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APOLLO 17

FINAL

LUNAR SURFACE PROCEDURES

VOL. 2: CONTINGENCY PLANS

PREPARED BY

EVA AND EXPERIMENTS BRANCH
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FINAL

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VOL. 2: CONTINGENCY PLANS

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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 Contingency Pland and Procedures for Apollo 17 Mission J-3, the seventh manned lunar landing mission.

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Sections 4.0 - 4.4 were prepared by the Science Mission Support Division, Science and Applications Directorate, for inclusion in this document.

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Contingency Plans

1.0 INTRODUCTION

The contingency plans and guidelines which are provided in this document are intended to provide a conceptual frame work to prepare for possible contingencies in the course of lunar surface operations on Apollo 17. A variety of situations are covered - - one man EVA's, EVA's in which the LRV is unavailable, shortened EVA's, and cases in which the LM has landed at a considerable distance from the intended landing point.

Obviously, not all problems that may arise can be covered in this document, to say nothing of combinations of conditions. The hope is, that the cases considered here, together with the general decision - making guidelines that are provided, will have sufficient application to the actual problem to minimize the replanning required at the time the problem is encountered.

To provide a foundation for effective mission-time replanning, Section 2 of this document describes some of the circumstances that can lead to contingency planning, and some of the guidelines that should govern this activity, should it become necessary.

In Section 3 some detailed procedures, timelines, and traverse data are provided. In all probability, these "canned" procedures would have to be retailored for the particular case, but they will provide a good point of departure for many instances that may arise.

The approach used in writing all of these plans is to minimize the required changes to the procedural sequence to which the CDR and LMP have been trained, at least within blocks of tasks, e.g. LRV loadup, ALSEP deployment, SEP layout. The crew studies contingency plans, and has been cross-trained to accomplish one-another's tasks, but only to a limited degree. Any re-planning of EVA's must be communicated to the crew and coordinated with them.

As much as possible of the nominal procedural flow should be preserved to prevent time loss through crew/ground confusion. Also, the cuff checklist can be used without extensive changes of a conservative approach to replanning is adhered to. For example, on a one-man EVA the crewman outside the LM would wear both cuff checklists, one on each arm, especially on EVA 1. CAPCOM, if necessary, would refer the extra-vehicular crewman to the appropriate checklist and page, thus guiding him through a procedural sequence.

Section 4 presents a series of detailed, step-by-step malfunction/trouble shooting or fixing procedures for various kinds of hardware difficulties that could arise. The hardware malfunctions cover both operational and scientific gear.

These procedures are intended for use by the operational team in formulating a set of problem-solving or work around tasks for the crew to solve a contingency without undue time loss or sacrifice of mission objectives.

The general layout of this document is that of a kit of tools, convenient to hand if needed. The data has been called from many sources or generated within the issuing organization. In many cases the material has been incorporated without change, and hence type faces and format are variable throughout this volume.

It is hoped that none of this material will ever be needed. It goes without saying that all procedures and timeline replanning will be with the concurrence of the responsible elements in the Mission Control Center.

2.0 GENERAL GUIDELINES

2.1 Experiment Priorities

The lunar surface experiments have been assigned the following priorities by the Mission Requirements document, Ref. 1, to form a basis for off-nominal planning. Although the nature of these experiments precludes a simplistic approach of lopping off these objectives from the bottom when problems arise necessitating sacrifice of some lunar surface plans, the priorities must be a factor in the decision making process that goes into gear as soon as troubles are at hand. They have also been a major factor in structuring the pre-plans in this volume.

Here are the experiments and their priorities:

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 Seismic Profiling (S-203) (Part of Apollo 17 ALSEP)
4	Lunar Surface Gravimeter (S-207) (Part of Apollo 17 ALSEP)
5	Lunar Atmospheric Composition (S-205) (Part of Apollo 17 ALSEP)
6	Lunar Ejecta and Meteorities (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 Detector (Sheets) (S-152)

The following guidelines from the Mission Implementation Plan further clarify conflicts between sampling objectives and ALSEP activities:

"Nominal timeline planning should reflect these priorities to optimize the timeline for maximum scientific return. This does not preclude ALSEP deployment prior to obtaining a documented sample of highland material. In the event of off-nominal situations, real time mission planning will utilize the assigned priorities in conjunction with the following guidelines:

(1) If the full staytime cannot be accomplished, then documented sampling of the highlands and ALSEP deployment should be planned.

(2) If there is insufficient time to do (1) above, documented dark mantle sampling and ALSEP deployment should be planned.

(3) If there is insufficient time to do (2) above, highland sampling should be planned.

(4) If there is insufficient time to do (3) dark mantle sampling should be planned."

Ed. Note: The previous statements on sampling priorities do not treat the relative priority of the sub floor unit and the dark mantle, a distinction which is made in the sampling objectives. The interpretation is made that "dark mantle" here includes its relation to the subfloor unit, so that the actual sampling location for dark mantle material may be one where it occurs in conjunction with sub-floor material, e.g. Station 4 or 5.

Lunar Seismic Profiling Charge Priorities:

At the September meeting of the Science Working Panel, the LSPE Principal Investigator discussed priority considerations for the individual explosive packages. Briefly, the largest charges (and most distant) are expected to provide the most new information and therefore have the highest priority. The nearby charges have lower priority, and the 2nd 1/4 pound and the 2nd 1/8 pound charges have the lowest priority - the reasoning being that in the event these charges could not be deployed, then the LM lift-off itself would provide seismic impulses which, to some extent, would substitute for the nearby charges.

The above discussion is reflected in the following table of LSPE charge priorities:

PRIORITY	CHARGE NUMBER	CHARGE SIZE (LBS.)
1	1	6
2	5	3
3	6	1
4	7	1/2
5	8	1/4
6	4	1/8
7	2	1/4
8	3	1/8

Traverse Station Priorities:

For situations where prior knowledge indicates that the planned three traverses cannot all be accomplished (e.g., reduced lunar surface staytime) or where not all the planned stations can be accomplished on a given EVA (e.g., shortened EVA duration), it is useful to apply station priorities in determining the resultant traverse plan.

The following station priorities were approved at the September meeting of the Science Working Panel. Although the station priorities were derived principally from geology and sampling considerations, they are generally consistent with the priorities of the Traverse Gravimeter Experiment and the Surface Electrical Properties Experiments and were agreed to by those investigators.

Overall Station Priorities:

Priority	Station(s)
1	2-3-4
2	1
3	6-7
4	8
5	9 or 10B*
6	5

Priorities within an EVA:

EVA	Priority	Station
1	1	ALSEP
	2	1
2	1	2
	2	4
	3	3
	4	5
3	1	6-7
	2	8
	3	9 or 10B*

*The distinction between stations 9 and 10B in the priority list depend principally on the assessment and accomplishments from station 1. Their relative priorities will be determined during the mission after this assessment of station 1 can be made.

Station Sampling Objectives Priority:

For situations where it is necessary to reduce station duration, or to reduce the number of tasks at a station, it is useful to apply station task priorities. However, the more detailed the list of tasks, the more difficult it is to get agreement on priorities and the less useful such a list becomes. Most of the stations have multiple sampling objectives (as opposed to tasks); however, and there is general agreement on the priority of these objectives. Such a list appears below and should provide the necessary guidelines to reducing station activities if the need arises. The reader is referred to the detailed station activity charts in Vol.1, Sections 3.1.1, 3.2.1, 3.3.1 for a more complete discussion of the objectives and rationale. Two points should be noted in applying the priorities: (a) no attempt is made to prioritize non-sampling tasks such as observations, TGE readings, or TV requirements, (b) objective priorities should not be interpreted such that every task within an objective must necessarily be accomplished before proceeding to any task within the next priority objective - this will vary and an attempt will be made prior to the mission to clarify these situations and provide a more useful set of station task priorities.

STATION	SAMPLING OBJECTIVE	PRIORITY
1	Sub-Floor	1
	Very dark mantle	2
	Sub-Floor and mantle contacts	3
	Dark mantle	4
2	Massif	1
	Light mantle	2
3	Light mantle	1
	Scarp	2
4	Dark Halo Crater	1
	Light mantle	2
5	Sub-Floor	1
	Dark mantle	2

STATION	SAMPLING OBJECTIVE	PRIORITY
6	Blocks	1
	Crater (20 m, fresh)	2
	Talus	3
7	Blocks	1
	Dark Mantle	2
8	Rock debris (on surface)	1
	or	
	Crater	1
	Dark Mantle	2
9	Crater	1
	Dark Mantle	2
10B	Blocks	1
	Dark Mantle	2

2.2 Activity Guidelines

1. For any malfunction on a scientific task spend a maximum of 10 minutes on malfunction procedures, then abandon. Additional time may be allocated on certain malfunctions before resulting in total experiment abandonment. These items are as follows: RTG Fueling, ALSEP Package 1 to Package 2 Cable Connections, ALSEP Antenna Erection and Alignment, and moving ALSEP Deployment to a later EVA. This additional time will be a real-time decision based on consumables and timeline constraints.

2. Do not offload ALSEP unless a minimum of 1 hour can be spent on deployment.

3. ALSEP deployment not complete on EVA-1; slip to end of EVA-2.

4. In the event the complete ALSEP Deployment is slipped to EVA-2, perform the deployment activity at the beginning of EVA-2.

5. Should the planned ALSEP deployment site be unsuitable for deployment, an alternate site should be selected using the following guidelines:

   A. Select alternate site $\geq$ 100meters west of LM.

   B. Select alternate site $\geq$ 100meters northwest or southwest of LM.

   C. Select alternate site $\geq$ 100meters south of LM.

   D. Select alternate site $\geq$ 100meters north of LM.

   E. Should planned ALSEP site include crater walls that slope > 5 degrees, locate ALSEP components on rim of crater, on elecated local terrain. (HFE probes should be 1.5 diameters from any sharp craters 3 feet diameter or larger).

   F. Should planned ALSEP site include outcropping whose height is greater than one foot and outcropping cannot be avoided, move ALSEP parallel to equator so that ALSEP component thermal radiators are away from outcropping but at a maximum angle of 7 degrees away from the equator. (HFE probes should be at least 5 diameters from boulders greater then 2 feet across exposed at the surface).

6. Should the planned SEP deployment site be unsuitable for antenna deployment, select the best site > 100 meters east of LM and deploy the antenna lines utilizing the following criteria:

   A. The antenna wire should be deployed within ± 10 degrees of nominal deployment line.

   B. Insure that antenna wire is not suspended across crater rim greater than 2 feet in depth.

   C. If possible, let antenna wire follow contour of surface.

7. For any malfunction or operational equipment such as the EMU systems, LRV systems or deployment, LCRU, GCTA, or LM systems, the applicable guidelines for replanning are contained in the Mission Rules for Apollo 17 (Ref. 2).

2.3 Hold Points

In the event of a PLSS or operational contingency (i.e., a PLSS malfunction or an imminent consumables redline due to an inability to complete the deployment tasks within the nominal timeline), the sequence of experiment deployment tasks may be temporarily stopped after the completion of any one of the hold points listed below. In case the ALSEP deployment cannot be completed during EVA-1 and part of the deployment must be deferred to EVA-2, three prime hold points provide the highest return from an ALSEP system viewpoint. (These hold points are following the completion of taskes C, F, and M). The deployment may be resumed at a later point in time by continuing with the next series of tasks).

A. Open SEQ Bay doors, offload ALSEP Subpackages #1 and #2, and emplace subpackages with handles upward, in and facing the sun. (Close SEQ Bay doors before a hold.)

B. Remove tools.

C. Rotate fuel cask. (PRIME EVA-1 HOLD POINT)

D. Remove fuel cask dome.

E. Unstow ALSD, place on LRV.

F. Remove fuel capsule from cask and insert into RTG, close SEQ Bay doors, carry ALSEP and drive LRV to ALSEP deployment site, offload HFE subpallet, connect RTG and HFE cables to Central Station, offload LEAM Carrier, deploy HFE subpallet(*), connect LEAM cable to Central Station, offload and deploy HFE Probe Package(*), and rotate Central Station. (PRIME EVA-1 HOLD POINT)

G. Offload and deploy LSG.

H. Offload and deploy HFE Electronics Package.

I. Offload and deploy LSPE Geophone Module.

J. Offload and deploy ALSD.(*)

K. Offload and deploy LMS.

L. Drill first bore hole and insert first probe into bore stem.(*)

(*) May be deferred if a hold is imminent. HFE and ALSD tasks may be interrupted in order to permit completion of other, less time consuming ALSEP tasks.

M. Release sunshield Boyd bolts, deploy antenna mast, raise sunshield, install aiming mechanism on mast, install antenna on aiming mechanism and aim antenna (**). (PRIME EVA-1 HOLD POINT)

N. Turn on shorting switch.

O. Drill second bore hole and insert second probe into bore stem.

P. Offload and deploy LEAM.

Q. Deploy LSPE Antenna.

R. Deploy LSPE Geophones.

S. Activate LSPE Enable Switch.

T. Deploy SEP Transmitter.

U. Deploy SEP antenna wire.

(**) Turn on shorting switch if a hold is imminent. Experiments are unpowered so no hazard would exist for astronauts.

2.4 Traverse Planning Criteria

Table 3.4-1 of Vol 1, Nominal Plans is reproduced here for convenience in restructuring station stops as the need may arise.

TASK	TIME (Min.)
Description	5
Trench (explanatory-digging only)	3
Rake Sample (with 1 Kg Soil)	8
Documented Sample	3
Single Core Sample	5
Double Core Sample	11
Core Sample Vacuum Container (with single core)	9

If the LRV is unavailable, or has become unworkable, the crew will carry out their traverses afoot. The walking traverses are given in Section 3.3. The crew, depending upon when the LRV stopped functioning, would converge on these traverses from the point of breakdown. These walking plans would apply from the outset of the EVA if the LRV breaks down at the LM.

If the LRV malfunction is at the LM the table on the next page, Table 2.4-1, provides a listing of the gear the crewmen would be able to carry with them on a walking traverse.

The crew may be rmquested to hand-carry the SEP receiver a few hundred meters to get at least a little data for the surface electrical properties experiment. Thenthe tape recorder would be removed and the SEP abandoned. The Traverse Gravimeter might also be carried a certain distance by a crewman for some gravity measurements away from the spacecraft.

Tables 2.4-2 and - 3 give some fundamental assumptions for an LRV traverse and for a walking traverse that must be taken into account in any replanning effort during the mission.

TABLE 2.4-1 WALKING TRAVERSE GEAR

EQUIPMENT	CDR	LMP
Photographic	o 60 mm HEDC o Extra Magazine	o 60 mm HEDC o Extra Magazine
Tools	o Tongs o Gnomon	o Scoop on Extension Handle o Rake (secured to PLSS Tool Carrier) o Rammer
Sample Containers	o 2 SCB's * o 20-DSBD (on Camera) o Extra 20-DSBD	o 2 SCB's * o 20-DSBD (on Camera) o Extra 20-DSBD o LRV Sampler o Core tubes as req'd o Core Tube Caps
Other	o BSLSS o EP's - 1 per EVA o TGE** (1st leg EVA 2 only) o SEP RCVR** (1st leg EVA 3 only)	o EP's - 1 per EVA

* Consideration would be given to carrying the Big Rock Bag in addition to the SCB's for equipment stowage

**Could be carried by either crewman

TABLE 2.4-2

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 INCRESS
5. FINAL LM O/H MARGIN = TIME REMAINING WITH NO ALLOWANCES
6. RESPIRATORY EXCHANGE QUOTIENT = 0.9
7. FEEDWATER HEAT OF VAPORIZATION 1038 $\frac{\text{BTU}}{\text{LB}}$

TABLE 2.4-3

WALKING 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 WALKBACK TIME
   AVAILABLE OPS WALKBACK 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 WALBACK, 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 $\frac{\text{BTU}}{\text{LB}}$

2.5 Photographic Contingencies

Camera malfunction procedures will be governed by "Apollo 17 Operational Cameras - Facts-Do's-Don'ts" (Ref. 3). The procedures and trouble-shooting logic in that manual apply to the 60mm data cameras and to the 500mm telephoto camera that the crew will use on the surface. There are also data for the 16mm Data Acquisition Camera that the crew intends to mount in the right-hand LM window for documenting some of the around-LM extravehicular activity.

Some general guidelines can be given for handling camera malfunctions, however, since photography is a primary source of data for the Lunar Surface Geology experiment, and provides documentation for all the surface experiments, the implementation of alternative procedures based on these guidelines will be coordinated with the Experiments officer and the Science Support Room during the mission.

1. Contingency: Malfunctions of one Camera

Camera	Solution
500mm	Do without, camera is for targets of opportunity. Convert one of the 60mm cameras to the 500mm lens (unless the 500mm lens is the part malfunctioning) between EVA's only if science support accepts loss of primary documentation during traverse.
CDR's 60MM	Do without until back in LM. Consider conversion of 500mm to 60mm lens unless 60mm lens malfunctioning. CDR should use remaining camera at station stops since he has majority of documentation (cross-sun) photos. LMP uses camera during LRV traverse.
LMP's 60MM	Do without until back in LM, consider conversion of 500mm camera (as above) Change CDR camera to B&W film. LMP should use camera during LRV traverse.

2. Contingency: Malfunction of Both 60MM Cameras

Convert 500mm camera to 60mm as soon as possible, by interchange of lenses - unless both 60mm lens have malfunctioned. In that case, no close in photos, TV documentation only at stations. Attempt to salvage a workable camera from the three camera systems between EVA's (of EVA 1 or 2).

Note: Lens transfer while outside the LM cabin is risky. The inside of the camera (both the body and lens) is exposed to dust contamination and possible jamming of the mechanisms. This conversion should be attempted only if both 60mm cameras are out of commission.

3.0 CONTINGENCY PLANNING

This section provides a time-choice point decision matrix for behind-time planning. Then various cases have been subjected to detail procedural planning, and these are shown as vertical timelines. Also, tabular summaries of the traverses possible for these cases are provided. The cases are one-man EVA's, walking traverses, off-nominal landing site. Vertical timelines are not provided for EVA 2 & 3 - walking, because preliminary procedures and close out procedures would differ only in LRV turn-on and shut down from nominal (Vol. 1). Vertical timelines are not provided for off-nominal landing sites, since the only differences in operations would be at, going to, or from stations. The planning for these would depend on exactly where the spacecraft actually landed. The cases given in Section 3.4 are for landing ellipse extremes, 2.7 Km N or S of the nominal point, and are intended as exhibits of the extremes of changes required in the nominal traverses.

3.1 Reduced Staytime and Shortened EVA's

EVA 2 and 3 are success-oriented plans, and depend upon no carry-overs from EVA 1. Thus it is very important to accommodate behind-time situations on EVA 1 without impacts on succeeding EVA's. At the same time, EVA 1 is most likely to generate a behind-time problem, because the complex tasks of LRV deploy and load up, ALSEP deploy, and SEP transmitter deploy all occur on that EVA. Also, the crew is least well-familiarized with working in a lunar gravity field, and have already accomplished separation, deorbit, and LM landing all in the same work period as this EVA. Finally, EVA 1 may be shortened from outset if the 18 hrs - to-repress rule comes into play. For example, if the crew lands one revolution late, the EVA will only be approximately five hours long. Figure 3.1-1, reproduced from the Flight Plan, is a guide for configuring shortened staytimes.

3.1.1 EVA 1

Figure 3.1-2 illustrates the logic flow which will be used for replanning a behind-time or shortened EVA 1. The basic ground rule in this logic is protection of a 45 minute stay at station 1 in order to permit meaningful geological return from that area. As the operations fall more and more behind the timeline, the number of operations by-passed, omitted, or postponed to another EVA keep adding up. Note this additive feature. If, for example, the crew is 50 minutes behind (or has only a 6 hour 10 minute EVA), Station 1 time would be no more than 45 minutes, then would be no SEP deploy TV coverage, ALSEP photos (the detail package closeups) would be postponed to EVA 3, and, finally, SEP transmitter deploy itself would not be done until EVA 2. Obviously, if the time for an operation has already occurred, e.g., ALSEP photos, then the block is skipped, and the next one down is taken if applicable to make up time.

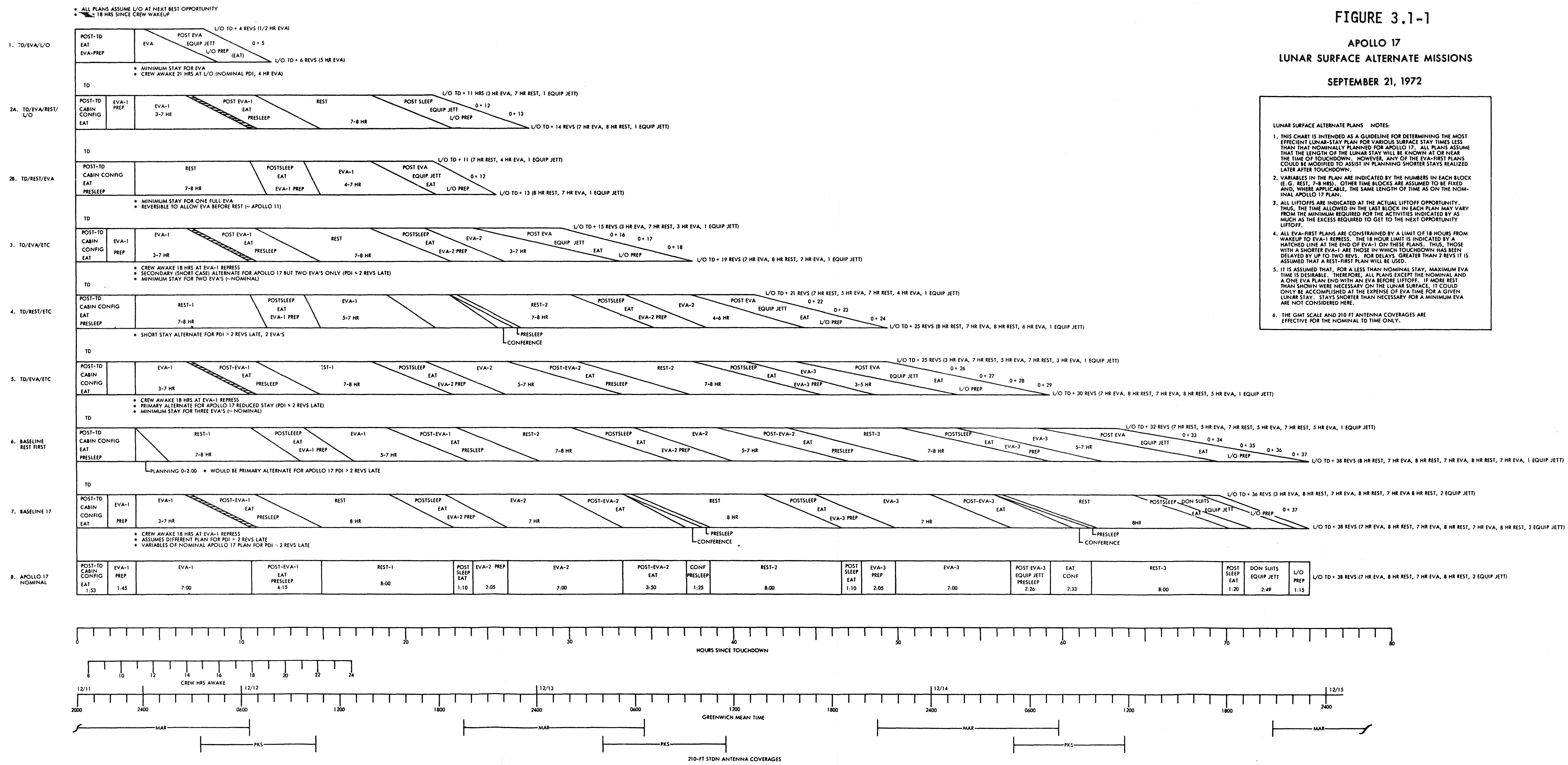
At a time deficit of over one hour, Station 1 is no longer tenable where it is. Then it is moved to another location (maybe Camelot) and the time for the total traverse (Station time plus travel to and from) is from 91 to 31 minutes before something else has to give, i.e., more ALSEP activities at 2 hours behind. Up to this point, ALSEP has been held inviolate (except for photos) including the core sample and Neutron Flux experiment.

Upward of three hours behind the timeline, the entire EVA changes (note "and" string breaks at this block in Fig. 3.1-2). ALSEP is postponed to EVA 2, and Station 1 is re-instated.

FIGURE 3.1-1

APOLLO 17
LUNAR SURFACE ALTERNATE MISSIONS

SEPTEMBER 21, 1972



LUNAR SURFACE ALTERNATE PLANS NOTES:

1. THIS CHART IS INTENDED AS A GUIDELINE FOR DETERMINING THE MOST EFFECIENT LUNAR-STAY PLAN FOR VARIOUS SURFACE STAY TIMES LESS THAN THAT NOMINALLY PLANNED FOR APOLLO 17. ALL PLANS ASSUME THAT THE LENGTH OF THE LUNAR STAY WILL BE KNOWN AT OR NEAR THE TIME OF TOUCHDOWN. HOWEVER, ANY OF THE EVA-FIRST PLANS COULD BE MODIFIED TO ASSIST IN PLANNING SHORTER STAYS REALIZED LATER AFTER TOUCHDOWN.
2. VARIABLES IN THE PLAN ARE INDICATED BY THE NUMBERS IN EACH BLOCK (E.G. REST, 7-8 HRS). OTHER TIME BLOCKS ARE ASSUMED TO BE FIXED AND, WHERE APPLICABLE, THE SAME LENGTH OF TIME AS ON THE NOMINAL APOLLO 17 PLAN.
3. ALL LIFTOFFS ARE INDICATED AT THE ACTUAL LIFTOFF OPPORTUNITY. THUS, THE TIME ALLOWED IN THE LAST BLOCK IN EACH PLAN MAY VARY FROM THE MINIMUM REQUIRED FOR THE ACTIVITIES INDICATED BY AS MUCH AS THE EXCESS REQUIRED TO GET TO THE NEXT OPPORTUNITY LIFTOFF.
4. ALL EVA-FIRST PLANS ARE CONSTRAINED BY A LIMIT OF 18 HOURS FROM WAKEUP TO EVA-1 REPRESS. THE 18 HOUR LIMIT IS INDICATED BY A HATCHED LINE AT THE END OF EVA-1 ON THESE PLANS. THUS, THOSE WITH A SHORTER EVA-1 ARE THOSE IN WHICH TOUCHDOWN HAS BEEN DELAYED BY UP TO TWO REVS. FOR DELAYS GREATER THAN 2 REVS IT IS ASSUMED THAT A REST-FIRST PLAN WILL BE USED.
5. IT IS ASSUMED THAT, FOR A LESS THAN NOMINAL STAY, MAXIMUM EVA TIME IS DESIRABLE. THEREFORE, ALL PLANS EXCEPT THE NOMINAL AND A ONE EVA PLAN END WITH AN EVA BEFORE LIFTOFF. IF MORE REST THAN SHOWN WERE NECESSARY ON THE LUNAR SURFACE, IT COULD ONLY BE ACCOMPLISHED AT THE EXPENSE OF EVA TIME FOR A GIVEN LUNAR STAY. STAYS SHORTER THAN NECESSARY FOR A MINIMUM EVA ARE NOT CONSIDERED HERE.
6. THE GMT SCALE AND 210 FT ANTENNA COVERAGES ARE EFFECTIVE FOR THE NOMINAL TD TIME ONLY.

FIGURE 3.1-2

BEHIND TIME PLANNING GUIDE FOR EVA I

MINUTES BEHIND	ACTION	IMPACT ON SUBSEQUENT EVA's (SEE NEXT PAGE)
0 - 21	REDUCE STATION 1 DURATION BY NUMBER OF MINUTES BEHIND (66 TO 45 MINUTES)	
	AND	
21 - 24	DROP TV FOR SEP DEPLOYMENT	
	AND	
24 - 31	POSTPONE COMPLETION OF ALSEP PHOTOS (TRUNCATE AFTER STEREO PAN)	A
	AND	
31 - 52	POSTPONE COMPLETION OF SEP DEPLOYMENT	B
	AND	
52 - 1+00	POSTPONE SEP OFF-LOAD AND WALK-OUT	C
	AND	
1+00 - 2+00	ABANDON STATION 1 - TRAVERSE TO ALTERNATE LOCATION; TOTAL TRAVERSE TIME = 91 > 31 MINUTES	
	AND	
2+00 - 2+27	POSTPONE ALSEP AREA ACTIVITIES IN FOLLOWING ORDER: 1. CORE BREAK AND CAP 2. NEUTRON FLUX MONITOR EMPLACEMENT - 6 MINUTES 3. CORE RECOVERY (CDR TAKES STEREO PAN) - 7 MINUTES 4. CORE DRILLING AND STEREO PAN (CDR ASSISTS WITH GEOPHONE DEPLOY) - 14 MINUTES	D
	AND	
2+27 - 2+56	POSTPONE HFE NO. 2 (ASSUMING HOLE NO. 1 IS NOMINAL) AND GEOPHONE DEPLOYMENT. TRUNCATE ALSEP AFTER LEAM	E
> 2+56	POSTPONE ALL ALSEP SITE ACTIVITIES REINSTITUTE TRAVERSE TO STATION 1 (45-MINUTE STATION TIME) REINSTITUTE SEP DEPLOYMENT AS TIME PERMITS	F

3.1.2 EVA 2 and 3

Figure 3.1-3 gives the residual impacts of having to restructure EVA 1 or EVA's 2 and 3. These impacts all cost time on these EVA's which must be compensated for by shortening time at stations on EVA 2 or 3, or by eliminating stations entirely. In general, these truncations or deletions will be on the lower priority stations (see Section 2), however, in cases where these lower priority stations contain activities essential to the success of a given objective on the mission (e.g, linear sampling points on the South Massif flow) consideration will be given to reducing the station time at a higher priority station.

Traverse planning which involves reshuffling tasks from one station to another should be avoided as much as possible, since this approach complicates crew procedures and increases the amount of instructional communication between the crew and MCC.

Any replanned traverses must, of course, be tested against the same emergency walk-back and drive-back situations as the nominal traverses. In some cases, this will result in having to depart a high priority station at the extremity of the traverse and subsequently to include a lower priority station nearer the LM.

FIGURE 3.1-3 IMPACT ON SUBSEQUENT EVA's OF OFF-NOMINAL EVA 1

(A) ALSEP PHOTOS - 6 MINUTES REQUIRED - PERFORM AT END OF EVA 3 UPON RETURN TO ALSEP SITE TO RETRIEVE NFE. REDUCE STATION 9 DURATION AND RETURN FROM TRAVERSE 12 MINUTES EARLY

(B) SEP DEPLOYMENT - IF PARTIALLY DEPLOYED ON EVA 1 AND CAN BE COMPLETED IN 15 MINUTES, THEN PERFORM AT BEGINNING OF EVA 2, REDUCING TIME AT STATIONS 2 OR 3

IF GREATER THAN 15 MINUTES REQUIRED, THEN PERFORM AT END OF EVA 2, REDUCING TIME AT STATION 5. (NET IMPACT = 18 MINUTES AT END OF EVA)

EVA 3 IMPACT - SAME AS (A) ABOVE

(C) SEP OFF-LOAD - 8 MINUTES ADDITIONAL REQUIRED OVER (B) ; PERFORM AT END OF EVA 2, ELIMINATING STATION 5

EVA 3 IMPACT - SAME AS (A) ABOVE

(D) DEEP CORE AND NEUTRON FLUX MONITOR

SUBSEQUENT EVA IMPACT

(1) 5 MINUTES

(1)+(2) 8 MINUTES

(1)+(2)+(3) 20 MINUTES

(1)+(2)+(3)+(4) 35 MINUTES

PERFORM (1)-(4) ABOVE, AS REQUIRED, AT END OF EVA 2. LMP ASSISTS CDR IN ABOVE TASKS AND COMPLETES ALSEP PHOTOS IF TIME PERMITS. REDUCE OR ELIMINATE STATION 5 DEPENDING UPON TIME REQUIRED

MOVE SEP DEPLOYMENT ((B) + (C)) TO BEGINNING OF EVA 3, ELIMINATING STATION 9

(E) COMPLETE ALSEP DEPLOYMENT (HFE PROBE NO. 2 AND GEOPHONES) - 27 MINUTES REQUIRED.

IMPACT SAME AS (D) ABOVE PLUS REDUCTION IN STATION TIME AT 2, 3, 4 BY 27 MINUTES

(D) + (E) = 1 HOUR 02 MINUTES

(F) PERFORM ENTIRE ALSEP AREA ACTIVITIES - 2 HOURS 30 MINUTES REQUIRED (INCLUDES NAVIGATION INITIALIZE AND TRAVERSE PREPARATION)

PERFORM AT BEGINNING OF EVA 2; EVA 2 TRAVERSE TBD

3.1.3 One EVA

If only one EVA can be accomplished because LM staytime on the moon is curtailed (whatever the reason) the following ground rules might be considered (subject, as always, to MCC responsible elements concurrence).

Delete the following from EVA:

1.	Full flag deploy (quick deploy at end of EVA)	Saving = 2 min
2.	2nd HFE Probe	Saving = 20 min
3.	ALSEP full photos	Saving = 6 min
4.	SEP Deploy (includes initial SEP transmitter layout)	Saving = 36 min
5.	Geophone #4 Deploy & delete photos	Saving = 14 min
6.	Delete Newtron Flux	Saving = 3 min
		TOTAL: 81 min

Add the following to EVA:

1. Extra EP deployments

   plus

2. LRV Final Disposition: 20 min

These changes to EVA would free an extra hour or so for geological objectives.

If the time available is less than seven hours, the geology time drops commensurably down to 45 minutes station time, just as it does for a behind-time EVA 1. Then a possible list for delection or change would look like this (based on priorities):

1.	LRV Find Disposition	Saving = 20 min
2.	Drillj core	Saving = 24 min
3.	LRV GCTA	Saving = 15 min
4.	LRV Deploy	Saving = 50 min
5.	LEAM Deploy (take pallet off)	Saving = 8 min
6.	LSG (Just remove)	Saving = 5 min

7. LSPE geophones & antenna — Saving = 19 min

   also

   4 changes — Saving = 12 min

8. Delete ALSEP (i.e., HFE) — Saving = 60 min

The ultimate is, of course, a minimum-time EVA of less than one hour. This "bare bones" EVA is a one-man quick look at the lunar surface. This timeline is given on the next few pages.

MISSION: APOLLO 17 DATE: DECEMBER 1972
EVA: ONE MAN - MINIMUM TIME

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRV	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+00	Check cabin pressure "ZERO" - Feedwater - ON Open Hatch			
		NOTE: Detailed procedures are presented in "Lunar Surface Checklist", "Equipment Prep EVA 1" section.			
	0+10	Move thru hatch			

MISSION: APOLLO 17 DATE: DECEMBER 1972

EVA: ONE MAN - MINIMUM TIME

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+10	Move thru hatch			
Pass LEC & ETB to EVA Crewman		Deploy LEC with ETB			
		Descend to top of ladder Deploy MESA			
		Descend to footpad			
LM 16mm Seq Cam - ON (12 FPS)		Check ascent capability to lower ladder rung			
NOTE: Monitor & photograph EVA crewman using LM 16mm Seq. Cam.		Step to surface			
Read procedures to EVA crewman		Check and discuss mobility and stability			
		Report LM status			
	0+20	Describe LM landing site			
		Remove HEDC from ETB & obtain +Z panorama			
16mm Cam - OFF Change Mag 16mm Cam - ON					
		Get a containment bag from left side of MESA and fill with rocks & soil			
	0+30				

MISSION: APOLLO 17 DATE: APOLLO 17
EVA: ONE MAN - MINIMUM TIME

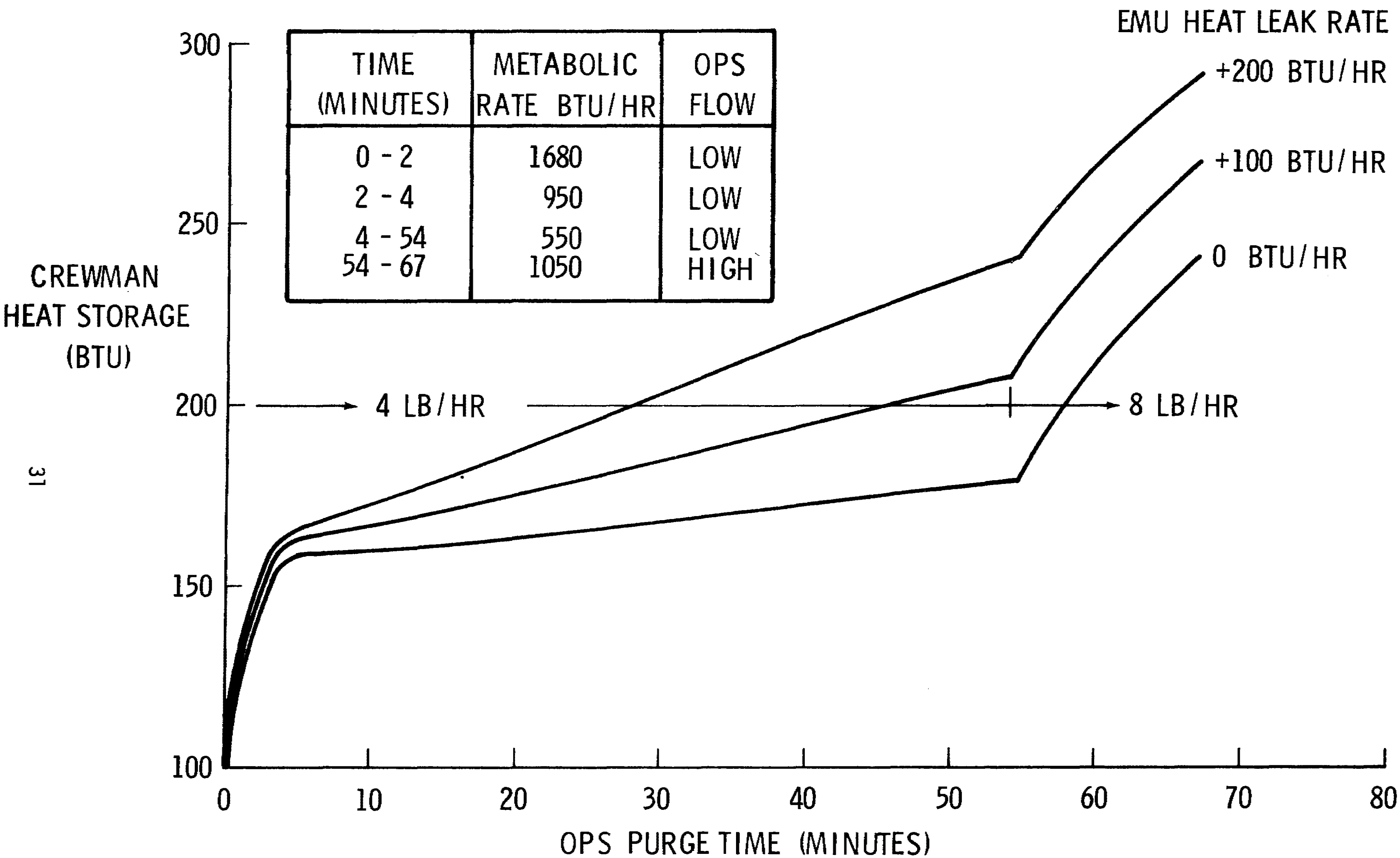
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	CRUTV	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+30				
16mm cam - OFF Change mag 16mm Cam - ON (12 FPS)					
		Stow HEDC in ETB			
16mm Cam - OFF		Clean EMU			
	0+40	Climb ladder, haul up ETB & containment bag & pass to LMP in the cabin			
Remove 70mm Cam and contingency sample from ETB					
Pass ETB to CDR		Discard LEC Receive & discard ETB			
		Ingress - Go to Post EVA Procedures			
	0+50				

3.2 One Man EVA's

Certain hardware problems, principally associated with the EMU, could result in the situation where one crewman would have to remain in the LM cabin while the other crewman performed the EVA alone. For example, a problem in the PLSS electrical system could result in the loss of fan and/or pump operation which would preclude EVA operations with that EMU. If such a problem developed it would most likely be discovered during the EVA preparation period and only a short time would be available for the ground to prepare contingency EVA plans. Thus, although such a situation is very unlikely to occur, it will be desirable to establish constraints and outline traverse objectives within these constraints.

Although it is possible to perform all the planned EVA tasks with one man (including ALSEP deployment and LRV deployment), it will obviously be more difficult and more time consuming. Timelines are provided in this section to show how the major tasks would be accomplished in this mode. Insofar as the traverse is concerned, the constraints remain the same in that the consumables margins must be retained to walk back from a failed LRV, or to drive back with a failed PLSS. The absence of the Buddy-SLSS, however, for cooling with the failed PLSS case results in a different radius of action for the one man case compared to the nominal two man case.

With the PLSS failure on the one man EVA, the crewman becomes completely dependent on the OPS for both oxygen, cooling, and CO_2 removal. To accomplish this, the OPS is operated in the purge mode with either of two flow rates, the selection of which depends upon the amount of cooling required. The necessity for the high flow rate (and hence early depletion) can be avoided if the crewman's activity after the PLSS failure can be minimized. Hence, the first constraint on the one man EVA is that traverse operations be restricted to the near vicinity of the LRV, on the order of 100 m. Allowing for the high metabolic rate in returning to the LRV over this distance and for a later period of high metabolic rate ingressing the LM, leaves the portion of the OPS capability which remains for use on the LRV return to the LM. This remainder is equivalent to a certain number of minutes driving time and dictates how far (in terms of driving time) the single crewman can range on the traverse. Figure 3.2-1 presents curves which can be used to estimate this maximum radius under various conditions. These curves represent the maximum capability available; the actual values to be used in real time situations will be determined by the Flight Director based on an overall assessment of the situation.



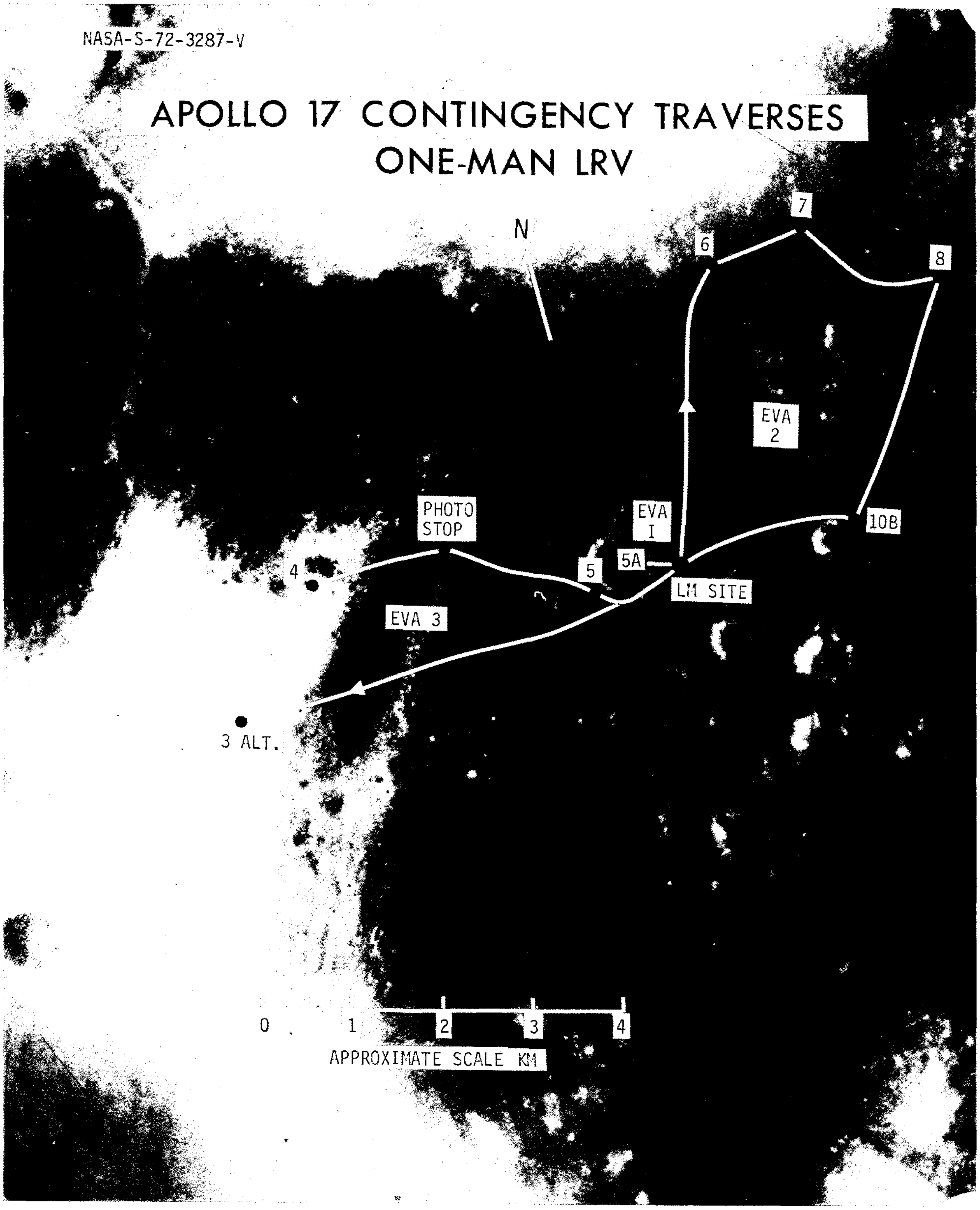
TIME (MINUTES)	METABOLIC RATE BTU/HR	OPS FLOW
0 - 2	1680	LOW
2 - 4	950	LOW
4 - 54	550	LOW
54 - 67	1050	HIGH

FIGURE 3.2-1: Crewman heat storage for contingency LRV Traverse with OPS cooling only (Low- and high-flow mode).

