APOLLO 16
LUNAR MODULE
ONBOARD VOICE
TRANSCRIPTION

CLASSIFICATION changed to U
By authority of Defense Security Classification Official
Date 11/9/73 - 2/9/78 - Daily Status
RECORDED ON THE DATA STORAGE EQUIPMENT ASSEMBLY (DSEA)

MAY 1972

GROUP 4
Downgraded at 3-year intervals; declassified after 12 years

CLASSIFIED DOCUMENT - TITLE UNCLASSIFIED
This material contains information affecting the national defense of the United States within the meaning of the espionage laws, Title 18, U.S.C., Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SECURITY CLASSIFICATION

The material contained herein has been transcribed into a working paper in order to facilitate review by interested MSC elements. This document, or portions thereof, may be declassified subject to the following guidelines:

Portions of this document will be classified CONFIDENTIAL, Group 4, to the extent that they:
(1) define quantitative performance characteristics of the Apollo Spacecraft, (2) detail critical performance characteristics of Apollo crew systems and equipment, (3) provide technical details of significant launch vehicle malfunctions in actual flight or reveal actual launch trajectory data, (4) reveal medical data on flight crew members which can be considered privileged data, or (5) reveal other data which can be individually determined to require classification under the authority of the Apollo Program Security Classification Guide, SCG-11, Rev. 1, 1/1/66.
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM ACTIVATION</td>
<td>1-1</td>
</tr>
<tr>
<td>STATIONKEEPING AND PDI PREPARATION</td>
<td>2-1</td>
</tr>
<tr>
<td>LIFT-OFF MINUS 18 TO POSTDOCKING</td>
<td>3-1</td>
</tr>
</tbody>
</table>
INTRODUCTION

This document is the transcription of the Apollo 16 flight crew communications recorded on the lunar module (LM) data storage equipment assembly (DSEA). After the multiplexed voice communications and mission elapsed time had been recorded on board the LM on a single track of the tape, the tape cassettes were transferred to the command module (CM) for the return to Earth. The cassettes were forwarded to NASA Manned Spacecraft Center, Houston, where mission elapsed time was converted to ground elapsed time for this document. Transcription of these tapes was managed by James L. Gibbons, Test Division, Apollo Spacecraft Program Office, to whom inquiries concerning this document should be referred.

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 34 14). The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.

The time used by Mission Control Center (MCC) and indicated as ground elapsed time (GET) in the Flight Plan was updated to the spacecraft, to MCC computers, and to the telemetry down-link pulse-code-modulated bitstream and other time-recording devices. This GET updating was performed only to correct significant changes in Flight Plan time occurring as the result of delayed lift-off, midcourse corrections, or spacecraft burn-time differences (trajectory dispersions).

Therefore, Apollo elapsed time (AET) (the true mission elapsed time) does not always agree with Flight Plan and MCC times. Users of this transcript are cautioned to apply the appropriate time-update deltas for the updated periods. Dashes in the time column indicate that the time could not be determined because of the use of the VOX mode.

Speakers in the transcript are identified as follows:

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR</td>
<td>Commander John W. Young</td>
</tr>
<tr>
<td>CMP</td>
<td>Command module pilot Thomas K. (Ken) Mattingly II</td>
</tr>
<tr>
<td>SC</td>
<td>Unidentifiable crewmember</td>
</tr>
<tr>
<td>MS</td>
<td>Multiple speakers</td>
</tr>
<tr>
<td>CC</td>
<td>Capsule communicator (CAP COMM)</td>
</tr>
</tbody>
</table>

UNCLASSIFIED
In the text, a series of three dots (…) designates those portions of the communications that could not be transcribed because of garbling. One dash (-) indicates a speaker’s pause or a self-interruption. Two dashes (---) indicate an interruption by another speaker or a point at which a recording was abruptly terminated. A series of three asterisks (***) indicates voice clipping caused by use of the voice-actuated (VOX) mode. Words given unusual emphasis by the speaker are underlined. The Apollo 16 mission was flown April 16 to 27, 1972; lift-off occurred at 17:54:00.57 G.m.t. (12:54:00.57 p.m. e.d.t.) on April 16. The CM was designated Casper and the LM was called Orion.
LM ACTIVATION

03 21 53 32 LMP How do you read, Ken?
03 21 53 34 CMP Loud and clear.
03 21 53 35 LMP Wow. You're just super also.
03 21 53 38 CMP Well, at least we got one improvement over the simulators.
03 21 53 41 LMP Boy, I'll say.
03 21 53 45 CDR Okay. That's really good.
03 21 53 47 CMP Outstanding.
03 21 53 48 LMP Okay. Go --
03 21 53 49 CMP ... How about a - you need a 16 65 before I get away from here, John?
03 21 53 56 CDR No, I - no, I - Tell him no.
03 21 53 59 LMP No.
03 21 54 00 CDR I can hear him - I can hear him through your headset.
03 21 54 03 LMP Go B to RECEIVE and - and then VHF A to T/R.
03 21 54 12 CDR Okay. Okay. What's those numbers again?
03 21 54 16 LMP 36673 -
03 21 54 18 CDR That's the LM weight?
03 21 54 19 LMP Yeah. And 39329.
03 21 54 31 CMP ...
03 21 54 33 LMP Yes, sir.
03 21 54 57 LMP Man, this zero gravity is so neat.
03 21 55 00 CMP ...
Yeah. You take the umbilicals onto your side? That's new, huh?

... 

Okay. On my checklist, it says verify them stowed.

... 

Huh? Okay.

It says both electrical umbilicals removed. Drogue - Oh, yeah. It does say remove them.

Hey, Ken?

Huh?

If you get into MIN DEAD BAND ATTITUDE hold, I can go ahead and do this coarse align.

Wait - Wait a - Now, wait a minute. Let - you can't do it without his numbers. And he's doing the tunnel stuff now.

Okay.

He wanted you to go - to do the coarse align, but let's do the tun - whatever you think's faster.

... 

Okay. Well, that - this comes - this comes after, Ken. The drogue and probe comes after, so why don't you get John - after the docked align.

... coarse alignment ...

Okay, go ahead. I just didn't see that. Ours just has us at - way ahead of that.

... 

Oh, I see what - Okay, you're right. All I'm supposed to do is verify this stuff. Let him get that end, John. We - we're in Fat City. Man, I'm putting a lot of load on this suit in the back --
03 21 57 13 CDR  It's all zipped.

03 21 57 14 LMP  -- when I straighten my legs up.

03 21 57 28 LMP  Hey, I don't get much feedback in my mikes. I thought I'd be able to hear myself.

03 21 57 41 CDR  You know what we need is some orange juice things over here - drinks.

03 21 57 44 LMP  We got some.

03 21 57 46 CDR  Do we?

03 21 57 47 LMP  Uh-huh.

03 21 58 09 CDR  That water's not leaking, is it?

03 21 58 10 LMP  No. It's not.

03 21 58 23 CMP  ...

03 21 58 47 LMP  Looks great.

03 21 59 28 CDR  I could do the landing gear deploy. You want to do that?

03 21 59 42 LMP  Yeah, that sounds all right to me. They don't have to see that.

03 21 59 46 CDR  Okay. Tell Ken we're gonna deploy the landing gear.

03 21 59 51 LMP  Hey, Ken. If you hear a thump, we're gonna deploy the landing gear.

03 21 59 59 CDR  Okay. Circuit breaker 11 --

03 22 00 00 LMP  What page are you on?

03 22 00 02 CDR  It's on page 1 - 3-17.

03 22 00 08 LMP  Okay.

03 22 00 09 CDR  Circuit breaker 11, ED LANDING GEAR FLAG, close.

03 22 00 16 LMP  Okay, LOGIC POWER A, open.
03 22 00 19  CDR   LOGIC POWER A is open.
03 22 00 20  LMP   MASTER ARM, ON.
03 22 00 23  CDR   MASTER ARM is coming ON. SYSTEM B light.
03 22 00 26  LMP   Okay. LANDING GEAR DEPLOY, FIRE.
03 22 00 28  CDR   LANDING GEAR DEPLOY, FIRE.
03 22 00 30  LMP   There they go.
03 22 00 34  CDR   Got a - a -
03 22 00 36  LMP   No doubt in my mind. You get a gray?
03 22 00 38  CDR   Gray.
03 22 00 39  LMP   Okay. ED 11, LOGIC POWER A, close.
03 22 00 41  CDR   LOGIC POWER A is closed.
03 22 00 43  LMP   SYSTEM A light, on.
03 22 00 44  CDR   It is.
03 22 00 45  LMP   FIRE again.
03 22 00 48  CDR   FIRE again, huh? LANDING GEAR DEPLOY, FIRE again.
03 22 00 52  LMP   Hey, it's out, John! I can see the front footpad.
03 22 00 59  CDR   Okay, and then what?
03 22 01 00  LMP   And then look at the front footpad. MASTER ARM, OFF.
03 22 01 04  CDR   Okay.
03 22 01 05  LMP   CB (11), ED LOGIC POWER --
03 22 01 07  CDR   LANDING GEAR FLAG, open.
03 22 01 08  LMP   Yeah, LANDING GEAR FLAG. Man, have we got the condensation in here. Looks like you're serious about this.
03 22 01 20 CMP  ...  
03 22 01 21 LMP  Yeah, they look okay.  
03 22 01 23 CDR  Hey, you - Is this your pair of scissors here, Charlie?  
03 22 01 27 LMP  In there, yeah.  
03 22 01 28 CDR  Did you take them out of here?  
03 22 01 30 LMP  I took them out of the data card kit.  
03 22 01 31 CDR  Okay.  
03 22 01 35 CMP  ...  
03 22 01 44 LMP  ... Man, this - this water cooling is so nice, Ken.  
03 22 02 19 CDR  Okay, we've done that.  
03 22 02 49 CDR  Are you in AUTO on the QUADS? No. Okay. Going to AUTO on the QUADS, Charlie.  
03 22 02 54 LMP  Okay.  
03 22 02 56 CDR  That was at 94:02 - 02:57.  
03 22 03 05 LMP  Check the quad temps.  
03 22 03 10 CDR  Super. They're already up there, ain't they?  
03 22 03 13 LMP  Yeah, I push - those breakers on your side are - -  
03 22 03 16 CDR  Man -  
03 22 03 17 LMP  - - manual. I mean they're - they cycle on and off by themselves.  
03 22 03 34 CDR  Hey, let's get the AOT reticle thing out and put it on.  
03 22 03 40 LMP  Oh. I forgot that. That's part of the housekeeping.  
03 22 03 42 CDR  Yeah.
I wonder how I forgot that?

Is it in there?

Yeah, here it is.

Okay, you got it.

What are you, a southpaw?

I'd look out the - yeah, I'll look out the other way.

Beautiful.

What's your problem?

Okay, Charlie.

It's not in here.

What's not?

That AOT thing.

What AOT thing?

During the housekeeping.

Don't worry about it, Charlie.

I know it. I just wanted to write it down for the 17 guys.

Oh.

My ears have cleared up, John. I mean my sinuses.

Mine, too. You know why?

Why?

With as much simulator time as we got -- What's the matter, Ken?

...
03 22 06 44 CMP ...

03 22 06 46 LMP Yeah. And it's tight. I can't budge it. You know, I wish I could cut my microphone off on my left side. That way I wouldn't get this drink bag squirted in my face every time.

03 22 07 12 CDR Pretty exciting, isn't it? ... me another shot of water, Charlie.

03 22 07 21 LMP Okay (laughter).

03 22 07 32 CDR That's good. That's enough.

03 22 07 36 LMP Come on. Let's chill it down a little bit.

03 22 07 37 CDR Oh. Think that's enough?

03 22 07 40 LMP Umm, that feels good.

03 22 07 46 CDR A-choo.

03 22 07 47 LMP Oh, boy.

03 22 08 35 LMP Can't understand why we're down to 91 percent on the descent $O_2$. Both tanks.

03 22 08 49 CDR They didn't fill them.

03 22 08 50 LMP You don't think so?

03 22 08 51 CDR Yeah.

03 22 08 54 LMP They never told me they weren't going to.

03 22 09 00 CDR That may be what it reads.

03 22 09 26 LMP 13 minutes to AOS. Or thereabouts.

03 22 09 52 CDR Is Ken pulling latches?

03 22 09 56 LMP Hey, Ken.

03 22 09 57 CMP Yeah.

03 22 09 58 LMP You all finished? I'm gonna close the hatch.

03 22 09 59 CMP Wait a minute.
03 22 10 00  LMP  Okay.
03 22 10 05  CDR  Is he off comm?
03 22 10 09  LMP  I don't know.
03 22 10 10  CDR  Don't close the hatch until he gets on comm.
03 22 10 21  LMP  This zero gravity is so neat.
03 22 10 23  CDR  Hey, Ken.
03 22 10 50  CMP  ... 
03 22 10 52  LMP  Okay. I've checked the exterior. The capture latches are engaged and locked. I got three good ones. And from my side, they're removed, the lock lever's engaged and flush; so we're all set.
03 22 11 17  CMP  ... 
03 22 11 22  LMP  Can you hear me on the comm, Ken?
03 22 11 24  CMP  Yeah, loud and clear.
03 22 11 25  LMP  Okay.
03 22 11 27  CDR  Yeah, it is, T.K. If you go to MIN DEADBAND ATTITUDE hold and give me a 06 20, I'd appreciate it.
03 22 11 39  CMP  Okay. I'll get with it right now.
03 22 11 42  LMP  Okay, Ken. I'm gonna close the hatch. We'll see you in 3 days, babe.
03 22 11 47  CMP  Okay.
03 22 11 48  LMP  And don't run off and leave us.
03 22 12 04  CDR  You want me to check and see if it's sealed? Want me to check the seal and see if there's anything in it before you close it? There was nothing in it, huh?
03 22 12 17  LMP  huh-uh.
03 22 12 32  CDR  Got it, huh?
Day 4

03 22 12 33  LMP  Uh-huh. Going AUTO, PRESS REG A -
03 22 12 40  CMP  Okay, John. I'm in MIN DEAD BAND.
03 22 12 43  CDR  Okay. And give me an 06 20.
03 22 12 53  CMP  Okay. Plus 002.74, plus 109.36, plus 004.57.
03 22 13 23  CMP  That's affirmative.
03 22 14 01  LMP  Did you get the docking angle written down, John?
03 22 14 03  CDR  It's minus 3-1/2.
03 22 14 04  LMP  Yeah. Just like in the training units. These -
03 22 14 13  CDR  What?
03 22 14 14  LMP  These helmet - these helmet bags, the plate - the - the snap caved in over here and you can't get it snapped.
03 22 14 37  CDR  There. Okay, Charlie. If you got some time, I'd like for you to check me on these angles.
03 22 14 42  LMP  Okay, just a minute.
03 22 15 26  CDR  ... Hey, Ken. You've got to stay in MIN DEAD BAND ATT hold until I tell you.
03 22 15 31  CMP  Yeah, I'm not going anywhere.
03 22 16 03  CDR  Charlie, you gonna put your foot on the -
03 22 16 07  LMP  The hatch?
03 22 16 08  CDR  Yeah. (Laughter)
03 22 16 19  LMP  Plus 002.74, huh?
03 22 16 21  CDR  Yeah --
03 22 16 22  LMP  Minus - subtract that. That'll be 6 - that one's correct. 289.36. That one is correct. This is wrong here. 360 minus should be a 370 something.

03 22 16 48  CDR  You got 340 - Yeah, that's a minus.

03 22 16 50  LMP  356.

03 22 16 51  CDR  356, yeah. (Laughter) 356 --

03 22 16 58  LMP  No, it's 355.43.

03 22 17 00  CDR  355.43.

03 22 17 03  LMP  Now add that up again and make sure it makes 360.

03 22 17 06  CDR  Yeah. Seven and 3 is 10; 5 and 4 is 9, 10; 5 and 4 is 9, 10; there we go.

03 22 17 13  LMP  Okay. Okay. Closed and secured hatch.

03 22 17 28  CDR  Plus 293.76 ENTER, plus 289.36 ENTER, plus 355.43.

03 22 17 47  LMP  You did the self-test already, huh, John?

03 22 17 48  CDR  Oh, yeah.

03 22 17 49  LMP  Okay.

03 22 17 51  CDR  Okay. Plus 293.76, plus 289.36, plus 355.43. Go. Go get them, tiger. Okay.

03 22 18 14  LMP  Should be 0, 284, and 060.

03 22 18 22  CDR  Yeah, you - he - he was out of attitude, wasn't he?

03 22 18 25  LMP  Oh, that's right. Yeah.

03 22 18 27  CDR  Okay. VERB 40 NOUN 20.

03 22 18 38  LMP  Maybe you ought to wait until that NO ATT light goes out.

03 22 18 40  CDR  It ain't gonna ever go out.

03 22 18 41  LMP  Oh, that's right. You got to release. You're right. Not until you do that, it won't go out.
Now, they said they're gonna change the REFSMMAT, right?

Why, what do you want to do?

...You can still set the REFSMMAT flag.

Yeah, I don't see why not.

Okay. NOUN 07 ENTER.

ENTER, 77 ENTER, 10000 ENTER, 1 ENTER.

Did you - did you check that REFSMMAT?

No. I'll check it in a second.

Okay.

It's set.

Okay.

Okay, Ken. I need an 06 20. On my - on my mark.

Okay. Standing by.

3, 2, 1 -

MARK.

Okay. 94:20:20.

002.69, plus 109.31, plus 004.72.

Plus 002.69, plus 109.31, plus 004.72.

That's affirmative.

You read out - read mine to me, John.

294.65, 289.96, 355.02.

Okay. I got it. All down in here.
Okay. What time was it, Charlie?


Should have AOS momentarily. You've done the landing gear. Did the DAP.

What else can we do, Charlie?

Nothing. Let's just wait until we get AOS and get the comm up. Then we do the E-memory dump.

Okay.

We got to get an up-link. Then we can start into the RCS, after I get the ascent bats checked out.

Ken, are we pretty close to being at the undocking attitude?

Undocking attitude is 0, 104, 0.

Yeah, we're pretty close.

Okay.

What time did they say AOS was, Ken?

The reason I ask, Ken, is for this P52, I need to be close to the right attitude to pick up the stars.

It's the same set of time-line procedures we've been using.

I know it. It's just that it's further off on the 8-ball than normal.

Is that gonna be close enough, John?

Yeah. I think --

Oh, let's try it and see what happens.

Okay. We just got them.

Charlie, ... AOS any second.
Day 4

03 22 23 05  LMP  Hello, Houston; old Orion.  How do you read?  Over.
03 22 23 10  CC  Orion, this is Houston.  Read you loud and clear.
03 22 23 12  LMP  Okay, Jim.  We're zipping right on through the checklists.  We got the PGNS up, the docked coarse align done, the landing gear is deployed, and the only thing we haven't done is really what you need to see.  And we're ready to start in on the S-band checks and bring up the steerable.  Over.
03 22 23 38  CC  Okay, Charlie.
03 22 23 43  LMP  Okay.  While guidance is - Let me give you some angles.  We had a VERB 06 NOUN 20 that was done at 94:20:20.  The IM angles were plus 294.65, plus 289.96, plus 355.02.  How do you read, Jim?
03 22 24 15  CC  Roger.  We copy.  Copied the LM as plus 294.65, plus 289.96, plus 355.02.  Over.
03 22 24 25  LMP  That's affirmative.  The command module are plus 002.69, plus 109.31, plus 004.72.  Over.
03 22 24 40  CC  Copy.  Plus 002.69, plus 109.31, plus 004.70 [sic].  Over.
03 22 24 47  LMP  That's firm.  Sounds like we got good comm on PRIMARY S-BAND T/R and SECONDARY POWER AMP.  I'm going SECONDARY S-BAND T/R and PRIMARY POWER AMP.  Over.  I got a lot of - -
03 22 25 03  CC  Standing by.
03 22 25 04  LMP  Okay.  Think it's my switch here, John.
03 22 25 07  CDR  Huh?  Yeah, it is.
03 22 25 10  LMP  Okay.
03 22 25 11  CDR  Try your other one.
03 22 25 13  LMP  See, it doesn't do it here.
03 22 25 15  CC  Casper, this is Houston.  We want NARROW on the S-BAND.
You've got it.

Okay, Jim. How do you read the old CDR?

Wait a minute. Let's get locked up here.

Okay.

Did that ruin it?

Yeah, you - go ahead. You ought have him.


Orion, this is Houston. Go ahead.

How do you read, Jim? Over.

I read you, but there's a lot of noise in the background.

Okay. We have primary evap activation time is 93:33:30, and we're standing by for the AGS abort constants. Over. Or - let us do the steerable first and get -

Roger.

-- and get you the down-link. Over - The E-memory dump. Over.

Okay. We're standing by for the steerable.

Okay, PM, SECONDARY, PRIMARY, VOICE --

Casper, this is Houston. Will you go AUTO?

You're AUTO.

What have we got there, Charlie?

Bringing up the steerable.

Okay. You want me to help you?

CONFIDENTIAL
STATIONKEEPING AND PDI PREPARATION

03 23 32 03 LMP Okay. You've got it. B, DATA. Okay, John. Get out your checklist, and you can start the rendezvous radar check, if you want to. We've got 16 minutes to the -

03 23 32 31 CMP Okay, Orion. I'm gonna turn my rear engines off as soon as it looks like we're stable here and go ahead and proceed with the closeout of the tunnel.

03 23 32 40 LMP Okay.

03 23 32 46 CDR Okay, we got something - we're hung up in some loop here, Charlie.

03 23 32 49 LMP Why -

03 23 32 50 CDR Do a VERB 96.

03 23 32 51 LMP - - why do you say that?

03 23 32 52 CDR Because the ACTIVITY light is on.

03 23 32 53 LMP Oh.

03 23 32 59 CDR There we go. Okay. Now what?

03 23 33 04 LMP Okay, you can do the rendezvous radar self-test, if you want to. That's all we got to do.

03 23 33 07 CDR Okay. Let's do it.

03 23 33 10 LMP Okay. And I'll do the rate gyro check. 95:26, TRACK MODE, SLEW. S-band ANTENNA, AFT. BIOMED, OFF. LO bit rate. UP-LINK SQUELCH, ENABLE. Okay. Okay, let's get going.

03 23 33 32 CDR Okay.

03 23 33 33 LMP Don't you - I'll read it to you.

03 23 33 34 CDR Okay. Give me the book - give me the boo -

03 23 33 35 LMP I'll read it to you; I've got nothing else to do.
You don't have nothing to do?

No. CB 11, RENDEZVOUS RADAR, two, close.

Okay. One, close --

Okay. Ken, can you turn the B3 off, please? We're gonna do a rendezvous radar checkout.

Yes, sir; it's been off.

Thank you. And verify your TRANSPONDER, OFF. Okay, you released it. CROSSPOINTERs both to HI MULT.

Verified.

Okay, go to HI MULT.

Okay. HI MULT.

Okay. Your - RATE/ERROR MONITOR, RENDEZVOUS RADAR. Okay, mine is, yours is.

What else we need?

Okay. RATE - go to RANGE/RANGE RATE. I got it.

RANGE/RANGE RATE.

SHAFT/TRUNNION, PLUS OR MINUS 50, you've got. Okay, MODE to SLEW. Temperature is okay. Select SECONDARY GYROS.

Okay.

No, no. Just - sl - I'm sorry, this to - this to SLEW. That what's I was --

Yeah, it is.

Okay, wait a minute, now; wait a minute. Okay. AC BUS A: RANGE/RANGE RATE ALTITUDE/ALTITUDE RATE, close. On 11, AC BUS A.

It's closed.

FLIGHT DISPLAYS: RANGE/RANGE RATE ALTITUDE/ALTITUDE RATE, close.
03 23 35 00 CDR Closed.
03 23 35 02 LMP Okay. SLEW RATE, HI. Okay, we're -
03 23 35 06 CDR SLEW.
03 23 35 07 LMP He's ... the latches. Okay, we've already slewed DOWN. Okay, check the mode I region, LEFT, RIGHT. Okay.
03 23 35 17 CDR I did.
03 23 35 18 LMP Okay. UP and DOWN. Okay, go to LO.
03 23 35 22 CDR LO. Go, Charlie.
03 23 35 24 LMP Okay. Oops, there you go. RIGHT, DOWN, LEFT, and UP. Okay.
03 23 35 32 CDR Okay.
03 23 35 33 LMP Okay, go to AUTO TRACK.
03 23 35 35 CDR Go to AUTO TRACK. RADAR TEST to on?
03 23 35 39 LMP RADAR TEST to RENDEZVOUS.
03 23 35 40 CDR RENDEZVOUS, I mean.
03 23 35 43 LMP Okay, go to 477 and 517. Crosspointers oscillate. FDAI needles vary. Okay, they are.
03 23 35 55 CDR Okay, it's 494. That close enough?
03 23 36 01 LMP Okay. This thing is gonna drive me insane.
03 23 36 24 LMP Okay. TEST MONITOR, AGC: 1.2 to 1.6. Okay, that's great - number. Okay; 1.2 to 1.6. TRANSMITTER: 2.8 to 3.2.
03 23 36 31 CDR 3.7.
03 23 36 32 LMP Great. It is?
03 23 36 34 CDR Yeah.
03 23 36 35 LMP Okay. SHAFT ERROR: 2.2 to 2.6.
2.2 to 2.6.
Wait a minute. How about the TRUNNION ERROR?
The same.
Okay. Go back to AGC.
AGC.
Okay. Set NORRMON flag, VERB 25 NOUN 07 ENTER, 101 
ENTER, 10 ENTER, 01 ENTER. RENDEZVOUS RADAR mode 
to LGC.
Okay. LGC. What am I doing? Go.
Okay. VERBS - NO TRACK and power fail. VERB 6 -
VERB 63.
Okay. Okay, PRO; TRACKER light on. Should go out 
after 12 seconds.
Yeah.
That comm can really screw you up. Well, we're not gonna have TV from the LM, unless we get that high gain up.
That's all right.
Okay, my lights are out. 72, varying, PRO.
There you go. 195.57, 195.57 --
Good.
-- minus 049.66.
Good.
VERB 34.
Okay. RADAR TEST to OFF.
RADAR TEST is OFF.
Day 4

03 23 38 10 LMP  VERB 40 NOUN 72.
03 23 38 11 CDR  NOUN 72 ENTER.  VERB 41, that right?  VERB 40 NOUN --
03 23 38 19 LMP  No, I just want you to zero the CDUs.
03 23 38 22 CDR  -- 72 ENTER.  Okay.
03 23 38 33 CDR  31210.
03 23 38 36 LMP  Making it overflow.  Have to bail out.
03 23 38 46 LMP  1210.  Two routines using AOT, IMU, or radar at same time.
03 23 38 50 CDR  Okay, that's my -- that was a procedural error.
03 23 38 53 LMP  Okay.  I don't know whether I got the right state vector there.  Let's kill that integration.  We'll try that state vector in a minute.  Okay.  Now, VERB 40 NOUN 72 ENTER.
03 23 39 15 CDR  ENTER.
03 23 39 16 LMP  Okay.  SHAFT and TRUNNION, PLUS OR MINUS 50.
03 23 39 22 CDR  There you go.
03 23 39 23 LMP  VERB 41 NOUN 72 ENTER.  Load plus 04000.  Same thing.  PRO.  VERB 16 72.
03 23 39 49 CDR  Okay.
03 23 39 50 LMP  It's there.  SHAFT and TRUNNION, PLUS OR MINUS 5.
03 23 39 54 CDR  Okay.
03 23 40 46 CDR  Hey, I --
03 23 40 47 LMP It's there.
03 23 40 48 CDR -- I'm going --
03 23 40 49 LMP Okay, RENDEZVOUS RADAR, two, open.
03 23 40 51 CDR RADAR, two, coming open, Charlie. VERB 44 ENTER.
03 23 40 59 LMP Okay. Go back to SLEW.
03 23 41 02 CDR SLEW.
03 23 41 03 LMP Okay, Ken. You can turn on B3 and the transponder, as you wish.
03 23 41 08 CDR Let's - let's check that state vector again, Charlie. That's --
03 23 41 10 LMP Okay. Let's undock first. Let's get all this done.
03 23 41 12 CDR Okay.
03 23 41 14 CMP Okay, I'm putting the hatch in.
03 23 41 16 LMP Okay, we've got to get a pressure integrity check. PGAs.
03 23 41 20 CDR Oh, we do?
03 23 41 21 LMP Yeah.
03 23 41 22 CDR Okay, so we ain't - Is that the only thing we have to do on this side, right?
03 23 41 25 LMP Yeah, we're - then we're 2 minutes ahead on that. We caught up, babe.
03 23 41 33 CDR Well, if that vector's right.
03 23 41 35 LMF Well, that - that won't take me 2 seconds to do that.
03 23 41 38 CDR Okay.
03 23 41 39 CMP Okay, would you verify that your hatch is closed and your vent valve in AUTO.
Tell him yes.

That's verified, Ken.

All right, sir.

Okay. SUIT GAS DIVERTER, PULL-EGRESS. CABIN GAS RETURN to EGRESS.

Here, let me read that to you, Charlie.

Okay.

Okay, SUIT GAS DIVERTER to PULL-EGRESS.

Go ahead.

CABIN GAS RETURN to EGRESS.

Go ahead.

SUIT CIRCUIT RELIEF to CLOSE.

Go ahead.

PRESS REG A to EGRESS.

Well, wait a minute, we got a - Okay. Go ahead. Go ahead.

Okay, PRESS REG B, DIRECT O₂.

Well, we got to get our helmets and gloves on first.

Oh, okay.

Charlie, I can't see what I'm doing.

Okay, I'm buttoned up.

Okay. Me - me - me, too, almost. Okay.

SUIT GAS DIVERTER to - to EGRESS.

Okay, I'm down to the PRESS REG B to DIRECT O₂.

PRESS REG B to DIRECT O₂.
Okay.

Monitor cuff gage to 3.7 to 4.0.

Okay, here we go.

Boy, it takes forever, doesn't it?

Yep.

How are your ears?

Fine.

Good; mine, too.

And, Orion; I understand you're complete with your rendezvous and ... transponder check ...

That's affirmative, Ken.

What do you have to do on this RCS?

We're okay now. We'll use RCS B for a little while.

Okay.

Okay. I'm going to CABIN-EGRESS.

Okay. Should you have system B shutoff valve closed?

Right now we do. I'm going to turn it on in a minute. But let's go - Okay.

Okay. PRESS REG - REG - REG B to - to DIRECT O₂.

I got that.

It says, PRESS REG B to EGRESS. Monitor cuff gage to - Are you at EGRESS?

Yeah.

Okay. Shouldn't be less than 0.3 in a minute.

Okay, we've been there.
03 23 46 02 CDR  Looks good to me, Charlie.
03 23 46 03 LMP  Okay, it looks good to me. I'm going SECONDARY CANISTER.
03 23 46 06 CDR  Okay.
03 23 46 08 LMP  Should have an O₂ light. We do.
03 23 46 11 CDR  Pressure dropped a little.
03 23 46 12 LMP  Okay. The loop was evacuated.
03 23 46 14 CDR  Yeah.
03 23 46 15 LMP  Then check it for a minute.
03 23 46 18 CDR  Okay.
03 23 46 32 LMP  Rock solid.
03 23 46 33 CDR  Yeah.
03 23 46 35 LMP  Okay, what's next?
03 23 46 36 CDR  Okay. CO₂ select to PRIMARY. CO₂ light goes off.
03 23 46 43 LMP  Go ahead.
03 23 46 45 CDR  SUIT CIRCUIT RELIEF to AUTO.
03 23 46 47 LMP  SUIT CIRCUIT RELIEF going AUTO. We'll start back down.
03 23 46 49 CDR  PRESS REG A and B to CABIN.
03 23 46 50 LMP  Going to CABIN.
03 23 46 55 CDR  CABIN GAS RETURN to AUTO.
03 23 46 57 LMP  CABIN GAS RETURN is in AUTO.
03 23 46 59 CDR  SUIT GAS DIVERTER to PUSH-CABIN. That'll really get us down.
03 23 47 02 LMP  Is that what it says?
Yeah.

Okay, here we go. How do you read?

Fine.

Man, it really brought us down, didn't it?

Yeah. I think that was a little too fast, Charlie. My ear didn't clear.

Sorry. Let's go back. What else does it say to do?

It's clear now.

Okay.

