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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

* (FOR ALL LAUNCH DATES)

APOLLO 17

FINAL

LUNAR SURFACE PROCEDURES

VOL. 1: NOMINAL PLANS

PREPARED BY

EVA AND EXPERIMENTS BRANCH
CREW PROCEDURES DIVISION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NOVEMBER 6, 1972

FINAL

APOLLO 17

LUNAR SURFACE PROCEDURES

VOL. 1: NOMINAL PLANS

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APOLLO 17

LUNAR SURFACE PROCEDURES

VOL. I: Nominal Plans

FINAL

PREFACE

This document has been prepared by the Crew Procedures Division, Flight Crew Operations Directorate, Manned Spacecraft Center, Houston, Texas and by General Electric, Apollo and Ground Systems, Houston Programs. The information contained herein represents Lunar Surface Procedures for Apollo 17 Mission J-3, the seventh manned lunar landing mission. The final document consists of two parts: Vol. 1 - Nominal Plans; Vol. 2 - Contingency Plans.

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ACKNOWLEDGEMENT

Much of the geological data and traverse planning material in this document was prepared by the Operation Analysis Branch of the Systems Engineering Division, Apollo Spacecraft Program Office, and was distributed under separate cover as "Apollo 17 Traverse Planning Data." All procedures and planning data for lunar surface operations are superceded by this document.

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1.0 INTRODUCTION

1.0 INTRODUCTION

This Final Apollo 17 Lunar Surface Procedures Document is used to document the planning for lunar surface EVA operations on Mission J-3, to describe the crew equipment interface, and to document the manner in which the lunar surface mission requirements are to be implemented.

The nominal plan includes three two-man EVA periods during the 75 hour stay of the LM vehicle on the lunar surface. The first, second and third EVA's are each planned for seven hours of activity from depressurization to repressurization of the LM.

EMU operations and procedures (including contingency) are covered in the EMU AOH, Reference 6.

Photographic and TV camera operations are integrated herein in a summary manner.

This document contains summary and detailed timeline and procedures data. The voice data plan and copies of the crew's cuff checklist are included. The summary timelines are essentially a task flow analysis along a time base showing coincident activities and points of interaction between crewmen. The detailed timeline procedures simply list in the sequence of performance, the steps required to carry out each of the tasks identified in the summary timeline. It is in the detailed timeline procedures that the crew/equipment interfaces are revealed. Both the summary and detailed timeline procedures present the CDR's and the LMP's task side-by-side to minimize the confusion as to which crewman is doing what and to show how they cooperate in the lunar surface operations. The voice data plan is provided coincident with the detailed timeline procedures as a device by which cap-com (capsule communicator) is able to keep abreast of the crew's activities and to provide cap-com with cues, data and data recording points with which to provide realtime assistance to the lunar surface crew during the EVA activities. The crew's cuff checklists are included for information only, showing the procedural cues the crew have at their fingertips.

The procedures herein are responsive to the Mission Requirements for SA-512/CSM-114/LM-12 J-3 Type Mission currently in effect as of the date of this document.

2.0 MISSION DESCRIPTION

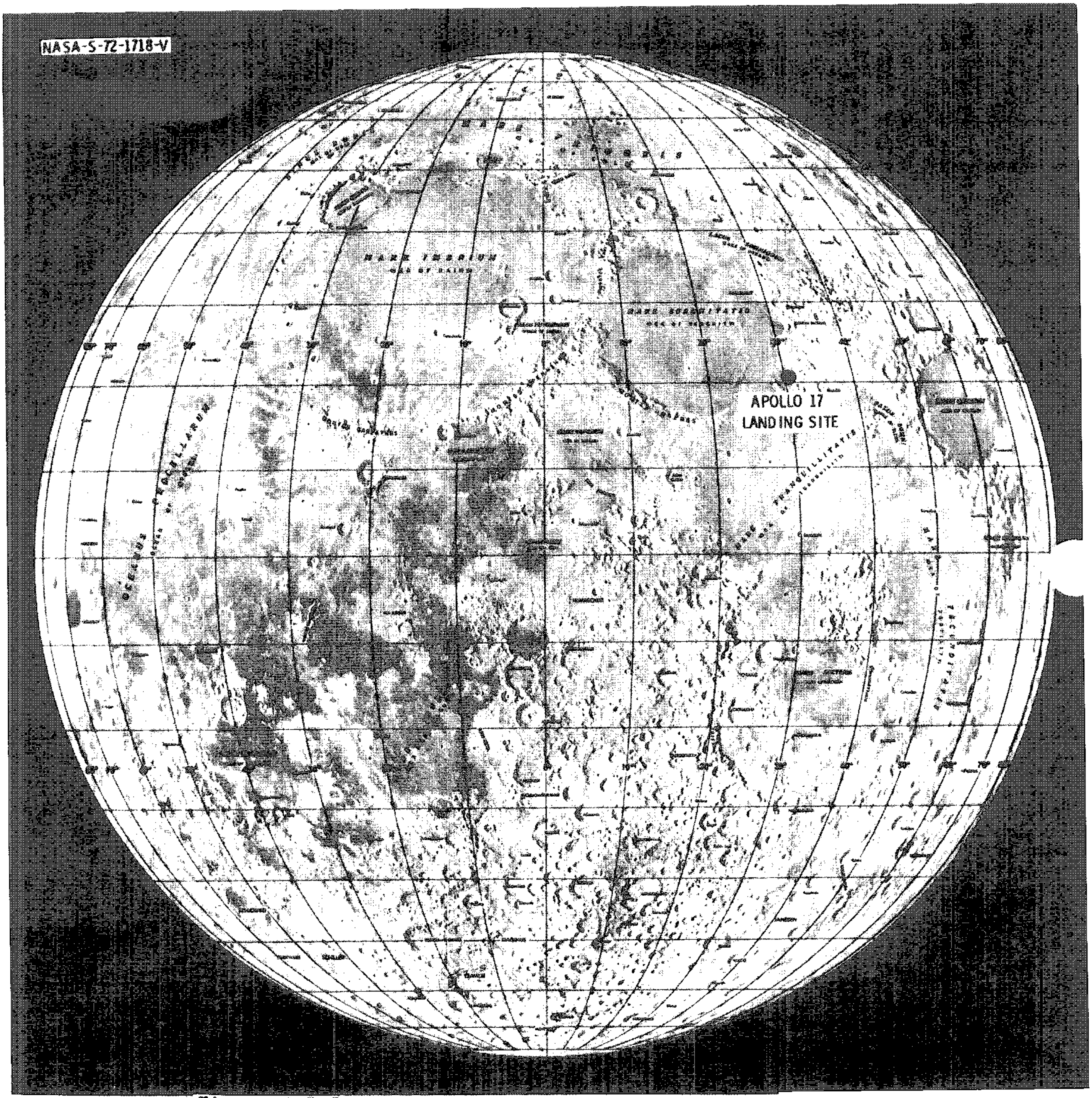

Figure 2.1-1 Whole moon view showing Apollo 17 landing site: 20 09'50"N. 30 44'58"E.

2.0 MISSION DESCRIPTION

2.1 LANDING SITE

The description of the Taurus Littrow site has been developed by a number of sources: notably, the Field Geology Experiment Team, various individuals in the Science and Applications Directorate, the Operations Analysis Branch of ASPO, and the Experiments Branch of Flight Control Division. Special acknowledgement is made to Drs. V. L. Freeman, J. W. Head, W. R. Muehlberger, and E. W. Wolfe who prepared the material on the geologic objectives of the mission, and the discussion of the Taurus-Littrow geologic setting.

2.1.1 Geographic Setting - The Taurus-Littrow region is located in the northeast quadrant of the moon (Figure 2.1-1), in the mountainous region of the southeastern rim of the Serenitatis basin, approximately 750 km east of the Apollo 15 site (Figure 2.1-2). The site name is derived from the Taurus Mountains, which lie to the north and northeast of the site forming a mountainous plateau at the eastern edge of Serenitatis between Posidonius and Macrobius, and from Littrow, an old 30 km highland crater which lies approximately 35 km north of the landing site. This area is well illustrated in Figure 2.1-3, an Apollo 15 metric camera oblique, a view of the Taurus-Littrow area from south of the landing site. Posidonius is the large crater in the upper left near the horizon, Mare Serenitatis is the dark region along the left margin, and the crater Littrow lies in the left-center, just north of the landing site. Macrobius is off the picture to the west and the relatively fresh large crater in the upper right is Romer. Figure 2.1-4 shows the map location of this region.

Approach and Landing - The approach to the landing point is from due east over a set of the sculptured hills which rise about 1-1/2 km above the plains. At the point where the descent trajectory passes over the hills, the terrain is about 750 meters above the landing site, the spacecraft clears the local terrain by about 3000 meters.

Figures 2.1-5 and 1-6 show two oblique views of the landing area and approach path. In Figure 2.1-6, South Massif is just out of view on the left margin but the light mantled material of the debris slide can be seen just downrange from the landing point.

Figure 2.1-7 shows a closer view of the landing area with the landing dispersion ellipse superimposed. Coordinates of the target point are as follows: longitude 30° 44' 58.3" E, latitude 20° 09' 50.5" N, radius 1,734,484 meters based on analytical triangulation of Apollo 15 photography.

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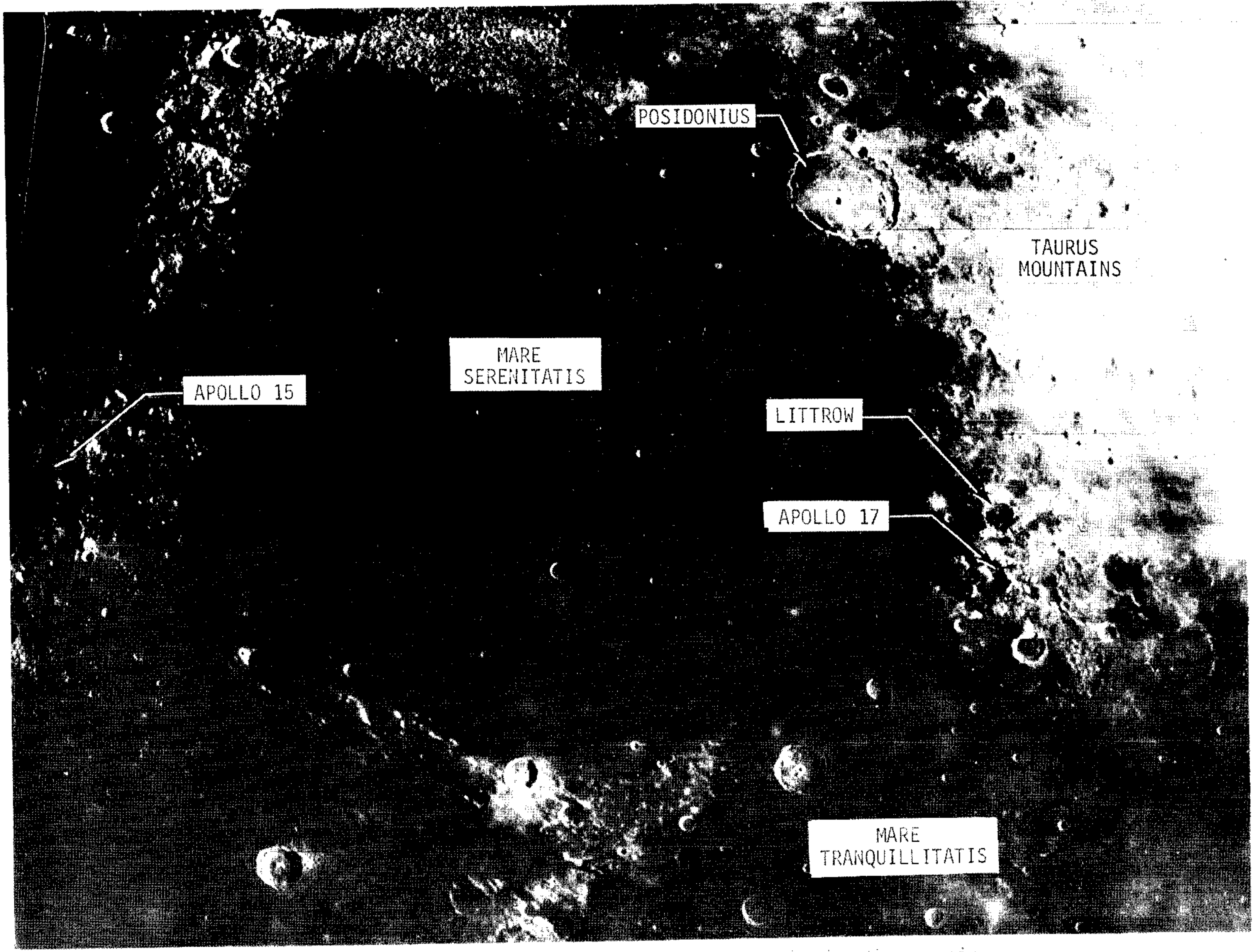

Figure 2.1-2 [illegible] of Apollo 17 landing region.

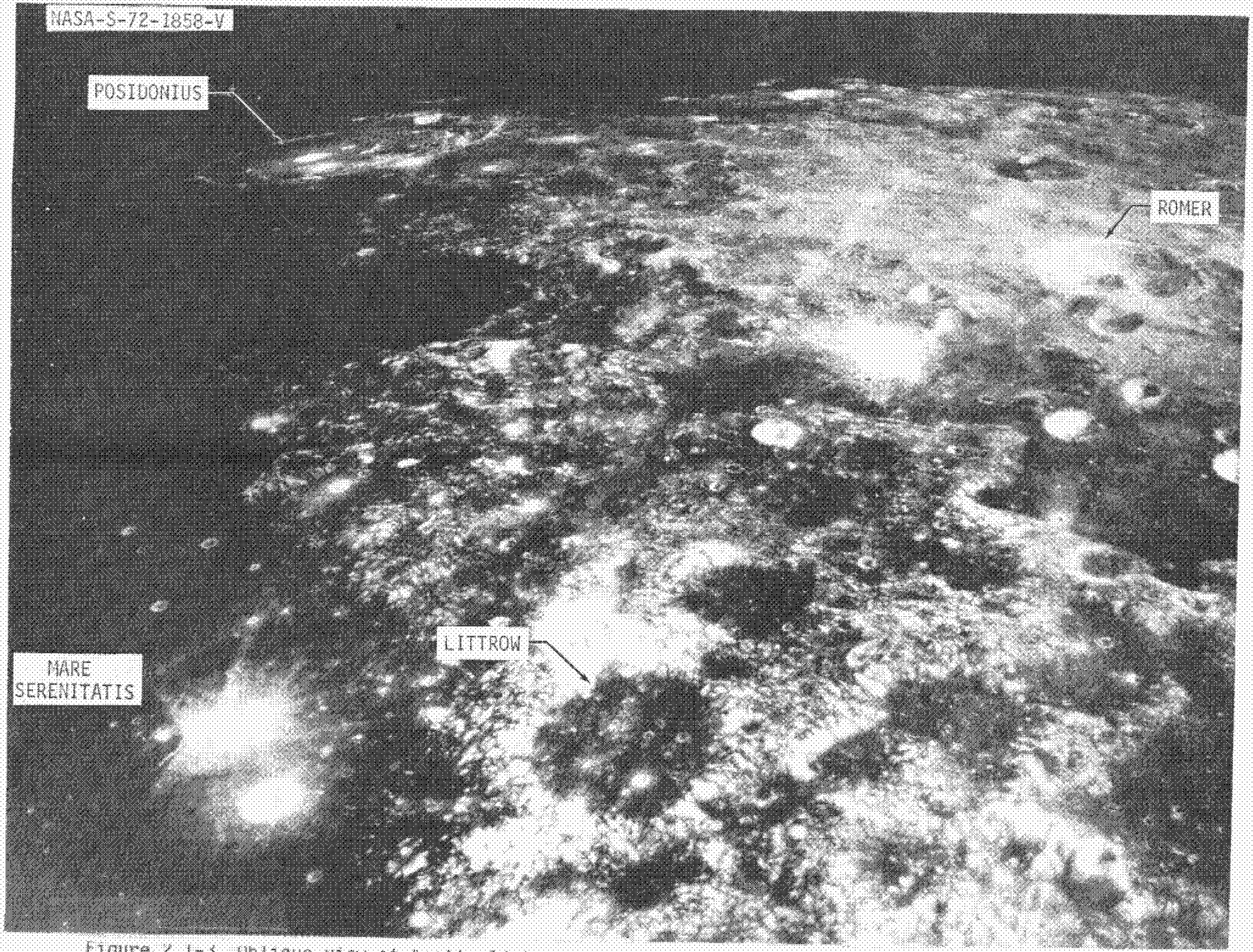

Figure 2.1-3 Oblique view of Apollo 17 landing region as seen by Apollo 15 mapping camera. The landing site itself is off the picture just below the center margin.

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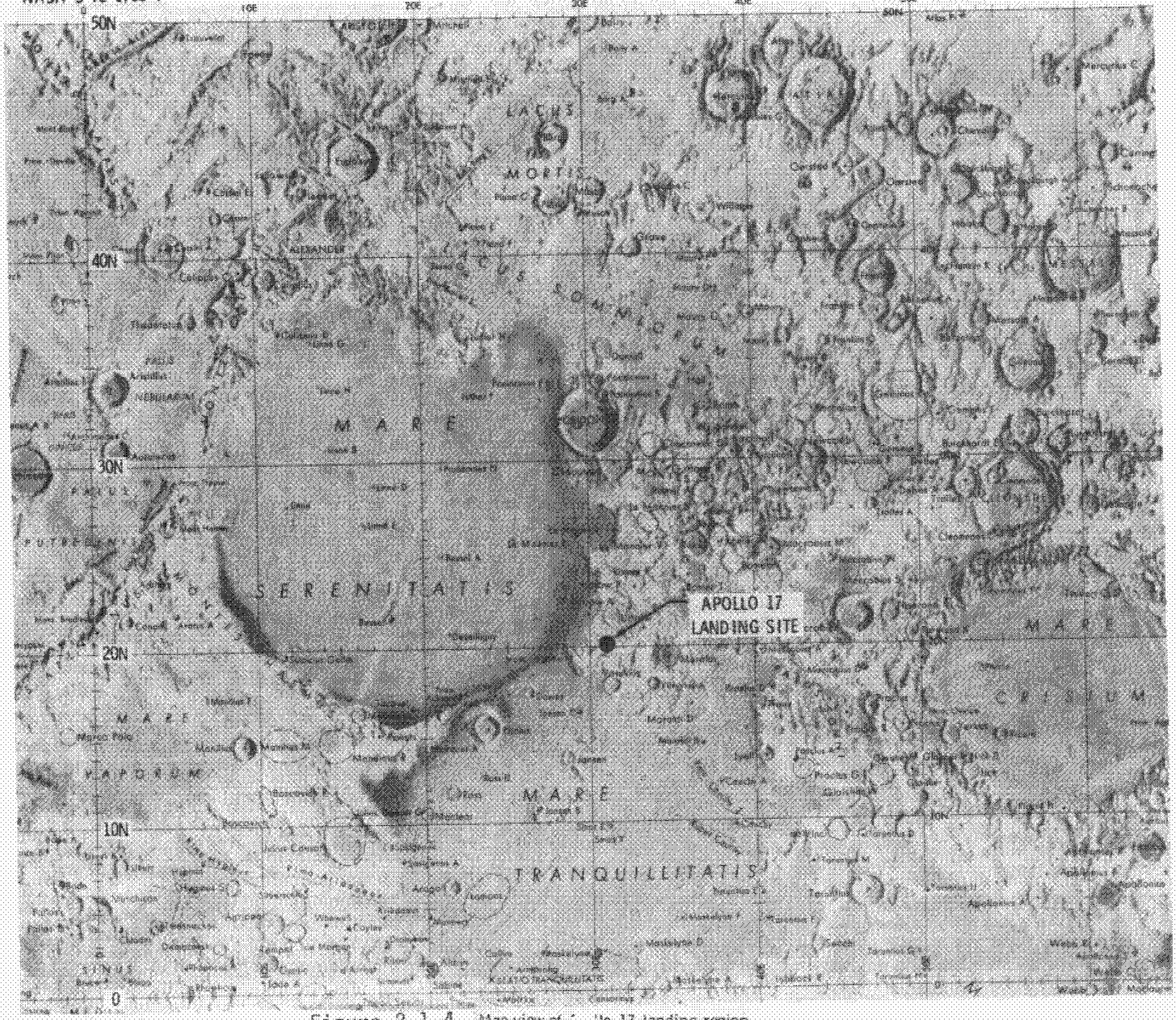

Figure 2.1-4 Map view of ' 'lo 17 landing region.

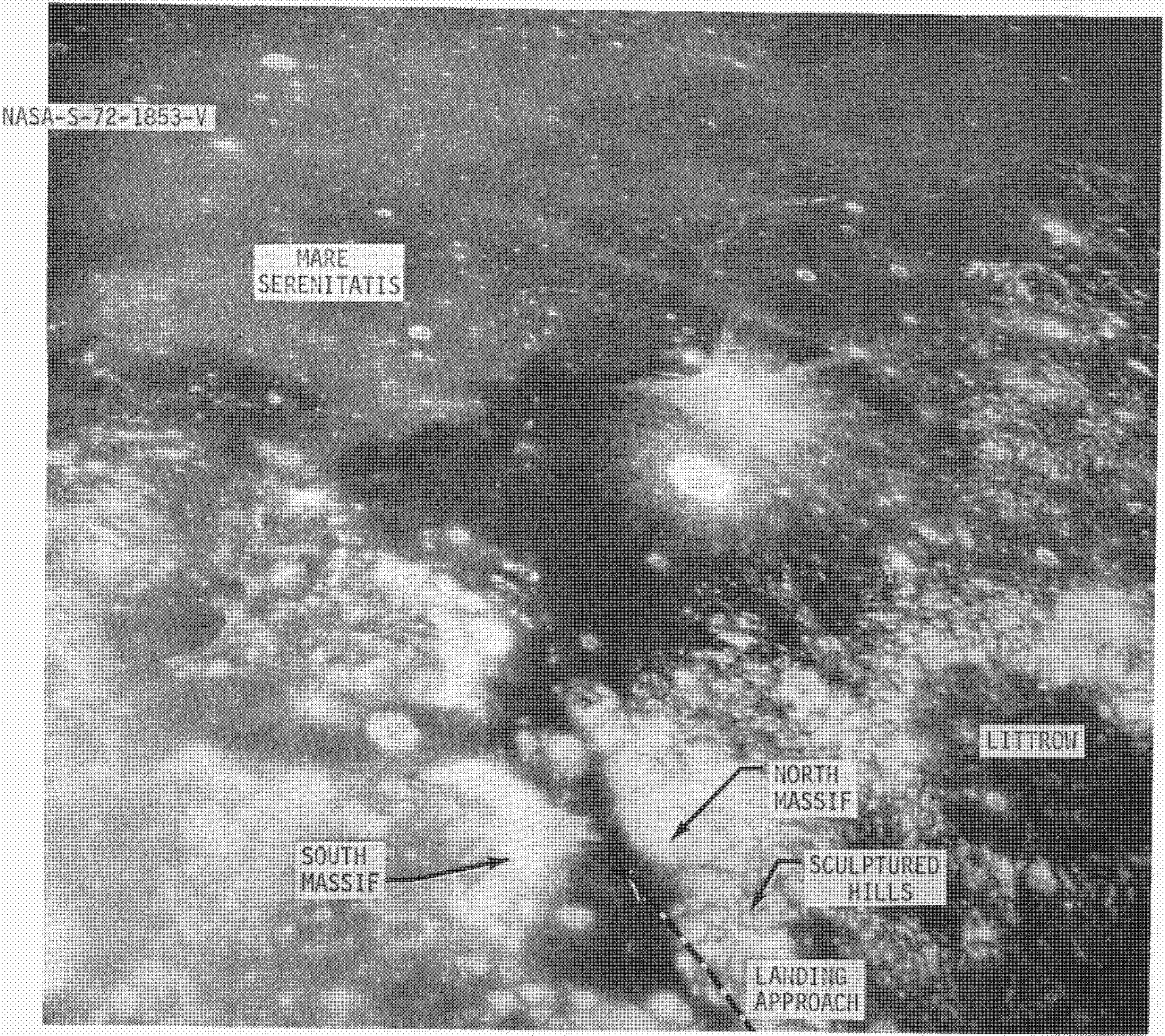

FIGURE 2.1-5 Apollo 15 oblique view of Taurus-Littrow area.

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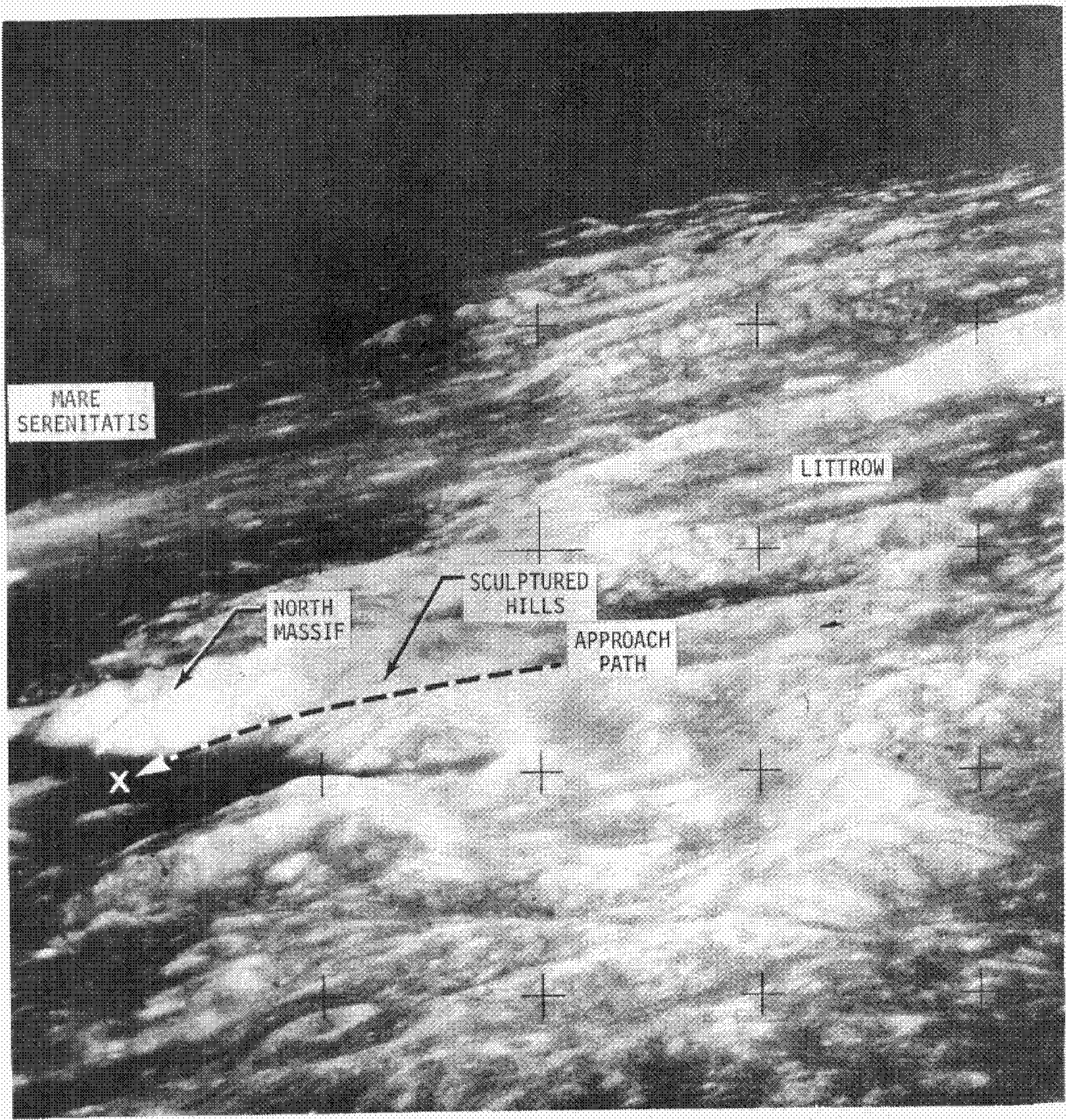

Figure 2.1-6 Apollo 15 oblique view looking northwest at the Taurus-Littrow area.

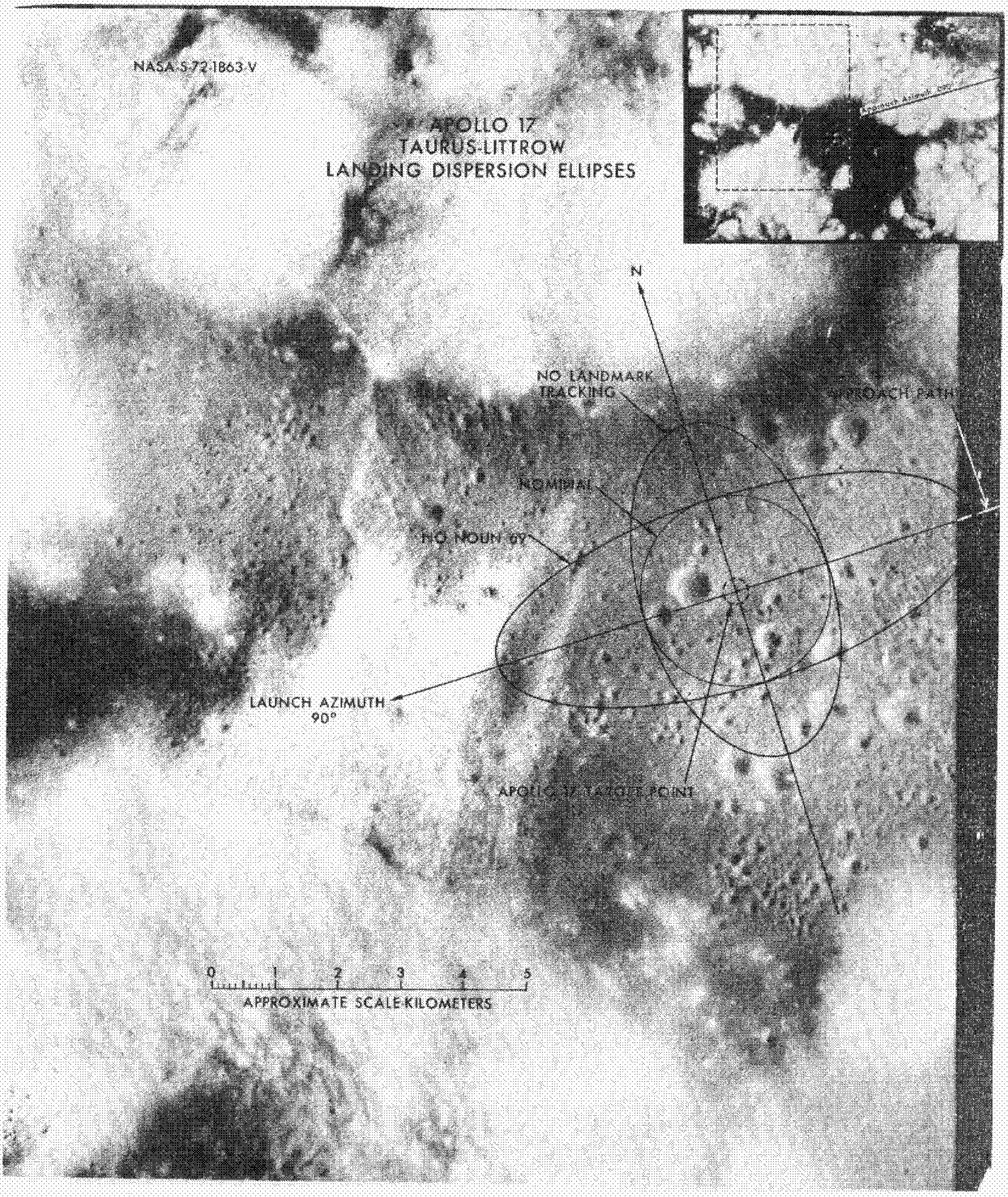

Figure 2.1-7 Landing approach and landing dispersion ellipse.

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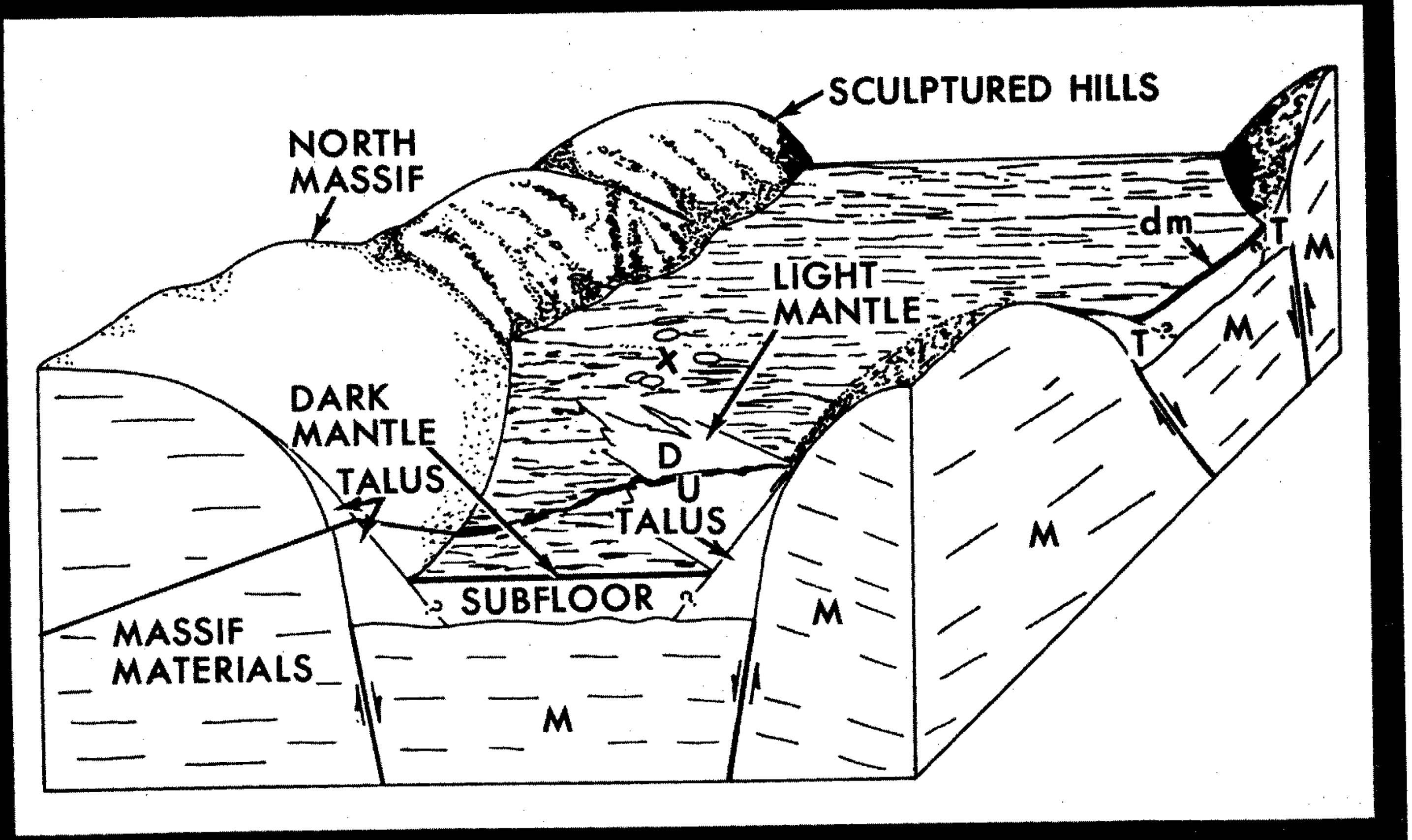
SCHEMATIC VIEW OF TAURUS-LITTROW LANDING REGION



x NORMAL LANDING SITE
VERTICAL EXAGGERATION ABOUT 2.5

Figure 2.1-8 Schematic view of Taurus-Littrow landing and traverse region looking east-southeast. X is nominal landing site.

2.1.2 Geologic Setting

General - The Taurus Mountains and associated highlands form the eastern uplifted edge of the Serenitatis basin, one of the moon's large multiringed basins. The bulk of this region probably consists of highland material uplifted to its present position at the time of formation of the Serenitatis basin. The landing point itself is on the floor of a flat-floored trough(Figure 2.1-8)whose subsurface is thought to consist of highlands material down-dropped by graben formation and partially buried by younger basin-filling plains materials. The valley floor, as well as portions of the upland area, is covered by a fine dark mantle that may be composed of volcanic fragments. The regional distribution of the dark mantle material is well illustrated in Figure 2.1-9, an earth-based telescopic view of the Serenitatis and Taurus-Littrow region.

Figure 2.1-10 is an Apollo 15 photograph looking south toward the Apollo 17 landing site at the edge of Mare Serenitatis (on the right). Several of the linear rilles so characterisitic of basin margins are seen in the center. The large crater in the center is Littrow B. The South Massif appears just at the upper tip of the RCS engine nozzle and the top of the North Massif just below that. The dark mantle is readily visible south of Littrow and around the massifs. Plains units and low highlands are seen in the foreground.

Geology of the landing area - The local setting of the landing site is shown in Figure 2.1-11 and 2.1-12 and the distribution of major geologic units is shown on Figure 2.1-13, a geologic map which covers approximately the same area as Figure 2.1-12.

Massif Material - Massif material forms the high, steep, relatively blocky mountain face immediately north and southwest of the landing point. The distinctive nature of the massifs is illustrated in Figure 14 which shows them grouped on the horizon in a view looking south. South Massif is indicated by the arrow. The materials of the massifs probably consist of breccia formed during impacts that created some of the major mare basins. Significant contributions of ejecta may have come from Tranquillitatis, Serenitatis, Nectaris, Crisium, and Imbrium (listed in order of decreasing age). These ejecta deposits probably overlie still older ejecta from earlier impact basins. Accordingly, the age of the massif material is regarded as Imbrian and pre-Imbrian. Faults bounding the massifs may have originated in the Serenitatis event. However, the sharp definition of the massif boundaries suggests that subsequent structural adjustments have occured.

A possible alternative interpretation is that the North and South Massifs are volcanic in origin. Their very steep faces and arcuate convex-outward shapes (Figure 2.1-12) are similar to shapes common in terrestrial volcanic domes on earth and thus they could be extrusive volcanic constructs.

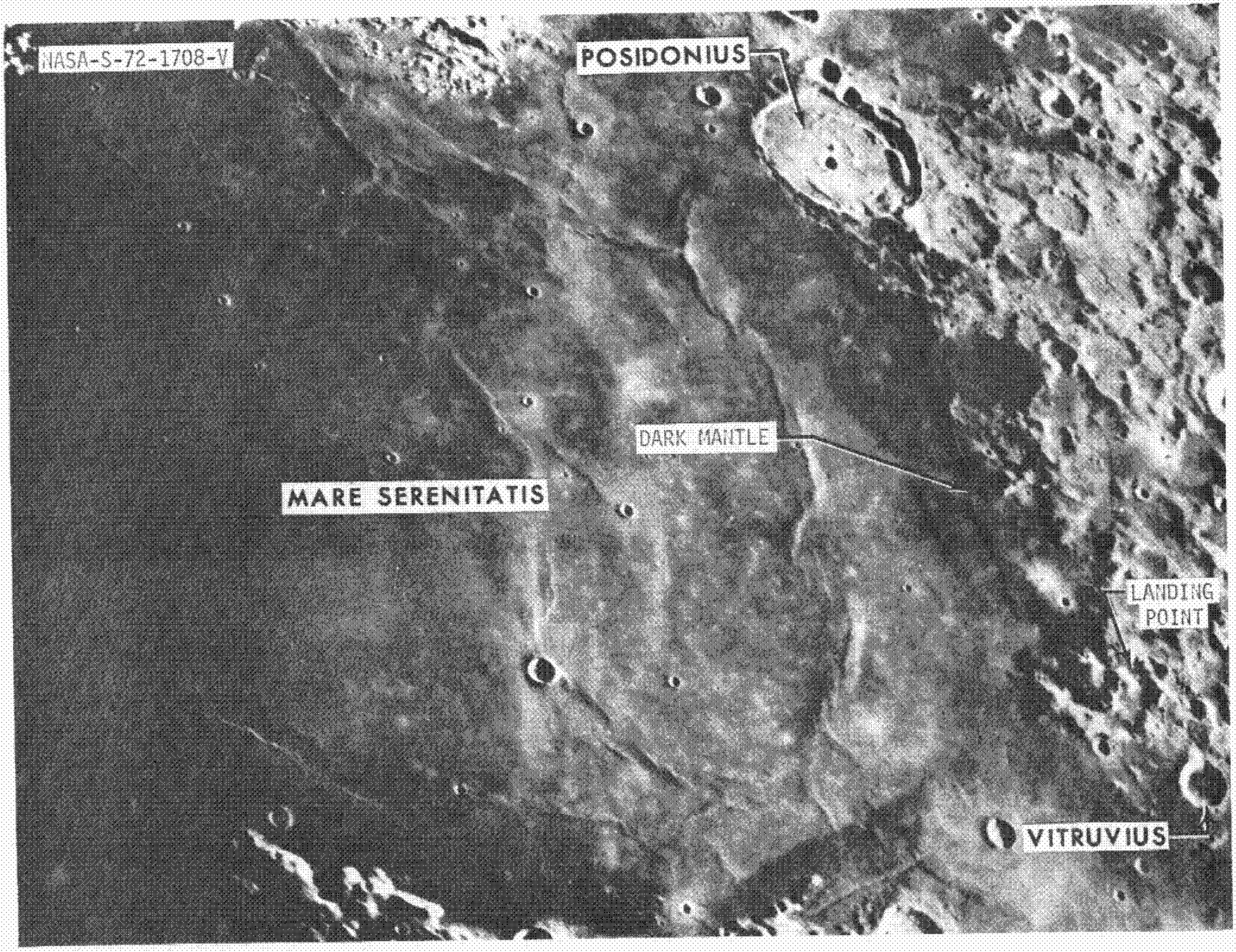


Figure 2.1-9A- Earth-based telescopic view of Apollo 17 landing region.

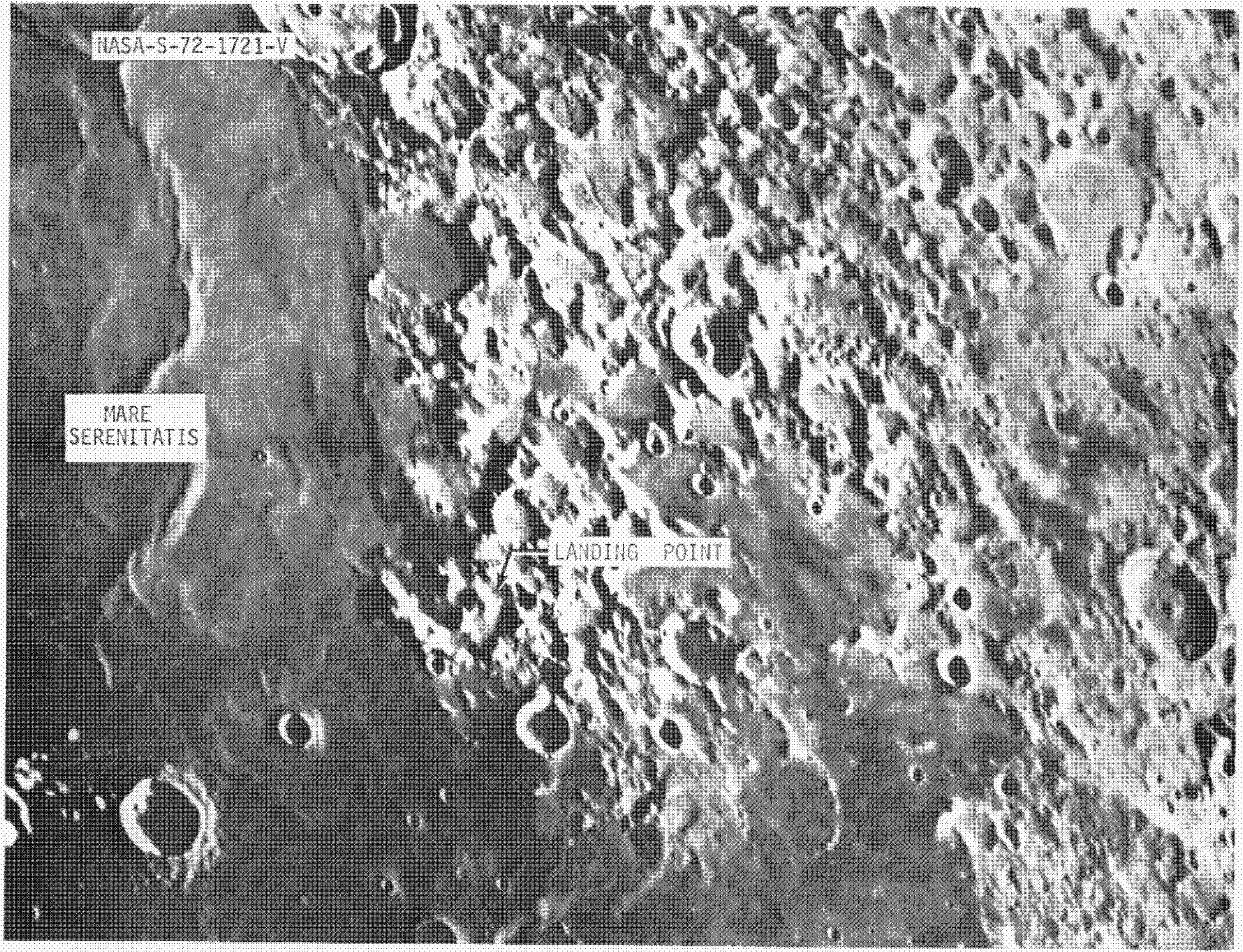


Figure 2.1-9B- Earth-based telescopic view of Apollo 17 landing region.

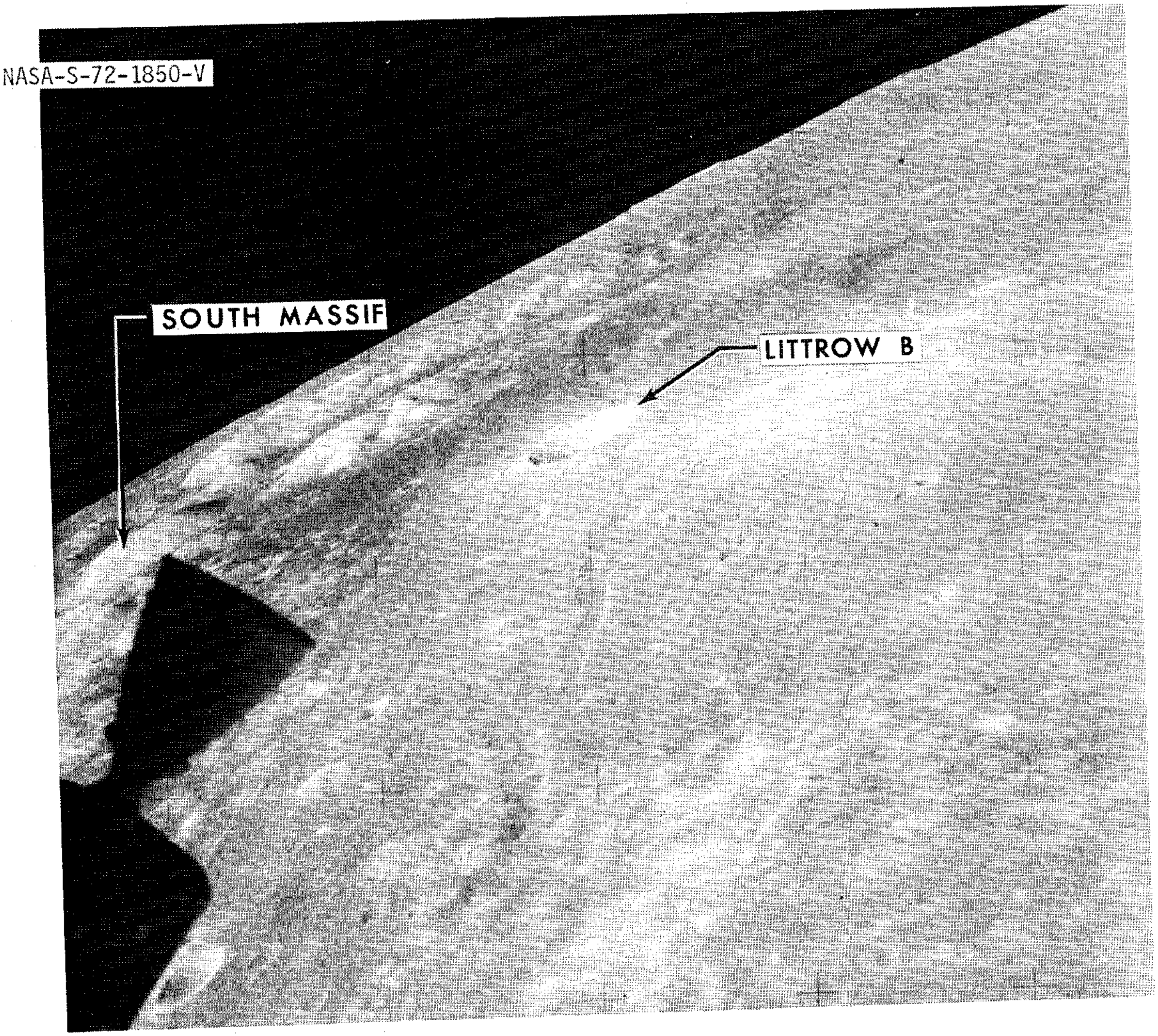


Figure 2.1-10 Southerly-looking oblique view of Apollo 17 landing region taken from Apollo 15.

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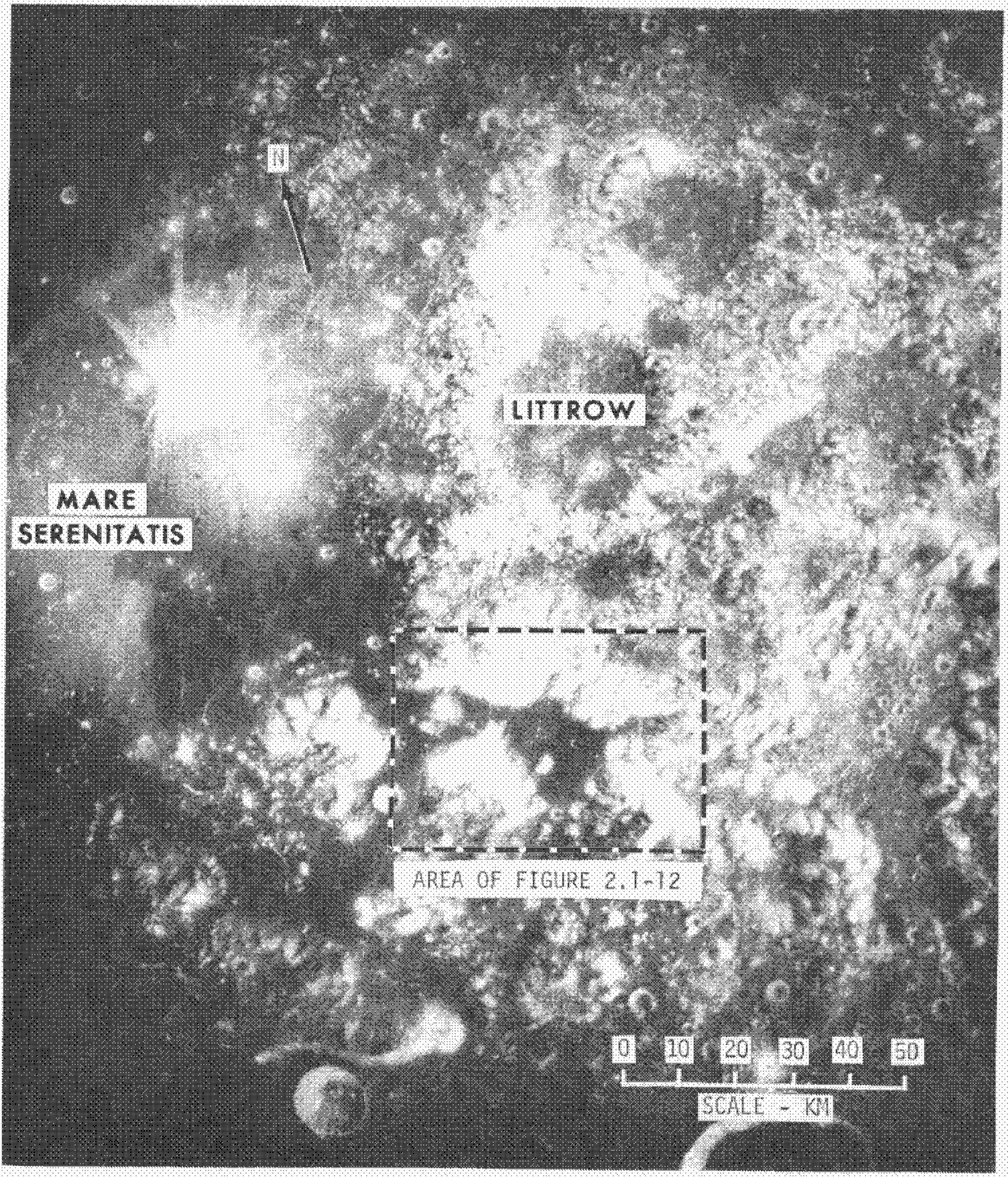

Figure 2.1-11 Apollo 15 mapping camera view of Apollo 17 landing area.

Figure 2.1-12 Enlargement of mapping camera view of Apollo 17 landing area and traverse area

Sculptured Hills Material - The sculptured hills unit, characterized by the occurrence of closely spaced domical hills (Figure 2.1-11) is widespread in the highlands between Serenitatis and Crisium. It is within traverse range northeast of the landing point (Figure 2.1-12, -13). Because of its occurrence in the walls and rims of old craters (e.g., Littrow), (Figure 2.1-11) the sculpturing may be interpreted as an erosional of highlands material degradation controlled by pre-existing sets of fractures. Accordingly, the sculptured hills unit may be similar in composition and different only in structural history from the massifs or it may differ in composition so as to have responded differently to deformational stress. The lack of resolvable blocks at the bases of slopes in the sculptured hills compared with their relative abundance at the bases of massif slopes supports the hypothesis of compositional difference. The sculptured hills probably consist of ejecta of Imbrian and pre-Imbrian ages, but, again, they have some characteristics suggestive of volcanic origin.

Low Hills Material - Low hills material occurs in discontinuous patches adjacent to massif and sculptured hills materials where they border the plains (Figure 2.1-11). The low hills are most likely the tops of downfaulted blocks of massif or sculptured hills material that protrude slightly above the general plains surface (Figures 2.1-8, -11). In addition, they may include materials derived from the adjacent uplands by mass wasting.

Plains Material* - The relative evenness of the valley floor at the landing site suggests that a basin-filling unit (plains material) that apparently submerged all but the highest projections of hill-forming material was emplaced after formation of the trough (Figure 2.1-8). Such fill might consist of volcanic flows, colluvium derived from the adjacent uplands, or sheets of breccia. Similar materials may fill nearby upland basins (e.g., Littrow) or may underlie the topographic bench around the east edge of the Serenitatis basin. Plains material is presumably exposed in the bright walls of the craters on the plains. The abundance of blocks in the crater walls and on their rims indicates that the plains material is either indurated or contains large indurated blocks. The large craters may penetrate through the plains material into the underlying massif or hills units, which may be represented in their ejecta. Plains material appears to be younger than the bulk of the massif and the hill materials and is probably older than youngest mare fill of the Serenitatis basin. Hence an age of Imbrian or pre-Imbrian is inferred for the plains material.

Dark Mantle Material - Dark, presumably unconsolidated material with no resolvable blocks (i.e., no blocks larger than 2 meters in diameter) occurs as a blanket a few meters to tens of meters thick on the plains surface and on the floors of nearby upland basins (Figure 2.1-9). It is discontinuous on sloping upland surfaces and on the steep walls of pre-existing craters (Figure 2.1-16). Low reflectivity

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* Or, better, "sub-floor material" to avoid confusion with the more familiar usage of "plain" meaning the valley floor independent of any stratigraphic connotation.

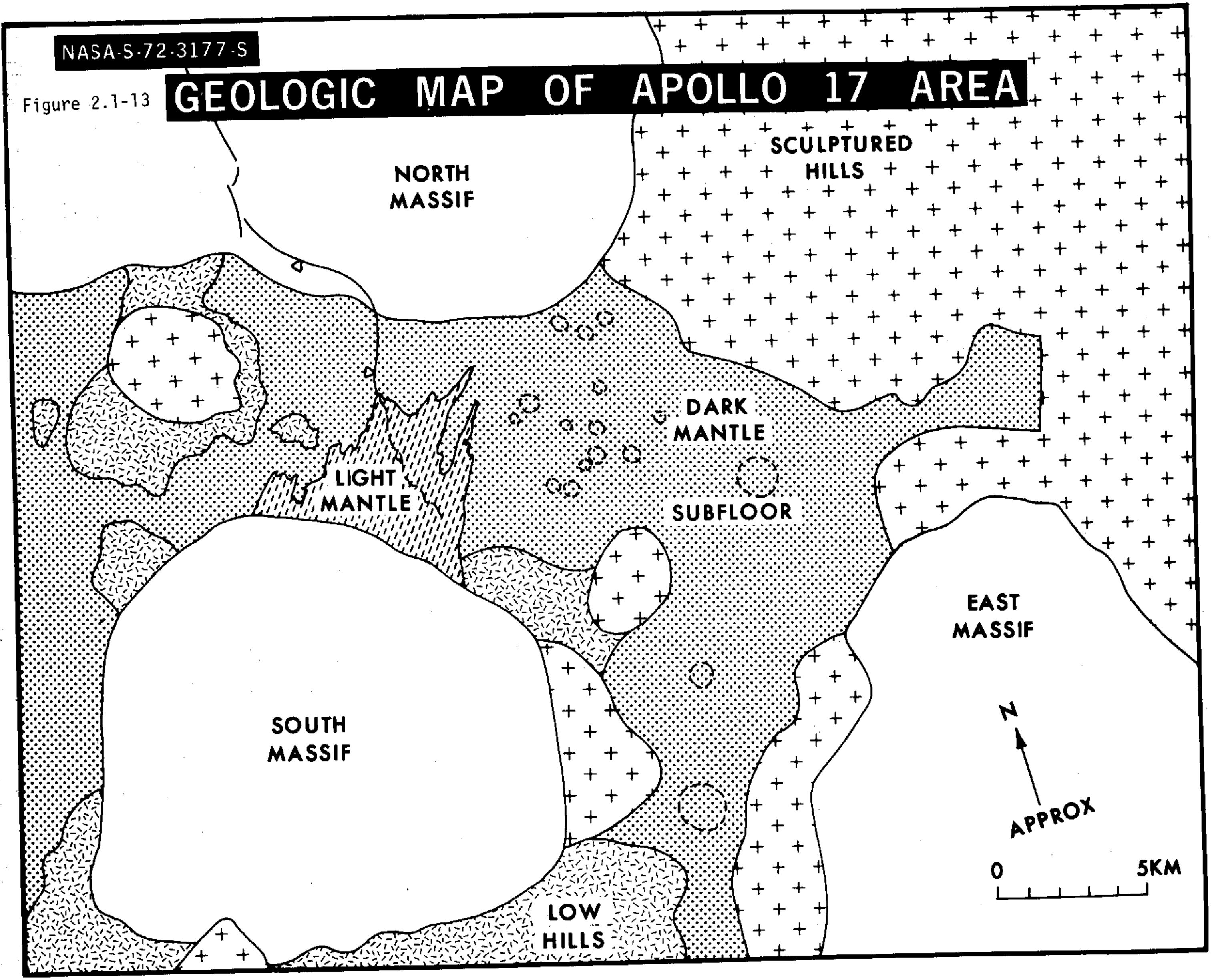

Figure 2.1-13 GEOLOGIC MAP OF APOLLO 17 AREA

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GENERALIZED GEOLOGIC MAP OF THE TAURUS-LITTROW AREA

E. W. Wolfe, J. W. Head, V. L. Freeman, and H. H. Schmitt

EXPLANATION

COPERNICAN ▨ *Light mantle material*

COPERNICAN AND ERATOSTHENIAN ░ *Dark mantle material*

IMBRIAN AND PRE-IMBRIAN *(Plains)* *

	□	⊞	▒
Plains material (mantled except in crater walls)	*Massif material*	*Sculptured Hills material*	*Low Hills material*

——— *Contact (includes fault contacts)*

◌ *Rim of larger pre-mantle crater on plains (plains material exposed in walls and rims)*

—△——△— *Scarp; barbs point downhill*

Adapted in part from Lucchitta, B. K., 1972, Preliminary Geologic Map of the Littrow Region of the Moon: U.S. Geological Survey, unpublished map.

* Plains = Subfloor

Source and Explanation of Symbols in Figure 2.1-13 Geologic Map

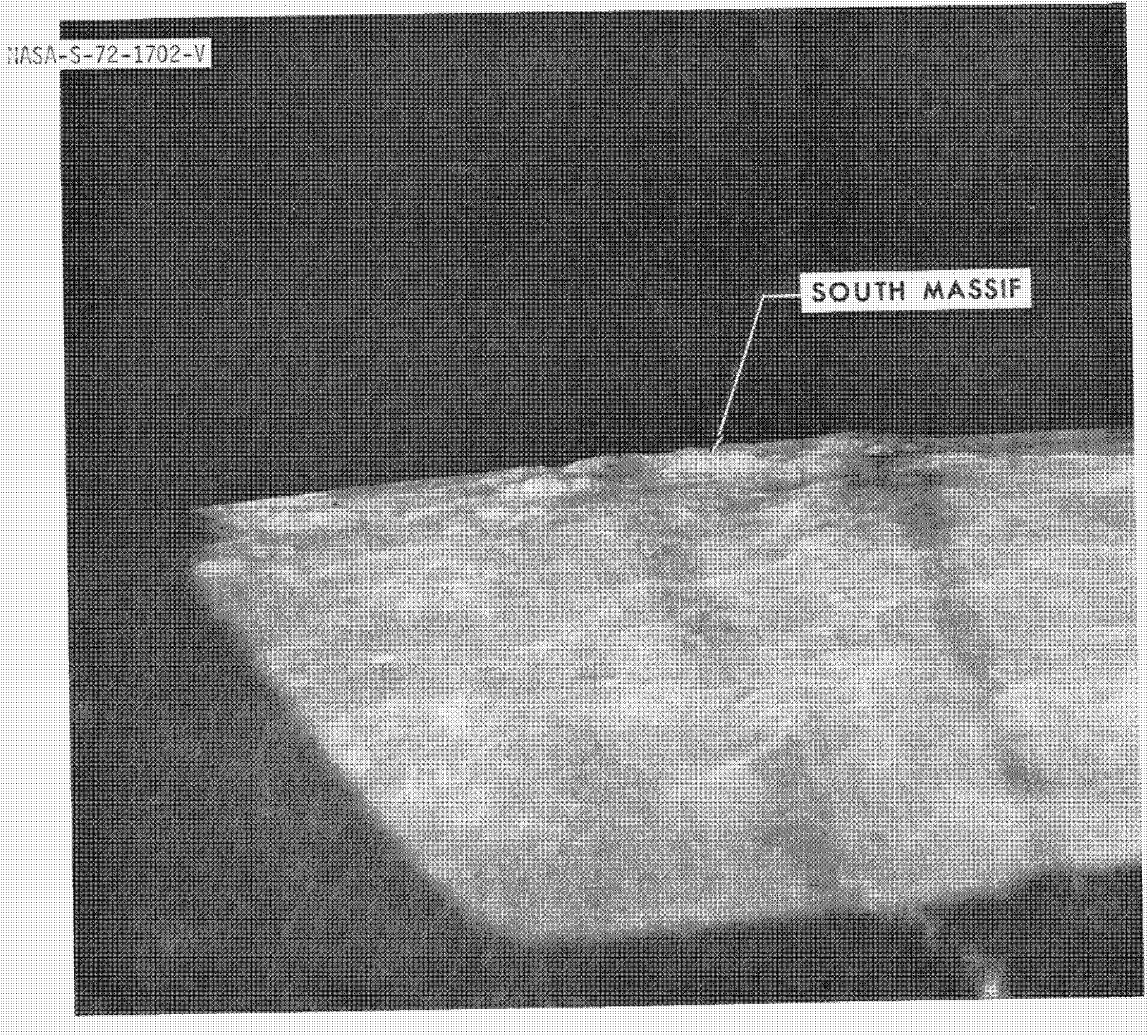


Figure 2.1-14 - Southerly-looking oblique from Apollo 15.

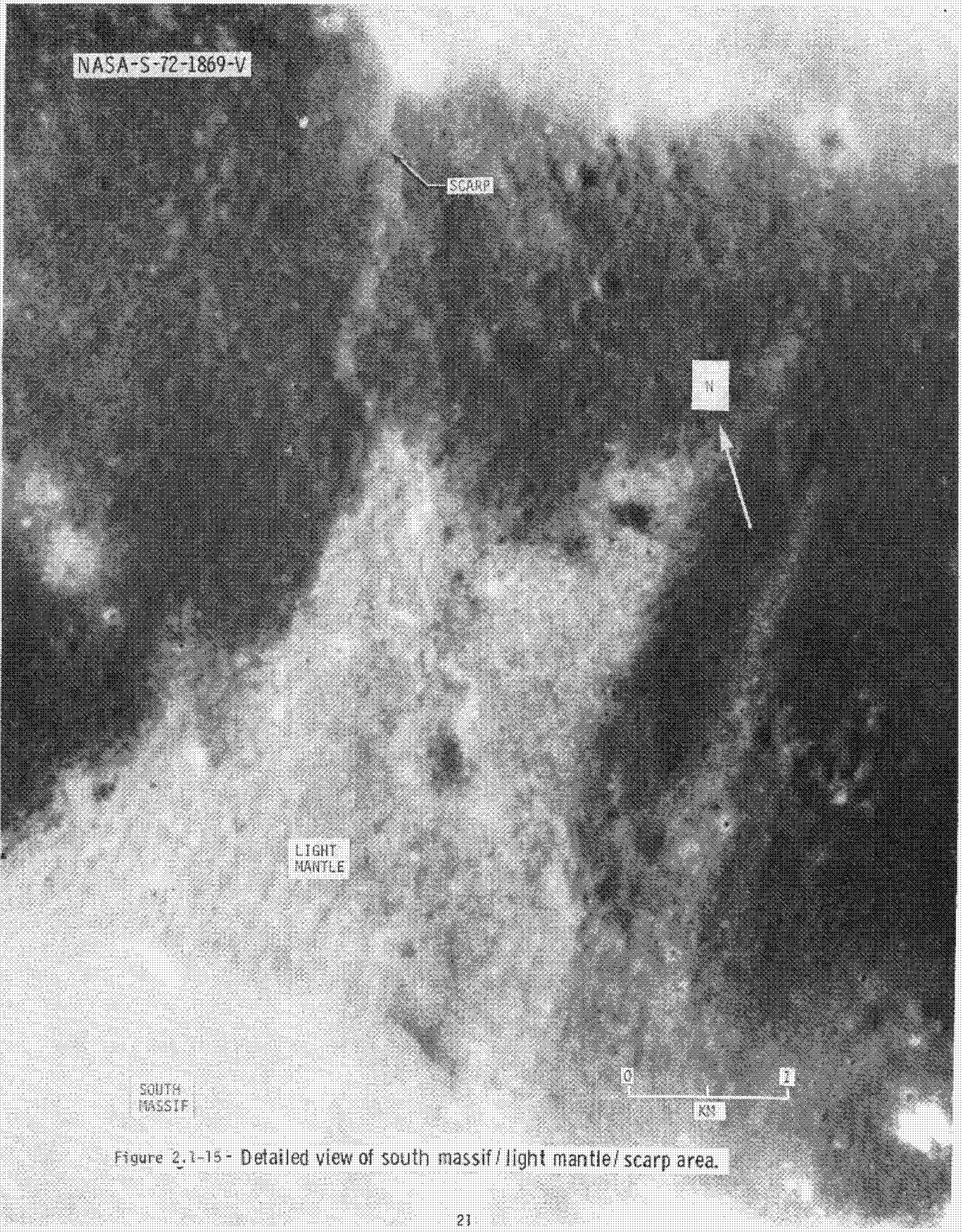


Figure 2.1-15 - Detailed view of south massif / light mantle / scarp area.

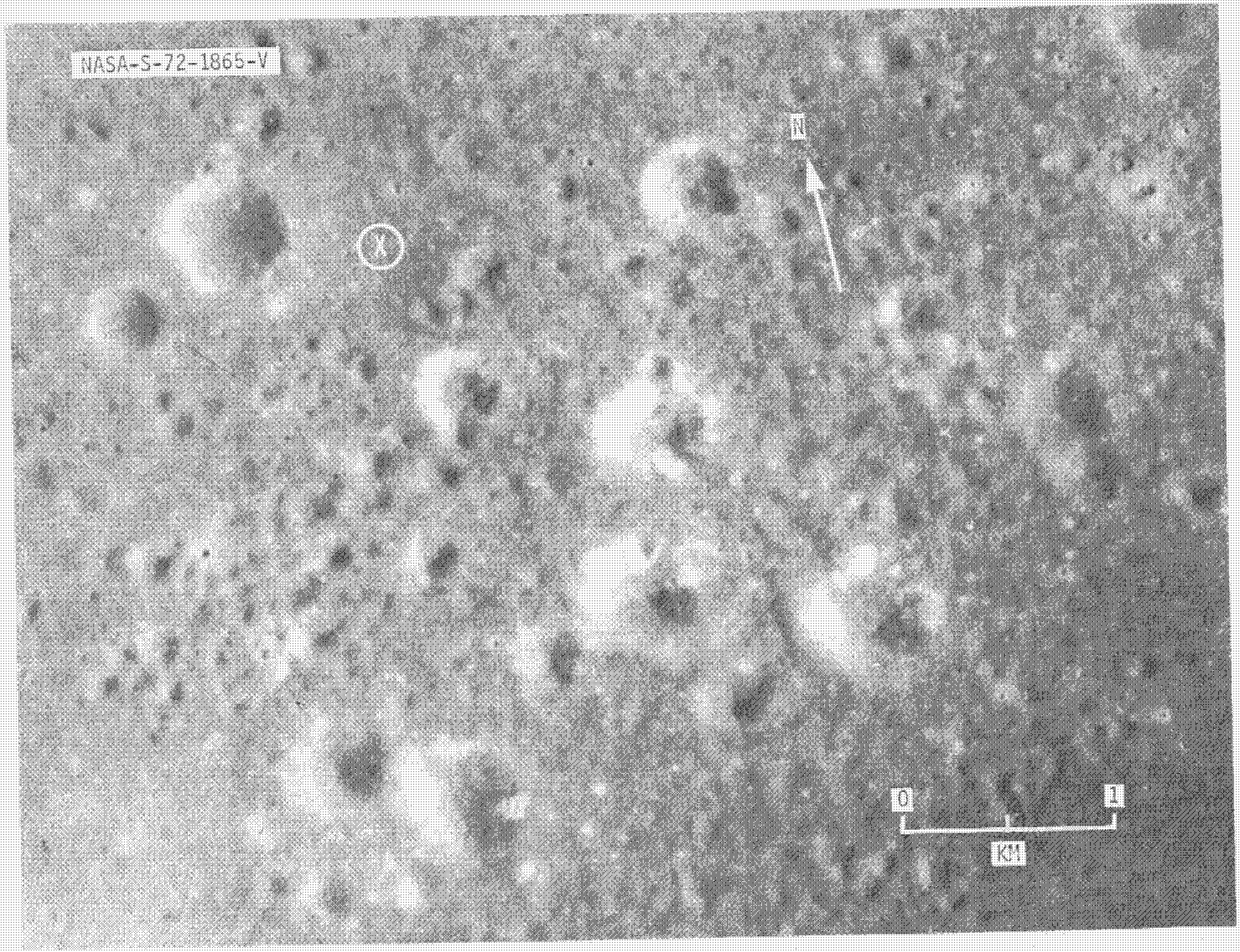


Figure 2.1-16 Detailed view of plains/dark mantle area.

in 3.8 and 70 cm radar images implies relative scarcity of cobbles and boulders in near-surface materials. The dark mantle is most readily interpreted as a pyroclastic deposit and is probably unconsolidated. A few small dark halo craters that could be vents for volcanic ash can be recognized in areas of massif and hills materials. No undoubted vents have been identified on the plains in the landing area. If vents are present in the Landing area, they may be too small to resolve in the orbital photographs, or we may misinterpret them as impact craters.

The dark mantle is interpreted to be younger than all of the large craters on the plains. Its relatively smooth uncratered surface and the sharpness of some of the underlying craters suggest a fairly young, perhaps Copernican, age.

Light Mantle Material - A bright ray-like feature with linear ridges and finger-like projections onto the dark mantel extends north from the South Massif (Figures 2.1-12,-15). No source crater for such a ray of ejecta can be identified. Hence this light mantle material may have been deposited by an avalance of unconsolidated debris from the slopes of the South Massif. It seemingly overlies the dark mantle because craters with dark ejecta dot the surface of the deposit. Large craters and a prominent scarp are visible although mantled and attest to the thinness of the deposit. Resolvable blocks (>2 m) are absent except near the south end of the slide and on the adjacent south massif slope. The light mantle shows greater reflectivity than the dark mantle in 3.8 cm radar imagery, which indicates a greater frequency of cobble on the surface of the light mantle. The absence of all but fresh small impact craters, apparent position of the light mantle over the dark mantle, and the relative absence of mixing near the thin edges of the light mantle imply a young, probably Copernican, age.

Surface Features - Major surface features of special geologic interest include craters, shallow troughs at the bases of the massifs and sculptured hills, and the prominent east-facing fault scarp.

The larger craters (generally >100 m) on the plains surface (Figure 2.1-16) are of three types:

(1) large (.5-1 km) steep-sided craters that occur in a cluster near the landing point

(2) large subdued craters with barely perceptible rims,

(3) scattered clusters of smaller (<.5 km) craters.

All three types are inferred to be older than the dark mantle although some could be contemporary volcanic sources. Exposures of wall and rim material are discontinuous and generally occur only on the inner wall below the rim crest. Elsewhere the ejecta are mantled except for scattered blocks large enough to project through the thin mantle. Although the larger craters are probably of impact origin, a volcanic origin for some may be considered.

The dark mantle is excavated only by relatively small craters that are generally much less than 100 m in diameter. The most likely vents for dark mantle material in the nearby uplands are small craters with related dark deposits of local extent. Vents in the plains area may be represented by similar small craters closely enough spaced so that the ejecta blankets overlap.

An apparently young, east-facing scarp, with local height of as much as 80 m, crosses the floor of the trough about 5 km west of the landing point and continues into the North Massif (Figure 2.1-15). The scarp, which probably represents the surface trace of a complex fault, consists of alternating north and northwest-striking segments, each on the order of 5 km long. Some segments occur as single, continuous, approximately straight scarps, others as zones of discontinuous en echelon scarps. Between the light mantle unit and the North Massif the scarp is covered by the dark mantle unit, which it therefore appears to antedate. However, distinctness of some segments of the scarp in the area of the light mantle and absence of dark mantle on some segments of the scarp on the North Massif suggest that younger movement may have occurred.

Regolith - An unusually small thickness of regolith is expected on the surfaces of the dark and light mantle units. In Apollo 15 orbital photographs with resolution of a few meters, these surfaces are not saturated by resolvable craters. An albedo boundary that may represent the edge of a local dark mantel unit crossing a .5 km crater about 2 km south of the landing point (Figure 2.1-16) shows no evidence of mixing at the same high resolution. Extrapolation from crater counts in the dark mantle suggests that crater diameters at the upper limit of the steady state distribution are most probably .3 m but may be as large as 3 m. Hence the mean thickness of completely mixed regolith may lie within the range of 3 to 30 cm.

2.2 LUNAR SURFACE OBJECTIVES

The following information is taken from the "Mission Requirements, SA-512/CSM-114/LM-12 J3 Type Mission, Lunar Landing," and its approved revisions.

2.2.1 Mission Objectives

The following primary mission objectives have been assigned to this mission by the Office of Manned Space Flight (OMSF) in the Mission Implementation Plan (Reference 1):

1) Perform selenological inspection, survey, and sampling of materials and surface features in a pre-selected area of the Descartes region.

2) Emplace and activate surface experiments.

3) Conduct in-flight experiments and photographic tasks from lunar orbit.

Detailed objectives have been derived from the OMSF-assigned primary objectives, placed in order of priority, and detailed to the extent necessary for mission planning.

2.2.2 Lunar Surface Priorities

The detailed objectives and experiments are listed below in their order of priority. Accomplishment of the detailed objectives and detailed experiments planned for the lunar surface will not be jeopardized for the sake of those planned for lunar orbit or coasting flight. The planning will, however, permit the surface Electrical Properties experiment to be turned OFF at certain times as defined in the Test Conditions for the Lunar Sounder Experiment.

Priority	Detailed Objectives and Experiments
	Lunar Surface
1	Documented Sample Collection at highest priority traverse station (Part of Lunar Geology Investigation)
2	Heat Flow (S-037) (Part of Apollo 17 ALSEP)
3	Lunar Surface Gravimeter (S-207) (Part of Apollo 17 ALSEP)
4	Lunar Seismic Profiling (S-203) (Part of Apollo 17 ALSEP)
5	Lunar Atmospheric Composition (S-205) (Part of Apollo 17 ALSEP)
6	Lunar Ejecta and Meteorites (S-202) (Part of Apollo 17 ALSEP)
7	Lunar Geology Investigation (S-059((Portions other than priority items 1 and 8)
8	Drill Core Sample Collection (Part of Lunar Geology Investigation)

9	Surface Electrical Properties (S-204)
10	Lunar Neutron Probe (S-299)
11	Traverse Gravimeter (S-199)
12	Cosmic Ray Experiment

2.3 EVA REQUIREMENTS

2.3.1 General Requirements

The stay time on the lunar surface is open-ended and the planned maximum will not exceed approximately 75 hours. After checkout of the LM to assess its launch capability, the LM will be depressurized to allow egress of astronauts to the surface. The nominal plan will provide for three periods of simultaneous EVA by both astronauts. The first EVA period will be up to approximately 7 hours in duration, as will the second and third EVA periods.

Traverse planning will provide for returning the crew to the LM under each of the following single-failure conditions.

> Use of the buddy-secondary life support system due to an inoperative PLSS anytime during a riding traverse (based on the assumption that the LRV will operate properly during the return to the LM).
>
> Use of two PLSS's for a walking return to the LM for an inoperative LRV anytime during a riding traverse (based on the assumption that both PLSS's will operate properly during the return to the LM).

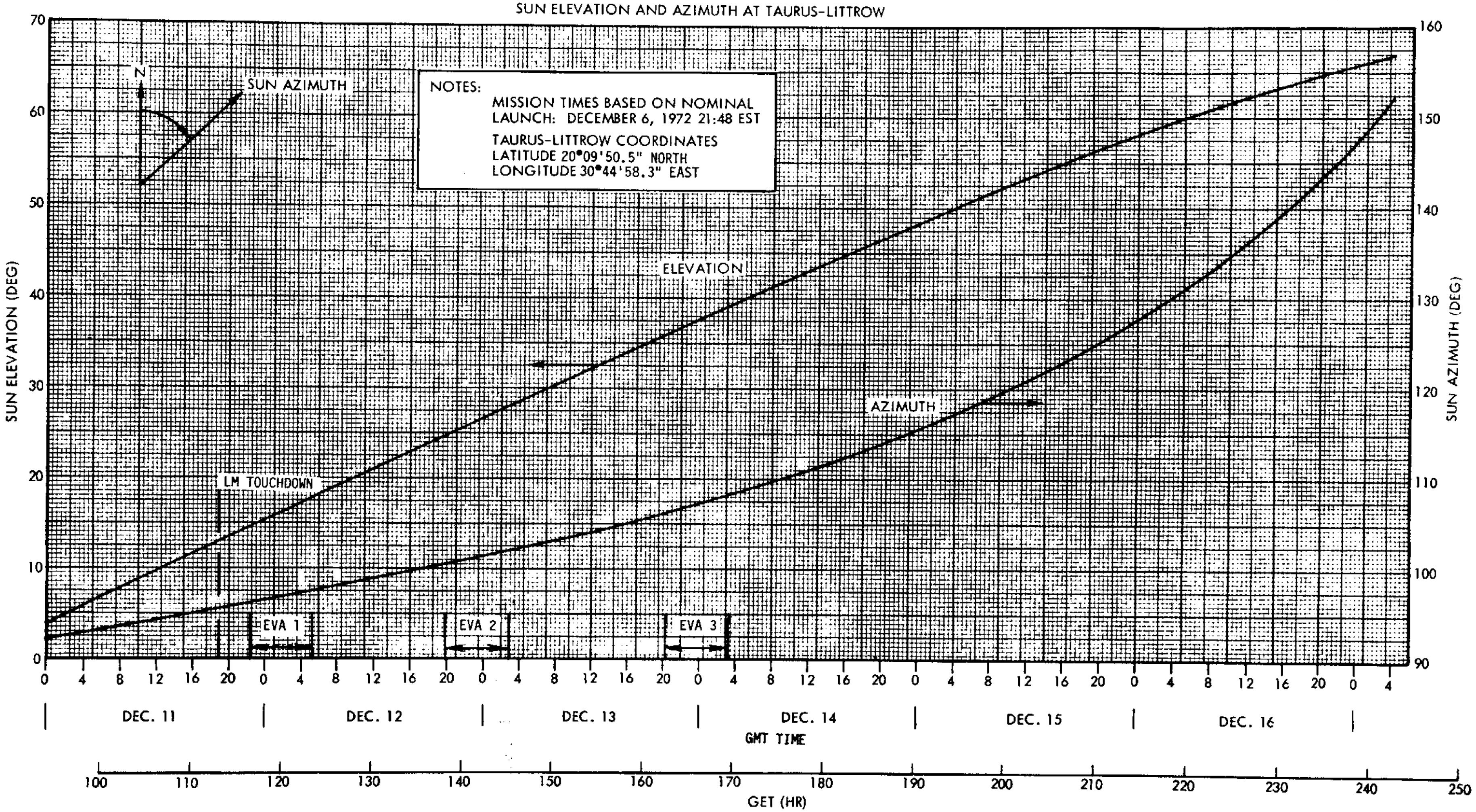
Traverse planning will not be provided for dual failure conditions such as two PLSS failures or an LRV failure combined with a PLSS failure. ALSEP deployment operations will be accomplished during the first EVA within the limitations and constraints defined in the CSM/LM Spacecraft Data Book, SNA-8-D-027, Vol. V, ALSEP Data Book for Apollo 17.

Television transmission will be provided as soon as the LRV mounted TV system (GCTA) is activated during the EVA period. Television coverage will include an external view of the landed LM, a panorama of distant terrain features and an astronaut conducting lunar surface activities. Television coverage will be provided by the GCTA during each science stop when using the LRV.

Photography will be employed throughout the EVA to document the activities and observations.

Figure 2.3-1 gives sun elevation and azimuth at the Littrow site as a function of date, GMT and GET. Table 2.3-1 gives earth and sun elevations and azimuths at the nominal EVA start times for this mission.

20 July 1972



NOTES:

MISSION TIMES BASED ON NOMINAL LAUNCH: DECEMBER 6, 1972 21:48 EST

TAURUS-LITTROW COORDINATES
LATITUDE 20°09'50.5" NORTH
LONGITUDE 30°44'58.3" EAST

FIGURE 2.3 - 1: SUN ELEVATION AND AZIMUTH AT TAURUS-LITTROW

START EVA	AZIMUTH		ELEVATION		APPROX. EARTH CRESCENT SIZE
	EARTH	SUN	EARTH	SUN	
1	240.5°	96.5°	44.5°	14.5°	53%
2	239.5°	102.0°	45.5°	25.0°	50%
3	238.0°	107.0°	46.0°	36.5°	47%

Note: All data based on a nominal launch date and time

TABLE 2.3-1: EARTH/SUN AZIMUTH AND ELEVATIONS AT NOMINAL EVA START TIMES FOR TAURUS-LITTROW

FIGURE 2.3-2: APOLLO 17 LUNAR STAY TIMELINE

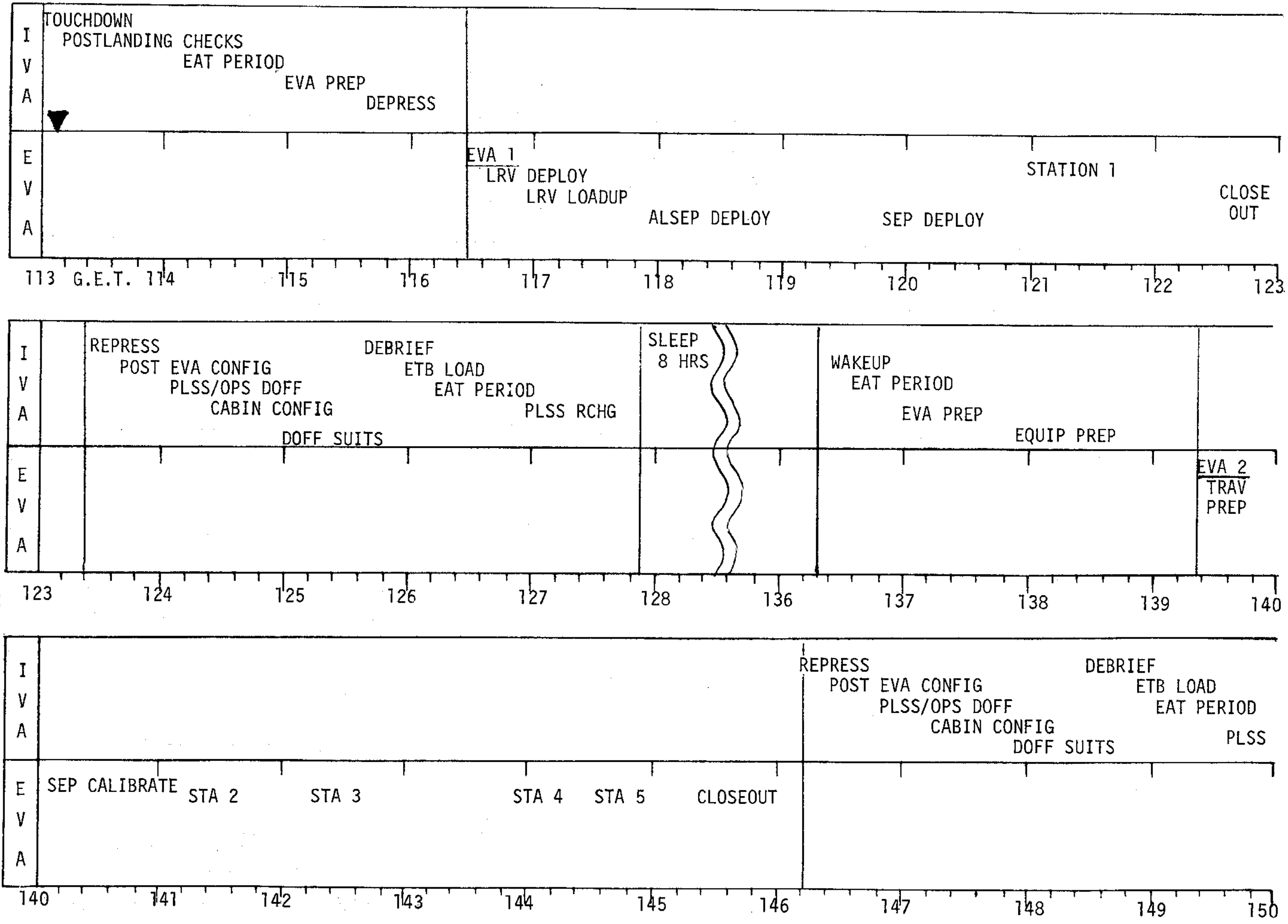
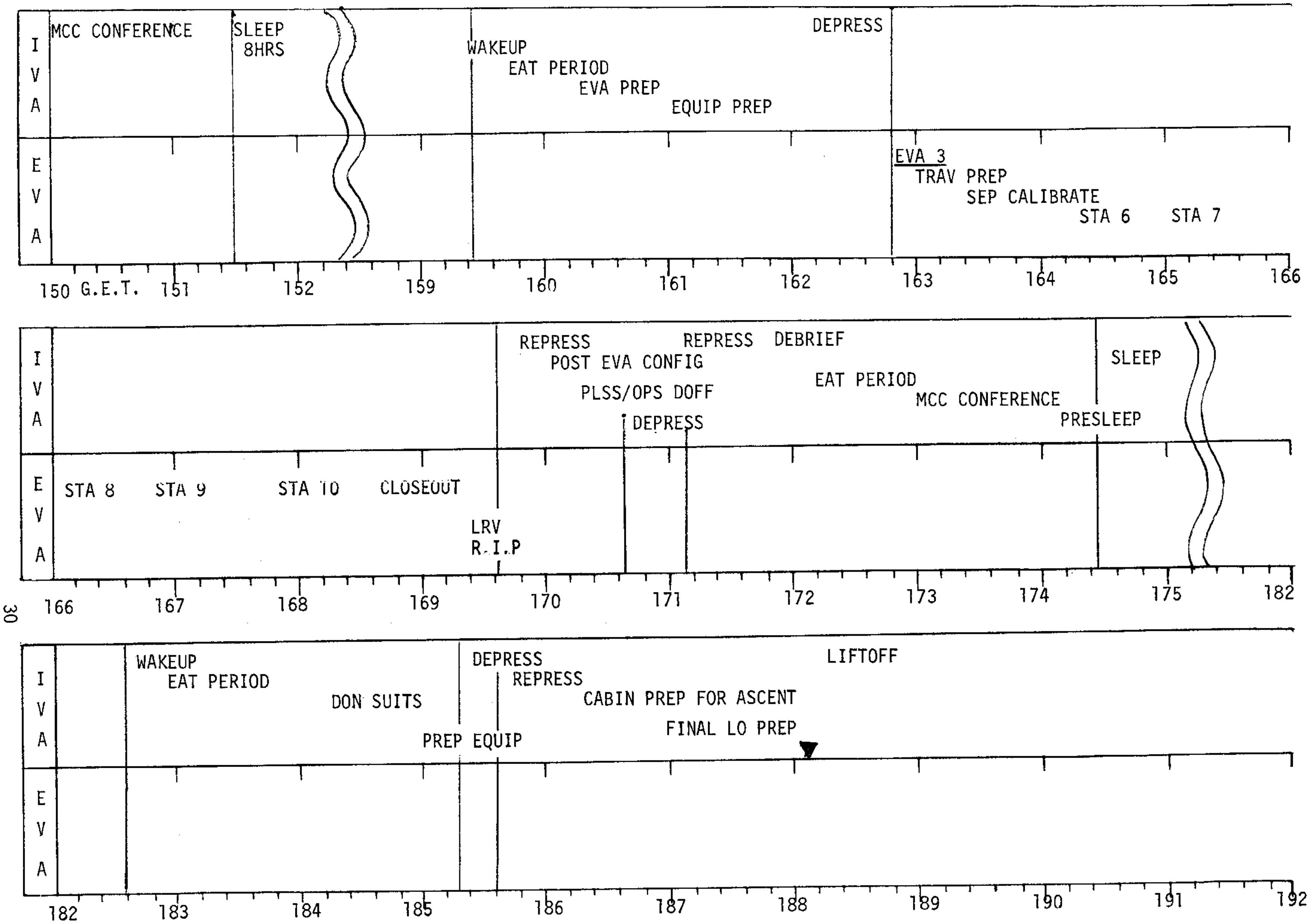


FIGURE 2.3-2: APOLLO 17 LUNAR STAY TIMELINE (Cont'd)



2.3.2 Traverse Objectives and Exploration Rationale

The crew's first objective on egress to the surface of the moon is to deploy and activate their principal geological exploratory tool, the Lunar Roving Vehicle (LRV). Following this operation, the crew puts the ground controlled television assembly (GCTA) into operation, and loads the LRV for lunar operations.

