

*Index*

**A**

- A. V. Roe Corporation 10, 24, 25, 350
- Aaron, John 179, 183, 309, 335
- Abbott, Ira H. 32
- Acheson, David C. 300
- Activation Analysis Laboratory 314
- Advanced Missions Program Office 218
- Aerojet-General Corporation 143, 152
- Aerospace Industries Association 191
- Aerospace Summer Intern Program 314
- Aerospace Task Force 317, 318
- Aerospatiale 296
- Agena-D target vehicle 93
- Air Force Ballistic Missile Division 22, 23, 122
- Air Force Flight Test Center 295
- Air Force Missile Test Center 110
- Air Force User Committee 239
- Akridge, Max 223, 225
- Al-Saud, Prince Sultan Salman 296
- Aldrich, Arnold D. 183, 325, 335
- Aldrich, Edward (Pete) 183, 315, 317
- Aldridge, Eleanor 317
- Aldrin, Edwin E. (Buzz) 94, 117, 124, 133, 174, 176, 200, 285
- Alford, Roy 78
- Allen, Joseph P. (Joe) 179, 275, 294, 302
- American Aeronautical Society 10
- American Association for the Advancement of Science 59
- American Institute of Aeronautics and Astronautics 192
- American Space Program vii, ix, 11
  - and the Cold War 321
  - early development 25, 35
  - effect on American education 6, 350
  - effect on Gulf War 343
  - funding vii, 3
  - future goals 320-321, 344
  - image vii
  - institutionalization of 11
  - management challenges 107
  - management techniques 61, 77, 209
  - post-*Challenger* accident 304-305, 320, 326
  - public interest in 123, 133, 150, 187, 226
  - reaction to Sputnik i, 1-15
  - shuttle era 222-225
- American Telephone and Telegraph (AT&T) 83, 289, 296
- Ames Aeronautical Laboratory (see Lewis Research Center)
- Ames Research Center 26, 37, 69, 188, 201, 224, 277, 295
- Anders, William A. 171, 332
- Anderson, Lyle 265
- Anderson, O. A. 220
- Anderson, Sen. Clinton P. 12, 189, 190
- Anfuso, Victor L. 18
- Anik D2 294
- Animals, use in space 30
  - Able 32
  - Baker 32
  - Enos 54
  - Ham 32, 38, 53, 55
  - Laika 1
  - Sam and Miss Sam 32
- Apollo Applications Programs 108, 192
- Apollo Experiments and Training on the Scientific Aspects of the Apollo Program* 128
- Apollo Extension System 195, 205
- Apollo program ix, 31, 53, 56-80, 84-117, 125-180, 185-203, 259-265, 273-289, 309-314, 330, 336-342, 350
  - 20th anniversary celebrations 252
  - and post-Apollo plans 188, 192, 195
- Apollo 4 134, 155
- Apollo 5 155, 173
- Apollo 6 135, 155
- Apollo 7 135, 155, 198, 165
- Apollo 8 156, 169, 171, 172, 224, 333
- Apollo 9 173, 183, 265
- Apollo 10 160, 174, 175, 176-77, 278
- Apollo 11 117, 133, 156, 159, 174-179, 182, 187, 195, 198, 202, 203, 218, 262, 333
- Apollo 12 179, 198
- Apollo 13 160, 173, 182-184, 196-199, 342
- Apollo 14 180, 187, 198, 199
- Apollo 15 180, 198-201, 265
- Apollo 16 180, 199, 202, 214, 265, 278
- Apollo 17 180, 187, 198-203, 214, 262
- Apollo 18 202
- Apollo 19 202
- Apollo AS204 fire vii, 112, 114, 140, 344
- budget 57, 135, 151
- compared to Mercury and Gemini 162-163
- contractor relations 71, 143, 145
- development plan 100, 103
- effect of space program 113-114
- effect on MSC personnel 115
- engineering and design 145-146
- flight tests 53, 169, 173
- historical significance 179
- improvements resulting from 114
- investigation results 113
- lessons from Gemini 64, 162-163, 165

- lunar program 79, 137, 141, 169
  - major elements 142
  - management conflicts 71, 105-107
  - management structure 86, 164, 166-168, 170
  - mission planning and control 103, 178-181
  - missions 160
  - origin of name 159
  - problems 71, 81, 135
  - program offices 86, 102, 335
  - public interest 104, 150
  - public reaction 117
  - redundancy systems 173
  - relationships between centers 111
  - request for contractor proposals 65, 142
  - review board 113, 114
  - subcontractors 147-149
  - technological advances 135, 174
  - training 127
  - Apollo spacecraft 73, 82, 90, 93, 103, 107, 108, 114, 118, 132, 134, 139-159, 173-174, 205-212, 221, 279, 311
    - life support systems 130
    - specifications 151
  - Apollo telescope mount 108, 168
  - Apollo-Soyuz vii, 188, 201, 207, 209, 210, 219-221, 227, 254, 285
  - Armed Services Committee 1, 2, 3,
  - Armstrong, Neil 94, 111, 117, 128, 133, 159, 164, 174, 176, 177, 285, 299, 300
  - Army Ballistic Missile Agency (ABMA) 19, 23, 27, 61, 73, 74, 105, 246, 312, 350
  - Army Ballistic Missile Program 4
  - Astronaut Office 118, 124, 127, 212
  - Astronauts 23, 24, 31, 32, 44, 51, 57, 58, 63, 66, 68, 72, 74, 91-95, 106, 111, 112, 117, 155-157, 172, 178, 184, 187, 195-200, 211-215, 221, 233, 248-254, 261, 265, 278-282, 286-289, 295-300, 307, 309, 332, 336, 342, 344, 350
    - insurance 122
    - media attention 117, 122-123
    - Mercury astronauts 122
    - privacy 123, 124
    - recruitment of 57, 82, 127, 248, 265
    - salary 119
    - selection criteria 118, 119, 127-128
    - selection process 117-122, 129, 248
    - Shuttle astronauts 248, 249
    - training 122-133, 160-163, 209, 248, 265
    - women 120, 248, 287
  - Atlantis* 253, 295, 296, 332-334, 337, 338, 343
  - Atlas rocket 17, 23, 37, 38, 56, 68, 69, 72, 80, 236, 237, 262, 285, 326, 344
  - Atomic Energy Commission 19, 61, 153, 193-196, 348
  - Atwood, J. Leland 138, 139, 142, 171
  - Augerson, William S. 119
  - Augustine Report 344-46
  - Augustine, Norman 317, 343, 344
  - Aurora 7 55
  - AVCO 143, 147, 152, 189
  - AVRO Aircraft, Ltd. of Canada 24-26, 63, 64, 80, 165, 249, 350
- B**
- Baker, Ellen 303, 337
  - Bales, Stephen (Steve) 95, 174, 182
  - Barnes, Major General G. M. 8
  - Barrett, H. Ray 265
  - Barrios Technology Inc. 261, 262, 264-265, 342
  - Batdorf, Dr. S. A. 19
  - Baudry, Patrick 290, 296, 302
  - Bay of Pigs 30, 187
  - Bayne, James A. 46, 48, 62, 63
  - Bean, Alan 128, 179, 215
  - Becker, Harold S. 223
  - Before Lift Off* 118, 292, 293
  - Beggs, James 308, 310
  - Bell Aerospace 152
  - Bell Aerosystems 147
  - Bell Corporation 9
  - Bell, David 27
  - Bell Laboratories 32
  - Bell Telephone 83, 259
  - BellComm 32, 83, 107, 152
  - Bendix 152, 203
  - Bentsen, Sen. Lloyd 214, 318, 330
  - Bergen, William D. 114, 179
  - Berglund, Rene A. 189
  - Berry, Dr. Charles 93-95, 113, 119
  - Berry, G. 66, 67
  - Berry, Ron 171
  - Beyer, Dr. D. H. 118
  - Bingman, Charles (Chuck) 62
  - Bird, John D. 144
  - Bland, William A. 21, 262
  - Bluford, Guion 249, 289
  - Boeing 73, 152, 190, 203, 224, 240, 253, 254, 264, 280, 329
  - Bogart, General Frank A. 205, 211
  - Boisjoly, Roger 304
  - Bolender, Carroll 167
  - Bond, Aleck 21, 49, 63, 102, 104, 114, 129, 130, 162, 189, 197, 213
  - Bonestell, Chesley 320