Okay, it says, "Rate gyro test." Suit circuit - Well, wait a minute.

Okay, we're down through there.

Yeah, okay --

... diverter ...

Turn the page. That's a regulator --

Regulator check.

Okay. I'm going to go to PUSH-CABIN. I don't understand that noise, but --

Well, the suit depresses around you, see?

Yeah, uh-huh, okay.

Verify CSM tunnel hatch, pressure equalization valve, and tunnel vent valves closed and tunnel vented. The fact is, we're getting no flow.

I know it. Okay. Hey, Ken. Is the tunnel vented yet?
03 23 48 22 CMP  It's venting.

03 23 48 23 LMP  Okay. We're ready for our regulator check right now, when you get a - if you'll give us a GO on that tunnel vent.

03 23 48 29 CMP  Okay. I've got about a half psi to go before I can get - let you have it.

03 23 48 35 LMP  Check. Okay.

03 23 48 58 LMP  That's crazy. We don't get any flow that way.

03 23 49 05 CDR  Well, maybe we're supposed to take our helmets and gloves off.

03 23 49 08 LMP  Doesn't say that. Okay, while we're waiting, let's check this state vector.

03 23 49 15 CDR  Yeah, okay.

03 23 49 16 LMP  Okay, where's the G&N Checklist? Did you - we put it back up? I did, I think. Yeah, here it is.

03 23 49 26 CDR  Could you check the other vector, too?

03 23 49 29 IMP  Yeah.

03 23 49 40 LMP  1-26; I knew there was some page in there somewhere where you could go.

03 23 49 52 LMP  Okay, VERB 01 NOUN 01 ENTER. 17 - 1173 ENTER. 21 ENTER.

03 23 50 06 CDR  It's already there.

03 23 50 07 LMP  Okay, NOUN 15 ENTER.

03 23 50 15 CDR  Okay, should be - -

03 23 50 16 LMP  Read them out to me.

03 23 50 17 CDR  - - 01501.

03 23 50 19 LMP  Go. ENTER.

03 23 50 21 CDR  77775.
Page 2-12

Day 4

03 23 50 22 LMP Go.
03 23 50 23 CDR 77776.
03 23 50 24 LMP Go.
03 23 50 25 CDR 57602.
03 23 50 26 LMP Go.
03 23 50 27 CDR 00301.
03 23 50 28 LMP Go.
03 23 50 29 CDR 37450.
03 23 50 31 LMP Go.
03 23 50 32 CDR 00155.
03 23 50 34 LMP Go.
03 23 50 35 CDR 20621.
03 23 50 36 LMP Go.
03 23 50 38 CDR 20111.
03 23 50 40 LMP Go.
03 23 50 41 CDR 31450.
03 23 50 43 LMP Go.
03 23 50 44 CDR 00662.
03 23 50 45 LMP Go.
03 23 50 46 CDR 17260.
03 23 50 48 LMP Go.
03 23 50 49 CDR 76004.
03 23 50 50 LMP Go.
03 23 50 52 CDR 55226.
03 23 50 53 LMP Go.
03 23 50 54 CDR 04076.
03 23 50 55 LMP Go.
03 23 50 56 CDR 17120.
03 23 50 57 LMP Go.
03 23 50 58 CMP I got us about 22-1/2 minutes from undocking, and I'm at 3 psi, looking in the tunnel. Let's wait another minute to get it bled down.
03 23 51 11 LMP Answer him, John.
03 23 51 14 CDR Okay, Ken. That's fine.
03 23 51 19 LMP Let's see what happens here.
03 23 51 22 CMP You guys got any problems over there?
03 23 51 26 CDR Yeah, we can't get our COMPUTER ACTIVITY light to go out. See, it's integrating somewhere. I wonder if it's a - if it's a LM state - CSM state vector. That's what it is - I got the idea.
03 23 51 40 LMP What?
03 23 51 41 CDR How do you transfer the - -
03 23 51 44 CMP Wouldn't you - if we do not undock until the ...
03 23 51 47 CDR No, we undock.
03 23 51 50 LMP Oh, no, we're ready to go.
03 23 51 51 CMP Okay.
03 23 51 52 LMP We just don't have your state vector in, and that's - that's our problem. It's not - it's having trouble bringing your state vector up.
03 23 51 58 CDR I know what we should do. We should do a VERB 66.
03 23 52 00 CMP Okay.
03 23 52 03 CDR Well, well, wait. Let me look and see if that's what we should do.

03 23 52 06 LMP I'm not sure you can do a VERB 66.

03 23 52 07 CDR I'm not sure you can in here, but they do it in P27.

03 23 52 12 LMP John?

03 23 52 13 CDR Huh?

03 23 52 14 LMP Let me read the book, okay?

03 23 52 15 CDR Okay. I can't - Just look where the verbs are, Charlie.

03 23 52 23 LMP That's what I'm going to do. That's nouns.

03 23 52 36 CMP Okay, I'm doing a routine check on the tunnel.

03 23 52 39 LMP Okay, that's - that's what we need - need.

03 23 52 40 CDR See that? Let's try it.

03 23 52 43 LMP Okay, doing a VERB 96.

03 23 52 45 CMP The ... valve checks.

03 23 52 48 LMP Okay. No, wait a minu --

03 23 52 52 CMP I'll make this one a 1-minute check.

03 23 52 53 LMP John, you should've done a VERB 96 and stopped that integration first. Okay, now VERB 66. Now call POO.

03 23 53 16 CDR That didn't fix it.

03 23 53 18 LMP That takes awhile. See? Good, we got it.

03 23 53 24 CDR Okay.

03 23 53 25 LMP PRO. Okay, let's look at POO now.

03 23 53 30 CDR We're looking at it.
Okay, we fixed it. Okay, what we need to do is get Ken's state vector.

Well, Ken's state vector is the same as ours, Charlie.

How about that? (Laughter) Better be. (Laughter)

Yeah.

(Laughter) Sorry about that.

That's why that's an - I knew that's what it was. What is this pressure you've got to keep lower than, Charlie? Explain that to me.

Okay. I've opened the tunnel vent, and I'm gonna bring my roll engines on, and you're clear to check your relief valve.

Okay.

Okay. Okay, John. Turn the page.

Hey, I'll read it to you, Charlie.

Regulator check. Here we go. Okay, starting with cabin repress.

CABIN REPRESS valve to MANUAL. Verify flow, then AUTO.

Okay, go ahead.

Verify overhead cabin dump valve to AUTO.

Go.

Circuit breaker 16, ECS, CABIN REPRESS to open.

Okay, go.

PRESS REG A and B to EGRESS.

Go.

SUIT GAS DIVERTER to EGRESS.
03 23 54 52  LMP  Go.
03 23 54 53  CDR  CABIN GAS RETURN to EGRESS.
03 23 54 54  LMP  Go.
03 23 54 55  CDR  Forward cabin dump valve, OPEN, then AUTO at 4-1/2.
03 23 54 59  LMP  Okay.
03 23 55 00  CDR  Want me to get it?
03 23 55 01  LMP  No, I'll get it. Okay, here we go. And it's going down.
03 23 55 11  CDR  Okay, AUTO at 4-1/2.
03 23 55 12  LMP  Okay, it is.
03 23 55 15  CDR  AUTO at 4-1/2. SUIT CIRCUIT RELIEF to OPEN.
03 23 55 18  LMP  Okay.
03 23 55 19  CDR  Verify suit pressure at 4-1/2, then CLOSE.
03 23 55 26  LMP  It is, CLOSE.
03 23 55 28  CDR  CLOSE. PRESS REG A to CABIN. Verify suit pressure —
03 23 55 30  LMP  Okay, PRESS REG A's coming to CABIN.
03 23 55 34  CDR  Comes up; it's rising, Charlie.
03 23 55 38  LMP  It is.
03 23 55 39  CDR  Right. Then it says, PRESS REG B to - PRESS REG A to EGRESS.
03 23 55 41  LMP  Okay, go.
03 23 55 42  CDR  SUIT CIRCUIT RELIEF to OPEN.
03 23 55 44  LMP  To OPEN? Okay, go.
03 23 55 46  CDR  SUIT CIRCUIT RELIEF, OPEN. Suit pressure goes to 4-1/2.
Okay.
Then it says, CLOSE.
CLOSE, okay.
PRESS REG B to CABIN.
Okay, go.
Verify suit pressure rises, 4.6 to 5. It is.
It is. Go ahead.
Okay. SUIT CIRCUIT RELIEF to AUTO.
Go ahead.
CABIN GAS RETURN to AUTO.
CABIN GAS RETURN to AUTO. Go ahead.
PRESS REG A to CABIN.
Okay.
SUIT GAS DIVERTER to PUSH-CABIN.
Okay. We don't get any flow when we do that.
No, do you know why?
Why?
I got - have I got my hoses right?
Yeah, you got your hoses right. This thing is leaking like a sieve.
What's that?
My helmet's full of water.
Oh.
Okay, Orion. I'm going to maneuver to the undocking attitude.
03 23 56 50 CDR Okay, go to it.
03 23 56 55 LMP Okay, John. What's next? Do the rate gyro check for me.
03 23 56 59 CDR Can't do it while he's maneuvering.
03 23 57 00 LMP Oh, yeah.
03 23 57 13 CDR Man, look at that Moon. We're going to have to get a rag to wipe this thing off with.
03 23 57 20 LMP There's some towels in your -
03 23 57 22 CDR Here.
03 23 58 06 CDR Here you go, Charlie.
03 23 58 08 LMP Okay, just a minute. This thing, I can't get - keep - stay rolled up.
03 23 58 23 CDR There we go. Here you go, Charlie.
03 23 58 25 LMP Just a minute. Okay, give it to me.
03 23 58 43 LMP Okay, John. Here you go.
03 23 58 45 CDR Okay.
03 23 59 05 CDR We don't unsuit until after undocking?
03 23 59 06 LMP Yeah.
03 23 59 07 CDR Is that what it is?
03 23 59 08 LMP Yeah.
03 23 59 09 CDR Oh. When is the undocking?
03 23 59 15 LMP In about 13 minutes.
03 23 59 18 CDR Okay.
03 23 59 28 LMP Can you get the tape out for me, John? I can't get this thing to stay in down here.
03 23 59 38  CDR  I can't either, Charlie.
03 23 59 57  CDR  We were on DOWN VOICE BACKUP that whole time?
03 23 59 59  IMP  Yeah, uh-huh.
04 00 00 00  CDR  Oh, boy.
04 00 00 01  LMP  Oh, boy is right. I had a couple of dadgummmits. Okay, John. Let's go. We got some stuff to do here before undocking. ATTITUDE MONITOR, LMP, to PGNS. It is. RENDEZVOUS RADAR MODE to SLEW.
04 00 00 16  CDR  It is.
04 00 00 17  LMP  DEAD BAND, MIN.
04 00 00 18  CDR  MIN.
04 00 00 19  LMP  ATTITUDE CONTROL, three, to MODE CONTROL.
04 00 00 20  CDR  MODE CONTROL.
04 00 00 21  LMP  MODE CONTROL, both, ATT HOLD.
04 00 00 22  CDR  ATT HOLD.
04 00 00 23  LMP  TTCA, both, to jets.
04 00 00 24  CDR  Jets.
04 00 00 25  LMP/CDR  Okay.
04 00 00 29  LMP  BALANCE COUPLE - Okay, RATE/ERROR MONITOR, LANDING RADAR/COMPUTER.
04 00 00 33  CDR  LANDING RADAR/COMPUTER.
04 00 00 42  LMP  Okay, ATTITUDE MONITOR, PGNS. GUIDANCE CONTROL, PGNS. Okay?
04 00 00 46  CDR  ATT - GUIDANCE CONTROL is PGNS.
04 00 00 52  LMP  Okay. MODE SELECT, LANDING RADAR.
04 00 00 54  CDR  LANDING RADAR.
04 00 00 55  LMP  RANGE/ALTITUDE MONITOR, RANGE/RANGE RATE.
04 00 00 57  CDR  Go.
04 00 00 59  LMP  RATE SCALE, 5 DEGREES A SECOND.
04 00 01 00 CDR  RATE SCALE, 5 DEGREES A SECOND.
04 00 01 02 LMP  ATT/TRANSLATION of 4 JETS.
04 00 01 04 CDR  4 JETS.
04 00 01 05 LMP  BALANCE COUPLE, ON.
04 00 01 06 CDR  BALANCE COUPLES are ON.
04 00 01 07 LMP  Okay, my monitor. Okay, I got to mount the camera. Don't believe we're going to be able to see anything, though.
04 00 01 13 CDR  Yeah, well, don't worry about that.
04 00 01 14 LMP  All fogged up. How about turning the window heater on? Want to try a window heater?
04 00 01 19 CDR  Want to try yours for a second?
04 00 01 21 LMP  Yeah, let's see what happens.
04 00 01 22 CDR  You don't want to leave it on too long, Charlie. So don't forget.
04 00 01 26 LMP  Okay. Okay, I'm going to open system B, so we'll have two jets, two -
04 00 01 35 CDR  Okay, Charlie. Okay, Ken. Are you in undocking attitude now?
04 00 01 39 CMP  That's affirmative; 12 minutes.
04 00 01 42 CDR  Okay.
04 00 01 52 CDR  Okay, Ken. Give me a VERB 06 COU N 20 on my mark.
04 00 01 53 CMP  Okay, ...
04 00 02 06 CMP  Okay, say when.
04 00 02 07 CDR  3, 2, 1 -
04 00 02 08 CDR  MARK it; 96:02:07.
04 00 02 09 CMP  ... Let's do it again.
04 00 02 13 CDR  Okay.  VERB 06 NOUN 20; 3, 2, 1 -
04 00 02 23 CDR  MARK.
04 00 02 24 LMP  96 -
04 00 02 25 CMP  ... plus -
04 00 02 26 CDR  96:02:23.
04 00 02 29 LMP  What?  Hold on, Ken.
04 00 02 30 CMP  -- 56, plus 000.45 --
04 00 02 36 LMP  Tell him to start over again.
04 00 02 41 CDR  Okay, that was at 96:02:23, Charlie.
04 00 02 45 LMP  Yeah --
04 00 02 46 CDR  Read the numbers again, Ken.
04 00 02 47 CMP  Plus 000.04, plus 105.56, plus 000.45.
04 00 02 58 CDR  Copy.
04 00 03 01 LMP  Okay.  Copy four balls 4, 105.56 three balls 45.
04 00 03 02 CMP  That's affirmative.
04 00 03 04 LMP  296.03 - 03, 28 --
04 00 03 10 CDR/LMP  5.63.
04 00 03 12 CDR  359.51.
04 00 03 18 LMP  359.51.  Okay.
04 00 03 57 CDR  How much fuel can we transfer into the ascent tanks before it becomes too full to fly?
04 00 04 01 LMP  Well, it's the pressure I think that - that they're worried about - on the ascent tanks.
Okay. This thing may make a small trim maneuver. Looks like it should be less than half a degree. Unless you'd just leave it alone with the ... Either way.

Okay. It's up to you.

Okay, let's leave it as is.

Okay, Charlie. The tape is going back in.

Well, I never did get to use it, but that's okay. Go ahead.

Okay. What else we got to check here?

Wait a minute, wait a minute. Okay, go ahead.

Just get the book.

Yeah. What's my f-stop for the 16?

Be easy to find. There's LM3/DAC/10/CEN [sic] - ULC.

Okay.

Mount Timeline Book. It's time. Okay, checklist ... check attitude. VERB - VERB 48 ENTER. 21 ENTER. 22012 ENTER. PRO. We got the right weight, huh?

Yeah. What's the DAC should be - I mean, there's Hasselblad/DC/60/HEX-A, (f/11, 250, focus).

Okay. Configure circuit breakers per unlocking chart, ... --

Okay. Go ahead, and I'll get the camera out.

Nothing like a helmet full of water.

Is it full, Charlie?

Just about.
Here's your ..., Charlie. Wait a minute. Let me check to be sure.

John, that window heater's working.

Where's your book?

I don't know.

Charlie, I'm going to pull it open. I don't think we're supposed to leave them run too long.

It's okay.

It worked, huh?

Yeah, it's working. Please close it. Then, up in the - you can just let it close - just a few more minutes, it'll be fine. Okay, why don't you open yours?

I did.

I mean close yours.

I did.

Okay.

John, can you see - is my thing leaking right now?

I can't tell, Charlie. Doesn't look like it. Is it leaking?

My whole helmet's full of water. I mean my whole comm carrier. My hair is soaked.

You're kidding.

Huh-uh.

Well, it leaks every time you put your - your thing up against it, that's for sure.

Is it leaking now?

Yeah. Every time you put it up against there, it leaks.
Like that, huh?

Yeah. That makes it squirt out.

Okay. That's what's happening.

You never had that happen to you before?

Yeah, but -

It never bothered you in one g.

Yeah. Never bothered me in one g.

Okay. Now what's undocking time?

96:13, about 4 minutes.

Okay, Ken. How much to undocking?

Three minutes and a half.

Okay. It's gonna undock at 96:13 even?

96:13.31.

Okay.

We'll stow the Activation Checklist - Oh, I can't. Harnesses are too tight. Do that later.

Are we through with the undocking - through the activation books, Charlie? I didn't do the rate gyro test.

Are we in attitude now?

Yeah.

Okay, let's go through this little one.

Okay.

It looks good to me.

Plus or minus 5 - 25 over there? No, that - that one.
04 00 10 59   CDR   That's got it.

04 00 11 04   LMP   Okay, it's got it. Let's see, are you hit - does your mike hit your valve? Let me see. Turn around towards me.

04 00 11 13   CDR   When it does, I get squirted.

04 00 11 14   LMP   You do?

04 00 11 15   CDR   Yeah. I had to really be careful.

04 00 11 26   LMP   Okay, check attitude. The VERB 48.

04 00 11 30   CDR   I did that.

04 00 11 32   LMP   Okay, LM weight we got.

04 00 11 33   CDR   You got it.

04 00 11 34   LMP   Okay, we got the angles.

04 00 11 35   CDR   I got the angles.

04 00 11 36   LMP   Okay. We can call -

04 00 11 37   CDR   All we need to do is call P47.

04 00 11 38   LMP   -- P47. Okay, you can close my window heater - open my window heater. It's clear now. Beautiful. Is yours closed, John?

04 00 11 48   CDR   Yeah.

04 00 11 49   LMP   Okay. It'll clear it off in a little bit. Takes about 10 minutes or so.

04 00 12 01   LMP   John, I'm going to have to pull this water bag out of here, I think.

04 00 12 04   CDR   Yeah.

04 00 12 05   LMP   I'm - I'm soaked.

04 00 12 20   CDR   Okay.

04 00 12 24   CMP   Okay, can you read me on VOX, Orion?
Loud and clear, Ken.
Orion, do you read on VOX?
Loud and clear, Ken.
We're reading you 5 by.
Okay. We're inside of a minute.
Roger. We got P47 coming up.
Understand. You're still GO.
We're still GO. P47's up.
If you're on VOX, you're clipping pretty badly, too.
We are not on VOX.
We're not on VOX, Ken. Okay, go ahead and undock whenever you want to, and then go ahead and separate.
Okay.
We're coming up. I'll give you a countdown to the release: 5, 4, 3, 2, 1 -
RELEASE.
Hey.
We didn't go very far. (Laughter) Okay. I'll let it sit here for a second. Okay, we're gonna back off now.
Very good.
Is he going?
Yeah.
Didn't get anything out of it.
Right on time to the second. This thing is a dream.
04 00 14 10  LMP  Okay, John. P00. I got a - I give you VERB 60.

04 00 14 15  CMP  I see you rolling, or yawing, as you guys do it. I see one, two, ought to see four ... Haven't seen them yet.

04 00 14 34  LMP  Okay, you can close - Okay. How's your window looking, John?

04 00 14 39  CDR  Looks great.

04 00 14 40  LMP  Okay, beautiful. Okay, camera's coming on.

04 00 14 45  CDR  Sequence camera ...

04 00 14 50  CMP  I can see three ... loud and clear. And looks like that one banner up there that we were watching shred is the only one that I see that is shredded. The rest of it's all intact.

04 00 15 05  LMP  Okay. Great, Ker. Man, it's great! Boy, when we fire the RCS, it really shakes the whole stack.

04 00 15 21  CMP  Oh, not any more!

04 00 15 24  LMP  Hey, you're beautiful, babe! You're just beautiful!

04 00 15 31  CMP  Yes, indeed. You sure look good.

04 00 15 34  LMP  Okay, all your booms are in.

04 00 15 41  CMP  I see full view. You've got three ... down. Your ... valve's clean ... clean ... still hanging on. What more can you ask for?

04 00 15 57  LMP  You can - you can see your RCS spitting at us.

04 00 16 00  CMP  Yeah, yours is doing the same.

04 00 16 06  CDR  Okay, Charlie. Helmet and gloves off.

04 00 16 19  CDR  Have we got Houston, yet? We ought to have them right now.

04 00 16 22  LMP  Not yet.
04 00 16 23 CDR  Okay, let's go through this sequence.

04 00 16 24 LMP  Okay, I got enough pictures here.

04 00 16 25 CDR  Yeah.

04 00 16 26 LMP  That's ten.

04 00 16 31 CDR  Boy, Ken, you look great!

04 00 16 32 CMP  Well --

04 00 16 33 LMP  You really got a pretty spacecraft!

04 00 16 34 CMP  Yours is a ... pretty one, too.

04 00 16 38 LMP  Okay, John. Helmets - and cameras to off, VHF ANTENNA is FORWARD --

04 00 16 46 CMP  It'll look even better without your ... peeking down underneath.

04 00 16 53 LMP  Sequence camera. Okay, suit gas diverter. Okay, let's get helmets and gloves off.

04 00 16 57 CDR  Okay.

04 00 17 06 CC  Orion, this is Houston. How do you read?

04 00 17 08 LMP  Roger. You're 5 by, Jim, and we're sailing free.

04 00 17 22 LMP  Okay, Jim. It was a little rushed, but we got it done. The only thing bad is, I got a hat full of orange juice.

04 00 17 34 CC  Okay, we copy, and we'd like you to go through another procedure here to get the S-band locked up if you're ...

04 00 17 41 LMP  Tell him to stan - stand by 1.

04 00 17 44 CDR  Stand by 1, Jim.

04 00 17 45 LMP  Okay, we're on hot mike still, John. VHF B DATA is ON. Okay, tell him go ahead.
Okay, Jim; go ahead.

Roger. We wanted to - you to put the steerable at PITCH, minus 75, and YAW at minus 12. In other words, the stowed position. So TRACK MODE, SLEW, wait 30 seconds, and then go PITCH of plus 63, YAW of minus 32, and antenna S-BAND to SLEW, and proceed with normal acquisition.

Okay, we copy. Hey, Ken.

And, Orion; this is Houston. We're --

Go ahead, Orion.

Okay, look up over my - our right side, and look at that antenna, the - the steerable, and see how it - it's moving. I'm going to move it in pitch, then in yaw. Over.

Okay. On your right side. Okay, I got it, and it's moving in - looks like a combination now. It's moving, though; it's oscillating at this time.

Okay, it should be stable --

Orion, this is Houston. We'd like to --

Now it's steady.

-- find out what your RCS configuration is at the present time.

Okay, Jim, we've got --

SYSTEM A and B are OPEN, CROSSFEED is CLOSE, and the - the ASCENT FEEDS are terminated.

We'd like for you to use SYSTEM A just as long as possible. Over.

Okay. SYSTEM A is - SYSTEM A is - is now OPEN, and the CROSSFEED is OPEN, and SYSTEM B is CLOSED.

And, Orion; have you loaded the AGS abort constants yet?
04 00 20 14 LMP  Negative. We don't have —
04 00 20 15 CDR  That's negative. Over.
04 00 20 18 LMP  We don't have the AGS — we don't have the AGS up yet, Jim.
04 00 20 20 CC  Okay, understand negative.
04 00 20 21 LMP  That's affirmative.
04 00 20 23 CC  ... because when you do load those constants, we want you to load nominal values from the data card.
04 00 20 30 LMP  Okay.
04 00 20 32 CDR  STABILIZATION/CONTROL, ENGINE ARM, closed. Okay, we're going ahead with the DPS throttle check, Jim.
04 00 20 45 LMP  Okay, you do that while I get the —
04 00 20 46 CDR  Okay.
04 00 20 47 CC  And if this S-band procedure doesn't work for us, we're going to ask you to maneuver to an FDAI attitude, where the - the yaw angle will not have to change, and we'll see if we can lock up in that attitude.
04 00 20 59 CDR  Roger; understand. Okay, DPS throttle check. What you got to do, Charlie - You are all wet. Here, get the thing back away from you.
04 00 21 11 LMP  I'm —
04 00 21 12 CDR  I got - I got it now.
04 00 21 19 LMP  Now, give - why don't you get me - get me a towel here.
04 00 21 26 CDR  Okay. Charlie?
04 00 21 36 CDR  ENGINE ARM to close.
04 00 21 39 LMP  Okay, Houston. Houston, how do you read on the steerable?
04 00 21 43  CDR  Give the ENGINE ARM.
04 00 21 47  LMP  Do what?
04 00 21 48  CDR  ENGINE ARM breaker - there you go.
04 00 21 50  LMP  Got it. Okay, Houston. Back on the AFT omni. How do you read?
04 00 21 59  CDR  ENGINE ARM to DESCENT.
04 00 22 06  LMP  Houston, on the AFT omni. How do you read?
04 00 22 09  CDR  DESCENT REG light is on. TTCAs to min --
04 00 22 10  CC  Orion, this is Houston. We'd like you to proceed now with this attitude maneuver, and I'll give you the FDAI angles and the steerable angles.
04 00 22 21  LMP  Go ahead.
04 00 22 25  CC  Okay, FDAI is ROLL, 000; PITCH, 053; and YAW, 000. And the steerable angles: PITCH, plus 26; YAW, minus 12. Over.
04 00 22 42  LMP  Copy. 000, 053, 000; PITCH, 26; YAW, minus 12.
04 00 22 55  LMP  Okay, John.
04 00 22 57  CDR  Try them again.
04 00 22 58  LMP  Okay.
04 00 22 59  CDR  Okay, Houston, we're running through the DPS throttle check. I got 12, 51, and 100. Charlie's got 13, 51, and 100.
04 00 23 16  LMP  Feels good. Looks bad. Darn thing.
04 00 23 30  CDR  ENGINE ARM is OFF.
04 00 23 31  LMP  Okay, Jim --
04 00 23 32  CDR  Cycle the CWEA --
04 00 23 33  LMP  Wait - wait a minute.
04 00 23 34 CDR
--- DESCENT. Eng stop, reset.

04 00 23 37 CC
Orion, the DPS throttle check looks good.

04 00 23 40 LMP
Okay, Jim, I have some NOUN 20s for you, if you're ready to copy.

04 00 23 43 CDR
... AUTO and CDR. TTCAs, both, to JETs, Charlie. Get yours to JET.

04 00 23 54 CC
Okay, go ahead on the NOUN 20s.

04 00 23 56 LMP
Okay; for the lunar module, Ori - Orion. We've got plus 296.03, plus 285.63, plus 359.51. For the command module, Casper, plus 000.04, plus 105.56 - -

04 00 24 23 CC
Orion, go FORWARD omni.

04 00 24 26 CDR
I get a 75.

04 00 24 28 LMP
How do you read FORWARD omni? You got a - Start your pitch maneuver, John.

04 00 24 35 CDR
To where?

04 00 24 40 LMP
Okay, to 053.

04 00 24 50 LMP
Okay, Jim. How do you read now?

04 00 24 56 CC
There's still excessive noise down here. Give me the command module numbers again.

04 00 25 08 LMP
Okay, we're - How do you read now? We're in a FORWARD omni.

04 00 25 20 CC
I can just barely read you, Charlie.

04 00 25 26 LMP
Okay, we'll read you out - on the NOUN 20s for the command module. Plus four balls 4, plus 105.56, plus 000.45. That time was at 96:02:20. Over. Okay, we there?

04 00 25 58 CDR
No. What do you want? 05 -
CC Orion, this is Houston. We hope you're about in attitude. We would like you to go through an acquisition here.

LMP Okay, we're in attitude and we're going to give you the steerable.

CDR Give me a shot of cold water, Charlie.


CC Charlie, I just barely read you on the FORWARD omni.

LMP Okay.

CDR You're loud and clear down there, Jim.

LMP Be advised, Houston, that when I select - I've got the angles set in: a plus 26; YAW, minus 12. We are in attitude, and when I select S-BAND to SLEW, the signal strength just slowly drifts off. Over.

CC Orion, this is Houston. Select PRIMARY TRANSMITTER/RECEIVER.

CDR 000, 53, huh, Charlie?

LMP Yeah.

CDR Okay.
04 00 28 37 LMP Okay, Jim. How do you read on the PRIMARY TRANSCEIVER?

04 00 28 40 CDR Okay, Houston. Can we go through the DPS throttle check now?

04 00 28 46 LMP Just did that.

04 00 28 48 CDR I mean the DPS pressurization check.

04 00 29 05 LMP Let's let it warm up, John.

04 00 29 11 LMP Okay, Houston. How do you read? Over.

04 00 29 22 LMP Okay, Houston. How do you read on the PRIMARY TRANSCEIVER?

04 00 29 25 CC Orion, this is Houston. How do you read?

04 00 29 27 LMP Loud ... - -

04 00 29 28 CDR Loud and clear. You're loud and - -

04 00 29 36 CC ... just barely hear you, and I have a landing site TCA for you if you're ready to copy.

04 00 29 37 CDR Roger. Can we now do the DPS pressurization checkout? Over.

04 00 29 55 CC Okay, we're ready for DPS press.

04 00 29 56 CDR Okay.

04 00 29 57 LMP And you go ahead with the - with the TCA, Jim.

04 00 30 20 LMP Okay, here we go. PROP TEMP/PRESS MONITOR, DESCENT 1 - -

04 00 30 23 CDR 1.

04 00 30 24 LMP - - DESCENT.

04 00 30 25 CDR Yeah, I checked all that, Charlie.

04 00 30 26 LMP Okay.

04 00 30 27 CDR I'm down to right there.
04 00 30 28 LMP Okay. MASTER ARM, ON.
04 00 30 30 CDR Talkback 1, MASTER ARM's ON. Okay.
04 00 30 35 LMP Okay, you should have two lights.
04 00 30 36 CDR Two lights.
04 00 30 37 LMP Okay.
04 00 30 38 CDR MASTER ARM's ON. Two lights, Houston.
04 00 30 39 LMP DESCENT PROPELLANT ISOL VALVE, FIRE.
04 00 30 42 CDR Okay. The PROP ISOL VALVE is going to FIRE ...
04 00 30 47 LMP HELIUM PRESS DESCENT START, FIRE.
04 00 30 49 CDR HELIUM PRESS DESCENT START is going to FIRE.
04 00 30 50 CC ..., Houston. Go DOWN VOICE BACKUP. Over.
04 00 30 53 LMP We are in DOWN VOICE BACKUP, Jim. Okay, FIRE.
04 00 30 55 CDR Okay. The DPS is pressurizing.
04 00 30 56 LMP 200 to 250, it should be.
04 00 30 57 CDR Okay. It did pressurize, 245 to 245. And the AMBIENT PRESS is 410, the SUPERCIT PRESS is 1170.
04 00 31 15 LMP Good.
04 00 31 19 CDR 1160.
04 00 31 20 LMP Okay.
04 00 31 21 CDR Okay, the AMBIENT PRESS is down to 390.
04 00 31 23 LMP MASTER ARM, OFF. Did you get that?
04 00 31 24 CDR MASTER ARM is OFF. Two lights off.
04 00 31 28 LMP Okay, I'll get the AGS activation here. Let's just leave this down there so we can both see it. Okay, will you wipe out my helmet, please?

CONFIDENTIAL
Yeah, sure will, Charlie. (Laughter) Tell you one thing Charlie's not going to get up here, and that's scurvy.

Orion, BIOMED switch, OFF.

The BIOMED is OFF, Jim.

I've drifted off in attitude.

That's okay.

Orion, the DPS pressurization checkout looks good.

Looks good to us. What is that?

That's the AOT - that's the filter out of here.

Oh, okay.

The polarizing coll --

Yeah, that's what it is.

Okay, Jim, could you give us our TCA landing site? Okay, AC BUS B, AGS, closed.

Okay, the AGS breaker's going closed, Charlie.

96, 32, 28.

