Tables

TABLE 1.—*Timeline of Apollo 17 Mission Events*

Event	Time from liftoff hours and minutes	Day	Eastern Standard Time
Launch	0:00	12/6	9:53 p.m.
Trans Lunar Injection	3:21	12/7	1:14 a.m.
Lunar Orbit Insertion	88:56	12/10	2:49 p.m.
Descent Orbit Insertion	93:13	12/10	7:06 p.m.
Spacecraft Separation	110:28	12/11	12:21 p.m.
Lunar Landing	113:02	12/11	2:55 p.m.
EVA 1	116:40	12/11	6:33 p.m.
EVA 2	139:10	12/12	5:03 p.m.
EVA 3	162:40	12/13	4:33 p.m.
Lunar Liftoff	188:03	12/14	5:56 p.m.
Spacecraft Docking	190:05	12/14	7:58 p.m.
Trans Earth Injection	236:40	12/16	6:33 p.m.
Trans Earth EVA	257:30	12/17	3:23 p.m.
Splashdown (Pacific Ocean)	304:41	12/19	2:34 p.m.

TABLE 2.—*LRV Exploration Traverses*

(The entries in this table are brief. They are explained in the text and in the glossary. The table should be considered a general guide only; not every item is mandatory at each stop. The times are especially likely to change during the mission. The reader may wish to mark the actual times for himself on the table.)

EVA 1. Refer to figure 118 for traverse route and station location.

Station/activity	Segment distance (km)	Travel time (min)	Total travel distance (km)	Arrive station EVA time (hr:min)	Stop time (min)	Depart station EVA time (hr:min)
LM			0. 00	0:00	107	1:47
Ride	0. 10	1				
ALSEP			0. 10	1:48	136	4:04
Ride	1. 25	10				
LSP–1 lb			1. 35	4:14	3	4:17
Ride	1. 15	9				
Station 1			2. 50	4:27	66	5:33
LSP–3 lb (at station 1)						
Ride	1. 70	14				
LSP–½ lb			4. 20	5:47	3	5:50
Ride	. 60	5				
SEP			4. 80	5:54	25	6:19
Ride	. 10	1				
LM			4. 90	6:20	40	7:00
Totals		40			380	7:00

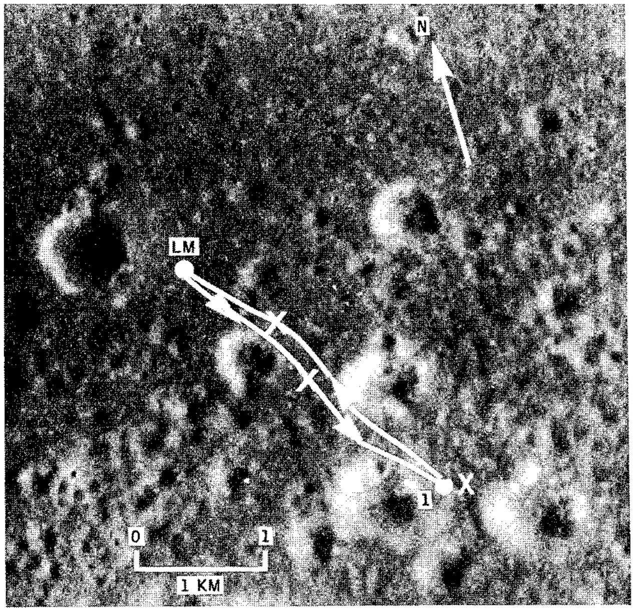

FIGURE 118.—EVA 1 LRV Traverse. Symbols: diamond—LRV sample location, X—LSPE charge location, circle—science station stop. NASA PHOTO S-72-50298.

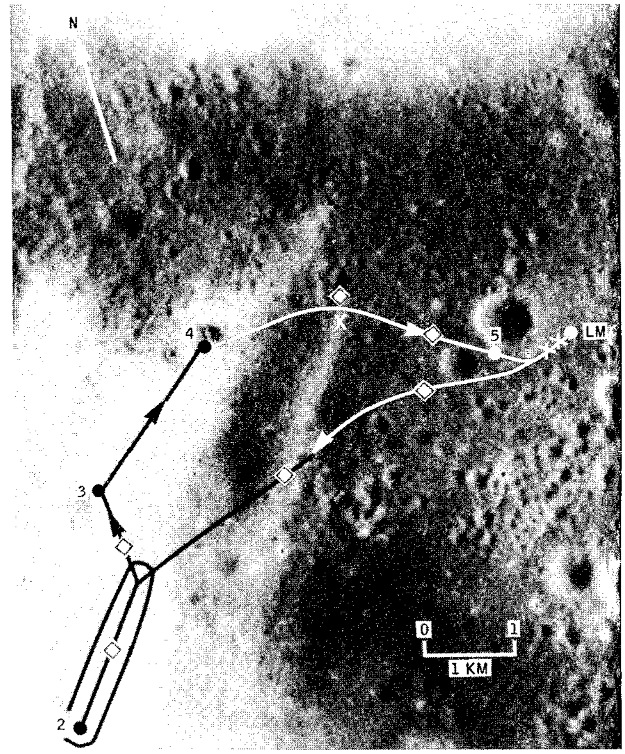

FIGURE 119.—EVA 2 LRV Traverse, symbols are same as those used in figure 118. NASA PHOTO S-72-50282.

