NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 12

TECHNICAL AIR-TO-GROUND VOICE TRANSCRIPTION

Prepared for

Data Logistics Office
Test Division
Apollo Spacecraft Program Office

MANNED SPACECRAFT CENTER
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INTRODUCTION

This is the transcription of the technical air-to-ground (TAG) voice communications of the Apollo 12 mission. The primary communications net (GOSS net 1) will be in continuous operation for the duration of the mission. An alternate communications net (GOSS net 2) may be activated when a separate communications link with the lunar module is desired.

The transcript is divided into three columns—time, speaker, and text. The time column consists of four two-digit pairs for days, hours, minutes, and seconds (e.g., 04 22 45 12). The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.

The primary communications net (GOSS net 1) comprises the bulk of the transcript. However, when GOSS net 2 is activated, the communications on that net will be integrated with the GOSS net 1 communications. A heavy dark line alongside the time column will indicate GOSS net 2 communications.

A series of three dots (...) is used to designate those portions of the text that could not be transcribed because of garbling. A series of three asterisks (***) is used to designate those portions of the text that could not be transcribed because of clipping caused by the VOX mode. One dash (-) is used to indicate a speaker's pause or a self-interruption and subsequent completion of a thought. Two dashes (- -) are used to indicate an interruption by another speaker or the point at which a recording was abruptly terminated.

Speakers in the transcript may be identified as follows.

Spacecraft:

CDR	Commander	Charles Conrad, Jr.
CMP	Command module pilot	Richard F. Gordon, Jr.
LMP	Lunar module pilot	Alan L. Bean
SC	Unidentified crewmember	
MS	Multiple speakers	

Mission Control Centers:

CC	Capsule communicator (CAP COMM)
LCC	Launch Control Center
F	Flight director
S	Surgeon

Remote sites:

AB	Airboss (Recovery aircraft)
CT	Communications technician (COMM TECH)
HORNET	USS Hornet
R1, R2, etc.	Recovery helicopters

When the CDR and LMP are in the undocked lunar module or on the lunar surface, their speaker designations will be suffixed by either LM or EVA to indicate their status (e.g., CDR-EVA or LMP-LM). During this mission, the command module was designated Yankee Clipper and the lunar module was called Intrepid.

MILA (REV 1)

Day Hour Min Sec		
00 00 00 00	CDR	Lift-off. The clock's running.
00 00 00 05	CDR	I got a yaw program.
00 00 00 14	CDR	Roger. Clear the tower. I got a pitch and a roll program, and this baby's really going.
00 00 00 20	CC	Roger, Pete.
00 00 00 22	CDR	It's a lovely lift-off. It's not bad at all.
00 00 00 33	CDR	Roll's complete.
00 00 00 34	CC	Roger, Pete.
00 00 00 42	CC	MARK.
00 00 00 43	CC	One Bravo.
00 00 00 44	CDR	Roger. We ... on that.
00 00 01 00	LMP	... Got your GDC.
00 00 01 02	CDR	Okay, we just lost the platform, gang. I don't know what happened here; we had everything in the world drop out.
00 00 01 08	CC	Roger.
00 00 01 12	CDR	I got three fuel cell lights, an ac bus light; a fuel cell disconnect, ac bus overlcad 1 and 2, main bus A and B out.
00 00 01 36	CC	Apollo 12, Houston. Try SCE to auxiliary. Over.
00 00 01 41	CDR	NCE to auxiliary - -
00 00 01 43	CC	SCE, SCE to auxiliary.
00 00 01 57	CC	MARK.
00 00 01 58	CC	One Charlie.
00 00 02 00	CDR	One Charlie.
00 00 02 06	CC	Apollo 12, Houston. Go for staging.
00 00 02 10	CDR	... we had some really big glitch, gang.

00 00 02 16	CDR	Inboard engines.
00 00 02 19	CC	Apollo 12, Houston. Try to reset your fuel cells now.
00 00 02 48	CDR	Got a good S-II, gang.
00 00 02 50	CC	Roger. We copy, Pete. You're looking good.
00 00 02 53	CDR	Okay. Now we'll straighten out our problems here. I don't know what happened; I'm not sure we didn't get hit by lightning.
00 00 03 01	CC	Your thrust is looking good, Pete.
00 00 03 03	CDR	Okay. I have a good GDC, and Al has got the fuel cells back on, and we'll be working on our ac buses.
00 00 03 10	CC	Right, Pete. Your fuel cells look good down here.
00 00 03 17	CDR	Think we need to do a little more all-weather testing.
00 00 03 19	CC	Amen.
00 00 03 24	CDR	Did you notice the tower, gang, after we cleared? It looked good.
00 00 03 28	CC	Good show, Pete. You're in mode 2.
00 00 03 30	CDR	Roger. In mode 2. No sweat.
00 00 03 46	CDR	Okay. We've got an ISS light on, and we have a cycling CO_2 partial pressure high, which I don't - bother me particularly, and we have reset all the fuel cells. We have all the buses back on the line, and we'll just square up the platform when we get into orbit.
00 00 04 03	CC	Roger, Pete. That sounds good.
00 00 04 07	CDR	Hey, that's one of the better SIM's, believe me.
00 00 04 13	CC	We've had a couple of cardiac arrests down here, too, Pete.
00 00 04 16	CDR	There wasn't any time for that up here. We've got a good clock running here, and correct me,

I'm going to give you a mark at 4 plus 30. I've lost my event timer. And - -

00 00 04 30	CDR	MARK.
00 00 04 31	CDR	4 plus 30.
00 00 04 34	CC	Looks good, Pete.
00 00 04 36	CDR	Okay. We're all organized again, gang.
00 00 04 39	CMP	The only thing we've lost now is the ISS. That number 1 ball is just drifting all over the place, and we'll have to catch it later.
00 00 04 42	CC	Roger, Dick.
00 00 04 44	CMP	We'd like to have the G&C guys think about how we're going to get that thing, because it's just drifting, just floating.
00 00 04 49	CC	Okay. We're thinking.
00 00 05 06	CC	12, Houston. We won't be sending you an S-IVB to COI call.
00 00 05 10	CDR	Okay, understand. And can you give us the good words like let's get that DSKY - I mean the IMU calmed down. It's rolling all over the place.
00 00 05 20	CC	Okay, Pete. And if you do a mode 4, it'll be on the backup.
00 00 05 24	CDR	Yes, no sweat. I got a good SCS.
00 00 05 26	CC	Okay. Good show.
00 00 05 29	CDR	I got a little vibration of some kind - She's chugging along here, minding her own business, though.
00 00 05 36	CC	Okay, Pete.
00 00 05 52	CMP	Stand by for the gimbal motors, Houston at 06:00.
00 00 05 56	CC	Roger, 12.
00 00 06 06	CC	Apollo 12, Houston. Level sense arm, 8 plus 37; cutoff, 9 plus 11.
00 00 06 13	CDR	Okay. Here comes the gimbal motors.

00 00 06 38	CC	MARK.
00 00 06 39	CC	S-IVB to orbit.
00 00 06 41	CDR	S-IVB to orbit.
00 00 07 05	CC	Apollo 12, Houston. You're right smack dab on the trajectory; your IU is doing a beautiful job.
00 00 07 10	CDR	Okay. We're all chuckling up here over the lights. We all said there were so many on we couldn't read them.
00 00 07 29	CC	12, Houston. Give us OMNI Delta.
00 00 07 32	CDR	Roger. Going to OMNI Delta.
00 00 07 43	CDR	Center engine.
00 00 07 57	CC	Apollo 12, Houston. We can start getting that platform squared away. Go IMU power, STANDBY, and then back to ON, and we'll get her caged up.
00 00 08 17	CDR	We'll wait until we get through staging here, I think, Houston.
00 00 08 20	CC	Okay. Soon as you can reach it; that's the way to go.
00 00 08 25	CC	Apollo 12, Houston. GO for staging.
00 00 08 28	CDR	Roger. We are GO for staging.
00 00 08 36	CDR	Okay. You want the LMP to turn off the G&N power and then bring it back on, and you want me to use my IMU cage switch, is that right?
00 00 08 44	CC	Stand by on that, Pete.
00 00 09 19	CDR	Got a good S-IVB; nice smooth staging.
00 00 09 22	CC	Roger, Pete. Your thrust looks good.
00 00 09 24	CDR	Okay. Give us some more words on the IMU now.
00 00 09 41	CC	Stand by a minute, Pete. We're still talking.
00 00 09 43	CDR	Okay.
00 00 10 10	CC	MARK.

00 00 10 11	CC	Mode 4.
00 00 10 12	CDR	Roger. Mode 4.
00 00 10 52	CDR	Well, I'll tell you one thing. This is a first-class ride, Houston.
00 00 10 57	CC	Kind of a rough start.
00 00 11 00	CDR	Yes. I always like to start out behind the eight-ball and get ahead.
00 00 11 09	CC	12, Houston. Cutoff, 11 plus 35.
00 00 11 14	CDR	11 plus 35. Roger. Roger.
00 00 11 35	CDR	Shutdown. 11 plus 33, Houston.
00 00 11 37	CC	Roger, Pete.
00 00 12 16	CC	Apollo 12, Houston. Before you get down there to work on that switch, try pulling on panel 5, your IMU main A and main B breakers.
00 00 12 30	CMP	Okay. That did it. They're both out. Now what do you want us to do?
00 00 12 37	CC	Your S-IVB safe now. Stand by.
00 00 12 39	CDR	Okay.
00 00 12 41	CC	You've got a GO orbit. You're looking good.
00 00 13 25	CC	12, Houston. Your S-IVB is looking good. You are configured for orbit.
00 00 13 30	CDR	Roger, Houston.
00 00 13 37	CC	Roger, 12. Your orbit is 102.5 by 100.

VANGUARD (REV 1)

00 00 13 44	CDR	At least that didn't lose it.
00 00 13 55	CDR	Houston, be advised that I am resetting on the stabilization and control system logic bus A 3 dash 4 Baker, which was out, for some reason.

00 00 14 09	CC	Roger, Pete. We copy. Also on your IMU main A and B breakers, let's leave them out for at least 3 minutes.
00 00 14 17	CDR	Okay. And then what do you want us to do, reset them and then come up with a P51 when we get in the darkness?
00 00 14 23	CC	That looks like the right plan, Pete. We are still talking; we'll give you a final on it.
00 00 14 27	CDR	Okay. What do you all figure - I think we got hit by lightning.
00 00 14 44	CC	12, Houston. We are about 45 seconds from LOS; we'll pick you up Canaries about 16.
00 00 14 49	CDR	Roger. Roger.
00 00 15 17	CC	12, Houston. Can you go to P00?
00 00 15 20	CDR	Roger. We'll go to P00.
00 00 15 21	CC	Thank you.
00 00 15 25	CDR	We were going into P00 and P00. Now, can we reset the breakers?
00 00 15 32	CC	That's affirmative. Go ahead.

CANARY (REV 1)

00 00 16 29	CC	Apollo 12, Houston through Canaries. How do you read, babe?
00 00 16 45	CC	Apollo 12, Houston through Canaries. How do you read?
00 00 16 48	CDR	I read you loud and clear.
00 00 16 51	CC	Roger. You are pretty garbled.
00 00 16 54	CDR	Okay. How's that?
00 00 16 55	CC	Much better, Pete.
00 00 16 58	CDR	Alrighty. I've got a little note for you. I've got a lot of ice on the outside of my number 1

		window. I think there was a fair amount of water underneath the BPC that hasn't sublimated yet.
00 00 17 14	CC	Roger.
00 00 17 16	CDR	And we're working on the REG check, and we have the IMU breakers back in, and we're looking at a 000 on the IMU.
00 00 17 26	CC	Roger.
00 00 17 38	CC	Apollo 12, Houston. Over.
00 00 17 39	CDR	Go ahead.
00 00 17 41	CC	Roger. We've looked at your REFSMMAT; it's looking good, Pete. You can press with P51 and 2.
00 00 17 47	CDR	Okay.
00 00 19 37	CC	Apollo 12, Houston.
00 00 19 40	CDR	Go ahead, Houston.
00 00 19 42	CC	Roger. When you do your P51, you're going to wipe out your REFSMMAT. If you'll go P00 and ACCEPT, we've got 4 minutes left; we'd like to get you a new uplink of your REFSMMAT.
00 00 19 51	CDR	Okay. There's P00 and ACCEPT right there.
00 00 19 53	CC	Okay, Pete. It's on its way.
00 00 20 01	CC	Pete, your P52 should be in OPTION 1; just a reminder.
00 00 20 07	CDR	P52 should be in OPTION 1. Roger. You're going to give us a - the PAD REFSMMAT back, is that right?
00 00 20 13	CC	That's affirmative, Pete.
00 00 21 15	CC	12, Houston. The load's coming up now.
00 00 21 19	CDR	Okay. We're standing by. There's a helmet over here.

00 00 21 49	CDR	Houston, I may have screwed you up there. I hit the RESET button.
00 00 21 56	CC	No, it's okay, Pete. We're still going.
00 00 22 00	CDR	Okey-dokey.
00 00 22 24	CDR	Hey, Houston. The LMP is no longer a rookie, and you can tell SIM SUP he gave him a heck of a one to break in on. We're still laughing.
00 00 22 37	CC	Roger, Pete. We'll tell him. Pete, we're about due to lose you; LOS here. AOS at Carnarvon will be at 52:15, and we hope to have some word for you by then on what the plan is.
00 00 22 50	CDR	Okay. We got a - We'll try and have you a good platform by then.
00 00 22 55	CC	Computer's yours, 12.
00 00 23 03	CC	12, Houston. The computer's yours.
00 00 23 25	CC	Apollo 12, Houston. We'll see you at 52.
00 00 23 29	CDR	Roger. See you at 52, Houston.

CARNARVON (REV 1)

00 00 52 39	CDR	Hello, Houston. Do you read Apollo 12 through Carnarvon?
00 00 52 43	CC	Hello, Stormy. We're reading you loud and clear.
00 00 52 46	CDR	Roger. Read you the same. We just finished a P51 with a four balls 1 star angle difference. Dick just did a P52 on stars 14 and 15 with another star angle difference of 1. The torquing angles were plus 00755, plus 00941, minus 00366; the time 52 plus 29; and things are back to normal.

00 00 53 17	CC	Roger, Pete. We copy your data. Your torquing angles: plus 00755, plus 00941, minus 00366 at 52:29.
00 00 53 31	CDR	That's affirmative. And we're getting on with our TLI checks.
00 00 53 35	CC	Roger, Pete. Would you turn your tape recorder off and set your bit rate at HIGH. We don't have a command - computer at Carnarvon. So you'll have to do it for us.
00 00 53 45	CDR	Okay. We just got a PROGRAM ALARM 20430, whatever that is.
00 00 53 53	CC	Roger, Pete. We'll check it out. 12, Houston. Can you give us a VERB 96, ENTER, to stop your integration? And we'd like you to do an E-MOD dump. Give us a 3, 2, 1, mark when you do your VERB 74; and if we get it done now, we should have an answer for you on your erasable memory by the time you get to Guaymas.
00 00 54 12	CDR	Okay. VERB 74 coming at you. 1 - -
00 00 54 19	CC	Do a VERB 96 first.
00 00 54 42	CC	12, Houston. Your PROGRAM ALARM was an integration problem.
00 00 54 57	CDR	I saw some illumination out the window; I'd almost be positive that we got hit by lightning some place.
00 00 55 04	CC	Roger, Pete. I don't think we got all of that transmission.
00 00 55 09	CDR	Okay. I'm just saying - in thinking back to when we had our big glitch, I remember seeing it get light outside the window. We were in the clouds; I'm pretty sure we got hit by lightning.
00 00 55 21	CC	Roger. Copy. Pete, here's our plan. When you finish your E-MOD dump, then we want to get you up on Honeysuckle - and make sure, by the way, that you get your S-band volume up for Honeysuckle - We want to uplink you a state vector at Honeysuckle, and then the next dark pass, we want you to do a P52 OPTION 3. Over.

00 00 55 42	CDR	Okay. We'll do a P52 OPTION 3 on the next dark pass, and that'll give you a drift check. Is that right?
00 00 55 49	CC	That's affirmative, Pete. All the memory we can see so far looks okay, and we should have a real verdict for you at Guaymas after this E-MOD dump.
00 00 55 58	CDR	Okay.
00 00 56 13	CC	12, Houston.
00 00 56 16	CDR	Go ahead, Houston.
00 00 56 17	CC	We're going to be passing you up some data later on in your checklist, little pieces that you can take out and go through in order to exercise some of your electrical system to give us a chance to see how it all looks.
00 00 56 33	CDR	Okay. Of course, we - we're on the time line, and we've exercised fuel cell purges and things like that, and all that seems to be functioning okay.
00 00 56 45	CC	Okay, Pete. It looks down here like the reason for your IMU problem was strictly a power supply problem.
00 00 56 51	CDR	Yes. We understand that. The voltage on the main buses went down to 24 volts.
00 00 56 56	CC	Yes.
00 00 56 58	CDR	And when we got the fuel cells back on the line, then - all three fuel cells just flat fell off the line.
00 00 57 05	CC	Roger. Pete. We're going to lose you here in about 30 seconds; we'll pick you up on Honeysuckle, S-band only, at 59:33.
00 00 57 14	CDR	Okay. We got the - we got the S-band up for Honeysuckle and - I was wrong. We're completing the fuel cell purges at this time; you can see some MASTER ALARMS.
00 00 57 23	CC	Roger.
00 00 57 31	CC	12, Houston. We got your E-MOD dump.

00 00 57 34	CDR	Roger.
00 00 57 36	CC	Pete, when you hit Honeysuckle, give us POO and ACCEPT.
00 00 57 40	CDR	Roger.
		HONEYSUCKLE (REV 1)
00 01 00 54	CC	Apollo 12, Houston through Honeysuckle. How do you read?
00 01 00 58	CDR	Hello, Houston. Read you loud and clear on the S-band. The computer is POO and ACCEPT, and I see another PROGRAM ALARM. I guess it went back into POO again.
00 01 01 06	CC	Roger, Pete.
00 01 01 09	CDR	He just gave it a VERB 96; let me look at the alarm. Yes, it's 20430 again. I just - you're in POO and ACCEPT right now, and you can go ahead and take it.
00 01 01 20	CC	Roger, Pete. We got it.
00 01 01 22	CDR	Okay. I had just recalled POO, and I started integration again. My fault.
00 01 02 12	CC	12, Houston. After we get the state vector up, we'll give you your 66 and your 45.
00 01 02 23	CDR	Roger-Roger.
00 01 03 10	CDR	Houston, 12.
00 01 03 12	CC	12, Houston. Go.
00 01 03 14	CDR	We had a normal docking-probe extension.
00 01 03 18	CC	Roger.
00 01 03 51	CC	Apollo 12, Houston. We're about 20 seconds from LOS on Honeysuckle. You're going to have to put your bit rate back down to LOW and tape recorder to FORWARD, and we'll be picking you up on Guaymas at 01:20, correction 01:28:21.
00 01 04 08	CDR	01:28:21. Roger-Roger. And is the computer mine?

00 01 04 13	CC	Roger. The computer is yours.

GUAYMAS (REV 1)

00 01 28 48	CC	Apollo 12, Houston. How do you read?
00 01 28 51	CDR	Loud and clear. How me?
00 01 28 52	CC	Roger. Read you loud and clear. We've got a few words for you if you'll stand by for a minute.
00 01 28 55	CDR	Okay. I imagine you have.
00 01 29 48	CDR	Are you guys going to be ready for the service module RCS hot fire down there, Houston?
00 01 29 53	CC	We sure will, Pete. Break. We've got some words for you now. Your E-MOD dump is still in work. We'll have some answers for you shortly on that. Got a couple of tests we'd like you to run while you're here over the States. Are you ready to copy?

END OF TAPE

00 01 30 25	CC	Apollo 12, Houston. Are you ready to copy?
00 01 30 27	CDR	Yes. We're ready to copy. Fire away.
00 01 30 30	CC	Okay. First thing we'd like to have you do, Pete, is a CMC self-check. Go into your operations checklist at page Foxtrot 2-2 and run that little dude, which is a four-stepper, and on step number 3, do a VERB 21 NOUN 27 ENTER, and then do a 10 ENTER rather than a 4 or a 5 ENTER. Over.
00 01 31 02	CDR	A CMC self-check on page F-20 - 2-2; step 3, VERB 21, NOUN 27, and do a 10 ENTER.
00 01 31 10	CC	That's affirmative, Pete, and when you finish that one, then we thought we ought to take a look at MTVC check. And your best bet for that is to follow your checklist, page Foxtrot 5-3, and begin where it says "TVC check and PREP."
00 01 31 33	CDR	Okay. We just decided that was a good idea ourselves.
00 01 31 37	CC	Okay. And then go through that until you get to page 5-4 and terminate your test at "ROT CONTROL POWER NORM, two, ac/dc." Over.
00 01 31 56	CDR	Okay. Copy.
00 01 31 57	CC	Okay. And then, to turn your motors off and clean it up, you want to skip to Foxtrot 5-6; and, on step number 18 there, go down to gimbal motors, four, OFF, and finish off the checklist there.
00 01 32 19	CDR	Okay. We copied that, and it's all in work right now. While they're getting those books out and getting ready to do that, let me give you the service module RCS hot fire; and just - Let me ask you a question, Jerry. The service module thrusters wouldn't show up with water and, even if they did, it would be long gone; and I've still got a big block of ice sitting outside my window here, so I hope they all fire right.
00 01 32 43	CC	So do we, Pete.
00 01 32 51	CC	Pete, I also have a TLI plus 90 maneuver PAD. Whenever you're ready to copy, give me a holler.
00 01 33 23	CC	Apollo 12, Houston.

00 01 33 34	CC	Apollo 12, Houston.
00 01 33 44	CDR	Okay. Houston, you ready for the fire down there?
00 01 33 48	CC	Roger, 12. Also, your VERB 96 flag is still set. If you will reselect POO, we can reset that dude.
00 01 33 58	CDR	Okay. We're coming at you with the hot fire.
00 01 34 01	CC	Roger. Standing by.
00 01 34 27	CDR	I don't think they're firing, Houston.
00 01 34 38	CC	Apollo 12, Apollo 12, Houston. We saw all the events on telemetry. Over.
00 01 34 44	CDR	You say they're firing? We didn't hear a thing.
00 01 34 52	CC	Apollo 12, Apollo 12, Houston. Affirmative. We saw the events go; but, of course, we didn't hear anything either.
00 01 35 03	CDR	Are you telling me they fired?
00 01 35 09	CC	Apollo 12, Apollo 12, Houston. Best try it again, Pete. We have no telemetry on your TCP's. All we have is the electrical indication.
00 01 35 53	CDR	Okay. That worked out pretty good.
00 01 35 56	CC	Apollo 12, Apollo 12, Houston. Roger. We saw your manifold pressures change a little bit, so it does look like they fired. Also, Neil's here, and he says he didn't hear his go on MIN IMPULSE either.
00 01 36 07	CDR	Okay. But we can see them firing. We're getting some flashes now.
00 01 36 12	CC	Roger.
00 01 36 22	CC	Apollo 12, Apollo 12, Houston. Are you ready for the TLI plus 90 PAD?
00 01 36 32	CDR	Roger. Ready to copy. Go ahead.
00 01 36 39	CC	Apollo 12, Houston. TLI plus 90 PAD follows. SPS G&N: NOUN 47 is 6357.3; NOUN 48, minus 1.55, plus 1.29; NOUN 33, 004:16:35.77; NOUN 81, minus 0438.1, plus 0000.1, plus 5046.7. Roll, pitch, and yaw is 179, 182, 359. NOUN 44 is NA. The DELTA-V_T: 5065.6, 6:16, 5043.9. Sextant,

12, 078.2, 24.1; boresight, 021; up, 09.1; right, 3.3. NOUN 61, plus 03.50, minus 027.81. EMS, 1142.4, 34409. GET of 0.05g is 016:46:09. The ullage is none - negative. You are undocked. P37 for lift-off plus 8. GET is 008:00, 6243, plus 166, 025.43. Over.

00 01 39 43	CDR	Houston, we're doing a self-check on the CMC, and we'll soon complete that; and our 2 is 4, our 3 is 2. Can we terminate that NOUN? Do you need a NOUN 8?
00 01 40 09	CDR	Houston, 12. Over.
00 01 40 11	CC	Roger, 12. Houston. Stand by on that a sec.
00 01 40 15	CDR	Okay, Houston. And while you're at it, I would like to bring on the SECS logics for you to get a GO for PYRO ARM, please, sir.
00 01 40 24	CC	Roger. You're GO.
00 01 40 30	CDR	And SECS logics 1 and 2 are up and on.
00 01 40 34	CC	Roger, Pete. And you don't need a NOUN 8; just terminate VERB 27, NOUN - correction, VERB 21, NOUN 27 ENTER, zero ENTER.
00 01 40 44	LMP	Are you ready for a readback, Houston?
00 01 40 47	CC	Roger. Go ahead.
00 01 40 49	LMP	Roger. SPS G&N: 6357.3, minus 1.55, plus 1.29, 004:16:35.77, minus 0438.1, plus 0000.1, plus 5046.7, 179, 182, 359; NA, NA; 5065.6, 6:16, 5043.9, 12, 078.2, 24.1, 021, up 09.1, right 3.3, plus 03.50, minus 027.81, 1142.4, 34409; 0.05g is 016:46:09; no ullage; undocked; 008:00, 6243, plus 166, 025.43. Over.
00 01 42 00	CC	Apollo 12, Houston. We sent you a wrong one on the P37 for lift-off plus 8. Your longitude should be minus 166 rather than plus.
00 01 42 14	LMP	Roger. Copied minus 166 on the longitude.
00 01 42 18	CC	Roger, 12. And if you'll give us POO and ACCEPT, we'll run your state vector up.
00 01 42 27	CMP	Okay. You got it, Houston.
00 01 42 29	CC	Roger.

00 01 42 36	CMP	Houston, this is 12. We're going to run through this gimbal check if you want to look at it right now.
00 01 42 42	CC	12, Houston. Let us get the state vector in first.
00 01 42 45	CMP	Okay. You want us to wait for you?
00 01 42 47	CDR	All right, we'll hold it, Houston.
00 01 42 49	CC	Okay, thanks.
00 01 43 09	CC	Apollo 12, Houston. You can run that TVC check.
00 01 43 39	CC	Apollo 12, Houston. Did you read my last?
00 01 43 43	CDR	No. What was that?
00 01 43 48	CC	You're GO on the MTVC check.
00 01 43 51	MS	...
00 01 43 52	CDR	We're in process right now.
00 01 43 53	CC	Okay.
00 01 43 54	CDR	Here come your gimbal motors, Houston.
00 01 45 20	CC	Apollo 12, Houston. The computer's yours.
00 01 45 25	CDR	Roger.
00 01 45 35	CC	Apollo 12, Houston. We've checked your E-MOD; it's GO.
00 01 45 41	CDR	Okay. The gimbal motor check looked pretty good; we're coming back to ac/dc, and going over to step 18 on F5-6.
00 01 45 51	CC	Roger, Pete. I've got your TL1 PAD, if you're ready to copy.
00 01 45 57	CDR	Hey, just - let's - Let us get the gimbal motors off.
00 01 46 36	CDR	Okay. The bus ties are off, Houston, and we are ready to copy the TLI PAD.
00 01 46 41	CC	Roger, Pete. We're about 2 minutes from LOS, so I'm going to copy - or read up the TLI PAD, and you can read it back when we get to AOS at

Canaries. TLI PAD follows. Time base 6, 2:37:43; TLI, 179, 059, 001; burn time, 5:44, 1051.54, 35420; separation attitude, 356, 092, 332; extraction, 300, 272, 028. Over.

00 01 47 56 CDR Okay. You want me to read it to you? It's 2:37:43, 179, 059, 001; burn time is 5 plus 44, 1051.54, 35420 356, 092, 332, 300, 272, 028.

00 01 48 22 CC Roger, Pete. Your readback's correct. You're about 1 minute from LOS, and you're GO for PYRO ARM.

00 01 48 29 CDR Roger. Understand. GO for PYRO ARM, and we're waiting for those golden words "GO for TLI."

00 01 48 36 CC Roger. We'll give them to you at Carnarvon. You can expect to pick up the Canaries at 01:50:11

00 01 48 45 CDR Roger.

CANARY (REV 2)

00 01 50 46 CC Apollo 12, Houston through Canaries. How do you read?

00 01 50 49 CDR Loud and clear.

00 01 50 51 CC Roger. Your PIPA BIAS and IRIG drift down here look real good based on the data that we have right now. Also, the - your theory and your idea that it was probably lightning that did it, that looks like about the best - best theory right now. With that in mind, the sequence of events is real explainable. We've got a pretty good idea why it happened. Everything is looking good here, and we see no reason why you can't just press.

00 01 51 23 CDR We concur. I guess the other thing that we were thinking about, maybe not lightning so much, as just unstable air. We were a pretty big piece of static electricity "buildering-upper" going through there. We might have just discharged ourselves.

00 01 51 41 CC Pete, that - That's exactly the theory that people are thinking here.

00 01 51 46	CDR	Yes. We sort of glowed all over there when all the lights came on, I think. I just - I'm still trying to search my memory because, of course, when all the lights came on I kept my attention in the cockpit.
00 01 52 08	CC	Pete, Dave wants to know why you're not watching what's going on outside.
00 01 52 14	CDR	I - I had a pair of eyeballs that were moving pretty fast about then, in and out.
00 01 52 22	CC	You had your scan in high bit rate, huh?
00 01 52 27	CDR	You better believe it.
00 01 52 36	CMP	Jerry, you could have come over and said that booster was right down the pike a little faster, boy.
00 01 52 43	CC	I wasn't sure soon enough.
00 01 52 46	CDR	Yes, you said it; he didn't hear it.
00 01 54 33	CC	Apollo 12, Houston. We're 1 minute from LOS. We'll be looking for you at Carnarvon 2 minutes late. It'll be 1 - correction 02:25:27.
00 01 54 48	CDR	Roger. And we're - As soon as we get into darkness, we'll give you the other P52, sir.
00 01 54 53	CC	Roger. Don't forget OPTION 3, Pete.
00 01 54 58	CDR	Roger - Roger. OPTION 3.
00 01 55 30	CC	So long, 12.
00 01 55 34	CDR	... Carnarvon.
		CARNARVON (REV 2)
00 02 24 48	CDR	Hello, Houston. Apollo 12 over Carnarvon.
00 02 24 52	CC	Apollo 12, Houston. Loud and clear.
00 02 24 56	CDR	...?
00 02 24 57	CC	Roger. Would you do some more work for us? Tape recorder OFF and HIGH BIT RATE.

00 02 25 01	CDR	Tape recorder OFF; HIGH BIT RATE. We used star 01 star 45. Mr. Gordon is getting better. He had five balls, and we have a minus 0001.4 minus 0002. and a plus 0001.8. And the time is 2 plus 20 plus 20 - And we had the O_2 HIGH FLOW light come ON, as advertised, at about 2 plus 21.
00 02 25 33	CMP	That time on that torquing was 2 hours 00 minutes 20 seconds.
00 02 25 37	CDR	Yes, and excuse me. Got that one wrong.
00 02 25 41	CMP	And Houston, if you're not going to use the computer, I'd like to go ahead and put in the time base 6 program that we have in our erasable, just to watch it.
00 02 25 49	CC	Roger. The computer's all yours, and we copy your torquing angles: minus 0001.4, minus 0002.8, plus 0001.8. Done at 2 plus 00 plus 20, and copy your O_2 high.
00 02 28 15	CC	Apollo 12, Houston. The good word is you're GO for TLI.
00 02 28 20	CDR	Hoop-ee-doo! We're ready! We didn't expect anything else.
00 02 28 29	CC	We didn't train for anything else, Pete.
00 02 28 32	CDR	You better believe it.
00 02 28 37	CMP	I'll tell you, Jer, we were just wondering if we'd trained for that launch, either.
00 02 31 15	CC	Apollo 12, Houston.
00 02 31 17	CDR	Go, Houston.
00 02 31 19	CC	Roger. We're going to be getting LOS shortly here now; you're going to have to go back to LOW BIT RATE and put your tape recorder FORWARD. We got our old buddies ARIA Bravo and ARIA Alfa waiting for you, and you'll be getting them at 02:44:11, and they'll cover you for 6 minutes until we get Hawaii, and Hawaii AOS is 2 plus 50 plus 22.
00 02 31 46	CDR	2 plus 50 plus 22. And that's during the burn, right?

00 02 31 50	CC	Roger.
00 02 31 52	CDR	Okey-dokey.

ARIA (REV 2)

00 02 43 26	CC	Apollo 12, Houston through ARIA Bravo. How do you read?
00 02 43 32	CDR	... Apollo 12. How do you read, Houston?
00 02 43 35	CC	Read you loud and clear, Pete.
00 02 43 55	CC	Apollo 12, Houston through ARIA. Over.
00 02 44 30	CC	Apollo 12, Houston through ARIA. Over.
00 02 45 16	CC	Apollo 12, Houston through ARIA. How do you read?
00 02 45 22	CDR	Don't read you too well, Houston. How do you read us?
00 02 45 24	CC	Roger. I've got you now, Pete. You're kind of broken, though.

HAWAII (REV 2)

00 02 50 33	CC	Apollo 12, Houston through Hawaii. How do you read?
00 02 50 38	CDR	...
00 02 50 54	CC	Apollo 12, Houston in the blind. Your trajectory and the S-IV both look good.
00 02 50 59	CDR	Roger. They look good here.
00 02 51 00	CC	Roger. We're reading you weak but clear now, Pete.
00 02 51 03	CDR	Okay. Everything's sticky-poo.
00 02 51 06	CC	Good show.
00 02 51 59	CDR	And Houston, 4 plus 30, everything's GO in here.

NOTE

Subsequent to TLI, there is continuous acquisition among Goldstone (GDS), Madrid (MAD), and Honeysuckle (HSK).

00 02 52 03	CC	Roger, Pete. Your cutoff looks nominal.
00 02 52 06	CDR	Looks good here.
00 02 52 16	CC	You're right smack on the line, Pete.
00 02 52 18	CDR	Okay, sir.
00 02 53 09	CDR	Okay, we have shutdown. The EMS reads plus 10.2; the DSKY reads 35413, plus 05003, plus 01917.
00 02 53 26	CC	Roger, Pete. Copy 10.2 on your EMS. DSKY is 35413, plus 05003, and plus 01917.
00 02 53 39	CDR	Roger.
00 02 55 22	CC	Apollo 12, Houston.
00 02 55 24	CDR	Go ahead, Houston.
00 02 55 26	CC	Roger. Would you give us IU UPTEL to ACCEPT? We want to close down a valve on your - lox valve on your O_2 H_2 burner.
00 02 55 34	CDR	Okay. It's in ACCEPT.
00 02 56 16	CC	Apollo 12, Houston. You can go back to BLOCK; we've got your valve closed.
00 02 56 20	CDR	Okay.
00 02 56 24	CC	And we're talking at you through Goldstone.
00 02 56 27	CDR	Roger.
00 02 56 57	CC	Apollo 12, Houston. Your cutoff looked real good. We'll spend a little time now evaluating your midcourse for you.
00 02 57 05	LMP	Okay. Earth is starting to get nice and round now; can't see it all, but we can see a lot of it.
00 02 57 14	CC	Roger.

00 02 58 00	CC	Apollo 12, Houston. Your attitude maneuver time is 03:08:04, and it'll be finished at 03 plus 12 plus 04; and we're looking at a separation time of 03 plus 18 plus 04.
00 02 58 19	CDR	Copy.

END OF TAPE

00 03 12 27	CC	Apollo 12, Houston. Give us OMNI Charlie, please.
00 03 13 34	CDR	Hello, Houston; Apollo 12. We're on the time line. We'll be sep at 03:18.
00 03 13 41	CC	Roger, Pete. How's the ice situation on your windows now?
00 03 13 44	CDR	We've got cr - awful bad windows. It's a shame because it's all the water that was on them and it looks like it'll be with us for the flight.
00 03 13 53	CC	Bad news, Pete.
00 03 13 55	CDR	'Sokay. Can't win them all. Maybe I'll get out and clean them later.
00 03 15 14	CDR	Houston, pyro armed.
00 03 15 18	CC	Roger, 12.
00 03 18 19	CC	We copy SLA SEP, Pete.
00 03 18 21	CDR	Okay, we seped.
00 03 19 53	LMP	We can see the whole United States, Houston.
00 03 19 58	CC	Roger. Give us OMNI Bravo, please.
00 03 20 25	CDR	I got an awful pretty looking Intrepid sitting out the window here, gang. We'll go get her.
00 03 20 31	CC	Roger.
00 03 21 26	CC	Apollo 12, Houston. You're GO for docking.
00 03 21 31	CDR	Roger, Houston.
00 03 23 12	CC	Apollo 12, Houston. We are configured for television early if you want to punch it up.
00 03 23 17	CDR	Okay. We're punching it up right now.
00 03 23 20	CC	Good show.
00 03 24 01	CDR	How does it look down there, Houston?
00 03 24 05	CC	Nothing yet, Pete.
00 03 24 33	CDR	How does that look to you, Houston?

00 03 24 39	CC	Still nothing, 12. Okay, stand by. I think we got it coming.
00 03 24 57	CC	12, Houston. We've got the TV now. Looks very good.
00 03 25 09	CC	Hello there, Intrepid.
00 03 25 26	CC	12, Houston. Black and white is spectacular, and the color is really pretty good, too.
00 03 25 44	CC	Apollo 12, Houston. The camera is cutting off about half of Intrepid now.
00 03 25 51	CDR	That's the best we could do. We're rignt next to it - -
00 03 25 53	CC	Roger.
00 03 25 54	CDR	- - about 5 feet.
00 03 26 18	LMP	You're looking right in the LM overhead window right now. We're getting closer.
00 03 26 24	CC	Roger, Al. And the color is really great now.
00 03 26 32	LMP	This Dick Gordon's smooth as silk.
00 03 26 45	CC	I think we just saw you grab it.
00 03 26 49	LMP	We're on the way in right now.
00 03 26 58	CDR	We got a hard dock, Houston. She looks good. Both barber - I mean, both A and B are gray. All latches made.
00 03 27 06	CC	Roger, Pete. Looks good.
00 03 28 05	CC	12, Houston. What was that just floated past the window?
00 03 28 12	LMP	I don't really know, Houston. We were in here doing the checklist.
00 03 28 18	CC	We're seeing some little white flecks - floating past the window.
00 03 28 22	LMP	We've got a - We're in a great big cloud of ice balls up here. They're just all over everywhere, and there is a lot of stuff floating up out of the S-IVB itself that looks like ice or white paint chips, one of the two.

00 03 28 35	CC	Roger. We can even see it here.
00 03 28 39	LMP	How does the zoom took - look to you, Houston? Want that changed any?
00 03 28 46	CC	It looks like it is in good position right now.
00 03 28 48	LMP	Just a second and we'll slide the camera over to the other side and give you a good Earth view.
00 03 29 27	CC	Apollo 12, Houston. If you're going to leave the camera there for a few minutes more, try an f:11 stop.
00 03 29 35	LMP	That's where we are now, Houston.
00 03 29 37	CC	Roger.
00 03 29 41	LMP	I'll try a little more for you.
00 03 29 52	CC	That is perfect. We can see the scribe marks on the window now, on the colored TV.
00 03 29 59	LMP	Roger.
00 03 30 03	CC	We can see the red windowsill; the ridge around the window.
00 03 30 08	LMP	Okay, we're going to move the camera now.
00 03 30 11	CC	Roger.
00 03 31 38	CC	12, Houston. We're picking up your Earth shots now. It's still moving a little bit.
00 03 31 43	CMP	Roger. We'll work on it.
00 03 32 08	CC	12, Houston. We've got a real good view now.
00 03 32 41	CC	Apollo 12, Houston. Were the LM docking lights on?
00 03 32 48	CMP	This is 12. I didn't notice whether they were or or not, I had my - had my eyes glued to the docking target.
00 03 32 56	CC	Roger.
00 03 33 06	CMP	Hey, Jer - This is Dick. How much fuel did I waste during that docking?

00 03 33 11	CC	Hang tight, Dick. We'll check.
00 03 33 24	CC	12, Houston. You're nominal; used 70 pounds.
00 03 33 31	CMP	That's too much; that's too much.
00 03 33 55	CC	Apollo 12, Houston. We're having a little trouble recognizing things here. How about giving us a little travelog?
00 03 34 01	CMP	Well, that's the Earth you're looking at, friend.
00 03 34 04	CC	Oh, I thought it was the Moon.
00 03 34 07	CMP	Charlie is not working again, is he?
00 03 34 09	CC	No, we've got him locked in a closet.
00 03 34 12	CMP	Okay. You should be looking at the Yucatan Peninsula, Mexico; Baja California is in plain sight. It's a pretty nice day down there. The Gulf - The western Gulf of Mexico has a cloud coverage along the coast; looks like it's almost up to Houston. It's south and west of it.
00 03 34 32	CC	Roger.
00 03 34 33	CMP	It looks like that garbage we came through down at the Cape is off the coast at this time.
00 03 34 41	CC	See, you could have waited and missed it, Dick.
00 03 34 43	CMP	Oh, I wouldn't have missed that for the world.
00 03 35 13	CC	12, Houston. Have you got your lens zoomed?
00 03 35 18	CMP	That's affirm.
00 03 35 20	CC	Okay. Why don't you try it backing off on it, and let us see a little bit more now?
00 03 35 51	CC	Looks like you zoomed it in closer rather than back that time.
00 03 36 34	CC	Okay, 12. Now we can see the Earth is indeed round.
00 03 36 43	CMP	Hey, Jer, it's a fantastic sight. The Mississippi Valley has a little bit of cloud coverage coming down from Canada, and there's some in the north - northeast part of the country, up in the New England States. Looks like they may be getting

some snow over here in the next day or two. Florida is cut in half by that front that went through this morning. The West Coast looks absolutely gorgeous; Baja California is clear, looks like the San Diego/Los Angeles area to the south and west of them is a little cloud coverage covered. I won't say anything about smog.

00 03 37 21	CC	Roger. You see any more dry fronts anywhere?
00 03 37 24	CMP	Hey, that was one of the driest ones I've seen in a long time; I hope I never see another one like it. As I look up north, there's nothing but clouds up there.
00 03 37 51	CDR	Hey, Houston, they got the CDR buried in the tunnel working while they're gawking.
00 03 37 58	CC	Roger.
00 03 39 02	CC	Apollo 12, Houston. Now with your zoomer, how about sliding in about halfway between where you are now and where you were before?
00 03 39 16	LMP	Okey-doke. Funny; we see the Moon out the right window here, window number 5; looks like about one quarter. We see the Earth out the left window.
00 03 39 27	CC	Roger.
00 03 39 43	CC	That's good right there.
00 03 40 02	CMP	Hey, Jer, I'm going to take the camera out of that left window out the Earth. I got to get to work and get this thing pressurized.
00 03 40 07	CC	Okay, Dick.
00 03 41 32	CC	Apollo 12, Houston.
00 03 41 35	LMP	Go ahead, Houston.
00 03 41 37	CC	Roger. Your signal strength looks a little low. Are you on the high gain?
00 03 41 43	LMP	That's affirm.
00 03 41 54	LMP	That any better, Houston?
00 03 42 02	CC	Roger. Looks good, Al. Looks like the signal strength bumped up pretty well.

00 03 42 26	CC	Apollo 12, Houston. What are your plans for the TV now?
00 03 42 29	LMP	We'll get with you in just a few minutes. We're repressing the LM right now.
00 03 42 33	CC	Okay.
00 03 48 46	CC	Apollo 12, Houston. We can see a handrail there now.
00 03 48 50	CMP	Roger. We're back at the LM window. We thought you were probably tired of looking at yourself.
00 03 49 01	CC	Roger. Still a little bit of that white stuff floating up, isn't there?
00 03 49 04	CMP	Yes, there's quite a bit of it still - still around us.
00 03 50 54	CMP	Okay. We're getting the hatch out now, Houston.
00 03 50 58	CC	Roger, 12.
00 03 51 03	CMP	We'll go on VOX and it's yours.
00 03 51 06	CMP	Houston, this is 12 on VOX.
00 03 51 11	CC	Roger, 12. We're reading you loud and clear on VOX.
00 03 51 14	CMP	Okay. I've got Pete working up in the tunnel. We've got the hatch - hatch is coming down between us.
00 03 51 21	CDR	Hooked on something for some reason here.
00 03 51 23	CMP	On this - hose over here.
00 03 51 26	CDR	Right.
00 03 51 27	CMP	Just a minute. Here you come.
00 03 51 32	CDR	And Houston, I do notice a sort of funny smell people have commented on. It's nothing to*** nervous, now that we expected it, but - -
00 03 51 43	LMP	Watch your hand controller.

***Voices clipped by VOX mode.

00 03 51 45	CDR	- - funny smell to it.
00 03 51 49	LMP	How do the latches look, Pete?
00 03 51 51	CDR	Just a minute. My VOX keeps breaking.
00 03 51 54	CC	That's affirmative, Pete. You're chopping on the VOX.
00 03 51 57	CDR	Yes. How's that now?
00 03 51 58	CC	Sounds pretty good now. Keep talking.
00 03 52 00	CDR	Okay. I'm going up in the tunnel at this time.
00 03 52 04	LMP	What did you put it on, about 7 on the VOX?
00 03 52 06	CDR	And I don't see any bad latches so far. Looks like everything banged home.
00 03 52 11	LMP	Are they all parallel?
00 03 52 13	CDR	All parallel. Let me check them all. Just a minute.
00 03 52 16	LMP	Hello, there - -
00 03 52 17	CMP	Hey, Houston, that was a real good ripple fire when they went home.
00 03 52 21	CC	Roger.
00 03 52 23	CDR	- - those - That's all good. Whee, the docking probe is hot. Oops, there's a latch that's not made, and now it is. Just the handle.
00 03 52 34	LMP	Just bang the handle home.
00 03 52 36	CDR	Just the handle, huh?
00 03 52 37	LMP	That's it.
00 03 52 38	CDR	Okay.
00 03 52 39	LMP	Now go around 1 to 12 and check them all.
00 03 52 40	CDR	Okay. Well, let's go hook up some warm-up umbilicals. Let me do a 360 up here.
00 03 52 45	CMP	Don't lose him up through the - -
00 03 52 47	CDR	No, sir.

00 03 52 48	CMP	- - probe, just - -
00 03 52 49	CC	Hey, 12; Houston.
00 03 52 50	CDR	Go.
00 03 52 51	CC	How about stopping the camera down? There is a light spot we're kind of worried about.
00 03 52 56	CDR	Yes, that was here the last flight.
00 03 52 59	LMP	... Pete, they mean in the LM. We can take it out of the window if you like or turn it off, Houston. Verify extend latched engaged indicator red not VIS.
00 03 53 12	CDR	Ho, ho, ho; there's one umbilical all hooked up.
00 03 53 15	CC	Apollo 12, Houston. You can go ahead and turn it off if you want to.
00 03 53 22	CDR	Roger.
00 03 53 24	CMP	Look - look up there. Al Bean's reading something to you; I don't know what the hell he's reading - don't know what he's reading right now.
00 03 53 28	CDR	What's you reading, Al?
00 03 53 31	LMP	Okay. You've ... and ... - -
00 03 53 34	CMP	Al?
00 03 53 35	LMP	- - ... second. Great.
00 03 53 38	CMP	You - to talk to me, you're going to have to reset your VOX up a little - you're breaking up.
00 03 53 40	CDR	Here, let me try something, Al.
00 03 53 42	LMP	Okay.
00 03 53 44	CMP	You got to put it up to about 7 or 8.
00 03 53 46	LMP	Got to hold on to this hatch.
00 03 53 47	CMP	Okay, good boy, hang onto the hatch.
00 03 53 48	LMP	All right. Now, let me go after the other umbilical.

00 03 53 51	CDR	I thought you were hanging on to the hatch?
00 03 53 53	LMP	I got it.
00 03 53 54	CDR	Are you talking to me?
00 03 53 55	LMP	Now, unhook the other umbilical and we'll be all set.
00 03 53 57	CDR	Just a minute -
00 03 53 59	LMP	Can you turn on the tunnel lights? You got enough ...?
00 03 54 02	CDR	Got lots of umbilical here. Oh boy, this is so much nicer than one-g practice. I can't believe it. (Laughter)
00 03 54 12	MS	(Laughter)
00 03 54 24	CDR	Okay, now that looks like two umbilicals all connected to me. And let me smoke over these latches one more time here. I want to check the top of each one of the springs - they're all good - -
00 03 54 39	LMP	Okay.
00 03 54 41	CDR	There's one - one latch, number 11, is a half cock - I mean a half load. Did you read that, Houston?
00 03 54 47	CC	Roger, Pete. We read it.
00 03 54 49	CDR	Latch number 9 is a half.
00 03 54 51	CC	Number 9.
00 03 54 54	CDR	Latch No. 7's a half.
00 03 54 56	CC	Roger.
00 03 55 00	LMP	Nothing wrong with that, I guess.
00 03 55 01	CDR	So - all the rest of them are full. I guess before we put the hatch back up there, Dick, we want to get on the LM power?
00 03 55 09	CMP	Yes, we do, go to ...
00 03 55 11	CDR	It's on 4-D, I'll reset it, Dick -

00 03 55 13	CMP	Okay, and I'm going to CSM.
00 03 55 15	CDR	Okay.
00 03 55 16	CMP	And it should read a half to 3 2, ... where we are, CSM.
00 03 55 19	CDR	We got power on the CSM, not very much. I mean on the LM.
00 03 55 23	CMP	That should go half a volt to 3.2.
00 03 55 25	CDR	Okay, it's reading a half - -
00 03 55 26	LMP	...
00 03 55 27	CDR	- - Three and four tenths.
00 03 55 30	CDR	Okay, Houston, you looking at that on your telemetry; does that look like we've got everything hooked up?
00 03 55 35	CC	Looks good, Pete.
00 03 55 37	CDR	Okay.
00 03 55 38	CMP	There it goes up to 3 volts - -
00 03 55 39	CDR	Okay.
00 03 55 40	CMP	- - Just cycled.
00 03 55 41	CDR	Just cycled, huh?
00 03 55 42	CMP	Just hit a cycle on it.
00 03 55 43	CDR	Very good.
00 03 55 44	CMP	And dropped to 1.4.
00 03 55 46	CDR	Okay, now - -
00 03 55 47	CMP	It looks to me like we can put the hatch back in.
00 03 55 49	CDR	- - Hand me the old friendly hatch; I'll stick her back up in there.
00 03 55 54	CMP	Okay. Let's - - let's miss those hoses this trip; I think it'd make it a little easier for us.
00 03 55 57	LMP	Also, these switches would be nice to miss too.

00 03 55 59	CDR	All right, wait a minute. I'm not in a very good position for you to hand me the hatch yet. Wait - let me just - -
00 03 56 03	CMP	Remember that we are in VOX.
00 03 56 06	CDR	Yes. Okay. Now, I want to get it right; the arrow is in the wrong direction. Rotate my way, gang, until you see an arrow, and then I'll - I'll go on up in here, and - -
00 03 56 17	CMP	Which color of arrow do you want? There's yellows and reds.
00 03 56 19	CDR	Well - The yellow.
00 03 56 20	CMP	The yellow's over right at me.
00 03 56 21	CDR	All right, now, wait a minute. Let me just cock her around here. Now, there's a hose over on your side that's holding it, Dick. Can you get that clear, and I'll go right up into the tunnel with it.
00 03 56 31	CMP	Well, you ought to go up in the tunnel first, like this and then turn it.
00 03 56 33	CDR	All right. I'm in here - I'm in here.
00 03 56 36	CMP	Now, turn it; there you have it.
00 03 56 37	CDR	All right. Now, where's my yellow arrow?
00 03 56 38	CMP	There's your red one right here.
00 03 56 40	CDR	Yes. All right, just a minute. Ho Ho - Ho, there we go.
00 03 56 46	LMP	How you doing with that?
00 03 57 00	CDR	The first thing I've got to do here, wait a minute. Unlatch - the latch - -
00 03 57 05	CMP	Yes.
00 03 57 06	CDR	- - not unlatch.
00 03 57 07	CMP	... know, just a second.
00 03 57 09	CDR	I think everything's in place here, wait a minute .

00 03 57 11	CMP	Now, be sure and rotate it more; you're not lined up.
00 03 57 14	CDR	All right.
00 03 57 15	CMP	Keep rotating it.
00 03 57 16	CDR	Okay.
00 03 57 17	CMP	There you go, I'll buy that one right there.
00 03 57 19	CDR	You'll buy that one right there?
00 03 57 20	CMP	Yes.
00 03 57 21	CDR	Let me go to - -
00 03 57 22	CMP	Maybe just a little less than that.
00 03 57 23	CDR	- - latch. Okay. That looks like it's home. Does that look like it's home to you?
00 03 57 31	CMP	It'll only go one turn. Looks like it to me.
00 03 57 35	CDR	Okay. All right, let me close the vent valve -
00 03 57 41	LMP	And I'll turn off the lights and we're - -
00 03 57 43	CDR	All right. Let's go per the checklist here, get the checklist? What do we - -
00 03 57 46	LMP	... my - warm little hands.
00 03 57 49	CDR	Okay.
00 03 57 50	CMP	Says the - -
00 03 57 51	CDR	Vent valve's closed, handle is latched, and I can verify that all the pieces of - -
00 03 57 58	CMP	Pressure equalization valve closed, clockwise?
00 03 58 00	CDR	That's good, pressure equalization - -
00 03 58 01	CMP	LM tunnel vent valve. LM/CM DELTA-P?
00 03 58 04	CDR	LM/CM DELTA-P.
00 03 58 05	CMP	And the tunnel lights are out?
00 03 58 07	CDR	Tunnel lights are out, and this gage doesn't read zero - it reads about plus a 10th when we get the pressure equalized.

00 03 58 11	CMP	I see - -
00 03 58 12	CC	Apollo 12, Houston.
00 03 58 14	CDR	Go.
00 03 58 15	CC	I need your O_2 fans on, and we'll watch them for you and tell you when to turn them off.
00 03 58 18	CDR	Okay, sir. I guess the next thing is, we want to get the surge tank and all our repress packages back up.
00 03 58 28	LMP	What in the world is all that red stuff back there?
00 03 58 32	CMP	That's just what I was wondering; it's real pink out there.
00 03 58 34	CMP	Yes.
00 03 58 35	CDR	Well, let me look and see.
00 03 58 36	LMP	Houston, 12. What's going on with the booster?
00 03 58 41	CDR	All pink out there.
00 03 58 42	CMP	Yes, something just - just looks like it's flowing - -
00 03 58 44	CC	Looks like you're getting fuel vent.
00 03 58 46	CDR	Huh?
00 03 58 49	CC	It's a normal fuel vent.
00 03 58 50	LMP	Hey, that's pretty spectacular.
00 03 58 52	CDR	Oh, no, I'll tell you what it is; the Sun is on the - on my right side, - -
00 03 58 54	LMP	Yes.
00 03 58 55	CDR	- - and it's shining around the booster - -
00 03 59 01	LMP	Through the - -
00 03 59 02	CDR	- - and it's shining through - -
00 03 59 03	LMP	- - through the vent.

00 03 59 04	CDR	- - the fuel vent, and it's made a rainbow. It's really spectacular.
00 03 59 07	LMP	Look out - -
00 03 59 08	CMP	Yes.
00 03 59 09	LMP	Can you see the apex of - -
00 03 59 10	CMP	Yes.
00 03 59 11	LMP	- - of where it all comes together, out there?
00 03 59 12	CMP	Yes. Sure can.
00 03 59 13	LMP	Look at that, what happened there? The vent must have shut off or something.
00 03 59 15	CMP	Still a little bit ...
00 03 59 18	LMP	There's all kinds of things going on back there.
00 03 59 19	CDR	Look at all those loose objects floating along with us down there.
00 03 59 21	LMP	(Laughter)
00 03 59 24	CDR	(Laughter) ... take them with us.
00 03 59 25	CMP	... there's a disaster waiting for us if we don't have those circuit breakers in over there on the LM SEP.
00 03 59 31	CDR	They're in, I checked them. About five times.
00 03 59 32	LMP	All right, let's get back to business. Tunnel vent lights off, okay.
00 03 59 37	CMP	You want to go off VOX?
00 03 59 40	CDR	Yes.
00 03 59 41	CMP	Houston, we're going to leave you on - off of VOX for a while, and we'll be back with you a little later.
00 03 59 45	CC	Okay, Dick.
00 03 59 46	CMP	And we're standing by here for our SEP time. What do you have for us for the SEP time?
00 03 59 58	CC	Stand by, 12.

00 04 00 07	CC	12, Houston. We're looking at a SEP time of 04:13.
00 04 00 16	CDR	Roger. SEP time of 04:13.
00 04 08 22	CDR	Houston, we're going to bring the SECS LOGIC ON.
00 04 08 26	CC	Roger, 12. We're all ready.
00 04 08 29	CDR	LOGIC 1 -
00 04 08 30	CDR	MARK.
00 04 08 31	CDR	LOGIC 2 -
00 04 08 32	CDR	MARK.
00 04 08 46	CC	12, Houston. You're go for PYRO's.
00 04 08 49	CDR	Roger. Go for PYRO ARM.
00 04 09 19	CC	Apollo 12, Houston. Go for ejection.
00 04 09 23	CDR	Roger.
00 04 11 08	CDR	Okay, Houston. You do want us to SEP at 4 plus 13 plus 00. Is that correct?
00 04 11 14	CC	That's affirmative, 12.
00 04 11 31	CMP	Houston, this is 12. We're having all kinds of time with this - trouble with this mission timer; we've had to reset that thing twice already.
00 04 11 39	CDR	Yes, the mission timer in the LEB is okay; it's kept good times. So, we keep getting our little pitch fork, and I just think that we're going to have a lot of trouble with it, so we're just not going to pay much attention to it.
00 04 11 52	CC	Roger, Pete.
00 04 12 12	CC	There goes Pete's EMI theory.
00 04 12 15	CDR	Say again, Houston.
00 04 12 16	CC	There goes your EMI theory, Pete.
00 04 12 19	CDR	Yes, I'm afraid you're right.
00 04 12 43	LMP	Give you a little TV, Houston.

00 04 12 47	CC	Okay. We're standing by.
00 04 13 42	LMP	We've seped, Houston. It looked good, and of course you still can't see anything yet; when we pitch around, I'll show it to you.
00 04 13 49	CC	Roger, 12.
00 04 14 00	CC	Apollo 12, Houston. We don't have our TV ground lines up at this time. If we don't get tnem up in time to see the pictures, we'll record it at Goldstone and show it later.
00 04 14 09	CDR	Roger.
00 04 14 49	CC	Apollo 12, Houston. We're copying television now and soon as you've finished with your ejection and you're clear, we'll go ahead and enable the S-IVB evasive maneuver.
00 04 15 42	CMP	Can you see those flashes, Houston? That's the RCS thrusters reflecting off the quads on the LM.
00 04 15 50	CC	Roger.
00 04 16 15	CC	Haven't seen any flashes yet, 12.
00 04 16 20	CMP	They may be a little dim for you to see.
00 04 16 34	CDR	Oh, there's the S-IVB, and I can see it venting.
00 04 16 42	CC	Roger, 12. When you're well clear and you're ready for us, let us know and we'll start the maneuver to the evasive attitude.
00 04 16 59	CDR	Boy, is that thing venting. What's it keep venting, anyhow, Houston? Keeps throwing out big clouds of - -
00 04 17 07	CC	We're not - -
00 04 17 08	CDR	- - of something.
00 04 17 09	CC	Roger. We're not supposed to be venting anything.
00 04 17 11	CDR	Boy, it's throwing stuff off the sides and out the back like crazy.
00 04 17 19	CC	Roger. Can you get us a picture?

00 04 17 21	CDR	Well, we'll get you some on the TV if we can; it just looks like it's venting something out of the rear end - big radial clouds of it coming out the back.
00 04 17 33	CC	That's really something.
00 04 17 56	CDR	As a matter of fact, Houston, I suspect that maybe you ought to enable that maneuver right now. It sure - -
00 04 18 03	CC	We'll do it, Pete.
00 04 18 04	CDR	- - it sure is throwing a lot of stuff out of the back of it; I ain't got any idea what it is, but it sure is throwing it out of there.
00 04 18 10	CC	Roger.
00 04 18 26	CC	Maneuver's initiated, Pete.
00 04 18 28	CDR	Okay. I can see it firing thrusters, and I can see it starting to yaw.
00 04 18 49	LMP	Try to get it out of the center hatch window now, Houston.
00 04 18 52	CC	Okay.
00 04 18 59	CC	12, Houston. Give us OMNI Delta, please.
00 04 19 10	CC	We're copying your TV real clear now, and the jerking has stopped. It's looking good.
00 04 19 55	LMP	Earth is about one and a half times the size of a basketball right now.
00 04 19 59	CMP	Houston. 12. Let us know when that maneuver is over, please.
00 04 20 03	CC	Wilco.
00 04 20 06	CMP	Say again, Houston.
00 04 20 08	CC	We'll let you know when that maneuver's complete. Al, how big's that - how far away is that basketball?
00 04 20 21	LMP	You probably got a better idea than I do about that one.

00 04 20 26	CDR	Could you see that thing throwing stuff out the back, Houston?
00 04 20 30	CC	We could awhile ago, and it looks like it's got a halo around it now. Is it still there?
00 04 20 35	CDR	Well, that's the Sun shining in the front end. But from the angle that we have on it, there's something venting out the - The aft engines are on either side and the upper aft engine, the engine that's away from the Earth - -
00 04 20 52	SC	...
00 04 20 54	CDR	No, I'm not talking about that; I'm trying to reference it to whatever it is that's venting back there; it's a line; see that line coming out of the engine, over on the left-hand side?
00 04 21 13	CC	12, Houston. We got a hunch that what happened is, when that LOX valve failed open and we tried to close it ourselves, it probably burned out that burner.
00 04 21 26	CC	Maneuver's complete, 12.
00 04 21 30	CDR	Okay and when are you going to brake the APS? Oh, hey, it just vented something tremendously; can you see that, Houston?
00 04 21 38	CC	Yes. We can see it now, Pete. Okay, try it again.
00 04 21 42	CMP	Houston, are you going to make that maneuver on time at 11:40?
00 04 21 57	CC	12, Houston. We're looking at 426 plus 18 for that burn.
00 04 22 03	CMP	Roger. 426 plus 18. And Houston, that's, I assume, is 11:40 after our SEP; is that correct?
00 04 22 21	CC	We're checking, 12.
00 04 22 41	CMP	Houston, we're changing the scenery on you; we'll come back to that S-IVB just before it goes.
00 04 22 47	CC	Roger, 12. And that maneuver will be done at 13 minutes past SEP.
00 04 22 52	CMP	Roger. I've got 09:52 right now.

00 04 22 58	CMP	How does the homeland look to you?
00 04 23 02	CC	Beginning to look kind of small.
00 04 23 10	CDR	It's really weird, Houston. There's something that's venting radially. And then there's something that's venting along the axial axis, and it's sort of taking turns. And right now, it reminds me of some guy standing back there with a water hose just spraying it in any old direction; it's just - it keeps venting, whatever it is, and it just keeps blowing away in different directions.
00 04 23 35	CC	Roger, Pete.
00 04 23 38	CDR	I'm trying to get all this on film for you.
00 04 23 41	CC	Good deal.
00 04 24 01	CC	12, Houston. On your event timer; that maneuver will be 12:48.
00 04 24 07	CMP	Okay, understand, 12:48.
00 04 25 13	CDR	Okay, Houston, we're going back to the S-IVB now for the burn.
00 04 25 17	CC	Roger, 12.
00 04 26 23	CC	We've got the S-IV now, 12.
00 04 26 27	CMP	Roger. Are you starting the maneu - starting the SEP maneuver?
00 04 26 33	CC	That's affirmative. We're ready now.
00 04 26 36	CMP	Okay, we're ready.
00 04 26 53	CC	Ullage motors are on.
00 04 27 06	CDR	Yes, we can see it starting to move now, Houston. Hear the motors firing?
00 04 27 10	CC	Roger.
00 04 27 37	CC	12, Houston. When you get a chance, turn off your O_2 fans.
00 04 27 43	CMP	Roger. They're coming off.

00 04 28 13	CC	12, Houston. The APS maneuver is complete.
00 04 28 21	CMP	How much you figure you got out of that, Houston?
00 04 28 28	CC	About 10 feet per second, Dick.
00 04 28 30	CMP	That's preplanned, did you really get that?
00 04 28 49	CC	12, Houston. The burn was nominal. If the vehicle is a shade lighter, we might have gotten just a little bit more DELTA-V out of it.
00 04 28 58	CMP	Okay. Well, that thing did a fantastic job for us today.
00 04 29 02	CC	Sure did.
00 04 29 31	CMP	Houston. The sunlight is starting to come in the window and we're a little concerned about the TV, so I guess you've seen the show for today on the S-IVB and we'll look at the Earth for a little bit for you.
00 04 29 43	CC	Roger, Dick, and we'd sure like to see what you guys look like.
00 04 29 48	CMP	Well, we look just like we did this morning when we got out of bed.
00 04 29 53	CDR	Now, there's a real reasonable guy for you.
00 04 29 58	CMP	..., we'll be glad to show you, and give me an attitude to go to; I'm not going to track that S-IVB any more.
00 04 30 10	CC	Roger, 12. Good attitude is ROLL 58, PITCH 240, YAW 39.
00 04 30 21	CMP	Roger. The reason I'll leave that S-IVB, it's starting to get in line with the Sun and I can still have it but it's a little tough.
00 04 30 27	CC	Roger, Dick. This attitude we just fired to you is your P52 attitude for 05 plus 30. And the stars that you can use at this attitude are number 12, Rigel; number 16, Procyon. And the reason why we had this one in our hip pocket is that this is the same attitude that you can use for the sextant calibration after you've realigned your platform.

00 04 30 55	CMP	Okay. Give it to me again, 58 - Would you?
00 04 30 59	CC	Roger. 58, 240, and 39.
00 04 31 05	CDR	And we've just turned off our TV; we've maneuvered where we no longer have the Earth or the S-IVB.
00 04 31 10	CMP	Now, that was 390 in yaw, is that right, 039?
00 04 31 15	CC	That's 39 - 039 in yaw.
00 04 31 19	CMP	Okay.
00 04 31 21	CC	This will save you one maneuver down the pike a ways.
00 04 31 48	CC	12, Houston. Give us OMNI Alfa.
00 04 32 15	CC	12, Houston. If you can give us an interior shot, I'd like to have a rough idea of when you can do it; and if you can't do it, we'll go ahead and release our TV lines.
00 04 32 26	CDR	It's coming to you right now; you should have something there.
00 04 32 31	CC	Okay. Great, Dick.
00 04 32 32	CDR	There's Dick Gordon with his sunglasses on. Boy oh boy. I'll tell you, these guys weren't kidding when they said this thing shakes, rattles, and rolls when you fire the thrusters; it's like being on a jerky train.
00 04 32 45	CC	Roger.
00 04 32 47	CMP	Okay, we're at 58 degrees in roll, 240 pitch, and 39 degrees in yaw.
00 04 32 54	CC	Roger, 12. We're not getting your TV.
00 04 33 00	CDR	We got a good picture here on our monitor.
00 04 33 12	CC	12, Houston. On the high gain, give us pitch minus 50 and yaw plus 60 and that should lock us up. Okay, we got your TV.
00 04 33 46	CC	Dr. Gordon, I presume.
00 04 33 50	CDR	Better known to his friends as Shicky Dicky.
00 04 34 01	CC	Hey, Red Baron, where's your scarf?

00 04 34 10	CMP	Well, I tell you. I think I forgot it during that boost phase. We ought to talk to you about all that good happening. That's a terrible way to break Al Bean into space flight, I'll tell you.
00 04 34 26	CC	Roger.
00 04 34 42	CMP	Say, what time is the LOX blowdown on the S-IVB?
00 04 34 48	CC	Stand by, 12. 12, Houston. Cris says he doesn't think you guys are the same age as when you got up this morning either.
00 04 34 58	CMP	He is absolutely correct. In fact, I wish you guys would play us that DSE tape back tonight. All Al Bean kept saying was there's power on the buses, there's power on the buses, and every light brightly inside was lit. And I kept thinking, why is he saying that to me?
00 04 35 20	CC	That's beautiful.
00 04 35 24	CMP	I was saying, Al, there's so many lights on, I can't read them all to you. He's totally recovered from launch, see that?
00 04 35 39	CC	Oh, it looks beautiful. That's a nice-looking hat you're wearing, Al.
00 04 35 45	LMP	We have three of them just alike in here. We got something else for you too.
00 04 36 03	CDR	I tell you, this command module's a good deal. Dick and I, being use to the Gemini, just hand everything to Al and say "hold it." And he's got 25 things in his hands.
00 04 36 15	CC	Roger.
00 04 36 20	CMP	I'm sorry I couldn't follow that S-IVB any more, but it was really getting into the Sun, and I guess we aren't going to see much of it anyway, any more.
00 04 36 29	CC	Roger, Dick. We'd like to have you guys start a battery charge now.
00 04 36 33	CMP	Okay. We are going to secure the TV too in just a minute now - -
00 04 36 35	LMP	I think we're on Battery B in the flight plan, huh?

00 04 36 38	CC	That's affirmative.
00 04 36 44	CMP	Okay, we're going to stow the TV, and we'll come back at you later with something.
00 04 36 54	CC	Roger. We've lost the TV now.
00 04 36 58	CMP	Roger. We just - shut it down.
00 04 37 18	CC	Apollo 12, Houston. Slingshot burn time is 4 pl 48 and it's in attitude.
00 04 37 24	CDR	Okay, 4 plus 48. Well - Have you got some gimba angles for us - that are - Well, let me ask you. Is it going to be in our window in the attitude we're in now or not?
00 04 37 38	CC	I kind of doubt it, Pete; do you want to watch it go?
00 04 37 40	CDR	No, no, we'll just stay put. We're getting hungry, and I think we're going to start getting out of these suits and eat in a little bit here.
00 04 37 50	CC	Roger.
00 04 37 54	CMP	Hey, Jerry, I'm still not too happy with the way this mission event timer is performing even though we do have the tuning fork intermittently in the window.
00 04 38 06	CC	Roger, Dick.
00 04 38 07	CMP	I guess we'll just have to keep an eye on it. Right now, it seems to be performing okay, but we'll watch it. I'm not so sure that that doesn get a glitch in it every now and then.
00 04 38 16	CC	Okay, Dick. And if you are going to lean a lot more heavily on your event timer, you might give us time hacks every once in a while when you're using it, and we'll set ours up and follow you down here and try to keep giving you the right kind of times.
00 04 38 30	CDR	Okay. Looks like the mission event timer in the LEB is keeping good time. Now, let me ask you - It also - if it was central timing problem, it would also show up with the pitch fork, right?
00 04 38 44	CC	That's affirmative.

00 04 38 45	CDR	Okay. We've never seen a pitch fork in the LEB timer, and it stayed right in SYNC all the way along, so we just periodically call it 1665 and update the - the mission timer. What happened is, when a pitch fork comes on, it begins to gain time on us; it keeps getting 5 or 6 seconds ahead.
00 04 39 04	CC	Roger.

END OF TAPE

00 04 46 24	CMP	Okay, Houston. We've started BAT B charge.
00 04 46 27	CC	Roger, 12.
00 04 47 15	CC	12, Houston. We've initiated the LOX dump.
00 04 48 20	CDR	Roger. We'll look for her to go by.
00 04 50 16	CC	Apollo 12, Houston.
00 04 50 18	CMP	Go ahead, Jerry.
00 04 50 21	CC	Roger, Dick. We've been kind of thinking here a little bit, and we'd like for you to consider a proposal here. It's the idea of getting into the LM tonight before bedtime and going through the housekeeping portion of your checklist, short of the communications, and powering up the CMC and giving us a check and an E-MOD dump.
00 04 50 47	CMP	Yes, that sounds like a good idea. We've been up here talking about what that launch may have done to the LM, and I think we can do that between the two P23's. What do you think of that?
00 04 51 01	CC	We're not going to do MCC 1, Dick. It looks like you won't need it, so you can do that during that time when you would normally be doing MCC 1.
00 04 51 11	CMP	Okay. It sounds good. We really don't have any place to go tonight, so we don't mind working late.
00 04 51 18	CC	Okay. It looks like about 11 hours, and we'll work out a good solid plan for you and come up with it.
00 04 51 27	CMP	Okay. If that was a proposal, you'd better watch the use of that language. We won't accept those sort of things.
00 04 51 39	CC	Roger. Should I have said this was a proposition for you?
00 04 51 53	CMP	No, you said proposal, sir.
00 04 58 56	LMP	Say, Houston, 12.

00 04 58 57	CC	Go ahead, 12.
00 04 59 00	LMP	I snickered at those ham sandwiches this morning, but I take it all back. They're delicious.
00 04 59 09	CC	Roger.
00 04 59 10	LMP	Our compliments to the chef.
00 04 59 14	CC	Roger. He'll be glad to hear that.
00 04 59 37	CC	Did you break out the jelly beans yet?
00 04 59 43	CDR	No, we're still reminiscing about that launch. We was wondering why we were supposed to try SCE to AUX. We haven't figured that one out yet.
00 04 59 55	CC	Well, the reason why is because we lost all of our telemetry.
00 04 59 59	CDR	Lost all your what?
00 05 00 00	CC	Telemetry.
00 05 00 17	CC	12, Houston. When you went under voltage there, you lost the SCE, and we had to go AUX in order to see what happened.
00 05 02 27	CDR	Hello, Houston, 12.
00 05 02 28	CC	Go 12.

[redacted]

00 05 03 37	CDR	Okay. I understand. Thank you, Jerry.
00 05 21 48	CC	Apollo 12, Houston.
00 05 21 51	CMP	Go ahead, Houston.
00 05 21 53	CC	Roger. If you'll give us POO and ACCEPT, we'll fire up some - a new REFSMMAT, a zero trunnion bias, and a CMC clock update. Over.
00 05 22 02	CMP	Roger. It's all yours.
00 05 22 05	CC	Roger.
00 05 25 34	CMP	Hey, Houston, 12.
00 05 25 35	CC	Go ahead, 12.
00 05 25 38	CMP	Roger. Doing the P23 at 6 hours. You gave me this attitude after we left that S-IVB, but the flight plan has star 15 for the optics CAL, 204 262 0. Are you going to change that?
00 05 26 01	CC	Dick, you'll have a new REFSMMAT at that time, and your inertial attitude ought to be that now. Once you put in your new REFSMMAT, you ought to be in good shape.
00 05 26 13	CMP	Oh, very good, very good. I understand. I was just behind you, I guess.
00 05 26 16	CC	That's the maneuver we were trying to save you.
00 05 26 21	CMP	Thank you.
00 05 26 25	CC	12, Houston. The computer is yours.
00 05 26 30	CMP	Okay.
00 05 26 32	CC	And if you can find the time in your busy social schedule, I got a P37 PAD for you.
00 05 26 43	CMP	Okay, just stand by. We'll find the book.
00 05 26 46	CC	Okay, this an LO plus 15, lift-off plus 15.
00 05 28 51	LMP	Go ahead with that P37, Houston.
00 05 28 56	CC	Roger, 12. This is just a four liner. Lift-off plus 15, GET is 015:00, 4714, minus 168, 050:06. Over.

00 05 29 23	LMP	Roger. 015:00, 4714, minus 168, 050:06.
00 05 29 31	CC	Roger, Al.
00 05 31 57	CC	Apollo 12, Houston.
00 05 32 00	CDR	Go ahead, Jer.
00 05 32 01	CC	Roger. What do you say we break the simulation down and debrief it now. And the backup crew's ready to get in.
00 05 32 09	CDR	Yes, I imagine they are ready to get in now. You can tell SIM SUP that's a new one to work on.
00 05 32 21	CC	Roger.
00 05 32 27	LMP	It's a good thing we've never seen it before because we sure didn't know what to do about it.
00 05 32 34	CC	Oh, you did pretty good.
00 05 32 38	LMP	That's right, absolutely nothing.
00 05 36 39	CMP	Houston, Apollo 12.
00 05 36 42	CC	Go ahead, 12.
00 05 36 44	CMP	Roger. You do have the PTC REFSMMAT in now. Is that correct?
00 05 36 52	CC	That's affirmative. On that last one, Dick, we sent you a PTC REFSMMAT, a zero trunnion bias, and a CMC clock update.
00 05 37 03	CMP	Okay.
00 05 45 31	CMP	Hey, Houston, this is 12.
00 05 45 40	CC	12, Houston. Go ahead.
00 05 45 42	CMP	Roger, Jerry. The reason I'm having trouble with this alignment - first star was Canopus. I got that okay in the sextant. The second star in PICAPAR is Procyon, and I don't have anything in the sextant.
00 05 46 00	CC	Right. Stand by, Dick.
00 05 47 16	CDR	Houston, CDR. How do you read?

00 05 47 21	CC	We read you loud and clear, 12. Go ahead.
00 05 47 22	CDR	Okay. No, this is CDR. I'm on the lightweight headset now. Just checking.
00 05 47 32	LMP	He just couldn't see it.
00 05 48 42	CC	12, Houston.
00 05 48 47	CMP	Go ahead.
00 05 48 49	CC	We're observing a weak signal down here. We'd like you to go ahead and track - check the position of the track mode switch and also the beam width.
00 05 48 58	CMP	Okay. We've been operating on OMNI's. Do you want us to go to high gain now?
00 05 49 05	CC	That is negative, 12.
00 05 49 16	CMP	Roger. We are presently in OMNI A.
00 05 51 55	CC	12, Houston.
00 05 51 59	CMP	Go ahead.
00 05 52 00	CC	We recommend that you use star 12 or star 15 for your second star.
00 05 52 06	CMP	Okay.
00 05 52 54	CDR	Houston, are you looking at the DSKY?
00 05 52 59	CC	Affirmative, 12.
00 05 53 07	CDR	Houston, you are looking at the torquing angles?
00 05 53 12	CC	We have them, 12.
00 05 53 14	CDR	Roger. Torquing at this time.
00 05 53 16	CDR	MARK.
00 05 56 14	CMP	Hello, Houston, 12.
00 05 56 17	CC	12, go ahead.
00 05 56 20	CMP	Roger. How does the flight plan look for this first set of P23's? Okay?

00 05 56 26	CC	Stand by, Dick.
00 05 56 37	CC	12, go ahead. There are no changes so far.
00 05 56 41	CMP	Okay. We are going to do the VERB - first maneuver VERB 49 to get the boresight star.
00 05 56 48	CC	Roger.

END OF TAPE

00 06 19 58	CMP	Houston, 12.
00 06 20 02	CC	12, go ahead.
00 06 20 04	CMP	Roger. Are you copying this P23 data?
00 06 20 08	CC	That's affirmative, Dick.
00 06 20 10	CMP	Okay. I was just wondering. You haven't been hollering at me, yet.
00 06 20 17	CC	It's looking good.
00 06 29 36	CC	12, Houston.
00 06 29 39	CDR	Go ahead, Houston.
00 06 29 41	CC	12, we've been thinking about the LM checkout procedures. We'd like your thoughts on whether you want to go in there as soon as you finish up with the P23.
00 06 29 54	CDR	Okay. We can do that. We could get into PTC and then go on in there. What do you got in mind?
00 06 30 08	CDR	I guess what I'm asking is what do you people think may have happened? Do you think we might have blown some breakers out or something?
00 06 30 21	CC	Pete, that's affirmative. We'd like to go ahead and check the position of several breakers just to make sure that we are getting the heaters coming off and on on all of the systems as we should be.
00 06 30 36	CDR	Okay. If you think that's a good idea, and we'll get ready to do that now. I think, what we'd like to do here is - Al is - I've gotten all the way out of my suit, but I still have to stow it. Al is working his way out of his right now while Dick's doing the P23, so we want to get Dick unsuited. We want to get everybody cleaned up here and get this spacecraft stowed. And then we'd like to go in the LM, I think; we've got plenty of time. Do you agree with that?
00 06 31 26	CC	12, that's affirmative. It sounds good. We would like to get into the LM before 8 hours GET.

00 06 31 34	CDR	Okay. Well, we'll give her a go. What's your reason for wanting to get in so quick?
00 06 31 43	CC	Stand by, Pete.
00 06 31 47	CDR	Old curious Pete. You got to give me a reason.
00 06 32 10	CC	12, Houston.
00 06 32 12	CDR	Go.
00 06 32 13	CC	Pete, one of the reasons we want to get in there early is there is a possibility that the ASA heater is not cycling the way it should be. In which case, 8 hours is the limit, and we ought to get a look at it before that time.
00 06 32 36	CDR	Go ahead, Houston. Standing by.
00 06 32 41	CC	Pete, I repeat. The reason we'd like to get in there before 8 hours GET is that the ASA heater may not be cycling, and the thermal limit then is about 8 hours, so we'd like to get in there before 8 hours and check the position of that circuit breaker to make sure it hasn't pooped and look at the status of the system.
00 06 33 04	CDR	Okay. We'll - we'll - we - we'll - we'll hustle.
00 06 33 10	CC	Okay, and Pete, we also have the LM checkout procedure that you'll be following for the - going through the activation checklist, and we're ready to read that up to you any time.
00 06 33 24	SC	...
00 06 33 25	CDR	You're going to have to hold it for a minute, Houston.
00 06 33 28	CMP	Hey, Houston. This is 12, and I'd like to continue this last set of 23's without doing another trunnion bias. Just a half hour, right now.
00 06 33 38	CC	Roger, Dave.
00 06 38 44	CDR	Okay, Houston. We are done with the P23's - and - I guess we're going to get ready to maneuver to PTC attitude then.
00 06 39 02	CC	Pete, repeat after "I've finished with the P23." You're breaking up.

00 06 39 10	CDR	Okay, we're getting ready to go into a PTC, or do you want us to hold the attitude we have right now as we go into the LM?
00 06 39 24	CC	Stand by on that, Pete.
00 06 39 43	CC	Pete, if you'll hold your present attitude, we'll get an answer up to you in about 3 or 4 minutes.
00 06 39 50	CDR	Okay. We're not going anywhere.
00 06 40 07	CC	12, Houston. Would you go over and try OMNI Bravo?
00 06 40 13	LMP	Going to OMNI Bravo.
00 06 44 25	CMP	Hello, Houston; Apollo 12.
00 06 44 29	CC	12, Houston. Go ahead.
00 06 44 32	CMP	Roger. Are you going to fix up our state vector?
00 06 44 38	CC	Stand by, Dick.
00 06 44 55	CC	12, we'll have one ready for you at about 10 hour
00 06 45 05	CMP	Okay.
00 06 49 25	CC	12, Houston.
00 06 49 29	LMP	Go ahead, Houston.
00 06 49 31	CC	12, you can go ahead and hold off on the PTC and enter the LM with your present attitude. We would like you to first, before you go in, check the DELTA-P, LM-CM DELTA-P, give us a reading on that and then we have a series of switch and circuit breaker configuration checks, then check the TM and the LGC. We have an abbreviation, or abbreviated procedures taken out of the activation checklist, and we're ready to read that up to you when you're ready to copy.
00 06 51 31	CC	12, Houston.
00 06 51 35	CMP	Go ahead, Houston.
00 06 51 38	CC	Did you get our last transmission, and would you give us a call when you're ready to copy the LM checkout steps?

00 06 51 46	CMP	Roger. You're going to have to give us a few minutes. We're still reconfiguring getting out of suits up here yet.
00 06 51 52	CC	Okay. Thanks, Dick.
00 06 56 57	CDR	Houston, Apollo 12.
00 06 57 00	CC	12, Houston.
00 06 57 02	CDR	Roger. We're ready to copy those instructions you've got about the activities you want us to perform in the LM.
00 06 57 10	CC	Roger. I only follow. First, before you go in we'd like you to read us down the DELTA-P from the LM command module, and then the abbreviated procedures to go through on the activation checklist are as follows: the activation 1, steps 1, 2, 3; activation 2, step 2. And activation 3 through activation 9, perform all. On activation 10, steps through 18; activation 11, steps 1, 2, 3; activation 12, through step 4. The COMM configuration is as follows: PM, PRIME, PRIME, OFF; PCM, OFF/RESET, OFF, HIGH.
00 06 58 15	MS	... - -
00 06 58 20	CC	- - On 11, - circuit breaker panel 11, LGC/DSKY CLOSED. On activation 27, perform CDR steps 3 through 6; activation 28, through step 7. Then if you'll give us a VERB 74 ENTER; take a look at the E-MOD. VERB 37, ENTER; 06, ENTER; and a PRO; you'll get a STANDBY light on. Panel 11, circuit breaker LGC/DSKY, OPEN. And then continue shutting it down with activation 15, steps 2, 3, 4, 5; and activation 16, perform all. That completes it.
00 06 59 21	LMP	Okay. Let me see if I got it right. First thing you want us to do is read CM-LM DELTA-P before we go in. Then we start with activation 1, steps 1, 2, 3. Activation 2, step 2. Activation 3, all. And that's activation 3, 4, 5, 6, 7, 8, 9, all of those. Step - correction - activation 10, steps 1 through 18. Activation 11, 1 through 3. 12, 1 through 4. COMM configuration should be - and I may have missed one here - PM PRIME, PRIME, OFF, PRIME - correction - PCM, OFF/RESET, and HIGH.

00 07 00 07	CC	Al, Houston.
00 07 00 25	CC	12, Houston.
00 07 00 26	LMP	Yes, Pete. Go ahead.
00 07 00 28	CC	We just had a brief cutout while we handed over to Goldstone. You did miss one on the COMM configuration. The - After OFF/RESET, it's OFF, and then HIGH. And then continue with your readback.
00 07 00 43	LMP	Okay. That'd be OFF/RESET, and then OFF, and then HIGH. Then CB(11) LGC/DSKY, close that, and then perform activation 27, commander steps 3 through 6. Then activation 28, steps 1 through 7 to a VERB 74, ENTER, and a VERB 37, ENTER, 06 ENTER, PRO, STANDBY. Light will come on, of course. Panel 11; then LGC/DSKY, OPEN, and then do activation 15, steps 2, 3, 4, and 5, and all of activation 16.
00 07 01 15	CC	That's correct, Al.
00 07 01 17	LMP	Okey-doke.
00 07 03 43	CDR	Hello, Houston; 12.
00 07 03 46	CC	12, go ahead.
00 07 03 48	CDR	Okay. Our DELTA-P has fallen off to plus 0.4, and the zero reading is actually 0.1, so it ought to be - It's fallen off about 0.3. And I'm getting ready to REPRESS the LM now.
00 07 04 08	CC	Roger, Pete. We copy. 0.4 and 0.1, fall off of 0.3.
00 07 08 31	CC	12, Houston.
00 07 08 33	LMP	Go ahead.
00 07 08 35	CC	We'd like to precede that LM checkout step with one step from TLC 1. That is, on TLC 1, step 4, carry out the last two lines. SUIT ISOLATION. (Both) to SUIT FLOW. SUIT ISOLATION (Both) to ACTUATE OVERRIDE.
00 07 08 59	LMP	All right. We understand; we'll do it.

00 07 18 18	CDR	Hello, Houston. We've got the hatch out and the probe out, and we're in the process of stowing that, and I'm going into the drogue right now.
00 07 18 31	CC	Roger, Pete. We copy.
00 07 20 25	CDR	Okay, Houston. The CDR's in the LM.
00 07 20 32	CC	Roger, 12. We copy.
00 07 20 38	CC	And Pete, if you find any circuit breakers which are out of configuration, would you hold up until we get TM before you change them?
00 07 20 48	CDR	Sure will. I'm not going to touch anything. I'm going to let Al come in here and do the activation - portion. He's got the checklist here, and he's tying the probe and the drogue down now.
00 07 20 58	CC	Roger.
00 07 22 39	CDR	Okay, Houston. Al and I are both in the LM now, and we are getting ready to do your checklist.
00 07 22 48	CC	Roger, Pete.
00 07 22 56	CDR	Okay. We put both SUIT ISOLATIONS to SUIT FLOW, and now we are going to turn them to SUIT DISCONNECT.
00 07 24 50	CDR	Okay, Houston. We are checking the breakers now. The ASA stab/control panel 16 CB is in.
00 07 25 03	CC	Roger, Pete. We copy.
00 07 25 24	LMP	Things look real tidy - Things look real tidy up here, Houston.
00 07 25 33	CC	Roger, Al. Are you home?
00 07 25 36	LMP	Pretty nice.
00 07 25 38	CMP	Hey, he's not going to be at home for at least 2 days.
00 07 25 42	CDR	Okay, Houston. I found in row 3 one circuit breaker that's out of configuration. Under lighting, utility is out and, according to my book, it should be in.

00 07 25 57	CC	Roger. We copy that, Pete.
00 07 26 25	CDR	Okay, Houston. That one circuit breaker out of panel 11 and all circuit breakers on panel 16 are in the proper configuration.
00 07 26 35	CC	Roger.
00 07 26 47	CC	Pete, would you hold up on activating the S-band until we can get the IU turned off down here?
00 07 26 55	CDR	Okay.
00 07 30 45	CC	Pete, Houston. An explanation on that utility circuit breaker: at liftoff that circuit breaker was out, and that is the way it was configured at the Cape. The change did not get into the checklist, so there was no change during flight, and we'd like you to go ahead and leave that circuit breaker out until we can get power on the LM.
00 07 31 08	CDR	Okay. Very good. And we're in the middle of step 11 on ACT 7 right now.
00 07 31 16	CC	Roger.
00 07 36 08	CDR	Hey ... Okay, Houston, we're going over on LM power at whatever GET it is right now.
00 07 36 23	CC	Roger, Pete. Copy. You're going over.
00 07 37 04	CMP	Okay. Houston, Apollo 12.
00 07 37 06	CC	12, go ahead.
00 07 37 08	CMP	Hi. Roger. Are you people looking at quad B? It's up there - a pretty good temperature, 170 degrees now.
00 07 37 20	CC	Roger, Dick. We'll look at it - -
00 07 37 22	CMP	- - And - Okay. And if there's no reason why we can't start PTC, unless you want to get this COMM stuff, I'll just hold here.
00 07 37 31	CC	Right. Stand by on that, Dick.
00 07 38 28	LMP	Okay, Houston. We're checking the voltages on the batteries now. We got - On battery 1, we got 34 Volts; battery 2, 34.2; battery 3, 34.2; battery 4, 30 - 34.2; battery 5 is 37; battery 6 is 37.

00 07 38 59	CC	Roger, Al. We copy. 34, 34.2, 34.2, 34.2, and 37 on 5 and 6.
00 07 39 07	LMP	Roger. You probably ought give 34.2 to that first one, too.
00 07 39 11	CC	Roger.
00 07 40 20	CDR	Houston, do you now want us to put ourselves in the COMM configuration you requested?
00 07 40 31	CC	Pete, that's affirmative.
00 07 40 34	CDR	Okay. Going on now.
00 07 40 51	CDR	Okay. We're set.
00 07 40 57	CC	Roger.
00 07 41 04	CDR	Do you want us to put in the LGC/DSKY circuit breaker now, Houston? Or do you want to wait until you get some good COMM with us?
00 07 41 14	CC	12, let's hold up on that right until we see what we have. And when you put the LGC to sleep, we'd like you to skip PROGRAM 06 and just pull the LGC circuit breaker. That way you'll be in the same configuration you were at launch, and the activation that you'll take up subsequently should work out.
00 07 41 36	CDR	Okay, then. We'll just sit tight right now; and for your information, we're on VHF antenna AFT and S-band AFT.
00 07 41 47	CC	Roger.
00 07 44 00	LMP	We're looking out our AOT, Houston, and it really looks nice.
00 07 44 03	CDR	Houston, are you getting any data from Intrepid, yet?
00 07 44 09	CC	12, that's negative. We're still reconfiguring to pick up that data.
00 07 44 13	CDR	Oh, okay. We're standing by to come up with the DSKY. And we'll hold until you get our data.
00 07 44 21	CC	Okay, Pete.

00 07 45 46	CDR	Hey, Houston. I was going to report that I had another person in sight, - but it - looking out the AOT - but it turns out that the left rear descent looks right in Dick's rendezvous window, and he's looking right back at us.
00 07 46 00	CC	Roger, Pete. We copy.

END OF TAPE

00 07 47 07	CDR	Say, Houston. How soon you going to be reconfigured? We hate to use these batteries up.
00 07 47 21	CC	Pete, we've got about another minute or two, and if we can't make it by then, we'll not go on with it.
00 07 47 28	CMP	What seems to be the problem, Houston?
00 07 47 33	CC	We're reconfiguring in order to get that data.
00 07 47 38	CMP	Yes? We've been planning to do this for quite a while.
00 07 49 31	CC	12, Houston. We're picking up some data from the LM now. Stand by. We're looking at it.
00 07 49 36	CDR	Okay, Houston. Very good; and say, we've got a special (laughter) - We've got a favor to ask you for our entertainment tonight.
00 07 49 45	CC	Roger. Go ahead.
00 07 49 47	CDR	You get the DSE tapes, don't you, of the launch?
00 07 49 57	CC	That's affirmative. We have it.
00 07 50 00	CDR	Well, (laughter) we want you to play it for us tonight before we go to bed. We're still up here laughing over it, trying to remember all the things that we said and did. So we want to hear it tonight before we go to bed.
00 07 50 13	CC	You want to relive that twice in one day?
00 07 50 17	CDR	Yes (laughter). You better believe it.
00 07 51 55	CDR	Hey, Houston. Are you ready for us for the LC - LGC DSKY breaker?
00 07 52 10	CC	12, that's affirmative. We're ready to go.
00 07 52 40	CDR	Houston, you want us to bring up the IMU also, huh?
00 07 52 49	CC	12, that's negative. We've - -
00 07 52 51	CDR	That's step 2 on page Activation 27.
00 07 52 54	CC	That's affirm. That was - On Activation 27, we had steps 3 through 6.

00 07 53 00	CDR	Roger.
00 07 54 24	CDR	And, Houston, there's self-test coming at you.
00 07 54 35	CC	Pete, we're not copying any computer data yet.
00 07 54 39	CDR	Okay. Well, it's doing self-check just fine, Houston.
00 07 54 46	CC	Roger. Copy your self-check looked good.
00 07 54 50	CDR	Okay. It's not complete yet, but it's - It's in the self-check. We've got a two and a one, and we've been running for about 50 seconds.
00 07 55 00	CC	Roger.
00 07 55 44	CDR	Okay, Houston. We've just completed the self-test satisfactorily. We're going to terminate the self-test.
00 07 55 54	CC	Roger. We've picked up and been copying your DSKY. And, Al, we've been showing a high quad 4 temperature. We would like for you to go ahead and check the position of two circuit breakers on panel 11. HEATERS RCS SYSTEM AB1, QUAD 4; and on panel 16, HEATERS RCS SYSTEM AB2, QUAD 4.
00 07 56 27	LMP	Roger. All the circuit breakers are out. I guess it's because we haven't gone to PTC yet.
00 07 56 35	CC	Roger, Al.
00 07 56 40	LMP	You ready for VERB 74?
00 07 56 49	CC	Al, could you hold off on VERB 74? We're trying to pick it up on another site.
00 07 56 54	LMP	Roger. We're standing by ready to give you VERB 74.
00 07 58 02	CC	Al, go ahead with the VERB 74.
00 07 58 12	LMP	Coming at you.
00 07 59 19	CC	Al, we've got the E-MOD.
00 07 59 25	LMP	Okay. Understand you got that. And that's the end. We are going to pull the DSKY breaker now and power down.

00 07 59 32	CC	Roger, Al.
00 08 00 02	LMP	Okay, Houston, we're powering her back down now.
00 08 00 06	CC	Roger. We copy. You're powering down.
00 08 04 01	LMP	Houston, we're getting ready to transfer to CSM power right now.
00 08 04 06	CC	Roger, Al.
00 08 05 54	CDR	Houston, have you got anything else for us before we close up the LM?
00 08 06 05	CC	Stand by on that, Pete.
00 08 06 17	CC	Pete, go ahead and button it up.
00 08 08 53	CDR	Houston, just checked the index angle on the docking here, and it's minus 0.3. Dick's COAS must have been in error.
00 08 09 06	CC	Copy minus 0.3. Well done.
00 08 09 12	CDR	Come on, Ed. Smile. You sound too serious down there today.
00 08 09 18	CC	Still thinking about your morning.
00 08 09 21	CDR	We're doing our best to forget it (laughter).
00 08 11 19	CDR	Okay, Houston. The LM hatch is closed.
00 08 11 23	CC	Pete, copy you got it closed. And we've got a few things for you to pick up on the time line when you're ready.
00 08 11 31	CDR	Okay. Give us about 10 here until we - we're still getting Dick out of his gear, and we've got to reconfigure - Let's get the probe and drogue back in.
00 08 11 44	CC	Roger. Will do.
00 08 15 57	CDR	Okay, Houston. We got the drogue in and probe's on its way up this time. We'll be done in about 5 minutes.
00 08 16 05	CC	Roger.
00 08 22 43	CDR	Okay, Houston. We have the tunnel all in, and everything's taken care of.

00 08 22 53	CC	Roger, Pete. Copy. You got it all buttoned up.
00 08 23 01	LMP	Hey, we're looking at you down there, Houston, and now you're about the size of a volleyball.
00 08 23 11	CC	Al, how far away is that volleyball?
00 08 23 14	LMP	I'd say that volleyball's about 2 feet away.
00 08 23 20	CC	Good eye, Al.
00 08 23 22	LMP	I can't see any landmass at all. All I can see is water with lots of clouds, and I can see sort of a glare point on the Earth. I think that must be the zero phase point to us. Other than that, it's very, very bright. And another interesting thing is, on the dark side, you cannot see where the Earth stops and space begins. It's unlike the Moon at night on in the daytime where you can see it in earthshine. You just can't see anything.
00 08 23 57	CC	Roger, Al. How come the old heads aren't giving us the same description?
00 08 24 03	LMP	They're still worried about this morning.
00 08 24 05	CMP	He won't let us near the window.
00 08 24 10	CDR	We've got a couple of interesting things here, too, Houston. I've now started picking up ice on my inner - inside portion of the outside panel on window 1. Don't ask me why.
00 08 24 27	CC	Okay, Pete. Let's hear that one again. The - You're picking up ice on the inside of the outside of the panel.
00 08 24 34	CDR	No, on the window number 1, the outside window has ice trickles on the inside of it. In other words, between it and the inner window.
00 08 24 45	CC	Roger, Pete. We got it.
00 08 24 52	CDR	And they weren't there earlier. I don't know when they arrived, but I just noticed them a little while ago.

00 08 25 29	CC	Pete, would you verify that you left the circuit breakers in the LM according to the configuration on activation 3 and 4 except - for that utility circuit breaker?
00 08 25 40	CDR	That's affirmative.
00 08 25 44	LMP	Does the systems testmeter look okay to you? Why'd you ask, Houston?
00 08 26 04	CC	Stand by, Al.
00 08 26 39	CC	Pete, we show that the current going over to the LM is oscillating as before, but it's about 1 amp higher on me.
00 08 26 47	CDR	Okay. What's that mean?
00 08 26 55	CC	Give us another long pause, Pete, and we'll be back up to you.
00 08 29 12	CMP	Hello, Houston; 12.
00 08 29 16	CC	12, Houston.
00 08 29 20	CMP	Roger. It - I think it's about time I went to PTC, don't you?
00 08 29 29	CC	Roger. That's affirmative, Dick. And now that you're back in out of the LM and ready to pick up, why don't I give you some of the things we've been thinking about as far as the time line. You'll be back on that nominal time line when you take the primary EVAP and deactivate it after PTC. And also for PTC, we'd like you to disable quads Alfa and Bravo.
00 08 30 05	CMP	Roger. Understand disable Alfa and Bravo.
00 08 31 06	CC	12, Houston.
00 08 31 12	CMP	Go ahead, Houston.
00 08 31 14	CC	Would you go ahead and turn off hydrogen tank 1 heater to get us to do some cryo balancing? And secondly, give us a readout of the service module RCS propellant quantity for all quads?
00 08 31 31	CDR	Okay. Hydrogen tank 1 heater is OFF, and 2 is remaining in AUTO.

00 08 31 39	CMP	Quad A propellant, FULL SCALE HIGH and a percent. Quad B, FULL SCALE HIGH; quad C, FULL SCALE HIGH; quad D, FULL SCALE HIGH.
00 08 31 50	CC	Roger. Copy all FULL SCALE HIGH.
00 08 32 13	CMP	Houston, we're going to go ahead and maneuver to 090 and set up PTC.
00 08 32 20	CC	Roger, Dick.
00 08 34 13	CMP	Hello, Houston. We have a cryo PRESS, O_2 tank 2 pressure's a little low. It's about 800.
00 08 34 21	CC	Dick, Roger. Copy 800.
00 08 34 25	CMP	And is that normal for that particular tank, or is that one we've - we expected to have trouble with? Like a warning coming on before the heater?
00 08 34 38	CC	Stand by on that, Dick.
00 08 35 07	CC	12, Houston. Had you gone ahead and stirred both tanks? They both look low at the present time.
00 08 35 16	CMP	We haven't done anything to them except leave the heaters on. We can give them both a fan cycle if you like.
00 08 35 24	CC	Stand by on that.
00 08 36 34	CC	12, Houston. You can go ahead and turn the fans on and bring the pressure up.
00 08 36 42	CDR	Roger. We're bringing them both on now, and understand you're going to watch them for us.
00 08 36 47	CC	Roger. We're looking.
00 08 38 02	LMP	Hello, Houston; 12.
00 08 38 06	CC	12, Houston. Go ahead.
00 08 38 07	LMP	What's that tank doing? You give us a ...? Tank 2 O_2.
00 08 38 43	CC	12, Houston. We are showing on tank 1, 737; tank 2, 755; and they appear to be holding.
00 08 38 51	LMP	Say that again, Houston.
00 08 38 57	CC	12, we show on tank 1, 737; tank 2, 755.

00 08 39 05	LMP	Roger. We are trying to figure out ourselves why they ... normal ...
00 08 39 28	CC	12, give us OMNI Alfa, OMNI Alfa.
00 08 39 43	CC	12, go to OMNI Alfa, OMNI Alfa.
00 08 40 29	LMP	Houston, 12.
00 08 40 34	CC	12, Houston.
00 08 40 46	CC	12, Houston. Go ahead.
00 08 40 53	LMP	Houston, this is 12. I just stated that I have quads Alfa and Bravo disabled with the AUTO RCS.
00 08 41 00	CC	Roger.
00 08 41 11	CC	And, 12, would you go ahead and verify that the O_2 heaters are in AUTO?
00 08 41 17	LMP	Both O_2 heaters are in AUTO.
00 08 41 21	CC	Roger, Al.
00 08 41 55	CC	12, Houston. We're looking at the O_2 again and reading tank 1, 758; and 777, tank 2. It's coming up slow.
00 08 42 26	LMP	Okay. We're going to leave our H - I mean our O_2 fans on until you give us a call, then.
00 08 42 32	CC	Roger. That's a good idea. Looks as though you just have some stratification, and it's going to take a little while to mix it up.
00 08 42 39	LMP	Okay.
00 08 47 38	CC	12. Houston.
00 08 47 40	CDR	Go ahead, Ed.
00 08 47 42	CC	Your pitch and yaw rates are - look low. You can go ahead and start the roll.
00 08 47 48	CDR	You say our pitch and yaw looks pretty good, huh?
00 08 47 51	CC	That's affirmative.
00 08 48 00	CMP	Hey, we've only been waiting about 10 minutes.

00 08 48 08	CC	Dick, looks good down here. We're ready to go.
00 08 48 11	CMP	Oh, I'm with you. I was just saying that it only took 10 minutes.
00 08 52 35	CMP	Hello, Houston; 12.
00 08 52 38	CC	12, Houston. Go ahead.
00 08 52 41	CMP	Roger. We are still venting this cabin overboard. We think we should have terminated that about 8 hours. Can we go ahead and terminate the cabin purge?
00 08 53 00	CC	Dick, we show that we ought to go on with that until about 12 hours.
00 08 53 07	CMP	Okay ...
00 08 56 52	CC	12, Houston.
00 08 56 55	CDR	Go ahead, Houston.
00 08 56 58	CC	Pete, we'd like you to take the S-band antenna to the OMNI and go to the Bravo position.
00 08 57 05	CDR	Okay. S-band OMNI to Bravo.
00 08 58 04	CMP	Houston, 12.
00 08 58 07	CC	12, Houston. Go ahead.
00 08 58 09	CMP	Roger. Let us know when you think we can deactivate the evaporator.
00 08 58 15	CC	Roger, Dick. Will do.
00 08 58 17	CMP	Thank you.
00 08 58 21	CC	Dick, you can go ahead and deactivate that now.
00 08 58 25	CMP	Okay.
00 08 59 16	CMP	Hello, Houston. This is 12, and we're about to change lithium hydroxide canister number 1.
00 08 59 25	CC	Roger, Dick. We copy.
00 08 59 54	CMP	Okay, Houston. The evaporator's secured.
00 08 59 59	CC	Roger, 12. Copy the evaporator secured.

00 09 02 08	CC	12, Houston.
00 09 02 11	CDR	Go ahead, Houston.
00 09 02 13	CC	We have some folks back here interested in your comments about the vibration during the S-II burn. Could you quickly give us a few clarifying remarks on that?
00 09 02 24	CDR	It just seemed to me it vibrated all the way through the whole S-II burn, that I could feel, and let me ask the other guys. Yes, it just - -
00 09 02 37	CMP	Had a small low amplitude.
00 09 02 39	CDR	Yes, a very small low amplitude vibration, you know, just a little shaking all the time throughout the whole burn.
00 09 02 54	CC	Roger, Pete. Do you have any feel for the direction and the frequency?
00 09 03 01	CDR	Well, it wasn't longitudinal, and - I don't know, a couple of cps really, I guess, or less.
00 09 03 11	CC	Roger, Pete.
00 09 03 21	CDR	Okay, can you see it on the records down there or anything?
00 09 03 31	CC	Pete, we don't have the - the folks here - the booster folks here are looking at the records right now.
00 09 03 40	CDR	Okay. Understand.
00 09 17 51	CDR	Hey, Houston. It might be interesting to note we haven't used the little separator on our water gun and we're working off the sip hydrogen separator; you know, the one that's down in the lower right-hand side of the LEB, and it's very good water so far. It's got a few bubbles in it.
00 09 18 17	CC	Real good, Pete. Nothing but the best for you.

END OF TAPE

00 09 22 17	CC	12, Houston.
00 09 22 21	CMP	Go ahead.
00 09 22 22	CDR	Go ahead.
00 09 22 24	CC	The folks down here have been looking over the LM E-MOD, and it looks very good to us. See no problem. Would you also take the O_2 fans and put them to OFF. We're - look pretty high on the tank pressure. It's 883 and 893.
00 09 22 41	CDR	Okay. They're both off. And thanks for the information on the LM.
00 09 22 46	CC	Roger.
00 09 50 37	CC	Apollo 12, Houston.
00 09 50 40	LMP	Go ahead.
00 09 50 43	CC	12, if you'll go to POO and ACCEPT, we'll give you a new state vector. Negative on the POO; just ACCEPT.
00 09 51 13	CC	Okay, 12. It's coming up. We're looking for a midcourse 2 tomorrow at 31 hours for about 61 feet per second, and also we have here an update to an erasable load in your alternate and contingency checklist on page 1-32 when you're ready to copy.
00 09 51 52	LMP	Go ahead, Ed. We'll get it on the flight plan and transfer it later. Is it T_{EPHEM}?
00 09 51 58	CC	That's affirmative. And that update is just two lines. Column B, line 4, 14616; line 5, 13744.
00 09 52 27	LMP	Okay, Houston. What page was that? We got column B, line 4 as 14616 and line 5, 13744.
00 09 52 37	CC	Roger, Al. Numbers are good, and that's on page 1-32.
00 09 52 44	CC	It's in your alternate - -
00 09 52 45	LMP	We got it.

00 09 52 46	CC	- - contingency checklist.
00 09 52 47	LMP	We got it.
00 09 53 33	CC	12, the uplink is complete. You can go back to BLOCK.
00 09 53 36	CMP	Roger. What did you give me?
00 09 53 39	CC	Gave you a good state vector.
00 09 53 44	CMP	You mean I ruined it, huh?
00 09 53 54	CMP	Ed, are you telling me that I ruined it with my P23?
00 09 54 03	CC	Dick, stand by on that and we'll see what your P23 did do.
00 09 55 04	CC	Dick, it looks as though your P23 did improve your state vector. However, we had a little longer time to work on it, about 6 hours worth of MSFN, and so we gave you one a tad more accurate.
00 09 55 18	CMP	Thank you.
00 10 18 16	CDR	Houston, 12.
00 10 18 18	CC	12, Houston. Go ahead.
00 10 18 21	CDR	You want that P52 at 10 - about 10:45?
00 10 18 28	CC	Stand by on that, Pete.
00 10 18 31	CDR	Okay.
00 10 19 09	CC	Pete, that P52 is really your option. We don't need it. You can go ahead and do it if you like. You have one coming up at around 15 hours and that would suffice.
00 10 19 21	CDR	Okay. We'll wait.
00 10 19 25	CC	Roger.
00 10 26 19	CC	Apollo 12, Houston.
00 10 26 22	CDR	Go ahead, Houston.
00 10 26 25	CC	12, we're still looking at a current going over to the LM which is about 1 amp higher than

before it was manned. It still fluctuates, but the mean is still about 1 amp higher. So we're faced with the question of whether we have it out of configuration in the LM, and we'd like to suggest that you go on back over to the LM and check the circuit-breaker configuration. The possibility here is that you've got a system on line which is not called out for and doesn't have proper cooling. I'd like to have your thoughts on that.

00 10 27 02	CDR	Okay. We're going to go back over if you want. Now, we left those two panels, as far as I know, in the proper configuration, but we'll go back over. The other thought that I had, I noticed when I closed the hatch that I tried to get the hatch all the way up to the very corner, watch the lights go out - I know the light switch worked on the hatch, because I tried that, but that would be about the only other thing that I can think of that didn't work.
00 10 27 33	CC	Okay. So those floodlights did go out when the hatch was closed.
00 10 27 37	CDR	Well, no. I don't know that they went out. I'm saying that if you push the switch it went out.
00 10 27 44	CC	Okay. That indicates at least that you didn't have the switch out of position.
00 10 35 02	CDR	Houston, we're on our way back in now.
00 10 35 06	CC	Roger, Pete.
00 10 35 09	CDR	We'll get the world's record for ingress/ egressing out of this baby in a couple of more.
00 10 35 15	CC	Roger. Give us a mark.
00 10 35 37	CC	Pete, we assume that you powered down the circuit breaker panel as - on activation 3 and 4. Two circuit breakers there that should be out which are shown in: one is utility light which we discussed and the other under ECS panel 16, the cabin REPRESS, should also be out. That was closed in a previous step.
00 10 36 07	CDR	We'll check them.

00 10 41 46	CDR	Okay, Houston. You got any more bets? The utility circuit - utility light circuit breaker on panel 11 is out and the cabin REPRESS circuit breaker on panel 16 is out.
00 10 42 14	CC	Roger, Pete. We copy that. Stand by and we'll see if there's anything else we can do while we're in there.
00 10 42 21	CDR	Okay. We're going to go through the whole phase 3 here again.
00 10 43 24	CDR	Okay, Houston. We've got a question for you. We - When we left last time, we put our exterior lighting switch from DOCK to OFF, since we'd already docked, and it may be that when it's in OFF it doesn't turn out the cabin lights when you close the hatch. Could you check that?
00 10 43 44	CC	Roger. We'll check that. We saw down here that when you opened the hatch, you didn't get any drop in the current, and we suspect that the problem was the floodlight, but stand by on that.
00 10 44 12	CC	Pete, would you go ahead and verify the position of the floodlight switch? Verify that it's off?
00 10 44 19	CDR	Floodlights are off and exterior lighting in OFF. We also punched the little button on the hatch and the floodlights went off.
00 10 44 32	CC	Roger. We copy.
00 10 45 40	CC	Pete, would you go ahead and open the floodlight circuit breaker, panel 16, and we'll troubleshoot. We'll be watching the current down here and see if we get a change.
00 10 46 16	CDR	Houston, 12. When you pulled that circuit breaker ... the service testmeter dropped 0.4 of an amp - correction - 0.4 of a volt.
00 10 46 34	CC	Roger, 12. We confirm that. We show a drop in amps back to what looked to be the same before you went in. We'd like you to go ahead and leave that circuit breaker open, and you can leave it in that configuration when you leave the LM. When you go back in, of course, we'll just have to punch it in.

00 10 46 56	CDR	Okay. We're getting back out of the LM, Houston. Must be that switch in the hatch is out of adjustment somehow.
00 10 47 04	CDR	Yes. He can put - The switch works by me pushing my finger on it, but it may not cut it off - when it's closed any more.
00 10 47 18	CC	Roger, Pete. We concur with that.
00 10 47 52	CDR	Hey, Houston. We're going to push the breaker back in for just a second and go shut the hatch and watch our testmeter.
00 10 48 00	CC	Roger, Pete.
00 10 49 11	LMP	Hello, Houston; 12.
00 10 49 13	CC	12, go ahead.
00 10 49 15	LMP	Roger. I guess that's it. The - I left the service testmeter and he - Pete came back in and closed the hatch and locked it completely, and the testmeter didn't drop at all. So, we got back in and I'm going to pull the floodlight circuit breaker and now we're down to the bottom.
00 10 49 33	CC	Roger.

END OF TAPE

00 11 08 47	CC	Apollo 12, Houston.
00 11 08 50	CDR	Go ahead, Houston.
00 11 08 52	CC	12, a while back you read to us some service module RCS propellant quantities, and they showed OFF-SCALE HIGH. Also the TM from that gage is still reading OFF-SCALE HIGH, and we suspect a problem with the gage. We'd like to do some troubleshooting on that and have you look at those four propellant quantity readings again and also look at the service module indicator to put that at HELIUM TANK TEMPERATURE and read the four quantities. For your information - For your information, our calculations down here show your RCS total is 86; A is 84; B, 88; C, 84; and D is 89.
00 11 09 42	CDR	Okay. I just checked all A, B, C, and D, and they're all still reading OFF-SCALE HIGH. And then the - in the tank in the service module RCS indicator He tank temp is reading 70 on A; it's reading 85 on B, 85 on C, and 65 on D.
00 11 10 19	CC	Roger, Pete. Copy 70, 85, 85, 65.
00 11 10 24	CDR	Yes. And something I forgot to pass on, I guess, I think I did. When we seped from the S-IVB prior to turning around, I believe it was helium 1, B, barber pole; and system A, secondary propellant, barber pole; and that was it. We turned them both on and away we went.
00 11 11 02	CC	Roger, Pete. We copy that.
00 11 11 09	CDR	We also, Houston, think that our PCM gage is out. It's been reading zero. We changed our canister at the proper time and we had - when was it? During powered flight, then?
00 11 11 20	CMP	During launch.
00 11 11 22	CDR	Yes, during launch we had a flashing P CO_2 light along with a few others. This thing jumped all over the place and then all of a sudden it went to zero and then it moved off the peg, so I kind of got the suspicion that the PT CO_2 gage was out.
00 11 11 54	CC	Roger, Pete. We confirm or suspect that down here.

00 11 18 16	CC	12, Houston.
00 11 18 20	CDR	Hello there, Houston. Go ahead.
00 11 18 24	CC	Say, since you got those two indications on the - two barber pole indications we'd like to have you verify that you did complete the step of throwing the secondary propellant service module RCS to CLOSE and then back to OFF.
00 11 18 46	CDR	That's affirmative.
00 11 18 48	CC	Roger.
00 11 30 22	CC	Apollo 12, Houston.
00 11 30 25	CDR	Go.
00 11 30 27	CC	Flight plan at this time calls for terminating the battery B charge. Because of the exercise this morning and the fact that it drained down the batteries, we'd like you to continue charging battery B, and we suspect that it'll probably go on to about 13 hours. We'll give you a call when we'd like you to go to battery A. Also, you can perform your O_2 fuel cell purge as planned, and if you hold out - or take that waste water dump down to about 15 percent rather than the nominal 25, you won't have to have another dump until about midcourse 2.
00 11 31 09	CDR	Understand.
00 11 51 44	CDR	Okay, Houston, we're going to turn off the dump now.
00 11 51 50	CC	Roger, 12.
00 11 53 10	CDR	Say, Houston, how far out are we?
00 11 53 19	CC	Stand by, Pete. We'll give you a good figure.
00 11 53 24	CDR	Thank you.
00 11 53 58	CC	12, you are about 56 000 miles out now, and you are smoking along at 7600 feet per second.
00 11 54 07	CDR	Okay. Thank you.
00 11 54 21	CC	Al, are you still at the window?

00 11 54 26	LMP	That's affirmative.
00 11 58 34	LMP	Houston, Apollo 12.
00 11 58 38	CC	12, Houston. Go ahead.
00 11 58 41	LMP	The Earth doesn't seem to be getting smaller too fast right now, but it is sort of funny. It just seems to hang out there. It doesn't - You can't see it rotate, you can't see it move or anything. It just sort of hangs out there in this black space, and the Moon just doesn't seem to be any bigger than it was when we left, but it looks more like a sphere also. It sort of looks like a ball that is being hung out there somehow. It's really crazy.
00 11 59 17	CC	Al, which way does it look like it is hanging from?
00 11 59 24	LMP	North Pole, naturally. Otherwise the string would get all tangled up.
00 11 59 35	CMP	Just scientists are supposed to know that.
00 11 59 40	CC	You need some experimental proof.
00 11 59 58	LMP	That subsolar point is over the water now, and it glints on the surface of the Earth just like a light on a billiard ball or something. There is a little spot there that gives you a little specular reflection, and then it's got a bright halo, or just a bright area, around it.
00 12 00 20	CC	Roger. How - -
00 12 00 24	LMP	It looks like we can see the coast of China and Japan now. It's kind of hard to tell. You can see red Earth pretty well, but if there's greens or grays, it is very difficult to discern them from the blues.
00 12 00 40	CC	Roger, Al. That glint, is that about a quarter of the way off the - about half-way between the terminator and the edge?
00 12 00 50	LMP	That's about right.
		Music - "San Antonio Rose"
00 12 04 27	CDR	Al's getting homesick up here; we're just trying to keep him happy.

00 12 04 36	CC	Pete, is that you singing?
00 12 04 39	CDR	No. Unfortunately, it's not.
00 12 04 59	CC	Pete, let's hear a little of that good music.
		Music - "San Antonio Rose"
00 12 05 15	CC	Okay, that's enough. Pete, I asked for a little of the good music.
00 12 05 26	CMP	Roger-Roger.
00 12 05 30	CDR	Just a minute. I'll go see if I can find it.
		Music - "Louisiana Man" by Rusty and Doug
00 12 08 02	CC	Pete, all the folks down here feel that isn't half bad.
00 12 08 07	CC	All bad.
00 12 08 14	CDR	Well, I'll tell you what it's done. It's precipitated a big search for the rest of the tapes. Al and Dick are scurrying all over the spacecraft.
00 12 08 25	CC	Can we help?
00 12 10 45	CMP	Houston, 12.
00 12 10 48	CC	12, Houston. Go ahead.
00 12 10 50	CMP	Okay. What about the waste stowage vent?
00 12 11 00	CC	12, you can go ahead and close it now.
00 12 11 03	CMP	Okay. And we'll hold off until we finish charging battery B, before we dump the battery compartment.
00 12 11 14	CC	Roger, Dick. That sounds good.
00 12 11 34	LMP	Ed, I guess you might as well start logging this leak rate now for the LM. It's - DELTA-P is plus 0.2 right at this time, and I don't think we'll be ... for a day or so now so we can start logging, and zero on our gage is 0.1 plus 0.1.
00 12 11 55	CC	Roger. Copy DELTA-P 0.2, and zero is 0.1.
00 12 12 00	LMP	That's affirmative.

00 12 12 24	CDR	Houston, this is 12. We went ahead and vented that battery right now and it's on its way down to zero. It was up to 3 volts when we started.
00 12 12 36	CC	Roger, 12.
00 12 13 19	CDR	Okay, Houston. At 12:24 it says here in our flight plan that we'll be full frame for a 500 millimeter and we have it out, and I presume that that time is still pretty good.
00 12 13 39	CC	Stand by on that, Pete.
00 12 13 58	CC	Pete, was that a recent write-in to the flight plan?
00 12 14 04	CDR	No, it's on our photo card.
00 12 14 07	CMP	We just found that out before we left.
00 12 14 11	CC	Roger.
		Music - "Chattanooga Choo-Choo"
00 12 18 48	CC	Pete, those values of the f-stops you just questioned look good. That's f:11 for the Earth, f:8 for the Moon.
00 12 18 57	CDR	Okay. Thank you.

END OF TAPE

Music - "Can't Take My Eyes Off of You" (Vicki Carr)

00 12 42 31	CMP	... is that any better?
00 12 42 35	CC	Well, we suggest, Dick, that maybe you continue scurrying around there.
00 12 42 40	CMP	Oh, you're really hard at it today, aren't you? Okay.

Music - "Wichita Lineman" (Glen Campbell)

00 12 52 17	LMP	That Earth view is really going to be something weird coming back, Houston, when you only got about a - just a little bitty sliver of the Earth, because, like I said earlier, you just can't see anything in the black. And when we had that eclipse at about 5 hours, I guess the Earth's going to completely disappear.
00 12 52 38	CC	Roger, Al, copy. You see Australia coming up over the - over by the edge?
00 12 52 46	LMP	I sort of do. It's difficult to tell, unless the ground is - has a pretty good contrast to the - to the water. And I can see some red over there, and I'm not really sure whether that's Australia or exactly what it is. Makes you wish you had studied your geology harder in high school, or something - geography, that is.
00 12 54 37	LMP	Okay, Houston. We've got Australia.
00 12 54 53	CC	12, Houston. Say again.
00 12 55 01	LMP	Roger, we got Australia in sight now at the - oh, it's about the 8 o'clock position, with respect to the terminator.
00 12 56 19	CC	Al, are you able to pick out any small islands out there in the Pacific?
00 12 56 25	LMP	Pete's using the monocular right now and - what do you say, Pete?
00 12 56 40	CDR	There's a lot of clouds out there, Houston. I can see a lot of fairly small clouds, but there is so darn much cloud cover out in the Pacific, except right off the northeast coast of Australia, that I really haven't found any islands yet, but I am sort of scanning for them now.

00 12 57 04	CC	Roger.
00 12 58 42	CMP	Hey, Houston, 12.
00 12 58 46	CC	Houston. Go ahead.
00 12 58 48	CMP	Roger. Have you been plotting this PTC on the ball? How's it looking?
00 12 58 54	CC	Roger, Dick. We've been watching it; stand by.
00 13 00 48	CC	Dick, we've been looking at your trace here, and it looks as though you're up to around 27 degrees now; you're just sort of pigtailing out. What gave you a large excursion was the waste-water dump. It looks as though you'll be heading back in; you won't really significantly improve - that is, you won't really get the alignment rate right down close to zero at the rate you're going, but you'll probably stay within 30 degrees, so just hold what you've got.
00 13 01 19	CMP	Okay, Ed. Thank you.
00 13 07 12	CC	Apollo 12, Houston. We have a - some P37 PADS for lift-off, 25, 35, 45, and 60, when you're ready to copy.
00 13 07 23	CDR	Okay. Mr. Bean is busying himself finding the PAD at this time, and he'll be ready to copy in just a minute.
00 13 07 31	CC	Roger.
00 13 07 35	CDR	Go.
00 13 07 36	CC	P37 block data: 025:00, 4227, minus 169, 074:12; 035:00, 6327, minus 166, 073:39; 045:00, 4917, minus 168, 097:58; 060:00, 4496, minus 168, 122:01.
00 13 08 44	CC	That's it, Al. Read back.
00 13 08 48	LMP	Okay, the last one I got before we lost S-band there with you was the 122, and I didn't copy the last part GET 400K.
00 13 08 59	CC	Okay. GET at 400K was 122:01.
00 13 09 08	LMP	Okay, readback follows: 025:00, 4227 ...; 035:00, 6327, minus 166, 073:39; ... 0 ... 045:00, 4917, minus 168, 097:5 ... - -

00 13 09 42	CC	Al, hold up; your transmissions are all broken.
00 13 10 03	LMP	I'll see if I can get a little closer to the mike; do you want me to start over again?
00 13 10 08	CC	Stand by, Al. We still have a lot of static on the line.
00 13 10 12	LMP	Okay.
00 13 10 47	CC	Okay, Al. Go ahead with your readback. After 025:00 we pretty much lost all of it.
00 13 10 55	LMP	Okay. I'll start anew. 025:00, 4227, minus 169 074:12; 035:00, 6327, minus 166, 073:39; 045:00, 4917, minus 168, 097:58; 060:00, 4496, minus 168 122:01.
00 13 11 41	CC	Readback correct, Al.
00 13 13 08	CMP	Hello, Houston, 12.
00 13 13 12	CC	12, Houston. Go ahead.
00 13 13 15	CMP	Roger. It looks like - get another calibration point for our service testmeter. Looks like the battery compartment is vented when it reads 0.4 of a volt. It's been on for about - well, 30 minutes and going ... Can you take a look at that?
00 13 13 33	CC	Roger. Copy. Voltage for vented is 0.4.
00 13 13 44	CMP	Roger. You confirm us closing that - at this time, starting on a battery B charge, over - or a battery Alfa charge.
00 13 13 59	CC	Dick, we'd like to go ahead and close the batter manifold, but continue charging battery B.
00 13 14 06	CMP	Okay.
00 13 14 28	CC	Dick, we estimate another 30 to 45 minutes for charging battery Bravo.
00 13 14 35	CMP	Okay.
00 13 35 32	CC	Apollo 12, Houston.
00 13 35 36	CMP	Go ahead, Houston.

00 13 35 39	CC	Dick, you can go ahead and stop charging battery Bravo and start on battery Alfa. If you go ahead and charge that until you hit the sleep period, you'll be able to get 60 percent of the charge back in.
00 13 35 56	CMP	Okay. We're going to go off BAT B and start charging BAT A.
00 13 36 02	CC	Roger.
00 13 36 20	CMP	Okay. We're charging BAT A at this time.
00 13 36 27	CC	Roger, 12.

END OF TAPE

00 14 17 42	CC	Apollo 12, Houston.
00 14 17 46	CDR	Go ahead, Houston.
00 14 17 48	CC	Roger. We're sort of suggesting here that, when you terminate your PTC, you go directly to your P23 attitude as listed in the flight plan to do your P52. There should be good stars there, and it will save one attitude maneuver later.
00 14 18 07	CDR	Okay.
00 14 18 11	CC	And at the P23 optics CAL, the roll is 204, pitch 262, and yaw 0.
00 14 18 18	CDR	Okay.
00 14 18 44	CDR	Welcome aboard, Don.
00 14 18 55	CC	You certainly had an exciting one this morning.
00 14 19 01	CDR	Yes. It keeps recurring in our conversation (laughter) throughout the day today.
00 14 19 14	CMP	Anybody see anything from the ground in all that business?
00 14 19 23	CC	That's affirmative. We saw lightning coming right down your p_ume, right to the ground.
00 14 19 32	CMP	Are you kidding me, or not?
00 14 19 34	CC	That's some of the reports we've been getting back.
00 14 19 39	CDR	I believe it.
00 14 19 44	CC	I keep telling you, you don't fly through thunder storms.
00 14 19 49	CDR	I keep wondering why they write that in all the handbooks. They can write that in the Saturn V handbook now.
00 14 45 43	CDR	Houston, Apollo 12.
00 14 45 52	CC	Houston, go.
00 14 45 56	CMP	You know these marks are going to be good. Dick Gordon even used his eye patch this trip.

00 14 46 04	CC	Roger.
00 14 46 13	CMP	I was looking at the Earth a few moments ago. You can see the entire top of Australia. Sure is pretty, and hardly any clouds at all over it. And looks to me like it's to be about one and a half to two times the size of a golf ball at arm's length.
00 14 46 31	CC	Should be a pretty impressive view from that altitude.
00 14 47 00	CC	Apollo 12, would you select OMNI Alfa, please?
00 14 47 10	CMP	Roger. Didn't seem to change anything.
00 14 47 17	CC	Houston, say again.
00 14 47 20	CMP	Roger. We were watching the signal strength, and it didn't seem to affect it much.
00 14 47 24	CC	We're anticipating.
00 14 47 27	CMP	Okay.
00 14 53 12	CMP	Say, Houston, 12.
00 14 53 16	CC	Go.
00 14 53 18	CMP	Our PICAPAR has put the star in the LM. Have you got a couple of stars to this attitude that would not have blockage by the LM?
00 14 53 29	CC	Stand by.
00 14 56 10	CC	Apollo 12. It looks like you beat the computer down here. Procyon and Rigel are the ones that we're recommending, that's 16, Procyon, and 12, Rigel.
00 14 56 24	CMP	Okay. And here's NOUN 05 for you, and here's the torquing angles coming down.
00 14 56 32	CC	Roger.
00 14 56 41	CMP	Okay. Houston. Are you copying those torquing angles?
00 14 56 44	CC	That's affirmative.
00 14 56 51	CMP	Have you got them, Houston?

00 14 56 54	CC	That's affirmative.
00 14 56 57	CMP	Okay.
00 14 59 11	CC	Apollo 12, Houston.
00 14 59 16	CMP	Go ahead, Houston.
00 14 59 18	CC	It looks like you've got a pretty good platform up there, since the last P52 you had - You show about 1.4 in negative drift in Z, and the other two axes are better than that, so we're quite pleased with that down here. Also, we would lik you to confirm the position of your SCE power push.
00 14 59 41	CMP	SCE power is in NORMAL.
00 14 59 44	CC	In NORMAL. Roger.
00 15 28 21	LMP	Hello, Houston, Apollo 9. Correction, 12.
00 15 28 34	CC	Go ahead. Houston, 12.
00 15 28 37	LMP	Roger, Houston. What state vectors do you have in the LM slot?
00 15 28 56	CC	It's the CSM prior to the P23.
00 15 29 03	LMP	Thank you.

END OF TAPE

00 15 52 30	CC	Apollo 12, Houston.
00 15 52 52	CC	Apollo 12, Houston.
00 15 52 56	CMP	Go ahead, Houston.
00 15 52 58	CC	Roger. It looks like we're ready for PTC now, and when you start the maneuver we would suggest OMNI Bravo.
00 15 53 08	CMP	Roger, OMNI Bravo.
00 15 54 58	CMP	Hey, Houston, how do those P23's look to the guys in the back?
00 15 55 03	CC	They look great.
00 15 55 07	CMP	They're real happy, huh?
00 15 55 09	CC	They sure are.
00 15 55 12	CMP	Okay. If they're happy, I'm happy.
00 15 55 24	CC	12, we've got an uplink to the gyro drift whenever you can give us the computer.
00 15 55 33	LMP	Okay. It's all yours.
00 15 55 35	CC	Thank you.
00 15 57 12	CC	Apollo 12, the computer's yours again. Thank you.
00 15 57 42	CC	Apollo 12, Houston. We're finished with the computer. It's yours again.
00 15 57 47	CDR	Okay. Thank you.
00 15 57 49	CC	Thank you.
00 15 58 21	CC	This is Houston, 12. Did you call?
00 15 58 27	CDR	That's negative, Houston. Some other spacecraft must have called in.
00 15 58 31	CC	Roger. (Laughter) I was hearing you occasionally weak, and we're not sure whether it's you or the others.
00 15 58 40	CDR	Roger-Roger.

00 16 06 33	CC	Apollo 12, Houston.
00 16 06 51	CC	Apollo 12, Houston.
00 16 06 55	CDR	Go ahead, Houston.
00 16 06 57	CC	Roger. We wanted to make a couple of suggestions for you before you settle down for the night, and we wanted to leave that up to your option, when you want to go to sleep after you eat. And a couple of items before - we wanted to remind you of - that you'll have to include before you settle down for the night. First one is that the H_2 tanks, both 1 and 2, should be in AUTO. You would terminate the battery charge, and you'd change the lithium hydroxide canister, and then we wanted to leave it up to you when you wanted to terminate your activity today.
00 16 07 40	LMP	Okay. We understand about the battery charge, and we intend to change the canister on time; and more than likely we'll try to go to bed about the proper time although we may go a little bit earlier. We're all pretty tired.
00 16 07 59	CC	Roger. That's fine with us, and we can understand that you might want a little extra sleep.
00 16 08 23	CC	12, in case I was not clear on that, we suggest that you go with the heaters to AUTO after you finish the presleep checklist.
00 16 08 34	LMP	Okay. H_2 heaters to AUTO after presleep checklist. Roger-Roger.
00 16 22 26	CDR	You guys calling, Houston?
00 16 22 30	CC	Not us. You must be talking to somebody strange now.
00 16 22 35	CDR	Okay.
00 16 25 40	CC	Apollo 12, Houston.
00 16 26 25	CC	Apollo 12, Houston.
00 16 26 29	CDR	Go ahead, Houston.

00 16 26 31	CC	Listen, those transmissions you thought you heard a couple of minutes ago were us running some keying checks. We didn't think they were getting out, but apparently a couple of them did; so apparently, nobody is up there flying with you.
00 16 26 43	CDR	Okay. Very good.
00 16 46 08	CC	Apollo 12, Houston.
00 16 46 12	CDR	Go ahead, Houston.
00 16 46 14	CC	Roger. We liked your PTC maneuver down here. Looks pretty good. And just a reminder to - You can turn off the AUTO RCS select switches now.
00 16 46 33	SC	...
00 16 53 36	CDR	Houston, Apollo 12.
00 16 53 39	CC	Go.
00 16 53 42	CDR	How about a E-memory dump?
00 16 53 46	CC	We're all ready.
00 16 53 51	CDR	Coming at you.
00 16 57 28	CC	Apollo 12, Houston.
00 16 57 35	CDR	Go ahead, Houston.
00 16 57 36	CC	Could you give us that dump again? We switched bit rate on you in the middle and fouled ourselves up.
00 16 57 46	CDR	Coming at you, Houston.
00 16 57 49	CC	Thank you.
00 16 58 08	CDR	Hey, Houston, seeing we don't have any service module RCS propellants gage that's working, could you give us our - what you think our present A, B, C, and D quads are, please?
00 17 03 32	CDR	Houston, Apollo 12.
00 17 03 35	CC	Go.

00 17 03 38	CDR	Roger. Did you get my last request?
00 17 03 41	CC	Yes. We're trying to work those up, the RCS consumables.
00 17 03 47	CDR	Oh, okay. Thank you.
00 17 03 48	CC	Yes. We're working on it.
00 17 06 32	CC	Apollo 12, Houston.
00 17 06 35	CDR	Go ahead.
00 17 06 37	CC	Okay. I've got your RCS propellants for you. The total is 83.2 percent; Alfa is 80.5; Bravo is 85.3; Charlie is 81.4; Delta is 85.4. That's the status as of about 2 minutes ago and also, we got your E dump successfully.
00 17 07 13	CDR	That's lovely.
00 17 07 15	CC	Roger.

END OF TAPE

00 17 06 32	CC	Apollo 12, Houston.
00 17 06 35	CDR	Go ahead.
00 17 06 38	CC	Okay. I've got your RCS propellant for you. The total is 83.2 percent, Alfa is 80.5, Bravo is 85.3, Charlie is 81.4, Delta is 85.4. That's the status as of about two minutes ago, and also, we got your E dump successfully.
00 17 07 13	CDR	That's perfect.
00 17 07 15	CC	Roger.
00 17 18 40	CDR	Houston, 12.
00 17 18 43	CC	Go.
00 17 18 47	CDR	Okay. The presleep checklist is complete. We have no medical crew status report, and - the - We're going to the normal lunar COMM mode except S-band NORMAL, so forth and so on.
00 17 19 02	CC	Roger. Have pleasant dreams. We see you in the morning.
00 17 19 11	CDR	Okay. The battery charge is going off at this time.
00 17 19 16	CC	Roger.
00 17 23 18	CC	Apollo 12, Houston.
00 17 23 48	CC	Apollo 12, Houston.
00 17 23 49	CDR	Go ahead, Houston.
00 17 23 51	CC	Sorry to bother you again, Pete. We need pyro BAT readouts from you if we could. We'd also like to get a LM/command module DELTA-P reading and a confirmation that the heaters are on AUTO - the cryo heaters.
00 17 24 07	CDR	Okay. The heaters are on AUTO; BAT C's, 37.1; pryo BAT A, 37.2; pryo BAT B, 37.2; and the LM/CSM DELTA-P is plus 0.4.

00 17 24 24	CC	Roger. We've got it all. Thanks very much and have a pleasant night's sleep.
00 17 24 31	CDR	Okay.

END OF TAPE

REST PERIOD - NO COMMUNICATIONS

01 03 53 32	CDR	Hello, Houston, Apollo 12.
01 03 53 36	CC	Good morning, Pete.
01 03 53 50	CC	Hello, 12. Houston here.
01 03 54 31	CDR	Hello, Houston; hello, Houston. Apollo 12. Over.
01 03 54 38	CC	Good morning, Pete.
01 03 54 41	CDR	Morning.
01 03 54 45	CC	You have everybody up and about there?
01 03 54 49	CDR	Everybody's up.
01 03 55 09	CDR	They give you a crew status report.
01 03 55 13	CC	I thought we just had it, but go ahead.
01 03 55 17	CDR	Okay. Everybody had 8 hours of sleep, and the PRD's for the CDR is 11 005; for the CMP, 11 005; for the LMP, 04 006.
01 03 55 36	CC	Roger. Copy.
01 03 55 59	CC	Apollo 12, Houston. If you want to go ahead and stir your cryo's, we can get good H_2 and O_2 readout for your consumables update.
01 03 56 10	CDR	Okay, that's in work.
01 03 56 15	CC	A couple of words on your RCS, Pete. We're running a little behind the curve, a total of about 60 pounds low. We are recommending that you perform your maneuvers at your option at either 0.2 degree a second or minimum impulse in an attempt to reduce RCS usage. Over.
01 03 56 44	CDR	Roger.
01 03 57 48	CC	12, Houston. Ready with your morning newscast if you are.
01 03 57 55	LMP	Okay. Go.

01 03 57 59	CC	Okay. Whoever answered me that time was way down in the mud and hardly readable. World attention is on the Flight of Apollo 12. The Soviet Union held the crew as courageous; and Tass, the official Soviet news agency, reported the start of the mission and a brief factual report in both of its Russian and foreign-language reports. Czechoslovak television carried a live coverage of the lift-off, complete with an explanation of technical details. In West Germany, all radio and television networks carried the launch live, as did the Japanese Broadcasting Company. The launch is being described by such adjectives as "spooky" and "cliff hanging." Even President Nixon, a one-time Navy man himself, admitted he had some anxious moments but added "I'm really proud of those three men up there." Weather is a news item in Houston where temperatures are expected to dip into the 20's tonight. Automobile owners are being advised to put anti-freeze in their car radiators. Today's a voting day in Houston as Houston picks a mayor, eight councilmen, four schoolboard members, and decides upon a number of special issues. In sports, Houston Oiler Woody Campbell ended rumors and speculation yesterday by strolling into the Oiler training room and putting on his uniform. He says he's in good shape after 10 months as an MP with the First Infantry Division in Vietnam and hopes to be in action very soon. We're working up some ball scores for you; the only one available right now is a halftime score, it's Ohio State 28 and Purdue 7.
01 03 59 49	LMP	Houston, 12. Right at the end of the reports on Apollo 12, we changed the antennas. Did you want to relay some stuff up between that and the election in Houston? If so, would you repeat it, please?
01 04 00 11	CC	Okay. Yes, I got several paragraphs in there. Let me start over again and I'll read it on down to where - the election in Houston. World attention is on the flight of Apollo 12. The Soviet Union held the crew as courageous; and Tass, the official Soviet news agency, reported the start of the mission in a brief factual report in both of its Russian and foreign language reports. Czechoslovak television carried live coverage of the lift-off, complete with an explanation of

technical details. In West Germany, all radio and television networks carried the launch live, as did the Japanese Broadcasting Company. The launch is being described with such adjectives as "spooky" and "cliff hanging." Even President Nixon, a one-time Navy man himself, admitted he had some anxious moments but added "I'm really proud of those three men up there." And weather is a big news item in Houston where temperatures are expected to dip into the 20's tonight, and there was a fairly heavy frost in the neighborhood last night. And then we picked up with the voting, which I guess you got.

01 04 01 29	LMP	Roger-Roger. Thank you.
01 04 01 43	CC	And I got a flight plan update when you have a chance.
01 04 01 53	CMP	Go ahead.
01 04 01 54	CC	Okay, Dick. At 30:30, we call for a waste-water dump, which is back to our normal procedure of dumping down to 25 percent on that one. And at 31:30, want to start a charge on battery Alfa. Over.

END OF TAPE

01 04 02 17	CDR	Roger. We copy.
01 04 02 25	CDR	Waste-water dump 30:30, 25 percent. Battery A charge, 31:30.
01 04 02 30	CC	Roger.
01 04 03 12	CC	12, Houston. Your PCO_2 sensor is powered through a circuit breaker on panel 5. If you haven't already checked it, would you check transducer pressure group 2; main Alfa circuit breaker?
01 04 03 31	CDR	Okay. Wait one.
01 04 03 53	CDR	They're all in, Houston.
01 04 03 57	CC	Thank you.
01 04 06 38	LMP	Houston, Apollo 12. How far out are we now?
01 04 06 41	CC	Stand by and I'll find out for you, Al.
01 04 06 55	CC	12, Houston. Not quite halfway at a 110 000 miles.
01 04 07 02	LMP	Roger.
01 04 09 25	CC	12, Houston. OMNI Delta, please.
01 04 13 39	CC	12, Houston. We'll continue to manage your antennas here until you tell us that you're ready to take control of them. And I have a consumables update for you.
01 04 13 51	CDR	Okay, Houston. We're eating breakfast, so we'll let you manage them for a while longer, and I'm ready to copy the update.
01 04 14 03	CC	Okay. The update was at 26:50; your total RCS is 83.2; reading Alfa through Delta, we have 80.5, 86.0, 80.8, 85.4. Your H_2 is 87.8 and 85.6; O_2 is 87.0 and 87.1. Over.
01 04 14 53	CDR	Roger. 12 copies.
01 04 28 41	CDR	Houston, 12.
01 04 28 45	CC	Go ahead, 12.

01 04 28 48	CDR	You got anything more to add to what happened yesterday? We've been sitting up here chuckling again this morning about it.
01 04 28 56	CC	Stand by and I'll get a recap on it, Pete.
01 04 28 57	CC	12, Houston. Nothing new to report. It's - They're still considering it from two, three aspects, but nothing firm yet.
01 04 30 08	CDR	Okay.
01 04 38 48	CC	12, Houston. We've got a half dozen or so scores of ball games in progress, if you're interested.
01 04 38 56	CDR	Okay. Go ahead.
01 04 38 58	CC	Okay. Final score, Syracuse beat Navy 15 to 0; in the third quarter, Yale is leading Princeton 14 to 7; in the first quarter, Texas 21, TCU nothing. In the third quarter, Houston's ahead of North Carolina State 34 to 7; in the third quarter, Michigan State is leading Minnescta 7 to nothing; and that big game in the Big 10, in the third quarter, it's now Ohio State 40 and Purdue 7.
01 04 39 35	CDR	Okay. Thank you.
01 04 39 38	CMP	... Paul, this is Dick. I understand that the University of Washington's homecoming's this weekend; will you wish them well for me, please?
01 04 39 46	CC	Okay. Sure will. We'll pass that on.
01 04 39 51	CDR	Sounds like I should have (clearing throat) wished Princeton well a little earlier; maybe it's not too late.
01 04 39 57	CC	No, it's only the first quarter. Maybe it will still work.
01 04 40 01	CDR	Okay.
01 04 40 04	LMP	And I guess Texas doesn't need any help.
01 04 40 07	CC	Apparently not.
01 05 00 58	CC	Hello, 12; Houston. We're not trying to press you, but we've got your uplinks and your PADS ready whenever you're ready.

01 05 01 08	CDR	Okay (clearing throat). We'll give you the computer right now, and - and I'll be ready to copy the PAD in just a second.
01 05 01 18	CC	Okay. And also, for information, the burn attitude for MCC-2 will also be a good attitude for P52 and for all your star checks if you want to come out of PTC and just go right to that attitude.
01 05 01 36	CDR	Okay. That sounds good. Ready to copy, and the computer is yours. It's in P00 and ACCEPT, and Al's ready to copy.
01 05 01 46	CC	Roger. It's MCC-2, SPS G&N: 63284, plus 0.96, minus 0.25, 030:52:43.68, minus 0060.1, minus 0012.6, plus 0005.6, 034, 095, 333. The NOUN 44 blocks are not applicable; 0061.7, 0:09, 0057.2. Sextant star 22, 150.5, 30.9. Your boresight star is Vega, 036, up 250, 0 deflection, up and down that is - correction, left and right. The rest of the PAD is NA. Your GDC align stars are Sirius, 15; Rigel, 12. The angles are 256, 152, 069; no ullage; LM weight, 33585. Over.
01 05 04 28	LMP	Okay, Houston. That's 63284, plus 0.96, minus 0.25, 030:52:43.68, minus 0060.1, minus 0012.6, plus 0005.6, 034, 095, 333, NA, NA, 0061.7, 0:09, 0057.2, 22, 150.5, 30.9. Vega, 036, up 250, 00. Set stars are Sirius, 15, and Rigel 12; 256, 152, 069; no ullage; LM weight 33585.
01 05 05 36	CC	That's all of Charlie, Al.
01 05 06 22	CC	12, Houston. The computer's yours.
01 05 06 29	LMP	Roger.
01 05 23 28	CC	12, Houston. You want some more ball scores, Dick, or are you busy?
01 05 23 34	CMP	Go ahead.
01 05 23 35	CC	Okay. Sorry, Pete; it didn't work. The final score was Yale 17, Princeton 14. And for Al, Texas is leading TCU at the half 24 to 7; Washington, they haven't started on the West Coast. In the fourth quarter, fourth quarter that is, Pitt is leading Army 12 to 6. Dave's next to me; he just cringed at that. A final,

Penn State beat Maryland 48 to nothing. Final, Houston beat North Carolina State 34 to 13. Here's a big one. In the third quarter, Mississippi is leading Tennessee 31 to nothing. The final in the Ohio State-Purdue game, Ohio State on top, 42 to 14. Minnesota beat Michigan State 14 to 10. In the first quarter, Arkansas is leading SMU 14 to 12. At half, Rice is leading A&M 7 to nothing. And that's all we have for now.

01 05 24 46	CMP	Okay. Appreciate it very much. Thank you.
01 05 30 05	CC	Hello, 12; Houston. You're GO for MCC-2.
01 05 30 10	CMP	Apollo 12. Roger.
01 05 30 37	CMP	Houston, Apollo 12. The LM/CSM DELTA-P is plus 0.7.
01 05 30 45	CC	Houston. Roger.
01 05 31 51	CC	12, Houston. I have some high-gain angles for you for the burn.
01 05 31 56	CDR	Okay, Houston. Go.
01 05 31 59	CC	Okay. That will be pitch minus 85, yaw plus 28. And when you get to the burn attitude, would you give us narrow beam width, please?
01 05 32 15	CDR	Okay. Pitch minus 85, yaw plus 28, and while we're in the burn attitude, go to narrow beam width.
01 05 32 22	CC	Roger.
01 05 32 31	CDR	And as soon as we roll around on this one to the right roll angle, we'll be going into the P52, Houston.
01 05 32 38	CC	Houston. Roger.
01 05 33 44	CC	12, Houston. Give us OMNI Bravo, please.

END OF TAPE

01 05 45 54	CC	Hello, 12, Houston. Over.
01 05 46 30	CC	Hello, Apollo 12, Houston. Over.
01 05 46 34	CDR	Go ahead there, Houston.
01 05 46 37	CC	Okay, on this - You've got a pretty tight LM, and it is going to have to be purged some. We have got two options. The flight plan calls for a CSM purge at 36 hours. The other option is to vent the LM down now. Instead of doing that, the pros and cons are that the cabin purge, the CSM cabin purge takes longer, and does slightly perturb the postburn tracking. Now, all of other things being equal, and if it meets with your approval, we would like to request that you vent the LM down now. Over.
01 05 47 22	CDR	Okay. Roger. How far do you want it vented?
01 05 47 30	CC	This is Houston. You are broken. Say again.
01 05 47 32	CDR	How far do you want it vented?
01 05 47 35	CC	Okay. We would like to vent to a DELTA-P of about 1.5 to 1.6. This should take about 30 to 45 minutes to go from the present 0.7 to those values. Over.
01 05 47 54	CMP	Houston, okay. Are you looking at the DSKY?
01 05 47 58	CC	That's affirmative.
01 05 48 02	CMP	Okay. There's the torquing angles. Do you copy?
01 05 48 05	CC	We have only got one so far. There they come. We have them, Dick.
01 05 48 14	CMP	Okay. Torquing on my mark.
01 05 48 16	CMP	MARK.
01 05 48 19	CC	Got it.
01 05 52 59	CC	Hello, Apollo 12, Houston. I have a status report on the Phoenix 200 if you want it, Pete.
01 05 53 07	CDR	Okay.

01 05 53 09	CC	Okay. Al Unser is leading after 59 laps. Mario Andretti is second. Bobby Unser is third. A. J. Foyt was forced out of the race. My information doesn't indicate when. He was running with the leaders and his car was damaged in a collision. There were no injuries.
01 05 53 30	CDR	Roger-Roger.
01 05 58 04	LMP	Houston. Apollo 12. The lithium hydroxide canister change out has been done on time.
01 05 58 10	CC	Roger 12. Thank you, and your platform looks real good. No updates.
01 05 58 16	LMP	Okay.
01 06 02 16	CC	Hello, Apollo 12, Houston. A hot flash on the Phoenix 200. Al Unser and Mario Andretti collided with each other and Bobby Unser is now in the lead.
01 06 02 28	CDR	Okay. Very good.
01 06 05 10	CC	Hello, 12, Houston. A correction to my last update on the Phoenix 200. That collision was between Mario Andretti and Bobby Unser. Al Unser still has the lead.
01 06 05 21	CDR	Okay. Very good. Do you know how far along they are in the race?
01 06 05 28	CC	No, we don't know right now, Pete. We will get it for you.
01 06 05 31	CDR	Okay.
01 06 11 49	CC	12, Houston. Can you give us a readout on the LM command module DELTA-P now, please?
01 06 11 56	CDR	Okay. Just a second, let me go up there. I had a clock running for a while, and I was just going to check it in a minute.
01 06 12 02	CC	We just want to get a heck on the rate.
01 06 12 18	CDR	Okay. It's about 1.25 to 1.3 right now.
01 06 12 25	CC	Roger, understand. And here on the ground, we're configured for TV.

01 06 12 31	CDR	Okay. We're just setting it up in here, and the - we'll go back to LM tunnel VENT. You want to go to 16, right?
01 06 12 39	CC	That's affirmative. Between 1.5 and 1.6.
01 06 12 45	CDR	Okay. It's back at VENT.
01 06 12 46	CC	Roger.
01 06 13 38	CDR	Houston, you want the TV now?
01 06 13 43	CC	Stand by, Pete.
01 06 14 03	CC	While we're getting a reading on the TV, Pete, they stopped the race in Phoenix after 84 laps because of rain, if you can believe it; and they're going to wait awhile and then restart when it slacks off.
01 06 14 16	CDR	Okay. Thank you.
01 06 15 48	CC	12, Houston. We're ready for a TV whenever you are, Pete.
01 06 15 56	CDR	Okay. We'll be coming at you in just a second.
01 06 15 59	CC	Roger.
01 06 16 15	CDR	Okay, Houston. We're giving you the TV. We'll be coming up VOX, and we'll let you watch what happens during the burn.
01 06 16 27	CC	Roger.
01 06 16 35	CDR	Okay, I guess I'm on VOX now. I've got to stow this helmet stowage bag. I'll stick it in this container A7 here.
01 06 16 50	LMP	No, not in A7.
01 06 16 54	CMP	B30.
01 06 16 56	CDR	Okay, Dick, I don't think your VOX is set quite right yet. Need some more sensitivity. Use the ... plug all the way.
01 06 17 03	CMP	Okay.

01 06 17 07	CDR	Let me get the big book.
01 06 17 10	CMP	Preburn checks, 30 hours 52 minutes 43.68 seconds.
01 06 17 25	CMP	Plus 5.6.
01 06 17 29	CDR	Okay. Got the TV yet, Houston?
01 06 17 37	CC	Roger, 12. Looks beautiful.
01 06 17 42	CDR	Okay. We're just going through the preburn checklist at this time. Al's down in the bilge stowing some gear for the burn. Dick's in the left-hand couch, and I'm in the center couch right now, and we have the TV mounted so that you can watch the instrument panel and the switches throwing.
01 06 18 10	CC	Roger, Pete.
01 06 18 15	CDR	Okay, let's see. The clock's in SYNC now.
01 06 18 17	CMP	They're in SYNC 34, 27, and 25.
01 06 18 20	CDR	Houston, do you want us to run the tape recorder during this TV or not?
01 06 18 28	CC	Stand by.
01 06 18 32	LMP	We're concerned about the high bit rate while operating the TV.
01 06 18 37	CC	12, Houston. Better run the tape just during the burn.
01 06 18 40	CMP	Okay.
01 06 18 48	LMP	We had the automatic stop on.
01 06 18 49	CDR	Al, would you take the monitor and put it someplace for a second? And Dick, hand me the - -
01 06 18 55	CMP	Put it over here.
01 06 18 56	CDR	- - tool E, so I can go up and check the DELTA-P in the LM again.
01 06 19 00	CMP	Okay, yes.

01 06 19 09	CDR	Okay, we've got just a little bit to go.
01 06 19 11	CMP	Got all your shoulder straps tucked away where they won't go anywhere?
01 06 19 15	CDR	We're at 1.4 on these water bags. Need a drink of water, Dick?
01 06 19 22	CMP	Got it.
01 06 19 23	CDR	Okay.
01 06 19 26	CMP	Well, let's see, we got to do something with the water gun. Let's stick her down here.
01 06 19 35	CDR	Can't, with that thing on, can you?
01 06 19 36	CMP	Uh-uh. Not unless it would go in backwards, which it will.
01 06 19 41	CDR	That's super.
01 06 19 43	CMP	There you go.
01 06 19 46	CDR	I'll hold on to tool E. I'm gonna - I'm gonna shut off the vent a minute anyhow.
01 06 19 53	CMP	We're almost there. If the our stowage bag falls off the wall, we're going to have garbage all over the place.
01 06 20 02	LMP	Okay. There's another one.
01 06 20 04	CMP	Great Scott.
01 06 20 12	LMP	Okay.
01 06 20 17	CDR	Got the DAP all loaded?
01 06 20 19	CMP	DAP's loaded. ROT CONTROL POWER, two of them, AC/DC.
01 06 20 22	CDR	AC/DC.
01 06 20 24	CMP	DET is set.
01 06 20 25	CDR	It's set.
01 06 20 27	CMP	And we have several choices. You can either go to P40, or we can sit where we are, or you can go over to P00.

01 06 20 36	LMP	Might as well sit here for a few minutes, I guess, and watch the clock, and see how they do.
01 06 20 43	CDR	Deadly TV monitor keeps floating around here. Get her and put her out of the way.
01 06 20 57	CMP	Okay.
01 06 21 14	CDR	Well, let me check that LM DELTA-P again.
01 06 21 25	CDR	No, not quite.
01 06 21 59	CDR	Okay. Now, weren't we flowing some O_2 before? Wonder why we're doing it now?
01 06 22 10	CMP	We haven't opened anything. You got any of the vents open down there, Al?
01 06 22 13	LMP	Let me check. I don't think so. I don't think we're flowing anything.
01 06 22 17	CMP	Everything's closed in here and the DELTA-P - -
01 06 22 21	CDR	No, it's in tunnel vent, I'm venting the LM down.
01 06 22 27	LMP	No, not a thing is venting as far as I can see.
01 06 22 34	CMP	Oh, you just may be making up some in the cabin.
01 06 22 37	CDR	Do you see anything loose, now?
01 06 22 39	LMP	I think I've got it all stowed.
01 06 22 42	CDR	Very good.
01 06 22 44	LMP	Trouble is, some of those things hang up in under the seats and float so still that you don't see them. Think they're part of the seat or something. You're not used to looking in those places on Earth.
01 06 22 55	CDR	Okay. We got 30 minutes to the burn.
01 06 22 58	LMP	All righty.
01 06 23 13	CDR	Set 10 minutes on your little ding-ding timer there, will you, Al. And then fasten it to that tunnel vent so I don't forget it.

01 06 23 20	LMP	All right.
01 06 23 30	CMP	Give all these circuit breakers a quickcage ...
01 06 23 32	CDR	Go for the burn, time is 9 seconds; to shutdown is burn time plus one, and we trim X to within two tenths, less than 2.
01 06 24 26	CMP	Did we ever dump the waste water down to 25 percent?
01 06 24 29	CDR	No. We can do that right now. Okay, wastewater dump coming up. Hey, Al, you want to check - want to watch the gage?
01 06 24 37	LMP	Okay.
01 06 24 38	CMP	Okay.
01 06 24 41	CDR	And Houston, we're going to dump the waste water down to 25 percent at this time.
01 06 24 47	CC	Roger, 12. We're standing by.
01 06 24 48	CMP	Okay, check - - okay, vent valve is closed, and I'm going to dump A.
01 06 24 52	LMP	Okay.
01 06 24 55	CMP	There you go.
01 06 24 56	LMP	You got 50 percent, around there, about 49.
01 06 25 00	CDR	Okay.
01 06 25 01	CMP	...
01 06 25 02	LMP	Huh?
01 06 25 03	CMP	I need the AUTO dump vent B systems book.
01 06 25 07	LMP	Pete's got it.
01 06 25 19	CDR	Okay, I'm going to - I'm reading 1 point - Houston, I'm reading 1.5 on the LM DELTA-P now, but I think I'll let it go to 1.6 because the gage has about a tenth error in it when it's equal.
01 06 25 33	CC	Okay, Pete, that sounds fine.

01 06 25 38	CMP	How is the waste water doing, Al?
01 06 25 40	LMP	It's doing good. It's just down to about 45.
01 06 25 41	CMP	Okay. Say, how's the focus on the TV? We usually don't become focused on this monitor up here.
01 06 26 20	CMP	Hey, Houston, what do you think of the hats our boss presented with us?
01 06 26 23	CC	We were just going to ask you for a little fashion show here, troops.
01 06 26 29	CMP	Well, we've got a space-qualified beta cloths and all those good things.
01 06 26 34	CC	Roger. CAPCOM has one, too.
01 06 26 39	CMP	Outstanding. Have you got a propeller on yours?
01 06 26 43	CC	No. Just one guy's got a propeller.
01 06 26 47	CMP	... That's what I figured.
01 06 26 49	CC	I'm just like you guys.
01 06 26 50	CMP	How's the waste water, Al?
01 06 26 51	LMP	It's good. It's ...
01 06 26 53	CMP	How much is it?
01 06 26 54	LMP	14 percent.
01 06 26 56	CMP	Okay.
01 06 26 57	LMP	It sure is spraying outside. It looks like a snowstorm.
01 06 27 01	CMP	Okay. Did you mean to leave this storage box open?
01 06 27 07	LMP	Yes, I've got something I want to put in there.
01 06 27 09	CMP	Okay.
01 06 27 29	LMP	Hand me a towel, would you, Pete?
01 06 27 35	CDR	Here you go.
01 06 27 46	CDR	Okay. Slip up into the tunnel, and let's look at the DELTA-P again. Just a smidge more. Okay.

01 06 28 04	CMP	How's the waste water?
01 06 28 06	LMP	Waste water is running. It's now at 31.
01 06 28 07	MS	Very good.
01 06 28 08	CMP	Very good.
01 06 28 12	LMP	I'm all done.
01 06 28 18	CDR	Al, if you will jump back in here, we can get the P40 checklist.
01 06 28 23	LMP	Okay. I will be right with you as soon as the waste water is down, and I'll get the LM squared away, and that's it.
01 06 28 28	CMP	Still 31 - now it's moving down. ... of the water is up at 95.
01 06 28 49	CMP	It's about 29 now.
01 06 28 56	LMP	Okay. One towel back where it belongs. Okay. That's 25 percent. Shut her down.
01 06 29 04	CMP	Waste water down, Pete.
01 06 29 06	CDR	Okay. Waste water coming off. Pressure relief is from dump A back to 2, potable inlet is coming open.
01 06 29 15	CMP	There you go.
01 06 29 17	CDR	That's it. Now, once you square away the LM, that's good enough, it ought to be just about 1.6.
01 06 29 21	LMP	I'll get this in the stowage compartment.
01 06 29 24	CDR	There we go, LM/CM DELTA-P and, Houston, it's reading now 1.6, exactly.
01 06 29 32	LMP	Okay. There I come.
01 06 29 35	CC	Roger. 12. You can terminate.
01 06 29 41	LMP	Okay. Let's put the tool over there. Now, let me up in my belt. Now adjust. Okay.

01 06 30 11	CMP	There you are.
01 06 30 13	CDR	All right. ... the whole works.
01 06 30 15	CMP	Give Al one. He can have the PAD, I guess.
01 06 30 18	CDR	Okay, Al, I'll let you have the PAD.
01 06 30 19	LMP	Okay.
01 06 30 20	CMP	Got ... easy?
01 06 30 25	CDR	Okay, want to cycle into P00 and P40 and bring everything up to speed.
01 06 30 29	LMP	Okay. We're down to ... 20 minutes.
01 06 30 30	CDR	Okay.
01 06 30 37	LMP	We're in P00 and P40.
01 06 30 39	CDR	Okay.
01 06 30 46	LMP	P40 and those angles look good, 337.30, 095.24, 332.52.
01 06 30 53	CDR	Okay. Let's go there.
01 06 30 54	LMP	All right. Going on maneuver. Yes. There it goes. This reminds me of riding in a freight train.
01 06 31 09	CDR	Freight train, freight train, going so fast (singing).
01 06 31 20	LMP	Okay, we're there.
01 06 31 21	CDR	All right.
01 06 31 22	LMP	Burn attitude.
01 06 31 25	CDR	Now, you've got the 50 18 and AUTO. We have checked the stars. Okay. I'll run the checklist to minus 6 minutes.
01 06 31 56	CMP	The GDC's aligned.
01 06 31 58	CDR	Okay.
01 06 32 04	CDR	All right. Panel 8 circuit breakers, STAB CONTROL SYSTEM 8 of them closed.

01 06 32 10	CMP	STAB CONTROL, 8 closed.
01 06 32 14	CDR	CB SPS, 12 of them closed.
01 06 32 18	CMP	SPS, 12 closed.
01 06 32 25	CDR	Okay, set DELTA-V_C. It's set - -
01 06 32 27	CMP	DELTA-V_C is set to 57.2.
01 06 32 31	CDR	Roger. That's verified. EMS FUNCTION DELTA-V verified?
01 06 32 33	CMP	DELTA-V verified.
01 06 32 34	CDR	MANUAL ATT, three of them in RATE COMMAND.
01 06 32 36	CMP	RATE COMMAND.
01 06 32 37	CDR	LIMIT CYCLE, ON.
01 06 32 39	CMP	LIMIT CYCLE is ON.
01 06 32 41	CDR	ATT DEADBAND, MIN.
01 06 32 42	CMP	MIN.
01 06 32 43	CDR	RATE's LOW.
01 06 32 44	CMP	RATE, LOW.
01 06 32 45	CDR	TRANS CONTROL POWER, UP and ON.
01 06 32 46	CMP	UP and ON.
01 06 32 47	CDR	SCS TVC, two, up to RATE COMMAND.
01 06 32 49	CMP	SCS TVC is RATE COMMAND.
01 06 32 50	CDR	DELTA-V_{CG} LM/CSM.
01 06 32 53	CMP	LM/CSM.
01 06 32 55	CDR	TVC GIMBAL DRIVE, PITCH and YAW, AUTO.
01 06 32 57	CMP	PITCH and YAW, AUTO.
01 06 32 58	CDR	Okay. There we are. We're holding at 6 minutes.

01 06 33 05	CMP	We've got about 12 minutes to go, Al, to bus ties.
01 06 33 10	CDR	How's that focus, Houston?
01 06 33 21	CC	Apollo 12, Houston. Focus is just a shade fuzzy now. It was better earlier.
01 06 33 28	CDR	Okay. I'll move in a little bit. How's that?
01 06 33 30	SC	How's that?
01 06 33 37	CC	It's getting worse now.
01 06 33 51	CMP	Wrong way.
01 06 33 53	CC	Now, it's improving. No, you went through it.
01 06 34 07	CMP	Here, I'll hold that for you.
01 06 34 09	CDR	Okay.
01 06 34 20	LMP	Looks like an eye exercise.
01 06 34 25	CDR	How's that look now, Houston?
01 06 34 31	CC	It's pretty good now, 12. It's still not as good as it was at first.
01 06 34 37	CDR	I can't understand why.
01 06 35 23	CMP	Friendly tuning fork again.
01 06 35 40	CDR	Yes. That's how I get around the spacecraft. I turn on my propeller.
01 06 36 04	CC	Apollo 12, contact.
01 06 36 09	CDR	Roger-Roger.
01 06 37 26	CMP	I'll hold this for a while?
01 06 37 28	CDR	Sure, just stick it up there somewhere.
01 06 37 29	CMP	Okay, I'll put it on the ...
01 06 37 45	CDR	Okay, Houston. 15 minutes.
01 06 37 49	CC	Roger, 12.

01 06 38 14	CMP	Al, I'll give BMAG back in about 3 or 4 seconds after the burn.
01 06 38 18	LMP	Okay.
01 06 38 20	CMP	It's only 9 seconds long.
01 06 38 22	LMP	Okay-dokey.
01 06 38 32	CDR	Looks like that S-IVB really did the job yesterday, didn't it?
01 06 39 24	CMP	Sure takes a long time for - whenever you dump anything, it sure takes a long time for it to dissipate out there. It really hangs with us.
01 06 40 02	CDR	Might mention to you, Houston, we've been all been enjoying the food very much. It's a lot better than Gemini.
01 06 40 08	CC	Real fine, Pete.
01 06 40 12	CDR	Nice to have hot coffee this morning.
01 06 41 05	CC	Apollo 12, Houston. I'll be giving you a 10-minute time hack in about a minute and a half.
01 06 41 12	CDR	Okay. Standing by.
01 06 41 20	CMP	It's a good move, Jerry, with the way our clocks are up here.
01 06 41 24	CDR	Yeah. When Dick's up here by himself, this mission timer we have on the panel 2 has been virtually useless. It changes time both plus and minus, and it's just not working at all right.
01 06 41 40	CC	Roger.
01 06 41 42	CDR	The one down in the LEB, one down in the LEB is keeping pretty good time.
01 06 42 14	CC	30 seconds to go.
01 06 42 18	CDR	Okay. It looks like we're pretty well in SYNC with you.

01 06 42 27	CC	I'm going to give you 1-second lead so it will be 10 when it gets there.
01 06 42 33	CDR	Okay.
01 06 42 39	CC	Stand by for 10. Two.
01 06 42 44	CC	MARK.
01 06 42 46	CDR	Right, 10 minutes; we're right with you. After the burn, we're going to clean up the spacecraft, and I think the three of us will shave. And then want to do some exercise with the exerciser, and I suspect that will occupy most of the rest of the day.
01 06 43 22	CC	Roger.
01 06 44 09	CDR	Get my hand out of the way there. Holding the books up here.
01 06 44 39	CDR	Seems like those upper thrusters, you can hear them fire; it's the lower ones that you can never hear.
01 06 44 48	LMP	I don't know what it is, but it's on top of the insulation of the quad supports.
01 06 44 55	CMP	Oh, yes, I saw ... yesterday.
01 06 44 56	LMP	They're discolored.
01 06 44 57	CDR	No, they were that way yesterday.
01 06 44 59	LMP	They were?
01 06 45 00	CDR	Yes. It looks like you dropped a drop of oil on water. It's multicolored. Yes. I noticed that yesterday.
01 06 45 06	LMP	You think it's some heating from our RCS thrusters, or what?
01 06 45 10	CDR	I don't think so. I don't think we've been firing them that way. They might of done it yesterday.
01 06 45 16	CMP	It wasn't there at launch, or when we first picked up the LM.

01 06 45 44	CDR	Okay. Coming up on 7 minutes, and we'll pick up the checklist at minus 6.
01 06 46 19	CDR	Okay, Al, let's bring on the bus ties.
01 06 46 23	LMP	Okay-doke. ... ON, A/C's ON; got them both.
01 06 46 29	CDR	Okay, TVC SERVO POWER 1, AC 1/MAIN A.
01 06 46 32	CMP	1, AC 1/MAIN A.
01 06 46 34	CDR	TVC SERVO POWER 2, AC 2/MAIN B.
01 06 46 37	CMP	2, AC 2/MAIN B.
01 06 46 39	CDR	ROT CONTROL POWER NORMAL, two, to AC.
01 06 46 41	CMP	AC.
01 06 46 42	CDR	ROT CONTROL POWER DIRECT, two, to OFF.
01 06 46 44	CMP	OFF.
01 06 46 45	CDR	BMAG MODE, three of them, ATT 1/RATE 2.
01 06 46 47	CMP	ATT 1/RATE 2.
01 06 46 48	CDR	SPACECRAFT CONTROL to SCS.
01 06 46 50	CMP	SCS.
01 06 46 51	CDR	ROTATION HAND CONTROLLER number 2, ARMED.
01 06 46 53	CMP	Number 2 is ARMED.
01 06 46 55	CDR	Okay. Primary TVC check. GIMBAL MOTORS, PITCH 1, YAW 1; START/ON.
01 06 46 59	CMP	Okay, are you ready?
01 06 47 00	CDR	PITCH 1. Go.
01 06 47 01	LMP	Here you go.
01 06 47 02	CDR	PITCH 1 -
01 06 47 03	CMP	Mark.
01 06 47 04	LMP	It's on.

01 06 47 05	CMP	I got it.
01 06 47 06	CDR	YAW 1 -
01 06 47 07	CMP	Mark.
01 06 47 08	LMP	It's ON.
01 06 47 09	CMP	I got it.
01 06 47 10	CDR	Okay. Verify TRIM CONTROL and SET.
01 06 47 11	LMP	Trim.
01 06 47 12	CMP	Plus 96, minus 25.
01 06 47 18	CDR	Okay, want to verify that, Al?
01 06 47 20	LMP	Just a minute. I have ... set.
01 06 47 24	CMP	Okay.
01 06 47 25	CDR	You got minus 25?
01 06 47 26	LMP	Minus 25, yes.
01 06 47 27	CDR	You've got MTVC, right?
01 06 47 28	CMP	Roger.
01 06 47 31	CDR	Okay. SPACECRAFT CONTROL to CMC.
01 06 47 34	CMP	CMC. Trim to zero.
01 06 47 36	CDR	TRANSLATIONAL HAND CONTROLLER, CLOCKWISE.
01 06 47 38	CMP	CLOCKWISE.
01 06 47 39	CDR	Verify no MTVC.
01 06 47 40	CMP	No MTVC.
01 06 47 42	CDR	Okay. Secondary TVC check. GIMBAL MOTORS, PITCH 2, YAW 2, START. Ready, Al?
01 06 47 47	LMP	Yes.
01 06 47 48	CDR	PITCH 2 -
01 06 47 49	CDR	Mark.

01 06 47 50	LMP	I got it.
01 06 47 51	CMP	I got it.
01 06 47 52	CDR	YAW 2 -
01 06 47 53	CDR	Mark.
01 06 47 54	LMP	I got it.
01 06 47 55	CMP	I got it.
01 06 47 56	CDR	Okay. Set the GPI trim.
01 06 47 57	CMP	Trim set.
01 06 47 58	LMP	Verified.
01 06 47 59	CDR	Okay. Verify MTVC.
01 06 48 00	LMP	Have MTVC in PITCH - and YAW.
01 06 48 04	CDR	Okay. TRANSLATION HAND CONTROLLER, NEUTRAL.
01 06 48 08	CMP	NEUTRAL.
01 06 48 09	CDR	Verify no MTVC.
01 06 48 11	LMP	No MTVC.
01 06 48 13	CDR	Verify GPI returns to zero, zero.
01 06 48 15	CMP	Zero, zero.
01 06 48 16	CDR	Okay. ROT CONTROL POWER, two, AC/DC.
01 06 48 20	CMP	AC/DC.
01 06 48 21	CDR	ROT CONTROL POWER DIRECT, two, MAIN A/MAIN B.
01 06 48 23	CMP	MAIN A/MAIN B.
01 06 48 24	CDR	BMAG MODES, three of them to RATE 2.
01 06 48 27	CMP	RATE 2.
01 06 48 28	CDR	PROCEED.
01 06 48 29	CMP	Trim.

01 06 48 30	CDR	Okay. That's complete. BMAG MODES, three of them, ATT 1/RATE 2.
01 06 48 35	CMP	ATT 1/RATE 2.
01 06 48 37	CDR	ENTER.
01 06 48 38	CMP	ENTER.
01 06 48 39	CDR	Okay. There's a 204. PRO.
01 06 48 44	CMP	Gimbal trim check: plus 2, minus 2.
01 06 48 46	CDR	Goodness gracious. It rattles the whole - -
01 06 48 47	CMP	Plus 2 - -
01 06 48 48	CDR	- - spacecraft, doesn't it?
01 06 48 51	CMP	- - minus 2. 0.
01 06 48 56	LMP	Yes. It moves it around, ...?
01 06 48 58	CMP	Yes.
01 06 48 59	CDR	Okay, and there's your trim set - -
01 06 49 01	CMP	Trim it once, ..., quarter.
01 06 49 03	CDR	Okay, you're standing by at 3 minutes and 40 seconds and counting.
01 06 49 09	CC	Roger, 12. Trim looked good here.
01 06 49 13	CMP	Roger-Roger, Houston.
01 06 49 14	LMP	Second burn.
01 06 49 20	CDR	Okay. Dick. FDAI scale 5/5.
01 06 49 22	CMP	Scale's 5/5.
01 06 49 24	CDR	LIMIT CYCLE, OFF.
01 06 49 25	CMP	LIMIT CYCLE's OFF.
01 06 49 26	CDR	RATE, HIGH.
01 06 49 27	CMP	RATE's HIGH.
01 06 49 28	CDR	Update the DET.

01 06 49 29	CMP	DET is right on.
01 06 49 31	CDR	Okay. Standing by for 2 minutes.
01 06 50 43	CDR	Okay, there's 2 minutes, Dick. DELTA-V thrust A to NORMAL.
01 06 50 47	CMP	DELTA-V A is NORMAL.
01 06 50 48	CDR	TRANSLATIONAL HAND CONTROLLER, ARMED.
01 06 50 50	CMP	ARMED.
01 06 50 51	CDR	ROTATIONAL HAND CONTROLLER, ARMED. A1, SPS HELIUM VALVES, two of them, AUTO.
01 06 50 56	LMP	They're AUTO.
01 06 50 57	CDR	Let's have it HIGH BIT RATE, RECORD, FORWARD, COMMAND RESET.
01 06 51 01	LMP	Okay.
01 06 51 03	CDR	Standing - -
01 06 51 04	LMP	Record COMMAND RESET.
01 06 51 05	CDR	- - standing by for 35 seconds.
01 06 51 08	LMP	Helium and nitrogen all look okay.
01 06 51 11	CDR	All righty.
01 06 51 12	LMP	Tank pressures look good.
01 06 51 45	CDR	MARK - 1 minute.
01 06 52 02	CMP	Sit over here where I can watch the clock for you.
01 06 52 11	CDR	DSKY's blank.
01 06 52 15	CDR	Average g; EMS MODE is - -
01 06 52 17	CMP	EMS is NORMAL.
01 06 52 18	CDR	Okay. There is no ullage. You're clear to proceed in 5 seconds.
01 06 52 25	CMP	Standing by on the PRO.

01 06 52 36	CDR	10, 9, 8, 7, 6, 5, flashing 99 to PRO, 2, 1 -
01 06 52 45	CDR	IGNITION.
01 06 52 46	CMP	Thrust.
01 06 52 47	LMP	I got ball valve A.
01 06 52 48	CDR	Okay - -
01 06 52 49	LMP	- - ... other ball valve.
01 06 52 50	CDR	- - 3, 4, 5, 6, 7, 8, 9 seconds - -
01 06 52 55	CMP	SHUTDOWN.
01 06 52 56	LMP	I got all ball valves off; compressors are okay.
01 06 52 58	CDR	B bank's off, A bank's off.
01 06 52 59	CMP	Very good.
01 06 53 00	CDR	Watch the gimbals.
01 06 53 01	LMP	I'm watching them - -
01 06 53 02	CMP	The gimbals are - -
01 06 53 03	CDR	Okay. YAW 2 is OFF.
01 06 53 04	CMP	It's OFF.
01 06 53 05	CDR	PITCH 2, OFF.
01 06 53 06	CMP	It's OFF.
01 06 53 07	CDR	YAW 1, OFF.
01 06 53 09	CMP	It's OFF.
01 06 53 10	CDR	PITCH 1, OFF.
01 06 53 11	CMP	It's OFF. Okay?
01 06 53 13	CDR	Okay. Let me run the checklist, now.
01 06 53 15	CMP	Moves out, doesn't it?
01 06 53 17	CDR	Yes. DELTA-V A and B switches, OFF.
01 06 53 18	CMP	They're OFF.

01 06 53 19	CDR	SPS INJECTOR VALVES, all CLOSED.
01 06 53 21	LMP	They're CLOSED.
01 06 53 22	CDR	SPS HELIUM VALVES, all CLOSED. Right?
01 06 53 24	LMP	Right.
01 06 53 25	CDR	GIMBAL MOTORS, four of them, OFF.
01 06 53 26	CMP	They're all OFF.
01 06 53 27	CDR	TVC SERVO POWER 1 and 2, OFF.
01 06 53 30	CMP	1 and 2 are OFF.
01 06 53 32	CDR	Okay. Main bus ties, two of them, OFF.
01 06 53 34	LMP	Coming off.
01 06 53 35	CDR	And there's the - -
01 06 53 36	LMP	They're OFF.
01 06 53 37	CDR	- - Yes, okay. Minus 1, minus 3, and plus or minus a tenth.
01 06 53 48	LMP	Is that our thrusters?
01 06 53 49	CDR	Yes, yes. Dick's trimming. That's it. Minus a tenth.
01 06 53 55	CMP	Trim is minus 0.1; EMS reads minus 2.2.
01 06 54 00	CDR	Okay. You got the bus ties off?
01 06 54 03	LMP	They're off.
01 06 54 05	CDR	Okay. Null residuals - it was done - and did you give them the EMS counter?
01 06 54 12	CMP	Yes.
01 06 54 13	CC	That's affirmative. We copy.
01 06 54 14	CDR	EMS FUNCTION - Okay, EMS MODE, STANDBY.
01 06 54 17	CMP	STANDBY and OFF.
01 06 54 18	CDR	LIMIT CYCLE, ON.
01 06 54 19	CMP	LIMIT CYCLE's ON.

01 06 54 20	CDR	ATT DEADBAND, MAX.
01 06 54 21	CMP	MAX.
01 06 54 22	CDR	TRANS CONTROL POWER, OFF.
01 06 54 23	CMP	TRANS CONTROL POWER's OFF.
01 06 54 25	CDR	ROT CONTROL POWER DIRECT, two of them, OFF.
01 06 54 27	CMP	DIRECT, two, OFF.
01 06 54 28	CDR	BMAG MODES, three of them to RATE 2.
01 06 54 29	CMP	RATE 2.
01 06 54 30	CDR	A1, PCM BIT RATE, LOW.
01 06 54 32	LMP	Okay.
01 06 54 34	CDR	And PRO - We done that.
01 06 54 37	CMP	VERB 82 doesn't need any - ... think so.
01 06 54 38	LMP	You know when you're ullaging, I can see a reflection on the bouncing clock here. It goes red.
01 06 54 42	CMP	Yes.
01 06 54 47	CDR	Hello, Houston.
01 06 54 49	CC	Go ahead, 12.
01 06 54 52	CDR	Roger. Single bank nominal SPS chamber pressure was 90. Dual bank was 95. Over.
01 06 55 00	CC	Roger. 90 and 95.
01 06 55 04	CDR	That's affirmative on my gage.
01 06 55 09	CMP	Okay. We going to have to go back to PTC.
01 06 55 13	CDR	Oh, Houston -
01 06 55 15	CC	Go ahead, 12.
01 06 55 17	CDR	Do we have a - Let's see - we have a GO to VERB 66, the state vector?
01 06 55 28	LMP	I think we're supposed to, anyway.
01 06 55 33	CMP	There now.

01 06 55 34	CDR	Okay. Well, that was nice to get a touch of g again. Nothing came off the ceiling so we must have gotten everything down where it belongs.
01 06 55 49	LMP	Yes, the LM's still out in front of us.
01 06 55 50	CMP	That thing makes a bang when it starts.
01 06 55 53	CDR	Noticed that.
01 06 55 54	CMP	It kind of kicks; the same way the S-IVB did. It's funny because it had a bang instead of a jerk, and then everything goes smooth after that, the same way as on the stages.
01 06 56 15	CDR	That ran pretty good together, didn't it?
01 06 56 20	LMP	It started ... oxidizer balance ... That way we can start where it was ...
01 06 56 31	CDR	All right. Houston, do you want anything else on the burn status report?
01 06 56 42	CMP	They locked up yet?
01 06 56 43	CC	12, Houston. Doesn't look like we need anything more. We'll poll the room here. Stand by.
01 06 56 56	CDR	And how does that engine look, Jerry, to the gentlemen on the ground?
01 06 57 03	CC	It looks very good, and we don't need any more information.
01 06 57 07	CDR	Roger. Thank you. Okay, Dick. Let's grab the checklist and go to PTC.
01 06 57 16	CMP	I'm slowly maneuvering back there. Minimum impulse to PTC attitude.
01 06 57 21	CDR	Okay. And I'll put the flight plan here. Al, while we are doing that, why don't you grab the camera and swish her around here? - -
01 06 57 34	LMP	Okay.
01 06 57 36	CDR	- - so I can finish - finish up the ..., okay.
01 06 57 44	LMP	I'll be moving the camera ...
01 06 58 12	CMP	Did they copy my residuals, Pete?

01 06 58 14	CDR	I think they probably did. Did you copy the Y residuals, Houston? What was it, minus 0.3?
01 06 58 18	CMP	Yes, yes.
01 06 58 21	CC	Affirmative, 12. We copied them all.
01 06 58 24	CDR	Okay.
01 06 58 29	LMP	Let's put this on the hatch, and they can see all the globules, all the little parts we didn't dump, but there's a part ... ...
01 06 58 39	CMP	Shine it on the window out there, anyhow. On the TV screen ... - -
01 06 58 45	CDR	Well, what you're seeing is a reflection of the fluorescent lights in the window. They couldn't figure that for a minute.
01 06 58 52	CMP	We turned one of them down - -
01 06 58 54	CDR	I thought we had a friend flying along with us. See all those particles go by, Houston?
01 06 59 02	CC	Sure can. It looks like a snow storm.
01 06 59 07	LMP	I been wondering where all of them came from, but I was watching the LM last night as it was coasting along, and there's a lot of small pieces of white material that's all over the LM, and I assume it's all over the other parts of the spacecraft, and then ... when we make a burn or something like that, it must shake parts of it loose.
01 06 59 29	CDR	I think what that is, Al, is ice from these water and urine dumps and everything that has collected on it, and then we shake them loose again.
01 06 59 34	LMP	Could be. Let's take a look out here at - at the LM - -
01 06 59 39	CC	12, this is Houston. Al, your mouth - mike must be away from your face a little bit too far. You're kind of hard to read on VOX.
01 06 59 49	LMP	Okay. ...
01 07 00 02	CDR	Say, Houston, do you have any words on this - on what may have happened to our helium - excuse me - our RCS - RCS gage - propellant quantity gage? You apparently have - Do you have TM on

		the ground or you just taking this from pressures and TEMP - helium pressure TEMP?
01 07 00 27	CC	Negative, Pete. We don't have TM on that on the ground; we're using pressures and temperatures to figure it.
01 07 00 44	CDR	Okay. Do you want the PTC checklist?
01 07 00 47	CC	12. Houston. Our TM is showing the same thing you're seeing - off-scale high.
01 07 00 53	CDR	I see. Understand.
01 07 00 57	LMP	Well, let's - let's turn A and B off again for 20 minutes to stabilize. Do you concur, Houston?
01 07 01 06	CC	Stand by, 12.
01 07 01 11	LMP	...?
01 07 01 14	CDR	Yes, he said he concurred.
01 07 01 16	LMP	Okay. Quads A and B are off. We'll sit here and stabilize.
01 07 01 21	CC	Okay, 12.
01 07 01 43	LMP	Well, that's one done. We only have five more to go.
01 07 01 46	CDR	That's right.
01 07 02 09	CDR	You know what you got now? You're getting - you hear those thruster firing. We're getting a little propellant slosh, I'll bet you.
01 07 02 17	CMP	Could very well be.
01 07 02 21	CDR	It sure is taking a while to settle down.
01 07 02 29	CMP	Look at that GDC. ... already.
01 07 02 33	CDR	Yes, we ought to run a drift check on that and find out if it's just - it seems to be not only yaw but pitch.
01 07 03 13	CDR	Hey, Houston, if it's all right with you, we will go ahead and secure the TV.
01 07 03 22	CC	Okay, 12. You guys are looking real fine. That was a nice burn.

01 07 03 27	CDR	Okay.
01 07 03 31	CC	Our compliments to your camera man.
01 07 03 36	CDR	Okay.
01 07 03 41	LMP	Yes. You have to help us on the focus. We can frame it and everything up here, but the focus is difficult to see up in this monitor.
01 07 03 51	CC	Al, if that's you talking, you're still not too good. Yes, the focus was real fine the last half of the show there, and right there when we were fiddling with it, it went bad and then you went through a good focal point and off to a fairly reasonably one, and it seemed to improve later on then.
01 07 04 14	LMP	Okay, I think the problem is if I zoom in on something, it's difficult to focus. I went back and was not zoomed in, and then it's a fairly easy situation.
01 07 04 24	CC	That's affirm. It seemed to be pretty nice.
01 07 04 26	LMP	Thanks, Houston for your help.
01 07 05 18	CC	12, Houston. We're starting the data dump now.
01 07 05 29	CC	Apollo 12, Houston.
01 07 05 33	LMP	We copied you, Jerry - you can see us dumping now.
01 07 05 36	CC	Roger.
01 07 06 37	CDR	And, Houston, we're planning to make a dump now. Is that okay?
01 07 06 49	CC	Say again, 12.
01 07 06 53	CDR	We're planning a urine dump now, if that's okay.
01 07 07 11	CC	Yes. No problem, 12. Go ahead.
01 07 07 15	CDR	Okay.
01 07 08 28	CC	Apollo 12, Houston. Did you do a fuel cell O_2 purge before the burn?
01 07 08 36	CDR	Negative. We didn't.

01 07 08 40	CC	Okay. We'd just as soon you'd delay it until your next opportunity at 40 hours.
01 07 08 48	MS	...
01 07 08 49	CDR	- - 40 hours. Thank you. Well, we're sorry we missed that.
01 07 08 53	CC	No sweat, 12.

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01 07 08 28	CC	Apollo 12, Houston. Did you do a fuel cell O_2 purge before the burn?
01 07 08 36	CMP	Negative. We didn't.
01 07 08 41	CC	Okay. We'd just as soon you delay it until your next opportunity at 40 hours.
01 07 08 48	CMP/CDR	...
01 07 08 49	CMP	- - 40 hours. Thank you. We're sorry we missed that.
01 07 08 53	CC	No sweat, 12.
01 07 15 22	CC	Apollo 12, Houston.
01 07 15 26	CMP	Go ahead, Houston.
01 07 15 28	CC	Roger. It looks like your rates are low enough now to start PTC; we notice your CMC MODE switch is in HOLD position and you should be in AUTO.
01 07 15 38	CMP	Okay.
01 07 16 46	CMP	There she goes, Houston.
01 07 16 48	CC	Roger, 12.
01 07 16 57	CMP	Houston, this is 12. Do you want us to save all jets or just work in this 30-degree deadband until our sleep period?
01 07 17 11	CC	12, Houston. You can turn them off now if you want to.
01 07 17 16	CMP	Okay. I'm just saving a couple that may fire on us or something, huh.
01 07 17 20	CC	Roger.
01 07 21 46	CC	Apollo 12, Houston.
01 07 21 50	CMP	Go ahead, Jer.
01 07 21 51	CC	Roger. Go S-band antenna to OMNI and OMNI Bravo.
01 07 21 57	CMP	Roger. OMNI to OMNI Bravo.
01 07 39 04	CDR	Houston, 12.

01 07 39 06	CC	12, Houston. Go.
01 07 39 10	CDR	Roger. Battery vent is - Battery compartment has been vented and we started charging BAT A at 31:37.
01 07 39 19	CC	Roger, Pete.
01 07 40 46	CDR	Houston, we just got a MASTER ALARM with nothing on the panel. Got any idea what that might have been?
01 07 40 53	CC	Stand by, 12. We'll start checking.
01 07 42 18	CC	Apollo 12, Houston.
01 07 42 22	CDR	Go.
01 07 42 23	CC	Roger. We don't see much out of the ordinary, Pete. We are on a low bit rate right now, and we will be in high bit rate shortly where we can look at things a lot more closely. About the only suspicious item is your O_2 flow rate is just a shade high, but we see nothing else.
01 07 42 40	CDR	Okay. We're venting the - the urine system - that new one, and we're just letting it run. I'll go shut her off.
01 07 42 50	CC	Okay, Pete.
01 07 43 04	CDR	Looking at the Earth down there, Houston, it looks like you are littler than a golf ball at arm's length now. Sure looks pretty though. The terminator looks like it's - it's kind of hard to tell from this distance - looks like it's passing somewhere just west of Tallahassee.
01 07 43 28	CC	Roger, Pete. It's just getting dark out here now.
01 07 45 26	CC	Apollo 12, Houston.
01 07 45 30	CDR	Go ahead.
01 07 45 31	CC	Roger. Your accumulator cycled just about the time you got that MASTER ALARM, so it may have been an O_2 flow high, and you may have just had a flicker on your matrix panel.
01 07 45 43	CDR	Okay.

01 08 00 47	CDR	Well, Houston, we have settled down to a normal routine during the day.
		Music - "Suspicious Minds" by Elvis Presley
01 08 00 58	CC	Roger, 12. We'll have some scores for you shortly.
01 08 02 37	CDR	Hello, Houston. Do you read 12?
01 08 02 40	CC	12, Houston. Reading you loud and clear on voice.
01 08 02 45	CDR	Roger. Did you get the transmission a little while ago?
01 08 02 48	CC	We got a few words and a little bit of music, and then it quit.
01 08 02 53	CDR	Okay. I think you lost our antenna about then.
01 08 03 03	CDR	We're trying all these things we didn't have in Gemini, like toothpaste and shaving and - We are really having a ball up here.
01 08 03 13	CC	Roger.
01 08 03 23	CC	All dressed up and no place to go.
01 08 03 28	CDR	Oh, we're going someplace. We can see it getting bigger and bigger all the time.
01 08 03 55	CC	Apollo 12, Houston. I have a little sports news for you.
01 08 04 00	CDR	Okay.
01 08 04 01	CC	Roger. The Phoenix 200 is still in a hold status; they apparently couldn't get past the thunderstorms. And here are some scores.
01 08 04 16	CDR	We were - -
01 08 04 17	CC	- - Go ahead.
01 08 04 20	CDR	No, go ahead.
01 08 04 22	CC	Roger. Some scores: Texas Tech 41, Baylor 7 - these are all finals - Texas 69, TCU 7; Arkansas 28, SMU 5; Rice 7, the Aggies 6; Northwestern 30, Indiana 27; Michigan 51, Iowa 6; Wisconsin 55, Illinois 14; Ole Miss 38, Tennessee 0; Missouri 40 and Iowa State 13. And the scores on the West Coast are starting to come in now. Dick, you'll be happy to hear Washington

and Southern Cal are tied 7 to 7 in the third quarter, and Oregon is - in the third quarter - is ahead of oh - UCLA 10 to 7.

01 08 05 17 CMP Jerry, I - makes me happy but I'll bet it doesn't make you happy, does it?

01 08 05 21 CC Game's not over, Dick.

01 08 05 31 CMP We've been trying to look at the United States through the monocular, and it just looks like most of the States is covered with clouds. Are you having bad weather generally over the country?

01 08 05 47 CC We'll have to take a look at an overall map, but here in Houston, it's been CAVU all day and beautiful, a wonderful, clear fall day.

01 08 05 58 CMP Okay.

01 08 06 08 CC 12, Houston. Dick, I got bad news for you. A final: USC 16, Washington 7.

01 08 06 18 CMP Boy, you sure changed that in a hurry, didn't you.

01 08 06 29 CC I didn't want to give you too long to gloat over that one.

01 08 06 45 CMP I think you were sandbagging me, Jerry. I was about to bet you.

01 08 06 49 CC I should've waited.

01 08 07 03 CC 12, Houston. I've got a weather map here for the United States. All up through the northeast part of the country it looks like it's either overcast or broken. And then in the Southeast and in the South and up through about the panhandle of Texas down into Florida it's all clear. And then, moving on further west, you get into New Mexico, Arizona, California, and you begin to pick up overcast skies again, all the way from Montana all the way down to Arizona. Montana has got a few broken and scattered clouds in the eastern side and then it's pretty bad over on the western side.

01 08 07 49 CMP Yes, we - we could - We were having a hard time picking out exactly where we were looking at. Even with the monocular everything is now - tends to be brown - and having a hard time picking out

		the land from the water, but it seems like that part of the country that we can see is pretty well covered with clouds.
01 08 08 11	CC	Roger. It looks like the whole West Coast is socked in.
01 08 08 37	CC	12, Houston. The weather system is a great big high sitting down over, oh, Gulfport - Biloxi area, so that's why we are so clear down in the Southeast. We have a weak high up around the four-corners area of Utah, Colorado, New Mexico, Arizona. And then everywhere else is just bad news.
01 08 08 59	CMP	I see.
01 08 09 08	CDR	How are our families doing, Jerry?
01 08 09 13	CC	Haven't talked to them, but I'll make a few calls and give you some answers.
01 08 09 18	CDR	Okay. Appreciate that every day if you could.
01 08 09 21	CC	We'll do her. Everybody is probably at supper right now, so probably catch them all at home.
01 08 14 22	CMP	Houston. We are just looking out of the window now and we were all talking about old project FSMOE. You remember that?
01 08 14 36	CC	I guess that one doesn't compute, 12.
01 08 14 41	CMP	Say again.
01 08 14 42	CC	That one doesn't compute.
01 08 14 45	CMP	Project FSMOE? Full-scale mockup of Earth?
01 08 14 52	CC	Roger.
01 08 14 56	CMP	Hard to tell which one we've got out the window.
01 08 15 05	CC	Is it blue or gray?
01 08 15 13	CMP	Pretty blue and white.

01 08 15 37	CMP	Hey, Jer, somebody's probably already said this before, but - That place looks like an oasis down there.
01 08 15 46	CC	Roger, Dick.

END OF TAPE

01 08 53 07	CDR	Houston, 12.
01 08 53 10	CC	12, Houston. Go.
01 08 53 13	CDR	What's your preliminary look at the midcourse show?
01 08 53 24	CC	Stand by a second, Pete. While they're ginning up the answer, got some nice warm words for you on your SPS burn. Evaluation shows that your I_{SP} is within one tenth of a second, and your thrust is within 20 pounds on that engine so you got a real hummer there.
01 08 53 42	CDR	Very good. I guess we can thank Mr. Thibodaux for that one.
01 08 53 56	CC	Roger.
01 08 54 12	CMP	Hey, Jerry, it says in the flight plan to perform housekeeping chores. We're having a devil of a time finding a housekeeper up here.
01 08 54 23	CC	Who's the junior man, Dick?
01 08 54 27	CMP	He's on the Exer-Genie right now. He thinks he made Captain already, but he's got a surprise.
01 08 54 35	CC	Roger. Your next midcourse looks like about a foot per second.
01 08 54 44	CDR	Okay. So I guess maybe we won't need to do any of those, huh?
01 08 54 48	CC	Roger. Looks real good for here anyway. Another little gem of wisdom we got for you here, when you entered PTC, you collapsed your deadband when you used VERB 37 ENTER to get the P00, so just as a little helpful reminder, we want you to remember that when you come out, you're going to zap to your NOUN 22 attitude as soon as you activate your jets unless you come out in SCS.
01 08 55 14	CDR	Okay. Understand.
01 08 55 17	CC	We figured you already knew it, but we wanted to show you how smart we were.

01 08 55 22	CDR	Good, thank you.
01 08 56 21	CMP	Houston, 12. What do you think now? I just redid a VERB 79.
01 08 56 27	CDR	Will that do it?
01 08 56 29	CC	Roger. You just cured it.
01 08 56 32	CDR	Okay. I guess we called a P21 in there or something; we got curious to see how far out we were and that must have collapsed it.
01 08 56 39	CC	That's affirmative, that's what you did.
01 08 56 43	CDR	Okay.
01 09 10 50	CC	Apollo 12, Houston.
01 09 10 54	CDR	Go ahead, Houston.
01 09 10 55	CC	Roger. Dick, you listening?
01 09 10 59	CDR	No, Dick's not on the horn.
01 09 11 01	CC	Okay. How about Al, is he listening?
01 09 11 05	LMP	I'm listening, yes.
01 09 11 07	CC	Okay, Al. I checked home for you and Sue got back this afternoon from the Cape. She said to say yesterday was a pretty exciting day for her, kind of wet, too. And she wanted to let you know that she had attended a birthday dinner party that was honoring Vice President Agnew yesterday and had a real fine time. She says her mom and dad are there with her at home now. They just finished dinner, and the kids are headed for bed, and she wishes you Godspeed.
01 09 11 39	LMP	Thanks, Jerry.
01 09 11 40	CC	Okay. Pete, I guess Jane and the boys are - -
01 09 11 43	CDR	Dick's up now.
01 09 11 45	CC	Pete, I guess Jane and the boys are out to dinner, I haven't been able to get ahold of them yet. And Dick, you up?
01 09 11 53	CMP	Go.

01 09 11 55	CC	Okay. Barbara says that Barb and Norman and your mother are all there now, and everybody's doing fine, and they've had enough excitement for a while, thanks. And if you don't mind, they just as soon you lay off the spectaculars.
01 09 12 13	CMP	Why? What in the world has happened?
01 09 12 15	CC	(Laughter). She said Aunt Dorothy is passing through Houston now, and she called in to say hello, and she said also to let you know that Bill Der Bing is there with them, and he's doing a great job.
01 09 12 30	CMP	Very good, thank you.
01 09 17 47	CDR	Hello, Houston, 12.
01 09 17 50	CC	12, Houston. Go.
01 09 17 54	CDR	Say, you know, yesterday we talked to you about this stuff that's all over the windows, and on Dick's rendezvous window - window 2 - We've got some kind of a white deposit that's like a - I don't know, it's like an ash and it's not flush on it, it's built up in little humps and tabs of it sticking out, especially in the upper right-hand corner. What we'd like to do is photograph this for you. We don't have much to do right now. We thought we'd photograph these windows and thought maybe you'd come up with some recommended settings and everything. Seems to me I remember somewhere we had those procedures for photographing windows back in D or something because they were bad.
01 09 18 43	CC	Roger, Pete. We'll get somebody going on that right away.
01 09 18 48	CDR	We expect this stuff will be long gone after reentry.
01 09 18 53	CC	Roger. We've been kind of dying to ask you too about the ice situation. How long did it take that to sublime off?
01 09 19 01	CDR	Well, now, that's a funny thing. The ice was sublimed off, but it's left a white deposit all along the perimeter of the number 1 window, that - that's on the black surface of the outside of that window, and it's up along the side

of the window too. It's similar to the same stuff that's on the rendezvous window. Now, the ice that was on the inside of the outer pane in the number 1 window - that's sublimated, too, since we started PTC. We have a - a fine deposit of water droplet; whatever was in the water - has adhered to the window and that's all in streaks and dots and splatters, so we kind of think some of this may have come when - when the tower was jettisoned; we're not sure, and I guess what we want to do is try and photograph this as best we can for you to see - because I haven't heard ... before either.

01 09 20 05	CC	Roger, Pete. How long did it take for that outer layer of ice on window 1 to sublime? How long was it before it was gone?
01 09 20 16	CDR	Yes, it didn't go until we were finally asleep last night or - we stopped looking at it. It was still there, I think, when we went to bed last night.
01 09 20 26	CC	Roger.
01 09 23 15	CC	12. Houston.
01 09 23 19	CDR	Go ahead, Houston.
01 09 23 20	CC	Roger. The polls are closed now and - soon as we get enough election results to give you a meaningful information here, we will run you up some returns.
01 09 23 32	CDR	Okay.
01 09 24 32	CC	Apollo 12, Houston. I'm going to run to get a bite to eat right now and your friendly AFD is going to be monitoring the line for you.
01 09 24 41	CDR	Roger-Roger.
01 09 48 07	CC	12, Houston.
01 09 48 10	CMP	Go ahead, Houston.
01 09 48 12	CC	Roger. I've got some words for you on the camera settings.
01 09 48 18	CMP	Okay. Wait 1.
01 09 48 30	CMP	Okay, Houston. Go ahead.

01 09 48 32	CC	Roger. Step number 1: make sure the sun is incident to the window but not shining directly into the camera. Step number 2: set the focus at 3 feet, and then do as best you can to hold your camera 3 feet from your target, realizing that this focal length is pretty sensitive to the distance. Your shutter speed is 1/250th. And if you don't have the spotmeter out, use an f-stop of 5.6 and take a picture of each window, and then go to an f-stop of 4 and take one of each window. And if you do have the spotmeter out and want to use that, then the only caution here is to be sure that the spotmeter is focused on the window or the target itself.
01 09 49 32	CMP	Understand, Houston.
01 09 57 21	CC	Apollo 12, Houston, with some election news.
01 09 57 26	CMP	Go ahead.
01 09 57 27	CC	Okay. About 10 percent of the votes are in and counted now, and Mayor Louie Welch is leading his nearest contender, who is Curtis Graves, by 10 000 votes to 3000; these are approximates. In the six City Council positions that are up for grabs, all the incumbents are leading at this time, and the housing code question in Houston is running about 8800 for and 6200 against.
01 09 57 58	CMP	Okay. Thank you.
01 10 06 38	CC	12, Houston.
01 10 06 42	CMP	Go ahead, Houston.
01 10 06 43	CC	We have a - some little bits of information here on the P23 that you've done so far. Also, it's generated a few questions that we'd like to ask. The first batch that you did showed a DELTA-H of 49.2 kilometers, and the second batch showed 24.8 kilometers, and the marks that you took in each batch, in each set, were consistent. And the uncertainty both times was about 4 kilometers, so we've got four questions to ask you which might possibly help us decide which DELTA-H to use. Over.
01 10 07 24	CMP	Go ahead.

01 10 07 26	CC	Okay. First question. Did you notice any difference between the horizons on the two batches; in other words, did you select a new horizon the second time?
01 10 07 34	CMP	Abso - absolutely, on the first one, they used top of the haze layer; on the second one, the haze layer was hardly discernible, used - what I considered the true Earth horizon.
01 10 07 47	CC	Okay, Dick, and the second question is - well, you've answered the second question essentially. We wanted to know if you used the same technique, or did you put the star below or above the upper part of the horizon, but that's answered. Next, is - were the stars - -
01 10 08 06	CMP	Well, Jerry, the reason I - -
01 10 08 08	CC	Go ahead, Dick.
01 10 08 11	CMP	The reason I did that, the second batch, that haze layer was hardly discernible at all, and the Earth's sphere was so sharp at that point, that I used it.
01 10 08 35	CC	Okay then, Dick. Then, I guess you're saying then that you liked the second batch better than the first batch. Is that affirmed?
01 10 09 09	CC	Apollo 12, Houston.
01 10 09 12	CMP	Go.
01 10 09 13	CC	Okay. Did you get my last question, Dick? Is - I'm assuming that you liked the second batch better than the first batch then.
01 10 09 21	CMP	That's affirmative, it was much sharper, much easier to define the horizon on the second batch.
01 10 09 27	CC	Roger, Dick. We kind of got the impression that the altitude seemed to be a function of the star of magnitude and we're wondering, were the star images pretty well focused?
01 10 09 39	CMP	That's affirmative. I didn't seem to notice that. The only thing I can say about the first batch is that they were at the very top of the - of the haze layer where it just starts to turn

		that very light blue, and I thought it was a lot further away than I expected it to be.
01 10 10 01	CC	Roger, Dick. And last question, was there any noticeable stray light and was it different on each batch?
01 10 10 09	CMP	No, the optics appeared to be excellent; they didn't have any problem with stray light whatsoever.
01 10 10 14	CC	Okay. Thank you, Dick.