The other consideration on one man traverse design is the fact that the LRV navigation tasks should be simplified by providing a return route where it will be possible to simply follow the outbound LRV tracks back to the LM. The reason for this consideration is that absence of the second crewman (who does much of the visual navigation) could compromise a time-critical emergency return.

Figure 3.2-2 depicts a set of traverses (assuming nominal landing) for the one-man EVA contingency. Note that there are two principal changes: traverse to Camelot on EVA 1 for a short sampling time, and abandoning Station 2 on any EVA. Note also that the nominal EVA 2 and 3 traverses switch for a one-man contingency, i.e., the single crewman goes to the North Massif area on EVA 2, to the edge of the South Massif flow on EVA 3. All these points are within LRV drive-back with OPS low flow under emergency conditions.

FIGURE 3.2-2


NASA-S-72-3287-V
APOLLO 17 CONTINGENCY TRAVERSES
ONE-MAN LRV
N
6
7
8
EVA
2
PHOTO
STOP
EVA
I
10B
4
5
5A
LM SITE
EVA 3
3 ALT.
0
1
2
3
4
APPROXIMATE SCALE KM

3.2.1 One Man EVA 1

The following pages present a block timeline of activities, a tabular traverse summary, and a detailed vertical procedural timeline for a full-time (7 hours) EVA 1. Note that geological sampling and investigation time is very short if only one astronaut can perform extravehicular operations. The changes required over a nominal two-man EVA 1 can best be ascertained by comparing the block timeline, Figure 3.2-3 , with the nominal in Vol. 1, Figure 3.1-1.

This contingency plan affords only a minimal amount of traverse* time, approximately 36 minutes. Additional on-station time can be bought at the price of some ALSEP objectives. For example, if HFE bore hole No. 2 is not drilled, and the ALSEP documentary photos are curtailed, about 26 extra minutes can be devoted to geological investigation at Camelot. If Geophone 4 is not deployed, and the special LSPE photos are eliminated (documentation of the geophone array would be with the pans taken for general ALSEP photos) another 14 minutes would be available if all went well otherwise. Thus exploration time at Camelot could be expanded by forty minutes with these sacrifices of ALSEP data. Table 3.2-1A (with 2A) depicts such an expanded station time.

* the "traverse" would be in the near vicinity of the LM.

FIGURE 3.2 - 3

APOLLO 17 LUNAR SURFACE TIMELINE

DATE DECEMBER 1972

ONE - MAN EVA 1

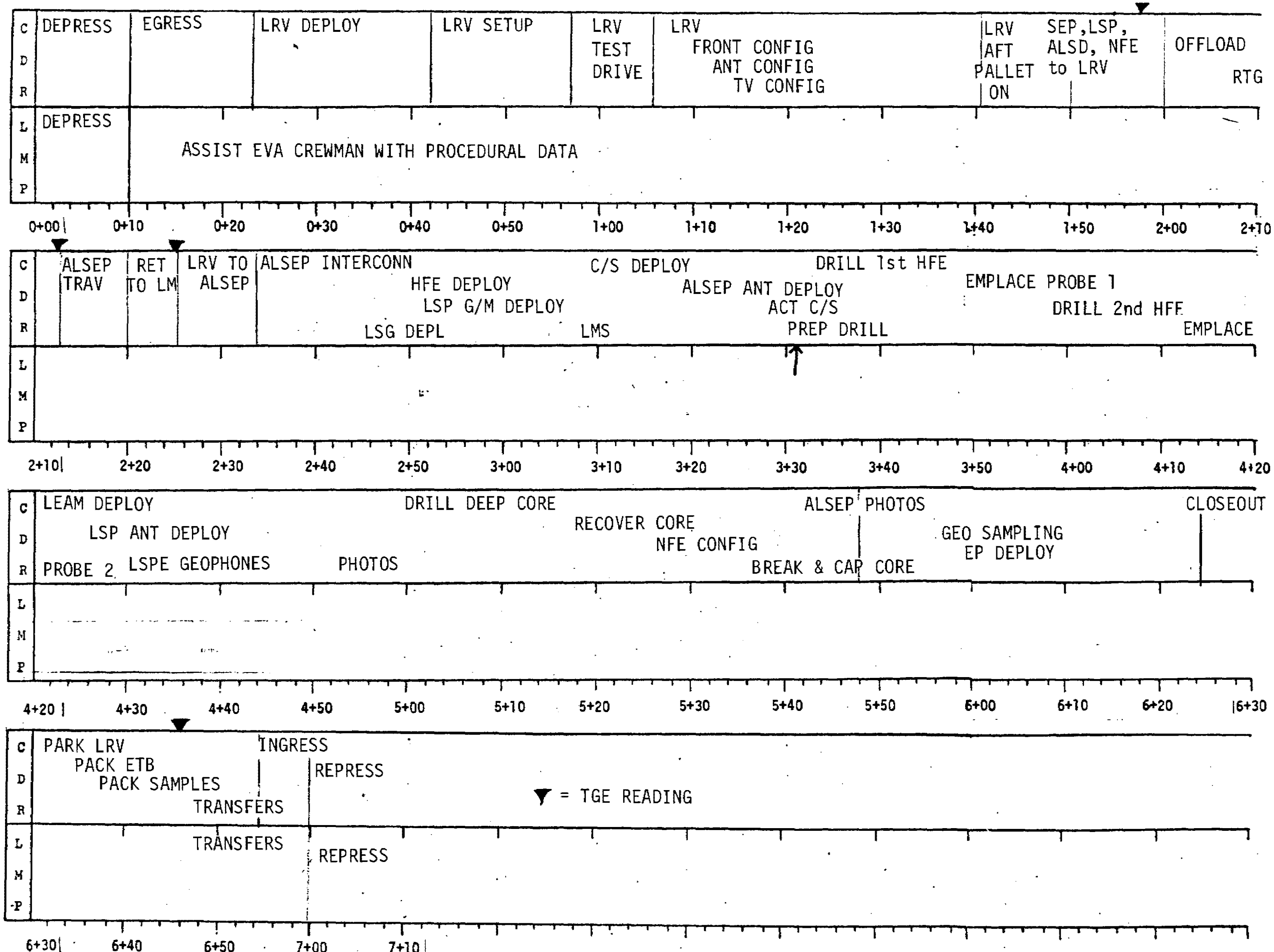


TABLE 3.2-1 ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 CALCULATED DATA OCT 9 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	2+25	2+25
RIDE	0.10	7.30	1				
ALSEP				0.10	2+26	3+22	5+48
RIDE	0.05	7.30	0				
1 ALT.				0.15	5+48	0+36	6+24
RIDE	0.05	7.30	0				
LM				0.20	6+25	0+35	7+ 0
TOTALS			1			6+58	7+ 0

		--------------- TRAVERSE CONTINGENCIES --------------					
		----------LRV FAILURE--------------				--PLSS FAILURE--	
STAT NO	RETURN DISTANCE TO LM (KM)	WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	MIN LRV RIDEBACK SPEED REQUIRED 0 MIN (KM/HR)	AVE EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
ALSEP	0.10	0+ 2	1+36	1+17	1+33	0.15	1048.82
1 ALT.	0.05	0+ 1	1+ 1	0+42	0+57	0.07	1039.03
LM	0.00	0+ 0	0+46	0+28	0+45	0.00	1039.46

TABLE 3.2-2 ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 INPUT DATA OCT 9 1972

EVA START 116:40 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	2+25	0.00	0.00	0.00	****	****	******
ALSEP	3+22	0.10	0.10	0.00	3.60	7.30	1560.0
1 ALT.	0+36	0.05	0.05	0.00	3.60	7.30	1560.0
LM	0+35	0.05	0.00	0.00	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	0.020	10.86	1.402	41.0

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.2-1A

ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 CALCULATED DATA NOV 27 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	2+25	2+25
RIDE	0.10	7.30	1				
ALSEP				0.10	2+26	2+50	5+16
RIDE	0.50	7.30	4				
5A				0.60	5+20	1+ 0	6+20
RIDE	0.60	7.30	5				
LM				1.20	6+25	0+35	7+ 0
TOTALS			10			6+50	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	2+10	1+52	2+ 5	0.15	0.19	1048.70
5A	0.60	0+10	0+55	0+36	0+52	0.88	1.16	1027.72
LM	0.00	0+ 0	0+52	0+34	0+45	0.00	0.00	1023.96

TABLE 3.2-2A ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 INPUT DATA NOV 27 1972

EVA START 116:40 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	2+25	0.00	0.00	0.00	****	****	******
ALSEP	2+50	0.10	0.10	0.00	3.60	7.30	1560.0
5A	1+ 0	0.50	0.60	0.00	3.60	7.30	1560.0
LM	0+35	0.60	0.00	0.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.020	10.86	1.403	41.0

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

APOLLO 17

DECEMBER 1972

ONE - MAN TIMELINE

LUNAR SURFACE EVA 1

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
ASSIST CDR		START EVA WATCH (CALL MARK)			
		NOTE: DETAILED PROCEDURES ARE PRESENTED IN THE "LM LUNAR SURFACE CHECKLIST", SECTION 9.1 - ONE-MAN EVA PREP			
	0+10				

MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	CRUTV	TASK FUNCTION LMP	CDR
ASSIST	0+10				
DEPLOY PLSS ANT(EVA) PLACE JETTISON BAG IN HATCH OPENING		EGRESS OPERATIONS EGRESS CABIN TO LM PORCH RECEIVE & JETTISON BAG			
PASS LEC/ETB TO EVA		RECEIVE ETB/LEC DESCEND LADDER TO TOP RUNG			
		UNLOCK & DEPLOY MESA LOWER ETB ON LEC			
NOTE: IVA CREWMAN ASSISTS EVA CREWMAN AS REQUIRED WITH PROCEDURES AND INFORMATION. HE ALSO PHOTOS EVA CREWMAN WHERE POSSIBLE WITH DAC		DESCEND LADDER TO SURFACE HANG ETB ON LADDER HOOK CHECK FOOTING, STABILITY & MOBILITY KICK JETT BAG UNDER LM			
		OPEN MESA BLANKETS UNSTOW SAMPLE RETURN BAG			
	0+20	HANG ON LADDER HOOK HANG ETB ON MESA TABLE			
(THIS IVA COLUMN WILL BE DROPPED UNTIL END OF THE EVA TO CONSERVE SPACE)		LRV DEPLOY RELEASE LRV INSULATION BLANKET REMOVE CONTINGENCY DEPLOY RELEASE LH DEPLOY TAPE-HANG ON +Z STRUT			
		CHECK: OUTRIGGER CABLE TAUT- CHASSIS PARALLEL-HINGES ENGAGED RELEASE DEPLOY CABLE-DEPLOY FULL LENGTH AT 45 DEG			
		ASCEND LADDER MONITOR LRV DEPLOY PREP PULL D-HNDL TO UNLOCK LRV (OBSERVE 4 DEG ROT) DESCEND LADDER PICK UP DEPLOY CABLE- KEEP TENSION ON CABLE			
		PULL RH TAPE TO ROTATE LRV VERIFY AFT CHASSIS UNFOLDS & LOCKS, REAR WHEELS UNFOLD,			
	0+30				

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EVA TIME	EVA ACTIVITIES
0+30	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
	PULL PIN LR TO RELEASE CABLE -DISCARD PIN & CABLE
	PULL LH DEPLOY TAPE TO LOWER FRONT END
0+40	PULL SADDLE RELEASE CABLE & VERIFY RODS FREE**
	PULL PIN TO RELEASE DEPLOY CABLE-DISCARD
	SET UP LRV
	PUSH AWAY FROM LM
	ERECT GEO PALLET POST
	DEPLOY LR FENDER EXT
	CHECK LR HINGE PIN ENGAGED
	ERECT CDR SEAT & UNSTOW SEAT
	RELEASE INBRD HNDHLD TIEDOWN
	PULL BOTH T-HNDLS, ROTATE 90 DEG, LOWER CONSOLE, RAISE HANDHOLD
	ROTATE T-HNDL 90 DEG TO LOCK
	PULL & DISCARD ATTITUDE & C/W FLAGS
	REMOVE TRIPOD & STOW LEFT TOEHOLD
	ERECT FOOTREST
	CHECK FRONT STEER DECOUPLE
	CHECK LF HINGE PIN ENGAGED
	DEPLOY LF FENDER EXT
0+50	**SET UP LRV**
	PICK UP & TURN LRV
	DEPLOY RR FENDER EXT
	CHECK RR HINGE PIN ENGAGED
	CHECK REAR STEERING RING
	ERECT LMP SEAT & UNSTOW
	LOWER ARMREST
	REMOVE TRIPOD & STOW RIGHT TOEHOLD
	ERECT FOOTREST
	CHECK RF HINGE PIN ENGAGED
	VERIFY BATT COVERS CLOSED
	LRV TEST DRIVE
	MOUNT LRV
	FASTEN SEATBELT
	POWER UP LRV PER DECAL
	TEST DRIVE LRV AROUND LM
1+00	POSITION LRV NEAR MESA
	+15 VDC SW-OFF-
	DISMOUNT LRV
	LRV FRONT CONFIG
	LIFT LCRU MTG POST LOCKS
	RELEASE Y-CABLE VELCRO TABS
	UNSTOW TCU CONN - DISCARD ADAPTER
	UNSTOW LCRU
	MOUNT LCRU ON LRV
	UNSTOW & CONNECT LCRU PWR CABLE-DISCARD ADAPTER
	UNSTOW TCU
1+10	

**PUSH DOWN W/CONT DEPLOY TOOL IF REQD

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
1+10	MOUNT TCU ON LRV CONNECT TCU PWR CABLE LRV ANT CONFIG UNSTOW RAKE TO CDR SEAT OPEN LRV ANT CANISTER UNSTOW LGA FROM CANISTER MOUNT LGA IN CDR HANDHOLD POINT LGA TO EARTH DEPLOY & CONNECT LGA CABLE UNSTOW HGA FROM CANISTER	1+30	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			
1+20	MOUNT HGA ON LRV ROTATE ANTENNA & EXTEND MAST UNSTOW CABLE, DISCARD FOAM CONNECT HGA CABLE TO LCRU VELCRO CABLE TO STAFF LRV TV CONFIG UNSTOW TV FROM MESA, CARRY TO LRV UNSTOW SUNSHADE - INSTALL ON TV MOUNT TV ON TCU-HORIZONTAL CW TO AFT CONNECT TV PWR CABLE FROM TCU TIP HGA AFT, DEPLOY DISH & LOCK POINT HGA AT EARTH, REALIGN AS REQUIRED	1+40	LRV AFT CONFIG REMOVE QUAD III THERM BLNKTS FROM PALLET OFFLOAD GEO PALLET MOUNT GEO PALLET ONTO LRV REMOVE & DISCARD PALLET HANDRAILS REMOVE & DISCARD LAUNCH PINS & VELCRO ON TGE SET TGE ON / STBY SW TO -ON- READ TGE TO MCC MSCL OPERATIONS OPEN QUAD III THERMAL BLANKETS UNSTOW PALLET - PLACE ON +Y FOOTPAD - ORIENT TO SUN UNSTOW LSPE ADAPTER BRACKET, & MOUNT ON PALLET			
1+30		1+50				

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
1+50	MOUNT PALLET ON ADAPTER & CLOSE LRV PALLET PRESS 'GRAV' ON TGE OFFLOAD SEC 1 FROM MESA OPEN SRC 1, TAKE SCB 1 OUT & INT. STOW ON MESA CLOSE ORGANIC CONTROL SAMPLE UNSTOW CORE/BORE STEM BAG & UNSTOW NEUTRON FLUX MONITOR CARRY TO LRV NOTE TGE STATUS - WHEN IND LIGHT OFF STOW BAG & MONITOR ON LRV STOW SCB 1 ON LRV TOOL GATE OFFLOAD DRILL FROM MESA PLACE DRILL ON LMP SEAT PRESS READ-READ TGE DISPLAY PLACE TGE ON GROUND DRESS 'GRAV' REMOVE MESA BRACKETS LiOH CANN TO MIDDLE OF MESA TIDY MESA BLNKTS	2+10	REMOVE ELEMENT, FUEL RTG REMOVE FIT-READ TEMP-DISCARD TIP PKG 2 UP CLOSE SEQ BAY DOORS ATTACH PKG 2 TO CARRY BAR WALK AROUND LM TO TGE DEPOSIT PKGS PRESS 'READ' ON TGE-READ TGE PRESS 'BIAS' ON TGE PICK UP ALSEP PKGS ALSEP TRAV WALK OUT 300 FT W TO APPROPRIATE SITE PLACE PKGS ON SURFACE RETURN TO LM			
2+00	ALSEP OFFLOAD OPEN SEQ BAY DOORS POSITION DES ECA TEMP MON SW-ON UNLOCK PKG 2 PULL LANYARD RELEASE RING REMOVE PKG 2 - PLACE ON SURFACE PULL PIN & DISCARD HOCKY STICK UNLOCK PKG 1 PULL LANYARD RELEASE RING REMOVE PKG 1 - PLACE ON SURFACE, ROT 90 DEG PULL PIN & DISCARD HOCKY STICK REMOVE & DISCARD TOOL BRKT ASSY STOW UHT'S ON PKG'S REMOVE & EXTEND CARRY BAR & INSTALL IN PKG 1 PLACE DRT & FIT IN SEQ BAY FUEL RTG POSITION PKG 2 FOR FUELING REMOVE RTG DUST COVER-DISCARD GET CASK LANYARD ROTATE FUEL CASK, DISCARD LANYARD GET DRT, REMOVE DOME READ TEMP LABEL-DISCARD DOME GET FIT-ENGAGE IN FUEL ELEMENT	2+20	TGE ON REACHING LM, PRESS 'READ' ON TGE, REPORT TO MCC PUT TGE BACK ON LRV GET ETB, PLACE UNDER CDR SEAT TURN LCRU MODE SW - '1' MOUNT LRV FASTEN SEATBELT POWER UP LRV DRIVE TO ALSEP SITE			
2+10		2+30				

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR

2+30

HEADING = 180°
PARK 60 FT NE C/S LOCATION
POWER DOWN LRV
DISMOUNT LRV
SWITCH LCRU - 'POS 3' (TV RMT)
ORIENT HGA

DUST BATT COVERS & MIRRORS - TCU, CTV, LCRU
DEPRESS 'GRAV' ON TGE

POSITION ALSEP PKG 1 SOUTH OF PKG 2 WITH PKG 1 IN DESIRED LOCATION

ALSEP INTERCONNECT (L)

REMOVE PKG 1&2 FROM CARRY BAR & DISCARD CARRY BAR
POSITION PKG 2 10 FT EAST C/S

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)

2+40

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 IF REQD

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 HFT TO SURFACE
DISCARD C/S CONN DUST COVER
DISCARD HFE CONN DUST COVER
MATE & LOCK HFE CONN

RELEASE 2 LEAM PALLET BB'S

2+50

ENGAGE UHT-REMOVE PALLET
PLACE PALLET ON SURFACE 10 FT W C/S

2+50

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

HFE DEPLOY

CARRY HFE 30 FT N C/S

LAY HFE PALLET ON SURFACE

RELEASE 4 BB'S ON PROBE BOX

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

3+00

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

LSG OFFLOAD

RELEASE 4 BB'S SECURING LSG
ENGAGE UHT IN LSG SOCKET
CARRY LSG 25' W OF C/S
DEPOSIT ON SURFACE

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

DISCARD G/M COVER
USE 1 FLAG TO ANCHOR MODULE
RETURN TO C/L

LMS OFFLOAD

USE UHT, PULL VENT RING
RELEASE 3 LMS BB'S

3+10

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	LMP	CDR
3+10	ENGAGE UHT LIFT LMS & ROTATE 90° ON SWIVEL PLACE LMS OFF TO ONE SIDE NE OF C/S DISENGAGE UHT C/S DEPLOY USE UHT-LEVEL & ALIGN C/S RELEASE REAR THERMAL CURTAIN RELEASE 3 ANTENNA BB'S PULL ANT MAST RELEASE PINS REMOVE ANT BRACKET RELEASE & FREE RF ANT CABLE RELEASE 16 PERIMETER BB'S EXTEND & LOCK MAST SECTIONS CHECK 4 CORNERS LOOSE RELEASE 2 INTERIOR BB'S RELEASE CENTER BB-GUIDE C/S UP	3+30	DRILL PREP & TGE CHECK TGE LIGHT - OFF - DEPRESS READ PG ON TGE READ TGE DISPLAYS TO MCC CLOSE COVER ASSEMBLE DRILL PER DECAL CARRY TO HFE SITE: *DRILL *RACK PLACE DRILL ON SURFACE LOCATE RACK/STEMS FOR DRILLING OPEN STEM BAG DRILL 1ST PROBE HOLE ATTACH LONG BORE TUBE TO DRILL FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS			
3+20	CHECK SUNSHIELD COMPLETELY UP CLOSE SIDE CURTAINS-DISCARD COVERS ALSEP ANTENNA DEPLOY WALK TO LEAM SUBPALLET RELEASE 2 BB'S ON GIMBAL CASE LIFT GIMBAL FROM PALLET 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 LAT = 2.02; LONG = 3.08 ALIGN SUN COMPASS-CHECK LEVEL ACTUATE SHORT SW-READ METER **DO NOT EMBED LMS TO LEVEL-REPOSITION *LAT = 2.02; LONG = 3.08 REQUEST XMTR TURN ON & VERIFY DOWN LINK	3+40	DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE ATTACH 2ND SHORT BORE TUBE SECTION TO STEM PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE EMPLACE HFE PROBE 1 PICK UP BOX 1, GRASP HANDLE RULL REMAINING CABLE FROM BOX			
3+30		3+50	REMOVE PROBE LEAN BOX AGAINST RACK			

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA TIME	EVA ACTIVITIES
3+50	GRASP PROBE & REMOVE END CAPS UNFOLD PROBE ASSY INSERT PROBE INTO BORE TUBE REMOVE RAMMER FROM BOX 1, USE RAMMER, INSERT PROBE 1 & READ INDEX NUMBER ON RAMMER USE RAMMER-INSERT 2ND THERMAL SHIELD, POSITION TO MARK F1 REMOVE RAMMER, PLACE NEXT TO BORE TUBE, READ TUBE HEIGHT POSITION 3RD THERMAL SHIELD EXIT CABLE S IN HOLE CARRY DRILL, TUBES, RACK & RAMMER TO WEST HOLE DRILL 2ND PROBE HOLE PLACE RACK, RAMMER, DRILL ON SURFACE ATTACH LONG BORE TUBE TO DRILL FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM PICK UP DRILL, ENGAGE WITH ROTATE DRILL CW TO SEAT
4+00	THREADS DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM PICK UP DRILL, ENGAGE WITH ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE EMPLACE HFE PROBE 2 PICK UP BOX 2, GRASP HANDLE PULL REMAINING CABLE FROM BOX REMOVE PROBE-DISCARD BOX
4+10	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 RECHECK HFE ELEC LEVEL & ALIGN CARRY UHT TO LRV
4+20	LEAM DEPLOY, ACT C/S RELEASE 4 BB'S ON LEAM ENGAGE UHT, CARRY 25 FT SE C/S PULL SOCKET PIN, ROTATE PKG REMOVE DUST COVER DEPLOY LEGS/GNOMON EMPLACE LEAM ON LUNAR SURFACE LEVEL & ALIGN WALK TO HFE SITE LSPE ANT DEPLOY CARRY HFE PALLET TO C/S, PLACE ON SURFACE RETRIEVE LSPE ANT & REEL (C/S) LOWER CABLE REEL TO SURFACE CARRY HFE PALLET & ANT 40 FT NW C/S PLACE HFE PALLET ON SURFACE EXTEND LSPE ANT TO FULL LENGTH USE UHT-INSERT ANT INTO SOCKET LEVEL PALLET SO ANT IS VERTICAL GO BACK TO LRV
4+30	PICK UP CAM

MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	CRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR

4+30

GEOPHONE DEPLOY (B)

DEPLOY GEOPHONE 3:
- *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 GHOMON 2' NW OF GEO 3
- *RETURN TO GEOPHONE MODULE

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

4+40

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

DEPLOY GEOPHONE 4:
- *ENGAGE UGT 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**

MOVE 25 FT SW, PHOTO GEOPHONES 1 & 3

TURN AND PHOTO GEOPHONE 2

TURN & PHOTO GEOPHONE 4

4+50

MOVE 25 FT SE, PHOTO GEOPHONES 2 & 3
TURN AND PHOTO GEOPHONE 1
TURN AND PHOTO GEOPHONE 4
TAKE PAN 3' BEHIND GEOPHONE 3

RETRIEVE GNOMON, RETURN TO C/S TAKING OTHER PHOTOS REQD TO DOCUMENT GEOPHONES

ACTIVATE LSPE ENABLE SW - STOW GNOMON ON LRV

LSG DEPLOY

GO TO LSG 25 FT W OF C/S

DEPLOY/LOCK SUNSHADE

TILT SUNSHADE TO PRESET ANGLE

EMPLACE LSG ON LUNAR SURFACE

ALIGN & LEVEL LSG

5+00

UNCAGE LSG GIMBAL-CHECK LEVEL
RETURN TO C/S

LMS DEPLOY

DEPLOY LMS 45 FT NE C/S, EMPLACE & LEVEL**

INSERT UHT & SNAP BREAKSEAL, ADJUST DUST COVER IF REQD
WALK TO C/S

DRILL DEEP CORE

CARRY TO CORE SITE 55 FT N HFE

PLACE DRILL, RACK & CORE PKG ON SURFACE

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

5+10

MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
5+10	PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 2ND CORE SECT TO STEM	5+30				
	PICK UP DRILL - MATE TO EMPLACED STEM					
	ROTATE DRILL CW TO SEAT DRILL STEM INTO SURFACE		CAP BIT END OF CORE STEM LAY STRING AGAINST RACK, BIT DOWN			
	ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM		<u>CONFIG NEUTRON FLUX</u> ACTIVATE LOWER SECTION			
			HANG CAP ON RACK			
	PLACE DRILL ON SURFACE REMOVE WRENCH		MATE LOWER TO UPPER SECTION			
	ATTACH 3RD CORE SECT TO DRILL PICK UP DRILL - MATE TO EMPLACED STEM		ACTIVATE UPPER SECTION			
	ROTATE DRILL CW TO SEAT THREADS DRILL STEM INTO SURFACE		PUSH UNIT DOWN CORE HOLE			
	ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM		<u>BREAK CORE STEMS</u> CARRY TO LRV: *CORE *CAPS *WRENCH			
			USE WRENCH & VISE TO LOOSEN 3RD STEM JOINT			
5+20	PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 4TH CORE SECTION TO DRILL PICK UP DRILL-MATE TO EMPLACED STEM	5+40	LOOSEN SIXTH JOINT			
	ROTATE DRILL CW TO SEAT DRILL STEM INTO SURFACE		UNSCREW & CAP EACH SECTION - STOW CORE SECTIONS IN STEM BAG			
	ATTACH WRENCH TO STEM ROTATE DRILL CCW TO REMOVE FROM CORE STEM		STOW STEM BAG ON LRV <u>ALSEP PHOTOS</u> TAKE STEREO PAN, 7' FROM C/S, ON 10' BASE			
	REMOVE WRENCH		DOCUMENT HFE STEMS: XSUN STEREO, 7' DNSUN SHOT, 11'			
	SET DRILL ASIDE <u>DEEP CORE RECOVER</u> GET CAPS FROM RACK, PLUG TOP GET TREADLE & NEUTRON FLUX PROBE FROM LRV					
	INSTALL JACK ON TREADLE, EXTEND HNDL * PLACE TREADLE OVER CORE STEM		<u>GEOLOGY ACTIVITIES</u>			
	JACK CORE STEM OUT OF SURFACE					
5+30		5+50				

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	IVT	LMP	CDR
5+50	(THE PROCEDURES TO BE PLANNED BY OPERATIONAL TEAM AS TO LOCALE, OBJECTIVES, ETC. WITH CONCURRENCE OF EVA CREWMEN)	6+10				
	EP DEPLOYMENT STRATEGY - TBD DEPENDING ON GEOLOGY SAMPLING LOCATION					
			RETURN TO LM FOR CLOSEOUT			
6+00		6+20	<u>CLOSEOUT</u>			
			PARK LRV 30 FT NW OF MESA H = 012 +15 VDC SW - OFF - ADJUST LGA READ OUT ALL LRV DISPLAYS ON CONSOLE			
			DISMOUNT LRV			
			PLACE 70MM CAM IN ETB			
			TAKE ETB TO LEC, HOOK ETB TO LEC			
			TAKE SCB WITH SAMPLES TO +Z PAD AND DEPOSIT			
6+10		6+30	MOVE CORE BAG TO +Z PAD			

MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	CDR
	6+30	UNSTOW DUST BRUSH			
		DUST TGE & SEP RECEIVER			
		PULL LRV CB A-B-C-D DUST TV, TCU, BATT COVERS			
		OPEN BATT COVERS			
		DUST BATTS IF DIRTY			
		DUST LCRU & SW OFF LCRU BLANKETS - 65% OFFLOAD TGE TO R. SIDE OF MESA IN SHADE DUST TGE PRESS GRAV PB - NOTE FLASH IND FOR LEVEL CYCLE			
		STOW DUST BRUSH			
		OFFLOAD EVA 1 PALLET			
OPEN HATCH	6+40				
RECEIVE EVA 1 PALLET		CARRY EVA 1 PALLET UP LADDER HAND IN TO IVA CREWMAN			
STRIP PALLET OF CONTENTS					
		TIDY MESA GET DUST BRUSH			
INTERIM STOW EQUIPMENT AS REQD		TGE READ, THEN - STBY -			
		EVA TERM			
		CARRY SCB UP LADDER & STASH ON PORCH			
HAND EMPTY EVA 1 PALLET OUT TO EVA CREWMAN		RECEIVE & DISCARD EVA - 1 PALLET			
	6+50				

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MISSION: APOLLO 17 EVA: 1, ONE-MAN DATE: NOVEMBER 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	CRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+50	RETURN TO SURFACE RETREIVE CORE STEM BAG RE-CLIMB LADDER			
RECEIVE & STOW STEM BAG		HAND STEM BAG IN TO IVA CREWMAN			
		PULL UP ETB (ON LEC) DETACH FROM LEC & PASS ETB THRU HATCH			
RECEIVE & INTERIM STOW ETB					
STOW EVA CREWMAN PLSS ANTENNA		START THRU HATCH			
CLOSE HATCH		MOVE THRU HATCH CLOSE HATCH			
REPRESS OPERATIONS		REPRESS OPERATIONS			
	7+00				

3.2.2 One Man EVA 2

The following pages present a block timeline of activities, a tabular traverse summary, and a detailed vertical procedural timeline for a full-time (7 hours) EVA 2. Only the preliminary procedures through SEP transmitter deployment and the closeout are included in the vertical timeline. Station tasks will be apportioned during the mission should this contingency occur according to the times given in the summary traverse table, Table 3.2-3

FIGURE 3.2-4

APOLLO 17 LUNAR SURFACE TIMELINE

DATE DECEMBER 1972

ONE-MAN EVA 2

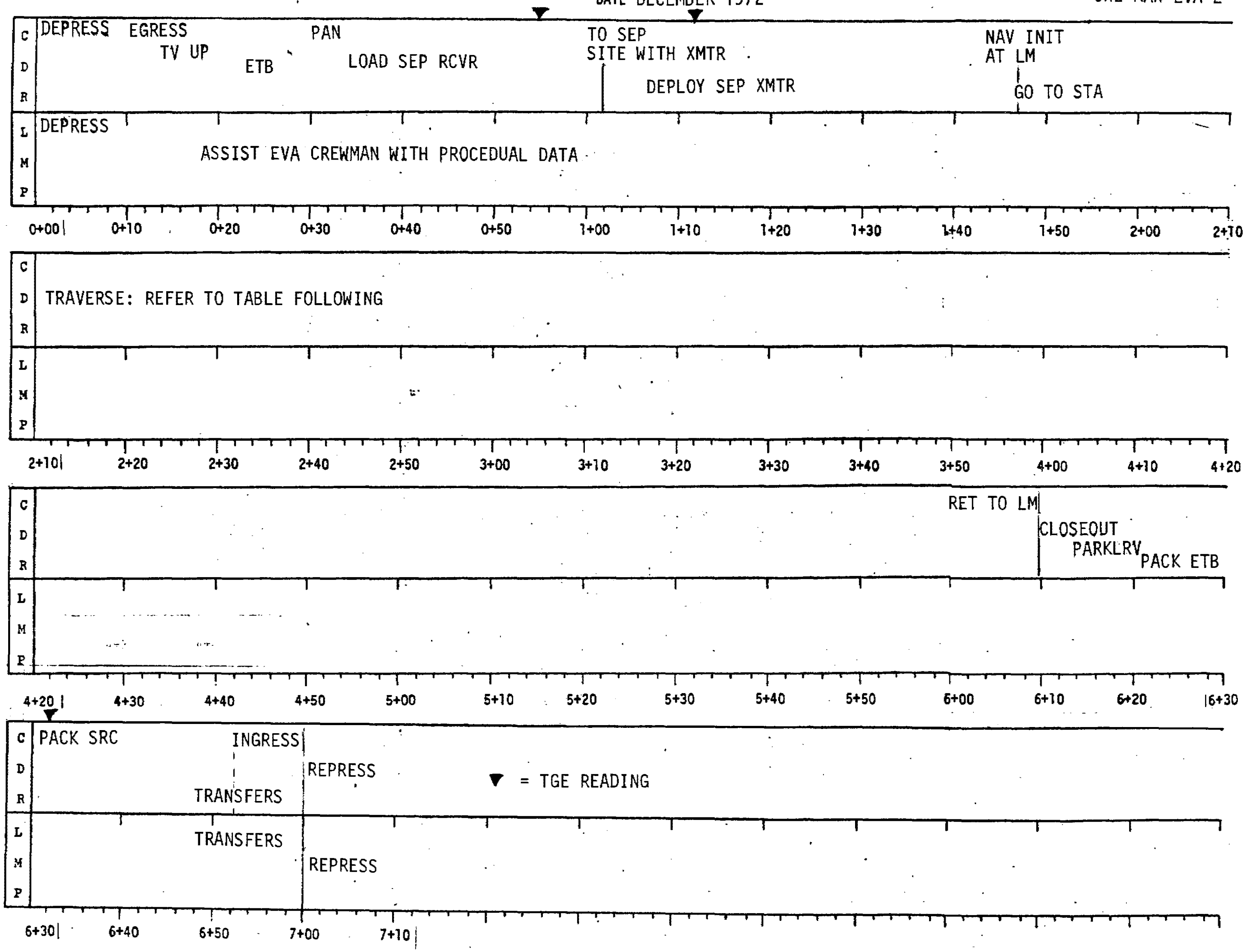

TABLE 3.2-3

ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 CALCULATED DATA NOV 27 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	1+ 2	1+ 2
SEP				0.00	1+ 2	0+45	1+47
RIDE	3.40	7.30	28				
6				3.40	2+15	0+40	2+55
RIDE	0.75	7.30	6				
7				4.15	3+ 1	0+40	3+41
RIDE	2.08	7.30	17				
8A				6.23	3+58	0+25	4+23
RIDE	3.00	7.30	25				
10B				9.23	4+48	0+56	5+44
6#CH							
R=1.75							
RIDE	1.75	7.30	14				
1/4#CH				10.98	5+58	0+ 5	6+ 3
R=.25							
RIDE	0.05	7.30	0				
1/8#CH				11.03	6+ 4	0+ 5	6+ 9
R=.16							
RIDE	0.15	7.30	1				
LM				11.18	6+10	0+50	7+ 0
TOTALS			92			5+28	7+ 0

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

STAT NO	RETURN DISTANCE TO LM (KM)	LRV FAILURE: WALKBACK TIME TO LM (HR+MIN)	LRV FAILURE: STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE: MIN LRV RIDEBACK SPEED REQUIRED 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
SEP	0.10	0+ 2	5+32	5+ 3	5+33	0.15	0.19	1050.00
6	3.40	0+57	3+10	2+40	3+30	4.98	6.58	947.27
7	3.56	1+19	2+10	1+40	2+22	5.21	6.89	936.69
8A	4.33	1+36	1+12	0+42	1+23	6.34	8.38	912.83
10B	1.80	0+30	1+18	0+49	1+ 8	2.63	3.48	892.87
6#CH								
R=1.75								
1/4#CH	0.20	0+ 3	1+44	1+16	1+15	0.29	0.39	880.08
R=.25								
1/8#CH	0.15	0+ 2	1+40	1+12	1+11	0.22	0.29	880.66
R=.16								
LM	0.00	0+ 0	1+11	0+44	0+45	0.00	0.00	899.85

TABLE 3.2-4 ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 INPUT DATA NOV 27 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	1+ 2	0.00	0.00	135.00	****	****	******
SEP	0+45	0.00	0.10	135.00	3.60	7.30	1560.0
6	0+40	3.40	3.40	135.00	3.60	7.30	1560.0
7	0+40	0.75	3.56	135.00	2.70	7.30	1290.0
8A	0+25	2.08	4.33	135.00	2.70	7.30	1290.0
10B	0+56	3.00	1.80	135.00	3.60	7.30	1560.0
6#CH R=1.75							
1/4#CH R=.25	0+ 5	1.75	0.20	135.00	3.60	7.30	1560.0
1/8#CH R=.16	0+ 5	0.05	0.15	135.00	3.60	7.30	1560.0
LM	0+50	0.15	0.00	135.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.028	11.29	1.353	41.0

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

APOLLO 17

DECEMBER 1972

ONE - MAN TIMELINE

LUNAR SURFACE EVA 2

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS			
ASSIST EVA		START EVA WATCH (CALL MARK)			
		NOTE: DETAILED PROCEDURES ARE PRESENTED IN THE "LM LUNAR SURFACE CHECKLIST", SECTION 9.1 - ONE-MAN EVA PREP			
	0+10				

MISSION: APOLLO 17 DATE: DEC '72
EVA: 2 (ONE-MAN)

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+10	EGRESS OPERATIONS			
DEPLOY PLSS ANT (EVA)		EGRESS CABIN TO LM PORCH			
PLACE JETTISON BAG IN HATCH OPENING		RECEIVE & JETTISON BAG HAND IN LEC TO IVA			
PASS LEC/ETB TO EVA		RECEIVE ETB/LEC & LOWER TO SURFACE			
		DESCEND LADDER TO SURFACE			
NOTE: IVA CREWMAN ASSISTS EVA CREWMAN AS REQUIRED WITH PROCEDURES AND INFORMATION. HE ALSO PHOTOS EVA CREWMAN WHERE POSSIBLE WITH DAC		RECHECK FOOTING, STABILITY & MOBILITY			
		KICK JETTISON BAG UNDER LM			
		PLACE TGE TO -ON- READ TGE TO MCC CARRY ETB TO THE CDR FOOTPAN			
	0+20	LCRU PLACE PWR SW -INT- VERIFY: MODE SW -3- LCRU BLANKETS 100% OPEN CLOSE BATT COVERS & PRESS TIGHT ALIGN HGA LRV CB's BUS A,B,C,D - CLOSE VERIFY NAV CB - CLOSE			
(THIS IVA COLUMN WILL BE DROPPED UNTIL END OF THE EVA TO CONSERVE SPACE)		SEP RCVR: PWR SW -STBY- READ TEMPERATURE IND CLOSE BLANKETS A & B			
		SRC 2 CONFIG UNSTOW SRC 2 (LH MESA) PLACE SRC 2 ON TABLE, OPEN FOLD BACK SKIRT TAKE OUT SCB 5, PLACE ON MESA (INTERIM STOW) SEAL ORGANIC CONTROL SAMPLE CLOSE SRC 2 (DON'T LATCH) UNSTOW LCRU BATT TIDY MESA BLANKETS PRESS TGE - GRAV -			
	0+30				

MISSION: APOLLO 17
EVA: 2 (ONE-MAN)

DATE: DEC '72

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES
0+30	CARRY THE FOLLOWING TO THE LRV: SCB 5 TO AFT TOOL GATE (LH) LCRU BATT TO UNDER CDR SEAT DUST BRUSH TO LCRU	0+50	SWIVEL GEO PALLET OPEN BSLSS OVER SEATBACK OFFLOAD SEP RCVR FROM EXPT PALLET
	LRV EQUIP PLACE EVA MAPS ON LMP SEAT (ETB) STOW THE FOLLOWING ITEMS UNDER THE CDR SEAT: 5-70mm MAGS (D,I,J,K) PLACE MAG R ON 500mm CAM POLAR FILTER PLACE 70mm CAM ON CDR SEAT		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)
	UNSTOW SCB 7 TO LRV GATE (RH) TRANSFER FROM SCB 5 TO SCB 7: 3 CORE TUBES (LOOSE) 3-20 BAG DISPENSERS 2 CORE CAP DISPENSERS SESC ("SHORT CAN") MOUNT 20 BAG DISPENSER ON 70mm CAM STOW SCB 7 UNDER LMP SEAT PLACE EVA MAPS IN HOLDER		PRESS 'READ' ON TGE, REPORT TO MCC PUT TGE ON LRV CLOSE GEO PALLET OFFLOAD SEP XMTR FROM EXPT PALLET
0+40	UNSTOW SCB 6 TO LRV GATE	1+00	PLACE SEP XMTR ON LMP FLOORPAN
	PHOTO PAN GET 70mm CAM (CDR SEAT) CARRY ETB TO MESA TABLE TAKE LM AREA PHOTO PAN AT 8:00/30'		TRAV TO SEP POSITION TV CAM FOR TRAV MOUNT 70mm CAM MOUNT LRV & POWER UP HOU: NAV, AMP HRS & TEMPS DRIVE LRV TO SEP XMTR SITE (>100m E OF LM)
	OFFLOAD 2nd EP TRANSPORTER FROM EXPT PALLET PLACE TRANSPORTER ON LMP FLOORPAN		POSITION LRV, H = 090 NAV: RESET THEN OFF DRIVE LRV: H DIST 090 0.1 210 0.1 360 0.2 POSITION LRV H=270 ALONG WEST ANT LEG, 10m FROM XMTR & 5m TO SIDE OF ANT
0+50		1+10	

SEQ CAM. | TASK FUNCTION: LMP | CDR

MISSION: APOLLO 17 DATE: DEC '72
EVA: 2 (ONE-MAN)

EVA TIME	EVA ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
1+10	POWERDOWN LRV DISMOUNT LRV GET SEP XMTR PRESS TGE - GRAV - WALK TO TRACK CROSSING W/XMTR DEPLOY XMTR LEGS RELEASE ANT REEL RETAINERS ALIGN DIAGONALS, SHADOW-GRAPH IN SUN GUADRANT DEPLOY REEL #1 EAST TAKE PHOTO TO XMTR FROM END OF #1 ANT (f11,74',1/250)			
1+20	DEPLOY REEL #2 WEST TAKE PHOTO TO XMTR FROM END OF #2 ANT (f5.6,74',1/250) DEPLOY REEL #3 SOUTH TAKE PHOTO TO XMTR FROM END OF #3 ANT (f8,74',1/250)			
1+30	DEPLOY REEL #4 NORTH TAKE PHOTO TO XMTR FROM END OF #3 ANT (f8,74',1/250) LEVEL & ALIGN XMTR ZERO ON SHADOWGRAPH DEPLOY CARRY HANDLE REMOVE THERMAL COVER DEPLOY SOLAR PANELS VERIFY LEVEL & ALIGN PLACE XMTR SW -ON-			
1+40	PHOTO LRV/SEP: STEREO PARTIAL PAN X-SUN 50' RCVR DN-SUN 7' SEP RCVR: PLACE POWER SW -ON- PLACE RCDR SW -ON- READ TGE TO MCC MOUNT LRV REPORT SSE, PITCH, ROLL, HEADING RESET NAV TORQUE GYRO PER MCC POSITION LGA 240° POWER UP LRV GEOLOGY (THE PROCEDURES TO BE PLANNED BY OPERATIONAL TEAM AS TO LOCALE, OBJECTIVES, ETC. WITH CONCURRENCE OF EVA CREWMEN)			
1+50				

MISSION: APOLLO 17 DATE:
EVA: 2 (ONE-MAN)

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
6+00		6+20	*DEPLOY COSMIC RAY* SHADE SIDE FIRST			
			ETB TO CDR FOOTPAN STOW ETB: 70mm CAM(LENSE INBOARD) 5 MAGS (RPT MAG/FRAME) 500mm MAG R MAPS			
			ETB TO LEC HOOK			
			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			
6+10	EVA 2 CLOSEOUT PARK LRV 30' NW OF MESA H=017 POWER DOWN LRV CAM TO CDR SEAT MODE SW - 3 - (TV RMT) ALIGN HGA	6+30				
	SEP RCVR: READ TEMP PWR SW - OFF - RCDR - OFF -		(PROCEED TO NEXT PAGE FOR FINAL IVA/EVA CLOSEOUT PROCEDURES)			
	UNDERSEAT SAMPLES TO SRB ("BIG BAG")					
	LRV SAMPLES TO SCB 5					
	MAPS TO CDR SEAT					
	SCB 5 TO SRC 2, POCKETS UP REMOVE SKIRT & SEAL PROTECTOR CLOSE & SEAL SRC 2: VERIFY GOOD SEAL PLACE ON +Z PAD					
6+20						

C/CPD-068

MISSION: APOLLO 17
EVA: 2 (ONE-MAN)

DATE: DEC '72

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+30	LCRU BLNKT OPEN - 100%			
		DUST SEP RCVR: BLANKETS A & B OPEN VERIFY: PWR SW - OFF - RCDR - OFF -			
OPEN HATCH		TGE TO R. SIDE MESA, IN SHADE (CARRY DUST BRUSH) TGE - GRAV -			
RECEIVE EVA-2 PALLET		EVA-2 PALLET ON TABLE ECS LiOH CAN TO POCKET LiOH CANS - PINS GREEN			
STRIP PALLET OF CONTENTS					
		CARRY EVA-2 PALLET TO PORCH			
INTERIM STOW EQUIPMENT AS REQD					
	6+40	HAND IN EVA-2 PALLET TO IVA			
		DESCEND TO SURFACE			
		TIDY MESA BLANKETS			
		DUST EMU			
		READ TGE TO MCC			
		PLACE TGE SW TO - STBY -			
		OPEN TGE THERMAL LID & DUST			
		DUST BRUSH TO LADDER HOOK			
HAND OUT EMPTY EVA-2 PALLET TO EVA CREWMAN		CARRY SRC 2 TO PORCH			
		DISCARD EVA-2 PALLET			
	6+50				

MISSION: APOLLO 17
EVA: 2 (ONE-MAN)

DATE: DEC '72

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
RECEIVE & STOW SRC 2	6+50	HAND SRC 2 IN TO IVA CREWMAN			
		DESCEND TO SURFACE			
		CARRY SCB 6 & BIG BAG (IF REQD) TO PORCH			
RECEIVE & INTERIM STOW BAGS		HAND BAGS IN TO IVA			
		PULL UP ETB			
RECEIVE & INTERIM STOW ETB		HAND ETB IN TO IVA			
STOW PLSS ANT		INGRESS			
ASSIST EVA INGRESS					
		REPRESS			
	7+00				

3.2.3 One Man EVA 3

The following pages present a block timeline of activities, a tabular traverse summary, and a detailed vertical procedural timeline for a full-time (7 hours) EVA 3. Only the preliminary and final closeout procedures are included in the vertical timeline. Station tasks will be apportioned during the mission should this contingency occur according to the times given in the summary traverse table, Table 3.2-5.