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 1		STATION 1		STATION TIME—66 min.
Investigate SUBFLOOR material exposed in crater rim; study historical sequence and mode of emplacement of multiple DARK MANTLE units—at 650m. mantled crater in plains area.				
Initial overhead Pan Geophysics TV Pan	Observation of DARK MANTLE along linear boundary separating two possible mantle units. Observation of bright crater rim deposits.	SUBFLOOR material—sampling in crater rim.	DARK MANTLE—investigate and sample lighter and darker DARK MANTLE units.	Final overhead Pan.
	Observations 70mm. photos. Structural or depositional relationships.	Documented sampling Boulders. Rocks and soil. Rake sampling.	Rake sampling Documented sampling (both sides of contact). Double core near edge of DARKER MANTLE unit.	
0:05	0:05	0:26	0:26	0:04

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 2. Refer to figure 119 for traverse route and station locations.

Station/activity	Segment distance (km)	Travel time (min)	Total travel distance (km)	Arrive station EVA time (hr:min)	Stop time (min)	Depart station EVA time (hr:min)
LM			0. 00	0:00	52	1:52
Ride	0. 25	2				
LSP–⅛ lb			0. 25	0:54	3	0:57
Ride	1. 55	13				
LRV Sample			1. 30	1:10	2	1:12
Ride	1. 70	14				
LRV Sample			3. 50	1:26	2	1:28
Ride	3. 65	30				
Station 2			7. 15	1:58	51	2:49
Ride	1. 03	8				
LRV Sample			8. 18	2:57	2	2:59
Ride	1. 03	8				
LRV Sample			9. 21	3:08	2	3:10
Ride	1. 04	9				
Station 3			10. 25	3:18	45	4:03
Ride	0. 67	6				
LRV Sample			10. 92	4:09	2	4:11
Ride	1. 33	11				
Station 4			12. 25	4:22	41	5:03
Ride	1. 35	11				
Photo			13. 60	5:14	5	5:19
LRV Sample						
LSP–6 lb						
Ride	0. 90	7				
LRV Sample			14. 50	5:26	2	5:28
Ride	0. 90	7				
Station 5			15. 40	5:36	30	6:06
Ride	0. 55	5				
LSP–¼ lb			15. 95	6:10	3	6:13
Ride	0. 35	3				
LM			16. 30	6:16	44	7:00
Totals		134			286	7:00

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 2 — STATION 2 — STATION TIME—51 min

Study MASSIF and LIGHT MANTLE and their relationships—at base of SOUTH MASSIF and proximal end of LIGHT MANTLE.

Initial overhead Pan. Geophysics TV Pan	Observations of MASSIF, trench, blocks, and LIGHT MANTLE.	MASSIF—investigate and sample base of SOUTH MASSIF.	LIGHT MANTLE—investigate and sample furrowed area at proximal end of mantle.	Final overhead Pan.
	Observations 70mm. photos. Uplands. Blocks and trench. LIGHT MANTLE.	Documented samples Boulders. Rocks and soil. Rake sample. Polarimetry.	Rake sample Documented samples of rocks and soil. Single core.	
0:05	0:05	0:21	0:16	0:04

EVA 2 — STATION 3 — STATION TIME—45 min

Study scarp and LIGHT MANTLE and their relationships—small bright craters near base of scarp.

Initial overhead Pan. Geophysics TV Pan	Observations of scarp and LIGHT MANTLE—origin of scarp, age relationships with mantle.	LIGHT MANTLE—sampling at intermediate point—small craters.	Scarp—investigate relations between scarp and LIGHT MANTLE and sample materials of scarp face.	Final overhead Pan.
	Observations 70mm. photos. Scarp.	Documented sampling Rake sampling. Radial sampling of small bright crater.	Exploratory trench Documented sampling 70mm. photos.	
0:05	0:05	0:13	0:18	0:04

EVA 2 — STATION 4 — STATION TIME—41 min

Study dark halo crater, LIGHT MANTLE, and historical sequence in light and dark materials—at edge of 110m. dark halo crater near distal edge of LIGHT MANTLE.