Their principal tasks on EVA 1 are to deploy the ALSEP and Surface Electrical Properties transmitter. Following these operations, the crew is ready for the exploration of Taurus Littrow. During the exploratory traverses, the Apollo 17 astronauts will deploy eight explosive packages, and take up to ten readings on the Traverse Gravimeter. The ALSEP, SEP, and other tasks mentioned above will be detailed in Section 3 of this document. The overall stay time timeline for Apollo 17 Lunar Surface Activities is given in Figure 2.3-2.

Geologic Objectives

Refer to Figure 2.3-3 for an overall schematic traverse map while reading this section.

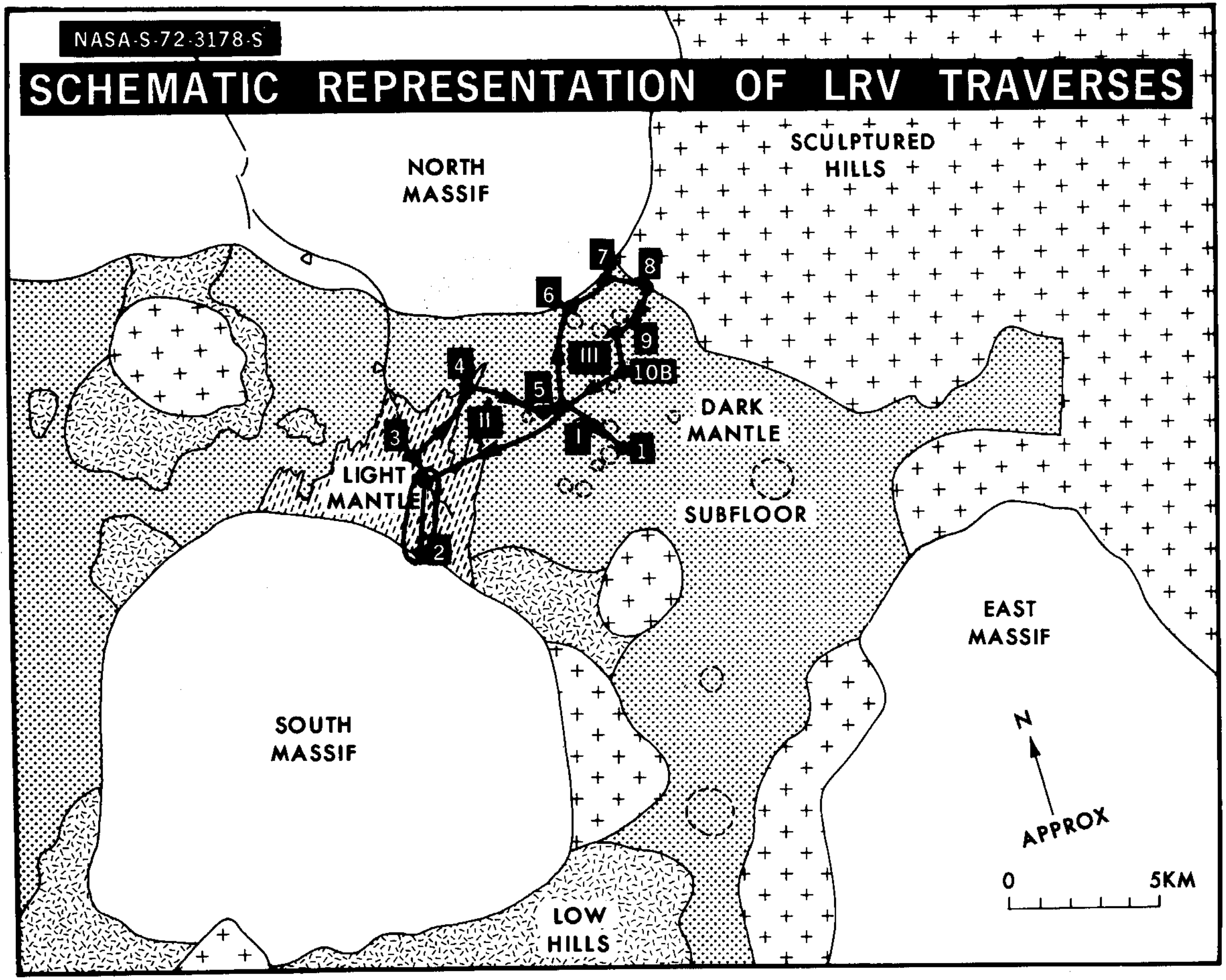
1. Massif and related units - observations, characterizations, and sampling.

a. Mode of origin and emplacement - the massif and related units are probably composed of breccia from various ejecta blankets, most likely arranged in subhorizontal layers with the youngest deposits lying at higher elevations. Observational and photographic data bearing on this problem will be gathered.

b. Stratigraphy - The light mantle unit appears to be some type of debris flow or avalanche which may contain massif material derived from the entire stratigraphic sequence comprising the South Massif. Sampling stations (2, 3, and 4) are scheduled in the light mantle in a direction normal to the mountain front in the hope that a maximum variety of South Massif rock types will be collected. Sampling at the base of the massifs is also designed to collect the widest possible variety of samples of massif material through sampling of boulders derived from the mountain slopes and collection of rake, soil, and other documented samples (stations 2, 6, and 7). Investigation of boulders should provide the opportunity to examine and document internal structures indicative of the mode of origin of the massif materials.

c. Areal variation - sampling at and within the North and South Massifs and comparison with the sculptured hill is designed to provide data on areal variation of highlands material.

Figure 2.3-3


NASA-S-72-3178-S
SCHEMATIC REPRESENTATION OF LRV TRAVERSES
NORTH MASSIF
SCULPTURED HILLS
DARK MANTLE
LIGHT MANTLE
SUBFLOOR
SOUTH MASSIF
EAST MASSIF
LOW HILLS
1
2
3
4
5
6
7
8
9
10B
I
II
III
N
APPROX
0
5KM

The distinct morphology of the sculptured hills suggests that they may be of different composition from the massifs. Station 8 is designed to investigate this possibility.

Relationships of the massif and massif-related units to the dark mantle unit are being investigated at stations 6-7, and 8; with the light mantle at station 2.

2. Dark mantle material - observations, characterization and sampling.

a. Mode of origin and emplacement - the dark mantle may be a volcanic pyroclastic deposit. Sources of the widespread dark mantle on the plains have not been specifically identified, but a variety of crater types (stations 1, 4, 5, 9, 10), among which sources might be included, will be investigated. In addition, investigation of a possible exposure of the edge of a local young dark mantle unit (station 1) may provide important data on the mechanism of emplacement.

b. Internal stratigraphy - both the vertical compositional variation in the dark mantle and the time span during which is accumulated are of scientific interest. Radial sampling of craters at stations 4 and 9 as well as numerous core tubes are designed to provide data on these questions.

c. External stratigraphy - observations and photographs of the relationships of the dark mantle to other units will also help to establish its historical significance. Relationships to the plains unit will be studied at stations 1, 5, and 10 and with the massifs at stations 6, 7, and 8. Observations of the relations of the dark and light mantle will be made as the crew drives across the contact and at station 4 where they will investigate a dark halo crater in the light mantle.

d. Areal variation - possible areal variations will be investigated at widespread sampling points in the dark mantle (stations 1, 4, 5, 8, 9, 10); these stations will provide samples over an area of 30 square km. If sources are local, a variety of sources will be sampled.

3. Plains material - observations, characterization, and sampling.

a. Mode of origin and emplacement - the plains materials may be volcanic in origin or they may be impact breccias. Early characterization of rock types at station 1 should bear on this question.

b. Areal variation - separation of stations 1, 5, and 10 by several kilometers provides the opportunity to investigate areal variation. The relationship of the plains to the dark mantle and possibly to other units underlying the plains will also be investigated.

3.0 PROCEDURES

3.0 NOMINAL LUNAR SURFACE PROCEDURES

On Apollo 17, the CDR and LMP will spend 75 hours on the lunar surface at the Taurus Littrow site, of which as many as 21 hours will be spent in actual lunar surface activities. There will be three 7-hour EVA's scheduled as shown in Figure 2.3-2, the Summary Timeline. The EVA periods are separated by LM cabin activities, which include housekeeping, nutrition, and sleep.

Section 3.1 details the first EVA. The first subsection, 3.1.1 gives a general narrative description of the lunar surface activities. This narrative is followed by 3.1.2, which summarizes the EVA traverse in tabular form, and gives times on station, traverse velocities and times, plus parametric planning data. Section 3.1.3 provides the detailed, minute-by-minute procedural timeline for the EVA. Each page of the timeline is faced by the Voice Data Plan. These data are used by Mission Control during the actual EVA to conduct operations, record data as required, and follow the lunar surface operations as they transpire. The Voice Data Plan includes copies of the Cuff Check List that the crew has with them as a job aid in carrying out their tasks.

In like fashion, Section 3.2 documents EVA 2 nominal procedures, and Section 3.3 EVA 3.

Figure 3.0-1 depicts the nominal LRV traverses for all three EVA's on Apollo 17.

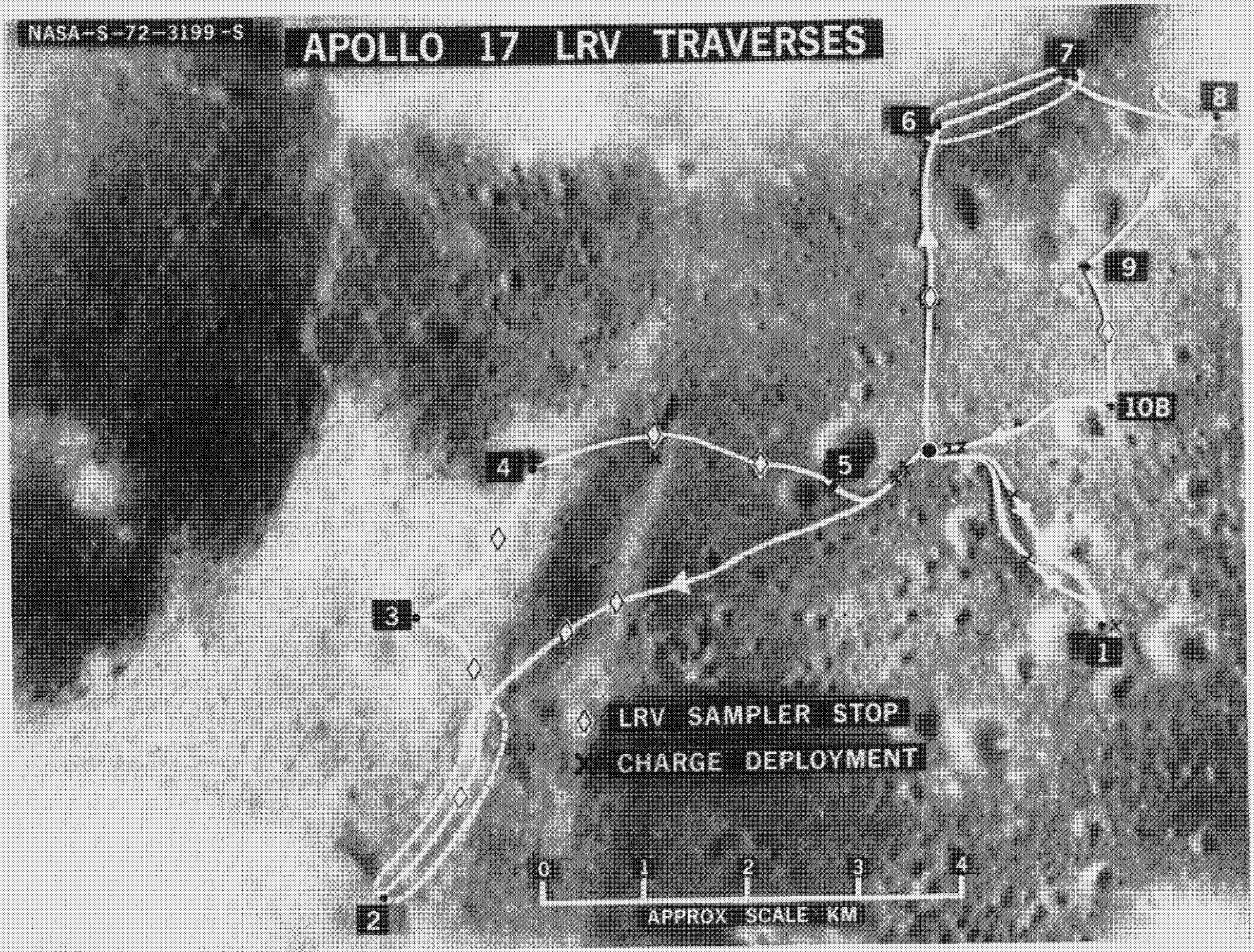
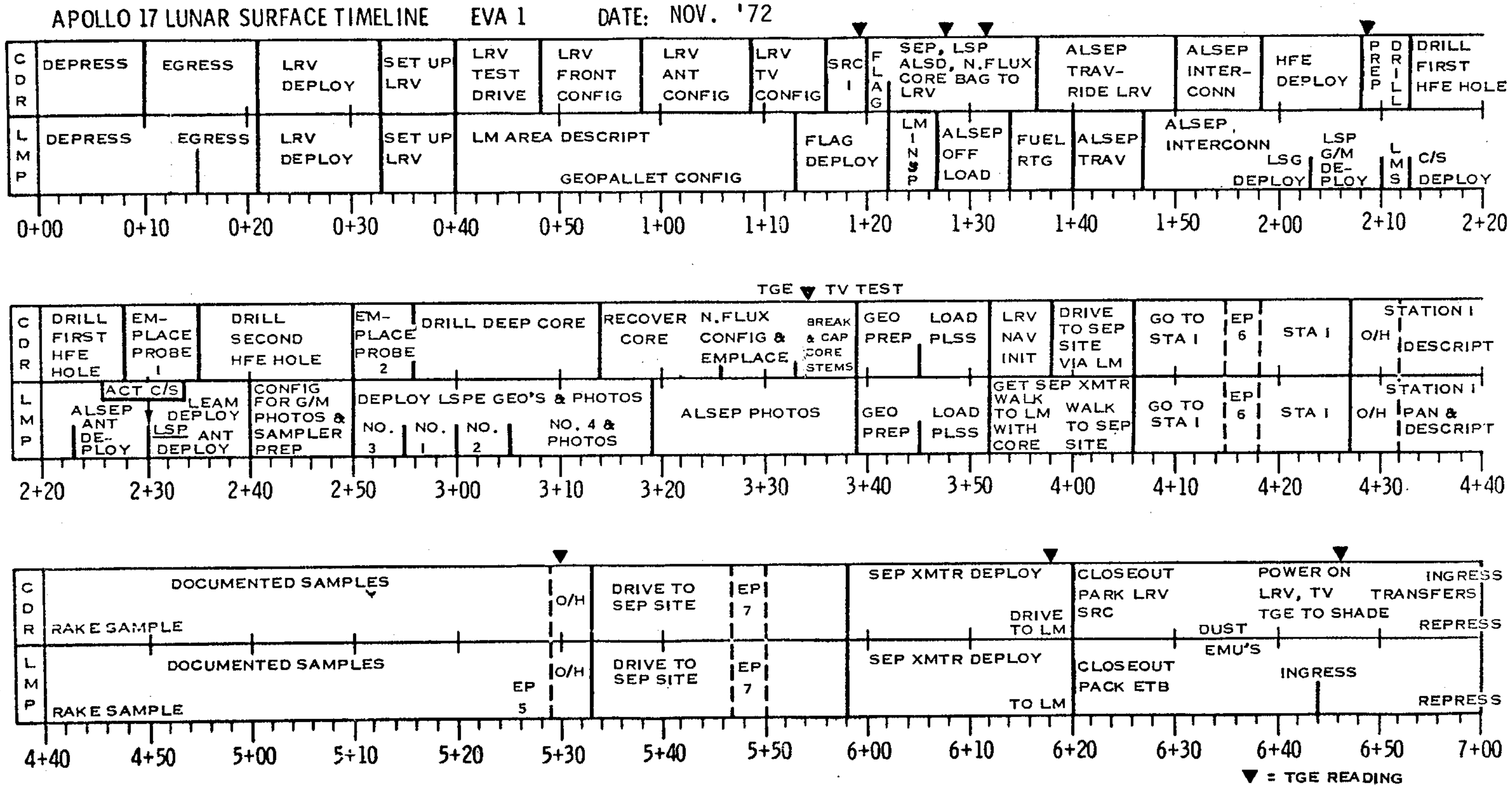


FIGURE 1.0-1: PICTORIAL VIEW OF THE LRV TRAVERSES

3.1 EVA 1

FIGURE 3.1-1

APOLLO 17 LUNAR SURFACE TIMELINE EVA 1 DATE: NOV. '72



3.1 EVA 1

3.1.1 EVA 1 - GENERAL DESCRIPTION

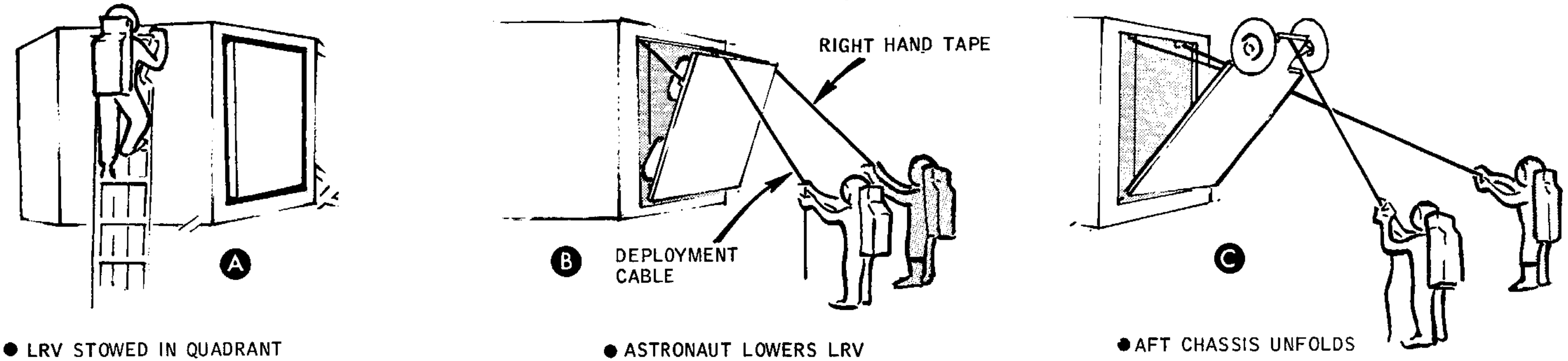
EVA 1 begins about four hours after touchdown on the lunar surface at Taurus-Littrow. The crew spends this pre-EVA time in site description from the LM windows, eating a light snack, and donning their extravehicular mobility equipment. The crew also readies a jettison bag of discarded items (see Table 3.7-4) and an Equipment Transfer Bag (ETB). The ETB contains an Electric Data Camera (70 mm), several magazines of film, maps, and the BSLSS, the contingency-use water umbilical. A block timeline is furnished to assist in understanding this EVA (Figure 3.1-1).

After depressurization of the LM cabin, the CDR exits the hatch first. The LMP hands out the jettison bag and the ETB. The ETB is attached to a line which can be hooked to the railings of the "porch" affixed before the forward hatch. The jettison bag is tossed clear of the LM, the ETB is gently lowered to the surface, and the CDR descends. CDR egress is followed shortly afterwards by LMP egress. After a preliminary period of familiarization, the two crewmen are ready for their first task--unloading the Lunar Roving Vehicle (LRV). It should be noted that the television system on Apollo 17 will not be operational until after it is loaded on the LRV. All operations on the lunar surface up to that point (about an hour and ten minutes into the EVA) will be covered by voice only.

The CDR and LMP lower the LRV from the side of the spacecraft by manipulation of lanyards and pulleys. They unfold the electric vehicle, set up the seats and the central console. This process is illustrated in Fig. 3.1-2. The CDR performs a short checkout of the LRV systems, then takes the vehicle around the LM to the vicinity of the MESA (Modular Equipment Stowage Assembly) and Quad III for loadup. During this time, the LMP busies himself with a walk-around and site description. The LMP takes some photos as he walks.

The next block of activities is concerned with loadup of the LRV. In general, the LMP concentrates on the aft end of the LRV, and items from Quad III. The CDR does the front end of the LRV, the deployment of the television and communications sytem. This system is comprised of the Ground Controlled Television Assembly (GCTA), the Lunar Communications Relay Unit (LCRU, pronounced "Lacru"), and the two antenna arrays. Fig. 3.1-3 illustrates the stowage of these items outbound on the MESA, plus other gear. Fig. 3.1-4 gives the general layout of the landing site when all the preliminaries of EVA 1 are complete. The LMP's tasks consist of loading a tool and bag stowed pallet (termed the "geopallet") onto the aft end of the LRV. This pallet is arranged to swing open like a gate to provide access to the mounting position of the Surface Electrical Properties receiver and antenna array. The pallet also holds the Traverse Gravimeter experiment. The LMP also brings the equipment transfer bag with the cameras and supplies over the LRV, and stows this gear.

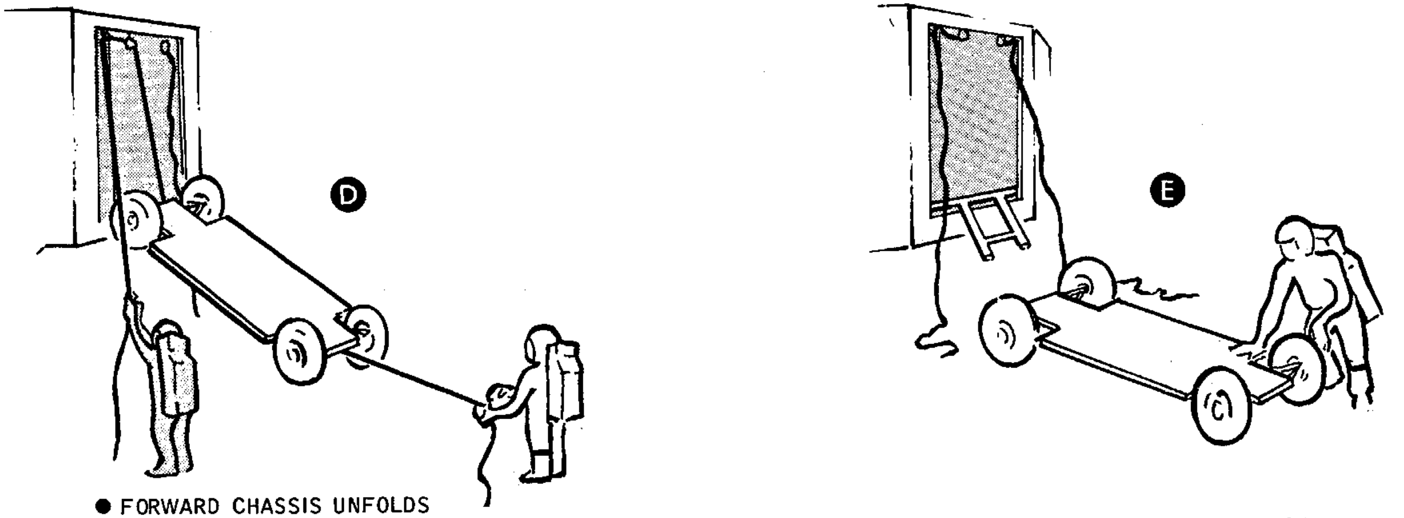
FIGURE 3.1 - 2 LRV DEPLOYMENT SEQUENCE



- LRV STOWED IN QUADRANT
- ASTRONAUT REMOVES INSULATION BLANKET, OPERATING TAPES
- ASTRONAUT REMOTELY INITIATES DEPLOYMENT

- ASTRONAUT LOWERS LRV FROM STORAGE BAY WITH RIGHT HAND TAPE

- AFT CHASSIS UNFOLDS
- REAR WHEELS UNFOLD
- AFT CHASSIS LOCKS IN POSITION



- FORWARD CHASSIS UNFOLDS
- AND LOCKS
- FRONT WHEELS UNFOLD
- ASTRONAUT LOWERS LRV TO SURFACE WITH LEFT HAND TAPE

- ASTRONAUT DISCONNECTS SPACE SUPPORT EQUIPMENT(SSE)

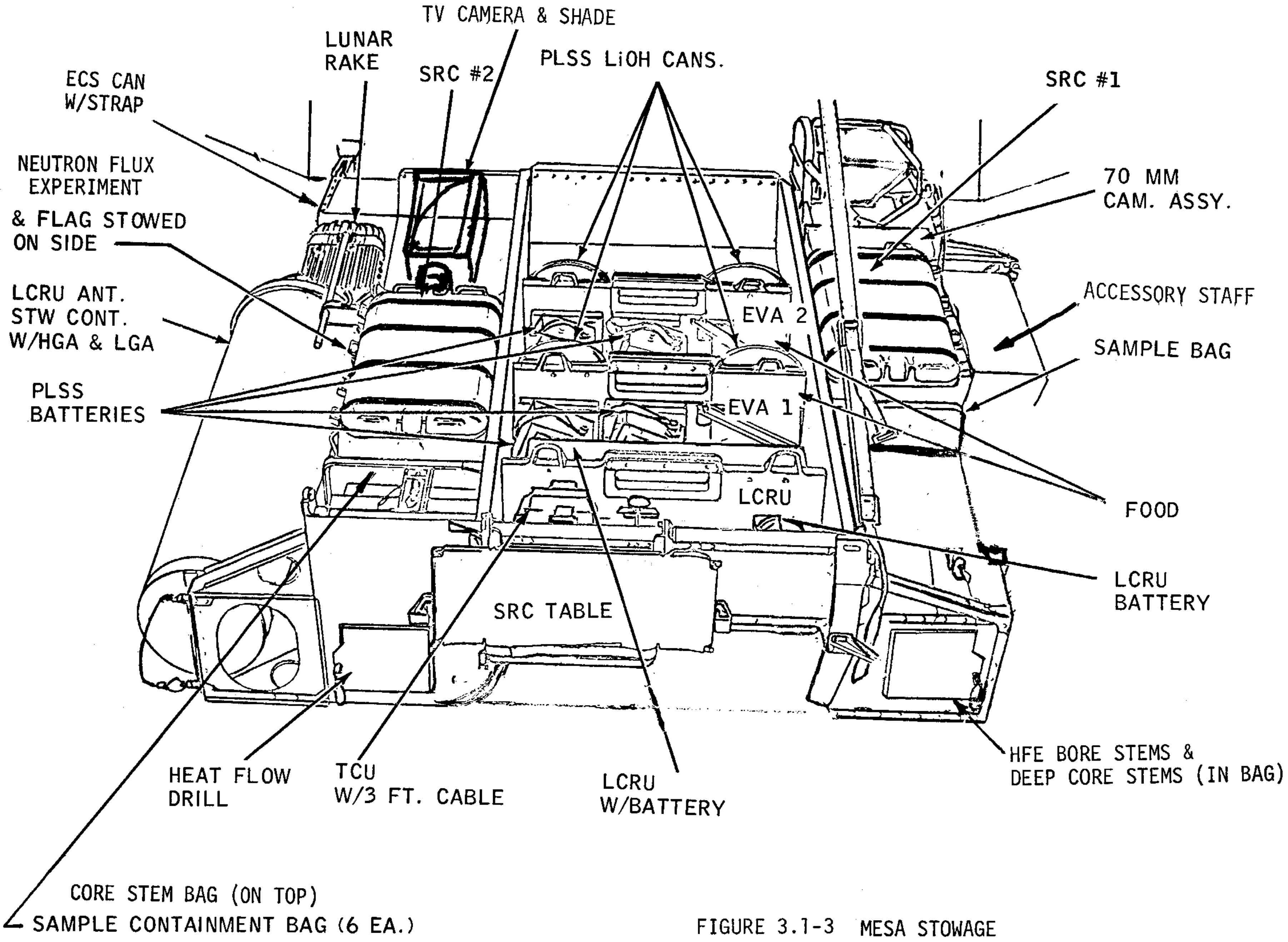


FIGURE 3.1-3 MESA STOWAGE

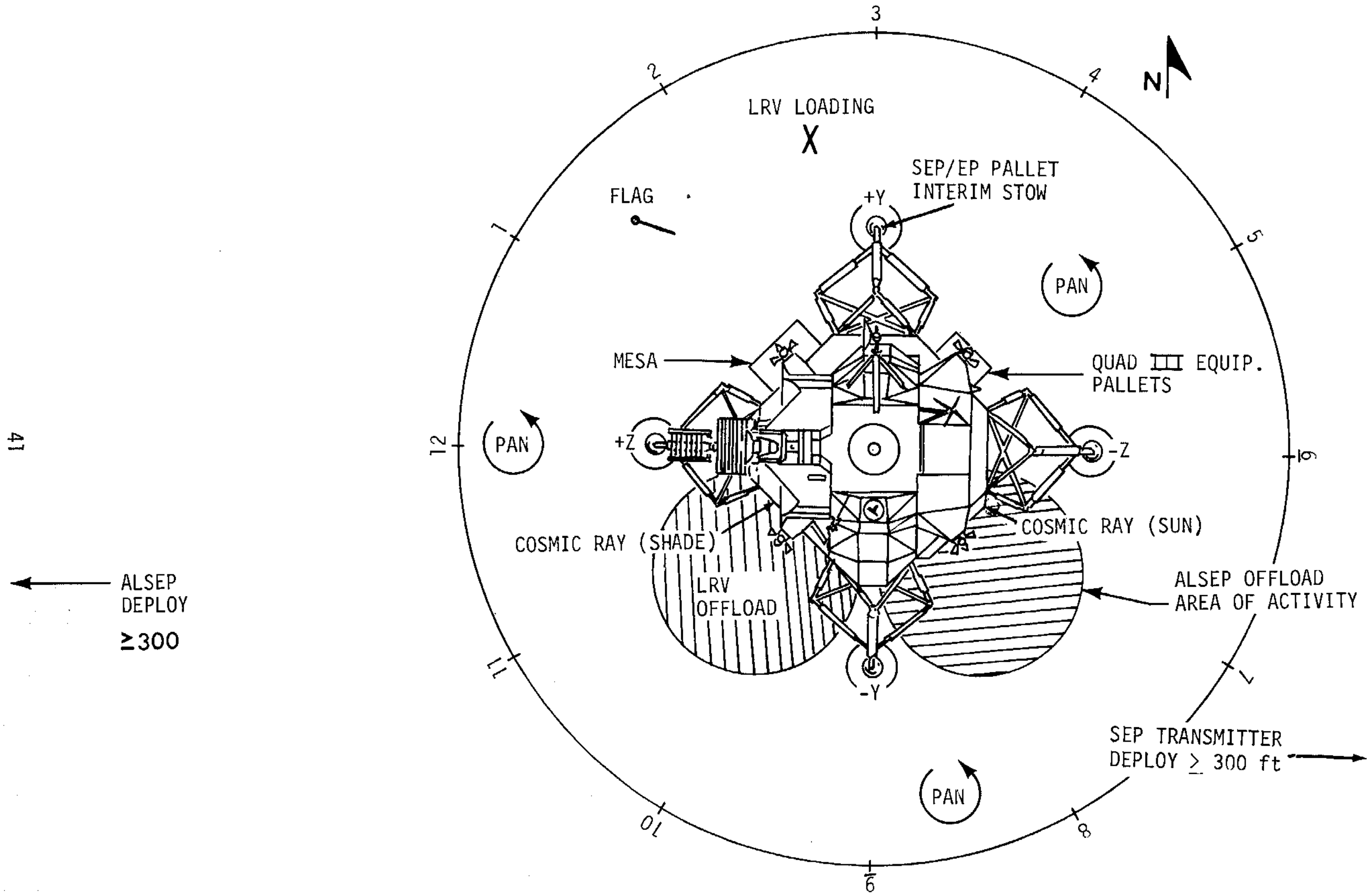


FIGURE 3.1-4 PROBABLE AREAS FOR NEAR LM LUNAR SURFACE ACTIVITY

During this operation the CDR finishes his setup of the television and LRV mounted communications system, and the TV is brought up. From this point on during the EVA, whenever the LRV is at a stop, the TV system is configured by the crew to be under ground control. When the LRV is under way, the communications system provides voice and telemetry only, via the low gain antenna.

The CDR's next task is to unload the bag of sampling supplies from Sample Return Container No. 1, and place the bag on the LRV aft geopallet. Immediately following this job, the two crewmen pause for a brief flag-planting ceremony. The LMP follows the flag ceremony by an inspection of the spacecraft, with photo documentation as required. The CDR busies himself during this period with offloading the equipment pallet from Quad III. This pallet contains the two brackets of Seismic Profiling explosive packages (four on each bracket), plus the Surface Electrical Properties Experiment transmitter and receiver. The CDR proceeds to mount the SEP receiver on the LRV, off the forward surface of the geopallet, between it and the LMP seat. The experiment is not activated until EVA 2, but the components are set up on EVA 1 for thermal control and for operational convenience. The CDR mounts one of the explosive package brackets on top of the geopallet, takes a gravimetric reading both on and off the LRV, replaces the gravimeter on the geopallet, and prepares to leave for the ALSEP site.

When the LMP finishes his LM inspection, he proceeds to unload the ALSEP packages (there are two) from the SEQ Bay or Quad II. He extracts a hot radioactive capsule from a graphite cask on the side of the LM, and places the capsule inside the radioisotope thermoelectric generator (RTG) to activate it. This is a SNAP-27 power source for the ALSEP array. The LMP then joins the two ALSEP packages with a handlebar for carryout to the ALSEP site.

The CDR and LMP rendezvous at the ALSEP site some 100 meters west of the spacecraft. The CDR parks the LRV about 20 meters NE of the prospective central station location. The heading is 180° for good TV coverage.

During ALSEP deployment, the CDR concentrates on the heat flow experiment (HFE) - drill core. The LMP lays out the rest of the experiment packages, after they interconnect the power package, the HFE, and the Lunar Ejecta and Meteorites Experiment (LEAM) to the central station.

The HFE consists of two sensor-and-heater probes connected by 6.5 meter cables to an electronics box, which in turn is connected by a 10 meter cable to the central station. The sensor probes are inserted down bore holes implanted by means of a special drill, the Apollo Lunar Surface Drill (ALSD). This system is almost identical to that carried on Apollo 16. The bore holes are made up of a string of one long (212 cm), and two short (71 cm) stems made of fibreglas-boron (the joints are metal and screw together). The string for each hole is implanted a section at a time by the rotary-percussive action of the ALSD. The ALSD is decoupled from the string for adding new sections by using a type of Stillson wrench.

When the CDR finishes placing a string of bore stems in the lunar surface, he drops the probe assembly down the hole. A fishing-rod like tool, the "rammer" is used to ensure the probe's location at the bottom of the hole. The rammer has an alphanumeric scale on the side, and the CDR reports depth of the probe to MCC. A small thermal plug is inserted to a depth of 10 cm, and a cover is placed over the hole.

The LMP's first task after interconnect is to deploy the Lunar Surface Gravimeter (LSG), an ultra-sensitive seismometer which can measure the lunar gravitational vector to an accuracy of 1 part in 10^5, detect tidal forces and oscillations which may provide data in support of the theory of gravitational radiation. The deployment consists of removal of the package from the central station, implacement 8 meters west, and erection of a sunshade. The gravimeter is then uncaged and is ready to go to work.

Next, the LMP interim deploys the Lunar Seismic Profiling Experiment (LSPE) geophone module to the south of the Central Station to get the module out of the way. The Lunar Atmospheric Composition Experiment, the Lunar Mass Spectrometer (LMS), is then placed 14 meters NE of the central station. The LMP aligns, levels the package, then inserts his Universal Handling Tool (UHT), an elongated Allen wrench, to crack a ceramic seal to expose the orifice of this experiment to the lunar environment. The LMS will measure particles in the mass range 1 to 110 amu.

The LMP then erects the central station sunshade assembly, puts up the antenna, aligns the antenna to point at earth, and requests establishment of MCC - ALSEP communication. He removes a dummy load from the RTG package to supply power to ALSEP.

The LEAM is carried on a separate subpallet that was on the RTG package. This experiment is a sensor for primary dust particle impacts, as well as ejecta particle impacts (from meteoroid events). It has an earth-commanded jettison-able-detector plate cover. The LMP deploys its legs, aligns the box with respect to a shadow cast by an integral gnomon, and bubble levels it.

The LMP continues his ALSEP task by retrieving the subpallet the HFE experiment was attached to. The subpallet forms a base for the whip antenna of the Lunar Seismic Profiling Experiment. This antenna sends the signals to the deployable explosive charges the crew will scatter about the site which detonates them.

The LMP picks up some supplies to enable him to take samples, dons a camera, and prepares to deploy the geophone array, the sensors which transduce the shocks of the detonating explosive packages. The array is kite or T-shaped, with the geophone module (it now becomes a terminal box) at the cross of the T. A geophone is placed at each end of the cross-bar, 100 meters apart, a 3rd phone is deployed due south at 29 meters, and the last at 85 meters distant south of the geophone module.

The finished ALSEP array is depicted schematically in Fig. 3.1-5.

The LMP proceeds to photographically document the array, as the CDR finishes his HFE deployment.

The CDR moves from HFE deployment to drilling the deep (4 meter) core. He uses sections of titanium core stems, in four sets of two 41 cm stems each. The site is about 18 meters north of the HFE area. The ALSD is used for this operation, too.

After all 8 stems are in the ground, the CDR utilizes a jack to pull the string out of the ground. In its place he deposits the Neutron Flux Experiment (NFE), a two-part rod with material to capture neutron tracks. The experiment is recovered at the end of EVA 3. The NFE is emplaced either by hand, by hammering, or by using the versatile ALSD. See Fig. 3.6-4 for details of this experiment.

The CDR winds up his ALSEP site tasks by disassembling 3 of the 7 joints of the core string. He uses the wrench and a special vise on the aft pallet of the LRV. Each section is capped and put aside, ready to be returned to the spacecraft.

Although the CDR and LMP are nominally independent in all their ALSEP operations, they may very well assist one another, particularly in core drilling, recovery, and neutron flux deployment.

Following this operation, the two crewmen prepare for their traverse to Station 1. The PLSS's are loaded with bags and equipment, and the LMP offloads one of the explosive packages. This package will be carried on his lap and deployed directly off the LRV on the way to Station 1.

Then the LMP carries the core stems back to the LM, while the CDR mounts the LRV, initializes the navigational system, and drives to the Surface Electrical Properties Experiment area (SEP).

The LMP drops off the core stems at the LM, unstows the SEP transmitter, and carries this unit out to the SEP site, 100 meters east of the LM.

It should also be mentioned that throughout this EVA, at the LM, at ALSEP, and at SEP, the Traverse Gravimeter is actuated to make measurements of the local gravity force. Each station visited also involves a gravimeter measurement as well.

Objectives for the EVA 1 traverse are to investigate and sample the dark mantle and the plains material, emplace seismic profiling charges, and obtain traverse gravimeter measurements. Figure 3.1-6 shows the route of the traverse across the dark mantle material southeastward to station 1. Enroute to station 1, a short stop is made (noted by the X) to emplace the 1 pound explosive charge for the Seismic Profiling experiment. Station 1 duration is 66 minutes and details of the station objectives and activities are shown in Figure 3.1-7. A 3 pound charge is deployed at Station 1. Leaving station 1, the traverse returns along the same

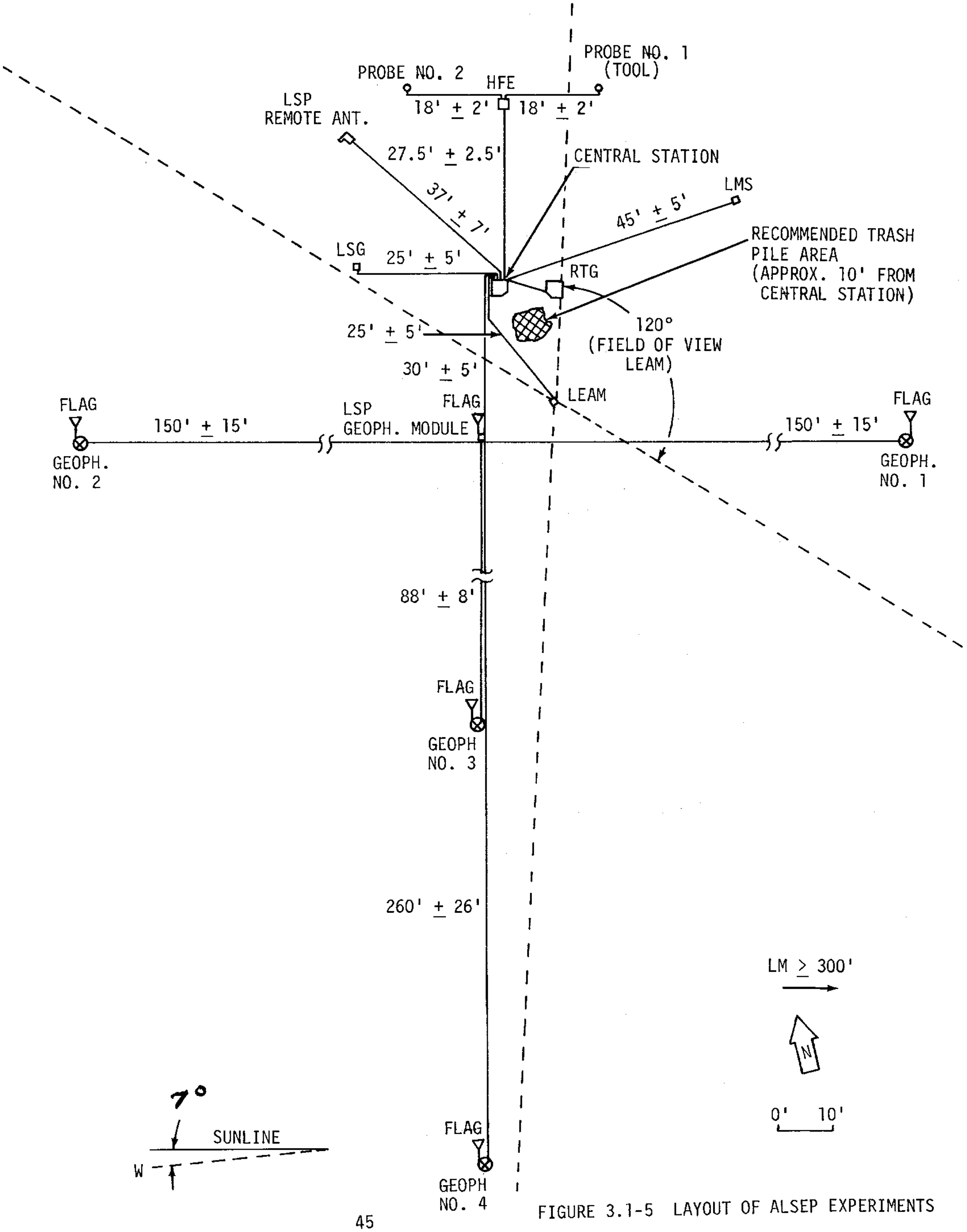


FIGURE 3.1-5 LAYOUT OF ALSEP EXPERIMENTS

path. The crew returns to the LM with a short stop enroute to emplace the 1/2 pound explosive charge.

The crew returns to the SEP deployment site to deploy the SEP Transmitter. The CDR drops off the LMP, and proceeds to lay out the SEP transmitter antenna array with LRV tracks. He maneuvers the LRV in an X-shaped pattern aligned to the cardinal points of the compass.

The SEP uses rf radiation from 1-32MHz and an alternately rotated energy plane to derive data on subsurface layering and structure. The transmitter uses two orthogonal dipole antennas (the X-array) deployed along the ground. The receiver is mounted on the LRV. A recorder accepts both receiver data and LRV navigational data. Hence, the finished SEP recording will reflect a three-dimensional rf reflection profile of the Taurus-Littrow area.

The LMP places the transmitter in the center of the "X" traced by the LRV. The CDR parks the LRV, joins the LMP, and helps deploy the antenna. The LMP is photographed by the CDR as they reach opposite ends of each dipole, hence provided complete documentation of the array. The LMP completes the SEP transmitter deployment by unfolding the solar panels and turning the transmitter to STANDBY. The unit will be operational on EVA 2.

Closeout activites include unloading the PLSS tool carriers, packing up the cameras and magazines, and loading the sample return container. The SRC, extra sample bags, the core stems, the bag of cameras, and a pallet of PLSS expendables and food are transferred to the ascent stage. The LMP precedes the CDR into the ascent stage to implement these transfers. The CDR dusts, then shuts down the television/communications system, takes a final traverse gravimeter measurement, and ingresses the spacecraft. Repressurization is then initiated to end EVA 1.

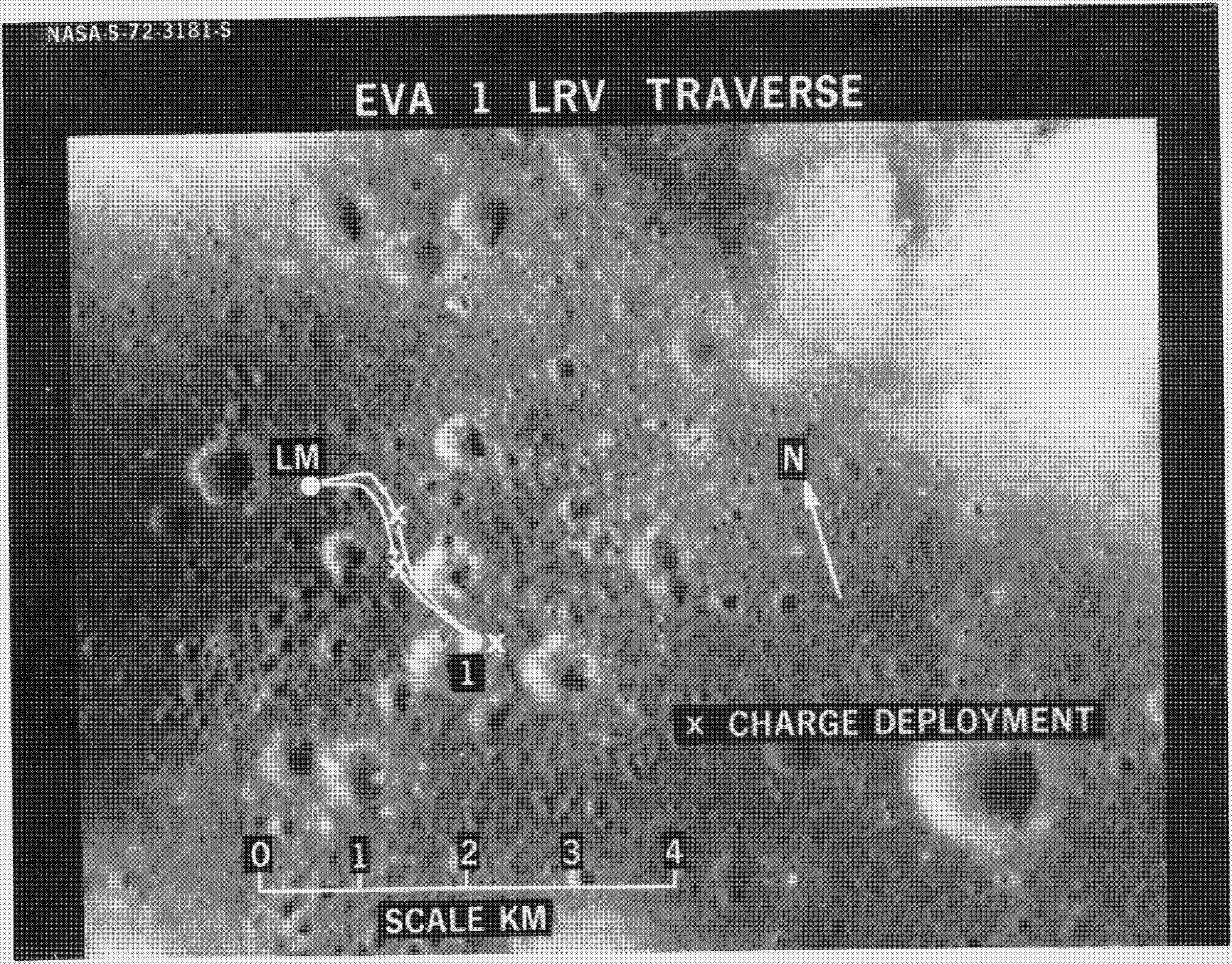


FIGURE 3.1-6 EVA 1 LRV traverse.

FIGURE 3.1-7: STATION 1 TASKS

EVA-1 Station 1 Station time 1+06

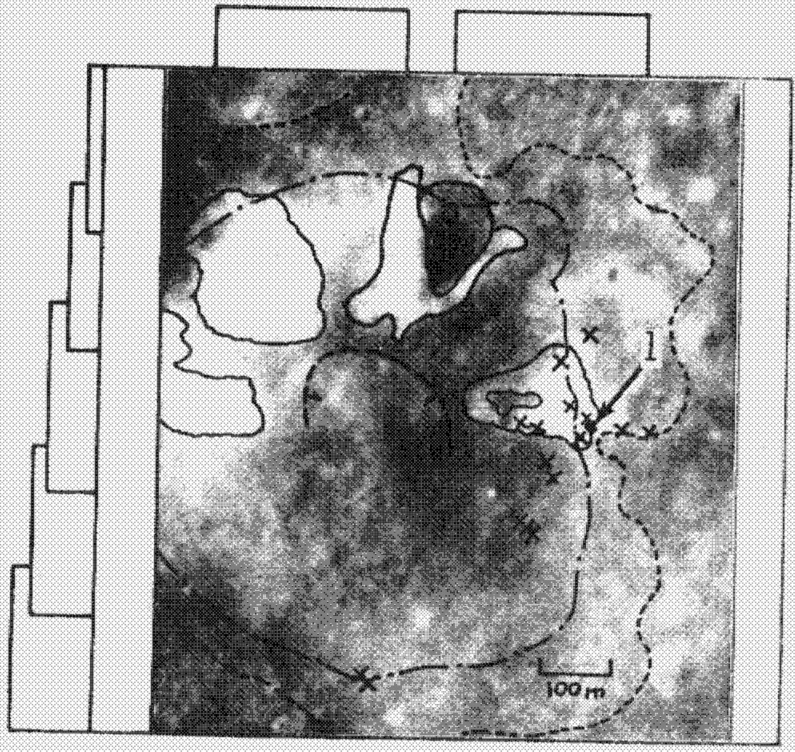
Location: East rim of 650 m crater at boundary between dark mantle and blocky subfloor material.

Geologic setting: Subfloor material is exposed in parts of the crater wall and rim as ejecta, talus, and perhaps outcrop. The subfloor unit is interpreted as basin-filling material such as lava flows, impact breccias, impact melts, or colluvial deposits emplaced after formation of the landing site valley. The original valley floor upon which the subfloor unit was deposited may have consisted of the upper part of the massif or sculptured hills units, and these materials may have been included in the ejecta at station 1.

Dark mantle covers the floor and parts of the crater wall and rim. Unusually dark mantle that could represent a younger or thicker (and hence less mixed) mantle deposit covers the southern half of the crater. Its northern boundary crosses the crater floor and wall as a distinct nearly straight line. An additional small patch of very dark mantle occurs on the north wall and rim of the crater. The dark mantle may be young, fine grained pyroclastic material derived from abundant, small vents that are generally unidentifiable in the orbital photographs.

Objectives:

- Characterize subfloor material
- Investigate historical sequence and mode of origin of dark mantle



EVA-1 - Station 1 continued

Tasks *	Rationale
•Observe/photograph crater walls, rims, ejecta	•Origin of crater
Subfloor:	
•Blocks •Observe/photograph structures and textures in several blocks in both bright and dark portions of crater rim •Documented samples	•Block structure and lithology as recorded in photographs and samples provide data on variety and interrelations of rock types and on origin and history of subfloor unit; lithologic distinction across albedo boundary would suggest high angle contact between distinct subfloor units.
•Rocks and soils •Documented samples •Rake	•Supplemental to block sampling; increases probability of comprehensively sampling subfloor materials.
•Pan	•Location; setting; crater wall structures; plains--dark mantle relationships
Dark mantle:	
•Observe/photograph dark mantle--very dark mantle-subfloor contacts	•Geometry and origin of mantle
•Documented samples - dark mantle and very dark mantle	•Composition; age; mixing
•Rake-very dark mantle	•Texture of mantle permitting, rake might optimize collection of scattered lithic fragments
•Trench - dark mantle--very dark mantle contact; very dark mantle--subfloor contact	•Geometry and origin of mantle units; relative amounts of regolith development
•Double core in very dark mantle near contact with dark mantle	•Stratigraphy; contact attitude; regolith history; sampling undisturbed mantle material
•Observe/photograph mantle--block relationships	•Chronology of blocks and mantle; origin of mantle
•Observe/photograph contrasting light and dark areas elsewhere on crater rim (especially dark patch on north rim)	•Possible clues to origin of mantle
•Pan	•Stereoscopic view (with earlier pan) of crater wall, very dark mantle contact crossing crater

---

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

Station 1 Timeline

EVA-1

1+06

	CDR	LMP
Initial overhead	5	5
Observation	10	10
•Crater, rim, ejecta, wall (500 mm)		
•Blocks, characterize and compare		
•relate to subfloor		
•Subfloor and mantle contacts		
•Block-mantle relationships		
•Regolith development		
Subfloor	21	21
•Documented sampling-emphasis on blocks		
•Rake/soil (kg)		
•Pan		
Subfloor and mantle contacts	14	14
•Exploratory trench and photographs		
•Double core in youngest unit		
Very dark mantle	7	7
•Documented sample		
•Rake/soil (kg)		
•Pan		
Dark mantle	3	5
•Documented sample		
Seismic charge deploy	2	
Final overhead	4	4
	66	66

3.1.2 EVA-1 TRAVERSES

This section is comprised of a tabular summary of the EVA 1 activities. Table 3.1-1 provides calculated data on distances, velocities, and times as the crew progresses through ALSEP deployment, SEP deployment, and station stops. The tabular data also show the time and location of the three explosive charges deployed on EVA 1.

The table also provides traverse contingency information, LRV - or PLSS - malfunctioned walkbacks or ridebacks. Table 3.1-2 lists input data for the program that generated Table 3.1-1.

Finally, Table 3.1-3 provides the basic assumptions inherent in the layout of the EVA traverses. These assumptions hold for all 3 EVA's, and this table will be repeated in Sections 3.2 and 3.3 for the reader's convenience.

TABLE 3.1-1 APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 CALCULATED DATA OCT 25 1972

EVA START 116:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	LRV MOBILITY RATE (KM/HR)	RIDE TIME (MIN)	TOTAL TRAVEL DISTANCE (KM)	ARRIVE STATION EVA TIME (HR+MIN)	STOP TIME (HR+MIN)	DEPART STATION EVA TIME (HR+MIN)
LM				0.00	0+ 0	1+45	1+45
ALSEP				0.00	1+45	2+21	4+ 6
SEP							
RIDE	1.43	7.30	12				
1*CHG				1.43	4+18	0+ 3	4+21
R=1.3							
RIDE	0.98	7.30	8				
1				2.41	4+29	1+ 6	5+35
3*CH							
R=2.3							
RIDE	1.65	7.30	14				
1/2*CH				4.06	5+48	0+ 3	5+51
R=0.8							
RIDE	0.76	7.30	6				
SEP				4.82	5+58	0+22	6+20
LM				4.82	6+20	0+40	7+ 0
TOTALS			40			6+20	7+ 0

---------------- TRAVERSE CONTINGENCIES --------------

		-----------LRV FAILURE---------------				--PLSS FAILURE--		
			STATION MARGIN ABOVE WALKBACK REQUIREMENTS			MIN LRV RIDEBACK SPEED REQUIRED		
STAT NO	RETURN DISTANCE TO LM (KM)	WALKBACK TIME TO LM (HR+MIN)	FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
ALSEP	0.10	0+ 2	3+26	3+ 8	3+14	0.10	0.12	1050.00
SEP	0.10	0+ 2	3+26	3+ 9	3+14	0.10	0.12	1050.00
1*CHG	1.51	0+25	2+39	2+21	2+36	1.47	1.75	1026.31
R=1.3								
1	2.49	0+41	1+ 3	0+44	1+ 6	2.42	2.88	999.81
3*CH								
R=2.3								
1/2*CH	0.84	0+14	1+34	1+16	1+17	0.82	0.97	982.02
R=0.8								
SEP	0.10	0+ 2	1+26	1+ 7	1+ 1	0.10	0.12	978.85
LM	0.00	0+ 0	1+ 7	0+49	0+45	0.00	0.00	985.64

TABLE 3.1-2 APOLLO 17 TAURUS LITTROW TRAVERSES

```
   EVA 1                       INPUT DATA                    OCT 25 1972

                       EVA START 116:40 HR:MIN GET

            STOP    SEGMENT    RETURN     HEAT    -MOBILITY RATES-  MET RATE
 STATION    TIME    DISTANCE  DISTANCE    LEAK      WALK      RIDE     WALK
   NO    (HR+MIN)    (KM)       (KM)    (BTU/HR)  (KM/HR)  (KM/HR)  (BTU/HR)

  LM        1+45      0.00       0.00      0.00     ****      ****   ******
  ALSEP     2+21      0.00       0.10      0.00     3.60      7.30   1560.0
  SEP
  1#CHG     0+ 3      1.43       1.51      0.00     3.60      7.30   1560.0
  R=1.3
  1         1+ 6      0.98       2.49      0.00     3.60      7.30   1560.0
  3#CH
  R=2.3
  1/2#CH    0+ 3      1.65       0.84      0.00     3.60      7.30   1560.0
  R=0.8
  SEP       0+22      0.76       0.10      0.00     3.60      7.30   1560.0
  LM        0+40      0.00       0.00      0.00     3.60      7.30   1560.0
```

```
MET RATE MET RATE MET RATE MET RATE   LEAK      EVA       EVA      OPS
 ALSEP    RIDING   STATION  LM O/H   RATE O2   START     START    TIME
(BTU/HR) (BTU/HR) (BTU/HR) (BTU/HR)  (LB/HR) (F/W-LB)  (O2-LB)   (MIN)

1050.00   550.00   950.00  1050.00    0.020    10.86     1.403    61.8
```

TABLE 3.1-3

LRV TRAVERSE ASSUMPTIONS

1. 30 MINUTES RESERVES MAINTAINED ON ALL PLSS CONSUMABLES AT STATION METABOLIC RATE
2. ALL DISTANCES AND SPEEDS ARE MAP DISTANCES AND MAP SPEEDS (MOBILITY RATES)
3. REQUIRED RATE = RETURN DISTANCE/AVAILABLE OPS RIDING TIME
   AVAILABLE OPS RIDING TIME = TOTAL OPS TIME LESS ALLOWANCES
   ALLOWANCES $\begin{cases}\text{5 MIN BSLSS HOOKUP}\\ \text{13 MIN LM INGRESS}\end{cases}$
4. TIME MARGIN AT STATION METABOLIC RATE
   STATION MARGIN = TIME REMAINING AFTER ALLOWANCE FOR 10 MINUTES AT LRV, WALKBACK, AND 13 MINUTES INGRESS
5. FINAL LM O/H MARGIN = TIME REMAINING WITH NO ALLOWANCES
6. RESPIRATORY EXCHANGE QUOTIENT = 0.9
7. FEEDWATER HEAT OF VAPORIZATION 1038 $\frac{\text{BTU}}{\text{LB}}$

3.1.3 DETAILED EVA 1 TIMELINE PROCEDURES

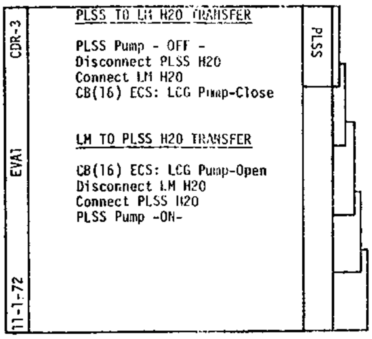
The detailed procedures for EVA 1 are shown on the following vertical format pages. The crew cuff check list pages which correspond approximately to the timeline are shown on the far left-hand side of the facing Voice Data Plan pages that accompany each page of the vertical timeline. Each page corresponds to 20 minutes of lunar surface time.

These data assure that the required information is given by the crew to MCC and assists Capcom in essential communications with the crew. The crew's cuff check list does not necessarily correspond to the vertical timeline in content or in terminology. The checklist is a crew preference item, and thus contains those cues and information that the crew feels it needs to accomplish the required tasks.

CREW EVA CHECKLIST

VOICE DATA

EVA 1

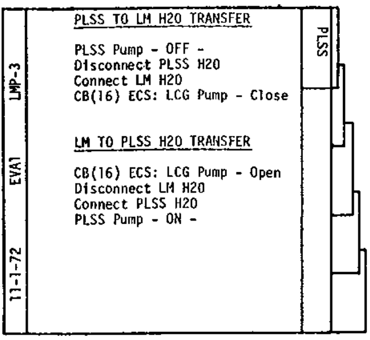


PLSS TO LM H2O TRANSFER

PLSS Pump - OFF -
Disconnect PLSS H2O
Connect LM H2O
CB(16) ECS: LCG Pump-Close

LM TO PLSS H2O TRANSFER

CB(16) ECS: LCG Pump-Open
Disconnect LM H2O
Connect PLSS H2O
PLSS Pump -ON-

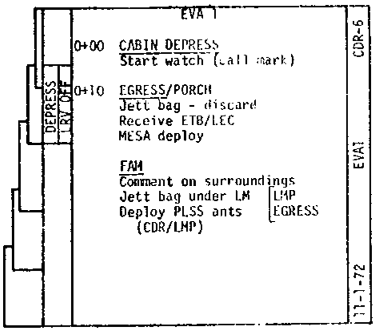


PLSS TO LM H2O TRANSFER

PLSS Pump - OFF -
Disconnect PLSS H2O
Connect LM H2O
CB(16) ECS: LCG Pump - Close

LM TO PLSS H2O TRANSFER

CB(16) ECS: LCG Pump - Open
Disconnect LM H2O
Connect PLSS H2O
PLSS Pump - ON -

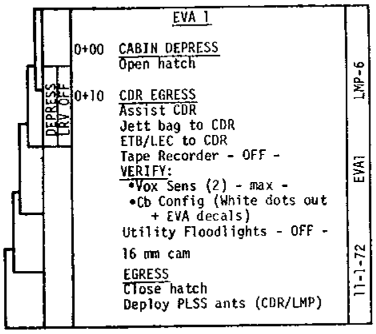


EVA 1

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
Receive ETB/LEC
MESA deploy

FAM
Comment on surroundings
Jett bag under LM
Deploy PLSS ants
(CDR/LMP)
LMP EGRESS



EVA 1

0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB/LEC to CDR
Tape Recorder - OFF -
VERIFY:
•Vox Sens (2) - max -
•Cb Config (White dots out + EVA decals)
Utility Floodlights - OFF -
16 mm cam
EGRESS
Close hatch
Deploy PLSS ants (CDR/LMP)

CODE:

(1) Mandatory requirement for data at time or event designated

(2) Data may be deferred until later in EVA or debriefing

AT START OF EVA:

SUN ANGLE ~ 14.5°

LM SHADOW ~ 26.2 m (86.5 ft)

ASTRONAUT SHADOW ~ 5.2 m (17.1 ft)

0+00 (1) CDR/LMP EVA watch start - MARK ________

(2) ETB CONTENTS
- 500MM CAM with MAG ____R
- LMP HEDC with MAG _____ (A)
- 2-70 MM MAGS _____ (B) _____ (C) HCEX
- 2-70 MM MAGS _____ (G) _____ (H) HBW
- MAPS, LRV Ck List, sun compass
- Map holder
- BSLSS/OPS Ant • Cosmic Ray Exp.
- 2 Lens brushes
- 20 - DSBD Camera shoe
- Tape & Scissors

(2) LMP - Verify CB config OK

0+10

APOLLO 17

NOMINAL TIMELINE

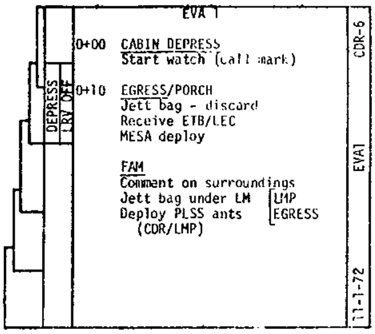
LUNAR SURFACE EVA 1

PRELIMINARY
SEPTEMBER 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
PRE-EGRESS OPERATIONS PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS START EVA WATCH (CALL MARK)		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		NOTE: DETAILED PROCEDURES ARE PRESENTED IN 'LUNAR SURFACE CHECKLIST' EQUIPMENT PREP - EVA 1 SECTION			
EGRESS OPERATIONS	0+10				

CREW EVA CHECKLIST

EVA 1

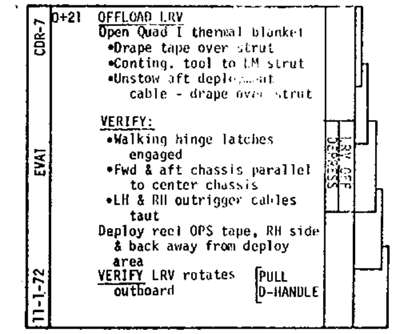


EVA 1

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
Receive ETB/LEC
MESA deploy

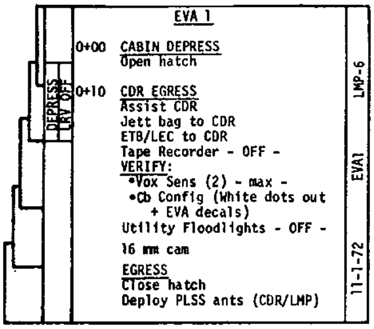
FAM
Comment on surroundings
Jett bag under LM
Deploy PLSS ants
(CDR/LMP)
[LMP EGRESS



0+21 OFFLOAD LRV
Open Quad I thermal blanket
- Drape tape over strut
- Conting. tool to LM strut
- Unstow aft deployment cable - drape over strut

VERIFY:
- Walking hinge latches engaged
- Fwd & aft chassis parallel to center chassis
- LH & RH outrigger cables taut

Deploy reel OPS tape, RH side & back away from deploy area
VERIFY LRV rotates outboard
[PULL D-HANDLE



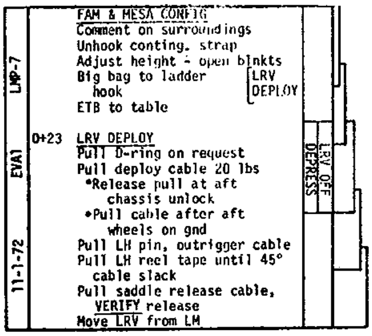
EVA 1

0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB/LEC to CDR
Tape Recorder - OFF -
VERIFY:
- Vox Sens (2) - max -
- Cb Config (White dots out + EVA decals)

Utility Floodlights - OFF -
16 mm cam

EGRESS
Close hatch
Deploy PLSS ants (CDR/LMP)



FAM & MESA CONFIG
Comment on surroundings
Unhook conting. strap
Adjust height - open blnkts
Big bag to ladder hook
ETB to table
[LRV DEPLOY

0+23 LRV DEPLOY
Pull D-ring on request
Pull deploy cable 20 lbs
- Release pull at aft chassis unlock
- Pull cable after aft wheels on gnd

Pull LH pin, outrigger cable
Pull LH reel tape until 45° cable slack
Pull saddle release cable, VERIFY release
Move LRV from LM

VOICE DATA

0+10 (1) LMP - Deploy CDR PLSS Antenna

(1) LMP - LM Switches
- Power Amp Sw - OFF
- Bit Rate Sw - LOW
- Modulation Sw - PM

(1) CDR - Deploy LMP PLSS Antenna

0+20 (1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) LRV: Verify during offload & setup
- Walking hinges engaged
- Fwd, aft, & center chassis parallel
- Outrigger cables taut
- LRV rotates o/b when D-handle pulled
- Front & rear hinge pins & steering seal OK
- Battery covers closed

0+30

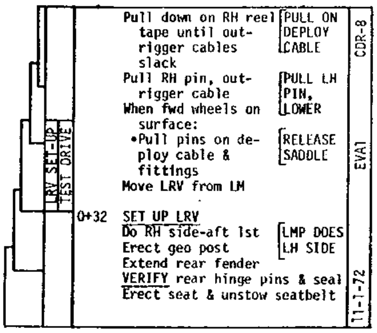
MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
OPEN HATCH ASSIST CDR EGRESS DEPLOY CDR PLSS ANTENNA HAND JETTISON BAG TO CDR	0+10	EGRESS OPERATIONS EGRESS CABIN TO LM PORCH			
		RECEIVE & JETTISON BAG			
HAND ETB/LEC TO CDR TAPE RECORDER-OFF-		RECEIVE ETB/LEC			
VERIFY: VOX SENS (2) - 'MAX' CB CONFIG		DESCEND LADDER TO TOP RUNG			
UTILITY FLOODLIGHTS - 'OFF'		UNLOCK & DEPLOY MESA LOWER ETB ON LEC			
TURN ON 16 MM CAMERA					
		DESCEND LADDER TO SURFACE			
LMP EGRESS OPERATIONS EGRESS LM TO PORCH		HANG ETB ON LADDER HOOK			
PARTIALLY CLOSE LM HATCH		CHECK FOOTING, STABILITY & MOBILITY			
DESCEND LADDER TO SURFACE		KICK JETT BAG UNDER LM			
CHECK FOOTING, STABILITY, MOBILITY DEPLOY CDR ANT	0+20	DEPLOY LMP PLSS ANT			
OPEN MESA BLNKTS					
UNSTOW SAMPLE RETURN BAG		LRV DEPLOY			
HANG ON LADDER HOOK HANG ETB ON MESA TABLE		RELEASE LRV INSULATION BLANKET REMOVE CONTINGENCY DEPLOY RELEASE LH DEPLOY TAPE - HANG ON +Z STRUT CHECK: OUTRIGGER CABLE TAUT CHASSIS PARALLEL			
LRV DEPLOY ASCEND LADDER MONITOR LRV DEPLOY PREP		RELEASE DEPLOY CABLE-DEPLOY FULL LENGTH AT 45 DEG RELEASE RH DEPLOY TAPE-MOVE AWAY FROM LRV-HOLD TAPE AS LMP UNLOCKS LRV			
PULL D-HNDL TO UNLOCK LRV (OBSERVE 4 DEG ROT) DESCEND LADDER		PULL RH TAPE TO ROTATE LRV			
GRASP DEPLOY CABLE, MONITOR DEPLOYMENT, MAINTAIN CAUTION: SLACKEN TENSION AS AFT CHASSIS DEPLOYS UNTIL WHEELS TOUCH SURFACE		VERIFY AFT CHASSIS UNFOLDS & LOCKS, REAR WHEELS UNFOLD, REAR WHEEL STRUTS FREE & CONTINUE PULLING TAPE UNTIL FWD CHASSIS LOCKS INTO POSITION & WHEELS UNFOLD & SLACK IN OUTRIGGER CABLES			
		PULL PIN RR TO RELEASE CABLE - DISCARD PIN & CABLE			
	0+30				

CREW EVA CHECKLIST

EVA 1

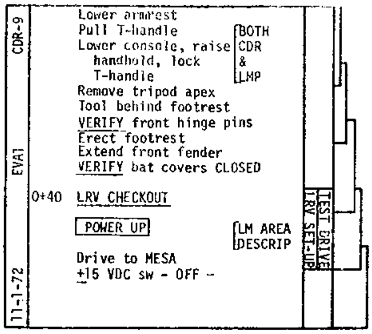
VOICE DATA



Pull down on RH reel tape until outrigger cables slack [PULL ON DEPLOY CABLE
Pull RH pin, outrigger cable [PULL LH PIN, LOWER
When fwd wheels on surface:
- Pull pins on deploy cable & fittings [RELEASE SADDLE

Move LRV from LM

0+32 SET UP LRV
Do RH side-aft 1st [LMP DOES LH SIDE
Erect geo post
Extend rear fender
VERIFY rear hinge pins & seal
Erect seat & unstow seatbelt

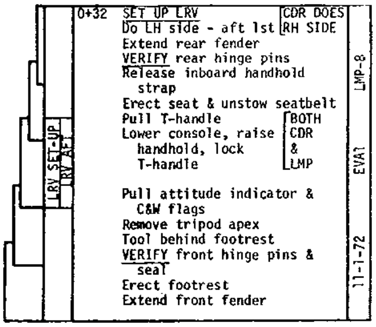


Lower armrest
Pull T-handle [BOTH CDR & LMP
Lower console, raise handhold, lock T-handle
Remove tripod apex
Tool behind footrest
VERIFY front hinge pins
Erect footrest
Extend front fender
VERIFY bat covers CLOSED

0+40 LRV CHECKOUT

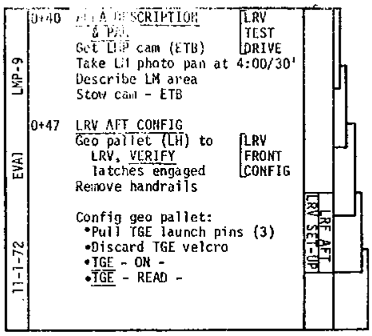
POWER UP [LM AREA DESCRIP

Drive to MESA
±15 VDC sw - OFF -



0+32 SET UP LRV [CDR DOES RH SIDE
Do LH side - aft 1st
Extend rear fender
VERIFY rear hinge pins
Release inboard handhold strap
Erect seat & unstow seatbelt
Pull T-handle [BOTH CDR & LMP
Lower console, raise handhold, lock T-handle

Pull attitude indicator & C&W flags
Remove tripod apex
Tool behind footrest
VERIFY front hinge pins & seal
Erect footrest
Extend front fender



0+40 AREA DESCRIPTION & PAN [LRV TEST DRIVE
Get LMP cam (ETB)
Take LM photo pan at 4:00/30'
Describe LM area
Stow cam - ETB

0+47 LRV AFT CONFIG
Geo pallet (LH) to LRV, VERIFY latches engaged [LRV FRONT CONFIG
Remove handrails

Config geo pallet:
- Pull TGE launch pins (3)
- Discard TGE velcro
- TGE - ON -
- TGE - READ -

0+30

(2) LMP - Area description

0+40

(1) CDR - Checkout LRV

Verify - PWM SEL Sw - BOTH

Read out displays:

Temp Bat 1	
Temp Bat 2	
Temp LF mtr	
Temp RF mtr	
Temp LR mtr	
Temp RR mtr	

Amp-Hr Bat 1	
Amp-Hr Bat 2	

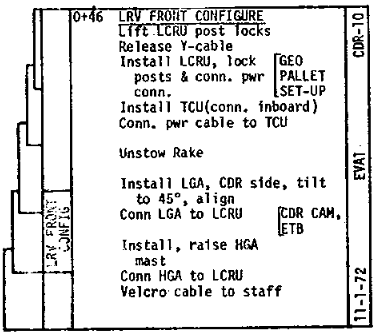
Volts:(1)_____(2)_______

0+50

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
HAND DEPLOY CABLE TO CDR	0+30	RETRIEVE DEPLOY CABLE FROM LMP & MAINTAIN TENSION TO SLIDE WHEELS AS REQD			
PULL PIN LR TO RELEASE CABLE - DISCARD PIN & CABLE PULL LH DEPLOY TAPE TO LOWER FRONT END		PULL PIN TO RELEASE DEPLOY CABLE-DISCARD			
PULL SADDLE RELEASE CABLE & VERIFY RODS FREE**					
SET UP LRV PICK UP & TURN LRV		SET UP LRV PICK UP & TURN LRV			
DEPLOY LR FENDER EXT CHECK LR HINGE PIN ENGAGED		ERECT GEO PALLET POST			
ERECT CDR SEAT & UNSTOW SEAT BELT RELEASE INBRD HNDHLD TIEDOWN		DEPLOY RR FENDER EXT CHECK RR HINGE PIN ENGAGED CHECK REAR STEERING RING			
		ERECT LMP SEAT & UNSTOW BELT LOWER ARMREST			
PULL T-HNDL, ROTATE 90 DEG, LOWER CONSOLE, RAISE HANDHOLD		PULL T-HNDL, ROTATE 90 DEG LOWER CONSOLE RAISE HANDHOLD			
ROTATE T-HNDL 90 DEG TO LOCK PULL & DISCARD ATTITUDE & C/W FLAGS		ROTATE T-HNDL 90 DEG TO LOCK REMOVE TRIPOD & STOW RIGHT TOEHOLD			
REMOVE TRIPOD & STOW LEFT TOEHOLD		CHECK RF HINGE PIN ENGAGED			
CHECK FRONT STEER DECOUPLE CHECK LF HINGE PIN ENGAGED		ERECT FOOTREST DEPLOY LF FENDER EXT			
ERECT FOOTREST DEPLOY LF FENDER EXT	0+40	VERIFY BATT COVERS CLOSED			
LM AREA DESC & PHOTO GET LMP CAM		LRV TEST DRIVE MOUNT LRV			
		FASTEN SEATBELT			
		POWER UP LRV PER DECAL			
		TEST DRIVE LRV AROUND LM			
DO LM AREA INSPECTION					
TAKE PHOTO PAN 30 FT FROM LM AT 4:00		POSITION LRV NEAR MESA			
STOW CAM IN ETB		+15 VDC SW-OFF- DISMOUNT LRV			
LRV AFT CONFIG REMOVE QUAD III THERM BLNKTS FROM PALLET OFFLOAD GEO PALLET		LRV FRONT CONFIG LIFT LCRU MTG POST LOCKS RELEASE Y-CABLE VELCRO TABS			
		UNSTOW TCU CONN - DISCARD ADAPTER			
MOUNT GEO PALLET ONTO LRV		UNSTOW LCRU			
	0+50				

**PUSH DOWN W/CONT DEPLOY TOOL IF REQD



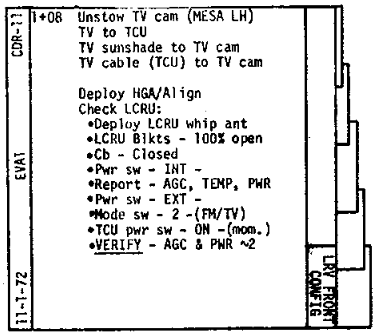
0+46 LRV FRONT CONFIGURE
Lift LCRU post locks
Release Y-cable
Install LCRU, lock posts & conn. pwr conn. [GEO PALLET SET-UP
Install TCU(conn. inboard)
Conn. pwr cable to TCU

Unstow Rake

Install LGA, CDR side, tilt to 45°, align
Conn LGA to LCRU [CDR CAM, ETB

Install, raise HGA mast
Conn HGA to LCRU
Velcro cable to staff

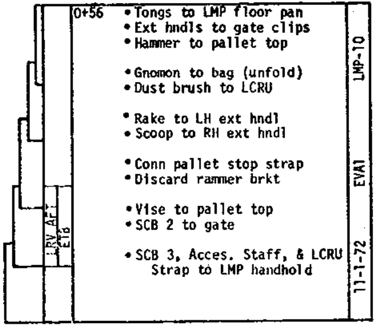
CDR-10
EVA1
11-1-72
LRV FRONT CONFIG



1+08 Unstow TV cam (MESA LH)
TV to TCU
TV sunshade to TV cam
TV cable (TCU) to TV cam

Deploy HGA/Align
Check LCRU:
- Deploy LCRU whip ant
- LCRU Blkts - 100% open
- Cb - Closed
- Pwr sw - INT -
- Report - AGC, TEMP, PWR
- Pwr sw - EXT -
- Mode sw - 2 -(FM/TV)
- TCU pwr sw - ON -(mom.)
- VERIFY - AGC & PWR ~2

CDR-11
EVA1
11-1-72
LRV FRONT CONFIG



0+56
- Tongs to LMP floor pan
- Ext hndls to gate clips
- Hammer to pallet top

- Gnomon to bag (unfold)
- Dust brush to LCRU

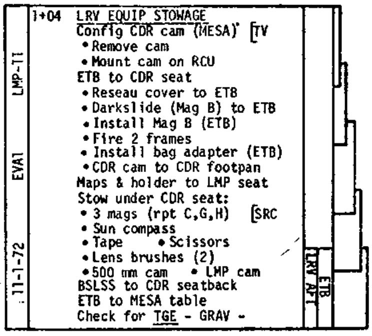
- Rake to LH ext hndl
- Scoop to RH ext hndl

- Conn pallet stop strap
- Discard rammer brkt

- Vise to pallet top
- SCB 2 to gate

- SCB 3, Acces. Staff, & LCRU Strap to LMP handhold

LMP-10
EVA1
11-1-72
LRV AFT ETB



1+04 LRV EQUIP STOWAGE
Config CDR cam (MESA) [TV
- Remove cam
- Mount cam on RCU

ETB to CDR seat
- Reseau cover to ETB
- Darkslide (Mag B) to ETB
- Install Mag B (ETB)
- Fire 2 frames
- Install bag adapter (ETB)
- CDR cam to CDR footpan

Maps & holder to LMP seat
Stow under CDR seat:
- 3 mags (rpt C,G,H) [SRC
- Sun compass
- Tape • Scissors
- Lens brushes (2)
- 500 mm cam • LMP cam

BSLSS to CDR seatback
ETB to MESA table
Check for TGE - GRAV -

LMP-11
EVA1
11-1-72
LRV AFT ETB

0+50

(1) LMP - TGE ON -

RDG:___ ___ ___

1+00

(1) LMP - CDR Cam Mag_______(B)

(1) LMP - Mags stowed

_____(C)_____(G)_____(H)

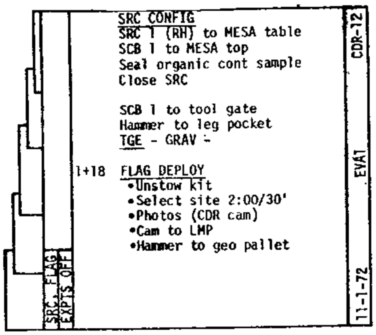
Lens brushes
Maps & holder
BSLSS
Bag shoe
Sun Compass
Tape
Scissors
500 mm Camera (Mag R)

1+10

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	0+50				
		MOUNT LCRU ON LRV			
		UNSTOW & CONNECT LCRU PWR CABLE-DISCARD ADAPTER			
REMOVE & DISCARD PALLET HANDRAILS		UNSTOW TCU			
REMOVE & DISCARD LAUNCH PINS & VELCRO ON TGE					
SET TGE ON / STBY SW TO -ON- READ DISPLAY TO MSC		MOUNT TCU ON LRV			
CONFIG TOOLS ON GEO PALLET *TONGS TO FLOOR *EXT HNDLS TO GATE *HAMMER *GNOMON *BAG STAFF TO HANDHOLD *DUST BRUSH TO LCRU		CONNECT TCU PWR CABLE			
		LRV ANT CONFIG UNSTOW RAKE TO CDR SEAT			
UNSTOW RAKE-MOUNT ON EXT HANDLE		OPEN LRV ANT CANISTER			
CONNECT PALLET STOP STRAP PUT SCB 2 ON GATE INSTALL SCOOP ON RH EXT HANDLE					
DISCARD DRIVE TOOL BRKT INSTALL VISE IN PALLET	1+00	UNSTOW LGA FROM CANISTER			
		MOUNT LGA IN CDR HANDHOLD			
		POINT LGA TO EARTH DEPLOY & CONNECT LGA CABLE			
PUT SCB 3 ON BAG STAFF - SECURE OPEN W/LCRU STRAP		UNSTOW HGA FROM CANISTER			
LRV MISC EQUIP STOWAGE UNSTOW CDR CAM FROM MESA					
MOUNT CDR CAM ON RCU RETRIEVE ETB - TO CDR FOOTPAN		MOUNT HGA ON LRV			
REMOVE & STOW RESEAU COVER IN ETB		ROTATE ANTENNA & EXTEND MAST			
PULL SLIDE, MAG B		UNSTOW CABLE, DISCARD FOAM			
INSTALL MAG B ON CDR CAM FIRE 2 FRAMES		CONNECT HGA CABLE TO LCRU			
INSTALL SAMPLE BAG ADAPTER PUT CDR CAM ON FOOTPAN PUT MAPS & HOLDER ON LMP SEAT		VELCRO CABLE TO STAFF			
		LRV TV CONFIG UNSTOW TV FROM MESA, CARRY TO LRV			
STOW 3 70 MM MAGS UNDER CDR SEAT (C,G,H)		MOUNT TV ON TCU-HORIZONTAL UNSTOW SUNSHADE - INSTALL ON TV CW TO AFT			
STOW 500 CAM UNDER CDR SEAT	1+10				

CREW EVA CHECKLIST

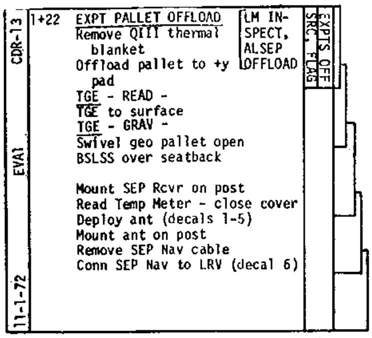

CDR-12

SRC CONFIG
SRC 1 (RH) to MESA table
SCB 1 to MESA top
Seal organic cont sample
Close SRC

SCB 1 to tool gate
Hammer to leg pocket
TGE - GRAV -

1+18 FLAG DEPLOY
- Unstow kit
- Select site 2:00/30'
- Photos (CDR cam)
- Cam to LMP
- Hammer to geo pallet

SRC, FLAG
EXPTS OFF
EVA1
11-1-72

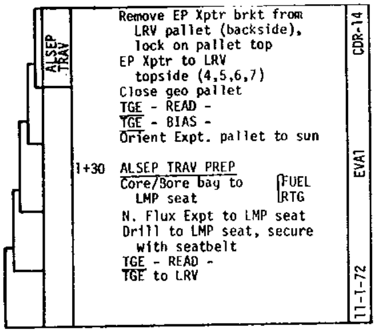

CDR-13

1+22 EXPT PALLET OFFLOAD
Remove QIII thermal blanket
Offload pallet to +y pad
TGE - READ -
TGE to surface
TGE - GRAV -
Swivel geo pallet open
BSLSS over seatback

LM INSPECT, ALSEP OFFLOAD

Mount SEP Rcvr on post
Read Temp Meter - close cover
Deploy ant (decals 1-5)
Mount ant on post
Remove SEP Nav cable
Conn SEP Nav to LRV (decal 6)

SRC, FLAG
EXPTS OFF
EVA1
11-1-72

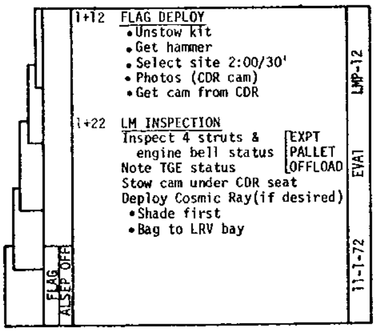

CDR-14

ALSEP TRAV

Remove EP Xptr brkt from LRV pallet (backside), lock on pallet top
EP Xptr to LRV topside (4,5,6,7)
Close geo pallet
TGE - READ -
TGE - BIAS -
Orient Expt. pallet to sun

1+30 ALSEP TRAV PREP
Core/Bore bag to LMP seat
FUEL RTG
N. Flux Expt to LMP seat
Drill to LMP seat, secure with seatbelt
TGE - READ -
TGE to LRV

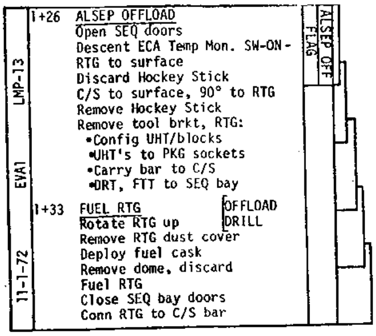
EVA1
11-1-72


LMP-12

1+12 FLAG DEPLOY
- Unstow kit
- Get hammer
- Select site 2:00/30'
- Photos (CDR cam)
- Get cam from CDR

1+22 LM INSPECTION
Inspect 4 struts & engine bell status
Note TGE status
EXPT PALLET OFFLOAD
Stow cam under CDR seat
Deploy Cosmic Ray(if desired)
- Shade first
- Bag to LRV bay

FLAG
ALSEP OFF
EVA1
11-1-72


LMP-13

1+26 ALSEP OFFLOAD
Open SEQ doors
Descent ECA Temp Mon. SW-ON-
RTG to surface
Discard Hockey Stick
C/S to surface, 90° to RTG
Remove Hockey Stick
Remove tool brkt, RTG:
- Config UHT/blocks
- UHT's to PKG sockets
- Carry bar to C/S
- DRT, FTT to SEQ bay

1+33 FUEL RTG
Rotate RTG up
OFFLOAD DRILL
Remove RTG dust cover
Deploy fuel cask
Remove dome, discard
Fuel RTG
Close SEQ bay doors
Conn RTG to C/S bar

