c. 2

Supplement to:

Apollo 16
Lunar Surface Procedures

(Final)

(March 16, 1972)

April 7, 1972

SUPPLEMENT TO

APOLLO 16

LUNAR SURFACE PROCEDURES

April 7, 1972

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Supplement to
Apollo 16
Lunar Surface Procedures
(Final) (March 16, 1972)

Make the following changes:

1. Page v add figure numbers and titles and page numbers.

2. Page vi add table numbers and titles and page numbers.

3. Insert Sections: 4.0 through 4.6

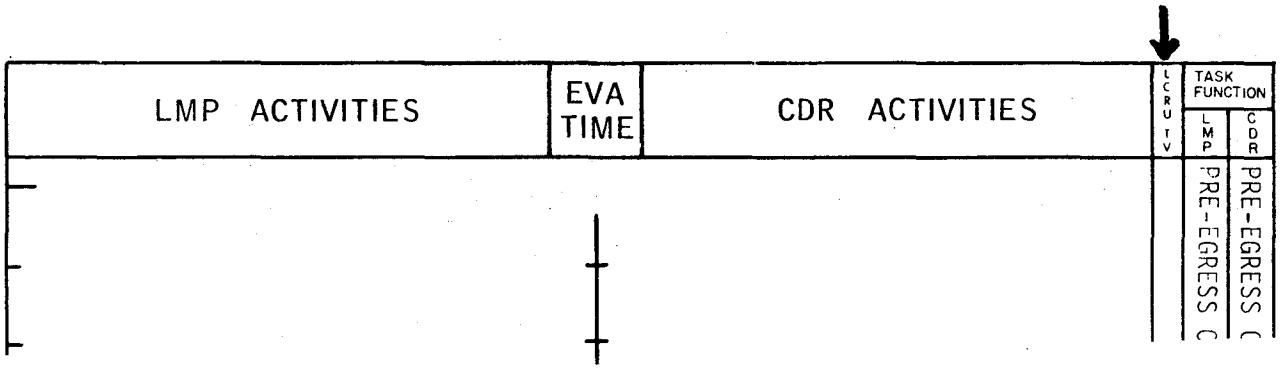
4. Replace the following pages with new pages herein attached: 70/71, 89/90, 91/92, 111/112, 121/122, 126/127, 164/165, 204/205, 206/207

5. Make the following additions, deletions or corrections as shown below:

Page	Location	Category	Detail of Change
16	Foot note	Correction	Dociment should be document
86	0 + 23	Add	"CDR - LCRU covers open (100%)"
86	0 + 24	Add	"CDR - LCRU Power Sw - External"
90	1 + 15	Add	"(1) Cap Com - Advise LMP to change DAC to 12 fps"
90	1 + 20	Add	..... at Station 4, "if slope NG for NAV update Park Heading 180°"
96	2 + 22	Add	..... Gyro "(If Nav Update)"
106	3 + 52	Add	..... Station 8. "If update not required advise CDR Park Heading 180°."
128	0 + 21	Add	..... UNPACK "(Either Crewman)"
147	3 + 34	Add	..... Gyro "(If Nav Update)"
153	4 + 38	Correction	LMP should by LPM
153	4 + 42	Add	"(1) Cap Com - Advise CDR to lower visor"
155	4 + 58	Correction	LMP should be LPM
155	5 + 02	Add	"(1) Cap Com - Advise CDR to lower visor"
155	5 + 08	Correction	CMP should be LMP
157	5 + 21	Correction	LMP should be LPM
157	5 + 27	Correction	LMP should be LPM
159	5 + 31	Add	"(1) Cap Com - Advise CDR to lower visor"

6. The sheets, with page letters, reflect changes to the crew cuff checklist. The changes are shown by a bar. The page numbers indicate the page in the document where the cuff checklist page is printed. The recipient should also insure that the change as indicated is reflected into the vertical time where appropiate.

7. In all vertical timelines, the column designated below shows times of DAC (Data Acquisition Camera) operation.



Contents

4.0 CONTINGENT PLANS

4.1 General Description

Contingency plans presented in this section apply to various situations where some degree of pre-mission planning, together with discussions and reviews with the responsible program elements serve to provide a set of plans and guidelines for use in real time where circumstances might not otherwise permit such planning. It is obvious that not all situations can be preplanned and it is understood that real time circumstances can modify even those situations which were preplanned. Such modifications, if made, will be with the concurrence of the responsible elements in the Mission Control Center.