Okay, I want to pull the HEATER circuit breaker --

Okay, yeah, that's good.

-- the ones that's cleared up.

Okay, Orion. The landing site TCA is 96:46:07. Over.

Roger; 96:46:07.

AGS STATUS to OPERATE, MASTER ALARM AGS light.

Okay, Charlie, I'm going to do the landing radar checkout, too.
Okay. AGS.

Need a time first?

Yeah. Okay, and I'll set AGS time, 377. Okay, 90 hours have 6; that's 360, 393, 5.

393 5, Charlie.

Mm-hmm.

MARK it.

It looks good to me. Okay, I want to go over this landing radar checkout. LANDING RADAR breaker's in.

Okay.

TRANSPONTERS to HI MULT; mode select to LANDING RADAR; H/H-dot; LANDING ANTENNA to AUTO. You bet. RADAR TEST to LANDING.

There we go. Got them.

Go to LANDING. RADAR TEST to LANDING; power signal light, out.

Okay, Jim; Houston on the steerable, I mean - Listen at me - Orion on the steerable. How do you read? Over.

Orion, we read you much better.

Okay, it worked that time, Jim. We got a 4.2 signal strength and the steerable is working. I'm in TRACK MODE, AUTO.

Very good. I have some words for you on the RCS.

Okay, go ahead.

Left.

Let's go normal configuration on your RCS and then we want you to transfer 3 percent more out of system A because we see the pressure going up on A.
04 00 34 51 LMP  Okay, transferring.

04 00 34 55 CC   And the caution, of course, not more than 180 on the APS.

04 00 35 04 CDR  Okay, the landing radar H-dot is only reading minus 17 right now. The 8000 works okay.

04 00 35 17 CDR  Okay, that looks good.

04 00 35 26 CC   Orion, will you give us HI bit rate, please.

04 00 35 35 LMP  Okay, you got HI bit rate - you got HI bit rate; BIOMED is LEFT. Jim, could we try a pitch maneuver back to the landing-site viewing attitude, so we'll see if this thing tracks?

04 00 35 49 CC   Stand by 1.

04 00 35 51 CDR  Okay, now that's not reading the right numbers here.

04 00 35 53 CC   Okay, just hold it 1. We want to get our up-links in and then you can try that maneuver.

04 00 36 01 LMP  Okay. What do you mean?

04 00 36 09 CDR  See?

04 00 36 13 CC   Okay, Orion, let's go POO and DATA, and we'll send you an up-link.

04 00 36 20 CDR  Let's ...

04 00 36 27 LMP  Okay, you've got POO and DATA. Okay, we're off hot mike now.

04 00 36 32 CDR  Okay, Houston, the landing radar test is not working properly.

04 00 36 39 CC   Okay, what's the problem, John?

04 00 36 44 CDR  Well, it's not reading the right numbers in altitude rate and it's not reading the right numbers in VERB 63. The ALTITUDE TRANSMITTER is 3.2, and the VELOCITY TRANSMITTER - VELOCITY TRANSMITTER is 3.7.
04 00 37 07  LMP  And, Jim, the AGS is loaded with the data card.
04 00 37 11  CC  ... Orion, Houston.
04 00 37 12  LMP  Go ahead.
04 00 37 13  CC  Okay, we want you to select normal voice.
04 00 37 21  LMP  Okay, you have normal voice, and the AGS is loaded
                  with the - with the data card numbers. Over.
04 00 37 25  CC  Roger; I copied, Charlie.
04 00 37 48  CC  Orion, this is Houston. Are you also showing bad
data on the tape meter for the landing radar?
04 00 37 53  CDR  That's affirmative. The H - altitude is reading
                  right at 8000, but the velocity was only reading
                  15. I'll run it again. Can I run it while P27
                  is in progress? Yeah, I'm sure I can.
04 00 38 14  CC  Stand by on that one.
04 00 38 23  CDR  Kind of a problem. LANDING RADAR to H-dot,
                  RADAR TEST to LANDING.
04 00 38 28  CC  Hold up on that landing radar check until after
                  the - the up-link.
04 00 38 31  CDR  Okay. I'll go off and pull the circuit breaker.
04 00 39 00  LMP  I'd like to pitch that back down so we can see the
                  landing site. Jim, we'd like to start a pitch
                  back down so we could see the landing site.
04 00 39 06  CC  Stand by. We're still getting the up-link.
04 00 39 57  CC  Orion, this is Houston. I have the abort pads
                  whenever y'all are ready.
04 00 40 05  LMP  Okay, stand by. Okay, go ahead.
04 00 40 15  CC  Okay, beginning. No PDI plus 12. 098:47 all
                  zeros; plus 0102.3, plus all zeros, minus 0050.0;
                  0138.0, plus 0011.0, 0113.9; 0:35; all zeros,
                  273; 5927.0; plus 0102.6, plus all zeros,
                  minus 0049.4; 099:35 all zeros; 101:22:15.00.
Day 5

Throttle profile 10 percent for 26 seconds, full throttle for remainder; LM weight, 36673. Over.

04 00 41 19 LMF
Okay, Jim. That was a little bit too fast, but I think I got it all. 098:47:00.00; plus 0102.3, plus all balls, minus 0050.0; 0138.0, plus 0011.0, 0113.9; 0:35, all balls, 273; 5927.0; 0127.60, plus all balls, minus 0049.4; 099:35 all balls; 101:22:15.00. LM - that's throttle profile is 10 percent for 26 seconds then full throttle. LM weight, 36673. Go ahead.

04 00 42 07 CC
Roger. Good readback. Let me just confirm the NOUN 86 DELTA-V_x plus 0102.6, and we're finished with your computer.

04 00 42 18 CDR
Okay, and I'm going into the landing radar check again.

04 00 42 20 CC
... an E-MOD dump for VERB 74.

04 00 42 25 CDR
You have it.

04 00 42 26 LMF
Okay, read that again, Jim. The - the Delta-V_x.

04 00 42 31 CC
DELTA-V_x, NOUN 86, is plus 0102.6.

04 00 42 50 CC
Charlie, I'm ready on the - the PDI pad.

04 00 42 54 LMF
Okay, I was wrong on that. I got it now, 0102.6. And go ahead with the PDI pads.

04 00 42 58 CC
Okay. You ready for PDI?

04 00 43 02 LMF
You speak.

04 00 43 03 CC
Okay, India, 0 - 098:35:04.68; 11:04, plus 0002.6; 002, 114, 340; plus 56997; PDI early, Juliett, 101:22:15.00; Kilo, 103:21 all zeros. Over.

04 00 43 44 LMF
Roger, Jim. Could we start a pitch attitude down to see the landing site?

04 00 43 49 CDR
Are you done with our E-MOD, Jim?
We're finished with the E-MOD dump, but we would just as soon get all these pads up, and we're not concerned about the landing site - down here.

Okay, I --

I didn't think you were.

Okay, fine. I'm down through Kilo, and I'll read back starting at India. 098:35:04.68; 11:04, plus 0002.6; 002, 114, 344; plus 56997; 101:22:15.00; 103:21:00.00. Over.

Okay, that's a good readback, and I have T2 and T3 for you.

Go ahead.

Okay. T2, Lima, 098:59:29.03; 105:19:45.00; T2 at PDI, plus 24 plus 25; and T3, Nectar, 100:42:42.86. Over.

Orion, will you verify AUTO on the steerable?

It is in AUTO. Okay, and reading back starting with Lima, 098:59:29.03; 105:19:45.00; November, 100:42:42.86. Go ahead with the next one. Over.

Okay, we're standing by for the - the landing radar checkout, John; and, of course, Charlie, you go that T2 at PDI at 24 plus 25, and I have an AGS K-factor for you.
Okay, go ahead with the AGS.

Okay, 00090, all zeros, 00111. Over.

Okay, copy 9 - 90, 00, 00111.

Okay - okay, there's the data. It's reading all right in H-dot, but it's changing data in - in the next two registers.

... down here.

And the tapemeter's now - and the tapemeter's now reading 480 opening, and the altitude meter which - first time I did it read 8000, and it's now reading zero.

Okay, Orion. Let's go LO bit rate. We're losing the steerable.

Roger.

Is it tracking?

No. Jim, I don't think it's tracking in yaw.

Get back over here then. Is it losing it?

Little bit.

I saw our landing site, Charlie.

You did?

Yeah.

What did it look like?

It's okay.
Orion, we'll get back to you on the landing radar.

Roger. You can see the data.

Okay.

And, Orion, this is Houston. Just a reminder on -
the load 405 and 406 to plus zero.

Roger.

And we're ready for HI bit rate.

Okay, you have it.

Yep. Okay, I'm going to terminate the landing radar test, if that's okay with y'all.

Roger.

Okay, VERB 47 ENTER.

Orion, Casper. Are you ready for a landing radar VHF ...

Okay. VERB 25.

That's negative. Houston wants them to stay locked on right now.

Roger.

Wait a minute, John. Turn back.

Okay, excuse me, Charlié.

Okay. Got to go HI, ENTER, PRO. Did you wipe out my helmet for me?

Yeah, I did.

Okay, thank you.
04 00 49 29  CDR  Are we still locked up?
04 00 49 30  LMP  Yeah.
04 00 49 45  LMP  Good signal strength.
04 00 49 56  CC   Orion, this is Houston. I have the circ pad if you're ready to copy.
04 00 50 00  LMP  Stand by. Go ahead.
04 00 50 12  CC   Okay, ignition is 097:40:17.16; NOUN 81, plus 0068.1, minus all zeros, minus 0058.0. Over.
04 00 50 29  LMP  Roger; copy. 097:40:17.16, plus 0068.1, minus all balls, minus 0058.0. Okay.
04 00 50 39  CC   Good readback.
04 00 50 41  LMP  Okay, let's - let's bypass the rendezvous radar. I guess we've got to - -
04 00 50 47  CDR  Okay, we'll go ahead and go the - and do the IMU fine align right now, if that's okay with you, Houston.
04 00 50 55  CC   Okay, we're standing by, John.
04 00 51 00  LMP  Okay, PRO. Okay, PRO. Okay, AOT LAMP, close.
04 00 51 11  CDR  It's closed, Charlie.
04 00 51 15  CC   Charlie, will you - at 404, will you put minus 12345.
04 00 51 27  LMP  Roger.
04 00 51 29  CDR  Okay, Houston, when we do this attitude maneuver for the P52, we're gonna lose high gain. Is that all right?
04 00 51 39  CC   Stand by. I think we're all prepared for it.
04 00 51 41  CDR  Okay.
Go to it.

Okay, you want to close your — your window shade up there?

Okay, that's what we're going — —

Okay, you can go ahead and maneuver, John — —

Okay.

— — and we want you to use RCS SYSTEM A.

Okay, we're using SYSTEM A.

There we go — PRO.

Want to put these back up, John? ... there.

Where did they come from?

Right over there on your panel.

Okay.

We ain't got a steerable antenna. Okay, Houston, we have you on the AFT omni. Okay, is zero zero set in up there, John?

Yeah.

Okay, forward detent.

What am I looking at?

Probably the — may be the landing radar. You see anything?

Why, should I see the landing radar?

I don't know. Okay, it says we're there. We're Spica. Yeah.

There's something right there. It's — it's the rendezvous radar antenna.
04 00 53 27  LMP  Okay.
04 00 53 29  CC   Orion, this is Houston. Go LO bit rate.
04 00 53 34  LMP  Got it. You have it.
04 00 53 35  CDR  Okay, are we in detent 2?
04 00 53 37  LMP  Yeah.
04 00 53 38  CDR  Yeah.
04 00 53 39  LMP  Okay, let's go. Push your breakers in.
04 00 53 41  CDR  Okay, I'll give it 30 seconds, Charlie.
04 00 53 56  LMP  Okay. It's probably drifting.
04 00 54 03  CDR  Okay.
04 00 54 04  LMP  Okay, go to SLEW, DOWN. Going out of the way?
04 00 54 10  CDR  It ain't moving.
04 00 54 19  LMP  It's not moving?
04 00 54 20  CDR  Huh-uh.
04 00 54 21  CMP  Let me shoot a SLEW. The AOT is not moving?
04 00 54 32  CDR  The AOT moves. The thing that I'm looking at ain't moving.
04 00 54 38  LMP  Let me see.
04 00 54 39  CDR  There you go. Now you got it. You got it. Whoa.
04 00 54 41  LMP  Okay, good. I was slewing the wrong way.
04 00 54 42  CDR  Okay.
04 00 54 43  LMP  Okay. Pull the breakers.
04 00 54 45  CDR  Okay.
04 00 54 52  LMP  Okay. Now, turn the lights off. You see a star?
OK, Spica.

Okay, give me VERB 76, Charlie.

Okay, you're in VERB 76. There you go, and you're clear to mark.

Two, three. Okay, now you go to the other axis, so that's four. Okay, that was a reject.

Yeah.

Okay.

Okay.

PRO. Okay, VERB 21 --

ENTER.

-- ENTER; 233 ENTER; PRO. Okay, PRO. Hey, that thing really takes off, doesn't it? (Laughter)

Knows what it's doing.

Huh? Man, look at that - Oh, there's old Casper out there. Isn't he pretty?

Okay.

Okay. ENTER, Charlie.

You see anything?

Oh, yeah.

Okay, ENTER, PRC. Go ahead. You got a VERB 76.

What is this one?

Antares.

Oh, yeah. No doubt about it. See the whole bloody constellation.
Okay, that was the Y, right?

Yeah, right.

Okay.

Okay, that's four.

One MARK.

Okay.

Two MARKS.

That's it.

Okay.

PRO, lights up. Super, John. Okay, minus 00005, PRO. Look at that. Okay, Houston, our torquing angles are minus 0.060, plus 1 - 0.139, minus 0.018.

All right, we could not read you. Would you go DOWN VOICE BACKUP?

Okay, you have DOWN VOICE BACKUP. And our angles were - NOUN 93s were minus 060, plus 139, minus 018, and we PROed at 96:58:40.

Okay, we can ENTER on that.

Go AFT omni.

Okay, AFT omni.

I got AFT omni. Okay, go to closed and AOT LAMP open, John. Okay. And I think we're getting a little close for Ken to do his - do this rendezvous — —

Okay, perhaps we can read the torquing angles, if you want to give them again.

Okay. Torquing angles are minus 0.060, plus 0.139, minus 0.018 at 96:58:40.
04 00 59 45  CDR  The star angle difference is minus four balls 5.
04 00 59 56  LMP  They've already got the up-link in.
04 01 00 01  CDR  Okay, we ought to get the radar check out of the way.
04 01 00 04  LMP  Well, I think Ken is getting ready for a burn at 90 - in 40 minutes. Ask him if he's ready and can support that.
04 01 00 09  CDR  We don't need it.
04 01 00 20  CC  Okay, we copied your NOUN 05, but we did not get the torquing angles. I hope y'all have written them down.
04 01 00 28  LMP  Roger. Minus 0.060, plus 0.139, minus 0.018. Over.
04 01 00 58  LMP  Okay, that looks good. That's great.
04 01 01 13  CC  Orion, this is Houston. We'd like to get HI bit rate again and some good voice. We'd like you to go back to that attitude which we gave you of pitch of 053 and set in the steerable angles of PITCH, plus 26; and YAW, minus 12.
04 01 01 30  LMP  Okay, we're enroute.
04 01 01 32  CC  ... delay the landing radar test until we get some good data.
04 01 01 40  CDR  Okay.
04 01 01 52  CDR  My guess on that landing radar, when you push the circuit breaker in, it's probably working off the ground or something. Maybe not.
04 01 02 04  LMP  Could be.
04 01 02 14  CC  Go FORWARD omni, Orion.
04 01 02 22  LMP  Okay, Jim, you have FORWARD omni. How do you read?
04 01 02 47  CDR  Ought to get there in a hurry.
Yeah. You want me to do a VERB 49?

No, we're almost there. What a ... 

Okay, Jim, how do you read FORWARD omni? Over.

Okay, Orion, let's go back to LO bit rate until we get the steerable.

Okay, we're LO bit rate. How do you read now? 053, John.

Okay.

Okay, we're there. Okay, Jim - okay, Jim, we have you now on the steerable. How do you read? Over.

I read you loud and clear. You sound beautiful.

Okay, the P52 went super. Our torquing angles were minus 0.060, plus 0.139, minus 0.018. We torqued at 96:58:40. Over.

Roger; copied. On torquing angles, minus 060, plus 0.139, and minus 0.018 at 96:58:40.

That's Roger. The AGS checkout has gone well.

You can go NORMAL voice.

Okay. Okay, the AGS checkout has gone well. We're in - the only thing we haven't done is rendezvous radar checkout and we'll get to that as soon as Ken gets through with his burn.

Roger; we're recommending that rendezvous radar checkout on the backside.

All right. Fine.

And landing radar checkout is the one we want to go through now.

Okay.

Okay, we're going now. LANDING RADAR, in.
04 01 05 03 LMP  Okay, CB(11), PGNS LANDING RADAR, closed.
04 01 05 07 CDR  Closed.
04 01 05 08 LMP  Check temp.
04 01 05 09 CDR  Go.
04 01 05 10 LMP  60 to 95. Okay, that's a little high.
04 01 05 12 CDR  It's been running, Charlie. I've already done it three times. Go.
04 01 05 16 LMP  CROSSPOINTER, HI MULT.
04 01 05 17 CDR  HI MULT.
04 01 05 18 LMP  MODE SELECT, LANDING RADAR.
04 01 05 19 CDR  LANDING RADAR.
04 01 05 20 LMP  H/H-dot.
04 01 05 21 CDR  H/H-dot.
04 01 05 22 LMP  LANDING ANTENNA to AUTO.
04 01 05 23 CDR  LANDING ANTENNA to AUTO.
04 01 05 24 LMP  Okay. RADAR TEST, LANDING.
04 01 05 25 CDR  RADAR TEST to LANDING.
04 01 05 26 LMP  Power signal is out. Going out, test monitor -- okay, that's on the tape meter.
04 01 05 31 CDR  Okay. Okay, it's up and left like it's supposed to be. You reckon it could have --
04 01 05 39 CC  John, when you get to the NOUN 66 and 67 values, we want you to read us the tape meter values of H and H-dot.
04 01 05 50 LMP  It's right on. It was the --
04 01 05 52 CDR  Okay, it's right on, Houston. It's 8000 at 480 off the H-dot.
04 01 05 58 LMP It was locked on at the ground, I bet you.

04 01 06 02 CDR Yeah. PRO, Charlie. Wait, I'll have to change this - wait until this one changes.

04 01 06 10 LMP Okay.

04 01 06 12 CDR See, there it goes. Okay now, PRO. Okay, minus 495, plus 1860, plus 1331.

04 01 06 20 LMP Right on.

04 01 06 21 CDR Right on. And the tape reader is up and left and it's reading 8000 at 480. I think it was locked on the ground or something when we came over that low pass, due to our communications angle. That may be wrong, but that - you know - it was sure acting funny.

04 01 06 34 CC Okay, it's looking good to us now.

04 01 06 36 CDR Okay, we got 3.2 on the ALTITUDE TRANSMITTER and 345 on the VELOCITY TRANSMITTER; make that 355. Okay, let's terminate this test.

04 01 06 46 LMP Okay, VERB 34.

04 01 06 48 CC Okay, we copy.

04 01 06 53 LMP Hey, Jim, on those drink bags, I tell you, it's pretty hard to see things when you've got a helmet full of orange juice. This zero gravity's something with that orange juice.

04 01 06 55 CDR LANDING RADAR to --

04 01 07 03 CC Well, you've got to drink fast.

04 01 07 08 LMP You really do. (Laughter)

04 01 07 09 CDR Tell me what to do there, Charlie.

04 01 07 10 LMP Okay. Eleven - LANDING RADAR breaker, open.

04 01 07 11 CDR Okay.
Okay, we're all set. When do we get the 210 up, Jim?

Okay, acquisition on your next rev.

Okay, pitch down just a little bit. We're losing it. Okay, it's coming great - coming back in. Why don't you go to ATT HOLD when you get there. Okay?

All right, I will, Charlie. I never thought about that. What a can of worms!

Comm can really kill you, can't it?

Wipe you right out.

Okay, VERB 77. We've got good signal strength.

Hey, Jim, we had to turn on our window heaters for about 10 minutes per side to clear up the windows right aft - right before undocking.

Roger; we copy.

Shoot me another slug - slug of water.

(Laughter)

We've been using the - we've been using the LCG pump to keep cool in here, and it's really neat.

We copy.

We've been needing something to keep cool, I'll tell you.

Yeah, we understand completely.

Jim, your up-link voice is just beautiful in every antenna we got. Over.

Okay, I guess that's a good data point. Unfortunately, the down-link is very, very noisy.

Okay, I wonder what happened on check - the comm checks we did at 55 hours. Of course, it was closer, but it was real good then, I thought.
What do we need to do here, Charlie?
Well, we're going to copy and load gyros -
No, scrub those things.
Yeah, okay. We'll scrub this.
Okay, we understand it's a completely different situation, Charlie.
Okay. If you'll let me get this camera - -
Your voice is crystal clear right now.
Roger.
Okay, John, I'm going to set - see what I have to set this thing at. Turn the page a little bit. I think it's 500.
John, I think I ought to take this drink bag out of my suit so I won't have a face full of water.
Okay.
It'll probably all settle out when I'm - -
When you get on the Moon.
- - when I get on the Moon and once we get some g on us.
Yeah.
What do you think?
Yeah, I think you're right.
Take it out?
Well, unless it's really - if it's really not bothering you too bad, leave it in there and drink from it.
Well, I'll tell you what. I'll be very careful. Wonder if I could cut that microphone off.
No, I wouldn't do it, but why don't you shape it in like this, pull it in like this. There you go. Then if - then if you pull it up.

Okay, that's - that's great.

See?

Yeah, okay.

Okay, let me see a pencil and a - give me those gyro torquing numbers, John.

Which ones, Charlie?

On the time line where we - the P52 you just did. Back over here.

Okay.

It was 96:58 - -

Yeah, 96:58:40.

... 96:59.

Yeah.

And the previous torque was - -

Minus 060?

No, wait a minute. When did we do the dock P52?

What are you worried about that for?

I want to calculate these gyro drift comps. Give me your checklist out of your purse - Wait a minute.

Orion, this is Houston with some trajectory information for you.

That's the activation one, Charlie.

Go ahead. Give me yours. I'll put it up for you.
Roger. It looks like you'll be coming in about 10,000 high at PDI, John, which will be about 3 to 4 seconds of hover time—

Understand.

—and you'll be 17,000 feet south.

Okay, does that mean that we're going to be— at pitchover, we'll be steering from south to north?

... affirmative.

Yeah—Okay, so at pitchover, we'll be— you'll be targeting us right into the target, but we'll be steering from south to north.

Is that based on Ken's tracking?

No, that's not. Negative on that one.

How did he get—

Okay.

But you'll probably be coming straight in by the time you get down to pitchover.

Okay, thank you.

How did he do on the landmark tracking? Ask him.

How did landmark tracking turn out?

Stand by.
04 01 14 00 LMP  We didn't even use it.
04 01 14 05 CC   Okay, the landmark tracking locked very good, John.
04 01 14 10 CDR  Okay.
04 01 14 18 CC   Orion, will you give us your ED BAT read-out, please?
04 01 14 25 LMP  Same as always, 37 volts.
04 01 14 29 CC   Very good.
04 01 14 44 LMP  Jim, is guidance going to have any gyro drift for us?
04 01 14 47 CC   Stand by. Okay, no update on that. And it looks like your - the attitude for PDI is very close to the one that we'd like for the ... - steerable, so we'll try that when you come around at AOS.
04 01 15 17 CDR  Okay.
04 01 15 18 LMP  Okay. And, Jim, on this 52, it - that radar is - was - had drifted up into the field of view. But it's no sweat just moving it down in slew.
04 01 15 28 CC   Okay, we copy.
04 01 15 39 CDR  And one other thing that - when we put those state vectors in there, I guess we didn't have any - LM vector in there - and our COMPUTER ACTIVITY light stayed on all the time. I finally figured out what it was and did a VERB 66, got rid of it. I think --
Roger; copy.

--- I think that's what it was.

Everybody's nodding their head down here - affirmative.

How you staying down there so good?

Charlie, I'm sitting in one g now.

You are?

Yeah.

Why?

Because I'm right on the floor.

This Velcro just doesn't work. I just come right up off it.

Well, John, it was heck (laughter) for a while, but I think we made it.

I think we did, Charlie. But I don't understand what we are going to do about this if that pressure keeps climbing up. Do you?

No.

Can we fly down --

Houston, 16. What appears to be the problem with SYSTEM A? Is it a reg problem or what?

Yes, that's affirmative, Charlie, a reg problem.

Okay, well, we have a - If we use up fuel - just SYSTEM A for descent, is what you want us to do?
Stand by. We'll give you an RCS configuration for PDI when y'all come around the corner.

Okay. Well, we'll be back.

And I'd like somebody to think about this high APS pressure we have during the lunar stay. Over.

Okay, we're looking at that one, too, John [sic].

He doesn't know the difference between you and me. He keeps calling me you and you me.

I know it. That's going to bite us right there.

That APS pressure? Yeah, we can't do that, can we? Oh, no, you stay for 3 days --

Okay, we are noticing an increase in the RCS pressure there, but we have enough ullage volume now to get the - all the propellant out.

Understand. Thank you. That means you're going to let it go to the relief valve.

I guess so.

You want to apologize for our comments on hot mike during that hectic time period?

Yeah. If we were on hot mike --

Orion, this is Houston. Have you ever noticed any change in your yaw meter?

None. Jim, it's stuck on minus 12.

Okay, and go ahead, John.

I think that - If we were on hot mike when we're talking to each other, I want to apologize right now. It's probably pretty interesting. Probably not, if the comm was as bad as you said it was.

It was good enough for us to understand you.

That's what I was afraid of (laughter).
We were afraid of that.

... these things.

Okay, Orion. If you see that reg pressure creeping up, you can do a small maneuver, which would help the situation.

Understand; we'll do that. How much does it have to be?

We'll do a VERB 49 to the AGS cal attitude, Jim.

Okay. And, Orion, we're coming up on about 2 minutes to LOS.

You want to answer him, John?

Roger; 2 minutes to LOS. See you around for PDI.

Orion, this is Houston. For your information, the burst disk pressure is 215 to 220 - the RCS.

Roger; understand.

Jim, is it both systems you see climbing?

No, it's just A.

Just system A.

Just system A, right.

Let's load that, Charlie.

What, the AGS cal?

Yeah.

Okay --

What's the AGS cal attitude?

Okay. 02250, plus 11250, plus 00250.
04 01 22 20  CDR  Okay. And, Jim, I saw the landing site as we passed over it. We're not going to have any trouble recognizing it from the rays. The rays stand out beautifully.

04 01 22 30  CC  Very good. Glad to hear it.

04 01 22 47  LMP  Here we go.

04 01 22 55  CDR  Now, shall we do it?

04 01 22 59  LMP  Oh --

04 01 23 00  CDR  Might as well.

04 01 23 03  LMP  Going POO and DATA ...

04 01 23 08  CDR  Okay, go ahead.

04 01 23 11  LMP  Ken, how do you read? Over.

04 01 23 23  CDR  Ken, do you read us on VHF? Over.

04 01 23 27  CMP  Yes; loud and clear.

04 01 23 29  CDR  You fixing to do the burn, right?

04 01 23 32  CMP  Sure am.

04 01 23 33  CDR  Okay, when you finish the burn, we'd like to get a radar check. I know that sounds a little late, but we'd sure like to do it. We'll do a P76 after you finish your verb - and a VERB 83 and get a radar lock, if that'd be all right.

04 01 23 56  CMP  Okay, we'll see how much I have to maneuver to get there.

04 01 23 58  CDR  Okay.

04 01 24 01  LMP  Here we go. Gosh! This thing take off.

04 01 24 43  CDR  Spares no effort.

04 01 24 45  LMP  It sure doesn't.
Now, we wait here about 5 minutes; it'll get the rates down so low I can do a VERB 76 and you can do the whole bit.

Okay.

Look at the - See we got zero rates. Look at the what the pitch rate is, 5 degrees down.

Mine says the same thing. Okay, 540 read-out: hasn't changed. 541 read-out: that hasn't changed. 542 read-out: that hasn't changed. 544 read-out: hasn't changed. 545 read-out: it's good. 546 read-out: good. It says go ATTITUDE HOLD, going to damp the rates, too, and ENTER on that. VERB 60, VERB 76, and VERB 1620.

I already got enough to do --

... we go. Okay, 400, and I stopped the DET. ...

Okay, I'm going to cycle the CWEA.

All right, Charlie, why don't you cycle the CWEA. It had a quad 1 light on when you did it. Remember we did that before once?

Quad 1 light? We had a quad 1 light then?

A red light - a red flag when you cycled it. It cycled all of them, as a matter of fact --

Ch.

-- It reset them all.

Yeah.

What do you stay in here for? If they don't have the high gain, there won't be no reason - Well, maybe they'll get us on a 250-foot dish. I've lost my glove - No, there they are. Where's yours? You got your gloves somewhere?

Aren't you smart. What you going to do with your hat?
I don't know. What's it doing down there?

Well, you said wash it out, so I left it there.

Oh, okay.

Ain't the clearest in the world, but it's the clearest I could do, Charlie. Honest.

It's terrible.

You want to try it yourself? Just doesn't come off.

Have you got another - another towel?

Have I got another towel? Yeah, there's a whole thing of them over here.

Let me wet this one down a little bit.

You start a clock backwards?

Yeah.

Yeah, I ain't done nothing right since I got out of bed this morning.

Okay, we're getting - we're getting behind the time line probably - maybe.

No, we aren't. We're okay.

Okay, nothing we can do here, huh?

Can you give me a tissue - try it on the front.

That's better [?].

Here you go, Charlie.

Okay, could you dry it a little bit for me, some more, while I copy the AGS cal numbers. We're through with this.

Here you go, Charlie. Where do you want to keep it?

Just Velcro it back up here somewhere.
We'll hit pretty hard.
Okay, that's great, John.
You know where to Velcro it. How about right there?
Where?
See there?
Yeah, that'll be all right. No, I'll - I'll - -
Can you get it?
- - knock into.
Wait a minute.
Wait a minute.
How about right - there?
Yeah, there's a piece.
Okay, it won't go anywhere.
Okay, here you go. AGS cal is complete.
How's that pressure looking? It's up there, isn't it?
It's okay.
Charlie, this is fun, by golly. (Laughter) It's really - it's really - it's the worse sim I've ever been in.
Yeah.
It's ...
It's really bad, isn't it?
Hey, Orion.
You speak. Go ahead, Ken.
I have an unstable yaw gimbal number 2. It oscillates in yaw any time it gets excited.

Oh, boy.

You got any quick ideas?

No, I sure don't.

What does your rules say, Ken?

It says I have to have four servo loops to do circ.

It's what?

Every time I put number 2 servo on, it's okay until I disturb it and then it starts to oscillate, and you can feel the spacecraft shaking. It's really doing it.

Okay. You have to have four loops to do circ, huh?

That's what it says. It's unstable in all SCS modes on secondary servo. I can't believe it, but I'm watching it. Every time I select the secondary YAW GIMBAL, any excursion with the thumbwheel causes it go unstable.

Okay. Well, just hold what you got then.

Hey, Ken, why don't you just stop it and then start it again.

I've done that twice.

Oh, okay.

Well, let us get pointed at you and do a VERB 83.

Okay, gang, I'm sure sorry about this, but that number 2 servo is just oscillating like a wild man.

Yeah.
And I've tried it both in manual and TVC and in the - just thumbwheel, and I get the same response. It could be a switch here somewhere, but - but I swear, I've checked them all - all I can. I guess I'll power them down.

Yep, and tell the ground when you go around.

Okay. Brother, what a way to start the day, huh?

Do you suppose there is any - Let me try terminating 509 and see if that would help maybe. No, it was in SCS; that shouldn't have any effect. I wonder if we got that relay stuck in there some way?

The TVC enable relay?

Okay, I'm going to try my gimbal drive check anyhow, in the G&N.

Okay.

Okay, John, I'll give you some needles. Follow those needles in AGS and point to him.

It's no good in TVC either, in the gimbal drive check.

Okay. Which way do I go? I have to - -

I'm going to back out here and power down.

Yaw left, pitch down.