FLAG
ALSEP OFF
EVA1
11-1-72

VOICE DATA

EVA 1

1+10 (1) CDR/LMP - EMU CHECK

	CDR	LMP
O2		
FLAGS		
PRESS		
COOL		

(1) CDR - LCRU covers open 100%

Report LCRU:

AGC ________

POWER ________

TEMPS ________

AGC(Verify 2)

1+20

(1) CDR-TGE-GRAV ________

(1) LMP - Comment on soil effects, LM condition, LM strut stroking

(1) CDR - TGE Rdg _ _ _ _ _ _ _ _ _ _

(1) CDR - TGE - GRAV ________

(1) CDR - SEP RCVR Temp ________

(1) LMP - Report EP Pallet ________

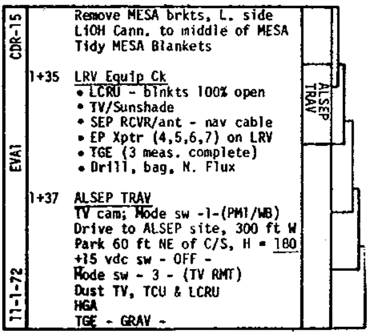
(1) LMP - DES ECA Temp Monitor Sw - ON

(1) CDR - TGE Rdg _ _ _ _ _ _ _ _ _ _

1+30 (1) CDR - TGE BIAS ________

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
STOW TAPE & SCISSORS IN CDR SEAT PUT BOTH CAMERAS UNDER CDR SEAT ALSO 2 LENS BRUSHES, COMPASS STOW BSLSS ON CDR SEAT	1+10	CONNECT TV PWR CABLE FROM TCU TIP HGA AFT, DEPLOY DISH & LOCK			
STOW ETB ON SRC TABLE		POINT HGA AT EARTH, REALIGN AS REQUIRED			
FLAG DEPLOY UNSTOW FLAG KIT, OPEN, PLACE ON MESA		CONFIGURE LCRU: *DEPLOY WHIP *LCRU BLKTS-100% OPEN *CB-'CLOSED' *POWER SW-'INT' *VERIFY AGC *REPORT-AGC, TEMP, PWR *PWR SW-'EXT' *MODE SW-2 *TCU PWR SW-ON (MOM.)			
REMOVE STAFF & GET HAMMER					
SELECT SITE 2:00/30' DRIVE STAFF INTO SURFACE		SRC 1 CONFIG UNSTOW SRC 1			
DEPLOY FLAG-EXTEND MAST & SPAR		PLACE SRC ON MESA TABLE OPEN SRC 1 REMOVE SCB 1-PLACE ON MESA			
MOUNT FLAG IN BASE STAFF		SEAL ORGANIC CONTROL SAMPLE & LEAVE IN SRC TAKE SCB 1 TO TOOL GATE			
GET CDR 70MM CAM		PUT HAMMER IN LEG POCKET PRESS 'GRAV' ON TGE			
PHOTO CDR/FLAG		FLAG DEPLOY POSE WITH FLAG RECEIVE CAM FROM LMP			
GIVE CAM TO CDR POSE WITH FLAG	1+20	PHOTO LMP/FLAG & HAND CAM TO LMP			
RECEIVE CAM FROM CDR					
LM INSPECTION DO LM INSPECTION, PHOTO UNUSUAL CONDITIONS		LRV MISC OPR			
INSPECT 4 STRUTS & ENGINE		OPEN QUAD III THERMAL BLNKT UNSTOW PALLET-PLACE ON +Y FOOTPAD			
NOTE TGE STATUS					
STOW CAM UNDER CDR SEAT		PRESS READ-READ TGE DISPLAY			
		PLACE TGE ON SURFACE, LEVEL PRESS GRAV PB-NOTE FLASH OPEN PALLET-BSLSS OVER SEATBACK			
ALSEP OFFLOAD OPEN SEQ BAY DOORS		MOUNT SEP RCVR ON LRV POST READ TEMP DEPLOY & ERECT SEP ANT			
POSITION DES ECA TEMP MON SW-ON UNLOCK PKG 2		MOUNT SEP ANT ON LRV POST REMOVE DUST CAP FROM LRV/SEP			
PULL LANYARD RELEASE RING REMOVE PKG 2 - PLACE ON SURFACE		CONNECT SEP NAV CABLE TO LRV REPOSITION BSLSS UNSTOW LSPE ADAPTER BRKT & MOUNT ON PALLET			
PULL PIN & DISCARD HOCKY STICK UNLOCK PKG 1		REMOVE LSPE CHARGE PALLET (4,5,6,7) MOUNT PALLET ON ADAPTER & CLOSE LRV PALLET			
PULL LANYARD RELEASE RING	1+30	PRESS READ-READ TGE DISPLAY PRESS BIAS PB-NOTE FLASH ORIENT EXPT PALLET TO SUN			

EVA 1



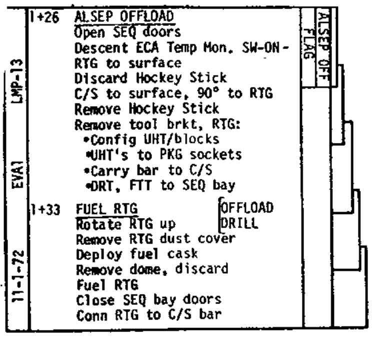
CDR-15 EVA1 11-1-72

Remove MESA brkts, L. side
LiOH Cann. to middle of MESA
Tidy MESA Blankets

1+35 LRV Equip Ck
- LCRU - blnkts 100% open
- TV/Sunshade
- SEP RCVR/ant - nav cable
- EP Xptr (4,5,6,7) on LRV
- TGE (3 meas. complete)
- Drill, bag, N. Flux

1+37 ALSEP TRAV
TV cam; Mode sw -1-(PM1/WB)
Drive to ALSEP site, 300 ft W
Park 60 ft NE of C/S, H = 180
+15 vdc sw - OFF -
Mode sw - 3 - (TV RMT)
Dust TV, TCU & LCRU
HGA
TGE - GRAV -

ALSEP TRAV



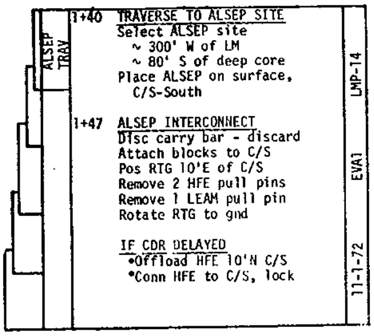
LMP-13 EVA1 11-1-72

1+26 ALSEP OFFLOAD
Open SEQ doors
Descent ECA Temp Mon. SW-ON-
RTG to surface
Discard Hockey Stick
C/S to surface, 90° to RTG
Remove Hockey Stick
Remove tool brkt, RTG:
- Config UHT/blocks
- UHT's to PKG sockets
- Carry bar to C/S
- DRT, FTT to SEQ bay

1+33 FUEL RTG
Rotate RTG up
Remove RTG dust cover
Deploy fuel cask
Remove dome, discard
Fuel RTG
Close SEQ bay doors
Conn RTG to C/S bar

OFFLOAD DRILL

ALSEP OFF FLAG



LMP-14 EVA1 11-1-72

1+40 TRAVERSE TO ALSEP SITE
Select ALSEP site
~ 300' W of LM
~ 80' S of deep core
Place ALSEP on surface, C/S-South

1+47 ALSEP INTERCONNECT
Disc carry bar - discard
Attach blocks to C/S
Pos RTG 10'E of C/S
Remove 2 HFE pull pins
Remove 1 LEAM pull pin
Rotate RTG to gnd

IF CDR DELAYED
- Offload HFE 10'N C/S
- Conn HFE to C/S, lock

ALSEP TRAV

1+30

(1) CDR - TGE Rdg __ __ __ __ __ __ __ __ __
& TGE back on LRV

(1) LMP - RTG Fueled ________

(1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) LMP - SEQ Bay Doors - CLOSED

1+40 (1) CDR - Mark LM Depart time ________

(1) CDR - At ALSEP site, LRV displays

		Temp Bat 1	
		Temp Bat 2	
		Temp LF mtr	
		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

(1) CDR - TGE - GRAV ________

1+50 (1) LMP - RTG cable temp Label reading ________(or report)

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

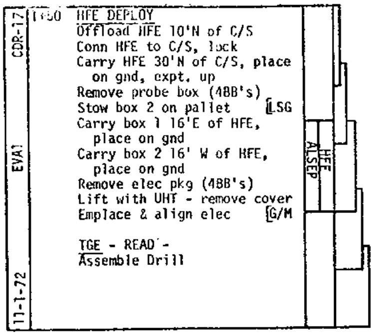
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
REMOVE PKG 1 - PLACE ON SURFACE, ROT 90 DEG	1+30	UNSTOW CORE/BORE STEM BAG & UNSTOW NEUTRON FLUX MONITOR CARRY TO LRV & STOW			
PULL PIN & REMOVE HOCKY STICK		OFFLOAD DRILL FROM MESA PLACE DRILL ON LMP SEAT PRESS READ-READ TGE DISPLAY STOW TGE ON LRV-ROTATE HNDL			
REMOVE & DISCARD TOOL BRKT ASSY CONFIG C/S BLOCKS STOW UHT'S ON PKG'S					
REMOVE & EXTEND CARRY BAR & INSTALL IN PKG 1 PLACE DRT & FIT IN SEQ BAY		REMOVE MESA BRACKETS LiOH CANN TO MIDDLE OF MESA TIDY MESA BLNKTS			
FUEL RTG POSITION PKG 2 FOR FUELING REMOVE RTG DUST COVER-DISCARD		LRV EQUIP CHECK *LCRU BLANKETS 100% OPEN LGA,HGA ALIGNED			
GET CASK LANYARD ROTATE FUEL CASK, DISCARD LANYARD		*TV SUNSHADE INSTALLED *SEP RCVR/ANT-NAV CABLE *LSP PALLET ON LRV			
GET DRT, REMOVE DOME READ TEMPILABEL-DISCARD DOME GET FIT-ENGAGE IN FUEL ELEMENT		*TGE (3 MEAS) *DRILL, BAG, NFE ON LRV			
REMOVE ELEMENT, FUEL RTG		ALSEP TRAV SWITCH LCRU - 'POS 1' (PM1/WB)			
REMOVE FIT-READ TEMP-DISCARD TIP PKG 2 UP		POS TV HORIZ CW & AFT MOUNT LRV-FASTEN SEATBELT			
CLOSE SEQ BAY DOORS ATTACH PKG 2 TO CARRY BAR		POWER UP LRV			
ALSEP TRAV CRADLE BARBELL IN CROOK OF ELBOW	1+40	DRIVE TO ALSEP SITE AREA			
CARRY ALSEP TO DEPLOY SITE & SURVEY SITE					
SELECT DEPLOY SITE FOR ALSEP**					
		POSITION LRV 60 FT NE C/S HEADING 180 +15 VDC SW - OFF - READ OUT DISPLAYS DISMOUNT LRV			
POSITION ALSEP PKG 1 SOUTH OF PKG 2 WITH PKG 1 IN DESIRED LOCATION		SWITCH LCRU - 'POS 3' (TV RMT) ORIENT HGA			
ALSEP INTERCONNECT (L) REMOVE PKG 1&2 FROM CARRY BAR & DISCARD CARRY BAR POSITION PKG 2 10 FT EAST C/S		DUST BATT COVERS & MIRRORS - TCU, CTV, LCRU			
PULL 2 HFE PULL PINS & LEAM ROTATE PKG 2 TO SURFACE RELEASE RTG CABLE REEL-3 BB'S ENGAGE UHT IN CABLE REEL READ TEMPILABEL (DO NOT TOUCH IF >250° = REPORT TO MCC)		DEPRESS GRAV PB ON TGE OBSERVE TGE INDICATOR CYCLING			
	1+50				

**300 FT W OF LM, 80 FT S OF LIKELY DRILL CORE SITE

CREW EVA CHECKLIST

VOICE DATA

EVA 1

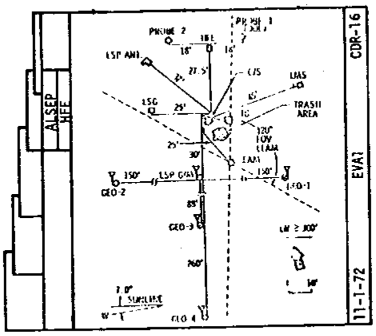


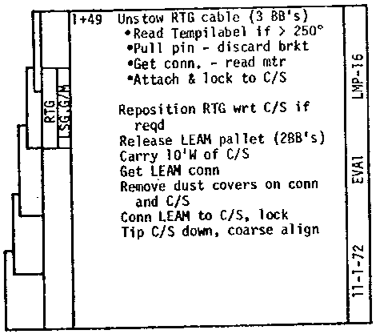
CDR-17 EVA1 11-1-72

1+50 <u>HFE DEPLOY</u>
Offload HFE 10'N of C/S
Conn HFE to C/S, lock
Carry HFE 30'N of C/S, place on gnd, expt. up
Remove probe box (4BB's)
Stow box 2 on pallet [LSG
Carry box 1 16'E of HFE, place on gnd
Carry box 2 16' W of HFE, place on gnd
Remove elec pkg (4BB's)
Lift with UHT - remove cover
Emplace & align elec [G/M

<u>TGE</u> - READ -
Assemble Drill

ALSEP HFE



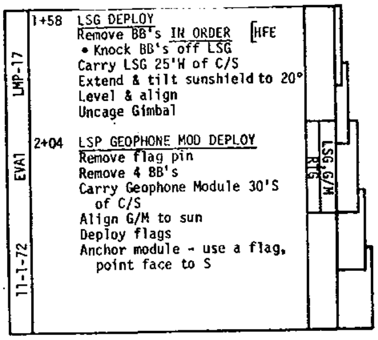


LMP-16 EVA1 11-1-72

1+49 Unstow RTG cable (3 BB's)
- Read Tempilabel if > 250°
- Pull pin - discard brkt
- Get conn. - read mtr
- Attach & lock to C/S

Reposition RTG wrt C/S if reqd
Release LEAM pallet (2BB's)
Carry 10'W of C/S
Get LEAM conn
Remove dust covers on conn and C/S
Conn LEAM to C/S, lock
Tip C/S down, coarse align

RTG LSG,G/M



LMP-17 EVA1 11-1-72

1+58 <u>LSG DEPLOY</u>
Remove BB's <u>IN ORDER</u> [HFE
- Knock BB's off LSG

Carry LSG 25'W of C/S
Extend & tilt sunshield to 20°
Level & align
Uncage Gimbal

2+04 <u>LSP GEOPHONE MOD DEPLOY</u>
Remove flag pin
Remove 4 BB's
Carry Geophone Module 30'S of C/S
Align G/M to sun
Deploy flags
Anchor module - use a flag, point face to S

LSG,G/M RTG

1+50

(1) LMP - Shorting SW - <u>SHORT</u> __________
Reading __________ AMPS

(2) LMP - RTG cable connected to
C/S __________ (time)

2+00

(1) CDR - Report if HFE Cables crossed

(1) LMP - LSG aligned and uncaged

(1) CDR - TGE Rdg _ _ _   _ _ _   _ _ _

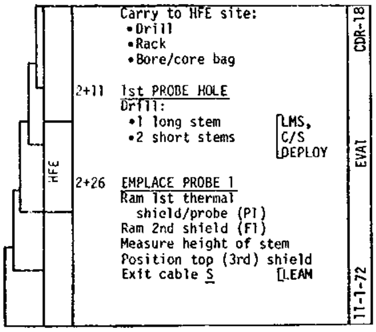
(1) LMP - Verify vent ring pulled

2+10

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
WALK TO PKG 1 DEPLOYING CABLE REMOVE SHORT PLUG FROM REEL, READ SHORTING PLUG METER TO MCC DISCARD SHORT PLUG DUST COVER DISCARD RTG C/S DUST COVER CONNECT SHORT PLUG TO C/S - ROTATE T-HANDLE REPOSITION RTG IT REQD RELEASE 2 LEAM PALLET BB'S ENGAGE UHT-REMOVE PALLET PLACE PALLET ON SURFACE 10 FT W C/S REMOVE LEAM CONN PULL PIN REMOVE LEAM CONN FROM PALLET REMOVE DUST COVERS FROM LEAM MATE & LOCK LEAM CONN PARTIALLY OPEN C/S DUST COVER TIP PKG 1 DOWN REMOVE & DISCARD C/S DUST COVER USE UHT, COARSE ALIGN C/S LSG DEPLOY RELEASE 4 BB'S SECURING LSG ENGAGE UHT IN LSG CARRY SOCKET CARRY LSG 25 FT W OF C/S	1+50	ALSEP INTERCONNECT (C) GET PKG 1 UHT ERECT HFE PALLET CARRY HNDL RELEASE TWO STRUT BOYD BOLTS ON HFE LIFT HFE FROM PKG 2 CARRY HFE 10 FT NORTH OF PKG 1 UNSTOW HFE CONNECTOR LOWER HFE TO SURFACE DISCARD C/S CONN DUST COVER DISCARD HFE CONN DUST COVER MATE & LOCK HFE CONN HFE DEPLOY CARRY HFE 30 FT N C/S LAY HFE PALLET ON SURFACE RELEASE 4 BB'S ON PROBE BOX			
DEPLOY/LOCK SUNSHADE TILT SUNSHADE TO PRESET ANGLE EMPLACE LSG ON LUNAR SURFACE ALIGN & LEVEL LSG UNCAGE LSG GIMBAL-CHECK LEVEL RETURN TO C/S LSPE G/M DEPLOY RELEASE 4 BB'S SECURING MODULE ENGAGE UHT IN CARRY SOCKET CARRY G/M 30 FT S C/S REMOVE FLAG RETAINING PINS DEPLOY & INTERIM STOW 5 FLAGS IN SURFACE EMPLACE G/M USE 1 FLAG TO ANCHOR MODULE RETURN TO C/S LMS DEPLOY USE UHT, PULL VENT RING RELEASE 3 LMS BB'S	2+00	LIFT PROBE BOX SEPARATE PROBE BOX HALVES STOW BOX 2 ON HFE ROTATE RAMMER FROM STOWED POSITION CARRY BOX 1 16 FT E PLACE BOX 1 ON SURFACE RETRIEVE BOX 2 FROM HFE CARRY BOX 2 16 FT WEST PLACE BOX 2 ON SURFACE REMOVE 4 BB'S ON HFE ELEC LIFT HFE FROM PALLET PUSH PALLET ASIDE & EMPLACE HFE ELEC DRILL PREP & TGE CHECK TGE LIGHT - OFF - DEPRESS READ PG ON TGE READ TGE DISPLAYS TO MCC CLOSE COVER ASSEMBLE DRILL PER DECAL			
	2+10				

CREW EVA CHECKLIST



Carry to HFE site:
- Drill
- Rack
- Bore/core bag

2+11 1st PROBE HOLE

Drill:
- 1 long stem
- 2 short stems

[LMS, C/S DEPLOY

2+26 EMPLACE PROBE 1

Ram 1st thermal shield/probe (P1)

Ram 2nd shield (F1)

Measure height of stem

Position top (3rd) shield

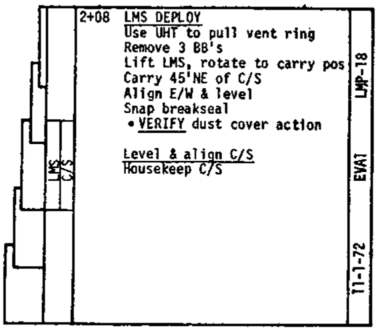
Exit cable S [LEAM

HFE

CDR-18

EVA1

11-1-72



2+08 LMS DEPLOY

Use UHT to pull vent ring

Remove 3 BB's

Lift LMS, rotate to carry pos

Carry 45'NE of C/S

Align E/W & level

Snap breakseal
- VERIFY dust cover action

Level & align C/S

Housekeep C/S

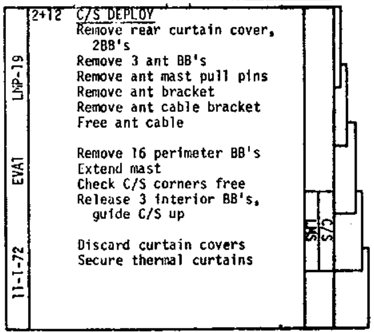
LMS

C/S

LMP-18

EVA1

11-1-72



2+12 C/S DEPLOY

Remove rear curtain cover, 2BB's

Remove 3 ant BB's

Remove ant mast pull pins

Remove ant bracket

Remove ant cable bracket

Free ant cable

Remove 16 perimeter BB's

Extend mast

Check C/S corners free

Release 3 interior BB's, guide C/S up

Discard curtain covers

Secure thermal curtains

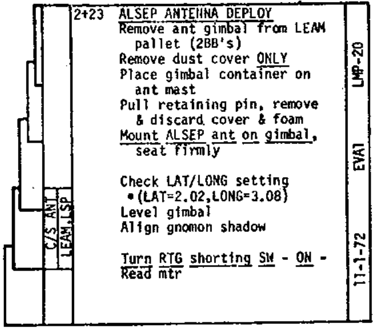
LMP-19

EVA1

11-1-72

SM1

S/S



2+23 ALSEP ANTENNA DEPLOY

Remove ant gimbal from LEAM pallet (2BB's)

Remove dust cover ONLY

Place gimbal container on ant mast

Pull retaining pin, remove & discard cover & foam

Mount ALSEP ant on gimbal, seat firmly

Check LAT/LONG setting
- (LAT=2.02,LONG=3.08)

Level gimbal

Align gnomon shadow

Turn RTG shorting SW - ON - Read mtr

C/S ANT

LEAM,LSP

LMP-20

EVA1

11-1-72

VOICE DATA

EVA 1

2+10 (1) LMP - LMS level/aligned
Breakseal open

(2) CDR - Start HFE Bore hole 1 drilling

(2) CDR - 54" stem in surface

2+20

(2) CDR - 28" stem in surface

(2) CDR - 28" stem in surface

2+30 (1) LMP - ________ AMPS
(Short Sw actuated)

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

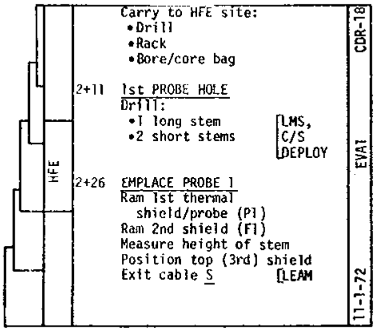
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
ENGAGE UHT, LIFT LMS & ROTATE 90 DEG ON SWIVEL - LOCK DEPLOY LMS 45 FT NE C/S, EMPLACE & LEVEL**	2+10	CARRY TO HFE SITE: *DRILL *RACK * STEM BAG			
INSERT UHT & SNAP BREAKSEAL, ADJUST DUST COVER IF REQD		PLACE DRILL ON SURFACE LOCATE RACK/STEMS FOR DRILLING OPEN STEM BAG			
WALK TO C/S		DRILL 1ST PROBE HOLE ATTACH LONG BORE TUBE TO DRILL			
C/S DEPLOY USE UHT-LEVEL & ALIGN C/S RELEASE REAR THERMAL CURTAIN		FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE			
RELEASE 3 ANTENNA BB'S PULL ANT MAST RELEASE PINS					
REMOVE ANT BRACKET RELEASE & FREE RF ANT CABLE		ROTATE DRILL CCW TO REMOVE FROM BORE STEM			
RELEASE 16 PERIMETER BB'S		PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM			
EXTEND & LOCK MAST SECTIONS		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS			
CHECK 4 CORNERS LOOSE		DRILL BORE TUBE INTO SURFACE			
RELEASE 2 INTERIOR BB'S	2+20				
RELEASE CENTER BB-GUIDE C/S UP					
CHECK SUNSHIELD COMPLETELY UP		ROTATE DRILL CCW TO REMOVE FROM BORE STEM			
CLOSE SIDE CURTAINS-DISCARD COVERS		PLACE DRILL ON SURFACE ATTACH 2ND SHORT BORE TUBE SECTION TO STEM			
ALSEP ANTENNA DEPLOY WALK TO LEAM SUBPALLET RELEASE 2 BB'S ON GIMBAL CASE LIFT GIMBAL FROM PALLET		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE			
CARRY TO C/S REMOVE GIMBAL BASE DUST COVER					
MOUNT GIMBAL ON ANTENNA MAST PULL PIN, REMOVE & DISCARD HOUSING & FOAM MOUNT ANTENNA ON GIMBAL VERIFY LAT/LONG & LEVEL GIMBAL*		ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE			
ALIGN SUN COMPASS-CHECK LEVEL		EMPLACE HFE PROBE 1 PICK UP BOX 1, GRASP HANDLE			
ACTUATE SHORT SW-READ METER **DO NOT EMBED LMS TO LEVEL-REPOSITION	2+30	RULL REMAINING CABLE FROM BOX REMOVE PROBE LEAN BOX AGAINST RACK			

*LAT = 2.02; LONG = 3.08

CREW EVA CHECKLIST

VOICE DATA

EVA 1



Carry to HFE site:
- Drill
- Rack
- Bore/core bag

2+11 1st PROBE HOLE

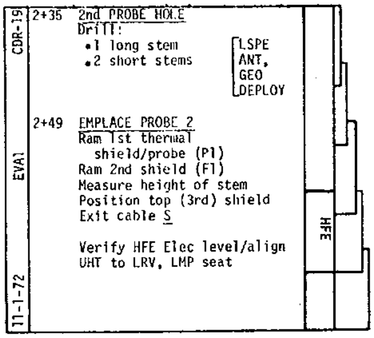
Drill:
- 1 long stem
- 2 short stems

[LMS, C/S DEPLOY

2+26 EMPLACE PROBE 1

Ram 1st thermal shield/probe (P1)
Ram 2nd shield (F1)
Measure height of stem
Position top (3rd) shield
Exit cable S

[LEAM



2+35 2nd PROBE HOLE

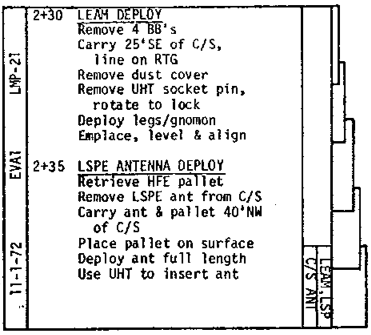
Drill:
- 1 long stem
- 2 short stems

[LSPE ANT, GEO DEPLOY

2+49 EMPLACE PROBE 2

Ram 1st thermal shield/probe (P1)
Ram 2nd shield (F1)
Measure height of stem
Position top (3rd) shield
Exit cable S

Verify HFE Elec level/align
UHT to LRV, LMP seat

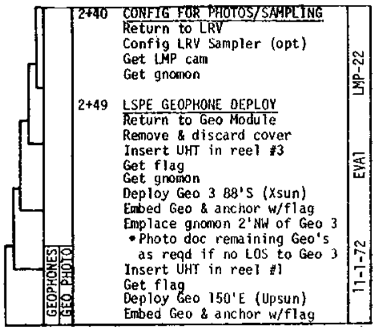


2+30 LEAM DEPLOY

Remove 4 BB's
Carry 25'SE of C/S, line on RTG
Remove dust cover
Remove UHT socket pin, rotate to lock
Deploy legs/gnomon
Emplace, level & align

2+35 LSPE ANTENNA DEPLOY

Retrieve HFE pallet
Remove LSPE ant from C/S
Carry ant & pallet 40'NW of C/S
Place pallet on surface
Deploy ant full length
Use UHT to insert ant



2+40 CONFIG FOR PHOTOS/SAMPLING

Return to LRV
Config LRV Sampler (opt)
Get LMP cam
Get gnomon

2+49 LSPE GEOPHONE DEPLOY

Return to Geo Module
Remove & discard cover
Insert UHT in reel #3
Get flag
Get gnomon
Deploy Geo 3 88'S (Xsun)
Embed Geo & anchor w/flag
Emplace gnomon 2'NW of Geo 3
- Photo doc remaining Geo's as reqd if no LOS to Geo 3

Insert UHT in reel #1
Get flag
Deploy Geo 150'E (Upsun)
Embed Geo & anchor w/flag

2+30 Capcom - advise crew on ALSEP down link

(1) CDR - Probe depth ________(P1)
- 2nd Shield depth ________(F1)
- Bore stem height ________(B6)

(1) LMP - LEAM Level ________
Alignment ________

(2) CDR - Start HFE Bore hole 2 drilling - MARK

(2) CDR - 54" stem in surface

2+40

(2) CDR - 28" stem in surface

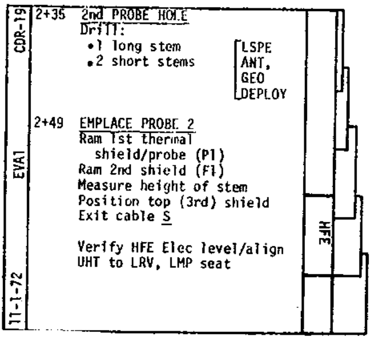
(2) CDR - 28" stem in surface

2+50 (1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
REQUEST XMTR TURN ON & VERIFY DOWN LINK	2+30	GRASP PROBE & REMOVE END CAPS UNFOLD PROBE ASSY INSERT PROBE INTO BORE TUBE			
LEAM DEPLOY RELEASE 4 BB'S ON LEAM ENGAGE UHT, CARRY 25 FT SE C/S		REMOVE RAMMER FROM BOX 1, USE RAMMER, INSERT PROBE 1 & READ INDEX NUMBER ON RAMMER			
PULL SOCKET PIN, ROTATE PKG REMOVE DUST COVER		USE RAMMER-INSERT 2ND THERMAL SHIELD, POSITION TO MARK F1 REMOVE RAMMER, PLACE NEXT TO BORE TUBE, READ TUBE HEIGHT			
DEPLOY LEGS/GNOMON		POSITION 3RD THERMAL SHIELD EXIT CABLE S IN HOLE			
EMPLACE LEAM ON LUNAR SURFACE		CARRY DRILL, TUBES, RACK & RAMMER TO WEST HOLE DRILL 2ND PROBE HOLE			
LEVEL & ALIGN WALK TO HFE SITE LSPE ANT DEPLOY		PLACE RACK, RAMMER, DRILL ON SURFACE ATTACH LONG BORE TUBE TO DRILL			
CARRY HFE PALLET TO C/S, PLACE ON SURFACE RETRIEVE LSPE ANT & REEL (C/S)		FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE			
LOWER CABLE REEL TO SURFACE					
CARRY HFE PALLET & ANT 40 FT NW C/S		ROTATE DRILL CCW TO REMOVE FROM BORE STEM			
PLACE HFE PALLET ON SURFACE EXTEND LSPE ANT TO FULL LENGTH		PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM			
USE UHT-INSERT ANT INTO SOCKET LEVEL PALLET SO ANT IS VERTICAL CONFIG FOR SAMPLING RETURN TO LRV	2+40	PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE			
GET DIXIE CUPS OUT OF SCB 1	LMP OPTION				
GET LRV SAMPLER FROM AFT PALLET					
PUT CUPS IN LRV SAMPLER STOW REMAINING CUPS IN PORCH		ROTATE DRILL CCW TO REMOVE FROM BORE STEM			
		PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM			
INSTALL SAMPLER ON CDR UHT (CDR SEAT) AND TETHER UNIT		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE			
		ROTATE DRILL CCW TO REMOVE FROM BORE STEM			
PUT CAM ON RCU		PLACE DRILL ON SURFACE			
PICK UP GNOMON DROP AT GEOPH MODULE	2+50				



CDR-19

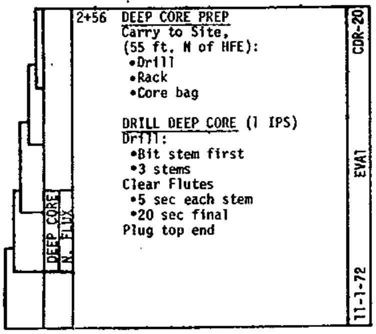
2+35 2nd PROBE HOLE
Drill:
- 1 long stem
- 2 short stems

[LSPE ANT, GEO DEPLOY

2+49 EMPLACE PROBE 2
Ram 1st thermal shield/probe (P1)
Ram 2nd shield (F1)
Measure height of stem
Position top (3rd) shield
Exit cable S

Verify HFE Elec level/align
UHT to LRV, LMP seat

EVA1
11-1-72
HFE



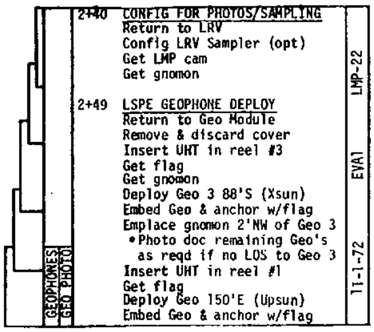
2+56 DEEP CORE PREP
Carry to Site,
(55 ft. N of HFE):
- Drill
- Rack
- Core bag

DRILL DEEP CORE (1 IPS)
Drill:
- Bit stem first
- 3 stems

Clear Flutes
- 5 sec each stem
- 20 sec final

Plug top end

CDR-20
EVA1
11-1-72
DEEP CORE
N. FLUX

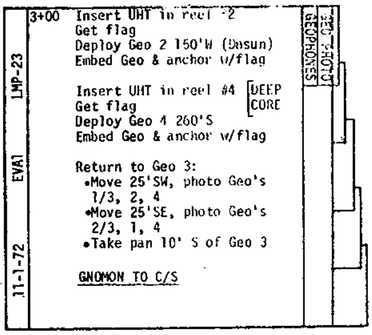


2+40 CONFIG FOR PHOTOS/SAMPLING
Return to LRV
Config LRV Sampler (opt)
Get LMP cam
Get gnomon

2+49 LSPE GEOPHONE DEPLOY
Return to Geo Module
Remove & discard cover
Insert UHT in reel #3
Get flag
Get gnomon
Deploy Geo 3 88'S (Xsun)
Embed Geo & anchor w/flag
Emplace gnomon 2'NW of Geo 3
- Photo doc remaining Geo's as reqd if no LOS to Geo 3

Insert UHT in reel #1
Get flag
Deploy Geo 150'E (Upsun)
Embed Geo & anchor w/flag

LMP-22
EVA1
11-1-72
GEOPHONES
GEO PHOTO



3+00 Insert UHT in reel #2
Get flag
Deploy Geo 2 150'W (Dnsun)
Embed Geo & anchor w/flag

Insert UHT in reel #4
Get flag
Deploy Geo 4 260'S
Embed Geo & anchor w/flag

[DEEP CORE

Return to Geo 3:
- Move 25'SW, photo Geo's 1/3, 2, 4
- Move 25'SE, photo Geo's 2/3, 1, 4
- Take pan 10' S of Geo 3

GNOMON TO C/S

LMP-23
EVA1
11-1-72
GEOPHONES
GEO PHOTO

EVA 1

2+50

(1) CDR - Probe depth __________ (P1)
- 2nd Shield depth __________ (F1)
- Bore stem height __________ (B6)

(1) CDR - Core drill location

(1) CDR - Core Drill __________
Start - MARK __________
____

3+00

(1) CDR - 1st Section in __________
surface ______ __________
____

(1) CDR - 2nd Section start - MARK

(1) CDR - 2nd Section in surface __________

(1) CDR - 3rd Section start - MARK

(1) CDR - 3rd Section in surface __________

3+10

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

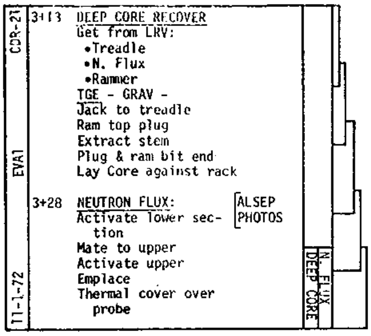
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	CRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
GEOPHONE DEPLOY DEPLOY GEOPHONE 3: DISCARD G/M COVER *ENGAGE UHT IN REEL 3 & GET FLAG *RETRIEVE GNOMON *CARRY 88 FT SOUTH C/S *EMBED FLAG IN LUNAR SURFACE *REMOVE GEOPHONE FROM REEL *EMBED GEOPHONE IN SURFACE *DISCARD REEL *ANCHOR GEOPHONE WITH FLAG *PLACE GNOMON 2' NW OF GEO 3 *RETURN TO GEOPHONE MODULE	2+50	EMPLACE HFE PROBE 2 PICK UP BOX 2, GRASP HANDLE PULL REMAINING CABLE FROM BOX REMOVE PROBE-DISCARD BOX GRASP PROBE & REMOVE END CAPS UNFOLD PROBE ASSY INSERT PROBE INTO BORE TUBE RETRIEVE RAMMER, MATE TO PROBE SEAT PROBE 2 & 1ST THERMAL SHIELD INTO BORE TUBE READ INDEX NUMBER ON RAMMER USE RAMMER - INSERT 2ND THERMAL SHIELD, POSITION TO MARK F1 REMOVE RAMMER, PLACE NEXT TO TUBE - READ INDEX DRESS CABLES, PROBE 1&2 TO LIE ALONG SURFACE, BLACK TO SOUTH			
DEPLOY GEOPHONE 1: *ENGAGE UHT IN REEL 1 & GET FLAG *CARRY 150 FT EAST C/S *EMBED FLAG IN LUNAR SURFACE *REMOVE GEOPHONE FROM REEL *EMBED GEOPHONE IN SURFACE *DISCARD REEL *ANCHOR GEOPHONE WITH FLAG *RETURN TO GEOPHONE MODULE		RECHECK HFE ELEC LEVEL & ALIGN CARRY UHT TO LRV DRILL DEEP CORE CARRY TO CORE SITE 55 FT N HFE DRILL, RACK & CORE RETRIEVE CORE BIT SECTION ATTACH CORE SECTION TO DRILL DRILL CORE STEM INTO SURFACE ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM			
	3+00	PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 2ND CORE SECT TO STEM			
DEPLOY GEOPHONE 2: *ENGAGE UHT IN REEL 2 & GET FLAG *CARRY 150 FT WEST C/S *EMBED FLAG IN LUNAR SURFACE *REMOVE GEOPHONE FROM REEL *EMBED GEOPHONE IN SURFACE *DISCARD REEL *ANCHOR GEOPHONE WITH FLAG *RETURN TO GEOPHONE MODULE		PICK UP DRILL - MATE TO EMPLACED STEM ROTATE DRILL CW TO SEAT DRILL STEM INTO SURFACE ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 3RD CORE SECT TO DRILL PICK UP DRILL - MATE TO EMPLACED STEM			
DEPLOY GEOPHONE 4: *ENGAGE UHT IN REEL 4 & GET FLAG *CARRY 260 FT SOUTH C/S *EMBED FLAG IN LUNAR SURFACE *REMOVE GEOPHONE FROM REEL *EMBED GEOPHONE IN SURFACE *DISCARD REEL *ANCHOR GEOPHONE WITH FLAG *RETURN TO GEOPHONE 3**		ROTATE DRILL CW TO SEAT THREADS DRILL STEM INTO SURFACE ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 4TH CORE SECTION TO DRILL			
AT 3RD GEOPHONE SITE-PHOTO	3+10	PICK UP DRILL-MATE TO EMPLACED STEM			

**TAKE 360 DEG PANS & ANY OTHER PANS REQD TO FULLY DOCUMENT LSPE GEOPHONES

CREW EVA CHECKLIST

VOICE DATA

EVA 1



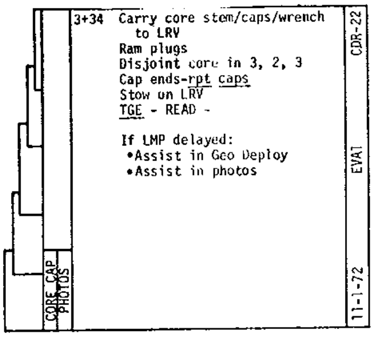
CDR-21 EVA1 11-1-72

3+13 DEEP CORE RECOVER
Get from LRV:
- Treadle
- N. Flux
- Rammer

TGE - GRAV -
Jack to treadle
Ram top plug
Extract stem
Plug & ram bit end
Lay Core against rack

3+28 NEUTRON FLUX: [ALSEP PHOTOS
Activate lower section
Mate to upper
Activate upper
Emplace
Thermal cover over probe

DEEP CORE | N. FLUX

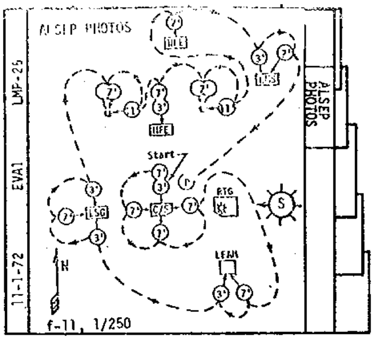


CDR-22 EVA1 11-1-72

3+34 Carry core stem/caps/wrench to LRV
Ram plugs
Disjoint core in 3, 2, 3
Cap ends-rpt caps
Stow on LRV
TGE - READ -

If LMP delayed:
- Assist in Geo Deploy
- Assist in photos

CORE CAP | PHOTOS



3+10 (1) CDR - 4th Section Start - MARK

(1) CDR - 4th Section in Surface ________

(1) CDR - Plug in top (depth)________

(1) LMP - Enable LSPE Sw

3+20

(1) CDR - Cap on bit ________
(or plug________depth)

(1) CDR - NFE lower section activation - MARK ________

3+30 (1) CDR - NFE upper Section activation - MARK ________

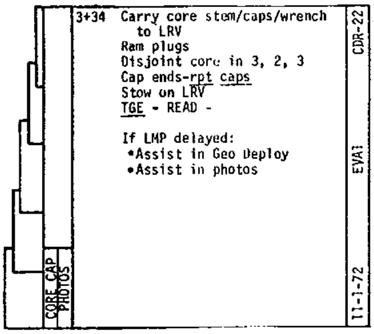
MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
DOCUMENT GEOPHONE LAYOUT**	3+10	ROTATE DRILL CW TO SEAT DRILL STEM INTO SURFACE			
MOVE 25 FT SW, PHOTO GEOPHONES 1 & 3		ATTACH WRENCH TO STEM			
TURN AND PHOTO GEOPHONE 2		ROTATE DRILL CCW TO REMOVE FROM CORE STEM			
TURN & PHOTO GEOPHONE 4					
MOVE 25 FT SE, PHOTO GEOPHONES 2 & 3		REMOVE WRENCH			
TURN AND PHOTO GEOPHONE 1 TURN AND PHOTO GEOPHONE 4		SET DRILL ASIDE DEEP CORE RECOVER GET CAPS FROM RACK, PLUG TOP			
TAKE PAN 3' BEHIND GEOPHONE 3		GET TREADLE & NEUTRON FLUX PROBE FROM LRV, ALSO RAMMER			
RETRIEVE GNOMON, RETURN TO C/S TAKING OTHER PHOTOS REQD TO DOCUMENT GEOPHONES		TGE-PRESS 'GRAV' INSTALL JACK ON TREADLE, EXTEND HNDL & PLACE TREADLE OVER CORE STEM			
ACTIVATE LSPE ENABLE SW - STOW GNOMON ON LRV		RAM TOP PLUG			
		JACK CORE STEM OUT OF SURFACE			
ALSEP PHOTOS					
PHOTO C/S 3', 7' XSUN TO SOUTH	3+20				
PHOTO C/S 7', UPSUN PHOTO C/S 7', XSUN TO NORTH PHOTO C/S 7', DNSUN					
PHOTO LEAM, 7' TOWARD C/S PHOTO LEAM, 3' TOWARD RTG					
PHOTO LSG, 3' XSUN TO NORTH PHOTO LSG, 7' UPSUN TOWARD C/S PHOTO LSG, 3' XSUN TO SOUTH					
PHOTO HFE W.HOLE, 7' XSUN STEREO TO SOUTH		PLUG BIT END OF CORE STEM - RAM LAY STRING AGAINST RACK			
PHOTO HFE 11' DNSUN PHOTO HFE ELECT, 7' XSUN		CONFIG NEUTRON FLUX ACTIVATE LOWER SECTION			
PHOTO HFE ELECT, 3' XSUN SOUTH PHOTO HFE E.HOLE, 7' XSUN STEREO TO SOUTH		HANG CAP ON RACK			
		MATE LOWER TO UPPER SECTION			
	3+30	ACTIVATE UPPER SECTION			

CREW EVA CUFF CHECKLIST

VOICE DATA

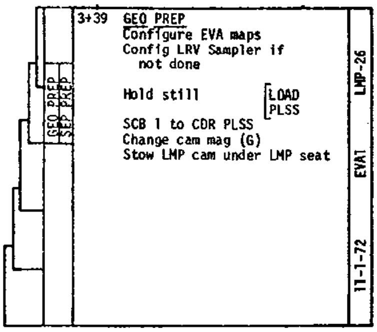
EVA 1


3+34 Carry core stem/caps/wrench
to LRV
Ram plugs
Disjoint core in 3, 2, 3
Cap ends-rpt caps
Stow on LRV
TGE - READ -

If LMP delayed:
•Assist in Geo Deploy
•Assist in photos

CORE CAP
PHOTOS

CDR-22 EVA1 11-1-72

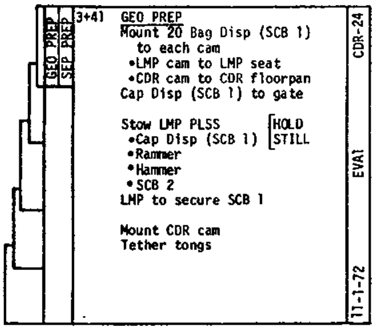

3+39 GEO PREP
Configure EVA maps
Config LRV Sampler if
not done

Hold still [LOAD PLSS

SCB 1 to CDR PLSS
Change cam mag (G)
Stow LMP cam under LMP seat

GEO PREP
SEP PREP

LMP-26 EVA1 11-1-72


3+41 GEO PREP
Mount 20 Bag Disp (SCB 1)
to each cam
•LMP cam to LMP seat
•CDR cam to CDR floorpan
Cap Disp (SCB 1) to gate

Stow LMP PLSS [HOLD STILL
•Cap Disp (SCB 1)
•Rammer
•Hammer
•SCB 2
LMP to secure SCB 1

Mount CDR cam
Tether tongs

GEO PREP
SEP PREP

CDR-24 EVA1 11-1-72

3+30

(1) CDR - CORE STEM CAPS (unless nominal)
SECTION 1 LOWER ________
SECTION 2 UPPER ________
SECTION 2 LOWER ________
SECTION 3 UPPER ________

(1) CDR - TGE RDG: ___ ___ ___

3+40 (1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR/LMP - MAG/FRAME COUNT
CDR: ___/___
LMP: ___/___

Verify - Gnomon back to LRV

SCB 1 CONTENTS:

2 - 20 DSBD (ON CAMERAS)
2 - CAP DISPENSERS
3 - CORE TUBES: 2 L 44,46
1 U 31
4 - SETS LRV SAMPLER BAGS

(1) CDR - SCB ________ 2 on LMP PLSS

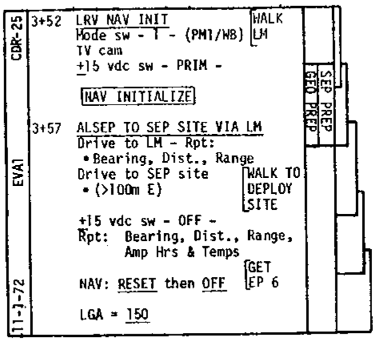
3+50

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	3+30	PUSH UNIT DOWN CORE HOLE			
PHOTO NFE IN SITU, 7' TO S PHOTO LMS, 3' XSUN TO S INCLUDE ORIFICE					
PHOTO LMS, 7' TOWARD C/S					
		BREAK CORE STEMS CARRY TO LRV: CORE CAPS WRENCH			
TAKE PHOTO PAN AT C/S		USE WRENCH & VISE TO LOOSEN 3RD STEM JOINT			
		LOOSEN SIXTH JOINT			
		UNSCREW & CAP EACH SECTION			
PUT CAM ON CDR SEAT					
CONFIG FOR TRAVERSE		READ TGE TO MCC			
LOAD LRV SAMPLER WITH DIXIE CUPS IF RQD					
ASSIST CDR IF RQD	3+40	STOW ON LRV CONFIG FOR TRAVERSE			
MOUNT MAP HOLDER - CONFIG MAPS		MOUNT 20 DSBD (SCB 1) TO EACH CAM			
		PUT CDR CAM ON PAN, LMP CAM ON LMP SEAT			
		PUT CAP DISPENSER ON TOOL GATE			
LOAD PLSS'S		LOAD PLSS'S			
HOLD STILL		STOW RAMMER ON LMP PLSS			
		STOW HAMMER ON LMP PLSS			
		STOW CAP DISPENSER ON LMP PLSS			
	3+50	STOW SCB 2 ON LMP PLSS			

EVA 1



CDR-25 EVA1 11-J-72

3+52 LRV NAV INIT
Mode sw - 1 - (PM1/WB)
TV cam
+15 vdc sw - PRIM -

NAV INITIALIZE

WALK LM

3+57 ALSEP TO SEP SITE VIA LM
Drive to LM - Rpt:
- Bearing, Dist., Range

Drive to SEP site
- (>100m E)

WALK TO DEPLOY SITE

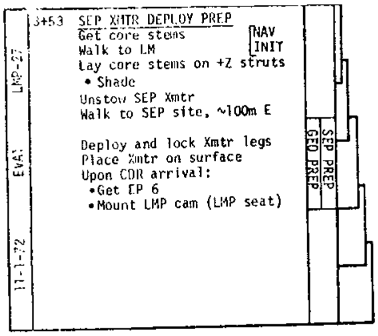
+15 vdc sw - OFF -
Rpt: Bearing, Dist., Range, Amp Hrs & Temps

NAV: RESET then OFF

GET EP 6

LGA = 150

SEP PREP GEO PREP



LMP-27 EVA1 11-1-72

3+53 SEP XMTR DEPLOY PREP
Get core stems
Walk to LM
Lay core stems on +Z struts
- Shade

NAV INIT

Unstow SEP Xmtr
Walk to SEP site, ~100m E

Deploy and lock Xmtr legs
Place Xmtr on surface
Upon CDR arrival:
- Get EP 6
- Mount LMP cam (LMP seat)

SEP PREP GEO PREP

3+50 (1) LMP - SCB 1 ON CDR PLSS

- CAMERA UNDER SEAT

(1) CDR - NAV INITIALIZE
- ● NAV CB - CLOSE (1.5 MIN SPINUP)
- ● NAV RESET - THEN OFF (RESET SW)
- ● HEADING ________
- ● SSD ________
- ● PITCH ________
- ● ROLL ________

BEARING/RANGE = 0
TORQUE GYRO ________
LRV UNDERWAY

(1) CDR - LRV at LM →

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - AT SEP SITE

LRV DATA:

NAV RESET - THEN OFF (RESET SW)

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

4+00

(1) LMP - EP #6 OFF PALLET
VERIFY SAFE

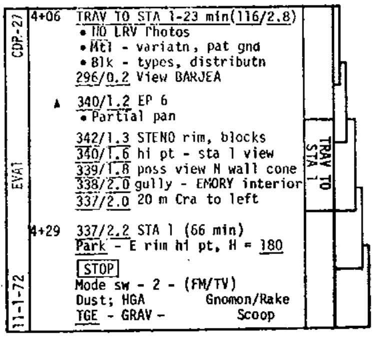
(1) CDR - LGA AZIMUTH 150°
(1) CDR - LRV UNDERWAY MARK ________

4+10

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	3+50				
PLACE SCB 1 ON CDR PLSS		HOLD STILL			
		LRV NAV INITIALIZATION			
STOW LMP CAM UNDER SEAT (LMP)		LCRU MODE SW 'POS 1' (PM1/WB)			
PICK UP CORE STEMS (IN BAG) WALK TO LM		POS TV HORIZ CW & AFT MOUNT LRV - FASTEN SEATBELT POWER UP LRV ORIENT LRV FOR NAV INIT.			
		LRV NAV CB - 'CLOSE' NAV RESET - 'RESET' - 'OFF'			
SEP XMTR DEPLOY PREP		READ HEADING, SSD, PITCH, ROLL			
PLACE CORE STEMS ON +Z STRUTS		VERIFY BEARING, RANGE = 0			
UNSTOW SEP TRANSMITTER		TORQUE GYRO TO HOU UPDATE			
		SEP XMTR DEPLOY SITE			
CARRY SEP XMTR TO DEPLOY SITE >100 M E OF LM		DRIVE TO SEP DEPLOY AREA >100 M EAST OF LM			
	4+00				
DEPLOY & LOCK XMTR LEGS IN POSITION		POWER DOWN LRV REPOSITION LGA TO H REPORT NAV DATA/SYSTEM			
PLACE XMTR ON SURFACE		RESET NAV SYSTEM			
GET EP 6 FROM GEOPALLET VERIFY 'SAFE'					
PUT ON LMP CAMERA MOUNT LRV WITH EP 6		POSITION LGA 150°			
		POWER UP LRV			
RIDE TO STATION 1		DRIVE TO STATION 1			
	4+10				



CDP-27

EVA1

11-1-72

4+06 TRAV TO STA 1-23 min(116/2.8)
- NO LRV Photos
- Mtl - variatn, pat gnd
- Blk - types, distributn

296/0.2 View BARJEA

▲ 340/1.2 EP 6
- Partial pan

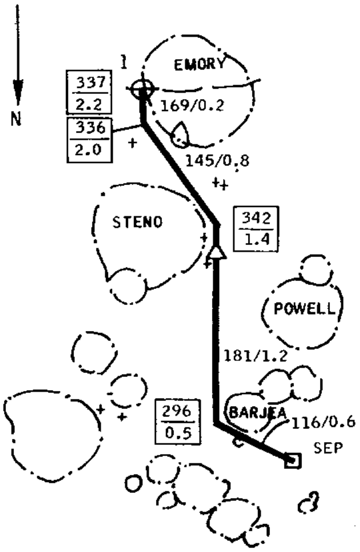
342/1.3 STENO rim, blocks
340/1.6 hi pt - sta 1 view
339/1.8 poss view N wall cone
338/2.0 gully - EMORY interior
337/2.0 20 m Cra to left

4+29 337/2.2 STA 1 (66 min)
Park - E rim hi pt, H = 180

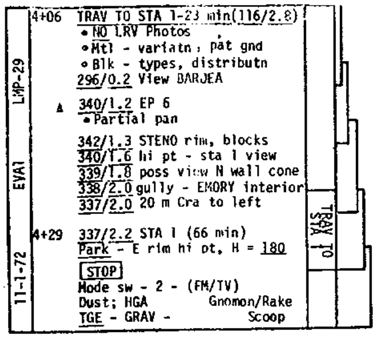
STOP

Mode sw - 2 - (FM/TV)
Dust; HGA Gnomon/Rake
TGE - GRAV - Scoop

TRAV TO STA 1



HISTORICAL SEQUENCE OF DARK MANTLE & CHARACT OF PLAINS MAT'L



LMP-29

EVA1

11-1-72

4+06 TRAV TO STA 1-23 min(116/2.8)
- NO LRV Photos
- Mtl - variatn, pat gnd
- Blk - types, distributn

296/0.2 View DARJEA

▲ 340/1.2 EP 6
- Partial pan

342/1.3 STENO rim, blocks
340/1.6 hi pt - sta 1 view
339/1.8 poss view N wall cone
338/2.0 gully - EMORY interior
337/2.0 20 m Cra to left

4+29 337/2.2 STA 1 (66 min)
Park - E rim hi pt, H = 180

STOP

Mode sw - 2 - (FM/TV)
Dust; HGA Gnomon/Rake
TGE - GRAV - Scoop

TRAV TO STA 1

EVA 1

4+10

(1) LMP - EP #6 - SAFE

(1) LMP - EP #6 PINS PULLED ________

(1) CDR - NAV DATA:

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) LMP - Rpt 70mm mag/frame ___/____

4+20

(1) CDR - STATION 1 ARRIVAL ________

4+30

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	4+10				
PHOTO APPROACH CHECK EP DISPLAY 'SAFE'		PHOTO APPROACH			
PULL 3 PINS (DISCARD PINS) EXTEND EP ANTENNA		STOP LRV POWER DOWN LRV			
PLACE EP ON SURFACE OUTSIDE TRACKS		REPORT NAV DATA			
SHOOT PART PAN		SHOOT PART PAN POWER UP LRV			
	4+20				
GO TO STA 1		GO TO STA 1			
-----------STATION 1-------------		-------------STATION 1-----------			
		POWER DOWN LRV			
	4+30				

EVA 1

4+30 (1) CDR - LRV DATA:

HEADING	Temp Bat 1
BEARING	Temp Bat 2
DISTANCE	Temp LF mtr
RANGE	Temp RF mtr
Amp-Hr Bat 1	Temp LR mtr
Amp-HR Bat 2	Temp RR mtr

(1) CDR/LMP - TGE - GRAV

(1) CDR - Verify Dusting

(1) CDR/LMP - MAG/FRAME

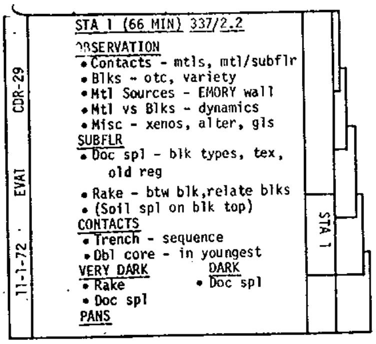
CDR - ___/____

LMP - ___/____

(1) CDR/LMP - Pan locations

(1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		



CDR-29 EVA1 11-1-72

STA 1 (66 MIN) 337/2.2

OBSERVATION
- Contacts - mtls, mtl/subflr
- Blks - otc, variety
- Mtl Sources - EMORY wall
- Mtl vs Blks - dynamics
- Misc - xenos, alter, gls

SUBFLR
- Doc spl - blk types, tex, old reg
- Rake - btw blk,relate blks
- (Soil spl on blk top)

CONTACTS
- Trench - sequence
- Dbl core - in youngest

VERY DARK
- Rake
- Doc spl

DARK
- Doc spl

PANS

STA 1

4+40 (1) CDR/LMP - RAKE SAMPLE:

ROCKS BAG# ________

____

SOIL BAG# ________

____

4+50

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
DISMOUNT FROM LRV	4+30	REPORT NAV & SYSTEM DATA DISMOUNT FROM LRV			
TAKE PHOTO PAN		LCRU MODE SW '2' ALIGN HGA			
GET GNOMON & SCOOP FROM AFT PALLET		DUST TV, TCU, LCRU			
		PRESS GRAV ON TGE VERIFY LIGHT FLASHING			
		GIVE MCC 'MARK'			
OBSERVATIONS		OBSERVATIONS			
PHOTOS		PHOTOS			
RAKE SAMPLE		RAKE SAMPLE			
	4+40				
DOCUMENTED SAMPLING		DOCUMENTED SAMPLING			
	4+50				

EVA 1

4+50

5+00

(1) CDR/LMP - CORE TUBE NO'S

____

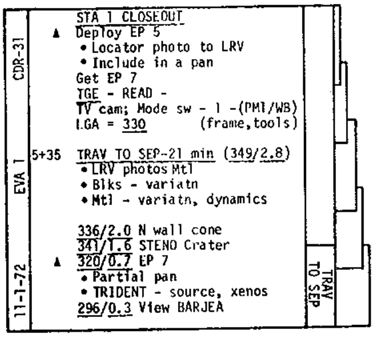
____

5+10

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	4+50				
DOCUMENTED SAMPLES		DOCUMENTED SAMPLES			
	5+00				
DOUBLE CORE (SOME PLACE DURING STATION - IN A YOUNG CONTACT)		DOUBLE CORE			
	5+10				



CDR-31

EVA 1

11-1-72

STA 1 CLOSEOUT

▲ Deploy EP 5
- Locator photo to LRV
- Include in a pan

Get EP 7

TGE - READ -

TV cam; Mode sw - 1 -(PMI/WB)

LGA = 330 (frame,tools)

5+35 TRAV TO SEP-21 min (349/2.8)
- LRV photos Mtl
- Blks - variatn
- Mtl - variatn, dynamics

336/2.0 N wall cone

341/1.6 STENO Crater

▲ 320/0.7 EP 7
- Partial pan
- TRIDENT - source, xenos

296/0.3 View BARJEA

TRAV TO SEP

EVA 1

5+10

(1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

5+20

(1) LMP - EP #5 - SAFE

(1) LMP - EP #5 PINS PULLED ________

(1) LMP - EP #7 OFF PALLET

VERIFY SAFE

(1) CDR/LMP - MAG/FRAME

CDR ___/____

LMP ___/____

5+30

(1) CDR/LMP - TGE RDG ___ ___ ___

MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
DOCUMENTED SAMPLES	5+10	DOCUMENTED SAMPLES			
	5+20				
TAKE EP #5 OFF PALLET CHECK EP DISPLAY - 'SAFE'					
PULL PINS(3) DISCARD PINS					
DEPLOY ANTENNA					
PLACE EP ON SURFACE PHOTO LOCATOR TO LRV GET EP #7 OFF PALLET CHECK EP DISPLAY - 'SAFE'					
PLACE EP #7 ON LMP FOOTPAN					
PHOTO PAN					
REPORT FILM COUNTER		REPORT FILM COUNTER			
STOW SAMPLES, SCOOP, RAKE, GNOMON	5+30	PRESS 'READ' ON TGE			

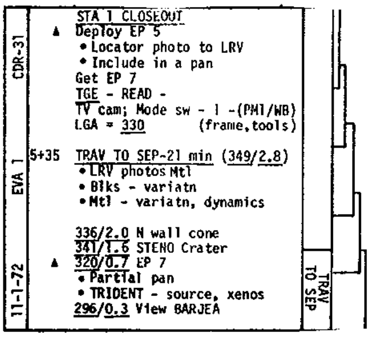
EVA 1

5+30

(1) CDR - LGA AZIMUTH 330°

(1) CDR - LRV UNDERWAY
MARK ________

CAPCOM: REMIND CREW DEPLOYED EXPLOSIVE PACKAGE ON RETURN PATH



CDR-31

EVA 1

11-1-72

STA 1 CLOSEOUT
▲ Deploy EP 5
- Locator photo to LRV
- Include in a pan

Get EP 7
TGE - READ -
TV cam; Mode sw - 1 -(PH1/WB)
LGA = 330 (frame,tools)

5+35 TRAV TO SEP-21 min (349/2.8)
- LRV photos Mtl
- Blks - variatn
- Mtl - variatn, dynamics

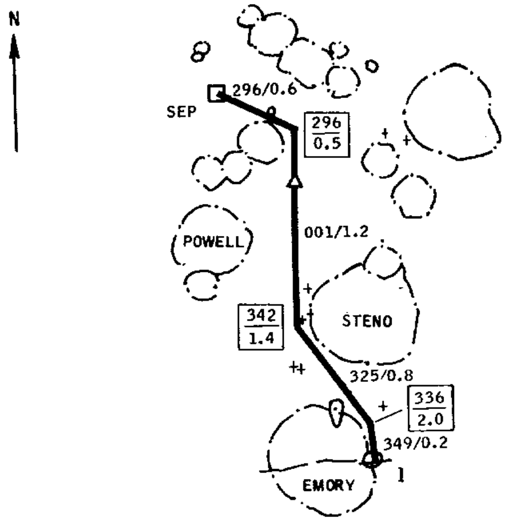
336/2.0 N wall cone
341/1.6 STENO Crater
▲ 320/0.7 EP 7
- Partial pan
- TRIDENT - source, xenos

296/0.3 View BARJEA

TRAV TO SEP

5+40

(1) CDR/LMP - LRV: SPEED ________
AMPS ________



(1) LMP - EP #7 SAFE

(1) LMP - EP #7 PINS PULLED ________

(1) CDR - NAV DATA:

HEADING	
BEARING	
DISTANCE	
RANGE	

5+50

MISSION: APOLLO 17
EVA: 1

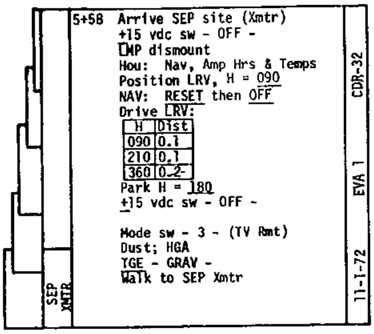
DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	5+30	REPORT READING TO MCC			
		CLOSE LID LCRU MODE SW - '1' POSITION TV AFT, HORIZ			
MOUNT LRV - PUT EP 7 ON LAP		MOUNT LRV FASTEN SEATBELT			
FASTEN SEATBELT		POSITION LGA 330°			
		POWER UP LRV			
RETURN TO LM AREA (SEP SITE)		RETURN TO LM AREA (SEP SITE)			
	5+40				
PHOTO APPROACH CHECK EP DISPLAY 'SAFE' PULL 3 PINS (DISCARD PINS)		PHOTO APPROACH STOP LRV POWER DOWN LRV			
EXTEND EP ANTENNA		REPORT NAV DATA			
PLACE EP ON SURFACE OUTSIDE TRACKS					
	5+50	SHOOT PART PAN			

EVA 1

5+50 (1) LMP - Rpt 70mm mag/frame

___/___



5+58 Arrive SEP site (Xmtr)
+15 vdc sw - OFF -
LMP dismount
Hou: Nav, Amp Hrs & Temps
Position LRV, H = 090
NAV: RESET then OFF
Drive LRV:

H	Dist
090	0.1
210	0.1
360	0.2-

Park H = 180
±15 vdc sw - OFF -

Mode sw - 3 - (TV Rmt)
Dust; HGA
TGE - GRAV -
Walk to SEP Xmtr

SEP XMTR

CDR-32

EVA 1

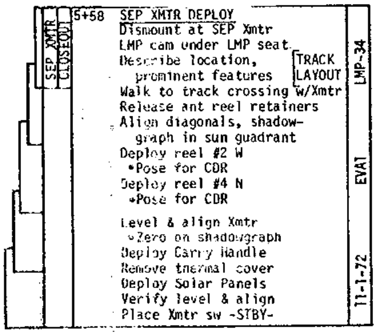
11-1-72

(1) CDR - REPORT ARRIVAL SEP SITE

(1) LMP - CAMERA UNDER SEAT
(1) CDR - NAV RESET, THEN RESET SW OFF

(2) LMP - SEP SITE DESCRIPTION

6+00



5+58 SEP XMTR DEPLOY
Dismount at SEP Xmtr
LMP cam under LMP seat
Describe location, prominent features
Walk to track crossing w/Xmtr
TRACK LAYOUT
Release ant reel retainers
Align diagonals, shadowgraph in sun guadrant
Deploy reel #2 W
•Pose for CDR
Deploy reel #4 N
•Pose for CDR

Level & align Xmtr
•Zero on shadowgraph
Deploy Carry Handle
Remove thermal cover
Deploy Solar Panels
Verify level & align
Place Xmtr sw -STBY-

SEP XMTR CLOSEOUT

LMP-34

EVA1

11-1-72

(1) CDR - TGE GRAV

6+10

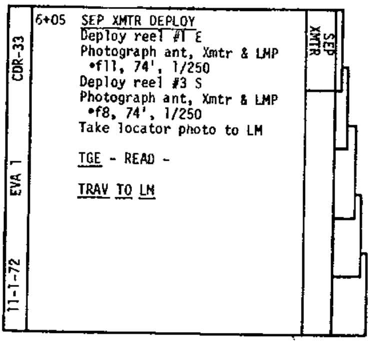
MISSION: APOLLO 17
EVA: 1

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU	TASK FUNCTION LMP	TASK FUNCTION CDR
SHOOT PART PAN	5+50	POWER UP LRV			
CONTINUE TO SEP SITE		CONTINUE TO SEP SITE			
		GO NEAR SEP XMTR			
SEP SITE		SEP SITE			
DISMOUNT LRV PLACE CAM UNDER SEAT		STOP LRV POWER DOWN LRV, VERIFY LMP CLEAR POWER UP LRV, DRIVE 0.1 W OF LMP H = 090° NAV RESET			
DESCRIBE AREA PROMINENT FEATURES TO MCC AS CDR DRIVES LAYOUT	6+0	CONTINUE ON CONSTANT HEADING 0.1 KM COME RIGHT TO HEADING 210° CONTINUE ON 210° FOR 0.1 KM COME RIGHT TO HEADING 360°			
MOVE XMTR TO TRACK CROSSING		CONTINUE ON 360° FOR 0.2 KM*			
RELEASE ANT REEL RETAINERS & DISCARD		PARK LRV ON H = 180° POWER DOWN LRV			
PLACE XMTR ON CROSSING WITH SHADOWGRAPH IN SUN QUAD		DISMOUNT LRV LCRU MODE SW - '3' ALIGN HGA			
REMOVE REEL 2 & DEPLOY ANTENNA WEST ALONG LRV TRACK		DUST TV, TCU, LCRU PRESS TGE 'GRAV' WALK TO SEP XMTR			
		REMOVE REEL 1 & DEPLOY ANTENNA EAST ALONG LRV TRACK			
	6+10				

*THESE MANEUVERS PROVIDE ORTHOGONAL LAYOUT FOR SEP ANTENNA

CREW EVA CUFF CHECKLIST



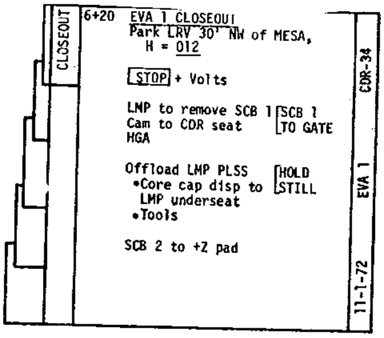
CDR-33
EVA 1
11-1-72

6+05 SEP XMTR DEPLOY
Deploy reel #1 E
Photograph ant, Xmtr & LMP
•f11, 74', 1/250
Deploy reel #3 S
Photograph ant, Xmtr & LMP
•f8, 74', 1/250
Take locator photo to LM

TGE - READ -

TRAV TO LM

SEP XMTR



CLOSEOUT

6+20 EVA 1 CLOSEOUT
Park LRV 30' NW of MESA,
H = 012

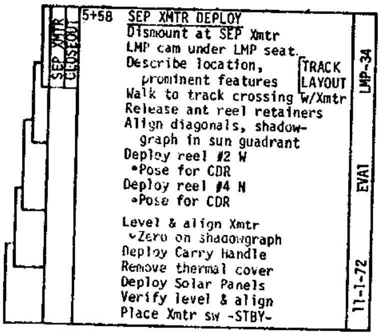
STOP + Volts

LMP to remove SCB 1
Cam to CDR seat
HGA
[SCB 1 TO GATE

Offload LMP PLSS
•Core cap disp to LMP underseat
•Tools
[HOLD STILL

SCB 2 to +Z pad

CDR-34
EVA 1
11-1-72

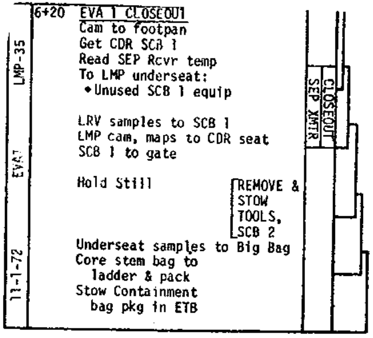


SEP XMTR
CLOSEOUT

5+58 SEP XMTR DEPLOY
Dismount at SEP Xmtr
LMP cam under LMP seat.
Describe location,
prominent features
[TRACK LAYOUT
Walk to track crossing W/Xmtr
Release ant reel retainers
Align diagonals, shadowgraph in sun quadrant
Deploy reel #2 W
•Pose for CDR
Deploy reel #4 N
•Pose for CDR

Level & align Xmtr
✓Zero on shadowgraph
Deploy Carry Handle
Remove thermal cover
Deploy Solar Panels
Verify level & align
Place Xmtr sw -STBY-

LMP-34
EVA1
11-1-72



LMP-35
EVA1
11-1-72

6+20 EVA 1 CLOSEOUT
Cam to footpan
Get CDR SCB 1
Read SEP Rcvr temp
To LMP underseat:
•Unused SCB 1 equip

LRV samples to SCB 1
LMP cam, maps to CDR seat
SCB 1 to gate

Hold Still
[REMOVE & STOW TOOLS, SCB 2

Underseat samples to Big Bag
Core stem bag to
ladder & pack
Stow Containment
bag pkg in ETB

SEP XMTR
CLOSEOUT

ETB Contents:

Mag _____(A)_____(B)_____(C)_____(G)

2 CAMS _____(R)

Maps

Sample Containment Bags

(1) CDR/LMP - LRV Samples Location

FSR's

VOICE DATA

EVA 1

6+10

(1) LMP - SEP XMTR
LEVEL ________
ALIGNMENT ________
PANELS DEPLOYED ________
SW - STDBY ________

(1) CDR/LMP - TGE RDG ___ ___ ___

6+20 (1) CDR - ARRIVAL AT LM ________

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

Volts: (1)______(2)______

(1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) LMP - SEP Temp________

(1) CDR/LMP - MAG/FRAME

CDR: ___/_____

LMP: ___/_____

SRC 1 CONTENTS:

SCB 1

ORGANIC CONTROL SAMPLE

6+30

(2) LMP - Mag/frames ___/_____
___/_____
___/_____

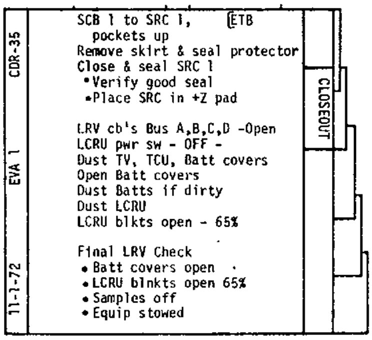
MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	CRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
STAND BEHIND REEL FOR CDR PHOTO	6+10	STAND BEHIND REEL - PHOTO REEL, XMTR, LMP f11, 1/250, 74'			
RETURN TO XMTR		RETURN TO XMTR			
REMOVE REEL 4 & DEPLOY ANTENNA NORTH ALONG LRV TRACK		REMOVE REEL 3 & DEPLOY ANTENNA SOUTH ALONG LRV TRACK			
STAND BEHIND REEL - FOR CDR PHOTO RETURN TO XMTR		STAND BEHIND REEL - PHOTO REEL, XMTR, LMP f8, 1/250, 74' RETURN TO LRV			
ALIGN & LEVEL XMTR (ZERO ON SHADOW GRAPH)					
DEPLOY CARRY HANDLE REMOVE & DISCARD THERMAL COVER - DEPLOY SOLAR PANELS		GO TO LRV, READ TGE			
VERIFY ALIGNMENT PLACE XMTR SW - 'STNDBY' RETURN TO LM		MOUNT LRV POWER UP LRV DRIVE TO LM			
TRAV TERMINATION	6+20	TRAV TERMINATION PARK LRV 30 FT NW OF MESA H = 012 + 15 VDC SW - OFF - ADJUST LGA READ OUT ALL LRV DISPLAYS ON CONSOLE			
READ SEP RCVR TEMPERATURE REMOVE SCB 1 - PLACE ON GATE XNSFER UNUSED EQUIP TO LMP UNDERSEAT		DISMOUNT LRV PLACE 70MM CAM ON CDR SEAT			
XNSFER LRV SAMPLES TO SCB 1 ASSIST CDR TO REMOVE & STOW TOOLS FROM PLSS		POINT HGA TO EARTH REMOVE TOOLS FROM LMP PLSS TOOL HARNESS			
EVA-1 CLOSEOUT (LMP) PUT UNDERSEAT SAMPLES IN SRB TAKE CORE BAG TO LADDER		STOW TOOLS ON GEO GATE			
PACK CORE STEMS IN BAG CARRY TO PORCH & STOW AGAINST LM		CLOSEOUT PREP SCB 2 TO +Z PAD SCB 1 TO MESA TABLE OPEN SRC 1			
STOW SAMPLE CONTAINMENT PKG TRANSFER ETB TO LRV-CDR FOOTPAN STOW 70MM CAM IN ETB(2)		PLACE SCB 1 IN SRC (POCKETS UP) REMOVE SRC SKIRT & DISCARD			
STOW MAPS IN ETB (CDR SEAT) TRANS 70MM MAGS FROM UNDER CDR SEAT TO ETB (READ FRAME COUNT EACH MAG) TAKE MAG OFF 500 MM CAM RESTOW CAM UNDER SEAT ATTACH ETB TO LEC	6+30	REMOVE SEAL PROTECTOR & CLOSE & SEAL SRC (SEAL CLEAR OF BAG MAT'L) EVA-1 CLOSEOUT (CDR)			

CREW EVA CHECKLIST

VOICE DATA

EVA 1

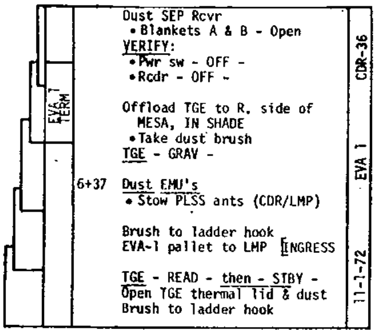

CDR-35
EVA 1
11-1-72

SCB 1 to SRC 1, [ETB
pockets up
Remove skirt & seal protector
Close & seal SRC 1
•Verify good seal
•Place SRC in +Z pad

LRV cb's Bus A,B,C,D -Open
LCRU pwr sw - OFF -
Dust TV, TCU, Batt covers
Open Batt covers
Dust Batts if dirty
Dust LCRU
LCRU blkts open - 65%

Final LRV Check
• Batt covers open
• LCRU blnkts open 65%
• Samples off
• Equip stowed

CLOSEOUT


EVA 1 TERM

Dust SEP Rcvr
• Blankets A & B - Open
VERIFY:
•Pwr sw - OFF -
•Rcdr - OFF -

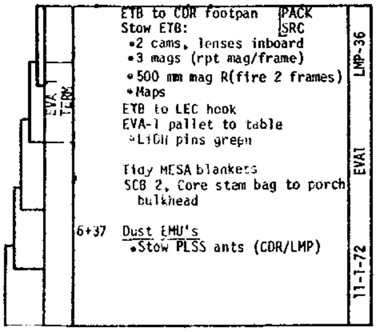
Offload TGE to R. side of
MESA, IN SHADE
•Take dust brush
TGE - GRAV -

6+37 Dust EMU's
• Stow PLSS ants (CDR/LMP)

Brush to ladder hook
EVA-1 pallet to LMP [INGRESS

TGE - READ - then - STBY -
Open TGE thermal lid & dust
Brush to ladder hook

CDR-36
EVA 1
11-1-72

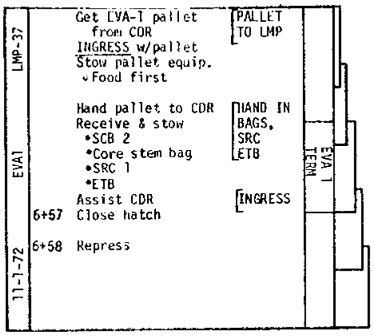

EVA 1 TERM

ETB to CDR footpan [PACK SRC
Stow ETB:
•2 cams, lenses inboard
•3 mags (rpt mag/frame)
•500 mm mag R(fire 2 frames)
•Maps
ETB to LEC hook
EVA-1 pallet to table
•LiOH pins green

Tidy MESA blankets
SCB 2, Core stem bag to porch
bulkhead

6+37 Dust EMU's
•Stow PLSS ants (CDR/LMP)

LMP-36
EVA1
11-1-72


LMP-37
EVA1
11-1-72

Get EVA-1 pallet [PALLET TO LMP
from CDR
INGRESS w/pallet
Stow pallet equip.
•Food first

Hand pallet to CDR [HAND IN BAGS, SRC ETB
Receive & stow
•SCB 2
•Core stem bag
•SRC 1
•ETB
Assist CDR [INGRESS
6+57 Close hatch

6+58 Repress

EVA 1 TERM

6+30 (1) LMP - PALLET 1 LIOH PINS
GREEN ________

(1) CDR - TGE in shade (verify)

(1) CDR - TGE GRAV

(1) CDR - Verify CB's A-B-C-D pulled
Batt Covers - OPEN
LCRU - 65% OPEN

(1) CDR - Verify Dusting

6+40

(1) CDR/LMP - PLSS Antennas stowed

TRANSFER ITEMS:
ETB
CORE STEMS (in Bag)
SCB # _____
SRC 1
PALLET 1

(1) LMP - In Cabin

(1) CDR - TGE Rdg ___ ___ ___ ___ ___ ___ ___
TBE - STNDBY

6+50

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
UNSTOW PALLET 1 FROM MESA - VERIFY PINS GREEN HANG PALLET 1 FROM SEC TABLE TIDY BLANKETS ON MESA	6+30	UNSTOW DUST BRUSH			
		PULL LRV CB A-B-C-D DUST TV, TCU, BATT COVERS			
CARRY SCB 2 & CORE BAG TO LM PORCH		OPEN BATT COVERS DUST BATTS IF DIRTY			
RETURN TO SURFACE		DUST LCRU & SW OFF LCRU BLANKETS - 65% DUST TGE & SEP RECEIVER			
		OPEN BLANKET A AND B			
		OFFLOAD TGE TO R. SIDE OF MESA IN SHADE PRESS GRAV PB - NOTE FLASH IND FOR LEVEL CYCLE			
DUST CDR'S EMU		HAND LMP DUST BRUSH			
HAND DUST BRUSH TO CDR					
		DUST LMP'S EMU			
	6+40				
STOW PLSS ANTENNAS EVA TERM LMP		STOW PLSS ANTENNAS STOW DUST BRUSH EVA TERM LMP			
RECEIVE EVA-1 PALLET FROM CDR		HAND EVA 1 PALLET TO LMP			
INGRESS CABIN WITH EVA-1 PALLET					
SHUT OFF 16 MM CAM - REPOSITION ON BRACKET		GET DUST BRUSH TGE READ, THEN - STBY - OPEN LID (RADIATOR) DUST TGE			
INTERIM STOW EQUIP AS REQD		HANG BRUSH ON HOOK EVA TERM CDR			
HAND EVA-1 PALLET TO CDR		CARRY SRC 1 UP LADDER & STASH ON PORCH RECEIVE & DISCARD EVA - 1 PALLET			
	6+50				

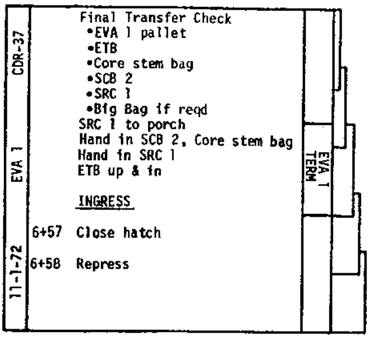
CREW EVA CHECKLIST

VOICE DATA

EVA 1

6+50 (1) CDR -

Verify brush stowed



CDR-37

EVA 1

11-1-72

Final Transfer Check
- •EVA 1 pallet
- •ETB
- •Core stem bag
- •SCB 2
- •SRC 1
- •Big Bag if reqd

SRC 1 to porch
Hand in SCB 2, Core stem bag
Hand in SRC 1
ETB up & in

INGRESS

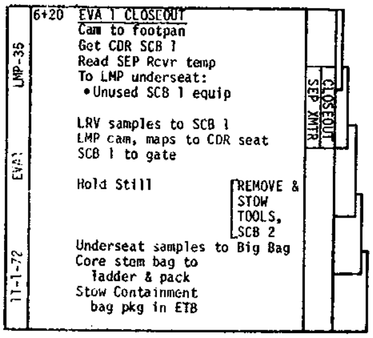
6+57 Close hatch

6+58 Repress

EVA 1 TERM

(1) LMP - Hatch Closed __________

7+00 (1) CDR - Cabin Repress __________



LMP-35

EVA 1

11-1-72

6+20 EVA 1 CLOSEOUT
Cam to footpan
Get CDR SCB 1
Read SEP Rcvr temp
To LMP underseat:
- •Unused SCB 1 equip

LRV samples to SCB 1
LMP cam, maps to CDR seat
SCB 1 to gate

Hold Still

REMOVE & STOW TOOLS, SCB 2

Underseat samples to Big Bag
Core stem bag to ladder & pack
Stow Containment bag pkg in ETB

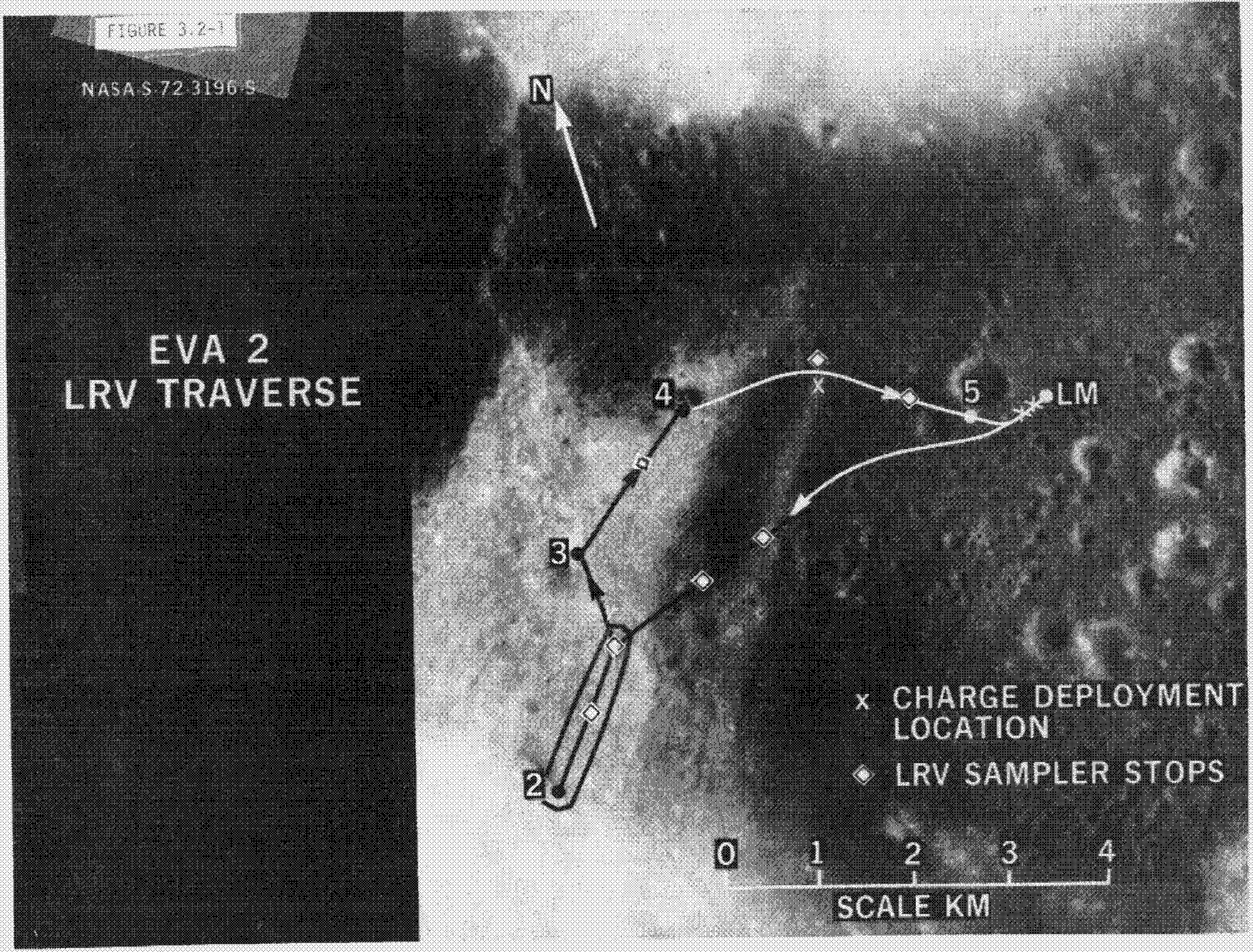
CLOSEOUT SEP XMTR

MISSION: APOLLO 17 EVA: 1 DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	6+50				
RECEIVE & STOW CORE BAG, SCB 2		HAND IN CORE BAG & SCB 2			
RECEIVE SRC 1, INTERIM STOW		HAND SRC 1 IN TO LMP			
RECEIVE ETB FROM CDR		PULL ETB UP WITH LEC HAND IN TO LMP			
ASSIST CDR DURING INGRESS		INGRESS LM			
CLOSE HATCH		CLOSE HATCH			
REPRESS OPERATIONS		REPRESS OPERATIONS			
	7+00				

3.2 EVA 2

FIGURE 3.2-1



EVA 2
LRV TRAVERSE

3.2 EVA 2

3.2.1 EVA 2 - GENERAL DESCRIPTION

EVA 2 begins with depressurization of the spacecraft cabin, followed by CDR egress. The CDR jettisons a bag of equipment no longer needed, then lowers the Equipment Transfer Bag (ETB) to the surface. The LMP follows the CDR soon afterwards. The operations around the LM are mainly devoted to preparing for the second geology traverse. SRC 2 is opened, and its contents made fast to the CDR's PLSS. In like fashion a a sample bag is fastened to the LMP. The crew makes a base camp Traverse Gravimeter reading, also places this instrument back on the LRV.

The LCRU is switched to its own power for this EVA, and the spare battery is taken out of the MESA for placement under the CDR seat on the LRV. As before, photographic supplies are located under the CDR seat.

The CDR drives out to the Surface Electrical Properties site, while the LMP walks. The CDR first brings up the LRV navigation system, and then heads for the SEP. He parks near the west leg of the antenna array, heading down sun for a navigational system initialization. All ranges and distances are, as they were on EVA 1, referenced to the SEP transmitter site.

While the CDR is initializing and correcting the navigational system, the LMP takes some photos to document the initial relationship between the LRV (where the SEP receiver-recorder is located) and the SEP transmitter. He then turns on the receiver and takes his place beside the CDR to begin the EVA 2 traverse.

Objectives of the EVA 2 traverse are to investigate and sample the base of the South Massif and the light mantle material of the debris slide, further investigation and sampling of the dark mantle and plains material, emplacement of seismic profiling charges, obtaining traverse gravimeter measurements, and obtaining data for the Surface Electrical Properties Experiment. A short stop is made about 500 feet west of the ALSEP area where a 1/8 pound seismic profiling charge is deployed. En route to station 2 (Figure 3.2-1), two short stops are scheduled (2 minutes each) where samples are taken from the LRV using the LRV sampling device. Approximately 2-1/2 hours of station time are spent on the light mantle material at three major stations (2, 3, and 4) and three short LRV sampling stops.