FIGURE 3.2-5

APOLLO 17 LUNAR SURFACE TIMELINE | EVA | DATE DECEMBER 1972 ONE - MAN EVA 3

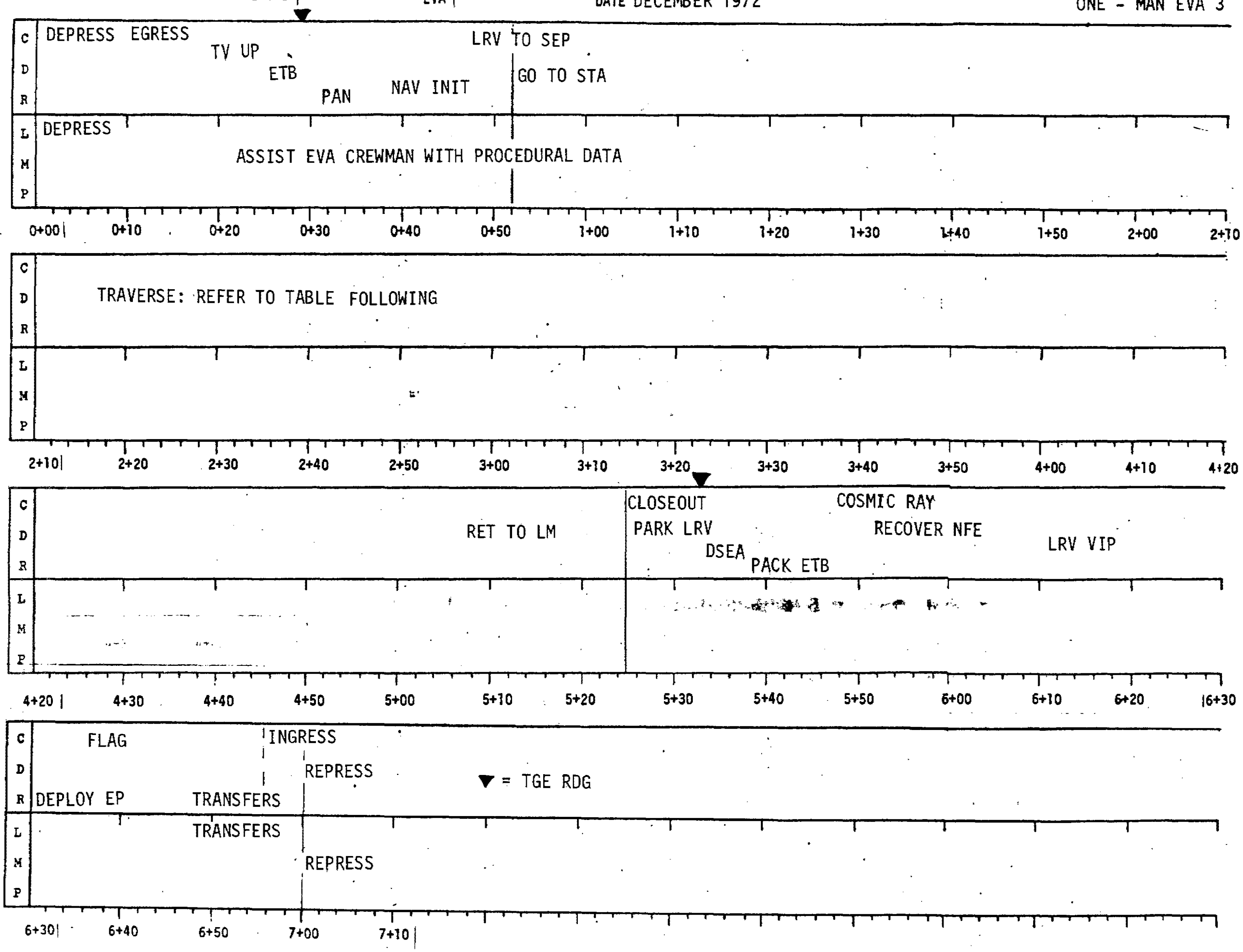

TABLE 3.2-5 ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 CALCULATED DATA NOV 27 1972

EVA START 162:40 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	0+50	0+50
SEP				0.00	0+50	0+ 2	0+52
RIDE	0.45	7.30	4				
1/8#CH R=.20				0.45	0+56	0+ 5	1+ 1
RIDE	4.63	7.30	38				
3 ALT.				5.08	1+39	0+59	2+38
RIDE	1.60	7.30	13				
4				6.68	2+51	0+58	3+49
RIDE	1.39	7.30	11				
PHOTO LRV-SA 3#CH R=2.4				8.07	4+ 0	0+10	4+10
RIDE	1.72	7.30	14				
5 1#CH R=0.9				9.79	4+24	0+46	5+10
RIDE	0.72	7.30	6				
1/4#CH R=.25				10.51	5+16	0+ 5	5+21
RIDE	0.40	7.30	3				
LM				10.91	5+25	1+35	7+ 0
TOTALS			90			5+30	7+ 0

ONE-MAN EVA

STAT NO	RETURN DISTANCE TO LM (KM)	WALKBACK TIME TO LM (HR+MIN)	TRAVERSE CONTINGENCIES — LRV FAILURE — STATION MARGIN ABOVE WALKBACK REQUIREMENTS: FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE — MIN LRV RIDEBACK SPEED REQUIRED: 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
SEP	0.10	0+ 2	6+12	5+46	6+28	0.15	0.19	1050.00
1/8#CH R=.20	0.35	0+ 6	5+58	5+33	6+15	0.51	0.68	1011.30
3 ALT.	4.98	1+23	2+38	2+11	3+21	7.29	9.64	877.09
4	4.13	1+32	1+38	1+12	2+ 1	6.04	7.99	876.77
PHOTO LRV-SA 3#CH R=2.4	2.84	0+47	2+ 7	1+41	2+24	4.16	5.50	864.79
5 1#CH R=0.9	1.12	0+19	1+54	1+30	1+53	1.64	2.17	863.08
1/4#CH R=.25	0.40	0+ 7	2+ 3	1+39	1+54	0.59	0.77	858.67
LM	0.00	0+ 0	0+51	0+27	0+45	0.00	0.00	899.56

TABLE 3.2-6 ONE-MAN EVA

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 INPUT DATA NOV 27 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+50	0.00	0.00	200.00	****	****	******
SEP	0+ 2	0.00	0.10	200.00	3.60	7.30	1560.0
1/8#CH R=.20	0+ 5	0.45	0.35	200.00	3.60	7.30	1560.0
3 ALT.	0+59	4.63	4.98	200.00	3.60	7.30	1560.0
4	0+58	1.60	4.13	200.00	2.70	7.30	1290.0
PHOTO LRV-SA 3#CH R=2.4	0+10	1.39	2.84	200.00	3.60	7.30	1560.0
5 1#CH R=0.9	0+46	1.72	1.12	200.00	3.60	7.30	1560.0
1/4#CH R=.25	0+ 5	0.72	0.40	200.00	3.60	7.30	1560.0
LM	1+35	0.40	0.00	200.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (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	11.29	1.353	41.0

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

APOLLO 17

DECEMBER 1972

ONE - MAN TIMELINE

LUNAR SURFACE EVA 3

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
PRE-EGRESS OPERATIONS	0+00	PRE-EGRESS OPERATIONS			
ASSIST EVA		START EVA WATCH (CALL MARK)			
		NOTE: DETAILED PROCEDURES ARE PRESENTED IN THE "LM LUNAR SURFACE CHECKLIST", SECTION 9.1 - ONE-MAN EVA PREP			
	0+10				

MISSION: APOLLO 17
EVA: 3 (ONE-MAN)

DATE: Dec '72

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+10	EGRESS OPERATIONS			
DEPLOY PLSS ANT (EVA)		EGRESS CABIN TO LM PORCH			
PLACE JETTISON BAG IN HATCH OPENING		RECEIVE & JETTISON BAG HAND IN LEC TO IVA			
PASS LEC/ETB TO EVA		RECEIVE ETB/LEC & LOWER TO SURFACE			
		DESCEND LADDER TO SURFACE			
NOTE: IVA CREWMAN ASSISTS EVA CREWMAN AS REQUIRED WITH PROCEDURES AND INFORMATION. HE ALSO PHOTOS EVA CREWMAN WHERE POSSIBLE WITH DAC		RECHECK FOOTING, STABILITY & MOBILITY			
		KICK JETTISON BAG UNDER LM			
		PLACE TGE TO -ON- READ TGE TO MCC CARRY ETB TO CDR FOOTPAN			
	0+20	LCRU PLACE PWR SW -INT- VERIFY: MODE SW -3- LCRU BLANKETS 100% OPEN CLOSE BATT COVERS & PRESS TIGHT ALIGN HGA LRV CB's BUS A,B,C,D - CLOSE VERIFY NAV CB - CLOSE SEP RCVR: PWR SW -STBY- READ TEMPERATURE IND CLOSE BLANKETS A & B			
(THIS IVA COLUMN WILL BE DROPPED UNTIL END OF THE EVA TO CONSERVE SPACE)		PLACE EVA MAPS (ETB) ON LMP SEAT			
		STOW UNDER CDR SEAT: 4 MAGS (RPT D,F,M,N) MAG R TO 500mm MOUNT 70mm CAM			
		ETB TO MESA TABLE			
	0+30				

MISSION: APOLLO 17 DATE: DEC '72
EVA: 3 (ONE-MAN)

EVA TIME	EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
0+30	PRESS TGE - GRAV - TAKE LM AREA PHOTO PAN AT 12:00/30' TAKE TO LRV "BIG BAG" TO GATE DUST BRUSH TO LCRU SEP RCVR PLACE POWER SW -ON- PLACE RCDR SW -ON- EQUIP PREP MOUNT EVA MAPS ON HOLDER HANG SCB 7 (LMP SEAT) ON GATE PLACE CAP DISPENSER ON GATE IF REQD MOUNT 20-BAG DISPENSER ON CAM	0+50	PARK LRV H=360 ALONG NORTH ANT LEG, 10m FROM XMTR & 5m TO SIDE OF ANT (REPORT) RESET LRV NAV GO TO FIRST STATION EVA 3			
0+40	STOW REMAINING SCB 7 EQUIP UNDER LMP SEAT READ TGE TO MCC PLACE TGE ON LRV TRAV PREP POSITION TV CAM FOR TRAV MODE SW -1- (PM1/WB) MOUNT & POWER UP LRV POSITION LRV H=270 POWER DOWN LRV REPORT SSE, PITCH, ROLL, HEADING RESET NAV TORQUE GYRO PER MCC TRAV TO SEP POWER UP LRV	1+00	GEOLOGY (THE PROCEDURES TO BE PLANNED BY OPERATIONAL TEAM AS TO LOCALE, OBJECTIVES, ETC. WITH CONCURRENCE OF EVA CREWMAN)			
0+50	DRIVE LRV TO SEP XMTR SITE	1+10				

MISSION: APOLLO 17
EVA: 3 (ONE-MAN)

DATE: DEC '72

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
5+20	5+40				
RETURN TO LM EVA 3 CLOSEOUT PARK LRV 15' NW MESA H = 270		ETB TO MESA TABLE CONTAM SAMPLE UNDER D/S(LRV SPLR) NEAR -Z DBL BAG STOW IN BIG BAG			
POWER DOWN LRV CAM TO CDR FOOTPAN MODE SW - 3 - (TV RMT) ALIGN HGA		*GET COSMIC RAY EXP* SUN SIDE FIRST MATE HALVES & BAG STOW IN ETB			
5+30 PLACE MAPS IN CDR SEAT	5+50				
DOFF PLSS HARNESS TGE TO SURFACE PRESS TGE - GRAV - SEP RCVR: PWR SW - OFF - READ TEMP REMOVE DSEA TO CDR SEAT		N. FLUX RECOVER WALK TO N. FLUX SITE			
DISCARD UNUSED EQUIPMENT FROM SCB 7 LRV SAMPLES TO BIG BAG		ENGAGE JACK ON NFE ROD JACK NFE OUT OF GROUND			
BIG BAG, SCB 7 & LRV SPLR TO +Z PAD ETB TO CDR FOOTPAN MOUNT COLOR MAG (E) ON CAM RETURN CAM TO FLOORPAN STOW ETB: SEP DSEA MAPS ALL LOOSE MAGS 500mm CAM MAG		DEMATE 2 SECTIONS			
5+40	6+00				

MISSION: APOLLO 17
EVA: 3 (ONE-MAN)

DATE: DEC '72

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
6+00	6+20				
GET CAP FROM RACK & TURN LOWER SECTION OFF		DUST:			
SCREW CAP ON LOWER SECTION		TV LENS, TV, TCU			
TURN UPPER SECTION OFF		LRV BATT COVERS & OPEN			
		LRV BATTS (IF DIRTY)			
		LCRU			
RETURN TO LM WITH NFE		TETHER BRUSH LCRU BLNKT - 100% OPEN COVER LCRU C/D PANEL WITH 65% BLANKET			
		ALIGN HGA			
PUT NFE ON MESA TABLE UNSTOW BAG, L SIDE MESA		GET EP 3 FROM TRANSPORTER			
TRANSFER NFE TO BAG, LEAN BAG AGAINST +Z STRUT		WALK TO SEP XMTR			
6+10	6+30	PLACE XMTR SW -OFF- WALK TO WEST XMTR ANT LEG			
LRV FINAL PARKING		DEPLOY EP 3			
MOUNT CAM		VERIFY EP "SAFE" PULL 3 PINS (DISCARD) EXTEND EP ANTENNA			
NAV: RESET THEN OFF					
DRIVE TO FINAL PARK SITE H = 102 DIST = 0.1 PARK H = 270 @ BRG = 282		PLACE EP ON SURFACE PHOTO 7' DNSUN TO LM f11/250			
		RETURN TO LM HOOK ETB TO LEC READ TGE TO MCC			
LRV CBS: BUS B, D - OPEN AUX CB BYPASS - ON LCRU: PWR SW - EXT		(PROCEED TO NEXT PAGE FOR FINAL IVA/EVA CLOSEOUT PROCEDURES)			
6+20					

MISSION: APOLLO 17 DATE: Dec '72
EVA: 3 (ONE-MAN)

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+30				
		FLAG DEPLOY UNSTOW FLAG KIT, OPEN, PLACE ON MESA			
		REMOVE STAFF & GET HAMMER			
		SELECT SITE 2:00/30' DRIVE STAFF INTO SURFACE			
	6+40	DEPLOY FLAG-EXTEND MAST & SPAR			
		MOUNT FLAG IN BASE STAFF			
		PHOTO FLAG WITH LM IN BACKGROUND AS DESIRED			
OPEN HATCH		CARRY N. FLUX BAG & SCB 7 TO PORCH			
RECEIVE N. FLUX BAG & SCB 7 FROM EVA		HAND BAGS TO IVA			
INTERIM STOW BAGS		DESCEND TO SURFACE			
		POLICE UP LM AREA, KICKING LOOSE EQUIP UNDER LM			
	6+50				

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MISSION: APOLLO 17 DATE: DEC '72
EVA: 3 (ONE-MAN)

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
TRACK LITE TEST CB (16) LTG TRACK - CLOSE - EXTERIOR LTG SW - TRACK -	6+50	CHECK TRACK LIGHT			
EXTERIOR LTG SW - OFF - CB (16) LTG TRACK - OPEN -					
		CARRY "BIG BAG" TO PORCH			
		HAND BAG INTO IVA			
RECEIVE "BIG BAG"		PULL UP ETB ON LEC			
INTERIM STOW BAG		HAND ETB INTO IVA			
RECEIVE ETB					
INTERIM STOW ETB					
ASSIST EVA INGRESS		INGRESS			
CLOSE HATCH					
		REPRESS			
	7+00				

3.3 Walking EVA's

The major constraining factors on walking traverses are: radius of action is more limited than LRV traverses to accommodate the BSLSS emergency return mode (approximately 3.6 Km is the maximum distance), average metabolic rate is higher and therefore PLSS consumables margins are lower, and the equipment which can be hand-carried precludes doing certain tasks which would be done on the LRV traverses. The walking traverses presented herein are consistent with these limitations while trying to accommodate as many of the original science objectives as practicable. It is assumed that the traverses originate from the nominal landing point; no attempt is made to preplan walking traverses from off-nominal landings. Such planning will be done after landing, if necessary.

A list of equipment to be carried on the walking traverses appears in Section 2.4, and the geometry of the traverses is shown in Figure 3.3-1. Two versions of EVA 3 are shown; the one selected depends to some extent on when the LRV becomes inoperative. Table 3.3-1 illustrates this dependence. Details of the walking EVA plans are discussed in the sections that follow.

FIGURE 3.3-1

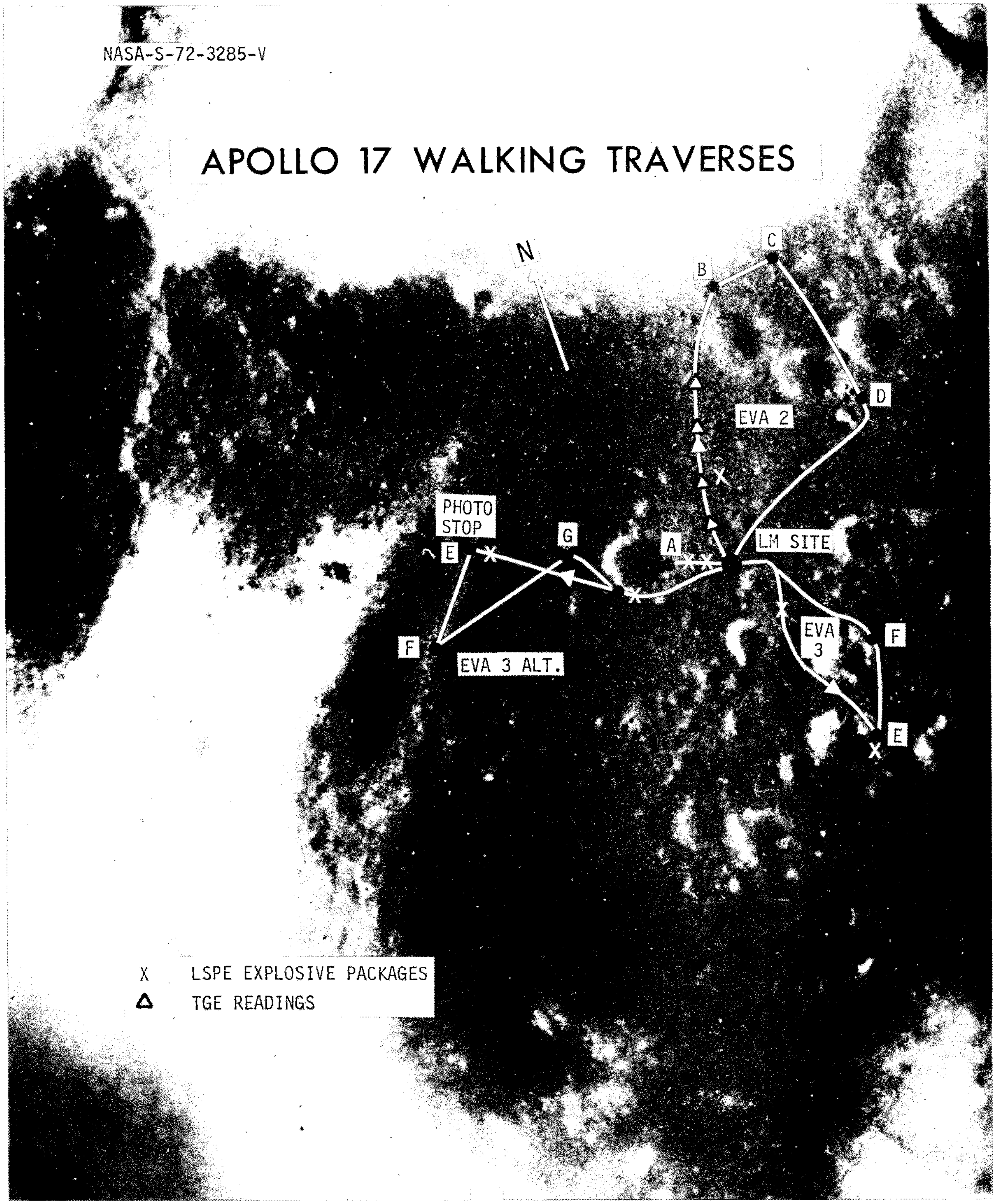

NASA-S-72-3285-V
APOLLO 17 WALKING TRAVERSES
N
C
B
D
EVA 2
PHOTO STOP
E
G
A
LM SITE
EVA 3
F
E
F
EVA 3 ALT.
X LSPE EXPLOSIVE PACKAGES
Δ TGE READINGS

TABLE 3.3-1

WALKING TRAVERSE PLANS

CASE	EVA 1	EVA 2	EVA 3
LRV INOPERATIVE FROM START	LOCAL DARK MANTLE AND CAMELOT CRATER	NORTH MASSIF AT STATION 6 - 7 PLUS DARK MANTLE AT STATION 9	DARK MANTLE/ SUB-FLOOR AT STATIONS 1 AND 10 OR LIGHT MANTLE SOUTH OF VICTORY CRATER PLUS DARK MANTLE AND SUB-FLOOR AT STATION 5
EVA 1 NOMINAL	-	SAME AS ABOVE	LIGHT MANTLE SOUTH OF VICTORY CRATER PLUS DARK MANTLE AND SUB-FLOOR AT STATION 5
EVA's 1 AND 2 NOMINAL	-	-	SAME AS WALKING TRAVERSE 2

3.3.1 Walking EVA 1

For the walking EVA 1 case, an LRV problem is assumed to have been detected after deployment and 13 minutes was spent in troubleshooting before abandoning the LRV. Following the initial period in the LM area, the crew moves out to the ALSEP site to spend 1 3/4 hour in performing the nominal ALSEP area activities. At the conclusion of this period, the crew returns to the LM where they configure for the walking traverse. Although they depart on the walking traverse at about the same time as for the LRV traverse, the slower mobility rates do not permit traversing to the nominal station, Station 1 (only about 20 minutes could be spent there).

Camelot Crater affords an opportunity to partially fulfill the objectives of Station 1, therefore the walking EVA 1 is oriented toward Camelot.

Two LSPE EP's are deployed enroute to Camelot (EP 4 and 8), where 1 hour 43 minutes are available for geological investigation. This is shown as Station "A" on the Eastern rim of Camelot; however, the 1 hour 43 minutes can, of course, be allocated at other sampling areas if desired. Any additional walking time, however, must be done at the expense of station time.

The final 40 minutes of EVA 1 is spent in closeout activities. Note that the SEP transmitter deployment is not done on EVA 1 . Limited data may be obtained on this experiment on EVA 3, and the transmitter deployment is postponed until that time.

The following pages provide a block timeline, a summary traverse table, and a detailed procedure for walking EVA 1.

FIGURE 3.3-2

APOLLO 17 LUNAR SURFACE TIMELINE

DATE DECEMBER 1972

WALKING TRAVERSE EVA 1

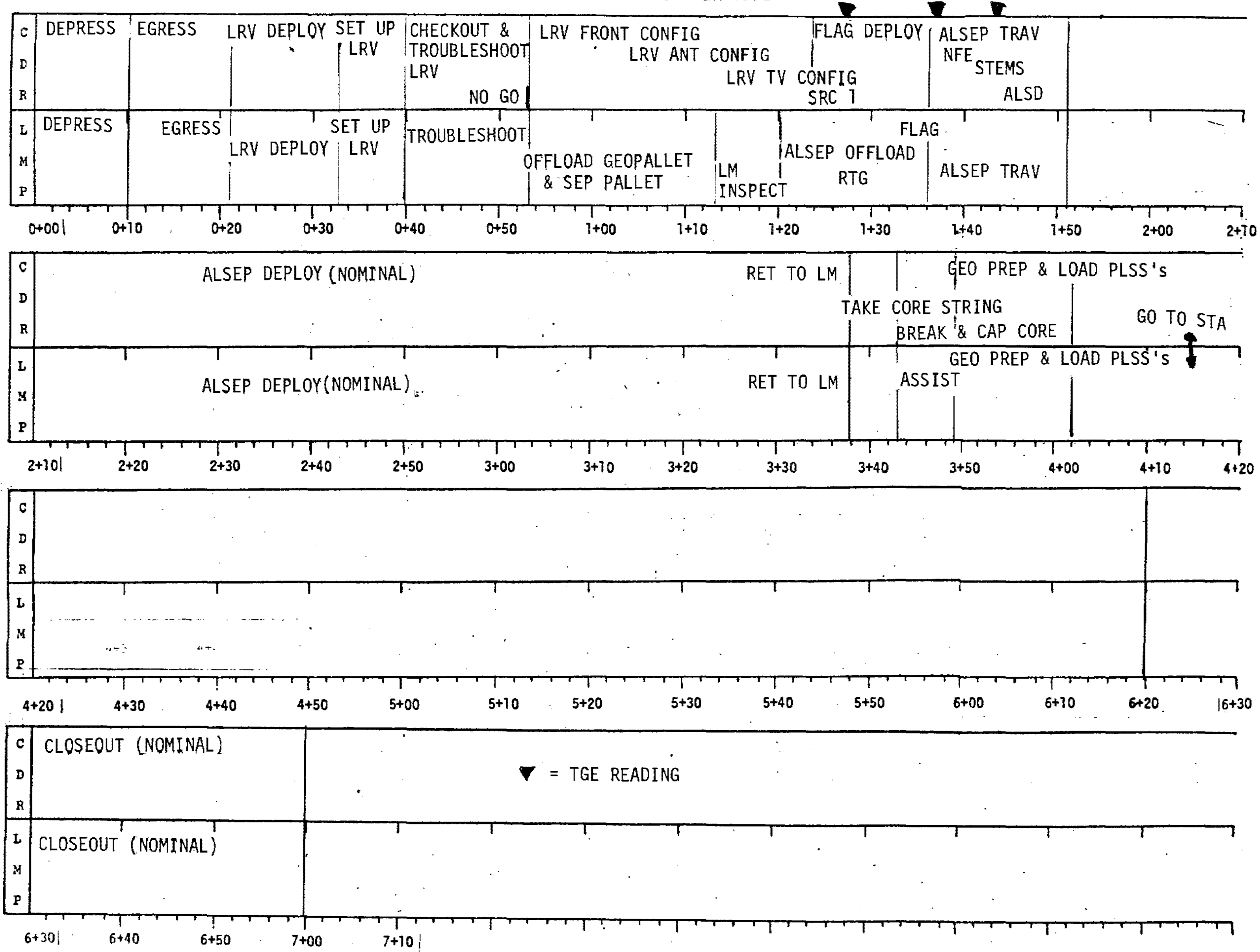


TABLE 3.3-2

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 1 CALCULATED DATA NOV 21 1972

EVA START 116:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+46	1+46
WALK	0.10	1.25	5				
ALSEP				0.10	1+51	1+45	3+36
WALK	0.10	2.50	2				
LM				0.20	3+38	0+24	4+ 2
WALK	0.35	2.50	8				
EP 4 R=0.20				0.55	4+11	0+ 3	4+14
WALK	0.05	2.50	1				
EP 8 R=0.25				0.60	4+15	0+ 3	4+18
WALK	0.20	2.50	5				
A-5A				0.80	4+23	1+43	6+ 6
WALK	0.60	2.50	14				
LM				1.40	6+20	0+40	7+ 0
TOTALS			36			6+24	7+ 0

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
ALSEP	0.10	0+ 2	4+ 8	3+51	3+55	0.10	1048.89
LM	0.00	0+ 0	3+44	3+25	3+30	0.00	1048.51
EP 4 R=0.20	0.35	0+ 6	3+17	3+ 4	3+13	0.34	1045.74
EP 8 R=0.25	0.40	0+ 7	3+11	2+59	3+ 8	0.39	1044.41
A-5A	0.60	0+10	1+15	1+ 5	1+16	0.58	1017.23
LM	0.00	0+ 0	0+54	0+35	0+45	0.00	1019.76

TABLE 3.3-3

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 1 INPUT DATA NOV 21 1972

EVA START 116:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	1+46	0.00	0.00	0.00	1.25	3.60	1000.0	1560.0
ALSEP	1+45	0.10	0.10	0.00	1.25	3.60	1000.0	1560.0
LM	0+24	0.10	0.00	0.00	2.50	3.60	1000.0	1560.0
EP 4 R=0.20	0+ 3	0.35	0.35	0.00	2.50	3.60	1000.0	1560.0
EP 8 R=0.25	0+ 3	0.05	0.40	0.00	2.50	3.60	1000.0	1560.0
A-5A	1+43	0.20	0.60	0.00	2.50	3.60	1000.0	1560.0
LM	0+40	0.60	0.00	0.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.020	10.86	1.403	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
OPEN HATCH ASSIST CDR EGRESS DEPLOY CDR PLSS ANTENNA HAND JETTISON BAG TO CDR	0+10	<u>EGRESS OPERATIONS</u> EGRESS CABIN TO LM PORCH RECEIVE & JETTISON BAG
HAND ETB/LEC TO CDR TAPE RECORDER-OFF- VERIFY: VOX SENS (2) - 'MAX' CB CONFIG UTILITY FLOODLIGHTS - 'OFF'		RECEIVE ETB/LEC DESCEND LADDER TO TOP RUNG UNLOCK & DEPLOY MESA LOWER ETB ON LEC
TURN ON 16 mm CAMERA		DESCEND LADDER TO SURFACE HANG ETB ON LADDER HOOK
<u>LMP EGRESS OPERATIONS</u> EGRESS LM TO PORCH PARTIALLY CLOSE LM HATCH		CHECK FOOTING, STABILITY & MOBILITY
DESCEND LADDER TO SURFACE		KICK JETT BAG UNDER LM
CHECK FOOTING, STABILITY, MOBILITY CDR DEPLOY ANT	0+20	DEPLOY LMP PLSS ANT
OPEN MESA BLNKTS UNSTOW SAMPLE RETURN BAG HANG ON LADDER HOOK HANG ETB ON MESA TABLE		<u>LRV DEPLOY</u> RELEASE LRV INSULATION BLANKET REMOVE CONTINGENCY DEPLOY RELEASE LH DEPLOY TAPE - HANG ON +Z STRUT CHECK: OUTRIGGER CABLE TAUT CHASSIS PARALLEL
<u>LRV DEPLOY</u> 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 GRASP DEPLOY CABLE, MONITOR DEPLOYMENT, MAINTAIN CAUTION: SLACKEN TENSION AS AFT CHASSIS DEPLOYS UNTIL WHEELS TOUCH SURFACE		PULL RH TAPE TO ROTATE LRV 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	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
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 SADDLE RELEASE CABLE & VERIFY RODS FREE		PULL PIN TO RELEASE DEPLOY CABLE-DISCARD
<u>SET UP LRV</u> PICK UP & TURN LRV		<u>SET UP LRV</u> PICK UP & TURN LRV ERECT GEO PALLET POST
DEPLOY LR FENDER EXT CHECK LR HINGE PIN ENGAGED ERECT CDR SEAT & UNSTOW SEAT RELEASE INBRD HNDHLD TIEDOWN		DEPLOY RR FENDER EXT CHECK RR HINGE PIN ENGAGED CHECK REAR STEERING RING ERECT LMP SEAT & UNSTOW LOWER ARMREST
PULL T-HNDL, ROTATE 90 DEG, LOWER CONSOLE, RAISE HANDHOLD ROTATE T-HNDL 90 DEG TO LOCK PULL & DISCARD ATTITUDE & C/W FLAGS REMOVE TRIPOD & STOW LEFT TOEHOLD ERECT FOOTREST CHECK FRONT STEER DECOUPLE CHECK LF HINGE PIN ENGAGED DEPLOY LF FENDER EXT		PULL T-HNDL, ROTATE 90 DEG LOWER CONSOLE RAISE HANDHOLD ROTATE T-HNDL 90 DEG TO LOCK REMOVE TRIPOD & STOW RIGHT TOEHOLD ERECT FOOTREST CHECK RF HINGE PIN ENGAGED
<u>LM AREA DESC & PHOTO</u> GET LMP CAM	0+40	VERIFY BATT COVERS CLOSED <u>LRV TEST DRIVE</u> MOUNT LRV FASTEN SEATBELT POWER UP LRV PER DECAL
DO LM AREA INSPECTION		<u>LRV NO-GO AT POWER UP</u>
TAKE PHOTO PAN 30 FT FROM LM AT 4:00 STOW CAM IN ETB AIR CDR WITH LRV CHECKOUT		CHECKOUT & TROUBLESHOOT LRV WITH LMP
	0+50	REPOSITION LRV TO MESA AREA