Okay. Okay, Ken, some - some you win and some you lose. I don't see any - -

PITCH 1 is OFF. Servos 1 and 2 are off.

Roger.

I'm back to PO0.

No, good in - PGNCS won't do it either?
That's why you don't leave the gimbals running for 20 minutes at a clip.

Oxidizer coming off. 1, 2's off. And 3.

Just lost one gimbal motor, hasn't he?

Lost a servo loop in yaw.

Hey, Ken, is it both gimbals oscillate like that?

Number 2 only. My burn rules say I've got to have 2 sets of servo loop - two in each ... all four servo loops to go.

I think that's right, Ken.

I'm sorry, gang. I don't know what to do with the darn thing. It's - it does it both when the CMC drives it and when we drive it. I started it, restarted it, and it's - it's apparently really in the servo loop.

Instant sunrise.

Um-hmm.

You get there before we do or do we get there before you do?

I don't know. It's probably a very close race since we're in almost the same orbit. In fact, I guess the next thing you got to do is make sure we don't hit.

I'll work on that.

Okay.

Get a little roll in there, John. I guess - you're coming around okay, though. Roll doesn't really matter.

Oh, terrible!

Where is it, Charlie?

We've got to pitch down.
<table>
<thead>
<tr>
<th>Time</th>
<th>User</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 01 43 03</td>
<td>CDR</td>
<td>When's AOS?</td>
</tr>
<tr>
<td>04 01 43 05</td>
<td>LMP</td>
<td>We've got a little bit to go yet.</td>
</tr>
<tr>
<td>04 01 43 39</td>
<td>LMP</td>
<td>There he is.</td>
</tr>
<tr>
<td>04 01 43 40</td>
<td>CDR</td>
<td>You got it?</td>
</tr>
<tr>
<td>04 01 43 41</td>
<td>LMP</td>
<td>Yeah.</td>
</tr>
<tr>
<td>04 01 43 43</td>
<td>CDR</td>
<td>How - -</td>
</tr>
<tr>
<td>04 01 43 44</td>
<td>CMP</td>
<td>I show us at 0.8 miles and 0.8 of a foot per second.</td>
</tr>
<tr>
<td>04 01 43 53</td>
<td>CDR</td>
<td>You got a lockup?</td>
</tr>
<tr>
<td>04 01 43 55</td>
<td>LMP</td>
<td>We've got a visual on you.</td>
</tr>
<tr>
<td>04 01 43 56</td>
<td>CMP</td>
<td>You have?</td>
</tr>
<tr>
<td>04 01 43 58</td>
<td>LMP</td>
<td>Yes, sir.</td>
</tr>
<tr>
<td>04 01 43 59</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 01 44 03</td>
<td>LMP</td>
<td>See him, John?</td>
</tr>
<tr>
<td>04 01 44 04</td>
<td>CDR</td>
<td>Yeah.</td>
</tr>
<tr>
<td>04 01 44 07</td>
<td>LMP</td>
<td>What's that flashing?</td>
</tr>
<tr>
<td>04 01 44 10</td>
<td>CDR</td>
<td>He's firing thrusters.</td>
</tr>
<tr>
<td>04 01 44 11</td>
<td>LMP</td>
<td>Oh.</td>
</tr>
<tr>
<td>04 01 44 12</td>
<td>CDR</td>
<td>His beacon is on.</td>
</tr>
<tr>
<td>04 01 44 14</td>
<td>CMP</td>
<td>Which way am I pointing compared to you? I should be about 180 degrees away from you, huh?</td>
</tr>
<tr>
<td>04 01 44 22</td>
<td>LMP</td>
<td>All we can - -</td>
</tr>
<tr>
<td>04 01 44 24</td>
<td>CDR</td>
<td>There's no way to tell, T. K.</td>
</tr>
<tr>
<td>04 01 44 26</td>
<td>CMP</td>
<td>Oh, okay. I thought you could see more than that.</td>
</tr>
<tr>
<td>04 01 44 31</td>
<td>LMP</td>
<td>All we see is your thruster firing.</td>
</tr>
<tr>
<td>04 01 44 38</td>
<td>CMP</td>
<td>Okay, I've got my rendezvous lights on.</td>
</tr>
<tr>
<td>Time</td>
<td>Call Sign</td>
<td>Text</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>04 01 45 13</td>
<td>LMP</td>
<td>I just don't believe it.</td>
</tr>
<tr>
<td>04 01 45 17</td>
<td>CDR</td>
<td>We must have done something wrong.</td>
</tr>
<tr>
<td>04 01 45 29</td>
<td>CDR</td>
<td>Okay, Ken, we're going to lock up the radar on you.</td>
</tr>
<tr>
<td>04 01 45 32</td>
<td>CMP</td>
<td>Okay, I'm probably going to have to maneuver so you can get a transponder. I doubt that you can get a lockup where I am now. Be with you in just a minute.</td>
</tr>
<tr>
<td>04 01 45 40</td>
<td>CDR</td>
<td>Well, we'll give her a go anyway. You're not very far away. We'll see.</td>
</tr>
<tr>
<td>04 01 45 50</td>
<td>LMP</td>
<td>Okay, GUIDANCE CONTROL, PGNS.</td>
</tr>
<tr>
<td>04 01 45 52</td>
<td>CDR</td>
<td>We're there?</td>
</tr>
<tr>
<td>04 01 45 54</td>
<td>LMP</td>
<td>AC BUS A, RENDEZVOUS RADAR, closed.</td>
</tr>
<tr>
<td>04 01 46 00</td>
<td>CDR</td>
<td>It's closed. Thirty seconds, Charlie.</td>
</tr>
<tr>
<td>04 01 46 20</td>
<td>LMP</td>
<td>Okay, SLEW for a manual lock on his ... We're probably going to have to pitch up a little bit.</td>
</tr>
<tr>
<td>04 01 46 43</td>
<td>CDR</td>
<td>We're only 3 degrees away from him.</td>
</tr>
<tr>
<td>04 01 46 49</td>
<td>LMP</td>
<td>He just disappeared out the top of my window.</td>
</tr>
<tr>
<td>04 01 46 53</td>
<td>CDR</td>
<td>I got him.</td>
</tr>
<tr>
<td>04 01 46 57</td>
<td>LMP</td>
<td>Oh, yeah, there he is.</td>
</tr>
<tr>
<td>04 01 47 16</td>
<td>LMP</td>
<td>No signal strength yet.</td>
</tr>
<tr>
<td>04 01 47 18</td>
<td>CDR</td>
<td>Okay, Ken, we must be out of your field of view.</td>
</tr>
<tr>
<td>04 01 47 24</td>
<td>CMP</td>
<td>Okay. I don't want to call P20 with this - I'm not sure how it reacts with all this other stuff. So I'm trying another way of finding you. I'm going to start a little pitch around and I think I'll pick you up.</td>
</tr>
<tr>
<td>04 01 47 34</td>
<td>CDR</td>
<td>Well, turn on the tracking light, Charlie. ...</td>
</tr>
<tr>
<td>04 01 47 36</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
</tbody>
</table>
04 01 47 53 CDR  I knew what the transformation error was.
04 01 49 03 CDR  Why isn't it moving? Oh, no.
04 01 49 13 LMP  You're in AUTO TRACK.
04 01 49 41 CDR  What time do we get AOS?
04 01 49 47 LMP  At about 98:08.
04 01 49 49 CDR  Okay, I want to be in the right attitude when we
                  get there.
04 01 50 03 CDR  You got the sunrise?
04 01 50 05 LMP  Looks like it.
04 01 50 09 CDR  Okay, Ken, we've had sunrise, and the Sun is behind
                  us. I guess that's the best cue.
04 01 50 15 CMP  ... star. I bet that's you.
04 01 50 17 CDR  Yeah.
04 01 50 19 CMP  I'm almost pointing at you, if that's the case. I
                  don't - That couldn't be. That must be a planet.
04 01 50 26 LMP  We got our tracking light on.
04 01 50 35 CDR  You ought to be right in the sunrise.
04 01 50 39 CMP  Well, I guess you're just a little ahead of me, so
                  you may get AOS first.
04 01 51 18 CDR  Is your transponder working?
04 01 51 21 CMP  Well, it's checked okay.
04 01 51 23 CDR  Okay.
04 01 51 24 CMP  I don't show anything on the AGC yet. Power's on.
                  It should work.
04 01 52 08 CDR  Want to transfer some more of it to the RCS?
04 01 52 11 LMP  Well, we're right on the limit there. ... firing it.
04 01 52 17 CMP  You're looking down-Sun at me, right?
04 01 52 19 CDR    Yep.
04 01 52 28 CMF    Say there, John, you're looking down-Sun at me?
04 01 52 29 CDR    That's affirmative.
04 01 52 31 CMP    Okay. I'm coming into the Sun, so I guess I must be coming close.
04 01 53 10 CDR    SLEW in LOW, RIGHT?
04 01 53 11 LMP    Yeah.
04 01 53 13 CDR    We're pointed right at you, Ken.
04 01 53 16 CMP    Okay.
04 01 53 27 CMP    I'm passing through the Sun right now.
04 01 53 45 CDR    That radar.
04 01 54 17 CDR    You ought to be looking right at us.
04 01 54 19 CMP    Well, what I'm looking at right now is the Sun.
04 01 54 25 CDR    That ought to be us.
04 01 54 28 CMP    Can you see my attitude yet?
04 01 54 30 CDR    No, I can't - I can't see you at all. All I see is the light.
04 01 54 35 CMP    Okay. ... you can turn it on, you can turn it off ... 
04 01 54 39 CDR    Okay.
04 01 54 40 CMP    Maybe I can figure out some way to make it useful yet.
04 01 54 41 LMP    There you go.
04 01 54 42 CDR    Okay, we got signal strength.
04 01 54 49 CMP    Roger. I show you locking up.
04 01 54 57 CDR    Okay, go ahead and go to AUTO TRACK, Charlie.
04 01 54 58 LMP  Okay.
04 01 55 32 CDR  Down and to the - down and to the left, Charlie. Three degrees down and right in the middle.
04 01 55 40 LMP  Okay, we've got it. That's what the needles say.
04 01 55 42 CDR  Okay. Okay.
04 01 55 44 LMP  Okay.
04 01 55 47 CDR  All right. All right, we've got it.
04 01 55 50 LMP  The tape meter running ... we'll go to LGC, VERB 63.
04 01 55 54 CDR  Okay.
04 01 55 55 LMP  Wait a minute. ... all this.
04 01 56 07 CDR  Okay.
04 01 56 12 LMP  ... firing it, John.
04 01 56 15 CDR  Okay, we'll let's - let's do this and get out of here --
04 01 56 16 LMP  I'm doing it.
04 01 56 17 CDR  -- 82 and 46.
04 01 56 18 LMP  Okay. I got to wait until it locks up.
04 01 56 19 CDR  It's locked up.
04 01 56 20 LMP  It ain't.
04 01 56 28 CDR  Well, it ain't never going to with me firing these jets like this - and not looking at him.
04 01 56 53 CMP  Does it look like I'm a little on the top of you, John?
04 01 56 56 LMP  Yeah.
04 01 56 58 CDR  Yeah, I believe so. Sure does.
04 01 57 00 LMP  Yeah, you are. Keep pitching, John.
04 01 57 04  CDR  Which way?
04 01 57 05  LMP  Up, he's going up.
04 01 57 09  CDR  He's going up. He's going down underneath us.
04 01 57 15  LMP  That's right, that's right. He should go down underneath us.
04 01 57 27  CDR  Okay, you got to PRO on that.
04 01 57 31  LMP  It ain't locked up, John.
04 01 57 47  LMP  He's off to the left.
04 01 57 59  LMP  There was the rendezvous radar light.
04 01 58 02  CDR  Huh? Yeah, it's locked - he's locked up. Good enough.
04 01 58 06  LMP  The light is not out. It is not locked up unless the light goes out.
04 01 58 10  CDR  Okay, but I want to get the PDI attitude.
04 01 58 13  LMP  Well, let's go to PDI and forego this.
04 01 58 15  CDR  Okay, we're terminating this rendezvous radar test, Ken. We're going to go to PDI attitude. Let's do a VERB 49 to that one.
04 01 58 20  LMP  No, it won't work until after you PRO at ... until you get a VERB --
04 01 58 24  CMP  I still don't have a visual on you yet, John.
04 01 58 28  CDR  Okay. Well, we're out in front of you and we're --
04 01 58 35  CMP  In front?
04 01 58 36  CDR  That's affirmative. We're ahead of you. No, dadgummit.
04 01 58 42  CMP  I don't see how that could be.
04 01 58 46  CDR  Well, we're - we're upside down and the Sun is over our shoulder and we're looking back at you, and I promise that's the case.
04 01 59 00  CMP  I guess my nav system isn't very good.
04 01 59 03  LMP  Okay, Ken, let's just forget this. I think you went down below us, and - we're going to PDI attitude, and why don't you go to your comm attitude.
04 01 59 12  CMP  Okay, what I'm trying to do is to keep from hitting you. I'd like to get a visual on you.
04 01 59 22  CDR  Well.
04 01 59 34  LMP  Why don't you just do a pitch - getting on the belly band and do a pitch around, John.
04 01 59 41  CDR  ... let's ... those breakers.
04 01 59 43  LMP  He should be below us. We've passed undocking.
04 01 59 46  CDR  Yeah.
04 01 59 59  LMP  I'll load this.
04 02 00 00  CDR  Yeah, load the PDI attitude.
04 02 00 14  CMP  My computer display shows that you're - that you're behind me.
04 02 01 07  CDR  Okay. Well, there for a while, Ken, we were locked up.
04 02 01 11  CMP  ... against the sky or the ground, or did you?
04 02 01 13  CDR  You're against the sky about 5 degrees up - 6 degrees up.
04 02 01 18  CMP  Okay.
04 02 01 48  CDR  Hear the algorithm test?
04 02 01 50  LMP  Yeah, that's what I'm doing.
04 02 01 56  CMP  I've got you. You were behind me.
04 02 02 02  CDR  We are, huh? The Sun's coming over our shoulder, that's all I know.
04 02 02 09  CMP  Well, I guess behind is kind of relative.
04 02 02 13  CDR  I think you're right.
04 02 02 16  LMP  The clock counts backwards. Well, there you go.
04 02 02 38  LMP  Let's go to PDI attitude then.
04 02 02 41  CDR  That's where we're going.
04 02 02 42  LMP  Okay. Do you want to PRO - we can PRO on this - do an auto maneuver.
04 02 02 49  CDR  We're there, Charlie.
04 02 03 03  CDR  All we got to do is keep the reg light off, right?
04 02 03 05  LMP  Yeah. You can move the COAS to the overhead window.
04 02 03 12  CDR  Okay.
04 02 03 21  LMP  I know they're not going to let us do PDI, though.
04 02 03 23  CDR  Huh?
04 02 03 24  LMP  They're not going to let us do it on this rev.
04 02 03 25  CDR  Yep, that's right.
04 02 03 33  CMP  Looks to me like we're opening again.
04 02 03 37  LMP  There you are.
04 02 03 38  CMP  I guess we must have passed our one rev.
04 02 03 39  CDR  Got it?
04 02 03 41  LMP  Yeah, there he is, right out there.
04 02 03 44  CDR  How far away?
04 02 03 45  LMP  Just yaw right and you got him.
04 02 03 49  CMP  Do you still have comm, Orion?
04 02 03 51  CDR  Yeah, we do.
04 02 03 52  LMP  Roger; we have a visual on you.
04 02 03 53  CMP  ... or just let it drift?
04 02 03 58 CDR    Say again.
04 02 04 01 CMP    Would you rather I stationkeep or just let it drift?
04 02 04 07 CDR    I wouldn't worry about it right now, Ken; we got to get ahold of the ground and see what they want to do.
04 02 04 12 CMP    I was just wondering if I'd be in a better posture if I kept stationary. That might make the abort situation on the PDI-2 better. ... ago and one gimbal, we've got it made.
04 02 04 22 CDR    We'll see what they say.
04 02 04 30 CMP    I guess we aren't going to be that far apart that it'll mess up your ... 
04 02 04 37 CDR    I don't think so.
04 02 04 41 CMP    What time are you supposed to get LO - get AOS?
04 02 04 46 LMP    Tell him 98:10.
04 02 04 50 CDR    98:10.
04 02 04 56 CMP    Okay.
04 02 04 59 CDR    Where is he?
04 02 05 00 LMP    Okay; let's start - let's go through this --
04 02 05 02 CDR    Okay.
04 02 05 03 LMP    -- We don't have our helmets and gloves on, I guess there's no need to do that.
04 02 05 05 CDR    No. VHF ANTENNA, FORWARD.
04 02 05 07 LMP    Okay; I got that.
04 02 05 08 CDR    CB(11) INVERTER 1, close.
04 02 05 11 LMP    Closed.
04 02 05 13 CDR    Select to INVERTER 1.
04 02 05 15 LMP    Okay, STAB/CONTROL - You want to go through this?
Yeah, man.

Okay, STAB/CONTROL (11) AE LD, close.

Go.

Okay, STAB/CONTROL ABORT STAGE, close.

Go.

Reset engine stop.

Engine stop is reset.

Set window bars.

Set the crash bars.

On, you!

Okay. I'll put the BATS - BATS on.

I see why you taped yours down.

Yeah.

Put your attitude monitor on PGNS, John.

Is that - is that the angle that you put them in, Charlie?

Those angles, I can't load them - I don't know - Those things have nothing to do with the FDAI.

Okay; let me load it.

It ain't going to work. You can't read off of that and load NOUN 22 and have it go to that attitude.

Yeah, you're right. Well, what was the old nominal PDI attitude? That's close enough.

Well, if you call VERB 63 --

No.

Okay; just maneuver to 11° PITCH.
04 02 06 43  CDR   114.
04 02 06 58  LMP   002.
04 02 07 00  CDR   002 ROLL.
04 02 07 04  LMP   And 340 YAW.
04 02 07 06  CDR   340 YAW.
04 02 07 46  LMP   Well, I'll tell you what. I'm going to turn off these ascent batteries. We don't need those. They ain't going to let us go.
04 02 08 32  CDR   Okay.
04 02 08 34  LMP   Okay.
04 02 08 42  CDR   You got it?
04 02 08 44  LMP   Got what?
04 02 08 45  CDR   See Ken out there?
04 02 08 46  LMP   Yeah, I see Ken.
04 02 08 47  CDR   Where is he?
04 02 08 52  CDR   Yeah.
04 02 09 02  LMP   Is it just - is it just an SCS where the servo loop is out?
04 02 09 07  CDR   Yeah, it's in both systems. The G&N won't do it either, Charlie.
04 02 09 12  LMP   Hey, Ken, the G&N won't do the gimbal drive right either?
04 02 09 14  CMP   No, sir. It goes unstable too.
04 02 09 18  LMP   Oh.
04 02 09 19  CMP   It's an honest-to-god unstability in the servo loop.
04 02 09 32  CDR   What should we acquire them on here? Should be - we should be getting them now, Charlie. 98:10.
04 02 09 39  LMP  Well, the Earth's - ain't come up yet.
04 02 09 41  CDR  Okay. Let me see the Timeline Book.
04 02 09 45  LMP  There you go.
04 02 09 50  CDR  Okay. Reset the window bars; AELD, close. THROTTLE
                      CONTROL to AUTO and CDR. That's GO. THROTTLE is
                      MIN.
04 02 10 00  CMP  It turns out I got a switch out of place over here.
                      I don't know whether something could come of that,
                      but I'm pretty convinced that it's got to be a
                      hardware-type problem.
04 02 10 12  CDR  Yeah, I don't - I don't think a switch can do
                      that to you.
04 02 10 17  CMP  I don't think so. I'd like to find the switch
                      right now.
04 02 10 21  CDR  Did you try both sets of AC 1 and AC 2 on it?
04 02 10 22  CMP  Yes, sir.
04 02 10 24  CDR  Yeah, I figured.
04 02 10 38  LMP  There it comes. Okay, Ken, we're getting earthrise.
04 02 10 49  CMP  Okay; I got my HIGH GAIN set AUTO.
04 02 11 14  CDR  Okay; they're locking up on me.
04 02 11 17  CMP  Hello, Houston. This is Casper bar [?] now. We
                      did not get a circ. And I'd like to talk about
                      the TVC servo loops.
04 02 11 33  CMP  That's affirmative. Presently about a mile ahead
                      of the LM. And, I'd like to talk about a TVC servo
                      loop problem.
04 02 11 54  LMP  Okay; yaw around to - yaw to zero.
04 02 11 56  CMP  ... tell me as soon as you get ready to - -
04 02 11 58  CDR  Yaw - yaw what?
04 02 12 00 CMP -- dump the DSE so you can take a look at what I'm talking about. And I'll leave you in --
04 02 12 04 LMP Yaw right a little bit.
04 02 12 06 CMP -- MANUAL and WIDE until you do. Okay, the text is that we came up to the burn time and I was going through the --
04 02 12 11 CDR Why?
04 02 12 13 LMP So we can get a better - better lock on them.
04 02 12 15 CMP ... checked out. I switched to --
04 02 12 18 CDR Loud and clear.
04 02 12 20 CMP -- ... the THC to perform the secondary gimbal check ... normal. I set the pitch trim normally, I went to set the yaw trim; and ... that the trim would not work and I got divergent oscillations on the yaw trim indicator, and you can feel them in the spacecraft. So, I switched to the --
04 02 12 44 CDR Hey, Ken, go off VHF, please.
04 02 12 45 CMP -- the number --
04 02 12 46 LMP All we got to do is --
04 02 12 47 CDR Huh?
04 02 12 49 LMP Turn yours off, man.
04 02 12 51 CDR Huh?
04 02 12 52 LMP Turn it off over there.
04 02 12 56 LMP Houston, Orion. Over.
04 02 13 00 CC Orion, this is Houston. Read you rather weak. How do you read us?
04 02 13 05 IMP Roger. You're 5 by. The command module did not do circ. And we're standing by to - for y'all's decision with him. Over.
We understand you're standing by. We want you to stay with the omni, and we'll be requesting high bit rate shortly.

Roger. Did you copy? No circ.

We're ready for high bit rate now. Copied no circ.

Okay; you have high bit rate. You hear that noise?

Okay; I anticipate a waveoff for this one. I'll set you up for the next one.

Okay.

Yeah, what is that noise? Huh?

I don't know either. ENGINE ARM, OFF, MASTER ARM, OFF, FOO, LANDING RADAR is off, ASCENT BATS, OFF.

They are.

PROPELLANT QUANTITY MONITOR, OFF.

It is.

We never turned it on. AUDIO to PTT.

ECS to CABIN mode.

It is.

Helmet and gloves off, AGS to ATT HOLD.

It is.

Align IMU, P52, same stars.

Okay. And Ken is right out in front of us. Maybe about 600 feet.

How about if I just give you the high gain from right here?

So we have a visual on him.
04 02 14 31  CC  Okay; we copy.
04 02 14 33  CDR  What attitude you want us to go to for best --
04 02 14 38  LMP  I think you can stop it right now.
04 02 14 40  CDR  I'm --
04 02 14 43  CC  Stay right where you are, John. Your comm - comm's really good.
04 02 14 46  CDR  Okay.
04 02 14 51  CC  Orion, will you confirm FORWARD omni?
04 02 14 55  CDR  Roger. That's what you have, FORWARD omni.
04 02 15 29  CMP  Okay; I've got you a solid lock on the high gain.
04 02 15 40  CMP  I prefer this attitude, Hank, because I can keep the LM in sight.
04 02 15 52  CDR  Let's try that rendezvous radar lockup again, Charlie.
04 02 15 55  LMP  Okay.
04 02 15 57  CDR  I don't understand why it didn't work. Do you?
04 02 15 58  LMP  No.
04 02 16 02  CMP  That's affirmative. Servo loop number 2, yaw only.
04 02 16 13  CMP  That's affirmative.
04 02 16 18  LMP  It's good, John.
04 02 16 21  CDR  It got him, hadn't it?
04 02 16 22  LMP  Yeah. Go AUTO TRACK.
04 02 16 30  CMP  No, sir. No, sir. Primary loop checked out normally. Secondary loop never checked out in yaw servo. The motor started normally, and it's - Go ahead, Hank.
04 02 16 56  CMP  That's affirmative. And I tried both AUTO and RATE COMMAND in SCS.
Orion, this is Houston. We would like you to go back to normal RCS configuration.

Roger. Normal RCS config, Charlie; whatever that means.

Jim, be advised we had a couple of RCS REG A lights on the back side, and by blipping the system, it went out.

That's affirmative.

I think he's probably just about out of mode - mode I limits, John.

Yeah, I think that's what it is.

We copied, Charlie.

Well, the heck with it.

Wait a minute. Let me park the antenna where it should be.

Plus all balls? No, you - there you go, plus.

Okay.

Let me pull the breakers.

Houston, How do you read? Over.

Okay; I'm prepared to do that right now if you're ready.

Read you loud and clear.

Okay. I don't think we're going to have - a - a - a - a - a meeting problem here. But we're pointed right at him, and as I look at him on my LPD - Ken is out at 46 degrees at about - oh, I'd say 8 - 800 or 900 feet, maybe a thousand.

Roger. Can you see those booms that had the problem?

They're all retracted. Everything's retracted.
04 02 20 05  CDR  Everything's retracted in the SIM bay.
04 02 20 11  CC    Okay. We copy.
04 02 20 12  CMP   Okay. I'm bringing the bus ties on.
04 02 20 29  CMP   Okay. And servo powers 1 and 2 are on in the loop configuration. Are you ready for me to start the gimbals?
04 02 20 50  CMP   Okay. Here comes - You just wanted to look at the yaw. Here comes YAW number 2. There it is, and it's oscillating now, and it's damped out, and that's in AUTO. I'll switch it to number 2, and number 2 in AUTO. I'm now going to move the thumbwheels, and it - well, now it's - there it goes - now it's oscillating and divergent, and I'm turning the gimbals off. Okay; YAW GIMBAL number 2 is off. I'll hold this configuration.
04 02 23 12  CDR   There's nothing we can do, Charlie. You think?
04 02 23 18  LMP   Up to them. Let's see the book.
04 02 24 26  CDR   You want - you say you want to go ahead and try it without - without the - without the loops? What do you think?
04 02 24 31  LMP   I don't think they do. I bet you they don't.
04 02 26 13  CDR   You never can tell, Charlie.
04 02 26 15  LMP   What?
04 02 26 16  CDR   What they'll do. Sock, me a little water.
04 02 26 24  LMP   Okay.
04 02 26 34  CDR   That's fine. Thank you.
04 02 27 19  LMP   Houston, 16.
04 02 27 24  CC    Go ahead, 16.
04 02 27 26  LMP   Roger, Jim. You guys working on some more pads and stuff for us?
Oh, yeah; we are, Charlie. And when you get a chance we'll take your AGS cal, if you have those.

Yeah, sure do. Stand by.

We'd like to pitch down to keep Ken in sight. Is that possible?

Okay. You're - you're cleared.

Okay. Starting with 540, minus 008, plus 001, plus 002, plus 006, plus 05 - correction, plus 045, minus 088. And the initial numbers were the same as on the Data Card Book.

Okay. Beginning - Here's the readback. Beginning at 540, minus 008, plus 001, plus 002, plus 006, plus 045, minus 088; and the initial values were the same as on the cards. Over.

That's affirmative.

Okay. And on your - on the RCS situation, we suspect that the - the burst disk went back side. We'd like to make sure of the system A pressure. When the source pressure in system A gets down to 500 psi, we'd like you to close off system A. Over.

Roger. What is it now, Jim?

When you say in source pressure, you mean helium?

Affirmative.

Okay, Jim, the helium is holding right up there. It's 2400 and that was where it was before we started getting those RCS lights. The pressure never has gone above about 205, 210 maybe.

Okay. We copy.

But it's RCS problem. The comm problem.

The radar problem.

And the gimbal problem.

They're liable to shoot us down on numbers alone.
<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 02 30 00</td>
<td>LMP</td>
<td>Yeah.</td>
</tr>
<tr>
<td>04 02 30 04</td>
<td>CDR</td>
<td>Man, I'm ready. I'm ready to go down and land. I think that'd really be neat.</td>
</tr>
<tr>
<td>04 02 30 47</td>
<td>LMP</td>
<td>I bet we dock and come home in about 3 hours.</td>
</tr>
<tr>
<td>04 02 31 55</td>
<td>LMP</td>
<td>Jim, give me a call when you want us to go to AFT omni.</td>
</tr>
<tr>
<td>04 02 32 02</td>
<td>CC</td>
<td>Yeah, we sure will, Charlie.</td>
</tr>
<tr>
<td>04 02 32 13</td>
<td>LMP</td>
<td>And have you got a - LOS time for us?</td>
</tr>
<tr>
<td>04 02 32 39</td>
<td>CDR</td>
<td>300 hours in the pressure suit.</td>
</tr>
</tbody>
</table>

TIME SKIP
... do you have any problems that are ...?

We got a RCS problem, but it's not too bad. And, otherwise, we're okay. We can't get our steerable antenna up.

You don't need that one up, do you?

No.

Can you land on omni?

Yeah, we can land on omni. How does that thing look to you, Ken? It it unstable everywhere?

Yes, sir. There's no question about it. I - Any - any force at all that moves it up makes it go unstable. Looks like that ... movement ...

Is that main B? Is it run off main B?

Yeah, but I don't think there's a - It's not likely ..., I wouldn't think. They - they told me after ... that they went back and looked at the ... all the heaters ... 

Ah so. Well, I never did think it was a good idea to run those gimbal motors that long.

Well, I guess they're having some of those kind of thoughts right now, too.

Yeah. Those once in a million problems like that coarse align, and everybody gets boresighted on it.

Well, I guess we'll be ready to ... ... one of those guys ... through it here ... Maybe ... into position, then the next turn on ..., they could ... probably pretty good by using - just using the proper trim to start the burn.

Yeah.

Then if you did encounter the - external pressures not moving them, then I don't know what you do. ... think we could use it in ACCEL COMMAND with - just set the proper trim. And if you needed it, go to SCS and ACCEL COMMAND - orbit the right direction.
04 03 26 18  CDR  ... that pulse. ... 
04 03 26 25  CDR  You sleeping? 
04 03 26 27  LMP  Was I sleeping? I was almost asleep. 
04 03 26 37  CDR  I bet my bride is beside herself. 
04 03 26 41  LMP  Yeah. 
04 03 27 12  LMP  Well, we'll be two revs late, but we'll do it. 
04 03 27 16  CDR  I hope you're right. 
04 03 27 28  CDR  We ain't gonna do any EVA today, either. 
04 03 27 30  LMP  You don't want to? 
04 03 27 32  CDR  Not for two revs, Charlie. Let's do it tomorrow and do the full thing. 
04 03 27 54  CDR  What's it do, bend? 
04 03 27 59  LMP  Probably the first dish, yeah. 
04 03 28 34  LMP  He's dropping down out the bottom of the window. 
04 03 28 54  CMP  We're now passing ... through Scorpio. 
04 03 28 58  CDR  Yep. 
04 03 29 00  CMP  I found out that, looking out the window out there, that the - we'd be able to see it a lot better. And I guess with the telescope that they've got that ... 
04 03 29 40  CMP  What's the limitation of how long you can stay before you can't go down? 
04 03 29 45  CDR  Five revs. 
04 03 29 47  CMP  No, I mean, what's the limiting factor? Is it water? 
04 03 29 50  CDR  No. We got plenty of water. 
04 03 29 52  LMP  We could - we can land and just do a couple of EVAs.
I was just wondering what - how they turned up with five revs. Is it - is it water, or what - what's the ...?

Got no idea.

I don't know.

Light still on?

Yeah, ours is.

No, I mean the RCS light.

What's the pressure?

It's 210.

I think we got enough ullage in there, in the tanks to -

Just let it go? It's not firing anymore?

Well, I don't know.

I don't think we ought to fire anymore.

It's probably that thermal blanket blew off and caused this thing to overpressurize.

Probably right, Charlie.

But the temps are good.

Is that sunrise?

Yep.

Did you say you had sunrise, Charlie?

It's coming up. We can see it glowing beyond the horizon.

It's going to be instant sunrise, you know.