Proceeding eastward from station 4, there is a short stop at the depression about 1 km east of station 4 where the 6 pound seismic profiling charge is deployed, an LRV sample is collected, and observations and photographs of the depression are made. Depending upon the crews' assessment, additional time could be invested here at the expense of station 5. An additional LRV sample is collected en route to station 5. Station 5, where approximately 1/2 hour is available, provides a further opportunity for investigating the plains material and dark mantle. The traverse then returns to the LM with an intermediate stop about 250 m west of the ALSEP where a 1/4 pound seismic profiling charge is deployed. The final 44 minutes of EVA 2 are spent in closeout activities in the LM area.

On arrival at the LM, the LRV is parked to maximize battery cooldown between EVA's, and powered down. The CDR, as he has done at each station stop, dusts the communications gear on the front of the LRV and brings up the TV. The LMP shuts off the SEP receiver. Then the two men unload each other's PLSS harnesses of the tools and sample bags they carry. The sample collection bag that came out of the SRC goes back into it, and this box is sealed. The LMP loads the cameras and magazines, maps, and the polarizing filter into the ETB, ready for transfer to the ascent stage. The Traverse Gravimeter is taken off the LRV and placed in the shade of the spacecraft. A final EVA 2 measurement is made. The crewmen dust each other off, and the LMP scales the ladder with an expendables supply pallet. The CDR shuts down the TV, configures the LRV for its between EVA stay. He carries the SRC and the two sample collection bags to the ascent stage and hands them in. Finally, he pulls up the ETB, hands it in to the LMP. He makes a final check that all transfer items are accounted for, and ingresses the cabin, thus closing EVA 2.

Figure 3.2-2 summarizes this EVA in a block timeline. Figures 3.2-3 through 3.2-6 provide task information for each of the stations planned for this EVA.

FIGURE 3.2-2

APOLLO 17 LUNAR SURFACE TIMELINE EVA 2 DATE NOV. '72

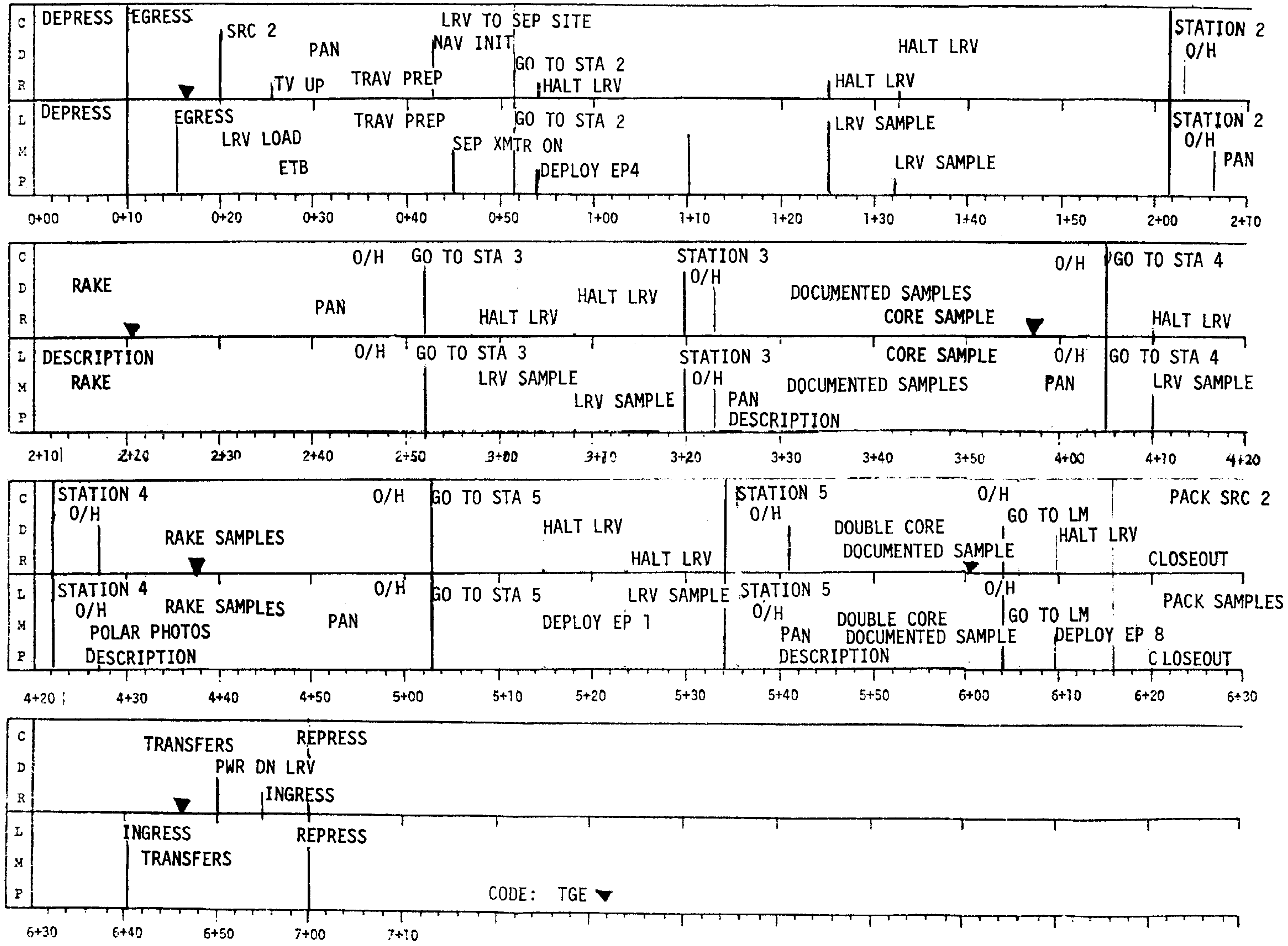


FIGURE 3.2-3 STATION 2 TASKS

EVA 2 Station 2 Station time 0 + 50

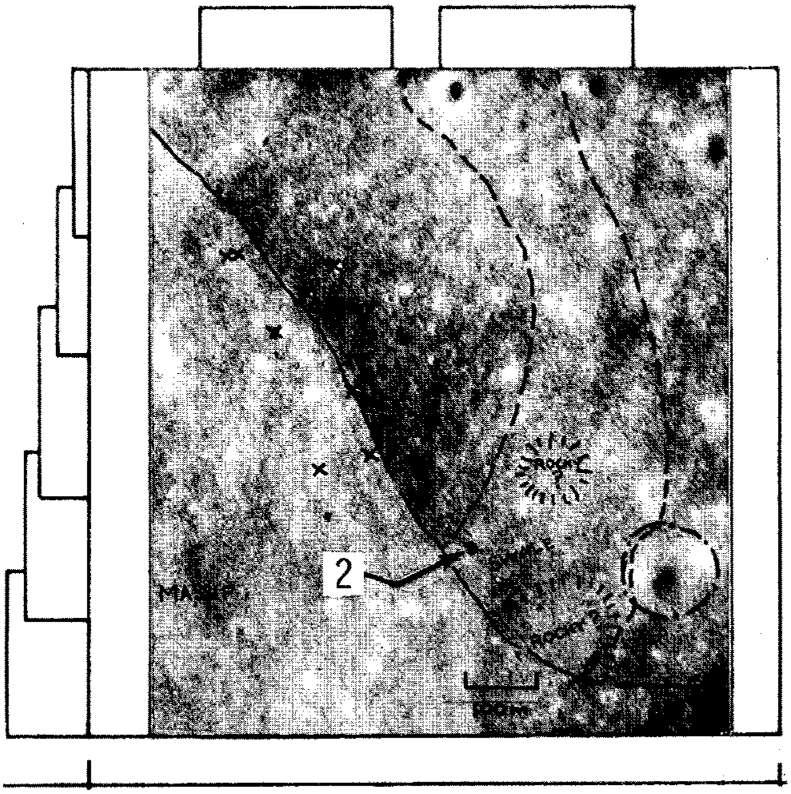
Location: Base of South Massif at contact between South Massif and light mantle

Geologic setting: Massif material underlies the steep mountain face at station 2. Most probably it consists of sheets of breccia ejected from the moon's large basins as they were formed. Faulting related to the Serenitatis event is thought to have uplifted the massif relative to the valley floor. Subsequent movement may also have occurred. However, the lower part of the mountain face is probably covered by talus that buries the bounding fault zone.

Light mantle occurs as a relatively thin ray-like sheet that extends onto the valley floor from the base of the massif. Absence of a likely source crater suggests that the light mantle is not a ray of ejecta. It may be debris from the mountain face deposited by an avalanche fairly late in the history of the landing area.

Objectives:

- Characterize South Massif bedrock as represented by materials at base of slope.
- Characterize light mantle and investigate features indicative of its origin.



TASKS *	RATIONALE
Massif:	
•Documented samples of rocks and soil with special emphasis on blocks with tracks.	•Collect representative sample of massif rock types as represented in talus at base; blocks with tracks most probably derived from massif
•Observe/photograph tracks and block sources	•Documentation of block sources may permit stratigraphic analysis of massif
•Observe/photograph block structures--textures	•Block structures and textures record history of emplacement and deformation of massif materials
•Rake sample	•Statistical sample of lithologic variety in pebble-size fragments in massif talus
•Observe/photograph proximal edge of light mantle	•Documents discrimination between talus and light mantle materials; may show light mantle features indicative of mantle origin
•Relate sample locations to proximal edge of light mantle; collect from above light mantle if possible	•Light mantle, if derived from massif, may represent source distinct from major sources of talus; hence discriminate sampling may permit stratigraphic interpretation of massif materials
•Pan-southeast crest of rim of Nansen crater near base of massif	•Massif-light mantle structures, contact; trough at massif base; blocks near massif base
Light mantle:	
•Documented samples of rocks and soil	•Characterize lithology of light mantle materials (which presumably were derived from south massif); exposure age of light mantle surface; possible sample of Nansen ejecta (could include subfloor or massif materials)
•Rake sample (intercrater area)	•Statistical sample of lithologic varieties in pebble-size fragments for comparison with rak samples from massif and from stations 3 and 4
•Observe/photograph surface structures such as riges and troughs	•Surface structures may be indicative of emplacement mechanism
•Trench	•Internal structures may provide evidence of mode of emplacement of light mantle
•Observe/photograph layering or other structure in trench walls	
•Pan from rim of Nansen crater 50(?) m away from intersection of rim with massif	•Stereoscopic view (with pan 1) of lower massif, trough and boulders near massif base; surface structures on light mantle.

---

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocatio which were selected as the nominal station activities.

EVA 2

Station 2 timeline

0 + 50

	CDR	LMP
Initial overhead	5	5
Observation •Blocks, tracks and sources •Blocks, structures and textures •Massif/light mantle contact •Light mantle, surficial and internal structure •Regolith	10	10
Massif •Documented sampling-emphasis on blocks with tracks •Rake/soil (kg) •Pan	21	21
Light mantle •Documented sampling-rocks •Rake/soil (intercrater area) •Pan	10	10
Final overhead	4	4
	50	50

FIGURE 3.2-4 STATION 3 TASKS

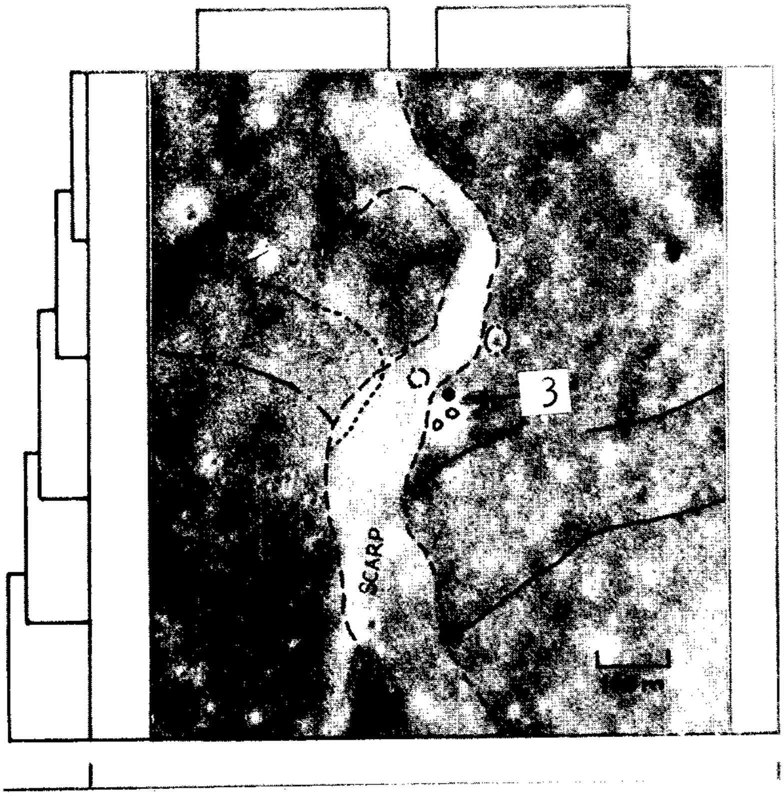
EVA 2 Station 3 Station time 0 + 45

Location: Base of scarp approximately halfway from station 2 to station 4.

Geologic setting: Light mantle apparently veneers the scarp, which may be the topographic expression of a fault, upthrown on the west. Presence of the scarp when the light mantle was emplaced may have produced depositional structures in the light mantle that can be used to interpret its origin. Ledges or blocks representing the bedrock underlying the scarp face may be accessible although none are recognized in pre-mission photographs. Two fresh craters, 15 and 20 m in diameter penetrate the surface of the light mantle near the base of the scarp.

Objectives:

- Sample central part of light mantle near base of scarp.
- Examine and sample scarp to determine interrelations and chronology of scarp and mantle materials.



EVA 2 Station 3 (continued)

TASKS *	RATIONALE
Light mantle:	
•Documented samples of rocks and soil	•Characterize lithology of light mantle materials (presumably these were derived from South Massif); exposure age of light mantle surface.
•Rake sample (inter-crater area)	•Statistical sample of lithologic varieties in pebble-size fragments for comparison with samples from stations 2 and 4.
•Double core in undisturbed surface near base of scarp (lower section goes in CSVC)	•Regolith development; detailed stratigraphy of upper meter of light mantle; possible volatiles in fault zone.
•Radial sample 15-20 m fresh crater	•Stratigraphy of upper 3 to 4 m of light mantle.
•Pan near 15-20 m fresh crater	•Location; character of scarp, light mantle surface, and sampled crater.
•Observe/photograph surface structures, textures, and fragment distribution; note apparent relations to scarp	•May indicate mode of emplacement of light mantle.
•Trench in undisturbed surface of light mantle	•Internal structures may indicate emplacement mechanism for light mantle; regolith thickness--relative age by comparison with regolith on dark mantle.
•Observe/photograph layering or other structure in trench walls	

EVA 2 **Station 3 (continued)**

Scarp:

•Observe/photograph (flight-line surveys) surface structures, textures, and fragment distribution.	•Characterize scarp and forming its surface; chronology of scarp and mantle units; origin of mantle units.
•Documented samples of scarp materials--may be desirable to observe and sample at small fresh crater.	•Scarp (or small fresh crater in scarp face) may expose (or excavate) materials older than the light mantle (e.g. dark mantle or subfloor). Occurrence of such materials at or near scarp face bears on chronology of scarp and mantle units and on mechanisms of scarp and mantle origins.
•Trench - Observe/photograph layering or other structures in trench walls	•Stratigraphy; origin of scarp face; origin of light mantle.
•Pan near scarp base	•Scarp and light mantle features;stereoscopic view with previous pan.

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* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 2

Station 3 timeline

0 + 45

	CDR	LMP
<u>Initial overhead</u>	5	5
<u>Observation</u>	5	5
•Distinguish light mantle and scarp materials •Chronology of scarp and light mantle (light mantle draping?, faulted?) •Depositional features of mantle on surface and in exploratory trenches; regolith development		
<u>Light mantle</u>	29	14
•Documented sampling (possible radial sampling) - rim of 20 m bright crater •Rake/soil (inter-crater area) •Pan •Double core by CDR near scarp base; lower section goes in CSVC		
<u>Scarp</u>	2	17
•Exploratory trench; documented sampling (by LMP) •Flight-line survey •Pan		
Final overhead	4	4
	45	45

FIGURE 3.2-5 STATION 4 TASKS

EVA 2 Station 4 Station time 0 + 40

Location: Dark halo crater at distal end of light mantle.

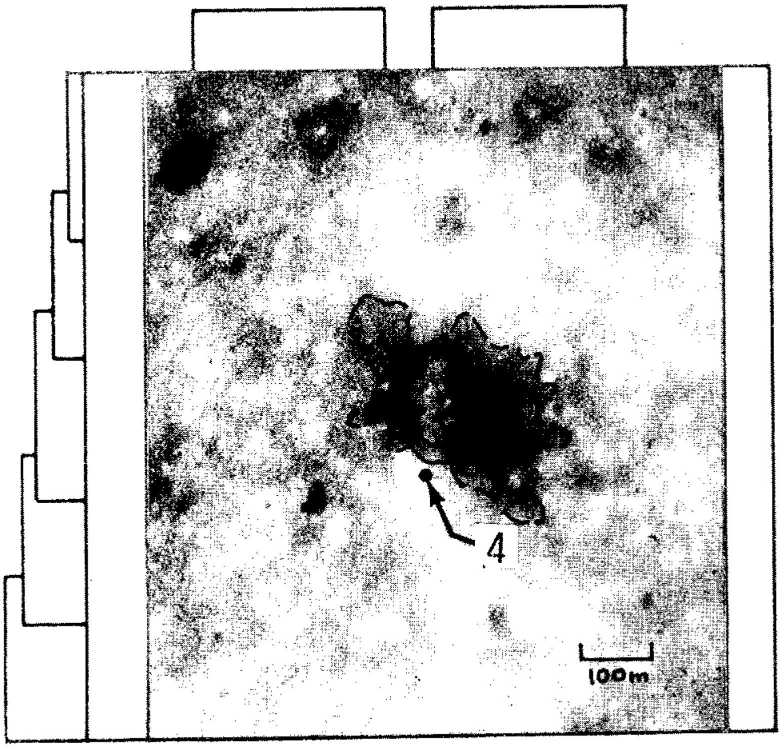
Geologic setting: A rayed, 110 m, dark halo crater is superimposed on the distal end of the light mantle. It seems likely that the crater was formed by impact and excavated thick dark mantle from below the light mantle. The crater floor is flat, benched, very rough, and is apparently covered by dark mantle material. This floor may represent a resistant layer, perhaps the top of the subfloor unit, about 10 m below the general level of the valley floor. No light colored materials or blocks are visible on the crater walls or rim, but subfloor fragments could be present.

Alternatively, the crater could be a vent that produced a small amount of dark mantle material after emplacement of the light mantle.

Several small bright craters occur in the light mantle south of the dark halo crater. They suggest that the light mantle may be as much as 4 m thick in this area. Two small craters nearest the dark halo crater could be in light colored ejecta (overturned light mantle) of the dark crater.

Objectives:

- Examine dark halo crater to determine its origin and sample its ejecta.
- Examine distal end of light mantle and sample its variety of rock types.



TASKS *	RATIONALE
Dark halo crater:	
•Observe/photograph ejecta, rim, crater interior	•Crater origin; sampling rationale
•Radial sample (dixie cup) 5 sample minimum	•Stratigraphy of dark mantle
•Documented samples - rocks and soil at crater rim (possible rake sample)	•Characterize lithology of dark mantle; possible sample of subfloor material; exposure age of crater
•Double core near edge of dark halo (if impact, core just within dark ejecta; if volcanic, try for one drive tube full of dark ejecta)	•Stratigraphy of ejecta and underlying light mantle
•Pan - crater rim	•Crater structures; scarp
•Polarimetry - crater rim	•Polarimetry of north and south massifs and sculptured hills to provide data on their similarities and differences
•Exploratory trench	•Compare regolith development with regolith on light mantle
Light mantle:	
•Observe/photograph surface structures, textures, fragment distribution, internal structure, regolith	•Mode of emplacement; compare with stations 2 and 3; relative age based on regolith thickness
•Rake sample (intercrater area)	•Statistical sample of lithologic varieties in pebble-size fragments for comparison with samples from stations 2 and 3
•Documented samples of rocks and soil from rim and ejecta blanket of small (approx. 10 m) fresh crater	•Characterize lithology of light mantle materials
•Pan	•Location, sampling context

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 2 Station 4 Timeline 0 + 40

	CDR	LMP
Initial overhead	5	5
Observation	5	5
•Dark halo crater interior, deposits (origin), regolith •Light mantle lithology, structures, regolith •Uplands and scarp (500 mm)		
Dark halo crater	12	15
•Documented sampling (rim) possible rake soil •Pan (rim) •Polarimetry (rim) •Radial sample (dixie cup) (at least 5 samples)		
Light mantle	14	11
•Documented sampling (bright crater) •Rake/soil (inter-crater) •Pan		
Final overhead	4	4
	40	40

FIGURE 3.2-6 STATION 5 TASKS

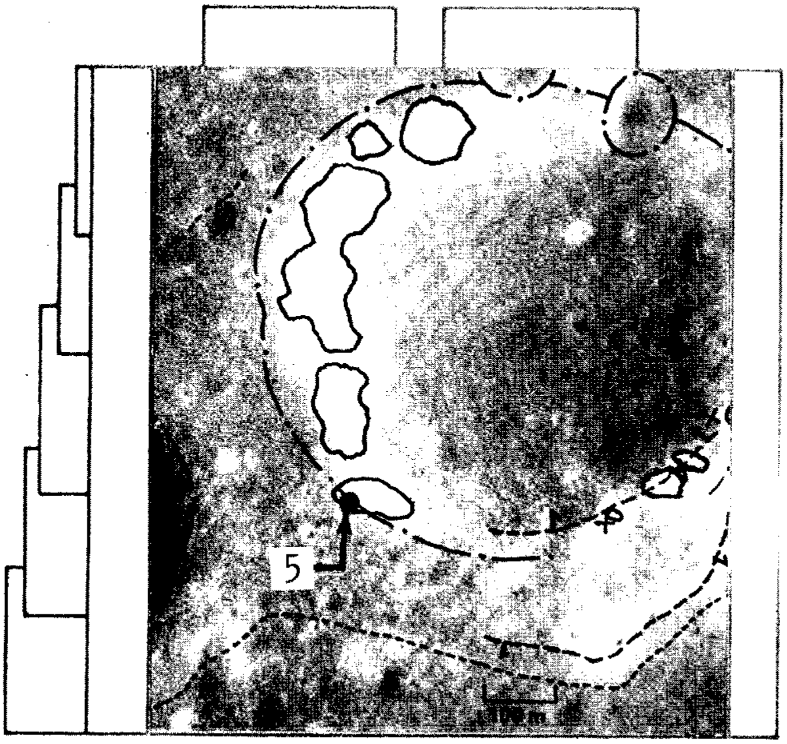
EVA 2 Station 5 Time 0 + 30

Location: Southwest side of low-rimmed 700 m crater west of landing point.

Geologic setting: As at station 1, subfloor material is exposed in parts of the crater rim and wall. Accessible exposures, however, are few and small, and no blocks are resolvable in the station area. Dark mantle covers the floor and much of the rim and wall of the crater.

Objectives:

- Observe and sample subfloor and dark mantle materials for comparison with other stations.



TASKS*	RATIONALE
•Observe/photograph crater walls, rims	•Crater origin
Dark mantle:	
•Double core through dark mantle/ subfloor interface	•Lateral variation in dark mantle (compare with deep drill core); character, age of pre-mantle surface
•Trench; observe/photograph regolith	•Comparison with light mantle for relative age; with other dark mantle areas for cause of thinning on crater rim
Subfloor:	
•Documented samples •Rake/soil	•Representative sampling of subfloor materials for comparison with samples from stations 1 and 10

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* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 2

Station 5 Timeline

0 + 30

	CDR	LMP
Initial overhead	5	5
Observation	3	3
•Crater wall/rim (origin) •Subfloor - compare with station 1 •Subfloor/dark mantle contact •Regolith		
Subfloor	9	9
•Documented sampling •Rake/soil		
Dark mantle	9	9
•Double core (including top of subfloor unit) •Pans (stereo-camelot)		
Final overhead	4	4
	30	30

3.2.2 EVA-2 TRAVERSES

This section is comprised of a tabular summary of the EVA 2 activities. Table 3.2-1 provides calculated data on distance, velocities, and times as the crew progresses through their preparations and station stops, culminating in closeout back at the LM. The tabular data also shows the time and location of the three explosive packages deployed on EVA 2.

The table also provides traverse contingency information, LRV - or PLSS - malfunctioned walkbacks or ridebacks.

Table 3.2-2 lists input data for the program that generated Table 3.2-1.

Finally, Table 3.2-3 provides the basic assumptions inherent in the layout of the EVA traverses.

TABLE 3.2-1 APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 CALCULATED DATA OCT 25 1972

EVA START 139:10 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	LRV MOBILITY RATE (KM/HR)	RIDE TIME (MIN)	TOTAL TRAVEL DISTANCE (KM)	ARRIVE STATION EVA TIME (HR+MIN)	STOP TIME (HR+MIN)	DEPART STATION EVA TIME (HR+MIN)
LM				0.00	0+ 0	0+52	0+52
RIDE	0.40	7.30	3				
1/8#CH R=.20				0.40	0+55	0+ 3	0+58
RIDE	3.43	7.30	28				
LRV-SA				3.83	1+26	0+ 2	1+28
RIDE	0.39	7.30	3				
LRV-SA				4.22	1+32	0+ 2	1+34
RIDE	3.48	7.30	29				
2				7.70	2+ 2	0+50	2+52
RIDE	1.08	7.30	9				
LRV-SA				8.78	3+ 1	0+ 2	3+ 3
RIDE	1.08	7.30	9				
LRV-SA				9.86	3+12	0+ 2	3+14
RIDE	0.73	7.30	6				
3				10.59	3+20	0+45	4+ 5
RIDE	1.09	7.30	9				
LRV-SA				11.68	4+14	0+ 2	4+16
RIDE	0.79	7.30	6				
4				12.47	4+22	0+40	5+ 2
RIDE	1.39	7.30	11				
PHOTO LRV-SA 6#CH R=2.4				13.86	5+14	0+ 4	5+18
RIDE	0.93	7.30	8				
LRV-SA				14.79	5+26	0+ 2	5+28
RIDE	0.79	7.30	6				
5				15.58	5+34	0+30	6+ 4
RIDE	0.72	7.30	6				
1/4#CH R=.25				16.30	6+10	0+ 3	6+13
RIDE	0.40	7.30	3				
LM				16.70	6+16	0+44	7+ 0
TOTALS			137			4+43	7+ 0

TABLE 3.2-1 (Continued)

EVA 2 CALCULATED DATA (CONTINUED)

		TRAVERSE CONTINGENCIES						
		LRV FAILURE				PLSS FAILURE		
STAT NO	RETURN DISTANCE TO LM (KM)	WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQUIREMENTS			MIN LRV RIDEBACK SPEED REQUIRED		AVG EVA MET RATE (BTU/HR)
			FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	
LM	0.00	0+ 0	◆◆◆◆	◆◆◆◆	◆◆◆◆	0.00	0.00	1050.00
1/8#CH R=.20	0.30	0+ 5	6+21	5+52	6+19	0.29	0.35	1016.65
LRV-SA	3.73	1+23	4+21	3+52	4+31	3.62	4.32	866.46
LRV-SA	4.12	1+32	4+ 6	3+37	4+17	4.00	4.77	857.41
2	7.58	2+48	1+18	0+48	1+41	7.36	8.78	833.25
LRV-SA	6.50	2+24	1+41	1+12	1+54	6.31	7.53	820.80
LRV-SA	5.41	2+ 0	2+ 5	1+35	2+ 8	5.25	6.27	809.74
3	5.50	2+ 2	1+13	0+44	1+15	5.34	6.37	829.14
LRV-SA	4.65	1+43	1+30	1+ 1	1+23	4.51	5.39	820.31
4	4.13	1+32	1+ 0	0+32	0+48	4.01	4.79	831.66
PHOTO	2.84	0+47	1+35	1+ 7	1+17	2.76	3.29	823.03
LRV-SA								
6#CH R=2.4								
LRV-SA	1.91	0+32	1+51	1+24	1+23	1.85	2.21	817.43
5	1.12	0+19	1+37	1+10	0+59	1.09	1.30	823.59
1/4#CH R=.25	0.40	0+ 7	1+48	1+22	1+ 2	0.39	0.46	820.26
LM	0.00	0+ 0	1+32	1+ 5	0+45	0.00	0.00	842.20

TABLE 3.2-2 APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 INPUT DATA OCT 25 1972

EVA START 139:10 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEGMENT DISTANCE (KM)	RETURN DISTANCE (KM)	HEAT LEAK (BTU/HR)	-MOBILITY RATES- WALK (KM/HR)	RIDE (KM/HR)	MET RATE WALK (BTU/HR)
LM	0+52	0.00	0.00	135.00	****	****	******
1/8#CH R=.20	0+ 3	0.40	0.30	135.00	3.60	7.30	1560.0
LRV-SA	0+ 2	3.43	3.73	135.00	2.70	7.30	1290.0
LRV-SA	0+ 2	0.39	4.12	135.00	2.70	7.30	1290.0
2	0+50	3.48	7.58	135.00	2.70	7.30	1290.0
LRV-SA	0+ 2	1.08	6.50	135.00	2.70	7.30	1290.0
LRV-SA	0+ 2	1.08	5.41	135.00	2.70	7.30	1290.0
3	0+45	0.73	5.50	135.00	2.70	7.30	1290.0
LRV-SA	0+ 2	1.09	4.65	135.00	2.70	7.30	1290.0
4	0+40	0.79	4.13	135.00	2.70	7.30	1290.0
PHOTO LRV-SA 6#CH R=2.4	0+ 4	1.39	2.84	135.00	3.60	7.30	1560.0
LRV-SA	0+ 2	0.93	1.91	135.00	3.60	7.30	1560.0
5	0+30	0.79	1.12	135.00	3.60	7.30	1560.0
1/4#CH R=.25	0+ 3	0.72	0.40	135.00	3.60	7.30	1560.0
LM	0+44	0.40	0.00	135.00	3.60	7.30	1560.0

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE O2 (LB/HR)	EVA START (F/W-LB)	EVA START (O2-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.028	11.29	1.353	61.8

TABLE 3.2-3

LRV TRAVERSE ASSUMPTIONS

1. 30 MINUTES RESERVES MAINTAINED ON ALL PLSS CONSUMABLES AT STATION METABOLIC RATE

2. ALL DISTANCES AND SPEEDS ARE MAP DISTANCES AND MAP SPEEDS (MOBILITY RATES)

3. REQUIRED RATE = RETURN DISTANCE/AVAILABLE OPS RIDING TIME
   AVAILABLE OPS RIDING TIME = TOTAL OPS TIME LESS ALLOWANCES
   ALLOWANCES $\begin{cases}\text{5 MIN BSLSS HOOKUP}\\ \text{13 MIN LM INGRESS}\end{cases}$

4. TIME MARGIN AT STATION METABOLIC RATE
   STATION MARGIN = TIME REMAINING AFTER ALLOWANCE FOR 10 MINUTES AT LRV, WALKBACK, AND 13 MINUTES INGRESS

5. FINAL LM O/H MARGIN = TIME REMAINING WITH NO ALLOWANCES

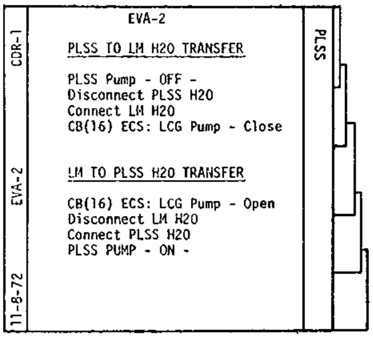
6. RESPIRATORY EXCHANGE QUOTIENT = 0.9

7. FEEDWATER HEAT OF VAPORIZATION 1038 $\frac{\text{BTU}}{\text{LB}}$

3.2.3 DETAILED EVA 2 TIMELINE PROCEDURES

The detailed procedures for EVA 2 are shown on the following vertical format pages. The crew cuff check list pages which correspond approximately to the timeline are shown on the far left-hand facing sheets together with the Voice Data Plan.

EVA 2



CDR-1
EVA-2
11-8-72

EVA-2

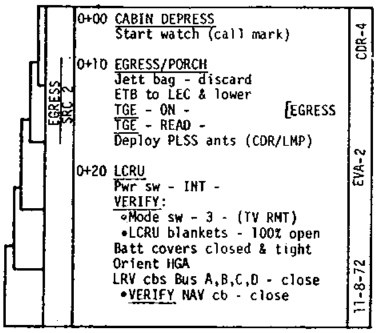
PLSS TO LM H2O TRANSFER

PLSS Pump - OFF -
Disconnect PLSS H2O
Connect LM H2O
CB(16) ECS: LCG Pump - Close

LM TO PLSS H2O TRANSFER

CB(16) ECS: LCG Pump - Open
Disconnect LM H2O
Connect PLSS H2O
PLSS PUMP - ON -

PLSS



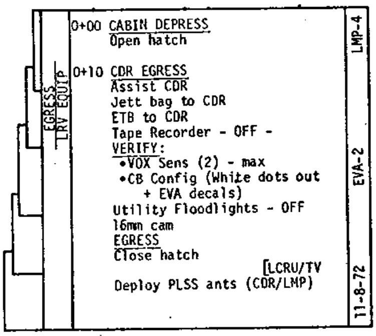
EGRESS
SRC 2

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
ETB to LEC & lower
TGE - ON - [EGRESS
TGE - READ -
Deploy PLSS ants (CDR/LMP)

0+20 LCRU
Pwr sw - INT -
VERIFY:
•Mode sw - 3 - (TV RMT)
•LCRU blankets - 100% open
Batt covers closed & tight
Orient HGA
LRV cbs Bus A,B,C,D - close
•VERIFY NAV cb - close

CDR-4
EVA-2
11-8-72



EGRESS
LRV EQUIP

0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB to CDR
Tape Recorder - OFF -
VERIFY:
•VOX Sens (2) - max
•CB Config (White dots out
+ EVA decals)
Utility Floodlights - OFF
16mm cam
EGRESS
Close hatch
[LCRU/TV
Deploy PLSS ants (CDR/LMP)

LMP-4
EVA-2
11-8-72

CODE:

(1) MANDATORY REQUIREMENT FOR DATA AT TIME OR EVENT DESIGNATED

(2) DATA MAY BE DEFERRED UNTIL LATER IN EVA OR DEBRIEFING

AT START OF EVA:

SUN ANGLE ~ 25°

LM SHADOW ~ 15.2 m (50 ft)

ASTRONAUT SHADOW ~ 4.5 m (15 ft)

0+00 (1) CDR/LMP - EVA WATCH START
MARK________

(2) ETB CONTENTS

CDR HEDC WITH MAG __________ (C)
LMP HEDC WITH MAG __________ (H)
MAGS _____(D)_____(I)_____(J)_____(K)
___(B) ____(R)
POLAR FILTER
MAPS
COSMIC RAY (IF NOT DEPLOYED EVA 1)

(2) LMP - VERIFY CB CONFIG OK

0+10

APOLLO 17

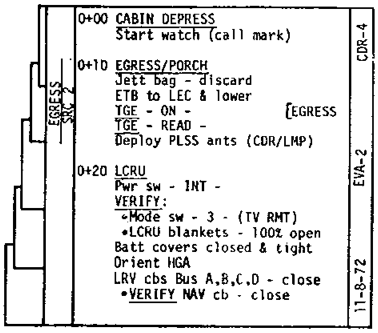
NOMINAL TIMELINE

LUNAR SURFACE EVA 2

NOV. 1972

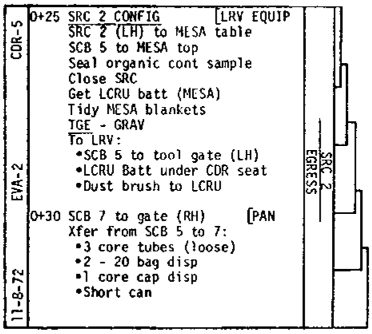
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		START EVA WATCH (CALL MARK)			
		NOTE: DETAILED PROCEDURES ARE PRESENTED IN LUNAR SURFACE CHECKLIST EQUIPMENT PREP - EVA 2 SECTION			
	0+10				

CREW EVA CHECKLIST

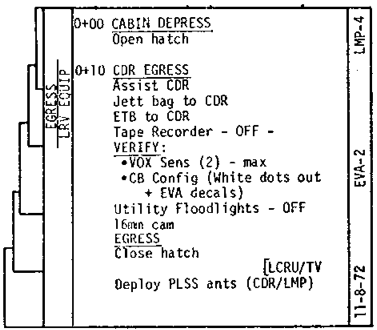

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
ETB to LEC & lower
TGE - ON - [EGRESS
TGE - READ -
Deploy PLSS ants (CDR/LMP)

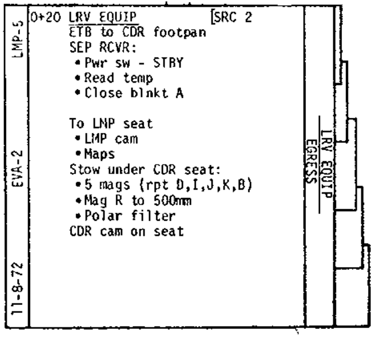
0+20 LCRU
Pwr sw - INT -
VERIFY:
- Mode sw - 3 - (TV RMT)
- LCRU blankets - 100% open
Batt covers closed & tight
Orient HGA
LRV cbs Bus A,B,C,D - close
- VERIFY NAV cb - close


0+25 SRC 2 CONFIG [LRV EQUIP
SRC 2 (LH) to MESA table
SCB 5 to MESA top
Seal organic cont sample
Close SRC
Get LCRU batt (MESA)
Tidy MESA blankets
TGE - GRAV
To LRV:
- SCB 5 to tool gate (LH)
- LCRU Batt under CDR seat
- Dust brush to LCRU

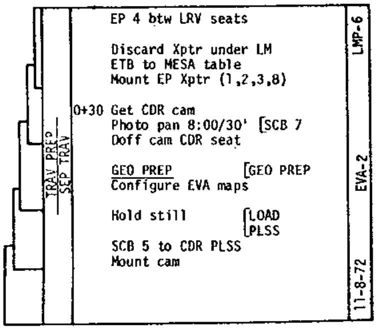
0+30 SCB 7 to gate (RH) [PAN
Xfer from SCB 5 to 7:
- 3 core tubes (loose)
- 2 - 20 bag disp
- 1 core cap disp
- Short can


0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB to CDR
Tape Recorder - OFF -
VERIFY:
- VOX Sens (2) - max
- CB Config (White dots out + EVA decals)
Utility Floodlights - OFF
16mm cam
EGRESS
Close hatch
[LCRU/TV
Deploy PLSS ants (CDR/LMP)


0+20 LRV EQUIP [SRC 2
ETB to CDR footpan
SEP RCVR:
- Pwr sw - STBY
- Read temp
- Close blnkt A

To LMP seat
- LMP cam
- Maps
Stow under CDR seat:
- 5 mags (rpt D,I,J,K,B)
- Mag R to 500mm
- Polar filter
CDR cam on seat


EP 4 btw LRV seats

Discard Xptr under LM
ETB to MESA table
Mount EP Xptr (1,2,3,8)

0+30 Get CDR cam
Photo pan 8:00/30' [SCB 7
Doff cam CDR seat

GEO PREP [GEO PREP
Configure EVA maps

Hold still [LOAD PLSS

SCB 5 to CDR PLSS
Mount cam

VOICE DATA

EVA 2

0+10

(1) LMP - LM SWITCHES
RECORDER - OFF
VOX SENS (2) - MAX
CB CONFIG
UTILITY FLOOD LIGHTS - OFF

(1) CDR - TGE - ON

(1) CDR - TGE RDG _ _ _,_ _ _,_ _ _

(1) LMP - DEPLOY CDR PLSS ANTENNA
(1) CDR - DEPLOY LMP PLSS ANTENNA

0+20

(1) LMP - SEP RCVR - STNDBY
(1) LMP - SEP RCVR - TEMP____

(1) CDR - LCRU BLANKETS OPEN 100%
- BATT COVERS CLOSED

(1) CDR/LMP - EMU CHECK

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) LMP - MAGS (5) UNDER SEAT

(1) LMP - Report EP pallet on LRV
& EP 4 between seats

(1) CDR - TGE GRAV

(1) CDR - DUST BRUSH ON LCRU

0+30

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

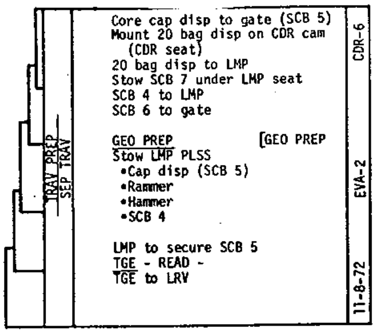
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
OPEN HATCH	0+10	EGRESS OPERATIONS			
ASSIST CDR EGRESS		EGRESS CABIN TO LM PORCH			
HAND JETTISON BAG TO CDR HOOK ETB TO LEC		RECEIVE & JETTISON BAG PASS IN LEC HOOK			
HAND ETB/LEC TO CDR		RECEIVE ETB/LEC			
VERIFY: *RECORDER - OFF *VOX SENS(2) - MAX *CB CONFIG *UTILITY FLOODLIGHTS OFF		DESCEND LADDER TO TOP RUNG & LOWER ETB DESCEND LADDER TO SURFACE			
LMP EGRESS OPERATIONS EGRESS LM TO PORCH		HANG ETB ON LADDER HOOK TGE MODE SW - ON TGE READ			
PARTIALLY CLOSE LM HATCH DESCEND LADDER TO SURFACE DEPLOY CDR PLSS ANTENNA		DEPLOY LMP PLSS ANTENNA			
SEP RCVR - STNDBY READ SEP RCVR TEMP CLOSE BLANKET A	0+20	LCRU PLACE PWR SW - INT VERIFY: MODE SW - 3			
LRV EQUIP TAKE ETB TO CDR FOOTPAN		OPEN BLANKETS; CLOSE LRV BATTS COVERS & PRESS TIGHT			
PLACE ON LMP SEAT OR PAN: 2-70 MM CAMERAS MAPS		PUSH IN CB's A, B, C, D VERIFY NAV CB - IN			
STOW UNDER CDR SEAT: 4-MAGS (D, I, J, K,B)		SRC 2 UNSTOW SRC 2 (LH MESA)			
TAKE OFF EP #4 - PLACE EP BETWEEN SEATS		PLACE SRC 2 ON TABLE OPEN, FOLD BACK SKIRT			
DISCARD TRANSPORTER FRAME		TAKE OUT SCB 5, PLACE ON MESA (INTERIM STOW) SEAL ORGANIC CONTROL SAMPLE			
TAKE ETB BACK TO HOOK MOUNT EP TRANSPORTER(1,2,3,8)ON LRV		CLOSE SRC 2 (DON'T LATCH)			
PHOTO PAN GET CAMERA, PLACE ON RCU PROCEED TO 30' OFF SEQ BAY (8:00)		TAKE OUT LCRU BATT; PLACE UNDER CDR SEAT TIDY UP MESA BLANKETS			
TAKE COMPLETE PAN	0+30	TGE - PRESS 'GRAV'			

CREW EVA CHECKLIST

VOICE DATA

EVA 2

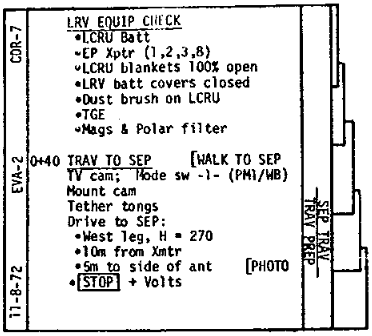
0+30



Core cap disp to gate (SCB 5)
Mount 20 bag disp on CDR cam
(CDR seat)
20 bag disp to LMP
Stow SCB 7 under LMP seat
SCB 4 to LMP
SCB 6 to gate

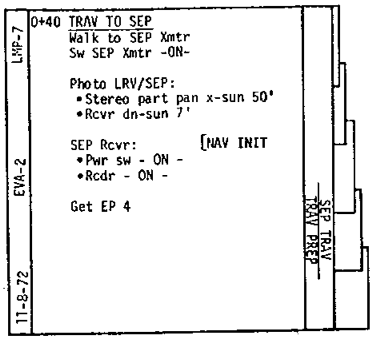
GEO PREP [GEO PREP
Stow LMP PLSS
•Cap disp (SCB 5)
•Rammer
•Hammer
•SCB 4

LMP to secure SCB 5
TGE - READ -
TGE to LRV



LRV EQUIP CHECK
•LCRU Batt
•EP Xptr (1,2,3,8)
•LCRU blankets 100% open
•LRV batt covers closed
•Dust brush on LCRU
•TGE
•Mags & Polar filter

0+40 TRAV TO SEP [WALK TO SEP
TV cam; Mode sw -1- (PM1/WB)
Mount cam
Tether tongs
Drive to SEP:
•West leg, H = 270
•10m from Xmtr
•5m to side of ant [PHOTO
•STOP + Volts



0+40 TRAV TO SEP
Walk to SEP Xmtr
Sw SEP Xmtr -ON-

Photo LRV/SEP:
•Stereo part pan x-sun 50'
•Rcvr dn-sun 7'

SEP Rcvr: [NAV INIT
•Pwr sw - ON -
•Rcdr - ON -

Get EP 4

(1) CDR - LRV EQUIP CHECK
LCRU BATT____
EP XPTR (1,2,3,8)____
LCRU BLNKTS OPEN 100%____
LRV BATT COVERS CLOSED____
DUST BRUSH ON LCRU____

MAG & POLAR FILTER____

(1) CDR - TGE Rdg___ ___ ___
Verify TGE on LRV

0+40

(1) LMP - SEP XMTR - ON

(1) CDR - LRV DISPLAYS & NAV INIT

				Temp Bat 1	
				Temp Bat 2	
				Temp LF mtr	
				Temp RF mtr	
Amp-Hr Bat 1				Temp LR mtr	
Amp-Hr Bat 2				Temp RR mtr	
SSD		ROLL		PITCH	
COMPUTED NAV HEADING					

(1) CDR - Report SEP / LRV Distance

(1) LMP - SEP RCVR - ON

(1) LMP - SEP RCDR - ON

(1) CDR - NAV RESET

(1) LMP - EP 4 "SAFE"

(1) CDR - POSITION LGA 240°

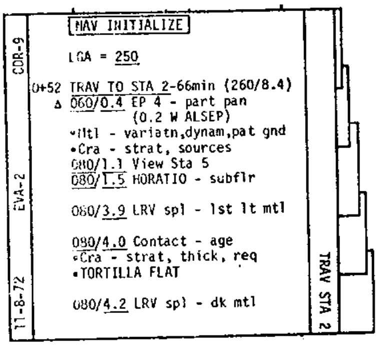
0+50

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+30	UNSTOW SCB 7, HANG ON GATE			
		TRANSFER FROM SCB 5 TO SCB 7: 1 - CORE CAP DISP 2 - 20 DSBD 3 - CORE TUBES (LOOSE)			
		STOW SCB 7 UNDER LMP SEAT			
CONFIGURE MAPS ON LRV		PUT 2 - 20 DSBD ON LMP PAN PUT SCB 4 ON TOOL GATE PUT SCB 6 ON PALLET BACK			
GEOLOGICAL PREP		GEOLOGICAL PREP			
HOLD STILL		LOADUP LMP PLSS TOOL CARRIER: HAMMER CORE RAMMER CORE CAP DISP. (SCB 5) SCB 4			
PLACE SCB 5 ON CDR		HOLD STILL			
		READ TGE PLACE TGE ON LRV			
SEP SITE	0+40	PUT ON 20 DSBD & TETHER TONGS			
WALK TO SEP SITE		POSITION LCRU MODE SW-1			
TURN ON SEP XMTR		TURN TV CW AFT & HORIZ MOUNT LRV & FASTEN BELT			
		POWER UP LRV			
PART PAN XSUN 50' TO LRV/SEP		DRIVE TO SEP SITE: W LEG X-ARRAY < 10 M FROM XMTR 5M FROM ANT WIRE HEADING 270°			
PHOTO SEP RCVR DNSUN 7' SW ON SEP RCVR		POWER DOWN LRV			
RCVR PWR - 'ON' SEP RECORDER - 'ON'		REPORT SSE, PITCH, ROLL, HEADING RESET NAV			
MOUNT LRV (EP #4 ON LAP)		TORQUE GYRO PER MCC POSITION LGA 240°			
FASTEN SEATBELT					
	0+50	POWER UP LRV			

EVA 2



CDR-9

EVA-2

11-8-72

NAV INITIALIZE

LGA = 250

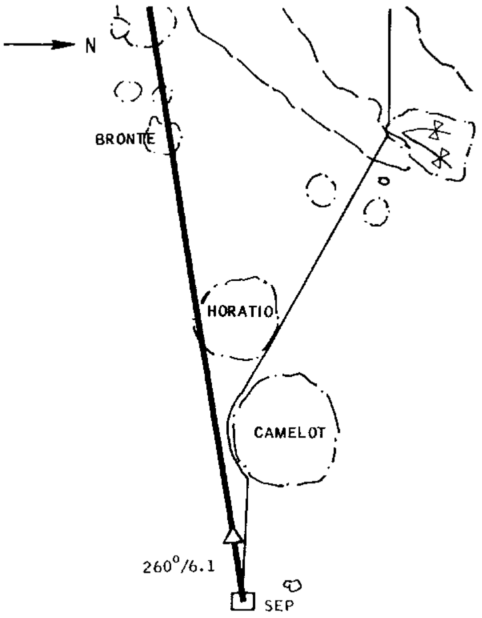
0+52 TRAV TO STA 2-66min (260/8.4)
Δ 060/0.4 EP 4 - part pan
(0.2 W ALSEP)
•Mtl - variatn,dynam,pat gnd
•Cra - strat, sources
080/1.1 View Sta 5
080/1.5 HORATIO - subflr

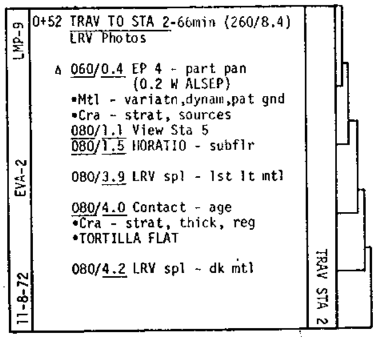
080/3.9 LRV spl - 1st lt mtl

080/4.0 Contact - age
•Cra - strat, thick, req
•TORTILLA FLAT

080/4.2 LRV spl - dk mtl

TRAV STA 2





LMP-9

EVA-2

11-8-72

0+52 TRAV TO STA 2-66min (260/8.4)
LRV Photos

Δ 060/0.4 EP 4 - part pan
(0.2 W ALSEP)
•Mtl - variatn,dynam,pat gnd
•Cra - strat, sources
080/1.1 View Sta 5
080/1.5 HORATIO - subflr

080/3.9 LRV spl - 1st lt mtl

080/4.0 Contact - age
•Cra - strat, thick, reg
•TORTILLA FLAT

080/4.2 LRV spl - dk mtl

TRAV STA 2

0+50

(1) CDR - LRV underway MARK ___________
- Passing end of SEP antenna MARK________

(1) LMP - EP 4 "SAFE"

(1) CDR - Nav Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - LRV Underway
MARK ___________

(1) LMP - Rpt 70mm mag/frame
___/_____

+00

(2) CDR/LMP - LRV: Speed ___________
Amps ___________

1+10

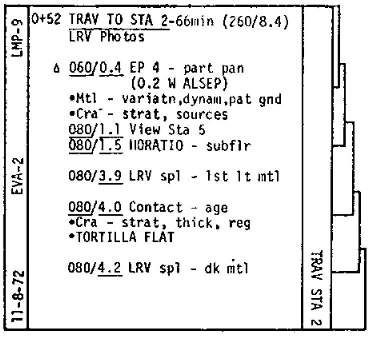
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+50				
GO TO STA 2		GO TO STA 2			
		REPORT LRV UNDERWAY			
	TO EP-4 DEPLOYMENT SITE				
PHOTO APPROACH		PHOTO APPROACH			
CHECK EP DISPLAY "SAFE" PULL 3 PINS (DISCARD PINS) EXTEND EP ANTENNA PLACE EP ON SURFACE OUTSIDE TRACKS SHOOT PART PAN		STOP LRV POWER DOWN LRV REPORT NAV DATA SHOOT PART PAN POWER UP LRV			
CONTINUE TO STA 2		CONTINUE TO STA 2			
	1+00				
	1+10				

EVA 2

1+10



LMP-9

EVA-2

11-8-72

0+52 TRAV TO STA 2-66min (260/8.4)
LRV Photos

Δ 060/0.4 EP 4 - part pan
(0.2 W ALSEP)
•Mtl - variatn,dynam,pat gnd
•Cra - strat, sources
080/1.1 View Sta 5
080/1.5 HORATIO - subflr

080/3.9 LRV spl - 1st lt mtl

080/4.0 Contact - age
•Cra - strat, thick, reg
•TORTILLA FLAT

080/4.2 LRV spl - dk mtl

TRAV STA 2

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

1+20

(1) CDR/LMP - LRV: Speed ________

Amps ________

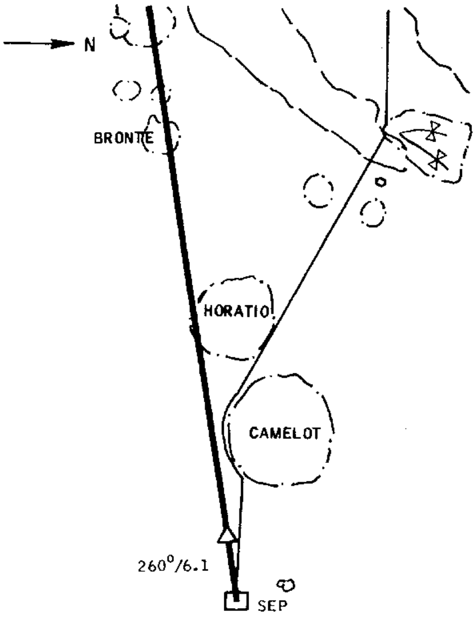
(1) LMP - Samples Bag No. ________

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - LRV Underway
MARK ________

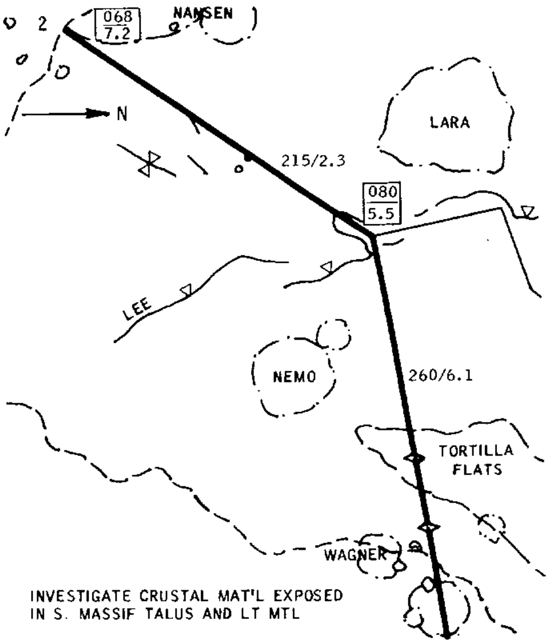
1+30



MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	1+10				
	1+20				
LRV SAMPLE		LRV SAMPLE			
COLLECT SAMPLE		STOP LRV			
		READ NAV DATA			
PHOTO PAN		PHOTO PAN			
CONTINUE TO STA 2		CONTINUE TO STA 2			
	1+30				



INVESTIGATE CRUSTAL MAT'L EXPOSED
IN S. MASSIF TALUS AND LT MTL

1+30

(1) LMP - Samples Bag No. ____________

(1) CDR - NAV Data

(1) CDR - LRV Underway <u>MARK</u>

HEADING	
BEARING	
DISTANCE	
RANGE	

1+40 (2) CDR/LMP - LRV Speed ____________

Amps ____________

1+50

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 2

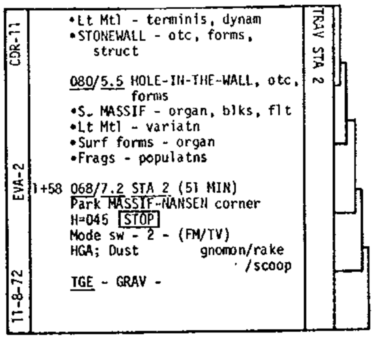
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
GO	1+30	GO			
LRV SAMPLE		STOP LRV			
COLLECT SAMPLE		READ NAV DATA			
PHOTO PAN		PHOTO PAN			
CONTINUE TO STA 2		CONTINUE TO STA 2			
GO	1+40	GO			
GO	1+50	GO			

CREW EVA CHECKLIST

VOICE DATA

EVA 2

1+50


CDR-11
EVA-2
11-8-72

•Lt Mtl - terminis, dynam
•STONEWALL - otc, forms,
struct

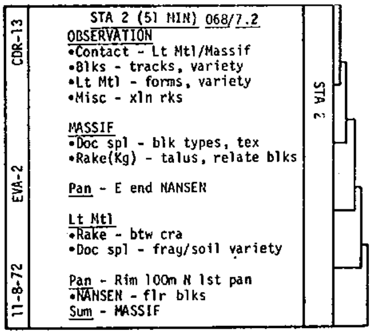
080/5.5 HOLE-IN-THE-WALL, otc,
forms
•S. MASSIF - organ, blks, flt
•Lt Mtl - variatn
•Surf forms - organ
•Frags - populatns

1+58 068/7.2 STA 2 (51 MIN)
Park MASSIF-NANSEN corner
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/rake
/scoop

TGE - GRAV -

TRAV STA 2

(1) CDR - Station 2 Arrival


CDR-13
EVA-2
11-8-72

STA 2 (51 MIN) 068/7.2
OBSERVATION
•Contact - Lt Mtl/Massif
•Blks - tracks, variety
•Lt Mtl - forms, variety
•Misc - xln rks

MASSIF
•Doc spl - blk types, tex
•Rake(Kg) - talus, relate blks

Pan - E end NANSEN

Lt Mtl
•Rake - btw cra
•Doc spl - fray/soil variety

Pan - Rim 100m N 1st pan
•NANSEN - flr blks
Sum - MASSIF

STA 2

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

2+00

(1) CDR - Verify Dusting

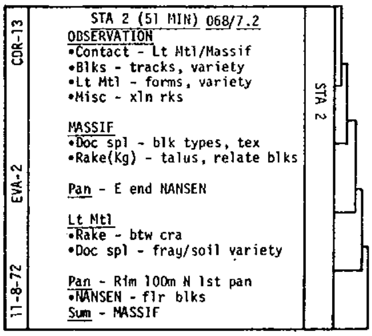
(1) CDR/LMP - TGE - GRAV

(1) CDR/LMP - Pan locations

2+10

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 2

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	1+50				
STATION 2		STATION 2			
		POWER DOWN LRV			
DISMOUNT FROM LRV		REPORT NAV & SYSTEM DATA			
TAKE PHOTO PAN	2+00	DISMOUNT LRV			
GEOLOGICAL OBSERVATIONS		LCRU MODE SW - '2' ALIGN HGA			
GET GNOMON & SCOOP FROM AFT PALLET		DUST TV, TCU, LCRU			
		PRESS GRAV ON TGE VERIFY LIGHT FLASHING GIVE MCC MARK			
OBSERVATIONS		OBSERVATIONS			
PHOTOS		PHOTOS			
GET RAKE FROM LRV (CHECK TGE TO ENSURE CYCLE COMPLETE)		PLACE GNOMON			
	2+10				



CDR-13

EVA-2

11-8-72

STA 2 (51 MIN) 068/7.2

OBSERVATION
- Contact - Lt Mtl/Massif
- Blks - tracks, variety
- Lt Mtl - forms, variety
- Misc - xln rks

MASSIF
- Doc spl - blk types, tex
- Rake(Kg) - talus, relate blks

Pan - E end NANSEN

Lt Mtl
- Rake - btw cra
- Doc spl - fray/soil variety

Pan - Rim 100m N 1st pan
- NANSEN - flr blks

Sum - MASSIF

STA 2

2+10 (1) CDR/LMP - RAKE Sample

[A] Rocks BAG # ____________
____

Soil BAG # ____________
____

[B] Rocks BAG # ____________
____

Soil BAG # ____________
____

2+20

2+30

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 2

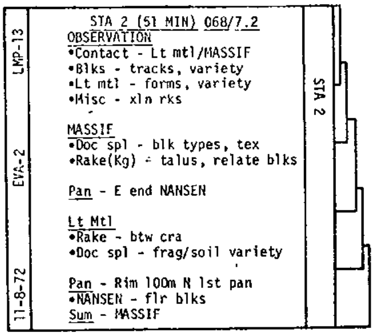
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
RAKE SAMPLE	2+10	RAKE SAMPLE			
	2+20				
	2+30				

CREW EVA CHECKLIST

VOICE DATA

EVA 2

2+30


LMP-13

EVA-2

11-8-72

STA 2 (51 MIN) 068/7.2

OBSERVATION

- •Contact - Lt mtl/MASSIF
- •Blks - tracks, variety
- •Lt mtl - forms, variety
- •Misc - xln rks

MASSIF

- •Doc spl - blk types, tex
- •Rake(Kg) - talus, relate blks

Pan - E end NANSEN

Lt Mtl

- •Rake - btw cra
- •Doc spl - frag/soil variety

Pan - Rim 100m N 1st pan

•NANSEN - flr blks

Sum - MASSIF

STA 2

2+40 (1) CDR/LMP EMU Check

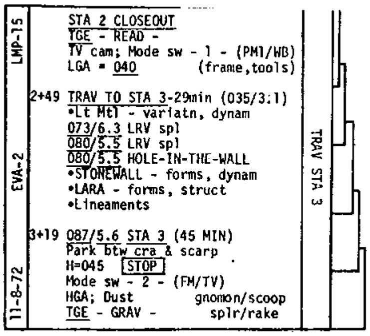
	CDR	LMP
O2		
FLAGS		
PRESS		
COOL		

(1) CDR - TGE Rdg ___ ___ ___

(1) CDR/LMP - Mag/frame

CDR - ___/_____

LMP - ___/_____


LMP-15

EVA-2

11-8-72

STA 2 CLOSEOUT

TGE - READ -

TV cam; Mode sw - 1 - (PM1/WB)

LGA = 040 (frame,tools)

2+49 TRAV TO STA 3-29min (035/3.1)

•Lt Mtl - variatn, dynam

073/6.3 LRV spl

080/5.5 LRV spl

080/5.5 HOLE-IN-THE-WALL

•STONEWALL - forms, dynam

•LARA - forms, struct

•Lineaments

3+19 087/5.6 STA 3 (45 MIN)

Park btw cra & scarp

H=045 STOP

Mode sw - 2 - (FM/TV)

HGA; Dust gnomon/scoop

TGE - GRAV - splr/rake

TRAV STA 3

(1) CDR - LGA Azimuth 035°

2+50 (1) CDR - LRV Underway MARK _________

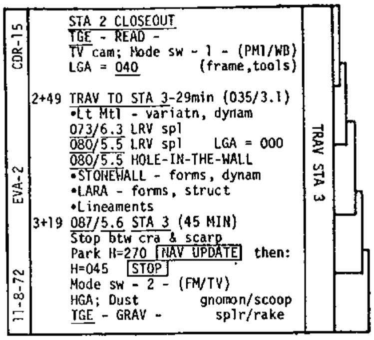
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
DOCUMENTED SAMPLES	2+30	DOCUMENTED SAMPLES			
	2+40				
	PHOTO PANS				
		READ TGE			
REPORT FILM COUNTER		REPORT FILM COUNTER			
LOAD UP LRV - SAMPLES, SCOOP, RAKE, GNOMON		LCRU MODE SW - '1'			
		POSITION TV AFT, HORIZ			
VERIFY GATE LATCHED		MOUNT LRV			
MOUNT LRV		FASTEN SEATBELT			
FASTEN SEATBELT					
		POSITION LGA 035°			
		POWER UP LRV			
	2+50				

EVA 2

2+50



CDR-15

STA 2 CLOSEOUT
TGE - READ -
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 040 (frame,tools)

2+49 TRAV TO STA 3-29min (035/3.1)
•Lt Mtl - variatn, dynam
073/6.3 LRV spl
080/5.5 LRV spl LGA = 000
080/5.5 HOLE-IN-THE-WALL
•STONEWALL - forms, dynam
•LARA - forms, struct
•Lineaments
3+19 087/5.6 STA 3 (45 MIN)
Stop btw cra & scarp
Park H=270 NAV UPDATE then:
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
TGE - GRAV - splr/rake

EVA-2

11-8-72

TRAV STA 3

(2) CDR/LMP - LRV Speed ________
Amps ________

(1) CDR - LRV start Mark

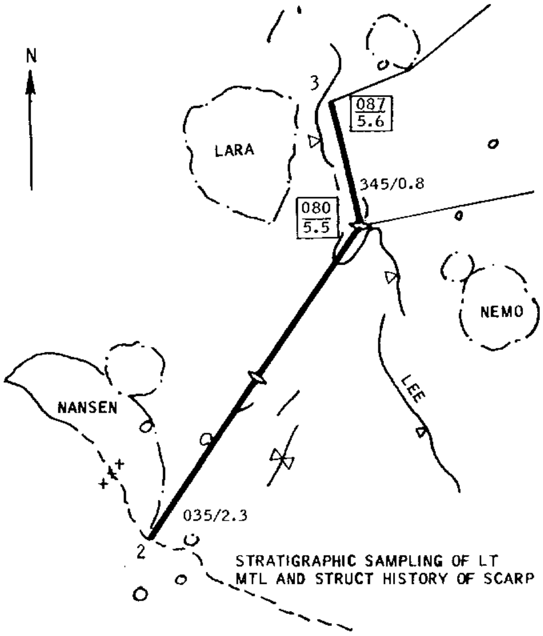
(1) LMP - Samples Bag No. ________

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - LRV Underway
MARK ________

3+00



STRATIGRAPHIC SAMPLING OF LT MTL AND STRUCT HISTORY OF SCARP

(2) CDR/LMP - LRV Speed ________
Amp Amps ________

(1) CDR - Adjust LGA 345°

(1) LMP - Samples Bag No. ________

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - LRV Underway
MARK ________

3+10

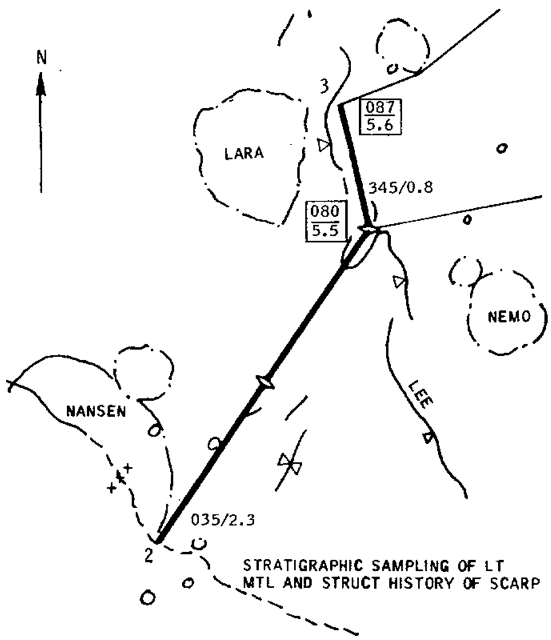
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	2+50				
GO TO STA. 3		GO TO STA. 3 REPORT LRV UNDERWAY			
LRV SAMPLE COLLECT SAMPLE PHOTO PAN		LRV SAMPLE STOP LRV PHOTO PAN READ NAV DATA			
CONTINUE TO STA 3	3+00	CONTINUE TO STA 3			
LRV SAMPLE COLLECT SAMPLE PHOTO PAN		LRV SAMPLE STOP LRV READ NAV DATA -ADJUST LGA 345° PHOTO PAN			
	3+10				

EVA 2

3+10



Capcom - Heading 270 at Station 3
for nav update

(1) CDR NAV UPDATE

SSD		ROLL		PITCH	
COMPUTED NAV HEADING					

3+20

(1) CDR - ARRIVAL STA 3 ________

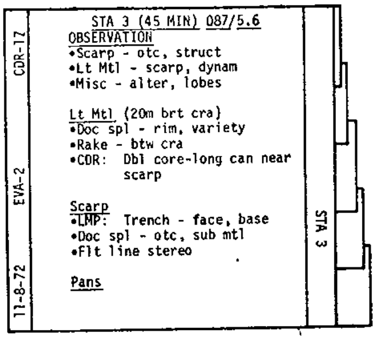
(1) CDR - LRV DATA

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

(1) CDR - Verify Dusting

(1) CDR/LMP - TGE GRAV

(1) CDR/LMP - Pan locations


CDR-17 EVA-2 11-8-72

STA 3 (45 MIN) 087/5.6

OBSERVATION
- Scarp - otc, struct
- Lt Mtl - scarp, dynam
- Misc - alter, lobes

Lt Mtl (20m brt cra)
- Doc spl - rim, variety
- Rake - btw cra
- CDR: Dbl core-long can near scarp

Scarp
- LMP: Trench - face, base
- Doc spl - otc, sub mtl
- Flt line stereo

Pans

STA 3

3+30

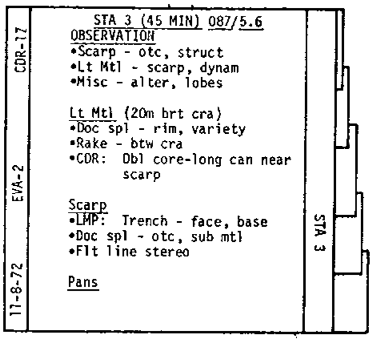
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
CONTINUE TO STA 3	3+10	CONTINUE TO STA 3			
DISMOUNT LRV		PARK 270° NAV UPDATE REPORT NAV AND SYSTEM DATA PARK 045°			
STATION 3	3+20	STATION 3			
PHOTO PAN		LCRU MODE - "2" ALIGN HGA			
GET GNOMON & SCOOP FROM AFT PALLET		DUST TV, TCU, LCRU			
		PRESS GRAV ON TGE VERIFY LIGHT FLASHING GIVE MCC MARK			
OBSERVATIONS		OBSERVATIONS			
PHOTOS		PHOTOS			
DOCUMENTED SAMPLES		DOCUMENTED SAMPLES			
	3+30				

EVA 2

3+30



CDR-17

EVA-2

11-8-72

STA 3 (45 MIN) 087/5.6

OBSERVATION
- Scarp - otc, struct
- Lt Mtl - scarp, dynam
- Misc - alter, lobes

Lt Mtl (20m brt cra)
- Doc spl - rim, variety
- Rake - btw cra
- CDR: Dbl core-long can near scarp

Scarp
- LMP: Trench - face, base
- Doc spl - otc, sub mtl
- Flt line stereo

Pans

STA 3

3+40 (1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

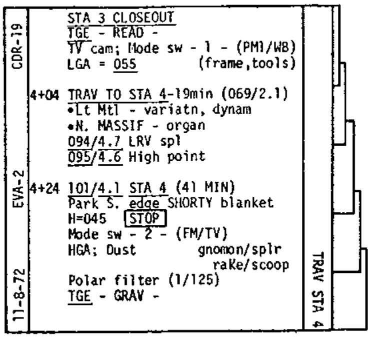
3+50

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
DOCUMENTED SAMPLING	3+30	DOCUMENTED SAMPLING			
	3+40				
	3+50				

3+50



CDR-19

EVA-2

11-8-72

STA 3 CLOSEOUT
TGE - READ -
TV cam; Mode sw - 1 - (PM1/W8)
LGA = 055 (frame,tools)

4+04 TRAV TO STA 4-19min (069/2.1)
•Lt Mtl - variatn, dynam
•N. MASSIF - organ
094/4.7 LRV spl
095/4.6 High point

4+24 101/4.1 STA 4 (41 MIN)
Park S. edge SHORTY blanket
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr
rake/scoop
Polar filter (1/125)
TGE - GRAV -

TRAV STA 4

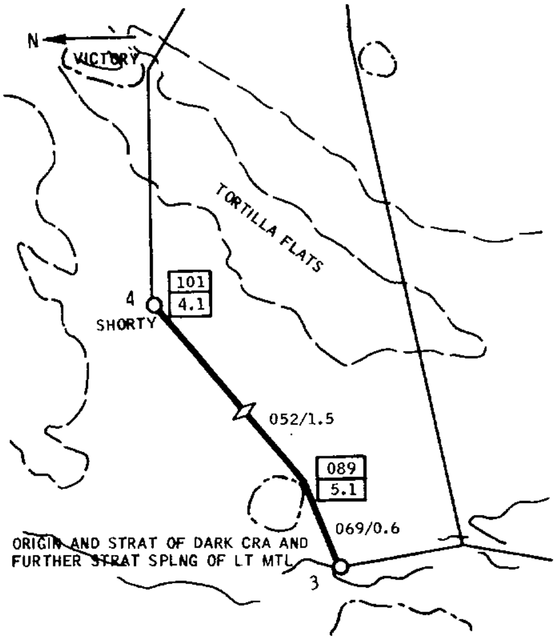
(1) CDR/LMP - MAG/FRAME

CDR - ___/_____

LMP - ___/_____

(1) CDR - TGE RDG __ __ __ __ __ __ __

4+00



(1) CDR - LGA Azimuth 060°

- LRV Heading ______

- Torque Gyro ________

(1) CDR - LRV Underway MARK __________

(2) CDR/LMP - LRV Speed __________

Amps __________

4+10

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	3+50				
		REPORT FILM COUNTER			
PHOTO PAN		READ TGE DISPLAYS - CLOSE LID			
REPORT FILM COUNTER					
	4+00				
LOAD SAMPLES, TOOLS, & GNOMON ON LRV		LCRU MODE SW - 1 POSITION TV AFT, HORIZ.			
VERIFY GATE LATCHED					
MOUNT LRV FASTEN SEAT BELT		MOUNT LRV FASTEN SEAT BELT UPDATE NAV POSITION LGA 060°			
		POWER UP LRV			
GO TO STA 4		GO TO STA 4 REPORT LRV UNDER WAY			
LRV SAMPLE		LRV SAMPLE			
	4+10				

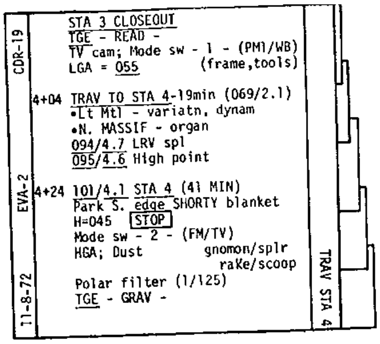
EVA 2

4+10

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) LMP - Samples Bag
No. ____________



CDR-19

STA 3 CLOSEOUT
TGE - READ -
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 055 (frame,tools)

4+04 TRAV TO STA 4-19min (069/2.1)
•Lt Mtl - variatn, dynam
•N. MASSIF - organ
094/4.7 LRV spl
095/4.6 High point

4+24 101/4.1 STA 4 (41 MIN)
Park S. edge SHORTY blanket
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr
rake/scoop

Polar filter (1/125)
TGE - GRAV -

EVA-2

11-8-72

TRAV STA 4

(1) CDR - LRV Underway MARK ____________

(2) CDR/LMP - LRV Speed ____________

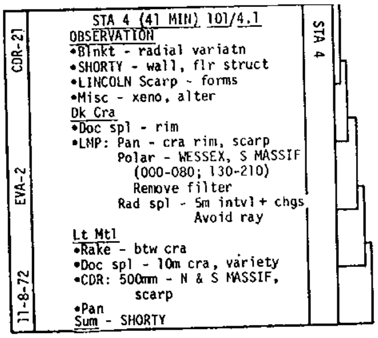
Amps ____________

4+20

(1) CDR - Station 4 arrival ____________

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	



CDR-21

STA 4 (41 MIN) 101/4.1
OBSERVATION
•Blnkt - radial variatn
•SHORTY - wall, flr struct
•LINCOLN Scarp - forms
•Misc - xeno, alter
Dk Cra
•Doc spl - rim
•LMP: Pan - cra rim, scarp
Polar - WESSEX, S MASSIF
(000-080; 130-210)
Remove filter
Rad spl - 5m intvl + chgs
Avoid ray
Lt Mtl
•Rake - btw cra
•Doc spl - 10m cra, variety
•CDR: 500mm - N & S MASSIF,
scarp
•Pan
Sum - SHORTY

EVA-2

11-8-72

STA 4

(1) CDR - Verify Dusting

(1) CDR/LMP - TGE GRAV

(1) CDR/LMP - Pan locations

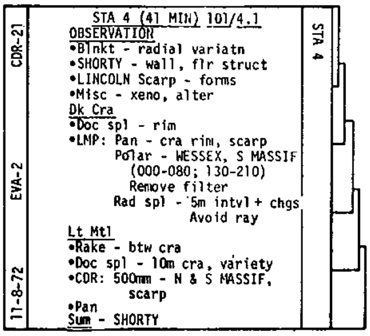
4+30

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
COLLECT SAMPLE PHOTO PAN	4+10	STOP LRV READ NAV DATA PHOTO PAN			
CONTINUE TO STA 4		CONTINUE TO STA 4			
	4+20				
STATION 4		STATION 4			
		POWER DOWN LRV REPORT NAV & SYSTEM DATA			
DISMOUNT LRV					
TAKE PHOTO PAN		DISMOUNT LRV			
GEOLOGICAL OBSERVATIONS		LCRU MODE - 2 ALIGN HGA			
GET GNOMON & SCOOP FROM AFT PALLET		DUST TV, TCU, LCRU			
		PRESS GRAV ON TGE VERIFY LIGHT FLASHING GIVE MCC MARK			
OBSERVATIONS		OBSERVATIONS			
	4+30				

EVA 2



CDR-21

EVA-2

11-8-72

STA 4

STA 4 (41 MIN) 101/4.1

OBSERVATION

- Blnkt - radial variatn
- SHORTY - wall, flr struct
- LINCOLN Scarp - forms
- Misc - xeno, alter

Dk Cra

- Doc spl - rim
- LMP: Pan - cra rim, scarp
  - Polar - WESSEX, S MASSIF (000-080; 130-210)
  - Remove filter
  - Rad spl - 5m intvl + chgs
    - Avoid ray

Lt Mtl

- Rake - btw cra
- Doc spl - 10m cra, variety
- CDR: 500mm - N & S MASSIF, scarp
- Pan

Sum - SHORTY

4+30 (1) LMP - Polar filter on cam
Reset Cam 1/125

Pos 1 - Pan	L	C	R
	L	C	R
	L	C	R
Pos 2 - Pan	L	C	R
	L	C	R
	L	C	R

Polar Filter off
Reset Cam 1/250

(1) CDR/LMP - Rake Sample

[A] Rocks BAG # ____________
____

Soil BAG # ____________
____

4+40

[B] Rocks BAG # ____________
____

Soil BAG # ____________
____

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

4+50

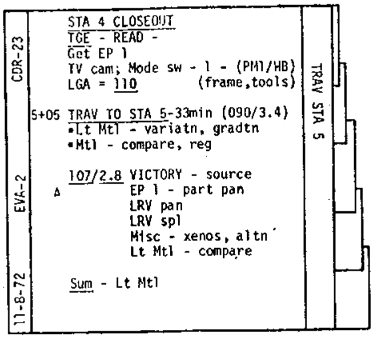
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
POLARIZATION PHOTOS	4+30				
		PHOTOS			
GET RAKE FROM LRV (CHECK TGE TO ENSURE CYCLE COMPLETE)		PLACE GNOMON			
<u>RAKE SAMPLES</u> (2)		<u>RAKE SAMPLES</u> (2)			
STOW RAKE					
	4+40				
	4+50				

EVA 2

4+50


CDR-23

STA 4 CLOSEOUT
TGE - READ -
Get EP 1
TV cam; Mode sw - 1 - (PM1/HB)
LGA = 110 (frame,tools)

5+05 TRAV TO STA 5-33min (090/3.4)
•Lt Mtl - variatn, gradtn
•Mtl - compare, reg

107/2.8 VICTORY - source
Δ EP 1 - part pan
LRV pan
LRV spl
Misc - xenos, altn
Lt Mtl - compare

Sum - Lt Mtl

EVA-2

11-8-72

TRAV STA 5

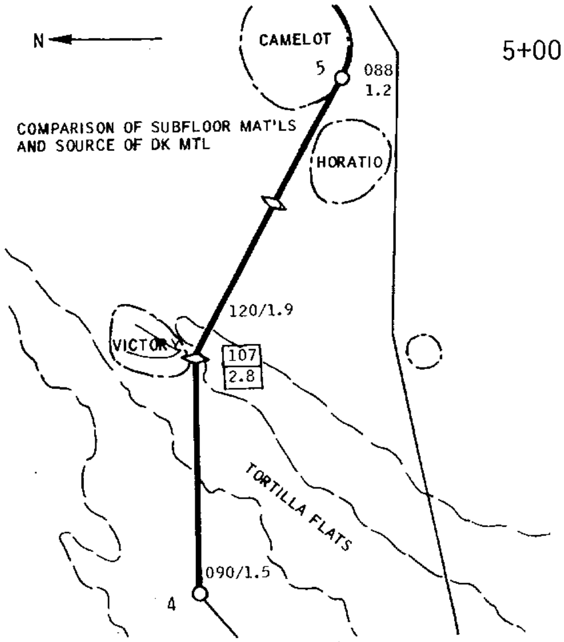
(1) CDR/LMP - MAG/FRAME
CDR - ___/_____
LMP - ___/_____

(1) CDR - TGE Read _ _ _ _ _ _ _ _

5+00 (1) LMP - EP-1 VERIFY "SAFE"

(1) CDR - LGA Azimuth 110°

(1) CDR - LRV Underway MARK _________



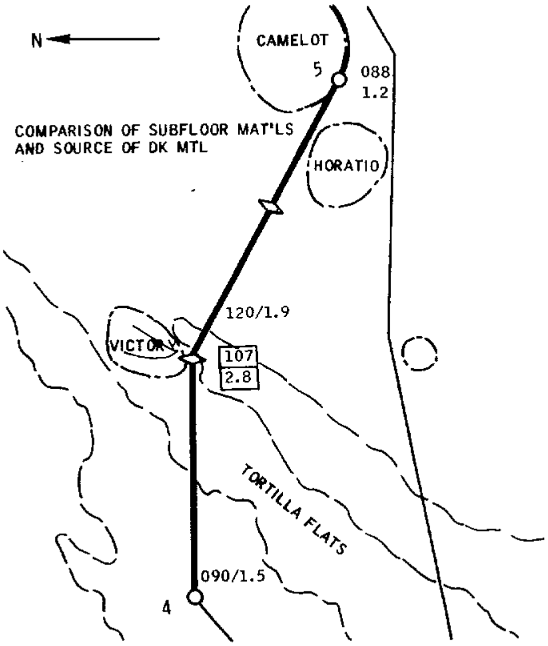
(2) CDR/LMP - LRV Speed _________
Amps _________

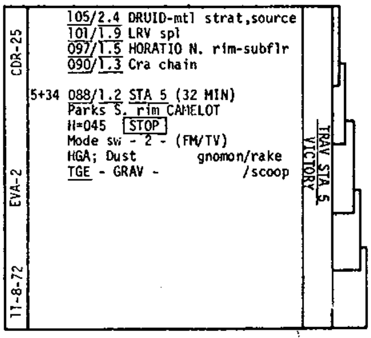
5+10

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 2

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+50				
PHOTO PAN					
REPORT FILM COUNTER		REPORT FILM COUNTER TGE READ			
LOAD SAMPLES, TOOLS, & GNOMON ON LRV GET EP - 1 (VERIFY 'SAFE') VERIFY GATE LATCHED	5+00	LCRU MODE SW - 1 POSITION TV AFT, HORIZ. MOUNT LRV FASTEN SEAT BELT			
MOUNT LRV WITH EP-1 FASTEN SEAT BELT		POSITION LGA 110° POWER UP LRV			
GO TO STA 5		GO TO STA 5 REPORT LRV UNDERWAY			
	5+10				

EVA 2





CDR-25

105/2.4 DRUID-mtl strat,source
101/1.9 LRV spl
097/1.5 HORATIO N. rim-subflr
090/1.3 Cra chain

5+34 088/1.2 STA 5 (32 MIN)
Parks S. rim CAMELOT
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/rake
TGE - GRAV - /scoop

TRAV STA 5
VICTORY

EVA-2

11-8-72

5+10

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) LMP - EP 1 "SAFE"

(1) LMP - Rpt 70mm mag/frame ___/___

(1) LMP - Sampler Bag No. ___________

(2) CDR - Distance moved from EP - estimate

(1) CDR - LRV Underway MARK ___________

5+20

(2) CDR/LMP - LRV Speed ___________
Amps ___________

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) CDR - LRV Underway MARK ___________

(1) LMP - Sampler Bag No______

5+30

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	5+10				
PHOTO APPROACH		PHOTO APPROACH			
"PHOTO SITE"		"PHOTO SITE"			
CHECK EP-1 DISPLAY 'SAFE'		STOP LRV			
PULL 3 PINS (DISCARD PINS)		POWER DOWN LRV			
EXTEND EP ANTENNA		REPORT NAV DATA			
PLACE EP ON SURFACE OUTSIDE TRACKS		SHOOT PART PAN			
SHOOT PART PAN		POWER UP & MOVE AWAY STOP & POWER ON LRV			
TAKE SAMPLE		SHOOT PART PAN			
PART PAN		POWER UP LRV			
CONTINUE TO STA 5		CONTINUE TO STA 5			
	5+20				
LRV SAMPLE		LRV SAMPLE			
COLLECT SAMPLE		READ NAV DATA			
PHOTO PAN		PHOTO PAN			
CONTINUE TO STA 5		CONTINUE TO STA 5			
	5+30				

EVA 2

5+30

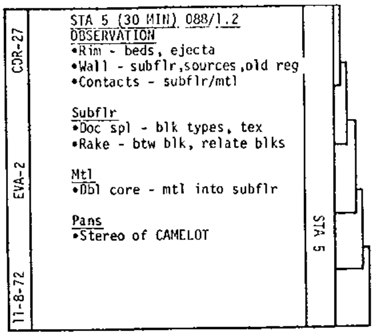
(2) CDR/LMP - LRV Speed ____________

Amps ____________

(1) CDR - Arrival Sta. 5 ____________

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	



CDR-27

EVA-2

11-8-72

STA 5 (30 MIN) 088/1.2

OBSERVATION
- Rim - beds, ejecta
- Wall - subflr,sources,old reg
- Contacts - subflr/mtl

Subflr
- Doc spl - blk types, tex
- Rake - btw blk, relate blks

Mtl
- Dbl core - mtl into subflr

Pans
- Stereo of CAMELOT

STA 5

(1) CDR - Verify Dusting

5+40

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR/LMP - TGE GRAV

(1) CDR/LMP - Pan locations

(1) LMP - CORE TUBES L ____________

U ____________

5+50

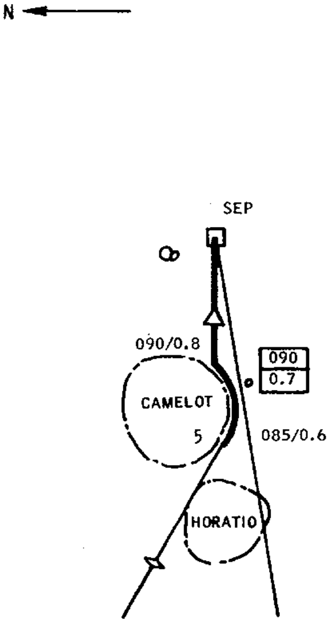
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	5+30				
STATION 5		STATION 5			
DISMOUNT LRV TAKE PHOTO PAN		POWER DOWN LRV REPORT NAV & SYSTEM DATA			
GEOLOGICAL OBSERVATIONS		DISMOUNT LRV			
		LCRU MODE - 2 ALIGN HGA			
GET GNOMON & SCOOP FROM AFT PALLET	5+40				
(ALSO EXTRA XT HANDLE)		DUST TV, TCU, LCRU			
		PRESS GRAV ON TGE VERIFY LIGHT FLASHING GIVE MCC MARK			
OBSERVATIONS		OBSERVATIONS			
PHOTOS		PHOTOS			
DOUBLE CORE		DOUBLE CORE			
	5+50				

EVA 2

5+50



CDR-27 EVA-2 11-8-72

STA 5 (30 MIN) 088/1.2

OBSERVATION
- •Rim - beds, ejecta
- •Wall - subflr,sources,old reg
- •Contacts - subflr/mtl

Subflr
- •Doc spl - blk types, tex
- •Rake - btw blk, relate blks

Mtl
- •Dbl core - mtl into subflr

Pans
- •Stereo of CAMELOT

STA 5

CDR-29 EVA-2 11-8-72

STA 5 CLOSEOUT
TGE - READ -
Get EP 8
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 100 (frame,tools)

6+06 TRAV TO LM-10min (085/1.4)
- •Mtl - distribtn
- •Rim - variatn

Δ 090/0.4 EP 8 - part pan

TRAV LM

6+00

(1) CDR/LMP -TGE RDG___ ___ ___

(1) CDR/LMP - Mag/frame
CDR - ___/_____
LMP - ___/_____

(1) LMP - EP-8 Verify "SAFE"

(1) CDR - LGA Azimuth 100°

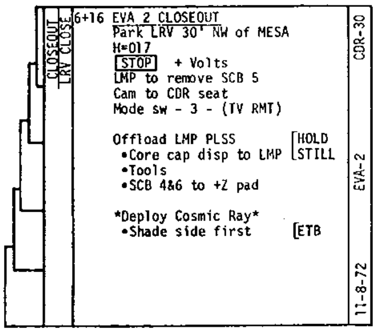
(1) CDR - LRV Underway MARK __________

6+10

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 2

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	5+50				
DOC SAMPLE(S)		DOC SAMPLE(S)			
PHOTO PAN	6+00				
REPORT FILM COUNTER		REPORT FILM COUNTER PRESS READ ON TGE READ DISPLAY TO MCC CLOSE LID			
LOAD SAMPLES, TOOLS, & GNOMON ON LRV		LCRU MODE SW-1 POSITION TV AFT, HORIZ			
GET EP-8 (VERIFY "SAFE") VERIFY GATE LATCHED		MOUNT LRV			
MOUNT LRV WITH EP-8		FASTEN SEATBELT			
FASTEN SEATBELT		POSITION LGA 100° POWER UP LRV			
GO TO LM		GO TO LM REPORT LRV UNDERWAY			
PHOTO APPROACH	6+10	PHOTO APPROACH			