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	0+50	
REMOVE QUAD III THERMAL BLANKETS FROM PALLET		LRV FRONT CONFIG LIFT LCRU POST LOCKS RELEASE Y-CABLE VELCRO TABS
OFFLOAD GEO PALLET		
MOUNT GEO PALLET ON TO LRV		UNSTOW TCU CONN - DISCARD ADAPTER UNSTOW LCRU
		MOUNT LCRU ON LRV
REMOVE & DISCARD PALLET HANDRAILS		UNSTOW & CONNECT LCRU PWR CABLE-DISCARD ADAPTER
REMOVE & DISCARD LAUNCH PINS & VELCRO ON TGE		UNSTOW TCU
SET TGE ON / STBY SW TO -ON- READ DISPLAY TO MCC CONFIG TOOLS ON GEO PALLET *TONGS TO CDR SEAT *EXT HNDLS TO GATE *HAMMER *GNOMON *DUST BRUSH TO LCRU	1+00	MOUNT TCU ON LRV
UNSTOW RAKE-MOUNT ON EXT HANDLE INSTALL SCOOP ON RH EXT HANDLE DISCARD DRIVE TOOL BRKT INSTALL VISE IN PALLET PLACE "BIG BAG" ON GATE		CONNECT TCU PWR CABLE LRV ANT CONFIG UNSTOW RAKE TO CDR SEAT OPEN LRV ANT CANISTER
LRV MISC EQUIP STOWAGE UNSTOW CDR CAM FROM MESA		UNSTOW LGA FROM CANISTER
MOUNT CDR CAM ON RCU RETRIEVE ETB - TO CDR FOOTPAN		MOUNT LGA IN CDR HANDHOLD
REMOVE & STOW RESEAU COVER IN ETB PULL SLIDE, MAG B INSTALL MAG B ON CDR CAM FIRE 2 FRAMES		UNSTOW HGA FROM CANISTER
INSTALL SAMPLE BAG ADAPTER PUT MAPS & HOLDER ON LMP SEAT		
	1+10	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
STOW 3 70 MM MAGS IN "BIG BAG" (C,G,H)	1+10	MOUNT HGA ON LRV
STOW 500 CAM UNDER CDR SEAT		ROTATE ANTENNA & EXTEND MAST
OPEN QUAD III THERMAL BLNKT UNSTOW PALLET-PLACE ON +Y FOOTPAD		UNSTOW CABLE, DISCARD FOAM CONNECT HGA CABLE TO LCRU
		VELCRO CABLE TO STAFF
		<u>LRV TV CONFIG</u> UNSTOW TV FROM MESA, CARRY TO LRV
<u>LM INSPECTION</u> DO LM INSPECTION, PHOTO UNUSUAL CONDITIONS		UNSTOW SUNSHADE - INSTALL ON TV MOUNT TV ON TCU-HORIZONTAL, CW & AFT
INSPECT 4 STRUTS & ENGINE		TIP HGA AFT, DEPLOY DISH & LOCK
		POINT HGA AT EARTH, REALIGN AS REQUIRED
		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
PLACE CAM ON CDR SEAT		
<u>ALSEP OFFLOAD</u> OPEN SEQ BAY DOORS POSITION DES ECA TEMP MON SW-ON UNLOCK PKG 2 PULL LANYARD RELEASE RING REMOVE PKG 2 - PLACE ON SURFACE	1+20	
PULL PIN & DISCARD HOCKY STICK UNLOCK PKG 1 PULL LANYARD RELEASE RING		<u>SRC 1 CONFIG</u> UNSTOW SRC 1 PLACE SRC ON MESA TABLE OPEN SRC 1 REMOVE SCB 1-HANG ON TOOL GATE
REMOVE PKG 1 - PLACE ON SURFACE, ROT 90 DEG		SEAL ORGANIC CONTROL SAMPLE & LEAVE IN SRC
PULL PIN & DISCARD HOCKY STICK		
REMOVE & DISCARD TOOL BRKT ASSY STOW UHT'S ON PKG'S REMOVE & EXTEND CARRY BAR & INSTALL IN PKG 1 PLACE DRT & FTT IN SEQ BAY		<u>FLAG DEPLOY</u> UNSTOW FLAG KIT, OPEN, PLACE ON MESA
<u>FUEL RTG</u> POSITION PKG 2 FOR FUELING REMOVE RTG DUST COVER-DISCARD GET CASK LANYARD		REMOVE STAFF & GET HAMMER
ROTATE FUEL CASK, DISCARD LANYARD		SELECT SITE 2:00/30' DRIVE STAFF INTO SURFACE
	1+30	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
GET DRT, REMOVE DOME READ TEMPILABEL-DISCARD DOME GET FTT-ENGAGE IN FUEL ELEMENT	1+30	
REMOVE ELEMENT, FUEL RTG		DEPLOY FLAG-EXTEND MAST & SPAR
REMOVE FTT-READ TEMP-DISCARD TIP PKG 2 UP CLOSE SEQ BAY DOORS ATTACH PKG 2 TO CARRY BAR		MOUNT FLAG IN BASE STAFF GET CDR CAM FROM LRV
FLAG DEPLOY POSE WITH FLAG RECEIVE CAM FROM CDR PHOTO CDR/FLAG & HAND CAM TO CDR		PHOTO LMP/FLAG GIVE CAM TO LMP
		POSE FOR LMP
ALSEP TRAV CRADLE BARBELL IN CROOK OF ELBOW		GET CAM & MOUNT ON RCU UNSTOW LiOH CAN~~N~~ & PLACE IN MESA UNSTOW CORE/BORE STEMS
CARRY ALSEP TO DEPLOY SITE & SURVEY SITE		UNSTOW DRILL & N. FLUX FROM MESA TO LRV SEAT
		TIDY MESA BLANKETS
SELECT DEPLOY SITE FOR ALSEP		ASSEMBLE DRILL PER DECAL
	1+40	
		CARRY DRILL , RACK & N. FLUX & CORE/BORE STEMS TO ALSEP SITE
POSITION ALSEP PKG 1 SOUTH OF PKG 2 WITH PKG 1 IN DESIRED LOCATION		
ALSEP INTERCONNECT (L) REMOVE PKG 1 & 2 FROM CARRY BAR & DISCARD CARRY BAR POSITION PKG 2 10 FT EAST C/S		
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) WALK TO PKG 1 DEPLOYING CABLE		ALSEP INTERCONNECT GET PKG 1 UHT
REMOVE SHORT PLUG FROM REEL, READ SHORTING PLUG METER TO MCC DISCARD SHORT PLUG DUST COVER		ERECT HFE PALLET CARRY HNDL RELEASE TWO STRUT BOYD BOLTS ON HFE
DISCARD RTG C/S DUST COVER CONNECT SHORT PLUG TO C/S - ROTATE T-HANDLE		LIFT HFE FROM PKG 2
REPOSITION RTG IT REQD		CARRY HFE 10 FT NORTH OF PKG 1
	1+50	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
RELEASE 2 LEAM PALLET BB'S	1+50	UNSTOW HFE CONNECTOR
ENGAGE UHT-REMOVE PALLET PLACE PALLET ON SURFACE 10 FT W C/S REMOVE LEAM CONN PULL PIN		LOWER HFE TO SURFACE DISCARD C/S CONN DUST COVER DISCARD HFE CONN DUST COVER
REMOVE LEAM CONN FROM PALLET REMOVE DUST COVERS FROM LEAM MATE & LOCK LEAM CONN		MATE & LOCK HFE CONN
PARTIALLY OPEN C/S DUST COVER TIP PKG 1 DOWN REMOVE & DISCARD C/S DUST COVER		<u>HFE DEPLOY</u> CARRY HFE 30 FT N C/S
USE UHT, COARSE ALIGN C/S		LAY HFE PALLET ON SURFACE RELEASE 4 BB'S ON PROBE BOX
<u>LSG DEPLOY</u> RELEASE 4 BB's SECURING LSG ENGAGE UHT IN LSG CARRY SOCKET CARRY LSG 25 FT W OF C/S		
		LIFT PROBE BOX SEPARATE PROBE BOX HALVES
DEPLOY/LOCK SUNSHADE		STOW BOX 2 ON HFE
TILT SUNSHADE TO PRESET ANGLE		ROTATE RAMMER FROM STOWED POSITION CARRY BOX 1 16 FT E
EMPLACE LSG ON LUNAR SURFACE		PLACE BOX 1 ON SURFACE RETRIEVE BOX 2 FROM HFE
ALIGN & LEVEL LSG	2+00	CARRY BOX 2 16 FT WEST
UNCAGE LSG GIMBAL-CHECK LEVEL RETURN TO C/S		PLACE BOX 2 ON SURFACE REMOVE 4 BB'S ON HFE ELEC
<u>LSPE G/M DEPLOY</u> RELEASE 4 BB'S SECURING MODULE ENGAGE UHT IN CARRY SOCKET CARRY G/M 30 FT S C/S		LIFT HFE FROM PALLET PUSH PALLET ASIDE & EMPLACE HFE ELEC
REMOVE FLAG RETAINING PINS DEPLOY & INTERIM STOW 5 FLAGS IN SURFACE		
EMPLACE G/M		CARRY TO HFE SITE: DRILL RACK
DISCARD G/M COVER USE 1 FLAG TO ANCHOR MODULE RETURN TO C/S		PLACE DRILL ON SURFACE LOCATE RACK/STEMS FOR DRILLING OPEN STEM BAG
<u>LMS DEPLOY</u> USE UHT, PULL VENT RING RELEASE 3 LMS BB'S		<u>DRILL 1ST PROBE HOLE</u> ATTACH LONG BORE TUBE TO DRILL FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE
ENGAGE UHT, LIFT LMS & ROTATE 90 DEG ON SWIVEL - LOCK		
DEPLOY LMS 45 FT NE C/S, EMPLACE & LEVEL		
INSERT UHT & SNAP BREAKSEAL, ADJUST DUST COVER IF REQD		
WALK TO C/S	2+10	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
C/S DEPLOY USE UHT-LEVEL & ALIGN C/S RELEASE REAR THERMAL CURTAIN	2+10	ROTATE DRILL CCW TO REMOVE FROM BORE STEM
RELEASE 3 ANTENNA BB'S PULL ANT MAST RELEASE PINS		PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM
REMOVE ANT BRACKET RELEASE & FREE RF ANT CABLE		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE
RELEASE 16 PERIMETER BB'S		
EXTEND & LOCK MAST SECTIONS		
CHECK 4 CORNERS LOOSE		
RELEASE 2 INTERIOR BB'S RELEASE CENTER BB-GUIDE C/S UP		ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE ATTACH 2ND SHORT BORE TUBE SECTION TO STEM
CHECK SUNSHIELD COMPLETELY UP		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS
CLOSE SIDE CURTAINS-DISCARD COVERS	2+20	DRILL BORE TUBE INTO SURFACE
ALSEP ANTENNA DEPLOY WALK TO LEAM SUBPALLET RELEASE 2 BB'S ON GIMBAL CASE LIFT GIMBAL FROM PALLET		
CARRY TO C/S REMOVE GIMBAL BASE DUST COVER		ROTATE DRILL CCW TO REMOVE FROM BORE STEM
MOUNT GIMBAL ON ANTENNA MAST PULL PIN, REMOVE & DISCARD HOUSING & FOAM MOUNT ANTENNA ON GIMBAL VERIFY LAT/LONG & LEVEL GIMBAL		PLACE DRILL ON SURFACE EMPLACE HFE PROBE 1 PICK UP BOX 1, GRASP HANDLE PULL REMAINING CABLE FROM BOX REMOVE PROBE LEAN BOX AGAINST RACK
ALIGN SUN COMPASS-CHECK LEVEL		
ACTUATE SHORT SW-READ METER DO NOT EMBED LMS TO LEVEL-REPOSITION		GRASP PROBE & REMOVE END CAPS UNFOLD PROBE ASSY INSERT PROBE INTO BORE TUBE REMOVE RAMMER FROM BOX 1, USE RAMMER, INSERT PROBE 1 & READ INDEX NUMBER ON RAMMER
REQUEST XMTR TURN ON & VERIFY DOWN LINK		USE RAMMER-INSERT 2ND THERMAL SHIELD, POSITION TO MARK F1
LEAM DEPLOY RELEASE 4 BB'S ON LEAM ENGAGE UHT, CARRY 25 FT SE C/S		REMOVE RAMMER, PLACE NEXT TO BORE TUBE, READ TUBE HEIGHT POSITION 3RD THERMAL SHIELD
	2+30	EXIT CABLE S IN HOLE

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVESE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	2+30	
PULL SOCKET PIN, ROTATE PKG REMOVE DUST COVER		CARRY DRILL, TUBES, RACK & RAMMER TO WEST HOLE
DEPLOY LEGS/GNOMON		
EMPLACE LEAM ON LUNAR SURFACE		DRILL 2ND PROBE HOLE PLACE RACK, RAMMER, DRILL ON SURFACE
LEVEL & ALIGN WALK TO HFE SITE		ATTACH LONG BORE TUBE TO DRILL
LSPE ANT DEPLOY CARRY HFE PALLET TO C/S, PLACE ON SURFACE		FIND HOLE INDEX ON PROBE CABLE DRILL BORE TUBE INTO SURFACE
RETRIEVE LSPE ANT & REEL (C/S) 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		PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS DRILL BORE TUBE INTO SURFACE
RETURN TO LM	2+40	
GET DRILL JACK & TREADLE GNOMON, DRIVE TUBE RAMMER, LMP CAM		ROTATE DRILL CCW TO REMOVE FROM BORE STEM
GET N. FLUX EXPT		PLACE DRILL ON SURFACE ATTACH SHORT BORE TUBE SECTION TO STEM PICK UP DRILL, ENGAGE ROTATE DRILL CW TO SEAT THREADS
RETURN TO ALSEP		DRILL BORE TUBE INTO SURFACE
GEOPHONE DEPLOY DEPLOY GEOPHONE 3: *ENGAGE UHT IN REEL 3 & GET FLAG *RETRIEVE GNOMON *CARRY 88 FT SOUTH C/S *EMBED FLAG IN LUNAR SURFACE *DISCARD REEL *ANCHOR GEOPHONE WITH FLAG *PLACE GNOMON 2' NW OF GEO 3 *RETURN TO GEOPHONE MOUDLE		ROTATE DRILL CCW TO REMOVE FROM BORE STEM PLACE DRILL ON SURFACE
	2+50	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: (11-27-72)

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
DEPLOY GEOPHONE 1: *ENGAGE UHT IN REEL 1 & GET GLAG *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 GEOHPONE 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 RECHECK HFE ELEC LEVEL & ALIGN
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		DRILL DEEP CORE CARRY TO CORE SITE 55 FT N HFE PLACE 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	
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 GEOHPONE 3		PLACE DRILL ON SURFACE REMOVE WRENCH ATTACH 2nd CORE SECT TO STEM 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
AT 3RD GEOPHONE SITE-PHOTO DOCUMENT GEOPHONE LAYOUT		ATTACH 3RD CORE SECT TO DRILL PICK UP DRILL - MATE TO EMPLACED STEM 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
	3+10	ATTACH 4TH CORE SECTION TO DRILL PICK UP DRILL-MATE TO EMPLACED STEM

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
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 ROTATE DRILL CCW TO REMOVE FROM CORE STEM
TURN AND PHOTO GEOPHONE 2		
TURN & PHOTO GEOPHONE 4		
		REMOVE WRENCH
MOVE 25 FT SE, PHOTO GEOPHONES 2 & 3		SET DRILL ASIDE
TURN AND PHOTO GEOPHONE 1		<u>DEEP CORE RECOVER</u> GET CAPS FROM RACK, PLUG TOP
TURN AND PHOTO GEOPHONE 4		GET RAMMER, RAM PLUG
TAKE A PAN 10' S of GEOPHONE 3		GET TREADLE & NEUTRON FLUX PROBE
		PLACE TREADLE OVER CORE STEM
RETRIEVE GNOMON, RETURN TO C/S TAKING OTHER PHOTOS REQD TO DOCUMENT GEOPHONES		
ACTIVATE LSPE ENABLE SW - STOW GNOMON ON LRV		JACK CORE STEM OUT OF SURFACE
	3+20	
<u>ALSEP PHOTOS</u> PHOTO C/S 3', 7' XSUN TO SOUTH		
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		LAY STRING AGAINST RACK <u>CONFIG NEUTRON FLUX</u> ACTIVATE LOWER SECTION
PHOTO HFE W. HOLE, 7' XSUN STEREO TO SOUTH		HAND CAP ON RACK
PHOTO HFE 11' DNSUN PHOTO HFE ELECT, 7' XSUN PHOTO HFE ELECT, 3' XSUN SOUTH		MATE LOWER TO UPPER SECTION
PHOTO HFE E. HOLE, 7' XSUN STEREO TO SOUTH		ACTIVATE UPPER SECTION
	3+30	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	3+30	PUSH UNIT DOWN CORE HOLE
PHOTO NFE IN SITU, 7' TO S PHOTO LMS, 3' XSUN TO S INCLUDE ORIFICE		COVER HANDLE WITH THERMAL BAG
PHOTO LMS, 7' TOWARD C/S		TAKE WRENCH, CORE STEM, & CAPS BACK TO LRV AT LM
TAKE PHOTO PAN AT C/S GET GNOMON		
RETURN TO LM		
PUT CAM ON CDR SEAT		
ASSIST CDR WITH CORE STEMS		<u>BREAK CORE STEMS</u>
		USE WRENCH & VISE TO LOOSEN 3RD STEM JOINT
	3+40	LOOSEN SIXTH JOINT
		UNSCREW & CAP EACH SECTION
		STOW ON +Z STRUTS
<u>CONFIG FOR TRAVERSE</u>		<u>CONFIG FOR TRAVERSE</u>
LOAD LRV SAMPLER WITH DIXIE CUPS IF RQD		MOUNT 20 DSBD (SCB 1) TO EACH CAM
ASSIST CDR IF RQD		PUT CDR CAM ON PAN, LMP CAM ON LMP SEAT
		PUT CAP DISPENSER ON TOOL GATE
CONFIG MAPS		
	3+50	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	3+50	
LOAD PLSS'S		LOAD PLSS'S
LOAD SCB 1 ON CDR'S PLSS		STOW RAMMER ON LMP PLSS
		STOW HAMMER ON LMP PLSS
CHECK TEMPERATURES OF TGE & SEP FOR TRAV GO/NO-GO DECISIONS		STOW CAP DISPENSER ON LMP PLSS STOW "BIG BAG" ON LMP PLSS
GO TO STA _____	4+00	GO TO STA _____
GEOLOGY (THE PROCEDURES TO BE PLANNED BY OPERATIONAL TEAM AS TO LOCALE, OBJECTIVES, ETC. WITH CONCURRENCE OF EVA CREWMEN)		
	4+10	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	6+10	
RETURN TO LM		RETURN TO LM
	6+20	
TRAV TERMINATION		TRAV TERMINATION
REMOVE SCB 1 - PLACE ON GATE XNSFER UNUSED EQUIP TO LMP UNDER SEAT		READ OUT ALL LRV DISPLAYS ON CONSOLE
ASSIST CDR TO REMOVE & STOW TOOLS FROM PLSS		PLACE 70MM CAM ON CDR SEAT
		POINT HGA TO EARTH
EVA-1 CLOSEOUT (LMP) CORE BAG TO MESA PACK CORE STEMS IN BAG & CARRY TO PORCH & STOW AGAINST LM		REMOVE TOOLS FROM LMP PLSS TOOL HARNESS
		STOW TOOLS ON GEO GATE
STOW SAMPLE CONTAINMENT PKG TRANSFER ETB TO LRV-CDR FOOTPAN STOW 70MM CAM IN ETB (2)		CLOSEOUT PREP "BIG BAG" TO GATE SCB 1 TO MESA TABLE OPEN SRC 1
STOW MAPS IN ETB (CDR SEAT) TRANS 70MM MAGS FROM "BIG BAG" TO ETB (READ FRAME COUNT EACH MAG) TAKE "BIG BAG" & ETB TO +Z		PLACE SCB 1 IN SRC (POCKETS UP)
		REMOVE SRC SKIRT & DISCARD REMOVE SEAL PROTECTOR & CLOSE & SEAL SRC (SEAL CLEAR OF BAG MAT'L)
ATTACH ETB TO LEC		EVA-1 CLOSEOUT (CDR)
	6+30	

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

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

MISSION: APOLLO 17 EVA: 1 (WALKING TRAVERSE) DATE: 11-27-72

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	6+50	
RECEIVE & STOW CORE BAG, "BIG BAG"		HAND IN CORE BAG & "BIG BAG"
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	

3.3.2 Walking EVA 2

The EVA 2 traverse is oriented to the North Massif area where the major portion of the nominal EVA 3 sampling objectives are obtained. Stations B and C correspond to the nominal Stations 6 and 7. The Sculptured Hills area (Station 8) is outside the walking EVA envelope. Station D corresponds to the nominal Station 9.

The Traverse Gravimeter is carried over the outbound leg on EVA 2 for the first 2 Km with stops every 500 m for gravimetric readings. At the end of 2 Km, the instrument is abandoned. Two LSPE EP's are deployed on the initial traverse leg (EP 6 and EP 1), at distances of 1.1 and 2.4 Km respectively from the LM.

The following pages give a summary table for this traverse.

TABLE 3.3-4

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 2 CALCULATED DATA NOV 21 1972

EVA START 139:10 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+45	0+45
WALK	0.50	2.50	12				
TGE 1				0.50	0+57	0+ 4	1+ 1
WALK	0.60	2.50	14				
TGE 2				1.10	1+15	0+ 4	1+19
EP 6							
R=1.1							
WALK	0.40	2.50	10				
TGE 3				1.50	1+29	0+ 4	1+33
WALK	0.50	2.50	12				
TGE 4				2.00	1+45	0+ 4	1+49
WALK	0.40	2.50	10				
EP 1				2.40	1+59	0+ 3	2+ 2
R=2.4							
WALK	1.00	2.50	24				
B-6				3.40	2+26	0+44	3+10
WALK	0.75	2.50	18				
C-7				4.15	3+28	0+44	4+12
WALK	1.70	2.50	41				
D-9				5.85	4+52	0+30	5+22
WALK	2.39	2.50	57				
LM				8.24	6+20	0+40	7+ 0
TOTALS			198			3+42	7+ 0

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
TGE 1	0.50	0+ 8	6+15	5+53	6+23	0.49	1033.61
TGE 2	1.10	0+18	5+32	5+19	5+54	1.07	1023.30
EP 6							
R=1.1							
TGE 3	1.50	0+25	5+ 2	4+55	5+34	1.46	1017.74
TGE 4	2.00	0+33	4+25	4+25	5+10	1.94	1013.30
EP 1	2.40	0+40	3+56	4+ 2	4+50	2.33	1010.69
R=2.4							
B-6	3.40	0+57	2+ 6	2+27	3+26	3.30	995.25
C-7	3.56	0+59	0+57	1+20	2+21	3.46	987.68
D-9	2.39	0+40	0+32	0+38	1+30	2.32	985.73
LM	0.00	0+ 0	0+38	0+ 9	0+45	0.00	993.81

TABLE 3.3-5

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 2 INPUT DATA NOV 21 1972

EVA START 139:10 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	0+45	0.00	0.00	135.00	2.50	3.60	1000.0	1560.0
TGE 1	0+ 4	0.50	0.50	135.00	2.50	3.60	1000.0	1560.0
TGE 2	0+ 4	0.60	1.10	135.00	2.50	3.60	1000.0	1560.0
EP 6 R=1.1								
TGE 3	0+ 4	0.40	1.50	135.00	2.50	3.60	1000.0	1560.0
TGE 4	0+ 4	0.50	2.00	135.00	2.50	3.60	1000.0	1560.0
EP 1	0+ 3	0.40	2.40	135.00	2.50	3.60	1000.0	1560.0
R=2.4								
B-6	0+44	1.00	3.40	135.00	2.50	3.60	1000.0	1560.0
C-7	0+44	0.75	3.56	135.00	2.50	3.60	1000.0	1560.0
D-9	0+30	1.70	2.39	135.00	2.50	3.60	1000.0	1560.0
LM	0+40	2.39	0.00	135.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.028	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

3.3.3 Walking EVA 3

Two basic versions of the EVA 3 traverse are presented in the tables which follow, each with and without SEP operations. These are denoted as follows:

Without SEP : EVA 3 and EVA 3A

With SEP: EVA 3S and EVA 3AS

If EVA 1 has been the nominal (LRV) traverse, and Station 1 has been visited as planned, then the walking EVA 3 traverse will probably take the form shown as EVA 3A. Otherwise, it will take the form indicated as EVA 3 wherein Emory Crater (Station 1) and Steno Crater are the prime stations.

The final decision as to the inclusion of SEP operations on the walking EVA 3 will largely depend upon whether or not the 30 min investment to deploy the transmitter/antenna can be afforded in light of the accomplishments on EVA 1 and 2.

If EVA 1 has been the nominal LRV EVA where the transmitter/antenna has already been deployed, then the time required to reconfigure the receiver for the walking SEP case is only about 10 minutes. In either case, the extent of SEP operations is to carry the receiver over the first 500 meters of the traverse, then remove the tape recorder, and abandon the experiment.

In all the variations of EVA 3, two LSPE EP's are deployed (EP 7 and 5). This completes deployment of 6 of the 8 EP's. The remaining two charges (1/4 and 1/8 Lb) are the lowest priority, and can be deployed in the near LM vicinity to the east, if time permits at the end of EVA 3.

TABLE 3.3-6

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3 CALCULATED DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+40	0+40
WALK	0.84	2.50	20				
EP 7				0.84	1+ 0	0+ 3	1+ 3
R=0.8							
WALK	1.65	2.50	40				
E-1				2.49	1+43	1+30	3+13
EP 5							
R=2.3							
WALK	1.00	2.50	24				
F-10				3.49	3+37	1+30	5+ 7
WALK	1.75	2.50	42				
LM				5.24	5+49	1+ 5	6+54
TOTALS			126			4+48	6+54

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
EP 7	0.84	0+14	5+40	5+27	6+15	0.82	1029.29
R=0.8							
E-1	2.49	0+41	2+23	2+33	3+38	2.42	986.25
EP 5							
R=2.3							
F-10	1.75	0+29	0+57	0+57	1+56	1.70	976.69
LM	0.00	0+ 0	0+26	0+ 0	0+51	0.00	990.57

TABLE 3.3-7

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3 INPUT DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	0+40	0.00	0.00	200.00	2.50	3.60	1000.0	1560.0
EP 7	0+ 3	0.84	0.84	200.00	2.50	3.60	1000.0	1560.0
R=0.8								
E-1	1+30	1.65	2.49	200.00	2.50	3.60	1000.0	1560.0
EP 5								
R=2.3								
F-10	1+30	1.00	1.75	200.00	2.50	3.60	1000.0	1560.0
LM	1+ 5	1.75	0.00	200.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.035	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

TABLE 3.3-8

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3A CALCULATED DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+40	0+40
WALK	0.97	2.50	23				
EP 7				0.97	1+ 3	0+ 3	1+ 6
R=0.8							
WALK	1.67	2.50	40				
EP 5				2.64	1+46	0+ 3	1+49
R=2.3							
WALK	0.20	2.50	5				
E-PS				2.84	1+54	0+31	2+25
WALK	1.00	2.50	24				
F-SL				3.84	2+49	0+31	3+20
WALK	1.75	2.50	42				
G-BC				5.59	4+ 2	0+31	4+33
WALK	0.75	2.50	18				
H-5				6.34	4+51	0+30	5+21
WALK	1.12	2.50	27				
LM				7.46	5+48	1+ 5	6+53
TOTALS			179			3+54	6+53

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
EP 7	0.97	0+16	5+32	5+20	6+10	0.94	1027.91
R=0.8							
EP 5	2.64	0+44	3+40	3+53	4+59	2.56	1015.54
R=2.3							
E-PS	2.84	0+47	2+56	3+12	4+20	2.76	1001.03
F-SL	3.18	0+53	1+47	2+ 7	3+19	3.09	993.01
G-BC	1.87	0+31	1+24	1+26	2+28	1.82	989.20
H-5	1.12	0+19	1+ 5	0+56	1+52	1.09	986.14
LM	0.00	0+ 0	0+25	0+ 0	0+52	0.00	997.09

TABLE 3.3-9

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3A INPUT DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	0+40	0.00	0.00	200.00	2.50	3.60	1000.0	1560.0
EP 7	0+ 3	0.97	0.97	200.00	2.50	3.60	1000.0	1560.0
R=0.8								
EP 5	0+ 3	1.67	2.64	200.00	2.50	3.60	1000.0	1560.0
R=2.3								
E-PS	0+31	0.20	2.84	200.00	2.50	3.60	1000.0	1560.0
F-SL	0+31	1.00	3.19	200.00	2.50	3.60	1000.0	1560.0
G-BC	0+31	1.75	1.87	200.00	2.50	3.60	1000.0	1560.0
H-5	0+30	0.75	1.12	200.00	2.50	3.60	1000.0	1560.0
LM	1+ 5	1.12	0.00	200.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.035	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

TABLE 3.3-10

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3S CALCULATED DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+40	0+40
WALK	0.10	1.25	5				
SEP				0.10	0+45	0+30	1+15
WALK	0.74	2.50	18				
EP 7				0.84	1+33	0+ 3	1+36
R=0.8							
WALK	1.65	2.50	40				
E-1				2.49	2+15	1+13	3+28
EP 5							
R=2.3							
WALK	1.00	2.50	24				
F-10				3.49	3+52	1+12	5+ 4
WALK	1.75	2.50	42				
LM				5.24	5+46	1+ 5	6+51
TOTALS			128			4+43	6+51

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
SEP	0.10	0+ 2	5+56	5+32	6+16	0.10	1046.79
EP 7	0.84	0+14	5+ 5	4+52	5+42	0.82	1035.06
R=0.8							
E-1	2.49	0+41	2+ 5	2+15	3+22	2.42	998.56
EP 5							
R=2.3							
F-10	1.75	0+29	0+58	0+57	1+59	1.70	987.18
LM	0.00	0+ 0	0+26	0+ 0	0+54	0.00	998.42

TABLE 3.3-11

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3S INPUT DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	0+40	0.00	0.00	200.00	2.50	3.60	1000.0	1560.0
SEP	0+30	0.10	0.10	200.00	1.25	3.60	1000.0	1560.0
EP 7	0+ 3	0.74	0.84	200.00	2.50	3.60	1000.0	1560.0
R=0.8								
E-1	1+13	1.65	2.49	200.00	2.50	3.60	1000.0	1560.0
EP 5								
R=2.3								
F-10	1+12	1.00	1.75	200.00	2.50	3.60	1000.0	1560.0
LM	1+ 5	1.75	0.00	200.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.035	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

TABLE 3.3-12

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3AS CALCULATED DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION	SEGMENT DISTANCE (KM)	WALKING MOBILITY RATE (KM/HR)	WALK 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+40	0+40
WALK	0.10	1.25	5				
SEP				0.10	0+45	0+30	1+15
WALK	1.07	2.50	26				
EP 7				1.17	1+40	0+ 3	1+43
R=0.8							
WALK	1.67	2.50	40				
EP 5				2.84	2+24	0+ 3	2+27
R=2.3							
WALK	0.20	2.50	5				
E-PS				3.04	2+31	0+22	2+53
WALK	1.00	2.50	24				
F-SL				4.04	3+17	0+22	3+39
WALK	1.75	2.50	42				
G-BC				5.79	4+21	0+21	4+42
WALK	0.75	2.50	18				
H-5				6.54	5+ 0	0+18	5+18
WALK	1.12	2.50	27				
LM				7.66	5+45	1+ 5	6+50
TOTALS			186			3+44	6+50

-----PLSS FAILURE TRAVERSE CONTINGENCIES-----

STAT	RETURN DISTANCE TO LM (KM)	CONT. WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQT (PRIMARY CREWMAN) FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	MIN WALKBACK SPEED REQ (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
SEP	0.10	0+ 2	5+56	5+32	6+16	0.10	1046.79
EP 7	0.97	0+16	4+52	4+40	5+32	0.94	1032.37
R=0.8							
EP 5	2.64	0+44	3+ 0	3+13	4+21	2.56	1021.83
R=2.3							
E-PS	2.84	0+47	2+25	2+41	3+51	2.76	1012.11
F-SL	3.18	0+53	1+25	1+45	3+ 0	3.09	1004.56
G-BC	1.87	0+31	1+12	1+14	2+18	1.82	999.82
H-5	1.12	0+19	1+ 5	0+56	1+55	1.09	997.02
LM	0.00	0+ 0	0+25	0+ 0	0+55	0.00	1005.61

TABLE 3.3-13

APOLLO 17 TAURUS LITTROW WALKING TRAVERSES

EVA 3AS INPUT DATA NOV 21 1972

EVA START 162:40 HR:MIN GET

STATION NO	STOP TIME (HR+MIN)	SEG DIST (KM)	RETURN DIST (KM)	HEAT LEAK (BTU/HR)	--MOBILITY RATE-- NOMINAL (KM/HR)	CONT'CY (KM/HR)	--MET RATE WALK--- NOMINAL (BTU/HR)	CONT'CY (BTU/HR)
LM	0+40	0.00	0.00	200.00	2.50	3.60	1000.0	1560.0
SEP	0+30	0.10	0.10	200.00	1.25	3.60	1000.0	1560.0
EP 7 R=0.8	0+ 3	1.07	0.97	200.00	2.50	3.60	1000.0	1560.0
EP 5 R=2.3	0+ 3	1.67	2.64	200.00	2.50	3.60	1000.0	1560.0
E-PS	0+22	0.20	2.84	200.00	2.50	3.60	1000.0	1560.0
F-SL	0+22	1.00	3.18	200.00	2.50	3.60	1000.0	1560.0
G-BC	0+21	1.75	1.87	200.00	2.50	3.60	1000.0	1560.0
H-5	0+18	0.75	1.12	200.00	2.50	3.60	1000.0	1560.0
LM	1+ 5	1.12	0.00	200.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP-SEP (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)
1050.0	950.0	1050.0	0.035	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

3.4 Off-nominal Landing Site Traverses

Under nominal conditions, the 3 sigma landing dispersion ellipse is approximately 1.5 Km radius, essentially circular. Any landing point within this ellipse is considered nominal and the planned traverses will remain essentially the same. Station times will be adjusted to compensate for the small difference in driving time over those traverses originating from the center of the ellipse.

Certain non-nominal conditions could result in landings outside the dispersion ellipse. A low thrust descent engine, for example, could result in landing far downrange. The absence of landmark tracking from lunar orbit can result in greater cross-range dispersions, and the failure to achieve an update of the position of the landing site relative to the LM just prior to descent initiation can cause large uprange and downrange uncertainties.

Pre-mission planning of new traverses to accommodate the range of these off-nominal landing points is a prohibitive job. For illustrative purposes, however, two extreme cross-range cases have been included in this document--2.7 Km North, and the same distance south.Only representative traverse maps and a summary table are given for these cases. The operations around the LM, ALSEP and SEP deploy, would, of course, be nominal.

3.4.1 Off-Nominal 2.7 Km North Case

Figure 3.4 - 1 depicts the changes required to the planned traverses to accomplish lunar surface objectives at this far north cross-range landing point. Table 3.4-1 gives EVA 1 traverse data, 3.4-3 EVA 2, and 3.4-5 EVA 3 information.

FIGURE 3.4-1

NASA-S-72-3206-V

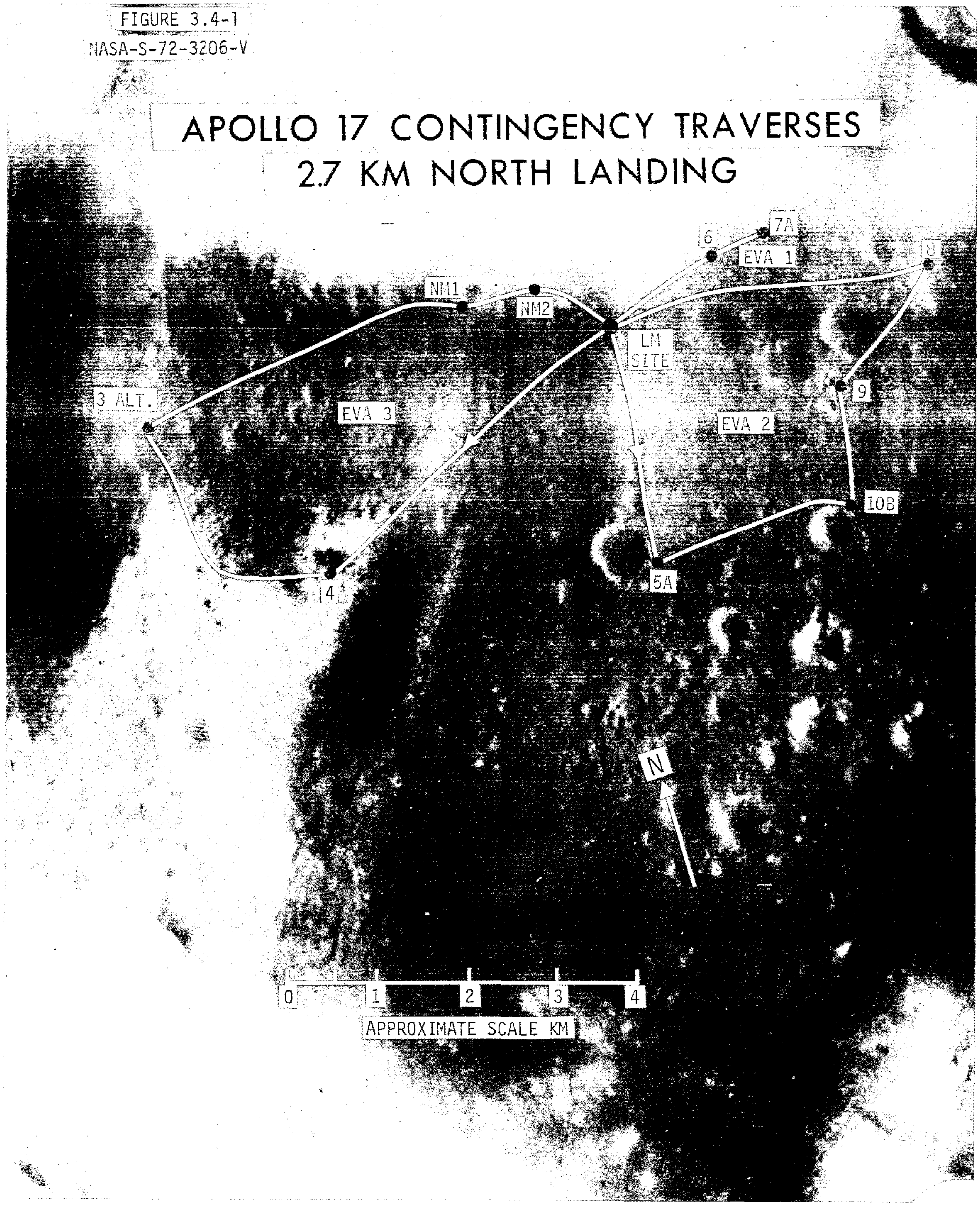


TABLE 3.4-1

2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 CALCULATED DATA NOV 6 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+47	1+47
RIDE	0.10	7.30	1				
ALSEP				0.10	1+48	2+16	4+ 4
RIDE	1.20	7.30	10				
6				1.30	4+14	1+32	5+46
1#CHG							
R=1.2							
RIDE	1.00	7.30	8				
SEP				2.30	5+54	0+25	6+19
RIDE	0.10	7.30	1				
LM				2.40	6+20	0+40	7+ 0
TOTALS			20			6+40	7+ 0

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

STAT NO	RETURN DISTANCE TO LM (KM)	LRV FAILURE: WALKBACK TIME TO LM (HR+MIN)	LRV FAILURE: STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE: MIN LRV RIDEBACK SPEED REQUIRED 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+29	3+11	3+17	0.10	0.12	1048.31
6	1.10	0+18	1+25	1+ 6	1+18	1.07	1.27	1007.93
1#CHG								
R=1.2								
SEP	0.10	0+ 2	1+19	1+ 0	1+ 1	0.10	0.12	1000.77
LM	0.00	0+ 0	1+ 0	0+41	0+45	0.00	0.00	1004.58

TABLE 3.4-2 2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 INPUT DATA NOV 6 1972

EVA START 116:40 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	1+47	0.00	0.00	0.00	****	****	******
ALSEP	2+16	0.10	0.10	0.00	3.60	7.30	1560.0
6	1+32	1.20	1.10	0.00	3.60	7.30	1560.0
1*CHG							
R=1.2							
SEP	0+25	1.00	0.10	0.00	3.60	7.30	1560.0
LM	0+40	0.10	0.00	0.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.020	10.86	1.403	61.8

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.4-3 2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 CALCULATED DATA NOV 6 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	0.90	7.30	7				
1/2#CH				0.90	0+59	0+ 3	1+ 2
R=0.80							
RIDE	0.45	7.30	4				
LRV-SA				1.35	1+ 6	0+ 2	1+ 8
RIDE	1.35	7.30	11				
5A				2.70	1+19	0+55	2+14
RIDE	2.30	7.30	19				
10B				5.00	2+33	1+15	3+48
RIDE	0.70	7.30	6				
LRV-SA				5.70	3+54	0+ 2	3+56
RIDE	0.70	7.30	6				
9				6.40	4+ 2	0+29	4+31
3#CH							
R=2.7							
RIDE	1.85	7.30	15				
8				8.25	4+46	0+55	5+41
RIDE	2.35	7.30	19				
1#CH				10.60	6+ 0	0+ 3	6+ 3
R=1.3							
RIDE	0.85	7.30	7				
1/8#CH				11.45	6+10	0+ 3	6+13
R=0.20							
RIDE	0.30	7.30	2				
LM				11.75	6+16	0+44	7+ 0
TOTALS			97			5+23	7+ 0

2.7 KM NORTH LANDING

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 FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	MIN LRV RIDEBACK SPEED REQUIRED 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
1/2*CH R=0.80	0.80	0+13	6+ 6	5+37	6+ 6	0.78	0.93	985.92
LRV-SA	1.35	0+22	5+48	5+18	5+51	1.31	1.56	961.18
5A	2.70	0+45	4+11	3+42	4+23	2.62	3.13	922.60
10B	3.20	0+53	2+31	2+ 1	2+41	3.11	3.71	900.73
LRV-SA	2.80	0+47	2+35	2+ 6	2+39	2.72	3.24	892.59
9	2.60	0+43	2+ 8	1+39	2+ 8	2.52	3.01	891.46
3*CH R=2.7								
8	3.60	1+ 0	0+37	0+ 8	0+41	3.50	4.17	885.67
1*CH R=1.3	1.25	0+21	1+21	0+53	0+58	1.21	1.45	868.35
1/8*CH R=0.20	0.30	0+ 5	1+37	1+10	1+ 4	0.29	0.35	863.04
LM	0.00	0+ 0	1+19	0+51	0+45	0.00	0.00	880.81

TABLE 3.4-4 2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 INPUT DATA NOV 6 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	****	****	******
1/2*CH R=0.80	0+ 3	0.90	0.80	135.00	3.60	7.30	1560.0
LRV-SA	0+ 2	0.45	1.35	135.00	3.60	7.30	1560.0
5A	0+55	1.35	2.70	135.00	3.60	7.30	1560.0
10B	1+15	2.30	3.20	135.00	3.60	7.30	1560.0
LRV-SA	0+ 2	0.70	2.80	135.00	3.60	7.30	1560.0
9	0+29	0.70	2.60	135.00	3.60	7.30	1560.0
3*CH R=2.7							
8	0+55	1.85	3.60	135.00	3.60	7.30	1560.0
1*CH R=1.3	0+ 3	2.35	1.25	135.00	3.60	7.30	1560.0
1/8*CH R=0.20	0+ 3	0.85	0.30	135.00	3.60	7.30	1560.0
LM	0+44	0.30	0.00	135.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (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

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.4-5 2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 CALCULATED DATA NOV 6 1972

EVA START 162:40 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	0+45	0+45
RIDE	0.45	7.30	4				
1/4#CH R=0.25				0.45	0+49	0+ 3	0+52
RIDE	1.25	7.30	10				
NM				1.70	1+ 2	0+50	1+52
RIDE	1.30	7.30	11				
LRV-SA				3.00	2+ 3	0+ 2	2+ 5
RIDE	1.30	7.30	11				
LRV-SA				4.30	2+15	0+ 2	2+17
RIDE	1.20	7.30	10				
3 ALT.				5.50	2+27	0+50	3+17
RIDE	1.00	7.30	8				
LRV-SA				6.50	3+25	0+ 2	3+27
RIDE	1.00	7.30	8				
3/4				7.50	3+36	0+30	4+ 6
RIDE	1.00	7.30	8				
4				8.50	4+14	0+50	5+ 4
RIDE	1.70	7.30	14				
PHOTO 6#CHG R=2.6 LRV-SA				10.20	5+18	0+16	5+34
RIDE	1.40	7.30	12				
LRV-SA				11.60	5+45	0+ 2	5+47
RIDE	1.00	7.30	8				
1/4#CH R=0.25				12.60	5+56	0+ 3	5+59
RIDE	0.10	7.30	1				
1/8#CH R=0.2				12.70	5+59	0+ 3	6+ 2
RIDE	0.30	7.30	2				
LM				13.00	6+ 5	0+55	7+ 0
TOTALS			107			5+13	7+ 0

2.7 KM NORTH LANDING

EVA 3 CALCULATED DATA (CONTINUED)

		TRAVERSE CONTINGENCIES						
		LRV FAILURE				PLSS FAILURE		
	RETURN DISTANCE	WALKBACK TIME	STATION MARGIN ABOVE WALKBACK REQUIREMENTS			MIN LRV RIDEBACK SPEED REQUIRED		AVG EVA
STAT NO	TO LM (KM)	TO LM (HR+MIN)	FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	0 MIN (KM/HR)	10 MIN (KM/HR)	MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
1/4#CH R=0.25	0.35	0+ 6	6+ 8	5+42	6+24	0.34	0.41	1008.43
NM	1.60	0+27	4+40	4+14	5+ 3	1.55	1.85	940.27
LRV-SA	2.90	0+48	3+58	3+32	4+29	2.82	3.36	906.98
LRV-SA	4.20	1+33	3+ 2	2+36	3+31	4.08	4.86	879.83
3 ALT.	5.40	2+ 0	1+31	1+ 5	2+ 5	5.24	6.25	881.13
LRV-SA	5.25	1+57	1+28	1+ 2	1+58	5.10	6.08	868.67
3/4	5.10	1+53	0+57	0+31	1+23	4.95	5.91	867.94
4	4.20	1+33	0+27	0+ 1	0+45	4.08	4.86	872.84
PHOTO 6#CHG R=2.6	2.80	0+47	0+51	0+25	1+ 1	2.72	3.24	863.03
LRV-SA	2.80	0+47	0+51	0+25	1+ 1	2.72	3.24	863.03
LRV-SA	1.40	0+23	1+16	0+51	1+11	1.36	1.62	853.16
1/4#CH R=0.25	0.40	0+ 7	1+32	1+ 8	1+17	0.39	0.46	847.02
1/8#CH R=0.2	0.30	0+ 5	1+31	1+ 7	1+15	0.29	0.35	847.20
LM	0.00	0+ 0	1+ 0	0+37	0+45	0.00	0.00	872.02

TABLE 3.4-6 2.7 KM NORTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 INPUT DATA NOV 6 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	****	****	******
1/4#CH R=0.25	0+ 3	0.45	0.35	200.00	3.60	7.30	1560.0
NM	0+50	1.25	1.60	200.00	3.60	7.30	1560.0
LRV-SA	0+ 2	1.30	2.90	200.00	3.60	7.30	1560.0
LRV-SA	0+ 2	1.30	4.20	200.00	2.70	7.30	1290.0
3 ALT.	0+50	1.20	5.40	200.00	2.70	7.30	1290.0
LRV-SA	0+ 2	1.00	5.25	200.00	2.70	7.30	1290.0
3/4	0+30	1.00	5.10	200.00	2.70	7.30	1290.0
4	0+50	1.00	4.20	200.00	2.70	7.30	1290.0
PHOTO 6#CHG R=2.6 LRV-SA	0+16	1.70	2.80	200.00	3.60	7.30	1560.0
LRV-SA	0+ 2	1.40	1.40	200.00	3.60	7.30	1560.0
1/4#CH R=0.25	0+ 3	1.00	0.40	200.00	3.60	7.30	1560.0
1/8#CH R=0.2	0+ 3	0.10	0.30	200.00	3.60	7.30	1560.0
LM	0+55	0.30	0.00	200.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (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	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

3.4.2 Off-Nominal 2.7 Km South Case

Figure 3.4-2 depicts the changes required to the planned traverses to accomplish lunar surface objectives at this far south cross-range landing point. The tables following give traverse time data.