Too dark. ... dark as ever.
04 03 33 46  LMP  It's behind you, Ken.
04 03 33 48  CDR  Yeah, it's behind you, boy. When it comes up, we won't be able to see you anymore.
04 03 33 53  CMP  Okay. I've got you boresighted.
04 03 33 56  CDR  Okay.
04 03 34 16  CDR  Be kind of hard to get a radar lock. Oh, no. The Sun'll be up long before it.
04 03 35 24  LMP  Yeow!
04 03 35 25  CMP  ...
04 03 35 31  CDR  (Whistle) It was long before we got there though that we saw it, right?
04 03 35 37  LMP  Right. Yeah.
04 03 35 38  CDR  Do you reckon light bends?
04 03 35 40  LMP  Huh?
04 03 35 41  CDR  Reckon the light bends?
04 03 35 44  CMP  ... you're looking great.
04 03 35 48  CDR  Where'd my glove go?
04 03 37 40  CDR  We were GO for PDI there for a while.
04 03 37 43  LMP  Yeah.
04 03 37 46  CDR  I can't - I can't believe it. I can't believe it (laughter). We'd had no trouble at all picking up the site either.
04 03 37 54  LMP  I know; it's beautiful. I guess you can't win them all.
04 03 38 10  CDR  I'm not getting any cooling at all, Charlie. Are you?
04 03 38 13  LMP  Cooling?
04 03 38 14  CDR  Yeah.
A little bit out of the suit. Not much.

Why don't you go to LGC on a - for a second or two?

Okay.

Charlie, we ought to have an eat period is what we ought to do. You ain't hungry?

No.

How about something to drink, or something like that?

Back there in the food locker.

I don't want anything, really.

You don't? Okay.

Unless they got a sandwich or something back there. I'll eat that.

All they got is those drinks, Charlie. Those orange drinks.

Wait a minute. Open the top, John.

I don't want to get too close to the hatch.

Ain't nothing wrong with the hatch. It's okay.

Those two on the left come open.

Yeah, I know it, if I can get to them.

See. Those orange drinks.

That's all that's in there, is orange drinks?

Well, there's some stuff behind it, but I can't get at it. I'm not - I just can't. I - I could reach it with the moving the orange drinks, but if I do, I don't know what I'm gonna do with them.

Put them in the Flight Data File up here. There's plenty of room up here.
Oh, oh. Excuse me.

Son of a gun, I keep - I keep getting them things.

In this one?

Yeah. Either one.

Don't think there is plenty of room in there. No, there ain't.

Man, there is more pieces of metal around this spacecraft! You want a food stick?

It won't go in there?

Might if I fold them in half.

Stick them into the ISA then.

There we go.

I'd hate for any of that stuff to get loose in zero gravity. It would be a mess.

Charlie, you got me almost to PDI there.

Well, I tried hard.

You did good.

But if the gear don't work. Well, maybe they'll come up with something.

How about a food stick? Can I have a food stick, Charlie?

Sure.

Don't know where he is now.

Probably down below him. Below us, rather. Hey, Ken, they want you to rendezvous at 100 hours, wherever that is.

Yeah, I thought they said that was our closest point of approach, and it sure doesn't look to me...
like it's going to make it. Looks like we passed it back there about 20 minutes ago.

04 03 44 19 LMP Yeah, I - I agree with you. They want you to be active.

04 03 44 24 CDR There is no way they can tell what it is on these short things; they don't have any idea where we are, Char - Ken.

04 03 44 39 CMP Charlie, I'm going to try to reacquire ... and make sure I don't have a bad ...

04 03 44 43 LMP Okay, I got 0.68 on the -

04 03 44 46 CMP I got 52. Let me reacquire and - and try it again.

04 03 44 52 CDR That - What is that? That's not 1676.

04 03 44 55 LMP No, that's -

04 03 44 56 CMP ... I can acquire ...

04 03 45 16 CMP ... are still out. Going to 5000.

04 03 45 20 CDR Okay.

04 03 45 21 LMP Okay. You can start closing if you want, I guess.

04 03 45 26 CMP Well, I guess I better ... back around any minute.

04 03 45 31 CDR Yeah, just be - Hey, if you want us to give you range and range rate, we'll lock on you. How about that?

04 03 45 37 CMP I'm sorry. I didn't understand what you said, John.

04 03 45 41 CDR We should lock on you and give you range and range rate.

04 03 45 45 CMP No, I thought you were saying that you didn't have your radar. I thought that's ... good sense.

04 03 45 49 LMP No. We got plenty.

04 03 45 50 CDR We got plenty of radar. We're going to do it.

04 03 45 52 CMP I thought you were trying to say ... the amps.
No. No, we got plenty of amps.

Okay. Well, that'll help. That's better than this thing.

Dang right. Where are - Which way should we pitch to get to you?

Beg your pardon?

Which way should we pitch to get to you?

Oh, let me see. You're all - Oh, boy. It's hard to tell what figures I'm looking at except rate. I think I'm looking at the top of you though.

Okay.

That's what it says, pitch up.

Well, you can't believe that, Charlie. We ain't updated it.

Huh?

We ain't updated it or nothing.

I said - Oh, you mean the radar? Oh. No.

Well, I don't see him anywhere.

That ... burn. That must be - maybe ... your engine. That's probably it, because I can see the bell here. So your - your ... pitched to 180 with me.

That's what I thought. He's been going in under us.

Well, why did you say pitch up?

I didn't say that. Ken did.

(Laughter) You ain't gonna take credit for it, huh? ... I'd have swore I heard you say pitch up.

Hmm. Well, that's what the AGS says, but that ain't right.
Well, it must have been - You know - -

Yeah, yeah.

-- you can't -- Anything less than a mile, these things ain't no good. Because - Well, AGS is okay. But this thing here measures from the center of the Moon. I don't have the foggiest notion where our boy is.

Hear that noise?

It's in the comm. Oh, that whooooo? Oh, yeah.

That's what I mean.

Yeah.

We were back here - It's got something to do with the VHF ranging.

Boy, I don't see him anywheres.

Think we got quite a ways to pitch yet.

Oh, shoot. Do it.

There he is. Yeah, he's way far away from us. I think what the problem is, Ken - -

There he is, dead ahead.

-- is you're opening up.

Dead ahead.

Yeah, I got it.

Push the RENDEZVOUS RADAR breakers in.

Yeah, that's a good idea.

I agree with you.

You want to be careful how much velocity you add, because you're too low to add a lot. Or --
... I just put in 2 foot per second. But that - that wouldn't - ... closing us yet.

Okay.

Looks like you're looking at me now.

Well, 2 foot a second. You should of took out 2 foot a second on account of you're ahead of us.

Ch, say again.

Remember Mr. Kepler?

Say again, Ken. Either way, 2 foot in or out will do it. That'll make him slow down when he goes up over the top of us.

Yeah.

I'd rather have - There we go.

Hey, we got him. Okay. He's still opening.

Okay. What kind of a range do you read now?

0.66 miles and open, and it's 0.6 foot a second.

Well, I guess I'd better put in another couple of foot per second then. Hate using all this gas up, but I guess that's all right.

Let me get him boresighted and locked up.

Well, let me get it like this.

Okay. Thought we might have had a side lobe.

Yeah.

There you go. Go to LGC.

Got a side lobe.

Tell me when you ...
Stand by, Ken. We had a side-lobe block; we're getting the main lobe. That looks like it, John. What - Oh, you want to go to -

There we go.

Okay; we close. Show 0.68 miles, 0 feet a second.

Yeah, you're 4200 out. It says here it -

Okay; we show you -

Better not add too much.

No. I'd just hold what you got, Ken.

Okay.

He'll drop way down. You know, if he - if he fires this way, it's retrograde; it's going to drop him low - lower his orbit.

Yeah. How much did you put in?

I put in a total of 3.5.

Okay; well, that's going to get you right close to the ground.

Not from over here.

I'm not going to get very far from you.

Am I closing any yet?

No.

It'll take half a rev.

Okay, I'm not sure - It seems to me I ...

Yeah, you know they have no idea where we are.

Yeah, but they know where we undocked, and what bearing ... --

No. No, there's no way. Not for short ranges like this.
If you really want to get me within half a rev, I guess it ought to be a radial burn, shouldn't it?

Okay; we show you closing slightly now, about a half a foot a second.

Okay.

Yeah, it shows it took me down to 8.6, but as long as I stick with you, I can't get too far away.

Okay, our range-rate meter says you're 4100 foot out.

Okay.

What do you show for your perilune?

The what?

What's your perilune?

Ours says 11.0, Ken.

Okay, I'm reading 8.6.

I guess the five revs might have been, John, the high gain coverage they got, since our steerable doesn't work. We can go as long as we got the 210.

Yeah.

It’s going to be hard to run - He's going to take a lot of gas to get over here.

Should have took it out.

Huh?

You thursted toward us 3.5 feet a second. Is that true?

I thursted toward you 3.5. Yeah, that was - looks like both in retrograde.

Yeah. Looks like to me you're going to have to go up a little bit now. A couple of feet a second.
Have you got some kind of chart there that could do the gimbals?

No, we sure don't.

No. But, see, that retrograde burn is going to take you down below us.

Roger. I understand that. It really looks like what I want to do is to make a radial burn, you behind me. I really ought to make a radial burn out, shouldn't I?

Yeah. Shouldn't he?

How about let's do that.

Okay.

... my range and range rate now?

0.680 feet a second.

It was 0.4 foot per second radial out.

Okay.

Man, it's really white into zero phase, isn't it?

Yeah.

Seems to me like I'm opening again.

Well, we got you about zero, Ken, maybe closing slightly. I think it's going to take a couple of feet per second radial.

He's got to go up like that. But with our mechanics, it may not do anything.

I guess I'm getting more or less concerned about that minus-X I put in there.

I guess I don't blame you. I'd have thought you'd have put in plus-X and rose over the top of us.

I think I'm going to take it back out ... That sound reasonable?
2-101

04 04 03 37 LMP Su - sure does to me, Ken.
04 04 03 57 CMP I can ... your ...
04 04 04 31 CDR Okay; now that shows you're opening at 3 and a -
that shows you're opening at 3.
04 04 04 45 LMP Here comes earthrise. You see it?
04 04 04 52 CDR Yeah.
04 04 04 53 LMP Man, that's spectacular.
04 04 04 59 CDR Yeah. Now according to our mechanics, you're bound
to end up behind us. And close to us.
04 04 05 07 CMP Okay. That shows we get a 59 by 9.
04 04 05 20 LMP Houston, Orion; how do you read?
04 04 05 24 CC Orion, this is Houston. Read you loud and clear.
04 04 05 27 LMP Roger. Same-o, Jim. We're about 0.7 of a mile
out from Casper now.
04 04 05 42 CC Say again, Charlie. We still have excessive noise
here.
04 04 05 48 LMP I say our range to Casper is about 0.7 of a mile.
04 04 05 52 CDR And he's opening at 2-1/2. He put in some
posigrade velocity to go up and above and come
down and get with us.
04 04 06 06 CMP John, I think that total is still slightly
retrograde.
04 04 06 13 CDR The total is slightly retrograde?
04 04 06 15 CMP Yeah. I - I'm thinking maybe I ought to ... put
some more in there.
04 04 06 19 CDR I think you're probably right. Another - another
2 feet a second.
04 04 06 29 CMP Okay.
Okay, 16. This is Houston. We still do not have an answer, but people are working very feverishly.

Orion. Roger.

Okay; thank you. It'll probably be awhile before we get to stationkeeping anyway. Like about a week.

That only shows 9.2. Why don't we get them to get an arc on this? I guess I'd like to know how good my vector was to start with.

It's no good this close in, Ken.

How's that?

It's not any good this close in.

Okay. I can't hear you.

He said it's not any good this close in.

I know, but my ... vector is good. How good is it?

Oh, okay.

That's what I'd like to know from Houston.

You're not locked on them?

Ken - Ken, you should be able to get a lock on with them.

No, I've been trying that.

Houston, Orion.

Go ahead, Orion.

Okay; we got an RCS SYSTEM A REG light. Pressures: HELIUM is looking like 2300 --

Get the B?

The PROPELLANT is at 210; the FUEL MANIFOLD at - and OX MANIFOLD is - correction, make it 215 - or 220. And everything else looks pretty good. Pressures are holding up - You think the burst disk is gone?
04 04 09 02 CC Roger. It looks that way to us, Charlie.

04 04 09 06 LMP Okay.

04 04 09 07 CC Casper, this is Houston. Read you loud and clear.

04 04 09 25 CDR Hey, Ken, why don't you summarize what you did in the way of thrusters to tell them what to expect. Okay?

04 04 09 31 CMP I'm doing that, John.

04 04 09 32 CDR Oh, okay.

04 04 09 33 CMP And - so I took about 3 of that out, and I put in a half foot per second radial at about 100 hours and 5 minutes, and then I put in the rest - took 2 foot per second posigrade at about 100 hours and 6 minutes. And at about 100 hours, I put in 3 - it was about - roughly retrograde. And my computer now shows 16.5 by 9.2. And I had a good state vector when I started, and that's probably a good value, but I want to ... do I show an arc or ...

04 04 10 12 CC We copy, Ken.

04 04 11 00 LMP That ... sound - sounds like all the gears are broken in it.

04 04 11 10 CC Orion, this is Houston. We're wondering where you got the estimate of 0.7 of a nautical mile range?

04 04 11 18 LMP We got the rendezvous radar locked on, if you want us to. Or do you want us to turn it off?

04 04 11 25 CC That's fine.

04 04 11 30 CMP I show us now at about 0.9 of a mile. Is that correct?

04 04 11 33 LMP That's right, Ken.

04 04 11 35 CDR 5500 feet, Ken.

04 04 11 36 CMP Okay. And still opening?
Yeah.

Houston, Orion. John and I been talking about - If we get to land this thing, we'd like to - probably ought to think about going to sleep first, and we'd get up and do a full EVA tomorrow.

Roger. We - we concur down here.

Could you tell me if my range - -

Okay, Casper. This is Houston. We're recommending that you - -

Go ahead.

-- null the line-of-sight rates and fire 5 feet per second toward the LM.

Okay. That's still going to be mostly retrograde, it looks like. That's how I got in this place to start with.

We copy you, Ker.

Okay; I'm going to hold. Can you guys get a short arc going on my trajectory?

Ken, we show you coming up on perilune now, so you'll be affecting your apolune.

You show me coming up on perilunes?

That's affirmative.

Roger. My state vector shows 19 miles up, and we're not - I'm just passing Smythii. Is that - does that sound reasonable that we shifted that much in orbital track?

Okay. That sounds good, Ken.

What's going on down there?

He ain't - -

I guess I'd like for you to - to summarize again where I stand. I'm a little bit confused now, Jim.
It appears to me I'm just - I'm just passing Smythii.

04 04 14 38  CC  We were hoping that -

04 04 14 41  CMP  And my altitude according to my computer - Was my state vector a little bit off to start with?

04 04 14 55  CC  We think your state vector was fairly accurate, Ken.

04 04 14 59  CMP  Okay. Then there's still a discrepancy in - -

04 04 15 01  CC  You'll be at perilune in 15 minutes.

04 04 15 03  CMP  Okay. That makes more sense.

04 04 15 05  CC  All right.

04 04 15 06  CMP  Because I'm presently at 19 miles, and I think that's probably a good estimate. If I do - Do you want me to thrust towards the LM now? Is that affirmative?

04 04 15 23  CC  That's affirmative.

04 04 15 25  CMP  Okay. Now I'm - This is using up a great deal of RCS which is going to violate the next line. Is this preferable to trying to do a regular rendezvous now?

04 04 15 38  CDR  Regular what?

04 04 15 46  CMP  Because if we still have a chance at landing, then I need to ... to you - -

04 04 15 48  CC  Ken, could you give your position relative to the LM?

04 04 15 52  CMP  Yes, sir. I'm ahead of him and slightly below, and I show a - a mile on the EMS, and I don't know what John has on the radar.

04 04 16 04  CDR  Yeah, he's - he's ahead of us, and I show him about - level and 6500 feet out and opening at 3 feet a second.

04 04 16 26  CC  Okay. We copy your position as ahead, below, and about 1 nautical mile.
04 04 16 30 CMP That's affirmative.

04 04 16 32 CDR And he's opening at 2-1/2 on 1678. And 3 feet a second on the tapemeter. Give me a VERB 83.

04 04 16 50 IMP Can't unless we terminate this.

04 04 16 52 CDR Well, let's terminate it.

04 04 17 03 CDR Can't terminate it, huh? Go to AUTO in TRACK.

04 04 17 07 CMP Okay, Jim. To make sure there's no confusion, I haven't done anything yet.

04 04 17 10 IMP No, you got to -

04 04 17 19 CC Okay; stand by.

04 04 17 32 CDR Okay. On the - on the COAS, I've got him boresighted there, and he's 35559 from local vertical.

04 04 17 46 CC Okay, Ken. This is Houston. We're convinced that we want you to fire directly at the LM about 5 feet per second. We want to get a positive closing rate.

04 04 17 57 CMP Okay. That's in work.

04 04 18 37 CMP Okay. Looks like the DAP isn't stable now. How about if I give it a VERB 46?

04 04 18 47 CC We copy.

04 04 18 49 CMP Good idea?

04 04 18 56 CC We show you in FREE.

04 04 18 59 CMP I am now, but I wasn't.

04 04 20 04 CDR The DAP is unstable!

04 04 20 06 CMP Does that mean I'm clear to do a VERB 46?

04 04 20 09 LMP Yeah, they said okay.

04 04 20 13 CDR They say okay, Ken.
Okay. Oh, it still didn't work. I think maybe I've had one of those transients.

For some reason, every time I pick up CMC AUTO, this thing - starts doing maneuvers.

Can't believe it.

Turn on some water, Charlie.

Orion, let's go LO bit rate.

You have it.

Okay.

Okay. I got it under control, Jim. I had - It was a bad DAP.

Thank God.

Okay. You want ... to put 5 foot per second ... at the LM.

Didn't mean to do that.

What?

What he just did.

Huh?

He didn't mean to do it.

He didn't?

No. It's going up and over us right now.

See? The line-of-sight rate --

Casper, Houston. Hold up on that RCS maneuver.

Okay. I've put in 3 foot per second.

Hold up, Ken.

Say again, please?
04 04 22 50 CC  Okay.  Hold it there.
04 04 22 51 CMP  Okay.  Holding at 3.
04 04 23 08 LMP  You keeping him boresighted?
04 04 23 10 CDR  Yeah.
04 04 23 24 LMP  Roll's going off a little bit, John.  Not that that's going to hurt you any.
04 04 23 50 LMP  Say he's drifting down - that says he's drifting down.
04 04 23 54 CDR  He's drifting up.
04 04 23 55 LMP  Well, look at the needle.
04 04 23 58 CDR  Okay, Ken, to - to get us, you're going to have to thrust down to null the needles.
04 04 24 06 CMP  Thrust down means towards the Moon or down as you see it?
04 04 24 13 LMP  Towards the Moon.
04 04 24 14 CDR  Towards the Moon.
04 04 24 18 CMP  Okay.  I guess I am.  Houston, do you want me to go null line of sight all the way in?
04 04 24 27 CC  We need a range and range-rate reading now.
04 04 24 30 CDR  7000 feet, closing at 3 feet a second, and we have a line-of-site rate.
04 04 24 44 LMP  Okay, Ken.  If you can kill that line of sight, you're closing.
04 04 24 47 CC  Okay; copy.
04 04 24 48 CMP  Roger, Charlie.  I'm standing by for instructions for the best ...  
04 04 25 01 CC  And, Casper; this is Houston.  You should null the line-of-sight rate.
04 04 25 11 CDR  He'll take ---
<table>
<thead>
<tr>
<th>Time</th>
<th>Call Sign</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 04 25 12</td>
<td>CMP</td>
<td>Okay. Do you want me to keep them nulled and go all the way in? Is that the idea?</td>
</tr>
<tr>
<td>04 04 25 19</td>
<td>CC</td>
<td>And keep a positive closing rate.</td>
</tr>
<tr>
<td>04 04 25 23</td>
<td>CMP</td>
<td>Okay. It's likely to be expensive, but we'll do that. Okay. You're going to have to - Your needles are better than mine. Why don't you tell me what to do there, John.</td>
</tr>
<tr>
<td>04 04 25 36</td>
<td>CDR</td>
<td>Okay. Thrust down, and I'll tell you which way the needle moves.</td>
</tr>
<tr>
<td>04 04 25 41</td>
<td>LMP</td>
<td>Towards the Moon, Ken.</td>
</tr>
<tr>
<td>04 04 25 42</td>
<td>CDR</td>
<td>Towards the Moon.</td>
</tr>
<tr>
<td>04 04 25 43</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 04 25 46</td>
<td>CDR</td>
<td>That's - that's the wrong way, Ken.</td>
</tr>
<tr>
<td>04 04 25 50</td>
<td>CMP</td>
<td>That's sure towards the Moon.</td>
</tr>
<tr>
<td>04 04 25 53</td>
<td>CDR</td>
<td>Were you thrusting?</td>
</tr>
<tr>
<td>04 04 25 54</td>
<td>CMP</td>
<td>That's affirmative.</td>
</tr>
<tr>
<td>04 04 25 55</td>
<td>CDR</td>
<td>Okay; thrust away from the Moon. That's doing it. A little more.</td>
</tr>
<tr>
<td>04 04 26 13</td>
<td>CDR</td>
<td>You didn't get it corrected, Ken.</td>
</tr>
<tr>
<td>04 04 26 19</td>
<td>CMP</td>
<td>How's that now?</td>
</tr>
<tr>
<td>04 04 26 21</td>
<td>CDR</td>
<td>Oh, it's just not moving very much at all.</td>
</tr>
<tr>
<td>04 04 26 24</td>
<td>CMP</td>
<td>You think this is a good place to stop.</td>
</tr>
<tr>
<td>04 04 26 26</td>
<td>CDR</td>
<td>No, you - It's gonna be expensive, Ken, to do this, but you - you're gonna have to thrust up.</td>
</tr>
<tr>
<td>04 04 26 32</td>
<td>CMP</td>
<td>Okay. I - I just need some gouges to when I get it nulled.</td>
</tr>
<tr>
<td>04 04 26 37</td>
<td>CDR</td>
<td>Okay. You don't have it nulled.</td>
</tr>
<tr>
<td>04 04 26 43</td>
<td>CMP</td>
<td>How's that?</td>
</tr>
</tbody>
</table>
04 04 26 45  CDR  That's - you've got 4 milliradians down.
04 04 26 55  CMP  Okay. What's my range rate?
04 04 26 57  CDR  Three - 3 feet a second, closing.
04 04 27 00  CMP  Okay.
04 04 27 01  CDR  You're at 6600 feet.
04 04 27 03  CMP  Still going down?
04 04 27 05  CDR  That's affirmative.
04 04 27 13  CDR  You got it to 3 milliradians.
04 04 27 17  CDR  You got it to 2 milliradians.
04 04 27 28  CDR  You've got it to 2 milliradians. Now you've got it, Ken. You killed it.
04 04 27 32  CMP  Okay.
04 04 27 55  CMP  Looks to me now like I'm drifting the other way.
04 04 27 59  CDR  Not according to my needles.
04 04 28 01  CMP  Okay; I'll believe your needles.
04 04 28 07  CDR  Better be something right around here.
04 04 28 16  LMP  Well, I really don't know.
04 04 28 18  CDR  Don't know what, Charlie?
04 04 28 25  CMP  Range rate?
04 04 28 29  CDR  It's 3-1/2 feet a second, and you're at 6300 feet.
04 04 28 34  CMP  Okay.
04 04 29 00  CMP  Is the rate starting to build now? I'm trying to calibrate the dead-band activity here so I can tell what the rate - when it's really a rate and when it's just dead banding.
04 04 29 13  CDR  Okay. Your rates are nulled essentially.
Okay. Thank you.

Turn on some more water, Charlie. I don't know if I can stand this or not.

I think I might throw up.

Houston, Orion --

Orion, request you select the SECONDARY TRANSMITTER/RECEIVER.

Ken - Ken, tell them I selected that SECONDARY. It'll be awhile.

Okay. Houston, Orion says that they have already selected the SECONDARY.

Okay, Houston. How do you read now?

I read you loud and clear, Orion.

Okay; you're 5 by. How's the problem looking?

You - you maneuvering, aren't you, John?

16, no answers yet. We're still looking at it.

You - are you - you're pitching up, aren't you?

Yeah.

Huh?

Yeah.

Okay. I just wondered. He looks like to me he's moving on out there some.

He is moving out.

Okay, Ken. You're at 5600 feet, closing at 4 feet a second.

Okay.
Okay, Orion. This is Houston. We'd like you to open the PRIMARY POWER AMP circuit breaker on 16.

Roger. It's - it's open, Jim.

Orion, let's go high bit rate.

Roger. You have high bit rate.

Here comes the landing site.

Yeah.

Okay, Ken. You're getting a line-of-sight rate. You're gonna have to thrust a little toward the Moon.

Okay; I'm gonna try this -

Okay, we can't hold high bit rate. Request you go back to low bit rate, Orion.

Needles didn't move, Ken.

That's the right direction.

Okay. That's up for me; looks like it ought to be down for you.

That sounds pretty good, Ken.

Okay.

Okay, Ken. You've got it.

Orion, this is Houston. Could you give us a range and range-rate read-out?

Okay. 4900 feet, closing at 5.

4900, closing at 5.

You got the line-of-sight rates nulled now, Ken.

Okay.
They wouldn't want to do it the easy way. We're gonna arrive at the same time, in the dark. They've thrusted toward us at - at perigee at 100 hours. Man, that's really - I mean, he's thrusting at apogee so it'd take effect at perigee. And that's no good.

Yes, they're nulled right now.

Okay. ... do we have some - some fuel point at which to cut off and switch over to the LM power?

How much are you using?

Well, that's - that's hard to show ... I don't know how much ... until I see on the way in. I'm reading - Of course, these gages don't tell you exactly how much, but I have - that's 65 percent showing on B. And all this stuff is gonna be in - with the ... plane. Houston, got any thoughts on a cutoff point on RCS?

Stand by, Ken.

Okay. Well, you're at 4000 feet now at 5 feet a second, Ken.

Okay - -

And - and your line-of-sight rate is starting to build a little in the other direction. You've got it now.

And, Orion; this is Houston. Is the CSM above you or below you? We hope he's directly ahead.

He's at 45 degrees above us.

Forty-five degrees above.

Above the local vertical.
Okay, he's got a 5-foot-a-second closing rate, and his line of sights are nulled on the radar.

And they look like they are killed completely on the optics, too. Going to need your tracker light here in a minute. We're just getting a little glinted sunlight now.

Okay. It's on now?

Okay. Thank you.

Which way was he supposed to thrust to null them?

The one that was down - When it was up, he was thrusting -

Toward the Moon - -

Yeah.

-- away from the Moon.

It was down for him.

It was opposite.

Yeah. They're just opposite of what we're looking at.

Yeah.

Boy, those rates look steady at they can be.

They really got them killed.

Okay; and since we are going to get rendezvoused in the dark, I guess we'll just come up alongside and hold stations.

That seems like a fair thing.

All right, sir.

Would - would it be easier to thrust down now?
04 04 40 46 LMP Yeah.
04 04 40 49 CDR Okay, Ken. You're gonna have to thrust down a hair.
04 04 40 54 CMP That's down to you, right?
04 04 40 56 LMP It looks - it would be up to us, Ken. I think if we thrusted, we'd have to thrust up. I think you have to thrust down a skosh.
04 04 41 05 CMP That's what I mean. You would thrust - you would thrust up.
04 04 41 07 LMP Yeah.
04 04 41 08 CMP Okay. I think I got it killed again.
04 04 41 11 LMP It's looking good.
04 04 41 12 CDR Looks pretty good.
04 04 41 17 CMP What's that closing rate now?
04 04 41 19 CDR Still 5 feet a second - still 3-1/2 feet a second. Now at 3000.
04 04 41 23 CMP Three and a half feet per second.
04 04 41 25 CDR Roger.
04 04 41 26 CMP Okay. All I've got's the tracking light; I've lost the rest of your image.
04 04 41 30 CDR Okay. You've - you're gonna have to thrust a little more to kill that rate the same way. Okay. That got a lot of it, but not all of it. Okay. You got most of it.
04 04 42 00 CC Casper, this is Houston. You might pick up a temperature caution light on your quads, but it's of no consequence.
04 04 42 07 CMP Okay. Yeah, I see B is up high. Is that due to thruster activity? Or is that due to heaters coming on?
Affirmative, Ken.
Okay.
... thruster activity.
Roger.
Orion, this is Houston. Will you give us another range and range rate, John.
Up - thirt - 3100 feet at 3-1/2.
You're 3100 at 3-1/2.
Roger. And an angle of 68 degrees to local vertical now.
Understand; 68 degrees.
I can't believe I'm doing this. I can't believe we're doing this. Turn on some more water. Okay, Ken. You got a slight rate going up to the south according to my needles.
Whoa, Charlie.
Whoa.
Okay. Let's watch that for a minute before I start working on it, because we haven't had any plane component before. How's the line-of-sight rate doing now? Holding?
It's holding. It's holding - the vertical one is holding right on.
Okay. And range rate?
You're at 3000 feet at 3 feet a second.
Okay.
2800 feet.
Well, we must be going in the right direction, then.
<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 04 44 24</td>
<td>CDR</td>
<td>Yeah, you're gonna get there.</td>
</tr>
<tr>
<td>04 04 44 26</td>
<td>CMP</td>
<td>Yeah.</td>
</tr>
<tr>
<td>04 04 44 33</td>
<td>CDR</td>
<td>You now have 2 milliradians to the south.</td>
</tr>
<tr>
<td>04 04 44 35</td>
<td>CMP</td>
<td>Okay; I'll take some of that out. That means I go to the south, right?</td>
</tr>
<tr>
<td>04 04 44 42</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>04 04 44 48</td>
<td>CMP</td>
<td>How's that? Right direction?</td>
</tr>
<tr>
<td>04 04 44 51</td>
<td>CDR</td>
<td>Yeah, that's got most of it.</td>
</tr>
<tr>
<td>04 04 45 20</td>
<td>CDR</td>
<td>You still got some more to the south you've got to get. Still 2 milliradians. Okay. That's got it, Ken.</td>
</tr>
<tr>
<td>04 04 45 30</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 04 46 20</td>
<td>CMP</td>
<td>Okay, it looks like I'm picking up a rate in the opposite direction ... in-plane component.</td>
</tr>
<tr>
<td>04 04 46 25</td>
<td>CDR</td>
<td>No, you're not - you're not. You don't have any rate yet.</td>
</tr>
<tr>
<td>04 04 46 29</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 04 46 31</td>
<td>CDR</td>
<td>According to my needles.</td>
</tr>
<tr>
<td>04 04 46 32</td>
<td>CMP</td>
<td>All right. John, this is very much like the simulator where, because of the dead band lags, it looks like it takes a long time to pick up one of those rates.</td>
</tr>
<tr>
<td>04 04 47 06</td>
<td>CC</td>
<td>Orion, this is Houston. We want you to get the rendezvous radar and the tracking light off as soon as it's feasible to conserve power.</td>
</tr>
<tr>
<td>04 04 47 14</td>
<td>CDR</td>
<td>Roger. We will. It's not feasible [sic] right now.</td>
</tr>
<tr>
<td>04 04 47 21</td>
<td>CC</td>
<td>Understand.</td>
</tr>
<tr>
<td>04 04 47 35</td>
<td>CMP</td>
<td>Okay, it looks like I may need a little more to the south.</td>
</tr>
</tbody>
</table>

04 04 47 45  CMP    Okay.

04 04 47 50  LMP    He's going to need to thrust towards us a little bit.

04 04 47 51  CDR    Yeah.

04 04 48 21  CDR    He thrusts the opposite way we do. We're up down.

04 04 48 24  LMP    Yeah.

04 04 48 25  CMP    How about that rate to the south? It looks like it's building again.

04 04 48 30  CDR    My needles don't show it, Ken.

04 04 48 32  LMP    To the south?

04 04 48 33  CMP    Okay.

04 04 48 34  LMP    He never really got it all out.

04 04 48 46  CDR    Better start using their -

04 04 48 49  LMP    Huh?

04 04 48 50  CDR    Somebody better start using their brains and commonsense here.

04 04 48 53  LMP    What do you mean?

04 04 48 55  CDR    Or it'll blow the whole works.

04 04 49 05  LMP    You don't think this is right, what he's doing?

04 04 49 07  CDR    Yeah.