Initial overhead Pan. Geophysics TV Pan	Observations of LIGHT MANTLE, dark ejecta, contact relations, crater interior.	LIGHT MANTLE—sample distal part at small bright craters.	Dark Halo Crater—investigate and sample to determine origin (internal or external) history.	Final overhead Pan.
	Observations 70mm. photos. Crater interior. Scarp.	Documented sampling Radial sampling of small crater. Rake sample.	Radial sampling Double core near edge of dark ejecta.	
0:05	0:05	0:11	0:16	0:04

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 2		STATION 5		STATION TIME—30 min.
Study relations between SUBFLOOR and DARK MANTLE—on rim of low-rimmed 700m. mantled crater in plains area.				
Initial overhead Pan	Observations of crater rim materials (SUBFLOOR), blocks, and DARK MANTLE.	SUBFLOOR—sampling of crater rim materials and boulders near rim crest for comparison with other SUBFLOOR samples.	DARK MANTLE—sampling lateral variation; any possible source of DARK MANTLE.	Final overhead Pan.
Geophysics TV Pan	Observations 70mm. photos. Crater wall	Documented sampling Rake sampling Compare with SUBFLOOR material from earlier station.	Double core in undisturbed DARK MANTLE material.	
0:05	0:05	0:05	0:11	0:04

EVA 3. Refer to figure 120 for traverse route and station locations.

Station/activity	Segment distance (km)	Travel time (min)	Total travel distance (km)	Arrive station EVA time (hr:min)	Stop time (min)	Depart station EVA time (hr:min)
LM			0. 00	0:00	45	0:45
Ride	1. 55	13				
LRV Sample			1. 55	0:58	2	1:00
Ride	1. 55	13				
Station 6			3. 10	1:12	47	15:9
Ride	1. 25	10				
Station 7			4. 35	2:10	47	2:57
Ride	1. 65	14				
Station 8			6. 00	3:10	47	3:57
Ride	1. 85	15				
Station 9			7. 85	4:13	30	4:43
Ride	. 70	6				
LRV Sample			8. 55	4:48	2	4:50
Ride	. 70	6				
Station 10B			9. 25	4:56	47	5:43
Ride	1. 75	14				
LSP-¼ lb			11. 00	5:57	3	6:00
Ride	0. 10	1				
LSP-⅛ lb			11. 1	6:01	3	6:04
Ride	0. 05	0				
LM			11. 15	6:05	55	7:00
Totals		92			328	7:00

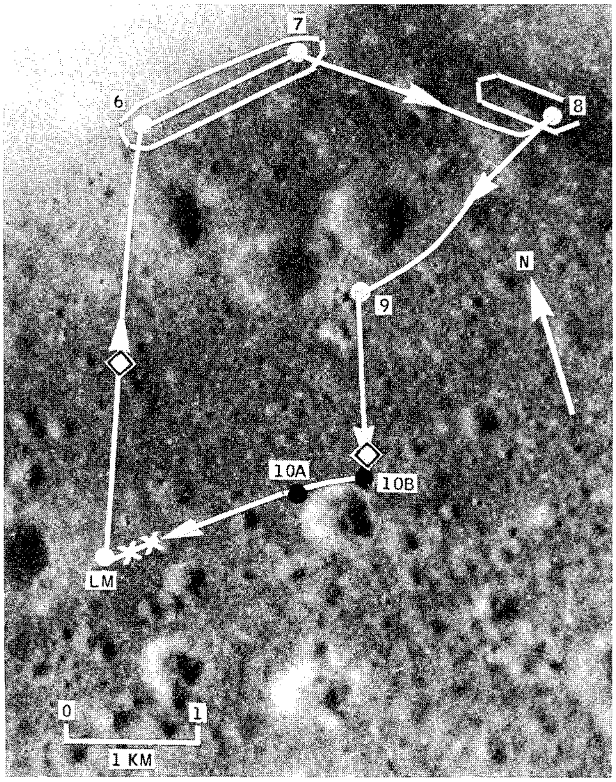

FIGURE 120.—EVA 3 LRV Traverse. Station 10A or 10B are alternate locations. One will be selected during the mission. Symbols are same as those used in figure 118. NASA PHOTO S–72–50299.

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 3		STATION 6 and 7		STATION TIME—88 min
Study Northern MASSIF and sample widest possible variety of rock types—near the base of the MASSIF.				
Initial overhead Pan	Observations of base of MASSIF, mantling materials, boulders.	MISSIF material—sample at base of MASSIF; study relation to DARK MANTLE.	MASSIF material—investigate and sample widest possible variety of boulders near base of MASSIF; investigate relations of boulders to DARK MANTLE.	Final overhead Pan.
Geophysics TV Pan				
	Observations 70mm. photos. Boulders.	Documented sampling Rake sampling. Polarimetry North MASSIF SCULPTURED HILLS.	Documented sampling of variety of boulders. Photo-documentation of boulder fabrics.	
0:10	0:10	0:20	0:40	0:08