- Borman, Frank 44, 93, 111, 114, 128, 133, 167, 171, 172, 213  
Boyer, William J. (Bill) 20, 21, 84, 165  
Bradley, Ray 224  
Brand, Vance D. 128, 210, 220, 302, 303  
Brandon, Floyd 45  
Braun, Wernher von 4, 6-9, 11, 12, 19, 23, 27, 30, 73, 99, 101, 104-106, 108, 110, 118, 145, 169, 189, 192, 196, 204, 210, 224, 320, 350  
background 7  
conflicts with Gilruth 106  
contributions to American space program 105  
director of Marshall Space Flight Center 27  
management style 106  
role in Shuttle program 320  
testimony at subcommittee hearings 8  
Brewer, Jerry 163  
Bridges, Sen. Styles 3, 17  
British Aerospace Corporation 281  
British Interplanetary Society 25  
Broadband X-Ray Telescope 342  
Brooks, Congressman Jack 319  
Brooks, Congressman Overton 18  
Broome, Douglas 114  
Brown & Root Construction Co. 30, 37, 47, 48, 259  
Brown, Clarence 223  
Brown, Clinton E. 144  
Brown, George R. 30, 37, 41, 260  
Brown, Porter 84  
Bundy, McGeorge 124  
Bush, Dr. Vannevar 4, 5  
Bush, President George 330, 332, 333, 334, 337, 342, 343, 345  
Butler, Sherwood 23  
Byrnes, Martin 39, 41, 42, 46, 48
- C**  
Campagna, I. Edward 37, 41, 45, 46, 48, 62, 63  
Canadarm 287, 291, 292, 294, 297  
Cape Canaveral 22, 23, 27, 32, 40, 53-55, 70, 74, 77, 82-85, 97, 109-111, 134, 182, 291, 297, 304  
communications problems 83  
launch facilities 110  
Mercury control center 83  
provides backup to MCC 92, 103, 109, 110  
renamed Kennedy Space Center 111  
role in Shuttle program 229  
space allocations and ownership 83  
Cape Kennedy (see also Cape Canaveral)  
Carpenter, Malcolm S. 122  
Carpenter, Scott 54, 55, 56, 68  
Carr, Gerald P. 215  
*Carrying the Fire* 117  
Carter, President Jimmy 238  
Casey, Bob 41, 42, 51  
Centaur rockets 25, 97  
Center for Space Power 319  
Cernan, Eugene A. 93, 109, 174, 203  
Chaffee, Roger 111, 112, 140  
*Challenger* ix, 243, 253, 287, 288, 289, 291-296  
*Challenger* accident 113, 298, 301, 307-312, 314, 317, 321, 326, 344  
Chamberlin, James A. (Jim) 58, 63-65, 143  
background 79  
Gemini Project Manager 78-81, 82, 87, 165  
management style 81  
reassigned by Gilruth 81  
role in forming STG 80  
Chance-Vought Missile Program 4, 143  
Chang-Diaz, Franklin 337  
Charlesworth, Clifford E. 95, 165, 169, *photo* 171, 172, 178, 198, 305, 325  
*Charlie Brown* 174  
Chilton, Robert G. 58, 59, 81  
Chimpanzees, used in spaceflight  
Ham 32, 38, 53, 55, 58  
Enos 54  
Chrysler Corporation 73, 224  
Chu, Dr. Paul 319  
Clagett, A. A. 143  
Clarke, Arthur C. 25  
Clarke, Stuart 42, 61  
Clear Lake, Texas 74, 77  
Cohen, Aaron vii, 114, 234, 235, 246, 304, 310-312, 316-318, 320, 325, 331, 334, 336-339, 342, 344  
Cold War 88, 156, 179, 187, 204, 220, 331  
effect on space program 187  
Collins Radio 143, 152, 260  
Collins, Michael *photo* 94, 117, 121, 285  
Colonna, Richard A. 325, 326, 334  
*Columbia* 253, 275, 279, 280, 282, 285, 287-289, 291, 297, 336, 342-344  
Columbia University Division of War Research 17  
Comet Kohoutek 216  
Command Module 90, 92, 107-114, 117, 135, 138, 142, 144, 145, 146, 152, 165, 169, 173-176, 179, 182-184  
Commercialization of space 257-269, 344  
federal support for 257  
small businesses and 257  
Committee on Armed Services 1  
Committee on Astronautics and Space Exploration 28

- Committee on Science and Astronautics 18, 31  
 Committee on Scientific Training and Facilities 18  
 Communications Satellite Corporation 300  
 Communications, worldwide 77, 95, 126, 138, 140, 152, 156  
     computer technology 83  
     contact with spacecraft 82  
     interface problems 83  
     light control stations 84-85  
     technological advances 84, 86  
 Compton, William David 153, 252  
 Computer integrations systems 82  
 Configuration management 77, 88, 90, 91, 92  
 Conrad, Charles 93, 94, 133, 179, 214  
 Construction of MSC 46, 48  
     achievements 47-49  
     contracts awarded 50  
     costs 49  
 Contracting 77, 80, 81, 91, 102, 122, 137-157  
     benefits of 137  
     cost-plus-fixed-fee 138, 151  
     cost-plus-incentive fee 88, 91, 151  
     impact of government regulations 154  
     NASA/Contractor relationships 137, 138  
     necessity of communications 140  
 Contractors 36, 48, 50, 60-65, 70-74, 80, 85, 92, 97, 98, 102, 106, 107, 113, 114, 134-155, 164, 174, 178, 184, 197, 203, 205, 209, 214-230, 257  
     Apollo program 65, 150-154  
     Shuttle program 222, 224  
 Control Data Corporation 247  
 Controlled reentry 77, 95  
 Convair 70-73, 142, 224, 230  
 Cooper, Henry, Jr. 118, 292, 293  
 Cooper, Leroy Gordon 68, 69, 70, 82, 93, 122, 133  
 Corbet, Wayne 223  
 Corps of Engineers  
     role in design and construction of the MSC 46  
     supervision of MSC construction 47  
 Cortright, Edgar M. 99, 104  
 Covert, Dr. Eugene E. 300  
 Covey, Richard 326  
 Covington, Clarke 325  
 Cox, Catherine Bly 330  
 Craig, Jerry W. 114  
 Crippen, Robert 248, 279, 288, 325  
 Croneis, Carey 37, 41  
 Cuban Missile Crisis 187  
 Culbertson, Phil 308  
 Cunningham, R. Walter 155, 165, 317  
 Curtis-Wright 4
- D**  
 D'Orsey, Leo 122, 123  
 Daniel, Price 50  
 Darrow, Whitney, Jr. 95  
 David Clark Company 174  
 Davis, Hubert P. and Mary 262, 263, 264  
 Davis, Jeff 42  
 Davis, Morgan 41  
 Debus, Kurt H. 100, 109, 110, 192, 196, 210  
 Deifembaker, Prime Minister John 24  
 Delta rocket 291, 307  
 Dembling, Paul 37, 124  
 Denver Aerospace 317  
 Department of Defense (DoD) 2, 4, 9, 13, 83, 98, 160, 281, 285  
     reaction to Sputnik 3  
     role in Apollo flights 160, (sidebar 161-162)  
     role in Shuttle program 238, 295  
 Digital Electronics Corporation 247  
*Discovery* 253, 276, 289-297, 326, 329-333, 342  
 Disher, John H. 104  
 Dixon Gun Plant 37  
 Donlan, Charles 17, 23, 25, 60, 120, 227  
 Doolittle, General James H. 4  
 Douglas Aircraft 4, 9, 73, 109, 143, 189, 193  
 Douglas, Donald W. 4  
 Dryden Flight Research Center 97, 265  
 Dryden, Dr. Hugh L. 14, 18-19, 23-30, 32, 35-41  
 Duff, Brian 181  
 Duke, Charles M., Jr. 202, 254, 265  
 Duke, Michael B. 316  
 Dula, Art 262  
 Dyna-Soar 9, 189, 240
- E**  
*Eagle* 176-178  
 Eagle Engineering 257, 261-264  
 Eagle-Picher Company 152  
 Earth Observations Aircraft Program Office 218  
 Earth Radiation Budget Satellite (ERBS) 293  
 Earth Resources Program 209  
 Economic impact of MSC 150, 209-214, 223, 230, 257-262  
 Edwards Air Force Base 14, 97, 282, 291, 295, 296  
 Eggleston, John 180  
 Eighth International Astronautical Federation  
     Congress 2  
 Eisele, Donn 155, 165  
 Eisenhower, President Dwight D. 1-4, 8, 12, 13, 18-20, 24, 27, 28  
 Electronic Research Center 194  
 Ellington Air Force Base 36, 41, 46

Elms, James C. 78, 86, 141  
    background 86  
    named Deputy Director of MSC 87  
    returns to private industry 88  
Emergency escape device 17  
Emme, E. M. 196  
*Endeavour* 334, 335  
Engineering Computation Facility 247  
Engle, Joe H. 280  
*Enterprise* 253, 254, 280, 282  
Environmental Protection Agency 154  
Epitaxy Center 319  
Escape tower 22  
Eudy, Glenn 304  
European Space Agency 266, 281, 285, 289, 290,  
    297  
Evans, Ronald 203  
Explorer I 12  
Extravehicular activity (EVA) 56, 77, 93, 94, 174,  
    274, 287  
    and Space Lab 215  
    lunar 178, 179  
    training 131

**F**

Fabian, John M. 288  
Faget, Maxime A. (Max) vii, 10, 14, 17, 19-23, 29,  
    37, 44, 46, 49, 59-65, 79, 81, 84, 87, 106, 111,  
    114, 143, 150, 153, 160, 164, 184, 188, 190,  
    218, 225, *photo* 280  
    heads Flight Systems Office 64  
    MSC Assistant Director 63  
    resigns to work in private sector 262  
    role in design of MSC 49  
Fairchild Republic 326  
Feltz, Charlie 141  
Feynman, Dr. Richard P. 300  
Fielder, Dennis 78, 82, 84, 85, 164, 165  
Fisher, Anna 288, 294  
Fisher, William F. 288, 297  
Fleming, William (Bill) 104  
Fletcher, James C. (Jim) 209, 214, 221, 229, 233,  
    238, 309-311, 319, 321, 325, 330, 333  
Flickinger, Brigadier General Donald D. 120  
Flight control 24, 55, 77, 82-85, 103, 163, 164-183,  
    212, 220, 245, 274-276, 287  
Flight endurance 53, 56, 77, 94  
Flight simulation systems 86  
Flight Systems Office 59, 79  
Flory, Donald A. 153  
Ford Aerospace 257  
Ford, President Gerald 221, 238