END OF TAPE

01 10 23 09	CDR	Houston, 12.
01 10 23 12	CC	Go ahead, 12.
01 10 23 16	CDR	We've been having a little discussion here on this photograph in the windows. We had the exterior color - I presume, really what you wanted was the C-EX - HC-EX rather than the normal color.
01 10 23 40	CC	Stand by a second, Pete; I'll check on it.
01 10 23 51	CDR	Well - We were showing for the color exterior, the 368, that we should have shot at a much slower speed, so that prompted us to think you meant us to use the HC-EX, and so maybe you'd better clarify that.
01 10 24 13	CC	Okay. They're checking right now.
01 10 24 18	CDR	Thank you.
01 10 24 31	CC	12, Houston. While we're looking for that answer for you, I've got an LOI minus 5 flyby PAD - maneuver PAD for you if you want to grab out a form.
01 10 24 43	CDR	Okay. Wait one.
01 10 25 11	CDR	Okay. We're ready to copy.
01 10 25 16	CC	Roger, Pete. LOI minus 5 flyby, SPS/G&N: 62633, NOUN 48, plus 0.90, minus 0.17; NOUN 33, 078:27:16.61, NOUN 81, plus 0068.4, minus 0206.0, plus 0579.3; roll, pitch, and yaw is 052, 217, 338; NOUN 44 is NA, NA. DELTA-V_T 0618.6, 1:26, 0613.6; sextant 32, 184.6, 38.6, boresight is NA, NA, NA; NOUN 61, plus 07.38, minus 169.95, 1165.9, 36231; GETO 5 g's, 145:52:20; GDC align stars are Sirius and Rigel. Roll is 256, pitch 152, yaw 069. Ullage, none. Other burn is SPS docked. The LM weight is 33585. Over.
01 10 28 21	CDR	Roger. LOI minus 5, SPS/G&N, and I may have screwed up on this ... 62633, plus 0.90, minus 0.17, plus 078:27:16:61; NOUN 81, plus 0068.4, minus 0206.0, plus 0579.3; roll, pitch, and yaw 052, 217, 338; NOUN 44, NA, NA.

DELTA-V_T 0618.6, 1:26, 0613.6; 32, 184.6, 38.6, NA, NA, NA; NOUN 61, plus 007.38, minus 169.95, 1165.9, 36231, 145:52:20. The stars Sirius and Rigel, roll 256, 152, 069, ullage none, SPS docked, LM weight 33585.

01 10 29 55	CC	That's affirmative, 12.
01 10 31 06	CDR	Hello, Houston; 12. Do you read?
01 10 31 09	CC	12, this is Houston. Your readback was correct.
01 10 31 15	CDR	Okay. Very good.
01 10 32 08	CC	Apollo 12, Houston.
01 10 32 11	CDR	Go ahead, Houston.
01 10 32 12	CC	Roger. Pete, you guessed us right. The data we sent you was based on HC-EX film. So that is what you ought to use.
01 10 32 22	CDR	Okay. Thank you.
		Music - "Son of A Preacher Man"
01 10 35 46	CC	12, Houston. Can we put our headsets back on now?
01 10 35 51	CDR	Yes. That's Dick's music.
01 10 36 00	CMP	They're friends of yours.
01 10 36 48	CC	Apollo 12, Houston. You might consider t-king a stereopair with that camera on the window.
01 10 36 56	CDR	Okay. We'll give her a try.
01 10 44 27	CDR	Houston, 12.
01 10 44 29	CC	Go ahead, Pete.
01 10 44 32	CDR	Does it look like we are going to have to reinitiate the purge or not on the CSM?
01 10 44 50	CC	Pete, dumping the tunnel down to 1.6 eliminated the requirement for it.
01 10 44 57	CDR	Okay. Very good.
01 10 46 12	CC	Hey, Pete. If you're looking for something to do, we got a geology pop quiz for you.

01 10 46 19	CDR	(Laugh) Oh, thanks a lot.
01 10 46 24	CMP	Go ahead, give it to them.
01 10 50 43	CDR	Houston, 12.
01 10 50 46	CC	12, Houston. Go.
01 10 50 49	CDR	We think we have the S-IVB in sight. We've - had a - an object which is in the same place all the time and appears to be tumbling. We've had it ever since yesterday, and it just seems to be tagging along with us, so I guess that's the S-IVB. It's usually out our center hatch window when our roll angle is about 35 degrees right now. Maybe that'll give you a clue, and somebody can figure out if that's what we're really looking at.
01 10 51 24	CC	Roger, Pete.

END OF TAPE

01 12 12 01	CC	12, Houston.
01 12 12 05	CDR	Go ahead.
01 12 12 07	CC	Roger, Pete. That thing you saw off the hatch, at a roll of 35 degrees, we figured there's probably three possible answers. Number 1: it could be the S-IVB, or possibly a SLA panel, or it could be the backup crew flying trail on you.
01 12 12 24	CDR	Roger. Actually we have two objects out there. One's not anywhere near as bright as the other, so I think the real bright one's the S-IVB and the other one's probably a SLA panel. They're about 20 degrees apart. And as far as the backup crew goes, tell them we'll meet them on the back side of the moon.
01 12 12 48	CC	Roger, Pete. Best as we can tell down here now - best as we can tell down here now, the S-IVB should be near Denebola, and if it's SLA panels - correction, what you are saying now ought to be near Enif; is that correct?
01 12 13 06	CDR	Yes, it's near Enif.
01 12 13 13	CC	Roger, Pete. And the words here are that the S-IVB is about 180 degrees away, near Denebola.
01 12 13 23	CDR	Okay. I wonder what that could be.
01 12 13 28	CC	Okay. We'll go back to our drawing board.
01 12 13 29	CDR	The object's very bright - The object's very bright, and it's obviously something that's tumbling. It's tumbling about 1-1/2 REV's per second, or at least it's flashing at us about that. And Dick - Dick is going to tell you what star it's near. He's messing with his chart right now.
01 12 13 55	CC	Roger. We're standing by.
01 12 26 25	CC	12, Houston.
01 12 26 29	CDR	Go ahead.
01 12 26 30	CC	Pete, as best as we can tell, looking at things down here, on those SLA panels, we assume that they weren't imparted any great amount of DELTA-V,

like anything more than 1 or so feet per second when they separated. Your SLA panels would probably only be about 300 miles away from you right now.

01 12 26 51	CDR	That could be true but, gee whiz, when we turned around, I saw one of those SLA panels leaving the area at a high rate of speed; it looked to me like it was leaving us pretty - pretty rapid clip, like it got a lot more than a foot per second or so.
01 12 27 21	CC	Well, since we don't really have any idea how they left or what their trajectory could be, it's kind of tough really to say just what the heck that could be.
01 12 27 33	CMP	Okay. We'll assume it's friendly anyway, okay?
01 12 27 37	CC	Roger. If it makes any noises, it's probably just wind in the rigging.
01 12 27 41	CDR	Okay. Understand.

END OF TAPE

01 13 57 53	CDR	Houston, 12.
01 13 57 57	CC	Hello, 12. Go.
01 13 58 06	CC	Apollo 12, Houston.
01 13 58 07	CDR	Houston, Apollo 12.
01 13 58 09	CC	Apollo 12, Houston. Go.
01 13 58 11	CDR	Roger. Huh?
01 13 58 19	CDR	Houston, if you haven't got anything to do down there, how about telling us where - what longitude line the terminator of the Moon is on.
01 13 58 34	CC	Roger, 12. It's in work. Sure you don't want that geology pop quiz?
01 13 58 43	CDR	Al's all eager. He says give it to him.
01 13 59 34	LMP	Houston, Apollo 12.
01 13 59 37	CC	12, Houston. Go.
01 13 59 40	LMP	Roger. We're getting close enough to the Moon now so that, even with the - the monocular, the Moon looks a lot like these photographs that you see taken from many of the observatories that are around the center. We were looking at it through the sextant a minute ago, and it really looks spectacular. It's starting to take on less of a silver color and more of a gray color when you look at it up close.
01 14 00 13	CC	Roger, Al. Watch those color descriptions.
01 14 00 19	LMP	You said it.
01 14 01 52	CC	Apollo 12, Houston. We're working on that question of yours. Also, it's about time now to terminate battery A charge. Over.
01 14 02 04	CDR	Okay. That's in work.
01 14 06 15	CC	Apollo 12, Houston.

01 14 06 23	CDR	Go ahead.
01 14 06 24	CC	That terminator longitude is between 7 and 8 degrees east. Over.
01 14 06 33	CDR	Roger. Thank you.

END OF TAPE

01 15 13 18	CC	Apollo 12, Houston.
01 15 15 36	CC	Apollo 12, Houston.
01 15 15 41	CMP	Go ahead, Houston.
01 15 15 44	CC	Hello, troops. Looks like a good burn today. Good show. Say, Pete, we got some folks sitting next to us here who would like to get some BIOMED data on the three of you tonight. Why don't you kick it around and give us a reply?
01 15 16 07	CDR	What do you want us to do? Keep our BIOMED hooked up tonight?
01 15 16 11	CC	That's affirm.
01 15 16 17	CDR	Okay. You want it on all three?
01 15 16 20	CC	That's correct. One thing they'd like to do is to get a baseline to help them during the EVA. They'd like to get - Apparently they use some of that data for input to the equations which they'll be using during the EVA.
01 15 16 41	CDR	Sleep - stuff?
01 15 16 44	CC	That's what we're told.
01 15 16 50	CDR	Okay. We'll leave it hooked up unless it bothers us.
01 15 16 54	CC	Okay.
01 15 16 55	CDR	I'm not exactly sure how you get it inside the sleeping bag.
01 15 17 01	CC	Okay. That sounds good. Thank you.
01 16 00 03	CDR	Hello, Houston; Apollo 12.
01 16 00 12	CC	Hello, 12; Houston. Go ahead.
01 16 00 30	CC	Hello, 12; Houston.
01 16 00 31	CDR	Hello, Houston; Apollo 12.
01 16 00 36	CC	12, Houston. Go ahead.
01 16 01 01	CC	Hello, 12; Houston. Go ahead.

01 16 01 05	CDR	Roger. The LM/CSM DELTA-P is plus 1.7.
01 16 01 15	CC	We copy. 1.7.
01 16 01 20	CDR	And we'll be bringing the purge line heaters on at 40 plus 35 per the flight plan.
01 16 01 30	CC	Roger, Pete.
01 16 01 33	CDR	And what do you want us to dump the waste water to - 25 percent or 15 percent?
01 16 01 44	CC	Let's take it down to 10 percent this time. That'll give you a pretty good margin.
01 16 01 55	CDR	Roger. Ten percent.
01 16 02 03	CC	You folks have been pretty quiet. What's up?
01 16 02 08	CDR	Nothing. We're just exercising and listening to the tape recorder and looking at the Moon and looking at the Earth - or reading the books.
01 16 02 19	CC	Roger. How's that tape recorder? Is the RPM up to nominal?
01 16 02 26	CDR	Yes. It works pretty good here in zero g. It works better than it does down there on the ground.
01 16 02 35	LMP	It just doesn't have much in the way of volume up here with a 5 psi.
01 16 02 56	CC	How's that cloud cover over the Pacific at this time?
01 16 03 02	CDR	Well, Australia is real clear again, and it doesn't look quite as cloudy north of Australia. It's sort of a - It's got a rectangular shape to it, whatever the system is north of Australia there. It's kind of funny looking.
01 16 03 23	CC	Roger. What's the smallest piece of land you can pick out? Can you see any of the Pacific islands?
01 16 03 34	CDR	(Laughter) No, we haven't - We can't see any of them. One of - Dick just says he can see Borneo right now. He's looking through the monocular.
01 16 03 46	CMP	You can't see it with your naked eye, though.
01 16 03 51	CDR	I think one of the problems is that - The only thing that we could see would be close to the

curve. All the - the terminator - We're not looking at that much of an Earth and all the water in the Pacific that's close to the terminator has a very shallow Sun angle on it, and it's fairly washed out.

01 16 04 19 CC Roger. You still getting a pretty good glint off the surface then?

01 16 04 25 CDR Yes. Dick says the subsolar point is just west of Australia. By the way, how far out are we now?

01 16 04 47 CC Okay. The board's showing a little over 140 000 - Stand by. We'll give you a little more accurate.

01 16 04 57 CDR Okay.

01 16 05 35 CC Pete, you're now 137 720 out, and you're going along at 3580 feet per second.

01 16 05 47 CDR Roger.

01 16 06 01 CDR Okay. We're going to ask the DSKY and see what it thinks.

01 16 06 14 CDR Not bad. 137 750.

01 16 06 25 CC Roger. We're showing - -

01 16 06 26 CDR - - ... - -

01 16 06 27 CC - - 755 right now.

01 16 06 31 CDR It'll only read to the nearest tenths, and the velocity is 3579.

01 16 06 42 CC Roger. We're just about the same as you, Pete.

01 16 09 06 CC 12, Houston. We have some unofficial results from the elections today. It looks as though Mayor Louie Welch was reelected to a fourth term. His closest competitor, Curtis Graves, got about 59 000, and the mayor's up to 98 now. According to - that's the first time since, I believe, 1927 we got a fourth term for a mayor.

01 16 09 38 CDR Very good.

01 16 11 15 CC Say, Al, is that Moon beginning to look a little bigger to you now?

01 16 11 22	LMP	It sure is. We were watching it through the sextant a while ago, and the features on the Moon are much more pronounced than they are - than we've seen before we left Earth. They looked almost like one of these strip pictures you see from an Earth-based telescope. The terminator is about 7 or 8 degrees east, and it's right on the edge of a maria and running through some of the terra, and it's very stark and beautiful from this point of view. I imagine tomorrow it's going to be even more impressive.
01 16 12 04	CC	Probably be very impressive from a distance of around 3 or 4 feet.
01 16 12 13	LMP	That, too.

END OF TAPE

01 16 55 59	CC	Apollo 12, Houston.
01 16 56 05	CMP	Go ahead, Houston.
01 16 56 07	CC	12, if you hold off on the waste water dump and the fuel cell purge until 41:20, you'll minimize the effect on PTC.
01 16 56 19	CMP	Sounds like a good suggestion. We'll do that.
01 16 56 23	CC	Roger.
01 17 20 14	CDR	Okay, Houston. Apollo 12 is dumping waste water and purging fuel cells.
01 17 20 21	CC	Roger, 12.
01 17 20 35	CC	Pete, can you see any ice crystals from that?
01 17 20 42	CDR	You can see the water dumps; there's no doubt about that. There's all kinds of it. In fact, they look like a regular snowstorm.
01 17 20 54	CC	Does the snowstorm tend to hang around or does it move off pretty quickly?
01 17 20 59	CDR	It moves out pretty fast.
01 17 46 33	CMP	Hello, Houston; 12.
01 17 46 39	CC	12, Houston. Go ahead.
01 17 46 43	CMP	Hey; Roger, Ed. I don't think that water dump did that PTC any good at all.
01 17 46 53	CC	G&C concurs with that down here.
01 17 47 20	CC	Dick, let us watch it a little while. We haven't seen you - much travel since you made that dump. You're around 25 degrees out now. We'll be keeping an eye on it and see which way you're going.
01 17 47 34	CMP	Okay.
01 17 54 21	CC	Apollo 12, Houston.
01 17 54 25	CMP	Go ahead, Houston.

01 17 54 28	CC	In looking at your - your angles here, it looks as though you might be pretty touch and go during the sleep period if you don't go ahead and re-initialize the PTC, and when you do that, give us a little better - a little better propellant margins. We'd like you to go ahead and reinitialize the DAP to 0.2 degrees per second rather than the 0.5 you have in there now.
01 17 54 56	CMP	Got you.

END OF TAPE

01 18 06 53	CC	Apollo 12, Houston. We've got a state vector for you, if you'll give us ACCEPT.
01 18 10 01	CC	12, Houston. The state vector is in, and we're ready for the E-MOD, whenever you want. No hurry.
01 18 13 48	CC	12, Houston.
01 18 13 53	CMP	Go ahead.
01 18 13 55	CC	State vector's in; the computer is yours. We're also ready to pick up on the roll now, Dick; and we're ready for the E-MOD dump, no hurry on that. Also, we have a question; have you cycled the water quantity indicator switch recently?
01 18 14 17	CMP	Yes, which one do you want it in?
01 18 14 30	CC	Your position - I guess you have it in WASTE right now - is fine. No problem either way, we just wanted to know whether you cycled it because we saw a funny down here.
01 18 14 41	CDR	Well, it's in POTABLE right now, do you want it in WASTE?
01 18 14 52	CC	Affirmative, Pete. WASTE is good.
01 18 14 58	CDR	What was the funny? Okay. It's in WASTE, and what was the funny?
01 18 15 19	CC	Pete, we saw the water quantity go from 101 percent down to 72 percent and remain there for a period of time and then work it's way back on up to 101 percent, and if you had cycled that switch, that would do it. That's the reason for the question.
01 18 15 43	CDR	Okay. I don't really remember, but we may have cycled it a couple of times.
01 18 15 51	CC	Okay.
01 18 27 06	CDR	Houston, 12.
01 18 27 10	CC	12, Houston. Go ahead.
01 18 27 13	CDR	E-memory dump coming at you.
01 18 27 16	CC	Roger. We're standing by.

01 18 31 09	CC	12, Houston. We have the E-MOD.
01 18 31 14	CDR	12, Roger.
01 19 02 29	CDR	Houston, Apollo 12.
01 19 02 34	CC	12, Houston. Go ahead.
01 19 02 38	CDR	Roger. Let me give you the onboard readouts: BAT Charlie, 37.0; pyro BAT A, 37.0; pyro BAT B, 37.1. We have no RCS quantities. The indicator is on MAIN A. Presleep checklist is complete, and we'll be going to our COMM configurations for sleep here in just a minute. And we're still doing some housekeeping chores, so you'll see some BIOMED on and off, a little bit, while we get ready to go to bed.
01 19 03 21	CC	Roger, Pete. We copy. 37, 37, 37.1. And we have the RCS consumables if you're interested.
01 19 03 33	CDR	Okay. Ready to copy.
01 19 03 36	CC	RCS total 80.9, A 78.9, 83.1, 79.2, 82.8. And that's at 40 hours even.
01 19 03 58	CDR	Roger.
01 19 04 02	CC	And we are assuming a negative crew status report.
01 19 04 10	CDR	That's right.
01 19 05 06	CC	12, Houston.
01 19 05 11	CDR	Go ahead.
01 19 05 12	CC	Before you go on off to sleep, would you take the - clear the DSKY and do it with a VERB 45 or VERB 66 rather than 37?
01 19 05 31	CDR	Is there any reason why we can't leave the clock time up there?
01 19 05 43	CC	Yes. We just prefer, although it's not a strong desire, to clear the DSKY so you're not working the relays in the DSKY, give you a little longer life.
01 19 05 54	CDR	Okay.
01 19 06 00	CC	And, 12, your PTC is looking good; we expect less than 6 degrees excursion during the sleep.

REST PERIOD - NO COMMUNICATIONS

02 04 56 10	CC	"Reveille" played on bugle.
02 04 56 33	CDR	Good morning, good morning.
02 04 56 34	CC	Good morning, Pete.
02 04 56 45	CDR	We're just getting stirring up here, and we'll be with you in a few minutes.
02 04 56 51	CC	Okay.

END OF TAPE

02 05 02 27	CDR	Houston, 12. We're ready for the consumables update.
02 05 02 33	CC	Okay, 12. Your consumables update for GET of 53 hours. RCS total is 80.2 - for information, Pete, that puts you 95 - that's 95 pounds below the how goes it. Reading Alfa through Delta 77.5, 82.4, 78.5, 82.5. Your hydrogen is at 80.6/78.8. Oxygen is 81.0/80.7. Over.
02 05 03 24	CDR	Copy.
02 05 03 42	CC	12, Houston. No update to the flight plan this morning.
02 05 03 50	CDR	Okay.
02 05 04 47	CDR	And, Houston, on the crew status report, the CDR slept approximately 8 hours, CMP approximately 9, LMP approximately 8. PRD readings for the CDR, 11 010; CMP, 11 009; LMP, 04 010.
02 05 05 09	CC	Roger 12. Copy.
		Music - "First Call To Formation" (trumpet)
02 05 07 37	CDR	Everybody's at attention in here.
02 05 08 00	CC	12, Houston. Let me know when you're settled in the breakfast nook, and I'll give you your morning news.
02 05 08 08	CDR	Okay. We'll be with you in a minute.
02 05 12 04	CDR	Hello, Houston, 12. We're ready for the news now.
02 05 12 09	CC	Okay, 12. The news reports on the flight of Apollo 12 are highlighting yesterday's midcourse correction and the fact that the flight is moving along smoothly. One wire service story calls attention to the improvement in the food menu on this flight. Local, as well as network stations, played video taped highlights of your television show yesterday. Prayers for the flight's success were said in churches everywhere. In Houston, Mayor Louie Welch won his fourth consecutive term by defeating five candidates. He won 53 percent of the vote. His nearest opponent was Curtis Graves, who received about 31 percent of the vote. A minimum housing code and a freedom-of-choice

integration plan won strong support. That's about it for news. A recap of how the top 10 teams did yesterday. Ohio State beat Purdue 42 to 14; Texas beat TCU 69 to 7 - I guess they're trying to edge Ohio State in the ratings. Tennessee lost to Mississippi; final score on that one was 38 to nothing. Arkansas beat SMU 28 to 15; Penn State over Maryland 48 to nothing; Southern Cal edged out Washington 16 to 7; UCLA over Oregon 13 to 10; Missouri beat Iowa State 40 to 13; Notre Dame won over Georgia Tech last night 38 to 20; and, of course, Purdue lost to Ohio State. Some pro scores today as they're in - these are finals - Dallas beat Washington 41 to 28; Detroit over St. Louis 20 to nothing; the Minnesota Vikings squeaked by Green Bay 9 to 7; and Kansas City, in the American League, beat New York 34 to 16. And we'll keep you posted on them as they come in later.

02 05 14 29	CDR	Okay.
02 05 27 55	CC	Hello, 12, Houston. We'll be handing over from Madrid to Goldstone in ? minutes. You may get a momentary loss of signal.
02 05 28 04	CDR	Okay.
02 05 28 08	CMP	Roger.
02 06 00 08	CC	Apollo 12, Houston.
02 06 00 12	CDR	Go ahead, Houston.
02 06 00 14	CC	Pete, we've looked at the situation here. We don't think that a midcourse number 3 is going to be required. We're still evaluating number 4 - it'll be small if we need it at all - so there will be no midcourse number 3. Also, we'd like you to balance the hydrogen for the fuel cells by turning tank number 2 heater OFF, and - until we get those back in balance. Also, for your information, the Phoenix races were rained out after 53 laps, yesterday, and so they're going to be rerun today, and we'll let you know the outcome.
02 06 00 54	CDR	Okay, very good. And hydrogen tank 2 heater is OFF.
02 06 01 00	CC	Roger. How's breakfast this morning?

02 06 01 10	CDR	It's in work right now. Very good.
02 06 01 14	CC	Fine.
02 06 06 27	CDR	Houston, 12.
02 06 06 30	CC	Go. 12, this is Houston; go ahead, Pete.
02 06 06 51	CDR	Houston, Apollo 12.
02 06 06 54	CC	Apollo 12, Houston. Go ahead.
02 06 07 29	CDR	Houston, Apollo 12.
02 06 07 53	CC	Apollo 12, Houston. Go.
02 06 07 59	CDR	Roger. Two questions: one, how far out are we; and two, what time do we reach the lunar sphere of influence?
02 06 08 08	CC	Roger. I'll get those numbers for you, Pete. You might want to turn your uplink squelch OFF. We're kind of low on signal strength. And you may not hear us very well. I've called you several times. So, that may be a cure.
02 06 08 24	CDR	Yes, I think we were just in the process of switching antennas or something.
02 06 08 28	CC	Okay. Pete, the time for your crossing the lunar sphere of influence is 68 plus 30 plus 19. Your altitude above the Earth is 163 000 280. Your altitude above the Moon is 63 000 190.
02 06 09 13	CDR	Okay, and how fast are we going now?
02 06 09 21	CC	2797. Now, that's referenced to us - -
02 06 09 24	CDR	Okay, thank you.
02 06 09 25	CC	- - down here.
02 06 09 29	CDR	Understand.
02 06 18 34	CC	Apollo 12, Houston.
02 06 18 39	CDR	Go ahead.
02 06 18 41	CC	Pete, a question. We wanted to know whether you wanted to manage the antennas or whether you want us to continue switching back and forth.

02 06 18 53	CDR	We've gone to high gain now. We'd like you to switch back and forth.
02 06 18 57	CC	Okay, if - if a - you're going to leave control of that down on the ground, they would prefer to stay in OMNI only and turn off the high gain.
02 06 19 08	CDR	Okay. We'll go back to OMNI.
02 06 19 10	CC	Fine. Thanks very much.
02 06 28 33	CDR	Houston, 12.
02 06 28 36	CC	Houston. Go.
02 06 28 43	CC	Apollo 12, this is Houston. Go ahead.
02 06 29 17	CC	Apollo 12, Houston.
02 06 29 25	CDR	Houston, Apollo 12.
02 06 29 27	CC	12, go ahead.
02 06 29 32	CDR	Roger. We changed out the LiOH canister and the LM/CM DELTA-P is 1.8 ... .
02 06 29 42	CC	1.8 what?
02 06 29 46	CDR	2.
02 06 29 47	CC	Roger, thank you. It seems like everytime you call, you catch us with our uplink signal down. Lithium hydroxide is changed and 1.82 for the DELTA-P.
02 06 30 01	CDR	You're breaking up. I think we are changing antennas. Say again.
02 06 30 05	CC	Roger. Confirm. Got your lithium hydroxide change out and DELTA-P at 1.82.
02 06 30 14	CDR	Roger.

END OF TAPE

02 06 44 50	CC	Apollo 12, Houston.
02 06 44 56	CDR	Go ahead.
02 06 44 57	CC	For your information, the Phoenix 200 is over. We still have only unofficial results, but the unofficial results show Al Unser as the winner. Number 2 is Ruby, and number 3 is Don Allenbach.
02 06 45 16	CDR	Roger. Thank you very much.
02 06 45 17	CC	Very good.
02 06 46 31	CMP	Hello, Houston; 12.
02 06 46 35	CC	Houston. Go ahead.
02 06 46 39	CDR	Okay, Don. Everybody has had breakfast, brushed their teeth, combed their hair, and we're even thinking about shaving today for you. But the big question I've got, I want to do that P52 option 3, the one that the flight plan has optional at 55 hours or so, and I want to remain in PTC while I do it. Do you concur?
02 06 47 04	CC	We concur. Fine. Sounds like you're ready for another busy day.
02 06 47 12	CDR	It really doesn't look that way, really. I think we'll just practice for a while.
02 06 47 15	CC	You're all cleaned up and nowhere to go.
02 06 47 20	CDR	We're going somewhere; we're not sure where.
02 06 47 24	CC	We are.
02 06 47 30	CMP	It doesn't look like we've moved very far for 2 days now.
02 06 47 33	CC	It'll be a long way home. You've been traveling a long way.
02 07 01 45	CDR	Houston, Apollo 12. Are you looking at the DSKY?
02 07 01 48	CC	That's affirmative.
02 07 01 58	CDR	Okay, Houston. You've cut out on the ... antenna.

02 07 02 04	CC	Roger. We are watching your DSKY.
02 07 02 24	CDR	Houston, do you have the torquing angles?
02 07 02 28	CC	That is affirmative.
02 07 02 32	CDR	Okay. We're going to go ahead and torque.
02 07 02 33	CC	Roger.
02 07 39 13	LMP	Houston, Apollo 12.
02 07 39 16	CC	Houston. Go.
02 07 39 20	LMP	Roger. Just looking through the monocular again at the Earth, and looks like it's dark everywhere except the lower left-hand corner of California. Right in there - L.A. and San Diego, and I can't see Baja California. It may be just twilight there. It's kind of hazy - not hazy, but insofar as the dark/light relationship, it's kind of difficult to tell. The lower left corner of California is the only part we can see in the sunshine right now.
02 07 40 01	CC	Roger. What does the weather look like out there?
02 07 40 10	LMP	Looks beautiful. See it real well. It doesn't appear to be any clouds - any large cloud formations near it. There's a nice crescent-shaped large weather system that appears to be several hundred miles out to sea, but I don't know if that will affect it or not. But the whole area around that southern tip of California there is nice and clear.
02 07 40 41	CC	Very good.

END OF TAPE

02 08 04 43	LMP	Houston, Apollo 12.
02 08 04 47	CC	Go ahead.
02 08 04 53	LMP	Been looking at the Earth some more through the monoculars, and I think maybe the part of the U.S. that I thought was the lower left-hand corner, the Los Angeles area, it was just about to have sunset, was really not. I don't think I could see that because of the - it's color-related to the blue of the rest of the Earth. I think maybe it was the desert area around Phoenix and around in there, just thinking about the time it is now. And I'm not able to discern at all the lower left-hand corner of the U.S., I think, because of the colors.
02 08 05 38	CC	Roger. A little smog out there in L.A.? Can't see through it?
02 08 05 47	LMP	No. I don't think it's smog. I can't see any of that area. I think it's probably just that the Earth out there has more trees, shrubs, and the like, and that makes it sort of a gray-green which is sort of like the ocean whenever you look at it from this view. And they just blend in together, and you're not able to tell exactly where one starts and one ends. We noticed that a little bit as we were closer to earth and then now as we get out this far, about all we can see is something contrasting very greatly with those blue-grays or blue-greens. In this case, it was sort of a reddish-brown. ... - -
02 08 07 52	CC	Apollo 12, Houston.
02 08 08 24	CC	Apollo 12, Houston.
02 08 09 04	LMP	Hey, Houston; Apollo 12.
02 08 09 06	CC	Roger. Go. We lost the very end of that transmission because we were switching antennas, but it sounds like you got a great view up there.
02 08 09 24	CC	Apollo 12, Houston.
02 08 09 50	CC	Apollo 12, Houston.

02 08 09 54	LMP	Houston, 12.
02 08 09 56	CC	Roger. We were switching antennas there. Lost the last part of that transmission, but it sounds like you got a good view out there tonight.
02 08 10 06	CDR	Yes, not too bad. Hey, Don, how'd the Saints and the Oilers make out today?
02 08 10 13	CC	The Oilers tied on the last play of the game. 20-20 was the final score.
02 08 10 19	CDR	What was the score?
02 08 10 20	CC	20-20.
02 08 10 22	CDR	20-20, huh? How'd the Saints do? They were playing the Giants.
02 08 10 35	CC	25 to 24 for New Orleans.
02 08 10 40	CDR	Roger. Thank you.
02 08 10 41	CC	Very good. Hey - -
02 08 10 42	CDR	Got some good news?
02 08 10 44	CC	Yes. Say, listen, can you see any of Antarctica from your position in the daylight?
02 08 10 59	CDR	That's affirmative, Don. We can see a large portion of it, as a matter of fact. It's continually in sunlight.
02 08 11 08	CC	Roger.
02 08 11 21	CC	Listen, I've got some other scores for you, if you are interested.
02 08 11 28	CDR	Go ahead.
02 08 11 29	CC	Okay. AFL: Houston and Denver 20-20; Kansas City over New York 34-16; Boston over Cincinnati 25-14; Buffalo over Miami 28 to 3; Oakland took San Diego 21-16; in the National, as I said, New Orleans over New York 25-24; Chicago 31, Atlanta 48; Philadelphia 17, L.A. 23; Detroit took St. Louis 20 to nothing; Dallas 41, Washington 28; and L.A. over Philadelphia, 23 to 17.

02 08 12 20	CDR	Roger. Thank you very much.
02 08 12 26	LMP	And could you give us the exact longitude the terminator is on the Moon at this time?
02 08 12 37	CC	Wait 1. We'll get it for you.
02 08 26 08	CC	Apollo 12, Houston.
02 08 26 13	CDR	Go ahead.
02 08 26 15	CC	The terminator on the Moon now is 1 degree west. We're trying to get it more accurately for you than that, but 1 degree west is the present terminator.
02 08 26 26	CDR	Okay. Thank you.
02 08 33 08	CDR	Houston, Apollo 12.
02 08 33 12	CC	Go, 12.
02 08 33 17	CDR	We were just talking about the TV show this afternoon, and I guess what we'd like to do - it probably hasn't been seen before that I remember - If we could get a high-gain antenna angle and the Sun in our center hatch so we could get as much light as possible into the command module, we'd like to use the TV and try and show the removal of the hatch, probe, and drogue and then take the TV over into the LM.
02 08 34 03	CC	Very good. We'll get those angles for you. Sounds like a good show.
02 08 36 48	CC	Apollo 12, Houston.
02 08 36 53	CDR	Go ahead.
02 08 36 54	CC	Just a note for the director of your TV presentation: We'll get the first 29 minutes of that presentation live; the rest of it will be recorded at Honeysuckle and shipped back to us. We'll get it in several days. But we'll only get directly through Goldstone your first 29 minutes.
02 08 37 17	CDR	Okay. We'll move it up and make sure we get into the LM by then, anyway.
02 08 37 21	CC	Okay. Just wanted to make sure you got all your best performance in the first period.

02 08 37 35	CMP	We'll figure out something, Don.
02 08 37 38	CC	Very good.
02 09 24 46	LMP	Hello, Houston; Apollo 12.
02 09 24 50	CC	Go ahead, 12.
02 09 24 56	LMP	How about asking the food experts down there, we had a can of tunafish spread salad last night, and there's about a half a can left today, and that stuff's still good to eat, isn't it?
02 09 25 10	CC	We'll check. I'll be right back with you.
02 09 25 15	LMP	Thank you.
02 09 25 32	CC	12?
02 09 25 36	LMP	Go ahead.
02 09 25 37	CC	The surgeon suggests you try a new one. New can.
02 09 25 52	LMP	Well, Dick has this one in his hot hand, and we just opened it last night. You sure that one isn't all right?
02 09 29 42	CC	Apollo 12, Houston.
02 09 29 46	LMP	Go ahead.
02 09 29 48	CC	We're still checking with some people down here whether there's any problem over that tunafish, but why don't you hold off eating it until we get a better answer for you?
02 09 29 56	LMP	Okay.

END OF TAPE

02 09 39 25	CC	Apollo 12, Houston.
02 09 40 12	CC	Apollo 12, Houston.
02 09 40 18	CDR	Go ahead.
02 09 40 20	CC	You can't imagine what consternation your tuna-fish question has raised down here. We have a wide diversity of opinion.
02 09 40 26	CDR	I decided it was - -
02 09 40 29	CC	The - -
02 09 40 30	CMP	I decided it was okay.
02 09 40 32	CC	Well, we have a vote that it's okay. The majority says throw it away; there's a minority report that says everybody can eat it except Dick Gordon.
02 09 40 41	CDR	Okay. That's done.
02 09 40 43	CC	Roger. They recommend that you probably throw it away.
02 09 40 50	CDR	Okay.
02 10 29 41	LMP	Hello, Houston; Apollo 12.
02 10 29 48	CC	Apollo 12, go ahead.
02 10 29 52	LMP	Roger. Do you have a report on the families' activities today?
02 10 29 57	CC	Negative. We'll see if we can find out what's been going on over here.
02 10 30 03	LMP	Thank you.
02 10 30 13	CDR	Meanwhile, Houston, I can tell you what we've been doing since we got up this morning, just for your information.
02 10 30 19	CC	Roger.
02 10 30 20	CDR	We cleaned the spacecraft fore and aft and all lower decks and ladders; cleaned up the garbage and restowed everything. And everybody had a bath and everybody shaved. And Al's studying

		the Moon. I'm studying descent. Dick's been fitting the SO 158 making sure it fits and works, and that's occupied us for about the last 3 hours.
02 10 30 48	CC	Ah, very good. Where do you put the garbage when you haven't got a fantail to throw it over?
02 10 30 55	CDR	We've defined the area below the window shade box and down next to the O_2 mass as the fantail, and we have rigged a garbage bag down there. And we retransferred all of the gear out of the TSB's and neatly wrapped and packaged them and made sure they all had their pills and good things in them.
02 10 31 19	CC	Very - -
02 10 31 20	CDR	- - and configured down there.
02 10 31 21	CC	Very good. You sound incredibly neat.
02 10 31 29	CDR	Haven't got much else to do, pal.
02 10 31 39	CC	We'll get your - the reports on your families - -
02 10 31 41	CDR	Also on the - -
02 10 31 44	CC	Go ahead.
02 10 31 46	CDR	Okay. Also, as we're approaching the Moon, of course, we're beginning to notice less and less of the Moon. We're moving out in front of it, and although - although the terminator is coming around, we're beginning to see less and less of the illuminated portion of the Moon, and it's becoming quite noticeable to us now.
02 10 32 07	CC	Roger.
02 10 54 03	CC	Apollo 12, Houston.
02 10 54 07	LMP	Go ahead.
02 10 54 09	CC	Roger. Just checked with your families. Pete, Jane reports that they've had a very quiet Sunday afternoon there. Everybody is home, and everybody is well, and there just really is not much excitement going on. It's just been a very quiet afternoon over at your house. Dick, Barbara says - -
02 10 54 29	CDR	Okay.

02 10 54 30	CC	Barbara reports to you, Dick, that Sharon and Lynn Diamond are over for the evening, and they're expecting the Irwins over momentarily, and Jim McDivitt just left. She says the boys have gone back to school, and she thought things were going to be pretty quiet; but, between Barbara and Karen, she's got so many giggling girls around there that it's more noisy than she thought. The other thing she pointed out was that Father Connally had been over and had noticed Barbara having a nap this afternoon, and coming out of church this evening he commented in front of some of the people standing there in the church that the last time he saw her she was - she had been asleep. And this was much to her consternation. Also, Barbara ask that you guys talk a little bit more. She says she certainly expected more conversation out of you than she's been getting. Al, your wife reported that they're all missing you. They're extremely proud of you.
02 10 57 03	CC	Apollo 12, Houston. How do you hear?
02 10 57 14	CDR	Houston, 12.
02 10 57 17	CC	Roger. How do you hear now, Pete?
02 10 57 28	CC	Apollo 12, Houston.
02 10 57 43	CC	Apollo 12, Houston.
02 10 57 57	CMP	Hello, Houston; 12.
02 10 57 59	CC	12, Houston. Do you read?
02 10 58 07	CC	Apollo 12, Houston.
02 10 58 16	CMP	Houston, 12. Are you locked up now?
02 10 58 19	CC	Apollo 12, Houston. Do you read me now?
02 10 58 24	CMP	I read you loud and clear. How us?
02 10 58 26	CC	I read you very fine. Sorry about switching antennas there. Al, your - As I started to say, your wife says that the family is missing you; they're very proud of how the flight is going along; and that they'll certainly be watching tomorrow. The children are all fine.
02 10 58 43	LMP	Great break.

02 10 58 48	CDR	We're not getting you at all, Don. What are you having, a site handover or something? We've only gotten about two or three words in the last 5 minutes.
02 10 58 56	CC	Roger. How do you hear me now? We - We've just switched the antennas.
02 10 59 03	CMP	Roger. You're loud and clear, and you started cutting out after you said that Father Connally was over and Barbara was taking a nap. Can you go back to that point?
02 10 59 11	CC	Oh, yes. Yes. Father Connally had been over in the afternoon and had seen Barbara taking a nap. So coming out of church this evening, in front of some of the members of the congregation, he said that the last time he had seen her she was asleep. And this was very embarrassing to her at the moment. Also - -
02 10 59 30	CMP	- - Well, that is better than what he could have said.
02 10 59 37	CC	(Laughter) Also, Barbara had the comment for the whole crew that she's a little disappointed in how much you're talking. She certainly wanted you - expected that you'd talk more than she's been hearing lately.
02 10 59 50	CMP	We're talking. She's just not hearing.
02 10 59 52	CC	She also requests that when you talk, try to be a little funnier. Al, talked to your wife. She said that the family are missing you and that they're extremely proud of how the flight's been going. They'll be watching tomorrow; and, also, she wanted you to know that all the children were fine. This evening when Amy was going to bed, she turned to her mother and she said, "I want to see my daddy. I want to touch him." So, you're being missed. Also, she concurs with the decision on the tunafish. She definitely was happy that you didn't eat the day-old tunafish. That's about all the family has to report.
02 11 00 50	CMP	Okay. Thank you, Don.
02 11 00 52	CC	Say, one other item for Pete. The board of directors has had a meeting, and the VFR has been replaced with IFR Conrad from now on.

02 11 01 05	CDR	(Laughter) I understand. Okay. Very good.
02 11 01 09	CC	Roger.
02 11 01 20	CMP	Don, we're all decided up here that we're going to have to get another Saturn V ride because we sure missed the last one.
02 11 01 26	CC	Very good (laughter).
02 11 03 00	CC	Apollo 12, Houston.
02 11 03 04	CDR	Go ahead, Houston.
02 11 03 05	CC	Things are going so well we've decided that you do not need a state vector update at this time. So things are going along very nicely.
02 11 03 16	CDR	Okay. What's your first hack on MCC 4?
02 11 03 23	CC	Just about 3 feet a second.
02 11 03 27	CDR	Are we going to do it or not?
02 11 03 32	CC	We're still evaluating.
02 11 03 37	CDR	Okay.

END OF TAPE

02 11 10 05	CC	Apollo 12, Houston.
02 11 10 09	CDR	Go ahead.
02 11 10 11	CC	Would you give us H_2 tank heater number 2 to AUTO?
02 11 10 19	CDR	H_2 heater number 2 to AUTO.
02 11 10 23	CC	Roger. Thank you.
02 11 10 26	CDR	You're welcome.
02 11 33 55	LMP	Houston, Apollo 12.
02 11 33 58	CC	Go ahead, 12.
02 11 34 02	LMP	We been looking out at the Sun with our monocular, and we put the sunglass that goes with the telescope over the front of it. Been looking at the Sun and looks like there's two or three dark spots on the west limb of the Sun. Maybe 30 - 40 degrees in, about the equator. Other than that, it doesn't - we can't see anything else. Over.
02 11 34 36	CC	Very good. If they're 30 or 40 degrees in, you won't have to worry about any flare particle from them.
02 11 34 44	LMP	Who's worried?
02 11 35 00	CC	Sounds like you guys are having a real good review of astronomy this afternoon.
02 11 35 07	LMP	We've been studying astronomy, geography, geology, a few other things up here.
02 11 35 19	CC	Roger.
02 11 35 25	LMP	Really not a lot to do on the way out. You've got your systems to monitor, and you got to eat, and keep yourself clean, get some sleep, and except for that, you're free to do a little looking out the window and studying the checklists and maps and things that you're going to be using when you get to the lunar orbit.
02 11 35 53	CC	You're in ... REV.

02 11 35 54	LMP	So it's got to be a pretty pleasant trip. Yes, we'll make it all up starting tomorrow.
02 11 36 06	CC	Beano, this is your old social director speaking. One thing, I'll guarantee that those dark spots on the Sun aren't clouds.
02 11 36 15	LMP	(Laughter) I thought it was particularly appropriate, since we were going to the Ocean of Storms, that we bailed out of the Earth in the midst of one of them.
02 11 36 27	CC	How about that.
02 11 36 32	CDR	We thought for a minute we had a caution and warning failure because they all came on.
02 11 36 40	CC	Understand.
02 11 36 45	CDR	What are you doing up so late, Social Director?
02 11 36 49	CC	Oh, I just thought I'd keep check on you, Pete. Looks like everything is just going great.
02 11 36 55	CDR	(Laughter) There's not too many places we can go.
02 11 36 58	CC	Yes. Watching the plot up here - -
02 11 37 01	CDR	...
02 11 37 05	CC	It's quite a view out there, isn't it, Pete?
02 11 37 10	CDR	Sure is. Did you all learn any special tricks about viewing the Earth or the Moon? Did you think we haven't tried?
02 11 37 22	CC	No. I think we've passed on all the basic information and guess it's quite a view to see it rotate through the windows there and take pictures of it.
02 11 37 34	CDR	Because, during launch, I usually tell Al which lights are on, if he has an electrical problem. Friday, all I could do was look over and tell him, I said, "Hey, Al, they're all on."
02 11 37 48	CC	No, we can probably plan some good simulations from now on.
02 11 38 02	LMP	We talked about it before; and Pete said, "Don't worry." He says, "If you ever have anything go

wrong in flight, it'll be something you've never seen before in your life." He was right.

02 11 38 14	CC	Yes. That's - that's the way it always happens.
02 11 38 28	CC	One thing you've got the advantage of us. We couldn't see the Moon until we got just - right nearly to it by that westerly site. You've probably got a pretty good view of it now.
02 11 38 42	LMP	Yes. Of course, it's getting - The illuminated portion as we move out in front of it is getting less and less all the time. We're really beginning to notice that we're seeing less and less of it.
02 11 38 53	CC	Roger.
02 11 39 35	CMP	Houston, 12. Since we're not doing MCC 3, do they want to do an alignment here or just do another REFSMMAT alignment?
02 11 39 48	CC	Negative. We don't need that. Things are really - -
02 11 39 52	CMP	Okay. How's that platform looking then, this morning?
02 11 40 07	CC	Your platform's looking really good, we'll try to get you some drift numbers.
02 11 40 15	CMP	Okay.
02 11 40 36	CC	Apollo 12, your drifts are 1.2 MERU on all axes or less. One of them's even lower than that.
02 11 43 31	CC	Apollo 12, Houston.
02 11 44 03	CC	Apollo 12, Houston.
02 11 44 08	CMP	Go ahead.
02 11 44 09	CC	Did you get that drift report? Your platform is less than 1.2 MERU on all axes.
02 11 44 20	CMP	Roger.
02 11 45 59	CC	Apollo 12, Houston. How's your sleeping bags working out up there, Pete? Over.

02 11 46 07	CDR	Real good, Tom. The first night I slept in a ba[illegible], and Al slept in a bag, and Dick slept up in the seat. He didn't sleep too well. And last night, I slept up in the seat, and Dick slept in my bag, and all of us like the bags. And one of the problems with the seat is that - and we're going to take care of that tonight - it's rattling around in here, and every time somebody stirs down below, why the seat bangs off the wall and that naturally wakes up the guy that's sleeping in it. It's kind of spring-loaded, anyhow.
02 11 46 42	CC	Roger. Looks - you getting plenty of sleep? Over.
02 11 46 49	CDR	Yes, plenty. We're getting more than I need.
02 11 46 52	CC	Good. The reports look real good down here.
02 11 47 24	CMP	Hey, Tom. What do you think of our RAD count?
02 11 47 28	CC	Say again?
02 11 47 34	CMP	What do you think of our PRD count?
02 11 47 36	CC	Stand by 1, Dick, I'll check.
02 11 47 53	CC	Well, from down here, it looks like the total RAD count showed that you got practically nothing up there.
02 11 48 03	CMP	Well, I wouldn't go so far as to say we've got nothing.
02 11 48 08	CC	At least, they call it 90 millirads.
02 11 48 19	CC	That's less than 1/300th of what atomic workers can get.
02 11 48 30	CC	And I'd nearly bet that the calorie count that you people can see up there just nearly zero.
02 11 48 41	CMP	I wouldn't bet on that either.
02 11 48 44	CDR	I would. The calorie count.
02 12 34 51	CC	Apollo 12, Houston.
02 12 34 55	CMP	Go ahead, Houston.

02 12 34 57	CC	Roger. We'd like to check and see if the expanded deadband has been collapsed. We'd like to check your load by looking at NOUN 79, so we'd like to ask you to enter a VERB 79 for us.
02 12 35 20	CMP	Okay, how's that? Proceed on that and I'll be okay, huh?
02 12 35 31	CC	Load looks all right to us. You can go ahead and proceed.
02 12 35 33	CMP	Are you looking at it, Don?
02 12 35 34	CC	That's affirmative. You can go ahead and proceed.
02 12 35 37	CMP	Looks okay to me, too.
02 12 35 48	CMP	Hey, Don, I think all of us up here are gaining weight on this food; it's been so good.
02 12 35 54	CC	Say again, 12.
02 12 35 55	CMP	Pete and I just had frankfurters and - say, this food up here has been so good, I think we're going to gain weight.
02 12 36 04	CC	12 - -
02 12 36 05	CMP	Pete and I just polished off four frankfurters and some apple - applesauce; Al Bean hasn't quite eaten his yet, but it's really been good.
02 12 36 15	CC	Hey, you're just killing me, man. I'm sitting down here without anything to eat.
02 12 36 23	CMP	You mean the Tastee-Freeze isn't open?
02 12 36 27	CC	I haven't been in it for a while. Just remember to do your mild exercise today so you don't gain weight.

END OF TAPE

02 12 44 13	LMP	Houston, Apollo 12.
02 12 44 17	CC	Go ahead, 12.
02 12 44 22	LMP	Roger. At 61:15, do you want an O_2 fuel cell purge and waste water dump like the flight plan calls for?
02 12 44 30	CC	That's affirmative.
02 12 44 35	LMP	Okay, and what do you want us to dump the water to, 10 percent?
02 12 45 22	CC	12, we'd like to recommend that you dump to zero since we're going to have quite a time before we'll have another opportunity for a dump.
02 12 45 34	LMP	Okay.
02 13 14 33	CDR	Houston, Apollo 12.
02 13 14 39	CC	12, Houston.
02 13 14 43	CDR	Roger. One waste water dump, one O_2 purge coming up.
02 13 14 47	CC	Roger.
02 13 14 51	CDR	Who's that? David?
02 13 14 55	CC	Good ear.
02 13 15 00	CDR	What are you doing - -
02 13 15 01	CMP	Good evening, David.
02 13 15 02	CDR	- - up so late?
02 13 15 03	CC	Watching after you.
02 13 25 32	CC	Apollo 12, Houston. We see zero on your waste water. Thanks very much.
02 13 25 39	CDR	Okay.
02 13 55 47	CMP	Hello, Houston; 12.
02 13 56 10	CMP	Hello, Houston; 12.

02 13 56 13	CC	Go ahead, 12.
02 13 56 21	CC	Apollo 12, Houston. Go ahead.
02 13 56 28	CMP	Hello, Houston; Apollo 12.
02 13 56 31	CC	Apollo 12, go.
02 13 56 36	CMP	Roger, Houston. Looks like that water dump has kind of ruined our PTC, here. I was just wondering if you want us to do anything with it or just stand by and wait until the - the fixed attitude at 63 hours.
02 13 56 57	CC	Roger. We - We followed your water dump maneuver.
02 13 58 08	CC	Wait 1. 12, we'll just continue to watch your attitude changes for a while, and - if anything - if your yaw swings too far, we can come out of it, but let's stay in the attitude you're in now for a while.
02 13 58 26	CMP	Okay.
02 13 58 28	CC	In PTC for a while is what I intended to say.
02 13 58 33	CMP	Roger. Understand.
02 14 10 50	CC	Apollo 12, Houston.
02 14 10 55	CMP	Go ahead.
02 14 10 56	CC	Just want to remind you to charge battery B, please.
02 14 11 07	CMP	Roger. Battery B charge.
02 14 11 09	CC	Roger. Thank you.
02 14 13 58	CDR	Houston, 12.
02 14 14 02	CC	Go ahead, 12.
02 14 14 49	CDR	Houston, Apollo 12.
02 14 15 06	CC	Apollo 12, Apollo 12, Houston. How do you read me?
02 14 15 23	CDR	Houston, Apollo 12.
02 14 15 25	CC	Apollo 12, Houston. Go.

02 14 15 40	CDR	Houston, Apollo 12.
02 14 15 43	CC	Apollo 12, Apollo 12, this is Houston. Over.
02 14 15 56	CDR	Houston, Apollo 12.
02 14 16 02	CC	12, Houston. Go.
02 14 16 06	CDR	What's going to be the roll angle, so we can start thinking about where we're going here - for this TV?
02 14 16 13	CC	Roger. Your roll angle is 285 degrees, pitch 90, and yaw is 0.
02 14 16 32	CC	Apollo 12, Houston.
02 14 16 35	CDR	Go.
02 14 16 36	CC	Roger. We've got a checklist change for you for coming out of PTC. Would you open your checklist to page F 9-7? Over.
02 14 16 48	CDR	Roger. Got it. Go ahead.
02 14 16 50	CC	Okay. On step number 1 to exit G&N PTC, because you're so far out of the deadband, you ought to put your MAN ATT 3 to ACCEL COMMAND before you put your AUTO RCS SELECTS to MAIN A and B. And we suggest we put the - this - -
02 14 17 08	CDR	Roger.
02 14 17 09	CC	- - into the checklist change for good.
02 14 17 13	CDR	Yes, that's probably - -
02 14 17 14	SC	..., okay?
02 14 17 15	CDR	- - a good idea.

END OF TAPE

02 14 17 26	CC	Okay. And we think you probably ought to come on out of PTC now. That's one of the reasons why we're having a little trouble with COMM.
02 14 17 33	CDR	Okay. And what we'll do - we'll slide on over to the 90, 0, 285.
02 14 17 35	CC	Roger.
02 14 24 38	CC	Apollo 12, Houston.
02 14 26 40	CC	Apollo 12, Houston, with a flight plan update.
02 14 26 47	CDR	Okay, Houston. Ready to copy.
02 14 26 50	CC	Roger. Your TV pass at 63 plus 00. Number 1, stop your PTC roll at 285, and this is what you need to put the Sun through the hatch window. Step number 2 is your high-gain antenna angles are pitch 19, yaw 268. Step number 3, put the ALC switch to the IN position, and open the camera aperture to FULL OPEN for your tunnel pictures.
02 14 27 44	CDR	Okay, Houston. We got it.
02 14 34 31	CDR	Houston, Apollo 12.
02 14 34 34	CC	12, Houston. Go.
02 14 34 37	CDR	When do you want us to start this show, now?
02 14 34 45	CC	Pete, we're ready whenever you are. Your option.
02 14 34 51	CDR	Okay. That's what I figured. So, we're starting to pressurize the command module now, and we'll start here directly.
02 14 35 01	CC	Okay.
02 14 49 55	CDR	Hello, Houston; 12.
02 14 49 57	CC	12, Houston. Go.
02 14 50 01	CDR	Okay. We're coming up VOX at this time, and we're getting ready to give you the TV. Al will get it going in just a second.
02 14 50 10	CC	Roger. Standing by.

02 14 50 26	LMP	... properly dressed.
02 14 50 34	CMP	Jerry, we've got to dress Al yet. We have to put on his hat.
02 14 50 39	CC	Roger. Lights! Camera! Action!
02 14 50 50	CDR	I'm down here ... up in here, I guess.
02 14 51 05	LMP	Let him get over here where the Sun comes in.
02 14 51 10	CMP	Shortly too.
02 14 51 11	LMP	There you go.
02 14 51 16	CMP	Who, me? Okay?
02 14 51 42	CDR	Okay. You putting it out? Wait a minute. You got it on the ground yet, Houston?
02 14 51 49	CC	Not yet, Pete.
02 14 51 53	CDR	Okay. We'll hold until you get the picture.
02 14 51 56	CC	Okay. We're not copying any FM downlink as yet.
02 14 52 25	CC	12, Houston. We have you in blushing black and white. And the color's coming in now.
02 14 52 32	CDR	Roger.
02 14 52 35	CMP	What happened to the color?
02 14 52 36	LMP	There you go.
02 14 52 37	CC	Takes a little for the processing.
02 14 52 40	CDR	Okay. As you can see, Dick's up there in the tunnel, and he's opening the vent valve now, and he's starting to pressurize the LM.
02 14 52 55	CDR	And we have a DELTA-P of about 2.3 at the moment.
02 14 53 04	CMP	Okay. It's going down to about 2.2.
02 14 53 12	CDR	Well, no. The DELTA-P went up when we pumped up the cabin.
02 14 53 21	CMP	DELTA-P is 1.8.
02 14 53 30	LMP	What's the cabin? Okay. Just about do it. We're down to 1.3 DELTA-P. Okay, 1 psi DELTA-P.

02 14 53 54	CDR	While we're equalizing the cabin, Houston, the attitude that you have us in, out our number 1 window, we have the Earth; and out the number 3 window, we have the Sun shining in; and out the number 5 window, we have the Moon. And, of course, we're too far from either the Earth or the Moon to see any motion, so it just seems to us that we're in suspended animation out here.
02 14 54 21	CC	Roger.
02 14 54 22	CMP	What's the cabin pressure, Al?
02 14 54 28	CDR	Yes, it is. And you just brought the cabin REG on and that ought to be okay so - -
02 14 54 35	CC	We're reading you 4.7 on your cabin pressure now; and, Al, we're not reading you at all.
02 14 54 47	LMP	... How do you read me now?
02 14 54 52	CC	Okay, now, Al.
02 14 54 56	LMP	Okay. And the hatch is open.
02 14 55 06	CMP	What in the heck is this thing doing up here? Here it goes - There's another one right there. You may not want to move it. There you go.
02 14 55 13	LMP	All right.
02 14 55 16	CDR	Okay. Pretty good - How's the lighting down there, Houston? Looks pretty good on the monitor.
02 14 55 23	CC	It's very good. We have a good picture of the hatch.
02 14 55 29	LMP	That's your feet up on the window there, Pete.
02 14 55 34	CDR	Sorry about that.
02 14 55 40	CMP	Okay. Let me get the hatch bag open so we can get it in.
02 14 55 50	LMP	This big old hatch wrestles pretty easily here in zero g.
02 14 55 56	CC	Beats one g all to heck, doesn't it?
02 14 56 00	LMP	Sure does, Jerry.
02 14 56 10	MS	...

02 14 56 18	LMP	Dick's putting it under the left-hand couch now. If we move down there, we can ...
02 14 56 29	CC	I just noticed, 12 - -
02 14 56 31	LMP	There you go.
02 14 56 32	CC	The outer side of that hatch makes a pretty good light reflector. So you might keep that in mind if you ever need a light at that place.
02 14 56 35	CMP	It sure does. Did you notice that, too?
02 14 56 40	CC	Affirmative. It really lighted things up.
02 14 56 44	CMP	Okay, now, we'll get back up there. We'll get up there again and take the probe out. As you recall, we've had it in and out of there several times already. And the procedures are fairly simple. Now that we've done it, we've already bled the nitrogen out, but all I do is hit that button anyway just for procedural purposes. And the preload handle's all set and everything. We'll unlock the temperature latch lock, and we'll extend the strut. The umbilicals are already disconnected and stowed.
02 14 57 33	CC	The lighting in the tunnel is just a tad dim, but we can make out what you're doing.
02 14 57 50	LMP	That's wide open on the f-stop now, Houston.
02 14 57 54	CC	Roger.
02 14 58 01	LMP	I think part of the problem is there's a lot of contrast between that dark tunnel and the white garment of Dick's. It's giving the camera a little fit.
02 14 58 17	CMP	Okay, turn the capture latch release 180 degrees, and all I have to do is pull the probe out of there. Okay, away she comes.
02 14 58 47	LMP	All right, while Dick's stowing that, I'll go up and get the drogue.
02 14 58 58	CMP	You got any late-night watchers, Jerry?
02 14 59 07	CC	That's affirmative.
02 14 59 12	CDR	Al, can you pull up your ..., please?

02 14 59 13	LMP	Okay. Just a second; I'll have to move the camera.
02 14 59 17	CMP	I'll hold the camera; here, hand it to me. I've got it.
02 14 59 20	LMP	Okay. How's that, Dick?
02 14 59 25	CMP	I've got it just fine.
02 14 59 34	LMP	Okay. Dick's putting the probe now under the right-hand seat, and he's going to have to strap that in with something - just enough to hold it there. Let's see if I can scoot around and give you a shot of it. Not quite as light down in there.
02 14 59 50	LMP	Okay.
02 15 00 28	CMP	Okay, Pete. We're ready for the drogue.
02 15 00 29	CDR	Coming down.
02 15 00 48	LMP	... you juggle with this thing every time.
02 15 00 49	CMP	Al, you got it on the umbilical cover; that's one reason. On your right hand; there you go.
02 15 01 01	CMP	Boy. Hey, move back that way, and I'll take it away from you.
02 15 01 10	CC	Sounds like you're handling empty milk cans up there.
02 15 01 12	CDR	There you go.
02 15 01 17	CMP	Hey, you want to look at the drogue after a docking?
02 15 01 19	LMP	That's right. Turn it around, but don't let any light hit on it, Dick, or I can't see it.
02 15 01 23	CMP	How's that?
02 15 01 25	LMP	Too much light. Sort of tip it up or move it over to the left or right. It's got a little circle of light on it.
02 15 01 31	CMP	How's that? Is that better?
02 15 01 36	LMP	I'll move in ... There's the drogue after one docking.

02 15 01 44	CC	Roger. We can't see too much because of the big light spot on it.
02 15 01 52	CDR	Okay, why don't you stash that, Al or Dick, and stick -
02 15 01 58	LMP	There's Dick Gordon looking through the hole.
02 15 02 02	CMP	Hello, there.
02 15 02 07	LMP	The only mark on it is - show them where the mark is, Dick. You hit it almost dead center when you did the docking. Yes, right there. That's funny. That mark looks just like a nose; about the same length, too.
02 15 02 26	CMP	Okay, Al. You want to stick her up here and we'll ...
02 15 02 50	LMP	Okay, go ahead, Pete.
02 15 02 52	CDR	All right.
02 15 03 03	CC	Okay, 12. The lighting in the tunnel looks pretty good now.
02 15 03 09	CDR	Okay. And if you'll hold it just a minute, I'll get the window shades down in the LM here.
02 15 03 20	LMP	There he goes. I don't think so. Not today. I have to transfer over these things, Dick, right here. Okay, well, I'm going over, but you'll have to hand us these goodies. We'll stick them in the LM. Hey, it looks like there's good lighting up there.
02 15 03 59	CC	Roger, 12. Lighting is very good.
02 15 04 03	CMP	Okay, we're going to -
02 15 04 04	CDR	Hand me those hoses first. Let me get some air going.
02 15 04 08	CMP	Okay.
02 15 04 10	CDR	Here, I'll get up there. Just sling me the book, Dick.
02 15 04 20	CMP	Okay.
02 15 04 21	CDR	And do you want to hand the long hoses up? We're putting these CSM hoses down inside the LM, since

there's no ventilation in there now. We just lay them around down there where we're going to be working with the LM, and it makes it real nice for cooling and gives you clean air down in there. Without them, it gets a little stale after a while. Okay. Why don't I just go through and show them how it looks - -

02 15 05 05	LMP	Okay.
02 15 05 06	CDR	- - when you go through the tunnel.
02 15 05 08	LMP	Go on.
02 15 05 19	CDR	Okay. It's pretty easy. Just float on up. Only problem is, when you get in here, we're going to be upside down and then you got to turn around and decide - -
02 15 05 26	LMP	Hand me the camera.
02 15 05 28	CDR	- - which way is right side up.
02 15 05 32	CMP	There you go. Now I'm going to check this line. It may not be as long as we'd like. That's it right there. That's it, Pete.
02 15 05 43	CDR	You'll probably have to turn around upside down, let me dive in there.
02 15 05 51	CMP	I tell you what. Let me scout those items, and I'll hand them in to you, Pete.
02 15 05 55	CDR	All right, what are you looking for?
02 15 05 59	CMP	Hand me the book, and I'll do it, toss them in to you, and you can put them up.
02 15 06 04	CC	12, Houston. We had a pretty good view of your ECS module there; and now, we're getting a good view of the main panels upside down.
02 15 06 19	CDR	We discovered an interesting thing while we were in here the other day. The AOT looks right into the command module rendezvous window, and I was looking out to see what I could see, and I saw this face looking back at me, and it was Dick in the other window.
02 15 06 41	CC	Roger. Did it scare you?
02 15 06 46	CDR	It should have.

02 15 06 47	LMP	... it's hot in here. It's quite warm in here today. The way we stopped has the Sun coming in through one window, and it's heating it up pretty good in here.
02 15 07 06	CC	Roger. Looks like the Sun's coming in through the CDR's window.
02 15 07 14	CDR	Yes. That's right.
02 15 07 16	CMP	Here's a box of Kleenex, Pete. Coming in, right by you.
02 15 07 17	CDR	Got it.
02 15 07 18	CMP	Next one's two towels. I'll go get them.
02 15 07 19	CDR	Okay.
02 15 07 20	CC	We just had a good view of the PLSS fastened down there on the floor between your legs.
02 15 07 28	CDR	Yes. I can't go down any further. My COMM line won't allow me to go any further than I am right now, so I got myself Velcroed to the top of Al's PLSS.
02 15 07 44	CC	Okay. That's a good view of it right there.
02 15 07 54	CDR	I'm just giving you a two-bit tour, Jerry.
02 15 07 59	CC	Roger.
02 15 08 05	CDR	When we were in the other day, we rigged the - -
02 15 08 32	LMP	Hey, here comes - -
02 15 08 35	CDR	What you got, Al?
02 15 08 36	LMP	- - yes, here comes a couple of towels. Both of that and the Kleenex go in the left-hand side storage compartment. Let me get the 16-millimeter magazines and 70-millimeter magazines.
02 15 08 49	CDR	Hey, Al. Why don't you come up here, and let me get those for you?
02 15 08 52	LMP	Okay. That's a good idea, and then maybe I can say a few words about this here.
02 15 08 56	CDR	Well, as a matter of fact, you're going to have to do that, Al, because I can't get any lower on

this COMM cable. You're the only one that can get down there.

02 15 09 02	LMP	All right.
02 15 09 04	CDR	I'll hold the camera, Dick. We have a three-way switch here in the tunnel.
02 15 09 10	LMP	Okay, I'll just come on past. Okay?
02 15 09 18	CDR	Dick?
02 15 09 19	CMP	Okay?
02 15 09 30	CC	We just had a good view of your helmet stowage bag down there a couple seconds ago.
02 15 09 41	CMP	Al, here's the Kleenex and the towels.
02 15 09 49	CC	Looks like you're trying to pack a telephone booth.
02 15 10 45	CDR	I'll get the camera in here, Jerry, and bring it around the corner.
02 15 10 51	LMP	Okay. Let me put those in their proper spots.
02 15 10 56	CDR	Okay, what we've got on this side, Jerry, is what we call a left-hand side stowage compartment, and it's pretty unique in that it's made out of Beta cloth, and from these snaps, you can see we can remove it. So what we do after the first EVA, we put a lot of our things that we don't need anymore inside these bags, and then we can put them outside on the lunar surface; and after the second EVA, we can put some other things in this other or the backend side of this stowage compartment, and then put it out on the lunar surface, also, until we end up being able to very tidily put some of our gear on the outside of the - outside the spacecraft so we'll be a lot lighter when we get ready to leave the lunar surface, which is handy since we - you can bring back more rocks and what have you.
02 15 11 50	CC	Roger.
02 15 11 53	LMP	Okay, I'll just stick this down in here.
02 15 11 55	CDR	You can also see in the picture the restraint straps that are hooked up above that, used to hold us in for landing.

02 15 12 06	LMP	There you go. Yes, this is what Pete's talking about. Okay, you got some more goodies? 70-millimeter magazines. There's two of them. These are the two that go here in the TSB, temporary stowage bag. ...
02 15 12 23	CDR	Two of them go in the ISA.
02 15 12 26	LMP	Right. Just a second. TSB safely stuffed away. Take a look in here, and let's see how this looks. Let's poke them right in here; then they'll be here tomorrow. Open this up.
02 15 12 46	CC	12, Houston. Our color TV is running about 11 seconds behind your voice; and so what you're talking about, we're seeing about anywhere from 10 to 11 seconds later.
02 15 13 03	CDR	Okay. That's interesting. Was that due to the processing?
02 15 13 08	CC	That's affirmative.
02 15 13 13	LMP	What we are doing now is putting the - two of the 70-millimeter magazines for Hasselblads in the stowage container here. Those are the two that we're going to use when we first get on the lunar surface. Here's three more, and these three will be used the second EVA, and so we'll stick them over here in the right-hand side stowage compartment. The right-hand side doesn't - isn't removable at all, as you probably know. We'll go ahead - The cameras and film that we bring back from the lunar surface, we'll put all of that material over here on the right-hand side, or a lot of it anywav, because the left-hand side won't be there. As you're looking now, then I'm slipping that Beta cloth bag in its place on the right side.
02 15 14 07	CC	Roger.
02 15 14 08	LMP	Okay, here's the 16-millimeter film.
02 15 14 09	CC	Okay.
02 15 14 12	LMP	The same thing with the 16-millimeter film, you'll be seeing in a moment.
02 15 14 26	CDR	Okay, there's just one of those, Dick, and that's in A-8.

02 15 14 32	CMP	That's the whole package, just here?
02 15 14 34	CDR	That's it.
02 15 14 37	LMP	Okay, as you see, I'm just about to put the 16-millimeter magazines in their stowage compartment. In spacecraft, as you can see, there is not a lot of room, so you end up having to put every item in its own little place. As you can see, as the film - as magazines go in, they fit into a tidy little - -
02 15 15 02	CDR	We need one of those. We need a spare.
02 15 15 03	LMP	- - ... bracket. And if Pete gives you a complete look at that right-hand stowage compartment, you can see we've got quite a lot of goodies here. Down here, we've got a spare - -
02 15 15 19	CC	We're getting a good view of the right-hand compartment now, and we can see your helmet stowage bag down there in the corner, that spherical white bag.
02 15 15 29	LMP	Right. Right in here, we keep some spare bulbs for the COAS. A little bit higher up, we've got Sun filter for our telescope.
02 15 15 46	CDR	Yes, and it's marked.
02 15 15 49	LMP	There's the COAS filter. It's the pilot's sighting device. The waste stowage bags are stored in the bottom two compartments. In here, I hope, is our Hasselblad camera, at least one of them. We have two of them. Yes, there it is. Got to put it together right now. It is - just the camera itself; we'll have to put the magazine on later, and the handle, and all the attachments allowed to be fixed to our PLSS. RCU, PLSS RCU.
02 15 16 30	LMP	Is that all of the transfer?
02 15 16 32	CC	Roger, Al. That's the color camera you're going to use out on the lunar surface, isn't it?
02 15 16 38	LMP	No, Jerry. We don't have the color camera that we're going to use on the lunar surface inside the LM. It is outside on the MESA, and it's going to be just like Apollo 11. When Pete goes down the ladder, he'll pull a handle; it will lower the MESA, and then the TV will be pointing

right at the lower part of the ladder so that everyone can see when he steps on the surface. We'll later put that out on the lunar surface on a tripod, and we'll be able to move it around so that everybody can see for both of our EVA's. Those two cameras - I only showed you one; the other is right next to it - are the two 70-millimeter still cameras; they hook right on the front of the suit, so that you can take still pictures of rocks, the Surveyor when we get there, and ALSEP, and what have you, while we are walking around.

02 15 17 39 CDR Jerry, I'm showing you a picture of the instrument panel right now; but what I'm more interested in, on my monitor, I can see some dust particles; maybe you can see them down there on the TV. I think that's pretty good resolution.

02 15 17 56 CC That's affirmative, Pete.

02 15 17 57 CDR They happened to be floating in the sunlight - they just happened to be floating in the sunlight that's in here. Of course, there is a little bit of - it's very light dust, but it looks big on the TV screen because the Sun is illuminating it; and, of course, as soon as we start running the ECS system in here, it will clean it all out.

02 15 18 18 LMP Okay, I am going to start doing that right now. Just opened the descent H_2O. I'm opening the descent O_2, Pete, and going to CABIN REPRESS, AUTO; and, when I do, you are going to hear a bang, so - -

02 15 18 33 CDR Stand by for the bang.

02 15 18 35 LMP - - Dick? Get ready for the bang.

02 15 18 36 CMP Stand by for the bang.

02 15 18 38 CDR Ready.

02 15 18 39 CMP Okay. That's it. And the CABIN REPRESS circuit breaker is going to go closed. Suit isolation valve, O_2, FLOW, and then actuate override.

02 15 18 53 LMP If you will just wait a minute, let me - I've got to get the camera on all that good stuff.

02 15 18 57 CMP All right.

02 15 18 58	CC	12, Houston. We can see the dust particles very well.
02 15 19 05	LMP	Okay.
02 15 19 08	CDR	This is a shot of the suit disconnect valves.
02 15 19 13	LMP	Did you show them where both of our PLSS's were stowed? We got one over here, Pete, on the side and one on the bottom. I didn't know - one of the floor right in front of the hatch.
02 15 19 22	CC	12, Houston. We've seen the one on the floor. - -
02 15 19 29	CDR	Okay.
02 15 19 30	CC	So, if you can show us the one over on the side, we'll be in good shape.
02 15 19 37	LMP	And pull this latch right?
02 15 19 40	CMP	I don't know; you will have to back it up ... and show that, Pete?
02 15 19 47	LMP	It's pretty tight quarters in there.
02 15 19 48	CDR	I don't know; you're going to have to back the camera up.
02 15 19 49	LMP	Okay. Why don't I do that.
02 15 19 51	CMP	Take a look at the monitor.
02 15 19 56	CDR	Be sure we don't get too much - -
02 15 19 59	CMP	That's a good picture.
02 15 20 01	CDR	... get that last item.
02 15 20 05	LMP	Yes, Pete's PLSS is on the wall behind him. When we suit up, we won't have a lot of time to talk to you on the lunar surface. What we do is, Pete gets over on his side, which is the left side of the spacecraft; this side over here. I'll be over on the right; I'll take my PLSS off the floor and put my OPS on top of it. Pete will do the same thing with his; then he'll put - hold my PLSS up while I put it on; this takes about 10 or 15 minutes to get my PLSS on and connected. Then I kind of back over in my corner and hold his PLSS; he turns around and puts it on. It's not a lot of

room here, as you can see; and when you're fairly bulky with your suit on, your PLSS is on, your helmet, and the whole business, you have to be very careful that you don't bump into the - any of the parts of the LM. I'm showing you my PLSS again. It is a little bright here, so I am going to have to be careful about this camera. There's the helmet stowage bag.

02 15 21 09	CDR	Hey, Al, I wonder if it's at all possible for you to stop the camera down and show them the window.
02 15 21 17	LMP	The markings on the window? That's a good idea.
02 15 21 19	CDR	Yes. The RTG is really illuminated there in the Sun.
02 15 21 21	CMP	Okay. Why don't you see if you can get over there near it?
02 15 21 25	LMP	All right.
02 15 21 26	CMP	Maybe we can show where you're standing there. Okay, the light just went out, Houston, because I've stopped the camera way down.
02 15 21 34	CC	Roger.
02 15 21 36	LMP	What I'm going to try to show you, without bothering the camera. Yes, but we don't need since I've got it ...
02 15 21 48	CC	12, Houston. What's the configuration of your suit ISO valves, now?
02 15 21 55	LMP	We opened and closed them, per the checklist. They are both in SUIT DISCONNECT.
02 15 22 03	CDR	It is getting awful bright.
02 15 22 05	LMP	I know it. It's liable to bother that camera.
02 15 22 07	CMP	There you go.
02 15 22 08	CDR	Is that too bright on the ground, Houston?
02 15 22 14	CMP	It is f:22.
02 15 22 15	CC	Can't tell, Pete.
02 15 22 17	LMP	You're looking at, Houston.

02 15 22 18	CC	Roger. We can see the scribe marks on the window.
02 15 22 24	LMP	Okay. What happens is, Pete stands right behind those scribe marks you can see right at the top; There's - where the horizontal line is, that's 0 degrees, and then there's a 10 down, 20 down, and 30, 40, and on down. Right at the top then, left and right, there is also some angular marks. As we proceed in the descent and we pitch over where the lunar surface is visible, about 7000 feet, Pete's going to be looking out through the window at those marks. I'll be reading from the computer, and the computer will say where it's taking us to land, relative to those marks. For example, probably the first thing you will hear me say is "42 degrees," so Pete will look out at the 42-degree mark, and he will see if that is the Surveyor crater. We spent a lot of time learning which crater the Surveyor is in and a lot of the more interesting craters around there, the more easily identifiable craters. He will look out and see if the crater's in the right place, I mean if the 42-degree mark's in the right place. If it is, then we'll just continue on the present trajectory. If not, he can use his control stick to put a certain number of inputs in to change the direction we are headed; for example, if he saw it at 40 degrees instead of 42 for the crater we wanted, he could pitch down a couple or pitch up a couple, depending on what he wanted to do. If he saw it at 40, he would pitch down a couple of hits of the stick and, hopefully very shortly, the computer would notice this and start heading for the 40-degree point. I'd continue reading the numbers, and he'd continue to monitor them all the way down. When we got down to a low altitude, then we would be in a good position for Pete to take over manually and land next to the point we're headed for. This is called the LPD or landing point designator. It allows the Commander to keep up with where the computer thinks it should land and then tell it to land at a different place, if he feels it should.
02 15 24 40	CC	Apollo 12, Houston.
02 15 24 41	LMP	Got any questions on that LPD, Houston? Go ahead.

02 15 24 45	CC	Roger. I hate to change the subject on you guys, but it looks like you don't have your AUTO REPRESS capability now. When you activated your SUIT ISO valve, it looks like what you should have done is gone to the SUIT, FLOW, and then used your actuator override, in order to set it up.
02 15 25 11	CDR	How does that look to you, Houston?
02 15 25 20	CC	We don't have TM; we saw that on your TV picture when you were over there fooling with it; and, so far, we haven't seen it again.
02 15 25 31	LMP	Okay. We fixed it up for you.
02 15 25 34	CC	Okay. Thanks. I think you pretty well covered that LPD situation. I don't know that there could be any questions.
02 15 26 16	CDR	Okay. We're readjusting it back inside now, Houston. Back over here, Al.
02 15 26 26	LMP	Okay, let me run up one of these window shades so I can check this AOT. Cut down your light, and maybe I can just leave it open a little bit. Just the other day, this AOT was beautiful. Push around over here. Scribe works, focus ...
02 15 27 02	CDR	Okay, Dick. I'm shining the camera down the tunnel at you now. The hat's awful bright in the Sun. That's it, see? Yes.
02 15 27 17	CC	Hello, Dick. We can see it.
02 15 27 29	CDR	You shine - you reflect the Sun, Dick. I can't keep it on you; you reflect the Sun off your suit so bright. I'm afraid it's going to burn a spot on the tube.
02 15 27 44	CC	Pete, you going to let Dick get any LM time?
02 15 27 49	CDR	Yes, he's been in and out with us.
02 15 27 52	CC	Okay. Pete. I think we're finished checking this thing out.
02 15 27 54	CMP	They've got to Jerry. They get command module time.
02 15 27 59	CC	That's right, babes; equal time.
02 15 28 03	CMP	Ready to close up shop?

02 15 28 04	CDR	Okay. Are you going to open - are you going to open that window or not?
02 15 28 07	CDR	That's it, no. We're through with those.
02 15 28 09	CMP	Yes, we're finished.
02 15 28 11	CDR	Jerry, do you have any more questions on the LM? Does anybody have any more questions down here or anything they want to see?
02 15 28 28	CC	No, I guess not, 12. Very good travelog, gang.
02 15 28 32	CMP	We're going to start to button her up, and I'm gonna - -
02 15 28 39	CDR	All right, Dick. We can - -
02 15 28 40	CMP	Hey, Pete - -
02 15 28 42	CDR	- - go on and button that up and then bring that camera in here and - -
02 15 28 45	LMP	I'm going to send the camera over to you right now.
02 15 28 48	CDR	- - take a look at the Earth and the Moon.
02 15 28 49	LMP	Okay. Here. Here comes the camera, followed by me. Toot. Toot. Watch it. It's at f:20 - wide open so - stop her down. There you go.
02 15 29 07	CC	12, Houston.
02 15 29 09	LMP	Okay. I'm going to close the cabin - - going to close CABIN REPRESS now.
02 15 29 13	CDR	Stand by for a bang, Dick.
02 15 29 14	CMP	Okay.
02 15 29 16	LMP	That's it.
02 15 29 18	CC	12, Houston. We heard the bang that time.
02 15 29 23	CDR	Yes. It sounds like about a .32 going off in your ear.
02 15 29 30	CC	Roger. And, Pete, on your way through there, would you give us another tunnel index reading?
02 15 29 38	CDR	Okay.

02 15 29 44	CMP	It was minus 0.3 the other day, Pete. I hope it hasn't changed.
02 15 29 48	CDR	Fortunately, it hasn't. It's still minus 0.3.
02 15 29 51	CMP	Hey, Jerry?
02 15 29 52	CC	Go ahead.
02 15 29 54	CMP	Hey, Jerry?
02 15 29 55	CC	Go ahead, Dick.
02 15 29 56	CMP	Did you see that number 1 window on the television? - -
02 15 29 59	CC	That's affirmative.
02 15 30 01	CMP	- - number 1 window on the television? That's what it looks like.
02 15 30 08	CDR	Say, Dick.
02 15 30 09	CMP	What's this thing out the window?
02 15 30 20	LMP	Pete, I need your damp rag. We ought to clean this CSF tunnel hatch seal. It's got a bunch of junk stuck on it.
02 15 30 31	LMP	Thank you. Looks like all these circuit breakers are just exactly like we left them.
02 15 30 40	CDR	That makes sense.
02 15 30 42	LMP	Okay. FLOODLIGHT's, ON; window shades, up; cabin dump valve, OPEN. Is it still open, Pete?
02 15 30 51	CDR	Cabin dump valve is still open.
02 15 30 53	LMP	Okay. The IVT and press on.
02 15 30 58	CC	12, Houston. That's a real good picture of the number 1 window there.
02 15 31 06	CDR	What have you got in the picture? Be careful, Charlie.
02 15 31 17	CC	There is a big white thing out there. It looks like a piece of pie.
02 15 31 23	CMP	Yes. That's right.

02 15 31 27	CDR	Okay. Hand me the hose, Al.
02 15 31 29	LMP	Okay. Just double checking all thes things to make sure they were tidy. Got them?
02 15 31 39	CDR	Okay, Jerry. I'll go over to the number 5 window now.
02 15 31 43	CC	Roger.
02 15 31 48	CC	Notice the stuff on the number 1 window is kind of linear looking. Linear striations or something.
02 15 31 54	CDR	Yes. It's still open.
02 15 31 56	CMP	Did you light the seal yet?
02 15 31 59	CDR	Yes, I've got to finish it in just a minute.
02 15 32 02	CMP	Okay. I was going to lift this hatch to you.
02 15 32 08	CDR	Either the problem there, Dick, is - that television line is around Al's COMM ... Okay, Houston. What do you have on number 5 window?
02 15 32 21	CC	Roger. We can see the Moon out there.
02 15 32 26	CDR	How does it look?
02 15 32 28	CC	Very, very slender segment. And it's a real good picture of it.
02 15 32 34	CDR	Was the picture of the Earth any good?
02 15 32 36	CC	Yes, it was pretty bright.
02 15 32 38	CDR	Before?
02 15 32 39	CC	Couldn't really see much except just the segment of it.
02 15 32 43	CDR	Okay, I had it stopped all the way down. Hey, Dick, will you take that hose and stick it someplace? Thank you. There you go. Now watch it. Your wire is - Let me go through there.
01 15 33 11	SC	(Laughter)
02 15 33 12	LMP	Looks like a snakepit.
02 15 33 23	CDR	That ought to do it.

02 15 33 24	LMP	Yes.
02 15 33 26	CMP	Hey. you and I are tangled up.
02 15 33 28	CDR	Okay.
02 15 33 34	SC	(Laughter)
02 15 33 40	CMP	There you go.
02 15 33 47	CDR	Okay. Let me slide back down there and finish the seal off.
02 15 33 51	CMP	All right.
02 15 33 58	CMP	Hey, are you doing good?
02 15 34 00	LMP	... your feet out now.
02 15 34 02	CDR	Okay.
02 15 34 11	SC	Hey, Jerry, I have the Earth again. Is that a better picture?
02 15 34 15	CC	That's a much better picture.
02 15 34 29	CDR	That landmass you're looking at there is Australia.
02 15 34 32	CC	Roger. We can't - -
02 15 34 34	SC	- - ... - -
02 15 34 35	CC	- - determine anything on the Earth there, but it looked quite a bit more like the Earth now than it did before. It looks like you got it stopped down considerably more.
02 15 34 51	CC	12, Houston. The word is Australia is getting your TV show live.
02 15 34 59	CDR	Roger. They're getting it live, and I wish they could see their landmass. It's almost right in the middle of the Earth. And they ought to recognize the snow cap of South Amer - of the South Pole just below them.
02 15 35 25	SC	Oh, ho.
02 15 35 26	CDR	I know it's been said before, but this is a really spectacular sight.

02 15 35 33	LMP	Australia is getting this live? I'd like to say hello to all my friends down there at the tracking station at Carnarvon, if they're down - -
02 15 35 50	CDR	How about handing me the drogue, Al, and I'll get that - -
02 15 35 52	LMP	- - ... right now. Okay, here it comes.
02 15 36 07	CC	12, Houston. Don't forget the troops at Honeysuckle.
02 15 36 14	LMP	Hello to all the troops at Honeysuckle. I've been to Honeysuckle, though.
02 15 36 22	CMP	What he's saying, Jerry, He's asking for a trip (laughter).
02 15 36 26	CC	That's what I figured - to Honeysuckle.
02 15 36 28	CMP	This one isn't long enough (laughter). This one's not long enough for him.
02 15 36 36	LMP	Getting that in there, Pete?
02 15 36 37	CDR	Yes.
02 15 36 38	CMP	Jerry, when we go back to the other side, turn to that monitor again. We may have a better picture this time.
02 15 36 43	CC	Okay, Dick.
02 15 36 55	CMP	Here's the problem, right here. Get it through here this way.
02 15 36 59	CDR	Okay.
02 15 37 00	CMP	And then stand like you want.
02 15 37 02	CDR	Okay, very good.
02 15 37 03	CMP	There you go.
02 15 37 04	CDR	There we go.
02 15 37 05	CMP	Stand any way you like it.
02 15 37 06	CDR	Oh, there we go.
02 15 37 20	LMP	I hope I did. Are you ...?

02 15 37 29	CC	Okay, Dick. We're copying the Moon now.
02 15 37 34	CMP	How's it look?
02 15 37 35	LMP	... as much as he's going to see.
02 15 37 36	CC	This is even a much better shot than the last one.
02 15 37 45	CDR	Well, do you see a place there you'd like to go?
02 15 37 48	CC	I'd like to go anyplace there.
02 15 37 53	CDR	Okay, one drogue's in, and somebody's pencil is floating by. Here you go. Is it yours, Al?
02 15 38 01	LMP	I'll check and see.
02 15 38 02	CDR	Okay, ... rest of that stuff now?
02 15 38 05	LMP	Yes. I'll hold the camera, and you can get the - -
02 15 38 07	CDR	No, no.
02 15 38 08	LMP	- - get the - -
02 15 38 09	CDR	We're going to change stations, Jerry.
02 15 38 11	CC	Roger.
02 15 38 15	CMP	I'll put this circuit back under the seat where it belongs. Hey, Al, let me get up out of your way.
02 15 38 20	LMP	Okay.
02 15 38 21	CC	12, Houston. On that Moon shot, it looked like we could see part of the lunar surface that's in the terminator and behind the terminator.
02 15 38 33	CDR	Good luck. We're having trouble doing that ourselves.
02 15 38 51	LMP	I didn't realize that waste-water dump was so propulsive. That really upset us there awhile back.
02 15 38 57	CC	It sure did.
02 15 38 59	CMP	Did you clean that seal real good, Pete?

02 15 39 05	CDR	Yes. That seal looked like the perfect dust collector or something. It was really dirty.
02 15 39 19	CC	FIDO says he really appreciated that dump.
02 15 39 20	CDR	Okay, ... put the - Say again?
02 15 39 26	CC	FIDO said he really appreciated that dump.
02 15 39 31	SC	(Laughter)
02 15 39 35	CDR	... the TV, Dick Gordon, and all - give you some tunnel shots again.
02 15 39 43	LMP	... out of the tunnel.
02 15 39 44	CDR	Go back inside and bring up the f-stop a bit. ... ... out. Refocus. Giving you some more tunnel work, Houston.
02 15 39 59	CC	Okay.
02 15 40 02	CDR	Dick Gordon's getting pretty fancy with that far - forward drogue. Those two exercises yesterday and - or three, I guess, counting the original one.
02 15 40 18	CDR	Got to go back further around.
02 15 40 20	LMP	All right. Pete, go around and turn around the other way. Here, I'll hold the camera.
02 15 40 32	CDR	All right. You got it?
02 15 40 35	LMP	I got it. There you go. Okay. Hold it out of the light.
02 15 40 38	CMP	All right. Now, we're going to move down here a little bit.
02 15 40 50	LMP	After all the wrestling we've done with that probe in practice, it's really amazing to see that big thing float around in here.
02 15 41 00	CMP	Beautiful piece of machinery. Seems like we're coming up on the ...
02 15 41 12	CDR	Try your - -
02 15 41 13	LMP	Okay. ... install. Probes are stowed. We're going to install a ... at capture latch release handle forward ... counterclockwise to the cocked

position. Put the probe under the drum. Pull on it. It's in there solid. And we'll put the latches in. Capture latch release handle - is in position. Capture latches are engaged, and now we'll put the installation strut on the wall.

02 15 42 02	LMP	Okay, we've extended the handle to the full extension. And we're going to ratchet the probe back up in place.
02 15 42 09	CMP	..., you can't see the other way.
02 15 42 20	CDR	Okay.
02 15 42 22	CMP	Back off a little bit; it'll be - -
02 15 42 23	CDR	As usual - -
02 15 42 25	CMP	There you go. That's a good shot there.
02 15 42 32	CDR	Hard to get a picture without a bright spot. That's why we're moving around a little bit, so we won't burn our TV camera out.
02 15 42 38	CC	We got a great picture right now, and we're copying Dick ratcheting it.
02 15 42 45	LMP	Okay. Stowing the strut now.
02 15 42 58	CMP	Okay, we've installed the probe and the ratchet handle is - and the insulation and strut are restowed, and the probe is loose in the tunnel just for stowage. Capture latch release handle is set and in the LOCK position. And we'll verify a few little odds and ends on here. The ratchet pall is flush with the housing. Preload shaft is up into the detent, and it's against the umbilical. And we're going to leave the umbilical stowed all ready to put in the hatch. In the hatch right here.
02 15 44 05	LMP	Okay.
02 15 44 26	CMP	And we're looking at the ourside of the hatch now.
02 15 44 42	LMP	Want to get out of the way for me?
02 15 44 48	CMP	There's one down.
02 15 45 02	CMP	Did you stow the strut thing where it was?
02 15 45 05	CDR	Yes. This time I'm learning.

02 15 45 09 LMP

In case our friends in Australia are wondering, we got a - of course, the top hatch on the LM, which is the first thing you saw - Pete wiped off the seal and closed it, and then he put on the drogue on the LM; although we had it stowed in here a moment ago, it fits on the LM and you put that in; and, of course, it looks like a big inverted ice cream cone. When that was complete, it hooks to attach the LM. When that was complete, then Dick got out the probe, which was attached to the command module, put it in the drogue, mated it with the drogue, and then attached it to the command module structure; and now he's put in the command module hatch. When we undock around the Moon in 2 days after passing through the same passageway, Dick will be in here by himself. We'll put the same hardware in, and then when we undock, he'll end up with this hatch to keep the seal in the command module and the probe on the command - on the front end of the command module. We'll end up with the drogue on the LM and then the LM hatch to keep the pressure seal in the LM; and this is the way we'll be for the 35 hours or so that we're apart. When we get back together, then he'll come in, dock his probe with our drogue, and just the same as we are right now. We'll remove all - both hatches and the probe and the drogue, and then we'll come back out of the LM into the command module. So, there's a lot of hardware, and it's heavy because the total wet vehicle weight right now is about 100 000 pounds, and it has to be removable.

02 15 46 55 CDR

That's it. You can turn the tunnel lights out and that's it; it's completely done.

02 15 47 01 LMP

That little valve right in the center is the pressure equalization valve. If there's a difference in pressure between the LM and the command module, we can take that valve and open it, and it will allow the pressure to equalize, thereby allowing us to open the hatch and that's this. It's got a handle with some teeth on it. Dick really ratchets it around. It works pretty good.

02 15 47 29 CMP

Jerry, I think some comments to the folks at home: We've enjoyed doing this for them. All three of us are in good spirits, we're feeling great, we've exercised and slept well, the food's been good, we have lots of nice cold water to drink, and we're sure enjoying the scenery.

		However, I'll tell you one thing: We do miss the good people back home.
02 15 47 51	CC	Roger, Dick. It was a great show, and we really enjoyed your - our little tour down through the lunar module. Glad to see you guys are looking so good, and you're sounding great, and we'll be seeing you later.
02 15 48 06	CMP	By-by.
02 15 48 08	CDR	Very good. By-by from 12.
02 15 48 12	CMP	Would you hold that a minute?
02 15 48 15	LMP	Gee, you really ...
02 15 48 22	CMP	Yes, damn nice.
02 15 48 26	CDR	Let's go off VOX.
02 15 49 38	CC	12, Houston. Look's like everything's set up well for starting PTC.
02 15 49 46	CDR	Okay. We don't have to do anything but crank her off. Okay?
02 15 49 55	CC	Affirmative.

END OF TAPE

02 15 52 53	CC	Apollo 12, Houston. Select OMNI antenna Bravo.
02 15 53 00	LMP	OMNI in Bravo.
02 16 00 43	CDR	Houston, Apollo 12.
02 16 00 52	CC	12, Houston. Go.
02 16 01 16	CDR	Hello, Houston; 12.
02 16 01 18	CC	Apollo 12, Houston. Go.
02 16 01 23	CDR	Roger. Are you going to let us know before we go to bed tonight whether we're going to do MCC4 or not?
02 16 01 37	CC	I think we probably can, Pete. Right now it doesn't look too much like we're going to do one.
02 16 01 45	CDR	Okay. We'll stand by. I just wanted to know whether we were going to know before we went to bed or not.
02 16 01 59	CC	Pete, I think we can tell you before you hit the sack.
02 16 02 05	CDR	Okay. Very good.
02 16 07 41	CDR	Houston, 12.
02 16 07 45	CC	12, Houston. Go.
02 16 07 54	CDR	It's amazing how well you can see when you're looking at something you recognize. I got the monocular here, and I'm looking at Australia, and I can see 80-Mile Beach and the area that that's in - and, the area that Shark's Mouth Bay just south of Carnarvon's in. It's very clear over in that part of Australia right now.
02 16 08 15	CC	Roger, Pete.

END OF TAPE

02 17 49 15	CC	Apollo 12, Houston.
02 17 49 21	CDR	Go ahead, Houston.
02 17 49 22	CC	Roger. Battery B is all chuck full of electrons now, and you can terminate the charge.
02 17 49 30	CDR	Roger. Thank you.
02 18 55 24	CC	Apollo 12, Houston.
02 18 55 34	CDR	Houston, 12. Go ahead.
02 18 55 40	CC	Roger, 12. At this time it looks like - there'll be no need to schedule a midcourse 4. Next 8 hours or so, if we have no major changes in the trajectory due to dumps or anything like that, it probably will be - a sure no midcourse 4.
02 18 56 03	CDR	Okay. It doesn't look like we'll have any dumps other than the regular urine dumps that we happen to have, but no waste water.
02 18 56 14	CDR	Jim, ... it looks like they're going to give us another 10 hours of sleep tonight, huh?
02 18 56 18	CC	Affirm.
02 18 56 37	CC	You guys eating dinner now?
02 18 56 42	CDR	That's affirm. Got some soup and salad, beef and gravy, butterscotch pudding, and ... Yes, I guess that's about it. Somebody got a grapefruit.
02 18 57 06	CC	Roger. Sounds tasty.

END OF TAPE

02 19 09 09	CC	Apollo 12, Houston.
02 19 09 15	CDR	Go ahead, Houston.
02 19 09 17	CC	Roger, Pete. It looks like your EKG indication has gone sour down here. Would you check your blue lead on your - your system there, when you get a chance?
02 19 09 40	CMP	In work. He was exercised; he may have pulled it loose.
02 19 09 43	CC	Okay.
02 19 10 30	CDR	How's it look now, Houston?
02 19 10 32	CC	Loud and clear, Pete.
02 19 10 37	CDR	Say again, Jerry?
02 19 10 38	CC	We're reading you loud and clear, Pete.
02 19 10 44	CDR	Okay. I just didn't reinstall it correctly.
02 19 10 55	CC	You are now medically acceptable again.
02 19 11 02	CMP	The major finally found his heart.
02 19 41 55	CC	Apollo 12, Houston.
02 19 42 00	CDR	Go ahead, Houston.
02 19 42 02	CC	Roger. Are you about ready to give us a E-MOD dump?
02 19 42 08	CDR	Okay. Coming at you.
02 19 42 17	CC	I've got your RCS consumables if you're ready to copy.
02 19 42 39	CMP	Okay, Jer. Go ahead.
02 19 42 42	CC	Roger. The GET, 67 plus 00, RCS total is 80.0; Alfa, 77.2; Bravo, 83.1; Charlie, 77.5; Delta, 82.2. Over.
02 19 43 12	CMP	Roger. Copy.
02 19 45 17	CC	Apollo 12. Houston. Were you calling?
02 19 46 04	CC	Apollo 12. Houston.

02 19 46 20	CMP	Hello, Houston; 12.
02 19 46 23	CC	Apollo 12, Houston. How do you read? Over.
02 19 46 28	CMP	Roger; loud and clear, Jerry. I'm reading you.
02 19 46 30	CC	Okay, Dick. We lost your E-MOD dump about halfway through. Would you try it again?
02 19 46 56	CMP	Hello, Houston; 12.
02 19 46 58	CC	Apollo 12, Houston. How do you read?
02 19 47 10	CC	Apollo 12, Apollo 12, this is Houston. How do you read?
02 19 47 17	CMP	Roger; loud and clear. I think we're in the middle of switching over. Are you ready for my onboard readouts?
02 19 47 24	CC	Affirmative, Dick. And we'll need another E-MOD dump from you, too.
02 19 47 33	CMP	Okay. Here comes the E-memory. PRIM BATTERY Charlie is 37.0; PYRO BAT Alfa, 37.1; PYRO BAT Bravo, 37.1; LM/CM DELTA-P, plus 0.25. Over.
02 19 47 55	CC	Roger. BATTERY Charlie, 37.0; PYRO Alfa, 37.1; PYRO Bravo, 37.1; DELTA-P, plus 0.25.
02 19 48 09	CMP	That's affirmative, and all you got to go is the water chlorination, and the crew status report is negative.
02 19 48 21	CC	Roger. We're going to need a cryo stir.
02 19 48 27	CMP	You've already had it.
02 19 48 29	CC	Okay. And no medication, right?
02 19 48 35	CMP	That's affirmative.
02 19 53 01	CC	Apollo 12, Houston.
02 19 53 08	CDR	Go ahead, Houston.
02 19 53 10	CC	Roger. Would you verify that you changed canister number 6? Out.
02 19 53 20	CDR	We sure did.

02 19 53 21	CC	Okay, and ask Dick to give us a quick call. His last downlink was pretty rough, and we suspect maybe it was mike position; otherwise, we might have COMM problems.
02 19 53 35	CDR	He's not on the COMM right now.
02 19 53 37	CC	Okay. You're sounding pretty good; it must have been his mike. And we've copied your E-MOD dump, and so that about wraps it up.
02 19 53 47	CDR	Okay. We're getting ready to sack out here, and still got to chlorinate the water yet. We're still cleaning up from dinner a little bit. Do you want us to wear BIOMED tonight? We prefer not to, the two that are sleeping under the couches, so that it doesn't interfere with our sleeping bags.
02 19 54 21	CC	Pete, doctor says we can get along without it tonight, but they definitely want it tomorrow night.
02 19 54 33	CDR	Okay. They going to make that standard procedure, they ought to rig these sleeping bags so that you can get in there without having to leave the hem open.
02 19 54 43	CC	Roger, Pete. The BIOMED they need tomorrow night is just on you and Al.
02 19 54 55	CDR	Yes, and we're the two that are sleeping in the sleeping bags under the couch.
02 19 54 59	CC	Ain't that nice!
02 19 55 14	CC	See you in the morning, Pete.

END OF TAPE

02 20 58 06	CC	Apollo 12, Houston.
02 20 58 13	CMP	Houston, 12. Go ahead.
02 20 58 16	CC	Roger. You about through with your dump up there?
02 20 58 27	CMP	Which dump are you talking about, Jerry?
02 20 58 31	CC	We're showing 0_2 flow a little bit high. It looks like your urine nozzle is open, and you're dumping. What we're ending up with here is - -
02 20 58 40	CMP	Oh, okay.
02 20 58 41	CC	- - PTC is going unstable here. It's beginning to diverge, and we figured we might as well stop it and start it over and get things squared away so there'll be no danger whatsoever of waking you guys up later.
02 20 58 54	CMP	Okay. We'll stop the purge now.
02 20 59 19	CC	Hey, Dick. What do you say we reestablish PTC here and get going good, so there will be no danger of waking you later?
02 20 59 27	CMP	Okay.
02 21 16 14	CMP	Houston, 12. How does the rate look?
02 21 16 32	CC	12, Houston. The rates are looking good.
02 21 16 37	CMP	Okay, here we go.
02 21 17 12	CC	12, Houston. You're clear to go ahead and turn it up and set your S-BAND, NORMAL; MODE switch to OFF.
02 21 17 24	CMP	Roger. Good night.
02 21 17 26	CC	Good night, Dick.

END OF TAPE

REST PERIOD - NO COMMUNICATIONS

03 05 57 58	CC	("Reveille" played on bugle)
03 06 00 51	CC	One more time. ("Reveille" played on bugle)
03 06 01 17	CMP	Apollo 12, all present and accounted for, sir.
03 06 01 21	CC	Roger, 12.
03 06 01 59	CMP	Houston, 12. Can you give me a roll angle to stop PTC to do the rest of that alignment?
03 06 02 09	CC	Sure will, 12. Stand by.
03 06 02 26	CC	12, Houston. You can continue to do PTC during the alignment as you have before. If you want stop, go to 270.
03 06 02 42	CMP	We'll keep doing PTC to save some gas.
03 06 02 46	CC	Roger.
03 06 03 05	CC	("Sweepers, Man Your Brooms" played on Boatswain whistle)
03 06 03 22	CC	The next - -
03 06 04 38	CDR	Houston, 12.
03 06 04 40	CC	Morning, 12; Houston. Go ahead.
03 06 04 45	CDR	Okay. On the crew status report, the CDR slept 9; the CMP, 8; the LMP, 8. The PRD's: CDR, 11013; CMP, 11013; the LMP, 04014. We cycled the fan, and we're back to the normal lunar COMM mode.
03 06 05 11	CC	Roger, 12. We copy. When you cycle the fans, could you do that for 3 minutes this time rather than the usual one, so we can get a little better hack on the readouts?
03 06 05 25	CDR	Okay. We'll go back and do it for 3. We just completed it for 2. We'll go back and do it for 3.
03 06 05 31	CC	Roger.
03 06 06 05	SC	Houston, 12. Can we start battery charge on BAT A now?

03 06 06 11	CC	That's affirmative, 12. Go ahead. We also have a flight plan update, when you're ready.
03 06 06 16	CDR	Okay.
03 06 06 24	CDR	Okay. We're ready to copy.
03 06 06 26	CC	Okay. First is, seeing we have no MCC 4, replace the flight plan timeline pages from GET 78 to 82 with the pages you'll find in the back - that's 6-7 to 6-9. And then you'll be picking it up again at page 3-58. At 78:00, for no MCC 4, delete stop PTC and continue PTC until 80 plus 50. This is optional. Insert - Then, at 80 plus 50, insert stop PTC at roll 300, and that's the Moon view attitude in roll. And at 79:45, would you perform a rendezvous radar transponder self-test to see if there was any effect on it during launch?
03 06 07 44	CDR	Okay. We got 80:50 stop PTC at 300; 79:45 rendezvous radar transponder self-test, and we have the proper pages out of the flight plan.
03 06 07 58	CC	Roger, 12.
03 06 16 21	CC	Apollo 12, Houston.
03 06 16 26	CDR	Go ahead, Houston.
03 06 16 28	CC	12, we have your consumables update and some comments on the - your P23's, as well as an alteration to your LOI abort card when you're ready to copy.
03 06 16 45	CDR	Okay. Let's have the consumables update and all that stuff, in that order.
03 06 16 52	CC	Okay, 12. Consumables at 78 plus 15: RCS total, 79.8; and Alfa up through Delta, in that order, 77.5, 83.4, 77.3, 81.2; and that gives you about 92 below the predicted. H_2 total, 71.2, 69.9. H_2 total, 70 - I'm sorry, that's O_2 total, 70.9, 72.5.
03 06 17 39	CDR	Okay.
03 06 17 46	CC	And, 12, for the P23, no COMM procedures. Dick, your first sighting exercises showed an excellent performance although the use of two different horizon locators resulted in quite different apparent horizons. The CMC horizon should be

updated to 19 kilometers rather than the 24 for the no COMM contingency. Change the erasable address 1351 from its present value of 27340 to 22434. Your second set of P23's done at about 15:30 were excellent. Therefore, use the same locator as in this set. As you expected, the best results are obtained when the star is positioned precisely on the substellar point when you're using only the center two-thirds of the sextant field of view and you center the star on the locator.

03 06 18 50	CC	12, do you have those values for the erasable?
03 06 18 53	CMP	Okay. We've got all of them.
03 06 18 57	CMP	Say again?
03 06 19 01	CC	12, confirm do you have the valuable - value for the erasable.
03 06 19 14	CDR	Okay, Houston. The address was 1351 and change it to 22434. Is that correct?
03 06 19 20	CC	That's correct. 12, on the LOI abort card which you have in the checklist F-13-2, your hybrid trajectory is a little different than nominal; your TLI was slightly off nominal, and your curve for the LOI abort is very sensitive to the dispersions in your TLI.
03 06 19 43	CDR	Hold it, Houston, until you get a good antenna.
03 06 19 45	CC	Okay.
03 06 20 18	CDR	Hello, Houston. How do you read?
03 06 20 23	CC	12, we read you with a fair amount of static in the background. Let's wait until we clear it up before we proceed.
03 06 21 05	CDR	Hello, Houston; 12. How do you read?
03 06 21 09	CC	12, we read you now. I think the static is dropping off. We're ready to proceed.
03 06 21 49	CC	Apollo 12, Houston.
03 06 21 56	CDR	Go ahead, Houston.

03 06 21 57	CC	12, a reminder, it would help if you turned the uplink squelch off.
03 06 22 06	CDR	Okay. Uplink squelch going off.
03 06 22 11	CC	Pete, we have a discussion of the LOI abort card when you're ready. That's in your checklist F-13-2.
03 06 22 25	CMP	Hang on a second, Houston. Do you have the DSKY or torquing angles?
03 06 22 31	CC	Stand by, Dick. Dick, we have them. Go ahead.
03 06 23 07	CDR	Okay, Houston. Give me the page again in the checklist you were talking about.
03 06 23 13	CC	Okay, Pete. That's your LOI abort card on F-13-2.
03 06 23 24	CDR	Okay. And we lost you there. All I heard you say - something about the trajectory, and you faded out.
03 06 23 32	CC	Roger, Pete. There's a change necessitated here because your hybrid trajectory is different than nominal. Your TLI was slightly off nominal, and the abort curve is very sensitive to dispersions in the TLI. The curve itself should be lowered slightly, and we can give you the coordinates for four different points, and you'll be able to plot that curve yourself. Are you ready to copy?
03 06 24 02	CDR	Yes. Go ahead.
03 06 24 04	CC	Okay. The four points under LOI DELTA-V_M: 400, 290, 135, and 60. Your correspon - corresponding abort DELTA-V's: 2240, 2065, 1865, 1800. You copy?
03 06 24 51	CDR	Okay. Let's see, we had four points: 400, 290, 135, and 600; and they correspond to 2240, 2065, 1865, and 1800. Is that correct?
03 06 25 10	CC	Pete, on - one correction - on your LOI DELTA-V_M. Your last one is 60 - That's 60, rather than 600.
03 06 25 24	CDR	Okay.
03 06 25 27	CC	Your CSM gimbal angles, which you'll see down in the lower right, are roll, 295; pitch, 271; yaw 332.

03 06 25 48	CDR	Okay. 295, 271, and 332.
03 06 25 52	CC	That's correct. When you plot the curve over, you'll see that your crossover point for mode 1 occurs at 320 - 320 rather than 290 as shown. This would have to be changed then in three places. First of all, the table, which you have on the card, your first value - first range goes from 290 to 650; that would now go from 320 to 650. On your flight plan, the value 290 is found also on page 3-59. That would have to be changed to 320. Also, the LMP cue card should be changed, 390 to 320. All of the other limits are unchanged.
03 06 26 55	CDR	Okay. We got that.
03 06 27 00	CC	Okay, Pete. That's it.
03 06 27 07	CDR	Roger.
03 06 38 05	CC	12, Houston.
03 06 38 10	CDR	Go ahead.
03 06 38 11	CC	12, for your information, after 68:30, a little over 10 hours ago, you started accelerating back towards the Moon. And you now are around 12 192 nautical miles out, and your velocity is building. You're presently going 3911 feet per second. We have some morning news for you. The news of the flight of Apollo 12 continues to maintain world-wide interest, and your television broadcasts are getting priority preference on the local and network newscasts. There's a lot of foreign press here at Houston Press Center, and it is expected to intensify as you get closer to the lunar landing. Incidentally, there's a new baby boy born to a Baltimore, Maryland, mother at the precise time of your lift-off. Her name - or his name is Charles Richard Alan. Wilson is their last name.
03 06 39 11	CC	We have some sport news, and one of the leading items is - -
03 06 39 15	CDR	Who did you say was first?
03 06 39 16	CC	Say again. Say again, 12.
03 06 39 22	CDR	Who did - Who did you say was first?

03 06 39 25	CC	First name turned out to be Charles, Charles Richard Alan. Al, I guess you just snuck in there.
03 06 39 46	CC	We'll be back to you within a minute with the sports news as soon as we get a better antenna.
03 06 39 53	CDR	Okay.
03 06 44 19	CC	12, Houston. We'll continue with the sports news when you're squared away.
03 06 44 25	CDR	Okay. Go ahead.
03 06 44 29	CC	News reports say that Notre Dame may be about to accept a bowl invitation. This would be for the first time since 1925. If it turns out to be the Cotton Bowl, they will undoubtedly play the winner of the Texas-Arkansas Southwest Conference championship in Fayette on December 6. Notre Dame has a 7-1-1 record, losing only to Purdue at the beginning of its season. Bobby Roseburg took an early lead and held on Sunday to defeat Jimmy Wright by one stroke in the $50 000 PGA Club Championship at the Road Runner Golf resort in Scotsdale. Results of yesterday's ball games: first, in the National League, Los Angeles took Philadelphia, 23 to 17; it was Dallas over Washington, 41 to 28; Minnesota, 9 and Green Bay, 7; Cleveland was over Pittsburgh, 24 to 3; San Francisco, 20 and Baltimore, 17; in a close one, New Orleans, 25, New York, 24; Atlanta took Chicago 48 to 31; and Detroit over St. Louis, 20 to 0. In the American League: Kansas City, 34 and New York, 16; Oakland, 21 and San Diego, 16; Buffalo over Miami, 28 to 3; and Boston took Cincinnati, 25 to 14; Houston and Denver played to a 20-20 tie. However, in the - Houston really made a classic comeback in the last 11 minutes. They put 17 points on when they were down 3 to 20 inside of 11 minutes. First of all, right tackle Domres scampered into the end zone after picking up a yun - fumble and running 35 yards. Beathard then got one long bomb to Jerry Levias which was over 80 yards, and in the last - or at the last 3 seconds left, Gerela kicked one field goal. Pete Beathard looked pretty good, and - especially in the last quarter and especially on that one last long bomb. He laid it right into the hands of Levias.

03 06 46 58	CC	And, Pete, one last - one last item - Al Unser won the Phoenix 200 race.
03 06 47 09	CDR	Roger. Thank you.
03 07 03 22	CC	Hello, 12; Houston. We have a state vector and a clock update for you, if you'll give us POO and ACCEPT, please.
03 07 03 30	CDR	Roger-Roger. POO and ACCEPT.
03 07 03 44	CDR	Boy, that Moon looks big today, Houston. Thing's about the size of a baseball held at arm's length. And you can see all the mountains and craters. It's really a beautiful sight. We're starting to move on the far side of the Sun from it, so we only see about an eighth of it. But that eighth of it is really stark. You can see - particularly up near the poles - On the LM, you can start to see that it's not a nice smooth ball anymore. It's got some little ridges and bumps that would be mountains or craters if you could see them right head on. It's a beautiful sight.
03 07 04 28	CC	Roger. Understand, 12. That's a good sign if it's getting be - look bigger.
03 07 04 34	CDR	On the other hand, the Earth - Yes - On the other hand, the Earth looks like about the size of a quarter held at arm's length, which is pretty small.
03 07 04 46	CC	Roger.
03 07 06 16	CC	12, Houston. We're waiting to get HIGH BIT RATE before we send up that load is the reason for the delay.
03 07 06 24	CDR	Okay.
03 07 11 17	CC	12, Houston. Computer's yours.
03 07 11 23	CDR	Roger.

END OF TAPE

03 07 36 33	CDR	Houston, 12.
03 07 36 36	CC	Go, 12.
03 07 36 41	CDR	Roger. You want to watch this rendezvous radar transponder self-test? We're about ready to do that any time you are.
03 07 36 51	CC	Okay, stand by.
03 07 36 58	CC	12, Houston. There's nothing meaningful we can monitor on that, Pete. Just go ahead with it.
03 07 37 03	CDR	Okay. It's in work.
03 07 39 27	CDR	Houston, 12.
03 07 39 29	CC	Go, 12.
03 07 39 33	CDR	Best we could determine, it's a good transponder. System test in A gave us 4.2; system test B gave us 2.0. With it in OPERATE on D, it gave us zero; and system test indicator in C UNLOCK gave us 0.4.
03 07 40 01	CC	Roger. Copy, 12. Understand. Thank you.
03 07 40 03	CDR	Anything else you need?
03 07 40 05	CC	If you're finished eating, I've got a pericynthic plus 2 abort PAD for you.
03 07 40 14	CDR	Okay. Al is ready to copy.
03 07 40 19	CC	Okay. Pericynthion plus 2. SPS/G&N: 62491, plus 0.90, minus 0.17, 085:25:17.92, plus 1601.0, plus 1561.9, minus 3498.1. The roll angle is NA, is unconstrained. The pitch angle is 031. The remainder of the PAD is NA. And that's no ullage and, of course, it will be a docked burn. Over.
03 07 41 38	LMP	Okay, Houston. That's pericynthion plus 2. SPS/G&N: 62491, plus 0.90, minus 0.17, 085:25:17.92, plus 1601.0, plus 1561.9, minus 3498.1, NA, 031; the rest of the PAD is NA; no ullage; dock burn.
03 07 42 13	CC	That's for Charlie, Al.

03 07 47 25	CC	Apollo 12, Houston. I have some checklist changes and updates for you if you want to break out your LM contingency checklist and the LM time line book, please.
03 07 47 39	CDR	Okay. Be with you in just a second. They are buried up here in R-3. We're going after them.
03 07 47 50	CC	Okay.
03 07 48 35	CDR	Okay. I've got the time line out. Let's go over those changes first, please.
03 07 48 41	CC	Okay. On the LM time line book, page 6.
03 07 48 54	LMP	Okay. Go ahead.
03 07 48 56	CC	Okay, that's Touchdown plus 32 through T-2 abort. At top left-hand part on about the eighth or ninth step down, there's descent vent fire. You got that?
03 07 49 12	LMP	Yes.
03 07 49 13	CC	Okay. Insert after that, if the SHe pressure drops 15 psi, then close both vents.
03 07 49 29	CDR	We got it.
03 07 49 30	CC	Okay. As Spence said he briefed you on, before launch, then we vent the oxidizer per the checklist and vent the fuel at 8 psi.
03 07 49 42	LMP	Roger. I have ... we
03 07 49 46	CC	Okay. Now, we go to the contingency book.
03 07 49 51	LMP	We don't have that book aboard. It's in the LM right now, but we'll take a note on the flight plan and move it over there.
03 07 50 00	CC	Okay. Page Delta/Alfa-6, step 1. After the step which says GUIDANCE CONTROL to PGNCS, add - on the Commander's PTCA THROTTLE, MIN. The reason for that is if the engine is on longer than 2 minutes, as it may be, when you run through the rest of this check, if it is on longer than 2 minutes without the PTCA in THROTTLE in 10 percent, you may damage the throttle actuator.
03 07 50 50	LMP	I understand.

03 07 50 52	CC	Okay. On page D/A-7, after step 1, we want you to set the lunar-centered bit. You do that with a VERB 25, NOUN 07, ENTER, 104, ENTER, 06000, ENTER, 1, ENTER. Over.
03 07 51 29	LMP	Roger. That's VERB 25, NOUN 07, ENTER, 104, ENTER, 06000, ENTER, 1, ENTER.
03 07 51 36	CC	That's affirm, Al.
03 07 51 41	LMP	That's interesting that we have to set it then, and we never have to set it during normal operations.
03 07 51 49	CC	Okay. Let me see if I can get an answer for you on that.
03 07 51 54	LMP	Also, the first one you sent up, we made the change in our activation checklist - correction - lunar surface checklist, first page, to reflect also the new vent pressures.
03 07 52 07	CC	Roger.
03 07 53 24	CC	Hello, 12; Houston. The reason for this, Al, is that in the normal activation sequence - that setting the lunar-centered bit that you asked about - in the normal activation sequence, the ground uplinks the vector and in the other stuff that they send up with that vector, they set this lunar-centered bit. However, the page we're talking about is the contingency for a docked DPS burn, that vector is not set up - sent up, and you will have to set this bit on board.
03 07 54 00	LMP	Roger. Understand now.
03 08 13 52	LMP	Houston, Apollo 12.
03 08 13 54	CC	Go ahead, 12.
03 08 13 58	LMP	Roger. LiOH canister change number 7 is complete, and we are getting ready to pressurize the CSM and then the IM.
03 08 14 07	CC	Roger. Understand, and you verify the position the oxidizer flow valve for me, please.
03 08 14 22	CMP	It's at INCREASE.
03 08 14 23	CC	Thank you.

03 08 14 24	LMP	It's at FULL INCREASE right now, and it shows MAX in the window. It was at NORMAL when we started the burn for the midcourse; and, then the minute it started, I moved it to INCREASE, and it finally made MAX by the time we shut down. So, we are planning to burn at FULL INCREASE.
03 08 14 40	CC	Okay. Thank you, Al.
03 08 15 57	LMP	Boy, the Moon is still getting big out there, Houston. It's about the size of a large grapefruit when you hold it about half-arm's length. It's a monster.
03 08 16 04	CC	Yes, that's a good sign, Al, and Pete wanted a reminder on breaking out the monocular if you are getting in close to the Moon there.
03 08 16 14	LMP	Okay. We have been using it pretty regularly; we didn't know we were going to use it so much on translunar, but it turned out to be pretty good even at great distances, and using it up close like this, the features are very, very stark, and I never really realized how high the edges of these craters are. These large craters are steep, and it is a pretty rough looking satellite.
03 08 16 41	CC	Roger. Understand.
03 08 16 50	LMP	Say again, Houston.
03 08 16 53	CC	Just rogered for your transmission.
03 08 17 00	CDR	Houston, Apollo 12. The LM is pressurized.
03 08 17 04	CC	Roger, 12.
03 08 17 26	CDR	And, Houston. The LM's pressurized.
03 08 17 29	CC	Roger, 12.
03 08 21 01	CDR	Houston, we are going to do our pre-LOI secondary ECS loop check right now.
03 08 21 07	CC	Roger, 12.
03 08 24 56	CMP	Houston, 12.
03 08 24 58	CC	Go, 12.

03 08 25 01	CMP	Roger. Secondary loop looks okay to us. Glycol EVAP temperature's coming down, and the quantity dropped just a little bit when the temperature's coming down, and also the radiator's being filled up with that stuff for the first time. What do you think? It looks pretty stable to us right now.
03 08 25 19	CC	Roger. It looks good here on the ground, Dick.
03 08 25 21	CMP	Dropped to a quantity of about - yes. Dropped on an indicated quantity of about - -
03 08 25 25	CDR	- - Okay, we are going to go ahead and secure it.
03 08 25 29	CC	Roger.
03 08 27 14	LMP	The Moon is about the size of a volleyball now - at arm's length.
03 08 27 21	CC	Roger. You guys must really be closing in on it, huh?
03 08 27 31	LMP	This is the first time we have been able to look at it, and in the mare area - up to now - it looked very, very smooth; but now when you look at the mare area, you can see there's a quite a number of long ridges, and what have you, that mar the maria a little bit.
03 08 27 50	CC	Roger. Understand.
03 08 28 02	CC	12, Houston. You can terminate charge on BAT A.
03 08 29 09	LMP	Roger. Terminate the charge on BAT A.
03 08 29 28	LMP	Yes, Houston, we're closing to the Moon fast enough now that everytime we do a 360, you pick it back up in the windows again. You can see it grow quite considerably.
03 08 29 40	CC	Roger, 12.
03 08 38 20	CDR	Okay, Houston. The next trip past 300, we'll go ahead and stop PTC. We're just out of about 50 degrees roll now, coming around, and we'll stop PTC at 300.
03 08 38 34	CC	Roger, 12.
03 08 45 48	CC	Hello, Apollo 12; Houston. If you'll give us POO and ACCEPT, we'll send up your target load

and your REFSMMAT; and your last state vector is still good. We will not be sending up a new state vector.

03 08 46 01	CDR	Okay. You've got it. POO and ACCEPT.
03 08 48 27	LMP	Houston, Apollo 12.
03 08 48 29	CC	Go ahead, 12.
03 08 48 39	LMP	Hey, another interesting thing is you look out on the mare, it didn't show so much from your maps that I've seen on Earth from the photos, there's isolated large mountains - hills, or something - right scattered throughout the mare. And in this low Sun-angle that we've got on the Moon right now, which is about, little less than an eighth, maybe a tenth of the Moon; they almost look like cumulus clouds at first glance because they're very bright on top, and they're significantly higher than the mare. And then when you look at them closer in the monocular, you can see that they're just very high hills.
03 08 49 24	CC	Roger, 12. Understand.
03 08 49 43	CC	Hello, 12; Houston. ... - -
03 08 49 45	CDR	- - He's really working on that doctoring.
03 08 49 51	CC	Say again what you're working on, Pete.
03 08 49 57	CDR	Never mind.
03 08 50 01	CC	Oh, Roger. Understand. Yes.
03 08 50 10	CC	He started a little early this time.
03 08 50 14	CDR	He won't - he won't let either one of us look.
03 08 50 18	CC	Understand. Hey, Jack Schmitt's here. He wants to know how Al spells mare. It's a pop quiz.
03 08 50 29	CDR	Is that that geology pop quiz you were going to give us the other day?
03 08 50 34	CC	That's the first question (laughter).
03 08 50 36	CDR	He refuses to take it. He won't take it today.
03 08 50 43	CC	Okay. If Al wants to do something worthwhile, I've got a PAD for him.

03 08 50 50	CDR	Thank you ...; now we can look.
03 08 50 52	LMP	Go.
03 08 50 55	CC	Okay. LOI 1 SPS/G&N: 62491, plus 0.90, minus 0.17, 083:25:18.51, minus 2821.3, plus 0603.6, plus 0112.4, 002, 263, 018, HA and HP are NA, 2887.3, 5:58, 2880.4, sextant star is 02, 254.0, 38.0. The rest of the pad is NA. Your GDC stars are Sirius, 15 - that's your Z-axis star - and Rigel, 12. The angles are 134, 230, and 357. The LM weight is 33585. Over.
03 08 52 57	LMP	LOI 1, SPS/G&N: 62491, plus 0.90, minus 0.17, 083:25:18.51, minus 2821.3, plus 0603.6, plus 0112.4, 002, 263, 018, NA, NA, 2887.3, 5:58, 2880.4, 02, 254.0 38.0; Sirius, 15, is the Z-axis star; Rigel, 12; 134, 230, 357; and the LM is 33585.
03 08 53 57	CC	That's affirmative, Al, and if you'll get out two more PADS, I've got TEI 1 and 4 for you.
03 08 54 12	LMP	Go ahead. Ready to copy.
03 08 54 14	CC	TEI 1, SPS/G&N: 38641, minus 0.59, plus 0.64, 085:32:39.16, plus 3207.1, plus 0813.0, minus 0310.9; NA for roll; pitch is 093; the rest of the pad is NA. Your ullage is four jets for 11 seconds; burn undocked. Over.
03 08 55 26	LMP	Okay, Houston. TEI 1 SPS/G&N: 38641, minus 0.59, plus 0.64, 085:32:39.16, plus 3207.1, plus 0813.0, minus 0310.9, NA, 093. The rest is NA. Ullage is four jets for 11 seconds; burn undocked.
03 08 55 59	CC	That's affirmative, and you are ready for TEI 4?
03 08 56 05	LMP	Go.
03 08 56 08	CC	Okay. This also is SPS/G&N: NA, NA, NA down to time, the time 092:00:46.70, plus 3519.6, plus 0967.2, minus 0177.4, NA, 084; remainder is NA; same ullage; undocked, assumes no LOI 2. Over.
03 08 57 11	LMP	Roger. SPS/G&N again: NA, NA, NA, 092:00:46.70, plus 3519.6, plus 0967.2, minus 0177.4, NA, 084,

NA, rest NA; ullage the same as previous; undocked, and this assumes no LOI 2.

03 08 57 38 CC That's affirmative.

END OF TAPE

03 09 02 37	CMP	Hello, Houston; Apollo 12.
03 09 02 39	CC	Go, Dick.
03 09 02 44	CMP	We're set up in the attitude for looking at the Moon. We can see it pretty good. We're worried about the Sun angle on it for television. We'll take a look at it, and while we're doing that, I'll go ahead and do the landing site REFSMMAT orientation. Okay?
03 09 02 59	CC	That'll be fine. And if you are getting sunlight in the camera, about the only - that's expected - would help is to point as far away from the Sun as you can, toward the points of the crescent.
03 09 03 15	CDR	No, that's not our problem. Our problem is the Sun is shining on the center hatch window, and the hatch window's got so much gunk on it that it's just so shiny that I'm afraid the TV wouldn't look through it. The Sun is not directly in the window yet. But we'll - We'll look at it, as we close it. Of course, we're going to drop behind anyhow and eclipse the Sun here in a minute.
03 09 03 42	CC	Roger.
03 09 04 38	CC	12, Houston. You might consider if that hatch window is really clobbered, Pete, looking out one of the side windows. We've got some angles here if you want to use window number 1, and we can work some up for window number 5, if that's a better window.
03 09 04 57	CDR	Five is absolutely the best window. It's the only one that we're ever going to get any pictures out of. The rest of them are so clobbered that we're not going to get much out of any of them.
03 09 05 05	CC	Okay. We'll have to run that through and check and make sure we - -
03 09 05 07	CDR	We need an angle for window 5.
03 09 05 09	CC	Okay. We'll have to run it through and make sure we can get high gain and the window at the Moon.

03 09 06 44	LMP	Okay, Houston, you looking at our torquing angle?
03 09 06 53	CC	We got it, 12.
03 09 06 59	LMP	Okay.
03 09 09 58	CDR	Houston, 12. Shall we give you the high gain now?
03 09 10 05	CC	That's affirmative.
03 09 13 17	CC	Hello, 12; Houston. Looking out window number 5, Pete, does not give us satisfactory high gain angle. So looks like we got our choice of the hatch window or window number 1. Also on previous flights it is indicated that even though the windows looked pretty grungy to the people on board, with the TV camera focus set at infinity, you kind of look through some of that stuff on the window and it's not as bad to us as it is to you.
03 09 13 48	CDR	Okay. Let us give it a try here for a minute out this center window and see what happens.
03 09 13 53	CC	Okay. Now if you'd rather use window number 1, we've got some - we've got some angles for you, or you can go ahead and use the hatch window.
03 09 14 05	CDR	I think we're better off with the center window in this case, and we'll - We'll give her a try here. Let's see what happens.
03 09 14 13	CC	Roger.
03 09 14 22	CDR	We're not going to send you any TV. We're just going to experiment with it for a while in here and see what we get.
03 09 14 27	CC	Understand.
03 09 14 29	CDR	If it doesn't turn out right, we'd just as soon not send it.
03 09 14 35	CC	Okay.
03 09 15 16	CC	12, Houston. To minimize perturbations to your trajectory now, we're requesting that you go out of single jet attitude control vector couples. Over.
03 09 15 33	CDR	Roger. In work.

03 09 19 26	CDR	Houston, 12.
03 09 19 29	CC	Go ahead, 12.
03 09 19 35	CDR	All the TV is doing is an excellent job of picking up all the droplets and glare and rivulets on the window. It's pretty - pretty hopeless.
03 09 19 45	CC	Okay. One suggestion is to try to fake it out a little bit by putting your ALC switch to the inside position and see if that makes any difference.
03 09 20 00	CDR	Okay. We - We tried both.
03 09 20 07	CC	Roger.
03 09 20 47	CDR	Houston, how long are you going to have Goldstone? It could be that when we slip behind the Moon, we - the Sun gets behind there - We may be able to give you some then.
03 09 21 02	CC	Okay. Stand by.
03 09 21 21	CC	12, Houston. We can - We have Goldstone scheduled for 20 minutes. We can keep it as long as we need it.
03 09 21 41	CDR	Okay, Houston. Why don't you hang on to him for a little while, and we'll see if we can pick anything else up out this window for you?
03 09 21 51	CC	Okay. Thank you.
03 09 21 57	CDR	Roger. Looks like it's about 10 or 15 degrees between the lighted limb of the Moon and the Sun right now, and it's just making our glass glare so much that there's no possibility of showing you what we see. We have to sort of get over near the edge where we can block the Sun with the window frame before we can see it ourself. Maybe when we go behind it, we can open up the aperture and you can see some from earthshine. I don't know if that's possible or not.
03 09 22 25	CC	Okay. The solar - solar corona will probably look great if you can get that coming by. That's supposed to be a pretty good camera for picking that up.
03 09 22 39	CDR	We'll give it a go.

03 09 22 40	CC	Okay. Pick up a few credits in electives there.
03 09 22 53	CDR	Yes, if that's okay.
03 09 22 57	CMP	If you're going to do that, you'd better do something about that maneuver schedule for 81:55.
03 09 23 01	CC	Okay.
03 09 27 08	CC	Hello, 12; Houston. We're going to keep Goldstone standing by, but as far as going to burn attitude 81:55, we'll do that; we'll press on with the flight plan as advertised.
03 09 27 24	CDR	Roger-Roger. We concur.
03 09 27 51	CDR	It's a shame that we don't have a shade of some kind that we could shade that window with because this is really quite a sight. Our motion to the left is not as apparent as our motion towards the Moon, and therefore, we have the decided impression that we're going right into the center of that baby right now.
03 09 28 12	CC	Okay. We'll check it out for you.
03 09 28 18	CDR	(Laughter) No, I trust you. I trust you.
03 09 32 17	CDR	Houston, 12. It's really a shame we can't show you this sight because we're dropping behind it in a hurry, with respect to the Sun, and we've only got about 2 degrees of a crescent Moon right now, and the rest of it, of course, is all in the black, but we're dropping behind it fast enough that we can just sit here over a few minutes' period of time and see it get smaller and smaller, the illuminated portion. Also, of course, it's filling more and more of the window all the time because we're - we're really smoking in there.
03 09 32 56	CC	Roger, 12.
03 09 46 44	LMP	Houston, Apollo 12.
03 09 46 46	CC	Go ahead, 12.
03 09 46 50	LMP	Could you give us your estimation of the fuel quantity and the helium pressure, SPS helium pressure, after the burn's complete? Your latest guess.

03 09 47 01	CC	Will do. Stand by.
03 09 51 12	LMP	Okay, Houston. We are maneuvering to the burn attitude.
03 09 51 15	CC	Roger. We copied that, 12.
03 09 51 57	CC	Hello, 12; Houston. After the burn, Al, your fuel quantity should show 39 percent remaining; your SPS helium pressure should be 1500 psi.
03 09 52 16	LMP	Thank you.
03 10 11 46	CC	Hello, 12; Houston. You give us POO and ACCEPT, we'll send up your state vector and target load.
03 10 11 54	CDR	Right, sir.
03 10 11 56	CC	Got a map update for you.
03 10 11 57	CDR	POO and ACCEPT.
03 10 12 01	LMP	Go.
03 10 12 03	CC	Okay. Map update for REV 1: 83:11:46, 83:24:35, 83:43:57, 83:36:36. Over.
03 10 12 32	LMP	Roger. 83:11:46, 83:24:35, 83:43:57, 83:36:36.
03 10 12 42	CC	That's affirmative.
03 10 13 46	CDR	Houston, Apollo 12.
03 10 13 49	CC	Go, 12.
03 10 13 53	CDR	Roger. The pre-LOI 1 systems checks are complete.
03 10 13 57	CC	Roger. Thank you, 12.
03 10 15 03	CC	Hello, 12; Houston. I have update to your LOI 1 PAD.
03 10 15 11	LMP	Okay. Wait 1.
03 10 15 18	LMP	Go ahead, Houston.
03 10 15 20	CC	All right. Al, now the seconds for your burn time will change. It is now 22.68. The NOUN 81: your DELTA-V_Y is now plus 0607.0; DELTA-V_Z is now plus 0142.0; dropping down to DELTA-V_T, that

value is now 2889.3; DELTA-V_C is 2882.4. Remainder of the PAD is unchanged.

03 10 16 14	LMP	Okay. In NOUN 33, the seconds register should be 22.68; NOUN 81, DELTA-V_Y plus 0607.0; DELTA-V_Z plus 0142.0; DELTA-V_T 2889.3; DELTA-V_C 2882.4.
03 10 16 38	CC	That's affirmative, 12.
03 10 17 12	CC	12, Houston. The computer's yours.
03 10 17 17	LMP	Roger, Houston.

END OF TAPE

03 10 44 10	CDR	Houston, 12. We're beginning to go into darkness at this time.
03 10 44 16	CC	Roger, 12.
03 10 44 17	CDR	As a matter of fact, we're there.
03 10 44 19	CC	Roger.
03 10 47 03	CMP	Hello, Houston. P40's up. How's it look?
03 10 47 07	CC	We're checking now, Dick.
03 10 47 12	CMP	Okay.
03 10 47 28	CC	Apollo 12, Houston. Looks real good.
03 10 47 34	CMP	Okay. If you're happy, we'll go ahead and roll to 2 degrees.
03 10 47 38	CC	Okay. Go ahead.
03 10 50 01	CMP	And, Houston, we're going OMNI B now.
03 10 50 03	CC	Roger, 12.
03 11 00 04	CMP	Houston, 12.
03 11 00 06	CC	Go, 12.
03 11 00 10	CMP	Roger. Sextant star check okay.
03 11 00 14	CC	Roger. Thank you.
03 11 02 58	CC	Hello, 12; Houston. You're GO for LOI.
03 11 03 04	CDR	Roger, Houston. GO for LOI. Burn checklist is complete to minus 6 minutes, and we're holding at that point.
03 11 03 11	CC	Roger.
03 11 03 12	CDR	... the other side.
03 11 03 13	CC	Okay, Pete. We'll see you at 43:57.
03 11 03 20	CDR	Roger-Roger.

03 11 09 44	CC	Hello, 12; Houston. Two minutes to LOS; be seeing you shortly.
03 11 09 52	CDR	Roger, Houston.
03 11 31 --		BEGIN LUNAR REV 1
03 11 44 19	CC	Apollo 12, Houston.
03 11 44 23	CDR	Hello, Houston. Yankee Clipper with Intrepid in tow has arrived on time. Are you ready for the burn status report?
03 11 44 31	CC	That's affirmative. Go ahead, Clipper.
03 11 44 36	CDR	Okay. The burn was on time. The burn time was 5 plus 52. The residuals were minus 0.1, plus 0.1, plus 0.1; DELTA-V_C was plus 1.0; the fuel, 38.4; the oxidizer, 38.7; the unbalance was increase 80 pounds. Over.
03 11 45 08	CC	Roger, 12. Copy.
03 11 45 13	CDR	Computer says we're in a 170 by 61.8.
03 11 45 23	CC	Roger, 12.
03 11 45 33	CDR	I guess like everybody else that just arrived, we're - All three of us are plastered to the windows looking.
03 11 45 40	CC	Roger. Understand.
03 11 45 45	LMP	Yes, but to Navy troops - It doesn't look like a very good place to pull liberty, though.
03 11 45 51	CC	Okay. We'll give you an okay three wire on that one.
03 11 45 57	LMP	Very good. I hope we can say the same thing tomorrow. Save those for tomorrow.
03 11 49 05	CDR	Hey, Houston; Apollo 12.
03 11 49 07	CC	Go, 12.
03 11 49 11	CDR	That was an excellent long-range rifle shot you guys gave us.
03 11 49 15	CC	Roger. Understand. We'll pass it on.

03 11 52 17	CC	Hello, 12; Houston. Any words on your observations?
03 11 52 24	CDR	Well, Houston, I was just looking at one very, very, odd, and it looks like a very fresh impact crater that is sort of collapsed on one side - that we've been looking at and discussing a little bit. It's got some fairly high raised sides on it, and we haven't quite got ourselves oriented to the proper size yet. I think these craters are much bigger than anything we've ever seen on Earth, so we're - We're just sitting here discussing various sizes and getting ourselves oriented on the map. I just broke out the monocular, and we're starting to look with it.
03 11 53 13	CC	Okay.
03 11 53 40	LMP	One interesting thing, Paul, was that in some of these large craters - the old ones, it looks like - as you look towards the distance, you can see that they - at least from here - appear darker, and it looks very flat like the mare looked from Earth, but the same size ones that you pass right over, they don't look a bit darker than any other of the terrain. So I guess it must have something to do with the way the Sun refracts off the - the surface. We're passing a beautiful impact crater here on our right side now. It's got many, many long rays; it's a beauty.
03 11 54 29	CC	Roger, 12.
03 11 55 25	LMP	It's - This impact crater that we're going over right now, which has such a fantastic ejecta pattern that we can see it so well, the ejecta pattern's got to go out 50 or 60 crater diameters, very easily discernible with the eye. And you can almost - You can pretty well tell the direction of the impact from looking at the ejecta blanket, but it - it's really spectacular.
03 11 55 57	CC	Roger, 12.
03 11 58 16	CDR	Okay, Houston. We'll be coming up with the TV in just a few minutes.
03 11 58 21	CC	Okay, 12. Can you see Langrenus yet?

03 11 58 27	CDR	No. We can't quite see that yet, but we've been looking over at Humboldt and looking at all the great fracture marks in it and everything. Actually, it looks to me like some crisscross roads down there in the desert or something. Very interesting.
03 11 58 44	CC	Roger.
03 12 00 01	CC	Hello, 12; Houston. We're starting to get a picture now.
03 12 00 28	CC	12, Houston. For information, you should be crossing 60 degrees east at 84:02:08.
03 12 00 39	CDR	We agree.
03 12 00 52	CDR	What do you see on the tube, Houston? I can't tell too much from the monitor.
03 12 01 00	CC	Okay. We're getting the - the lunar surface. It appears that we can see the subsolar point, or could at one time there. We can see numerous small light-colored craters. Okay - -
03 12 01 21	CDR	I'm going to hand it over to Dick. He's got Langrenus out the window.
03 12 01 25	CC	Okay. Very good.
03 12 01 30	LMP	We're coming up on VOX to you, Houston.
03 12 01 33	CC	All right.
03 12 01 37	LMP	Dick's got the camera. He's pointing it over toward Langrenus now. This Petavius over here is a beautiful thing. Whenever you get finished, I'll see if I can shoot it.
03 12 01 55	CMP	Okay.
03 12 01 56	LMP	It's got high peaks in the middle.
03 12 01 58	CDR	What happened to the monocular?
03 12 02 00	LMP	Here it is.
03 12 02 36	CDR	... there's the central peaks right in Langrenus right there. - -
03 12 02 41	CC	Okay.

03 12 02 42	CDR	I can see those pretty well.
03 12 02 43	CC	Roger. We're picking it up. On the screen, the colors appear to be green to brown. Can you describe the colors in the scene that you're seeing there now?
03 12 02 54	CDR	That'll do for now. The - mountain that's sort of ... sort of in the center of Langrenus I'm looking at through the monocular, and apparently, they look very smooth with the naked eye, but by looking through the monocular, I can pick up these black dots. They're very black, and I - They're obviously very large boulders sitting that are around on it.
03 12 03 27	CC	Roger. The picture on the TV screen - -
03 12 03 30	CDR	Okay.
03 12 03 31	CC	- - of the central peak - it looked kind of - It appeared to be rather rounded.
03 12 03 39	CDR	Yes. It appears to be rounded, but it's got a lot of big boulders sitting on it. I'll hand the camera over to Al, now. He's got some stuff out his window.
03 12 03 49	CC	Okay.
03 12 03 51	CDR	Oops, that's one for the geologists, the materials out his window he wants to shine it down on.
03 12 04 02	CC	I see - -
03 12 04 03	LMP	I ... myself.
03 12 04 15	CDR	You were asking what color it looks like from here. It's changed slightly as we went around it. At first, it had a very, very light gray-white concrete appearance. Now, it has more of a - it's still a light-gray concrete, but it has a little - just a touch of brown in it. At least, that's the way it appears to me. That's the - the Moon that's directly below us. Of course, there's several places that are very, very white, and I'll point the camera at one of them now. It's a small crater, and it's very symmetrical. It just looks like a cone with a flat bottom.

03 12 05 00	CC	Roger.
03 12 05 01	LMP	If you can see that.
03 12 05 02	CC	Okay. It's going out the top of the screen. Can you move up and pick it up just a little? There, that's good.
03 12 05 11	CDR	There you go.
03 12 05 19	CC	I understand that - -
03 12 05 20	CDR	We're going over Theophilus.
03 12 05 23	CMP	Yes, Pete.
03 12 05 25	CDR	Fifty minutes.
03 12 05 26	CC	Okay. Understand that this - -
03 12 05 27	CMP	There goes the color again.
03 12 05 28	CDR	Tweak! Tweak!
03 12 05 29	CC	- - crater appears to be white down inside, Al. Is that right?
03 12 05 36	LMP	Well, it's pretty bright. It's white, and then it's got some radial streaks of a more darker material. It's rolling down, or at least runs from the rim down to the center - down to the flat bottom. I think you can see those on the TV. Let me show you a real bright crater that's more towards the horizon, but it's one of the very, very bright ones. Can you see that? I'll try to put it right in the center.
03 12 06 05	CC	Okay. I can see one that's just a little bit above the edge of the window there.
03 12 06 07	LMP	How's that now?
03 12 06 09	CDR	Right. Another interesting thing is - This white or gray-white Moon, it contrasts very starkly with the black sky just like everyone's reported. And maybe even so on the TV down there. But the black is about as black as you've ever seen in your life. It's just - doesn't have any - any hues or anything to it. It's just solid straight dull black, and then the Moon is just sort of very light concrete color.

In fact, if I wanted to look at something that I thought was about the same color as the Moon, I'd go out and look at my driveway.

03 12 06 52	CC	Okay. We'll send - -
03 12 06 53	CDR	Not near as - even Earth orbit - Even Earth orbit at night or the daytime, the sky was never as black as it is here. This is the blackest black I ever saw. Al described it as dull, and it doesn't even seem like a dull black when you look at it on the horizon, to me. It's like an ebony black. It's as coal black as I've ever seen.
03 12 07 20	LMP	Okay. I'm going to pass the TV over to Dick now.
03 12 07 22	CDR	Show you - There's a very interesting crater that Dick's got down there. There's another one that I'm looking into; it's the first one I've seen with the fractures in the bottom of it that we've flown right directly over. And there's a fracture pattern that runs right through the middle of the crater including the rim of it, perpendicular to it, crosses all the way across the crater, so it gives me the feeling that - that the fracture pattern - that particular fracture doesn't have anything to do with the crater.
03 12 07 59	CC	Roger.

END OF TAPE

03 12 08 12	CC	Okay. What are looking at there now, 12? Is that the bottom of the crater or a mare area?
03 12 08 20	CMP	That's at the bottom of a crater, a large mare area actually, Paul. And in the crater, there are two - in the maria, there are two brand new craters that have fairly detailed ray patterns going out from them. They're quite start - quite startling when you see them, because they are perfect radial patterns from two of them, right next to each other.
03 12 08 50	CDR	The edge is pretty interesting. As a matter of fact, that one ray pattern looks like it's only one direction. It look that way to you, Dick?
03 12 09 00	CMP	Yes. It looks like it's pointing towards us.
03 12 09 02	CDR	Yes.
03 12 09 03	CMP	That double-ray pattern is just a single one.
03 12 09 07	CC	Roger, 12.
03 12 09 12	CDR	Oh! That is a beautiful crater over here to the right. It's not particularly spectacular, but it's pretty symmetrical, and it's got some interesting sloping in on the sides. It looks like an old, old one. We're getting ready to pass over the Sea of Fertility right now. I guess we are over it. There's a lot of rilles and some cracks in here we ought to be able to pick up on the TV.
03 12 09 59	CDR	We're passing over the Sea of Fertility now, and it is a little bit darker than the terra that we've been over, but not so much. It's more of a - just a slightly darker gray.
03 12 10 13	CC	Roger, 12.
03 12 10 21	CDR	Looks like the beach sand down at Galveston whenever it's wet.
03 12 10 31	CC	Okay. We had a team of geologists checking your driveway. We'll send them to Galveston now.
03 12 10 37	CDR	(Laughter) Okay.

03 12 10 53	CDR	Looking down into a real fresh impact crater in the Sea of Fertility; and, with the monocular, I can see some pretty large boulders. So I guess, as high as we are, if I can see those boulders, they must be pretty darn big.
03 12 11 05	CC	Roger. We can see that crater in the lower left part of the screen right now.
03 12 11 22	CMP	Yes, let me show this impact crater or you got something you want to show them, Pete? Hey, let me show you - -
03 12 11 30	CDR	One is fairly bright.
03 12 11 37	LMP	You can sure see the direction that one came in from, can't you, Pete? There's hardly any ejecta to our right, which would be - to the south, I guess.
03 12 11 49	CDR	That one you're looking into now, Houston, that's the one I was saying. It's really got some big boulders in the bottom of it.
03 12 11 56	CC	Roger. You're breaking up a little on VOX, Pete.
03 12 12 02	CDR	Sorry.
03 12 12 03	CC	Okay. We see that crater there which has a ray pattern through about everything but about a 110-120 degrees of it off to the right. Is that the one to which you're referring?
03 12 12 16	CDR	That's - yes, that's right. That's correct.
03 12 12 20	CC	Understand that you can see larger boulders in the bottom of the crater?
03 12 12 26	CDR	Yes, and also along the sides of it.
03 12 12 42	CC	Hey, there's a big one we have right there now.
03 12 12 50	CDR	Yes, that one just came into view. I guess that's still in the Sea of Fertility. Yes, it's still in.
03 12 12 58	CMP	And there's this big one - -
03 12 12 59	LMP	We're getting ready to pass over Theophilus here, Pete. It's going to be right down at your lower 1 o'clock. That's a good picture, too.

03 12 13 07	CMP	Lower 7 o'clock.
03 12 13 08	LMP	Yes, you - That's a beauty.
03 12 13 09	CDR	Oh, there it is.
03 12 13 10	LMP	See it?
03 12 13 11	CDR	Yes.
03 12 13 12	CMP	There's Theophilus.
03 12 13 13	CDR	That one we were showing you a moment ago doesn't have a name, and it's - it's interesting just to the - behind that small one you were showing is sort of a whole streak of light-colored material that runs for hundreds of miles there and it's a different shape. Maybe it's just the elevation in that area; I don't know. It's near the central peak, so I'll use the monocular on it.
03 12 13 37	CC	Okay, and - -
03 12 13 38	CDR	... the central peaks in Theophilus.
03 12 13 40	CC	Roger. We got them good in the screen, and we saw that large white ray as you switched windows there. The peaks of Theophilus -
03 12 13 51	CDR	It's kind of interesting if you look right on - One thing about the peaks, I'm looking at them through the monocular; and, on the top of the peaks, you can see a great number of what appear to be boulders, and they must be huge to be visible from the altitude we're at right now.
03 12 14 11	CC	Okay. Understand there are boulders on the tops of the peaks, and they look like some fairly well defined ridge lines in that central peak. Is that how they look through the monocular?
03 12 14 23	CDR	That's right. That's right. That TV must be coming through real well, because from here it looks like very sharp ridge lines; and, if you look at either side of the ridge line, you can see sort of a terracing, a mild terracing effect that's parallel to the ridge line. It could be some form of something or - in fact, some sort of transportational mechanism there, I don't know what it is. Probably gravity. Obviously, you can see some - what would be termed rilles and ... running down from the ridge line. They're running perpendicular to it, more or less.

03 12 15 09	CC	Roger. We're looking at -
03 12 15 18	CDR	You ought to be able to look over to your side real far over there - -
03 12 15 23	CC	And them.
03 12 15 24	CDR	- - and see the Sea of Serenity and some of those craters over in there. They ought to be pretty good contrast where that dark bar is. There any over there?
03 12 15 31	LMP	There're plenty of them.
03 12 15 32	CDR	Yes, that ought - that might be interesting. Hey, there's some pretty good cracks over there.
03 12 15 34	LMP	Hey, look at that rille over there, Dick. Get - get that.
03 12 15 36	CDR	We're going to change windows here. There's some beautiful rilles over in the other side, north side.
03 12 15 41	LMP	I don't know, maybe we ought to try this one. Let me see. Can you see them out of that one better?
03 12 15 46	CMP	Boy, that is beautiful. Oh!
03 12 15 53	LMP	... TV camera, I don't know. Where'd it go?
03 12 15 55	CMP	There's some grabens over here, big long ones that come down the -
03 12 16 01	CDR	(Whisper) Don't ... that.
03 12 16 04	CC	There's a very sharp crater you can see in the top left part of the screen right now.
03 12 16 32	CC	In the view, we can see now, there appears to be a dark line running from the lower left up toward the top center. Can you make anything out of that?
03 12 16 44	CDR	Yes. That's what I'm trying to show you.
03 12 16 46	CC	Okay. We're - -
03 12 16 48	LMP	Looks like some fair - looks like some fairly deep rilles and droppings over there, particularly the ones that you ask about. They're very, very

deep. There's a nice wide one over there, Pete. Can you see it? Over by that fresh impact with the raised rim?

03 12 17 08	CDR	Maybe you'd better take the camera in the other window.
03 12 17 11	CMP	Over here?
03 12 17 12	LMP	Yes. Put if over there with Dick.
03 12 17 14	CC	12, Houston. In that scene you just shifted from, there appeared to be two parallel rilles. You confirm that?
03 12 17 25	CDR	That's - that's correct. As a matter of fact, in looking at it, there are two parallel rilles and then they actually pick up, well not quite a third one. It's like one ends on one side, and the middle one goes all the way through, and then one picks up on the right-hand side.
03 12 17 47	CC	Roger. Understand. The picture's - -
03 12 17 48	CMP	Well, there's two parallel grabens in this sea.
03 12 17 50	CDR	Also - also on that - that rille - one of the last things we saw and, Hous- or at the Cape when we talked with the geolcgist was the little experiment that the guy did blowing air through the sand, gases that - Sure encugh I've got some examples of that right here in those trench-like structures. There's some crater chains running through them and alongside of them, just like - we talked about - -
03 12 18 29	CMP	We've got some examples. There's a big giant up here just blowing sand all over the place.
03 12 18 34	CC	Okay, understand. Now, we can see - just a minute ago a - furrow or trench coming from the lower left side of the screen up toward the center and kind of ending in a string of rather poorly defined craters.
03 12 18 49	CMP	Roger. There's one up here that's actually a double - double graben; it's not offset. There are two of them running parallel to each other.

03 12 18 56	CDR	Hey, Dick. You see the double craters right there? Do you see the grabens running alongside of them? And you see the little string? It looks like a string of craters. Two sets of them. Can you give them that on the TV? I may get it out of this window. Wait a minute. Let me try the center window.
03 12 19 25	CC	12, Houston. While you are setting up, how - how's the view out of your windows now?
03 12 19 34	CDR	Pretty much the same, Houston. Window number 5 is a good one, window number 4 is poor, window number 3, which is the hatch window, it's not - it's bad - it's still the same condition it was at launch. All of them are. But, because we've got a bright background instead of the dark background we had before, the marks on them aren't quite as noticeable.
03 12 20 01	CC	Okay. We're getting very good pictures here.
03 12 20 02	CDR	Number 1 is by far the worst window. Number 2 -
03 12 20 07	CMP	Okay. This is up north. What you're seeing is a rille here with a whole bunch of - looks like vent holes running along these rilles. Can you see those from the ground, Paul?
03 12 20 27	CC	That's affirm. We could see them before - You just moved off of what appears to be a rille moving to the right now. And we could see the - -
03 12 20 37	CDP	... over on your side there, Dick. Yes. There's the - there's several - there's a whole bunch of areas in here, just looking out the window generally, that give you the feeling that, as we've talked about with the geologists, that some of this is volcanic action in here.
03 12 20 59	CC	Okay. Now, we can see a crater just to the left of the screen there that's rather poorly defined and appears to be a good-sized rille or fracture running across the floor.
03 12 21 22	LMP	Hey, we've got the Straight Wall coming up on this side, Houston. When it gets a little bit closer, I'll show it to you. It's a beautiful straight line.
03 12 21 30	CC	Very good.

03 12 21 32	LMP	Also, we've got a couple - here; let me borrow that thing, Dick, a minute.
03 12 21 43	CMP	Okay.
03 12 21 53	CDR	Kind of ridiculous not to be taking pictures -
03 12 21 56	CMP	Is the camera over there, Al?
03 12 21 58	LMP	Yes. Wait a minute. I'll get it for you. Now, I don't know where he put it. Where'd you put the Hasselblad?
03 12 22 07	CDR	Can you see the Straight Wall now, Houston?
03 12 22 09	CC	Yes, sir. We can see it very good. Just beyond that large crater was another smaller crater and its rim, and we can see the Wall on beyond it.
03 12 22 23	LMP	- picture that. Does anybody know?
03 12 22 27	CMP	You got this little chart right here. We've been - since the update, we've been here 56 minutes, so leave it 56 minutes, DATA.
03 12 22 46	LMP	I'm going to move off the Straight Wall, now, Houston, and look down at a crater. I don't have my chart here, so I don't know the name of it, but it's got extremely well defined terraced walls. It's got a nice central peak in the middle. And let me see if I can get it better for you. There it is.
03 12 23 06	CC	Oh. Roger. We have a good one there, Al.
03 12 23 07	LMP	And it also has a nice crack right down at the bottom.
03 12 23 11	CC	Roger. We see that.
03 12 23 12	LMP	That's a pretty impressive-looking crater. We're in the terra now, and you can tell that the ground is much more hummocky and quite a bit rougher than the mare which we're getting ready to approach in a few moments.
03 12 23 38	CMP	Here's another one with a good central peak. In fact, this is one of the highest central peaks that - That's a hard one to show because the radar antenna of the LM is partially eclipsing it. Can you see that central peak there?

03 12 24 02	CC	That's affirm. We're - -
03 12 24 03	LMP	... high ...
03 12 24 04	CC	We're getting a good - -
03 12 24 05	LMP	It's almost as high as the rim itself. Okay.
03 12 24 22	LMP	Sun's getting a lot lower now, as we approach the terminator - -
03 12 24 26	CDR	I can see the terminator.
03 12 24 27	LMP	- - things are much more in relief. Let me point the camera back past the Straight Wall again. Let me give you another view of that, because it's coming into even greater relief from this angle. Then, I'll go back and give you the horizon, because that's one of the most impressive things right here. Take a look at those mountains.
03 12 24 46	CC	We have them.
03 12 25 00	LMP	I'll move a little bit around and see if I can - Here's some of those mountains we talked about earlier that look like, from the distance, like little clouds over the mare. You can see how bright they are relative to the mare surface; and, maybe even on the TV, they look like puffy clouds. However, they're not. They look like hard rock down there.
03 12 25 20	CC	Roger. Understand they are not clouds.
03 12 25 25	LMP	(Laughter)
03 12 25 36	LMP	Got something out your window, Pete?
03 12 25 41	CDR	Too dark.
03 12 25 42	LMP	It's getting dark. Boy. There's a high mountain right there on the horizon. I bet you - Do you see that very high mountain on the horizon, Houston? It's about the center of the screen now. All you can see is reflected light.
03 12 25 58	CC	Affirmative. We have it. 12, Houston. Can you open your f-stops any - get in this dim light?
03 12 26 12	LMP	That will happen. We'll try it.

03 12 26 49	LMP	How's that look, Houston?
03 12 26 50	CC	That's better.
03 12 26 54	LMP	Sure looks better here. Here's an interesting feature down there, that you're looking at near that large crater. The hole is - seems to be a general trending of ridges in this area, all in the same direction. They'd be running, I guess, on your camera from the top right-hand corner to the lower left. And it's particularly evident down there by the large crater that's in your picture.
03 12 27 32	CC	Roger. We see that.
03 12 27 35	LMP	There it is right - You see it?
03 12 27 38	CC	That's affirm.
03 12 27 39	LMP	Interesting. There's - I guess it's probably parallel to - Let me show you some more of these clouds. I think you'll like them. They just seem to be large bumps on top of the mare.
03 12 27 54	CMP	Hey, let me show them Mösting over here, Al.
03 12 27 56	LMP	Okay. Here you go.
03 12 27 58	CMP	Mösting is coming into view.
03 12 28 00	LMP	Yes.
03 12 28 01	CMP	Schröter's Valley's up to the north.
03 12 28 03	CDR	... temperature down.
03 12 28 05	CMP	All right. Down.
03 12 28 06	LMP	You can open it again, if you want it. It's the close one in. Boy, it's beautiful right in - Look at that crater. Wowee.
03 12 28 20	CMP	Straight Wall pretty impressive in this light.
03 12 28 34	CMP	Yes, that's a -
03 12 28 35	CMP	There you go, Houston.
03 12 28 37	CC	Yes. We got it.
03 12 28 41	CMP	I believe that's Mösting.

03 12 28 45	CC	Roger.
03 12 28 47	CMP	Mösting.
03 12 28 53	CDR	Now, it's starting to get a little dark outside.
03 12 28 55	LMP	Okay, whenever you get finished - whenever you get finished, there's a beauty over here, Dick. Whenever you get finished, there's a beauty over here. We're getting to where we get that low Sun angle; we can see those little craters within the big ones. I don't - I think they're probably in all of them; we just can't see them. There's the Sun in this one. It looks like it's - somebody hit it with a bunch of buckshot right -
03 12 29 16	CDR	I wonder which - I wonder which one of those shadows down there is a 5-degree Sun angle?
03 12 29 26	LMP	I don't know. Go 5 degrees from the terminator.
03 12 29 29	CC	Hello, 12; Houston. You just passed over - 5-degree Sun angle on the surface.
03 12 29 35	LMP	Okay, that's what I was just trying to look at here and see what I could see.
03 12 29 40	CMP	Boy, there's -
03 12 29 43	LMP	Yes, there's some beauties over here.
03 12 30 00	LMP	We got a beauty for you, Houston. Right in the terminator. See if I can run up the f-stop for you.
03 12 30 07	CC	Okay, that's coming in good, Al.
03 12 30 12	CDR	Take a look at - down in that crater, the number of other small craters.
03 12 30 16	CC	Roger. We see them.
03 12 30 20	LMP	That's fantastic. Let me - Soon as you look at that one, I'll show you the horizon; and near the terminator on the hori- distant horizon, you can easily see the curvature of the Moon, and you can also see the stark contrast between the horizon and the bright rocks and the dark crater. I'm moving over there now. There's the Straight Wall again.

03 12 31 04	CMP	Hey, Paul, all I can say, it's another fighter pilot's life: Hours and hours.
03 12 31 10	CC	(Laughter) Roger.
03 12 31 12	LMP	How's that look, Houston?
03 12 31 14	CC	That's looking good, Al.
03 12 31 21	LMP	That crater's a beauty out there. The rim is illuminated by the low Sun while, down inside the crater, it's dark. And you can see the ray patterns from here, and you can see the mare surface. It almost looks like somebody took a - some cake icing and spread it with a big knife, laid it all around out there, and then somebody shot some BB's in it. It really is beautiful. It's got that layering all over it.
03 12 31 50	CDR	Mösting, and that ... up Schröter's Valley.
03 12 31 58	LMP	Got something over there? Let me hand it back to you. Okay. Now the ... down in the terminator. You ought to have Copernicus out there somewhere.
03 12 32 20	CDR	You should see all that stuff that's on the window. That's why that window isn't any good for photography out of it. The Sun's really shining right on it now.
03 12 32 30	CC	Roger. We can see all that stuff, Pete. However, we're getting a good picture through it in the open spaces.
03 12 32 39	LMP	I guess Copernicus is too far out there to see, isn't it, Dick? Or can you see it?
03 12 32 44	CMP	It's on the horizon. You can't even - Yes. Guess we passed it a minute ago.
03 12 32 59	CDR	That silly thing floating outside the window.
03 12 33 03	LMP	Where'd the Moon go?
03 12 33 04	CMP	There it is over there.
03 12 33 06	LMP	Oh.
03 12 33 07	CDR	Are we maneuvering some way? Now where'd that little piece of blue and gold stuff - whatever it is.

03 12 33 13	CMP	Must be Mylar. No.
03 12 33 15	CDR	Well, Houston, that looks like that's about it for this pass.
03 12 33 18	CC	Roger, 12. Very good show.
03 12 33 25	LMP	Boy, I'll tell you. You sure can't see anything on the other side of the terminator. That's black, too.
03 12 33 35	CMP	Let's go off VOX now.
03 12 34 31	CC	Hello, 12; Houston. For information, all spacecraft systems are in excellent shape.
03 12 34 41	CDR	12. Roger. Thank you.
03 12 35 43	CC	12, Houston. Map update when you're ready.
03 12 35 53	LMP	Just a second, Houston. Go ahead.
03 12 35 58	CC	Okay, LOS 85:08:42, 85:31:16, 85:52:27.
03 12 36 23	LMP	Roger. LOS 85:08:42, 85:31:36, 85:52:27.
03 12 36 30	CC	Okay, the time at 180 degrees was 85:31:16.
03 12 36 40	LMP	Okay, got it.
03 12 36 41	CC	Roger.
03 12 37 31	CC	Hello, 12; Houston. On the ground, we're seeing some changes in signal strength, both up and down. Have you changed any of your communications modes recently?
03 12 37 44	CDR	No.
03 12 37 47	CC	Okay.
03 12 37 51	CDR	You mean over the last few minutes or what?
03 12 37 57	CC	Yes, 12. Just in the last 5-10 minutes.
03 12 38 04	CDR	The only thing we've done is turn the TV off. Let me double check.
03 12 38 20	CDR	All the other COMM switches appear to be in the normal position, and the only thing we did was turn TV off.

03 12 38 27	CC	Okay, thank you.
03 12 38 33	CDR	Your COMM to us has been super.
03 12 38 37	CC	Roger. Same here.
03 13 03 39	CC	Hello, 12; Houston. Five minutes to LOS; we'll see you in 49 minutes.
03 13 03 46	CDR	Roger-Roger. We're settled down to a nice meal, and we're allowing ourselves a little music on the tape recorder. And we'll see you on the other side.
03 13 03 56	CC	Okay, who won the vote on what you're playing on the tape recorder?
03 13 04 03	CDR	We've been very democratic. We play a little bit of Al's, and a little bit of Dick's, and a little bit of mine.
03 13 04 08	CC	That's nice.
03 13 04 11	CMP	Generally not in that order.

END OF TAPE

03 13 31 --		BEGIN LUNAR REV 2
03 13 52 54	CC	Hello, 12; Houston.
03 13 52 58	CDR	Hello, Houston; Apollo 12. Loud and clear.
03 13 53 02	CC	Roger. Same. In an attempt to troubleshoot this variation in signal strength which we experienced for a little bit after the TV pass, will you verify the position that you had the HIGH-GAIN ANTENNA TRACK switch in at that time, please?
03 13 53 2[illegible]	CMP	It was in NARROW.
03 13 53 26	CC	Ok- okay. How about the TRACK switch?
03 13 53 29	CMP	We had it REACQ.
03 13 53 32	CC	Roger. REACQ.
03 13 53 34	CMP	It was in REACQ.
03 13 53 35	CC	Roger. Thank you and - -
03 13 53 37	CMP	Roger; and it's still in REACQ, NARROW.
03 13 53 39	CC	Okay, understand, and I've got an update to your CSM alternate and contingency checklist, if you want to break it out.
03 13 53 52	CMP	Okay, give you a call in a second. Go ahead.
03 13 54 00	CC	Okay. On page 1-32, Dick.
03 13 54 10	CMP	Okay. Go ahead.
03 13 54 13	CC	Okay, in column Charlie -
03 13 54 14	CMP	Are you going to give me ...?
03 13 54 17	CC	Say again.
03 13 54 21	CMP	Go ahead.
03 13 54 23	CC	Okay, in column Charlie, line 7, the number was formerly 27340; change that to read 22434. This puts in the new DELTA-H from your P23's.

03 13 54 45	CMP	Okay. We've all ready got it in.
03 13 54 49	CC	Roger.
03 13 55 08	CDR	Okay, Houston. Be advised we dumped waste water to 10 percent and purged the fuel cells.
03 13 55 13	CC	Understand, 12.
03 13 55 31	CC	And, 12; Houston. I've got your map update for REV 3.
03 13 55 40	CMP	Okay. Go ahead.
03 13 55 42	CC	Okay. The numbers are 87:17:09, 87:39:40, 88:01:22. Over.
03 13 56 03	CMP	Roger. Copy 87:17:09, 87:39:40, 88:01:22.
03 13 56 11	CC	That's affirm.
03 13 59 43	CC	Hello, 12; Houston. If you'll give us POO and ACCEPT, we'll give you a state vector and a target load.
03 13 59 52	CMP	It's all yours.
03 13 59 54	CC	Thank you.
03 14 06 08	CC	Apollo 12, Houston. The computer's yours.
03 14 06 12	CDR	Okay, Houston. Thank you.
03 14 11 40	CC	Hello, Apollo 12; Houston. I have two PADS for you when you're ready to copy.
03 14 12 03	CDR	Roger, Houston. Go ahead. We're ready to copy.
03 14 12 07	CC	Okay. First PAD is LOI 2. That's an SPS/G&N: 38627; plus 1.45, minus 0.66; 0.87:48:47.39; minus 0139.2, plus 0000.1, minus 0089.5; 360, 220, 360; 0066.2, plus 0054.1; 0165.5, 0:17, 0159.4. Your sextant star is Fomalhaut 45, 296.6, 27.3. Your ullage will be two jets for 19 seconds. Your sextant star will be occulted by the Moon until 87 hours. Over.
03 14 14 03	CDR	Roger. Would you just give me the NOUN 47 again?
03 14 14 14	CC	Roger. That's 38627.

03 14 14 25	CDR	Okay. LOI 2 SPS/G&N: 38627; plus 1.45, minus 0.66; 087:48:47.39; minus 0139.2, plus 0000.1, minus 0089.5; 360, 220, 360; 0066.2, plus 0054.1; 0165.5, 0:17, 0159.4; Fomalhaut, 45, 296.6, 27.3; two jets' ullage, 19 seconds; and the sextant star is occulted until 87:00.
03 14 15 38	CC	That's affirmative, and I have a TEI 5 PAD when you're ready.
03 14 16 29	CDR	Okay, we're ready to copy.
03 14 16 33	CC	All right. TEI 5 SPS/G&N: 37452; minus 0.64, plus 0.50; 093:40:32.35; plus 3745.1, plus 1006.8, minus 0275.7; NA, 081. The rest of the PAD is NA. Your ullage is four jets for 11 seconds; that's an undocked burn and assumes LOI 2. Over.
03 14 17 38	CDR	Okay. TEI 5 SPS/G&N: 37452; minus 0.64, plus 0.55; 093:40:32.35; plus 3745.1, plus 1006.8, minus 0275.7; NA, 081. Rest of PAD is NA. I believe you said four jets, 11 seconds, assumes LOI 2.
03 14 18 11	CC	That's affirmative and that's an undocked burn, and your yaw trim for NOUN 48 is plus 050. Over.
03 14 18 27	CDR	Okay. Yaw trim plus 050, and it's undocked.
03 14 18 31	CC	Roger.
03 14 28 42	CC	Apollo 12, Houston.
03 14 28 50	CDR	Go ahead, Houston.
03 14 28 52	CC	Okay, Pete, throughout the flight, your oxygen consumption has been slightly higher than previous flights, by approximately 10 percent. This is no problem, as extrapolating that to end of mission still gives us plenty of oxygen available. In an attempt to try to figure out why, though, we have a couple of questions, primarily with respect to your use of the URA. Approximately how long after use do you leave the cover valve in VENT before you close it? Over.

03 14 29 34	CDR	We usually keep it on until the O_2 HIGH light comes on, which is a couple of minutes worth of venting.
03 14 29 44	CC	Okay, and what position do you - do you leave the cover valve and the waste management overboard drain valve when you're not using the URA?
03 14 29 58	CDR	Usually shut the dump valve, OFF. Leave the cover in VENT.
03 14 30 07	CC	Roger, we got that. We will massage that, thank you.
03 14 30 14	CDR	Okay, we probably have used a little more oxygen through that, and we noticed on our plot that we were running a little low on oxygen, also.
03 14 30 27	CC	Roger.
03 14 44 58	CMP	Houston, 12. Are you looking at the DSKY?
03 14 45 03	CC	Okay. We're looking at it. Stand by.
03 14 45 08	CC	Okay. We've got it, 12. Thank you.
03 14 45 14	CMP	Okay. We're torquing.
03 14 45 16	CC	Roger.
03 14 50 51	CC	Hello, Apollo 12; Houston. You're rolling into the high gain limits. Give me OMNI Charlie, please.
03 14 51 03	CMP	Roger.
03 14 53 08	CC	Hello, 12; Houston. Give us OMNI Delta, please.
03 14 58 56	CDR	Houston, Apollo 12.
03 14 58 59	CC	Go ahead, 12.
03 14 59 03	CDR	Roger. You can see quite well in Earth's shine, up here. The LM is illuminated very brightly because it's fairly reflective, but the Moon

itself is fairly easy to see in earthshine; it's quite beautiful, real soft, and sort of gives it a greenish tinge, gray-green.

03 14 59 26 CC Roger. Understand. And do you say that the LM is illuminated by earthshine?

03 14 59 35 CDR Yes. Real well. It's very reflective itself, and so it looks almost like the soft sunlight if there is such a thing. But you can, for example, look out and read the marks on the Commander's overhead window; you can see all the quads, the struts. And real pretty up here in earthshine. Kind of gives it sort of a gray-green cast, though.

03 15 00 03 CC Roger. Understand.

END OF TAPE

03 15 12 10	CC	12, Houston. Five minutes to LOS.
03 15 12 16	LMP	12. Roger.
03 15 13 24	CDR	Okay, Houston. We just called up P40 for you to take a look at it before we disappear.
03 15 13 30	CC	Roger, 12.
03 15 14 11	CC	Hello, Apollo 12; Houston. You're GO for LOI 2, and your PIPA's look real good.
03 15 14 19	CDR	Roger, Houston. GO for LI - LOI 2.
03 15 14 26	CC	Yes, it's been a long night here, too.
03 15 14 34	CDR	No, it wasn't that; I had the water gun half in and half out, and I was trying to talk and drink at the same time. Actually, we're - it's kind of interesting - Dick and Al and I have really switched over to this time schedule, and we're quite happy on it. We - We're not really aware of the fact that it's the middle of the night back there.
03 15 14 56	CC	Roger.
03 15 39 --		BEGIN LUNAR REV 3
03 16 01 31	CC	Hello, Apollo 12; Houston.
03 16 01 37	CDR	Hello, Houston; Apollo 12. LOI 2 burn complete. The burn was on time. The burn time was 17 seconds. The residuals were plus 0.3, 0, plus 0.1. DELTA-V_C was minus 4.4, fuel 35.4, oxidizer 35.9, increase 110. We're in a 66.3 by 54.7 according to us. Over to you.
03 16 02 16	CC	Roger, 12. We copy.
03 16 02 21	CDR	And we have BAT B on the charger at this time.
03 16 02 26	CC	Roger.
03 16 02 39	CDR	We're in the process of - Al is photographing off the target-of-opportunity chart here in order, and we're trying to get as much of that stuff done as we can.
03 16 02 54	CC	Roger, 12.

03 16 09 24	CDR	Okay, Houston; Apollo 12. We've gone to LM PRESS on our valve to bring the LM up.
03 16 09 33	CC	Roger, 12.
03 16 22 00	CC	12, Houston. If you'll give us POO and ACCEPT, we'll give you a clock update.
03 16 22 07	CDR	Okay. POO and ACCEPT it is.
03 16 22 30	CC	And, 12; Houston. I have a map update PAD and a landmark tracking PAD, when you're ready.
03 16 22 40	CDR	Okay. We're ready to copy.
03 16 22 43	CC	Okay. The map update for REV 4. 89:13:09, 89:37:59, 89:59:18. Over.
03 16 23 09	CDR	Roger. Map update, 89:13:09, 89:37:59, 89:59:18.
03 16 23 16	CC	That's affirm. Are you ready for your landmark tracking PAD?
03 16 23 29	CDR	Roger. This for H-1?
03 16 23 35	CC	That's affirmative. H-1.
03 16 23 40	CDR	Okay. Go ahead.
03 16 23 43	CC	Okay. And the computer's yours, and the H-1 PAD: T_1 is 90:35:41; T_2 90:40:50; the offset is 12 miles north. Over.
03 16 24 09	CDR	Roger. Twelve miles north. Okay. 90:35:41, 90:40:50, and 12 north.
03 16 24 25	CC	That's affirmative.
03 16 41 23	CMP	Houston, 12.
03 16 41 27	CC	Go ahead, 12.
03 16 41 32	CMP	- - ... number 10 was changed.
03 16 41 40	CC	Roger.

END OF TAPE

03 16 54 58	CMP	Hello, Houston; 12.
03 16 55 01	CC	Go ahead, 12.
03 16 55 05	CMP	And if you have the DSKY or the torquing angles.
03 16 55 09	CC	Roger. We got them.
03 16 55 13	CMP	Okay. I'm torquing at this time.
03 16 55 15	CC	Roger.
03 17 05 17	CDR	Hello, Houston; 12.
03 17 05 19	CC	Go, 12.
03 17 05 25	CDR	Roger. The tunnel's clear, and we're going into the LM.
03 17 05 28	CC	Roger, 12.
03 17 08 10	CC	12, Houston. Five minutes to LOS.
03 17 08 18	CDR	12. Roger.
03 17 37 --		BEGIN LUNAR REV 4
03 17 59 48	CC	Apollo 12, Houston.
03 18 00 34	CC	Apollo 12, Houston.
03 18 00 39	CMP	Hello, Houston; Apollo 12. Go.
03 18 00 43	CC	Very good. Nice to hear your voice.
03 18 00 48	CMP	Roger. I answered you before. You must not have picked it up.
03 18 00 53	CC	Sorry about that.
03 18 00 57	CMP	That's okay. Pete and Al are in the LM - or Pete's in half and half, and they're going down through their checklist stuff, and I'm standing by ready to hear the P22.
03 18 01 11	CC	Very good.

03 18 01 14	CMP	In fact - In fact, I want to go ahead ... You'll probably lose me on the high gain; I'll give you OMNI B when I ...
03 18 01 23	CC	Roger.
03 18 01 30	CDR	And, Houston; 12. We just finished checking out our OPS's, and they checked out 40, both of them.
03 18 01 38	CC	Roger. Copy 40, both of them.
03 18 05 36	LMP	Houston, Intrepid.
03 18 05 39	CC	Go, Intrepid.
03 18 05 44	LMP	Roger. We're just standing by until time 90:30 where we do our COMM activation. Everything looks good in the LM. We've checked all the things we're supposed to, and they're all ship-shape, ready to go.
03 18 05 59	CC	Roger. We're ready to go down here whenever you want to do the COMM checks.
03 18 14 34	CDR	Houston, Apollo 12.
03 18 14 37	CC	Apollo 12, go ahead.
03 18 14 46	CDR	Houston, Apollo 12.
03 18 14 49	CC	Apollo 12, go ahead.
03 18 14 54	CDR	Roger. We're powering up LM COMM at this time starting with our voice check on VHF A with the CSM.
03 18 15 02	CC	Roger. You're coming in with a lot of background right now, Pete.
03 18 15 12	CDR	Houston, Intrepid. How do you hear?
03 18 15 15	CC	Read you well except for your background, which is very high.
03 18 15 23	CDR	Roger.
03 18 15 37	CDR	Yankee Clipper, Intrepid on VHF A. How do you hear?
03 18 15 40	CMP	Intrepid, Yankee Clipper. VHF A loud and clear. How me?

03 18 15 43	CDR	Read you the same.
03 18 16 26	CDR	Yankee Clipper, Intrepid. How do you read VHF B?
03 18 16 30	CMP	Intrepid, Yankee Clipper. VHF B loud and clear. How me?
03 18 16 33	CDR	Read you the same.
03 18 16 35	CMP	Hey, that's really sterling.
03 18 16 52	CDR	Houston - Houston, Intrepid. How's the S-BAND DOWNVOICE BACKUP and LOW BIT RATE? Over.
03 18 17 01	CC	Intrepid, Houston. We're still reading you well except for your background, which is still high.
03 18 17 18	LMP	Okay. We're going to PCM HIGH now. How do you pick it up?
03 18 17 24	CC	Roger. Give us just a moment to reconfigure the ...
03 18 17 32	CC	Go ahead, Intrepid.
03 18 17 39	LMP	How's the VOICE and HIGH BIT RATE?
03 18 17 44	CC	Roger. You're just the same, Pete. We're still reading you satisfactorily; again, you've got a lot of buzz in the background.
03 18 17 59	CMP	Houston, this is Apollo 12. I'm talking to you on the CSM S-band, and Al's talking to you on the Intrepid S-band. Are you sure that that's not a ground problem? We're getting - Al's getting good reception up here on S-band with no noise.
03 18 18 25	CC	Roger. We'll check.
03 18 18 59	LMP	Houston, Intrepid. Just went by on that ... . How do we look now?
03 18 19 06	CC	You're somewhat weaker, but still readable. Still considerable background noise.
03 18 19 14	LMP	Roger. That's the way it should be.
03 18 19 25	LMP	Okay. How do you read now, Houston? DOWN VOICE BACKUP BIOMED, LOW BIT RATE.

03 18 19 32	CC	Roger. Again, you're still somewhat weak, readable, and the background is dropping just slightly.

END OF TAPE

03 18 20 04	CDR	... Intrepid.
03 18 20 06	LMP	LOW BIT RATE with BIOMED. How do you copy? Over.
03 18 20 11	CC	Read you very good on this one; your background has dropped considerably.
03 18 20 42	CDR	Houston, we just went TELEMETRY HIGH. How do you read us now, VOICE?
03 18 20 46	CC	Read you fine on this one, Pete.
03 18 21 01	LMP	And we are coming at you TELEMETRY LOW and S-BAND RANGE to RANGE. And will you copy the ... on hot mike?
03 18 21 09	CC	Roger.
03 18 21 29	CC	Intrepid, would you stand by on this mode, so we can try a range acquisition?
03 18 21 37	CDR	Affirmative.
03 18 22 00	CC	Intrepid, Houston. How do you read?
03 18 22 07	LMP	Loud and clear, Houston.
03 18 22 09	CC	Very good. Read you the same.
03 18 22 19	CC	Intrepid, Houston. We're - -
03 18 22 21	LMP	Did you pick up our range then?
03 18 22 23	CC	That is affirmative. We finished that acquisition. Thank you.
03 18 22 28	LMP	Okay. And that completes our COMM checks. We're going to deactivate Intrepid and go back to Yankee Clipper.
03 18 22 36	CC	Very good. Thank you.
03 18 23 43	CC	Yankee Clipper, Houston. Would you confirm that you're in OMNI Delta?
03 18 23 56	CMP	Houston, Clipper. Confirm.
03 18 24 01	CC	Roger. Thank you very much.

03 18 28 13	CC	Intrepid, Houston.
03 18 28 20	LMP	Come ahead, Houston.
03 18 28 21	CC	Roger. Two items we'd like to get from you before you close that out and that's the OPS sour pressure and also the GET of activation of LM power.
03 18 28 35	CDR	Okay. I gave you the OPS; they're 5800 each an let me - and let me look in the book and find o what time we went on the LM power; just a secon
03 18 28 45	CC	Roger.
03 18 28 56	CDR	We went on LM power at 90:08:13.
03 18 29 03	CC	90 plus 08 plus 13. Thank you.
03 18 29 47	CDR	And, Houston, Intrepid just went back on CSM power at 90:29:35.
03 18 29 56	CC	90 plus 29 plus 35. Roger.
03 18 32 20	CC	Intrepid, Houston.
03 18 32 26	CDR	Go ahead, Houston.
03 18 32 28	CC	We'd like you to confirm that you're going to pull the circuit breaker on the floodlights so that the light will go out when you close the refrigerator door.
03 18 44 17	CMP	Hello, Houston. Let me know when you've copied that.
03 18 44 23	CC	Say again.
03 18 44 30	CMP	Let me know when you've copied the P22.
03 18 44 36	CC	Roger. We've got it. Thank you.
03 18 44 58	CMP	Houston, I'm going to look at the latitude and longitude from these marks.
03 18 45 03	CC	That's affirmative. We've got the data, Dick. You can proceed.
03 18 47 22	CMP	Hello, Houston; Apollo 12.

03 18 47 26	CC	Houston. Go ahead.
03 18 47 31	CMP	Hey, Don, did you people copy the NOUN 89?
03 18 47 35	CC	That is affirmative.
03 18 47 41	CMP	Okay. Let me know how that exercise turned out, will you please?
03 18 47 45	CC	Will do. We've got a state vector for you whenever you want to give us the computer, and we got a TEI maneuvering PAD P40 and a map update for you whenever you're ready.
03 18 48 00	CMP	Okay. The computer's yours.
03 18 48 03	CC	Thank you.
03 18 48 27	CC	Apollo 12, Houston.
03 18 48 37	CDR	Go ahead, Houston.
03 18 48 40	CC	We'll wait for the high gain antenna to uplink your state vector, and the rest attitude in the flight plan is good.
03 18 48 58	CDR	Roger, Houston.
03 18 50 29	CC	Apollo 12, Houston.
03 18 50 38	CMP	Go ahead, Houston.
03 18 50 40	CC	Dick, do you have any comments on the lighting conditions on H-1?
03 18 50 47	CMP	No. They were excellent. It was very easy to find the target, very easy to mark on. I thought the lighting conditions were outstanding for that.
03 18 50 55	CC	Very good.
03 18 51 14	CDR	Okay, Houston. Why don't you give me the map update and the TEI 11 PAD? I'll copy them now and by that time we'll be getting over to the sleep attitude here and give you the high gain in a minute.

03 18 51 30	CC	Very good. The map update for REV 5 LOS is 91 plus 11 plus 37; 180 position is 91 plus 36 plus 21; AOS is 91 plus 57 plus 45. TEI 11 PAD, SPS plus G&N: NOUN 47, 37358; NOUN 48, minus 0.65, plus 0.49; GET 105:23:55.20; NOUN 81, plus 3192.1, plus 0725.8, minus 0139.8; roll NA, pitch 107, yaw NA; ullage, four jets for 11 seconds; and the burn is undocked.
03 18 53 18	CDR	Okay, Houston. We have you on the high gain, and I'll go to ACCEPT at this time, and to wrap up to you with 91:11:37; 91:36:21; 91:57:45. The TEI 11 PAD SPS/G&N: 37358, minus 0.65, plus 0.94, plus - no - no, excuse me, it's just 105:23:55.20, plus 3192.1, plus 0725.8, minus 0139.8; NA, 107, NA; four jets, 11 seconds; undocked.
03 18 54 13	CC	Roger. On NOUN 48, the Y-trim was plus 049. All the rest was correct.
03 18 54 27	CDR	Okay. That's what I have on the PAD. I don't know what I read back to you. I have 049, and how's the LM current look to you at this time?
03 18 54 36	CC	Looks very good.
03 18 54 44	LMP	Okay. We're in the process of buttoning the tunnel back up.
03 18 55 27	CC	Apollo 12, Houston. Would you try OMNI Delta for us, please?
03 19 00 50	CC	Apollo 12, Houston.
03 19 00 38	CDR	Go ahead, Houston.
03 19 00 40	CC	We did not get your state vector completed before we lost you on the pitch there, so we'll continue that now.
03 19 00 52	CDR	Okay.
03 19 01 25	CMP	Hello, Houston; Apollo 12.
03 19 01 26	CC	Go
03 19 01 30	CMP	Roger. On this DAP load for the rest attitude, do you want me to use A-C per roll or B-D? Will you get the readings from G&C on that please? The flight plan or . .

03 19 01 47	CC	Roger. We want to use B-D, Dick. Bravo Delta.
03 19 01 53	CMP	Okay. Thank you. I thought so.
03 19 02 32	CC	Apollo 12, Houston. We're through setting up your state vector, and we'd like to try to get an E dump before you go around the corner.
03 19 02 44	CDR	Okay. VERB 74 coming at you.
03 19 02 48	CC	Roger.
03 19 02 56	CDR	And we have you out our window for the first time since we've been in lunar orbit. We've been too busy to get a look at you. Look pretty nice out there.
03 19 03 05	CC	Thank you. We're all smiling for you.
03 19 03 11	CDR	We happy up here.
03 19 10 23	CC	Apollo 12, Houston. We're about 1 minute from LOS here. We'll see you at 91:57.
03 19 10 37	CDR	91:57. Roger-Roger.
03 19 10 41	CC	Roger. So you can adjourn to the wardroom.
03 19 10 47	CDR	We's already there.
03 19 10 51	CC	Very good.
03 19 10 58	CDR	Pretty soon we're going to have movies on the fantail.
03 19 11 02	CC	Very good.
03 19 11 22	CC	So long. We'll see you coming around the other side.
03 19 11 28	CDR	Roger-Roger.
03 19 13 36	--	BEGIN LUNAR REV 5.

END OF TAPE

03 19 58 08	CC	Apollo 12, Houston.
03 19 58 11	CDR	Roger, Houston; 12. Loud and clear.
03 19 58 16	CC	Very good. We've got a couple of questions for you. When did you activate the cryo pans?
03 19 58 27	CDR	When? Did we activate them? We haven't done it yet.
03 19 58 31	CC	Okay, if you will let us know, we can track the quantities a little bit better, if we know that. Also, we are ready to terminate the battery B recharge.
03 19 58 43	CDR	Okay, we'll terminate battery B. Why don't we go ahead and cycle the fans for you now? We were just - we were going to wait until just before we were going to go to sleep, but we will cycle them now for you.
03 19 58 52	CC	Roger; thank you. Also, Dick, the boys in the back room are very well pleased with the P22 tracking; they were impressed with the technique and the spacing. Also the - Your solution agree to within a hundredth of a degree of the map positions, so everybody is very pleased with that.
03 19 59 27	CC	Pete, when you go in the LM tomorrow, the AGS people would like you to check a series of locations in the E-memory just to check out tha system. I've got a list of the locations and the expected parameters that we'd like to read you sometime before bedtime this evening. They'll rest better if you have them tonight.
03 19 59 59	CDR	Okay. This is due to - what happened on launch Is that what you are saying? You want to verif from memory?
03 20 00 04	CC	That is affirmative. I've got the list wheneve you want to copy. It is about a page of locations, about 25 or so.
03 20 00 15	CDR	Okay. Al's got his hands full of food bags right now. Just a second, and I will copy them for him. Wait 1.

03 20 00 21	CC	Roger.
03 20 00 31	CC	We liked your idea of movies on the fantail so much that, while you were running around behind the Moon there this time, we replayed your last TV coverage for the boys down in the hanger deck. It was very nice.
03 20 00 46	CDR	Very good.
03 20 00 48	CC	It looks a lot better on the big screen than it does on my home television set.
03 20 00 56	CDR	Well, tell you what, it looks a lot better from right here with the old eyeball, but we are doing as best we can for you.
03 20 01 01	CC	I bet it does.
03 20 01 05	CDR	I - I wish we could bring some TV from the back side of the Moon. I really - I sort of am more impressed with the back side of the Moon as being prettier than I am with the front side.
03 20 01 16	CC	You're making us feel envious.
03 20 01 18	CDR	I'm not sure that that meets with complete agreement in the spacecraft, but -
03 20 01 25	CC	I guess everyone has his favorite spot someplace - -
03 20 01 27	LMP	Okay, I'll tell you what - I'm ready -
03 20 01 32	CC	Go ahead.
03 20 01 33	LMP	I'm ready to copy those AGS addresses now.
03 20 01 36	CC	Roger. Location 454, the value is plus 00700; location 466, plus 00150; location 506, plus 02400; 523 is plus all zeros; 527, plus 00500; location 537, plus 00002; location 560, plus all zeros; location 561, plus 02436; plus - or location 564, minus 46314; location 565, plus 40611; location 566, plus 01531; 601, minus 75341; location 602, plus all zeros; 622, plus 00062; location 634, plus 00100; 654, minus 62655; location 655, plus 03467; 657, plus 00015; location 661, plus 00031; location 662, plus 53603; 666, plus 04140; location 672, plus 20053; that's the end of the list.

03 20 05 13	CDR	Okay, just a second, and I will read it back to you.
03 20 05 16	CC	Roger.
03 20 05 29	CDR	Okay, address 454, plus 00700; address 466, plus 00150; 506, plus 02400; 523, plus all zeros; 527, plus 00500; address 537, plus 00002 address 560, plus all zeros; 561, plus 02436; 564, minus 46314; address 565, plus 40611; address 566, plus 01531; 601, minus 75341; 602, plus all zeros; 622, plus 00062; 634, plus 00100; 654, minus 62655; 655, plus 03467; 657, plus 00015; 661, plus 00031; 662, plus 53603; 666, plus 04140; 672, plus 20053.
03 20 06 05	CC	Roger on all of them.
03 20 07 11	CDR	Okay, we'll check those tomorrow.
03 20 07 14	CC	Thank you.
03 20 07 26	CC	Hey, Al, on your TV broadcast, when you were commenting about mountains looking like clouds, were you aware that those mountains were in the Sea of Clouds?
03 20 07 39	LMP	No. I guess that's where it got its name, huh?
03 20 07 44	CC	We thought you had planned a pun for us.
03 20 07 49	LMP	No, I wasn't smart enough for that.
03 20 07 53	CC	Hey, listen. We've got one idea down here on the O_2 consumption rate that we'd like to get your comments on. The suggestion was that, last night while you guys were asleep, the metabolic rates indicated that one of you was dreaming, probably about scuba diving, and that we think you were dreaming about petting a moray eel; and in the hyperventilation, you sucked up too much of the oxygen.
03 20 08 27	CDR	Okay, tell David, David, that I'll go along with that one.
03 20 08 31	CC	Roger.
03 20 08 42	CDR	I suspect that it's this urine device thing - we're just out of the habit of leaving it on to keep it flushed out. It doesn't flush out very well, so we've been leaving it on, and we usual

don't bother to shut it down until the O_2 HIGH FLOW comes on or something; that takes awhile. But that probably doesn't account for all of it.

03 20 09 12	CC	The practical people would be impressed with that. Most of us like the moray eel theory better.
03 20 09 20	CDR	Okay, I'll go along with that.
03 20 09 22	CC	Roger.
03 20 25 04	CDR	Hello, Houston; 12.
03 20 25 06	CC	Go ahead.
03 20 25 11	CDR	Will you have one of the doctors look at my BIOMED and see if it's okay? I had to move one of the leads. For some reason, it reacted on my skin, and it's all welled up into a bunch of blisters here, so I had to move it.
03 20 25 27	CC	Roger. He reports that it - you're - they're getting a good signal.
03 20 25 35	CDR	Okay. Very good. I'm going back off the air.
03 20 25 39	CC	Roger.

END OF TAPE

03 21 34 -- BEGIN LUNAR REV 6

03 23 33 -- BEGIN LUNAR REV 7

REST PERIOD - NO COMMUNICATIONS

04 01 32 --		BEGIN LUNAR REV 8
04 01 55 07	LMP	Houston, Apollo 12.
04 01 55 19	CC	Apollo 12, Houston. Go ahead.
04 01 55 24	LMP	Roger. Got a couple of quick questions for you. One, we seem to be find - a little more RCS - there seems to be a little more RCS thruster activity around the Moon than we had imagined. Is Control satisfied with our propellant usage right now and the number of firings? That's one. Two, I've been getting a little stuffy in the head. In fact, I been that way since launch. Do you know - I don't have a cold or anything. My ears are sometimes clear, and sometimes they're not. I took a decongestant pill about - several hours ago, and in order to be sure that my ears are good and clear tomorrow for the - all the LM activity and the EVA, how often should I take one of those pills to get the maximum effectiveness from it?
04 01 56 25	CC	Roger. We'll check on both of those.
04 01 58 58	CC	Apollo 12, Houston.
04 01 59 04	LMP	Go ahead.
04 01 59 06	CC	The surgeon recommends that we take one of those every 8 hours; so 8 hours after you took the first one, we recommend another one, and it should be just about time to take one more just before the EVA, so that's the recommendation. Also, we're interested in getting BIOMED, and we're wondering if you can turn on Pete's BIOMED if it's just a question of throwing the switch. We're not getting any BIOMED from him, and we don't know why. Don't wake him up, but we wondered if you could get us some BIOMED from him easily.
04 01 59 40	LMP	No. He's down in his sleep station, and it makes it a bit uncomfortable to get the BIOMED down to there, so he's not even connected to it. That's why you're not getting it from Pete at all. The only person you've been getting it from is Dick.

04 01 59 54	CC	Roger. We didn't get any for a long time there. Okay. And on the thrusters, they look good. We're checking further, but, at the first approximation, things look fine.
04 02 00 12	LMP	Sounds good. I'm going to head back to sleep, Houston, so the only person you'll have BIOMED on is Dick, I guess.
04 02 00 19	CC	Roger. Thank you. Hope your nose clears up.

END OF TAPE

04 03 30 -- BEGIN LUNAR REV 9

REST PERIOD - NO COMMUNICATIONS

04 04 53 45		"Reveille" played on bugle
04 04 54 00	CC	Apollo 12, Houston. Good morning.
04 04 54 13	CC	Apollo 12, Houston. Good morning.
04 04 54 38	CC	Apollo 12, Apollo 12, this is Houston. Over.
04 04 54 56	CC	Apollo 12, Apollo 12, Houston. Good morning.
04 04 56 15	CC	Apollo 12, Apollo 12, this is Houston. Good morning, good morning.
04 04 56 23	CDR	Good morning, Houston. This is 12.
04 04 56 26	CC	Good morning, gentlemen; today's the big day. Hit the deck.
04 04 56 33	CDR	Roger. We've been there for a while.
04 04 56 36	CC	Very good. We've got a couple of items for you when you get your eyes wide open.
04 04 56 44	CDR	Okay. I'm ready to copy.
04 04 56 51	CC	Question about your biomedical sensor that you reported moving the other day. Is it still holding in position?
04 04 56 57	CDR	Yes. I want to talk to you about that this morning. Go ahead with the rest of the questions, then I'll talk to you about it.
04 04 57 05	CC	Okay. That was one of them. One of the other items was that, while you were sleeping, we had a class-2 flare reported on the Sun. We watched it very carefully in your behalf, and we get no particles coming out of it in the vicinity of the Earth. So, we exercised the system, but there's nothing to report coming your way. The surgeon is recommending - -
04 04 57 28	CDR	Okay.
04 04 57 30	CC	- - The surgeon is recommending that we change your biomedical sensor, but what do you have to say about first?

04 04 57 39	CDR	I - I've already moved the sensor, and I'm developing a little bit of a problem with all of them. I've never had this problem before, but something in that goo is - allerg - My skin is allergic to it, I guess. And I finally had to move the upper one because I broke out underneath it. And I guess I was weeping plasma or something, and it finally started weeping over the side. It's been bothering me for the last couple of days. Now, all of them are in the same category, and I don't want to move ... and get this stuff out in the open. I - I can't do - You tend to break out even worse. Now, the one on my chest is pretty bad, and I've moved that one. So, what I propose to you all is - that - I'm going to leave them just the way they are until we get all the way through the EVA and I get back up here. Then, I want to take them off.
04 04 59 35	CC	Apollo 12, would you go MANUAL on the high gain? We're losing your signal.
04 04 59 47	CC	Apollo 12, Apollo 12. Please go MANUAL on the high gain. We're losing your signal.
04 05 00 19	CC	Apollo 12; Houston.
04 05 00 24	CDR	Okay, Houston. I'm on OMNI B. How's that?
04 05 00 27	CC	Roger. Much better. We lost most of your transmission about your BIOMED centers - sensors, Pete. You had said that you'd been having trouble for a day or so on that. What was the last half of that message?
04 05 00 42	CDR	Okay. What the problem is, is I - For some reason, it's making me break out. It looks like I got poison ivy under those things, and they're weeping plasma or whatever you weep. And the one I moved is the one on the top of my chest, and it's all broken out up there. Now, I don't want to take the rest of them off, because I'm afraid of what I'm going t find underneath. So, what I propose to do is continue the way they are, and when we get done EVA's down there, I want to get rid of them. They're driving me buggy.

04 05 01 19	CC	Roger. We're going to talk that one over for a second. We're about 2 minutes from LOS. Just in case we should lose you a little bit early, we expect to pick you up again at 101 plus 49.
04 05 01 35	CDR	Roger. Okay, I've already moved that one, and my my - skin's in pretty bad shape underneath it. It's - It's still weeping whatever you weep, plasma, I guess, and I don't want to move the other ones.
04 05 01 52	CC	Roger. Just a question on them - on that. When you moved it, did you put on a new seal and new jelly?
04 05 02 00	CDR	That's affirmative.
04 05 02 02	CC	Very good.
04 05 02 11	CDR	I think we're getting ready to lose you here, Houston. We'll see you on the other side at 101:49.
04 05 02 18	CC	Roger.
04 05 03 16	CC	Apollo 12, we'll see you on the other side.
04 05 03 23	CDR	Roger-Roger.

END OF TAPE

04 05 27 --		BEGIN LUNAR REV 10
04 05 50 09	CC	Apollo 12, Houston. How do you read?
04 05 50 15	CDR	Hello, Houston; 12 reads you loud and clear. How me?
04 05 50 19	CC	Roger, Pete. We are reading you loud and clear.
04 05 50 27	CC	Apollo 12, Houston. On your BIOMED sensors situation, we have a few words for you, if you are ready.
04 05 50 36	CDR	Go ahead.
04 05 50 38	CC	Okay. The recommendations of the medical people here are that you remove the two side - the respiration sensors. You can go ahead and take those off completely, and treat the areas with your first-aid cream; and if they are weeping, you can go ahead and cover them with a Band-aid or something. The ones on the blue lead, they recommend you do the same thing with those; remove them, cover them with first-aid cream, and put a Band-aid on them if they are weeping and then relocate those with a whole brand new system; and that way you will have a good clean system with a minimal chance of itching beginning immediately in a new area. And, of course, if you don't like this particular proposal, they have no objection to you sticking to the way you wanted to do it - of just leaving it where it is.
04 05 51 33	CDR	Jerry, just - I want to stick with it the way it is. It works. The respiration leads on my sides are the least ones that are bothering me. I moved the one that bothered me the most, and the best I could describe that area is that it looks like I've got a 1-inch-round patch of very bad poison ivy. The rest of them aren't anywhere near that bad. They have been bothering me but they work, and I would just as soon leave them where they are, because the area that I moved is raw; and I have covered it with a Band-aid, but I am a little worried about getting my sides exposed, even with Band-aids, with that LCG on. I think that the sensors themselves will do better protection just the

way it is. And when I get back up, I'll take them all off and switch them around.

04 05 52 27 CC Okay, Pete. That's fine. We are satisfied with that if that is the way you would like to do it.

04 05 52 35 CDR Yes. You're getting good data now, aren't you?

04 05 52 38 CC Roger. Looks very good, Pete.

04 05 52 44 CDR Okay. I would just like to leave it the way it is. Let me give you the sleep report. Everybody had 7 hours across the board, and the PRD's were from Commander through LMP 11016, 11015, 04017. The checklist has been complete. We dumped the water to 10 percent. We purged the fuel cells. We cycled the fans, and we are just finishing up breakfast right now.

04 05 53 16 CC Roger, Pete. Sounds good. We would like to get a little more medical information from you if we can. First of all, we want to get a little more word on how Al is doing with his stuffiness, and is anybody else suffering from any stuffiness?

04 05 53 37 CDR That's negative and I'll let you - nobody else is stuffy - and I'll let you talk to Al direct.

04 05 53 43 CC Okay.

04 05 53 44 LMP I've had a pretty stuffy - Houston - I've had a pretty stuffy head ever since we got into orbit, and I assumed it was going to go away in a couple of days, but it never did. I don't sneeze, cough, or have any other symptoms. It just seems to be fairly full in the ears and the nose. I tried a couple of decongestants. They work well, but I didn't know exactly how far apart to take them. Right now my ears is - are clear, and my nose feels real well. I have taken two of the pills, 8 hours apart; and then, I've been using the spray, so it looks like we have got it licked right now.

04 05 54 29 CC Okay, Al. That was what we were going to suggest is that you take your pills 8 hours apart and use the spray, and we just hope that takes care of it for you. Next question we had from the medical people is, how did you guys

sleep? You got 7 good solid hours, or was there any fitfulness at all?

04 05 54 53	CDR	We are all sleeping real well up here. As a matter of fact, we've overslept, I think.
04 05 55 00	CC	That's great.
04 05 55 05	CDR	I'll tell you, it's a real switch from Gemini. I never slept at all in that thing, and, boy, I can crawl down there in that lower - underneath the couch - and just disappear for 8 hours.
04 05 55 17	CC	Roger. The doctors say that you ought to space your Actifeds now every 6 hours now, instead of 8.
04 05 55 27	CDR	That's for Al.
04 05 55 29	LMP	Roger. How often can you use that spray? I kind of wondered that, too.
04 05 55 40	CC	Al, use that about 3 to 4 hours. If you can space it to 4, fine. If you need it, go ahead and use it every 3 hours.
04 05 55 49	LMP	Okay. Well, don't have to worry. I've - it's real clear now, and it stays clear as long as I use the pills and things, so it looks good for the rest of the trip.
04 05 56 00	CC	Well, that sounds fine, Al.
04 05 56 03	CDR	I don't think - I don't think he's had anything. It seems to us - We have all kicked it around a little bit - more like maybe there may be a little bit of dust floating around in here or something, that may be just making it stuffy. It is a little bit different than being on the ground. He is not allergic to anything on the ground but that is what it appears to be.
04 05 56 28	CC	Roger, Pete. Is Al putting on his LCG now? His BIOMED doesn't look too dandy.
04 05 56 35	CDR	No, he is just laying here eating breakfast. We'll smarten him up before he gets in it.
04 05 56 40	CC	Roger.
04 05 56 46	CMP	Okay. And we need our CSM consumables if you would pass it to us, please.

04 05 56 54	CC	Okay. We're working on that. While you are waiting, I've got a flight plan update for you on the Fra Mauro pictures and also your REV 11 map update.
04 05 57 05	CMP	Ready to copy. Go ahead.
04 05 57 09	CC	Roger. While you are copying, give us POO and ACCEPT, and we have some uplinks for you. First flight plan update is Fra Mauro photos.
04 05 57 18	CMP	You got it.
04 05 57 19	CC	Tango 1 is 102:30:26; Tango 2 is 102:32:27; Tango Charlie Alfa is 102:32:58. The optimum position in the window will come at 102:31:39. Over.
04 05 57 56	CMP	Roger. T_1, 102:30:26; T_2 is 102:32:27; TCA is 102:32:58; optimum 102:31:39.
04 05 58 12	CC	Roger, Dick. Your COMM just improved. You must have moved your mike closer to your mouth. Flight plan update for REV 11. REV 11 map update: LOS 103:02:01, 103:26:34, 103:47:44.
04 05 58 50	CMP	Roger. Copy.
04 05 58 53	CC	Okay. And I have your CSM consumables update, if you're ready to copy.
04 05 58 59	CMP	Go ahead.
04 05 59 00	CC	Okay. GET is 101 plus 00; RCS total, 69.2; Alfa, 68.5; Bravo, 71.8; Charlie, 66.9; Delta, 69.6; hydrogen is 64.4 and 61.5; oxygen is 63.6 and 65.7. Over.
04 05 59 48	CMP	Roger. Copy.
04 06 00 42	CC	Apollo 12, Houston.
04 06 00 48	CMP	Go ahead.
04 06 00 49	CC	Roger. Before you slipped into the pad last night, we didn't get your onboard readouts. We need your pyro batteries and your BAT C readouts.
04 06 01 26	CMP	Jerry, all the batteries, battery C, pyro BAT A, pyro BAT B, all read 37.1.