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 3		STATION 8		STATION TIME—44 min.
Characterize SCULPTURED HILL unit and study its relationships to DARK MANTLE—near base of SCULPTURED HILLS				
Initial overhead Pan.	Observations of SCULPTURED HILL unit and DARK MANTLE.	SCULPTURED HILLS materials—sample at base of SCULPTURED HILL for comparison with other highland units.	DARK MANTLE—sample for lateral variation.	Final overhead Pan.
Geophysics TV Pan				
	Observation	Rake sampling Documented sampling of rocks and soil.	Documented sampling	
0:05	0:05	0:20	0:10	0:04

EVA 3		STATION 9	STATION TIME—29 min.
Study historical sequence and origin (?) of DARK MANTLE—at fresh 80m. crater.			
Initial overhead Pan	Observations of dark crater and its ejecta.	DARK MANTLE—investigate crater and sample its ejecta blanket to study internal stratigraphy and/or origin; lateral variation.	Final overhead Pan.
Geophysics TV Pan			
	Observation 70mm. photos Crater interior	Radial sampling Rake sampling (?) Documented sampling	
0:05	0:05	0:15	0:04

EVA 3		STATION 10A*		STATION TIME—47 min
Study relationships between DARK MANTLE and SUBFLOOR—on rim of 500m. blocky-rimmed mantled crater.				
Initial overhead Pan	Observations of DARK MANTLE/SUBFLOOR relations in crater interior.	SUBFLOOR material—investigative and sample on rim of crater.	DARK MANTLE—investigative and sample.	Final overhead Pan.
Geophysics TV Pan				
	Observations 70mm. photos crater wall blocks.	Documented sampling of rocks and soil.	Double core near contact with SUBFLOOR material. Documented sampling of rocks and soil.	
0:05	0:05	0:17	0:14	0:04

*10A and 10B are *alternate* locations for Station 10. One of the two will be selected during the mission depending upon the sampling objectives to be emphasized.

TABLE 2.—*LRV Exploration Traverses*—Continued

EVA 3		STATION 10B*		STATION TIME—47 min
Study relationships between DARK MANTLE and large blocks—on rim of 500m. blocky-rimmed mantled crater				
Initial overhead Pan	Observations of DARK MANTLE/SUBFLOOR relations in crater interior and of DARK MANTLE/block relations near rim.	SUBFLOOR material—investigate and sample large blocks near crater rim.	DARK MANTLE—investigate and sample.	Final overhead Pan.
Geophysics TV Pan	Observations 70mm. photos crater wall blocks.	Documented sampling of block materials.	Double core near contact with SUBFLOOR material. Documented sampling of rocks and soil.	
0:05	0:05	0:17	0:14	0:04

*10A and 10B are *alternate* locations for Station 10. One of the two will be selected during the mission depending upon the sampling objectives to be emphasized.

TABLE 3.—*ALSEP Timeline*

Time after start of EVA in hour/min	Activity: Commander	Activity: LM pilot
1:15	Remove experiment pallett	Inspect LM.
1:20	Remove experiment pallett	Remove ALSEP.
1:30	Prepare for ALSEP travel	Fuel RTG.
1:40	Travel to ALSEP site	Travel to ALSEP site.
1:50	Deploy HFE	Place ALSEP packages and connect electrical cables.
1:55	Deploy HFE	Deploy LSP.
2:00	Deploy HFE	Remove LSP.
2:05	HFE drill hole for probe 1	Deploy LMS.
2:10	HFE drill hole for probe 1	Level, align, deploy C/S.
2:20	HFE emplace probe 1	Deploy antenna.
2:25	HFE drill hole for probe 2	Deploy LEAM.
2:30	HFE drill hole for prove 2	Deploy LSP antenna.
2:40	HFE emplace probe 2	Deploy LSP Geophone.
2:50	Drill deep core	Deploy LSP Geophone.
3:00	Drill deep core	ALSEP photos.
3:10	Recover deep core and emplace neutron flux.	ALSEP photos.
3:20	Initial settings for LRV navigational system	Stow sampler. Return core to LM. Get SEP.
3:30	SEP site traverse and layout	Prepare for SEP Transmitter deploy.
3:40	SEP Deploy Transmitter	SEP Deploy Transmitter.
3:50	Begin traverse activities	Begin traverse activities.

Table 4.—*Apollo Science Experiments*

The science experiments carried on each Apollo mission are more numerous and also more complex than those carried on each preceding Apollo mission. None of the Apollo 11 experiments is operating today (October 1972). About half of the Apollo 12 experiments still operate and all of the Apollo 14, 15, and 16 experiments are operating. We expect that many of the experiments will continue to send data to the Earth for several years.