Forward, Dr. Robert L. 337  
Foster, Willis 153  
Freedom 7 32, *photo* 33, 38, 54, 124  
Frick, Charles W. 64, 67, 70, 86  
Friendship spacecraft 55  
Friendswood Development Corporation 260  
Frosch, Dr. Robert A. 238  
Fullerton, Charles Gordon 128, 282, 290, 302

**G**

Gagarin, Yuri 29, 32, 36, 38, 64, 74  
Galileo spacecraft 334, 337  
Gallup Poll 331  
Garn, Sen. E. J. (Jake) 290, 295, 302  
Garneau, Marc 293, 302  
Garrett Corporation 143, 147, 152, 174  
Garriott, Owen K. 215  
Gavin, James M. 29  
Gemini Incentive Task Group 91  
Gemini program ix, 31, 32, 53, 55, 61-65, 70-74,  
    77, 90, 97-111, 115-133, 138, 140, 141, 145,  
    155, 163-167, 174, 179, 181, 188, 189, 197, 205,  
    210, 216, 229, 230, 233, 238, 240, 274, 276,  
    278, 279, 287, 303, 311, 312, 336, 350  
    contracts 79  
    costs 80  
    initiated 56  
    lessons from 94  
    management requirements 87  
    origin of name 79  
    reconfigured 74,  
    role of private sector 79  
    technological achievements 83, 85, 95  
Gemini Project Office 63, 64, 67, 79-81, 104, 165  
    improvements 92  
    management crisis 81  
Gemini spacecraft 89, 164  
    construction difficulties 141  
    Gemini 1 56  
    Gemini 2 86  
    Gemini 3 86, 92, 93, 134, 279  
    Gemini 4 92  
    Gemini 5 93  
    Gemini 6 93  
    Gemini 7/6 58, 93, 163  
    Gemini 8 93, 111, 164, 265  
    Gemini 9 93, 111  
    Gemini 10 94, 95, 111  
    Gemini 11 97  
    Gemini 12 97  
    interior design 93  
    operations and mission control 82

- specifications 80
  - two-man 80
  - unmanned 77
  - Gemini-Apollo Executive Group 140
  - General Dynamics 22, 64, 65, 142, 143, 224, 225, 226, 230, 308, 311, 329
  - General Electric 64, 113, 142, 143, 146, 152, 211, 224, 230, 259, 263, 266, 329
  - General Motors 139, 148, 151, 152, 174
  - General Precision 174
  - General Services Administration 45
  - Georgia Institute of Technology 211, 279, 281
  - German rocket scientists 5-9, 17, 105-106, 297, 300
  - German Rocket Society 6
  - German Space Operations Center 297
  - Germany, Daniel M. 334
  - Getaway Specials 282, 288, 289, 295-298
  - Gibson, Edward G. 128, 215
  - Gibson, Robert L. (Hoot) 249, 288, 290, 302, 303
  - Gillespie, Ben 42, 46
  - Gilruth, Robert Rowe (Bob) viii, 10, 11, 14, 15, 17, 18-89, 101-114, 119-127, 133, 134, 141-146, 154, 169-172, 180, 181, 184, 189, 190-198, 209, 219-229, 260, 314, 337, 350, *photo* 352
    - abolishes Mercury Project Office 74
    - and NASA growth pressures 26
    - announces cost cutting program 88
    - assigns "tiger team" after Apollo fire 114
    - commissions JSC self-study 209
    - concerns about post-Apollo goals 192, 193
    - conflicts with von Braun 106
    - contributions to the MSC 58
    - creates Apollo Project Office 65
    - creates Gemini Project Office 79
    - Director of MSC 77, 101
    - Director of STG 23
    - Gilruth system 53, 58, 60
    - influence on space program 59-60, 125
    - management style 58-59, 60, 106
    - organizes MSC 63-65
    - organizes Space Task Group 21, 35, 350
    - reaction to Houston location 40-41
    - reorganizes MSC 82, 87
    - resolves "Gemini Management Crisis" 81
    - retirement 198
    - role in Apollo flights 169
    - role in locating MSC to Houston 37
    - transfers to Houston 47
  - Glenn L. Martin Company 9, 79, 86
  - Glenn, John 54, 55, 68, 85, 121-125, 128, 295
  - Glennan, Thomas Keith 15, 19, 20, 23, 27-29, 35, 36, 37, 38, 119
  - Goddard, Robert H. 6, 7, 26, 350
  - Goddard Space Flight Center 22, 26, 27, 31, 35-37, 83, 85, 86, 92, 97, 110, 160, 180, 181, 234, 239, 248, 266, 275, 290, 292, 329, 350
  - Goett Committee 64
  - Goett, Harry 26, 27, 35, 36, 188
  - Goetz, Robert C. 198, 308, 310
  - Goodwin, Burney 42
  - Goodyear Aircraft Corporation 79
  - Goodyear Tire and Rubber 260
  - Gordon, Richard F. 94, 133, 179
  - Graham, William R. 308-310
  - Gramm-Rudman-Hollings Deficit Reduction Bill 343
  - Graves, Barry 84, 87, 88
  - Gray, Wilber H. 174
  - Griffin, Gerald 95, 171, 172, 179, 181, 184, 197-199, 295, 307-311, 315, 317, 319, 332, 352
  - Griffin, Richard L. (Larry) 301, 310
  - Grillo, Steve 123
  - Grimwood, James 79
  - Grissom, Virgil I. 54, *photo* 55, 88, 92, 111, 112, 121-128, 140
  - Gross, Robert E. 4
  - Ground-based computer control systems 74
  - Ground Rules for Manned Lunar Reconnaissance* 64
  - Grumman Aerospace/Boeing 224, 257, 261
  - Grumman Aircraft Corporation 93, 142, 143, 154, 167, 189, 190, 193, 203, 230, 250, 326
    - develops the lunar excursion module 82, 114, 144, 152, 173, 174
  - Gulfgate Shopping Center 43, 45
  - Gulfstream II 249
  - Gustke, Brigadier General Russel F. 37
  - Guthrie, George 126
- ## H
- Hacker, Barton 79
  - Hage, George 169, 181
  - Hagerty, James C. 2
  - Haise, Fred W. 182
  - Hale, N. Wayne, Jr. 159
  - Hall, Walter 193
  - Halley's Comet 297
  - Hamlin, Jim 86
  - Hammack, Jerome B. 102, 104, 161, 165, 170, 213, 218, 262, 266
  - Hamill, Major James P. 8
  - Hanaway, John 262
  - Haney, Paul 78, 92, 93, 104, 133, 134, 170, 181
  - Hannah, David, Jr. 266, 281

- Hansen, James E. 14  
Hanson, Grant 225  
Hartke, Sen. Vance 235  
Hartman, Harvey 324, 331  
Hauersperger, Karla 282  
Hawley, Steven A. 288, 290, 302, 303  
Hayden, Sen. Carl 12  
Hayes International Corporation 260  
Hazard Analysis Group 304  
Healy, John P. 114  
Hearings 4-5, 11-14  
Hello, Bastian 114  
Hermes II program 9  
Hernandez Engineering 261, 266  
Hernandez, Miguel A., Jr. 262, 265, 266  
Hess, Dr. Wilmot N. 170, 180, 181  
Hicks, Roger 335  
High altitude rocket research 7-9  
High Speed Flight Center (see Dryden Flight Research Center)  
Hilmers, David 326  
Hjornevik, Wesley 20, 35, 36, 37, 39, 42, 44, 45, 61-66, 70, 87, 89, 91, 119, 143, 170, 230  
Hobby, William P. 108  
Hodge, John D. 64, 83-86, 92, 94, 162-165, 225  
Hoffman, Samuel K. 138  
Hofton, James Van 290, 292, 297, 302  
Holley, I. B., Jr. 105, 106  
Holloway, Tommy W. 301  
Holmes, D. Brainerd 32, 37, 86, 101  
    background 71  
    Director 71  
    heads Office of Manned Space Flight 51, 107  
    reorganizes NASA administrative systems 107  
Honeywell, Incorporated 143, 149, 152  
Horton, Eugene 42, 125, 134, 254  
Horwitz, Solis 2  
Hotz, Robert B. 300  
Houbolt, Dr. John C. 144, 145  
House Committee on Science and Astronautics 20, 31, 38, 39, 41, 42, 50, 102  
House Select Committee hearings 14  
House Select Committee on Aeronautics and Space Exploration 17, 28  
House Subcommittee on Manned Space Flight 187  
House, R. O. 20  
Houston Advanced Research Center 317  
*Houston Post* 108  
Houston, Texas 5, 15  
    celebrates opening of MSC 50-51  
    chosen by NASA for "spaceflight laboratory" 33, 35-42  
    first considered for location of manned spacecraft program 36  
    local economy and the space program 150, 257, 259, 260, 350  
    support for MSC 42, 257  
Hubble Space Telescope 334, 338, 342, 343, 344  
Huffstetler, William 312, 313, 324  
Hughes Aircraft 4, 143  
Humble Oil Company 37, 41  
Humphrey, Vice President Hubert 191  
Huntoon, Carolyn L. 316, 324, 331  
Huntsville, Alabama 17, 19, 23, 27, 145, 169, 215, 246, 350  
Hurley, Roy T. 4  
Hurricane Carla 41, 42  
Hutchinson, Neil 309  
Hyland, Lawrence 4
- I**  
IBM 84-86, 146, 152, 230, 247, 248, 257, 259, 326  
Indonesian Government 288, 291  
Industrial support of space program 103, 137-157  
Insects in Flight Motion Study 282  
International Geophysical Year 2, 9  
International Latex Corporation 152, 174  
*Intrepid* 179  
*Introduction to Outer Space, An Explanatory Statement* 13  
Irwin, James 128, 200, 201, 254
- J**  
James, Lee B. 169  
Jeffs, George 317  
Jet Propulsion Laboratory 7, 9, 97-98, 277, 317  
Johns Hopkins Hospital 281  
Johnson and Johnson 282  
Johnson, Caldwell C. 22, 224  
Johnson, Harold I. 126  
Johnson, Kimble 25  
Johnson, President Lyndon B. ix, 1-3, 12, 13, 15, 17, *photo* 18, 19, 28, 29, 30, 32, 41, 42, 50, 51, 73, 74, 82, 88, 113, 135, 165, 178, 187, 188, 190-192, 196, 214  
    background 5  
    compares Sputnik crisis to Pearl Harbor 4  
    holds subcommittee hearings 4-5, 11  
    signs first space treaty 140  
Johnson Space Center (JSC) (see Manned Spacecraft Center)  
Johnston, R.E. 262, 263  
Johnson, Ray 19  
Johnston, Richard S. (Dick) 49, 114