VOICE DATA

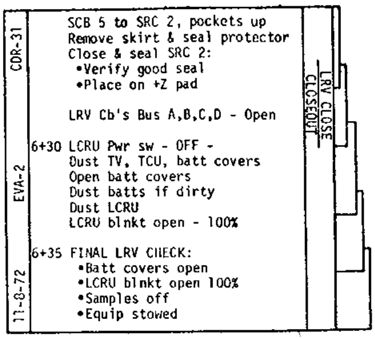

CLOSEOUT
LRV CLOSE

6+16 EVA 2 CLOSEOUT
Park LRV 30' NW of MESA
H=017
STOP + Volts
LMP to remove SCB 5
Cam to CDR seat
Mode sw - 3 - (TV RMT)

Offload LMP PLSS [HOLD STILL
- Core cap disp to LMP
- Tools
- SCB 4&6 to +Z pad

Deploy Cosmic Ray
- Shade side first [ETB

CDR-30
EVA-2
11-8-72


CDR-31
EVA-2
11-8-72

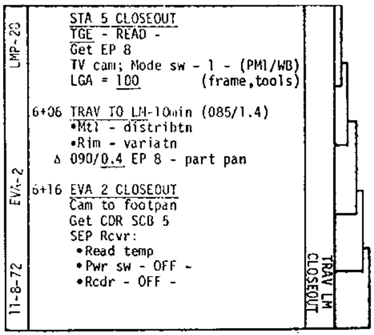
SCB 5 to SRC 2, pockets up
Remove skirt & seal protector
Close & seal SRC 2:
- Verify good seal
- Place on +Z pad

LRV Cb's Bus A,B,C,D - Open

6+30 LCRU Pwr sw - OFF -
Dust TV, TCU, batt covers
Open batt covers
Dust batts if dirty
Dust LCRU
LCRU blnkt open - 100%

6+35 FINAL LRV CHECK:
- Batt covers open
- LCRU blnkt open 100%
- Samples off
- Equip stowed

LRV CLOSE
CLOSEOUT


LMP-29
EVA-2
11-8-72

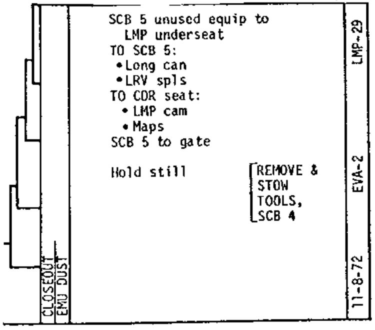
STA 5 CLOSEOUT
TGE - READ -
Get EP 8
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 100 (frame,tools)

6+06 TRAV TO LM-10min (085/1.4)
- Mtl - distribtn
- Rim - variatn

Δ 090/0.4 EP 8 - part pan

6+16 EVA 2 CLOSEOUT
Cam to footpan
Get CDR SCB 5
SEP Rcvr:
- Read temp
- Pwr sw - OFF -
- Rcdr - OFF -

TRAV LM
CLOSEOUT


SCB 5 unused equip to
LMP underseat
TO SCB 5:
- Long can
- LRV spls

TO CDR seat:
- LMP cam
- Maps

SCB 5 to gate

Hold still [REMOVE & STOW TOOLS, SCB 4

LMP-29
EVA-2
11-8-72

CLOSEOUT
EMU DUST

ETB Contents:

Mag/Frames ___/_____, ___/_____,
___/_____, ___/_____, ___/_____

Maps

2-Cameras

SCB 5 CONTENTS: Samples
4 Core Tubes (1 in CSVC)
Other__________
____
____

EVA 2

6+10 (1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

(1) LMP - EP-8 "SAFE"

(1) CDR - LRV Underway MARK __________

(2) CDR/LMP LRV Speed __________
Amps __________

6+20 (1) CDR - Arrival at LM __________

(1) CDR - LRV Data VOLTS__________

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

(1) CDR/LMP - SEP RCDR - OFF Blanket A open

(1) LMP - SEP RCVR - OFF SEP TEMP__________

(1) CDR/LMP - Mag/Frame
CDR - ___/_____
LMP - ___/_____

(1) LMP - Cosmic Ray Deployed__________
SRC 2 Contents:
SCB 5
ORGANIC CONTROL SAMPLE

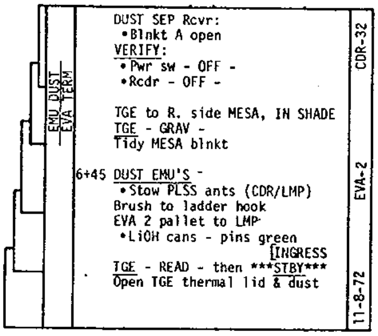
6+30

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
CHECK EP-8- "SAFE" PULL 3 PINS (DISCARD)	6+10	STOP LRV			
		READ NAV DATA			
EXTEND EP ANTENNA PLACE EP ON SURFACE OUTSIDE TRACKS		SHOOT PART PAN			
SHOOT PART PAN		POWER UP LRV			
CONTINUE TO LM		CONTINUE TO LM			
ARRIVE AT LM		ARRIVE AT LM			
DISMOUNT LRV DOFF CAMERA ONTO SEAT		PARK LRV NORTH H=017 ALIGN LGA			
OFFLOAD SCB 5 - CDR PLSS: PUT SCB 5 ON GATE		READ LRV DISPLAYS (INCL. VOLTS)			
REPORT SEP RCVR TEMP SEP RCVR - OFF SEP RECORDER - OFF		DISMOUNT LRV DOFF CAMERA ONTO SEAT			
STUFF UNUSED EQUIP UNDER LMP SEAT		LCRU MODE SW - 3			
FILL SCB 5 WITH LRV SAMPLES	6+20	ALIGN HGA DUST TV, TCU, LCRU			
CLOSEOUT		CLOSEOUT			
HOLD STILL		OFFLOAD LMP PLSS: HAMMER RAMMER CORE CAP DISPENSER (TO LMP) SCB 4 & 6 (TO +Z PAD)			
TAKE UNDERSEAT SAMPLES TO BIG BAG		PUT SCB 5 IN SRC 2			
		PULL SKIRT OFF, REMOVE SEAL COVER			
COSMIC RAY					
GET COSMIC RAY EXP FROM ETB - UNBAG		CLOSE & SEAL SRC 2			
PULL EXPERIMENT APART, WALK TO L HINGE SSE					
HANG 'SHADE' PART, SURFACES OUT, ON HINGE (RESET HINGE)		PLACE SRC 2 ON +Z PAD			
CAUTION: SHADE PART MAX SUN EXPOSURE 60 SEC		OPEN CB's A, B, C, D			
	6+30				

CREW EVA CHECKLIST


EMU DUST
EVA TERM

DUST SEP Rcvr:
- Blnkt A open

VERIFY:
- Pwr sw - OFF -
- Rcdr - OFF -

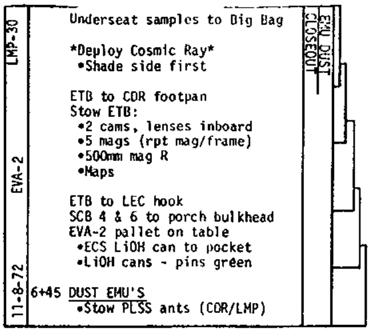
TGE to R. side MESA, IN SHADE
TGE - GRAV -
Tidy MESA blnkt

6+45 DUST EMU'S -
- Stow PLSS ants (CDR/LMP)

Brush to ladder hook
EVA 2 pallet to LMP
- LiOH cans - pins green

[INGRESS
TGE - READ - then ***STBY***
Open TGE thermal lid & dust

CDR-32
EVA-2
11-8-72


LMP-30
EVA-2
11-8-72

Underseat samples to Dig Bag

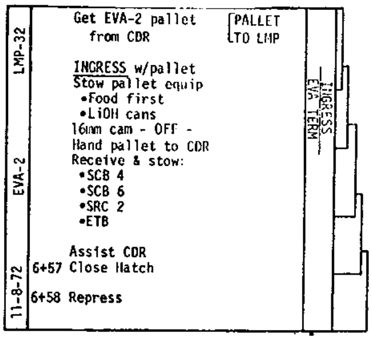
Deploy Cosmic Ray
- Shade side first

ETB to CDR footpan
Stow ETB:
- 2 cams, lenses inboard
- 5 mags (rpt mag/frame)
- 500mm mag R
- Maps

ETB to LEC hook
SCB 4 & 6 to porch bulkhead
EVA-2 pallet on table
- ECS LiOH can to pocket
- LiOH cans - pins green

6+45 DUST EMU'S
- Stow PLSS ants (CDR/LMP)

CLOSEOUT
EMU DUST


LMP-32
EVA-2
11-8-72

Get EVA-2 pallet
from CDR
[PALLET
TO LMP

INGRESS w/pallet
Stow pallet equip
- Food first
- LiOH cans

16mm cam - OFF -
Hand pallet to CDR
Receive & stow:
- SCB 4
- SCB 6
- SRC 2
- ETB

Assist CDR
6+57 Close Hatch

6+58 Repress

INGRESS
EVA TERM

VOICE DATA

EVA 2

6+30

(1) CDR - TGE GRAV

(1) CDR/LMP - PLSS Antennas
Stowed - Verify

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR - Verify LCRU Blankets
100%, Pwr Sw - OFF

(1) CDR - Verify CB's A - B - C - D
pulled
Batt covers open
(Radiators clean/dirty)
Verify brush stowed

(1) CDR - Verify Dusting

6+40

TRANSFER ITEMS:

SCB 4 & 6

Pallet 2 (with ECS LiOH
can)

(1) CDR - TGE RDG __ __ __ __ __ __ __ __ __ __ __

TGE - STANDBY

(1) LMP - Verify PLSS LiOH can pins green

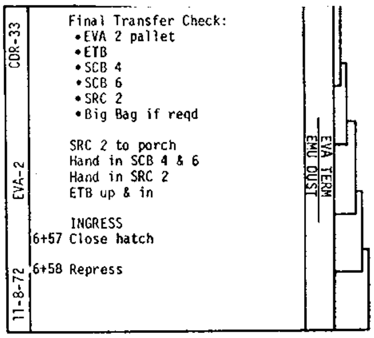
6+50

MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
SECURE 'SUN' PART, SURFACES OUT, TO VELCRO ON	6+30				
SECONDARY STRUT, -4 OR +4 LANDING GEAR		LCRU PWR SW - 'OFF' DUST TV, TCU			
GET ETB, PLACE ON CDR PAN		DUST LRV BATT COVERS, OPEN COVERS			
STOW: 4-MAGS MAPS 2-CAMERAS 500 CAM MAG		DUST LCRU VERIFY LCRU BLANKETS OPEN 100%			
TAKE ETB TO LADDER, ATTACH LEC TAKE SCB 4 & 6 TO PORCH		FINAL LRV CHECK: • BATTERY COVERS OPEN • LCRU BLANKETS OPEN 100% • SAMPLES OFF • EQUIPMENT STOWED			
RETURN TO SURFACE		DUST SEP RCVR • OPEN BLANKET A AND B			
REMOVE EVA 2 PALLET FROM MESA		PLACE TGE ON SURFACE IN SHADE			
PLACE PALLET ON SRC TABLE PACK ECS LIOH CANNISTER IN POUCH	6+40	GET DUST BRUSH TGE - PRESS 'GRAV'			
EMU CLEAN		EMU CLEAN			
STOW ANTENNAS		STOW ANTENNAS			
HOLD STILL		DUST LMP HAND DUST BRUSH TO LMP HOLD STILL			
DUST CDR					
EVA TERM					
ASCEND LADDER GET EVA 2 PALLET FROM CDR		HAND EVA 2 PALLET TO LMP			
INGRESS ASCENT STAGE WITH PALLET		PRESS TGE 'READ', READ DATA TO MCC POSITION SW TO 'STNDBY'			
INTERIM STOW SUPPLIES FROM PALLET: FOOD & PLSS EXPEND; ECS, LIOH.		OPEN LID, DUST TGE			
VERIFY PINS GREEN ON PLSS CANS	6+50				

EVA 2



Final Transfer Check:
- EVA 2 pallet
- ETB
- SCB 4
- SCB 6
- SRC 2
- Big Bag if reqd

SRC 2 to porch
Hand in SCB 4 & 6
Hand in SRC 2
ETB up & in

INGRESS
6+57 Close hatch

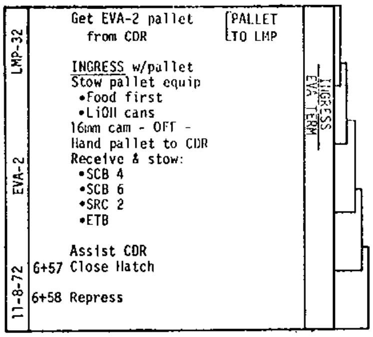
6+58 Repress

6+50 Transfer Items: *(CK)*

ETB
SCB ____(4) _____(6)
SRC 2
Pallet 2

(1) LMP - Hatch closed __________

7+00 (1) CDR - Cabin Repress __________



Get EVA-2 pallet
from CDR
[PALLET
TO LMP

<u>INGRESS</u> w/pallet
Stow pallet equip
- Food first
- LiOH cans

16mm cam - OFF -
Hand pallet to CDR
Receive & stow:
- SCB 4
- SCB 6
- SRC 2
- ETB

Assist CDR
6+57 Close Hatch

6+58 Repress

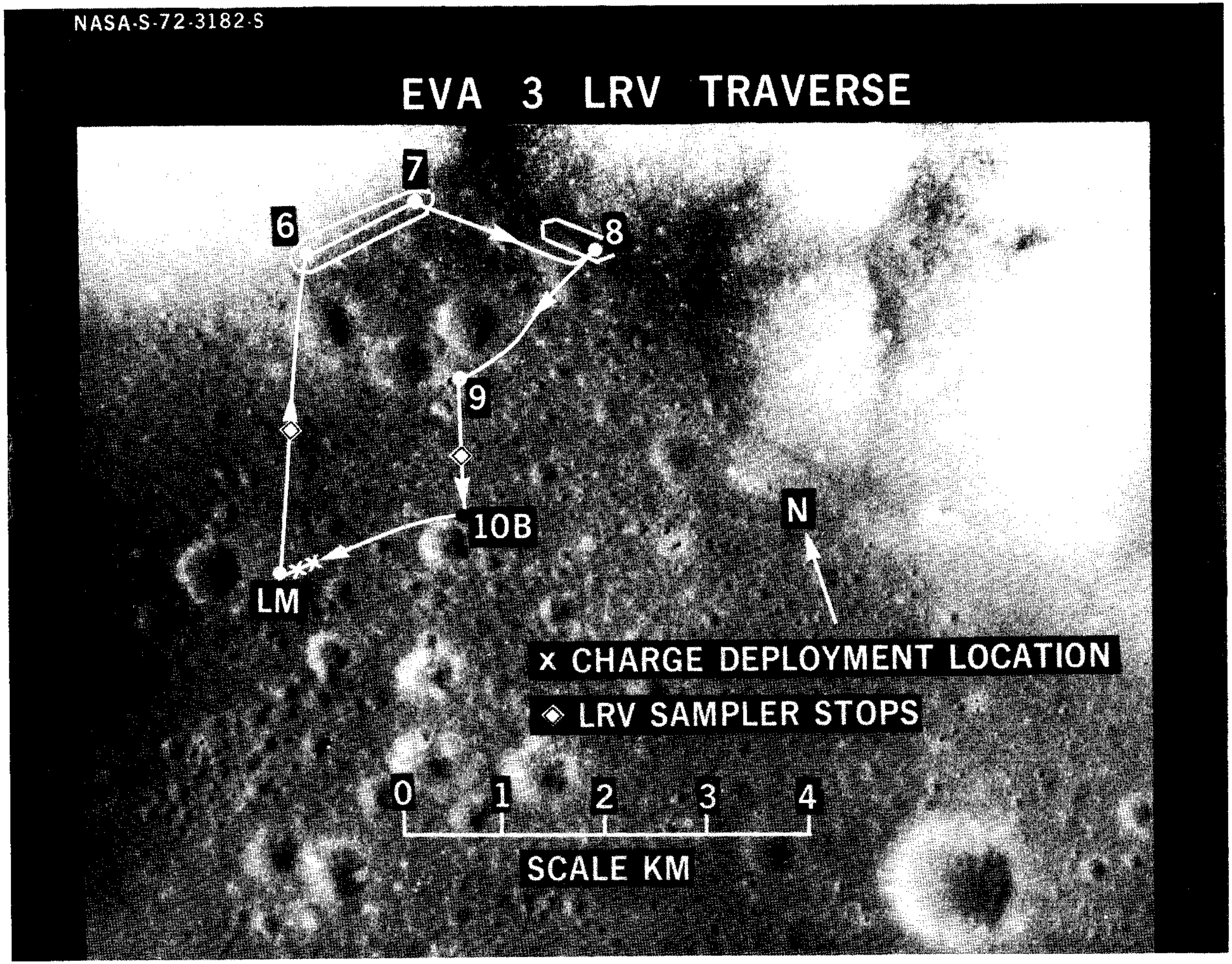
MISSION: APOLLO 17
EVA: 2

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
PASS OUT EVA 2 PALLET	6+50	GET SRC 2, CARRY UP TO PORCH			
		DISCARD EVA 2 PALLET HAND SCB 4 & 6 IN TO LMP			
RECEIVE & STOW SCB's					
RECEIVE & INTERIM STOW SRC 2		HAND SRC 2 TO LMP			
RECEIVE & STOW ETB		PULL ETB UP, HAND TO LMP			
ASSIST CDR		INGRESS CABIN			
CLOSE HATCH		CLOSE HATCH			
REPRESS OPERATIONS		REPRESS OPERATIONS			
	7+00				

3.3 EVA 3

FIGURE 3.3-1


NASA-S-72-3182-S
EVA 3 LRV TRAVERSE
7
6
8
9
10B
LM
N
x CHARGE DEPLOYMENT LOCATION
◇ LRV SAMPLER STOPS
0
1
2
3
4
SCALE KM

3.3 EVA 3

3.3.1 EVA 3 - GENERAL DESCRIPTION

EVA 3 begins with depressurization of the spacecraft cabin, followed by egress of the CDR, just as on the previous two EVA's. As before, he jettisons a bag of no longer needed gear, lowers the Equipment Transfer Bag to the ground, and descends to the surface. He is followed shortly thereafter by the LMP, who closes the ascent stage hatch after him. As before, the operations around the LM are concentrated on getting ready for the traverse this time to the North Massif area.

The CDR immediately upon gaining the lunar surface initiates a gravimetric measurement with the TGE, following which he changes the battery in the LCRU and brings up the television system. From this point on MCC and the general public have television coverage of the operations at Taurus Littrow.

The LMP unloads the ETB onto the LRV magazines and maps for use during the traverse. He powers up the LRV electrical system at this point to bring up the navigational system gyro (it requires nearly two minutes to reach operating speed).

The crew completes its around-LM activities by loading each other up with sample bags and tools. Then the CDR mounts the LRV for driveout to the SEP transmitter site, while the LMP walks out to that area. The CDR drives to the east leg of the crossed dipole on a parking heading of the 270 degrees to begin a navigational alignment procedure.

The LMP photos the relationship between this initialization location of the LRV and the SEP transmitter for establishing a baseline for SEP data obtained on EVA 3. He then turns on the SEP receiver-recorder and takes his place beside the CDR for driveout to the first station on EVA 3, Station Six.

Objectives of the EVA 3 traverse are to investigate and sample the North Massif and sculptured hills material to the north and northeast of the landing site, further investigation and sampling of the dark mantle and plains material, emplacement of seismic profiling charges, obtaining traverse gravimeter measurements, and obtaining data for the Surface Electrical Properties (SEP) experiment.

The traverse proceeds in a northerly direction (see Fig. 3.3-1) to Station 6 with a single LRV sampling stop en route. Approximately two and a quarter hours station time is spent in the North Massif sculptured hills area at three major stations (Stations 6, 7, and 8). Proceeding westerly from Station 8, the traverse continues to Station 9, where a fresh 80 meter crater provides an opportunity to investigate the dark mantle and possibly learn something about its stratigraphy.

Leaving station 9, the traverse route goes in a southerly direction to Station 10. A single LRV sampling stop is made en route to this station. Sampling and observations of the dark mantle and plains material occupy the thirty-odd minutes available at Station 10.

The traverse then wends its way back to the spacecraft via an explosive Package deployment site 0.25 km from the ALSEP site. This charge is a 1/4 lb one.

The crew then stops at the LM. They immediately unload their PLSS tool harnesses and get the sample bags ready for transfer to the ascent stage. Several bags are, in fact, taken to the porch of the LM by the LMP at this time. The CDR makes a gravimetric measurement with the TGE.

The LMP loads up the ETB with camera magazines and the map package, while the CDR recovers the tape recorder from the SEP receiver, and takes down the two halves of the Cosmic Ray Experiment, which, it will be remembered, were hung up on the spacecraft at the beginning of EVA 1.

The CDR and LMP part company at this time. The CDR mounts the LRV to drive it to its final disposition site, jocularly called "V.I.P.", while the LMP trudges out to the ALSEP site to recover the Neutron Flux Experiment.

The CDR drives some 0.1 km East by SE not very far from the SEP transmitter. He parks the LRV to a prescribed heading, leaves the TV System in operation, and connected to LRV battery power. He thoroughly cleans the batteries and communications system, and removes the last Explosive Package from the aft end of the LRV. He deploys this charge some distance away from the LRV (later, long after the crew returns to the CM, the TV system will watch this charge detonate). He turns off the now-useless SEP transmitter, and returns to the LM.

The LMP uses the core-sample jacking mechanism to withdraw the two-part Neutron Flux Experiment from the lunar surface. He "turns off" each section of the experiment after disassembling them, and returns to the spacecraft with the experiment. He bags the two sections for transfer and stowage.

It is anticipated that the LMP will be back at the LM before the CDR completes his tasks at the "V.I.P." site. The LMP, accordingly, polices the area, kicks as much loose gear as possible under the LM descent stage to preclude blowing it into the ALSEP area during LM ascent.

The two crewmen clean each other off, and effect a series of transfers of bags and gear to the ascent stage. The LMP enters the ascent stage first to receive and stow these items, and is followed shortly thereafter by the CDR to closeout the final EVA on Apollo 17 and the Lunar Landing Program.

Figure 3.3-2 summarizes this EVA in a block timeline. Figures 3.3-3 through 3.3-7 provide task information for each of the stations planned for EVA 3.

FIGURE 3.3-2

APOLLO 17 LUNAR SURFACE TIMELINE EVA 3 DATE NOV. '72

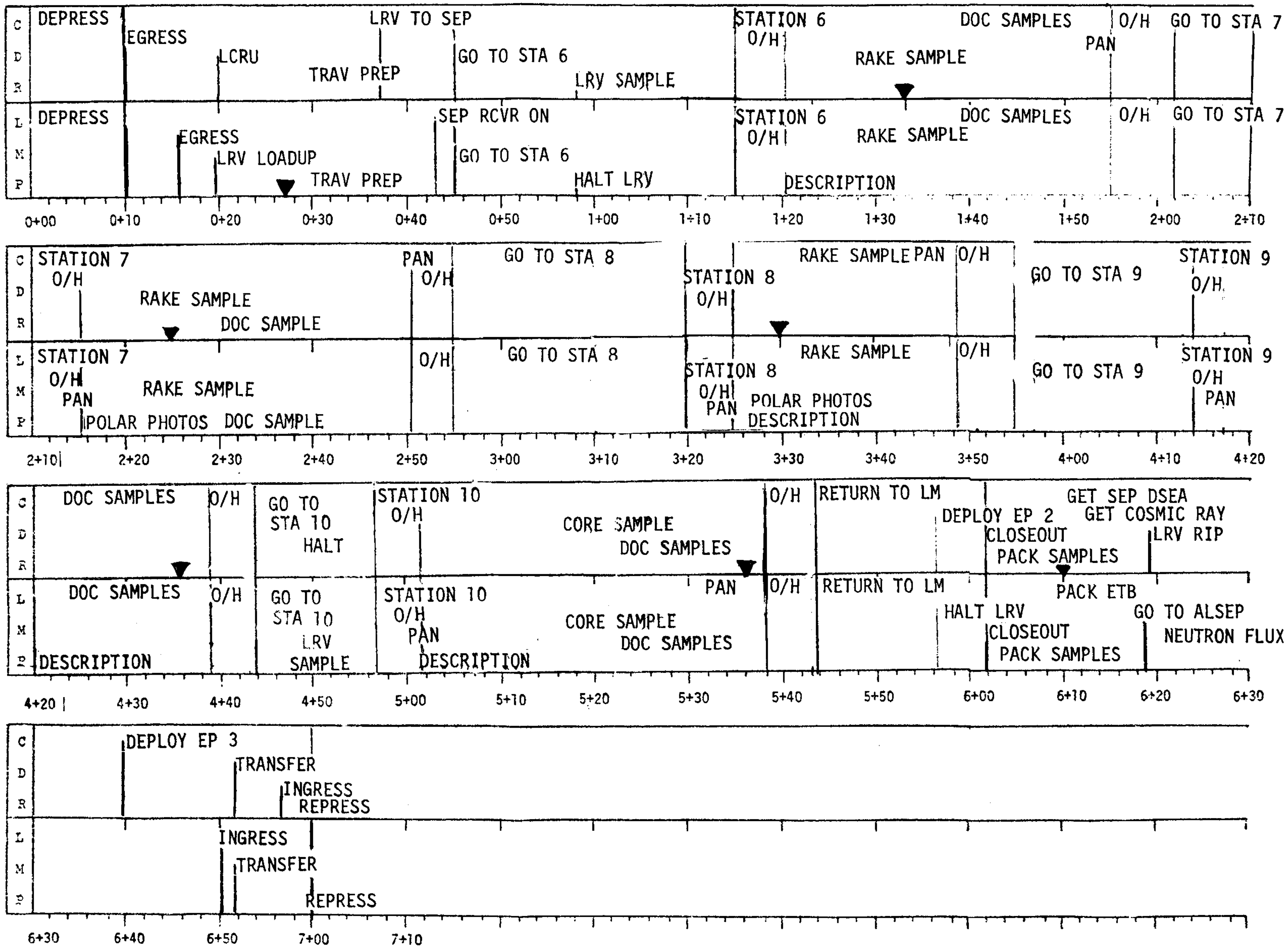


FIGURE 3.3-3 Stations' 6 and 7 TASKS

EVA-3 Stations 6 and 7 Station time 1+34

Location: Field of large blocks near base of north massif. West end (Station 6) defined as 8x16m block near 20m fresh crater.

Geologic setting: As at Station 2, the north massif materials, most probably ejecta from the moon's large basins, are thought to be buried by talus on the lower mountain slopes. In contrast to the sharp mountain foot at Station 2, the lower slope of the north massif grades through a gentle curve into the subhorizontal surface of the valley floor. Presumably the boundary has been subdued by accumulation of materials, including dark mantle, that have been transported down slope by mass wasting. The valley floor is covered by dark mantle, which extends upward locally onto the lower massif slopes.

Several large blocks, thought to be derived from the north massif are present near the mountain foot. Particularly notable is a large (8x16m) block lying at the end of a trail more than 1km long on the mountain face. A sharp crater near the block may contain reworked massif materials in its ejecta.

Objectives:

Characterize and sample materials representing the north massif.
Sample dark mantle.

EVA-3 - Station 6 and 7 continued

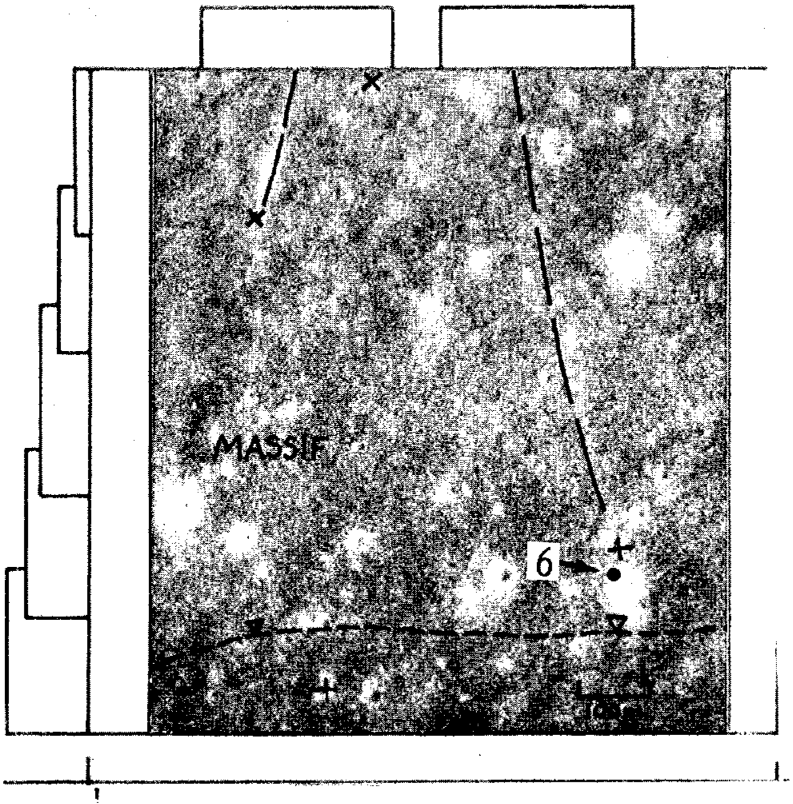
Tasks *	Rationale
North Massif:	
Documented samples from large blocks with special emphasis on blocks with tracks	Large blocks provide variety of clasts in their matrix - thus most detailed characterization of massif materials; blocks with tracks most probably derived from massif
Observe/photograph tracks and block sources	Identification of sources may permit stratigraphic analysis of massif
Observe/photograph block structures and textures	History of emplacement and subsequent modification of massif materials
Rake/soil and documented samples of rocks on rim of bright 20 m crater	Sample representative colluvium at massif base; may include both massif debris and dark mantle from massif surface.
Rake/soil and documented samples of massif materials on top of or mixed with dark mantle (especially if bright 20 m crater does not excavate massif colluvium)	Attempt to collect fragments of massif colluvium
Dark mantle:	
Documented sample from plains surface near massif base	Lateral variation in dark mantle composition; compare with other stations
Observe/photograph relations between blocks and dark mantle	Timing, mechanism of emplacement of blocks or dark mantle.
Single core	Lateral and vertical variation in dark mantle

---

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 3 Station 6 Timeline 0 + 47

	CDR	LMP
Initial overhead (includes TGE, TV pan)	5	5
Observation	5	5
•Block tracks and sources (500 mm)		
•Block structures and textures		
•Block/mantle relationships		
•Slope/mantle relationships		
•Stations 7, 8		
•Compare lithologies of blocks, crater rims, talus		
Blocks		
•Documented sampling	15	15
Talus	8	8
•Documented sampling		
•Single core		
Crater (20 m, fresh)	9	9
•Documented sampling		
•Rake/soil (Kg)		
Pans	1	1
Final overhead	4	4
	47	47



EVA-3

Station 7 Timeline

0 + 47

	CDR	LMP
Initial overhead (includes TGE, TV pan)	5	5
Observation	5	5
•Block tracks and sources (500 mm) •Block structures, textures •Block/mantle relationships		
Blocks	21	18
•Documented sampling		
Dark Mantle	11	11
•Documented sampling •SESC - permanently shadowed soil (east-west split)		
Pans	1	1
Polarimetry - Sculptured Hills		3
Final overhead	4	4
	47	47

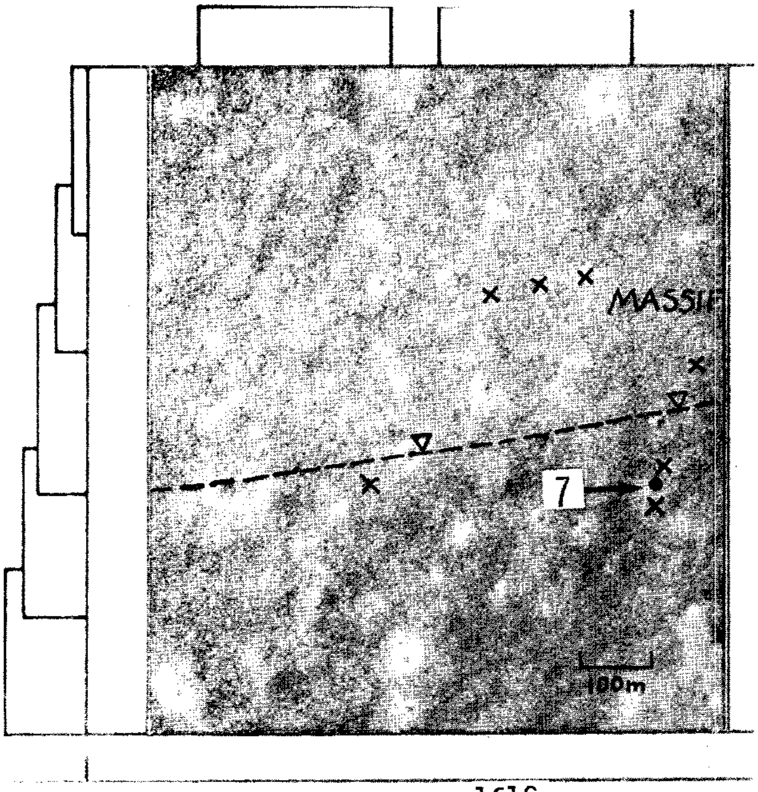


FIGURE 3.3-4 Station 8 TASKS

EVA-3 Station 8 Station time 0+47

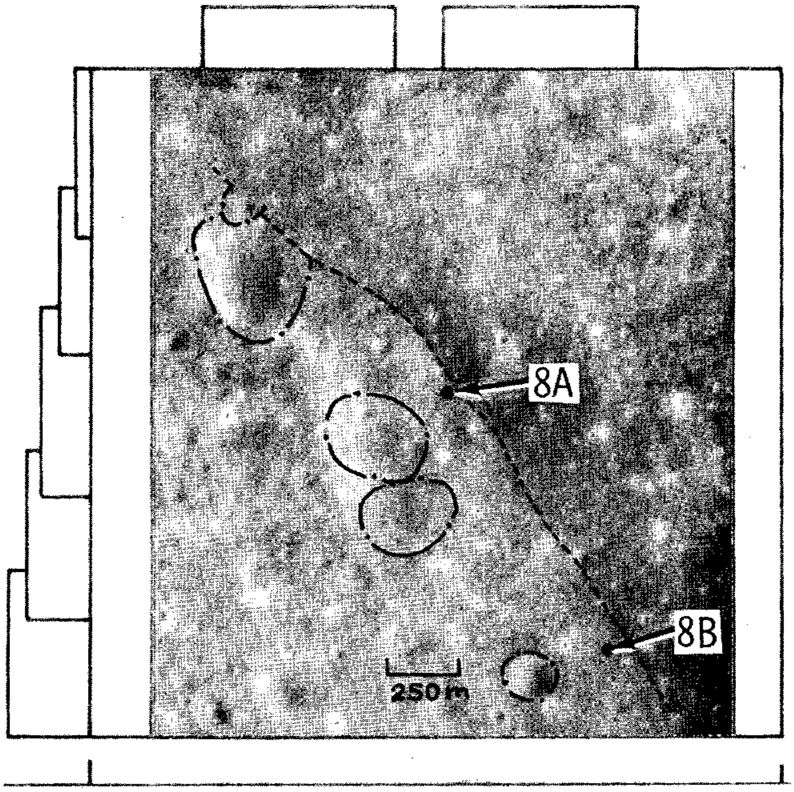
Location: Base of sculptured hills.

Geologic setting: Sculptured hills material underlies much of the highland area between the Serenitatis and Crisium basins. The base of the hills grades gently into the subhorizontal valley floor; apparently a thick accumulation of mass wasted materials has subdued the topographic break at the base of the slope.

Dark mantle covers the valley floor and extends well up onto the slope at the station. Craters that excavate materials from beneath the dark mantle have not been positively identified on the accessible part of the slope.

Objectives:

Characterize sculptured hills unit
Compare with massif and subfloor materials
Sample dark mantle



EVA-3 - Station 8 continued

Sampling criteria:

1) area in which debris from hillside (other than dark mantle) is visible on surface of lower slope, or
2) crater on lower slope that excavates materials distinct from dark mantle, or
3) largest, freshest crater as high on lower slope as possible

Tasks*	Rationale
Sculptured hills:	
Observe/photograph lithology of blocks, rocks from sculptured hills	Characterization, comparison with massif and plains materials; sampling rationale; history of emplacement and deformation
Trench, observe soil	Colluvium from sculptured hills may be mixed with dark mantle - hence, may be sampled in soil
Block area	
Documented samples - blocks, rocks	Characterization of sculptured hills materials
Rake/soil (interblock area)	Attempt to concentrate fragments of sculptured hills material from soil
Crater area	
Documented samples - rocks from crater rim	Crater may excavate colluvium including sculptured hills material from beneath dark mantle
Rake/soil at crater rim	Attempt to concentrate fragments of sculptured hills material from soil excavated in small cratering event
Dark mantle:	
Documented samples	Comparison with other stations (i.e. lateral variation)
Pans	Location, sampling context

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 3 Station 8 Timeline 0 + 47*

	CDR	LMP
Initial overhead	5	5
Observation	10	10
•Rock tracks and sources		
•Rock lithology - compare with massifs		
•Hills debris in soil (trench)		
•Dark mantle occurrence		
Sculptured Hills material		
Rock debris (on surface)	24	24
•Documented sampling		
•Rake/soil (interblock area) (Kg)		
OR		
Crater	24	24
•Documented sampling (ejecta)		
•Rake/soil (ejecta) (Kg.)		
•Rake/soil (inter-crater area)		
Dark mantle	3	3
•Documented sampling		
Pans	1	1
Final overhead	4	4
	47	47

---

* 47 minutes is available for station 8 provided an appropriate sampling site is found at the first encounter with the sculptured hills region (station 8A). If it is necessary to range along the base for some distance (approximately 1 km is allowed), the increased driving time to station 8 (and subsequently back to station 9) is about 10-12 minutes and will be done at the expense of station 8 time; the observation time will be reduced to a minimum on the premise that observations from the LRV (while driving) will suffice; thereafter, reduction in sampling time will be necessary.

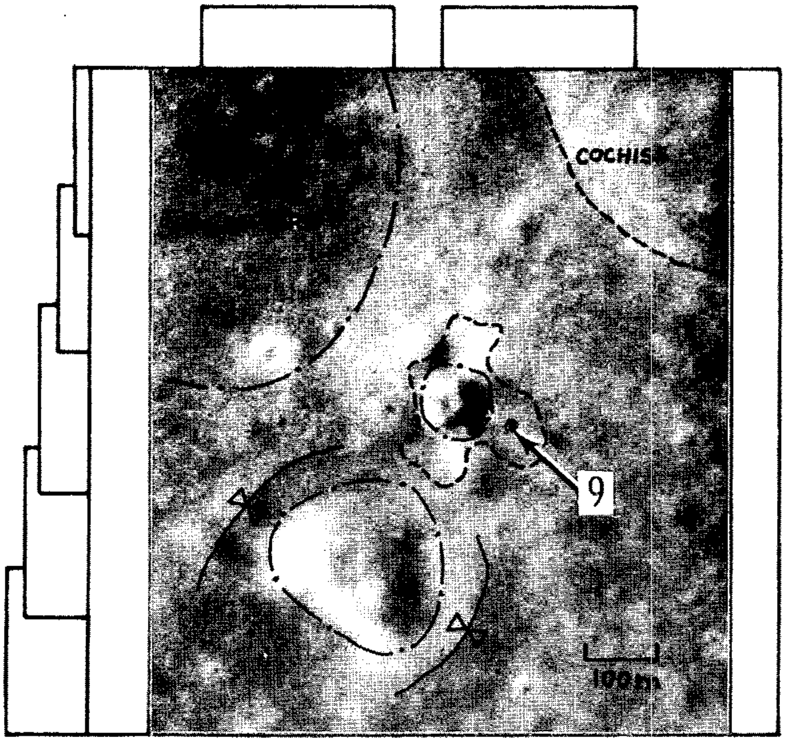
Location: Sharp-rimmed 80m crater on valley floor about 2km northeast of the landing point.

Geologic setting: The 80m crater has a lumpy floor and a sharp raised rim. It occurs on the valley floor in an area extensively covered by dark mantle. No blocks are visible in its ejecta, and its walls, floor, and rim are indistinguishable in albedo from the surrounding dark mantle.

Most probably the crater was formed by impact, but volcanic origin is a viable alternate hypothesis. The freshness of the crater suggests that fresh ejecta can be sampled at the surface. However, the uniformity of albedo across the ejecta and onto the surface of the surrounding valley floor causes worry that a young thin deposit of dark mantle material could coat the crater ejecta.

Objectives:

Determine historical sequence and lateral continuity of dark mantle at young 80m crater.



EVA-3 - Station 9 continued

Tasks*	Rationale
Observe/photograph ejecta, rim, crater interior	Crater origin; sampling rationale
Radial sample (dixie cup) 5 sample minimum	Stratigraphy of dark mantle
Documented samples-rocks and soils at crater rim (possible rake sample)	Characterize lithology of dark mantle; possible sample of subfloor material; exposure age of crater
Stereo-pan at crater rim	Vantage point for crater structure and regional setting

---

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

EVA 3

Station 9 Timeline

0 + 30

	CDR	LMP
Initial overhead	5	5
Observation	5	5
•Relation of dark mantle to crater •Crater interior, deposits (origin)		
Crater	11	16
•Documented sampling (rim) possible rake/soil •Pan (rim) (stereo of crater interior) •Radial sampling (dixie cup) - by LMP (at least 5 samples)		
Dark mantle	5	0
•Documented sampling •Pan		
Final overhead	4	4
	30	30

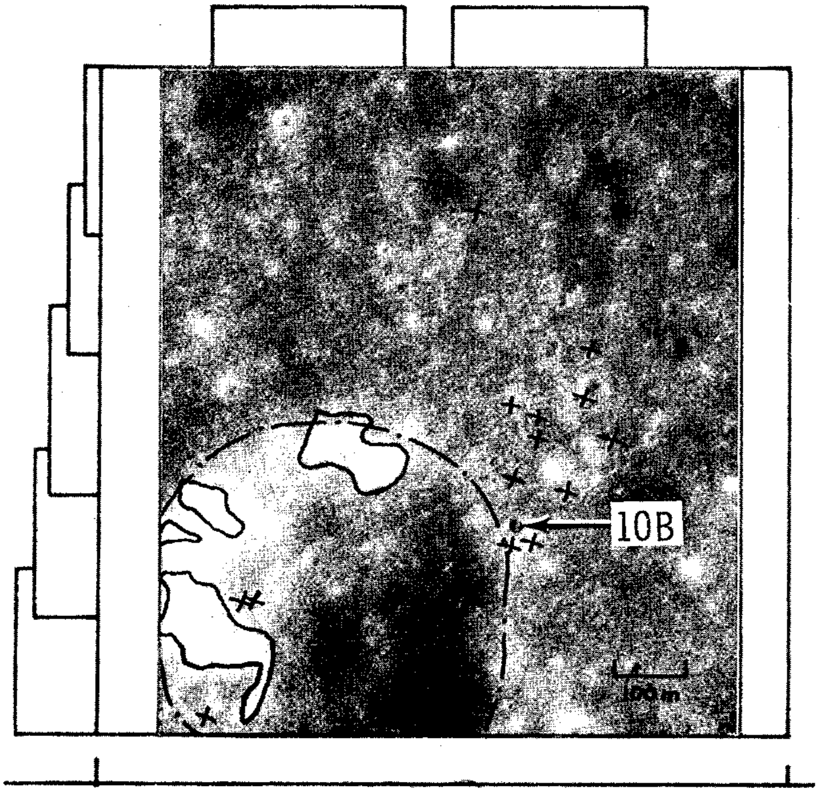
EVA-3 FIGURE 3.3-6 Station 10B TASKS Station time 0+47

Location: Block field just northeast of Sherlock crater.

Geologic setting: Subfloor material is exposed in the west and north walls of Sherlock crater. The northeast part of the crater is extensively covered by dark mantle. However, a number of large blocks apparently protrude through the dark mantle on and beyond the northeast crater rim. Their occurrance near the crater rim suggests that they are ejecta from Sherlock. If so, they are most probably derived from the subfloor.

Objectives:

Compare, contrast numerous blocks with subfloor materials at Stations 1 and 5.
Sample dark mantle.



EVA-3 - Station 10B continued

Tasks*	Rationale
Blocks:	
Observe/photograph block textures and structures	Characterization, origin, history of subfloor materials
Documented samples of blocks	Extend subfloor sampling begun at Stations 1 and 5
Dark mantle:	
Observe/photograph relation of dark mantle to blocks	Mechanics of dark mantle emplacement
Documented sample	Comparison with dark mantle of other localities
Double core	Depositional and weathering history

* Considered to be an all inclusive shopping list of tasks if time were available. The station timeline which follows presents the particular tasks (and time allocations) which were selected as the nominal station activities.

Station 10B Timeline

0 + 47

	CDR	LMP
Initial overhead	5	5
Observations •Block textures and structures compare with stations 1, 5 •Relation between dark mantle and blocks	5	5
Blocks •Documented sampling	21	21
Dark mantle •Documented sampling •Double core	11	11
Pans	1	1
Final overhead	4	4
	47	47

3.3.2 EVA-3 TRAVERSES

This section is comprised of a tabular summary of the EVA 3 activities. Table 3.3-1 provides calculated data on distances, velocities, and times as the crew goes through their station stops, packs the LRV for the last time, and closes out the final EVA of the final Apollo moon mission. The tabular data also show the time of deployment and location of the two explosive packages deployed on EVA 3.

The table also provides traverse contingency information, LRV - or PLSS - malfunctioned walkbacks or ridebacks.

Table 3.3-2 lists input data for the program that generated Table 3.3-1.

Finally, Table 3.3-3 provides the basic assumptions inherent in the layout of the EVA traverses.

```
TABLE 3.3-1  APOLLO 17  TAURUS LITTROW TRAVERSES

    EVA 3B                CALCULATED DATA                  OCT 30 1972

                         EVA START 162:40 HR:MIN GET

                         LRV                   TOTAL    ARRIVE              DEPART
             SEGMENT   MOBILITY   RIDE    TRAVEL    STATION      STOP     STATION
             DISTANCE    RATE     TIME   DISTANCE  EVA TIME     TIME     EVA TIME
STATION        (KM)     (KM/HR)   (MIN)    (KM)    (HR+MIN)   (HR+MIN)  (HR+MIN)

LM                                         0.00      0+ 0       0+45      0+45
RIDE           1.63      7.30      13
LRV-SA                                     1.63      0+58       0+ 2      1+ 0
RIDE           1.75      7.30      14
6                                          3.38      1+15       0+47      2+ 2
RIDE           0.75      7.30       6
7                                          4.13      2+ 8       0+47      2+55
RIDE           3.03      7.30      25
8B                                         7.16      3+20       0+35      3+55
RIDE           2.30      7.30      19
9                                          9.46      4+14       0+30      4+44
RIDE           0.64      7.30       5
LRV-SA                                    10.10      4+49       0+ 2      4+51
RIDE           0.73      7.30       6
10B                                       10.83      4+57       0+47      5+44
RIDE           1.60      7.30      13
1/4#CH                                    12.43      5+57       0+ 3      6+ 0
R=.25
RIDE           0.05      7.30       0
1/8#CH                                    12.48      6+ 1       0+ 3      6+ 4
R=.20
RIDE           0.15      7.30       1
LM                                        12.63      6+ 5       0+55      7+ 0

TOTALS                            104                           5+16      7+ 0

                 ---------------- TRAVERSE CONTINGENCIES --------------
                 -----------LRV FAILURE----------------  --PLSS FAILURE--
        RETURN   WALKBACK   STATION MARGIN ABOVE          MIN LRV RIDEBACK
       DISTANCE    TIME     WALKBACK REQUIREMENTS         SPEED REQUIRED    AVG EVA
STAT    TO LM     TO LM        FW        O2     AMP HRS   0 MIN    10 MIN   MET RATE
 NO      (KM)   (HR+MIN) (HR+MIN) (HR+MIN) (HR+MIN)   (KM/HR)  (KM/HR)   (BTU/HR)

LM       0.00      0+ 0      ****      ****      ****      0.00     0.00    1050.00
LRV-SA   1.65      0+27      5+30      5+ 4      5+54      1.60     1.91     935.76
6        3.40      0+57      3+49      3+23      4+24      3.30     3.94     895.70
7        3.56      0+59      2+54      2+28      3+28      3.46     4.12     898.11
8B       4.51      1+40      1+23      0+57      1+47      4.33     5.22     868.93
9        2.39      0+40      1+49      1+24      1+58      2.32     2.77     856.25
LRV-SA   1.98      0+33      1+54      1+29      1+53      1.92     2.29     831.36
10B      1.80      0+30      1+ 7      0+42      1+ 8      1.75     2.08     859.58
1/4#CH   0.20      0+ 3      1+35      1+11      1+19      0.19     0.23     849.03
R=.25
1/8#CH   0.15      0+ 2      1+33      1+ 9      1+16      0.15     0.17     849.53
R=.20
```

TABLE 3.3-2 APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3B INPUT DATA OCT 30 1972

EVA START 162:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEGMENT DISTANCE (KM)	RETURN DISTANCE (KM)	HEAT LEAK (BTU/HR)	-MOBILITY RATES- WALK (KM/HR)	RIDE (KM/HR)	MET RATE WALK (BTU/HR)
LM	0+45	0.00	0.00	200.00	****	****	******
LRV-SA	0+ 2	1.63	1.65	200.00	3.60	7.30	1560.0
6	0+47	1.75	3.40	200.00	3.60	7.30	1560.0
7	0+47	0.75	3.56	200.00	3.60	7.30	1560.0
8B	0+35	3.03	4.51	200.00	2.70	7.30	1290.0
9	0+30	2.30	2.39	200.00	3.50	7.30	1560.0
LRV-SA	0+ 2	0.64	1.98	200.00	3.60	7.30	1560.0
10B	0+47	0.73	1.80	200.00	3.60	7.30	1560.0
1/4#CH R=.25	0+ 3	1.60	0.20	200.60	3.60	7.30	1560.0
1/8#CH R=.20	0+ 3	0.05	0.15	200.00	3.60	7.30	1560.0
LM	0+55	0.15	0.00	200.00	3.60	7.30	1560.0

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE O2 (LB/HR)	EVA START (F/W-LB)	EVA START (O2-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.035	11.39	1.353	61.8

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.3-3

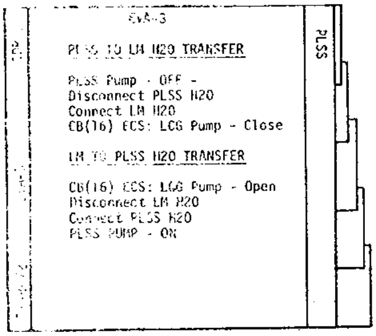
LRV TRAVERSE ASSUMPTIONS

1. 30 MINUTES RESERVES MAINTAINED ON ALL PLSS CONSUMABLES AT STATION METABOLIC RATE
2. ALL DISTANCES AND SPEEDS ARE MAP DISTANCES AND MAP SPEEDS (MOBILITY RATES)
3. REQUIRED RATE = RETURN DISTANCE/AVAILABLE OPS RIDING TIME
   AVAILABLE OPS RIDING TIME = TOTAL OPS TIME LESS ALLOWANCES
   ALLOWANCES $\begin{cases}\text{5 MIN BSLSS HOOKUP}\\ \text{13 MIN LM INGRESS}\end{cases}$
4. TIME MARGIN AT STATION METABOLIC RATE
   STATION MARGIN = TIME REMAINING AFTER ALLOWANCE FOR 10 MINUTES AT LRV, WALKBACK, AND 13 MINUTES INGRESS
5. FINAL LM O/H MARGIN = TIME REMAINING WITH NO ALLOWANCES
6. RESPIRATORY EXCHANGE QUOTIENT = 0.9
7. FEEDWATER HEAT OF VAPORIZATION 1038 $\frac{\text{BTU}}{\text{LB}}$

3.3.3 DETAILED EVA 3 TIMELINE PROCEDURES

The detailed procedures for EVA 3 are shown on the following vertical format pages. The crew cuff check list pages which correspond approximately to the timeline are shown on the far left-hand facing sheets together with the Voice Data Plan.

CREW EVA CUFF CHECKLIST



EVA-3

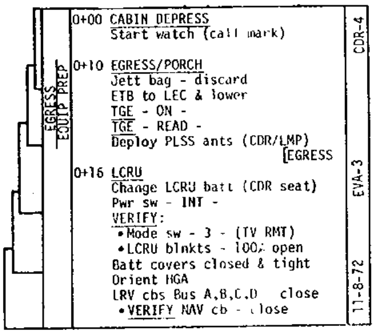
PLSS TO LM H2O TRANSFER

PLSS Pump - OFF -
Disconnect PLSS H20
Connect LM H20
CB(16) ECS: LCG Pump - Close

LM TO PLSS H2O TRANSFER

CB(16) ECS: LCG Pump - Open
Disconnect LM H20
Connect PLSS H20
PLSS PUMP - ON

PLSS



0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
ETB to LEC & lower
TGE - ON -
TGE - READ -
Deploy PLSS ants (CDR/LMP)
[EGRESS

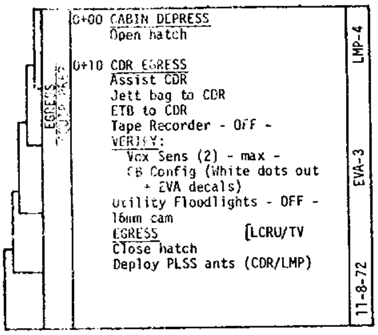
0+16 LCRU
Change LCRU batt (CDR seat)
Pwr sw - INT -
VERIFY:
•Mode sw - 3 - (TV RMT)
•LCRU blnkts - 100% open
Batt covers closed & tight
Orient HGA
LRV cbs Bus A,B,C,D close
•VERIFY NAV cb - close

EGRESS
EQUIP PREP

CDR-4

EVA-3

11-8-72



0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB to CDR
Tape Recorder - OFF -
VERIFY:
Vox Sens (2) - max -
CB Config (White dots out
+ EVA decals)
Utility Floodlights - OFF -
16mm cam
EGRESS [LCRU/TV
Close hatch
Deploy PLSS ants (CDR/LMP)

EGRESS
EQUIP PREP

LMP-4

EVA-3

11-8-72

VOICE DATA

EVA 3

CODE:

(1) Mandatory requirement for data at time or event designated

(2) Data may be deferred until later in EVA or debriefing

At start of EVA:

SUN ANGLE ∿ 36.5°

LM SHADOW ∿ 8.8 m(29 ft)

ASTRONAUT SHADOW ∿ 2.4 m (8 ft)

0+00 (1) CDR/LMP - EVA watch start
MARK _____

(2) ETB Contents:

CDR HEDC with Mag _____(E)

LMP HEDC with Mag _____(L)

Mags _____(F) _____(K) _____(M) _____(N)
_____(R) _____(D)

Maps

Polar filter

(2) LMP - verify CB Config OK

0+10

APOLLO 17

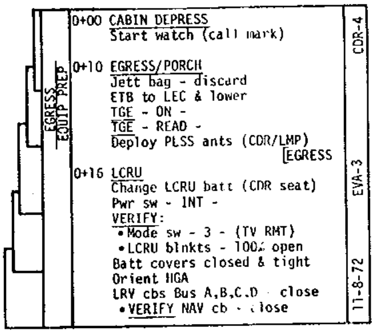
NOMINAL TIMELINE

LUNAR SURFACE EVA 3

NOVEMBER 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		Start EVA watch (Call "MARK")			
		NOTE: detailed procedures are presented in "Lunar Surface Checklist" Equipment Prep - EVA 3 Section			
EGRESS OPERATIONS	0+10	EGRESS OPERATIONS			

CREW EVA CUFF CHECKLIST

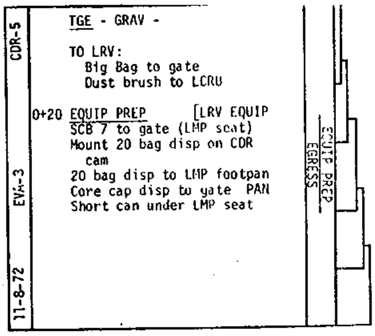

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS/PORCH
Jett bag - discard
ETB to LEC & lower
TGE - ON -
TGE - READ -
Deploy PLSS ants (CDR/LMP)
[EGRESS

0+16 LCRU
Change LCRU batt (CDR seat)
Pwr sw - INT -
VERIFY:
- Mode sw - 3 - (TV RMT)
- LCRU blnkts - 100% open

Batt covers closed & tight
Orient HGA
LRV cbs Bus A,B,C,D - close
- VERIFY NAV cb - close

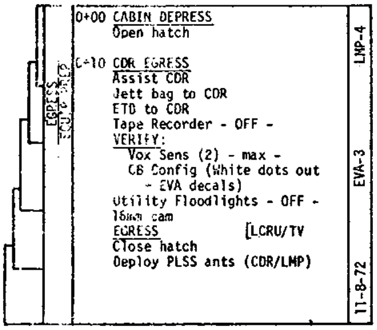
EGRESS
EQUIP PREP
CDR-4
EVA-3
11-8-72


TGE - GRAV -

TO LRV:
Big Bag to gate
Dust brush to LCRU

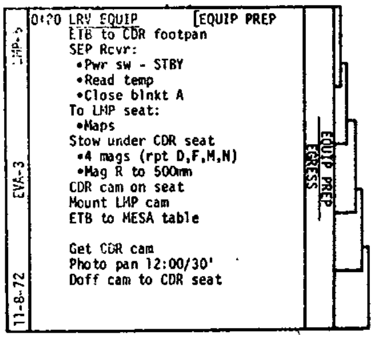
0+20 EQUIP PREP [LRV EQUIP
SCB 7 to gate (LMP seat)
Mount 20 bag disp on CDR cam
20 bag disp to LMP footpan
Core cap disp to gate PAN
Short can under LMP seat

CDR-5
EVA-3
11-8-72
EGRESS
EQUIP PREP


0+00 CABIN DEPRESS
Open hatch

0+10 CDR EGRESS
Assist CDR
Jett bag to CDR
ETB to CDR
Tape Recorder - OFF -
VERIFY:
Vox Sens (2) - max -
CB Config (White dots out - EVA decals)
Utility Floodlights - OFF -
16mm cam
EGRESS [LCRU/TV
Close hatch
Deploy PLSS ants (CDR/LMP)

EGRESS
EQUIP PREP
LMP-4
EVA-3
11-8-72


0+20 LRV EQUIP [EQUIP PREP
ETB to CDR footpan
SEP Rcvr:
- Pwr sw - STBY
- Read temp
- Close blnkt A

To LMP seat:
- Maps

Stow under CDR seat
- 4 mags (rpt D,F,M,N)
- Mag R to 500mm

CDR cam on seat
Mount LMP cam
ETB to MESA table

Get CDR cam
Photo pan 12:00/30'
Doff cam to CDR seat

LMP-5
EVA-3
11-8-72
EGRESS
EQUIP PREP

VOICE DATA

EVA 3

0+10

(1) LMP - LM switches,
Tape Recorder - OFF
Vox Sens (2) - MAX

CB Config
Utility Floodlights - OFF

(1) CDR/LMP - EMU check

	CDR	LMP
O2		
FLAGS		
PRESS		
COOL		

(1) CDR - TGE ON _____
- TGE READ ___ ___ ___

(1) CDR - Deploy PLSS antenna (LMP)

0+20

(1) LMP - Deploy PLSS Antenna (CDR)

(1) CDR - Power sw - INT Verify LCRU Batt Change
-LCRU Blankets open 100%
-LRV Bat covers closed

(1) LMP - ETB items stowage:
Mags under CDR seat (F, M,N,K, R, D)
Maps to holder (via LMP seat)
Mag R to 500 mm Camera

(1) CDR - LRV CB's A,B,C,D, NAV - IN

(1) LMP - SEP RCVR - STNDBY
SEP RCVR Temp _____
- SEP RCDR Sw - OFF

(1) CDR - Dust brush to LCRU

(1) CDR - TGE GRAV

0+30

MISSION: APOLLO 17
EVA: 3

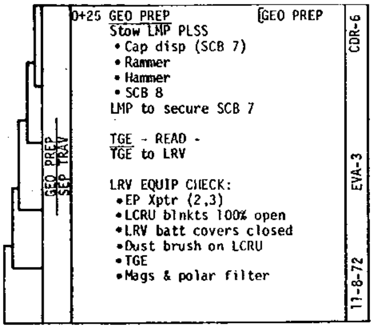
DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
ASSIST CDR	0+10	MOVE THRU HATCH			
PASS CDR JETTISON BAG		RECEIVE & TOSS JETTISON BAG TO -Y SIDE OF LM			
PASS ETB TO CDR		RECEIVE ETB			
VERIFY: TAPE RECORDER - OFF VOX SENS (2) - MAX CB CONFIG UTILITY FLOODLIGHTS - OFF		HANG ETB ON LEC DESCEND LADDER TO TOP RUNG & LOWER ETB			
		DESCEND LADDER TO SURFACE			
LMP EGRESS OPERATIONS		KICK JETTISON BAG UNDER LM			
EGRESS LM TO PORCH		TGE - POWER SW - 'ON' TGE - PRESS 'READ' - REPORT TO MCC			
PARTIALLY CLOSE LM HATCH					
DESCEND LADDER TO SURFACE					
DEPLOY PLSS ANTENNA - CDR		DEPLOY PLSS ANTENNA - LMP			
LRV EQUIPMENT		LCRU & LRV			
TAKE ETB TO CDR FOOTPAN	0+20	OPEN BATT ACCESS DOOR, PULL OUT OLD BATTERY - TOSS UNDER LM			
SEP RECEIVER		GET LCRU BATTERY UNDER CDR SEAT			
POWER SW (RCVR) - 'STANDBY'					
READ TEMP TO MCC		INSTALL & CLOSE DOOR LCRU POWER SW - 'INT'			
VERIFY RECORDER SW - 'OFF' CLOSE BLANKET A		MODE SW - 3(TV RMT) OPEN LCRU BLANKETS 100%			
ETB					
PUT BOTH CAMERAS ON LMP SEAT PUT MAPS ON LMP SEAT		CLOSE LRV BATT COVERS, PRESS TIGHT ORIENT HGA			
STOW UNDER CDR SEAT 4 MAGS - F, K, M, N, D		CLOSE LRV CB's - A, B, C, D VERIFY NAV CB - CLOSED			
INSTALL MAG R ON 500 CAM & RESTOW		GET SAMPLE RET BAG (SRB) MOUNT ON AFT SIDE GEOPALLET			
MOUNT LMP CAM ON RCU					
RETURN ETB TO MESA TABLE		TAKE DUST BRUSH TO LCRU, STOW			
TAKE PHOTO PAN 12:00/30 FT		TGE - PRESS 'GRAV'			
PUT CAMERA ON LMP SEAT	0+30				

CREW EVA CHECKLIST

VOICE DATA

EVA 3

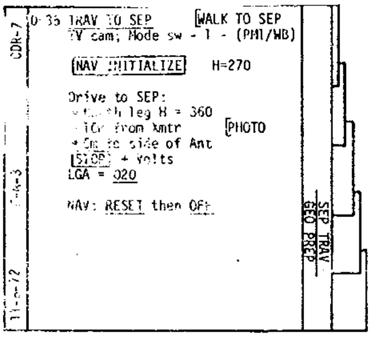

0+25 GEO PREP [GEO PREP
Stow LMP PLSS
- Cap disp (SCB 7)
- Rammer
- Hammer
- SCB 8

LMP to secure SCB 7

TGE - READ -
TGE to LRV

LRV EQUIP CHECK:
- EP Xptr (2,3)
- LCRU blnkts 100% open
- LRV batt covers closed
- Dust brush on LCRU
- TGE
- Mags & polar filter

CDR-6 EVA-3 11-8-72
GEO PREP
SEP TRAV


0+35 TRAV TO SEP [WALK TO SEP
TV cam; Mode sw - 1 - (PM1/WB)

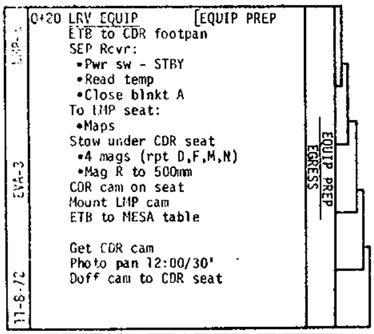
NAV INITIALIZE H=270

Drive to SEP:
- South leg H = 360
- 10m from Xmtr [PHOTO
- 5m to side of Ant

STOP + Volts
LGA = 020

NAV: RESET then OFF

CDR-7 EVA-3 11-8-72
SEP TRAV
GEO PREP


0+20 LRV EQUIP [EQUIP PREP
ETB to CDR footpan
SEP Rcvr:
- Pwr sw - STBY
- Read temp
- Close blnkt A

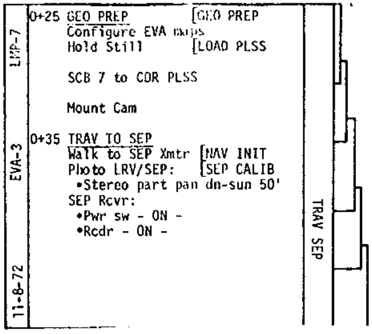
To LMP seat:
- Maps

Stow under CDR seat
- 4 mags (rpt D,F,M,N)
- Mag R to 500mm

CDR cam on seat
Mount LMP cam
ETB to MESA table

Get CDR cam
Photo pan 12:00/30'
Doff cam to CDR seat

LMP-6 EVA-3 11-8-72
EQUIP PREP
EGRESS


0+25 GEO PREP [GEO PREP
Configure EVA maps
Hold Still [LOAD PLSS

SCB 7 to CDR PLSS

Mount Cam

0+35 TRAV TO SEP
Walk to SEP Xmtr [NAV INIT
Photo LRV/SEP: [SEP CALIB
- Stereo part pan dn-sun 50'

SEP Rcvr:
- Pwr sw - ON -
- Rcdr - ON -

LMP-7 EVA-3 11-8-72
TRAV SEP

0+30

(1) CDR/LMP - Report SCB's on PLSS's (Nos.)
CDR_______ LMP________

(1) CDR - TGE Read _ _ _ _ _ _ _ _ _

(1) CDR - TGE to LRV

(1) CDR/LMP - leaving for SEP

SSD		ROLL		PITCH	
COMPUTED NAV HEADING					

0+40

(1) CDR - LRV displays + Volts _____(1) _____(2)

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

(1) CDR - Report distance SEP/LRV

(1) LMP - SEP RCVR & RCDR - ON

(1) CDR - Position LGA 020°

(1) CDR - NAV Reset

(1) CDR - LRV underway

MARK _____

(1) CDR - Report passing end of SEP Antenna
MARK________

0+50

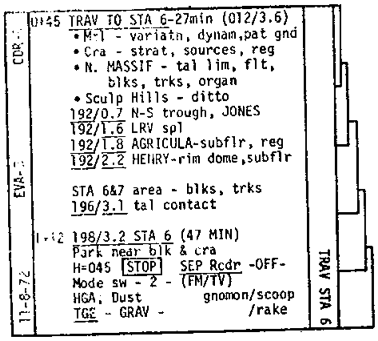
MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
GEOLOGY PREP	0+30	GEOLOGY PREP			
LOAD LRV SAMPLER (BAGS UNDER LMP SEAT)		GET SCB 7 (LMP SEAT) PLACE ON TOOL GATE			
PLACE MAPS IN HOLDER		INSTALL 20 DSBD ON CDR CAM PUT 20 DSBD ON LMP FOOTPAN PUT CORE CAP DISP ON TOOL GATE			
HOLD STILL		LOAD LMP's PLSS: RAMMER, HAMMER, CORE CAP DISPENSER, SCB 8			
PUT SCB 7 ON CDR PLSS		READ TGE AND LOAD TGE ON LRV			
		LRV EQUIP CHECK			
TRAVERSE PREP		TRAVERSE TO SEP			
MOUNT LMP CAMERA ON RCU INSTALL 20 DSBD ON CAM		POSITION TV AFT & HORIZONTAL LCRU MODE SW - 1 PUT ON CDR CAMERA			
WALK TO SEP SITE (NE QUADRANT OF SEP TRANSMITTER ANTENNA ARRAY		MOUNT LRV & FASTEN SEAT BELT POWER UP LRV			
	0+40	NAV INITIATION			
		READ SSD, ROLL, PITCH, LRV DISPLAYS			
		TORQUE GYRO AS REQUIRED			
		POWER UP LRV, DRIVE TO N LEG, H = 360°			
		POWER DOWN LRV			
PHOTO LRV/SEP: STEREO PART PAN DN-SUN 50'		NAV RESET SW - "RESET" - "OFF"			
SEP RCVR & RCDR POWER - ON		POSITION LGA 020°			
MOUNT LRV & FASTEN SEAT BELT		POWER UP LRV			
GO TO STATION 6		GO TO STATION 6			
	0+50				

CREW EVA CUFF CHECKLIST

VOICE DATA



CDR-[illegible]

EVA-3

11-8-72

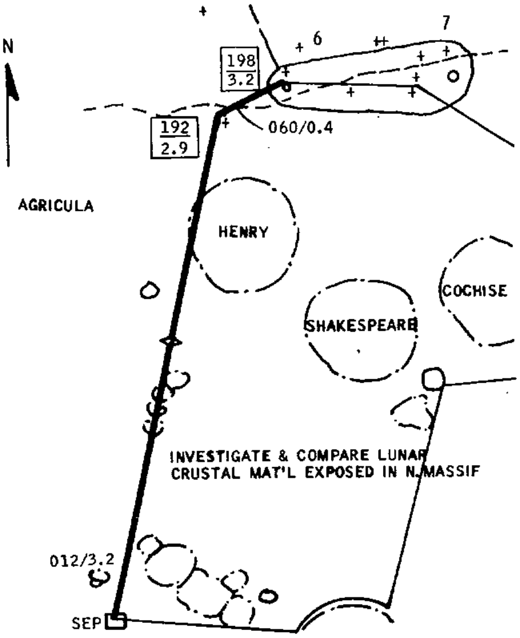
0+45 TRAV TO STA 6-27min (012/3.6)
- M-1 - variatn, dynam,pat gnd
- Cra - strat, sources, reg
- N. MASSIF - tal lim, flt, blks, trks, organ
- Sculp Hills - ditto

192/0.7 N-S trough, JONES
192/1.6 LRV spl
192/1.8 AGRICULA-subflr, reg
192/2.2 HENRY-rim dome,subflr

STA 6&7 area - blks, trks
196/3.1 tal contact

1+12 198/3.2 STA 6 (47 MIN)
Park near blk & cra
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA, Dust gnomon/scoop
TGE - GRAV - /rake

TRAV STA 6



EVA 3

0+50

(1) CDR/LMP - LRV: Speed _____
Amps _____

(1) LMP - samples bag no. _____

(1) CDR - NAV data

HEADING	
BEARING	
DISTANCE	
RANGE	

1+00 (1) CDR - LRV underway
MARK _____

(1) CDR/LMP - LRV: Speed _____
Amps _____

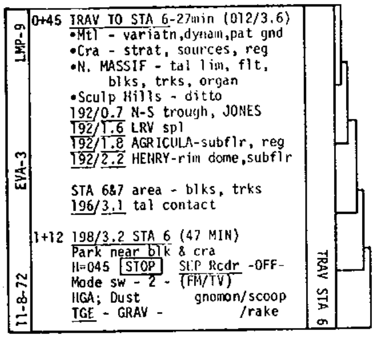
1+10

MISSION: APOLLO 17
EVA: 3

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	0+50				
LRV SAMPLE		LRV SAMPLE			
Collect sample Photo PAN		Stop LRV Read NAV data Photo PAN			
CONTINUE TO STATION 6	1+00	CONTINUE TO STATION 6			
	1+10				

CREW EVA CUFF CHECKLIST


LMP-9 EVA-3 11-8-72

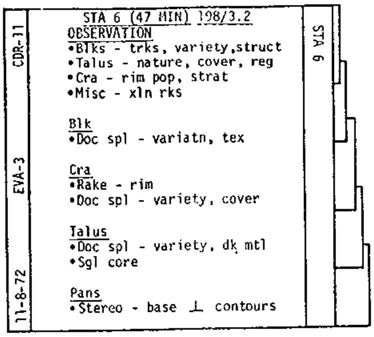
0+45 TRAV TO STA 6-27min (012/3.6)
- •Mtl - variatn,dynam,pat gnd
- •Cra - strat, sources, reg
- •N. MASSIF - tal lim, flt, blks, trks, organ
- •Sculp Hills - ditto

192/0.7 N-S trough, JONES
192/1.6 LRV spl
192/1.8 AGRICULA-subflr, reg
192/2.2 HENRY-rim dome,subflr

STA 6&7 area - blks, trks
196/3.1 tal contact

1+12 198/3.2 STA 6 (47 MIN)
Park near blk & cra
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
TGE - GRAV - /rake

TRAV STA 6


CDR-11 EVA-3 11-8-72

STA 6 (47 MIN) 198/3.2

OBSERVATION
- •Blks - trks, variety,struct
- •Talus - nature, cover, reg
- •Cra - rim pop, strat
- •Misc - xln rks

Blk
- •Doc spl - variatn, tex

Cra
- •Rake - rim
- •Doc spl - variety, cover

Talus
- •Doc spl - variety, dk mtl
- •Sgl core

Pans
- •Stereo - base ⊥ contours

STA 6

VOICE DATA

EVA 3

1+10

(1) CDR - Station 6 arrival

(1) CDR - LRV data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

(1) CDR - Verify Dusting

(1) CDR/LMP - SEP RCDR - OFF

(1) CDR/LMP - TGE - GRAV

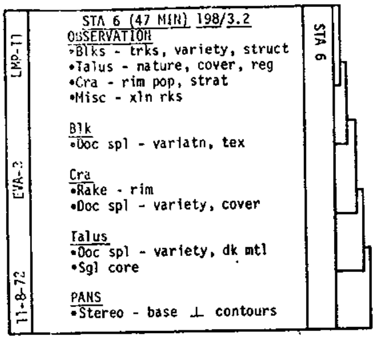
1+20 (1) CDR/LMP - Pan locations

1+30

MISSION: APOLLO 17
EVA: 3

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	1+10				
STATION 6		STATION 6			
Dismount LRV TURN SEP RECORDER OFF Take photo PAN		Power down LRV Report nav & system data			
		Dismount LRV			
Geological observations		LCRU mode sw - <u>2</u> Align HGA			
Get gnomon & scoop from aft pallet		Dust TV, TCU, LCRU Press GRAV on TGE Verify light flashing			
	1+20				
Observations		Observations			
		Photos			
		Get rake from tool gate (Verify TGE thru cycle)			
RAKE SAMPLE		RAKE SAMPLE			
Stow rake	1+30				



LMP-11

EVA-3

11-8-72

STA 6 (47 MIN) 198/3.2

OBSERVATION
- Blks - trks, variety, struct
- Talus - nature, cover, reg
- Cra - rim pop, strat
- Misc - xln rks

Blk
- Doc spl - variatn, tex

Cra
- Rake - rim
- Doc spl - variety, cover

Talus
- Doc spl - variety, dk mtl
- Sgl core

PANS
- Stereo - base ⊥ contours

STA 6

EVA 3

1+30 (1) CDR/LMP - RAKE sample

[A] Rocks Bag # ______

______

Soil Bag # ______

______

[B] Rocks Bag # ______

______

Soil Bag # ______

______

1+40 (1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

1+50

MISSION: APOLLO 17
EVA: 3

DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
Documented samples (Esp. boulders)	1+30	Documented Samples (Esp. boulders)			
	1+40				
	1+50				

CREW EVA CUFF CHECKLIST

CDR-13

STA 6 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 085 (frames, tools)

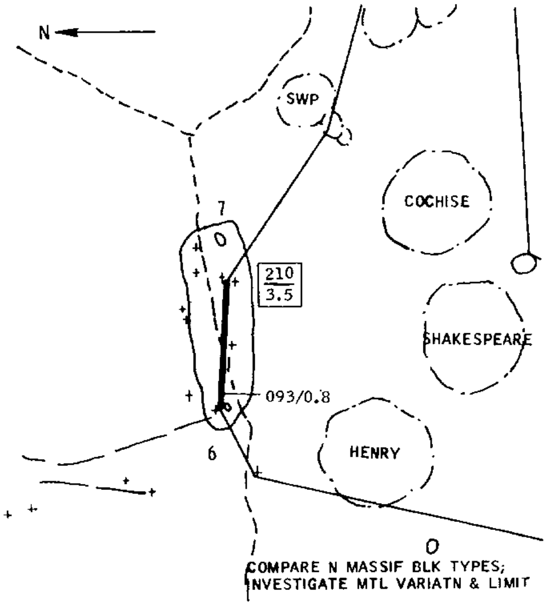
1+59 TRAV TO STA 7-11min (093/0.8)
- Blks - variatn
- Contact - chgs
- Cra - reg, tal, mtl strat

2+10 210/3.5 STA 7 (47 min)
Park
H=045 [STOP] SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
Polar filter (1/125)
TGE - GRAV -

EVA-3

11-8-72

TRAV STA 7



COMPARE N MASSIF BLK TYPES;
INVESTIGATE MTL VARIATN & LIMIT

VOICE DATA

EVA 3

1+50

(1) CDR - TGE Read ___ ___ ___

(1) CDR/LMP - Mag/Frame

CDR ___/_____

LMP ___/_____

(1) CDR/LMP - SEP RCDR - ON

(1) CDR - LGA Azimuth _____ 090°'

(1) CDR - LRV underway MARK _____

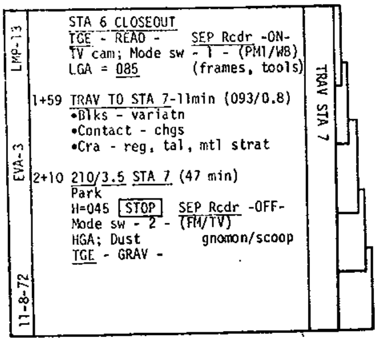
2+00

(1) CDR/LMP - LRV: Speed _____
Amps _____

2+10

MISSION: APOLLO 17 DATE: NOV. '72
EVA: 3

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	1+50				
Photo pan					
		Read TGE			
Report film counter		Report film counter			
Load samples, tools, & gnomon on LRV		LCRU mode sw - 1 Position TV aft, horiz			
Verify gate latched TURN SEP RECORDER ON					
Mount LRV Fasten seat belt		Mount LRV Fasten seat belt			
		Position LGA 090° Power up LRV			
Go to STATION 7		Go to STATION 7			
	2+00	Report LRV under way			
	2+10				



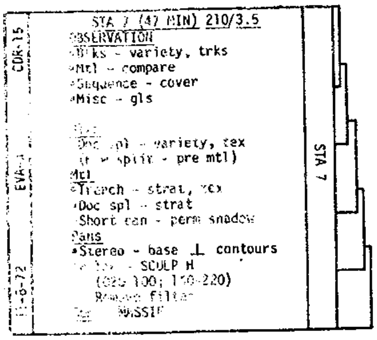
LMP-13 EVA-3 11-8-72

STA 6 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/W8)
LGA = 085 (frames, tools)

1+59 TRAV TO STA 7-11min (093/0.8)
•Blks - variatn
•Contact - chgs
•Cra - reg, tal, mtl strat

2+10 210/3.5 STA 7 (47 min)
Park
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
TGE - GRAV -

TRAV STA 7



CDR-15 EVA-3 11-8-72

STA 7 (47 MIN) 210/3.5
OBSERVATION
•Blks - variety, trks
•Mtl - compare
•Sequence - cover
•Misc - gls

[illegible]
•Doc spl - variety, tex
(r + split - pre mtl)
Mtl
•Trench - strat, tex
•Doc spl - strat
•Short can - perm shadow
Pans
•Stereo - base ⊥ contours
[illegible] - SCULP H
(020-100; 110-220)
Remove filter
[illegible] MASSIF

STA 7

EVA 3

2+10 (1) CDR - Station 7 Arrival

(1) CDR/LMP - SEP RCDR - OFF

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-Hr Bat 2		Temp RR mtr	

(1) CDR - Verify Dusting

(1) CDR/LMP - TGE - GRAV

(1) CDR/LMP - Pan Locations

2+20

(1) CDR/LMP - RAKE Sample

[A] Rocks Bag # _____
_____

Soil Bag # _____
_____

[B] Rocks Bag # _____

Soil Bag # _____

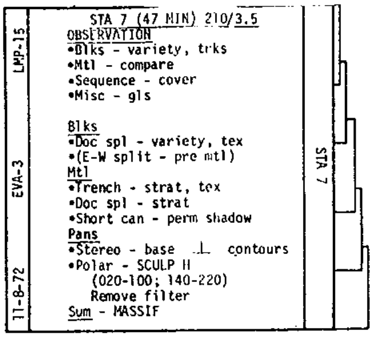
2+30

MISSION: APOLLO 17
EVA: 3

DATE: NOV, '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
STATION 7	2+10	STATION 7			
Dismount LRV TURN SEP RECORDER OFF Take photo pan		Power down LRV Report nav & system data			
		Dismount LRV			
Geological observations		LCRU mode sw - 2 Align HGA			
Get gnomon & scoop from aft pallet		Dust TV, TCU, LCRU			
		Press grav on TGE Verify light flashing			
Observations		Give MCC MARK Observations			
Get rake from tool gate (verify TGE thru cycle)	2+20				
RAKE SAMPLE		RAKE SAMPLE			
Stow rake					
Documented samples		Documented samples			
	2+30				

EVA 3



LMP-15

EVA-3

11-8-72

STA 7 (47 MIN) 210/3.5

OBSERVATION
- •Blks - variety, trks
- •Mtl - compare
- •Sequence - cover
- •Misc - gls

Blks
- •Doc spl - variety, tex
- •(E-W split - pre mtl)

Mtl
- •Trench - strat, tex
- •Doc spl - strat
- •Short can - perm shadow

Pans
- •Stereo - base ⊥ contours
- •Polar - SCULP H
  (020-100; 140-220)
  Remove filter

Sum - MASSIF

STA 7

2+30

2+40 (1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) LMP - Polar Filter on Camera

Reset camera 1/125

Pos 1 - Pan LCR
LCR
LCR

Pos 2 - Pan LCR
LCR
LCR

Discard filter reset
Camera 1/250

2+50

MISSION: APOLLO
EVA: 3

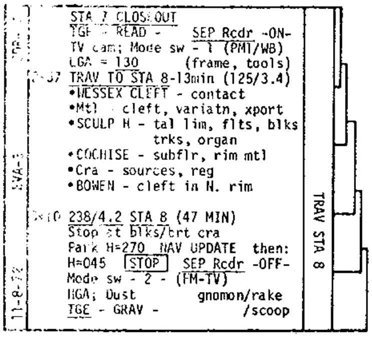
DATE: NOV. '72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	2+30				
Documented samples		Documented samples			
	2+40				
Put polar filter on camera					
Reset camera to 1/125 Take polarization photos - S MASSIF 3 pans: 1 for each filter position L - C - R (all f5.6)					
Discard filter, reset CAM to 1/250					
	2+50				

CREW EVA CHECKLIST

EVA 3

VOICE DATA


EVA-3

11-8-72

STA 7 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 (PM1/WB)
LGA = 130 (frame, tools)

2+57 TRAV TO STA 8-13min (125/3.4)
- WESSEX CLEFT - contact
- Mtl - cleft, variatn, xport
- SCULP H - tal lim, flts, blks trks, organ
- COCHISE - subflr, rim mtl
- Cra - sources, reg
- BOWEN - cleft in N. rim

3+10 238/4.2 STA 8 (47 MIN)
Stop at blks/brt cra
Park H=270 NAV UPDATE then:
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM-TV)
HGA; Dust gnomon/rake
TGE - GRAV - /scoop

TRAV STA 8

2+50

(1) CDR - TGE Read ___ ___ ___

(1) CDR/LMP - Mag/Frame

CDR ____/____

LMP ____/____

(1) CDR/LMP - SEP RCDR - ON

(1) CDR - LGA Azimuth 115°

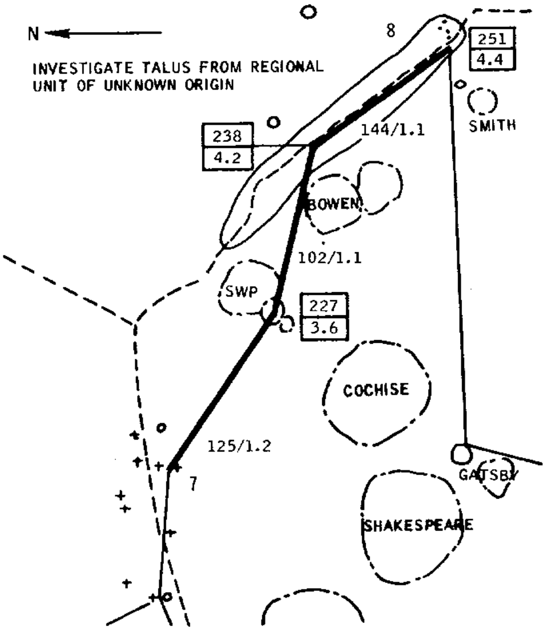
(1) CDR - LRV underway

MARK ____

3+00

(1) CDR/LMP - LRV Speed ____

Amps ____



INVESTIGATE TALUS FROM REGIONAL UNIT OF UNKNOWN ORIGIN

3+10

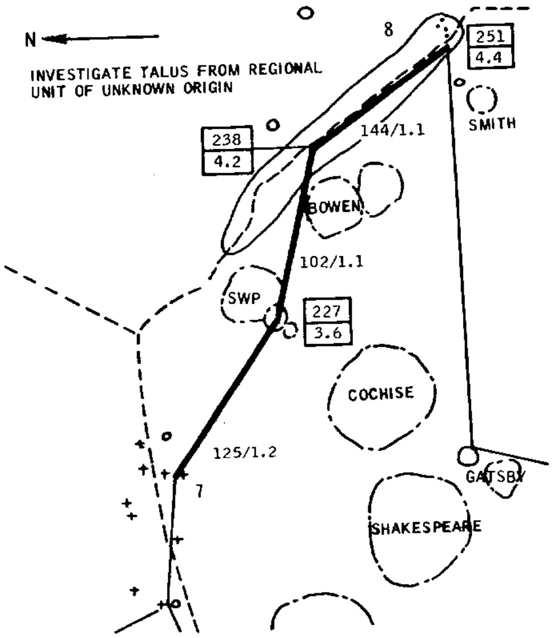
MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

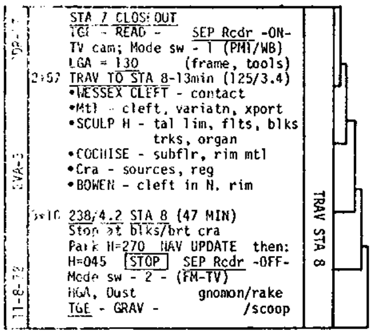
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION	
				LMP	CDR
Photo PAN	2+50	Read TGE			
Report film counter		Report film counter			
Load samples, tools, & gnomon on LRV		LCRU mode sw - 1 Position TV AFT, Horiz			
Verify gate latched		Mount LRV			
TURN SEP RECORDER ON Mount LRV Fasten seat belt		Fasten seat belt			
		Position LGA 115° Power up LRV			
GO TO STATION 8		GO TO STATION 8			
	3+00				
	3+10				

EVA 3

3+10



Capcom - Heading - 270°
for NAV update at Station 8



11-8-72

EVA-3

STA 7 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 (PM1/WB)
LGA = 130 (frame, tools)
2:57 TRAV TO STA 8-13min (125/3.4)
- WESSEX CLEFT - contact
- Mtl - cleft, variatn, xport
- SCULP H - tal lim, flts, blks trks, organ
- COCHISE - subflr, rim mtl
- Cra - sources, reg
- BOWEN - cleft in N. rim

3+10 238/4.2 STA 8 (47 MIN)
Stop at blks/brt cra
Park H=270 NAV UPDATE then:
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM-TV)
HGA, Dust gnomon/rake
TGE - GRAV - /scoop

TRAV STA 8

3+20

(1) CDR - Station 8 Arrival

(1) LMP - SEP Recorder - OFF

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

SSD	ROLL	PITCH
COMPUTED NAV HEADING		

(1) CDR/LMP - TGE GRAV

(1) CDR - Verify Dusting

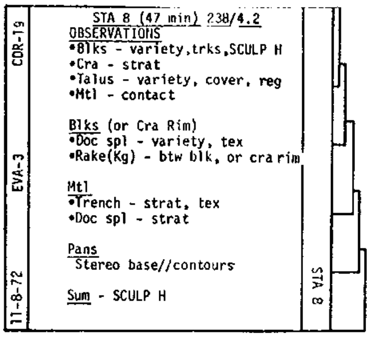
(1) CDR/LMP - Pan locations

3+30

MISSION: APOLLO 17 DATE: NOV. 1972
EVA: 3

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	3+10				
STATION 8	3+20	STATION 8			
Dismount LRV Take photo PAN		Park H=270° for NAV update Report nav & system data			
SEP Recorder - OFF					
Geological observations		Repark LRV to 045°			
		LCRU mode sw - 2 Align HGA			
		Dust TV, TCU, LCRU			
Get gnomon & scoop from aft pallet		Press gray on TGE Verify light flashing Give MCC MARK			
Observations		Observations			
	3+30				

3+30



CDR-19

EVA-3

11-8-72

STA 8 (47 min) 238/4.2

OBSERVATIONS
•Blks - variety,trks,SCULP H
•Cra - strat
•Talus - variety, cover, reg
•Mtl - contact