Number	Experiment	Mission and landing site						
		A–11 Sea of Tranquility	A–12 Ocean of storms	A–13 Mission aborted	A–14 Fra Mauro	A–15 Hadley-Apennine	A–16 Descartes	A–17 Taurus-Littrow
	Orbital experiments							
S—158	Multi-Spectral Photography		X					
S—176	Cm Window Meteoroid				X	X	X	X
S—177	UV Photography—Earth and Moon					X	X	
S—178	Gegenschein from Lunar Orbit			X	X	X		
S—160	Gamma-Ray Spectrometer					X	X	
S—161	X-Ray Fluorescence					X	X	
S—162	Alpha Particle Spectrometer					X	X	
S—164	S-Band Transponder (CSM/LM)			X	X	X	X	X
S—164	S-Band Transponder (Subsatellite)					X	X	
S—165	Mass Spectrometer					X	X	
S—169	Far UV Spectrometer							X
S—170	Bistatic Radar			X	X	X	X	
S—171	IR Scanning Radiometer							X
S—173	Particle Shadows/Boundary Layer (Subsatellite).					X	X	
S—174	Magnetometer (Subsatellite)					X	X	
S—209	Lunar Sounder							X
	Surface experiments							
S—031	Passive Seismic	X	X	X	X	X	X	
S—033	Active Seismic				X		X	
S—034	Lunar Surface Magnetometer		X			X	X	
S—035	Solar Wind Spectrometer		X			X		
S—036	Suprathermal Ion Detector		X		X	X		
S—037	Heat Flow			X		X	X	X
S—038	Charged Particle Lunar Env			X	X			
S—058	Cold Cathode Ion Gauge		X		X	X		
S—059	Lunar Field Geology	X	X	X	X	X	X	X
S—078	Laser Ranging Retro-Reflector	X			X	X		
S—080	Solar Wind Composition	X	X	X	X	X	X	
S—151	Cosmic-Ray Detection (Helmets)	X						
S—152	Cosmic Ray Detector (Sheets)						X	
S—184	Lunar Surface Closeup Photography		X	X				
S—198	Portable Magnetometer				X		X	
S—199	Lunar Gravity Traverse							X
S—200	Soil Mechanics				X	X	X	X
S—201	Far UV Camera/Spectroscope						X	
S—202	Lunar Ejecta and Meteorites							X
S—203	Lunar Siesmic Profiling							X
S—204	Surface Electrical Properties							X
S—205	Lunar Atmospheric Composition							X
S—207	Lunar Surface Gravimeter							X
M—515	Lunar Dust Detector		X	X	X	X		
S—229	Lunar Neutron Probe							X

TABLE 5.—*Apollo Science Principal Investigators and Instrument Contractors*

Listed here are the principal investigators for all the scientific experiments that will have been done in the Apollo program when it ends in 1973. The principal investigator is the individual directly responsible for the scientific interpretation of the data obtained on each experiment. In most cases, he has the help of a team of experts in his field of science. Seldom before in the study of the science of either the Moon or the Earth has so much talent been brought to bear on the interpretation of an individual experiment.

Also listed are the instrument contractors. Only the prime contractors are shown. Many subcontractors from widely different geographic areas also contributed significantly toward the success of the new scientific discipline LUNAR SCIENCE.

There are also 189 principal investigators in the United States and 15 foreign countries who are carrying out researches on lunar samples. Because of the length of this list, their names could not be given here.

LUNAR SURFACE EXPERIMENTS

Experiment	Principal investigator	Instrument contractor
Lunar Passive Seismology	Dr. G. V. Latham, University of Texas, Galveston, Tex.	Bendix, Aerospace Division, Ann Arbor, Mich.
Lunar Active Seismology	Dr. R. L. Kovach, Department of Geophysics, Stanford University, Stanford, Calif. 94305	Bendix.
Lunar Tri-Axis Magnetometer	Dr. Palmer Dyal, Code N204-4, Ames Research Center, Moffett Field, Calif. 94034	Philco-Ford.
Solar Wind Spectrometer	Dr. C. W. Snyder, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, Calif. 91103	Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif.
Suprathermal Ion Detector	Dr. J. W. Freeman, Department of Space Science, Rice University, Houston, Tex. 77001	Time Zero Corp.
Lumar Heat Flow (with drill)	Dr. M. E. Langseth, Lamont-Doherty Geological Observatory, Columbia University, Palisades, N.Y. 10964	Columbia University, Arthur D. Little, Cambridge, Mass., Martin-Marietta, Denver, Colo.
Cold Cathode Ionization Gauge	Dr. F. S. Johnson, University of Texas at Dallas, Post Office Box 30365, Dallas, Tex. 75230	The Norton Co. Time Zero Corp.
Lunar Geology Investigation Apollo 11 and 12.	Dr. E. M. Shoemaker, California Institute of Technology, Pasadena, Calif. 91109	
Lunar Geology Investigation Apollo 14 and 15.	Dr. G. A. Swann, U.S. Geological Survey, Flagstaff, Ariz. 86001	
Lunar Geology Investigation Apollo 16 and 17.	Dr. W. R. Muehlberger, Geology Department, University of Texas, Austin, Tex. 78712.	
Laser Ranging Retro-Reflector	Dr. J. E. Faller, Wesleyan University, Middletown, Conn. 06457.	Bendix.
Solar Wind Composition	Dr. J. Geiss, University of Berne, Berne, Switzerland.	University of Berne, Berne, Switzerland
Cosmic Ray Detector (sheets)	Dr. R.L. Fleischer, General Physics Lab, G.E. R. & D. Center, Schenectady, N.Y. 12301	General Electric, R. & D. Center, Schenectady, N.Y.