Juno launch vehicle 9, 12, 72  
 Jupiter rocket program 9, 12, 22, 73, 110, 334, 337, 343

**K**

Kaplan, Marvin 45  
 Kapryan, Walter J. 110  
 Karman, Theodore von 7  
 Keldysh, Mstislav V. 218  
 Keller, K. T. 9  
 Kelly, William R. 211, 324, 331  
 Kennedy, President John F. ix, 22, 27, 28, 30-33, 39, 41, 54, 123, 124, 145, 160, 176, 178  
   announces lunar landing initiative 141, 187  
   effect of assassination on space program 74, 111  
   relies on Johnson for space leadership 29  
   visits MSC 51, 73  
 Kennedy Space Center (KSC) (see also Cape Canaveral) 74, 85, 86, 97, 98, 101, 103, 107, 109-115, 133, 134, 150, 151, 160, 169, 179, 182, 184, 196, 198, 199, 202, 210, 211, 215, 225, 227, 234, 253, 277, 287, 289, 295, 325, 337, 338  
 Kentron International 264  
 Kerr, Sen. Robert 50  
 Kerwin, Lt. Commander Joseph 128, 129, 215  
 Killian, Dr. James R. 4, 17  
 King, Elbert A., Jr. 153  
 Kinzler, Jack 23, 66, 89  
 Kissinger, Henry 229  
 Kleinknecht, Kenneth S. 11, 56, 65, 67, 81, 89, 103, 106, 143, 174, 213  
   becomes Manager of Project Mercury 61, 63  
   heads Gemini Incentive Task Group 91  
   manages Skylab Program Office 211  
   moves to Houston 56, 61  
 Kohl, Chancellor Helmut 291  
 Kohrs, Richard (Dick) 304, 305, 324, 325, 335  
 Koppenhaver, James T. 143  
 Kotanchik, Joseph 114  
 Kraft, Christopher 10, 21, 55, 58, 59, 60, 63, 65, 66, 81-89, 92, 93, 103, 109, 144, 163, 164, 165, 169, 170, 172, 179, 181, 184, 198, 199, 211-215, 235, 238, *photo* 280  
   designs Mercury control center 86  
   heads Flight Operations Division 73  
   Mission Operations Director 93, 209, *photo* 352  
 Kranz, Eugene 84, 92, 170, 175, 181, *photo* 280  
   background 163  
   role in Apollo flights 160, 165, 171-173, 176-178, 183, 184  
 Kranzberg, Dr. Melvin 281  
 Kruschev, Nikita 27

Kubasov, Valeriy 220, 221  
 Kurbjun, Max C. 144  
 Kusske, Amy 282  
 Kutyna, Major General Donald J. 300  
 Kyle, Howard 84, 165

**L**

LaBerge, Walter 86  
 Lambert, C. Harold 335  
 Landing Safety Team 305  
 Lang, Dave W. 58, 61, 65, 143, 260  
 Lange, Oswald H. 143  
 Langley Aeronautical Laboratory 10, 11, 14, 15, 19, 23, 24, 83, 97, 350  
 Langley Research Center 31, 35, 36, 45, 58, 61, 98, 99, 144, 234, 238, 240-243, 277, 308, 315, 335  
 Lauderdale, Lloyd 317  
 Launch Abort and Crew Escape Team 305  
 Launch vehicle, capabilities 236, 294, 295, 309, 312, 339  
   man-rated 130  
   reusable 72, 237  
 Lead Center Management System 233, 346, 273, 311  
 Leadership Report 321, 325  
 Lee, Chester M. 181  
 Lee, Dr. William A. 174  
 Leonov, Alexei A. 220, 221  
 Levine, Arnold S. 137, 194  
 Lewis Flight Propulsion Laboratory 14, 20, 21  
 Lewis Research Center 17, 32, 35-37, 97, 224, 274, 277, 278, 311, 329  
 Lewis, George 21  
 Lichtenberg, Bryon 289, 302  
 LifeSat 313  
 Life Sciences Advisory Committee 119  
 Lilly, William E. 102  
 Lindburgh, Charles 7  
 Lindeman, Richard E. 112  
 Lippmann, Walter 1  
 Lister, Jack 329  
 Little Joe launch vehicle 10, 17, 23, 38, 53, 60  
 Llewellyn, John S. 165  
 Lockheed 4, 142, 143, 152, 221, 224, 230, 250, 257, 259, 260, 261, 264, 279, 308  
 Loftus, Joseph P., Jr. 79, 81, 123, 125, 236, 263, 286, 313  
 Long, Dr. Donlin M. 281  
 Long Duration Exposure Facility (LDEF) 291, 292, 334, 338  
 Los Alamos Laboratory 160  
 Lounge, Mike 290, 302, 303, 326

- Lousma, Jack R. 215, 282, 302  
Lovelace, Dr. Randolph II 119, 120, 238  
Lovell, James A., Jr. 93, 171, 182, 288  
Low, George 17, 21, 22, 27-29, 36, 37, 42, 57, 58, 64, 70, 71, 88, 100, 102, 104, 103, 105, 107, 108, 109, 113, 114, 120, 133, 143, 188, 219, 227, 229, 237, 303, 336  
Apollo Program Manager 114, 169  
background 21-22  
head of Manned Lunar Landing Task Group 36  
interface with STG 100  
named Deputy Director of MSC 88  
role in Gemini program 104  
role in Mercury program 73  
LTV Corporation (Ling-Temco-Vought) 259, 317  
Lucid, Shannon 337  
Luna spacecraft 27  
Lunar and Mars Exploration Activity 335  
Lunar and Planetary Institute 251, 252, 254, 315  
Lunar Excursion Module (LEM) 73, 82, 98, 107, 114, 134, 144, 159  
Lunar expeditions 179, 187  
Lunar landing (see Apollo program) 54, 64, 65, 73, 77, 93, 94, 95, 103, 109, 133, 134, 142, 144, 145, 156, 165, 171-180, 187-202, 205, 331, 333  
20th anniversary 337  
initiative 33, 141  
Lunar mission inception and design ix, 31  
Lunar orbital missions 169  
training 127  
versus Earth orbital missions 64, 160  
world reaction 157, 175, 179  
Lunar module 159, 160, 169, 182, 200, *photo* 200  
Lunar probes 192  
Lunar Receiving Laboratory 153, 154, 180, 251, 252, 254  
Lunar roving vehicle 200  
Lunar soil 199  
Lunar-Mars initiative 335, 337, 339, 342-345  
Lunney, Glynn 95, 165, 178, 179, 182, 184, 220, 278, 307, 337
- M**  
Malfunction procedures 172  
Malina, Frank J. 7  
Man-rated design criteria 279  
*Managing NASA in the Apollo Era* 137  
Manned Maneuvering Unit (MMU) 291, 294  
Manned Orbiting Laboratory Program 279  
Manned satellite 22, 35  
Manned space laboratory 64  
Manned space program 17, 18, 20, 26-28, 72, 77, 112, 113  
debate over 30  
early years 28  
economic benefits 31  
funding 31, 36, 58, 75  
personnel and management problems 32, 107, 108  
public reaction 30, 35, 150  
Manned Spacecraft Center (MSC) (also Johnson Space Center) vii, ix, 10, 14, 15, 19, 20, 22, 33, 36, 78, 97-115, 273, 329, 350  
aftermath of *Challenger* accident 307, 314, 321, 335  
becomes fully operational 47, 53, 77, 78  
capabilities 312, 338  
computer technology 247-248  
construction cost 38, 40, 49-50, 75  
construction design criteria 47  
contractor relations 71, 257  
division of labor and administrative structure 22  
economic impact on Texas economy 150, 257, 259, 268-269, 350  
effects of layoffs 211-14, 216, 233, 261, 268  
engineering facilities 242, 246, 251  
engineering philosophy 209  
inception 20, 53  
lead center 235-255, 311, 335, 336, 350  
management 60-66, 97-118, 307, 336, 347, 350  
move to permanent quarters 75  
organizational problems 86-87  
organizational review (1972) 205  
personality 99-101, 105  
personnel 63-64, 75, 77  
political influence on new location 41-42, 260  
potential sites 39  
program 103, 105, 107-109, 117, 312, 350  
program offices 63  
relations with NASA Headquarters and other centers 104-106, 307  
relocated to Houston, Texas 37-40, 63, *photo* 40  
renamed Lyndon B. Johnson Space Center 214  
reorganization 87, 89-90, 211, 216  
responsibilities during Apollo 64  
role in research and development 255  
role in Shuttle program 229, 233-255, 260, 311, 319, 350  
senior staff meetings 68-69  
shuttle laboratories 241, 251  
social consciousness 254  
temporary office locations 46, *map* 48  
ties with the academic community 313-318