Blks (or Cra Rim)
•Doc spl - variety, tex
•Rake(Kg) - btw blk, or cra rim

Mtl
•Trench - strat, tex
•Doc spl - strat

Pans
Stereo base//contours

Sum - SCULP H

STA 8

(1) CDR/LMP - RAKE Sample

[A] Rocks Bag # _____
_____

Soil Bag # _____
_____

3+40

[B] Rocks Bag # _____
_____

Soil Bag # _____
_____

3+50

MISSION: APOLLO 17

EVA: 3

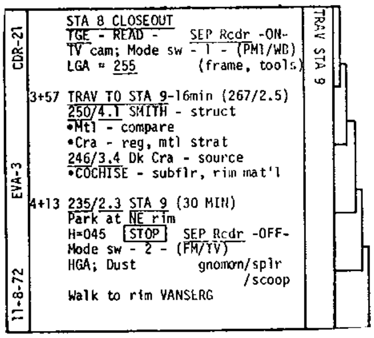
DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION	
				LMP	CDR
	3+30				
RAKE/SOIL SAMPLE		RAKE/SOIL SAMPLE			
DOCUMENTED SAMPLES	3+40	DOCUMENTED SAMPLES			
TRENCH		TRENCH			
Photo Pan		Photo Pan			
	3+50				

CREW EVA CHECKLIST

VOICE DATA

EVA 3


CDR-21

EVA-3

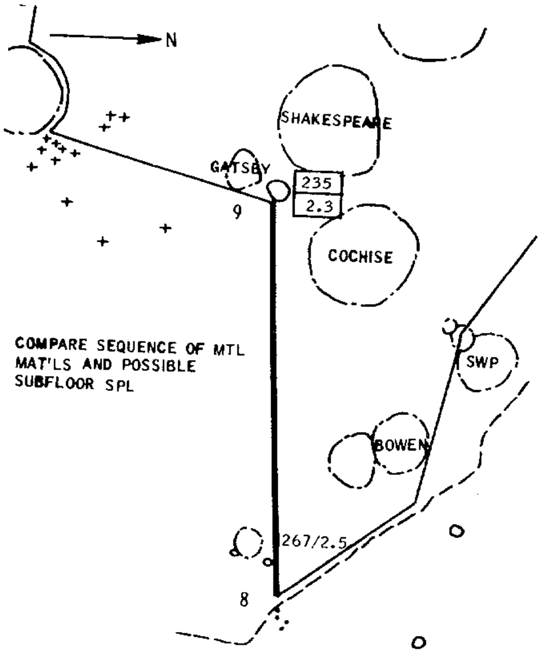
11-8-72

TRAV STA 9

STA 8 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 255 (frame, tools)

3+57 TRAV TO STA 9-16min (267/2.5)
250/4.1 SMITH - struct
•Mtl - compare
•Cra - reg, mtl strat
246/3.4 Dk Cra - source
•COCHISE - subflr, rim mat'l

4+13 235/2.3 STA 9 (30 MIN)
Park at NE rim
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr
/scoop
Walk to rim VANSERG



COMPARE SEQUENCE OF MTL MAT'LS AND POSSIBLE SUBFLOOR SPL

3+50

(1) CDR/LMP - Mag/frame
CDR _____/_____
LMP _____/_____

(1) CDR - TGE Read _ _ _ _ _ _ _ _ _

(1) CDR/LMP - SEP RCDR - ON

(1) CDR - LGA Azimuth 255°
- LRV Heading ____
- Torque Gyro

(1) CDR - LRV Underway MARK _____

4+00

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

4+10

MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	3+50				
Report film Counter		Read TGE Report film Counter			
Load up LRV - samples, scoop, rake, gnomon TURN SEP RECORDER ON Verify gate latched Mount LRV Fasten seatbelt		LCRU mode sw - 1 Position TV aft, horiz. Torque gyro as required Position LGA 255°			
Go to STATION 9		Go to STATION 9 Report LRV Underway			
	4+00				
	4+10				

CREW EVA CHECKLIST

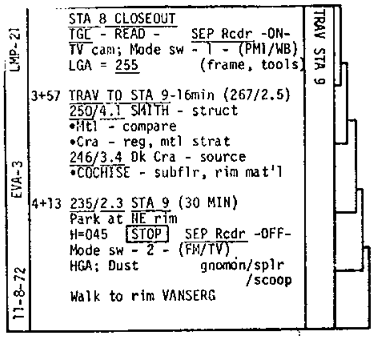
VOICE DATA

EVA 3

4+10

(1) CDR/LMP - LRV Speed _____

Amps _____



LMP-21

STA 8 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 255 (frame, tools)

3+57 TRAV TO STA 9-16min (267/2.5)
250/4.1 SMITH - struct
•Mtl - compare
•Cra - reg, mtl strat
246/3.4 Dk Cra - source
•COCHISE - subflr, rim mat'l

4+13 235/2.3 STA 9 (30 MIN)
Park at NE rim
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr /scoop
Walk to rim VANSERG

EVA-3

11-8-72

TRAV STA 9

(1) CDR - Station 9 Arrival _____

(1) LMP - SEP Recorder - OFF

(1) CDR - LRV Data

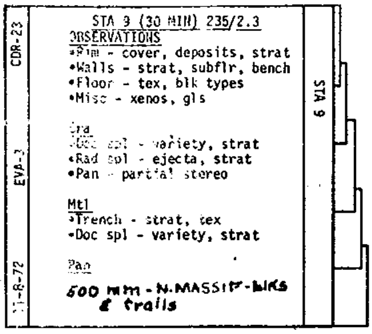
HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

(1) CDR - Verify Dusting

(1) CDR/LMP - TGE GRAV

4+20

(1) CDR/LMP - Pan locations



CDR-23

STA 9 (30 MIN) 235/2.3
OBSERVATIONS
•Rim - cover, deposits, strat
•Walls - strat, subflr, bench
•Floor - tex, blk types
•Misc - xenos, gls

Cra
•Doc spl - variety, strat
•Rad spl - ejecta, strat
•Pan - partial stereo

Mtl
•Trench - strat, tex
•Doc spl - variety, strat

Pan
500 mm - N. MASSIF - blks & trails

EVA-3

11-8-72

STA 9

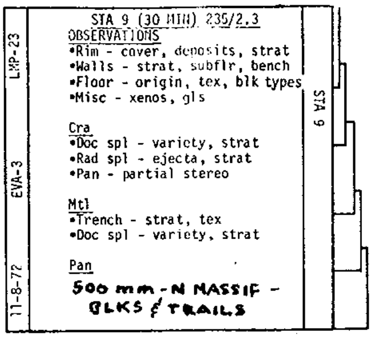
4+30

MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION	
				LMP	CDR
	4+10				
STATION 9		STATION 9			
Dismount LRV		Power down LRV			
Take photo PAN		Report nav & system data			
SEP Recorder - OFF		Dismount LRV			
		LCRU mode sw - 2 Align HGA			
Geological observations					
Get gnomon & scoop from aft pallet		Dust TV, TCU, LCRU Press gra on TGE Verify light lashing Give MCC MARK			
	4+20				
Observations		Observations			
Documented Samples		Documented Samples			
	4+30				

CREW EVA CHECKLIST



LMP-23
EVA-3
11-8-72

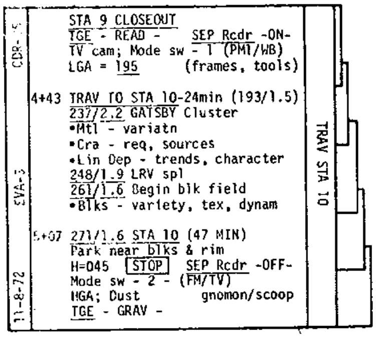
STA 9 (30 MIN) 235/2.3
OBSERVATIONS
- •Rim - cover, deposits, strat
- •Walls - strat, subflr, bench
- •Floor - origin, tex, blk types
- •Misc - xenos, gls

Cra
- •Doc spl - variety, strat
- •Rad spl - ejecta, strat
- •Pan - partial stereo

Mtl
- •Trench - strat, tex
- •Doc spl - variety, strat

Pan
500 mm - N MASSIF - BLKS & TRAILS

STA 9



CDR-15
EVA-3
11-8-72

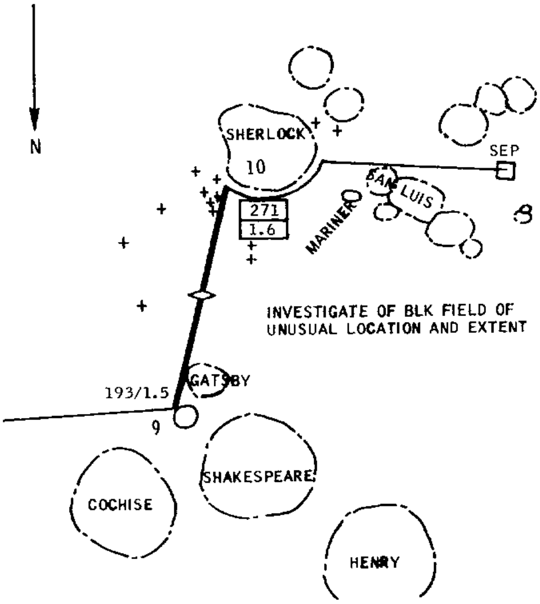
STA 9 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 (PM1/WB)
LGA = 195 (frames, tools)

4+43 TRAV TO STA 10-24min (193/1.5)
237/2.2 GATSBY Cluster
- •Mtl - variatn
- •Cra - req, sources
- •Lin Dep - trends, character

248/1.9 LRV spl
261/1.6 Begin blk field
- •Blks - variety, tex, dynam

5+07 271/1.6 STA 10 (47 MIN)
Park near blks & rim
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
TGE - GRAV -

TRAV STA 10



INVESTIGATE OF BLK FIELD OF UNUSUAL LOCATION AND EXTENT

VOICE DATA

EVA 3

4+30

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR/LMP - TGE RDG ___ ___ ___

4+40

(1) CDR/LMP - Mag/frame
CDR _____/_____
LMP _____/_____

(1) LMP - SEP Recorder - ON

(1) CDR - LGA Azimuth 195°

(1) CDR - LRV Underway MARK_____

(1) LMP - Samples Bag #_____

(1) CDR - NAV data

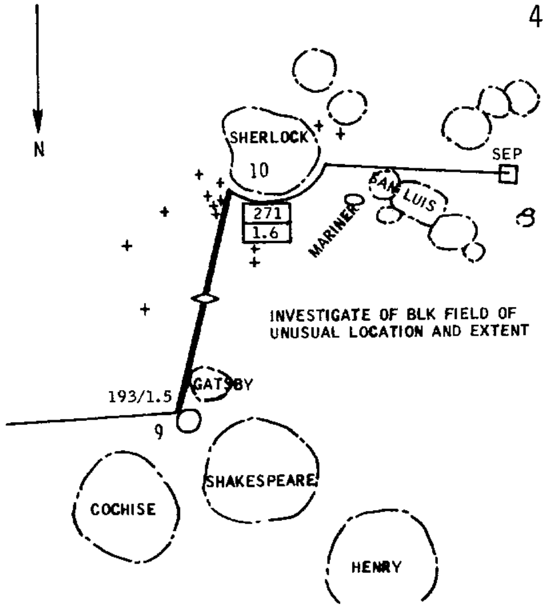
HEADING	
BEARING	
DISTANCE	
RANGE	

4+50

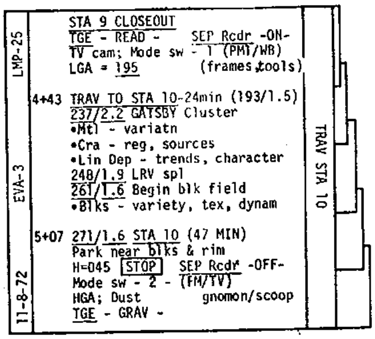
MISSION: APOLLO 17 DATE: NOV. 1972
EVA: 3

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION	
				LMP	CDR
	4+30				
Radial Samples		Radial Samples			
Stereo Pan					
Report film counter		Read TGE Report film counter			
Load up LRV - samples, scoop, rake gnomon Verify gate latched SEP Recorder - ON Mount LRV Fasten seatbelt	4+40	LCRU mode sw - 1 Position TV aft, horiz. Mount LRV Fasten seatbelt Position LGA 195° Power up LRV			
Go to STATION 10		Go to STATION 10 Report LRV underway			
LRV SAMPLE Collect sample		LRV SAMPLE Stop LRV			
	4+50				

EVA 3



INVESTIGATE OF BLK FIELD OF UNUSUAL LOCATION AND EXTENT



LMP-25

EVA-3

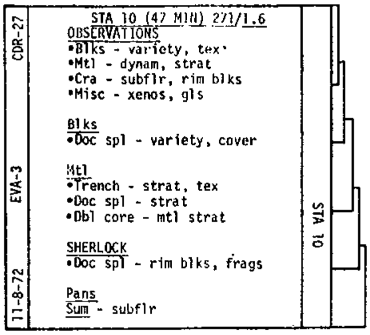
11-8-72

STA 9 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 (PMI/WB)
LGA = 195 (frames,tools)

4+43 TRAV TO STA 10-24min (193/1.5)
237/2.2 GATSBY Cluster
•Mtl - variatn
•Cra - reg, sources
•Lin Dep - trends, character
248/1.9 LRV spl
261/1.6 Begin blk field
•Blks - variety, tex, dynam

5+07 271/1.6 STA 10 (47 MIN)
Park near blks & rim
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/scoop
TGE - GRAV -

TRAV STA 10



CDR-27

EVA-3

11-8-72

STA 10 (47 MIN) 271/1.6
OBSERVATIONS
•Blks - variety, tex
•Mtl - dynam, strat
•Cra - subflr, rim blks
•Misc - xenos, gls

Blks
•Doc spl - variety, cover

Mtl
•Trench - strat, tex
•Doc spl - strat
•Dbl core - mtl strat

SHERLOCK
•Doc spl - rim blks, frags

Pans
Sum - subflr

STA 10

4+50 (1) CDR - LRV Underway MARK____

(1) CDR - STATION 10 Arrival____

(1) CDR - LRV Data

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

5+00

(1) LMP - SEP Recorder - OFF
(1) CDR - Verify Dusting
(1) CDR - TGE - GRAV

(1) CDR/LMP - Pan locations

5+10

MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

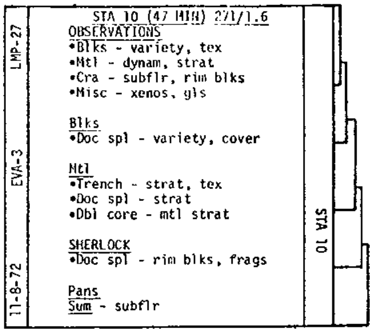
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+50				
Photo PAN		Read nav data Photo PAN			
Continue to STATION 10		Continue to STATION 10			
STATION 10		STATION 10			
Dismount LRV		Power down LRV			
SEP Recorder - OFF		Report nav & system data			
Take photo PAN					
Geological operations		LCRU mode sw - 2 Align HGA			
	5+00	Dust TV, TCU, LCRU			
Get gnomon & scoop from aft pallet		Press grav on TGE Verify light flashing Give MCC MARK			
	5+10				

5+10

(1) CDR/LMP - Core tube no's.

Upper_____

Lower_____



LMP-27

EVA-3

11-8-72

STA 10 (47 MIN) 271/1.6

OBSERVATIONS

- Blks - variety, tex
- Mtl - dynam, strat
- Cra - subflr, rim blks
- Misc - xenos, gls

Blks

- Doc spl - variety, cover

Mtl

- Trench - strat, tex
- Doc spl - strat
- Dbl core - mtl strat

SHERLOCK

- Doc spl - rim blks, frags

Pans

Sum - subflr

STA 10

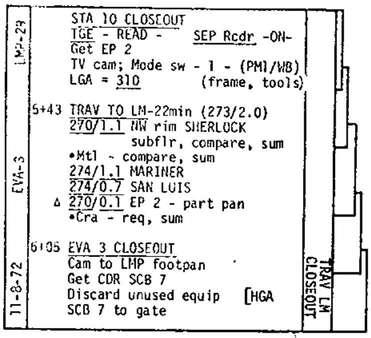
5+20

5+30

MISSION: APOLLO 17　　DATE: NOV. 1972
EVA: 3

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION	
				LMP	CDR
	5+10				
Observations		Observations			
CORE SAMPLE		CORE SAMPLES			
Get out two core tubes (SCB 7) & assemble to ext. handle (rake) report core tube no's		Assist LMP			
Drive core tubes		Photo core sample			
	5+20				
Disassemble, ram, and cap core tubes		Assist LMP			
Stow SCB 7					
Documented samples		Documented samples			
	5+30				

EVA 3



LMP-29

EVA-3

11-8-72

STA 10 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
Get EP 2
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 310 (frame, tools)

5+43 TRAV TO LM-22min (273/2.0)
270/1.1 NW rim SHERLOCK
subflr, compare, sum
•Mtl - compare, sum
274/1.1 MARINER
274/0.7 SAN LUIS
Δ 270/0.1 EP 2 - part pan
•Cra - req, sum

6+05 EVA 3 CLOSEOUT
Cam to LMP footpan
Get CDR SCB 7
Discard unused equip [HGA
SCB 7 to gate

TRAV LM
CLOSEOUT

5+30

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR/LMP - TGE RDG ___ ___ ___

(1) CDR/LMP - Mag/Frame
CDR ____/____
LMP ____/____

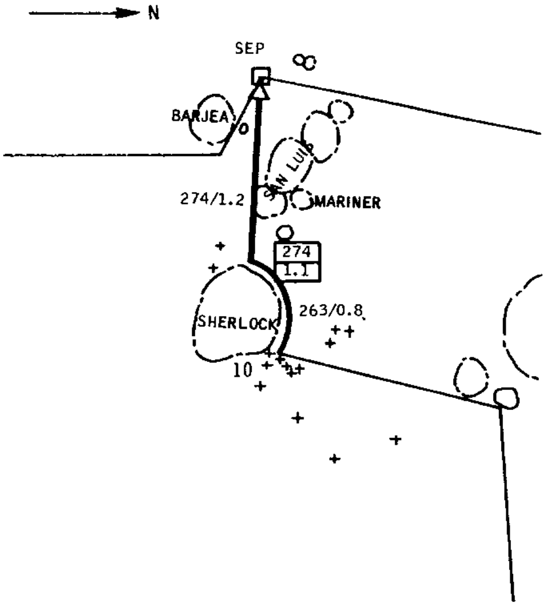
5+40 (1) LMP - EP#2 - "SAFE"

(1) CDR - LGA Azimuth 270°

(1) CDR - LRV Underway MARK ____

(1) CDR/LMP - LRV Speed ____
Amps ____

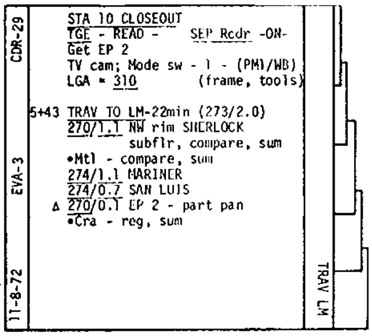
5+50



MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION	
				LMP	CDR
	5+30				
		Read TGE - close lid			
Report film counter		Report film counter			
	5+40				
Load up LRV - samples, scoop, rake, gnomon		LCRU mode sw - 1 Position TV aft, horiz.			
Verify gate latched		Mount LRV			
Get EP#2 - verify "safe"		Fasten seatbelt			
Mount LRV-EP#2 on lap		Position LGA 270°			
Fasten seatbelt		Power up LRV			
Return to LM		Return to LM			
		Report LRV underway			
	5+50				



CDR-29

STA 10 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
Get EP 2
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 310 (frame, tools)

5+43 TRAV TO LM-22min (273/2.0)
270/1.1 NW rim SHERLOCK
subflr, compare, sum
•Mtl - compare, sum
274/1.1 MARINER
274/0.7 SAN LUIS
Δ 270/0.1 EP 2 - part pan
•Cra - reg, sum

EVA-3

11-8-72

TRAV LM

EVA 3

5+50

(1) LMP - EP#2 - "SAFE"

(1) CDR - NAV Data

HEADING	
BEARING	
DISTANCE	
RANGE	

6+00

(1) CDR - LRV Underway MARK _____

(1) LMP - Rpt 70mm mag/frame

____/_____

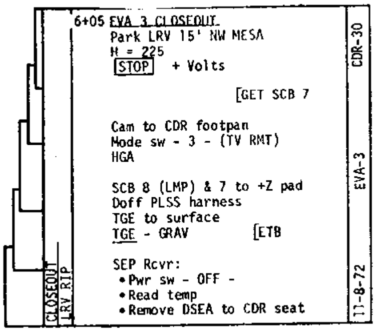
(1) CDR - Arrival at LM

(1) CDR - LRV Displays :Volts ____(1) _____(2)

HEADING		Temp Bat 1	
BEARING		Temp Bat 2	
DISTANCE		Temp LF mtr	
RANGE		Temp RF mtr	
Amp-Hr Bat 1		Temp LR mtr	
Amp-HR Bat 2		Temp RR mtr	

(1) CDR - TGE GRAV

6+10



6+05 EVA 3 CLOSEOUT
Park LRV 15' NW MESA
H = 225
STOP + Volts

[GET SCB 7

Cam to CDR footpan
Mode sw - 3 - (TV RMT)
HGA

SCB 8 (LMP) & 7 to +Z pad
Doff PLSS harness
TGE to surface
TGE - GRAV [ETB

SEP Rcvr:
•Pwr sw - OFF -
•Read temp
•Remove DSEA to CDR seat

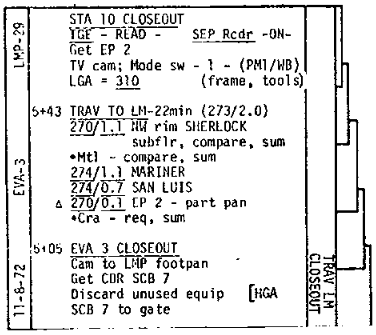
CDR-30

EVA-3

11-8-72

CLOSEOUT

LRV RIP



LMP-29

STA 10 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
Get EP 2
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 310 (frame, tools)

5+43 TRAV TO LM-22min (273/2.0)
270/1.1 NW rim SHERLOCK
subflr, compare, sum
•Mtl - compare, sum
274/1.1 MARINER
274/0.7 SAN LUIS
Δ 270/0.1 EP 2 - part pan
•Cra - req, sum

5+05 EVA 3 CLOSEOUT
Cam to LMP footpan
Get CDR SCB 7
Discard unused equip [HGA
SCB 7 to gate

EVA-3

11-8-72

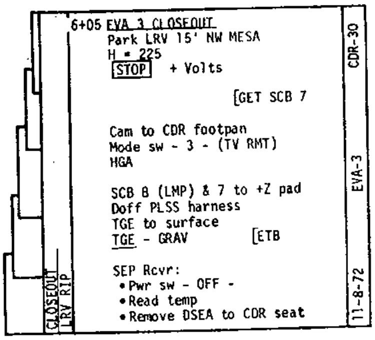
TRAV LM

CLOSEOUT

MISSION: APOLLO 17 DATE: NOV. 1972
EVA: 3

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	5+50				
PHOTO APPROACH		PHOTO APPROACH			
CHECK EP DISPLAY 'SAFE'		STOP LRV POWER DOWN LRV			
PULL 3 PINS (DISCARD PINS)		REPORT NAV DATA			
EXTEND EP ANTENNA PLACE EP ON SURFACE OUTSIDE	6+00	POWER UP LRV			
SHOOT PART PAN		SHOOT PART PAN			
<u>ARRIVAL AT LM</u>		<u>ARRIVAL AT LM</u>			
DISMOUNT LRV		PARK LRV 15 NW OF MESA H = 240°			
GET SCB 7 FROM CDR PLSS		POWER DOWN LRV			
PUT LMP CAM & MAPS ON CDR SEAT PLACE SCB 3 & 7 ON +Z PAD		REPORT LRV SYST DISPLAYS INCLUDING VOLTS			
		DISMOUNT LRV PUT CAMERA IN CDR FOOTPAN			
		LCRU MODE = 3 (TV RMT)			
HOLD STILL		ALIGN HGA TAKE 5 CB OFF LMP & PLACE ON +Z PAD			
DOFF PLSS HARNESS (QD)	6+10	DOFF PLSS HARNESS (QD)			

CREW EVA CUFF CHECKLIST


6+05 EVA 3 CLOSEOUT
Park LRV 15' NW MESA
H = 225
STOP + Volts

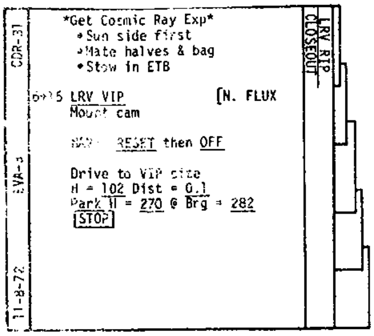
[GET SCB 7

Cam to CDR footpan
Mode sw - 3 - (TV RMT)
HGA

SCB 8 (LMP) & 7 to +Z pad
Doff PLSS harness
TGE to surface
TGE - GRAV [ETB

SEP Rcvr:
- Pwr sw - OFF -
- Read temp
- Remove DSEA to CDR seat

CDR-30
EVA-3
11-8-72
CLOSEOUT
LRV RIP

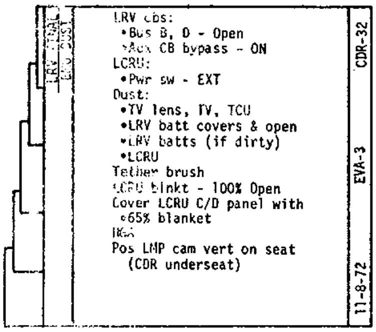

Get Cosmic Ray Exp
- Sun side first
- Mate halves & bag
- Stow in ETB

6+15 LRV VIP [N. FLUX
Mount cam

NAV - RESET then OFF

Drive to VIP site
H = 102 Dist = 0.1
Park H = 270 @ Brg = 282
STOP

CDR-31
EVA-3
11-8-72
LRV RIP
CLOSEOUT

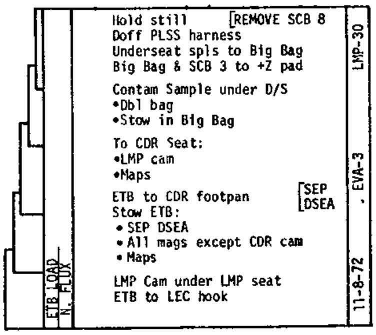

LRV cbs:
- Bus B, D - Open
- Aux CB bypass - ON

LCRU:
- Pwr sw - EXT

Dust:
- TV lens, TV, TCU
- LRV batt covers & open
- LRV batts (if dirty)
- LCRU

Tether brush
LCRU blnkt - 100% Open
Cover LCRU C/D panel with
65% blanket
HGA
Pos LMP cam vert on seat
(CDR underseat)

CDR-32
EVA-3
11-8-72
LRV FINAL
EMU DUST


Hold still [REMOVE SCB 8
Doff PLSS harness
Underseat spls to Big Bag
Big Bag & SCB 3 to +Z pad

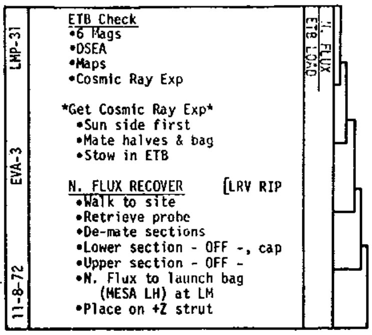
Contam Sample under D/S
- Dbl bag
- Stow in Big Bag

To CDR Seat:
- LMP cam
- Maps

ETB to CDR footpan [SEP DSEA
Stow ETB:
- SEP DSEA
- All mags except CDR cam
- Maps

LMP Cam under LMP seat
ETB to LEC hook

LMP-30
EVA-3
11-8-72
ETB LOAD
N. FLUX


ETB Check
- 6 Mags
- DSEA
- Maps
- Cosmic Ray Exp

Get Cosmic Ray Exp
- Sun side first
- Mate halves & bag
- Stow in ETB

N. FLUX RECOVER [LRV RIP
- Walk to site
- Retrieve probe
- De-mate sections
- Lower section - OFF -, cap
- Upper section - OFF -
- N. Flux to launch bag
  (MESA LH) at LM
- Place on +Z strut

LMP-31
EVA-3
11-8-72
ETB LOAD
N. FLUX

VOICE DATA

EVA 3

6+10

(1) CDR/LMP - Disposition of LRV Samples & FSR's

(1) CDR - SEP Temp _____

RCVR OFF _____

(1) LMP - ETB PACK
- ● MAPS _____
- ● LMP CAM MAG
- ● 4 MAGS _____/_____
_____/_____
_____/_____
_____/_____

(1) CDR - Cosmic Ray collected
MARK _____(Shade)
MARK _____(Sun)

6+20

(1) CDR - LRV Underway
H = 102°
D = 0.1 km
Park H = 270°
Bearing = 282°

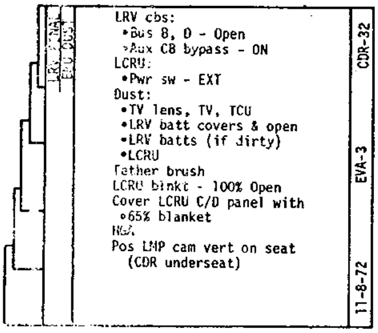
(1) CDR - LRV CB'S OPEN
EXC. Bus A, C & Aux
AUX CB BYPASS - ON
LCRU Mode sw - 3
LCRU Power sw - EXT

6+30

MISSION: APOLLO 17
EVA: 3

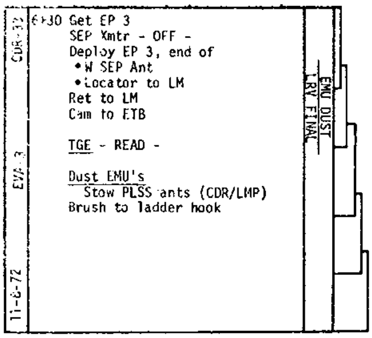
DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
TRANSFER UNDER SEAT SAMPLER TO BIG ROCK BAG	6+10	PLACE TGE ON SURFACE			
		TGE - PRESS 'GRAV'			
HANG BIG BAG TO LADDER HOOK		RETRIEVE COSMIC RAY			
TAKE ETB TO CDR FOOTPAN		COLLECT HALF ON STRUT & THEN HALF ON HINGE - REASSEMBLE			
PACK ETB: • MAPS • MAG FROM LMP CAMERA • MAG FROM 500 CAMERA • 4 MAGS FROM UNDER SEAT • SEP DSEA (LEAVE LMP CAM UNDER CDR SEAT)		BAG COSMIC RAY & PLACE IN ETB OPEN GEOPALLET READ SEP TEMP - RCVR SW - 'OFF'			
		PULL LANYARD & OPEN SEP CASE			
		RELEASE CATCH, DISCONNECT LEAD REMOVE DSEA			
		HAND DSEA TO LMP OR PLACE ON SEAT			
		CLOSE GEOPALLET			
TAKE ETB TO LM, HOOK TO LEC					
WALK OUT TO ALSEP		LRV FINAL DISPOSITION			
		PUT ON CDR CAMERA			
	6+20	MOUNT LRV - RESET NAV			
		FASTEN SEATBELT DRIVE TO V.I.P. SPOT H = 102° DISTANCE = 0.1 KM PARK HEADING = 270° ON BEARING 282°			
CHECK LMS SHIELD FLAT GO TO NFE SITE					
ENGAGE JACK ON NFE ROD		POWER DOWN LRV			
JACK NFE OUT OF GROUND		DISMOUNT LRV			
		LRV CB's - OPEN BUS B & D			
		SW AUX CB BYPASS - 'ON' LCRU POWER SW - 'EXT'			
		ALIGN HGA			
DEMATE 2 SECTIONS	6+30				



LRV cbs:
•Bus B, D - Open
•Aux CB bypass - ON
LCRU:
•Pwr sw - EXT
Dust:
•TV lens, TV, TCU
•LRV batt covers & open
•LRV batts (if dirty)
•LCRU
Tether brush
LCRU blnkt - 100% Open
Cover LCRU C/D panel with
•65% blanket
NGA
Pos LMP cam vert on seat
(CDR underseat)

CDR-32
EVA-3
11-8-72

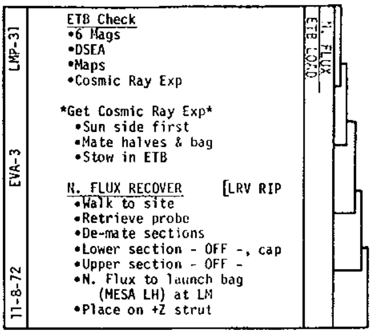


6+30 Get EP 3
SEP Xmtr - OFF -
Deploy EP 3, end of
•W SEP Ant
•Locator to LM
Ret to LM
Cam to ETB

TGE - READ -

Dust EMU's
Stow PLSS ants (CDR/LMP)
Brush to ladder hook

CDR-32
EVA-3
11-8-72

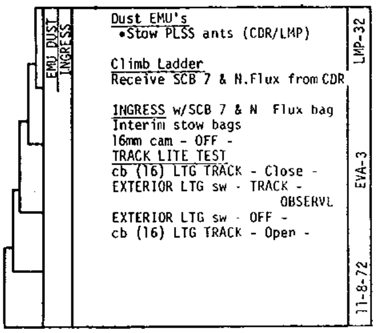


ETB Check
•6 Mags
•DSEA
•Maps
•Cosmic Ray Exp

Get Cosmic Ray Exp
•Sun side first
•Mate halves & bag
•Stow in ETB

N. FLUX RECOVER [LRV RIP
•Walk to site
•Retrieve probe
•De-mate sections
•Lower section - OFF -, cap
•Upper section - OFF -
•N. Flux to launch bag
(MESA LH) at LM
•Place on +Z strut

LMP-31
EVA-3
11-8-72



Dust EMU's
•Stow PLSS ants (CDR/LMP)

Climb Ladder
Receive SCB 7 & N.Flux from CDR

INGRESS w/SCB 7 & N Flux bag
Interim stow bags
16mm cam - OFF -
TRACK LITE TEST
cb (16) LTG TRACK - Close -
EXTERIOR LTG sw - TRACK -
OBSERVE
EXTERIOR LTG sw - OFF -
cb (16) LTG TRACK - Open -

LMP-32
EVA-3
11-8-72

EVA 3

6+30

(1) LMP - NFE lower & upper
Sections - OFF

(1) CDR - Batt covers open
LCRU 100% open
Panel covered
Brush tethered

(1) CDR - Verify Dusting

(1) CDR - EP 3 - "SAFE"

(1) CDR/LMP - EMU Check

	CDR	LMP
02		
FLAGS		
PRESS		
COOL		

(1) CDR - SEP XMTR - OFF

6+40

(1) CDR - EP 3 - "SAFE"
- Pins pulled

(1) CDR - Mag in ETB _____

(1) CDR - TGE Read ___ ___ ___

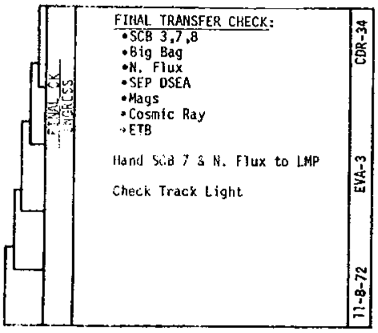
TGE - OFF

6+50

MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

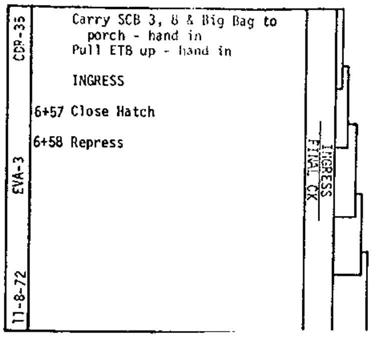
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
GET CAP FROM RACK & TURN LOWER SECTION OFF	6+30	DUST TV, TV LENS, TCU			
SCREW CAP ON LOWER SECTION		DUST LRV BATT COVERS OPEN COVERS			
TURN UPPER SECTION OFF		DUST LRV BATTERIES			
BAG SECTIONS IN THERMAL BAG		DUST LCRU - 100% OPEN TETHER DUST BRUSH			
RETURN TO LM WITH NFE		RIP OFF 65% BLANKET COVER LCRU PANEL			
		PROP LMP CAM WITH LENS STRAIGHT UP			
		GET EP 3 FROM GEOPALLET - VERIFY "SAFE"			
PUT NFE ON MESA TABLE UNSTOW BAG, L SIDE MESA		WALK TO SEP TRANSMITTER			
TRANSFER NFE TO BAG, LEAN BAG AGAINST +Z STRUT					
		SW TRANSMITTER POWER - OFF WALK TO W REEL SEP ANT ARRAY			
	6+40				
POLICE AREA - KICK LOOSE GEAR UNDER LM		DEPLOY EP 3 VERIFY EP "SAFE" PULL 3 PINS (DISCARD) EXTEND EP ANTENNA PLACE EP ON SURFACE PHOTO 7' DNSUN TO LM f11/250			
		RETURN TO LM			
		TAKE MAG OFF CAM			
		INSTALL DARK SLIDE (MESA TABLE) PLACE IN ETB DOFF CAMERA READ TGE			
CLEAN EMU'S ASSIST CDR		CLEAN EMU'S DUST LMP'S EMU			
DUST CDR'S EMU		ASSIST LMP			
STOW PLSS ANTENNAS	6+50	STOW PLSS ANTENNAS			



FINAL TRANSFER CHECK:
- •SCB 3,7,8
- •Big Bag
- •N. Flux
- •SEP DSEA
- •Mags
- •Cosmic Ray
- •ETB

Hand SCB 7 & N. Flux to LMP

Check Track Light

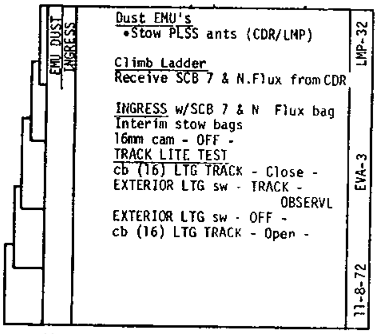


Carry SCB 3, 8 & Big Bag to porch - hand in
Pull ETB up - hand in

INGRESS

6+57 Close Hatch

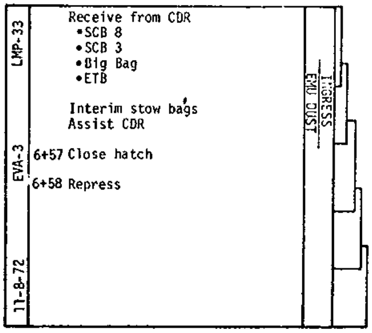
6+58 Repress



Dust EMU's
- •Stow PLSS ants (CDR/LMP)

Climb Ladder
Receive SCB 7 & N.Flux from CDR

INGRESS w/SCB 7 & N Flux bag
Interim stow bags
16mm cam - OFF -
TRACK LITE TEST
cb (16) LTG TRACK - Close -
EXTERIOR LTG sw - TRACK - OBSERVL
EXTERIOR LTG sw - OFF -
cb (16) LTG TRACK - Open -



Receive from CDR
- •SCB 8
- •SCB 3
- •Big Bag
- •ETB

Interim stow bags
Assist CDR

6+57 Close hatch

6+58 Repress

EVA 3

6+50 (1) CDR/LMP - PLSS antennas stowed

TRANSFER LIST:
- SCB 7
- SCB 8
- SCB 3
- SRB
- ETB
- Neutron Flux

(1) LMP - Hatch Closed _____

(1) CDR - Cabin Repress _____

7+00

MISSION: APOLLO 17
EVA: 3

DATE: NOV. 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
INGRESS CLIMB LADDER	6+50	READ TGE TO MCC SHUT OFF TGE			
RECEIVE NFE & SCB 7 FROM CDR		HAND NEUTRON FLUX & SCB 7 TO LMP			
INGRESS WITH NFE & SCB 7					
DO TRACKING LIGHT TEST: CB (16) LTG TRACK - CLOSE - EXTERIOR LTG SW - TRACK - EXTERIOR LTG SW - OFF - CB (16) LTG TRACK - OPEN -		CHECK TRACKING LIGHT ON REPORT TO MCC			
		CLIMB LADDER WITH SCB 3, 8, AND BIG BAG			
RECEIVE & STOW SCB 3, 8, & BIG BAG OUT OF WAY		PASS BAGS TO LMP PULL UP ETB			
RECEIVE & STOW ETB		PASS ETB TO LMP			
ASSIST CDR		DROP LEC & INGRESS			
CLOSE HATCH REPRESS OPERATIONS		CLOSE HATCH REPRESS OPERATIONS			
	7+00				

3.4 SAMPLING

3.4 SAMPLING AND SPECIAL PROCEDURES

At each of the station stops on the traverses planned for Apollo 17, the crew performs certain tasks over and over again. These are sample gathering procedures that have been standardized in crew training, both in field trips and suited procedures practice at KSC and MSC. The nominal procedures are given in the familiar time line format, but the reader should understand that the crew can and will modify these techniques to fit the circumstances and time constraints, in accord with the principal criteria to

(a) Collect samples representative of the different materials and geological formations present at the site.

(b) Provide sufficient photographic documentation, description, and location data to permit after flight analysis to reconstruct the geological setting of the sample -- a sample without a context has lost much of its value.

(c) Protect these samples for return to earth.

The timelines following are based on Apollo 16 actual times. These tasks are summarized in Table 3.4-1.

The main EVA time lines of sections 3.1, 3.2, and 3.3 simply list these repetitive sampling tasks. The actual procedures for them are to be found in this section.

TABLE 3.4-1

SAMPLING AND SPECIAL PROCEDURES TASK TIMES

TASK	APOLLO 16 ACTUAL
1. GEOLOGICAL DESCRIPTION (BEFORE TASKS BEGUN)	5 MINUTES
2. EXPLORATORY TRENCH (DIG ONLY)	3
3. RAKE SAMPLE (WITH SOIL)	8
4. DOCUMENTED SAMPLE	3
5. SINGLE CORE SAMPLE	5
6. DOUBLE CORE SAMPLE	11
7. CSVC (WITH SINGLE CORE)	9

MISSION: APOLLO 17 DATE: SEPT 1972

1. OBSERVATIONS

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	0	DESCRIBE STATION AREA • GEOLOGICAL SETTING & FEATURES • SIGNIFICANT FORMATIONS • OBJECTS OF INTEREST			
	↔				
		TAKE PHOTOS (STEREO PRS XSUN PREFERRED) TO DOCUMENT AREA			
		TAKE FLIGHT-LINE* & VERTICAL PARTIAL PANORAMAS AS REQUIRED			
	5				
	10				

MISSION: APOLLO 17 DATE: SEPT 1972

2. EXPLORATORY TRENCH

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
TAKE LOCATOR PHOTO LRV IN BKGND XSUN f8, 1/250, 15 FT	0	SELECT AREA TO BE SAMPLED - PLACE GNOMON			
USE SCOOP, DIG TRENCH 3-8 IN. DEEP 20° OFF SUNLINE					
TAKE AFTER PHOTO DNSUN f11, 1/250, 11 FT		TAKE AFTER PHOTOS STEREO PR X-SUN f8, 1/250, 7 FT			
IF SAMPLES TAKEN:* USING SCOOP COLLECT SOIL SAMPLES FROM INSIDE TRENCH & SURFACE		IF SAMPLES TAKEN:* GET SAMPLE BAGS, REPORT NO'S, HOLD BAGS FOR OTHER TO FILL			
	5				
*SAMPLE DOCUMENTATION ADAPTATION OF STANDARD DOC. SAMPLE PROCEDURE - i.e. NO LOCATOR, "BEFORE" SHOTS LIMITED TO 1 OR 2.					
	10				

MISSION:APOLLO 17 DATE:SEPT 1972

3. RAKE SAMPLE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
	0	SELECT AREA FOR OPTIMUM ROCK DISTRIBUTION & PLACE GNOMON			
REMOVE RAKE/XT HANDLE FROM LRV		DESCRIBE AREA; RELATE TO SURROUNDING TERRAIN			
HAND RAKE TO CDR					
TAKE BEFORE PHOTO DNSUN f11, 1/250, 11ft		TAKE XSUN STEREO PR f8, 1/250, 7ft			
MAKE READY SAMPLE BAG, REPORT NUMBER HOLD BAG FOR CDR TO FILL		USE RAKE; COLLECT 1 KG OF ROCKS 3/8" TO 1 1/2 " DIA (~ 1 SAMPLE BAG FULL)			
CLOSE & SEAL SAMPLE BAG STOW IN SCB (CDR PLSS)					
COLLECT 1 KG FINES (1 BAG FULL) PRISTINE AREA		GET SAMPLE BAG READY, REPORT NUMBER HOLD FOR LMP TO FILL			
	5				
TAKE LOCATOR SHOT, LRV OR LANDMARK IN BKGROUND f8, 1/250, 15 ft (focus 74)		CLOSE SAMPLE BAG, SEAL & STOW IN SCB (LMP PLSS)			
STOW RAKE BACK ON LRV		TAKE AFTERSHOT, X-SUN f8, 1/250, 7 ft			

MISSION: APOLLO 17 DATE: SEPT 1972

EVA: 4. SINGLE SAMPLE DOCUMENTATION

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LRV TV	TASK FUNCTION	
				LMP	CDR
Describe sample	0	Describe sample & place gnomon down-sun with pointer leg at sample & color chart at 45° to sun		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
Take down-sun photo at f11, 1/250, 11 ft		Take stereo pair X-sun at f8, 1/250, 7 ft			
Prepare sample bag (id reqd) & report bag number		Collect sample			
Seal sample bag and place in collection bag		Take X-sun after photo f8, 1/250, 7 ft			
*Take locator photo using LRV in background X-sun at f8, 1/250, 15 ft		Describe area of sample			
NOTE: Locator photo may be taken before sampling		Pick up gnomon			
Proceed to next sample	5	Proceed to next sample			
*This locator photo procedure assumes that a panorama is taken at each sampling site, showing the position of the LRV. This photo may consist of LMP's turning in place after his down-sun "before" photo to take the locator of the LRV					

MISSION: APOLLO 17
EVA: 5. CORE TUBE SAMPLE

DATE: SEPT 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
Remove core tube from CDR's sample bag	0	Place gnomon nearby		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
Assemble core tube/ext handle - report number		Remove hammer from LMP PLSS tool carrier			
Hold core tube upright on surface and press into surface by hand		Take stereo pair X-sun f8, 1/250, 7 ft			
Drive tube into surface (comment on difficulty)		Photo tube & LRV f8, 1/250, 15 ft (locator)			
Remove core from surface					
Assist CDR		Obtain core tube cap from LMP PLSS & cap tube Remove core tube from ext hndl Pull follower pin			
Get extension handle from CDR & install scoop		Get core tube tool & seat core follower against core			
		Stow core in collection bag stow core tube tool & hammer			
Proceed to next sample	5	Pick up gnomon			
		Proceed to next sample			

NOTE: Double core tube procedures are similar to the above except that the cap of the lower tube must be removed to mate the lower tube to the upper tube. The caps are replaced when the tubes are disassembled and the follower on each tube is seated with tool. The double core is rammed as a unit before the tubes are disassembled. A double core requires an additional six minutes.

MISSION: APOLLO 17 DATE: SEPT 1972

6. PHOTO POLARIMETRIC SURVEY

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION	
				LMP	CDR
Install polar filter on camera (Verify on camera)	0				
Assume a position X-sun from distant feature to be photographed					
Reset camera f5.6, 1/125, 74 ft					
Take 3 4-photo partial pans: f5.6, 1/125, 74 ft, Filter L* f5.6, 1/125, 74 ft, Filter C f5.6, 1/125, 74 ft, Filter R					
Move down-sun from first position					
Take 3 4-photo partial pans: f5.6, 1/125, 74 ft, Filter R* f5.6, 1/125, 74 ft, Filter C f5.6, 1/125, 74 ft, Filter L					
	10				
	20				

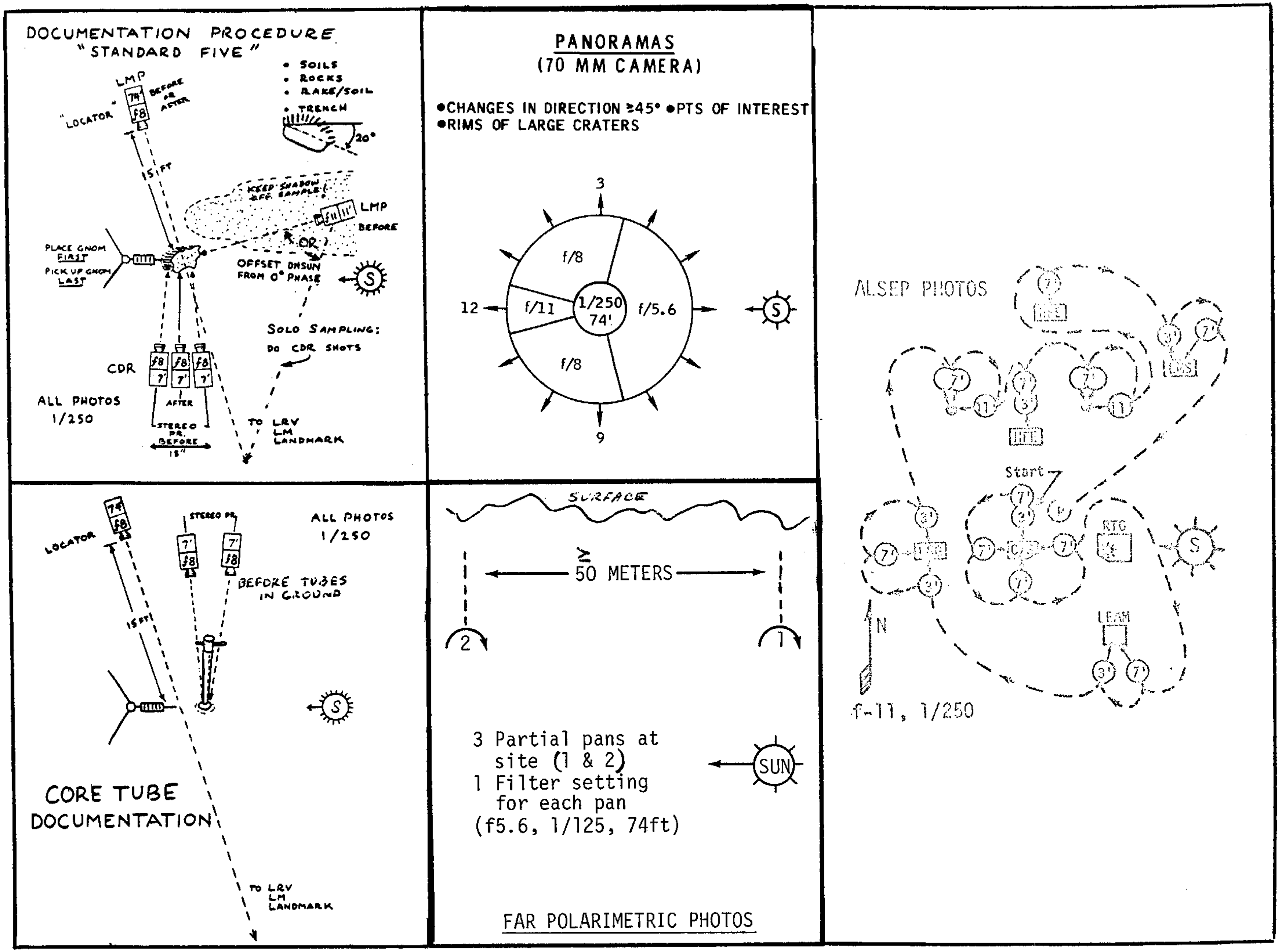
3.5 PHOTOGRAPHY

3.5 PHOTOGRAPHY DATA

Figure 3.5-1 summarizes the various kinds of photographic routines the crew goes through in the course of their lunar surface operations.

The photographic techniques utilized for documented samples and for documenting core tube samples are very similar to those used in Apollo 16. That is, for a documented sample, the CDR takes a cross-sun stereo pair from 7 feet before sampling while the LMP takes a down-sun photo from 11 feet. The CDR then takes an after photo cross-sun from 7 feet and the LMP takes a cross-sun location photo from 15 feet with the LRV in the background. This procedure assumes that a photo panorama is taken at each science site, showing the position of the LRV. To document a core tube sample, a cross-sun stereo pair from 7 feet and a location photograph from 15 feet will be taken after the core tube is embedded in the surface.

The diagram depicting ALSEP layout documentation shows the path the LMP follows to carry out this task.



DOCUMENTATION PROCEDURE "STANDARD FIVE"

- SOILS
- ROCKS
- RAKE/SOIL
- TRENCH

ALL PHOTOS 1/250

SOLO SAMPLING: DO CDR SHOTS

PANORAMAS (70 MM CAMERA)

- CHANGES IN DIRECTION ≥45°
- PTS OF INTEREST
- RIMS OF LARGE CRATERS

ALSEP PHOTOS

f-11, 1/250

CORE TUBE DOCUMENTATION

ALL PHOTOS 1/250

FAR POLARIMETRIC PHOTOS

3 Partial pans at site (1 & 2)
1 Filter setting for each pan
(f5.6, 1/125, 74ft)

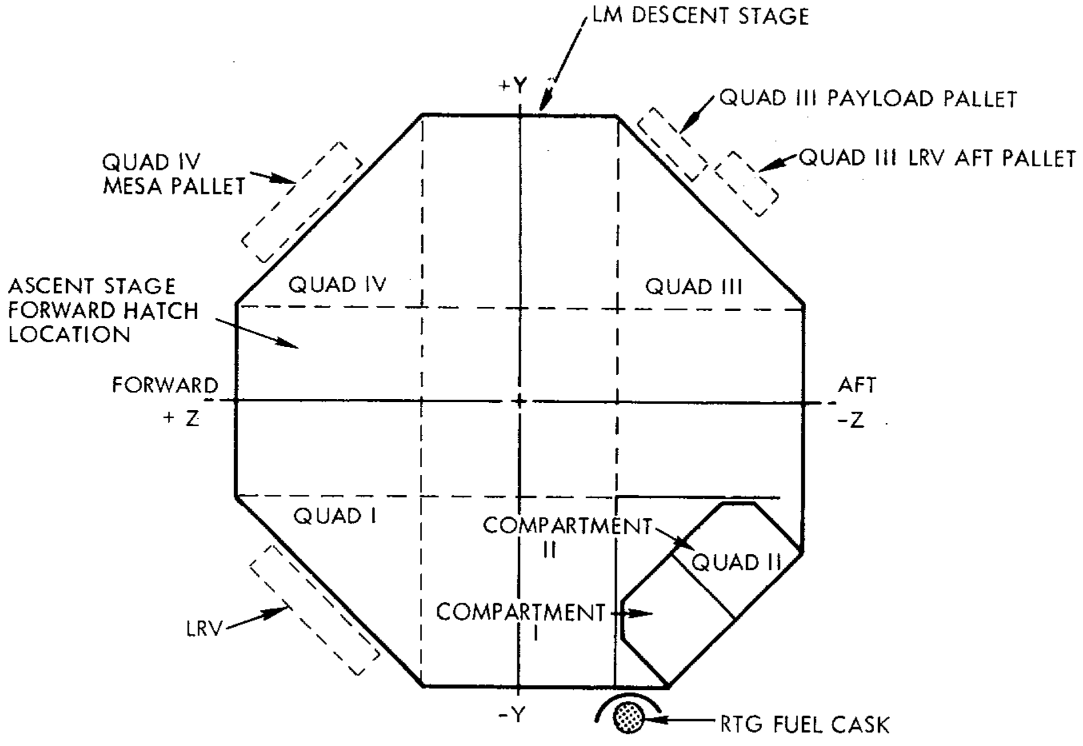
Figure 3.5-1 Lunar Surface Photo Data

3.6 EXPERIMENTS

3.6 LUNAR SURFACE EXPERIMENTS - DEPLOYMENT & EQUIPMENT DATA

Figure 3.6-1 illustrates the LM Descent Stage stowage locations for the lunar surface scientific equipment. Detailed data on ALSEP experiments is contained in Section 3.6.1. The astrophysical experiments (Cosmic Ray and neutron flux) and the geophysical experiments (Traverse Gravimeter and Surface Electrical Properties) are contained in section 3.6.2.

Other lunar surface equipment is discussed and described in Section 3.6.3.



QUAD I
- LUNAR ROVING VEHICLE

QUAD II SEQ BAY
- APOLLO 17 ALSEP
  - SUBPACKAGE NO. 1
  - SUBPACKAGE NO. 2

QUAD III PAYLOAD PALLET
- SURFACE ELECTRICAL PROPERTIES EXPERIMENT
- LUNAR SEISMIC PROFILING CHARGES

QUAD IV MESA PALLET
- LUNAR SURFACE DRILL ASSEMBLY
- LUNAR NEUTRON PROBE
- LUNAR SURFACE ELECTRIC HASSELBLAD CAMERA
- CAMERA ACCESSORIES
- GROUND-COMMANDED TV CAMERA, CONTROL UNIT, AND ACCESSORIES
- SAMPLE RETURN CONTAINERS (2)
- LUNAR SURFACE RAKE
- SAMPLE CONTAINMENT BAGS (6)
- Sample Return Bag

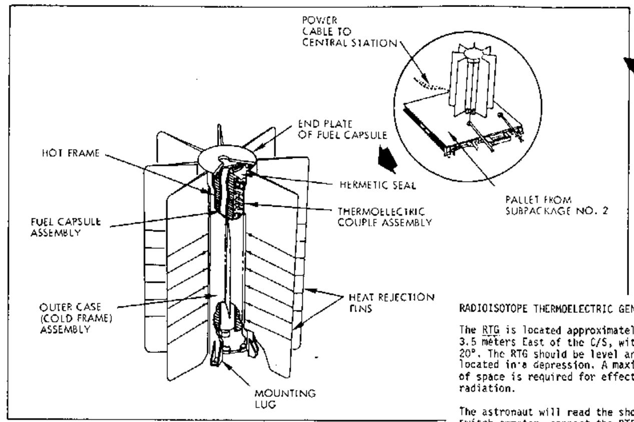
QUAD III LRV AFT PALLET
- LARGE SAMPLING SCOOP
- GNOMON/COLOR PATCH
- HAMMER
- 32-INCH TONGS (2)
- TOOL EXTENSION HANDLE (2)
- LUNAR GRAVITY TRAVERSE EXPERIMENT
- LRV SAMPLER
- SAMPLE COLLECTION BAGS (2)
- EXTRA SAMPLE COLLECTION BAGS (4)

Figure 3.6-1 LM DESCENT STAGE STOWAGE OF SCIENTIFIC GEAR

3.6.1 ALSEP Deployment And Equipment Data

The ALSEP deployment site is selected in a location not less than 100 meters due West of the LM such that the LM ascent engine blast will not create a dust cloud or otherwise disturb the deployed experiments. The ALSEP site should be fairly level and relatively free of boulders and craters which may interface with nominal deployment procedures or thermal characteristics. The experiments and central station should not be deployed in a shadow, near a large boulder nor in a crater. Pertinent ALSEP experiment deployment data is summarized in Figure 3.6-2.

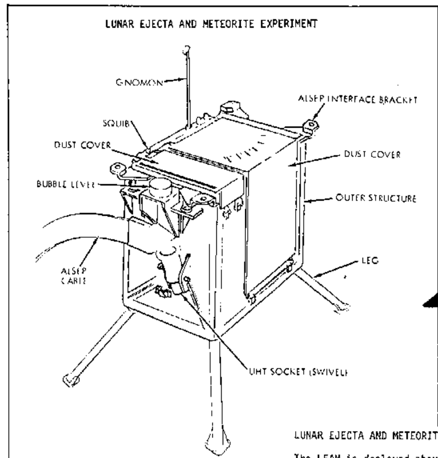
The deployment layout is shown in Figure 3.6-3.



RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG)

The RTG is located approximately 3 to 3.5 meters East of the C/S, within ± 20°. The RTG should be level and not located in a depression. A maximum view of space is required for effective heat radiation.

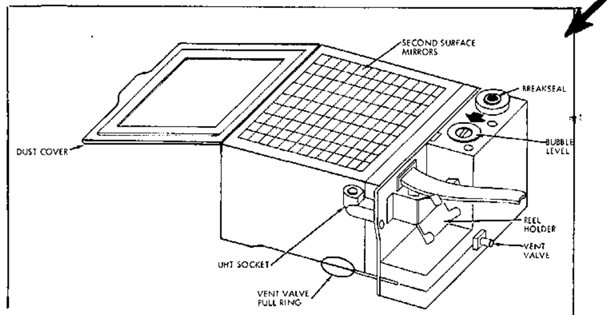
The astronaut will read the shorting switch ammeter, connect the RTG to the C/S, and actuate the switch at the proper time.



LUNAR EJECTA AND METEORITE EXPERIMENT (LEAM)

The LEAM is deployed about 8 meters Southeast of the C/S. No objects 10° or higher in any azimuth direction from Up sensor on top. East and West sensors require free 120° field of view with look angle of East sensor aligned 20° North of East.

LEAM is leveled within ±5° with bubble, and aligned by means of a gnomon and compass rose to within 5° of the sunline. The actual alignment reading is reported to MCC.

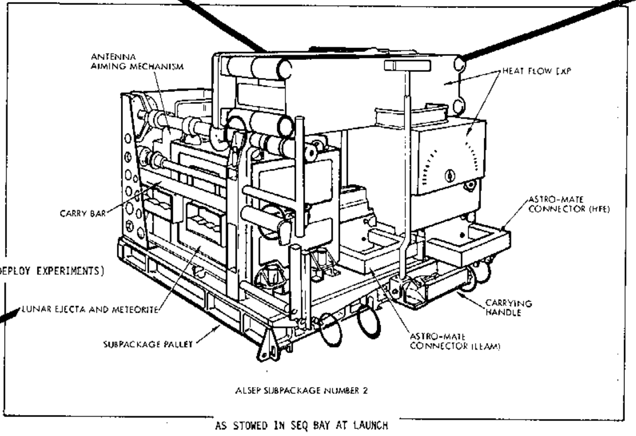


LUNAR MASS SPECTROMETER DEPLOYED

LUNAR ATMOSPHERIC COMPOSITION (LAC)
OR
LUNAR MASS SPECTROMETER (LMS)

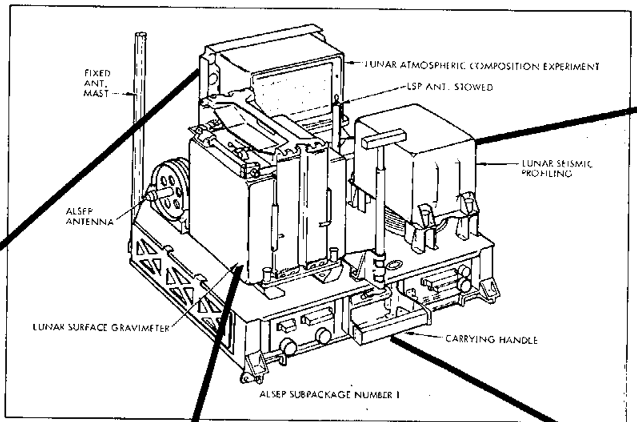
The LMS is deployed 14 meters or more East-northeast of C/S. Boulders or ridges should not be in the plane of the aperture within 15 meters.

Cable exit should be toward C/S, and the device should be leveled to within 15 degrees by bubble.



ALSEP SUBPACKAGE NUMBER 2

AS STOWED IN SEQ BAY AT LAUNCH

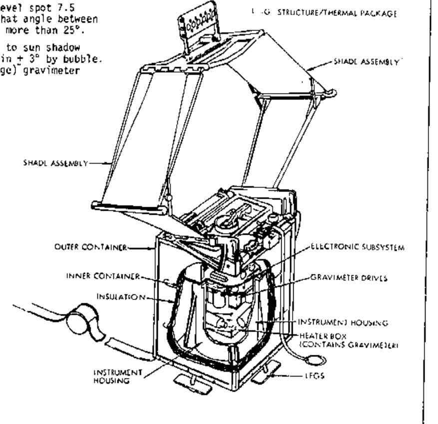


ALSEP SUBPACKAGE NUMBER 1

LUNAR SURFACE GRAVIMETER (LSG)

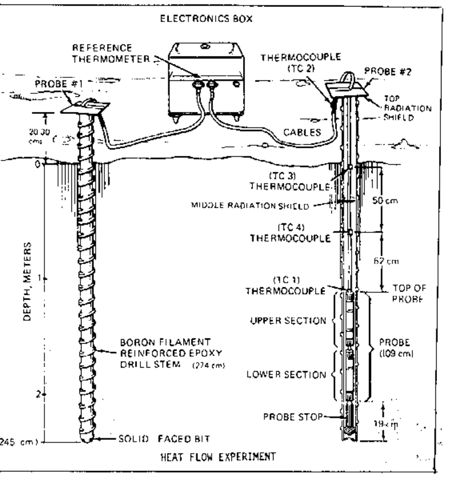
The LSG is deployed on a level spot 7.5 meters West of C/S, such that angle between LSG and LSPE antenna cable more than 25°.

Plane of sunshade parallel to sun shadow within ± 3°, leveled within ± 3° by bubble. Crewman must release (uncage) gravimeter gimbal by pulling lanyard.



HEAT FLOW EXPERIMENT (HFE)

The HFE is deployed 8 to 10 meters North of C/S, and aligned within ± 5° of the plane of the ecliptic using the UHT as a gnomon, and leveled within 5° using a bubble level. The HFE probes are deployed 5 to 6 meters from the electronics package and a minimum of 12 meters from the RTG. The HFE probe holes are drilled with the Apollo Lunar Surface Drill (ALSD) within 15° of vertical and should be 3 or more diameters from boulders more than 1 meter across, 1.5 diameter from rims of fresh craters more than 1 meter across.



HEAT FLOW EXPERIMENT

LUNAR SEISMIC PROFILING EXPERIMENT (LSPE)

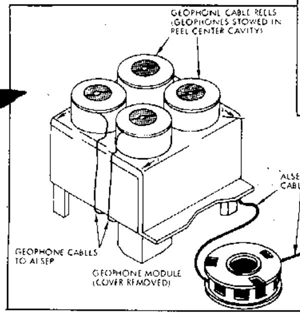
LSPE Geophone deployment calls for a T-array with the geophone module (terminal box) some 9 meters South of the C/S.

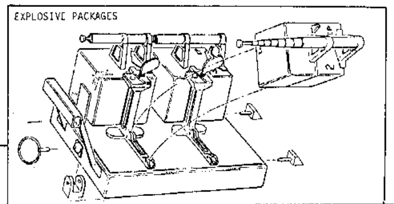
Alignment of arms of the array is within ± 3° determined by sighting along markers flags at each geophone. See Fig. 3.6-3 for array distances.

Each geophone to be vertical within 7 degrees. Complete loss of data occurs if geophone off vertical by 15° or more.

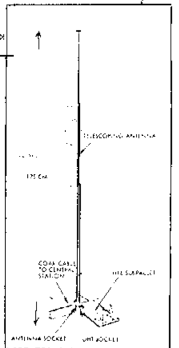
LSPE Antenna is deployed on discarded HFE launch pallet 12 meters NW of C/S. Antenna is extended to 2 meter height.

LSPE Explosive Package (EP) deployment is covered in the Traverse sections of this Document.





LUNAR SEISMIC PROFILING EXPERIMENT

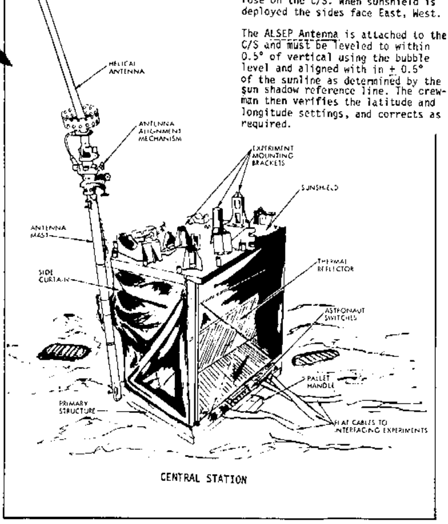


LSPE TRANSMITTING ANTENNA

CENTRAL STATION (C/S)

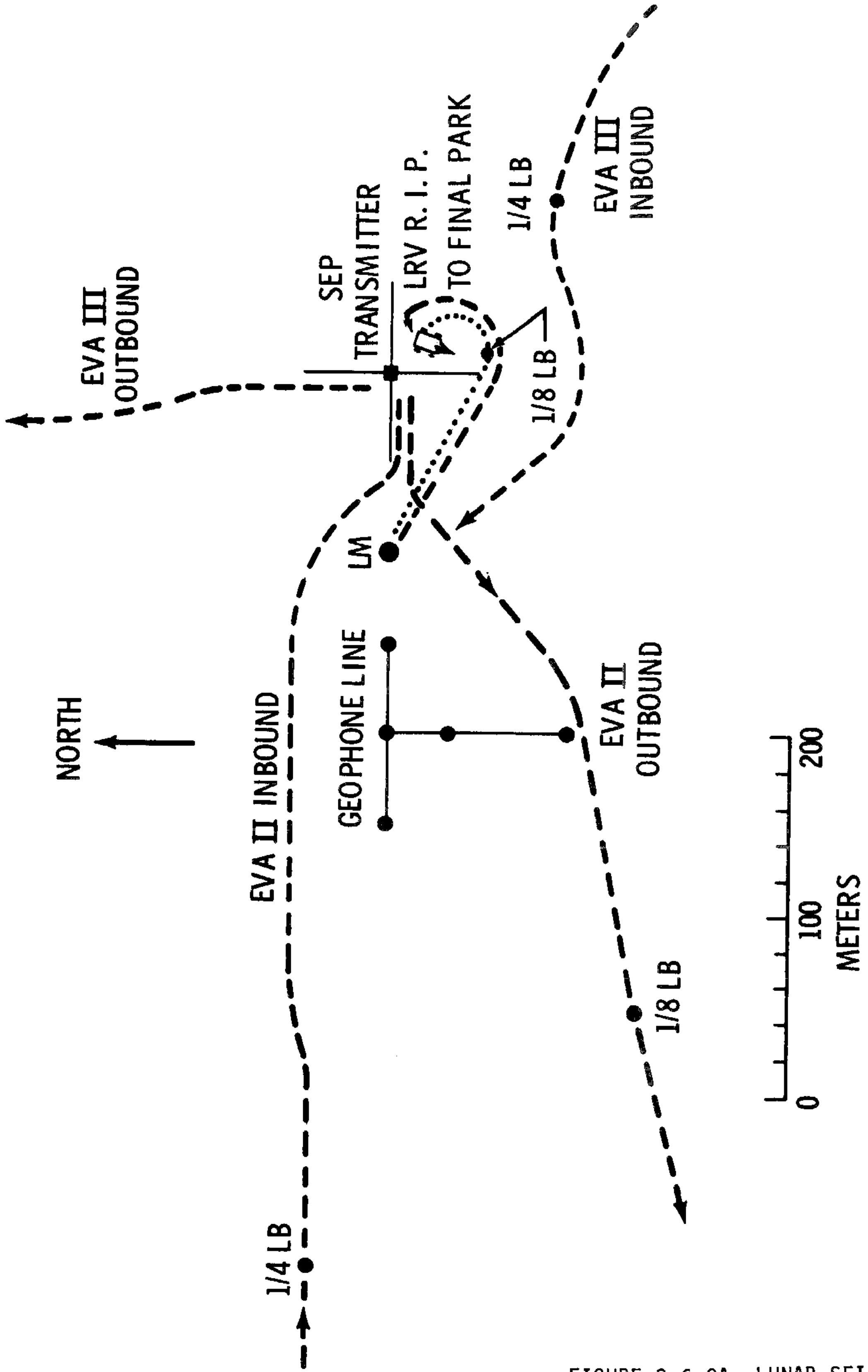
The Central Station is deployed East of the RTG, leveled within 5° of vertical using bubble level and aligned within ± 5° of East - West using a gnomon and a partial compass rose on the C/S. When sunshield is deployed the sides face East, West.

The ALSEP Antenna is attached to the C/S and must be leveled to within 0.5° of vertical using the bubble level and aligned with in ± 0.5° of the sunline as determined by the sun shadow reference line. The crewman then verifies the latitude and longitude settings, and corrects as required.

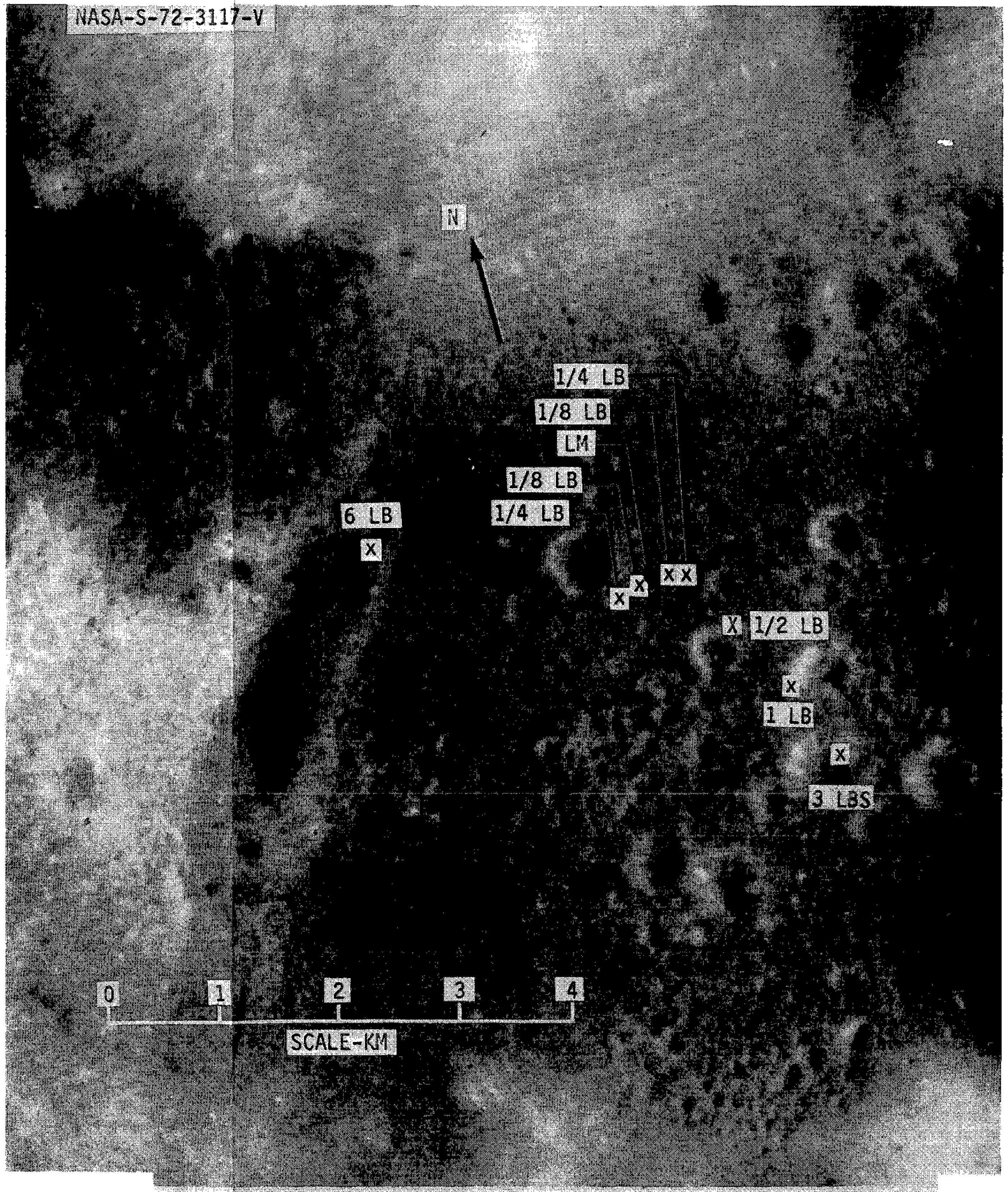


CENTRAL STATION

FIGURE 3.6-2 ALSEP DEPLOYMENT DATA



Detail of LSPE Charge Deployment Plan in LM Area.



Location of Lunar Seismic Profiling Experiment explosive charges.

FIGURE 3.6-2A LUNAR SEISMIC PROFILING EXPERIMENT EXPLOSIVE CHARGE DEPLOYMENT

LSPE EP DETONATION PLAN

EP NUMBER	TRANSPORT MODULE NO.	EP CHARGE SIZE-POUNDS	DEPLOYMENT DISTANCE - KILOMETERS FROM NEAREST GEOPHONES			NOMINAL DEPLOYMENT TIME - HR: MIN		DETONATION TIME*	
			MAX.	MIN.	PLAN.	EVA	EVA TIME	AFTER DEPLOYMENT - HOURS: MIN.	AFTER LM LIFTOFF - HOURS: MIN.
6	2	1	1.3	0.9	1.3	1	4:20	90:45	23:42
5	2	3	2.4	2.0	2.3	1	5:31	91:45	25:53
7	2	1/2	0.9	0.7	.8	1	5:50	92:45	27:12
4	2	1/8	0.2	TBD	.2	2	:57	90:45	42:49
1	1	6	2.7	2.1	2.4	2	5:17	91:45	48:09
8	1	1/4	.38	.20	.25	2	6:12	93:45	51:04
2	1	1/4	.38	.20	.25	3	5:59	92:45	73:21
3	1	1/8	0.2	TBD	.2	3 (after park at	6:40 LRV V.I.P.)	93:45	75:02

Note: The times given above are based on the following planned Mission Event GET times:

Landing	113:02
Start EVA 1	116:40
Start EVA 2	139:10
Start EVA 3	162:40
LM Liftoff	188:03
TEI	236:40

*Based on nominal timer; specification allows ± 27 minutes tolerance.

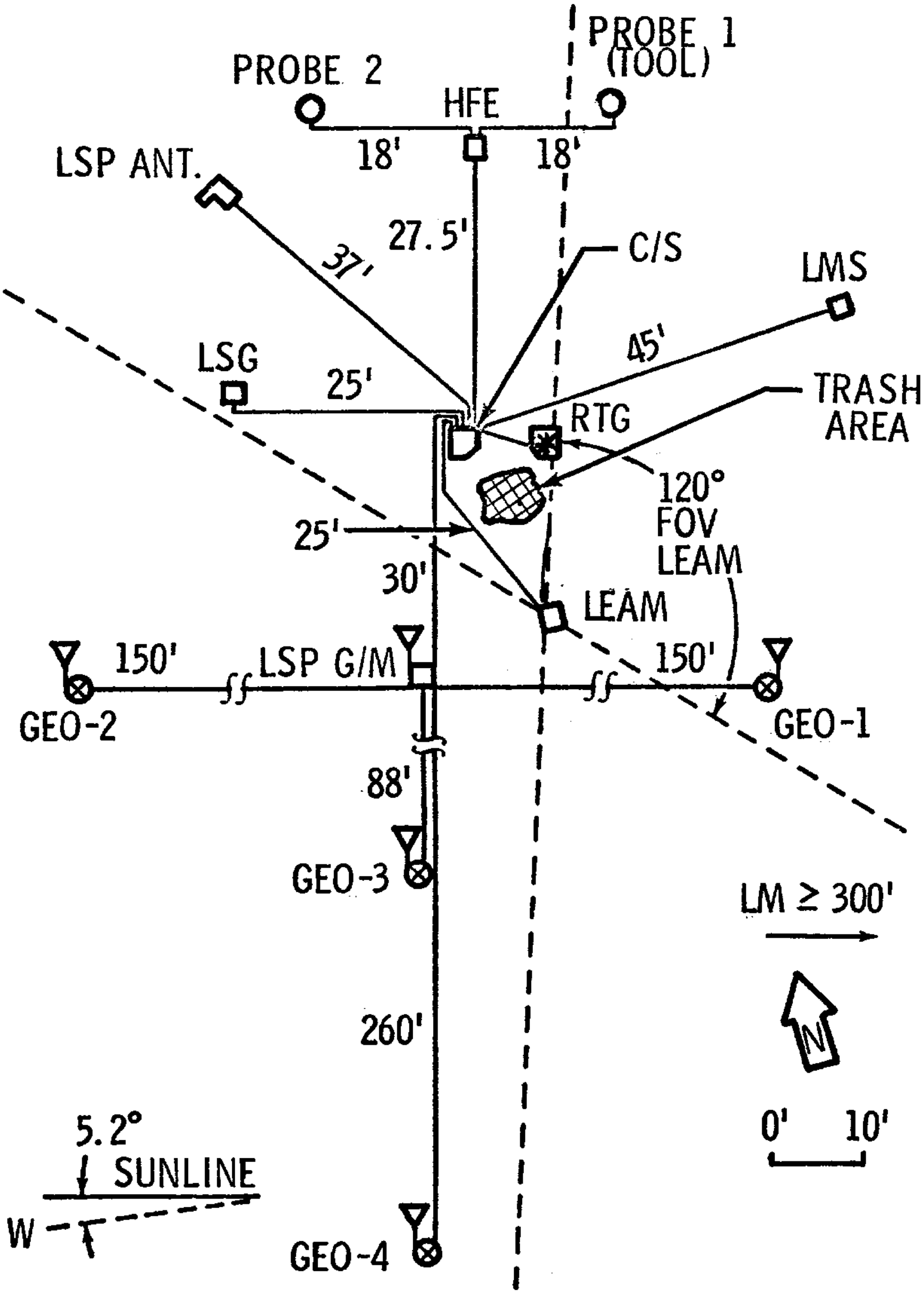
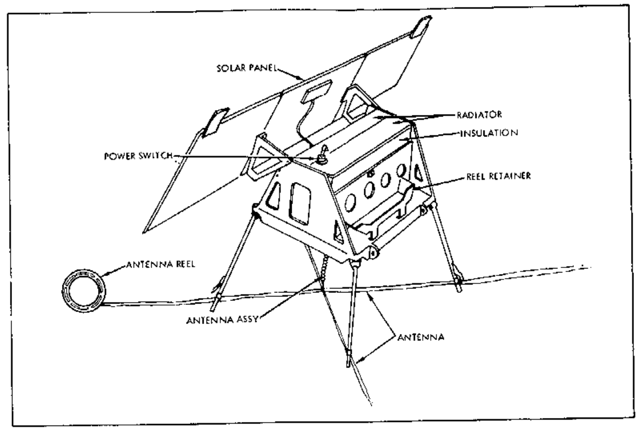
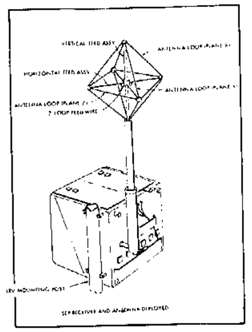


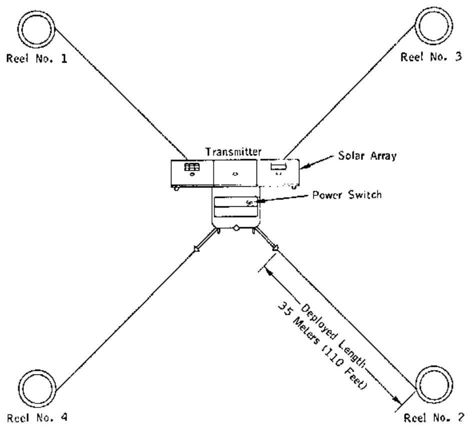
Figure 3.6-3 APOLLO 17 ALSEP DEPLOYMENT

3.6.2 Astrophysical and Geophysical Equipment Data

Figure 3.6-4 depicts the experiments in this category and includes a brief description of the experiment, as well as general constraints.







SURFACE ELECTRICAL PROPERTIES (SEP)

The SEP obtains data about the rf energy transmission, absorption, and reflection characteristics of the lunar surface and subsurface for use in modelling the upper layers of the moon. The presence of water, and the in situ electrical properties of lunar material are also studied.

SEP TRANSMITTER

Stowed on an equipment pallet, Quad III. Has X-array orthogonal dipole antennae. SEP uses 6 frequencies from 1 to 32 MHz, with a power of 2 - 3.75 watts. Lifetime is 66 hours in ON position, 57 hours in STANDBY (sun away from solar array)

X-array is deployed to four cardinal points of compass--N,E,S,W.

SEP RECEIVER

Stowed on an equipment pallet,Quad III. Receiver is mounted on back of LRV between geopallet and LMP seat.

SEP receiver is high gain superheterodyne unit which outputs an audio signal to a tape recorder. Battery life is 116 watt-hrs at 12vdc. Heat rejection by optical solar reflector (OSR).

Unit is turned on EVA 2, placed in STANDBY at station stops longer than 30 minutes.

At end of EVA 3, tape recorder recovered and returned to earth.

TRAVERSE GRV

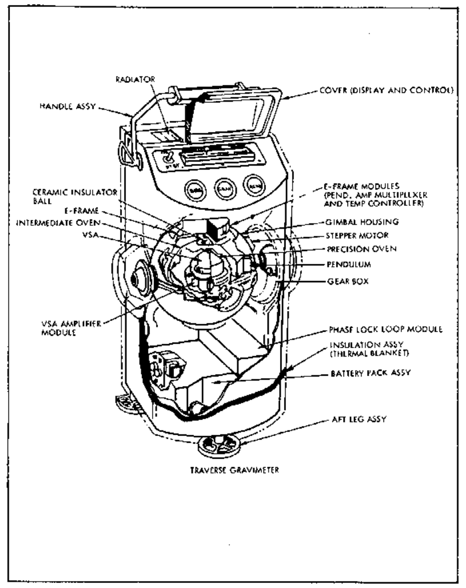
TRAVERSE GRAVIMETER EXPERIMENT (TGE)

The TGE makes a survey of the general landing site gravitational characteristics, relative to the value at the LM. The TGE will also provide data on the relative value of gravity at a known place on the moon and on the earth to establish the relationship between the two.

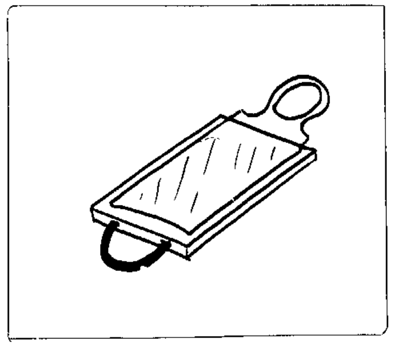
The TGE uses a Vibrating String Accelerometer (VSA) as a sensor. It can measure in two modes --GRAV or normal, or BIAS or inverted.

The TGE rides on the back of the LRV, on the Geopallet. A measurement is made at each station on all three EVA's, plus baseline measurements at the LM (two are off-LRV BIAS + GRAV).

The TGE's automatic sequence includes self-leveling (1st 30 sec. of cycle) then 1 to 2 minutes measurement time. The TGE outputs to a digital readout section which stores the data until convenient for a crewman to read it. The TGE must be left undisturbed during its operating cycle.



TRAVERSE GRAVIMETER



COSMIC RAY EXPERIMENT

The Cosmic Ray Experiment is a small device stowed in the ascent stage at launch. The unit consists of two parts which fit together. One part goes in shade of LM and samples deep space, the other is in full sun, and gathers data on the solar wind, and other solar particles.

NEUTRON FLUX EXPERIMENT (NFE)

This experiment measures rates of neutron capture as function of depth of track in surface, also measures energy spectra.

The astronaut moves a control on each section to uncover the capture surfaces. He joins the two halves together, and inserts NFE down hole left by core drilling.

Minimum exposure time is 24 hours. Minimum separation from RTG is 25 meters. The NFE must be thermally protected to keep temperature below 70° C. Desired depth is 2 meters.

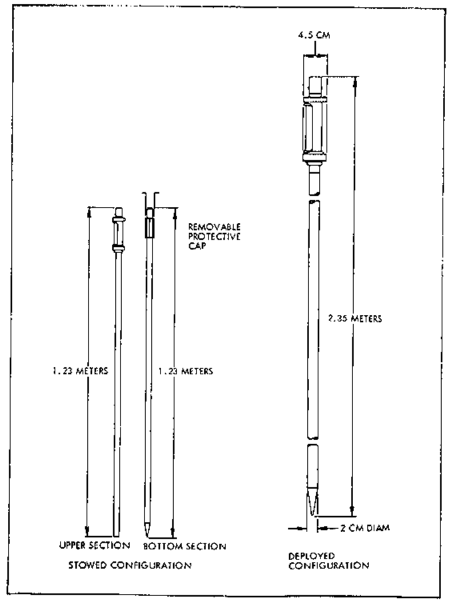


FIGURE 3.6-4 ASTROPHYSICAL & GEOPHYSICAL EXPERIMENTS

3.6.3 Other Lunar Surface Equipment

The illustration in Figure 3.6-5 summarizes the lunar surface geology equipment and supporting gear. Those items marked (*) are normally stowed on the LMP'S tool harness although they can also be stowed in the areas shown. Figure 3.6-6 has some larger sketches of geological equipment. These units are the same as those used on Apollo 16.

Figure 3.6-7 and -8 depict the Deep Core taken with the Apollo Lunar Surface Drill. Figure 3.6-9 and -10 illustrate the contents of each Sample Return Container.

Finally, Figure 3.6-11 shows what the well-dressed Lunar Surface Astronaut will wear on Apollo 17.