04 06 01 34	CC	Roger. Copy 37.1.
04 06 01 39	CMP	That's Charlie.
04 06 01 40	CC	Thank you, Dick.
04 06 02 22	CC	Apollo 12, Houston. The computer is yours. You've got a new state vector and a new REFSMMAT.
04 06 02 32	CMP	Roger.
04 06 03 15	CMP	Hello, Houston; 12.
04 06 03 16	CC	Go ahead, 12.
04 06 03 21	CMP	Roger. Understand we'll be doing option 1 on the P52 here at 103 hours. Is that affirmative?
04 06 03 30	CC	12, Houston. Did you ask about option 1 on your P52?
04 06 03 38	CMP	That's affirmative.
04 06 03 45	CC	That's affirmative, 12; option 1.
04 06 03 50	CMP	Okay.
04 06 04 03	CDR	Say, Houston, did our orbit decay last night like it was supposed to?
04 06 04 18	CC	12, Houston. Affirmative, and we're getting good comparisons within a 100 feet.
04 06 04 28	CDR	Good show.
04 06 04 29	CC	Roger. These are downrange comparisons
04 06 04 37	CDR	Understand. I guess if Dick nails that 193 like - or 191 like he did the other one last night, the only excuse will be mine if we don't make it.
04 06 04 51	CC	Roger, Pete.
04 06 05 14	CC	Apollo 12, Houston.
04 06 05 19	CDR	Go ahead, Jerry.
04 06 05 20	CDR	Roger. Your S-band communications on the previous two REV's haven't been too sterling. We've had a couple of cases where your signal

strength has dropped off and then come back up again. We'd like to do the rest of this pass, using your secondary SERVO electronics and see if that doesn't avoid the problem again. Now, what you'll have to do is take your TRACK mode and go to MANUAL with that, and then your SERVO electronics to SECONDARY and then REACQUIRE. Over.

04 06 05 58	CDR	Roger-Roger.
04 06 06 24	CDR	Houston, 12. How do you read?
04 06 06 26	CC	12, Houston. Loud and clear.
04 06 06 30	CDR	Okay, we've switched to SECONDARY. I noticed - I was watching it just before we went around the horn on the last pass and when we were within 6-7 minutes of LOS, the antenna just started driving itself, and the signal strain started falling off. The antenna was sort of wandering around. Now, I don't know whether that would be the electronics or perhaps some something else that's influencing the antenna. We'll look for it again on this pass.
04 06 07 04	CC	Roger. I guess that's about what we're thinking, Pete. That's why we recommended your SECONDARY SERVO electronics.
04 06 13 03	CC	Apollo 12, Houston. I have a DAP PAD and a TEI 34 PAD for you.
04 06 13 12	CDR	Okay. Just a second, Houston. Okay. Go ahead, Houston.
04 06 13 29	CC	Roger. CSM DAP load. This is for LOPC number 1, or for rescue. The CSM weight is 36786; pitch minus 0.78, yaw plus 0.43. Over.
04 06 13 56	CDR	Roger. Copy for the plane change or rescue; weight 36786; trim minus 0.78, plus 0.43.
04 06 14 08	CC	Affirmative. TEI 34 follows. Maneuver PAD SPS/G&N: The weight is 36000; NOUN 48, minus 0.70, plus 0.33; NOUN 33, 150:44:48.52; NOUN 81, plus 3118.6, plus 0409.1, minus 0131.3; roll, NA, pitch 136, yaw NA. The rest of the PAD is NA. Your ullage is four jets, 11 seconds. Over.

04 06 15 37	CDR	Roger. SPS/G&N: 36000; minus 0.70; plus 0.33; 150:44:48.52; plus 3118.6, plus 0409.1, minus 0131.3; NA, 136, NA; four jets, 11 seconds.
04 06 16 02	CC	Affirmative.
04 06 16 20	CDR	What's going on down there in the world today, Jerry?
04 06 16 26	CC	Gee, I don't know, Pete. I just got here myself. We'll have a news brief for you real shortly.
04 06 16 34	CDR	Roger.
04 06 19 05	CC	Apollo 12, Houston. I've got news for you now, or would you rather wait until after the photos?
04 06 19 15	CDR	We're pretty busy right now. We'll give you a call back.
04 06 19 19	CC	Okay.
04 06 21 21	CDR	Okay, Houston. We just changed out the LiOH canister per flight plan, and we're ready for the news.
04 06 21 28	CC	Okay, Pete. News coverage on your flight is beginning to pick up as the touchdown gets a little closer here. I guess most of the reports right now are about your medical ailments. Your "code in de dose" and all that stuff. Joseph P. Kennedy died peacefully today without regaining consciousness from a heart attack. In the Senate today, the vote for the confirmation of Judge Haynsworth has been tentatively set for noon, Friday. And on the stock market, business world, the stock market dropped 6 points yesterday and rebounded a little bit today, with the averages up about 2.64. In international news, the United States and the Soviet Union met yesterday in Finland for what President Nixon called momentus negotiations to seek agreement on ways to limit production on their arsenals of war. In local news, the University of Houston accepted a bid to play Auburn in the Astro-Bluebonnet Bowl on New Year's Day. In the weather world, the weather here in Houston is really miserable. We've had showers most of the day. The temperature started out this morning fairly warm and has been plummeting all day, and it's in the low 50's right now. I got a little piece out of the Houston Post that gives the Bowl games at a glance. The

Rose Bowl game, looks like it's going to be decided who's playing in it this next weekend. It's either going to be Southern Cal or UCLA, and they'll be playing either Michigan or Purdue. In the Rose - In the Orange Bowl, it's settled out now with Penn State playing Missouri. In the Cotton Bowl, Notre Dame has accepted a bid to the Cotton Bowl; and they're going to be either playing Texas or Arkansas, whoever wins that game. I think it's December the 6th. In the Sugar Bowl in New Orleans, it'll be Mississippi versus whoever loses the Texas-Arkansas game. In the Bluebonnet Bowl, I gave you that one already. The Peach Bowl will be South Carolina, and they haven't picked a team to play them yet. In the Gator Bowl, it'll be Tennessee versus Florida. In the Tangerine Bowl, Davidson versus Toledo; and in the Sun Bowl, Georgia is going to play Nebraska. That pretty well covers some of the more important Bowls.

04 06 24 12	CDR	Roger. I'd still like to square something away down there. Al doesn't have a cold; all I have is a 1-inch itch and I don't consider that any big major medical problem. As a matter of fact, we're in pretty damn good shape.
04 06 24 26	CC	Roger, Pete.
04 06 24 42	CC	12, Houston. Al;s BIOMED still looks a little bit ratty.
04 06 24 50	CDR	Okay. We - We'll smarten him up here. We're just getting into the LCG's and stuff now; and - and I mean we're just getting them out of stowage and everything; and we'll work him over, and see if we can't clean him up. He may have a loose lead; he's been in and out of his harness a couple of times during the night.
04 06 25 08	CC	Okay. It looks like a loose lead down here. Give us a call when you've got him adjusted, and we'll tell you how it looks.
04 06 25 40	CDR	Okay. His leads look pretty tight now. How's it look down there?
04 06 25 47	CC	Stand by. We'll take a look at it. No, it's still looking pretty squirrelly, Pete.

04 06 26 01	CDR	Okay.
04 06 33 26	CDR	Hello, Houston; 12.
04 06 33 30	CC	12, Houston; go.
04 06 33 36	CDR	Roger-Roger, Jerry. You can tell good Captain Shaky that he can relax. We've got his pictures.
04 06 33 45	CC	Roger. He'll be tickled to hear that.
04 06 33 51	CDR	You can tell him to relax till he sees them, that is.
04 06 33 56	CC	Roger. They look pretty good, huh?
04 06 34 02	CDR	Let's put it this way, let's say they're going to be very interesting.
04 06 34 06	CC	Roger. Copy.
04 06 37 58	CC	Apollo 12, Houston.
04 06 38 02	CMP	Go ahead.
04 06 38 04	CC	Roger. Got some words from the families. Dick, I just talked to Barbara and she's been resting up; they're taking naps and everything, getting all set for spending the night up with you; and Barbara said to tell you that she thinks you're just great.
04 06 38 24	CMP	Well, tell her thank you. After 16 years, it's about time.
04 06 38 29	CC	(Laughter) Pete, are you listening?
04 06 38 35	CMP	Negative, Jer; they're getting in their LCG's.
04 06 38 39	CC	Okay. When they get back up on the hook, give me a call.
04 06 38 41	CDR	Hold it; hold it.
04 06 38 45	CMP	Okay. We'll have them check in as soon as they come up.
04 06 38 48	CC	Okay.
04 06 38 50	CMP	And I'm doing a maneuver for the 102:50 right now, Jerry.

04 06 38 54	CC	Roger. Copy.
04 06 40 03	CMP	Hello, Houston; 12. Pete's back up on the line.
04 06 40 07	CC	Okay, Pete; talked to Jane just a few minutes ago, and she said the family's all doing fine, and they're - -
04 06 40 12	CDR	Hold it a minute.
04 06 40 15	CC	Say again.
04 06 40 19	CDR	Okay; go.
04 06 40 21	CC	Roger, Pete. Just talked to Jane a few minutes ago. She said the family's all doing just fine, and they're all getting rested up to spend the night up watching you guys.
04 06 40 34	CDR	Very good, Jer. Thank you. And will you have the doctors look at the BIOMED? I'm in my LCG now. All hooked up.
04 06 40 40	CC	Your BIOMED looks real good.
04 06 40 48	CDR	Okay. Now, I just had a little discussion with Al, and we want you to look at his BIOMED as soon as he comes back up. All his sensors are on good, and all his connections are tight; and we prefer not to get into a game of playing swap the amplifiers or anything, because those things aren't tuned. Right?
04 06 41 13	CC	That's affirmative. We agree with that too, Pete.
04 06 41 24	CDR	Okay. He'll be back up in a minute.
04 06 41 26	CC	Okay.
04 06 41 27	LMP	Houston, this is Al. Go ahead and check my BIOMED now.
04 06 42 06	CC	12, Houston. Al, you're still looking noisy. It looks just like a loose connection. Don't really know what you could do more than just tighten them up.
04 06 42 18	LMP	We've tightened both the top and bottom ones several times. I think maybe that's just the way it's going to be.

04 06 42 33	CC	Al, did you look under your sensors to see they were dry and really pick them off and look at them, or did you just kind of punch them on?
04 06 42 44	LMP	Well, I haven't had any trouble with the sensors. They might be dry. I didn't look under them at all; just checked the connections like you requested.
04 06 42 54	CC	Roger.
04 06 43 04	CC	12, Houston. We are about 1 minute from a handover from Goldstone. There may be an interruption there.
04 06 43 14	CDR	Okay.
04 06 44 32	CC	Apollo 12, Houston.
04 06 44 37	CDR	Go, Houston.
04 06 44 39	CC	Roger. Al's BIOMED looks pretty bad there. The medical people suggest that you try, on one of your sensors, try a new seal and some new paste under it. We'll see what that does.
04 06 45 02	LMP	Which one?
04 06 45 03	CC	Oh, pick the top one; that will be okay.
04 06 45 09	LMP	Okay.
04 06 45 28	CC	Al, while you are cutting and pasting there, are you listening?
04 06 45 38	CDR	He's not listening. Go ahead. What do you need?
04 06 45 41	CC	I was just going to pass up some words from Sue when he listens next time.
04 06 45 47	CDR	Okay. We'll get him on the line after while.
04 06 45 49	CC	Okay.
04 06 50 05	CMP	Hello, Houston. Are you looking at the DSKY, so I don't have to write this down?
04 06 50 14	CC	Roger. We copied your star angles.
04 06 50 35	CMP	Do you have those?
04 06 50 37	CC	Sure do, Dick. It's pretty good for on-the-job training.

04 06 50 45	CMP	You weren't supposed to say that out loud. Okay. I'm torquing at this time.
04 06 50 52	CC	Roger.
04 06 51 13	CMP	Boy, Jerry, this platform has done real well, in spite of that glitch we gave it at launch.
04 06 51 23	CC	Roger, Dick. You recommend that we glitch them like that every time?
04 06 51 29	CMP	No, sir. Not at all.
04 06 52 05	CDR	Okay, Houston. How about looking at Al now? We changed one sensor out. Everything looks good.
04 06 52 12	CC	Roger, Pete. Stand by.
04 06 53 07	CC	12, Houston. If you can work on that lower sensor now, we'd like you to get them both if you can. If you can only do one, do the lower sensor; and we'd like to have a look at you before you go LOS at - in 8 minutes and 45 seconds.
04 06 57 51	CDR	Okay, Houston. How does the BIOMED look now?
04 06 58 02	CC	12, Houston. It's a little bit improved. What did you do that time?
04 06 58 09	CDR	Just what you said; change the lower one out.
04 06 58 15	CC	It seems to be improving now, Pete. I guess we'll just have to live with what we can get here.
04 06 58 23	CDR	There you go. That's the words I want to hear. We're on our way. Bye-bye.
04 06 58 26	CC	Roger.
04 06 59 10	CC	12, Houston.
04 06 59 17	CDR	Go, Houston.

END OF TAPE

04 06 59 18	CC	Roger. Like to have you paste up that third BIOMED sensor, and that'll be the end of the fooling around with it.
04 06 59 30	CDR	What third one? The one on the top?
04 06 59 32	CC	That's affirmative.
04 06 59 37	CDR	Okay.
04 06 59 40	CC	Al, you listening?
04 06 59 46	LMP	Yes, Jer.
04 06 59 48	CC	Okay, Al. I talked to Sue a little while ago, and they're also doing fine at home. They're resting up getting ready for tonight.
04 06 59 54	LMP	Stand by. Stand by.
04 06 59 56	CC	Okay.
04 07 00 08	LMP	Hey, Houston, I think we found the problem. The one - The one that we just pulled off on the top all dried out.
04 07 00 14	CC	Roger. They're rejoicing in the streets here.
04 07 00 52	CC	Apollo 12, Houston. One minute from LOS, and things are all looking good now, and we'll see you at 103:47. Over.
04 07 01 06	LMP	Roger. 103:47.
04 07 25 --		BEGIN LUNAR REV 11
04 07 49 12	CC	Apollo 12, Houston. How do you read?
04 07 49 17	CMP	Hello, Houston; 12. Loud and clear.
04 07 49 19	CC	Roger. Read you the same.
04 07 49 26	CC	12, Houston. I have a REV 12 map update and a landmark tracking PAD.
04 07 49 48	CMP	Go ahead. Houston.
04 07 49 50	CC	Roger. Map update, REV 12: LOS 105:00:05, 105:24:56, 105:46:11. Over.

04 07 50 17	CMP	Roger, Jerry. I copied all that.
04 07 50 19	CC	Okay. Landmark tracking update: landmark number 193, REV 12, T_1 is 106:24:54, 106:29:59, south 18.
04 07 50 48	CMP	Roger. Copy. T_1, 106:24:54; T_2, 106:29:59; south 18.
04 07 50 57	CC	Affirmative, Dick.
04 07 51 02	CMP	Okay. Our status is pretty good right now. Al's over in the LM. He's been over there about 10 minutes. We've got everything rigged in the command module. Pete's getting on his PGA, and as soon as he does that, we'll be right back in business.
04 07 51 20	CC	Roger, Dick.
04 07 51 26	CC	12, Houston. When you get to it, we need a docking tunnel angle.
04 07 51 36	CMP	Roger, Jerry. It should be there in the records. We called it down twice; it's still the same. Negative 0.3. Over.
04 07 51 44	CC	Okay. Still hasn't changed. Thank you.
04 07 51 50	CMP	Better not with all 12 of those latches made.
04 07 52 40	CDR	Why don't you set your clock, Al?
04 07 52 28	LMP	Houston, Intrepid.
04 07 53 31	CC	Intrepid, Houston. Go.
04 07 53 35	LMP	Roger. I'm down in the LM now. Everything is shipshape. Just pulled back the window shades, and both of the windows are well frosted over. Guess we'll turn on the heaters when we power up in about 4 or 5 minutes.
04 07 53 48	CC	Roger, Al. And we're reading you nice and clear.
04 07 53 55	LMP	Roger. I'm on CSM still.
04 08 04 56	CDR	Houston, Apol - Apollo 12.
04 08 04 58	CC	12, Houston. Go.

04 08 05 03	CDR	Okay. I'm all suited and I'm on the CSM system. Will you take a look at the BIOMED and everything? How does that look?
04 08 05 11	CC	Doctor says it looks very good.
04 08 05 17	CDR	Okay.
04 08 05 30	LMP	Houston, Intrepid. On the LM S-band - How do you hear?
04 08 05 34	CC	Intrepid, this is Houston. Reading you slightly weaker than normal and fairly clear.
04 08 05 45	LMP	Roger.
04 08 06 14	CC	Intrepid, Houston. We're copying your low bit rate.
04 08 06 25	LMP	Roger.
04 08 06 45	LMP	Also, Houston, my systems engineer's bus voltage now is 26.9. You want me to go to high tap on both systems? Over.
04 08 06 54	CC	Understand your SE bus is 26.9?
04 08 07 01	LMP	That's affirmative, and Commander's bus is 28.
04 08 07 08	CC	Intrepid, Houston. You're very difficult to read. Did you say Commander's bus 28?
04 08 07 16	LMP	That's affirmative; 28 and system engineer's 26.9, and do you want me to go over to high-voltage tap now?
04 08 07 24	CC	Roger. Stand by, Al.
04 08 07 37	CC	Intrepid, Houston. Affirmative. You can go to high tap now.
04 08 07 45	LMP	Roger.
04 08 17 12	LMP	Houston, Intrepid.
04 08 17 15	CC	Intrepid, Houston. Weak, but clear. Go.
04 08 17 20	LMP	Roger. We came on LM power at 104:00:00 and just ...

04 08 17 30	CC	Roger. Copy. LM power 104:00:00.
04 08 22 05	LMP	Houston, Intrepid. We're going to go over part of the secondary S-band circuitry now. Over.
04 08 22 14	CC	Roger, Intrepid.
04 08 23 04	LMP	Houston, Intrepid. On SECONDARY TRANSMITTER/ RECEIVER power now.
04 08 23 09	CC	Intrepid, Houston. Reading you weak with heavy background noise.
04 08 23 17	LMP	Roger. We're going back to PRIMARY.
04 08 23 20	CC	Roger, Al.
04 08 26 13	CDR	Hello, Houston; CDR on Intrepid. How do you read?
04 08 26 18	CC	CDR, Intrepid, this is Houston. Reading you weak with heavy background noise.
04 08 26 26	CDR	Roger-Roger. We're going ahead with tape turn-on and self-test.
04 08 26 34	CC	Roger, Pete.
04 08 29 19	CC	Intrepid, Houston. You've dumped your backgroun noise. We copy on S-band antenna.
04 08 29 27	LMP	Okay, Houston. And I just did VERB 35 ENTER, an right after I did it, I got a program alarm 212.
04 08 29 41	CC	Intrepid, Houston. That's expected. No problem. Press on.
04 08 29 48	LMP	Okay.
04 08 32 46	CDR	Okay, Houston. The computer got through self-check okay.
04 08 32 50	CC	Roger, Pete.

END OF TAPE

04 08 34 50	CDR	How - How do you read, Yankee Clipper? Intrepid on VHF B.
04 08 34 54	CMP	Intrepid, Yankee Clipper; loud and clear.
04 08 34 56	LMP	How do you read me, Yankee Clipper?
04 08 34 58	CMP	Loud and clear.
04 08 34 59	LMP	Okay. Let's go to SIMPLEX A.
04 08 35 01	CMP	Roger. SIMPLEX A.
04 08 35 26	LMP	Okay, Yankee Clipper, how do you read SIMPLEX A?
04 08 35 29	CMP	Loud and clear.
04 08 35 30	CDR	Roger. Give me a CSM time from your computer, please.
04 08 35 35	CMP	Okay. It's 104:35:34 -
04 08 35 39	CDR	No, no, no. Give me one of the future.
04 08 35 41	CMP	Okay. Set it up for 104:36. That's in 15 seconds, if you can make it?
04 08 35 57	CMP	Five seconds, 4, 3, 2, 1 -
04 08 36 02	CMP	MARK.
04 08 36 05	CMP	104:36.
04 08 36 07	CDR	Okay. Now, let's get a 0665 going.
04 08 36 13	CMP	Okay. Go ahead.
04 08 36 15	CDR	Okay. On my mark, we'll take the time. 4, 3, 2, 1 -
04 08 36 22	CDR	MARK.
04 08 36 23	CMP	Roger. I got 104:36:20.41.
04 08 36 51	CDR	They are only off by 0.82 seconds. That's not bad.

04 08 36 55	CMP	Want to get another check?
04 08 37 13	CDR	Okay. Let's try one more time.
04 08 37 15	CMP	Okay.
04 08 37 18	CDR	On my mark, we'll take the time. 3, 2, 1 -
04 08 37 23	CDR	MARK.
04 08 37 25	CMP	I've got 104:37:21.68.
04 08 37 30	CDR	Okay. I've got 21:72. Very close. That's good enough.
04 08 37 34	CMP	Okay.
04 08 37 36	CDR	Now, give me your T_{EPHEM}, please.
04 08 37 50	CMP	Roger. R1 reads four balls 4, 146 16 137 44.
04 08 38 02	CDR	Okay. Four balls 4, 146 16 137 44.
04 08 38 07	CMP	Charlie.
04 08 39 18	CDR	Hello, Houston. How do you read Intrepid? Are you ready for the E-memory dump?
04 08 39 24	CC	Intrepid, Houston. Reading you loud and clear; ready for the dump.
04 08 39 32	CDR	It's on its way.
04 08 39 37	CC	Roger, Pete.
04 08 39 44	CDR	Okay, Dick, I'm ready for you to go to MIN DEADBAND ATTITUDE, hold, and give me a set of gimbal angles.
04 08 40 12	CDR	Did you copy, Yankee Clipper?
04 08 40 14	CMP	Okay, Pete. I'm a - R1 is 240 14, R2 is 271 00, and R3 is 359 38.
04 08 40 37	CDR	Say the last one again.
04 08 40 39	CMP	359 38.
04 08 43 09	CDR	Hey, Houston. Are you doing your mathematics on the ground? Check these gimbal angles.

04 08 43 16	CC	Roger, Pete. We're working.
04 08 43 22	LMP	And we're going to try to check the ascent batteries right now.
04 08 43 26	CC	Roger.
04 08 43 58	CDR	Okay, Yankee Clipper; Intrepid. You no longer have to hold your ATTITUDE tight DEADBAND.
04 08 44 07	CMP	Okay, Pete. And I'm ready for a VERB 06, NOUN 20, anytime.
04 08 45 04	CDR	Okay, Yankee Clipper; on my mark, let's get an 06 20. 4, 3, 2, 1 -
04 08 45 13	CDR	MARK.
04 08 45 15	CMP	Hello, Houston; Yankee Clipper.
04 08 45 18	CC	Clipper, Houston; go.
04 08 45 21	CMP	R1 reads plus 239 67; R2 plus 271 54; R3, plus 359 17. Over.
04 08 45 35	CC	Roger, Yankee Clipper. Go ahead, Intrepid.
04 08 45 40	CDR	Roger. Plus 05999, plus 09118, plus 00058.
04 08 46 03	CC	Roger. What's your GET?
04 08 46 08	CDR	104:45:10.
04 08 46 13	CC	Roger. Copy. 104:45:10, Yankee Clipper, plus 23967, plus 27154, plus 35917. Intrepid, plus 05999, plus 09118, plus 00058.
04 08 46 37	CDR	That's the Charlie here, and would you verify that guidance is happy with steps 1 through 7 there on AGS 30 and 31 and all flags are set.
04 08 46 50	CC	Roger. They're very happy.
04 08 47 17	CDR	Houston, Intrepid, EB BAT voltage is 37.5 for both BAT A and BAT B.
04 08 47 25	CC	Roger, Intrepid.
04 08 47 41	CDR	Hey, Houston, you got any objections if I blow the gear down?

04 08 47 49	CC	Negative, Intrepid. Go ahead.
04 08 47 54	CDR	Okay, We'll deploy the gear.
04 08 47 56	CMP	I probably won't be able to see it. It is as dark as blazes out there, but go ahead.
04 08 48 25	CDR	Any doubt about that?
04 08 48 30	CC	Looks good down here, Pete.
04 08 48 56	CDR	Okay, Houston. The gear is down and locked.
04 08 49 02	CC	Roger, 12.
04 08 49 08	CDR	Let's see if you can do it like the SIM's and get me back up my IMU fine align.
04 08 49 16	CC	Roger.
04 08 49 55	CDR	Okay, Houston. We are bringing the AGS up at this time.
04 08 49 59	CC	Roger, 12.
04 08 50 52	CC	Intrepid, Houston. With your gyro torquing ang
04 08 51 03	CDR	Roger, Houston. Ready to copy.
04 08 51 05	CC	Roger. Outer, minus 00250; inner, minus 00360; middle, plus 00050.
04 08 51 28	CDR	Okay. That was: X, minus 00250; Y, minus 0036 Z, plus 00050.
04 08 51 42	CC	That's affirmative, Pete.
04 08 52 42	CDR	Houston, how long to LOS?
04 08 52 45	CC	Intrepid, Houston. LOS in 7 plus 20.
04 08 52 52	CDR	Okay. We will give you your first set of 06 20 if you want them.
04 08 53 01	CC	Intrepid, Houston. They won't help us much, -
04 08 53 03	CMP	Okay, Pete. Go ahead.
04 08 53 04	CC	- - but we will take them.

04 08 53 07	CDR	Okay. Forget it. Have you got a DAP data code, LM weight, and CSM weight for me?
04 08 53 20	CC	Intrepid, Houston. Those are in work.
04 08 53 29	CC	Intrepid, Houston. If you will give us POO and DATA, we will get your REFSMMAT up early.
04 08 53 43	CDR	Roger. You got POO and DATA.
04 08 53 47	CC	Roger, Pete. I've got your LM and CSM weights for you when you are ready to copy.
04 08 53 57	CDR	Go ahead.
04 08 53 59	CC	Roger. LM weight, 33730; CSM weight, 36786. Over.
04 08 54 14	CDR	Okay. LM weight, 33730; 36786.
04 08 54 20	CC	Affirmative, Pete.
04 08 56 34	CC	Intrepid, Houston. Computer is yours.
04 08 56 41	LMP	Roger.
04 08 56 46	CDR	Houston, Intrepid.
04 08 57 49	CC	Intrepid, Houston. Go.
04 08 57 53	CDR	Roger. The drogue is in. The probe is in, and our hatch is closed, and we are over on Intrepid's ECS.
04 08 58 01	CC	Roger.
04 08 59 03	CC	Intrepid, Houston. You are 1 minute from LOS; and just a reminder, don't do a VERB 47 on the backside or you will be integrating for a long time.
04 08 59 19	CDR	Understand, Houston. The LMP, of course, is back in, and we are going to press with everything that doesn't need MSFN.
04 08 59 29	CC	Roger. So long Clipper.
04 08 59 49	CDR	Yankee Clipper, Intrepid. We are going to start giving you data now.

04 09 00 02	CC	Yankee Clipper, Intrepid. Houston looking for you at 105:45.
04 09 23 --		BEGIN LUNAR REV 12
04 09 46 37	CC	Yankee Clipper, Houston. Over.
04 09 46 43	CMP	Hello, Houston; Clipper here.
04 09 46 45	CC	Roger, Clipper. Give us POO and ACCEPT, and we'll start your state vector up.
04 09 46 56	CMP	How about a 06 20 first?
04 09 47 01	CC	Okay; fine.
04 09 47 06	CMP	Pete, you ready?
04 09 47 08	CDR	Yes, sir. On my mark, 5, 4, 3, 2, 1 -
04 09 47 15	CDR	MARK.
04 09 47 18	CMP	Hey, Houston, you ready to copy?
04 09 47 20	CC	Roger. Go ahead.
04 09 47 24	CMP	Hey, Yankee Clipper, R1 reads 23961; R2 reads 27186; R3 reads 35952.
04 09 47 36	CC	Roger, Clipper. Go ahead, Intrepid.
04 09 47 41	CDR	Roger. R1 reads 06008, 09189, 00047. And the time was 105:47:12.
04 09 47 57	CC	Roger. At 105:47:12, CSM: plus 23961, plus 27186, plus 35952. Intrepid plus 06008, plus 09189, plus 00047.
04 09 48 20	CMP	Clipper. Roger.
04 09 48 21	CDR	Intrepid, that's affirmative, and we're ready to go to POO and DATA.
04 09 48 25	CC	Okay. We want to pump one up to Dick, first.
04 09 48 31	CMP	It's all yours.
04 09 48 32	CDR	Okay. Pump one up to Dick. While you're doing that, I did the rate gyro check; I pressurized the RCS system. Pressurized okay. The helium pressures are 2900 and 2900.

04 09 48 45	CC	Roger, Intrepid. They're looking good.
04 09 48 48	CDR	Okay. You guys ready for the DAP set, gimbaled, and throttle test?
04 09 48 56	CC	Affirmative. Go ahead.
04 09 49 04	CDR	Okay. It'll be coming to you in a minute.
04 09 49 21	CC	Yankee Clipper and Intrepid, I have your undock and SEP attitudes, if you're ready - times.
04 09 49 32	CDR	Okay. We're ready to copy.
04 09 49 35	CC	Roger. Undock time 107:54:00. Your attitude is roll 180, pitch 288, yaw 0. Separation 108:24:42. Over.
04 09 50 01	CMP	Clipper copied.
04 09 50 03	CDR	Intrepid copied 107:54:00, 108:24:42; and the attitudes were 108, 288, and 0.
04 09 50 12	CC	Affirmed.
04 09 50 18	CDR	And there is NOUN 48; and it's reading plus 000504, plus 00576. Going to VERB 34, ENTER.
04 09 50 29	CC	Roger, Pete.
04 09 50 35	CC	Clipper, Houston. I have a REV 13 map update, if you're ready.
04 09 50 43	CMP	Okay, Houston; go.
04 09 50 45	CC	Roger. LOS: 106:58:33, 107:23:17, 107:44:39.
04 09 51 06	CMP	Clipper copied.
04 09 51 09	CC	Clipper, Houston. We're through with your computer. Intrepid, if you've got POO and DATA, we're ready to roll.
04 09 51 19	CDR	Okay. And how does the GDA position look?
04 09 51 25	CC	GDA is go. Ready for throttle.
04 09 51 36	CDR	Commander's soft stop.
04 09 51 39	CC	Roger. Confirmed.

04 09 51 48	CDR	And that's Commander's full throttle.
04 09 51 54	CC	Roger. Confirm it. Intrepid, Houston. You have POO and DATA?
04 09 52 05	CDR	LMP's to soft stop.
04 09 52 09	LMP	That's affirmative.
04 09 52 12	CC	Uplink is on the way.
04 09 52 19	LMP	Roger. That's the soft stop on the LMP.
04 09 52 23	CC	Roger, Al. Looks good.
04 09 52 29	LMP	Here comes MAX. Okay. Going back to MIN.
04 09 52 37	CC	Intrepid, Houston. We missed MAX. I think we got mixed up in the time delay.
04 09 52 46	LMP	Okay. At MAX now.
04 09 52 53	CC	Okay. We copied MAX now.
04 09 52 54	LMP	... Houston. I went through all the AGS - Roger, I went through all the AGS memory that you gave us last night on the update, and they all checked out per the update.
04 09 53 05	CC	Roger.
04 09 53 18	CC	Intrepid, Houston. Full throttle looks good on the LMP side.
04 09 53 24	LMP	Roger.
04 09 53 56	CDR	Houston, I can step ahead here and do RCS check-out if you want, right now.
04 09 54 03	CC	Stand by a minute, Pete.
04 09 54 08	CDR	Say again.
04 09 54 10	CC	Stand by a second, Pete.
04 09 54 24	CC	Intrepid, Houston. We're ready for that RCS when we finish the uplink.
04 09 54 34	CDR	Okay. Dick, how much time do you have until you have to maneuver?

04 09 54 39	CMP	I should be at the attitude by 106:15 at the latest, Pete.
04 09 54 44	CDR	Okay. I think I can do the whole hot fire.
04 09 54 49	CMP	Okay by me. Let me know.
04 09 58 04	CDR	When do you want to maneuver, Yankee Clipper? Tell me what time you have to maneuver.
04 09 58 11	CC	Intrepid, Houston. Computer is yours.
04 09 58 16	CDR	Okay. Coming at you with a TTCA cold fire.
04 09 58 20	CC	Roger.
04 09 59 20	CDR	Hey, Yankee Clipper, you read Intrepid? I'm going to be firing here in a minute.
04 09 59 25	CMP	Okay. I'll go to FREE when you want.
04 09 59 27	CDR	Okay.
04 09 59 29	CC	Intrepid, Houston. Your TTCA cold fire looked good.
04 09 59 43	CDR	Coming at you with a number 3 step.
04 09 59 48	CC	Roger, Pete.
04 10 00 27	CDR	Okay. All those numbers are off by 1, Houston. Is that all right?
04 10 00 34	CC	Intrepid, Houston. You're go.
04 10 00 39	CDR	Okay. Going to step 4. Okay. Yankee Clipper, CSM WIDE DEADBAND, ATT hold; verify CSC MODE FREE; tunnel vented to zero.
04 10 00 52	CMP	Okay. All those things are done. Go. Copy, Pete?
04 10 01 05	CDR	Roger. I copy.
04 10 01 07	CMP	I'm in FREE.
04 10 01 13	CDR	Coming at you, Houston.
04 10 01 16	CC	Roger, Intrepid.
04 10 01 42	CDR	Okay; want to damp them, Yankee?

04 10 01 45	CMP	No. Let it roll. Are you all through?
04 10 01 47	CDR	No, I've got some more. Just minimum impulse though.
04 10 01 50	CMP	Okay; let it roll this way, Pete. Just the way I wanted to go.
04 10 02 36	CDR	Coming at you with PGNS MINIMUM IMPULSE, Houston.
04 10 02 38	CC	Roger, Intrepid.
04 10 03 44	CDR	How's that look, Houston?
04 10 03 47	CC	Intrepid, Houston. Looks good, break; your AGS abort constants in the checklists are good. Over.
04 10 04 00	CDR	Oh, understand, Houston.
04 10 04 05	CMP	Hey, Pete, I'm going to continue the maneuver. I've got it.
04 10 04 07	CDR	Okay. You've got it, babe. We're finished.
04 10 04 10	CMP	Watch your antenna. I'm going to OMNI D.
04 10 04 15	CMP	Hello, Houston; Clipper. On OMNI D.
04 10 04 18	CC	Roger, Clipper.
04 10 04 23	CMP	Okay. I'm maneuvering to tracking attitude, so I will be on OMNI for you.
04 10 04 28	CC	Roger.
04 10 04 33	CMP	Pete, we want another 06 20 here in this attitude, too.
04 10 04 37	CMP	The tracking attitude.
04 10 04 39	CDR	That right.
04 10 04 40	CMP	Yes, I know.
04 10 06 15	CDR	Let us know when you get to your attitude, Dick.
04 10 06 17	CMP	...
04 10 06 48	CDR	Houston, Intrepid.
04 10 06 51	CC	Intrepid, Houston. Go.

04 10 06 55	CDR	Things are looking good enough; I expect to hear NOUN 69 is zero.
04 10 07 02	CC	Roger, Pete. So do we. Do you want to go down the REV early?
04 10 07 05	CMP	Okay, Pete. Standing by.
04 10 07 08	CDR	It's okay with me, pal.
04 10 07 10	CMP	Here's an 06 20.
04 10 07 18	CDR	On my mark; 4, 3, 2, 1 -
04 10 07 21	CDR	MARK.
04 10 07 23	CMP	Roger, Houston; Clipper. R1, plus 00046; R2, 27021; R3, 00008. Over.
04 10 07 36	CC	Roger, Clipper. Go ahead, Intrepid.
04 10 07 42	CDR	Roger. R1, 29926; R2, 09015; R3, 35980. The time 106:07:19.
04 10 07 55	CC	Roger. At 106:07:19, Clipper: plus 00046, plus 27021, plus 00008. Intrepid: plus 29926, 09015, plus 35980.

END OF TAPE

04 10 08 22	CDR	That's affirmative.
04 10 08 35	CDR	And, Houston, we'll go to aft an - or forward antenna now in anticipation of Dick's tracking exercise.
04 10 08 46	CC	Intrepid, Houston. We'd rather have you stay with the steerable as long as you can.
04 10 08 52	CDR	Okay. We'll stay with the steerable.
04 10 08 55	CC	It's just possible we won't lose you.
04 10 09 00	CDR	Okay. Crazy. If you see us getting close, give us a holler, and we're going to get busy in here.
04 10 09 04	CC	Will do, Pete.
04 10 11 06	LMP	Hey, Pete, we're coming up on Theophilus. Look out to your left.
04 10 11 31	CDR	Oh, yes; I can see it from here now.
04 10 12 51	LMP	There. Hear jets firing, Pete?
04 10 12 56	CDR	No.
04 10 12 59	LMP	Must be mine hitting your foot pad, then.
04 10 13 03	CDR	Yes. I'm in AGS PULSE.
04 10 13 05	LMP	Okay. Make sure.
04 10 13 20	CC	Intrepid, Houston with a K-factor update when you're to copy.
04 10 13 28	LMP	Go ahead, Houston. Ready now.
04 10 13 31	CC	Roger. R1, 00100; R2, all zips; R3, 00073. Over.
04 10 13 46	LMP	Roger. 00100, all zeros, 00073.
04 10 13 51	CC	Affirmative.
04 10 14 12	LMP	You were fast on that one, Houston.
04 10 14 16	CC	Affirm.
04 10 14 55	CC	Intrepid, Houston.

04 10 15 00	CDR	Go, Houston.
04 10 15 02	CC	Roger. If you've got time, Pete, can you give us another VERB 06 NOUN 20 at this attitude?
04 10 15 10	CDR	Yes. We got time, Dick?
04 10 15 15	CMP	Yes; stand by. I'm loading 89 right now. I'll get it.
04 10 15 19	CDR	Okay. I'll stand by.
04 10 15 47	CMP	Okay. Any time, Pete.
04 10 15 51	CDR	Okay. On my mark; 4, 3, 2, 1 -
04 10 15 56	CDR	MARK.
04 10 15 59	CMP	Houston, R1 reads plus three balls 44, R2, plus 26956; R3, plus 00054. Over.
04 10 16 11	CC	Roger, Clipper. Go ahead, Intrepid.
04 10 16 16	CDR	Okay, Houston. Plus 29928, plus 08952, plus 35934. The time 106:15:55.
04 10 16 35	CC	Roger. At 106:35:55: Clipper, plus three zeros 44, plus 26956, plus three zeros 54; Intrepid, plus 29928, plus 08952, plus 35934.
04 10 16 56	CDR	That's a Charlie.
04 10 16 58	CC	Roger. That GET was 106:15:55. Affirmative?
04 10 17 05	CDR	That's affirm.
04 10 17 15	CDR	Okay, Houston. You've been keeping tabs on us; make sure I got this right. It seems to me we're complete through 107 hours, or at 46. We're standing by to pick up with rendezvous radar self-test and AGS CAL. You see anything before that we haven't done?
04 10 17 39	CC	Give us a second to review, Pete. We think you're okay.
04 10 17 44	CDR	Okay. Scope her over. I don't want to leave anything out.
04 10 19 25	CC	Intrepid, Houston.
04 10 19 30	CDR	Go, Houston.

04 10 19 31	CC	Okay. We're up with you, Pete. You're at 107.
04 10 19 39	CDR	Okay. I think that's going to work real good then, because while Dick's not firing any thrusters - AGS CAL and the rendezvous radar self-test out of the way.
04 10 19 47	CC	Roger.
04 10 20 37	CDR	Let me know when you're going to start tracking, Yankee.
04 10 20 41	CMP	Okay, Pete. I've got 66 degrees trunnion yet to REV align along with it, and it's got to come down to 22 before I'll pitch over.
04 10 20 50	CDR	Okay. You know where you are?
04 10 20 53	CMP	Sure; I'm scoping over scenery out in front of me.
04 10 20 56	CDR	That's good. Okay. Let me know if you see the Snowman when you go by.
04 10 21 02	CMP	Okay.
04 10 21 07	LMP	Houston, Intrepid. We forgot to give you our RCS helium pressure. It's about 2950.
04 10 21 14	CC	Roger, Al. Thanks.
04 10 21 19	CDR	It's okay. The LMP was outside when I gave it to you.
04 10 21 33	CDR	I believe he was over here seeing what he forgot.
04 10 22 24	CMP	Houston, Clipper.
04 10 22 26	CC	Clipper, Houston. Go.
04 10 22 31	CMP	I'm just looking over the electrical system. Do we have a battery A charge scheduled this afternoon?
04 10 22 40	CC	Stand by, Dick. We'll check it out.
04 10 22 54	CC	That's a negative, Dick. Next charge is 131:30.
04 10 23 04	CMP	You're going to make that SPS burn, and that battery A is down quite a bit.
04 10 23 16	CC	Roger, Dick. We copy, and we'll reevaluate it.

04 10 23 25	CMP	May have missed one along the way; I'm not sure.
04 10 23 44	CMP	Hey, Pete, we're getting close.
04 10 23 47	CDR	Okay, Dick. Do your usual good job.
04 10 23 53	CMP	My best.
04 10 23 55	CDR	I know that.
04 10 27 08	CDR	How are you doing, Clip?
04 10 27 11	CMP	Okay, Pete. It's 106:30. I'll be starting the pitchover so - Hang on.
04 10 27 16	CDR	Okay. We'll be watching our antenna. We're still on high gain.
04 10 27 20	CMP	Okay. It's coming down into the field of view.
04 10 27 25	CDR	Have at her.
04 10 29 13	CMP	Okay, Pete. I've got the target.
04 10 29 15	CDR	Good show.
04 10 29 30	CMP	Very good down there.
04 10 29 50	CDR	What do we do with it? Which way are we pitching?
04 10 32 02	CDR	Boy, oh boy, Houston. Do we have a fantastic view of Copernicus.
04 10 32 11	CC	Roger, Pete.
04 10 32 13	CMP	Hey, Pete, my boy. I gave you five of my best ones.
04 10 32 17	CDR	Good show, Richard.
04 10 32 19	CC	How's the Snowman look, Dick?
04 10 32 21	CDR	Okay. We owe Houston -
04 10 32 24	CMP	I didn't even have a chance to really look at it that time, Jer.
04 10 32 29	CDR	Hey, Dick. I don't know if you can see it, but if you can, you ought to take a look at Copernicus there. That is really something else. And we owe him an 06, 20, whenever he gets stopped.

04 10 32 51	CMP	I'm just looking at Copernicus. Houston, let me know when you got the data.
04 10 32 58	CDR	Isn't that something?
04 10 32 59	CC	Roger, Clipper.
04 10 33 00	LMP	Sure is.
04 10 33 20	CDR	Where - Where you going, Dick?
04 10 33 24	CMP	I'm pitched to 158. I'd like to ... - -
04 10 33 26	CC	Clipper, Houston. We have your data.
04 10 33 29	LMP	Okay. Okay. And that's for what?
04 10 33 36	CMP	For an 06, 20; then I'll go out for the AGS CAL.
04 10 33 39	LMP	Okay. Very good.
04 10 33 42	CMP	Pretty nice down here, Pete.
04 10 33 46	CDR	I hope so.
04 10 33 56	CDR	Boy, I tell you; I can't get over Copernicus. Houston, that - There's nothing on any other part of the Moon that we've seen since we've been here that even looks like that.
04 10 34 08	CC	Roger, Pete. Break. Clipper. We got your P22 data.
04 10 34 29	CDR	Did you get that, Clipper? He got your P22 data.
04 10 36 08	CDR	Okay, Dick. Let me know when you can - when you're steadied up.
04 10 36 38	CDR	Okay. On my mark; 4, 3, 2, 1 -
04 10 36 44	CDR	MARK.
04 10 37 10	CDR	Did you copy that, Houston?
04 10 37 12	CC	Negative, Intrepid. You're going to have to relay.
04 10 37 20	CDR	Okay. You can give me the angles if you want, Dick, and I'll relay them. I didn't copy them. Give them again.
04 10 37 34	CMP	Hello, Houston; Clipper on the high gain.

04 10 37 36	CC	Roger, Clipper. Loud and clear.
04 10 37 40	CMP	Okay. Had to get you back before I give them to you. R1 reads plus 00270, R2 reads plus 15866, R3 reads plus 00408.
04 10 37 55	CC	Roger, Clipper. Go ahead, Intrepid.
04 10 38 00	CDR	Roger. 29685, 33862, 35578. The time 106:36:40.
04 10 38 14	CC	Roger. At 106:36:40, Clipper was plus 00270, plus 15866, plus 00408; Intrepid, plus 29685, plus 33862, plus 35578.
04 10 38 39	CDR	That's affirmative. Dick, you're cleared to go the AGS CAL attitude, and we're standing by.
04 10 38 53	CMP	Okay. We're on our way.
04 10 38 55	CDR	Good show.
04 10 39 06	CMP	Hey, don't overshoot or you'll get a night landing. Did you know that?
04 10 39 10	CDR	Yes. Boy, you sure throw the gunk by the front of the spacecraft when you fire those forward firing thrusters.
04 10 40 22	CMP	Hey, Pete. We're there and settled down. You want to give them some more?
04 10 40 27	CDR	Okay. If you're all settled down. On my mark; 4, 3, 2, 1 -
04 10 40 33	CDR	MARK.
04 10 40 38	CMP	Houston, Clipper.
04 10 40 39	CC	Go ahead, Clipper.
04 10 40 43	CMP	Roger. Yankee Clipper with three more gimbal angles. Plus 00779, plus 15745, plus 02348. Over.
04 10 40 56	CC	Roger, Clipper. Go ahead, Intrepid.
04 10 41 04	CDR	Roger. 29175, 33737, 33638; the time 106:40:30.
04 10 41 20	CC	Roger. At 106:40:30: Clipper, plus 00779, plus 15745, plus 02348; Intrepid, plus 29175, plus 33737, plus 33638.

04 10 41 41	CDR	That's affirmative.
04 10 41 42	CC	Roger.
04 10 41 46	CDR	Okay, Clipper, would you disable thruster B-3, please sir? Or are you in FREE?
04 10 41 54	CMP	How about if I go FREE? You can get the whole works done?
04 10 41 57	CDR	FREE is even better, and make sure your radar transponder is off.
04 10 42 02	CMP	It is off, and I'm in FREE right now.
04 10 42 05	CDR	Okay.
04 10 42 15	CC	Intrepid, Houston. When you get a chance, POO and DATA. We have a PIPA bias update for you.
04 10 42 32	CDR	What'd you just do, Clipper?
04 10 42 35	CMP	Nothing. I didn't do anything.
04 10 42 37	CDR	I thought I heard a big clunk somewhere.
04 10 42 42	CMP	Well I've been accused of a lot of things, but that's the worst.
04 10 42 59	CMP	I'm in here minding my own business, Pete.
04 10 43 05	CC	Intrepid, Houston. Over.
04 10 43 10	CDR	Go ahead, Houston; Intrepid.
04 10 43 12	CC	Roger. If you'll give us POO and DATA, we have a PIPA bias update for you.
04 10 43 19	CDR	You got it.
04 10 43 22	CC	Roger. It's on the way.
04 10 44 52	CC	Intrepid, Houston. Computer's yours.
04 10 44 57	CDR	Thank you.
04 10 45 00	CC	Clipper, Houston.
04 10 45 07	CMP	Go ahead.
04 10 45 08	CC	Roger, Dick. Battery Alfa's in real good shape. It's only got 7 amp hours missing.

04 10 45 18	CMP	Okay. I'm happy if you're happy.
04 10 45 20	CC	Roger.
04 10 46 01	CDR	Houston, we got a program alarm, 1106. Uplink too fast.
04 10 46 08	CC	Roger, Pete.
04 10 46 23	CC	Intrepid, Houston. We're checking into that alarm. There was no uplink coming at the time.
04 10 46 31	CDR	Okay. I'd just thought I'd activate the rendezvous radar. I don't know if that had anything do to - to do with it.
04 10 47 18	CDR	Say, Houston, why don't you send that uplink again? We might have had that program alarm and not noticed it.
04 10 47 34	CC	Intrepid, Houston. We didn't see the alarm while we were uplinking. We think the uplink was clean.
04 10 47 44	CDR	Okay. What do you think? Just a spurious alarm?
04 10 47 48	CC	Don't know, Pete. We'll look at it a little deeper and come back at you shortly.
04 10 47 54	CDR	Okay.
04 10 49 13	CMP	Hey, Jer. Needless to say, I'm anxious to find out how those marks look to the people on the ground.
04 10 49 19	CC	Dick, they look real fine.
04 10 49 24	CMP	Thank you. I'm glad to hear that.
04 10 49 32	CDR	Okay, Houston. Running a rendezvous radar self-test, and my Xmitter power is low according to my book. I got 2.65. Let me give you all the numbers: AGC with 1.65; Xmitter with 2.65; shaft error was 22 to 26; trunnion error was 22 to 26. Also, my tape reads 49 - 493-1/2 feet per second by 500; and the tapemeter reads 195.2 miles vice 194. How's - How's that grab you?
04 10 50 25	CC	Intrepid, Houston. Roger. Stand by. We'll look at it for a second.

04 10 50 37	CC	Intrepid, Houston. If you want to read out this PIPA bias we sent you to check it out, go VERB 01 NOUN 01 and check out address 1452 and 1456. Over.
04 10 50 54	LMP	Understand.
04 10 50 56	CDR	Roger. What should they read?
04 10 51 06	CC	Roger. 1452 should read 77116, and 1456 should read 01573.
04 10 51 21	CDR	1452, 77116; and 1456 should read 01573.
04 10 51 30	CC	That is affirmative, Pete.
04 10 51 44	CMP	Pete, let me know when you're through with your rendezvous radar, and I'll get my transponder in the act.
04 10 51 52	CDR	Okay.
04 10 54 26	LMP	Houston, Intrepid.
04 10 54 29	CC	Intrepid, Houston. Go.
04 10 54 34	LMP	Just completed the AGS CAL. Looks like the AGS passed with flying colors. 540 was minus 00013; 541 was minus 00003; 542 was plus 00004; 544 was plus 00004; 545 was plus 00019; 546 was all zeros.
04 10 55 05	CDR	Yankee Clipper, you can ... back on.
04 10 55 06	CC	Roger. Copy. 540 minus 00013, minus 00003, plus 00004, plus all zeros 4, plus 00019, and plus all zeros.
04 10 55 24	LMP	That's affirm. The only one that I thought that changed significantly was 544, which changed from a minus 6 to a plus 4.
04 10 55 34	CC	Roger, Al.
04 10 55 51	CMP	Al, are you through with the AGS CAL and everything?
04 10 55 54	LMP	That's affirmative.
04 10 55 56	CDR	If you are, I'm going to go ahead and maneuver to the undocking attitude. Okay?

04 10 56 00	LMP	Good idea.
04 10 56 02	CDR	Okay, Houston. I just checked the PIPA bias, and those registers are loaded correctly. The radar passed all the checks correctly except the one number that I gave you. Everything else worked fine.
04 10 56 16	CC	Roger, Pete. Your rendezvous radar looks like it's pretty good. The transmitter power is a bit low, but it's GO.
04 10 56 27	CDR	Okay.
04 10 57 29	CC	Intrepid, Houston.
04 10 57 35	CDR	Go ahead, Houston.
04 10 57 37	CC	Roger. We're about a minute from LOS. Everything's looking real good. Your computer and everything is fine. The most possible idea we can think for your 1106 alarm was, if you turned your DUA off about when your computer was running, that might have possibly caused it.
04 10 58 02	LMP	What's a DUA?
04 10 58 06	CC	Roger. That's your digital uplink assembly.
04 10 58 12	LMP	Oh! Okay.
04 11 22 --		BEGIN LUNAR REV 13

END OF TAPE

04 11 45 07	CMP	Hello, Houston; Yankee Clipper here.
04 11 45 09	CC	Yankee Clipper, Houston. Loud and clear.
04 11 45 14	CMP	Okay. If you'll kill my tape for me, I'll get the TV on.
04 11 45 19	CC	Roger.
04 11 45 20	CMP	Thank you.
04 11 45 23	CDR	And, Intrepid reading you loud and clear, Houston. We're ready for undocking.
04 11 45 27	CC	Roger, Intrepid. Now, we read you the same.
04 11 46 19	CC	Intrepid, Houston. You're GO for undocking.
04 11 46 25	CDR	Roger-Roger.
04 11 47 36	CC	Yankee Clipper; Houston. Copying TV.
04 11 47 42	CMP	Okay. Thank you.
04 11 47 46	CDR	Can you see me waving at you, Jerry?
04 11 47 50	CC	You better have Dick focus it.
04 11 47 56	CDR	Okay.
04 11 47 57	CMP	It's focused. It's just dark where he is.
04 11 50 03	CMP	Four minutes, Pete.
04 11 50 05	CDR	Roger. Four minutes, and we're standing by. We're ready to go.
04 11 50 10	CMP	Okay. Don't forget to soft undock. You'll probably get a little jar out there, so you'll want to damp for a little bit.
04 11 50 16	CDR	Okay. You just tell me when I'm free. I'm along for the ride until then.
04 11 50 20	CMP	Okay.
04 11 51 03	CMP	Two minutes.
04 11 51 04	CDR	Roger.

04 11 52 10	CMP	I'm on VOX, Pete, so I can talk and not have to hit a switch.
04 11 52 18	CDR	Okay, Dick. I'm with you. And I'm going to P47 in 1 minute 30 seconds.
04 11 52 31	CMP	Okay.
04 11 52 33	CMP	MARK.
04 11 52 34	CMP	There you go, 1:30.
04 11 52 36	CDR	Okay. And then I'm going to dial up a VERB 77 and stand by on the ENTER, as soon as you release me.
04 11 53 01	CMP	One minute.
04 11 53 06	CDR	Okay, Dick.
04 11 53 16	CMP	Footpads look kind of good. Nice to see you with your landing gear down for a change.
04 11 53 25	CDR	Roger.
04 11 53 47	CMP	Five seconds. Make that 15.
04 11 53 58	CMP	Now it's 5.
04 11 54 08	CMP	Okay. Here you go again.
04 11 54 10	CDR	*** Alright. Back off, Dick.
04 11 54 30	CDR-LM	There he goes.
04 11 54 32	CMP	I just wanted to wait and let that damp, Pete.
04 11 54 36	CDR-LM	Okay. I - I got minus - I got minus 1 and nothing. So forget it.
04 11 54 48	CC	Intrepid, Houston. Looks good.
04 11 54 54	CMP	How's the tube, Jerry?
04 11 54 56	CC	Real good, Dick. Real good.
04 11 55 01	CMP	Okay.
04 11 55 03	CDR-LM	Okay, Dick. Yawing left, 60.
04 11 55 08	CMP	Hey, Pete. You're cutting in and out to me.

04 11 55 09	CDR-LM	Roger. Go off VOX.
04 11 55 34	CMP	Pete, give me a radio check?
04 11 55 37	CDR-LM	How do you read, Yankee Clipper? - -
04 11 55 40	CMP	Okay.
04 11 55 41	CDR-LM	- - 1, 2, 3, 4, 5; 5, 4, 3, 2, 1. How's that?
04 11 55 47	CMP	Pick up your yaw.
04 11 55 51	CMP	How's that picture, Jerry?
04 11 55 52	CC	Clipper, Houston. The picture's beautiful.
04 11 56 02	CMP	Quite a sight, isn't it?
04 11 56 04	CC	It sure is, Dick. We're copying Pete's yaw maneuver now.
04 11 56 10	CMP	Affirm. Just about got it completed.
04 11 56 16	CDR-LM	Okay, Dick. How do you read me?
04 11 56 18	CMP	Loud and clear now, Pete.
04 11 56 20	CDR-LM	All right. Pitching up 90.
04 11 56 23	CC	Clipper, Houston. Your FM is breaking up on occasion.
04 11 56 29	CMP	What - what's breaking up?
04 11 56 31	CC	Your FM is breaking up. It's looking good now.
04 11 56 57	CC	Intrepid, Houston. If you'll give us POO and DATA, we'll start your uplink.
04 11 57 05	CDR-LM	You've got it.
04 11 57 06	CC	Roger. You're on the way, Pete.
04 11 58 23	CDR-LM	Hey, you look pretty nice over there, Yankee.
04 11 58 36	CDR-LM	Hey, Dick, you read me?
04 11 58 41	CC	Yankee Clipper, Houston. How do you read?
04 11 58 45	CMP	Houston, Clipper. Loud and clear.

04 11 58 47	CC	Roger. Intrepid's on.
04 11 58 48	CDR-LM	Hey, Houston, tell him to turn off his VOX because he's cutting out his own VHF.
04 11 58 58	CMP	Intrepid, Yankee Clipper. Say again.
04 11 59 01	CDR-LM	Okay. You were cutting out your own VHF, being VOX. Your camera was keying it.
04 11 59 12	CMP	Okay. I'm off of VOX now, and you're cutting out on me now.
04 11 59 17	CDR-LM	Okay. How's that?
04 11 59 19	CMP	Okay. That's better. Stay there.
04 11 59 33	CDR-LM	Okay. You've got it on me. I'm not going to touch anything again.
04 11 59 39	LMP-LM	Yankee Clipper. I'll turn on my tracking light for a minute. See if you see it.
04 11 59 44	CC	Intrepid, Houston with a DOI PAD.
04 11 59 50	CMP	I've got it, Al. I've got your light.
04 11 59 53	LMP-LM	Okay, this is Intrepid, Houston.
04 11 59 54	CC	Okay. Standing by.
04 12 00 14	LMP-LM	Go, Houston.
04 12 00 19	CC	Yankee Clipper, Houston. Try pitch, minus 78; yaw, plus 225 on your high gain.
04 12 00 30	CMP	Yes. That's where it's been, Jerry.
04 12 00 32	CC	Roger. You're breaking up pretty badly. Intrepid, Houston. P30 IM maneuver DOI PAD: NOUN 33, 109:23:39.41; NOUN 81, minus 0070.8; all zeros, plus 0015.1; NOUN 42, 0060.5, plus 0008.3, 0072.4; burn time, 0.29, 000, 297; AGS, minus 0070.9; plus all zips; plus 0014.4. The rest is NA. Over.
04 12 02 00	LMP-LM	Roger. Copy 109:23:39.41; minus 0070.8, all zips, plus 0015.1; 0060.5, plus 0008.3, 0072.4; 029, 000, 297; minus 0070.9, plus all zips, plus 0014.4.

04 12 02 31	CC	That's affirmative, Al. Break. The computer's yours.
04 12 02 33	CMP	Okay. Houston, is - -
04 12 02 34	LMP-LM	Okay. That's what I wanted to know. Thank you.
04 12 02 44	CDR-LM	Can't get any good pictures of you today, Dick. You - the Sun's not in the right place.
04 12 02 52	CMP	Okay. We'll do it tomorrow.
04 12 02 54	CC	Clipper, Houston.
04 12 02 58	CMP	Go ahead, Houston.
04 12 03 00	CC	Roger. Have you tried reacqusition on the high gain? And if you have, why don't you try secondary transponder? Intrepid, Houston with a no PDI plus 12 PAD.
04 12 03 21	CDR-LM	Break, break, Houston. This is Intrepid. If it would be any help to you, Yankee Clipper's S-band antenna is just wandering - it's just oscillating back and forth in two directions, like it can't hold LOCK.
04 12 03 34	CC	Roger, Pete. Thanks.
04 12 03 38	LMP-LM	It looks like it's in some sort of continual search mode.
04 12 03 48	LMP-LM	Ready to copy the no PDI plus 12.
04 12 03 51	CC	Roger, Al. NOUN 33, 110:32:04.70; NOUN 81, plus 0116.9, all zips, plus 0131.0; NOUN 42, 0147.6, plus 0013.3, 0175.6; burn time 041, 000, 199; AGS, plus 0114.8, all zips, plus 0132.8; NOUN 11, 111, 17, all zips; NOUN 37, 112, 58, all zips. Over.
04 12 05 29	LMP-LM	Roger, Houston. Copy. 110:32:04.70; plus 0116.9, all zips, plus 0131.0; 0147.6, plus 0013.3, 0175.6; 041, 000, 199; plus 0114.8, all zips, plus 0132.8; 111, 17, all zips; 112, 58, all zips.
04 12 06 02	CC	That's affirmative, Al. I've got your PDI PAD and your PDI is less than 10 and greater than 10.
04 12 06 16	LMP-LM	Let her go, then.

04 12 06 22	CC	Roger, Al. PDI T_{ig}, 110:20:37.58; NOUN 61, 09.42, minus 0004.9; FDAI, 356, 110, 000; DEDA 231 is plus 56960; PDI less than 10; NOUN 37, 112:58:00.00; PDI greater than 10; NOUN 37, 114, 57, 00.00. Over.
04 12 07 36	LMP-LM	Roger. Copy. 110:20:37.58; 09.42, minus 0004.9; 356, 110, 000; plus 56960; 112:58; all zips; 114, 57, all zips.
04 12 07 56	CC	That's affirmative, Al. I have T_2 for you now.
04 12 08 24	LMP-LM	Go.
04 12 08 26	CC	Roger. T_2 abort. T_{ig}; 110:42:02.00; NOUN 37, 116, 56, all zips; T_2 at PDI plus 21 minutes 25 seconds. Over.
04 12 08 59	LMP-LM	Roger. 110:42:02.00; 116, 56, all zips, 21:25.
04 12 09 08	CC	Roger. T_3, if you're ready?
04 12 09 16	LMP-LM	We are ready.
04 12 09 19	CC	Roger. T_3 T_{ig}; 112:27:42.00; P22 acquisition at 112:25:00. Break. Yankee Clipper, you are coming on loud and clear on the TV now.
04 12 09 44	CMP	Roger. I had to go to MANUAL on my high gain. It won't stay locked on.
04 12 09 51	CDR-LM	It's nice and steady over there, now, Dick. I guess something went wrong with the AUTO track.
04 12 09 56	CMP	Yes. It's because I'm in MANUAL that I'm staying in there now.
04 12 09 58	CDR-LM	Yes. It's pretty solid. It just wobbles a little bit when you fire a thruster.
04 12 10 04	LMP-LM	Readback, Houston, is 112:27:42.00; 112:25:00.
04 12 10 11	CC	That's affirmative, Al. Clipper, Houston. Did you try the secondary transponder before you went to MANUAL?
04 12 10 26	CMP	That's affirmative.
04 12 10 30	CC	Roger.

04 12 10 32	CC	Intrepid, Houston. I have your gyro torque angle.
04 12 10 34	CDR-LM	It must be something in the AUTO lock mechanism.
04 12 10 47	CDR-LM	Hold it just a minute. We'll be right with you.
04 12 10 50	CC	Okay. Standing by.
04 12 11 28	LMP-LM	Go ahead, Houston. Ready to copy.
04 12 11 31	CC	Roger. Your LM gyro torque angles: X, minus 00045; Y is minus 00035; Z is minus 00092. Over.
04 12 11 55	LMP-LM	Roger. Copy. Minus 00045, minus 00035, and minus 00092.
04 12 12 03	CC	Affirmative. Break. Clipper, Houston with a map update, Rev 14.
04 12 12 14	CMP	Okay, go, and I copied all the other.
04 12 12 17	CC	Roger, Dick. LOS 108:56:58; 109:21:38; 109:43:04. Over.
04 12 12 42	CMP	Roger. 108:56:58; 109:21:38; 109:43:04.
04 12 12 49	CC	Affirm.
04 12 12 54	CMP	And I'm standing by for SEP.
04 12 12 58	CC	Roger, Dick.
04 12 13 44	CDR-LM	Say, Houston, the SIM went pretty smooth today.
04 12 13 48	CC	Affirmative, Pete.
04 12 13 56	LMP-LM	Looks like, because of your tracking, Dick, they raised their landing site altitude about 2400 feet.
04 12 14 08	CMP	That's not hard to believe, Al. Looked like it was in a hole to me.
04 12 14 14	CDR-LM	And, Houston, I guess you saw the landing radar self-test. That came out 40.
04 12 14 19	CC	Roger, Pete. We copy that.
04 12 14 29	CC	Intrepid, Houston. We'd like to get your value on transmitter power, on that.

04 12 14 39	CDR-LM	Okay. Wait 1. They were both 3.6.
04 12 14 47	CC	Roger. Copy.
04 12 14 49	CDR-LM	Actually - actually the velocity Xmitter was 3.62, and the altitude Xmitter was 3.60.
04 12 14 58	CC	Roger.
04 12 15 25	CMP	Houston, Yankee Clipper.
04 12 15 26	CC	Go ahead, Clipper.
04 12 15 30	CMP	I'll go back to primary transponder, here, as soon as we separate. ... hasn't helped it a bit. Looks like I've lost the AUTO track feature in the high gain.
04 12 15 44	CC	Roger, Dick. We concur on that.
04 12 15 56	CDR-LM	Dick, you're - We're still in secondary servo's there. You might go back to the primary ones.
04 12 16 07	CC	All right, Conrad. You're stealing our thunder now.
04 12 16 13	CDR-LM	Okay. Just trying to help out.
04 12 16 18	CC	You keep your mike just ahead of me.
04 12 16 19	CMP	If you both recall, that's why we left it in the first place.
04 12 16 23	CMP	If you both recall, that's why we left it in the first place.
04 12 16 27	CDR-LM	Yes. But it wasn't breaking lock then. You were just getting intermittent signal strength.
04 12 16 33	CMP	What's it getting now?
04 12 16 39	CDR-LM	The only reason I'm beating you, Jerry, is I'm 257 000 some odd miles closer to him than you are (laughter).
04 12 18 51	CC	Intrepid, Houston.
04 12 18 54	CDR-LM	Go.
04 12 18 56	CC	Roger, Pete. The way things are looking right now, you're going to be starting PDI about

		5 miles north of track; and, during the descent, you are going to be steering south.
04 12 19 09	CDR-LM	Five miles north of track. Okay. As long as it knows it, it's okay with me.
04 12 19 42	CC	Clipper, Houston. Are you going to try those primary servo electronics?
04 12 19 52	CMP	It's been tried. How's it looking?
04 12 19 56	CC	Looking good and solid now.
04 12 20 03	CDR-LM	Yes. The antenna's not moving around at all. It appears to be locked on tight.
04 12 20 13	CC	Clipper, Houston. Are you in AUTO now?
04 12 20 20	CMP	That's negative.
04 12 20 29	CDR-LM	Forget it, Dick. Go back to MANUAL.
04 12 20 32	CC	Roger. We copy your AUTO, Dick. You're better off in MANUAL.
04 12 20 39	CDR-LM	Is it still in AUTO, Dick? It is just locked up solid if it is.
04 12 20 42	CMP	No, it's MANUAL.
04 12 20 43	CDR-LM	Oh, okay. Sorry.
04 12 20 49	CMP	I can move around in here pretty good when I've got all this room.
04 12 22 25	CDR-LM	This is one of the better visuals I've seen, Dick.
04 12 22 29	CMP	Yes. You are right. I've been taking stills, and I let it get out of view of TV. I got to get you back.
04 12 22 42	CDR-LM	I got you 1 minute and 40 seconds - -
04 12 22 45	CDR-LM	MARK.
04 12 22 46	CDR-LM	- - to SEP.
04 12 23 04	CC	Clipper, Houston. You're GO for SEP.
04 12 23 09	CMP	Roger.

04 12 23 21	CC	Intrepid, Houston. Give us a mark with 1 minute to go to SEP, would you?
04 12 23 28	CDR-LM	It is already 1 minute. I'll give you one at 45 seconds.
04 12 23 40	CDR-LM	MARK.
04 12 23 41	CDR-LM	Forty-five seconds.
04 12 23 56	CDR-LM	You concur with that, Yankee Clipper?
04 12 24 00	CMP	I don't have average g yet, Pete.
04 12 24 02	CDR-LM	Okay. I - I may have copied the time down wrong or something.
04 12 24 06	CMP	108:24:42.
04 12 24 08	CDR-LM	Okay; 42. I got 22. ... time.
04 12 24 10	CMP	Average g is on. Average g.
04 12 24 14	CDR-LM	Very good.
04 12 24 18	CMP	I'll be watching you.
04 12 24 20	CDR-LM	Okay. We'll be looking for you, too. Okay, there he goes. He's burning.
04 12 24 43	CC	Intrepid, Houston. You were off on that figure by 20 seconds. CSM was right.
04 12 24 51	CDR-LM	Yes. I had the wrong time. He's burning now, and he looks good out there.
04 12 24 55	CC	Roger.
04 12 25 01	CMP	Burn's complete.
04 12 25 03	CDR-LM	By-by.
04 12 25 04	CMP	See you, troops.
04 12 25 35	CC	Clipper, Houston. You can terminate average g now.
04 12 25 41	CMP	It's done. It's done.
04 12 25 46	CDR-LM	Okay, Houston. We're in UPDATA LINK for you any time you want to send this state vector.

04 12 25 55	CC	We'll be ready in about 3 minutes, Pete.
04 12 25 59	CDR-LM	Okay, and meanwhile, I'm going to take the computer. Give me a holler when you're ready.
04 12 26 02	CC	Roger.
04 12 26 48	CDR-LM	Boy, do you look neat down there against the Moon, Dick.
04 12 26 58	CDR-LM	We're taking them. We're taking them.
04 12 27 51	CDR-LM	Dick, do you want to get your transponder on?
04 12 28 09	CC	Clipper, Houston. Try OMNI Bravo.
04 12 28 16	LMP-LM	They want OMNI Bravo.
04 12 28 33	CMP	Hello, Houston.
04 12 28 35	CC	Clipper, Houston. Loud and clear.
04 12 28 46	CMP	Still have the TV on the OMNI?
04 12 28 51	CC	That's negative, Clipper.
04 12 28 55	CMP	Okay. I'll secure it.
04 12 29 08	CC	Clipper, Houston. Would you check your DELTA-V_{CG} switch to CSM?
04 12 29 16	CMP	CSM. Thank you.
04 12 29 33	CMP	Intrepid, Clipper going to DUPLEX B and RANGING.
04 12 29 37	CDR-LM	Okay. We're not ready for you yet, but you can go ahead there, and we'll come up in a minute. Okay. We're coming up now.
04 12 29 45	CMP	Okay.
04 12 29 58	CMP	Okay. Loud and clear, but let me get locked on. Don't talk to me for a minute.
04 12 30 34	CDR-LM	Are you ready with that updata link yet, Houston?
04 12 30 36	CC	That's affirmative, Pete. Go POO and DATA.
04 12 30 40	CDR-LM	You got it. POO and DATA.
04 12 30 42	CC	Roger, Intrepid; Houston. We got another delay. It'll be another minute before we can start it up.

04 12 30 59	CDR-LM	Okay.
04 12 31 21	CC	Intrepid, Houston. It's on its way.
04 12 31 41	CC	Intrepid, Houston. You ready for your data?
04 12 31 47	CDR-LM	Yes. Go ahead.
04 12 31 48	CC	Okay. It's on the way.
04 12 31 54	CMP	I got you at 0.2 of a mile.
04 12 32 30	CMP	Pete, I show you locked on with the radar.
04 12 32 36	CDR-LM	Okay. I got AUTO track.
04 12 32 57	CDR-LM	For some reason, we show a great deal out of plane.
04 12 33 26	CC	Intrepid, Houston. The computer is yours. Break. Clipper, Houston. If you'll go P00 and ACCEPT, we've got your uplink.
04 12 33 36	CMP	Okay. It's all yours.
04 12 33 41	CC	Roger, Clipper. It's on the way.
04 12 34 09	CDR-LM	Okay. I hold you at 1.3 - No, excuse me, Dick. I'm looking at the wrong register; 0.22 at about 3 feet per second.
04 12 34 23	CMP	I've got it - I've got you at 0.2526 on the VHF.
04 12 34 33	CDR-LM	And the tapemeter looks good?
04 12 34 49	CDR-LM	I also show you going a good ways out of plane to me for some reason.
04 12 34 54	CMP	I've got the same thing myself. I don't understand it. Coming - think I'm coming back a little, though.
04 12 38 12	CMP	How about some exterior lights for me?
04 12 38 14	CDR-LM	Okay. Coming on.
04 12 38 22	CMP	Do you have my lights?
04 12 38 24	CDR-LM	Sure do.
04 12 38 25	CMP	Okay. Your tracking light's on.

04 12 39 20	CC	Clipper, Houston. Computer's yours.
04 12 39 25	CMP	Thank you.
04 12 40 55	CMP	Pete, I've got you at 4.7 miles.
04 12 40 59	CDR-LM	Okay. I've secured mine, Dick.
04 12 41 02	CMP	Okay.
04 12 41 07	CDR-LM	My VERB 83 shows you a 4.7 and 3-1/2 feet a second.
04 12 41 12	CMP	Okay.
04 12 42 19	CDR-LM	Okay, Hou - Houston. I'm going to P40 for you to look at it.
04 12 42 25	CC	Roger, Pete. Stand by.
04 12 42 35	CC	Intrepid, Houston. We're copying your P40.
04 12 42 42	CDR-LM	Okay. Can I go?
04 12 42 46	CC	Roger. Go.
04 12 43 15	CDR-LM	Dick, I'm going to start my yaw maneuver in a minute.
04 12 43 18	CMP	Okay.
04 12 44 44	LMP-LM	Houston, Intrepid. How do you think the AGS and PGNCS compare?
04 12 44 52	CC	Stand by 1 second.
04 12 45 22	CC	Intrepid, Houston. You're PGNCS and AGS look real good.
04 12 45 30	LMP-LM	Thank you.
04 12 48 31	CMP	Houston, Yankee Clipper.
04 12 48 34	CC	Clipper, Houston. Go.
04 12 48 37	CMP	Are you copying my gyro torquing angles?
04 12 48 51	CC	Clipper, Houston. We've got them now.
04 12 52 34	CDR-LM	Houston, what time is LOS?

04 12 52 37	CC	Intrepid, Houston. LOS is coming up in 4 minutes.
04 12 52 55	CDR-LM	Okay. We'll try and have this alignment finished for you, so you can look at it.
04 12 53 08	CDR-LM	Here's a star-angle difference, Houston. Four balls 2 coming at you with the torquing angles.
04 12 53 14	CC	Roger, Pete.
04 12 53 21	CDR-LM	How's that grab you? Are you looking at the DSKY?
04 12 53 24	CC	Those are great. You're GO for DOI.
04 12 53 30	CC	Intrepid, Houston. We're looking at - -
04 12 53 31	CMP	Hey, ...
04 12 53 32	CDR-LM	... that's all right.
04 12 53 34	CC	- - an AOS of 109:43:30.
04 12 53 50	CC	And, Clipper; Houston. We're looking for your AOS at 109:41.
04 12 53 58	CMP	Okay. I'll be there.
04 12 55 58	CC	Intrepid, Yankee Clipper. You're looking good. One minute to LOS; we'll see you on the other side.
04 12 56 07	CDR-LM	Yes, sir; and after all that jazz about the LPD, old Aldebaran is a half a degree off of in yaw and a half a degree off of in pitch, which is in the noise level; and I can see it out the window; no strain.
04 12 56 23	CC	Beautiful, Pete, beautiful.
04 12 56 43	CC	Intrepid, Houston. Is that in relation to your new mark or the old one?
04 12 56 49	CDR-LM	No. That's right around the 40 mark. It's off about three quarters of a degree to the right and about a tenth of a degree down in pitch.
04 12 56 59	CC	Roger. So long.

END OF TAPE

04 13 20 --		BEGIN LUNAR REV 14
04 13 43 17	CC	Yankee Clipper, Houston. How do you read?
04 13 43 33	CC	Yankee Clipper, Houston. How do you read?
04 13 43 56	CMP	Houston, Clipper.
04 13 43 58	CC	Roger, Clipper; Houston. Loud and clear.
04 13 44 04	CMP	Roger. Good burn. Good burn.
04 13 44 07	CC	Roger.
04 13 44 31	CC	Intrepid, Houston. How do you read?
04 13 44 33	CDR-LM	Hello, Houston; Intrepid. Roger. We read you loud and clear, and we just watched our first earthrise, which was fantastic. And we had a great DOI burn. The X residual was 0, Y was plus 0.2, and Z was minus 0.6.
04 13 44 55	CC	Roger, Pete. Copy your residuals: X, 0; Y, plus 2 - 0.2; and Z, minus 0.6.
04 13 45 05	CDR-LM	That's Charlie.
04 13 45 12	CC	Intrepid, Houston. What were your AGS residuals Over.
04 13 45 18	CDR-LM	Coming at you; 1 second.
04 13 45 27	LMP-LM	AGS residuals were plus 0.3, plus 0.1, and minus 0.6.
04 13 45 33	CC	Roger. Al.
04 13 45 44	CC	Intrepid, Houston. We have your steerable now. Could you give us HIGH BIT RATE?
04 13 45 51	CDR-LM	Roger. Going to HIGH BIT RATE.
04 13 46 47	CDR-LM	And, Houston, whenever you're ready, we're ready to give you POO and DATA.
04 13 46 53	CC	Roger, Intrepid.
04 13 48 46	CC	Intrepid, Houston. Would you put your BIOMED switch LEFT?

04 13 48 54	CDR-LM	Okay. Going BIOMED, LEFT.
04 13 49 11	CDR-LM	How soon before you're going to send up the data, Houston?
04 13 49 16	CC	About 1 minute, Pete.
04 13 49 21	CDR-LM	Okay. I'll hold then. We're standing right by to do the mode 2, lock on the radar, so we're holding.
04 13 49 26	CC	Okay. Break. Yankee Clipper, Houston. I've got a REV 15 map update for you.
04 13 49 36	CMP	Roger. Go ahead.
04 13 49 37	CC	Roger. LOS: 110:55:25, 111:20:01, 111:41:32. Over.
04 13 50 00	CMP	Roger. Copy.
04 13 50 46	CC	Intrepid, Houston. Go POO and DATA. We're ready to go.
04 13 50 52	CDR-LM	We got it; POO and DATA for you. Go ahead.
04 13 50 55	CC	Roger. It's on the way.
04 13 51 17	LMP-LM	You're about 30 degrees above our horizon now, Houston, and you're about a one-third-crescent Moon, and you really are beautiful - big blues and whites.
04 13 51 31	CC	Roger, Al. We put on our Sunday best for you.
04 13 51 41	LMP-LM	We're pretty well suited out up here ourselves.
04 13 51 50	CDR-LM	Boy, this thing sure flies nice.
04 13 52 12	CDR-LM	Hey, does it still look like we're 5 miles north?
04 13 52 26	CC	Intrepid, Houston. Affirmative. You're still looking 5 north.
04 13 52 32	CDR-LM	Okay, what kind of an azimuth with respect to the Sun will I have on that - Is it that little that I'm not going to notice it?
04 13 52 58	CC	Stand by, Pete. We're checking with the experts.
04 13 53 04	CDR-LM	Okay.

04 13 53 59	CC	Intrepid, Houston. The computer's yours.
04 13 54 03	LMP-LM	Very good.
04 13 54 16	LMP-LM	Houston, Intrepid. When I went my updata link to VOICE BACKUP it made a whistle on our COMM, so I'm just going to leave it off.
04 13 54 24	CC	Roger, Al.
04 13 54 43	CC	Intrepid, Houston.
04 13 54 50	CDR-LM	Go.
04 13 54 51	CC	Roger. Now that you got a new RLS, we've got a new address 231 for you.
04 13 54 58	CDR-LM	Go.
04 13 54 59	CC	Okay. 231 is plus 56957.
04 13 55 10	CDR-LM	Plus 56957. Roger.
04 13 55 13	CC	Roger.
04 13 55 14	CDR-LM	Coming at you with the radar, Dick.
04 13 55 21	CMP	Okay.
04 13 55 31	CC	Intrepid, Houston. That whistle you heard, we think, was because we were still commanding. They'd like to have you try it again.
04 13 55 41	CDR-LM	Just tried it; it looks good on the VOICE BACKUP here.
04 13 55 45	CC	Roger.
04 13 55 52	CDR-LM	Ascent BATs coming on.
04 13 55 56	CC	Roger, Intrepid.
04 13 56 11	LMP-LM	And we've got a mode 2, lock.
04 13 58 01	LMP-LM	Houston, our first perilune altitude check, using the tapemeter, shows that it's going to be about 57500.
04 13 58 11	CC	Roger, Al. Copy.
04 13 58 16	LMP-LM	Do you concur or not?

04 13 58 17	CMP	Houston, Clipper.
04 13 58 20	CC	Stand by, Intrepid. We're checking. Break. Clipper, go ahead.
04 13 58 27	CMP	Roger, Jerry. Could you send me a good LM state vector, please?
04 13 58 50	LMP-LM	Second check shows it to be 59 000 feet.
04 13 58 55	CC	Roger, Al. Clipper, Houston. We think it probably won't do you much good to have it right now. It'd be better later.
04 13 59 05	CMP	Okay.
04 13 59 36	CC	Intrepid, Houston. We're still looking at a perilune of 50 000.
04 13 59 44	LMP-LM	Okay.
04 14 00 04	LMP-LM	Our third one shows it's going to be 64 000. It's just making kind of a sweep up. Might be this tapemeter problem we saw on our self-check.
04 14 00 15	CC	Roger.
04 14 02 03	CDR-LM	Okay, Houston. Are you looking at P63?
04 14 02 09	CC	That's affirmative, Pete.
04 14 02 13	CDR-LM	You got enough; I'll go back to POO.
04 14 02 16	CC	Stand by. Okay, Pete. Go to POO.
04 14 04 33	CDR-LM	We're doing real good up here, Houston. How are you feeling down there?
04 14 04 37	CC	Intrepid, Houston. We're feeling great.
04 14 04 57	CC	Intrepid, Houston.
04 14 05 01	CDR-LM	Go ahead.
04 14 05 03	CC	Roger, Pete. On this Sun angle, or Sun azimuth - as far as we can see, there'll be no noticeable difference, as far as you're concerned. All you got to do is watch out and not fly through any clouds.

04 14 05 16	CDR-LM	Okay. I'll stay away from the clouds, and we're looking for the Snowman.
04 14 05 20	CC	Roger.
04 14 06 55	CDR-LM	I sure hope you have this lined up right, Houston because there sure is a big mountain range (laughter) in front of us, right now. I hope we go down in the middle. There is one valley.
04 14 07 06	CC	Roger, Pete.
04 14 08 36	CDR-LM	Say, Houston. Where are we? Over Fra Mauro?
04 14 08 45	CC	Stand by, Pete. We're looking at lines, right now. We don't have our map up.
04 14 08 52	CDR-LM	Okay.
04 14 10 36	CC	Intrepid, Houston. You've probably just passed over Theophilus.
04 14 10 43	CDR-LM	Okay. Pretty darn rugged down there.
04 14 10 51	CC	Roger. Tell us when you want us to turn on the mirror.
04 14 10 57	CDR-LM	You can turn the mirror on; give me the fox-clipping, and we got the hook down.
04 14 11 02	CC	Roger.
04 14 11 06	CDR-LM	Roger. Fox-clipping, 285; clear deck.
04 14 11 44	CDR-LM	Interestingly enough, Houston, at this attitude, I still can see the lunar horizon. I have to really peer to find it, but I can see it.
04 14 11 56	CC	Roger, Pete.
04 14 12 01	CDR-LM	And in 40 seconds, we'll be going to P63.
04 14 12 05	CC	Roger.
04 14 13 31	CDR-LM	Okay, Houston. There's 5018 for you.
04 14 13 36	CC	Roger, Intrepid. Looks good.
04 14 17 05	CC	Intrepid, Houston. No transients.
04 14 17 11	CDR-LM	Roger.

04 14 17 36	CC	Intrepid, Houston. GO for PDI.
04 14 17 41	CDR-LM	Roger. GO for PDI.
04 14 18 59	CDR-LM	Hello, Houston. Hello, Yankee Clipper. Intrepid's up VOX.
04 14 19 05	CC	Houston. Read you loud and clear.
04 14 19 09	CMP	***Clipper. Loud and clear.
04 14 19 10	CDR-LM	Roger.
04 14 19 31	CDR-LM	On my mark, it will be 1 minute.
04 14 19 39	CDR-LM	MARK.
04 14 19 40	CDR-LM	One minute.
04 14 19 41	LMP-LM	Why don't you start it, Pete?
04 14 19 44	CC	Roger, Pete.
04 14 19 49	LMP-LM	We begin descent in 35 seconds.
04 14 20 01	CDR-LM	I'll do it at 30, Al.
04 14 20 03	LMP-LM	Okay.
04 14 20 06	CDR-LM	Blinkety-blank. Average g descent engine is ARMED. How about my velocity light?
04 14 20 16	LMP-LM	Got it made.
04 14 20 17	CDR-LM	I got a couple of lights there.
04 14 20 18	CC	Copied and ARMED.
04 14 20 19	CDR-LM	... attitude light.
04 14 20 30	CDR-LM	10, 9, 8 - we have ullage - 7, 6, 5 - PRO -
04 14 20 41	CDR-LM	I have IGNITION.
04 14 20 42	LMP-LM	Got a start.
04 14 20 43	CDR-LM	3, 4, 5 - DESCENT ENGINE, COMMAND OVERRIDE, ON.
04 14 20 47	LMP-LM	Okay. Throttle up at 26.
04 14 20 48	CDR-LM	Yes.

04 14 20 49	CC	Copy, throttle on.
04 14 20 50	CDR-LM	I can't hardly hear you for some reason. Okay. Standing by for throttle up, Houston.
04 14 20 58	LMP-LM	Pete, it looks good.
04 14 21 06	CDR-LM	Throttle up.
04 14 21 09	LMP-LM	It really feels good.
04 14 21 10	CC	Roger, Pete. Copy, throttle up.
04 14 21 16	CC	DPS is looking good, Pete.
04 14 21 20	CDR-LM	All right.
04 14 21 21	LMP-LM	Helium looks good. Regulators look good here.
04 14 21 23	CDR-LM	Okay. Standing by for 1-minute hack.
04 14 21 26	LMP-LM	Okay.
04 14 21 35	CDR-LM	There's a little RCS activity, not too much.
04 14 21 39	CDR-LM	MARK.
04 14 21 40	CDR-LM	One minute. 5208 minus 20 - 48 000. ... Looks good.
04 14 21 57	CC	Intrepid, Houston. Now, 69 plus 04200. Over.
04 14 21 59	MS	...
04 14 22 09	LMP-LM	Roger. Copied. Plus 04200.
04 14 22 17	CC	That's affirmative.
04 14 22 18	LMP-LM	2169.
04 14 22 23	CC	Intrepid, Houston. GO for enter.
04 14 22 29	LMP-LM	It's in, babe.
04 14 22 34	CC	Intrepid, Houston. Looking good at 2.
04 14 22 39	LMP-LM	Okey-doke.
04 14 22 40	CDR-LM	Roger. These lights are hanging in. Looks good here.

04 14 22 51	CC	Roger. MSFN agrees with PGNCS and AGS.
04 14 22 55	CDR-LM	Very good, very good.
04 14 23 04	CDR-LM	Feels good to be standing up in a g-field again.
04 14 23 08	CC	Roger.
04 14 23 10	CDR-LM	Okay, 2 minutes and 30 seconds. 4276, minus 53, and 44 700. Looks good. It's poking right down there.
04 14 23 23	CDR-LM	Check that RCS.
04 14 23 26	LMP-LM	Looks good, Pete.
04 14 23 29	CDR-LM	...
04 14 23 32	LMP-LM	They've been giving the ED BATs today.
04 14 23 34	CDR-LM	Yes. Don't forget the ED BATs today. There you go.
04 14 23 41	LMP-LM	Three minutes.
04 14 23 44	CDR-LM	About 44 feet per second fast, about 6 feet per second low on H-dot, and about 100 feet low on altitude. Looking good.
04 14 23 53	CC	Intrepid, Houston. Roger. You're looking good at 3.
04 14 23 58	CDR-LM	Okay, Houston. I have an altitude light out and a velocity light out.
04 14 24 07	CC	Roger.
04 14 24 12	CDR-LM	I'm showing minus 918, minus 1000. Looks good; how does it look to you, Houston?
04 14 24 20	CC	Roger. Looks good; recommend you incorporate it.
04 14 24 26	CDR-LM	No sooner said than done. Let me know when it converges; I'm going back to my normal displays.
04 14 24 35	CC	Okay, Pete.
04 14 24 40	CC	Intrepid, Houston. You're going 4 and go past 5.
04 14 24 41	LMP-LM	ED BATs are GO, Houston.

04 14 24 44	CC	Roger. Copy, ED BATs, GO.
04 14 24 46	CDR-LM	Roger. Here it comes.
04 14 24 53	LMP-LM	Looking good. Looking good. Excellent! Hold it right in there. Supercrit hangs at 1100 or 12. All the time!
04 14 25 04	CDR-LM	Okay. Look over all the gages.
04 14 25 05	LMP-LM	Okay.
04 14 25 06	CDR-LM	Okay. Check out everything.
04 14 25 07	LMP-LM	RCS looks good. Electrics look good.
04 14 25 14	LMP-LM	Partial pressure CO_2 is it's usual zerc (laughter). Got a couple of good winners in these two spacecraft.
04 14 25 22	CDR-LM	Okay. We're out at 35 000.
04 14 25 25	CC	Roger, Pete.
04 14 25 26	LMP-LM	... percent on that one.
04 14 25 27	CDR-LM	I'm getting a fair amount of - I'm getting a fair amount of RCS firing, more than I think I should; but how's the gimbal look to you guys, Houston?
04 14 25 34	CC	They're looking good, Pete.
04 14 25 38	CDR-LM	Okay.
04 14 25 41	CDR-LM	There's a 5-minute hack, Al.
04 14 25 43	LMP-LM	Okay.
04 14 25 44	CDR-LM	Boy, it's really giving her heck on the RCS; that must be the radar update.
04 14 25 49	LMP-LM	Better give the AGS an update; it might need it.
04 14 25 51	CDR-LM	Yes.
04 14 25 53	LMP-LM	23 plus -
04 14 25 56	CDR-LM	It really is banging it around, isn't it?

04 14 26 05	CC	Intrepid, Houston. Throttle down at 6 plus 22.
04 14 26 11	CDR-LM	We got her, 6 plus 22.
04 14 26 12	LMP-LM	- - 6 plus 22.
04 14 26 16	CDR-LM	Just gave you a little AGS update.
04 14 26 19	LMP-LM	Good.
04 14 26 22	CDR-LM	According to this here computer, it's right on the money.
04 14 26 25	LMP-LM	Better turn that sequence camera on in a moment.
04 14 26 28	CDR-LM	Okay.
04 14 26 30	CDR-LM	6 plus 22 for throttle down, huh?
04 14 26 32	LMP-LM	Yes.
04 14 26 34	CDR-LM	Okay.
04 14 26 38	LMP-LM	Throttle's down; I'm going to put on the camera. How's that strike you?
04 14 26 40	MS	...
04 14 26 41	CC	Intrepid, Houston. You're looking good at 6.
04 14 26 46	CDR-LM	Okay. Standing by for throttle down.
04 14 26 54	LMP-LM	PGNCS and AGS are - just agree something fantastic -
04 14 27 03	LMP-LM	23, let's give it another update.
04 14 27 04	CDR-LM	Throttle down.
04 14 27 05	LMP-LM	Throttle down.
04 14 27 06	CDR-LM	6 plus 23.
04 14 27 07	CC	Roger.
04 14 27 11	CDR-LM	Where's zero?
04 14 27 14	LMP-LM	Where's it now? Give them another AGS update.
04 14 27 18	CDR-LM	... I can just barely see the horizon, but - That baby is really giving it the kazoopy with the RCS, isn't it?

04 14 27 34	LMP-LM	Sure is. Why don't I go ahead and put that camera on now?
04 14 27 36	CDR-LM	All right. Why don't you?
04 14 27 37	LMP-LM	It's running.
04 14 27 39	CDR-LM	All right. Seven minutes ...
04 14 27 40	CC	Intrepid, Houston. Monitor descent fuel 2.
04 14 27 41	CDR-LM	Looks good. Descent fuel 2; it's there.
04 14 27 50	LMP-LM	Okay, Pete. Seven minutes; 1153 means you're about 30 feet per second - Wait a minute - let's - Go ahead and go for 730.
04 14 27 57	CDR-LM	Okay. We're out at 19 000 feet; I've got something of a horizon out there; I've got some craters, too, but I don't know where I am, yet.
04 14 28 05	LMP-LM	730.
04 14 28 08	CDR-LM	Let's scope over the numbers at 730.
04 14 28 09	LMP-LM	Okay. 730, 153, not too bad, minus 135 - We're descending a little faster than normal, and we're a little bit low.
04 14 28 21	CDR-LM	Pull up.
04 14 28 22	LMP-LM	Everything looks good.
04 14 28 24	CDR-LM	160 feet a second, huh? Okay.
04 14 28 27	LMP-LM	We'll be there in a minute.
04 14 28 28	CDR-LM	In a minute.
04 14 28 30	LMP-LM	Number.
04 14 28 31	CDR-LM	Number's ready.
04 14 28 38	CC	Intrepid, Houston. You're looking good at 8.
04 14 28 43	CDR-LM	Okay, passing 12 000 feet, according to cur tapemeter, Houston.
04 14 28 48	CC	Roger.
04 14 28 53	CDR-LM	Spring-loaded to go grab that ...

04 14 28 55	LMP-LM	Stop when you're out at 10 000 feet. Hook up your lanyard.
04 14 28 58	CDR-LM	Okay. Standing by for P64.
04 14 29 02	LMP-LM	Okay.
04 14 29 03	CDR-LM	I'm trying to cheat and look out there; I think I see my crater.
04 14 29 08	LMP-LM	Hey, baby!
04 14 29 09	CDR-LM	I'm not sure.
04 14 29 10	LMP-LM	Coming through 7.
04 14 29 11	CDR-LM	Would that be P60?
04 14 29 13	LMP-LM	P64, Pete. ...
04 14 29 14	CDR/ LMP-LM	P64. That's it; there's LPD.
04 14 29 17	CC	Roger. Copy P64.
04 14 29 18	CDR-LM	... 6000 update. Hey, there it is! There it is! Son-of-a-gun! Right down the middle of the road!
04 14 29 25	LMP-LM	Outstanding! 42 degrees, Pete.
04 14 29 27	CDR-LM	Hey, it's starting right for the center of the crater.
04 14 29 28	CMP-LM	42. Look out there.
04 14 29 29	CDR-LM	I can't believe it! Amazing! Fantastic! 42 degrees, babe. Just keep talking. ...
04 14 29 36	LMP-LM	Guide it in. 42; we're passing 3500. Coming down at about 99 feet a second. You're looking good. About 15 percent fuel; I'll reset my watch.
04 14 29 45	CC	Intrepid, Houston. GO for landing.
04 14 29 47	LMP-LM	... over 1. I just want LPD to the right a little.
04 14 29 50	CDR-LM	Roger. Stand by.
04 14 29 51	LMP-LM	Okay. Roger. 40 degrees, LPD, Pete, 40 degrees.

04 14 29 53	CDR-LM	That's so fantastic, I can't believe it!
04 14 29 55	LMP-LM	You're at 2000 feet.
04 14 29 57	CDR-LM	How far?
04 14 29 58	LMP-LM	The boys on the ground do okay. 1800 feet up, 39 degrees; you got 94 seconds of LP - LPD time left.
04 14 30 05	CDR-LM	Okay. I'll want - move forward a little bit.
04 14 30 08	LMP-LM	38. 38 degrees, 36 degrees; you're 1200 feet, Pete. A thousand feet coming down at 30. You're looking good. Got 14 percent fuel. Looks good out there, babe, looks good.
04 14 30 24	LMP-LM	32 degrees. You're at 800 feet. 33 degrees. You're at 680 feet. 33 degrees, 600 feet; antenna's okay.
04 14 30 36	CDR-LM	Okay.
04 14 30 38	LMP-LM	35 degrees; you're 530 feet, Pete. 530, 471. You're all right! 426.
04 14 30 47	CDR-LM	I got it.
04 14 30 48	LMP-LM	400. Your at P66, Pete.
04 14 30 51	CDR-LM	Right.
04 14 30 52	LMP-LM	P66. Okay.
04 14 30 55	CDR-LM	Yes. I got to get over to my right.
04 14 30 56	LMP-LM	You're at 330 feet, coming down at 4.
04 14 30 57	CDR-LM	Yes.
04 14 30 58	LMP-LM	You got 11 percent. Got loads of gas. 300 feet coming down at 5.
04 14 31 05	CDR-LM	Now, it's rolling right.
04 14 31 06	LMP-LM	Oh! Look at that crater; right where it's suppose to be. Hey, 10 percent; 257 feet, coming down at 5; 240 coming down at 5. Hey, you're really maneuvering around.
04 14 31 19	CDR-LM	Yes.

04 14 31 21	LMP-LM	Come on down, Pete.
04 14 31 22	CDR-LM	Okay.
04 14 31 23	LMP-LM	Ten percent fuel. 200 feet, coming down at 3. You need come on down.
04 14 31 29	CDR-LM	Okay.
04 14 31 31	CMP-LM	190 feet. Come on down. 180 feet, 9 percent; you're looking good. Going to get some dust before long.
04 14 31 41	LMP-LM	130 feet; 124 feet, Pete. 120 feet, coming down at 6. You got 9 percent, 8 percent. You're looking okay. 96 feet, coming down at 6. Slow down the descent rate.
04 14 31 54	LMP-LM	80 feet - 80 feet, coming down at 4. You're looking good. 70 feet; looking real good. 63 feet, 60 feet, coming down at 3.
04 14 32 04	LMP-LM	50 feet, coming down; watch for the dust. About 46 - -
04 14 32 09	CC	Low level.
04 14 32 10	LMP-LM	42 feet. Coming down at 3. Coming down at 2. Okay. Start the clock. 42 feet, coming down at 2. 40, coming down at 2. Looking good; watch the dust. 31, 32, 30 feet. Coming down at 2, Pete; you got plenty of gas, plenty of gas, babe. Stay in there.
04 14 32 28	CC	30 seconds.
04 14 32 29	LMP-LM	18 feet, coming down at 2. He's got it made. Come on in there. 24 feet.
04 14 32 35	LMP-LM	CONTACT LIGHT.
04 14 32 36	CC	Roger. Copy CONTACT.
04 14 32 39	CDR-LM	PRO. PRO!
04 14 32 41	LMP-LM	Yes, PRO.
04 14 32 42	CDR-LM	Okay. ENGINE ARM, OFF.
04 14 32 44	LMP-LM	Okay.

04 14 32 45	CDR-LM	I cycled these valves; you got your - DESCENT ENGINE COMMAND OVERRIDE, OFF?
04 14 32 49	LMP-LM	Yes.
04 14 32 50	CDR-LM	Okey-dokey. I tightened the main shutoff valve.
04 14 32 52	LMP-LM	Okay.
04 14 32 53	CDR-LM	BUS B, CLOSED.
04 14 32 55	LMP-LM	You get both REGs pushed, babe.
04 14 32 57	CDR-LM	The REGs are closed.
04 14 32 58	LMP-LM	Good landing, Pete! Outstanding, man! MASTER ARM, ON. Beautiful. Descent vent, FIRE.
04 14 33 09	CDR-LM	Okay, I'll scope over the ascent. Ah - the ASCENT HELIUM, okay. Okay. Descent REG warning light. Don't worry about it. Ascent expendables look good; O_2, H_2O.
04 14 33 25	LMP-LM	Get this book turned over.
04 14 33 27	CDR-LM	Okay, we're in hot shape, Houston. We're in real good shape! ... - -
04 14 33 30	CC	Roger, Pete.
04 14 33 31	CDR-LM	- - engine stop. You pushed it. ... MODE CONTROL, both AUTO.
04 14 33 35	LMP-LM	Both AUTO.
04 14 33 36	CDR-LM	DESCENT ENGINE, COMMAND OVERRIDE, OFF.
04 14 33 38	LMP-LM	OFF.
04 14 33 39	CDR-LM	ENGINE ARM, OFF.
04 14 33 40	LMP-LM	OFF.
04 14 33 41	CDR-LM	I've got the 413 in and cycled the parker valve.
04 14 33 42	LMP-LM	Okay.
04 14 33 43	CDR-LM	THRUSTER ISOL VALVES are done; MAIN SHUTOFF's done; you've vented; MASTER ARM, ON. MASTER ARM, have you turned it OFF?

04 14 33 50	LMP-LM	MASTER ARM is OFF.
04 14 33 52	CDR-LM	Okay. Just watch the systems and stand by for a few minutes.
04 14 33 56	LMP-LM	Okay.
04 14 33 58	CDR-LM	Man, oh man, Houston. I'll tell you, I think we're in a place that's a lot dustier than Neil's. It's a good thing we had a simulator, because that was an IFR landing.
04 14 34 08	CC	Roger, Pete.
04 14 34 09	CDR-LM	... I was high, Al, I - -
04 14 34 10	LMP-LM	... I know it. Holy cran, it's beautiful out here!
04 14 34 15	CDR-LM	It sure is; it's something else. We flew by it - -
04 14 34 18	CMP	Hello, Intrepid. Hello, Intrepid. Hello, Intrepid.
04 14 34 23	CDR-LM	How are you?
04 14 34 24	CMP	Intrepid, congratulations from Yankee Clipper.
04 14 34 29	CDR-LM	Thank you, sir. We'll see you in 32 hours - -
04 14 34 36	CMP	Okay. Have a ball.
04 14 34 44	CC	Intrepid, Houston. You're stay for T_1.
04 14 34 50	CDR-LM	I got a GO for T_1.
04 14 34 52	LMP-LM	Okay. 413 thruster, hit it. P68, RECORDER, OFF. ...
04 14 35 11	CDR-LM	Hey, we flew right by the crater, Houston, but this ground looks neat out here. We're not going to have any trouble going back there.
04 14 35 16	CC	Roger.
04 14 35 18	LMP-LM	Okay. We're in lunar alignment, Houston, with the AGS.
04 14 35 21	CC	Where'd you put her down, Pete; over on site 4?

04 14 35 23	MS	...
04 14 35 27	CDR-LM	No, sir. About halfway between site 4 and site 3. I - I flew by the right side of the crater and then had to fly over to the left and land. We're in good shape.
04 14 35 40	CC	Roger.
04 14 35 41	LMP-LM	Reset your engine stop, Pete.
04 14 35 42	CDR-LM	Okay.
04 14 35 44	LMP-LM	You made a beautiful landing.
04 14 35 45	CDR-LM	You guys did outstanding targeting. I'll tell you; that thing was right down the middle. Beautiful!
04 14 35 51	CC	Oh, we're glad to hear that, Pete. Intrepid, Houston. We got your NOUN 43.
04 14 35 56	CDR-LM	I'll tell you; it's a real pleasure for me to ride with a number 1 aviator.
04 14 36 00	LMP-LM	Okay.
04 14 36 01	CDR-LM	Roger.
04 14 36 04	LMP-LM	PRO going to P12.
04 14 36 05	CDR-LM	Okay.
04 14 36 06	LMP-LM	12, ENTER. Give me the times for P12. Okay?
04 14 36 34	LMP-LM	110, 42 - -
04 14 36 36	CDR-LM	Wait a minute. Okay.
04 14 36 40	LMP-LM	42, 0200, 200.
04 14 36 46	CDR-LM	20?
04 14 36 47	LMP-LM	Yes. BLOCK. 00200.
04 14 36 54	CDR-LM	Yes.
04 14 36 55	LMP-LM	Right.
04 14 36 56	CDR-LM	PRO. That does it.

04 14 37 00	LMP-LM	Yes, that did it. Right there. Write down your ...
04 14 37 03	CDR-LM	5513.5?
04 14 37 04	LMP-LM	Okay. ENTER.
04 14 37 07	CDR-LM	ENTER. I'll read it to you.
04 14 37 09	LMP-LM	Okay.
04 14 37 10	CDR/ LMP-LM	5513.5.
04 14 37 13	CDR-LM	That's it.
04 14 37 14	LMP-LM	ENTER.
04 14 37 15	CDR-LM	And 19.5 - -
04 14 37 18	LMP-LM	Plus 0019.5.
04 14 37 20	CDR-LM	And all zips.
04 14 37 22	LMP-LM	All zips. Got it. That's it, 4 minutes 35 seconds. Anything else? Set the DET UP. Okay. Houston, how does the AGS look?
04 14 37 39	CC	Intrepid, Houston. PGNCS and AGS both looking great.
04 14 37 45	CDR-LM	Okay.
04 14 37 49	LMP-LM	We're 11 plus 1 in there.
04 14 37 50	CDR-LM	Man, I can't wait to get outside. Look at that.
04 14 38 01	LMP-LM	... 58158.
04 14 38 05	CDR-LM	Okay. VOX counting up.
04 14 38 08	LMP-LM	Okay. Loaded. Everything's ready to go.
04 14 38 16	CDR-LM	Snowman stood out so clear I couldn't believe it.
04 14 38 19	LMP-LM	It's beautiful out there. I even took a peek.
04 14 38 22	CDR-LM	It's a nice place to land.
04 14 38 24	LMP-LM	Boy, it sure was drifty though.

04 14 38 2,	CDR-LM	I'm sorry I flew by, but I was just going too fast.
04 14 38 31	LMP-LM	Nice touchdown. It felt like you hit just a little bit on your back - -
04 14 38 36	CDR-LM	It's a good thing we leveled off high - -
04 14 38 38	LMP-LM	Yes!
04 14 38 39	CDR-LM	- - and came down, because I sure couldn't see what was underneath us once I got into that dust. That went a long way. That stuff was going to the horizon.
04 14 38 50	LMP-LM	Did it really? Just like they say? Look at those boulders out there on the horizon, Pete. Gee-many! This is a pretty good place. Look right over there.
04 14 39 07	CDR-LM	Yes.
04 14 39 09	LMP-LM	Those rocks - Are we on the Copernicus Ray area?
04 14 39 16	CDR-LM	Is that right? Oh, great!
04 14 39 28	LMP-LM	Right? I'm working it out.
04 14 39 31	CDR-LM	Okay, Houston. Are we GO or STAY?
04 14 39 34	CC	Intrepid, Houston. You're STAY; and if you'd like to recycle and try it again, we'll talk to SIM's.
04 14 39 41	MS	(Laughter)
04 14 39 42	CDR-LM	No, not this time.
04 14 39 43	LMP-LM	Yes. We're still mad at him for earlier in the week.
04 14 39 48	CC	Roger.
04 14 39 50	LMP-LM	Okay. Let's get off BLOCK.
04 14 39 52	CDR-LM	Okay. Going to POO. Off BLOCK.
04 14 40 41	CDR-LM	Say, Houston, are you watching our descent REGs?
04 14 40 46	CC	Stand by, Pete.

04 14 40 58	CC	Intrepid, Houston. The SHe's holding fine, and the venting's going along well.
04 14 41 04	CDR-LM	Okay. I'll tell you what. We're going to start hustling along here, so I'd appreciate it if - you'd give me a holler when it gets down into the 2 to 8 range.
04 14 41 15	CC	We'll do it, Pete.
04 14 41 30	CC	Yankee Clipper, Houston. Over.
04 14 41 35	CMP	Go ahead, Houston.
04 14 41 37	CC	Roger, Dick. Can you get the high gain pointed at us? We'd like to dump that tape recorder.
04 14 41 44	CMP	Okay. My pitch attitude's 81. Let me get you some angles.
04 14 42 04	CC	Clipper, Houston. Did you copy that whole descent?
04 14 42 11	CMP	That's affirmative.
04 14 42 14	CC	Very good. Intrepid, Houston. You can close your OX vent. Leave the fuel open for a little while.
04 14 42 30	CDR-LM	Roger. Closing the OX vent. It's CLOSED.
04 14 42 36	CMP	Houston, do you have the high gain?
04 14 42 40	CC	Roger, Dick.
04 14 44 02	CMP	... Are you looking at the DSKY?
04 14 44 07	CC	Roger. We're looking.
04 14 44 54	CMP	And, Jerry, did you get the torquing angles and the time?
04 14 44 58	CC	That's affirmative. We have them, Dick.
04 14 45 03	CMP	Okay. Just looks like a good platform yet.
04 14 45 06	LMP-LM	Here comes an AGS CAL at you, Houston.
04 14 45 09	CC	Roger, Intrepid.

04 14 46 10	CDR-LM	Okay, Houston. You're copying the NOUN 04, and we'll go recycle. That's plus 00476.
04 14 46 19	CC	Roger. Copy, Pete.
04 14 47 26	CC	Intrepid, Houston. You can close your fuel vent now. The SHe's holding.
04 14 47 37	LMP-LM	Roger. FUEL VENT, CLOSED.
04 14 49 10	CC	Yankee Clipper, Houston. How do you read? Over.
04 14 49 17	CMP	Loud and clear, Jer.
04 14 49 19	CC	Roger.
04 14 49 47	CDR-LM	Okay, Houston. Are you copying those torquing angles?
04 14 49 51	CC	Affirmative, Pete. We got them.
04 14 50 45	CC	Yankee Clipper, Houston. Over.
04 14 50 50	CMP	Houston, Yankee Clipper here.
04 14 50 52	LMP-LM	Houston, did you copy the results of the AGS CAL?
04 14 50 53	CC	Yankee Clipper, this is Houston. Would you check you surge tank switch and the ON detent? They were seeing a little funny in it.
04 14 51 10	CC	Intrepid, Houston. Go.
04 14 51 12	CMP	It's in the ON position.

END OF TAPE

04 14 51 14	LMP-LM	Did you copy the results of the AGS CAL down there?
04 14 51 18	CC	That's affirmative, Al. Roger. Thank you, Dick.
04 14 51 26	CMP	It looks okay. It's solid up here, Jerry.
04 14 51 28	CC	Roger.
04 14 51 55	CC	Yankee Clipper, Houston. Over.
04 14 52 02	CMP	Go ahead, Houston.
04 14 52 03	CC	Roger, Clipper. We'd like to try something with your high gain antenna. Go to the WIDE beamwidth and AUTO. Over.
04 14 52 18	CMP	Okay. I'm in WIDE and AUTO.
04 14 52 20	CC	Roger, Dick.
04 14 53 02	CC	Yankee Clipper, Houston. Seems to be holding. Now try MEDIUM beamwidth. Over.
04 14 53 11	CMP	Okay. You got MEDIUM.
04 14 53 13	CC	Roger, Dick.
04 14 54 04	CC	Yankee Clipper, Houston.
04 14 54 10	CMP	Go ahead.
04 14 54 11	CC	Okay, Dick. You're about a minute from LOS. We're satisfied with your surge tank pressures. You - we'll take a little - look in a little while at your S-band - next time you come around the horn. We'll be expecting to see you at 111:40. Over.
04 14 54 28	CMP	Roger. 111:40.
04 14 55 18	CDR-LM	Hey, Houston; Intrepid.
04 14 55 28	CC	Intrepid, Houston. Go.
04 14 55 34	CDR-LM	I think I did something I said I'd never do. I believe I shut that beauty off in the air before touchdown.

04 14 55 42	CC	Shame on you!
04 14 55 51	CDR-LM	No, I was on the gages. That's the only way I could see where I was going. I saw that blue contact light and I shut that baby down, and we zipped in from about 6 feet. Boy, you can sure see the stars out of this AOT. I'm in detent 1 right now, looking at Sirius, and I can see the whole constellation.
04 14 56 10	CC	Roger. Great, Pete. The Air Force guy here - guys here say that's a typical Navy landing.
04 14 56 18	CDR-LM	That's okay. As long as the hook was down and we didn't bolt, I'm happy.
04 14 56 22	CC	That's affirmative. You didn't get a bolter.
04 15 00 30	CC	Intrepid, Houston.
04 15 00 34	CDR-LM	Go, Houston.
04 15 00 36	CC	Roger. We'd like to check out a couple of AGS addresses when you get a chance. Would you read out address 233 and 464 for us, please?
04 15 00 47	LMP-LM	Okay. There's 233, plus 00250; 464 is plus 00500.
04 15 01 01	CC	Roger. Thank you, Al. Those addresses are okay.
04 15 01 12	LMP-LM	Okay.
04 15 06 36	CDR-LM	Hey, Houston; Intrepid.
04 15 06 40	CC	Intrepid, Houston. Go.
04 15 06 44	CDR-LM	Okay. We were marking on Pollux and we entered one wrong number and did a VERB 32. Is there any way to wipe out that set of marks now that we did the VERB 32?
04 15 06 59	CC	Stand by, Pete. We'll confer with the experts there.
04 15 08 56	CDR-LM	Forget it, Houston. I can do the program over again.
04 15 09 04	CC	Roger. They're asking for 30 more seconds.

04 15 09 09	CDR-LM	Okay, we'll wait. All we want to do is get outside, that's all.
04 15 09 23	CC	Intrepid, Houston. The simplest thing to do is do the program over.
04 15 09 30	CDR-LM	We agree. By-by.
04 15 09 31	CC	Okay.
04 15 18 --		BEGIN LUNAR REV 15
04 15 18 34	CDR-LM	Okay, Houston. You watching the DSKY?
04 15 18 40	CC	Affirmative, Pete.
04 15 18 42	CDR-LM	An - and there are your torquing angles.
04 15 18 47	CC	Roger. They look great.
04 15 19 04	CDR-LM	And there's your LAT, LONG, and altitude.
04 15 19 11	CC	Roger. Let us look at that for a second.
04 15 19 18	LMP-LM	Looks like Dick did some good tracking, with an altitude like that.
04 15 19 23	CC	Roger.
04 15 19 31	LMP-LM	Hey, Houston. It's even fun at one-sixth g inside of this spacecraft.
04 15 19 38	CC	Don't break anything, Al.
04 15 19 43	LMP-LM	No, we - As soon as we landed we started handling the books like we do at the simulator at one g. We were throwing them off the table, and over near the circuit breakers and what have you.
04 15 20 02	CC	Intrepid, Houston. Recommend you acce_ NOUN 89.
04 15 20 14	CDR-LM	Okay. That's done, and we're going t› POO.
04 15 20 33	CDR-LM	And if it's okay with you, we'll go ahead and do the second P57 right now.
04 15 20 47	CC	Roger, Intrepid. Go.
04 15 20 51	CDR-LM	Okay.
04 15 27 01	CC	Intrepid, Houston. Would you read us out AGS address 267?

04 15 27 09	CDR-LM	Coming at you. Plus 10240.
04 15 27 20	CC	Roger. Thank you.
04 15 27 32	CC	Intrepid, Houston. We're just chasing a funny in the AGS. We're convinced it's okay and we're just trying to figure it all out.
04 15 27 42	CDR-LM	Okay. No sweat.
04 15 30 15	CDR-LM	Okay, Houston. There are the torquing angles.
04 15 30 20	CC	Roger, Pete. We copy.
04 15 30 25	CDR-LM	Want us to torque?
04 15 30 27	CC	Roger. Go ahead.
04 15 30 32	CDR-LM	Okay.
04 15 31 02	CDR-LM	Okay. What do you want to do with that one?
04 15 31 07	CC	Let's look at it for just a minute, Pete.
04 15 31 12	CDR-LM	Okay.
04 15 32 04	CC	Intrepid, Houston. Recommend you reject this NOUN 89. Your first one was a little better.
04 15 32 12	CDR-LM	Okay. Reject it is.
04 15 33 52	CC	Intrepid, Houston. If you'll go POO and DATA, we're ready to fire you up some new vectors.
04 15 34 00	LMP-LM	Roger. Just a second; 047 is plus 37433, and 053 is plus 05250.
04 15 34 16	CC	Roger. Stand by. We got them, Al.
04 15 34 28	LMP-LM	Okay.
04 15 34 30	CC	Roger. Looks like you better tweak up your steerable a little bit. Looks like we're beginning to lose a little signal.
04 15 34 39	LMP-LM	Okay. What do you recommend is the best possible angle?
04 15 34 53	CC	Stand by, Al. We'll get them.
04 15 35 06	CC	Intrepid, Houston. Try pitch plus 13, yaw minus 26.

04 15 35 18	LMP-LM	The yaw will be good, but the pitch isn't even close. It must be somewhere around 110.
04 15 35 24	CC	Roger. It's pitch 113. Sorry. My fault.
04 15 35 32	LMP-LM	That's where we are now, Houston.
04 15 35 34	CC	Roger.
04 15 36 14	CDR-LM	Okay, Houston. You got POO and DATA.
04 15 36 16	CC	Roger, Pete.
04 15 36 29	CC	Intrepid, Houston. I've got the octal/data for your P22 workaround procedure.
04 15 36 38	CDR-LM	Okay. We are ready to copy.
04 15 36 43	CC	Okay. Your first one is 04645, ENTER and 35070, ENTER.
04 15 37 00	CDR-LM	Okay. 04645, ENTER and 35070, ENTER.
04 15 37 07	CC	That's affirmative, Pete, and I've got a DAP load update for LM weight for you.
04 15 37 15	CDR-LM	Okay.
04 15 37 18	CC	Roger. Your new LM weight is 10802.
04 15 37 29	CDR-LM	10802. Roger.
04 15 37 42	CDR-LM	And, Houston, are we stay yet?
04 15 37 49	CC	Affirmative. Stay for T_3.
04 15 37 56	CDR-LM	Okay. We'll go ahead on surface 9 and start our stay partial powerdown.
04 15 38 05	CC	Roger.
04 15 38 19	CDR-LM	And do you have the P22 hack time?
04 15 38 27	CC	Roger, Pete. It's on your lunar surface PAD. Stand by. I'll read it out to you again.
04 15 38 33	CDR-LM	Okay.
04 15 38 34	LMP-LM	We got it.
04 15 38 59	CC	Intrepid, Houston. We have an update on that P22 hack time for you.

04 15 39 06	CDR-LM	Go.
04 15 39 07	CC	Okay. Figure on 112:24:30.
04 15 39 17	CDR-LM	Roger. 112:24:30.
04 15 39 21	CC	Affirmative.
04 15 39 41	CC	Intrepid, Houston. The computer is yours.
04 15 39 47	CDR-LM	Roger.
04 15 39 51	CC	You have a new RLS and state vector.
04 15 39 57	CDR-LM	Thank you.
04 15 44 01	CC	Yankee Clipper, Houston. How do you read?
04 15 44 16	CMP	Hello, Houston; Yankee Clipper here.
04 15 44 18	CC	Roger, Clipper. Reading you weak but clear.
04 15 44 24	CC	Clipper, if you'll give us POO and ACCEPT, we'll start your update.
04 15 45 13	CC	Yankee Clipper, Houston.
04 15 45 16	CMP	Hello, Houston; Yankee Clipper here.
04 15 45 29	CC	Yankee Clipper, Houston.
04 15 45 34	CMP	Hello, Houston; Yankee Clipper. Loud and clear.
04 15 45 37	CC	Roger, Dick. You in POO and ACCEPT and ready for an uplink?
04 15 45 44	CMP	That's affirmative.
04 15 45 46	CC	Roger. It's on its way.
04 15 47 00	CC	Clipper, Houston. I have a REV 16 map update and a landmark tracking PAD, if you're ready to copy.
04 15 47 10	CMP	Go ahead.
04 15 47 11	CC	Roger. Map update REV 16: LOS is 112:53:48, 113:18:23, 113:39:28.

04 15 47 40	CMP	Roger, Jerry. Copied 112:53:48, 113:18:23, 113:39:28.
04 15 47 46	CC	Roger, Dick. P22 landmark tracking PAD follows: T_1 is 112:20:00; T_2 is 112:25:11; the landmark is number 193; and it's south 06. Over.
04 15 48 14	CMP	Roger. Landmark 193, T_1 is 112:20:00; T_2, 112:25:11; 6 miles south.
04 15 48 25	CC	Affirmative.
04 15 48 34	CMP	Okay. I'll see if I can plot it in the same place I did last time.
04 15 48 38	CC	Roger. You got something new to look at down there, too.
04 15 48 46	CMP	Let's - let's save them for the next REV.
04 15 49 33	CC	Yankee Clipper, Houston. The CMC is yours.
04 15 49 39	CMP	Roger, Jerry. Thank you. How are things going on the surface?
04 15 49 44	CC	They're doing great, Dick.
04 15 49 49	CMP	... the same ...
04 15 49 59	CC	Clipper, Houston. Give us NARROW beamwidth.
04 15 50 09	CMP	Okay.
04 15 58 43	CC	Intrepid, Houston.
04 15 58 47	CDR-LM	Go ahead.
04 15 58 49	CC	Well done, Intrepid. You got a bunch of happy geologists in the back room waiting to go. Say, we're standing by with a LM consumables update and also standing by for your description.
04 15 59 04	CDR-LM	Okay. We were just working on that and I'm - I'm very close to where I want to be, but I'm trying to pin it down exactly.
04 15 59 15	CC	Roger.

04 16 01 44	CDR-LM	I guess, Houston, for planning purposes, we landed very close to the head of the Snowman. I'm guessing exactly on the same line as selected site 3 but a little bit further left and I - Let me give you some coordinates here. This is my first orfhand cut at it.
04 16 06 59	CDR-LM	Say, Houston; Intrepid.
04 16 07 03	CC	Intrepid, Houston. Go ahead.
04 16 07 07	CDR-LM	We're having a little trouble judging distance. How long is my shadow?
04 16 07 13	CC	Intrepid, your shadow length on a level surface is 250 feet.
04 16 07 27	CDR-LM	You've got to be kidding me.
04 16 07 59	CC	Intrepid, Houston. We could shorten that a bit to 230. Which way do you think you are?
04 16 08 07	CDR-LM	Okay. Well, if my shadow's 230 feet long, we're really misjudging distances.
04 16 08 16	CC	Roger, Pete. Are you short or long?
04 16 08 21	CDR-LM	Well, I'd say that my shadow was much shorter than that.
04 16 08 29	CC	Roger.
04 16 08 40	CMP	Houston, Yankee Clipper.
04 16 08 42	CC	Clipper, Houston. Go ahead.
04 16 08 45	CMP	Is - Is Intrepid going to do a P22?
04 16 08 51	CC	That's affirmative.
04 16 08 59	CC	Intrepid, Houston.
04 16 09 05	CDR-LM	Go ahead.
04 16 09 06	CC	A reminder: Prior to your P22, I'd like you to execute VERB 41 NOUN 72.
04 16 09 18	CDR-LM	Okay. Going VERB 41 NOUN 72.

04 16 09 53	CDR-LM	What VERB 41 NOUN 72 did you want me to do anyhow? I got it pointing 270, 180.
04 16 10 07	CC	Stand by, Pete.
04 16 11 10	CC	Intrepid, Houston. The stuff you carried out on surface 9 going to 270, 180 is good.
04 16 11 21	CDR-LM	Understand.
04 16 13 54	CC	Intrepid, Houston.
04 16 13 59	CDR-LM	Go.
04 16 14 00	CC	We'll shorten that shadow length up for you a bit. If we assume a 3-1/2-degree slope all the way, then you'll come up with a 150-foot shadow.
04 16 14 12	CDR-LM	Okay. Then I'm judging about right. How wide a diameter is the head of the Snowman?
04 16 15 24	CC	Intrepid, Houston. Diameter of the head crater from one inside rim to the other inside rim is around 400 to 500 feet.
04 16 15 41	CDR-LM	Okay. Right on the head of the Snowman, to the left, let's use map 7-6 at coordinates M-5 and make it 10.5. I think that's a very sharp, blocky rim crater. Do you agree?
04 16 16 12	CC	Copy. M-5, 10-5.
04 16 17 47	CC	Intrepid, Houston. The coordinates which you gave us, are those the coordinates of the crater or the coordinates of your present location? And also, repeat your question on - related to the blocky rim.
04 16 18 00	CDR-LM	No. I want to know if that crater that I gave you, that's not where I am, I want - I have a crater - I think I have that crater in sight. And it's a very blocky rim crater, and I want to know if the crater that I gave you the coordinates of is a very blocky rim crater. I think I'm sitting right next to the head of the Snowman on the right-hand side at coordinates S - Wait 1. Yes, S-8 and 13.3. I think that's where I landed.
04 16 18 36	CC	Copy S-8 and 13.3. The coordinates you gave us of the crater are right next to bench

		crater. Do you confirm? Bench crater being at L-5 rather than M-5.
04 16 18 57	CDR-LM	I don't know. Yes. Wait a minute. I got to get on this P22. Hold the phone.
04 16 20 57	CDR-LM	Okay, Houston. We're standing by to track.
04 16 21 02	CC	Roger, Intrepid.
04 16 21 16	CDR-LM	Yes; it's bench crater. That's the one I'm referring to. And I think I landed at head crater, almost - just a little bit past one of the traverses that you got laid out there.
04 16 21 37	CC	Roger, Intrepid. And we're trying to decide here whether your present position is really R-2 rather than S-8.
04 16 21 57	CDR-LM	Yes, you're right. R-2. I'm sorry. I'm reading it backwards. R-2.
04 16 22 01	CC	Roger. Thank you, Pete.
04 16 23 18	CDR-LM	Houston, we're eating right now. We'll give a description here in another 15 minutes or so.
04 16 23 24	CC	Roger, Intrepid. And we're standing by with a consumables update.

END OF TAPE

04 16 24 00	CDR-LM	I'm getting acquisition P22. Looks good.
04 16 24 04	CC	Roger.
04 16 24 07	CMP	Houston, tell him I show him locked on.
04 16 24 23	CC	Roger, Clipper.
04 16 26 40	CDR-LM	Hey, Houston. Intrepid has a visual on Yankee Clipper.
04 16 27 07	CDR-LM	Hey, Houston. Relay to Yankee Clipper I've got him visually.
04 16 27 13	CC	Roger, Intrepid. Will do.
04 16 27 17	CC	Clipper, Houston.
04 16 27 26	CC	Clipper, for your info, Intrepid has a visual on you.
04 16 27 33	CMP	Thank you.
04 16 30 55	CMP	Hello, Houston; Yankee Clipper.
04 16 30 58	CC	Clipper, Houston. Go ahead.
04 16 31 03	CMP	Okay. Do you have all the data?
04 16 31 06	CC	Affirmative, Clipper. We have it.
04 16 31 17	CMP	Okay. The next time, I want to see you put that Intrepid right in the middle of the sextant.
04 16 31 21	CDR-LM	Houston, Intrepid's ready to copy the consumables update.
04 16 31 26	CC	Roger, Clipper.
04 16 31 28	CC	Intrepid, consumables update for GET 11 plus 50: RCS A, 80; B, 75; O_2 descent, 87.6 and 97.4; H_2O, 78.7, 99.2; amp hours, 1243.3, 572.3.
04 16 32 12	CDR-LM	Okay. I got it all, except the only thing that wasn't clear was the time.
04 16 32 18	CC	Roger. That was for 111 plus 50 plus 00.

04 16 32 26	CDR-LM	Okay. Got it. Thank you.
04 16 32 29	CC	Roger.
04 16 32 42	CDR-LM	Okay. Are you ready for VERB 74?
04 16 32 52	CC	Stand by on that, Pete. We'll be right back with you.
04 16 32 58	CC	Okay, Intrepid. We're ready; VERB 74.
04 16 34 21	CDR-LM	Say, Houston. From your data, where do you think we landed?
04 16 34 31	CC	Stand by on that, Pete. We have a good E-MOD dump.
04 16 34 35	CDR-LM	I think it's just a matter of - Okay. I think it's just a matter of a few hundred feet one way or another. I flew right by the side of the crater and grounded to a halt and parked it, but that's about my best guess right now where we are.
04 16 34 50	CC	Roger, Pete. We'll be getting the - massaging the data and be getting back to you on that and the E-MOD look's - We have the data on the E-MOD.
04 16 35 36	CC	Intrepid, Houston. On your previous question on bench crater, from our maps here, we can't tell whether that is a blocky rim.
04 16 35 49	CDR-LM	Okay. Well, I - in my - Now you can take the Sun line for a reference to craters about 5 degrees off to the left of the Sun line of my shadow, and it's a - is a very blocky rim, big blocks, I can - Depending on how far away it is, there's some blocks over there that may be 8 feet.
04 16 36 15	CC	Roger. Copy. You're looking at the crater which is 5 degrees south of the Sun line?
04 16 36 26	CDR-LM	Yes. Five degrees left of the shadow.
04 16 36 32	CC	Roger.
04 16 37 07	CDR-LM	Soon as we get done eating here, we'll get with it. We're pretty hungry.
04 16 37 16	CC	Roger, Intrepid. You deserve it.

04 16 37 24	CMP	This is Yankee Clipper. No, they don't. Tell them to get to work.
04 16 37 32	CC	Roger, Clipper.
04 16 37 36	CMP	They're down there having all the fun, and you're doing all the work.
04 16 37 44	CC	They'll get with it soon, Clipper.
04 16 38 25	CC	Intrepid, Houston.
04 16 38 31	CDR-LM	Go.
04 16 38 32	CC	Help us get a better visual pindown of where you are. Do you - Are you able to locate a 50-foot block, approximately 100 foot, right in front of you, or an 8- to 10-foot block about 50 feet in front of you? And that will be at R5, 13.1.
04 16 39 23	CDR-LM	Well, I can't say that there is anything like that. There is one great big block that looks to me like it's 1500 or 2000 feet in front of us that meets that description. It's a really big fellow, sitting out there.
04 16 39 44	CC	Roger, Intrepid.
04 16 39 45	CDR-LM	However, what fools you, Houston, let me say this - Let me say this; there's another large crater right smack in front of us, but it's now obvious to us. There is no shadow length. That angle is so low that we're sitting here where we don't see any shadows; and unless we look very carefully, it's not obvious to us that there is a big crater out there. Now, I kind of think - I kind of think that that may be the head of the Snowman that's sitting out further past me - I'm not sure that I'm not sitting right smack on the other side of the Surveyor crater, just a little bit past it. I think really the best thing for us to do is to get out and look around. The sooner we do that, the quicker we'll figure out where we are.
04 16 40 47	CC	Roger, Intrepid. We concur with that, and we're also standing by for your LM description. We have your lift-off time for REV 16 to 19, when you're ready to copy.

04 16 41 14	CDR-LM	Go ahead, Houston.
04 16 41 20	CC	REV 16, T_4 is 114:26:06; REV 17, T_5, 116:24:28; REV 18, T_6, 118:22:46; REV 19, T_7, 120:21:09.
04 16 41 54	LMP-LM	Roger. 114:26:06, 116:24:28, 118:22:46, 120:21:09.
04 16 42 04	CC	Roger. Readback correct.
04 16 46 43	CDR-LM	Houston, this is Intrepid. Al's finishing off eating; and, while he does that, I've been sitting here scanning with the monocular. And the first thing I should give you, according to the checklist here, as you already know, we flew right by the side of the Snowman, and landed right past him some little bit. And our yaw angle is 10 degrees, and my general impression is - that we're in country where I see mostly angular rocks, very few rocks at hand that are rounded. Everything is angular. Now, I'll let Al talk about the closeup stuff. Out on the horizon - -
04 16 47 52	CC	Intrepid, Houston.
04 16 47 55	CDR-LM	- - horizon. Go.
04 16 47 57	CC	Intrepid, we'd like to get to Yankee Clipper before LOS, and we'll be right back with you.
04 16 48 04	CDR-LM	Okay.
04 16 48 06	CC	Yankee Clipper, Houston.
04 16 48 43	CC	Intrepid, Houston. Go ahead with your description of the horizon, and we'll be breaking in to you as soon as we can get back with Yankee Clipper. We've lost COMM temporarily.
04 16 48 54	CDR-LM	Okay. There are - the blocky rim crater that I previously mentioned - When I look through the monocular, everything has a pure white ...; these big blocky boulders look pure white. Now, some of them are really big; and, when I say big, I'm talking 8, 10, maybe 20 feet up on the horizon. They have got to be 20 feet across.
04 16 50 03	CC	Intrepid, Houston. Your COMM is breaking up slightly.

04 16 50 12	LMP-LM	We were laughing about that ourselves.
04 16 51 15	CDR-LM	Okay, Houston. I'm back on the air again. And just a general comment about all these blocks in the surrounding terrain; at first glance out of the spacecraft, I could distinguish absolutely no color difference in anything. About the only difference is looking cross-Sun versus down-Sun. I'm sure that some of these rocks have different colors and different textures; but, from here, viewing from the spacecraft, they don't appear that way. Looking at all the materials on the horizon and the blocks on the horizon, they all appear to be of the same material, and they all appear to be pure white. Now, we've got a pretty low Sun angle, and I'm looking at them at a low angle, so they have varying other colors; but in this monocular, they all appear white. They are all very blocky. As I said, the size goes all the way up to, I'm guessing, 20 feet. A couple of big ones on the horizon.
04 16 52 34	CC	Roger, Intrepid.
04 16 55 25	CC	Intrepid, Houston.
04 16 55 41	CC	Intrepid, Houston.
04 16 57 23	CC	Intrepid, Houston.
04 16 57 29	CDR-LM	Go ahead.
04 16 57 32	CC	Intrepid, in order to pin down your location a little bit better, would you try to give us the location with respect to the LM. That is, distance and angle, from your Z-axis, of the large block that you have on the horizon? And also the large craters, craters that are roughly 20 feet in diameter or larger that is, slightly larger than the LM shadow width? Also, we ought to press on here fairly quickly, as we are getting a little bit behind our time line.
04 16 58 08	LMP-LM	That's what we think, too. I'll tell you what we're going to do. I'll give you a good description here; and we're going to get ready; and when we get out, we'll take the TV and show you the craters; and I think you'll have a pretty good handle on it. Generally, right now, we're sitting on a, not a level surface, but we don't see any particularly high hills, either. It's just sort

of a - like an undulating plain. You can see quite far in all directions. There doesn't seem to be any particularly high objects, such as mountains or high hills or anything like that that interferes with the view. The only features that are obvious, besides the just general rolling country that we're on, is a blocky rim craters that are visible in almost every direction. Some of them are quite close, and some of them are far away. We got one of them, for example, at 12 o'clock, Pete described about 2000 or 3000 feet away, that if it didn't have these large boulders on it and had a pretty nice raised rim, perhaps maybe even up to 10 feet high raised rim, we wouldn't be able to see it. I guess the diameter of that crater must be on the order of 600 to 700 feet; that's at 12 o'clock. We've got a number of more weathered craters around us of every size, from one that's just outside the window here at 2 o'clock, 15 feet, that's about 6 feet in diameter and about 3 feet deep, all the way up to one that I see over at the 1 o'clock position. It doesn't have a particularly raised rim, but it looks like it could have a diameter in the order of 400 feet, 500 feet. The - There are many rocks that are scattered around on the surface. Most of them are partially buried, and as they are buried there, you can see that there are little fillets of dirt that has built up around almost all of them. And I can't tell, of course, whether - if it's only from this direction or not, but all these rocks seem to have the same characteristics, whether they are small or large. One interesting feature that is directly at our 12 o'clock, about 20 feet, is a whole surface area that's a bit different from the rest in the fact that it's got sort of parallel lines or parallel trenches or skin trenches perhaps an eighth of an inch deep and running what would be north to south to us; and you can see it from about my 2 or 3 o'clock position, all the way over to Pete's window. The left seems to - some sort of force apparently caused these traces to be made in the surface. I don't think it was our engine, because, as I say, they are perpendicular to the lines that our engine would have made. We'll be able to get a better look at that

when we get out, of course; and we'll also be able to use that close-up stereocamera on it and just get some good pictures of it.

04 17 01 54 CC Roger, Intrepid.

04 17 01 58 LMP-LM One - Pete also pointed out that there doesn't seem to be any possibility here of seeing anything like a contact between different colored surfaces. There may be - a chance to notice the contacts or different materials by looking at the texture. For example, that area that I described as directly in front of the LM that has those north-south lines on them. But, other than that, there is - It just looks like one uniform surface with many, many craters in it. There is no immediately apparent white rim craters near us. Most of the ones that I can see out my window don't have a raised rim at all. They don't have any particular elongation. They seem to be, just from glancing at them, about the same texture as the areas surrounding them. I think you're going to like this place, though, Houston, because we can see, in the not-too-far distance, some pretty nice-size rocks that are on the edge of the craters that we suspect could be bedrock from below the regolith here. And, well, I guess, we'll have to get outside and find how far we can move and how fast, so that we know which ones of these we can visit. It looks there are going to be some good places out here to the west with the ALSEP. And I think, in general, that just - We're going to be able to gather a lot of good information from where we are. This is a lot better surface, I think, than Pete or I had imagined before we got here. It looks like we're going to be able to move around pretty well, and it looks like there's going to be a lot of different types of samples lying about. So I think probably with that, we'll go ahead and start rigging out.

04 17 04 21 CC Roger, Al. That was an excellent description. Before we hustle on here, could you give us one quick answer? What is the distance of the 400-foot crater which you see at 1 o'clock?

04 17 04 33 LMP-LM Roger. I'd say it's about 500 feet, and it runs from about my 12:30 to my 2 o'clock position. It looks - it doesn't look like it has any particular blocks on the rim. I'll - I think we'll

		be able to pinpoint ourselves pretty well when get out and look behind us a little, and maybe walk over to one of these craters.
04 17 04 57	CDR-LM	Also, Houston, I landed - not 20 feet behind me - if I peer around the corner of the window here, I'm right on the edge of another great big crater. I just - it falls away at a - oh, I'm going to say 10-degree slope at least, right behind us. We're right on the edge, we landed right past a fairly large crater. I'd say 300 to 400 feet in diameter. Generally, it's very strange - It rolled, ... very apparent to me to look for when I came in for a landing but ... down ... around the back. And I was going to ... to keep them close to my ... back about 50 feet.
04 17 05 47	CC	Roger, Intrepid. That'll give us a lot to work with while you're in the EVA PREP. We're standing by.
04 17 06 08	LMP-LM	I'm sorry, Houston. Say again. We were talking.
04 17 06 11	CC	Intrepid, that will give us a lot to work with while you're in your EVA PREP. We're standing by for that now.
04 17 06 21	LMP-LM	Okay. I guess the next thing is, I got to do P06 and power down the IMU, if ya'll concur.
04 17 06 38	CC	Intrepid, go ahead. We're ready for the power-down.
04 17 06 42	LMP-LM	Roger. Go ahead.
04 17 08 21	CDR-LM	Houston, crew status report. No medication; PRD for the Commander, 11018; for the LMP, 04019.
04 17 08 31	CC	Roger, Intrepid.
04 17 14 24	CC	Intrepid, Houston.
04 17 14 32	LMP-LM	Go.
04 17 14 35	CC	Say, Al, it sounds as though your cold has cleared up considerably. Have you - can you give us the - It sounds as though your stuffed head has cleared up considerably. Could you give us the last time at which you took the Actifed?

04 17 14 52	LMP-LM	Roger. Took the Actifed just before we put our helmets on prior to DOI. I don't recall exactly what that time was. And it started clearing up along about PDI time, and I think that being in this gravity field right here is helping it a bit. It allows it to drain. And today I don't have any cold; it just seems to feel a bit stuffy.
04 17 15 17	CC	Roger, Al. Thank you.
04 17 16 --		BEGIN LUNAR REV 16
04 17 17 09	CDR-LM	Houston, what time are we scheduled to go out for EVA?
04 17 17 15	CC	Stand by, Pete.
04 17 17 41	CC	Intrepid, Houston. You're scheduled for cabin DEPRESS about 1 hour from now. That's 114:20.
04 17 18 20	CDR-LM	Okay, Houston. I got you. 114:20. Thank you.
04 17 18 22	CC	Roger.
04 17 40 10	CC	Yankee Clipper, Houston.
04 17 40 15	CMP	Hello, Houston.
04 17 40 29	CC	Clipper, we read you with a lot of static in the background. We'll hold up until you lock on.
04 17 41 42	CMP	Houston, Yankee Clipper.
04 17 41 45	CC	Yankee Clipper, Houston. Go ahead.
04 17 41 53	CMP	Roger. Just checking in on you.
04 17 41 56	CC	Clipper, if you'll give us POO and ACCEPT, we'll ship you up the more refined state vector.
04 17 42 11	CMP	Okay, Houston. It's all yours.
04 17 42 14	CC	Roger.
04 17 42 18	CMP	Stand by. I've got a ...
04 17 42 22	CC	Roger.
04 17 42 39	CMP	Okay, Houston. Now, it's all yours.

04 17 42 43	CC	Roger, Clipper.
04 17 47 05	CC	Yankee Clipper, Houston.
04 17 47 12	CMP	Go ahead, Houston.
04 17 47 15	CC	Clipper, we're having a slight delay on getting that state vector up to you. We're having a little TM problem. We have a P22 PAD for you when you are ready to copy.
04 17 47 25	CMP	Ready to copy.
04 17 47 28	CC	P22. T_1; 114:18:30, 114:23:32. And that's south 04. Update to the LAT, LONG, and altitude; disregard those numbers in the flight plan. LAT, minus 3.029; longitude/2, minus 11.708; altitude, minus 1.13. And on your map, LAM-7, the coordinates are 13.4, K.9.
04 17 48 23	CMP	Roger, Houston. Copy. T_1, 114:18:30; T_2, 114:23:32. South 04. Coordinates; minus 3.029; minus 11.708; altitude; minus 1.13. On LAM chart, 13.4, K.9.
04 17 48 51	CC	Readback's correct, Dick. We have a REV 17 map update for you, also.
04 17 48 58	CMP	Go ahead.
04 17 49 00	CC	LOS, 114:51:47; 115:16:45; 115:37:55.
04 17 49 16	CMP	Roger. 114:51:47; 115:16:45; 115:37:55.
04 17 49 26	CC	Readback correct, Dick.
04 17 52 07	CC	Yankee Clipper, Houston. The computer's yours.
04 17 52 13	CMP	Thank you.
04 17 58 46	CMP	Hey, Ed, how come you haven't been giving me any TEI PAD?
04 17 59 13	CC	Clipper, stand by on that. I think we'll work out the rendezvous solution first.
04 17 59 21	CMP	Oh, okay.

04 17 59 34	CC	Say, Dick, when you're looking for them in the sextant, if you look at the head crater, we suspect that they're on the northwest rim of head crater. That's the head of the Snowman.
04 17 59 40	CMP	Okay. Understand.

END OF TAPE

04 18 02 06	CDR-LM	Houston, Intrepid. In case you want to know where we are, we'll be with you with the PLSS COMM checks in just about 2, 3 minutes.
04 18 02 14	CC	Roger, Intrepid. Standing by.
04 18 07 55	CDR-LM	Houston, we're going to modulate FM and coming up with COMM, the TV closed, and we'll be coming at you in a minute.
04 18 08 04	CC	Roger, Intrepid. Standing by.
04 18 08 49	CDR-LM	VOX and full increase on the sensitivity. All right; wait a minute. Wait a minute. VHF A - I know - VHF A, TRANSMIT; VHF B, RECEIVE; audio LMP: S-BAND at T/R; ICS to T/R; relay ON; mode VOX; VOX SENS, MAX; VHF A, TRANSMIT RECEIVE; VHF B, RECEIVE. Get ready for the COMM. VHF VOICE ON, OFF, ON, OFF, HIGH; RANGE, OFF/RESET; SQUELCH A and B noise threshold, plus 1-1/2.
04 18 10 13	CDR-LM	How you doing? Okay. RECORDER, ON; VHF antenna to EVA; UPLINK SQUELCH, ENABLE; LMP connect to PLSS COMM (CB audio).
04 18 11 26	CDR-LM	... We're all locked up. Okay PLSS mode (LMP) - A (tone-on, vent); flag-P; press flag - and I hear you - PLSS O_2 gage, 85 percent; give me a COMM check. ... I hear you loud and clear. Okay. Don't unstow PLSS antenna, if not transmit, garbled, or loss of TM. Okay; I'm going to go to my PLSS. Hold the card for me?
04 18 15 19	CDR-LM	Okay?
04 18 16 29	LMP-LM	All right.
04 18 16 42	CDR-LM	Okay.
04 18 17 07	LMP-LM	Hold on.
04 18 22 28	CMP	Houston, I have Snowman. And I believe I have the Surveyor from the northwest side of the Surveyor crater.
04 18 22 54	CC	Clipper, Houston. We copy that - -
04 18 22 56	CMP	And, Houston, it's cast a shadow; it looks like it is about - Oh, it's hard to distinguish; it looks like about a third of a crater in diameter.

04 18 23 14	CC	Roger, Clipper. Copy you - -
04 18 23 15	CMP	... I have. I have Intrepid. I have Intrepid.
04 18 23 25	CC	Well done, Clipper. Copy; one crater diameter to the north. Is that affirmative?
04 18 23 33	CMP	I have him. He's on the Surveyor crater; he's about a fourth of a Surveyor crater diameter to the northwest.
04 18 23 44	CC	Roger, Clipper. Well done.
04 18 23 49	CMP	I'll tell you, he's the only thing that casts a shadow down there.
04 18 23 55	CC	Roger.
04 18 24 04	CMP	He's got a fairly good sized crater just to the north and slightly east of him; out directly behind him; he is on the Surveyor crater.
04 18 24 14	CC	Roger, Clipper.
04 18 24 37	CMP	All right, Ed. Now I'm directly overhead. He's a third of the way between the Surveyor crater and the head.
04 18 24 53	CC	Clipper, Houston. Say again.
04 18 24 59	CMP	The Intrepid is just on the left shoulder of the Snowman. He is looking at me. He is about a third of the way from the Surveyor crater to the head. I see the Surveyor! I see the Surveyor!
04 18 25 15	CC	Roger, Clipper. Good eyeball. Well done.
04 18 26 22	CMP	Hey, Ed. That's almost as good as being there.
04 18 26 29	CC	Roger, Clipper.
04 18 26 41	CMP	Let me know when you have your data.
04 18 27 28	CMP	Houston, Clipper. Do you have your data?
04 18 27 35	CC	Clipper, that's affirmative. We have it.
04 18 27 44	CMP	And, Houston, I'd like to do that again on each pass. You might think - about putting the camera on the sextant.

04 18 27 55	CC	Roger, Clipper. That sounds good.
04 18 28 14	LMP-LM	It says here - Did you? Hey, all of a sudden, I get all kinds of COMM. Did you hear me?
04 18 28 20	CDR-LM	Yes.
04 18 28 21	CC	Intrepid, we read you loud and clear.
04 18 28 28	LMP-LM	... all along? All along, Houston?
04 18 28 37	CDR-LM	Hello, Houston; Intrepid. How do you read?
04 18 28 40	CC	Intrepid, Houston. We read you loud and clear.
04 18 28 46	CDR-LM	Okay. Do you read Al?
04 18 28 50	CC	Negative. Al, we read you very weak in the background.
04 18 28 55	CDR-LM	In your radio.
04 18 29 00	CC	Al, give us a short count.
04 18 29 09	LMP-LM	... ... 5, 4, 3, 2, ...
04 18 29 13	CC	Al, we read you partially on the last part of that count with a loud hum in the background.
04 18 29 21	LMP-LM	How do you read now? I think - -
04 18 29 24	CC	Loud and clear, Al.
04 18 29 26	LMP-LM	Right. I accidentally hit your - -
04 18 29 36	CDR-LM	(Laughter)
04 18 29 37	LMP-LM	Let's go.
04 18 29 38	CDR-LM	You got to be kidding.
04 18 29 39	LMP-LM	That's right.
04 18 29 40	CDR-LM	Wait a minute. Go back to B.
04 18 29 42	LMP-LM	Okay. We're going to complete ...
04 18 29 45	CDR-LM	Go to A.
04 18 29 47	LMP-LM	That's what it was, Pete.

04 18 29 48	CDR-LM	Yes. Go to A.
04 18 29 49	LMP-LM	Loud and clear, babe. Loud and clear. Go to B.
04 18 29 56	CDR-LM	Go to B. Loud and clear.
04 18 29 59	LMP-LM	Okay. Okay; go AR.
04 18 30 04	CDR-LM	AR.
04 18 30 07	LMP-LM	How do you hear, Pete.
04 18 30 08	CDR-LM	Loud and clear. How do you hear, Houston?
04 18 30 10	CC	Intrepid, we read you loud and clear; and for your info, Clipper got a visual on you, and he also picked up Surveyor.
04 18 30 22	CDR-LM	Hey, ask him where are we? (Laughter)
04 18 30 30	LMP-LM	Houston, my O_2 quantity is - -
04 18 30 34	CDR-LM	Mine's 90, Houston.
04 18 30 36	LMP-LM	- - 90 percent.
04 18 30 38	CDR-LM	Okay. Feed me COMM - -
04 18 30 40	CC	Copy; 90, both.
04 18 30 45	CDR-LM	Okay. Did he tell you how far - Did he have the LM and the Surveyor - -
04 18 30 56	LMP-LM	Go ahead. Read to me, Pete.
04 18 30 59	CDR-LM	ECS CABIN REPRESS, CLOSED.
04 18 31 00	LMP-LM	Okay; it is. S FAN DELTA-P, OPEN.
04 18 31 02	CDR-LM	Open. ECS SUIT FAN 1, OPEN.
04 18 31 04	LMP-LM	Open. SUIT FAN 1 on your side. Okay; read me that.
04 18 31 12	CDR-LM	SUIT GAS DIVERTER, PULL/EGRESS.
04 18 31 13	CMP	Hello, Houston; Yankee Clipper.
04 18 31 14	LMP-LM	It's PULL/EGRESS.

04 18 31 15	CC	Clipper, go ahead.
04 18 31 16	CDR-LM	CABIN GAS RETURN to EGRESS.
04 18 31 17	LMP-LM	CABIN GAS RETURN, EGRESS.
04 18 31 20	CDR-LM	SUIT CIRCUIT RELIEF, AUTO.
04 18 31 21	CMP	Roger. Intrepid's coordinates on LAM 7, 13.6, K.9.
04 18 31 22	LMP-LM	SUIT CIRCUIT RELIEF, AUTO.
04 18 31 25	CDR-LM	Verify ECS caution and H_2 SEP component lights come on. Okay?
04 18 31 31	LMP-LM	Don't have anything.
04 18 31 32	CC	13.6 and K.9. Copy. Thank you, Clipper.
04 18 31 37	CMP	That's Charlie.
04 18 31 45	CDR-LM	SUIT GAS DIVERTER, PULL/EGRESS. CABIN GAS RETURN to EGRESS and ... RELIEF AUTO. I don't have an ECS light yet. There's nothing.
04 18 31 55	CDR-LM	Well, that won't be - You know it runs down; takes a little while to go.
04 18 31 58	LMP-LM	Oh, okay. Very good.
04 18 32 01	CDR-LM	OPS connect, LMP - first, turn around - -
04 18 32 04	LMP-LM	Okay.
04 18 32 05	CDR-LM	- - slowly.
04 18 32 08	LMP-LM	What do you want? I thought you were going to undo it.
04 18 32 10	CDR-LM	Oh, well; I can't from this side.
04 18 32 12	LMP-LM	Right there?
04 18 32 13	CDR-LM	Stay still. Right there. Boy, these PLSS's are nice in one-sixth g. There's one O_2 hose. There's five more of that O_2 hose. Houston, Intrepid.

04 18 32 35	CC	Intrepid, Houston. Go ahead.
04 18 32 41	CDR-LM	Roger. Did Yankee Clipper have us both in the sextant at the same time? Over.
04 18 32 52	CC	Roger. That's affirmative. He got you between head crater and Surveyor crater slightly north.
04 18 33 02	LMP-LM	That's it.
04 18 33 05	CDR-LM	That's where I figured we landed. Okay. Turn around slow.
04 18 33 11	LMP-LM	That's all I can do, Pete, with these hoses on.
04 18 33 14	CDR-LM	That's all you can do? Okay. Let me put this down. That's funny. Oh, I didn't get something. You're going to have to turn around.
04 18 33 23	LMP-LM	Okay.
04 18 33 25	CDR-LM	Easy does it, babe.
04 18 33 29	LMP-LM	Good shape.
04 18 33 31	CDR-LM	Got to be careful or I'll jump right through the the cabin overhead every time I want to - to do something in the - -
04 18 33 39	LMP-LM	Okay?
04 18 33 41	CDR-LM	Got it. Just a second; I'll be right with you. If you could just carry this PLSS around for 29 hours - Almost feels good (laughter).
04 18 33 54	LMP-LM	Relatively speaking, it feels great (laughter).
04 18 33 59	CDR-LM	Okay. I got one more snap. Can you bend over? That's it. Easy. Okay. I got you. Oops. (Laughter.) An O_2 hose, and a cable.
04 18 34 13	LMP-LM	Okay. That fits good.
04 18 34 20	CDR-LM	You got it? You got that one? Okay. Now turn - you got to stand - Can you stand up straight?
04 18 34 27	LMP-LM	Yes, but I can't turn any further, see. Those - -
04 18 34 29	CDR-LM	Now wait a minute here.

04 18 34 40	CDR-LM	Okay, now. Oh, you want this under this one flap, don't you?
04 18 34 43	LMP-LM	Yes.
04 18 34 44	CDR-LM	Okay. Under the flap? Snap, crackle -
04 18 34 52	LMP-LM	Pop.
04 18 34 54	CDR-LM	There you go. Now, where are we? Back to the checklist.
04 18 34 58	LMP-LM	Okay. Let me get yours now.
04 18 35 00	CDR-LM	Wait a minute.
04 18 35 07	CDR-LM	Now - Let's get you off, okay?
04 18 35 10	LMP-LM	Get systems first.
04 18 35 14	CDR-LM	Bag to actuated RCU - which you did; snap OPS O_2 hose to side of PLSS, which I did. SUIT ISOLATION VALVES, SUIT DISCONNECT, on the LMP. There you go. Okay?
04 18 35 26	LMP-LM	I connect ...
04 18 35 31	CDR-LM	I'll get them. Let me get them. They're easier.
04 18 35 33	LMP-LM	Okay.
04 18 35 35	CDR-LM	Oh boy, look at the ater.
04 18 35 36	LMP-LM	In the suit loop.
04 18 35 38	CDR-LM	Where's all the water com'ng from?
04 18 35 40	LMP-LM	It comes right out of the inlet hose.
04 18 35 42	CDR-LM	It sure is. Okay. Hey, you want to connect the oxygen?
04 18 35 50	LMP-LM	Yes, just a second, I want to - I kind of thought I was getting some water in my suit; it's just cold air.
04 18 35 57	CDR-LM	Okay?
04 18 35 59	LMP-LM	It's connected and locked.

04 18 36 01	CDR-LM	Okay.
04 18 36 02	LMP-LM	What else have we got? Purge valve?
04 18 36 04	CDR-LM	Okay. One purge valve coming up.
04 18 36 14	LMP-LM	Wait a minute. Get the safety lock.
04 18 36 17	LMP-LM	Is it locked?
04 18 36 18	CDR-LM	Yes sir, that's locked.
04 18 36 25	LMP-LM	It's centered at top right.
04 18 36 26	CDR-LM	Okay? Okay; same thing. Lean over and let me get your gear.
04 18 36 28	LMP-LM	Hang on. I'm just going to squat down like this and you can get all of it.
04 18 36 37	CDR-LM	Okay. That's a good way to do it.
04 18 36 41	LMP-LM	Then I'm going to fuel up on the drinking water.
04 18 36 43	CDR-LM	All right.
04 18 37 03	CDR-LM	I've got the feeling we're going to put an ALSEP package out.
04 18 37 17	LMP-LM	Okay. Stand up, Pete; there's not a lot of room.
04 18 37 22	CDR-LM	Yes.
04 18 37 23	LMP-LM	Okay. Here's one for over your head. Here's one from under your arm.
04 18 37 44	LMP-LM	That's good; looks good.
04 18 37 46	CDR-LM	Okay.
04 18 37 47	LMP-LM	Just a second.
04 18 37 48	CDR-LM	Okay. Let me disconnect your hose, that's better. Okay.
04 18 37 58	LMP-LM	And here comes your exhaust. 8033.
04 18 38 02	CDR-LM	Man, there's a lot of water in those hoses. Hey, Houston you read Intrepid?

04 18 38 08	CC	Intrepid, Roger. We copy your comment on water in the hoses.
04 18 38 15	CDR-LM	Yes. It's just that the air seems to be extremely cold - coming in, at least - the inlet hose is quite cold. And some moisture is getting that bad in it. Everything else seems okay.
04 18 38 31	CC	Roger.
04 18 38 36	LMP-LM	That's tricky; that looks like a small ... That's - that OPS position right there. Okay. That's good.
04 18 38 47	CDR-LM	You want me to check that again?
04 18 38 49	LMP-LM	Yes. Check mine to make sure it's locked.
04 18 38 50	CDR-LM	Yes. It's locked.
04 18 38 51	LMP-LM	Okay.
04 18 38 56	CDR-LM	- - drink.
04 18 38 57	LMP-LM	Okay. Let's do that. Pass the gin around and we'll shut off the descent H_2O.
04 18 39 10	CDR-LM	(laughter).
04 18 39 32	LMP-LM	And water off. And H_2O is off.
04 18 39 37	CDR-LM	Okay. Position mike.
04 18 39 39	LMP-LM	Good.
04 18 39 40	CDR-LM	Yes.
04 18 39 41	LMP-LM	S-band on?
04 18 39 42	CDR-LM	Yes.
04 18 39 44	LMP-LM	Okay. Mine's on. That's ... Don helmets and visors. Okay. Let me get your helmet for you. Stay right where you are. Okay. Watch your head. Watch your snaps; that's on pretty good. Locked. Get your - Everything is so light up here - the helmet cover ... out there in the Cape, it was a little bit tougher. Okay. But my fan is running.

04 18 39 53	CDR-LM	Is your vent flag up?
04 18 39 55	LMP-LM	I don't know. No, it's not.
04 18 41 21	LMP-LM	That came off. Here, just a second. Get it. Turn it off ...
04 18 41 32	CDR-LM	I can hear it.
04 18 41 34	LMP-LM	Hear it spin out?
04 18 41 36	CDR-LM	Yes.
04 18 41 37	LMP-LM	Remember when we talked about that one?
04 18 41 39	CDR-LM	Yes.
04 18 41 48	LMP-LM	If you went up with my helmet on, it won't - it'll - That water in your suit is making your helmet fog a bit.
04 18 41 56	CDR-LM	Take my helmet off a minute.
04 18 41 57	LMP-LM	Okay.
04 18 42 04	CDR-LM	Put your hand over the back of my thing, and see if you can feel it. No. No. Right over the back of - the neckring.
04 18 42 37	LMP-LM	Can't feel my own either, though.
04 18 42 41	CDR-LM	I can feel air blowing out of yours. Can't you feel air blowing out of that?
04 18 42 47	LMP-LM	No. Is any of it hitting your neck?
04 18 42 50	CDR-LM	Huh?
04 18 42 51	LMP-LM	Is it hitting your neck at all?
04 18 42 53	CDR-LM	No. The P flag goes out, huh?
04 18 43 00	LMP-LM	Yes. Right there.
04 18 43 01	CDR-LM	Hey, Houston, didn't somebody tell me that these P flags might not go out until you get your helmet and gloves on?
04 18 43 08	CC	Intrepid, that's affirmative. Go ahead and button up; put the helmet and gloves on and turn on the fan and the vent flag should go out.

04 18 43 18	CDR-LM	... that sorry. It's never - it's not wiped enough. I have no idea since you got that - all that - probably blowing all this moisture out your suit.
04 18 43 29	CDR-LM	Yes.
04 18 43 30	LMP-LM	You want to wipe it again?
04 18 43 31	CDR-LM	Yes. Better.
04 18 43 38	LMP-LM	I'll tell you one thing, let's turn this valve right here up a little bit. Where's the helmet bags?
04 18 43 51	LMP-LM	Here.
04 18 44 03	LMP-LM	Go.
04 18 44 05	CDR-LM	I got this sneaking suspicion that that fan is not running like it should.
04 18 44 13	LMP-LM	You will have to wait until you get your gear on, and let's see.
04 18 44 16	CDR-LM	Yes, I know. This happened to me once before. Somebody left a piece of paper in the PLSS-LiOH canister.
04 18 44 27	LMP-LM	Hey, check that; if it did - -
04 18 44 29	CDR-LM	It would make me unhappy.
04 18 44 33	LMP-LM	Okay. You do this. You've got to wipe yours off. I didn't wipe it off good. Okay? Leave that there. Put another one of those on?
04 18 44 54	CDR-LM	Yes.
04 18 44 55	LMP-LM	Okay? Turn this way and let me check that other LiOH canister.
04 18 45 08	CDR-LM	Open that thing up, and pull that canister all the way out of there. Look in there; make sure there isn't something in there.
04 18 45 14	LMP-LM	Okay.
04 18 45 15	CDR-LM	That's exactly what happened the last time.
04 18 45 18	LMP-LM	Nothing.

04 18 45 19	CDR-LM	Well, isn't that neat. Put the canister back in and lock the door.
04 18 45 26	LMP-LM	Locked.
04 18 45 27	CDR-LM	That a boy.
04 18 45 30	LMP-LM	Just a second.
04 18 45 42	LMP-LM	Locked good and tight now.
04 18 45 44	CDR-LM	Okay. Okay, I'm going to do this the other way around, Al, I'm going to get my gloves on first, helmet last.
04 18 46 10	LMP-LM	See how it runs this trip. Try it this way this time. Pretty good. Looks pretty good.
04 18 46 30	CDR-LM	Okay?
04 18 46 31	LMP-LM	See how it works this trip. Okay; let's - -
04 18 46 38	CDR-LM	Hey, your vent light went out. Look at your - - ...
04 18 46 40	LMP-LM	Oh yes; okay.
04 18 46 41	CDR-LM	Everything's working.
04 18 46 42	LMP-LM	Crazy.
04 18 46 46	CDR-LM	Everything looks good, Houston.
04 18 46 48	CC	Roger, Intrepid.
04 18 46 53	CDR-LM	Double check my helmet down, will you, Al?
04 18 46 55	LMP-LM	You bet. It's not locked.
04 18 47 00	CDR-LM	Locked.
04 18 47 01	LMP-LM	Okay. Get your gloves out.
04 18 47 04	CDR-LM	Okay. Wait a minute.
04 18 47 08	LMP-LM	And - yours. Lift this up for you. It's right over here - under yours - yours right there. Yes. And it's - -.
04 18 47 20	CMP	Houston, Clipper.

04 18 47 22	CC	Clipper, go ahead.
04 18 47 25	LMP-LM	Wait a minute.
04 18 47 26	CDR-LM	You want to get your EV gloves out of the way or leave them right where they are?
04 18 47 28	CMP	Roger. Would you find out which film they want me to use for this picture session the next time around? The normal sextant landmark tracking film, which is C-EX, or the high-resolution stuff the - It's C-EX.
04 18 47 29	LMP-LM	Oh, good enough. Good enough right where they are.
04 18 47 30	CDR-LM	But did you see? The window's beginning to fog up.
04 18 47 34	LMP-LM	Do you want to put the window heaters on?
04 18 47 36	CDR-LM	No. We can't watch them.
04 18 47 39	LMP-LM	Better put them on for a while. Pull them before you get out.
04 18 47 42	CDR-LM	Okay. That's what I'll do.
04 18 47 44	LMP-LM	Never get any pictures that way. Hey, Houston? Here, which one's yours? That one's yours. Put it on your head ...
04 18 47 54	CDR-LM	Okay.
04 18 47 56	LMP-LM	Reach back there - just a second, I'll get it - -
04 18 47 59	CC	Clipper, understand. You want to know which camera to be using on the next pass, is that affirm?
04 18 48 07	CMP	No. I know which camera, Ed. Which film?
04 18 48 08	CDR-LM	Good picture of the lunar surface.
04 18 48 10	CC	Copy. Stand by.
04 18 48 13	CMP	Color exterior or high-speed power exterior?
04 18 48 18	CDR-LM	Okay.
04 18 48 19	CC	Dick, let's go with the color exterior.

04 18 48 20	CDR-LM	Let me really check that.
04 18 48 26	CMP	Say again, Houston.
04 18 48 28	CDR-LM	Okay.
04 18 48 32	CC	Dick, go with the color exterior for the next pass. Color exterior.
04 18 48 38	CMP	Ok - okay. Understand. Thank you.
04 18 48 48	CDR-LM	Okay, now. Let me slip my PLSS up; gets - -
04 18 48 51	MS	...
04 18 48 54	LMP-LM	Will do, Pete. Will do.
04 18 48 55	CDR-LM	I'll get you all buttoned up.
04 18 48 58	LMP-LM	Looks fine. Let me pull your visor down a little bit.
04 18 49 00	CDR-LM	Yes. That a boy.
04 18 49 02	LMP-LM	Good, then you got these - -
04 18 49 03	CDR-LM	Okay. Let's leave me gloves off until I get your helmet and visor on.
04 18 49 06	LMP-LM	All right.
04 18 49 08	CDR-LM	Your helmet. Hand me that, and I'll hold it for you.
04 18 49 14	LMP-LM	There you go. Let me slide that on my head.
04 18 49 32	LMP-LM	I'll hold it up if you'll lock - no, no - Oh, wait a minute.
04 18 49 39	CDR-LM	Okay?
04 18 49 40	LMP-LM	Locked. Looking good. Everything looks - -
04 18 49 44	CDR-LM	Hold it - hold your thing just a second. Okay. Wait a minute. Yes, I checked that for you.
04 18 49 59	LMP-LM	Okay.
04 18 50 06	CDR-LM	Okay.

04 18 50 07	LMP-LM	Super.
04 18 50 12	CDR-LM	There you go.
04 18 50 13	LMP-LM	Okay. Hold up the pressure. Hold up your pressure -
04 18 50 18	CDR-LM	Wait a minute; let me get all this out first. Out and about. There you go.
04 18 50 31	LMP-LM	Okay. Okay. What does it say next?
04 18 50 38	CDR-LM	Now we need a set of gloves.
04 18 50 39	LMP-LM	Okay.
04 18 50 40	CDR-LM	Now just let me turn real slow.
04 18 50 48	CC	Yankee Clipper, Houston. One minute to LOS. And we'll be giving you a P22 pad at AOS.
04 18 51 18	CC	Yankee Clipper, Houston. Thirty seconds to LOS.
04 18 51 24	CMP	Roger. I'll see you next pass.
04 18 51 53	LMP-LM	Boy, you can tell those are brand new gloves; I hardly get me fingers down them. Thank you.
04 18 52 21	CDR-LM	Before you cover your wrist, let me check your lock. Check mine.
04 18 52 28	LMP-LM	Okay. Just a second. Okay. ... to you, Pete. These are locked.
04 18 52 47	CDR-LM	Just a minute.
04 18 52 56	LMP-LM	Let me see it. It looks good. Let me look at you. Good enough.
04 18 53 09	CDR-LM	Okay.
04 18 53 11	LMP-LM	They're okay, Pete. Wait a minute - Let me see that. Okay. ... there. Okay!
04 18 53 32	CDR-LM	Okay now. Hold the phone. Let's see.
04 18 53 35	LMP-LM	Get me a shot of cold water, here.
04 18 53 38	CDR-LM	Yes.

04 18 53 40	LMP-LM	Let's get some helmet bags in the SICA, and they are already there. Okay?
04 18 53 47	CDR-LM	Let's get a shot of cold water, and then we'll turn off the pump.
04 18 53 49	LMP-LM	Okay. Here it comes.
04 18 53 59	CDR-LM	Okay. Let it chill down.
04 18 54 08	LMP-LM	Yes, leave it on for a second.
04 18 54 21	CDR-LM	That it?
04 18 54 22	LMP-LM	That's it.
04 18 54 23	CDR-LM	Okay. CB16; ECS:LCG PUMP, OPEN.
04 18 54 29	LMP-LM	OPEN.
04 18 54 31	CDR-LM	Then disconnect. Let me disconnect yours.
04 18 54 35	LMP-LM	Okay.
04 18 54 41	CDR-LM	Now you have to turn this way.
04 18 54 45	LMP-LM	That it?
04 18 54 46	CDR-LM	Okay.
04 18 54 47	LMP-LM	Second, let me get yours. Okay. Let's - Hold that a second.
04 18 55 00	CDR-LM	Yes, now I got to hook up yours.
04 18 55 04	LMP-LM	Put it right over the top.
04 18 55 15	LMP-LM	It's in.
04 18 55 16	CDR-LM	In?
04 18 55 17	LMP-LM	Yes; it's in.
04 18 55 19	CDR-LM	Okay. Thank you. Hang on to your water hose, here. No. Your right hand. That a boy. Okay?
04 18 55 37	LMP-LM	Now rotate it.
04 18 55 42	CDR-LM	- - in. Lock go in?
04 18 55 43	LMP-LM	Yes, sir.

04 18 55 45	CDR-LM	Okay. Both locks are in. Okay.
04 18 55 48	LMP-LM	Could still be further. ...
04 18 55 56	LMP-LM	You got to route yours up there on the wall.
04 18 55 58	CDR-LM	Yes, yes.
04 18 55 59	LMP-LM	While you're doing that, I'll get this in.
04 18 56 01	CDR-LM	No, I'm afraid I can't do it with you standing there. I'm going to have to wait until you turn around.
04 18 56 06	LMP-LM	Okay.
04 18 56 07	CDR-LM	Put yours in there.
04 18 56 12	LMP-LM	Okay.
04 18 56 28	LMP-LM	Okay. I'll turn around and get out of your way.
04 18 56 35	CDR-LM	Back off into your corner.
04 18 56 37	LMP-LM	Okay.
04 18 56 48	CDR-LM	Can we get up on the step a little bit?
04 18 57 13	CDR-LM	You want to hold these hoses?
04 18 57 15	LMP-LM	Sure.
04 18 57 33	CDR-LM	Turn around.
04 18 57 34	LMP-LM	Okay.
04 18 58 03	CDR-LM	Wonder if I need to get the water in there. Maybe you could do that.
04 18 58 08	LMP-LM	Okay.
04 18 58 09	CDR-LM	Everything else is in.
04 18 58 11	LMP-LM	Will do.
04 18 58 12	CDR-LM	Wait a second. Got it.
04 18 58 15	LMP-LM	Okay.
04 18 58 47	LMP-LM	You got the window heater on over there, Pete?

04 18 58 50	CDR-LM	No. I'll have to wait until you turn around.
04 18 59 02	CDR-LM	Let's - How are you doing over there?
04 18 59 04	LMP-LM	Good. Just about got it done.
04 18 59 08	CDR-LM	Okay. I turned on your window heater just a second.
04 18 59 10	LMP-LM	All right. That's it.
04 18 59 12	CDR-LM	Get in your corner again.
04 18 59 17	LMP-LM	Okay.
04 18 59 19	CDR-LM	I don't know about you, but my suit is collapsing around me. How about you?
04 18 59 23	LMP-LM	That's right.
04 18 59 24	CDR-LM	Huh?
04 18 59 25	LMP-LM	Yes. So's mine. The cabin pressure must have pumped a little. It's the last breaker in the upper left. Okay. Now, verify: Don EV gloves - wait a minute - -
04 18 59 41	LMP-LM	Right here.
04 18 59 42	CDR-LM	Torso tie-down?
04 18 59 44	LMP-LM	Mine's okay.
04 18 59 45	CDR-LM	All O_2 connectives locked?
04 18 59 47	LMP-LM	Check mine. I'll check yours. I looked at yours, okay. Locked; that one's locked. That's locked. You're vertical. My diverter valves vertical?
04 18 59 59	CDR-LM	Yes, sir. Your diverter valves are vertical. Everything looks locked here. Looking for it.
04 19 00 07	LMP-LM	Make sure the water lock is in. You got the water lock?
04 19 00 09	CDR-LM	You don't have a lock on your water control.
04 19 00 11	LMP-LM	... No, it's - It's locked. Hey, here's one that doesn't have a lock locked.

04 19 00 18	CDR-LM	That's locked.
04 19 00 19	LMP-LM	Okay. And it's giving us a squeak.
04 19 00 22	CDR-LM	What am I hung under?
04 19 00 25	LMP-LM	Back to there. Okay. Go ahead.
04 19 00 28	CDR-LM	I think we ought to get over here where we turn on the oxygen.
04 19 00 31	LMP-LM	That's right. Got a warning tone for PRESS or something.
04 19 00 35	CDR-LM	Yes, we're ...
04 19 00 39	LMP-LM	PLSS O_2, ON. Want me to try it?
04 19 00 44	CDR-LM	Yes. No; wait a minute. Excuse me. PLSS DIVERTER, MIN.
04 19 00 49	LMP-LM	Okay.
04 19 00 50	CDR-LM	PLSS PUMP, ON.
04 19 00 51	LMP-LM	Wait, wait. Let me read that thing.
04 19 01 08	CDR-LM	Come on. Let's get the oxygen.
04 19 01 09	LMP-LM	Okay.
04 19 01 11	CDR-LM	Wait a minute. Get your pump on.
04 19 01 16	LMP-LM	There we go. DIVERTER, MIN; PRESS REGS A and B, EGRESS.
04 19 01 22	CDR-LM	Okay.
04 19 01 23	LMP-LM	Try that for size. Okay. They're EGRESS.
04 19 01 27	CDR-LM	Okay. Now PLSS O_2, ON.
04 19 01 31	LMP-LM	Okay. Verify - Okay, that's a good idea.
04 19 01 41	LMP-LM	Ready to go.
04 19 01 47	CDR-LM	I've got an 0 flag, and tone on, and - -
04 19 01 50	LMP-LM	Okay. Check your CB configuration while we wait.

04 19 01 59	CDR-LM	I don't think we can both turn around at the same time.
04 19 02 02	LMP-LM	Okay. Go ahead and check yours and I'll check mine.
04 19 02 15	CDR-LM	How's your window doing?
04 19 02 18	LMP-LM	It's clearing up.
04 19 02 27	CDR-LM	Oh boy! That suit was really clapped down around me.
04 19 02 30	LMP-LM	Yes.
04 19 02 49	CDR-LM	Yes. CB's looked pretty good.
04 19 02 51	LMP-LM	Okay. Let me check mine.
04 19 02 58	LMP-LM	And I'm sitting at 38.
04 19 03 00	CDR-LM	Okay.
04 19 03 15	LMP-LM	Okay. Looking good. ... PRESS up. Coming on up. Do I need ... check now?
04 19 03 37	CDR-LM	Yes.
04 19 03 38	LMP-LM	Okay. Feels good in this one-sixth g. doesn't it?
04 19 03 45	CDR-LM	Yes, except I notice that the slight slope we're standing on, I keep falling in the back.
04 19 03 49	LMP-LM	Yes.
04 19 03 52	CDR-LM	I think I left my oxygen OFF. Coming up.
04 19 04 15	LMP-LM	Those rocks have been waiting 4-1/2 billion years for us to come grab them.
04 19 04 20	CDR-LM	Think so, huh?
04 19 04 21	LMP-LM	Let's go grab a few (laughter). Yes. Heck, yes.
04 19 04 25	CDR-LM	Get an ALSEP out first.
04 19 04 26	LMP-LM	Okay.
04 19 04 29	CDR-LM	Run the old check.
04 19 04 35	LMP-LM	Okay. Mine's holding real good.

04 19 04 43	LMP-LM	You got a good tight suit?
04 19 04 45	CDR-LM	Yes. And the tone came on, so I'm ready to have the oxygen off.
04 19 05 01	LMP-LM	... I've got a good tight suit.
04 19 05 02	CDR-LM	Houston, are we GO for EVA?
04 19 05 05	CC	Stand by, Intrepid. We'll be right with you.
04 19 05 14	LMP-LM	Okay.
04 19 05 15	CDR-LM	Stand by? You guys ought to be spring-loaded.
04 19 05 19	CC	Intrepid. You're GO for EVA.
04 19 05 24	CDR-LM	Roger. CABIN REPRESS valve CLOSED?
04 19 05 27	LMP-LM	Okay. Just a second.
04 19 05 28	CDR-LM	Easy does it.
04 19 05 32	LMP-LM	CABIN REPRESS, CLOSED.
04 19 05 38	CDR-LM	Okay. Dump valve OPEN, then AUTO at 3-1/2.
04 19 05 45	LMP-LM	Okay. Easy does it.
04 19 05 54	CDR-LM	Is it open?
04 19 05 55	LMP-LM	Yes.
04 19 06 05	CDR-LM	Let me.
04 19 06 06	LMP-LM	Just need to move a little bit.
04 19 06 17	LMP-LM	Kind of give me a push back, Pete.
04 19 06 23	CDR-LM	Why don't you let me get it, Al? Stand up. Stand up, Al I got it.
04 19 06 30	LMP-LM	The block's in the way ...
04 19 06 33	CDR-LM	Why don't you - wait, let's - You're going to tire yourself out doing that. Let me get it. That a boy. Okay. That's it. Cabin going down. Okay.
04 19 06 49	CDR-LM	MARK.

04 19 06 50	CDR-LM	3.5. Okay?
04 19 06 53	CC	Copy 3.5.
04 19 06 56	CDR-LM	Let me see. Verify cuff gage does not drop below 4.8.
04 19 07 02	LMP-LM	Sure doesn't.
04 19 07 03	CDR-LM	Man, mine's up in the overhead someplace. You got a foggy visor?
04 19 07 14	LMP-LM	No.
04 19 07 16	CDR-LM	No?
04 19 07 25	CDR-LM	Verify cabin at 3-1/2, suit circuits at 3-1/2 to 4.5, and it's up there at 4.2.
04 19 07 31	LMP-LM	Okay.
04 19 07 35	CDR-LM	PGA Zeta and 4.8, and it's decaying.
04 19 07 39	LMP-LM	Okay, Houston. We're GO to open it all the way here. How about you?
04 19 07 40	CDR-LM	Okay.
04 19 07 43	LMP-LM	They said GO.
04 19 07 44	CDR-LM	Okay.
04 19 07 45	CC	Roger, Intrepid. Looks good here.
04 19 07 46	CDR-LM	- - valve OPEN.
04 19 07 48	LMP-LM	That's it, Pete. Feels good.
04 19 07 58	CDR-LM	You bet. When do we turn on the water?
04 19 08 03	LMP-LM	Just as soon as we get this thing down real low.
04 19 08 09	CDR-LM	I've got a tone.
04 19 08 10	LMP-LM	That's right.
04 19 08 13	CDR-LM	And an H_2O flag.
04 19 08 14	LMP-LM	That's good. Both suits.
04 19 08 22	CDR-LM	I show 1 pound on the cabin.

04 19 08 24	LMP-LM	Okay.
04 19 08 58	LMP-LM	How's it look?
04 19 08 59	CDR-LM	Oh, it's about 0.2.
04 19 09 02	LMP-LM	Let's give it a go.
04 19 09 03	CDR-LM	Okay.
04 19 09 10	LMP-LM	Not quite.
04 19 09 12	CDR-LM	Just let it sit for a while.
04 19 09 13	LMP-IM	Yes.
04 19 09 44	CDR-LM	On about a 0.1 now.
04 19 09 46	LMP-LM	Okay. Give me a little push down.
04 19 09 48	CDR-LM	Down?
04 19 09 49	LMP-LM	Yes.
04 19 10 11	CDR-LM	How are you doing?
04 19 10 12	LMP-LM	Oh, I'm doing great; just waiting for the pressure to get low enough to open the hatch.
04 19 10 16	CDR-LM	You can reach that upper left-hand corner, you can feel it.
04 19 10 26	LMP-LM	Easy, easy does it.
04 19 10 32	CDR-LM	There you go.
04 19 10 33	LMP-LM	Got it, babe.
04 19 10 35	CDR-LM	Okay. The hatch is open now. Okay.
04 19 10 38	LMP-LM	Let me reset the valve.
04 19 10 40	CDR-LM	Okay.
04 19 10 41	LMP-LM	Wait just - in a minute. I'll hold it. Pull her open again.
04 19 10 49	CDR-LM	I think I got it.
04 19 10 51	LMP-LM	Okay. I got the hatch. Go ahead and reset the valve.

04 19 10 55	CDR-LM	Okay. Now what I need to do is get some water going in. Do you stand up?
04 19 10 59	LMP-LM	Okay. Good shape.
04 19 11 02	CDR-LM	All right. Lean it against me.
04 19 11 07	LMP-LM	Okay. This feed water open. Okay. Let's get it going.
04 19 11 18	CDR-LM	Mine's on.
04 19 11 20	LMP-LM	Mine's on, too.
04 19 11 23	CDR-LM	Okay.
04 19 11 24	LMP-LM	Get your ... O_2 open.
04 19 11 25	CDR-LM	All right, while we're doing that, rest until cooling sufficient; verify PGA stable at 3.7. Mine's still up there at some horrendous number. No wonder - -
04 19 11 34	LMP-LM	Get these.
04 19 11 35	CDR-LM	No wonder I can't move. Two down. LM suit circuit 3.6 to 4.0. It is, 4.1.
04 19 11 43	LMP-LM	Good.
04 19 11 44	CDR-LM	Need 4.3. CWEA status. You should have an ascent PREP light, a preamps, and an ECS.
04 19 11 50	LMP-LM	Exactly what we've got.
04 19 11 52	CDR-LM	And H_2O SEP COMPONENT LIGHT ON.
04 19 11 54	LMP-LM	Okay.
04 19 11 56	CDR-LM	LIGHTING ANNUNCIATOR/NUMERIC, DIM.
04 19 12 00	LMP-LM	Okay.
04 19 12 02	CDR-LM	CB(16) TV CLOSE.
04 19 12 04	LMP-LM	All right.
04 19 12 05	CDR-LM	Do that.
04 19 12 06	LMP-LM	I'm going to turn around.

04 19 12 07	CDR-LM	Okay.
04 19 12 21	LMP-LM	CLOSED.
04 19 12 23	CDR-LM	Now, if you'll just hold still a minute - No, you're going to have to turn around and get in the corner.
04 19 12 29	LMP-LM	Okay.
04 19 12 30	CDR-LM	And bend over and I'll get your antenna up.
04 19 12 31	LMP-LM	All right.
04 19 12 33	CDR-LM	Easy. Ea -
04 19 12 34	LMP-LM	You done?
04 19 12 35	CDR-LM	Yes. Okay. Bend over.
04 19 12 36	LMP-LM	Okay.
04 19 12 37	CDR-LM	Can you bend over?
04 19 12 52	CDR-LM	One antenna up.
04 19 12 53	LMP-LM	Okay.
04 19 13 12	LMP-LM	Yours is up.
04 19 13 13	CDR-LM	Okay. Wait for it to cool.
04 19 13 27	LMP-LM	Why don't you put those LIGHTING ANNUNCIATORS to DIM?
04 19 13 30	CDR-LM	Okay. If you'll back into your corner so I can turn around.
04 19 13 33	LMP-LM	Okay.
04 19 13 46	LMP-LM	Okay.
04 19 13 54	CDR-LM	I'm finding it the other way around. In the airplane, I walk flat-footed. Here, I'm standing on my toes all the time.
04 19 14 09	CDR-LM	A pretty good vacuum. Wonder how long it's going to take this boiler to get going.
04 19 14 26	LMP-LM	New visor.
04 19 14 29	CDR-LM	No. Same as yours.

04 19 14 32	LMP-LM	Some of this cool air and it'll be okay.
04 19 14 39	CDR-LM	There goes the hatch.
04 19 14 40	LMP-LM	Oh, oh. Let's get that baby. Get it. Okay. I'll hold it open. Yes, because that water - -
04 19 14 49	CDR-LM	Yes, I know.
04 19 14 50	LMP-LM	That'll tend to keep it closed. Yes, let's pull it all the way open while waiting for ...
04 19 14 54	CDR-LM	Wait a minute. That a boy.
04 19 15 28	CDR-LM	Hey, my boiler's on the line.
04 19 15 30	LMP-LM	Yes. Mine's coming up, too. Feels real good.
04 19 15 33	CDR-LM	Let's see. I can go to intermediate flow, huh?
04 19 15 39	LMP-LM	Yes. Soon as she starts.
04 19 15 43	CDR-LM	Hey, it's in INTERMEDIATE. I'm ready to go over the sill.
04 19 15 46	LMP-LM	Just a second.
04 19 15 47	CDR-LM	... my checklist.
04 19 15 48	LMP-LM	Can't find the LEC; hey, come on, babe.
04 19 15 52	CDR-LM	Deploy the LEC into MESA; MOBILITY; cg shift, downreach, arm motion, walking balance and all that good stuff.
04 19 16 --		BEGIN LUNAR REV 17
04 19 16 01	LMP-LM	Just a second, pull the door all the way back. Want me to hand you something? Can you go out, and then I'll hand it to you. Yes. By-by; see you in a minute.
04 19 16 17	CDR-LM	How am I doing? Am I hanging on something here? I get the feeling I'm stuck under something here.
04 19 16 22	LMP-LM	You're bumping into the - the purse there. Forward.
04 19 16 26	CDR-LM	Purse? ... purse. Okay.
04 19 16 29	LMP-LM	All right, now you're in good shape.

04 19 16 31	CDR-LM	Okay.
04 19 16 32	LMP-LM	Go straight down from where you are.
04 19 16 33	CDR-LM	Okay.
04 19 16 36	LMP-LM	Good; that's good.
04 19 16 38	CDR-LM	Okay.
04 19 16 39	LMP-LM	Doing good. You're headed right square out the hatch. You'll have to bend over more, though. Wait - wait - wait - oops. Come forward a little. Go to your right - you're - There you are. Now go. Get that little - -
04 19 16 59	CDR-LM	Got to kneel down a little more.
04 19 17 03	LMP-LM	Well, I'll push you if you don't mind.
04 19 17 10	CDR-LM	What am I hung on?
04 19 17 12	LMP-LM	Nothing. You're okay.
04 19 17 14	CDR-LM	Got this garbage bag in my way.
04 19 17 17	LMP-LM	Okay. You're headed out the door. Looks real good.
04 19 17 39	CDR-EVA	Okay. Okay, I'm out on the porch. Just a second, gang, let me pull a pip pin. Deploy the MESA.
04 19 17 58	LMP-LM	Okay.
04 19 17 59	CDR-EVA	And I'm having a heck of a tug with that handle. Down another step.
04 19 18 03	LMP-LM	Okay. While you're doing that, let me get the LEC ready for you.
04 19 18 10	CDR-EVA	Good godfrey. That - That handle's in there like something I never saw before.
04 19 18 18	LMP-LM	How's the lock joint? Is it easy to get - Was it easy to get the lock out?
04 19 18 21	CDR-EVA	Yes. Now that's better. I couldn't get the handle out of the deal. I just pulled the cable releases down.
04 19 18 28	LMP-LM	Okay.

04 19 18 29	CDR-EVA	There you go.
04 19 18 34	LMP-LM	You haven't got anything to do, so you can take this with you.
04 19 18 37	CDR-EVA	Hey, I'll tell you what we're parked next to.
04 19 18 39	LMP-LM	What?
04 19 18 40	CDR-EVA	We're about 25 feet in front of the Surveyor crater.
04 19 18 43	LMP-LM	That's good. That's where we wanted to be.
04 19 18 45	CDR-EVA	I got - I bet you when I get down to the bottom of the ladder, I can see the Surveyor.
04 19 18 51	LMP-LM	Roger. Hey, guy, you want to take this with you, Pete?
04 19 18 53	CC	Sounds good, Pete. Just like you wanted.
04 19 18 56	CDR-EVA	Just swing her out here. That's right.
04 19 19 02	LMP-LM	Okay; now hold it there just a second, Pete.
04 19 19 04	CDR-EVA	Okay.
04 19 19 06	LMP-LM	One second.
04 19 19 11	CDR-EVA	Do you have any TV, Houston?
04 19 19 14	CC	Roger. We've got a TV. No Pete Conrad as yet.
04 19 19 24	CDR-EVA	No, I'm at the top of the ladder. Okay. Now look, this thing is all the way out of the package. How do you want me to do it? This way?
04 19 19 31	LMP-LM	Just keep doing.
04 19 19 32	CDR-EVA	Huh?
04 19 19 33	LMP-LM	Adiós.
04 19 19 34	CDR-EVA	No, but this thing isn't all the way out of the - ... Here, let me have this end of it. Let me come back up the ladder a notch.
04 19 19 43	LMP-LM	Okay.
04 19 19 45	CDR-EVA	That a boy. Which end is that? Which end do I want? This is the end I want.

04 19 19 50	LMP-LM	There you go.
04 19 19 52	CDR-EVA	There we go (laughter). Look at that stuff go.
04 19 19 56	LMP-LM	Sure glides at one-sixth, doesn't it?
04 19 19 58	CDR-EVA	Yes. Wait a minute. Looks - Looks like we got 900 feet of this stuff.
04 19 20 07	LMP-LM	Hey - Okay, just a second. Don't go down yet. I've got to get my camera on you, babe.
04 19 20 11	CDR-EVA	I can't go down yet anyhow. I got a - whoop - get the LEC all the way down.
04 19 20 16	LMP-LM	Okay.
04 19 20 17	CDR-EVA	There you go.
04 19 20 36	CDR-EVA	All right. Still can't figure out what kind of a snarl I've got here.
04 19 20 55	CDR-EVA	Hey, Al.
04 19 20 56	LMP-LM	Yes.
04 19 20 57	CDR-EVA	Can you look - Can you look out your window?
04 19 20 59	LMP-LM	Sure.
04 19 21 02	CDR-EVA	All right. I think I see what's wrong.
04 19 21 07	LMP-LM	What's the problem?
04 19 21 08	CDR-EVA	Oh, that LEC came out of the bag in three pieces, and as you would well imagine, then I picked the wrong piece.
04 19 21 15	LMP-LM	Do you want me to pull it back in and throw you the end?
04 19 21 17	CDR-EVA	No. That's not the problem.
04 19 21 19	LMP-LM	It's no trouble.
04 19 21 20	CDR-EVA	I got it right now. Man, they aren't kidding when they say things get dusty. Whew! I'm headed down the ladder.
04 19 21 26	LMP-LM	Okay; wait. Let me get the old camera on you, babe.

04 19 21 29	CDR-EVA	Okay.
04 19 21 51	CDR-EVA	Man, is that a pretty-looking sight, that LM.
04 19 21 58	CC	You're coming into the picture now, Pete.
04 19 22 03	CDR-EVA	Okay.
04 19 22 06	LMP-LM	Okay; got the old camera running.
04 19 22 09	CDR-EVA	Okay. Down to the - the pad.
04 19 22 15	LMP-LM	Okay.
04 19 22 16	CDR-EVA	Whoopie! Man, that may have been a small one for Neil, but that's a long one for me. I'm going to step off the PAD.
04 19 22 24	CDR-EVA	MARK.
04 19 22 25	CDR-EVA	Off the - ooo, is that soft and queasy. Hey, that's neat. I don't sink in too far. I'll try a little - Boy, that Sun's bright. That's just like somebody - shining a spotlight on your hand.
04 19 23 12	CDR-EVA	Well, I can walk pretty well, Al, but I've got to take it easy and watch what I'm doing. Boy, you'll never believe it. Guess what I see sitting on the side of the crater. The old Surveyor. The old Surveyor; yes, sir (laughter). Does that look neat! It can't be any further than 600 feet from here. How about that?
04 19 23 43	CC	Well planned, Pete.
04 19 23 44	CDR-EVA	Okay. Let me see. I've got a little chore to do here, right? Say again.
04 19 23 50	CC	I say that was well planned, Pete.
04 19 23 55	CDR-EVA	Yes. Just a couple of months with a lot of people. Let's see, deploy the LEC in the MESA - That's done. I'm looking at my mobility, cg shift. I have the decided impression I don't want to move too rapidly, but I can walk quite well. That cra - The Surveyor really is sitting on the side of a steep slope, I'll tell you that. Okay. Now I'll work on my contingency sample. Got to walk real careful, Al.
04 19 24 36	LMP-LM	Okay.

04 19 24 37	CDR-EVA	Can you see me all right?
04 19 24 38	LMP-LM	Not yet. I need you ... back of the window for - -
04 19 24 41	CDR-EVA	Okay.
04 19 24 42	LMP-LM	- - just a second.
04 19 24 43	CDR-EVA	... move in a hurry.
04 19 25 03	CDR-EVA	As you might suspect from some of the pictures Neil brought back, gang, I have a - several small rocks sitting out in front of me that have a neat amount of dirt built up around them. I'm not sure that my descent engine didn't blow them there. But then again, it may not have.
04 19 25 36	CC	Roger, Pete. Copy that. Is the dirt built up on the side closest to the LM?
04 19 25 43	CDR-EVA	Well, let me - I'm going over to get my contingency sample, and I'll get one of the rocks - in the sample. And yes, as a matter of fact, it is built up on the side that - that the LM landed on. Let me get it. Well, there's one scoop. There's another with some more rocks in it. Whee! This dirt's just like the one-sixth g airplane, Al. Flies up in the air, and you can just chase it around. Boy, now, I'll tell you - you know, this Sun it - it really is - it's just somebody's got a - a super bright spotlight. Here's another good looking rock. Whoops! In the sample. There's another rock I want to get in it.
04 19 27 06	CDR-EVA	I think that's about enough, don't you? Except there's one - one big rock that's too pretty to pass up. No, I may not be a hog. It won't fit. I'll go over here and get this other one, though.
04 19 27 19	LMP-LM	Boy, you sure lean forward, Pete.
04 19 27 22	CDR-EVA	Hey, lean forward; I feel like I'm going to fall over in any direction.
04 19 27 26	LMP-LM	Your leaning about - -
04 19 27 27	CDR-EVA	Say, Houston, one of the first things that I can see, by golly, is little glass beads. I got a piece about a quarter of an inch in sight, and

I'm going to put it in the contingency sample bag, if I can get it. I got it. Am I really leaning over, Al?

04 19 27 50	LMP-LM	You sure are. You - On Earth you'd fall over, I believe.
04 19 27 54	CDR-EVA	Huh?
04 19 27 55	LMP-LM	On Earth, you'd fall over leaning that far forward.
04 19 27 59	CDR-EVA	But - it seems a little weird, I'll tell you. It's - Don't think you're going to steam around here quite as fast as you thought you were.
04 19 28 06	LMP-LM	I'll tell you, your boots are digging in the soil quite a bit. If you don't pick up your feet, you really kick a - a load of dirt ahead of you. Your left foot's got a big mound ahead of it right now that it's just pushing along.
04 19 28 20	CDR-EVA	Uh-oh, do I hear a tone?
04 19 28 23	LMP-LM	Yes. I've got a H_2O A.
04 19 28 27	CDR-EVA	You do?
04 19 28 29	LMP-LM	Yes. I wonder why? Hey, Houston.
04 19 28 35	CC	Al, verify feed water's ON.
04 19 28 40	LMP-LM	It's - It's been on. It's still on. Boy, do I think and wow! Feed water's on and still real cool in here.
04 19 29 04	CC	Al, DIVERTER VALVE to MINIMUM.
04 19 29 09	LMP-LM	Okay. It's MINIMUM now. What do you think I may have done? Broken through the sublimator or something?
04 19 29 18	CC	That's affirmative, Al.
04 19 29 31	CC	We have a good shot of you there, Pete.
04 19 29 36	CDR-EVA	Okay. Well, I'm starting to - take this baby apart. While I am doing that - Houston.
04 19 29 52	CC	Go ahead.

04 19 29 53	CDR-EVA	That descent engine! It's just like Neil's. I didn't dig any crater at all. Al, you've really got to watch your step down here.
04 19 30 08	LMP-LM	Okay.
04 19 30 20	CDR-EVA	Look at all those good things in this MESA. Things that I've seen before. Didn't hardly stroke the gear at all, and it looked like we were - Looks like I landed just about vertical.

END OF TAPE

04 19 30 46	CDR-EVA	Just like Neil and Buzz said, Al. Get on a little slope and you tend to keep on going.
04 19 31 20	LMP-LM	... fell over.
04 19 31 30	CDR-EVA	Would you believe it; the MESA is too low for once?
04 19 31 41	CC	Al, how does the feedwater look now?
04 19 31 47	LMP-LM	Well, it's still got an A in there, but I'm plenty cool, I went back to MINIMUM, and I'm sitting here in MINIMUM. What do you think happened?
04 19 32 02	CC	Al, we would like to watch it a little bit. It could be instrumentation. Stand by.
04 19 32 08	LMP-LM	Okay.
04 19 32 39	CDR-EVA	How long have I been out, Houston?
04 19 32 45	CC	Pete, you've been out 25 minutes, and you're about 4 minutes ahead.
04 19 32 52	CDR-EVA	Okay. I got the cable out, ... MESA, and I'm setting up ETB at this time.
04 19 33 06	LMP-LM	Let's see. How is this packed? Very nice. Very nice.
04 19 33 14	CDR-EVA	Hey, Al, ... work out here all day. Just take your time.
04 19 33 22	LMP-LM	Almost too cold on INTERMEDIATE. I'm thinking seriously of going to M.
04 19 33 38	CDR-EVA	There's some - color chart.
04 19 33 55	CDR-EVA	(Humming) No. Tray is right side out.
04 19 34 06	LMP-LM	Right. No, that's not right. No.
04 19 34 14	CDR-EVA	I think our next big surprise, Al, is getting this thing up.
04 19 34 19	LMP-LM	Getting what up?
04 19 34 20	CDR-EVA	The ETB.

04 19 34 22	LMP-LM	Oh, is that right?
04 19 34 24	CDR-EVA	(Laughter) We'll see what happens. Okay? How's your water?
04 19 34 28	LMP-LM	Oh, it still shows an A, but it's cool. It may be instrumentation.
04 19 34 32	CDR-EVA	Let's hope so. Just beginning to warm up to this task.
04 19 34 55	CDR-EVA	LCG water pump sounds like a diesel truck running out here. Comforting to know that it's running. I'm off to get the battery.
04 19 35 11	LMP-LM	Okay. I think I know what happened, Houston. I think I know what happened.
04 19 35 25	CC	Pete, go ahead.
04 19 35 27	LMP-LM	Ahhh!
04 19 35 30	CDR-EVA	What did - What did you just do, Al?
04 19 35 31	LMP-LM	Man, I just figured it out.
04 19 35 33	CDR-EVA	You sure did. You just blew water out the front of the cabin.
04 19 35 36	LMP-LM	That's what - -
04 19 35 37	CDR-EVA	Ice crystals.
04 19 35 38	LMP-LM	- - that's what had happened to the PLSS.
04 19 35 41	CDR-EVA	What's that?
04 19 35 42	LMP-LM	Oh, the door had flown shut, like it did before; and it probably bothered the sublimator, because it wasn't in a good vacuum anymore.
04 19 35 47	CDR-EVA	Yes.
04 19 35 50	LMP-LM	So, the door is probably going to start working in a minute.
04 19 35 54	CDR-EVA	I should hope so. When you opened the door, that thing shot iceballs (laughter) straight out the hatch.
04 19 36 00	LMP-LM	Yes. There's probably - all from my - never thought you'd have to do that.

04 19 36 05	CDR-EVA	Hey, you bent the outside of that front hatch on the way out. You tore some of the skin.
04 19 36 10	LMP-LM	How did I do that?
04 19 36 11	CDR-EVA	I don't know; must have hit your PLSS there. Got a nice scrape mark right along the way out.
04 19 36 21	LMP-LM	Sorry about that. ... me to be gentle.
04 19 36 25	LMP-LM	Houston - -
04 19 36 26	CC	Al, it's looking better.
04 19 36 28	CDR-EVA	Did you - -
04 19 36 29	LMP-LM	Yes, I - I didn't realize that the hatch could close quite so tightly like that, because when I was working on the other side of the cabin, the hatch went closed and I didn't notice it, and apparently the - it's quitting - holding a good vacuum in here. My H_2O A flag is off now, so everything is copacetic.
04 19 36 52	CC	Roger, Al. It looks good down here.
04 19 36 57	LMP-LM	Okay.
04 19 36 58	CDR-EVA	Okay. I've got both canisters, Al, both batteries. As soon as I get them in here, I got to pack the contingency sample.
04 19 37 11	LMP-LM	Okay. Sitting tight, waiting for you, babe.
04 19 37 14	CDR-EVA	Okay, I just - I tell you, you really can't move as fast as I thought you could. You got to take it real easy. It's a feeling that I'm most spiffy on the balance up here. Help. I may have to -
04 19 38 06	CDR-EVA	Okay. Man, did I get dirt all over myself. This is what is known as dirt, dirt.
04 19 38 41	LMP-LM	Let me know when you start heading back out there to duty, Pete - Pete - Pete. I'll get a good shot of you, Pete.
04 19 38 47	CDR-EVA	Getting ready to do it in a second, Al, just as soon as I get the bag. I got the contingency sample in the bag.

04 19 38 54	LMP-LM	Okay.
04 19 38 55	CDR-EVA	Just as - I've got everything else, bus batteries, LiOH canisters, and I just got to hook up the LEC. (Humming) I tell you one thing, we're going to be a couple of dirty boogers. ... ...? Why don't you take up a little slack, Al?
04 19 38 58	CC	Yankee Clipper, Houston.
04 19 39 05	CMP	Hello, Houston; Yankee Clipper.
04 19 39 17	CC	Yankee Clipper, Houston.
04 19 39 35	LMP-LM	All right. Just a little. It works. Hey, this is - -
04 19 39 39	LMP-LM	What?
04 19 39 40	CDR-EVA	I tell you, this is dirt, dirt.

GOSS NET 1 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

04 19 39 46	CC	Yankee Clipper, Houston.
04 19 39 52	CMP	Hello, Houston; Clipper here.
04 19 40 02	CC	Clipper, Houston. Intrepid's started the EVA. They're 32 minutes in, and things are looking good.
04 19 40 13	CMP	Roger, ... they're out. Thank you.
04 19 40 20	CC	Dick, when the COMM clears up, we'll give you a P22 PAD and a map update for REV 18.
04 19 40 29	CMP	Okay.
04 19 44 43	CC	Yankee Clipper, Houston.
04 19 45 03	CC	Yankee Clipper, Houston.
04 19 45 08	CMP	Houston, Clipper. Go ahead.
04 19 45 10	CC	Clipper, would you go to a roll 180, pitch 345? At that attitude, you'll have to just roll a 180 for your landmark tracking. To get high gain, go to angle PITCH, minus 45; YAW, 350.

04 19 46 07	CC	Yankee Clipper, Houston. Do you copy?
04 19 46 11	CMP	Roger. And we're roll 180, ... 345.
04 19 46 17	CC	That's affirmative.
04 19 48 29	CMP	Okay, Houston. Clipper on HIGH GAIN.
04 19 48 33	CC	Roger, Yankee Clipper. We'll be right back with you.
04 19 48 58	CC	Yankee Clipper, Houston. We have a P22 PAD for you and a map update for REV 18 when you're ready to copy.
04 19 49 07	CMP	Roger. Go ahead.
04 19 49 09	CC	P22: T_1, 116:16:51, 116:21:53, that's North, 8 miles. Your DAC settings are 1/60th, 1 frame per second, and that's the color film.
04 19 49 35	CC	Your map updates for REV 18: 116:50:14, 117:15:07, 117:36:22. Do you copy?
04 19 49 58	CMP	This is Clipper. Roger. Can I use my last coordinates for Surveyor and Intrepid?
04 19 50 09	CC	Clipper, say again.
04 19 50 15	CMP	Can I use my own coordinates for Intrepid?
04 19 50 22	CC	Roger, Clipper. We copy.
04 19 55 37	CSM	Music - Teabury Shuffle (Tijuana Brass)
04 19 55 57	CC	Thanks for the music, Clipper.

GOSS NET 2 COMMUNICATIONS BETWEEN CC AND LM RESUME

04 19 39 51	CDR-EVA	(Laughter) That's the greatest.
04 19 39 53	LMP-LM	What's that?
04 19 39 55	CDR-EVA	My end of the ETB just came out of its metal slot. Somebody that made this can didn't make it like all the training units; they made it littler, so it came out. I caught it as it was going by. You know this metal ... are ... all the way through?