- Manned spacecraft network 84  
 Maneuverable manned satellite 188  
 Marine Corps 215, 282  
 Mark, Hans 290, 295, 308, 332  
 Marquardt Corporation 143, 148, 152, 174, 188, 189  
 Mars 12, 13, 192  
 Mars Mission 313, 320, 321, 330-345, 350  
 Marshall Space Flight Center 27, 36, 73-75, 97-113, 138-144, 150, 160, 167, 169, 189, 196, 203, 210-215, 221-230, 233, 234, 253, 277, 304, 307, 311, 312, 326, 329  
     role in Apollo program 107, 108  
     role in Gemini program 107  
     role in Space Shuttle program 222, 253  
     Spacelab Program office 281  
 Martin Company 79, 86, 142, 143  
 Martin, Lou 113  
 Martin Marietta 64, 65, 114, 203, 211, 224, 263, 317, 343  
 Massachusetts Institute of Technology 4, 5, 23, 60, 64, 65, 199, 289, 300  
 Mathews, Charles W. 11, 17, 21, 23, 25, 62, 81-84, 126, 143, 165, 189  
     background 81-82  
     named head of Gemini Project Office 81, 87  
     named head of Spacecraft Research Division 63  
 Mathews, Fred 84  
 Mattingly, Thomas K. 128, 182, 202, 203, 282, 290, 302  
 Mayer, John P. 21, 165, 212  
 McAuliffe, Christa 293, 290, 299, 303  
 McCandless, Bruce 128, 291, 302, 303  
 McCarty, Bill J. 304  
 McCormack, John W. 12, 17  
 McCulley, Mike 303, 337  
 McCurdy, Howard E. 330  
 McDivitt, Jim 44, 93, 128  
 McDonnell Aircraft Corporation 23, 63, 79-82, 91-93, 141, 143, 189  
     and incentive fee contracts 91, 151  
     manufactures Gemini spacecraft 79, 82  
     manufactures Mercury spacecraft 8, 80  
     suggests Gemini 7/6 rendezvous 93  
 McDonnell Douglas 211, 223, 224, 230, 257, 261, 266, 282, 293, 317, 329  
 McElroy, Neil H. 2, 3, 4  
 McKenzie, Joe 65  
 McKenzie, Virginia 65  
 McKinley, C.H. 317  
 McMullen, Thomas H. 181  
 Medaris, Major General John B. 9, 110  
 Medical Operations Office 67, 119, 170  
 Mendell, Dr. Wendell 252  
 Merbold, Ulf 289, 302  
 Mercury astronauts 51  
 Mercury Mark II 79, 80  
 Mercury program project ix, 10, 14, 17, 22-32, 36-38, 53-74, 77, 79-87, 89, 94, 95, 97, 98, 100, 103-115, 118-133, 144, 146, 152, 155, 162-165, 179, 188, 216, 224, 229, 230, 233, 287, 303, 311, 312, 331, 336, 350  
     completion of 53, 70-71, 82  
     costs 28  
     management 73, 86  
     problems 28, 53  
     public reaction 82  
     successes 53  
 Mercury Project Office 48, 55, 56, 61, 63, 74, 211  
 Mercury spacecraft 23, 53, 54, 80, 87, 107, 109, 133, 138, 189, 197, 205, 274  
     flight control 55, 162  
     redesign 79  
 Mercury-Atlas 38, 55, 56, 69, 70, 80  
 Mercury-Redstone 3 54, 69  
 Mexico 85, 296, 297  
 Meyer, Andre 17, 22  
 Michael, William H. 144  
 Military role in space program 10-14, 18, 129  
 Miller, John Q. 304  
 Miller, Thomas D. 192  
 Miller, George P. (Rep.) 18, 39, 50  
 Miller, Philip 37, 39  
 Minneapolis-Honeywell 152  
 Minority astronaut candidates 288  
 Missile and satellite programs 1, 2, 4, 5, 11  
 Missile Firing Laboratory 110  
 Missile gap ix, 5, 26, 27, 28  
 Mission Control Center 85, 86, 103, 117, 131-135, 152, 160, 165, 172, 173, 176-184, 197, 202, 214, 241, 247, 248, 274-278, 288, 292, 294, 326  
     at Cape Canaveral 53  
     malfunction procedures 164  
     press access to 182  
     reestablished in Houston 74, 82, 84  
     role in Apollo flights 159, 163, 175  
 Mission Specialists 248, 249, 337  
 Mississippi Test Facility 278  
 Mitchell, Edgar Dean 128, 199, 265  
 Mitchell, George 318  
 Moore, Jesse W. 308, 310, 311  
 Morgan, Barbara 293  
 Morris, Owen 169, 171, 172, 235, 257, 262-264, 273, 278

- Morton, Thiokol 301, 326  
Motorola 148, 152  
Mtekateka, Bishop Josiah 93  
Mueller, George E. 71, 74, 99-102, 104, 108, 123, 133, 140, 141, 146, 159, 169, 190-196, 223-227  
background 101-102  
relations with Congress 102  
role in Headquarters administrative changes 101,  
Murray, Charles 139, 330  
Musgrave, F. Storey 128, 287  
Muskie, Edmund 235  
Myers, Dale D. 146, 184, 196, 210, 226, 227, 238
- N**  
Nagy, Alex P. 79  
National Advisory Committee for Aeronautics (NACA) 4, 6, 9-14, 17-22, 57-59, 61, 70, 81, 86, 97, 98, 101, 105, 114, 123, 137, 224, 234, 262, 339, 347, 350  
appropriations bills 36, 38, 191  
conference on high speed aerodynamics 14  
differences between NACA and NASA 59  
founded by Congress 10  
management 99  
pilotless aircraft research 17  
public relations activities 77  
reconstituted as NASA 10  
NASA Advisory Committee 344  
NASA Appropriations Bill 36-38  
NASA Commercial Centers of Excellence 317  
NASA Oversight Committee 190, 259  
NASA Planning Steering Group 195, 225  
NASA Road One 48  
NASA Source Evaluation Board 143  
NASA spacecraft center 22  
National Academy of Sciences 13  
National Advisory Committee for Aeronautics (see NACA)  
National Aeronautics and Space Act 11, 14, 18  
National Aeronautics and Space Administration (NASA) ix, 4, 10, 14-51, 57-65, 68, 70-75, 77-93, 97-115, 117-146, 150-156, 159-194, 209-211, 214-231, 257-267, 273-282, 285-305, 329-347, 307-328  
budget and personnel 152, 153, 154  
funding 36, 342  
Headquarters 21, 22, 35-38, 41-48, 78, 79, 98-111, 114-127, 133, 134, 138, 140, 143, 152, 153, 169, 181, 189, 193, 195, 198, 205, 209-210, 214, 220, 223-226, 273, 295  
history 97-98  
locates "spaceflight laboratory to Houston" 35  
organizational problems 31, 100  
program offices 32  
National Aeronautics and Space Agency 14  
National Aeronautics and Space Council 14, 28, 30, 192  
National Broadcasting Company (NBC) 78  
National Commission on Space 307, 320, 321  
National Electronics Corporation 154  
National Oceanic and Atmospheric Administration 160  
National Science Foundation 3, 13  
National Science Teachers Association 282  
National Space Council 307, 318, 333, 338, 343, 346  
National Space Transportation Program Office 307, 325, 335  
Naval Research Laboratory 2, 9, 12, 26, 293  
Nebrig, Daniel A. 320  
Neil, Roy 78, 331  
Nelson, Congressman Bill 298  
Nelson, George 326, *photo* 292, 297  
Nelson, Todd 282  
New Initiatives Office 268, 305, 312-317, 325, 327  
New Projects Panel 64  
Newell, Homer 32, 153, 195, 196, 210, 225  
Nicholson, Leonard 301, 305, 335  
Nicks, Oren 28, 29, 102, 315, 316, 318  
Nieman, Ed 163  
Nixon, President Richard M. 27, 28, 177-179, 196, 203, 204, 214, 218-229, 257-261  
authorizes development of Space Shuttle 206, 235  
goals for Shuttle program 229, 257  
North American Aviation 69, 73, 74, 78, 79, 86, 93, 109-114, 137, 138, (*sidebar* 139), 141-146, 151, 152, 171, 173, 178-190, 222, 250  
and paraglider landing system 75, 79  
constructs launch escape tower 109  
independent reports on Apollo fire 113  
merges with Rockwell 111  
Rocketdyne Division 138  
wins contract for Saturn V booster 74  
wins contract for 3-man spacecraft 73, 143  
North American Rockwell Corporation 37, 137, 179, 203, 211, 220-234, 250, 257, 261, 262, 287  
North, Warren 17, 19, 22, 78, 83, 104, 127  
Northrop Corporation 143, 152  
Norton, David J. 315, 316, 317, 318  
Notkin and Company 154  
Nova launch vehicle 64, 72

**O**

Oak Ridge National Laboratory 153  
 Oberth, Hermann 6, 7, 350  
 Occupational and Safety Act of 1970 154  
 Occupational Safety and Health Administration 154  
 Office of Commercial Programs 319  
 Office of External Relations 198  
 Office of Management and Budget 194, 235  
 Office of Manned Space Flight 32, 37, 51, 99, 103, 104, 107, 128, 129, 146, 190, 227  
 Office of Space and Terrestrial Applications 280, 293  
 Office of Space Flight Programs 36  
 Office of Space Science and Applications 98, 128, 129, 152, 282, 293  
 Office of Space Station 308  
 Office space 45, 46  
   interim facilities, Houston 1962, *map* 48  
 Omniplan 342  
 Operation Paperclip 8  
 Operations Support Contract 342  
 Orbital maneuvering system 230  
 Orbiter Project Office 234, 235, 245, 311, 326  
 Ordnance Guided Missile Center 9  
 Outer space, development of 12