TABLE 5.—*Apollo Science Principal Investigators and Instrument Contractors*—Continued

LUNAR SURFACE EXPERIMENTS

Experiment	Principal investigator	Instrument contractor
Portable Magnetometer	Dr. Palmer Dyal, Code N204-4. Ames Research Center, Moffett Field, Calif. 94034	Ames Research Center (in-house)
Lunar Traverse Gravimeter	Dr. M. Talwani. Lamont-Doherty Geological Observatory, Columbia University, Palisades, N.Y. 10946	Massachusetts Institute of Technology—Draper Laboratory
Lunar Seismic Profiling	Dr. R. L. Kovach. Department of Geophysics, Stanford University, Stanford, Calif. 94305	Bendix
Surface Electrical Properties	Dr. Gene Simmons. Massachusetts Institute of Technology, Building 54-314, Cambridge, Mass. 02139	Massachusetts Institute of Technology, Center for Space Research, Cambridge, Mass., and Raytheon, Sudbury, Mass.
Lunar Atmospheric Composition	Dr. J. H. Hoffman. Atmospheric & Space Sciences, University of Texas at Dallas, Post Office Box 30365, Dallas, Tex. 75230	Bendix and University of Texas at Dallas, Division of Atmospheric and Space Sciences, Post Office Box 30365, Dallas, Tex. 75230
Lunar Surface Gravimeter	Dr. Joseph Weber. Department of Physics and Astronomy, University of Maryland, College Park, Md. 20742	Bendix. LaCoste and Romberg, Austin, Tex.
Lunar Dust Detector	Mr. J. R. Bates, Code TD5. Manned Spacecraft Center, Houston, Tex. 77058	
Lunar Neutron Probe	Dr. D. S. Burnett. Division of Geology and Planetary Sciences, California Institute of Technology, Pasadena, Calif. 91109	California Institute of Technology, Pasadena, Calif. 91109, Manned Spacecraft Center, Houston, Tex. 77058
Soil Mechanics	Dr. James K. Mitchell. Department of Civil Engineering, University of California, Berkeley, Calif. 94720	
Far UV Camera/Spectroscope	Dr. G. Carruthers, Code 7124.3. U.S. Naval Research Laboratory, Washington, D.C. 20390	U.S. Naval Research Laboratory, Washington, D.C.
Gamma-Ray Spectrometer	Dr. J. R. Arnold. Chemistry Department, University of California-San Diego, La Jolla, Calif. 92037	Jet Propulsion Laboratory
X-Ray Fluorescence	Dr. Isidore Adler. Theoretical Studies Br., Code 641, Goddard Space Flight Center, Greenbelt, Md. 20771	American Science and Engineering, Inc., 11 Carleton St., Cambridge, Mass. 02142

TABLE 5.—*Apollo Science Principal Investigators and Instrument Contractors*—Continued