04 19 40 11	LMP-LM	Yes.
04 19 40 12	CDR-EVA	Unfortunately, it's smaller than the metal holder. Kind of interesting.
04 19 40 18	CDR-EVA	Wait, wait, wait, wait, wait, wait.
04 19 40 19	LMP-LM	Okay.
04 19 40 23	CDR-EVA	And ... ..., come on. That a boy. Wait just a minute. Okay, now.
04 19 40 30	LMP-LM	Hold the phone a second.
04 19 40 34	CDR-EVA	You can - wait, wait. ... I go. (Humming and laughter) Wait until I get this shadow. Because I can't see what I'm doing more than right here in the front - -
04 19 40 46	LMP-LM	Okay.
04 19 40 47	CDR-EVA	- - I'm about to fall down this little crater hole. Oops. Wait, it really does get -
04 19 40 53	LMP-LM	You'd better get over here in the shadow.
04 19 40 56	CDR-EVA	I'm in a - Oops, another crater hole (laughter).
04 19 41 01	LMP-LM	It's a regular obstacle course over there.
04 19 41 02	CDR-EVA	Man, am I going to get dirty. Hold it, now. Back up a little ways. ... Tell me if it's clear of the porch rail, huh?
04 19 41 20	LMP-LM	It is now.
04 19 41 21	CDR-EVA	It is? I can't see a thing, looking into the Sun. Pull.
04 19 41 25	LMP-LM	Okay, I'll bring her in.
04 19 41 29	CDR-EVA	Dump it in easy.
04 19 41 31	LMP-LM	Okay. Good rig.
04 19 41 32	CDR-EVA	I can't. Wait a minute. Wait, wait, wait, wait. That a boy; now, I can see. Oh, ... (laughter) I'm getting dirty. Whee! Got it.
04 19 41 56	LMP-LM	Okay. I'll just step right back out to you in a flash.

04 19 42 00	CDR-EVA	Okay, let me see. While you're doing that, what was I supposed to do? Oh, I know, possibly TV deploy. I'll go work on the - yes - tripod.
04 19 42 15	LMP-LM	Okay.
04 19 42 17	CDR-EVA	(Humming) Trying to learn to move faster. Pretty good. Hey, I feel great. How long we been out, Houston?
04 19 42 37	CC	Pete, you're 34 minutes into the EVA, and you're right on the nominal time line.
04 19 43 13	CDR-EVA	That contingency sample is black.
04 19 43 16	LMP-LM	You'd better believe it.
04 19 43 24	CDR-EVA	I may have put - filled the bag too full.
04 19 43 33	LMP-LM	Doesn't go into ... ...
04 19 43 36	CDR-EVA	One camera, two cameras. Come on, little fellow. Here comes one TV camera.
04 19 43 59	LMP-LM	Okay, ready for you, Pete.
04 19 44 01	CDR-EVA	Right. Well - Shoot - Allright. I got the strap onto it. Let me come over here and get it. Here I come.
04 19 44 13	LMP-LM	Okay.
04 19 44 16	CDR-EVA	(Humming) I feel like Bugs Bunny (laughter).
04 19 44 33	LMP-LM	Take it away whenever you need it.
04 19 44 35	CDR-EVA	Okay. I'm going right now, if I don't fall over, I can -
04 19 44 43	LMP-LM	Sure goes out easy.
04 19 44 44	CDR-EVA	Yes. Yes. Let her keep coming. Let me get over to this side. Let's get it over the handrail. Hold it, hold it right there.
04 19 44 56	LMP-LM	Okay.
04 19 44 57	CDR-EVA	Now, I can't see it on account of the Sun, so tell me when it's over the handrail.

04 19 45 00	LMP-LM	It's over the handrail now.
04 19 45 01	CDR-EVA	All right. Just lower it real slow. That's a boy. Easy. Hold it right there.
04 19 45 06	LMP-LM	Okay.
04 19 45 07	CDR-EVA	Just stay put. Okay, let her go.
04 19 45 14	LMP-LM	That's it.
04 19 45 15	CDR-EVA	All right. Now, just hold it right there. Hold it; hold it; hold it. One - that is - two. Okay, let go. All the way.
04 19 45 30	LMP-LM	Okay.
04 19 45 33	CDR-EVA	All right, LEC ..., TV deploy, LMP egress, contingency sample area. Deploy and place 70 millimeter on the MESA. So I get me a camera.
04 19 45 59	LMP-LM	Okay, be out in a minute. Got to set the camera, and I'll be right out.
04 19 46 03	CDR-EVA	All right. Let me know so I can photograph you.
04 19 46 06	LMP-LM	Okay.
04 19 46 12	CDR-EVA	Okay, contingency sample 8, that's 8. Eight, five. It's done.
04 19 46 59	CDR-EVA	We sampled in quite a few places, Houston, so I'm taking a bunch of pictures.
04 19 47 04	CC	Roger, Pete. Pete, for your information for those photos, your shadow lines right now is about 45 feet on a level plane.
04 19 47 16	CDR-EVA	Okay, very good. Contingency sample area I got, deploy the color chart (laughter). Take your time, Al.
04 19 47 28	LMP-LM	Okay. I'm ready to do it.
04 19 47 55	LMP-LM	Houston. How does the LM look? I'm getting ready to go out the front door.
04 19 48 03	CC	Roger. I'll stand by on that.
04 19 48 36	CDR-EVA	Whoops. Hey, wait. I'm going to - I wonder if I can get in the bottom of this crater hole.

04 19 48 42	CC	Al, Houston. The LM is looking good. You're GO for egress. Pete, you're at 40 minutes into the time line, and you're about 4 minutes ahead.
04 19 48 55	CDR-EVA	Okay (laughter) Oh dear.
04 19 49 10	LMP-LM	Okay, Pete, here I come.
04 19 49 11	CDR-EVA	Wait, wait, wait, wait.
04 19 49 13	LMP-LM	You ready now?
04 19 49 14	CDR-EVA	No, no, no, no. Let me come (humming). Got to run through this crater. Here I come. Now, wait a minute, LM egress 5 - oops - at 15. I just shambled that color chart. I tried to throw it in the ground; and naturally, it went in sideways, and it got itself so covered with dirt, you wouldn't know what color it was. Okay, I'm ready for you.
04 19 49 43	LMP-LM	Okay, you might want to give me directions, too.
04 19 49 45	CDR-EVA	All right, yes.
04 19 49 48	LMP-LM	Bumping anything?
04 19 49 52	CDR-EVA	Okay, you're coming straight out and the further you can bend over the better. All right, move to your right.
04 19 49 59	LMP-LM	Okay.
04 19 50 00	CDR-EVA	That a boy. Now. That's it. You have to get your knees down. That a boy. Good shape, good shape.
04 19 50 12	LMP-EVA	Okay, I'm pulling the hatch closed here.
04 19 50 15	CDR-EVA	Okay. Don't lock it. Okay, you're right at the edge of the porch.
04 19 50 22	LMP-EVA	Okay.
04 19 50 36	CDR-EVA	Hey, if I'd landed 20 feet behind where I landed, we'd have landed right smack in that crater.
04 19 50 49	CDR-EVA	Do it.
04 19 50 51	LMP-EVA	Oh, it's kind of hard to move the door. I was just getting in and trying to get it.

04 19 50 57	CDR-EVA	There you go.
04 19 50 59	LMP-EVA	I'm going to try to keep the door open for us there.
04 19 51 03	CDR-EVA	Okay.
04 19 51 13	LMP-EVA	Pretty good, I'd better get my visor down though.
04 19 51 15	CDR-EVA	Yes sir. My, that Sun is bright.
04 19 51 27	LMP-EVA	Well, the LM looks nice on the outside.
04 19 51 29	CDR-EVA	Houston, let me ask you a question. How important is that color chart? I tried to spike it in the ground, you know, so it was perpendicular to the Sun, and it just didn't do that, and it's all covered with dirt. I can go back and resalvage it, if you want to take the time.
04 19 51 45	CC	Press on with what you're doing there, Pete, and we'll get a answer back to you.
04 19 51 52	CDR-EVA	Okay.
04 19 51 53	CC	Pete, press on. No problem.
04 19 51 59	CDR-EVA	Okay. That a boy. You look great. Welcome aboard. Okay, place - Wait a minute - The chart I didn't get, deploy color chart on undisturbed surface. Didn't make it. Contingency sample area I got, and LMP egress I got. I'm off for S-band antenna.
04 19 52 18	LMP-EVA	Okay. My that Sun is bright.
04 19 52 22	CDR-EVA	Yes, take it easy.
04 19 52 25	LMP-EVA	It feels good.
04 19 52 26	CDR-EVA	Yes, you really do begin to adapt. You hop a little bit. If you turn around and walk over to your right a little bit and look over that crater, you're going to see our pal sitting there, and that's one steep slope it's on. Okay, now what have you got all over your boot? Stop. You picked up a piece of landing gear ...
04 19 52 46	LMP-EVA	Okay. Here we go.

04 19 52 49	CDR-EVA	That a boy.
04 19 52 51	CDR-EVA	Okay, I'm going into -
04 19 52 52	LMP-EVA	Hey, you've got to watch it in these shadows.
04 19 52 54	CDR-EVA	Yes. You can't see what you're doing. Come over here where I am. See that Surveyor sitting there?
04 19 52 59	LMP-EVA	There that thing is. Look at that.
04 19 53 01	CDR-EVA	Will you look how close we almost landed to that crater!
04 19 53 06	LMP-EVA	Beautiful, Pete.
04 19 53 08	CDR-EVA	Look at the descent engine. It didn't even dig a hole. Okay.
04 19 53 14	CC	Pete, Houston.
04 19 53 16	CDR-EVA	Houston, I'm need to process -
04 19 53 18	LMP-EVA	Go ahead, Houston.
04 19 53 21	CC	Pete, will you give us status the - on the LM and also some comments on your boot penetration?
04 19 53 32	CDR-EVA	Okay. My comment's are exactly the same as Neil's. In fact, everytime I get down in one of these little craters, I sink in a lot further. I'd say our footsteps are sinking in -
04 19 53 42	LMP-EVA	What do you want to do with it?
04 19 53 43	CDR-EVA	Put it over by the light gear. I think I cover that rock box with - it later. Remember, last minute change. And -
04 19 53 53	LMP-EVA	Hey, wait a minute. You want ... the next step?
04 19 54 00	CDR-EVA	Oh, I tell you. I think it's pretty much the same as Neil and Buzz found, don't you, Al?
04 19 54 05	LMP-EVA	I do. One thing I've noticed; it seems to compact into a very shiny surface. I guess the particles are very small and very cohesive, so when you - every boot print, as you look at it,

it looks almost like hitting a piece of rubber itself. It's so well defined, you can't see any grains in it or anything.

04 19 54 26 CDR-EVA Al, can you find - can you find the Earth?

04 19 54 29 LMP-EVA Where's the Earth?

04 19 54 31 CDR-EVA Oh, there it is; I can see it. Hello [illegible], Earth.

04 19 54 33 LMP-EVA Where is it?

04 19 54 34 CDR-EVA Just look at the S-band antenna and look up that way; it's right up there.

04 19 54 38 LMP-EVA That's the ...

04 19 54 40 CDR-EVA Okay. Now - Where did we all agree was the best place to deploy this S-band? ... here, huh?

04 19 54 45 LMP-EVA Yes. A little bit further out.

04 19 54 47 CDR-EVA That ought to - Here's a good spot. Hey, I don't want to get too far away from the cable.

04 19 54 51 LMP-EVA What's the - What's the matter with right here?

04 19 54 52 CDR-EVA That's a good place.

04 19 54 53 LMP-EVA Okay.

04 19 54 54 CDR-EVA Point to Earth.

04 19 54 56 LMP-EVA That's what it says.

04 19 54 59 CDR-EVA Okay.

04 19 55 00 LMP-EVA I'm glad you didn't land back about 50 feet.

04 19 55 02 CDR-EVA That's what I'm saying, buddy.

04 19 55 05 LMP-EVA (Laughter) Hey, you can see some little shiny -

04 19 55 11 CDR-EVA Glass.

04 19 55 12 LMP-EVA Right - glass, in these rocks.

04 19 55 14 CDR-EVA Yes, I reported that.

04 19 55 18	LMP-EVA	You can also see some pure glass, if you look around. You can jump up in the air.
04 19 55 26	CDR-EVA	Hustle, boy, hustle. We got a lot of work to do. I've got to do my PANS in 15 - 5 minutes here.
04 19 55 31	LMP-EVA	Okay. I'm doing some useful work, like getting that TV camera going.
04 19 55 35	CDR-EVA	Okay, good idea.
04 19 55 42	LMP-EVA	You really got to be careful when you go out of the light into the dark.
04 19 55 46	CDR-EVA	Yes. Okay.
04 19 55 58	LMP-EVA	Okay. Move position 20 feet and 10.
04 19 55 59	CDR-EVA	Hey, I got a - This second thing won't come out. Hey, give me a hand here.
04 19 56 09	LMP-EVA	Yes, sir; what can I do for you?
04 19 56 11	CDR-EVA	This second S-band thing won't deploy.
04 19 56 13	LMP-EVA	Well, do you want me to pull or hold?
04 19 56 15	CDR-EVA	On this?
04 19 56 16	LMP-EVA	Yes. On this. Pull. Pull away from me.
04 19 56 19	CDR-EVA	Okay.
04 19 56 21	LMP-EVA	Okay, never mind; forget it.
04 19 56 23	CDR-EVA	You get it?
04 19 56 24	LMP-EVA	No - I don't think it's - Let go, let go.
04 19 56 26	CDR-EVA	Try different -
04 19 56 27	LMP-EVA	You got it; never mind.
04 19 56 30	CDR-EVA	That's not right, is it? Doesn't that thing have two sections to it?
04 19 56 34	LMP-EVA	No, never mind; forget it; let's go.
04 19 56 39	CDR-EVA	Hey, Houston; does the inner mast - it's just one piece, huh?

04 19 56 48	CC	Copy the question. You want to know if the inner mast is one or two sections.
04 19 56 55	CDR-EVA	Yes. It seems to me - I'm getting dumb-dumb, maybe. It looks shorter than it used to look at practice for some reason - -
04 19 57 05	CC	Pete, that inner mast should be two sections.
04 19 57 06	CDR-EVA	- - more than one section - I think so; you have to pull out the top ...
04 19 57 18	LMP-EVA	Hey, this TV cable over here by the front porch.
04 19 57 22	CDR-EVA	Okay.
04 19 57 23	LMP-EVA	The TV is almost off.
04 19 57 26	CDR-EVA	You know, it is significantly easier just to do anything here. Like this arm motion is so simple because you're not fighting the rest of your weight like you are in one g.
04 19 57 38	LMP-EVA	All set?
04 19 57 43	CDR-EVA	(Laughter) Look at that; that leg doesn't want to - Go on down, leg (laughter).
04 19 57 49	LMP-EVA	Okay; let's get that TV down and show everybody. Wait a minute. Lock inner mast; lock outer mast; extend and lock brakes; we've done align - remove thermal cover. Okay? ... lock thermal cover.
04 19 58 12	CDR-EVA	Goodby.
04 19 58 21	LMP-EVA	Okay, Houston, I'm going to move the TV camera now.
04 19 58 24	CC	Roger, Al.
04 19 58 28	CDR-EVA	Hey, it's real nice moving around up here. You don't seem to get tired. You really hop like a bunny. Where, oh where is Earth? There it is. Here is the TV. And up - Pointing toward the Sun. That's bad. Point it here a minute. (Humming)
04 19 59 07	CDR-EVA	There's that. Look at that go (laughter).

04 19 59 26	LMP-EVA	Hey, Red, I was going to deploy this 20 feet and 10; but, because of the Sun being where it is, we're going to have to deploy it a little bit more toward the 2 o'clock position. I think that will be okay though. That will give you a good shot; right in here. I'll see if I can keep the stuff from getting in the camera at all.
04 19 59 45	CC	Al, we have a pretty bright image on the TV; could you either move or stop it down?
04 19 59 52	CMP-EVA	Okay, I'm going to have to stop it down. That's as far as it goes; Houston. How does that look to you?
04 20 00 08	CC	No, it's still looks the same, Al. Why don't you try shifting the scene?
04 20 00 15	LMP-EVA	Okay, I'm going - the problem is the LM is very reflective; let me - I got two choices. Let me go over here further to the side, and you check and see if it reflects too much; and if it does, I'll have to go stick it in the shade. And then maybe shine past the LM; of course, that makes it not be too good either, but it may be the best we can do.
04 20 00 37	CC	Okay, Al. And also, you might try the automatic light control to the outside.
04 20 00 58	CDR-EVA	Okay, Al, watch.
04 20 01 01	LMP-EVA	Wait a sec. Let me check it. How does that look, Houston?
04 20 01 05	CC	Still looks the same, Al. We have a very bright image at the top and blacked out at the - for about 80 percent of the bottom.
04 20 01 14	CDR-EVA	(Laughter) Man, oh man, did that thing deploy! (Laughter)
04 20 01 22	LMP-EVA	Well, I'll tell you what let me do, Houston. Let me move it around here back, so the back is to the Sun, and maybe that'll help. Maybe that's the way we're going to have to do it.
04 02 01 31	CC	Okay, Al; go ahead.
04 20 01 35	LMP-EVA	Once we learn the trick here, I think we can do it each time. That may do it; that may do it, right there, Houston.

04 20 01 49	CC	Al, we haven't seen any change at all. Why don't you go and take your glove in front of the lens, but not over it, to see whether we can get any change at all.
04 20 02 01	LMP-EVA	What do you see now?
04 20 02 03	CC	Still the same, Al. We've got a very bright part - about 20 percent of the top, and black on the bottom.
04 20 02 15	LMP-EVA	Well, got any suggestions?
04 20 02 19	CC	Stand by, Al.
04 20 02 20	LMP-EVA	I'm pointing it at a nonbright area. Let me point it - it's pointed away from the Sun here. It may be ground problems. I hope it is. All the connections look good.
04 20 02 43	CC	Hey, Al, why don't you take a good close look at the lens and make sure it's in the right configuration?
04 20 02 52	LMP-EVA	Okay, I've got it on focus at infinity; I've got the zoom at 30 or 40 or 50; I'll put in 75; and I got the f-stop at 22.
04 20 03 07	CC	Roger, Al; we copy.
04 20 03 14	LMP-EVA	I've got it pointing exactly opposite the Sun here, so - .
04 20 03 26	CC	Al, we see no change at all in the scene. Why don't you just give it a little tap? It may be the color wheel is hung up.
04 20 03 53	LMP-EVA	I put this antenna 1 foot too close.
04 20 04 13	CDR-EVA	Hey, Houston, it won't hurt if my PLSS antenna hits this S-band antenna, will it?
04 20 04 24	CC	Stand by on that, Pete.
04 20 04 33	CC	Pete, that's no problem.
04 20 04 37	CDR-EVA	Okay.
04 20 04 48	CDR-EVA	Hey, Al.
04 20 04 49	LMP-EVA	Yes.

04 20 04 50	CDR-EVA	Come over here. You're going to have to help me line up this antenna.
04 20 04 53	LMP-EVA	All right. Houston, I'm going to leave the camera just pointed off in the distance. If you get any ideas, I'd be glad to work on it for you.
04 20 05 01	CC	Roger, Al. Try and point it off where you don't get any reflectance into it, and we'll be thinking about it here on the ground.
04 20 05 09	LMP-EVA	Okay. The plug that runs right into the back of the TV, it's sort of a white plastic material and it looks like it's cracked and maybe even melted a little bit. It doesn't look typical of that sort of connecter.
04 20 05 23	CDR-EVA	... around to the back. No, no, no. No, you got to go around - go around so you can look at the antenna and tell me when I've got it pointed at the Earth.
04 20 05 30	LMP-EVA	All right.
04 20 05 31	CDR-EVA	No, don't get underneath it. That a boy.
04 20 05 33	LMP-EVA	Okay.
04 20 05 34	CDR-EVA	Now. Whoops, see what I mean; this thing - you're going to have - really going to have to watch that ALSEP. You could skip over this whole antenna without even blinking at it.
04 20 05 42	LMP-EVA	Okay, go ahead.
04 20 05 44	CDR-EVA	Can you see the Earth?
04 20 05 45	LMP-EVA	No.
04 20 05 46	CDR-EVA	You've got to get around here. The Earth, and the Sun are right lined up. You have to look right into the Sun and look up in the sky. Watch it, you're on the TV antenna - I mean cable.
04 20 05 56	LMP-EVA	Okay.
04 20 06 00	CDR-EVA	See what I'm trying to do? I've got to pitch over now, right?

04 20 06 03	LMP-EVA	Yes. Oh, there it is. I got you now. Bet we can hide it.
04 20 06 08	CDR-EVA	Yes.
04 20 06 09	LMP-EVA	I tell you where you need to go, Pete. Okay, that's good. Now you need to point - you need to rotate the whole thing counterclockwise. That's good. You're getting there - getting there. That old Earth's just hanging up there.
04 20 06 28	CDR-EVA	How much further?
04 20 06 29	LMP-EVA	Oh, I'd say another 3 or 4 degress maybe. Stop. Good boy. Okay, now. Wait. That looks just good, as far as angles. Now, up and down.
04 20 06 41	CDR-EVA	I can move it in a little closer, but -
04 20 06 46	LMP-EVA	Okay, come down with it.
04 20 06 51	CDR-EVA	Touching now, but hate to come down.
04 20 06 55	LMP-EVA	Put down. Come on down.
04 20 06 59	CDR-EVA	Coming.
04 20 07 02	LMP-EVA	Okay, stop. Now - now go clockwise. All right, a little more. I think you're pretty close to right on there, Pete.
04 20 07 12	CDR-EVA	All right, now wait a minute. Don't - don't let me knock it over, but I got to -
04 20 07 15	LMP-EVA	Okay. I'm trying to stabilize it for you.
04 20 07 17	CDR-EVA	Yes, but every time you do, you push it in the -
04 20 07 19	LMP-EVA	Okay. You go ahead.
04 20 07 22	CDR-EVA	That's difficult to do. It's so tender up here on these legs.
04 20 07 26	LMP-EVA	Yes. I know.
04 20 07 28	CDR-EVA	I don't see the Earth anywhere in the sight. Too close. Have any ideas which way to go?
04 20 07 36	LMP-EVA	Yes. Just like that.

04 20 07 41	CDR-EVA	Say, we're going to have to - let's push these legs in a little bit - get this thing more stable. Get this thing in the dirt.
04 20 07 48	LMP-EVA	Okay.
04 20 07 50	CDR-EVA	Don't break them. That thing is delicate.
04 20 07 51	LMP-EVA	I know it; now, it's in the dirt. Now, let's line her up.
04 20 07 55	CDR-EVA	Okay. Can you look right down the mast?
04 20 07 57	LMP-EVA	Yes. It looks like it's lined up to me. We'll just have to move in and try it, because you're awfully close -
04 20 08 03	CDR-EVA	About as - how is it in azimuth? And I'll look for it in pitch.
04 20 08 07	LMP-EVA	Get a little bit more clockwise. You're right on it, babe; stop. Now, run it up and down in pitch, and you're bound to get it.
04 20 08 23	CDR-EVA	No. I've got to go the other way and get it. Whoops! ... Hold it. Take you hands off it.
04 20 08 32	LMP-EVA	I can't; it'll fall over.
04 20 08 33	CDR-EVA	No, it won't. ... pull on it.
04 20 08 34	LMP-EVA	You're pulling on it, here.
04 20 08 35	CDR-EVA	Leave it alone.
04 20 08 38	LMP-EVA	Okay, I've got my hands off it. It's standing there.
04 20 08 40	CDR-EVA	Ah.
04 20 08 42	LMP-EVA	Be delicate, because this pulls on it; see that? Got it?
04 20 08 57	LMP-EVA	You want me to go work on something else now?
04 20 08 59	CDR-EVA	Yes.
04 20 09 00	LMP-EVA	Okay. Looks good. Just be careful you don't move it any closer to the right side of your PLSS and bump it.

04 20 09 07	CDR-EVA	Okay?
04 20 09 09	LMP-EVA	I'll put out the solar wind collector. Before I do, let me get a camera out here so I can take your picture, Pete. Get out that solar wind collector.
04 20 09 40	CDR-EVA	Okay. Earth, I ... you again to S-band antenna site.
04 20 09 49	CDR-EVA	Now, what's next?
04 20 09 51	LMP-EVA	Okay. To me, it's solar wind collection.
04 20 09 54	CDR-EVA	Okay.
04 20 09 56	CC	Al, when you finish up the solar wind, would you give one more last try on that camera? Try opening up the f-stop all the way and exercising the zoom.
04 20 10 07	LMP-EVA	I sure will. Well, we sure don't want to touch those cables.
04 20 10 16	CDR-EVA	No, we've got to stay away from those cables, you're rig!
04 20 10 22	CDR-EVA	Got a camera with you?
04 20 10 24	LMP-EVA	I certainly do.
04 20 10 25	CDR-EVA	Okay, just hang on to it. Houston, how long we been out?
04 20 10 34	CC	Pete, you've been out 1 hour and 2 minutes, and you're both running about 2 minutes off nominal behind.
04 20 10 44	CDR-EVA	Okay.
04 20 12 25	LMP-EVA	Looks like a good place for the solar wind collector, Pete. I think I'll stick it right here.
04 20 12 49	CDR-EVA	Where are you?
04 20 12 50	LMP-EVA	Right here.
04 20 12 51	CDR-EVA	Okay.
04 20 12 52	LMP-EVA	I'm planting it right here.

04 20 12 53	CDR-EVA	Okay.
04 20 13 01	LMP-EVA	Got to get back on this time line in a minute.
04 20 13 02	CDR-EVA	Yes, let's go, boy. I knew we were going to run late. Ding-a-ling TV didn't help.
04 20 13 19	LMP-EVA	Okay. Solar wind collector ... sense.
04 20 13 39	CDR-EVA	That looks good. Okay, come here! I've got something for you. Let's go.
04 20 13 42	LMP-EVA	Okay.
04 20 13 43	CDR-EVA	A hammer. Now. Take the hammer - -
04 20 13 46	LMP-EVA	Wait, wait. Want me to bang that TV first?
04 20 13 48	CDR-EVA	Yes, yes.
04 20 13 51	LMP-EVA	How about right here?
04 20 13 53	CDR-EVA	Okay.
04 20 13 55	LMP-EVA	Right here's a good spot.
04 20 13 56	CDR-EVA	Okay.
04 20 13 59	LMP-EVA	...
04 20 14 00	CDR-EVA	No.
04 20 14 03	LMP-EVA	Right here?
04 20 14 04	CDR-EVA	Yes.
04 20 14 12	LMP-EVA	Goes right in the ground.
04 20 14 14	CDR-EVA	Yes, that's no problem, is it?
04 20 14 17	LMP-EVA	Those poles just drags right in.
04 20 14 26	LMP-EVA	Okay.
04 20 14 32	CDR-EVA	You might go whistle on the TV.
04 20 14 35	LMP-EVA	Okay, I'll go work on it a little bit.
04 20 14 36	CDR-EVA	Okay.

04 20 14 39	CC	Al, we copy your comment on insertion on that into the ground. How far in are you able to get it?
04 20 14 47	LMP-EVA	Oh, I pounded it in over a foot, I'd say; and it didn't look like it was any harder towards the end than right at the beginning. It's there. It's pretty -
04 20 15 02	CDR-EVA	I'll tell you what, Al -
04 20 15 03	LMP-EVA	Okay, now, I'm going - Houston, I'm going to move the fo - move the focus a bit and see what happens.
04 20 15 10	CC	Roger, Al. Don't spend too much time on it. You're running a tad behind.
04 20 15 17	LMP-EVA	Okay, well, I'll tell you what. I can feel that the wheels, when I hold the - when I hold the end of the lens, I can feel the wheels running, because I can feel something in motion inside. Okay, now, I just changed completely the settings I had before. The f-stop's ... 1 and 2, but I can - -
04 20 15 35	CC	Okay, Al, we see no change down here. Why don't you press on?
04 20 15 40	LMP-EVA	Okay, let me - let me try another f-stop, the other way. How's that?
04 20 15 48	CC	There's no change down here, Al. That's coming in there, now, Al. Okay, what change did you make?
04 20 16 02	LMP-EVA	I hit it on the top with my hammer. I figured we didn't have a thing to lose.
04 20 16 08	CC	Skillful fix, Al.
04 20 16 09	LMP-EVA	I hit it on the top with this hammer I've got. Yes, that's skilled craftmanship. Got it up.
04 20 16 17	CDR-EVA	Hey, that's - Al - -
04 20 16 19	LMP-EVA	Yes, sir.
04 20 16 20	CDR-EVA	That ... has already sheared this thing.

04 20 16 25	LMP-EVA	Never touched it.
04 20 16 27	CDR-EVA	Okay.
04 20 16 28	LMP-EVA	What should we do now with the lens, Houston?
04 20 16 34	CC	Okay, why don't you give us one more light rap, and also cut down on the f-stop?
04 20 16 43	LMP-EVA	All right, will do. Now, is the zoom right for you?
04 20 17 04	LMP-EVA	...
04 20 17 05	CDR-EVA	Oh, darn. Need to choose ... - -
04 20 17 12	CC	Al, we're still not getting a good picture. Why don't you press on, and we'll try to get back to it later, if we have time.
04 20 17 21	LMP-EVA	Okay, I'll pound it a little bit. There you go. I'll just leave it like it is, pointed slightly toward the LM here, so that if you do get a picture, you'll see something.
04 20 17 36	CDR-EVA	Ready to go now.
04 20 17 37	LMP-EVA	That ought to give you some sort of a picture that you can think about. Be glad to come back and work on it. Got to go to work again.
04 20 17 43	CDR-EVA	Al?
04 20 17 44	LMP-EVA	Yes, sir.
04 20 17 45	CDR-EVA	What I need is a piece of tape.
04 20 17 48	LMP-EVA	I'll get some.
04 20 17 49	CDR-EVA	Good luck.
04 20 17 51	LMP-EVA	Oh, there's all kinds of tape around here.
04 20 17 54	CDR-EVA	Okay.
04 20 18 42	LMP-EVA	I've had it on this thing.
04 20 19 27	CDR-EVA	Houston.
04 20 19 29	CC	Pete, go ahead.

04 20 19 33	CDR-EVA	Okay, the flag is up.
04 20 19 37	CC	Roger, copy. The flag is up.
04 20 19 38	CDR-EVA	We hope everyone down there is as proud of it as we are - -
04 20 19 39	CC	We show you are very close to the nominal time line. How about an EMU check?
04 20 19 48	CDR-EVA	Okay. We have the flag up. Like I said, hope everybody down there is as proud of it as we are to put it up.
04 20 20 02	CC	Affirmative, Pete. And we're proud of what you're doing.
04 20 20 18	CDR-EVA	Al?
04 20 20 19	LMP-EVA	Yes, sir.
04 20 20 20	CDR-EVA	Can we have a quickie here?
04 20 20 22	LMP-EVA	Okay.
04 20 20 32	CDR-EVA	Back up a little more -
04 20 20 33	LMP-EVA	Okay.
04 20 20 34	CDR-EVA	About 15 feet.
04 20 20 35	LMP-EVA	All right.
04 20 20 40	CDR-EVA	Did you ... of your TV cable?
04 20 20 43	LMP-EVA	No, I just went right over it, babe.
04 20 20 44	CDR-EVA	(Laughter)
04 20 20 45	LMP-EVA	Here you are. Take a look, Pete.
04 20 20 48	CDR-EVA	I can't see you.
04 20 20 56	LMP-EVA	Get it?
04 20 20 57	CDR-EVA	Sure did.
04 20 20 58	LMP-EVA	Okay.
04 20 21 03	CDR-EVA	Another one?

04 20 21 04	LMP-EVA	Yes ...
04 20 21 17	CDR-EVA	Okay, got you.
04 20 21 20	LMP-EVA	Okay, good.
04 20 21 22	CDR-EVA	Okay, get back working, while I go get my camera. I got some PAN shots and next the ALSEP. And, Houston, I'm down on MID cooling.
04 20 21 41	CC	Roger, Pete. How's Al doing?
04 20 21 50	CDR-EVA	Say again.
04 20 21 53	CC	Is Al doing all the work?
04 20 21 58	CDR-EVA	No, sir. I'm heading out to do the PAN photographs right now; and, with any luck at all, we'll get back on the time line and complete what we need. Al's taking shots of the solar wind, and I'm hopping out here to the number 1 slot.
04 20 22 18	CC	Roger.
04 20 22 19	LMP-EVA	Boy, you sure can move on this surface.
04 20 22 21	CDR-EVA	Yes, but watch it when - watch it when you hit a rock.
04 20 22 25	LMP-EVA	Does it ...
04 20 22 29	CDR-EVA	Okay, go f:11; f:11 it is. 2, 3, now f:8, 4, 5, 6, 7, 6, 7 -
04 20 23 30	CDR-EVA	7.
04 20 23 34	CMP	Hello, Houston. This is Yankee Clipper. I'm ... ...
04 20 23 44	CC	Clipper, you were broken up. Say again.
04 20 23 50	CDR-EVA	Who are you talking to?
04 20 23 53	CC	Pete, we have Clipper both - and you both on the same air to ground - -
04 20 23 56	CMP	Houston, this is Yankee Clipper.
04 20 23 57	CC	Clipper, go ahead. Say again.

04 20 24 07	CMP	Houston, Yankee Clipper. I marked off Snowman with the telescope, and we're going to get some good pictures from that one.
04 20 24 14	CC	Roger, Clipper.
04 20 24 47	CDR-EVA	1, 2, 3, 4, 5, 6 -
04 20 25 18	LMP-EVA	Do you hear a little background noise, Pete? Kind of staticy and things?
04 20 25 21	CDR-EVA	I keep hearing a whistle.
04 20 25 22	LMP-EVA	That's what I hear. Okay.
04 20 25 44	CDR-EVA	Okay, Houston, two of the PANs are done.
04 20 25 49	CC	Roger, Pete. Copy. Two PANs. Al, how was the LM inspection?
04 20 25 56	LMP-EVA	I'm working on it right now.
04 20 25 59	CC	Roger.
04 20 26 05	CDR-EVA	Taking a look at that Surveyor, Al; I should suspect we ought to be able to get there quite readily. I'm going to head down there by the crater a little bit, but instead of - whoops ...
04 20 26 14	LMP-EVA	Watch yourself; it's easy to slide.
04 20 26 16	CDR-EVA	Yes, you can say that again. I notice you've been over here, haven't you?
04 20 26 22	LMP-EVA	Yes.
04 20 26 29	CDR-EVA	I don't think this is going to show anything, but I'll give it a go.
04 20 26 33	LMP-EVA	What's that?
04 20 26 34	CDR-EVA	Oh, I'm trying to show the front gear there and how it went - how it planted itself, but it's not really - it's not right enough.
04 20 26 46	LMP-EVA	Give it a go, though.
04 20 26 59	CDR-EVA	Uh-oh.
04 20 27 00	LMP-EVA	Bad?

04 20 27 03	CDR-EVA	I think my camera's -
04 20 27 54	CDR-EVA	This pad bounced.
04 20 27 58	LMP-EVA	Could be your plus Y bounced about pad diameter.
04 20 28 05	CC	Al, do you have any comments on the footpad interaction with the surface?
04 20 28 11	LMP-EVA	Yes, I do. Actually we - Pete's pads went in a little bit further than did Neil's; I'd say most of the pads are in about an inch and a half to two, and it sort of looked like we were moving slightly forward, and that pretty well killed off our left - right velocity when we touched down. The right-hand footpad seems to have bounced; that'd be the plus Y, the right-hand ...; the others don't seem to have. They must have - maybe hit there first, and rocked back and forth or something.
04 20 28 48	CC	Roger, Al. Do you see anything on the surface from the DPS?
04 20 28 56	LMP-EVA	No, I don't. The surface under there - it's kind of interesting - the surface under there is clean. It doesn't have the loose dust particles that - as does the rest of the lunar surface about here. It also has a number of small round dirt clods, if you want, that seem to be strolling off in a radial direction from underneath the skirt of the engine. I'll take a couple of pictures ... shots about 8 inches or so off the ground.
04 20 29 07	CMP	Houston, Yankee Clipper. Do you have the DSKY?
04 20 29 13	CC	Stand by, Clipper.
04 20 29 29	CC	Clipper, Houston. We're watching the DSKY.
04 20 29 43	CDR-EVA	I think I can get a good one for you, Houston.
04 20 29 46	CC	Roger, Al. It's a good description.
04 20 29 48	CDR-EVA	There we go.
04 20 29 51	LMP-EVA	Hey, you can really move around out here, Houston. That a mobile POGO ridge that we've got there, and also that one in the centrifuge. Man, it's

		just like this. You can just run and bounce just like you can on that POGO. It's a real good training device.
04 20 30 09	CDR-EVA	Where are you, Al?
04 20 30 10	LMP-EVA	I'm over here back - the back ... I'm ready to start - to start the ALSEP ...
04 20 30 16	CDR-EVA	Okay. I got the ... and I'm coming around.
04 20 30 18	LMP-EVA	All right.
04 20 30 20	CDR-EVA	Okay, Houston, I went back to intermediate cooling.
04 20 30 26	CC	Roger. We copy that.
04 20 30 29	LMP-EVA	Good idea. Say, I've noticed when you get started moving down here well, it's sometimes hard to stop.
04 20 30 37	CDR-EVA	Yes. Hold on to this.
04 20 30 39	LMP-EVA	All right.
04 20 30 40	CC	Pete and Al, you're 1 plus 22 into the time line, and you're running about 6 minutes behind nominal. We're monitoring PLSS feedwater 2 as a determining parameter.
04 20 30 55	CDR-EVA	Okay, Houston. We'll start catching up now. We've kind of gotten over the initial checkout on how to walk and move around, and maybe we got - we won't have any problems with this hardware like we did with the - -
04 20 31 10	LMP-EVA	... Here you go.
04 20 31 13	CDR-EVA	- - in the antenna.
04 20 31 16	CC	Roger. And we're showing 2 plus 30 left in the EVA.
04 20 31 23	CDR-EVA	Okay.
04 20 31 29	LMP-EVA	Okay, Pete, your saddlebag's on.
04 20 31 31	CDR-EVA	All right, let's go.
04 20 31 34	LMP-EVA	Okay, and we're off to load the ALSEP. ...
04 20 31 39	CDR-EVA	No.

04 20 31 42	CDR-EVA	We ought to be able to move out with this thing.
04 20 31 48	LMP-EVA	The LM exterior looks real good. The LM exterior looks beautiful the whole way around. Real good shape. ... that doesn't look the way it did the day we launched it.
04 20 32 02	CDR-EVA	Right.
04 20 32 12	LMP-EVA	Okay. Here we go, Pete. Ohh, up they go, mates, one ALSEP. There it is.
04 20 32 24	CDR-EVA	There it is, is right. It is laying on the lunar surface. Better go to intermediate cooling, get good and chilled down. Okay?
04 20 32 44	LMP-EVA	Hey, it's dusty, isn't it? You've got to go easy.
04 20 32 48	CDR-EVA	Sure do.
04 20 32 52	LMP-EVA	Here it comes.
04 20 32 53	CDR-EVA	Coming right up.
04 20 32 54	LMP-EVA	Hey, that's about right.
04 20 32 57	CDR-EVA	Widen that out on the boom, Houston. Sure looks pretty.
04 20 33 02	CC	Roger, Pete. We copy.
04 20 33 36	LMP-EVA	Look at me, Pete. It's a good shot, babe. The LM and everything ...
04 20 33 45	CDR-EVA	Lay her on the ground. Okay, I'll bring mine out.
04 20 34 07	CDR-EVA	Right out on the Moon, just like the other guys.
04 20 34 13	LMP-EVA	Wait until I get this out of your way.
04 20 34 14	CDR-EVA	Okay.
04 20 34 44	CC	Yankee Clipper, Houston. OMNI Charlie, OMNI Charlie.
04 20 35 17	CDR-EVA	It's going to look like - -
04 20 35 19	LMP-EVA	Say again.
04 20 35 20	CDR-EVA	Going to look like the back of the flight crew training program in a minute.

04 20 35 23	LMP-EVA	Yes.
04 20 35 25	CDR-EVA	Okay. That ... is coming closed. Uh-Oh. All right, push that toward me.
04 20 36 47	LMP-EVA	What are ... ...
04 20 36 49	CDR-EVA	I don't know.
04 20 37 13	CDR-EVA	Hey, Al, would you mind ...?
04 20 37 16	LMP-EVA	Very good, Pete. Here's one here. Let me get it out for you.
04 20 37 21	CDR-EVA	Thank you.
04 20 37 27	LMP-EVA	Okay, lift your left foot up and you're okay.
04 20 37 30	CDR-EVA	Okay. Thank you.
04 20 37 38	CC	Yankee Clipper, Houston. HIGH GAIN ANTENNA; PITCH, minus 13; YAW, 225.
04 20 38 08	CDR-EVA	Hey, Houston, do you hear this constant beeping in the background?
04 20 38 13	CC	That's affirmative. We've heard it now for about the past 45 minutes.
04 20 38 17	CDR-EVA	What is it?
04 20 38 19	LMP-EVA	That's right, so have we. What is it?
04 20 38 26	CC	Intrepid, we've tried to isolate it. It appears it's something on the downlink where it's coming from the LM.
04 20 38 45	CDR-EVA	Hey, Al.
04 20 38 46	LMP-EVA	Just a second.
04 20 38 47	CDR-EVA	Hey, there's lunar tools, all set up for you, fellow.
04 20 38 50	LMP-EVA	Okay.
04 20 38 53	CDR-EVA	This ALSEP's doing okay.
04 20 38 59	LMP-EVA	Old Chuck Wethered will be happy to know we're throwing it up for him, here. That's all right.

04 20 39 05	CDR-EVA	Here you go. Now, what do you need of these?
04 20 39 10	LMP-EVA	I need anything you've got. ... - -
04 20 39 11	CDR-EVA	Good.
04 20 39 12	LMP-EVA	- - that tool?
04 20 39 14	CDR-EVA	How about this? You need that one?
04 20 39 17	LMP-EVA	How about the - Here, let me put that on. No, no. You put that in the package 2, and I'll pick that up later.
04 20 39 23	CDR-EVA	It's already in package 2.
04 20 39 25	LMP-EVA	Then, one must be yours.
04 20 39 29	CDR-EVA	Okay.
04 20 39 34	CDR-EVA	Okay, I put that there.
04 20 39 46	LMP-EVA	Excuse me, Pete, I'll move it over and plant it.
04 20 39 48	CDR-EVA	Wait a minute.
04 20 39 49	LMP-EVA	All right.
04 20 39 51	CDR-EVA	Got to put this together right - Where's the arrow? We've got to let down the cap while we wait?
04 20 40 01	LMP-EVA	Wait a minute. Here you go.
04 20 40 04	CDR-EVA	Okay.
04 20 40 05	LMP-EVA	Put this together.
04 20 40 15	LMP-EVA	Houston, we're going to go ahead and put down the fuel cask right now, and then I'll take the filament out of it.
04 20 40 26	CC	Roger, Al. Copy. You're working with the fuel cask.
04 20 40 31	CDR-EVA	Wait, wait, wait, wait, wait.
04 20 40 35	LMP-EVA	I knew it. This is such a bad place to put it, Pete.
04 20 40 38	CDR-EVA	Huh?

04 20 40 39	LMP-EVA	That's a bad place to put it.
04 20 40 40	CDR-EVA	Yes.
04 20 40 44	LMP-EVA	Fuel cask comes down beautifully in position. Came down just right.
04 20 40 49	CDR-EVA	Oh, I know what I have to do, Al. Standing here not doing it.
04 20 40 55	LMP-EVA	Okay, maybe I need to move the side on in.
04 20 41 00	CDR-EVA	We're moving right along, Houston. We're catching up.
04 20 41 21	CC	Yankee Clipper, Houston. Go to wide deadband.
04 20 41 29	CDR-EVA	Houston. You can log me for my first ...
04 20 41 37	CDR-EVA	Hey, Houston.
04 20 41 39	CC	Pete, go ahead.
04 20 41 40	CDR-EVA	It's real interesting, as we put out this ALSEP right - There's one thing that's pretty obvious, as we're setting out the components of the ALSEP here, is I just hope that these thermal coatings don't have to stay as white as they are right now, because there's just no way. With all this dust, there's just no possibility that - -
04 20 42 01	LMP-EVA	You can not get them a little bit dirty. And - -
04 20 42 03	CDR-EVA	Little bit dirty isn't the word for it.
04 20 42 05	LMP-EVA	I know it. This - this - this - this - this is real - going to be a real problem, I guess, if thermally they've got to maintain that coating, because there's just no way you can do it. Everything that touches the ground picks it up. This suit is about half dirty because the ... landed on it. Uh-oh. It's a little dirty even on top of the fuel element, there. Okay.
04 20 42 29	CDR-EVA	Wait just a minute now before you - get turned away.
04 20 42 34	CC	Al, we copy your comments.
04 20 42 39	CDR-EVA	There. Okay.

04 20 42 40	LMP-EVA	I guess we'll just have to make allowances for things like that when we build them. They sure are going to get dirty.
04 20 42 50	CDR-EVA	Okay, I'm unlocking the cask dome, right now. It unlocks perfectly, shaking it down, trying to get it off. There you go.
04 20 43 02	LMP-EVA	It came off beautifully. Put 2 in the - dome aside.
04 20 43 09	CDR-EVA	Very nice.
04 20 43 10	LMP-EVA	Okay. I'll get out the cask removal tool.
04 20 43 19	LMP-EVA	You can stand over there, Pete.
04 20 43 22	CDR-EVA	I've got to go back to MIN cooling. I'm about to freeze to death.
04 20 43 27	LMP-EVA	...
04 20 43 28	CDR-EVA	Yes. Okay. Go ahead.
04 20 43 36	LMP-EVA	Yes, oh.
04 20 43 37	CDR-EVA	Yes. Start - - There you go.
04 20 43 53	LMP-EVA	...
04 20 43 55	CDR-EVA	Okay, tighten up the rocks ...
04 20 43 59	LMP-EVA	Hold it.
04 20 44 10	LMP-EVA	... to chip.
04 20 44 18	CDR-EVA	There. It's screwed all the way down.
04 20 44 26	CDR-EVA	That could make a guy mad, you know it?
04 20 44 28	LMP-EVA	Yes.
04 20 44 32	CDR-EVA	Let me undo it a minute, and try it a different way.
04 20 44 34	LMP-EVA	Yes.
04 20 44 38	CDR-EVA	It can really get you mad.
04 20 44 41	CDR-EVA	Houston, Al put the tool on, screwed it all the way down, and the fuel element would not come

out of the can. He's taking the tool off, and he's working it again.

04 20 44 54	CC	Roger, Pete. We copy.
04 20 45 13	CDR-EVA	You got any suggestions?
04 20 45 17	LMP-EVA	This ... kind of ... me.
04 20 45 25	CDR-EVA	Better?
04 20 45 26	LMP-EVA	Come over and look.
04 20 45 28	LMP-EVA	I tell you what worries me, Pete. If I pull on it too hard, there's a very delicate lock mechanism.
04 20 45 33	CDR-EVA	Better not push the pins in quite so far, and wiggle it a little. I just get the feeling that it's hot and swelled in there or something. Doesn't want to come out.
04 20 45 42	LMP-EVA	I can sure feel the heat though on my hands. Come out of there, rascal.
04 20 45 55	CDR-EVA	Suppose the ... or something?
04 20 46 04	LMP-EVA	Say, Houston.
04 20 46 06	CC	Go ahead.
04 20 46 11	LMP-EVA	Okay. We've really got a problem, I guess. I've tried using different pins; you know it's got a three-pin removal - -
04 20 46 19	CDR-EVA	Dual.
04 20 46 20	LMP-EVA	- - so I tried using different pins in different holes. That doesn't appear to have any effect. It operates - you know - everything operates just exactly like it does in the training mockups - and - up at GE. The only problem is, it just won't come out of the can. I am suspicious that it just ... in there or something and friction's holding it in. But it's such a delicate tool, I really hate to - to pull on it too hard. I think what we can do - -
04 20 46 48	CDR-EVA	Hey, I'll be with you.
04 20 46 50	LMP-EVA	- - go get that hammer and bang on the side of it.

04 20 46 52	CDR-EVA	No. I got a better idea. Where's the hammer?
04 20 46 54	LMP-EVA	That's what I said.
04 20 46 55	CDR-EVA	No, no. But I want to try and put the back end in under that lip there and pry her out. Let me go get the hammer. Be right back. Where did you put it?
04 20 47 06	LMP-EVA	Huh? What? Hammer's on the MESA.
04 20 47 08	LMP-EVA	Okay. Let me get the tool off so it can warm up.
04 20 47 14	CDR-EVA	Okay.
04 20 47 26	LMP-EVA	Can't figure that out.
04 20 47 44	CC	Al, when you're working on that, try to make sure you've got the pins all the way in, tighten up on it, then you can try pushing down on it a little, before you pull it out.
04 20 47 57	LMP-EVA	Okay. Don't - don't touch these needles; if these break off, that's all she wrote.
04 20 48 01	CDR-EVA	Yes. I understand.
04 20 48 02	LMP-EVA	And don't pound on anything that'll break.
04 20 48 03	CDR-EVA	No, no. I'm not going to.
04 20 48 05	LMP-EVA	Okay. We'll try it again.
04 20 48 12	CDR-EVA	Rotate and try it this way.
04 20 48 18	LMP-EVA	Pry's in there just like you - going to do the job, only it doesn't do the job.
04 20 48 23	CDR-EVA	Oh man, look at this dust fly.
04 20 48 29	LMP-EVA	Just a minute. Just - just a minute. Get those pins in here again.
04 20 48 38	CDR-EVA	You're not getting those pins all the way in.
04 20 48 41	LMP-EVA	They're not in now because I'm lining them up. Just a damn minute. Now they are all the way in.
04 20 48 46	CDR-EVA	They're all the way in - not quite. That bottom one down there's -

04 20 48 53	CDR-EVA	Now, my recommendation would be pound on the gasket.
04 20 48 55	LMP-EVA	Yes.
04 20 48 56	CDR-EVA	Hey, that's doing it; give it a few more pounds.
04 20 49 00	CDR-EVA	Got to be harder than that. It's going - It's coming out. Pound harder.
04 20 49 09	LMP-EVA	Keep going.
04 20 49 12	CDR-EVA	Come on ...
04 20 49 14	LMP-EVA	Keep going, baby. That hammer's a universal tool.
04 20 49 17	CDR-EVA	You better believe it; there you got it.
04 20 49 19	LMP-EVA	Got it. Got it, Houston.
04 20 49 21	CDR-EVA	(Laughter) That's beautiful.
04 20 49 23	LMP-EVA	That's too much.
04 20 49 24	CC	Well done, troops.
04 20 49 26	CDR-EVA	Man, ...
04 20 49 28	LMP-EVA	We got it, babe. It fits in the RTG real well. It's just the cask was holding in on the side.
04 20 49 38	CC	Yankee Clipper, Houston. One minute to LOS.
04 20 49 40	LMP-EVA	- - come to the Moon without a hammer. That's it, Pete.
04 20 49 50	CDR-EVA	(Laughter)
04 20 49 51	LMP-EVA	That's outstanding.
04 20 49 52	CDR-EVA	(Laughter)
04 20 49 57	LMP-EVA	Make our move -
04 20 49 58	CDR-EVA	I'm ready. ...
04 20 50 05	LMP-EVA	Okay, Houston. The fuel element is in the RTG. I can feel it radiate heat already.
04 20 50 11	CDR-EVA	Put your hand over here -
04 20 50 13	CC	Copied that, Al.

04 20 50 16	CDR-EVA	Wait a minute - no. No, wait a minute, Al; have you got it strapped around your boot? Let me look and see.
04 20 50 21	LMP-EVA	Okay.
04 20 50 23	CDR-EVA	No, you're all right.
04 20 50 24	LMP-EVA	All right?
04 20 50 25	CDR-EVA	Yes.
04 20 50 26	LMP-EVA	Boy, this thermal coating doesn't mean a thing here.
04 20 50 29	CDR-EVA	Yes. That thing is really getting covered with dirt. My gosh.
04 20 50 33	LMP-EVA	I hope they made allowances for it.
04 20 50 36	CDR-EVA	They do. Okay. ... ...?
04 20 50 41	LMP-EVA	It doesn't look like it. Let me look at that just a second.
04 20 50 44	CDR-EVA	Okay.
04 20 50 45	LMP-EVA	It's the right way.
04 20 50 52	CDR-EVA	That's it.
04 20 50 54	LMP-EVA	Hey, feel the heat off that machine. That's amazing.
04 20 50 59	CDR-EVA	1400 degrees.
04 20 51 02	LMP-EVA	Almost as hot as the Sun.
04 20 51 03	CDR-EVA	... (Laughter)
04 20 51 06	LMP-EVA	Hey, do me a favor.
04 20 51 07	CDR-EVA	What do you need? ...
04 20 51 08	LMP-EVA	No, go lower. There you go; you got it.
04 20 51 11	CDR-EVA	Okay.
04 20 51 14	CDR-EVA	Okay, let me go - scouting - smoke over the area. Okay.

04 20 51 18	LMP-EVA	Got everything you need?
04 20 51 22	CDR-EVA	All right, there's no TV, so I got the SIDE - and the picker-uppers for the rocks.
04 20 51 30	LMP-EVA	Okay.
04 20 51 31	CDR-EVA	Okay. Let's go right off to our little mound over there; how does that grab you?
04 20 51 36	LMP-EVA	Okay. Something's wrong.
04 20 51 39	CDR-EVA	What's the matter?
04 20 51 49	LMP-EVA	Things jammed. The thing doesn't - ...
04 20 51 57	CC	Pete, we copy. You've got the UHT tongs and subpallet.
04 20 52 07	CDR-EVA	We're making our move, Houston.
04 20 52 11	LMP-EVA	I can tell this is going to be a work - ... Now, take it easy.
04 20 52 16	CDR-EVA	How long did you say our shadow was - the LM's shadow, 150 feet?
04 20 52 24	CC	Stand by, Pete.
04 20 52 26	LMP-EVA	No, that isn't any 150 feet.
04 20 52 34	CDR-EVA	Take your time, Al; I just going out - -
04 20 52 36	LMP-EVA	That's what I'm doing. What's the hurry? We got it made.
04 20 52 38	CDR-EVA	No, I'm just going out to scout the area, that's all.
04 20 52 40	LMP-EVA	Okay, I'm going to set it down ...
04 20 52 42	CDR-EVA	Okay.
04 20 52 43	LMP-EVA	Go to intermittent cooling.
04 20 52 44	CDR-EVA	...
04 20 52 45	LMP-EVA	Okay.
04 20 52 55	LMP-EVA	You know, they ought to build equipment for lunar operations some other color besides white.

04 20 52 59	CDR-EVA	(Laughter)
04 20 53 08	LMP-EVA	I'm going to go right up to the head crater, I guess.
04 20 53 14	CDR-EVA	Well, if you're going to do anything - -
04 20 53 22	LMP-EVA	... moving. Move it some more. Got any direction you want me to go?
04 20 53 26	CDR-EVA	Well, it looks to me like either the direction you're headed is good, or the one a little bit more to the right. You're going - You're going to have to go far enough so we don't end up in one of the craters when we ... deploy.
04 20 53 41	LMP-EVA	Okay.
04 20 53 42	CDR-EVA	Okay.
04 20 53 44	LMP-EVA	But I want to go 10 degrees off our takeoff angle; and I think I'm headed out about that way now.
04 20 53 50	CDR-EVA	Okay.
04 20 54 01	CDR-EVA	You just stay back there and take your time. I'll go out here and scout the area.
04 20 54 08	LMP-EVA	You're getting pretty far out.
04 20 54 09	CDR-EVA	Huh?
04 20 54 10	LMP-EVA	Getting pretty far out.
04 20 54 13	CC	Pete and Al, your LM shadow should be about 110 feet.
04 20 54 15	LMP-EVA	... forward unit.
04 20 54 20	CDR-EVA	Okay, I'm looking for it. I'm dying to find out what this mound is over here anyhow, Al. We got a very peculiar mound sticking up out of the ground, Houston. I want to go look at it. As a matter of fact, I think I'll go take a picture of it. My - get out ... - -
04 20 54 39	CC	Roger, Pete. Could you give us your position and distance with respect to the LM?
04 20 54 46	CDR-EVA	Wait 1.

04 20 54 48	LMP-EVA	Go ahead, Pete. Do what you're doing. Pete's about - I'd guess, about 300 feet at 12 o'clock in the bottom of a shallow carter that you're bound to see on your map. It's sort of a doublet. Okay?
04 20 55 01	CDR-EVA	I'm ... to the right-hand edge of the head crater.
04 20 55 07	CC	Roger.
04 20 55 14	CDR-EVA	Hey, Al. Here's a neat spot to put it out up here.
04 20 55 17	LMP-EVA	Is it flat for a good piece?
04 20 55 19	CDR-EVA	Oh, you'd better believe it.
04 20 55 20	LMP-EVA	Okay, we'll put that - It's a good long ways away too; it must be at least - what - 500 feet from the LM?
04 20 55 27	CDR-EVA	I don't know.
04 20 55 28	LMP-EVA	600?
04 20 55 31	CDR-EVA	It's a world's most peculiar - I got to photograph this thing. I can't imagine what it is. The mound is sticking up; and I can't imagine how it got there or what would make it.
04 20 55 46	LMP-EVA	Boy, you can cover the ground on this light-weight ... at one-sixth g. Really move.
04 20 55 53	CDR-EVA	I got to get them a stereo of this thing. It's really fantastic.
04 20 56 06	CDR-EVA	How's our time line going, Houston?
04 20 56 08	CC	Pete, at 1 plus 48 into the EVA, you're looking good. Looks as though you're right on there, if you've just about completed your traverse.
04 20 56 19	CDR-EVA	We have, Houston. Yes. Now, look, Al. Look over here. We're way out from the LM. Over nere, Al.
04 20 56 27	LMP-EVA	Okay.
04 20 56 28	CDR-EVA	See where I'm headed. This great big flat area.

04 20 56 29	LMP-EVA	That's a good - Hey, there's another one of those mounds over there.
04 20 56 31	CDR-EVA	Where? Hey, you're right. What do you suppose they are?
04 20 56 35	LMP-EVA	I don't know, Houston, what they are; they're just sort of mounds. Looks like - don't take this the wrong way. It looks like a small volcano, only it's just about 4 feet high; and it's about - at the top, it's about 5 feet across; and it then slopes from the top on down to the - level with the terrain, and that - that diameter, that circle - where it finally becomes level with the terrain, is about 15 or 20 feet. So, it looks sort of like a small volcano. There's a couple of them out here. They look like they're formerly made out of mud or something.
04 20 57 15	CC	Al, Roger. We copy. Is there any hole or central vent?
04 20 57 22	LMP-EVA	I don't know. I got to go over -
04 20 57 24	CDR-EVA	We'll go over after we get the ALSEP out. There's a couple of them here. There was a - this is a - we couldn't ask for a better spot to put this ... down.
04 20 57 33	LMP-EVA	No. This is nice. Hey, lot more rocks up here.
04 20 57 42	CDR-EVA	Listen ... we could play geologist for 2 days and never get any further than we are right now. Seeing all different kinds of things.
04 20 57 51	LMP-EVA	Hey, here's a different one.
04 20 57 52	CDR-EVA	Yes. It's really neat. Better than any geologist in Houston (laughter).
04 20 58 02	LMP-EVA	Let's get a quick PAN of the area here that - ... the ALSEP before the - There you go.
04 20 58 09	CDR-EVA	Okay, man alive.
04 20 58 13	LMP-EVA	Tired?
04 20 58 14	CDR-EVA	No, I'm not tired. That handle, you know, when you carry this thing around in one g, the ALSEP tends to hang down, but you carry it around up here at one-sixth and particularly the RTG tends to rotate - the whole pallet. So, in a few

minutes, you've got one up - kind of half way up in the air and the other one's down by your left leg, being afraid that the handle's going to come undone. It's just that your handle doesn't lock. Okay. I have to almost - that's slick. You know these neat little decals we got on here?

04 20 58 53 LMP-EVA Yes.

04 20 58 54 CDR-EVA You can't hardly read them in the sunlight because they don't have enough contrast to them. They're so bright.

04 20 59 07 LMP-EVA Okay, let's move them.

04 20 59 09 CDR-EVA Okay. Let me make sure now that we're not going to run out into some hole.

04 20 59 15 LMP-EVA That's pretty good, Pete. I'm going to move just a little bit further to the east - correction, to the north, so that I won't end up over in that hole to the side. Okay?

04 20 59 25 CDR-EVA All right. Yes, I think it would be a real good spot.

04 20 59 51 CDR-EVA Okay, I'm - -

04 20 59 52 LMP-EVA Awfully frustrating. Okay, I think this is the spot, Pete, right here.

04 20 59 57 CDR-EVA You look and make sure now that we're going to have a good place for everything.

04 21 00 02 LMP-EVA Yes, we will. Magnetometer can sit over there and the seismometer will sit on a good flat place; although the trouble with the seismometer, we don't have any good solid bedrock or anything to set it on. All we've got is this - this dirt. And I don't see any area around that has any rock.

04 21 00 23 CC Roger, Al.

04 21 00 24 LMP-EVA I'm afraid we're just going to have to take what we can get on this seismometer.

04 21 00 37 CDR-EVA You know, there must be some thermal expansion or something. I'm having a heck of a time getting this UHT in this SIDE. It just flat won't go in there.

04 21 00 49	LMP-EVA	Well, just pick it up with your hand. I always handled it back with my hand.
04 21 00 53	CDR-EVA	I can't bee - bend down that far.
04 21 00 54	LMP-EVA	Okey-doke. ...
04 21 01 48	CDR-EVA	Where'd you go, Al?
04 21 01 49	LMP-EVA	I'm right over here, babe.
04 21 01 50	CDR-EVA	Oh, you're miles away.
04 21 01 52	LMP-EVA	Yes, I am. I moved over here.
04 21 01 54	CDR-EVA	Oh, son of a gun.
04 21 01 55	LMP-EVA	I had to do it, Pete, so that I'd have a good place for the SIDE.
04 21 02 06	CDR-EVA	Okay, there's a good spot. Looks good.
04 21 02 18	CC	Al, when you deploy that PSE stool, it would help if you tamp that ground down as well as you could before putting the stool down.
04 21 02 29	LMP-EVA	I'm going to try to do that. This - this ground is - is not - you know; it doesn't get hard as you move down a couple of inches - if you tamp it, and that's what I'm plan to do; but I don't know. We'll just have to see what happens. I'm worried about it getting a thermal short myself.
04 21 02 49	CC	Roger, Al.
04 21 03 08	LMP-EVA	Boy, I'll tell you.
04 21 03 10	CDR-EVA	Man, are you dirty.
04 21 03 11	LMP-EVA	Boy, we should have cleaned that out a bit. Look at the ALSEP.
04 21 03 16	CDR-EVA	I know.
04 21 03 17	LMP-EVA	Ridiculous (laughter).
04 21 03 20	CDR-EVA	I remember how they took care of this white paint. You had to have gloves (laughter). They must - begin to - They got a kind of a problem here.
04 21 03 41	LMP-EVA	I'm going to have to do this myself. I'll have to do this backwards; but it's going to work right. Do me a favor, Pete. Look at each ...

04 21 04 05	CDR-EVA	(Laughter) I'll be with you in a minute.
04 21 04 07	LMP-EVA	Okay.
04 21 04 10	CDR-EVA	You can relieve me in this side right here while I ... because it looks like it might -
04 21 04 14	LMP-EVA	Yes. Give me that thing. Let me hold it.
04 21 04 16	CDR-EVA	Easy, easy. That a boy.
04 21 04 17	LMP-EVA	I got it.
04 21 04 18	CDR-EVA	That a boy. Now - wait.
04 21 04 20	LMP-EVA	Watch for that ... cable.
04 21 04 21	CDR-EVA	Yes, but let me get it plugged in.
04 21 04 23	LMP-EVA	They sure splay around under this one-sixth g, don't they? It's moving around a bunch. ...
04 21 04 29	CDR-EVA	Watch it, watch it. Where's the orange stripe?
04 21 04 33	LMP-EVA	Should be same as on that other one.
04 21 04 37	CDR-EVA	Obviously, it's on the side I can't see.
04 21 04 40	LMP-EVA	Yes. Blue to blue.
04 21 04 55	LMP-EVA	You know that noise - that whistling - is coming from you, Pete, because every time you move around, it whistles. When you stop, it quits.

END OF TAPE

04 21 05 06	CDR-EVA	Is that right?
04 21 05 07	LMP-EVA	Yes. There it is.
04 21 05 09	CDR-EVA	Is it locked good?
04 21 05 10	LMP-EVA	Yes sir. Take your - -
04 21 05 12	CDR-EVA	...
04 21 05 13	LMP-EVA	You're good.
04 21 05 14	CDR-EVA	Drop that baby.
04 21 05 15	LMP-EVA	Okay. You got it?
04 21 05 16	CDR-EVA	Let me have the cable right there.
04 21 05 17	LMP-EVA	All right. Oops! That came out.
04 21 05 19	CDR-EVA	That's what I wanted.
04 21 05 20	LMP-EVA	Okay.
04 21 05 21	CDR-EVA	That's what I wanted.
04 21 05 22	LMP-EVA	All right. Those lights came on nice.
04 21 05 24	CDR-EVA	Yes.
04 21 05 28	CDR-EVA	The next thing I got to do is head this way with it, right?
04 21 05 30	LMP-EVA	No. Before you do that, come here a second, would you, please?
04 21 05 33	CDR-EVA	Yes, but let me set it down.
04 21 05 35	LMP-EVA	Uh-oh, the top popped open.
04 21 05 39	CDR-EVA	Supposed to do that?
04 21 05 41	LMP-EVA	No. Not supposed to do that. You can close it, though, before it gets any dirt in it. You can just reach up there and close it.
04 21 05 49	CDR-EVA	Okay. You better - You better do it for me - -

04 21 05 51	LMP-EVA	... close it while I'm holding it - -
04 21 05 52	CDR-EVA	Okay.
04 21 05 53	LMP-EVA	Before we get any dirt on it.
04 21 05 54	CDR-EVA	Son of a gun. Why did that happen? Never saw it do it before.
04 21 05 55	LMP-EVA	... We could still salvage that, though.
04 21 06 04	CDR-EVA	Wait a minute. The little - the little -
04 21 06 05	LMP-EVA	I see it. I see it.
04 21 06 07	CDR-EVA	That a boy.
04 21 06 08	LMP-EVA	Now kind of turn it over with your other hand, Pete. So - -
04 21 06 10	CDR-EVA	Wait a minute. Wait 1 minute ...
04 21 06 12	LMP-EVA	I'm waiting.
04 21 06 14	CDR-EVA	Where do you want to go with it?
04 21 06 15	LMP-EVA	Well, I want to see if you - Let me get this. Okay. Now, let's see the other side.
04 21 06 21	CDR-EVA	This way?
04 21 06 22	LMP-EVA	That's great. Yes. This won't - This won't hurt a thing. Wait a second.
04 21 06 28	CDR-EVA	That's it. You got it.
04 21 06 29	LMP-EVA	But just don't touch that. It'll be okay.
04 21 06 31	CDR-EVA	Okay.
04 21 06 32	LMP-EVA	Didn't hurt a thing.
04 21 06 33	CDR-EVA	Let me just put this down here.
04 21 06 36	LMP-EVA	Okay.
04 21 06 38	CC	Pete, before you set the central station down for the final time, would you also tamp that ground down? It would help in keeping the dirt off of the thermal-sensitive areas.

04 21 06 57	CDR-EVA	Oh, I did it, I did it (laughter).
04 21 07 00	LMP-EVA	You set it down.
04 21 07 01	CDR-EVA	I set it down and it didn't fall over. I can't believe it. Here I come. What do you need, Al?
04 21 07 05	LMP-EVA	Use your tongs to hold this up a minute. It's a little hot, and I don't want to touch it. Watch this.
04 21 07 12	CDR-EVA	Where are my tongs?
04 21 07 14	LMP-EVA	Right there in your - There you got them. Now if you'll just hold it steady, then I can do the rest.
04 21 07 23	LMP-EVA	There, now. That's good.
04 21 07 33	LMP-EVA	Thanks, Pete. Got it.
04 21 07 35	CDR-EVA	Okay. I'll go get the rest of the stuff over here. Where we at?
04 21 07 39	LMP-EVA	Okay. Now we're going to get the easy part.
04 21 07 42	CDR-EVA	Okay. Take you time. Things coming out real well. The name of the game is to get the ALSEP here. Whoom! Up to one crater and over another (laughter).
04 21 07 50	LMP-EVA	Oh, man.
04 21 07 52	CDR-EVA	Does that - Does that look as good as it feels?
04 21 07 55	LMP-EVA	It does. Here, I'll tell you the way to do, Pete, bend and rock from side to side as you run. Like that. There you go.
04 21 08 03	CDR-EVA	(Laughter)
04 21 08 04	LMP-EVA	You really move better that way.
04 21 08 07	CDR-EVA	Here I come, ready or not.
04 21 08 15	LMP-EVA	Houston, I'm - I'm not kidding, we are really getting dirty out here. There's no way to handle all this equipment with all the dust on it. Every time you move something, the dust flies; and, in this low gravity, it really takes off, goes way up in the air and then comes down and lands on you.

04 21 08 32	CDR-EVA	How far do you estimate we're from the LM? 600 feet? 700 feet?
04 21 08 36	LMP-EVA	At least.
04 21 08 37	CDR-EVA	I think you're right. 600, 700 feet.
04 21 08 40	LMP-EVA	Way to do it.
04 21 08 42	CDR-EVA	Here I come (humming).
04 21 09 30	CDR-EVA	(Humming) Coming into the antenna, man.
04 21 09 35	LMP-EVA	Okay.
04 21 09 50	LMP-EVA	Okay, let me plug this thing in, Pete.
04 21 09 52	CDR-EVA	I can't get down low enough to get it off.
04 21 09 54	LMP-EVA	I'll get it for you, if you can't.
04 21 09 56	CDR-EVA	Okay. Wait a minute. Let me move that dust cover for you.
04 21 09 59	LMP-EVA	How's that strike you? Okay. Just leave this latch - -
04 21 10 03	CDR-EVA	... I think it's a joke. Strikes me pretty good. I'll be tamping the dirt around this central ...
04 21 10 13	LMP-EVA	Okay.
04 21 10 17	LMP-EVA	Going to have to design things with little legs on them or something, so you can put them down and they stand on the soil (laughter).
04 21 10 23	CDR-EVA	If we had that suit we could bend over in, we'd have the job done by now.
04 21 10 27	LMP-EVA	Hey, can you push down on this side of that?
04 21 10 29	CDR-EVA	Yes. My biggest sweat is trying to bend over. Wait a minute. Ready, get set, push. That on, or not?
04 21 10 35	LMP-EVA	I don't think so.
04 21 10 36	CDR-EVA	I don't think so.

04 21 10 38	LMP-EVA	No, let me - Let me look at it a second. Here we - Here we are.
04 21 10 41	CDR-EVA	Which way do you want this?
04 21 10 42	LMP-EVA	Come to me. Right there.
04 21 10 45	CDR-EVA	I had to really push that other [illegible]. Look at all that dust.
04 21 10 53	CDR-EVA	Okay now -
04 21 10 56	LMP-EVA	Wait a second. Wait a second. Let me get it with you.
04 21 11 01	CDR-EVA	Ready? That got it, didn't it?
04 21 11 04	LMP-EVA	That did it, now.
04 21 11 05	CDR-EVA	That did it.
04 21 11 06	LMP-EVA	Now we won't touch the shorting button. Okay. We've connected the RTG to the central station, Houston. And we're ready to go to work deploying the experiments.
04 21 11 15	CDR-EVA	I'll get the antenna mast.
04 21 11 16	LMP-EVA	All right.
04 21 11 17	CDR-EVA	(Humming)
04 21 11 33	CC	Pete, did you experience any trouble with the dust cover on the side?
04 21 11 41	CDR-EVA	It opened, Houston, and we closed it again, and we got no dirt on it, fortunately.
04 21 11 50	CC	Roger, Pete. Well done.
04 21 12 11	CDR-EVA	Okay. Let me tamp the dirt down underneath the central station. Hey, easy does - Whoops! (Laughter) That's me.
04 21 12 19	LMP-EVA	What happened?
04 21 12 21	CDR-EVA	Oh, I started to walk away with the central station attached to the UHT via the little gizzy. Okay?

04 21 12 29	LMP-EVA	The RTG's down and cooking.
04 21 12 30	CDR-EVA	Okay. I'm tamping the dirt, here.
04 21 12 33	LMP-EVA	Okay.
04 21 12 34	CDR-EVA	Have I got it tamped pretty good? Look over where I'm tamping. How am I doing?
04 21 12 38	LMP-EVA	Looks good. Need a little bit more this way, I think. The problem with tamping, Pete, it looks like every time you tamp that your foot comes up - you know it - -
04 21 12 46	CDR-EVA	Yes. In tamping - -
04 21 12 47	LMP-EVA	It redusts - it redusts the area.
04 21 12 49	CDR-EVA	Yes. Okay. Here we go, Al. Now, take your u - u - UHT, there - -
04 21 12 55	LMP-EVA	Move that.
04 21 12 56	CDR-EVA	- - and keep the side cable cleared.
04 21 12 57	LMP-EVA	Sounds good.
04 21 12 58	CDR-EVA	All right.
04 21 12 59	LMP-EVA	A little bit.
04 21 13 --		BEGIN LUNAR REV 18
04 21 13 00	CDR-EVA	Here she comes. Over she goes. Get it right down that ... No. There you go. How's that?
04 21 13 10	LMP-EVA	That's good.
04 21 13 12	CDR-EVA	Okay.
04 21 13 14	LMP-EVA	Ready to go to work.
04 21 13 15	CDR-EVA	Go. Have at it.
04 21 13 18	CDR-EVA	Okay, well, I got to - Let's see, I've got to get the solar wind, huh?
04 21 13 22	LMP-EVA	Don't know when I'm going to do the -
04 21 13 28	CDR-EVA	I better -

04 21 13 38	CDR-EVA	Houston, how we doing on the time line?
04 21 13 58	CDR-EVA	Do you read me, Al?
04 21 13 59	LMP-EVA	Sure do.
04 21 14 00	CDR-EVA	Hello, Houston. How we doing on the time line?
04 21 14 09	LMP-EVA	They may be talking tc Yankee Clipper.
04 21 14 14	CC	Al, do you have a reading on the shorting amp?
04 21 14 19	CDR-EVA	Wait a minute. I'll get it. Hold the phone. Do you read me, Houston?
04 21 14 24	CC	Sure do; go ahead.
04 21 14 29	CDR-EVA	Okay. I was asking you how we were doing on the time line?
04 21 14 57	CDR-EVA	Can't see that needle anywhere. Can you, Al?
04 21 15 00	LMP-EVA	Let me see it. Let me help you. Doesn't it show any amps?
04 21 15 05	CDR-EVA	Place is covered with dust.
04 21 15 06	CC	Pete and Al, at 2 hours and 7 minutes into the EVA, you're about 5 minutes behind.
04 21 15 15	CDR-EVA	Okay.
04 21 15 16	LMP-EVA	Pull - hold me a little bit.
04 21 15 17	CDR-EVA	Wait a minute. Going back to MIN cooling. What do you need?
04 21 15 22	LMP-EVA	Hold - hold me to look.
04 21 15 24	CDR-EVA	Oh, okay. ...
04 21 15 29	LMP-EVA	I don't even see a needle in there.
04 21 15 30	CDR-EVA	I don't either. That's what's bothering me. It's not reading zero, and I don't see a needle.
04 21 15 34	LMP-EVA	I don't even see a needle in there, Houston.
04 21 15 36	CDR-EVA	Yes. Okay. Let's quit screwing with it.

04 21 15 40	CDR-EVA	Get on the time line.
04 21 15 42	LMP-EVA	I don't know where it went.
04 21 16 27	CDR-EVA	Houston, did you get our last comment?
04 21 16 31	CC	Negative, Pete. Go ahead.
04 21 16 36	CDR-EVA	We can't see a needle in the shorting amp anywhere. It's not at zero. It's not in sight.
04 21 16 45	CC	Roger. We copy. Go ahead.
04 21 17 30	LMP-EVA	We're not done for the bag - for the - seismometers, Houston. And I've sort of dug a little crater so that the - essentially the stool - the hole in the center of the stool, has - is de - is de - has more clearance between it and the ground. Hopefully, this will keep the sides from getting in the ground at all.
04 21 18 01	CC	Roger, Al. That's good. Go ahead.
04 21 18 04	LMP-EVA	... anyway ... the seismometer. We'll see - We'll see how it works. It looks like it might work. I tamped it also in the - in the small crater there.
04 21 18 16	CDR-EVA	Okay. I've got the solar wind deployed here. Okay. Just a minute.
04 21 18 31	LMP-EVA	Boy, you really have to be careful of the cables, don't you?
04 21 18 42	LMP-EVA	Okay. Looks good. Looks good.
04 21 18 46	CDR-EVA	Okay.
04 21 18 50	CDR-EVA	Okay. After the solar wind, I did an EMU check and I'm down to mid-cooling, anyhow, and it says LSM OFF MODE 2 ... Wait a minute. Let me by.
04 21 19 03	LMP-EVA	Wait a minute. Okay.
04 21 19 08	CDR-EVA	Stay where - We have to be careful. Don't move sideways or backwards. You just don't know what's there. You've always got to move forwards.
04 21 19 14	LMP-EVA	Yes.

04 21 19 21	CC	Pete, we copy an EMU check.
04 21 19 23	LMP-EVA	... this way a little bit.
04 21 19 27	CDR-EVA	Shove it?
04 21 19 29	LMP-EVA	Just move - just put your thing in the - in the holder, and move it over this way a little bit.
04 21 19 35	CDR-EVA	I'm not sure I can do that, but I'll give it a try.
04 21 19 41	LMP-EVA	Watch it. There you go.
04 21 19 43	CDR-EVA	How's that for one-footed - La-dee-da?
04 21 19 48	LMP-EVA	Pretty good.
04 21 19 50	CDR-EVA	You make me knock my solar wind over, I'm going to be mad at you.
04 21 19 53	LMP-EVA	Okay. You're just - Here, let me give you a hand.
04 21 19 59	LMP-EVA	Make sure you - You hold it there.
04 21 20 01	CDR-EVA	Hey, don't - Don't touch that. I've got a - one boyd bolt off it.
04 21 20 05	LMP-EVA	Sure ...
04 21 20 06	CDR-EVA	Huh?
04 21 20 07	LMP-EVA	Want me to help you move it that way?
04 21 20 09	CDR-EVA	No. It's got one boyd bolt out of that magnetometer.
04 21 20 11	LMP-EVA	Okay. Okay. Go ahead.
04 21 20 15	CDR-EVA	***we're doing it, making a mess. You'd be better off - let me - listen, can you - you - leave - leave it sit. Let me hold that. You - you put that stool back here closer.
04 21 20 23	LMP-EVA	Okey-dokey.
04 21 20 24	CDR-EVA	Am I over all the cables?
04 21 20 26	LMP-EVA	Okay.

04 21 20 27	CDR-EVA	Huh?
04 21 20 28	LMP-EVA	No, you're okay. You got it?
04 21 20 30	CDR-EVA	Yes. Let me have it. All right?
04 21 20 32	LMP-EVA	Yes.
04 21 20 33	LMP-EVA	Take the clip off.
04 21 20 34	CDR-EVA	Okay.
04 21 20 35	LMP-EVA	All right, now; you move your stool back.
04 21 20 45	LMP-EVA	...
04 21 20 49	CDR-EVA	Okay. Let your EMU break.
04 21 20 53	CDR-EVA	I am. I trying to stay away - -
04 21 20 56	CDR-EVA	That's a nice job on that solar wind.
04 21 20 58	LMP-EVA	Thank you. You've got to be careful you don't kick dirt on them once we get them set down. I guess the way you could do it is have - have it some sort of package ... package ... all the dirt.
04 21 21 10	CDR-EVA	What are you doing anyhow?
04 21 21 13	LMP-EVA	Well, I had to get this - Oh, I'm sorry.
04 21 21 21	CDR-EVA	Here you go; move it up right here where my footprints are.
04 21 21 23	LMP-EVA	Okay.
04 21 21 25	CDR-EVA	There. That a boy. That a boy. Now don't - There, now, kind of tamp it right around in there. Doing good. That a boy.
04 21 21 46	LMP-EVA	It could go off the central peak. Now, let's see what happens if we set it right -
04 21 21 59	CDR-EVA	That's good.
04 21 22 01	LMP-EVA	That looks like it'd be okay, doesn't it?
04 21 22 02	CDR-EVA	Yes.

04 21 22 03	LMP-EVA	Just a second. Let me do a couple of things. Do this like they said. I take it back and move it out of there.
04 21 22 12	CDR-EVA	Pull it over a little bit more and level it up.
04 21 22 16	LMP-EVA	This doesn't - Yes, this doesn't need to be up. Okay. That's got kind of a deeper hole there the center.
04 21 22 22	CDR-EVA	Yes. You're in good shape. That doesn't have to level, huh?
04 21 22 24	LMP-EVA	No, because the - the other one levels from under the stool.
04 21 22 27	CDR-EVA	Okay. Push it down a little bit.
04 21 22 29	LMP-EVA	Okay. That's a good idea.
04 21 22 32	CDR-EVA	... it?
04 21 22 35	LMP-EVA	Looking good. Looking good.
04 21 22 37	CDR-EVA	Just give me the tongs, and I'll put them away.
04 21 22 39	LMP-EVA	Okay.
04 21 22 42	CDR-EVA	Get with it and I'll start opening boyd bolts.
04 21 22 52	LMP-EVA	That's going to do okay, Pete.
04 21 22 55	CDR-EVA	Thank you.
04 21 22 56	LMP-EVA	Yes.
04 21 22 59	CDR-EVA	All right.
04 21 23 13	CDR-EVA	If I wasn't at 3.7 psi, I'd whistle while I work. I can't do it. (Whistle) Oh, yes, I can.
04 21 23 34	LMP-EVA	Okay. That seismometer's right in position now. Here's hoping. Here's hoping nothing happens to it.
04 21 23 46	CDR-EVA	Looks real good, Al.
04 21 23 47	LMP-EVA	Yes, it does. It looks like it's going to clear. Houston, looks like digging that little hole might work. Setting up there nice now, and

it looks like maybe it's not going to get down in the hole. Maybe - maybe we did it. We'll have to see.

04 21 24 05 CC Roger, Al. We concur; it sounds like a good plan.

04 21 24 20 CDR-EVA Whoops!

04 21 24 29 LMP-EVA Here's something. Look at that.

04 21 24 32 CDR-EVA What?

04 21 24 34 LMP-EVA Just have to put a little dirt on it, I guess. When I put out the skirt of this foil, it doesn't want to lie down. I guess because it's been folded so long. I guess I can just probably just put it on. It acts almost like it has an electric static charge on it. It's resisting the lunar surface. I'm sure that isn't it.

04 21 24 52 CDR-EVA Hey, stop 1 second. Watch out. Don't - don't come across - don't - I know. That's what I want you to do is come take it.

04 21 24 58 LMP-EVA Okay.

04 21 24 59 CDR-EVA That cable isn't even unreeling. See, it's perfect. Take it out there and set it. That a boy.

04 21 25 06 LMP-EVA It's right behind you. You may - -

04 21 25 08 CDR-EVA There you go.

04 21 25 09 LMP-EVA Just trip it. You might want to trip it - Trip it off that thing, Pete.

04 21 25 17 CDR-EVA Trip it off what?

04 21 25 18 LMP-EVA It's on that post.

04 21 25 20 CDR-EVA Oh. All right.

04 21 25 23 LMP-EVA Take a picture ... That shadow's going to be just right. Looking okay.

04 21 25 36 CDR-EVA Ah, fiddle de diddle. Come on.

04 21 25 47 CDR-EVA Okay. Everything is going great, but that whistle is driving me nuts. Bothering you?

04 21 25 54	LMP-EVA	A little bit.
04 21 26 03	LMP-EVA	Okay.
04 21 26 10	CDR-EVA	Oh, darn it. I can't - can't help but get dirt on this darn thing, no matter how careful I am.
04 21 26 19	LMP-EVA	I don't think there's a way, Pete. I don't think there's a way. But you got - you know where you could - You put it out in a package and then your last step - like the SIDE over there, it just deploys off the thermal wrapping, your dirt protector, and you end up with a nice clean experiment that way.
04 21 26 48	CDR-EVA	How we doing on the time line, Houston?
04 21 26 53	CC	Stand by, Pete.
04 21 27 09	CDR-EVA	Whooo! (Laughter)
04 21 27 12	LMP-EVA	What happened?
04 21 27 14	CDR-EVA	Oh, it's just the way things pop off down here in one-sixth g. Okay. Won't be long and I'll get to my favorite task, pointing the antenna.
04 21 27 29	CC	Pete, we show you're about 8 to 10 minutes behind but it's no sweat. You've got - You got lots of oxygen and feedwater. We'll give you an update on the time remaining, there, when you finish deploying the ALSEP.
04 21 27 42	CDR/ LMP-EVA	Okay.
04 21 27 43	LMP-EVA	Good. Looks like it's going real good, Houston. This seismometer, I'm having a little trouble making the skirt lie down; but, other than that, it looks good. It doesn't want to just lay flat like it does on Earth at one g. It sort of wants to slip up again. I guess it's just because it's got this memory in it from being folded so long, and - -
04 21 28 08	CC	Roger, Al. You can make a two-man task out of that and put a little dirt around the outside edge to hold it down if you like. You won't have any trouble getting any dirt on it, will you?

04 21 28 20	LMP-EVA	Houston, I noticed that if I just - I'm pushing it down. That'll do it.
04 21 28 40	LMP-EVA	Okay, Pete. Let me level it up.
04 21 28 42	CDR-EVA	I think it's pretty near level. It's lined up exactly.
04 21 28 46	LMP-EVA	If I give it a couple of pushes.
04 21 28 49	CDR-EVA	I got this feeling there's a couple of boyd bolts around under here.
04 21 29 12	LMP-EVA	Thing looks level as can be to me.
04 21 29 16	CDR-EVA	Looks good.
04 21 29 20	CC	Roger, Al. Copy. You have the bubble centered.
04 21 29 30	LMP-EVA	I'll tell you an interesting thing about this bubble, Houston; no, it's okay. It's okay.
04 21 29 44	CDR-EVA	I am not happy here, Al. I'm afraid some of these boyd bolts - There's not enough of them, and I don't understand why.
04 21 29 57	LMP-EVA	Why, one of them didn't do or what?
04 21 29 59	CDR-EVA	Well, I don't know. I haven't the foggiest idea. I thought all of them did.
04 21 30 04	LMP-EVA	Looked like you're well ahead of the time.
04 21 30 06	CDR-EVA	Hey, take your stick and kick a little dirt up on it right there.
04 21 30 11	LMP-EVA	Huh?
04 21 30 12	CDR-EVA	Take your stick and just put a little dirt on the edge, just on the edge, though. Not much.
04 21 30 21	CDR-EVA	Uh-oh. I got some bad news.
04 21 30 23	LMP-EVA	That's okay. I won't do that anymore.
04 21 30 27	CDR-EVA	That's okay; that skirt'll stay down enough.
04 21 30 32	LMP-EVA	Okay. That's - that's complete. Let me take a couple of pictures of it. Okay, Houston. The passive seismic is down; the alignment is

exactly 90 degrees, and I'm going to take a couple pictures of it here.

04 21 30 51 CDR-EVA Hey, Al.

04 21 30 52 LMP-EVA Yes?

04 21 30 54 CDR-EVA I don't know what's the matter, but something is.

04 21 30 59 LMP-EVA Here it is.

04 21 31 00 CDR-EVA Okay. Would you look and see if the lens on my camera looks clean? Wait a minute.

04 21 31 13 LMP-EVA There, you got it made.

04 21 31 15 CDR-EVA No, I don't either. I don't know wnat's the matter.

04 21 31 17 LMP-EVA Want me to hold down this part while you get ready to take - -

04 21 31 18 CDR-EVA Push - push - push that center down. All right? Looks good.

04 21 31 22 LMP-EVA Oops. Got it.

04 21 31 23 CDR-EVA Very good.

04 21 31 24 LMP-EVA That's beautiful.

04 21 31 25 CDR-EVA Hey, it's alive (laughter).

04 21 31 26 LMP-EVA It sure wants to come up, doesn't it? Whoo!

04 21 31 29 CDR-EVA That did it.

04 21 31 30 LMP-EVA That's beautiful.

04 21 31 31 CDR-EVA That did it.

04 21 31 39 CDR-EVA Houston, central station's up.

04 21 31 42 CC Roger. Copy. Central station up, and 90 degrees on the PSE gnomon.

04 21 31 56 CDR-EVA Hey, Al.

04 21 31 57 LMP-EVA Yes, sir.

04 21 32 00 CDR-EVA Never mind. I'll get you in a minute.

04 21 32 04	LMP-EVA	Don't ever move backwards (Laughter).
04 21 32 05	CDR-EVA	Hey, we're going to have to do a lot of - What did you do, fall over?
04 21 32 08	LMP-EVA	No.
04 21 32 09	CDR-EVA	No?
04 21 32 10	LMP-EVA	No, but I just - I didn't come close even - it's just that - I think something you want to follow as a rule - -
04 21 32 18	CDR-EVA	But don't kick dirt on this - -
04 21 32 20	LMP-EVA	That dome right there?
04 21 32 38	CDR-EVA	...
04 21 32 41	LMP-EVA	... essential ...
04 21 32 43	CDR-EVA	I know it.
04 21 32 44	LMP-EVA	... level.
04 21 33 01	CDR-EVA	Not too bad.
04 21 33 04	LMP-EVA	Get a good shot of it here, Pete?
04 21 33 06	CDR-EVA	Okay.
04 21 33 35	CDR-EVA	Okay, I'll take out the - the magnetometer.
04 21 33 40	LMP-EVA	Central station went up so nice.
04 21 33 44	CDR-EVA	Al, those are my last two boyd bolts.
04 21 33 47	LMP-EVA	Okay.
04 21 34 09	LMP-EVA	I'm down in a little crater now, Houston.
04 21 34 13	CDR-EVA	Sure enough, right in the bottom of the crater.
04 21 34 15	LMP-EVA	It is a lot more - a lot softer dust than up on the rim. Not much; but it's noticeable. I don't think the sides are slippery, though. I don't think it's going to bother us going over to get our Surveyor.
04 21 34 32	CC	Roger, Al. We copy. You on your way out with the LSM?

04 21 34 38	LMP-EVA	That's right. Got it right in hand; I'm out at the end of the line, and I'm deploying the legs right now.
04 21 34 46	CC	Roger.
04 21 34 55	CDR-EVA	One antenna mast in place, Houston. Going back for the - my favorite thing.
04 21 35 05	CC	Roger, Pete. Copy antenna mast in place and good luck.
04 21 35 10	CDR-EVA	Wha'd you - -
04 21 35 11	LMP-EVA	Look at that, Pete.
04 21 35 12	CDR-EVA	What?
04 21 35 14	LMP-EVA	Hey, one of the fun things here, Houston, is all these Styrofoam packing blocks that come off - to - that are put on there to protect it during man - shipment, or launch - when you take them off and throw them, they really sail. These things stay airborne up for 10 seconds, maybe.
04 21 35 40	CDR-EVA	Got any more thoughts on our TV camera, Houston?
04 21 35 44	LMP-EVA	Hey, Pete? Pete.
04 21 35 46	CDR-EVA	What?
04 21 35 47	LMP-EVA	Watch this.
04 21 35 50	CDR-EVA	(Laughter)
04 21 35 51	LMP-EVA	(Laughter)
04 21 35 54	LMP-EVA	Try that on - Hey, I just threw something. It hasn't hit the ground yet; it must have gone up 300 feet. Boing!
04 21 36 01	CDR-EVA	(Laughter) Stop playing and get to work (laughter). Come on. Maybe they'll extend us until 4-1/2 hours. I feel like I could stay out here all day. ...
04 21 36 08	LMP-EVA	I know it ... Right there. This is going to be a good place for the magnetometer.
04 21 36 21	CC	Pete, we've been thinking on that camera, and when you get back, we'll have a test for you to

run on it. It looks as though part of it's come back. And we're going to try and see what we can salvage.

04 21 36 34	CDR-EVA	Ok - Okay.
04 21 36 42	LMP-EVA	What do you think happened to it, Houston?
04 21 36 51	CC	Al, we're not sure on that. Why don't you wait until we - wait until you get back at the LM, and we'll work it out a bit and see if we can determine it?
04 21 37 05	LMP-EVA	All right.
04 21 37 07	CDR-EVA	Hey, Al?
04 21 37 08	LMP-EVA	Yes.
04 21 37 10	CDR-EVA	Gee, that's nice. Gee, that's weird (laughter).
04 21 37 13	LMP-EVA	(Laughter) Those arms, on Earth they just flop down in position. Here they don't even want to stay. There they go.
04 21 37 22	CDR-EVA	That thing hit the ground; it's still bouncing.
04 21 37 34	LMP-EVA	That's slick. That's really slick.
04 21 37 41	LMP-EVA	Boy, I hope - I hope - -
04 21 37 44	CC	Hello, Yankee Clipper; Houston.
04 21 37 54	CDR-EVA	You hope, you hope?
04 21 37 56	LMP-EVA	Oh, I was just thinking about something.
04 21 38 06	LMP-EVA	Pete, no way to keep these things clean; I'm really worried about this white coating.
04 21 38 17	CDR-EVA	Lucky for me that the antenna had it almost - level.
04 21 38 44	LMP-EVA	I can see that; ..., does it? Doesn't seem hard to see. I'll see what I can do with it.
04 21 38 53	CDR-EVA	There it is. Here it is. I think. Right there. Right in the center. Center.
04 21 39 14	CC	Yankee Clipper, Houston.
04 21 39 19	CMP	Hello, Houston; Clipper here.

04 21 39 22	CC	Dick, the EVA - EVA is going pretty well; they're 2-1/2 hours into it; and they've got the ALSEP a good way deployed. Apparently both of them look as though they just crawled out of a coal bin. Other than that, seems pretty much nominal.
04 21 39 40	CMP	Very good. Thank you.
04 21 39 42	LMP-EVA	Okay, Houston. The magnetometer's deployed; it's level, and it's pointed exactly east. And the little black dot is right in the middle.
04 21 39 54	CC	Roger, Al. Copy.
04 21 39 57	LMP-EVA	Same - same - Main concern here, there's just a lot of dust on top of the box where the electronics are. Just hope it doesn't bother it too much.
04 21 40 16	CC	Roger, Al. Yankee Clipper, we have a map update for REV 19.
04 21 40 27	CMP	Okay.
04 21 40 30	CC	REV 19: LOS 118:48:40, 119:13:30, 119:34:33.
04 21 40 50	LMP-EVA	Okay, Pete, let me take a couple of pictures of this. ...
04 21 40 58	CDR-EVA	What are you mumbling about over there?
04 21 41 00	LMP-EVA	Well, I just - I just don't - I don't like all that dirt on it; don't know what we can do though. There's no way to work around it; the radiator's got a little dirt on it, and there's no way to dust it off, and there is no way - All you can do is tap it a little bit and hope some of it falls off and that's about it. Don't want to tap it too hard. That's the best I can do.
04 21 41 29	CDR-EVA	Okay.
04 21 42 18	LMP-EVA	Okay. Okay. I've deployed the SIDE, Pete.
04 21 42 30	CDR-EVA	Okay.
04 21 42 31	LMP-EVA	It's my last item.
04 21 42 34	CDR-EVA	Not my last one.
04 21 42 35	LMP-EVA	Okay.

04 21 42 52	CDR-EVA	Does the antenna look like it's pointed at Earth? Wait.
04 21 42 57	LMP-EVA	It looks close.
04 21 43 02	CDR-EVA	That's it. ...
04 21 43 19	CDR-EVA	Okay.
04 21 43 21	CDR-EVA	... SIDE, right now.
04 21 43 26	LMP-EVA	Got her.
04 21 43 27	CDR-EVA	Okay.
04 21 43 34	LMP-EVA	Okay. I hope I don't tug on the station here, as I come out, Pete.
04 21 43 39	CDR-EVA	If that happens -
04 21 43 41	LMP-EVA	It all looks pretty level, by the way. Your station does.
04 21 43 45	CDR-EVA	Yes.
04 21 44 20	CDR-EVA	We're nearing the end, I'll bet.
04 21 44 23	LMP-EVA	I'm done.
04 21 44 27	CDR-EVA	How's that -
04 21 44 38	LMP-EVA	Now it's just - (laughter) - They must have doubled the cable length on this one.
04 21 44 43	CDR-EVA	That does it?
04 21 44 53	LMP-EVA	Okay.
04 21 44 54	CDR-EVA	You're at the end. You're at the end.
04 21 44 55	LMP-EVA	Okay. Let me set it down and we'll work on it right here.
04 21 44 58	CDR-EVA	That does it, old buddy.
04 21 44 59	LMP-EVA	Okay.
04 21 45 17	CDR-EVA	Okay. Now what do I want to do?
04 21 45 36	LMP-EVA	... do like that, does it?
04 21 45 39	CDR-EVA	Pick up the tongs.

04 21 45 41	LMP-EVA	What?
04 21 45 42	CDR-EVA	Pick up the tongs. Were they with that box - Do I have them?
04 21 45 46	LMP-EVA	You've probably got them on you.
04 21 45 48	CDR-EVA	I do. I can't see - No, they weren't with that box. We used them for something by the central station.
04 21 46 01	CDR-EVA	Hey, I got them on me.
04 21 46 03	LMP-EVA	Okay.
04 21 46 13	CDR-EVA	Okay, Houston, the antenna is up. It's aligned to 1644 and 525.
04 21 46 20	CC	We copy that, Pete. You got the nominal alignment.
04 21 46 29	LMP-EVA	That came out.
04 21 46 30	CDR-EVA	Side screen came out very nice. Okay.
04 21 46 35	LMP-EVA	Popped it out. Looks good.
04 21 46 38	CDR-EVA	Boy, are you dirty. I'm just as dirty.
04 21 46 45	LMP-EVA	Don't much want to stay down. Okay. That first shape; I can't believe it.
04 21 47 26	LMP-EVA	(Laughter) You got to be kidding. Yes. Boy, anytime you put anything spring-loaded on the Moon you're in trouble (laughter). This screen has got sort of - you know - a spring to it?
04 21 47 38	CDR-EVA	(Laughter).
04 21 47 41	LMP-EVA	Doesn't want to lie down much up here in this gravity.
04 21 47 48	CDR-EVA	Okay. Houston, how long we been out?
04 21 47 53	CC	Pete, you've been out 2 plus 40, and the pacing one right now is Al. You're running around 20 minutes behind. And when you can, we'd like an EMU check, and if you'd give us your O_2 readings?
04 21 48 11	CDR-EVA	Okay. My O_2 reading is 50 percent. And have you got anything for us? Haven't heard too much from you.

04 21 48 22	CC	Negative on that. You're perking along real well. And we're following your progress. It looks as though you're getting the job done.
04 21 48 29	CDR-EVA	Okay. Look - How you doing, Al?
04 21 48 39	LMP-EVA	I'm doing good.
04 21 48 40	CDR-EVA	Okay.
04 21 48 41	LMP-EVA	That little thing just doesn't want to - -
04 21 48 42	CDR-EVA	Houston, let me ask you a question. Can I push in the shorting amp thing?
04 21 48 51	CC	That's affirmative, Pete. We understand you're not able to get a reading. So, go ahead and close it, and we'll stand by for a zero reading.
04 21 48 59	CDR-EVA	All right. It might - Okay, it might be full scale high.
04 21 49 03	LMP-EVA	Hey, you'd better tell them I still haven't put the SIDE down.
04 21 49 07	CDR-EVA	That doesn't make any difference, does it?
04 21 49 08	LMP-EVA	I don't know.
04 21 49 09	CDR-EVA	It's all connected. It's all connected. Does it make any difference, Houston?
04 21 49 13	CC	Stand by.
04 21 49 19	CDR-EVA	You're a big area litter bug? You know that?
04 21 49 23	LMP-EVA	I know it.
04 21 49 30	CC	Pete, we'd like you to go ahead and get the full deployment down first before you depress the shorting amp.
04 21 49 38	CDR-EVA	Okay. Boy, you're dirty all the way to you knees. Can I give you any help?
04 21 49 42	LMP-EVA	Sure could.
04 21 49 44	CDR-EVA	All right; here I come.
04 21 49 50	CC	And, Pete and Al, a comment on picture taking. If you would, try to document some of the dirt which you've - which has gotten over - all over

the equipment. If you would, try to get closeups which will show the dirt we might have on thermally sensitive areas. And, also, when you get done, if you would, take one or two extra pictures showing the ALSEP with the mounds that you described previously in the background. That'll give us a good geometric reference.

04 21 50 23 CDR-EVA Okay. I did a PAN -

04 21 50 24 LMP-EVA Hold it - Hold that, Pete.

04 21 50 25 CDR-EVA I did a PAN out here at the -

04 21 50 31 LMP-EVA Okay. Just a second. Now, let me hold this end and you stretch that end out.

04 21 50 35 CDR-EVA Okay. I got it.

04 21 50 36 LMP-EVA Go to the right. That's it. Get the ... Get the coils out of it.

04 21 50 39 CDR-EVA Which way's that thing head?

04 21 50 41 LMP-EVA It's got to head away from - central station - away from everything. Probably ought to be a point right over there.

04 21 50 50 CDR-EVA Okay.

04 21 50 51 LMP-EVA But, now, I think if you kind of twirled it a couple times, it would end up uncoiling that twist in the line there.

04 21 50 59 CDR-EVA That's all right. We can try it that way, I guess.

04 21 51 02 LMP-EVA Looks like it might be working. That's good. That's doing good. Okay. Let me take and set this thing down, and it's supposed to point to the Earth this way. That'll be good.

04 21 51 15 CDR-EVA Get your ground wires wrapped around the leg.

04 21 51 17 LMP-EVA ... got it. Looks like it's going to be okay.

04 21 51 21 CC Yankee Clipper, Houston.

04 21 51 27 CMP Go ahead.

04 21 51 29 CC Yankee Clipper, if you'll give POO and ACCEPT, we'll ship you up a state vector, a target load, and a REFSMMAT.

04 21 51 39	CMP	... has got it.
04 21 51 42	CC	Roger.
04 21 51 43	LMP-EVA	Okay. Hold on, hold on. Don't tip over.
04 21 51 46	CDR-EVA	Now, wait a minute, wait a minute.
04 21 51 49	LMP-EVA	Okay.
04 21 51 50	CDR-EVA	I got it steadied.
04 21 51 51	LMP-EVA	Okay.
04 21 51 53	CDR-EVA	There, that's all right.
04 21 51 54	LMP-EVA	Just hold it there and twist it.
04 21 51 55	CDR-EVA	Watch it, watch it, watch it.
04 21 51 56	LMP-EVA	Okay. I'm trying to.
04 21 51 58	CDR-EVA	No, you're foot's hung in it. That a boy.
04 21 52 01	LMP-EVA	That did it. Okay. Let me sneak it back on again. Okay.
04 21 52 06	CDR-EVA	Now, what do you want?
04 21 52 07	LMP-EVA	I want to put that lid back on there. It would probably be best if we just left it off.
04 21 52 11	CDR-EVA	I think it would be best if you left it alone.
04 21 52 13	LMP-EVA	Okay. Now if you hold it there while I - -
04 21 52 15	CDR-EVA	... I got it. I got it anchored.
04 21 52 17	LMP-EVA	- - because this is going to want to turn it over.
04 21 52 19	CDR-EVA	Yes. I know.
04 21 52 20	CC	Yankee Clipper, Houston. We're coming up with a load.
04 21 52 25	CDR-EVA	Yes. Step on it.
04 21 52 31	LMP-EVA	Okay. That's what I think I can do. No.
04 21 52 37	CDR-EVA	Those guys got to be kidding about that cable on that - They knew that thing was going to do that.

04 21 52 53	LMP-EVA	There, maybe that's better.
04 21 52 59	CDR-EVA	Come on, this thing's making us run behind.
04 21 53 02	LMP-EVA	I know it, but I don't see any way to quickly - (Laughter)
04 21 53 07	CDR-EVA	All right, now, just a minute. Your foot. That's better.
04 21 53 14	LMP-EVA	Okay. Make it turn - Let's try it a couple more times. I think if I hold it this way and use this tool, I can probably set it - -
04 21 53 21	CDR-EVA	Hey, it's just like zero g; everything floats up. That baby's going to nose dive into the dirt every time, sure as I'm standing here. That cable's cleverly designed to make it do that.
04 21 53 31	LMP-EVA	Let's put it like this. Down like that.
04 21 53 35	CDR-EVA	Don't fall over.
04 21 53 37	LMP-EVA	Okay. There's no way.
04 21 53 40	CDR-EVA	Yes, just - that a boy.
04 21 53 45	LMP-EVA	That thing goes right in the dirt each time - -
04 21 53 47	CDR-EVA	I know, I know. It's going to do that. It's very frustrating. Turn it around and point it the other way. See if it'll - See if it'll point out that way.
04 21 53 55	LMP-EVA	All right. That might be good, too. Okay.
04 21 53 59	CDR-EVA	Do - I knew that ding-a-ling cable was going to make us spend hours trying to do that.
04 21 54 08	LMP-EVA	(Laughter) Doesn't that make you mad?
04 21 54 12	CDR-EVA	Yes. I know - especially when you know it's going to happen.
04 21 54 14	LMP-EVA	Look, why can't I set it like this? You just let go of the SIDE and come over, and step on that thing.
04 21 54 18	CDR-EVA	Hey, if this SIDE falls over, then I'm really going to be mad. I got that thing firmly planted.

04 21 54 22	LMP-EVA	Just a minute. Wait, wait. Hold - hold it. Hold her a minute. Okay. Get this just arranged.
04 21 54 35	CDR-EVA	That's it. Now step on it.
04 21 54 37	LMP-EVA	I can't. Here - There's no way.
04 21 54 41	CDR-EVA	Let go of the - Let go of the string in your hand. That a boy, now bend -
04 21 54 47	LMP-EVA	It's just - -
04 21 54 48	CDR-EVA	... That's it. Push it in.
04 21 54 51	LMP-EVA	Ah! We made it. I hope. Let's push it real hard in there.
04 21 54 55	CDR-EVA	Okay.
04 21 54 56	LMP-EVA	I think we've got it licked.
04 21 54 58	CDR-EVA	That a boy. Easy does it.
04 21 54 59	LMP-EVA	Aw, you - That thing just jumps right up.
04 21 55 04	CDR-EVA	(Laughter)
04 21 55 05	LMP-EVA	Pete, I'm just afraid that one - We've had it on this one.
04 21 55 08	CDR-EVA	You've had it on that one, all right.
04 21 55 10	LMP-EVA	Hey, here it is here. Look, I don't think it makes any difference if it - if it lays on its side as long as it points its aperture in the right place.
04 21 55 16	CDR-EVA	Yes.
04 21 55 17	LMP-EVA	Let's move it around here and just let it lay on its side. Yes, it doesn't know - It doesn't know the difference. Let's just kind of lay it around. Let's turn it - now, that'll be - that'll work, that'll work.
04 21 55 30	CC	Al, we concur with that. Go ahead.
04 21 55 32	CDR-EVA	That work right there?
04 21 55 34	LMP-EVA	Okay. It looks like the only way this - this cable has just got too much spring for the -

for the - the weight of the package, and there's just no way. Okay, Pete. Let her go. Now, let me level it. No way.

04 21 55 54	CDR-EVA	That's a shame. What time is it, anyhow? Let me get over here and get a big picture of this.
04 21 56 08	CC	Pete, you're 2 plus 48 into the EVA.
04 21 56 16	LMP-EVA	Okay. Level this, Pete. That's leveling good. Leveling real good.
04 21 56 34	CDR-EVA	That American flag sure looks pretty back here next to the LM, doesn't it? The S-band? Looks like a model.
04 21 56 42	LMP-EVA	Yes. I think that's going to do it for the SIDE. That was a tough one. More than one tough one.
04 21 56 47	CDR-EVA	Back off; I got the picture.
04 21 56 50	LMP-EVA	... you got a ...? Can - Can you see the bubble and everything in it?
04 21 56 52	CDR-EVA	No. Let me get - I'm just getting one from a distance here, up a way.
04 21 56 58	LMP-EVA	Get 74 feet.
04 21 57 00	CC	Al, copy you have the SIDE deployed.
04 21 57 03	LMP-EVA	Yes.
04 21 57 05	CDR-EVA	Yes Everything's deployed. I'm going to go get the shorting plug now, Houston.
04 21 57 09	CC	Okay. Standing by.
04 21 57 12	CDR-EVA	(Humming) Boy, do I like to run up here. This is neat. The first thing we've got to do is run over to that volcano-looking - or whatever that little jabber-do is. That's interesting. Okay, Houston. Here comes the shorting plug.
04 21 57 44	CC	Yankee Clipper, Houston. The computer is yours.
04 21 57 53	CMP	...
04 21 57 59	CDR-EVA	Hey, Al.
04 21 58 00	LMP-EVA	Yes, sir.

04 21 58 01	CDR-EVA	I need your help over here for a minute.
04 21 58 04	LMP-EVA	I'll be there.
04 21 58 06	CDR-EVA	Houston, how about ASTRO switch 1?
04 21 58 09	CC	You're clear to rotate ASTRO switch 1, Pete.
04 21 58 15	CDR-EVA	Okay.
04 21 58 19	LMP-EVA	Okay.
04 21 58 33	LMP-EVA	Okay.
04 21 58 34	CDR-EVA	Okay. Gosh, we can't - We've got to realign that antenna.
04 21 58 46	CDR-EVA	Okay, Houston. ASTRO switch 1 is rotated; shorting amp switch is in. I'll be a happy man if you tell me you're getting a signal.
04 21 58 56	CC	Roger, Pete. Stand by.
04 21 58 58	CDR-EVA	Boy, it's all put up.
04 21 59 01	LMP-EVA	It sure looks nice.
04 21 59 02	CDR-EVA	How about messing with this one thing right here?
04 21 59 05	LMP-EVA	Okay. Well, we'll do it, Pete. Let's - let's - I wanted to just look at the numbers, what'd you do? Hey ... do me a favor. Use your tongs and pick up a couple of these boyd bolts and set them on the edge of that skirt - actuate the seismic. There's about 10 boyd bolts just near it over there. What did you want me to look at?
04 21 59 26	CDR-EVA	Just check - Check that antenna; make sure it's level.
04 21 59 29	LMP-EVA	Okay.
04 21 59 31	CDR-EVA	Okay, I'm ...
04 21 59 33	LMP-EVA	You do that. I'll give you the tongs. I'm going to run over and photograph this ding-a-ling looking -
04 21 59 37	CDR-EVA	All right.

04 21 59 39	CC	Pete and Al.
04 21 59 40	CDR-EVA	- - want to stay out?
04 21 59 41	CC	Pete and Al, Houston. Looks like you did the job. We're getting data back.
04 21 59 47	CDR-EVA	Hey, Houston. You just don't know how happy I am.
04 21 59 51	LMP-EVA	Okay. Tell me again the hack numbers you're supposed to use.
04 21 59 54	CDR-EVA	16445.25. Here, turn around.
04 21 59 58	LMP-EVA	Okay.
04 21 59 59	CDR-EVA	I shouldn't have done that. Dirty all over, here.
04 22 00 01	LMP-EVA	Okay.
04 22 00 02	CDR-EVA	All right, I'm going over to this mound.
04 22 00 03	LMP-EVA	Okay.
04 22 00 04	CDR-EVA	I'll be back in a flash. By-by.
04 22 00 06	LMP-EVA	Okay. I'll tell you the numbers I read; you tell me if they're right.
04 22 00 09	CDR-EVA	Okay.
04 22 00 11	LMP-EVA	I read 52 - no, correction - I read 525.
04 22 00 17	CDR-EVA	That's right.
04 22 00 18	LMP-EVA	Okay. I also read - 16 - 42.
04 22 00 33	CDR-EVA	I don't know what this thing is. It's really weird.
04 22 00 36	LMP-EVA	1642. You ever - Is that - Is that it?
04 22 00 39	CDR-EVA	1644, Al.
04 22 00 41	LMP-EVA	Okay. Same thing. Looks good, looks good.
04 22 00 46	CDR-EVA	I don't know what this is. Let me get the - feet at f:8.

04 22 00 54	CMP	Houston, Clipper.
04 22 01 06	CC	Yankee Clipper, Houston. Go ahead.
04 22 01 12	CMP	Roger. Houston, do you have a maneuver pad for me?
04 22 01 17	CC	That's affirmative. We'll be up with you in about 2 minutes.
04 22 01 21	CMP	...
04 22 01 26	CDR-EVA	I know what it is.
04 22 01 28	LMP-EVA	What is it?
04 22 01 29	CDR-EVA	Well, I think that rock - I think it's a little secondary impact crater. Very funny ... Is that a funny rock - it looks -
04 22 01 38	CC	Yankee - Yankee Clipper, Houston. I have the maneuver PAD when you're ready to copy.
04 22 01 46	CMP	Go ahead.
04 22 01 47	LMP-EVA	Hey, here's a rock they'll be glad to see in Houston.
04 22 01 50	CDR-EVA	Good.
04 22 01 51	LMP-EVA	It's an interesting one. It looks like a solid glass chunk. It's a real shiny black. Did you ever see any thing like it before?
04 22 01 54	CC	Dick, purpose, lunar orbit plane change 1, SPS/G&N: 36733 minus 0.73, plus 0.51, 119:47:12.54, minus 0011.5, plus 0349.6, minus all balls. Roll, pitch, and yaw, all zeros, 0062.5, plus 0057.3, 0349.7, 0:18, 0337.1, 05,002.6, 18.7.
04 22 03 12	CC	Dick, for boresight, Draco Beta.
04 22 03 30	CC	And that's down 007, right 46. The remainder is NA.
04 22 03 39	CDR-EVA	Put this rock in your pack. ... - -
04 22 03 42	CC	Sirius and Rigel.

04 22 03 46	CDR-EVA	- - glass spatter on it. That's fantastic.
04 22 03 48	CC	For your alignments, 047, - -
04 22 03 50	LMP-EVA	Never seen anything like that rock.
04 22 03 51	CC	- - 263, - -
04 22 03 52	CDR-EVA	No, I haven't. No, I haven't.
04 22 03 53	CC	- - 055. - -
04 22 03 54	CDR-EVA	That's great.
04 22 03 55	CC	- - And that's two-jet ullage - -
04 22 03 56	CDR-EVA	... go.
04 22 03 57	CC	- - for 15 seconds. Read back.
04 22 04 01	CDR-EVA	Hey, Hous - Are you through? Al?
04 22 04 03	LMP-EVA	Yes. I - I got - I got some pictures to take and that's it.
04 22 04 06	CMP	Hey, Houston; Yankee Clipper.
04 22 04 07	CDR-EVA	... and I'll meet you over at that big mound. All right?
04 22 04 09	CC	Clipper, go ahead.
04 22 04 10	LMP-EVA	All right.
04 22 04 13	CMP	If you want to talk to me, you'll have to take it off of relay so that Pete and Al won't cut you out.
04 22 04 22	CDR-EVA	Going to bring the tongs, Al.
04 22 04 25	CC	Okay, Clipper. Understand. You did not copy all of that PAD. Is that affirm?
04 22 04 31	CMP	That's affirmative. It's impossible with those guys yakking.
04 22 05 54	CDR-EVA	Okay. Boy, is that a big rock!

04 22 06 30	CDR-EVA	Okay, Al. What are you up to?
04 22 06 33	LMP-EVA	I'm coming your way. Let's start sampling.
04 22 06 36	CDR-EVA	Okay.
04 22 06 37	LMP-EVA	I'll be there in a minute.
04 22 06 38	CDR-EVA	Houston, how long you going to let us stay out?
04 22 07 05	CDR-EVA	Hello. Hello, Houston?
04 22 07 12	CC	Al, Houston. Go ahead.
04 22 07 16	CDR-EVA	Okay. How long you going to let us stay out?
04 22 07 23	CC	Pete, you'll be extended 30 minutes, so you're out for a total of 4 hours.
04 22 07 28	LMP-EVA	Hey, man!
04 22 07 29	CC	And it looks as though you're - -
04 22 07 30	CDR-EVA	All right, how much do we have?
04 22 07 36	CC	Okay. You've got about 1 hour left, and it looks as though we're going to have to close off pretty much with the nominal plan; and stand by; we have some words on the traverse back.
04 22 07 49	CDR-EVA	Okay. We're standing over at the head crater.
04 22 07 55	LMP-EVA	Why don't we start picking up some rocks, Pete, while we wait?
04 22 07 57	CDR-EVA	Yes. Yes. Yes. Yes.
04 22 08 01	LMP-EVA	Want to get a picture of that?
04 22 08 03	CDR-EVA	Sure do.
04 22 08 05	LMP-EVA	Let me get it set up.
04 22 08 07	CDR-EVA	Right.
04 22 08 12	LMP-EVA	Try it at f:8. Okay. There you go. Okay. Grab her up, Pete.

04 22 08 31	CC	Pete and Al, two things we'd like you to do on the traverse on the way back: One is to get samples and some documentation of those mounds; and, secondly, if you can, get over to the thousand-foot crater, which is northwest of the ALSEP, and get samples and documentation of that sample from there.
04 22 08 56	CDR-EVA	Thousand-foot crater?
04 22 08 57	LMP-EVA	Suppose that's where we are? Is that that one over there?
04 22 08 59	CDR-EVA	You don't mean the head crater, do you? Let's get some of this now, then.
04 22 09 04	LMP-EVA	Okay.
04 22 09 05	CC	Negative. We'll - If you're at head crater now we'll give you - We'll give you a radar vector. Stand by.
04 22 09 12	LMP-EVA	... this way. You're - You've already got pictures of the - this, Pete?
04 22 09 17	CDR-EVA	Yes, at 15 feet. I'm just taking it close up over here.
04 22 09 18	LMP-EVA	Okay. Take that at about - -
04 22 09 19	CDR-EVA	Go get the - Look at this black rock here.
04 22 09 21	LMP-EVA	Okay. Wait. Let me get close - Wait - Wait. Uh oh. That - That ruins it.
04 22 09 25	CDR-EVA	I got it, I got it, I got it.
04 22 09 26	LMP-EVA	Yes, but I didn't get a picture of it. Okay.
04 22 09 28	CDR-EVA	Of that one? Yes. Okay?
04 22 09 32	LMP-EVA	There, you old picture in there. Let's get another one from here ... this one -
04 22 09 36	CC	Pete.
04 22 09 38	CDR-EVA	Let's go around to the other side and not kick any dirt on it. It ruins it.
04 22 09 40	LMP-EVA	Yes. Okay; go ahead.

04 22 09 42	CDR-EVA	Go.
04 22 09 43	CC	Pete, Houston. The crater which we speak of is - Pete, the crater which we speak of is about 300 feet northwest of head crater.
04 22 09 58	CDR-EVA	The head - Oh - I see it. Yes. You mean the great big one over here?
04 22 10 01	CC	That's affirmative.
04 22 10 02	CDR-EVA	Okay. Yes. We can go over there. Okay, but that's the ...
04 22 10 07	LMP-EVA	Wait, wait, wait a minute.
04 22 10 08	CDR-EVA	Huh?
04 22 10 09	CC	And, Pete and Al, we'll be - -
04 22 10 10	CDR-EVA	There's ... to that.
04 22 10 12	CC	- - talking with Yankee Clipper, giving him a maneuver PAD, for about the next 5 minutes.
04 22 10 18	CDR-EVA	Very good.
04 22 10 20	LMP-EVA	Let me see if I can chip some of that off, Pete, with this. Get my tool here. I know - -
04 22 10 27	CDR-EVA	You could work 6 or 7 hours here; never bother you a bit - a bit.
04 22 10 36	CDR-EVA	Okay.
04 22 10 37	LMP-EVA	Kind of knock a piece of that off.
04 22 10 41	CDR-EVA	(Humming) Got the feeling that when that crater was made, it just threw out a big blob of dirt. This is where it landed.
04 22 10 48	LMP-EVA	Yes.
04 22 10 51	CDR-EVA	Ain't any that big.
04 22 10 53	LMP-EVA	Hey, you'd almost - I wouldn't be surprised to find this is that micro ... You haven't got any ...
04 22 10 59	LMP-EVA	Hey, look at that picture.
04 22 11 00	CDR-EVA	...

04 22 11 01	CC	Pete and Al, Houston.
04 22 11 02	LMP-EVA	Okay. That'll be a goodie.
04 22 11 03	CDR-EVA	Go.
04 22 11 04	LMP-EVA	Go ahead.
04 22 11 05	CC	We're trying to get a maneuver PAD up to Clipper; he's having a hard time copying it with you talking in the background. Could you - Could we have some silence for about - for about 5 minutes, while we get that PAD up?
04 22 11 23	CDR-EVA	Yes.
04 22 11 25	CC	Okay. We'll be right back with you. Clipper, Houston. Are you ready to copy?
04 22 11 30	CMP	Go, Bill.
04 22 11 34	CC	Lunar Orbit plane change 1, SPS/G&N: 36733, minus 0.73, plus 0.51, 119:47:12.54, minus 0011.5, plus 0349.6, minus all balls; roll, pitch, and yaw, all zero; H_a 0062.5, plus 0057.3, 0349.7, 0:18, 0337.1, 05, 002.6, 187, and that's Draco Beta; down 00.7, right 4.6, the remainder is NA. Sirius and Rigel - Roll, pitch, and yaw: 047, 263, 055; the ullage is two jets for 16 seconds. Read back.
04 22 13 25	CMP	SPS/G&N: 36733, minus 0.73, plus 05.1, 119:47:12.54, minus 0011.5, plus 0349.6, all zips, roll, pitch, and yaw, all zips; H_a 0062.5, plus 0057.3, plus 0349.7, 0.18, 0337.1, 05, 002.6, 187; Draco Beta, down 00.7; right 4.6; 047, 055; 16 seconds. Over.
04 22 14 20	CC	Read back correct, Dick.
04 22 14 28	CMP	Okay, thank you.
04 22 14 32	CC	Pete and Al, we're back with you.
04 22 14 36	LMP-EVA	Okay.
04 22 14 37	CDR-EVA	Roger-Roger. We're almost over to the thousand-foot crater.
04 22 14 40	CC	Roger.

04 22 14 44	CDR-EVA	Got - Got about another 200 feet to go. You can see these linear patterns quite frequently on the surface, Houston. They are - seem to generally run from the north to the south, and they're just little lines. They're off in the dirt; sometimes you see a large area - we're in an area right now. It looks like it had a fresh impact not too long ago.
04 22 15 15	LMP-EVA	Let me take a picture of this one, Pete. This - -
04 22 15 17	CDR-EVA	Hey, I got some neat - neat ones right here.
04 22 15 19	LMP-EVA	Okay. Looks like a secondary impact crater that occurred - recently.
04 22 15 28	CDR-EVA	Yes. Some of them do, don't they?
04 22 15 30	LMP-EVA	They do. This one looks like fresh - doesn't have that old look like all the rest of these - -
04 22 15 33	CDR-EVA	Come on. Let's go. ... right over there.
04 22 15 34	LMP-EVA	There's some of that ...
04 22 15 37	CC	Roger, Pete and Al. We copy that. We show you're 3 hours and 7 minutes in - into the EVA. And we'd like you back to the LM to start the closeout in 10 minutes. That's at 3 plus 17.
04 22 15 52	LMP-EVA	Okay.
04 22 15 53	CDR-EVA	Holy Christmas, we're going to have to smoke there, Houston.
04 22 15 55	CC	That's affirmative.
04 22 15 57	CDR-EVA	Yes. We're almost to the crater. Okay, we'll - we're not getting very many rocks by going this far, but if that's what you want, that's what you want. Run, baby. (Laughter)
04 22 16 09	LMP-EVA	Hey, let's - When we start picking up, we'll try and get a larger sample - -
04 22 16 12	CDR-EVA	Hey, look at - This looks like a brilliant spanking fresh impact crater. Look at that little fellow, huh?
04 22 16 21	LMP-EVA	Sure does, doesn't he?

04 22 16 22	CDR-EVA	Yes. Let's get some rocks right here; here's some. Here, get some pictures first. Get some pictures of that crater, and I'll get some over there. I'll get this one right here.
04 22 16 32	LMP-EVA	Okay. Wonder why these look so fresh? Must be just the difference in materials.
04 22 16 38	CDR-EVA	Boy, it sure does look fresh though, doesn't it?
04 22 16 43	CDR-EVA	There - There's a rock for you.
04 22 16 44	LMP-EVA	Okay.
04 22 16 46	CDR-EVA	Listen, we need to find a grapefruit, too, you know.
04 22 16 48	LMP-EVA	Yes. There's a bunch around.
04 22 16 50	CDR-EVA	Made a dent on this rock. Whoops. Wait a minute; I dropped it. Hold it, move on a little bit; move on, move forward.
04 22 16 56	LMP-EVA	Okay.
04 22 16 58	CDR-EVA	Don't like hustling. I'll be dobbed! Let's go.
04 22 17 04	LMP-EVA	Okay.
04 22 17 06	CDR-EVA	Get right to the edge of this crater and photograph it. Get a PAN in it, and then we won't have to come back this way. Look at there; that crater's spectacular isn't it? Wow, a monster! Look at that rock! I'd like to -
04 22 17 18	LMP-EVA	Oh ... get some of this bedrock - -
04 22 17 20	CDR-EVA	Well, we may want to go back there tomorrow, but we can't go any further. We'll never get back in 10 minutes.
04 22 17 27	LMP-EVA	Hey, there's bedrock down here a little ways.
04 22 17 29	CDR-EVA	Where?
04 22 17 30	LMP-EVA	It's right down the hill.
04 22 17 31	CDR-EVA	Hey, you're right.
04 22 17 32	LMP-EVA	About 50 - 50 yards.

04 22 17 34	CDR-EVA	Here I go.
04 22 17 35	LMP-EVA	Hey, good show.
04 22 17 39	CDR-EVA	You're right. I'll pan it first. Got just a minute. I'm going to get in here and - You got to go to intermediate cooling.
04 22 17 47	LMP-EVA	Okay.
04 22 17 49	CDR-EVA	Been around here so far on MIN.
04 22 17 51	LMP-EVA	Yes, let's ... -
04 22 17 52	CDR-EVA	Look at - don't - don't - Don't they look like something looking into zero phase? Look at those - -
04 22 17 56	LMP-EVA	Yes.
04 22 17 57	CDR-EVA	- - fresh little jabber - dos. Now wait a minute. I want to - -
04 22 17 59	LMP-EVA	Why don't you go ahead and pan - right here?
04 22 18 00	CDR-EVA	And I want to get it at 74.
04 22 18 03	LMP-EVA	Okay.
04 22 18 04	CDR-EVA	Seventy-four - -
04 22 18 05	LMP-EVA	You ought to have two f:8.
04 22 18 06	CDR-EVA	Eight, right?
04 22 16 08	LMP-EVA	Fifty, and you're looking - right there, and you ought to have it.
04 22 18 11	CDR-EVA	Eight over there, and 11 right there, and 8 over there.
04 22 18 14	LMP-EVA	Yes.
04 22 18 15	CDR-EVA	1, 2, 3 - -
04 22 18 19	LMP-EVA	Beautiful.
04 22 18 20	CDR-EVA	- - 4 - -
04 22 18 21	LMP-EVA	You can - better believe it -
04 22 18 23	CDR-EVA	- - 5. Now, let me go back to f:11.

04 22 18 27	LMP-EVA	Okay.
04 22 18 28	CDR-EVA	We'll have to smoke to get back to that LM. We're a long way.
04 22 18 31	LMP-EVA	Not where we are. ...
04 22 18 35	CDR-EVA	Huh?
04 22 18 37	LMP-EVA	Got it. I was just looking over this rock down here. Looks like it came - -
04 22 18 41	CDR-EVA	Just a minute. Okay. Now, let me go over here, and I'll get one in stereo of this baby.
04 22 18 47	LMP-EVA	Okay.
04 22 18 48	CDR-EVA	Let me just leap over here a ways.
04 22 18 50	LMP-EVA	Houston, we're looking down into this big crater now, and it looks rather old. ... - -
04 22 18 53	CDR-EVA	Hey, there's some bedrock on the bottom, I think, here. Looks like big boulders.
04 22 18 57	LMP-EVA	There's some big boulders that are resting inside the rim. None on the rim like we see on a large crater that's further to the west by another thousand feet. But you don't see any outcropings of rocks either that - you know - that we could look down and say, well, from the top of the rim down to about 20 feet or something, then we come to the - the underlying rock, but there is this rock that's very large, and arm's - spread around. We're going to try to collect some of the samples.
04 22 19 31	CDR-EVA	Hey, I'm going to get the - -
04 22 19 32	CC	Roger, Al. We suggest that you hustle. We show you're 3 hours - 3 hours and 11 minutes, and we'd like you back there around 17 - 6 more minutes.
04 22 19 43	LMP-EVA	We're picking up a couple right now, and we're on our way back. Just a minute.
04 22 19 53	LMP-EVA	Boy, there's a big block over there.
04 22 19 55	CDR-EVA	Why don't you get it? Got it? I can't get it with the tongs.

04 22 19 57	LMP-EVA	Move ahead and I'll pick it up.
04 22 19 59	CDR-EVA	Hey, wait a minute. How about this?
04 22 20 06	LMP-EVA	Get it?
04 22 20 15	CDR-EVA	Push it over here and I'll get it.
04 22 20 16	LMP-EVA	Push her over here.
04 22 20 26	CDR-EVA	Okay ...
04 22 20 27	LMP-EVA	Drop it in my bag.
04 22 20 29	CDR-EVA	Okay. You got anything else you want to put in your bag? Got to push another one over here.
04 22 20 34	LMP-EVA	Okay, in just a minute.
04 22 20 35	CDR-EVA	Okay.
04 22 20 37	LMP-EVA	A couple of big ones. Oh, I wish get this inside of that. I can't.
04 22 20 41	CDR-EVA	Try that one.
04 22 20 42	LMP-EVA	That's a good one.
04 22 20 44	CDR-EVA	Huh?
04 22 20 46	LMP-EVA	A couple of nice ones right here. Wait a minute. Get my ...
04 22 20 53	CDR-EVA	There you go. Oops.
04 22 20 56	LMP-EVA	Okay. Wait a minute. Yes. Let's just - let's just get - get this real good one.
04 22 21 02	CDR-EVA	Yes.
04 22 21 03	LMP-EVA	Okay. We're getting you some of this rock and hope it's a ... Let's go back - -
04 22 21 10	CC	Roger, Pete and Al. We copy. We suggest you start smoking on back there. You're 3:13 and I'd like you back there in 4 minutes.
04 22 21 21	CDR-EVA	Okay. We're on our way. Let's go, Al.
04 22 21 22	LMP-EVA	Hey, Pete?

04 22 21 23	CDR-EVA	Yes.
04 22 21 24	LMP-EVA	Let me ask you something.
04 22 21 25	CDR-EVA	What?
04 22 21 26	LMP-EVA	What -
04 22 21 28	CDR-EVA	Huh?
04 22 21 29	LMP-EVA	That's interesting, isn't it?
04 22 21 30	CDR-EVA	What?
04 22 21 31	LMP-EVA	I was looking at that rock perched right over on top of the hill, there. ... my distance here, because there's nothing but -
04 22 21 38	CDR-EVA	Here.
04 22 21 39	LMP-EVA	- - all the same.
04 22 21 41	CDR-EVA	Yes.
04 22 21 42	LMP-EVA	... the same.
04 22 21 48	LMP-EVA	Must have been 1200 - 1300 feet, huh?
04 22 21 51	CDR-EVA	At least.
04 22 21 52	LMP-EVA	At least.
04 22 21 53	LMP-EVA	You could travel a lot further than that; you know it?
04 22 21 54	CDR-EVA	Yes.
04 22 21 55	LMP-EVA	You could really make a long traverse if you had a good long-term OPS.
04 22 21 58	CDR-EVA	What do you figure my strides are - 10 feet?
04 22 22 02	LMP-EVA	No. I'd say your - each - each width only goes about - When you're running normal, I'd say they'd go about 3 or 4 feet but you could just go indefinitely at this pace.
04 22 22 11	CDR-EVA	Yes.
04 22 22 12	LMP-EVA	You don't get tired. Seems that you land flat-footed and then you just push off your toes and - Then you go.

04 22 22 24	CDR-EVA	(Laughter)
04 22 22 25	LMP-EVA	Fun! Well, we got that ALSEP up.
04 22 22 33	CDR-EVA	Listen. When I get this rock box, we've got to get some more rocks. Turned us all around and we didn't get any rocks.
04 22 22 44	LMP-EVA	I'm getting some up here.
04 22 22 46	CDR-EVA	We'll fill it. Just a minute.
04 22 22 53	CDR-EVA	Hey, Houston. We're approaching the ALSEP, headed back to the LM.
04 22 22 59	CC	Roger, Pete. We copy.
04 22 23 05	CDR-EVA	If you hadn't made me run all the way -
04 22 23 07	LMP-EVA	Who, me?
04 22 23 08	CDR-EVA	Yes.
04 22 23 09	LMP-EVA	Hey, ease over this way a little.
04 22 23 10	CDR-EVA	Which way?
04 22 23 11	LMP-EVA	Over towards your left.
04 22 23 12	CDR-EVA	What you want to do?
04 22 23 14	LMP-EVA	I thought there were a couple of good rocks over there. There.
04 22 23 21	CDR-EVA	Be about half way -
04 22 23 23	LMP-EVA	Why don't we grab a couple of rocks here?
04 22 23 26	CDR-EVA	All right. Here's one right here.
04 22 23 27	LMP-EVA	Okay. Let me get a photograph of it. Hurry. We're on the way.
04 22 23 33	CDR-EVA	Coming?
04 22 23 38	LMP-EVA	Okay. There's a good one. Wait a minute. Eight. Step in and get the picture.
04 22 23 48	CDR-EVA	Got it?
04 22 23 49	LMP-EVA	Got it. There you go.

04 22 23 53	CDR-EVA	Good boy. Okay.
04 22 24 08	LMP-EVA	Get another good one. Forget the picture.
04 22 24 11	CDR-EVA	Okay. You're in the shadow. Step back just a little.
04 22 24 14	LMP-EVA	I said forget the picture. - -
04 22 24 15	CDR-EVA	Okay.
04 22 24 17	CC	Pete and Al, we're picking up your heavy footprints going by the seismometer.
04 22 24 24	CDR-EVA	That's great.
04 22 24 25	LMP-EVA	Hey, Pete.
04 22 24 26	CDR-EVA	Yes.
04 22 24 27	LMP-EVA	Let's get one last shot of this thing.
04 22 24 30	CDR-EVA	You - Look, I got to get going on the rock box. I can't - -
04 22 24 32	LMP-EVA	Oh, okay; let's deal them.
04 22 24 35	CDR-EVA	Go ahead and get one more. Zing. I feel like Ebeneezer Scrooge or something running across the plain.
04 22 24 49	LMP-EVA	Boy, there's a lot of soft land here.
04 22 24 53	CDR-EVA	Okay. We're within about 300 feet of the LM now, Houston.
04 22 24 59	CC	Roger, Pete. We copy.
04 22 25 01	CDR-EVA	Coming on a - -
04 22 25 02	LMP-EVA	Freak out!
04 22 25 03	CDR-EVA	There's a good rock.
04 22 25 04	LMP-EVA	Halt, halt, halt!
04 22 25 05	CDR-EVA	Look at that!
04 22 25 06	LMP-EVA	I swear there's a - -
04 22 25 07	CDR-EVA	Never saw one like that before. Look at that!

04 22 25 12	LMP-EVA	Okay.
04 22 25 14	CDR-EVA	That green? What is it?
04 22 25 17	LMP-EVA	- - see it.
04 22 25 18	CDR-EVA	No, it was grinning at me. That's why I stopped.
04 22 25 19	LMP-EVA	Okay.
04 22 25 20	CDR-EVA	The heck with it. Put it in the rock bag.
04 22 25 21	LMP-EVA	Let's go.
04 22 25 22	CDR-EVA	Yes, sir.
04 22 25 23	LMP-EVA	Okey-doke.
04 22 25 28	CDR-EVA	(Laughter)
04 22 25 30	LMP-EVA	Here, let's pick up a couple of these.
04 22 25 32	CDR-EVA	Okay.
04 22 25 36	LMP-EVA	Hey, they're good. They're a little different. They're more the gabbro type. Yes - wait a second. Wait a second.
04 22 25 59	CDR-EVA	Get it in?
04 22 26 01	LMP-EVA	Good show.
04 22 26 02	CDR/ LMP-EVA	Let's go.
04 22 26 05	CDR-EVA	What I'd hate to see is an LMP laying on the lunar surface. Hey, what's that glass! Look at that! Son of a gun. I got to have that. Look at that, a pure bead of glass! Hey, that's -
04 22 26 18	LMP-EVA	Let's grab it. Oh, come on. Hold my hand.
04 22 26 24	CDR-EVA	Okay.
04 22 26 31	LMP-EVA	Oh, I'm losing it.
04 22 26 44	LMP-EVA	Got it.
04 22 26 45	CDR-EVA	Pure glass or something, huh?
04 22 26 46	LMP-EVA	It's one of those black beads, only this one's - -

04 22 26 47	CDR-EVA	Careful.
04 22 26 48	LMP-EVA	- - about - -
04 22 26 49	CDR-EVA	All look green to me. Okay.
04 22 26 52	LMP-EVA	- - three-eighths of an inch in diameter. And they're all - -
04 22 26 56	CDR-EVA	Sound like the Intrepid.
04 22 27 04	CDR-EVA	Okay. What do I got to do here?
04 22 27 09	LMP-EVA	Okay. - -
04 22 27 11	CDR-EVA	Okay. I'll tell you something you can do.
04 22 27 13	LMP-EVA	Okay.
04 22 27 14	CDR-EVA	Take the PAN photograph again. I took them at 15 feet, I think, by mistake.
04 22 27 18	LMP-EVA	Okay.
04 22 27 19	CDR-EVA	And I'll get the rock box out.
04 22 27 20	LMP-EVA	All right. Real good.
04 22 27 22	CDR-EVA	Hey, Houston. We're back at the LM.
04 22 27 26	CC	Roger, Al, Pete. We copy. After you get finished with the core tube, Al, we'll have some instructions for you with the TV.
04 22 27 35	LMP-EVA	Sounds good. Okay, Pete. Where are the tongs for a moment?
04 22 27 41	CDR-EVA	The tongs are on the MESA.
04 22 27 43	LMP-EVA	Okay.
04 22 27 44	CDR-EVA	They are?
04 22 27 45	LMP-EVA	I have them now. Now, which PANs do you want me to take? Over here?
04 22 27 47	CDR-EVA	No, about - Yes. Front and over on left and rear.
04 22 27 51	LMP-EVA	Fifteen, 12 each or - -
04 22 27 53	CDR-EVA	Yes, take 15.

04 22 27 54	LMP-EVA	Okay. Will do. I'll take them again. I'm going to take a few PANs first, Houston, if that's okay. It'll take about an additional 3 minutes.
04 22 28 14	CDR-EVA	Hey, Al.
04 22 28 16	LMP-EVA	Yes, sir.
04 22 28 17	CDR-EVA	Never mind. Wait a minute. I'm getting it. Now I got it.
04 22 28 21	LMP-EVA	Okay. Okay.
04 22 28 49	CDR-EVA	One camera in ETG.
04 22 29 21	CDR-EVA	That Surveyor sure looks neat sitting on the side of that crater.
04 22 29 25	LMP-EVA	Pretty steep walls down there.
04 22 29 43	CDR-EVA	Not going to have any trouble sleeping tonight.
04 22 29 46	LMP-EVA	Okay. Okay, let me just get the other two PANs, Pete. Be finished in a minute.
04 22 29 54	CDR-EVA	Okay. Okay, still 70 millimeter, the hammer - -
04 22 30 03	LMP-EVA	Hey, stuff that handle.
04 22 30 05	CDR-EVA	I'm getting it right now. Good Godfrey.
04 22 30 30	CDR-EVA	Okay, here's RC number 1 coming up.
04 22 30 38	LMP-EVA	... PANs. Get out the higher plane.
04 22 30 42	CDR-EVA	Say again?
04 22 30 43	LMP-EVA	Oh, I was too low for the PANs.
04 22 30 50	CDR-EVA	Okay, this is a good spot, I think.
04 22 31 45	CDR-EVA	Okay.
04 22 31 49	LMP-EVA	Okay. That's it for the PANs, Pete.
04 22 31 51	CDR-EVA	Okay. One rock box open.
04 22 31 53	LMP-EVA	Okay, one more set to go.
04 22 31 56	CDR-EVA	Okay.
04 22 31 59	LMP-EVA	I've got this bag of rocks on me, here. Want me to bring them to you in a minute?

04 22 32 03	CDR-EVA	Yes. I'm - I'm having trouble over here with the rock box holders.
04 22 32 09	LMP-EVA	Okay. If you have a little trouble, I can help you with it.
04 22 32 13	CDR-EVA	Yes. Yes. This rock box keeps wanting to go up in the air. Oh, the heck with it. I think I'll put them in there.
04 22 32 39	CDR-EVA	Scale.
04 22 32 40	CMP	Houston, Yankee Clipper. You have a DSKY?
04 22 32 46	CC	Stand by, Clipper.
04 22 32 48	CDR-EVA	Got to get this core tube, buddy.
04 22 32 50	LMP-EVA	I know it.
04 22 33 00	LMP-EVA	- - as fast as I can.
04 22 33 03	CC	Clipper, Houston. We're watching the DSKY's.
04 22 33 05	CDR-EVA	Just great.
04 22 33 10	LMP-EVA	Okay, all the PANs are done, Pete. Okay?
04 22 33 14	CDR-EVA	Come get the core tube.
04 22 33 15	LMP-EVA	Okay.
04 22 33 16	CDR-EVA	It's in work.
04 22 33 21	LMP-EVA	Okay. Here's this. I'll get that.
04 22 33 29	CDR-EVA	Okay. Now, put in the handtool carrier.
04 22 33 31	LMP-EVA	Yes sir. I'm just going to lay it in there. I'm not going to - -
04 22 33 35	CDR-EVA	Yes.
04 22 33 36	LMP-EVA	- - fit it in there now, so we can get finished.
04 22 33 39	CDR-EVA	Okay. Here, hang those on there, too.
04 22 33 43	LMP-EVA	Good. You want hung on there, Pete?
04 22 33 49	CDR-EVA	Okay.

04 22 33 50	LMP-EVA	You bet. You bet. Got it. Okay. Go get that core tube.
04 22 33 54	CDR-EVA	Here's your core tube right here.
04 22 33 56	LMP-EVA	Just a second.
04 22 33 57	CDR-EVA	Okay.
04 22 34 04	LMP-EVA	Okay.
04 22 34 06	CDR-EVA	Here it is ...
04 22 34 07	CC	Pete, now, you're 3 plus 26 into the EVA. And Al, we'd like you to hustle. We'd like you back there at the bottom of the ladder in 3 minutes.
04 22 34 18	LMP-EVA	I'll hustle. I'll hustle.
04 22 34 22	CDR-EVA	Let me get your rock bag before you get away.
04 22 34 24	LMP-EVA	Okay, get that rock bag. I'll go get this core tube. I think I can make it in 3 minutes.
04 22 34 28	CDR-EVA	All right, wait just a minute.
04 22 34 30	LMP-EVA	If they'd give me 2 minutes, I'd go over and do their TV. Maybe they ... the TV, too.
04 22 34 34	CDR-EVA	Yes.
04 22 34 35	LMP-EVA	Got that?
04 22 34 36	CDR-EVA	Yes.
04 22 34 37	LMP-EVA	Got the bag?
04 22 34 38	CDR-EVA	Yes.
04 22 34 39	LMP-EVA	Adios. I'll go for the core tube. I'll go for the core tube over near the TV, and I'd come back by it.
04 22 34 47	CDR-EVA	There you go. There you're thinking.
04 22 34 52	CC	Okay, Al, good idea.
04 22 34 54	CDR-EVA	I sure wish we had more rocks.
04 22 34 57	LMP-EVA	Say again?
04 22 34 58	CDR-EVA	I wish we had more rocks.

04 22 35 02	LMP-EVA	Okay, I'm core tubing it, right now.
04 22 35 12	CDR-EVA	You know, I wish we had more rocks.
04 22 35 16	CC	Pete, you can go ahead and fill up the remainder with the fines from that area.
04 22 35 24	CDR-EVA	Okay. I'll have to wait for Al to come back anyhow. Let me see; is there something I could be doing all this time? And one thing is shut down my water. Good Lord, I'm floating to death again. Let's see. Scoop material. That a boy.
04 22 35 38	LMP-EVA	Houston, we're getting the core tube in real good. It's down almost full length now.
04 22 35 44	CDR-EVA	That a boy, Al.
04 22 35 45	LMP-EVA	It's a little harder to drive in; you have to auger it a bit and then pound it, but now it's full length, and let me take a - a picture of it and that will be it.
04 22 35 53	CC	Roger, Al. Sounds like you've got the lunar core tube technique worked out.
04 22 36 00	LMP-EVA	I got the record for core tube depth, right now.
04 22 36 02	CDR-EVA	(Laughter)
04 22 36 03	LMP-EVA	- - in my pocket.
04 22 36 04	CDR-EVA	(Laughter) Good show. (Laughter)
04 22 36 07	CC	Copy your record of core tube depth, and you've probably got the record for swinging pieces of ALSEP across the lunar landscape.
04 22 36 18	CDR-EVA	And would you believe, I've found a use for the big scoop.
04 22 36 23	LMP-EVA	Okay, here comes the core tube.
04 22 36 26	CDR-EVA	Okay.
04 22 36 27	LMP-EVA	Got the cap ready, Pete?
04 22 36 28	CDR-EVA	Yes.
04 22 36 29	LMP-EVA	This stuff comes right out, doesn't it? That's all right.

04 22 36 32	CDR-EVA	Okay.
04 22 36 33	LMP-EVA	I'll bring it right back.
04 22 36 35	CDR-EVA	Just a minute, I - -
04 22 36 36	LMP-EVA	Houston, I'm coming right by the TV camera. Did you want me to do anything to it?
04 22 36 40	CC	That's affirmative, Al. First, we'd like to take and put the - -
04 22 36 44	LMP-EVA	Okay.
04 22 36 45	CC	- - automatic light control switch to inside, then open the apeture in steps - -
04 22 36 51	LMP-EVA	All right; will do.
04 22 36 53	CC	- - and leave it at 10 seconds at each step.
04 22 36 59	LMP-EVA	Okay. It's now on inside. Okay, now, I'm going to the aperture. Looking almost directly cross-Sun by the way, Houston.
04 22 37 15	CC	Roger. Call it out if you would, Al, while you're doing it.
04 22 37 21	LMP-EVA	All right. f:22. Okay, I'm in f:22 right now. I'll stay right there for about 10 seconds. Okay, going to the next one. There's not a lot of them marked on here, Houston; there's only about three marks; I'll just move it a little touch. Okay. I moved it just a little bit, and I'll leave it there for 10 seconds. Now, I'll tell you when I come to the next marked one. Okay, moving again.
04 22 38 12	CDR-EVA	Houston, rock box 2's going into the wide pad with the Mylar or whatever you - film or whatever you call that stuff off the S-band antenna, going on top of it.
04 22 38 22	LMP-EVA	Okay, it is in 5.6 now, Houston. It's been there for about 5 seconds.
04 22 38 26	CC	Roger, Al; we copy. And Pete, we copy you got the rock box over there with the H film from the S-band.
04 22 38 34	LMP-EVA	Yes. Okay, it's now a little past 5.6, opened up a little more. I'll bring you that core tube in a minute, Pete.

04 22 38 43	CDR-EVA	Now, I'm just looking for things to do. I got a whole bag full of soil, and rock box 2 out. Man, does that LM look pretty! Does that Surveyor look pretty!
04 22 38 57	LMP-EVA	Okay. I'm turning it again, Houston.
04 22 39 00	CC	Roger.
04 22 39 01	LMP-EVA	Okay. Now, it's just a little bit above 2.2.
04 22 39 17	LMP-EVA	Okay. Now, it's going to be wide open on the next move, which is right now. Okay. It's wide open, Houston.
04 22 39 39	LMP-EVA	Standing by for some more instructions, Houston.
04 22 39 42	CC	Okay, Al. Would you do one other thing, then. Pick the camera up and invert it. Maybe give it a shake or two and see if we can get anything.
04 22 39 53	LMP-EVA	Will do. It's upside down and I'm shaking it now.

END OF TAPE

04 22 40 00	LMP-EVA	I still am a little concerned about this plug on the back of the camera; it looks - doesn't look exactly copacetic. It looks like it's cracked a little bit, - the ... material, and it looks like it could have melted or something. There might be a problem right in the wiring there. Okay, I've shaken it and what have you.
04 22 40 21	CDR-EVA	Hold it upside down just for a few minutes.
04 22 40 24	CC	Okay. And, Al, why don't you try moving that wire on the back and see if that will do anything?
04 22 40 30	LMP-EVA	Okay. I'll try to hold it in for 10 or 15 seconds.
04 22 40 49	LMP-EVA	Okay. I'm holding it in now.
04 22 41 11	CC	Hey, Al, I think we've run out of ideas here for the present time. Let's press on. Okay, take the camera over and put it in the LM shade, point it at a dark spot, the darkest spot you can find, and open the camera way up, f:2.2.
04 22 41 28	CDR-EVA	Okay. Will do.
04 22 41 32	LMP-EVA	Let's go with the core tube.
04 22 41 33	CDR-EVA	Okey-doke.
04 22 41 34	LMP-EVA	Okay, babe. Here you are. Take this hammer and core tube if you would; both of them in my hand here. Let me set the camera down, then I'll help you. Hold on.
04 22 41 44	CDR-EVA	That a boy.
04 22 41 45	LMP-EVA	Camera right there.
04 22 41 46	CDR-EVA	Whatta shame that camera didn't work.
04 22 41 48	LMP-EVA	That's right. Take - put that somewhere. Just drop it right in this baby right here.
04 22 41 52	CDR-EVA	Okay.
04 22 41 53	LMP-EVA	Okay, Pete. Does it look like the dirt's in there?

04 22 41 56	CDR-EVA	Yes, sir. It looks like the dirt is in there.
04 22 41 58	LMP-EVA	Good. Put the cap on that tube. You got it all unlocked here.
04 22 42 03	CDR-EVA	Okay. Unlock.
04 22 42 05	LMP-EVA	That's it. That core tube's in the bag - wait a minute. Give me my - give me my rocks off of here, will you?
04 22 42 12	CDR-EVA	Sure will.
04 22 42 13	LMP-EVA	We've got a whole bag full of dirt there.
04 22 42 16	CDR-EVA	Okay.
04 22 42 17	LMP-EVA	Bigger rock?
04 22 42 18	CDR-EVA	What'd we do with it?
04 22 42 19	LMP-EVA	No, no, no, just give me the bag, the whole bag.
04 22 42 21	CDR-EVA	Okay.
04 22 42 22	LMP-EVA	Do we want to save that bit?
04 22 42 25	CDR-EVA	Yes.
04 22 42 26	LMP-EVA	Let's throw that bit in the box.
04 22 42 27	CDR-EVA	Okay, I will. Let me have it.
04 22 42 30	LMP-EVA	Here you go. No, no, not there. Here - you've got it.
04 22 42 33	CDR-EVA	All right. Hey, that's a couple of neat-o rocks.
04 22 42 38	LMP-EVA	Okay.
04 22 42 41	CC	Pete and Al, Houston. We show you are 3 plus 35 into the EVA. And you've got plenty of consumables, so we suggest you go at a relaxed hustle to get back in.
04 22 42 56	LMP-EVA	Okay. It's almost all done. Think we've got it made.
04 22 43 00	CDR-EVA	Hey, Al. I got to dump some of this dirt. Come here, Al.
04 22 43 03	LMP-EVA	Just a second, let me move this TV.

04 22 43 06	MS	...
04 22 43 07	CDR-EVA	Okay, forget it.
04 22 43 08	LMP-EVA	There you go. It's wide open now; in the dark. Okay, Houston; it's wide open in the dark.
04 22 43 18	CC	Okay, Al.
04 22 43 27	LMP-EVA	I feel like the guy in the shopping center waiting for his wife.
04 22 43 32	CDR-EVA	Okay?
04 22 43 33	LMP-EVA	I'm standing here holding two bags, buddy.
04 22 43 36	CDR-EVA	I'm coming - coming (laughter).
04 22 43 39	LMP-EVA	..., don't get tangled up in the LEC.
04 22 43 42	CDR-EVA	Okay, what I want you to do - No, no, no - dump some dirt in this bag.
04 22 43 46	LMP-EVA	Dump some dirt in that bag.
04 22 43 47	CDR-EVA	Yes, yes, that a boy.
04 22 43 49	LMP-EVA	How much? When you say stop?
04 22 43 51	CDR-EVA	Well, let's just keep on going for a little bit.
04 22 43 52	LMP-EVA	Okay.
04 22 43 54	CDR-EVA	All right, let me look. All right. Boy, that's dirt.
04 22 43 58	LMP-EVA	That's dirt, you better believe it. They're not going to grow many roses here, but - -
04 22 44 02	CDR-EVA	Now, that's good; that's plenty. Hold it. All right. Now, we shake her all down. That's a good bag full.
04 22 44 21	LMP-EVA	Do you want me to just - what do you want me to do with this, Pete? ...
04 22 44 24	CDR-EVA	Yes. I may need some help from you.
04 22 44 26	LMP-EVA	Okay. ... help close that box?
04 22 44 27	CDR-EVA	Yes.

04 22 44 28	LMP-EVA	Okay.
04 22 44 29	CDR-EVA	Get it in here.
04 22 44 30	LMP-EVA	All right.
04 22 44 31	CDR-EVA	I'll just set this here because we can always get it when we need it. Put it right there. Now, hang onto the box while I stuff it.
04 22 44 37	LMP-EVA	Okay.
04 22 44 38	CDR-EVA	... me to make sure I don't grab the seal.
04 22 44 41	LMP-EVA	Okay. Go. Hey, you're right, that thing doesn't want to stuff, does it? Kind of - kind of flimsy. They better start making this lunar equipment a little more sturdy.
04 22 44 58	CDR-EVA	These bags are all breaking open, too.
04 22 45 00	LMP-EVA	That's AISEP.
04 22 45 02	CDR-EVA	And there's a rock box that's full of rocks.
04 22 45 07	LMP-EVA	Okay. That looks good, Pete. Could we - put it in any other way? Better put it in the middle - it's going to be right on that seal. There, it's in there okay. That'll do it.
04 22 45 19	CDR-EVA	Got a ... have the room.
04 22 45 22	LMP-EVA	It closed; don't you worry.
04 22 45 23	CDR-EVA	Okay. Is that it?
04 22 45 24	LMP-EVA	Wait a minute. Looks good; you've got a good - good full box.
04 22 45 30	CDR-EVA	Okay. Close the door. Watch your handle there; watch your handle.
04 22 45 35	LMP-EVA	...
04 22 45 36	CDR-EVA	Okay?
04 22 45 39	LMP-EVA	You've got it, babe.
04 22 45 40	CDR-EVA	Now, just hold. Hang onto the box. Watch it; I don't want to break the table.
04 22 45 44	LMP-EVA	That's what I was thinking - -

04 22 45 46	CDR-EVA	Hey, that's good. Lock that latch.
04 22 45 51	LMP-EVA	Go to it!
04 22 45 52	CDR-EVA	I got it! - -
04 22 45 53	LMP-EVA	The other one. All right.
04 22 45 54	CDR-EVA	Hot-diggety dog. Okey-doke. All right, now. Put your camera in the ETB.
04 22 45 58	LMP-EVA	All right. I'm not sure I didn't use up all my pictures today. That's a good idea.
04 22 46 02	CDR-EVA	I don't know how many I took; I waved it - 36 on the ... - wait a minute - -
04 22 46 08	LMP-EVA	No, 140.
04 22 46 10	CDR-EVA	Okay. Let's see; we've sealed the organic thing, removed the saddle bags, we scooped material, we stowed the SRC, we stowed the core tube, we closed the SRC; we got an EMU check, COMM check - Hello, Houston. How do you read?
04 22 46 26	CC	Loud and clear.
04 22 46 31	CDR-EVA	Okay. How much time have we got, Houston?
04 22 46 33	LMP-EVA	Hold that bag - just a minute, Pete.
04 22 46 36	CC	Pete, we show that you're 3 plus 38 into the EVA, and you've got a fair amount of consumables; so don't - don't rush too hard getting back in - Just do what you have to, and do it at a safe pace.
04 22 46 52	CDR-EVA	Okay. Sounds good.
04 22 46 54	LMP-EVA	You going to leave your - There we go.
04 22 46 59	CDR-EVA	Frustrating, doesn't it?
04 22 47 00	LMP-EVA	Okay. It is frustrating.
04 22 47 02	MS	...
04 22 47 04	LMP-EVA	Hold it up just a little bit, Pete. Lift it up just a little.
04 22 47 08	CC	Pete, will you confirm that you have the stereo-camera over in the Sun?

04 22 47 17	LMP-EVA	Is your stereocamera in the Sun, Pete?
04 22 47 19	CDR-EVA	No, just a second.
04 22 47 20	LMP-EVA	Okay.
04 22 47 21	CDR-EVA	I want to see that first.
04 22 47 23	LMP-EVA	Okay.
04 22 47 28	CDR-EVA	Stereocamera going into the Sun.
04 22 47 30	LMP-EVA	... to check ...?
04 22 47 32	CDR-EVA	It'll do. They've got to take this tool off. ... camera. Okay. ... over on the Y PAD, next to my handy-dandy rock box 2, which is neatly covered. You want it sitting in the sunshine, is that correct, Houston?
04 22 47 50	CC	That's affirmative, Pete.
04 22 47 51	LMP-EVA	Watch that cable, Pete; you're bothering your S-band.
04 22 47 54	CDR-EVA	Did I hit it?
04 22 47 56	LMP-EVA	Yes. You clipped your left foot on it.
04 22 47 58	CDR-EVA	Did I - ruin the S-band?
04 22 47 59	LMP-EVA	I don't think so but you ought to check it before you go in.
04 22 48 02	CDR-EVA	Okay.
04 22 48 03	LMP-EVA	Don't think you did, but the danger is great.
04 22 48 06	CDR-EVA	... all over the camera.
04 22 48 09	LMP-EVA	There you go.
04 22 48 10	CDR-EVA	Why don't you walk around and check it? (Laughter)
04 22 48 18	LMP-EVA	Damn you! Getting in a hurry.
04 22 48 23	CDR-EVA	(Humming)
04 22 48 30	CDR-EVA	Hey, Al.
04 22 48 31	LMP-EVA	Yes, I'm coming.

04 22 48 32	CDR-EVA	Oh, okay.
04 22 48 33	LMP-EVA	I don't like to come across that area, that S-band line is too tender.
04 22 48 37	CDR-EVA	Okay. Get that.
04 22 48 50	CDR-EVA	Thank you.
04 22 48 51	LMP-EVA	That's good.
04 22 48 53	CDR-EVA	Okay.
04 22 48 56	LMP-EVA	That's a pretty good idea, putting that foil over there.
04 22 49 01	CDR-EVA	Hey. Al, let me check the S-band.
04 22 49 03	LMP-EVA	Okay.
04 22 49 04	CDR-EVA	And then, we ought to dust each other off and get in.
04 22 49 06	LMP-EVA	Man, we are filthy!
04 22 49 09	CDR-EVA	We need a brush, a whisk broom.
04 22 49 11	LMP-EVA	Okay. S-band antenna, lunar stay; would you - get in there and try that?
04 22 49 16	CDR-EVA	Okay, all I got to do is get in, soon as we dust off.
04 22 49 23	CC	Roger, Pete.
04 22 49 26	LMP-EVA	Okay. We're looking at the Earth.
04 22 49 29	CDR-EVA	Yes, go ahead. Okay, dust me off; and I'll dust you and get in.
04 22 49 35	LMP-EVA	I don't know what good you're going to do.
04 22 49 37	CDR-EVA	Hey, it does dust off a little bit.
04 22 49 38	LMP-EVA	Does it?
04 22 49 39	CDR-EVA	Stand still.
04 22 49 40	LMP-EVA	Okay.
04 22 49 41	CDR-EVA	Very good.

04 22 49 42	LMP-EVA	Yes, I guess it does. Get's rid of that loose stuff.
04 22 49 49	CDR-EVA	Hey, come over here by the ladder where - -
04 22 49 51	LMP-EVA	It's going to be dark over here - -
04 22 49 52	CDR-EVA	No, I can see. Let me - just come over here by the ladder.
04 22 49 55	LMP-EVA	Okay.
04 22 59 56	CDR-EVA	There you go.
04 22 50 02	LMP-EVA	Oh, I see why; you can get lower that way.
04 22 50 03	CDR-EVA	Yes.
04 22 50 04	LMP-EVA	Good idea. Good idea.
04 22 50 14	CDR-EVA	Kick your boots real hard when you - -
04 22 50 16	LMP-EVA	Okay.
04 22 50 17	CDR-EVA	Okay, now turn around this leg this way - other way.
04 22 50 20	LMP-EVA	I can crawl up the ladder halfway if you'll get my upper - going up the ladder, can't knock it off.
04 22 50 24	CDR-EVA	There you go. That's a good idea; go ahead and do that.
04 22 50 26	LMP-EVA	See anything else above me?
04 22 50 27	CDR-EVA	No. Just go ahead and start up the ladder.
04 22 50 29	LMP-EVA	Okay.
04 22 50 32	LMP-EVA	... - Apollo 12.
04 22 50 38	CDR-EVA	There you go. You didn't quite make it.
04 22 50 39	LMP-EVA	Oh, yes I did.
04 22 50 40	CDR-EVA	Stay put.
04 22 50 41	LMP-EVA	Okay.
04 22 50 43	CC	Al, would you give us a mark when you're on the footpad?

04 22 50 46	CDR-EVA	... Wait a minute, wait, wait.
04 22 50 48	LMP-EVA	Roger. I'm off the footpad right now; I'm standing on the ladder. Pete's dusting my boots off, trying to keep some of this dust out of the LM.
04 22 50 56	CC	Roger, Al. Thanks.
04 22 50 57	CDR-EVA	Oh, man, is it dusty. Just hold still for a while. Wait - wait - wait a couple; man, but let me brush.
04 22 51 04	LMP-EVA	... you can get rid of a lot of it, kicking that way.
04 22 51 07	CDR-EVA	Okay.
04 22 51 08	LMP-EVA	... get it out of your soles - your boots.
04 22 51 10	CDR-EVA	Okay; go ahead on up.
04 22 51 11	LMP-EVA	Oh, okay.
04 22 51 22	CDR-EVA	Oh - I'm in this dingy television wire again. There we go. I'll help you - back here as best I can.
04 22 51 38	LMP-EVA	That's a good idea. I've got to raise my gold visor here so I won't scratch it, and put my protective visor down. There.
04 22 51 48	CDR-EVA	Now. See the hatch? When you come up ..., just look at the hatch.
04 22 51 53	LMP-EVA	I'm really going to have to be tender about it; I'm not sure we're not going to want to put some tape over it or something.
04 22 52 01	CDR-EVA	Okay. All the way down. Raise your rear end. That a boy. Got her.
04 22 52 15	LMP-EVA	That's a very ..., I'll do a pushup.
04 22 52 19	CDR-EVA	... in some more?
04 22 52 20	LMP-LM	About in. Very good. In the hatch, Houston.
04 22 52 23	CC	Roger, Al. Copy. You're in.
04 22 52 29	CDR-EVA	Maybe your old friendly third will get the ETD.
04 22 52 32	LMP-LM	Okay, just a second. Let me get my gear. Okay. Just a second.

04 22 52 43	CDR-EVA	An ETD and two cameras ready to come up. Oh, there's my friend again. Al Bean?
04 22 52 53	LMP-LM	What?
04 22 52 55	CDR-EVA	That thing's going to drive me buggy. Guess what.
04 22 53 01	LMP-LM	Houston?
04 22 53 02	CC	Go ahead, Pete.
04 22 53 03	LMP-LM	Do you want me to switch over to lunar stay antenna? Do you want me to switch to lunar stay antenna right now while Pete's on the surface? Over.
04 22 53 12	CC	Roger. That's affirmative, and TRACK MODE, OFF.
04 22 53 17	LMP-LM	Okay. I'm going to LUNAR STAY right now, but we may lose COMM for a second; if I don't hear from you, I'll come back up.
04 22 53 24	CC	Roger.
04 22 53 27	LMP-LM	Stay.
04 22 53 43	LMP-LM	Houston, Apollo 12. How do you hear on LUNAR STAY?
04 22 53 46	CC	Intrepid, you're loud and clear. Sounds like Pete did the job.
04 22 53 49	LMP-LM	...
04 22 53 52	CDR-EVA	Sure did. Get your signal strength, Houston? Go ahead and start ETB up.
04 22 53 57	LMP-LM	I got - I'm going TRACK MODE to OFF.
04 22 54 02	CC	Roger.
04 22 54 03	LMP-LM	Okay. Now, just a second, Pete, I haven't got the TV rigged. One second.
04 22 54 08	CDR-EVA	Okay.
04 22 54 19	CC	Intrepid, signal strength is good.
04 22 54 24	LMP-LM	Okay.
04 22 54 25	CDR-EVA	Matter of fact, you sound stronger, Houston.

04 22 54 30	CC	I believe so, Pete.
04 22 54 33	CDR-EVA	Need to mount it.
04 22 54 35	LMP-LM	Got it. We've got it. Wait a second; let me clear a nice little room here for it.
04 22 54 46	LMP-LM	Say, are we going to jettison this garbage bag at the end of this EVA, Pete?
04 22 54 48	CDR-EVA	Yes, sir.
04 22 54 49	LMP-LM	Okay, let me get it in good position.
04 22 54 51	CDR-EVA	Why don't you throw it out right now?
04 22 54 52	LMP-LM	That's a good idea.
04 22 54 54	CDR-EVA	I can get rid of it.
04 22 54 56	LMP-LM	That's a good idea; you can move it out of the way.
04 22 54 58	CDR-EVA	That's a ... one.
04 22 55 06	LMP-LM	Okay, here it comes.
04 22 55 15	LMP-LM	Just a second.
04 22 55 16	CDR-EVA	Okay.
04 22 55 17	LMP-LM	Just a second.
04 22 55 22	CDR-EVA	Don't worry about it. Is that okay?
04 22 55 24	LMP-LM	Sure. It won't bother us. Get it when you come up. Power up.
04 22 55 29	CDR-EVA	Okay. Just a second.
04 22 55 34	LMP-LM	Let me try something that might be just easier on all of us. Oh, I don't have to run one over a pulley; I can just pull it up, Pete.
04 22 55 41	CDR-EVA	It doesn't weigh anything.
04 22 55 42	LMP-LM	That's right. Who needs a pulley? It's easier this way.
04 22 55 44	CDR-EVA	Wait a minute. Go ahead, pull. 1, 2, 3. That a boy.

04 22 55 53	LMP-LM	Hey, I got an idea. Now, you pull - you pull.
04 22 56 05	CDR-EVA	Wait - wait a minute. Now, it's making a mess. Never mind. Keep on pulling.
04 22 56 06	LMP-LM	Okay. Okay, just a second.
04 22 56 11	CDR-EVA	All right.
04 22 56 20	LMP-LM	I got my transfer bag in. Secured.
04 22 56 47	LMP-LM	Okay, bring her on back, Pete.
04 22 56 51	CDR-EVA	Okay. Wait, wait. Don't let it get hung up. Coming.
04 22 56 56	LMP-LM	Let her go.
04 22 56 57	CDR-EVA	No, wait a minute, now. Just keep it taut.
04 22 57 00	LMP-LM	Okay.
04 22 57 04	CDR-EVA	See, you can't do it that way, Al. Take it easy. Let's do that slow. That a boy. That a boy. Now, now, you can let go of it.
04 22 57 31	CDR-EVA	Here is that. We got one rock box coming up. Okay, Al. Easy does it; easy does it. Wait a minute, now. Easy does it. Easy, easy! Easy! Easy! Easy! You're pulling when I don't want you to pull. Okay, now pull. Okay, now we got to give it the heave-ho, ready? 1, 2, pull.
04 22 58 17	LMP-LM	Got it made. Okay, lift here up a little bit, Pete. Let it come forward.
04 22 58 26	CDR-EVA	That baby is heavy.
04 22 58 27	LMP-LM	That's right in the door, though. Let me shove that in here.
04 22 58 32	CDR-EVA	Okay. Okay, Houston. One rock box inside.
04 22 58 38	CC	Roger, Pete. Copy. One SRC in.
04 22 59 02	LMP-LM	Okay, bring her out.
04 22 59 05	CDR-EVA	Okay. Wait, wait, wait, wait, wait! This thing is like playing with a snake. Okay, that's a boy. Now. Easy does it. Get all this good stuff and put it over here in the gear pad. Okay,

		now, down. Now, you're going to hang on to it and hand it to me, right? So I can tie it on the porch?
04 22 59 38	LMP-LM	Yes. That's right.
04 22 59 39	CDR-EVA	Okay. Am I dirty.
04 23 00 00	CDR-EVA	Okay, Houston. What do you want me to do? Get in?
04 23 00 06	CC	That's affirmative, Pete. If you've got the ETB and the rock box in, then climb in yourself.
04 23 00 58	CC	Intrepid, Houston.
04 23 01 17	CC	Intrepid, Houston.
04 23 01 21	CDR-EVA	You all ready for me to come in, Al?
04 23 01 23	LMP-LM	I'm ready. It's up to them.
04 23 01 27	CDR-EVA	Wonder what happened to Houston. I'm not sure that that LUNAR STAY didn't do it. I'd rather go back on TRACK and get them back. Okay.
04 23 01 35	CC	Intrepid, Houston. Stand by.
04 23 01 40	CDR-EVA	Okay, what's your problem?
04 23 01 41	CC	Okay, we had a changeover from one site to another, down here. It was all on our end. No problem with your antenna. It's working well.
04 23 01 51	CDR-EVA	Okay, you guys ought to call those things out in advance. That's been happening all the way through this flight.
04 23 01 58	CC	Roger, Pete. We concur. And go ahead and press on on the ingress.
04 23 02 06	CDR-EVA	Okay, Houston.
04 23 02 13	CDR-EVA	MARK.
04 23 02 14	CDR-EVA	I'm on the footpad.
04 23 02 17	CC	MARK.
04 23 02 31	CDR-EVA	That was easy.

04 23 01 35	LMP-LM	I just closed my feedwater. You might want to do that, too.
04 23 02 42	CDR-EVA	Probably a good idea. Let me see if I can find it back here. Okay, I just closed mine. Coming up the ladder.
04 23 02 57	LMP-LM	Gosh, you're shaking the whole LM.
04 23 02 59	CDR-EVA	Sorry about that.
04 23 03 01	LMP-LM	We get a warning, because you haven't got your feedwater, but that's okay. You've got cooling for quite a while.
04 23 03 06	CDR-EVA	Yes. Understand. Okay, one garbage bag. Anything else in there you want to get rid of?
04 23 03 13	LMP-LM	Not a thing.
04 23 03 16	CDR-EVA	All right, hand me the LEC.
04 23 03 18	LMP-LM	Okay, the LEC's got kind of a little slip knot in it because the - Got it?
04 23 03 24	CDR-EVA	Yes.
04 23 03 26	CC	Pete, on your way through the hatch, will you give a check on the seal?
04 23 03 33	CDR-EVA	Check on the seal.
04 23 03 34	LMP-LM	Yes. I can see it probably better than he could from this side, Houston. Seal looks real good. I'll tell you what we did do; when we got out, we - -
04 23 03 44	CDR-EVA	I can't believe I did that.
04 23 03 46	LMP-LM	Yes, you did. Because I remember, you were hitting here and then when I backed up, I could - I'll tell you - we probably just ought to put a piece of tape over it.
04 23 03 54	CDR-EVA	Okay. That's my feedwater ...
04 23 03 55	LMP-LM	... scan on the hatch, and for about a 10-inch cut, there; and it didn't hurt the insulation, didn't hurt the hatch, and I don't know whether you want us to put a piece of tape on there or just forget it. It doesn't look like it's going to bother anything.

04 23 04 14	CDR-EVA	I say just forget it.
04 23 04 15	LMP-LM	Okay, Pete.
04 23 04 16	CDR-EVA	Why don't you get over on your side?
04 23 04 17	LMP-LM	Okay. Let me move over.
04 23 04 18	CDR-EVA	Okay.
04 23 04 20	LMP-LM	I just checked your circuit breakers, and they're all good.
04 23 04 22	CDR-EVA	All right.
04 23 04 27	LMP-LM	Just a second; I'm not out of the way, yet.
04 23 04 29	CDR-EVA	All right, but I want you to hold the door for a minute while I - -
04 23 04 31	LMP-LM	Okay.
04 23 04 32	CDR-LM	- - close this front.
04 23 04 33	LMP-LM	Well, I've got to get out of the way.
04 23 04 35	CDR-EVA	- - front thing here.
04 23 04 37	CC	Pete, we concur. No tape.
04 23 04 39	CDR-EVA	All right.
04 23 04 41	LPM-LM	Okay.
04 23 04 44	CDR-EVA	Okay.
04 23 04 46	LMP-LM	Now, wait a second, Pete. Let me back up a little better.
04 23 04 50	CDR-EVA	Okay, tell me which way to go.
04 23 04 51	LMP-LM	Just a second. Okay, you're just perfect. Shoot right on in. Put your chest down and your rear end up - there you go; got it. Go a little bit to the left. Get a little further until your head bumps. Do a pushup and you're fat - little bit to the left, little bit further to the left. That's it. Up.
04 23 05 14	CDR-EVA	Okay.

04 23 05 16	LMP-LM	You're in the best possible position. Scoot in in a little more - and you got it.
04 23 05 19	CDR-LM	I'm in; no sweat.
04 23 05 21	LMP-LM	Okay. Now careful when you turn around. You've got - ...
04 23 05 23	CDR-LM	Yes.
04 23 05 25	LMP-LM	Okay. Boy, you look dirty.
04 23 05 28	CDR-LM	Oh, you do, too.
04 23 05 31	LMP-LM	... watch your turn now. I'll get this hatch. Okay, it says PLSS feedwater, closed. We did that. Forward hatch closed and locked. When you're out of the way, I'll slide over and lock it.
04 23 05 40	CDR-LM	Am I out of the way?
04 23 05 41	LMP-LM	Not yet.
04 23 05 42	CDR-LM	Wait until I turn around. Just a minute.
04 23 05 47	LMP-LM	Okay?
04 23 05 48	CDR-LM	Okay.
04 23 05 49	LMP-LM	Get down on my hands and knees and lock this thing. Need to push down. Wait just a second; let me raise my visor so I can see what's going on in here.
04 23 05 58	CDR-LM	Okay.
04 23 06 00	LMP-LM	Can you give a push-me-down?
04 23 06 01	CDR-LM	I am pushing you down. Need further?
04 23 06 07	LMP-LM	Just back up and let me tilt further forward. This is just as good.
04 23 06 10	CDR-LM	I can't go back any further. Why don't you let me close it?
04 23 06 16	LMP-LM	Okay, see if you can reach it. It's just a little bit out of my reach; you might be able to get it. Okay, easy.
04 23 06 23	CDR-LM	I'm ready.

04 23 06 24	LMP-LM	Let me get back here in the corner. Watch your PLSS. There you go.
04 23 06 38	CDR-LM	Hatch closed.
04 23 06 39	LMP-LM	Did you get it?
04 23 06 40	CDR-LM	Yes.
04 23 06 41	LMP-LM	Good show.
04 23 06 42	CDR-LM	Okay.
04 23 06 43	LMP-LM	Okay, next one. Dump valve, both AUTO. I've verified this one; verified that one.
04 23 06 49	CDR-LM	That one's AUTO.
04 23 06 50	LMP-LM	Okay. Let me look at something first.
04 23 06 57	LMP-LM	Okay. PLSS O_2 and PRESS; flags may come on during REPRESS. If PLSS O_2 less than 10 percent, manually control cabin REPRESS to maintain positive PGA pressure. Forget it. Okay, LIGHTING ANNUNCIATOR and NUMERICS, BRIGHT.
04 23 07 12	CDR-LM	Wait a minute, easy. There you go.
04 23 07 19	LMP-LM	Okay, now I'm going to go over here, over just a little so I can turn around. Oh, you did your circuit breakers? The best I can; easy does it.
04 23 07 29	CDR-LM	What are you trying to do?
04 23 07 31	LMP-LM	Get that stop button depressed.
04 23 07 33	CDR-LM	Yes.
04 23 07 34	LMP-LM	I've got to turn around. REPRESS valve. Okay?
04 23 07 38	CDR-LM	Well, I can reach the REPRESS valve, if you want.
04 23 07 41	LMP-LM	No, I've got it here.
04 23 07 43	CDR-LM	That does it.
04 23 07 45	LMP-LM	Why don't you reach it? It may be better if you could.
04 23 07 47	CDR-LM	Can you reach CABIN REPRESS to what, AUTO?

04 23 07 50	LMP-LM	CABIN REPRESS to AUTO. PRESS REGs A and B to CABIN.
04 23 07 54	CDR-LM	Okay.
04 23 07 55	LMP-LM	MASTER ALARM in this CABIN REPRESS. Let's watch the pressure.
04 23 08 01	LMP-LM	Cabin pressure is starting up.
04 23 08 07	CDR-LM	One psi.
04 23 08 19	LMP-LM	Coming in.
04 23 08 21	CDR-LM	Huh?
04 23 08 22	LMP-LM	It's coming in good.
04 23 08 26	CDR-LM	...
04 23 08 28	LMP-LM	REPRESS is looking good.
04 23 08 36	LMP-LM	Going ahead, PLSS O_2, OFF. ... That's it; a little bit more.
04 23 08 53	CDR-LM	Okay. PLSS O_2, OFF.
04 23 09 00	LMP-LM	Can you verify that I've got mine off?
04 23 09 04	CDR-LM	What?
04 23 09 05	LMP-LM	Will you verify that I've got mine off? I'll pull your diverter valve up, and check the water, and you do have it up.
04 23 09 18	CDR-LM	Okay, Houston. There's the cabin at 4.6.
04 23 09 22	LMP-LM	Okay, MASTER ALARM. Let me turn it off.
04 23 09 24	CC	Roger, Pete; we copy you. We show that down here.
04 23 09 28	LMP-LM	... to DEPRESS suit as required.
04 23 09 31	LMP-LM	... operates yours, here.
04 23 09 35	CDR-LM	Okay.
04 23 09 45	LMP-LM	Okay. CABIN REPRESS valve closes at 4. Verify CABIN PRESS stable.
04 23 09 59	CDR-LM	Cabin gas returned to AUTO.

04 23 10 01	LMP-LM	Okay, CABIN GAS RETURN, AUTO.
04 23 10 03	CDR-LM	Wait a minute. Get over here.
04 23 10 06	LMP-LM	Okay. AUTO.
04 23 10 12	CDR-LM	SUIT CIRCUIT RELIEF, AUTO.
04 23 10 13	LMP-LM	That's already AUTO.
04 23 10 14	CDR-LM	That's right. SUIT GAS DIVERTER, PUSH CABIN.
04 23 10 19	LMP-LM	PUSH CABIN.
04 23 10 20	CDR-LM	Verify EVA circuit breaker configuration on your side: SUIT FAN number 1, CLOSED.
04 23 10 25	LMP-LM	Wait just a second. SUIT FAN 1, CLOSED and I'll close the SUIT FAN DELTA-P.
04 23 10 32	CDR-LM	Okay.
04 23 10 33	LMP-LM	And I'll also notice ECS caution, H_2O SEP, and I've got them. And COMM: TV OPEN. Houston, do you want me to turn off the TV or leave it on?
04 23 10 42	CC	That's affirmative, Al. Turn it off.
04 23 10 52	LMP-LM	Okay, and it says doff gloves, helmets, visors, and all that; and let's go off relay. We're going off relay right now, Houston.
04 23 11 --		BEGIN LUNAR REV 19
04 23 11 01	CDR-LM	How do you want me to go, Al?
04 23 11 05	CC	Roger. Copy, you're going off relay.
04 23 12 11	CC	Intrepid, Houston.
04 23 12 26	CC	Intrepid, Houston.
04 23 13 08	CC	Intrepid, Houston.
04 23 14 57	CC	Intrepid, Houston.
04 23 16 38	CC	Intrepid, Houston.
04 23 18 20	CC	Intrepid, Houston.
04 23 20 50	CDR-LM	AUDIO, COMMANDER, and VHF A, OFF; B, RECEIVE.

04 23 20 55	LMP-LM	VHF A, OFF; B, RECEIVE.
04 23 20 57	CDR-LM	MODE, ICS/PUSH-TO-TALK.
04 23 21 03	CC	Intrepid, Houston.
04 23 21 08	CDR-LM	Houston, Intrepid. Loud and clear; how us?
04 23 21 10	CC	We read you loud and clear. Say, are you folks still concerned about the water in the suit loop?
04 23 21 21	CDR-LM	I'd like to hear about it.
04 23 21 24	CC	Roger. If you would like to try to get it out, you can blow it out and use the wipes - rag that you have over in the aft part of the right-hand equipment stowage bag as a cleanup device. Or you could probably best put it right over the exit and catch it before you get it into the dust in the cabin.
04 23 21 49	CDR-LM	Okay. We're not going to worry about it right now. Let's get out - we want to get out of all this gear, and we will talk to you later.
04 23 21 56	CC	Roger.
04 23 21 57	CDR-LM	PLSS MODE (both) zero, connect to LM COMM. Okay. AUDIO COMMANDER to VHF A, OFF; B, RECEIVE. A is OFF; B is RECEIVE. MODE, ICS/PTT; RELAY, OFF. A COMM, VHF, OFF, OFF, OFF, ON, LEFT, HIGH; RECORDER, OFF; and UPLINK SQUELCH, OFF. All done? Okay. Verify descent O_2. Okay. Connect O_2 supply to LMP first. Just a minute. Let me ease over here. How did that get undone? Did you undo it?
04 23 22 41	CDR-LM	O_2. O_2. What are you going to do? Oh, you don't want a CONNECT yet. You're going to have to turn around - this side to me. Right? Right? Yes. Yes. Yes, you've got to turn all the way around that way. That a boy.
04 23 23 08	CDR-LM	***
04 23 23 41	CDR-LM	Okay.

04 23 23 46	CDR-LM	Turn on - wait a minute. PLSS fill OPEN and then close after 2 minutes. I'll do it on my mark. B.
04 23 23 57	CDR-LM	MARK.
04 23 24 20	CDR-LM	Hey, Al Bean. That was a hell of a show. Too bad the TV didn't work. Would you recycle that stop button? I'd feel a lot better.
04 23 24 40	LMP-LM	...
04 23 24 43	CDR-LM	I can't see it from here, Al. I'll have to wait.
04 23 24 54	CDR-LM	May be it. Although I think you tend to underestimate. This is***.
04 23 25 16	CDR-LM	You've still got - you've got to go 2 minutes and you -
04 23 25 36	CDR-LM	Hey, I***. You've got a ... joint in it or something. It's a good thing the TV wasn't working.
04 23 25 52	CDR-LM	Yes. I got a lot of pictures of you around the ALSEP. I've got good pictures of you.
04 23 26 00	CC	Pete, we're reading you on VOX.
04 23 26 02	CDR-LM	You've got 2 minutes. Turn her off. Okay.
04 23 26 12	CDR-LM	Doff? No, no. Just a minute.
04 23 35 08	CC	Yankee Clipper, Houston.
04 23 35 13	CMP	Hello, Houston; Clipper here.
04 23 35 17	CC	Clipper, you were sort of a forgotten man for a little while. We're all - All eyes are on you now. We're with you.
04 23 35 29	CC	And, Clipper, the EVA was completed.
04 23 35 31	CMP	Okay, Ed. I've got a little - will you clean up that ... channel? I've got an echo in here.
04 23 36 01	CC	Yankee Clipper, how do you read?

04 23 36 07	CMP	There you go. Now, you're nice and clear.
04 23 36 10	CC	Roger. They completed the EVA with a 4-hour 1-minute EVA, and they got all of the objectives accomplished. They did a real swell job, and we're watching you, Dick.
04 23 38 54	CMP	Well, I guess I'll go VOX, so it'll be easier for you people to follow on these onboard checklists as I go down here.
04 23 39 00	CC	Roger, Dick.
04 23 39 06	CMP	Nobody is checking on me today.
04 23 39 09	CC	We're watching you now, Babe.
04 23 39 14	CMP	Okay, I have everything down to 6 minutes - it's all done.
04 23 39 23	CC	Roger.
04 23 40 09	CMP	Okay, I'm going to slide across the ballroom and get the BUS TIES.
04 23 40 14	CC	Roger.
04 23 40 26	CMP	Okay, the BUS TIES are ON MTVC SERVO POWER 1, AC 1/MAIN A; 2, AC 2/MAIN B; ROTATIONAL HAND CONTROLLER POWER, NORMAL, two, AC; DIRECT, two are OFF; BMAG, three, ATT 1/RATE 2; SPACECRAFT CONTROL'S to SCS; ROTATIONAL HAND CONTROLLER number 2 is ARMED. And we'll go into PRIMARY TVC check. Gimbal motors: MOTOR 1, PITCH 1; I've got it - one, YAW - mark, I've got it. That's it. PITCH. Now, I've got TRIM and YAW. TRIM is set - minus 73, plus 51. I have MTVC. SPACECRAFT CONTROL to CMC. TRIM is zero. TRANSLATIONAL HAND CONTROLLER, clockwise; no MTVC ... number 2, PITCH - mark. I've got it. YAW 2 - mark. I've got it. TRIM is satisfactory. MTVC is satisfactory - -
04 23 42 19	CDR-LM	Houston, Intrepid.
04 23 42 28	CC	Intrepid, Houston. Go ahead.
04 23 42 33	CDR-LM	Roger. How far behind time are we?
04 23 42 40	CC	Stand by, - -
04 23 42 41	CDR-LM	I'll put it this way. Aren't we supposed to be doing a 119/45?

04 23 42 43	CC	Intrepid. We're coming up on a burn with Dick right now, about 4 minutes and 30 seconds away.
04 23 42 51	CDR-LM	Okay. We'll go - we'll be off the air.
04 23 42 53	CC	Roger.
04 23 42 55	CMP	- - NEUTRAL and no MTVC. ROTATIONAL HAND CONTROLLER, two, AC/DC, DIRECT, two, MAIN A, MAIN B; BMAG's, RATE 2. TRIM; okay, it's trimmed. ATT 1/RATE 2, ENTERED. Gimbal drive test: plus 2, minus 2, zero; plus 2, minus 2, zero. In 4 seconds, I'll have TRIM, I hope. Okay, that's TRIM; 03:47 time; FDAI scale 5/5; LIMIT CYCLE is OFF; RATE is HIGH; DET is 1 second fast.
04 23 44 13	CC	Clipper, Houston. I remind you, we'd like to have all THRUSTERS ARMED.
04 23 45 20	CMP	DELTA-V THRUST A is NORMAL; TRANSLATIONAL HAND CONTROLLER is ARMED; ROTATIONAL HAND CONTROLLER is ARMED; HELIUM VALVES are AUTO; stand by for average g.
04 23 45 37	CC	You're looking good here, Dick.
04 23 45 43	CMP	Thank you.
04 23 46 41	CMP	DSKY BLANKS. DSKY is hot and EMS is NORMAL. Ullage: I have ULLAGE. PROCEED. THRUST, ON. ... 5 seconds. Looking good.
04 23 47 33	CMP	SHUTDOWN.
04 23 47 35	CMP	A and B are OFF; PITCH 2 is OFF; YAW 1 is OFF; PITCH 1 is OFF.
04 23 47 58	CC	Dick, all gimbals OFF.
04 23 48 00	CMP	These are the residuals, but I'm off in attitude right now.
04 23 48 04	CC	Okay. Thank you, Clipper. No trim.
04 23 48 12	CMP	Okay. I'm off in attitude, but there's the trim anyway.
04 23 48 23	CMP	Okay. I'm going to go over and get those bus ties.
04 23 48 27	CC	Roger.
04 23 48 31	CMP	How's it looking up here, ...?

04 23 48 33	CC	We're watching you, Dick. We'll give vou an update.
04 23 48 46	CMP	There it is.
04 23 49 02	CMP	And OXIDIZER is 32.9, FUEL is 32.7, the UNBALANCE is INCREASE 75.
04 23 49 14	CC	Roger, Dick. We copy.
04 23 49 20	CMP	EMS is minus 8.4.
04 23 49 26	CC	Roger. Copy. Would you give us POO, please, Dick?
04 23 50 19	CC	Intrepid, Houston.
04 23 50 27	CDR-LM	Go ahead.
04 23 50 29	CC	Intrepid, plane change burn was good, and we show that you're about 1.15 behind in the flight plan.
04 23 50 40	CDR-LM	Okay. That's not too bad. We'll pick up.
04 23 51 05	CC	Clipper, Houston. Will you give us POO and ACCEPT for lift-off REFSMMAT?
04 23 51 13	CMP	Okay, you've got it.
04 23 53 08	CC	Clipper, the computer is yours.
04 23 53 14	CMP	Thank you.
04 23 54 19	CDR-LM	I'd better do one thing.
04 23 59 39	CC	... sure will.
05 00 01 43	CC	Yankee Clipper, Houston.
05 00 01 48	CMP	Go ahead, Houston.
05 00 01 50	CC	Dick, the burn looked real good on PGNCS. We'll be tracking you going across here, and it all looks good for the lift-off. Have a map update for you, REV 20, when you are ready to copy.
05 00 02 05	CMP	Okay.
05 00 02 08	CC	REV 20: 120:46:53; 121:11:53; 121:33:05.
05 00 02 28	CMP	Okay. I copied that.

05 00 02 30	CC	Roger, Dick.
05 00 02 44	CMP	How do you want to handle this high gain antenna ... the way it's been acting today?
05 00 02 50	CC	Stand by on that.
05 00 05 57	CC	Yankee Clipper. Houston.
05 00 06 05	CMP	Go ahead. Houston.
05 00 06 07	CC	Dick, we would like you to go to REACQ at the present time and recycle and then go back to AUTO. For the sleep period, we will have you go to the OMNI's.
05 00 08 19	CC	Dick, let's go back to AUTO.
05 00 10 09	CC	Intrepid, Houston.
05 00 10 14	CDR-LM	Go ahead.
05 00 10 17	CC	Intrepid your last step on post-EVA 1 card, where you reverse the O_2 hoses. We suggest that's a good time to check for the water.
05 00 10 34	CDR-LM	Okay, Houston. We are just about at that step right now; we're just reconfiguring the cameras. Keep you posted. The PLSS's are all recharged and batteries replaced, LiOH canisters, and first O_2 charge.
05 00 10 57	CC	Roger. We copy.
05 00 11 42	CC	Pete, our intent on that comment about the PLSS O_2 hoses is to be assured that those hoses are straight and that you do get all the water running out of them, that there's no low places in the hoses in which the water can lie.
05 00 12 01	CDR-LM	Okay. Drain the hoses. That's the idea. Okay?
05 00 12 05	CC	That's affirmative.
05 00 12 48	CC	Yankee Clipper, Houston. On the HIGH-GAIN, MANUAL, we need - pitch, minus 31; yaw - 241. Correction on the yaw. That's 247.
05 00 13 11	CMP	Hello, Houston. How do you hear me now in high gain?

05 00 13 14	CC	Dick, we got you loud and clear.
05 00 13 20	CMP	Now, this thing is acting up though; watch it.
05 00 13 24	CC	Roger. And in the REACQ MODE, you went off.
05 00 13 30	CMP	It won't hold it in AUTO either. I got to stay in MANUAL.
05 00 13 35	CC	Roger, Dick.
05 00 14 18	CC	Say, Dick. That was a fantastic job you did on picking up the Surveyor and the LM. That was well done. Plus the burn change - the plane change on the burn. You have been doing a good job.
05 00 14 34	CMP	Thank you, sir.
05 00 15 58	CC	Clipper. OMNI Bravo. Clipper, OMNI Bravo.

END OF TAPE

05 00 20 50	CDR-LM	Houston, we're going to modulate PM.
05 00 21 09	CC	Intrepid, ready to copy.
05 00 21 19	CDR-LM	Roger. We just went to modulate PM, per checklist.
05 00 21 24	CC	Roger, Pete.
05 00 24 24	CC	Clipper, Houston. Would you confirm you're on OMNI Bravo?
05 00 24 39	CMP	No, negative. I'm on high gain right now. Would you like me to go to OMNI Bravo?
05 00 24 51	CC	That's affirmative, Dick. Go OMNI Bravo, present time.
05 00 33 04	CMP	Houston, Yankee Clipper. I just got a MASTER ALARM on the caution and warning display.
05 00 33 14	CC	Okay, Yankee Clipper. Roger. Copy MASTER ALARM.
05 00 33 48	CC	Yankee Clipper, we see nothing down here. You're still looking good.
05 00 36 17	CMP	Houston, ...
05 00 36 24	CC	Yankee Clipper, Houston. Did you call?
05 00 36 32	CMP	Intrepid, ...
05 00 37 01	CC	Clipper, we copied that P52 torquing angle.
05 00 37 10	CMP	Okay. Thank you, ...
05 00 40 48	CDR-LM	Houston, you'll never believe what we've been doing for the last 35 minutes.
05 00 40 55	CC	Go ahead. We're waiting.
05 00 41 00	CDR-LM	I am going to take this 35-cent scale that they sent out here to weigh these bags with and break it over somebody's head.
05 00 41 11	CC	I take it you're having a malfunction with the bag.
05 00 41 17	CDR-LM	... and the scale. - -
05 00 41 18	CC	- - The bag and the scale?

05 00 41 20	CDR-LM	The nut - No, just the scale. The nut came off the top of the adjustment, and that's the end of the scale.
05 00 43 18	CC	Pete, we are busy activating the scale experts.
05 00 43 46	CDR-LM	Hey, tell me where they stowed the pliers in here.
05 00 43 54	CC	Stand by, Pete.
05 00 44 45	CC	Pete, our first cut on the plier location is in one of the PPK's.
05 00 44 54	CDR-LM	Roger.
05 00 45 35	CC	Pete, it's in the lower lunar boot compartment.
05 00 45 51	CC	Yankee Clipper, 1 minute to LOS.
05 00 45 59	CMP	Roger.
05 00 50 27	CC	Yankee Clipper, Houston.
05 00 50 32	CC	Intrepid, Houston.
05 00 50 39	LMP-LM	Go ahead, Houston.
05 00 50 41	CC	Al, how you coming on weighing the water? Our suggestion is that you, if you don't see that you're going to be able to do it in a short period of time, that you move on. Suggestion is that you look for something where you can accurately measure its volume, and we'll calibrate it when you come back. And the last alternative is, just plain guess at the volume.
05 00 51 12	LMP-LM	Okay, Houston. Well, let us think about it a minute. We're still working on the scale.
05 00 51 24	CC	Roger, Al. We copy.
05 00 52 20	LMP-LM	Eureka; we did it! Got the nut back on.
05 00 52 25	CC	Well done, Intrepid.
05 00 53 57	CDR-LM	Houston, one RCU weighs 3.8 kilograms on this fickle, darned scale.
05 00 54 08	CC	Copy, 3.8 kilograms.
05 00 54 15	CDR-LM	Well, if that's what KG stands for at the top of the scale. I'm sorry. Make it 0.38 - 0.38.

05 00 54 31	CC	Roger. We copy 0.38. You had us wondering down here - a few of us. The metric fellows were wondering.
05 00 54 38	CDR-LM	Me, too.
05 00 57 13	LMP-LM	This bag is really filling up, Houston.
05 00 57 18	CC	Roger, Al. Was that the CDR's?
05 00 57 25	LMP-LM	That's right.
05 00 57 40	CC	Intrepid, for your information, your EVA went 4 hours and 1 minute. And, Al, you were the shortest in terms of quantity remaining. Your PLSS H_2O was down to 47 minutes remaining; and, Pete, your O_2 was most critical on you. And you had still 2 hours 7 minutes left.
05 00 58 10	CDR-LM	Okay.
05 00 59 02	LMP-LM	Okay. Pete's water bag weighs 0.26 kilograms.
05 00 59 11	CC	Copy, 0.26.
05 01 01 06	CDR-LM	Say, Houston. While we're doing this, what was our Btu output level, do you figure?
05 01 01 14	CC	Stand by.
05 01 01 21	CDR-LM	I say, what Btu level do you think we were working at?
05 01 01 26	CC	Pete, you averaged out at 900 Btu; and, Al, you averaged out at 1000.
05 01 01 42	CDR-LM	What kind of signals are you getting from the ALSEP? Is that running all right?
05 01 01 48	CC	That's affirmative. It's running real well. The PSE and LSM are up and working, and they're just going through the activation phases for the remainder.
05 01 01 59	CDR-LM	Okay.
05 01 02 58	LMP-LM	0.17 kilograms for the LMP's water.
05 01 03 04	CC	0.17. Got it.

05 01 03 16	CDR-LM	And, Houston, I'm going to go ahead top off our PLSS's, and while we're doing that, I guess we ought to get into our EVA debriefing with you.
05 01 03 30	CC	Roger. We're standing by for that.
05 01 07 02	CC	Intrepid, Houston. We also have your lift-off block data for REV 20 to 24.
05 01 07 11	CDR-LM	Wait 1.
05 01 07 55	CDR-LM	Go ahead, Houston.
05 01 08 06	CC	Okay, Intrepid. Lift-off block data REV 20 to 24. 20, T_8, 122:19:32; 21, T_9, 124:17:54; 22, T_{10}, 126:16:13; 23, T_{11}, 128:14:34; 24, T_{12}, 130:12:59.
05 01 08 45	LMP-LM	Roger. Copied. 122:19:32, 124:17:54, 126:16:13, 128:14:34, 130:12:59.
05 01 08 58	CC	That's correct, Al.
05 01 09 05	LMP-LM	Say, Houston, I'm a little bit puzzled about that TV camera. Do you think it had some sort of mechanical failure or did we point it at the Sun too much?
05 01 09 15	CC	That's the question right now, and we're trying to figure it out. We got mechanical and Vidicon-burn people taking sides. We're not sure right now.
05 01 09 31	LMP-LM	We got lots of room. We'll bring it back for you.
05 01 09 42	CC	That is a possibility, Intrepid.
05 01 10 --		BEGIN LUNAR REV 20
05 01 14 49	CDR-LM	Say, Houston. Do you have any questions that you wanted to ask us about the EVA?
05 01 14 55	CC	That's affirmative. We'd like to get your comments first if we could, and then we'll take up the questions and recommendations that we can come up with.
05 01 15 05	CDR-LM	Okay. My first comment is that I got water in both my boots, and it's driving me buggy.
05 01 15 14	CC	Roger. Copy. Water in the boots.

05 01 15 19	CDR-LM	My second comment is that the EVA went pretty well as planned. I think that most everything, once we got to a task the way we had practiced it back there, we got it done. It was kind of the unforeseen, as usual, which almost got us behind. I will say one thing. It very definitely took about 10 minutes or so to adapt to what was going on, but as soon as I did, I really got the hot-foot, and I think that Al felt the same way.
05 01 15 57	CC	I think from our end down here, Pete and Al, you did a tremendous job. You were able to go along, as you said, on the nominal things and take care of the off-nominal also. There were quite a few points there where you might not have met the objective, had you not played "heads up" ball.
05 01 16 16	LMP-LM	Yes. That's the handy of having a hammer aboard.
05 01 16 20	CDR-LM	My heart was in my throat when he couldn't pull that cask out of there. I mean the element out of the cask.
05 01 16 31	CC	Al, you should have been a surgeon.
05 01 16 33	CDR-LM	As far as the geology goes - That was me that was beating with the hammer, not Al. As far as the geology goes, we really didn't have a chance to look too hard, but I think it's very obvious that there are a variety of different kinds of rocks. I would also like to say that I think that we're in a most favorable position to get to the Surveyor. I don't think we want to walk down the crater wall from the crater-wall side that the Surveyor is on. I think what we want to do is walk down in the crater right from the LM across the bottom and walk up to Surveyor. It looks far too steep to approach from the other side, near the upper part. That's number one. Number two, I think that we're pretty well game for any kind of a traverse that you want us to make. You know what we can do here in a few minutes is sit down with our book and put together the best of spot 3 and 4. And ya'll can do the same thing.
05 01 18 14	CC	Okay, Pete. We're leaning right now towards the traverse for site 4, although we wouldn't take it necessarily in the same order it's spelled out there. If you want, you can get out your notes on board for site 4, and we could give you a tentative of the spellout of the order in which

you would hit those points. And in looking at it, I see it would take you down the western wall of the Surveyor crater, which is, I believe, the way you want to go.

05 01 18 53 CDR-LM Yes. Let me find number 4 here, just a second; I'll be right with you.

05 01 19 17 CDR-LM Say, that would - That ought to work out pretty darn clever, actually, to start at F-3 which is essentially where we landed there.

05 01 19 37 CC Roger. That's affirmative. We show our present thoughts on where you landed are R-2, 15.0. And, if you like, I'll go ahead and give you the order in which you could hit those points that are spelled out, like A through G.

05 01 19 56 CDR-LM Hey, wait a minute. I'm going to improve your knowledge of where we are. It just came to me what crater I'm looking into here. I am sitting approximately 120 feet northeast from the number 3 crater, that's 3 in age, that is on the east side of the head crater which would be Q - As a matter of fact, we're right on about Q-5 and about 14.1.

05 01 20 55 CC Roger, Pete. We copy that.

05 01 21 04 CC The back room will be thinking about that, and we'll get back to you on that.

05 01 21 06 CDR-LM Okay.

05 01 21 07 CC That puts you pretty close.

05 01 21 12 CDR-LM Okay. Now give me some words about the water in my boots. I'm not kidding. I've got water in my boots and I want to know what to do about it. I didn't get any water out of my drain hoses, but I'm just beginning to pick up water in my left boot. I had it in my right boot for a while.

05 01 21 31 CC Okay. Stand by, Pete; we will be right with you.

05 01 21 35 CDR-LM Okay. I tell you, the first thing I am going to do is disconnect the suit hoses.

05 01 21 40 CC Okay. We're thinking about that, Pete, and why don't we go on with this debriefing? And we'll

		get back to you as soon as we can come up with a good recommendation.
05 01 22 59	CC	Pete, can we go ahead with the debriefing? What I'd like to do is give you the recommended order for the points in traverse 4.
05 01 23 10	CDR-LM	Okay. Just a second. I disconnected my hoses. This blue hose is really pumping out pretty moist air. I'm just going to let it pump it out. The air is ice-cold air and I think that's part of the problem. Is there some way we can warm up this air?
05 01 23 32	CC	Stand by with that, Pete.
05 01 24 31	CC	Pete, would you give us the position of the suit temperature control valve and also confirm that the LCG pump circuit breaker is pulled?
05 01 24 47	CDR-LM	Okay. Suit TEMP is FULL COLD. I gue s we'll go to FULL HOT on that.
05 01 24 53	CC	Affirmative.
05 01 24 55	CDR-LM	And the LCG pump breaker is OUT.
05 01 25 00	CC	Roger.
05 01 25 29	CDR-LM	Okay. Go ahead; give me your recommended sites now.
05 01 25 33	CC	Roger. Okay. Number 1 would be F, and that's head crater; number 2, B, bench crater; number 3, A, sharp crater; and we might possibly delete this depending on how you are doing on the time line at that point. Number 4 is C, halo crater; number 5, D, Surveyor crater; 6 is E, block crater; and we'll omit G.
05 01 26 32	CDR-LM	Okay. Now where is A? Oh, it's sharp crater, is that right?
05 01 26 40	CC	That's affirm. A is sharp crater. And we may just cut across that corner depending upon how you are doing with the time line.
05 01 26 51	CDR-LM	Yes. But don't we also want to get out here on this possible Copernican ray stuff? Oops, excuse me, ... material.