**P**

Pacsynski, Al 249  
 Paine, Thomas O. 169, 184, 196, 209  
   head of National Commission on Space 307  
   NASA administrator 104, 160, 218, 227  
 Paraglider landing system 74, 80  
 PARD 10, 11, 21  
 Parker, Robert 128  
 Parker Seal Company 304  
 Parker, W. A. 42, 45  
 Parsons, John M. 37, 39  
 Partners in Recovery 161  
 Partners in Space 288, 318  
 Patillo, Pat 46  
 Paup, John W. 138, 141, 142, 143  
 Payload Integration Office 245, 278, 282  
 Payload Operations Control Center 275  
 Payload Specialists 249, 289, 293, 295, 296, 297  
 Pearson, Ernest O., Jr. 36  
 Peck, Robert 42  
 Pentagon 120, 295  
 Perkins, Ray 264  
 Perot, H. Ross 332  
 Perry, S. O. 4  
 Pesek, Joan 44

Peterson, Carl 223, 262  
 Peterson, Donald H. 128, 287  
 Peterson, John 78  
 Petrone, Rocco A. 169, 209  
 Philco 84, 85, 86, 166, 167, 260  
 Philco-Ford 146, 152, 259  
 Phillips, Franklin 43  
 Phillips, Sam 101-3, 104, 107, 132, 134, 169, 181, 189, 257, 309, 311, 319  
 Phillips, W. Hewitt 58, 59  
 Physical effects of long-duration spaceflight 95  
 Piland, Bob 60, 64, 65, 70, 73, 143, 180, 212, 216, 262  
 Piland, Joseph V. 154, 180, 212, 216, 262  
 Pilotless Aircraft Research Station (see also Wallops Station) 10, 14, 17, 97, 350  
 Pitzer, Kenneth 41  
 Pogue, William R. 128, 215  
 Pohl, Henry O. 81, 242, 246, 324  
 Polaris Missile 9, 56  
 Porter, W. Arthur (Skip) 316, 317, 318  
 Powers, John A. (Shorty) 41, 42, 77, 78, 122-125, 133, 201  
 Pratt & Whitney 74, 143, 146, 149, 152, 174  
 Precision Rubber Products 304  
 Preparedness Investigating Subcommittee  
   hearings 1-5, 8, 11, 12  
 President's Scientific Advisory Board 17, 113  
 Pressure suits 74, 77, 80, 126, 131  
 Pressurized capsule 17  
 Preston, G. Merritt 17, 22, 35, 55, 65, 66, 83-89, 108-110  
 Project HYWARDS 9  
 Project Mercury (see Mercury Program Project)  
 Project Offices 64  
 Project ORDCIT 8  
 Project Rover 3  
 Propulsion systems 97, 141-144, 155, 168, 181, 183, 184, 211, 222, 273, 339, 342  
 Proxmire, Sen. William 191, 235  
 Public Affairs Office 78, 89, 104, 117, 125, 134, 324  
 Public relations 77-78, 104, 123, 133  
 Purser, Paul 10, 11, 17, 19-25, 35, 37, 50, 58, 63, 65, 67, 78, 81, 82, 104-106, 189, 195, 314

**Q**

Quarantine procedures 199  
 Quayle, Vice President Dan 317, 333, 343

**R**

Radiation, Inc. 174

- Radio Corporation of America (RCA) 71, 83, 152, 174, 257, 263, 297, 290, 311
- Raines, Martin L. 304
- Ranger 7 171, 173
- Ray, Leon 304
- Ray, Rex 61, 62
- Rayburn, Sam 5, 42
- Raytheon 152
- Reagan, President Ronald 257, 280, 291, 293, 295, 297, 299, 308, 317, 330
- Redding, Ed 37
- Redstone Arsenal 4, 9, 73
- Redstone rocket 3, 7, 9, 17, 19, 22, 23, 27, 38, 54, 69, 72, 77, 83, 105-107, 110, 130, 262, 163
- Redundancy systems 130, 173, 235, 241
- Rees, Eberhard 169, 196, 210, 312
- Remote Manipulator System 149
- Rendezvous and docking 56, 58, 59, 64, 70, 71, 73, 77, 79, 80, 92-95, 103, 142, 144, 145, 160, 164, 165, 174, 178, 189, 209, 211, 219, 221
- Rendezvous Committee 144
- Reorganizations 88-90, 95, 107
- Reusable Ground Launch Vehicle Concept and Development Planning Study 223
- Rice University 37, 40, 259, 260  
provides site for spacecraft center 33, 39, 41, 47, 48, 51
- Richard, Ludie G. 169
- Richardson, Herbert H. 317
- Ride Report 344
- Ride, Dr. Sally K. 287, 288, 300-304, 311, 321
- Roberts, Tecwyn (Tec) 26, 84, 85, 165
- Robinson, Emyre Barrios 262, 264
- Rockefeller Brothers Fund 12
- Rockefeller, Nelson 12
- Rocket Research Project 7
- Rocketdyne 73, 74, 109, 138, 145, 174, 329  
chosen to design Shuttle engines 230  
prime contractor, Saturn propulsion systems 138
- Rockwell International 65, 139, 230, 238, 253, 264, 308, 317, 326, 335, 342
- Rockwell Standard 139
- Rockwell, Willard F. 137
- Rogers Commission 299, 300, 307, 321, 326, 329, 349
- Rogers, William P. 299
- Roland, Alex 330
- Roosa, Stuart Allen 128, 199
- Roosevelt, President Franklin 5
- Roosevelt, President Theodore 15
- Root, Eugene 4
- Rose, Rodney G. (Rod) 24, 25, 26, 53, 81, 274
- Rosen, Milton 195, 225
- Rothrock, Addison M. 36
- Rummel, Robert W. 300
- Russell, Sen. Richard B. 2
- Russian Space Program 17, 29, 32
- Rutland, C. H. 223
- Ryan Aeronautical Company 79
- Ryker, Norman 141
- ## S
- ### Satellites
- ASC-1 290, 297
- Arabsat 290, 296
- ASTRO-1 342
- AUSSAT 290, 297
- GLOMR 296, 297
- Leasat-3 296
- NUSAT 296
- Palapa B 285, 288, 291, 294
- SATCOM Ku-2 297-290
- SOLAR MAX 291, 292
- SYNCOM-3 289, 290, 296, 297
- SYNCOM-4 290, 294, 296, 297
- Telesat 285, 289, 290, 296
- Telesat 288
- Telstar 1 285, 289, 296
- Westar VI 291, 294
- Saturn program 27, 54, 64, 107, 108
- Saturn rocket 72, 73, 74, 77, 82, 93, 97, 103, 105, 107-115, 134-144, 152, 155, 160, 165, 169, 171, 173, 175, 189, 203, 210, 222, 223, 236
- Saudi Arabia 296
- Sauter, Linda 44
- Scheer, Julian 133
- Scherer, Lee R. 210
- Schirra, Walter (Wally) 68, 70, 88, 93, 121, 122, 128, 133, 155, 165, 201
- Schmitt, Sen. Harrison Hagan (Jack) 128, 203, 252, 295
- Schnyer, A. Daniel 223
- School of Aviation Medicine 119
- Science Advisory Committee 4, 13, 28, 30, 113, 173, 193, 195
- Science and Applications Directorate 154, 170, 180, 181, 213, 218, 219, 244, 246, 251
- Science Applications International 342
- Scott Science & Technology 201, 265, 266
- Scott, David R. 93, 111, 200, 201, 265
- Scout launch vehicle 72
- Scriven, General George P. 10
- Scully-Power, Paul 293
- Seabrook, Texas 260