04 04 49 15  LMP    You want me to stick that card back over there?

04 04 49 16  CMP    Okay, I show quite a drift rate now, John. Do you still show no out of plane?

04 04 49 27  CDR    Yeah, I don't show any, and I've got you boresighted in that hole. And I don't show any motion there either, Ken.
<table>
<thead>
<tr>
<th>Time</th>
<th>User</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 04 49 35</td>
<td>LMP</td>
<td>Where? Our needles say he's drifting south.</td>
</tr>
<tr>
<td>04 04 49 40</td>
<td>CDR</td>
<td>Just a little south, Ken.</td>
</tr>
<tr>
<td>04 04 49 42</td>
<td>CMP</td>
<td>Okay. It looks like ... I'm gonna take some of that out.</td>
</tr>
<tr>
<td>04 04 50 00</td>
<td>LMP</td>
<td>He's going off the bellyband.</td>
</tr>
<tr>
<td>04 04 50 01</td>
<td>CMP</td>
<td>Can you tell if I'm going - Maybe I put that in the wrong direction, although I'm sure that was right. South is to your left, isn't it?</td>
</tr>
<tr>
<td>04 04 50 12</td>
<td>CDR</td>
<td>You betcha.</td>
</tr>
<tr>
<td>04 04 50 13</td>
<td>CMP</td>
<td>Okay. We're going the right way, then.</td>
</tr>
<tr>
<td>04 04 50 18</td>
<td>LMP</td>
<td>Hey, wait a minute, Ken - -</td>
</tr>
<tr>
<td>04 04 50 19</td>
<td>CDR</td>
<td>Whoa, Ken. You got it.</td>
</tr>
<tr>
<td>04 04 50 26</td>
<td>LMP</td>
<td>Okay, Ken. You were drifting south. That's right. You have to thrust north. You got it.</td>
</tr>
<tr>
<td>04 04 50 31</td>
<td>CMP</td>
<td>We've been going in the right direction all along, then.</td>
</tr>
<tr>
<td>04 04 50 32</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 04 50 33</td>
<td>CDR</td>
<td>Yeah, you have.</td>
</tr>
<tr>
<td>04 04 50 34</td>
<td>CMP</td>
<td>It appears to be I'm still a little bit out of plane. I guess that's the sensitivity of the rendezvous radar.</td>
</tr>
<tr>
<td>04 04 50 37</td>
<td>CDR</td>
<td>Yeah, don't worry about it.</td>
</tr>
<tr>
<td>04 04 50 55</td>
<td>LMP</td>
<td>Down to 1 foot a second. If he'd get a little bit more closing rate in, it'd be less gas.</td>
</tr>
<tr>
<td>04 04 51 07</td>
<td>CDR</td>
<td>I think it would be too.</td>
</tr>
<tr>
<td>04 04 51 08</td>
<td>LMP</td>
<td>Huh?</td>
</tr>
<tr>
<td>04 04 51 09</td>
<td>CDR</td>
<td>Let's call up VERB 63 again. Can we do that? No, I don't want to - I don't want to break lock.</td>
</tr>
</tbody>
</table>
Okay; how's my closing rate?

We're showing a foot a second on tapemeter. It isn't closing very fast.

Well, that's what I was just wondering. There could be a little more plus-X.

Okay. Say when and how much.

Okay. I'm gonna put in a foot plus-X. Okay? As long as we're using brute force, we might as well.

Okay.

Okay, that's about a foot.


There you go. It works!

How about that.

What was that?

Tunnel light.

Oh.

I can see the LM in earthshine now.

Okay, fine. You're getting over behind us, Ken. You're gonna have to - to thrust toward us a little more.

Okay. What's my range rate now?

It's at 2000 feet, but it's hardly closing at all.

Okay. Give me another foot. There's another foot per second.

Okay. Now you're starting to build a rate to the north.
04 04 54 02  CMP  I don't think those ... are as good as we're using them in here.
04 04 54 05  CDR  Yeah. I don't - I don't think they're quite as good.
04 04 54 09  CMP  It looks like I need to start reversing my in-plane direction.
04 04 54 11  LMP  Yeah.
04 04 54 12  CMP  Okay; do I still have a positive closure rate?
04 04 54 13  CDR  Yeah. Three feet a second; 2000 feet.
04 04 54 19  CMP  Okay.
04 04 54 21  CDR  1800 feet now.
04 04 55 09  LMP  Old Antares.
04 04 55 38  CDR  Okay, Ken. Now you are moving north, definitely.
04 04 55 41  CMP  Okay. I'm getting you centered back up in the COAS.
04 04 55 46  CDR  Okay.
04 04 56 01  LMP  He's got to put that 05 back in to get - to get his orbit back up.
04 04 56 08  CMP  Okay. Do I still have a positive closure rate?
04 04 56 11  CDR  Say again?
04 04 56 14  CMP  Do I still have a closure rate?
04 04 56 17  CDR  That's affirmative. Two feet a second.
04 04 56 19  CMP  Okay. Looks like the old EMS is just sort of sitting here looking at itself.
04 04 57 10  CDR  Okay, Ken. You do have a line-of-sight rate to north.
Okay. I'm gonna go ahead and use the EMS - I mean the COAS on the sync, because that's working out pretty good in here. Seems to be a more sensitive indicator of out of plane.

Okay; you've got 4 milliradians to the north. And you're at 1500 feet now.

Okay. Just barely drifting in the COAS. Looks pretty good here.

Okay. Well, now you have -

Can you see me at all?

Yes, sir. In earthshine I can see the whole LM, now.

Okay, fine.

I'm afraid we're gonna run out of earthshine before we get it completed. How's the closure rate now?

Still 2 feet a second, Ken. We're about 1400 feet now.

Okay. Man, that Moon in earthshine is really something.

Okay; and I show you with 4 milliradians to the north, and I see you drifting slowly across the COAS to the north.

Roger. I didn't quite get it stopped.

Okay, you're fixing it.

That looks to me like that's fixed. You still show some residuals?

Yeah, it's still 3 milliradians to the north.

Okay.

Okay --
Orion, this is Houston. We're showing about 10 minutes to LOS, and I have some words for you on our general plan when it's convenient.

Go ahead.

Okay. When you come off on AOS, on the next rev, rev 15, we'll give you GO or NO GO for another try. And we'd be looking at PDI on rev 16. And at that time, we'd have pads for you and procedures. Over.

Okay. Fair enough.

Casper, this is Houston.

Go right ahead.

Roger. We want you to verify that you're in auto DUMP on the water, that's the PRESSURE RELIEF in the number 2 position - that's vertical. And if you have an opportunity to get away from the controls there, we'd like you to manually dump the water to 10 percent on the back side. That should require about 17 minutes. Over.

Roger. I am in auto DUMP and I'll - I'll have to wait until we get in daylight to go down there, I think. I show about full, but I guess it isn't.

Okay; we copy.

Okay, Ken, line-of-sight rate is starting to - You'll have to thrust down a little - or, I mean up a little. That's fixed it.

Okay. How's my closing rate?

Two feet a second. You're at 1000 feet now, approaching it.

How's the out of plane?

It's starting to go to the south of here. Don't worry about it right now.

All right.
You got it, Ken. When you get in - when you get in - -

Orion, this is Houston. We'd like you to configure for RCS Bravo only. Over.

Roger; we'll open the CROSSFEEDS and close MAIN SOV A. We're configured.

Why don't you turn out some lights, Charlie? I don't know -

Okay. How's that?

Yeah. Okay.

Let me turn the numerics down a little bit.

Okay, Ken; 990 feet now.

All righty.

What a time to be closing, pitch black dark.

970. You've got the line-of-sight rates. Okay; can you see me with the spotlight yet?

No. That's what I was looking to see, because we're gonna lose earthshine here in just a minute.

Okay, Ken. You've got to thrust down just a hair.

You get that thrusting down a hair?

Yeah, I'm not sure if that was the same down you're talking about.

Okay. No. That made it worse. That's making it worse.

It's really strange; it was sitting here in the COAS here, right in the middle.

You thrust a hair down and a hair to the north.

You're upside down compared to me, and when you say down, you mean you're going - you're going down on me. Is that correct?
I'm doing it from the needles. If you don't ro - if you haven't rolled from the last way you were doing it, we were doing it okay.

Yeah. That's right, Ken. We're going down with you. We'd have to thrust up, according to the needle.

Okay; it's 820 feet now.

Okay.

It still doesn't seem like it does much. Okay; I show a line-of-sight rate that's essentially killed.

That's about right.

Yeah. They're about killed for this close in.

He looks bigger than 800 feet.

Sure does. At night, all cats are black.

... one of those cycle slips of that radar.

What's your VHF reading, Ken?

0.14.

0.14?

Yes, sir.

Okay; we're 750 feet here.

How much?

750.

Okay; I can see - your image is about 2 degrees, now.

16, this is Houston. We're showing 2 minutes to LOS. And if you give us a range and rate and Ken, perhaps you could repeat it for us.
Okay; 710 feet, closing at 2 feet a second, rates essentially nulled.

Did you copy that, Houston? The range is 710 feet, 2 feet per second, rates nulled. Houston, did you copy Casper?

Roger; we copied down here. Thank you.

Okay.

Okay, Ken. I can see the whites of your eyes. I can see you every time your light flashes. And every time my light flashes, it flashes off your probe.

Uh-huh. Let me turn the spotlight on.

You ought to have me now. Does it do you any good?

Yeah. I could tell I got you, but it's a poor competitor for earthshine.

Well, we ain't got any earthshine, old buddy.

Beg your pardon?

I say, we're gonna lose earthshine here in a minute.

Roger. It will all of a sudden look very night.

You can rendezvous under these conditions very nicely, the problem being that you've got to keep referring to that - to the reticle to get some kind of range, because there's just no - you still don't have enough depth perception to tell where you are.

Right. You're gonna be docking with - you're just slowly drifting to the north. You got the vertical line-of-sight rate killed.

Okay; in order to have good comm - -
LIFT-OFF MINUS 18 TO POSTDOCKING

07 07 11 49  CDR  What do you need here?

07 07 11 50  LMP  I need to get this VERB 47.

07 07 11 53  CDR  Okay; but you don't want it until 17 --

07 07 11 55  LMP  It's okay; I think the state vector -- Well, we can
wait 2 minutes, yeah. This helmet's worse than
any training helmet I've ever had, man.

07 07 12 21  CDR  It's pretty bad (laughter).

07 07 12 22  LMP  Isn't it bad?.

07 07 12 23  CDR  Yeah. Hey, Houston, are we on mike to you now?

07 07 12 35  CC  Orion, this is Houston. Recommending PGNS for the
direct rendezvous.

07 07 12 39  CDR  Understand PGNS for the direct rendezvous.

07 07 13 03  LMP  You know, I feel tired when I'm in here. But out-
side -- I never was tired a bit, outside. Never
felt tired.

07 07 13 10  CDR  Yeah. That water cooling is what does it. Why
don't you -- why don't you --

07 07 13 14  LMP  Want a shot?

07 07 13 15  CDR  Yeah.

07 07 13 17  LMP  You know, we could regulate this valve down here.

07 07 13 19  CDR  No, don't mess with that. It's no big thing.
That -- that -- that's on -- should be on hot; it'd
freeze you to death if you did.

07 07 14 05  LMP  How many hours and 13 minutes did he say?

07 07 14 08  CDR  Twenty hours and something.

07 07 14 11  LMP  That ain't bad for two-revs-late landing.

CONFIDENTIAL
Day 8

07 07 14 13 CDR Yeah.
07 07 14 17 LMP Of course, we got our nominal - we got 70 - we had - been on the ground 73 hours.
07 07 14 22 CDR Yeah.
07 07 14 29 LMP We landed at - see, 104 - No, I take it - 71 hours we've been on the ground.
07 07 14 41 CDR Okay, Charlie, here's the VERB 47.
07 07 14 42 LMP Okay, babe. I'm ready. I got to open that water. Whoo!
07 07 14 50 CDR Yeah, open that water. Forget that thing.
07 07 14 52 LMP Okay; 414 plus 1. HI bit rate, got it. Go.
07 07 14 56 CDR ENTER. Wait a minute. We've got to load VERB 25 --
07 07 15 03 LMP Oh, rats. Yeah.
07 07 15 08 CDR What is that?
07 07 15 10 LMP Okay; load once - VERB 25. Did you ever PRO on that?
07 07 15 12 CDR Yeah, I did. No, I didn't. VERB 25
07 07 15 20 LMP Yeah, ENTER. Plus 170, plus all balls, plus 4.
07 07 15 25 CDR 0004?
07 07 15 27 LMP Yeah, just put a 4 in there and - There you go.
07 07 15 31 CDR That what you want, huh?
07 07 15 32 LMP Yeah, now let me see if I got 414 and a 1. Okay. Go ahead.
07 07 15 42 CDR PRO.
07 07 15 48 LMP Good thinking, John, I forgot - It ought to say "Load the K-factor." We must have missed that somewhere.
07 07 15 55 CDR May be two or three pages of stuff we missed, Charlie.

07 07 16 07 LMP Okay. I got it.

07 07 16 10 CDR Okay. 308, 305, 302, 299, 296, 293, 289, 4 minutes, 04:30.

07 07 16 29 LMP Okay; 15 minutes, I'm going BATs 2 and 4 - Okay, Houston. Can I take BATs 2 and 4 OFF now?

07 07 16 39 CC Roger. We're ready.

07 07 16 41 LMP Okay, John. You've got - 5 and 6 are looking good.

07 07 16 45 CDR BATs 2 and 4, OFF/RESET.

07 07 16 47 LMP Okay BATs 2 going OFF/RESET.

07 07 16 49 CDR Talkback barber pole, BAT 4, OFF/RESET?

07 07 16 51 LMP It is.

07 07 16 52 CDR DESCENT BAT, DEAD FACE.

07 07 16 54 LMP Okay; dead facing.

07 07 16 55 LMP MARK.

07 07 16 56 CDR Okay.

07 07 16 57 LMP Okay.

07 07 16 58 CDR Talkback barber pole - -

07 07 17 01 LMP Okay.

07 07 17 02 CDR - - circuit breakers, 11 and 16, ECA CONTROLS, open.

07 07 17 03 LMP Okay.

07 07 17 05 CDR And circuit breaker, 11 and 16, ASCENT ECA CONTROLS to open.

07 07 17 11 LMP Okay, don't we open the DESCENT ECA, also?
07 07 17 12 CDR Yeah. Didn't I tell you? Both of them. DESCENT ECA --

07 07 17 16 LMP Okay.

07 07 17 17 CDR -- and ECA CONTROL.

07 07 17 18 LMP Okay.

07 07 17 19 CDR ASCENT ECA CONTROL. Verify circuit breakers per launch, check the configuration charts.

07 07 17 26 LMP Okay.

07 07 17 30 CDR Okay. S-BAND ANTENNA is open, AGS, there's FDAI, AC BUS VOLT, ACT LAMP, and -- all closed except the THRUST breaker. Okay, urine line HEATER breaker should be open. RENDEZVOUS RADAR - SIGNAL CONDITIONER 1, AZA, ABORT STAGE, ATCA (PGNS), AELD, DIRECT CONTROL, DECA POWER, LOGIC POWER, UTILITY. Okay. SIGNAL STRENGTH DISPLAY; the three of those should all be closed. They are. Two, 3, 4, those are open. One, 2, 3, 4 of those are open. One, 2, 3, 4, 5, 6, 7 of those is open. One of those is open. One, 2, 3, 4, 5, 6, 7. Seven of those is open. Excuse me, Charlie.

07 07 18 43 LMP No sweat. One open, top row, I got it, PQGS. One open, second row: DESCENT ENGINE OVERRIDE. Good. Four open, next row: S-BAND ANTENNA, TV, GLYCOL PUMP, LCG PUMP, CABIN FAN CONTROL. Six open, bottom row: MESA, S-BAND, ASCENT ECA, DESCENT ECA, DESCENT ECA CONTROL, BUS TIES. Okay. Okay; at minus 12 minutes, give me a VERB 83.

07 07 19 31 CC Orion, we'd like CABIN GAS RETURN in EGRESS.

07 07 19 35 LMP It is. Oh, no; it's not.

07 07 19 41 CDR Did I miss that one, Charlie?

07 07 19 42 LMP No, you - That's what - what the procedure says.

07 07 19 46 CDR Huh?
That was correct. Roger. It's in EGRESS. Our procedure said AUTO, but they changed their mind, I guess. Okay, you can PRO. Okay; for an APS leak, we get a 400 plus l; a 604 ENTER; GUIDANCE CONTROL, AGS; regs, open; MASTER ARM, ON; ENGINE ARM, ASCENT; and ABORT STAGE, push. And we'll (cough) - we'll be right on the way.

Okay.

Okay, 11 minutes.

Shall we do that at lift-off minus 10?

Yeah.

Why not?

Boy, this is gonna be some ride!

I hope so, Charlie.

Yeah. All right, Jim. How does the tube look? We're ready to pressurize the APS now. Okay, MASTER ARM, ON.

We're standing by. You have the GO for press.

ASCENT HELIUM select, TANK 1.

Okay; MASTER ARM is ON. We have two lights; we're going to TANK 1. Okay. Gonna fire TANK 1?

Yep. FIRE - ASCENT HELIUM PRESS, FIRE.

ASCENT HELIUM PRESS, FIRE, TANK 1.

There she comes, pressurized right up. Hardly dropped. Okay, select TANK 2. Wait a minute.

How does that look to you, Houston?

Stand by.

TANK 1 looks good. GO for TANK 2.

Roger.
07 07 22 41 LMP  Okay. Select TANK 2?
07 07 22 43 CDR  Go.
07 07 22 44 LMP  ASCENT HELIUM PRESS, FIRE.
07 07 22 45 CDR  ASCENT HELIUM PRESS, FIRE.
07 07 22 50 CDR  Okay; there's TANK 2.
07 07 22 52 LMP  MASTER ARM, OFF.
07 07 22 53 CDR  MASTER ARM is OFF.
07 07 22 54 LMP  The helium went up; 31, 20. Okay? Okay, I'm gonna close MAIN SOV A.
07 07 23 06 CDR  Okay.
07 07 23 07 LMP  Open the ASCENT FEEDs.
07 07 23 08 CDR  Okay.
07 07 23 10 LMF  Open the ASCENT FEEDs, close MAIN SOV B.
07 07 23 15 CDR  Okay; we're crossfeeding with the new procedure you just gave us, Houston.
07 07 23 18 LMF  We're - it's not - it's ascent feed.
07 07 23 21 CDR  I mean ascent feeding. I'll get it right one of these days.
07 07 23 30 LMF  Okay; standing by for 5 minutes.
07 07 23 33 CDR  Roger.
07 07 23 34 LMF  Let's check the APS card right now.
07 07 23 36 CDR  Okay.
07 07 23 40 LMF  Okay. C - DISPLAY/ENGINE OVERRIDE LOGIC is closed.
07 07 23 42 CDR  Go.
07 07 23 43 LMF  CB (11) and (16) STAB/CONT --
Orion, you're GO for lift-off.

-- STAB/CONTROL all closed except --

Roger.

-- except your AEA DEC - and DECA POWER.

AEA and DECA POWER, Charlie.

Okay, DESCENT ENGINE OVERRIDE is open. RATE SCALE, 25 DEGREES A SECOND.

25 DEGREES A SECOND.

ATT/TRANSLATION to 4 JETS.

4 JETS.

BALANCE COUPLE, ON.

BALANCE COUPLE is ON.

DEAD BAND is MIN.

DEAD BAND, MIN.

ABORT, ABORT STAGE, reset.

Reset.

ATTITUDE CONTROL, three, to MODE CONTROL.

ATTITUDE CONTROL, three, to MODE CONTROL.

MODE CONTROL, ascent - for ascent, PGNS and AGS to AUTO.

Okay.

Stop pushbutton, reset.

They're reset.

TTCA, two, to JETS.

Two to JETS.
Okay; standing by for 2 minutes.

We go to the lift-off book, don't we?

But - Yeah, we've got to get the LANDING RADAR AC closed at 5 minutes. I mean the RENDEZVOUS RADAR.

Yeah.

Okay; RCS; you're looking good. Water's looking good. What's wrong, John?

Something's in my eye.

Oh.

I got it.

Okay; RENDEZVOUS RADAR, AC, closed.

RENDEZVOUS RADAR, AC, closed.

And we go to the Timeline Book.

Can you close that behind you, John, here?

What's that, Charlie?

This data file thing?

Sure.

Thanks. I couldn't reach it.

Get one snap on it.

Or that Velcro on the other side if - Okay; 4 minutes.

Okay, she looks good to me.

(Coughing).

How's your eye, John?

Okay.
07 07 28 56  LMP  What's wrong?
07 07 28 58  CDR  I think it's - I'm sweating.
07 07 29 00  LMP  Hmm.
07 07 29 12  CDR  It's okay now.
07 07 29 14  LMP  Sure?
07 07 29 15  CDR  Yeah.
07 07 29 34  LMP  Was the Sun shining in it?
07 07 29 35  CDR  Yeah.
07 07 29 47  CDR  Okay, Charlie; 2 minutes.
07 07 29 48  LMP  MASTER ARM, ON.
07 07 29 49  CDR  Okay, Houston; MASTER ARM is coming ON. Two lights.
07 07 30 00  LMP  Okay; AGS needles are deflected. Alignment looks great.
07 07 30 25  LMP  Okay; ICS/PTT; 400 plus 1 is in; we've reset the watch.
07 07 30 31  CDR  Okay.
07 07 30 40  LMP  Okay; at plus 1 second, if we get an auto ignition, it's the START button.
07 07 30 45  CDR  Okay.
07 07 30 50  LMP  Okay; 1 minute.
07 07 31 08  LMP  Okay; get the guard off the ENGINE ARM.
07 07 31 11  CDR  Yeah.
07 07 31 15  LMP  DSKY blanks.
07 07 31 16  CDR  DSKY blanks, 30 seconds.
07 07 31 21  LMP  Camera's started, and it's running. Okay; standing by for 10 seconds.
Okay.

Let me get this first.

Okay.

ABORT STAGE, ENGINE ARM.

ENGINE ARM to ASCENT.

PRO. She took. Stand by; 3, 2, 1 --

LIFT-OFF. There we go!

Auto start; engine START pushbutton.

Engine START.

Seven, 8, 9, 10, pitchover.

Pitchover.

Pitchover on time.

What a r --

Okay; she's right on.

What a ride! What a ride! Okay; 18 seconds, John; 30 seconds, looking for 308.

Right on; it's right on the H-dot.

Lot more wallowing than I thought.

Yeah.

308, looks good. 4800, 91, 1800, looking good.

AGS is following; KEY RELEASE; coming up on a minute.

There we go.

One minute, 305.

One minute, 305, looks good. 124 on the H-dot, 50 --
07 07 32 54 CC  Orion, you're GO at 1.
07 07 32 55 LMP  Okay, looking good.
07 07 32 57 CDR  Roger; looking good here.
07 07 32 58 LMP  AGS and PGNS agree.
07 07 33 11 LMP  Quite a bump, huh? 01:30, you need 302 on the ball, John.
07 07 33 15 CDR  Okay.
07 07 33 20 LMP  It's that PHF noise again.
07 07 33 22 CDR  Yeah.
07 07 33 23 LMP  302, 4 - 151, out of 9000. Looking great.
07 07 33 25 CDR  Okay.
07 07 33 26 LMP  AGS and PGNS agree. Hey, we're really going down range. Look how we pitch, can't even see the horizon.
07 07 33 35 CDR  Yeah.
07 07 33 37 LMP  I can out the overhead window. Coming up 2 minutes.
07 07 33 48 CDR  Two minutes and 299; it's right on.
07 07 33 54 LMP  ...
07 07 33 55 CDR  Looks good.
07 07 33 56 LMP  299, 170, 14,000; looks great. AGS and PGNS are right on, John.
07 07 34 01 CDR  Right.
07 07 34 14 LMP  02:30, we're looking for 296.
07 07 34 18 LMP  MARK it: 02:30, 183, 19,000; within 400 feet, and 2 feet a second. AGS and PGNS are looking great. Okay, I'll check the targeting. That's a good number.
07 07 34 36 CDR  Good.
07 07 34 41 LMP  Four minutes, it says.
07 07 34 44 CDR  Get that - get those displays out of there, Charlie (laughter).
07 07 34 48 LMF  Okay, coming up on 3 minutes -
07 07 34 50 LMF  MARK.
07 07 34 51 CC  Orion, you're GO at 3.
07 07 34 52 CDR  Roger; looking good.
07 07 34 53 LMF  190, 25; looking good. AGS and PGNS tracking right together, Houston.
07 07 35 02 CC  Roger.
07 07 35 12 LMF  Okay, at 03:30, we're looking at 289.
07 07 35 17 CDR  289, right on.
07 07 35 18 LMF  Right on.
07 07 35 21 LMF  Okay; 03:30, and we're at 190 H-dot; 30,000, looking great.
07 07 35 24 CDR  Okay.
07 07 35 29 LMF  This beeby - this baby is flying it right on! AGS and PGNS agreeing. At 4 minutes, John, we're looking for 285.
07 07 35 39 CDR  We got it; 285.
07 07 35 40 LMF  Okay. ... some RCS.
07 07 35 50 CDR  Roger; GO at 4.
07 07 35 51 LMF  Four minutes, 184, 36,000; within 300 feet, cameras off. I'm gonna let it run out. No, I better not. I've got to get some of Ken. I forgot about that. Okay. At 04:30, looking for 282.
07 07 36 14 CDR  Roger.
<table>
<thead>
<tr>
<th>Time</th>
<th>User</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>07 07 36 19</td>
<td>LMF</td>
<td>Right on; 282. Okay; at 184 - Okay, 04:30 was 173, ll; looking good. Going to 500 on the AGS; 2300 to go, John.</td>
</tr>
<tr>
<td>07 07 36 42</td>
<td>CDR</td>
<td>Five minutes, 278.</td>
</tr>
<tr>
<td>07 07 36 43</td>
<td>LMF</td>
<td>Yeah.</td>
</tr>
<tr>
<td>07 07 36 44</td>
<td>CDR</td>
<td>Right on! Beautiful.</td>
</tr>
<tr>
<td>07 07 36 47</td>
<td>CC</td>
<td>Orion, you're GO at 5.</td>
</tr>
<tr>
<td>07 07 36 50</td>
<td>LMF</td>
<td>Mark; 5 minutes. 278, 157; right on! Within 1000 feet; 2000 to go; 05:30, we're looking for 274.</td>
</tr>
<tr>
<td>07 07 37 14</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 07 37 15</td>
<td>LMF</td>
<td>Really picking up speed now; V_I. Okay, at 05:30, 135, 51,000; looking great. Six minutes, 269.</td>
</tr>
<tr>
<td>07 07 37 48</td>
<td>LMF</td>
<td>Must be the roll transients he's talking about. Six minutes, 109, 54. Okay; we're right on, John. 1000 to go. Okay; let me slew the - Stick that breaker in over there.</td>
</tr>
<tr>
<td>07 07 38 11</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 07 38 12</td>
<td>LMF</td>
<td>Forgot this. Okay, I won't worry about it now.</td>
</tr>
<tr>
<td>07 07 38 16</td>
<td>CDR</td>
<td>Okay, Charlie, we're 700 to go.</td>
</tr>
<tr>
<td>07 07 38 17</td>
<td>LMF</td>
<td>Yep. Okay; 600 to go. Looking good. Okay, ASCENT FEEDs are coming open.</td>
</tr>
<tr>
<td>07 07 38 33</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 07 38 36</td>
<td>LMF</td>
<td>Okay. Ascent - terminated ascent feed, Houston. Okay, stand by for ENGINE ARM, John.</td>
</tr>
<tr>
<td>07 07 38 42</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 07 38 45</td>
<td>LMF</td>
<td>Okay, there's 200. ENGINE ARM, OFF.</td>
</tr>
<tr>
<td>07 07 38 47</td>
<td>CDR</td>
<td>ENGINE ARM is OFF.</td>
</tr>
<tr>
<td>07 07 38 49</td>
<td>LMF</td>
<td>Stand by for ABORT STAGE, reset. And stop. See if we get auto shutdown. Stop. Shutdown.</td>
</tr>
</tbody>
</table>
07 07 38 58  CDR  Shutdown. PRO, Charlie.
07 07 39 01  LMP  PRO. Super, no trim.
07 07 39 04  CDR  Okay.
07 07 39 07  LMP  Insertion!
07 07 39 08  CDR  Insertion, Houston. On time, minus 0.3, minus 1.0, and plus 1.7. Okay, Charlie. Let's get into this book right here.
07 07 39 17  LMP  Okay; let me have it. Okay, VERB 82, we don't need that.
07 07 39 21  CDR  No.
07 07 39 22  LMP  VERB 76?
07 07 39 23  CDR  I don't --
07 07 39 24  LMP  AGS MODE CONTROL, ATT HOLD.
07 07 39 26  CDR  -- I don't want a VERB 76.
07 07 39 27  LMP  Yeah. I know it. Let's go to LGC.
07 07 39 31  CDR  Okay.
07 07 39 32  LMP  RENDEZVOUS RADAR. Up here; RADAR MONITOR, RENDEZVOUS RADAR.
07 07 39 37  CDR  Okay.
07 07 39 38  LMP  SHAFT/TRUNNION, PLUS OR MINUS 5; RATE SCALE, 5.
07 07 39 40  CDR  Okay.
07 07 39 44  LMP  RANGE/ALTITUDE MONITOR, RANGE/RANGE RATE.
07 07 39 46  CDR  Okay.
07 07 39 47  LMP  Going to FORWARD on the VHF.
07 07 39 56  CC  A reminder to hit the stop button, John.
07 07 40 01  CDR  Say again? Over.
You're okay.

Say again, Houston.

Never mind. You're standing by for tweak. I have the tweak for you.

Okay; go ahead.

175:54:05, minus 2.0, minus 0, minus 10.0. Over.

Copy at 175:54:05, minus 2.0, minus 0, minus 10.0.

Good readback.

Two - 2 back and 10 away from the Moon, right?

Ten and - Yeah. Uh-huh. Two down, and 2 back.

No, 2 down --

Two back.

Yeah, that's what I mean, 2 back.

And - and 2 down. To us. Our feet. X, minus X, is 2 down.

Two down.

Yeah.

Two retrograde.

That's right.

And 10 away from the Moon.

Two here, minus 2, and a minus 10.

Yeah; I know it.

Okay.

When is it?

At 1 - 54:05. We got another minute.
Okay; what's the rest on the checklist there?

I'm getting it now. It's over here on my side. Plus 03979.

Okay; stand by to burn.

Look at those PIPAs, would you?

Yeah. I just re - I just redid them.

Oh, you did.

Yeah. 01:50 - 01:50 --

Okay; 2 aft, John, now.

Look at all that dust. Okay. Minus 10.

Little bit more.

Okay?

Okay. That looks good. Okay?

Yeah; let's go.

Okay; PRO. Okay. Get me INVERTER - check INVERTER 2 - C - Okay, I got INVERTER 2; you can open INVERTER 1 breaker. LOGIC POWER, open; and CABIN FAN, close. Okay. Tweak's complete, Houston.

Roger. Copy.

Did you get your CABIN FAN?

Yeah, we need that one bad, don't we?

Okay, John. We get an auto maneuver -

Okay. Well, I got to call up P20 again to get it.

Okay. I know it. Why don't -

Orion, we'd like you to use the - B SYSTEM, so open the CROSSFEED and close the MAIN SOV on SYSTEM A.
Roger.

Okay, Jim. You got it. We're crossfeeding SYSTEM Bravo. For P20 auto maneuver, pitching up.

We'd better leave our helmets and gloves on.

I think we better leave our helmets and gloves on. Did you get the CABIN FAN, John?

CABIN FAN circuit breaker is in.

Okay; good.

And, Houston; Casper will need a state vector for a ... to be ready?

Okay. It says we're there. ENTER. Check the AGS needles. AGS wants to pitch down to get him.

No, he's - he's right out there.

Houston, Casper. Roger. I'll need a state vector. How soon do you expect to have one?

Stand by.

Look at that signal strength, John.

Yeah.

Look at that beautiful thing. Okay. We got him.

Okay.

Down 4 degrees. Okay? I'm gonna accept it.

Well, I don't know - I sure don't see ---

Well, that was the last maneuver we had, see?

Okay.