05 01 27 09	CC	Roger. We do want to get off after that Copernican ray material. Two points: one is it's further out than you might be able to hack in a normal traverse just for the documented samples; and, two, we're not too sure exactly where that line really lies. If you can, go on over to that - into that area without taking a lot of time away from the other documented sampling; press on.
05 01 27 45	CDR-LM	Okay. In looking at the map, we got all the way over to - if you go to, what is it, the general map, map 5 - whatever you want to call them - We got over in that shelf crater, that's where you sent us, and we got to that fellow, so some of that stuff we picked up might be of that Copernican ray material. We also had photographs down there of that shelf, which everybody thought was interesting. I took a set of stereos in that thing, all the way around that big crater. Now, we made it over there with no strain. Matter of fact, we ran over and ran back in nothing flat. So, I think it's reasonable to go as you have indicated. Which would be one, starting at F, which is right in front of the spacecraft, then going to sharp, then going to bench, then to halo, then to the Surveyor crater, then to block, and back to the spacecraft. How's that sound?
05 01 29 03	CC	Roger, Pete. That sounds real good. Understand you'd like to go sharp and then bench.
05 01 29 13	CDR-LM	Yes. We can try that.
05 01 29 17	CC	Roger. No problem.
05 01 29 28	CC	Okay, Pete, if you would, take a look at the information you have there on those sites, and we'll be getting back to you in the pre-EVA briefing and talk a little bit more about the location of the sampling, the core tubes, and the trench site sampling.
05 01 29 47	CDR-LM	Okay.
05 01 29 49	CC	You may have some pretty good ideas on that now after being able to look at it first hand. And, Pete, we have several questions for you related to the EVA. We'd like to move through these pretty quickly, as we know we ought to get you off to bed pretty quickly.

05 01 30 14	CDR-LM	Okay.
05 01 30 18	CC	First, a question on the water in the boots. When was the first time you got water in the boots, Pete; and, Al, do you have any in at the present time?
05 01 30 32	CDR-LM	Al doesn't have any. I noticed it just starting before I just got off the suit loop to PREP for EVA. I noticed it when I came - It started in my right boot when I came back in and these hoses - blue hose, of course, was up. Pumped out about three or four three-quarter-inch balls of water when I first disconnected it, just a few seconds ago.
05 01 31 06	CC	Roger. Thank you, Pete.
05 01 31 09	CC	Question for you, Al. In the EVA PREP, the PLSS COMM check took longer than nominal. What corrective action did you take, and do you think we may have a problem the second time around?
05 01 31 26	LMP-LM	None at all. It was completely my error. At the front of the RCU, there's a switch, it goes MAIN, OFF; I pushed it off or something like that, for a moment there I did, and we should have had it at MAIN and we didn't. And so we were a little confused there for a while.
05 01 31 44	CC	Roger.
05 01 31 45	LMP-LM	It was entirely an onboard problem.
05 01 31 48	CDR-LM	Question for you, Houston. How long was our total EVA PREP time?
05 01 31 53	CC	Stand by on that one.
05 01 32 03	CC	Pete, your total EVA PREP time was 2 hours and 8 minutes.
05 01 32 10	CDR-LM	Okay. I believe we'll do it in about 1 plus 45 tomorrow as planned. Like Al said: one, we made a couple of mistakes; and the other one, we had our heads up and locked. Something we didn't have on the checklist and we should have known better.
05 01 32 32	CC	Pete - or Al, second question. When you put the core tubes in, do you now think it's feasible to join two core tubes together and

		perhaps get at least one a[nd] a half core tube lengths in? Something on that order?
05 01 32 55	LMP-LM	Yes. It was getting harder as I drove it in just like it does back on Earth. But I think if you wanted to stand there and pound, maybe three times as long as you would have to to drive in one, you could do it. And I don't know if we could do that now, though, with those pins in, but maybe we could take those pins out and put two of them together. I'd sure be willing to give it a try if you'd want to do it.
05 01 33 25	CC	Okay. We'll be thinking about that one and get back to you with it. Apparently, the ... ring is what made the difference there. If you're looking at your map - -
05 01 33 35	CDR-LM	... got a problem.
05 01 33 38	CC	Go ahead.
05 01 33 42	CDR-LM	No comment there.
05 01 33 46	CMP	Hello, Houston; Clipper.
05 01 33 50	CC	Yankee Clipper, Houston. Read you loud and clear.
05 01 33 55	CMP	... stand by ... the E-memory dump ...
05 01 34 04	CC	Roger. Stand by on that Dick.
05 01 34 11	CDR-LM	Okay, Houston. If you're watching the computer, I'm going to bring it out of STANDBY and put it back in again to update the clock time.
05 01 34 20	CC	Roger, Intrepid.
05 01 34 51	CDR-LM	There's another one of those downlink too-fast alarms.
05 01 35 09	CC	Yankee Clipper, Houston. We're ready for the E-MOD.
05 01 35 18	CMP	Here it comes.
05 01 35 45	CMP	... The onboard readouts ... I have for the batteries; 36.1 volts, battery C, pyro BAT A, pyro BAT B.

05 01 36 05	CC	Roger, Intrepid. Copy 36.1 volts, and would you say which ones those apply to?
05 01 36 16	CMP	Say again, Ed.
05 01 36 20	CC	Clipper, you gave me a reading 36.1 volts. I didn't copy; for which batteries were you reading that out?
05 01 36 29	CMP	Okay. That's three of them on battery C, pyro BAT A, and pyro BAT B.
05 01 36 35	CC	Roger. And we'll be up to you with an RCS update in a minute.
05 01 38 17	CC	Yankee Clipper, Houston.
05 01 38 23	CMP	Go ahead.
05 01 38 25	CC	Dick, for the sleep period in order to get a little extra signal margin on the OMNI's, we'd like first of all - you'll be turning your HIGH GAIN to OFF; S-BAND, NORMAL; VOICE to OFF; S-BAND, AUXILIARY; TAPE to OFF. If you have to call ground, do it on DOWNVOICE BACKUP.
05 01 38 58	CC	Clipper, did you copy?
05 01 39 10	CC	Intrepid, Houston. Would you give us aft OMNI?
05 01 39 29	CC	Intrepid, Houston.
05 01 39 36	LMP-LM	Go ahead, Houston.
05 01 39 38	CC	First, would you give us aft OMNI? And we are ready to pick up with the debriefing.
05 01 39 50	CDR-LM	Aft-S-BAND - Is that what you want?
05 01 40 13	CC	Intrepid, negative. That's the VHF antenna.
05 01 40 15	CDR-LM	Go, go, Houston.
05 01 40 29	CC	And, Intrepid, we are ready to pick up with the debriefing.
05 01 40 41	CDR-LM	Okay, Houston. Go ahead.
05 01 40 45	CC	Okay. Two questions related to the mounds which you saw out there. Is the object at R-5, 13.1 a mound or a rock? And, secondly, confirm that you did get a sample of the mound material.

05 01 41 04	CDR-LM	Yes. We got a sample of the mound material; we got lots of them. And would you say again the coordinates?
05 01 41 12	CC	Coordinates are R-5, 13.1.
05 01 41 56	CDR-LM	No. I don't think so, Houston. This mound is too small to show up like that. I believe I'll look at it a little bit more here for a minute and think about it. The mound - I'll tell you where the mound is - The mound is not seen on the map. What you gave me was a crater.
05 01 42 23	CC	Roger. We copy that. And on that mound sample, you got material from the mound as well as material around the mound itself?
05 01 42 34	CDR-LM	That's right. We can get tomorrow a documented sample if you want.
05 01 42 40	CC	We will talk to you about that in the briefing before the EVA, Pete. And a question on the number and sizes of rocks - What was the ratio of fines to rocks that you finally ended up with?
05 01 43 03	CDR-LM	I put two of the large scoops worth of fill in one bag that had three rather large rocks in it; I think it is three. And the other bag of rocks fills half of the rock box, and I guess there were - What would you say, Al, 10, 12 rocks in there, and the rock box is full to the top. I couldn't get anything more in there, I'll tell you that, and get the core tube in there. That's it.
05 01 43 47	CC	Roger. We copy that. One question on the SIDE dust cover. Was the SIDE dust cover well aligned after reclosing? And the reason for asking that is in case we suspect a misalignment, we would try to activate that now and if it doesn't work, we'd have a manual backup.
05 01 44 12	LMP-LM	The SIDE dust cover popped off about three times, Houston. And the last time it popped off was when we just finished aligning it neatly level and we put out the cold cathode ... gage and the cover popped off again, and we didn't want to disturb the experiment to try and put the cover back on - we'd spent already overtime on it, so

		we just left the cover off. So, as the experiment sets right now, the cover is off. Now if this is unacceptable, I guess we can take a swing by there tomorrow and try to put the cover back on. And we can put it on lined up accurately as it was to begin with, if that is what you want.
05 01 44 57	CC	Okay. Stand by on that, and we'll be massaging that one tonight.
05 01 45 03	LMP-LM	Okay. My recommendation is unless it is going to hurt the SIDE to leave it just like it is, because it is just a precariously balanced experiment over there and it is going to take time to do it right.
05 01 45 18	CC	Roger. We copy that, Al. And, Pete, could you give us an estimate of the number of rocks that you have on board?
05 01 45 31	CDR-LM	I really didn't get a count, Houston. Well, let me see - I guess it would be about, would you say - about 15 to 20 rocks is all.
05 01 45 44	CC	Okay. We are looking for really the quantity of rocks - pounds of rocks.
05 01 45 51	CDR-LM	That rock box is heavy, I'll tell you that. I think it is right up to MAX.
05 01 45 58	CC	Roger. That is good enough. One last question, Al. When you took the fuel element out, in the extraction, what was the force profile like? In other words, did it all of a sudden come free at one point or did it gradually come free as you extracted it?
05 01 46 16	LMP-LM	Well, Pete started pounding on the SIDE; and, as it came out, an eighth of an inch at a time - make that a sixteenth of an inch at a time - until it was about three-eighths of an inch out. Once it was three-eighths of an inch out, it slid out rather easily.
05 01 46 36	CC	Roger. We copy that.
05 01 46 38	CDR-LM	What is the fuel cask made out of?
05 01 46 41	CC	That's graphite.
05 01 46 45	CDR-LM	Okay. Well, I pretty well was beginning to bang it up pretty badly. As a matter of fact, I think

I cracked it. I had better go look at it tomorrow. And I was rapping it as hard as I could and was getting about an eighth of an inch at a time until it finally got about - What would you say, Al, an inch and a half out, and then it came all the way.

05 01 47 06 CC Roger.

05 01 47 16 CC Pete, no problem with that. You don't have to go back to it.

05 01 47 23 CDR-LM Okay.

05 01 47 45 CC Pete, we have a procedure here in order to get the water out of the suit loop. First, suit loop - or the suit isolation, disconnect both; disconnect the O_2 hoses. Suit isolation to SUIT FLOW, both; lower the outlet of the hose to floor for about 2 minutes. Suit isolation to disconnect, both; connect both O_2 hoses; suit isolation suit flow, both.

END OF TAPE

05 01 48 25	CDR-LM	Okay, I understand that one, and we'll do it in a little bit; we're eating right now.
05 01 48 31	CC	Roger.
05 01 48 32	CDR-LM	I got my hoses disconnected anyhow.
05 01 48 34	CC	Roger, Pete. And we don't see a - a real easy way of getting the water out of the boots - if you turn the heat way - way up, we may be able to dry some of it out and the other ... is to use gravity in whatever way you could - you could use it.
05 01 48 52	CDR-LM	I - I don't have that much water in there, and it's drying up - or at least it's as warm as I am right now, so it's not bothering me and it's no sweat.
05 01 49 02	CC	Roger.
05 01 49 06	CDR-LM	I just want to make sure the suit loop's running right, that's all.
05 01 49 12	CC	Roger, Pete.
05 01 49 13	LMP-LM	Say, Houston. Question for you.
05 01 49 17	CC	Go ahead.
05 01 49 19	LMP-LM	Here's a question for you, Hous. With the tapemeter being like it is and those erratic readings, we seemed to be getting - approaching PDI, as far as the backup perilune monitor check. How are we going to use that tapemeter tomorrow when we're trying to update the AGS in range and range rate?
05 01 49 42	CC	That's a good question, Al; we'll be working on that one. That's another one tomorrow, we're going to have a lot of people thinking hard over the sleep period.
05 01 49 49	LMP-LM	Okay, I think we can just call up NOUN 78. Yes, I - I think we could just call NOUN 78 with P20 running - isn't that right?
05 01 50 02	CDR-LM	You could do that. And the first thing that I'd propose doing, Houston, is we'll get a - we'll

get a quick airborne check after we launch and do a - I get a manual lock-on or something, go do a VERB 63, and check the tapemeter against the DSKY.

05 01 50 24 CC Roger.

05 01 50 26 CDR-LM That's no big deal.

05 01 50 29 CC Roger, Intrepid. We recommend, also, that you shoot for the 3-1/2-hour EVA.

05 01 50 41 CDR-LM Okay.

05 01 50 46 CC Roger. And we'll wake you up at the nominal time in the flight plan.

05 01 50 53 CDR-LM Okay.

05 01 51 22 CC Yankee Clipper, Houston.

05 01 51 45 CC Yankee Clipper, Houston.

05 01 52 21 CC Yankee Clipper, Houston.

05 01 52 37 CMP Houston, Clipper. Go ahead.

05 01 52 40 CC Clipper, you have A-C rolls selected in the DAP. Would you verify that your A-C thrusters are also enabled?

05 01 52 52 CMP ... select ...

05 01 53 02 CC Dick, we also have a lift-off block data for REV 20 through 24 when you're ready to copy and the RCS totals, if you're interested.

05 01 53 17 CMP Yes, I sure am interested in the ... just a second, though.

05 01 53 22 CC Roger, Dick.

05 01 53 25 CMP Okay. Go ahead.

05 01 53 29 CC REV 20, T_8, 122:19:32; REV 21, T_9, 124:17:54; 22, T_{10}, 126:16:13; REV 23, T_{11}, 128:14:34; REV 24, T_{12}, 130:12:59. Your RCS totals at a GET of 121 plus 30 is 57.7 and Alfa through Delta are 60.7, 55.5, 58.8, 56.0.

05 01 54 34	CMP	Roger. Copy. Thank you very much. Is that it for the day?
05 01 54 41	CC	You're welcome, Clipper. And say again the question.
05 01 54 47	CMP	I said, "Was that it for the day?"
05 01 54 54	CC	Clipper, again you were broken; repeat the question.
05 01 55 02	CMP	Okay, I guess that's it for the night, huh?
05 01 55 14	CC	Roger. That's it, Dick, except for one thing. Would you verify that your pyro BAT readings are 36.1 rather than 37.1?
05 01 55 26	CMP	They are 37 - 37.1.
05 01 55 31	CC	Copy, 37.1. Thank you. We'll talk to you in the morning.
05 01 55 38	CMP	Okay.
05 02 13 24	CDR-LM	Houston, Intrepid.
05 02 13 29	CC	Go ahead, Intrepid.
05 02 13 34	CDR-LM	Roger. When do you want us to change the - give me the times for the LiOH pressures change, would you, please?
05 02 13 39	CC	Okay. Sure will, Pete. Now we got a couple more questions to get rid of some Irish ... here; and when you answer these, we can turn you loose to go to sleep. First off, what are your intentions for your suit-hose configuration for sleep? Over.
05 02 14 04	CDR-LM	Al says he's hot, and he's going to leave his connected to blow air. I'll probably sleep with mine off.
05 02 14 11	CC	Okay. Understand. Secondly, how about a - for our friendly surgeon, a crew status report and a medication and radiation status?
05 02 14 26	CDR-LM	Okay. The crew's in super shape - no medication, and let me look at my little RAD counter here, just a second.
05 02 14 36	LMP-LM	LMP had one of those decongestant pills just prior to EVA.

05 02 14 42	CC	Understand, Al.
05 02 14 44	CDR-LM	And my RAD counter is 1 - my RAD counter is 11020.
05 02 14 51	LMP-LM	And mine's 04020.
05 02 14 55	CC	Okay, thank you. One last question. On your - Did you have any problems with the tapemeter during your descent other than it reading high on the perilune check?
05 02 15 12	CDR-LM	We had it in ALTITUDE/ALTITUDE RATE on the descent, naturally - and it looked to me like it agreed pretty closely with the PGNS's numerical readout on the DSKY. That's what kind of concerns me about the rendezvous radar; also, that low transmitter power - maybe it all hooked in somehow.
05 02 15 30	CC	Okay. Thank you.
05 02 15 32	LMP-LM	No, I don't - I disagree. I disagree on low transmitter power - we got a - we got surface locked up; and, when the command module went by at a good P22, the tapemeter did not run in the P22 like it does in the simulator; I'll say that for it. And secondly, it was off; I don't remember the number now, but it was off from its normal reading and self-test, although the PGNS portion of rendezvous radar self-test was absolutely correct. So I suspect that there may be just something wrong with that tapemeter; I don't think there's anything wrong with the rendezvous radar itself.
05 02 16 17	CC	Okay, thank you. And - and it was just - it was not in agreement; it was not erratic in operation in any way, was it?
05 02 16 28	CDR-LM	No, it runs just perfect - not erratic. I think there's just - my impression of these perilune altitude checks and everything; there may be a bias on it, like 30 or 40 feet per second.
05 02 16 44	CC	Roger, Intrepid. Thank you.
05 02 17 07	CC	Intrepid, Houston. Pete, the second time you disconnected your suit hoses, did you get any water out of the hoses then?

05 02 17 18	CDR-LM	No, it was the second time that I got all the water out of them. I did - I took them off the first time and put them on the floor as advertised and didn't get any water out of them. I put them back on again; I started getting water in my boots, so I took them off that time, and I never put them on the floor; I just took them off and it blew three three-fourth-inch water balls right out of it, splattered all over the spacecraft; and, since then, it's been pretty good. And we turned the suit - ... here up, oh, hot, and we'll see - see how that works.
05 02 18 03	CC	Okay. Thank you.
05 02 18 25	CC	Intrepid, Houston. Has - has Al done the same thing with his hoses, Pete? And, if he has not, we would like to request that he do so before you turn in.
05 02 18 37	CDR-LM	Yes, he - he - he hasn't gotten any water, but he's going to drain them right now. Now, look, you got us down here for an hour to eat tomorrow; there's a - we're in one-sixth g, and when it doesn't take us anywheres near that long to eat, we can whistle through things a lot faster. I think we can pretty well stick to the nominal time line and get a good night's rest. It may turn out, that after 6 or 7 hours' worth of sleep we're going to get stirring, because we're both up, and we're not going to sit here. So, we'll give you a holler whenever we get up, and we're going to start cooking right then and there and be ready to go over the ... at that so we can get as good a EVA out of it as possible and not cut ourselves at the end.
05 02 19 20	CC	Okay. That will be fine, Pete.
05 02 20 29	CC	Intrepid, Houston. Request that Al go to SUIT FLOW while you're disconnected; so, if there is any water in there, it will blow it on out.
05 02 20 45	LMP-LM	That's a pretty reasonable request.
05 02 29 34	CC	Hello, Intrepid; Houston. Over.
05 02 29 40	CDR-LM	Go ahead.
05 02 29 42	CC	Okay. Pete, can we have the results of Al's suit loop check?

05 02 29 50	CDR-LM	Roger. He got two drops of water. That's it.
05 02 29 55	CC	Okay; understand. And on that lithium hy - -
05 02 30 03	LMP-LM	It's one of those mysteries of life, Paul. I don't have any water in mine, to speak of, and Pete has his coming out all the time. We've been shifting over to SEPARATOR, but I really don't think that's the answer. Must be something to do - just like on Neil's spacecraft with ... hoses or the way it turns or something else.
05 02 30 24	CC	Roger, Al. Understand. And also on the lithium hydroxide canister change; if it fits in with your activities at that time, we would like to have it changed out at 130 hours on the clock; and, for your information, you're 12 minutes past the halfway mark in your total mission time.
05 02 30 46	LMP-LM	Roger. And you want the LiOH out at 130:00?
05 02 30 53	CC	That's affirmative.
05 02 31 31	CC	Intrepid, Houston. Let us know when you're getting ready to turn in, Pete, and we won't bother you any more.
05 02 31 39	CDR-LM	Okay. We're still fiddling around here a little bit; we're just getting ready to lig - rig the hammocks now.
05 02 31 48	CC	Roger.
05 02 31 50	CDR-LM	Al wanted to go EVA again, and I refrained him until tomorrow.
05 02 31 57	CC	Okay. Good show.
05 02 36 32	CDR-LM	Say, Houston, do you want us to do this - go to DOWN VOICE BACKUP and POWER AMPLIFIER, OFF?
05 02 36 41	CC	Stand by ..., Intrepid..
05 02 36 56	CC	Intrepid, Houston. That's affirmative, Pete.
05 02 37 04	CDR-LM	Okay. We're going DOWN VOICE BACKUP and POWER AMPLIFIER, OFF at this time and configured for sleep.
05 02 37 10	CC	Roger, Pete. Nighty-night.

05 02 37 12	CDR-LM	And a - Okay, and I understand it's - 129:55 is reveille, is that right?
05 02 37 22	CC	That's affirmative.
05 02 37 27	CDR-LM	Okay. We'll gauge it on that. Nighty-night.
05 03 09 --		BEGIN LUNAR REV 21
		END OF TAPE

05 05 07 -- BEGIN LUNAR REV 22

05 07 05 -- BEGIN LUNAR REV 23

REST PERIOD - NO COMMUNICATIONS

05 09 01 50	CDR-LM	Hello, Houston; Intrepid. How are you this morning?
05 09 01 58	CC	Good morning, Intrepid. How did you sleep?
05 09 02 05	CDR-LM	Short, but sweet. We're hustling right now, and we're going to eat breakfast, have a little talk with you, and get about our business.
05 09 02 15	CC	Sounds good.
05 09 03 --		BEGIN LUNAR REV 24
05 09 23 24	LMP-LM	Houston, Intrepid. What's the local time down there, Paul?
05 09 23 29	CC	It's 19:25 now, Al.
05 09 03 40	LMP-LM	Roger.
05 09 07 56	CDR-LM	Okay, Houston. We both slept 5 hours. My PRD is 11020, and Al's is 04021.
05 09 08 11	CC	Roger. Copy, Intrepid. For information, Pete, can you see the ALSEP out the LM window?
05 09 08 20	LMP-LM	Sure can.
05 09 08 21	CC	Okay, Al. When you get a chance, what I would like for you to do is - they are getting - not getting the readings they expected from the CCIG. If you can, we would like you to give a look-see at it with the monocular to see whether you can tell whether it is rightside up and whether the port has been opened or not. Over.
05 09 08 50	CDR-LM	Okay. Wait 1. We left that in a rather precarious position due to the cable last night, and it wouldn't surprise me if it is not upside down, face down, because that is exactly where it wanted to go.
05 09 09 05	CC	Yes, understand, Pete. It's - They've given a command to open the ports, and the pressure has not gone down in it at the rate they expected.

05 09 09 24	LMP-LM	When we left it last night, Houston, we left it sort of on its back facing about 80 degrees from the horizontal. That was the best we could do.
05 09 09 36	CC	Okay. Understand.
05 09 09 54	CDR-LM	Unfortunately, Houston, it is on the opposite side of the SIDE and it - which is supposed to be lined up with my ... It does look like it's exactly the same as we left it last night, but I can't really tell. We run over there after we get out and look.
05 09 10 14	CC	Okay. Thank you, Pete.
05 09 10 32	CC	Intrepid, Houston. I have got a late change for you that came in a couple of hours ago. On the rocks you are bringing back in the jettison bag, Grumman has come through and - along the way, and several people have decided that the weight, the allowable weight, to be stowed in the bags on the deck there should be reduced from 35 pounds to 20 pounds. That's 14 pounds of rock and one 6-pound bag.
05 09 11 20	CDR-LM	I didn't quite get the end of that. Say it again.
05 09 11 25	CC	Okay. Stand by 1, Pete.
05 09 12 15	CDR-LM	Houston, while you are working that problem, I would like to know if there are any restrictions on when we go over the sill.
05 09 12 28	CC	Okay. Stand by, Pete, and we will give you a word on that.
05 09 12 33	CDR-LM	Okay. I would like to go as soon as I can get ready without hurrying. And I've kind of got the suspicion, looking over the PREP card, a good bit of this stuff is done, and it is pretty much a deal of hooking up the PLSS's and going. And I think we are going to be able to get out somewhere around 131:30 to 132, and we will be looking at the time line and see what we should be doing than normally.
05 09 13 02	CC	Roger, Intrepid.
05 09 13 25	CC	Okay, Intrepid; Houston. That's affirmative, Pete. Whenever you're ready, at your own pace,

you can go over the sill. Of course, we do want to talk to you about the briefing on the traverse before you go out.

05 09 13 43 CDR-LM Okay. I will give you a call in about 3 or 4 minutes. We have some sprucing up to do; and, while we are eating breakfast, you can give us the hot word on geology.

05 09 13 53 LMP-LM Also give us some word on the families, if you would.

05 09 13 59 CC Okay; sure will. Did you get that on the allowable weight of the materials to be brought back in the jettison bags being changed from 35 pounds to 20 pounds?

05 09 14 13 CDR-LM Roger. How far down on the scale is that? I can't remember.

05 09 14 18 CC It's 1 inch, Pete.

05 09 14 23 CDR-LM One inch. Roger.

05 09 14 52 CC Intrepid, Houston. They want the TV camera brought back, so I have got some changes to your surface checklist to cover stowing it for return when you are ready to copy.

05 09 15 07 CDR-LM Okay. Wait 1. What page?

05 09 15 12 CC Okay. Page 65 to start with.

05 09 15 20 CDR-LM We're there. Go ahead.

05 09 15 22 CC Okay. Down under the block that contains word "rest periods," about the fifth - fourth item down is "voice-to-voice." We want to insert in there a step to stow utility towels from the hammocks in the upper boot box. These will be used, as I will describe to you later, to protect the TV camera when you stow it for return.

05 09 15 49 CDR-LM Shucks. We already took them out to use to keep ourselves nice and clean.

05 09 15 54 CC Okay. Okay. Now on page 67 of the surface checklist.

05 09 16 10 CDR-LM Go.

05 09 16 14	CC	Okay. On the right-hand column under EVA-2 PREP, about the eighth or ninth line down, it says remove ECS lithium hydroxide cartridge and bracket. Do not remove the bracket. Keep it on the engine cover. Over.
05 09 16 33	CDR-LM	Good idea.
05 09 16 36	CC	Okay. Now on page 77.
05 09 16 53	CDR-LM	Go.
05 09 16 54	CC	Okay. On the right-hand column under "LMP," next to the last step after "Verify circuit breaker," insert a step to open the TV circuit breaker.
05 09 17 08	LMP-LM	Okay, Houston. In other words, you say to turn the TV on to begin with and then before I get out to open it. Is that the plan?
05 09 17 18	CC	That's affirmative, Al. I should have made that clear. They want to try one more look to see if something short of a miracle occurred, and then you will open the circuit breaker again before you get out.
05 09 17 33	LMP-LM	Sounds good. Be sure to remind me because it's not on my current checklist, and I won't have this one out. And what's the latest thinking on that, too?
05 09 17 47	CC	You mean on why it didn't work, Al?
05 09 17 53	LMP-LM	That's right.
05 09 17 57	CC	That hasn't been resolved yet.
05 09 18 02	LMP-LM	Well, I'm going to worry about that one all night.
05 09 18 07	CC	Okay. Don't sweat it. On page 78 now.
05 09 18 15	CDR-LM	Go.
05 09 18 17	CC	Okay. Under the "CDR" now, we're going to have you use your Surveyor dismantling tool, I guess, on this TV camera, the cutters, to get it apart. So add a couple of steps here, Pete, at the end of your list. We want you to cut the TV cable on the spacecraft side of

		the camera connector, below the adapter. And then stow the TV - -
05 09 18 47	CDR-LM	Yes. I understand.
05 09 18 48	CC	And then stow the TV camera in the ETB.
05 09 18 54	CDR-LM	Okay.
05 09 18 55	CC	Okay. We'll remind you of these steps since they're not on your chart.
05 09 18 58	CDR-LM	Also mention - That's right, because they're not on the cuffs.
05 09 19 02	CC	Roger.
05 09 19 15	CDR-LM	Okay. Go ahead, Paul.
05 09 19 20	CC	Okay. Now on page 93.
05 09 19 34	CDR-LM	Go ahead.
05 09 19 35	CC	Okay. In the right-hand column, the fourth or fifth line up, after "Unstow 70 millimeter cameras," add a step to unstow the TV camera from the ETB and stow on the engine cover.
05 09 19 52	CDR-LM	Okay. Next step.
05 09 20 00	CC	Okay. It's been written on page 97, Pete.
05 09 20 10	CDR-LM	Go ahead.
05 09 20 14	CC	Okay. Let me read it over here a minute, and I'll paraphrase it for you. We want to fold the TV camera. We're going to stow it in the lithium hydroxide canister.
05 09 20 24	CDR-LM	Okay. Do you want us to pack it with the towels as best we can, huh?
05 09 20 28	CC	That's affirmative, and they want it - just wrap the remaining - Fold the handle, wrap the cable around the camera as best you can and stow it in the lithium hydroxide canister bracket on the engine cover and stow it with the lens up. Over.
05 09 20 55	CDR-LM	Okay. Now has anybody checked to make sure that we can fit the camera and all the cables and stuff in that - -

05 09 21 04	CC	That's affirm - -
05 09 21 05	LMP-LM	You might can, but I don't know.
05 09 21 06	CC	That's affirmative. They had and - oop - okay.
05 09 21 15	CDR-LM	Okay. The only reason I wondered is in case it - We'll make it work.
05 09 21 20	CC	Roger. The lens will stick up - it's been checked out - The lens will protrude up out of the canister stowage about 6, 7 inches and they then want you to wrap some utility straps around the end of the camera to hold it in place.
05 09 21 40	LMP-LM	We'll do it.
05 09 21 48	CDR-LM	Consider it done in PREP.
05 09 21 52	CC	Okay. And one other thing, on your tiedown of this bag with the extra rocks in it, they want you to run an additional strap - Stand by 1.
05 09 22 11	CC	Okay. After you get the bag secured on the deck there between you, they want an additional strap run from the straps holding the bag down up to the ISA D-ring, for additional support. Over.
05 09 22 33	CDR-LM	Okay. We'll do it.
05 09 22 37	CC	Okay. That takes care of our procedural changes this morning. I'll give your families a call and get the word back up to you in about 5 or 10 minutes.
05 09 22 48	LMP-LM	Sounds good.
05 09 22 50	CDR-LM	What's the Yankee Clipper doing, sleeping?
05 09 22 52	CC	Yes. He's cutting off a few Z's there. Clipper's scheduled to sleep until 131:30, and our intention now is to let him sleep until then, if he does.
05 09 23 13	CDR-LM	Okay.
05 09 23 15	CC	Okay. I got a couple of messages for you here I'll read up to you. The officers and crew of the USS Independent - or correction, of the

USS Intrepid extend their best wishes to all three of you. They're following your progress closely as you write another intrepid chapter in American history. And they - From the blue Caribbean, they wish you smooth sailing on your voyage across the vast ocean of space and their thoughts and prayers are with you.

05 09 23 47	CDR-LM	Thank you.
05 09 27 55	CDR-LM	Say, Houston; Intrepid. I'm going to bring the computer out of P06 and put it back to bed again.
05 09 28 06	CC	Stand by.
05 09 28 27	CDR-LM	Okay, Houston. I've got another one of those 1105 alarms, which is uplink too fast. I don't know why that happens all the time, but it does. I'm going to go ahead and put it back to sleep again.
05 09 28 38	CC	That's fine, Pete.
05 09 29 00	CDR-LM	Okay. It's back in STANDBY.
05 09 29 02	CC	Roger.
05 09 31 05	CC	Hello, Intrepid; Houston. I have a consumables update for you, if you want it, Pete; and, after that, I've got some lift-off block data.
05 09 31 23	CDR-LM	Okay. Go ahead with the consumables update, and then the block data.
05 09 31 28	CC	All right. RCS Alfa is 80 percent; Bravo is 76; oxygen is 76 and 96; water, 47 and 99; and your amp hours is 850 and 572. The lift-off block data for REV 25, which is T_{13}, is 132:11:35; REV 26, T_{14}, is 134:09:59; REV 27, T_{15}, 136:08:25; REV 28, T_{16}, is 138:06:50. Over.
05 09 32 51	LMP-LM	Roger, Houston. We copied the consumables updates, and you have lift-off times 132:11:35, 134:09:59, 136:08:25, 138:06:50.
05 09 33 07	CC	That's affirmative, Al.
05 09 33 46	CC	Hello, Intrepid; Houston. I have a couple of words on your rendezvous self-test and your tapemeter, if you're interested in them now.

05 09 33 55	CDR-LM	Go on.
05 09 33 57	CC	Okay. Your rendezvous radar self-test was good. The checklist had the SPEC values, not the actual values, which is the reason for the difference. They ran through them on the ground and it checked out 4.0. Your tapemeter perilune checks were also good. MPAD ran a solution through on the ground here using the actual CSM state vectors. They had been slightly perturbed, and they came up with the same values off the chart as you did.
05 09 34 30	CDR-LM	Fantastic.
05 09 34 32	CC	How about that?
05 09 34 38	CDR-LM	Okay. Then you think our tapemeter is going to be accurate during the rendezvous then? We can just use that data?
05 09 34 45	CC	That's affirmative.

END OF TAPE

05 09 -- --	CDR-LM	Okay, Houston. How about giving me the word on geology now?
05 09 -- --	CC	They'll be with you in a minute, Pete.
05 09 -- --	CDR-LM	Okay.
05 09 -- --	CC	Pete, now, Houston. We're ready to go with the traverse plan.
05 09 -- --	SC-LM	Ho, ho, ho, good morning.
05 09 -- --	CC	Good morning, good morning. We can pick it up at LSE 76G. I think that is the easiest way to follow it on your map.
05 09 -- --	SC-LM	I have it right in my hand. Go.
05 09 -- --	CC	Okay. First of all, the two prime sites we consider around here are bench and sharp craters. We could pretty much follow the traverse which we discussed before. What I'd like to do is give you the additional information that you don't have on your sheet and also, perhaps, to discuss how we'll fit the ALSEP revisit into this. Your first point along the traverse is head crater and which we called out F. What we would like to do in view of the fact that you are going out towards the ALSEP is to move that SIDE over to the northwest rim of head crater and coordinates there are R-0 11.0, and then you will carry out which we already have outlined for head crater. That's the two partial PANs across head crater and document the slope, slumps, and ledges. In addition to that, seeing as we have the PSE so closely located to that, we would like to see if we can get a known signal for the PSE; so, if possible, could you roll a large crater - a large boulder - the former would have been a little harder - roll a large rock into the crater and take a stereopair of the rock rolling - take a stereopair of the rock prior to rolling and a stereopair of the track made by the rock after rolling. Okay, that's point 1. Do you copy?
05 09 -- --	SC-LM	Yes, sir. We'll rock and roll. We've had a lot of training for that sort of thing on the geology trips we had. We're with you all the way. Let's press on from the head.

05 09 -- --	CC	Roger. We've got some happy looking geologists here. We have Uel Clanton back here, and he's betting that somewhere along the traverse, you'll find some stuff.
05 09 -- --	SC-LM	There's stuff all over the place.
05 09 -- --	CC	Okay, after this first point, then you can go on out to ALSEP, and word on the CCIG is to make sure that it is laying on its back. We would like for you to confirm, however, that you did try to lay it down in the normal mode and that the only way you really can - you thought you could make it work - is having it lay on its back.
05 09 -- --	SC-LM	Look, we are going to go the other way around, I think. Let's go to ALSEP and then to 1.
05 09 -- --	CC	Okay. ... okay. Fine. Either way you want it. Look at the geometry.
05 09 -- --	CDR-LM	Another thing, while you are standing there - I want to tell you, I do - I do have bench crater in view from the window; sharp Crater, I do not. So it looks to me like it would be relatively easy to go to ALSEP - to the coordinates you gave me on head crater, and I am looking at it right now, and I see several rocks which might do what you want to do - which we might be able to roll down the side of that crater and followed by one astronaut, probably; but anyhow, we will give it a whirl and then in the next plane, you want us to go sharp, and if so ...
05 09 -- --	CC	No, Pete. The next one is bench crater and then we will be moving on to sharp.
05 09 -- --	CDR-LM	Okay.
05 09 -- --	CC	What we would like to do is to move -
05 09 -- --	SC-LM	Do it the other way around and that way I am going around in a circle.
05 09 -- --	CC	Okay. What we wanted to do was to move your point B on bench crater on over to the northwest edge of it as opposed to on the southwestern edge.
05 09 -- --	SC-LM	Okay. I am with you. Give me the coordinates and we will do it your way.

05 09 -- --	CC	Okay. Coordinates on that would be M-0 and 10.0, so you would be up on the north side.
05 09 -- --	SC-LM	Great minds think alike. That is where I was pointing.
05 09 -- --	CC	Roger. Okay, three things we would like you to do which are in addition to what we already discussed on your plan. Take stereopairs of features of interest in bench crater, especially of the bench; determine whether the bench is bedrock or breccia near - near the base of regolith. And, if the bench is bedrock, sample ejecta representative of the bench or sample the bench itself, if possible. And lastly, look northwest and - -
05 09 -- --	SC-LM	I understand.
05 09 -- --	CC	- - Roger, Al. And lastly, in bench crater, look northwest and southwest from the rim of bench crater to see if Copernicus ray material is obviously different from other units.
05 09 -- --	SC-LM	Okay.
05 09 -- --	CC	Okay. Moving out to sharp crater which is coordinate A. First, we call for a full trench site sample in the crest of sharp crater, and we want to make sure you also add to that the gas analysis sample. That looks as though it will be pretty much your furthest point out. We would like a whole PAN from the rim of sharp crater, that also is because that is your furthest point out. And crew option at this point - extend your traverse west into what appears to be Copernicus ray material and also -
05 09 -- --	SC-LM	Hold on for a second, Houston.
05 09 45 31	CDR-LM	Okay. Go ahead, Houston.
05 09 45 35	CC	Okay. Last points on sharp crater is sample and describe differences across the contact of M-1, M-2, if it is apparent when you reach that region. On your map, that shows up as a dotted line running northwest-southeast.
05 09 45 59	CDR-LM	Yes. We have got it. I can tell you right now, it is going to be pretty darn hard to do that. You look across on the material looks all the same. Looking down-Sun, it looks all the same, except it is a different color.

05 09 46 17	CC	Roger.
05 09 46 18	CDR-LM	It's really weird. I'm sure that you can see the stuff from far out; but down here, it might as well all be the same until you get right up on top of - the individual rocks.
05 09 46 28	CC	Roger. Understand. Probably, you might not see any color differences, but if you could keep your eye open for differences in rock types. Moving on to the fourth point - -
05 09 46 38	CDR-LM	We will.
05 09 46 40	CC	- - which is halo crater. Now, as we have it called out there, at this point, you can try to join the two core tubes together and core through the thin ejecta of crater 6, or halo crater. When you do that, you pull - you'll have to pull the pip pin off the one core tube which you make the bottom tube. We'd like you to avoid the rockiest parts of the crater; and, if the tubes can't be joined, just take one on the rim and then one about 100 feet west of that location. If you could, give us a PAN at that location, and here is a comment which is really applicable to all of the traverse. Document patterned ground and fillets on different slopes and blocks, especially any asymmetric fillets you may run into. We would expect - Well, we would find it most interesting to get this type of information on the youngest material so that's why we call for it here, especially in halo crater. The best way to document pattern ground is to photo into the Sun, near-field, and that way the pattern should show up in an optimum way.
05 09 48 01	CDR-LM	Okay.
05 09 48 04	CC	And the last one is you go on down the Surveyor crater, and in there we have a block crater. We'd like there to collect the samples of major rock types and a partial PAN across the Surveyor crater. And I think that covers it from our end.
05 09 48 28	CDR-LM	Okay. We may have a little trouble getting to block crater. I'm not sure whether it is an optical illusion or what, but that face - that wall that the Surveyor is on looks one whale of a lot steeper than 14 degrees. Now, it just may be that we are standing on the other side

		of the crater ourselves and it just looks a little funny. And we've been discussing the Surveyor a little bit here during the evening, and it does - that crater gets pretty rugged over on that side, especially in the block area, as I remember it from yesterday. We'll give her a go. Now, when we get in each one of these points, you can remind us of it again. But I - I think we have it fairly well in mind what you want.
05 09 49 11	CC	Okay, we'll be talking to you on the way, and one last note of clarification on that CCIG. If it's sitting up so that it's pointing horizontal to the ground, just leave it alone. If it's flipped over so that it is looking into the ground, then we want you to lay it on its back. If it's already on its back, that's good enough.
05 09 49 35	CDR-LM	Okay. And now, the covers should be off, is that right?
05 09 49 41	CC	That's affirmative.
05 09 49 46	CDR-LM	If it's not off, should we try and take it off for you?
05 09 49 51	CC	Stand by.
05 09 50 12	CC	Pete, that's negative. If it's on there, leave it as it is.
05 09 50 22	CDR-LM	Understand.
05 09 54 31	LMP-LM	Houston, quicky. Do you want a core tube at head crater, or do you want us to skip that one?
05 09 54 39	CC	Stand by.
05 09 55 45	CC	Okay, Al, lets look for that third core tube over at sharp crater. The - take that in the - in doing your trench site sampling. That will allow you to get that biological core tube sample at that point.
05 09 56 02	LMP-LM	Understand.
05 09 56 47	CC	Intrepid, Houston. We're having a changeover of sites here and we may be off the line for a short while.

05 09 56 59	LMP-LM	Thank you, Houston. That's a good way to do it.
05 09 57 03	CC	It'll be in about another 3 minutes that we're handing over.
05 10 10 08	LMP-LM	Houston, Intrepid.
05 10 10 10	CC	Intrepid, Houston. Go ahead.
05 10 10 15	LMP-LM	A real interesting thing has happened to that solar wind collector. It's been sitting out there since yesterday, of course; and, when I left if yesterday, it was - just a flat sheet of foil - you know - restrained at both ends; but as I look out there now, starting about 1 - maybe a foot from the top, it is sort of folded back around the pole that's holding it. Looks almost like a sail in the wind around the pole. It's sort of bulging in the front and bent back on the sides. Real crazy.
05 10 10 50	CC	We've got a real solar wind, I suspect, Al.
05 10 10 58	LMP-LM	I think - You may think we're kidding; I don't know.
05 10 11 01	CC	No, Al. I won't think you'd be kidding. It could be, maybe the front part of that is just thermally expanding a lot more than the back. The back's probably radiating and the front's probably very hot. And just a thermal difference across it could do it. I'm meeting with a lot of approval back here on that idea.
05 10 11 22	LMP-LM	- It looks - - yes. Well, it looks like it's wrapped around the pole - that's a funny thing - It looks like the wind is blowing on it.
05 10 11 33	CC	Well, we've got two good ideas, so far. Maybe we can come up with a third.
05 10 31 52	CDR-LM	Houston, Intrepid.
05 10 31 55	CC	Intrepid, Houston. Go ahead.
05 10 32 00	CDR-LM	Roger. The LiOH canister was changed out at 130:00:00. EVA PREP is almost complete to PLSS donning. We're just putting the stuff on our visors.
05 10 32 16	CC	Roger, Pete. We copy.

05 10 32 18	CDR-LM	Excuse me, material.
05 10 32 23	CC	Copy.
05 10 36 28	CC	Intrepid, Houston.
05 10 36 33	LMP-LM	Go.
05 10 36 35	CC	Will you confirm that you did keep the bracket on the engine cover for TV camera stowage rather than putting it in the jettison bag - that is the ECS LiOH ...
05 10 36 48	LMP-LM	You better believe it; it's still there.
05 10 36 51	CC	Roger.
05 10 44 18	CC	Intrepid, Houston.
05 10 44 25	CDR-LM	Go ahead.
05 10 44 27	CC	Intrepid, one additional word on the CCIG. When you're - When you go out to CCIG, we will leave the power on to the instrument and we'd like you to tell us what its status is before you touch it. If the status is - such that we want it left in that configuration, you'll just move on. If you have to change its configuration, then we'll have to turn the power off, and we'd like you to hold off going near it until we give you the clearance. We'll give you a reminder of this when you're on the way out.
05 10 45 06	CDR-LM	Understand.
05 10 49 04	CC	Intrepid, Houston.
05 10 49 08	CDR-LM	Go.
05 10 49 12	CC	Pete, Jane ... sends her congratulations and - for a job well done. And Al, Sue has followed it all and is thrilled that you've really made it on the money. The children are fine; tired, but happy, and they're going to continue following all the way through the second EVA.
05 10 49 36	LMP-LM	Thank you. Ed.
05 10 49 37	CDR-LM	Roger; thank you.
05 10 56 10	CDR-LM	Houston, Intrepid. We'll be coming upon the PLSS COMM in about 3 minutes.

05 10 56 15	CC	Roger, Intrepid. We're standing by.
05 10 56 22	CDR-LM	We're at the PLSS COMM check, if you want to follow it.
05 10 56 25	CC	Roger. We're with you.
05 10 57 53	LMP-LM	Houston, Intrepid.
05 10 57 55	CC	Intrepid, Houston. We read you loud and clear.
05 10 58 02	LMP-LM	Roger. I just went to FM and TV and we're - was unable to contact you. Had you all switched over to FM? Over.
05 10 58 10	CC	Stand by on that, Al.
05 10 59 27	CC	Intrepid, Houston. We're configured for the FM. Let's give it another go.
05 10 59 34	LMP-LM	Coming at you.
05 11 00 17	LMP-LM	Houston, Intrepid.
05 11 00 20	CC	Intrepid, Houston.
05 11 00 22	LMP-LM	Okay. How do you read?
05 11 00 24	CC	We read you loud and clear.
05 11 00 28	LMP-LM	Okay. We've got the TV going right now, also.
05 11 00 30	CC	Roger.
05 11 00 40	CDR-LM	VHF A TRANSMIT/RECEIVE; B, RECEIVE; LMP S-BAND, T/R; ICS, T/R; RELAY, ON; MODE, VOX; VHF A, TRANSMIT/RECEIVE; VHF B, RECEIVE. Here come your COMM: VHF, VOICE, ON, OFF, ON, OFF, HIGH; RANGE, OFF/RESET; SQUELCH A and B noise threshold plus 1-1/2; RECORDER, ON; VHF ANTENNA to EVA; UPLINK SQUELCHed, ENABLE; LMP connect to PLSS COMM, audio CB.
05 11 02 --		BEGIN LUNAR REV 25
05 11 02 18	CDR-LM	... PLSS mode, LMP to A.
05 11 02 19	LMP-LM	A.
05 11 02 23	CDR-LM	Hello there.
05 11 02 24	CC	Read you loud and clear, Pete.

05 11 02 26	CDR-LM	Read you the same. Should have a tone on, a vent flag, a P, and a PRESS flag 0.
05 11 02 30	CC	Got it.
05 11 02 31	CDR-LM	PLSS 0_2 PRESS gage greater than 75.
05 11 02 33	CC	It is.
05 11 02 34	CDR-LM	We have a good COMM check with me. No, I'm sorry, we don't need that. Commander gone to PLSS COMM.
05 11 02 41	CC	Okay.
05 11 02 42	CDR-LM	Hold the card.
05 11 02 49	LMP-LM	... is OFF. Okay. PLSS mode, Commander to B. You get no MSFN reception.
05 11 02 56	CDR-LM	Hello there. I read you loud and clear. I got a press 0 flag.
05 11 02 58	LMP-LM	Read you the same.
05 11 03 00	CDR-LM	I got an 0_2 flag and I've got 80 percent.
05 11 03 04	LMP-LM	Okay. Vent flag B, and a PRESS flag 0. Here is what I've got. You don't have an 0_2 to begin with, do you?
05 11 03 10	CDR-LM	I've got an 0_2 PRESS and a vent.
05 11 03 12	LMP-LM	0_2 will go out in a minute. Okay?
05 11 03 14	CDR-LM	Yes. Okay. Is PLSS 0_2 greater than 75?
05 11 03 16	LMP-LM	Yes.
05 11 03 17	CDR-LM	Okay. Perform COMM. Did that PLSS mode - -
05 11 03 22	LMP-LM	Okay. I'll go B and you go A. How do you hear?
05 11 03 26	CDR-LM	Loud and clear.
05 11 03 27	LMP-LM	Get you the same.
05 11 03 30	CDR-LM	Okay. PLSS mode, both of them, A AUTO, okay?

05 11 03 32	LMP-LM	How do you read?
05 11 03 33	CDR-LM	Loud and clear.
05 11 03 39	CDR-LM	Houston, Intrepid. How do you read?
05 11 03 42	CC	Intrepid, we read you both loud and clear.
05 11 03 46	CDR-LM	Very good. Very good. Okay, Houston, LMP's O_2 quantity is 80 percent.
05 11 03 53	CC	80 percent. Copied.
05 11 03 55	CDR-LM	Okay. And so's the - and CDR, 80 percent, also.
05 11 03 58	CC	Roger.
05 11 04 01	LMP-LM	Okay. We are opening the TV circuit breaker right now.
05 11 04 04	CC	Roger.
05 11 04 05	LMP-LM	Final systems PREP. CB 16 ... CABIN REPRESS, CLOSE; Verify.
05 11 04 13	CDR-LM	It's CLOSED.
05 11 04 14	LMP-LM	And DELTA-P, OPENED.
05 11 04 16	CDR-LM	It's OPENED.
05 11 04 17	LMP-LM	CB(11) ECS: SUIT FAN 1, OPEN. Okay.
05 11 04 20	CDR-LM	Verify ECS CAUTION; H_2O SEP component lights ON.
05 11 04 24	LMP-LM	On in a minute. Yes.
05 11 04 26	CDR-LM	Okay. Suit GAS CONVERTER, FULL EGRESS.
05 11 04 28	LMP-LM	FULL EGRESS.
05 11 04 30	CDR-LM	Okay. CABIN GAS RETURN to EGRESS; CABIN GAS RETURN to EGRESS.
05 11 04 37	LMP-LM	And verify that the SUIT CIRCUIT RELEASE is in AUTO.
05 11 04 39	CDR-LM	SUIT CIRCUIT RELEASE is in AUTO.
05 11 04 41	LMP-LM	Okay.

05 11 04 42	CDR-LM	Connect to the OPS's.
05 11 04 44	LMP-LM	Okay. Just a second. There is your hose. Let me button your flap. Okay.
05 11 05 12	CDR-LM	Now, if you will turn the other way, I will get your other side.
05 11 05 16	LMP-LM	Just a second. Okay. Turn to the right here. Got it. ...

END OF TAPE

05 11 07 07	CDR-LM	Easy does it, that's a boy. Master caution, an ACO SEP light, an ECS light; that's the ones we wanted.
05 11 07 15	LMP-LM	Yes.
05 11 07 16	CDR-LM	Okay. Now, let's me - get it.
05 11 07 19	LMP-LM	Where are you going?
05 11 07 20	CDR-LM	Down here just a little bit.
05 11 07 25	LMP-LM	And I get that to snap - Can't see, that's - Okay, that's all snapped. Okay?
05 11 07 29	CDR-LM	Okay. All right. Do you want to get - Oh, wait a minute, one other thing, right here. Got it. I snapped your - OPS hose in the side of the PLSS there.
05 11 07 45	LMP-LM	Okay. Did you trim this thing out?
05 11 07 46	CDR-LM	Yes.
05 11 07 47	LMP-LM	Okay. Let me do that to you now.
05 11 07 49	CDR-LM	Okay.
05 11 07 51	LMP-LM	And we throw in a couple of purge valves then.
05 11 07 53	CDR-LM	Yes, I got the purge valves right now.
05 11 07 56	LMP-LM	Okay. This'll finish you off.
05 11 08 00	CDR-LM	Okay.
05 11 08 21	CDR-LM	- - do that?
05 11 08 22	LMP-LM	Yes, sir.
05 11 08 23	CDR-LM	... verified locked.
05 11 08 24	LMP-LM	Okay. Let me check you. Your's good.
05 11 08 27	CDR-LM	And let me disconnect you from your suit hoses.
05 11 08 30	LMP-LM	Okay.

05 11 08 31	CDR-LM	You're disconnect.
05 11 08 42	CDR-LM	Okay, that's good.
05 11 08 44	LMP-LM	This would be easier if you'd -
05 11 08 49	CDR-LM	Okay. Tuck this in.
05 11 09 01	LMP-LM	It's not in. You're going to have to do that; I can't see it.
05 11 09 04	CDR-LM	I'll do it. Okay. What'd you have to do - -
05 11 09 10	LMP-LM	Purge valve.
05 11 09 11	CDR-LM	Okay.
05 11 09 13	LMP-LM	Get it started and rotate it with that ... Okay, there you go.
05 11 09 18	CDR-LM	That's LOCKED and that's LOCKED; while I'm down here, let me - that's LOCKED, LOCKED.
05 11 09 23	LMP-LM	Okay. That's it.
05 11 09 25	CDR-LM	Hoses under the flap, huh? Let me check all yours - 1, 2.
05 11 09 30	LMP-LM	Okay.
05 11 09 31	CDR-LM	Safety's IN, safety's IN. That safety's IN and that safety's IN. Okay, they look good.
05 11 09 42	LMP-LM	Verify PLSS centered and proper height.
05 11 09 44	CDR-LM	Yes. Mine is. Okay. Take a drink and DESCENT H_2O, closed.
05 11 09 48	LMP-LM	Okay.
05 11 10 06	CDR-LM	Okay.
05 11 10 30	CDR-LM	And H_2O, closed. Okay. Position mike.
05 11 10 36	LMP-LM	Okay.
05 11 10 37	CDR-LM	PLSS fans, CT.
05 11 10 38	LMP-LM	ON.
05 11 10 39	CDR-LM	Vent flag.

05 11 10 41	LMP-LM	Clear to vent.
05 11 10 44	CDR-LM	Don helmets, then visors.
05 11 10 45	LMP-LM	Okay.
05 11 10 48	CDR-LM	This one is***yours.
05 11 10 51	LMP-LM	Okay.
05 11 10 52	CDR-LM	Pull that.
05 11 11 10	CDR-LM	Okey-dokey.
05 11 11 28	LMP-LM	... Helmet's locked.
05 11 11 44	CDR-LM	That sounded real good.
05 11 11 46	LMP-LM	Yes.
05 11 11 49	CDR-LM	And your helmet is locked.
05 11 11 51	LMP-LM	Okay.
05 11 11 52	CDR-LM	Hold still and I'll put this on.
05 11 11 53	LMP-LM	All right. A bit cool in here today.
05 11 11 59	CDR-LM	Give you a little chilldown with this LCG. Okay.
05 11 12 09	CDR-LM	Okay. ... leave them on.
05 11 12 14	LMP-LM	Just a second.
05 11 12 17	CDR-LM	... First, let me get it all down in the pack and everything. Okay, highsters[?].
05 11 12 23	LMP-LM	Okay. You got it.
05 11 12 25	CC	Intrepid, Houston.
05 11 12 29	CDR-LM	Go, Houston.
05 11 12 31	CC	In looking at the TV, the ... will be leaving the TV off for this, so if you would take the - keep that circuit breaker out and go to S-band mode PM.
05 11 12 44	CDR-LM	Okay. We'll do it in just a minute.
05 11 12 55	LMP-LM	Okay - up. Okay, Pete. ... that hookup.

05 11 13 05	CDR-LM	Houston, I'm sure sorry the TV didn't work. It's a beautiful sight to see - Intrepid and Surveyor sitting here on this crater.
05 11 13 16	CC	Roger, Pete. We'll be waiting for those pictures.
05 11 13 25	LMP-LM	Hey, lift up your PLSS.
05 11 13 26	CDR-LM	Okay.
05 11 13 34	LMP-LM	Okay. You're all buttoned in.
05 11 13 37	CDR-LM	Beautiful.
05 11 13 38	LMP-LM	Okay. Next.
05 11 13 39	CDR-LM	Here's a pair of gloves for you.
05 11 13 41	LMP-LM	Okay. PLSS fan on down here. ... visors -
05 11 13 44	CDR-LM	Okay. LCG pump open?
05 11 13 47	LMP-LM	Yes. Right now.
05 11 13 49	CDR-LM	Okay. And you might as well get the TV and and S-band reconfigured. The TV's still out, of course.
05 11 13 56	LMP-LM	Okay. We're going to PM, Houston.
05 11 13 58	CC	Roger.
05 11 13 59	CDR-LM	There's PM and - -
05 11 14 08	LMP-LM	Disconnect LM hoses and ... Connect PLSS H_2O hose and stow LM hoses.
05 11 14 15	CDR-LM	Okay.
05 11 14 29	LMP-LM	I'm going to turn around here, Pete.
05 11 14 31	CDR-LM	Okay - and I've got my hoses off. How come - how come we don't have our gloves on yet?
05 11 14 39	LMP-LM	... - Do this first.
05 11 14 41	CDR-LM	Okay. Very good. Can't see the checklist, that's all.
05 11 14 46	LMP-LM	Go ahead and get all - ... up there.
05 11 14 49	CDR-LM	Okay.

05 11 15 07	CDR-LM	Okay, my PLSS water is hooked up.
05 11 15 10	LMP-LM	Okay, let me turn around.
05 11 15 12	CDR-LM	Okay, and I'm ready to do - the hoses.
05 11 15 14	LMP-LM	Okay. Get yours routed and hand them to me and I'll stick them in.
05 11 15 17	CDR-LM	Okay, coming up and over. Take it around real easy. Okay, now. I've got to get over there against the hamper.
05 11 15 27	CDR-LM	Coming over.
05 11 15 53	CDR-LM	I hung up again.
05 11 15 55	LMP-LM	I don't know; let me see. You look okay.
05 11 15 58	CDR-LM	I can't move in for some reason.
05 11 16 01	LMP-LM	Move over my way just a little way.
05 11 16 03	CDR-LM	Never mind, I'm going to do it with these.
05 11 16 05	LMP-LM	All right. You're kind of hung up on the flight data file.
05 11 16 08	CDR-LM	This is going to do it better anyhow. Done it that way yesterday. How's that look?
05 11 16 14	LMP-LM	Looks good to me.
05 11 16 15	CDR-LM	Okay, that's pretty steamy. Here's a pair of gloves for you.
05 11 16 17	LMP-LM	Let me grab that checklist again.
05 11 16 18	CDR-LM	Okay.
05 11 16 26	LMP-LM	Verify the following: helmet and visors, locked and adjusted.
05 11 16 31	CDR-LM	Okay.
05 11 16 38	LMP-LM	Okay, you're locked and adjusted.
05 11 16 43	CDR-LM	Okay, torso tiedown adjusted.
05 11 16 47	LMP-LM	I can see that you are locked - I can see it - in good shape.

05 11 16 53	LMP-LM	Okay.
05 11 16 54	CDR-LM	Okay, torso tiedown.
05 11 16 55	LMP-LM	Mine's okay.
05 11 16 56	CDR-LM	Mine's okay, too.
05 11 16 58	LMP-LM	Okay. O_2 connectors - Let me check all yours, then you can check all mine. Those are vertical-in - locked. COMM is locked; let me see about your water.
05 11 17 27	LMP-LM	Water's locked. Everything's locked.
05 11 17 29	CDR-LM	Okay, you look good.
05 11 17 30	LMP-LM	I've been over these a couple of times; they - -
05 11 17 32	CDR-LM	Hey, does that water look good?
05 11 17 33	LMP-LM	And I checked your water. It's in and locked - things are flush.
05 11 17 38	CDR-LM	Okay.
05 11 17 41	LMP-LM	Purge valves are all in. Okay, don EV gloves and lock them up.
05 11 17 48	CDR-LM	Okay, here's a pair for you.
05 11 17 53	LMP-LM	Thank you.
05 11 19 17	CDR-LM	Find it?
05 11 19 18	CDR-LM	The right one of mine didn't want to do it either.
05 11 19 21	LMP-LM	Take it off again.
05 11 19 35	CDR-LM	Can't tell whether they're in or not.
05 11 19 38	LMP-LM	..., Pete?
05 11 19 43	CDR-LM	Verified. Pull this one open.
05 11 19 50	LMP-LM	Just a second.
05 11 19 56	CDR-LM	Why don't you just let me have it?
05 11 19 58	LMP-LM	Okay. There you go.

05 11 20 18	CDR-LM	Now, then. There you go. Now do it; push your button down.
05 11 20 26	LMP-LM	Turn yours' in a smidgeon.
05 11 20 28	CDR-LM	Huh?
05 11 20 30	LMP-LM	Do it this way.
05 11 20 40	CDR-LM	The left-hand one hangs up.
05 11 20 43	LMP-LM	Doesn't want to do it, does it? There it did. I can't do it with your -
05 11 20 52	CDR-LM	Got them in there?
05 11 20 55	LMP-LM	...
05 11 21 06	LMP-LM	It never fails, does it? The one time you don't want something to hang up with you it's going to start fogging up.
05 11 21 13	CDR-LM	There you go; let me look at it.
05 11 21 18	LMP-LM	Got her.
05 11 21 19	CDR-LM	That's a ... out of there. Everything looks good.
05 11 21 32	LMP-LM	... in lock?
05 11 21 34	CDR-LM	Okay, verify mine.
05 11 21 38	LMP-LM	I can't see it. There, that's LOCKED.
05 11 21 44	CDR-LM	It's LOCKED.
05 11 22 20	LMP-LM	- - verter is in MIN; I'm going to pump, ON.
05 11 22 36	CDR-LM	Verify it's locked.
05 11 22 59	CDR-LM	Then tie this thing.
05 11 23 01	LMP-LM	Okay.
05 11 23 06	CDR-LM	Locked?
05 11 23 07	LMP-LM	Yes, sir.
05 11 23 17	LMP-LM	PLSS DIVERTER, MIN. Pump.

05 11 23 21	CDR-LM	Right. Pump's ON and I'm beginning to be sucked down. Let's get the cabin to EGRESS, Okay?
05 11 23 27	LMP-LM	EGRESS.
05 11 23 28	CDR-LM	Can you get them?
05 11 23 29	LMP-LM	EGRESS.
05 11 23 30	MS	Mode's in EGRESS. ...
05 11 23 32	CDR-LM	Okay. Jettison bag is up - - the LHSSC is unstrapped. It's got PLSS batteries, Li cartridges -
05 11 23 40	LMP-LM	All that other?
05 11 23 41	CDR-LM	Yes. Position ETB on engine cover.
05 11 23 44	LMP-LM	Where is it?
05 11 23 45	CDR-LM	Huh?
05 11 23 48	LMP-LM	Right here.
05 11 23 49	CDR-LM	Okay.
05 11 23 51	LMP-LM	Here you go.
05 11 23 54	CDR-LM	..., I got her.
05 11 23 55	LMP-LM	Okay. Turn around.
05 11 23 57	CDR-LM	Okay. Get back on the engine that way.
05 11 24 01	LMP-LM	Don't hurry, I'm getting my - going to get my CB batteries still.
05 11 24 05	CDR-LM	I - get my CB's real quick. Row 1: One, in. Out - One, out; three, in; one, out. Those are in. FAN 1 is in, CABIN; FAN 1 is out. GLYCOL AUTO TRANSFER is - all in. And out. Two, in, all the way out to SIG CONDITIONER, that's out, ... out. All out but MISSION TIME.
05 11 24 47	LMP-LM	Hey, these guards are really good.
05 11 24 49	CDR-LM	Three - out, That's it.
05 11 24 58	LMP-LM	Okay. Same here, they all look good.
05 11 24 59	CDR-LM	Ready for a PRESS INTEG check. Okay. PLSS O_2, ON.

05 11 25 14	CDR-LM	Yes, oh boy, does that feel better.
05 11 25 18	LMP-LM	Got a O_2 0 flag; PRESS 0 flag.
05 11 25 22	CDR-LM	Pressure's coming up good.

GOSS NET 2 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

05 11 25 51	CMP	Hello, Houston; Yankee Clipper.
05 11 25 55	CC	Yankee Clipper, Houston. We read you loud and clear. Good morning.
05 11 26 01	CMP	Good morning. On the Yankee Clipper, reveille's been held, we've sweeped down fore and aft, the batteries are all charged, the crew is ready for work, and Yankee Clipper's reporting for duty, sir.
05 11 26 12	CC	Roger, Dick. Your two friends are moving right ahead; they're just about ready to egress. They're running about 1-1/2 hour ahead of time. They're pretty anxious to get out.
05 11 26 23	CMP	Good, good.
05 11 26 26	CC	Dick, have a question for you here. Did you turn the optics power off before sleep?
05 11 26 34	CMP	That's affirmative.
05 11 26 37	CC	Roger, copy; you did turn it off?
05 11 26 41	CMP	That's affirm. And I turned it back on and woke up.
05 11 26 45	CC	Roger. And, Dick, when you cycle the H_2, O_2 fans, would you cycle those for 3 minutes?
05 11 26 53	CMP	Roger. That has been done, sir; 3 minutes.
05 11 26 56	CC	Roger.
05 11 27 09	CC	And, Dick, we have a lift-off block data for REV 25 through 28 when you're ready to copy.
05 11 27 21	CMP	Go ahead.
05 11 27 23	CC	Okay, REV 25: T_{13}, 132:11:35; 26: T_{14}, 134:09:59; 27: T_{15}, 136:08:25; REV 28: T_{16}, 138:06:50.

05 11 27 51	CMP	Roger. REV 25, 132:11:35; 26, 134:09:59; 27, 136:08:25; 28, 138:06:50.
05 11 28 07	CC	Dick, you were quite broken up on that; would you repeat that readback, please?
05 11 28 14	CMP	Roger. Starting with REV 25: 132:11:35; 134:09:59; 136:08:25, 138:06:50.
05 11 28 29	CC	Roger, Dick. Let's go back to REV 26 for T_{14}, that is 134:09:59.
05 11 28 39	CMP	That's correct, 134:09:59.
05 11 28 42	CC	Roger.

GOSS NET 1 COMMUNICATIONS BETWEEN CC AND LM RESUME

05 11 26 04	CDR-LM	Coming up.
05 11 26 26	LMP-LM	I'll make it.
05 11 26 27	CDR-LM	Okay.
05 11 26 33	LMP-LM	I'm to set it at a regulated 3.9, for some reason.
05 11 26 37	CDR-LM	I've got to get my O_2 off.
05 11 26 40	LMP-LM	You ready? Okay. Let's do what that says.
05 11 26 48	CDR-LM	Mine's off.
05 11 26 49	LMP-LM	Okay. Let's time it.
05 11 26 51	CDR-LM	...
05 11 26 54	LMP-LM	Stop.
05 11 26 55	CDR-LM	Thanks for that.
05 11 27 35	CDR-LM	Okay, Houston. The decay checks look pretty good; are we GO for EVA?
05 11 27 42	CC	Stand by, Intrepid. You are GO for EVA, Pete.
05 11 27 50	LMP-LM	... I get my OX pack.
05 11 27 52	CDR-LM	Roger. Okay. What are you going to do?
05 11 27 56	LMP-LM	Get my oxygen back on.

05 11 27 57	CDR-LM	Okay. Same here. My oxygen's back on. Very good, a tone, then an O, looks good.
05 11 28 09	LMP-LM	Confirmed. Okay, CABIN REPRESS VALVE, CLOSED.
05 11 28 12	CDR-LM	Okay.
05 11 28 14	LMP-LM	I'll get it.
05 11 28 15	CDR-LM	Okay.
05 11 28 19	LMP-LM	Cabin REPRESS valve, CLOSED.
05 11 28 22	CDR-LM	Okay.
05 11 28 23	LMP-LM	Wait a minute; it's not all the way. Okay, CLOSED. What else?
05 11 28 28	CDR-LM	Okay. I'm going to drop the *** now for the forward dump valve.
05 11 28 32	LMP-LM	Excuse me.
05 11 28 33	CDR-LM	... - hung up on something.
05 11 28 36	LMP-LM	Okay.
05 11 28 38	CDR-LM	Got a lot of room.
05 11 28 39	LMP-LM	Okay.
05 11 28 51	CDR-LM	Okay, four - ... There you go.
05 11 29 00	LMP-LM	Okay.
05 11 29 01	CDR-LM	Okay, 3.5; verify cuff gage does not below - drop below 4 8.
05 11 29 05	LMP-LM	Okay, the suit loop is 4 1 - -
05 11 29 09	CDR-LM	Mine's 4 8.
05 11 29 10	LMP-LM	- - my cuff gage is 4.95.
05 11 29 13	CDR-LM	Okay, cabin at 3 5 - it is?
05 11 29 16	LMP-LM	Yes.
05 11 29 17	CDR-LM	LM suit circuit 3 6 to 4 3?
05 11 29 20	LMP-LM	It is.

05 11 29 22	CDR-LM	PGA graded is 4.8?
05 11 29 24	LMP-LM	And decaying.
05 11 29 25	CDR-LM	Looks good.
05 11 29 26	LMP-LM	Go.
05 11 29 27	CDR-LM	Start your watch.
05 11 29 29	LMP-LM	Okay.
05 11 29 33	CDR-LM	Got it started?
05 11 29 34	LMP-LM	Yes.
05 11 29 36	CDR-LM	FORWARD DUMP valve to OPEN.
05 11 29 37	LMP-LM	Yes.
05 11 29 39	CDR-LM	Dump it.
05 11 29 42	LMP-LM	Coming down, Pete.
05 11 29 59	CDR-LM	Is something open?
05 11 30 00	LMP-LM	No, that little - ... cap - popped off.

GOSS NET 2 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

05 11 30 03	CC	Yankee Clipper, Houston.
05 11 30 08	CMP	Go ahead.
05 11 30 11	CC	Clipper, we have a consumables update when you're ready to copy.
05 11 30 19	CMP	I'm ready to copy.
05 11 30 23	CC	Okay, first, Dick, if you would, for an uplink, would you go to POO and ACCEPT. We'll be giving you a CSM state vector, LM LOS, and updating CMC clock.
05 11 30 36	CMP	Okay, it's all yours.
05 11 30 38	CC	Roger. And on the consumables update: at 131 plus 00, RCS total, 57.5, 61.0, 55.8, 57.8, 55.3. And your Delta's from the flight plan: first, for the RCS total: minus 8.5 percent, Alpha through Delta: minus 6.8, minus 8.9,

		minus 8.7, minus 9.6. Your H_2 total: 54.3, 51.3; O_2 total: 53.9, 57.6. And we show that you're 103 pounds below the flight plan. To balance the cryos, would you take the H_2 tank 2 heater to the OFF and O_2 tank 1 heater, OFF?
05 11 31 49	CMP	Okay, H_2 tank 2 heater's OFF, and O_2 tank 1 heater.
05 11 31 57	CC	Roger. And Pete and Al are just ready to egress; they just depressed the cabin. If you like, we'll be going over to MSFN relay.
05 11 32 11	CMP	Yes, I'd like to listen to them. Thank you very much.
05 11 32 14	CC	Okay.

GOSS NET 1 COMMUNICATIONS BETWEEN CC AND LM RESUME

05 11 30 14	CDR-LM	Cabin's 1 pound.
05 11 30 15	LMP-LM	Okay.
05 11 30 29	LMP-LM	And I'm 5.0, and the suit loop is 4.0, and the cabin is a half, about 0.6.
05 11 30 35	CDR-LM	Okay.
05 11 30 57	CC	Everything looks good down here, Pete.
05 11 31 02	CDR-LM	Roger. It looks good up here.
05 11 31 04	LMP-LM	Okay, there goes a - H_2O.
05 11 31 09	CDR-LM	Got 1-2?
05 11 31 10	LMP-LM	Yes, there it goes. Push to PRESS.
05 11 31 15	CDR-LM	Okay, cabin is still about 2-1/2; it's 0.25, Al.
05 11 31 20	LMP-LM	Okay.
05 11 31 21	CDR-LM	Just let it bleed for a while.
05 11 31 22	LMP-LM	Okay.
05 11 31 46	CDR-LM	My suit's still 4.9. You'll have to jiggle on it a little bit.

05 11 31 53	LMP-LM	Okay.
05 11 31 56	CDR-LM	Probably still outgassing. All right, let her go for a while. Let her go, still - still a little bit more.
05 11 32 07	LMP-LM	These suits are bleeding down too. See.
05 11 32 23	CDR-LM	They're holding it at that point, too. Jiggle that.
05 11 32 31	LMP-LM	Okay. Think I can get her now, Pete.
05 11 32 41	CDR-LM	Everything all right?
05 11 32 42	LMP-LM	Got her.
05 11 32 43	CDR-LM	Okay. You hold her open.
05 11 32 44	LMP-LM	All that stuff will go out the door.
05 11 32 46	CDR-LM	I'll hold it. I got it open.
05 11 32 47	LMP-LM	Got it?
05 11 32 48	CDR-LM	Yes.
05 11 32 55	LMP-LM	Just a second. Got my foot by it.
05 11 33 00	CDR-LM	All right. There you go. Okay. Now, I'm going to put this DUMP valve to AUTO.
05 11 33 08	LMP-LM	DUMP valve to AUTO. My feedwater is on.
05 11 33 16	CDR-LM	Okay, that DUMP valve look in AUTO?
05 11 33 18	LMP-LM	Let me check. I can't see. Yes, sir, it looks in AUTO.
05 11 33 22	CDR-LM	Okay. Now, let's just hold this door open right here like that. Get my feedwater on.
05 11 33 27	LMP-LM	Okay.
05 11 33 38	CC	Yankee Clipper, Houston. Are you copying Intrepid?
05 11 33 43	CDR-LM	While we're standing here, why don't we jettison this gear? If you just back into the corner.
05 11 33 44	CMP	Clipper, affirmative.

05 11 33 46	CC	Roger.
05 11 33 50	LMP-LM	Just a second, Pete. Wait until the suit pressure goes down a little bit.
05 11 34 01	CDR-LM	All right, leave that right where it is.
05 11 34 03	LMP-LM	What do you want to do?
05 11 34 05	CDR-LM	Close it.
05 11 34 06	LMP-LM	I will. If you stick it in the crack here - no, stick it in that crack right there. There's a good spot.
05 11 34 12	CDR-LM	That a boy.
05 11 34 13	LMP-LM	Yes. While the hatch ... back, I'm going to get this gear in here.
05 11 34 21	CDR-LM	That's all right.
05 11 34 26	LMP-LM	Pete, stand there and make sure that my water is on all the way.
05 11 34 30	CDR-LM	Okay. You'll have to turn.
05 11 34 31	LMP-LM	Okay.
05 11 34 33	CDR-LM	You're on.
05 11 34 34	LMP-LM	Okay.
05 11 34 38	CDR-LM	Turn further than that, please.
05 11 34 40	LMP-LM	Okay.
05 11 34 41	CDR-LM	Wait - wait. That's outgassing (laughter).
05 11 34 55	CDR-LM	It's all the way out.
05 11 34 56	LMP-LM	Okay. My water light is out; I have a good boiler.
05 11 35 00	CDR-LM	Mine isn't out yet.
05 11 35 02	LMP-LM	Okay.
05 11 35 04	CDR-LM	Now. Get rid of this baggage here. Back up.
05 11 35 11	LMP-LM	Caution and warning status check is okay.

05 11 35 13	CDR-LM	All right.
05 11 35 28	LMP-LM	Get it.
05 11 35 29	CDR-LM	Did it make it?
05 11 35 30	LMP-LM	No, it's sitting on the front porch but it's okay. My suit's still pretty high, 4.3. LIGHTING ANNUNCIATOR/NUMERICS, DIM?
05 11 35 39	CDR-LM	Okay, let me turn.
05 11 35 40	LMP-LM	Okay.
05 11 34 42	CDR-LM	Towards you.
05 11 35 43	LMP-LM	Okay.
05 11 35 51	LMP-LM	DIM?
05 11 35 52	CDR-LM	Yes.
05 11 35 57	LMP-LM	Okay, I'm just - Tell you what; why don't you release my antenna? Adjust that flop; no, that flop right there.
05 11 36 09	CDR-LM	Flap.
05 11 36 10	LMP-LM	Okay.
05 11 36 15	CDR-LM	I'm pulling mine and then when you go down to go out, I'll take yours up.
05 11 36 17	LMP-LM	Okay. Up?
05 11 36 25	CDR-LM	Fine. I'm ready to go.
05 11 36 29	LMP-LM	Okay, just a second.
05 11 36 30	CDR-LM	All right. Let me - hold my knee against that - that Velcro doesn't hold worth a hoot.
05 11 36 36	LMP-LM	Okay, out you go.
05 11 36 37	CC	Yankee Clipper, the CMC is yours.
05 11 36 38	CDR-LM	Okay.
05 11 36 45	LMP-LM	Don't get hung on there. Anything?
05 11 36 46	CMP	Yankee Clipper. Understand, the DSKY is mine.

05 11 36 48	CDR-LM	No.
05 11 36 49	LMP-LM	Okay. That's the way; you're centered good this trip. That's good. Move a little bit to the left - little bit to the left; there you go. You better get that antenna as you go.
00 11 37 04	CDR-LM	Okay. It's out. Get it?
05 11 37 08	LMP-LM	Yes, ready to go.
05 11 37 09	CDR-LM	Okay.
05 11 37 10	LMP-LM	Move a little bit to your right - and you're out the hatch - and I'll be standing by to get the LEC.
05 11 37 17	CDR-EVA	Wait a minute. Must be going off; did the bag go off?
05 11 37 22	LMP-LM	I can't tell.
05 11 37 24	CDR-EVA	I can't either. Okay. Good shape. Okay. Do you want to hand me the LEC? I mean the - the left-hand side stowage, you want to get rid of it?
05 11 37 44	LMP-LM	Let's get rid of it.
05 11 37 45	CDR-EVA	All right.
05 11 37 48	LMP-LM	You okay?
05 11 37 50	CDR-EVA	Okay.
05 11 37 56	LMP-LM	The circuit. Open the hatch a little more and give it a kick.
05 11 38 08	LMP-LM	And I'm standing by for the LEC.
05 11 38 13	CDR-EVA	All right, wait a minute. The LEC, coming at you. I've got to bring it up. Wait a minute.
05 11 38 21	LMP-LM	Okay. Got it.
05 11 38 26	CDR-EVA	There you go. I'm headed down the ladder.
05 11 38 28	LMP-LM	All right.
05 11 38 29	CDR-LM	Now, the cameras.
05 11 38 32	LMP-LM	Okay.

05 11 38 50	CDR-EVA	Whoops, long step. Okay, Houston -
05 11 38 58	CDR-EVA	MARK.
05 11 38 59	CDR-EVA	I'm on the lunar surface.
05 11 39 01	CC	Roger. Copy, Pete.
05 11 40 25	CDR-EVA	One of these contrast charts fell down here yesterday, Al, so there's only two good ones; the other one's too dirty.
05 11 40 31	LMP-LM	All right.
05 11 40 32	CDR-EVA	It doesn't rap off; it just -
05 11 40 41	LMP-LM	Okay, ready to transfer ETB when you are.
05 11 40 43	CDR-EVA	Okay. Coming right after it, right now.
05 11 40 54	LMP-LM	Looks like the lock on this PB - I mean the lock on the LEC is - jammed with -
05 11 41 03	CDR-EVA	Dirt?
05 11 41 04	LMP-LM	Dirt, yes.
05 11 41 21	LMP-LM	Pull away.
05 11 41 23	CDR-EVA	Huh?
05 11 41 24	LMP-LM	Pull away.
05 11 41 26	CDR-EVA	Oh, it may - have to let it out easier. Okay, let it go. Just lower it. Lower. All right, just lower it some more - and hold it right there.
05 11 41 40	LMP-LM	Okay.
05 11 41 43	CDR-EVA	Boy, I'll tell you, I'm going to learn - two things I'm going to learn to dislike, and one of them's a TV cable and the other one's the S-band antenna cable.
05 11 41 52	CC	Roger, Pete. We copy that.
05 11 41 58	CDR-EVA	And they are constantly underfoot.
05 11 42 08	CDR-EVA	All right. Now, let me take it across to the other side - where it's out of your way.

05 11 42 17	LMP-LM	Okay.
05 11 42 21	LMP-LM	Al, before egress, would you confirm that the TV circuit breaker is out?
05 11 42 20	LMP-LM	Confirmed; out.
05 11 42 30	CC	Roger.
05 11 42 32	LMP-LM	It is out, Houston.
05 11 42 35	CC	Roger, Al.
05 11 42 38	LMP-LM	Okay.
05 11 42 48	CDR-EVA	..., my friendly gnomon. In all that - ... to the activity yesterday, I forgot all about him sitting here.
05 11 44 21	CDR-EVA	What you up to, Al?
05 11 44 23	LMP-LM	Getting this camera set.
05 11 44 24	CDR-EVA	Okay. Got SRC 2 - Working away here.
05 11 44 55	LMP-LM	Okay. Let me check all the circuit breakers and I'll be out with you.
05 11 44 59	CDR-EVA	Okay.
05 11 45 13	CDR-EVA	Down that side.
05 11 45 17	LMP-LM	Do you have enough?
05 11 45 44	CDR-EVA	I'll tell you, these Teflon bags don't hold up too well in a vacuum. In a lunar environment, I'll put it that way.
05 11 45 54	CC	Roger, Pete. We copy that comment. Any clarification?
05 11 46 00	CDR-EVA	Yes, they tend to have fatigue failures along the cracks when you go to open them up. I notice the two bags that I put in the SRC yesterday - they're that way. And, let me get back here just a second; let's see, pass LEC, ETB transfer, geology PREP, stow on HTC; contrast charts, extension handle, hammer, small shovel, and gnomon.
05 11 46 22	LMP-LM	Here I come, Pete.

05 11 46 23	CDR-EVA	Okay, have fun. Place SRC 2 on MESA, attach weighbag to scale, attach saddlebag to LMP. There's one thing that's bothering me; I don't have that saddlebag. I wonder - why I don't. Might I find one? Ah ha ha, here's one. ..., how are you doing?
05 11 46 51	LMP-LM	Good.
05 11 46 53	CDR-EVA	Check. Okay - keep coming - you're in pretty good shape. There you go - a little - a little ... - -
05 11 47 01	LMP-LM	I'm trying to close this hatch.
05 11 47 03	CDR-EVA	Oh, okay.
05 11 47 34	CDR-EVA	Right now, this stuff, this - material around the spacecraft reminds me - in this Sun angle, looking into the Sun - a very rich brown color - it reminds me of a good plowed field.
05 11 47 59	CC	Roger, Pete.
05 11 48 00	CDR-EVA	Looking down-Sun, it's still the same old ash gray, very light white ash gray.
05 11 48 40	LMP-EVA	Okay. LMP's off the footpad.
05 11 48 44	CDR-EVA	Okay, LMP. How about let's get a - a Surveyor parts bag here?
05 11 48 54	LMP-EVA	All right, just a second, Pete. All right, thermal visors.
05 11 48 57	CDR-EVA	Huh?
05 11 48 58	LMP-EVA	I'm going to pull down those little side visors.
05 11 49 02	CDR-EVA	They are - Houston. I think Al and I both find that these little side Sun visors are extremely handy.
05 11 49 13	CC	Roger, Pete. We copy.
05 11 49 14	LMP-EVA	..., I've got a strap down.
05 11 49 41	CDR-EVA	Almost cold today on midcooling. How are you doing?
05 11 49 44	LMP-EVA	About the same. ..., check that line right there, Pete.

05 11 49 50	CDR-EVA	Say again.
05 11 49 51	LMP-EVA	I'm going to set the tether right there and -
05 11 49 54	CDR-EVA	Okay.
05 11 50 00	LMP-EVA	... Put it on you here, Pete.
05 11 50 05	CDR-EVA	How's that? Is that - you want me to stand low or high?
05 11 50 08	LMP-EVA	Low.
05 11 50 09	CDR-EVA	Okay. How's that?
05 11 50 12	LMP-EVA	Good.
05 11 50 14	CDR-EVA	Okay, got that one on - ... under the side - Looking good so far.
05 11 50 30	LMP-EVA	You know, other than the large-size rocks - very, very difficult to determine a contact around here.
05 11 50 40	CDR-EVA	Okay - we looked.
05 11 50 50	LMP-EVA	Okay. Now, around to the side. We're putting the parts bag on Pete right now, Houston. Going on.
05 11 50 58	CDR-EVA	Okay. Real well.
05 11 51 00	CC	Roger. We copy that.
05 11 51 05	LMP-EVA	Boy, Houston. That COMM is super; it sounds like you're right inside my helmet.
05 11 51 09	CC	Roger. That's the same we've had.
05 11 51 16	LMP-EVA	I wonder what happened since yesterday?
05 11 51 23	CDR-EVA	I don't know; I think everybody learned a little - -
05 11 51 25	LMP-EVA	Okay. That bag's on there; now, let's see where else.
05 11 51 28	CDR-EVA	I need to get the tool, tool, tool (singing). And before you put the tool in, we got to cut a TV cable.

05 11 51 38	CC	That's affirmative. Cut the TV cable below the adapter, about 1 inch and then - that's 1 foot below the adapter, and then stow the TV camera in the ETB.
05 11 51 50	CDR-EVA	Okay.
05 11 52 04	CDR-EVA	Hey, look at that Surveyor, Al. That's not anywheres near as bad a slope - -
05 11 52 09	LMP-EVA	No - -
05 11 52 10	CDR-EVA	- - Now that it's out of the shade.
05 11 52 11	LMP-EVA	Hey, Houston, that Surveyor looks a lot better today. Yes, now that the Sun's up on it, shone on it.
05 11 52 16	CDR-EVA	Get those TV cables cut. Now, wait a minute; leave it right on there for a second. Come on over and put the thing in my back and let's mount our cameras and then ETB. Is that all right?
05 11 52 26	LMP-EVA	Sounds good.
05 11 52 27	CDR-EVA	Or either that, bring it back - I'm sorry.
05 11 52 28	LMP-EVA	It's okay. Doesn't make any difference. ...
05 11 52 37	CDR-EVA	I think you got ... right here.
05 11 52 39	LMP-EVA	Got the right idea; that's the lunar walk. Okay. Stick it in here.
05 11 52 47	CDR-EVA	Look at that part number on the side of the tool.
05 11 52 57	LMP-EVA	... that a few times.
05 11 53 01	CDR-EVA	Say, Houston, while he's putting the tool on, it's a very interesting thing. There is a angular rock that's literally 6 inches from the engine exhaust skirt. It's just sitting on the - on the lunar surface, and I really find it hard to believe that the engine exhaust couldn't blow that rock away. It's only about 3-1/2 inches by 3-1/2 inches, and it's not stuck in the ground; it's just sitting there loosely about 6 inches from the engine bell; and, of course, the ground is glassy clean all the way around it and yet the engine exhaust blast didn't blow that rock away.

05 11 53 37	LMP-EVA	Pete, where's the saddlebag?
05 11 53 40	CC	Roger, Pete. We copied that comment. Were you able to get a photo of that in the first EVA?
05 11 53 47	CDR-EVA	No, we'll get that right now. Is there one in here, Al?
05 11 53 52	LMP-EVA	Yes.
05 11 53 53	CDR-EVA	Oh.
05 11 54 01	CC	And, Pete, now for your reference on the photos. Your shadow length now is 18 foot.
05 11 54 08	CDR-EVA	Okay.
05 11 54 10	LMP-EVA	Here's a couple of sneaky bags first.
05 11 54 14	CC	Al, also if you would, before you start that traverse, would you get a good photo of the solar wind to show us how that foil is wrapped around?
05 11 54 26	CDR-EVA	Will do.
05 11 54 27	LMP-EVA	Okay, Houston, that won't take a second. Okay, let me attach this bag to - would you attach this bag to me, Pete?
05 11 54 34	CDR-EVA	Yes.
05 11 54 39	LMP-EVA	I'm going to slide that off at the same time. All right.
05 11 54 49	CDR-EVA	Okay, I'll tell you what, if you go put one camera - Here, the saddlebags on - if you'd put one camera on, you look at those little - Go get the TV, I'll mount this other - gear on here. My compliments to the man that packed that SRC box; it looks just like the training boxes.
05 11 55 16	CDR-EVA	Hand me those tongs a second.
05 11 55 17	LMP-EVA	Yes, sir. Here's the tongs. Where are you?
05 11 55 23	CDR-EVA	Right behind you. Hold on just a second. Hold on; let's see what this is.
05 11 55 31	LMP-EVA	That's what left of - -

05 11 55 33	CDR-EVA	Okay, got you.
05 11 55 34	LMP-EVA	- - some of those parts back there.
05 11 55 35	CDR-EVA	Got you.
05 11 55 36	LMP-EVA	Okay.
05 11 55 46	LMP-EVA	Okay - the core tubes.
05 11 55 57	CDR-EVA	Come on; get out of there. If I didn't know better, I'd say there was solar wind up here. It blows hard enough to blow sample bags in the wrong direction. Okay, Al, three core tubes in the ...
05 11 56 24	LMP-EVA	Okay - take them.
05 11 56 31	CDR-EVA	Dixie cup dispenser coming up.
05 11 56 38	LMP-EVA	Okay.
05 11 56 43	CDR-EVA	Could you ...?
05 11 57 05	LMP-EVA	Saddlebag.
05 11 57 12	CDR-EVA	Chart fits right in its back.
05 11 57 14	LMP-EVA	Worried about that.
05 11 57 17	CDR-EVA	Got it?
05 11 57 18	LMP-EVA	Yes, sir. It's in the saddlebag.
05 11 57 19	CDR-EVA	Okay. Now here's the other thing here, the safety line.
05 11 57 24	LMP-EVA	Huh? Oh, yes.
05 11 57 28	CDR-EVA	When I hook those on there, too, that thing's a pain in the neck over there, the way they spread out in the vacuum.
05 11 57 33	LMP-EVA	Okay.
05 11 57 34	CDR-EVA	And I got the gas sample tube here.
05 11 57 35	LMP-EVA	All right.
05 11 57 39	CDR-EVA	Gas sample tube coming up.

05 11 57 43	LMP-EVA	Okay.
05 11 57 44	CDR-EVA	Now I need to get that safety line.
05 11 57 47	LMP-EVA	I'll put that over here.
05 11 57 49	CDR-EVA	Okay, I'll get the safety line. One safety line - whoops, excuse me.
05 11 57 53	LMP-EVA	That's okay.
05 11 57 55	CDR-EVA	I"ll put my camera on; we'll put the TV camera in the ETB and away we go.
05 11 58 01	LMP-EVA	... ... right there.
05 11 58 10	CDR-EVA	Got it?
05 11 58 11	LMP-EVA	Yes, sir. It's in.
05 11 58 12	CDR-EVA	Okay. If you get your camera, I'll put that TV camera in the ETB.
05 11 58 16	LMP-EVA	Okay. ...
05 11 58 25	CDR-EVA	Okay, from the local terrain, Houston, as you know it right now, and with the polarizing filter. Have you got any particular place enroute to the ALSEP or to head crater that you'd like polarizing pictures taken?
05 11 58 43	CC	We'll get back to you on that. Press on now, would you, Pete, with the nominal plan right now.
05 11 58 51	CDR-EVA	Here, let me have it.
05 11 58 53	LMP-EVA	Okay, let me film the - -
05 11 58 54	CDR-EVA	Film the handle, yes.
05 11 58 58	CDR-EVA	Hold it tight.
05 11 58 59	CDR-EVA	I got it as far as I can.
05 11 59 06	CC	Pete, we have no preference on that. Go ahead and take it as called out for in the cuff checklist.
05 11 59 14	CDR-EVA	Okay. Take an ETB and we'll screw with it later.
05 11 59 16	LMP-EVA	Good idea.

05 11 59 17	CDR-EVA	... in.
05 11 59 18	LMP-EVA	Okay.
05 11 59 19	CDR-EVA	Drop her. Okay, Houston, one TV camera in the bag and - our plan of attack is - Al?
05 11 59 31	LMP-EVA	Go.
05 11 59 33	CDR-EVA	One picture of that rock under the descent stage - -
05 11 59 36	LMP-EVA	Will do.
05 11 59 37	CDR-EVA	- - Grab the handtool carrier and head for the sola wind and grab a picture of that; in the meantime, I'll lope off to the ALSEP and check the SIDES; I'll meet you at point 1 at head crater.
05 11 59 49	CC	Roger; we copy. And, Al, have you gotten the readings on the contrast charts?
05 11 59 57	LMP-EVA	Not yet and I plan to do that real quick.
05 12 00 00	CC	Roger.
05 12 00 01	LMP-EVA	Houston, Pete's on his way to the ALSEP.
05 12 00 08	CC	- Roger, Al; we copy. And at 30 minutes into the VA - EVA, you're pretty close to the nominal time line.
05 12 00 17	LMP-EVA	Okay. Very good.
05 12 00 30	CDR-EVA	Can the guy with the seismometer hear me running?
05 12 00 36	LMP-EVA	...
05 12 01 07	CDR-EVA	Okay.
05 12 01 11	CC	Pete, we're watching you down here on the seismic data - looks as though you're really thundering right by it.
05 12 01 20	CDR-EVA	Yes, I - I ground to a halt to switch to intermediate cooling. I noticed that - it is obviously a little bit hotter out here with the higher Sun angle right now. Okay. I'm approaching the Emplemus side.

05 12 01 41	CC	Roger. And we're able to copy your rest and now that you're moving again.
05 12 01 48	CDR-EVA	Okay. All right, Houston. The status is - oops, I'm going to get dust in it. The cover is off, and it's pointed up at the sky at about a 60-degree angle.
05 12 02 09	CC	Roger. Do not touch it right now, Pete. Which way is that pointing - relative to east-west?
05 12 02 19	CDR-EVA	It is pointed down-Sun.
05 12 02 23	CC	Roger. Pete, no need to change the configuration; let's press on. We copy that you've stopped on the seismic.
05 12 02 41	CDR-EVA	Yes. Where's me handy-dandy LMP?
05 12 02 47	LMP-EVA	He's contrast charting.
05 12 02 49	CDR-EVA	Oh, okay. Meet you at the head crater, pal.
05 12 02 52	LMP-EVA	Okay.
05 12 02 57	CDR-EVA	Oh, boy, is ... like I want that rock. Here's a dandy extra grapefruit-size-type goody. Find a crater with a shadow in it first; there's one.
05 12 03 24	LMP-EVA	Okay, Houston, I'm approaching a crater now and I'm going to put the contrast chart in it - one on each side; one on the sunny side, one on the shadow side. ... before.
05 12 03 35	CC	Roger.

GOSS NET 2 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

05 12 03 41	CC	Yankee Clipper, Houston.
05 12 03 46	CMP	Go ahead, Houston.
05 12 03 49	CC	Clipper, would you give us the configuration of your high-gain system?
05 12 03 59	CMP	Roger. It's in REACQ now - SERVO ELECTRONICS, and SECONDARY.
05 12 04 10	CC	Roger. Copy REACQ. And say last.
05 12 04 27	CC	Dick, we copy that you have - in the REACQ position and say your second comment?

05 12 04 36	CMP	It's REACQ, NARROW BEAM width, SERVO ELECTRONICS in SECONDARY.
05 12 04 41	CC	Roger. Copy NARROW and SECONDARY. Dick, we have a map update for you when you're ready to copy.
05 12 04 53	CC	If you'd like, we'll hold up until we can get you off relay.
05 12 05 02	CMP	You're going to have to if you want me to hear.

GOSS NET 1 COMMUNICATIONS BETWEEN CC AND LM RESUME

05 12 03 44	LMP-EVA	Okay. There's the one on the sunny side.
05 12 03 46	CDR-EVA	Man, have I got the grapefruit rock of all grapefruit rocks. It's got to come home in the spacecraft; it'll never fit in the rock box. Okay, Houston, I'll tell you what I'm going to do. I'm going to wind up at the right place at head crater and, while I'm waiting for Al, I'll roll a boulder for you. Okay, Houston?
05 12 04 07	CC	Sounds good, Pete.
05 12 04 09	CDR-EVA	I'm now looking at the ...
05 12 04 18	CC	Pete, Houston. Can you give us a mark when you roll - -
05 12 04 20	CDR-EVA	That crater is - Yes, I sure will. That crater is, by golly, a rather steep crater - a lot steeper than it looks from out the LM. It's -
05 12 04 37	LMP-EVA	Houston?
05 12 04 39	CC	Yes, go.
05 12 04 43	LMP-EVA	I'm looking at the contrast chart in the Sun and I can see all the different shades. And I've taken a photo of it; now, look at the one in the shadow. In the shadow, I can see - Well, depends on how close I am. If I'm within about 3 feet of it or 4 feet of it, I can see all six shades. I'l take a picture here, then I'll back up.
05 12 05 10	CDR-EVA	Let me ask you a question, Houston. How big a rock?

05 12 05 17	CC	Pete, Houston. I presume - whatever's a convenient size for you. We'll check that out though.
05 12 05 27	CDR-EVA	Okay. How about a grapefruit-size rock? That's what I'm holding in my hand and these other rocks that I was talking to you about are pretty well buried, and they're pretty large, I don't think I could get one of them going.
05 12 05 39	LMP-EVA	Houston?
05 12 05 40	CC	Roger. We copy. Grapefruit-size or any size is fine.
05 12 05 49	CDR-EVA	Okay. Al, are you standing still?
05 12 05 53	LMP-EVA	Yes, I'll stand still; go ahead.
05 12 05 54	CDR-EVA	Okay. I'm standing still. Houston, on my mark, they're rolling -
05 12 06 00	CDR-EVA	MARK.
05 12 06 01	CDR-EVA	It's starting down - hit, hit, hit, hit. Now it's just rolling. Roll, roll, roll, still rolling.
05 12 06 13	CC	Roger, Pete. We've got some jiggles - -
05 12 06 14	CDR-EVA	Roll, roll, roll.
05 12 06 15	CC	- - that I can see here. We'll get a reading on it for you.
05 12 06 22	CDR-EVA	Still rolling - still rolling. Very slowly, still rolling. And it's stopped -
05 12 06 31	CDR-EVA	MARK.
05 12 06 32	CDR-EVA	Stop.
05 12 06 37	LMP-EVA	Okay, Houston, I'm looking at the contrast chart in the shadow and, as I mentioned, at 3 feet I can see all six. If I back up maybe 10 feet, as long as I stand here a moment and adapt my eyes, I can see all six, also. Now, the thing that seems to have the biggest effect on it is how low the Sun is. The Sun is high now and so I don't have to squint my eyes particularly looking in that direction. Yesterday, looking into the same crater, even though it wouldn't be any

darker in there because the Sun was there, I could - would never be able to adapt. Right now, I can see all six marks, and I've taken the photographs. Going to go out and do solar wind now.

05 12 07 23	CC	Roger.
05 12 07 24	CDR-EVA	I can't see a lot of difference in visibility - visibility here as on Earth, really. You adapt just as well - the only major difference I've noticed is the fact that when you're out here on these - this area, if you look cross-Sun, the Moon appears one color; if you look down-Sun, it's another; if you look up-Sun, it's another. But looking into shadows or anything else like that, it's pretty much the same as on Earth.
05 12 07 27	CC	Yankee Clipper, Houston. We've dropped the relay; we have a map update, REV 26, when you're ready to copy.
05 12 07 40	CMP	Okay, go ahead.
05 12 07 42	CC	LOS: 132:37:34, 133:02:27, 133:23:47.
05 12 07 55	CC	Copy that, Al.
05 12 07 59	LMP-EVA	Okay, I'll take some pictures here of the solar wind for you.
05 12 08 06	CMP	Clipper copies.
05 12 08 07	CC	Roger. We'll give you back the relay.
05 12 08 15	LMP-EVA	It doesn't look as pronounced, wrapped around the pole now that I get out here, Houston. It - looks pretty much like yesterday, just sort of, I guess it was sort of an optical illusion from inside the spacecraft. I took a couple of pictures of it, but I don't think there's anything unusual going on there.
05 12 08 37	CC	Roger, Al. And, Pete, if it's convenient, and you can find another rock there and give her a heave, Experiments sure would like to see another one.

05 12 08 50	CDR-EVA	Okay, I was setting up my rock hole and all that - good things for the polarizing light. And - say, I was looking at a rock that has small crystals in it. One of them is shining very, very bright green, like ginger-ale-bottle green.
05 12 09 28	CDR-EVA	Okay. Al, are you on your way?
05 12 09 30	LMP-EVA	That's affirm; I'm now making sure that everything is in the toolbox - handtool carrier here.
05 12 09 38	CDR-EVA	Okay.
05 12 09 39	LMP-EVA	I'm mounting them pretty firmly. Hey, Houston. As I was working around the handtool carrier a moment ago, the canvas bag came loose. It took me about 2 minutes to put it back together again; it came off the metal sides. And it looks like those clips that hold it on are going to be completely inadequate and I expect that we're going to have some trouble with it all day today. Maybe we ought to think about fixing it before the next time.
05 12 10 05	CC	Roger, Al. We copy that. Do you think that once you put a little weight in it, she'll hold better?
05 12 10 12	LMP-EVA	I don't know; they don't - the, they don't seem to have a lot of friction on the sides there, and the bag just floats around it. It needs to be more firmly attached some way.
05 12 10 24	CC	Roger.
05 12 10 25	LMP-EVA	Okay.
05 12 10 35	CDR-EVA	Al?
05 12 10 36	LMP-EVA	Yes, sir.
05 12 10 37	CDR-EVA	Where are you?
05 12 10 38	LMP-EVA	I'm just leaving the LM.
05 12 10 40	CDR-EVA	Okay.
05 12 10 41	LMP-EVA	Boy, this handtool carrier is - is light and nice.
05 12 10 46	CDR-EVA	...

05 12 10 47	LMP-EVA	Compared to carrying it around on Earth I think it's going to be - we might be able to just slip it right down inside the Surveyor crater with us. Piece of cake. Okay. I see you over there; I'm on the way. Oh, don't tell me, you ding-a-ling camera. Man.
05 12 11 20	LMP-EVA	I can see anything - everything from fine-grain basalt as I come running across the area here, to - coarse - coarse-grain ones; I see some - sort of light reddish-grey colored rock that I would call - I don't know really what I would call it - it looks almost like a granite, but of course it probably isn't, but it has the same sort of texture. The individual components - constituents, so to speak are crystals but it still has that same appearance.
05 12 12 02	CC	Roger, Al. We copy that. And, Pete, can we give you any help with that camera?
05 12 12 09	CDR-EVA	I got it going - just fine.
05 12 12 12	CC	Roger.
05 12 12 17	CDR-EVA	I'm taking the polarized pictures right now - but, Al, when you get up to me, if you'll just stop up-Sun at 15 feet and take that shot of what I'm shooting at, 11 15, two pictures; one before, one after.
05 12 12 36	LMP-EVA	Okay, let me take something out of this crater hole, Pete. It's sort of unusual; it's got a lot of those little droplets on it, those blips. But - but the - the fragments in this crater looks different from - the others. Take a couple of quick pictures, then I'll be right with you.
05 12 12 54	CDR-EVA	Okay. It's all working out just fine.
05 12 13 01	LMP-EVA	Get me a stereopair of this. Good. We'll use the tongs ... and I'll pick it up.
05 12 13 16	LMP-EVA	It's right exactly - this is a very small crater, Houston, probably about 3 feet in diameter and looks like it was made at - not very fast moving or energetic or heavy projectile. Yet, right in the middle of the hole is some of these glass-covered rock fragments. And, on some of the other rocks that seemed to be rested in the hole, I'm putting them all in a - sample bag 1 here, I mean - some of the others don't have any coating

on them at all. I'm picking them up with the tongs, but I can't tell how strong they are but they don't seem - they don't seem to hold together too well; they seem kind of weak. There you go. Now, I'll hand over all the work to you.

05 12 14 07 CC Roger, Al. We copy that. If you're going to document that, try to get some of the material around the glass as well as the glass itself.

05 12 14 16 LMP-EVA Okay. I want to - I'll just get this as a bonus. I want to get over here and start working with Pete as a team, here.

05 12 14 21 CC Roger.

05 12 14 22 LMP-EVA Just didn't want to have to try to remember where that was.

05 12 14 25 CDR-EVA You're going to get a big surprise when you look into this head crater, Al. It's a heck of a lot deeper than it looks.

05 12 14 30 LMP-EVA Okay.

05 12 14 39 CDR-EVA Here's a nice white, small crater - a white rim on it, about a 5-foot diameter one.

05 12 14 48 LMP-EVA I've been concentrating, Houston, as I came walking over here to head crater, to see if there were any possible changes in either texture, slope, color, anything you can think of or anything that I could think of, that would say to me that I was walking on a different surface than I was when I started. And I can't - haven't seen a thing yet; it all looks the same - it all looks like it's covered with this - black rock.

05 12 15 19 CDR-EVA Slow up. Don't - don't - don't kick dust in the middle of my polarized picture area, here.

05 12 15 23 LMP-EVA Okay. I'll stop right here.

05 12 15 25 CDR-EVA Okay. Put the tool carrier down and get - get your up-Sun pictures. You see where my footsteps are, that rock that's half buried and the two rocks that I've turned over in my footsteps?

05 12 15 35 LMP-EVA Yes.

05 12 15 36 CDR-EVA Okay, it's 15 feet, f:11, two shots - Now, you're not going to get the before, unfortunately.

05 12 15 46	LMP-EVA	Okay. How about right - better have my shadow here or over there?
05 12 15 50	CDR-EVA	No, that's the pile, right there. See where my - see where I turned over the two rocks alongside the great big rock, where my foottracks are?
05 12 15 58	LMP-EVA	Oh yes, way down there at the end.
05 12 16 00	CDR-EVA	No, right here. I'll walk over to it.
05 12 16 04	LMP-EVA	That's a good idea.
05 12 16 06	CDR-EVA	Right straight in front of me. This rock pile, right here.
05 12 16 09	LMP-EVA	Oh, okay. Want me to shoot it from right here?
05 12 16 11	CDR-EVA	Yes, and you aren't 15 feet; back up; you're in ...
05 12 16 13	LMP-EVA	All right. I sure will. Fifteen feet - okay, it ought to be about f:11.
05 12 16 37	LMP-EVA	Okay, got those two. Got a couple of pictures there, Houston. Let me tell you what my camera reading is now and then we can try to keep up with it from time to time. Next time, I'll come over here by Pete and we'll - -
05 12 16 50	CDR-EVA	Yes, Houston, I've shot three - six - nine - 12, 15 - 15 pictures.
05 12 17 01	CC	Copy 15, Pete.
05 12 17 05	CDR-EVA	Okay, and on my mark, I'm going to send a slightly smaller rock into the crater. Are you ready?
05 12 17 12	CC	Roger. We're watching.
05 12 17 14	CDR-EVA	MARK.
05 12 17 18	CDR-EVA	I didn't quite kick it hard enough; wait 1 and I'll do it again.
05 12 17 25	LMP-EVA	And, Houston, that sample bag that I put the fragments in that I mentioned earlier, that I found in the bottom of that small crater?

05 12 17 31	CDR-EVA	MARK.
05 12 17 32	LMP-EVA	That's sample bag 1D.
05 12 17 37	CC	Copy your mark, .1, or Pete, and 1D on that sample bag.
05 12 17 46	CDR-EVA	You know, it's a funny thing, Houston, in one-sixth g, even though slopes are steep and everything, these rocks just don't want to go anywhere.
05 12 17 58	CC	Roger, Pete. We haven't been able to pick it up on the PSE here.
05 12 18 04	CDR-EVA	Okay, that was too small a rock. Take the filter off the front of my camera, would you?
05 12 18 08	LMP-EVA	Okay. Let me set this down. And you might want to take ...
05 12 18 15	CDR-EVA	Okay.
05 12 18 17	LMP-EVA	... your camera. Filter's off.
05 12 18 20	CDR-EVA	Okay. That's it for the filter.
05 12 18 24	LMP-EVA	Goodness, that thing goes.
05 12 18 30	CDR-EVA	Okay. Okay, I've got a rock over here.
05 12 18 38	LMP-EVA	Okay.
05 12 18 39	CDR-EVA	What are we supposed to get here?
05 12 18 41	LMP-EVA	We probably ought to come over here to the other side; it looks the best, and do a little trench, and compare some of the soil profiles.
05 12 18 49	CDR-EVA	Okay, they wanted it - look, I've got an area right over here that looks like a good area to work in. Okay?
05 12 18 56	LMP-EVA	Little white spatterlike craters; it looks like they're very fresh impact, like that little one right there.
05 12 19 03	CDR-EVA	Yes, that's a good idea.
05 12 19 04	LMP-EVA	Let me go over here; there's three in a row, and let's work this area a little bit, which is the corner of head crater they wanted us to work.
05 12 19 12	CDR-EVA	Okay.

05 12 19 13	LMP-EVA	And we can work right here and up to the top of it.
05 12 19 16	CDR-EVA	What - what corner is this?
05 12 19 18	LMP-EVA	We're in the northwest corner.
05 12 19 21	CDR-EVA	Okay.
05 12 19 22	LMP-EVA	Right as I indicated on the map.
05 12 19 24	CDR-EVA	Okay.
05 12 19 25	LMP-EVA	Okay. Now I don't want to get any dirt in this thing; it's pretty interesting.
05 12 19 28	CDR-EVA	Okay.
05 12 19 29	LMP-EVA	A little secondary impact crater, huh?
05 12 19 33	CDR-EVA	Okay, you want me to step down from here?
05 12 19 36	LMP-EVA	No, I'll get the cross-Sun.
05 12 19 38	CDR-EVA	Okay. And I'll set this - -
05 12 19 40	LMP-EVA	Well, you've got to, also got to be careful with this tool carrier, Houston. Did you want to put the gnomon in, Pete?
05 12 19 45	CDR-EVA	Oh, yes, let me have my tool.
05 12 19 47	LMP-EVA	Okay.
05 12 19 48	CDR-EVA	Wait 1.
05 12 19 49	LMP-EVA	Here's your - grabber.
05 12 19 52	CC	Roger, Al. We copy that comment and on the north west rim, we're looking for two partial PANs.
05 12 20 00	CDR-EVA	Okay, that's a - -
05 12 20 01	LMP-EVA	All right, we'll get them.
05 12 20 05	CDR-EVA	...
05 12 20 06	LMP-EVA	Okay, wait, let me get my pictures, Pete.
05 12 20 10	CDR-EVA	Okay.

05 12 20 11	LMP-EVA	Let me get over here and get the gnomon and - Let's ... over this rock right here; this rock is very - typical of all the fragments around here.
05 12 20 24	CDR-EVA	Okay.
05 12 20 28	LMP-EVA	Hey, that's interesting; look where you kicked. Got some lighter material there.
05 12 20 32	CDR-EVA	Boy, sure did, didn't I!
05 12 20 34	LMP-EVA	Yes, that's interesting; that's the first time we've seen that.
05 12 20 36	CDR-EVA	In fact, you know what it looks like here, it looks like it may be this darker material - Well, I don't know - -
05 12 20 42	LMP-EVA	I'm going to photograph that, too. Let me get - -
05 12 20 44	CDR-EVA	Okay.
05 12 20 45	LMP-EVA	- - let me get this. Houston, kind of interesting here. Pete walked across one edge of the rim here. We're about - oh, 50 feet inside the upper rim and he happened to scrape an area there with his foot. It's a much lighter colored soil - -
05 12 21 04	CDR-EVA	Like cement.
05 12 21 06	LMP-EVA	Yes. Let me take -
05 12 21 08	CDR-EVA	Get your picture?
05 12 21 09	LMP-EVA	I got it.
05 12 21 10	CC	Roger, Al.
05 12 21 14	LMP-EVA	Here, let me get my bag, Pete. You got to be careful with that handtool carrier; it'll fall over.
05 12 21 22	CDR-EVA	Right.
05 12 21 25	LMP-EVA	It's light and - -
05 12 21 26	CDR-EVA	Sample bag number 13, okay?
05 12 21 29	LMP-EVA	Oh.
05 12 21 32	CDR-EVA	Okay. Al, let me photograph this thing, and let's trench this whole area.

05 12 21 37	LMP-EVA	Okay.
05 12 21 38	CDR-EVA	I dropped the gnomon in right here over my footsteps and the light soil versus the dark, and we can trench the - -
05 12 21 45	LMP-EVA	Okay, I just put it into 3D.
05 12 21 49	CC	3D, Al.
05 12 21 51	LMP-EVA	In just a second. ... Okay.
05 12 21 54	CDR-EVA	Let's see. Five feet, f:8, 1/250th. Okay.
05 12 22 06	LMP-EVA	Okay, and let me get a picture of what you're doing.
05 12 22 07	CDR-EVA	Get the stereopair on, I think.
05 12 22 10	LMP-EVA	Okay. You're going to trench right there, huh?
05 12 22 13	CDR-EVA	Yes, let me get my shovel.
05 12 22 16	LMP-EVA	Okay.
05 12 22 27	LMP-EVA	Okay. That's going to make an interesting shot. What can I give you, Pete?
05 12 22 33	CDR-EVA	I need the shovel.
05 12 22 34	LMP-EVA	All right. I'll hold the tool carrier while you grab at it. Got her?
05 12 22 39	CDR-EVA	Yes. Let me have the handle.
05 12 22 40	LMP-EVA	Need the handle?
05 12 22 42	CDR-EVA	...
05 12 22 43	LMP-EVA	Can I get it?
05 12 22 44	CDR-EVA	No.
05 12 22 45	LMP-EVA	Okay. Move over here where I can bag it better for you.
05 12 22 58	CDR-EVA	Okay.
05 12 22 59	LMP-EVA	Very interesting things about this side of the mountain - I mean, this side of the crater - is that these boulders aren't uniformly distributed

around. They all seem to be over here on the western side. If you look over the eastern side or the north or south, you can see some; but there's quite a bit more over here on the west, for some reason - -

05 12 23 21 CDR-EVA Here you go, Al - quit baloneying and help me.

05 12 23 24 LMP-EVA Okay.

05 12 23 26 CC Roger, Al. We copy that.

05 12 23 30 LMP-EVA Okay.

05 12 23 31 CDR-EVA Look at that.

05 12 23 32 LMP-EVA Stick it right in there - -

05 12 23 33 CDR-EVA In that white soil with the brown, huh?

05 12 23 34 LMP-EVA Yes.

05 12 23 35 CDR-EVA There you go. Now, let me trench it.

05 12 23 39 LMP-EVA Okay.

05 12 23 40 CDR-EVA We get some photos of that.

05 12 23 41 LMP-EVA Okay, look, you can see where you dug in that; there's still some under you; why don't you give me another scoop right in there?

05 12 23 46 CDR-EVA Okay. A good idea.

05 12 23 48 LMP-EVA There's not much in here. Okay. Where Pete digs up - sure enough, right underneath the surface, you find some much lighter gray - Boy, I don't exactly know what at this point, and you can look around now and see several places where we've walked. If the same thing's occurred, we never have seen this at all - boy, that's going to make a good picture, Pete. Never seen this at all on the area we were before. Hey, that looks nice.

05 12 24 22 CC Roger, Al. We copy that; you think it could be the Sun angle?

05 12 24 25 LMP-EVA Listen. No, not at all. This is definitely a change to a light gray as you go down, and the deeper Pete goes - he's down about 4 inches now - it still remains this light gray. It's - this

soil must be of a different makeup than that we were on outside the crater, because we have to - -

05 12 24 45 CDR-EVA Say, this is different than around the spacecraft, because we've kicked up all kinds of stuff around the spacecraft and it's all the same color - -

05 12 24 52 LMP-EVA Top and bottom, this is quite a bit different.

05 12 24 54 CDR-EVA But this soil looks like it -

05 12 24 58 LMP-EVA I tell you what we should do here, Pete.

05 12 25 00 CDR-EVA What?

05 12 25 01 LMP-EVA Why don't you dig deep - -

05 12 25 02 CDR-LMP Deep?

05 12 25 03 LMP-EVA Yes, dig as deep as you can, then give me a sample right out of the bottom, because this will be something new. I'll put it in sample bag number 5D.

05 12 25 13 CC Al, we copy 5D. And would you give your location relative to the center of head crater. Specifically, are you just on the west side of it where we have the triple crater?

05 12 25 24 LMP-EVA We aren't; we're on the northwest corner of it - -

05 12 25 27 CDR-EVA Right where you told us to go, Houston.

05 12 25 30 CC Roger. You should be very close to that triple crater.

05 12 25 31 LMP-EVA Give me another shovelful there, Pete.

05 12 25 35 CDR-EVA Triple crater. Well, there's one crater right here - -

05 12 25 39 LMP-EVA There's a couple of craters right over the rim here; we're sort of in the rim - Pete's down now about - -

05 12 25 46 CDR-EVA That's not a good one, Al, let me get - -

05 12 25 49 LMP-EVA - - down about 6 inches and - looks just light gray down there. Now, in the bag, you'll find there's some darker gray material that fell in off the side.

05 12 26 01	CDR-EVA	There you go.
05 12 26 02	LMP-EVA	Hey, I want to - -
05 12 26 03	CDR-EVA	Let's throw this little rock in that I dug up from deep down.
05 12 26 06	LMP-EVA	Is that a rock?
05 12 26 07	CDR-EVA	Yes, sir.
05 12 26 08	LMP-EVA	Okay.
05 12 25 09	CDR-EVA	Get another sample bag.
05 12 26 11	LMP-EVA	All right.
05 12 26 12	CDR-EVA	That's a good one, because I don't want - -
05 12 26 13	LMP-EVA	Well, wait a minute; let me get a picture of it first.
05 12 26 16	CDR-EVA	I dug it up out of a hole. It's hard to keep this soil in the bag. Stereopair. Okay, in ... D.
05 12 26 32	LMP-EVA	There's ... a little of the top soil mixed in because the sides collapsed. Angle of repose is about 85 degrees, but - -
05 12 26 40	CDR-EVA	The minute you touch the side, it falls in.
05 12 26 42	LMP-EVA	- - It's not cohesive at all, even though it seems to remain nearly vertical; I guess it's the low gravity. Hey, that's a nice rock. Pete just handed me a rock from the bottom of the hole, and it's covered with gray; I can't see - anything in it other than just the gray dirt covering, soil covering. Let me get a final shot, Pete.
05 12 27 03	CDR-EVA	Okay.
05 12 27 07	LMP-EVA	Okay. That's good.
05 12 27 17	LMP-EVA	Okay. As you move off, Pete, every once in a while, I can see some white; but, most of the time - Hey, you kicked over a rock that had a white bottom - quite a bit different than the top. Right behind you; you might want to take a picture of that. It's quite a bit different than those others.

05 12 27 49	CDR-EVA	Houston. You're going to have to budget our time now. How long do you want us to spend it in head crater?
05 12 27 55	LMP-EVA	Because it looks like we could just spend all our time here if we wanted to - -
05 12 27 57	CDR-EVA	That's what's bothering me; we could do that any place here on the Moon.
05 12 28 02	CC	Pete, we show that you're 58 minutes into the EVA, and we'd like to get you over to bench crater, and leaving there something on the order of 1 plus 12; we can slip that a bit. So we suggest you finish up where you are - what you're doing there at head and move on.
05 12 28 21	CDR-EVA	Okay. Al, where's the map?
05 12 28 23	LMP-EVA	Got the map right here, Pete. Let you take a look at this.
05 12 28 27	CDR-EVA	By the way, this is the smartest idea we came up with, Houston; this map just works great out here.
05 12 28 31	LMP-EVA	Okay, let me take a picture of this rock. I'm going - -
05 12 28 37	CDR-EVA	This isn't going to show much.
05 12 28 38	LMP-EVA	Let me use your shovel.
05 12 28 40	CDR-EVA	All right. Now I'm trying to find the triple craters they're referring to.
05 12 28 43	LMP-EVA	Kick it around - here.
05 12 28 54	CC	Pete, that triple crater is just south of your present position, and why don't you just go ahead and move on?
05 12 29 02	CDR-EVA	Okay. I got you.
05 12 29 15	LMP-EVA	Okay. Now, there's a good picture, Pete, let me get that one.
05 12 29 18	CDR-EVA	Okay, now, let me see which side is which.
05 12 29 20	LMP-EVA	Well, we've got it; turn over one of the rocks of the rim. The bottom part of the rock is gray, about a half of it; this rock happens to be about

a 6-inch-diameter rock. That'll give you stereo on it. And the top is the same color as the - -

05 12 29 35 CDR-EVA ... You got it in your shadow.

05 12 29 37 LMP-EVA Yes. I do. I'll take another one. Pete, maybe you want it.

05 12 29 45 CDR-EVA Even these rocks out in here - even the ones that are almost completely covered with the soil, if I look at them, I can see glints of crystals or something.

05 12 29 53 LMP-EVA Yes, every one of them.

05 12 29 55 CDR-EVA All right, let me have that.

05 12 29 56 LMP-EVA There's your tube.

05 12 29 57 CDR-EVA All right, we're going to head for bench crater. Okay. Now we didn't get a PAN view, did we?

05 12 30 03 LMP-EVA No, and I'm going to get it when I get to the triple craters, which is right over here.

05 12 30 07 CDR-EVA Sounds good.

05 12 30 08 LMP-EVA They think they're right over here; I can't see them; I've got to look over the hill.

05 12 30 11 CDR-EVA All right. Yes, here they are. Ho, ho, ho. Hey, things are quite a bit lighter gray up here on top of the hill.

05 12 30 26 LMP-EVA Yes. The ... we're approaching - -

05 12 30 28 CDR-EVA Oh, look - look - look at these craters, Al.

05 12 30 33 LMP-EVA Boy.

05 12 30 36 CDR-EVA Now, Houston, do you want head crater - from triple craters? Is that what you want or do you want the triple craters?

05 12 30 49 CC Pete, we suggest you just move on to bench - and comment on that double core tube; if you find a spot that looks soft, go ahead and sink the double core tube.

05 12 31 00 CDR-EVA We'll do it at bench.

05 12 31 03 CC Roger.

05 12 31 05	CDR-EVA	It's really a shame, Houston; we could - we could work out here for 8 or 9 hours. The work is no strain at all.
05 12 31 20	LMP-EVA	I took three quick pictures of triple craters, Houston.
05 12 31 27	CDR-EVA	We're not going to get to that other one - bench, is it; but that looks like a real interesting area on - on the far corner of bench, Al. See all those big rocks? Some of them look as if they could be bedrock out of somewhere.
05 12 31 40	LMP-EVA	I'm kind of wondering, we're passing up these here - and they got to be bedrock from somewhere; we need to get a pretty large-sized one here, before we leave this area, Pete.
05 12 31 47	CDR-EVA	I'll tell you what we'll do, is I'll stop right here and take a PAN.
05 12 31 51	LMP-EVA	Okay.
05 12 31 52	CDR-EVA	How's that grab you?
05 12 31 55	LMP-EVA	Because these rocks obviously came out of the crater, because they're scattered more uniformly around it. There's a bunch of them on the rim and there's not many far away. We probably ought to grab a big one of them.
05 12 32 06	CDR-EVA	74.
05 12 32 07	LMP-EVA	You're moving - straight south now.
05 12 32 17	LMP-EVA	There's an interesting rock; let's - Hey, that's all right; let's get it.
05 12 32 29	LMP-EVA	Let me read your camera and you can read mine, if you would. Help them out a bit down there.
05 12 32 34	CDR-EVA	Just a minute. Okay, your camera right now is on 36. How about mine?
05 12 32 41	LMP-EVA	That's 36 also.
05 12 32 43	CDR-EVA	Okay, move.
05 12 32 44	LMP-EVA	Did you copy that, Houston?
05 12 32 48	CC	Roger, we got it, Al.

05 12 32 51	LMP-EVA	Every crater you come - every crater you come to and look in, you see the glass beads. Move out of your way, Pete.
05 12 33 12	CDR-EVA	Okay, now. Back to rock-taking settings, 5 feet, f:8, 1/250th. Okay. All right, Al, where do you want to grab the sample here?
05 12 33 20	LMP-EVA	Right here, I'd like to grab that rock right there, because it's got kind of a sharp edge on it and all the rest of them are - I don't know, it's got kind of a - an oblique edge on it, and you don't see many like that around here.
05 12 33 32	CDR-EVA	Which one you mean?
05 12 33 33	LMP-EVA	This one right here, this gray one. It looks a little bit different than the rest.
05 12 33 35	CDR-EVA	This one?
05 12 33 36	LMP-EVA	No, right there, a little bit further - that one right there. I'll just grab it and put it in the box, if we can pick it up.
05 12 33 40	CDR-EVA	This one, the big one?
05 12 33 42	LMP-EVA	The big one.
05 12 33 43	CDR-EVA	Ho, ho, ho, wait until I get the pictures.
05 12 33 44	LMP-EVA	Okay. If we can do that, we can just put it in the bag. I think that's kind of a different-looking rock. This rock is different, Houston - just in the way it's shaped, and it's partly rounded and got some oblique angles on it. Maybe under all that dirt is something a little bit different.
05 12 34 05	CDR-EVA	Okay. I got it.
05 12 34 06	CC	Roger, Al. We copy that.
05 12 34 17	LMP-EVA	Sorry.
05 12 34 18	CDR-EVA	That's all right. All right. Picking it up; no sweat.
05 12 34 22	LMP-EVA	Okay.
05 12 34 23	CDR-EVA	That a boy. We know you got the rock; that's what counts.

05 12 34 26	LMP-EVA	Okay.
05 12 34 28	CDR-EVA	Okay, I got the bag.
05 12 34 30	LMP-EVA	The thing that was giving it that unusual shape was the dirt that was adhering to it (laughter). That's okay; we'll take it back with us.
05 12 34 36	CDR-EVA	Good rock.
05 12 34 38	LMP-EVA	And this is probably typical of the rocks around this crater, Houston. So, - I think it will be a good sample for us.
05 12 34 53	LMP-EVA	I'd say in the area we're moving along now as we head south - is, what you say, Pete, there's about 5 percent rocks?
05 12 35 02	CDR-EVA	Yes, something like that; they go anywhere from 2-1/2, 3 feet all the way down to small fragments.
05 12 35 06	LMP-EVA	That's right. There's even one by you there that's 3 feet that's not ... - Look at the fillets around that rock.
05 12 35 12	CDR-EVA	Look, that's deep ... - -
05 12 35 13	LMP-EVA	That's a beauty. Wait a minute; I'd better stop and get that. Hold the tongs.
05 12 35 15	CDR-EVA	Okay, let's do; let's - -
05 12 35 17	LMP-EVA	In fact, maybe we can take it on two or three sides. Have to watch - The trouble is - There you go; that's a - that's a good rock. Hey, look at the pits in it, too. That's obviously been struck a lot by - meteroids; this is going to be a good rock, Houston. It's about 3 feet in diameter, about 2 feet thick - -
05 12 35 34	CDR-EVA	Got ... back around it.
05 12 35 35	LMP-EVA	- - well-rounded, got a - lot of surface pits in it. I can see the glitter -
05 12 35 42	CDR-EVA	I got to back off to 15 feet on this one.
05 12 35 44	LMP-EVA	Okay.
05 12 35 45	CDR-EVA	Get a stereopair.
05 12 35 46	LMP-EVA	Okay.

05 12 35 48	CC	Roger, Al. We copy that. Are you able to find any chips from that rock in the near vicinity?
05 12 35 49	MS	...
05 12 35 57	LMP-EVA	This is not unlike all the other rocks around here, Houston. All the rocks are just about -
05 12 36 01	CDR-EVA	Al, did you get some off the far side - of that?
05 12 36 06	LMP-EVA	Yes, let's get that. That's a good idea. All the rocks we've been looking at, Houston, in this area seem to be the same. They seem to have a - the rock has got dirt built up on all sides of it, all directions.
05 12 36 18	CDR-EVA	Sure does; looks about equal too, doesn't it?
05 12 36 20	LMP-EVA	It looks about equal; that's right. Very interesting. I don't know what the means of transport but it's - it's just built up around it.
05 12 36 21	CC	Yankee Clipper, 1 minute to LOS.
05 12 36 28	CDR-EVA	Here's some here.
05 12 36 31	CDR-EVA	Go ahead. I want to look here for a second.
05 12 36 36	LMP-EVA	If you look real closely at the rock, the surface of it is coarse pitted and there's some pits that are maybe even up to three-eighths of an inch in diameter on it; however, most of them are small. It doesn't look like a basalt, although the grains are too small for me to see anything - identify any specific one. Some of the pits have glass in it, which is not too surprising; and many of them don't. That's about all we can say about that rock, Houston, and that's typical of the ones in this area.
05 12 36 38	CC	Yankee Clipper, 30 seconds to LOS.
05 12 37 14	CC	Roger, Al. Could you give us a sample bag number and then press on?
05 12 37 20	LMP-EVA	Okay. Well, we didn't take a sample there. The couple that we did take a sample of previously are the same types, so the last couple of samples have been of the same type rocks that we're discussing.

05 12 37 32	CDR-EVA	Okay, Houston, I'm coming up on bench crater right now. I loped off and left Al. And I took you a PAN in bench crater. This looks like a very interesting crater; it's different. Oh, and I see some really different rocks - a big one. Hey, that looks like bedrock. Gee, what a crater. Oh, boy.
05 12 37 45	CMP	...

END OF TAPE

05 12 38 01	CDR-EVA	Hey, Al, look at - Come on over here.
05 12 38 03	LMP-EVA	I'm coming.
05 12 38 05	CDR-EVA	We got to get some of this. Let me get some PAN's in there.
05 12 38 08	CC	Sounds interesting, Al. And, Pete, sounds as though you're getting down to bedrock. Is that affirm?
05 12 38 15	CDR-EVA	Yes. They got to be bedrock. And this one in the bottom is - As a matter of fact - -
05 12 38 21	LMP-EVA	Boy, there's some big fragments around here.
05 12 38 22	CDR-EVA	- - Get the pictures. It looks like to me that stuff is melted in the bottom of it. I - Can't swear that, but I'll get you some pictures. Starting right now. f:8 - P - I - fix. Okay. Let me go over on the other little bit here. Get you a good PAN.
05 12 38 55	LMP-EVA	Yes. This rock looks pretty much the same from a distance, Houston.
05 12 39 02	CDR-EVA	Yes, there's - -
05 12 39 03	LMP-EVA	...
05 12 39 04	CDR-EVA	- - get picked out of this crater.
05 12 39 05	LMP-EVA	I'm just sorry you guys - -
05 12 39 06	CDR-EVA	Beautiful!
05 12 39 07	LMP-EVA	- - aren't all here.
05 12 39 08	CDR-EVA	What a fantastic sight. Al, look in the bottom of that crater.
05 12 39 12	LMP-EVA	Hey, look at that.
05 12 39 13	CDR-EVA	Do you think that stuff melted or what? What's that look like to you?
05 12 39 20	LMP-EVA	Well, it looks to me - those rocks look - what it looks to me like is we've got one of those

central - little bitty central peaks, you know - little rebound there, like the - -

05 12 39 28 CDR-EVA Yes. But don't they look melted on the top? Don't they look like they've been - they were molten? They're not - they're not completely jagged.

05 12 39 34 LMP-EVA No, they're not. It's hard to tell. I noticed when I was looking at that rock back there up real close that it had been hit by meteorites so much, I guess, it had given it a rounded appearance something like those in the hole, except there's a couple over there, like you say, that don't look that way. Hey, we ought to grab one of these pieces of rock.

05 12 39 50 CDR-EVA Hey, hey, hey. Here's some good rock samples right here. Come on.

05 12 39 53 LMP-EVA Okay.

05 12 39 54 CDR-EVA Let's get with it.

05 12 39 55 LMP-EVA I'm right here.

05 12 39 56 CDR-EVA I know (laughter). You know me, I want to cover the ground.

05 12 40 02 LMP-EVA Okay. ...

05 12 40 06 CDR-EVA They'll baloney about it all day long in the LRL. The name of the game is to get the business done.

05 12 40 11 LMP-EVA Okay.

05 12 40 12 CDR-EVA One potato.

05 12 40 13 LMP-EVA Okay.

05 12 40 14 CDR-EVA - - potatoes. There's another one.

05 12 40 16 LMP-EVA All right.

05 12 40 17 CDR-EVA Look at that baby; that rock looks a little different.

05 12 40 21 LMP-EVA Okay. I don't think - don't think it's going to fit. Let's put it in one of these bags. It'll fit in there, Pete.

05 12 40 30	CDR-EVA	Okay.
05 12 40 31	LMP-EVA	It's going to go in sample bag 64. I think it's ... oops - -
05 12 40 37	CDR-EVA	Come here, you pesky booger. 64. It might fit in there.
05 12 40 43	LMP-EVA	No. It won't fit in there, Pete. The rock's too big.
05 12 40 46	CDR-EVA	Let's just put it in here, and we've got a nice picture of it, so we can tell where it's from - -
05 12 40 49	LMP-EVA	That's a super rock..
05 12 40 50	CDR-EVA	- - let's just pick up two or three others - little ones and put them in 64 here, from that same area. Here, all this - -
05 12 40 57	CC	Copy. Sample 64.
05 12 40 59	CDR-EVA	- - head crater, I mean - from -
05 12 41 04	LMP-EVA	Nice rock. Get some of the other we took the picture of.
05 12 41 08	CDR-EVA	Yes. Wait a minute.
05 12 41 09	LMP-EVA	Okay. Yes. I don't think I got that in the picture.
05 12 41 14	CDR-EVA	Okay. May not have.
05 12 41 16	LMP-EVA	Hey, you notice that underneath this soil on the rim, too, it's the light gray.
05 12 41 21	CDR-EVA	Look. See that stuff over - Let's go over to that corner and try to get a - break off a piece of that big rock, huh? - -
05 12 41 26	LMP-EVA	That's a good idea.
05 12 41 27	CDR-EVA	- - looks like bedrock to me.
05 12 41 29	LMP-EVA	Can do that.
05 12 41 30	CDR-EVA	And go on and put 64 in there. Houston, there are a couple of small rocks that we just picked up from the area we have been discussing. It

doesn't - I don't think they appeared in the photo, but that won't make any difference. It's just typical of the other rocks around here. Holy Christmas! What's this? Look at this, Al. We're kicking up the same sort of light gray. Apparently, on the rims here, you get that light gray, out in the - -

05 12 41 58 LMP-EVA Huh? No, no. - -

05 12 41 59 CDR-EVA - - look at this stuff.

05 12 42 01 LMP-EVA Hey, that's interesting.

05 12 42 02 CDR-EVA What do you suppose that is?

05 12 42 04 LMP-EVA Hey, we can't - Here's something interesting, Houston. Hey, it looks like a surface - What we got is what looks like kind of a semiburied rock. Hey, there's a small piece of it over there to the left. See it, Pete? We'll be able to catch it and put it in the bag.

05 12 42 15 CDR-EVA Yes.

05 12 42 16 LMP-EVA See that over there?

05 12 42 17 CDR-EVA Yes.

05 12 42 18 LMP-EVA What it looks like is a - a buried rock, not unlike the others around here, except it appears to have some sort of coating on it that's very iridescent. Lot of crystals shining in it.

05 12 42 29 CDR-EVA I'll tell you what's happened is it - it - it's been laying in the ground and it's been hit by another fragment.

05 12 42 34 LMP-EVA Think so?

05 12 42 35 CDR-EVA Yes. Look at the glass beads, too. Look it all over the place.

05 12 42 39 LMP-EVA I know.

05 12 42 40 CDR-EVA Okay, you want to - you want to catch that - -

05 12 42 42 LMP-EVA Okay.

05 12 42 43 CDR-EVA - - piece over there and I'll put it - wait - let me get the - the sample of it.

05 12 42 45	LMP-EVA	Okay.
05 12 42 46	CDR-EVA	All right. Sample in sample bag 7L.
05 12 42 51	CC	Copy, 7. And would you go ahead and give us some picture numbers, also?
05 12 42 58	LMP-EVA	Okay. We'll give you some in just a minute. Pete's picking up a small piece of this rock. Maybe you could get a piece that's fractured right off the middle.
05 12 43 06	CDR-EVA	That's what I wanted to do.
05 12 43 08	LMP-EVA	Okay. Let me get out of your way so you can see it.
05 12 43 13	CDR-EVA	On the edge of the scoop.
05 12 43 14	LMP-EVA	Okay.
05 12 43 15	CDR-EVA	There it is right there.
05 12 43 16	LMP-EVA	Okay. Got kind of an interesting coating on it. That's different from what we've seen.
05 12 43 22	CDR-EVA	Yes.
05 12 43 23	LMP-EVA	Maybe this is more newly exposed than the ... Is that all you want to put in that bag?
05 12 43 28	CDR-EVA	Listen. Hand me the scoop - -
05 12 43 29	LMP-EVA	Okay.
05 12 43 30	CDR-EVA	- - let me get some of those glass beads and stuff there - -
05 12 43 32	LMP-EVA	All right. Let me get you the scoop.
05 12 43 36	CDR-EVA	Okay. How long have we been going, Houston?
05 12 43 43	LMP-EVA	Got it, Pete.
05 12 43 45	CC	Pete, we show you're 1 plus 14 into the EVA and we'd like you to move on from this crater at about 1 plus 27. If you could, then go on down and take a look at the bedrock on the bench.

05 12 44 01	LMP-EVA	Hey, I - I better not put that in there, that's what we wanted to show was the - -
05 12 44 03	CDR-EVA	Okay.
05 12 44 04	LMP-EVA	Let me get you another sample bag.
05 12 44 05	CDR-EVA	I hate to try and get down to the bottom of this fellow. It's awful steep.
05 12 44 09	LMP-EVA	Yes - -
05 12 44 10	CC	Okay. Then hold off on that. Don't go ahead.
05 12 44 12	CDR-EVA	- - Let's forget that - -
05 12 44 13	CC	Negative on the request.
05 12 44 14	CDR-EVA	But - but - but I'm going to get you - we're going to get you some of the bedrock. It looked like it's up in the lip here. All of it looks the same - on the edge.
05 12 44 22	LMP-EVA	We're working on it, Houston. We're working on it.
05 12 44 25	CDR-EVA	That's 8D.
05 12 44 27	LMP-EVA	Ridiculous.
05 12 44 28	CDR-EVA	I think.
05 12 44 29	LMP-EVA	What happened to 1, 2, 3, 4, 5?
05 12 44 33	CDR-EVA	(Laughter) Get you another one. Okay.
05 12 44 38	LMP-EVA	What we're putting in here now, Houston, is some soil that's right next to the rock that we previously described. In fact, Pete's got a nice fragment of that rock that's going to end up in this bag, too. Oh, catch that one.
05 12 44 49	CDR-EVA	Oh - ooo.
05 12 44 50	LMP-EVA	That's a beauty. That thing is barely - weak - it fractures right off - -
05 12 44 57	CDR-EVA	(Laughter)

05 12 45 00	LMP-EVA	You've got to get some control there, babe, you're overpowering it. This one-sixth g up here, Houston - You lift something up in your scoop; and, when you stop the scoop, it just keeps going up in the air.
05 12 45 11	CDR-EVA	I'll tong it (laughter) ... the other way.
05 12 45 16	LMP-EVA	Looked good though.
05 12 45 22	LMP-EVA	Okay. Put that in the bag. There you go.
05 12 45 26	CDR-EVA	We need to put more, samples per - in the bag.
05 12 45 30	LMP-EVA	And they are saying they can't hardly use those little ones.
05 12 45 32	CDR-EVA	They won't fit in there any bigger.
05 12 45 35	LMP-EVA	Here, I'll get it.
05 12 45 36	CDR-EVA	Okay.
05 12 45 57	LMP-EVA	Thank you. Okay?
05 12 45 59	CDR-EVA	Okay. Let's go over here and get some of this good rock. Like bedrock to me.
05 12 46 03	LMP-EVA	Okay.
05 12 46 05	CDR-EVA	Looks a lot like the fragments we've been seeing laying all over the place, but this stuff obviously - I'll bet you we have a total of about 3 pounds of rocks right now.
05 12 46 13	LMP-EVA	Okay. I'm with you.
05 12 46 14	CDR-EVA	Okay. We're going to have to grab some bigger ...
05 12 46 22	CDR-EVA	Got to dip down in the side of the crater there see how it is going up and down - -
05 12 46 25	LMP-EVA	Yes - it would be - ... - -
05 12 46 27	CDR-EVA	Boy, this is interesting. I want to get this area right here and see if I can't sample it - -
05 12 46 32	LMP-EVA	Good move.

05 12 46 33	CDR-EVA	- - if I don't fall down in the crater. Go. That's a boy. Well, this is different; look at this, Al? This is different, we'll get some of this.
05 12 46 43	LMP-EVA	Okay.
05 12 46 47	CC	Al, Houston. Over.
05 12 46 51	LMP-EVA	Go ahead, Houston.
05 12 46 53	CC	Al, we would like you to go to intermediate flow for a minute and a half. We'll give you a call.
05 12 47 00	LMP-EVA	Okay. What's the problem?
05 12 47 10	CC	We're looking at a slightly lower than nominal feedwater pressure.
05 12 47 16	LMP-EVA	Okay. It's cooling real fine. Look at the glass all over those rocks.
05 12 47 22	CDR-EVA	Yes. I need to -
05 12 47 28	LMP-EVA	I want to bring this back; look at it.
05 12 47 30	CDR-EVA	Okay.
05 12 47 37	LMP-EVA	Here, let me put this - put that in there.
05 12 47 40	CDR-EVA	... It's going to fall.
05 12 47 41	LMP-EVA	There you go.
05 12 47 43	LMP-EVA	Hold it.
05 12 47 50	LMP-EVA	Huh?
05 12 47 51	CDR-EVA	Let me get up here. Okay?
05 12 47 52	LMP-EVA	Watch it - it - You're going to -
05 12 47 56	CDR-EVA	Okay. Now you're going to help me get a bunch of these.
05 12 47 59	LMP-EVA	Let's do; let's get a bunch of them and then they'll - have any rocks to bring back. Doing the best I can. There you go; there's a good one. Put that thing in here.

05 12 48 14	CDR-EVA	...
05 12 48 18	LMP-EVA	I'm putting on ... the bag, but it won't make it work.
05 12 48 23	CDR-EVA	I had to take that big piece right there. Look at it; it's got spattered glass or something all over it.
05 12 48 29	LMP-EVA	Let's take it. Why don't we take a big piece of it? And - sample bag.
05 12 48 39	CDR-EVA	I'm ... these sample bags, whether they're the - lit. - the round ones, or the square ones - or the flat ones, they're all the same type. What you need are sample bags - little ones for these and some big ones for the bigger rocks. Okay; 9B is the sample we just picked up and described, Houston.
05 12 48 57	LMP-EVA	Okay. Put this right in here, Pete.
05 12 48 58	CDR-EVA	No. Wait a minute; here's a better one.
05 12 49 00	LMP-EVA	Okay. Now we are working on sample bag - 10B.
05 12 49 07	CDR-EVA	- 10B.
05 12 49 09	CC	Roger. Copy 10B; and, on your way out, would you get that partial PAN with a 75-foot base line?
05 12 49 17	LMP-EVA	We will sure do that - -
05 12 49 18	CDR-EVA	I already got the PAN.
05 12 49 20	LMP-EVA	Well, Pete says he already got it.
05 12 49 21	CDR-EVA	Got a stereo partial PAN. Okay?
05 12 49 24	CC	Roger.
05 12 49 27	CDR-EVA	Okay. That's a good rock, and that one fills that one up.
05 12 49 41	LMP-EVA	Okay, Pete, what is your next pleasure?
05 12 49 44	CDR-EVA	I don't know. What do you think, Houston?
05 12 49 51	CC	You're looking in good shape. You can press on along the traverse over to sharp crater.

05 12 50 00	CDR-EVA	Okay.
05 12 50 02	LMP-EVA	Why don't you take your - Oh, you already got a snapshot of this, didn't you, Pete?
05 12 50 06	CDR-EVA	Wait, wait, wait. Sharp crater, that's funny, I can't seem to locate it.
05 12 50 11	CC	Pete, from your present position that's 400 feet southwest.
05 12 50 19	LMP-EVA	Nice one 400 feet south - -
05 12 50 21	CDR-EVA	- - Al, it's got to be over that hill right there.
05 12 50 23	LMP-EVA	About right there.
05 12 50 24	CDR-EVA	Right here.
05 12 50 26	LMP-EVA	Okay. Let's try it.
05 12 50 37	LMP-EVA	400 feet southwest.
05 12 50 39	CDR-EVA	All right. Now we want to get the core tube and that gas sample and a bunch of good things, right, Houston?
05 12 50 46	CC	That's affirmative, Pete. All those good things at sharp crater.
05 12 50 56	CDR-EVA	Got to find it first.
05 12 50 59	CC	Al, you can go ahead and put that diverter valve to your choice. Your feedwater pressure is holding even. Looks as though it's working well. It's slightly lower than nominal.
05 12 51 10	LMP-EVA	Okay, Houston.
05 12 51 11	CDR-EVA	Sharp crater, where are you?
05 12 51 15	LMP-EVA	Got it pinpointed, Pete?
05 12 51 16	CDR-EVA	No. I can't find it.
05 12 51 19	LMP-EVA	Well, we're going in about the right direction.
05 12 51 20	CDR-EVA	There's one right over here to - kind of more to your right. Trouble is, I'm looking down zero phase, you know, and that's - There it is. That's got to be it right there.

05 12 51 34	LMP-EVA	Hey, I see it.
05 12 51 37	CDR-EVA	Boy, there's big fragments out here.
05 12 51 41	LMP-EVA	You can say that again.
05 12 51 42	CDR-EVA	Have you got the shovel?
05 12 51 43	LMP-EVA	I sure do.
05 12 51 44	CDR-EVA	Good boy (laughter). No, that's not it either.
05 12 51 52	LMP-EVA	Why don't we stop here and look at the chart a little bit more closely?
05 12 52 00	CDR-EVA	Man, does that LM look small back there. I'll tell you what. I'd better get a tie anyhow. Look at the chart.
05 12 52 08	LMP-EVA	Okay.
05 12 52 09	CDR-EVA	Okay.
05 12 52 11	LMP-EVA	Okay.
05 12 52 13	CC	Roger. Are you going to give us a backside survey at that point, Pete?
05 12 52 18	CDR-EVA	Yes. I'll make it a full PAN. Darn far out. I might as well.
05 12 52 27	CC	Okay. A full PAN over when you get to sharp. We show you are 1 plus 23 into the EVA and we're looking to leave a sharp crater on 1 plus 51, so you got lots of time.
05 12 52 41	CDR-EVA	We got to find sharp crater first.
05 12 52 42	LMP-EVA	- - I kind of agree with you. Where is it?
05 12 52 44	CDR-EVA	I don't know. We should be right here. I got a - how big is sharp crater?
05 12 52 55	LMP-EVA	Looks pretty small. It looks to me to be about 30 meters.
05 12 53 00	CDR-EVA	Okay. I've got it. It's right here in front of me.
05 12 53 02	LMP-EVA	Okay?

05 12 53 03	CDR-EVA	Yes. That's it.
05 12 53 22	CDR-EVA	Okay. That little box. ...
05 12 53 35	LMP-EVA	This has got to be sharp crater right here. Let's - We'll drive that double core tube in there.
05 12 53 40	CDR-EVA	All right.
05 12 53 42	LMP-EVA	Yes. This has a nice white rim - a white rim on it. In fact, the rim of this looks pretty much like the area we kicked over on the previous craters. I'm not sure this is sharp crater, but it's - Let's use it anyway, because it's the only one out here.
05 12 53 55	CDR-EVA	I know. I can see - There is nothing out here. It's the darnedest thing I've ever saw.
05 12 54 01	CC	We're estimating a diameter of sharp crater, Pete, for about 40 feet.
05 12 54 08	LMP-EVA	40 feet, huh? - -
05 12 54 09	CDR-EVA	Hey, Al, this may be it.
05 12 54 10	LMP-EVA	This is it. It's got to be it. It's got a nice raised rim on it.
05 12 54 13	CDR-EVA	Yes. Look at that.
05 12 54 14	LMP-EVA	It's raised up about - What do you say, 2 feet?
05 12 54 17	CDR-EVA	Yes. The trouble is that I'm running zero phase. It's like you never - Oh, yes, look at - Oh-hoo-hoo-hoo -
05 12 54 22	LMP-EVA	Hey, this is the same color as all that subsurface material.
05 12 54 27	CDR-EVA	It's awful soft in here; watch it.
05 12 54 29	LMP-EVA	Okay.
05 12 54 30	CDR-EVA	Holy Christmas! Look at the bottom of that.
05 12 54 31	LMP-EVA	Say, you know something, Houston?
05 12 54 33	CDR-EVA	Hey, Houston.

05 12 54 35	CC	Go ahead, Pete.
05 12 54 36	CDR-EVA	It looks like blast effect coming out of it. Looks like it's got blast effects radial all around. This has got to be fairly fresh to the - Look at that, Al. Isn't that neat? I - we might get some pictures of that.
05 12 54 52	LMP-EVA	Okay.
05 12 54 53	CDR-EVA	I don't know what to set it on - 7½, I guess. We're not that far away.
05 12 54 56	LMP-EVA	Boy, the - The rim is soft here, isn't it?
05 12 54 59	CDR-EVA	- - Sure is.
05 12 55 00	LMP-EVA	Quite a bit softer than the others we - -
05 12 55 01	CDR-EVA	But look at the radial spray pattern.
05 12 55 04	LMP-EVA	Beautiful.
05 12 55 05	CDR-EVA	Look at that. I guess I'm supposed to drive the what - double core tube here or something?
05 12 55 09	LMP-EVA	Yes. Set that baby up. Look at that skip.
05 12 55 12	CDR-EVA	We got to dig a trench?
05 12 55 14	CC	Al, we'd like to get the trench site sample there, and you can hold off on that double core tube until you get over to halo crater.
05 12 55 23	LMP-EVA	Okay. Good. All right, we're supposed to look left for Copernican rays here too.
05 12 55 40	CDR-EVA	Houston, there's no way to tell the difference - contactwise. You agree, Al?
05 12 55 45	LMP-EVA	There's no way. Now this one is fresh enough so that you can see - like you say - some of the rays, but any crater older than this there doesn't appear to be any way to tell the materials from inside the crater from that that was there when - I mean, right on the surface before the crater was formed. There's no - there's no differentiation at all. Let's see. Which sample do you want now?

05 12 56 13	CC	Al, we're looking for the trench site sample. That includes your environmental sample of trench and the gas analyses you can put in there, too.
05 12 56 23	LMP-EVA	Okay. We'll do the whole smash here for you.
05 12 56 26	CDR-EVA	You want it right in the crater rim?
05 12 56 27	LMP-EVA	That's what it says.
05 12 56 28	CC	That's affirmative. That would be perhaps the easiest and best place to do it, and you can get that one core tube down in the bottom of the trench.
05 12 56 37	CDR-EVA	Yes, yes, yes.
05 12 56 39	LMP-EVA	Okay, Pete. Before you do that ... you're going to have to lift this up so that I can take the sample out.
05 12 56 44	CDR-EVA	Wait 1. Okay, I'll be right with you.
05 12 56 47	LMP-EVA	Okay.
05 12 56 48	CDR-EVA	You going to do it right there?
05 12 56 50	LMP-EVA	Yes. Lift it up and I'll reach in there and grab the - put the - This will be the one for the soil here.
05 12 57 00	CDR-EVA	Hey, one thing I've noticed, Houston, carrying the - the tools and - but although your gloves - you don't feel any of the temperature here. Turns out nice and bright, but it's nice and cool in here, except when you're carrying something metal, like the handtool carrier, or the shovel, or something. Then your hand starts to get warm.
05 12 57 20	LMP-EVA	Could you - Could you get out of the -
05 12 57 21	CDR-EVA	Yes.
05 12 57 22	LMP-EVA	Could you just slide a little bit?
05 12 57 23	CDR-EVA	Okay. Let me slide right over here. That's a new one.
05 12 57 33	LMP-EVA	Oh, wait a minute. I've got to do it over here. ...

05 12 57 37	CDR-EVA	Hey, Houston.
05 12 57 39	CC	Pete, go ahead.
05 12 57 41	CDR-EVA	Did you take a picture before, Al?
05 12 57 43	LMP-EVA	No.
05 12 57 44	CDR-EVA	Yes. No - noth - nothing, Houston. We're okay.
05 12 57 49	LMP-EVA	I'll take one right now, Pete.
05 12 57 52	CDR-EVA	That'd be a good spot right there, I believe.
05 12 57 58	LMP-EVA	Okay. Go ahead, Pete.
05 12 58 06	CDR-EVA	Dig in that stuff.
05 12 58 08	LMP-EVA	Wow!
05 12 58 09	CDR-EVA	You could drive three core tubes down there.
05 12 58 12	LMP-EVA	You sure could. It's soft.
05 12 58 13	CDR-EVA	Yes. Got down about 8 inches.
05 12 58 15	LMP-EVA	Yes. Pete, you're digging in the - digging a nice clean trench.
05 12 58 18	CDR-EVA	Wait, wait, wait, wait. Let me get the trench pictures.
05 12 58 21	LMP-EVA	Okay.
05 12 58 22	CDR-EVA	And I'm in the wrong setting, too - -
05 12 58 23	CC	Okay, Al. Could we have some numbers along with those pictures?
05 12 58 28	LMP-EVA	Okay. We'll have to give them to you, Houston. We've been delinquent there. Fine gray. Very fine soil here.
05 12 58 41	CDR-EVA	Okay, Al.
05 12 58 43	CDR-EVA	Okay. I'm ready to - - T-T-1 take a look at my - What's the ... numbers?
05 12 58 46	LMP-EVA	Okay. You're on number 105.
05 12 58 52	CDR-EVA	Ow.

05 12 58 53	LMP-EVA	That's okay. Well, I'll trade cameras with you because you've been ... Okay?
05 12 58 56	CDR-EVA	Okay.
05 12 58 58	LMP-EVA	All right. Now what you - what do you want to do? Fill that with dirt and - and rocks?
05 12 59 --		BEGIN LUNAR REV 26
05 12 59 02	CDR-EVA	We sure do.
05 12 59 03	LMP-EVA	Huh?
05 12 59 04	CDR-EVA	Fill the big container with dirt.
05 12 59 10	CC	Pete, we copy you're on 105.
05 12 59 12	LMP-EVA	Be careful now. Wait a minute, wait. The tools didn't go in.
05 12 59 22	CDR-EVA	That's okay.
05 12 59 23	LMP-EVA	That stuff is really funny. Now I can't see the trench and I know you can't.
05 12 59 28	CDR-EVA	That's - that a boy. Yes. Let's get organized. Okay?
05 12 59 32	LMP-EVA	Yes.
05 12 59 33	CDR-EVA	And when you get it in there, try to tap it. Maybe it will come out - -
05 12 59 35	LMP-EVA	You got to come this way.
05 12 59 36	CDR-EVA	Okay. See, what's happening is my arm is being turned by the cables. There, there.
05 12 59 44	LMP-EVA	Maybe you grab the handles closer to the thing-a-ma-gig there - -
05 12 59 49	CDR-EVA	Yes.
05 12 59 50	LMP-EVA	- - when you lift it up. Okay. We need some more. There you go. Wait a minute.
05 12 59 55	CDR-EVA	There; that's the game.
05 12 59 56	LMP-EVA	Wait a minute.

05 12 59 57	CDR-EVA	That's the game.
05 12 59 59	LMP-EVA	Yes, but you lost half of it that way.
05 13 00 05	LMP-EVA	Well, you still need some more, although one more scoop ought to do it though.
05 13 00 09	CDR-EVA	Ah, that's soft (laughter).
05 13 00 12	LMP-EVA	Watch yourself. You're getting close to the crater.
05 13 00 16	CDR-EVA	(laughter)
05 13 00 17	LMP-EVA	You get about 10 percent in there - -
05 13 00 19	CDR-EVA	... now?
05 13 00 20	LMP-EVA	You want to do one more, or is that good?
05 13 00 21	CDR-EVA	Okay (laughter).
05 13 00 22	LMP-EVA	One more and you'll make it.
05 13 00 25	CDR-EVA	(laughter) That's all. I'll just have to - There isn't anything holding it together. It takes me back in my childhood when I just - you know - you wanted to fling things in every direction.
05 13 00 34	LMP-EVA	Okay, that's it. Bag's full. And now let me put the lid on.
05 13 00 46	CDR-EVA	I'm sorry, but I (laughter) just can't ... turn to.
05 13 00 51	LMP-EVA	Okay.
05 13 00 52	CDR-EVA	Can I help you with that? Wait, wait, wait, wait.
05 13 00 53	LMP-EVA	Yes. Why don't you? I'll hold this and you get the lid.
05 13 01 00	CDR-EVA	Right here.
05 13 01 01	LMP-EVA	Okay.
05 13 01 04	CDR-EVA	Yes. Let go. I got it. Okay, you put the lid on.

05 13 01 07	LMP-EVA	All right. Here's the lid.
05 13 01 10	CDR-EVA	Boy.
05 13 01 12	LMP-EVA	Right on the top. Houston, this dirt came from about 8 inches down. Wait a minute, Houston.
05 13 01 20	CC	Copied. Eight inches down, and what's the sample bag number on that?
05 13 01 26	LMP-EVA	This is the deep trench sample in the - doesn't fit right there - all right - Okay, - Okay, on this? Now, lower it.
05 13 01 45	CDR-EVA	Isn't that ridiculous?
05 13 01 46	LMP-EVA	... time.
05 13 01 49	CDR-EVA	I'm just jamming on it. It's not sliding.
05 13 01 54	LMP-EVA	It's not this ... at ... I know. Now you hold it nice and tight.
05 13 01 57	CDR-EVA	I'll tell you what's the matter is that thing - you're getting - getting friction. Wait, wait. Hold her tight.
05 13 02 05	LMP-EVA	Here, I'll get it.
05 13 02 06	CDR-EVA	Okay.
05 13 02 09	LMP-EVA	You got it.
05 13 02 10	CDR-EVA	... oil. Suppose you're getting some vacuum welding? Huh?
05 13 02 17	LMP-EVA	No. That's okay.
05 13 02 18	CDR-EVA	That's it. Put her down tight.
05 13 02 20	LMP-EVA	A little bit more.
05 13 02 21	CDR-EVA	Go ahead. That's a boy.
05 13 02 23	LMP-EVA	Will you snap the top on?
05 13 02 24	CDR-EVA	Okay.
05 13 02 28	LMP-EVA	That's a good top in that one. Hold on. Don't let go. Good.

05 13 02 39	CDR-EVA	Okay. Now you need a core tube in the bottom of that trench. Is that right, Houston?
05 13 02 43	CC	That's affirmative. And, Al, when you get a chance can we get your photo numbers?
05 13 02 50	CDR-EVA	That's right - 50. And this is core tube number 2.
05 13 02 54	LMP-EVA	Core tube 2 and I'll need the - There you go. Ought to be a good place, Pete. Relatively fresh stuff here.
05 13 03 03	CDR-EVA	Yes. You'd better believe it. Very good. Okay.
05 13 03 08	LMP-EVA	This kind of pack you could almost drive it without a hammer; but, if you'll hand it to me, I'll get - -
05 13 03 11	CDR-EVA	Just a second. I want to take a couple more shots of this before we leave.
05 13 03 23	LMP-EVA	There. Okay.
05 13 03 28	CDR-EVA	They're all in. I'll get the pictures.
05 13 03 30	LMP-EVA	All right.
05 13 03 31	CDR-EVA	It's driving in real easy, Houston.
05 13 03 34	LMP-EVA	Go on ... all the way.
05 13 03 35	CC	Roger.
05 13 03 36	LMP-EVA	I can't lean down too far now. And we're driving it all the way in pretty easy.
05 13 03 42	CDR-EVA	That a boy. Wait 1. Stop. That's it.
05 13 03 47	LMP-EVA	Okay. Just a second. Let's put this up. Let me take a picture of it, Pete. Make sure we got it documented.
05 13 03 53	CDR-EVA	Do. ... old pictures. Okay.
05 13 04 01	LMP-EVA	All right. This dirt's gotten on my camera and I can't see the settings anymore. I'm going to have to do something about that.
05 13 04 23	LMP-EVA	Okay. You ready to put the top on this core tube?

05 13 04 25	CDR-EVA	You'd better believe it.
05 13 04 26	LMP-EVA	Okay. Here we come. I hope that soil stays in there.
05 13 04 36	CDR-EVA	See if it did.
05 13 04 37	LMP-EVA	Probably did because it stayed in your scoop so well.
05 13 04 40	CDR-EVA	You'd better believe it. It's full.
05 13 04 41	LMP-EVA	Okay.
05 13 04 42	CDR-EVA	Come over here with it.
05 13 04 43	LMP-EVA	All right. There you go. Better.
05 13 04 59	CDR-EVA	Good sample.
05 13 05 01	LMP-EVA	Yes. It is. A good sample.
05 13 05 03	CDR-EVA	There you go.
05 13 05 04	LMP-EVA	Ah, got the cap on the can.
05 13 05 06	CDR-EVA	That a boy.
05 13 05 07	LMP-EVA	Okay. Just a minute. Hunch. Done it.
05 13 05 12	CDR-EVA	Careful - -
05 13 05 13	LMP-EVA	Okay?
05 13 05 14	CDR-EVA	- - put the scoop back on. All right? And I'll stow it.
05 13 05 16	CDR-EVA	Okay, Houston. What else do you want here?
05 13 05 19	CC	Okay. We show you should have gotten in the trench site sample, the core tube samples from the end - from the bottom and also the gas analysis sample.
05 13 05 31	LMP-EVA	Okay. We need some little rock fragments from here, Pete. ... hold on - -
05 13 05 35	CC	Roger. That's surface rock fragments.
05 13 05 38	CDR-EVA	Okay. Just a second. Yes. We're going to get it; hold the phone.

05 13 05 41	LMP-EVA	Got to find it first. Do you know where the ...?
05 13 05 49	CDR-EVA	No. ...
05 13 06 02	LMP-EVA	I'll move it around and see if you see it.
05 13 06 05	CDR-EVA	Yes. Yes. Stick your hand straight down. Towards your knee; that a boy; you ought to have it.
05 13 06 11	LMP-EVA	Got it; I almost got it.
05 13 06 14	CDR-EVA	Some little rocks in here - -
05 13 06 15	LMP-EVA	Okay, little rocks ...
05 13 06 19	CC	Roger. Copy. You got some rocks and the gas analysis and would also confirm that you have gotten the environmental sample?
05 13 06 27	LMP-EVA	Pete, have you got the - -
05 13 06 28	CDR-EVA	We got the environmental sample, we got ... core tube, and I'm trying to find a little rock. Little rock? There - there's a lot - -
05 13 06 45	LMP-EVA	There's a neat one. There it is right there.
05 13 06 48	CDR-EVA	Ho-ho, just right for that little can.
05 13 06 52	LMP-EVA	Give me a few.
05 13 06 54	CDR-EVA	I think it shrunk.
05 13 06 58	CC	Al, your PLSS feedwater is back up to nominal and all looks good.
05 13 07 04	LMP-EVA	Okay. Thank you very much, Houston. See those bright shiny ones there?
05 13 07 07	CDR-EVA	Yes, yes, yes, yes.
05 13 07 09	LMP-EVA	Wait. Let's get a shot of them. Just move - Just a second, Pete.
05 13 07 11	CDR-EVA	Okay.
05 13 07 13	LMP-EVA	Okay. Got a picture of them.
05 13 07 18	LMP-EVA	Careful. ... There. How about those right - right there? There. Right - there. See them shine?

05 13 07 29	CDR-EVA	The little ones?
05 13 07 30	LMP-EVA	No, no. Move over this way. This way. Up - you're near about - right there.
05 13 07 36	CDR-EVA	No. Hey, that's a neat - oh, that's glass. Look at that.
05 13 07 40	LMP-EVA	Right next to it.
05 13 07 41	CDR-EVA	Yes, here. One at a time. Make a good sample for them.
05 13 07 46	LMP-EVA	And that piece right next to it, right there.
05 13 07 47	CDR-EVA	Okay.
05 13 07 49	LMP-EVA	Houston, how far are we from the LM?
05 13 07 52	CC	Stand by.
05 13 07 53	CDR-EVA	(Laughter)
05 13 07 55	LMP-EVA	... trick; wish we had -
05 13 07 56	CDR-EVA	(Laughter)
05 13 07 57	LMP-EVA	Hey, we need some more, Pete. Give me a bigger rock. There's not enough to do anything with.
05 13 08 00	CDR-EVA	(Laughter) Hey, come on, I'm getting tired of picking up those little things.
05 13 08 02	LMP-EVA	There's nothing in there.
05 13 08 04	CDR-EVA	I can't - Where is my stupid tool? There it is.
05 13 08 06	LMP-EVA	Get a big one. There's one right there.
05 13 08 08	CDR-EVA	Get a big what? Here, this one?
05 13 08 10	LMP-EVA	Yes.
05 13 08 12	CDR-EVA	I don't think that will fit.
05 13 08 14	LMP-EVA	Let's try it.
05 13 08 15	CDR-EVA	No, that won't - -
05 13 08 16	LMP-EVA	No ...

05 13 08 17	CC	Pete and Al, we show you 1200 feet from the LM.
05 13 08 22	CDR-EVA	Okay. Come on, Al, we're wasting time. There you go.
05 13 08 34	CC	Pete, as soon as you finish up there, you can head on back toward the east, towards halo crater. No need to go any further west.
05 13 08 43	LMP-EVA	Got it, Pete?
05 13 08 44	CDR-EVA	Yes. Wait. Let go a minute.
05 13 08 52	CDR-EVA	I'm with you, Houston.
05 13 09 00	LMP-EVA	Hey, good show, Pete; good turning.
05 13 09 06	CDR-EVA	There you go. The front of my lens is clean, relatively speaking. Nothing else is.
05 13 09 15	LMP-EVA	Okay. Want me to put that up?
05 13 09 17	CDR-EVA	Yes.
05 13 09 18	LMP-EVA	Okay. We got it.
05 13 09 20	CDR-EVA	Okay. Give me one gnomon and my shovel.
05 13 09 22	LMP-EVA	Here's your shovel.
05 13 09 24	CDR-EVA	Head for halo crater.
05 13 09 26	CC	Okay, Pete. We will give you a radar vector on this one. If you will go over - just directly east of bench crater, and you can continue on east until you are just about directly opposite the LM. And then a couple of more steps ought to take you right to halo crater.
05 13 09 45	CDR-EVA	Sounds like a pretty good vector. That also says that we are running right into the Sun. Does that agree with you?
05 13 09 51	CC	That's affirmative. You will be running right into the Sun and directly at your 9 o'clock position, you will see the LM. And then a couple of more steps and you'll be right there.
05 13 10 01	CDR-EVA	I've got the LM in sight to my 10 o'clock. You know what I feel like, Al?

05 13 10 11	LMP-EVA	What?
05 13 10 12	CDR-EVA	Did you ever see those pictures of giraffes running in slow motion?
05 13 10 16	LMP-EVA	...
05 13 10 17	CDR-EVA	- - that's exactly what I feel like (laughter).
05 13 10 21	CC	Say, would you giraffes give us some comment on your boot penetration as you move across there, what you're doing now, and what you had back there at sharp crater?
05 13 10 32	LMP-EVA	Oh, it's much firmer here. We don't sink in anywheres near as much. Now I'm crossing some of my own tracks.
05 13 10 38	CDR-EVA	Yes.
05 31 10 39	LMP-EVA	The toes sink in a bit, Pete, as you push off. You land flat-footed so your heels don't sink in; but, as you push off with your toes, they sink in down about 3 inches. Your heels are only sunk in perhaps an eighth of an inch.
05 13 10 52	CC	Roger. Thank you, Al.
05 13 10 53	LMP-EVA	- - kick off on your toe. Every time he lands he sends a - little particles spraying out ahead of him, and beside him and everywhere else. They go out to distances maybe 2 feet to 3 feet around him.
05 13 11 12	CDR-EVA	Okay. We're back at bench crater. Now, have we gone too close towards the LM?
05 31 11 27	CDR-EVA	Going on the south side of bench crater, Houston.
05 13 11 30	CC	Okay. Now, if you'll just go directly to the east of the center of bench crater and then continue directly east right into the Sun; and then at 9 o'clock, you'll see the LM, and a couple of more steps and you'll be there.
05 13 11 45	CDR-EVA	Okay.
05 13 11 59	CDR-EVA	I've got the decided feeling I'm going to sleep tonight.

05 13 12 21	CC	Pete, the crater you're looking for, halo crater, is just about the same size as sharp crater and should resemble it.
05 13 12 31	CDR-EVA	I think I have it in sight, but I'm not sure. I ... I'll tell you what I'm going to do, Houston. I'm going to take an EMU break. How you doing, Al?
05 13 12 44	LMP-EVA	Okay.
05 13 12 52	CC	Pete, the dimension on halo crater is about 20 feet, so that would make it half of what you saw at sharp.
05 13 13 03	CDR-EVA	Okay. Now, halo. I wonder if I'm standing - You suppose this is it, Al?
05 13 13 09	LMP-EVA	Well, it doesn't have any halo around it.
05 13 13 13	CDR-EVA	Yes, I know. But you never can tell from here.
05 13 13 17	LMP-EVA	You can look at the map when you get here.
05 13 13 20	CMP-EVA	Tell you one thing I'd go for is a good drink of ice water.
05 13 13 23	LMP-EVA	Quit thinking that. Let me look in the map, Pete.
05 13 13 30	CDR-EVA	Okay.
05 13 13 31	CC	Pete and Al, can we have an EMU check? And one way to locate it, also, is that it should be right on the rim of Surveyor crater, and you ought to see Surveyor off directly to the northeast.
05 13 13 48	CDR-EVA	Okay. I - I - I know where we are. And, EMU check of mine reads about 55 percent O_2, Houston.
05 13 13 57	LMP-EVA	Mine reads 55 O_2 also, Houston.
05 13 14 00	CC	Copy. Fifty-five both.
05 13 14 02	CDR-EVA	... beautiful. Round glass ball they got to have, Al. Quarter of an inch.
05 13 14 14	CDR-EVA	And the sample bag.
05 13 14 16	LMP-EVA	Coming. Coming.
05 13 14 19	CDR-EVA	Look at that.

05 13 14 24	LMP-EVA	Okay; just a second. First time I've worked up a heart rate, I think.
05 13 14 34	CDR-EVA	Okay.
05 13 14 35	LMP-EVA	This is sample bag 11D.
05 13 14 37	CDR-EVA	I didn't take a picture. I just wanted to - -
05 13 14 39	CDR-EVA	Okay. Watch that crater behind you. Don't step back.
05 13 14 48	LMP-EVA	Wait a minute.
05 13 14 51	CDR-EVA	This is glass beads.
05 13 14 52	LMP-EVA	I know. I was thinking of this. We got to - total of about 5 pounds of rocks.
05 13 14 56	CDR	Okay.
05 13 14 57	LMP-EVA	I'd hate to - I'd hate to have us get back to the LM and then have to fill it up around here again.
05 13 15 02	CDR-EVA	Ah, we're going to the Surveyor crater.
05 13 15 05	LMP-EVA	Okay.
05 13 15 06	CDR-EVA	... get to the bottom of that baby.
05 13 15 08	LMP-EVA	Why don't you take a rest here?
05 13 15 09	CDR-EVA	Yes.
05 13 15 10	LMP-EVA	Funny. Do - do your hands get hot holding that shovel?
05 13 15 14	CDR-EVA	My hands just get hot, period. I guess - I don't know whether it is the shovel or what.
05 13 15 18	LMP-EVA	You know, as long as it - like now, mine are cool. But the minute I start carrying this tool carrier, they start warming up. Wouldn't think the thing would be that hot.
05 13 15 25	CDR-EVA	Yes. Yes - I - I'll tell you what - Let's see, we're cross-Sun, right? Look over here at me and smile.
05 13 15 32	LMP-EVA	Okay. Have a picture. You're right there by a crater.

05 13 15 36	CDR-EVA	There's the LM. Right in the background. Looked great. There you go.
05 13 15 49	CDR-EVA	All right. Let's - Let's ease off at a nice - -
05 13 15 51	LMP-EVA	- - Okay ... - -
05 13 15 52	CDR-EVA	- - at a slower pace. Just like you're going now. I think this is halo crater right up here in front of us.
05 13 16 11	LMP-EVA	Hey, Ed, you might tell Fred Haise he ought to quit working on running and work on holding things in his hands. ... My legs don't get a bit tired, but your hands get tired carrying these tools, particularly the handtool carrier.
05 13 16 29	CC	Roger, Al. Sure will. I'm sure he is listening.
05 13 16 31	LMP-EVA	Yes. You wouldn't - Yes, I think that's - Yes, that's - That's funny. It - You wouldn't think it that way.
05 13 16 40	CDR-EVA	Tell Jim Lovell to practice digging (laughter).
05 13 16 45	LMP-EVA	Boy, look at - look at all the texturing - Look here, Pete; now we are crossing across something that's got a completely different texture than what we have been on.
05 13 16 52	CDR-EVA	You're right.
05 13 16 53	LMP-EVA	Look at all - look here. We got all sorts of - -
05 13 16 54	CDR-EVA	This is halo - Let's take some pictures here.
05 13 16 59	LMP-EVA	This - We've run across a sort of a textural contact. We're suddenly on a - on an area that's quite - not so smooth; it's got dimples and wrinkles in it. You want me to take some pictures or what, Pete?
05 13 17 11	CDR-EVA	Yes. Why don't you come up here - -
05 13 17 13	LMP-EVA	Okay.
05 13 17 14	CDR-EVA	- - and we will take a couple of good dirt bag samples of this stuff.
05 13 17 16	LMP-EVA	Okay.

05 13 17 17	CDR-EVA	I will get the - -
05 13 17 20	LMP-EVA	It's interesting. You know, I think this looks like that material that we talked about the first day in front of the LM. Maybe it runs past the LM down into this area. But it's sure different than where we've been. It looks almost like it - like it's more - the material is more cohesive and forms clumps, instead of being so nice and smooth. ... around behind you.
05 13 17 28	CDR-EVA	I was waiting for the gnomon to damp out, but - -
05 13 17 55	LMP-EVA	Okay. Right here. Good shot here, Pete.
05 13 17 58	CDR-EVA	I wanted to get my foot - footprints in it too, so they can see that.
05 13 18 02	LMP-EVA	Okay.
05 13 18 05	CDR-EVA	Uh-oh.
05 13 18 10	LMP-EVA	You know, I think I will take some a little further away. Back up a little, and shoot a 15-foot one if it's okay.
05 13 18 18	CDR-EVA	Yes. I'm going to dig.
05 13 18 22	LMP-EVA	All right. I will be back to collect it in just a second; let me get this 15 footer.
05 13 18 27	CDR-EVA	It's halo crater. It has slightly big - Yes.
05 13 18 33	LMP-EVA	Hey, I'm shooting about four here. Okay. ... interesting that this - -
05 13 18 42	CDR-EVA	Just get some sample bags and we'll - -
05 13 18 44	LMP-EVA	Okay, Pete.
05 13 18 45	CDR-EVA	- - scoop this stuff.
05 13 18 46	LMP-EVA	Okay.
05 13 18 47	CDR-EVA	Let me - Boy, it sure is fine; it's kind of like over at the other - at sharp crater.
05 13 18 55	LMP-EVA	Yes. Looks the same, except on the surface it just seems - -
05 13 18 58	CDR-EVA	Except it looks almost finer.

05 13 19 00	LMP-EVA	Yes.
05 13 19 01	CDR-EVA	Wait a minute and I'll get you another bag - -
05 13 19 02	LMP-EVA	It's funny though. If you saw this on Earth, you would think it was a - a real soft dirt that it had just been rained on recently. ... Not hard rain, but just a sprinkle, so that the droplets - -
05 13 19 14	CDR-EVA	There you go.
05 13 19 15	LMP-EVA	Now, that's a good sample bag full.
05 13 19 17	LMP-EVA	That's 12D, Houston, the sample bag number - -
05 13 19 20	CDR-EVA	- - Is halo crater a shallow crater, Houston? With a couple or three dimple craters in the south side of it?
05 13 19 31	CC	Stand by, Pete.
05 13 19 34	CDR-EVA	Okay.
05 13 19 35	LMP-EVA	We can collect the rock while we wait, Pete.
05 13 19 38	CDR-EVA	Yes, I - Well, look; I think this is halo crater right here.
05 13 19 41	LMP-EVA	All right. Let's ease over there - -
05 13 19 42	CDR-EVA	- - And let's go get some rocks from it and everything; we're seeing it right; we - we - we're - We've actually got the soil sample from part of it.
05 13 19 49	LMP-EVA	Okay.
05 13 20 09	CDR-EVA	But this isn't 20 feet in diameter. Is it right on the rim of the Surveyor crater, Houston?

05 13 20 15	CC	That's affirmative; and, from your comments on the three dimples, we show that you're there.
05 13 20 22	CDR-EVA	Okay. What do you want in it?
05 13 20 26	CC	We'd like to get the PAN and a double core tube.
05 13 20 27	CDR-EVA	...
05 13 20 33	LMP-EVA	I can't believe we're at the right place.
05 13 20 35	CDR-EVA	I - I'm not sure we're at the right place, either. Let me look at the top of this hill here. This is Surveyor crater. Let me look at the chart.
05 13 20 44	LMP-EVA	There's a nice rock right there.
05 13 20 45	CDR-EVA	Here's Surveyor.
05 13 20 49	LMP-EVA	Let me look at the map. Not even hardly a crater worth looking at where we are.
05 13 20 58	LMP-EVA	Okay.
05 13 20 59	CC	Okay, Pete. It's your call there. You're the local experts. If you see a better location for that double core tube, go ahead.
05 13 21 10	CDR-EVA	Yes. We're trying to find the right - right crater, Houston.
05 13 21 15	LMP-EVA	Hey, Pete. I think it's that area right over there - there. That's the - Halo is this first one right here, the little one, and then all those others are next over according to the chart.
05 13 21 24	CDR-EVA	Okay.
05 13 21 25	LMP-EVA	- - So we can just go over there and - -
05 13 21 27	CDR-EVA	Which one's halo? This one right here?
05 13 21 29	LMP-EVA	This - no, it's right - You see where I'm pointing?
05 13 21 31	CDR-EVA	No.
05 13 21 32	LMP-EVA	As I see it, it's that one right over there.
05 13 21 34	CDR-EVA	Okay. Let's go.
05 13 21 36	LMP-EVA	Okay.

05 13 21 37	CDR-EVA	And I have the double core tube?
05 13 21 38	LMP-EVA	All right.
05 13 21 39	CDR-EVA	And you want what, Houston, a partial PAN?
05 13 21 44	CC	That's affirmative. We'd like a full PAN at that point, Pete.
05 13 21 50	CDR-EVA	I just ... - -
05 13 21 51	CC	And also, Al, if you could give us some sort of an estimate of how hard it is to get the core tube in. That is, what's the force you have to use; how many pounds and how much force.
05 13 22 01	LMP-EVA	Sure will.
05 13 22 02	CDR-EVA	Hey, look at this little neat-o crater right here. It's a good place to sample.
05 13 22 16	LMP-EVA	Oh, look at all the glass in the bottom of that baby. Got a lot of that though.
05 13 22 20	CDR-EVA	Huh?
05 13 22 21	LMP-EVA	Got a lot of glass.
05 13 22 22	CDR-EVA	Out there?
05 13 22 23	LMP-EVA	Yes.
05 13 22 24	CDR-EVA	I think that's halo right there.
05 13 22 25	LMP-EVA	Which one?
05 13 22 26	CDR-EVA	The one you're looking at. Right over ... that one - that one right there.
05 13 22 29	LMP-EVA	Too big.
05 13 22 30	CDR-EVA	Too big, huh?
05 13 22 31	LMP-EVA	Let's take this one right here.
05 13 22 34	CDR-EVA	All right. That's good. Lots of glass down in the bottom of this baby - -
05 13 22 42	CC	Pete and Al, could we have a readout on the cameras at this point?
05 13 22 46	LMP-EVA	Sure could. Just a second. Yes. - See mine probably, Pete.

05 13 22 51	CDR-EVA	You'd better take all these pictures. I'm running out.
05 13 22 53	LMP-EVA	Well, I'd better change cameras because - -
05 13 22 54	CDR-EVA	Sixty - 60 for Al. - -
05 13 22 56	LMP-EVA	Let's see. You've got 110. You've got plenty to go.
05 13 22 59	CDR-EVA	Hey, I - You know what's happened?
05 13 23 01	LMP-EVA	No.
05 13 23 02	CDR-EVA	This thing hasn't been taking every picture.
05 13 23 03	LMP-EVA	Take a picture and let's see.
05 13 23 04	CDR-EVA	I - I just caught it. I - I mean it's been doing it intermittently.
05 13 23 07	LMP-EVA	Okay. Now ... get out and make the double core tube here.
05 13 23 17	CC	Pete, we copy 60 and 110 on the film.
05 13 23 23	CDR-EVA	That's affirm.
05 13 23 24	LMP-EVA	Here, look at the chart a minute, Pete, while ... - -
05 13 23 26	CDR-EVA	Yes. Okay. ... be careful. ...
05 13 23 55	CC	Pete and Al, we'd like you to go ahead and get the PAN's taken on the LMP's camera. You can either have Al do the PAN's or switch cameras. Your choice.
05 13 24 10	CDR-EVA	Okay. Roger-Roger.
05 13 24 14	LMP-EVA	Okay, Pete. You'll have to unscrew - pull the pin and unscrew that if you can.
05 13 24 27	CDR-EVA	Okay.
05 13 24 28	LMP-EVA	Good luck on unscrewing it. Hey, wait. Hold it just a second.
05 13 24 33	CDR-EVA	I'll get it.
05 13 24 34	LMP-EVA	Okay. Hey, good show.

05 13 24 39 CDR-EVA Okay.

GOSS NET 2 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

05 13 24 36	CMP	Yankee Clipper, Houston.
05 13 24 40	CC	Clipper, we read you loud and clear.
05 13 24 45	CMP	Roger.
05 13 24 49	CC	Dick, they're pressing right on with the EVA, and they're about two-thirds of the way towards - through the traverse and just working their way over towards Surveyor.
05 13 25 01	CMP	Okay.
05 13 25 25	CMP	Ed, would you like to have my torquing angles from P52?
05 13 25 30	CC	Stand by.
05 13 27 30	CC	Clipper, Houston. Negative copy on those torquing angles. And we have two map updates for you. We have 26 and 27. And Lansberg A update P22 and your F-158, REV 27 update when you're ready to copy.
05 13 27 51	CMP	I'm ready to copy, and I can read out the P52 angles, if you want them.
05 13 28 01	CC	Roger, Dick. Go ahead and read them down. We're standing by to copy.
05 13 28 08	CMP	Okay, R-1 was plus 0.255, R-2 was minus 0.228, and R-3 was plus 0.141; platform was torqued at GET of 132 plus 45 plus 00.
05 13 28 28	CC	Yankee Clipper, you were breaking up. We did not copy that. Stand by. We'll see if we can get a little better COMM.
05 13 28 42	CMP	How you hear me now, Houston?
05 13 28 45	CC	Okay. That's much better, Dick. Go ahead with those angles.
05 13 28 50	CMP	Okay. Plus 0.255, minus 0.228, plus 0.141; the platform was torqued at 132 plus 45 plus 00.
05 13 29 09	CC	Copy plus 0.255, minus 0.228, plus 0.141, and torqued at 132:45:00.

05 13 29 22	CMP	Charlie. I'm ready to copy.
05 13 29 27	CC	Okay, map update, REV 26: 132:37:34, 133:02:27, 133:23:47. Map update, REV 27: 134:36:04, 135:00:51, 135:22:17. P22, Lansberg A, REV 26: T_1 134:05:06, 134:10:08, and you're north 3 miles. And last PAD is F-158, REV 27. Stand by. Clipper, going ahead with that update, T_1 135:21:11, 135:31:11; T_3 135:42:11, 136:04:11. Read back.
05 13 31 20	CMP	Okay. REV 27, LOS 134:36:04, 135:00:51, 135:22:17. P22 PAD for Lansberg A, T_1 is 134:05:06; T_2, 134:10:08; 3 miles north. F-158; REV 27; T_1, 135:21:11; T_2, 135:32:11; T_3 is 135:42:11; T_4 is 136:04:11. Over.
05 13 31 59	CC	Dick, all back - all readback is correct except for T_2, and that's 135:31:11.
05 13 32 08	CMP	135:31:11.
05 13 32 11	CC	That's affirmative.
05 13 32 15	CMP	Okay. I got some work to do. Thank you.
05 13 32 18	CC	Very good. We'll be getting you back to relay.

GOSS NET 1 COMMUNICATIONS BETWEEN CC AND LM RESUME

05 13 32 42	CDR-EVA	Double core tube. You can drive it. Give it a go.
05 13 32 47	LMP-EVA	I'm going to hand you the hammer. I'm not sure that double core tube screws on as far as it should. Try it again.
05 13 32 57	CC	Pete and Al, Houston. Be sure you give us the number of the lower core tube, please.
05 13 25 05	LMP-EVA	Okay. The lower core tube is number 3, I think. Yes.
05 13 25 09	CDR-EVA	Three?
05 13 25 10	LMP-EVA	Three, and the upper one's 1.
05 13 25 12	LMP-EVA	Okay.

05 13 25 13	CDR-EVA	Ready to pound it.
05 13 25 14	LMP-EVA	Where are you going to drive it?
05 13 25 16	CDR-EVA	Where would you recommend?
05 13 25 17	LMP-EVA	Well, let's go over to this crater right here.
05 13 25 19	CDR-EVA	Okay.
05 13 25 23	LMP-EVA	Where it's soft around those little ... craters.
05 13 25 29	LMP-EVA	About right here.
05 13 25 31	CDR-EVA	Yes.
05 13 25 33	LMP-EVA	Want to take a picture?
05 13 25 34	CDR-EVA	Yes.
05 13 25 36	LMP-EVA	- - I can shove it in that little - I hope this is a good soft place.
05 13 25 39	CDR-EVA	Yes.
05 13 25 41	LMP-EVA	It seems to be. Oh, I hit something solid there. Well, I shoved it in - I used all my weight, Houston, and shoved it in about 11 inches. Now, I'll just pound on it a while and see what we can do. It ... be going in okay. Yes. It's going in down.
05 13 25 50	CDR-EVA	Keep ...
05 13 26 02	LMP-EVA	No. We've got a good spot. I don't think - really think this is the right place. Some of those things aren't so obvious.
05 13 26 11	CDR-EVA	Got awful solid, didn't it?
05 13 26 13	LMP-EVA	Yes, it's going. Let me wiggle it a bit. It's got one core tube completely in now. Have to hit it harder.
05 13 26 31	LMP-EVA	Hey, Houston. This hammer - when you hit on the side of it, like you have to ... it knocks little chips of metal off the side of the hammer. I don't think that's too good.
05 13 26 46	CC	Roger, Al. Is it damaging the hammer or the core tube?

05 13 26 55	LMP-EVA	I'm afraid some of the fragments will damage the suit. It's not damaging itself. You know, it's it's just breaking the - Hey, I'm better left handed than right. There goes another fragment. Do you see it, Pete?
05 13 27 06	CDR-EVA	Yes, I'm watching.
05 13 27 11	LMP-EVA	You even hit it with the front end and some of them pop off. They're flying all over the place.
05 13 27 17	CDR-EVA	Okay. He's up to the bottom of the handgrip portion of the upper tube. He's really driving that baby.
05 13 27 24	LMP-EVA	Look at that ham - look at that - look at that (laughter). It looks like it's got a coating over the hammer, Pete, and I'm knocking the coating. Instead of being steel or aluminum hammer, it's -
05 13 27 34	CDR-EVA	Yes.
05 13 27 35	LMP-EVA	- some sort of coated arrangement.
05 13 27 37	CC	That's affirmative, Al. There is a coating on that hammer and that's probably what you're knocking off. And also, we want to be sure to get the site there documented.
05 13 27 47	CDR-EVA	We'll document it for you.
05 13 27 50	LMP-EVA	Coming up.
05 13 27 51	CDR-EVA	We almost got it.
05 13 27 52	LMP-EVA	Ooh! Almost.
05 13 27 54	CDR-EVA	Hit something solid there, didn't you?
05 13 27 56	LMP-EVA	No. It's just getting down there, Pete.
05 13 27 58	CDR-EVA	Hey, that baby is in the ground.
05 13 28 00	LMP-EVA	We've got a double. Now the question is can we pull it out?
05 13 28 02	CDR-EVA	(Laughter)
05 13 28 03	LMP-EVA	... Let me get the ... I hope that's a good spot.
05 13 28 08	CDR-EVA	I do, too.

05 13 28 15	LMP-EVA	Ought to get some of these rocks nearby here.
05 13 28 21	LMP-EVA	Come on. Let's see here. 250, 11. All right.
05 13 28 32	LMP-EVA	You give them that low PAN or something, so they can see where this came from. So they - -
05 13 28 35	CDR-EVA	You - You do it. I don't have that much film.
05 13 28 37	LMP-EVA	Okay. Why don't I just trade you cameras? That's probably the smart way.
05 13 28 41	CDR-EVA	All right.
05 13 28 48	LMP-EVA	Hey, would you lift mine off when you're through?
05 13 28 51	LMP-EVA	Sure will.
05 13 28 52	CDR-EVA	I can't pull those things right. They tend to vacuum weld a little bit or something, I think.
05 13 28 59	CDR-EVA	Can you hold that one?
05 13 29 00	LMP-EVA	Hey, that's about to come apart.
05 13 29 02	CDR-EVA	I'll be darned if it isn't. I'll fix it to hold the handle there. ... back ...
05 13 29 08	CDR-EVA	Whoa!
05 13 29 09	LMP-EVA	It did come apart. It did come apart.
05 13 29 11	LMP-EVA	Son of a gun.
05 13 29 13	CDR-EVA	Well, that kind of bombed out. I tell you what, the only thing we can - did it - -
05 13 29 18	LMP-EVA	It broke!
05 13 29 19	CDR-EVA	Sure did break.
05 13 29 22	LMP-EVA	Well, I'll tell you what happened, Houston. The nut that holds the handle of the camera on broke off. And so, the handle's free, but that's okay. We'll just carry it around.
05 13 29 26	CDR-EVA	Let me ask you a question.
05 13 29 38	CC	Roger, Al. We got you. We - we understand that the nut broke, but you - The camera is still usable, right?

05 13 29 46	LMP-EVA	Yes. And your nut's loose too, Pete. Stay - Stay there. Let me tighten it up for you. Think they work loose in one-sixth g; yet, we - we knew that, we should have watched it more carefully ... Can you help do that yourself?
05 13 30 04	CDR-EVA	Yes.
05 13 30 05	LMP-EVA	Because it's hard for me to do.
05 13 30 06	CDR-EVA	Yes.
05 13 30 07	LMP-EVA	Let me go put the hammer up and this camera somewhere and I'll be right back. There goes the bracket, but that's okay. Still got the camera.
05 13 30 27	CDR-EVA	But you're going to have to help you get this camera off. ...
05 13 30 30	LMP-EVA	Okay. There's no need to get it off now.
05 13 30 35	CDR-EVA	Okay. I'll leave it on. No; I want to give it to you.
05 13 30 39	LMP-EVA	And you're going to use this one?
05 13 30 42	CDR-EVA	Al, you got to take the Surveyor pictures, so why don't I give you the camera?
05 13 30 46	LMP-EVA	Okay. That's good enough.
05 13 30 49	CDR-EVA	But, we've still got 50 pictures or so. Now watch it. Make sure it takes a picture each time it turns.
05 13 30 54	LMP-EVA	Okay.
05 13 30 55	CDR-EVA	And just - Why don't you - The camera - I'll tell you what - Well, here, I'll hold it and you take this one off.
05 13 31 01	LMP-EVA	Okay. You got that camera. Take this one off. Help me take it off; now I'll tighten the nut. And I'm going to tip it down a little bit.
05 13 31 12	CDR-EVA	Okay. And then I'll hold that down.
05 13 31 13	LMP-EVA	There you go. Tip it - Push - Push your RCU down a little bit more.
05 13 31 18	CDR-EVA	I'm trying to.

05 13 31 19	LMP-EVA	A bit more. It's almost off, Pete. ... Push down some more.
05 13 31 25	CDR-EVA	I can't.
05 13 31 26	LMP-EVA	There you go. Okay, now. I can tighten this thing. Yes, I'm tightening so it'll get tight. Okay. I got enough, there; that'll be enough. Now about right there.
05 13 31 46	CDR-EVA	All right. I'll drop that one in here.
05 13 31 47	LMP-EVA	Well, why don't you - ... - -
05 13 31 48	CDR-EVA	... carry it.
05 13 31 50	LMP-EVA	Well, that's what I'd do. Carry it or something.
05 13 31 52	CDR-EVA	But - but, I got too much other stuff.
05 13 31 54	LMP-EVA	I - Let me carry part of it or something. Okay. Let me go pull out the core tube.
05 13 31 58	CDR-EVA	No, I tell you what. We can always take the magazine off this and put it on the other one.
05 13 32 01	LMP-EVA	That's what we can do, I guess.
05 13 32 03	CDR-EVA	Yes. We just drop it in here.
05 13 32 05	LMP-EVA	Okay.
05 13 32 06	CDR-EVA	All right. Let's go get your core tube. I'll go get it.
05 13 32 09	LMP-EVA	Okay. You go get it. Here I'll - -
05 13 32 10	CDR-EVA	- - get the cap off.
05 13 32 12	LMP-EVA	Take the cap, right here.
05 13 32 15	CDR-EVA	Okay. Hey, you sure beat on it.
05 13 32 23	LMP-EVA	That's what it took to get it in the ground.
05 13 32 26	CDR-EVA	It's coming up real easy.
05 13 32 28	LMP-EVA	What?
05 13 32 31	CDR-EVA	I say it's coming up real easy.

05 13 32 35	LMP-EVA	Looked for a minute like you were going down real easy (laughter). The core tube hangs in and your feet just sink down. Okay, hold.
05 13 32 48	CDR-EVA	Hey, we made a tactical error here.
05 13 32 51	LMP-EVA	In what fashion?
05 13 32 53	CDR-EVA	I think we dropped an end of the tube we shouldn't have dropped.
05 13 32 56	LMP-EVA	No.
05 13 32 57	CDR-EVA	Yes. We got to take them apart. Remember?
05 13 33 01	LMP-EVA	Okay. Well, what we'll have to do is pick it up, right over there.
05 13 33 05	CDR-EVA	Where is it?
05 13 33 06	LMP-EVA	It's right over here.
05 13 33 07	CDR-EVA	Okay.
05 13 33 13	LMP-EVA	Hold - hold on. We'll find it.
05 13 33 16	CDR-EVA	It's right back there. It's someplace buried in the dirt. I see it. Ha. Ha. Right here. Wait a minute. I'll get it with the - Here, you hold the core tube.
05 13 33 24	LMP-EVA	Okay. Just a second. Just a second. Okay. I've got the core tube. I'll start unscrewing it. - -
05 13 33 33	CDR-EVA	Where's my sample stir?
05 13 33 35	LMP-EVA	Right there. You got it, Pete. All right. You got your hose too. Pull. ... - There you go. Good show.
05 13 33 53	LMP-EVA	Uh-oh.
05 13 33 54	CDR-EVA	What?
05 13 33 55	LMP-EVA	Hey, this ain't going to work here, gang.
05 13 33 56	CDR-EVA	Why?
05 13 33 57	LMP-EVA	Well, see the - Here, wait a minute. Reach inside the core tube. Wait. Which goes which - There you go. Beautiful. Right down in there. You got it? You got that one? Okay?

05 13 34 11	CDR-EVA	Yes.
05 13 34 12	LMP-EVA	Boy, I drove a nice core tube in there.
05 13 34 15	CDR-EVA	Well, it doesn't look any different, though, from the eye - halfway down.
05 13 34 24	LMP-EVA	Loan me the tweezers a moment. See that cap right there? The cap right there. Okay.
05 13 34 41	CDR-EVA	Ooh. Can you haul the camera now?
05 13 34 44	LMP-EVA	Sure. I can lift - Why don't I just lift this up?
05 13 34 55	LMP-EVA	Well, there goes the shovel, but we can get that in a minute.
05 13 34 58	CDR-EVA	Okay? You got it?
05 13 35 01	LMP-EVA	Wait. Just a little closer? Now, wait a - wait. Hold it right there.
05 13 35 16	CDR-EVA	Okay.
05 13 35 18	LMP-EVA	That a boy. ...
05 13 35 28	LMP-EVA	Good show there, Commander.
05 13 35 31	CDR-EVA	Let me hold on to that thing.
05 13 35 33	LMP-EVA	Right. ... Okay. You got her?
05 13 35 41	LMP-EVA	Is this on there tight enough?
05 13 35 42	CDR-EVA	Yes.
05 13 35 43	LMP-EVA	Okay. Put the shovel back on here? I'll get it. Okay. Looks good, Pete.
05 13 35 58	CC	Pete, we copy that you finished the core tube. Is that affirm?
05 13 36 02	CDR-EVA	Yes, sir. We got a double core tube, and all put together correctly.
05 13 36 08	CC	Very good. Well done. Have you gotten the penorama?

05 13 36 15	CDR-EVA	No, I'm going to get Al to do that right now. He's using my camera. His camera's had it. With the handle off it and everything, by the time we got done handling it, we got dirt all over the lens. We run out of film; we happen to have another magazine with us, or change that one - -
05 13 36 34	LMP-EVA	- - Don't change that; just take that one off.
05 13 36 36	CDR-EVA	Or we could do that or - -
05 13 36 37	LMP-EVA	Of course, we don't want to, but if we have to, I guess we can. Okay. Let me start this PAN.
05 13 36 42	CDR-EVA	Seventy-four.
05 13 36 44	LMP-EVA	Seventy-four it is, f:11, 250. Okay?
05 13 36 50	CDR-EVA	Okay, Houston. What else would you like here?
05 13 36 55	CC	Okay, Pete. You're 2 hours and 7 minutes into the EVA. And we show you leaving halo at around 2:15. And now that's for a 4-hour EVA. We've extended you to 30 minutes for a total EVA of 4 hours. We'd like, before you go on, to have a good EMU check and sit down and regroup and figure out a plan of attack on the Surveyor. One thing we would like to make sure is that you remain away from directly below the Surveyor as you move up to it. That is, move up to on one side or the other, either north or south.
05 13 37 32	CDR-EVA	Okay. We concurred with that. We were talking about it last night. We're going to approach it from the side.
05 13 37 42	CC	Roger.
05 13 37 54	LMP-EVA	That's it, Pete. PAN's complete. Probably ought to get rocks - one of these rocks here just throw it in the bag - -
05 13 38 01	CDR-EVA	Yes. I think we ought to.
05 13 38 03	LMP-EVA	How about - You want to get this one?
05 13 38 05	CDR-EVA	... a sample bag.
05 13 38 08	LMP-EVA	Let's - Let's sample a couple of these laying right over here.
05 13 38 10	CDR-EVA	Good idea. That a boy.

05 13 38 18	LMP-EVA	Oh wow, my ears just came back down.
05 13 38 26	CDR-EVA	Just a second. I shouldn't have done that.
05 13 38 30	LMP-EVA	Okay. Here, take one quick picture so we can save some film.
05 13 38 35	CDR-EVA	All right. Here it goes.
05 13 38 36	LMP-EVA	- - where it came from.
05 13 38 37	CDR-EVA	Okay. Just a second.
05 13 38 53	LMP-EVA	Those little holders for this - for these sample bags are ridiculous, you know. In this light gravity up here, if you put anything in the holder and move, it flips it right out of it. Come out of there, sample bag. There you go. Funny how this one - Go in there. Go in - That a boy. Give me some of that dirt around there too, Pete. Drop it right in. This is going in sample bag 13D, Houston.
05 13 39 23	CC	Roger, Al.
05 13 39 26	CDR-EVA	Al, let's move up on the rim of the Surveyor crater and start getting some rocks, gnomon, - And we'll ...
05 13 40 14	CC	Al, could we have some sample bag numbers while you're working along there?
05 13 40 20	LMP-EVA	Sure could. I thought I - Didn't I call out 13D, Houston? I guess I didn't call it out loud enough. I think it was 13D. Then - Let me then check the next one and if you - The next time we stop I will tell you the next one for sure and then you will know what it is.
05 13 40 33	CC	Roger. Thank you, Al.
05 13 40 41	CDR-EVA	Al, look at these rocks; they look a little bit different. Let's grab some.
05 13 40 45	LMP-EVA	Yes, sir.
05 13 40 50	CDR-EVA	Look at that glass in the bottom of that one. They look like granites, don't they?
05 13 41 00	LMP-EVA	They do; they look just like granite. Here's a beauty over - Here's a beauty.

05 13 41 05	CDR-EVA	Where?
05 13 41 06	LMP-EVA	Right here. That is a nice rock.
05 13 41 08	CDR-EVA	Huh?
05 13 41 09	LMP-EVA	Right around here. Let's get this one for sure. Right there.
05 13 41 13	CDR-EVA	Okay.
05 13 41 14	LMP-EVA	... in the bag, but it is sure different. It seems to have some - -
05 13 41 18	CDR-EVA	Got a big glass splotch on it.
05 13 41 20	LMP-EVA	Yes. That's a good one. That's a real good rock. Get some pictures - -
05 13 41 23	CDR-EVA	- - Wait. Wait. Wait. Wait. Okay. ...
05 13 41 31	LMP-EVA	That's a beauty. That gnomon doesn't really damp as fast as it should you know, Pete. I think it does great in one g, but one-sixth g, it won't - doesn't seem to damp right. Let me get the cross-Suns too. Oops, got to get over where you are.
05 13 41 51	LMP-EVA	Okay. Okay. We will just put that in; that's a beautiful rock.
05 13 41 59	CDR-EVA	Okay. You able to scoop it up? You know you need some tongs that will get bigger samples than we have got.
05 13 42 12	LMP-EVA	All right. Watch that.
05 13 42 17	CDR-EVA	You know seeing that, I just thought -
05 13 42 19	LMP-EVA	Hey, that's beautiful. It's got a lot of -
05 13 42 23	CDR-EVA	Don't drop it.
05 13 42 24	LMP-EVA	Nearly dropped it. Tough to hold it.
05 13 42 27	CDR-EVA	Okay. Now I want some of these granites over here - looks like granite.
05 13 42 32	LMP-EVA	Okay. Let's try that.
05 13 42 36	CDR-EVA	Doesn't that LM look neat, sitting on the other side of that crater?

05 13 42 39	LMP-EVA	(Laughter) Yes. It does; we ought to get a shot of that.
05 13 42 42	CDR-EVA	Yes. Get a shot of home.
05 13 42 47	LMP-EVA	Okay. Let me see, how many shots have I got now, Pete?
05 13 42 50	CDR-EVA	143.
05 13 42 55	LMP-EVA	143, okay - -
05 13 42 56	CDR-EVA	- - You're getting close to the end with it.
05 13 42 57	LMP-EVA	Okay. That's 14D, Houston, is the next sample bag, so the last one was 13D. Let me take a picture quick here.
05 13 43 05	CC	Roger, Intrepid. We copy that.
05 13 43 07	CDR-EVA	Ah-uh-ow.
05 13 43 17	CDR-EVA	Al, why don't you step across over here?
05 13 43 19	LMP-EVA	All right.
05 13 43 20	CDR-EVA	Step across over there; photograph that rock right there - Wait until I drop the gnomon in - -
05 13 43 24	LMP-EVA	Okay.
05 13 43 25	CDR-EVA	- - and do it in such a manner as to get this crater that it came out of.
05 13 43 28	LMP-EVA	That's a good idea. Let me see if I can; I'll have to back - Let me get a 15-foot shot.
05 13 43 32	CDR-EVA	Yes. That's just what I was just thinking.
05 13 43 34	CC	Pete, could we have your present position?
05 13 43 37	LMP-EVA	- - 15-foot.
05 13 43 39	CDR-EVA	Roger. We are - If you were looking at the Surveyor crater and west with 12 o'clock, we're at 9 o'clock position on the Surveyor crater.
05 13 43 54	LMP-EVA	Okay, Pete.
05 13 43 55	CC	Roger. Copy that. Copy. You're right on the rim - understand - We'd like to get a good EMU check and a rest here before you proceed.

05 13 44 04	LMP-EVA	That's a good idea, Houston - -
05 13 44 05	CDR-EVA	- - Okay, Houston. That's a good idea. What - what we are going to do is I'm getting this - -
05 13 44 09	LMP-EVA	- - Wait. Wait 1. Wait, Pete, I've got an idea.
05 13 44 11	CDR-EVA	What?
05 13 44 12	LMP-EVA	This one might be good for 13. Pete, let me reach back here and grab this strap.
05 13 44 19	CDR-EVA	Okay, now?
05 13 44 20	LMP-EVA	Go. Okay. Let me roll a little bit over.
05 13 44 28	CDR-EVA	That a boy. Back up. Now, if they had a strap like that, they could just hold the other guy while he leaned over and picked up a rock.
05 13 44 34	LMP-EVA	Hey, that's a - -
05 13 44 35	CDR-EVA	It works pretty good. It sure saves time. Look at the sheer face on that rock, something wrestled by it or something.
05 13 44 43	LMP-EVA	It's fractured a bit; it's got some pretty interesting fracture marks on it. It also has got some - what look like abrasion marks on it. Maybe that's just hard packed dirt. Boy, there is a lot of flashing crystals in that rock - crystal faces. It's a good rock.
05 13 44 53	CC	Yankee Clipper. OMNI Charlie, OMNI Charlie.
05 13 45 01	CDR-EVA	Listen, I'll tell you what I recommend we do while we are taking - -
05 13 45 03	LMP-EVA	Okay. Let me get a - -
05 13 45 04	CDR-EVA	- - an EMU break.
05 13 45 05	LMP-EVA	Okay. Let me take the - the picture of that where the rock was. Right there.
05 13 45 11	CDR-EVA	Okay. What I recommend we do is change film packs.
05 13 45 15	LMP-EVA	All right. That's a good idea.
05 13 45 19	LMP-EVA	We'll do that next.