- Seamans, Robert C., Jr. 32, 79, 101, 124, 141, 144, 145
- Security 1, 5, 19, 66, 84, 85, 89, 90, 119, 120, 123, 156, 191, 193, 239, 294, 295, 324, 333
- Seddon, Margaret Rhea 288, 290, 302
- Select Committee on Astronautics and Space Exploration 12
- Selection and Training of Personnel for Space Flight* 118
- Sells, S. B. 118
- Senate Select Committee on Space and Astronautics 17
- Shaffer, Philip C. 183
- Sharp, Frank 124
- Shea, Joseph F. (Joe) 70, 71, 87, 107, 113, 114, 189
- Shepard, Alan B., Jr. 32, *photo* 33, 38, 53, 54, 78, 85, 122, 127, 124, 163, 199, 201
- Sheppard, Dr. Sallie 318
- Sherman, Milton 141, 142
- Shuttle Avionics Integration Laboratory (SAIL) 230
- Shuttle landing strips 239, 250
- Shuttle Management Structure Team 304
- Shuttle Mission Simulator (SMS) 248, 250, 278
- Shuttle Payload Activities Team 277
- Shuttle Payload Integration and Development Program Office 278
- Shuttle Program Office 165, 233, 234, 262, 273, 282, 335
- Shuttle Program Task Group 227
- Silverstein, Abe 17, 18, 19, 23, 26, 31, 36, 57, 79, 102, 104, 120
- background 21-22
- Director of Goddard Space Flight Center 35
- establishes Manned Space Flight Office 21
- interface with STG 100
- leaves NASA 32, 37
- rift with Gilruth 27, 35
- role in Mercury program 71
- role in relocating manned spacecraft program 36, 37
- Silviera, Milton A. 230
- Simpkinson, Scott 17, 22, 23, 109, 114, 169
- Singer Link Division 248, 252, 265, 278
- Sisk, Congressman B. F. 18
- Sixth International History of Astronautics Symposium 17
- Sjoberg, Sigurd A. 198, 209
- Skylab Program Office 211
- Skylab vii, 127, 178, 188, 190, 197, 203-205, 207, 209-211, 214-216, 218, 221, 226, 229, 231, 234, 238, 251, 254, 274, 276, 282, 288, 312, 321
- Slayton, Donald K. (Deke) 68, 70, 111, 120, 121, 125, 126, 169, 184, 220, 266
- astronaut 122
- Director for Flight Crew Operations 73, 87
- Head of the Astronaut Office 73, 127
- resigns to work in private sector 262
- Slayton, Kent 68
- Sloop, John 104
- Small and Disadvantaged Business Office 268
- Small Business Innovation Development Act of 1982 266
- Small businesses 150, 154, 257, 267, 268
- Sneider, William C. 181
- Snoopy* 174
- Solid Rocket Boosters 238, 253, 279, 285, 301, 326
- Sonett, Dr. C. P. 129
- Soviet space program 1
- Space vii, 159, 196
- mission control 159
- race i, 27, 54, 135, 315
- role in space exploration 209
- Space Act 11, 14, 18, 19, 294
- amendment 30
- Space Act of 1958 15
- Space Adaptation Syndrome 288
- Space Advisory Board 317, 318
- Space Age 18, 19, 49, 105-106, 196
- Space Business Research Center 319
- Space Business Roundtable 317
- Space Center Houston 331, 332
- Space Council 14, 28, 29, 30
- Space Environment Simulation Laboratory (SESL) 131
- Space Exploration Initiative 337, 338, 342
- Spaceflight
- costs 57, 75
- German role in 105-106
- historical significance ix
- human dimensions 118-133
- technical challenges 56-57
- Spaceflight program 17
- Space Foundation 317, 319
- Space Industries, Inc. 264
- Space News Roundup* 44, 55, 70, 74, 78
- Space Research Center 314-319
- Space Services Inc. 266-267, 281
- Space Shuttle Program ix, 193, 195, 196, 206, 209-231, 233-255, 319, 325, 330, 339
- Canadian-sponsored experiments 293
- challenges 233, 343
- compared with other programs 274
- contractors 222, 224, 230, 260

- costs 236-239, 285, 286, 295
  - design and testing requirements 235
  - development 274
  - early concepts 222
  - effect of *Challenger* disaster 335
  - experiments 338
  - financial resources 235, 236-239
  - first commercial package 282
  - first shuttle flight 253, 273
  - flight requirements 285
  - getaway special 282, 298, 295
  - laboratories 241, 251
  - launch vehicles 238
  - management 224, 234, 308, 312, 319
  - oceanographic experiments 293
  - orbiter modifications 326
  - payload planning 275, 285
  - post-*Challenger* changes 343
  - project office 213
  - public interest 293
  - public support for 273, 280
  - purpose 309
  - remote manipulator (Canadarm) 287, 291-297
  - retrieve and repair satellite 292
  - satellites deployed 296-298
  - scientific knowledge 252, 281
  - shuttle pallet satellite (SPAS) 287
  - summary of shuttle flights 302-304
  - technical challenges 233, 234, 239, 279
  - technological innovations 251-252
  - training 293
  - Space Station *Freedom* vii, 233, 264, 329, 334, 335, 337, 339, 345, 346, 350
  - Space Station Projects Office 325, 335, 336
  - Space station vii, ix, 188-196, 204, 205, 210, 221-226, 252, 258, 268, 273, 295, 297, 307-313, 319-321, 325-339, 342-347
  - Space suit 112, 130, 131, 152, 174, 287, 292
  - Space Task Group (STG) vii, 11, 15, 20, 21, 25-27, 31, 32, 38-45, 53, 57-59, 61-64, 71, 77-84, 98-101, 105, 106-115, 119, 120, 142, 163, 189, 196, 225, 227, 229, 234, 249, 278, 335
    - addresses Mercury technical problems 38
    - location 35, 36
    - organization memo 21
    - origin and development 35
    - reaction to relocation to Houston 43
    - staffing 23, 24
  - Space Technology Laboratories 71, 101, 143, 152, 174
  - Space Transportation System (STS) 159, 193, 196, 205, 209-231, 254, 287, 307, 325, 345
  - Spacelab 280, 285, 289, 290, 295, 296, 297
  - Spacelab Program Office 280
  - Special Committee on Space and Aeronautics 12
  - Special President's Task Group 196
  - Sputnik 1-11, 15, 18, 29, 36, 59, 74, 75, 82, 98, 105, 106, 155, 163, 189, 233, 250, 321, 347
  - Sputnik I 1, 35, 350
    - effect on American educational system 6
    - effect on American space program 1, 2, 3, 36, 75, 82, 155
    - military significance 2, 3
    - political repercussions 3
    - reaction of scientific community 59-60
    - world reaction 1
  - Sputnik II 17
  - Stafford, Thomas P. 88, 93, 174, 220, 221, 281, 295, 332
  - Stall, Harold S. 331, 332
  - Star Wars 317
  - Starfire Rocket 266
  - Stennis Space Center 350
  - Sterling, William 93
  - Stevens Institute of Technology 311
  - Stewart, Bob 291
  - Stoller, Homer 32
  - Stone, Ralph W. 144
  - Storms, Harrison A. (Stormy) 138, 142
  - Strass, H. Kurt 64
  - Strategic Defense Initiative 317
  - Strategic Task Group 10
  - Subcommittee on International Cooperation 18
  - Subcommittee on Scientific Research and Development 18
  - Subcommittee on Space Science and Applications 280
  - Subcommittee on Space Problems and Life Sciences 18
  - Sullivan, Kathryn D. 293
  - Surveyor 3 179, 194
  - Surveyor 1 171
  - Survival gear 77, 80
  - Swigert, John L., Jr. 182
  - Systems and subsystems management 77
  - Systems Management American Corp. 342
- ## T
- Tapley, Dr. Byron 318
  - Taylor, General Maxwell 4
  - Teacher in Space Project 293
  - Teague, Congressman Olin E. (Tiger) 18, 38, *photo* 41, 42, 43, 51, 77, 102, 108, 109, 113, 127, 146, 150, 187, 190-193, 196, 197, 200, 221, 259, 315



Technological advancements 13, 152, 156  
 Technology and Commercial Projects Office 268  
 Television  
     role in publicizing space program ix  
 Teller, Dr. Edward 4, 5  
 Texas A & M University 259, 234, 262, 311, 314-319  
 Texas Engineering Experiment Station 314  
 Texas Instruments 247, 260  
 Texas Space Grant Consortium 315, 318  
 Thagard, Dr. Norman 288  
*The Right Stuff* 120  
*The Space Station* 295  
 Thibodaux, Joseph G. 11  
 Thiokol 152  
 Thomas, Sen. Albert 37, 41, 42, 51  
 Thompson, Bill vii  
 Thompson, Clarke W. 51  
 Thompson, Floyd L. 20, 24, 27, 113, 195  
 Thompson, Robert F. 165, 229, 234, 235  
 Thor launch vehicle 72  
 Thor rocket 22, 73  
 Thorson, Richard A. 335  
 Tiger Team 114  
 Tindall, Howard 165, 169  
 Titan II rocket 72, 74, 77, 79, 88, 107  
 Toftoy, Colonel H. N. 8  
 Total Quality Management 336  
 Tower, Sen. John 50  
 Tracking and Data Relay Satellite (TDRS) 287, 290  
 Training 118, 122-133, 151, 163, 164, 172, 175, 180, 198, 211, 214, 220, 248-251, 264-266, 276, 278, 285-287, 292, 293, 301, 312, 315, 338, 342  
 Training hardware 126  
 Truly, Lt. Commander Richard H. 128, 129, 280, 289, 319, 333, 334, 338, 343  
 Truszynski, Gerald 169  
 TRW 152, 174  
 Tsiolkovsky, Konstantin E. 6, 7, 350  
 Turner, Luther 42  
 Turrentine, Gordon 46

**U**

Ulmer, Ralph E. 41  
 Ulysses Probe 334, 343  
 UniSys 342  
 United Aircraft 152, 174, 211  
 University of Houston 39, 46, 264, 268, 314-319  
 University of Tennessee 288  
 University of Texas 266, 279, 308, 314-318, 332  
 Unmanned Moon landing 13  
 Utah State University 282

**V**

V-2 missile 7, 8, 9, 105  
 Van Allen radiation belts 12, 180  
 Van Allen, James 330  
 Van Hoften, James D. 292, 297  
 Van Horn, Richard 317  
 Vanguard launch vehicle 72  
 Vanguard rocket program 2, 3, 12, 72  
 Vanguard satellite program 26, 32  
 Vavra, Paul 84  
 Vienna, Austria 17, 22  
 Vietnam War, effect on space program 108, 113, 135, 137, 156, 178, 187, 188, 192, 193, 197, 205, 206, 226, 261  
 Viking program 9, 321  
 Vincent, John 42  
 Voas, Robert 119, 120, 125, 126  
 Vostok spacecraft 32, 38  
 Voyager 337