LUNAR SURFACE EXPERIMENTS

Experiment	Principal investigator	Instrument contractor
Alpha Particle Spectrometer	Dr. Paul Gorenstein American Science and Engineering, Inc., 11 Carleton St., Cambridge, Mass. 02142	American Science and Engineering, Inc.
S-Band Transponder (subsatellite) S-Band Transponder (CSM/LM)	Mr. W. L. Sjogren Mail Code 156–251, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, Calif. 91103	TRW Systems Group, One Space Park, Redondo Beach, Calif. 98278 (None for CSM/LM S-Band.)
Mass Spectrometer	Dr. J. H. Hoffman Atmospheric & Space Sciences, University of Texas at Dallas, Post Office Box 30365, Dallas, Tex. 75230	University of Texas at Dallas, Division of Atmospheric and Space Sciences, Post Office Box 30365, Dallas, Tex. 75230
Far UV Spectrometer	Mr. W. E. Fastie The Johns Hopkins University, Baltimore, Md. 21218	Applied Physics Laboratory, 8621 Georgia Ave., Silver Spring, Md. 20910
Bistatic Radar	Mr. H. T. Howard Stanford Electronics Laboratory, Stanford University, Stanford, Calif. 94305	
IR Scanning Radiometer	Dr. Frank J. Low Lunar and Planetary Laboratory, The University of Arizona, Tucson, Ariz. 85721	Barnes Engineering Co., Defense and Space Contracts Division, 44 Commerce Road, Stamford, Conn.
Particle Shadows/Boundary Layer (Subsatellite).	Dr. Kinsey A. Anderson Space Science Laboratory, University of California, Berkeley, Calif. 94726.	Analog Technology, 3410 East Foothill Boulevard, Pasadena, Calif. 91907. Subcontractor to TRW Systems Group.
Magnetometer (Subsatellite)	Dr. Paul J. Coleman, Jr Department of Planetary & Space Science, UCLA, Los Angeles, Calif. 90024.	Time Zero Corp., 3530 Torrance Boulevard, Torrance, Calif. 90503. Subcontractor to TRW Systems Group.
Lunar Sounder	Dr. Stanley H. Ward Department of Geological and Geophysical Sciences, Room 30 Mines Building, University of Utah, Salt Lake City, Utah. Mr. Walter E. Brown, Jr Mail Code 183–701, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, Calif, 91103	
SM Orbital Photographic Tasks 24-Inch Panoramic Camera.	CSM "Photo Team"* Mr. F. J. Doyle, Chairman Topographic Division, U.S. Geological Survey, 1340 Old Chainbridge Road, McLean, Va. 22101.	Itek Corp., 10 Maguire Road, Lexington, Mass. 02173.
SM Orbital Photographic Tasks, 3-Inch Mapping Camera, 3-Inch Stellar Camera.	CSM "Photo Team"* Mr. F. J. Doyle, chairman.	Fairchild Camera and Instrument Corp., 300 Robbins Lane, Syosset, Long Island, N.Y. 11791

TABLE 5.—*Apollo Science Principal Investigators and Instrument Contractors*—Continued

LUNAR SURFACE EXPERIMENTS

Experiment	Principal investigator	Instrument contractor
SM Orbital Photographic Tasks, Laser Altimeter.	CSM "Photo Team"* Mr. F. J. Doyle, chairman	RCA Aerospace Systems Division, Post Office Box 588, Burlington, Mass. 01801
CM Visual Observations	Dr. Farouk El Baz Code MAS, NASA Headquarters, Washington, D.C. 20546	
Apollo Window Meteoroid	Mr. B. G. Cour-Palais/TN61. NASA Manned Spacecraft Center, Houston, Tex. 77058	
UV Photography Earth and Moon Uses CM electric Hasselblad camera with specified lens and filters.	Dr. Tobias C. Owen Department of Earth and Space Sciences, The State University of New York, Stony Brook, N.Y. 11790	
Gegenschein from Lunar Orbit Uses CM 35-mm. Nikon camera.	Mr. Lawrence Dunkelman, Code 613. 3. Goddard Space Flight Center, Greenbelt, Md. 20771	
CM Photographic Tasks Uses standard CM facility camera.	CSM "Photo Team" * Mr. F. J. Doyle, chairman.	

*The cameras flown in the Command and Service Modules are considered to be facility equipment, and have no principal investigator *per se*. The Photographic Team, headed by Mr. F. J. Doyle, fills the principal investigator role in preflight development and flight planning activities. There are many investigators who do scientific analysis of the facility data from the cameras and laser, and these data will continue to be available for study in the future by more scientists. As in the case of scientists who perform analysis on lunar samples, they are too numerous to list here.

TABLE 6.—*Scientific Equipment Suppliers*

The companies that built scientific equipment for the Apollo program, including 11 through 17, are shown here. Clearly, I could not list every company that produced a small screw; there would be too many. So I have chosen to list those companies, or governmental agencies, that contributed significantly to the design, building, etc., of hardware.