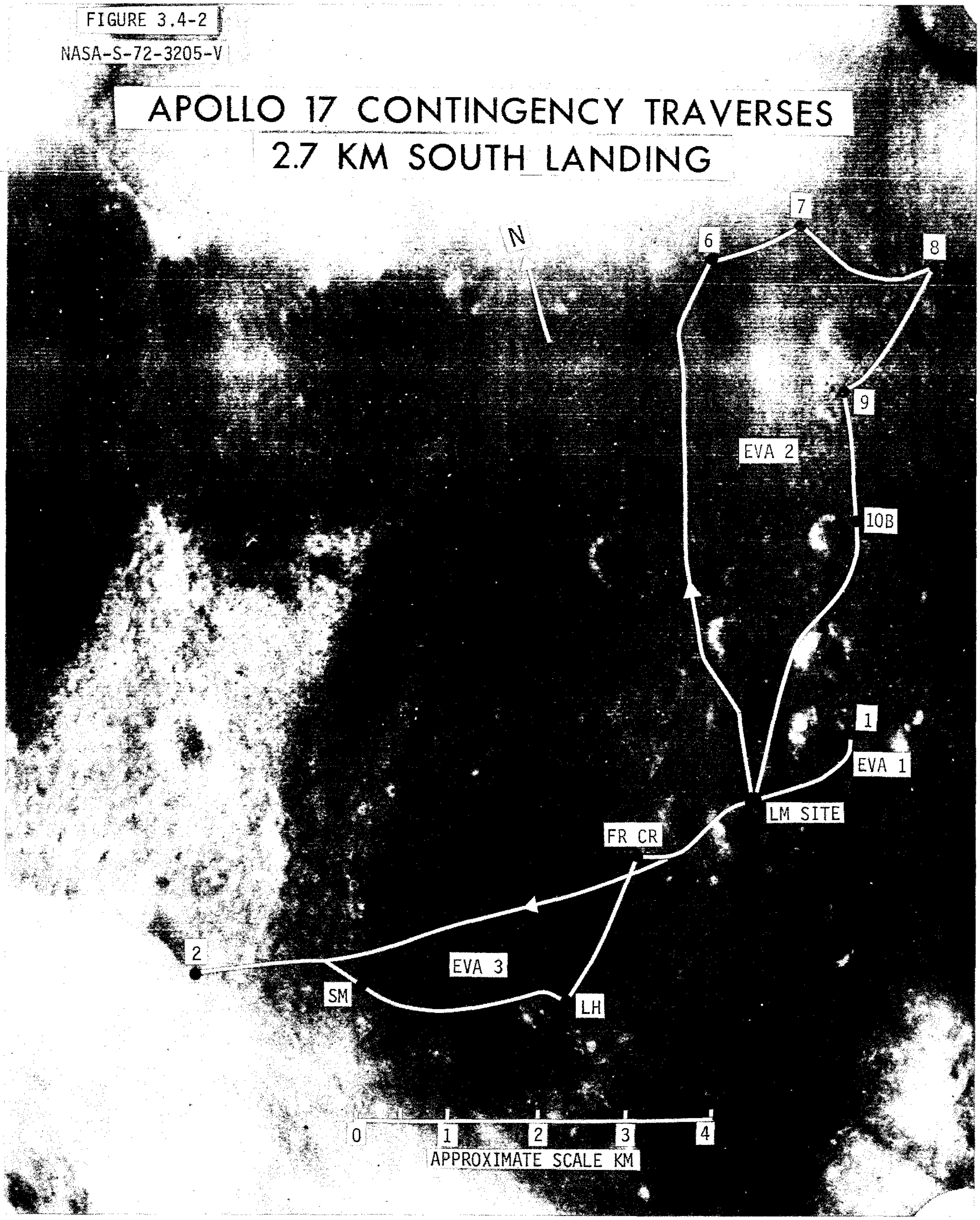


FIGURE 3.4-2
NASA-S-72-3205-V
APOLLO 17 CONTINGENCY TRAVERSES
2.7 KM SOUTH LANDING
N
6
7
8
9
EVA 2
10B
1
EVA 1
LM SITE
FR CR
2
EVA 3
SM
LH
0
1
2
3
4
APPROXIMATE SCALE KM

TABLE 3.4-7 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 CALCULATED DATA NOV 6 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+47	1+47
RIDE	0.10	7.30	1				
ALSEP				0.10	1+48	2+16	4+ 4
RIDE	0.90	7.30	7				
1#CHG				1.00	4+11	0+ 3	4+14
R=1.0							
RIDE	0.55	7.30	5				
1				1.55	4+19	1+21	5+40
3#CH							
R=1.4							
RIDE	1.25	7.30	10				
1/2#CH				2.80	5+50	0+ 3	5+53
R=0.3							
RIDE	0.10	7.30	1				
1/8#CH				2.90	5+54	0+ 0	5+54
R=.20							
RIDE	0.05	7.30	0				
SEP				2.95	5+54	0+25	6+19
RIDE	0.10	7.30	1				
LM				3.05	6+20	0+40	7+ 0
TOTALS			25			6+35	7+ 0

STAT NO	RETURN DISTANCE TO LM (KM)	TRAVERSE CONTINGENCIES — LRV FAILURE — WALKBACK TIME TO LM (HR+MIN)	STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE — MIN LRV RIDEBACK SPEED REQUIRED 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+29	3+11	3+17	0.10	0.12	1048.31
1#CHG	0.90	0+15	3+ 1	2+42	2+53	0.87	1.04	1032.65
R=1.0								
1	1.45	0+24	1+22	1+ 4	1+18	1.41	1.68	1006.53
3#CH								
R=1.4								
1/2#CH	0.25	0+ 4	1+44	1+26	1+25	0.24	0.29	992.76
R=0.3								
1/8#CH	0.15	0+ 2	1+46	1+28	1+26	0.15	0.17	991.73
R=.20								
SEP	0.10	0+ 2	1+20	1+ 2	1+ 1	0.10	0.12	995.09
LM	0.00	0+ 0	1+ 2	0+43	0+45	0.00	0.00	999.45

TABLE 3.4-8 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 1 INPUT DATA NOV 6 1972

EVA START 116:40 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	1+47	0.00	0.00	0.00	****	****	******
ALSEP	2+16	0.10	0.10	0.00	3.60	7.30	1560.0
1#CHG	0+ 3	0.90	0.90	0.00	3.60	7.30	1560.0
R=1.0							
1	1+21	0.55	1.45	0.00	3.60	7.30	1560.0
3#CH							
R=1.4							
1/2#CH	0+ 3	1.25	0.25	0.00	3.60	7.30	1560.0
R=0.3							
1/8#CH	0+ 0	0.10	0.15	0.00	3.60	7.30	1560.0
R=.20							
SEP	0+25	0.05	0.10	0.00	3.60	7.30	1560.0
LM	0+40	0.10	0.00	0.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.020	10.86	1.403	61.8

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.4-9 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 CALCULATED DATA NOV 6 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	2.90	7.30	24				
LRV-SA				2.90	1+16	0+ 2	1+18
RIDE	2.90	7.30	24				
6				5.80	1+42	0+42	2+24
RIDE	0.75	7.30	6				
7				6.55	2+30	0+42	3+12
RIDE	2.08	7.30	17				
8A				8.63	3+29	0+39	4+ 8
RIDE	1.94	7.30	16				
9				10.57	4+24	0+30	4+54
RIDE	0.64	7.30	5				
LRV-SA				11.21	4+59	0+ 2	5+ 1
RIDE	0.73	7.30	6				
10B				11.94	5+ 7	0+41	5+48
RIDE	3.45	7.30	28				
LM				15.39	6+16	0+44	7+ 0
TOTALS			126			4+54	7+ 0

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

STAT NO	RETURN DISTANCE TO LM (KM)	LRV FAILURE: WALKBACK TIME TO LM (HR+MIN)	LRV FAILURE: STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE: MIN LRV RIDEBACK SPEED REQUIRED 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
LRV-SA	2.90	0+48	5+ 3	4+33	5+16	2.82	3.36	894.32
6	5.80	2+ 9	2+33	2+ 3	2+49	5.63	6.72	853.47
7	6.50	2+24	1+26	0+56	1+46	6.31	7.53	864.85
8A	6.60	2+27	0+33	0+ 4	0+47	6.41	7.64	856.54
9	4.70	1+44	0+47	0+18	0+44	4.56	5.44	849.45
LRV-SA	4.25	1+34	0+55	0+26	0+46	4.13	4.92	844.88
10B	3.45	0+57	0+44	0+15	0+36	3.35	4.00	852.18
LM	0.00	0+ 0	1+28	1+ 1	0+45	0.00	0.00	852.50

TABLE 3.4-10 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 2 INPUT DATA NOV 6 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	****	****	******
LRV-SA	0+ 2	2.90	2.90	135.00	3.60	7.30	1560.0
6	0+42	2.90	5.80	135.00	2.70	7.30	1290.0
7	0+42	0.75	6.50	135.00	2.70	7.30	1290.0
8A	0+39	2.08	6.60	135.00	2.70	7.30	1290.0
9	0+30	1.94	4.70	135.00	2.70	7.30	1290.0
LRV-SA	0+ 2	0.64	4.25	135.00	2.70	7.30	1290.0
10B	0+41	0.73	3.45	135.00	3.60	7.30	1560.0
LM	0+44	3.45	0.00	135.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (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

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

TABLE 3.4-11 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 CALCULATED DATA NOV 6 1972

EVA START 162:40 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	0+45	0+45
RIDE	0.50	7.30	4				
1/4#CH R=0.4				0.50	0+49	0+ 3	0+52
RIDE	1.60	7.30	13				
LRV-SA				2.10	1+ 5	0+ 2	1+ 7
RIDE	0.30	7.30	2				
6#CHG R=2.3				2.40	1+10	0+ 3	1+13
RIDE	1.80	7.30	15				
LRV-SA				4.20	1+28	0+ 2	1+30
RIDE	2.10	7.30	17				
2				6.30	1+47	0+50	2+37
RIDE	2.05	7.30	17				
SM				8.35	2+54	0+44	3+38
RIDE	0.95	7.30	8				
LRV-SA				9.30	3+45	0+ 2	3+47
RIDE	0.95	7.30	8				
LRV-SA				10.25	3+55	0+ 2	3+57
RIDE	0.90	7.30	7				
LH				11.15	4+ 5	0+45	4+50
RIDE	1.80	7.30	15				
FR CR				12.95	5+ 4	0+45	5+49
RIDE	0.85	7.30	7				
1/4#CH R=0.25				13.80	5+56	0+ 3	5+59
RIDE	0.30	7.30	2				
1/8#CH R=0.16				14.10	6+ 2	0+ 3	6+ 5
RIDE	0.05	7.30	0				
LM				14.15	6+ 5	0+55	7+ 0
TOTALS			116			5+ 4	7+ 0

2.7 KM SOUTH LANDING

EVA 3 CALCULATED DATA (CONTINUED)

STAT NO	RETURN DISTANCE TO LM (KM)	TRAVERSE CONTINGENCIES — LRV FAILURE: WALKBACK TIME TO LM (HR+MIN)	LRV FAILURE: STATION MARGIN ABOVE WALKBACK REQUIREMENTS FW (HR+MIN)	O2 (HR+MIN)	AMP HRS (HR+MIN)	PLSS FAILURE: MIN LRV RIDEBACK SPEED REQUIRED 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
1/4#CH	0.50	0+ 8	6+ 4	5+38	6+22	0.49	0.58	1004.81
R=0.4								
LRV-SA	2.10	0+35	5+13	4+47	5+40	2.04	2.43	914.26
6#CHG	2.40	0+40	5+ 1	4+35	5+29	2.33	2.78	903.38
R=2.3								
LRV-SA	4.20	1+33	3+50	3+23	4+19	4.08	4.86	846.02
2	6.30	2+20	1+48	1+22	2+25	6.12	7.30	846.59
SM	4.40	1+38	1+47	1+21	2+ 7	4.27	5.10	844.54
LRV-SA	3.70	1+22	1+59	1+34	2+12	3.59	4.29	835.35
LRV-SA	3.10	0+52	2+20	1+55	2+33	3.01	3.59	826.93
LH	2.95	0+49	1+34	1+ 9	1+43	2.86	3.42	838.98
FR CR	1.20	0+20	1+22	0+58	1+13	1.17	1.39	841.04
1/4#CH	0.35	0+ 6	1+36	1+12	1+17	0.34	0.41	836.29
R=0.25								
1/8#CH	0.05	0+ 1	1+39	1+15	1+16	0.05	0.06	835.29
R=0.16								
LM	0.00	0+ 0	1+ 3	0+39	0+45	0.00	0.00	863.11

TABLE 3.4-12 2.7 KM SOUTH LANDING

APOLLO 17 TAURUS LITTROW TRAVERSES

EVA 3 INPUT DATA NOV 6 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	****	****	******
1/4#CH R=0.4	0+ 3	0.50	0.50	200.00	3.60	7.30	1560.0
LRV-SA	0+ 2	1.60	2.10	200.00	3.60	7.30	1560.0
6#CHG R=2.3	0+ 3	0.30	2.40	200.00	3.60	7.30	1560.0
LRV-SA	0. 2	1.80	4.20	200.00	2.70	7.30	1290.0
2	0+50	2.10	6.30	200.00	2.70	7.30	1290.0
SM	0+44	2.05	4.40	200.00	2.70	7.30	1290.0
LRV-SA	0+ 2	0.95	3.70	200.00	2.70	7.30	1290.0
LRV-SA	0+ 2	0.95	3.10	200.00	3.60	7.30	1560.0
LH	0+45	0.90	2.95	200.00	3.60	7.30	1560.0
FR CR	0+45	1.80	1.20	200.00	3.60	7.30	1560.0
1/4#CH R=0.25	0+ 3	0.85	0.35	200.00	3.60	7.30	1560.0
1/8#CH R=0.16	0+ 3	0.30	0.05	200.00	3.60	7.30	1560.0
LM	0+55	0.05	0.00	200.00	3.60	7.30	1560.0

MET RATE ALSEP-SEP (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	11.29	1.353	61.8

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

4.0 EQUIPMENT CONTINGENCY PROCEDURES

The following pages present detail procedures and logic for a variety of hardware malfunctions. Gear around LM, ALSEP site activities, lunar surface equipment not associated with ALSEP, and EMU problems are covered.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.1 MESA Deployment

EVENT NO.	CONTINGENCY	ACTION
1.	MESA does not deploy	1. Try repeated pulls on release handle. 2. Grasp cable beyond bell crank and pull to deploy MESA. 3. Pull white lanyard and have second crewman pull "O" ring to release MESA. CAUTION MESA IS FREE TO FALL ONCE LATCH HAS BEEN RELEASED.
2.	Lanyard fails, MESA falls to lunar surface.	1. Block up MESA. 2. Tie up MESA if lanyard available.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.2 SRC Preparation

EVENT NO.	CONTINGENCY	ACTION
1.	Unable to open Sample Return Container (SRC).	1. Tap corners of SRC lid with available tools and attempt to pull lid free. 2. If forced to abandon either SRC #1 or SRC #2, use sample collection bags for sample storage and transfer the bags to LM ascent stage.
2.	SRC seal area dirty.	Use brush to clean seal.
3.	Unable to latch SRC.	1. Verify spacer has been removed. If not, remove. 2. Open SRC and check for interference. 3. If no interference, close and engage other strap latch. If this latch will rotate to within 30° of being closed, force closing by applying pressure on back of box. a. If this strap latches, try first latch again in the same manner. b. If the second latch will not latch, return to earth with the first latch closed. c. If still cannot latch at least one side, wrap lanyard around SRC or tap closed.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.3 ALSEP Offload

EVENT NO.	CONTINGENCY	ACTION
	4.1.3.1 SEQ Bay Doors	
1.	SEQ Bay door lanyards unusable.	1. If lanyard free from cable, pull cable. 2. If lanyard melted and fused to Inconel, attempt to break lanyard free with hard pull. 3. If unable to manually break lanyard free, use hammer to free lanyard and pull cable.
2.	SEQ Bay doors will not open when lanyard is pulled.	1. Pry open astronaut protection door, fail mechanism, and pull on lanyard again. 2. If unsuccessful, use hammer to chop hole in main door Inconel shield at center patch, hook hammer behind cable, pull to release latch and open door while latch is pulled, and continue to open door upward.
3.	SEQ Bay door will not stay open.	1. Verify that door is fully open and folded up over SEQ Bay. 2. If Quad II is low, secure door with velcro strap. 3. If Quad II is high, second crewman will have to hold door open.
4.	SEQ Bay door partially closed and jammed.	1. Ensure that lanyard is not tangled. 2. Continue pulling on lanyard while second crewman manually assists in closing door. 3. If unsuccessful, discontinue use of lanyard and use hammer to fail mechanism in order to close door.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.3 ALSEP Offload (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.1.3.2 Subpackage Removal	
1.	Subpackage unlatching mechanism will not function.	1. If lanyard pulls loose or mechanism jams, remove thermal covering from bottom of SEQ Bay and attempt to move release mechanism lever forward. 2. If unsuccessful, use hammer to pry outward from structure on right-hand link of latching mechanism, forcing latch over center and releasing subpackages.
2.	White portion of deployment lanyard will not release from base of subpackage.	1. Grasp release latch at base of subpackage and twist in an effort to break the latch or the slot. 2. If unsuccessful, attempt to cut lanyard with scissors in order to break or tear (webbing) loose.
3.	Subpackage will not slide on rails	Get assistance from second crewman.
4.	Handling assembly pull pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force on pin with hammer on break pin. 3. Attempt to pry handling assembly away from subpackage. 4. If unsuccessful, attempt to break the handling assembly off at the point where the pin jammed, either manually or with hammer. 5. If still unsuccessful, leave handling assembly on subpackage.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.3 ALSEP Offload (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.1.3.3 ALSEP Traverse Preparation	
1.	Tool support pull pin jams.	1. Apply additional force while rotating pin or break pin with hammer. 2. If unsuccessful, use hammer to fail bracket in an attempt to retrieve tools. 3. If still unsuccessful, abandon ALSEP.
2.	ALSEP tool binds in stowage bracketry.	1. Jiggle tool and apply additional force. 2. Obtain assistance from second crewman. 3. If unable to remove one UHT, continue deployment using second UHT. 4. If unable to remove either UHT, abandon ALSEP. 5. If unable to remove DRT, attempt to gain access to fuel capsule by using hammer or extension handle to destroy cask dome and pry away bands. 6. If dome cannot be removed, abandon ALSEP. 7. If unable to remove FTT, abandon ALSEP. 8. If unable to remove carry bar, use suitcase carry mode to transport ALSEP to deployment site.
3.	Carry bar does not extend and/or lock.	1. If carry bar does not extend, use suitcase carry mode. 2. If carry bar does not lock when extended, collapse carry bar to stowage position and re-extend. 3. If carry bar still does not lock, use as is but position gloves at outer sections of bar when transporting packages.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.3 ALSEP Offload (Concluded)

EVENT NO.	CONTINGENCY	ACTION
—	4.1.3.3 ALSEP Traverse Preparation (Concluded)	
4.	Carry bar will not engage in subpackage keyhole socket.	1. Examine carry bar flange and subpackage keyhole socket for obstructions, dislodge obstructions by impact and re-engage carry bar in subpackage keyhole socket. 2. If keyhole socket is unusable, use suit-case carry mode.

4.1.4 RTG Fueling

EVENT NO.	CONTINGENCY	ACTION
1.	Cask will not rotate.	**CAUTION** USE EXTREME CARE WHEN WORKING NEAR HOT FUEL CASK. DIRECT EXPOSURE TO HOT CASK COULD DAMAGE OR FAIL THE SPACE SUIT. 1. Verify upper trunnion release by hooking hammer or extension handle on astronaut guard and insure that the cask is free of the upper trunnion. 2. Request aid of the second crewman to apply forward and downward force with hammer or extension handle on the astronaut guard, while the first crewman attempts to rotate cask. 3. Continue to apply force to fail gear box. NOTE When gear box fails, one crewman must support cask with available tools at the proper angle for capsule removal. 4. If still unable to gain access to fuel capsule, abandon ALSEP.
2.	Engaging mechanism on DRT does not lock on cask dome.	1. Attempt to remove dome by applying forward pressure or side loading on the DRT. The dome will rotate without the locking pin engaged. 2. After dome is rotated (without locking pin engagement) use hammer or extension handle to remove dome. 3. If unable to remove dome without DRT engagement, attempt to gain access to fuel capsule by using hammer to destroy cask dome and pry away bands. 4. If dome cannot be removed, abandon ALSEP.

4.1 LUNAR MODULE SITE ACTIVITIES

4.1.4 RTG Fueling (Continued)

EVENT NO.	CONTINGENCY	ACTION
3.	Lock nut assembly will not rotate.	1. Use hammer or extension handle to impact the DRT, cask or dome in order to overcome any binding, while continuing to rotate DRT. 2. If unable to rotate lock nut assembly, attempt to gain access to fuel capsule by using hammer to destroy cask dome and pry away bands. 3. If dome cannot be removed, abandon ALSEP.
4.	Pretension bands will not release, causing excessive loading on dome locking lugs.	1. Use hammer or extension handle to free lugs at the lock nut assembly on the dome. 2. If unable to release bands, attempt to gain access to fuel capsule by using hammer to destroy cask dome and pry away bands. 3. If dome cannot be removed, abandon ALSEP.
5.	FTT fingers will not engage in fuel capsule.	1. Check for side loading on FTT and for full inward travel of FTT fingers. 2. Examine FTT fingers for obstructions, dislodge obstructions by impacting and attempt to re-engage FTT in fuel capsule. 3. Apply additional force to FTT knob. 4. Retract FTT fingers, rotate FTT 120°, attempt to re-engage FTT in capsule, and repeat task in all three positions, if required. 5. Jar mechanism by banging FTT knob against the LM landing gear. 6. If FTT will not function, abandon ALSEP.
6.	Capsule will not release from cask after FTT is attached and locked to capsule.	1. Apply side loads to FTT while attempting to pull capsule out of cask. 2. Retract FTT fingers, rotate FTT 120°, attempt to re-engage FTT in capsule, and repeat task in all three positions, if required.

4.1.4 RTG Fueling (Concluded)

EVENT NO.	CONTINGENCY	ACTION
6.	Capsule will not release from cask after FTT is attached and locked to capsule. (Concluded)	3. Use hammer or extension handle to impact side of cask or end of the FTT to free the capsule. 4. If unsuccessful, allow for backplate cool-down (5-10 minutes) and repeat task. 5. If capsule will not release, abandon ALSEP.
7.	FTT fingers will not release from fuel capsule.	1. Check for side loading on FTT and for full outward travel of FTT fingers. 2. Apply additional force to FTT knob. 3. Use hammer or extension handle to impact the end of the FTT in an attempt to free the FTT. 4. If FTT will not release from capsule, leave FTT in place on the fueled RTG and ensure capsule is locked into RTG. 5. If fuel capsule is not locked in RTG, place RTG Subpackage in horizontal position on LRV. (Carry Central Station Subpackage in suitcase mode.)
8.	One FTT finger broken.	Abandon ALSEP. FTT tool will not operate with a broken finger.

4.2 ALSEP SITE ACTIVITIES

4.2.1 Subpallet Removal

EVENT NO.	CONTINGENCY	ACTION
1.	Carry bar binds in keyhole socket on Subpackage.	1. Ensure release button is operable. 2. Apply additional downward pressure to carry bar while pushing on Subpackage. 3. If unsuccessful, use contingency release method (peel off velcro strip, release pull pins (2) and disengage carry bar from flange). 4. If still unsuccessful, attempt to break carry bar off at keyhole socket or flange by using hammer. 5. Attempt to level and align Subpackage.
2.	Unable to locate RTG 3 meters due east of Central Station due to presence of craters, etc.	1. Locate RTG as far from Central Station as possible. 2. Deploy RTG south of planned location. 3. If no site available south of planned location, deploy Central Station north of planned location, but no more than 1.5 meters north, in order to keep RTG out of field of view of Central Station radiator.
3.	HFE Subpallet or astromate pull pin lanyard breaks.	1. Attempt to remove pin by grasping any remaining lanyard. 2. Manually remove pin.
4.	Pull pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force with hammer or break pin. 3. If unsuccessful, use hammer to break bracket. 4. If unsuccessful, and one HFE Subpallet pull pin cannot be released, remove Boyd bolts and rotate subpallet until the bracket breaks.

4.2 ALSEP SITE ACTIVITIES

4.2.1 Subpallet Removal (Continued)

EVENT NO.	CONTINGENCY	ACTION
4.	Pull pin jams. (Concluded)	5. If HFE astromate connector cannot be released, notify MCC and abandon HFE deployment after removing HFE Subpallet. 6. If HFE Subpallet cannot be removed, remove as much equipment as possible. 7. If unsuccessful with removing LEAM carrier, leave LEAM carrier on RTG Subpackage, but remove LEAM and aiming mechanism immediately after subpackage is rotated to the ground.
5.	Subpallet will not come off subpackage.	1. Ensure subpallet pull pins have been released. (Ref. Event 4 on previous page.) 2. Ensure Boyd bolts have been released. (Ref. Event 6 below.) 3. Ensure that front of subpallet has been raised to clear the mounting stud. 4. Leave subpallet on subpackage, but remove as much of related equipment as possible. 5. Use hammer to force forward movement of subpallet or to break bracket or HFE Subpallet strut.
6.	Boyd bolt(s) will not release.	NOTE Reference Figure 4-1, page 143 for Boyd bolt positions on the subpackages. 1. Use second UHT. 2. Force rotation of UHT to strip Boyd bolt threads. 3. Use hammer or available tools to apply an upward force on the opposite side of subpallet where the Boyd bolts are binding in an attempt to break Boyd bolts free. 4. Use hammer to fail Boyd bolts.

4.2 ALSEP SITE ACTIVITIES

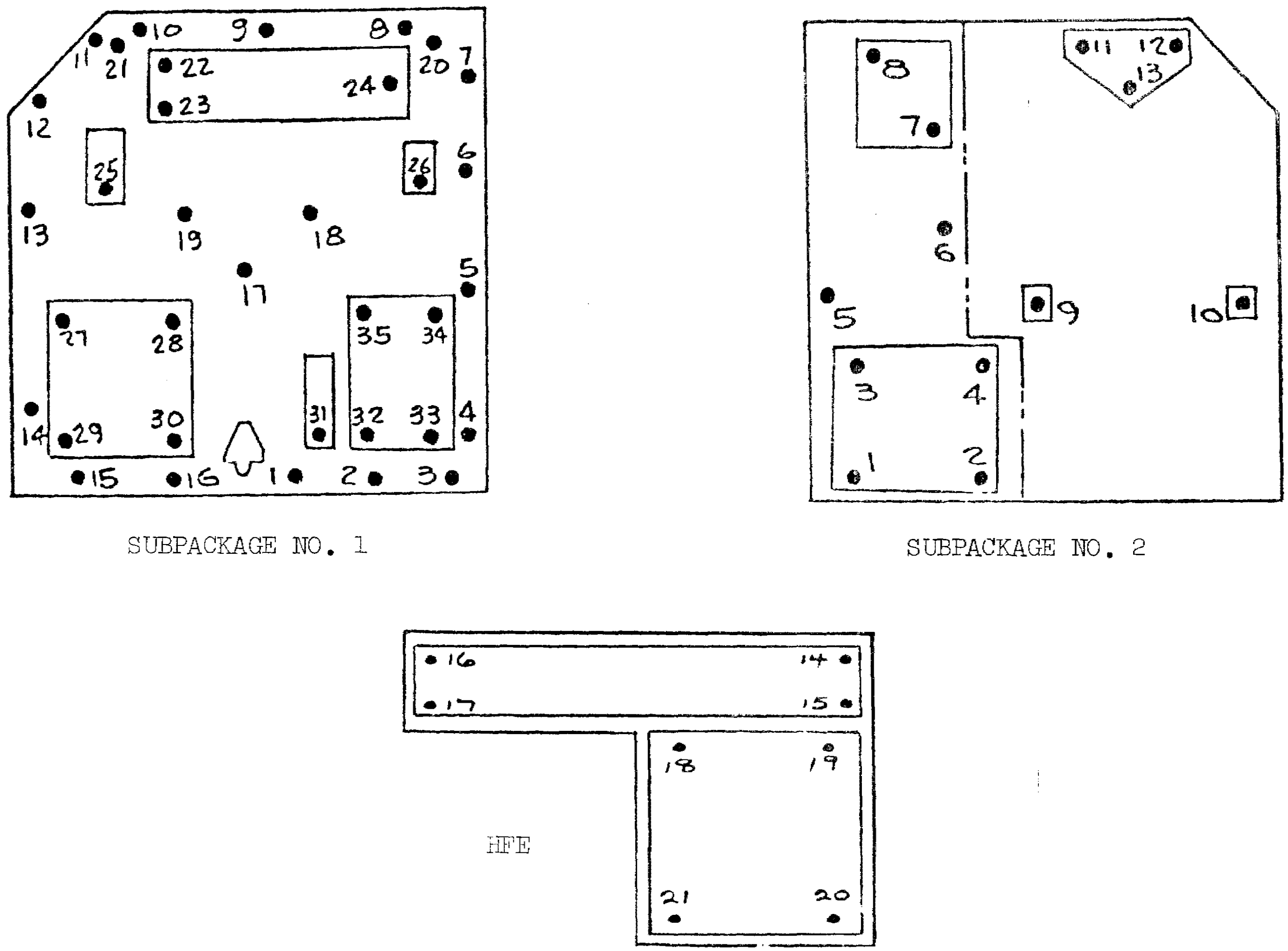
4.2.1 Subpallet Removal (Continued)

EVENT NO.	CONTINGENCY	ACTION
6.	Boyd bolt(s) will not release. (Continued)	5. If unable to release RTG cable reel Boyd bolts, tilt package on carry handle side, and utilize UHT to unwind cable manually to expose shorting plug. 6. If unable to release Boyd bolts on HFE Subpallet, attempt to release Boyd bolts on HFE electronics and probe packages. 7. If unable to release Boyd bolt(s) on HFE electronics or probe package, leave HFE electronics on RTG or subpallet but remove astromate connector and rip probe containers apart with hammer or available tools. Retrieve emplacement tool and probes, and deploy probes. 8. If unable to release Boyd bolt(s) on LSPE, leave LSPE on sunshield and deploy LSPE/Central Station as one unit. NOTE Explosive packages should not be deployed if LSPE geophones cannot be deployed. 9. If unable to release Boyd bolt(s) on LSG, leave LSG on sunshield and deploy LSG/Central Station as one unit. 10. If unable to release Boyd bolt(s) on LMS, leave LMS on sunshield and deploy LMS/Central Station as one unit. 11. If unable to release Boyd bolts on LEAM Subpallet, attempt to release Boyd bolts on LEAM and aiming mechanism. 12. If unable to release Boyd bolts on LEAM, leave LEAM on carrier and deploy still mounted on carrier. 13. If unable to release Boyd bolts to LSPE antennas, leave antenna on sunshield (do not extend antenna) and deploy Central Station.

4.2 ALSEP SITE ACTIVITIES

4.2.1 Subpallet Removal (Concluded)

EVENT NO.	CONTINGENCY	ACTION
6.	Boyd bolt(s) will not release. (Concluded)	14. If unable to release Boyd bolts to ALSEP antenna, abandon effort and continue Central Station sunshield deployment. NOTE Adjust Central Station as required, in real time, to achieve good communication. 15. If unable to release Boyd bolt(s) on Central Station sunshield, leave sunshield in stowed position and continue ALSEP deployment.



SUBPACKAGE NO. 1

SUBPACKAGE NO. 2

HFE

Figure 4-1. Boyd Bolt Locations

4.2 ALSEP SITE ACTIVITIES

4.2.2 RTG Cable Interconnect

EVENT NO.	CONTINGENCY	ACTION
1.	RTG cable reel tempi-label dots are all black.	**CAUTION** USE EXTREME CARE WHEN WORKING NEAR HOT RTG. DIRECT EXPOSURE TO TEMPERATURE IN EXCESS OF 250°F COULD DAMAGE SPACE SUIT. 1. Do not touch RTG cable reel, cable or shorting plug. 2. Use UHT handle to deploy RTG cable, release shorting plug pull pin and retrieve shorting plug. 3. If unsuccessful, stow shorting plug on Central Station (in shade if possible) until temperature is below 250°F. Cool-down period is approximately 10 minutes.
2.	UHT will not engage in RTG cable reel carry socket.	1. If first UHT will not engage, try second UHT in carry socket. 2. If UHT engagement fails, deploy by using handle of UHT.
3.	Crewman walks too far and jerks RTG.	1. Obtain assistance from second crewman to move Central Station closer to RTG to provide sufficient slack cable for RTG cable interconnect and continue deployment of RTG cable. 2. Check cable and connectors at shorting plug and RTG interfaces for visible signs of damage and notify MCC if there are visible signs of damage.
4.	Shorting plug pull pin does not release.	1. Apply additional force on pin or break pin with hammer. 2. Use hammer to break bracket. 3. Attempt to separate cable from shorting switch.

4.2 ALSEP SITE ACTIVITIES

4.2.2 RTG Cable Interconnect (Continued)

EVENT NO.	CONTINGENCY	ACTION
5.	Ampere gauge unreadable or arrow is at zero.	1. Reset switch. 2. Apply additional force to shorting switch and note if ammeter shows reading. 3. Separate shorting switch from RTG cable and connect cable directly to Central Station. 4. Continue ALSEP deployment.
6.	Shorting switch turned but ammeter shows no drop in amperage.	1. Reset the switch. 2. Apply additional force to shorting switch and note if amperage drops. 3. Separate shorting switch from the RTG cable and connect RTG cable to Central Station. 4. Continue ALSEP deployment.
7.	Shorting plug connector fails to engage and lock to Central Station (C/S).	1. Check shorting plug connector for proper orientation. 2. Check both connectors for debris on pins or Central Station receptacle. 3. Depress outer flange of shorting plug connector to ensure proper function. 4. Reconnect, applying additional downward pressure on the flange assembly. Second crewman can aid by holding PLSS. 5. Manually separate the shorting plug from the RTG cable, discard and connect RTG cable directly to Central Station. NOTE If RTG cable connector cannot be mated to Central Station, abandon ALSEP.

4.2 ALSEP SITE ACTIVITIES

4.2.2 RTG Cable Interconnect (Concluded)

EVENT NO.	CONTINGENCY	ACTION
8.	Shorting plug engages, but falls off when subpackage is rotated.	1. Return subpackage to vertical position, retrieve cable, remove debris and remate connectors. 2. If outer flange is not free to travel or shorting plug falls off again, manually separate the shorting plug from the RTG cable and connect RTG cable connector to Central Station. 3. If RTG cable connector will not stay mated to Central Station, abandon ALSEP.

4.2 ALSEP SITE ACTIVITIES

4.2.3 Heat Flow Experiment

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.1 HFE Deployment	
1.	Astromate connector will not come out of stowage assembly.	1. Apply additional force. 2. Obtain assistance from second crewman. 3. Use hammer to tap Astromate connector through bracket or bend brackets out. 4. If unsuccessful, use hammer to break bracket. NOTE If Astromate connector cannot be removed from stowage assembly, abandon HFE deployment.
2.	Astromate connector dust cover cannot be removed.	1. Apply additional force and twist whole dust cover back and forth while pulling outward. 2. Obtain assistance from second crewman.
3.	Astromate connector fails to engage and lock.	1. Check connector for proper orientation. 2. Check connectors on cable and Central Station for debris and bent pins. 3. Verify that locking lever is in unlocked position. 4. Reconnect. NOTE If Astromate connector cannot be mated to Central Station, abandon HFE deployment.
4.	Unable to deploy heat flow experiment electronics 9 meters from Central Station.	Deploy electronics as far as possible from the Central Station, staying as far as possible from the RTG.

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.1 HFE Deployment (Continued)	
5.	Crewman walks too far and jerks Central Station.	1. Carry HFE subpallet back toward Central Station to provide slack cable and continue deployment of HFE. 2. Check cable and connectors of experiment and Central Station interfaces for visible sign of damage.
6.	HFE subpallet strut will not collapse.	1. Apply additional force. Use hammer if necessary. 2. Continue HFE deployment with strut uncollapsed.
7.	HFE Probe Package halves will not separate.	1. Verify velcro straps are released. 2. Turn probe package upside down to remove locking cylinders. 3. If unsuccessful, attempt to use hammer to rip HFE Probe Package apart and retrieve probes and emplacement tool.
8.	Unable to deploy HFE Probe Package half 6 meters west or east of HFE Electronics Package due to presence of craters, etc.	Locate HFE Probe Package as far from RTG, the other Probe Package half, Central Station and other ALSEP experiment sites as cable permits. Maintain maximum separation between probes.
9.	Crewman walks too far and jerks HFE Electronics Package.	1. Carry HFE Probe Package back toward HFE Electronics Package to provide sufficient slack cable for probe emplacement. Continue deployment of HFE. NOTE Orange and black marker at 5 meters on probe cable. 2. Check cable and connector at HFE Electronics interface for visible signs of damage.

4.2 ALSEP SITE ACTIVITIES

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.1 HFE Deployment (Concluded)	
10.	The bubble level or sun compass is damaged or degraded.	Visually level by using estimation of true vertical and other equipment as reference; align by using shadows and other equipment as a reference; and ensure ample photo coverage is obtained to verify experiment orientation.

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.2 Drill Operation	
1.	Temporary delay period exceeding 30 minutes in ALSD operations.	Place drill on lunar surface with battery end down and oriented such that the back of the battery is directed toward the sun. Do not place ALSD in a shaded area if sun angles are in the range of 9 to 22 degrees.
2.	Handle assembly fails to lock properly to battery.	1. Verify handle is free of interference and properly aligned. 2. Verify that fixed pin is fully engaged and force handle to locked position. 3. With the aid of the second crewman, attempt drilling operation without the handle.
3.	Power head does not operate during pre-deployment test (no spindle rotation).	1. Remove power head from treadle outbound stowage and recheck operation. 2. Put bore section in spindle and apply torque CW. 3. Tap on power head spindle "axially." 4. Abandon drill and proceed to Section 4.2.3.3, Event 1.
4.	Power head bracket jams causing difficulty in removal from the treadle.	Grasp spindle with left hand and press down on treadle with thumb.
5.	Difficulty in drilling hole.	1. If drilling rate is < 5 in./min. and hole is less than 40 inches deep, remove drill and move 3 feet to new location. (If unsuccessful, repeat step up to 2 new locations.) 2. If unsuccessful at third location, continue drilling until 10 minutes power-on time has elapsed per HFE bore hole.

4.2 ALSEP SITE ACTIVITIES

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.2 Drill Operations (Continued)	
5.	Difficulty in drilling hole. (Concluded)	NOTE If crewman is drilling on first hole, then proceed to second hole after completing step #3. If drilling on second hole, proceed to coring operation after completion of step #3. 3. If unable to obtain hole greater than 40 inches deep, proceed to Section 4.2.3.3, Event 1.
6.	Unable to add additional stem section.	1. Check axial alignment and attempt re-arrangement. 2. Inspect male joint for foreign material and clean. 3. Add new stem sections and repeat steps 1 and 2 until engagement. 4. If unsuccessful in mating, use wrench or power head for additional torque.
7.	High torque exists during drilling operations.	1. Attempt to clear flutes by drilling with upward pressure on drill handle. 2. Continue drilling. NOTE Slip clutch will prevent excessive torque from over-powering astronaut.
8.	Power head runs slowly.	1. Tap relief valve with hammer or wrench. 2. Continue drilling for 10 minutes power-on time.

4.2 ALSEP SITE ACTIVITIES

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.2 Drill Operations (Concluded)	
9.	Bore stem binds on power head and back-drives spindle/drive train before breaking loose.	1. Hit joint with a hammer. 2. If second or third sections are attached, remove top joint from rest of bore stem, screw core stem adapter into bore stem and drill core hole. 3. Remove core stems from core hole and insert HFE probe into core hole.

4.2.3 Heat Flow Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.3 Probe Emplacement	
1.	Drill inoperable.	1. Hand auger the bore stems into the subsurface combined with hammering of the bore stems. Place the probe inside the bore stem. NOTE One 28-inch bore stem section should be used exclusively for pounding. This is to preserve the threaded joints on the stems. 2. If unsuccessful, insert the probe into a hole made by a double core tube. Apply force to the top of the probe for better penetration into the subsurface. Not more than 10 lbs. of force should be exerted to prevent damage to the probe. Fill hole around probe. 3. If unsuccessful, lay probe and cable on top of lunar surface.
2.	Possible to drill only a shallow bore hole.	1. If the first section or more of bore stems is drilled into the lunar surface, emplace heat flow probes into bore holes. 2. Make careful measurement with the emplacement tool to determine the depth of hole and probe emplacement.
3.	Emplacement tool collapses while driving probe into bore hole.	1. Withdraw emplacement tool. Re-extend and lock the tool and resume driving probe into bore hole. 2. If emplacement tool collapses again, discard tool, insert probe into bore hole as far as possible and report to MCC.

4.2.3 Heat Flow Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
	4.2.3.3 Probe Emplacement (Concluded)	
4.	Obstructions in the bore stem prevent complete insertion of probe.	**CAUTION** DO NOT USE EMPLACEMENT TOOL TO CLEAR OBSTRUCTIONS FROM HOLE UNTIL ONE PROBE HOLE/ASSEMBLY HAS BEEN COMPLETED. 1. Use emplacement tool to clear obstruction from the hole, then insert probe. Probe can safely be pulled with a force up to 30 lbs. 2. If unsuccessful, abandon effort and report depth of insertion.
5.	Heat flow probe does not lock on bottom "Hook" of first bore stem.	1. Apply downward pressure to engage hook. 2. Emplace probe as deep in stem as possible with opposite end of emplacement tool and read depth on emplacement tool.
6.	Unable to drill HFE hole with bore stems.	1. If unable to obtain a HFE hole greater than 1 meter deep into the subsurface with the bore stems at either probe locations, then proceed to drill the deep core at probe #1 location. Using the treadle and extractor, remove the deep core and insert the probe through the treadle into the deep core drill hole. Care must be taken that the treadle does not shift when removing the stem or emplacing the probe. 2. To obtain the second HFE probe hole, proceed as outlined in Section 4.2.3.3, Event 1.

4.2 ALSEP SITE ACTIVITIES

4.2.4 Lunar Surface Gravimeter Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	UHT will not engage in LSG carry socket.	1. If first UHT will not engage, try second UHT in carry socket. 2. If UHT engagement fails, deploy and emplace LSG manually.
2.	Unable to deploy LSG 8 meters west of Central Station due to presence of craters, etc.	1. Locate LSG as far from Central Station, RTG and other experiment sites as LSG cable will permit. 2. Deploy LSG south of planned location, but attempt to locate LSG so that LSG cable will not cross other cables or run along with and in contact with another cable. 3. If no site available south of planned location, deploy LSG north of planned location, but maintain at least a 25 $\pm$ 5 degree angle between the LSG cable and LSPE antenna cable and attempt not to block Central Station field-of-view. Attempt to locate LSG so that LSG cable will not cross other cables or run along with and in contact with another cable.
3.	LSG sunshade will not lock in place when extended.	1. Insure sunshade guy wires or gimbal release lanyard are not inhibiting full sunshade deployment. 2. If sunshade is fully deployed, manually lock sunshade latches or obtain assistance from second crewman. 3. Apply additional force to achieve complete sunshade deployment and ensure locking. 4. If unsuccessful, use hammer to force sunshade latches to lock in place. 5. If still unsuccessful, manually release sunshade latches and collapse sunshade to storage configuration to cover radiator.
4.	Detent does not hold sunshade at tilt angle for landing site latitude.	Position in next detent that will hold tilt angle nearest the degree reading specified for the site latitude.

4.2 ALSEP SITE ACTIVITIES

4.2.4 Lunar Surface Gravimeter Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
5.	Crewman walks too far and jerks Central Station.	1. Carry experiment back toward Central Station to provide sufficient slack cable and continue deployment of LSG. 2. Check cable and connectors at experiment and Central Station interfaces for visible signs of damage and notify MCC if there are visible signs of damage.
6.	LSG Boyd bolt falls into cavity when sunshade is deployed.	1. Determine if Boyd bolt is lodged near gimbal mechanism; then attempt to manually dislodge Boyd bolt (avoid electronics wires). 2. Manually tilt experiment to allow Boyd bolt to fall free. 3. If unsuccessful or if Boyd bolt is not lodged near gimbal mechanism, abandon effort and continue LSG deployment.
7.	LSG sunshade will not tilt away from UHT socket to appropriate angle.	1. Lightly tap sector gears with UHT to dislodge debris. 2. Apply additional pulling force on sunshade while holding experiment steady with UHT. 3. Obtain assistance from second crewman. 4. If unsuccessful, manually release sunshade latches and collapse sunshade to storage configuration in order to cover radiator area.
8.	The bubble level or sun compass is damaged or degraded.	Visually level by using estimation of type vertical and other equipment as reference; align by using shadows and other equipment as reference; and ensure ample photo coverage is obtained to verify experiment orientation.
9.	Uncaging lanyard breaks.	1. Attempt to uncage LSG by grasping any remaining lanyard. 2. Manually uncage LSG by rotating the uncaging cam 90° (a retracting spring will automatically rotate the cam the additional 90°).