**W**

Wainerdi, Richard 317  
 Walker, Arthur B.C., Jr. 300  
 Walker, Charles D. 293  
 Wallops Island Station 22, 23, 32, 36, 53, 97, 326  
 Walt Disney Imagineering 332  
 Warrior Constructors, Inc. 154  
 Washington, D. C. 8, 14, 17, 19, 21, 22, 26, 27, 41, 43-46, 48, 57, 64, 70, 78, 120, 122, 140, 142, 195, 197, 209, 220, 225, 308, 309, 318, 319, 335  
 Water landing 17, 23, 68, 71, 79, 88, 102-104, 113, 146  
 Water-landing parachute system 17, 74  
 Water Transport System 38-40  
 Waterman, Alan 3  
 Webb, James (Jim) vii, 24, 29-32, 36, 37, 39-41, 43, 51, 70, 74, 78, 101, 104, 113, 123, 124, 145, 146, 169, 190, 191, 195  
     reorganizes NASA management 71  
     and NASA management system 99  
     retires 160, 197  
 Webster, Texas 260  
 Weightless Environment Training Facility (WETF) 131, 249  
 Weinberger, Caspar 238  
 Weitz, Paul J. 215, 331  
 Welch, Louie 260, 261  
 Welsh, Edward C. 29, 156, 192  
 West Estate 37, 47  
 West, Colonel Paul 46, 48  
 Western Electric 19, 84  
 Western Union 291

*Suddenly, Tomorrow Came . . .*

Wheelon, Dr. Albert D. 300  
Whirlpool Corporation 211  
Whitbeck, Phil 62, 216  
White Sands Missile Range 266, 282  
White, Dr. Stanley C. 46, 62, 63, 119, 120  
White, Edward H. 44, 111, 112, 140  
    first spacewalk 93, *photo* 94  
Whynot, Charles 265  
Wiesner, Jerome B. 29, 30, 124, 145  
Williams, Don 337  
Williams, Larry 335  
Williams, Walter C. 10, 41, 46-48, 51, 60-65, 71,  
    78, 84-87,  
Wilson, Charles E. 2, 3  
Winn, Grace 43-45, 68  
Wolfe, Tom 120  
Women astronaut candidates 120, 288  
Worden, Alfred 201, 202  
Wright brothers 18

Wright, House Speaker Jim 319  
Wyatt, DeMarquis D. 104

**Y**

*Yankee Clipper* 179  
Yarborough, Sen. Ralph 50  
Yardley, John F. 140, 141, 317  
Yeager, Brigadier General Charles E. (Chuck) 10,  
    61  
Young, Major John 88, 92, *photo* 94, 128, 174,  
    179, 201-203, 265, 279, 324, 300-302  
Young, R. Wayne 212, 229, 324, 335

**Z**

Zbanek, Leo T. 62, 66  
Zedekar, Raymond 126  
Zimmerman, Charles H. 17, 20, 21  
Zoerner, Gary 264

*The JSC History Series*

*Suddenly, Tomorrow Came . . .*

**Reference Works, NASA SP-4000:**

- Grimwood, James M. *Project Mercury: A Chronology* (NASA SP-4001, 1963).
- Grimwood, James M., and Hacker, Barton C., with Vorzimmer, Peter J. *Project Gemini Technology and Operations: A Chronology* (NASA SP-4002, 1969).
- Link, Mae Mills. *Space Medicine in Project Mercury* (NASA SP-4003, 1965).
- Astronautics and Aeronautics: A Chronology of Science, Technology and Policy* (NASA SP-4004 to SP-4025, a series of annual volumes continuing from 1961 to 1985, with an earlier summary volume, *Aeronautics and Astronautics, 1915-1960*).
- Ertel, Ivan D., and Morse, Mary Louise. *The Apollo Spacecraft: A Chronology, Volume I, Through November 7, 1962* (NASA SP-4009, 1969).
- Morse, Mary Louise, and Bays, Jean Kernahan. *The Apollo Spacecraft: A Chronology, Volume II, November 8, 1962-September 30, 1964* (NASA SP-4009, 1973).
- Brooks, Courtney G., and Ertel, Ivan D. *The Apollo Spacecraft: A Chronology, Volume III, October 1, 1964-January 20, 1966* (NASA SP-4009, 1973).
- Van Nimmen, Jane, and Bruno, Leonard C., with Rosholt, Robert L. *NASA Historical Data Book, Vol. I: NASA Resources, 1958-1968* (NASA SP-4012, 1976, rep. ed. 1988).
- Newkirk, Roland W., and Ertel, Ivan D., with Brooks, Courtney G. *Skylab: A Chronology* (NASA SP-4011, 1977).
- Ertel, Ivan D., and Newkirk, Roland W., with Brooks, Courtney G. *The Apollo Spacecraft: A Chronology, Volume IV, January 21, 1966-July 13, 1974* (NASA SP-4009, 1978).
- Ezell, Linda Neuman. *NASA Historical Data Book, Vol. II: Programs and Projects, 1958-1968*. (NASA SP-4012, 1988).
- Ezell, Linda Neuman. *NASA Historical Data Book, Vol. III: Programs and Projects, 1969-1978* (NASA SP-4012, 1988).

**Management Histories, NASA SP-4100:**

- Rosholt, Robert L. *An Administrative History of NASA, 1958-1963* (NASA SP-4101, 1966).
- Levine, Arnold S. *Managing NASA in the Apollo Era* (NASA SP-4102, 1982).
- Roland, Alex. *Model Research: The National Advisory Committee for Aeronautics, 1915-1958* (NASA SP-4103, 1985).
- Fries, Sylvia D. *NASA Engineers and the Age of Apollo* (NASA SP-4104, 1992).

**Project Histories, NASA SP-4200:**

**Human Space Flight Programs:**

- Swenson, Loyd S., Jr., Grimwood, James M., and Alexander, Charles C. *This New Ocean: A History of Project Mercury* (NASA SP-4201, 1966).
- Hacker, Barton C., and Grimwood, James M. *On Shoulders of Titans: A History of Project Gemini* (NASA SP-4203, 1977).
- Benson, Charles D. and Faherty, William Barnaby. *Moonport: A History of Apollo Launch Facilities and Operations* (NASA SP-4204, 1978).
- Ezell, Edward Clinton, and Ezell, Linda Neuman. *The Partnership: A History of the Apollo-Soyuz Test Project* (NASA SP-4209, 1978).
- Brooks, Courtney G., Grimwood, James M., and Swenson, Loyd S., Jr. *Chariots for Apollo: A History of Manned Lunar Spacecraft* (NASA SP-4205, 1979).
- Bilstein, Roger E. *Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles* (NASA SP-4206, 1980).

Compton, W. David, and Benson, Charles D. *Living and Working in Space: A History of Skylab* (NASA SP-4208, 1983).

Compton, W. David. *Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions* (NASA SP-4214, 1989).

**Satellite Space Flight Programs:**

Green, Constance McL., and Lomask, Milton. *Vanguard: A History* (NASA SP-4202, 1970; rep. ed. Smithsonian Institution Press, 1971).

Hall, R. Cargill. *Lunar Impact: A History of Project Ranger* (NASA SP-4210, 1977).

Ezell, Edward Clinton, and Ezell, Linda Neuman. *On Mars: Exploration of the Red Planet, 1958-1978* (NASA SP-4212, 1984).

**Scientific Programs:**

Newell, Homer E. *Beyond the Atmosphere: Early Years of Space Science* (NASA SP-4211, 1980).

Pitts, John A. *The Human Factor: Biomedicine in the Manned Space Program to 1980* (NASA SP-4213, 1985).

Naugle, John E. *First Among Equals: The Selection of NASA Space Science Experiments* (NASA SP-4215, 1991).

**Center Histories, NASA SP-4300:**

Hartman, Edwin P. *Adventures in Research: A History of Ames Research Center, 1940-1965* (NASA SP-4302, 1970).

Hallion, Richard P. *On the Frontier: Flight Research at Dryden, 1946-1981* (NASA SP-4303, 1984).

Muenger, Elizabeth A. *Searching the Horizon: A History of Ames Research Center, 1940-1976* (NASA SP-4304, 1985).

Rosenthal, Alfred. *Venture into Space: Early Years of Goddard Space Flight Center* (NASA SP-4301, 1985).

Hansen, James R. *Engineer in Charge: A History of the Langley Aeronautical Laboratory, 1917-1958* (NASA SP-4305, 1987).

Dawson, Virginia P. *Engines and Innovation: Lewis Laboratory and American Propulsion Technology* (NASA SP-4306, 1991).

**General Histories, NASA SP-4400:**

Corliss, William R. *NASA Sounding Rockets, 1958-1968: A Historical Summary* (NASA SP-4401, 1971).

Wells, Helen T., Whiteley, Susan H., and Karegeannes, Carrie. *Origins of NASA Names* (NASA SP-4402, 1976).

Anderson, Frank W., Jr. *Orders of Magnitude: A History of NACA and NASA, 1915-1980* (NASA SP-4403, 1981).

Sloop, John L. *Liquid Hydrogen as a Propulsion Fuel, 1945-1959* (NASA SP-4404, 1978).

Roland, Alex. *A Spacefaring People: Perspectives on Early Spaceflight* (NASA SP-4405, 1985).

Bilstein, Roger E. *Orders of Magnitude: A History of NACA and NASA, 1915-1990* (NASA SP-4406, 1989).

**New Series in NASA History,  
Published by The Johns Hopkins University Press:**

Cooper, Henry S.F., Jr. *Before Lift-Off: The Making of a Space Shuttle Crew* (1987).

McCurdy, Howard E. *The Space Station Decision: Incremental Politics and Technological Choice* (1990).

Hufbauer, Karl. *Exploring the Sun: Solar Science Since Galileo* (1991).

McCurdy, Howard E. *Inside NASA: High Technology and Organizational Change in the U.S. Space Program* (1993).