He's holding attitude. It'll give us a new maneuver here.

Okay, go. Here's some ---

CONFIDENTIAL
07 07 45 48 LMP See. There we go. Now look, look at the radar needles. And the AGS needles are centered too. Right on.

07 07 45 53 CDR Okay.

07 07 45 54 LMP Okay, I see him. He's 12 o'clock, a bright star.

07 07 45 57 CDR You see him, Charlie?

07 07 46 00 LMP Yeah, uh-huh.

07 07 46 03 CDR I got him, too.

07 07 46 06 CDR Okay. There's a data point. That's a 166 miles in the sunset.

07 07 46 08 LMP Yeah. Okay. VERB 80 - P20 auto maneuver, VERB 80.

07 07 46 14 CDR Okay, Casper. We have you visually.

07 07 46 18 LMP Okay, did you get the VERB 80 in?

07 07 46 20 CDR VERB 80 ENTER.

07 07 46 23 LMP Okay. That's a - we - let's do a VERB 32 on that one.

07 07 46 25 CMP Glad to hear that. I don't have you yet.

07 07 46 27 LMP That - that was a good update. We could have taken that one. Okay, 417 plus 10000 ENTER, 411 plus 10000.

07 07 46 41 CMP Houston, Casper is standing by.

07 07 46 45 CC Roger. We're still working on it, Ken.

07 07 46 49 LMP He's gone, now.

07 07 46 51 CDR Yeah, it's sunset.

07 07 46 53 LMP Yeah.

07 07 46 54 CDR I still got him.

07 07 46 55 LMP You do?
07 07 46 56 LMP You do?
07 07 46 57 CDR Yep. I can't see him in the COAS, but I can see him outside of it.
07 07 47 02 LMP Oh, yeah. I see him. Yeah. 411 ENTER, 621 read-out. Okay. We got the AGS and AUTO update, Jim.
07 07 47 21 LMP T minus 38 minutes.
07 07 47 33 CDR Okay. We're gonna accept that, Charlie?
07 07 47 35 LMP Yeah. It was a good update.
07 07 47 56 CC Okay, Ken; if you'll go to ACCEPT, we'll send an up-link for you.
07 07 48 06 CDR Okay. The ENGINE ARM is OFF; stop pushbutton is going to reset.
07 07 48 08 LMP Okay. You don't have to worry about that, really. Okay. Ten, set DET. Look at all that dirt. 303 is 25 degrees, the AGS says, John.
07 07 48 24 CDR Okay.
07 07 48 25 LMP Okay. We got one set of marks already. Okay. I guess we could do a VERB 83 to set the ORDEAL.
07 07 48 32 CDR Let's hold off until we get to the next --
07 07 48 34 LMP Okay, P --
07 07 48 35 CDR -- mark, Charlie.
07 07 48 37 LMP You could call P34.
07 07 48 39 CDR Yeah. I'll do that, too.
07 07 48 40 LMP Okay. Hope that cabin fan works. Look at that beautiful sunset, would you? Boy, Jim. The sunset is spectacular.
07 07 49 01 CC Bet it is.
07 07 49 06 LMP Okay; we must have it, John. Okay, P34. Okay, load TPI time of 176:37:52.00.
07 07 49 34 CDR What's the AGS say to -
07 07 49 39 LMP What does AG3 say --
07 07 49 40 CC Orion, there will be no PIPA update.
07 07 49 41 CDR Understand. No PIPA update.
07 07 49 43 LMP Well, we got a couple of marks, and I destroyed our solution. None out of plane. 81 --
07 07 49 51 CC Casper, the computer's yours.
07 07 49 52 LMP that's probably a pretty good number. Plus 81 plus 14.
07 07 49 57 CMP Thank you.
07 07 50 02 LMP Oh, marks already. Fantastic!
07 07 50 06 CDR Okay. Charlie, why don't we get a - whatever it is you do to get a VERB 86.
07 07 50 11 CMP And, Orion, I've got about 2.2 volts on the signal - on the radar. Can you give me a better reading?
07 07 50 17 CDR Roger. We're at 113 miles. And I have you visually out the window as a bright star.
07 07 50 35 LMP I see his beacon! It's flashing at us. Down a little bit.
07 07 50 39 CMP Okay. We need to try to reacquire. I'm several miles off from you. We'll reacquire on the A channel.
07 07 51 03 CDR Houston, what time is LOS?
07 07 51 09 CC Stand by.
07 07 51 29 CC We have a 176:23, Charlie [sic].
07 07 51 32 CDR Okay. Thank you. 176:23 for LOS, Charlie.
07 07 51 39 LMP Okay.
07 07 51 40 CDR Twenty minutes.
07 07 51 42 LMP  Five marks in, John. Okay. You can - can I get a VERB 83?
07 07 51 52 CDR  You can touch my computer today.
07 07 51 53 LMP  Okay.
07 07 51 54 CMP  How about another range check when you get a chance to, please?
07 07 51 58 CDR  Okay. We're at 106.5 miles on the tapemeter. That could be a couple of miles off, Ken.
07 07 52 06 CMP  Okay.
07 07 52 08 LMP  We ought to check that.
07 07 52 13 CDR  Okay. The VERB 83 says we're at 105.72 miles, with five marks in.
07 07 52 18 LMP  Okay; 23 on ORDEAL, John.
07 07 52 22 CDR  Okay.
07 07 52 28 LMP  That cabin fan is cleaning it out in here.
07 07 52 37 CDR  It ain't moving, Charlie.
07 07 52 41 LMP  Are you in POWER OFF?
07 07 52 43 CDR  No. The power is on LUNAR. It's in SLEW, DOWN. There you go.
07 07 53 02 CDR  OPERATE/SLOW.
07 07 53 04 LMP  Okay. Got three marks.
07 07 53 07 CDR  Okay. Let's see what we're in.
07 07 53 11 LMP  Okay. The AGS says 315. It says a 410. (Cough) By 76. That's probably biased with some marks. Okay, Ken. We see your tracker - your light's flashing.
07 07 53 45 CMP  Okay, ...
Yeah. 41 by 77. Okay. We need a VERB 48, John. There's some food. Did you get a VERB 32?

No, I didn't do a VERB 32. I PROed on that thing. VERB 48 ENTER, 21 ENTER, what?

Oh, excuse me. 12012.

Okay, PRO. Okay, PRO.

Jim, we got 5988 on the weight. Does that look okay?

We in darkness?

Yeah. Think that must be him, that bright star up there.

That's him, Charlie. He'll be at - he'll disappear in a second when he goes into nighttime.

Yeah. Okay. Coming up on 30 minutes for my chart R and R-dot.

The COAS is doing pretty good, Charlie. I got it right in the middle of the COAS. Look at the needle.

Yeah. Fantastic.

That's good, isn't it?

Super, John.

MARK. 365 and 90.5.

He disappeared.

Okay. Do you have your tracking light on ...?

Yes, sir. I'll cycle it - cycle it, but it was on. I can't tell whether it's working, though, Ken.

I don't see nothing. I don't see any fla - -
07 07 57 01  LMP  I - I could barely see it on the footpad - even on - just on the footpad, the only way I could tell it was working, the - -

07 07 57 06  CMP  Tallyho.

07 07 57 07  CDR  Okay; he's got us.

07 07 57 08  CMP  Tallyho.

07 07 57 09  CDR  Good show, Ken.

07 07 57 11  LMP  Great. Great, Ken.

07 07 57 22  CC  Orion, this is Houston with the TPI solution.

07 07 57 26  CDR  Okay. We're all ears.

07 07 57 31  CC  Okay. DELTA-V_x, plus 77.6; DELTA-V_y, plus 3.8; DELTA-V_z, plus 3.1; for a total of 77.7. TPF is 29. Over.

07 07 57 52  LMP  Roger; copy. Plus 77.6, plus 3.8, plus 3.1, TPF is 29.

07 07 58 03  CMP  Good readback.

07 07 58 21  LMP  Man, that lift-off was something, wasn't it?

07 07 58 23  CDR  That was neat.

07 07 58 25  LMP  For a while there, I did - I did - I thought we - I heard it go poop and it sort of - it sort of sat. Before it lifted off.

07 07 58 38  CDR  It's a sweet little flying machine.

07 07 58 39  LMP  Yeah.

07 07 58 43  CDR  ... all that stuff.

07 07 58 45  LMP  Scissors floated out. Hmm.

07 07 58 54  CDR  See how much dirt has disappeared so far?

07 07 58 56  LMP  Yeah.
Okay. I'm going to break out the -
Okay, we VERB 32 it right here somewhere.
Fifteen marks it says, John, but -
I don't need that. VERB 32 it.
Okay.
... many minutes. VERB 32 ENTER. Okay, Houston. We're VERB 32, and we ought to have pretty good numbers.
Roger. We copy.
Ah, this is a sweet flying machine, I'll tell you.
We'll read it down here, John. We can't read you very well. It's just excessive noise on the loop.
Okay.
(Cough) Okay, there it is; 30.6, John.
Okay.
PRO. NOUN 58 coming up. Okay; 40.2, 78.1, 27.7. NOUN 81s, plus 78.0, plus 2.7, minus 0.2.
What's the ground say?
Huh?
What did the ground say?
The ground says minus 77.6 - plus 77.6, plus 3.8 -
Okay, we copied them, John.
-- plus 3.1.
Okay.
And the AGS says plus 70 - 78.4, plus 2.0 plus 2.6. It's got a good solution also, John.
07 08 01 41 CDR  It's closer to the ground than we are.
07 08 01 43 LMP  Yeah.
07 08 01 54 LMP  Okay, Ken. We did a recycle. We're looking at 78.0, plus 2.7, a minus 0.2 on the PGNS.
07 08 02 07 CDR  Okay, Charlie. Tell me again what --
07 08 02 08 CC  We copy.
07 08 02 09 CDR  Tell me again what the AGS - AGS says in regards to the ground.
07 08 02 12 LMP  It's - the AGS says 78.4 versus 77.6. It says 2.0 versus 3 point - 8, and it says 2.6 versus 3.1.
07 08 02 29 CDR  Understand.
07 08 02 40 LMP  Seventy miles out, John. Get on the chart at 25 degrees. Seventy miles and 25 degrees. We're right on the line. Golly, what is that? Want some tears?
07 08 03 01 CDR  No, thank you, Charlie.
07 08 03 02 LMP  (Laughter)
07 08 03 12 LMP  You notice our 40-g [?] bags didn't come out with two snaps on them?
07 08 03 22 CDR  Great.
07 08 03 35 LMP  What a sweet machine.
07 08 04 33 LMP  Got you some lunar dust.
07 08 04 36 CDR  ...
07 08 04 40 LMP  (Laughter) How's your eye?
07 08 04 41 CDR  Fine.
07 08 04 42 LMP  Okay.
07 08 04 43 CDR  It's the sunshine.
07 08 04 45 LMP  Oh.
It's all in one eye. That doesn't bother you?

Yeah. I had to close it. Uh-huh.

What a heck of a time for something like that to happen to you.

I know it. I see his tracking light, John. Flashing. 12 o'clock. Hope that wasn't a dadgum - Oh, that might have been a little particle.

Yeah, that's a particle floating by us that we're lighting with our -

Yeah. Yeah, right.

With our - we're lighting it with our strobe [?].

Yeah.

Matter of fact, I think that's what we were tracking the other day when we first saw Ken.

Hey, Houston; Orion. How do we look for APS TPI?

Roger; GO for an APS TPI.

All right. What's your estimate of burn time?

Four seconds.

Okay. Check the RCS. Looking good. EPS is looking good.

Orion, are you requesting burn time? Over.

That's affirmative.

Stand by.

That - John, that fan's giving a lot of circulation. Look at - Watch this.

Yeah. It was supposed to have cleaned the place out. Man, we already done more work today than I do in a month normally, Charlie. I can't believe it.
07 08 07 25 LMP  How you feeling?
07 08 07 27 CDR  I feel great.
07 08 07 28 LMP  Yeah, me too.
07 08 07 29 CDR  That's really an exhilarat - -
07 08 07 30 CC   Burn time for TPI should be about 2.5 seconds.
07 08 07 38 LMP  Roger. Thank you, 2.5.
07 08 07 41 CDR  Trouble is my eyes was tearing so bad I couldn't look out and watch it. Dadgummit!
07 08 07 45 LMP  Oh, that was a - that was some lift-off. There was a piece of the MESA blanket went out there about 300 meters. I'm glad we put the ALSEP over where we did. That thing would have - could have wiped it out. And it hit the ground with a big - ton of bricks.
07 08 08 02 CDR  I didn't even see the ALSEP.
07 08 08 25 CDR  Okay, ascent.
07 08 08 42 LMP  (Laughter) We're going to have lots of marks.
07 08 08 46 CDR  I'm not so sure I shouldn't VERB 93 it.
07 08 08 50 LMP  Okay, give them - That might be a good idea.
07 08 08 54 CDR  Hey, Houston, with 21 marks at 17 minutes, you want to just keep marking as opposed to VERB 93ing, right?
That's right.

The answer to that, Jim, was yes, I'm sure. Just want to make sure somebody thunked [sic] about it.

Okay, just continue marking them, John.

Understand.

Okay, you're coming up on 2 minutes to LOS, and you're looking good.

Sure are, man.

All solutions have converged.

We used about - we haven't used hardly any RCS.

I'm just trying to keep your needles close enough to get good marks, Charlie.

That's great, John; thank you. Okay; 50 miles at 28 degrees.

Okay; riding slightly inside, but not much. Excuse me.

Sure.

Orion, you could do your final comp at 10 instead of 8. Your preference.
07 08 10 41 LMP That might be a good idea.
07 08 10 44 CDR Okay.
07 08 10 45 LMP (Coughing)
07 08 10 52 MS ... 
07 08 10 53 LMP We're probably gonna break lock. With all of this Z.
07 08 10 58 CDR Yeah, we are gonna break lock.
07 08 11 00 LMP All this X and no Z.
07 08 11 02 CDR Yeah.
07 08 11 11 LMP Okay, my comm is set. There they go.
07 08 11 20 CDR Hey, Ken, how are you doing?
07 08 11 31 CMP Orion, this is Casper on Victor Hotel. How do you read?
07 08 11 34 CDR Read you loud and clear, Ken. Boy, it'll be nice to see you.
07 08 11 38 CMP Hey, this stuff is working pretty good today, isn't it?
07 08 11 40 CDR It really is. The ground - MSFN says all solutions are converging.
07 08 11 46 CMP Man, I could see that thing - light of yours at 70 miles on the telescope, even.
07 08 11 52 CDR Yeah, I could see you visually right after lift-off, when we were supposed to be like 150 miles away.
Charlie and I both saw you. That's a good data point. We been asking and nobody has the answer. You can't see it through the COAS, but you can if you look around the side.

Well, you got to be in the — down here; that'll it up.

Yeah, that's right. That's the answer.

John, why don't you give me a mark at 12 minutes to go or something. ...

Okay.

Man, Ken, we got a load of rocks.

Well, that's fine. We got lots of room for them.

Why? What did you do?

Man, we got the world's two biggest trash cans you've ever seen.

I bet.

Well, you ought to see the two pig pens over here. You ain't gonna let us in!

(Laughter) ... you guys really did get ...

It was — it was — Geez, it's a lot of fun, Ken.

I never had so much fun in all my life, Ken. And old FDO put us right on the spot. Did you ever see the LM - tracking?

I never had a tracking pass on you.

Oh, that's too bad.

I saw — I saw a glint off the - the LM once, and I saw a glint off the Rover when you were over on Stone Mountain — with the binoculars.
They told us that once.
Okay, Ken, we got 12:30, 3, 2, 1 -
MARK it - -
... I'm right with you - -
-- MARK.
... I don't know whether it's this - this VHF comm or the ...
Yeah.
Yeah, you're a little garbled over here, but I think it's our receiver.
44 at 30 degrees. Well, you know, you've had one rendezvous, now we need one.
Okay. I just ... you do this one.
Yeah.
How's your RCS looking, babe?
(Laughter) Well, after we got through with that first fiasco, we've been - rather meager - meager in our usage.
I bet.
... in town.
This is like Gemini X. A dual orbit - a dual - no, I don't want to talk about it.
Okay; 11 minutes.
You want to PRO at 10, John?

I don't think we're going to need a chart solution, but I'll take the numbers down anyway.
Standby numbers are the same as the ground numbers.
Okay. Okay, Ken, we're gonna break lock here when we pitch around, because of this - all of this Z we got. I mean X.
Okay; ... pressure numbers?
Right.
We haven't recycled yet.
We haven't recycled yet.
Okay, why don't you just copy my finals?
Okay.
Minus 78.4 --
Okay --
-- Minus 2.4, plus 3.8.
Okay.
And I got a control mode ... so I'm going to set my computer now.
Okay --
Can you afford that?
Yeah; oh, yeah.
In other words, you got plenty of marks. All righty.
We got plenty. We're gonna - we're gonna start ours, too.
Want to PRO?
Yeah, PRO at 09:30, Charlie.
Okay. Okay, I'll stop updating on the AGS.
07 08 16 38  CDR  Okay.
07 08 16 41  LMP  The AGS says 78.1. It's 30 46.  PRO.
07 08 17 02  LMP  Okay; 40.2, 78.0, 27, 0.7. That hadn't changed a bit. Okay, NOUN 81's a plus 78.0, plus 2.7, plus 0.7. Okay, there's a PRO.
07 08 17 47  LMP  Okay, John. The only one we're off on is in Z. Minus - that'd be plus -
07 08 18 04  CDR  How much are we off?
07 08 18 08  LMP  About 2 feet a second. And you're about 3 - about 2.5 feet a second from the ground. And the Z comparison is 9 feet a second, so AGS and PGNS are both good.
07 08 18 20  CDR  Okay. Well, we're righter than they are, I'm sure of that.
07 08 18 25  LMP  Yeah. Well, the AGS says - the only one we're really bad on is - the AGS is minus 3.7.
07 08 18 35  CDR  What's the PGNS?
07 08 18 36  LMP  Okay, I'll -
07 08 18 40  CDR  Z is not important.
07 08 18 42  LMP  Yeah.
07 08 18 43  CDR  How are we on X?
07 08 18 45  LMP  X is right on.
07 08 18 47  CDR  Okay.
07 08 18 48  LMP  Okay, Ken, we're gonna burn the PGNS solution; we're within a foot a second.
07 08 18 52  CMP  Okay.
07 08 18 54  LMP  We didn't break lock. We haven't pitched.
. 07 08 18 56  CDR  We ain't maneuvered to the attitude, Charlie.
07 08 18 58 LMP  Oh, that's why, huh? Okay, 404 is going to 0.

07 08 19 16 CDR  We may not break it as it is. Are you ready for
this maneuver, Charlie?

07 08 19 21 LMP  Yes, sir.

07 08 19 23 CDR  Yeah, we're gonna break it.

07 08 19 41 LMP  We're not either. Look at that!

07 08 19 51 CDR  Well, we might. We're right on the ragged edge,
I think.

07 08 20 14 CDR  Tried that before. It worked on the ground.
You know something?

07 08 20 21 LMP  What?

07 08 20 22 CDR  I feel like we're still in one-sixth gravity with
these restraints.

07 08 20 26 LMP  I know it.

07 08 20 27 LMP  Okay, John, I'm set up over here. We got NOUN 86,
let's see, check NOUN 86 - 410 plus 5, and I'm
not gonna load the DELTA-Vs.

07 08 20 57 CDR  You gonna check NOUN 86?

07 08 20 58 LMP  No, they're all right. It's just - see, they
want me to keep my solution independent here.
See how it does. 35, 104; it's pretty close.
Is that okay with you? Or you want me to load
NOUN 86?

07 08 21 11 CDR  No, that's all right.

07 08 21 12 LMP  Huh?

07 08 21 13 CDR  That's okay, we can burn anyway. Who want - who
wanted you to do that? Are you doing this for
Jerry Thomas?

07 08 21 20 LMP  No. It's just in the procedures. It's been that
way. They said that - that if the solutions
agree close enough to pass the test, to keep them
independent.
07 08 21 30 CDR Oh, okay.

07 08 21 46 LMP How about a little shot of agua?

07 08 21 49 CDR Man, that's the best idea I ever heard of.

07 08 21 54 CMP Did they tell you that they changed our schedule a little bit?

07 08 21 58 CDR Yeah, we get to keep the lunar module.

07 08 22 04 CMP Yeah, they also said we're going home a day early.

07 08 22 07 LMP They didn't tell us that.

07 08 22 09 CMP Well, I didn't get any answers as to why. I just got this cryptic "No ... P62." No, no shaping burn and come home a day early.

07 08 22 24 LMP Okay, see a little gitchy.

07 08 22 26 CMP I - I thought they ... to do something about it, but I guess there's ... been any reason to talk to anybody about it.

07 08 22 32 LMP We ought to PRO, John, get on to the --

07 08 22 33 CDR Okay.

07 08 22 42 LMP Okay, Ken -

07 08 22 43 LMP MARK. 03:30 until the burn.

07 08 22 45 CMP Okay, I ... you. ... and I'm all set.

07 08 22 49 LMP Okay. Okay, at 1 minute, John, we go to AGS MODE CONTROL to AUTO -

07 08 22 52 CDR All righty.

07 08 22 54 LMP At 30 seconds, ABORT STAGE.

07 08 22 55 CDR Okay.

07 08 22 56 LMP Then you manual ullage.
10 seconds' worth.

10; uh-uh. And I'll get the PRO. (Cough) about a 2-1/2, one-potato, two-potato, shutdown-type thing.

Okay.

Make sure that's in there. I'm trimming the residuals.

That means we're leaving tomorrow.

No, we --

... the day after.

Huh?

I think it's the day after.

The day after tomorrow? Is that a day early?

I think so.

Tuesday's not --

Let's - we'll worry about it later.

Yeah, okay.

...  

Super.

Is that your orb rate, Charlie?

Yeah.

Okay - without the angle. That's right on.

Yeah. Local horizontal.

What was ours? PGNS solution? I forgot --

PGNS was 78.0, 2.7; point - plus 0.7; AGS was 78.3, 2.9, minus 3.7.
07 08 25 22  CDR  Okay.
07 08 25 23  LMP  Okay, 50 seconds AGS MODE CONTROL is going to AUTO; stand by on ABORT STAGE.
07 08 25 32  CDR  Okay, I'll get the manual ullage; then you PRO.
07 08 25 33  LMP  Okay. And I get the PRO. Okay?
07 08 25 35  CDR  Yeah.
07 08 25 37  LMP  Well, we (cough) we've only been at it 14 hours. (Cough) Okay, ABORT STAGE. Stand by for 10 seconds.
07 08 25 43  LMP  MARK, 20 seconds, Ken.
07 08 25 45  CMP  All set.
07 08 25 47  LMP  We look in good shape.
07 08 25 52  CDR  This is what gets me.
07 08 25 54  LMP  Okay. Ullage.
07 08 25 55  CDR  10, 9, 8, 7, 6 --
07 08 25 56  LMP  Broke lock.
07 08 25 57  CDR  5, 4 --
07 08 25 58  LMP/CDR  PRO.
07 08 25 59  CDR  3, 2 --
07 08 26 00  LMP  Stand by.
07 08 26 01  CDR  1 --
07 08 26 02  LMP  Engine ignite.
07 08 26 03  CDR  1, 2, 3 ... --
07 08 26 10  LMP  Shut - Wow! Burn complete, Ken. PRO. Okay, we're trimming. Great, John!
07 08 26 25  CDR  Shoot, look at it!
It's fast, isn't it?

Dadgum. Okay, great. That thing really - that's great, John.

Okay.

Minus 2, minus 0, minus 0.2.

Okay.

Okay, we can PRO out of there. AGS has got minus 0.3 - minus 4 - plus 39. That's right. Okay. Stop that. Turn the page. Okay. AGS MODE CONTROL, ATT HOLD. P37 - Max NOUN 49's a 0.8 and 0.5 - and 5.0. Okay, do you want to do a VERB 67?

Do I want to do a VERB 67?

Yeah. For 2002, change the W-matrix.

I will in a second, hear?

Okay.

Okay, can I reacquire ... ?

Wait until we get pointed at you, Ken; it'll be 2 seconds.

Okay.

Okay, we're about there, go ahead.

All right. And I'll tell you when I've got it.

Okay, I got you at 27 miles.

... --

Okay, we haven't got a lockon yet.

Come on, radar. There it goes.

There she comes.
07 08 29 09  CDR  It was taking a long time to designate.
07 08 29 15  LMP/CDR  Agh!
07 08 29 29  LMP  Okay, 2000.
07 08 29 56  LMP  Okay, Ken, we read 25 miles.
07 08 29 59  LMP  MARK.
07 08 30 01  LMP  Okay.
07 08 30 05  CDR  Okay.
07 08 30 23  LMP  Wonder what that noise is? That sounds like the evil winds blowing.
07 08 30 29  CMP  I thought that was just on this side.
07 08 30 31  LMP  No, it's terrible over here.
07 08 30 35  CMP  It comes in - it must be the VHF ... 
07 08 30 48  CMP  It probably picked up when you ... lock.
07 08 31 15  LMP  Twenty-four miles and 37 degrees.
07 08 31 31  CDR  Hey, look up in the G&N Dictionary, how to enter that thing.
07 08 31 35  LMP  VERB 67, and just load it and enter.
07 08 31 37  CDR  Yeah, that's what I did. Then I had to PRO out of it.
07 08 31 41  LMP  That's right.
07 08 31 43  CDR  I never had to PRO out of it before.
07 08 31 44  LMP  Okay, wait a minute; let me look.
07 08 31 47  CDR  It'll tell you right there.
07 08 31 49  LMP  Yeah. "VERB 67 LOAD." That's all it says.
07 08 31 53  CDR  I don't think it's loaded.
I --

... again with the ... values in there. And then after that ... zero on it, I think.

Yeah, we got them.

You ought to VERB 34 on that.

What do you do on that? VERB 34?

Yeah.

... too many zeros, or do you have another one?

We have another register.

Okay.

VERB 34?

Yeah. That'll kill it.

I see him.

You see him?

Yeah.

Yeah, there he is.

We got your light, Ken.

Okay.

Boy, this is neat. That APS is a pretty big boot, isn't it?
07 08 33 28 CDR  
Sure is.

07 08 33 46 LMP  
Okay; at 9 minutes, I need a theta.

07 08 35 18 CDR  
43 6.

07 08 35 48 LMP  
Ken, you should have seen old Percy Precision, here, plant this beauty down! I'm tellin' you!

07 08 35 58 CMP  
... by Double Spot?

07 08 36 00 LMP  
About 100 meters off - 200 meters, maybe.

07 08 36 09 CDR  
I do one precision at a time. See if you really got -

07 08 36 19 LMP  
Really got what?

07 08 36 21 CDR  
Trying to see if I really got drift up there.

07 08 36 25 LMP  
I see him out there.

07 08 36 27 CDR  
I do, too.

07 08 36 28 LMP  
That - that spot's been in the same place flashing. Is that what you said?

07 08 36 30 CDR  
Yeah.

07 08 36 31 LMP  
Yeah.

07 08 36 34 CDR  
I - some milliradians there.

07 08 36 38 LMP  
Yeah.

07 08 36 41 CDR  
Wish that cabin fan would suck all this dirt out of here.

07 08 36 42 LMP  
It's doing a pretty good job.
But what happened when we lit the engine?

I know it. It came all off the floor; that's the Velcro down.

Ken, we're gonna need that vacuum cleaner something bad.

Oh, okay.

You won't even want to put on these OPSS, Ken.

That's right.

I only fell down six times.

Charlie - Charlie was laying down more than he was standing up.

Okay, coming up on - final comp.

Okay.

Okay, we'll give you a mark countdown of final comp, Ken.

Okay.

Okay, about 45, 40 seconds - 50 seconds.

Can you imagine that, 18 li - more hours of consumables with three revs of high power?

You could have gone 18 more hours?

On the electrical.

On the electrical.

How long was your EVA today?

5 -

05:30. They wouldn't let us do a full one.

05:31.
07 08 38 03 CDR  For some reason.
07 08 38 04 LMP  We - Okay. Stand by, Ken.
07 08 38 06 CMP  All set.
07 08 38 09 LMP  3, 2, 1 -
07 08 38 12 LMP  PRO.
07 08 38 14 CMP  Okay. ...! And that's - minus 0.2, minus 0.1, and minus 0.4.
07 08 38 30 CDR  That's funny. We got minus 0.3, minus 0.1, and plus 0.9. Let's see.
07 08 38 40 CMP  What did you get, Ken?
07 08 38 43 CMP  Minus 0.2, minus 0.1, minus 0.4.
07 08 38 49 LMP  Okay, AGS is - -
07 08 38 50 CDR  Three milliradians at 12 minutes.
07 08 38 53 LMP  AGS is 0, plus 0.9, plus 0.8.
07 08 39 06 CDR  Well, if we don't get more than one axis, it'll - in - in P41, we won't do it. If that doesn't root something, square up to 1 something -
07 08 39 15 LMP  (Cough) No. It doesn't.
07 08 39 16 CDR  Huh?
07 08 39 17 LMP  No, it does not. Whenev - you know - We gonna burn?
07 08 39 23 CDR  Not unless that makes more than 1.
07 08 39 25 LMP  It doesn't.
07 08 39 27 CDR  Maybe we ought to do the 0.9, Charlie.
07 08 39 29 LMP  Okay.
07 08 39 32 CMP  Which one do you put the 0.9 in?
Z. Well -
Okay.
Okay, you want to call?
Yeah.
I guess I'm going with that. What you got on the AGS?
The same thing. In Z, we had almost the same number, John; AGS had 0.8 and 0.9.
Okay.
But I had a little out of plane, which I think is probably wrong. Okay; 20 seconds, Ken.
Okay.
Okay. Go ahead, John.
(Cough) You know, there's no doubt when you have a thruster struck on in the real world, is there?
Nope.
Okay, Ken, our residuals are minus 0, plus 0, minus 0.1.
Okay; what was it you put in?
Z of plus 0.9.
Okay.
Okay, a VERB 93 here, John - Yeah.
What was our transfer angle, Charlie?
30 degrees.
That's what I figured. So a 30-degree transfer angle - at 15 minutes, we should have 2 milliradians ---
Man, you're in the Sun, Ken, and you're the brightest thing I've ever seen in my life!

This thing is right-on. We've got a 1-milliradian bias, and it says it's 2-1/2 milliradians, and it should be 2 milliradians.

Instant sunrise!

Absolutely spectacular!

Okay; my tracking light's off, Ken.

You make a pretty good-size star.

You're bri---

By golly, in the sextant, I can even tell what you are.

Okay. We're at 60 degrees, huh, Charlie?

Yeah.

I hope we get there before this lunar dust eats us alive.

Me, too.

What a heck of a thing to have happen to you at lift-off.

What? Yeah, I know it.

I mean, I couldn't see out of it.

I was worried.

Well, there's noth - no need to worry. I was going - I was going to ... --

277, 62 degrees, and we've got 60,000 feet.

Just about right on the line, John. Okay. You - we got you 59,000 feet, Ken; 72 feet a second.
Look at this thing. It hasn't fired a thruster in 3 minutes, Charlie.

I know it.

Fantastic. If you'll hold still, it won't fire any, once it figures out where the c.g. is. What a machine.

... --

You've still got some particles dangling along with you.

Man, I wouldn't be surprised! Wait until you open the hatch.

Yes, this is sort of a traveling dog and pony show.

You ought to have seen old A. J. Foyt and Barney Oldfield all rolled into one on that Rover, Ken. I mean he really put it through its paces.

You ought to see that flat - lands out there.

Whoever called that the Cayley Plains was an idiot.

Yeah, man. There isn't a flat spot in the whole place!

There were - there were some deep sinkholes out there, Ken, that must have been 70, 80 meters deep, and they weren't even on the maps.

I believe that. Yeah.

You saw them?

No, but I just - that sounds like what you'd - about - how close we could come on a ...