4.2 ALSEP SITE ACTIVITIES

4.2.4 Lunar Surface Gravimeter Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
10.	LSG sensor will not uncage when uncaging lanyard is pulled.	1. Attempt to uncage LSG by manually rotating the uncaging cam until lanyard breaks. 2. If unsuccessful, continue LSG deployment. After initial alignment and leveling, attempt to align bubble in exact center of level.

4.2 ALSEP SITE ACTIVITIES

4.2.5 Lunar Seismic Profiling Experiment

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.1 Geophone Module Deployment	
1.	Unable to deploy 10 meters south of Central Station due to presence of craters, etc.	1. Locate LSPE GM as far from Central Station, RTG and other experiment sites as LSPE GM cable will permit. 2. Deploy LSPE GM west of planned location, but do not cross cables or run LSPE GM cable along with and in contact with another cable. 3. If unable to deploy LSPE GM west of planned location, deploy LSPE GM east of planned location, but do not cross cables or run LSPE GM cable along with and in contact with another cable.
2.	UHT will not engage in LSPE GM carry socket.	1. Try to engage second UHT in socket. 2. If UHT engagement fails, deploy manually.
3.	Crewman walks too far and jerks Central Station.	1. Carry experiment back toward Central Station to provide sufficient slack cable and continue deployment of LSPE GM. 2. Check cable and connectors at experiment and Central Station interfaces for visible signs of damage and notify MCC if there are visible signs of damage. If required, activate LSPE Enable Switch and pull one geophone to determine if LSPE is operable and wait for response from MCC.
4.	Geophone flag release pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force with MESA hammer or break pin. 3. If unsuccessful, abandon effort and continue LSPE deployment without flags.
5.	Geophone flag release lanyard breaks.	1. Attempt to remove pin by grasping any remaining lanyard. 2. Manually remove pin.

4.2 ALSEP SITE ACTIVITIES

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.1 Geophone Module Deployment (Concluded)	
6.	Geophone flag will not unfold or lock.	1. Apply additional force in an attempt to unfold and/or lock flag. 2. Obtain aid of second crewman. 3. If unsuccessful, abandon effort and continue deployment of another flag if available.
7.	Cover will not release from LSPE GM.	1. Stand directly over LSPE GM and pull straight up on UHT shaft. 2. Attempt to pry the cover loose or break cover with hammer and remove.
8.	Geophone Flag cannot be embedded in lunar surface because its planned location is too hard.	1. Locate LSPE GM west or east of planned location and at least 10 meters from Central Station. 2. If still unable to embed the Geophone Flag in lunar surface, abandon effort, but exercise caution during geophone deployment. Second crewman can assist in achieving satisfactory alignment of the geophones.
9.	Less than five flags available.	1. Use any available discarded hardware to anchor LSPE GM if necessary. 2. Use flag(s) to anchor LSPE Geophone.

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.2 Geophone Deployment	
1.	UHT will not engage in geophone cable reel.	1. Try to engage second UHT in reel socket. 2. If UHT engagement fails, deploy cable manually.
2.	Geophone cable reel will not come out of LSPE Geophone Module.	1. Apply upward force while rocking the geophone cable reel in an attempt to free the reel from the geophone module. 2. If unsuccessful, use center geophone (#3) as alternate to assure triangular configuration of the geophones.
3.	Less than four or no flags available for geophone deployment.	1. Assure one flag will be available for the center geophone (#3). 2. If no flags or not enough flags are available to complete the geophone deployments, use discarded hardware, if available, to anchor and visually depict the geophone deployment location. Also look for geological mark for interrelation of the geophones.
4.	Unable to deploy geophones at planned deployment location due to presence of craters, boulders, etc.	Walk around crater, boulder, etc., and deploy geophones as far out as cable permits and emplant in flat terrain, not in craters. Geophones should be deployed so that three of them comprise the vertices of an equilateral triangle with the fourth in the center of the triangle.
5.	Geophone cable reel does not turn freely or will not rotate.	Deploy cable manually.
6.	Cable spews off Geophone cable reel.	Remove any kinks or snarls in cable, as practicable.
7.	During deployment, the cable becomes suspended between crater rim edges.	If geophone cable is deployed over depression more than two feet deep, insure that the cable has enough slack to follow the contour of the lunar surface.

4.2 ALSEP SITE ACTIVITIES

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.2 Geophone Deployment (Concluded)	
8.	Crewman walks too far and jerks geophone module/geophones and/or flag out of ground, disturbs Central Station, etc.	1. Carry geophone back toward geophone module to provide sufficient slack cable and continue geophone deployment. 2. Re-emplant flag anchor at geophone module, if required. Check cable and connectors at geophone, geophone module and Central Station interfaces for visible signs of damage and check Central Station and ALSEP antenna leveling and alignment. Relevel and realign Central Station and ALSEP antenna, if required, and notify MCC if there are visible signs of damage or if releveling and realignment were required. 3. Determine if other deployed geophones and flags are still emplanted into lunar surface. If geophones and/or flags were disturbed, re-emplant into lunar surface. 4. Upon return from geophone deployment, if Central Station and ALSEP antenna were disturbed, check other experiments leveling and alignment, and relevel, realign and notify MCC if experiments were disturbed.
9.	Geophone and/or flag cannot be embedded in lunar surface because its planned placement location is too hard or due to presence of craters, etc.	1. Locate geophone and flag as far from the LSPE Geophone Module as cable permits and emplace on flat terrain. 2. Move the geophone and flag laterally with respect to the geophone deployment line to a softer surface. 3. If flag cannot be embedded, look for geological mark for interrelation of the four geophones and photo document as necessary for exact locations.
10.	LSPE Enable Switch cannot be turned CW to "ENBL" position.	1. Apply additional force to switch. 2. If unsuccessful, abandon effort and photo document. Report condition to MCC.

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.3 Antenna Deployment	
1.	HFE Subpallet unavailable for use as LSPE Antenna Mounting Base.	Remove LSPE Antenna and cable reel from Central Station, deploy at planned location, extend antenna sections, imbed into lunar surface and prop up, as required, with rocks or other lunar debris.
2.	LSPE Antenna cable reel will not deploy to maximum length.	1. Return to cable reel, lift from lunar surface and examine for possible restriction of cable deployment. 2. Eliminate restriction and continue deployment. 3. If unsuccessful, deploy antenna as far as possible from Central Station as cable will permit. NOTE Do not activate LSPE Antenna unless deployed >6 meters from Central Station.
3.	Unable to locate LSPE Antenna 12 meters northwest of Central Station due to presence of craters, etc.	1. Locate LSPE Antenna as far from Central Station, RTG, LSG and the nearest HFE probe site as cable permits. 2. Deploy LSPE Antenna south of planned location, but maintain at least a 25-degree angle between the LSG cable and LSPE Antenna. Do not cross cables or run LSPE Antenna cable along with and in contact with another cable. 3. If unable to deploy LSPE Antenna south of planned location, deploy north of planned location but at least 5 meters from the nearest HFE probe site. Do not cross cables or run LSPE Antenna cable along with and in contact with another cable.

4.2 ALSEP SITE ACTIVITIES

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.3 Antenna Deployment (Concluded)	
4.	LSPE Antenna cannot be extended.	1. Apply additional force in an attempt to extend antenna. 2. Deploy antenna to maximum length possible. 3. If unsuccessful, deploy antenna in stowed condition.
5.	LSPE Antenna breaks.	1. Jam broken section into antenna and make sure all sections have been extended, if possible. 2. If unsuccessful, discard section that broke off and utilize remainder of antenna.
6.	LSPE Antenna will not lock into HFE Sub-pallet Antenna socket.	1. Apply additional downward force on UHT handle. 2. If unsuccessful, prop up with rocks and continue ALSEP deployment.

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.4 Explosive Packages and Offload Deployment	
1.	Explosive Packages Transport Frame pull pin jams.	1. Apply additional force on pin with hammer or break pin. 2. If unsuccessful, use hammer to break bracket. 3. If still unsuccessful, remove charges as assigned per EVA and stow under seat of LRV.
2.	Aborted EVA after start of EP deployment.	Deploy EP's a minimum of 13 meters apart but within deployment distance constraints.
3.	The camlock which secures EP to Transport Frame will not rotate CCW.	1. Apply additional force. 2. Obtain assistance from second crewman. 3. If unsuccessful, use hammer to release camlock. 4. If still unsuccessful, abandon effort, notify MCC, and continue deployment of the next Explosive Package.
4.	Explosive Package will not come off of Transport Frame.	1. Apply additional force while rotating the Explosive Package on the outboard retaining pin until the inboard retaining pin is clear. 2. A slight inboard push may be required to disengage the hook projection from the outboard retaining pin. 3. If unsuccessful, abandon effort, notify MCC and continue deployment of the next Explosive Package.
5.	Safe/Arm Slide indicator in "Arm" position or in "Resafe" position.	Discontinue Explosive Package deployment, lower EP to lunar surface without deploying antenna, and continue on to the deployment of the next Explosive Package. Report EP number and location to MCC.

4.2.5 Lunar Seismic Profiling Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.4 Explosive Packages and Offload Deployment (Continued)	
6.	EP Antenna cannot be extended or cannot be fully extended.	1. Apply additional force in an attempt to extend antenna. 2. If unsuccessful, release pull pins and lower to lunar surface. Report EP number and location.
7.	EP Antenna breaks.	1. Attempt to jam broken section into antenna and make sure antenna has been fully extended. 2. If unsuccessful, release pull pins and lower to lunar surface. Report EP number and location.
8.	One or all of the EP pull pins jam.	1. Apply additional upward force while rotating pin. 2. If pull ring #2, rotate approx. 70° in a CCW direction before pulling straight up. 3. If pull ring #3, apply only upward force since two pull pins (thermal battery timer and firing pin safing) are ganged together. 4. If unsuccessful, notify MCC of EP number and location, abandon effort and continue deployment of the next Explosive Package.
9.	Explosive Package falls over on lunar surface.	1. Retrieve EP from lunar surface and remove debris, as required. 2. Redeploy EP.
10.	If pin shears or if S/A slide indicator moves.	Stop deployment sequence and place EP on lunar surface. Do not force pin pull-out.

4.2.5 Lunar Seismic Profiling Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
	4.2.5.4 Explosive Packages and Offload Deployment (Concluded)	
11.	Unable to deploy Explosive Package at planned location due to presence of obstruction, crevice or soft deep dust.	1. If obstruction or crevice near deployment site, place a minimum of 3 meters from obstruction or crevice. 2. If soft deep dust at deployment site, relocate at site nearby or pack dust in a 1-foot diameter circle before emplacing EP on lunar surface. 3. EP #1, the 6 lb. Explosive Package, must be deployed at the greatest distance from the LSPE geophone array, but should not exceed 2.4 Km. 4. EP #3 and #4, the 1/8 lb. Explosive Packages must be deployed a minimum of .16 Km from the geophone array.
12.	Explosive Packages inadvertently deployed in wrong sequence.	Continue deployment but notify MCC of the deployment sequence and EP number.

4.2 ALSEP SITE ACTIVITIES

4.2.6 Lunar Mass Spectrometer Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	LMS vent lanyard breaks.	1. Attempt to open vent by grasping any remaining lanyard. 2. If unsuccessful, remove LMS from sunshield and manually open vent by triggering vent lever.
2.	UHT will not engage in LMS carry socket.	1. Try to engage second UHT in socket. 2. If UHT engagement fails, deploy manually.
3.	LMS carry socket does not rotate or lock.	1. Apply additional force in an attempt to rotate socket. 2. If unsuccessful in attempt to rotate socket or socket will not lock, deploy manually.
4.	Crewman walks too far and jerks Central Station.	1. Carry experiment back toward Central Station to provide sufficient slack cable and continue deployment of LMS. 2. Check cable and connectors at experiment and Central Station interfaces for visible signs of damage and notify MCC if there are visible signs of damage. Check LMS leveling and alignment, and relevel, realign and notify MCC if experiment was disturbed.
5.	Unable to deploy LMS 14 meters northeast of Central Station due to presence of boulders, etc.	1. Locate LMS as far from Central Station, RTG, and other experiment sites as LMS cable will permit. 2. Deploy LMS north of planned location, but at least 5 meters from nearest HFE probe and attempt not to block HFE Electronics Package and Central Station field-of-view. Attempt not to cross cables or run LMS cable along with and in contact with another cable. 3. If no site available north of planned location, deploy LMS south of planned location, but do not allow LMS cable to touch RTG and attempt not to block RTG field-of-view. Attempt not to cross cables or run LMS cable along with and in contact with another cable.

4.2.6 Lunar Mass Spectrometer Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
6.	The bubble level or sun compass is damaged or degraded.	Visually level by using estimation of true vertical and other equipment as reference and ensure ample photo coverage is obtained to verify experiment orientation.
7.	UHT will not engage in LMS breakseal socket.	1. Try to engage second UHT in socket. 2. If UHT engagement fails, apply additional force. 3. If still unsuccessful, abandon effort and continue ALSEP deployment.
8.	LMS seal will not break when UHT is moved in direction of arrow.	1. Apply additional downward and forward force in direction of arrow. 2. Apply side stress on breakseal. 3. If still unsuccessful, disengage UHT from breakseal socket. Abandon experiment and continue ALSEP deployment.
9.	Entrance aperture cover will not deploy automatically.	Use UHT handle as a pry to loosen aperture cover.

4.2 ALSEP SITE ACTIVITIES

4.2.7 Lunar Ejecta and Meteorites Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	UHT will not engage in LEAM carrier carry socket.	1. Try to engage second UHT in carry socket. 2. If UHT engagement fails, remove manually by grasping back support structure or tool bracket.
2.	Astromate pull pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force with hammer or break pin. 3. If unsuccessful, use hammer to break bracket. 4. If Astromate connector cannot be released, abandon LEAM deployment.
3.	Astromate connector will not come out of stowage assembly.	1. Apply additional force. 2. Obtain assistance from second crewman. 3. If unsuccessful, use hammer to break bracket. 4. If Astromate connector cannot be removed from stowage assembly, abandon LEAM deployment. 5. If Astromate connector is partially deployed, but is hung up, ensure that cable reel is free of stowage bracket.
4.	Astromate connector falls to lunar surface.	Retrieve connector with UHT handle.
5.	Astromate connector dust cover cannot be removed.	1. Apply additional force and twist whole dust cover. 2. Obtain assistance from second crewman.

4.2.7 Lunar Ejecta and Meteorites Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
6.	Astromate connector will not engage and lock.	1. Check connector for proper orientation and, if not oriented properly, reorient connector and attempt to re-engage connector. 2. Check connectors on cable and Central Station for debris and, if debris is visible, remove or shake out debris and attempt to re-engage connector. 3. Check connectors on cable and Central Station for bent pins and, if bent pins are visible, notify MCC and attempt to force re-engagement of connector. 4. If Astromate connector cannot be mated to Central Station, abandon LEAM deployment.
7.	Astromate connector locking lever will not rotate and lock.	1. Check connector for proper orientation. 2. Check connector on cable and Central Station for debris and bent pins. 3. Verify that locking lever is in unlocked position. 4. Reconnect.
8.	Astromate connector engages, but falls off when subpackage is rotated.	1. Return subpackage to vertical position, retrieve cable, remove any debris, remate connectors, and ensure locking lever is fully rotated. 2. If Astromate connector will not stay mated to Central Station, abandon LEAM deployment.
9.	UHT will not engage in LEAM carry socket.	1. Try to engage second UHT in socket. 2. If UHT engagement fails, deploy manually.
10.	LEAM dust cover pull ring fails.	1. Manually peel off dust cover. 2. Request aid of second crewman.

4.2 ALSEP SITE ACTIVITIES

4.2.7 Lunar Ejecta and Meteorites Experiment (Continued)

EVENT NO.	CONTINGENCY	ACTION
11.	Crewman walks too far and jerks Central Station.	1. Carry experiment back toward Central Station to provide sufficient slack cable and continue deployment of LEAM. 2. Check cable and connectors at experiment and Central Station interfaces for partial disconnect and for visible signs of damage. Reconnect if necessary and notify MCC if there are visible signs of damage. Check LSG, LMS, and Central Station leveling and alignment, and relevel, realign and notify MCC if experiments or Central Station were disturbed.
12.	Unable to deploy LEAM 8 meters southeast of Central Station due to presence of craters, boulders, etc.	1. Locate LEAM as far from Central Station, RTG and other experiment sites as LEAM cable will permit and keep RTG out of LEAM sensors field-of-view. 2. Deploy LEAM north or east of planned location, but remember that east and west sensors require a free 120° field-of-view with the look angle of the east sensor aligned 25° north or east.
13.	LEAM carry socket pin jams.	1. Apply additional force while rotating pin. 2. If unsuccessful, deploy manually.
14.	LEAM carry socket does not rotate or lock.	1. Apply additional force in an attempt to rotate socket. 2. If unsuccessful in attempt to rotate socket or socket will not lock, deploy manually.
15.	LEAM leg/gnomon release lanyard breaks.	1. Attempt to release legs and gnomon by grasping any remaining lanyard. 2. Manually release velcro to deploy gnomon and release pin to deploy legs.

4.2.7 Lunar Ejecta and Meteorites Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
16.	One leg (or more) fails to deploy, to lock or leg(s) collapse.	1. Apply additional force manually to achieve complete leg deployment or ensure locking. NOTE Do not exert any pressure or force on the removable covers over the sensors. 2. Drag defective leg in the lunar soil to bind it in the extended position. 3. If unsuccessful, fold all legs into stored configuration and set LEAM upon a nearby rock or an array of smaller rocks sufficiently high to isolate the experiment from the lunar soil. Allow adequate room for the deployed dust covers (to avoid sensor shielding).
17.	Gnomon fails to self-deploy.	Deploy gnomon manually.
18.	The bubble level or sun compass is damaged or degraded.	Visually level the upper horizontal edges of the LEAM with the lunar horizons; align LEAM west sensor axis toward LSPE Geophone Module; and ensure ample photo coverage is obtained to verify experiment orientation.
19.	Gnomon fails to remain in vertical position.	1. Forcefully bend or remove gnomon as necessary. 2. Align LEAM west sensor axis toward LSPE Geophone Module. 3. Ensure ample photo coverage is obtained to verify experiment orientation. Include the full shadow (as feasible) of LEAM in photographs.

4.2 ALSEP SITE ACTIVITIES

4.2.8 Central Station

EVENT NO.	CONTINGENCY	ACTION
1.	Central Station sunshield binds.	1. Ensure all Boyd bolts have been released. 2. Use UHT to ensure that Boyd bolts have been sprung upward. 3. Check to see if thermistor cable, curtain covers or thermal curtains are jammed, or if ALSEP antenna cable or LSPE Remote Antenna cable is clear of sunshield and release them with UHT handle, if required. 4. Engage UHT in Central Station temporary stowage socket and use UHT as a lever to raise sunshield. 5. If unsuccessful, use UHT handle in an attempt to pry sunshield upward. 6. If guy wire is preventing sunshield extension, attempt to free the guy wire if it is entangled or caught. 7. If guy wire cannot be freed, fail the tufbraid in order to permit sunshield extension. 8. If unsuccessful, use hammer to jar or break sunshield free, if site of resistance to deployment can be located. 9. If sunshield cannot be deployed, leave sunshield in stowed condition.
2.	CS sunshield not fully deployed.	1. Verify guy wires are taut. 2. If front extender cannot be fully extended, gently press downward on rear of sunshield to level sunshield and increase size of opening, front side of Central Station. NOTE Do not press downward on front of sunshield since Central Station thermal control would be degraded.

4.2 ALSEP SITE ACTIVITIES

4.2.8 Central Station (Continued)

EVENT NO.	CONTINGENCY	ACTION
3.	RF antenna cable reel lanyard breaks or pin jams.	1. Use handle of UHT to hook restraining brackets. Bend or break restraining brackets off the sunshield. 2. Deploy cable using UHT.
4.	Aiming mechanism housing will not come off subpallet.	1. Verify Boyd bolts have been released. 2. Use second UHT. 3. Force rotation of UHT to strip Boyd bolt threads. 4. If unsuccessful, use hammer to break housing off mounting legs to gain access to aiming mechanism. 5. If unable to gain access to aiming mechanism, mount antenna on Central Station sunshield and point toward earth.
5.	Antenna mast pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force with hammer or break pin. 3. If unsuccessful, use hammer to break bracket. 4. If still unsuccessful, place aiming mechanism and antenna on sunshield and prop up for stability and to ensure assembly is level.
6.	Antenna mast support pin jams.	1. Apply additional force while rotating pin. 2. Apply additional force with hammer or break pin. 3. If unsuccessful, use hammer to break bracket. 4. If still unsuccessful, abandon Central Station sunshield deployment.

4.2.8 Central Station (Continued)

EVENT NO.	CONTINGENCY	ACTION
6.	Antenna mast support pin jams. (Concluded)	5. Adjust Central Station as required, in real time, to achieve good communication.
7.	Antenna restraining arm will not rotate.	1. Ensure Boyd bolt has been released 2. Use UHT to ensure that Boyd bolt has been sprung upward. 3. If unsuccessful, use UHT handle to force antenna restraining arm rotation. 4. If still unsuccessful, use hammer to pry antenna free or break bracket. 5. If unsuccessful in attempt to gain access to ALSEP antenna, abandon effort and continue Central Station sunshield deployment. 6. Adjust Central Station as required, in real time, to achieve good communication.
8.	Antenna mast does not lock when extended.	1. Apply additional force. 2. Obtain assistance from second crewman. 3. If unsuccessful to lock sections, place aiming mechanism and antenna on sunshield and prop up for stability and to ensure assembly is level. 4. Adjust antenna as required in real time to achieve good communication.
9.	Side thermal curtain cover cannot be removed.	Use UHT handle to bend or break side thermal curtain cover.
10.	Velcro tabs on side curtains will not mate or match up properly.	1. Run UHT between mating surfaces to release Velcro and attempt to reattach Velcro properly. 2. If unsuccessful in attempt to mate or match up Velcro properly, continue nominal ALSEP deployment sequence.

4.2 ALSEP SITE ACTIVITIES

4.2.8 Central Station (Concluded)

EVENT NO.	CONTINGENCY	ACTION
11.	Aiming mechanism will not seat on antenna mast.	1. Examine antenna mast for obstruction. 2. If aiming mechanism is partially seated and stable, continue with nominal deployment. 3. Examine antenna mast for damage. If damaged, mount aiming mechanism and antenna on sunshield. 4. Adjust antenna as required in real time to achieve good communication.
12.	Antenna will not seat on aiming mechanism.	1. Ensure cable outlet is properly oriented. 2. Check for obstructions. 3. If antenna is partially but firmly seated on aiming mechanism, continue with nominal deployment. 4. Examine antenna and aiming mechanism for damage. If damaged, mount antenna on sunshield and adjust as required in real time.

4.2 ALSEP SITE ACTIVITIES

4.2.9 ALSEP Activation

EVENT NO.	CONTINGENCY	ACTION
1.	Central Station Contingency antenna alignment.	1. Point antenna in general direction of earth. 2. Adjust antenna pointing angle in small increments. 3. Perform required offsets under MCC direction.
2.	ALSEP signal is not received or is not functioning properly.	1. Verify antenna is properly oriented, Central Station is properly leveled and aligned, and RF cable and connectors are intact. 2. Notify crew to turn Switch #1 CW to "RESET" and then return to "PWR." 3. If ammeter indicates a non-zero reading, disconnect shorting plug from the RTG cable and connect RTG cable connector to Central Station. 4. Notify crew to adjust antenna pointing angle in small increments. 5. Request data through a site with 85-foot antenna. 6. Select "Low Bit Rate." 7. If visible signs of damage and ALSEP signal is still not received, abandon ALSEP.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.1 SEP Offload	
1.	Receiver retaining pins jam.	1. Apply additional force on pin with hammer. 2. Pry retainer bracket away far enough to gain access to receiver. 3. Break off bracket where pin is jammed using hammer.
2.	Release lanyard breaks.	1. Grasp receiver carry handle and attempt to pull lanyard to release pins. 2. If not enough lanyard to grasp, attempt to pry retainer pins out with hammer or available tools. 3. If unsuccessful, proceed as outlined in Event 1 above.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.2 SEP Receiver Deployment	
1.	Top Lock Pins fail to engage receiver.	1. Use pip pin lanyard loop around LRV post extension and under pallet mounting bracket. 2. Verify bottom bracket is fully seated. 3. Check holes for obstruction.
2.	Receiver antenna lanyard(s) break on attempt at deployment.	1. Verify retention pin has been removed. Use available tools to remove pin if necessary. 2. Verify antenna cable is free to move into mast during mast extension. 3. Grasp each half of the mast to extend mast sections to full deployment. 4. Grasp antenna loop assembly around the end cluster and carefully withdraw the loop assembly to full deployment. 5. Deploy loop structure by moving center sliding structure with fingers towards the top of the antenna until loops are fully deployed.
3.	Antenna mast will not seat on post.	1. Insure cable outlet is properly oriented. 2. Examine antenna mast for obstructions. 3. If antenna is partially but firmly seated on bracket, continue with normal deployment. 4. If unsuccessful, mount antenna in one of the tool carrier holes on the tool pallet.
4.	Receiver antenna loop breaks.	1. Photograph broken area and report condition to MCC. 2. Insure that remainder of antenna is properly extended. NOTE If possible, secure loose end of broken wire so it does not interfere with remainder of antenna.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.2 SEP Receiver Deployment (Continued)	
5.	Lanyard breaks on Nav. data cable plug dust cover.	1. Insure engagement ring is open. 2. Pull on remaining lanyard. 3. Pry dust cover out with available tools.
6.	Nav. data cable plug fails to seat in socket.	1. Insure engagement ring is open. 2. Examine cable plug and socket for obstructions. 3. Reconnect, applying additional pressure on the flange assembly. 4. If unsuccessful, crew should report Nav. data readout from the LRV approximately every 1/2 Km. 5. Crew should attempt to maintain a constant LRV speed and a straight line traverse during the first 300 meters of each EVA.
7.	LRV Nav. data fails or is turned off.	1. Crew should report time of stops, time of starts, and speed of LRV during traverse. 2. Crew should attempt to maintain a constant LRV speed and a straight line traverse during the first 300 meters of each EVA.
8.	Receiver temperature indication off nominal (Critical off nominal temperature TBD).	1. Additional temperature readings as requested by MCC may be required. 2. Additional OSR's may have to be uncovered for rest period. 3. Check dust conditions and dust OSR surfaces if necessary. NOTE Due to exact status of temperature and when in EVA it occurs, MCC will have to supply specific instructions.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.2 SEP Receiver Deployment (Concluded)	
9.	Receiver box does not open for DSEA removal.	1. Rip thermal blanket as necessary to expose door section. 2. Pry door section with tool or hit with hammer to open.
10.	DSEA connector does not come off nominally.	1. Pull DSEA release lanyard. 2. Pull DSEA from receiver with connector attached. 3. Attempt to work connector off with hands or pry with available tools. 4. Attempt to break or cut cable.
11.	DSEA inaccessible due to AFT pallet not opening.	1. If possible, fold up CDR seat and have crewman gain access to DSEA from CDR seat position. 2. If unsuccessful, remove Receiver from LRV and retrieve DSEA.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.3 SEP Transmitter Deployment	
1.	Transmitter leg(s) do not deploy.	1. If leg(s) have not been deployed, leave in stowed configuration and deploy transmitter directly on surface. 2. If other leg(s) have been deployed, apply additional force manually to achieve complete leg deployment or ensure locking. 3. If unsuccessful, place side of transmitter with defected leg upon or against a nearby rock or an array of smaller rocks sufficiently high enough to allow leveling and alignment of the instrument. 4. Level and align as necessary.
2.	Antenna wire binds in reels.	1. Inspect for trouble. 2. Manually grasp wire and reel and pull wire out of reel. 3. If unsuccessful, place reel on surface and continue deployment of remaining antennas. 4. Document position shots graphically and report to MCC.
3.	Reel becomes detached from end of antenna wire.	1. Place wire in straight line position. 2. If wire will not stay in position, place object on end of wire to weight down and deploy as nominal. 3. Document area by photography.
4.	Unable to deploy antennas at 90° due to obstructions.	1. Position the antenna wire within ± 10 degrees of nominal deployment to avoid boulders or craters greater than 10m. 2. Document actual orientation. NOTE The antenna should be in a straight line.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Continued)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.3 SEP Transmitter Deployment (Concluded)	
5.	Unable to avoid craters less than 10m in diameter.	1. If crater is less than 2 feet in depth, continue deployment. 2. Insure that antenna wire is not suspended across crater rims greater than 2 feet in depth. 3. If possible, place antenna wire on rim of crater or outside crater area but within ± 10 degrees of nominal deployment line.
6.	Antenna wire breaks.	1. Inspect for nature of problem and report nature of break to MCC. 2. If feasible, strip insulation and reconnect wire by twisting. 3. Document location of break with photography. 4. Continue deployment of remaining antennas.
7.	Solar panel is dropped.	1. Inspect for dust conditions and report. 2. Clean panel and replace in slot.
8.	Solar panel does not engage mounting pins.	1. Attempt to engage one side at a time. 2. Alternate side and attempt to engage. 3. If only one side mounts nominally, rest other side in place and unfold solar panel carefully.
9.	Transmitter is overturned.	1. Restore transmitter to upright position. 2. Check solar panel for mounting and dust conditions and clean if necessary.
10.	Nav. system has failed or no visible tracks for antenna layout.	1. Layout antenna in orthogonal direction using visual clues with as much accuracy as possible. 2. Add pan camera shots from center of array to document antenna leg orientation.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.1 Surface Electrical Properties (Concluded)

EVENT NO.	CONTINGENCY	ACTION
	4.3.1.4 EVA Operations	
1.	LRV Failure.	1. If failure occurs at beginning of traverse, attempt to plan a walking traverse within 300m of transmitter, recover DSEA tape, and return to LM. 2. If failure occurs during traverse and too late to plan a walking traverse close by, retrieve the DSEA if data has been gathered for return to LM. NOTE Reference Section 1.0 for detail of walking traverse.
2.	Thermal blanket tears during OSR covering or uncovering.	1. Report condition to MCC. 2. Continue flap operation as normally as possible. 3. After LRV travel,check OSR dust conditions, report to MCC, dust if necessary.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.2 Neutron Flux Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	Unable to deploy Neutron Probe 25 meters from RTG.	Deploy Neutron Probe as far from the RTG as possible and behind boulders if possible.
2.	Unable to deploy Neutron Probe on EVA-1.	1. Maintain thermal protective cover around Neutron Probe until time of actual deployment. Place Probe in shaded area if possible. 2. Deploy Neutron Probe as soon as possible during EVA-2. NOTE Cover exposed section with thermal bag, assuring that thermal cover completely covers all exposed areas of the Probe.
3.	Probe will not go in core hole or core hole not available.	1. If power head is operating, use to drive lower section of Probe into surface. Attach upper section and attempt to drive remainder of Probe length into surface utilizing the power head. NOTE The Probe lower section must be in the ON position before driving into surface. 2. If power head is not available, insert Probe lower section into a hole made by a double or triple core tube and use hammer to drive the lower section into surface.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.2 Neutron Flux Experiment (Concluded)

EVENT NO.	CONTINGENCY	ACTION
4.	Probe lower section only in surface.	1. Remove upper section. 2. Place thermal protection cover over exposed end of lower section. 3. Turn on upper section and place in core stem bag. 4. Place upper section on lunar surface in shade of boulder throughout lunar stay time. NOTE Cover exposed sections with thermal bag, assuring that the thermal cover completely covers all exposed areas of the Probe section.
5.	Unable to retrieve Neutron Probe by hand.	1. Use core extractor to remove Neutron Probe. 2. If unsuccessful, disconnect upper section of Probe and attempt to remove from surface.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.3 Traverse Gravimeter Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	TG temperature indication off nominal.	1. If temperature indicator (the eighth digit) is displaying a reading ≥ 6 before EVA, place the TG in shade of LM with the radiators open. Do not take on EVA if reading stays above 6. 2. If reading ≥ 6 during traverse, place TG in standby, open radiators and shade TG if possible. Discontinue operations for remainder of EVA. 3. If temperature indicator (the eighth digit) is displaying a reading ≥ 5, open radiators and place TG in shade, if possible. Continue normal operations.
2.	Phase lock loop failure	NOTE A predictable number* will result if the phase lock loop does not capture. Should the phase lock loop not capture, press the Gravity and read button simultaneously.
3.	First three display numbers indicate zero's.	Go into by-pass mode of operation by pressing the Gravity and read button simultaneously. NOTE The read button should not be depressed more than twice in successive 18-second intervals. If a third reading is required, wait at least two minutes before pressing button.
4.	Level/measure light flashes.	If the level/measure light flashes and then goes out without having been on standby, the TG needs to be placed on a more level location (within 15° of horizontal). *610 xxx xxx OR 730 xxx xxx

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.4 Cosmic Ray Experiment

EVENT NO.	CONTINGENCY	ACTION
1.	Quad I of LM in sun or no hook available to hang shade slide on.	Place shade part in MESA cavity with detectors pointing away from LM. NOTE Maximum sun exposure of shade part is 60 seconds.
2.	Cosmic Ray Experiment dropped on surface.	Hit edge of experiment against LM strut or other solid object to remove as much dust as possible. NOTE Do not brush detector surfaces.
3.	Experiment stowage bag not available to place experiment in at end of exposure time.	Place experiment in whatever bag is available to cover as much of experiment as possible and place in ETB or Sample Collection Bag for return.
4.	Solar Flare occurs before deployment.	Continue normal deployment.
5.	Solar Flare occurs after experiment is deployed.	Retrieve experiment as soon as possible.
6.	Unable to separate the Cosmic Ray plates.	Hang the Cosmic Ray Experiment in the sun with the windows on the face of the experiment toward the sun.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.5 Core Sample (Drill)

EVENT NO.	CONTINGENCY	ACTION
1.	Core sections do not engage at male/female connections.	1. Check axial alignment. 2. Inspect male joint for foreign material. 3. Add new stem section and repeat steps 1 and 2. 4. If unsuccessful in mating by hand, use wrench or power head for additional torque.
2.	Power head spindle binds on male end of core stem after drilling.	1. Extract core with power head attached by using the alternate extractor method of laying the treadle beside the stem instead of placing it over the stem. 2. Use the vise/wrench at the LRV to separate the core stems. a. Remove bottom three core stems as usual. b. Remove the next two stems together and cap. c. Leave top stem attached to power head and discard.
3.	Core stems do not disengage at male/female connections.	1. Bypass failed joint and disengage at next male/female connection. 2. Tap core stem joint with hammer.
4.	Wrench fails to grip the core stem.	1. Use second crewman to hold stem if still in drilling operation. 2. If drilling is completed, use LRV vise and treadle locking pawl to separate stems.
5.	Vise fails to grip core stem.	Use wrench and treadle locking pawl at the LRV to separate stems.
6.	Extractor stroke is excessively short.	1. Insure core puller is engaging stem. 2. Attempt to use extractor to get stem started out of the ground and then use second crewman to lift it the rest of the way.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.5 Core Sample (Drill) (Concluded)

EVENT NO.	CONTINGENCY	ACTION
7.	Reconnection of core stem after subsurface decoupling.	Carefully insert the emplacement tool into the hole to serve as an alignment mandrel. Place core stem over emplacement tool and carefully lower stem section into subsurface and recouple core stem sections.

4.3 LUNAR SURFACE EXPERIMENTS (NON-ALSEP)

4.3.6 Lunar Surface Handtools

EVENT NO.	CONTINGENCY	ACTION
1.	UHT cannot be attached to Yo-Yo or Yo-Yo has failed.	1. Engage UHT in subpackage, subpallet, or experiment UHT sockets, as required, for temporary stowage. 2. If not in ALSEP area, place UHT on LRV for stowage. NOTE Do not place UHT in lunar soil because soil may foul the UHT balls.

4.4 EMU Malfunction Procedures

This section provides the actual Extravehicular Mobility Unit malfunction procedures that are included in each of the six lunar surface crew cuff check lists flown on Apollo 17.

EMU MALFUNCTIONS

M1

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)

MALF

11-8-72

EMU 1,2

EMU 3
EMU 4

EMU 3: O2 Flag-O, Tone-On

Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
 PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

M2

MALF 11-8-72

M3

MALF 11-8-72

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
 Ver TM For Subl Restart Or Aux
 H2O Act: Subl Restart: Prim H2O
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H2O - Open,
 Wait 4 Min Or H2O Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H2O Act: Diverter-MIN, Aux
 H2O - Open, Wait 4 Min Or H2O
 Flag Off, Diverter As Desrd
 (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H2O Depletion:
 (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
 Prim H2O - Open, Wait 4 Min Or
 H2O Flag Off, Diverter As Desrd

EMU 3

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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 H2O-Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O-Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
If TM Does Not Ver Subl Brkthru: (H2O Press Sw Fail or H2O Blocked Or Depleted)
If Prim Or Aux H2O-Clsd: Diverter-MIN, Prim & Aux H2O Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

EMU 4A / EMU 5 — M4 — MALF — 11-8-72

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 O2 Qty, If > Than Normal Decr Rate: OPS-ON (O2 Flag Fail & EMU Leak)
If No Tone & TM Confirms Low H2O Press (H2O Flag Failed & H2O Sys Problem-Go To EMU 4 If PRIM In Use,Or 4A If AUX In Use)
If TM H2O Press Good (Transient Cond Or Tone Fail)

M5 — MALF — 11-8-72 — EMU 5 / EMU 4A

M6 MALF 11-8-72

EMU 6: Cuff Gage <3.7, (All Other Indicators OK)

OPS-On

<u>If Cuff Gage Increase</u>,
 (PLSS Reg Shift)

<u>If No Gage Increase</u>,
 Ver TM >3.7, OPS - Off
 (Cuff Gage Fail)

EMU 7: PLSS O2 Qty Ind Abnormal

Ck Cuff Gage Or O2 Flag-O

<u>If Cuff Gage >4.0</u>, OPS-On,
 PLSS O2-Off (PLSS Reg Fail)

<u>If Cuff Gage <3.7 Or O2 Flag-O</u>,
 OPS-On (Leak)

<u>If No Apparent Failure</u>, Ver TM
 (Ind Or X-ducer Fail Or Leak)

M7 MALF 11-8-72

EMU 8: Cuff Gage >4.0

<u>If O2 Flag-O Or PLSS O2 Decr</u>,
 OPS-On, PLSS O2-Off
 (PLSS Reg Fail)

<u>If Neither</u>, Ver TM (Gage Fail)

EMU 9: Loss Of Pump Noise

<u>If No Side Tone</u>, OPS-On,
 Purge Vlv-LO, Act. BSLSS
 (Power Fail) [If No BSLSS,
 OPS-On, Purge Vlv-Hi]

<u>If Sidetone OK</u>, Ver Pump-On. If
 Add'l Cooling Reqd, Act. BSLSS
 (Pump Fail) [If No BSLSS,
 OPS-On, Purge Vlv-Hi]

EMU 10: Cooling Inadequate

Ver Diverter-MAX & Pump-On
Ver Prim & (If On Aux) Aux H2O Open: If Open, Act. Gas Trap 5 Sec, Wait 3 Min, If Add'l Cooling Reqd, Act. BSLSS (Flow Restr, Subl Or Pump Degrd, Or Heat Leak) [If No BSLSS, OPS-On, Purge Vlv-Hi]
Ver TM For Aux H2O Act: Diverter MIN, Aux H2O-Open, Wait 4 Min, Diverter As Desrd (Prim H2O Depletion)
If Prim Or (If On Aux) Aux H2O Clsd: Diverter-MIN, Prim & (If On Aux) Aux H2O-Open, Wait 4 Min, Diverter As Desrd (H2O Flag Fail)

EMU 10
EMU 11, LCRU

N8 MALF 11-8-72

N9 MALF 11-8-72

EMU 11: Loss Of Voice Comm (LMP)

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 MSFN:
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)

EMU 11, LCRU
EMU 10

BSLSS Don And Activate

1 Unstow BSLSS
2 Conn Tether Between Crewmen:
  BSLSS H2O Flow Divider At Good
  PLSS, Good PLSS On RH Side
3 Remove Dust Cover From BSLSS
  H2O Flow Divider
4 Discon Good PLSS H2O From PGA
5 Conn BSLSS H2O Flow Divider To
  PGA With Good PLSS
6 Failed PLSS Pump-Off
7 Discon Failed PLSS H2O From
  PGA & Secure
8 Discon BSLSS H2O From BSLSS
  H2O Flow Divider
9 Conn BSLSS H2O To PGA With
  Failed PLSS
10 Conn Good PLSS H2O To BSLSS
  H2O Flow Divider

BSLSS-DON
BSLSS-DOFF

M10 MALF 11-8-72

BSLSS Doff

1 Discon BSLSS From Failed PLSS
  PGA
2 Discon Tether From Both PGA's
3 Discon PLSS H2O From BSLSS
4 Discon BSLSS From PGA & Discard
5 Conn Good PLSS H2O To PGA
6 Ingress LM

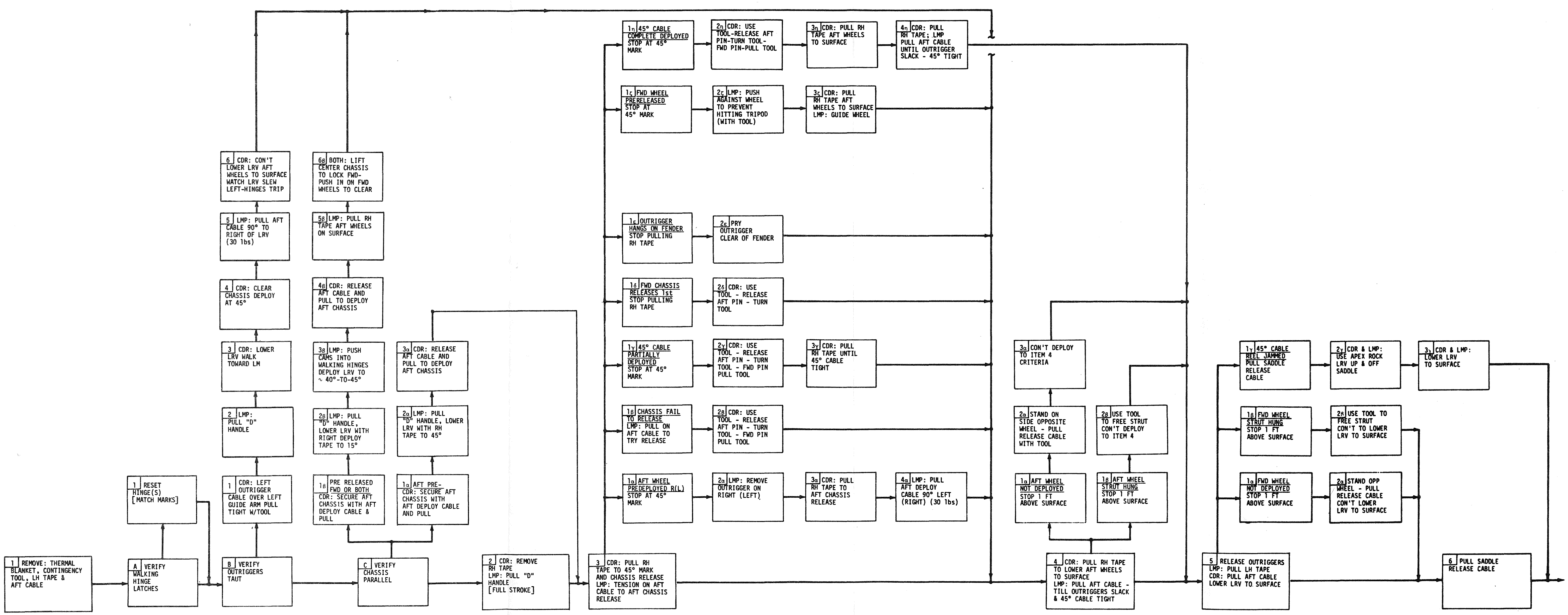
M11 MALF 11-8-72

BSLSS-DON

4.5 LRV Deployment Malfunction Logic

The LRV Malfunction Procedure Logic Diagram, Figure 4.5-1, is intended as a technique to follow the step-by-step deployment of the LRV. The normal procedure is given in the sequences of horizontal blocks at the bottom of the page. Any problem detected during the deployment is corrected by moving vertically on the figure through the malfunction procedure. The normal procedure is re-entered, after correcting the condition, at the appropriate point and is continued to completion.