05 13 45 24	CDR-EVA	Okay. Why don't I - Okay, I'll get this camera out --
05 13 45 27	LMP-EVA	Stay right there just a second.
05 13 45 29	CDR-EVA	Shoot a - shoot a good - shoot a PAN, and get the Surveyor. Use up that film.
05 13 45 36	LMP-EVA	Hey, that's good. I didn't - That ought to be good. Ah, it's a bad place to shoot, but I'll try it, though.
05 13 46.01	CDR-EVA	Al, what I think we can do is walk down here about 300 feet and walk straight down that slope to it.
05 13 46 06	LMP-EVA	I do, too. It doesn't look so bad from here, does it, Pete?
05 13 46 08	CDR-EVA	No.
05 13 46 14	CC	Pete, will that direction of your travel be to the northeast direction?
05 13 46 21	CDR-EVA	No, what we do is go directly east and then walk directly short of north, you know, curving right around and down to it.
05 13 46 31	CC	Roger. Copy. You're going directly east and then you'll be curving around going up north towards the Surveyor.
05 13 46 38	CDR-EVA	Yes. You can get a - You get kind of an optical illusion depending on where you're standing.
05 13 46 44	LMP-EVA	Trade me one. Trade me magazines.
05 13 46 46	CDR-EVA	Okay. Wait a minute.
05 13 46 49	LMP-EVA	Careful when you undo it.
05 13 46 51	CDR-EVA	I'll tell you what. You'd better put that one in.
05 13 46 54	LMP-EVA	No, we want the dark.
05 13 46 55	CDR-EVA	Okay.
05 13 46 56	LMP-EVA	I wanted to put it back on here, Pete.
05 13 46 59	CDR-EVA	All right. I'll try.

05 13 47 00	LMP-EVA	I don't think it makes any difference. We just put it in here. You're right.
05 13 47 04	CDR-EVA	All right.
05 13 47 05	LMP-EVA	Just put it right in there with the rocks.
05 13 47 07	CDR-EVA	Yes. Yes. Thank you. Let me - Let me hold the camera see -
05 13 47 12	LMP-EVA	Wait a minute. Okay. Go.
05 13 47 19	LMP-EVA	Boy, these cameras got dirty, didn't they?
05 13 47 21	CDR-EVA	Yes.
05 13 47 22	CC	Pete, a reminder on that film pack, cycle one frame before you start.
05 13 47 31	LMP-EVA	Roger. We cycled one before we took it off, too. I think we're in good shape, Houston.
05 13 47 39	CDR-EVA	Good thing we've practiced this a few times. I tell you what. Why don't you let me hold it for you? Okay?
05 13 47 46	LMP-EVA	Just a second. Here, I'll show you what you need to do. Pull this out of the way. The rock is what's driving me buggy. Hold it there.
05 13 47 58	CDR-EVA	Wait, wait, wait.
05 13 47 59	LMP-EVA	Hold the camera. Hold it there.
05 13 48 00	CDR-EVA	Okay.
05 13 48 01	LMP-EVA	That's - That's it.
05 13 48 12	LMP-EVA	Hold the camera.
05 13 48 13	CDR-EVA	Okay. Got it?
05 13 48 21	LMP-EVA	...
05 13 48 29	CDR-EVA	That's it. You got it.
05 13 48 30	LMP-EVA	We got it.
05 13 48 31	CDR-EVA	Good show. Hot dog.
05 13 48 34	LMP-EVA	Wait a minute, wait a minute. Okay, keep the trigger pulled. Trigger pulled. Let her go. Now try it again. Try it again. That's it, babe. No strain. Okay, let me put it on.

05 13 48 47	CDR-EVA	That le.s is good and clean, too.
05 13 48 50	LMP-EVA	Okay. Hope we didn't get anything on the Reseau lens inside. I bet we got some dust on it. Where am I? Okay.
05 13 48 58	CDR-EVA	Huh?
05 13 49 00	LMP-EVA	Great. Got her on there, Pete.
05 13 49 01	CDR-EVA	There you go. Okay. Let's wander over here.
05 13 49 11	LMP-EVA	Yes. I think a strap on you or something like that so - on each of you, so if you want to lean over and pick up a rock, the other guy just holds the strap, and you lean over and pick up the rock and go. Get some bigger sample bags. Hey, Pete, why don't I - -
05 13 49 27	CC	Good thought Al.
05 13 49 28	CDR-EVA	What do you want?
05 13 49 29	LMP-EVA	I was going to say as long as we're going - What?
05 13 49 36	CDR-EVA	We're moving on, Houston.
05 13 49 48	LMP-EVA	Yes. A few minutes ago, Pete wanted to pick up a rock, so I held onto a - that strap of the Surveyor bag and he leaned right over and picked it up and I helped him get back up. It's not that you're heavy or anything, it's the fact that you don't - you have such poor balance.
05 13 50 02	CDR-EVA	Look at that glass - -
05 13 50 04	CC	Pete and Al, Houston. Before you go much further, could you stop and have a little break there before you proceed on down the slope?
05 13 50 15	LMP-EVA	... - -
05 13 50 16	CDR-EVA	Yes - Yes. We are just going to move to the area, where we could stop and case the joint. Al, grab a shot of that beaded glass there and we'll bag it.
05 13 50 27	LMP-EVA	Okay.
05 13 50 28	CDR-EVA	That's better than the Hope diamond.
05 13 50 39	LMP-EVA	Okay. Set her up.

05 13 50 42	CDR-EVA	Better take that.
05 13 50 46	LMP-EVA	There you are in here.
05 13 50 47	CDR-EVA	Okay.
05 13 50 50	LMP-EVA	Okay. I got it, Pete.
05 13 50 52	CDR-EVA	Got her?
05 13 50 53	LMP-EVA	Yes. Got a lot of those we've - Got too many of them.
05 13 50 58	CDR-EVA	Oh, you did get a lot of these?
05 13 50 59	LMP-EVA	Yes. Why don't you get that? Pick it up - -
05 13 51 02	CDR-EVA	- - could get the rock with it. Look.
05 13 51 03	LMP-EVA	Okay. Get some rocks with it. That's a good id - Hey, here's some rocks right here. There's a good rock. You know, we keep collecting a lot of the same type of rocks, because there just doesn't seem to be any other kinds around. I haven't seen any microbreccia the whole day; I've looked around for it. All I have seen is some basalt; I've seen nothing that looked vesicular at all, except on the surface.
05 13 51 27	CDR-EVA	I haven't either.
05 13 51 31	LMP-EVA	You know, that's real strange; it's - It's not at all like Neil's rocks.
05 13 51 35	CC	Roger. We copy those comments. Pete, now we show you are 2 plus 23 into the EVA and, based on a 4-hour EVA, you would be leaving the Surveyor at 2 plus 50. But don't rush; we'd like to make sure you get a good rest before you go into it.
05 13 51 51	CDR-EVA	Okay.
05 13 51 52	LMP-EVA	Why don't you give me a rock or two, Pete? And I will stick in there. Got any spares? There you go. Good rock. Good rock.
05 13 52 07	CDR-EVA	Get a load of this crazy juggling act.
05 13 52 10	LMP-EVA	Treasure. Okay. That will hit.
05 13 52 15	LMP-EVA	We just made a sample of - glass bead and some local rock on the south edge of the Surveyor crater, Houston. And they are going into bag 14D.

05 13 52 29	CC	14D.
05 13 52 30	CDR-EVA	- - brings back all of our training. I'm trying to remember who the guy was that kept saying whatever you do, don't get dust on the gnomon.
05 13 52 34	MS	(Laughter)
05 13 52 44	CDR-EVA	Okay. We are going to jog on here for a little bit, Houston, and get a little bit closer to the Surveyor and look her over.
05 13 52 55	LMP-EVA	Yes. Hey, that's coming in from the south; looks like a good way, Pete.
05 13 52 59	CDR-EVA	I'll tell you what I'm going to do, Al. I am just gonna lope right around here.
05 13 53 02	LMP-EVA	That's what I mean. If you stay at this level, you'll end up at Surveyor.
05 13 53 05	CDR-EVA	You're right.
05 13 53 07	LMP-EVA	Follow the contour lines.
05 13 53 08	CDR-EVA	No problem at all, Houston. Look at the scoop sticking out, and you couldn't see that before.
05 13 53 18	CC	Pete and Al, could you give us a comment on how far you're sinking in?
05 13 53 24	CDR-EVA	Not sinking in very far at all. This is fairly firm stuff and I'm down in the crater about the same distance down that Surveyor is. I'm just going around it radially. Wouldn't you say so, Al?
05 13 53 41	LMP-EVA	Yes, I would say that - I think Houston is just as concerned about us getting down in this crater. We been thinking about it, too, Houston.
05 13 53 47	CDR-EVA	Okay. Don't worry about it, Houston, because it's - Really, it's no strain; I'm 200 feet away from it; I'm at the same level; the ground is firm, and I can go right back up the way I came down with no strain at all.
05 13 54 02	LMP-EVA	That's right.
05 13 54 03	CC	Roger. Sounds good.
05 13 54 04	CDR-EVA	It's just exactly the way we thought it was going to be last night, when we were talking about it.

05 13 54 07 LMP-EVA Yes, it is. I don't think there'll be any sweat about it.

05 13 54 09 CDR-EVA Al, I'll tell you what let's do. Sit right over here, and we will park all of our gear, take ourselves a little rest, go over your photo plan, and then we'll have at it.

05 13 54 20 LMP-EVA Okay. Let's go right over here.

05 13 54 22 CDR-EVA I will tell you what, why don't you get a photograph of it right now?

05 13 54 25 LMP-EVA That's a good place. Okay. Will do. Yes. I can do it right here.

05 13 54 29 CDR-EVA I'm trying to see which way it landed.

05 13 54 33 CC Okay, Pete and Al, when you are looking at it there, would you also try to determine whether there is any effect from the dust during the descent? That is, could you determine whether there is more dust on either the west or the east side of any of the bays, and the north or the south side of the camera?

05 13 54 57 CDR-EVA Okay. We sure will. I actually flew around it; however, I probably passed closer to it than I am parked to it right now. No, that's not really true. I'll tell you, the way that dust was going, it probably went right over top of it.

05 13 55 15 LMP-EVA Yes. That's right. Any dust you had on the edge would never go down to this crater.

05 13 55 19 CDR-EVA Yes. What happened to that volume, Al?

05 13 55 22 LMP-EVA I don't know. How does - It sounds good to me. Are you just a little - -

05 13 55 25 CC We read you both loud and clear.

05 13 55 26 LMP-EVA Okay. I'm not talking loud enough.

05 13 55 29 CDR-EVA Okay. No problem.

05 13 55 30 LMP-EVA I'm going to mosey up here just a little, Pete, without any tools, which makes it pretty easy.

05 13 55 35 CDR-EVA Look, I'll tell you what. Let's leave the whole - I tell you what - Let's take the tool carrier with us - -

05 13 55 40 LMP-EVA Yes.

05 13 55 41	CDR-EVA	- - I think can go right up the other rim and around to - -
05 13 55 42	LMP-EVA	Sure.
05 13 55 43	CDR-EVA	- - and - -
05 13 55 44	LMP-EVA	- - Right on out - -
05 13 55 45	CDR-EVA	- - that big blocky baby there and - -
05 13 55 46	LMP-EVA	- - Hey ... bedrock - -
05 13 55 47	CDR-EVA	- - ... right over there at that - that - -
05 13 55 49	LMP-EVA	Huh?
05 13 55 50	CDR-EVA	- - neat crater. Where all that rock is just - -
05 13 55 51	LMP-EVA	- - ...
05 13 55 52	CDR-EVA	- - back of the LM.
05 13 55 55	LMP-EVA	Turns out ... - -
05 13 55 56	CDR-EVA	You know, I could have landed the LM in the bottom of that crater. It would have scared me to death, but -
05 13 56 15	LMP-EVA	Let's see. Okay, Pete. Why don't - Would you carry the hand-tool carrier down there?
05 13 56 19	CDR-EVA	Whoop.
05 13 56 20	LMP-EVA	And let me take some pictures up here around it?
05 13 56 22	CDR-EVA	Okay.
05 13 56 23	LMP-EVA	Now look. You can see which way it came in. See the way these gear pads dug in over there - -
05 13 56 27	CDR-EVA	Yes.
05 13 56 28	LMP-EVA	- - dug up dirt? They're still setting there.
05 13 56 30	CDR-EVA	Yes.
05 13 56 31	LMP-EVA	This is going to make a good shot. We're not supposed to take pictures during the night. We'll have to do it, though.

05 13 56 45	LMP-EVA	Beautiful. Beautiful sight. You know, this one's brown and I don't remember ours brown there at the Cape. Kind of a light tan or maybe that - Maybe that's the way it's changed color. What color was this one, Houston? White? When - When it started out?
05 13 57 01	CC	Stand by on that.
05 13 57 04	CDR-EVA	Yes. It looks a light tan now.
05 13 57 12	LMP-EVA	Hey, this crater isn't as steep as we thought, Pete.
05 13 57 15	CDR-EVA	No. And I'd better be careful. I'm going to get dust on her. Yes.
05 13 57 21	LMP-EVA	I'll stop here, and this will be my last picture.
05 13 57 30	CC	Al, the equipment bays were white on the side, and the scoop itself was a light blue.
05 13 57 39	LMP-EVA	Well, it's kind of a - Well, we'll get down there and get closer inspection. What was the general color of the structure? For example, all of the struts and the like?
05 13 57 50	CC	That's all white. The equipment bays and the primary structure was all painted with a white paint.
05 13 57 59	LMP-EVA	... it turned tan or something. We'll have to look at it more closely.
05 13 58 01	CDR-EVA	Yes. That's what happened. It just changed color, huh?
05 13 58 04	LMP-EVA	It sure has. Something has cooked that paint brown. Can't imagine what. You know, it's funny. On the slopes here, it's just a little bit softer. But there's no tendency to slip down or anything like that.
05 13 58 19	CDR-EVA	I know.
05 13 58 20	LMP-EVA	I don't think it's any deeper. A little softer maybe. Maybe a little deeper. Why don't I move this down here just a little bit closer, Pete?
05 13 58 27	CDR-EVA	Okay.
05 13 58 28	LMP-EVA	Then we'll take the rest down here where we can see it better.

05 13 58 30	CDR-EVA	Okay. Let's just make sure we don't get any dirt down there on it.
05 13 58 32	LMP-EVA	Okay. We'll walk real slow.
05 13 58 36	CDR-EVA	Hey, you can see - Look at there where it dug those scoops. You can still see the - -
05 13 58 40	LMP-EVA	Boy, that's going to make some beautiful pictures on the way that's weathered since - -
05 13 58 44	CDR-EVA	Doesn't look like the pictures we saw of this a long time ago.
05 13 58 50	LMP-EVA	That's going to be good.
05 13 58 51	CDR-EVA	Oh, that is interesting! What in the hell?
05 13 58 52	LMP-EVA	Look at how it's kind of made them into - Once again, it looks like something has rained on it. They've taken on a little - -
05 13 58 58	CDR-EVA	Wonder if that was from us?
05 13 59 00	LMP-EVA	Oh, no. I don't think so. As you notice, there's a general trend of lines along here from the north - that would be the northeast or the southwest - See those little lines running along through the crater here?
05 13 59 15	CDR-EVA	Yes.
05 13 59 16	LMP-EVA	I think I'll take a picture of that. Boy, this thing is dusty. ... 8. Just do this.
05 13 59 33	CDR-EVA	Yes, this has those lineal patterns here, Houston. Right down inside the crater; and they're not - they're not laying at all in the same direction - I mean, it's not from us - not from the LM.
05 13 59 44	LMP-EVA	No.
05 13 59 46	CC	Roger.
05 13 59 49	LMP-EVA	I tell you what - -
05 13 59 50	CDR-EVA	Hey, Al, did you get a picture right across there?
05 13 59 53	LMP-EVA	Yes, I did, Pete.
05 13 59 54	CDR-EVA	Why don't - why don't you go ahead and put this together?

05 13 59 57	LMP-EVA	Okay. There's your tongs while you're there. Just a second. I'll give them back to you.
05 14 00 10	LMP-EVA	Good place to rest.
05 14 00 24	LMP-EVA	I may not - -
05 14 00 25	CDR-EVA	Is that the way that thing goes?
05 14 00 27	LMP-EVA	Yes. What's that?
05 14 00 32	CDR-EVA	Let me hold one end of it.
05 14 00 33	LMP-EVA	There you go. ... There you go. I think that's it.
05 14 00 50	LMP-EVA	Pete, could you hold - hold that a minute?
05 14 00 52	CDR-EVA	Wait just a second.
05 14 00 53	LMP-EVA	Okay. What are you trying to get?
05 14 00 55	CDR-EVA	... I dropped something down in there. Okay there. Now I can hold it. What do you want me to hold?
05 14 01 02	LMP-EVA	Hold that camera a second. Got it?
05 14 01 06	CDR-EVA	Why don't we just throw that camera away?
05 14 01 08	LMP-EVA	Well, I was thinking of that earlier and decided that, since this one broke, we might have to put that one on.
05 14 01 13	CDR-EVA	... - -
05 14 01 14	LMP-EVA	The readability - the reliability ... to make it.
05 14 01 44	LMP-EVA	... kind of mad.
05 14 01 46	CDR-EVA	Huh?
05 14 01 47	LMP-EVA	... look down there just once more. ...
05 14 01 57	LMP-EVA	There you go.
05 14 02 11	CDR-EVA	... boy.
05 14 02 20	LMP-EVA	...
05 14 02 22	CDR-EVA	Yes. I'm holding it with this post. Wait a minute. What's in your bag, here?

05 14 02 38	LMP-EVA	Yes. There's a film magazine.
05 14 03 22	LMP-EVA	Let be borrow your little thing here while we rest.
05 14 03 54	CDR-EVA	Move that handle and throw it away.
05 14 03 57	LMP-EVA	Okay. That's a good idea.
05 14 03 59	CDR-EVA	... out of here we don't need.
05 14 04 17	LMP-EVA	Turn this in.
05 14 04 33	CDR-EVA	Bad. Had it.
05 14 04 36	LMP-EVA	Huh? I'll get it.
05 14 04 46	CDR-EVA	I'll tell you what, why don't you mosey down there and start taking some photographs?
05 14 04 50	LMP-EVA	That's a good idea. Got your cuff checklist there?
05 14 04 53	CDR-EVA	There.
05 14 04 54	LMP-EVA	Okay.
05 14 04 56	CDR-EVA	The first thing is photo bay A, 11, 15 feet, one picture.
05 14 05 03	LMP-EVA	11, 15; let me get a check. 11, 15, Boy, that's turned just kind of a light tan hasn't it, Pete?
05 14 05 11	CDR-EVA	It sure has.
05 14 05 12	LMP-EVA	And some of the things are even a dark brown.
05 14 05 14	CDR-EVA	Now, you're closer that 15. Don't go any closer.
05 14 05 16	LMP-EVA	Yes. Maybe I'd better back up a little.
05 14 05 17	CDR-EVA	That a boy.
05 14 05 18	LMP-EVA	How's that?
05 14 05 19	CDR-EVA	That a boy - -
05 14 05 20	CC	Hey, Pete, do you think there's a chance you're at the wrong Surveyor?
05 14 05 26	CDR-EVA	No, sir.

05 14 05 28	LMP-EVA	Boy! It sure dug in the ground, didn't it? Oh, look at those pad marks. They're still there. Still the waffle imprints on it. Okay. What's next?
05 14 05 36	CDR-EVA	Photo TV sector f:8, 15, three pictures.
05 14 05 41	LMP-EVA	Okay. Let me move down.
05 14 05 43	CDR-EVA	Hey, this cuff checklist sure helps do the job.
05 14 05 47	LMP-EVA	It sure does.
05 14 05 50	CDR-EVA	Cadet Gibson checklist. Okay, Al. Hey, look at that dirt's still on the footpad. It's going to make a great - -
05 14 05 56	LMP-EVA	- - and compliments to the CAPCOM.
05 14 05 59	CDR-EVA	Hey, we got a nice brown Surveyor here, Houston. even the tanks which were - -
05 14 06 05	LMP-EVA	Yes. Raise the visor and it's not so brown, but it's tan.
05 14 06 09	CDR-EVA	The glass is still on the top.
05 14 06 11	LMP-EVA	Not a bit of it is fractured.
05 14 06 12	CDR-EVA	Yes.
05 14 06 13	LMP-EVA	Amazing.
05 14 06 14	CDR-EVA	Okay. Shovel is a gray. Take the Surveyor scene here.
05 14 06 20	LMP-EVA	I don't want to kick any of this dirt up because I'd like to get a picture of compacting of the dirt there.
05 14 06 24	CDR-EVA	Yes.
05 14 06 25	LMP-EVA	It's going to be a tough shot.
05 14 06 27	CDR-EVA	That's photo TV sector f:8, 15, and three. Now I have photo scoop imprints, f:8, 5, two in stereo.
05 14 06 37	LMP-EVA	Okay. Wait. I'm not - I'm not finished yet.
05 14 06 45	LMP-EVA	Boy, that color chart has sure changed colors these days.

05 14 06 49	CDR-EVA	Okay.
05 14 06 50	LMP-EVA	Let me get a quick shot here. About 15 feet and I'll shoot.
05 14 06 55	CDR-EVA	Okay. Now I want the footpad photo scoop imprints f:8, 5 feet, two in stereo.
05 14 07 04	LMP-EVA	Okay. Those scoop imprints look different than I imagined.
05 14 07 08	CDR-EVA	Okay.
05 14 07 09	LMP	Let me try them. And a little closer.
05 14 07 13	CDR-EVA	You have to really bend over.
05 14 07 15	LMP-EVA	...
05 14 07 16	CDR-EVA	Back up. ... where you're shooting, Al.
05 14 07 21	LMP-EVA	Shooting right there where the scoops made the scoops.
05 14 07 22	CDR-EVA	Oh, I'm sorry. Yes. The next one is photo the footpads: two prints, f:8, 5, two in stereo.
05 14 07 32	LMP-EVA	Wait just a second; I'll get it. I'm going to - I know what I'm going to do. Okay. Okay. I'll get the footpads now. And I'll also get the dirt that's on them. That looks good. Okay. What's next, Pete?
05 14 07 53	CDR-EVA	Disturbed surface by the footpad-2 area. Okay. Then take photo. FP-2 area f:8, 5, in stereo.
05 14 08 03	LMP-EVA	Okay. Will do. Did it. ... disturbed it all right. Well, we'll be able to get the rocks that the Surveyor's on - No strain. Get a bunch. There's one. Okay. Next one, Pete.
05 14 08 26	CDR-EVA	Photo very near engine bay A, f:11, 5 feet, one picture.
05 14 08 33	LMP-EVA	Okay. A little bit to the east of - - Looks pretty good. The engine is still green. In fact that green seems to have had less change than most of the rest. Okay, Pete. That's complete.
05 14 08 49	CDR-EVA	Photo large box A, f:8, 5 feet, one picture.
05 14 08 55	LMP-EVA	Okay. Say that again now. I was checking something else real quick.

05 14 09 02	CDR-EVA	Okay. The big box.
05 14 09 04	LMP-EVA	Okay.
05 14 09 05	CDR-EVA	At 5 feet.
05 14 09 06	LMP-EVA	Five feet.
05 14 09 07	CDR-EVA	f:8.
05 14 09 09	LMP-EVA	Okay. Will do.
05 14 09 13	CDR-EVA	Okay. Now be careful about the glass.
05 14 09 17	LMP-EVA	Okay.
05 14 09 19	CDR-EVA	And they want you to smoke that over carefully and photo wipe and then photo the - -
05 14 09 26	LMP-EVA	Now be careful. Let me look and see what it looks like. Houston, not a bit of this glass is cracked. One little piece down here looks like it no longer reflects, but other than that, it's in perfect condition. A little warped - segments warped, but other than that, it looks pretty much the same. The thing that's the most amazing to me is how it's turned so brown.
05 14 09 51	CC	Roger. We copy that, Al.
05 14 09 52	LMP-EVA	- -, Pete, if I wipe it with my - - I'm going to wipe it, but not with my glove. I'm going to wipe it with this little cloth that protects my wrist ring. It doesn't have any structural thing - anything structurally associated with it.
05 14 10 06	CDR-EVA	It wipes off just like you'd expect us to wipe off glass.
05 14 10 11	LMP-EVA	Let me wipe a couple of spots though - it might - It's going to be tough to show this, Pete. It's in a shadow. Give it a go, though. I don't think the pictures are going to show you much, Houston. Because it's - Well, we'll give it a go, but -
05 14 10 25	CDR-EVA	They're better than no pictures at all.
05 14 10 26	LMP-EVA	That's right. That's exactly right. Okay. Got it there, Pete. Ready for the next one.
05 14 10 34	CDR-EVA	Okay. Photo small box f:8, 5, one.

05 14 10 38	LMP-EVA	Okay. Now that's pretty much in the shadow. I'm going to open it up a little bit.
05 14 10 42	CDR-EVA	That's my shadow.
05 14 10 43	LMP-EVA	No, no, no. It's in the shadow of the landing radar or the - instrument box.
05 14 10 47	CDR-EVA	I think you ought to photo that scoop there, the way it's dug in.
05 14 10 50	LMP-EVA	I did.
05 14 10 52	CDR-EVA	There's no way that thing can slide down the hill on us the way it's dug in.

END OF TAPE

05 14 10 57	LMP-EVA	Okay, now let me get that footpad. That's a beautiful shot there. We're going to do footpad 3, I guess it is, or is that 1?
05 14 11 05	CDR-EVA	That's 3.
05 14 11 06	LMP-EVA	Okay. And that's going to be in f:8, probably. It's pretty low; let me try 5.6.
05 14 11 14	CDR-EVA	That aft honeycomb shock absorber struck the dirt and looks like it took some of the shock. Other than that, the front one didn't appear to do that. ...
05 14 11 26	LMP-EVA	Sure isn't going to slide down the hill though, that's for sure. Okay, Pete. What's next? Back up 15 feet and take it.
05 14 11 32	CDR-EVA	Photo bay B - -
05 14 11 34	LMP-EVA	Okay. Let me get over here.
05 14 11 35	CDR-EVA	That's 11, 15, 1 -
05 14 11 37	LMP-EVA	That'll be a tough shot, because it's in the Sun, but I'll get ... go. Get over here; that might help it.
05 14 11 53	LMP-EVA	Back up a little bit more. How's that for 15 feet, Pete.
05 14 12 04	CDR-EVA	You're more than 15.
05 14 12 05	LMP-EVA	Okay?
05 14 12 08	CDR-EVA	Now, you're good.
05 14 12 09	LMP-EVA	Okay.
05 14 12 14	CDR-EVA	You're pointing too high.
05 14 12 15	LMP-EVA	I know it. I'm trying to shoot the top of the ... Give me a few extras. Okay. Go ahead.
05 14 12 22	CDR-EVA	Okay. Photo solar array; got photo footpad 3. Those solar arrays are not blue anymore; they're black.

05 14 12 33	LMP-EVA	Hey, how do you do that? Let me try it from here. Oops - what's the solar array setting?
05 14 12 41	CDR-EVA	5.6, 15 feet, one photo.
05 14 12 44	LMP-EVA	Right on track. Okay, shot.
05 14 12 52	CDR-EVA	Okay, move around to the front.
05 14 12 58	LMP-EVA	Next one?
05 14 13 01	CDR-EVA	Photo footpad, 3. f:11, 5 feet, one photo.
05 14 13 06	LMP-EVA	All right, got it in sight. It dug in real well, too. It's probably - it's right, in fact, it's right - dug in right to the top of the - -
05 14 13 15	CDR-EVA	And another thing we're going to photo is the scoop trenches f:8, 5 feet, at 2.
05 14 13 23	LMP-EVA	Okay.
05 14 13 25	CDR-EVA	There's the Canopus seeker.
05 14 13 27	LMP-EVA	God! There's some - Hey, let me get the top of this little instrument box, where the glass is fractured there. They're interested in that, if I can get it. See up the hill here. Oh, look! There's where it hit. See?
05 14 13 43	CDR-EVA	Is that your warning tone or something else?
05 14 13 45	LMP-EVA	No. Nothing I know of.
05 14 13 47	CDR-EVA	That's that noise again that we had yesterday, remember?
05 14 13 52	LMP-EVA	Okay. Now I photograph the trenches, right?
05 14 13 57	CDR-EVA	Yes.
05 14 13 58	LMP-EVA	Okay.

GOSS NET 2 (SEPARATE, SIMULTANEOUS COMM LINK BETWEEN CC AND CM) IN USE

05 14 13 58	CC	Yankee Clipper, Houston. You can stop your pitch at 232. That's 232.
05 14 14 26	CMP	Houston, Clipper. Do you have your P22 information?
05 14 14 44	CMP	Houston, Yankee Clipper.

05 14 15 01	CC	Yankee Clipper, Houston. Go ahead.
05 14 15 07	CMP	Roger. Do you have your ...?
05 14 15 14	CC	Clipper, you're broken up. Say again.
05 14 15 21	CMP	Do you have your P22 information?
05 14 15 29	CC	Clipper, we have the data.
05 14 17 22	CC	Yankee Clipper, OMNI Delta, OMNI Delta.
05 14 22 55	CC	Yankee Clipper, Houston. High gain angles, minus 26 and 186.
05 14 34 47	CC	Yankee Clipper, 1 minute to LOS.
05 14 34 53	CMP	...

GOSS NET 1 COMMUNICATIONS BETWEEN CC AND LM RESUME

05 14 13 59	CDR-EVA	Hey, this is - this is so much easier working around than in one g in our practice; it's unbelievable.
05 14 14 08	LMP-EVA	Pete, can you move? You're shadowing the situation.
05 14 14 10	CC	Roger, Pete. Good way to have it.
05 14 14 12	LMP-EVA	Trenches at 5 feet? - 5 feet or 15 feet?
05 14 14 18	CDR-EVA	What are you photoing, Al?
05 14 14 19	LMP-EVA	The trenches.
05 14 14 21	CDR-EVA	Photo the scoop trenches at 5 feet, f:8 in stereo. Watch it - watch it now; you're going to get dust on us.
05 14 14 30	LMP-EVA	I'm watching real close.
05 14 14 33	CDR-EVA	Now, you're farther than 5 feet.
05 14 14 34	LMP-EVA	You're right. ...
05 14 14 37	CDR-EVA	That a boy. That's it.
05 14 14 42	LMP-EVA	Camera's moving all the time, so I guess we're getting it.

05 14 14 49	CDR-EVA	Okay. Photo the TV mirror.
05 14 14 51	LMP-EVA	Okay.
05 14 14 53	CDR-EVA	Now, the TV mirror is - -
05 14 14 55	LMP-EVA	f:8 5 ...
05 14 14 59	CDR-EVA	The TV mirror is brown.
05 14 15 01	LMP-EVA	Yes.
05 14 15 03	CDR-EVA	It's no longer a mirror.
05 14 15 05	LMP-EVA	No, it's brown because it's looking at brown, isn't it?
05 14 15 07	CDR-EVA	No, it looks like - -
05 14 15 08	LMP-EVA	Maybe it's got some coating on it. Yes. It does.
05 14 15 11	CDR-EVA	Why don't you stay right there, and I'll come in and wipe it?
05 14 15 15	LMP-EVA	Okay. Come on in and wipe it. Look it over close.
05 14 15 18	CDR-EVA	See the mechanical components down inside it.
05 14 15 21	LMP-EVA	Okay.
05 14 15 29	CDR-EVA	It's just got a fine dust on it.
05 14 15 30	LMP-EVA	Fine dust on it. I'll be darned! Get a shot of that; that will be a good - Let me - if I'm set right. No, I'm not set right! Did you tell me 5.6?
05 14 15 42	CDR-EVA	No. Photo TV mirror: f:8, 5 feet - -
05 14 15 49	LMP-EVA	Oh, no! Okay, I goofed it. I'll take it again. Hey, get over here, Pete. Get one more shot.
05 14 15 56	CDR-EVA	Okay.
05 14 15 59	LMP-EVA	You don't get a chance like this every day, now. Shoot up the extras; we've got lots of film.
05 14 16 05	CDR-EVA	There you go. Okay? Why didn't you get yourself in the photo, too?

05 14 16 14	LMP-EVA	Okay. Just a second. Back up just a little, Pete. Try for 15 feet. Okay. That ought to be good. How's that look to you?
05 14 16 39	CDR-EVA	Good. Come in just a foot.
05 14 16 43	LMP-EVA	You got a calibrated eye? Oh, that camera is not right on the money; it's out of focus.
05 14 16 54	CDR-EVA	Okay. Okay, Houston. I - I'm jiggling it. The Surveyor is firmly planted here. That's no problem. Okay, Al. We're ready to start getting the TV camera.
05 14 17 03	LMP-EVA	Okay.
05 14 17 09	CDR-EVA	Now, do you want to do something for me first?
05 14 17 11	LMP-EVA	Yes, sir. Okay. I sure will.
05 14 17 30	CDR-EVA	I'll be darned. All soft dirt.
05 14 17 41	LMP-EVA	Give me a big smile.
05 14 17 42	CDR-EVA	Okay. Okay. ... ... that back on the front. I'll tell you what I'm going to do. ... Let's go - Wait a minute. ... can you get the tool off my back?
05 14 18 09	LMP-EVA	Yes, just a second.
05 14 18 15	CDR-EVA	All right, we're going to have to start moving out.
05 14 18 18	LMP-EVA	I know it. Okay. Retrieve cutter and can. Okay. Here we go. There's the cutter. Hey, this is easier in one-sixth g. Here comes your cutter, babes. Okay. You still don't have a cutter. Now, let me get the can.
05 14 18 45	LMP-EVA	Okay. One cutter. Okay. Looking good. Houston, can you hear us okay?
05 14 18 57	CC	Al, say again.
05 14 19 00	LMP-EVA	Suppose they can't hear us anymore?
05 14 19 02	CC	Negative, Al. We read you loud and clear.
05 14 19 07	LMP-EVA	Okay. I thought so, but that cable's arranged a little bit differently from the one we trained on.

05 14 19 13	CDR-EVA	Yes. It looks it.
05 14 19 17	LMP-EVA	... ready to capture that cable.
05 14 19 26	CDR-EVA	Yes, ready.
05 14 19 27	LMP-EVA	Okay. Now, this cable here - It's not a Y-cable at all, is it?
05 14 19 37	CDR-EVA	No. Well, it is a Y-cable but it's of a different manner. Hey, here's something else they didn't tell us either. Look at that.
05 14 19 50	LMP-EVA	A few extra ones.
05 14 19 51	CDR-EVA	Yes.
05 14 19 52	LMP-EVA	I'll tell you what. You're just going to have to get that - reach in under enough to cut it on the other side.
05 14 19 57	CDR-EVA	Just wait a second. Let me get in there.
05 14 19 59	LMP-EVA	Okay.
05 14 20 01	CDR-EVA	Drop that in the can. That's the only piece they're going to get that way. Okay. ... Watch it.
05 14 20 09	CDR-EVA	Yes. I've got to cut the cable back here, though. Okay.
05 14 20 13	LMP-EVA	Watch it, watch it. You've got a cut right there, Pete. Give them a couple of pieces. There you go.
05 14 20 20	CDR-EVA	All right, back off.
05 14 20 22	LMP-EVA	Okay, you've got to - Hey, you've got to cut this cable too, Pete.
05 14 20 25	CDR-EVA	No, it goes around the camera.
05 14 20 27	LMP-EVA	All right. Oh, no, it doesn't either. Under those tubes, isn't it?
05 14 20 31	CDR-EVA	Yes.
05 14 20 33	LMP-EVA	And here's a few extras. And it's wired entirely different - -

05 14 20 37	CDR-EVA	Wait a minute. You've got to cut the other side of that little hole.
05 14 20 38	LMP-EVA	Yes, I know.
05 14 20 39	CDR-EVA	There you go.
05 14 20 40	LMP-EVA	Now, you've got it.
05 14 20 50	LMP-EVA	Gosh, did you see that material disintegrate? Hey, that cuts easy. Now, which tube did you want to give me, Pete? Do you want me to hold one of those tubes?
05 14 21 04	CDR-EVA	Yes.
05 14 21 05	LMP-EVA	Let me get in there close.
05 14 21 16	CDR-EVA	I got it?
05 14 21 17	LMP-EVA	Yes. Okay. Go. Got to be careful.
05 14 21 30	CDR-EVA	Got it?
05 14 21 31	LMP-EVA	No, it's too big.
05 14 21 33	CDR-EVA	Too big? Wait, wait, wait, wait, wait!
05 14 21 38	LMP-EVA	Okay.
05 14 21 44	CDR-EVA	Okay. Let me put the top on.
05 14 21 58	CDR-EVA	It has kind of weathered a little bit in 3-1/2 - 31 months, hasn't it?
05 14 22 03	CDR-EVA	...
05 14 22 06	LMP-EVA	Hey, what?
05 14 22 08	CDR-EVA	That antenna is still pointed right to Earth. ... It never had to move.
05 14 22 18	CDR-EVA	Okay, that's done. ... that.
05 14 22 23	LMP-EVA	Okay, we've got the - got the sample, Houston. The sterile sample, the cable, and tube. Okay, that's in there good; let me make sure that's in there tight, Pete.
05 14 22 40	CDR-EVA	Okay, one shiny tube coming up. Okay, wait a minute. Be around there in a minute. Look at

how all that stuff fractured and fell on the ground.

05 14 22 51 LMP-EVA Yes.

05 14 22 52 CDR-EVA The paint's flaked off.

05 14 22 53 LMP-EVA Yes. It looks like a shiny mirror, some kind of thermal coating.

05 14 22 59 CDR-EVA I hate to tell you this, but the Surveyor tool is - -

05 14 23 04 LMP-EVA Hey, that's a tougher tube then we're supposed to have, gang. I'd say forget that tube and find another one.

05 14 23 09 CDR-EVA Yes, or I'm going to break the tool.

05 14 23 11 LMP-EVA I know it. That's - -

05 14 23 12 CDR-EVA That tube on the back we are supposed to collect, Houston, is just a little bit stronger than it's supposed to be, for a glass mirror.

05 14 23 20 CC Roger. We copy.

05 14 23 21 LMP-EVA Okay. We're going to have to pick another tube. How about right here, Pete?

05 14 23 22 CDR-EVA Wait a minute.

05 14 23 25 LMP-EVA That's a shiny tube; that would be a good one if we could cut it.

05 14 23 29 CDR-EVA Where?

05 14 23 30 LMP-EVA Right there.

05 14 23 31 CDR-EVA Oh, that's even thicker.

05 14 23 32 LMP-EVA Yes, I guess it looks it, doesn't it?

05 14 23 33 CDR-EVA Get the camera. Forget the tube.

05 14 23 36 LMP-EVA Why don't you bang your way out of that glass?

05 14 23 38 CDR-EVA ... or break the tool, no kidding.

05 14 23 43 LMP-EVA Hey, Pete.

05 14 23 44	CDR-EVA	Huh?
05 14 23 45	LMP-EVA	Why don't you bang that glass one?
05 14 23 48	CDR-EVA	Won't even break (laughter). That's pretty good glass, Houston. Can't even break it with our - -
05 14 23 55	LMP-EVA	There you go. Take a piece off, and I'll collect it and put it in.
05 14 24 00	CDR-EVA	Kind of crunches, doesn't it? Hey, that's not glass. Terrible! Man, forget it.
05 14 24 06	LMP-EVA	I don't know what it is.
05 14 24 08	CDR-EVA	That's sure not what we tried out in Houston - I mean at the Cape. That's metal with glass on top of it.
05 14 24 15	LMP-EVA	You'd better take a picture of it.
05 14 24 23	LMP-EVA	Amazing. That's a tough shot, too. Let's get over on this side of it.
05 14 24 28	CDR-EVA	Okay.
05 14 24 29	LMP-EVA	Okay, that'll be a good shot, I think. Just a minute.
05 14 24 43	CDR-EVA	Come on, boy; we got to move.
05 14 24 45	LMP-EVA	Wait a second.
05 14 24 52	CDR-EVA	Got it? Okay, whip around the other side of that scoop and let's get that camera.
05 14 24 55	LMP-EVA	All right. All right. Wait, I got to open your bag.
05 14 24 59	CDR-EVA	I'm not going anywhere.
05 14 25 01	LMP-EVA	Okay. I just got to open your bag.
05 14 25 07	LMP-EVA	That one's good. All the parts are working.
05 14 25 19	CDR-EVA	Okay. Thanks to Joe Roberts, this bag's going to do the job, I think. There. He worked hard on this thing. Let me reach down in there and open it up now.

05 14 25 39	LMP-EVA	Okay?
05 14 25 40	CDR-EVA	Yes, it works great. Thing popped out wide open.
05 14 25 44	LMP-EVA	That's ...
05 14 25 45	CDR-EVA	Uh-oh.
05 14 25 47	LMP-EVA	What's the matter?
05 14 25 49	CDR-EVA	Well, it's not - Get a little open here. Every second I spend opening it up is worth about 2 minutes when you try to put it in the bag. Okay. I think it's open now.
05 14 26 00	LMP-EVA	Hey, I got a shiny tube for you.
05 14 26 02	CDR-EVA	Okay. Let me get it. Let me get it. You sure do. That's a good one, too. Here. Wait a minute. Watch your hand. Cut. That a boy. Good cut. Good cut.
05 14 26 19	LMP-EVA	Little more, Pete.
05 14 26 21	CDR-EVA	Okay, two more tubes on that TV camera and that baby's ours.
05 14 26 39	LMP-EVA	Okay?
05 14 26 40	CDR-EVA	Good.
05 14 26 42	LMP-EVA	All right. Let's get them.
05 14 26 47	CDR-EVA	That's one.
05 14 26 51	LMP-EVA	Let me get a grip on him now.
05 14 26 52	CDR-EVA	Okay.
05 14 27 00	LMP-EVA	(Laughter) ... we got her.
05 14 27 04	CDR-EVA	Beautiful.
05 14 27 05	LMP-EVA	Turn around. Let me see it.
05 14 27 06	CDR-EVA	Lay it on you, man (laughter). It'll fit right in that sack. Hey, is this ever lighter than that one in Houston?
05 14 27 16	CDR-EVA	Let's get the scoop while we're at it.

05 14 27 18	LMP-EVA	Okay. I think I can hold that thing with one hand and open the bag. Get in there. Get in that bag.
05 14 27 24	CDR-EVA	There you go.
05 14 27 26	LMP-EVA	In the bag. In the bag.
05 14 27 27	CDR-EVA	In the bag?
05 14 27 29	LMP-EVA	Here, wait a second. Now, I've got to zip it up.
05 14 27 31	CDR-EVA	Good show.
05 14 27 32	CC	Copy. It's in the bag.
05 14 27 36	LMP-EVA	It's in the bag.
05 14 27 50	LMP-EVA	Okay, let me get around to the other side of you. It's a little hard to zip. This is one of the hard parts.
05 14 27 55	CDR-EVA	Okay. Want me to bend over a little bit?
05 14 27 57	LMP-EVA	Yes. I sure would. Okay. And lean back. That'll do it. Just like that.
05 14 28 01	CDR-EVA	Okay.
05 14 28 03	LMP-EVA	... I won't. I won't. ... Right there. One more pull and I've got it.
05 14 28 11	CDR-EVA	Okay.
05 14 28 13	LMP-EVA	I've got lots of oxygen.
05 14 28 15	CDR-EVA	Yes, same here. Okay. Now, let me put the covers down on it.
05 14 28 20	LMP-EVA	Before you get that thing buried too deep, how about letting me cut this scoop off?
05 14 28 24	CDR-EVA	Well, okay, scoop goes right in here.
05 14 28 2[illegible]	LMP-EVA	Oh, you've got a place for it.
05 14 28 28	CDR-EVA	Well, sure. You didn't think you were going to leave without a scoop, did you?
05 14 28 30	LMP-EVA	No.

05 14 28 35	CDR-EVA	Okay, grab the scoop.
05 14 28 37	LMP-EVA	Man, there - that's the problem.
05 14 28 38	CDR-EVA	That's what they said, but - Let me hold it. Maybe - -
05 14 28 41	LMP-EVA	Wait a minute. Wait a minute. Let me - let me help.
05 14 28 44	CDR-EVA	You got it.
05 14 28 45	LMP-EVA	Broke.
05 14 28 47	CDR-EVA	That's good.
05 14 28 48	LMP-EVA	Oh, smooth as silk.
05 14 28 49	CDR-EVA	Cut it apart right here. Now, that's right. They wanted it - No, they wanted it just after that joint. So cut it right there.
05 14 28 57	LMP-EVA	Okay. Good cut, but they wanted that joint if they could get it. Are you at the root? No, you're okay.
05 14 29 09	CDR-EVA	That's it. That's it.
05 14 29 12	LMP-EVA	One scoop.
05 14 29 15	CDR-EVA	That's dandy! It's even got dirt in it. Bring back some of the original dirt. Okay. Got an extra sample for you, Houston. The scoop's got dirt in it.
05 14 29 21	CC	Well done, troops. Say, when you move out from here, right? - Well, first of all, we show you're 3 hours into the EVA; and you're about 10 minutes behind nominal traverse we had figured out for a 4-hour EVA. However, your PLSS consumables are holding out real well, so we suggest you go on with the nominal traverse. We may want you to cut down to perhaps just one sample at blocky crater.
05 14 29 49	CDR-EVA	Okay, that's what I wanted to do is go to blocky crater if you agree - -
05 14 29 50	LMP-EVA	Hey! Hey, look - look at this, Pete.
05 14 29 51	CDR-EVA	What?

05 14 29 54	LMP-EVA	We thought this thing had changed color, but I think it's just dust. Look, we rubbed into that battery, and it's getting shiny again. Let me get a shot on it.
05 14 30 00	CDR-EVA	Okay, go ahead.
05 14 30 01	LMP-EVA	I think that's what - maybe this thing's just collecting all this red dust.
05 14 30 06	CC	Okay, Pete. Now, before you leave there, also, would you get some of those geosamples which we've discussed, as well as some of the loose soil from that area?
05 14 30 18	CDR-EVA	Will do. We'll do it right now.
05 14 30 21	LMP-EVA	Okay.
05 14 30 22	CDR-EVA	Let's do it.
05 14 30 23	LMP-EVA	Here's this rock right here. Let me give the Surveyor tool a heave.
05 14 30 27	CDR-EVA	Okay.
05 14 30 28	LMP-EVA	We don't need it for anything, do we?
05 14 30 31	CDR-EVA	Houston, we don't need this Surveyor tool anymore, do we?
05 14 30 34	CC	If you've got the TV back at the LM already cut off, then there is no more need for it.
05 14 30 47	CDR-EVA	Okay. Al, have I got my scoop on?
05 14 30 51	LMP-EVA	Do you?
05 14 30 53	CDR-EVA	You've got you ... rock right here. Okay. Let me go get the sample bags.
05 14 31 02	LMP-EVA	Hey, that's a good one.
05 14 31 04	CDR-EVA	I don't think the TV could see that one, though, I figure it was too close. How about this one?
05 14 31 11	LMP-EVA	... down with you.
05 14 31 15	CDR-EVA	Okay. All right, now. Trying to remember where that - they got a ... one.

05 14 31 25	LMP-EVA	Here's a square one. I see one up there, right now.
05 14 31 28	CDR-EVA	Where's the one that had the lines in it?
05 14 31 31	LMP-EVA	I think it's right over - right up here on the - There's a crater, right up - I'll show you. Looks like - -
05 14 31 36	CC	Pete and Al, Houston. Before you leave the area of the Surveyor, would you take a look back at the Surveyor and see whether the direction of the sunlight has any effect on the colors which you see?
05 14 31 51	LMP-EVA	Direction of the - -
05 14 31 52	CDR-EVA	Wait, wait! Let me get this in the bag, too.
05 14 31 54	LMP-EVA	Sorry. Didn't know you had it, Pete.
05 14 31 57	CDR-EVA	Okay. No, it's light brown wherever you look at it, up-Sun, down-Sun, or cross-Sun.
05 14 32 05	LMP-EVA	But, strangely enough, that light brown rubs off. That's the funny part.
05 14 32 06	CDR-EVA	Yes.
05 14 32 08	LMP-EVA	That's funny, because the dirt here is not brown.
05 14 32 11	CDR-EVA	Look, is that the rock right there? You know, these rocks, as they showed in the Surveyor pictures, all have this soil built up around them.
05 14 32 24	CC	Roger, Pete.
05 14 32 25	LMP-EVA	Yes, they all have fillets around them.
05 14 32 30	CDR-EVA	I'm trying to remember where - I can't orient myself to the pictures, can you?
05 14 32 35	LMP-EVA	No, there's - I think it's about - -
05 14 32 37	CDR-EVA	Should we nab this one right here?
05 14 32 39	LMP-EVA	That's a good rock right there.
05 14 32 41	CDR-EVA	I don't know whether I can get that or not. Let me see.

05 14 32 51	LMP-EVA	We'll get it. That a boy. There you go.
05 14 33 06	CDR-EVA	Okay, let's head for blocky crater; pick up a couple of more of these in route.
05 14 33 11	LMP-EVA	Sounds good to me.
05 14 33 12	CDR-EVA	Let's get that brick-looking one over there. I think that's one of them they saw there. Up the hill a little bit - ways. - -
05 14 33 18	CC	Pete and Al, we have comment on what you just said about brushing up against the battery case. Would you make sure that anything which you picked up against that battery case you clean off your EMU?
05 14 33 32	LMP-EVA	Yes. We're thinking about that - -
05 14 33 34	CDR-EVA	There wasn't any signs of KOH anywhere. - -
05 14 33 36	LMP-EVA	Yes. We've looked, and - -
05 14 33 37	CDR-EVA	The battery case was tight. Nice and tight and brown.
05 14 33 41	LMP-EVA	Right here's the one, the square one, Pete.
05 14 33 44	CC	Roger.
05 14 33 45	CDR-EVA	Where?
05 14 33 46	LMP-EVA	There.
05 14 33 48	CDR-EVA	Okay. That's about enough rocks, pal.
05 14 33 55	LMP-EVA	I think it is, that is, for here. Let me get it. Okay, you got it. Good show.
05 14 34 07	CDR-EVA	Okay, let's head for blocky crater.
05 14 34 09	LMP-EVA	Okay.
05 14 34 12	CC	Al, do you have a sample bag number on that last one?
05 14 34 14	LMP-EVA	...
05 14 34 16	CDR-EVA	All those rocks are too big for sample bags - -

05 14 34 19	LMP-EVA	They are big rocks, Houston. They're all at least 6 inches in diameter, and I think these are some of the ones you wanted. It's kind of hard to tell without having a photograph on hand or something that's standing there and studying it for a lot longer than I think we care to do it, just which rocks are which.
05 14 34 41	CC	Roger.
05 14 34 45	CDR-EVA	It's pretty easy to move along on this slope. It's just a little bit deeper and it a little bit softer.
05 14 34 51	LMP-EVA	I'm going to take a break here, Pete, for just a few seconds.
05 14 34 54	CDR-EVA	All right. I'm right with you.
05 14 35 00	CDR-EVA	Can't get up your pace when you're running on the side of a slope.
05 14 35 04	LMP-EVA	No.
05 14 35 05	CDR-EVA	You don't have a chance to go from side to side, like on level ground. Look at that nuge boulder out there at - boy, I wish we could go over there. Look at that boulder.
05 14 35 13	LMP-EVA	Where?
05 14 35 15	CDR-EVA	Straight ahead. See it there? Allen?
05 14 35 20	LMP-EVA	No, where?
05 14 35 22	CDR-EVA	Over the top of the hill.
05 14 35 25	LMP-EVA	Don't see where you are looking.
05 14 35 27	CDR-EVA	Right on the other side of the - about 200 yards that way. See that big boulder sitting up there; the biggest one we've seen since we've been here.
05 14 35 37	LMP-EVA	I don't see which one you're referring to - that one right there?
05 14 35 40	CDR-EVA	Yes.
05 14 35 43	LMP-EVA	Yes. Oh, these down in here are bigger than that. Look at that right here. Look at that right there on your left. Look.

05 14 35 50	CDR-EVA	Let me turn around and look.
05 14 35 52	LMP-EVA	Gigantic right there. There's a big one.
05 14 35 54	CDR-EVA	What?
05 14 35 55	LMP-EVA	Come further left. That's a pretty good sized one.
05 14 36 00	CDR-EVA	I've got it. Let's get up out of the crater where we can get up on the level ground. Okay.
05 14 36 10	LMP-EVA	Hey, Pete.
05 14 36 11	CDR-EVA	Huh?
05 14 36 13	LMP-EVA	This - There it was kind of hung up on the gnomon. Let me get the gnomon and pick it up. It's not usually on there - no gnomon.
05 14 36 34	CDR-EVA	There you go. Okay, let's document up a sample here, and I think you ought to photo that whole blocky crater right there. That thing's spectacular.
05 14 36 53	LMP-EVA	It is. What is it?
05 14 36 56	CDR-EVA	Bed - That's got to be bedrock there, babe. Yes. Let's get some samples of that.
05 14 37 00	LMP-EVA	Got to be.
05 14 37 03	CDR-EVA	Hey, Houston - is the dimple crater's right behind the LM? Is that - it's a big blocky impact crater.
05 14 37 21	LMP-EVA	That may be cool enough back in MIN cooling.
05 14 37 32	CDR-EVA	... I kind of thought it would be tough down in the crater, losing your balance, but it doesn't seem to be; it's just harder walking, that's all.
05 14 37 42	CC	Pete and Al, could we have EMU check?
05 14 37 47	CDR-EVA	Sure could. Right at the top of the rim, we can get a good place to rest. I am reading 36 percent oxygen.
05 14 37 54	LMP-EVA	We're okay.

05 14 37 56	CDR-EVA	We're going to sample - I'll tell you what we're going to do, Houston. We're going to get an EMU check here; we're going to pick up one sample out of this blocky crater; give you a partial PAN of it because it's a pretty fantastically interesting crater with a lot of bedrock. Big chunky rocks blown up out of it - -
05 14 38 11	LMP-EVA	Very angular. Very sharp.
05 14 38 13	CDR-EVA	- - and get a sample of the double craters on the side of the Surveyor crater, and then my recommendation is, we've got so much gear and so many rocks, that we head for the LM and start packing it all up.
05 14 38 25	CC	Roger. We concur; that's a good idea. Al, could you give us your percent?
05 14 38 32	LMP-EVA	I sure could. Looks like about 36 percent.
05 14 38 36	CC	Copy. 36 on both, and how are you doing on that film?
05 14 38 42	LMP-EVA	Let me ask Pete. That's a good question. Boy, my camera is completely dust-covered, Houston. I just hope that the lens is open - ... 121. How's the lens? - -
05 14 38 52	CDR-EVA	Your lens is in good shape. Now, why don't you stand right here and get a partial PAN while you're resting on this crater? Either side.
05 14 38 58	LMP-EVA	Hey, wait a minute. Look at this.
05 14 38 59	CDR-EVA	What?
05 14 39 01	LMP-EVA	I can't - Forget it. I thought I saw something.
05 14 39 10	CDR-EVA	I'm beginning to think that these rocks that look red, if we'd just crack them open, we'd find they're plain old basalt rock on the inside. We just don't ever have any cracked. We ought to pound one of those things with a hammer in a minute.
05 14 39 22	LMP-EVA	Okay, you want me to do a PAN of this little part or the whole crater, Pete?
05 14 39 25	CDR-EVA	No, get the whole crater. Get about four shots across it and then move over and get another four.

05 14 39 30	LMP-EVA	Okey-doke. 74.
05 14 39 37	CDR-EVA	Funny, I can't notice that TV camera on my back. It moves my c.g. further in.
05 14 39 43	LMP-EVA	Does it feel okay back there?
05 14 39 45	CDR-EVA	Oh, it feels okay; sure, the way to carry gear; it sure beats that thing. That's a pain. Now, wait a minute; where are you shooting, Al? I want you to shoot down in that crater right there.
05 14 39 55	LMP-EVA	Sorry, that's what I - Okay, read you.
05 14 39 59	CDR-EVA	Shoot way down into it; get a stereo of that thing with those big blocks down there.
05 14 40 03	LMP-EVA	Okey-doke. It's kind of dark, but I think we can get something good. Okay, move over here. This is probably the most spectacular crater we've come to, I think. The original craters took it down to bedrock and then, I guess, more recently then, this one, came in here and really banged it out. These blocks are a lot more sharp cornered than any we've seen anywhere else. I guess this must be the most recent one we've been around.
05 14 40 40	CDR-EVA	No. I got the idea that the bedrock's not too deep, and that this was a big crater but it's very, very, very, very old. And then this thing came along and hit it - -
05 14 40 50	LMP-EVA	That's right.
05 14 40 51	CDR-EVA	- - and broke into the side of the bedrock that's been sticking out into this ... - -
05 14 40 55	LMP-EVA	Yes, and then threw it all out again.
05 14 40 59	CDR-EVA	I think - Let's get a sample of that rock.
05 14 41 04	LMP-EVA	Yes. Let's do. I think it's going to be the same - -
05 14 41 05	CDR-EVA	And then let's get out of here.
05 14 41 06	LMP-EVA	Okay. Want to get a docu - we document and a couple of the big pieces. How's that?
05 14 41 12	CDR-EVA	Yes.

05 14 41 13	LMP-EVA	That's a good idea. Let's see. What looks like all the same. Right here?
05 14 41 16	LMP-EVA	Yes. Let me get a shot at it, Pete, cross-Sun.
05 14 41 19	CDR-EVA	Okay. Get a stereopair right here. We don't need the gnomon; I'll put the - -
05 14 41 22	LMP-EVA	By the way, when I shot that crater down there, I had my distance set on 30 feet. I thought that would be right, but that's the only one we haven't shot on the numbers.
05 14 41 36	CDR-EVA	Get further back, Bean.
05 14 41 38	LMP-EVA	Okay. Let me get some rocks. Okay. This is going to be sample bag number - number 15D, Houston.
05 14 41 53	CC	15D, Al.
05 14 41 56	LMP-EVA	Okay. Pete, you ought to put two or three rocks in here, just generally; and I'll photograph them, and we can see what you took. Couple of more. Those are good. Okay. You know, most of the rocks we've seen today is exactly like this. Going to pound one of these with a hammer in a minute.
05 14 42 16	CDR-EVA	Hey, there's some of that light-colored under-soil.
05 14 42 20	LMP-EVA	You're right. Okay. You want me to get another sample bag?
05 14 42 30	CDR-EVA	No. I want to start moving out.
05 14 42 33	LMP-EVA	Okay. Go.
05 14 42 35	CDR-EVA	All right.
05 14 42 43	LMP-EVA	I'll just pick up this one big rock here, Pete, and stick it in the bag.
05 14 42 47	CDR-EVA	Okay.
05 14 42 48	LMP-EVA	Good. That's a good rock.

05 14 42 50	CDR-EVA	Okay, Houston. Now, I'm going to go pack up the doc'ed samples box, and I'll understand you're going to allow me 20 pounds of other rocks. Is that right?
05 14 43 05	CC	Pete, what we'd like to do is to get an estimate from you of how much you think you've got in the first SRC in terms of volume or weight.
05 14 43 16	CDR-EVA	Well, in comparison to the zero-g airplane, let's see, the maximum load is 80 total pounds, right? I'm going to guess that the mass that I sent up was about a 60-pounder. Just the box.
05 14 43 37	CC	Roger, Pete. From what you said in the first EVA and basic calculations on Apollo 11 data, we come up with about 54 pounds.
05 14 43 48	CDR-EVA	Very good. I think that we're fairly close.
05 14 43 57	LMP-EVA	I just bet you everything we got here is really black basalt. All been colored just like that Surveyor. Hey, that bag is bouncing a little bit too much back there, Pete.
05 14 44 06	CDR-EVA	Huh?
05 14 44 08	LMP-EVA	Surveyor bag is bouncing.
05 14 44 09	CDR-EVA	Well, that's okay. It's not hurting anything.
05 14 44 36	CDR-EVA	Al, you've got to get that closeup stereocamera going.
05 14 44 39	LMP-EVA	Okay.
05 14 45 02	CDR-EVA	Okay, Houston. ... back in the LM.
05 14 45 13	CC	Roger, Pete. You're 3 plus 16 into the EVA, and for a 4-hour EVA, you're right on.
05 14 45 21	CDR-EVA	Okay. Very good.
05 14 45 40	LMP-EVA	Hey, did you know that our EVA antenna didn't go straight up? It's on a - -
05 14 45 45	CDR-EVA	I noticed that when I was running back.
05 14 45 52	CDR-EVA	I'll tell you. -

05 14 45 56	CC	Roger, Al. Copy. How far off the nominal position was it?
05 14 46 02	CDR-EVA	Looks like - -
05 14 46 03	LMP-EVA	It's sticking up about 65 degrees.
05 14 46 08	CC	Roger, Al.
05 14 46 10	CDR-EVA	This thing is driving me buggy.
05 14 46 41	LMP-EVA	Hey, I think all this stuff is just fine-grain basalt, Pete. We haven't seen anything else but that. We haven't seen anything at any of the places that we've gone except the same type of fine-grained basalt. It's been different colors because of how long it's been out on the surface or where it's been. It'll be interesting when we get them to Houston and they crack them open.
05 14 47 07	CDR-EVA	Hopefully.
05 14 47 12	LMP-EVA	Take a rest here a moment. I used to have to push the legs down in that lunar handtool carrier, but I don't have to anymore. He just pushes his own legs; got enough rocks in there.
05 14 47 34	LMP-EVA	Hey, Houston. Here's where that engine moved some dirt. You can see it here.
05 14 47 44	CC	Where are you on that, Al?
05 14 47 49	LMP-EVA	I'm right to the left rear of the - It looks like I'm between the plus Y and minus Z strut, and it looks like it really washed a lot of dirt off in this direction. If I look back behind me, - -
05 14 48 03	CDR-EVA	Hey, Al? Al? Let's get the - -
05 14 48 08	LMP-EVA	Need some rocks?
05 14 48 09	CDR-EVA	Get the rocks over here. Come on. We can't baloney all day. We've got to get out of here.
05 14 48 14	CC	We concur, Pete.
05 14 48 16	CDR-EVA	I want you to put the - put the tool carrier right here.

05 14 48 21	LMP-EVA	There it is.
05 14 48 22	CDR-EVA	Stick your camera in the ETB and get the film can out of there, and I'm going to start packing up the gear.
05 14 48 38	LMP-EVA	Okay, here is the camera.
05 14 48 41	CDR-EVA	I'm not sure. I guess all this will fit in here; our cameras and everything, complete with this TV camera.
05 14 48 48	LMP-EVA	Okay.
05 14 48 52	CDR-EVA	Don't lift it up, Al, or my rock box to go.
05 14 48 53	LMP-EVA	Okay.
05 14 48 56	CDR-EVA	That a boy. Okay. Do you want to take my saddlebag off?
05 14 49 07	LMP-EVA	Okay. Here.
05 14 49 11	CDR-EVA	No, hammer.
05 14 49 13	LMP-EVA	Okay.
05 14 49 21	CDR-EVA	Got it?
05 14 49 22	LMP-EVA	No. Okay. Now I'll go do stereo closeup photos.
05 14 49 34	CDR-EVA	I'll tell you what, you go get me the solar wind, first.
05 14 49 37	LMP-EVA	Solar wind first? I'll go get it for you.
05 14 49 38	CDR-EVA	That a boy.
05 14 49 40	LMP-EVA	You want me - Let me take that little bag out there with me.
05 14 49 43	CDR-EVA	There it is, right there. Wait. Al, wait a minute - wait, wait, wait! You're all tangled up in the TV cable. I'll tell you, that TV cable is going to be - is really making me mad. There you go. That - wait, wait, wait. Wait, wait. Let's take the Surveyor - TV camera.
05 14 50 07	LMP-EVA	Huh?
05 14 50 08	CDR-EVA	Put it at the footpad.

05 14 50 11	LMP-EVA	Is that what you want to do with it?
05 14 50 12	CDR-EVA	I want you to put it at the footpad.
05 14 50 16	LMP-EVA	Oh, okay.
05 14 50 17	CDR-EVA	All right.
05 14 50 19	LMP-EVA	Let me set this down, then I'll go get it. Just a second.
05 14 50 23	CDR-EVA	Thank you. You're all tangled up again. I'll tell you, it's a trap. Okay.
05 14 50 35	LMP-EVA	Put this on the bottom one, Pete. It ... better.
05 14 50 51	CDR-EVA	Go ahead and turn this way, would you? Okay. We're much lighter. We're not going to have any trouble running this one up the LEC.
05 14 51 12	LMP-EVA	Okay. That's off there.
05 14 51 15	CDR-EVA	Where'd you put it?
05 14 51 17	LMP-EVA	Got it right here. Where would you like it?
05 14 51 19	CDR-EVA	... this LEC. Oh boy, I made a mistake. I should have brought the tool cutter back with me. This TV cable - Just put it in the footpad - This TV cable is going to drive me crazy.
05 14 51 31	LMP-EVA	Here you are. Want me to take it and move it out of the area?
05 14 51 35	CDR-EVA	I just tried to throw it under the LM now -
05 14 51 38	LMP-EVA	I can grab one end and just pull it out if you want. Why don't I do that?
05 14 51 41	CDR-EVA	It's all tangled up in the LEC, now. This happens every damn time.
05 14 51 46	LMP-EVA	Okay, I'll put this - Where do you want me to put this? Right here - right in the footpad.
05 14 51 49	CDR-EVA	I'm going to straighten this LEC out right now.
05 14 51 53	LMP-EVA	There you go.
05 14 51 55	CDR-EVA	Now, look, when I disappear with the LEC, you get that TV cable and get it out of here.

05 14 51 59	LMP-EVA	Okay.
05 14 52 02	CDR-EVA	There you go. Now, just throw the TV cable under the spacecraft.
05 14 52 12	LMP-EVA	Okay. Just a second.
05 14 52 19	CDR-EVA	There we go. That's better. Thing cost me 10 minutes!
05 14 52 50	CDR-EVA	Okay, I want you to get the solar wind.
05 14 52 53	LMP-EVA	Okay. Let me get this TV cable out of the way.
05 14 52 59	CDR-EVA	I could be packing some rocks.
05 14 53 11	LMP-EVA	Pete, would you hold this just one second, and then we'll get rid of this cable forever? Pull that.
05 14 53 19	CDR-EVA	Where do you want me to go with it?
05 14 53 20	LMP-EVA	Just stand right there. Then I can get this out over here, see. Before that, I couldn't.
05 14 53 33	CDR-EVA	There, now you've only got one place - -
05 14 53 35	LMP-EVA	That's right.
05 14 53 37	CDR-EVA	Is that right?
05 14 53 40	CDR-EVA	... Leave the door ...
05 14 53 54	CDR-EVA	Okay.
05 14 53 57	LMP-EVA	Tell me when.
05 14 54 04	LMP-EVA	This the bag you want me to use, Pete?
05 14 54 05	CDR-EVA	Yes.
05 14 54 07	LMP-EVA	Okay.
05 14 55 26	LMP-EVA	Solar wind doesn't like to roll up much. Little rascal, doesn't want to roll up. Just wrap it around here best I can without getting any dirt on it.

05 14 55 48	CDR-EVA	This is really ridiculous. I got dust all over the rock box, and I'm trying to blow it off. You going to manage that.
05 14 56 13	LMP-EVA	Okay. We got that solar wind.
05 14 56 17	CDR-EVA	Good boy!
05 14 56 20	LMP-EVA	Houston, we got that solar wind, but it didn't roll up in a very neat package.
05 14 56 26	CC	Roger, Al. We copy. That's all right.
05 14 56 46	CDR-EVA	Hey, it sure didn't, did it?
05 14 56 48	LMP-EVA	No. It just didn't. It split right near the top.
05 14 56 50	CDR-EVA	Can I help you?
05 14 56 51	LMP-EVA	Yes. You can hold that, and I'll just try to roll it up as best I can without getting any - I already got a little dirt on it ... You know what I mean?
05 14 57 02	CDR-EVA	Yes.
05 14 57 03	LMP-EVA	Not a lot I can do about it. I'm sure it's a good experiment. That thing is fragile.
05 14 57 09	CDR-EVA	Here, let me hold this end, and you just wrap it tight. That a boy.
05 14 57 14	LMP-EVA	I'll squeeze it down.
05 14 57 15	CDR-EVA	That a - -
05 14 57 16	LMP-EVA	And chase down any of those noble gases or whatever ... Okay. Got that in there? Looks bad, but I think it will do the job, Houston. We squashed it in so it's right - Let me get this right - -
05 14 57 32	CC	Roger, Al.
05 14 57 34	LMP-EVA	There you go. Okay. It just doesn't look so good, Houston.
05 14 57 38	CDR-EVA	Give me a hand getting this rock box closed.
05 14 57 40	LMP-EVA	Okay. Will do. Hey, that's a nice full box.

05 14 57 48	CDR-EVA	That's what I'm afraid of right there in the top of it.
05 14 57 52	LMP-EVA	Now, just what we need. Wait.
05 14 57 57	CDR-EVA	Now, I've got to get this dirt off it somehow. Hey, I know. Reach right in there. There's a brush and a scribe.
05 14 58 --		BEGIN LUNAR REV 27
05 14 58 06	LMP-EVA	Wait a minute.
05 14 58 10	CDR-EVA	Oh, why didn't I think of that earlier.
05 14 58 12	LMP-EVA	Got it? Then you can just take out the seal - There you go. Good show, Pete
05 14 58 17	CC	Pete, that glass brush should be over there on the handtool carrier if that will be of use to you.
05 14 58 27	CDR-EVA	We're using it right now. Works good, too.
05 14 58 28	CC	Roger.
05 14 58 32	CDR-EVA	Okay, Al. Put that back in.
05 14 58 34	LMP-EVA	Back in.
05 14 58 38	CDR-EVA	Now.
05 14 58 43	LMP-EVA	Okay. Okay. Go. Got it made.
05 14 58 59	LMP-EVA	Looks like you did it.
05 14 59 02	CDR-EVA	Yes. I hope so.
05 14 59 04	LMP-EVA	Okay. Got it, Pete. It looks good. The ... is closed, Houston.
05 14 59 14	CDR-EVA	Al, I want all the big ones. That looks like about 1 inch to me.
05 14 59 19	LMP-EVA	Yes.
05 14 59 20	CDR-EVA	That's it. The extra bag.
05 14 59 24	LMP-EVA	Okay, you got some of those bedrock ones in there, didn't you?

05 14 59 28	CDR-EVA	Yes.
05 14 59 29	LMP-EVA	Good show.
05 14 59 30	CC	Pete, Houston.
05 14 59 31	LMP-EVA	What do you want me to do with that?
05 14 59 33	CDR-EVA	Well - Yes.
05 14 59 35	CC	Okay. We'd like to give you a little weight summary for the rock boxes. If - We estimate you probably got about the same in rock box 2 as you did in rock box 1. No problem there. The Surveyor parts and TV camera will show a nominal 25 pounds in 15. What you could put in your bag that goes on the floor is about 15 pounds worth of rocks; and in the left-hand side stowage bag, you can put about 25 pounds of rock. So I guess those are the two you are working for now. Fifteen pounds' worth of rocks in the bag on the floor, and 25 pounds on the left-hand side stowage bag.
05 15 00 12	CDR-EVA	Okay, we don't have that many rocks, Houston. I'll tell you what we've got. We've got - SRC 2 is full and closed. It's - gosh, I hope I got it all in there, let me see: Solar wind, core tubes, environmental gas sample, documented samples all made it in. And the box is full, and I closed it, and I've got about - What's 1 inch on my scale? - I've got about 1 inch worth of rocks in another bag. And that's it; that's all the rocks we've got.
05 15 00 42	CC	Roger, stand by for that number, Pete. Pete, that 1-inch displacement is about 10 to 15 pounds. No problem, pack it up.
05 15 01 01	CDR-EVA	Okay. That's good. Okay, now, let me ask you another question. I can get some more rocks. Why don't I do that? While Al is taking stereophotos. We'll see if I can get myself - -
05 15 01 21	LMP-EVA	Okay, I'm going to - I don't have a camera to go along with this, so I'll just tell Houston when I'm taking a picture and then they'll know. So they can keep up with it. Okay, Houston. On this stereocamera, I'm taking a picture now, about 10 feet from the LM between the plus Y and minus Z strut, and I am hoping to show the effects

of the engine exhaust on the lunar surface. I'm going to - That was number 800. There's one at 801. It's moving around here ... I'm going to take another one. The little counter doesn't seem to be working. Everything is working okay but the little counter. And I am taking the fourth picture right up next to the engine, here. Okay, another one close to the engine. About 2 feet from the engine. Okay, Houston. The little counter on top of the experiment's not working, so I'll just tell you what I take next. And the light and everything seems to be working so I assume it's probably taking pictures. I'm going to go look for a crater that is undisturbed and take a picture down inside it.

05 15 02 56	CC	Roger, Al.
05 15 02 59	LMP-EVA	Here's one of a rock. Take two of the rock. Now, I am taking a picture of Pete's footprint in the soil. You can take a look at the interaction of that. Take another one.
05 15 03 53	CC	Pete, Houston.
05 15 03 54	LMP-EVA	I'm in an area now, Houston. It looks like -
05 15 03 57	CDR-EVA	Yes, go ahead.
05 15 03 59	CC	Okay, we recommend that you pack up where you are and start trying to pack up the excess rocks you just got and think about ingress.
05 15 04 11	CDR-EVA	Okay, very good. Houston, I'd like to comment to all the people who are involved with this EVA, my congratulations.
05 15 04 30	CC	Well, I think you two folks did an excellent job.
05 15 04 44	LMP-EVA	I'll take some of these pictures until you give me a call, Pete.
05 15 04 48	CDR-EVA	Why don't you just start working your way over here, Al? And we've got an awful lot of gear, and we will start getting her up.
05 15 04 55	LMP-EVA	All right. Will do.
05 15 04 57	CDR-EVA	We've got about 22 minutes by my clock - 23 minutes.

05 15 05 03	LMP-EVA	All right.
05 15 05 05	CDR-EVA	And we got a long day in front of us. - -
05 15 05 07	LMP-EVA	Okay.
05 15 05 11	LMP-EVA	Okay. Oh, this is so much fun. I can jump up about 3 feet and do a - 180. You might do a - 360!
05 15 05 26	CDR-EVA	You got to watch it though. You get all that mass going around and you get in trouble.
05 15 05 30	LMP-EVA	Okay.
05 15 06 11	CDR-EVA	What's up with Yankee Clipper this morning, Houston?
05 15 06 18	CC	Pete, Yankee Clipper looks real good. He's been doing P22's and rolling right off.
05 15 06 26	CDR-EVA	Good.
05 15 06 27	LMP-EVA	Okay, Pete, I'll take this as my last one.
05 15 06 29	CDR-EVA	Okay. If he can see the Surveyor, has he been able to see us out there?
05 15 06 35	LMP-EVA	Okay, that did it, Pete.
05 15 06 37	CDR-EVA	All right. I don't know how many we've got - -
05 15 06 38	CC	No report on that, Pete.
05 15 06 46	CDR-EVA	All right.
05 15 06 48	LMP-EVA	Here's a red one.
05 15 06 53	CDR-EVA	Got it.
05 15 06 54	LMP-EVA	Okay.
05 15 06 58	CDR-EVA	Okay, lift her up. Now we - I'm going to put it in the ETB.
05 15 07 03	LMP-EVA	Okay. There is goes.
05 15 07 07	CDR-EVA	Hey, wait. I want to watch.
05 15 07 08	LMP-EVA	Ready?

05 15 07 09	CDR-EVA	Yes.
05 15 07 18	LMP-EVA	Okay.
05 15 07 21	CDR-EVA	Okay.
05 15 07 25	LMP-EVA	Okay. I think we got all the film in, didn't we, Pete?
05 15 07 30	CDR-EVA	Yes.
05 15 07 31	LMP-EVA	I tell you what. Let's send the ... and, okay, clean me, and I'll get in there, and we'll start pulling this thing because we've got quite a load.
05 15 07 37	CDR-EVA	Yes. Now, one thing I need to do is - hand me the Surveyor - Surveyor bag.
05 15 07 41	CDR-EVA	Surveyor bag coming up.
05 15 07 45	LMP-EVA	... out of the way, babe. Here you are right here. Here's the two hooks.
05 15 07 52	CDR-EVA	That solves that one. All right. That's one.
05 15 07 55	LMP-EVA	Yes, it is.
05 15 07 56	CDR-EVA	Don't lock them. ... think they're going to need locking anyway. I don't think we need to lock anyway. Just leave well enough alone.
05 15 08 01	LMP-EVA	That's right. Damn things are getting jammed. Okay? Is that it?
05 15 08 06	CDR-EVA	Yes.
05 15 08 07	LMP-EVA	Let's see, put it back on the footpad. Okay? Not supposed to get too dirty.
05 15 08 09	CDR-EVA	Okay. Now, let's brush you off.
05 15 08 10	LMP-EVA	Okay.
05 15 08 13	CDR-EVA	Why don't you hop up on the ladder, and let me brush you off from the ladder?
05 15 08 16	LMP-EVA	Okay, why don't you brush me off up high here and then I'll hop up and you can get me.
05 15 08 18	CDR-EVA	Okay. I'm not getting much off.

05 15 08 26	LMP-EVA	Okay.
05 15 08 27	CDR-EVA	It's a start.
05 15 08 31	LMP-EVA	Let me try you, babe.
05 15 08 32	CDR-EVA	Okay.
05 15 08 39	LMP-EVA	Oh, that isn't as hard to get off. Let me get up here. Now, I'm going to kick my feet, so it's going to get this Surveyor bag dirty.
05 15 08 54	LMP-EVA	Ow! They shock.
05 15 08 57	CDR-EVA	Okay. Let me hit you.
05 15 09 00	LMP-EVA	All right. Okay. Let me kick my shoes.
05 15 09 05	CDR-EVA	Climbing up ... I think I'm making myself dirtier. Boy, I tell you something. These lanyards get grimy black.
05 15 09 13	LMP-EVA	Is that it?
05 15 09 15	CDR-EVA	Yes.
05 15 09 17	LMP-EVA	Okay, I'll go in.
05 15 09 19	CDR-EVA	Man the camera.
05 15 09 20	LMP-EVA	Okay.
05 15 09 33	CDR-EVA	Okay, I'll watch you in the hatch.
05 15 09 35	LMP-EVA	Okay. Okay, just a second. Just let me get the door open. There's door wide open. You want my golden buzzer?
05 15 09 46	CDR-EVA	Get in.
05 15 09 49	LMP-EVA	Am I lined up okay?
05 15 09 50	CDR-EVA	You might want to turn off your PLSS feedwater when you get all the way in.
05 15 09 53	LMP-EVA	Pretty good thinking. Okay.
05 15 10 03	CDR-EVA	That a boy.
05 15 10 06	LMP-EVA	... Does it.

05 15 10 09	CDR-EVA	Roll a little left. Yes, that's it. That's it. Okay, just a second. No rush. Take your time.
05 15 10 32	LMP-EVA	I've got to get this sequence camera out of the way; I don't want to leave it in here when I'm in here.
05 15 10 44	CDR-EVA	Did you ever get the picture of the LM and Earth?
05 15 10 47	LMP-LM	No.
05 15 10 48	CDR-EVA	Oh, that's a shame.
05 15 10 49	LMP-LM	I know it.
05 15 10 50	CDR-EVA	Hi Earth; I can see us. It's up over the LM now. It's the first time I've had a chance to look. You're about a quarter Earth.
05 15 11 05	LMP-LM	Let me mount the bag. Hey, you got to give me a little slack, Pete.
05 15 11 10	CDR-EVA	Oh, okay. More?
05 15 11 15	LMP-LM	Just a second; I'll be okay. Don't put any weight on it yet. Can you hold the weight - -
05 15 11 20	CDR-EVA	Wait, wait, wait - Just a second. There you go.
05 15 11 37	CDR-EVA	Now hold on. Wait, wait, wait, wait.
05 15 11 43	LMP-LM	There you go.
05 15 11 44	CDR-EVA	Now, heave away.
05 15 11 45	LMP-LM	Okey-doke.
05 15 11 46	CDR-EVA	It's all yours.
05 15 11 56	LMP-LM	Okay, babe, you just pull in like this. All right. Got it.
05 15 12 15	CDR-EVA	Hey, Houston, the Surveyor gear is up, coming back for SRC 2.
05 15 12 21	CC	Roger, Pete. Copy Surveyor parts bag in.
05 15 12 37	LMP-LM	Okay, Pete. Take them. Wait a minute - Oh, no; not yet - not yet. Not yet - hand out. Uh-oh. That's okay. That's beautiful. Oh, boy. Okay. Take her.

05 15 12 58	CDR-EVA	Huh?
05 15 12 59	LMP-LM	Take it away.
05 15 13 00	CDR-EVA	Okay. And the game is don't rush and do it right.
05 15 13 04	LMP-LM	Okay.
15 13 07	CDR-EVA	Here I go get you the rock box. Okay. Like a rock box?
05 15 13 20	CDR-EVA	I need some more line, Al.
05 15 13 25	LMP-LM	Okay. I've got that much more. That's the end. You may have it tangled on something, Pete.
05 15 13 34	CDR-EVA	I see what the problem is.
05 15 13 37	LMP-LM	There, it's on the hatch; there you go.
05 15 13 55	CDR-EVA	Okay. Lift away, you've got a rock box.
05 15 13 57	LMP-LM	Okay. Feel how heavy this thing is.
05 15 14 03	CDR-EVA	Wait a minute, wait.
05 15 14 05	LMP-LM	Okay.
05 15 14 06	CDR-EVA	Wait a minute. There you go.
05 15 14 10	LMP-LM	All right. Now do it.
05 15 14 12	CDR-EVA	I'm going to have to use the pull-in feature; just a second. All right, ready?
05 15 14 26	LMP-LM	Go.
05 15 14 28	CDR-EVA	Give her one big heave.
05 15 14 30	LMP-LM	Made it.
05 15 14 32	CDR-EVA	Okay. I can't see it. Gosh darn it. Sun is in - -
05 15 14 34	LMP-LM	Can you take up some tension and I'll pull it in?
05 15 14 37	CDR-EVA	Got it.
05 15 14 38	LMP-LM	That's it.

05 15 14 39	CDR-EVA	Rock box 2 is in, Houston.
05 15 14 42	CC	Roger. Rock box 2 in.
05 15 14 47	CDR-EVA	And am I filthy dirty from the LEC. Wow, wow, wow!
05 15 15 24	LMP-LM	Okay, Pete. Go ahead.
05 15 15 56	CDR-EVA	(Humming) ... getting in and out of these shadows really gets eerie looking. Okay, Al, if you'll wait just a minute. There you go.
05 15 16 41	LMP-LM	Okey-dokey.
05 15 16 42	CDR-EVA	Coming in. Okay, just a second. Passing over the thing.
05 15 16 56	LMP-LM	You'd better believe it.
05 15 16 58	CDR-EVA	I can't see.
05 15 16 59	LMP-LM	Okay, pull up a little bit and I'll bring it in.
05 15 17 01	CDR-EVA	The Sun's shining right in my eyes.
05 15 17 02	LMP-LM	That's it.
05 15 17 03	CDR-EVA	In?
05 15 17 04	LMP-LM	It's in.
05 15 17 06	CDR-EVA	Beautiful job; just throw the LEC out. Okay, Houston. ETB is in with the camera and all the film, and so forth and so on.
05 15 17 16	CC	Roger, Pete. Copy you got the ETB in with the TV camera, closeup stereo, and the film packs.
05 15 17 25	LMP-LM	Okay, now, Pete, here comes the LEC, so watch out.
05 15 17 28	CDR-EVA	All right (laughter).
05 15 17 30	LMP-LM	Man, that really comes out, doesn't it? Gee, that went 50 feet.
05 15 17 38	CDR-EVA	Okay, let's see. Have I forgotten anything? Forgotten anything?

05 15 17 48	CC	Pete, you didn't roger the film pack. Do you have all the film packs and the closeup stereofilm, as well as the TV in that ETB?
05 15 17 59	CDR-EVA	Okay. Closeup stereofilm was in the ETB, two black and white magazines and one camera. I threw the other camera away because it was broken - went up. And the TV camera went up, so I believe we've got everything, Ed.
05 15 18 15	CC	Okay. You got the - Also the one camera which had the third film pack on?
05 15 18 24	CDR-EVA	The third film pack never got used.
05 15 18 26	LMP-LM	Yes, it did too, Pete.
05 15 18 28	CDR-EVA	Oh, did you?
05 15 18 29	LMP-LM	Yes.
05 15 18 30	CDR-EVA	Oh, I'm sorry. Okay, we got three film packs and one camera up there right now. How's that?
05 15 18 36	LMP-LM	Did you send the film back up?
05 15 18 38	CDR-EVA	Yes.
05 15 18 40	LMP-LM	Okay, we sent all three film packs back up. Oh, oh, oh, oh. There is something I wanted to - That's my low water pressure, Houston. I just turned off my water. That's good.
05 15 18 51	CC	Stand by on that, Al. Pete, also how about the tools?
05 15 19 00	CDR-EVA	Yes, sir.
05 15 19 23	LMP-LM	You might want to turn off your water too, Pete.
05 15 19 26	CDR-EVA	Yes, I was sitting here thinking there was something I ought to do. Mines off.
05 15 19 42	LMP-LM	Okay. Out of your way.
05 15 19 45	CDR-EVA	Okay. Houston, I guess you can mark me off the lunar surface; I'm on the footpad.
05 15 19 57	CC	Roger. We got that, Pete, at 3 hours and 50 minutes into the EVA.

05 15 20 11	CDR-EVA	Okay, up on the ladder I come, Hi-ho, hi-ho, hi-ho. Boy, I'll tell you, Al, that LEC really got me dirty.
05 15 20 24	LMP-LM	Yes, it flips that dirt all around.
05 15 20 48	CDR-EVA	Hi-ho. Oh wait a minute; I know what I want to do. There we go.
05 15 21 08	LMP-LM	You want to give me that piece of paper?
05 15 21 10	CDR-EVA	I couldn't get it up. I dropped it.
05 15 21 12	LMP-LM	That's too bad.
05 15 21 14	CDR-EVA	Okay, Houston, that's my PLSS feedwater, no sweat.
05 15 21 17	LMP-LM	Head down, come down. That's better. Move to your left slightly.
05 15 21 18	CC	Roger, Pete.
05 15 21 22	LMP-LM	That's it; come on in. Come to your left a little bit. Okay, come on up. Little more to the left. Just right.
05 15 21 36	CDR-EVA	Huh?
05 15 21 37	LMP-LM	You're just right. Scoot in there. Got to kind of scoot a little bit further in. You got it made. Bump into me, now. Okay. Okay.
05 15 21 55	CDR-LM	... let me close the hatch.
05 15 21 57	LMP-LM	... out of the way, and I wonder what that's from.
05 15 22 01	CDR-LM	What?
05 15 22 02	LMP-LM	That little - ... maybe ...
05 15 22 06	CDR-LM	I think that came from off of the landing.
05 15 22 19	LMP-LM	Lock her up, babe; you are nice and clean. Gordon will be glad to see you.
05 15 22 32	CDR-LM	One hatch closed.
05 15 22 33	LMP-LM	Okay, check that for AUTO ... but you can see - -
05 15 22 37	CC	Yankee Clipper, Houston.

05 15 22 38	CDR-LM	Yes. I'm flipping. You just - Go to hatch AUTO.
05 15 22 44	LMP-LM	Okay, let me move out of the way.
05 15 22 46	CDR-LM	Both to AUTO? Tell me when - lighting: ANNUNCI-TOR and NUMERICS, BRIGHT.
05 15 22 52	LMP-LM	Wait a minute.
05 15 22 57	CDR-LM	Okay. CABIN REPRESS valve AUTO.
05 15 23 04	CDR-LM	AUTO.
05 15 23 06	LMP-LM	PRESS REGs A and B, MASTER ALARM will come on, and cabin warning light. Okay, here comes the O_2. And the pressure is rising. Looks good right this minute. Okay, that's normal. PLSS O_2, OFF.
05 15 23 24	CDR-LM	Say again.
05 15 23 26	LMP-LM	PLSS O_2, OFF when you get 3.1.
05 15 23 34	CDR-LM	I can't get mine. Can you get it?
05 15 23 37	LMP-LM	Let me see if I can.
05 15 23 40	CDR-LM	I can't get it, Al.
05 15 23 42	LMP-LM	Just a second. Let me get mine, too.
05 15 23 53	CDR-LM	Okay? Could you get mine off?
05 15 23 57	LMP-LM	Roger. ... Just a second.
05 15 24 00	CDR-LM	I can't hear you.
05 15 24 14	CDR-LM	Your O_2 is OFF.
05 15 24 16	LMP-LM	Everything's OFF, Pete.
05 15 24 20	LMP-LM	And the cabin pressure is - -
05 15 24 22	CDR-LM	Cabin, 4 pounds.
05 15 24 23	LMP-LM	Okay, you want me to turn the ... off?
05 15 24 33	CDR-LM	That's it, that's it, babe. ... the checklist.
05 15 24 37	LMP-LM	I hope that seal is good.

05 15 24 39	CDR-LM	Say again.
05 15 24 41	LMP-LM	I didn't check that seal real closely.
05 15 24 43	CDR-LM	I didn't either.
05 15 24 44	CC	Yankee Clipper, Houston.
05 15 24 50	LMP-LM	Okay. It says here: Verify cabin pressure increasing. Now, let me tell you. PLSS O_2, OFF, activate OPS purge valve to DEPRESS, suit as required.
05 15 25 04	CDR-LM	Ah, that's better. Hey, don't take your helmet off!
05 15 25 13	LMP-LM	That's right.
05 15 25 14	CDR-LM	Just your gloves.
05 15 25 16	LMP-LM	Do we do that?
05 15 25 19	CDR-LM	Yes, we do, because we have to put on our other ones.
05 15 25 24	LMP-LM	Okay. Okay, let me read you.
05 15 25 33	CDR-LM	Yes. Okay.
05 15 25 34	LMP-LM	Cabin REPRESS valve closes at 4.4. Verify cabin pressure stable at 4.6. Looks good to me, Pete. Post-EVA systems CONFIG: Verify EV cir - look over there and make sure SUIT FAN 1 is closed. Now, make sure that SUIT FAN DELTA-P is closed.
05 15 25 41	CC	Yankee Clipper, Houston.
05 15 25 52	CDR-LM	Okay, just a second. SUIT FAN 1 is closed.
05 15 26 01	LMP-LM	SUIT FAN DELTA-P, closed. Okay. They're going to get some ECS caution and H_2O SEP component lights out.
05 15 26 08	CDR-LM	I can't hear you. What?
05 15 26 10	LMP-LM	ECS CAUTION and H_2O SEP component lights will go out in a minute. Doff your glove.
05 15 26 15	CDR-LM	Everything's out.
05 15 26 16	LMP-LM	Okay. That H_2O valve open? Okay, that's a good idea boy. Purge valves -

05 15 26 37	CDR-LM	Now, we don't have anything left but a little rendezvous. (Laughter)
05 15 26 41	LMP-LM	Ascent and rendezvous, babe.
05 15 26 47	CC	Yankee Clipper, Houston.
05 15 26 53	CMP	Houston, this Yankee Clipper.
05 15 26 54	CDR-LM	Give me your purge valve fitting, I'll put it in the TSB. Okay, let me give you my purge valve. Okay?
05 15 26 56	CC	Yankee Clipper, your two cohorts are back in. They just finished another 4-hour EVA; accomplished all the objectives and did an excellent job.
05 15 27 08	LMP-LM	You got it.
05 15 27 09	CMP	Okay, thank you very much. ... right now.
05 15 27 15	CC	Roger.
05 15 27 16	CDR-LM	This suit stuff has got all that dirt on it; I think it's - is this mine?
05 15 27 18	CMP	...
05 15 27 25	LMP-LM	There you go, Pete.
05 15 27 26	CDR-LM	I can't turn it ...
05 15 27 27	LMP-LM	Sure, sure. ... purge valve because it has to rotate with the other. Got your ...? Let's find it.
05 15 27 55	LMP-LM	I know. Here somewhere. Is that H_2O valve open? Turn it over.
05 15 28 09	LMP-LM	Purge valve and OPS O_2 hose, stow purge valves in TSB.
05 15 28 15	CDR-LM	Just throw it in there, I'll find the ball.
05 15 28 18	LMP-LM	Oh, may have thrown it over. May be behind you.
05 15 28 24	CDR-LM	..., these things won't come undone.
05 15 28 26	LMP-LM	I think they got a lot of that dust on them.

05 15 28 28	CDR-LM	Here, would you turn this please?
05 15 28 29	LMP-LM	Yes, I sure will. There you go.
05 15 28 36	CDR-LM	I don't understand why I can't ... there.
05 15 28 39	LMP-LM	Okay.
05 15 28 43	CDR-LM	They're sticking.
05 15 28 44	LMP-LM	Connect your LM hoses. Red to red; blue to blue. Here, I'll hand you your hoses, Pete.
05 15 28 57	CDR-LM	So far, we haven't touched one of those circuit breakers as far as I can tell, around in here.
05 15 29 10	LMP-LM	There's your hoses, Pete. Got them?
05 15 29 13	CDR-LM	Yes. Here's mine. Okay.
05 15 29 51	LMP-LM	Red to red; blue to blue; isolation both to SUIT FLOW.
05 15 29 57	CDR-LM	Okay, would you turn mine on? Thank you.
05 15 30 02	LMP-LM	Got it.
05 15 30 04	CDR-LM	Does that feel good!
05 15 30 06	LMP-LM	Okay. Let's get to the PLSS pump, OFF and FAN, OFF; and the backpressure in your fan.
05 15 30 13	CDR-LM	Okay, that's good.
05 15 30 15	LMP-LM	Disconnect PLSS H_2O from PGA; connect LM H_2O.
05 15 30 19	CDR-LM	I'll get yours and you get mine.
05 15 30 23	LMP-LM	Lift up your RCU a little bit, Pete. RCU, there you go.
05 15 30 36	LMP-LM	That did it. That did it. ...
05 15 30 50	CDR-LM	Okay?
05 15 30 51	LMP-LM	Okay.
05 15 30 52	CDR-LM	LCD PUMP IN.

05 15 30 54	LMP-LM	Okay. We're going to get two of them probably. You see them?
05 15 31 00	CDR-LM	Test mode, both on them O, ON.
05 15 32 07	CDR-LM	Okay, hello there. A, OFF, and B is OFF. ...
05 15 32 35	CC	Intrepid, Houston.
05 15 32 36	CDR-LM	Houston, Intrepid hooked up on the Intrepid system. How do you read?
05 15 32 42	CC	We read you loud and clear, Pete, and we're standing by to give you any help on the stowage you may need; and when you get down to it, we also have some good words for you on how to stow the TV camera.
05 15 32 58	CDR-LM	Okay, we'll wait for a while. Let us get through our checklist, please.
05 15 33 02	CC	Roger.
05 15 43 47	CDR-LM	Hello, Houston; Intrepid.
05 15 43 51	CC	Intrepid, Houston. Go ahead.
05 15 43 54	CDR-LM	Roger. Are we a little bit early, or do you want me to go ahead with the checklist and put on my rendezvous radar operate heater circuit breaker?
05 15 44 05	CC	Stand by, Pete.

END OF TAPE

05 15 44 01	CDR-LM	... circuit breakers.
05 15 44 03	CC	Stand by, Pete.
05 15 45 23	CC	Pete, we show that you are ahead. You can go ahead and complete that step, and we'll be back with you to - on any items which we would like you to hold on.
05 15 45 38	CDR-LM	Okay. Very good. I'll go ahead and put that in, and we're going to go ahead with our jettison here shortly.
05 15 45 48	CC	Roger.
05 15 52 08	CC	Yankee Clipper, Houston. On the high gain, would you give us pitch, minus 30; yaw, 175?
05 15 52 53	CMP	Hello, Houston; Yankee Clipper.
05 15 52 57	CC	Yankee Clipper, Houston. Go ahead.
05 15 53 02	CMP	Roger, Houston. Just want to let you know that 158 is going along real great. It's taking pictures every 20 seconds.
05 15 53 09	CC	Real good, Dick.
05 15 53 12	CMP	... just to hear something time line.
05 15 53 17	CC	Roger. Copy. You're right on the time-line.
05 15 53 24	CMP	If you've got REV 28 update, I'll take that now before we get into the 158 for the next REV.
05 15 53 34	CC	Roger, Dick. We have the S-158 for REV 28 when you're ready to copy.
05 15 53 47	CMP	Okay. Go ahead.
05 15 53 48	CC	T_1, 137:28:55; T_2, 137:40:55; roll 90, 228, 338; T_1, 137:49:11; for Descartes, roll 89, 217, 319; T_1, 137:52:42; Fra Mauro, roll 62, 162, 312; T_1, 138:03:47.

05 15 54 18	CMP	Okay. And I put these on T_1 time, 137:28:55, T_2 time is 137:40:55; Canopus, roll 090, pitch 228, yaw 338; T_1 is 137:49:11; Descartes, roll 89, pitch 217, yaw 319; T_1 137:52:42; Fra Mauro, roll 62, pitch 162, yaw 312; T_1 138:03:47. Over.
05 15 54 31	CC	Readback correct, Dick. And we also have map update for REV 28.
05 15 54 38	CMP	Go.
05 15 54 40	CC	LOS 136:34:34, 136:59:16, 137:20:47.
05 15 54 56	CMP	Roger. I copied that. Thank you.
05 15 54 59	CC	Okay, Dick. And we also have one extra thing here. You can observe a transient event. You should take photos and observe Alphonsus at a GET of 136:00:02. You need not change film. You can go with the Hasselblad 80-millimeter lens if you want to take photos, and you can go with f:4, 250, at infinity. The transient event, area 7. Your brightening between the central peak and west wall, 110 nautical miles south of track, use window number 1, and it can be performed in the S-158 attitude.
05 15 56 55	CMP	Roger. I copy at 136:00:02, El Hasselblad, 80 millimeter, f:4, 1/250th, and it's going to be area 7, window 1, 110 south, and say what it is again, please?
05 15 57 12	CC	Okay, Dick, that's a brightening between the central peak and west wall.
05 15 57 29	CMP	Okay. I've got the camera now. I'll take a look at it.
05 15 57 32	CC	Roger, Dick.
05 15 59 41	CMP	Houston, Clipper.
05 15 59 44	CC	Clipper, Houston. Go ahead.
05 15 59 49	CMP	Roger. Is that in the crater Theophilus?
05 15 59 56	CC	Dick, say again. Would you -

05 16 00 03	CMP	The transient event, is that in the crater Theophilus?
05 16 00 08	CC	That's at Alphonsus, Dick.
05 16 00 16	CMP	Okay.
05 16 00 17	CC	Again, Alphonsus and a brightening between the central peak and west wall.
05 16 00 30	CMP	Okay. I've got it.
05 16 04 28	CMP	Houston, this is Clipper. That first pass is completed.
05 16 04 33	CC	Roger, Clipper. Copy complete. What was the visual on that transient event?
05 16 04 43	CMP	I didn't see anything out there. There is a dark area in between the central peak and the west wall, but I can't tell what it is. Looked a little bit darker than the rest of the surrounding area. It's quite a ways away, so - I really can't see much down there.
05 16 05 01	CC	Roger.
05 16 05 29	CMP	Houston, how is that charge on battery A coming along?
05 16 05 35	CC	Roger. We copy.
05 16 06 19	CC	Yankee Clipper, you can terminate the charge on BAT A at 137:00 as in the flight plan.
05 16 06 29	CMP	Okay. Let's start on B, I guess, huh?
05 16 06 32	CC	That's affirmative.
05 16 06 39	CMP	Okay. ... just be on your toes.
05 16 06 56	CC	Yankee Clipper.
05 16 06 57	CMP	... want Charlie to go to sleep ...
05 16 07 02	CC	Dick, say again.
05 16 07 07	CMP	... don't want Charlie to go to sleep?

05 16 07 13	CC	Dick, it sounds good, but you're slightly garbled. Maybe you could move the mike a bit away from your mouth.
05 16 07 21	CMP	Roger. I said I didn't want Charlie to go to sleep.
05 16 07 23	CC	Roger. We copy that. Say, Dick, at 140 plus 00, you have a landmark track coming up of 193. It's your option, you can go ahead and do 193 or landmark tracking on the LM. Whichever way you want to go, we'll work you up a PAD.
05 16 07 42	CMP	Well, which would you prefer?
05 16 07 46	CC	It's really your option, Dick. We can work up a PAD either way.
05 16 07 59	CMP	Let's use the LM, huh?
05 16 08 02	CC	Okay. We'll get you a PAD for the LM.
05 16 11 41	CC	Yankee Clipper, Houston.
05 16 11 46	CMP	Go ahead.
05 16 11 48	CC	Dick, well, we need some words on the status of that hatch window in order to help us interpret the data you're getting back from the 158.
05 16 12 05	CMP	Well, it's - It's really not too bad. It's got a few drops on the outside yet from that LOX stuff that's on there and I've been trying to keep the inside clean. It's got some smear marks on the inside pane where we've tried to wipe it. It got all wet last night and I tried to dry it off this morning with a towel and some Kleenex. It's still smeared a little, but other than that, it looks pretty good; really not too bad. I'll clean it again right now.
05 16 12 37	CC	Roger, Dick. Thank you.
05 16 13 19	CDR-LM	Hello, Houston; Intrepid.
05 16 13 22	CC	Intrepid, Houston. Go ahead.
05 16 13 26	CDR-LM	Roger. Commander's feedwater remaining 0.32 KG.
05 16 13 36	CC	0.32 kilograms.

05 16 13 41	CDR-LM	That's right, and we'll have the LMP's for you in just a minute.
05 16 13 46	CC	Roger.
05 16 17 14	CDR-LM	Houston, the LMP's water is 0.26.
05 16 17 19	CC	0.26.
05 16 17 34	LMP-LM	That's affirmative.
05 16 27 25	CDR-LM	Houston, as soon as we get through our suit integrity check, we will be depressing the cabin for the jettison.
05 16 27 32	CC	Roger, Intrepid.
05 16 32 15	CC	Yankee Clipper, Houston. One minute - 1-1/2 minutes until LOS.
05 16 32 24	CMP	Roger. See you next pass.
05 16 32 27	CC	Roger, Dick. See you again.
05 16 32 32	CMP	Okay.
05 16 45 11	CC	Intrepid, Houston. COMM check.
05 16 45 18	CDR-LM	Loud and clear. The equipment's jettisoned. We are just cleaning up the cockpit. Sorry.
05 16 45 23	CC	Roger, Pete. We copy two impacts on the PSE during jettison.
05 16 45 31	CDR-LM	That's PLSS 1 and PLSS 2.
05 16 45 36	CC	Roger.
05 16 45 38	CDR-LM	They were - as a matter of fact - as a matter of fact, that may help you calibrate that thing because let me - I got a clean kick on both of them. In other words, when they left the hatch, they departed the hatch and went free, fell all the way to the ground without touching the ladder or anything on the way.
05 16 46 01	CC	Okay. They pretty much went straight out - -
05 16 46 02	CDR-LM	... roughly did the same thing - -
05 16 46 04	CC	- - on a ballistic right on down and hit the ground. Didn't arc up at all.

05 16 46 09	CDR-LM	That's right.
05 16 46 13	CC	Okay. Thank you.
05 16 48 28	CC	Intrepid, Houston. We're changing over sites in about 10 seconds. We may be losing COMM for a minute or two.
05 16 48 39	CDR-LM	Thank you.
05 16 52 22	CC	Intrepid, Houston. We have some words for you on the stowage of the TV and also the equipment which is put on the floor by the Z-27.
05 16 52 34	CDR-LM	Okay. We're right at that point; we're just ready for you.
05 16 52 39	CC	Okay, Pete. And first - -
05 16 52 42	LMP-LM	Go ahead, Houston.
05 16 52 44	CC	- - fold the TV handle and stow it in the LiOH canister bracket on the engine cover, lens up. Secure the TV cable into the camera, pad the camera with utility towels in the upper boot bay. Replace the knurled knob hold-down, secure the camera with the utility straps. Strap the straps around the lens and the knurled knobs.
05 16 53 13	CDR-LM	Understand.
05 16 53 24	CC	Intrepid, give me a call when you are ready for some information on the equipment to go by Z-27.
05 16 53 33	LMP-LM	Okay. That'll be 10, 15 minutes.
05 16 56 --		BEGIN LUNAR REV 28
05 16 59 45	CC	Intrepid, Houston. You can expect lost COMM here for about 1 to 2 minutes. We have a handover.
05 16 59 54	LMP-LM	Okay. Okay.

END OF TAPE

05 17 18 05	CDR-LM	Okay, Houston. Start talking to us about the gear you want us to tie down back of the OPS's.
05 17 18 16	CC	Roger, Pete. Okay, first point there is to ensure that the V-27 bulkhead is protected. You can use data books and towels for that purpose. We suggest also, on tying down the equipment and rocks which you have in the bags there that goes on the floor next to the V-27, by the OPS, that you use two additional strands of the utility straps. They will go from the top of the jett - jettison bag to the ISA attach fitting; that's the D ring on the midsection step. This will give you four strands total - -
05 17 19 06	LMP-LM	Say the last part again, Ed.
05 17 19 09	CC	Okay. We suggest that you use two additional strands of the utility straps. Now this would go from the top of the jettison bag to the ISA fitting, that's the D ring on the midsection step. This will give you a total of four strands. Essentially what we're looking for here, Al, is to tie this thing down with as many strands as you can, at least four, so that in the docking we don't get this thing coming off the floor and busting the straps.
05 17 19 53	LMP-LM	Understand.
05 17 21 16	CC	Yankee Clipper, Houston.
05 17 21 22	CMP	Hello, Houston; Clipper here.
05 17 21 25	CC	Hello, Dick. Pete and Al are just finishing up the post-EVA, and it looks as though they're pretty far ahead. They have a little bit of time to sit back and relax. We have a map update for REV 29 when you're ready to copy.
05 17 21 49	CMP	Okay, I'm - I'm ready to copy. Tell those guys to sit back and relax. Did a great job.
05 17 21 59	CC	Dick, say again. You're broken up.
05 17 22 04	CMP	Roger. I'm ready to copy. Tell those guys they deserve a rest. They can sit back and relax. It's a pretty job.

05 17 22 11	CC	Roger. Will do. LOS, 138:32:34, 138:57:42, 139:18:49.
05 17 22 33	CMP	Clipper copies.
05 17 22 35	CC	Roger, Dick.
05 17 22 49	CMP	Ed, it sounds like they didn't have any problems down there at all.
05 17 22 59	CC	Dick, that's affirmative. They ran into a few things; but, as they did yesterday, they overcame them. No problems.
05 17 23 16	CMP	I expect most of their problems are human.
05 17 23 26	CC	Maybe so, Dick, but not many of them errors. Dick, will you go back in your flight plan to 131:30? And we missed a crew status report at that point.
05 17 23 55	CMP	Okay. Says here I had 7 hours sleep, PRD ... 110 ...
05 17 24 51	CC	Yankee Clipper, Houston. How do you read?
05 17 24 56	CMP	Loud and clear. How me?
05 17 25 02	CC	Stand by, Dick. We still have a lot of garbling, and broken up.
05 17 25 09	CMP	Okay.
05 17 38 34	CDR-LM	Houston, Intrepid. We have everything stowed, secured properly, and we're ready to start the launch countdown at the proper time; and, if you'll give us about 15 or 20 minutes to chow down here, we'll come back with you and have a little chitty chat about the EVA.
05 17 38 58	CC	Roger, Pete. Sounds like a good plan. And, Pete, you're still quite a bit ahead. It looks as though the furthest you could go up to in the checklist is on Surface 101. Lift-off minus 2:40; you'll have to hold at that point until we get you the right - CSM state vector.
05 17 39 26	CDR-LM	Okay. No problem. I'm not - I'm not hustling on that; we're just sitting here now getting the spacecraft all squared away. I'd say everything's tied down; but man, oh man, is it filthy in here; we must have 20 pounds of dust, dirt, and all kinds of junk.

05 17 39 46	CC	Roger, Pete. That'll be an interesting zero g.
05 17 39 48	CDR-LM	Okay. Al and I have ... - Right. Al and I make - look like a couple of bituminous coal miners right at the moment.
05 17 40 08	CDR-LM	But we're happy.
05 17 40 12	CC	So are a lot of people down here.
05 17 40 50	CDR-LM	Hey, let me get a time hack with you on my mission timer; I'm reading 137:40:53, 4, 5, 6, 7, 8, 9, 137:41; is that about right?
05 17 41 11	CC	Roger, Intrepid. You're a couple of seconds off; we can give you a more accurate time hack if you like.
05 17 41 19	CDR-LM	No, that's all right. I'll - When I bring the computer out of STANDBY, I'll get the time okay.
05 17 41 24	CC	Roger.
05 17 41 27	CDR-LM	I just - I just happened to think about it; I haven't messed with the mission timer since we landed.
05 17 44 39	CDR-LM	Hey, Houston, how's the SIDE doing? Did it - that cold gas jobber-do get running or not?
05 17 44 48	CC	Stand by on that, Pete; we'll get the latest word on it.
05 17 44 56	CDR-LM	Also, how are the package temperatures doing? Are they running like they expected?
05 17 45 06	CC	Pete, looks good on both counts. The CCIG came up and is looking nominal, and the temperatures are looking nominal.
05 17 45 17	CDR-LM	Very good. All equipment's running, huh?
05 17 45 20	CC	That's affirm. And I'll tell you, from watching those plots from down here, that PSE is sure doing the job.
05 17 45 29	CDR-LM	Great.
05 17 50 44	CDR-LM	Houston, Intrepid.
05 17 50 47	CC	Intrepid, Houston. Go ahead.

05 17 50 52	CDR-LM	Roger. We've been running our - if you'll look at our schedule there, we've been running our tape recorder according to the schedule, and because the EVA is - ran longer, do we have anything left on that for ascent rendezvous? Can you check that out for us?
05 17 51 10	CC	Roger. Will do, Pete. Stand by.
05 18 13 46	CMP	Hello, Houston. Clipper and I.
05 18 13 53	CC	Yankee Clipper, we copy.
05 18 14 02	CMP	And you're looking for my status report last night. I had 7 hours' sleep.
05 18 14 23	CMP	Had a PRD ... 11019.
05 18 14 32	CC	Roger. We copy 7 hours and 11019; and, Dick, we're having a little bit of trouble understanding. You sound - -
05 18 14 39	CMP	... Houston.
05 18 14 41	CC	Dick, you sound slightly garbled. I'm wondering if the microphone is in - the correct position relative to your mouth.
05 18 14 51	CMP	How do you hear me now?
05 18 14 54	CC	Roger. That's a little better.
05 18 14 59	CMP	Okay. I'm holding it close enough to my mouth.
05 18 15 11	CC	Dick, we show a real strong signal down here, but the transmission's still slightly garbled.
05 18 15 19	CMP	Okay, Houston. I'll try to work on it.
05 18 15 23	CC	Roger.
05 18 15 57	CC	Yankee Clipper, Houston.
05 18 16 03	CMP	Go ahead, Houston.
05 18 16 05	CC	Dick, would you go ahead and stir the cryos for 3 minutes? We'd like to see where we stand with respect to balancing.
05 18 16 14	CMP	Okay.
05 18 19 22	CMP	Houston, are you copying those torquing angles?

05 18 19 31	CC	Clipper, that's affirmative. We have the angles.
05 18 20 11	CMP	Okay, Houston, the cryos have been stirred for 3 minutes.
05 18 20 14	CC	Roger, Dick. We copy that. It looks as though you're almost balanced. About one more REV ought to do it, and then you'll be going back to AUTO.
05 18 20 24	CMP	Okay.
05 18 24 36	CC	Yankee Clipper and Intrepid. We'd like to give you the T_{17} and T_{18} lift-off PAD's before CSM LOS, coming up in about 8 minutes.
05 18 24 49	CMP	Okay.
05 18 25 04	CDR-LM	This is Intrepid. Ready to copy.
05 18 25 09	CC	Roger, Intrepid. Yankee Clipper, are you ready to copy?
05 18 25 16	CMP	Yankee Clipper ready.
05 18 25 19	CC	Roger. T_{17}, 140:05:15; T_{18}, 142:03:40.
05 18 25 44	CDR-LM	Okay. Intrepid copies 140:05:15, 142:03:40.
05 18 25 51	CC	Readback's correct, Intrepid.
05 18 26 09	CDR-LM	And, Houston, Intrepid standing by to copy the P22 hack time and the new octal numbers and we're also ready to debrief with you. Standing by for your questions.
05 18 26 27	CC	Okay, Intrepid. We're not planning to do that P22. The job's been done already, so we can forget the P22 coming up at 140 plus 00.
05 18 26 45	CDR-LM	Okay.
05 18 27 02	CC	And, Intrepid, we have your consumables PAD when you're ready to copy.
05 18 27 11	CDR-LM	We're ready to copy.
05 18 27 13	CC	Consumables at GET of 137:00: RCS A, 80 percent; B, 76; O_2, and we'll give you first the descent and the ascent. 47, 96; H_2O, 39.5, 99.2, amp-hours 729.7, 572.3.

05 18 27 54	CDR-LM	Roger. Copied all that.
05 18 27 57	CC	Okay, Intrepid. And on your question on the tape recorder; we show that under the way that we'd normally figure that by extending those two EVA's, we come up with 10-1/2 hours, whereas the tape recorder normally goes 10. However, those assumptions are, first, 100-percent activity in the descent, ascent, and the rendezvous and 30-percent activity on the EVA. The 100-percent figure is most likely high and the 30-percent figure is most likely low, so it's pretty difficult for us to come up and tell you exactly when you're going to be cutting off in the ascent or if you will at all.
05 18 28 48	CDR-LM	Okay. We'll just go ahead and run it per the schedule.
05 18 28 51	CC	Roger.
05 18 29 04	CC	Okay, Intrepid. And our first comment on the EVA. The Gold Flight Team members back here would like to give you congratulations for a job well done.
05 18 29 20	CDR-LM	Thank you.
05 18 29 28	CC	And, Intrepid, we have a few questions. First one of which is on the weigh bags and their cracking. Can you briefly describe the problem that you encountered in cracking and what the reason may be for it?
05 18 29 49	CDR-LM	Well, they seemed to - when I folded the first big one - let me think a minute - oh, I know, the contingency sample - One, I believe has some holes in it, doesn't it, Al? I - I can't remember on that, but anyhow the first big one wound up - just about an inch-and-a-half-long crack appeared in it when I was folding it, just like a fatigue failure; and that appears to be pretty much what happened. I noticed a couple of the saddle bags were the same way after we got done rattling around with them. They had some 1- or 2-inch-long cracks which made holes in them.
05 18 30 40	CC	Roger. We copy that. Was - Can you relate it to a given thermal situation? In other words, were they all cold at the time or really couldn't you say that?

05 18 30 52	CDR-LM	Well, I really - I really couldn't say. I - I think you ought to realize from the angle that we're at that the MESA was in the Sun. Did you all know that?
05 18 31 09	CC	Okay. No, we didn't know that. At least, I wasn't aware of that one.
05 18 31 18	CDR-LM	Okay. It's not completely in the Sun, but it's almost in the Sun. When I say almost, you know there's some gear struts throwing some shadows and everything, but that area was in sunlight.
05 18 31 35	CC	Roger, Pete. Yankee Clipper, 1 minute to LOS. See you on the other side.
05 18 31 44	CMP	Roger.
05 18 31 48	CC	Question two, Intrepid. Could you discuss the failure of the camel hander - the camera handle?
05 18 32 01	CDR-LM	Yes, sir. That narrow knob came off the shaft that it was mounted to, therefore allowing all the pieces to fall apart.
05 18 32 14	CC	Roger. And how did the hammer fail? Did it fail in some way other than just the chips of the coating coming off?
05 18 32 30	CDR-LM	No, no; that's all. Just the coating was coming off.
05 18 32 34	CC	Roger.
05 18 32 42	CC	Okay. What problems did you have with the - with the S-band in terms of the cable, and also exactly where did you put it?
05 18 32 57	CDR-LM	Well, I didn't - just the fact that I wasn't looking where I was going, and I was getting tangled up in the S-band antenna wire once in a while. That was not as bad as the TV, though, because the TV one doesn't lay flat; the S-band one lays flat. We put the S-band out just like we agreed to do it, and minimized running over the wire which was out the plus-Y direction pretty much.
05 18 33 29	CC	Roger. And, Pete, when you went back to check the CCIG, could you tell us how close you got to it?

05 18 33 43 CDR-LM I just walked up to within about - I walked up to it within about 5 feet of it.

05 18 33 55 CC Okay. Thank you. Okay, and a question on the third film pack which we used. How much of that was used on the inside, and where in the traverse did you pick it up and - and change it to one of the existing cameras?

05 18 34 19 CDR-LM Well, I got some bad news for you and some good news. In the first place, the third magazine was a color magazine, and all it had on it were some shots that were taken of earthrise and a few things like that coming around on descent; and, unfortunately, Al and I got our signals crossed, and it's outside on the lunar surface right now. Now, what we did was take the black-and-white magazine off of Al's camera when it failed and put it on my camera and used it up so that we have two complete black and whites of the second EVA and two complete colors of the first EVA, and the only thing that's missing is the color magazine that has undocking and a couple other mundane things like that on it at - at the beginning of the LM operation; and, unfortunately, that's out there in that saddle bag. We didn't catch that one.

05 18 35 18 CC Okay. You did get the Surveyor, though?

05 18 35 26 CDR-LM Oh, yes. We have all the Surveyor pictures and everything, but they're all black and white.

05 18 35 32 CC Real good. And lastly, we've been looking at your power consumption profile and notice that you're not using as much as they initially anticipated. They attribute that to the lack of use of the floodlights. Would you confirm that you've not had the floodlights on since the beginning of the first EVA?

05 18 35 58 CDR-LM That's right. We haven't had the floodlights on. Also, we've used LCG pump very, very little. Every once in a while we give ourselves a squirt. The spacecraft, in contrast to Neil's, we've been very warm, and we've been comfortably warm with just the air in our suits, and I'd say the temperature inside here right now is running in the low 70's somewhere, and it's been that way ever since we got here.

05 18 36 32	CC	Roger, Pete. Okay. That's the last of our questions. We could finish this up if you give us a - two PRD readings.
05 18 36 43	CDR-LM	Okay. Wait 1.
05 18 37 02	CDR-LM	Al is 04022, and I'm still 11020. It'd kind of give you the idea mine may have quit running.
05 18 37 19	CC	Okay, Pete. We copy your 04022, and say the second?
05 18 37 28	CDR-LM	11020, and I think that's what it was the last time I gave it to you.
05 18 37 34	CC	That's correct, Pete. A question on the - -
05 18 37 40	CDR-LM	Maybe it quit running.
05 18 37 44	CC	Could be. A question on the equipment jettison. Was there anything other than what's already called out for that was jettisoned or not jettisoned?
05 18 38 01	CDR-LM	Well, we jettisoned everything according to the checklist.
05 18 38 06	CC	Roger. Say, Pete, how does the inside of the cabin look about now?
05 18 38 10	CDR-LM	Except for - It's very neat and orderly except for the fact that it's very dirty.
05 18 38 20	CC	Kind of a neat and orderly coal mine.
05 18 38 25	CDR-LM	That's about the size of it. The only thing that we do have, of course, is the LiOH canister container which now has the TV camera in it.
05 18 38 38	CC	Roger.
05 18 38 45	CDR-LM	The EVA - antenna is down and stowed.
05 18 38 52	CC	Roger. And we also understood from Al out there on the surface that that only partially deployed; only got up around 60 degrees.
05 18 39 01	CDR-LM	Okay. When I was - I was the one that put it up; and, when I put it back down, I discovered that I hadn't turned it the last - about 20 percent, and so it went all the way up and then I stowed

it. So it functioned correctly. It was me. I didn't put it all the way up.

05 18 39 25 CC Roger, Pete. The COMM was beautiful though. We had probably the best of any SIM we've had.

05 18 39 35 CDR-LM Yes, I concur; the COMM really has been super. These PLSS's and suits performed magnificently. These suits are a shambles though.

05 18 40 11 CC Say, Pete and Al, when you climbed back in, you - you terminated at 3 plus 55 and both of you were - Your reserve was determined by oxygen. In PLSS 1, the reserve was 2 plus 05, which would have given you a 6-hour PLSS; and the PLSS 2 was 1 plus 50, which is pretty close to 6 hours also.

05 18 40 44 CDR-LM That's - That's very good to know, and there's no reason why you can't stay out there and work that long. You don't get tired.

05 18 40 53 CC Get a little thirsty, though, I bet.

05 18 40 59 CDR-LM We were. We were really thirsty after the second EVA because - I don't - I don't know as yet how far we went. I think we made a pretty good trip out there.

05 18 41 15 CC Roger, Pete. We're estimating something over a mile for the full circuit. But that's not counting some of the side jaunts you made.

05 18 41 23 CDR-LM We've been - We've been - Yes. We've been trying to follow our tracks out here with the monocular. The - the other thing that I - I - Have you got your map book there? Let me talk to you about this big blocky rimmed crater that's out here.

05 18 41 43 CC Yes. Stand by on that.

05 18 41 56 CC Okay. We got the map.

05 18 42 02 CDR-LM Okay. It's the - on the great big map, it's the crater - the one that has got the really big blocks on it, that's just outside the ellipse on map A.

05 18 42 14 CC Okay, Pete. Which is the great big map?

05 18 42 16 CDR-LM The smaller one is - Okay, the one that shows the landing ellipse. It's number 39. Wait a minute, - Let me - Look just a second. It's number 30 chart.

05 18 42 48	CDR-LM	Yes. That - That crater is on our horizon, and we can see it from here, and I can sit here with the map and pick out the really great big boulders and everything, and - one of the problems up here is there's nothing to break up - or there's nothing between you and any object that you happen to pick up out there like a rock to judge distance by. And, when we first landed, I really thought that crater was like a thousand feet away, but it's obviously a whale of a lot further than that away. It looks like it's right next to us, and we can use the monoculars and scan those gigantic boulders over there. That's the only one that's visible to us on the horizon, but I wanted to point out you can get an idea and of the fact that that really looks like it's about a thousand feet away from us, but you know how far away it is from us and how difficult it is to gage distance.
05 18 44 02	CC	Roger, Pete. Maybe the use of that LM shadow then was pretty useful. I know in the beginning, you doubted that the shadow was really that - that long, and apparently it was telling you the truth.
05 18 44 19	CDR-LM	Yes. I think you're probably right. The other thing is from the - from the spacecraft here looking at the ALSEP, it looks like it's right under the window, and Al and I are just guessing that it's at least 450 feet away now.
05 18 44 38	CC	Roger.
05 18 46 05	CDR-LM	Say, I got a question for you, Houston. What do the experts think about doing an alignment in orbit now, versus what we got here on the lunar surface yesterday?
05 18 46 22	CC	Copy your question, Pete. Stand by. Also, that crater which you were talking about is, we estimate, 4-1/2 kilometers from your present position.
05 18 46 37	CDR-LM	Looks like it's just a hop, skip, and a jump.

END OF TAPE

05 18 48 32	CC	Pete, we'd like to go ahead and stick with the procedures we have right now. We can give you an update on it after the two P57's and insertion. There's a chance that we may not need it.
05 18 48 47	CDR-LM	Okay. Well, now, I wasn't proposing that we didn't do it; we're going to go ahead and do it. I was just curious after we got a good RLS which we've never gotten before, out of the P57 yesterday, what everybody though about that.
05 18 50 11	CDR-LM	Say, Houston, one thing that occurred to me, the reason we're not using the flood lights is because that overhead hatch is not rigged right and that microswitch is open all the time, and I should say the microswitch isn't rigged right; the hatch is okay. And those floodlights were on all the time, so when we were getting ready to come down over in night side, we had the floods on, just the two lower ones were still always on. So, we pulled that breaker, and we've left it out all the rest of the time. That's the reason.
05 18 50 46	CC	Roger. We copy that.
04 18 51 07	CC	Say, Pete and Al, do you think that if you were out there for say 4-1/2 maybe even 5 hours, you'd get hungry as well as thirsty on a - extended traverse?
05 18 51 23	CDR-LM	I don't think so if you chowed down good just before you left.
05 18 51 27	LMP-LM	I agree with that. You really get thirsty, though. Maybe they can come up with something that you can put on the inside of your helmet, something like - not exactly like the - the little valve salvance device, just something where you could maybe reach over and take a - even a swallow of water. You're only thirsty because your throat is dry, and if you just had something - one swallow ... I think that'd fix you up right there.
05 18 51 56	CC	Roger, Al. Say, did either one of you kneel down in order to get anything off the surface, or did you use the newly developed Bean technique of holding on to the Surveyor parts bag and lowering the Commander to the surface?

05 18 52 15	CDR-LM	Yes. Well, we used all kinds of things like that. You could take the shovel and stick it in the ground and just do a one arm pushup and lean down and pick up a rock off the ground with the other hand. It's really a ridiculous way to do it. If you had a good way to bend, why, you'd have the whole program wired. But, you could do that. It's okay. I fell over once out there, and Al picked me back up again. It's no big deal.
05 18 52 45	LMP-LM	But, in the - in the same sense, you're always fussing around trying to get down there to get these rocks, and we did kneel down a couple of times. I knelt down and picked stuff up. And it's particularly easy if you got that handtool carrier with you. But we really do need to come - need to come up with some sort of strap or something that would allow you to lean over and grab a rock that won't fit in those tongs.
05 18 53 10	CC	Roger.
05 18 54 --		BEGIN LUNAR REV 29
05 19 03 02	CDR-LM	Houston. Intrepid, picking up the launch PREP VERB 98 at LO minus 02:50.
05 19 03 11	CC	Roger, Intrepid.
05 19 12 05	CDR-LM	Okay, Houston. You see that 212? That's the same thing we had before, also.
05 19 12 12	CC	Roger, Intrepid. We copy, and we concur. We expect it.
05 19 13 59	CC	Intrepid, Houston.
05 19 14 05	CDR-LM	Go.
05 19 14 07	CC	We have a update on the star Ar - Arcturus on page 102 of the surface checklist. We'd like you to use Procyon, 16, or Sirius, 15, and that's detent 1.
05 19 14 34	CDR-LM	Roger.
05 19 14 41	CDR-LM	Okay. And we passed self-test all right.
05 19 14 48	CC	Roger.
05 19 14 54	CDR-LM	Are you ready for E-MOD dump?

05 19 14 58	CC	That's affirmative. We're ready for the E-MOD.
05 19 16 31	CC	Intrepid, Houston.
05 19 16 35	CDR-LM	Go.
05 19 16 37	CC	If you will give us POO and ACCEPT, we'll give you a CSM state vector and RLS update.
05 19 16 45	CDR-LM	You have POO and ACCEPT.
05 19 20 05	CMP	Hello, Houston; Yankee Clipper.
05 19 20 09	CC	Yankee Clipper, Houston. Loud and clear.
05 19 20 14	CMP	Well, hello there, stranger. How are you?
05 19 20 22	CC	Morning, Dick. We are fine. How are you?
05 19 20 27	CMP	Well, pretty good. I hope you would like to have some company for a change.
05 19 20 31	CC	Roger. Got the house clean?
05 19 20 36	CMP	As a matter of fact, I just finished that. I sure do; got everything in order; ready to go towards the LM and bring back ... That's quite a chore; keeping this thing clean.
05 19 20 53	CC	Roger. You got a couple of coal miners coming up to see you.
05 19 20 59	CMP	That's okay. I'll be glad to see them.
05 19 21 10	CC	Intrepid, Houston. The computer is yours. Break. Yankee Clipper, if you will go POO and ACCEPT, we have an uplink.
05 19 21 20	CMP	All yours.
05 19 23 14	CDR-LM	Houston, you got the lift-off time for me?
05 19 23 20	CC	Stand by.
05 19 23 39	CC	Intrepid, Houston. Your lift-off time is 142:03:47.
05 19 23 52	CDR-LM	I copy 142:03:47.00.
05 19 23 57	CC	Affirmative.
05 19 24 05	CC	Clipper, Houston. Computer's yours.

05 19 24 11	CMP	Okay. And Jerry, will you find out what they want to do about this battery charge, because I'm using the bus ties during the rendezvous?
05 19 24 23	CC	Roger.
05 19 24 43	CC	Yankee Clipper, Houston. Why don't you figure on terminating the battery charge at LOS?
05 19 24 52	CMP	All right; I could let it go until I ... just before lift-off. That way it might take it all the way up.
05 19 25 33	CC	Clipper, Houston. We prefer that you terminate at LOS on this pass.
05 19 25 40	CMP	Roger.
05 19 25 41	CC	Roger. That would be one less thing for us to keep track of prior to lift-off.
05 19 25 48	CMP	Okay.
05 19 27 17	CDR-LM	Say, Houston; Intrepid.
05 19 27 20	CC	Intrepid, Houston. Go.
05 19 27 25	LMP-LM	Roger. When you look out the AOT in the dark quadrant? You can see these lights - particles of light, flashes of light just seem to come from - in this case, I'm looking in quadrant 1 which is the left one. It's coming from behind me, the left, and they're just sailing off in space. I was thinking they're dropping from my water boiler, but it looks like some of those things are escaping the Moon. They really haul out of here and just press off at the stars.
05 19 27 56	CC	Roger.
05 19 28 25	CC	Yankee Clipper, Houston with a P22 tracking PAD.
05 19 28 42	CMP	Go ahead.
05 19 28 44	CC	Roger. Your target is LM; T_1 is 139:57:39; T_2 is 140:02:38; south 05; latitude is minus 3 - -
05 19 29 10	CMP	Roger. T 112 -

05 19 29 13	CC	Latitude, minus 3.036; longitude over 2 is minus 11.709; altitude minus 1.13. If you want to take photos, your DAC settings are 1/60th, 1 over 60, one SP, 1 FPS, and C-EX film. You're - you should be at zero local horizontal rather than 22 degrees pitchdown. Over.
05 19 30 04	CMP	Roger. Understand. T_1, 139:57:39, T_2, 140:02:38, 5 miles south, latitude is minus 3.036, longitude over 2 is minus 11.709; altitude minus 1.13 and ... information. I will not use it.
05 19 30 34	CC	Roger, Dick. And I've got a REV 30 map update when you're ready.
05 19 30 51	CMP	Go ahead.
05 19 30 54	CC	Roger. REV 30, LOS 140:31:05; 140:56:06, 141:17:20.
05 19 31 20	CMP	Roger. Yankee Clipper, we copied.
05 19 31 22	CC	Okay. And, Dick, I've got your consumables update when you are ready.
05 19 31 30	CMP	Go ahead.
05 19 31 32	CC	Roger. At a GET of 139 plus 20, RCS total was 56 percent; Alfa is 58; Bravo, 56; Charlie, 56; Delta, 55; hydrogen tank 1 is 49.9; tank 2 is 49.8; oxygen, 52.7 and 54.4. Over.
05 19 32 14	CMP	Roger. I copy that. And my rendezvous radar transponder self-check is okay.
05 19 32 25	CC	Roger.
05 19 32 57	CMP	Hey, Jerry, I would like to have a DAP update also, please.
05 19 33 06	CC	Roger, Dick. Stand by. We'll get it for you.
05 19 34 06	CDR-LM	Okay, Houston. Looking at the DSKY torquing angles?
05 19 34 13	CC	Roger. We see them, Pete.
05 19 35 19	CC	Intrepid, Houston.
05 19 35 24	CDR-LM	Go.

05 19 35 26	CC	Roger, Pete. How's your drinking water intake then since you got back in? You been replacing quite a bit of it?
05 19 35 35	CDR-LM	Yes, sir.
05 19 39 19	CC	Yankee Clipper, Houston. If you'll give us POO and ACCEPT, we have another LM state vector for you.
05 19 39 29	CMP	Okay, Houston. I'm going to stop my roll ... here. Okay. Go ahead.
05 19 39 34	CC	Roger.
05 19 40 20	CDR-LM	All right, Houston. Is there any objection if we track him when he goes by this time? And do you have the OSCIL, or don't you want us to do it?
05 19 40 36	CC	Intrepid, Houston. We hadn't really planned on doing a P22 on this pass.
05 19 40 45	CDR-LM	Okay. We'll forget it.
05 19 40 50	CC	Okay. Break. Yankee Clipper, Houston. I've got your DAP update.
05 19 41 00	CMP	Sock it to me.
05 19 41 02	CC	Okay. About the only change you need is you need to go to 0.5-degree deadband, so R_1 should read 1110.1.
05 19 41 27	CMP	Okay. Are the weights and trim verified yet?
05 19 41 35	CC	Roger, Dick. Your weights and your trims are good.
05 19 41 41	CMP	Okay. That's what I was worried about. Thank you. I'll probably go to a half a degree a second during the rendezvous because those maneuvers are pretty long.
05 19 41 49	CC	Roger.
05 19 42 58	CMP	Houston, Clipper. Never mind. Forget it.
05 19 44 21	CC	Yankee Clipper, Houston. We're through with your computer.
05 19 44 28	CMP	Roger. Thank you.

05 19 44 59	CC	Yankee Clipper, Houston. On your maneuver, go S-band OMNI Charlie. Over.
05 19 49 20	CC	Yankee Clipper, Houston. Go OMNI Delta.
05 19 49 29	CDR-LM	Houston, Intrepid.
05 19 49 32	CC	Intrepid, Houston. Go.
05 19 49 37	CDR-LM	Has Yankee gone overhead yet?
05 19 49 43	CC	Not yet, Pete.
05 19 49 48	CDR-LM	Give me an overhead time, so I can watch him go by.
05 19 50 08	CMP	Take T_2 and add 96, Jerry.
05 19 51 01	CC	Intrepid, Houston. Clipper should be overhead at 140:04:10.
05 19 51 17	CDR-LM	Okay. Thank you. I'm going to check the plane change and see how good you are.
05 19 52 08	CMP	Houston, Yankee Clipper. Is Intrepid up VHF?
05 19 52 15	CC	Stand by, Clipper. Break. Intrepid, this is Houston. Clipper wants to know if you're up VHF.
05 19 52 24	CDR-LM	No, but we will come up VHF.
05 19 52 28	CC	Roger. Break. Clipper, Houston. Intrepid says he'll be up.
05 19 52 35	CMP	Okay. Ask him whether he wants us up VHF A or B SIMPLEX.
05 19 52 40	CC	Clipper, Houston. What would you like, VHF A or B SIMPLEX?
05 19 52 46	CMP	... go on normal VHF ranging.
05 19 52 51	CC	Say again, Clipper.
05 19 52 57	CMP	How about the normal VHF ranging ...?
05 19 53 06	CC	Intrepid, Houston. Come up on VHF ranging configuration. Over.
05 19 53 15	CDR-LM	Will do.

05 19 58 19	CC	Yankee Clipper, Houston.
05 19 58 24	CMP	Go ahead.
05 19 58 26	CC	Roger, Dick. Are you going to use the zero-degree pitch or 22-degree pitch down for this pass?
05 19 58 33	CMP	Twenty-two degrees.
05 20 04 53	CDR-LM	Hello, Yankee Clipper; Intrepid on VHF. How do you read?
05 20 04 59	CMP	Loud and clear, Pete.
05 20 05 37	CMP	Hello, Houston; Clipper.
05 20 05 45	CC	Yankee Clipper, Houston. Go.
05 20 05 50	CMP	Roger. Houston, I don't like those marks at all, that Sun angle was pretty high and the whole area is washed out, and it's the best that I could tell you, I think I was on the Surveyor crater but I can't be sure of that.
05 20 06 08	CC	Roger, Dick.
05 20 06 13	CMP	That Sun's a lot too high to define that right now.
05 20 06 16	CDR-LM	Houston, Intrepid. We had a visual on him although I couldn't talk to him on VHF.
05 20 06 25	CC	Intrepid, Houston. Roger.
05 20 06 29	CC	Clipper, this is Houston. Did you read Intrepid on VHF?
05 20 06 36	CMP	That's affirmative.
05 20 06 39	CC	Roger. You sure it wasn't in S-band because, you know, we're in a relay mode.
05 20 06 49	CMP	Houston, Clipper. I think it's VHF, Jerry.
05 20 06 57	CC	Okay.
05 20 07 56	CMP	Hey, Jerry, I sure wouldn't do anything with that P22 data because I'm not sure of it.
05 20 08 04	CC	Roger, Dick. We've copied your data.

05 20 08 23	CC	Clipper, Houston. We'll give that data a good evaluation before we do anything with it.
05 20 09 25	LMP-LM	Houston, Intrepid.
05 20 09 30	CC	Intrepid, Houston. GO.
05 20 09 34	LMP-LM	Got sort of an interesting thing going on AGS right now. I didn't notice earlier, but it may just be because the lights are brighter now. I'm getting an all 8's flash on both the address and the information registers at about one-fifth the brilliance of the normal numbers. And a - It's pulsing every second.
05 20 10 00	CC	Roger, Al.
05 20 10 06	LMP-LM	If I turn down the illumination level just a little bit, it's not noticeable.
05 20 10 52	LMP-LM	Hello, Houston; Intrepid. You ready for my RCS hot fire?
05 20 10 59	CC	Intrepid, Houston. Roger. Fire away.
05 20 11 03	CDR-LM	Okay.
05 20 11 32	CC	Intrepid, Houston.
05 20 11 37	LMP-LM	Go.
05 20 11 39	CC	Roger, Al. Fredo is here. He and I have both seen that phenomena on your DEDA during testing of most all the spacecrafts up at Bethpage, and it's probably an EMI.
05 20 11 56	CDR-LM	That's what we've been talking about, but we thought we'd just touch in on it.
05 20 11 59	LMP-LM	When you go to your roll rate, roll left, pitch up - -
05 20 12 01	CC	Roger. I think TRW's got a workup on this problem.
05 20 12 08	CDR-LM	Okay?
05 20 12 11	CDR-LM	Here you go, Houston, with roll, pitch, and yaw.
05 20 12 14	CC	Roger, Pete.

05 20 12 48	CC	Intrepid, Houston.
05 20 12 53	CDR-LM	Don't panic. We just blew over our S-band erectable, and we're up on our steerable.
05 20 13 02	CC	Roger. I was just going to tell you, Pete, we lost some of the data on that fire check.
05 20 13 11	CDR-LM	Okay. You want me to give to you again?
05 20 13 13	CC	Stand by. I'll tell you what we need.
05 20 13 15	CDR-LM	I never gave you yaw anyway.
05 20 13 19	CC	Pete, can you just start over from the beginning?
05 20 13 25	CDR-LM	Okay.
05 20 13 45	CDR-LM	Pitch up is the only one that didn't sound right.
05 20 13 51	CC	Intrepid, Houston. I've got a K-factor update for you when you're ready.
05 20 13 58	CDR-LM	Okay.
05 20 14 01	CC	Roger. R_1 is 00140; R_2 is all zips, R_3 is 00033.
05 20 14 16	CDR-LM	Okay. 000 - 00140; all zips; three zips 33.
05 20 14 23	CC	Roger.
05 20 14 30	CDR-LM	Okay. How'd the hot fire look?
05 20 14 39	CC	Intrepid, Houston. That went kind of fast. Give us a chance to take a look at our tapes.
05 20 14 47	CDR-LM	Okay.
05 20 15 50	CC	Intrepid, Houston. The passive seismometer just verified that you did do your hot fire.
05 20 16 01	CDR-LM	Very good.
05 20 16 18	CDR-LM	Does the passive seismometer say my hot fire is GO?
05 20 16 50	CMP	Houston, Clipper.
05 20 16 54	CC	Clipper, Houston. Go.
05 20 16 59	CMP	Okay; have the DSKY.

05 20 17 01	CDR-LM	I understand I was GO.
05 20 17 13	CMP	Houston, are you ready for our gyro torquing angles?
05 20 17 19	CC	Clipper, Houston. Roger. Go ahead.
05 20 17 45	CC	Intrepid, Houston. I have a LM ascent PAD and a CSI PAD.
05 20 17 54	CDR-LM	Okay. Just a second. Are you ready for my - the rest of my hot fire?
05 20 17 58	CC	Roger. We're ready. Go ahead. Break. Clipper, you can go ahead and torque.
05 20 18 05	CMP	Okay, I did. Thank you.
05 20 19 08	CDR-LM	Okay. I gave you an extra pitchup fire because we were photographing the effects on the ground. It's quite spectacular.
05 20 19 16	CC	Roger, Pete.
05 20 19 20	LMP-LM	And we're ready to copy the launch PAD.
05 20 19 25	CC	Roger. LM ascent PAD follows: T_{ig} 142:03:47.00; NOUN 76, 5535.0, 0037.0, plus 000.2; DEDA 47 is plus 37364, plus 05607, plus 58642, plus 56955; DEDA 465 is plus 00370; DEDA 546 is NA; ignition one REV late is 144:02:09; LM weight, 10789; CSM weight, 35390. Over.
05 20 21 02	LMP-LM	Roger.

END OF TAPE

05 20 21 02	LMP-LM	Roger. Copy 142:03:47.00, 5535.0 0037.0, plus 000.2, plus 37364, plus 05607, plus 58642, plus 56955, plus 00370, NA, 144:02:09.00, 10789, 35390.
05 20 21 36	CC	That's affirmative, Al. P32 CSI PAD follows. NOUN 11, 143:01:50.60; NOUN 37, 144:38, all zips; NOUN 81, 0492, all zips; DEDA 373 is 01818, 275 is 02780; AGS DELTA-V's, plus 0492, all zips, plus 0010. Over.
05 20 22 43	LMP-LM	Roger. 143:01:50.60; 144:38, all zero's, 0492, all zero's, 01818, 02780, plus 0492, all zeros, plus 0010.
05 20 23 05	CC	Affirmative, Al.
05 20 23 14	CDR-LM	Okay, Houston. I'm standing by for your up-data link and the LGC gyro compensation.
05 20 23 23	CC	Roger, Pete.
05 20 23 31	CMP	Houston, this is Clipper. I copied those PAD's.
05 20 23 35	CC	Roger, Clipper.
05 20 23 51	CC	Yankee Clipper, Houston. Over
05 20 23 57	CMP	Go ahead.
05 20 23 59	CC	Roger, Dick. You can terminate your battery Bravo charge now, and we'd like to have you put your O_2 tank 1 heaters and your hydrogen tank 2 heaters back to AUTO. And dump your waste water to between 5 --
05 20 24 15	CMP	Roger - Roger.
05 20 24 48	CC	Yankee Clipper. Houston.
05 20 24 54	CMP	I have - got the H_2 and O_2 heaters, and dump the water to 52 percent.
05 20 25 01	CC	Okay. That's it, Dick. Thank you.
05 20 25 03	CMP	And I'll do a purge next.

05 20 25 05	CC	Roger.
05 20 25 06	CMP	I'll do a purge on the oxygen and hydrogen fuel cell.
05 20 27 17	CC	Intrepid, Houston.
05 20 27 22	CDR-LM	Go ahead.
05 20 27 24	CC	Pete, we'll be setting your gyro compensation uplink to you after you've done your second P57.
05 20 27 34	CDR-LM	Okay, must be a mistake in the checklist.
05 20 27 36	CC	Yes, that's right. It's not - it's poorly placed in the checklist.
05 20 27 42	CDR-LM	Okay. How'd the hot fire look all the way around? Everything okay?
05 20 28 08	CDR-LM	Got another question for you, too, Houston. What did Yankee Clipper's orbit finally decay down to? How well did you hit 60?
05 20 28 25	CC	Roger, Pete. It's 61.9 by 58.4 at CDH.
05 20 29 33	CDR-LM	Yes, that's pretty good, and we're targeted for zero CDH here on this thing, right?
05 20 29 42	CC	That's affirmative.
05 20 29 47	CDR-LM	Okay.
05 20 30 30	CC	Yankee Clipper, Houston. We're about 35 seconds from LOS. You're looking good, and we're looking for an AOS at 141:17.
05 20 30 42	CMP	Okay, Jerry. Thank you.
05 20 38 11	CC	Intrepid, Houston. How do you read?
05 20 38 16	CDR-LM	Loud and clear.
05 20 53 --		BEGIN LUNAR REV 30
05 21 00 06	CDR-LM	Houston, Intrepid.
05 21 00 09	CC	Intrepid, Houston. Go.

05 21 00 14	CDR-LM	Any objections to us starting P57 now?
05 21 00 31	CC	Intrepid, Houston. We prefer that you wait until 45 in order to maximize the DELTA-T there.
05 21 00 39	CDR-LM	You mean 15, I hope.
05 21 00 46	CC	Yes. That's right - 15. We were thinking in terms of lift-off minus 45.
05 21 00 58	CDR-LM	I'm with you.
05 21 02 22	CC	Intrepid, Houston.
05 21 02 29	LMP-LM	Go ahead.
05 21 02 31	CC	Roger, Al. Would you put battery 5 on the line now? Before, it wasn't really carrying it's load as well as it should have, and we'd like to pre-precondition that one, get it a little warmer and get it started early.
05 21 02 47	LMP-LM	Okay. I noticed that; we'll do it.
05 21 02 49	CC	Okay.
05 21 03 02	CDR-LM	That's exactly what it did prior to descent - not much.
05 21 17 48	CC	Yankee Clipper, Houston. How do you read?
05 21 17 53	CDR-LM	Loud and clear. We're standing by --
05 21 17 54	CMP	Clipper, read you loud and clear.
05 21 18 08	CMP	Houston, Yankee Clipper. Read you loud and clear.
05 21 18 11	CC	Roger, Clipper. Reading you the same.
05 21 18 16	CMP	Okay. Looks GO here, Jer.
05 21 18 22	CC	Roger, Dick.
05 21 18 45	CC	Clipper, Houston. Your state vectors are all good, so there'll be no uplink to you this time. Your map update PAD is scratched, and I've got a landmark tracking PAD if you're ready to copy.

05 21 19 01	CMP	Roger. Do you want us to do this one, or can we skip it?
05 21 19 09	CC	Stand by.
05 21 19 22	CMP	The reason I say that, Jerry; since I can't see them at these high Sun angles, it's pretty academic to do this one. I'd just as soon save the gas and skip it.
05 21 19 35	CC	Roger, Dick. We're talking about it.
05 21 20 02	CC	Clipper, Houston. The data is only in the event you want to try to watch lift-off.
05 21 20 10	CMP	Yes. I know that. I don't think I can see them, Jerry, so let's skip it. The sun angle's too high.
05 21 20 15	CC	Okay, Dick.
05 21 21 30	CC	Intrepid. Houston. Your gravity angle difference looks good and, there'll be no uplinks to you this time.
05 21 21 39	CDR-LM	Very good, very good.
05 21 21 43	CC	Yankee Clipper, Houston.
05 21 21 48	CMP	Go ahead.
05 21 21 49	CC	Roger, Dick. Here's the COMM plan. About the time - When you get VHF communications established with Intrepid, we're going to dump the MSFN relay. If for some reason you lose it and you want to - you want to hear the - the Intrepid lift off, let us know, and we can reconfigure in about 20 seconds; but we would prefer to leave the relay out as long as you've got VHF.
05 21 22 16	CMP	Roger. I think that'll be fine. Thank you.
05 21 22 36	CDR-LM	Boy, this place is fascinating, absolutely fascinating.
05 21 29 35	CC	Pretty nice looking torquing angles, Intrepid.
05 21 29 40	LMP-LM	Yes, sir. I like them.

05 21 29 42	CC	Roger.
05 21 31 08	CC	Intrepid, Houston. You're go to cast off on this REV.
05 21 31 14	CDR-LM	Roger - Roger.
05 21 32 53	LMP-LM	Houston, did you copy the values ... ?
05 21 32 58	CC	That's affirmative, Al, and they're Go.
05 21 42 48	CDR-LM	Houston, we're firing ascent 1.
05 21 42 52	CC	Roger, Intrepid.
05 21 43 07	CC	Intrepid, Houston. Looks good.
05 21 43 20	CC	Tank 2 looks good.
05 21 48 03	LMP-LM	BAT'S 2 and 4 coming off, Houston.
05 21 48 07	CC	Roger, Intrepid.
05 21 49 09	LMP-LM	Houston, Intrepid. Are you recommending VHF A RECEIVER ON or OFF for launch? Over.
05 21 49 19	CC	Stand by, Intrepid.
05 21 49 52	CC	Intrepid, Houston. Need to have your VHF A TRANSMITTER to VOICE RANGE and RECEIVER, OFF.
05 21 50 03	LMP-LM	That's where she's at. Thanks.

END OF TAPE

05 22 00 52	CDR-LM	Hello, Houston; Intrepid is on VOX. How do you read?
05 22 00 57	CC	Loud and clear, Pete.
05 22 01 02	CDR-LM	Roger. Checklist is complete; standing by for T_{ig} minus 2.
05 22 01 06	CC	Roger.
05 22 01 49	CDR-LM	T_{ig} minus 2, 400 plus 10. Set your watch.
05 22 01 56	LMP-LM	I set that at 1 minute.
05 22 01 59	CMP	*** Clipper. I have the LM.
05 22 02 00	CDR-LM	And start - -
05 22 02 01	MS	...
05 22 02 02	CC	Roger, Clipper. Intrepid, Clipper's watching you.
05 22 02 07	CDR-LM	Howdy, Yankee Clipper. Okay. Very good.
05 22 02 43	CDR-LM	On my time, Yankee Clipper, it will be 1 minute.
05 22 02 49	CDR-LM	MARK.
05 22 02 50	CDR-LM	One minute. MASTER ARM is ON. ... - -
05 22 02 53	CMP	Okay.
05 22 02 54	CDR-LM	...
05 22 02 56	CMP	...
05 22 02 57	LMP-LM	I've got it.
05 22 03 00	CDR-LM	... stage push in 30 seconds, Pete.
05 22 03 05	LMP-LM	Roger. Watch the ALSEP, and I'll fly the bird.
05 22 03 08	CDR-LM	Looks good to me.
05 22 03 15	LMP-LM	Thirty-five?
05 22 03 16	CDR-LM	DSKY's blank. Average g; abort stage - -

05 22 03 23	LMP-LM	Abort stage, push.
05 22 03 24	CDR/ LMP-LM	Engine arm, ascent.
05 22 03 26	LMP-LM	All we lack is pro and, then after, we get engine, start.
05 22 03 28	CDR-LM	Okay.
05 22 03 30	CDR-LM	Twenty seconds.
05 22 03 32	CC	Looking good, Pete.
05 22 03 36	CDR-LM	Okay. 10, 9, 8, 7, 6, 5 -
05 22 03 45	CDR-LM	ARM.
05 22 03 46	LMP-LM	Go.
05 22 03 47	CDR-LM	3, 2, 1 -
05 22 03 49	CDR-LM	LIFT-OFF.
05 22 03 50	CDR-LM	And away we go.
05 22 03 52	LMP-LM	Boy, did it fire.
05 22 03 55	CDR-LM	Going? Looks pretty good
05 22 03 56	LMP-LM	... our descent stage - holding on.
05 22 03 58	CDR-LM	Looks good. ALSEP looks good.
05 22 04 01	LMP-LM	... It didn't get the ALSEP.
05 22 04 03	CC	Intrepid, Houston. Copy ignition; guidance looks good.
05 22 04 06	CDR-LM	Pitchover's looking good. Okay. Boy, you sure do ...
05 22 04 15	LMP-LM	Nice and quiet, isn't it?
05 22 04 16	CDR-LM	Firing like I don't know what.
05 22 04 18	CDR-LM	MARK.
05 22 04 19	CDR-LM	Thirty seconds. Thirty seconds; 177, 984.6, and out at 1900 feet.

05 22 04 28	LMP-LM	- That's pretty good.
05 22 04 29	CDR-LM	We're on our way.
05 22 04 30	LMP-LM	And at 1 minute, yaw right 20, Pete.
05 22 04 32	CDR-LM	Okay.
05 22 04 38	LMP-LM	Boy, there's that -
05 22 04 43	CDR-LM	Say again? Pitch program looks good.
05 22 04 50	LMP-LM	Kind of wobbles around up here. ...
05 22 04 51	CDR-LM	...
05 22 04 52	CC	Intrepid, Houston. Looking good at 1 minute.
05 22 04 57	CDR-LM	Okay. We've yawed right 20. Keeping right down the pike.
05 22 05 02	LMP-LM	Okay.
05 22 05 04	CDR-LM	What a nice - -
05 22 05 05	LMP-LM	Both tank pressures look good, Pete.
05 22 05 06	CDR-LM	What a nice ride.
05 22 05 07	LMP-LM	RCS, right in there.
05 22 05 10	CDR-LM	Yes.
05 22 05 11	LMP-LM	Sure jumps every time those thrusters fire.
05 22 05 13	CDR-LM	Yes.
05 22 05 14	LMP-LM	Flies smooth. ... part of it.
05 22 05 20	CDR-LM	All right, 1 plus 30, 745, 156. We're out at 9000 feet.
05 22 05 32	LMP-LM	Too jumpy.
05 22 05 36	CDR-LM	Okay. It's just changing PG.
05 22 05 38	LMP-LM	I know it. It's still smooth.
05 22 05 41	CDR-LM	What a neat-o ride.
05 22 05 44	LMP-LM	It's a real good one.

05 22 05 45	CDR-LM	This thing is pitching over. It's right on the pitch profile.
05 22 05 49	CDR-LM	MARK.
05 22 05 50	LMP-LM	... 2 minutes.
05 22 05 52	CDR-LM	Two minutes. 1061, 175 - -
05 22 05 55	CC	Intrepid, Houston. GO at 2.
05 22 05 56	CDR-LM	- - 6. Just a little bit higher. Roger.
05 22 06 03	LMP-LM	Everything looks good, Pete ... - -
05 22 06 04	CDR-LM	Sure does.
05 22 06 09	LMP-LM	Looks like the same territory we've passed over before, doesn't it? (Laughter)
05 22 06 14	CDR-LM	PGNS and AGS agree?
05 22 06 15	LMP-LM	Perfectly.
05 22 06 16	CDR-LM	Roger. Okay.
05 22 06 19	CDR-LM	MARK.
05 22 06 20	CDR-LM	Two minutes and 30 seconds, looking at 1373, 187, climbing out at 19 700. Houston, you better clear me out of flight level 240 for flight level 600.
05 22 06 37	CC	Roger. Squawk 21.
05 22 06 38	LMP-LM	... right.
05 22 06 41	CDR-LM	Okay. Squawking 21. How does your high gain look, Al?
05 22 06 48	LMP-LM	High gain looks real good, Pete. Hanging in there.
05 22 06 49	CDR-LM	MARK.
05 22 06 50	CDR-LM	Three minutes, 1752, 194, climbing out at 25 000.
05 22 07 00	CMP	Houston, Clipper. If you can, have him transmit VHF also.
05 22 07 06	CDR-LM	Say again, Dick.

05 22 07 07	CC	Dick would like you to transmit on VHF.
05 22 07 13	CDR-LM	Roger. I am transmitting on VHF.
05 22 07 19	CDR-LM	Three minutes and 30 seconds, Al. 2130 feet per second, climbing 193, and we're out at 31 600.
05 22 07 31	LMP-LM	Okay. Camera went off sometime after lift-off. I hope it got the ALSEP.
05 22 07 41	CDR-LM	It's still running.
05 22 07 42	LMP-LM	I turned it back on.
05 22 07 43	CDR-LM	Oh, I see. Wonder why we got the MASTER ALARM? Never did see anything.
05 22 07 47	LMP-LM	No, I didn't either. Everything looks good.
05 22 07 50	CC	Intrepid, Houston. You're looking good at 4.
05 22 07 51	CDR-LM	Four minutes, 2513, - -
05 22 07 56	LMP-LM	Pressures look good.
05 22 07 57	CDR-LM	- - 37, climbing out at 37 000.
05 22 07 59	LMP-LM	Okay.
05 22 08 01	CDR-LM	Oh, look at that rille down there. Wow!
05 22 08 08	LMP-LM	That was part of Lansberg, I think, down there on the left.
05 22 08 14	CDR-LM	Hey, - -
05 22 08 15	LMP-LM	The camera stopped again, Pete.
05 22 08 17	CDR-LM	Forget it.
05 22 08 19	CDR-LM	MARK.
05 22 08 20	CDR-LM	4:30. 2954 feet. This is a hot machine. 173, climbing out of 42 800. Glad you're happy. Okay.
05 22 08 37	CDR-LM	Helium pressures look good.
05 22 08 38	LMP-LM	Hey, I can move around a little bit more now as we lighten up.

05 22 08 43	CDR-LM	Okay. You've got a big job now. Don't forget the ascent feed ... - - (laughter).
05 22 08 45	LMP-LM	I've been thinking about them since we lifted off.
05 22 08 48	CDR-LM	Okay. Five minutes.
05 22 08 50	CDR-LM	MARK.
05 22 08 51	CDR-LM	Five minutes, 3403, 156 feet, and out at 47 000.
05 22 08 57	CC	Intrepid, Houston. You're looking good at 5. The harbor master has cleared you into the main clant - channel.
05 22 09 04	CDR-LM	Roger. Really getting down there.
05 22 09 13	LMP-LM	Look at that lunar surface, would you.
05 22 09 16	CDR-LM	Okay. Five plus 30.
05 22 09 19	LMP-LM	Okay.
05 22 09 20	CDR-LM	MARK.
05 22 09 21	CDR-LM	Man, look at that crater we're flying over.
05 22 09 22	LMP-LM	Okay. I'm going to call it 500.
05 22 09 24	CDR-LM	And - What are you doing?
05 22 09 26	LMP-LM	Okay; 70, 100.
05 22 09 28	CDR-LM	Okay.
05 22 09 29	LMP-LM	... valve.
05 22 09 33	LMP-LM	I think we got it.
05 22 09 34	CDR-LM	1400 feet per second to go. Okay. Get a mark at 6 minutes.
05 22 09 49	CDR-LM	Six minutes, 6 minutes, 4382. Okay, I'm going to get over on VERB 16, NOUN 85 right now. This thing's running a little bit hot.
05 22 10 02	LMP-LM	Okay. 900 feet according to the AGS.
05 22 10 05	CDR-LM	Okay.

05 22 10 06	LMP-LM	... It's sure picking up fast.
05 22 10 08	CDR-LM	Okay.
05 22 10 09	LMP-LM	Thirty-seven.
05 22 10 10	CDR-LM	Okay.
05 22 10 11	LMP-LM	There's a little bit more ...
05 22 10 14	CDR-LM	Okay.
05 22 10 15	LMP-LM	Standing by for - -
05 22 10 16	CDR-LM	700 feet to go.
05 22 10 17	LMP-LM	Standing by for 200 feet per second. 621 to go.
05 22 10 23	CDR-LM	600 feet.
05 22 10 24	LMP-LM	Now you've got 500 feet to go. Wow, we're really bumping along.
05 22 10 28	CDR-LM	Five - 475. 439.
05 22 10 33	MS	...
05 22 10 36	CDR-LM	Standing by.
05 22 10 37	LMP-LM	327, Pete.
05 22 10 39	CDR-LM	Okay. MAIN SHUTOFFS OPEN.
05 22 10 42	LMP-LM	Okay.
05 22 10 43	CDR-LM	OPEN.
05 22 10 44	LMP-LM	Open they go.
05 22 10 45	CDR-LM	System A didn't open.
05 22 10 47	LMP-LM	Okay.
05 22 10 48	CDR-LM	Going to close ascent feed, Al - -
05 22 10 51	CC	Looking good at 7, Pete.
05 22 10 52	CDR-LM	- - Get the BUS FEED on.
05 22 10 53	LMP-LM	Okay.

05 22 10 54	CDR-LM	It just opened.
05 22 10 55	LMP-LM	Okay.
05 22 10 56	CDR-LM	Seven.
05 22 10 57	LMP-LM	Okay.
05 22 10 58	CDR-LM	Pushing ABORT STAGE.
05 22 11 00	LMP-LM	ENGINE ARM, OFF. Okay.
05 22 11 03	CDR-LM	Okay. Hey, I got to back off 32 feet. ... thing. Agree to that, Houston? MASTER ALARM, but I don't know for what.
05 22 11 24	LMP-LM	Everything looks okay.
05 22 11 36	LMP-LM	... Houston ...
05 22 11 39	CDR-LM	I'll tell you what happened. I got to watching that problem, and I let her overspeed.
05 22 11 43	LMP-LM	Oh! Okay.
05 22 11 44	CDR-LM	Okay.
05 22 11 45	LMP-LM	But didn't -
05 22 11 46	CDR-LM	... stage ready. I just figured we ...
05 22 11 47	LMP-LM	Okay.
05 22 11 48	CDR-LM	Houston, how do you read?
05 22 11 50	CC	Loud and clear, Pete.
05 22 11 54	CDR-LM	Okay. Does that look satisfactory to you?
05 22 11 57	CC	Looks good, Pete. We copied your overburn, and we see you're turning now.
05 22 12 04	CDR-LM	Okay. I took it all out. I've got interested in this - -
05 22 12 08	CMP	Hello, Houston; Clipper. Still no VHF from Intrepid.
05 22 12 11	CDR-LM	Main shutoff valve A indicated barberpole.
05 22 12 16	CC	Roger, Clipper.

05 22 12 17	CDR-LM	So I tried and recycled it twice and then shut off both ascent feeds and left the crossfeed open as it is now. And I'm going to close both of them.
05 22 12 25	LMP-LM	Okay. MODE CONTROL, two, up to ATT HOLD. They are.
05 22 12 29	CDR-LM	Okay.
05 22 12 31	LMP-LM	INVERTER 2, INVERTER 1, OPEN.
05 22 12 32	CDR-LM	Okay.
05 22 12 33	LMP-LM	And - on INVERTER 2? I am on INVERTER 2.
05 22 12 42	CDR-LM	Okay.
05 22 12 43	CC	Intrepid, this is Houston. Punch your ENGINE STOP pushbutton.
05 22 12 50	LMP-LM	Yes. Did it. Sorry about that. Everything's off.
05 22 12 55	CDR-LM	Okay.
05 22 12 57	LMP-LM	Okay. Now - -
05 22 12 58	CDR-LM	External light to TRACK.
05 22 12 59	LMP-LM	... let me get ... Gee, it's a dirty spacecraft in here.
05 22 13 03	CDR-LM	Shall we go off VOX?
05 22 13 04	LMP-LM	Yes.
05 22 13 13	CC	Clipper, Houston. We're setting up the relay now.
05 22 13 19	CMP	I wonder why he's not transmitting VHF.
05 22 13 37	CC	Intrepid, Houston. Clipper's not reading you VHF; we're configuring for MSFN relay now.
05 22 14 29	CC	Intrepid; Yankee Clipper, how do you read Houston, now? We're in the RELAY mode.
05 22 14 38	CDR-LM	Hello, Yankee Clipper; Intrepid. How do you read?

05 22 14 42	CMP	Intrepid, Yankee Clipper. Loud and clear now.
05 22 14 50	CC	Intrepid, did you read Clipper's answer?
05 22 14 56	CDR-LM	Yes, I read him.
05 22 16 14	CC	Intrepid, Houston. Looks like you got a 47 by 8.8. Over.
05 22 16 23	CDR-LM	Roger. What were we targeted for?
05 22 16 44	CC	Clipper, Houston. Give us POO and ACCEPT. We have a LM state vector for you.
05 22 16 55	CMP	Okay, Houston. You got it.
05 22 16 57	CC	Roger. On the way.
05 22 19 09	CC	Intrepid, Houston.
05 22 19 15	CDR-LM	Go ahead.
05 22 19 16	CC	Roger, Pete. Would you verify you're up on your forward VHF antenna? Break, Clipper, your computer's yours.
05 22 19 25	CDR-LM	We're up on VHF antenna.
05 22 19 26	CMP	Thank you.
05 22 19 28	CC	Roger, Pete.
05 22 21 42	CMP	Houston, Clipper. Did you see the DSKY?
05 22 21 45	CC	We got it, Dick. Go ahead.
05 22 21 50	CMP	Roger. I've got some good torquing angles here. I guess you really don't need them, do you?
05 22 21 58	CC	Negative. We don't need them.
05 22 21 59	CDR-LM	Can you read us?
05 22 22 02	CMP	That's affirm. I read you now, Pete, loud and clear.
05 22 22 06	CDR-LM	Okay. You be looking.
05 22 22 55	CC	Yankee Clipper, Houston.
05 22 23 06	CDR-LM	Okay, Houston. You're looking at the DSKY there, the torquing angles.

05 22 23 14	CC	Roger. We're looking at them, Pete. Sterling.
05 22 23 20	CDR-LM	Okay. Okay. We're going to PRO.
05 22 23 25	CC	Yankee Clipper, Houston. Over.
05 22 23 30	CMP	Go ahead.
05 22 23 31	CC	Roger, Dick. How about turning down your S-band thumbwheel and make a VHF check. And, if you're in good shape on VHF, we're going to break down this relay again.
05 22 23 42	CMP	He's breaking now, Jerry; I can hear them now.
05 22 23 45	CC	Roger.
05 22 23 52	CMP	Are you supposed to be on RANGING right now? I thought you were supposed to be transmitting on A.
05 22 25 10	CMP	Intrepid, Clipper. I have you in my big eye.
05 22 25 26	CDR-LM	Very good.
05 22 26 17	CDR-LM	Dick, I hold you at 351 feet a second, at 200 miles.
05 22 26 35	CMP	I concur on that, Pete.
05 22 26 39	CDR-LM	Say again, Dick.
05 22 26 40	CMP	I concur. I concur.
05 22 26 42	CDR-LM	Okay. I'm just starting P20.
05 22 28 31	LMP-LM	Houston, Intrepid. We're going to go over to OMNI now.
05 22 28 37	CC	Roger, Intrepid.
05 22 28 47	CC	Intrepid, Houston. You're about 45 seconds from LOS.
05 22 28 59	CC	Intrepid, Houston. We'll see you at 143:16.
05 22 29 08	CDR-LM	Roger - Roger.
05 22 29 20	CC	Intrepid, Houston. Your CSI DELTA-V is going to be about 46.5. Over.

05 22 29 30	CDR-LM	Roger. 46.5.
05 22 30 03	CC	Intrepid, Houston. We've got LOS on the Clipper, and we'll see him at 13.
05 22 30 12	CDR-LM	Okay. Say again our AOS time?
05 22 30 17	CC	Your AOS time is 143:16. It's nominal.
05 22 30 25	CDR-LM	143:16. I got you.
05 22 30 26	CC	Roger. Nominal in the flight plan.
05 22 30 35	CC	Intrepid, Houston. Go LOW BIT RATE.
05 22 51 --		BEGIN LUNAR REV 31
05 23 16 57	CMP	Okay. Sounds good. I'll be working on out-of-plane here for you.
05 23 17 01	CC	Yankee Clipper, Houston. How do you read?
05 23 17 07	CMP	Hello, Houston, Clipper. Loud and clear.
05 23 17 09	CC	Roger.
05 23 17 15	CMP	Roger. CSI burn was good. Intrepid burned 45.3 feet per second. My solution was 45.9.
05 23 17 28	CC	Roger, Dick.
05 23 18 38	CMP	Hey, Pete, your plane change is minus 0.4.
05 23 19 25	CC	Intrepid, Houston. How do you read?
05 23 19 32	LMP-LM	Loud and clear, Houston.
05 23 19 34	CC	Roger, Al. Read you the same.
05 23 19 41	LMP-LM	Residuals PGNS were plus 0.1, minus 0.1, and minus 0.3.
05 23 19 54	CC	Intrepid, Houston. We'd like to know what your DELTA-V's were that you loaded.
05 23 20 03	CDR-LM	What do you mean, what DELTA-V's we loaded? We loaded 45.3 feet per second. Is that what you mean?
05 23 20 09	CC	Affirm.

05 23 20 10	CDR-LM	That was our CSI solution.
05 23 20 12	CC	Okay.
05 23 20 14	CDR-LM	Okay. And I've run CDH here, and it looks like minus 9 and minus 8 roughly. Shows me 59 seconds early at TPI.
05 23 20 28	CC	Roger.
05 23 20 30	CDR-LM	And we're not going to make the system look like we need to make the out-of-plane. We are down in the noise level on out-of-plane. Dick's going 0.4 of a foot per second; and I haven't looked at it yet, but I will in a minute.
05 23 20 44	CC	Roger. Intrepid, Houston. Can you give us HIGH BIT RATE, please?
05 23 21 40	CDR-LM	I tell you, Houston, I sure do enjoy flying this thing. It's - Both the ascent stage and the descent stage are both nice.
05 23 21 51	CC	Roger, Pete.
05 23 22 01	CDR-LM	For - for your information, I crossed that on the CSI burn, and that pretty evened me up, and I also switched my DAP load to system A.
05 23 22 19	CC	Roger. Copy.
05 23 22 27	CDR-LM	And my out-of-plane shows 0.31 miles and 0.3 of a foot per second, so I think we'll forget it.
05 23 22 37	CC	Okay, Pete. That sounds good. While you got a minute, we had a question about the sequence camera. Did that camera stop right after lift-off?
05 23 22 51	CDR-LM	Apparently it did, and then it stopped again several times.
05 23 22 55	LMP-LM	That's affirmative. It stopped, and then I started it, and it stopped two or three times.
05 23 23 00	CC	Roger.
05 23 23 49	CDR-LM	Say, I guess nobody else has - Anybody else had to use these window heaters before? Our windows keep fogging over, and I have to run the window heaters all the time.

05 23 24 05	CC	Intrepid, Houston. The folks here say that was pretty nominal on Apollo 11.
05 23 24 13	CDR-LM	Oh, I didn't remember that. Okay. Very good.
05 23 24 43	CMP	Hey, Pete.
05 23 24 45	CDR-LM	Go ahead, Dick.
05 23 24 46	CMP	My CDH time on my computer is 143:59:46:70.47.
05 23 24 56	CDR-LM	Okay. We're within a couple - about 15 seconds of one another.
05 23 25 01	CMP	Okay. We're going to use yours.
05 23 25 03	CDR-LM	Okay. 144:00:01.53.
05 23 25 10	CMP	I got it. Thank you.
05 23 25 14	CC	Intrepid, Houston.
05 23 25 18	CDR-LM	Go.
05 23 25 19	CC	Roger, Pete. I sent you bum dope. 11 did not use their heaters.
05 23 25 26	CDR-LM	Yes. I don't remember anybody having to use them, and both my docking window and - and both Al's window and my window - We collected moisture on the lunar surface and we've started collecting it here in flight, so I put the window heater back on.
05 23 25 43	CC	Roger.

END OF TAPE

05 23 26 43	CDR-LM	Sure do apologize, Houston, for the overburn. I got my head looking at Al there and shut her off late.
05 23 26 52	CC	Roger. No sweat, Pete.
05 23 27 07	CMP	What did he do this time, Pete?
05 23 27 08	CDR-LM	Say again.
05 23 27 10	CMP	What the devil did he do this time?
05 23 27 12	CDR-LM	Well, he didn't do anything. We had one main shutoff valve that barberpoled over here, and it turned out to be an indicator. But, I got interested in that and I didn't de-arm the engine soon enough, and we shut down about 30 feet per second over. Steve, that's the reason I had to back her up. No big deal.
05 23 28 02	CMP	Okay, Pete. My first try at it is ...
05 23 28 11	CDR-LM	And what?
05 23 28 18	CMP	...
05 23 28 19	CDR-LM	Okay, Dick. You're almost unreadable.
05 23 28 22	CC	Clipper, Houston. Your S-band is getting pretty ratty.
05 23 29 56	CDR-LM	Okay, Dick. I'm still on 17.6.
05 23 30 17	CDR-LM	Are you looking at the recycle on the DSKY, Houston?
05 23 30 31	CC	We're checking, Pete.
05 23 30 41	CDR-LM	It's minus 10 and minus 8.8.
05 23 30 45	CC	Intrepid, Houston. We're watching.
05 23 31 45	CDR-LM	I finally - finally got a visual on Yankee Clipper, I think.
05 23 31 52	CC	Roger.
05 23 31 55	CDR-LM	Yes. I got you visually, Yankee.

05 23 32 08	CMP	... 122 miles.
05 23 32 10	CDR-LM	Okay. I show 122 on mine, closing at 95 feet a second.
05 23 33 45	CDR-LM	... That OMNI PPI ... Hey, I saw your flash down there. ...
05 23 36 36	CMP	Pretty close to that rim.
05 23 36 54	CDR-LM	... on the Surveyor on the ... of that crater.
05 23 37 14	CDR-LM	Say, Houston, Al's working so hard keeping his AGS updated here, why don't we let him burn CDH?
05 23 37 26	CC	Roger, Pete.
05 23 37 32	CDR-LM	... Jerry there?
05 23 37 42	CC	Intrepid, Houston. Stand by on that. We're consulting our oracle right now.
05 23 37 48	CDR-LM	Houston, I'm only kidding, but he's all over the cockpit. Putting that range and range rate in.
05 23 37 57	LMP-LM	... my burn.
05 23 38 59	CDR-LM	I think we ought to rename the Intrepid the flying junk pile. You ought to see it inside this spacecraft, Houston.
05 23 39 09	CC	Roger. Copy.
05 23 41 41	CDR-LM	Okay. I'm minus 10.3. And my TPI's 2-1/2 minutes early.
05 23 41 58	LMP-LM	Okay.
05 23 43 08	CDR-LM	Say, Houston. With - with your concurrence - we'd like to go over into the cabin mode for a while ... cabin mode and try to get rid of some of this dirt before we dock.
05 23 43 28	CC	Roger, Pete. Stand by.
05 23 43 34	CC	Intrepid, Houston. Go ahead, use the cabin mode.

05 23 43 40	CDR-LM	... Canisters. Yes. Okay.
05 23 43 41	CC	Intrepid, Houston. I've a PIPA bias update read-up for you.
05 23 43 52	CDR-LM	Okay.
05 23 43 59	CDR-LM	Go ahead.
05 23 44 00	CC	Okay. VERB 21, NOUN 01, ENTER, 1452, ENTER, 77423, ENTER; ENTER, 1454, ENTER, 00406, ENTER; ENTER, 1456, ENTER, 00777, ENTER. Over.
05 23 44 52	CDR-LM	Okay. Let me see if I got those numbers all right. VERB 21, NOUN 01, ENTER, 1452, ENTER, 77423, ENTER; ENTER, 1454, ENTER, 00046, ENTER, ENTER, 1456, ENTER, 00077?
05 23 45 14	CC	Intrepid, Houston. That's negative. Address 1454 should read 00406, and address 1456 should read 00777. Over.
05 23 45 38	CDR-LM	Okay. 1454 is 00406 and 1456, 00777.
05 23 45 47	CC	That's affirmative, Pete.
05 23 45 52	CDR-LM	Okay.
05 23 46 26	LMP-LM	Hey, Al, have you ...?
05 23 46 32	CDR-LM	... burn ...
05 23 46 35	CC	Yankee Clipper, Houston. Over.
05 23 46 41	CMP	Go ahead, Houston.
05 23 46 42	CC	Roger. I've got some high gain angles for you, Dick.
05 23 46 55	CMP	Go ahead ...
05 23 46 57	CC	Roger. Pitch is minus 23 and yaw is plus 171. Over.
05 23 47 21	CMP	And we're on high gain.
05 23 47 23	CC	Roger.
05 23 47 54	CMP	Pete, ... run your solution. I've only got 20 marks on ...

05 23 48 00	CDR-LM	Say again, Dick.
05 23 48 02	CMP	... on that solution, we got enough marks here for five solutions. We ought to go ahead and press on.
05 23 48 14	CDR-LM	Okay.
05 23 48 47	CC	Yankee Clipper, Houston. We're going to have - -
05 23 48 49	CMP	..., Jer.
05 23 48 50	CC	- - a handover here now, in your case from Honeysuckle to Madrid. Over. At 143:50.
05 23 48 59	CMP	Okay.
05 23 49 01	CDR-LM	Very good.
05 23 49 07	CMP	Whichever way the world turns.
05 23 49 15	CMP	Pete, your out-of-plane for CDH is 0.4 plus.
05 23 50 13	CMP	Okay. I'm getting ready to ... final COMP.
05 23 50 17	LMP-LM	I just fired one.
05 23 50 33	CC	Yankee Clipper, Houston. How do you read through Madrid?
05 23 50 39	CMP	Hello, Houston; Clipper. Loud and clear by me.
05 23 50 41	CC	We read you the same.
05 23 51 42	CMP	Early, early, early, it's a minus sign. Seventy five. Okay. Here's my solution. DELTA-H is 0.8; 34.53 at 3 minutes early; DELTA-V's, NOUN 81, 10.3, zero, and 7.0. 7.0. Would you read me your velocities again please? 5.3 is in Y, ... in Z. Okay. I copied minus 2.2 zip, plus 9.3. How about minus 10.2 and 7, ... for this 9.3?
05 23 52 52	CDR-LM	Now, wait, wait, wait, Dick. Call Houston and have them relay it to me. I can't understand you.
05 23 53 00	CC	Clipper, Houston. Go ahead.
05 23 53 03	CMP	... That's okay. Go ahead.

05 23 53 14	CMP	Hey, Jerry. Just tell him I agree with his solution?
05 23 53 19	CC	Roger. Break, Pete. Clipper says he agrees with your solution.
05 23 53 26	CDR-LM	Okay. Very good. And, Jerry, tell them that our NOUN 81 was - Where did you put it, Al? Minus 10.7, or is that 2, minus 10.2 and minus 9.3?
05 23 53 43	CC	Roger. Copy. NOUN 81, minus 10.2, and minus 9.3.
05 23 53 51	CMP	Roger - Roger.
05 23 53 52	LMP-LM	That's affirmative.
05 23 53 56	CC	And Clipper Rogered that. He heard it.
05 23 54 04	CDR-LM	Hey, you got any thoughts on the ground, Houston, why our COMM is so bad between each other?
05 23 54 11	CC	Pete, we're checking.
05 23 54 12	CDR-LM	There must be something - Could you just tell us how to fix it?
05 23 54 13	CC	Break. Did you get an out-of-plane from Dick?
05 23 54 18	CDR-LM	We don't have any out-of-plane. It was 0.3 again or something.
05 23 54 22	CMP	That was 0.4, Pete.
05 23 54 24	CDR-LM	Oh; 0.4 of a foot per second.
05 23 55 43	CC	Clipper, Houston.
05 23 55 49	CMP	Go ahead, Houston; this is Clipper.
05 23 55 52	CC	Roger. Just thought we'd better make a check with you and see how your antennas are. Are you on the starboard antenna?
05 23 56 02	CMP	That's affirmative. I'm on the lower antenna, lower right.
05 23 56 05	CC	Roger.
05 23 56 10	CMP	The VHF is really horrible.

05 23 57 06	LMP-LM	Okay.
05 23 58 07	LMP-LM	Okay.
05 23 58 47	LMP-LM	Are you going to burn?
05 23 59 10	CDR-LM	You're right, Al. I picked it up on the sextant.
05 23 59 29	CDR-LM	It's smaller than the LM.
05 23 59 37	CMP	I'm with you. Let me know if I can help you.
05 23 59 57	LMP-LM	Do you want a countdown?
06 00 00 45	LMP-LM	Okay, Pete.
06 00 00 50	CDR-LM	Burn complete, Houston.
06 00 00 52	CC	Roger, Pete. Looks good.
06 00 01 53	CDR-LM	Okay.
06 00 02 54	LMP-LM	My TPI time was 144:34:54.87. That's pretty good.
06 00 03 03	LMP-LM	144:34:54.87.
06 00 03 43	LMP-LM	Roger. 144:34:54.87.
06 00 08 55	CDR-LM	Okay, Al. Pick up on ... right here.
06 00 09 17	LMP-LM	Yes, sir.
06 00 10 51	CMP	Okay. I got a time of 144:36:20.24. That's affirmative.
06 00 11 17	CMP	28.5 for TPI.
06 00 11 25	CMP	It was 12 seconds off.
06 00 11 52	CMP	Ah, you're too easy. Still easy.
06 00 13 41	CMP	You get your light on again?
06 00 13 52	CMP	Hey, Pete?
06 00 13 57	CMP	Okay. That blasted Sun cut there is making it very difficult to take marks. I got five of them; six of them so far.

06 00 14 14	CMP	Good thing it doesn't bother the VHF any. I said it doesn't bother the VHF any.
06 00 15 13	CMP	Okay.
06 00 15 24	CMP	You guys got something flying along with you? Could be.
06 00 17 31	CMP	Hey, would you guys check your tracking light? It's dark out there. I don't see you anymore.
06 00 17 56	CMP	Well, I'll just keep looking here. Just hang on.
06 00 18 37	CMP	Well, I sure don't see you.
06 00 18 51	CMP	I wonder why you lost it. It was really great there the first nightside pass.
06 00 19 11	CMP	Well, you're gone, Pete. I'll have to back you up on VHF and seven marks.
06 00 19 59	CC	Intrepid, Houston. We have a TPI solution here.
06 00 20 06	CDR-LM	All right. We're ready to copy.
06 00 20 08	CC	Okay. T_{ig} at 144:35:52. We're getting a DELTA-V_X of 25.9; a DELTA-V_Z of minus 12.8. Your total DELTA-V is 30.
06 00 20 29	CDR-LM	Roger. That's very close. Our first cut was a V-total of 28.9.
06 00 20 36	CC	Roger.
06 00 20 44	CMP	Hey, Jerry, what happened to your out-of-plane solution?
06 00 21 10	CC	Clipper, Houston. We're seeing about 8 feet per second, but we don't believe it.
06 00 21 19	CMP	Oh, okay.
06 00 21 20	CDR-LM	We don't either.
06 00 21 22	CMP	I knew you had to have something somewhere. Hey, you ought to see the Earth in the telescope, Pete; it's fantastic.

06 00 21 42	CMP	But I don't have you in the sextant. That's okay. Your blinking light's just not blinking, that's all.
06 00 21 51	CDR-LM	Hey, Houston. It looks like our tracking light's burned out. Dick hasn't been able to find us in this sextant. And on the first nightside pass we had little bits and pieces floating along with us and we could tell that the tracking light was flashing on them. And we still have, I've presumed to think, bits and pieces floating along and nothing's flashing on them, so I'm pretty sure it burned out.
06 00 22 11	CC	Roger, Pete.
06 00 22 22	LMP-LM	Yes, sir. Okay.
06 00 22 26	CC	Hi, Intrepid.
06 00 22 27	LMP-LM	Okay.
06 00 22 28	CC	This is Houston. How'd your sweepdown fore and aft go?
06 00 22 33	CDR-LM	It's getting much cleaner in here running this way; and, also, Yankee Clipper informs me he has the television all set up. When we come around the horn, we'll come around with the television on in VOX.
06 00 22 47	CC	Roger.
06 00 22 53	CDR-LM	Who knows, you may get to see the first whifferdill.
06 00 22 59	CC	Roger, Pete. Our electrical watchers say that the current indicates that your tracking light is on.
06 00 23 11	CDR-LM	Okay. Now we just turned it off. Now does the current show that?
06 00 23 19	CC	It - It sure does, Pete.
06 00 23 26	CMP	You're - they're - You're flying through the air backwards, then, Pete, because I don't see it.
06 00 23 33	CDR-LM	Well, my ball tells me I'm pointed at you, Dick, and so does my radar.

06 00 23 38	CMP	Well, you may have current, but you don't have any light.
06 00 23 43	CDR-LM	Maybe that thing can burn out in such a manner that it still draws current - But that doesn't make sense, does it?
06 00 23 49	CC	That's affirmative, Pete.
06 00 23 55	CDR-LM	Oh, it can't do that?
06 00 24 00	CC	Yes, it can.
06 00 24 03	CDR-LM	Well, I'm pretty sure it's burned out. I don't see it flashing anywhere in the spacecraft, not that I remember seeing it before, but I did remember it on bits and pieces, and I don't see it anymore.
06 00 24 29	CDR-LM	Yes. When's - when's LOS, Houston?
06 00 24 33	CC	We've got LOS coming up for both of you in 3 minutes.
06 00 24 40	CDR-LM	Okay. Very good.
06 00 24 42	CC	You're only about 10 seconds apart.
06 00 24 47	CDR-LM	Okay.
06 00 25 50	CMP	Okay. I've got a recycle going.
06 00 27 02	CDR-LM	... Houston ...
06 00 27 10	CMP	Okay, Pete. Thank you.
06 00 27 20	CC	Yankee Clipper, Houston. Go LOW BIT RATE. Pass that word on to the LM.
06 00 27 30	CMP	Will do, Jerry.
06 00 49 --		BEGIN LUNAR REV 32

END OF TAPE

06 01 14 24	LMP-LM	... S-band 500, 111. There it is.
06 01 14 31	CDR-LM	Find the S-band yet?
06 01 14 33	LMP-LM	Yes.
06 01 14 34	CDR-LM	Where?
06 01 14 35	LMP-LM	Where it's supposed to be.
06 01 14 37	CC	Intrepid, Houston. How do you read?
06 01 14 42	CDR-LM	Houston, Intrepid reads you loud and clear. We're 1.7 miles away from Yankee Clipper, closing at 38 feet per second. Right down the tube.
06 01 14 55	CC	Roger, Pete. Break. Yankee Clipper, Houston. How do you read?
06 01 15 00	CMP	Hello, Houston; Yankee Clipper. Loud and clear. How me?
06 01 15 03	CC	Roger. The same.
06 01 15 07	CMP	What do you have on the tube?
06 01 15 10	CC	Nothing yet, Dick.
06 01 15 17	CMP	Okay. I'm going to roll a little more and give you some more high gain.
06 01 15 34	CC	Clipper, Houston - -
06 01 15 37	CDR-LM	38 feet per second.
06 01 15 40	CC	Clipper, Houston. We're going to need about a 60-degree roll right to get to high gain.
06 01 15 48	CMP	You're getting it.
06 01 16 21	CMP	Pete, I have you at 1.2 miles.
06 01 16 23	CDR-LM	I concur.
06 01 16 30	CMP	Boy, you sure look strange down there among all the sand dunes.
06 01 16 35	CDR-LM	Sorry about that.

06 01 16 42	CMP	One mile, and I'm ... at 31 feet.
06 01 16 58	CMP	Okay, 1 mile, I got you at.
06 01 17 00	CDR-LM	Okay.
06 01 17 21	CC	Clipper, Houston. We're getting your TV black and white now. Processing will be along shortly.
06 01 17 30	CMP	Okay. How does it look?
06 01 17 34	CC	Looking good in black and white, and we think we can see Intrepid.
06 01 17 41	CDR-LM	55 - 40 500 feet at 30 feet a second.
06 01 17 48	CC	Roger.
06 01 17 51	CDR-LM	Hold off a little more. Looks close now.
06 01 17 56	LMP-LM	Huh?
06 01 17 58	CDR-LM	Looks close now, and he's 40 000 feet away.
06 01 18 03	CMP	... ... in case I have to break for you. Hey, Pete, you're looking pretty good. I've got you at 0.6 of a mile.
06 01 18 15	CDR-LM	Yes. Okay. About through a half a mile here, and going down.
06 01 18 29	CDR-LM	Better run through that secondary canister for a while. This primary doesn't smell too good, either. That's our ... . Both in SECONDARY?
06 01 18 38	CDR-LM	All right. At half a mile; 19 feet a second, Dick.
06 01 18 44	CMP	Check. A half a mile.
06 01 18 51	CMP	Now, you're looking pretty good.
06 01 18 55	CDR-LM	Okay.
06 01 19 24	CDR-LM	You look pretty darn good yourself. Out at 2000 feet.
06 01 19 30	CC	Clipper, Houston. We've got good color now. Looking good.

06 01 19 37	CMP	Okay, Pete, I've got you at one-third of a mile. 2000.
06 01 19 43	CDR-LM	Okay.
06 01 19 45	CMP	Looking good. How can you look so good if you're so ugly?
06 01 19 55	CDR-LM	Say again.
06 01 19 57	CMP	How can you look so good when you're so ugly?
06 01 19 59	CDR-LM	I don't know. You look awful good yourself.
06 01 20 10	CDR-LM	1500 feet, Dick.
06 01 20 11	CMP	Okay.
06 01 20 13	CC	Intrepid, Houston. Give us HIGH BIT RATE, please.
06 01 20 19	CDR-LM	Okay, Houston.
06 01 20 44	CDR-LM	Eight feet a second at 1200 feet. Clipper, - Moves out there when you give her maximum thrust.
06 01 21 09	CDR-LM	Five feet a second.
06 01 21 12	CMP	Okay, Pete, you're looking good. Keep it coming.
06 01 21 14	CDR-LM	Okay. Thousand feet.
06 01 21 26	LMP-LM	Let her coast in.
06 01 21 28	CDR-LM	Antenna is in, now. ...
06 01 21 32	LMP-LM	Huh?
06 01 21 34	CDR-LM	I'm punching this antenna. Okay right now.
06 01 22 01	CDR-LM	Exterior light off.
06 01 22 03	CMP	It's off.
06 01 22 05	CDR-LM	OMNI aft on the midleft.
06 01 22 08	CMP	OMNI aft ... ...
06 01 22 10	CMP	... feet.

06 01 22 12	CDR-LM	Say again.
06 01 22 13	CMP	I said 900 feet.
06 01 22 15	CDR-LM	Yes. I got 800.
06 01 22 17	CMP	Okay.
06 01 22 42	CDR-LM	You're looking better all the time, Yankee.
06 01 22 46	CMP	Yes, keep going; I still have some film left.
06 01 23 44	CDR-LM	500 feet.
06 01 23 49	CMP	Check. I've got you at 540.
06 01 24 19	CDR-LM	Okay, I'm down to 3 feet a second.
06 01 24 23	CMP	Is your tracker light on?
06 01 24 26	CDR-LM	No. We'll turn it on for you.
06 01 24 31	CMP	No, you don't have one.
06 01 24 36	LMP-LM	Okay. We'll turn it back off.
06 01 25 08	CDR-LM	Two feet a second, Dick, 200 feet.
06 01 25 42	CDR-LMP	Okay, the radar broke lock, Al; would you take care of it?
06 01 25 47	LMP-LM	Okay.
06 01 25 48	CDR-LM	I'll go to the checklist.
06 01 25 50	LMP-LM	Okey-dokey.
06 01 25 58	CDR-LM	How do you read me, Dick?
06 01 25 59	CMP	I read you loud and clear, Pete; you look awful good. How come you didn't bring the docking target back with you?
06 01 26 10	CDR-LM	Say again.
06 01 26 12	CMP	How come you didn't bring the docking target back with you?
06 01 26 15	CDR-LM	You're almost unreadable. Relay through Houston.

06 01 26 20	CC	Roger, Intrepid. He wants to know why you didn't bring the docking target with you.
06 01 26 26	CDR-LM	Oh, I got it. On the top.
06 01 26 27	LMP-LM	Pete?
06 01 26 30	CDR-LM	Yes.
06 01 26 32	LMP-LM	Want me to start right there?
06 01 26 33	CDR-LM	Yes, VERB 34, ENTER.
06 01 26 34	LMP-LM	Okay. VERB 34, ENTER.
06 01 26 51	CDR-LM	Let me put down that number. Might be a good one to remember.
06 01 26 56	CMP	Hello, Houston; Clipper.
06 01 26 58	CC	Clipper, Houston. Go. We can see thrusters firing now.
06 01 27 04	CMP	Okay. Am I clear for PYRO ARM?
06 01 27 12	CC	You're GO for LOGIC, Dick.
06 01 27 13	CMP	And I'll have the T_6 LOGIC on for you in a minute. Okay, here's the LOGIC.
06 01 27 29	CC	Clipper, Houston. You're GO for PYRO ARM and stand by to receive the skipper's gig.
06 01 27 37	CMP	Aye-aye, sir. Okay, Pete. Why don't you let me finish this roll, huh?
06 01 27 48	CDR-LM	Do your what?
06 01 27 49	CMP	Let me finish this 180-degree roll. Okay?
06 01 27 55	CDR-LM	I don't understand what he's saying, Al; do you understand?
06 01 27 58	LMP-LM	No.
06 01 27 59	CC	Intrepid, Houston. He's going to finish his roll maneuver now.
06 01 28 02	LMP-LM	I'm working on it.

06 01 28 05	CDR-LM	All right. ... . Two rolls, Dick, and I'll fly wing on you.
06 01 28 16	CMP	Okay.
06 01 28 26	CDR-LM	Look at the S-band antenna of his ... track.
06 01 28 33	LMP-LM	Is it moving?
06 01 28 37	CDR-LM	Also, that is extremely interesting. Look at the cover on the ...
06 01 28 44	CDR-LM	Huh?
06 01 28 47	LMP-LM	Okay. Cover on what?
06 01 28 48	CDR-LM	Look at the umbilical cover. Do you suppose that's where it got hit by lightning or something? What's made it brown? Look at the top of it; it's burned.
06 01 28 55	LMP-LM	Yes, I do believe that's where it got hit.
06 01 28 58	CDR-LM	No. Maybe it gets burned by other -
06 01 29 03	LMP-LM	Maybe we better find out. Why don't you move over to the left a little bit? And I'll take a picture of it, and they can look at it later.
06 01 29 10	CMP	Hey. Can you drop down a little, Pete?
06 01 29 12	CDR-LM	Can I do what?
06 01 29 13	CMP	Drop down.
06 01 29 15	CDR-LM	Down.
06 01 29 16	CMP	Yes. Towards the Moon.
06 01 29 20	CDR-LM	Towards where?
06 01 29 21	CMP	Toward the Moon.
06 01 29 25	CDR	Oh, yes; okay.
06 01 29 27	LMP-LM	Okay, Pete - -
06 01 29 28	CDR-LM	How much farther down you want me to go?
06 01 29 30	CMP	Well, go down so I can see you; I've lost - I'm losing you now.

06 01 29 36	CDR-LM	You don't have me?
06 01 29 38	CMP	No. Get down towards the Moon; you're going below me, below the spacecraft.
06 01 29 43	CDR-LM	Oh, I think he wants me to -
06 01 29 45	LMP-LM	That's right. He's upside down.
06 01 29 46	CDR-LM	Oh, I'm sorry, when you say down - that's up to me pal; I'm upside down.
06 01 29 50	CMP	I said towards the Moon.
06 01 29 52	CDR-LM	Sorry, I don't know where the Moon is; I just -
06 01 29 53	CMP	It's right there.
06 01 29 55	CDR-LM	Now, you see me?
06 01 29 56	CMP	Okay. Go. I got you.
06 01 29 59	CDR-LM	Okay.
06 01 30 01	CMP	Now, do your maneuvering.
06 01 30 02	CDR-LM	All right, let me stop my radar - have you got it?
06 01 30 04	CMP	I've got it.
06 01 30 05	CDR-LM	You've got it.
06 01 30 06	LMP-LM	Okay, you need to pull both rendezvous circuit breakers.
06 01 30 08	CDR-LM	Okay, wait just a second. Is the rendezvous radar in the right place?
06 01 30 13	CMP	It's 320, 320, which is where it should be.
06 01 30 16	CDR-LM	Okay. Got those out. Rendezvous radar breakers are pulled from the VERB 44.
06 01 30 21	CC	Intrepid, Houston. If you get a chance, we would like that picture.
06 01 30 28	CDR-LM	He took it already, Houston.
06 01 30 30	CC	Good show.

06 01 30 31	CDR-LM	Started to take it with the movie camera, but - hey, he's got something sticking out around the top of him too; you ought to take a look. Right up there.
06 01 30 40	LMP-LM	On the top, Pete.
06 01 30 42	CDR-LM	Wait a minute; I ... on my checklist here.
06 01 30 45	LMP-LM	All right.
06 01 30 59	CDR-LM	Hey, overhead window. Read me the rest of that, Al.
06 01 31 04	LMP-LM	Okay. External lighting to DOCK.
06 01 31 10	CDR-LM	Okay.
06 01 31 13	LMP-LM	Which it is. And - that's it.
06 01 31 14	CDR-LM	Okay. Here I come - -
06 01 31 15	LMP-LM	No, wait. Why don't you take a look at whatever is swinging on top of the spacecraft; see it?
06 01 31 21	CDR-LM	It's probably part of the SEP package.
06 01 31 23	LMP-LM	I bet it is. I bet you're right. ... back to back.
06 01 31 26	CDR-LM	Get a picture of that?
06 01 31 28	LMP-LM	I tried to.
06 01 31 31	CDR-LM	All right, Dick, I'm going to pitch over 90 degrees now.
06 01 31 34	CMP	Okay, let's go.
06 01 31 35	CDR-LM	Okay, I'm going OMNI aft, Houston.
06 01 31 39	CC	Roger, Intrepid.
06 01 31 41	CDR-LM	Let me have this one. ...
06 01 31 56	LMP-LM	My antenna's okay.
06 01 32 01	CDR-LM	Okay. Pitch down 90 and yaw - -

06 01 32 18	LMP-LM	You're right, Pete. Now look, ... right now.
06 01 32 25	CC	Intrepid, Houston. Give us LOW BIT RATE.
06 01 32 31	LMP-LM	Will do.
06 01 32 34	CDR-LM	Okay, Dick. Now, I'm going to yaw left 120.
06 01 32 38	CMP	Okay. Go ahead; I'm ready.
06 01 32 39	CDR-LM	Okay.
06 01 32 46	LMP-LM	... ...
06 01 32 58	CDR-LM	Okay.
06 01 33 05	CDR-LM	Okay.
06 01 33 06	LMP-LM	Pete ... ...
06 01 33 07	CDR-LM	90.
06 01 33 17	CMP	That's not enough. That's good.
06 01 33 21	CDR-LM	Okay.
06 01 33 22	LMP-LM	Okay. There's another one for you.
06 01 33 24	CDR-LM	Okay. VERB 77.
06 01 33 26	LMP-LM	I've got VERB 77, but I'll do it again.
06 01 33 30	CDR-LM	Okay.
06 01 33 31	LMP-LM	What else?
06 01 33 32	CDR-LM	... ... contact after hard dock. MODE CONTROL both OFF. After the hard dock.
06 01 33 36	LMP-LM	Okay. Yes.
06 01 33 40	CDR-LM	... down there.
06 01 34 23	CDR-LM	Hey, Richard. You didn't set up the rendezvous target for me.
06 01 34 29	CMP	... your picture taken instead.
06 01 34 32	CDR-LM	Okay.

06 01 34 38	CMP	Hey, we're looking good and closing. Right on the money.
06 01 34 44	CDR-LM	Okay. Looks good here.
06 01 34 47	CMP	Okay.
06 01 34 55	CDR-LM	Looking good; looking good. That a boy. ... Up a little bit. Looks good, Dick.
06 01 35 22	CDR	Got capture?
06 01 35 23	CMP	Capture.
06 01 35 24	CDR	Okay, go FREE.
06 01 35 25	CMP	FREE.
06 01 35 27	CDR	Very good. We're in good shape. Go ahead ...
06 01 35 32	CMP	That's what there was supposed to be, wasn't I, was FREE?
06 01 35 35	CDR	Yes, sir, you're looking good. Stable as a rock. Go ahead.
06 01 35 37	CMP	Wait a minute; just let me stabilize a little bit.
06 01 35 40	CDR	Okay, it looks pretty stable to me.
06 01 35 42	CMP	Think so, huh?
06 01 35 44	CDR	Huh?
06 01 35 45	CMP	I want to put you down just a little bit.
06 01 35 46	CDR	Okay.
06 01 35 47	CMP	Let the dynamics die out just a little.
06 01 35 49	CDR	Okay. It's hardly moving at all.
06 01 35 53	CMP	Yes, but the target, I want for you to come down a little bit.
06 01 35 57	CDR	Okay. Steady as a rock.
06 01 36 00	CMP	Okay, I'm getting it down there with the attitude. It's okay. Okay?

06 01 36 05	CDR	Go ahead.
06 01 36 06	CMP	Are you ready to retract?
06 01 36 07	CDR	I'm ready to retract.
06 01 36 08	CMP	Okay, Charlie Brown, here you go.
06 01 36 13	CDR	Okay.
06 01 36 23	CMP	And you're home free, boy.
06 01 36 24	LMP	... beautiful.
06 01 36 25	CDR	Both drogue latches are out, pal, and you got it.
06 01 36 30	CMP	Thank you, thank you.
06 01 36 31	CDR	Super job, Richard. That was smooth, wasn't even a ripple. Okay, read me the checklist there, Al.
06 01 36 41	LMP	Okay. MODE CONTROL, AGS at HOLD.
06 01 36 45	CDR	AGS at HOLD.
06 01 36 47	LMP	ATTITUDE CONTROL, three of them pulled.
06 01 36 49	CDR	Pulled.
06 01 36 50	LMP	GUIDANCE and CONTROL, AGS.
06 01 36 51	CDR	GUIDANCE and CONTROL, AGS.
06 01 36 52	LMP	DEADBAND, MAX.
06 01 36 54	CDR	DEADBAND, MAX.
06 01 36 55	LMP	BALANCE couples, ON.
06 01 36 56	CDR	BALANCE couples, ON.
06 01 36 57	LMP	Verify FORWARD DUMP valve, AUTO.
06 01 37 00	CMP	Hello, Houston; Clipper.
06 01 37 02	CC	Clipper, Houston. Go.
06 01 37 05	CMP	Roger, that's the end of the TV show. We've got some work to do.

06 01 37 10	CC	Roger. We can see Pete through the window now.
06 01 37 15	CMP	Well, I'll leave it on for a little while then.
06 01 37 17	CDR	Hello, there.
06 01 37 20	LMP	I've got a 12021.
06 01 37 23	CC	Roger, Pete. We can see your nose from here.
06 01 37 28	CDR	That's my sunglasses I've got on in my helmet.
06 01 37 31	LMP	12021.
06 01 37 35	CC	Intrepid, Houston. I've got some S-band angles for you.
06 01 37 37	CDR	The Marines are picking on us again.
06 01 37 42	CC	Intrepid, Houston. Negative on the angles.
06 01 37 45	LMP	Go ahead.
06 01 37 48	CDR	Okay. Houston, I've got 5838 in for the LM weight, 35389 in for the CSM weight. Is that good enough?
06 01 38 04	CC	Stand by, Pete.
06 01 38 11	CDR	Those are blank on my checklist, so I'm -
06 01 38 19	LMP	I believe you're right. I believe lightning must have hit right on the front of that - -
06 01 38 23	CDR	Well, I'm not sure that ... ...
06 01 38 24	LMP	... ... look around ...
06 01 38 32	CDR	Where are you going to, Richard?
06 01 38 35	CMP	I'm just wandering, Pete. I've got it in 10-degree DEADBAND plus or minus 5.
06 01 38 42	CDR	Okay.
06 01 38 48	CC	Intrepid, Houston. I got your weights.
06 01 38 54	CDR	All right, Houston. Go ahead.

06 01 38 57	CC	Okay, LM weight is 5334, and CSM weight is 35600.
06 01 39 10	CDR	Copy. LM weight is 5334, and CSM is 35600. Very good.
06 01 39 25	CC	Roger. Break. Clipper, did you copy?
06 01 39 32	CMP	Houston, I just put 5500 in for the LM. Is that close enough?
06 01 39 41	CC	Clipper, the LM weight is 5334; and if you're ready to copy, I've got your trims for you.
06 01 39 54	CMP	Listen, I don't really need those things, do I?
06 01 39 57	CC	Okay, we'll skip them.
06 01 40 01	CMP	Hang on to them in case we need them, though, Jerry. I've got to get to work and get that tunnel pressurized.
06 01 40 07	CC	Roger. Go half degree deadband.
06 01 40 13	CMP	I'm in plus or minus 5 degrees. I can save some fuel that way.
06 01 40 37	CMP	Houston, Clipper.
06 01 40 39	CC	Clipper, Houston. Go.
06 01 40 43	CMP	I expect the folks are a little bored with that scene now. I'll turn the television off with your concurrence.
06 01 40 49	CC	Roger. We concur.
06 01 40 55	CMP	How was the show?
06 01 40 57	CC	Very, very good, Dick.
06 01 41 02	CMP	Okay, the TV is off.
06 01 41 06	CC	Clipper, Houston. You did a great job of docking.
06 01 41 12	CDR	Boy, that was a super job.
06 01 41 15	CMP	The way you guys stuck it out there in front of me, all I had to do was drive it in.