And old deadeye, here, picked the only flat spot within 2 kilometers to land on.
07 08 46 50 CDR  That was luck, I think, more than anything else.
07 08 46 54 LMP  Fifty meters in any direction, John, and we'd have had a 10-degree tilt.
07 08 46 59 CDR  Yeah, we would have.
07 08 47 00 LMP  No, well, maybe 5, but -
07 08 47 04 CDR  Heck, 50 meters backwards and we'd have been a lot worse than that.
07 08 47 09 LMP  We'd have been in deep trouble. Ken, 10 - 10 feet behind the aft footpad was about a 12-foot-deep crater about 20 feet across.
07 08 47 22 CMP  (Laughter) Could you see it on the approach?
07 08 47 27 CDR  Yeah.
07 08 47 28 CMP  Yeah.
07 08 47 29 LMP  He says he did.
07 08 47 31 CDR  Yeah, I did. I inched over it. I saw the dang - I saw the - I saw - I saw the ground all the way to touchdown, Ken. These guys have been saying they can't see the ground. I saw it.
07 08 47 43 LMP  I - Yeah.
07 08 47 44 CDR  I didn't have any trouble nulling the velocity.
07 08 47 46 LMP  I was amazed, John, that - really that - that we -
07 08 47 51 CDR  Did you see it?
07 08 47 52 LMP  Yeah, I did. But there wasn't - that there was not as much dust because of the soft regolith there. It was really spongy.
07 08 48 00 CDR  ... - -
07 08 48 01 LMP  Okay, 46,000 at 72 - 46.
07 08 48 18 CDR  Hey, listen, they reported some data that Izzy got; said the - said that the Cayley Plains was
salithic (?) but not as much as the eastern high-
lands that you guys got. And they said that your
gear was working good except for the laser altim-
eter, which was doing something.

07 08 48 35 CMP Yeah. That's when we'd been rewriting the Flight
Plan.

07 08 48 40 CDR Yeah, I know it.

07 08 48 42 LMP I can imagine.

07 08 48 43 CDR You should have seen what the heck's been going
on - Well, I'm sure you know.

07 08 48 48 LMP Okay, we got 43,000 feet, Ken.

07 08 48 51 CMP Okay.

07 08 48 56 LMP You are really bright, babe.

07 08 49 08 CMP ... against the lunar surface.

07 08 49 13 LMP What?

07 08 49 14 CMP You really look pretty against the lunar surface.

07 08 49 16 LMP Oh.

07 08 49 18 CMP You got the little split imagery in through there.

07 08 49 21 CDR You do? The red against the - the star against a
red background?

07 08 49 22 CMP Yeah.

07 08 49 23 CDR When I first saw that on Apollo 10, I thought I
was in 2001. I couldn't figure out what was
happening, because the - the guys I was tracking
were up above me at the time, for some reason.

07 08 49 39 CMP Now we've moved ... Now I'm seeing the - the Moon
through the ... behind you, I think. It's not red
anymore, anyhow ... looks like cartoon characters
someone would draw.
07 08 50 03 CDR I really think we ought to let that all get out of here before we try to take our helmets and gloves off, if we can - if we can possibly help it. Golly, what an approach angle; 68 degrees at -

07 08 50 16 LMP We're right - almost right on the line.

07 08 50 18 CDR Yeah.

07 08 50 30 CDR Listen, I don't care if they're bringing us home, because we got a ... or what - you know, if that's what the reason is. If it's for some other reason, then I am mad.

07 08 50 36 CMP I think it's for some other reason.

07 08 50 38 LMP Such as that gimbal motor.

07 08 50 41 CMP I'm sure of it.

07 08 50 42 CDR It's probably - it's probably starting to grind on the manager.

07 08 50 44 CMP Yep. ... go home. ... could say that.

07 08 50 59 CDR It ain't - you didn't make the dang gimbal motor. You did the right thing. Boy, and - if - if it had been me up there, I probably would have aborted the whole bloody thing. I don't care what they'd have said.

07 08 51 10 LMP Okay, 2 minutes to go, Ken.

07 08 51 11 CMP Okay. Man, this tracking's so much fun, let's do it all over again.

07 08 51 14 CDR Yeah.

07 08 51 15 CMP ... pretty.

07 08 51 16 CDR First time you ever got a set that worked, huh?

07 08 51 17 CMP Yeah (laughter).

07 08 51 18 CDR (Laughter)
I haven't had a red light now in so long, I don't know what it means.

Yeah. You know, these optics are beautiful. This AOT in here is just like - just fantastic.

Good. I'd never believe that this ... could be so nice.


(Laughter) I never did, either.

We get rendezvoused before we get AOS.

Do we?

Yeah. We're not docked, but we're rendezvoused.

Hopefully.

..., or did they scrub that?

They didn't say scrub it. I'm going to take them until they say scrub it. Nobody told me.

We got the film.

All righty.

I saved you some on this roll. It's --

Okay, how about taking a good look at that dude right up - right up there on top of that ...

Okay. And I'll tell you what we'll do, Ken. We'll - When we come to dock, we'll go to the docking attitude. Once we get lined up, go to the docking attitude, and I'll try to maneuver in to where it's - All you got to do is translate forward. Would that be all right? Save you some RCS?

Well, at this point, the RCS isn't that ...

Okay - okay, well, however --

...
CDR Yeah, but, you know, RCS is midcourse fuel.

CMP Yeah, I know.

CDR And this thing has got a barrelful of it.

LMP Okay; 20 seconds, Ken.

CMP Okay.

LMP You bas - you crummy thing.

CDR What did it do?

LMP PRO. I thought I had a stuck key, but it came out.

CDR Okay, did you get that PRO, Ken?

CMP Yes, sir.

CDR Okay.

LMP Okay; plus 0.5, plus 0.2, plus 0.7.

CDR Well, I don't know. The last one was so good, I might as well do this one, too.

LMP Yeah.

CMP I've got plus 0.5, minus 0.5 and plus 2.2.

CDR Oh, yeah?

LMP Okay, we'll burn this.

CMP Okay.

LMP We're going to burn plus 0.5, plus 0.2, plus 0.7.

CMP All righty.

LMP 90 degrees at 26.5. We're coming right in there, John. Perfect. You want a lunar rock as a souvenir? They'd never miss it.

CDR I'll give it to Ken. No, I don't - I don't know what to do with it at this point. Oh, first igneous rock I've seen.
Man, we've got some nice crystalline rocks.

Hope so. Here we go, Charlie.

Okay.

One minute to go, Ken.

Okay.

And he said 29 foot a second on the braking, which sounds about right. What'd it say?

PGNS said 27.

Okay, we'll take it.

Ground said 29.

Well, in case you don't have enough ..., I'll give you ...

Okay.

Okay, average g is on.

This is some flying machine, boy.

Isn't it?

Okay, John, it's flashing at you.

Okay, 0.4.

Up, up.

Minus 0.8.

Yeah.

Okay, Ken, there they are; minus 0, minus 0.1, minus 0.

Okay.

Okay, John, go to POO. VERB 48, when that gets up.
Okay.

Okay, 11002. Okay. Okay, PRO and a P47. And a VERB 63.

Okay.

Want me to key that for you?

Yeah.

Okay, we're at 3.15 miles, Ken; 33 feet a second.

Okay.

Okay, the AGS is set. Hey, here comes the AO - AOS. Good show. I was wrong on that.

Hello, Houston; Orion. Over.

Orion, this is Houston. Go ahead.

Okay, Jim. We're 3 miles out, closing. We did a TPI of plus 78.0, plus 2.7, plus 0.7, and we burned two midcourses of minus 0.3, minus 0.1, plus 0.9, plus 0.5, plus 0.2, plus 0.7, and we got a visual.

Roger. Copied all that.

I guess we don't need to tell you, but this is a sweet machine.

You're so right.

Look at that bright spot up there, will you. Okay, John, I'll get the - you got the burn report? UP-LINK SQUELCH is coming OFF, PCM is HI, bit rate is LEFT [sic]. Okay, set up the camera. I'll just hold it in my hand.

Okay.

Orion, you're just a little tiny black dot to the unaided eye.

Well, you look brighter than any star or planet I've ever seen. Against that black sky.

Either that or we're rendezvousing with Venus.
07 08 59 55  LMP  Yeah, we're coming to Venus.  (Laughter)
07 09 00 03  CDR  Okay; 15,000 feet, 2.42 miles, and 31 feet a second. And the line-of-sight rates are essentially nulled.
07 09 00 23  LMP  You lost a screw, John. I guess that - I guess they left them out on purpose.
07 09 00 27  CDR  Probably had this panel off and back on so many times, they didn't know what else to do.
07 09 00 30  LMP  Yeah.
07 09 00 32  CDR  I want that sign.
07 09 00 33  LMP  Okay, I'll - we'll remember - -
07 09 00 34  CDR  If there's any way. I don't know how to get it.
07 09 00 36  LMP  Well, we can peel - it'll peel off of there. It's just a piece of tape. Okay, get - I'll put it on your good side.
07 09 01 15  LMP  Two miles, Ken.
07 09 01 18  CMP  Okay.
07 09 01 35  CDR  We may have to not do any line-of-sight corrections.
07 09 01 37  LMP  I don't think there's going to be a bit. Isn't that amazing?
07 09 02 06  CDR  He is right in the middle of the COAS and he is not moving one iota.
07 09 02 12  CMP  Okay, I've got you at 28 foot per second.
07 09 02 15  CDR  That's what we've got us at 28.3.
07 09 02 32  CDR  You might - When he starts to grow - He's growing now.
07 09 02 42  LMP  Yeah. You can make out an outline now, Ken.
07 09 02 50  CMP  ... still reading 28 foot per second at a mile and a half.
07 09 02 55  LMP  Okay.
07 09 03 36  CDR  Look at that white rock coming at us.
07 09 03 38  LMP  Yeah.
07 09 03 39  CDR  There you go, Charlie; there's a white rock for you.
07 09 03 41  LMP  Seen lots of them.
07 09 03 45  CDR  Okay, 8000 feet; 27 feet a second.
07 09 04 24  CDR  Charlie, don't cover up my DSKY.
07 09 04 27  LMP  I was just looking at that dirt on that hatch down there.
07 09 04 34  CMP  Okay, I see you; you are a little white dot.
07 09 04 37  LMP/CDR  Yeah.
07 09 04 38  CDR  Show me ...
07 09 04 40  LMP  It's on the needle.
07 09 04 42  CDR  Up down ... about out of plane. Here, Charlie, you'll need this for your ...
07 09 04 47  LMP  That's what I was looking for. I dropped that beauty.
07 09 04 51  CDR  Okay, Ken, we're approaching ..., and we're going to brake to 20.
07 09 04 55  LMP  No, 30 at a mile, 20 at 3.
07 09 04 59  CDR  Okay, I'm going to get this vertical out.
07 09 05 03  LMP  Okay. We got a little - Radar says a little to the left, John.
07 09 05 11  CDR  Okay, just hold it a little.
07 09 05 15  CMP  I think that's right; you need to go to your - you need to go to your ...
Be north. Okay, 5000 feet. 5000 out, Houston.
Looks like it could be a little more to the north.
Hey, listen, who's vectoring who around here?
I thought the idea was we took turns.

Okay; 4000 feet, Ken, and we got 7 feet to kill off.

Okay.

Twenty at 3, John?

Yeah.

Okay, 3000 at 21, Ken.

Okay.

Okay, John. We want 10 at 1500.

Okay. And you're getting big, Ken.

Sure is. Growing like a -

Okay, we got 2000 feet now, Ken.

Okay. Man, that looks good.

What a beautiful machine.

Okay, we need to take 10 off, John.

Okay, we'll take 10 off, Charlie.

Okay, 0.2 at 9.4, Ken.

At 600 feet, we want 5, John.

Okay.

Boy, you are beautiful, Ken.
07 09 09 00  CMP That's the nicest thing anyone's said.
07 09 09 01  LMP Casper --
07 09 09 02  CDR What a rendezvous machine this is.
07 09 09 07  LMP Casper is really beautiful. Okay, we're at 800 feet at 10 feet per second, John.
07 09 09 13  CDR Okay.
07 09 09 33  LMP 650 at 10.
07 09 09 36  CDR Okay, going to 5, Charlie.
07 09 09 37  LMP Okay. Okay, we're at 5, Ken, at 600 feet. Make it 540 feet.
07 09 09 56  CMP You look a lot smaller in the daytime. It's really great.
07 09 10 04  CDR What a flying machine this is, Ken. Okay, 400 feet; we're going to 4.
07 09 10 23  CMP My, you look good. Your forward firing thrusters look like little flashlights when they fire.
07 09 10 30  LMP Ken, you're clean. You don't have a boom out.
07 09 10 33  CMP Okay, wait until you get back around there and take a look. We know they aren't out that far, but we want to look at the covers.
07 09 10 39  LMP Okay. We're 240 feet.
07 09 10 44  CMP Good.
07 09 10 45  LMP 280 feet, it says. Sure looks like we're closer than that to me.
07 09 10 53  CDR No.
07 09 11 01  LMP Man, that big dish looks great. I couldn't get mine to work in yaw.
07 09 11 16  LMP Okay, 200 feet, John?
07 09 11 18  CDR  Yep.
07 09 11 27  CDR  More like about 2, Charlie.
07 09 11 29  LMP  Yeah, probably. I was just looking at the radar. Okay, John, I'm going to go to POO.
07 09 11 39  CMP  (Laughter) ... these cartoons in the real world.
07 09 11 50  CDR  Isn't it something?
07 09 11 53  LMP  Okay, I'll go to dock.
07 09 12 05  CMP  Okay, I'm ready to go to attitude whenever you are.
07 09 12 09  CDR  Okay, wait until I get this thing where I want it, Char - Ken.
07 09 12 12  CC  Orion, this is Houston. When you're stationkeeping, let me know. We have some words for you.
07 09 12 17  CDR  Okay, we're stationkeeping.
07 09 12 22  CC  Okay, John. Looking at the pictures of the lift-off, and it appears that something might have come loose from the skin on the back of the vehicle, so for that reason, we want Ken to take some pictures of the LM. So we have a slight modification ... the Flight Plan and ask you to do a yaw 360 after Ken does his VERB - VERB 49 to the docking attitude.
07 09 12 51  CDR Roger. I - I - a yaw 360 after Ken does a VERB 49 to the docking attitude. Okay, now (laughter) -
07 09 13 07  CMP  Okay, right here I've got good lighting, if - if you want me to get some pictures, if John could just do a ... - -
07 09 13 14  CC  -- we can't hear you very well, but --
07 09 13 16  CDR  Let me pitch up 90, Ken, and you hold station. Can you do that?
07 09 13 20 CMP  Stand by. Let me get my camera out and ready, and I'll take it - see if I can -

07 09 13 25 CDR  Hey, Houston - -

07 09 13 26 CC  16, this is Houston. Let me just recap here, the procedure.

07 09 13 31 CDR  Okay. Okay, Houston. We're in perfect position to get - -

07 09 13 34 CC  We want you to do - Ken, do the VERB 49 maneuver, attempt a attitude ... per the Flight Plan, and then do the 360-degree roll, and of course following that, you do the VERB 49 maneuver into the docking attitude. And then I have a change for the Flight Plan, whenever you're ready to copy.

07 09 13 56 CMP  Okay. We're in perfect position to take pictures of the LM right now. All we've got to do is to pitch. You'll prepare us to go to the other sequence, is that correct?

07 09 14 11 CC  Okay, if you're in position to take pictures of the LM, we wanted the LM to do a 360-degree yaw, and you're to take pictures of the - the minus-B portion of the ascent stage, using the same camera settings that you have on the - the DAC and the EL, except for focus on the EL should be changed to infinity. Over.

07 09 14 36 CMP  Okay, 1/250 is that setting, and I'll take pictures of the ... Let's see, that's ...

07 09 14 46 LMP  That's the back part, Ken.

07 09 14 49 CC  Okay, Ken, it's the back side of the LM.

07 09 14 53 CMP  Roger. I - I'm with you. And I'll turn the DAC on, and I'll - and I'll take an EL. And I have stationkeeping now.

07 09 15 04 CDR  Okay.

07 09 15 10 CC  Ken, if you observe anything there, will you please relay your observations?
Yes, sir; certainly will.

Houston, on lift-off, one of the MESA blankets flew out in front of the LM and hit the ground about 200 meters in front of the LM. Over.

And a portion of the MESA blanket is still on the front?

Yeah, that might have been what you saw. It came pretty high in the air and went straight out to the west. Look at that crater down there, would you?

We copy.

Okay, everything on the LM back side looks clean, just the surfaces of the - are flaked with the paint that are ...

Look at that maria out there, John. In that highland.

Yeah.

Okay, on the - on the back side - -

Get the pictures - -

- - it looks like some of the - -

Orion, will you go FORWARD omni.

FORWARD omni, Charlie.

Okay.

Looks like some of the thermal blanket around the descent engine on the back end there is - well, pretty badly chewed up. Some of the stuff is torn, a couple of panels are torn off, and some of the stripping in between looks like it was struck by something. It looks like all the Mylar blankets underneath are still in tact.

These guys are crazy (laughter).
They are. Well, that's - that's a data point.

Yeah, they have a ... doing 360-degree yaws. Ken's going to do one.

(Laughter)

I don't know. I don't know. When we first got in this program - -

We got the ... on the underside of the ... side of the - -

Ken, can you observe whether it's possible for sunlight to directly impinge on portions of the spacecraft equipment?

No, sir, it's not possible when you're docked. I can't tell you about the bottom, but on the back side, the - the Mylar blankets are still intact. It's only that outer covering that's broken.

I tell - -

We copy.

I tell you, this thing really flies beautifully.

Orion, AFT omni.

Okay.

... big thing. This is easy.

You better believe.

There's old - What's the big crater down there? It looks like Theophilus.

What's your range? I'm ready to go to ... attitude.

Okay. We'll be pressing on with the Flight Plan.

Roger. We're pressing.

Okay, John, are you ready for me to go to my attitude?
07 09 18 37  CDR  That's a - Wait a second until we get in position.

07 09 18 40  CMP  Okay. I'm just going to do a little with the roll and the pitch, be my pitch down --

07 09 18 48  CC  Orion, will you go NORMAL voice?

07 09 18 51  CDR  Okay.

07 09 18 54  CMP  ... Are you all set?

07 09 18 59  CDR  Wait until we get up here.

07 09 19 01  LMP  Okay, you got us NORMAL voice, Houston? You got Orion?

07 09 19 04  CDR  Are you ready, Charlie?

07 09 19 05  LMP  Yeah, I'm ready.

07 09 19 06  CDR  Okay, go to it, Ken.

07 09 19 07  CMP  Okay, you have stationkeeping. I'm maneuvering.

07 09 19 09  CDR  Shoot, I thought I had the stationkeeping long before this.

07 09 19 24  CC  Casper, will you read ...?

07 09 19 27  CMP  You got it.

07 09 19 31  CC  You're ...

07 09 19 35  CDR  Okay, I'm gonna keep him - keep him in the middle, Charlie.

07 09 19 41  LMP  What is it - what are we going to see with him rolling like that?

07 09 19 46  CDR  He's maneuvering to some attitude - he's maneuvering - he's doing a three-axis maneuver to the SIM bay attitude.

07 09 19 52  LMP  Oh. Well, I got a peek at the SIM bay as we came up under it; clean.
07 09 20 03  CDR  Now, Charlie, you want me to maneuver and get a little closer to him?

07 09 20 06  CMP  Hey, Charlie, have you got a ...?

07 09 20 10  LMP  Yeah, I'm on it.

07 09 20 12  CMP  Okay. The thing I'd like you to look at is up around the aft shelf of the SIM bay; there's two booms back there.

07 09 20 20  LMP  Yeah.

07 09 20 21  CMP  One of my ... mass spec has got a white cover, and it's kind of a rectangular-shaped cover. The one on the left - or it's really at about the middle, ... thermal cover, and that's the ... Would you take a look and see if either of those covers are not quite closed, because we have indications that the base ... are not closed. We have indications that ...  

07 09 20 48  LMP  Okay.

07 09 20 57  CDR  Are you maneuvering, Ken?

07 09 20 59  CMP  Yes, sir.

07 09 21 00  CDR  Oh.

07 09 21 04  CMP  This is one of the fastest maneuvers I've made in a long time.

07 09 21 06  LMP  Are you gonna sit - are you gonna pitch some more, so we can see the SIM bay?

07 09 21 12  CMP  Well, I'm not there yet, Charlie.

07 09 21 14  LMP  Okay.

07 09 21 15  CMP  I'll tell you when I get there.

07 09 21 31  CMP  Got about 20 degrees of pitch and about 30 degrees of roll.

07 09 21 43  LMP  Okay, what do you do after that?
07 09 21 45 CMP  Well, then I wait for you to take a look. And then after you do that, why, we'll do a 360-degree rotation about the X-axis while you take pictures of the thermal coatings.

07 09 21 57 LMF  Okay, I can see around the - the thrusters now that it's blistered and peeled. They want OM - they want --

07 09 22 08 CMP  Did you call Casper?

07 09 22 09 LMF  -- OMNI Delta.

07 09 22 12 CC  OMNI Delta.

07 09 22 14 CDR  They want your OMNI Delta, Ken.

07 09 22 16 CMP  Okay, thank you.

07 09 22 20 CDR  Well, you'd probably be blistered and peeled, too, if you were as hot as they are.

07 09 22 25 LMF  Okay, Ken, at the aft end, down next to the engine bell, there's a black cover that appears to be partially opened.

07 09 22 37 CMP  Could you tell me which side of the SIM bay?

07 09 22 40 LMF  Okay, it's on the side away from the hatch.

07 09 22 45 CMP  Okay, and it's dark beneath the thermal covering?

07 09 22 49 LMF  Yeah.

07 09 22 50 CMP  Okay. And it's partially open?

07 09 22 51 LMF  Looks like it to me.

07 09 22 52 CMP  Okay. Okay, you don't see anything white sticking out from under it?

07 09 22 56 LMF  No.

07 09 23 04 LMF  Okay, there may be a little shield on the mass spec is - the black. Okay, do you see the gamma ray door?

07 09 23 04 LMF  Yeah. That's silver, isn't it?
<table>
<thead>
<tr>
<th>Time</th>
<th>Role</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>07 09 23 05</td>
<td>CDR</td>
<td>Let's go on up there, Charlie.</td>
</tr>
<tr>
<td>07 09 23 06</td>
<td>LMP</td>
<td>It's closed.</td>
</tr>
<tr>
<td>07 09 23 08</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 09 23 10</td>
<td>CDR</td>
<td>Are you there yet, Ken?</td>
</tr>
<tr>
<td>07 09 23 12</td>
<td>CMP</td>
<td>(Laughter) No, no. I'll - I'll tell you.</td>
</tr>
<tr>
<td>07 09 23 15</td>
<td>LMP</td>
<td>Are we there yet, daddy?</td>
</tr>
<tr>
<td>07 09 23 18</td>
<td>CMP</td>
<td>(Laughter)</td>
</tr>
<tr>
<td>07 09 23 27</td>
<td>LMP</td>
<td>I think f/8 is too bright; I think we need f/11.</td>
</tr>
<tr>
<td>07 09 23 30</td>
<td>CDR</td>
<td>Yeah, the Sun is shining on it. This is a lousy attitude for picturetaking. Are you taking pictures now?</td>
</tr>
<tr>
<td>07 09 23 36</td>
<td>LMP</td>
<td>Yeah.</td>
</tr>
<tr>
<td>07 09 23 48</td>
<td>LMP</td>
<td>Ain't gonna be doing any good with the Sun shining on it like that though, John.</td>
</tr>
<tr>
<td>07 09 23 56</td>
<td>CC</td>
<td>Orion, you have 32 minutes to ...</td>
</tr>
<tr>
<td>07 09 24 03</td>
<td>CMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>07 09 24 07</td>
<td>LMP</td>
<td>Okay, start - Okay, Ken, the paint is blistered on the quad above the SIM bay, too, pretty badly.</td>
</tr>
<tr>
<td>07 09 24 23</td>
<td>CMP</td>
<td>On the quad above the SIM bay? You mean A quad?</td>
</tr>
<tr>
<td>07 09 24 27</td>
<td>LMP</td>
<td>Not A quad, I mean the paneling above the SIM bay. You know, as you come out the hatch, you grab the handles and walk down to the two handles on the SIM bay?</td>
</tr>
<tr>
<td>07 09 24 37</td>
<td>CMP</td>
<td>Yep.</td>
</tr>
<tr>
<td>07 09 24 38</td>
<td>LMP</td>
<td>Okay, that along the wide - those - that silver paint in there is really badly - -</td>
</tr>
<tr>
<td>07 09 24 45</td>
<td>CDR</td>
<td>Here's a door that's not closed there back there in the back end.</td>
</tr>
</tbody>
</table>
07 09 24 48 LMP  Yeah, that's what I said. Yeah, that's the one - Okay, you - The - the mass - the gamma ray door is partially open, Ken.

07 09 24 59 CMP  Okay, good. Can you get some pictures of those, too?

07 09 25 02 LMP  Yeah.

07 09 25 03 CMP  Okay, and I'm ready to start my 360 roll when you get the pictures of those things.

07 09 25 06 LMP  We got them; go ahead.

07 09 25 09 CMP  Okay. I'm gonna roll left.

07 09 25 11 CDR  Okay. I'm gonna back up here. I don't want to run into high gain, Charlie.

07 09 25 18 LMP  Yeah. You're zapping the - the SIM bay, too, with the thrusters. John, I can't see my - Okay, there we go. Looks good.

07 09 25 53 CMP  You guys are pretty fast ... outside up there. It was nice and clean until you came back.

07 09 26 00 CDR  Yeah.

07 09 26 04 LMP  Part of the "United States" has peeled off, Ken.

07 09 26 05 CDR  What are you doing to your high gain there, Ken?

07 09 26 08 CMP  I'm ...

07 09 26 10 CDR  Oh.

07 09 26 12 CMP  ...?

07 09 26 13 CDR  Yeah.

07 09 26 17 CMP  I'll pick it up.

07 09 26 18 LMP  Okay, Ken, the umbilical thing is really - I don't see how you get any thrust out of that thruster that's pointed right at that umbilical thing. Shoot, it fires right on it.
07 09 26 30  CDR  That make you a little nervous, Charlie?
07 09 26 32  LMP  Yeah.
07 09 26 33  CDR  Me, too.
07 09 26 43  CDR  Is this close enough, Charlie, or do you want to be closer?
07 09 26 44  LMP  No, that's fine, John. I don't believe I could get it all in the field of view if you were any closer.
07 09 26 53  CDR  Okay, Ken, I can - as soon as we get around here, we better go dock, because we got 32 minutes to darkness, and I don't want to have another one of them night dockings.
07 09 27 02  CMP  Okay. Well, we're almost there. The next event on our schedule is for me to go to the docking attitude.
07 09 27 11  CDR  Okay.
07 09 27 14  CMP  And then, I guess you can slide around in front of me. ... inspect the engine.
07 09 27 24  CDR  Okay, go to it. What is - Your attitude and my attitude dockingwise is compatible? It's the same - -
07 09 27 34  CMP  They had been in the simulator, and I'm sure they will be today.
07 09 27 38  CDR  I'd be surprised. The only thing nominal so far is the rendezvous. I hope the rest of it turns out that way.
07 09 27 49  LMP  We want to go to 180, 282, 300 on the ball, John.
07 09 27 53  CDR  Okay.
07 09 28 05  LMP  Okay, Ken, the - Out your - your window, off behind you on the high gain side, it's real nice and clean; on the other side of the spacecraft, the - the 180 opposite that, starting at about
the middle of the hatch around, is pretty badly blistered and peeled. Not peeled, but blistered; around about the umbilicals.

07 09 28 39 CMP Okay.
07 09 28 50 CDR Okay, what? Maneuvering to --
07 09 28 54 CMP Okay, I'm getting ready to go over to a ... attitude.
07 09 29 01 CDR Well --
07 09 29 02 CMP -- the attitude we came up in.
07 09 29 03 CDR Okay.
07 09 29 04 CMP All set?
07 09 29 05 CDR All set.
07 09 29 08 LMP That's enough pictures. I'm getting tired of holding that button.
07 09 29 18 CDR What were you shooting at? One frame a second?
07 09 29 20 LMP Well, I don't mean holding the button, I mean holding the camera.
07 09 29 32 CDR I'm not used to this zero g.
07 09 29 34 LMP I know it. (Laughter)
07 09 29 35 CDR It raises Cain with us.
07 09 29 46 LMP Hey, that is some crater, right down there.
07 09 29 50 CDR Are you going to undocking now, Ken?
07 09 29 53 CMP I beg your pardon, John?
07 09 29 55 CDR Are you at the undocking attitude now?
07 09 29 57 CMP Yes, sir; I'm in the undocking attitude. It's almost identical to my rendezvous attitude.
07 09 30 03 CDR Okay. We go to 180 what?
Day 8

07 09 30 11 LMP 180 roll, 282 pitch, and 300 yaw.
07 09 30 19 CDR Okay.
07 09 30 41 LMP Okay. There we go. Now I'm zero gravity, took my -
07 09 30 47 CDR Oh, man!
07 09 31 00 LMP John, this place still looks like a pig sty.
07 09 31 04 CC ... go OMNI Delta.
07 09 31 07 LMP Hey, Ken, are you - are you about there now?
07 09 31 11 CMP Well, I got 90 degrees of roll to go.
07 09 31 13 CDR Okay. But your pitch is okay, huh?
07 09 31 17 CMP Well, I got about 10 degrees of pitch.
07 09 31 19 CDR That's what I thought. It looks pretty good.
07 09 31 28 CMP Houston, did you get me on logic GO and the omni?
07 09 31 38 CDR Houston, Casper wants a logic GO and a omni.
07 09 31 46 CC Okay. You're GO.
07 09 31 49 CDR Okay. They gave you a GO, Ken.
07 09 31 53 CMP Okay.
07 09 32 00 CC Casper, OMNI Alfa.
07 09 32 07 CMP Okay, the LOGIC is on.
07 09 32 17 CC Let's hold up on the PYRO ARM.
07 09 32 20 LMP Hold on the PYRO ARM, Ken.
07 09 32 25 CDR Don't tell me.
07 09 32 34 LMP You copy that, Ken?
07 09 32 35 CMP Yes, sir.
07 09 32 36 LMP  Okay.
07 09 32 37 CMP  I thought they gave me a GO, but I guess not.
07 09 32 51 CC  ... take the LOGICs, OFF, and ... again.
07 09 32 55 LMP  Oh, no.
07 09 32 56 CMP  LOGIC's OFF.
07 09 33 00 CC  Stand by.
07 09 33 13 CDR  I can't believe it.
07 09 33 14 CC  ... GO for PYRO ARM ... LOGICs on.
07 09 33 18 CMP  Okay. The LOGICs are coming on. There goes number one. There goes number two.
07 09 33 33 CC  Casper, you're GO for PYRO ARM.
07 09 33 36 CMP  Okay. PYRO ARM's coming on. One. There's two.
07 09 33 50 LMP  Okay, John, you want to pull the RENDEZVOUS RADAR breakers?
07 09 33 59 CDR  Okay, Ken. You there?
07 09 34 01 CMP  I'm about 5 degrees from it. You can go ahead and ...
07 09 34 07 CDR  Okay, you have it. 282.
07 09 34 38 CDR  And yaw 300, Charlie?
07 09 34 39 LMP  Yeah.
07 09 34 49 CDR  And yaw, 300, which is over there.
07 09 35 31 CMP  Okay, I'm approaching. Your attitude looks good. I'll tell you when we have capture.
07 09 36 38 CDR  What is this thing lined up with? Whew!
07 09 36 47 LMP  How's he look?
07 09 37 04 CDR  I never got the true picture of this before today.
07 09 37 08 LMP  (Laughter)
07 09 37 13 CDR  He's right on, about a degree off. There's no way you can see it, Charlie.
07 09 37 19 LMP  No, I can't see him.
07 09 37 21 CDR  I want - I - I just want to be able to do something intelligent, like shut the thrusters off when we get capture.
07 09 37 32 LMP  It's only 09:30, John; we've been up since - 15 hours. Not bad.
07 09 37 42 CDR  Ken, you look beautiful to me.
07 09 37 45 CMP  Say again.
07 09 37 46 CDR  You look right on to me. My optical sight is coming right into your docking window.
07 09 38 05 CDR  Don't hit my arm, Charlie.
07 09 38 07 LMP  I'm sorry.
07 09 38 08 CDR  ...
07 09 38 35 CDR  How would you like to do a EVA transfer?
07 09 38 39 LMP  How would you like a kick in the behind?
07 09 38 42 CDR  Hot mike to Houston.  (Laughter)
07 09 38 48 LMP  No, we're normal voice. But we got our tape recorder running.  (Laughter).

#   #   #