FIGURE 4.5-1 LRV MALFUNCTIONS PROCEDURES LOGIC DIAGRAM



REFERENCES

1. Mission Requirements: SA-512/CSM-114/LM-12, J-3 Type Mission--Lunar Landing. MSC-05180, Rev. B dtd 18 Sept 1972

2. Final Flight Mission Rules: Apollo 17, MSC-01807, dtd Sept. 1, 1972

3. Apollo 17 Operational Cameras: Facts-Do's-Don'ts, CD42-A-980, dtd Jan 20, 1972, revised 10/30/72 (Change C)

4. Final Flight Plan, Apollo 17, dtd Oct. 23, 1972

December 1, 1972

ERRATA AND CORRECTION PACKAGE FOR VOL 1

APOLLO 17 FINAL LUNAR SURFACE PROCEDURES

INSTRUCTIONS

1. Make corrections to document as listed in Attachment 1
2. Some copies of the document are missing pages 75 through 82. These pages are provided, should they be needed, in Attachment 2.
3. The cuff check list pages provided in the document, were, in some cases, changed after the document went to press. The final "as flown" cuff check lists with the changes marked are provided in Attachment 3.

R. Koppa

R. J. Koppa

Document Manager

ATTACHMENT 1

Document Corrections

PAGE	TIME	CORRECTION
63	1+10	"BOTH CAMERAS" should be "LMP CAMERA"
65	1+34	
	1+36	"FIT" should be "FTT"
	1+38	
75	3+15	"3' BEHIND" should be "10' SOUTH"
	3+26	"PLUG" should be "CAP"
	3+28	ADD for LMP "PHOTO HFE E HOLE 11' DNSUN"
94	6+31	(VOICE DATA) ADD "(1) Capcom - position TV lens downsun and pitch down"
115	0+21	"BLANKET A" should be "BLANKET A & B"
	0+24	"4 MAGS" should be "5 MAGS"
117	0+45	"PART PAN" should be "PART STEREO PAN"
	0+46	"SSE" should be "SSD"
152	6+30	(VOICE DATA) ADD "(1) Capcom - position TV lens downsun and pitch down"
153	6+33	"4 MAGS" should be " 5 MAGS (DIJKB)"
	6+34	ADD for LMP "500 CAM MAG"
175	0+23	"BLANKET A" should be "BLANKET A & B"
209	6+03	"H = 240" should be "H = 270"
	6+08	"5 CB" should be "SCB 8"
		ADD for CDR "PLACE SCB 7 ON + Z PAD"
	6+05	DELETE for LMP "PUT LMP CAM & MAPS ON CDR SEAT"
		ADD for LMP "PUT LMP CAM ON FOOTPAN" "DUMP UNUSED EQUIPMENT" "PUT SCB 7 ON GATE"

PAGE	TIME	CORRECTION
211	6+10	"SAMPLER" should be "SAMPLES"
	6+11	CHANGE for LMP "HANG BIG BAG TO LADDER HOOK" to "PLACE BIG BAG ON + Z PAD"
	6+16	ADD for LMP "TAKE ETB TO LM, HANG ON MESA TABLE"
	6+17	ADD for LMP "COLLECT CONTAMINATED SAMPLE UNDER LM"
	6+18	ADD for LMP "DOUBLE BAG & PLACE IN BIG ROCK BAG"
	6+19	DELETE for LMP "TAKE ETB TO LM, HOOK TO LEC"
213	6+31	DELETE "BAG SECTIONS IN THERMAL BAG"
215	6+51	DELETE "SHUT OFF TGE"

ATTACHMENT 2

Pages 75 - 82

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

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION 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 ROTATE DRILL CCW TO REMOVE FROM CORE STEM			
TURN AND PHOTO GEOPHONE 2					
TURN & PHOTO GEOPHONE 4					
MOVE 25 FT SE, PHOTO GEOPHONES 2 & 3 TURN AND PHOTO GEOPHONE 1 TURN AND PHOTO GEOPHONE 4 TAKE PAN 3' BEHIND GEOPHONE 3		REMOVE WRENCH SET DRILL ASIDE DEEP CORE RECOVER GET CAPS FROM RACK, PLUG TOP GET TREADLE & NEUTRON FLUX PROBE FROM LRV, ALSC 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 PHOTO HFE 11' DNSUN PHOTO HFE ELECT, 7' XSUN PHOTO HFE ELECT, 3' XSUN SOUTH PHOTO HFE E.HOLE, 7' XSUN STEREO TO SOUTH		PLUG BIT END OF CORE STEM → RAM LAY STRING AGAINST RACK CONFIG NEUTRON FLUX ACTIVATE LOWER SECTION HANG CAP ON RACK MATE LOWER TO UPPER SECTION			
	3+30	ACTIVATE UPPER SECTION			

STC/CPD-0681 NASA — MSC

EVA 1

3+30

CORE CAP
PHOTOS

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

CDR-22 EVA1 11-1-72

(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		

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

LMP-26 EVA1 11-1-72

(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

GEO PREP
SEP PREP

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

CDR-24 EVA1 11-1-72

(1) CDR - SCB ________ 2 on LMP PLSS

3+50

MISSION: APOLLO 17 DATE: NOV. '72

EVA: 1

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	L C R U / V	TASK FUNCTION LMP	TASK FUNCTION 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 20 DSBD (SCB 1) TO EACH CAM			
MOUNT MAP HOLDER - CONFIG MAPS					
		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			

CDR-25 EVA1 11-1-72

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

NAV INITIALIZE

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

SEP XMTR DEPLOY PREP
Get core stems
Walk to LM
NAV INIT
Lay core stems on +Z struts
• Shade
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

EVA 1

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 DATE: NOV. '72
EVA: 1

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION 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 PLACE CORE STEMS ON +Z STRUTS		READ HEADING, SSD, PITCH, ROLL VERIFY BEARING, RANGE = 0			
UNSTOW SEP TRANSMITTER		TORQUE GYRO TO HOU UPDATE			
CARRY SEP XMTR TO DEPLOY SITE >100 M E OF LM		SEP XMTR DEPLOY SITE 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 RESET NAV SYSTEM			
PLACE XMTR ON SURFACE					
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				

EVA 1

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 BARJFA

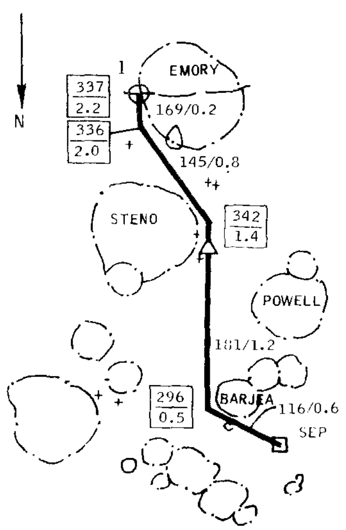
340/1.2 EP 6
- Partial pan

342/1.3 STENO rim, blocks
340/1.6 hi pt - sta 1 view
339/1.8 poss view N wall cone
336/2.0 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

11-1-72



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

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 BARJFA

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

LMP-29 EVA1 11-1-72

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 DATE: NOV. '72
EVA: 1

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LRV	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+10				
PHOTO APPROACH CHECK EP DISPLAY 'SAFE' PULL 3 PINS (DISCARD PINS)		PHOTO APPROACH			
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				

VOICE DATA

11-1-72 EVA1 CDR-29

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

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		

4+40

(1) CDR/LMP - RAKE SAMPLE:

ROCKS BAG# ________

____

SOIL BAG# ________

____

4+50

ATTACHMENT 3

"As Flown" Cuff Check Lists

CREW CUFF CHECK LISTS

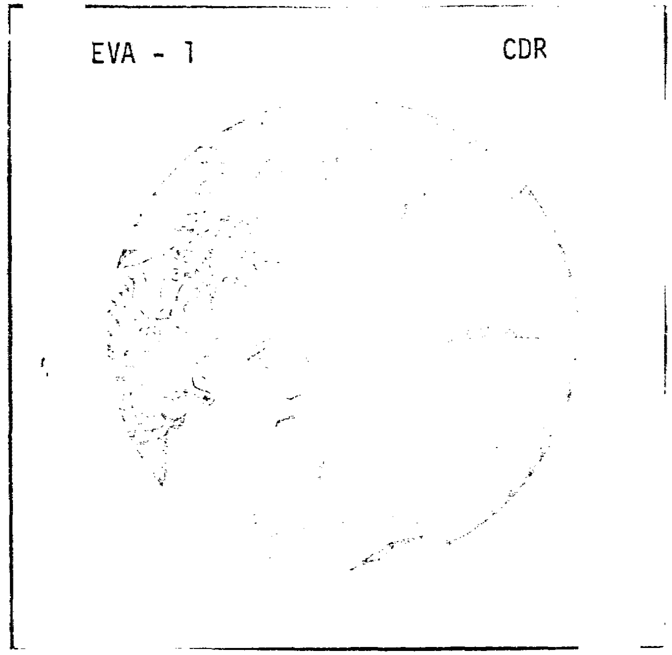
The following pages provide the final "as flown" crew cuff check lists for all three EVA's. Changes to the check lists that occurred after publication of the final Lunar Surface Procedures Document for Apollo 17, dated November 6, 1972, are indicated by black bars in the margins. The mode of change is shown by crossing out the affected words or data and inserting the corrections if the change was done by pen and ink, and by different typed words or data if the change was done prior to printing the cuff check list for flight. Please make the appropriate changes in your copy of the Lunar Surface Procedures Document.

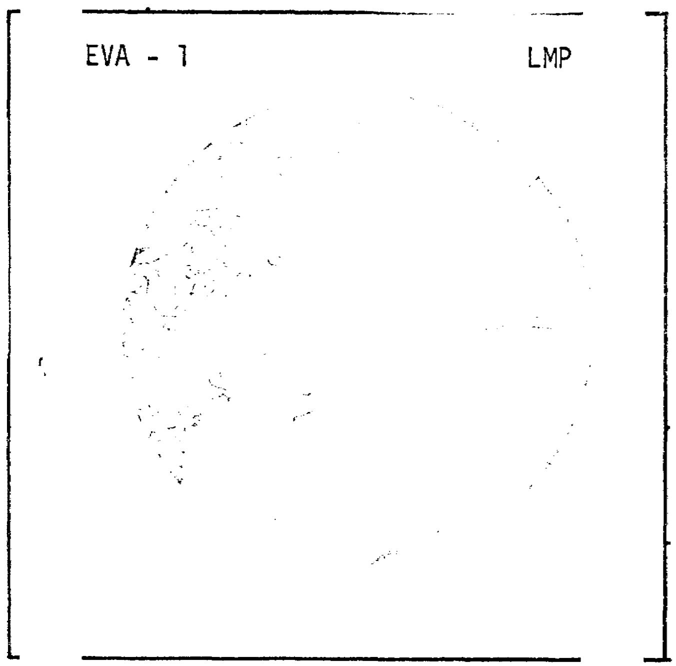
The pages of the cuff check lists are depicted as bound onto the cuff check list assembly, the CDR's at the top of each page, the LMP's on the bottom (except where the CDR and LMP pages are identical).

These pages were made from the actual masters used to print the flight cuff check lists by Xerography on Chronapaque.

FINAL CREW CUFF CHECK LIST

EVA 1


EVA - 1
CDR


EVA - 1
LMP

EVA 1 CDR

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

Dan A. Bland, Jr.

D.A.Bland, Jr.

RVBlevins

R.V.Blevins

JGO

Approved by:

R.G.Zedekar

R.G.Zedekar

Gene Cernan

Capt. Eugene Cernan, CDR

RJK

CDR-3 EVA1 11-1-72

PLSS

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 LMP

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

Dan A. Bland Jr.

D.A.Bland, Jr.

RV Blevins

R.V.Blevins

JGO

Approved by:

R.G.Zedekar

R.G.Zedekar

H.H. Schmitt

H.H.Schmitt, LMP

RJK

LMP-3 -EVA1 11-1-72

PLSS

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 -

LM AREA MAP

LM AREA MAP

BLANK

LM AREA MAP

LM AREA MAP

BLANK

DEPRESS | LRV OFF

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

CDR-6 EVA1 11-1-72

CDR-7 EVA1 11-1-72

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

DEPRESS | LRV OFF

DEPRESS | LRV OFF

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)

LMP-6 EVA1 11-1-72

LMP-7 EVA1 11-1-72

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

DEPRESS | LRV OFF

LRV SET-UP / TEST DRIVE

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

CDR-8 EVA1 11-1-72

CDR-9 EVA1 11-1-72

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 -

LRV SET-UP / TEST DRIVE

LRV SET-UP / LRV AFT

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

LMP-8 EVA1 11-1-72

LMP-9 EVA1 11-1-72

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 -

LRV SET-UP / LRF AFT

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

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

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

CDR-12 EVA1 11-1-72

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)

EXPTS OFF
SRC, FLAG

CDR-13 EVA1 11-1-72

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
Stow cam under CDR seat
Deploy Cosmic Ray (if desired)
- Shade first
- Bag to LRV bay

EXPT PALLET OFFLOAD

FLAG
ALSEP OFF

LMP-12 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-13 EVA1 11-1-72

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

CDR-14 EVA1 11-1-72

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

ALSEP TRAV

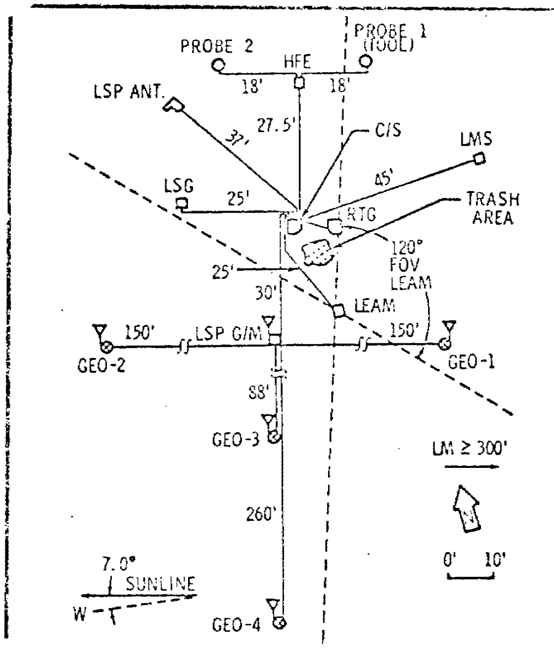
1+40 TRAVERSE TO ALSEP SITE
Select ALSEP site
  ~ 300' W of LM
  ~ 80' S of deep core
Place ALSEP on surface,
  C/S-South

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

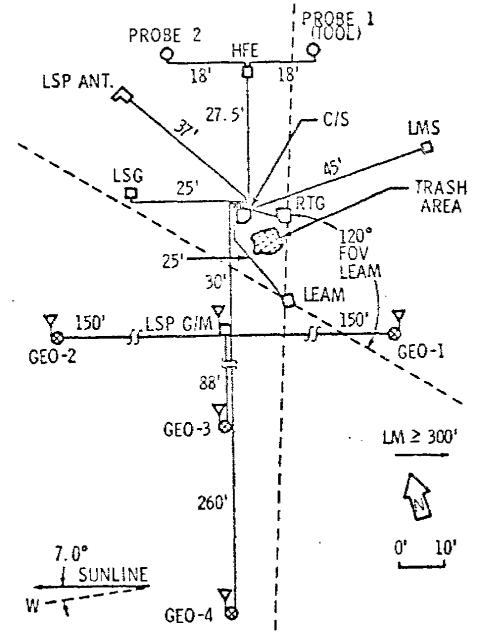
LMP-14 EVA1 11-1-72

LMP-15 EVA1 11-1-72



ALSEP

ALSEP HFE



CDR-16 EVA1 11-1-72

CDR-17 EVA1 11-1-72

1+50 HFE DEPLOY
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

TGE - READ -
Assemble Drill

HFE ALSEP

RTG LSG,G/M

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

LMP-16 EVA1 11-1-72

LMP-17 EVA1 11-1-72

1+58 LSG DEPLOY
Remove BB's IN ORDER [HFE
- Knock BB's off LSG
Carry LSG 25'W of C/S
Extend & tilt sunshield to 20°
Level & align
Uncage Gimbal

2+04 LSP GEOPHONE MOD DEPLOY
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

CDR-18 | EVA1 | 11-1-72

HFE

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

CDR-19 | EVA1 | 11-1-72

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

HFE

LMP-18 | EVA1 | 11-1-72

LMS | C/S

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

LMP-19 | 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

LMS | C/S

2/2

CDR-20 EVA1 11-1-72

DEEP CORE / N. FLUX

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-21 EVA1 11-1-72

N. FLUX / DEEP CORE

3+13 DEEP CORE RECOVER
Get from LRV:
•Treadle
•N. Flux
•Rammer
TGE - GRAV -
Jack to treadle
Ram top plug
Extract stem
Cap ~~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

LMP-20 EVA1 11-1-72

C/S ANT / LEAM, LSP

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

LMP-21 EVA1 11-1-72

LEAM, LSP / C/S ANT

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

CORE CAP
PHOTOS

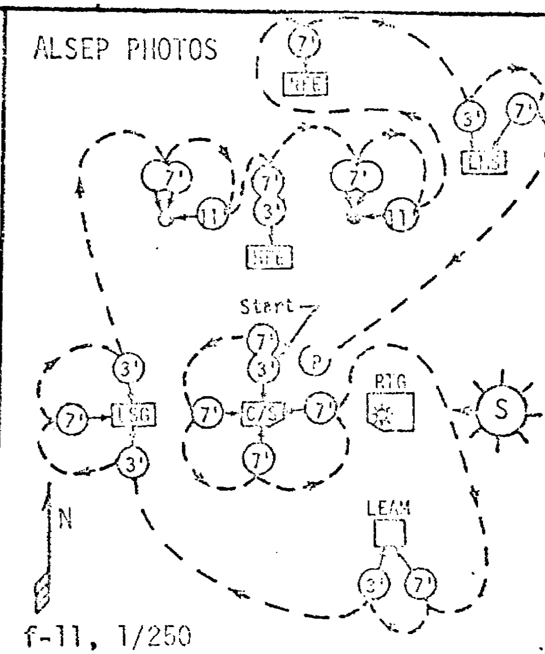
CDR-22 EVA1 11-1-72

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

CDR-23 EVA1 11-1-72

CORE CAP



GEOPHONES
GEO PHOTO

LMP-22 EVA1 11-1-72

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-23 EVA1 11-1-72

GEOPHONES

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 [DEEP CORE
Get flag
Deploy Geo 4 260'S
Embed Geo & anchor w/flag

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

GEO PREP / SEP PREP

CDR-24 — 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
GNOMON

CDR-25 — EVA1 — 11-1-72

3+52 LRV NAV INIT [WALK LM

Mode sw - 1 - (PM1/WB)
TV cam
+15 vdc sw - PRIM -

NAV INITIALIZE

3+57 ALSEP TO SEP SITE VIA LM

Drive to LM - Rpt:
- Bearing, Dist., Range

Drive to SEP site [WALK TO DEPLOY SITE
- (>100m E)

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

NAV: RESET then OFF [GET EP 6

LGA = 150

SEP PREP / GEO PREP

ALSEP PHOTOS

LMP-24 — EVA1 — 11-1-72

Activate LSPE enable sw

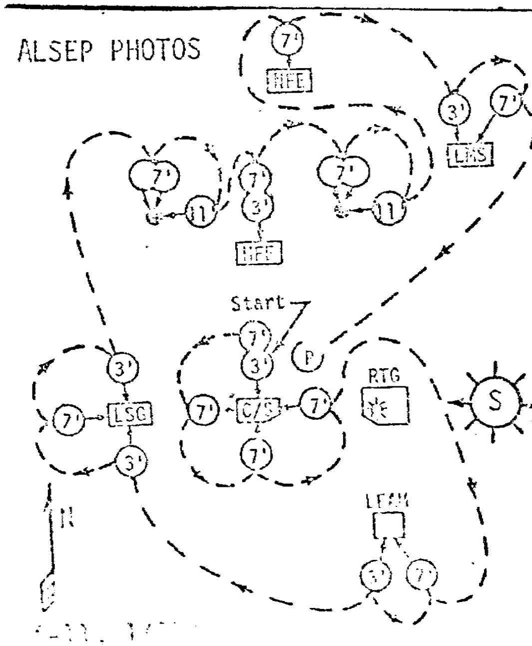
3+19 Take ALSEP Photos

Gnomon to LRV
Place LMP cam on CDR seat
Stow sampler

If CDR drilling:
- Assist with N. Flux
- Assist with core capping

LMP-25 — EVA1 — 11-1-72

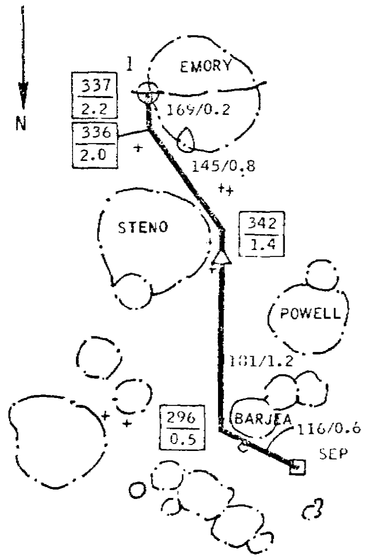
ALSEP PHOTOS



ALSEP PHOTOS

3-16

TRAV TO STA 1



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

CDR-26 EVA1 11-1-72

CDR-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

GEO PREP
SEP PREP

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

LMP-26 EVA1 11-1-72

LMP-27 EVA1 11-1-72

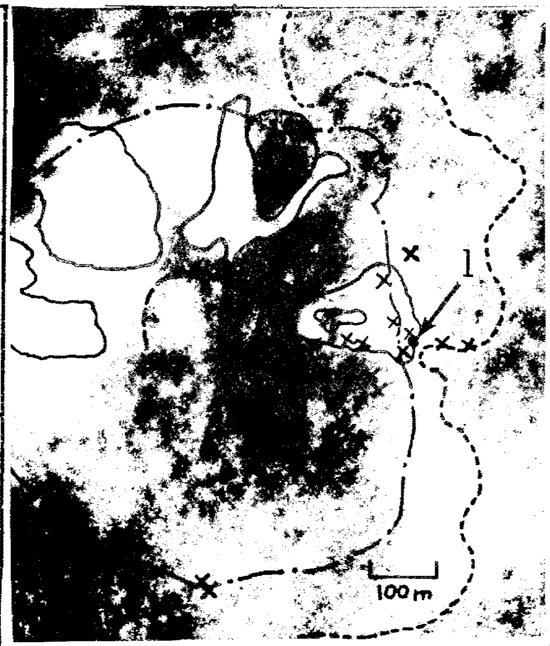
3+53 SEP XMTR DEPLOY PREP
Get core stems [NAV
Walk to LM [INIT
Lay core stems on +Z struts
- Shade

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

STA 1 MAP



CDR-28 EVA1 11-1-72

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 - (Ke) btw blk,relate blks
- (Soil spl on blk top)

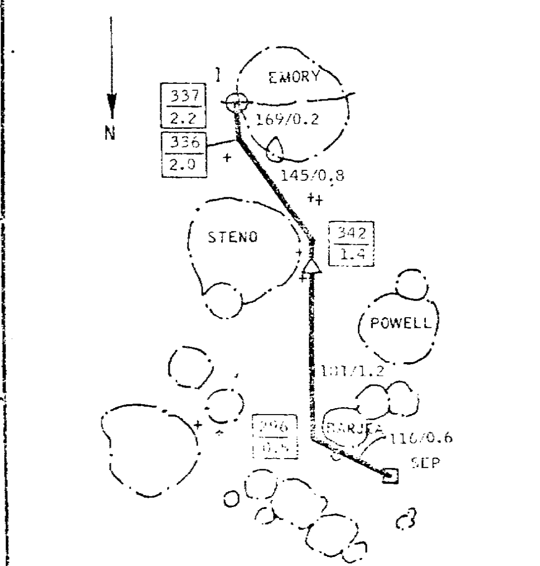
CONTACTS
- Trench - sequence
- Dbl core - in youngest

VERY DARK	DARK
• Rake	• Doc spl
• Doc spl	

PANS

STA 1

TRAV TO STA 1



HISTORICAL SEQUENCE OF DARK MANTLE ... CHARACTER ... PLAINS MAT'L

LMP-28 EVA1 11-1-72

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 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

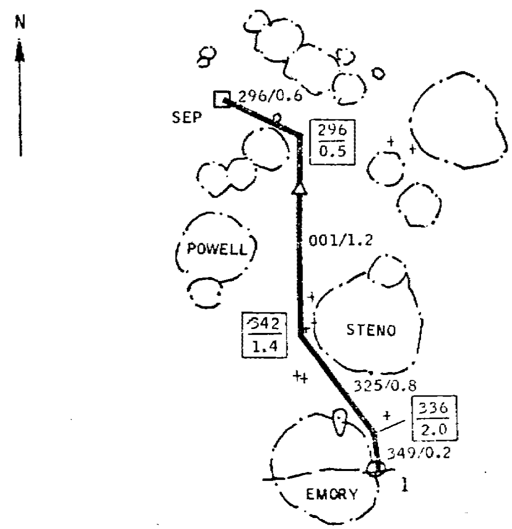
4+29 337/2.2 STA 1 (66 min)
Park - E rim hi pt, H = 180

STOP

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

TRAV TO STA 1

TRAV TO SEP



CDR-30 EVA1 11-1-72

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 -(PM1/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

STA 1 MAP

SAME AS CDR-30

LMP-30 EVA1 11-1-72

LMP-31 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	DARK
• Rake	• Doc spl
• Doc spl	

PANS

STA 1

SEP XMTR

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

CDR-32 EVA 1 11-1-72

CDR-33 EVA 1 11-1-72

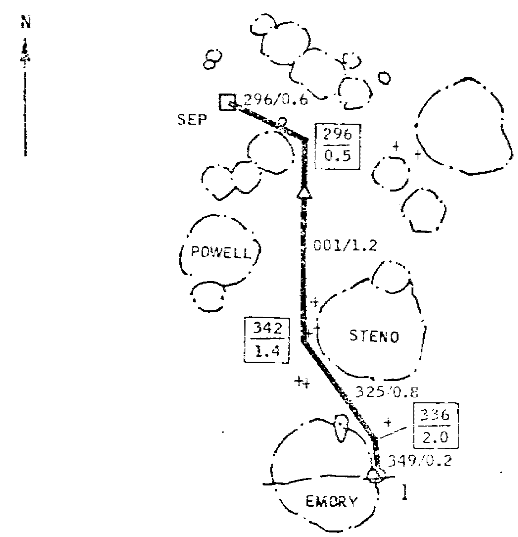
6+05 SEP XMTR DEPLOY
Deploy reel #1 E
Photograph ant, Xmtr & LMP
•f11, 74', 1/250
Deploy reel #3 S
Photograph ant, Xmtr & LMP
•f8, 74', 1/250
Take locator photo to LM

TGE - READ -

TRAV TO LM

SEP XMTR

TRAV TO SEP



LMP-32 EVA 1 11-1-72

LMP-33 EVA1 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 -(PM1/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

CLOSEOUT

6+20 EVA 1 CLOSEOUT

Park LRV 30' NW of MESA,
H = 012

[STOP] + Volts

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

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

SCB 2 to +Z pad

CDR-34 EVA 1 11-1-72

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

SEP XMTR CLOSEOUT

5+58 SEP XMTR DEPLOY

Dismount at SEP Xmtr
Get LRV Splr ~~LMP cam under LMP seat~~
Describe location, [TRACK
prominent features [LAYOUT
Walk to track crossing w/Xmtr
Release ant reel retainers
Align diagonals, shadow-
graph 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

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

EMU

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

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

EMU

LMP-37 EVA1 11-1-72

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

16mm Cam - OFF - & repos
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

EMU

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-0, 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)

EMU 1,2 | EMU 3

CDR-38 EVA 1 11-1-72

CDR-39 EVA 1 11-1-72

EMU 3: O2 Flag-0, Tone-On
Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

EMU 1,2 | EMU 3

EMU

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-0, 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)

EMU 1,2 | EMU 3

LMP-38 EVA1 11-1-72

LMP-39 EVA1 11-1-72

EMU 3: O2 Flag-0, Tone-On
Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

EMU 1,2 | EMU 3

EMU 4
EMU 4A

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
 Ver TM For Subl Restart Or Aux
 H2O Act: Subl Restart: Prim H2O
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H2O - Open,
 Wait 4 Min Or H2O Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H2O Act: Diverter-MIN, Aux
 H2O - Open, Wait 4 Min Or H2O
 Flag Off, Diverter As Desrd
 (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H2O Depletion:
 (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
 Prim H2O - Open, Wait 4 Min Or
 H2O Flag Off, Diverter As Desrd

CDR-40 EVA 1 11-1-72

CDR-41 EVA 1 11-1-72

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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
 H2O-Clsd, Diverter-MAX, Wait 5
 Min, Diverter-MIN, Prim H2O-
 Open, Wait 4 Min Or H2O Flag
 Off, Diverter As Desrd
 (Subl Brkthru)
If TM Does Not Ver Subl Brkthru:
 (H2O Press Sw Fail or H2O Blocked
 Or Depleted)
If Prim Or Aux H2O-Clsd:
Diverter-MIN, Prim & Aux H2O
Open, Wait 4 Min Or H2O Flag
Off, Diverter As Desrd

EMU 4
EMU 4A

EMU 4
EMU 4A

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
 Ver TM For Subl Restart Or Aux
 H2O Act: Subl Restart: Prim H2O
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H2O - Open,
 Wait 4 Min Or H2O Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H2O Act: Diverter-MIN, Aux
 H2O - Open, Wait 4 Min Or H2O
 Flag Off, Diverter As Desrd
 (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H2O Depletion:
 (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
 Prim H2O - Open, Wait 4 Min Or
 H2O Flag Off, Diverter As Desrd

LMP-40 EVA1 11-1-72

LMP-41 EVA1 11-1-72

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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
 H2O-Clsd, Diverter-MAX, Wait 5
 Min, Diverter-MIN, Prim H2O-
 Open, Wait 4 Min Or H2O Flag
 Off, Diverter As Desrd
 (Subl Brkthru)
If TM Does Not Ver Subl Brkthru:
 (H2O Press sw Fail or H2O Blocked
 Or Depleted)
If Prim Or Aux H2O-Clsd:
 Diverter-MIN, Prim & Aux H2O
 Open, Wait 4 Min or H2O Flag
 Off, Diverter As Desrd

EMU 4
EMU 4A

EMU

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-0, 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)

EMU 1,2 EMU 3

CDR-38 EVA 1 11-1-72

CDR-39 EVA 1 11-1-72

EMU 3: 02 Flag-0, 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

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-0, 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)

EMU 1,2 EMU 3

LMP-38 EVA1 11-1-72

LMP-39 EVA1 11-1-72

EMU 3: 02 Flag-0, 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

CDR-40 EVA 1 11-1-72

EMU 4 | EMU 4A

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
 Ver TM For Subl Restart Or Aux
 H2O Act: Subl Restart: Prim H2O
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H2O - Open,
 Wait 4 Min Or H2O Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H2O Act: Diverter-MIN, Aux
 H2O - Open, Wait 4 Min Or H2O
 Flag Off, Diverter As Desrd
 (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H2O Depletion:
 (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
 Prim H2O - Open, Wait 4 Min Or
 H2O Flag Off, Diverter As Desrd

CDR-41 EVA 1 11-1-72

EMU 4 | EMU 4A

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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
 H2O-Clsd, Diverter-MAX, Wait 5
 Min, Diverter-MIN, Prim H2O-
 Open, Wait 4 Min Or H2O Flag
 Off, Diverter As Desrd
 (Subl Brkthru)
If TM Does Not Ver Subl Brkthru:
 (H2O Press Sw Fail or H2O Blocked
 Or Depleted)
If Prim Or Aux H2O-Clsd:
Diverter-MIN, Prim & Aux H2O
Open, Wait 4 Min Or H2O Flag
Off, Diverter As Desrd

LMP-40 EVA1 11-1-72

EMU 4 | EMU 4A

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
 Ver TM For Subl Restart Or Aux
 H2O Act: Subl Restart: Prim H2O
 Clsd, Diverter-MAX, Wait 5 Min,
 Diverter-MIN, Prim H2O - Open,
 Wait 4 Min Or H2O Flag Off,
 Diverter As Desrd (Subl Brkthru)
 Aux H2O Act: Diverter-MIN, Aux
 H2O - Open, Wait 4 Min Or H2O
 Flag Off, Diverter As Desrd
 (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
 Or Prim H2O Depletion:
 (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
 BSLSS (Subl Degrd) If No BSLSS,
 OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
 Prim H2O - Open, Wait 4 Min Or
 H2O Flag Off, Diverter As Desrd

LMP-41 EVA1 11-1-72

EMU 4 | EMU 4A

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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
 H2O-Clsd, Diverter-MAX, Wait 5
 Min, Diverter-MIN, Prim H2O-
 Open, Wait 4 Min Or H2O Flag
 Off, Diverter As Desrd
 (Subl Brkthru)
If TM Does Not Ver Subl Brkthru:
 (H2O Press sw Fail or H2O Blocked
 Or Depleted)
If Prim Or Aux H2O-Clsd:
 Diverter-MIN, Prim & Aux H2O
 Open, Wait 4 Min or H2O Flag
 Off, Diverter As Desrd

EMU

EMU MALFUNCTIONS

EMU 1 EMU 1,2 EMU 3

CDR-38 EVA 1 11-1-72

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-39 EVA 1 11-1-72

EMU 3: O2 Flag-O, Tone-On
Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

EMU 1,2 EMU 3

EMU

EMU MALFUNCTIONS

EMU 1,2 EMU 3

LMP-38 EVA1 11-1-72

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)

LMP-39 EVA1 11-1-72

EMU 3: O2 Flag-O, Tone-On
Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

EMU 1,2 EMU 3

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
Ver TM For Subl Restart Or Aux H2O Act: Subl Restart: Prim H2O Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
Aux H2O Act: Diverter-MIN, Aux H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru Or Prim H2O Depletion: (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act. BSLSS (Subl Degrd) If No BSLSS, OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

EMU 4 / EMU 4A — CDR-40 — EVA 1 — 11-1-72

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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 H2O-Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O-Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
If TM Does Not Ver Subl Brkthru: (H2O Press Sw Fail or H2O Blocked Or Depleted)
If Prim Or Aux H2O-Clsd: Diverter-MIN, Prim & Aux H2O Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

CDR-41 — EVA 1 — 11-1-72 — EMU 4 / EMU 4A

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
Ver TM For Subl Restart Or Aux H2O Act: Subl Restart: Prim H2O Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
Aux H2O Act: Diverter-MIN, Aux H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru Or Prim H2O Depletion: (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act. BSLSS (Subl Degrd) If No BSLSS, OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

EMU 4 / EMU 4A — LMP-40 — EVA1 — 11-1-72

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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 H2O-Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O-Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
If TM Does Not Ver Subl Brkthru: (H2O Press sw Fail or H2O Blocked Or Depleted)
If Prim Or Aux H2O-Clsd: Diverter-MIN, Prim & Aux H2O Open, Wait 4 Min or H2O Flag Off, Diverter As Desrd

LMP-41 — EVA1 — 11-1-72 — EMU 4 / EMU 4A

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)

EMU 5 | EMU 6,7

CDR-42 EVA 1 11-1-72

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)

CDR-43 EVA 1 11-1-72

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)

EMU 5 | EMU 6,7

LMP-42 EVA1 11-1-72

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)

LMP-43 EVA1 11-1-72

EMU 5 | EMU 6,7

EMU 8,9 EMU 10

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-44 EVA 1 11-1-72

CDR-45 EVA 1 11-1-72

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 Degrd, 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)

EMU 10 EMU 8,9

EMU 8,9 EMU 10

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]

LMP-44 EVA1 11-1-72

LMP-45 EVA1 11-1-72

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 Degrd, 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)

EMU 10 EMU 8,9

EMU11, 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~~ MSFN:
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-46 EVA 1 11-1-72

CDR-47 EVA 1 11-1-72

BSLSS Don And Activate

1 Unstow BSLSS
2 Conn Tether Between Crewmen:
BSLSS H2O Flow Divider At Good
PLSS, Good PLSS On RH Side
3 Remove Dust Cover From BSLSS
H2O Flow Divider
4 Discon Good PLSS H2O From PGA
5 Conn BSLSS H2O Flow Divider To
PGA With Good PLSS
6 Failed PLSS Pump-Off
7 Discon Failed PLSS H2O From
PGA & Secure
8 Discon BSLSS H2O From BSLSS
H2O Flow Divider
9 Conn BSLSS H2O To PGA With
Failed PLSS
10 Conn Good PLSS H2O To BSLSS
H2O Flow Divider

EMU11, LCRU
BSLSS

EMU11, 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

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perform EMU 11.
If no comm with ~~STDN~~ MSFN:
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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)

LMP-46 EVA1 11-1-72

LMP-47 EVA1 11-1-72

BSLSS Don And Activate

1 Unstow BSLSS
2 Conn Tether Between Crewmen:
BSLSS H2O Flow Divider At Good
PLSS, Good PLSS On RH Side
3 Remove Dust Cover From BSLSS
H2O Flow Divider
4 Discon Good PLSS H2O From PGA
5 Conn BSLSS H2O Flow Divider To
PGA With Good PLSS
6 Failed PLSS Pump-Off
7 Discon Failed PLSS H2O From
PGA & Secure
8 Discon BSLSS H2O From BSLSS
H2O Flow Divider
9 Conn BSLSS H2O To PGA With
Failed PLSS
10 Conn Good PLSS H2O To BSLSS
H2O Flow Divider

BSLSS
EMU11, LCRU

BSLSS Doff

1 Discon BSLSS From Failed PLSS
  PGA
2 Discon Tether From Both PGA's
3 Discon PLSS H2O From BSLSS
4 Discon BSLSS From PGA & Discard
5 Conn Good PLSS H2O To PGA
6 Ingress LM

BSLSS

CDR-48 EVA 1 11-1-72

BSLSS Doff

1 Discon BSLSS From Failed PLSS
  PGA
2 Discon Tether From Both PGA's
3 Discon PLSS H2O From BSLSS
4 Discon BSLSS From PGA & Discard
5 Conn Good PLSS H2O To PGA
6 Ingress LM

BSLSS

LMP-48 EVA1 11-1-72

FINAL CREW CUFF CHECK LIST

EVA 2

EVA - 2 CDR

EVA - 2 LMP

EVA 2 CDR

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

R.V.Blevins

D.A Bland, Jr.

Approved by:

R.G.Zedekar

Capt. Eugene Cernan, CDR

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

EVA 2 LMP

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

R.V.Blevins

D.A.Bland, Jr.