Company	Address	Responsibility
Motorola, Inc., Govt. Elec. Div	Scottsdale, Ariz	Command Receiver, ALSEP Control Data System
U.S. Geological Survey	Flagstaff, Ariz	Lunar Geology Investigation
Murdock Engineering	Los Angeles, Calif	Penetrometer
Ames Research Center	Moffett Field, Calif	Lunar Portable Magnetometer and Lunar Surface Magnetometer
Analog Technology Corporation	Pasadena, Calif	Particle Shadows/Boundary Layer (Subsatellite), Particles Experiment Subsystem, and Gamma Ray Spectrometer
California Institute of Technology	Pasadena, Calif	Neutron Flux Gradient Experiment
Electro-Optical Systems, Inc	Pasadena, Calif	Design and fabrication of electronics and packaging, ALSEP Solar Wind Spectrometer
Jet Propulsion Laboratory	Pasadena, Calif	Gamma Ray Spectrometer, and Medium Energy Solar Wind
North American Rockwell	Downey, Calif	Lunar Sounder
Philco	Palo Alto, Calif	Lunar Tri-Axis Magnetometer
Space Ordnance Systems, Inc	Saugus, Calif	Grenade Launcher, Subsystem of ASE
Stanford Electronic Laboratory, Stanford University	Standord, Calif	Bistatic Radar
Time Zero Corporation	Torrance, Calif	Magnetometer (Subsatellite), Suprathermal Ion Detector, and Electronics Subsystem of LEAM
TRW Systems Group	Redondo Beach, Calif	S-Band Transponder (Subsatellite and CSM/LM), and SS Particle Boundary Layer
University of California at Berkeley	Berkeley, Calif	Cosmic Ray PI Support
Velonex, Inc	Santa Clara, Calif	High Voltage Power Supply, Lunar Surface Ultraviolet Camera/Spectrograph
Martin Marietta Corporation	Denver, Colo	Apollo Lunar Surface Drill (ALSD)
Barnes Engineering Co	Stamford, Conn	IR Scanning Radiometer
Chicago-Latrobe Co	Chicago, Ill	Core stems, core and bore bits, Apollo Lunar Surface Drill
Applied Physics Laboratory	Silver Spring, Md	FAR UV Spectrometer
Black and Decker Manufacturing Co	Towson, Md	Powerhead, Apollo Lunar Surface Drill
Westinghouse Electric Corp	Baltimore, Md	CM Color TV Camera
American Science & Engineering, Inc	Cambridge, Mass	Alpha Particle Spectrometer, and X-Ray Fluorescence
ITEK Corp	Lexington, Mass	24-Inch Panoramic Camera
Arthur D. Little, Inc	Cambridge, Mass	Heat Flow Probes, Surface Electrical Properties, Boron Filament/Glass Epoxy-bore stems, Apollo Lunar Surface Drill, and LSG Thermal Subsystem
Littleton Research & Engineering Corp	Littleton, Mass	Assist in structural verification of hardware
Massachusetts Institute of Technology—Draper Laboratory	Cambridge, Mass	Lunar Traverse Gravimeter
Massachusetts Institute of Technology—Center for Space Research Geophysics	Cambridge, Mass	Surface Electrical Properties
RCA Aerospace Systems Division	Burlington, Mass	Laser Altimeter
David Clark Co	Worcester, Mass	Communication Carriers (Com-caps)
Raytheon Co	Sudbury, Mass	Surface Electrical Properties
Bendix Corp	Ann Arbor, Mich	ALSEP
Rosemont Engineering Co	Minneapolis, Minn	Platinum Sensors
Eagle-Picher Ind., Electric Division	Joplin, Mo	Battery housing and attachment design
Washington University at St. Louis	St. Louis, Mo	Cosmic Ray PI Support and Equipment Construction
The Singer Co., Kearfott Division	Little Falls, N.J	Pendulous Vertical Sensors

TABLE 6.—*Scientific Equipment Suppliers—Continued*

Company	Address	Responsibility
Paillard	Sinden, N.J	Hasselblad Cameras and Equipment
RCA—Astro Electronics Div	Princeton, N.J	Ground Commanded Color TV
RCA—Government Systems	Camden, N.J	EVA Communications Systems and Lunar Communications Relay Unit (LCRU)
Atomic Energy Commission	Albuquerque, N. Mex	Radioisotope Thermoelectric Generator (RTG)
Bulova Watch Co., Inc., Systems & Instrument Division	Valley Stream, N.Y	LSP Timers
Fairchild Camera and Instrument Corp	Syosset, Long Island, N.Y	3-Inch Mapping Camera
General Electric R. & D. Center	Schenectady, N.Y	Cosmic Ray Detector (Sheets)
Norton Research Corp	Merrick, N.Y	Cold Cathode Gauge
Yardney Electric Corp	New York, N.Y	Silver Zinc Battery Apollo Lunar Surface Drill
Maurer	Long Island, N.Y	16 mm Camera System
Research Foundation of NY	Albany, N.Y	PI Support for UV Photography
Naval Research Laboratory	Washington, D.C	FAR UV Camera/Spectroscope
Hershaw Chemical Co	Solon, Ohio	Inorganic scintillator assembly—Gamma Ray spectrometer
General Electric	Valley Forge, Pa	Equipment design and construction Cosmic Ray Detector (sheets)
Radio Corporation of America	Lancaster, Pa	Photomultiplier tubes—Gamma Ray Spectrometer
Three-B Optical Co	Gibsonia, Pa	Schmidt optics for Lunar Surface Ultraviolet Camera
Union Carbide Corp	Oak Ridge, Tenn	Sample Return Containers (SRC's)
LaCoste & Romberg	Austin, Tex	Sensor for LSG
Manned Spacecraft Center	Houston, Tex	Lunar Dust Detector, Cold Cathode Ionization Gauge, and Soil Mechanics
Rice University	Houston, Tex	Suprathermal Ion Detector
Teledyne Industries Goetech Division	Garland, Tex	Seismic Detection Subsystem of ASE
University of Texas at Dallas	Dallas, Tex	Mass Spectrometer and Atmospheric Composition
University of Berne	Berne, Switzerland	Solar Wind Composition.

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