06 01 42 00	CC	Intrepid, Houston, go UPDATA LINK to DATA. Your S-band antenna angles are pitch, 176; yaw, 59.
06 01 42 18	LMP	Thank you, Houston. We'll try it.
06 01 42 26	CMP	Hey, Pete, is your FORWARD DUMP in AUTO?
06 01 42 29	CDR	Yes.
06 01 42 30	CMP	Okay.
06 01 42 32	CC	Yankee Clipper and Intrepid, we're ready to start uplinks to you. Who would like the first one?
06 01 42 42	CMP	Yes, Clipper is ready.
06 01 42 45	CC	Roger. Give us POO, and we'll start it up.
06 01 42 50	CMP	It's all yours.
06 01 42 58	CC	Intrepid, Houston. HIGH BIT RATE.
06 01 43 16	CC	Intrepid, Houston. Give us HIGH BIT RATE. Over.
06 01 43 22	CDR	Roger, we'll give you HIGH BIT RATE.
06 01 43 25	LMP	We gave it to you, Houston. Maybe you're just not catching it.
06 01 43 27	CC	Roger. We copy now.
06 01 46 44	CDR	Say, Houston; Intrepid. What time is it back there, anyhow?
06 01 46 50	CC	It's just about high noon. It's 9 minutes after 12.
06 01 46 56	CDR	Oh, I - I've completely lost all sense of night and day. Al said, Al wants to know what day it is.
06 01 47 08	CC	20 November, 20; and it's Thursday.
06 01 47 13	CDR	Okay. Thursday, Roger.
06 01 47 32	CC	Intrepid, Houston. If you'll go POO and DATA, we've got an uplink for you, and go UPDATA LINK to DATA. Over.

06 01 47 43	CDR	You got it, Houston.
06 01 47 48	CC	Clipper, Houston. The computer's yours.
06 01 48 20	CDR	Say, Houston, while you got a minute, I'd like to talk over something with you.
06 01 48 27	CC	Go ahead, Pete.
06 01 48 31	CDR	When we were on the back side then coming around, I don't remember exactly what time it was, coming up on - what was it, midcourse correction - coming up on a midcourse correction, we got an ECS light with a partial pressure CO_2 and went over seven. And that kind of surprised me, and we did switch the canister secondary, and sure enough the CO_2 gage went to zero, and like it was starting on a fresh canister. I don't think the canister that we put in, which was at 130 hours, that's only 15 hours old, should have done that. I'm wondering if maybe I ought to take a look at that canister and see if it's wet or anything.
06 01 49 33	CC	Roger, Pete. Stand by. I think we've got some words on that.
06 01 49 39	CDR	Okay.
06 01 49 51	CMP	Hey, Pete, got to take the hatch out.
06 01 50 08	CDR	Is that what you said, Dick? We can open the hatch?
06 01 52 49	CC	Intrepid, Houston. The computer's yours.
06 01 52 55	CDR	Roger.
06 01 53 05	CC	Yankee Clipper, Houston. Got a CSM separation maneuver PAD for you and a LM jettison attitude and a LM JETT time.
06 01 53 18	CMP	Houston, this is Clipper. You're going to have to hold those. I'm busy up here in the tunnel.
06 01 53 22	CC	Okay. You'll just give me a call when you're ready for them.
06 01 53 26	CC	Intrepid, Houston. I've got PAD for you when you're ready to copy.

06 01 53 28	CDR	Might go over the hill. Hey, Jerry, don't let him go over the hill without getting them.
06 01 53 35	CC	Okay.
06 01 54 03	CC	Intrepid, Houston. You ready to copy PADs?
06 01 54 10	LMP	Negative, Houston. But we will be in just a minute; I'll give you a call.
06 01 54 13	CC	Okay.
06 01 57 21	CMP	Hey, Pete. Hey, Conrad. Hey, Commander Conrad. Pietro, where are you?
06 01 57 47	LMP	Yankee Clipper, Intrepid. Are you giving us a call?
06 01 57 48	CMP	No, we're talking to each other. Sorry about that.
06 01 57 53	LMP	Okay.
06 01 57 58	CDR	I've got my helmet on, Dick. I can't see you down here.
06 01 58 20	LMP	Houston - Houston, Intrepid. We're ready to copy those PADs.
06 01 58 25	CC	Roger, Intrepid. The first PAD will be a P30 LM maneuver; call it LM impact or LM final. Are you ready?
06 01 58 45	LMP	Ready to go.
06 01 58 47	CC	Roger. NOUN 33: 149:28:17.50; NOUN 81: minus 0181.2, plus 0060.3, minus 0001.5; NOUN 42 is NA; burn time, NA; FDAI: 162, 358; AGS: minus 0181.1, plus 0060.3, minus 0002.8. The rest is NA.
06 01 59 56	LMP	Roger, Houston. 149:28:17.50; minus 0181.2, plus 0060.3, minus 0001.5; NA; NA; NA; NA; 162, 358; minus 0181.1, plus 0060.3, minus 0002.8.
06 02 00 18	CC	That's affirmative, Al. A couple of flight plan updates for you. Number 1: we would like for you to bring back the sequence camera and stow it in Alfa 8 and no bag will be required. Over.

06 02 00 46	LMP	Understand.
06 02 00 49	CC	Roger, Al. Also, on panel 16, would you pull your LM tracking light's circuit breaker? Over.
06 02 01 00	LMP	Way ahead of you on that one.
06 02 01 16	CMP	Hello, Houston; Clipper.
06 02 01 17	CC	Go ahead, Clipper.
06 02 01 21	CMP	I'm ready for those PADs.
06 02 01 24	CC	Roger, Dick. Would you put your TAPE RECORDER forward switch to FORWARD, please?
06 02 01 34	CMP	Okay. It is.
06 02 01 36	CC	Okay, the first one will be your separation burn PAD. Separation maneuver follows: roll, 180; pitch, 343; yaw, 000; GET of T_{ig} is 148:04:30; DELTA-V; 1 foot per second; burn, Z-axis, retrograde. Over.
06 02 02 26	CMP	Roger. CSM separation attitude 180; pitch, 343; 000 in yaw; T_{ig}, 148:04:30; DELTA-V, 1 foot per second; Z-axis, RETRO.
06 02 02 45	CC	Roger. This is your jettison PAD. Your roll angle is 220; pitch is 358; yaw is 352 - correction, 342; GET of jettison is 147:59:30. Over.
06 02 03 16	CMP	LM jettison altitude: roll, 220; pitch, 258; yaw, 342; jettison time 147:59:30.
06 02 03 28	CC	Roger, Dick and the last one in your CSM P76 PAD. GET of T_{ig} is 149:28:54.5; DELTA-V_X, minus 0181.1; DELTA-V_Y, plus 0060.3; DELTA-V_Z, plus 0003.6.
06 02 04 14	CMP	Roger. Copy 149:28:54.5; X, minus 0181.1; Y, plus 0060.3; Z, plus 0003.6.
06 02 04 26	CC	That's affirmative, Dick.
06 02 04 30	CMP	And what was that, anyway?
06 02 04 39	CC	That'll be the - -

06 02 04 40	CMP	In other words, now that I've got it, what do I do with it?
06 02 04 43	CC	If you want to track the LM, Dick, this is the data that you need for tracking.
06 02 04 50	CMP	Oh, that my P76 PAD. Okay?
06 02 05 01	CMP	Thank you, Jerry, I understand.
06 02 05 03	CC	Roger, Dick.
06 02 05 31	CC	Intrepid, Houston.
06 02 05 39	LMP	Go ahead, Houston.
06 02 05 41	CC	Roger, Al. When you get a moment here, before you go LOS, we've got a couple of items. Number 1: We'd like a few more words if you can on what it was you saw dangling from the CSM; I think you called it a separation package or something like that, and also we'd like to see you go back to your primary LiOH canister, and give us a look at it and see if it goes off on the CO_2, again.
06 02 06 08	CDR	Okay, we'll do that. We're a little bit suspicious of it because we had some erratic readings with our CO_2. We'll go back to primary right now - Houston, the - It looks like some of the stuff we used to get back at the SEP plane on Gemini, except it looked like a piece of metal - it was about 3 feet long and about an inch wide, that was just curling up off the back there, right at the SEP plane.
06 02 06 43	CC	Roger, Pete.
06 02 06 52	CC	Clipper, Houston. I've got a REV 33 map update for you.
06 02 07 03	CMP	Hey, Jerry, can we skip this one? We're kind of busy right now.
06 02 07 07	CC	Sure can, Dick.
06 02 07 10	CMP	Okay. Just holler at us when we go around the corner. We'll be looking for you.

06 02 07 14	CC	Okay, that takes care of the paper work for this pass.
06 02 07 20	CMP	Thank you, pal.
06 02 07 37	LMP	How long before LOS, Houston?
06 02 07 40	CC	We've got 18 minutes and about 30 seconds now.
06 02 07 46	LMP	Roger.
06 02 13 40	CDR	Dick, can you take a look in the tunnel?
06 02 16 47	CC	Yankee Clipper, Houston.
06 02 16 52	CMP	Go ahead.
06 02 16 54	CC	Roger, Dick. When you get a second, I've got some DAP data for you and a couple of switches for you to check.
06 02 17 05	CMP	Okay. Will I need the DAP data?
06 02 17 08	CC	Yes. It looks like a couple of registers need changing.
06 02 17 17	CMP	Go ahead with it.
06 02 17 20	CC	Roger. R-1 should be 61101; R-2 is 01111. and check your A-C ROLL, AUTO SELECT valve switches to the OFF position. And UPTLM to BLOCK. Over.
06 02 17 50	CMP	Okay. Okay, Jerry. I'll get that after a bit, but I'm still trying to get this stuff over here to the CSM.
06 02 17 58	CC	Okay, Dick.
06 02 18 05	CMP	Hey, Pete. I'm maneuvering to the jettison attitude. Don't let it worry you. Don't worry.
06 02 18 16	CDR	I won't.
06 02 18 56	CDR	Can you get it?
06 02 19 05	CMP	I think so.
06 02 19 43	LMP	Yes, Pete. I think so.

06 02 25 10	CC	Yankee Clipper and Intrepid, this is Houston. We're 1 minute from LOS. We're looking for AOS at 147:12. Over.
06 02 25 22	LMP	Intrepid, Roger.

END OF TAPE

06 02 48 --		BEGIN LUNAR REV 33
06 03 16 08	CC	Intrepid, Houston. How do you read?
06 03 16 14	LMP	Read you loud and clear.
06 03 16 15	CC	Roger. Yankee Clipper, how do you read?
06 03 16 19	CMP	Houston, loud and clear.
06 03 16 21	CC	Roger; read you both the same.
06 03 16 54	CC	Yankee Clipper, Houston. Pete, are you in the Clipper now?
06 03 17 01	CMP	Pete's - Pete's reading the checklist to Al. Hey, Jerry, I got a question.
06 03 17 08	CC	Go.
06 03 17 09	CMP	Pete wants to know if he can leave his LCG in the LM.
06 03 17 17	CC	Okay, Dick. Stand by. We'll get an answer on that. I got a couple of questions for them - would you relay them?
06 03 17 27	CMP	Yes, I can, Jerry. They're going through their checklists, so they can get out of it.
06 03 17 32	CC	Okay. Here's our - here's our questions - -
06 03 17 35	CMP	... ask the questions.
06 03 17 36	CC	- - You know that hanging metal they were talking about on the service module? We're wondering if that's in a position such that it might possibly be the cause of our S-band antenna problem, causing it to dither.
06 03 17 59	CDR	It's further up than that - it's right around the SEP plane of the service module, and it's right on the top of Dick Gordon, whereas his S-band antenna's on his bottom left, if you go relative to the upper windows.
06 03 18 18	CC	Okay. We copy that, and the other one is, don't forget to bring the LM TV camera across.

06 03 18 26	CDR	We've already got it, and it's stowed on the command module, and we put it in one of those special bags because it had a lot of dust on it.
06 03 18 34	CC	Roger. Good.
06 03 18 40	CDR	Hey, and also, Houston, we need to know if we can just go ahead and leave our LCG's here, or do you want them brought back?
06 03 18 47	CC	We're checking on that now, Pete.
06 03 21 11	CC	Clipper, Houston.
06 03 21 16	CMP	Go ahead, Houston.
06 03 21 17	CC	Roger. High-gain antenna's not doing too well. We'd like you to go MANUAL, and your angles are pitch, minus 41; yaw, 4. Over.
06 03 21 52	CC	Intrepid. Houston.
06 03 21 58	CDR	Go ahead, Houston.
06 03 21 59	CC	Roger. On your LCG question, the only problem we have right now is in the area of contamination. We're giving it a quick checkout on that and we'll have an answer for you in just a few minutes.
06 03 22 22	CDR	Say again, Houston.
06 03 22 26	CC	Intrepid, Houston. The only problem that - the question mark we have with the LCG being left in the LM is the contamination thing. We're getting an okay on it, and we will get back with you in just a couple minutes.
06 03 22 39	CDR	Understand.
06 03 22 57	CC	P30 looked good, Al.
06 03 23 16	CC	Clipper, Houston. I have a CSM DAP load for you and a map update for REV 34.
06 03 23 33	CMP	Go ahead, Jerry.
06 03 23 35	CC	Okay, Dick. Your CSM weight is 35634. I've got your trim angles anytime you need them. Your map update is REV 34; LOS is 148:24:47, 148:2 - correction, 49:43, 149:11:01.

06 03 24 10	CMP	Roger. I copy that, and the CSM weight is 35634.
06 03 24 15	CC	Affirmative, Dick.
06 03 26 44	CC	Intrepid, Houston.
06 03 26 50	CDR	Go ahead, Houston.
06 03 26 52	CC	Roger. You can leave those LCG's in the LM if you want to, and let us know where you stowed them, would you?
06 03 27 00	CDR	Will do.
06 03 27 07	CDR	We're going to leave them in the CSM ditty bag which will be on the floor.
06 03 27 13	CC	Okay, fine.
06 03 31 43	CC	Intrepid, Houston.
06 03 31 52	CMP	Hello.
06 03 31 53	CC	Roger. Have you got your master alarm circuit breaker closed?
06 03 32 02	CMP	It's open.
06 03 32 09	CC	Okay, Dick.
06 03 32 10	CMP	What would you like, Houston?
06 03 32 12	CC	No, that's fine the way it is.
06 03 32 14	CMP	Is it okay? Okay.
06 03 36 41	CMP	Hello, Houston; Clipper.
06 03 36 44	CC	Roger, Clipper. Go.
06 03 36 48	CMP	Do you want to send something to the LM to see if the uplink is okay? How about a VERB 44?
06 03 36 58	CC	Stand by just a second, Dick.
06 03 37 26	CC	Clipper, Houston. We're going to send an ERROR RESET.
06 03 37 49	CC	Yankee Clipper; this is Houston. Intrepid is GO; you can clear it out any time.

06 03 37 56	CDR-LM	Roger. We've been trying to.
06 03 42 10	CMP	Houston, Clipper. How about a PYRO ARM? Here comes the LOGIC, ON, for you.
06 03 42 16	CC	Roger, Clipper.
06 03 42 29	CC	Yankee Clipper, Houston. GO for PYRO ARM.
06 03 42 34	CMP	Roger. GO for PYRO ARM.
06 03 57 31	CMP	Houston, Clipper. Two minutes to jettison.
06 03 57 34	CC	Roger, Clipper.
06 04 01 00	CC	Yankee Clipper, Houston. Go to REACQ on the HIGH GAIN. Over.
06 04 01 07	CDR	Roger.
06 04 06 42	CC	Yankee Clipper, Houston.
06 04 06 48	CDR	Houston, Clipper. Go.
06 04 06 49	CC	Roger. Your high gain's beginning to jitter again. Better go MANUAL, and your angles in the flight plan are good. That's minus 36 on the pitch and 352 on the yaw.

END OF TAPE

06 04 12 23	CC	Apollo 12, Houston.
06 04 12 28	CDR	Hello.
06 04 12 30	CC	Pete, the surgeon has some words for you about your sensors - sensor irritation, if you want to listen to that.
06 04 13 00	CMP	Why don't you stand by until they get some coffee?
06 04 13 03	CC	Roger.
06 04 19 03	CC	Apollo 12, Houston.
06 04 19 16	CC	Apollo 12, Houston. OMNI Bravo, please.
06 04 19 47	CC	Apollo 12, Houston in the blind. OMNI Bravo, please.
06 04 20 29	CC	Apollo 12, Houston.
06 04 20 36	CDR	Hello, Houston; 12. Go ahead.
06 04 20 37	CC	Roger. We recommend that you shut off the high gain. First, put the TRACK switch on MANUAL; next, put the HIGH GAIN POWER switch to OFF, and talk to us through OMNI - we assume you're on OMNI Bravo. We think that should be a good one.
06 04 20 57	CDR	Your assumption is correct.
06 04 21 43	CC	Apollo 12, Houston. Everything looks in good shape down here. Also, the LM looks in good status for the deorbit burn.
06 04 23 58	CC	Apollo 12, Houston. We show about 45 seconds to LOS. You'll be coming around the corner at 149:11.
06 04 24 10	CDR	Roger, Don. Thank you.
06 04 46 --		BEGIN LUNAR REV 34
06 05 12 23	CC	Apollo 12, Houston.
06 05 13 28	CC	Apollo 12, Houston. Apollo 12, Houston.
06 05 15 31	CC	Apollo 12, Houston.
06 05 18 04	CC	Apollo 12, Houston.

06 05 18 23	CC	Apollo 12, Houston in the blind. For your information, for P20 tracking of the LM with the sextant, you'll get a program alarm 20430 when the LM vector intersects the surface. With a VERB 66 ENTER and reset the alarm, you'll clear that. Impact time at the surface should be 149 plus 55 plus 59. That's when you should get the alarm 20430, and it's only the LM vector passing through the surface.
06 05 21 41	CMP	Hello, Houston; Yankee Clipper.
06 05 21 44	CC	Loud and clear. How are you doing, Dick?
06 05 21 52	CC	Apollo 12, Houston.
06 05 21 55	CMP	Doing pretty good. I've got the LM in the sextant. And I've been tracking him, and I've got the camera ... right now watching the LM. What time is that burn scheduled for?
06 05 22 07	CC	Okay. The burn ignition time is 149 plus 28 plus 14. Did you get a transmission from us in the blind about 2 minutes ago about a program alarm?
06 05 22 22	CMP	Negative.
06 05 22 24	CC	Roger. If you're going to track in P20, which we see you're setting up for, when the LM vector intersects the lunar surface, you will get a program alarm 20430. When you go VERB 66 and ENTER and put your vector in that slot deal and RESET, the alarm should go away. Now, the impact time is expected to be 149 plus 55 plus 59.
06 05 23 05	CMP	Okay, fine. Thank you.
06 05 23 07	CC	Roger. We've got some other goodies for you. We've got a P40 maneuvering PAD, when you're ready to copy; we've got some words for Pete about his skin irritation; we've got consumables PADs and a few other things when you want them.
06 05 23 26	CMP	..., Don. I'm trying to track this LM while these guys are still packing the spacecraft.
06 05 24 18	CC	Apollo 12, we're not reading you very well on that last transmission. Could you give that again?
06 05 24 26	CMP	Give what again, Don?

06 05 24 28	CC	Your last transmission. You were breaking up.
06 05 24 34	CMP	I said you'd better hold all that stuff awhile. Pete and Al are trying to pack this spacecraft, yet, with all the stuff they brought back from the LM; and I'm trying to track the LM itself. So we won't have time for anything else right now.
06 05 24 48	CC	Very good. We'll hold it.
06 05 27 13	CC	Apollo 12, Houston. One minute to LM ignition.
06 05 27 22	CMP	Roger.
06 05 28 28	CC	Apollo 12, Houston. The LM is on its way down.
06 05 28 35	CMP	Roger. ...
06 05 29 07	CMP	Houston, 12.
06 05 29 09	CC	Go, 12.
06 05 29 13	CMP	Is the LM still burning?
06 05 29 16	CC	That's affirmative.
06 05 29 20	CMP	Okay.
06 05 32 26	CMP	Houston; this is 12. Let me know when he finishes burning.
06 05 32 48	CMP	Houston, Apollo 12.
06 05 32 50	CC	Houston, go ahead.
06 05 32 59	CMP	Roger. Will you let me know when he's through with the burn, please?
06 05 33 05	CC	Say again, 12.
06 05 33 12	CMP	Will you call and let me know when the LM finishes its burn?
06 05 33 17	CC	Okay, it has finished its burn now. It's been over about a minute and a half.
06 05 33 24	CMP	Thank you.
06 05 35 58	CC	Apollo 12, Houston. We show just under 20 minutes until LM impact.

06 05 39 56	CC	Apollo 12, Houston. We've computed a new impact time for the LM impacting the surface at 149 plus 55 plus 17.
06 05 40 11	CMP	Roger.

END OF TAPE

06 05 49 04	CMP	Hello, Houston; Apollo 12.
06 05 49 07	CC	Go ahead, 12.
06 05 49 10	CMP	Roger, Don. Let's get caught up on some of those PADs. Let me know when that thing impacts, so I can shut off this camera, because I can't see it through the telescope?
06 05 49 18	CC	Roger. We've got 6 minutes to impact, and I've got a P40 TEI PAD for you.
06 05 49 54	CMP	Okay. Go with the TEI PAD.
06 05 49 57	CC	Roger. TEI 39, SPS/G&N: NOUN 47 is 35629; NOUN 48 is minus 0.67, plus 0.44; GET 160:42:19.26; NOUN 81, plus 3463.6, plus 0671.1, minus 0128.2; roll, NA; pitch, 109; yaw, NA; all the rest is NA; ullage, four jets, 11 seconds; and this assumes no plane change 2.
06 05 51 09	CMP	Okay. Copy TEI PAD 39. SPS/G&N is 35629; minus 0.67, plus 0.44; 160:42:19.26; plus 3463.6, plus 0671.1, minus 0128.2; pitch is 109; four jet, 11 seconds; no plane change 2.
06 05 51 33	CC	That's affirmative.
06 05 51 40	CC	Does Pete want to hear some recommendations from the flight surgeon on his skin irritation?
06 05 51 53	CMP	No, he doesn't need any information on that.
06 05 51 56	CC	Okay. I've got a consumable PAD for you, if you want it.
06 05 52 08	CMP	You've got some what?
06 05 52 19	CMP	Don, say again. You were cut out.
06 05 52 22	CC	Roger. We've got a consumable update for you. RCS total is 47.6, Alfa is 46.4, Bravo is 48.7, Charlie is 46.4, Delta is 48.7, and we show 2 minutes and 38 seconds to LM impact.
06 05 52 47	CMP	Okay. Understand. And would you tell me when I should start on the secondary pro - propellants? On the secondary fuel.

06 05 53 00	CC	Roger.
06 05 53 15	CC	12, we'll get an estimate on that for you.
06 05 55 13	CC	Countdown for LM impact. 3, 2, 1 -
06 05 55 18	CC	MARK.
06 05 55 21	CC	LM impact.
06 05 55 28	CDR	Okay, thank you.
06 05 56 02	LMP	Houston, Apollo 12.
06 05 56 04	CC	Go.
06 05 56 07	CDR	Would you like to take the E-memory dump?
06 05 56 10	CC	That is affirmative.
06 05 56 16	CDR	It's on its way.
06 05 56 18	CC	Roger.
06 05 56 33	CDR	And, Don, we want to report the crew status report. Everybody is feeling fine. No medication today. There's been enough excitement.
06 05 56 44	CC	Very good. Copy that.
06 05 56 46	CDR	And the onboard readouts, Houston - the onboard readouts - those three batteries are still at 37.1. And the rest of our transmission has been taken care of.
06 05 57 10	CC	We got 37.1. Will you give us the end of that?
06 05 57 18	CDR	That's all three of my batteries. Battery C, PYRO A, and PYRO B.
06 05 57 22	CC	Roger. Understand for all batteries. Also would you give us a word about the CO_2 cartridge, secondary? We were wondering why you'd gone to SECONDARY, if you had any other trouble on that? Apollo 12, that was the LM cartridge we were talking about. If you'd had another glitch on the CO_2 sensor.
06 05 58 42	CMP	And, Don, since our high gain is acting up like it is, do you want us to go OMNI - OMNI Bravo tonight?

06 05 58 50	CC	This is affirmative. OMNI Bravo. That's OMNI Bravo when you configure for sleep, and we'd like you to put the normal S-band voice to OFF at that time.
06 05 59 10	CMP	Roger.
06 05 59 13	CC	One question. We were wondering if the sequence camera had been wrapped when you stowed it for - to prevent damage. Your choice as to where you want to stow it.
06 06 00 10	CC	Apollo 12, would you hold what you have on attitude until we finish this E-MOD dump?
06 06 00 51	CC	Dick, for the RCS, we're 25 pounds on each quad above the level at which we'd open the secondary. So, things are okay there.
06 06 01 05	CMP	Okay. I won't worry about it tonight.
06 06 01 07	CC	Roger.
06 06 01 19	CC	Apollo 12, for your information, all the surface experiments for ALSEP are in great shape. They're all operating very well. There is apparently no temperature degradation at all because of any dust. So, that looks like that came out real fine. The passive seismic is working fine. It - noticed Pete walk past. Also got a very nice trace for your lift-off. On the LM impact, we were probably about 40 nautical miles away. So, the short period didn't get anything, but it looks like the long period got a couple of signals. Also, the cold cathode gage could see the sublimator walking past, Pete, when you went over to check the SIDE experiment, and all the other experiments are working fine. So everybody is absolutely delighted with the way you deployed the ALSEP. The passive did record the impact on long period.
06 06 03 04	CC	Apollo 12, Houston. Before you close out the LEB, we'd like to just remind you to zero the optics, and we'd like you to leave the power on so that we can watch the CDU's tonight. We've seen just a couple of glitches, and we just want to follow through on that and see how they're doing.
06 06 03 30	CMP	They're doing fine.

06 06 03 32	CC	Very good.
06 06 08 38	CC	Roger.
06 06 12 38	CC	Apollo 12, Apollo 12. If you read, would you give us OMNI Bravo. OMNI Bravo.
06 06 14 29	CC	Apollo 12. If you read, give us OMNI Bravo. OMNI Bravo.
06 06 16 56	CC	Apollo 12, Apollo 12, OMNI Bravo. OMNI Bravo.
06 06 18 43	CC	Apollo 12, Houston. Apollo 12, Houston. Could you give us OMNI Bravo? OMNI Bravo.
06 06 19 57	CC	Apollo 12, Houston. We show about 3 minutes to LOS; if you could give us OMNI Bravo, we would appreciate it. OMNI Bravo.
06 06 21 05	CC	Apollo 12, Apollo 12, Houston. We show 2 minutes from LOS. We would like OMNI Bravo, if you could. OMNI Bravo.
06 06 22 10	CC	Apollo 12, Houston. We show 1 minute from LOS. If you read us, would you give us - OMNI Bravo. OMNI Bravo.
06 06 44 --		BEGIN LUNAR REV 35
06 07 14 11	CC	Apollo 12, Houston. Apollo 12, Houston. Apollo 12. Mode Brav - OMNI Bravo, please.
06 07 15 08	CC	Apollo 12, Houston in the blind. Would you give us OMNI Bravo, Please? OMNI Bravo.
06 07 15 23	CC	Apollo 12, Houston. Would you give us OMNI Bravo, please?
06 07 16 09	CC	Apollo 12, Apollo 12. This is Houston. Do you read?
06 07 16 17	CC	Apollo 12, Apollo 12. This is Houston. Do you read?
06 07 17 08	CC	Apollo 12, Apollo 12, Houston. Do you read?
06 07 17 20	CC	Dick, if you can read us, would you give us OMNI Bravo, please? OMNI Bravo.
06 07 18 09	CC	Apollo 12, Apollo 12. This is Houston. Do you read?

END OF TAPE

06 07 19 06	CC	Apollo 12, Apollo 12. This is Houston on guard. If you read, rock your wings. Give us OMNI Bravo, please.
06 07 23 07	CC	Apollo 12, Apollo 12. This is Houston. Do you read us?
06 07 23 18	CC	Apollo 12, Houston. Try OMNI Bravo, if you read us, please.
06 07 24 07	CC	Apollo 12, Houston. Apollo 12, Houston. Do you read us? OMNI Bravo, if you read, please.
06 07 26 15	CC	Apollo 12, Apollo 12, Houston. This - this is Houston. Do you read us? If you read us, please give us OMNI Bravo. OMNI Bravo.
06 07 40 21	CC	Apollo 12, Houston. Apollo 12, Houston. Do you read?
06 07 40 45	CC	Apollo 12, Houston; Apollo 12, Houston. Would you give us OMNI Bravo, turn up your S-band voice?
06 07 41 15	CC	Apollo 12, Houston. Do you read us?
06 07 41 52	CC	Apollo 12, Houston. Apollo 12, Houston. Do you read?
06 07 42 23	CC	Apollo 12, Apollo 12, this is Houston. Do you read?
06 07 42 39	CC	Apollo 12, Apollo 12. In the blind. Give us OMNI Bravo, please.
06 08 01 40	CC	Apollo 12, this is Houston. Do you read us?
06 08 02 13	CC	Apollo 12, Houston.
06 08 02 20	CC	Apollo 12, this is Houston. Do you read us?
06 08 03 38	CDR	Hello, Houston; hello, Houston; Apollo 12.
06 08 03 45	CC	Hello, Apollo 12.
06 08 03 50	CDR	What do you want?
06 08 03 51	CC	We were just a little concerned about letting you go for 8 hours without any COMM. We're sorry to interrupt your sleep, but now we've got

you back in COMM, so we're just going to wish you a good night and sorry for the interruption.

06 08 04 05	CDR	Okay. We're not sleeping. We're all just trying to get clean in here; so, we had the COMM off. We'll be back with you after a while. Don't - panic.
06 08 04 14	CC	Roger. No problem. It's just that we had no TM or anything. We didn't want you to go to sleep before we got ahold of you.
06 08 43 --		BEGIN LUNAR REV 36

END OF TAPE

06 10 42 -- BEGIN LUNAR REV 37

06 12 38 -- BEGIN LUNAR REV 38

REST PERIOD - NO COMMUNICATIONS

06 13 30 04	CC	Good morning, Apollo 12; Houston.
06 13 30 11	CDR	Go ahead, Houston.
06 13 30 14	CC	Morning, 12. Standing by.
06 13 30 19	CDR	Roger.
06 13 30 26	CMP	Okay, Ed. Crew status report: Sleep across the board CDR, CMP, LMP - 4-1/2, 4, 4; PRD reading - 11021, 11021, 04023.
06 13 30 44	CC	Roger. We copy.
06 13 31 39	CC	12, Houston. We're standing by with the updates as called out in your flight plan, and in that order.
06 13 31 48	CMP	... Ed.
06 13 31 51	CC	Okay. Are you ready to copy lunar orbit plane change 2?
06 13 31 58	CMP	Okay.
06 13 32 01	CC	Maneuver PAD lunar orbit plane change 2 SPS/G&N: 35584; minus 0.78; plus 0.29; 159. Okay; hold it there, Dick. Okay. Let's pick up again on the GET; we are getting a lot of static. 159:04:44.78; minus 0013.6; plus 0381.1; plus all zeros; roll, pitch, yaw, all zeros; 0064.0; plus 0056.5; 0381.3; 0.19; 0368.2; 05; 045.6; 38.7; boresight star is 036; up 16.5; left 1.9; and your stars, Sirius and Rigel; you have 223, 084, 071; the ullage is four jet, 11 seconds. Standing by for readback.
06 13 33 54	CC	And, 12, before the readback, we are also standing by with your state vector, target load, and REFSMMAT if you will give us POO and ACCEPT.
06 13 34 09	CMP	You have it, Houston. And, Ed, here comes the readback. Lunar orbit plane change numbe 2 SPS/G&N: 35584; minus 0.78; plus 0.29; 159:04:44.78; minus 0013.6; plus 0381.1; all zips; roll, pitch, yaw, zeros; 0064.0; plus 0056.5; 0381.3; 0:19; 0368.2; 05; 045.6; 38.7; 036; up 16.5; left 1.9; Sirius and Rigel; 223, 048, 071; four jet, 11 seconds.

06 13 34 58	CC	Readback is correct and one comment; that's heads up.
06 13 35 05	CMP	Okay.
06 13 35 07	CC	Consumables update at GET of 157 plus 00; RCS total 47.1; 47. - 46.1 on A; 49.3; 45.4; 47.6; and, assuming that you have stirred, H_2 total, tank 1, 44; tank 2, 44; O_2 47 and 49.
06 13 35 42	CMP	Okay. Copied all that.
06 13 35 45	CC	Coming at you with a map update, REV 39: LOS 158:16:32, 158:41:50, 159:02:46.
06 13 36 08	CMP	Roger. LOS 158:16:32, 158:41:50, 159:02:46.
06 13 36 17	CC	Readback is correct; and we're standing by with a TEI PAD, when you are ready to copy.
06 13 36 32	CMP	Go ahead.
06 13 36 33	CC	TEI 41 SPS/G&N: 34264; minus 0.78; plus 0.28; 164:41:16.04; your DELTA-V's, plus 3655.4, plus 0470.1, plus 0032.9; roll, NA; pitch, 092; yaw, NA; your ullage, four jet, 11 seconds; and that assumes the lunar orbit plane change 2.
06 13 37 31	CMP	Okay. TEI 41 SPS/G&N: 34264; minus 0.78; plus 0.28; 164:41:16.04; plus 3655.4; plus 0470.1; plus 0032.9; NA; 092; NA; four jet, 11 seconds; assumes lunar orbit plane change 2.
06 13 37 56	CC	That's Charlie.
06 13 38 42	CC	12, Houston. Could we have the configuration of the high gain track mode and beam width?
06 13 38 51	CMP	Roger. MANUAL, MEDIUM.
06 13 38 54	CC	Copy.
06 13 38 58	CMP	Yes. We are playing with it now for you.
06 13 39 03	CC	Roger.
06 13 39 06	CMP	Okay. We are REACQ NARROW now.
06 13 39 10	CC	Roger. REACQ.
06 13 39 47	CC	12, Houston. Would you like some information on the crater which you made?

06 13 39 55	CDR	Yes.
06 13 39 58	CC	Okay. The location is south 3.95 and west 21.17 and that's, relative to the Surveyor, 36 nautical miles east and 14 nautical miles south. And you will be able to see that on your - where the actual location is - on the southwestern edge of the circle for target of opportunity 39. Your velocity at impact was 5502 and you came in at the angle of about 3.8 degrees relative to local horizonal.
06 13 40 46	CDR	Hey, give me the LAT-LONG again.
06 13 40 50	CC	Roger. That's 3.95 south, 21.17 west, and we did pick that up on the PSE. We've got some long-period oscillations from it. They lasted on the order of 40 to 50 minutes.
06 13 41 09	CDR	Good.
06 13 41 17	CC	12, the computer is yours.
06 13 41 23	CMP	Thank you.
06 13 41 31	CC	Pete, Houston.
06 13 41 36	CDR	Go ahead.
06 13 41 39	CC	Okay, Pete. You can dispense with the bioharness, and we have some recommendations for you if you feel you need it for clearing up some of the skin irritation.
06 13 41 53	CDR	Okay. It goes away as soon as I take it off. The one that I have is all dried up now, that I can move, so go ahead with your recommendation.
06 13 42 07	CC	Okay. We recommend you consider the following: one, wash thoroughly around all sensitive locations with the wetwipes; you then remove biosensor and harness; wash the skin in those areas with wetwipes and let dry; apply the skin cream to the infected areas twice daily; and apply no bandages over the irritated areas; and, in drying, just let it dry in the air.
06 13 42 41	CDR	Okay. Thank you.
06 13 44 01	CC	Apollo 12, Houston. Would you give us the shaft key pack [?] reading and also whether you see any oscillations?

06 13 44 23	CDR	The trunnion is reading 35.9 and the shaft is reading 0.4 and it's oscillating between 3599 and 0.5.
06 13 44 46	CC	Roger. And thank you. We are seeing deviations at a half of a degree down here.
06 13 44 53	CDR	That's about right.
06 13 44 57	CC	Roger. Would you take the optics coupling switch to DIRECT and see if it stops?
06 13 45 16	CDR	That seemed to do it.
06 13 45 19	CC	Roger.
06 13 46 49	CC	12, Houston.
06 13 46 54	CDR	Go ahead.
06 13 46 55	CC	Say, it looks as though it's - it would be possible for you folks to do some photography on the impact, or the crater which you folks made with the ascent stage. We can give you an idea of what the procedure would involve, and you can use your own discretion as to whether you want to try it.
06 13 47 17	CMP	What are you thinking of using to take the pictures, Ed?
06 13 47 37	CDR	Also, Houston, the shaft is still oscillating a half degree here in the DIRECT.
06 13 47 43	CC	Roger. Okay. You'd be using the 250-millimeter lens, and it'd be hand hold hand held out the hatch window. If you'd like, I can read you up a quick summary of the procedure.
06 13 48 08	CMP	Let's see; the procedure's not necessary. Give me the gimbal angles and the time and what window.
06 13 48 23	CC	Okay. What you do is immediately follow in the Lalande high-resolution photography on REV 39 which appears to be the best place to pick this up. You'd stop your pitch rate and do a 20-degree roll left. Impact point will be visible out the hatch window, 22 miles south of track. TCA would be 159:47:23, and we've already given you the information of where it appears on your target of opportunity map. You would remove the camera

from window 4, change to 250-millimeter lens and hand hold out the hatch window and the following settings would apply: f:5.6 and 1/125. And you can take several shots.

06 13 49 23	CMP	Okay. I've got after Lalande photography, stop pitch, 20-degree roll left; TCA is 159:47:23; 250-millimeter lens; f:5.6 and 1/125.
06 13 49 40	CC	That's right. That's 1/125th.
06 13 49 46	CMP	Roger. And that was out of the window number 5? Or the hatch window?
06 13 49 53	CC	That's affirm. Out the hatch window.
06 13 55 59	CC	Apollo 12, Houston.
06 13 56 04	CDR	Go ahead.
06 13 56 06	CC	Okay. With reference to our questions we just had on the optics, I'll tell you what we've seen down here. We've just seen the oscillation intermittently; and so far, we've seen no effect on the P52's, and we've observed this oscillation only in the zero mode.
06 13 56 25	CDR	Okay.
06 14 12 18	CC	Apollo 12, Houston.
06 14 12 23	CDR	Go ahead.
06 14 12 26	CC	12, we've observed that the high gain antenna works better after being off. Therefore, we'd like to request that you turn the high gain antenna power off at LOS and then turn it back on again at AOS.
06 14 12 43	CDR	Okay.
06 14 16 05	CC	12, Houston. One minute to LOS.
06 14 16 10	CDR	Roger-Roger.
06 14 16 13	CMP	Roger. There are the torquing angles. Are you picking them up?
06 14 16 22	CC	That's affirmative. We have them.
06 14 16 26	CDR	Okay.

06 14 16 28	CMP	I'm torquing at this time.
06 14 16 47	CC	12, see you on the other side.
06 14 16 51	CDR	By-by.
06 14 37 --		BEGIN LUNAR REV 39
06 15 03 31	CMP	Houston, Apollo 12. We're standing by for the burn.
06 15 03 34	CC	Apollo 12, Houston. We've got TM; we're looking at you.
06 15 03 41	CMP	Okay. Good show.
06 15 04 05	CC	12, Houston. You're looking good.

END OF TAPE

06 15 05 29	CDR	Okay, Houston. Minus a half, plus 0.2.
06 15 05 38	LMP	May want ... attitude.
06 15 05 42	CC	Roger.
06 15 05 43	CDR	Okay. Minus 0.6, plus 0.2, plus 0.7.
06 15 05 48	CC	Copy, 12.
06 15 05 53	CMP	And the EMS is minus 11.3.
06 15 05 57	CC	Roger. 11.3. The burn looked good, and we've got a REFSMMAT when you're ready.
06 15 06 04	CMP	Okay. Let us get out of this one.
06 15 06 33	LMP	Okay, Houston. You have POO and ACCEPT.
06 15 06 39	CC	Roger, 12.
06 15 06 51	CMP	Hello, Houston; 12.
06 15 06 53	CC	12, Houston. Go ahead.
06 15 06 56	CMP	Okay. Fuel is 29.5; OX, 29.7; unbalance 60 pounds increase.
06 15 07 07	CC	We copy, 12.
06 15 07 08	CDR	And do you need anything else from us for - on that burn. Do you need anything else?
06 15 07 19	CC	Negative, 12. We've got all we need.
06 15 07 24	CMP	Thank you.
06 15 08 43	CC	12, computer is yours. And we have the information for photo Lalande.
06 15 08 51	CMP	Okay. Go ahead.
06 15 08 55	CC	Okay. Photo Lalande, REV 39: T_1, 159:40:19; T_2, 159:44:19; roll, pitch, and yaw: 000.9, 256.6, 005 - scratch that - that's 000.5.
06 15 09 29	CMP	Okay. I didn't get the last one there. Roll, 000 something, 256.6, and 000.5.

06 15 09 39	CC	Okay. That's correct, and roll is 000.9.
06 15 09 48	CMP	Okay. And the time is 159:40:19 and 159:44:19.
06 15 09 55	CC	That's correct.
06 15 17 08	CC	Apollo 12, Houston. You can start charge on BAT A.
06 15 18 41	LMP	Houston, 12.
06 15 18 43	CC	12, go ahead.
06 15 18 49	LMP	That hot engine of ours didn't by any chance buy us enough gas to come home a day early, did it?
06 15 19 02	CC	We'll check on that. Stand by. We'll see what we can work out.
06 15 19 09	LMP	Yes. I knew it was touch and go with fuel reserves; but, seeing the engine was so good, I didn't know whether we wound up with a little bit more.
06 15 19 25	CC	Okay, 12. We're thinking on that one.
06 15 19 32	LMP	That a boy.
06 15 20 13	CC	12, Houston. You can start charge on BAT A.
06 15 20 19	LMP	Roger. In work.
06 15 26 46	CMP	Hello, Houston; 12.
06 15 26 49	CC	12, Houston. Go ahead.
06 15 26 53	CMP	Hey, Ed. Will you ask SAO how come they've got 8 minutes' worth of exposures on this target when T_1 to T_2 is only 4 minutes long?
06 15 27 05	CC	Roger. Will do.
06 15 27 33	CC	Dick, that's just PAD on the film; you can cut it off before or after, as you see fit.
06 15 27 42	CMP	Okay. I thought maybe I'd missed something.
06 15 27 48	CC	No way.
06 15 27 54	CMP	It's possible. That SPS is a real hummer, isn't it?

06 15 28 02	CC	Yes. It is really throwing it out.
06 15 28 10	CMP	That's the first time I've seen it wallow; it is starting to wallow through the sky, now.
06 15 28 18	CC	Yes. Copy that, Dick.
06 15 28 33	CDR	Say, Ed. On the target of opportunity number 39, way back on that circle is the LM? Ascent stage crater?
06 15 28 44	CC	Stand by, Pete. It's on the southern - and I'll give you - It's a little bit one way or the other. Stand by.
06 15 29 00	CC	Pete, that's on the south edge, directly on the south edge of the circle.
06 15 29 11	CDR	Okay. It indicates on the map, there, that there's a sort of a ridge running along there. Is it on the east side of the ridge or on the west side of the ridge?
06 15 29 30	CC	Stand by.
06 15 29 40	CDR	It's not a ridge; I guess it's a mountain I'm looking at down there, Ed. On this map, it's not too steepy.
06 15 30 06	CC	Okay, Pete. The ridge, which I believe you are talking about, runs along to the western side of the center of that circle so that the impact ought to be a little bit to the east of that ridge. I agree, the map's not too well defined in that area, however.
06 15 30 25	CDR	Okay. Very good. Thank you.
06 15 32 23	CC	Al, would you verify that you've started that battery charge or that it is in work?
06 15 32 31	LMP	It's - it's in work. We're kind of busy right now.
06 15 32 35	CC	Okay. Thank you.
06 15 32 58	CDR	All right, Houston. BAT A charge started.
06 15 33 02	CC	Roger, Pete. Thank you.
06 15 53 46	CMP	Hello, Houston.

06 15 53 49	CC	12, Houston. Go ahead.
06 15 53 53	CMP	Okay. Can you pick up the DSKY?
06 15 53 59	CC	Roger. We have it.
06 15 54 03	CMP	There you are. That's not bad for a gyro torquing, huh?
06 15 54 12	CC	Roger, Dick. Looks real good.
06 15 54 14	CMP	That tells me we ought to be use - that tells me we ought to be using them more often.
06 15 54 26	CMP	And, Houston, I'm going to go ahead and torque at this time.
06 15 54 29	CC	Okay. We're standing by.
06 15 54 34	CMP	You got it.
06 16 01 02	CC	12, Houston with a stereophoto and map update, REV 40.
06 16 01 10	CMP	Okay. Stand by a second.
06 16 01 19	CMP	Go ahead.
06 16 01 22	CC	Stereophoto: T_1, 160:58:54; T_2, 161:55:58; map update, REV 40, LOS 160:15:24, 160:40:11, 161:01:15.
06 16 02 06	CMP	Roger, Houston. Stereophoto: 160:58:54, 161:55:58; map update, REV 40, 160:15:24, 160:40:11, 161:01:15.
06 16 02 25	CC	Readback correct. And we have some update for the times for shutter-speed changes, there over on 3-140. There's a shift of 5 minutes. Just take 5 minutes and add it to each, and that'll give you the four of them in the order in which they're on the page, 161:11, 161:21, 161:39, 161:43.
06 16 07 38	CDR	Houston, 12.
06 16 07 41	CC	12, Houston. Go ahead.
06 16 07 45	CDR	We've been having a long discussion here, and we concluded that we goofed on Lalande, and we

got you some neat 500-millimeter pictures of Herschel. Now, I've got a question for you.

06 16 08 01	CC	Okay. Go ahead.
06 16 08 04	CDR	Would you rather we took the 500 millimeters on Lalande on this next pass rather than the stereostrip, or go on and get the thing in order? And we feel that the REV prior to TEI, we could pick up either the stereostrip, which would be a little offset looks like along the same diameter as Lalande off to the left, or we could pick up the 500 millimeter then, either way.
06 16 08 37	CC	Okay, Pete. Stand by on that.
06 16 09 42	CC	12, Houston.
06 16 09 46	CDR	Go ahead.
06 16 09 48	CC	Okay. Lalande is the lowest of the photo priorities, so we recommend you continue with the flight plan as is, and if it looks to be possible to pick that up on the last REV before TEI, then we can go ahead and give it a GO. But don't perturb the flight plan now.
06 16 10 07	CDR	Okay. We'll give her a go before we leave on the last REV and y'all will work up T_1, T_2 times for us, and we'll get it right this time. Sorry.
06 16 10 21	CC	Okay, Pete. No problem. We'll work those up for you; and did you copy the transmission on the changes on the DAC shutter speed on page 3-140 of your flight plan?
06 16 10 32	CDR	No. We were - we were losing you. We had - No, we sure didn't, so how about running that by again?
06 16 10 43	CC	Okay. On page 3-140 of your flight plan, we have the DAC shutter-speed changes. There's four of them, and you add 5 minutes to each one of those. And that'll give you 161:11, 161:21, 161:39, 161:43.
06 16 11 07	CDR	Okay. Got that done.
06 16 11 10	CC	Roger.

06 16 14 01	CC	12, Houston. One and one-half minutes to LOS, and a reminder on that power on the high gain. And, also, were you able to pick up anything on the target of opportunity?
06 16 14 15	CDR	No, we weren't.
06 16 14 20	CC	Roger.
06 16 14 23	CDR	And high gain power is off.
06 16 15 06	CC	Thirty seconds, 12. We'll see you on the other side. And maybe the photos will show something on that.
06 16 15 11	CDR	All right.
06 16 15 16	LMP	Okay.
06 16 35 --		BEGIN LUNAR REV 40

END OF TAPE

06 17 03 40	CC	Apollo 12, Houston. Standing by.
06 17 03 46	CMP	Roger. We're working this stereostrip right now, Ed. Going real well.
06 17 03 51	CC	Real good, Dick.
06 17 04 00	CMP	Hey listen, Ed, I'm sorry I screwed up on that last one, but we are sure getting a lot for you; so, see if those guys can give us those 4 minutes on that last REV, ...?
06 17 04 10	CC	Okay, understand the request, Dick; we don't place too much importance on that; but, if you want it, we can give it to you.
06 17 04 19	CMP	It has it in our flight plan, so it's important to me.
06 17 04 24	CC	Understand that, Dick.
06 17 04 32	CDR	We'll get it on the flyby.
06 17 04 37	CC	Say again, 12.
06 17 04 42	CDR	I just said we'd get it on the flyby.
06 17 04 47	CC	Roger.
06 17 05 14	CC	12, Houston. We suggest NOUN 91.
06 17 05 21	CDR	Roger.
06 17 12 23	CDR	Houston, 12.
06 17 12 28	CC	12, Houston. Go ahead.
06 17 12 32	CDR	We got Dick working this pass and Al and I are sightseeing. This is really the first chance we've had to get a good look at the moon; so, we're enjoying this pass with the map, checking off all the craters.
06 17 12 49	CC	Roger, Pete. Understand. Does it look any different after being down there; you get a little better feel for what it's like?

06 17 13 00	CDR	Well, I - I think so. Of course, the back side back there doesn't really look anything like what we were on.
06 17 13 11	CC	Roger.
06 17 13 20	LMP	I personally think, Ed, it's more spectacular from orbit - that you can see all these gigantic craters and the - and - the - all diameters of the Moon and its change in color. When you get out on the surface - it's interesting down there, naturally, but it's not too much unlike just being out in a big field of clumps on Earth.
06 17 13 47	CMP	You haven't got any of these craters around it.
06 17 13 48	LMP	Not that - not that much difference - than on Earth - -
06 17 13 53	CMP	... at the right place.
06 17 13 55	LMP	- - and, of course, you can never see anything like this - ... down here.
06 17 14 08	CC	Do you think that will satisfy Dick?
06 17 14 15	LMP	No, he keeps talking about making a low pass over the landing site before we go.
06 17 14 22	CMP	And I may get another chance; you can't ever tell.
06 17 14 26	CC	Hope so.
06 17 14 37	CC	You mentioned that back side looks different; is it - just a different crater density or entirely different nature to it?
06 17 14 50	CDR	Looks like different nature to me.
06 17 15 11	CC	12 - -
06 17 15 12	LMP	The back side, like everyone said, is - Go ahead, Ed.
06 17 15 17	CC	No, go ahead, Al.
06 17 15 23	LMP	I was just going to say, it's just like everyone said before, the back side is a lot more worked over, a lot more - worn and smooth; and where the front side's got all these mare areas, a lot more contrast and a lot more sharp features to look at.

I personally like to look at the front side, the rilles and the - the higher mountains; the contrast between that and the mares to me is more interesting.

06 17 15 57	CC	Roger. Probably that Sun angle has a lot to do with how treacherous some of those mountainsides look.
06 17 16 10	LMP	That's right, Ed, because on the back side here, there's no flat area at all; it's all just ... and big craters, little craters - no real sharp contrast between flat and high mountains or anything like that.
06 17 16 56	CC	That must have been an interesting approach going down there; you had some pretty steep - ... you were flying over there at pretty shallow Sun angles.
06 17 17 10	CDR	You mean the PDI?
06 17 17 12	CC	That's affirmative.
06 17 17 16	CDR	Yes. Well, at first, we - we - The last time I saw it coming up on PDI, it looked like we were really augering in and going through some mountains, but I was kind of occupied, watching the descent in the cockpit there, and when we pitched over and I first looked, I didn't have the foggiest idea where I was; and then, all of a sudden, the old pattern was sitting right there.
06 17 17 46	CC	Just like the Cape, huh?
06 17 17 47	CDR	Yes, I was just a - and then I did a little LPD and - Yes, just like it; and I did just a little LPDing mainly to - would you believe it, to get out of the crater, not to get to it, because it looked like we were going to land right smack on the ...
06 17 18 07	CC	We've got a FIDO down here, telling me about a prediction of 10 feet.
06 17 18 10	CDR	Hey, - Well, for all I know, he could be right because it sure looked like we were going right in the middle of the crater.
06 17 18 42	LMP	Another beautiful sight, Ed. Headed down from DOI to PDI; we'd already entered the PDI attitude,

and just at the part of the ... where that would make us ... vertical ..., at that time, an earth-rise occurred, and really a fantastic sight. It occurred very rapidly up here like ... said, and it's just such a fantastic view of a blue and white shiny ball, ... it's about one-third of a ball, compared to sort of a drab gray or brown or whatever color you can call the Moon. It's - a spectacular sight.

06 17 19 23	CC	Roger, Al. Say, you're a bit broken up. Why don't you try moving the mouthpiece?
06 17 19 37	LMP	Will do, Ed.
06 17 19 50	CC	12, we have a little lunar news for you if you're - -
06 17 19 52	LMP	You know the only sight that I saw - -
06 17 19 53	CC	- - interested.
06 17 19 56	LMP	Okay.
06 17 19 58	CC	Okay, Pete and Al and Dick, you got a central station down there; the power is good, and you got a good signal. Average temperature now is about 72 degrees, and it's slowly increasing about 0.6 degrees per hour. The biggest thing that happened recently was the impact of the ascent stage and the PSE picked that up very well. They consider that one of the most significant things that's happened to date on lunar seismology. The LSM is working real well. They just did a flip CAL on it, and they did the flip CAL before ascent. And they also noted at ascent that the magnetic field blanked out at ignition and lasted - the blankout lasted for 10 to 12 minutes after. The solar wind has its covers off and is perking right along. The SIDE also picked up some counts in the high energy range of the detectors at ascent. And they also think they have a probable pickup of the impact itself. However, the SIDE is still - continues to short out occasionally, and they think it's just degassing; so now, they have the high voltage off, and they'll probably bring it back on around lunar noon. Other than that, it looks as though it's really perking right along; you did a swell job.

06 17 21 25	CDR	Hey, Ed. What - What's their best estimate now of the effect of all the dust it got on it? The pieces of equipment we laid down there?
06 17 21 39	CC	Okay, from what we can see down here, there's no observable effect.
06 17 21 47	CDR	Oh, that - that's going to be very interesting, because - I wonder what happened to the EASEP then - because, obviously, you couldn't have blown - ll couldn't have blown any more dust on that EASEP than - than we got on our ALSEP and - that thing really got dirty. It got into the ... we needed and everything else. You just can't help but get them real dirty. Oh, it's not that dirty, but ... had a fair amount of dust on it.
06 17 22 19	CC	Roger, Pete.
06 17 22 20	CDR	You can see from our pictures when we get them back just exactly how dirty it was.
06 17 22 27	LMP	Yes, I was going to say a minute ago, Ed, the only other sight that I thought was more spectacular was ascent from the Moon. And when that thing's ready to bang and stage, it started straight up, and actually goes pretty fast - I was a little surprised. And it pitched over so far, I could look straight down and see the descent stage and see the ALSEP - see that we hadn't knocked over any parts of the ALSEP; it didn't look like anything big was being blown that way. I had the camera mounted in the window, pointed - you know, pilot's eye view. Instead of pointing down, like ..., I just had it mounted on the window pointed straight ahead, and it would have caught the same view we were getting only the thing stopped some time, and I'm not really sure when, and I'm just hoping that it didn't stop before we lifted off and made that pitchover, because that'll be spectacular to look at on the movies. I started it again a couple times, as you know, during the ascent and it still shut down - it worked all the time during the descent but something happened.
06 17 23 30	CC	Roger, Al. Sure hope you did catch that. Yes, that was a concern perhaps of that SIDE being pretty susceptible to tipping over there, especially from anything blowing out on the - from the ascent itself. Glad to hear it didn't.

06 17 24 35	CDR	Well, I'll tell you one thing, Ed. You and Joe and all the guys put together a great lunar surface LM; that thing went without a hitch.
06 17 24 45	CC	Well, I think you guys were the prime movers from the beginning and the hitches that did come up, you sure knew how to work around them. Well done.
06 17 24 56	CDR	Anybody can swing a hammer.
06 17 25 44	CC	12, Houston. We're standing by with a map update for REV 41, TEI PAD, REV 43, and some times for high-resolution photos Descartes and Fra Mauro.
06 17 26 03	CMP	Okay. We're ready to copy.
06 17 26 07	CC	Map update, REV 41: 162:13:27, 162:38:38, 162:59:49; TEI PAD, REV 43, SPS/G&N: 34235; minus 0.64, plus 0.24; 168:28:52.72; NOUN 81, plus 2944.7, plus 0271.9, minus 0079.0; NA, pitch is 126, and NA; four jets; 11 seconds. Read back.
06 17 27 13	CMP	Roger. On AOS/LOS, 180, I got that.
06 17 27 21	LMP	And the TEI PAD is SPS/G&N: 34235; minus 0.64, plus 0.24; 168:28:52.72; plus 2944.7, plus 0271.9, minus 0079.0; NA, 126, NA; four jet; 11 seconds.
06 17 27 44	CC	That's Charlie. And we've got times for - -
06 17 27 48	LMP	Roger-Roger.
06 17 27 50	CC	- - we have your times for high resolution photos on Descartes and Fra Mauro, when you're ready.
06 17 27 58	CMP	Go ahead. Ready to copy.
06 17 28 01	CC	Okay. Descartes, T_1, 163:29:12; T_2, 163:33:12; roll, pitch and yaw, you can use the attitudes in the flight plan. Fra Mauro, T_1, 163:40:01; T_2, 163:44:01. And again, roll, pitch, yaw angles are the same as in the flight plan.
06 17 28 38	CMP	Roger, Ed. Copy 163:29:12, 163:33:12; for Fra Mauro, 163:40:01, 163:44:01; and the R, P, Y as in the flight plan.

06 17 28 52	CC	That's correct.
06 17 29 49	CC	Pete, Houston.
06 17 29 56	CDR	Go ahead.
06 17 29 57	CC	Say, in looking over the transcripts of the EVA, Uel figures you saw some pretty interesting stuff down there. As a matter of fact, he figures about 11 times.
06 17 30 09	CDR	Okay. Very good. That's not too bad for 8 hours.
06 17 30 18	CC	That's for sure.
06 17 30 27	CDR	You learn how to be a test pilot by not committing yourself.
06 17 30 33	CC	Say again. You were a bit broken.
06 17 30 38	CDR	I say, you learn how to be a test pilot by not committing yourself. It's called "weasel wording."
06 17 30 49	CC	Guilt by association.
06 17 31 44	LMP	We're passing over the crater Kant right now, and it has a large impact crater in the middle of it that's got rocks so big in it that I can see them with my naked eye laying down there; so, they got to be awful big.
06 17 32 07	CC	Must be looking at chunks of the real bedrock.
06 17 32 14	LMP	Yes. And from here - of course, this is a bright impact crater, and the rocks laying out there are pure white in contrast to a rather dull gray sort of texture of the rest of the crater Kant.
06 17 32 34	CC	Roger. You made that comment also on the surface about some of those which were pure white. Do you think that was just the Sun angle or do you think that's the real color?
06 17 32 44	LMP	Well, I don't know - I guess we're about high noon now, wait a minute - we're at high noon now, and it may be the Sun angle because we, of course, were sitting on the surface and the Sun was relatively low, shining across at those blocks. But no matter now you slice it, anywhere along in here, no matter what the Sun angle is, these gray craters appear to be white, like chalky color,

with blotches on them. As a matter of fact, we're passing over a bunch of them now, and I can see boulders with my naked eye, and I can see them real clearly with the monocular.

06 17 33 41	CC	That would make a very spectacular descent from low gate.
06 17 33 54	LMP	Yes. And also -
06 17 37 07	CDR	Say, Ed, I was just looking at the flight plan and noticed what time it was back there. How come you get all the good deals?
06 17 37 17	CC	Guess I'm just lucky. No, I'd just as soon be up during the middle of the night rather than be up during the day and watch you guys sleep.
06 17 42 21	CC	Apollo 12, Houston.
06 17 42 26	CDR	Hello, Houston; 12. How do you read?
06 17 42 30	CC	Okay. You're clear but there's an awful lot of static. We'll be picking up a little better COMM fairly shortly.
06 17 42 38	CDR	Okay, Ed. Just looking at the flight plan and noticed what time it was back there. How come you get all the good deals?
06 17 42 47	CC	Well, it's a good deal. I'd rather be up when you're up than be watching you sleep during the day.
06 17 42 56	CDR	Yes. That's true.
06 17 42 59	CC	Paul Wietz has become a sleep expert.
06 17 43 05	CDR	(Laughter)
06 17 45 02	CC	Apollo 12, Houston. High gain angles: Pitch, minus 22; yaw, 175.
06 17 45 14	CMP	Roger.
06 17 45 37	CC	12, Houston.
06 17 45 44	CDR	Go.
06 17 45 46	CC	Okay, that's much better. Say, on that question you brought up before about the - having that

hot engine and looking at the return. If we did it the way you suggested, we'd be -

06 17 46 01	CDR	Wait just a second, Ed.
06 17 46 02	CC	Okay.
06 17 46 34	CDR	Okay, Ed. Go ahead. Sorry, we were trying to - Al and I were trying to pick up this Snowman from here.
06 17 46 41	CC	Did you get him?
06 17 46 46	CDR	Yes. I got him in the monocular.
06 17 46 48	CC	Okay. On the question you brought up before, it looks as though your DELTA-V capability would be around 20-feet-per-second margin, and that looks a little bit small.
06 17 47 01	CDR	Okay. No problem; we weren't sweating it. We just knew that if we had a better engine or something, why, there was a chance that we might have enough to do it. No problem at all.
06 17 47 17	LMP	That's 1 less day in the LRL, Ed.
06 17 47 21	CC	That's right. I think you probably got a little better place to spend it there.
06 17 47 27	LMP	... flight time.
06 17 47 41	CC	I bet you there's lots of guys sitting over in the LRL that wouldn't mind trading you a day or two.
06 17 47 50	LMP	I suppose you're right.
06 17 51 22	CC	Apollo 12, Houston. We suggest a zero degrees - on the shaft.
06 17 51 31	CMP	Okay.
06 17 57 22	CC	12, Houston. Go ahead.
06 17 58 05	CT	Honeysuckle on net 1.
06 17 58 50	CT	Honeysuckle COMM TECH, Houston COMM TECH, net 1 voice check.
06 17 58 54	HSK	Honeysuckle; read you loud and clear.

06 17 58 56	CT	Roger. Read you the same.
06 17 58 59	HSK	Houston COMM TECH, Honeysuckle net 1. We could possibly have a remoting problem. In house, we're not copying the spacecraft being remoted to GOSS. We're checking.
06 17 59 09	CT	Roger.
06 17 59 51	CC	Apollo 12, Houston.
06 18 00 02	CDR	Go ahead, Houston.
06 18 00 05	CC	Okay, 12. We had a - little bit out of configuration here, and we're squared away now. Did you call?
06 18 00 15	CDR	No, we didn't. I guess Dick wanted to ask about some gyro torquing angles but we had gotten a P50 done - two done early the last time and already passed them to you.
06 18 00 30	CC	Okay.
06 18 01 20	CC	Apollo 12, Houston. You can continue with the pitch. We have the DSE dump. You can continue on to the Descartes attitude.
06 18 01 32	LMP	Okay.
06 18 02 02	CC	12, Houston.
06 18 02 07	CMP	Go ahead, Ed.
06 18 02 09	CC	Say, Dick, in order to help FIDO out a little bit, would you try to do the dumps on the back side, where possible?
06 18 02 22	CMP	Sure thing. I just couldn't wait any longer.
06 18 02 29	CC	We'd like to see the back side of the Moon.
06 18 02 30	CMP	If you know what I mean. Say that again?
06 18 02 39	CC	After watching you on the front side, we'd like to see what the back side looks like.
06 18 02 45	CMP	Oh, okay.

END OF TAPE

06 18 09 44	CC	Apollo 12, Houston. Would you verify that the recorder switch is in the FORWARD position?
06 18 09 56	LMP	Roger. FORWARD.
06 18 09 59	CC	Thank you.
06 18 10 02	LMP	Did you want it off, Houston?
06 18 10 09	LMP	Did you want it off, Houston?
06 18 10 38	LMP	Houston, Apollo 12. Did you want us to put that switch in FORWARD, where it is now, or put it back to OFF?
06 18 10 46	CC	Stand by.
06 18 11 07	CC	Al, what we want is the tape record switch to FORWARD if it's not there already.
06 18 11 16	LMP	That's where she is and that's where she'll stay. Okay?
06 18 12 26	CC	Apollo 12, 1 minute to LOS.
06 18 12 34	LMP	Roger.
06 18 34 --		BEGIN LUNAR REV 41
06 19 00 21	CC	Apollo 12, Houston is listening.
06 19 00 37	CDR	Roger, Houston. 12 here.
06 19 00 40	CC	Roger, Pete. Loud and clear.
06 19 00 43	CDR	How you doing this morning, Jerry?
06 19 00 44	CC	Good. How're you feeling?
06 19 00 49	CDR	Great. Well, Dick and I are trying to find Secchi 1 right at the moment; we're right about - -
06 19 00 59	LMP	Pete and I are finally getting our first look at the Moon. Just kind of skylarking.
06 19 01 03	CC	Kind of nice to kind of get back away from it and look at it from a distance, huh?
06 19 01 09	LMP	Yes. We had - We didn't get a chance before we went down to look at it. We always had something

going on, and as a result we just got glimpses. We got a couple of glimpses there when we've been heading down and taking some photographs. We haven't had to monitor any too closely because they've been done every 20 seconds by the intervalometer and we've been able to look out the window.

06 19 01 40	CC	12, Houston. If one of you can find a pencil, I got a REV 42 map update for you.
06 19 02 21	LMP	Okay, Jerry. I'm ready to copy.
06 19 02 24	CC	Okay. Map update for REV 42: LOS is 164:12:05, 164:37:09, 164:58:26. Over.
06 19 02 54	LMP	Roger. 164:12:05, 164:37:09, 164:58:26.
06 19 03 03	CC	Affirm.
06 19 19 22	CC	Apollo 12, Houston.
06 19 19 28	LMP	Hello.
06 19 19 29	CC	Roger. If you'll give us ACCEPT, we'll start on uplink of your CSM state vector on LOW BIT RATE.
06 19 19 39	LMP	Okay.
06 19 23 35	CC	Apollo 12, Houston. The computer's yours.
06 19 23 42	LMP	Thank you.

END OF TAPE

06 19 44 57	CDR	Okay, Houston; Apollo 12.
06 19 45 00	CC	12, Houston. Go.
06 19 45 05	CDR	Okay. We've got Descartes, and we got Fra Mauro.
06 19 45 10	CC	Good show, Pete. You can terminate the charge on battery Alfa and start it on battery B the first chance you get. And, if you're ready to copy, we can get these tracking PAD's out of the way that are on your page 3-145, and that ought to take care of the paperwork for a little while.
06 19 45 33	CDR	Okay. You have BAT charge B is in work. And I'm ready to copy.
06 19 45 39	CC	Okay, Pete. We've got four of them. First one is Charlie Papa 1, T_1 is 16 -
06 19 45 47	CDR	Break. Break. Would you hold it just a few minutes?
06 19 45 51	CC	Okay.
06 19 45 53	CDR	We want to take a look at Copernicus.
06 19 47 10	CDR	Okay, Houston. Ready to copy. Sorry.
06 19 47 14	CC	Okay, Pete. The first one is Charlie Papa 1, T_1 is 164:52:57, 164:58:02, north 04. The next one is Charlie Papa 2, 165:11:16, 165:16:15, north 14. Delta Echo 1 is the next one; 165:24:21, 165:29:17, and it's on track. Foxtrot Mike 1 is 165:35:08, 165:40:06, north 09. Over.
06 19 48 49	CDR	Okay. Charlie Papa 1, 164:52:57, 164:58:02, north 04; Charlie Papa 2, 165:11:16, 165:16:15, north 14; Delta Echo 1, 165:24:21, 165:29:17; Foxtrot Mike 165:35:08, 165:40:06, north 09.
06 19 49 25	CC	That's affirmative, Pete.
06 19 53 23	CC	Apollo 12, Houston. Go LOW BIT RATE on PCM.
06 19 54 44	CDR	I guess you got a pretty full Moon down there right now, huh, Jerry?

06 19 54 48	CC	That's affirmative, Pete. I got a look at it coming into work this morning, and it's almost completely full and it's beautiful. Houston's enjoying - -
06 19 55 02	CDR	It's really been spectacular over here by the terminator. We're looking at a lot of stuff, I guess everybody's seen before that's been up here.
06 19 55 18	CC	Roger, Pete. Houston, down here, is enjoying good cold, clear weather, and so the Moon is particularly beautiful.
06 19 55 29	CDR	Sounds good.
06 20 06 19	CDR	Houston, 12. Have you got the torquing angles on the DSKY?
06 20 06 23	CC	Affirmative, Pete.
06 20 06 27	CDR	Okay.
06 20 11 04	CC	Apollo 12, Houston.
06 20 11 09	CDR	Go ahead, Houston.
06 20 11 12	CC	Roger. You're about a minute from LOS. We will be picking you up again at 164:58, and on your waste water dump on the back side, dump to 15 percent. Over.
06 20 11 30	CDR	Roger. See you at 58. We'll dump to 15.
06 20 11 34	CC	So long, Pete.
06 20 32 --		BEGIN LUNAR REV 42
06 21 13 14	CC	Apollo 12, Houston. Do you read?
06 21 13 19	CMP	Houston, 12. Go ahead.

END OF TAPE

06 21 13 13	CC	Apollo 12, Houston. Do you read?
06 21 13 19	CDR	Houston, 12. Go ahead.
06 21 13 21	CC	Okay. Just checking in. I've got a map update and a TEI 45 block data, whenever you're ready to copy.
06 21 13 31	CDR	Jerry, can you wait to between runs, here?
06 21 13 36	CC	Sure can. You just - call me when you're ready.
06 21 13 42	CDR	Okay. I'll be able to get ready for that after this one.
06 21 13 45	CC	Okay.
06 21 14 03	CDR	And, Jerry. Let Al Bean get his gear together and he'll copy that TEI PAD.
06 21 14 08	CC	Roger.
06 21 14 28	LMP	Go ahead, Jerry.
06 21 14 32	CC	Roger. TEI 45 block data and put it on a maneuver PAD, SPS/G&N: 34163, NA, NA. NOUN 33 is 172:27:16.43; NOUN 81, plus 3027.9, plus 0283.6, minus 0009.3; NA, 122, NA; the rest of the PAD is NA; ullage, four jets, 17 seconds. Over.
06 21 15 59	LMP	Roger, Jerry. Copied TEI 45, SPS/G&N: 34163, NA, NA, 172:27:16.43, plus 3027.9, plus 0283.6, minus 0009.3, NA, 122, NA; four-jet 11-second ullage.
06 21 16 33	CC	Roger. I've got a REV 43 map update for you.
06 21 16 41	LMP	Roger.
06 21 16 56	CC	Okay. REV 40 - REV 43: LOS 166:10:37, 166:35:36, 166:56:58. Over.
06 21 17 29	LMP	Roger. 166:10:37, 166:35:36, 166:56:58.
06 21 17 35	CC	Affirm.
06 21 17 43	LMP	Have you heard from our family lately?

06 21 17 49	CC	Oh, I expect they're just up and around this morning having breakfast, getting the kids off to school. I guess when things slow down, what do you say I give them a call and get some words?
06 21 18 00	LMP	That's a good idea. Thanks.
06 21 18 05	CC	Is this Al?
06 21 18 10	LMP	That's right.
06 21 18 12	CC	Did you get the word that Amy was visited by the tooth fairy?
06 21 18 21	LMP	(Laughter) No. ... doing.
06 21 18 23	CC	Yes. That happened when you guys were getting ready to - for your descent. We didn't have time to get that up to you, but Amy wanted me to be sure and tell you that.
06 21 18 36	LMP	Thank you.
06 21 20 43	CDR	Houston, 12.
06 21 20 45	CC	12, Houston. Go.
06 21 20 49	CMP	Jerry, go ahead with that second group of P22's, please.
06 21 20 57	CC	Stand by, Dick. We don't have them yet.
06 21 21 23	CC	12, Houston. We'll have those for you in just a couple of minutes.
06 21 23 59	CC	Apollo 12, Houston. I have those landmark tracking PAD's now.
06 21 24 17	CMP	Okay, Jerry. Go ahead.
06 21 24 20	CC	Okay. These are the ones on page 3-149. The first one is Charlie Papa 1: T_1 is 166:51:23, 16:56:29, north 02. We'll have the LAT/LONG information for you in a few minutes. Charlie Papa 2: T_1 is 167:09:42, 167:14:42, north 14; Delta Echo 1: 167:22:46, 167:27:43, north 02; Foxtrot Mike 1: 167:33:0 - correction 32, 167:38:32, north 12. Over.

06 21 26 04	CMP	Roger. Copied CP-1: 166:51:23, 166:56:29, north 02; CP-2; 167:09:42, 167:14:42, north 14; Delta Echo 1: 167:22:46, 167:27:43, 02 north; FM 1 - sounds like an airplane - 167:33:32, 167:38:32, 12 north. Over.
06 21 26 37	CC	That's affirmative. We'll have some other information here in just a minute.
06 21 26 46	CMP	I've got the same landmarks on what I'm doing right now, Jerry.
06 21 27 08	CC	12, Houston. We're going to take your NOUN 89's and convert that to your LAT/LONG's for this particular pass. Over.
06 21 27 17	CMP	Oh, okay. I see.
06 21 30 43	CC	Apollo 12, Houston.
06 21 30 50	CMP	Go ahead, Houston.
06 21 30 51	CC	Roger. On that P22 stuff I just passed up to you, go ahead and use your flight plan LAT/LONG's and mark on the same features you did on the previous pass.
06 21 31 19	CMP	Okay, Jer. Understand we mark the same thing as this pass here.
06 21 31 24	CC	That's affirmative.
06 21 33 47	CMP	Hey, Houston; Apollo 12.
06 21 33 49	CC	Go ahead, 12.
06 21 33 54	CMP	Jerry, do you want me to use the same LAT/LONG that's in the flight plan or the one that I just calculated for P22?
06 21 34 05	CC	Dick, use the ones in the flight plan. Not the NOUN 89's.
06 21 34 12	CMP	Okay. Thank you.
06 21 42 49	CMP	Houston, 12.
06 21 42 51	CC	12, Houston. Go.
06 21 42 56	CMP	Hey, Jerry, have the boys check the - the speed setting on that one. That was a pretty bright target. And I put the shutter on 1/60th; I think it ought to be about 1/125th. Will you check up on that?

06 21 43 08	CC	Roger. Which target was that?
06 21 43 13	CMP	This last one, Fra Mauro 1.
06 21 43 16	CC	Okay. Dick, while I have you, sometime on the back-side pass here, I think you can expect to see the manifold pressure on RCS quad C start to dis - decrease, meaning that you've depleted your primary tank. We'd like you to switch to secondary on that quad only. All right?
06 21 43 39	CMP	Okay. Secondary on C only. Thank you.
06 21 43 41	CC	Do that just when the manifold pressure starts to decrease - -
06 21 43 44	CMP	I won't switch unless I see them de - As I was going to say, I won't switch until I see them decrease.
06 21 43 51	CC	Good show, Dick.
06 21 44 19	CC	12, Houston. Go ahead. We concur with you on your setting for Fra Mauro.
06 21 44 33	CMP	Okay. I'll make it 1/125th on the next pass.
06 21 44 36	CC	Roger. 1/125th.
06 21 57 56	CC	Apollo 12, Houston. COMM check.
06 21 58 06	CMP	Loud and clear.
06 21 58 08	CC	Roger. We have some data to uplink to you as soon as we can get good data.
06 21 59 39	CMP	I think we've been causing you some trouble there, Houston. We were trying to give you high gain and couldn't make it.
06 21 59 49	CC	Say again, 12.
06 22 00 00	CMP	I think we caused you a little squawk. We tried to give you our high gain and weren't able to do it.
06 22 01 36	CMP	We're in POO and ACCEPT, Houston.
06 22 01 39	CC	Roger. It's on its way.
06 22 04 03	CC	Apollo 12, Houston. The computer's yours.

06 22 04 14	CMP	Thank you much.
06 22 08 52	CC	Apollo 12, Houston. Over.
06 22 08 59	LMP	Go ahead, Jerry.
06 22 09 00	CC	Roger. We show you a minute and a half from LOS, and we'll be picking you up at 166:56, and would you pass the word to Dick that the P22 marks are looking real good and they're very consistent? About the only thing that we might have to offer is that he's starting his marks just a bit too early.
06 22 09 28	LMP	Roger. How much is a bit, Houston?
06 22 09 35	CC	About 11 seconds.
06 22 09 41	LMP	We'll try to correct that one.
06 22 09 44	CC	Roger. See you on the other side.
06 22 09 51	LMP	Okey-dokey.
06 22 10 10	CMP	Houston, 12.
06 22 10 11	CC	Go, 12.
06 22 10 16	CMP	Hey, Jerry. Al just put in a comment about starting these a little early. I felt that I had to, because that last mark the target is going out of sight; that's because our field of view in the telescope isn't as much as it is in the sextant, and I think you've got to start a little bit earlier than 40 seconds after T_2. I've done that purposely. Any comments?
06 22 10 39	CC	Okay. That's fine.
06 22 29 --		BEGIN LUNAR REV 43

END OF TAPE

06 22 57 24	CC	Apollo 12, Houston. How do you read?
06 22 57 35	CDR	Hello, Houston; Yankee Clipper.
06 22 57 40	CC	Roger. Read you loud and clear.
06 22 57 45	CDR	Okay, Houston. You're breaking up.
06 22 58 11	CC	Yankee Clipper, Houston. How do you read me now?
06 22 58 16	CDR	Roger. Loud and clear. Listen, Jerry, I've got something real important for you. We were taking some target of opportunity photographs with the same film pack that we had the 500-millimeter film on, and without going into details right now - I'll tell you later when we have the time - that magazine pack popped off and we're not sure we didn't wipe out that film magazine. Now, what we suggest is that - is we dump the landmark tracking, seeing as we got good ones last time on Descartes and Fra Mauro and you pump us up another T_1 and T_2 for both of them and let's get some more 500 millimeter this pass on another magazine. Okay?
06 22 59 10	CC	Roger, Pete. We copy. Stand by 1.
06 22 59 16	CDR	Okay.
06 23 02 45	CC	Yankee Clipper, Houston.
06 23 02 51	CDR	Go, Houston.
06 23 02 52	CC	Roger. We concur with your plan, Pete, and we're hustling right now to get some new T_1, T_2 times for Descartes and Fra Mauro.
06 23 03 03	CDR	Okay. Let me tell you what happened. We - Al was very careful to watch all the time we were taking the 500-millimeter pictures to - to make sure that the camera was, in fact, running; and he was watching the side opposite the counter which is at the - the little red-and-white deal; and, and, and - I mean, he was watching the red-and-white thing as we were taking the picture and we noticed that we ... 500 millimeter indicated approximately 100 pictures but the counter only read 60 and we kicked that around for quite

a while until we finally concluded that, because Al had been watching, that - that there was something wrong with the counter and we really had taken all the pictures. So we decided that we'd use up the rest of that film on targets of opportunity; so while Al was taking the pictures out the window, the side of the magazine just popped off out of nowhere for no reason, and it opened up about an eighth of an inch, and Al tried to get it back on and then he had to actually open the lock and put it back on. Oh, we never did get it on, so he just taped it on, and we don't know whether it's lightstruck or not and we don't know why it - it popped open, but we're sure suspicious. We also don't know if it - if it was only partially on to begin with that we really did lose film; so I think it's best that we take a fresh magazine, which he has, and we'll get those pictures again.

06 23 04 56	CC	Roger, Pete. That sounds like the best way to go.
06 23 05 02	CDR	Okay. We do.
06 23 09 13	CC	Yankee Clipper, Houston.
06 23 09 19	CDR	Go, Houston.
06 23 09 20	CC	Roger. I've got your T_1's and T_2's, we'll have some attitudes for you shortly. Ready to copy?
06 23 09 31	CDR	Yes, sir.
06 23 09 32	CC	Okay. For Descartes, Tango 1 is 167:26:05; Tango 2 is 167:30:05; for Fra Mauro, Tango 1 is 167:36:58; Tango 2 is 167:40:58. And we'll have your attitudes for you in a few minutes.
06 23 10 13	CDR	Okay. And don't forget to work up that same data for Lalande for the REV before TEI there.
06 23 10 20	CC	Roger. Will do it.
06 23 10 25	CDR	Okay.
06 23 14 26	CC	Yankee Clipper, Houston. While you are waiting, I have a REV 44 map update.
06 23 14 35	CDR	Okay, Houston
06 23 14 37	CC	Roger. LOS 168:09:05, 168:33:57, 168:55:10. Over.

06 23 15 04	CDR	Roger. 168:09:05, 168:33:57, 168:55:10.
06 23 15 12	CC	Roger. And I've got your attitudes for Descartes and Fra Mauro.
06 23 15 22	CDR	Go.
06 23 15 23	CC	Roger. For Descartes: roll, 1.1; pitch, 285.9; yaw, 1.6. For Fra Mauro, roll, 1.4; pitch, 252.0; yaw, 2.0.
06 23 16 02	CDR	Roll, 1.1; 285.9; yaw, 1.6; roll, 1.4; 252.0; 2.0.
06 23 16 24	CC	Clipper, Houston. I did not read your readback. You were broken.
06 23 16 32	CDR	Roger. Roll, 1.1; pitch, 285.9; yaw, 1.6 for Descartes. Fra Mauro: roll, 1.4; pitch, 252.0; yaw, 2.0.
06 23 16 48	CC	That's affirmative.
06 23 16 55	CDR	Okay.
06 23 17 05	CC	Clipper, Houston. If you did a P52, we need a torquing time. Over.
06 23 17 18	CC	Clipper, Houston. I guess we need the angles, too. Over.
06 23 17 28	CMP	Okay, Jerry. Torquing angles are plus 0.095, minus 0.088, minus 0.003; torquing time, 164:06:33.
06 23 17 46	CC	Roger. Copy the time as 164:06:33 and your torquing angles were plus 0.095, minus 0.088, minus 0.003.
06 23 18 41	CC	Clipper, Houston. We assume then that you did not do a P52, at about 165:50. Over.
06 23 18 57	CMP	No.
06 23 18 59	CC	Roger.
06 23 19 02	CMP	Yes, we did; excuse me.
06 23 19 06	CC	Okay. Those were the numbers we were interested in.
06 23 19 09	CMP	- - plus decimal - okay - plus 0.023, minus 0.003, plus 0.073; time 165:52:05.

06 23 19 29	CC	Roger. Time 165:52:05 and the angles are plus 0.023, minus 0.003, and plus 0.073.
06 23 19 46	CMP	Okay.
06 23 21 15	CMP	Hey, Jerry, those guys are a ... point ... point ... point but I don't see any different from the first ones anyway.
06 23 21 23	CC	Roger, Dick. Judging from the results on all the P22's you been sending down, buddy, you're the expert.
06 23 21 58	CMP	Hey, Jerry, tell Kohrs also that on CP-2, he did pick that northern crater and - the one that he's got in the catalog is the center one, but the coordinates he has are for - is for a northern one, as he'll see in the film.
06 23 22 15	CC	Roger. That's the one you marked on. Right?
06 23 22 21	CMP	Yes. Just this once, and I marked on the one he has in the film, but the coordinates are actually for the northern crater.
06 23 22 29	CC	Roger, Dick. Understand.
06 23 29 46	CC	Clipper, Houston. How do you read?
06 23 29 52	CMP	Loud and clear.
06 23 29 53	CC	Okay. We got you high gain and reading you loud and clear now.
06 23 29 59	CMP	Okay. We're just finishing up Descartes.
06 23 30 05	CC	Roger.
06 23 30 07	CMP	We've got the box all taped - We've got the box all taped up this time.
06 23 30 12	CC	Roger. Good recovery, guys.
06 23 31 35	CC	Clipper, Houston. How do you read now?
06 23 31 40	CDR	Loud and clear.
06 23 31 42	CC	Roger. We're reading you weak but clear now. We're on backup equipment at Honeysuckle.
06 23 31 49	CDR	Okay.

06 23 31 52	CC	Loud and clear now, Pete.
06 23 31 56	CDR	Okay.
06 23 41 04	CDR	Okay, Houston. We got Fra Mauro.
06 23 41 07	CC	Roger, Pete.
06 23 50 42	CC	Yankee Clipper, Houston.
06 23 50 47	CDR	Go, Houston.
06 23 50 49	CC	Roger, Pete. We've had a meeting of the minds here, and the tentative plan right now is to drop the stereophotos on, stereostrip work on REV 44 because it has a lower priority than the landmark tracking, and so we want to be prepared for landmark tracking on the next REV. We'll have PAD data available for you by AOS, and what we are going to have to do now is uplink you a new state vector and have you do a P52 on this pass. Over.
06 23 51 25	CDR	Okay. What you want is Fra Mauro, Descrates landmarking tracking. Is that right?
06 23 51 29	CC	That's affirmative, Pete.
06 23 51 34	CDR	Okay.
06 23 51 37	CC	So, if you go POO and ACCEPT, we'll run your state vector up.
06 23 51 44	CDR	You got it.
06 23 51 48	CC	Okay. It's on the way.
06 23 53 11	CDR	Hey, Houston; Yankee Clipper here. Why don't we start the last test during the stereostrip and we'll grab Lalande in the middle of it, and we can get it all that way.
06 23 53 26	CC	That sounds like a sterling proposal, Pete.
06 23 53 31	CDR	Okay. We'll do that on the last REV, and we'll break right in the middle there just before T_1, grab Lalande and go back to it. And that'll take care of the whole show.
06 23 53 59	CC	Clipper, Houston. You mentioned Lalande, and that confused us. Say again.

06 23 54 08	CDR	On the very last REV, we want to photograph Lalande with the 500 millimeter.
06 23 54 17	CC	Roger. We're with you now.
06 23 54 22	CDR	Okay. So what we need from you is the T_1 and the times for Descartes and Fra Mauro. We'll get them next pass. And then we need a T_1 time for 500 millimeter on Lalande on the next pass, which is the pass we burn TEI on, and we'll stereostrip her up to that point. REV Lalande, keep on going with the stereostripper and burn TEI around the corner.
06 23 55 07	CC	Stand by, Pete. Clipper, Houston. The computer is yours.
06 23 55 19	CDR	Okay. And we'll give you a P52 in about 2 minutes here.
06 23 55 37	CC	Roger. While you're waiting, Pete, I've got messages from the families.
06 23 55 50	CDR	Go.
06 23 55 51	CC	Okay, Pete. Your kids - I called them this morning about 8:30 - Your kids are off to school and Jane says you're doing a great job and that she's really proud. And they're all waiting anxiously for all three of you to get back. Dick, Barbara said you're doing a fabulous job but she sure wishes you could get some rest, so she could. And, Al, Sue says she spent the evening with Jane, and they had a lot of fun last night, and they both feel real good about everything. And she's now in a watching-and-waiting mode.
06 23 56 31	CDR	Okay. Thank you, Jerry.
06 23 56 32	LMP	Thanks, Jer.
06 23 56 39	CC	Copy P52.
06 23 57 21	CDR	There's your alignment, Jer.
06 23 57 58	CDR	Houston, Clipper.
06 23 58 03	CC	Go ahead, Clipper.
06 23 58 05	CDR	Okay. Now at 170 hours, we going to do this P52, option 1. So, make sure SAO gives us

gimbal angles for Lalande with the right - with the fact that we've got the option 1 in for TEI. Okay?

06 23 58 22	CC	Roger, Pete.
06 23 58 27	CDR	Say again.
06 23 58 30	CC	Will do it, Pete.
07 00 01 48	CC	Clipper, Houston.
07 00 01 53	CDR	Go ahead.
07 00 01 55	CC	Roger. We're a little bit concerned about doing your stereostrip work on that last REV prior to TEI. We think that might squeeze some of the targeting near the end there, and we - we think you'd be better off if you did your stereostrip work on REV 44. I have some T_1 and T_2 times for you.
07 00 02 37	CC	Clipper, Houston. The plan is to do your stereophotos up until the landmark tracking time, and then terminate the strip photos and do your tracking.
07 00 02 56	CMP	Okay, Jerry. Give me the T_1 and T_2 times for Descartes, Fra Mauro.
07 00 03 03	CC	Okay. Terminate your battery B charge. And your stereophotos for REV 44 are T_1 of 168:54:00, 169:10:00, and we'll have your T_1 and T_2 times for - at AOS for your other work.
07 00 03 40	CMP	Roger. Understand T_1 and T_2 for REV 44 for the stereostrip, 168:54:00, 169:10:00.
07 00 03 49	CC	Roger. And we'll have your time for the landmark tracking when you come around the horn.
07 00 03 55	CMP	Okay. Very good.
07 00 07 16	CC	Yankee Clipper, Houston.
07 00 07 22	CMP	Go ahead.
07 00 07 23	CC	Roger. The fuel manifold pressure on all your quads is started down, so go ahead and switch all four quads to secondary. We're looking for LOS

here in 1 minute and 30 seconds and we'll see you coming around the horn at 168:55. Over.

07 00 07 41	CMP	Okay.
07 00 09 10	CC	So long, Clipper.
07 00 28 --		BEGIN LUNAR REV 44

END OF TAPE

07 00 57 24	CDR	Hello, Houston. Clipper ready to copy DE-1 and FM-1.
07 00 57 32	CC	Hello, Clipper; this is Houston. Roger. P22 tracking update. Your target is Delta Echo 1: T_1 is 169:21:10, 169:26:04, north 05; the LAT, LONG, and altitude are unchanged from your last PAD. For the second target, Foxtrot Mike 1: T_1 is 169:31:55, 169:36:53, north 16; LAT, LONG, and altitude, no change. Over.
07 00 58 38	CDR	Roger. Delta Echo 1: 169:21:10, 169:26:04, north 05; FM 1; T_1: 169:31:55, 169:36:53, north 16; and LAT and LONG unchanged on both.
07 00 58 57	CC	That's affirmative, Pete, and I've got your REV 45 update if you're ready?
07 00 59 09	CDR	Go ahead.
07 00 59 10	CC	Okay, REV 45 map update: 170:07:19, 170:32:25, 170:53:40. Over.
07 00 59 36	CDR	Roger. Copy. 170:07:19, 170:32:25, 170:53:40.
07 00 59 44	CC	Affirmative, and I've got a TEI 45 preliminary for you.
07 00 59 52	CDR	Okay. Wait 1.
07 00 59 54	CC	Okay, that's a maneuver PAD, Pete.
07 00 59 59	CDR	You have a lot of systems data.
07 01 00 11	CDR	Okay, go ahead.
07 01 00 13	CC	Roger, preliminary. TEI 45, SPS/G&N: NOUN 47: 34163; minus 0.64, plus 0.24; NOUN 33: 172:27:16.15; NOUN 81: plus 3027.4, plus 0297.8, minus 0019.6; roll, pitch, and yaw, 180, all zips, all zips; NOUN 44: both NA; DELTA-V_T, 3042.1, 2:10, 3020.9; sextant: 01; 232.9; 23.7; boresight: 041; down 01.6; left 4.8; NOUN 61: minus 15.82, minus 165.00; EMS: 1171.2, 36198; GET of 0.05g is 244:21:55; GDC align on Sirius and Rigel; roll is 138; pitch, 079; yaw, 002; four-jet ullage; 11 seconds. Over.

07 01 03 22	LMP	Roger, Houston. Copy 34163; minus 0.64, plus 0.24; 172:27:16.15; plus 3027.4, plus 0297.8, minus 0019.6 200,000,000; NA, NA; 3042.1, 2:10, 3020.9: 01;; 232.9; 23.7; 041; down 01.6; 14.8; minus 15.82, minus 165.00; 1171.2, 36198; 244:21:55. Let's go back up to the sextant, counting the boresight star, SXT, I think that should have been 648. Over.
07 01 03 40	CC	That's negative, Al. That's an L for left, 4.8.
07 01 04 47	LMP	Roger. Understand.
07 01 04 59	CC	Okay, Al. And did you copy the GDC align stars and angles?
07 01 05 06	LMP	Roger. Sirius and Rigel, 138, 079, 002; four jets, 11 seconds.
07 01 05 14	CC	Roger. You got it, Al.
07 01 41 47	CC	Yankee Clipper, Houston.
07 01 41 51	CDR	Go ahead.
07 01 41 53	CC	Roger. Tracking looked real good. When you get to the P52 attitude, we'd like to have the high gain, and we've got your REFSMMAT for TEI coming up.
07 01 42 05	CDR	Okay.
07 01 47 35	CDR	There you go, Houston. We're on the high gain.
07 01 47 38	CC	Roger. Reading you loud and clear.
07 01 49 29	CC	Clipper, Houston. If we can have a POO and ACCEPT, we will ship your REFSMMAT up.
07 01 49 38	LMP	You've got it.
07 01 49 43	CC	Roger. It's on the way.
07 01 49 53	CC	Clipper, Houston. Got a special report for you on your CSM consumables. We've had you doing so many off-nominal things, we thought you'd probably like a quick off-the-cuff report. Right now you stand, as of 169 plus 20, you stand with 37 percent RCS total and its - Alfa is 38 percent, Bravo is 37, Charlie 37, and Delta is 36. Over.

07 01 50 28	CDR	Roger.
07 01 52 39	CC	Clipper, Houston. Computer's yours.

END OF TAPE

07 01 56 43	CMP	Houston?
07 01 56 46	CC	Clipper, Houston. Go.
07 01 56 48	CMP	He drives a good bus. Houston, are you copying those angles?
07 01 56 53	CC	Roger. They're beautiful.
07 01 57 01	CMP	And we're torquing at this time.
07 01 57 03	CC	Roger.
07 02 06 16	CC	Yankee Clipper, Houston. You're 1 minute from LOS. Things are looking good, and we're looking for you around the horn at 170:53. Over.
07 02 06 32	CMP	Roger. 170:53; see you then -
07 02 06 35	CC	Roger.
07 02 26 --		BEGIN LUNAR REV 45
07 02 58 19	CC	Apollo 12, Houston.
07 02 58 20	CDR	Hello, Houston; Clipper here.
07 02 58 23	CC	Roger. We've got - -
07 02 58 24	CDR	Hello, there! How are you today?
07 02 58 26	CC	Just fine. How's things up near the Moon?
07 02 58 31	CDR	Not too bad, but I think we're about ready to leave.
07 02 58 35	CC	Very good. We'll be glad to have you back.
07 02 58 37	CDR	We haven't met anybody up here.
07 02 58 40	CC	Hey, listen. I've got some times -
08 02 58 41	CMP	We haven't found any strangers.
07 02 58 45	CC	Thank goodness! Hey, Dick, we've got the state vector and a target load for you any time you want to give us the computer; and, also, I've got the data for the higher resolution photography PAD for Lalande, but we want to make sure

that you understand that this is your option. We don't want to press you too much on this last pass before TEI, so if you want to do it, fine. We'll appreciate it. If not - -

07 02 59 11 CMP No.

07 02 59 12 CC - - it's your option.

07 02 59 15 CMP Don, we understand that, and we want to do it, because I messed it up myself this morning. I want to get it.

07 02 59 20 CC Okay. Whenever you're ready to copy, I can give you the money - the information.

07 02 59 27 CMP Go ahead. I'm ready to copy.

07 02 59 29 CC Okay. T_1 is 171:30:52, T_2 is 171 plus 34 plus 52; roll, 7.1; pitch, 141.1; yaw, 8.2. Maneuver to the attitude by 171 plus 24. Now, the target is not the crater rim; the target has been displaced south 8 nautical miles, so what we'd like you to do is estimate that; pick a point near that spot, and track whatever point you pick. Now, the gouge on 8 nautical miles is that it's three lines on the COAS, and the radius of the crater is 6-1/4 nautical miles. The camera settings remain the same.

07 03 01 36 LMP You've got POO and ACCEPT on the computer, Houston.

07 03 01 39 CC Thank you.

07 03 03 49 CMP Hey, Houston. I want to check on this three-line-widths business over - Are you saying that it's 8 nautical miles at acquisition, is three-line-widths' worth on the COAS?

07 03 04 03 CC Three degrees, that is three marks offset.

07 03 04 09 CMP Oh, oh, oh! Three degrees. Okay, very good. Understand.

07 03 04 15 CC I have for you, when you want to copy them, the updates to your TEI 45 PAD and also a TEI 46 PAD. We can do that any time, either before or after the photography, that you want.

07 03 04 29	LMP	Okay. We're ready to do that in about 2 seconds.
07 03 04 34	CC	Roger.
07 03 04 36	LMP	Okay, go ahead.
07 03 04 38	CC	Okay, do you want the whole TEI PAD over again, Al, or just the changes? There will be four of them.
07 03 04 46	LMP	Why don't you just give us the changes?
07 03 04 49	CC	Okay. This is the TEI 45 PAD. The first change is NOUN 33; the correct time is 172:27:16.14; NOUN 81 is plus 3027.2, plus 0302.1, minus 0025.3. The DELTA-V burn time box is 3042.3, 2:10, 3021.1; and the GET for 0.05g is 244 plus 21 plus 56.
07 03 05 56	LMP	Okay, we need the DELTA-V_T, the burn time, and DELTA-V_C one more time, please.
07 03 06 01	CC	Okay. DELTA-V_T is 3042.3 2:10 3021.1.
07 03 07 30	CC	Apollo 12, the computer is yours. Thank you.
07 03 07 37	CMP	Roger. And, Houston, did you agree with that readback?
07 03 07 42	CC	We didn't get your readback.
07 03 07 50	CMP	Roger. How do you hear now?
07 03 07 52	CC	Hear you loud and clear.
07 03 07 57	CMP	Okay. First correction was NOUN 33, the seconds column should read 16.14; NOUN 81, DELTA-V_X is plus 3027.2; DELTA-V_Y is plus 0302.1; DELTA-V_C is minus 0025.3; DELTA-V_T is 3042.3; burn time remains 2 plus 10; DELTA-V_C is 3021.1; and GET at 0.05g is 244:21:56.
07 03 08 38	CC	That is correct. Do you want the TEI 46 PAD?
07 03 08 46	CMP	Wait just a second.
07 03 08 4C	CC	Okay.

07 03 10 00	CMP	Okay, Houston. Apollo 12 is ready to copy the next PAD.
07 03 10 03	CC	Roger. This is the TEI 46, SPS/G&N: NOUN 47, NA; NOUN 48, NA; time is 174:27:15.41; NOUN 81, plus 3072.3, plus 0312.7, minus 0189.5; roll, NA; pitch, 359; yaw, NA; ullage is four jets, 11 seconds.
07 03 11 06	CMP	Roger. Understand. SPS - -
07 03 11 23	CC	Apollo 12. Break. Break. We're losing you. OMNI Delta, please.
07 03 11 39	CMP	Houston, Apollo 12. Sorry, we were maneuvering then and lost you. How do you hear now?
07 03 11 44	CC	Read you loud and clear, again. We lost you just as you started your readback.
07 03 11 51	CMP	Okay. SPS/G&N, and we go down to NOUN 33: plus 0017.4, plus 0002.7, plus 0154.1; plus 3072.3, plus 0312.7, minus 0189.5; NA, 359, NA, four-jet ullage for 11 seconds. Over.
07 03 12 21	CC	That's affirmative. I've also got a REV 46 map update if you want it.
07 03 12 31	CMP	We don't need it.
07 03 12 37	CC	I'd better give you your AOS times, don't you think?
07 03 12 43	CMP	These guys are getting eager. Zip it up.
07 03 12 49	CC	Roger. AOS with TEI is 172 plus 40 plus 42, and without TEI is 172 plus 52 plus 00.
07 03 13 13	CMP	Okay. That's 172:40:42 and 172:52:00.
07 03 13 19	CC	Roger. Just a question. We missed that one readback attempt. Did you give us a readback on that Lalande photography stuff that we missed also?
07 03 13 33	CMP	I sure did. I'll read it back again, if you'd like.
07 03 13 37	CC	Okay.
07 03 13 40	CMP	How about 171:30:52, 171:34:52; roll, 7.1; pitch, 141.1; yaw, 8.2; be there by 171 plus 24.

07 03 13 52	CC	We agree to all that; thanks very much.
07 03 14 06	CC	Okay, you have your state vector and your target load, and the computer's yours if ...
07 03 14 16	CMP	Thank you, Houston. Roger.
07 03 28 43	CMP	Houston, Apollo 12.
07 03 28 46	CC	Go.
07 03 28 50	CMP	Pre-TI - TEI systems checks are complete.

END OF TAPE

07 03 34 24	CC	Apollo 12, OMNI Alfa, please.
07 03 36 22	CC	Apollo 12, would you verify OMNI Alfa?
07 03 36 34	CC	Apollo 12, OMNI Alfa, please.
07 03 37 19	CC	Apollo 12, Houston. Do you read?
07 03 42 40	CC	Apollo 12, Houston.
07 03 42 44	CMP	Go ahead.
07 03 42 46	CC	Roger. We just had a few moments of data dropout. Wanted to say hello again.
07 03 42 52	CMP	Okay. Thank you. We're at the burn attitude at this time. We're doing a star check here shortly.
07 03 42 58	CC	Roger. You -
07 03 42 59	CMP	And we're beginning a P40.
07 03 43 00	CC	Roger. Your star is going to be just a little late coming into view for the - on the - the flight plan. It'll be in view at 171:57:08; that's number - star number 1.
07 03 43 26	CMP	Say the time again, Houston.
07 03 43 29	CC	The time is 171:57:08, which is about 2 or 3 minutes after it's shown in the flight plan for the star check.
07 03 46 43	CMP	Hello, Houston. You're looking at P40.
07 03 46 46	CC	Roger. Thank you.
07 03 58 07	CMP	Houston, 12. The star check's okay.
07 03 58 11	CC	Very good.
07 04 03 45	CC	Apollo 12, Houston. We show about 2 minutes to LOS, and everything's looking good to us down here.
07 04 03 54	CDR	Roger. See you on the other side.
07 04 03 57	CC	Very good. We got a nice spot in the South Pacific all reserved for you.

07 04 04 04	CDR	Okay.
07 04 05 25	CC	Apollo 12, Houston. We'll see you coming around the other side at 172:40, headed for home.
07 04 05 34	CDR	Roger-Roger. By-by. See you on the other side.
07 04 05 36	CC	Have fun.
07 04 41 01	CC	Apollo 12, Houston.
07 04 41 07	CDR	Hello, Houston. Apollo 12's en route home.
07 04 41 10	CC	Very good.
07 04 41 14	CDR	Got a burn status report for you. Burn was on time. Burn time was 2 plus 11; V_{GX} was 0; V_{GY} was plus 0.7; V_{GZ} was plus 0.1; DELTA-V_Z was minus 14.4; fuel was 7.4; oxidizer was 7.7; imbalance, plus 50.
07 04 41 52	CC	Roger, 12. We got on time; 2 plus 11; zero, plus 0.7, plus 0.1, minus 14.4, and will you say again. Your transmissions were pretty weak on the end.
07 04 42 13	CDR	Roger. Fuel was 7.4; oxidizer was 7.7; and the unbalance was plus 50.
07 04 42 23	CC	Roger. 7.4, 7.7, and plus 50. Looks good.
07 04 43 28	CC	Apollo 12, Houston. If you have a camera out already and plan some pictures coming back, we have a target of opportunity for you. However, if you don't have the camera out, we don't want you to bother to dig one out.
07 04 43 46	CDR	We have a camera out.
07 04 43 48	CC	Roger. They would be extremely happy if you could get some pictures of high lunar latitude so that we can get some small-scale mapping. The procedure is as follows: at time 173 plus 05, we'd like you to use the Hasselblad with an 80-millimeter lens, black-and-white film, f:5.6, 1/250th, and infinity, and take pictures at high latitudes, three frames, about every 30 seconds.
07 04 44 39	CC	To clarify. They want three frames together at 30-second intervals.

07 04 44 53	CDR	Roger. And give me the time again, would you, please?
07 04 44 56	CC	Well, the time's not critical. 173 plus 05, which is sort of during the last half of your TV pass, but this is your option.
07 04 45 10	CDR	Okay. Are you ready to receive TV?
07 04 45 59	CC	Apollo 12, Houston. We're ready for TV anytime you want to send some down to us.
07 04 46 06	CDR	Okay. We're trying to get into a good position right now. The formal one is a little bit later, but we're leaving the Moon so fast, we thought we'd better take it.
07 04 46 19	CC	We're ready any time you want to send it.
07 04 47 56	CC	Apollo 12, we're coming through in black and white. We expect color any minute.
07 04 48 04	CDR	Okay. Looks like we're climbing straight up from it.
07 04 48 25	CC	Ah! Now we've got a good picture in true and living color.
07 04 48 32	CDR	Roger.
07 04 48 42	CDR	Let's change windows with it, Houston.
07 04 48 46	CC	Roger. We really get the impression that you're on a fast elevator.
07 04 49 37	CC	We see your view along the terminator now, although we don't see quite as much coverage as we did before. Oh, here it comes in now.
07 04 50 46	CC	12, it really looks you are climbing out in burner.
07 04 50 55	CMP	Yes, we're really moving out, Don. It doesn't take very long to get some altitude out of that place.
07 04 51 07	CMP	We've got you looking right at the terminator, now, of course, and then up towards the north. Al's over getting - busy getting black and whites. I'm on the - the ... holding the TV monitor for Pete. We're all kind of busy letting you see all this.

07 04 51 27	CC	It looks great.
07 04 51 42	LMP	One of the things that you're probably seeing - probably noticed on your TV screen is how rough it looks along the terminator line. And this is - was our impression the first time we passed over it. We said to ourselves, "There, now there's a real rough part of the Moon." And the next day when the terminator moved 14 degrees, we found that the part that was now in a higher Sun looked fairly smooth, or at least like the rest of the Moon as you see it, and the part that was now into the terminator looked the roughest. So, I guess you get a real feel for the texture of the Moon by looking at - at near the terminator where you can see the height of the craters and the mountains and all the many features that are on the Moon and more relief.
07 04 52 31	CC	Roger. That's - -
07 04 52 32	LMP	Hey, Pete, if you point the camera up there toward the north, you can show them a couple of long rilles.
07 04 52 38	CDR	Okay.
07 04 52 40	CC	Roger. That texture really comes through loud and clear on your picture.
07 04 52 59	LMP	The impression that I get, Don, and I had this impression the first time I looked at the terminator, too, is that it's really useless for you all to have color down there, because it is pure black and white, and the way it looks to me right now, where we are, it looks to me like a ... and that I'm not really looking at the real Moon. It - it just doesn't look right, it's so black and white. It is sort of like a painting.
07 04 53 31	CMP	Roger. Looks just like a black-and-white photograph, doesn't it?
07 04 53 35	CC	Roger. We copy.
07 04 53 37	CDR	Well, it - it's real enough to make me want to go into the direction I'm going after 90 hours.
07 04 53 48	CMP	Just looks like the sailors are ready to go on liberty, that's all.

07 04 54 07	LMP	Up at the upper top, I see one rille up there. I don't know if you can see it on your TV camera. It's almost a straight line. It's about - I'm looking at the monitor, and I can't see it on the monitor. It's about a third of the way down from the top, and they run horizontally across there. It looks just almost like a straight line.
07 04 54 32	CC	Roger. It's hard for us to see it on our screen down here.
07 04 54 52	CC	Can you identify any of the features for us, 12?
07 04 55 01	LMP	Well, we'll - we'll break out our map. You know our map doesn't go to the higher latitudes and lower ones, but we'll see what we can find that we can point out to you that we know.
07 04 55 14	CC	Roger.
07 04 56 23	LMP	Hey, Don, how long did you want us to keep up this photography of the high latitudes, three each 30 seconds?
07 04 56 30	CC	Stand by.
07 04 56 41	CC	You probably got enough now. Anything you want to give us is fine, but don't push yourself. We're happy with what we got now.
07 04 57 14	CC	12, it's really amazing how much the size of the Moon has changed just in the few minutes you've been on the air so far.
07 04 57 29	CMP	I'm looking out my small hatch window to the right and I can see the Moon as an entire sphere right now. We have really moved out.
07 04 57 39	CC	We sure concur.
07 04 57 41	LMP	I've got to have FIDO crank - have FIDO crank out what's our altitude right now. What's our altitude rate? Anybody know?
07 04 57 59	CMP	Now, I think one of the things you can't see in your TV, though, is how the texture of the Moon changes, the higher the Sun angle, and over to the extreme westerly region there, you can see how light it is and how much more gray and stark it is by the terminator. But we, as Al said, found it that way as the terminator moved across. It all really looks the same.

07 04 58 27	CC	Roger. That shows up very clearly down here.
07 04 58 39	CDR	Our onboard computer says that we're 109 miles right now.
07 04 58 43	CC	Apollo 12, Houston. Right now you're getting close to 1100 nautical miles above the surface, and you're coming up about 4000 feet a second.
07 04 58 52	LMP	Okay. We were - We were reading our DSKY wrong; we're showing 8098 miles.
07 04 59 23	LMP	The area that's sort of dark down in the lower corner of your screen is Smyth's Sea, and it's - It looks, as you pass over, to be one of the about-medium-size mares that we see on the Earth side of the Moon. The thing that's the most noticeable about it is the fact that there's many craters in it that are all filled up with the mare material. You can just see the - the rare outline of the rim. They apparently were once very big like a lot of the craters you see over there near the terminator. Now they've filled up and so they don't appear so. Now it's down at the bottom of your screen by that little white dot.
07 05 00 11	CC	Roger. We see it very clearly. We assume that's the Sea of Fertility that's over on the west limb.

END OF TAPE

07 05 01 00	CC	Apollo 12, Houston. We show that you're coming up at about 1 nautical mile a second. You're really moving out.
07 05 01 12	CMP	Okay.
07 05 01 27	CMP	We had talked about it on the back side of the Moon just before the burn. We only put in 3000 feet a second. We were going a little over 5000 feet a second around the Moon, and we were talking about how it didn't seem like very much additional velocity to get to take you away from the Moon and head you on back to Earth, but I guess this low gravitational field here just allows you to not put in a lot and escape the sphere of influence pretty readily.
07 05 02 00	CC	Right. Your velocity is dropping off at about 1 foot per second each second, so you needed all you put in.
07 05 02 10	CMP	Roger. That's a lot less than our velocity dropped off per second wnen we left Earth. It, of course, was trying to pull us back much harder, and so we ended up slowing down from our 36 000 feet per second much more rapidly. You could look at the computer and see that the velocity was dropping many times that per second.
07 05 02 30	CC	Roger. We were watching you down here.
07 05 02 43	CDR	Today, while the picture-taking was going on, the three of us had the opportunity to discuss what we thought the texture of the surface was, especially because we were interested in our landing area and possibly finding some Copernican ray materials, looking at the rays and everything. And they are quite readily visible from 60 nautical miles, but if you look at them carefully through the monocular or something like that, I think that the difference in texture is so slight when you get actually down on the surface that Al and I had the impression on the lunar surfacc at our landing site that we just could see no contact difference whatsoever anywhere we went, and I think that as you look at the Moon going away you get that idea. You see highlights and whites and grays. You can see rays and things like that, but they're really not that much difference in color from one another.

07 05 03 55	CC	Roger. What about the white and gray differences you saw around the west side of head crater? Could you see those out over the regional area?
07 05 04 10	CDR	Well, I kind of had the feeling that - Al and I talked about this, that when we were in the right place and our foot subtracks turned up the lighter material that it was still the same material. It's just that it hadn't weathered on the surface, and we had the feeling that the ray material is probably the same thing. It's pretty much the same general material, but it came at different times and it's had different amounts of exposure to the weather.
07 05 04 45	CC	Roger.
07 05 04 49	LMP	Yes. This is - There just didn't seem to be any difference in the colors at all. If you look at any part of the Moon at the same time as any other part of the Moon, as you started at the terminator and went around the Moon, it changed colors from gray to white and finally to brown. And we all sort of thought that was about what it was, and then the next day, it did the same thing. The part that used to be more to the white, now it was the gray, because the shadows were over there more as the terminator moved in that direction. And we weren't able to see except in several spots any real large differences in colors. I'll tell you, Pete; could you show them that large crater down there in the lower left hand?
07 05 05 37	CMP	... monitor.
07 05 05 39	LMP	No. It's way over here on the opposite side of the terminator. There's Tycho. Can you show them that one? The one with the cracks and several craters in the middle. That's a beautiful crater.
07 05 06 04	CC	To give us some idea of the color, how would - -
07 05 06 07	CDR	... Take the TV and I'll show them.
07 05 06 08	CC	- - How would you describe the color of Smyth's Sea and the Sea of Tranquility for us, so we'll know how accurate our TV color is.
07 05 06 21	CDR	It just seems a chalky gray to us.

07 05 06 26	CC	Like Portland cement?
07 05 06 32	CDR	Pretty much. That's good as anything else.
07 05 06 36	CC	We want to know whether it's wet or dry.
07 05 06 38	LMP	- - dark, mare material. Some of it looks wet. Would you believe that?
07 05 06 45	CDR	As a matter of fact that's probably not too bad a description. If you just threw some Portland cement down and threw water on it in varying amounts it would be a little more moist than others and I get the same idea looking down here.
07 05 07 00	CMP	The wet parts, of course, would be the darker mare material that's there, and it is lightened considerably by rilles and craters and ejecta that's been taking place there, this giving it a lighter texture, but basically remaining the same type of material, I'm sure.
07 05 07 21	CC	Hey, listen. Tell us about all those grooves and ridges you saw on the surface. Did you get any patterns out of those? Could you see those from orbit?
07 05 07 37	CMP	Let me take it. ...
07 05 07 46	CC	Hey, 12. Is that the subsolar point - -
07 05 07 48	CDR	Don, the ones we saw - -
07 05 07 54	CC	Sorry to cut you off, there - -
07 05 07 56	CDR	... bright impact crater, yes. Also, the sea just to the south of that great impact crater is the one that in the middle of it are two craters; one crater has a single ray that runs horizontally all the way through it, and the other crater has a single ray that just runs out one side of it. A very odd set of ray patterns there.
07 05 08 22	CC	Roger.
07 05 08 23	LMP	Say, Don, you were asking about those lines. We don't - The ones we saw on the ground were very, very small; maybe an eighth of an inch. But there are definite patterns on the Moon. I'm going to show you up at high latitudes right now. Let's see the monitor, Pete, so I can see if I'm pointing to the right place. Now, I think you'll

be able to see some lines that's either run from the pole all the way down towards the center of the Moon, towards the equator. Let's see if I can get over to the right place. Are you able to see that, Don? It seems to emanate right from the pole region right where the terminator strikes the pole, and then they seem to come down toward the mare area. They seem to run in parallel lines from that point on down.

07 05 09 12	CC	Roger. They just barely show up on our screen.
07 05 09 19	LMP	Did you get a look at the crater Tycho? That's pretty impressive because it's large and has a lot of rays. And it also has - although the rays at this particular Sun angle aren't so visible, you can see it as a large - one of the larger craters down in the southern part of the Moon, easily visible from Earth. In fact, one of the most visible from Earth.
07 05 09 41	CC	Roger. We didn't know whether that was Tycho or whether that was the subsolar point.
07 05 09 47	LMP	No, that's Tycho. And also that crater just to the north of it, which I don't know the name of, is also a very bright crater. It appears very white in our little monitor up here.
07 05 09 59	CC	Roger. We see it very clearly down here, too.
07 05 10 06	CDR	Here you are.
07 05 10 08	LMP	Hey, let's move it to that hatch window. It's a better window, Pete.
07 05 10 27	LMP	Take a few more pictures.
07 05 10 38	CDR	High gain looks okay. Stop there! You got it now.
07 05 10 44	CC	That's a very impressive picture.
07 05 10 52	LMP	Okay. I've got the monitor, Pete.
07 05 10 55	CDR	Okay, Dick. Just a little bit higher.
07 05 10 57	CMP	... so that we could - I can't hold it any higher because of the top of the window.
07 05 11 01	LMP	Okay.

07 05 11 03	CDR	Dick just maneuvered it so that I can see the whole Moon, and that's it now. We have the whole Moon out our window.
07 05 11 13	CC	We've got a good picture of that. You know, the most amazing thing is that you were just in orbit down there a few minutes ago.
07 05 11 27	CMP	More so to us than, I'm sure, to you, Don.
07 05 11 33	CC	I'm sure that's true.
07 05 11 41	CDR	I'm getting that sort of detached feeling, detached from the Moon.
07 05 11 54	CMP	Can they see it as a whole sphere now, Pete?
07 05 11 58	CC	You're cutting out just a little bit of the south.
07 05 12 06	CMP	Yes, it's in the - I just can't move the camera there in the window.
07 05 12 11	CC	No, you're doing a great job.
07 05 12 16	CMP	Well, I keep the camera up and down the same way all the time.
07 05 12 43	CMP	Hey, that's about the most I can get in right now. And we're going so fast, though, that I think that it'll all show up in there in a minute.
07 05 12 50	CC	That's beautiful. We can see all the way, of course, to the western limb and the north terminator, about halfway down to the south.
07 05 13 01	CMP	Say, are we coming out in the Earth-Moon plane here, or are we going over the top or what? We were just discussing this and wondering, it's not - You know, it's not obvious when we leave what we're doing. It's my guess to say that we'd be coming out right along the equatorial plane, but what are we actually doing?
07 05 13 29	CC	We'll get it for you in just a second.
07 05 13 51	CC	Hey, listen. While we're getting that, since you're the international experts on lunar rock rolling, how does that work? Tell us what a rock looks like when it rolls down a lunar crater, since you did some of that on Earth.

07 05 14 08	CDR	Well, it goes very slowly. And I guess the impression you have is the same way as if you throw something up there, and we had the occasion to throw some things away. They sort of move out, not too rapidly, but they just keep going, and that's exactly what happens when you roll a rock down the side of a crater. Once you get - It was hard to get them going; I was surprised. I think everybody had the idea up there that because you're in such light gravity, that things would roll down rather easily. And that really wasn't the case. Once you got it going, it just sort of went along in animated slow motion, but it kept going for a long, long time.
07 05 14 54	CC	Did it bounce, or did they dig in, and did they go through this bounce ...?
07 05 14 59	CDR	Well, they bounce and slide, a little bit of everything, just like they do on Earth, but just stretch it out. I was - I found that I couldn't walk; wherever we went, we loped, and it just didn't seem natural not to lope. And - But when you lope, it reminded me of these pictures, high-speed motion pictures of watching a greyhound run or something like that. That's just the feeling I had as I loped across because I'd have to step out and then just sort of hold what I had until I came down. And that's the way Al and I moved around on the whole traverse.
07 05 15 38	CC	Sounds like you were having a ball.
07 05 15 41	LMP	Dick, if you could pitch down the little board, it'd help Pete a lot.
07 05 15 44	CDR	Well, Al accused me of making him carry all the tools. One time he said that he had wound up with all the ones that I had, too, and I was just running there in front of him. He's probably right, now that I think about it.
07 05 15 58	LMP	You know the funny thing about moving around on the lunar surface, you put on this pressurized suit we wear, and you try to do it on Earth, with even close to the weight you have on your back on the Moon and you get tired very rapidly from the walking, and you don't have to walk over, you know - let's say 200 or 300 yards and you're ready for a rest. But, on the Moon, in the light gravity with the same suit on and the same weight,

your legs never seem to get tired. I guess when you run up the side of a steep slope, you could do it, but just running around on level ground, you assume some kind of normal pace and you're able to go for long distances without your legs getting tired. The suit doesn't always want to bend like you want to bend. For example, it bends pretty well in the knee and it bends pretty well in the ankles, but it doesn't want to bend up near the thigh, the top of the thigh. So what happens is you tend to run with straight legs, land flatfooted and then push off on your toes. And you think to yourself, "Well, I'm going to tire out my calves pretty soon because I'm not used to this sort of thing," but apparently the force it takes to push off on your toes on the Moon is much less than you just have when you walk or run on Earth, so your legs just don't seem to tire. You can move around rather easily, don't you think, Pete?

07 05 17 28 CDR Yes. I'd like to ask the doctors because I haven't any idea, but I'm sure that our heart rate stayed fairly low even when we were loping. I don't think we approached anywhere near the heart rates that we had in just our normal walk-throughs and practices in just one g back on Earth and I agree with Al. You could go for 8 or 9 hours out there and still be ... The other thing that we did was - I think was kind of interesting - Everybody got worried about falling over and going down slopes and things. I fell over once up there, but I didn't have any problem getting up and we just finally - to expedite things - We would just either fall over on our face picking up the rock and give ourselves a one-hand pushup or just get down on our knees and with it get whatever it was we needed to pick up down there, because we picked up many rocks that were bigger than the tongs would pick up.

07 05 18 22 CC Roger. Your heart rates were just about as expected, and the report is that you are just about in the Earth-Moon plane, just a very small bit out of the Earth-Moon plane, but almost coming straight home. Also, we are about to lose one of the satellites that is bringing this TV back to the States, so we're probably going to have to bid goodby here fairly soon.

07 05 18 46 CDR Okay. Why don't we - We'll just slip inside for a second and say hello to everybody and then you can shut her off.

07 05 18 59	CC	Very good.
07 05 19 15	CMP	Who's got the monitor?
07 05 19 20	LMP	Okay. That's a good idea.
07 05 19 39	LMP	The way we were hunting the monitor just then as we moved the camera inside the spacecraft, one of the fun things about this zero-g living, when you spend a day or two here, you have lots of items that you keep around - pencils, cameras, and scissors to open your food - Do you? Do you need more light?
07 05 19 58	CC	Roger. Are you on your inside switch?
07 05 20 00	LMP	We got it ... Yes. How's this do for you?
07 05 20 07	CC	Now you are coming in better.
07 05 20 09	LMP	How does that do?
07 05 20 10	CC	Pretty good.
07 05 20 11	LMP	Okay. Let's me see. What you got in focus, here?
07 05 20 14	CC	You're looking good now.
07 05 20 16	LMP	Okay. That is a good idea.
07 05 20 18	CDR	Is this better?
07 05 20 19	CC	That's affirmative.
07 05 20 23	LMP	That ought to do it. When you end up like - I don't know if you can see this camera that I have got on TV - the one that I was taking pictures of the Moon with, but they float around just like you see. The funny part is - The funny part is when you're not watching them, they'll float off, and then you will hunt for them, but the problem is all your training all of your life has been to hunt for them on top of things - like on top of the seat or on top of the floor, or somewhere else. And so you walk around the spacecraft hunting for them, but really they may be in plain view, just resting right on the underside of the seat, or maybe just up there near the top of the strut, and you have one whale of a time finding these objects. You look all around and then somebody on the other side will say "Look, it's right by your left ear." It really becomes quite a lot

of fun when one of these things gets lost. You spend a few minutes hunting around and usually end up right in plain view, but you just don't look there from all these habits you built up over the years.

07 05 21 21	CC	Hey, now we see Dick.
07 05 21 25	CMP	Hey, Don, I understand you have changed your schedule around there quite a bit since we left last Friday, and we are very sorry about that, but that can't be helped either.
07 05 21 38	CC	No problem.
07 05 21 39	CMP	We did all our work, I understand, real early in the morning or very late at night down there, and we understand very late the first night out - about 20-hour day to adjust our schedule to the activities around the Moon and we sure enjoyed it, and hope that everybody there has enjoyed having us bring what we can to them.
07 05 22 03	CDR	We were particularly disappointed that we weren't able to give - Yes, we were particularly disappointed that we weren't able to give you the lunar surface TV. It just didn't seem to work out and I guess that maybe the next flight, Apollo 13, will give you a chance to look at what's going on down there because it's going to be a lot of fun.
07 05 22 24	CC	Listen. Everybody was absolutely delighted with the tremendous job you did.
07 05 22 38	CC	What happened to Pete? We haven't seen him yet.
07 05 22 44	CMP	He's going to come into view.
07 05 22 46	CDR	I've been hiding in my favorite spot in the top of the tunnel.
07 05 22 55	LMP	We've got all our gear stowed in here by the way. Why don't you show them some of the gear we've got stowed? Surveyor bag, particularly, because that's unusual, and we've got it stowed in a pretty slick place.
07 05 23 03	CDR	I don't know whether they can see all of this, but we do - We have the rock boxes put to bed and all the Surveyor gear. I guess one of the big thrills, of course, for Al and I was to sit down

		next to the Surveyor, and especially when we stepped outside and looked out around the back of the spacecraft - -
07 05 23 26	LMP	Yes. That was a thrill!
07 05 23 27	CDR	- - and saw it sitting right there on the other side of the crater. I also gave myself quite a thrill. I think you'll appreciate it when you see the pictures and you see how close we landed to the crater - which I didn't notice at the time because it was behind me, but I didn't want to overfly too far, but I guess I parked it pretty close to the edge of the crater. And we were also very impressed that the tracking and everything put us right down the middle. Everybody at home certainly did their homework there. We didn't have to do anything but land it. And Dick surprised me, I think, by finding us - not only finding us in the sextant, but also finding the Surveyor and the LM in the sextant. He also took some pictures through his sextant with a 16-millimeter camera of that on the next REV and, hopefully, we'll have movies of the LM and the Surveyor on the ground that are discernible in the movies. I don't know if that will work or not. We'll have to wait until we see the film.
07 05 24 34	CC	Very good. We will be looking for them.
07 05 24 35	CDR	We have enjoyed the trip. We have enjoyed the trip. Everybody adapted to zero g real well. We enjoyed whistling in and out of the LM and after having flown 8 days in Gemini, it's a real pleasure riding around in this thing and being able to move around, and have all the good food and hot water, and shaves, and all those good things we couldn't do. We've kept the ship pretty spick and span, and we do have things all neatly stowed. I don't know if you can show them, Dick, why don't you show them the Surveyor bay?
07 05 25 08	CMP	No, they can't see it.
07 05 25 10	CDR	Well, with that, I think we'll sign off, and we'll see you in about 3 days.
07 05 25 14	CC	Thanks a million! All three of you did a 4.0 job, and your families and the whole team are waiting for you back down here on the ground.

07 05 25 24	CDR	Thank you.
07 05 25 43	CC	Apollo 12, Houston.
07 05 25 49	CDR	Go ahead.
07 05 25 50	CC	If you will give us POO and ACCEPT, we will give you a PTC REFSMMAT, and for the PTC we want to use quads Alfa and Delta.
07 05 26 06	CMP	Hey, we are going to stay at this attitude if ...
07 05 26 08	CDR	Okay. You got it. POO and ACCEPT.
07 05 26 10	CC	Thank you.
07 05 26 21	LMP	You know something, Don? This Moon is just this white ball right out in the middle of a big black void, and it doesn't seem like either - We're separating from one another, but there just doesn't seem to be any rhyme or reason why we are or why it's setting out there. All the time we were in lunar orbit we were discussing this thing - how unreal it looked, and it is amazing to us to fly around it as it is when you just think about going to the Moon. It is very, very unreal to be there.
07 05 26 57	CC	You know, your pictures were absolutely fantastic showing how fast you moved away from the Moon. You really gave us a good picture of that.
07 05 27 08	LMP	We're still doing it. - It's really getting small in a hurry. It's just sort of unreal to look outside. It is almost like a photograph moving away from you. It doesn't seem possible it can be a whole sphere that you were orbiting a couple of hours ago.
07 05 27 28	CC	Well, when you first gave us a picture, you looked like you were very close to your orbital altitude; but, by the time the picture went inside, it looked like about a basketball out at arm's length.
07 05 27 50	CDR	That's pretty good, because right now at arm's length it's about 6 inches.
07 05 27 55	CC	Tremendous.
07 05 28 27	LMP	Hey, Don. Do they have any hack on the midcourse yet?

07 05 28 31	CC	Yes. It's extremely small, something like a third or a quarter - a third or a half foot per second.
07 05 28 41	LMP	Yes. That's great. That's great.
07 05 28 43	CC	It was a very excellent burn. It's going to be a real small one.
07 05 28 51	CMP	I'll tell you this SPS engine is a real hummer. It really gets out and goes and really performs well at that. It's really a smooth ride.
07 05 29 00	CC	We copy.
07 05 29 41	CC	Apollo 12, Houston.
07 05 29 46	CMP	Go.
07 05 29 47	CC	Listen. Once you guys get bedded down, we're not going to awaken you in the morning. So whenever you get up and want to start a new day, you give us a call. You've earned a good long night's sleep. So sleep in as long as you want.
07 05 30 03	CDR	Okay. No problem.
07 05 30 04	CMP	Yes. Swell idea.
07 05 30 12	CMP	I think I gained weight on this trip. They've accused me of being a chowhound.
07 05 30 18	CC	How come you're not getting out and doing your mile a day?
07 05 30 24	CDR	He does it running from his couch to the food compartment.
07 05 30 29	CC	(Laughter)
07 05 30 30	LMP	He's topped Conrad now.
07 05 30 31	CDR	Al Bean is discouraging everybody from running these days.
07 05 30 33	LMP	Yes. That's right.
07 05 30 39	CDR	Al's got a new training schedule? He's going to become the Training Officer.
07 05 30 45	CC	Roger. The computer's yours. We've finished sending up your REFSMMAT.

07 05 30 53	CDR	Okay. Thank you. How long can we - When do you want us to start PTC?
07 05 31 01	CC	Anytime you want.
07 05 31 05	CDR	Okay. We'd like to hold off on it for a while.
07 05 31 12	CC	Let's hold off. We're in the middle of a playback data. So, give us some time on that.
07 05 36 47	CC	Apollo 12, Houston.
07 05 36 52	LMP	Go ahead.
07 05 36 53	CC	Roger. We finished dumping the data, and so you can start PTC any time you want to, after you finish 52.
07 05 37 05	LMP	Okay.
07 05 52 35	LMP	Houston. You looking at our DSKY?
07 05 52 58	CC	Go, 12.
07 05 53 03	LMP	Roger. We just wanted to give you the torquing angles on the DSKY.
07 05 53 07	CC	Roger. We got them, 12. Thank you.
07 05 55 34	LMP	Houston, you ready for an E-memory dump?
07 05 55 40	CC	Give us just a moment.
07 05 55 45	LMP	Okay.
07 05 59 42	CC	Apollo 12, Houston. We're ready for that E-memory dump now.
07 05 59 47	LMP	Okay.
07 06 01 11	CC	Apollo 12. We've got a good E-memory dump. Thank you very much.
07 06 01 22	LMP	You're welcome. Thanks for the good P30 PAD.
07 06 01 29	CC	Yes, sir.
07 06 11 09	CMP	Houston, Apollo 12. Which quads did you want disabled for the PTC?
07 06 11 16	CC	Disable Baker and Charlie. We want you to use Alfa and Delta.

07 06 11 25	CMP	Roger. I guess when we're established in PTC attitude you will want us to go off the high gain and use the OMNI's tonight because of the performance of the high gain?
07 06 11 44	CC	That's affirmative.
07 06 12 11	CC	Apollo 12, when you go off the high gain, we'd like you to turn off the high-gain power during the sleep period and pick up with OMNI Bravo.
07 06 12 24	CMP	Okay. Will do.
07 06 12 29	CC	Also, we'd like you to turn off the optics power this evening for the sleep period.
07 06 12 38	CMP	You want us to turn off the optics power this evening, huh?
07 06 12 41	CC	That is affirmative.
07 06 12 51	CMP	And - Let me ask you again, Houston. Say again those two quads that you want disabled.
07 06 12 59	CC	Bravo and Charlie, off; Alfa and Delta to be used.
07 06 13 07	CMP	Okay.
07 06 19 25	CC	Apollo 12, Houston.
07 06 19 33	LMP	Go ahead, Houston.
07 06 19 35	CC	Roger. I checked with your wives and I have a short status report on the family whenever you get a minute.
07 06 19 41	LMP	Outstanding. Let's hear.
07 06 19 44	CC	Okay, Pete. I talked to Jane, and she said she really enjoyed the TV show. Also she sent a letter out. - -
07 06 19 50	LMP	Hold on just a second. Hold on just a second.
07 06 19 52	CC	Roger.
07 06 19 57	LMP	He'll be on in just a second.
07 06 20 30	CDR	Go ahead.
07 06 20 31	CC	Okay, Pete. Talked to Jane, and she said she saw the TV show and enjoyed it mightily, that it

was a great show. Also, she sent a letter for you out to the carrier that will be there with all the family news when you arrive. But she wanted you to know that all the family is well, and that they're anxious for you to hurry home. Dick, Barbara - -

07 06 20 53 CDR Very good.

07 06 20 56 CC - - said that they also saw the show and they thought it was great, and the family's in - She says again, great shape, so they're looking for you back in a hurry. Al, I talked to Sue. - -

07 06 21 08 CMP - - Okay, Don. Thank you.

07 06 21 10 CC - - You bet. Al, I talked to Sue and it seems that when the network put on the TV show, they had Pete's name up under your picture, and she said it's been so long since she has seen you, that it even confused her for a moment. But the family's been watching the flight. They're waiting for you, and they're looking forward to splashdown and everybody's fine.

07 06 21 38 LMP Thank you for checking, Don.

07 06 21 40 CC You might wear a nametag or something so that she'll recognize you.

07 06 21 49 LMP There won't be any worry about it for another 20 days or so.

07 06 21 52 CC Roger.

07 06 21 53 CMP I'll talk to her through the glass in the LRL for a while. We're just finishing up a meal now, Don, and we'll be coming at you with the postsleep check report in about, I don't know, 10, 15 minutes.

07 06 22 09 CC Fine. We'll be down here.

07 06 22 15 CMP I hope so.

END OF TAPE

07 06 42 18	CC	Apollo 12, Houston.
07 06 42 41	CC	Apollo 12, Houston.
07 06 42 46	CDR	Go ahead, Houston.
07 06 42 51	CC	You're extremely weak, Pete.
07 06 42 56	CDR	Okay. Well, we've been on the - ... high gain ...
07 06 43 07	CC	Roger. Your rates look good, so you can spin up anytime you want, and we assume you have no dumps to do that will perturb the roll.
07 06 43 18	CDR	No.
07 06 43 20	CC	Roger.
07 06 43 37	CC	Pete, would you ask one of the other crew to transmit? We can just barely read you.
07 06 43 46	LMP	Okay ... ... How do you read me, Houston?
07 06 43 51	CC	Still extremely weak, Al. You're just barely audible.
07 06 43 57	LMP	... Houston. ... having any problems with your earphones ... ...
07 06 44 10	CC	Roger. The problem is probably between the site and Houston. We've got a good downlink signal, so we'll check it out here on the ground. Thank you.
07 06 45 03	CC	12, we copied just a little dumping going on. As soon as that damps out, you can go ahead and roll.
07 06 47 00	CC	It appears that we've lost the downlink long line for a few minutes. As soon as we get it re-established, we'll be back with you.
07 06 47 23	CDR	Houston, 12.
07 06 47 24	CC	Roger. That one came down loud and clear.
07 06 47 30	CDR	Okay. Are you telling me you don't want us to dump any urine? Is that correct?

07 06 47 34	CC	No. We're saying just damp out your rates for a few more minutes and then start your roll.
07 06 47 43	CDR	Okay. But you don't want us to dump urine after we start PTC. Is that right?
07 06 47 48	CC	Whatever is necessary, go ahead and do, but we - damp out your rates as much as you can before you start to roll.
07 06 47 56	CDR	Okay.
07 06 48 03	CC	We just don't want to have to wake you up in the middle of the night and do a maneuver for us.
07 06 48 09	CDR	Yes, I - it's no problem. We - we can keep it onboard. So I just - I just didn't know when we're down this light if it was going to mess us up, and I guess it probably will, so we'll go ahead and keep it onboard. It's no problem.
07 06 48 23	CC	Roger.
07 07 07 21	CC	Apollo 12, Houston. Your rates look good to us. If you want to spin up, we're agreeable.
07 07 07 28	CDR	Okay. We were just getting ready to do that now. Thank you.
07 07 07 31	CC	Roger.
07 07 13 49	CDR	Houston, 12.
07 07 13 51	CC	Go ahead, 12.
07 07 13 56	CDR	I screwed that one up, so I'm going to start over again.
07 07 14 01	CC	Roger.
07 07 19 07	CC	Apollo 12, Houston.
07 07 19 14	CDR	Go ahead.
07 07 19 15	CC	Roger. We're going to be on LOW BIT RATE most of the night, so we won't be getting any BIOMED data from you, so if you want to disconnect your harnesses, that's fine with us.
07 07 19 28	CDR	Okay. Very good. Okay. Let me give you the checklist here. The crew status report: The

Commander had one decongestant; the CMP had nothing; the LMP had one sleeping pill last night and one decongestant. The fans have been cycled. The water's been chlorinated. We've verified the valves; BAT C at 37.0; pyro BAT A, 37.1; pyro BAT B, 37.1. You've got the E-memory dump, and as soon as I get PTC going here, we're going to hit the pad. Actually, LMP and CMP are already asleep.

07 07 20 14	CC	Very good. Have a good night. You've certainly earned your rest.
07 07 20 22	CDR	Thank you.
07 07 20 23	CC	We'll see you in the morning.
07 07 20 25	CDR	And how do the rates look to you down there?
07 07 20 28	CC	Looks fine. Spin her up.
07 07 20 36	CDR	Okay.

END OF TAPE

REST PERIOD - NO COMMUNICATIONS

07 19 39 33	CC	Music "The Yankee Clipper, Apollo 12," (chorus)
07 19 40 08	CC	Music "The Second Time Around" (chorus)
07 19 41 45	CC	Good morning, 12. Welcome back to transearth coast.
07 19 41 57	SC	Music
07 19 41 59	CDR	Good morning, Houston. How are you?
07 19 42 02	CC	Very good. How are you folks?
07 19 42 07	CDR	Fine. We'd like - we'd like to say we really sacked out last night, I guess.
07 19 42 15	CC	That you did. You had to, Paul Weitz was on.
07 19 42 21	CDR	(Laughter) Very good.
07 19 42 29	CC	Say, Pete, right now - -
07 19 42 30	CDR	What's new in the world of news today?
07 19 42 33	CC	Okay, why don't we first figure out how you want to go from here? We could take a - and pick up midcourse 5 which is relatively small - a little over 2 feet per second and 188:27, or we could slip it a little bit it's - maybe - up to on the hour even. It's really up to you folks.
07 19 42 59	CDR	188:27, huh?
07 19 43 02	CC	That's right. It depends upon how far you are along in your postsleep activities. It can be slipped just as easily.
07 19 43 16	CDR	Okay. What - Why not don't - why don't we go ahead and burn it on time? I tell you what, the only thing we have to do is change the canister, and we all had 12 hours' sleep last night, I think. I lost track of time there. And the PRD's are 11026, 11025, and 04027; and we'll go ahead and do a quick P52 here for you in a PTC orientation. And then give you the computer, okay? And you can uplink loads. That what you want to do?

07 19 43 57	CC	Okay, that sounds good.
07 19 44 05	CDR	And in the meantime, we'll go ahead and put on - How - What do - Do you want us to try and get the H_2 purge done?
07 19 44 12	CC	Okay.
07 19 44 13	CDR	And the waste water dump before - and fuel cells before we do the burn?
07 19 44 17	CC	Yes, let's go ahead and try to carry things out in the same order in which you would have done them before. That is, all flight plan items preceding your midcourse 5 was still required and accomplish it at your own - crew-determined pace. Your water dump and fuel - fuel cell purge is after your sextant star check.
07 19 44 40	CDR	Okay. Very good. We'll go ahead and do the P52 right now.
07 19 44 49	CC	Okay. And one word on after M - MCC 5 and your associated data dump, the - you'll roll the spacecraft 180 degrees and hold attitude rather than PTC for the next 1-1/2 hours, and then you perform P23 nominally scheduled for 189.
07 19 45 12	CDR	Okay.. P23 for 189. What roll orientation did you want?
07 19 45 26	CC	Okay. You'd be rolling 180 degrees from the attitude you'd have in MCC 5.
07 19 45 37	CDR	Okay. Very good.
07 19 45 47	CC	We have a consumables PAD for you here, and we'll be coming up with a maneuver PAD shortly.
07 19 52 40	CC	Apollo 12, OMNI Charlie; OMNI Charlie.
07 19 53 03	CC	Apollo 12, OMNI Charlie; OMNI Charlie.
07 19 54 23	CC	Apollo 12, OMNI Charlie; OMNI Charlie.
07 19 55 13	CC	Apollo 12, OMNI Charlie; OMNI Charlie.
07 19 55 19	CDR	Roger.
07 19 55 26	CC	Apollo 12, Houston.

07 19 55 32	CDR	Okay. Here's the alignment for you. It was done on 645, star angle difference: Four balls 1, plus 00288, minus 00301, plus 00211, 187:54:45. And the computer is yours.
07 19 55 58	CC	Roger, Pete. You can go ahead and cut off the cryo fans.
07 19 56 05	CDR	Okay.
07 19 56 10	CC	And we have a maneuver PAD and consumables update, in that order, when you're ready to copy.
07 19 56 17	CDR	Okay. Give me the consumables update first.
07 19 56 20	CC	Okay. GET: 187:30; RCS total, 34; and Alfa through Delta: 35, 32, 34, 34; H_2, 34.5 and 34.5; O_2, 37.3 40.2.
07 19 56 54	CDR	Okay. I copied all that. We're ready for the maneuver PAD.
07 19 56 58	CC	MCC 5 RCS/G&N: 25138; your trims are NA; GET, 188:27:13:74; plus 0002.0; and DELTA-V_Y, DELTA-V_Z are zero; 089, 339, 007; NOUN 44, NA; 0002.0, 0.05, 0002.0; 22; 323.0.
07 19 57 50	LMP	Hold on a second.
07 19 57 51	CC	Roger.
07 19 58 06	LMP	Did you - I understand now. The DELTA-V_T is in the 0002.0. Start from there.
07 19 58 16	CC	Okay. First, NOUN 44 was NA; DELTA-V_T was 0002.0; 0:05, 0002.0, and that was DELTA-V_C; 22; 323.0, 35.9; boresight star 016, up 07.2, left 4.2; NOUN 61, minus 15.81, minus 165.14; 1171.1, 36198; 244:22:34. Under comments, your stars, Sirius and Rigel, alignments, 256, 152, 069; your ullage is a four-jet RCS, plus X.
07 19 59 44	LMP	Okay, RCS/G&N: 25138; NA; NA; 188:27:13:74; plus 0002.0, the next two are zip; and then, roll is 089, 339, 007; NA, NA; 0002.0, 0:05, 0002.0; 22; 323.0, 35.9; 016; up 07.2; left 4.2; minus 15.81, minus 165.18; 1171.1, 36198; 244:22:34; Sirius and Rigel, 256, 152, 069; four jets, plus X.

07 20 00 36	CC	Okay, NOUN 61, longitude was 165.14 and the other is correct.
07 20 00 47	LMP	Roger. I got minus 165.14. Is that - is that right?
07 20 00 53	CC	That's Charlie.
07 20 00 57	LMP	Okay.
07 20 01 00	LMP	Okay, Houston. Also, we're going to vent the battery compartment there. That's up to about 3.6, and we'll do that along with the rest of the dump.
07 20 01 10	CC	Roger.
07 20 01 48	CC	12, the computer is yours.
07 20 01 55	CDR	Roger.
07 20 05 50	CC	Apollo 12. OMNI Bravo.
07 20 06 14	CC	Apollo 12. OMNI Bravo.
07 20 07 42	CC	Apollo 12. OMNI Bravo.
07 20 15 19	CC	Apollo 12, OMNI Alfa; OMNI Alfa.
07 20 16 51	CC	Apollo 12, OMNI Alfa; OMNI Alfa.
07 20 18 49	CC	Apollo 12, OMNI Alfa; OMNI Alfa.
07 20 19 52	CC	Apollo 12, Houston.
07 20 20 12	CC	Apollo 12, Houston.
07 20 20 17	CDR	Right here, Houston. We got you on the high gain now, and the H_2, O_2 fuel cell purge is in works and so is the waste water dump. Sextant star check okay.
07 20 20 27	CC	Roger.
07 20 20 37	CC	Apollo 12, Houston. You can hold off on that battery B charge until tomorrow.
07 20 20 47	CDR	Okay.
07 20 23 15	CDR	Say, Houston. We're not going to get the purge - fuel cell purge all the way done by

burn time. What would you like us to do about that? We can purge oxygen a minute and 20 for each or we can do something else.

07 20 23 30	CC	Stand by, Pete.
07 20 24 02	CC	Apollo 12, Houston. You can go ahead and continue on with the purge through the burn.
07 20 24 10	CDR	Okay.
07 20 28 10	CDR	Okay, Houston, the burn is complete.
07 20 28 13	CC	Roger, 12.
07 20 28 15	CDR	The residuals were zero.
07 20 28 18	CC	Roger.
07 20 28 40	CMP	Hey, Ed, for your information, this EMS is useless for this kind of thing; I finished the burn; I was reading 1.8 feet per second; it's got a pretty sizable bias on it. I haven't reported this before because it has been working and meeting all tolerances; but, in the EM DELTA-V test, it goes down to minus 18.1 and it's been consistent that way throughout the flight.
07 20 29 08	CC	Roger, Dick.
07 20 30 17	CC	12, Houston.
07 20 30 22	CDR	Go ahead.
07 20 30 24	CC	Will you enable an A-C roll on the DAP? And also, we're showing that your weight is about 400 pounds heavier than what we passed you in the PAD.
07 20 32 02	CDR	Okay. Now, Houston, you want us to roll 180?
07 20 32 08	CC	Stand by for just a moment, Pete.
07 20 32 15	CDR	We're rolling.
07 20 32 31	CC	Pete, if you have already eaten, you can go right on to the P23's, and the attitude for those are in the flight plan and they are good.
07 20 32 42	CDR	Okay.

07 20 35 36	CMP	Houston, Apollo 12.
07 20 35 39	CC	12, Houston. Go ahead.
07 20 35 43	CMP	Roger. For these P23's, I'm going to disable two quads in the DAP. Which two do you suggest?
07 20 36 03	CC	Alfa and Bravo. Disable Alfa and Bravo.
07 20 36 08	CMP	Roger. Alfa, Bravo, disabled.
07 20 36 22	CC	And, 12, you can give us OMNI Alfa as you approach the high gain limits.
07 20 36 33	CMP	Roger. OMNI Alfa.
07 20 36 34	LMP	OMNI Alfa.

END OF TAPE

07 20 56 47	CC	Apollo 12, Houston.
07 20 57 26	CC	Apollo 12, Houston.
07 21 01 38	CC	Apollo 12, Houston. OMNI Delta, OMNI Delta.
07 21 01 44	CDR	Roger-Roger. Al's OMNI Delta, OMNI Delta.
07 21 01 57	CC	Roger. Thank you, Pete. Say, do you have a reason for not selecting balance couples for P23?
07 21 03 40	CC	Hello 12, Houston.
07 21 03 55	CDR	Go ahead, Houston.
07 21 03 58	CC	12, do you have a reason for not selecting balance couples for the P23?
07 21 03 17	CDR	Do you read the CMP, Houston?
07 21 04 19	CC	That's negative, Pete. We're not picking up the CMP at all. The only transmissions we've heard are from you.
07 21 04 27	CDR	Okay. I've got him hooked up.
07 21 04 28	CMP	How - How about now?
07 21 04 30	CC	Okay, Dick, you're coming in now.
07 21 04 31	CMP	How about now?
07 21 04 34	CC	Okay, Dick, we've got you. Go ahead. - -
07 21 04 35	CMP	Okay. Sure we had a reason for not using - Yes, I sure had a reason for not using balance couple and that's I'm using minimum impulse controller in the LEB. With this balance couple on, the vehicle is far too sensitive to get decent marks of this thing. The vehicle motions are too exaggerated. My P23 information will be much better if I use unbalance couple.
07 21 05 01	CC	Okay, Pete - or Dick, good idea. Thank you.
07 21 06 21	CC	Hello, Pete; Houston.
07 21 06 25	CDR	Go ahead, Houston.
07 21 06 28	CC	You gave us a battery manifold pressure of 3.6; would you confirm that that is volts?

07 21 06 38	CDR	Yes. That - Well, I read it wrong. I was looking at the wrong thing. It was 1.8 volts.
07 21 06 46	CC	Roger. 1.8. We did a little head scratching down here on that one. Thank you.
07 21 06 54	CDR	Sorry, sorry.
07 21 06 59	CC	No problem. It's good to exercise the system.
07 21 12 53	CC	Apollo 12, Houston. High gain antenna angles for your next P23 attitude: pitch, minus 55, yaw 3.
07 21 13 15	CDR	Roger, Houston.
07 21 31 07	CDR	Houston, 12.
07 21 31 10	CC	12, Houston. Go ahead.
07 21 31 15	CDR	Okay. I got a question for you.
07 21 31 18	CC	Go ahead.
07 21 31 23	CDR	Anybody got any suggestions down there on how we could warm up the cabin a little bit? It's getting a little cool in here. Can we go - do like we do on the launch day or whatever it is and maybe run the secondary loop without any cooling on it or something to get some heat in here?
07 21 31 42	CC	Stand by, Pete.
07 21 35 00	CMP	Houston, 12.
07 21 35 03	CC	12, go ahead.
07 21 35 09	CMP	Roger. How many marks is that on the second star? I've lost count. Is that two or three? I believe it was three.
07 21 35 24	CC	Stand by, Dick.
07 21 35 28	CMP	And, also, ask if they want another trunnion bias before I finish off this set.
07 21 36 38	CMP	Ed, you still with me?
07 21 36 40	CC	Yes, We're still with you. Right now they're still scratching their heads. Just a minute, Dick.

07 21 36 47	CMP	Well, tell them to quit scratching. I'll say that was three, and I'll press on, and I'll do another trunnion bias. They don't have to worry about it.
07 21 37 01	CC	Okay, Dick. We concur.
07 21 37 35	CC	- - Okay, Dick. The problem down here was that we didn't have data when you were taking your first mark, so we really weren't sure where you stood in the total flow.
07 21 37 49	CMP	That's - That's our fault, Houston. We're the...
07 21 37 57	CMP	Ed, does that mean you want me to do that first set of stars over again?
07 21 38 09	CC	Negative on that. We've got it recorded, and we'll dump and take - We'll have a dump and take a look at it.
07 21 38 17	CMP	Okay. Thank you. I'm going to have to do another trunnion bias and press on to star number 3.
07 21 38 24	CC	Okay, Dick. Very good.
07 21 41 40	CC	Apollo 12, Houston. For your calibration attitude, give us OMNI Delta.
07 21 41 47	CDR	Roger. Going OMNI Delta.
07 21 44 14	CC	12, Houston.
07 21 44 21	CDR	Go ahead.
07 21 44 24	CC	We have a procedure here for warming up the cabin.
07 21 44 32	CDR	Go ahead.
07 21 44 35	CC	Okay. Take the glycol EVAP temperature in to MANUAL and adjust the primary glycol EVAP IN valve to obtain a temperature of the glycol evaporator OUT of 55 degrees.
07 21 44 58	CDR	Okay. GLYCOL IN valve to MANUAL and adjust the glycol TEMP to an IN of 55. Thank you. And be advised we're running one cabin fan right now.
07 21 45 09	CC	Roger.
07 21 45 21	CC	Pete, on that last procedure, we want to adjust the EVAP temperature OUT to 55 degrees.

07 21 45 33	CDR	Roger. TEMP, OUT. Did I say "TEMP, IN"? I'm sorry.
07 21 49 15	CC	Apollo 12, Houston. Do you still have the high gain angles for the P23 attitude?
07 21 49 22	CDR	Yes. I think I have them here in REACQ. Say them again.
07 21 49 28	CC	Roger. That's pitch, minus 55; yaw 3.
07 21 49 41	CDR	Yes. We've got them.
07 21 49 43	CC	Thank you.
07 21 53 46	CDR	Houston, 12 on the high gain. Back in the P23 attitude.
07 21 53 52	CC	Roger, Pete. We've got you loud and clear.
07 21 54 15	CDR	Say, Ed, you're getting pretty doggone good at this CAPCOMMing, aren't you?
07 21 54 21	CC	Oh, well, I enjoy it. Getting a little practice on these coast periods. Like I say, however, Paul Weitz is the real sleep expert.
07 21 54 41	CDR	I kind of figured last night we must have gone through 10 CAPCOMM's of sleep.
07 21 54 47	CC	Yes. You went through a few. Paul Weitz came in here and was waiting 6-1/2 hours for the big moment and then you overslept, and he went out of here with a long face again.
07 21 55 04	CC	However, he's on for reentry; he's assuming you're not going to be sleeping through that.
07 21 55 11	CDR	I don't think we will be. Who's the Flight Director down there today, right now?
07 21 55 21	CC	We've got Pete Frank.
07 21 55 26	CDR	Oh, I thought if it was Jerry, I'd let him listen to some of my music.
07 22 03 34	CMP	Hey, Houston; Apollo 12.
07 22 03 37	CC	12, Houston. Go ahead.
07 22 03 41	CMP	Roger. Have you been looking at this P23 inertial?

07 22 03 48	CC	That's affirmative, and we copy you're off the fairway.
07 22 03 49	CMP	The AUTO optics are dropping. Have you got any suggestions? I've dropped back to zero optics.
07 22 04 02	CC	Yes. Stand by, Dick, and we'll be right with you.
07 22 04 08	CMP	Okay.
07 22 04 41	CC	Dick, would you take the optics switch to zero and wait 30 seconds?
07 22 06 00	CMP	How does it look, Ed?
07 22 06 23	CC	Stand by, Dick. We're still looking at it.
07 22 07 27	CC	Dick, could you give us POO?
07 22 07 37	CMP	Okay. You got it.
07 22 08 24	CC	Dick, we'd like to sit here in POO for about 5 minutes. It may be a possible software problem.
07 22 08 32	CMP	Okay, Ed. No problem. You've only got us thinking how to do new realignments.
07 22 08 42	CC	Roger.
07 22 08 54	CDR	It's about time CMP get back in the game again.
07 22 08 58	CC	Pete, you were way down in the noise level there. Would you say again?
07 22 09 05	CDR	I don't think you want to hear it.
07 22 09 11	CC	It sounded too good to miss.
07 22 09 14	CDR	I just said that - I just said that it sounds like CMP is getting back in the game again.
07 22 09 28	CC	That's right. He's been itching to go since launch.
07 22 09 35	CDR	I bet he has. Since after launch, huh?
07 22 09 39	CC	That's right, about a minute after launch.
07 22 09 56	LMP	Hey, how about looking on the records down there and find out how long it was from the time our fuel cells cropped off the line until we put them back on? Can you do that?

07 22 10 06	CC	Roger. Sure will.
07 22 10 34	CC	12, I can read up to you a portion of our news broadcast that we were going to read up to you a little later on, which is on that subject, and it was - A tentative analysis shows that the Apollo 12 was struck twice by lightning during lift-off. Don Arabian told a press conference gathering in Building 1 that the strike occurred at 36 seconds after lift-off and again at 52 seconds after the Saturn left the pad. According to Arabian, the rocket and the engine plume exhaust acted just like a wire that ran from the clouds to the ground and then from cloud to cloud. There are photographs available of the strike. The Arabian analysis is called a very interim kind of report.
07 22 11 24	CDR	Hey, that's great. We're sure looking forward to seeing those films. We saw it from inside, but we'd sure like to see it from outside the next time.
07 22 11 31	CMP	You said it.
07 22 11 43	CC	How did it look visually from the LM, looking at the command module/service module interface?
07 22 11 58	CDR	Well, we've been discussing that subject and I guess you ought to go look at some photographs of CSM's that have had LM's on the nose and make sure that it's not from LM thruster firing, but that junction box where all the cabling runs from the command module to the service module was black on top like it was burned, and - However, I noticed on the top of the ... boxes on the service module some similar type marks. We were discussing it here, and our suspicion was possibly the lightning strikes always goes to the small point, and we were suspecting up here you had us on the outside pictures, that we probably got struck on the tower and it just went all the way down the stack.
07 22 11 54	CC	Roger, Pete.
07 22 13 04	CDR	I wonder if they are going to revise the weather rules for launch?
07 22 13 14	CC	I guess they are looking at it. What's been said so far, under identical conditions with an identical spacecraft, you wouldn't do it over again.

07 22 13 25	CDR	These three guys would.
07 22 13 28	LMP	Yes, you left out one item, the crew.
07 22 13 33	CDR	I guess we hold the world's record now as the world's fastest lightning rod.
07 22 13 41	CC	The world's tallest.

END OF TAPE

07 22 18 39	CC	Hello, Al; Houston.
07 22 18 45	LMP	Go ahead.
07 22 18 48	CC	Okay, on your request before, we showed that at 36 seconds, three fuel cells went off; at 1 plus 42, two fuel cells were on line; and at 1 plus 70 - or I'm sorry that's 142 seconds, two fuel cells were on line; and 170 seconds, the third one came on.
07 22 19 19	LMP	Okay. We'll - we've been trying to remember it ever since launch. We hadn't been giving it a lot of thought since we left Earth orbit, - but we were trying to think about it right now. We couldn't remember where we got them back on.
07 22 19 33	CC	Roger. Did they indicate barber pole after that 36 seconds?
07 22 19 40	LMP	Oh, yes. They indicated barber - all - all six of them were barber poled; and FUEL CELL 1, 2, 3 light were on, and AC BUS 1 and 2 light were on, and AC BUS 1 and 2 OVERLOAD were on the FUEL CELL BUS DISCONNECT was on and MAIN BUS A undervolt, MAIN BUS B undervolt, and every one of those things were on. I'll tell you - -
07 22 20 01	CDR	I also looked at the malfunction procedures and there's nothing that covers that particular series of lights.
07 22 20 07	LMP	We knew there wasn't. The funny part about a situation like that is you get - All right, let's say you get, for example, a fuel cell and an AC, an AC overload and a main bus undervolt, you don't work on the fuel cells because you know the problem's probably down in the ac somewhere so you start in the ac. And that's sort of what we did. We started working down in the ac, and they were all good. Then, we went up to the overload. They looked good. Then we're into the mains and they looked pretty good except the undervolt. Then we finally got to the fuel cells, so we - and I didn't have idea one on what to do.

07 22 20 42	CC	Well, it looks like we got another page in the malfunction book.
07 22 23 10	CC	Apollo 12, Houston. We're looking at a middle gimbal angle down here of about 58 degrees.
07 22 23 18	CDR	Roger.
07 22 24 03	CDR	Hey, that's - We've just been talking in here, and we just thought of something. When we lost the three fuel cells, which was at 36 seconds, which was the first time lightning struck - Of course, we didn't realize that we got hit twice. However, the platform didn't go when all the fuel cells went. So, it must have been when we got hit the second time that that dumped the platform. Now, it's beginning to make sense. I've been - It's been but - bugging me all along how we lost the platform so late. We didn't know whether it just slowly went off because of the 24 volts or what, but it sounds like now what happened was that if we, in fact, really did get hit twice, why, the second time that dumped the platform.
07 22 24 55	CC	Yes, that may be. They've been looking over all the traces down here and talking to all the lightning experts, and I think they have some tentative ideas on that. They'll probably be able to give you some pretty concrete discussion on it when you get back.
07 22 25 12	CDR	Okay.
07 22 27 44	CC	Apollo 12, Houston.
07 22 27 48	CDR	Go ahead. Go ahead.
07 22 27 53	CC	Okay, two things. First of all, we did confirm that you lost your platform at 56 simultaneously with the - the second strike. And also, on the optics problem, we suspect that it may be due to operating the optics switch at the same time as VERB 37. We'll be coming up to you with some DSKY entries to check this.
07 22 28 20	CDR	Okay.
07 22 28 24	CC	And, Dick, could we have a clarification on something which - which happened a short while ago, and that was, what value had you loaded into the EMS counter before MCC 5?

07 22 28 42	CMP	2.0.
07 22 28 45	CC	2.0. Roger.
07 22 28 47	CMP	There's so much bias in that thing, it almost counts up - so much bias in there that it almost counts up as fast as it counts down.
07 22 28 55	CC	Roger.
07 22 29 01	CDR	Say, I've been wondering if we ought to - Dick and I discussed this much earlier in the flight and wondering - We could calibrate that accelerometer here in flight during GTA, and I'm just wondering if we oughtn't do that. This thing is really bad news. It's got a lot of bias on it.
07 22 29 39	CMP	Maybe the GTA doesn't work in flight; I don't know, but we ought to see whether we could get that bias out of the EMS.
07 22 29 47	CC	Pete, one thing which we're suggesting down here is to load in 102 or 100 into whatever it is and fly with that.
07 22 29 58	CC	That should help you - -
07 22 29 59	CDR	It does the same thing.
07 22 30 00	CC	That - -
07 22 30 02	CMP	No. That doesn't either. It does exactly the same thing.
07 22 30 08	CC	Roger.
07 22 31 56	CC	Apollo 12, Houston with the DSKY entries.
07 22 32 02	CMP	Okay, wait 1.
07 22 32 20	CMP	Okay, Ed. We're ready to copy.
07 22 32 23	CC	Okay, what we're doing here is setting the optics status word or OP's modes to a known configuration. We do that with a VERB 21, NOUN 01, ENTER, 1331, ENTER, 130, ENTER. And then, if you would, cycle the optics zero switch OFF and then ON; and we'll be watching it down here, and stand by.
07 22 33 01	CMP	Roger, Ed. Copied. Checking out the optics mode and VERB 21, NOUN 01, ENTER, 1331, ENTER, 130, ENTER, optics zero OFF, and then back ON.

07 22 33 13	CC	Affirmative.
07 22 33 33	CMP	Okay, optics zero is OFF and goes back to optics zero.
07 22 33 42	CC	Roger.
07 22 34 24	CC	Apollo 12, Houston. That looks as though it cleared the problem. We're ready to go on with the P23's.
07 22 34 41	CMP	Do you want another trunnion bias, or is that okay, the same one I had?
07 22 35 00	CC	Stand by, Dick.
07 22 35 09	CC	Dick; we better - -
07 22 35 11	CMP	It hasn't changed, the whole flight.
07 22 35 16	CC	Dick, we better go ahead and get another optics CAL.
07 22 35 21	CMP	Okay.
07 22 35 54	CC	Dick, go ahead and scratch the optics CAL. Looking at it, we feel you can get away without it.
07 22 43 03	CC	12, Houston.
07 22 43 10	CDR	Go ahead.
07 22 43 11	CC	Okay, clarification on that optics problem: if you go to optic zero and then hit VERB 37 before 15 seconds have elapsed, you can run into the problem which you did.
07 22 43 27	CDR	Okay, we understand. Thank you. And Dick said that's exactly what he did by mistake. He says it's from ignorance.
07 22 43 59	CC	And, 12, one thing on the - your gas separator; we'd like to try and see how well that thing is working. You can go ahead and remove the gas-separator cartridges and run on the H_2 separator only. And continue on that way unless it's not doing the job, and then you can go back to your normal configuration.
07 22 44 06	CDR	Well, let me tell you what we've done, anyhow, already. We've been running our food system

without the cartridge, and we've been running the gun with the cartridge for the whole flight. And the cold water output is very, very good on the food system. The hot water output still has a tendency to get some air in it. But I kind of suspect that there's just a little air or hydrogen or whatever it is in the water, and when you heat the water, that makes the air bubbles expand; and we'll go ahead and pull the cartridge off the gun and operate without it and see how that goes. We have had the cartridge on the gun the whole time.

07 22 44 53	CC	Okay. Thank you, Pete. And also, you - if we go ahead and pick up some BIO - data on Dick and Al during the course of the day, we'd appreciate it.
07 22 45 09	CDR	Okay, I'll have them hook up.
07 22 45 34	LMP	We thought we were hooked up. We forgot.
07 22 45 46	CC	Roger. Surgeon is looking at you, now.
07 22 46 02	CC	And, 12, when you finish up with the P23, we have a high gain test here. It's an engineering attempt to isolate the problem area, and we're looking for a thermal problem in the high gain antenna electronics.
07 22 46 21	CDR	Okay, very good. You got something we can copy down now. We'll go ahead and copy it.
07 22 46 30	CC	Okay. Coming at - coming at you first of all with a switch configuration: S-band TRANSPONDER to PRIMARY; S-band AUXILIARY to TAPE; TAPE RECORDER, PCM ANALOG, TAPE RECORDER to RECORD; S-BAND ANTENNA, HIGH GAIN; HIGH GAIN power, ON, HIGH GAIN ANTENNA, SERVO ELECTRONICS - -
07 22 46 56	LMP	Ed, take it a little slower.
07 22 47 00	CC	Okay. Let's go back. S-band TRANSPONDER, PRIMARY - -
07 22 47 04	CDR	Hey, you've got Al really smoking in here - -
07 22 47 06	LMP	We don't take shorthand up here, gang.
07 22 47 18	LMP	Go ahead, Ed.
07 22 47 21	CC	Okay, Al, are you ready? S-band TRANSPONDER, PRIMARY - -

07 22 47 25	CDR	Hey, Al was ready last time.
07 22 47 30	LMP	I've got it all the way down to POWER, ON.
07 22 47 34	CC	Okay, that's HIGH GAIN power ON, and then HIGH GAIN SERVO ELECTRONICS, to PRIMARY. Okay, then set up the following attitude.
07 22 47 48	LMP	Okay you want - -
07 22 47 51	CC	Pitch, 0; yaw, 69.9; and roll, 50. The attitude deadband of 0.5, which I believe you have in there now, so it's no change. You acquire MSFN in the MANUAL mode and then switch to the AUTO REACQ mode and NARROW BEAM width. High-gain angles from manual acq - acquisition are: minus 22 on pitch and yaw, 194. Okay, then if we detect a loss of lock, or if you detect oscillations, turn the DSE on by placing the TAPE RECORDER switch to FORWARD. And go - go ahead and get data for 5 minutes, and then stop the recorder. And then, at that point, we've got a little set of procedures we'll follow through here, and we can read them off to you at the time, as you're going through them step by step. What essentially we're doing is looking at the effect of primary versus secondary transponder or primary versus secondary electronics and WIDE BEAM width versus NARROW BEAM width.
07 22 49 49	LMP	Okay, I understand now that you want the TRANSPONDER in PRIMARY - -
07 22 49 53	CC	Al, could you hold it a minute?
07 22 49 54	LMP	The S-BAND AUX to TAPE switch. Sure.
07 22 49 58	CC	Okay, we'd like you to go ahead and get that optics CAL now that you're finished with the P23.
07 22 50 14	LMP	Okay. Start working on it now.
07 22 50 21	CC	Okay, Al, go ahead with your readback.
07 22 50 26	LMP	Okay, you want the TRANSPONDER, PRIMARY and then you want to put the S-BAND AUX in TAPE; put the receiver to PCM ANALOG and RECORD; go on the HIGH GAIN with the S-band; put power on with SERVO, PRIMARY; go to a spacecraft attitude of pitch, 0; yaw, 69.9; roll, 50 with a deadband of 0.5. We'll acquire - we'll acquire MSFN manually; switch to the REACQ mode with NARROW DEADBAND, and those angles are minus 22 and 194; and, if we notice a

		loss of lock or we notice that we get oscillations, we turn the RECORDER, OFF, for at least 5 minutes.
07 22 51 17	CC	That's right, and if you run into loss of COMM, you'll be able to pick us up on OMNI Bravo.
07 22 51 26	LMP	Roger.
07 22 51 46	CMP	Houston, Apollo 12.
07 22 51 49	CC	12, go ahead.
07 22 51 53	CMP	Hey, Ed, on this - about this CAL this maneuver, and you people down there on the ground are obviously noticing this, quite a ways away from both attitudes where we're doing the P23's themselves. For the next series of stars - I haven't looked at them yet; but, for the next series of P23's, would you check that to make sure that we don't have this large maneuver? We'll look at it, also, right now; and if we do, let's pick a different star for the - for the optics CAL. We don't need a star as bright as 12. We can use almost any star we've got out there.
07 22 52 37	CC	Okay, Dick, we understand that. And - -
07 22 52 39	CMP	You know what I'm talking about?
07 22 52 40	CC	Roger; we understand that request. It's a good idea. We'll be doing that.
07 22 52 45	CMP	Maybe the angles are such with the Sun that we don't have one, but - but I think you can give me one near the P23 attitude that I can use for a - a trunnion bias or optics CAL. If not, I can always use star 12.
07 22 53 03	CC	Roger. We concur with that down here. We'll be doing that for you, Dick.
07 22 57 45	CMP	... copied the DSKY.
07 22 58 00	CDR	Hello, Houston. On OMNI Delta; how do you read?
07 22 58 03	CC	We read you loud and clear.
07 22 58 08	CMP	Okay, got the DSKY. There's his first optics CAL.
07 22 58 16	CC	Roger. We're looking at it.

07 22 58 21	CDR	Okay. Here comes the second one.
07 22 58 37	CDR	There it is. And there's the third one. And there's the fourth one. Okay, Ed, that's it.
07 22 59 17	CC	Okay, that looks good. Thank you.
07 22 59 22	CDR	Okay. Now we'll go ahead and maneuver to the attitude for this S-band.
07 22 59 27	CC	Okay.
07 23 00 13	CC	12, Houston.
07 23 00 18	CDR	Go ahead.
07 23 00 20	CC	Those sightings look pretty good. You - you had a good state vector in there, and the sightings essentially change it so your - your reentry angle changed by just 0.035 degrees.
07 23 00 36	CDR	Okay.
07 23 01 29	CMP	Houston, 12.
07 23 01 30	CC	12, go ahead.
07 23 01 34	CMP	Ed, this is Dick. Would you ask the guys there to determine whether they want us to do a 47 or leave it the way it is? And I want to play with this P37 a little bit, later.
07 23 01 54	CC	Roger, Dick.
07 23 01 58	CMP	I know what I'd like to do is go ahead and leave the state vector in there that I've got and see if I can improve on it with this series of marks.
07 23 02 10	CC	Dick, we concur. That sounds good. Go ahead and do it that way.
07 23 02 16	CMP	Thank you.
07 23 02 19	CC	And, Dick, when you like, we could take a look on - at your next set of P23's on page 3-173 and look at your second optics CAL.
07 23 02 37	CMP	What do you mean the second one?
07 23 02 39	CC	Okay. Well, you do the first one and then about 30 minutes later - 30 or 40 - you probably want to pick up a second one.

07 23 02 49	CMP	Yes, that's true. If I can get myself in gear and get going and get all those in before 30 minutes are up. However, go ahead.
07 23 02 56	CC	Okay. If you don't get them all in before you require another one, perhaps the easiest way to do it is to just pitch up 57-1/2 degrees so that you - your zero line of sight is then right along star 160. That's probably the smallest attitude change.
07 23 03 19	CMP	In other words, go ahead and pitch up 57.5 and use star 160 for the trunnion bias CAL.
07 23 03 26	CC	Roger. That's the star you have to be going next - -
07 23 03 27	CMP	... that's what you told me?
07 23 03 29	CC	- - That's affirmative. That's the star you happen to be working with.
07 23 03 32	CMP	Okay. Okay, I'll do 160. I should get that in under a half hour with no strain. I'll do star 160 and then pitch up 57.5, do a CAL, and press on.
07 23 03 47	CC	Roger. Actually any star you're working - -
07 23 03 48	CMP	Say again.
07 23 03 49	CC	- - with, whether it's 160, 171, or 163, whichever one you happen to be at.
07 23 03 55	CMP	Okay, and I understand. That figures.
07 23 05 24	CMP	Houston, 12.
07 23 05 26	CC	12, go ahead.
07 23 05 29	CMP	Ed, I'd like to think about this pitching up 57. Whether I pitch, yaw, or a combination of them depends on shaft angle for that particular star. Does it not?
07 23 05 42	CC	Roger, Dick. We're just talking about that down here. That's a pilot pitch of 57-1/2 degrees, and it may be getting you into the problem with the middle gimbal angle. What we can do down here is, and plan to do, is to work you up a calibration star for each one of the stars you'll

		be working at, and we can give it to you at any time you want it during the P23.
07 23 06 06	CMP	Okay, that sounds like an awful lot of work. Why don't you give me a normal NAV star or a star that's in the vicinity of roll, 090; pitch, 329; yaw, 332? Give me a star that's close to that.
07 23 06 24	CC	Roger. Okay, we'll do that, Dick.
07 23 06 57	CC	12, Houston. Could you go on back to balance couples now?
07 23 07 05	CMP	No. We sure can't. Thanks for reminding me. We should go AUTO maneuvering on that except for the actual P23. And we really intend to.
07 23 07 23	CC	Roger, Dick. That makes it a little easier to keep track or to make sure we got a good state vector for you.
07 23 07 31	CMP	Roger. I understand all the problems; but, just during the marking, I want to be in the unbalance, but all of our maneuvers should be with - be with balance couples. I agree.
07 23 07 42	CC	Guess that vehicle is a little sensitive right now, isn't it?
07 23 07 48	CMP	It sure is, if you have ... and minimum impulse.
07 23 11 05	CMP	Houston, that was your ALERT light. Did you see it?
07 23 11 18	CC	Stand by, 12.
07 23 12 20	CC	Apollo 12, Houston.
07 23 12 57	CC	Apollo 12, Houston. Go ahead. Did you get your CREW ALERT.
07 23 13 03	CMP	Light on that?
07 23 13 41	CC	Apollo 12, Houston. Houston did not send a CREW ALERT. We're checking with the sites now.
07 23 13 49	CMP	No, no. You misunderstood me, Ed. We had the GIMBAL LOCK light on.
07 23 13 51	CC	Okay. Yes, we misunderstood.

07 23 13 53	CMP	Put it - Yes. We didn't put it GIMBAL LOCK, but the ALERT part of it was on.
07 23 14 30	CC	Apollo 12, Houston. We would expect that light, and you're still about 15 degrees away from getting - getting into a problem.
07 23 14 40	CMP	Yes, we're watching, Ed, but we got another problem here. I look at our attitude, and I got a 58P, and I can't maneuver automatically away from this thing. You think we ought to zero the OCDU one time?
07 23 14 58	CC	Dick, say again your last comment.
07 23 15 03	CMP	Well, look where we are. There's our attitude, and I can't maneuver past this automatically. I get a 618 and it says we're there.
07 23 15 17	CC	Okay, Dick. Stand by.
07 23 15 21	CMP	We're there. We're right there. We're okay. Hey, we're crazy up here. We're all right.
07 23 15 35	CC	12, we agree with your last comment.
07 23 15 37	CMP	We'll explain this to you later. We don't want - Well, we'll explain it later. We have a good reason for it, but we don't want to tell everybody.
07 23 15 47	CC	Okay.
07 23 15 48	CDR	What he's saying is we are dumb-dumb up here.
07 23 15 51	CC	No, we agree with the last comment, not the first one.
07 23 19 26	CC	Apollo 12, Houston.
07 23 19 31	CDR	Go ahead.
07 23 19 33	CC	We got the folks down here thinking about the difference between a 5018 and a 618: You thinking about the same thing?
07 23 19 41	CDR	No, no - we (laughter) - we were just dumb-dumbs sitting here looking at 69 degrees yaw, which is sitting right next to gimbal lock in zero pitch, and wondering why we were sitting there; and it wasn't maneuvering when we were really in the right place. That's all.

07 23 20 02	CC	Roger, 12.
07 23 20 04	CDR	We're just not used to sitting in an attitude like this where we're looking at a red ball.
07 23 20 08	CMP	Hey, Ed, I have a feeling we're telling you to much, and you're all getting nervous down there.
07 23 20 44	CC	Apollo 12, Houston. Would you confirm that you've got the switch configuration as we've read up, and then, also, have you gone to REACQ in NARROW BEAM?
07 23 20 54	CMP	Roger. It's all set.
07 23 20 58	CC	Roger. Okay, now in that attitude, we got the Sun looking right up the engine bell and that ought to be heating things up as fast as we can do it.
07 23 21 11	LMP	Okay. Don't forget we've been operating in SECONDARY SERVO up until about 5 minutes ago when we switched to PRIMARY for this test.
07 23 21 24	CC	Roger Al.
07 23 21 50	CC	Apollo 12, Houston. We see no FM subcarrier down here. Would you confirm that the S-BAND RECORDER - or S-BAND AUX is to TAPE?
07 23 22 05	CMP	It's at TAPE.
07 23 22 08	CC	Thank you.
07 23 22 09	CMP	How about a RESET?
07 23 22 11	CDR	How about a RESET? Yes.
07 23 22 14	CMP	Give you a RESET.
07 23 22 18	CC	Roger.
07 23 24 20	CC	12, Houston. We have the subcarrier now. What we're going to be doing now is just sitting here and seeing if the problem will appear, and we're looking for a - a 6-degree - decibel drop in signal or you report a hunting in the antenna.
07 23 24 41	CDR	Okay.
07 23 24 50	CC	And, 12, this could go on for a little while. We'll continue this for 4 hours, or until a problem is identified.

07 23 24 59	CDR	Okay, very good.
07 23 28 41	CC	Apollo 12, Houston. While you're sitting there backed up to the fire, we have some news for you, if you like.
07 23 28 49	CDR	Go ahead, Ed.
07 23 28 54	CC	Okay, 12. There're some pretty good football games on tap today in the college ranks. Ohio State and Michigan tangle in a Big Ten game. The Buckeyes are favored to win and retain their number 1 rating. If Ohio State does win and retain its number 1 ranking, it will be the 6th time in modern football history that a team has won the title 2 years in a row. In other games, UCLA is favored over Southern Cal; Purdue is favored over Indiana; Oklahoma is the choice over Nebraska; and TCU should beat Rice. Princeton plays Dartmouth; and Washington meets Washington State; and we're not guessing the outcome with any of those. Texas University is open, and they're looking towards Texas A&M on Thanksgiving. Houston is picked over a tough Wyoming team. We'll keep you posted on the games that are going on this afternoon. Texas is now accepting ticket orders for the Cotton Bowl and the Sugar Bowl. The winner of the Texas-Arkansas game on December sixth goes to the Cotton Bowl to face the Fighting Irish. And the loser will play Mississippi in the Sugar Bowl at New Orleans. Willie McCovey of the San Francisco Giants beat out Tom Seiver of the Mets for the National League's Most Valuable Player Award. The big game in pro ball on Sunday is the Dallas Cowboys against the Los Angeles Rams. The Oilers will be playing the Miami Dolphins down in Florida. Meanwhile, the Oilers report that line backer Ed Watson has been placed on waivers to make room for Woody Campbell. A Delta launch vehicle has placed - placed Britain's first communications satellite into an orbit from Cape Kennedy. It's called Skynip. Now in an elliptical orbit, the satellite will be placed into a synchronous orbit of 22 300 miles on Sunday. In the world and national news headlines, the Senate has rejected the nomination of Judge Clement Haynsworth by a 55-to-45 vote. Henry Cabot Lodge has resigned as ambassador to the Paris peace talks, and Charles DeGaulle is 79 today.
07 23 31 21	CC	All three Apollo 12 wives wowed the news media yesterday as they paraded out of the Conrad house

in stunning white suitpants. They each carried a sign which read, "Proud, Thrilled, and Happy." The family activity will be rather restricted this weekend. Dick, Barbara will attend Mass this Sunday - or this morning at 8:30. And, Al, Sue will attend a luncheon today at the Lakewood Yacht Club and will visit Mission Control this afternoon at about 3 PM. Pete, Jane will be going shopping today for Chris' birthday present. She is also scheduled to go to the Yacht Club for the luncheon. On Sunday, after church, they plan to go on a picnic at Cloverfield with the Rice's. Your father-in-law is expected to arrive here sometime Sunday and will remain until after splashdown.

07 23 32 11	CDR	Thank you, Ed.
07 23 32 13	CC	You're welcome.
07 23 32 14	CDR	Thank you kindly, and tell those Huskies to get after those Cougars today.
07 23 32 27	CC	We'll do it, Dick.
07 23 32 42	CC	And, 12, it's been about 5 hours now since you started accelerating back towards the Earth.
07 23 32 55	CDR	Good.
07 23 33 07	CMP	Roger, Ed, and I have us at 15.97 degrees north and 91.62 east.
07 23 33 24	CC	Roger, Dick.
07 23 33 26	CMP	And I have us at a - and I have us at 174 480 miles out from Earth, traveling at 3150 feet per second; and our entry angle to the Earth at this time is minus 78.11 degrees.
07 23 33 50	CC	Dick, that sounds good. They're all right on.
07 23 40 01	CMP	Houston, 12.
07 23 40 06	CC	12, Houston. Go ahead.
07 23 40 11	CMP	Ed, we'd like to have you to keep track of one more thing. We have done a GDC alignment just prior to this test, when we got to this attitude; and, before we come out of it, I wish you'd remind us to review our angles on the GDC. This thing's been drifting pretty badly in yaw the

whole flight. In fact, it's up to, I think, pretty close to 10 degrees an hour in yaw, but we'd like to give you the numbers when we get out of this - just before getting out of this attitude.

07 23 40 45 CC Okay, Dick. We'll do that.

07 23 44 06 CC Apollo 12, Houston with some news on how your ALSEP is doing.

07 23 44 16 CDR Go, babe.

07 23 44 18 CC Okay, your - the central station is still performing well. RTG output is around 73 watts, and as of just a short while ago, they've sent up a total of 382 commands. PSE has gotten into a stable temperature equilibrium around 126 degrees. And they have observed three - at three different times, the tracings have showed that there was some seismic activity taking place. The LSM is - is increasing in activity as the Moon is entering a magnetic zone between the Earth's two solar shock waves. That is, the Moon is approaching the center of the Earth's magnetic tail near lunar noon where the - where the field is the lowest. And at that point, the LSM site survey will be accomplished. And the solar wind is perking right along and doing real well.

07 23 45 29 LMP Say, Ed, from all they know now about watching the temperatures, do they forecast this will last for 2 years?

07 23 45 41 CC Okay, folks down here are pretty optimistic, but I'll have to ask to see if we can really extend it that far. I'll try and get you an answer to that, Al.

07 23 46 13 CC And, 12; Houston. The folks down here have thought a little bit about your two EVA's, especially the geology involved, and have a few questions which were stimulated by what you said during the EVA's and after it. And, any time you would like to have a discussion of those questions, we are sitting here waiting for you.

07 23 46 38 CDR Okay, Ed. We're in the middle of a big garbage cleanup right now; and, as soon as we get the place spruced up, we'll be with you. It'll take us about another hour or so.

07 23 46 48 CC Okay, Pete.

END OF TAPE

07 23 57 00	CC	Apollo 12, Houston. In another 3 minutes, we'll have a site handover, and you'll get a temporary loss of signal.
07 23 57 07	CDR	Okay.
08 00 16 39	CDR	Houston, 12.
08 00 16 45	CC	12, go ahead.
08 00 16 49	CDR	Roger, Houston. We've completed our little sweep - down there and we're ready for your question.
08 00 16 55	CC	Okay, Pete. We'll be with you in just a minute.
08 00 17 15	CC	Okay, Pete. One question is, could you give a little more elaborate description of the patterned ground with the ridges and grooves; that is, were there several scales of the patterning and was there a difference in the bearing strength of the surface on the patterned ground?
08 00 17 39	CMP	You're referring to the things that look like streaks and that we talked about that were in different directions, also, than the LM - so that they weren't effects of the LM exhaust plume, is that what you're talking about?
08 00 18 00	CC	Yes, you talked - you described some which were perpendicular to the dis - to the direction which you thought the exhaust plume would normally give pattern ground.
08 00 18 11	CDR	Yes. If I remember correctly, that was in the Surveyor crater, and I think that we noticed these radial streaks almost everywhere. Don't you agree, Al?
08 00 18 25	LMP	Yes. We'd see some and then we'd go through an area that wouldn't have any; then we'd see another area and then there would be an area that wouldn't have any, so we were seeing them frequently, you know; they weren't very isolated, but they were all over. The ones down in the Surveyor crater were from - looked to me like the north-northeast, running southwest, wouldn't you say, Pete? And then maybe the ones out in front of the LM, for example, they were north, running south and maybe northwest running south. I can't remember

now, but I'm sure it's on the voice tape. The size as I recall - Pete may recall them differently - It's hard to remember them, some of these things - They look to me like they were about maybe an eighth of an inch to a sixteenth of an inch wide, and they maybe were a - as you looked at them real close, they looked like they were about a sixteenth of an inch high or less and then, maybe then they were about three-eighths of an inch between little hills; something like that would be my guess. What do you think, Pete?

08 00 19 28 CDR Yes, I agree with that. You mentioned bearing strength. I think the bearing strength of the ground, generally speaking, in the Surveyor crater and up around as we approached it from the far side on our traverse and everything was probably some of the firmest ground we were on; the ground that we sank in the least. There was one place we got into, when we got out - way out - Was it sharp crater, Al? - where we felt that the ground was much more soft and powdery and we were, therefore, not as good bearing strength.

08 00 20 08 LMP Yes. I think it was sharp; maybe that's on the tape, too.

08 00 20 11 CDR And I can't - I can't say that I remember any radial patterning out there at sharp to speak of.

08 00 20 20 LMP I don't remember any either. One thing - we know we did that gold camera right at the very end, and I don't think I was able to get any of that patterned ground; I should have, but the time just ran out. Before I could get very many pictures, we came back in. I did take it with a 70-millimeter several times.

08 00 20 41 CC Roger. Over what extent did that patterned ground occur, and can you relate it to anything that you've seen back here?

08 00 20 59 CDR Well, I don't think we paid that much attention to it, other than when we were aware of it; it was all around us like the Surveyor crater. Going down - I guess walking down to the Surveyor was when we noticed it in there, while we were resting. And to what extent it went, I really can't say; but, like Al said, we came across it in several places, and I would - I don't think - It's more an impression than anything else, but

I really don't remember it out there by sharp crater or anything, and that is where ground was sort of soft and maybe finer grained than we've been on. So that may be a very pertinent point, that the more firmer ground that we're on, the more we would see this radial or patterned streaking.

08 00 21 53 LMP Hey, and that's something else I haven't thought of, Pete. Remember that firm ground also was the same ground we came up on when I said it looks this ground has got kind of little blobs in it; and it looks like what a nice, smooth, level dirt field would look like if it just had some very light rain on it. Remember when we looked at that? That's was - -

08 00 22 13 CDR You're right. That was when we were on firm ground, right there. That's a good point; I hadn't thought of that.

08 00 22 19 LMP I do remember looking at that patterned to see where it went; and usually, if I was near it and looked out in the distance, it looked like it went in the direction of the grooves, as far as I could see out in that direction, you know, and be able to see any detail that fine. In other words, I never did look either left or right on those groove patterns where it did look to me like it went all the way out to the limit of vision to seeing them. I never saw any sort of contact along the transverse direction of the grooves either in Surveyor crater or in front of the LM or the couple of other places we happened to walk around. Yes, now that I mention it, we saw I guess at least three basic types of ground. The one that we were on most of the time that we discussed, like right outside the LM, we saw the kind with the grooves; we saw the kind with the little like raindrops on it, and we - of course, we got pictures of all the different kinds, and then we - we saw some more finely powdered ground like out around sharp crater, and then we saw some more finely powdered like is down on the inside of the small craters and some - to some extent on the inside of the Surveyor crater. Those are all the different types of soils that I can recall.

08 00 23 39	CDR	However, they all had the same color. Boy, there was, other than the fact that you're suddenly aware that you've sunk in further or you just have to be thinking about it or looking at it at the time, there was no distinguishing in colors or anything like that. Now, there might be a subtle enough distinction in colors that from a far distance; that's where rays out of these craters give you that pattern. But, when you're standing right up close to it, that was not at all apparent that there was anything different in color.
08 00 24 18	LMP	Yes, that color was so deceptive. I can recall now looking at all of the terra around the LM the first day we were out and making some comments - I don't recall what I said, probably more gray-brown or gray-white. Then, the second day I was out in the very same place, and I wasn't really aware of it at the time; I kept talking about it being light brown. All the rocks, I kept thinking, had a light tan coating; whereas, the first day I thought they had a light gray coating. My impression now is, and it could be completely wrong, but - is that I'm going to be anxious to see the rocks when we get home - If we picked up all the different kinds of rocks that we saw that had to do with texture and shape and anything else, we could see which wasn't much, believe me. I looked hard. But my impression is, we're going to crack those rocks open and when we do we're going to find - We should have done this on the lunar surface with a hammer - we're going to find that those things are dark gray basalts. Also, every time we came in the LM, both times, Pete's suit and my suit looked the same gray color. I never saw anything but that dark gray. I never saw any of the browns that I'd seen outside or anything like that.
08 00 25 23	CDR	Yes, our suits looked we'd been wallowing around in graphite, a dull graphite.
08 00 25 28	LMP	That's right. It was about that thin, too, and fine, and it clung to everything.
08 00 25 35	CC	There were some points there where you talked about seeing large white boulders in the distance or on other occasions, seeing things which appeared white. Do you really think that was the the color white, or do you think it was the way in which the Sun was refracting off of those surfaces that you were looking at?

08 00 25 55 LMP Well, we discussed that again when we got back up in orbit; and the fact that, at the high Sun angles, the ground looked white to us from orbit and everything, and I think it's purely a matter that the Sun is so bright that when it shines on those objects at a distance and you're very close to having the Sun directly behind you, that it gives the appearance - everything has the appearance of being chalk white. I think that's one of the most different things about the lunar surface, that I saw, from the Earth's surface was the fact that where the Sun is has such a great effect on the color. Whereas, you take on Earth you have some sort of rock laying on the ground, the Sun can move a long way and the rock still pretty much looks the same; and, when you pick it up and kind of shade it with your body or something on the ground, you can usually get a good index of the color. You do that on the Moon, and you just can't hardly see the rock. When it's in the Sun it just changes colors with the sunlight. That's one of the most phenomenal differences I can see.

08 00 27 04 CDR Yes. Now, Al mentioned a very good point. There's no doubt about it that the ground looked different the second day than the first due to the Sun angle getting higher; however, on the horizon, the horizon remained approximately the same, and again I think it's because of the greater distance and the fact that the angle between us and the Sun was still relatively small looking at a distance, and the rocks still looked white out there, chalk white. I'll bet if we stayed there and let the Sun move to 90 degrees, that what we saw in the distance would change in color.

08 00 27 48 LMP Yes, I agree with Pete. Now, one interesting thing, when we were out at the Surveyor, that was sort of tan, my initial impression was that radiation or something had darkened the paint, but when you look at the chrome surface - the only surfaces I saw that didn't look this way were the barer surfaces, by the way. But you look at the chrome surfaces of, for example, that battery box, and it had changed almost the same color, that light tan. Now, maybe if we had looked at it that first day and it had been in sunlight, it wouldn't have looked like tan; it would have looked like gray, but it looked like tan - you'll be able to get this, of course, because we've got the cameras with us - but when I rubbed the

box, it took off the light gray coloring; but it just didn't dust off. I'm pretty sure that we didn't put it on with our LM, because it wasn't just like dust that hangs around your house that's only been there a day or two. It was like dust that's collected on there for a long time and longer to have some effects on it, long enough so that it really becomes not a thick coating but a very cohesive coating. It was almost like a skin on there. You had to rub hard to get it off that battery box. When you did, there was a nice shiny chrome beneath it. It was kind of a strange thing, like a bunch of dust had blown on the box; and it had stood there long enough to really get hard.

08 00 29 11	CDR	But I think there's going to be enough parts that have not been touched by either our gloves or by the bag that the camera is in, that you'll be able to get a good hack on that.
08 00 29 23	CC	Roger. I imagine also, we'll get - -
08 00 29 25	CDR	Yes. Like the TV mirror.
08 00 29 28	CC	Go ahead, Pete.
08 00 29 30	CDR	Yes, the TV mirror has only my finger mark on it, and I'm sure that nothing else has touched any of the rest of that TV mirror, and it was covered with this fine dust.
08 00 29 43	LMP	Also, in the same place with the mirror, Pete, although our mockup didn't look this way as I remember, there's a lot of electronics exposed in behind that mirror, that, of course, we never could possibly touch. It should have the same coating in there or something.
08 00 29 57	CDR	The other most important thing is the Surveyor was equally brown all the way around it; and had we covered it coming in, I think we'd have seen a directional pattern on the Surveyor, so I don't think, as a matter of fact, the way that dust flew when we landed, I don't think any of it landed within 10 miles of where we landed. It just took off.

08 00 30 17	LMP	I kind of agree. And even if it did, it wasn't going to fall in the crater; just shoot right across it.
08 00 30 21	CDR	Yes, and the Surveyor was lower than we were.
08 00 30 24	LMP	Hey, did - I just thought of an interesting possible point that somebody wants to do when they get with that camera - The geologists want to look at it when they get the camera before they give it to the scientists - is back in there behind that mirror where all the radiation could get in to - It couldn't get into as much as it could in, let's say, the top. The camera got radiation all day long, because it would get it the minute the Sun came up and it'd get it all the way around to sunset. But inside that little hole where the mirror rotates, there's going to be parts in there, easily calculable, that got just only a certain amount of Sun each individual day. Like, say, some parts would only get 10 percent of the Sun on the outside; some parts of the inside would get 50 percent, so if they're very careful with that mirrored surface in the back of the mirror and inside that little hollow place, they're liable to be able to get some index of how fast this stuff builds up and when it does.
08 00 31 21	CC	Roger. Were you able to notice any kind of vertical - -
08 00 31 23	CDR	They're going to have to be careful - -
08 00 31 27	CC	Go ahead.
08 00 31 28	LMP	I think you are going to want to have something thought through on that before that camera goes whistling off in the distance. This is going to take a lot of fooling around with, before all that information would be lost.
08 00 31 42	CC	Yes, that's true, Al. We'll have to be careful how we handle that. Did you notice any vertical gradient in the color on the Surveyor, as you might expect, if it was dust?

08 00 32 01	CDR	No, it was pretty well uniform all the way over it.
08 00 32 07	LMP	Pete brought out a point. It's strange, too. It was - all the way around; it all looked the same.
08 00 32 12	CDR	You see, we approached from the opposite side than we landed, and that was our first impression coming up on the opposite side was that it was brown. It didn't look brown the day before in the shadow, either; it looked white. And, of course, it was out in the sunlight by the time we got to it on the second EVA.
08 00 32 37	CC m	Okay, a question on the vesiculation of rocks. Did you really notice any or an appreciable amount of vesiculation in any of the rocks you saw?
08 00 32 48	CDR	Not a one. That's what's funny. I guess Neil and Buzz brought some back, but we didn't see one rock anywhere with any of that type structure.
08 00 32 59	LMP	I agree with Pete. One time I reported I did, and then I looked at the rock when we finally picked it up, and it didn't look like it at all. It had a bunch of pits on it, but it didn't have any vesicules in it, and we were all doing something else, and so I never really went back and corrected myself; but I've got to agree with Pete. I never saw any vesicular material at all.
08 00 33 19	CDR	I'm not convinced that we got too much different kind of rock material, to tell you the truth. Of course, I got fooled out there in the desert; and so anything that we saw that remotely resembled being different to our eye, we brought you a sample.
08 00 33 36	LMP	I don't think we - I think we got every - I think we got a sample of almost everything that was there. Everything that we saw that was different in texture, or the way it weathered, or where it was setting, or anything else that seemed unusual to us about the differences of rocks, we grabbed some of them; but, like Pete says, it's going to be interesting to see how many different things we did actually get.

08 00 34 23	CC	Pete and Al, were you able to notice any - which appeared to be boulder tracks on head crater or any of the other craters similar to the type of tracks you saw after you rolled that one rock down?
08 00 34 38	CDR	None. None that - Well, let me say this. I was - Without walking down to the crater, I couldn't tell what kind of a track the rock made that I rolled down there to start with. However, I think we have enough PAN photos that you can stereo in the craters that we went up to that if there any boulder tracks, you're going to be able to see them.
08 00 35 09	LMP	Yes, I think that's the best point right there. We took enough so you're going to find them. Now, I don't remember seeing any myself, but I think - I also don't remember specifically looking for them. Usually, when you see them, if you see anything special like that, you'll remember it, but maybe there are some around and I didn't - just even notice them.
08 00 35 29	CDR	All right, let me ask a question down there - when we were in orbit, we passed a particular area, and I'll have to go back to the map and look, where there were three or four bright craters that had very, very dark gray material streaking down the sides of them, like landslides. Now, we were aware of many places by using the monocular, seeing landslide type or slides or slump in all the craters all around the whole Moon that we could see, but there were only these three or four craters that had very decided gray slumps or streaks or something. It almost gave you the impression that there had been a liquid spill or something. It was so different from anything else. Has anybody reported that, or have you seen them in your photographs from Earth before?
08 00 36 30	CC	We'll try and get you an answer to that, Pete.
08 00 36 41	CDR	That boulder track business got me to thinking about that. Go ahead with your question.
08 00 36 45	LMP	Let me say something else, too, and I can't remember if I said it. You know where we talked with Al Chinester [?] and the guys, before we went, about the main objectives of the geology

wasn't to go out and grab a few rocks and take some pictures, but to try to understand the morphology and the stratigraphy and what-have-you of the vicinity you were in. Look around and try to use your head along these lines. Well, I'll tell you, there was less than 10 times I stood in spots, including in the LM both times we were back in, and said, "Okay now, Bean, what can you do in that - can you fill that square? Is it possible to look at there and try and determine where this came from, which is first, which is second and all that?" And except for deciding which craters looked newer than others, which we know from ground observations, I was not able to see any special little clues like we were, for example, over in Hawaii and we were when we were out at Meteor Crater and other places, that gave us that kind of clues. That whole area is just - has been acted on by these meteoroids or something else so that all these features that are normally neat clues to you on Earth are not available for observation. I didn't find any way to fill that - those two big squares, you know; I never was able, when walking up to a crater, to determine when the normal ground stopped and the ejecta started except on the difference in slope or the fact that it got a little bit more powdery under my feet, and that's not a very good index. We never saw anything of a different color or a different amount of rocks or anything else, except the times that Pete and I kept kicking up that very light gray as opposed to the more dark cement-gray material. There's just no contrast to look at.

08 00 38 41 CDR I think even a trained geologist would have trouble doing a whole lot of field geology that way on the Moon. I think what you're going to have to do is pick your traverses like we did and just sort of select at a regular interval as you go along and then come back and analyze the stuff to find out differences. I've kind of got the idea that a lot of it is the same and the only difference being its relative age to one another by being blasted by a meteor coming in and getting thrown out at different times. Don't you think that, Al?

08 00 39 23 LMP I think that. I think one of the things you're going to want to up, too, is you're going to want to up the number of core tubes so you can get down in these areas you are interested in and find out what's going on under there, because it's covered with this layer, and there just ain't no way to figure it out. I know, thinking back - like I say, before the EVA, during the EVA, and afterwards, we talked about it and thought about trying to get the big picture, trying to be more than rock collectors and picture takers; and, believe me, we worked at it, and I think from our training we were pretty doggoned good at getting that sort of thing in training, not just grabbing a few rocks, but trying to evaluate the things that we want to evaluate. But it just was difficult to do because the clues just aren't right laying there on the surface. It's got this big blanket of all-beat-up soil over every single thing. I think maybe you want to get a better trenching tool. Pete, the trenching tool we had was just that shovel and he could only go down about 8 inches without falling on his head. Now, if you don't want to get a lot of core tubes but you want to see what's going on maybe we need some sort of better trenching tool so a guy can lean over and trench down 6 or 8 inches or, at least as far as the ground is soft, and then take a look at what's underneath it.

08 00 40 47 CDR We were really hindered in the fact that we could not bend over. It wasn't as apparent in our training as it was up there because, in your training when you weigh 285 pounds there in the building, and you've got all the stuff on your back, it's fairly easy to sort of scrunch down or lean quite a bit. You can't do that up there on the Moon, and like Al just said, and I'm short and low to the ground to begin with, that somebody that's taller than I am is going to have a difficult time with the same length tools trenching as deep as I did. Because you just can't get over. And we've really - we got a whole bunch of ideas and we're going to, in the 5 days there in the MQF, we'll put all this down on paper on what we think we could do to pass on some suggestions to improve the tools that we have right now, to do a little better job.

08 00 41 45	LMP	Yes, I think those tools can really be worked over; they seemed pretty good before we left, but once we got up there and started working with them, in that one-sixth g, like Pete says, you can't always do the same things; you're leaning in a different way, and things are a little different. I think we thought about it enough and observed it enough that we can come back and give some pretty good suggestions for tool improvement and equipment improvement along those lines that'll help the next guys get more rocks, and better rocks, and faster, and trench deeper, and do more core tubes, or whatever else they want to do. Hey, tell them they can start fixing that doggoned hammer.
08 00 42 23	CC	Okay. Thanks for your comments.
08 00 42 25	CDR	Yes. We concluded that everything is too delicate to start with; the extension handle was about wiped out by the time Al got done driving that double core tube.
08 00 42 38	LMP	Yes. Even though you're light up there, everything's light; we could still get something like a hammer swinging, or if you get moving, and want to stop, you could still put some pretty good loads on some equipment.
08 00 43 13	CC	Okay, Pete and Al. That's it for the questions. thanks very much. Could you give us a reading off the O_2 pressure gage on the REPRESS pack?
08 00 43 34	CDR	Yes. One more thing, that we did - getting back to this crater morphology and all that business; when we looked at those craters, we tried to do that, too, because we could see bedrock, or what we thought was bedrock, on the outside, we said, "Great! We're going to look in those craters." This is what we said before we even got out. "We're going to look in those craters and we're going to see a deep contact between the regolith and the bedrock, and we're going down a little bit further and here's going to be something else; we really got it knocked." We looked in those craters and what it looks like is just like the surface except there is a few rocks that seem to be resting on the wall and resting in the bottom. Now, if you went down there and dusted away all that material, I don't know how much there is there, maybe you would find a contact between the

regolith and the bedrock; now, you know, you really couldn't see it. Now, maybe you could infer it from the pictures we took and what we discussed. Usually, it was showing here and there, particularly on that very last crater. But that's going to take some work; it's just not like looking at a crater on Earth.

08 00 44 45 LMP I think the - the fact that it has this makes geology up there as difficult, if not more difficult, as it is on the Earth, because you have trees and grass and all kinds of things like that that hide a lot of the Earth's geology. So, I think you're in the same box up there. ... What do you want? The REPRESS package is 850 psi.

08 00 45 16 CDR Another thing that has been concerning me a little bit - you know we keep talking about going to all these neat places like Hyginus Rille and all that stuff, because we are going to stand on the side right below the rille and we're going to look up on that big high side and right there is going to be the history of the Moon, sort of like the Grand Canyon gives us such a great one of the Earth. Well, I'll tell you, if the sides of that place are anything like the sides of craters, or the sides of the Surveyor, you're going to look up there and you're going to see a bunch of dust just like you see on the surface, unless - you know - I could be easily wrong, we haven't been there, but - but we just didn't see any places, no matter what the slope, that didn't have all this material all over it.

08 00 46 08 CC Roger.

08 00 47 09 CC 12, Houston. I'm looking back at all the burns and result of the VC counter. It looks as though the thing's working pretty well from what we can determine. We've looked back at midcourse 2, LOI 1, LOI 2, and the lunar orbit plane change, both of them, and TEI; and it looks as though it's - predicted and the crew readout are doing pretty well. They're in pretty close agreement.

08 00 47 37 CMP Okay, Ed. What you say - what you say is generally true, now and the reason I say that is because those burns - these things are being held up until about 20 seconds or so before burn time.

I measured the PIPA bias exactly one time, and it came out to be 1.4 feet per second in 1 minute which is really power; and there's no question about that. And the only other thing, the other indication I've got is that on the DELTA-V test you - 586.8 in 10 seconds on the DELTA-V test, you always come up with minus 18.1, which seems to be a little higher that we'd expect to see, although we're still perfectly within tolerance. I see nothing wrong with it. During the RCS burn, the burn took a little bit of time to do and to trim out; and, during that time, the PIPA bias or the bias or the four other bias in the EMS was actually almost as high as my ability to trim, so that's why you got such an erroneous reading on that. That had a little something to do with the separation from the booster at the TLI also, but I'll talk about that later.

08 00 49 04	CC	Yes. Those things still up there within tolerance, however, Dick.
08 00 49 10	CMP	Oh, that's correct. Yes. I recognized that. I just want you to know that that's what we've got, and I guess that's just real world.
08 00 50 44	CDR	Hey, one last comment, there, Houston. How about telling old Uel Clanton that we both thought we were in Kapoho, too, when we were on that Moon, and we gave him about the - about the same type of information that we gave him at Kapoho, as far as it was visible.
08 00 51 05	CC	Roger, Al; will do.
08 00 53 28	CC	12, Houston.
08 00 53 33	CDR	Go ahead, Houston.
08 00 53 35	CC	Say, if it's possible for you to see out of the rendezvous window to get a good shot at the Moon, we'd like to get some more small-scale, high-latitude photographs, and this would be at your convenience. If you think you can do it, give us a call, and we'll give you some procedures.