Approved by:

R.G.Zedekar

H.H.Schmitt, LMP

LMP-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

CDR-2 EVA-2 11-8-72

LM AREA MAP

LM AREA MAP

LM AREA MAP

BLANK

LMP-2 EVA-2 11-8-72

LM AREA MAP

LM AREA MAP

LMP-3 EVA-2 11-8-72

LM AREA MAP

BLANK

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

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

CDR-5 EVA-2 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
Close hatch
[LCRU/TV
Deploy PLSS ants (CDR/LMP)

LMP-4 EVA-2 11-8-72

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

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

LMP-5 EVA-2 11-8-72

TRAV PREP
SEP TRAV

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

CDR-6 EVA-2 11-8-72

CDR-7 EVA-2 11-8-72

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

SEP TRAV
TRAV PREP

TRAV PREP
SEP TRAV

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

LMP-6 EVA-2 11-8-72

LMP-7 EVA-2 11-8-72

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

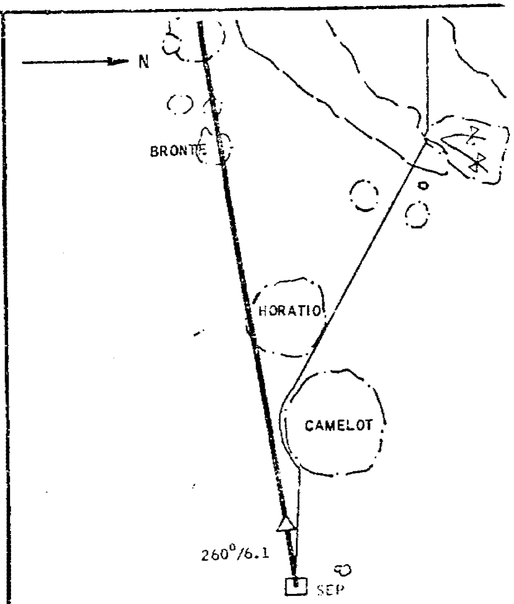
Photo LRV/SEP:
- Stereo part pan x-sun 50'
- Rcvr dn-sun 7'

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

Get EP 4

SEP TRAV
TRAV PREP

TRAV STA 2



CDR-8 EVA-2 11-8-72

CDR-9 EVA-2 11-8-72

NAV INITIALIZE

LGA = 240

0+52 TRAV TO STA 2-~~66~~70min (260/8.4)
Δ 080/0.4 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

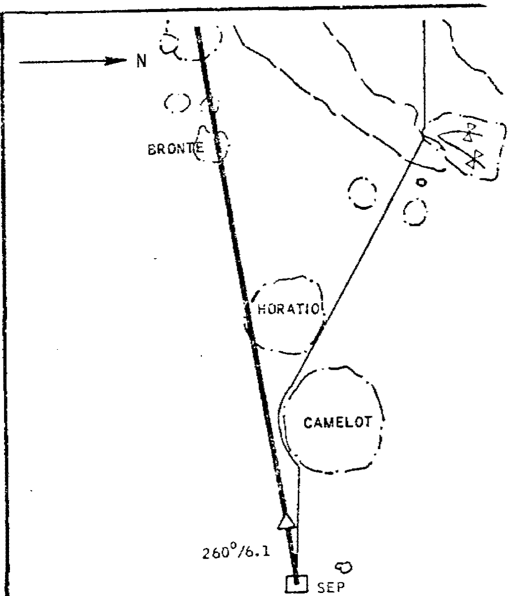
080/3.9 LRV spl - 1st lt mtl

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

080/4.2 LRV spl - dk mtl

TRAV STA 2

TRAV STA 2



LMP-8 EVA-2 11-8-72

LMP-9 EVA-2 11-8-72

0+52 TRAV TO STA 2-70min (260/8.4)
LRV Photos

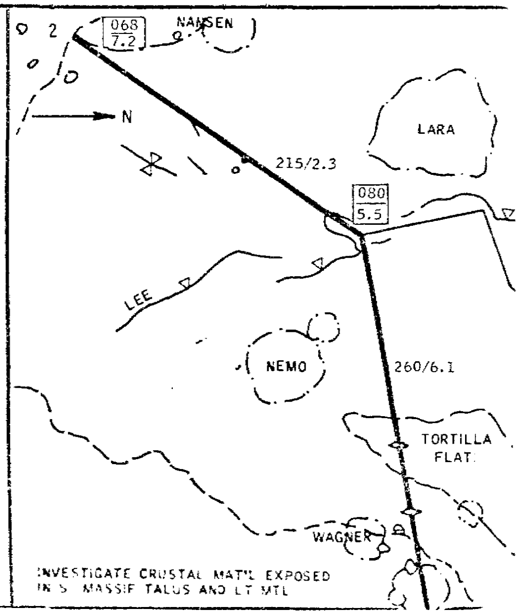
Δ 080/0.4 EP 4 - part pan
(0.2 W ALSEP)
•Mtl - variatn,dynam,pat gnd
•Cra - strat, sources
080/1.1 View Sta 5
080/1.5 HORATIO - subflr

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



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

CDR-10 EVA-2 11-8-72

LMP - CDR-11 EVA-2 11-8-72

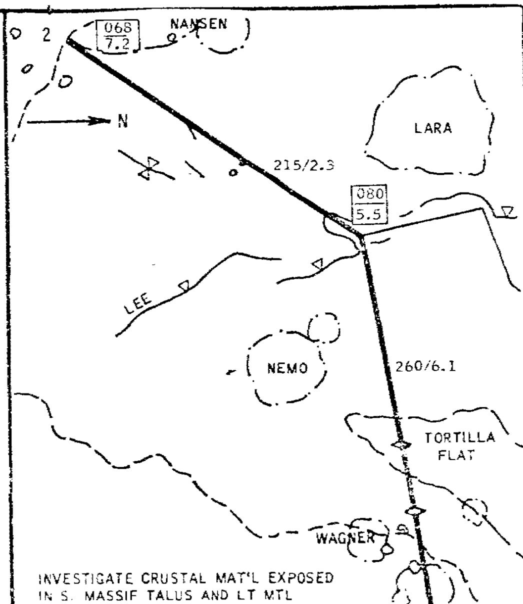
TRAV STA 2

•Lt Mtl - terminis, dynam,reg
•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

2+02 068/7.2 STA 2 (50 MIN)
Park MASSIF-NANSEN corner
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/rake
/scoop
TGE - GRAV -

TRAV STA 2



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

LMP-10 EVA-2 11-8-72

STA 2

CDR-12 LMP EVA-2 11-8-72

CDR-13 LMP EVA-2 11-8-72

STA 2 (50 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

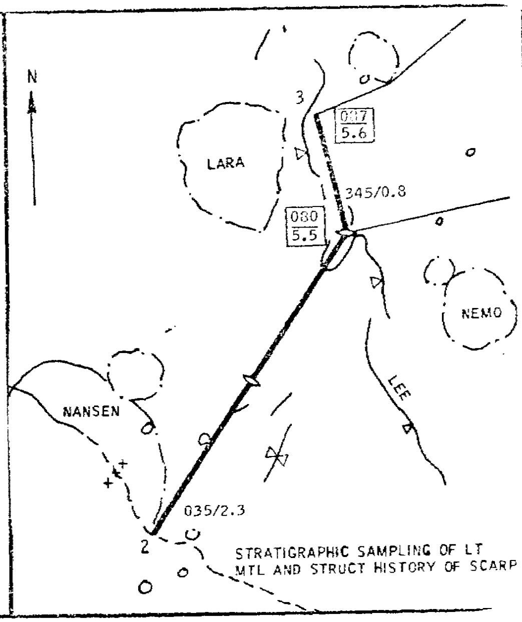
Lt Mtl
- Rake - btw cra
- Doc spl - frag/soil variety

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

Sum - MASSIF

STA 2

TRAV STA 3



11-8-72 EVA-2 LMP · CDR-14

11-8-72 EVA-2 LMP CDR-15

STA 2 CLOSEOUT
TGE - READ -
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 035 (frame,tools)

2+52 TRAV TO STA 3-27min (035/3.1)
•Lt Mtl - variatn, dynam
073/6.3 LRV spl
080/5.5 LRV spl LGA = 345
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

TRAV STA 3

ME AS CDR

STA 3

EVA-2 LMP- CDR-16

11-8-72

EVA-2 LMP CDR-17

11-8-72

STA 3 (45 MIN) 087/5.6

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

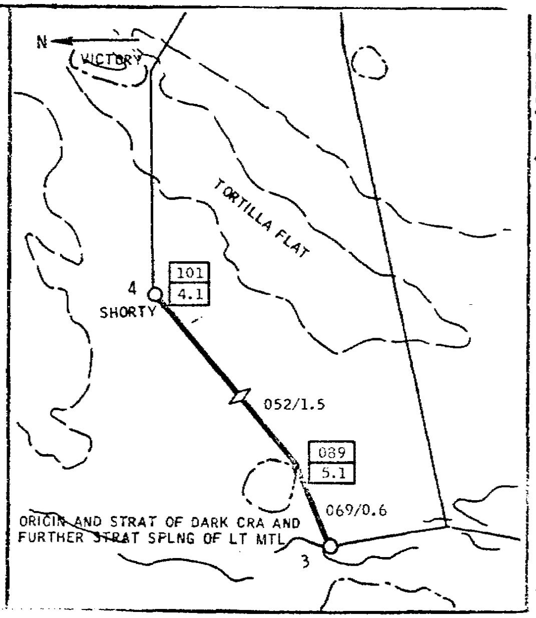
Lt Mtl (20m brt cra)
- •Doc spl - rim, variety
- •Rake - btw cra
- •CDR: Dbl core-long can near scarp

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

Pans

STA 3

TRAV STA 4



11-8-72 EVA-2 LMP-CDR-18

11-8-72 EVA-2 LMP CDR-19

STA 3 CLOSEOUT
TGE - READ -
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 060 (frame,tools)

4+04 TRAV TO STA 4-17min (069/2.1)
- Lt Mtl - variatn, dynam
- N. MASSIF - organ

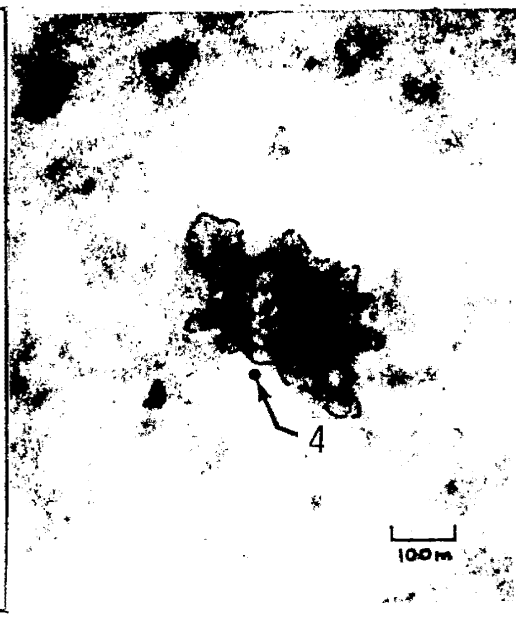
094/4.7 LRV spl
095/4.6 High point

4+21 101/4.1 STA 4 (40 MIN)
Park S. edge SHORTY blanket
H=045 $\boxed{\text{STOP}}$
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr
rake/scoop
Polar filter (1/125)
TGE - GRAV -

TRAV STA 4

SAME AS CDR

STA 4



EVA-2 LMP CDR-20 11-8-72

EVA-2 LMP CDR-21 11-8-72

STA 4 (~~41~~ 40 MIN) 101/4.1

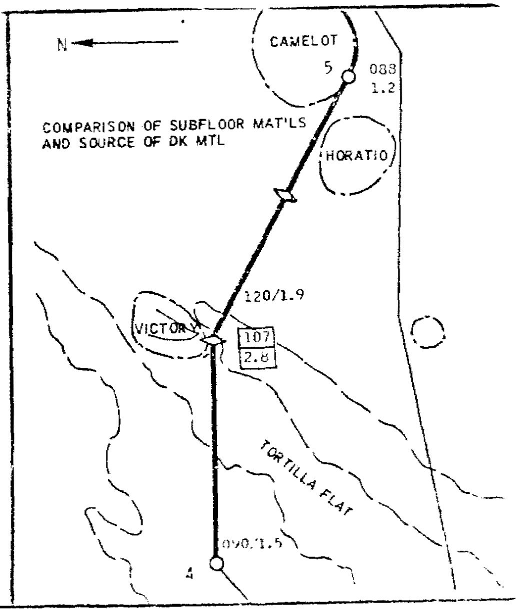
OBSERVATION
- Blnkt - radial variatn
- SHORTY - wall, flr struct
- LINCOLN Scarp - forms
- Misc - xeno, alter

Dk Cra
- Doc spl - rim
- LMP: Pan - cra rim, scarp
  - Polar - WESSEX, S MASSIF (000-080; 130-210)
    - Remove filter 1/250
  - 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

STA 4

TRAV STA 5



11-8-72 EVA-2 LMP CDR-22

11-8-72 EVA-2 LMP CDR-23

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

5+01 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

TRAV STA 5

VICTORY
TRAV STA 5

CDR-24 LMP EVA-2 11-8-72

CDR-25 LMP EVA-2 11-8-72

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 (30 MIN)
Park S. rim CAMELOT
H=045 STOP
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/rake
TGE - GRAV - /scoop

TRAV STA 5
VICTORY

STA 5

CDR-26 LMP- EVA-2 11-8-72

CDR-27 LMP 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

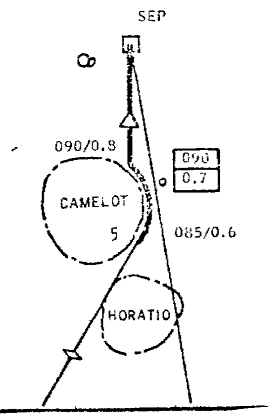
Pans
- •Stereo of CAMELOT

STA 5

343

SAME AS CDR

TRAV LM



CDR-28 EVA-2 11-8-72

CDR-29 EVA-2 11-8-72

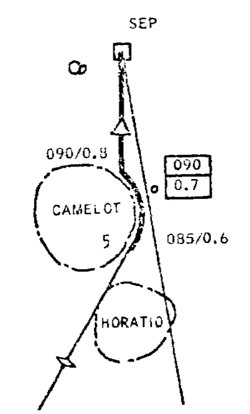
STA 5 CLOSEOUT
TGE - READ -
Get EP 8
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 100 (frame,tools)

6+04 TRAV TO LM-12min (085/1.4)
- Mtl - distribtn
- Rim - variatn

Δ 090/0.6 EP 8 - part pan

TRAV LM

TRAV LM CLOSEOUT



LMP-28 EVA-2 11-8-72

LMP-28 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+04 TRAV TO LM-12min (085/1.4)
- Mtl - distribtn
- Rim - variatn

Δ 090/0.6 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

LRV CLOSEOUT

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)
HGA
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 CLOSEOUT

EMU DUST 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

LMP-30 EVA-2

Underseat samples to Big 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

EMU DUST CLOSEOUT

EMU DUST
EVA TERM

CDR-32 EVA-2 11-8-72

DUST SEP Rcvr:
- Blankets A & B 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-33 EVA-2 11-8-72

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

EMU DUST

EVA TERM
INGRESS

LMP-31 EVA-2 11-8-72

BLANK

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

EVA TERM

3-4

BLANK

CDR-34 EVA-2 11-8-72

EMU MALF

CDR-35 EVA-2 11-8-72

SEP DEPLOY

Drive to SEP site (100m E LM)
Rpt: Bearing, Dist, Range
Position LRV, H=090
Reset LRV NAV
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)
HGA; Dust
Get camera
TGE - GRAV -
Walk to SEP Xmtr

SEP DEPLOY

LMP-33 EVA-2 11-8-72

EMU MALF

LMP-34 EVA-2 11-8-72

SEP DEPLOY

Get SEP Xmtr-carry to SEP site
(100m E LM)
Deploy and lock Xmtr legs
Release ant reel retainers
Place Xmtr on track crossing
Align diagonals, shadowgraph
in sun quadrant

Deploy reel #2 W
Pose for CDR
Deploy reel #4 N
Pose for CDR

SEP DEPLOY

SEP 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

TGE - READ -

CDR-36 EVA-2 11-8-72

MI MALF 11-8-72

EMU MALFUNCTIONS

EMU 1,2

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)

3.4

SEP DEPLOY

Level & align Xmtr
 •Zero on shadowgraph
Deploy carry handle
Remove thermal cover
Deploy Solar Panels
Verify level & align
Place Xmtr sw - ON -

LMP-35 EVA-2 11-8-72

EMU 3
EMU 4

EMU 3: O2 Flag-O, Tone-On

Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

M2
MALF
11-8-72

M3
MALF
11-8-72

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
Ver TM For Subl Restart Or Aux H2O Act: Subl Restart: Prim H2O Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
Aux H2O Act: Diverter-MIN, Aux H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru Or Prim H2O Depletion: (H2O Press Sw Fail)
If Add'l Cooling Reqd, Act. BSLSS (Subl Degrd) If No BSLSS, OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN, Prim H2O - Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

EMU 3

SAME AS CDR

EMU 4A
EMU 5

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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 H2O-Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O-Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
If TM Does Not Ver Subl Brkthru: (H2O Press Sw Fail or H2O Blocked Or Depleted)
If Prim Or Aux H2O-Clsd: Diverter-MIN, Prim & Aux H2O Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

M4 MALF 11-8-72

M5 MALF 11-8-72

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 O2 Qty, If > Than Normal Decr Rate: OPS-ON (O2 Flag Fail & EMU Leak)
If No Tone & TM Confirms Low H2O Press (H2O Flag Failed & H2O Sys Problem-Go To EMU 4 If PRIM In Use, Or 4A If AUX In Use)
If TM H2O Press Good (Transient Cond Or Tone Fail)

EMU 5
EMU 4A

3-50

EMU 6,7
EMU 8,9

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)

M6 MALF 11-8-72

M7 MALF 11-8-72

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]

EMU 8,9
EMU 6,7

15-?

SAME AS ...

EMU 10: Cooling Inadequate

Ver Diverter-MAX & Pump-On
Ver Prim & (If On Aux) Aux H2O Open: If Open, Act. Gas Trap 5 Sec, Wait 3 Min, If Add'l Cooling Reqd, Act. BSLSS (Flow Restr, Subl Or Pump Degrd, Or Heat Leak) [If No BSLSS, OPS-On, Purge Vlv-Hi]
Ver TM For Aux H2O Act: Diverter MIN, Aux H2O-Open, Wait 4 Min, Diverter As Desrd (Prim H2O Depletion)
If Prim Or (If On Aux) Aux H2O Clsd: Diverter-MIN, Prim & (If On Aux) Aux H2O-Open, Wait 4 Min, Diverter As Desrd (H2O Flag Fail)

EMU 10
EMU 11, LCRU

M8
MALF
11-8-72

M9
MALF
11-8-72

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 MSFN:
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)

EMU 11, LCRU
EMU 10

BSLSS-DON
BSLSS-DOFF

BSLSS Don And Activate

1 Unstow BSLSS
2 Conn Tether Between Crewmen:
  BSLSS H2O Flow Divider At Good PLSS, Good PLSS On RH Side
3 Remove Dust Cover From BSLSS H2O Flow Divider
4 Discon Good PLSS H2O From PGA
5 Conn BSLSS H2O Flow Divider To PGA With Good PLSS
6 Failed PLSS Pump-Off
7 Discon Failed PLSS H2O From PGA & Secure
8 Discon BSLSS H2O From BSLSS H2O Flow Divider
9 Conn BSLSS H2O To PGA With Failed PLSS
10 Conn Good PLSS H2O To BSLSS H2O Flow Divider

BSLSS Doff

1 Discon BSLSS From Failed PLSS PGA
2 Discon Tether From Both PGA's
3 Discon PLSS H2O From BSLSS
4 Discon BSLSS From PGA & Discard
5 Conn Good PLSS H2O To PGA
6 Ingress LM

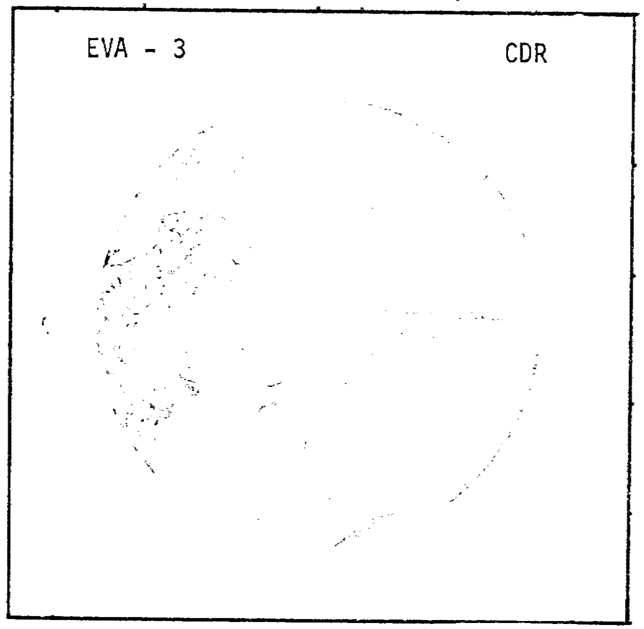
BSLSS-DON

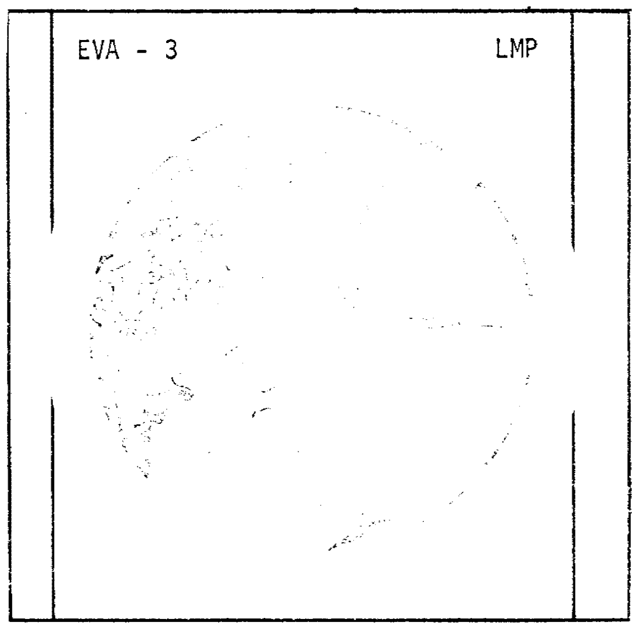
SAME AS CDR

FINAL CREW CUFF CHECK LIST

EVA 3

3.54


EVA - 3
CDR


EVA - 3
LMP

EVA 3 CDR

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

R.V.Blevins

D.A.Bland, Jr.

Approved by:

R.G.Zedekar

Capt. Eugene Cernan, CDR

CDR-1 EVA-3 11-8-72

EVA-3

PLSS

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 3 LMP

LUNAR SURFACE CUFF CHECKLIST

Prepared by:

R.V.Blevins

D.A.Bland, Jr.

Approved by:

R.G.Zedekar

H.H.Schmitt, LMP

LMP-1 EVA-3 11-8-72

EVA-3

PLSS

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 -

3-96

LM AREA MAP

CDR-2 EVA-3 11-8-72

LM AREA

MAP

CDR-3 EVA-3 11-8-72

BLANK

LM AREA MAP

LM AREA MAP

LMP-2 EVA-3 11-8-72

LM AREA

MAP

LMP-3 EVA-3 11-8-72

BLANK

LM AREA MAP

EGRESS
EQUIP PREP

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 blankets - 100% open
Batt covers closed & tight
Orient HGA
LRV cbs Bus A,B,C,D - close
• VERIFY NAV cb - close

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

EGRESS
EQUIP PREP

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)

0+20 LRV EQUIP [EQUIP PREP
ETB to CDR footpan
SEP Rcvr:
• Pwr sw - STBY
• Read temp
• Close blankets A & B
To LMP seat:
• Maps
Stow under CDR seat
• 4 mags (rpt D,F,M,N)
• Mag R to 500mm
LMP cam on seat
Mount CDR cam
ETB to MESA table

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

EGRESS
EQUIP PREP

GEO PREP / SEP TRAV

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

CDR-7 EVA-3 11-8-72

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

$\boxed{\text{NAV INITIALIZE}}$ H=270

Drive to SEP:
• North leg H = 360
• 10m from Xmtr [PHOTO
• 5m to side of Ant
$\boxed{\text{STOP}}$ + Volts
LGA = 020

NAV: RESET then OFF

SEP TRAV / GEO PREP

TRAV SEP

BLANK

LMP-6 EVA-3 11-8-72

LMP-7 EVA-3 11-8-72

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

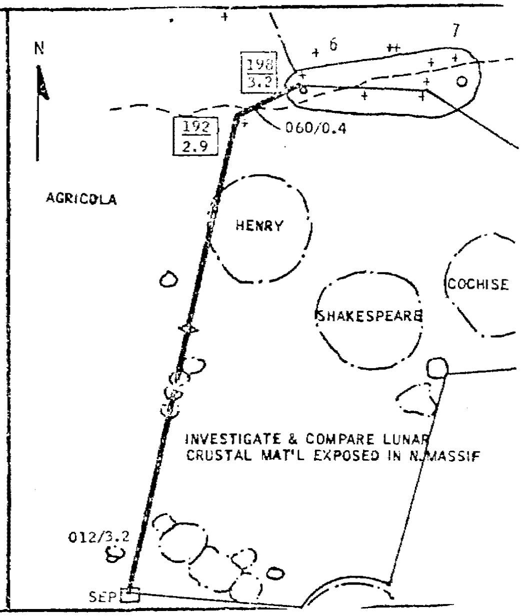
SCB 7 to CDR PLSS

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 -

TRAV SEP

TRAV STA 6



CDR-8 EVA-3 11-8-72

LMP-CDR-9 EVA-3 11-8-72

0+45 TRAV TO STA 6-30min (012/3.6)
- Mtl - variatn, dynam,pat gnd
- Cra - strat, sources, reg
- N. MASSIF - tal lim, flt, blks, trks, organ
- Sculp Hills - ditto

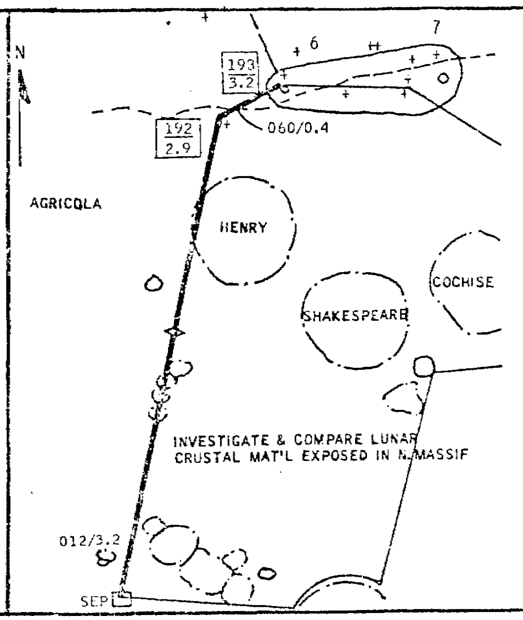
192/0.7 N-S trough, JONES
192/1.6 LRV spl
192/1.8 AGRICOLA-subflr, reg
192/2.2 HENRY-rim dome,subflr

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

1+15 198/3.2 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

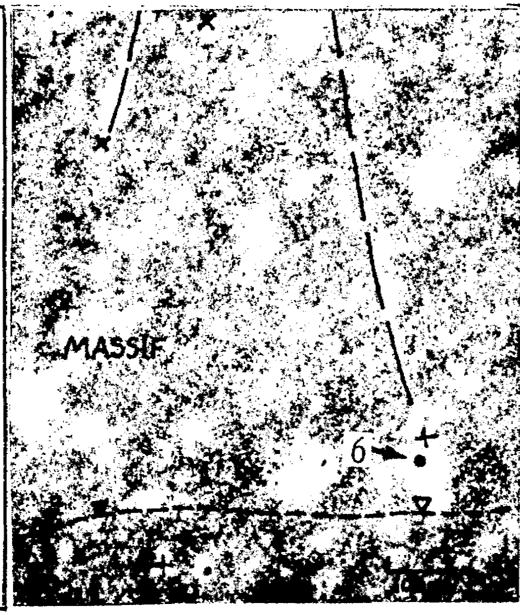
TRAV STA 6



LMP-8 EVA-3 11-8-72

SAME

STA 6



LMP CDR-10 EVA-3 11-8-72

LMP 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(Kg) - rim
- Doc spl - variety, cover

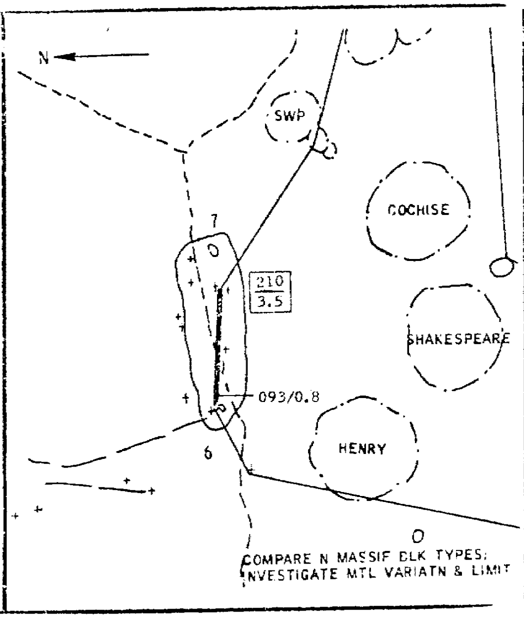
Talus
- Doc spl - variety, dk mtl
- Sgl core

Pans
- Stereo - base ⊥ contours

STA 6

SAME AS CDR

TRAV STA 7



LMP-CDR-12 EVA-3 11-8-72

CDR-13 EVA-3 11-8-72

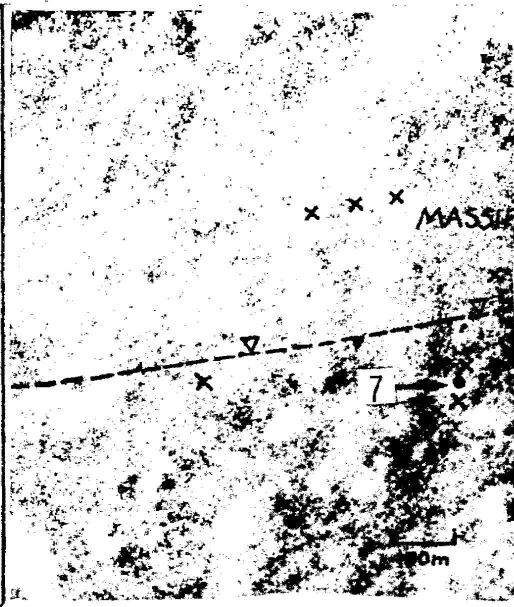
STA 6 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 090 (frames, tools)

2+02 TRAV TO STA 7 - 6min (093/0.8)
- Blks - variatn
- Contact - chgs
- Cra - reg, tal, mtl strat

2+08 210/3.5 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 -

TRAV STA 7

STA 7



LMP CDR-14

EVA-3

11-8-72

LMP CDR-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

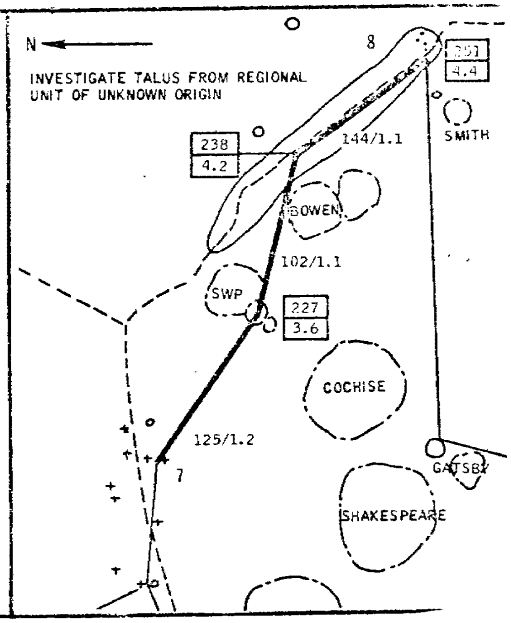
- Stereo - base ⊥ contours
- Polar-SCULP H,E [illegible] S MASSIF
  (020-100; 140-220)
  Remove filter 1/250

Sum - MASSIF

STA 7

SAME AS [illegible]

TRAV STA 8



EVA-3 LMP CDR-16 11-8-72

EVA-3 CDR-17 11-8-72

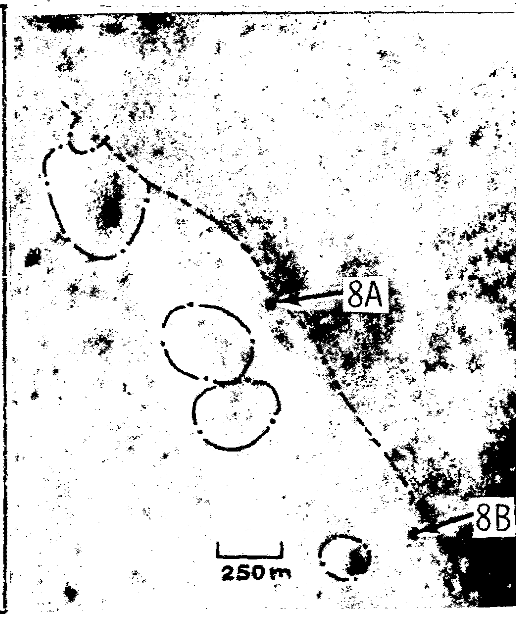
STA 7 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 (PM1/WB)
LGA = 115 (frame, tools)
2+55 TRAV TO STA 8-17min (125/3,3)
•WESSEX CLEFT - contact
•Mtl - cleft, variatn, xport
•SCULP H - tal lim, flts, blks
trks, organ
•COCHISE - subflr, rim mtl
•Cra - sources, reg
•BOWEN - cleft in N. rim

3+12 238/4.2 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

SAME AS

STA 8



EVA-3 CDR-18

11-8-72

EVA-3 CDR-19

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

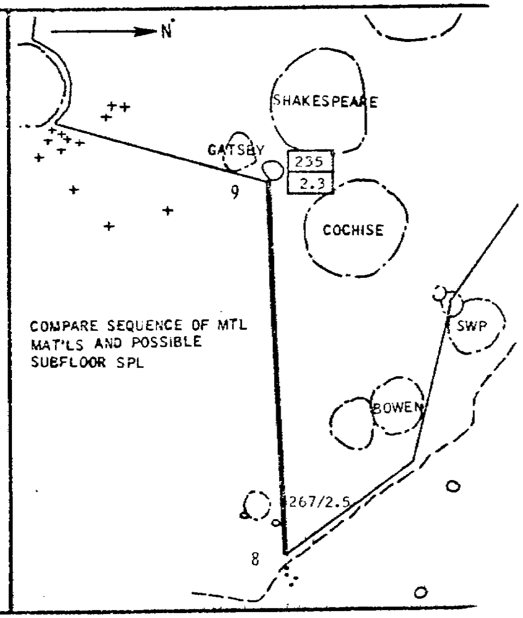
Mtl
- Trench - strat, tex
- Doc spl - strat

Pans
Stereo base//contours

Sum - SCULP H

STA 8

TRAV STA 9



11-8-72 EVA-3 CDR-20

11-8-72 EVA-3 CDR-21

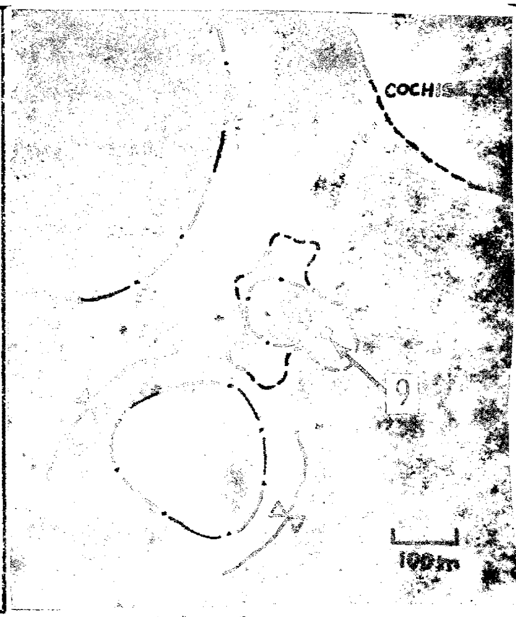
STA 8 CLOSEOUT
TGE - READ - SEP Rcdr -ON-
TV cam; Mode sw - 1 - (PM1/WB)
LGA = 255 (frame, tools)

3+59 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+15 235/2.3 STA 9 (30 MIN)
Park at SE rim
H=045 STOP SEP Rcdr -OFF-
Mode sw - 2 - (FM/TV)
HGA; Dust gnomon/splr
TGE /scoop
Walk to rim VANSERG

TRAV STA 9

STA 9



11-8-72 EVA-3 LMP CDR-22

11-8-72 EVA-3 LMP CDR-23

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
- •LMP: Rad spl - ejecta, strat
- •Pan - partial stereo

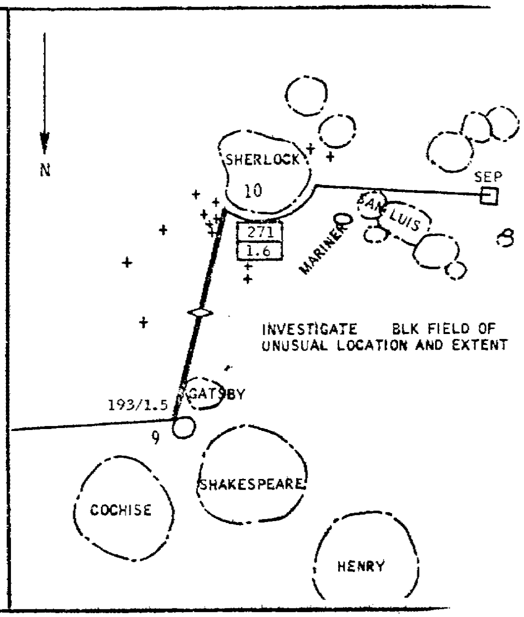
Mtl
- •Trench - strat, tex
- •Doc spl - variety, strat

Pan

CDR: 500mm - N MASSIF - blks & trails

STA 9

TRAV STA 10



LMP CDR-24 EVA-3 11-8-72

LMP CDR-25 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+45 TRAV TO STA 10-13min (193/1.5)
237/2.2 GATSBY Cluster
- Mtl - variatn
- Cra - req, sources
- Lin Dep - trends, character

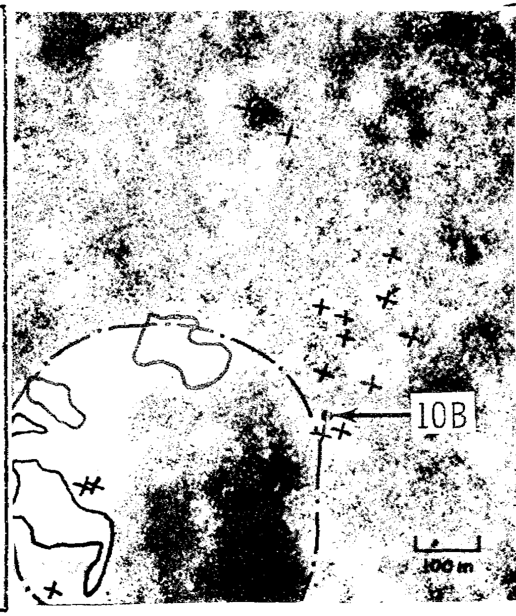
248/1.9 LRV spl
261/1.6 Begin blk field
- Blks - variety, tex, dynam

4+58 271/1.6 STA 10 (46 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

SAME AS

STA 10



11-8-72 EVA-3 LMP-CDR-26

11-8-72 EVA-3 LMP- CDR-27

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

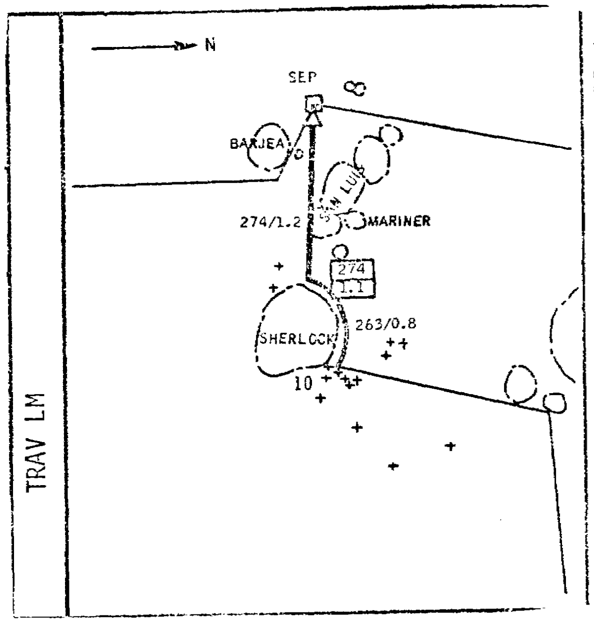
Mtl
- •Trench - strat, tex
- •Doc spl - strat
- •Dbl core - mtl strat

SHERLOCK
- •Doc spl - rim blks, frags

Pans
Sum - subflr

STA 10

CDR-28 EVA-3 11-8-72



SAME AS CDR

CDR-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 = 270 (frame, tools)

5+44 TRAV TO LM-21min (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

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 = 270 (frame, tools)

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270/1.1 NW rim SHERLOCK
subflr, compare, sum
•Mtl - compare, sum
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274/0.7 SAN LUIS
Δ 270/0.1 EP 2 - part pan
•Cra - reg, sum

6+05 EVA 3 CLOSEOUT
Cam to LMP footpan
Get CDR SCB 7
Discard unused equip [HGA
SCB 7 to gate

CLOSEOUT
LRV RIP

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

CDR-31 EVA-3 11-8-72

Get Cosmic Ray Exp
- Sun side first
- Mate halves & bag
- Stow in ETB

6+19 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

LRV RIP
CLOSEOUT

ETB LOAD
N. FLUX

Hold still [REMOVE SCB 8
Doff PLSS harness
Underseat spls to Big Bag
To CDR Seat;
- LMP cam
- Maps

Big Bag, SCB 3, LRV spl to +Z pad

ETB to CDR footpan
Stow ETB:
- SEP DSEA
- All mags except CDR cam [SEP DSEA
- Maps

LMP Cam under CDR seat
ETB to ~~LEC hook~~ **MESA Table**

Contam Sample under D/S
- Dbl bag
- Stow in Big Bag

LMP-30 EVA-3 11-8-72

LMP-31 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 VIP
- 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

N. FLUX
ETB LOAD

LRV FINAL
EMU DUST

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

CDR-33 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

EMU DUST
LRV FINAL

EMU MALF

EMU DUST
INGRESS

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

LMP-33 EVA-3 11-8-72

Receive from CDR
- SCB 8
- SCB 3
- Big Bag
- ETB

Interim stow bags
Assist CDR

6+57 Close hatch

6+58 Repress

INGRESS
EMU DUST

EMU MALF

FINAL CK

INGRESS

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

INGRESS

FINAL CK

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)

3.74

EMU 3
EMU 4

EMU 3: O2 Flag-O, Tone-On

Ck Cuff Gage & PLSS O2 Qty
If Cuff Gage >4.0: OPS-On,
PLSS O2 - 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 O2 Qty Decr: OPS-On(Leak)

M2 MALF 11-8-72

M3 MALF 11-8-72

EMU 4: H2O Flag-A, Tone-On(Prim)

Ver Prim H2O - Open, If Open
Ver TM For Subl Restart Or Aux
H2O Act: Subl Restart: Prim H2O
Clsd, Diverter-MAX, Wait 5 Min,
Diverter-MIN, Prim H2O - Open,
Wait 4 Min Or H2O Flag Off,
Diverter As Desrd (Subl Brkthru)
Aux H2O Act: Diverter-MIN, Aux
H2O - Open, Wait 4 Min Or H2O
Flag Off, Diverter As Desrd
(Prim H2O Depletion)
If TM Does Not Ver Subl Brkthru
Or Prim H2O Depletion:
(H2O Press Sw Fail)
If Add'l Cooling Reqd, Act.
BSLSS (Subl Degrd) If No BSLSS,
OPS - On, Purge Vlv-Hi
If Prim H2O - Clsd: Diverter-MIN,
Prim H2O - Open, Wait 4 Min Or
H2O Flag Off, Diverter As Desrd

EMU 3

5-75

EMU 4A
EMU 5

EMU 4A: H2O Flag-A, Tone-On(Aux)

Ver Prim & Aux H2O-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 H2O-Clsd, Diverter-MAX, Wait 5 Min, Diverter-MIN, Prim H2O-Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd (Subl Brkthru)
If TM Does Not Ver Subl Brkthru: (H2O Press Sw Fail or H2O Blocked Or Depleted)
If Prim Or Aux H2O-Clsd: Diverter-MIN, Prim & Aux H2O Open, Wait 4 Min Or H2O Flag Off, Diverter As Desrd

M4

MALF

11-8-72

M5

MALF

11-8-72

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 O2 Qty, If > Than Normal Decr Rate: OPS-ON (O2 Flag Fail & EMU Leak)
If No Tone & TM Confirms Low H2O Press (H2O Flag Failed & H2O Sys Problem-Go To EMU 4 If PRIM In Use,Or 4A If AUX In Use)
If TM H2O Press Good (Transient Cond Or Tone Fail)

EMU 5
EMU 4A

3-76

EMU 6,7
EMU 8,9

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)

M6
MALF
11-8-72

M7
MALF
11-8-72

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]

EMU 8,9
EMU 6,7

3.77

EMU 10: Cooling Inadequate

Ver Diverter-MAX & Pump-On
Ver Prim & (If On Aux) Aux H2O Open: If Open, Act. Gas Trap 5 Sec, Wait 3 Min, If Add'l Cooling Reqd, Act. BSLSS (Flow Restr, Subl Or Pump Degrd, Or Heat Leak) [If No BSLSS, OPS-On, Purge Vlv-Hi]
Ver TM For Aux H2O Act: Diverter MIN, Aux H2O-Open, Wait 4 Min, Diverter As Desrd (Prim H2O Depletion)
If Prim Or (If On Aux) Aux H2O Clsd: Diverter-MIN, Prim & (If On Aux) Aux H2O-Open, Wait 4 Min, Diverter As Desrd (H2O Flag Fail)

EMU 10
EMU 11, LCRU

M8 MALF 11-8-72

M9 MALF 11-8-72

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 MSFN:
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)

EMU 11, LCRU
EMU 10

5-78

BSLSS-DON
BSLSS-DOFF

BSLSS Don And Activate

1 Unstow BSLSS
2 Conn Tether Between Crewmen:
   BSLSS H2O Flow Divider At Good PLSS, Good PLSS On RH Side
3 Remove Dust Cover From BSLSS H2O Flow Divider
4 Discon Good PLSS H2O From PGA
5 Conn BSLSS H2O Flow Divider To PGA With Good PLSS
6 Failed PLSS Pump-Off
7 Discon Failed PLSS H2O From PGA & Secure
8 Discon BSLSS H2O From BSLSS H2O Flow Divider
9 Conn BSLSS H2O To PGA With Failed PLSS
10 Conn Good PLSS H2O To BSLSS H2O Flow Divider

M10 MALF 11-8-72

M11 MALF 11-8-72

BSLSS Doff

1 Discon BSLSS From Failed PLSS PGA
2 Discon Tether From Both PGA's
3 Discon PLSS H2O From BSLSS
4 Discon BSLSS From PGA & Discard
5 Conn Good PLSS H2O To PGA
6 Ingress LM

BSLSS-DON
BSLSS-DOFF

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