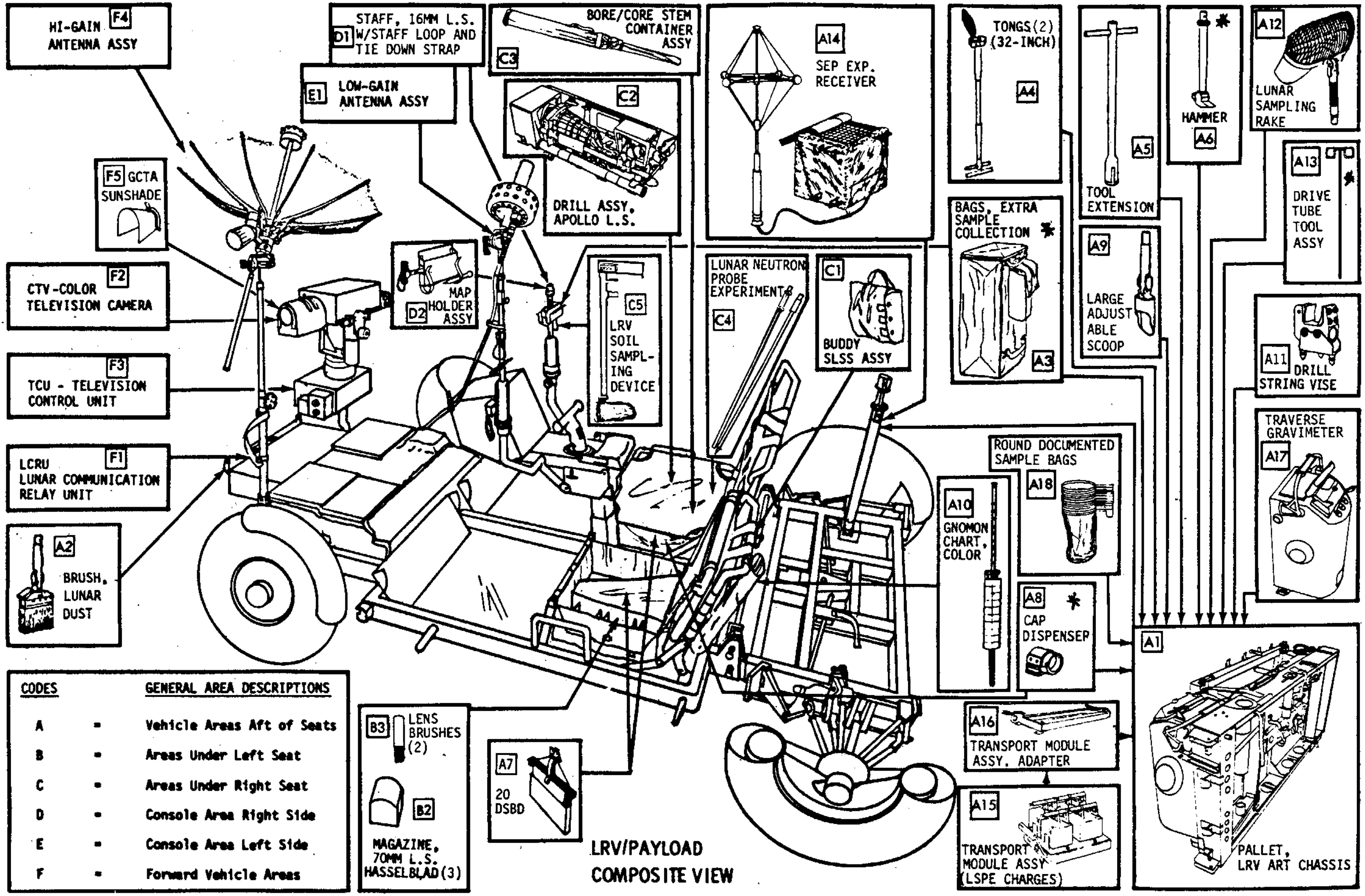


FIGURE 3.6-5 LUNAR FIELD GEOLOGY EQUIPMENT STOWAGE ON LRV

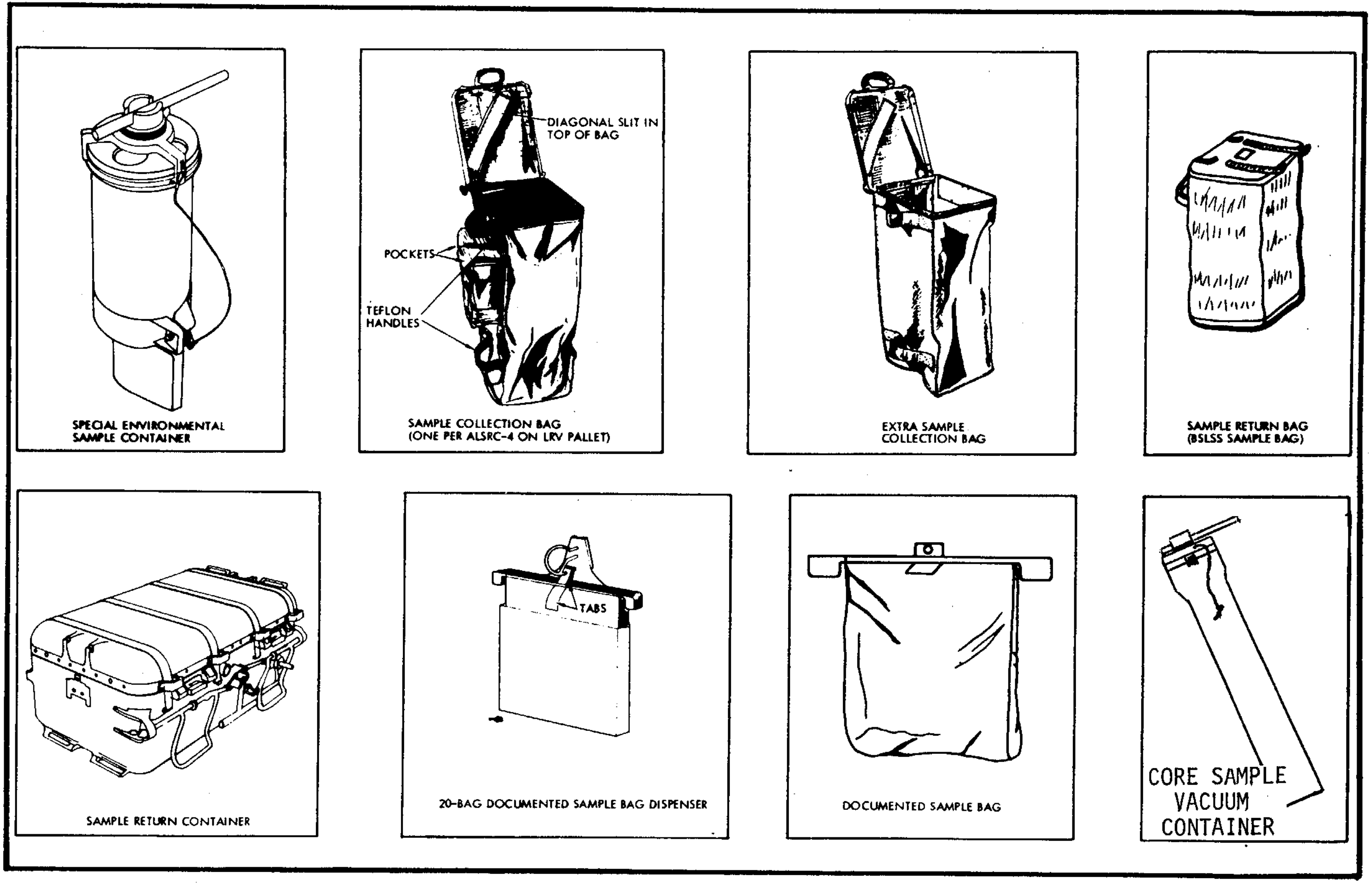


FIGURE 3.6-6 LUNAR GEOLOGY SAMPLE CONTAINERS

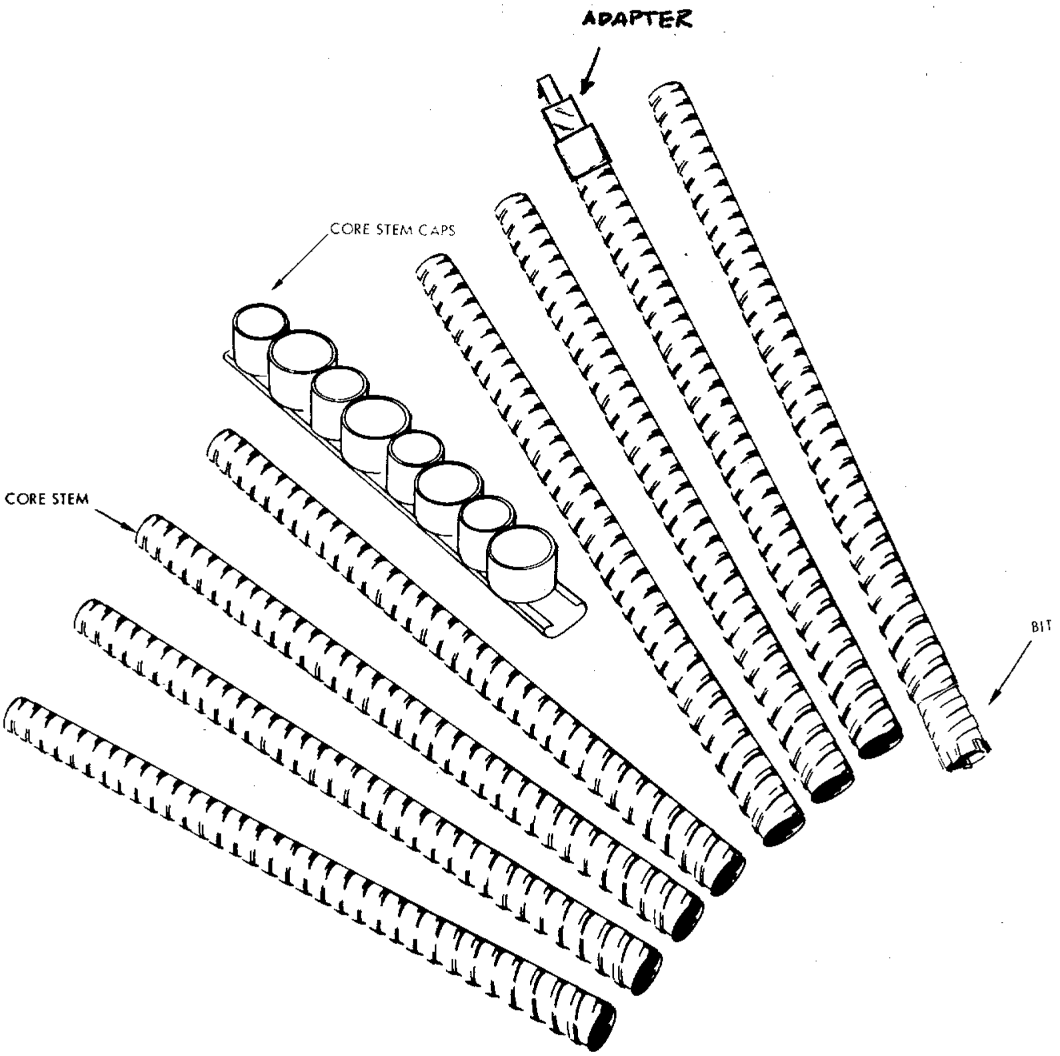


FIGURE 3.6-7 LUNAR SURFACE DRILL CORE STEMS & CAPS

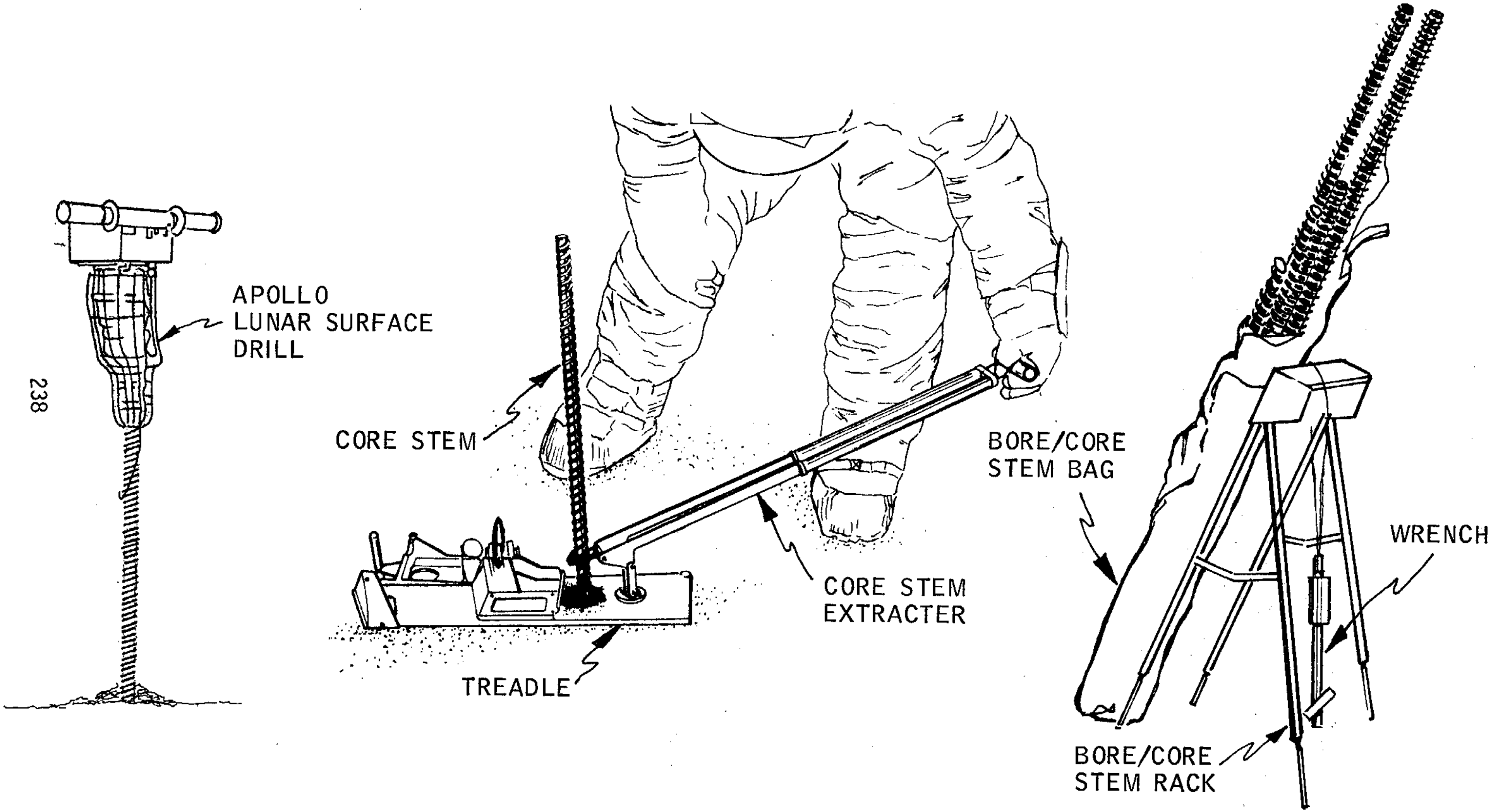


FIGURE 3.6-8 LUNAR SURFACE BORING & CORING HARDWARE

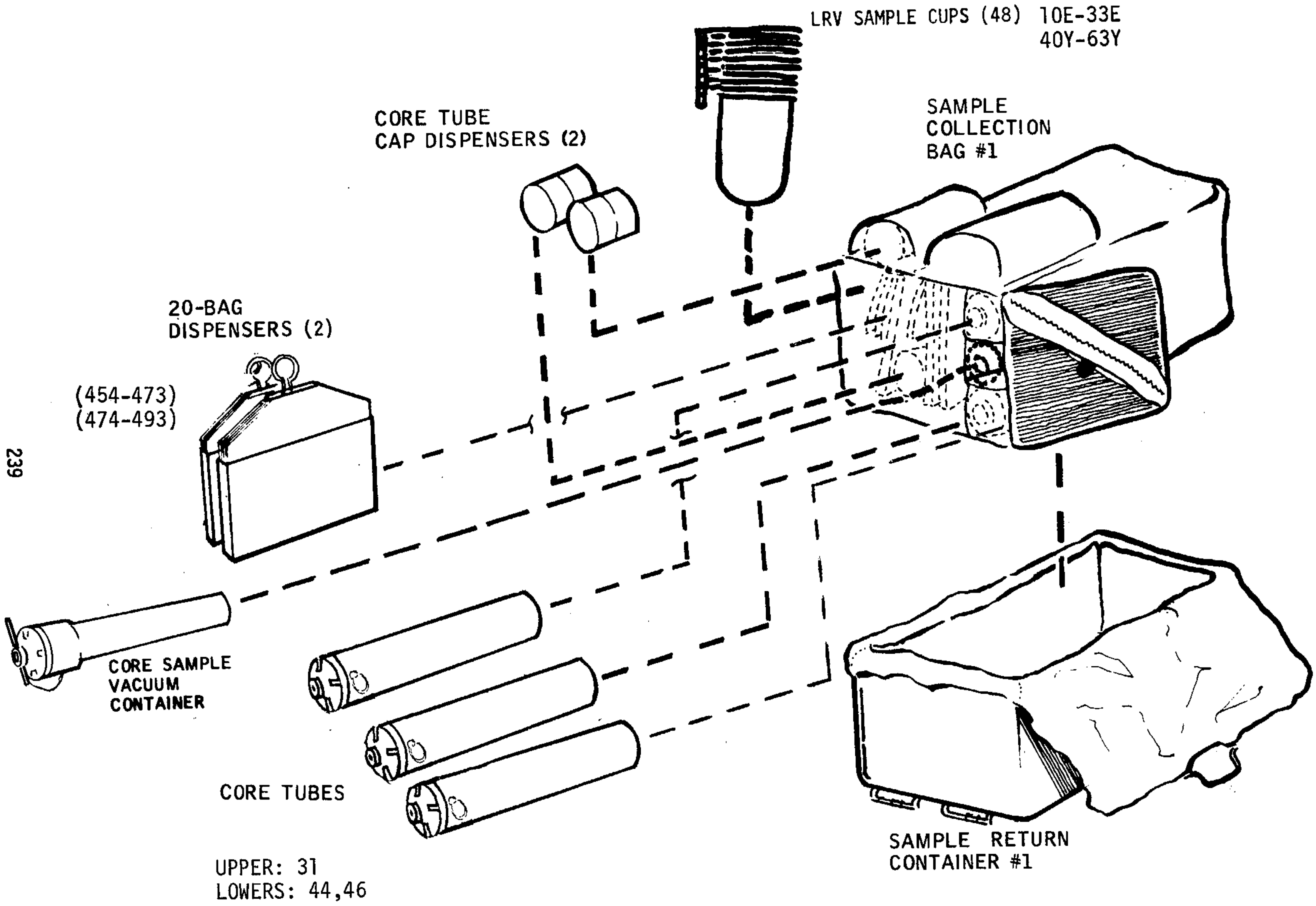


FIGURE 3.6-9 GEOLOGY SAMPLING ITEMS STOWED IN SRC # 1

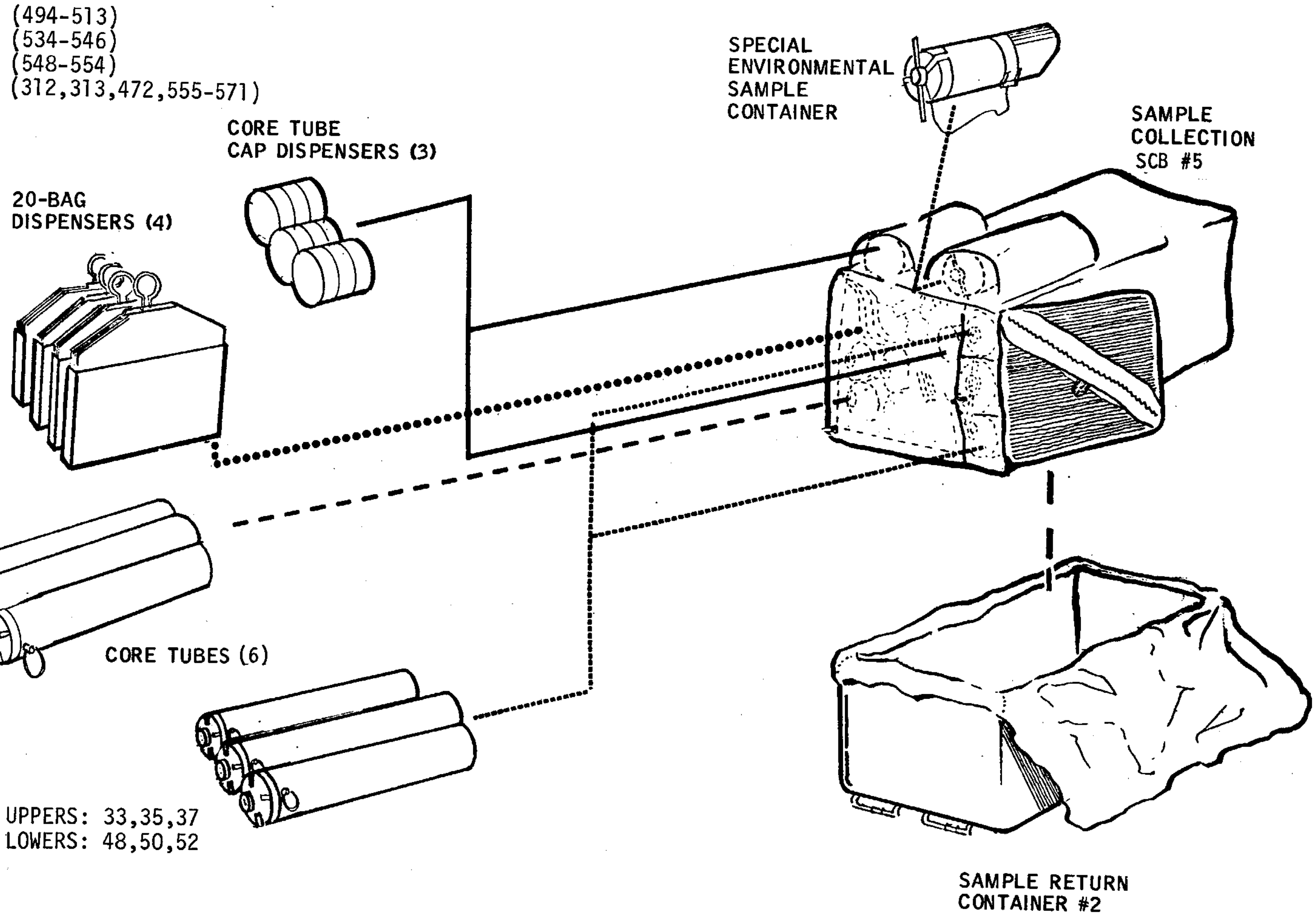


FIGURE 3.6-10 GEOLOGY SAMPLING ITEMS STOWED IN SRC # 2

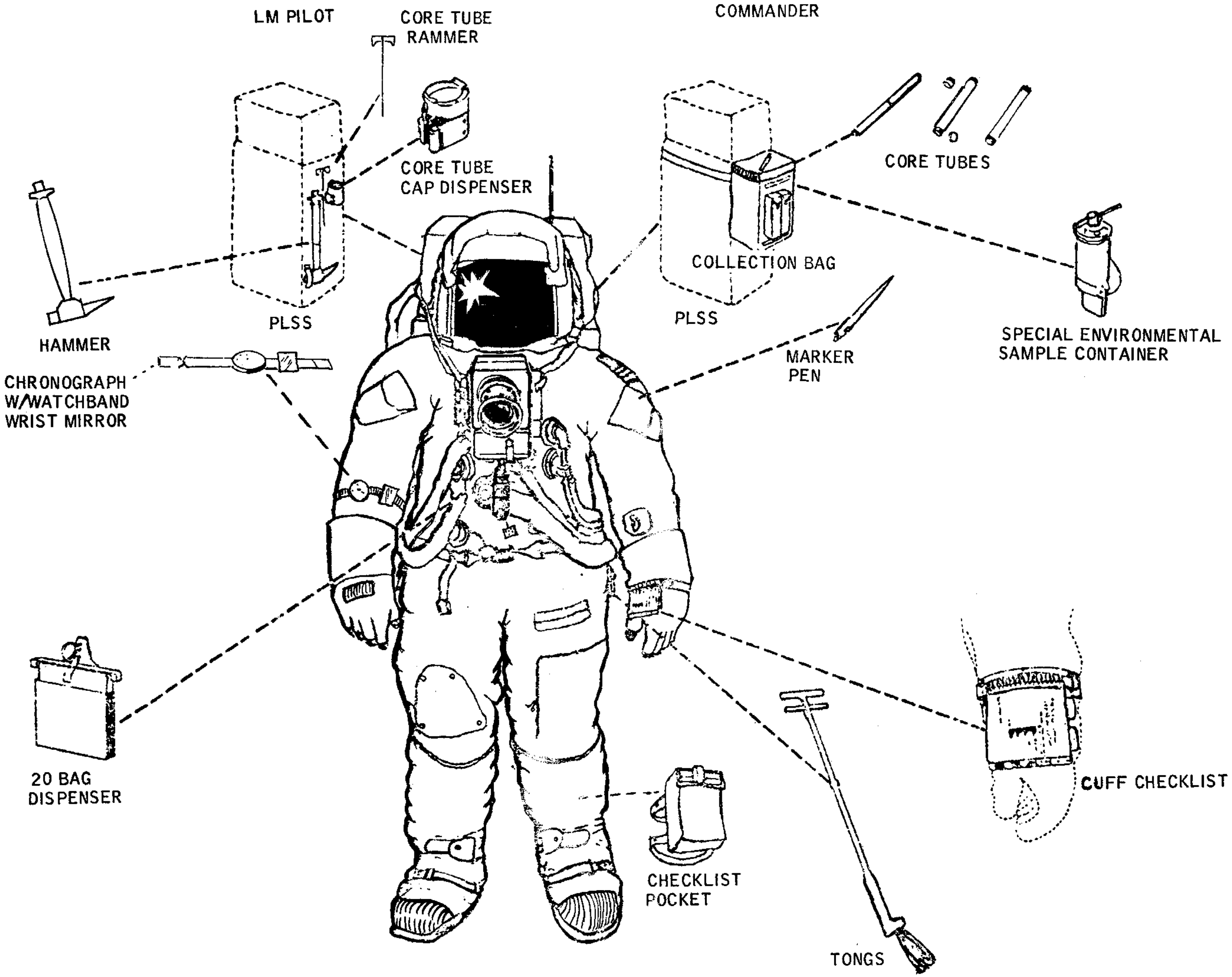


FIGURE 3.6-11 LUNAR SURFACE EQUIPMENT STOWED ON EMU

3.7 EQUIPMENT

3.7 LUNAR SURFACE EQUIPMENT MANAGEMENT

This section provides listings of lunar surface equipment with respect to their location at selected points during the three EVA's. The selected points are as follows:

EVA		EVENT	TABLE NO.
1	:	PRE-ALSEP LOADUP AT LM	3.7-1
1	:	PRE-ALSEP LRV CREW CONFIGURATION	
1	:	PRE-GEOLOGY LRV CREW CONFIGURATION	
1	:	ARRIVAL AT LM	
1	:	TRANSFERS TO MESA & LM	
1	:	FINAL EVA 1 CONFIGURATION	
2	:	PRE-GEOLOGY LOADUP AT LM	3.7-2
2	:	PRE-GEOLOGY LRV-CREW CONFIGURATION	
2	:	ARRIVAL AT LM	
2	:	TRANSFERS TO MESA & LM	
2	:	FINAL EVA 2 CONFIGURATION	
3	:	PRE-GEOLOGY LOADUP AT LM	3.7-3
3	:	PRE-GEOLOGY LRV-CREW CONFIGURATION	
3	:	ARRIVAL AT LM	
3	:	TRANSFERS TO MESA & LM	
3	:	FINAL EVA 3 CONFIGURATION	

These three tables are combined for sake of clarity on one sheet. Table 3.7-4 lists the loose equipment left on the lunar surface during the course of the lunar stay on Apollo 17.

Table 3.7-5 lists equipment transfer items during all three EVA's, both to the surface and into the ascent stage of the LM.

TABLE 3.7-1: EVA 1 EQUIPMENT MANAGEMENT

	ITEM	INITIAL PRE-ALSEP LOADUP AT LM		FINAL PRE-ALSEP LRV-CREW CONFIGURATION	PRE-GEOLOGY LRV-CREW CONFIGURATION	ARRIVAL AT LM	TRANSFERS TO MESA & LM	FINAL EVA 1 CONFIGURATION
		ORIGIN	DESTINATION					
[EVA 1] ETB	LMP 70 MM CAM	LMP CAM	UNDER CDR SEAT	▬	ON LMP	ON LMP	ETB TO A/S	▬
	MAG ALPHA		UNDER CDR SEAT	▬	(USED) ▬	▬	ETB TO A/S	▨
	MAG BRAVO		CDR CAM	▬	ON CDR	(USED) UNDER CDR SEAT	ETB TO A/S	▨
	MAG CHARLIE		UNDER CDR SEAT	▬	▬	ON CDR	ETB TO A/S	▬
	MAG GOLF		UNDER CDR SEAT	▬	ON LMP	ON LMP	ETB TO A/S	▨
	MAG HOTEL		UNDER CDR SEAT	▬	▬	▬	ETB TO A/S	▬
	MAP PKG (EVA 1)		UNDER CDR SEAT	▬	ON ACC STAFF	▬	ETB TO A/S	▨
	HOLDER W/CHECKLIST	ETB	UNDER CDR SEAT	▬	ON ACC STAFF	▨	▨	▨
	SUN COMPASS		UNDER LMP SEAT	▨	▨	▨	▨	▨
	BSLSS		BEHIND CDR SEAT	▨	▨	▨	▨	▨
	LENS BRUSHES (2)		UNDER CDR SEAT	▨	▨	▨	▨	▨
	20 DSBD BRACKETS (2)		ON CAMS	▨	▨	▨	▨	▨
	COSMIC RAY EXP		DEPLOYED	▬	▬	▬	▬	▬
	500 MM CAM			▬	▬	▬	▬	▬
	MAG ROMEO	500 CAM	UNDER CDR SEAT	▬	▬	▬	ETB TO A/S	▬
MESA	SRC 1		ON MESA TABLE	▬	▬	▬	TO A/S	▨
	CDR 70 MM CAM		CDR SEAT	UNDER CDR SEAT	ON CDR	ON CDR	ETB TO A/S	▬
	BORE/CORE STEM PKG		ON LMP SEAT	▬	BORE STEMS-IN GND CORE STEMS-AT MESA	▬	CORE STEM BAG TO A/S	▨
	ALSD		ON LMP SEAT	▬	DISCARDED	▨	▨	▨
	FLAG		DEPLOYED	▨	▨	▨	▨	▨
	ECS LiOH CANISTER	MESA	MIDDLE OF MESA	▬	▬	▬	PALLET 1 TO A/S	▨
	RAKE		GEO PALLET (XT HNDL)	▨	▨	▨	▨	▨
	CORE STEM BAG		▬	▬	▬	▬	TO A/S	▨
	NEUTRON FLUX EXPERIMENT		ON LMP SEAT	▬	IN GROUND	▬	▬	▬
	PALLET 1		▬	▬	▬	▬	TO A/S	SUPPLIES IN A/S PALLET DISCARDED
	SAMPLE RETURN BAGS (6)		▬	▬	▬	▬	ETB TO A/S	▨
	SCB 1	SRC 1	TOOL GATE	▬	ON CDR PLSS	▬	SRC 1 TO A/S	▨
	SCB 2	GEO PALLET	▬	▬	ON LMP PLSS	▬	TO A/S	▨
	SCB 3	GEO PALLET	ON ACC STAFF	▬	▬	▬	▬	▬
GEO PALLET & MSCL	ALSEP PKG 1	SEQ BAY	SURFACE	LMP CARRY	DEPLOYED	▨	▨	▨
	ALSEP PKG 2	SEQ BAY	SURFACE	LMP CARRY	DEPLOYED	▨	▨	▨
	SEP XMTR	QUAD 3	Q-3 PALLET IN SUN	▬	DEPLOYED	▨	▨	▨
	SEP RCVR	QUAD 3	ON LRV PALLET POST	▬		▬	▬	▬
	EP #6	QUAD 3		▬	ON LMP LAP	DEPLOYED	▨	▨
	EP #5	QUAD 3 ON	ON	▬	▬	DEPLOYED	▨	▨
	EP #7	QUAD 3 PALLET	GEO PALLET	▬	▬	DEPLOYED	▨	▨
	EP #4	QUAD 3		▬	▬	▬	▬	▬
SCB 1	20 DSBP BAG PACKS (2)			▬	ON CAMS	EXPENDED	▨	▨
	CAP DISPENSERS (2)			▬	1-LMP,1-TOOL GATE	▬	DISCARDED ▬	▨
	CORE TUBE (U)	SCB 1 IN SRC 1	TOOL GATE	▬	▬	FILLED	SRC 1 TO A/S	▨
	CORE TUBE (L)			▬	▬	FILLED	SRC 1 TO A/S	▨
	CORE TUBE (L)			▬	▬	▬	UNDER SEAT	▬
	CSVC			▬	UNDER LMP SEAT	▬	▬	▬
	LRV SAMPLER CUP SETS (4)			▬	1-LRV SAMP,3-SEAT	1-LRV SAMP,2-SEAT	▬	▬
	LRV SAMPLER	GEO PALLET	▬	▬	ON ACC STAFF	▬	▬	▬
[EVA 2] ETB	MAG DELTA							
	MAG INDIA							
	MAG JULIET							
	MAG KILO							
	MAP PKG (EVA 2)							
	POLARIZING FILTER							
MESA	SRC 2							
	PALLET 2							
	LCRU BATT							
GEO PALLET	SCB 4							
	SCB 5							
	SCB 6							
	SCB 7							
	EP #1							
	EP #8							
	EP #2							
	EP #3							
SCB 5	20 DSBD BAG PACKS (2)							
	20 DSBD BAG PACKS (2)							
	CAP DISPENSER							
	CAP DISPENSER							
	CAP DISPENSER							
	CORE TUBE (U)							
	CORE TUBE (U)							
	CORE TUBE (U)							
	CORE TUBE (L)							
	CORE TUBE (L)							
	CORE TUBE (L)							
	SESC							
[EVA 3] ETB	MAG ECHO							
	MAG FOXTROT							
	MAG LIMA							
	MAG MIKE							
	MAG NOVEMBER							
	MAP PKG (EVA 3)							
	SCB 8							
	SAMPLE RETURN BAG							

TABLE 3.7-2: EVA 2 EQUIPMENT MANAGEMENT

		INITIAL PRE-GEOLOGY LOADUP AT LM		PRE-GEOLOGY LRV-CREW CONFIGURATION	ARRIVAL AT LM	TRANSFERS TO MESA & LM	FINAL EVA 2 CONFIGURATION
		ORIGIN	DESTINATION				
[EVA 1] ETB	LMP 70 MM CAM	ETB	LMP SEAT/PAN	ON LMP	▬	ETB TO A/S	▬
	MAG ALPHA						
	MAG BRAVO						
	MAG CHARLIE	(ON CDR CAM) ETB	LMP SEAT/PAN	ON CDR	(USED) UNDER CDR SEAT	ETB TO A/S	▨
	MAG GOLF						
	MAG HOTEL	ETB	LMP SEAT/PAN	ON LMP	(USED) UNDER CDR SEAT	ETB TO A/S	▨
	MAP PKG (EVA 1)						
	HOLDER W/CHECKLIST						
	SUN COMPASS						
	BSLSS						
	LENS BRUSHES (2)						
	20 DSBD BRACKETS (2)						
	COSMIC RAY EXP	▬	▬	▬	▬	▬	DEPLOYED
	500 MM CAM	▬	▬	▬	▬	▬	▬
	MAG ROMEO	ETB	500 CAM	▬	▬	ETB TO A/S	▬
MESA	SRC 1						
	CDR 70 MM CAM		LMP SEAT/PAN	ON CDR	▬	ETB TO A/S	▬
	BORE/CORE STEM PKG						
	ALSD						
	FLAG						
	ECS LiOH CANISTER						
	RAKE						
	CORE STEM BAG						
	NEUTRON FLUX EXPERIMENT	▬	▬	▬	▬	▬	▬
	PALLET 1						
	SAMPLE RETURN BAGS (6)						
	SCB 1						
	SCB 2						
	SCB 3	▬	▬	▬	▬	▬	▬
GEO PALLET & MSCL	ALSEP PKG 1						
	ALSEP PKG 2						
	SEP XMTR						
	SEP RCVR	▬	▬	▬	▬	▬	▬
	EP #6						
	EP #5						
	EP #7						
	EP #4	GEO PALLET	LMP FOOT PAN	ON LMP LAP	DEPLOYED	▨	▨
SCB 1	20 DSBP BAG PACKS (2)						
	CAP DISPENSERS (2)	▬	▬	▬	EXPENDED	▨	▨
	CORE TUBE (U)				IN SCB 5	SRC 2 TO A/S	▨
	CORE TUBE (L)						
	CORE TUBE (L)	▬	▬	▬	▬	▬	▬
	CSVC	▬	▬	▬			
	LRV SAMPLER CUP SETS (4)	▬	▬	▬	1-LRV SAMP,1-SEAT	▬	▬
	LRV SAMPLER	▬	▬	▬	▬	▬	▬
[EVA 2] ETB	MAG DELTA			▬	ON CDR CAM	ETB TO A/S	▨
	MAG INDIA		UNDER CDR SEAT	▬	(USED) ▬	ETB TO A/S	▨
	MAG JULIET			▬	ON LMP CAM	ETB TO A/S	▨
	MAG KILO	ETB		▬	▬	ETB TO A/S	▬
	MAP PKG (EVA 2)		LMP SEAT/PAN	▬	▬	ETB TO A/S	▨
	POLARIZING FILTER			UNDER CDR SEAT	▬	▬	▬
MESA	SRC 2	MESA	MESA TABLE	▬	▬	TO A/S	▨
	PALLET 2	MESA	▬	▬	▬	TO A/S	SUPPLIES IN A/S PALLET DISCARDED
	LCRU BATT	MESA	UNDER CDR SEAT	▬	IN LCRU?	▨	▨
GEO PALLET	SCB 4	GEO PALLET	TOOL GATE	ON LMP PLSS	ON GEO PALLET (?)	TO A/S	▨
	SCB 5	SRC 2	TOOL GATE	ON CDR PLSS	▬	SRC 2 TO A/S	▨
	SCB 6	GEO PALLET	▬	▬	ON PLSS (?)	TO A/S	▨
	SCB 7	GEO PALLET	TOOL GATE	UNDER LMP SEAT			
	EP #1			▬	DEPLOYED	▨	▨
	EP #8	ON	ON	▬	DEPLOYED	▨	▨
	EP #2	PALLET	GEO PALLET	▬	▬	▬	▬
	EP #3			▬	▬	▬	▬
SCB 5	20 DSBD BAG PACKS (2)			SCB 7	▬	▬	▬
	20 DSBD BAG PACKS (2)			ON CAMS	EXPENDED	▨	▨
	CAP DISPENSER			ON LMP PLSS	EXPENDED	▨	▨
	CAP DISPENSER			SCB 7	▬	▬	▬
	CAP DISPENSER			SCB 7	▬	▬	▬
	CORE TUBE (U)	SCB 5 IN SRC 2	(IN SCB 5) TOOL GATE	SCB 7	▬	▬	▬
	CORE TUBE (U)			SCB 7	FILLED	SRC 2 TO A/S	▨
	CORE TUBE (U)				FILLED	SRC 2 TO A/S	▨
	CORE TUBE (L)			SCB 7	▬	▬	▬
	CORE TUBE (L)			▬	FILLED	SRC 2 TO A/S	▨
	CORE TUBE (L)			▬	IN CSVC	SRC 2 TO A/S	▨
	SESC						
[EVA 3] ETB	MAG ECHO						
	MAG FOXTROT						
	MAG LIMA						
	MAG MIKE						
	MAG NOVEMBER						
	MAP PKG (EVA 3)						
	SCB 8						
	SAMPLE RETURN BAG						

TABLE 3.7-3: EVA 3 EQUIPMENT MANAGEMENT

INITIAL PRE-GEOLOGY LOADUP AT LM		PRE-GEOLOGY LRV-CREW CONFIGURATION	ARRIVAL AT LM	TRANSFERS TO MESA & LM	FINAL CONFIGURATION	ITEM	
ORIGIN	DESTINATION						
ETB	ON LMP	▬	▬	DISCARDED*	▨	LMP 70 MM CAM	[EVA 1] ETB
						MAG ALPHA	
ETB	UNDER CDR SEAT	▬	▬	ETB TO A/S	▨	MAG BRAVO	
						MAG CHARLIE	
						MAG GOLF	
						MAG HOTEL	
						MAP PKG (EVA 1)	
						HOLDER W/CHECKLIST	
						SUN COMPASS	
						BSLSS	
						LENS BRUSHES (2)	
						20 DSBD BRACKETS (2)	
▬	▬	▬	▬	ETB TO A/S	▨	COSMIC RAY EXP	
▬	▬	▬	▬	▨	▨	500 MM CAM	
ETB	500 CAM	▬	▬	ETB TO A/S	▨	MAG ROMEO	
						SRC 1	MESA
ETB	ON CDR	▬	▬	DISCARDED*	▨	CDR 70 MM CAM	
						BORE/CORE STEM PKG	
						ALSD	
						FLAG	
						ECS LiOH CANISTER	
						RAKE	
						CORE STEM BAG	
▬	▬	▬	▬	TO A/S	▨	NEUTRON FLUX EXPERIMENT	
						PALLET 1	
						SAMPLE RETURN BAGS (6)	
						SCB 1	
						SCB 2	
▬	▬	▬	FULL ▬	TO A/S	▨	SCB 3	
						ALSEP PKG 1	GEO PALLET & MSCL
						ALSEP PKG 2	
						SEP XMTR	
▬	▬	▬	▬	DSEA TO A/S	▨	SEP RCVR	
						EP #6	
						EP #5	
						EP #7	
						EP #4	
						20 DSBD BAG PACKS (2)	SCB 1
						CAP DISPENSERS (2)	
						CORE TUBE (U)	
						CORE TUBE (L)	
▬	▬	▬	FILLED	TO A/S	▨	CORE TUBE (L)	
						CSVC	
▬	▬	▬	EXPENDED	▨	▨	LRV SAMPLER CUP SETS (4)	
▬	▬	▬	DISCARDED	▨	▨	LRV SAMPLER	
ETB	UNDER CDR SEAT	▬	▬	ETB TO A/S	▨	MAG DELTA	[EVA 2] ETB
						MAG INDIA	
						MAG JULIET	
IN ETB	UNDER CDR SEAT*	▬	▬	ETB TO A/S	▨	MAG KILO	
						MAP PKG (EVA 2)	
▬	▬	▬	DISCARDED	▨	▨	POLARIZING FILTER	
						SRC 2	MESA
						PALLET 2	
						LCRU BATT	
						SCB 4	GEO PALLET
						SCB 5	
						SCB 6	
						SCB 7	
						EP #1	
						EP #8	
▬	▬	▬	DEPLOYED	▨	▨	EP #2	
▬	▬	▬	▬	▬	DEPLOYED	EP #3	
▬	▬	ON CAMS	EXPENDED	▨	▨	20 DSBD BAG PACKS (2)	SCB 5
						20 DSBD BAG PACKS (2)	
						CAP DISPENSER	
▬	▬	ON LMP PLSS	EXPENDED	▨	▨	CAP DISPENSER	
▬	▬	ON TOOL GATE	▨	▨	▨	CAP DISPENSER	
▬	▬	▬	FILLED	TO A/S	▨	CORE TUBE (U)	
▬	▬	▬	FILLED	TO A/S	▨	CORE TUBE (U)	
						CORE TUBE (U)	
▬	▬	▬	FILLED	TO A/S	▨	CORE TUBE (L)	
						CORE TUBE (L)	
						CORE TUBE (L)	
						SESC	
(ON CDR CAM) ETB	ON CDR	▬	(USED) UNDER CDR SEAT			MAG ECHO	[EVA 3] ETB
	UNDER CDR SEAT	▬	ON CDR CAM	ETB TO A/S	▨	MAG FOXTROT	
ETB (ON LMP CAM)	UNDER CDR SEAT	▬	(USED) UNDER CDR SEAT	ETB TO A/S	▨	MAG LIMA	
	ON LMP	▬	(USED) UNDER CDR SEAT	ETB TO A/S	▨	MAG MIKE	
	UNDER CDR SEAT	▬	ON LMP CAM	ETB TO A/S	▨	MAG NOVEMBER	
	LMP SEAT/PAN	▬	▬	ETB TO A/S	▨	MAP PKG (EVA 3)	
GEO PALLET	TOOL GATE	LMP PLSS	▬	TO A/S	▨	SCB 8	
MESA	GEO PALLET	▬	▬	TO A/S	▨	SAMPLE RETURN BAG	

*MAYBE ON 500 CAM

*ONE OF THESE TO BE LEFT LENS UP FOR LONG-TERM EXPERIMENT

KEY: ▬ NO CHANGE IN STATUS OR LOCATION IN THIS BLOCK.
▨ NO FURTHER CHANGE IN STATUS OR LOCATION DURING REST OF EVA'S.

TABLE 3.7-4 LOOSE EQUIPMENT LEFT ON LUNAR SURFACE

1. Jettison During EVA-1: (In a Jettison Bag)
   2 OPS Pallets
   3 Arm rests
   Camera Bag & padding

2. Discarded On Lunar Surface During EVA-1
   Misc Pip Pins and Fastenings
   Thermal Covers
   MESA Brackets
   ALSEP RTG Dome Removal Tool and Fuel Transfer Tool
   ALSEP Subpallet
   Lunar Surface Drill, Treadle, Rack & Extractor Assy
   ALSEP Dust Cover (pkg. 1)
   LCRU/GTCA Pallet
   Pallet 1
   SRC Dust Skirt and Seal Protector
   Bore/Core stems bag & protectors
   Core Tube Cap Dispenser

3. Operational Equipment Deployed and Left On EVA-1
   Flag
   TV Camera, LCRU, TCU, HGA, LGA
   LRV
   ALSEP: LSG, LSPE, LMS, LEAM, HFE
   3 Explosive Packages
   Quad III Pallet with hand tools and TGE
   SEP Receiver and Transmitter
   Neutron Flux Exp.
   Cosmic Ray Exp.(option)

4. Jettison During EVA-2
   1 LM ECS LiOH Cartridge and Canister
   2 PLSS Batteries
   2 PLSS LiOH Cartridges and Canisters

5. Discarded on Lunar Surface During EVA-2
   EVA-2 Pallet
   1 Core Tube Cap Dispenser
   SRC Dust Skirt and Seal Protector
   LSPE Pallet 1

6. Operational Equipment Deployed and Left on EVA-2
   3 Explosive Packages
   Cosmic Ray Experiment

7. Jettisoned During EVA-3 (In Jettison Bag)
   2 PLSS Batteries
   2 PLSS LiOH Cartridges and Canisters
   2 LCG (SPARES)

8. Discarded on Lunar Surface During EVA-3

LRV w/TV, TCU, LCRU, 1-LCRU Battery
Hand Tool Gate w/tools
Gnomon
Polarizing Filter
2-70mm Data Camera w/Bracket, Handle, Trigger
500mm Data Camera
Accessory Staff
Lunar Equipment Conveyor
2 lens Brushes
BSLSS
Dust Brush
Unused Documented Sample Bags
Reseau Plate Covers (2)
Sun Compass
TGE
SEP RCVR
LRV Sample Assy

9. Operational Equipment Deployed and Left On EVA-3

2 Explosive Packages

10. Jettisoned to Lunar Surface After EVA-3

2 PLSS
TIED IN ISS
  2 pr Lunar Boots
  2 RCU
  Retractable Tethers
  1 Armrest

11. Jettisoned to Lunar Surface Prior to L/O

2 ICG
2 Hammocks
Sleep Restraint
Waste Receptacle
Helmet/EVA Int. Stow.
ETB
2 LCG Adapters
1 LM ECS LiOH cartridge and Cannister

12. Discarded after LM A/S Launch

1-LM Descent Stage

TABLE 3.7-5 EQUIPMENT TRANSFERRED BETWEEN ASCENT STAGE/SURFACE/ASCENT STAGE

1. Transferred to Surface EVA-1
   - ETB and Contents:
     - Mags (70mm)B,C,G,H
     - 500mm Camera with Mag R
     - LMP 70mm Camera with Mag A
     - Map Pkg for EVA 1
     - Map Holder
     - LRV Checklist
     - 2 Lens brushes, Tape, Scissors
     - 2 Bag dispenser Brackets
     - Sun Compass
     - BSLSS (with Spare OPS Antenna Kit)
     - Cosmic Ray Experiment
   - Empty EVA-1 Pallet

2. Transferred into Ascent Stage EVA-1
   - ETB and Contents:
     - Mags A,B, H,R
     - 2 70mm cameras w/Mags C&G
     - Map Pkg for EVA-1
     - 6 - Sample Containment Bags
   - SRC 1
   - SCB 2
   - Core Stems (8) in Bag
   - EVA-1 Pallet with ECS LiOH cannister

3. Transferred to Surface EVA-2
   - ETB and Contents:
     - Mags D,I,J,K,R,B
     - 2-70mm Cameras w/Mags C&H
     - Map Pkg for EVA 2
     - Polarizing Filter
   - Empty EVA-2 Pallet

4. Transferred into Ascent Stage EVA-2
   - EVA 2 Pallet
   - ETB and Contents:
     - Mags C,H,I,J,R,B
     - 2-70mm cameras w/Mags D&K
     - Map Pkg for EVA 2
   - SRC 2
   - SCB 4
   - SCB 6

TABLE 3.7-5 CONT'D

5. Transferred to Surface EVA-3
   - ETB and Contents:
     - Mags F,K,M,N,R,D
     - 2-70mm cameras w/Mags E&L
     - Map Pkg for EVA 3

6. Transferred into Ascent Stage EVA-3
   - ETB and Contents:
     - Mags E,F,L,M,N,R,D,K
     - Map Pkg for EVA 3
     - Cosmic Ray Experiment
     - DSEA
   - SCB 3
   - SCB 7
   - SCB 8
   - Sample Return Bag
   - Neutron Flux Experiment

3.8 LRV

3.8 LUNAR ROVER VEHICLE

The Apollo 17, J-3, mission is the third to use a vehicle to transport the crew and equipment on extended geology traverses. The benefits derived from using the LRV during the geology traverses include:
1) Decreased metabolic rates while driving,
2) Decreased traverse time between geology sites,
3) Increased communications capability, and
4) Increased equipment transportation capability.

The intent of this section is to provide operational data relative to the LRV systems, operations, performance and constraints. In addition, a section is provided showing the decal and checklist used in operating the vehicle on the lunar surface.

3.8.1 Systems

The LRV (see figure 3.8-1) is a four wheel, electrically powered, crew controlled, vehicle designed to accommodate two crewmen and stowed ancillary equipment (see figure 3.5-1 LRV stowage) for lunar surface traverses. Control of the LRV during the traverse is effected by either of the two crewmen operating the hand controller located between them. The functions of the hand controller are shown in figure 3.8-3. The crewman in the left seat nominally has a control advantage since the "T" handle is biases in his direction.

Selection of power sources for the steering motors (2) and the drive motors (4), monitoring of parameters and operation of the navigation system is possible by either crewman using the control and display console. The functions of the control and display console which are not intuitively obvious are briefly described in figure 3.8-4. For a complete description of the LRV systems refer to the Lunar Roving Vehicle Operations Handbook.

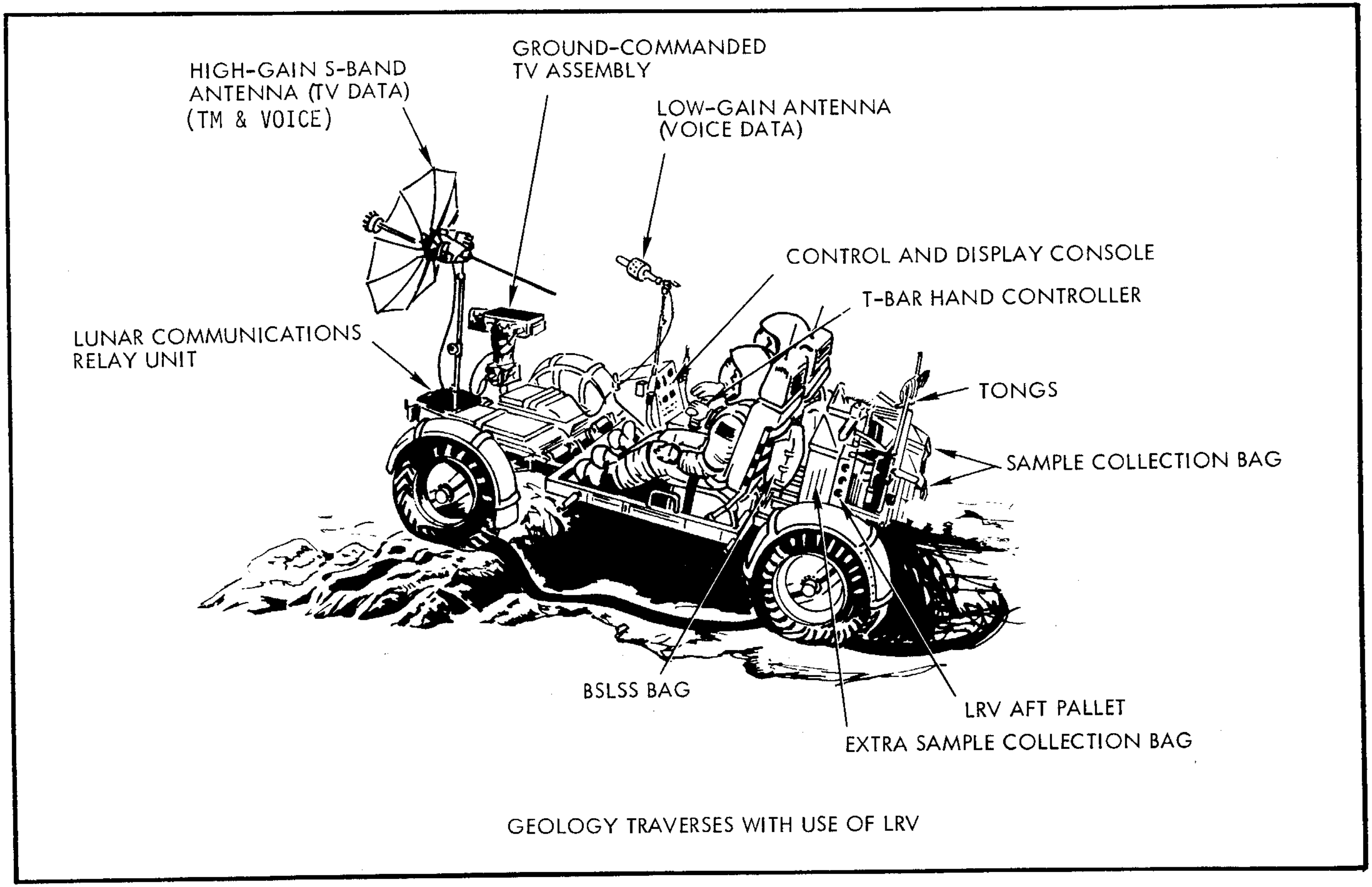
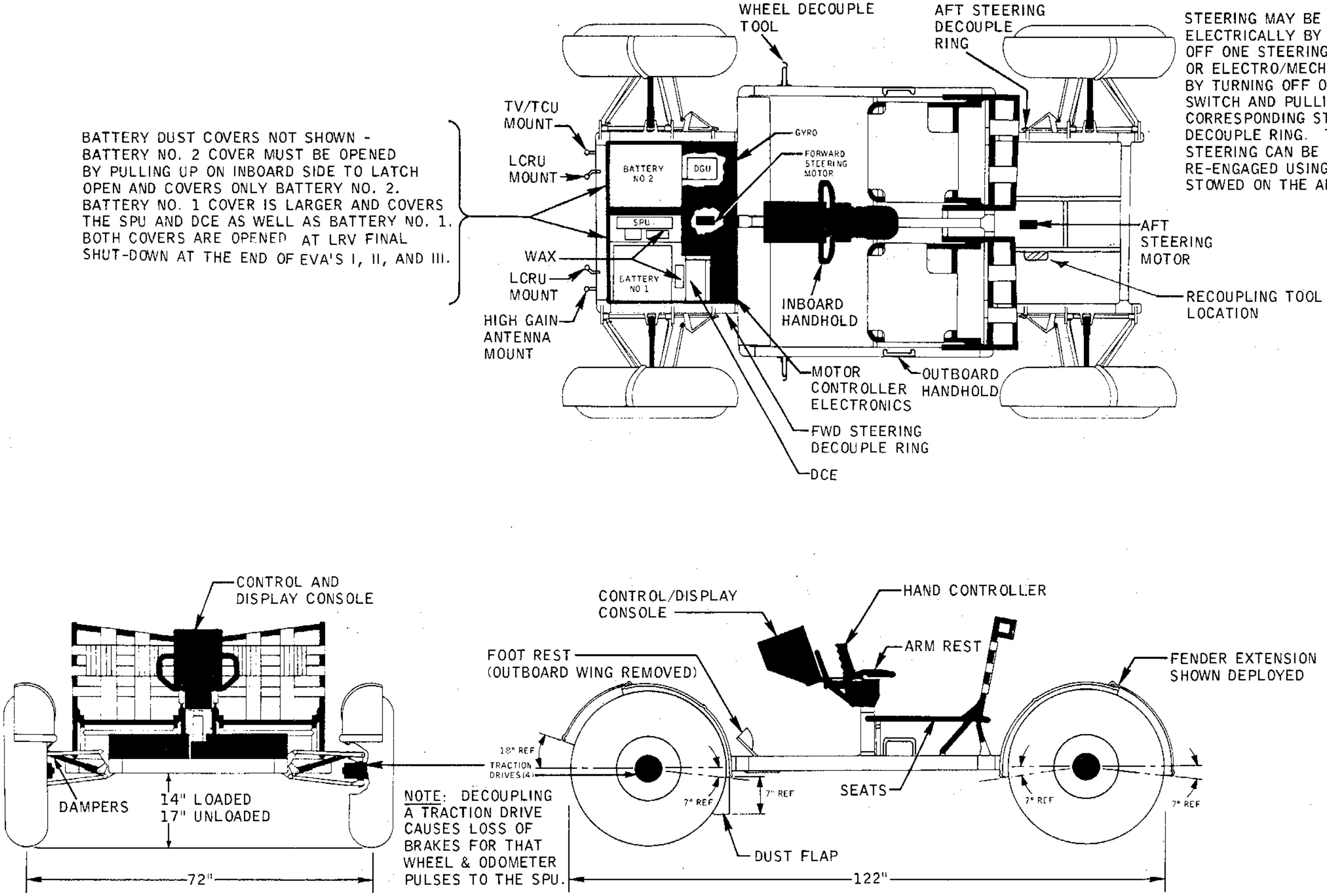


FIGURE 3.8-1 LUNAR ROVING VEHICLE (LRV)



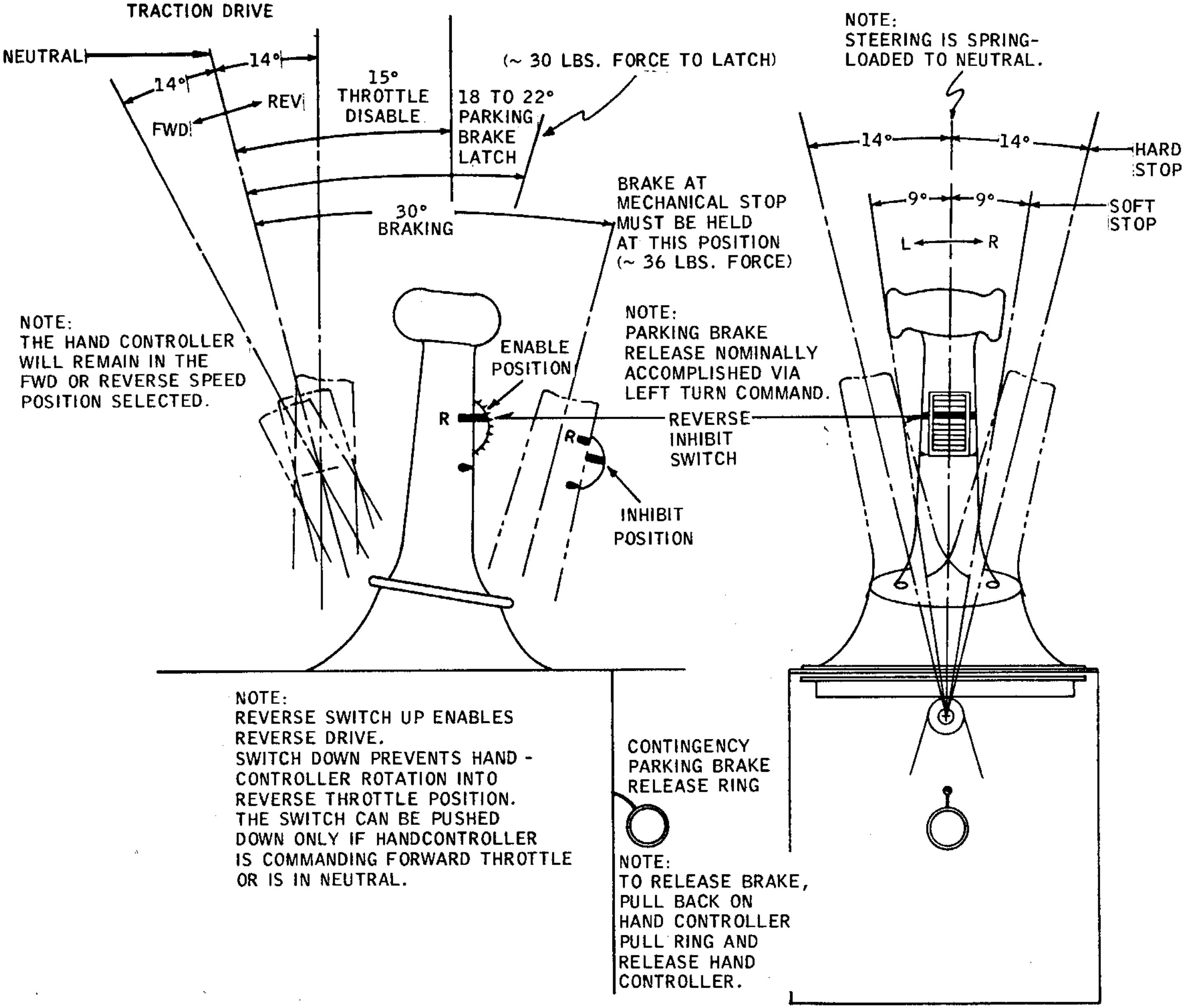
BATTERY DUST COVERS NOT SHOWN - BATTERY NO. 2 COVER MUST BE OPENED BY PULLING UP ON INBOARD SIDE TO LATCH OPEN AND COVERS ONLY BATTERY NO. 2. BATTERY NO. 1 COVER IS LARGER AND COVERS THE SPU AND DCE AS WELL AS BATTERY NO. 1. BOTH COVERS ARE OPENED AT LRV FINAL SHUT-DOWN AT THE END OF EVA'S I, II, AND III.

STEERING MAY BE DISABLED: ELECTRICALLY BY TURNING OFF ONE STEERING SWITCH OR ELECTRO/MECHANICALLY BY TURNING OFF ONE STEERING SWITCH AND PULLING THE CORRESPONDING STEERING DECOUPLE RING. THE REAR STEERING CAN BE MECHANICALLY RE-ENGAGED USING A TOOL STOWED ON THE AFT FRAME.

NOTE: DECOUPLING A TRACTION DRIVE CAUSES LOSS OF BRAKES FOR THAT WHEEL & ODOMETER PULSES TO THE SPU.

CAUTION: USE ONLY THE WHEEL DECOUPLE TOOL TO DECOUPLE OR TO RECOUPLE THE DRIVE UNIT.

FIGURE 3.8-2 LRV SYSTEMS



BRAKE AT MECHANICAL STOP MUST BE HELD AT THIS POSITION (~ 36 LBS. FORCE)

NOTE:
STEERING IS SPRING-LOADED TO NEUTRAL.

NOTE:
THE HAND CONTROLLER WILL REMAIN IN THE FWD OR REVERSE SPEED POSITION SELECTED.

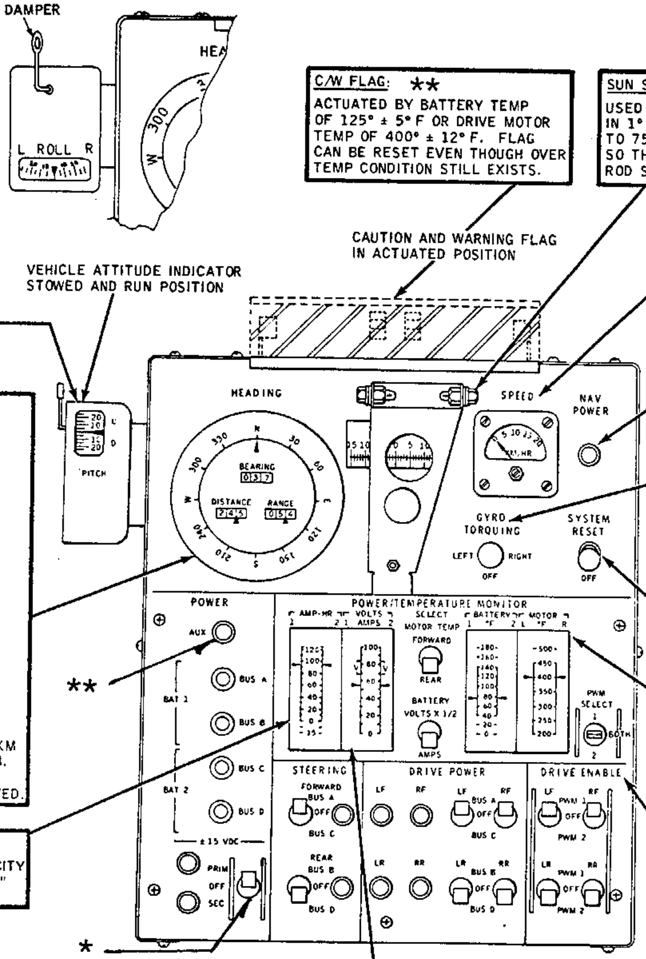
NOTE:
PARKING BRAKE RELEASE NOMINALLY ACCOMPLISHED VIA LEFT TURN COMMAND.

NOTE:
REVERSE SWITCH UP ENABLES REVERSE DRIVE.
SWITCH DOWN PREVENTS HAND-CONTROLLER ROTATION INTO REVERSE THROTTLE POSITION.
THE SWITCH CAN BE PUSHED DOWN ONLY IF HANDCONTROLLER IS COMMANDING FORWARD THROTTLE OR IS IN NEUTRAL.

NOTE:
TO RELEASE BRAKE, PULL BACK ON HAND CONTROLLER PULL RING AND RELEASE HAND CONTROLLER.

FIGURE 3.8-3 LRV HANDCONTROLLER FUNCTIONS

FIGURE 3.8-4 LRV CONTROL AND DISPLAY FUNCTIONS



ATTITUDE INDICATOR (PITCH & ROLL):
USED FOR NAV. ALIGNMENT AND UPDATE. THE LRV IS PARKED WITHIN ± 6° PITCH AND ROLL.

ROLL
± 25° IN 1° INCREMENTS

PITCH
± 25° IN 5° INCREMENTS

HEADING INDICATOR:
DISPLAYS THE LRV HEADING WITH RESPECT TO LUNAR NORTH. THE INITIAL SETTING AND UPDATING OF THIS INSTRUMENT IS ACCOMPLISHED BY OPERATING THE GYRO TORQUING SWITCH LEFT OR RIGHT.

BEARING INDICATOR:
DISPLAYS BEARING TO THE LM IN ONE DEGREE DIGITS. IN THE EVENT OF POWER LOSS TO THE NAVIGATION SYSTEM, THE BEARING INDICATION WILL REMAIN DISPLAYED.

DISTANCE INDICATOR:
DISPLAYS DISTANCE TRAVELED BY THE LRV IN INCREMENTS OF 0.1 KILOMETER. THIS DISPLAY IS DRIVEN FROM THE NAVIGATION SIGNAL PROCESSING UNIT WHICH RECEIVES ITS INPUTS FROM THE THIRD FROM THE FASTEST TRACTION DRIVE ODOMETER. TOTAL DIGITAL SCALE CAPACITY IS 99.9 KM.

RANGE INDICATOR:
DISPLAYS THE DISTANCE TO THE LM, AND IS GRADUATED IN 0.1 KM INCREMENTS WITH A TOTAL DIGITAL SCALE CAPACITY OF 99.9 KM. IN THE EVENT OF POWER LOSS TO THE NAVIGATION SYSTEM, THE RANGE INDICATED AT TIME OF POWER LOSS WILL REMAIN DISPLAYED.

AMP-HR METER: *
THIS INDICATOR IS USED TO MONITOR REMAINING BATTERY CAPACITY IN BATTERY 1 AND BATTERY 2. AT FULL CHARGE, BOTH THE "1" AND "2" READ 121 AMP-HRS.

C/W FLAG: **
ACTUATED BY BATTERY TEMP OF 125° ± 5° F OR DRIVE MOTOR TEMP OF 400° ± 12° F. FLAG CAN BE RESET EVEN THOUGH OVER TEMP CONDITION STILL EXISTS.

SUN SHADOW DEVICE (SSD):
USED TO INITIALIZE THE NAVIGATION SYSTEM. 15° EITHER SIDE OF ZERO IN 1° DIVISIONS. THE SSD IS EFFECTIVE FOR SUN ELEVATION ANGLES UP TO 75°. READING THE SHADOW FOR NAV. ALIGNMENT - THE LRV IS PLACED SO THAT A SHADOW IS CAST WITHIN ± 3° OF ZERO. THE CENTER OF THE ROD SHOULD BE USED IN CASTING THE SHADOW.

SPEED INDICATOR:
SHOWS LRV VELOCITY FROM 0 TO 20 KM/HR AND IS DRIVEN BY ODOMETER PULSES FROM THE RIGHT REAR WHEEL. THE NAV POWER C/B MUST BE IN TO OPERATE THE INDICATOR.

NAV POWER CIRCUIT BREAKER: *
PROVIDES POWER FROM BATTERY 1 & 2 TO NAV SYSTEM. NAV SYSTEM GYRO MUST STABILIZE FOR 3 MIN. BEFORE MOVING THE VEHICLE OR TORQUING THE GYRO.

GYRO TORQUING SWITCH:
USED TO TORQUE THE GYRO UNTIL THE HEADING CORRESPONDS TO THE CALCULATED LRV HEADING. THE SWITCH IS USED TO INITIALIZE THE NAV SYSTEM AT THE START OF THE EVA AND TO UPDATE THE SYSTEM DURING THE TRAVERSE. LEFT (RIGHT) SWITCH POSITION CAUSES HEADING ROSE TO ROTATE CLOCKWISE (COUNTERCLOCKWISE) AT 1.5 °/SEC. SWITCH ACTUATION LIMITED TO 2 MINUTES.

SYSTEM RESET SWITCH:
USED TO RESET BEARING, DISTANCE, AND RANGE TO ZERO AT THE START OF EACH EVA.

MOTOR °F METER: *
THIS INDICATOR IS USED TO MONITOR THE TEMPERATURE OF EACH DRIVE MOTOR. SELECTION OF WHICH SET OF WHEELS TO MONITOR IS MADE BY PLACING THE MOTOR TEMP SELECT SWITCH TO EITHER FORWARD OR REAR POSITION. EXPECTED TEMP READING IS 200° F. ALLOWABLE TEMP BRACKET ON METER IS 200 TO 450° F.

BATTERY °F METER: *
THIS INDICATOR IS USED TO MONITOR THE INTERNAL TEMPERATURE OF EACH BATTERY. THE ALLOWABLE BATTERY TEMPERATURE AS BRACKETED ON THE METER IS 40 TO 140° F. EXPECTED TEMP RANGE IS 45 TO 120° F.

VOLTS AMPS METER:
THIS INDICATOR IS USED TO MONITOR THE VOLTAGE OR CURRENT BEING SUPPLIED FROM BATTERY 1 AND BATTERY 2. SELECTION OF THE PARAMETER TO MONITOR IS CONTROLLED BY THE BATTERY SELECT SWITCH

, THE METER INDICATION WILL BE TWICE THE ACTUAL VALUE
THE NOMINAL METER READING FOR VOLTAGE IS BRACKETED FROM 66 TO 82.

* POWER VIA CB'S BUS B&D
** POWER VIA CB'S BUS A&C

3.8.2 Operations

The following table is a compendium of the functions performed on and with the LRV during the lunar surface EVA operations. As such, it is designed to supplement data on LRV operations as specified in the integrated EVA vertical timelines, by providing detail procedures. The delineation of these functions is by EVA and the procedures referenced within each function are given in chronological order.

TABLE 3.8-1

LRV OPERATIONAL FUNCTIONS

	FUNCTION	PROCEDURE
EVA-1	Deploy and set-up	Table 3.8-2
	LRV Power-up	Table 3.8-3.A
	Navigation Alignment	Table 3.8-4
	Geology/Science Sites	
	A) Nominal	Table 3.8-5.A
	B) Nav update	Table 3.8-5.B
	LRV close-out	Table 3.8-5.A
EVA-2	LRV power-up	Table 3.8-3.B
	Navigation Alignment	Table 3.8-4
	Geology/Science Sites	
	A) Nominal	Table 3.8-5.A
	B) Nav Update	Table 3.8-5.B
	LRV close-out	Table 3.8-6.B
EVA-3	Navigation Alignment	Table 3.8-4
	Geology/Science Sites	
	A) Nominal	Table 3.8-5.A
	B) Nav Update	Table 3.8-5.B
	LRV close-out	Table 3.8-6.C

TABLE 3.8-2
LRV OFF-LOAD FROM LM AND LRV SET-UP

1. Release LRV insulation blanket, verify outrigger cables taut and chassis parallel.

2. Inspect right and left walking hinge latches to verify indicator marks aligned.

3. Release contingency deployment tool velcro. Remove and stow tool.

4. Release left hand deployment tape stowed in nylon bag attached to lower left support arm by velcro tapes.

5. Stow left hand deployment tape by draping it over a LM landing strut for convenient future access.

6. Release deployment cable from teflon clips on left side of LRV center chassis and deploy cable.

7. Release right hand deployment tape stowed in nylon bag attached to lower right support arm by velcro tape. Hold tape and move away from LRV deployment area.

8. Ascent LM ladder and pull LRV deployment D-handle. Verify LRV moves outward from LM about 4 degrees.

9. Descend LM ladder. Grasp deployment cable, monitor deployment activity and maintain tension on deployment cable.

10. Pull right hand deployment tape. Verify LRV rotates outward from LM.

11. Continue to pull right hand tape. When the tape marks appear (the vehicle is outboard at about 45 degrees) verify that:

    (a) Tension on aft deployment cable is released.
    (b) Aft chassis unfolds and locks in position.
    (c) Rear wheels unfold and tethered rear wheel struts fall free.
    (d) Forward chassis is released from console post and returns to 35 degree position. (Rotates in toward LM)

12. Continue to pull right hand tape. Verify that:

    (a) Center/aft chassis rotates until rear wheels contact lunar surface.
    (b) Rear wheels slide on surface permitting center/aft chassis to move away from LM.

    NOTE: If wheels fail to slide, deployment cable may be pulled to permit center/aft chassis to move away from LM.

13. Continue to pull right hand tape. Verify that:

    (a) Rear wheels are on the surface.
    (b) Forward chassis continues to unfold and locks in position.
    (c) Forward wheels unfold.
    (d) Slack in outrigger cables (outer braked reel cables) and in 45° cable.

14. Release right hand tape and at chassis RR grasp outer braked reel cable and remove cable pin and discard cable and pin outside work area.

15. At chassis LR grasp outer braked reel cable and remove cable pin and discard cable and pin outside work area.

16. Pull left hand tape. Verify that forward chassis lowers until all wheels contact lunar surface and support vehicle weight and 45° cable is slack.

    NOTE: If wheels fail to slide, deployment cable may be pulled to move LRV away from LM.

17. Coil deployment cable and remove cable release pin and chassis delatch fitting pin. Discard cable and deployment hardware outside of work area (right).

18. Pull saddle release cable verify telescoping rods drop free (left).

19. Erect LRV geology pallet mounting post (right).
    -(SEE NOTE 1)-

20. Deploy rear fender extension (right and left).

21. Check rear hinge pins engaged (right and left).

22. Check rear steering decouple ring sealed (right).

23. Release inboard hand hold tie down (left).

24. Erect seats (release seat tie down straps) (right and left).

25. Attach seat support leg velcro strap to outboard handhold (right and left).

26. Lower arm rest (right).

27. Pull attitude indicator and C&W pins and discard (left).

28. Pull console "T" handle and rotate 90°; lower console while raising inboard handhold (right and left).

29. Lock console/handhold in place, T handle 90°, velcro T handle strap (right and left).

30. Remove tripod and stow toehold (wheel decouple tool) (right and left).

31. Release velcro tiedowns and erect footrest and velcro in place (right and left).

32. Check front hinge pins engaged (right and left).

33. Check fwd steering seal intact (left).

34. Deploy front fender extension (right and left).

35. Verify battery covers closed (right and left).

NOTE 1: The vehicle may be picked up by both crewmen and turned away from the LM prior to vehicle set-up (i.e., prior to step 19).

TABLE 3.8-3A

POWER-UP (EVA-1)

1. Check hand controller operation.
2. Set parking brake and Verify Reverse INHIBIT Switch - DOWN.
3. BUS A, BUS B, BUS C, BUS D Circuit Breakers - CLOSE.
4. Report BAT 1 and BAT 2 AMP-HR indications.
5. Report BAT 1 and BAT 2 AMPS indications.
6. BATTERY Switch - VOLTS x 1/2.
7. Report BAT 1 and BAT 2 VOLTS indications.
8. BATTERY Switch - AMPS.
9. Report BAT 1 and BAT 2 temp (°F) indications.
10. Report motor temps (LF, RF, LR, RR).
11. Aux CB - CLOSE
12. ± 15 VDC PRIM and SEC Circuit Breakers - CLOSE.
13. STEERING FORWARD AND REAR Circuit Breakers - CLOSE.
14. DRIVE POWER LF, RF, LR, RR Circuit Breakers - CLOSE.
15. PWM SELECT Switch - BOTH. (Verify)
16. DRIVE ENABLE LF and RF Switches - PWM 1.
17. DRIVE ENABLE LR and RR Switches - PWM 2.
18. ± 15 VDC Switch - SEC.
19. STEERING FORWARD Switch - BUS A.
20. STEERING REAR Switch - BUS D.

CAUTION

The hand controller should be in park brake position and the drive enable switches must be set to an <u>active</u> PWM prior to setting any drive power switch to an energized bus. If the drive power switch is turned on and the corresponding drive enable switch is not selected to an active PWM, then full power will be applied to the corresponding drive motor when the hand controller is released from brake position. Should this condition occur, the hand controller should be immediately returned to park brake position.

21. DRIVE POWER LF and RF Switches - BUS A.

22. DRIVE POWER LR AND RR Switches - BUS D.

*23. Release parking brake and place reverse INHIBIT switch - UP position.

NOTE: The LRV driver may now back away from LM. LRV driver should request other crewman to direct and monitor any backing operations from an off-vehicle position.

*24. Stop LRV and set parking brake. Reset Reverse INHIBIT Switch (push switch DOWN).

25. Release parking brake and drive to MESA area for equipment loading.

26. Stop LRV and set brake.

27. ± 15 VDC SW - OFF

*Omit Steps 23 & 24 if the LRV has been picked up and turn facing away from the LM.

TABLE 3.8-3B
POWER-UP (EVA-2&3)

1. Close LRV covers as required and press on covers to mate velcro.
2. Check hand controller set parking brake and Verify Reverse INHIBIT Switch - DOWN.
3. BUS A, BUS B, BUS C, BUS D Circuit Breakers - CLOSE.
4. NAV POWER CB - CLOSE (Verify) (Do not Torque gyro or move LRV for 1-1/2 min.).
5. AUX CB - CLOSE (Verify).
6. Report BAT 1 and BAT 2 AMP-HR indications.
7. Report BAT 1 and BAT 2 VOLTS indications.
8. Report BAT 1 and BAT 2 AMPS indications.
9. Report BAT 1 and BAT 2 temp (°F) indications.
10. Report drive motor temps (LF, RF, LR, RR).
11. Verify PWM SELECT Switch - BOTH.
12. Verify DRIVE ENABLE LF and RF Switches - PWM 1.
13. Verify DRIVE ENABLE LR and RR Switches - PWM 2.
14. ±15 VDC Switch - PRIM
15. Release parking brake and Drive to nav alignment site.

TABLE 3.8-4
NAVIGATION ALIGNMENT

1. Drive LRV to area level within ± 6° of zero for pitch and roll.
2. Deploy Sun Shadow Device (SSD).
3. Park heading down sun within ± 3° SSD.

    Hand controller to parking brake position
    Power down (± 15 VDC SW - OFF)

4. Report SSD, pitch and roll readings.
5. Stow SSD and attitude indicator.
6. Move SYSTEM RESET switch <u>momentarily</u> to RESET and return to OFF position.
7. Verify bearing, distance & range indicators zero.
8. Operate GYRO TORQUING switch to LEFT or RIFHT position to correct HEADING indicator as required.
9. Power-up LRV. (± 15 VDC SW - PRIM).

TABLE 3.8-5A
GEOLOGY/SCIENCE SITE NOMINAL

1. Stop LRV and set hand controller in parking brake position; Neutral throttle, reverse inhibit switch - down.

2. Power down as follows:

   (a) ± 15 VDC Switch - OFF.

3. Report LRV readings in the following ORDER:

   (a) Heading
   (b) Bearing
   (c) Distance
   (d) Range
   (e) Amp-Hr Batt 1
   (f) Amp-Hr Batt 2
   (g) Temp Batt 1
   (h) Temp Batt 2
   (i) Temp LF motor *
   (j) Temp RF motor *
   (k) Temp LR motor *
   (l) Temp RR motor *

4. LCRU mode switch:

   (a) 3 (TV RMT) (near the LM) or,
   (b) 2 (FM/TV) (on the traverse)

5. Align HGA via AGC meter and sight.

6. Dust CTV, TCU and LCRU.

7. Perform science requirements.

8. Return to LRV.

9. Stow Gnomon.

10. LCRU mode switch to 1 (PM1/WB).

11. Mount LRV and fasten seat belt.

12. Verify handcontroller in parking brake position and reverse inhibit switch down.

13. ± 15 VDC switch - PRIM.

14. Release parking brake.

*These four readings may be given as "all low" if the temps do not drive the needle off the peg.

TABLE 3.8-5B
GEOLOGY/SCIENCE SITE-NAV UPDATE

1. Drive to area level within ± 6° of zero for pitch and roll.

2. Deploy SSD and head down sun within ± 3° SSD.

3. Stop LRV and set hand controller in parking brake position. Reverse inhibit switch - down.

4. Report SSD, pitch and roll readings.

5. Stow SSD and attitude indicator.

6. Power down as follows:

   (a) ± 15 VDC Switch - OFF.

7. Report LRV readings in the following ORDER:

   (a) Heading
   (b) Bearing
   (c) Distance
   (d) Range
   (e) Amp-Hr Batt 1
   (f) Amp-Hr Batt 2
   (g) Temp Batt 1
   (h) Temp Batt 2
   (i) Temp LF motor *
   (j) Temp RF motor *
   (k) Temp LR motor *
   (l) Temp RR motor *

8. LCRU mode Switch:

   (a) 3 (TV RMT) (near the LM) or,
   (b) 2 (FM/TV) (on the traverse)

9. Align HGA via AGC meter and SIGHT.

10. Dust CTV, TCU and LCRU.

11. Perform stop science requirements.

12. Return to LRV.

13. Stow Gnomon.

14. LCRU mode switch to 1 (PM1/WB).

15. Mount LRV and fasten seat belt.

16. Verify hand controller in parking brake position and reverse inhibit switch down.

17. Report heading and Torque Gyro to Houston update as required.

18. ± 15 VDC switch - PRIM.

19. Release parking brake.

*These temps may be reported as "all low" if temps do not drive needle off the peg.

TABLE 3.8-6A

EVA-1 Closeout

1. Position LRV near MESA, 30 feet from LM - Cross sun, Heading = 012° set parking brake and verify REVERSE INHIBIT switch - DOWN.

2. Report BEARING, DISTANCE, & RANGE.

3. ± 15 VDC switch - OFF.

4. Report LRV readings in following order:

   (a) Amp-Hr Batt 1
   (b) Amp-Hr Batt 2
   (c) Temp Batt 1
   (d) Temp Batt 2
   (e) Temp LF motor *
   (f) Temp RF motor *
   (g) Temp LR motor *
   (h) Temp RR motor *

5. LCRU mode sw - 3 (TV RMT).

6. Align Hi-gain Ant.

7. Dust CTV, TCU & LCRU.

8. Prior to LM ingress.

   (a) LCRU power switch - OFF
   (b) LCRU thermal blanket - place 35% , blanket over mirrors (i.e., 65% of mirrors showing).
   (c) LRV battery covers - OPEN & dust LRV mirrors as required. (Dust LCRU mirrors).
   (d) BUS A, BUS B, BUS C, & bus D cb's - OPEN.

*These temps may be reported as "all low" if temps do not drive needle off the peg.

TABLE 3.8-6B

EVA-2 Closeout

1. Position LRV near MESA, 30 feet from LM - Cross sun, Heading - 017° set parking brake and verify REVERSE INHIBIT switch - DOWN.

2. Report BEARING, DISTANCE and RANGE.

3. ± 15 VDC switch - OFF

4. Report LRV readings in following order:

   (a) Amp-Hr Batt 1
   (b) Amp-Hr Batt 2
   (c) Temp Batt 1
   (d) Temp Batt 2
   (e) Temp LF motor*
   (f) Temp RF motor*
   (g) Temp LR motor*
   (h) Temp RR motor*

5. LCRU mode sw - 3 (TV RMT).

6. Align Hi-gain Ant.

7. Dust CTV, TCU, & LCRU.

8. Prior to LM ingress:

   (a) LCRU power switch - OFF
   (b) LCRU thermal blanket - 100% open. (verify)
   (c) LRV covers open and LRV mirrors dusted as required (Dust LCRU mirrors).
   (d) BUS A, BUS B, BUS C, &BUS D CB's - OPEN.

*These temps may be reported as "ALL LOW" if temps do not drive needle off the peg.

TABLE 3.8-6C

EVA-3 Closeout

1. Position LRV near MESA - Set parking brake and verify REVERSE INHIBIT switch - DOWN.

2. Report BEARING, DISTANCE and RANGE.

3. ± 15 VDC switch - OFF.

4. Report LRV readings in following order:

   (a) Amp-Hr Batt 1
   (b) Amp-Hr Batt 2
   (c) Temp Batt 1
   (d) Temp Batt 2
   (e) Temp LF motor*
   (f) Temp RF motor*
   (g) Temp LR motor*
   (h) Temp RR motor*

5. LCRU mode switch - 3 (TV RMT).

6. Align Hi-gain Ant.

   NOTE: Off-load equipment and then drive to final LRV parking site.

7. LCRU mode switch - 1 (PM1/WB).

8. Ingress LRV verify parking brake, reverse inhibit switch - DOWN.

9. ± 15 VDC switch - PRIM.

10. NAV RESET switch to RESET momentarily then to - OFF.

11. Verify BEARING, DISTANCE and RANGE - ZERO.

12. Drive on a HEADING of 102° until the DISTANCE indicator reads 0.1 km; BEARING indicator should read 282°. Turn left to a HEADING OF 225° and stop at outbound tracks.

13. Set parking brake.

14. ± 15 VDC switch - OFF.

15. NAV POWER CB - OPEN.

16. BUS B and BUS D CB's - OPEN (Note BUS A & BUS C CB's remain closed).

17. AUX power CB - CLOSED (Verify).

18. AUX power by pass sw - ON.

19. LCRU mode sw - 3 (TV RMT).

20. Align Hi-gain Ant.

21. Peel 65% LCRU blanket - and install over control panel.

22. Dust CTV & TCU.

23. LRV battery covers - OPEN.

24. Dust LRV mirrors as required.

25. Dust LCRU mirrors.

*These temps may be reported as "ALL LOW" if temps do not drive needle off the peg.

3.8.3 Performance and Constraints

The purpose of this section is to provide LRV performance, constraints and operating limitations which are of general interest.

Detailed performance and constraint characteristics may be found in the LRV Operations Handbook, Appendix A.

Velocity, steering and braking capabilities and limitations are shown in figures 3.8-5, 3.8-6 and 3.8-7, respectively.

Slopes, positive or negative, significantly effect the LRV characteristic. An observation that can be made from these figures is that increasing slopes-decrease speed, improve steering and dynamic stability, and stopping distance as compared to a 0° slope. Figure 3.8-8 is intended to further refine the data provided in figure 3.8-7 to include the effects of various hand controller braking positions on stopping distance vs slopes for 8 km/hour.

Table 3.8-7 is compendium of LRV operating limits, constraints, and requirements of crew operation. These are generally presented without comment.

APOLLO 17 LRV VELOCITY CONSTRAINTS (KPH)

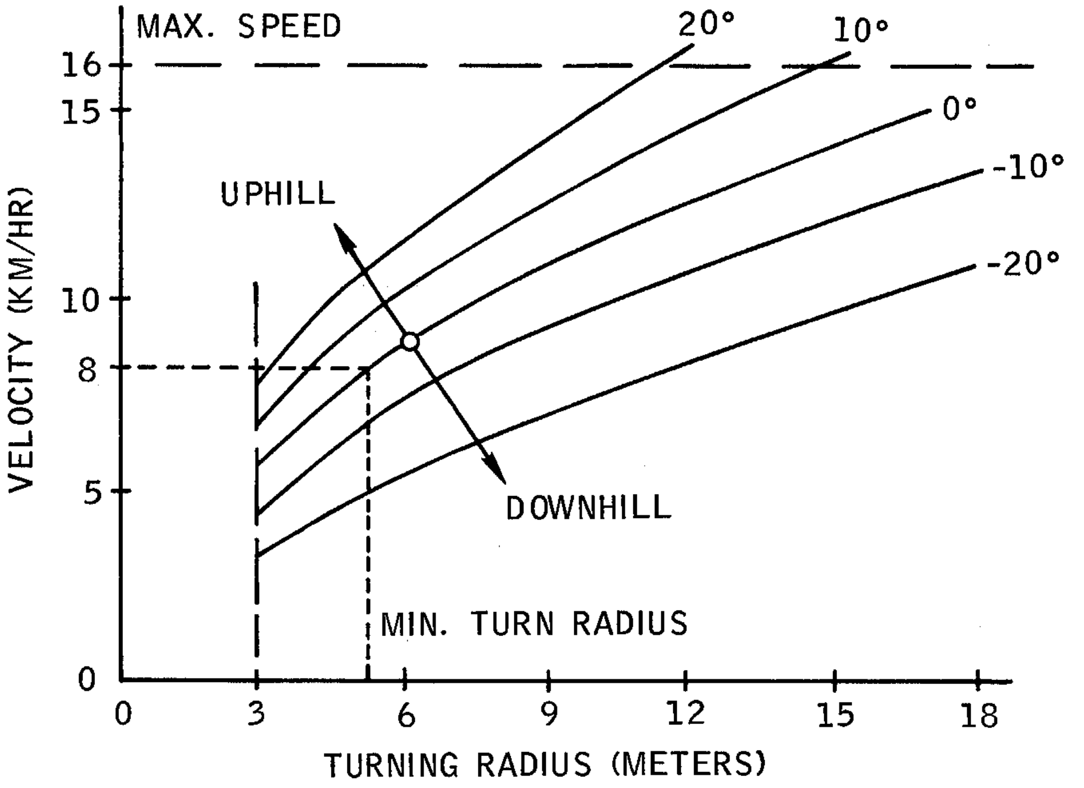
CONSTRAINTS	SLOPE	SMOOTH MARE	ROUGH UPLANDS
SPEED CAPABILITY TORQUE LIMITED	0°	11.53	11.12
	5°	8.64	8.55
	10°	7.28	7.23
SUSPENSION LIMIT LOADS		16	10
		12" BUMP AT 14 KPH	
CONTROLLABILITY 13° SIDE SLIP ANGLE		6m TURN AT 5.5 KPH	
		12m TURN AT 10 KPH	

NOTE: MID RANGE P.S.D.
1.5 FACTOR OF SAFETY ON SUSPENSION LOAD

Figure 3.8-5

FIGURE 3.8-6

DYNAMIC STABILITY - STEERING STABILITY



COEFFICIENT OF FRICTION: $\mu = 0.6$

EXAMPLE: ON LEVEL GROUND AT 8 KM/HR, SLIDING BEGINS AT A TURN RADIUS OF 5.2 METERS.