08 00 53 57	CDR	Okay. Now we just took some about 2 hours ago, some 250-millimeter of the Moon which, of course, are full frame. Would you care for some now and what lens would you like?
08 00 54 15	CC	It sounds as though you pretty well outguessed us. The Hasselblad with the 250-millimeter lens, black-and-white film, 5.6, 1/250th and, of course, at infinity, and if you'd take two or three photos and repeat approximately at 30-minute intervals for 1 hour.
08 00 54 40	CDR	Okay. We'll - Tell me the f-stop again. That's the only thing I didn't hear. Okay. We got it. I'm sorry.
08 00 54 48	CC	5.6.
08 00 54 52	CDR	Okay.
08 00 55 47	CC	12, Houston.
08 00 55 54	LMP	Go ahead, Ed.
08 00 56 00	CC	Apollo 12, Houston. Are you observing any variation in the antenna position at the present time?
08 00 56 09	LMP	No. I've been sort of watching it, Ed. The only thing I've noticed this whole time is every once in a while the yaw will just wiggle one time, just a smidge, and that's the only thing I've seen. Otherwise, it's been steady as a rock.
08 00 56 34	CC	Okay. We just picked up a little variation in your signal strength down here.
08 00 56 40	LMP	Okay, now wait a minute here, that just made a liar out of me, because it's just starting to do it up here. With the signal strength varying, and it's doing it in yaw. ... in yaw.
08 00 56 50	CC	Roger. We're just starting to pick that up down here. DSE, ON, please.
08 00 56 58	LMP	DSE, ON. Roger.
08 00 57 14	LMP	Okay, now the RECORDER is ON and we're in LOW. Do you want us to go to HIGH BIT RATE?
08 00 57 20	CC	Affirmative. HIGH BIT RATE.

08 01 02 03	CC	Apollo 12, TAPE RECORDER to STOP.
08 01 02 15	CDR	Okay, that's done, Ed.
08 01 02 21	CC	Thank you, 12. It looks as though it's settled down. Let's just keep an eye on it.
08 01 03 12	CC	12, DSE to FORWARD.
08 01 03 27	CDR	Yes, we got it.
08 01 05 49	CMP	Houston, Apollo 12.
08 01 05 52	CC	12, Houston. Go ahead.
08 01 05 56	CMP	Roger. Let me give you the angles on the GDC at this time.
08 01 06 02	CC	Go ahead.
08 01 06 05	CMP	Okay. Roll, 072.25; pitch is 352.4; yaw is 081.55.
08 01 06 31	CC	Roger, Dick. Copy 072.25, 352.4, 081.55. Thank you.
08 01 06 41	CMP	Roger. I'd like to get the other one later or before we leave this attitude.
08 01 06 47	CC	Okay.
08 01 08 53	CDR	Houston, 12.
08 01 08 55	CC	12, go ahead.
08 01 08 59	CDR	It looks like what the antenna's done now is driven to some position other that OPTIMUM and it's just sitting there.
08 01 09 13	CC	Roger, Pete.
08 01 09 38	CC	12, would you go to WIDE BEAM width?
08 01 09 44	CDR	Roger. WIDE BEAM width.
08 01 09 47	CC	Thank you.
08 01 11 21	CC	Apollo 12, DSE to OFF.
08 01 11 33	CDR	Roger. It's OFF.
08 01 12 31	CC	Apollo 12, is the antenna holding steady at the present time?

08 01 12 39	CDR	As best as I can tell it is, Ed. It's moved a little bit from where it was a little while ago, but it's not wobbling like it was doing the other day.
08 01 12 52	CC	Roger.
08 01 13 07	CDR	I take that back. It may be wobbling just a little teeny tiny bit. I can see just a very slight oscillation in signal strength and maybe - of course, our gage is not to ... for being so inclined - It looks like it might be oscillating a degree or so.
08 01 13 34	CC	Roger. Thank you.
08 01 13 44	CDR	And that's normally in yaw.
08 01 13 51	CC	Roger. Yaw.
08 01 14 03	CDR	The other day when we were in the LM and Dick was having that trouble, it was oscillating in both axes, pitch and yaw.
08 01 20 59	CC	12, Houston.
08 01 21 05	CDR	Go ahead, Ed.
08 01 21 08	CC	For your next P23 at 195, we have another calibration star which I think will work out a little bit better for you when you're ready to copy.
08 01 21 20	CDR	Go ahead.
08 01 21 24	CC	That's at star 24, Gienah, and the attitude is roll, 092; pitch, 329; yaw, 0. And that should give you a pretty small angle difference between the next attitude you'll be going to.
08 01 21 46	CDR	Okay, thank you. Appreciate it.
08 01 21 51	CMP	This ought to be a very interesting one, Ed, because I noticed on the other series - The first series of P23 that Gienah was pretty dim in the normal optics mode, but I'll be interested to see if I can see the star through the landmark line of sight and I'd like to try it. It sounds good to me.
08 01 22 13	CC	Roger, Dick.

END OF TAPE

08 01 38 51	CC	Apollo 12, Houston. Would you put the DSE at FORWARD, please?
08 01 39 36	CC	12, could we have the TRACK mode to NARROW?
08 01 39 53	CMP	You got it, Ed.
08 01 39 55	CC	Roger.
08 01 40 46	CMP	Man, is this chocolate pudding and butterscotch pudding ever good. You ought to try some.
08 01 40 55	CC	Roger, Dick. I'd like to trade you.
08 01 41 02	CMP	Not yet, Ed; not yet. Two more days and you can.
08 01 41 33	CC	Apollo 12, Houston. Could we have secondary electronics?
08 01 41 38	CMP	Secondary electronics coming at you.
08 01 44 44	CC	Apollo 12, Houston. Would you give us secondary transponder and pause at the center position?
08 01 44 52	CMP	Roger.
08 01 48 02	CC	Apollo 12, Houston. Could you give us your onboard readouts of the high gain antenna angles, pitch and yaw?
08 01 48 12	CMP	Roger. Pitch is about a minus 20 and yaw is about 190.
08 01 48 28	CC	Roger. We copy.
08 01 48 54	CC	Apollo 12, Houston. Would you select WIDE BEAM width, and then go to MANUAL, and select pitch, 60; yaw, 240? That's a pitch of minus 60.
08 01 56 02	CC	Apollo 12, Houston. Would you give us AUTO REACQ - AUTO REACQ?
08 01 56 23	CMP	Okay. You got it, Houston.
08 01 56 25	CC	Roger. Thank you. We apparently dropped off there when you went to MANUAL and that was pitch, minus 60; yaw, 240.
08 01 56 35	CMP	That's correct.

08 01 57 17	CC	Apollo 12, Houston. Would you give us the pitch and yaw readings on the high gain antenna?
08 01 57 26	CMP	Roger. It looks like minus about 22 and 1 - I guess about 190.
08 01 57 40	CC	Roger, 12. And also, if you would, the GDC angles.
08 01 57 48	CMP	Okay. Stand by. I'm going to work on those at ... couples.
08 01 57 52	CC	Roger.
08 01 58 35	CMP	Okay, Ed. Here's the best I could get here for you: roll is 093.1, pitch is 339.25, yaw is 086.4.
08 01 58 57	CC	Roger. 093.1, 339.25, and 086.4.
08 02 03 40	CC	Apollo 12, Houston.
08 02 03 46	CDR	Go ahead.
08 02 03 48	CC	Okay. We're finished up with the ... test on the S-band, and we'd like to go to LOW BIT RATE. The S-band AUX to OFF and TAPE RECORDER, FORWARD, to OFF, and we will be staying in the WIDE BEAM width.
08 02 04 21	CDR	And you want us to stay on the secondary transponder?
08 02 04 27	CC	That's affirmative.
08 02 04 32	CDR	Okay.
08 02 04 33	CMP	What's the test look like, Ed?
08 02 04 37	CC	Stand by, and we'll get a summary of that for you. And, Dick, before you go over to the P23's, you want them - They want to manually maneuver away from gimbal lock.
08 02 04 56	CMP	Okay. I got a whole hour before that P23. Is there anything you want us to do, or any particular attitude to be in?
08 02 05 10	CC	Stand by.
08 02 05 11	CMP	If not, we'll look at the Earth for a while.
08 02 05 42	CC	Dick, at this time, you can go on over and do the P23's; the angles we gave you are still good.

And then at - When you finish up with that, you can go back to PTC -

08 02 05 57	CMP	Okay. You want us to do P23's; go ahead and do them an hour early, is that correct?
08 02 06 01	CC	That's correct.
08 02 06 04	CMP	Okay, fire. Here we go.
08 02 08 13	CMP	Houston, 12.
08 02 08 15	CC	12, Houston. Go ahead.
08 02 08 19	CMP	Roger. Here is the inner vector I have in there for Venus at this particular title. Okay? Knowing you're an hour early.
08 02 08 33	CC	Stand by.
08 02 08 43	CC	That's affirm, Dick. It's good.
08 02 08 47	CMP	Okay. Thank you.
08 02 19 53	CMP	Houston, Apollo 12.
08 02 19 56	CC	Go, 12.
08 02 20 00	CMP	Roger, I want to make sure you're getting all this.
08 02 20 08	CC	Dick, we're watching it all.
08 02 20 16	CMP	You were so quiet, I wasn't sure you were getting it.
08 02 20 21	CC	Watching some good working action.
08 02 28 49	CMP	On that last lock, I think I took it past your horizon mark. ... is a little bit too far, but I'll take it anyway.
08 02 28 59	CC	12, say again.
08 02 29 05	CMP	I think that last hack, Don, was just a little bit into the Earth too far. It won't be on the horizon; that's okay.
08 02 29 10	CC	Roger.
08 02 43 37	CMP	Houston, Apollo 12.
08 02 43 39	CC	Go, 12.

08 02 43 43	CMP	Guess what! I don't have a star.
08 02 43 55	CC	Apollo 12, say again, please.
08 02 44 00	CMP	I said I don't have a star.
08 02 44 34	CC	Dick, you're going to have to try that once again. We're breaking up in communications, and we don't read you down here.
08 02 44 41	CMP	Roger, how do you hear me?
08 02 44 44	CC	Still breaking up, but probably readable. Try it.
08 02 44 49	CMP	Okay, I do not have a star for star number 56. There is no 6N star 204.
08 02 45 02	CC	Roger.
08 02 45 08	CMP	Tell the boys in the backroom I don't have a star for this particular one in the field of view. I can't see it.
08 02 45 14	CC	Roger; we'll work on it.
08 02 46 15	CC	Dick, part of that test, we wanted to make sure whether or not you could not see the star because of light shafting. Was that the case?
08 02 46 27	CMP	Well, it's light out there. I don't necessarily see any light shafting, but I sure can't see the star in the field of view.
08 02 46 33	CC	Roger. Then - -
08 02 46 34	CMP	I don't know why, or what the reason for it is.
08 02 46 38	CC	Okay, the nav star then is star 24 and the Earth's far horizon.
08 02 46 48	CMP	Okay.
08 02 52 29	CC	Apollo 12, Houston.
08 02 52 33	CMP	Go ahead.
08 02 52 34	CC	We'd like you to dump the waste water down to zero before you go into the PTC, then we won't have to disturb that later, if you would for us.
08 02 52 53	CMP	Okay stand by, I want to get this BIAS - ... in BIAS yet.

08 02 52 56	CC	Sure, anytime before you set up PTC.
08 02 54 46	CMP	Don, this is Dick again. Where do you want to take the waste water down to before PTC?
08 02 54 52	CC	Take it clear down to zero, then you'll have an undisturbed night's sleep.
08 02 55 01	CMP	Okay, you're not worried about that bladder all the way down to zero, huh?
08 02 55 05	CC	Roger.
08 02 55 10	CMP	Okay.
08 02 55 45	CMP	Houston, 12.
08 02 55 47	CC	Go.
08 02 55 50	CMP	Don, I was curious on that 6N when they use star 204. How close is that to the Sun?
08 02 56 13	CC	We're looking it up for you, Dick. Dick, that was 20 degrees; 20.
08 02 56 33	CMP	It seems like I could have - should have been able to see it, then, huh?
08 02 56 53	CC	It's in that area where it's kind of marginal, Dick, and we were kind of interested whether you could or could not see it.
08 02 57 01	CMP	Okay, well, I sure looked all over in there and I couldn't see any star in the field of view.
08 02 57 05	CC	Roger.
08 02 57 13	CMP	In fact, it surprised me; I thought I was going blind.
08 02 57 17	CC	Maybe that star didn't get turned on today.
08 02 57 23	CMP	Don, I was going to accuse you of the wrong ... vectors and all kinds of things like that, but I thought I better not.
08 03 00 18	CMP	Don, do you want to take an E-memory dump at this time?
08 03 00 25	CC	Give us just 1 minute to set up, Dick. .
08 03 00 29	CMP	Okay.

08 03 00 40	CMP	Don, for the navigation expert's information, this last - this last set of stars - the airglow is starting to - to show up, and I'm starting to use the top part of the airglow for a visible horizon.
08 03 00 55	CC	Roger, Dick.
08 03 00 59	CMP	That first set it was not the case, or at least I couldn't tell that there was any airglow there anywhere ... just used the high part of the horizon.
08 03 01 12	CC	Dick, we show you down to zero on waste water now.

END OF TAPE

08 03 03 35	CC	Apollo 12, we're ready for the E-MOD dump.
08 03 03 40	CMP	Okay. It's coming at you.
08 03 03 42	CC	Roger. Also, Dick, how well could you see Venus, the first star you did, and the fifth star, 163? Were those clearly visible?
08 03 03 53	CMP	That's affirmative. No problem with the stars at all. Venus - Venus, of course, looked like about four of them put together.
08 03 04 02	CC	Roger. Very good. Thank you - -
08 03 04 03	CMP	Actually, it's - It's a very easy planet to use for the simple reason that you can take the horizon and strip the image of Venus so that you get a pretty good mark off of it.
08 03 04 22	CC	Very good.
08 03 04 24	CMP	And the rest - the rest of them, the stars are so dim that you really can't do that. All you can do is get the star down to the horizon, but with Venus, you can actually split the planet with the horizon.
08 03 04 37	CC	Roger. Copy.
08 03 05 51	CMP	Houston, let me know when you're through with that E-memory dump. I want to take a look at 83 and see what I did to my AUTO state vector.
08 03 06 00	CC	Roger. We're through with the E-MOD dump now, and when you look at 83, would you also look at NOUN 54, too, so we can check that one? Okay. VERB 83, NOUN 54.
08 03 06 11	CMP	Want it now? Okay.
08 03 06 29	CMP	Okay. NOUN 54 is 6.24 miles and zero velocity.
08 03 06 33	CC	Roger.
08 03 06 38	CMP	How does it look down there?
08 03 06 41	CC	Looks fine.
08 03 06 45	CMP	I'll do a P37 and see what it looks like.

08 03 06 49	CC	Roger.
08 03 10 23	CC	Apollo 12, for your information, at the end of the second quarter, Michigan leads Ohio State 21 to 12.
08 03 10 33	CDR	Okay. Startling, huh?
08 03 10 40	CC	There's still a little more to go.
08 03 10 42	CMP	Hey, Don, ask them if they - -
08 03 10 45	CC	Go ahead.
08 03 10 46	CMP	Okay, ask FAO if he knows a secret hiding place for P30 PAD's in the spacecraft.
08 03 11 11	CC	We're not sure you're cleared for that information.
08 03 11 17	CMP	Well, I'd sure like to be because we ran out of them 2 days ago.
08 03 11 22	CC	He doesn't know of any other place - any special place to look. We'll - We'll ask around in the back room, but first quick guess is he doesn't know.
08 03 11 36	CMP	Well, I don't think there are any. So we've been manufacturing them for 2 days.
08 03 11 43	CC	Roger. We'll research it some more.
08 03 11 44	CMP	Some of these guys didn't have anything to do anyhow.
08 03 12 21	CC	We'll try to keep down the number of midcourses so you won't need any more.
08 03 12 28	CMP	That's good; that's good.
08 03 20 48	CC	Dick, would you confirm that you terminated the water dump?
08 03 20 54	CMP	That's affirmative. We terminated when you hollered at us.
08 03 20 57	CC	Fine. Thank you.
08 03 20 59	CMP	Why, doesn't it look like it?
08 03 21 01	CC	We can't tell for several hours, and they were worried.

08 03 21 07	CMP	Okay. I'll check again, but I know we did.
08 03 21 10	CC	No sweat, if you did it.
08 03 21 14	CMP	Then rest assured; it's terminated.
08 03 21 17	CC	Roger. Thank you.
08 03 21 45	CC	Apollo 12, Houston. According to all our information down here, the only P30 PAD's you have are in that CMS - CSM update book, and there should be only 12 of them counting both sides of the pages.
08 03 22 02	CMP	Yes. Okay. That's fine. We ran out; that's all. All right. We just thought maybe there were more around here some place else.
08 03 22 09	CC	Not to our knowledge.
08 03 22 11	CMP	We've already scrounged a couple P30 PAD's out of some contingency books, so when they think of those, why, forget passing it up, because we already got them.
08 03 22 21	CC	Roger.
08 03 22 53	CC	Dick, we rechecked your P37 solution down here in our computers, and it agrees exactly.
08 03 23 08	CMP	Very good.
08 03 53 16	CMP	Houston, Apollo 12.
08 03 53 21	CC	12.
08 03 53 27	CMP	Don, if you think we're stable enough and it looks like we're under control down there, we're going to go ahead and start PTC.
08 03 53 38	CC	We suggest you let your rates damp out a little bit more.
08 03 53 45	CMP	That's a suggestion I'll gladly follow.
08 03 53 48	CC	Roger.
08 03 53 52	CMP	I guess the reason they're there, is we're still moving around a bit. Everybody's cleaning up and shaving. We're through dumping water and everything else overboard so we probably can try and

		get it started. Maybe we better remain a little more calm inside here.
08 03 54 06	CC	Roger.
08 04 01 51	CC	Apollo 12.
08 04 01 56	CMP	Go.
08 04 01 57	CC	Roger. The rates look okay to start up on PTC. We'd like you to turn off the high gain, - turn the POWER, OFF; and start with OMNI Bravo as you start the PTC.
08 04 02 12	CMP	Okay. HIGH GAIN POWER, OFF; and OMNI Bravo for PTC.
08 04 02 16	CC	That's affirmative.
08 04 02 20	CMP	And we're on OMNI Bravo.
08 04 02 21	CC	Thank you.
08 04 22 08	CC	Apollo 12, Houston.
08 04 22 32	CC	Apollo 12, Houston.
08 04 22 45	LMP	Go ahead, Houston; Apollo 12.
08 04 22 47	CC	Roger. We suspect that after the evaporator temperature is stabilized here in your PTC maneuver, the temperature in the cabin may get a little warm for you, so we want you to evaluate what that feels like before you get ready to settle down for the night, and we may either have to adjust the mixing ratio colder or go back to AUTO, at your choice.
08 04 23 12	LMP	Okay. Last night it was fairly cold PTC, so I feel we're just going to - if it gets too warm this way, when we finally get in the proper attitude, well, I guess we'll just have to turn it down a smidgeon.
08 04 23 24	CC	Roger. It'll probably take about another hour to - -
08 04 23 26	LMP	It's got to be somewhere between - -
08 04 23 29	CC	It'll take about another hour probably to stabilize.

08 04 23 30	LMP	Okay. I just - Okay.
08 04 33 05	CC	Apollo 12, Houston.
08 04 33 11	CDR	Go.
08 04 33 12	CC	Pete, some time this evening, if you've got time, we've got some geology questions down here that we would like to send up to you. And, when you want to discuss them, we'll - We'll pipe them up to you, if that's all right with you.
08 04 33 30	CDR	Are these different from the geology questions we got about 3 or 4 hours ago? We're glad to do it.
08 04 33 36	CC	That is affirmative. It's really a continuation of the same kind of material, but we've got eight specific questions.
08 04 33 46	CDR	Okay. Why don't we start in about - about 10 minutes? We're cleaning up from a meal and we'll be ready to go in 10 minutes.
08 04 33 55	CC	Fine, or any time is fine. Thank you.

END OF TAPE

08 04 44 30	CDR	Hello, Houston; Apollo 12.
08 04 44 32	CC	Go, 12.
08 04 44 37	CDR	Roger. We're ready for your questions.
08 04 44 40	CC	Okay. Let's start with two quick ones on the Surveyor work. The first one is, are you bringing back any glass from the Surveyor thermal switchplate?
08 04 44 51	CDR	No. The glass apparently, which we didn't know, was bonded onto metal; and then, the metal, in turn, was bonded onto the little standoff things that held it off the top of the box. We tried to get it, and everybody had told us back there that it was going to have separated from its bonding, and it had not. It was in great shape. It was bonded to the metal just perfect. We beat on it, smashed, and bent, but all we did was break it into little teeney, tiny pieces. Shattered it, actually is what happened, and it just remained fastened, very tenaciously to the metal it was bonded to. That was that. We just couldn't get it.
08 04 45 41	CC	Roger. Whoever made that bonding material will appreciate that testimonial. Okay, on the second one, did you get any soil samples from the Surveyor trenching area other than the material that may be with the scoop itself?
08 04 46 00	CDR	The scoop itself has some material left in it, I believe, or - it'll be in that bag, and that'll be it.
08 04 46 09	CC	Okay. Roger. Next question now goes to the geology area, and the question's - Well, I'll start out here. Did you ever climb one of those mounds, and what more description can you give us of the mounds, and particularly was there any apparent orientation or elongation to the mounds? Also, anything about vent holes?
08 04 46 33	CDR	Okay. Now, the mounds weren't that big that you would climb one. You could just stand and look at it. There were two of them. One was bigger than the other; and, no, they didn't have any vent holes. Their orientation - both of them, appeared to be in an east-west direction. Sort

of - Let's say you had a strip that was about a foot wide, that you just bent it and made a little triangular thing out of it. The mounds looked something like that, and we sampled all around one mound. Brought back stuff from it - material; excuse me, Uehl Clanton. That's about all I can say for them. They didn't ... I guess you're - I think you're hunting around for anything volcanic in nature, and they didn't appear to, to us anyhow. They appeared more like a big glob of something that had been pitched into that particular area, either by the craters that were formed nearby or something else further away. We looked around for all evidences of vent holes or anything coming out of it that might be scattered around, you know. Let's say, rocks from it itself or some ejected pyroclastics around on the ground might be near it. We couldn't find any of those either. I was kind of wondering at the time why you didn't ask us to give a core tube through it, but you didn't.

08 04 48 21 CC Roger. Thanks. Next, if there's no more in that one, the next one is whether or not you noticed any preferential distribution of the glass beads and the glassy material?

08 04 48 42 CDR Generally speaking, it was all over the place in the bottom of even the smallest little craters that we came across. But we found it wherever we went, and no more in one place than in another. I think that we have three or four samples of glass that looked the same that were taken from different places, and they should be documented. One of them isn't, but I remember where we got it.

08 04 49 20 CC Roger. I'm not sure I understand. Did you mean that they - the glass beads were in the bottoms of all craters or that they were on the tops of the level surfaces as well as in the bottoms of the craters?

08 04 49 33 LMP That's right. When we walked around on the level surface, if you just look down and look even halfway, you'd find beads here and there. Now, you didn't find a lot of big ones. You'd run across big ones every once and a while, big ones being about a quarter to three-eighths of an inch in size. If we came upon those, we would see them, but generally there were a lot of little ones

around. Now, if you looked down into the small craters, I'm thinking of the craters 3 or 4 foot in diameter, maybe a foot deep, it didn't look like they were made with very big objects; you would usually find glass beads at the bottom and you would usually find glass-covered rocks, and that was surprising to us because we had always imagined that these beads just came from very - from the more - the larger craters, up to 8 or 9 or 10 feet, but this didn't seem to be the case.

08 04 49 51 CDR Also, if I remember, we have a rock which is some 2 inches or so in size that is spattered with glass, and we brought it back for that reason. They are not beads; it's just a big splatter - -

08 04 50 48 CC Apollo, break, break. We have lost antenna for a moment.

08 04 51 00 CC Apollo, break, break. We have lost COMM for a moment.

08 04 51 20 CC Apollo 12, Houston. Do you read us?

08 04 51 46 CC Apollo 12, Houston. Do you read?

08 04 51 53 LMP Roger. We apparently lost your antenna for a while. We are ready to go again.

08 04 51 57 CC Roger. We switch antennas there. Al, the last thing we heard you saying was that in some of the small craters there were glass-covered rocks. Would you repeat anything after that?

08 04 52 11 LMP Roger. Did you hear Pete's description?

08 04 52 13 CC Negative.

08 04 52 17 LMP Okay. Right. I was saying that even the craters up to as little as 3 or 4 feet in diameter, 1 foot deep, the ones that didn't look to me like they were made by either very heavy particles, or very fast particles, you could usually look around in the bottom of them and see glass-covered small rocks, in a number of them. We took some pictures and documented them real well, and then I'll let Pete - let me say the rest. Also, one time when we were walking around outside a big crater, we saw a rock about 3 inches in diameter, I guess, somewhere around in that neighborhood; and it was almost completely covered with this glass. And the

glass looks the same as the glass you see in closeup stereopictures that Neil brought back, that he took pictures of, down in small craters. So, this will be a nice sample for somebody to look over.

08 04 53 14 CC Very good. Okay. Next time - next question is - Can you give us some more detail on the material that appeared to be melted in the bottom of bench crater? Did this just cover the central peak or did it appear more extensively located - spread around down there?

08 04 53 34 CDR It appeared to be - to look - a little bit lava-like in nature but I don't mean to imply that I thought the crater was volcanic in origin. It looked more to me like we were seeing the effects of some high-speed impact and - causing some melting of material down there. I wish that we could have gone down in that crater and gotten a sample, but it was too steep and too rugged for us to attempt it, and, therefore, we did take some partial PAN stereo of the whole crater for you and we tried to get material from the top but nothing from the top resembled the material in the bottom.

08 04 54 27 LMP I think the reason Pete said that to begin with is our experience over in Hawaii in some of those chains of craters or those lines of - I can't think of the exact word now - but where the lava comes out in long cracks, zones of weakness; it just sort of bubbles out and spatters one on top itself and ends up making sort of knobby-looking mounds of basalt. Well, from the top of the crater, all this stuff looked like knobby little mounds that were sort of like ... zones - the material you usually see around ... zones and that's why he is trying to say - neither of us think of it as a volcanic material, but it had that sort of melted knobby effect. We got a lot of pictures of it, though.

08 04 55 16 CC Roger. On the northwest side of head crater, you talked about a rock that you kicked over, and you mentioned that the bottom was different from the top and we are not sure just in what way it was different. Remember that one?

08 04 55 36 CDR Well, yes - I remember it and it wasn't different in - I think maybe - I should maybe have clarified it then because it wasn't that big a deal -

I guess it was the first time that when we kicked over a rock, it was two different colors, you know. Before you'd kick over a rock and it looks just like the top is the bottom. This one, it looked a little bit lighter gray and the reason was, after I thought about it, was because we were marching around in that same area where we noticed that there were two different types of soil. The soil that was the topsoil for just a thin layer on the top of an eighth of an inch or something, and then below that was the thin gray layer and that - what was causing the rock to appear white, in this case, instead of gray like the top was the fact that it had been in this light soil down beneath the surface. So, I don't think it's a big thing.

08 04 56 29 CC Roger. Let me give you the last two questions, so you can cover them together. The first one is, are there any special or unusual features that you remember, thinking back on it now, that you didn't have time to describe? And the other thing is, can you sort of recap the traverse along each leg and recall what you think was the significant feature that you saw at each of the stations where you stopped?

08 04 57 08 CDR Wait 1 while we discuss it a second.

08 04 57 10 CC Sure.

08 04 57 32 CDR I think we pretty well talked about everything that we saw that attracted our attention. We can't think of anything right now that we saw that we didn't mention to you sometime or another, either during the EVA's or after. Al's only comment, which he already said he talked about this morning, was the fact that the color did change with the Sun angle between the first day and the second day. As far as the traverse goes, I guess that the most significant thing - There was nothing unusual at head crater other than the - the fact that we found that - I guess, that head crater was where we first saw the difference in soil below the ground and above the ground. The next most significant thing I think, is as we did go over to sharp crater, - Yes - no, no, head crater is not where we saw it; no, the crater - What was the name of the crater that we saw the material we just discussed? Was it - That was bench crater, right?

08 04 59 07	CC	Say again on that, 12.
08 04 59 11	CDR	Wasn't the name of the crater - our second stop on the traverse was bench crater, is that correct?
08 04 59 16	CC	That's right.
08 04 59 20	CDR	Okay. The - I'd get our books out except they're so dirty with dust, and we've had a heck of a time getting rid of the dust in the command module, I don't want to do that.
08 04 59 31	CC	No, don't do that.
08 04 59 34	CDR	The - We discussed the difference in texture of the rocks at the bottom of that crater. I guess the next most significant thing was that somewhere between bench crater and sharp crater, we obviously ran over what must be a contact in that the ground very definitely changed to a softer, finer dust. We sank in deeper out there not only right at sharp crater but leading up to it. Now, we both found it very difficult to ever walk slowly. We always went at a lope where ever we went; that just seemed the natural way to go. So, Al sort of spotted it first watching me run because he was behind and he could tell that - I guess I was kicking up more dust. Is that right, Al?
08 05 00 27	LMP	Yes. That's right. It was obvious that Pete had started running on a different kind of ground, or dragging his feet, one. It turned out it was different kind of ground.
08 05 00 35	CDR	And I guess that's the most significant thing over there on that part of the traverse. From there, we're not sure that we ever did get to halo crater. There turned out, now I'm going to have to look at our photographs and I'm going to have to look at the maps again and figure out exactly where halo crater was because there were about five little craters all of them which could have been halo crater, all together; and it wasn't apparent in looking at the little map that we had which was colored at that spot, whether there were five craters or two craters or what. And I had a very difficult time locating it. We suspect that we were not in halo crater but if we weren't, we were awful darn close to it. I guess the next significant thing was the fact that from halo

crater, or coming up to halo crater, we really got on a third type ground, which was ground that we discussed around the Surveyor crater which seemed to be the firmest, especially down in the crater. It seemed to be the most firm ground that we were on. It still had dust; we still sank in, but we sank in the least in the Surveyor crater, both going down to the Surveyor from the one side and going up towards the LM through that blocky crater on the other side, nearest the LM. The blocky crater was also an interesting feature and that may be something that we - I think we did discuss, though, as we stood there - was the fact that we felt that the Surveyor crater was an old crater, as if it h' been impacted - -

08 05 02 20 CC Hold up for just a second. We're going to have to switch antennas, and we may lose you for a second.

08 05 02 30 CDR Okay.

08 05 03 22 CC Apollo 12, Houston. We've got a good signal. Go ahead.

08 05 03 27 CDR Okay. I guess we discussed it that we felt the Surveyor crater must have been impacted very early and had bedrock, and that this bedrock had weathered down to where the crater was very smooth and had weathered much there; and along came another one and made this small blocky crater in the side of it which must had been - which indicated to me that bedrock was not too far below the surface right where we were at the Surveyor crater. And, of course, we have samples of that. Something that Al and I just were talking about - he wanted me to mention that the Surveyor, except for the fact that it had changed color, looked in very good shape. This is true. But there's something that I noticed, using the cutters. Supposedly, the tubes that we used in practice were exactly the same metal and aluminum that the Surveyor was made out of. And if this is the case, something very definitely happened to the metal, like it crystallized, because it was much easier to cut the Surveyor tubes except the one tube which I flat couldn't cut; and I think that they were off on their dimension on that tube. It must have been a much stronger tube than they'd indicated, much thicker tube,

thicker walled tube. But the wire bundles that we cut, too, also had the appearance of being very brittle. They cut very, very easily. I was - Yes, the coating flaked off the insulation. And there was one wire bundle that had a cloth insulation on it which was not on our mockup, and there was a - The other wire bundle which was on the mockup wasn't quite the configuration that it was in the mockup. But these wire bundles seemed to cut quite easily, also. And I don't think it's because I was juiced up, I think there was very definite crystallization or something there. You'll get to see that with the stuff we bring back.

08 05 05 41 CC Very good.

08 05 05 43 CDR I guess the last most significant thing is that Al and I and Dick also, having watched our training, were impressed with the fact that we managed to get as far out as we did. And that it was as easy going in that kind of country as it turned out to be. The distance that we covered, I guess we covered a little over a mile.

08 05 06 05 LMP You put that on Earth in your equipment - if you had lunar-weight equipment on Earth, you could never make that traverse in that time. You would die before you got to the end, and we weren't even sweating; we were kind of hopping around out there doing the job. The only thing that kept us from moving faster was there was so much to see. Also, the only thing that kept us from studying more details at each site was the fact that we had to keep pressing on. So what's going to happen when we get back, we're not going to know all the details of each site because we just weren't able to stay there long enough, as long as we'd like to on any site. We could have spent that whole time in any of those craters, trenched around them and looked at - collected different size rock - type rocks around it, and tried to go back and forth on the - check the blanket and see if we could discover any difference in texture and all that sort of thing. But the time just wasn't available. It was one of those things of how much you want to cover in the time you've got to do it.

08 05 07 00	CDR	Yes, what Al's saying is we did Big Bend, Hawaii, Meteor Crater, and New Mexico all in one 2-hour trip around there. That's about what it amounted to.
08 05 07 11	CC	Yes. You did a great job in it, too. Hey, listen. When you looked into the craters, did you notice any boulder tracks that indicated there'd been many rocks rolled down besides the ones you rolled down or accumulations of boulders at the bottom of these steep slopes?
08 05 07 31	CDR	No, not any particular distribution. When there were rocks in the bottom, it was in these blocky craters where it looked like the material had been there.
08 05 07 48	CC	Roger.
08 05 07 50	CDR	Now, the dust, as such, and I'm sorry; I just didn't observe - I wasn't really standing in a position to observe any track that the one rock made that I rolled down. The other rock that I threw down there was so small that it didn't go very far anyhow. Now, dust flew and the rocks both bounded and rolled depending on how far along it was going down the side of the crater. But it was not obvious to me that it was making any tracks. Now, had you stood back and looked at it from a different Sun angle, I feel that maybe you would for a while. Just like, it was very obvious when we looked out our window where we had been walking around. We could see for great distances where our footsteps went.
08 05 08 37	CC	The seismologists are trying to get some feeling for whether or not you thought there was a lot of rock rolling that might be causing the signals that they see.
08 05 08 50	CDR	If there was, it was not evident to us. Most of the rocks that we saw on the sides of craters all had dust around the bottom of them and they - it didn't look like they had moved for a long, long period of time and most of them looked like they were partially buried the majority of them looked that way.

08 05 09 13	LMP	That's right. Not only that, we didn't see any that looked like they thought they were going to roll down in the near future, either.
08 05 09 19	CC	Roger. Hey, listen. When you pulled out the core tube, did the holes collapse or did they stay there?
08 05 09 31	CDR	That's a good question. We didn't really look down it, did we, Al?
08 05 09 37	LMP	I didn't say that right; I was talking to Pete.
08 05 09 40	LMP	The tubes themselves stayed pretty doggoned uncollapsed except for the top 1 or 2 inches. The minute you draw out the core tube, the top 1 inch, let's say not 2 - 1 inch or so would kind of crumble off and some parts would fall down in, but the sides were still relatively vertical. It's the same thing that happened in the trenches. When Pete would dig the trenches, the sides would be almost 90 degrees, except every time you'd tap the sides, let's say accidentally with his shovel, then that part would get knocked off, but the part that would remain, would still remain 90 degrees. As long as you didn't touch it, it seemed to be happy right there at 90 degrees.
08 05 10 19	CDR	That reminds me of another thing. That pulsed my memory. Again, this is an impression, but it seemed to me that there were angles greater than 90 degrees in the trenches, implying layering; and, although there wasn't any difference in color, it seems to me that that would sort of imply that there was some layering there and maybe this material is built up over a different time frames. If that's really true, you'll see that in the photographs.
08 05 10 54	CC	Very good. Hey, listen, when you deployed the solar wind experiment, did that staff go down into the ground far enough to let the bottom of the foil contact the surface? And when you rolled it back up, did all of the foil have difficulty in rolling up or is some of the top section of that roll up smoothly? Do you remember?
08 05 11 19	LMP	Yes. The answer to the first question is, it didn't go all the way down until it touched the soil. It would have, I think, if we could have pushed it. I pushed on it as hard as I could and then I kind of pushed on it hard enough to

lift my feet off the ground, and it went down that far which was a foot or so. I can't recall, but I did take a picture of it, and you'll be easily - I mean, you'll be able to easily determine how far it went and that was all the force I could put on it. The answer to the second question is, when it started to roll up, it rolled up about a foot and a half and then it didn't want to roll up any more. It wanted to crinkle. It just didn't want to roll. Okay, so, I pulled it down and rolled it up; pulled it down and rolled it up; and about the fifth rollup, that crinkle area tore in a longitudinal crack. It just all of a sudden cracked. And I said, "Oh, oh, things are going to get a little difficult here." So, I stretched it out again; I was pretty tender with it all the time; I wasn't being clumsy about it because I had some experience with these foils under vacuum conditions in the chamber, that they get awful tender, and all the time I was being as careful as I could. So I started to roll it back up again, and it started to tear some more so I realized that time that it was not going to roll up. So, what I did was let it go - let the roller go and swung around a couple of times and then what I tried to do is take - and I took the roller off the staff and held on the roller and I tried to hold one end - hold the roller and just roll it up, using the sides.

08 05 13 04	CC	Apollo 12, we're switching antennas again.
08 05 14 00	CC	Apollo 12, Houston. Do you read me?
08 05 14 34	CC	Apollo 12, Houston.
08 05 14 36	CDR	Go ahead.
08 05 14 39	CC	We lost another antenna switchover. Al, you were just saying, you held one end of the roller and were rolling the foil back up when we lost you.
08 05 14 51	LMP	Okay. Then, I rolled it up the best I could with my fingers on the edge, realizing that I was going to get some lunar dirt in it, but there wasn't any other way to solve the problem. I tried to be clean with it, but I am sure there is going to be some dirt on it. I hope the experimenters can brush the dirt off, bake it off, or do whatever they - when they take out the molecules.

So, maybe they can just dust it off, dust the thing off; and, hopefully, there won't be any rush. Now, when they find it - when I finally took it back to the rock box to put it in the Teflon bag, Pete, we looked at the bag and we looked at the roller; and by my technique of rolling it, the roller was bigger than the bag. So, I took my hands and just crushed the foil on the outside, you know, just squeezed it together and made it big - small enough to fit into the bag we had put in. So that outside layer has a lot of dirt from my hands on it, but inside it, it ought to be relatively clean, particularly on the side nearest the hinge point. Because I tried to never touch there.

08 05 15 53 CC Roger. That sounds good, Al. I'm sure the data is still good on it and they wanted to plan their procedures in the LRL. Listen, that's all the questions we had for you unless there's some other things that come to mind.

08 05 16 11 LMP Okay. Let me throw one at you so I don't forget it.

08 05 16 12 CC Okay.

08 05 16 14 LMP You know, we had some trouble with those Teflon bags. We had some trouble with those Teflon bags overnight on the lunar surface. They cracked and just didn't act right. Pete reported it, and I'm sure it's documented. I got to thinking maybe that's what happened to that aluminum foil roll. The tape that holds the foil together and everything else; I don't know what it is. But if it's Teflon tape or something like it, maybe that's what is giving us our problem. It just doesn't want to roll up after a certain period of time exposed either to a vacuum or cold or something else. I know it just doesn't work like it does when we are training in the atmosphere with a new roll.

08 05 16 51 CC Roger. Hey, listen, they've just handed me two more questions.

08 05 16 55 LMP Hey, one - one - -

08 05 16 56 CC Go ahead.

08 05 16 57	LMP	Let me say one other thing about that that also confirms it. I hadn't thought about it either. Remember when - when the first day, it was just hanging out there like an old window shade. Okay, the second - when we got up the second morning, we looked out there, and I called back and said, "Look, Pete and I both think that this thing has been wrapped around the pole." When I got out there, it hadn't been; but it had taken a definite set. The metal wasn't - the metal wasn't set as it had been before, like a window shade. It sort of had a catty-cornered set in it, not a crease, but sort of a hill running catty-cornered across it at about half the height of the diameter of the staff. So, maybe that aluminum foil under vacuum, or whatever the tape is, takes a set, it just doesn't want to roll up because the set is stronger than the spring tension.
08 05 17 47	CC	That certainly could be. Hey, listen, did you take any closeup stereopictures outside of the disturbed area and, if so, where?
08 05 18 01	LMP	We took closeup - Oh, I know what you mean. You mean closeups stereocamera?
08 05 18 05	CC	Yes.
08 05 18 06	LMP	Yes, we did. I took some near - I took some near the engine, as I talked about, then I walked out and took some of the bottom of some little craters that we had not walked in. Then, I took some of Pete's footsteps, three or four of those. Then, I went out into a couple of areas that we hadn't been and took some photographs. But we were not able, because of the time, to really do as many pictures as we wanted and do as many different things. And that's just - Since that was the last experiment, that was one that's just sort of suffered, and so I - we'll just have to see what we get out of that one. We weren't - I wasn't particularly satisfied with the way it was at the end, but we'll just have to see what happens.
08 05 18 46	CC	Roger. Listen, that's all our questions. Let me mention a couple of things that I think you'll find interesting. You were concerned about the dust on the ALSEP experiments. The heatup thermal curves are going just exactly along the predicted lines. So, apparently you guys did just a great

job on working in those dusty conditions, because there appear to be no thermal problems on that thing. I guess you've already heard the - some of the results on the passive seismic, when you sent down the lunar module, the whole mare, or at least that area, vibrated like a plate for some 35 minutes, and the scientists are really delighted in the kind of data that they're getting out of that. They haven't figured out what it means yet, but they're sure interested in the data.

08 05 19 39	LMP	Say, we've been wondering something up here. Did you happen to figure out why the LM impacted so far from the seismic experiment as it did?
08 05 19 51	CC	Yes. We had to turn that off from the ground, and there was a slight overburn in getting the signals up there to turn off the computer, and the slight overburn dropped it in a little further east than we had programed it.
08 05 20 08	LMP	Okay. We were trying to psych that out up here. Okay, thank you.
08 05 20 11	CC	Listen, we have a couple of final scores for you: Michigan, 24, and Ohio State, 12; Missouri, 69, Kansas, 21.
08 05 20 26	LMP	Sounds good. How about giving our families a call in the next 10 minutes and see what's going on?
08 05 20 30	CC	Roger. I tried a few minutes ago and your wives -
08 05 20 32	LMP	I guess it's time ...
08 05 20 35	CC	I couldn't catch your wives home a few minutes ago. I'll give them a try again, thanks.
08 05 20 42	LMP	Okay. Thanks, Don.
08 05 20 47	CC	There's a luncheon going on over in your neighborhood someplace.
08 05 20 53	LMP	Oh, that's right.
08 05 32 48	CC	Apollo 12, Houston.
08 05 32 51	CDR	Go ahead, Houston.

08 05 32 53	CC	Roger. I just talked to your ladies. Pete, Jane said that Christopher got a bike for his birthday; and, within an hour after he got it, it had a small accident. He didn't have any problems, but the bike is a little worse for wear. He's a little disturbed over that. Also, Peter went with the Allens up to Elkin's Lake deer hunting. They're supposed to be back tomorrow afternoon; so, of course, now, we have no report on his prowess as hunter and she was particularly delighted with the way the flight's going. She says to really congratulate you on a good flight, and they're looking for you back home.
08 05 33 33	CDR	Roger. Thank you, Don.
08 05 33 35	CC	Dick, talked to Barbara -
08 05 33 37	CDR	Dick's not up right now. Why don't you talk to Al?
08 05 33 40	CC	Okay. Al, talked to Sue. She -
08 05 33 43	CDR	Oh, wait a minute. He's not - Al - Don, Al's not on it either. Wait a second; I got to get him up on the COMM. We're just chlorinating water and doing a few things here.
08 05 33 52	CC	Roger.
08 05 33 56	CDR	He'll give you call in a minute.
08 05 33 58	CC	Fine.
08 05 34 [illegible]	LMP	Go ahead, Don.
08 05 34 41	CC	Roger. Dick, I talked to Barbara.
08 05 34 47	LMP	No, this is Al.
08 05 34 49	CC	Oh, okay. Let's hold off on this. We're about to switch antennas. I'll be back with you in a minute.
08 05 36 23	CC	Apollo 12, Houston.
08 05 36 31	LMP	Go ahead.

08 05 36 33	CC	Okay, Al, Sue reports that they had a real nice luncheon. She went to that this afternoon; the kids, of course are home from school, and today's a real nice day here in Houston, so they've been having fun around the house, and the only other thing is that they're really getting anxious for Monday, and get you guys back down here on the Earth.
08 05 36 56	LMP	Thank you, Don.
08 05 36 58	CDR	We feel the same way, believe me.
08 05 37 00	CC	Roger. Is Dick around there yet?
08 05 37 01	CDR	Yes, Dick's up.
08 05 37 02	CC	Okay, Barbara -
08 05 37 03	CDR	He's up. Go ahead.
08 05 37 06	CC	Roger. Barbara reports Uncle Herb has repaired all the bicycles and so the kids are really delighted with that. She also reported that the luncheon went off very nicely. Also, Mom and Dad have gone up with Aunt Mary to restock the larders around the house and get all the food they need in the house. Barbara reports the children have been particularly good today, and she is very happy over that, obviously, and they are happy about the flight and really are looking forward to splashdown.
08 05 37 40	CMP	Well, sounds like a normal day around the Gordon household. Thank you, Don.
08 05 37 43	CC	Roger. Listen, we've got some final ball scores for you: Cornell, 28, over Penn, 14; Penn State over Pittsburg, 27 to 7; Pete, Princeton took Dartmouth, 35 to 7; Purdue, 44, Indiana, 21; Notre Dame took the Air Force, 13 to 6; and a third quarter score, Tennessee, 24, and Kentucky, 14.

08 05 38 17	CDR	Very good. Let me give you the presleep checklist and crew status report is as follows: CDR had one decongestant, CMP had one, and Al had a sleeping pill last night. That's about that - We've cycled the fans, chlorinated the water. The valves are all at the proper positions. You have got the E-memory dump and the BAT C is 37.0; PYRO BAT A, 37.0; PYRO BAT B is 37.0; and we are on MAIN A on the dc indicator. And that is about it.
08 05 39 08	CC	Very good. Hey, listen. A preliminary report on the antenna test shows that the problem is associated with heating. We want to run another test tomorrow in which we hope to pin down exactly which component of the electronics is experiencing that heating. We will brief you on this in the morning; but it won't involve much for the crew, mostly just orienting the thing and letting it heat up and making couple of switch changes; but this probably means that we may slide the second P23 back about an hour; but we will brief you on that change and what the test consists of first thing in the morning.
08 05 39 45	CDR	Okay, and I guess the other question is, do they still plan to do the TV the way we talked about it before the flight?
08 05 40 02	CC	Stand by a second.
08 05 40 06	CDR	We don't need the answer to it right now. Just between now and tomorrow sometime.
08 05 40 32	CC	Pete. The plans are to go ahead as briefed before the flight.
08 05 40 39	CDR	Okay. Very good.
08 05 40 44	CC	You guys got anything else for us before you go beddy-by.
08 05 40 50	CDR	Don't think so.
08 05 40 52	CC	Well, have a pleasant night's sleep and we will see you in the morning then.

08 05 40 55	CDR	The only thing that's in short supply up here right now is tape recorder batteries. We are on MAX conserve on that right now, so we can squeeze the last drop of music out of them.
08 05 41 07	LMP	Might tell the skipper of that ship to put it right on the center of the target because Dick Gordon is going to be driving it right to that point.
08 05 41 13	CC	Very good. Hey, listen, if you run out of tape music, have Pete give you some of that "dum de dum dum" stuff.
08 05 41 29	CDR	You mean "ticky poo" and all that jazz?
08 05 41 32	CC	That's right.
08 05 42 24	CC	Apollo 12, Houston. The surgeon was wondering if anybody was going to be hooked up on bioharness tonight.
08 05 42 32	CDR	We prefer not to. I don't have any on and the other two guys - It is just a pain in the neck getting into the bag with all that big cable hooked up.
08 05 42 45	CC	Roger.
08 05 42 46	CDR	You don't need it for anything, do you?
08 05 42 49	CMP	Let me ask this question. How about letting us all just completely unplug and not even get on the radio? If you want us for anything, use the CREW ALERT and we will have the amplifier on the MASTER ALARM and it works fine. What do you think about that?
08 05 43 08	CC	That's fine with us.
08 05 43 16	CC	The surgeon will sleep as good as you do with no BIOMED to watch.
08 05 43 21	CDR	That's great. That's good. He may be wor - interested in the fact that we are taking these decongestants, but this spacecraft is so loaded with dust, I can't believe it. We got to clean the screens about every 2 hours. What we brought back from the LM must have been the world's record for dust, and we have just been having one whale of a time getting this thing clean. I thought it would be cleaned in a matter of 8 to 12 hours,

but we have been cleaning screens about 2 or 3 hours apart since we came back from the lunar surface, and we are still getting junk off of them.

08 05 44 10	CC	Roger. All the medical types -
08 05 44 11	CDR	Much more so than going out.
08 05 44 16	CC	The surgeons down here are reviewing their treatment for silicosis so we will be prepared for you.
08 05 44 28	CDR	What in heaven's name is that?
08 05 44 31	CC	That is a miner's disease from breathing coal dust.
08 05 44 36	CDR	There you go. Okay. I am with you.
08 05 44 39	CC	Hey, we are going to send up a crew alarm here for you in just a second - a CREW ALERT, excuse me, to check out the system.
08 05 44 49	CDR	Okay. Wait until we get the power on; we were just rigging the CREW ALARM now.
08 05 44 55	CC	Tell us when you are ready.
08 05 44 56	CDR	We are ready.
08 05 45 16	CDR	It works just fine. Did you hear it?
08 05 45 18	CC	Yes. We heard it down here. Fine, already. We'll rest in comfort.
08 05 45 24	CDR	Okay. So will we. Nighty-night.
08 05 45 27	CC	Nighty night.
08 05 45 34	CDR	Hey, Don. Tell Paul Weitz to have a lively night tonight, will you?
08 05 45 39	CC	Will do.

END OF TAPE

REST PERIOD - NO COMMUNICATIONS

08 15 38 21	SC	"The Yankee Clipper, Apollo 12" (chorus)
08 15 38 29	CDR	Good morning, guys.
08 15 38 37	CC	Good morning.
08 15 39 22	CC	Hello, 12; Houston.
08 15 39 40	CC	Hello, Apollo 12; Houston. Over.
08 15 40 04	CC	Music - "Apollo 12" (chorus)
08 15 40 24	CMP	The weather is clear up here.
08 15 40 27	LMP	It's sunny in Bombay.
08 15 40 29	CDR	Rainy in London.
08 15 40 33	LMP	Smoggy in L.A.
08 15 40 39	CMP	Snowing in Washington, D.C.
08 15 40 41	SC	Music "The Yankee Clipper, Apollo 12" by chorus
08 15 40 46	CDR	Raining in Chicago. Good morning.
08 15 40 52	CC	Good morning 12.
08 15 40 58	CDR	Don't tell me we've got Paul on the horn.
08 15 41 02	CC	Hey, what are you guys doing? You were supposed to let us sleep as long as we wanted this morning.
08 15 41 08	CDR	We were supposed to let you sleep as long as you wanted to sleep this morning ... - Well, we woke up a up a little bit early.
08 15 43 23	LMP	Houston, 12.
08 15 43 25	CC	Go ahead, 12.
08 15 43 29	LMP	We'll go ahead and eat now and pick up the O_2 fuel cell purge, the waste water, and all that stuff on time.
08 15 43 37	CC	Okay. That's the first update to your flight plan is to scratch the O_2 fuel cell purge and the waste water dump.

08 15 43 49	CDR	Scratch them, huh? Okay. Very well. We will.
08 16 01 42	CDR	Houston, 12.
08 16 01 48	CC	Go ahead, 12.
08 16 01 52	CDR	We got a message we'd like you to send for us.
08 16 01 56	CC	All right. Go ahead.
08 16 02 01	CDR	All right. It's to Rear Admiral Davis, Recovery Forces, U.S.S. Hornet. "Dear Red Dog, Apollo 12 with three tail hookers expect recovery ship to make its PIM as we have energy for only one pass. Signed Pete, Dick, and Al."
08 16 02 26	CC	Okay, Pete. You're - you're breaking up a little bit. I'll ask you to repeat in a couple of minutes. So, we'll tape it here and then I'll get it off of that.
08 16 02 35	CDR	Okay.
08 16 02 48	CC	12, Houston. Read your message again.
08 16 02 56	CDR	Okay. It's to Rear Admiral Davis, Recovery Forces, U.S.S. Hornet. "Dear Red Dog, Apollo 12 with three tail hookers expect recovery ship to make its PIM as we have energy for only one pass. Signed, Dick, Pete, and Al."
08 16 03 29	CC	12, Houston. You're fading in and out. Say again all after PIM.
08 16 03 35	CDR	"As we have energy for only one pass."
08 16 03 42	CC	Copy.
08 16 03 43	CDR	"Signed Pete, Dick, and Al."
08 16 03 46	CC	Copy, Pete.
08 16 03 50	CDR	Very good. Thank you.
08 16 03 53	CC	How's - How's the chow in the wardroom this morning?
08 16 03 59	CDR	Very good. We're still eating it.

08 16 04 05	CC	Who's messcooking this morning?
08 16 04 10	CDR	Oh, we're all taking a little turn at it. This is one of the few of them, though, that you can all float above the table instead of setting the chairs beside it. That makes it pretty nice. You can just move up and down and make your selection.
08 16 04 27	CC	Roger.
08 16 04 50	CDR	We - Houston, we just got our first glimpse of you this morning, and there's not very much of you out there.
08 16 05 00	CC	Roger. Understand. Yes, I'm looking at it in the flight plan. There sure isn't, is there?
08 16 05 07	CDR	No.

END OF TAPE

08 16 10 21	CC	Apollo 12, Houston. Your message is on the way and I got some ball scores if Dick's listening.
08 16 10 34	CDR	Yes. He's listening. Go ahead.
08 16 10 37	CC	Okay. We're still trying to run down the Washington - Washington State results, Dick. In the top ten, Purdue beat Indiana, 44 to 21. As you got the score last night, I see in the log, Michigan beat Ohio State, 24 to 12. And last night USC beat UCLA, 14 to 12, so it will be Michigan and USC in the Rose Bowl. Penn State beat Syracuse - Penn State beat Pittsburgh, 27 to 7; Stanford beat CAL, 29 to 28; Tennessee over Kentucky, 31 to 26; Missouri layed it on Kansas, 69 to 21; TCU beat Rice, 21 to 17; and Houston beat Wyoming, 44 to 21.
08 16 11 49	CMP	It sounds like they had some wild ballgames down there yesterday.
08 16 11 50	CC	Yes. They sure did. Hey, for information, how is - how's the gas in your water? Is it all right?
08 16 12 01	CMP	Well, the cold water is really quite good. It's been like that all along. And we're still getting a little bit of - still getting a little gas out of our hot water at the crew preparation station. Other than that, it's pretty good. We really can't complain about it. It's just - seems to us to be just as good with or without the gas cartridge separators on.
08 16 12 28	CC	Okay. Thank you, Dick. That's the data point we were looking for. And how's your cabin TEMP working using the manual mixing?
08 16 12 37	CMP	We didn't touch it last night. The glycol evap TEMP was holding about 55, 56 and we were fairly comfortable last night.
08 16 12 47	CC	Roger. Very good.
08 16 12 52	CMP	We want those Saints and Oilers to win today now.
08 16 12 57	CDR	Paul, we are beginning to pick up quite a bit of moisture inside the spacecraft on the hatch structure, both the tunnel hatch and the main hatch,

		and on the coves at the rendezvous window and down on the bottom bulkhead below the LC bag, but that was to be expected when we're down light.
08 16 13 21	CC	Roger. Understand, Pete. Is the water all staying in place or is it drifting around at all?
08 16 13 32	CDR	Oh, no. It all stays in place and we're just getting ready. We wiped her down last night and we'll wipe her down again this morning. It's not that bad.
08 16 13 40	CC	Roger.
08 16 13 48	CDR	I guess all that fuel aboard and the LM acts as a reflector and heat sink and we didn't have any going out, of course, and now that we're so light and empty; why, I think we've got - fueled down pretty good.
08 16 14 04	CC	Roger, Pete.
08 16 32 06	CMP	Houston, 12.
08 16 32 09	CC	Go ahead, 12.
08 16 32 13	CMP	What's the look at - MCC 6 or 7 right now?
08 16 32 21	CC	Stand by.
08 16 33 53	CC	Hello, 12; Houston. At a little less than 140 000 miles out on the glide slope, you're looking pretty good. You're on speed - mid-course 6. Right now, we're looking on the order of 0.2 of a foot a second. If 6 is not performed, 7 looks like about 0.7 of a foot per second.
08 16 34 14	CMP	Okay. So what you're telling me is that we probably won't do 6 and we might tweak up on 7, huh?
08 16 34 24	CC	That's the way it looks.
08 16 34 28	CMP	Okay. Very good.
08 16 34 57	CMP	Houston, Apollo 12.

08 16 35 00	CC	Go ahead, 12.
08 16 35 04	CMP	Okay, Our crew status report: all three of us got 9 hours sleep last night. PRD readings, across the board, 11029, 11028, 04030.
08 16 35 20	CC	Roger. Copy, Dick. Pete, how's that patch on your skin where that sensor was bothering you doing?
08 16 35 30	CDR	I have - a rash where every sensor was and they're all doing okay. I was doing what the guys said in Houston, that skin cream, but they're not bothering me or anything, but every one of them - and, and I don't understand that because I've worn them for this legnth of time before and never had any trouble. But apparently something reacted this time; maybe they changed the type of paste they use or something.
08 16 36 03	CC	Roger. Thank you, Pete. And, when you've finished eating there and have the opportunity, I've got some updates - got your consumables update and some flight plan items for you.
08 16 36 17	CDR	Okay. We're ready to copy.
08 16 36 19	CC	Okay. Your consumables are 208 hours; your total RCS is 29.2; reading Alfa through Delta; 30.8, 28.9, 26.9, 30.1; your hydrogen stands at 29 percent in each tank; your oxygen is 33 and 35.
08 16 36 56	CDR	Okay. Copying all that.
08 16 36 58	CC	Okay. Now in your flight plan, at 210 hours and 30 minutes. Okay. Commence a charge on battery Alfa. When you terminate battery Alfa, we'll start a charge on battery Bravo and we'll give you a call on that.
08 16 37 27	CDR	Okay.
08 16 37 28	CC	Okay. Now at 213 hours.
08 16 37 35	CDR	Okay.
08 16 37 37	CC	All right. As requested yesterday, we've got new attitudes for your optics CAL and your P23. At 213 hours, your optics CAL attitude will be 089, 334, and 0. The star will be number 24. Your P23 attitude, 090, 32?, and 327. Over.

08 16 38 19	CDR	Roger. Copied the optics calibration on star 24. The new angles are 089, 334, and 0; and the VERB 49 maneuver for P23 attitude, initially, is 090, 329, 327.
08 16 38 39	CC	That's affirmative; and now, at 214 hours, we're going to slip another high gain antenna test at you.
08 16 38 56	CDR	Go ahead.
08 16 38 57	CC	Okay. So, we'll delete in your flight plan, start PTC; we'll go the antenna test attitude which is 050, pitch is 0, yaw is 069. The high gain angles are pitch, minus 19; yaw, 193; use half a degree deadband. The test will last approximately 4 hours.
08 16 39 44	CDR	Okay. 214, scratch the PTC, high gain antenna test. In a half a degree deadband, angles are 050, 0, 069; high gain antenna angles, minus 19, 193; the test lasts for 4 hours and you'll probably correct us through that in real time, I suspect. Is that correct?
08 16 40 04	CC	That's affirmative.
08 16 40 32	CC	Okay, 12. And depending on when this high gain antenna test is complete, which I say is estimated somewhere in the order of 4 hours - When it's complete, you'll then pick up your P23 which is presently scheduled at 217 hours in the flight plan. And I got the angles when you're ready.
08 16 40 58	CMP	Go ahead.
08 16 41 03	CC	Okay. I'll shoot it right ahead, here. Those angles and the stars are all the same as the one I read you for 214 hours, Dick.
08 16 41 14	CMP	Okay. I suspected as much. Thank you.
08 16 41 17	CC	Roger. And the same thing at 220 hours.
08 16 41 23	CMP	Okay.
08 16 41 26	CC	And if you're unable to use any of the stars during your P23's, just give us a growl and we've got some alternate stars picked out for you to use.

08 16 41 39	CMP	Okay. Thank you. How did those P23's go yesterday? Doing you any good in the back row?
08 16 41 48	CC	Stand by, and I'll find out for you.
08 16 41 57	CC	12, Houston. It was excellent data, Dick; best we've had yet.
08 16 42 04	CMP	Okay.
08 16 43 58	CC	Hello, 12; Houston. If you'll give us ACCEPT, we'll send up your state vector.
08 16 44 06	CMP	Okay. Paul, I got a question on that.
08 16 44 14	CC	Go ahead.
08 16 44 15	CMP	The other state vectors in there now from the - We have the state vectors in there now from the P23's yesterday, and the old descent state vector in the LM slot. Are they going to try and preserve the P23 stuff or just go right over it? Can you answer that for me?
08 16 44 33	CC	Okay. I'll get an answer for you, Dick.
08 16 45 46	CMP	Houston, 12.
08 16 45 48	CC	Go ahead, 12.
08 16 45 51	CMP	You ought to get started to working down there so we can schedule the water pumps to take care of midcourses.
08 16 46 02	CC	Okay. We'll turn them to.
08 16 47 07	CC	Hello, 12; Houston. We can do it to preserve your P23 state vectors, Dick; and we can keep it in either slot you want.
08 16 47 20	CMP	Well, it doesn't make any difference - however you like. You handle it from the ground; let me put it that way.
08 16 47 31	CC	Yes. Okay, we'll do that. They're working the procedures now; it's going to take a little longer for this uplink - about 5, 6 minutes.
08 16 47 42	CMP	Okay. Well, call us when you're ready.
08 16 47 45	CC	Okay.

08 16 54 43	CC	Apollo 12, Houston. We're ready to uplink into the LM slot, Dick, and you can keep your P23 vector in the CSM slot.
08 16 54 54	CMP	Very good. Go ahead.
08 16 54 58	CC	It's on the way.
08 16 55 07	CC	Oh, it's not on the way, it'll be a minute while we're switching antennas.
08 16 56 12	CC	12, Houston. Now it's on its way.
08 16 56 17	CMP	Okay. Thank you.
08 16 58 31	CC	12, Houston. The computer's yours.
08 16 58 38	CMP	Thank you.
08 17 29 57	CC	Apollo 12, Houston. You guys want some morning news?
08 17 30 03	CDR	Yes, sir. Send up the morning news.
08 17 30 06	CC	Okay. First off, among the hundreds of suggestions received by NASA on how to apair - how to repair the Apollo 12 lunar camera was one calling for the use of a woman's hairpin. I don't know why you guys didn't think of that. From Washington, the - -
08 17 30 26	CDR	(Laughter) We didn't have the woman.
08 17 30 33	CC	(Laughter) I'll go on (laughter). From Washington, the Senate - -
08 17 30 36	CDR	That stopped you cold, didn't it?
08 17 30 38	CC	Huh?
08 17 30 44	CDR	We were looking, but we couldn't find one.
08 17 30 51	CC	Okay. From Washington, the Senate Foreign Relations Committee under Senator Fulbright has decided to go ahead with a series of hearings next month to help the administration determine just what is the wisest future procedure for ending the Vietnam war. Hearings will be confined to testimony on nine bills and resolutions introduced by both hawks and doves. In Saigon, guerrilla troops, I guess they're VC's, ambushed

American troops for the fourth time this week, killing two GI's and wounding seven. Deputy Defense Secretary David Packard said that he's very concerned about our casualties and acknowledges U.S. commanders are sending out smaller units on sweeps. In Los Angeles at the regional headquarters of the Alcoholism Council, a telephone installer exchanging phones answered a routine call from a council staffmember. He pleaded with the guy, "You'd better get over here quickly, I've taken two calls and one sounded pretty desperate. I can't talk to you any longer, there's another call coming in." Out of Washington comes word that the new 400-passenger jumbo jetliner will not bring immediate fare cuts until 1974 and beyond, according to a CAB staff study. The report cited two factors, the high cost of introducing the new airplane and the initial gap between the great number of seats and the amount of passenger traffic available. And from London comes word that a 21-year-old man crippled by polio when he was two will walk across the United States next summer to raise money for charity. He did this in Great Britian last year and raised $4800 by walking the length of Britian on crutches. Al, your ALSEP news - Not a whole lot to report this morning. The performance of the central station continues to be normal. The passive seismic is - They're trying to stop some long-period Z-axis oscillation. LSM is operating satisfactorily, as is the solar wind. The SIDE is still - got the high voltages off continuing to operate in the out-gas mode. And that's about it from here this morning.

08 17 33 41	CDR	Roger. Thank you. Hey, we can entertain you with a little saucy ... fandango.
08 17 33 51	CC	Okay. Go ahead. We got your commercial this morning.
08 17 34 11	CDR	Speedy Al's gone into the sleep mode to pass time; that's all he does these days is sleep. He's over in the corner sleeping now.
08 17 34 21	CC	Well, who's winding the victrola? It sounds like it's having a hard time running there.
08 17 34 28	CDR	Listen, we're getting low on BAT power.

08 17 34 45	CDR	That's our launch tape.
08 17 35 18	CC	Hey, Pete. Hold the mike a little closer. We're not reading it very well.
		Music - "Freight Train" by Peter, Paul, and Mary.
08 17 35 26	CC	There you go.
08 17 36 40	CDR	Hey, Paul. We dedicate that song to Saturn 507.
08 17 36 45	CC	Okay. Duly noted.
08 17 36 52	CDR	And the high tenor was sung by Al Bean.
08 17 36 55	CC	Yes. I was going to say, I thought you said he was sleeping.
08 17 37 01	CDR	He gets up every once in a while.
08 17 37 06	CMP	Okay, Paul. I have a question on this EMS entry test. We're on ground test pattern number 2 and I assume you want it run right on that one, and the same for the flight test patterns for entry?
08 17 37 20	CC	Okay. Stand by. Also, will you confirm your lithium hydroxide canister change?
08 17 37 29	CMP	That's been done.
08 17 37 31	CC	Roger. Thank you.
08 17 37 57	CC	12, Houston. That's affirm, Dick. Run it on test pattern number 2.

END OF TAPE

08 17 38 06	CMP	Okay. We're ready to do that now.
08 17 38 08	CC	Roger.
08 17 41 13	CMP	Houston, 12.
08 17 41 15	CC	Go ahead, 12.
08 17 41 19	CMP	The EMS checked out satisfactorily.
08 17 41 21	CC	Roger. Thank you, Dick.
08 17 47 13	CC	Hello, 12; Houston. Cliff Charlesworth and his Green Team are going off for the last time. They said say "Hey" and they'll see you in Houston.
08 17 47 24	CDR	Very good. We appreciate the fine descent.
08 17 47 29	LMP	Sure do. It was magnificent.
08 17 47 32	CC	They copied that.
08 17 47 40	CDR	Yes. I was going to say, why don't you save that flight controllers' blast until after the eleventh of December? I'd sure like to be there.
08 17 47 48	CC	Okay. That's a promise.
08 18 09 23	CDR	Houston, you got those torquing angles?
08 18 09 26	CC	Roger. We got them.
08 18 09 30	CDR	Okay. Very good.
08 18 27 35	CMP	Houston, 12.
08 18 27 37	CC	12, Houston. Go ahead.
08 18 27 41	CMP	We commenced the BAT A charge at this time.
08 18 27 45	CC	Roger. BAT A.
08 18 27 52	CDR	Morning, Ed.
08 18 27 55	CC	Morning, crew.

END OF TAPE

08 19 18 39	CDR	Houston, 12.
08 19 18 41	CC	12, Houston. Go ahead.
08 19 18 45	CDR	In case you're watching the DSKY, it's a little OJT for Al, and we won't torque.
08 19 18 52	CC	Roger.
08 19 55 24	CC	Hello, Apollo 12; Houston.
08 19 55 28	CDR	Go ahead, Houston.
08 19 55 30	CC	Say, 12, we've got a couple of points we'd like to talk over if you would - a few things on magazines, storage, and P23's. Have you got about 10 or 15 minutes?
08 19 55 31	CDR	Okay.
08 19 55 42	CC	Okay. First of all, which magazine was used to photograph Fra Mauro on the LM activation day?
08 19 55 55	CDR	Okay. Wait 1.
08 19 56 01	CC	And our second question related to that was - is - was this same magazine - Was this the same magazine which failed during the bootstrap photography?
08 19 56 12	CDR	No. No, that - That we can answer. All of the magazines are marked what they are, and Dick doesn't remember offhand now which magazine he had Fra Mauro on during LM activation, but he's looking. Let's see. Maybe we have it in the flight plan.
08 19 56 35	CC	We've got some folks down here who are pretty interested in Fra Mauro.
08 19 56 42	CDR	The Fra Mauro troops are in on Sunday, huh?
08 19 56 48	CC	They have no time limits.
08 19 56 57	CDR	Who do you got down there? Captain Shaky?
08 19 57 02	CC	No, he's not down here now, but we got other folks pursuing it for him.
08 19 57 09	CDR	Oh, I see. We'll get it for you in just a minute ..., we got to do a little digging.

08 19 57 22	CC	Okay. Thank you, Pete.
08 19 57 34	CDR	It's in magazine S.
08 19 57 37	CC	Magazine F. Thank you.
08 19 57 40	CDR	That's the one - that's the one that called out for it, and that - that is the one that opened up on us.
08 19 57 53	CC	Okay. Understand. Magazine Foxtrot, and that is the one that opened up?
08 19 57 59	CDR	No. It was Sugar, Sugar.
08 19 58 03	CC	Say again.
08 19 58 06	CDR	This magazine's Sugar, Sierra.
08 19 58 12	CC	Okay. Understand. Fra Mauro is on Foxtrot and Sugar is the one that opened?
08 19 58 18	CDR	No.
08 19 58 19	CC	Other way around?
08 19 58 20	CDR	They're all on Sugar. They're all on Sugar, and Sugar is the magazine that opened up.
08 19 58 28	CC	Okay. Thank you.
08 19 58 32	CDR	Now, we got Fra Mauro and Descartes and Lalande with 500 millimeter on another magazine, also. That was the second trip around.
08 19 58 50	CC	Okay. Thank you, Pete.
08 19 58 51	CDR	So somewhere along in there we'll get it. And I'm not - I'm not sure that all of magazine Sugar is ruined, by any means, but we just didn't want to take any chances.
08 19 59 14	CC	Okay, 12. One question which you might have to put a little thought in, and that is: What deviations from the entry stowage checklist had to be made in terms of pounds and location from - The folks down here, for reentry purposes, would like to figure that out.
08 19 59 33	CDR	Okay. We - we have stowed everything, as far as the boxes go, according to the flight plan. And

let me mention a couple of boxes to you that have some gear in them that's not listed.

08 19 59 51	CC	Okay.
08 19 59 56	CDR	In A-8, in the single garment LCG and ... kit, we have all that junk that we brought back from the LM. And now, what my suggestion is on the TV camera off the Surveyor and the extra rocks is to tie up in front of the L-shaped bag on the floor in front of A-4 and A-5 rather than on the top of A-1 as it calls out in the flight plan.
08 20 00 35	CC	Okay, Pete. Do you have any sort of an estimate?
08 20 00 36	CDR	And if you all could - -
08 20 00 38	CC	Do you have an estimate of the number of pounds for those rocks?
08 20 00 44	CDR	The rocks probably weigh 15 pounds.
08 20 00 50	CC	Roger.
08 20 00 54	CDR	What they are is four large rocks.
08 20 00 57	CC	Those are the grapefruits?
08 20 01 01	CDR	Yes. They're the grapefruits, all of them. They would - they would - not - None of those would fit in the - We didn't want to use up the room in the rock boxes for those big ones.
08 20 01 27	CC	Okay, Pete - -
08 20 01 28	CDR	Now, if it's okay with you, we would like to tie that Surveyor camera gear and all that stuff right in front of the L-shaped bag between it and A-4 and 5.
08 20 01 49	CC	Pete, let us run - -
08 20 01 50	CDR	Another thing is - -
08 20 01 51	CC	- - that one down a little bit, and we'll be getting back to you.
08 20 01 55	CDR	Okay. The other thing is we have the two lunar surface suits, Al's and mine, in the lower part of the L-shaped bag, and we have Dick's in the upper part. And what we intend to do, with your concurrence there, is to leave those two lunar

suits in the lower part of the L-shaped bag, and we'll take Dick's out and tie it on top of A-1 under the Commander's couch. I don't want to take those lunar suits out of the bags. They're so darned dirty that it's unbelievable.

08 20 02 30	CC	Okay, Pete.
08 20 02 38	CDR	And that's it. We don't have any other gear. Everything's stashed where it belongs.
08 20 02 46	CC	Okay, Pete. Do you have any rocks underneath couches?
08 20 02 52	CDR	Do we have any what?
08 20 02 54	CC	Do you have rocks stowed directly underneath couches? And, if so, we'd like to assure that you have at least a 3-inch clearance.
08 20 03 01	CDR	No. No, we don't have rocks stored there. They're all in the Surveyor - in the big bag that has the Surveyor camera in it. The lunar tools and the extra bag of rocks are all in the - in the one big white bag, which we want to put down in front of A-4 and 5.
08 20 03 18	CC	Okay. And for that, you estimated the total weight of that bag is 15? Or was that only the rocks?
08 20 03 25	CDR	That's only the rocks. That's got the camera - the Surveyor camera - and the lunar tools that we said we were bringing back.
08 20 03 37	CC	Okay. Thank you.
08 20 03 41	CC	Pete, is Dick on the line?
08 20 03 46	CMP	Yes. I'm listening. Go ahead, Ed.
08 20 03 49	CC	Okay, Dick. One thing on the P23's, which we have done - and the ones coming up. The latest vector shows the angle Gamma of about minus 6.04, and that's based on 14 hours of unperturbed tracking after dumps, purges, and unbalance-couple P23's. Inaccuracies in our ground vector or trajectory perturbations could give us this angle. You have already demonstrated the extreme accuracy that you can get using two jets. To avoid trajectory perturbations and uncertainties in our ground vector, we would like you to use balance couples from here on for your P23's. Also, since the use

of unbalance couples perturbs the state vector, as you have so accurately detemined, it would be useful to see how accurately you can do the balance-couple P23's.

08 20 04 45 CMP That sounds like a pretty good speech.

08 20 04 51 CC I've been working on it all morning.

08 20 06 05 CC Dick, from your - from your brute silence, I can only conclude that you're working up a comparable speech.

08 20 06 14 CMP Yes. We'll do it. No. There's no question about that, Ed. We'll do it any way you want to. Sounds like GUIDO and FIDO are having at it again. Wait a minute.

08 20 07 12 CC Say, Dick, a note from the trench, here. Don't put GUIDO in with the bad guys.

08 20 07 19 CMP Okay.

08 20 11 56 CMP Houston, Apollo 12. The position report: we're over 16 north, 144.97 west - correction, east.

08 20 12 09 CC Roger. That looks good to us down here.

08 20 12 15 CMP How could it be? That's with my bad state vector.

08 20 12 27 CC I guess - -

08 20 12 28 CDR Are you hitting the needle?

08 20 12 29 CC I guess I'd better go back and work on that speech again.

08 20 12 45 CDR No, I think the only point that Dick was trying to make - and that's a very valid point - certainly it perturbs the vector, but the next series of marks takes out that perturbation from the previous set and so forth; and, if you're really doing your own NAV - navigate all the way down, almost to entry and that's what we're trying to prove. I think you all are worrying a little bit too much about preserving your own vector down there so far out. We all know that doing it with balance couples is going to make it ... and there are going to be poorer marks. And if I was coming home no COMM, my last worry would be perturbing my own state vector by a gnat's eyebrow, as long as I was going to continue those marks all the way down to just before reentry.

08 20 13 34	CC	Okay. You really think using balance couples will degrade appreciably the marks you may be able to get?
08 20 13 43	CDR	It does in the simulator, so we'll find out up here.
08 20 13 48	CMP	Ed, that's a good point; we ought to look at it that way since I'll be doing it, and I'll be using the same techniques. I - I know it's going to be a lot harder to do, and it'll take a little longer, but maybe - maybe we can prove something by doing it that way. I think it's a good idea to look at it the other way, also.
08 20 14 06	CC	Okay. So far, the ones you've done on two quads look real good. You can get a job down here as a P23 instructor.
08 20 14 17	CMP	Oh, no, I won't.

END OF TAPE

08 20 47 40	CMP	Houston, 12.
08 20 47 44	CC	12, Houston. Go ahead.
08 20 47 48	CMP	Hey, Ed, I've just been thinking about the nasty accusations you people have been making about my unbalanced-couple minimum-impulse P23's, and gee whiz, I kind of think it's probably EECOM's water dumps that's doing all this to the state vectors.
08 20 48 09	CC	Just a minute, Dick; we've got EECOM and FIDO wrestling down in the trench. We'll get them apart and discuss it.
08 20 48 18	CMP	No, you don't have to do that; I was just bugging you. Trying to find something in my defense.
08 20 48 30	CDR	What he's telling you is he's getting lazy up here and he doesn't want to work today.
08 20 48 34	CC	Yes. But the people down here are talking a lot about dumps we've been having. Maybe that could do it.
08 21 17 44	CMP	Houston, you getting all this good data?
08 21 17 49	CC	We sure are.
08 21 17 52	CMP	Okay.
08 21 20 10	CMP	Hello, Houston; Apollo 12. No star for this particular one.
08 21 20 21	CMP	That star 204?
08 21 20 23	CC	Roger, 204. We have an alternate star for you here. Star 125, near, and we'll have the unit vectors for you and NOUN 88 when you're ready to copy.
08 21 20 34	CMP	Okay. Just stand by.
08 21 20 54	CMP	Go ahead, Houston.
08 21 20 55	CC	125 is the star; unit vectors NOUN in 88 are as follows: minus 0.25472, minus 0.78647, minus 0.56266.

08 21 21 25	CMP	All right, Houston; this is 12. Understand star - star 125, minus 0.25472, minus 0.78647, minus 0.56266. That Charlie?
08 21 21 37	CC	That's Charlie, and the magnitude of that is 2.4.
08 21 21 43	CMP	Okay. Was 204 pretty close to the Sun or about 20 degrees, maybe?
08 21 21 53	CC	That's affirmative. Shaft line is about 6 degrees from the Sun.
08 21 24 03	CMP	Hello, Houston. I still don't have a star.
08 21 24 10	CC	Okay, Dick. Stand by. Okay, Dick; let's try star 24, far, and you have the unit vectors on board. That's a 2.8 magnitude.
08 21 24 18	CMP	That was star 24. That's okay; I don't need the vector for it. Star 24 was far horizon?
08 21 24 32	CC	Affirmative.
08 21 24 35	CMP	Okay.
08 21 34 07	CMP	Houston, this is 12. A comment on that first mark: I was a little deep into the horizon on that one. I think that's why it came out of that DELTA-R.
08 21 34 20	CC	Roger, Pete.
08 21 45 44	CMP	Hello, Houston; 12.
08 21 45 48	CC	12, Houston. Go ahead.
08 21 45 52	CMP	Ed, I went back to look at 204 again, and every now and then I can't pick up the star. It's so dim that I'm trying to move it out of the horizon or move it at all. I lose it in the field of view, so I really can't use it for a P23.
08 21 46 10	CC	Roger, Dick. That star - - star 125 is really 15 degrees.
08 21 46 12	CMP	...
08 21 46 13	CC	- - star shaft angle from the line of sight of the Sun. I think we quoted your figure as 6.
08 21 46 25	CMP	Okay. Then, I still can't see it. I'm going back and do - give you another trunnion - or optics CAL trunnion bias.

08 21 46 40	CC	Dick, say again. We didn't copy your last comment.
08 21 46 44	CMP	Going to go back and get you an optics CAL.
08 21 46 50	CC	Roger.
08 21 49 20	CMP	Okay, Houston. There you are.
08 21 49 36	CC	Okay, Dick. Thanks very much. It looks good. Would you hold this attitude for about another 2 minutes while we finish up on the tape dump?
08 21 49 47	CMP	Sure will. We're getting ready to maneuver to the high gain antenna test attitude, but we'll wait.
08 21 56 55	CC	Apollo 12, Houston. We have the switch configuration for the S-band test.
06 21 57 06	CMP	Go ahead. We're ready to copy.
08 21 57 09	CC	Okay. It's the same configuration which we went through yesterday. If you still have that, it's good; if not, I'll read it up to you again.
08 21 57 21	CMP	Ed, I think we still have it, but go ahead and read it and we'll do it as you read it.
08 21 57 24	CC	Okay. S-BAND TRANSPONDER to PRIMARY, S-BAND AUX to TAPE.
08 21 57 31	CMP	Roger.
08 21 57 35	CC	TAPE RECORDER, PCM/ANALOG; TAPE RECORDER, RECORD; S-BAND ANTENNA, HIGH GAIN; HIGH GAIN ANTENNA POWER, ON; HIGH GAIN ANTENNA SERVO ELECTRONICS, PRIMARY.
08 21 58 05	CMP	Okay. We're - we're all there except - we're all there except for the SERVO ELECTRONICS to PRIMARY, and I'm in the SECONDARY TRANSPONDER and going to PRIMARY TRANSPONDER at this time.
08 21 58 44	CMP	Hello, Houston; Apollo 12.
08 21 58 45	CC	12, go ahead.
08 21 58 50	CMP	Houston, 12.

08 21 58 57	CC	Apollo 12, go ahead.
08 21 59 01	CMP	Roger. We're all set now. We've got the TRANSPONDER in PRIMARY; S-BAND AUX is to TAPE; PCM/ANALOG to RECORD; I'm not yet to FORWARD; HIGH GAIN POWER and the SERVO ELECTRONICS in PRIMARY.
08 21 59 21	CC	Roger.
08 21 59 22	CMP	And are you going to - are you going to run the tape?
08 21 59 29	CC	Dick, we'll be running the tape if we come up with a problem. But we'll have it - We'll be asking you to turn it on when we develop a problem.
08 21 59 45	CMP	Okay. Fine; understand. And we're in LOW BIT RATE. You want LOW or HIGH BIT RATE?
08 21 59 54	CC	HIGH BIT RATE.
08 21 59 58	CMP	Okay. All set.
08 22 00 42	CMP	Houston, 12.
08 22 00 45	CC	12, Houston. Go ahead.
08 22 00 48	CMP	Roger, Ed. While we're in this attitude, we can run the same test with our GDC as we ran yesterday for you. The difference is that we're using the rate 1 needles at this - rate 1 package at this time for the GDC, and it seems to be just as bad as the rate 2 system, so if you want to, we can give you the same check.
08 22 01 10	CC	Okay. Let's go ahead with that, Dick. We're ready to copy.
08 22 01 15	CMP	Okay. We're just going to - we're aligning the GDC at this time.
08 22 01 19	CC	Roger.
08 22 03 33	CMP	Okay, Houston. We aligned it in roll 049.4, pitch is 000.9, and yaw is 068.6.
08 22 03 55	CC	Roger, 12. Copy 049.4, 000.9, and 068.6.
08 22 11 35	CC	12, Houston.

08 22 11 39	CDR	Go.
08 22 11 40	CC	Would you put the ATTITUDE SET switch to the GDC position?
08 22 11 46	CDR	Roger.
08 22 11 49	CC	Thank you.
08 22 13 38	CDR	Houston, 12.
08 22 13 41	CC	12, Houston. Go ahead.
08 22 13 45	CDR	I was just going to mention that we've gotten up to 60 on the glycol EVAP TEMP, but I see it's starting back down now that we've got tailpipe to the Sun. I'll just leave them alone. We're quite comfortable.
08 22 14 00	CC	Roger, Pete.

END OF TAPE

08 22 39 59	CC	Apollo 12, Houston.
08 22 40 03	CDR	Go ahead.
08 22 40 06	CC	Could we get another reading on those GDC angles? And then after that, we'd like to propose another method in order to get a little more accuracy. One of the problems we're having is, when the yaw angle gets over 60 degrees, we get a lot of coupling with the other axes, and it's difficult for us to sort it out and get a good hack on what the drift rates really are. If you give us those - -
08 22 40 28	CDR	That's true.
08 22 40 30	CC	Okay. If you could give us those readouts now, and, then afterwards, align the - you can use the align - the attitude set to 000, using the thumbwheel.
08 22 40 42	CDR	Okay.
08 22 41 22	CDR	Okay, Houston. The roll is 051.1, pitch is 358.7, and yaw is 069.3.
08 22 41 39	CC	Roger. 051.1, 358.7, 069.3. Thank you.
08 22 42 12	CDR	Wait a minute, Houston; we used the wrong numbers.
08 22 42 17	CC	Roger. Standing by.
08 22 43 41	CDR	Okay, Houston. The angles are 052.4, 003.8, 071.0.
08 22 43 58	CC	Roger. 052.4, 003.8, 071.0.
08 22 44 09	CDR	That's right.
08 22 45 08	CDR	Okay. We aligned at 000.
08 22 45 11	CC	Roger, Pete. Thank you.
08 23 09 05	CDR	Houston, 12.
08 23 09 08	CC	12, Houston. Go ahead.
08 23 09 15	CDR	About 3, 4 days ago, I guess, our number 1 urine filter stopped flowing, so we switched filters;

and our number 2 filter just quit flowing, so we're dumping without any filter, and I wondered how long that's going to work. Any good words about that?

08 23 09 36	CC	Stand by, Pete. We'll try to get some for you.
08 23 13 15	CC	Apollo 12, Houston.
08 23 13 19	CMP	Go ahead.
08 23 13 21	CC	12, would you start a battery B charge, and also give us a readout of the battery manifold pressure?
08 23 13 29	CMP	Okay.
08 23 13 38	CMP	4-A battery manifold reads 1.5.
08 23 13 44	CC	1.5. Thank you.

END OF TAPE

09 00 06 29		Music - "Sugar Sugar" (Archies)
09 00 07 02	CC	12, we have a little more endurance than that.
09 00 07 33	CDR	It's R&R time aboard the Clipper.
09 00 07 54	CC	12, do you have the sequence camera going?
09 00 08 01	CMP	Negative.
09 00 08 33	CMP	What's the movie tonight in the wardroom?
09 00 08 38	CC	Dick, say again.
09 00 08 43	CMP	What's the flick in the wardroom tonight?
09 00 09 13	CC	Dick, we've got one called "Lost in Space" or "After P23's."
09 00 09 23	CMP	Are you giving me a - Are you sending me a message?
09 00 09 33		Music - "Hey, Little Woman"
09 00 10 17	CMP	Ken, are you telling me that MSFN's vector's the same degree as mine?
09 00 10 24	CC	Dick, we're trying to shape up the MSFN vector now.
09 00 10 29	CMP	Okay.
09 00 11 24	CC	Dick, was that meant to be post-TLI music?
09 00 11 31	CMP	Well, yes, you might say that.
09 00 11 36	CC	I hope it's not post-TEI.
09 00 11 37	CMP	This isn't too bad right now. Well, it's not too bad right now. I guess it depends on where the song originates, huh?
09 00 22 12	CC	Apollo 12. TAPE RECORDER to FORWARD and WIDE BEAM width.
09 00 22 21	CMP	Roger. FORWARD, WIDE BEAM width.
09 00 22 38	CMP	It takes almost 10 hours to start - 2 hours to start that up, doesn't it?

09 00 22 46	CC	It took a little longer time this time.
09 00 23 18	CC	Apollo 12, Houston. Could we have the readouts of the AGC and the antenna pitch and yaw angles?
09 00 23 29	CMP	Okay. Pitch is about minus 20 degrees, yaw is 190, and the AGC on European clock code for 12 o'clock, it's about - 145; in other words, I'd estimate about three-quarter full scale.
09 00 23 54	CC	Roger. Understand. Pitch, minus 20; yaw, 190; and AGC, 45, or about three-quarters scale. Thank you, Dick.
09 00 25 16	CC	Apollo 12, Houston.
09 00 25 20	CMP	Go ahead.
09 00 25 26	CC	12, we'd like you to, first of all, dial in a pitch of minus 60, yaw, 240; and, then on our call, switch the high gain antenna to MANUAL mode and then to REACQ. And we'll give you a call when we want you to go to MANUAL.
09 00 25 50	CMP	Okay. I've got minus 60 and 240 already set up. Waiting for your call.
09 00 27 13	CC	Apollo 12, will you go to MANUAL mode and then REACQ?
09 00 27 20	CMP	Okay. In MANUAL - going to ...
09 00 27 48	CC	Apollo 12, would you again give us the readings of the AGC and antenna pitch and yaw?
09 00 27 56	CMP	Roger. It's the same as before, Ed. Minus 20, 190, and about three-quarter full scale.
09 00 28 04	CC	Roger, Dick.
09 00 28 41	CC	Apollo 12, would you switch the high gain to NARROW BEAM? And we'll give you a call in 30 seconds and ask you to read out the same quantities.
09 00 28 51	CMP	Roger. On NARROW BEAM.
09 00 29 08	CMP	Okay, Ed. Pitch looks like it's about minus 12, yaw is 180, and the AGC peaked in when I switched to NARROW and it's dropped off now to three-quarter full scale.

09 00 29 28	CC	Roger. Understand. Minus 12, 180, and AGC peaked and now at three-quarter scale.
09 00 30 54	CC	Apollo 12, Houston. Do you observe the antenna still oscillating?
09 00 31 07	CMP	... straight. Ken, but it's gone up by about five-sixths, and the antenna position angles are pitch, minus 20, and yaw, 190.
09 00 31 22	CC	Roger. We copied pitch, minus 20, and yaw, 190; and - do you see any oscillations at all?
09 00 31 35	CMP	No, I don't see any at all right now.
09 00 31 38	CC	Thank you, Dick.
09 00 32 12	CC	Apollo 12, Houston. Could we have the GDC angles?
09 00 32 21	CMP	They are the same, Ed; minus 20 and 190.
09 00 32 26	CC	Dick, right now we're looking for the GDC angles - We're finished now with the high gain test.
09 00 32 31	CMP	Oh, I'm sorry - I mis - misunderstood you, and we'll give them to you real quick here. I think we've got a better GDC on the number 1 package than we had with the number 2.
09 00 33 12	CMP	Okay, Ed. Roll is 5.8, pitch is 6.7, and yaw is 6.1.
09 00 33 21	CC	Copy. 5.8, 6.7, and 6.1.
09 00 33 33	CMP	That's Charlie.
09 00 33 38	CC	12, we can go now to the P23 attitude, but we'd like you to roll 180 from that attitude for thermal reasons.
09 00 33 52	CMP	Okay.
09 00 33 53	CC	And would you - Be sure that you are manually maneuvered away from gimbal lock.
09 00 34 02	CMP	You bet.
09 00 36 24	CC	12, Houston. Would you give us S-BAND AUX to OFF and TAPE RECORDER to OFF?

09 00 36 35	CMP	You got it.
09 00 36 37	CC	Roger.
09 00 46 36	CMP	Hello, Houston; Apollo 12.
09 00 46 39	CC	12, Houston. Go ahead.
09 00 46 42	CMP	Hey, what'd you learn from that high gain antenna test?
09 00 46 48	CC	Stand by, Dick.
09 00 50 26	CC	12, Houston.
09 00 50 32	CMP	Go ahead.
09 00 50 34	CC	Okay, 12. We have a recommendation on the use of that system without the filter. First of all, we recommend you continue to use the overboard line without the filter, and it's possible it may clog. If so, we'll have you dump the waste water down to some quantity, which we'll specify at that time. After that, you can install the interconnect line and use the system as before. The interconnect procedure, you'll find on ECS 31.
09 00 51 09	CMP	12. Roger.
09 00 51 36	CC	And, 12, one note on the stowage configuration which you specified earlier. That configuration looks to be a good one from our standpoint. We would like to make sure we understand it as you do. We understand you've got the Surveyor parts bag, rocks, and tools all in one large white bag, and that is on the floor in front of the L-shaped bag. And between it and A-4 - -
09 00 52 04	CDR	That's where it is.
09 00 52 06	CC	Okay. And that's between it and A-4, A-5, and that this bag is tied down.
09 00 52 11	CDR	That's correct.
09 00 52 12	CC	Okay. Your LM gear is in A-8 - -
09 00 52 15	CDR	It's not there right now, Ed.
09 00 52 17	CC	Okay. But that's where you plan to have it.

09 00 52 20	CDR	That - That's right.
09 00 52 21	CC	Okay. LM gear is in A-8 - and Dick's PGA under A-1?
09 00 52 31	CDR	That's correct.
09 00 52 34	CC	Okay. It's a good way to go.
09 00 52 41	CMP	Hey, Ed. What page did you say this interconnect was on the - -
09 00 52 47	CC	That's ECS MAL 31.
09 00 52 48	CMP	- - What number?
09 00 52 50	CC	ECS MAL 31.
09 00 52 52	CMP	Okay. Now, is this - Okay; got it; 31. Is this dumping the waste water through the hatch?
09 00 53 00	CC	Negative, Dick. Stand by.
09 00 53 50	CMP	Houston, this is 12. We understand what you're talking about okay - on the waste water.
09 00 53 59	CC	Okay, Dick. That's the first procedure stuff defined on that page.
09 00 54 04	CMP	Yes. We understand it.
09 01 00 24	CC	Apollo 12, Houston.
09 01 00 28	CMP	Go ahead.
09 01 00 29	CC	The drift rates you got on package 1 were 3.7 degrees in all axes. We'll be sitting in this attitude here for - on the order of 45 minutes to an hour. Why don't we go ahead and take a look at package 2 in the same way as we did package 1?
09 01 00 49	CMP	Okay. It's a good idea. Are you saying also we're delaying the P23's for another hour or so?
09 01 00 56	CC	That's affirmative.
09 01 00 59	CMP	Okay. That's fine with me. Yes. We're not going to go anywhere; we'll be here.
09 01 01 15	CMP	Okay -

09 01 01 16	CMP	MARK it.
09 01 01 17	CMP	The GDC is aligned on package 2.
09 01 01 23	CC	Roger, Dick. Thank you.
09 01 01 25	CMP	On package number - package number 2.
09 01 19 10	CC	Apollo 12, Houston.
09 01 19 15	CMP	Go ahead, Houston.
09 01 19 18	CC	12, we'd like you to take the waste water dump to 30 percent at the present time. Your P23 can then be done at 218:30 where we - where it should be clear for the sightings. And also, our temperatures will come back to where we like to see them, and the second set of P23's can be done at 220 hours even.
09 01 20 06	CMP	Okay. I understand. Take the waste water and dump it right now to 30 percent. The second set of P23's, do those at 218:30 and the third set as in the flight plan at 220. Is that affirmative?
09 01 20 23	CC	That's affirmative, Dick. And you have the attitudes for those on board.
09 01 20 31	CMP	Yes, I sure do. And for my information, on the waste water dump to 30 percent, will that give us our 80 percent for reentry tomorrow?
09 01 20 44	CC	That's affirmative, Dick; that's what we're looking for.
09 01 20 48	CMP	Okay. This should be our last one on the waste water then, is that right?
09 01 20 51	CC	That's right.

END OF TAPE

09 01 34 20	CC	Hello, Apollo 12; Houston.
09 01 34 23	CMP	Hello, Houston; Apollo 12.
09 01 34 27	CC	Say, 12, you can go ahead and carry out a fuel cell O_2 purge for 2 minutes at the present time. You won't have to do an H_2 purge either now, nor before reentry. This ought to group together all of the perturbations and also will be that last of any dumps or purges that will be required by us. This will make one big happy FIDO down here and ought to just cut down and - or eliminate anything else we'll require from you.
09 01 35 03	CMP	Okay. We'll purge the fuel cells of oxygen for 2 minutes on each one. And I'm glad to see you have a very happy FIDO then.
09 01 45 13	CC	Apollo 12, Houston.
09 01 45 20	CMP	12 here.
09 01 45 21	CC	Dick, we'd like you to go to Bravo-Delta roll in the DAP, and we have an RCS consumables update for you when you're ready to copy.
09 01 45 35	CMP	Okay. Let me get the PAD first.
09 01 46 23	CMP	Okay, Ed. Go ahead.
09 01 46 25	CC	Okay. GET 217 plus 30; RCS total, 29; 31, 31, 24, 30.
09 01 46 45	CMP	Roger, Ed. ... 217, 30, 29 total, 31, 31, 24, 30.
09 01 46 52	CC	That's Charlie. And, Dick, on the P23's which you're doing at 217; before you reported you had a problem with star 204, which is your third star listed there, we would like you to take and try 125 over again in its place. That should be about 0.7 magnitude brighter relative than 204. You have the unit vectors for that already; they were read up, or you could find them on page 3-188 on the flight plan.
09 01 47 27	CMP	Okay. I already have them. It is interesting that I couldn't see star 125 before either.

09 01 47 36	CC	Okay, Dick. If you would, give it a try again this time and if it won't work, we'll have another star ready for you.
09 01 47 42	CMP	Okay. I'll be glad to.
09 01 48 27	CMP	Houston, 12. Was that far horizon or near horizon on 125?
09 01 48 33	CC	125 is near.
09 01 48 43	CMP	Okay. Near. Thank you.
09 01 53 12	CC	Hello, 12; Houston. We have a preliminary result of your high gain test.
09 01 53 20	CDR	Okay. Go ahead.
09 01 53 22	CC	The up- and downlink rf signal strength decreased by approximately 10 to 12 dB. The data does not show that the beam switching occurred during the problem period. The onboard antenna does show the - the antenna would move off boresight as though it was tracking and nulling a false error. The tentative conclusion is that since the antenna would operate in the WIDE BEAM in REACQ in NARROW BEAM, MANUAL, it appears that the boresight shift is caused by a loss of antenna feed or a comparator circuitry in the NARROW BEAM mode - the strip lines. The high gain antenna malfunction has been isolated to the high gain antenna rf area, thereby eliminating the high gain antenna, the electronic box, and the S-band transponder. The problem appears to be associated with the dynamic thermal operation of the antenna.
09 01 54 16	CDR	Thank you.
09 02 07 34	CMP	Houston, 12.
09 02 07 38	CC	12, Houston. Go ahead.
09 02 07 41	CMP	Hey, Ed, what did the boys in the back room say about that first set today of P23's?
09 02 07 49	CC	Stand by on that, Dick, and we'll try and get a word up to you.
09 02 08 14	CC	It's going to take a little while to get a speech together on this one, Dick.
09 02 08 19	CMP	Say again.

09 02 08 22	CC	It will take to get - a little while to get a a comparable speech to the last one together.
09 02 08 28	CMP	Don't worry about that, just a good, bad, or indifferent, or usable. I don't want any speeches from you, Ed. Conrad's giving them all up here.
09 02 12 31	CC	Hello, Dick; Houston.
09 02 12 34	CMP	Hello.
09 02 12 36	CC	Dick, the sightings themselves that you took were very good in terms of procedures and, from what we could tell, the accuracy. When you incorporated them into the state vector, however, we did see a raise in the vacuum perigee of about 6 miles.
09 02 12 53	CMP	Okay.
09 02 13 05	CMP	Where - What did this bring it up to, Ed, about 30 miles?
09 02 13 16	CC	Dick, that moves us up to about 27 miles.
09 02 13 21	CMP	Okay.
09 02 14 20	CMP	Ed, my onboard perigee is 23.2 miles.
09 02 14 26	CC	Copy. You have 23.2 miles.
09 02 14 31	CMP	That's out of a VERB 32 - That's a negative value, of course.
09 02 14 40	CC	Roger.
09 02 16 11	CC	Dick, at this time, you can maneuver to the P23 attitude; and - First, however, we would like those drift check numbers. You can start those P23's if it's - the atmosphere around the spacecraft looks sufficiently clear to take sightings.
09 02 16 28	CMP	Okay.
09 02 16 54	CDR	Okay, Ed. They are 3.1, 7.0, and 8.3, roll, pitch, and yaw.
09 02 17 05	CC	Thank you, Pete. That's 3.1, 7.0 and 8.3.
09 02 17 12	CDR	That's correct.
09 02 28 31	CC	12, Houston.

09 02 28 36	CDR	Go ahead.
09 02 28 38	CC	Your package 2 drift weights were roll, 1.9; pitch, 5.9; and yaw, 6.8. We've been able - We've calculated your vacuum perigee using your state vector as a value of plus 18.6, and a reentry angle of minus 6.63. Using our state vector, we get a value of plus 27 nautical miles and the angle of 6.01.
09 02 29 16	CDR	Okay.
09 02 29 23	CC	And, Pete, if you would, would you have Al check his leads on the EKG when convenient? We're not getting a valid EKG reading down here.
09 02 29 34	CDR	I'm not sure he's alive. He only comes out every once in a while for a meal.
09 02 29 44	CC	Well, we want to watch him, too.
09 02 29 49	CDR	Will you let me know what he's doing?
09 02 29 58	CC	Well, okay. Go ahead.
09 02 30 04	CDR	How's that look, Ed?
09 02 30 08	CC	Stand by.
09 02 30 21	CMP	Houston, 12. I have no star for the number 1 star.
09 02 30 32	CC	Roger, Dick. We've got another star here, that's 156, and you can find the unit vectors for that on page 3-188 on your flight plan.
09 02 30 52	CMP	Star number is 156?
09 02 30 55	CC	Affirmative.
09 02 31 22	CC	And, Pete, we're still getting some noisy readings from Al's EKG. If you would, ask him to check them again and, if they appear unchanged or loose, then we'd like him to go ahead and rebond them.
09 02 31 40	LMP	Okay. I just checked them, Ed, and they seem to be okay to me. Is this the same kind of erratic ratings we were getting just prior to going into the LM, or do you think it's some - do you think it's a sensor problem? Do you think it's something - connector problem or something?

09 02 31 57	CC	It looks to be exactly the same as we've noted before, and we think it's a connection problem.
09 02 32 21	CC	Al, clarification on that, it's a connection of the sensor to your skin as opposed to the other connector.
09 02 32 33	LMP	Roger.
09 02 33 51	CMP	Okay, Houston. This is 12. I still don't have a star. 156 is no good either.
09 02 34 02	CC	Okay, Dick. Last one we have worked up down here is 174 and you can find the state - unit vectors for that on the same page, 188 in your flight plan.
09 02 36 46	CMP	Houston, you'll be happy to hear I have a star this time.
09 02 36 51	CC	Good show, Dick.
09 02 39 42	LMP	Houston, Apollo 12.
09 02 39 44	CC	12, go ahead.
09 02 39 47	LMP	I just took a look at my BIOMED harness and, sure enough, the very same sensor is dried out again, the paste in there. And I'm not able to ease it out this time to replace it with new paste, so what I'm going to do is take off my old bioharness and put on a brand new one, if that's okay with you.
09 02 40 09	CC	Roger. That's very good. We'll have a happy surgeon if you do that.
09 02 40 13	LMP	Okay. Well, tell him I'm going to take them off, and it'll take me about 30 minutes or an hour to do it.
09 02 40 21	CC	That's great, Al; press on.
09 02 45 46	CMP	Houston, 12. No star.
09 02 45 53	CC	I read you, Dick. Let's go to 26-F.
09 02 46 01	CMP	Okay.

END OF TAPE

09 03 04 53	CMP	Okay, Houston. There you are.
09 03 05 00	CC	Roger, Dick. We have it. You can remain at that optics CAL attitude until your next set of P23's coming up in about 1 hour.
09 03 05 10	CMP	Okay. Fine. Thank you.
09 03 05 19	CMP	How about the stars for that next one? Looks like we already got some bad ones we know about.
09 03 05 28	CMP	Roger, Dick. We see that. We're working on some, and we'll pass them up to you shortly.
09 03 05 34	CMP	Okay.
09 03 06 14	CC	12, Houston. You can terminate BAT B charge now.
09 03 06 21	CMP	Roger.
09 03 07 09	CC	12, could we have a readout of the battery manifolds before you vent?
09 03 07 21	CMP	Houston, it's 1.2, and we're going to vent it.
09 03 07 24	CC	1.2. Thank you.
09 03 09 48	CC	Hello, Dick; Houston.
09 03 09 53	CMP	Hello.
09 03 09 54	CC	That last set of P23's moved us in the right direction; looks as though your vacuum perigee now is 23.4 from using your onboard state vector and reentry angle of minus 6.28. So we're - looks as though that set of P23's is giving us good agreement between MSFN and your onboard value.
09 03 10 21	CMP	Okay.
09 03 33 04	CC	Apollo 12, Houston. Give us WIDE BEAM width, please.
09 03 33 10	CDR	Roger. Good morning, Jerry.
09 03 33 12	CC	How you doing?
09 03 33 14	LMP	Where've you been all day. Watching the football game?
09 03 33 17	CC	Yes. You better believe it.

09 03 33 21	LMP	Which one did you watch?
09 03 33 25	CC	I just saw the Oilers getting started with Miami. They're tied right now, 7 to 7. Oh, it's 10 to 7 now; and I'm kind of waiting for the Rams and the Cowboys to get started a little later. Be starting in about 2-1/2 or an hour and a half from now.
09 03 33 40	LMP	Very good.
09 03 49 05	CC	Apollo 12, Houston with a flight plan update.
09 03 49 10	CMP	Stand 1, Jer.
09 03 49 24	CMP	Go ahead.
09 03 49 26	CC	Okay. This is for your P23 at 220. Star number 161 is still good; star number 174 is still good; and 26 is still good for the third sighting. For the fourth sighting, change your star number to 31 - 31 fa and I think you have the unit vectors on that, already The fifth sighting - -
09 03 49 58	CMP	I don't think we're going to need it.
09 03 50 01	CC	Say again.
09 03 50 04	CMP	That star 31, I don't need the unit vectors, Jerry.
09 03 50 06	CC	Okay. Star number 5, or sighting number 5 is Jupiter; that's still good. Sighting number 6 would be on star 75 near, and here's the unit vectors for it: R_1 is minus 09871; R_2 is minus 79163; and R_3 is minus 60298. For alternates, you have 24 far and 236 north, or correction, near; and the unit vectors on 236 are as follows: R_1 is minus 45010; R_2 is minus 89075, and R_3 is minus 06311. Over.
09 03 52 10	CMP	Okay, Jerry. I'm sorry ... . I'm with you now. I was looking up star 174. I thought I had used that before and it was no good; but I did use it, and it was good. Number 1 star is 161. It's okay. Number 2 star is 174, and it's okay. Number 3 star is 26. Number 4 star is 31, and it's Earth far on horizon. Jupiter is okay for number 5; and number 6 we're replacing with star number 75; Earth near horizon unit vectors: minus 09871; minus 79163;

		minus 60298. Two alternate stars, 24 on the far horizon and 236 on the near horizon; 236 unit vectors are minus 45010, minus 89075, minus 06311. Over.
09 03 53 03	CC	That's affirmative, Dick. Your magnitude on star 31-F is 0.2, and the magnitude on 236 near is 3.0.
09 03 53 16	CMP	Okay. Fine. Understand.
09 03 53 19	CDR	Thank you.
09 03 58 21	CC	Apollo 12, Houston. It's Oilers, 17; Miami, 7.
09 03 58 29	LMP	Good-o.
09 04 14 47	CC	Apollo 12, Houston. It's Oilers, 22; Miami, 7, now. We've got a field goal and a safety.
09 04 15 00	CDR	Very good.
09 04 28 38	CMP	Houston, 12.
09 14 28 41	CC	12, Houston. Go.
09 04 28 44	CMP	Roger, Jerry. No star is visible for number 6 or 75 near horizon. Which would you rather have me use - 24 or 236?
09 04 29 00	CC	Stand by a second.
09 04 29 08	CMP	Say again.
09 04 29 19	CC	12, Houston.
09 04 29 23	CMP	Go ahead.
09 04 29 25	CC	Roger. They want to check your unit vector again on star 75. They didn't see it come up in the last register.
09 04 29 34	CC	As best we can tell, you ought to be able to use 75.
09 04 29 48	CMP	Well, the best I can tell, I can't.
09 04 29 54	CC	Okay. Stand by a second.
09 04 30 10	CC	12, Houston. Recommend you use 24 far. Over.
09 04 30 15	CMP	Okay.

END OF TAPE

09 04 40 18	CMP	Okay, Houston. It's all yours.
09 04 40 22	CC	Roger, 12. You should be going to the PTC attitude now, and I've got some procedures for you for photographing that hatch window contamination when you're ready to copy.
09 04 40 41	CMP	Okay, Jerry. Stand by.
09 04 40 42	CC	Okay.
09 04 41 25	CMP	Go ahead, Jerry.
09 04 41 27	CC	Roger, Dick. The best way to take these photos is with a Sun-incidence angle of about 45 degrees, and, in PTC, you'll get this angle when your roll is either 215 degrees or 290 degrees. And the procedure to use is essentially the same as we did on the way out, you know, when you took pictures of windows 1 and 2. They need to have you clean the inside pane, and then set your Hasselblad with the 80-millimeter lens with black-and-white film and take two photos at an f-stop of 5.6 at 1/250th and a focus of 3 feet, and then change your f-stop to f:4 and take two more photos. Over.
09 04 41 28	CMP	Okay, Jer. We got all that, and we'll get that done.
09 04 53 15	CC	Apollo 12, Houston.
09 04 53 18	CDR	Go.
09 04 53 21	CC	Roger. In your - Going into PTC, we recommend that you disable quads Charlie and Delta and select OMNI Bravo for us, and we'll take care of switching for you. On your high gain antenna, would you turn off your power and we'll leave it off until time for TV and then get it up again? And, just a reminder, during the TV portion, it looks like you're going to have to limit your - your views to interior because the Sun being - pretty near to being behind the Earth like it is, we're afraid that if you try to take a look at the Earth with the camera, you're liable to zap it in the sunlight. And, looking ahead to 221:30, we would like you to do that P52 that's planned on there,

		but as things stand right now, looks like there'll be no midcourse number 6, and we'll probably do a midcourse number 7. Over.
09 04 54 17	CDR	Okay. Understand.
09 04 54 18	CC	Good enough, and has Dick got any comments on the results of the last P23? It looked pretty good down here.
09 04 54 28	CDR	He says no.
09 04 54 30	CC	Okay.
09 04 54 31	CMP	Good up here.
09 04 54 32	CC	Roger. Final score on that ballgame was Houston, 32; Miami, 7.
09 04 54 42	CMP	Very good, Jer. Thank you.
09 04 57 20	CDR	Houston, 12.
09 04 57 21	CC	Go ahead, 12.
09 04 57 24	CDR	Earlier they reported that we weren't going to do anything more from the ground in the way of purges. Does that mean that we're going to skip this H_2 purge here?
09 04 57 40	CC	That's affirmative, Pete.
09 04 57 42	CDR	Okay.
09 05 12 25	CC	Apollo 12, Houston. You can start your PTC.
09 05 12 33	CDR	Okay.
09 05 30 33	CC	Apollo 12, Houston.
09 05 30 37	CDR	Go ahead.
09 05 30 39	CC	Pete, we've just uncovered a problem on the TV program that's scheduled. We come to find out we have a terrain-masking problem on Goldstone, and the TV start and stop times that we've got for you right now are too early. What it boils down to is, we can't start TV until 224:10 and, with your concurrence, we'd like to run the TV show between 224:10 and 224:40. And that means stopping your PTC at 223:50, and I've got some

attitude angles and high gain angles for you; and so what you'll do is stay in PTC a little longer and get all your presleep checklist out of the way and have it all done so that we can run this TV show - the press conference that we've got for you here - And then as soon as we're finished with that, we can just shut her down, and you guys can head for the sack.

09 05 31 39	CDR	Very good. That's fine with us.
09 05 31 42	CC	Okay. If you're ready for - -
09 05 31 43	CDR	We're having a hard time using - we're having a hard time using all that 10-hour rest period these days.
09 05 31 52	CC	Okay. If you're ready to copy, I've got your times, and attitudes, and everything for you.
09 05 32 00	CDR	Okay. We're ready to copy.
09 05 32 03	CC	Okay. We're on page 3-191. Where it says "maneuver to TV attitude," change 223:15 to 223:50. And your roll is 340; pitch, 270; yaw, 0. Your high gain angles are pitch, plus 190; and yaw, 270. And in this attitude, you'll have window number 1 looking at the Earth and window number 5 looking at the Moon. And, as I mentioned before, your TV then will be from 224:10 to 224:40, and let's move this - and go ahead and get this presleep checklist done early. And we've got your - The questions that I'll be reading up to you on this press conference submitted by the Apollo 12 press corps, and that's about it, Pete.
09 05 33 06	CDR	Okay. Very good.
09 05 40 13	CDR	Houston, you got those torquing angles?
09 05 40 26	CC	12, Houston. Affirmative. We've got your torquing angles.
09 05 40 31	CDR	Okay. That Dick Gordon is getting pretty fancy in PTC, isn't he?
09 05 40 37	CC	Pretty slick.
09 05 40 45	CMP	A few more days, and I'll understand it.

END OF TAPE

09 06 28 18	CMP	Houston, Apollo 12. We're going to be working with our TV camera inside, and so we're going to take out our S-band FM transmitter group 1 circuit breaker.
09 06 28 28	CC	Roger, 12.
09 07 41 02	CC	Apollo 12, Houston.
09 07 41 06	CDR	Go ahead, Houston.
09 07 41 07	CC	Roger. Got a few ball scores for you.
09 07 41 11	CDR	Go.
09 07 41 14	CC	Roger. The Rams beat the Cowboys 24 to 23 in a real squeaker of a game that just finished. The Raiders beat the Chiefs, 27 to 24; and Vikings, 52; Steelers, 14. That pretty well covers it for today with the TV ballgames, and you already know the score of the Oiler-Miami game.
09 07 41 41	CDR	Roger. Thank you.
09 07 41 43	CC	Okay. And another item - wanted to just review with you the format for today's TV show. In this particular little news conference bit, you're going to be asked questions that were submitted by newsmen right here at MSC. That's the news staff that's been here covering the flight. Most of the questions that are going to be read up to you will be exactly as submitted by the newsmen, and they'll be in an order of priority specified by the news media.
09 07 42 15	CDR	Okay.
09 07 42 20	LMP	We're going to stop in about 2, 3 minutes and at 340 roll.
09 07 42 29	CC	Okay.

END OF TAPE

09 07 57 41	CC	Apollo 12, Houston.
09 07 57 45	CMP	Go ahead, Houston.
09 07 57 46	CC	Roger. On that high gain antenna, you can go ahead and just go to REACQ, NARROW BEAM, and let's wait and see what happens. If it goes sour on us, we'll have to go MANUAL.
09 07 57 59	CMP	Okay. It's in REACQ, NARROW BEAM, now.
09 07 58 01	CC	Okay, and we're getting you 5 by right now.
09 07 58 07	CMP	Okay.
09 07 59 41	CC	Apollo 12, Houston with some more football scores for you.
09 07 59 46	CMP	Go ahead.
09 07 59 47	CC	Roger. New Orleans 43, San Francisco 38; San Diego 45, Denver 24; Detroit 16, Green Bay 10; Cleveland 28, New York 17; Baltimore 24, Chicago 21.
09 08 00 16	CMP	There's a few interesting ones in there, isn't there?
09 08 00 22	CC	Didn't copy that, Dick. Say again.
09 08 00 27	CMP	I said, "there's a few interesting ones in there."
09 08 00 30	CC	That's affirmative. The Saints are looking pretty good.
09 08 01 12	CC	12, Houston. One more score: Philadelphia, 34; Saint Louis, 30.
09 08 01 20	CMP	Like I said, a very interesting day.
09 08 06 38	CMP	Houston - Yankee.
09 08 06 42	CC	Clipper, Houston. Go.
09 08 06 45	CMP	We're ready anytime you are.
09 08 06 50	CC	Okay. We're checking out our lines; we'll be right back with you.
09 08 07 02	CMP	Okay. We're sending.
09 08 07 06	CC	Roger.

09 08 07 21	CC	12, Houston. We're copying you.
09 08 07 55	CC	12, Houston. You look great but you're upside down.
09 08 08 01	CDR	Take the camera - -
09 08 08 02	CMP	Turn us over.
09 08 08 03	CDR	Take the camera over - that's the only way we could mount it.
09 08 08 06	CC	Okay. Look like a bunch of bats hanging from the ceiling.
09 08 08 37	CDR	That's what flying with rookies will do for you.
09 08 08 54	CC	12, Houston. Stand by a couple of seconds here; we're going to try to flip the picture.
09 08 09 01	CDR	Okay.
09 08 09 15	CDR	The fourth guy holding the camera doesn't understand English, so we can't get him to turn it around up here.
09 08 09 24	CC	Would you believe that we can't flip it?
09 08 09 30	CDR	Okay.
09 08 09 31	CC	About the best we can do is flip black and white but the color has to stay where it is.
09 08 09 36	CDR	Okay. Well, let's see what we can do.
09 08 10 54	CC	12, Houston. We're getting our usual excellent quality picture.
09 08 11 11	CC	Looks very good, Pete.
09 08 11 32	CDR	Okay, I guess we's ready if you're right side up now.
09 08 11 38	CC	Real fine, Pete. It looks good. We can see all three of you. We see Al Bean flipping in on the side there. First of all, I'll read you a little statement; then, we'll start off with the questions. The questions that you'll be asked in this news conference have been submitted by newsmen here at the Manned Spacecraft Center who have been covering the flight. Some of the questions they raise will have been answered in your communications with

Mission Control but the public at large has not heard them. The questions are being read to you exactly as submitted by the newsmen, and in an order of priority specified by them. So, here comes question number 1. If you had this mission to fly over again or were planning another with your present knowledge, what would you do differently and what equipment would you add or modify, specifically in connection with the EVA? Over.

09 08 12 36 CDR Well, I think we'd work over all the tools and - the tool carrier and the bags. I think we'd work over just about all of it. I think it was very good, and I think it operated very well, seeing we'd never been there before and attempted to do that kind of work. Now that we've done it, I think we can make some improvements on it. Now, I'll let Al talk about it.

09 08 13 00 LMP I think that you about hit it, Pete. I think the PLSS's and the OPS's and the suits, as far as the operation of both EVA's were, you couldn't ask for anything better than that. The tools are going to need a little work.

09 08 13 17 CC Okay, troops, here comes - -

09 08 13 18 CMP ... - Hey, Jerry?

09 08 13 21 CC Go ahead.

09 08 13 22 CMP If I had it to do over again, I'd of - I'd of wagered a little more with all those people who said I would never be able to find the LM on the lunar surface. In fact, if I'd of been that smart, I'd have bet them I'd find the Surveyor also and I'd retire.

09 08 13 37 CC (Laughter) Roger, Dick. Okay, here comes question number 2. Was there some confusion about something you said yesterday about the launch into the thunderclouds? Would you or would you not consent to launching under those conditions again?

09 08 13 55 CDR I'd go again.

09 08 13 58 CMP We made it this time; why couldn't we do it again?

09 08 14 01 LMP Concur.

09 08 14 04 CC Okay, troops. Question number 3. Aside from the lightning, what gave you your most apprehensive

moment, if any, either before the lunar landing, during your time on the Moon, or afterwards? And if you never had an apprehensive moment, was there ever a time when you may have been a little bit concerned over what was going on?

09 08 14 31 LMP Well - how about from lift-off all the way through to a GET of 224 hours and 14 minutes and 30 seconds?

09 08 14 38 CDR Yes, that's a pretty good answer. I think - I think clearly all three of us were a lot calmer through most of the flight than I thought we'd be or any of us thought we'd be, except I think both Al and I were a little bit nervous about ascent. After ..., you only got to have one engine. I think we were a little tweaked there right - towards T_0 on lift-off through the ascent stage; but once we got going and it was going so well, that - really didn't concern either one of us after that.

09 08 15 15 LMP The only time I can think of is - one time when we were walking around on the lunar surface on the second EVA, I felt my suit pressure kind of pulse. And that PLSS is so good that you never feel any change in pressure as you walk around or move around or jump up and down or anything else. This one time it did, and I took a quick glance at my suit pressure gage because I thought maybe it was building up or decreasing; I had some sort of problem where I would - had to use the OPS, but it wasn't the gage. It was just right, and that was the end of it. The only time it occurred either, but that gave me quite pulse there for a second.

09 08 15 54 CC Roger.

09 08 15 55 CMP Well, I think when we - switched to the command module side of the house, Jerry. Everything has gone according to plans and as expected. I think that the best thing about my end of the operation is that there have not been any surprises, and I'd like to keep it that way.

09 08 16 14 CC Yes, that's kind of nice, no surprises. Pete, now questions number 4 is for you. Out there on the Moon, you sounded happy, even euphoric. Some people think that maybe you were on an oxygen high. Were you? And for both you and Al, how did it feel subjectively to be out there?

09 08 16 36 CDR Well, I was very happy, but I wasn't on any oxygen high. I was very happy because all the work that we

had put into that EVA was beginning to pay off; and once we got over the initial stumbling block of the one little problem we had getting the fuel cask going, why I was quite happy because we were on the time line; everything was going the way we thought it was going to go; and I was just having a ball because it was much easier than all the one-g practice we'd done learning how to do that.

09 08 17 14 LMP Yes. You're asking about how it feels - I think for about the first 10 minutes that you're out, at least in my case, you find that it's not as hard as you think it's going to be to move around, and you're pretty happy about that. But you could sense that first 10 minutes you still want to be careful and you don't want to overextend yourself, so you're - you're sort of excited trying to get up to speed, get your balance in good shape, and get your movements in good shape so you can start doing the work. And once the first 10 minutes is over and you sort of realize that you now know how to hold your balance and you now aren't going to fall down and everything is working real well, I think right then you start getting down to the operational part of it and after that you - you just press on and get the job done, like Pete said.

09 08 18 00 CDR I was in a good humor to start with, seeing we had landed next to the Surveyor. That started the thing off right.

09 08 18 10 CC Okay. Question number 5. On Apollo 11, Armstrong and Aldrin had to curl up in the corners of the LM to sleep and complained that they were cold and uncomfortable. You had hammocks and blankets. How did you sleep? And, on the subject of sleep, a lot of people are wondering whether you dreamed there on the Moon.

09 08 18 32 CDR Well, let's take them all in order. In the first place, we didn't have any blankets. We had the hammocks. And, as you may or may not remember, about a week before the flight, we found a problem on the boot of my backup suit and all four of our suits were sent back to the factory and the boots were replaced. And, in the process of doing that, the suit had to be re-rigged when we came back - when they came back to the Cape - and I had to fit my suit without the liquid cooled garment because both the flight ones were already packed, and you can't put a nonflight one in a flight suit. And I had - the legs got a little bit too tight, so in my hammock that night I didn't want to take my suit off; it was too dirty in there. In my

hammock, I was very uncomfortable; my shoulders - the suit was pressing on the bottom of my feet and my shoulders, and it sounds funny but even bending your knees or anything you can't - you can't get rid of that. If the suit's too short, it's too short; it was about a half an inch too short. So I beared with it most of the night and I only slept maybe 4 and 1/2 hours, mostly on account of that, and then Al, very kindly, the next morning, let my suit out for me and - which took him about an hour, so that - that's about how I spent my night. And as for the dreams, I don't dream normally anyhow, that I can remember, and I didn't dream there.

09 08 20 12 LMP I didn't - I didn't dream either, and I don't know; I didn't sleep too good on the Moon. Not because we were cold or hot, because we weren't; we had both the liquid cooled garment on and we had air running through our suit. And so, if we got a little warm, we could either turn on the water pump and get a little cool water running through your suit, which would rapidly cool you down, or turn on the air and get a little air running through your suit to cool you down. So using those two controls, I think Pete and I stayed just about the temperature we wanted to stay. And the hammocks were very comfortable; it's interesting that if you rig them on the Earth and they're pretty long and you say - boy, when you get in that, it's really going to sag but when you get on the Moon and you only weigh about 30 or 35 pounds and you get in those hammocks, I was looking at Pete up on his; you don't hardly sag a bit. You just kind of lay there almost horizontal. A real comfortable place to sleep.

09 08 21 10 CC Roger, Al. And you didn't dream either, huh?

09 08 21 14 LMP No, I didn't dream a bit. I woke up and went back to sleep a number of times. Another interesting thing, people have worried about the amount of sound in the LM bothering you. It's fairly noisy in there and there's a couple of pumps that change frequency every once in a while; but, all in all, I don't think that was any hindrance to sleep, do you, Pete?

09 08 21 34 CDR No.

09 08 21 36 LMP The one-sixth g is nice; it just keeps - It pushes you down enough so that you feel pressure on your back or your side or wherever you're laying but it's not enough to really give you any pressure points in the suit. I think one-sixth g is nicer than either zero g to sleep in or one g to sleep in. It - It's a - It's a good happy medium. It's pleasant.

09 08 22 00 CC Roger. Question number 6 is for Dick Gordon. Dick, how does it feel to be alone for a day and a half in orbit around the Moon? And what were you able to observe of Pete's and Al's activities on the surface?

09 08 22 24 CMP Well, it's a little hard - to - to really express how one would feel, being with Pete and Al for 4 days on the way out there, being very close through all that training, and then being left alone to tend the command module in lunar orbit while they're down there for some 32 hours of the lunar stay. I'd thought about this beforehand - what it would really be like to be completely alone on the back side of the Moon, no contact with any other human being; but, surprisingly enough, the activities were such that I was awful busy during my waking hours; didn't really have time to dwell upon that; and, to be perfectly frank, so blasted tired at the end of the day, that I could hardly get to bed fast enough to get enough sleep to carry on the next day's activities which were busy in themselves because of the photographic requirements that were levied on me while in lunar orbit, while Pete and Al were working on the surface. I never did observe them personally on the surface, although I did see the LM through the optics, which are right behind us; and I also saw the Surveyor in the crater. I saw both of these objects twice on two different passes. On one pass, I put the camera on the sextant. Hopefully, I'll have pictures of that so my doubting friends will no longer doubt. All in all, I think that kind of describes the activities that I went through while Pete and Al were down on the lunar surface. The last part of your question, Jerry, I forgot what it was. Would you repeat it again?

09 08 24 07 CC That's about the crash landing, Dick. Did you see it go in?

09 08 24 12 CMP No. None of us saw it go in. After we separated, I tracked the LM for a considerable length of time in the optics, and thought I had a pretty good state vector so that the AUTO optics would track the LM automatically. Therefore, I put the camera, the same camera on the sextant right here behind me, hoping that it would automatically track the LM into the lunar surface. I don't know whether we were successful with that or not. I have some doubts about that. Certainly we - none of us saw it with our naked eye.

09 08 24 50 CC Roger, Dick. Thanks. Question number 7. You mentioned during the EVA finding three kinds of soil.

Will you give a brief description of each, its color, its texture, and so forth, and discuss whatever problems you had in handling all the different kinds of lunar material.

09 08 25 10 CDR Well, when we say three different kinds of soil yesterday, that was a - I guess what I want to say a subjective thing in that the colors were all the same. It appeared that some soil was firmer than other soil in the manner in which we sunk into it. And the finer soil would be - the softer soil that we sank deeper in was of a finer grain. This was over towards the very extreme end of our traverse, over at the sharp crater which is about as far away as we could get from the LM. And now, we have samples - in the sample bags - some of these types of soil. When I say three different kinds of soil, the medium-textured one was where we landed on one side of the Surveyor crater; and, over on the other side when we went down to get to the Surveyor, we found the ground was - I'd say considerably more firmer. It appeared to be firmer ground, not quite as - we didn't sink in quite as much as we did over working around the LM. Then, when we got over to the sharp crater, which was the far end, that's the softest ground; we sank in the deepest there. Do you have anything to add to that, Al?

09 08 26 33 LMP No, you covered it. They asked about the color..

09 08 26 36 CDR One of the real difficult things about the whole EVA, in the geology part of it, was the fact there didn't appear to be any difference in color among either the rocks or the soils. They all looked about the same. The first day, to me, they all looked sort of a dull gray. And I think I described most of the rocks that way, as a dull gray, and the soil's a dull gray, and this sort of thing's a dull gray. And if you look real close, of course, you could see maybe a - -

09 08 27 09 CC Apollo 12, Houston. Break, break. You'll have to go MANUAL on your high gain antenna. We just lost you.

09 08 27 17 CDR Okay.

09 08 27 31 CC Okay. We're getting you back now, Pete. Press on.

09 08 27 39 CDR Well, anyway, all the - the rocks, the soil looks sort of a gray, and if you look real close maybe you can find a white rock now and then or you could maybe disturb something and get a little darker gray; but generally, they were gray. The second day we went out, the same thing that looked gray to us the first day, started looking, at least to me, started looking a sort of a brown, a dark brown, or a tannish brown; and it was really one of the most interesting things of the EV - of the lunar surface operations, was how much that color could change just with a 7-degree or so Sun-angle change and how everything there changes color with it. In fact, when we came upon the Surveyor, you'll recall, it was gray, I mean, it was brown. We saw it the second day; it was brown, and we asked you if it had been painted that way and you said no, it hadn't been; it had really been white. When we got up next to it, we discovered that sure enough it looked brown, and the coating on it was the same brown as the soil. Now, I wouldn't be a bit surprised when we get all those parts back to Houston, they don't turn out to be, you know, under the Earth light and light of the laboratory, they turn out to be kind of a dark gray, again. It's going to make geology quite a bit more difficult than we see it on Earth because the color cues just aren't going to be there; you're going to have to look for texture and fracture and luster and a lot of other things that will aid you in determining differences in rocks and minerals.

09 08 29 16 CC Roger. Let's move on to the next question here. It's number 8. Were the Moon's color, texture, and general appearance, as seen from above, as you expected them to be? And is there any place on Earth you know of that looks like the Ocean of Storms?

09 08 29 38 IMP No. I can't think that there is. It reminds me of desert areas. You might be able to find appearance like that in some deserts, particularly the back side of the Moon, which is a lot more beat up than the front side. As far as the Ocean of Storms, I guess there really isn't any corollary, any one place on Earth that we can recall, at least.

09 08 30 08 CC Okay. The next question is for Pete. Pete, everybody's wondering about the fall you took on the Moon. Was it accidental or on purpose? And how did it feel to fall in the weak lunar gravity and could you have recovered your footing if Al Bean hadn't been there to help you?

09 08 30 32 CDR Yes. No, I was - I didn't fall on purpose. I was trying to pick up something, and I was just standing next to Al. It was a rock that was too big to go in the tongs and we sort of had a little game we played there of leaning on the tongs and sort of doing a one-armed jabber-do all stretched out, and I just sort of rolled over on my side down there on the ground and Al, before I got all the way down, just gave me a shove back up again. I don't think it'll be any problem. The business of falling against a rock and cutting your suit or something; you don't fall that fast. You just wouldn't hit a rock hard enough, do you think, Al?

09 08 31 19 LMP No, not only that, you're talking about not falling fast: When you start to fall, and you lose your balance at first sort of quickly, particularly if you ever try to back up, because the ground is uneven and you step in holes or over rocks. You fall so slowly that it gives you plenty of time almost to turn around, or catch your footing before you actually get low enough down before it's too late. I can recall a number of times when I lost my balance. If I'd lost my balance that much on Earth, I would have probably fallen down. But on the Moon, because you start moving so slowly, you're usually able to spin around and bend your knees and recover. And, like you say, Pete, you're falling so slow that you can usually catch yourself or roll over or something.

09 08 32 02 CDR I think that's another thing. I think - and I saw Al do this two or three times also, in trying to bend over to get something, we'd start to fall over and you fall so slowly that you just start moving out and you just keep moving until your feet come back up under you again. So it's not that easy to fall over up there, for that matter. And I really don't think there's any problem.

09 08 32 30 CC Roger. Question number 10 I think you've pretty well answered, but I'll read it anyway and you can add any more thoughts you might have to it. While you were inspecting the Surveyor spacecraft down there in the crater, you commented about changes in its appearance, the white part seemed to turn tan and so on. Will you discuss this further and give us any impressions or conclusions you may have about what caused these changes?

09 08 32 54 CDR Well, this brown color is definitely some lunar dust that's on it. And it was evenly distributed all the way around it, so I don't think it's dust

that we blew on with the - with the LM when we landed. I think it's accumulated there; it wasn't that easy to wipe off. And the other thing I think that was most apparent to Al and I were in cutting the tubes; in practice, we had, and I'm going to have to check this, but theoretically we had the same aluminum tubing as the struts were on the Surveyor and the tubing appeared much more brittle and much easier to cut up there, so I suspect that some crystallization or something had happened to the metal in the 31 months that it was sitting there. And the other thing was that we noticed that the wire bundles that we had to cut, the insulation had gotten very dry and very hard and also very brittle. And I think that's about it. Can you think of anything else, Al?

09 08 33 55 LMP No. I think you covered it, Pete.

09 08 33 58 CC Okay, here comes number 11. Do you think that future EVA's can be extended beyond the 4-hour limit? Or do yc believe the number of 4-hour EVA's should be increased in order to get more exploration done on each mission?

09 08 34 13 CDR No, I think you ought to go a longer time on each EVA. We felt badly, sort of, that we got shut off the other day, although we didn't have the data in real time, nor did we have the agreement with the ground, that we weren't going to go past the 4 hours. But we had 6 hours worth of consumables and we'd gotten out early on the second EVA. And as far as being tired or anything, we weren't tired; we were - We could have kept on going; we hustled to get back just to make our 4-hour deadline. And I think that the big problem is getting suited up and getting unsuited when you get back in. Doing the work outside is easy. Once you step down the ladder, you're on your way. And I think what you should do is get a long-term PLSS. And, if you have a 3-day LM, you have a PLSS that'll stay out for 8 or 9 hours and some way to give the guy a drink of water and maybe a shot of food. And he can sit down and take a little siesta out there for a half an hour in the middle of it. And he can do an 8-hour day work out there. And that's the big, the big - thing is getting it all on and getting out and getting it all off and putting it away when you get back in.

09 08 35 26 CMP I think there's another significant problem Pete didn't mention. That's the amount of dirt that you bring back in the spacecraft with you. Both Pete and Al, although they had been in the LM for a considerable length of time before they got back into the command module, still brought back a tremendous, just a tremendous amount of dirt and dust in their clothing and on their persons, and I think if you're going to work in that environment for any length of time, you're really going to have to tackle this problem of keeping clean.

09 08 35 56 CC Roger. Thank you. That was a good one. Question number 12. For future lunar explorations, is a geologist a desirable member of the crew? And what sort of surface transportation would you recommend?

09 08 36 12 CDR Well, you can go pretty good on your feet; I can tell you that right now. I guess we ran almost a mile out there without giving it too much thought. Certainly, I think a geologist should go on the trip. I'll tell you one thing, though, it took every bit of knowledge I had getting that baby down there in the right place. That was no easy task and I think - As a matter of fact, we were discussing that earlier today; I'm a big advocate of the LLTV. I think that was a tremendous help to me, and I - Certainly, that's been my profession and it took everything I had to get that LM down in one piece. I think that we got some things to work out on that that'll make those tasks easier, and I think that the idea is to get the transportation system worked out and then take the necessary people to go. There's no doubt that a geologist can do a better job than I can; I'm not a geologist.

09 08 37 19 CC Roger, Pete. This is the last question now. Millions of people who stayed up late one night last week are wondering what happened to that TV camera, anyway.

09 08 37 31 CDR Well, Jerry, we really don't know what happened to it. All I know is you told me you were getting a picture and then I didn't pay any more attention to it until I head you talking with Al, and we don't know what happened to the camera; but we have it on board. We brought it back with us, and whatever is wrong with it, they'll find out and have it fixed so that they have good TV for 13.

09 08 37 55	CC	Roger, Pete. That covers all the questions we have. You got any general-nature little goodies you'd like to show us or talk about?
09 08 38 04	CDR	Well, I just - is - is George Low down there, by any chance?
09 08 38 14	CC	Pete, he doesn't seem to be in the MOCR or in the viewing room, but we know he's listening.
09 08 38 21	CDR	Okay, well, he could probably see it later, but he sent us a letter about not having a certain passenger aboard the spacecraft; and, unfortunately, he is aboard the spacecraft, and we just wanted to show it to George so that he could write the proper letter to allow him to have made the flight.
09 08 38 46	LMP	I've got something to say. Pete, Dick, and I spent -
09 08 38 50	CC	Roger. You found him, huh?
09 08 38 54	CDR	We sure did. He was in the food locker.
09 08 39 02	CC	Is he fat?
09 08 39 05	CDR	He's very fat.
09 08 39 07	CC	Go ahead, Al.
09 08 39 10	LMP	Pete, Dick, and I spent a couple of years getting ready for this mission, both backing up Apollo 9 and working on this one. We spent a lot of time sitting around thinking about what our chances were of actually getting to the Moon and landing there and coming back home. Every one of these space missions boils down, as you know, Jerry, boils down to about three big things. One, you got to have trained people that operate the spacecraft and that operate on Earth as flight controllers, and we felt pretty good about that. We've been training hard; we've worked with the flight controllers and we knew they had. You got to have a good set of procedures to work by and people like Bill Kindle and the men that work with him, they've spent many long hours and a heck of a lot of effort developing them. So, we were pretty happy about that too. And that leaves the hardware; the machinery that's got to work; the Saturn V and the command module and the LM, and that was our sort of big unknown.

We knew there were millions and millions of parts in here, and it doesn't take very many parts to go bad before you can - you can abort a lunar mission. It's a long chain of events, and any one of them can shoot you down and cause you to come back home early without making it. We, of course, couldn't walk around and check all the parts on any of these things; we don't even know that much about it. We did know the people that worked on it, though, people like Jim Harrington at the Cape, and Buzz Hello there, and Chuck Tringali, our team leader, and a lot of others that I didn't mention right then. We kind of felt pretty good about the fact that they were handling the gear. We're on the way home now; we'll be back tomorrow, and every bit of this machinery has worked beautifully. We've had a couple of small failures, but none of the equipment that we worried about has shown anything but perfect performance. The fuel cells, for example, are just perking along, just as beautifully as they can, been putting out 20 amps apiece and holding their own just perfectly. I think this is a fantastic tribute to the people that designed this equipment, and the people that built it, and the people down at the Cape that checked it out. I'm pretty proud of the Apollo 12 mission. We got everything we were supposed to do done. I hope that all of those people there, that had anything to do with this hardware, that built it, that designed it, or that checked it out, feel as proud about this mission as I do.

09 08 41 40	CC	Roger, Al. I think I can speak for everybody down here when I say that we're all darn proud of it ourselves. I think all of our little mascots - Snoopy and BC and the rest of them - have really done their jobs well in helping us to keep the mission before the people and keep everybody motivated.
09 08 42 12	CDR	We got one last thing to show you and then we'll close.
09 08 42 21	CC	Roger. Go ahead.
09 08 42 47	CC	Pete, while you're making preparations, the family's here in the MOCR viewing you.
09 08 42 56	CDR	Good.

09 08 42 58	CC	We got you on the big, big screen.
09 08 43 02	CDR	Hey, great. Tell them we'll be home in about a week.
09 08 43 05	CC	Roger.
09 08 43 06	LMP	We can call tomorrow.
09 08 43 09	CDR	We wrote a little inscription over the FPAI and signed it -
09 08 43 18	CC	Roger. Try focusing in just a little bit. We can almost read it. It says "Yankee Clipper with Intrepid in tow -
09 08 43 29	CDR	No, it says, "Yankee Clipper sailed with Intrepid to the Sea of Storms, Moon, November 14, 1969."
09 08 43 39	CC	Roger; we can read it now. Thanks.
09 08 43 51	CC	And we copy the signatures.
09 08 43 56	CDR	And that's it, Jerry, from Apollo 12, good night. We'll be talking to you tomorrow morning.
09 08 44 00	CC	Roger. We'll be seeing you.
09 08 44 01	CMP	Tally-ho, good night.
09 08 44 45	CC	Apollo 12, Houston.
09 08 44 49	CDR	Go ahead.
09 08 44 50	CMP	Go ahead.
09 08 44 51	CC	Roger. We got all that state vector for you. Would you like to just load it in the LM slots? Or do you want to take it the way it is?
09 08 44 57	CDR	I don't know; is it any different than the one I've already got?
09 08 45 05	CC	It is a little different.
09 08 45 09	CMP	Jerry, I'll take it anywhere you want to send it to up here (laughter). There's plenty of electric ... the P23 slot would do.
09 08 45 28	CC	Okay. We'll just put it in the LM slots and preserve the P23 for now.

09 08 45 35	CMP	Okay. You can stuff it into any slot you want to.
09 08 45 38	CC	Roger, babe.
09 08 45 52	CC	12, Houston for PTC this time. Disable Bravo and Charlie.
09 08 45 59	CMP	Roger.
09 08 46 24	CC	12, Houston. We're going to have a MCC7 PAD for you and an entry PAD, and then we'll - these are preliminary PADs which will be updated later.
09 08 46 38	CMP	That's what we'd like to hear, that entry PAD.
09 08 46 41	CC	Roger.
09 08 46 42	CDR	Stand by, Jerry. We've got to get a couple of books; we may even have to manufacture a couple of PADs.
09 08 47 37	CDR	Go ahead with that preliminary P30 PAD, Jerry, and I'll copy it down.
09 08 47 43	CC	Stay by just a second, Pete, we're still scratching it out.
09 08 47 48	CDR	Okay.
09 08 51 19	CC	Apollo 12, Houston. POO and ACCEPT, and we'll start the uplink.
09 08 51 28	CMP	You got it.
09 08 52 00	CC	Here she comes.
09 08 52 17	CC	12, Houston. I have your maneuver PAD, midcourse 7, ready.
09 08 52 23	CDR	Go.
09 08 52 24	CC	Roger. Midcourse 7. RCS/G&N; NOUN 47 is 25036; NA; NA, 241:21:53.33; NOUN 81: minus 0006.0, all zips, plus 0000.2; roll, pitch, and yaw are all zips; 310, all zips; NOUN 44 is NA; NA: DELTA V_T 0006.1, 0.13, 0006.1; sextant, 11, 241.4, 39.7; boresight, 044, up 01.3, left 5.0; the rest is NA. Comments: Sirius and Rigel for GDC align; roll is 336; pitch, 262; yaw, 357; ullage is four quads, plus X; under "other," we assume entry IMU alignment. Over.

09 08 54 37	CDR	Okay, Jerry. 25036; NA; NA; 241:21:53.33; minus 0006.0, all zips, plus 0000.2; 000; 310, 000; NA; NA; 0006.1; 0.13, 0006.1; 11; 241.4, 39.7; 044, up 01.3, left 5.0; Sirius and Rigel the stars; 336, 262, 357, four quads; plus X and assumes entry IMU alignment.
09 08 55 21	CC	That's affirmative.
09 08 55 32	CC	We'll have your entry PAD in just a couple of minutes.
09 08 55 36	CDR	Okay. We're ready when you are.
09 08 55 44	CMP	After the weatherman told me for the launch that it was going to be clear with scattered clouds, 10 miles of VIS, and a very weak cold front was going through that was very dry, I hesitate to ask the preliminary weather in the recovery area.
09 08 56 02	CC	We'll give it to you if you really want it.
09 08 56 05	CMP	Yes. Go ahead and give it to us, will you?
09 08 56 07	CC	Okay. We'll scare it up; we got it all written out somewhere here. While you're waiting, I got a few more football scores - these are American League.
09 08 56 30	CMP	Yes. Go ahead and send them up.
09 08 56 31	CC	Okay. New York Jets 40, Cincinnati 7; Boston 35, Buffalo 21; and then back to National - Washington was 27, Atlanta 20.
09 08 57 47	CC	12, Houston with the weather. This is based on a forecast on 23 November at 1100. The weather will be 1800, scattered, variable broken, high scattered, 10 miles; the winds from 120 at 15, and the seas are 4 feet.
09 08 58 10	CDR	Okay. Thank you.
09 08 58 42	CC	12, Houston. The computer is yours.
09 08 59 15	CC	Apollo 12, Houston with an entry PAD.
09 08 59 22	CMP	Go.
09 08 59 24	CC	Roger. Entry PAD. Mid-PAC is the area; 000, 151, 000; GET for the horizon check is 244:05:21, 267; NOUN 61 is minus 15.82, minus 165.16; 062; NOUN 60, 36116, 6.49; 1167.9, 3619.7; RRT is

244:22:21, 00:29; NOUN 69 is all NA's; VCIRC 4.00, 02.10; 00.19, 03.23, 08.04; sextant, 23, 294.6, 29.0; boresight, 016; up 14.7; left 1.1; lift vector, up; comment 1: Assumes entry IMU alignment; comment 2: Assumes midcourse 7. Over.

09 09 01 55 CMP Roger. Copy 000, 151, 000; 244:05:21; 267; minus 15.82, minus 165.16; 062; 36116, 6.49; 1167.9, 3619.7; 244:22:21, 00:29; NA for the next four slots; 4.00, 02.10; 00.19, 03.23, 08.04; 23, 294.6, 29.0; 016; up 14.7; left 1.1; up; and the two comments are assumes entry IMU alignment and MCC7 completed.

09 09 02 50 CC That's affirmative. We've got a few other goodies here for you. When you start up PTC, we'd like you to do it with quads Bravo and Charlie disabled. And a couple of switches for your COMM system; your FM transmitter group 1 circuit breaker should be closed and S-BAND AUX TV switch OFF, and then go ahead and power down your high gain antenna and give us OMNI Bravo. And a quick reminder, your state vector is now loaded in the LM slot and your P23 is still in the CSM side.

09 09 03 27 CMP Okay. We've got all those switches set and we're going to give you OMNI Bravo right now.

09 09 03 33 CC Roger.

09 09 03 55 CMP Houston, 12.

09 09 03 57 CC Go ahead, 12.

09 09 04 00 CMP What's the midcourse adjusting for?

09 09 04 04 CC Stand by for a second. We'll check.

09 09 04 25 CC 12, Houston. The reason for the midcourse is that you're a little bit shallow and we want to steepen it up. Right now, we're looking at a flight-path angle of 5.77 and a perigee of 30.

09 09 04 39 CMP Okay.

09 09 04 43 LMP Say, Jerry, earlier today, I asked to take off my sensors so that I could replace them with some new ones because they weren't working properly, and I took them off and one of them

		is sort of broken out like Pete's. What I'd like to do, if it's okay with the surgeons, is leave the sensors off tonight and when I get up tomorrow morning real early, I'll put the whole new set on; that way, they'll have the BIOMED for reentry and - see if they think that's okay.
09 09 05 20	CC	Roger, Al. The surgeon concurs on that. They'd like to watch the CMP tonight for the sleep period and the other two guys in the bags can go without.
09 09 05 31	LMP	Sounds good.
09 09 07 51	CC	Apollo 12, Houston. We're handing over from Madrid to Goldstone in about 20 seconds.
09 09 07 57	CDR	Okay.
09 09 08 46	CC	12, Houston through Goldstone. How do you read?
09 09 08 50	CDR	Loud and clear.
09 09 10 32	CC	12, Houston. Looks like all we need from you is your presleep checklist data and we'll leave you alone.
09 09 10 39	CMP	Okay.
09 09 11 47	CC	12, Houston. We - -
09 09 11 48	CDR	Are you ready for - for the E-memory dump?
09 09 11 52	CC	Just going to tell you we're ready.
09 09 11 59	CDR	Coming at you.
09 09 12 01	CC	Roger.
09 09 12 05	CDR	Okay. The command module RCS injector TEMPS are 4.2 for 5 Charlie; 4.0 for 5 Delta; 3.6 for 6 Alfa; 6 Bravo is 4.4; 6 Charlie is 3.4; and 6 Delta is 4.6. BAT C is 37, PYRO BAT A and PYRO BAT B are both 37. The CDR and CMP both had one decongestant today. The LMP had one sleeping pill last night. We can't chlorinate the water; we have no buffer left. So, I don't think that makes any big deal. And everything else is per checklist.
09 09 12 54	CC	Roger, Pete.

09 09 13 08	CDR	See you in the morning.
09 09 13 09	CC	Roger, 12. We copied your E-MOD. This, by the way, guys, is the last shift for your friendly Gold Team, and Gold Flight and all of us on the team are mighty proud of you guys and we thought we'd like to let you know it. We'll see you back here at the ranch in a few days so take care and don't take any bolters.
09 09 13 29	CDR	Roger-Roger. We appreciate it. A great job from you guys. Thank you.

END OF TAPE

09 09 21 01	CC	Apollo 12, Houston. No need to answer me, but you need to get quads Bravo and Charlie off.
09 10 03 57	CC	Apollo 12, Houston.
09 10 04 17	CC	Apollo 12, Houston.
09 10 05 21	CC	Apollo 12, Houston.
09 10 08 49	CDR	Go ahead, Houston.
09 10 08 52	CC	Roger, guys. Sorry to wake you up, but we're concerned about the chlorine situation. We'd hate like the dickens to see you guys get stuck with an extra 20 days in the quarantine because of it. The status down here now is we'd like you, if you've got chlorine, to go ahead and chlorine the water - chlorinate it even if you don't have the buffer. The thing is that you ought to do it now, so when you get up in the morning, it'll taste reasonably good enough so that you can handle it.
09 10 09 21	CDR	Okay. Consider it done.
09 10 09 26	CC	Roger. How about the CMP; is he hooked up to BIOMED?
09 10 09 33	CDR	Yes. Do you have it on him?
09 10 09 34	CC	No. We sure don't.
09 10 09 38	CDR	Don't, huh?
09 10 10 21	CMP	Houston, 12.
09 10 10 22	CC	Go, 12.
09 10 10 25	CMP	What are we supposed to use for a buffer for that chlorine?
09 10 10 34	CC	12, Houston. The surgeon says that you won't even need a buffer. If you put it in now and let it sit all night and then disseminate into the water, that it won't be too bad in the morning.
09 10 10 45	CMP	Okay. Hey, Jer, I'm sorry. I'd fallen asleep here and left my suit power and audio off, but I've got them back on now.

09 10 10 53	CC	Okay.
09 10 10 54	CMP	You see my heart?
09 10 10 55	CC	We got you loud and clear - -
09 10 10 56	CMP	- - on the way over there?
09 10 10 57	CC	You'd better believe it, Dick - -
09 10 10 59	CMP	- - ... Okay.
09 10 11 04	CC	- - just pitty-patting right down the line.
09 10 11 07	CMP	Watch it get lazy.
09 10 11 11	CC	You made the surgeon's whole night.
09 10 11 15	CC	Good night, guys.
09 10 11 18	CMP	Night, Jer.
09 10 16 15	CDR	Houston, 12.
09 10 16 19	CC	Go ahead, 12.
09 10 16 46	CC	Apollo 12, Houston. Go ahead.
09 10 16 51	CDR	I think we found a third bag of this stuff up here, so ... got everything.
09 10 16 57	CC	Good show. We figured that was probably what had happened, Pete. And we were thinking if you talked to us again, we were going to tell you where everything was stowed and see if you could find it.
09 10 17 11	CDR	Yes, well, we only thought we had two bags, and we had three.
09 10 17 15	CC	Roger. See you in the morning.
09 10 17 19	CDR	Roger. Nighty-night.

END OF TAPE

REST PERIOD - NO COMMUNICATIONS

09 18 05 40	CMP	Hello, Houston; Apollo 12.
09 18 05 44	CC	Good morning, Apollo 12.
09 18 05 49	CMP	Good morning, good morning. We are just getting cleaned up and eating breakfast.
09 18 05 54	CC	Very good. Are you ready for the big day?
09 18 05 59	CMP	I don't know. What's happening?
09 18 06 01	CC	Oh, we've got a nice little section in the South Pacific reserved for you. And we have most of the Navy standing by to pick you up.
09 18 06 09	CMP	Good. We've cleared certain area of all altitudes, huh?
09 18 06 13	CC	That's affirmative.
09 18 39 02	CDR	Houston, Apollo 12.
09 18 39 05	CC	Go, 12.
09 18 39 09	CDR	Yesterday, I gave them a tentative storage arrangement and I'd like to modify that just one little bit, and I'll appreciate it if you'd let RETRO know.
09 18 39 22	CC	Roger.
09 18 39 23	CDR	Instead of storing Dick's suit under the left-hand couch, we have some garbage in the TSB and we'd like put that in the hatch bag. And it's all soft. And then we'd like to take Dick's suit and stow it under the right seat and that's the only change.
09 18 39 41	CC	Roger; copy.
09 18 39 48	CDR	Thank you.

END OF TAPE

09 19 03 58	LMP	Houston, Apollo 12.
09 19 04 00	CC	Go ahead, 12.
09 19 04 03	LMP	Morning, Don. Say, this is Al, and I put on that new EKG harness. How about asking the doctors to look at it and see if it's okay?
09 19 04 13	CC	Roger - -
09 19 04 14	LMP	I moved the lower - I moved the lower sternal up about 1 inch to keep it off the old spot. But I don't know if that makes any difference or not.
09 19 04 23	CC	Roger. We'll have him check it for you.
09 19 06 26	CC	Apollo 12, Houston.
09 19 06 31	CDR	Go ahead.
09 19 06 32	CC	The surgeon reports that he is getting a good signal from both of you, and you're both definitely still alive.
09 19 20 39	CDR	Good show.
09 19 20 44	CDR	Houston, we stopped PTC for a moment to do some photography, and we'll get back in it again in about 10 minutes.
09 19 20 52	CC	Very good. When do you plan to do a P23? Will you do that before you - -
09 19 21 01	CDR	Say again.
09 19 21 02	CC	Do you plan - -
09 19 21 03	CDR	Say again, Houston.
09 19 21 04	CC	Do you plan to do the P23 while you're out of PTC before you reenter?
09 19 21 10	CDR	We might as well. Let's see, we might be doing it just a few minutes early. We'll hold to 236. You want to do that?
09 19 21 22	CC	Stand by. Okay. We're okay for early, and we have some attitudes for you when you're ready to copy.

09 19 21 35	CDR	Okay. I'll be back with you in a minute for the attitudes.
09 19 31 58	CDR	Houston, 12. You got a consumables update for me?
09 19 32 02	CC	Roger. We'll get it for you momentarily; and, in return, can you give us a sleep and PDR - PRD readout?
09 19 32 13	CDR	Roger. Across the board 8, 8-1/2, 8-1/2; 11032, 11032, 04034.
09 19 32 22	CC	Thank you. Okay. The RCS total at 233 hours is 25.5; Alfa is 26.3; Bravo is 26.6; Charlie is 23.0; Delta is 26.2; H_2 total is 21.9 percent; O_2 total is 27.7 percent.
09 19 33 04	CDR	Copied all that. Thank you.
09 19 35 41	CDR	Houston, 12. Ready to copy those angles.
09 19 35 45	CC	Roger. The P23 optics calibration attitude: roll, 89; pitch, 334; yaw, 0; the optics calibration star is star 24; P23 sighting attitude: roll, 87; pitch, 329; yaw, 316; for the fourth star, substitute star 24, for horizon. Note, if unable to use the star, go to the next star in sequence. No alternate stars will be updated, and please report the type of difficulty with any stars omitted.
09 19 37 13	CDR	Okay. P23 boresight optics calibration: 089, 334, 0; star 24: and P23 attitude 087, 329, 316; and, for star 4, substitute star number 24; no alternate stars. Please report difficulty with any stars omitted.
09 19 37 37	CC	That's affirmative; and, with star 24, it's the far horizon.
09 19 37 46	CDR	Yes. I got that. ... far horizon.
09 19 38 43	CC	Apollo 12, Houston. One flight plan change for you when you want to copy.
09 19 38 51	CDR	Okay. Go ahead.

09 19 38 52	CC	At 238 hours and 30 minutes, the report of the command module RCS injector valve temperatures, delay that report to 240 hours and that will improve our chances of not having to do any heating.
09 19 39 17	CDR	Okay. I just looked at them right now, and over the night during the PTC, they're all above 4 ..., some just barely, and so we will have gone back into PTC for a while after the ... and I think doing that, we'll probably be in pretty good shape.
09 19 39 34	CC	Roger. Thank you, Pete.
09 19 39 35	CMP	Don't we have it - We have it until just before you do it.
09 19 48 47	CC	Apollo 12, Houston. We would like to - you to give us the high gain antenna if you would. We would like you to turn the power on. Give us WIDE BEAM width, REACQ mode. The pitch angle is minus 79, and yaw is 156.
09 19 49 10	CDR	Coming at you.
09 19 49 28	CDR	There you go; it's all locked up.
09 19 49 30	CC	Thank you.
09 19 49 31	CDR	You want to leave it in WIDE?
09 19 49 32	CC	That's affirmative. - -
09 19 49 33	CDR	- - you want to leave it in WIDE? Okay.
09 20 03 52	CMP	Houston, Apollo 12.
09 20 03 55	CC	Go ahead, 12.
09 20 03 58	CMP	Hey, would you check with the boys in the back room? Should I have - be having any trouble with Jupiter, as far as seeing it or not? I can't see it. Do I have a right vector in?
09 20 04 07	CC	Roger. We're checking.
09 20 04 12	CMP	This is a surprise to me. I - you wouldn't think I'd have trouble seeing Jupiter.

09 20 04 39	CMP	Hello, Houston; 12. It's all right. I got it now.
09 20 04 42	CC	Very good. That gives us a lot of comfort to realize they're all still up there.
09 20 04 52	CMP	Why should that be comforting to you? What if we missed one? What would you care?
09 20 04 55	CC	Oh, we don't mind if we miss a star, but if all the planets aren't there, you know, the astrologers are really bent out of shape.
09 20 05 04	CMP	Well, being there and seeing is one - two different things.
09 20 05 07	CC	Roger.
09 20 10 30	CMP	Houston, Apollo 12.
09 20 10 33	CC	Go, 12.
09 20 10 35	CMP	Don, star 75 is not visible.
09 20 10 38	CC	Roger. No 75.
09 20 10 42	CMP	And I'm going to press on to star 24.
09 20 10 45	CC	Roger.

END OF TAPE

09 20 14 11	CMP	Don, one of the problems I'm having with this one is, that star is so dim that when I get it down to the airglow, it almost washes out to nothing, and I can't quite tell where it is. But I'll go ahead and mark on him anyway.
09 20 14 25	CC	Roger.
09 20 14 33	CMP	Half the time I can't find him; I lose him.
09 20 16 10	CMP	That's about the toughest star I've had to do so far.
09 20 16 15	CC	Say again, Dick.
09 20 16 17	CMP	I said that one is about the toughest one I've had.
09 20 16 21	CC	We're giving you your MAX test since this is your last chance.
09 20 16 26	CMP	Well, if they get any dimmer than that, I'm not going to be able to see them.
09 20 16 30	CC	Roger.
09 20 19 02	CMP	Houston, on this particular star here, there's a big round, very dim - very dim orange ball that covers about three-quarters of the sextant, but I can see the star through it even though it doesn't appear orange itself.
09 20 19 22	CC	Is that a Sun reflection, or what's causing the orange ball? Do you know?
09 20 19 28	CMP	I don't know. I would suspect it might be the proximity to the Sun, but I'm really not sure of that.
09 20 19 34	CC	Roger.
09 20 19 35	CMP	I don't have the complete orange - I don't have the complete orange ball in the sextant, but I've got the better half of it.
09 20 19 44	CC	Roger. Copy.
09 20 19 45	CMP	Look at that - Look at that - Look at that patch and you can see how much of the Moon is in that patch, and that's a little bit more than that in here on the Sun.

09 20 19 56	CC	Roger, Dick.
09 20 20 05	CC	We suspect that's scattered light, Dick.
09 20 20 11	CMP	I'm sure it is.
09 20 22 26	CMP	Houston, 12.
09 20 22 28	CC	Go ahead.
09 20 22 31	CMP	Don, I can't use this star either. Once I start moving it, there's so much scattered light that I lose the star completely, and I can't keep track of it.
09 20 22 40	CC	Roger. That's what the test is to show. Thanks.
09 20 22 45	CMP	Okay. I'll press on to the next one.
09 20 22 47	CC	Roger.
09 20 22 51	CMP	As the famous astronaut once said, press.
09 20 27 00	CMP	Well, I think that's a good one to end on.
09 20 27 04	CC	Very good.
09 20 27 11	CMP	I'll give you an optics CAL again.
09 20 27 14	CC	Okay.
09 20 27 44	CC	Dick, Houston. Can you tell us how the horizon compares now with the second batch of translunar that you did when you had a good clear horizon?
09 20 27 58	CMP	The second batch - Which second batch are you referring to, Don? On the way out or on the way back in?
09 20 28 04	CC	Translunar, on the way out.
09 20 28 08	CMP	Well, I think there's probably a little learning process as to what is the horizon you ought to be using. I think far too much is made of that airglow layer, and you can almost use what you think is the horizon, which also includes the airglow layer. And it's really not that undefined. It's fairly definite; it's very easy to use. And I think the second set that I did going out was by far the better one, and I've been using that particular horizon for all of these all the - on the way back in.

09 20 28 38	CC	Roger. We copy. Thank you very much.
09 20 30 49	CC	Apollo 12, Houston. If you're interested, we've got football scores, the morning headlines, and the local weather for you, if you want to work that in among your busy activities.
09 20 31 07	CMP	Don, go ahead. We'll listen right now.
09 20 31 11	CC	Roger. The scores from yesterday in the NFL: Cleveland 28, New York 17; Detroit 16, Green Bay 10; Philadelphia 34, St. Louis 30; Washington, 27, over Atlanta, 20; Los Angeles, 24, to Dallas, 23; Baltimore over Chicago, 24 to 21; Minnesota, 52, over Pittsburgh, 14; New Orleans, 43, to San Francisco, 38. In the AFL: Oakland took Kansas City, 27 to 24; Houston 32, Miami 7; New York 40, Cincinnati 7; Boston 35, Buffalo 21; and San Diego 45, Denver 24. In the news: Splashdown stories and yesterday's news conference are getting good coverage. Pete's boys, Andy and Chris, did a little soaring of their own yesterday. Scott Royce took the boys and Jane up for a ride yesterday. Andy said he'd rather be a soaring pilot than an astronaut. You can work that out with him later, Pete. And Chris's reaction was, "It feels good, but I still like to water ski the best." There's a provocative headline, "Boston Hospital Maternity Wards Are Feeling The Impact Of Two Severe February Snowstorms," and I'll let you imagine how the story runs. The Houston weather is pretty bad. It's overcast and drizzling, not really a day the Chamber of Commerce would be proud of; however, in the landing area, we're reporting 1800 scattered and a high scattered, winds out of the east at 15 knots with 10-mile visibility. The waves are 3 feet; you've got 5-foot swells, and if you've remembered to pack your lava-lavas it should be a lovely day in the South Pacific.
09 20 33 26	CMP	Thank you, Don. It sounds real good, and we'll be happy to see the land of lava-lavas.
09 20 33 30	CC	Very good.
09 20 33 47	LMP	Houston, 12.
09 20 33 48	CC	Go ahead.
09 20 33 50	LMP	What do you want us to disable for PTC, C and - C and D?

09 20 33 57	CC	That's good. Yes.
09 20 34 00	LMP	Okay, fine. C and D are going off and we'll stabilize.
09 20 35 19	CC	Apollo 12, if you will set in on the high gain pitch, 40; yaw, 270, we'll take over on the ground and switch your antennas for you.
09 20 37 11	CMR	Hello, Houston; Apollo 12.
09 20 37 13	CC	Go ahead.
09 20 37 15	CMP	Don, I guess we ought to start thinking about getting these state vectors up to speed. I have the onboard ones for the CSM and the ground CSM state vectors in the LM slots. Do you want us to put the ground vector in both slots now?
09 20 37 47	CC	Just a second, Dick; we're talking.
09 20 37 51	CMP	Okay.
09 20 38 27	CC	Dick, Houston. The vectors that you've got in there now are quite satisfactory for the present, but we're going to send you some much better ones in the flight plan, so we'll - We don't think there's any need to play with them now, and we'll send you up some better ones later.
09 20 38 47	CMP	Okay. I've got a 239:30 as the time we were talking about. Okay. Very good.
09 20 38 57	CMP	I didn't particularly appreciate your saying much better. You could have said a little better, couldn't you?
09 20 39 03	CC	Sorry about that. It's early in the morning down here.
09 20 44 09	CMP	Houston, 12. We're ready to start PTC when you give us the word.
09 20 44 16	CC	Roger.
09 20 44 26	CC	12, give us a few more minutes to let the rates damp out, please.
09 20 52 39	CC	Apollo 12, Houston. Let's go ahead and roll it on the PTC.
09 20 52 54	CMP	Roger. We're starting PTC.

09 20 52 59	CC	Roger. And I'm about to turn you over to the tender care of Paul Weitz, so we'll see you when you get back to the LRL. And have fun in the South Pacific.
09 20 53 07	CMP	Okay, Don. Thank you much, and thank you for all your help.
09 20 53 10	CC	Very good. We'll see you later. Goodby.
09 20 55 17	SC	Music - "Wind Me up Again"
09 21 04 17	CMP	Houston, Apollo 12.
09 21 04 20	CC	Go, 12.
09 21 04 24	CMP	Good morning, Paul. Is anybody down there thinking about getting this eclipse as far as we're concerned when the Sun goes behind the Earth? We've got - What we've got is some - We've got some 16-millimeter black and white and some 70-millimeter black and white.
09 21 04 47	CC	Okay. We'll check on it. We're getting the times on that now. We'll pass those up to you and, when we do, we'll give you the dope on the - what they want it taken with.
09 21 05 05	CMP	12, Roger.
09 21 10 53	CC	Hello, 12; Houston. On our last LOS during your roll, we did not acquire high gain; we expected to. Would you verify if your high gain angles are pitch, 40; yaw, 270?
09 21 11 10	CMP	Okay. We have minus 40 - plus 40 in pitch.
09 21 11 14	CC	That's affirmative. It should be plus 40.
09 21 16 25	CC	Hello, 12; Houston. I've got a couple of things for your operations checklist, page Foxtrot 5-8.
09 21 16 37	CMP	Stand by.
09 21 17 00	CMP	Okay. Say which page, Don?
09 21 17 02	CC	That's Fox 5-8.
09 21 17 07	CMP	Oh, okay; 5-8.
09 21 17 09	CC	Right.
09 21 17 22	CMP	Go ahead.

09 21 17 24	CC	Okay. We pick up the checklist there with the EMS drift check, and we would like to know the results of that on the ground when it's complete. And now, about the ninth line down, where it calls out the set DELTA-V_C, we'd like you to set the DELTA-V_C plus 100 feet a second if you would, please.
09 21 17 45	CMP	Okay.
09 21 17 48	CC	And that's it. Thank you.

END OF TAPE

09 22 10 40	CMP	Hello, Houston; Apollo 12.
09 22 10 52	CC	12, Houston. Go ahead.
09 22 10 56	CMP	Okay. Roger, Paul. This little EMS test that's in the checklist for the P41; I just ran it for 100 seconds. I set it at 100 feet per second. It ran for 100 seconds, and now the EMS reads 102.2. Over.
09 22 11 13	CC	All right. We'll massage that and see what it means down here, Dick. Thank you.
09 22 11 18	CMP	Okay.
09 22 12 52	CC	Hello, 12; Houston.
09 22 12 55	CMP	Go ahead.
09 22 12 57	CC	Okay, Dick. We're looking right now at a midcourse 7 of about 2-1/2 feet a second. They want to get another - about another half hour of tracking, after which they will work up your maneuver PAD for you then.
09 22 13 10	CMP	Okay. We're not in any big rush except to get home, and we'll wait any length time you need for that midcourse.
09 22 13 18	CC	Okey-doke.
09 22 48 25	CC	Hello, Apollo 12; Houston. I have some information for you on the solar corona photos.
09 22 48 33	CMP	Stand by a second.
09 22 48 58	LMP	Go ahead, Paul.
09 22 49 00	CC	Okay. They just want you to take photos coming out of the shadow, and they're requesting that you use the Hasselblad, because you indicated the black-and-white film. Use the 80-millimeter lens, an f-stop of 2.8 focused at infinity. They want you to take as many photos as you can starting at a GET of 241:55:20. Now this is approximately 2 minutes before your sunrise. To start off with, use a shutter speed of 1 second. As you come out of the shadow, as soon as you can see a hairline

		Sun, change your shutter speed to 1/125th, and - Stand by 1. I'll have your final setting in just a minute.
09 22 50 39	CC	Okay, 12. And, as I said, as soon as you can see any sign of the sun at all, switch your - change your shutter speed to 1/125th. Take photos at that setting for 5 to 10 seconds, after which as the Sun comes up, then change to f:16 at 1/500th of a second. And you can just take a bunch of photos at that; and, for information, the sunrise time is 241:57:18. Over.
09 22 51 25	LMP	Roger. Understand. We'll start about GET 241:55:20; we'll use black and white, 80-millimeter lens, and we'll have it set at 2.8, infinity, 1 second. And the first time we see a sliver of Sun, we'll switch it to 1/125th and work on that for about 15 seconds; then we'll shift over to f:11, 1/500th, and take some more.
09 22 51 54	CC	Okay, Al. Change over after the Sun - After you see the first sign of the Sun, go about 10 seconds instead of 15; and after the Sun starts coming up, your final f-stop is 16. That's f:16 at a 500th.
09 22 52 14	LMP	Understand; f:16 and 10 seconds at the earlier setting of f:2.8 at 1/125th.
09 22 52 24	CC	That's affirmative, Al. Also, in your flight plan, we call for a COMM check at 239 hours. We're not going to run that COMM check. We would, however, like you to go ahead and fire up your VHF and we'll hold off until we get indications of a good signal strength on the ground, at which time we'll then run a VHF COMM check.
09 22 52 51	LMP	Sounds good. I just turned it on right now.
09 22 52 55	CC	Okay. Thank you.
09 22 54 02	LMP	Also, Houston, when you give us an attitude for this solar picture, how about giving it to us so it's good out window 5? That's our best window.
09 22 54 15	CC	Roger, 12.
09 22 56 13	CC	12, Houston with your photography attitude.
09 22 56 20	LMP	Go.
09 22 56 21	CMP	Go ahead.

09 22 56 22	CC	Okay. That's roll, 300; pitch, 310; yaw, 0, and that should give it to you out window 5.
09 22 56 35	CMP	Roger. Roll, 300; pitch, 310; yaw, 0; window 5.
09 22 56 39	CC	Roger.
09 23 08 08	CDR	Houston, 12.
09 23 08 11	CC	Go ahead, 12.
09 23 08 14	CDR	Let me give you our final stowage configuration; we swapped back again. We've got everything the way we told you - Dick's - We've got one suit under the left-hand couch, and it has a helmet on, and the other two helmets are on top of the Surveyor bag, tied down right in front of A-4 and A-5. Everything else is the way we gave it to you.
09 23 08 44	CC	Okay. Thank you, Pete.
09 23 16 07	CMP	Houston, 12.
09 23 16 10	CC	Go ahead, 12.
09 23 16 13	CMP	Do you really want us to run this CMC self-check?
09 23 16 18	CC	Stand by.
09 23 17 35	CC	Hello, 12; Houston. We see no requirement for that self-check.
09 23 17 40	CMP	Okay.

END OF TAPE

09 23 22 12	CC	Apollo 12, Houston. We have some words on your P52.
09 23 22 17	CDR	Okay.
09 23 22 18	CC	Okay. The attitude based on the PTT REFSMMAT is roll, 091.2; pitch, 161.7; yaw, 021.6. Stars - The stars are 35, Rasalhague, and Pete's old favorite, 37, Nunki. We haven't passed up a burn attitude yet, but you - This will put you at the burn attitude, except you'll be 180 degrees out in roll.
09 23 23 03	CDR	Okay.
09 23 23 04	CC	And your high gain angles are pitch, minus 85; yaw, 255.
09 23 23 15	CDR	Okay.
09 23 24 42	CC	Apollo 12, Houston. I have a midcourse 7 PAD for you when you're ready to copy.
09 23 24 53	CMP	Roger. Go ahead.
09 23 24 55	CC	Okay. It's midcourse 7 RCS/G&N: 24985, NA, NA, 241:21:57.38, minus 0002.4, plus all zeros, plus 0000.1, 000, 310, 000, NA, NA, 0002.4; 0:05; 0002.4. Your sextant star is 10, 241.7, 39.5. There's no Apollo star available for a boresight check. Your GDC stars are Sirius, 15; Rigel, 12. The angles, 336, 262, 357; four-jet ullage; that's a four quad burn. And just some comments to pass up to you; they're not related to the burn. Since the burn is so short, we'll make no correction for your EMS drift. It looks right now like you have 64 hours of battery time on the water, and we're going around the room now to see whether or not to give you a GO for entry. Over.
09 23 27 08	CMP	Hey, you guys are all right. Stop the world; I want to get off.
09 23 29 00	LMP	Houston, Apollo 12. Let us know when you're ready for the readback on that PAD.
09 23 29 03	CC	Okay. We're ready and waiting.

09 23 29 11	LMP	Okay. We thought you were going to do something about that GO.
09 23 29 16	CC	No, we're still massaging it. Go ahead and read it back.
09 23 29 21	LMP	Okay. 24985, NA, NA, 241:21:57.38, minus 0002.4, plus all zips, plus 0000.1, 000, 310, 000, NA, NA, 0002.4, 0:05, 0002.4, 10, 241.7, 39.5, Sirius 15, Rigel 12, 336, 262, 357, it's four-jet burn.
09 23 29 58	CC	That's affirmative, Al.
09 23 31 28	CC	Hello, 12; Houston. We're going to let you come back, so I have an entry PAD for you.
09 23 31 33	CMP	Okay. Gosh, you guys are okay today. We'll be ready to copy in just a second.
09 23 31 56	CMP	Go ahead.
09 23 31 59	CC	Okay. Entry to the MPL: 000, 151, 000, 244:05:18, 267, minus 158.1, minus 165.17, 06.1, 36116, 6.49, 1167.3, 36198, 244:22:18, 00:29. The next four blocks are all NA down to DO, 400, 02.11, 00:19, 03:27, 08:04, the sextant star is 23, 294.7, 29.0, the boresight star is Procyon, 01.6, up 14.6; left 1.0; lift vector, up. Use the EMS nonexit pattern. And some times for you here: GET of sunset, 240:32:07; sunrise, 241:57:23. You'll cross the terminator at 244:14:04; and, if you're interested, moonset is at 244:20:05. Over.
09 23 34 52	LMP	Okay. 000, 151, 000, 244:05:18, 267, minus 158.1, minus 165.17, 06.1, 36116, 6.49, 1167.3, 36198, 244:22:18, 00:29, 400, 02.11, 00:19, 03:27, 08:04, 23, 294.7, 29.0, Procyon, 01.6; up 14.6; left 1.0; up. Use EMS nonexit pattern, sunset 240:32:07; sunrise 241:57:23. We'll cross the terminator at 244:14:04; moonset, 244:20:05.
09 23 35 56	CC	That's all Charlie, Al.
09 23 36 02	LMP	Roger.
09 23 40 25	CC	Hello, Apollo 12; Houston. When you take those corona photos, it probably wouldn't be a bad idea to turn the lights down in the cabin to try to minimize reflections off the window, Pete. Over.

09 23 40 40	CDR	Okay. We'll do that.
09 23 41 06	CDR	And the computer's yours anytime you want it, Houston.
09 23 41 10	CC	Okay. Thank you.
09 23 49 56	CC	Computer's yours, Dick.
09 23 49 59	CMP	Roger. Thank you.
09 23 53 57	CMP	Houston, Apollo 12.
09 23 53 59	CC	Go ahead, 12.
09 23 54 01	CMP	The CM RCS injector temp's, are as follows: 5 Charlie, 4.3; 5 Delta, 4.4; 6 Alfa, 4.0; 6 Bravo, 4.5; 6 Charlie, 4.3; 6 Delta, 4.8.
09 23 54 17	CC	Roger. Copy, 12. Thank you.
09 23 54 26	CC	Okay, 12. No preheat on the injector.
09 23 54 29	CMP	Okay.
10 00 07 40	CMP	Houston, 12. Are you copying the DSKY?
10 00 07 50	CC	Roger. We got them, 12.
10 00 07 53	CMP	Okay. We are going to torque it at this time.
10 00 07 56	CC	Roger.
10 00 13 26	CDR	Houston, 12.
10 00 13 28	CC	Go ahead, 12.
10 00 13 30	CDR	We're rolling left to the burn attitude; we going to lose the high gain?
10 00 13 39	CC	Stand by.
10 00 13 44	CC	Affirmative, 12. Give us OMNI Delta, please.
10 00 13 47	CDR	Okay.
10 00 33 34	CMP	Hello, Houston; Apollo 12.
10 00 33 37	CC	Go ahead, 12.

10 00 33 39	CMP	We're getting a spectacular view at eclipse. We're using the Sun filter for the G&N optics, looking through, and it's unbelievable.
10 00 33 48	CC	Roger. Understand, Dick.
10 00 33 57	CMP	The reason it looks so much different is the limb of the Earth is eclipsing it. It's not quite a straight line, but it's certainly a large, large disk right now. Looks quite a bit different than when you see the Moon eclipse the Sun.
10 00 34 15	CC	Roger.
10 00 34 18	LMP	Anybody down there know how I - what we can set the camera at to use the Sun filter on it? To - to - take a couple of shots of this eclipse right through it?
10 00 34 31	CC	Stand by and we'll check.
10 00 34 35	LMP	They'd better hustle.
10 00 34 38	CC	Okay.
10 00 34 47	LMP	Funny thing is, you cannot see the Earth at all when you just shield your hand from the Sun and look out right next to it where the Earth should be. It's not there at all. When you stick your smoked glass up, you can see where it's cutting the - the Sun. Otherwise, it's completely invisible.
10 00 35 04	CC	Roger, Al.
10 00 42 16	LMP	Fantastic sight. What we see now is - The Sun is almost completely eclipsed now, and what it's done is illuminated the entire atmosphere all the way around the Earth, even though the Sun is still on what looks like the western limb of the Moon - the Earth to us.
10 00 42 34	CC	Roger. Understand, Al. And we're still working on getting a procedure for taking some photographs of it.
10 00 42 40	LMP	Man, it's too light. We're using those for sunrise. I think they'll be exactly the same.

10 00 42 45	CC	Okay.
10 00 42 46	LMP	But the diameter of the Earth now looks compared - to the Moon - I'd say about 15 times the diameter of the Sun; but it's illuminating the whole atmosphere all the way around. It really looks pretty. You can't see the Earth. It's black just like the - space.
10 00 43 13	CC	Roger. Understand you cannot make out the Earth at all.
10 00 43 18	LMP	No. You can't see any features on it. All you can see is this sort of purple-blue, orange, some shades of violet, completely around the Earth. It's illuminated.
10 00 43 29	CC	Roger.
10 00 44 18	CDR	It's very interesting looking at the atmosphere. It has blues and pinks in it, but instead of being banded, it's segmented, which is very peculiar; I don't understand why. It may be the difference between over the landmasses and water or something.
10 00 44 38	CC	Roger, Pete. Understand. Is it kind of like you would see in the desert in the evening sometimes when you get that blue and pink streaking in the sky?
10 00 44 48	CDR	Yes. Except, like I say, t's segmented for about - Right from the Sun around about a quarter of the Earth is pure blue, and then it becomes pink to about 20 degrees of arc; and then it turns back to blue again. And it's blue all the way around the bottom - to where it turns pink again, and then it turns blue again.
10 00 45 18	CC	Roger, 12.
10 00 47 01	LMP	It's a heck of a time to be without any 70-millimeter color film, I'll tell you.
10 00 47 07	CC	- - ... - -
10 00 47 08	LMP	But I know how to get it on a 16-millimeter camera.
10 00 47 11	CC	Okay, Al. Good show. We were just thinking the same thing.

10 00 50 45	LMP	Have you got a suggestion on the f-stop for the 16 millimeter?
10 00 50 50	CC	We're working on it.
10 00 50 52	LMP	It looks - It looks like this is going to have a luminated atmosphere, probably the whole time it's eclipsed. What it looks like now through the smoked glass is that the Sun is completely set behind the Earth, and you probably know better than I do from some - -
10 00 51 16	LMP	Roger. We're using it at 1/60th at 1 frame a second and 1 - using 1.4 f-stop and also at 2 - and what - and a 1. What it looks like is the Sun is set, but it's so close to the limb of the Moon on the back side there, that that bright light is being channeled through the atmosphere, and so if you look at it with a naked lie - eye you can't tell the Sun is set yet. Through the smoked glass, you can see that it's no longer a disk there, but you just see a bright white line the diameter of the Sun.
10 00 51 57	CC	Roger, Pete. Understand. Al.

END OF TAPE

10 00 53 45	CMP	Houston, 12.
10 00 53 47	CC	Go ahead, 12.
10 00 53 49	CMP	We're shooting these at 1/60th at 1.4, and that's where we're going to stay unless you come up with a better suggestion.
10 00 53 57	CC	Roger. We got that, Dick; 1/60th, 1.4 at 1 frame a second. They're working on it in the back room and, actually according to our figures here, you should still be seeing a little piece of the Sun. You don't enter the full umbra until a little after 241 GET.
10 00 54 16	CMP	You're absolutely correct. We still have a little bit of Sun through the horizon on the western limb.
10 00 54 22	CC	Roger.
10 00 54 25	CMP	But right now, the Earth is completely - the atmosphere of the Earth is completely illuminated all the way around, 360, and right in the center it's as black - it's as dark at the - as space behind it itself. This is really spectacular.
10 00 54 42	CC	Roger.
10 00 54 47	CMP	Have you got any more adjectives for spectacular? I'd like to use some if you have.
10 00 54 52	CC	No. We'll put somebody to work on that, too.
10 00 55 44	CC	Hello, 12; Houston. You are taking these pictures through the optics, right?
10 00 55 51	CMP	Negative, Houston. Through the hatch window.
10 00 55 53	CC	Okay.
10 00 56 12	CC	12, Houston. Which lens do you have on the DAC?
10 00 56 16	CMP	I have 18 millimeter.
10 00 56 18	CC	Okay.
10 00 56 52	CC	Okay, 12; Houston. We've got some words for you. Set aligns to f:2, go to TIME on your mode select,

and give us a 1-second exposure, if you would. Hit the button that opens the shutter; hit the button again that closes it.

10 00 57 16	CMP	Understand. We'll work on it.
10 01 00 18	CMP	Houston, Apollo 12. One thing that puzzles us a little bit, perhaps FIDO can answer it. It looks to us like the Sun is being eclipsed by the Earth - Earth's north pole or south pole. It's kind of hard to tell what - whether it is its east or west limb. Have you got any additional dope there on that?
10 01 00 37	CC	Okay. We'll find out and see which direction it's moving.
10 01 02 45	CC	Hello, 12; Houston. For the mode select in TIME to function properly on the camera, the shutter speed has to be set to 1/60th even though that's not our actual shutter speed.
10 01 02 58	LMP	I'd say we've got it. Thank you, though, Houston.
10 01 03 00	CC	Roger.
10 01 11 27	LMP	This has got to be the most spectacular sight of the whole flight. We can see now that the Sun's behind the Earth. We can see clouds sort of on the dark part of the Earth; and, of course, the Earth's still defined by this thin narrow - or thin blue-and-red segmented band. It's a little bit thicker over at the - down where the Sun just set than it is at the other one, but it is really a fantastic sight. The clouds appear sort of pinkish gray, and they're sort of scattered all the way around the Earth. It would be interesting to know exactly what part of the Earth we're looking at or what our nadir is now, because that part doesn't appear to have any clouds, and these others appear to be sort of revolving around it.
10 01 12 26	CC	Roger, Al. Understand that you can see clouds all the way around the Earth including the dark portion of it, and your nadir right now is just about the Indian Ocean.
10 01 12 37	CDR	Well, the whole - the whole Earth is dark to us. We looking at the nightside, but we can see all the clouds. We haven't been able to distinguish

landmasses yet, but we might be able to in a minute when we get a little bit better adapted, and I think the airglow is illuminating the clouds down there.

10 01 12 56	CC	Roger, Pete.
10 01 13 12	CC	12, Houston. I'll give you a time hack to ignition so you can check your DET. It'll be at 8 minutes which is about 40 seconds away.
10 01 14 04	CDR	What happened to your time hack?
10 01 14 07	CC	Well, we're going to come up on 8 minutes - Yes, I blew it. I'll give you one at 7:30.
10 01 14 12	CDR	Okay. (Laughter) I - you had me worried for a minute.
10 01 14 16	CC	Okay. We're discussing the important parts, such as which side of the world the Sun's set on. 5, 4, 3, 2, 1 -
10 01 14 28	CC	MARK
10 01 14 29	CC	7:30.
10 01 14 30	CDR	Okay. We're right with you.
10 01 15 22	CMP	Say, Houston. It's very interesting. We can see lightning and the thunderstorms down there on the Earth. I don't know how many miles out we are, but all the cloud cover that has thunderstorms in it, we can see lightning - you can see it quite clearly, flashing from wherever we are.
10 01 15 40	LMP	Yes. They look like - sort of just like fireflies down there blinking off and on.
10 01 15 47	CC	Yes. Yes. You're about 25 750 out.
10 01 15 55	LMP	Yes. We're starting to look out for these synchronous satellites now. We've been lookin up ahead.
10 01 16 01	CC	Okay.
10 01 16 05	CDR	Sure hate to run into one up here.
10 01 16 09	CC	Yes. It could ruin your day.

10 01 17 01	CC	Apollo 12, Houston. If those lightning flashes are fairly frequent, we'd like to see if we can capture some of them on film, which would be the mode you are presently in with the speed set to 1/60th at f:2, remain in the TIME on the mode select, and leave the shutter open for 1 to 2 minutes.
10 01 17 24	CMP	Oh, yes. They're - they're equally - they're - They're that frequent. There's two areas down there that are quite active right now.
10 01 17 32	CDR	Paul, have you got any idea of how to hold that camera still for 1 to 2 minutes?
10 01 17 37	CC	No.
10 01 17 39	CDR	Okay.
10 01 17 40	CMP	We'll give it her go after we get this burn off.
10 01 17 43	CC	Okay.
10 01 19 06	CC	Hello, 12; Houston. On your question on where the Sun went behind the Earth, we've decided that it did go behind the western limb of the Earth in the northern hemisphere and should reappear on the eastern limb, still in the northern hemisphere.
10 01 19 27	CDR	Roger.
10 01 22 13	LMP	Okay. Plus 0.1, plus 0.1, minus nothing.
10 01 22 18	CC	Roger, 12.
10 01 24 15	CC	12, Houston. What did your EMS read after that burn, please?
10 01 24 21	LMP	I even hate to tell you, it's - I'd say it's 102.4 to burn down to 100 - At the end of the burn, it was 101.4 and moving fast - -
10 01 24 33	CMP	It was 102.7 at burn time after turning it on the normal switch at the proper 30 seconds before the burn.
10 01 24 46	CC	Roger. Understand.
10 01 27 03	CDR	Houston, 12. We - we're better night-adapted now, and by golly, we can see India, and we can see the Red Sea, and we can see the Indian Ocean

quite clearly. It's amazing how well we can see, for that matter. We can see Burma and the clouds going around the coastline of Burma, and we can see Africa and the Gulf of Aqaba; it looks like the same photograph Dick and I took on 11.

10 01 27 37 CDR Roger, Pete.

10 01 29 03 CDR We can also distinguish the lights of large towns with our naked eye, just barely, and by using the monocular, we can confirm that that's what we're seeing.

10 01 29 16 CC Roger, 12. That's very interesting. You may now hold the class record for seeing lights.

10 01 29 32 CDR I can tell you, there's a couple of ripdoozer thunderstorms down there that are really - really letting go.

10 01 29 40 CC From what can you see of the geography there, can you tell where the thunderstorms are, Pete?

10 01 29 46 CDR Okay. I'll give you a fix on this one that is really bright.

10 01 30 04 CDR I'm going to give you a fix and say that it's about 2, 300 miles to the southwest of the tip of India. There seems to be a weather system out there, and it's got thunderstorms all the way along it.

10 01 30 28 CC Roger, 12.

10 01 30 52 CDR It's - Venus is just below the Earth, and we can see Venus quite clearly, well, you can see all kinds of stars, but Venus is just below the Earth. This is - This is really a sight to behold, to see it at nighttime like this.

10 01 31 10 CC Roger.

10 01 32 10 CC Hello, 12; Houston. For your information, weather does not have any surface reports from that region, but the satellite picture does show quite extensive cloud coverage of the area you're reporting the lightning.

10 01 32 26 CDR Okay. I got a - Unfortunately, we've got our Earth map stashed away. I wish I had it out. I'm not sure that I'm giving you the absolute exact location. And the other thing is, it

looks like, just north of India and I'd say all up through China and Russia, if that's what we're looking at, the whole area in there looks like it is completely covered with clouds.

10 01 32 54	CC	Roger. Understand, Pete.
10 01 33 04	CDR	Also, also, right in the center of the Earth now, we have some real bright light shining, staying on - that - that Dick's looking at with the monocular. It's really bright.
10 01 33 20	CC	Roger. Understand. Does it appear to be coming from your nadir point, which should be just off the eastern coast of India now?
10 01 33 28	CDR	Yes. Looks like it's coming just about out of the center of what we're looking at. I would say south of Burma and east of India.
10 01 33 39	CC	Roger. That's just about your nadir.
10 01 34 11	CDR	I can't imagine what that is.
10 01 34 21	CC	We can't either. We're checking for possibilities.
10 01 34 27	CDR	It's a steady light, and it appears in size to be as big as any of the thunderstorms flashing.
10 01 34 39	LMP	Yes. It's as big as Venus at least.
10 01 34 59	CC	Roger. Understand.
10 01 34 59	LMP	It's hard to tell if it is exactly in the center of the Earth or not, it's pretty close to being right in the center. Maybe just a little bit to our right, whatever that means. Just a little bit to the side that the Sun did not go behind the Earth on.
10 01 35 21	CC	Roger. I think we understand that.
10 01 35 26	CDR	And looking at the airglow with the monocular is - Boy, there is another sight now that is not like being in Earth orbit whatsoever. It's - it's a bright red next to the Earth, and then it's got a green band in it, and then it's got a blue band.
10 01 35 52	CC	Would you say these color bands encircle the Earth now, Pete?

10 01 35 58	CDR	Yes. But it's not the same all the way around. What I'm seeing is - is sunrise, really. The Sun is - this is about 40 degrees from the Sun, and there's a red - bright red band - and then a sort of a light green band that's very thin, and then a blue one which must be all of the atmosphere.
10 01 36 25	CC	Roger.
10 01 38 08	CC	12, Houston. Can you still see that bright light about in the center?
10 01 38 14	CDR	We're - Al - Al - we rolled so Al could take the sunrise pictures, and the Sun has pretty well wiped out that view that we had. Now the Sun's started up, and the Earth has turned black again.
10 01 38 26	CC	Roger. Understand.
10 01 43 55	CMP	Houston, 12.
10 01 43 57	CC	Go ahead, 12.
10 01 44 00	CMP	Paul, does it look like we are going to have an update to our entry PAD - or not, after that burn?
10 01 44 11	CC	Stand by. I'll check on it, Dick.
10 01 44 35	CC	12, Houston. They want to get a little more tracking on you. It looks good. Some of the - some of the times may change a second or two, but as soon as they get a good track, we'll send it on up.
10 01 44 47	CMP	Okay. Not pushing, just curious.
10 01 44 49	CC	Roger.
10 01 46 21	CC	Hello, 12; Houston. If it's not already there, will you select the left VHF antenna, please?
10 01 46 31	CMP	Roger. Left VHF antenna.
10 01 46 33	CC	Okay. And, also, the ground readout of suit pressure dropped to zero a few minutes ago. Will you give us your onboard readout?
10 01 46 44	CDR	Oh, it sure did. It reads zero also.

10 01 46 48	CC	Okay, we just wanted to confirm it. Thank you.
10 01 48 09	LMP	Houston, Apollo 12. I sort of think that time you gave me to start shooting, 241:55:20, is the time that the Sun will be completely over the limb of the Earth, and it would be too late then. I've been shooting per your instructions for the last 3 or 4 minutes. Can you confirm that?
10 01 48 31	CC	I'll check on it, Al.
10 01 48 43	CC	I understand, Al, that you can see the Sun, now. Is that right?
10 01 48 52	LMP	That's affirmative. I've been watching it for about the last 4 or 5 minutes. I didn't put a clock on it, but I started that sequence you gave me when the Sun started to peek around. I expect that the time I got that came out of the computer was the time when it's going to be fully out.
10 01 49 08	CC	Okay, Al. Good show.
10 02 14 03	CC	Apollo 12, Houston. I have your landing area information, if you're interested.
10 02 14 10	CDR	Go ahead.
10 02 14 11	CC	Okay. The forecast hasn't changed since this morning, Pete. Still calling for good weather; 1800 foot, scattered, variable, broken, 10 miles; the wind is out of the east at 15; we've got 3-foot waves on top of 5-foot swells, and they're running about 40 degrees apart. The altimeter is 2938, which gives a DELTA-H of plus 38 feet. Your landing time now looks like 2058 Zulu. Sunrise was at 1612 - Zulu that is, and sunset will be at 04:24. There are some widely scattered showers in the area, less than 10 percent. Okay, on the recovery forces, the Hornet's on station. They will have three helos there, ... four of them. Swim 1 and 2, with swimmers onboard; Recovery 1 for the swimmer and a medic, and Photo 1. We've also got two E-1's that'll be airborne - that's Airboss and Relay 1. We've got two C130's. It will be 40 minutes getting to onstation and they've got a pararescue on board. Their calls are Samoa Rescue 1 and 2. Over.

10 02 15 58	CDR	Houston, 12. We copied all that.
10 02 16 02	CC	Roger.
10 02 18 21	CC	Hello, 12; Houston. Give us OMNI Alfa, please.
10 02 18 46	CC	12, Houston. OMNI Alfa, please.
10 02 19 18	CC	Hello, Apollo 12; Houston. Requesting OMNI Alfa.

END OF TAPE

10 02 25 20	CDR	Hello, Houston; Apollo 12.
10 02 25 22	CC	Go ahead, 12.
10 02 25 24	CDR	Roger. We'd like to go through the logic sequence.
10 02 25 31	CC	Stand by.
10 02 25 47	CC	Okay, 12. We were waiting for HIGH BIT RATE. We have it now, so go ahead.
10 02 25 52	CDR	Okay. We'll give you a holler as we get to them.
10 02 25 55	CC	Roger.
10 02 26 15	CDR	Okay. We're down to ELS AUTO, Houston, and we're ready for the sequence logic 2 on up.
10 02 26 34	CMP	61 logic, Mark; 62 logic, Mark.
10 02 26 40	CC	12, Houston. You're GO for PYRO ARM.
10 02 26 43	CDR	Roger.
10 02 36 38	CC	Hello, Apollo 12; Houston. Over.
10 02 37 14	CC	Apollo 12, Houston.
10 02 38 35	CC	Apollo 12, Houston. Over.
10 02 39 39	CC	Apollo 12, Houston.
10 02 42 42	CC	Apollo 12, Houston. Over.
10 02 43 47	CC	Hello, Apollo 12; Houston. Negative downlink; request you tune for MAX. Over.
10 02 44 35	CC	Hello, Apollo 12; Houston in the blind. Negative downlink. Try to raise us on any antenna you can, including VHF. Over.
10 02 47 26	CC	Hello, Apollo 12; Houston. Over.
10 02 52 14	CC	Hello, Apollo 12; Houston. Over.
10 02 53 16	CDR	This is 12. Go ahead.
10 02 53 19	CC	Hello, 12; Houston. Over.
10 02 53 22	CDR	Go ahead, Houston.

10 02 53 23	CC	Okay. We haven't been able to get a hold of you guys for a little bit. Where have you been?
10 02 53 27	CMP	Right here.
10 02 53 28	CDR	Sitting on the checklist OMNI Charlie like it said, which apparently wasn't the right one.
10 02 53 35	CC	Yes. We tried to get an OMNI Alfa call to you, but didn't get it in in time, I guess.
10 02 53 40	CDR	Okay. What do you need?
10 02 53 45	CC	I'll find out if they want anything different.
10 02 53 48	CDR	Okay.
10 02 57 27	CC	12, Houston. We lost everything, including down data, during that 10 or 15 minutes. Have you performed your sextant star check?
10 02 57 35	LMP	That's affirmative. We're just getting ready to align again, and we'll perform it right after we align.
10 02 57 42	CC	Okay. Thank you.
10 02 57 44	LMP	And the boresight star even checks out.
10 02 57 46	CC	How about that?
10 03 01 27	LMP	Houston, 12. You got the torquing angles?
10 03 01 30	CC	Roger. We've got them.
10 03 08 16	LMP	Houston, we're activating the water boiler at this time.
10 03 08 19	CC	Roger, 12.
10 03 10 47	CMP	Houston, 12. EMS check's okay.
10 03 10 50	CC	Roger, Dick. Thank you.
10 03 10 53	CMP	And we're down in the checklist at final stowage.
10 03 10 56	CC	Roger. And, 12, Houston. A reminder is that the camera settings for your fireball and clutes photos are not in the checklist. They only appear in the flight plan there.
10 03 11 13	CMP	Roger. Thank you; we got it.

10 03 17 52	CC	12, Houston. We're ready with your state vector if you'll give us ACCEPT.
10 03 17 58	CDR	Okay. Just a second. You've got it.
10 03 18 05	CC	Got it.
10 03 20 51	CC	12, Houston. The computer's yours.
10 03 20 54	CDR	Roger.
10 03 23 37	CC	Hello, Apollo 12; Houston. The only change worth noting on your PAD is the EMS range to GO.
10 03 23 46	LMP	Okay. What's that?
10 03 23 48	CC	That is now 1166.3.
10 03 23 57	LMP	Roger. Copy 1166.3.
10 03 24 02	CC	That's right.
10 03 26 12	CC	Hello, 12; Houston. Give us a right antenna on VHF, will you, please?
10 03 26 17	CMP	Roger. Right antenna, VHF.
10 03 26 33	CDR	Okay, Houston. Are we GO for PYRO ARM for command module RCS PREP?
10 03 26 39	CC	Stand by.
10 03 26 56	CC	12, Houston. You're GO for LOGIC ARM.
10 03 27 01	CMP	Logic 1, Mark; logic 2, Mark.
10 03 27 16	CC	12, Houston. You're GO for PYRO ARM.
10 03 27 18	CMP	Roger. GO for PYRO ARM.
10 03 29 59	CMP	Okay, Houston. We'll be coming up with the command module RCS check in just a minute.
10 03 30 04	CC	Roger, 12. We're ready whenever you are.
10 03 30 09	CMP	Okay.
10 03 31 42	CC	Hello, 12; Houston. The check looked good here.
10 03 31 46	CDR	Looked good up here, too.
10 03 31 47	CMP	Roger. It looked good here.

10 03 33 59	CC	Uh-oh, 12; Houston. Give us OMNI Charlie, please.
10 03 34 04	CMP	Going OMNI Charlie.
10 03 45 48	CC	Hello, 12; Houston.
10 03 45 51	CDR	Go ahead, Houston.
10 03 45 52	CC	Just a reminder, Pete. Since the - Your steam pressure readout on the secondary system has been erratic in the reentry phase; just double check that you're on PRIMARY.
10 03 46 05	CDR	Roger. We're on PRIMARY.
10 03 46 08	CC	Roger.
10 03 47 25	CC	Hello, 12; Houston. Give us VHF left, please.
10 03 47 31	CDR	Roger. VHF left.
10 03 52 25	CMP	Okay, Houston. Bus ties.
10 03 52 28	CC	Roger, 12.
10 03 56 25	CC	Apollo 12, Houston. I'll give you a time hack at 25 minutes, which is about 50 seconds away, and if one of you wants to turn down your S-band volume, we'll get a VHF voice check.
10 03 56 39	CMP	Okay.
10 03 56 53	CC	Hello, Apollo 12; Houston. S-band/VHF SIMUL. How do you read?
10 03 57 13	CC	Stand by for a mark at 25 minutes: 3, 2, 1, -
10 03 57 19	CC	MARK

END OF TAPE

10 03 58 11	CC	Hello, 12; Houston. Were you reading our VHF?
10 03 58 14	CMP	That's affirmative.
10 03 58 16	CDR	Affirmative.
10 03 58 18	CC	Roger.
10 03 58 26	CC	12, Houston. If you're talking VHF now, you're very broken and garbled, and we're not reading you, yet.
10 03 58 34	CMP	Hello, Houston; Apollo 12. How do you hear?
10 03 58 36	CC	Loud and clear, Dick.
10 03 58 37	CMP	Okay.
10 04 05 56	CDR	Okay, Houston. We're going to arm the pyros for SEP.
10 04 06 00	CC	Roger, 12.
10 04 07 32	CC	12; Houston. We confirm separation.
10 04 07 35	CDR	Roger.
10 04 11 14	CC	12, Houston. I'll give you another hack on your DET at 10 minutes, which is about 1 minute from now.
10 04 11 20	CDR	Okay.
10 04 12 14	CC	Stand by for your mark. 3, 2, 1 -
10 04 12 19	CC	MARK.
10 04 12 20	CC	Ten minutes.
10 04 12 22	CDR	Roger. We're right with you.
10 04 19 26	CC	Hello, Apollo 12; Houston through ARIA.
10 04 19 30	CDR	Loud and clear, Houston. ...
10 04 19 40	CC	Roger, 12.
10 04 19 50	CDR	On my mark, you'll have moonset, Houston. You can check your time. 3, 2, 1 -

10 04 19 57	CDR	MARK.
10 04 19 58	CDR	Moonset.
10 04 22 30	CC	12, Houston. Coming up on blackout. We'll see you at 3:28.
10 04 25 51	CC	Hello, Apollo 12; Houston. Over.
10 04 26 37	CC	Hello, Apollo 12; Houston. Over.
10 04 27 04	CDR	Hello, Houston. You read Apollo 12 out of blackout?
10 04 27 08	CC	Roger, 12. Reading you loud and clear now.
10 04 27 12	CDR	Okay. It's right on the money.
10 04 27 16	CC	Roger. We concur, Pete.
10 04 27 17	CMP	We're taking our second dive in.
10 04 27 19	CC	Roger.
10 04 27 25	CMP	Pulling 3g's, and it starts the Earth mode.
10 04 27 29	CDR	That first time I get a shower at 6g ... thought I'd wiped all the water out of the tunnel. ... We're doing great.
10 04 27 33	CC	Roger, 12.
10 04 28 04	CMP	Okay, Houston. We've got 50 miles to go on my mark.
10 04 28 08	CMP	MARK.
10 04 29 23	CC	Hello, 12; Houston. We have radar and S-band contacts on you.
10 04 29 29	CDR	Roger.
10 04 30 44	LMP	Got drogues, Houston.
10 04 31 29	CDR	10 000. Standing by for mains.
10 04 31 33	CDR	There go the mains. Three, but they're not reefed. There they go. They dereefed. Hello, Houston; Apollo 12. Three gorgeous, beautiful chutes. And we're at 8000 feet, on our way down, in great shape.

10 04 32 04	CC	12, Houston. Give us your LAT-LONG, please.
10 04 32 11	LMP	Airboss, we read you loud and clear, and we're okay.
10 04 32 15	AB	Roger, Apollo 12. Set your contact report, please.
10 04 32 33	AB	Say again. Over.
10 04 32 40	R	This is Recovery. Tally ho; I have a visual.
10 04 32 47	AB	...
10 04 32 51	R	This is Recovery. I am 3 miles north of the 300 radial. Three miles - I have a visual. He is bearing 135 from me, 6000. I am - pretty good. ... Looks good.
10 04 33 11	AB	Roger. ... 2 had zero bearing - -
10 04 33 31	R	The command module is just above the cover of the clouds at 5500 feet.
10 04 33 44	P-1	Photo 1 has ... zero, zero.
10 04 33 51	P-1	... 200.
10 04 34 01	R	This is Recovery. I still have a visual. He's just beginning to sink into the clouds.
10 04 34 07	AB	Apollo 12, Apollo 12, this is Airboss transmitting in the blind. Your primary transmitter is inoperative, inoperative. Switch to SECONDARY 259.7 and ... Over. We have a visual on you; we have a visual on you.
10 04 34 29	R	This is Recovery. I've lost visual contact. He hit the clouds. I'm ... down. Tally ho, another visual: 4 miles, getting N 130, passing through 4000 feet.
10 04 34 54	R	This is Recovery. Passing through 3500. Range 4 miles on the command module; three chutes; looks good. Going into another cloud.
10 04 35 11	AB	... 12, how do you read Airboss?
10 04 35 20	CDR	Roger. Read you same. We're all okay.
10 04 35 24	AB	Roger. Understand. You look great.

10 04 35 34	R	Rccovery 1 has visual ... 100. This is Recovery. Seems to be about 1500 feet above the water, three good chutes.
10 04 35 47	AB	Roger, Recovery. Roger.
10 04 36 14	R	This is Recovery. Still in contact.
10 04 36 23	R	SPLASHDOWN.

END OF TAPE