FIGURE 3.8-7

STOPPING DISTANCE VERSUS INITIAL VELOCITY FOR VARIOUS SLOPES

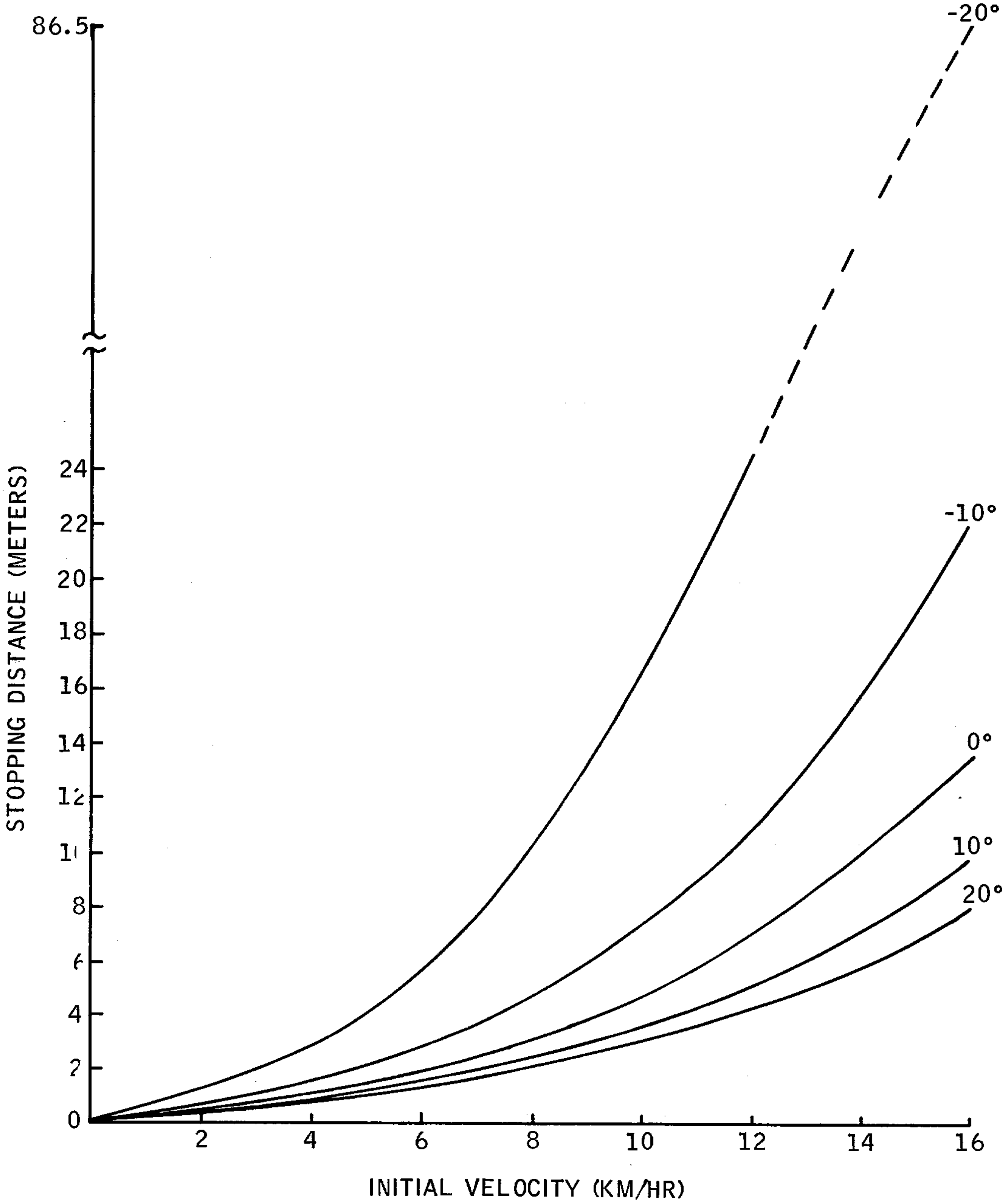


FIGURE 3.8-8

LRV STOPPING DISTANCE VS. HANDCONTROLLER PULL FORCE FOR 8 KM/HR

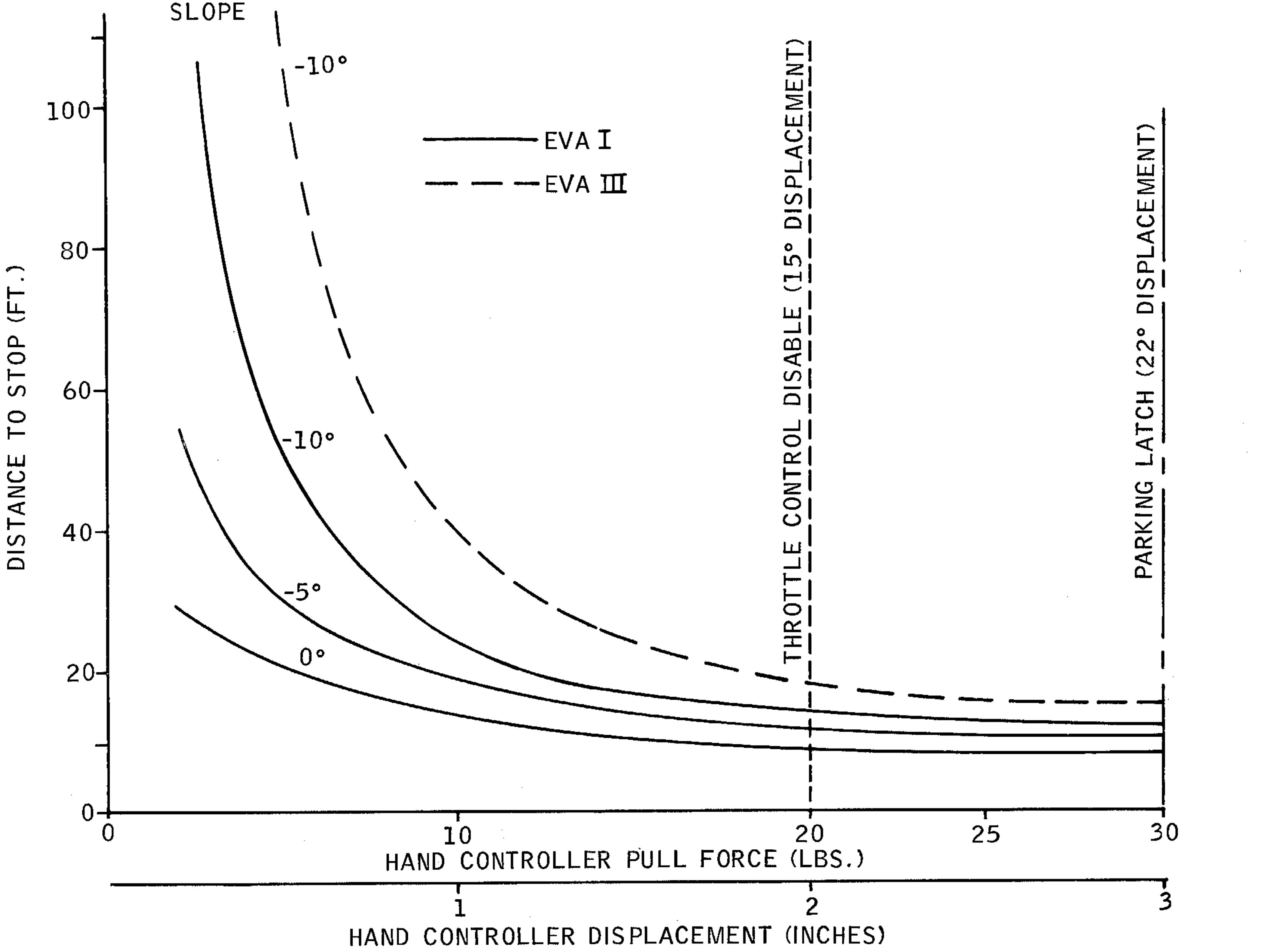


TABLE 3.8-7

LRV Operating Limits, Constraints & Requirements

1. The LRV velocity should not exceed 5 km/hour while traversing to the ALSEP site with the ALSD on the LMP seat.

2. The NAV power circuit breaker must be closed for at least 1-1/2 minutes before torquing the gyro or repositioning the LRV.

3. The navigation system gyro must not be torqued continuously for more than two (2) minutes.

   NOTE: Since the heading indicator torques at a rate of 1.5°/sec the heading could be torqued 180° in 2 minutes.

4. To minimize heading errors for navigation system initial alignment and updates, the LRV should be parked such that the pitch and roll is within ± 6° of zero, (roll being the most critical) and the Sun Shadow Devices (SSD) within ± 3°.

5. The attitude indicator and the SSD should be read to MCC within the tolerances noted below to minimize heading errors:
   Pitch within 2-1/2°, Roll within 1° and SSD within 1°.
   Further the shadow cast on the SSD scale should be read from the center of the rod.

6. Park the LRV cross sun heading North between EVA's in the sun light and at least 30 feet from the LM:

   (a) END of EVA-1 - HEADING = 012°
   (b) END of EVA-2 - HEADING = 017°

7. Open the LRV battery covers at the end of each EVA.

8. The LCRU thermal blankets will be open (i.e. % of mirror showing) as per the following schedule:

   (a) EVA-1, EVA-2, & EVA-3 - 100%
   (b) Between EVA's 1&2 - 65%
   (c) Between EVA's 2&3 - 100%
   (d) Subsequent to EVA-3 - 100%

9. The LRV will be parked at the conclusiong of EVA 3 as per the following parameters:

   (a) Distance 300 ft ± 25 ft
   (b) LRV to LM Bearing 282°
   (c) LRV Heading 225°

10. Caution: While driving, an open-operating corridor shall be maintained on either side of the LRV. For a velocity of 8 km/hour the driving corridor should be 17 feet. Possible condition: guard against steering failures.

11. Caution: The drive enable switches must be set to an active PWM prior to setting any drive power switch to an energized bus. If the drive power switch is turned on and the corresponding drive enable switch is not selected to an active PWM, then full power will be applied to the corresponding drive motor when the hand controller is released from brake position.

12. Warning: The EMU should not brush against the LRV wire wheels at any time. This constraint is to protect the man and the suit not the LRV. Possible condition: Wire breakage on wheel.

13. Warning: The gloved hand is not to be used to decouple or recouple a traction drive unit. The decouple tool is specifically provided for this operation. Possible condition: Overtemp drive unit.

14. Hi-gain antenna sighting/LRV Heading: Coarse alignment (6°) of LCRU Hi-gain angenna may be made at any LRV parking heading by use of the AGC meter. Fine alignment (2.5°) via the optical sight is dependent upon the LRV heading as follows:

	LRV Heading	Optical Sighting
1)	340° - 210°	good - not more than 30 secs of crew time
2)	210° - 280° and 325° - 340°	marginal - more than 30 secs of crew time
3)	280° - 325°	not possible

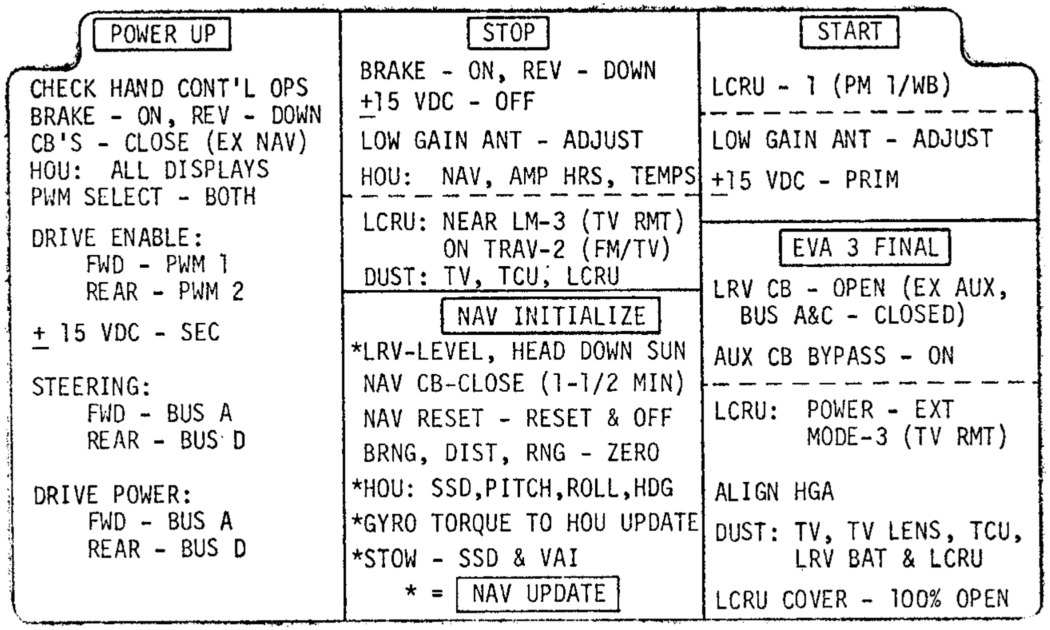
15. The LRV mirrors (eg Battery 1, Battery 2, SPU and DCE) shall be dusted at the end of each EVA if there is dust visible or if 10% of the mirrored surface is covered with dust clumps.

16. The TV cameras will be manually positioned horizontal, CW and pointing aft by the crew at the end of each science site.

17. The maximum down slope velocity for slopes greater than 12° shall be 4 Km per hour. This may require braking for extend driving times. The brakes should be applied as required to slow the vehicle and then relaxed (i.e., do not drag the brakes nor panic stop the LRV).

3.8.4 Decals and Checklists

The LRV Operations Decal located on the console immediately ahead of the LRV handcontroller is shown in figure 3.8-9. The LRV/LCRU Malfunction Procedures Checklist shown in figure 3.8-10 is included as part of the onboard Flight Data File and is stowed in the LRV mapholder.



POWER UP

CHECK HAND CONT'L OPS
BRAKE - ON, REV - DOWN
CB'S - CLOSE (EX NAV)
HOU: ALL DISPLAYS
PWM SELECT - BOTH

DRIVE ENABLE:
- FWD - PWM 1
- REAR - PWM 2

± 15 VDC - SEC

STEERING:
- FWD - BUS A
- REAR - BUS D

DRIVE POWER:
- FWD - BUS A
- REAR - BUS D

STOP

BRAKE - ON, REV - DOWN
±15 VDC - OFF
LOW GAIN ANT - ADJUST
HOU: NAV, AMP HRS, TEMPS

LCRU: NEAR LM-3 (TV RMT)
ON TRAV-2 (FM/TV)
DUST: TV, TCU, LCRU

NAV INITIALIZE

*LRV-LEVEL, HEAD DOWN SUN
NAV CB-CLOSE (1-1/2 MIN)
NAV RESET - RESET & OFF
BRNG, DIST, RNG - ZERO
*HOU: SSD,PITCH,ROLL,HDG
*GYRO TORQUE TO HOU UPDATE
*STOW - SSD & VAI
* = NAV UPDATE

START

LCRU - 1 (PM 1/WB)

LOW GAIN ANT - ADJUST
±15 VDC - PRIM

EVA 3 FINAL

LRV CB - OPEN (EX AUX,
BUS A&C - CLOSED)
AUX CB BYPASS - ON

LCRU: POWER - EXT
MODE-3 (TV RMT)
ALIGN HGA
DUST: TV, TV LENS, TCU,
LRV BAT & LCRU
LCRU COVER - 100% OPEN

Figure 3.8-9 LRV Operations Decal

Figure 3.8-10

LOSS OF VOICE COMM with MSFN (LCRU)

LCRU:

LGA: AGC <2

MODE - FM/TV (HGA) - - - - - - - - - - - - - - - - - LGA or Rcvr 1
CB LRV AUX - Close
POWER - alt. pos. (INT/EXT) - - - - - - - - - - - - 16.8V Batt Power or DC - DC Converter

AGC >2 & POWER >1

MODE-PM1/NB (LGA) - - - - - - - - - - - - - - - - - Downlink Sig Proc

MODE-FM/TV (HGA) - - - - - - - - - - - - - - - - - - S-B Xmtr or Rcvr 1 Audio

Traverse Mode: Swap Ant Connectors
MODE-PM2/NB (LGA)

AGC >2 & POWER <1

CB LCRU - CLOSE - - - - - - - - - - - - - - - - - - - 28V Overload

If CB opens: MODE-FM/TV (HGA)
CB LCRU - Close - - - - - - - - - - - S-Band Xmtr Short
CB LRV AUX - Close
POWER - EXT - - - - - - - - - - - - - CB/Switch Short

Traverse Mode: Swap Ant Connectors
MODE-PM2/NB (LGA)

CB LRV AUX - Close
POWER - alt. pos. (INT/EXT) - - - - - - - - - - - - 28V Batt Power or DC - DC Converter

HGA: AGC <2.5

MODE-PM1/WB (LGA) - - - - - - - - - - - - - - - - - HGA or Rcvr 2
CB LRV AUX - Close
POWER - alt. pos. (INT/EXT) - - - - - - - - - - - - 16.8V Batt Power or DC - DC Converter

AGC >2.5 & POWER >1

MODE - PM2/NB (HGA) - - - - - - - - - - - - - - - - Downlink Sig Proc

MODE - PM1/WB (LGA) - - - - - - - - - - - - - - - - S-B Xmtr or Rcvr 2 Audio

AGC >2.5 & POWER <1

CB LCRU - Close - - - - - - - - - - - - - - - - - - - 28V Overload

If CB Opens: MODE - PM1/WB(LGA)
CB LCRU - Close - - - - - - - - - - - S-Band Xmtr Short
CB LRV AUX - Close
POWER - alt. pos. (INT/EXT) - - - - - - - - - - - - 28V Batt Power or DC - DC Converter

Figure 3.8-10

LRV MALF. PROCEDURE

LOW ACCELERATION OR LOW SPEED

1. Cycle hand controller (fwd/rev/fwd) - - - - - - - - - - - Intermittent Contacts
2. Check motor temps. if any motor temp.
   unbalanced high (> 50°):
   Affected wheel - DRIVE POWER Sw — OFF - - - - - - - - Motor Short
   If motor continues to heat:
   While driving - decouple wheel - - - - - - - - - - - - - Traction Drive Binding
3. Set parking brake
   DRIVE ENABLE Sw (4) - PWM 1 - - - - - - - - - - - - - - - PWM 2 Failure
   PWM SELECT Sw - PWM 1
4. Set parking brake
   DRIVE ENABLE Sw (4) - PWM 2 - - - - - - - - - - - - - - - PWM 1 Failure
   PWM SELECT Sw - PWM 2
5. DRIVE POWER Sw (4) - alt. pos. - - - - - - - - - - - - - - Bus A (D) Failure
   STEERING Sw (2) - alt. pos.
6. LF,RF DR PWR Sw - BUS A
   LR,RR DR PWR Sw - BUS B - - - - - - - - - - - - - - - - - - Batt 2 Failure
   REAR STEERING Sw - BUS B
7. LF,RF DR PWR Sw - BUS C
   LR,RR DR PWR Sw - BUS D - - - - - - - - - - - - - - - - - - Batt 1 Failure
   FWD STEERING Sw - BUS C
8. Restore normal configuration per power-up decal. Monitor motor temps. frequently. Perform step 2 if motor temp. unbalance occurs.

LOSS OF STEERING AND DRIVE FROM ALL WHEELS

1. ±15 VDC Sw - alt. pos. - - - - - - - - - - - - - - - - - - - ±15 VDC Circuitry
2. Set Parking Brake
   DRIVE ENABLE Sw (4) - PWM 2
   PWM SELECT Sw - PWM 2
   ±15 VDC CB (2) - close - - - - - - - - - - - - - - - - - - - PWM 1 Shorted
3. Set Parking Brake
   DRIVE ENABLE Sw (4) - PWM 1
   PWM SELECT Sw - PWM 1
   ±15 VDC CB (2) - close - - - - - - - - - - - - - - - - - - - PWM 2 Shorted
4. DRIVE POWER Sw (4) - OFF (individually)
   ±15 VDC CB (2) - close - - - - - - - - - - - - - - - - - - - DCE Shorted
5. STEERING POWER Sw (2) - OFF (individually)
   ±15 VDC CB (2) - close - - - - - - - - - - - - - - - - - - - Steering Shorted

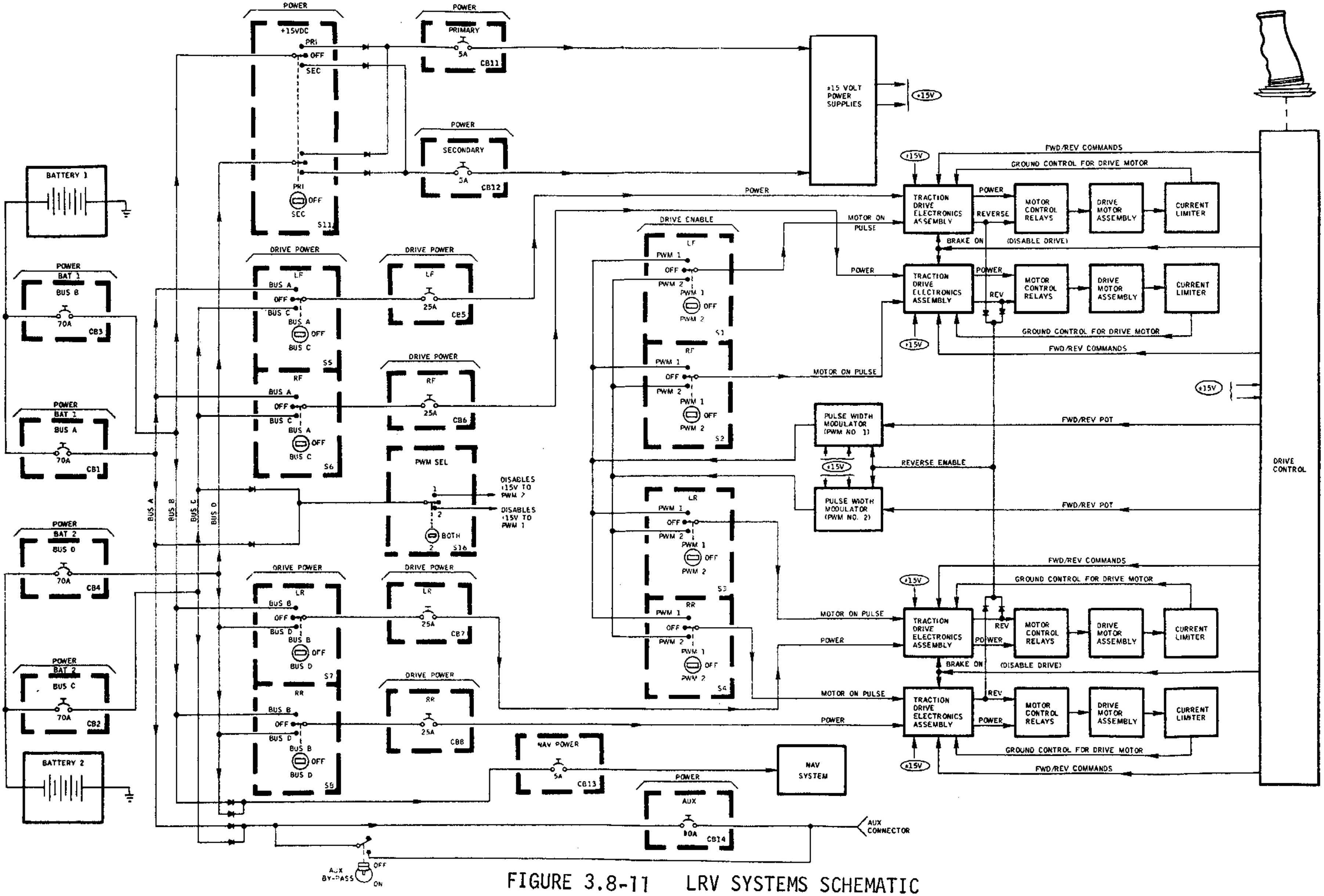


FIGURE 3.8-11 LRV SYSTEMS SCHEMATIC

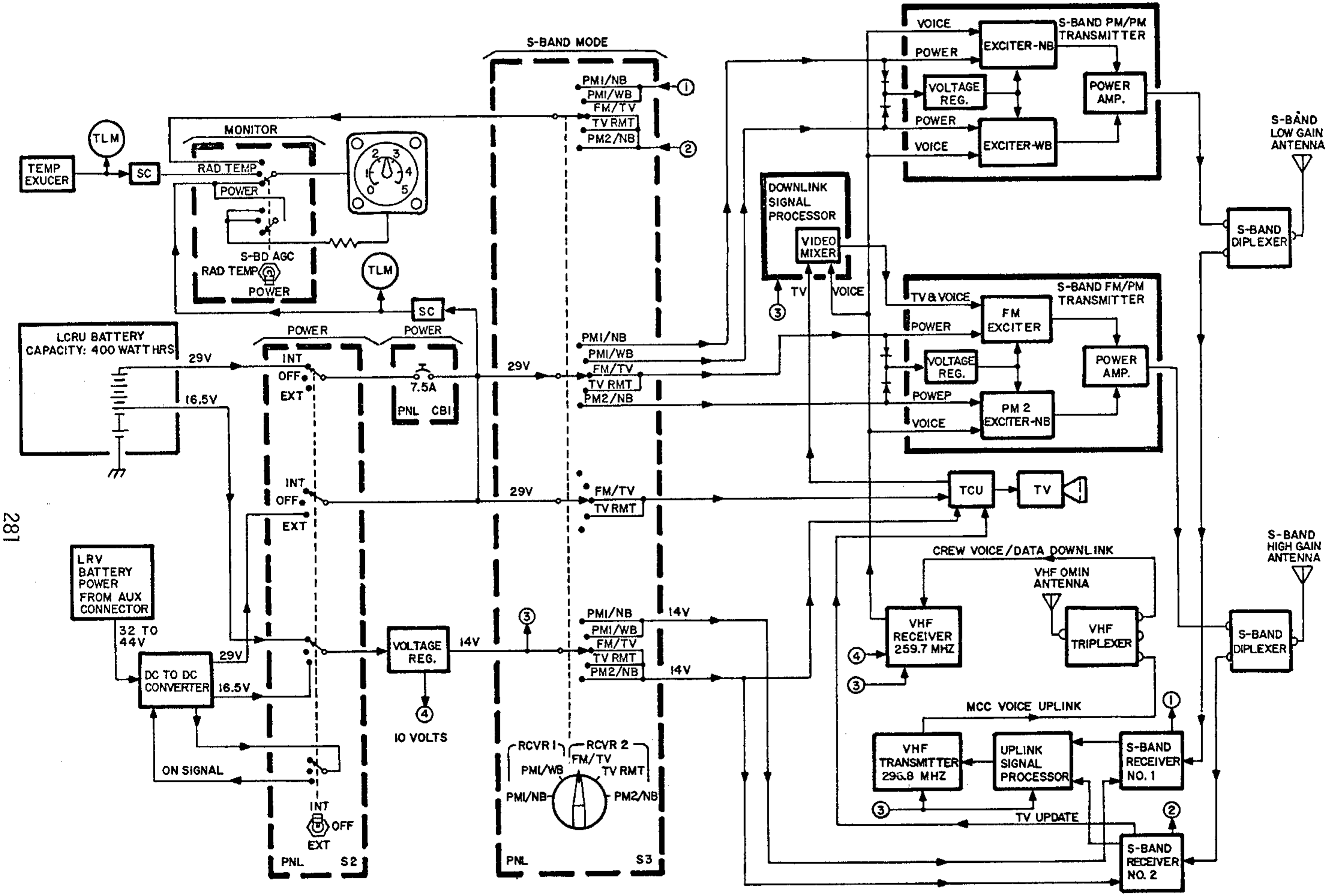


FIGURE 3.8-12 LCRU SYSTEM SCHEMATIC

4.0 APPENDIX

4.0 APPENDIX

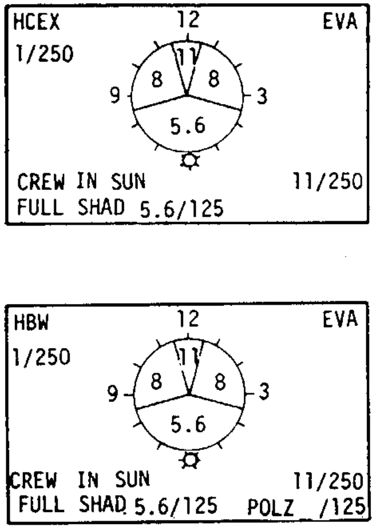
4.1 ABBREVIATIONS AND ACRONYMS

ALSD	Apollo Lunar Surface Drill
ALSEP	Apollo Lunar Surface Experiments Packages
A/S	Ascent Stage (of the LM)
BB	Boyd Bolt (fasteners on ALSEP)
BRB	Big Rock Bag (Sample Return Bag - CFE)
BSLSS	Buddy Secondary Life Support System
CDR	Commander
CRE	Cosmic Ray Experiment
C/S	Central Station
CSVC	Core Sample Vacuum Container
CTV	Color Television (Camera)
D/S	Descent Stage (of the LM)
DSBD	Documented Sample Bag Dispenser
ECS	Environmental Control System
EMU	Extravehicular Mobility Unit
EP	Explosive Package
ETB	Equipment Transfer Bag
EVA	Extravehicular Activity
GCTA	Ground Controlled Television Assembly
HBW	High-speed Black and White Film
HCEX	High-speed Color Exterior Film
HEDC	Hasselblad Electric Data Camera
HFE	Heat Flow Experiment
HGA	High-Gain Antenna
ICG	Internal Cover Garment
ISS	Interim Stowage Shelf
LACE	Lunar Atmospheric Composition Experiment (same as LMS, qui vide)
LCG	Liquid Cooled Garment
LCRU	Lunar Communication Relay Unit
LEAM	Lunar Ejecta and Meteorites Experiment
LEC	Lunar Equipment Conveyor
LGA	Low Gain Antenna

LiOH	Lithium Hydroxide
LM	Lunar Module
LMP	Lunar Module Pilot
LMS	Lunar Mass Spectrometer
LRV	Lunar Roving Vehicle
LSG	Lunar Surface Gravimeter
LSPE	Lunar Seismic Profiling Experiment
Mag	Magazine (for 70 mm)
MCC	Mission Control Center
MESA	Modularized Equipment Stowage Assembly
MSFN	Manned Space Flight Network
NAV	Navigation System (on the LRV)
NFE	Neutron Flux Experiment
OPS	Oxygen Purge System
PLSS	Primary Life Support System
PRA	Parabolic Reflector Assembly
RCU	Remote Control Assembly
RHSC	Right Hand Side Console
RTG	Radio-isotope Thermoelectric Generator
SCB	Sample Collection Bag
SEP	Surface Elecrtrical Properties (Experiment)
SEQ	Scientific Equipment
SESC	Special Environmental Sample Container
SRC	Sample Return Container
SSD	Sun Shadow Device (on RLV)
SSE	Space Support Equipment (system for deploying LRV)
SRB	Sample Return Bag (Same as Big Rock Bag)
TCU	Television Control Unit
TD	Touchdown
UHT	Universal Handling Tool (from ALSEP)

4.2 EQUIPMENT DECALS

Decals are provided as required to supplement the crew cuff check lists and to provide detailed information for tasks that require step-by-step operations. Figure 4.2-1 shows the decals for the lunar surface cameras and the ALSD.



These decals are affixed to the CDR and LMP Hasselblad Electric Data Cameras.

1. PUSH SWITCH TO TEST
2. PULL PIN 2 (LEFT SIDE)
3. TURN LOCK 3(BOTTOM RIGHT)CCW
4. TURN LOCK 4(RIGHT SIDE)CCW
   PULL UP-PULL LANYARD TO RIGHT
5. REMOVE & INSTALL HANDLE-BLACK
   PIN UP
6. REMOVE RACK - LIFT VERTICALLY
7. PUSH LEG FROM CLIP
8. EXTEND & LOCK LEGS (3)
9. PLACE RACK ON SURFACE
10. PULL PIN 5 - SWING COLLAR UP
11. REMOVE DRILL

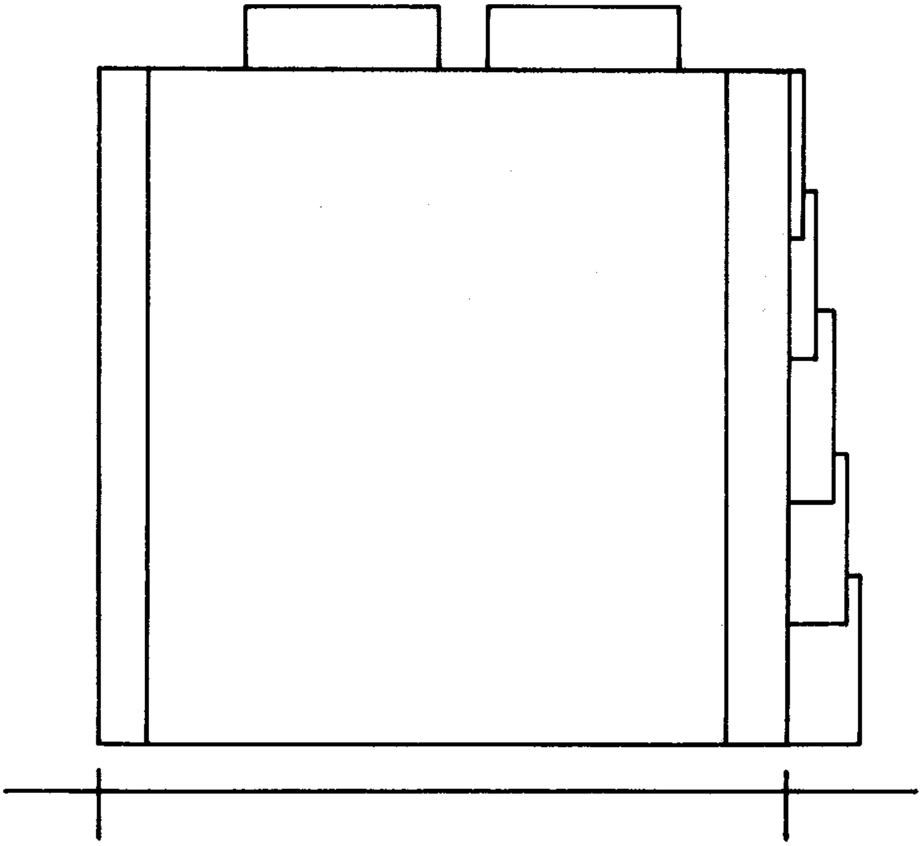
These decals are affixed to the Lunar Surface Drill thermal cover.

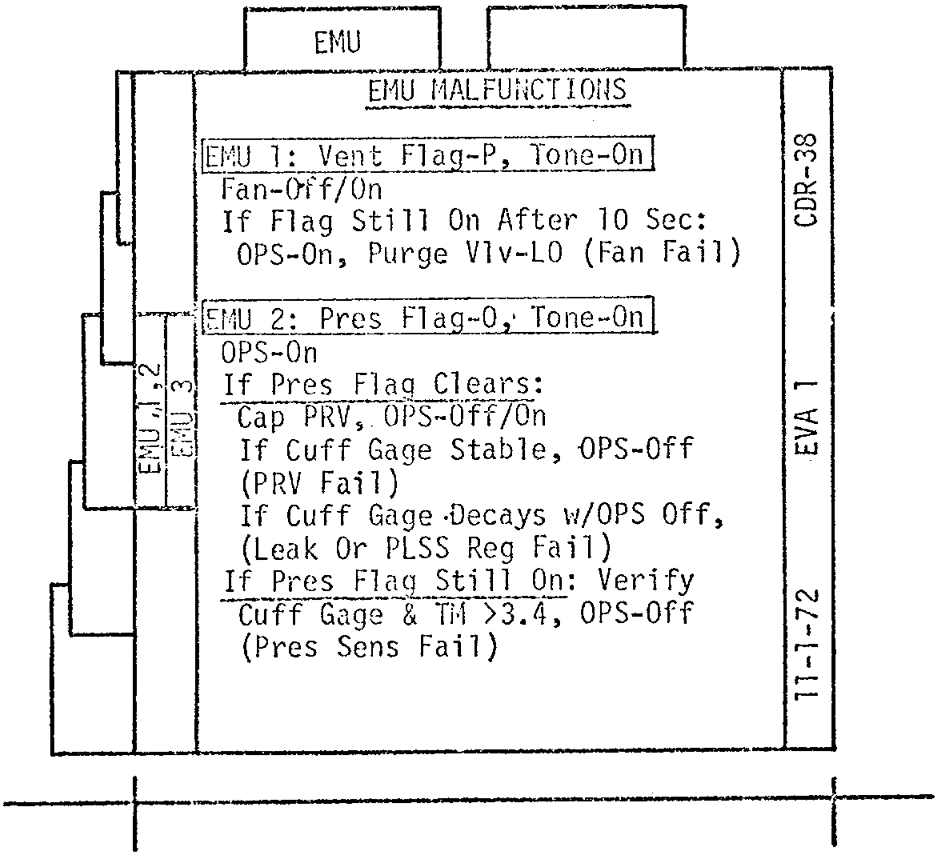
REMOVE THERMAL COVER
BEFORE DRILLING

FIGURE 4.2-1 EQUIPMENT DECALS

4.3 EMU MALFUNCTION PROCEDURES

The following Cuff Checklist pages contain the malfunction crew procedures for eleven (11) EMU malfunctions, for loss of voice communications through the LCRU on the LRV and BSLSS donning, activation and doffing procedures. These pages are included as the last section in both the CDR and LMP Cuff Checklist.





EMU

EMU 1,2

EMU 3

EMU MALFUNCTIONS

EMU 1: Vent Flag-P, Tone-On

Fan-Off/On

If Flag Still On After 10 Sec:
 OPS-On, Purge Vlv-LO (Fan Fail)

EMU 2: Pres Flag-O, Tone-On

OPS-On

If Pres Flag Clears:
 Cap PRV, OPS-Off/On
 If Cuff Gage Stable, OPS-Off
 (PRV Fail)
 If Cuff Gage Decays w/OPS Off,
 (Leak Or PLSS Reg Fail)

If Pres Flag Still On: Verify
 Cuff Gage & TM >3.4, OPS-Off
 (Pres Sens Fail)

CDR-38

EVA 1

11-1-72

CDR-39

EVA 1

11-1-72

EMU 3: 02 Flag-O, Tone-On

Ck Cuff Gage & PLSS 02 Qty
If Cuff Gage >4.0: OPS-On,
 PLSS 02 - Off (PLSS Reg Fail)
If Cuff Gage <3.7, OPS-On
 Cap PRV, OPS-Off/On
 If Cuff Gage Stable, OPS-Off
 (PRV Fail)
 If Cuff Gage Decays w/OPS Off,
 (Leak Or PLSS Reg Fail)
If PLSS 02 Qty Decr: OPS-On(Leak)

EMU 1,2

EMU 3

EMU 4: H20 Flag-A, Tone-On(Prim)

Ver Prim H20 - Open, If Open
 Ver TM For Subl Restart Or Aux
 H20 Act: Subl Restart: Prim H20
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H20 - Open,
 Wait 4 Min Or H20 Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H20 Act: Diverter-MIN, Aux
 H20 - Open, Wait 4 Min Or H20
 Flag Off, Diverter As Desrd
 (Prim H20 Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H20 Depletion:
 (H20 Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H20 - Clsd: Diverter-MIN,
 Prim H20 - Open, Wait 4 Min Or
 H20 Flag Off, Diverter As Desrd

EMU 4

EMU 4A

CDR-40

EVA 1

11-1-72

EMU 4 EMU 4A

EMU 4A: H20 Flag-A, Tone-On(Aux)

Ver Prim & Aux H20-Open, If Open
& Add'l Cooling Reqd, Act.
BSLSS (Subl Degrd) [If No BSLSS,
OPS-On, Purge Vlv-Hi]
Ver TM For Subl Restart: Prim
H20-Clsd, Diverter-MAX, Wait 5
Min, Diverter-MIN, Prim H20-
Open, Wait 4 Min Or H20 Flag
Off, Diverter As Desrd
(Subl Brkthru)
If TM Does Not Ver Subl Brkthru:
(H20 Press Sw Fail or H20 Blocked
Or Depleted)
If Prim Or Aux H20-Clsd:
Diverter-MIN, Prim & Aux H20
Open, Wait 4 Min Or H20 Flag
Off, Diverter As Desrd

EMU 5 EMU 6,7

EMU 5: Tone-On, No Flags

Ck Cuff Gage
If <3.4: OPS-On (Pres Flag
Fail & Leak Or PLSS Reg Shift)
If >3.4: After Tone Off,
Cycle Mode Sel A/AR
If Tone On Again:
Fan-Off 5 Sec,
If No Vent Flag: OPS-On, Purge
Vlv-Lo (Vent Flag & Fan Fail)
If Vent Flag On: Fan-On, Check
PLSS 02 Qty, If > Than Normal
Decr Rate: OPS-ON (02 Flag
Fail & EMU Leak)
If No Tone & TM Confirms Low
H20 Press (H20 Flag Failed &
H20 Sys Problem-Go To EMU 4 If
PRIM In Use,Or 4A If AUX In Use)
If TM H20 Press Good (Transient
Cond Or Tone Fail)

CDR-43 EVA 1 11-1-72

EMU 5

EMU 6,7

EMU 6: Cuff Gage <3.7, (All Other Indicators OK)

OPS-On

If Cuff Gage Increase,
(PLSS Reg Shift)

If No Gage Increase,
Ver TM >3.7, OPS - Off
(Cuff Gage Fail)

EMU 7: PLSS 02 Qty Ind Abnormal

Ck Cuff Gage Or 02 Flag-0

If Cuff Gage >4.0, OPS-On,
PLSS 02-Off (PLSS Reg Fail)

If Cuff Gage <3.7 Or 02 Flag-0,
OPS-On (Leak)

If No Apparent Failure, Ver TM
(Ind Or X-ducer Fail Or Leak)

EMU 8,9

EMU 10

CDR-44 EVA 1 11-1-72

EMU 8: Cuff Gage >4.0

If 02 Flag-0 Or PLSS 02 Decr,
OPS-On, PLSS 02-Off
(PLSS Reg Fail)

If Neither, Ver TM (Gage Fail)

EMU 9: Loss Of Pump Noise

If No Side Tone, OPS-On,
Purge Vlv-LO, Act. BSLSS
(Power Fail) [If No BSLSS,
OPS-On, Purge Vlv-Hi]

If Sidetone OK, Ver Pump-On. If
Add'l Cooling Reqd, Act. BSLSS
(Pump Fail) [If No BSLSS,
OPS-On, Purge Vlv-Hi]

CDR-45 EVA 1 11-1-72

EMU 8,9
EMU 10

EMU 10: Cooling Inadequate

Ver Diverter-MAX & Pump-On
Ver Prim & (If On Aux) Aux H20
 Open: If Open, Act. Gas Trap
 5 Sec, Wait 3 Min, If Add'l
 Cooling Reqd, Act. BSLSS (Flow
 Restr, Subl Or Pump Dagrd, Or
 Heat Leak) [If No BSLSS,
 OPS-On, Purge Vlv-Hi]
Ver TM For Aux H20 Act: Diverter
 MIN, Aux H20-Open, Wait 4 Min,
 Diverter As Desrd (Prim H20
 Depletion)
If Prim Or (If On Aux) Aux H20
 Clsd: Diverter-MIN, Prim & (If
 On Aux) Aux H20-Open, Wait 4
 Min, Diverter As Desrd
 (H20 Flag Fail)

CDR-46 EVA 1 11-1-72

EMU 11, LCRU
BSLSS

EMU 11: Loss Of Voice Comm (LM)

Ck Vol Controls (Wheel A-Hou,
 Blade-B-EVA)
Cycle PTT Sw-MAIN & MOM
CDR Mode Sel To B, LMP To A
 (Hand Signals)
If No Comm, CDR To A, LMP To B

LCRU 1: Loss Of Voice Comm (LCRU)

If no comm between crewmen,
 perform EMU 11.
If no comm with STDN:
 Ck Vol Control (Wheel-A-Hou)
 Repoint LCRU antenna
 Select alternate mode--
  Mode - PM1/WB or FM/TV
  Point selected antenna
 LCRU cb - close
 LRV AUX cb - close
 LCRU POWER Sw - alt pos (INT/EXT)

CDR-47

EVA 1

11-1-72

BSLSS Don And Activate

1 Unstow BSLSS

2 Conn Tether Between Crewmen:
  BSLSS H20 Flow Divider At Good
  PLSS, Good PLSS On RH Side

3 Remove Dust Cover From BSLSS
  H20 Flow Divider

4 Discon Good PLSS H20 From PGA

5 Conn BSLSS H20 Flow Divider To
  PGA With Good PLSS

6 Failed PLSS Pump-Off

7 Discon Failed PLSS H20 From
  PGA & Secure

8 Discon BSLSS H20 From BSLSS
  H20 Flow Divider

9 Conn BSLSS H20 To PGA With
  Failed PLSS

10 Conn Good PLSS H20 To BSLSS
  H20 Flow Divider

BSLSS

EMU/T.LCRU

BSLSS

BSLSS Doff

1 Discon BSLSS From Failed PLSS
  PGA

2 Discon Tether From Both PGA's

3 Discon PLSS H20 From BSLSS

4 Discon BSLSS From PGA & Discard

5 Conn Good PLSS H20 To PGA

6 Ingress LM

CDR-48

EVA 1

11-1-72

4.4 TRAVERSE PLANNING PARAMETERS

Note: Section 4.4 has been prepared in its entirety by the Operations Analysis Branch, Systems Engineering Division, Apollo Spacecraft Program Office

EVA TRAVERSE PLANNING PARAMETERS

The purpose of this appendix is to provide a summary reference source for primary data used in lunar surface traverse planning. These data are those that have been generally concurred with for use in current lunar surface operations planning and study. Officially approved data for each mission ultimately appear in the Apollo Spacecraft Operational Data Books, Flight Mission Rules and the Flight Plan. Prior to that time, these EVA traverse planning parameters will be updated periodically through the Lunar Surface Operations Planning Meetings.

Primary lunar surface traverse planning data presented herein are categorized for each reference with the organization and person responsible for the data indicated at the bottom of each page, along with the official data source reference.

APOLLO 17 PLANNING PARAMETERS

1. Crewmen Parameters

1.1 Metabolic Rates[1], $\dot{Q}_M$

a. Riding on LRV 550 Btu/Hr

b. Working

(1) Overhead and ALSEP Activities 1050 Btu/Hr

(2) Geological Station Activities 950 Btu/Hr

c. Contingency Walking

Duration	Walking Speed[2] (Average)	Metabolic Rate Including 20-Percent Uncertainty
	Over Uncorrected Map Distance	
Up to 1 Hour Total Return Time	3.6 Km/Hr	1560 Btu/Hr
Return Requiring Over 1 Hour	2.7 Km/Hr	1290 Btu/Hr

d. Normal Walking (Average)

2.5 Km/Hr, Uncorrected Map Distance, 1000 Btu/Hr

1.2 Respiratory Quotient 0.90

1.3 Time in Pressurized PGA[3]

Uninterrupted time in a pressurized PGA should be limited to 7 hours of nominal EVA.

Responsible Organization:	Medical Operations Division/DD
Point of Contact:	J. F. Zieglschmid, MD; Ext. 42 [2]R. G. Zedekar/CG3; Ext. 3091
Official Data Sources:	[1]SODB, Vol. II, LM Data Book, Part 1, Table 4.3-2, page 4.3-13 [3]SODB, Vol. IV, EMU Data Book, Operational Constraints and Limitations, page 3.2-3, EPG-11

2. PLSS Parameters

2.1 PLSS Battery

a. Battery Capability		25.4 Amp-Hours
b. Battery Voltage		16.8 Volts dc
c. TM Usable		20.92 Amp-Hours
(1) Pre-EVA Checkout	1.2 Amp-Hours	
(2) Post-EVA Reserve	1.43 Amp-Hours	
(3) TM Inaccuracy	1.85 Amp-Hours at 7.6 Hours	
d. Usage Rate		2.7 Amps

Responsible Organization: Crew Systems Division/EC

Point of Contact: J. L. Gibson; Ext. 2352

Official Data Sources: SODB, Vol. IV, EMU Data Book, EMU Consumables Tables 4.0-3A and 4.0-3B

2. PLSS Parameters (Continued)

2.2 Primary Oxygen Supply

a. POS Bottle Volume		378 Cu In.	
b. Full Charge	(EVA 1)		(EVA 2 or 3)
	1432 Psia @ 70°F 1.860 Lb (Z = 0.9485)		1395 Psia @ 70°F 1.810 Lb (Z = 0.950)
c. EMU Pressurization		70 Psia 0.091 Lb	
d. LM Repress		25 Psia 0.031 Lb	
e. TM Inaccuracy		48 Psia 0.060 Lb	
f. Minimum Regulation Pressure		145 Psia 0.180 Lb	
g. O_2 Reserve at Normal Working Rate		76 Psia 0.095 Lb	
h. Total Usable O_2	1.403 Lb		1.353 Lb

2.3 EMU O_2 Leak Rates

a. EVA 1	0.020 Lb/Hr
b. EVA 2	0.028 Lb/Hr
c. EVA 3	0.035 Lb/Hr

Responsible Organization: Crew Systems Division/EC

Point of Contact: J. L. Gibson; Ext. 2352

Official Data Sources: SODB, Vol. IV, EMU Data Book, EMU Consumables Tables 4.0-3A and 4.0-3B, and Mission Appendix

2. PLSS Consumables (Continued)

2.4 O_2 Usage Rate $1.627 \times 10^{-4} (\dot{Q}_M)$ + EMU Leak Rate

2.5 PLSS Feedwater

a.	Feedwater Loading		11.90 Lb
(1)	Main Tank	8.50 Lb	
(2)	Aux. Tank	3.40 Lb	
b.	Transport Loop Makeup (EVA 1 only if PLSS launched with feedwater)		0.13 Lb
c.	Non-Expellable		0.09 Lb
d.	Slave Water		0.63 Lb
e.	Usable Leftover Slave Water (EVA 2 or 3)		0.30 Lb
f.	Reserve at Normal Working Rate		Provided by slave water and thermal inertia
g.	Heat of Sublimation		1038 Btu/Lb
h.	Usable Feedwater	(EVA 1)	(EVA 2 or 3)
		10.86 Lb 11,273 Btu	11.29 Lb 11,719 Btu

Responsible Organization: Crew Systems Division/EC

Point of Contact: J. L. Gibson; Ext. 2352

Official Data Sources: SODB, Vol. IV, EMU Data Book, EMU Consumables Tables 4.0-3A and 4.0-3B, and Mission Appendix

2. PLSS Parameters (Continued)

2.6 EMU Heat Leak, $\dot{Q}_{hl}$[1]

EVA	I	II	III
T=0 Launch	0 RLP*	+135 RLP*	+200 RLP*
T+24 Launch	TBD	TBD	TBD

*RLP - Rough Lunar Plain

2.7 Feedwater Usage Rate[2]

a. Cooling Rate, $\dot{Q}_T = 1.26\ \dot{Q}_M + 153\ \text{Btu/Hr} + \dot{Q}_{hl}$

b. Feedwater, $\dot{W}_{H_2O} = \dfrac{\dot{Q}_T}{1038\ \text{Btu/Lb}\ H_2O}$

2.8 PLSS LiOH Capability[3]

a. Nominal Loading

(1) Total CO_2 Absorption, No Thermal Soak	10,900 Btu
(2) Total CO_2 Absorption, Thermal Soak	8,400 Btu
b. Usage Rate	Crew Metabolic Rate

Responsible Organization: Crew Systems Division/EC

Point of Contact: J. L. Gibson, Ext. 2352

Official Data Sources:

[1] SODB, Vol. IV, EMU Data Book, EMU Heat Leaks, Figure 4.0-1 and Mission Appendix

[2] SODB, Vol. IV, EMU Data Book, page 4.5-66, Figure 4.5-44

[3] SODB, Vol. IV, EMU Data Book, EMU Consumables, Tables 4.0-3A and 4.0-3B

3. BSLSS/OPS

3.1 OPS[1]

a. OPS Bottle Volume	322 Cu In.
b. Full Charge	5.75 Lb at 5880 Psia
c. Residual	
(1) High Purge	0.706 Lb at 500 Psia -40°F
(2) Low Purge	0.411 Lb at 300 Psia -40°F
(3) Makeup	0.106 Lb at 100 Psia 64°F
d. Usable	
(1) High Purge	5.04 Lb
(2) Low Purge	5.34 Lb
(3) Makeup	5.64 Lb
e. Lifetime	
(1) High Purge	39 Minutes
(2) Low Purge	79.5 Minutes

3.2 BSLSS[2]

a. BSLSS Hookup Time Required[3]	5 Minutes
b. Emergency LM Ingress Time[3]	13 Minutes
c. Time Limit for Walk-back to LRV (Ops Low Purge) for BSLSS Hookup	10 Minutes

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Responsible Organization: Crew Systems Division/EC

Point of Contact: J. L. Gibson; Ext. 2352
[3] R. G. Zedekar/CG3; Ext. 3091

Official Data Sources:
[1] SODB, Vol. IV, EMU Data Book, EMU Consumables Tables 4.0-3A and 4.0-3B, Figure 4.6-5

[2] SODB, Vol. IV, EMU Data Book, Section 4.7, page 4.7-1

4. Lunar Roving Vehicle

4.1 LRV Mobility Rate for Premission Planning	7.3 Km/Hr
4.2 LRV Emergency Return Speed	Not to exceed 9.2 Km/Hr for premission planning; actual value to be assessed in real time over outgoing leg of traverse.

Responsible Organization: MSFC

Point of Contact: D. Arnett

Official Data Sources: LRV Operations Data Book

4.5 REFERENCES AND BACKGROUND MATERIAL

1. Mission Science Planning Document (Apollo Mission J-3, Apollo 17: Science and Applications Directorate, NASA-MSC dtd July 16, 1972

2. Mission Requirements, J-3 Type Mission, Lunar Landing: Apollo Spacecraft Program Office, NASA-MSC dtd March 16, 1972 (Basic) Revision A, dtd July 5, 1972 (MSC-05180)

3. ALSEP Data Book: Bendix Aerospace Corp. BSR3335 (MSC No. ALSEP MP-07) dtd 7-17-72

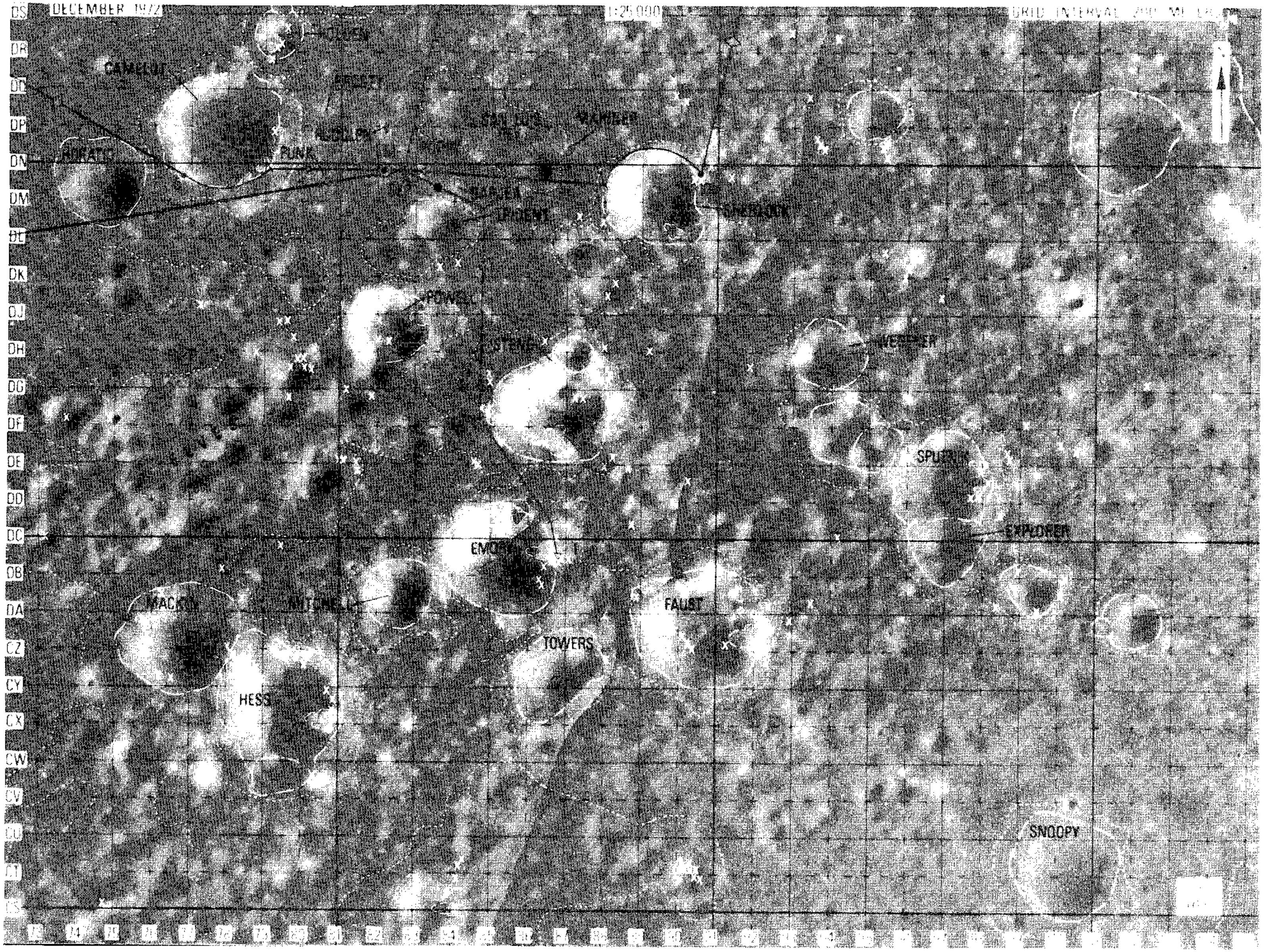
4. ALSEP Systems Handbook (Apollo 17, ALSEP 5, Array E) : Flight Control Division, NASA-MSC dtd Aug 8, 1972

5. APOLLO 17 Traverse Planning Data (2nd Edition): Apollo Spacecraft Program Office, NASA-MSC dtd Sept 1, 1972

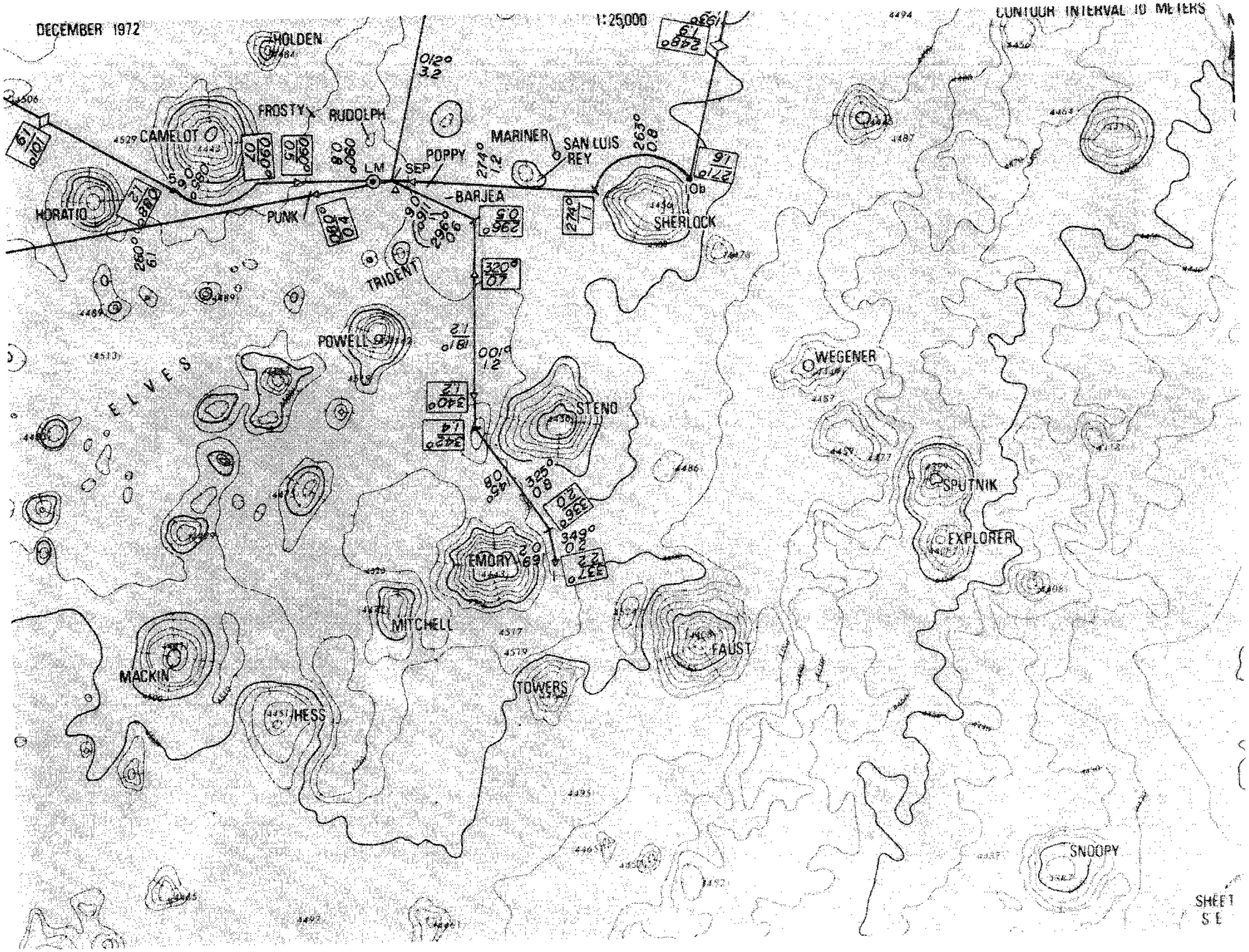
6. Apollo Operations Handbook-Extravehicular Mobility Unit: Vol.II Operational Procedures MSC-01372-2; Vol.IV, Rev. 2, SNA-8-d-027 (IV) REV. Crew Systems Division, NASA-MSC

SPECIAL SUPPLEMENT

The following maps are reproductions of the Flight Data File maps that the Apollo 17 crew will transfer to the surface and use during their sorties at Taurus-Littrow. Each map is two-sided: one side shows the traverse as an overlay on a photomap of the part of the site; the other side is a topographic map with navigational information. Both sides give place names which, for the most part, are informal designations given by the crew to aid them in describing their findings and location during lunar surface operations.



EVA 1 TRAVERSE TO STATION 1



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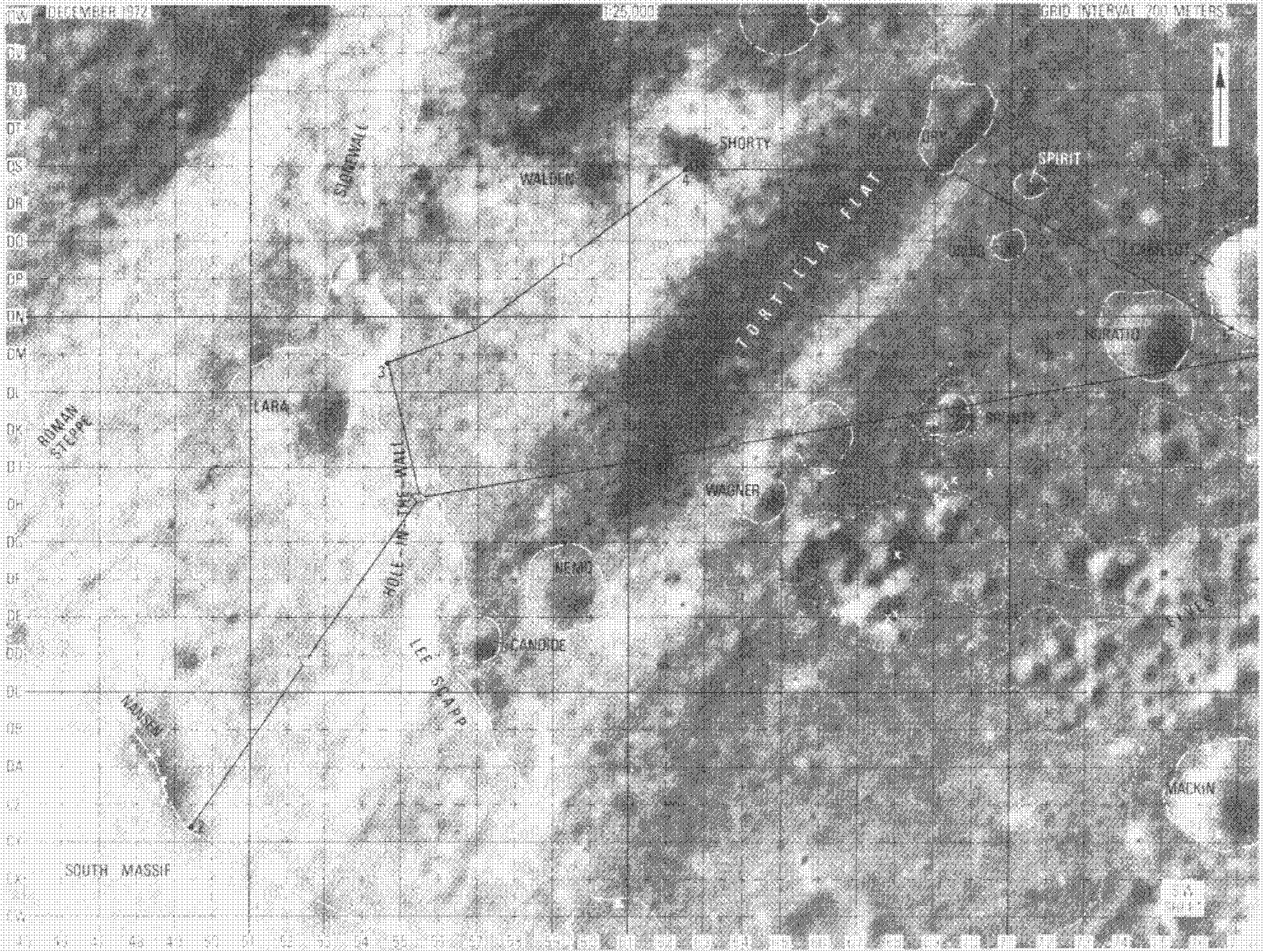
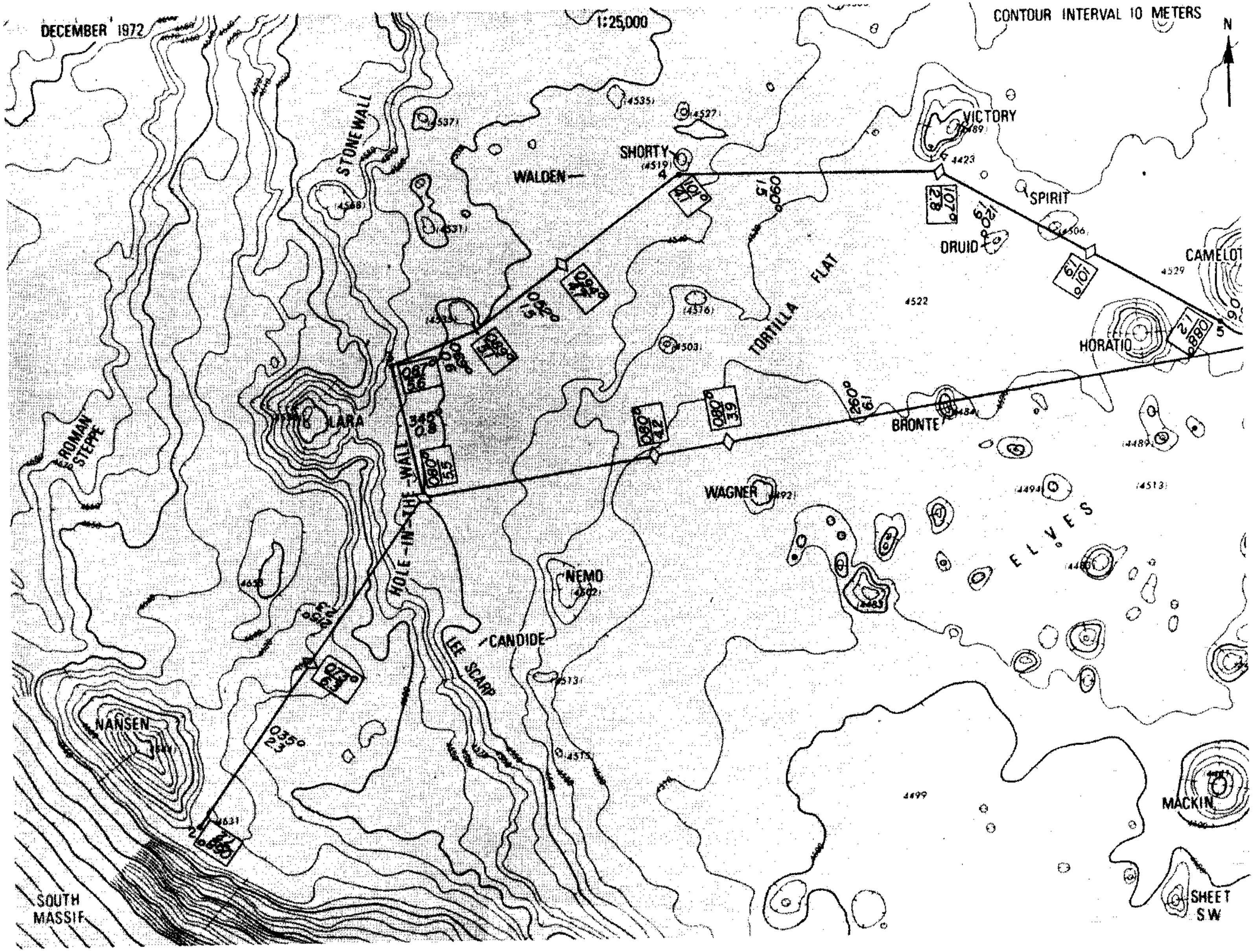


EVA 2 TRAVERSE - SOUTH LEG



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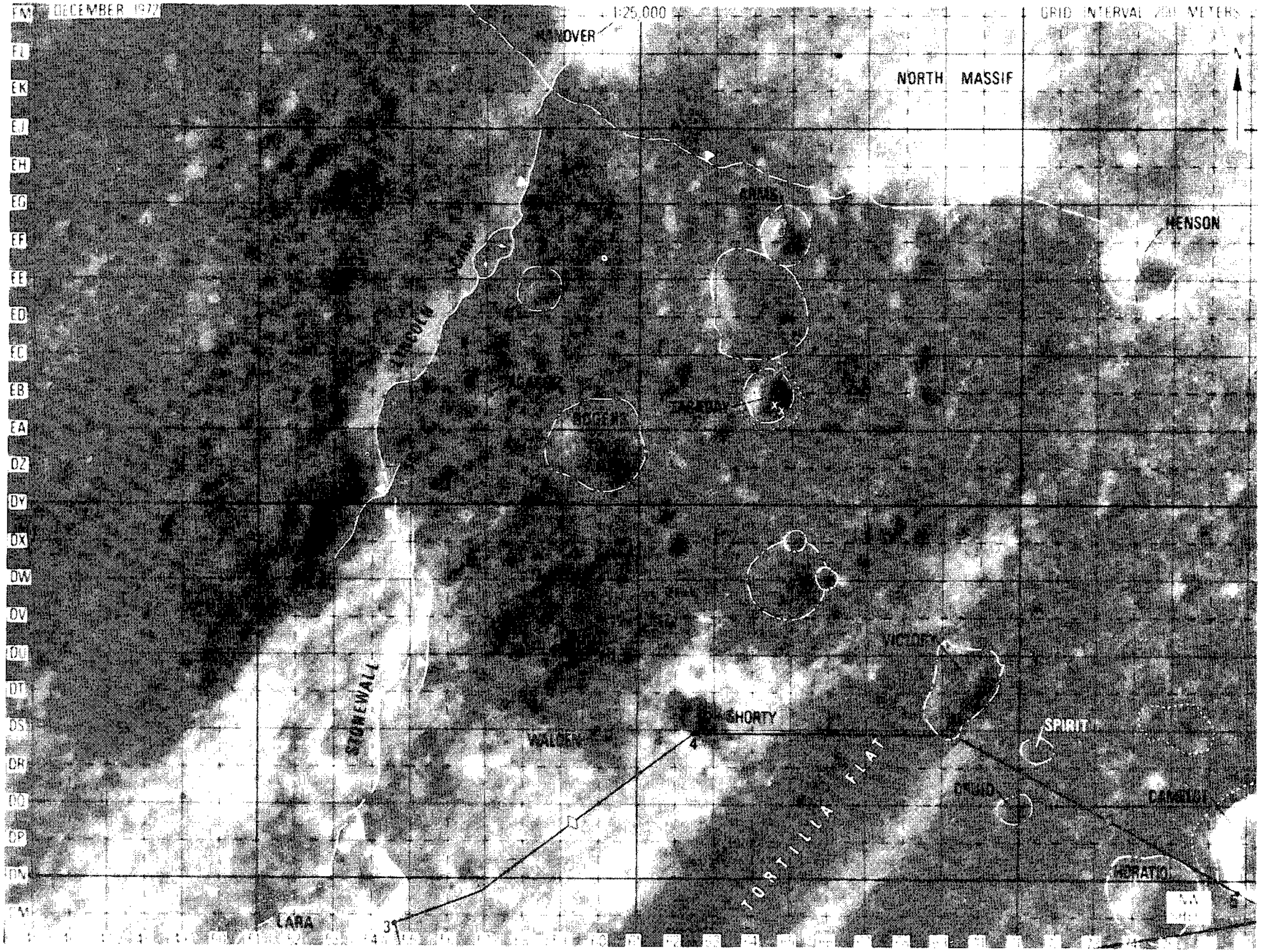
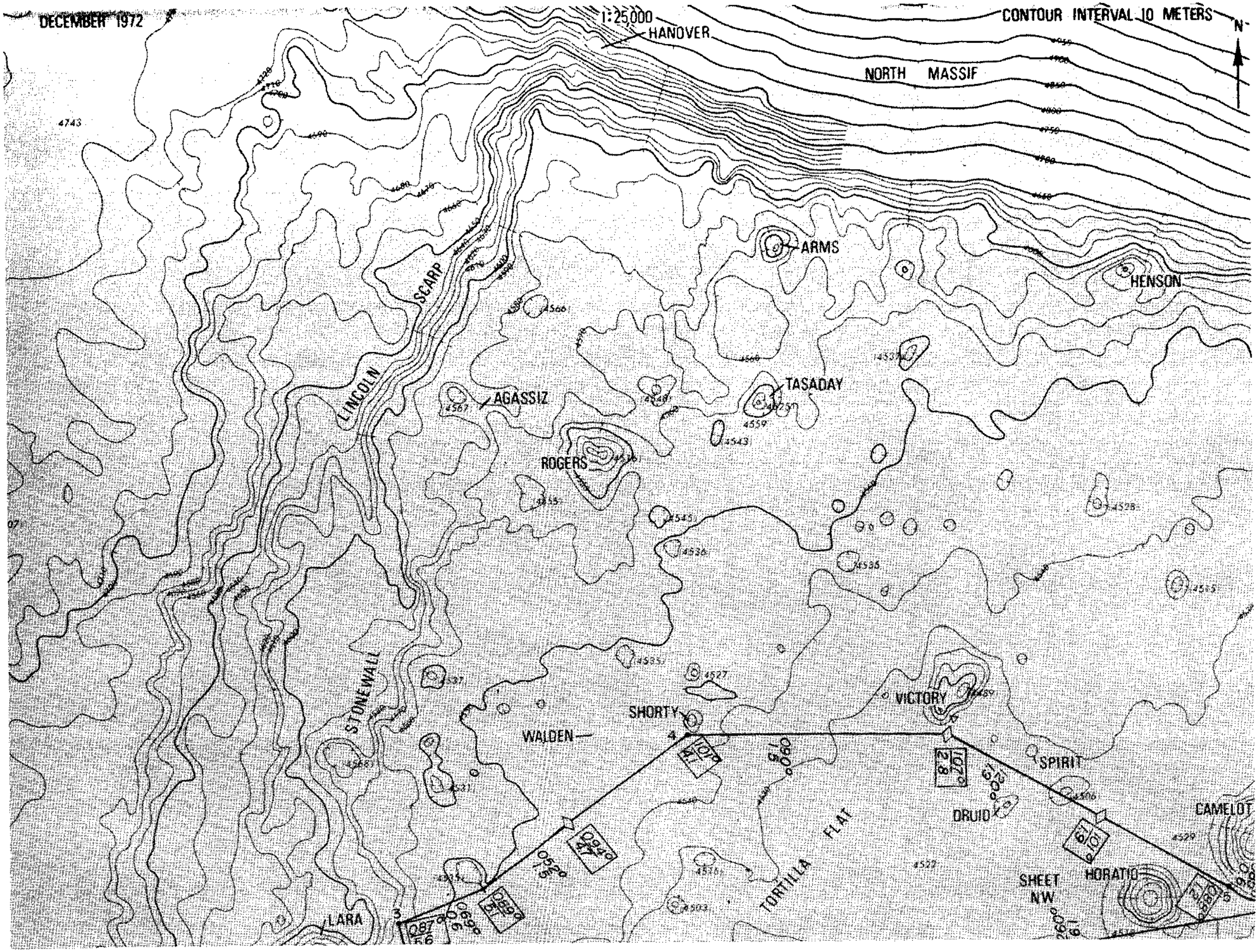


EVA 2 TRAVERSE - NORTH LEG



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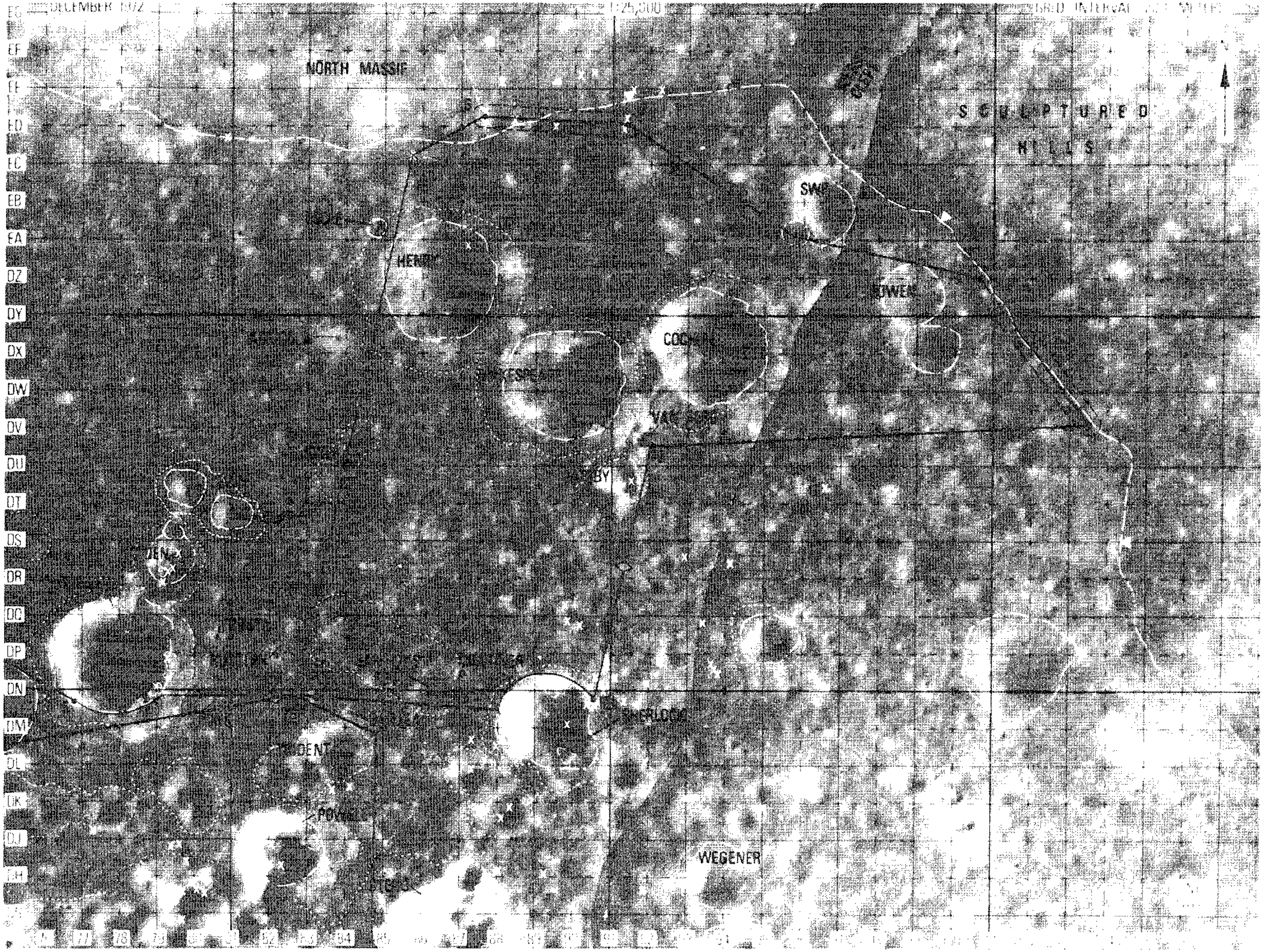
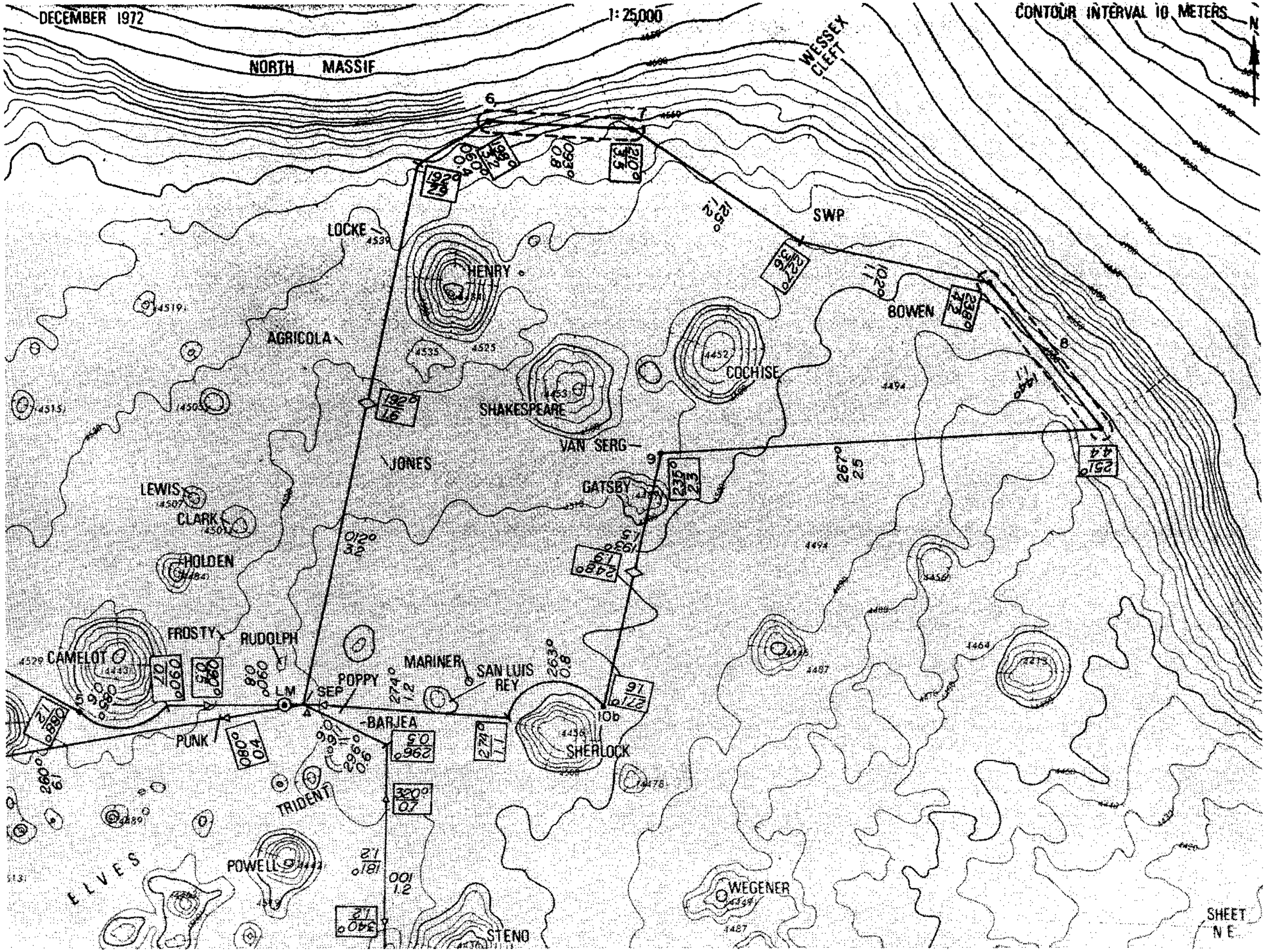
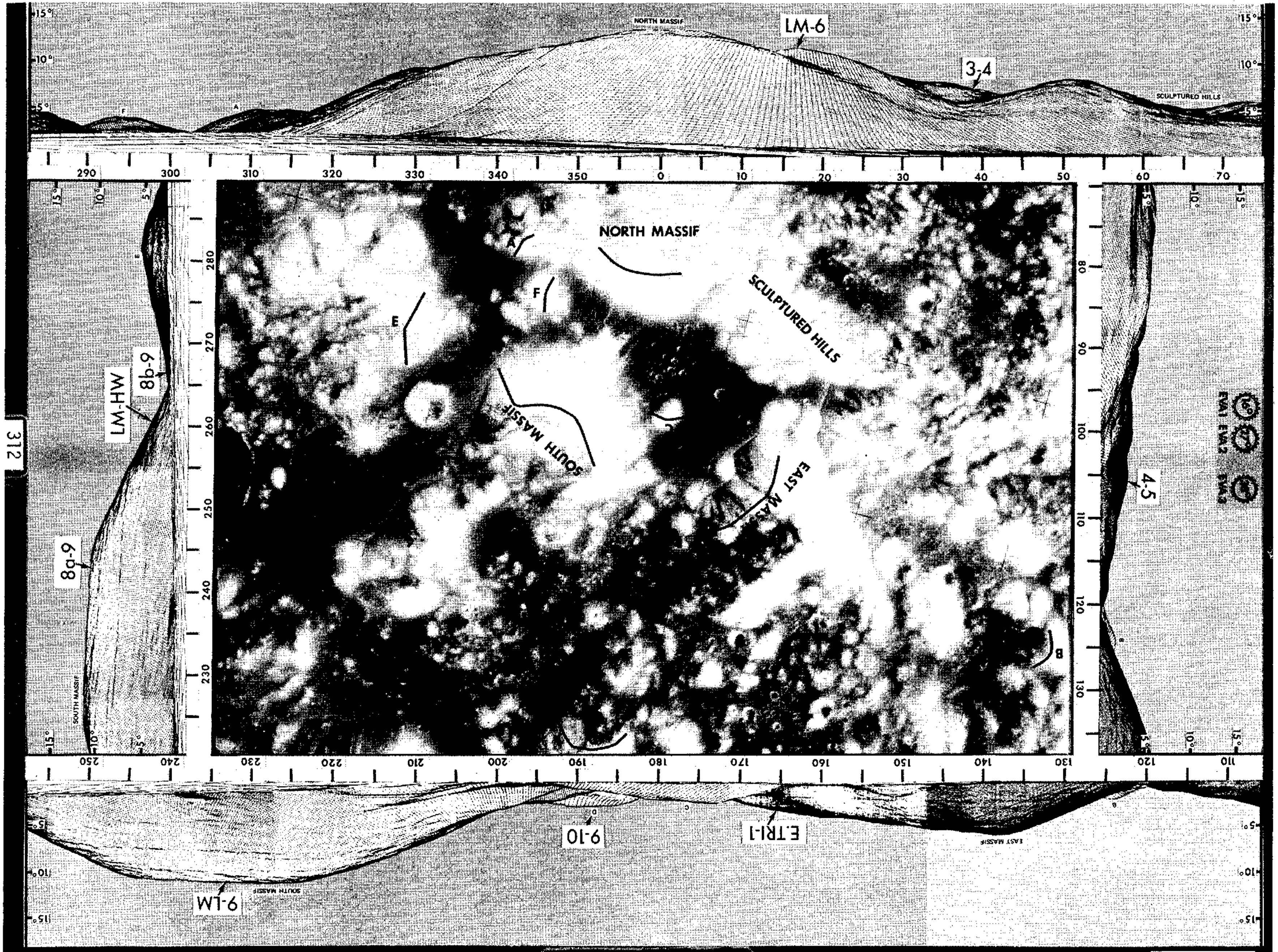


EVA 3 TRAVERSE



EVA 3 TRAVERSE



HORIZON PROFILE MAP

NASA — MSC