Plans and guidelines for the following contingency situations are presented in this section:

(a) Walking EVA's

(b) One man EVA's

(c) EVA's from off-nominal landing points

(d) Shortened EVA's (with prior knowledge)

(e) Behind time during EVA

The following science priorities were used in replanning EVA activities when circumstances dictate.

A. Surface Experiments Priorities

(Source: Mission Implementation Plan and Mission Requirements Document)

1. Documented Sample Collection at highest priority traverse station (Part of Lunar Geology Investigation)

2. Heat Flow (S-037) (Part of Apollo 16 ALSEP)

3. Lunar Surface Magnetometer (S-034) (Part of Apollo 16 (ALSEP)

4. Passive Seismic (S-031) (Part of Apollo 16 ALSEP)

5. Active Seismic (S-033) (Part of Apollo 16 ALSEP)

6. Drill Core Sample Collection (Part of Lunar Geology Investigation)

7. Lunar Geology Investigation (S-059) (Portions other than priority items 1 and 6 above)

8. Far UV Camera/Spectroscope (S-201)

9. Solar Wind Composition (S-080)

10. Soil Mechanics (S-200)

11. Portable Magnetometer (S-198)

12. Cosmic Ray Detector (Sheets) (S-152)

13. Lunar Rover Vehicle Evaluation

B. Station Priorities within each Traverse

(Source: Science Working Panel Minutes of March 16-17, 1972)

PRIORITY	EVA I STATION	EVA II STATION	EVA III STATION
1	1-2	4-5	11-12
2	3	8	14
3		6	13
4		10	17
5		9	16
6		7	15

C. Priority of Major Science Activities at Stations

(Exclusive of standard tasks such as TV, photographic pans, etc.)

STATION:	PRIORITY OF ACTIVITIES:
1	Rake/Soil samples; other documented samples
2	Documented samples of Spook; LPM Site Measurement Documented samples of Buster; 500 mm photos
3	Retrieve core; arm MP
4	Rake/Soil Samples Documented Samples Double Core Penetrometer Measurement 500 mm photos
5	N/A
6	N/A

7	Documented Samples 500 mm photos
8	Rake/Soil Samples Boulder samples Other documented samples Double Core
9	CSVC Surface Samples
10	Double Core Penetrometer measurement Documented samples Trench samples
11	Documented Samples 500 mm photos Near Field Polarimetry Far Field Polarimetry
12	Rake/Soil Samples Documented samples 500 mm photos
13	N/A
14	Rake/Soil Samples Documented Samples Double Core 500 mm photos
15	LPM Measurement Soil Samples Rock Samples
16	LPM Measurement Soil Samples Rock Samples
17	Rake/Soil Sample Documented Samples LPM Measurements

D. Priority of "Special" Samples

(Source: SWP minutes of February 7-8, 1972)

PRIORITY:	SAMPLE:
1	Split Boulder
2	Giant Igneous Rock
3	Radial Sampling of Fresh Crater
4	CSVC

5	Surface Sampler Activities
6	Fillet Sample
7	Permanently Shadowed Soil
8	E-W Split

4.2 Walking EVA's

The major constraining factors on walking traverses are: radius of action is more limited than LRV traverses to accommodate the B-SLSS emergency return mode (approximately 3.75 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 station tasks which were done on the LRV traverses (LMP measurements, for example). The walking traverses presented herein are consistent with these limitations while trying to accommodate as many of the original science objectives as practical. It is assumed that the traverses originate from the nominal landing point and no attempt is made to preplan walking traverses from off-nominal landings. Such planning will be done after landing, if necessary. It should also be noted that the three walking traverses discussed herein will apply whether the LRV is inoperative for all three EVA's or whether it becomes inoperative later in the mission.

Table 4.2-1 lists the equipment that will be carried by the crewman on the walking traverses and how it will be carried. Basically, the only tools or experiments that will not be carried are the following:

(a) Lunar portable magnetometer

(b) Penetrometer

(c) Scoop (Lunar surface rake carried instead)

(d) 500 mm camera (carried on EVA III only)

(e) Padded bags, polarizing filter

Figure 4.2-1 shows the geometry of the three walking traverses, the details of which appear below.

TABLE 4.2-1
APOLLO 16 LUNAR GEOLOGY SAMPLING EQUIPMENT FOR
A WALKING TRAVERSE

1. Mounted on CDR PLSS
   - B-SLSS
   - 2 SCB's

2. Tethered to CDR
   - UHT (when taking surface samplers)

3. On CDR RCU
   - 70mm HEDC with mag
   - 20 DSBD on HEDC

4. Hand-carried by CDR
   - Gnomon
   - Maps

5. Mounted on LMP PLSS
   - Core tube rammer
   - Hammer
   - 2 SCB's

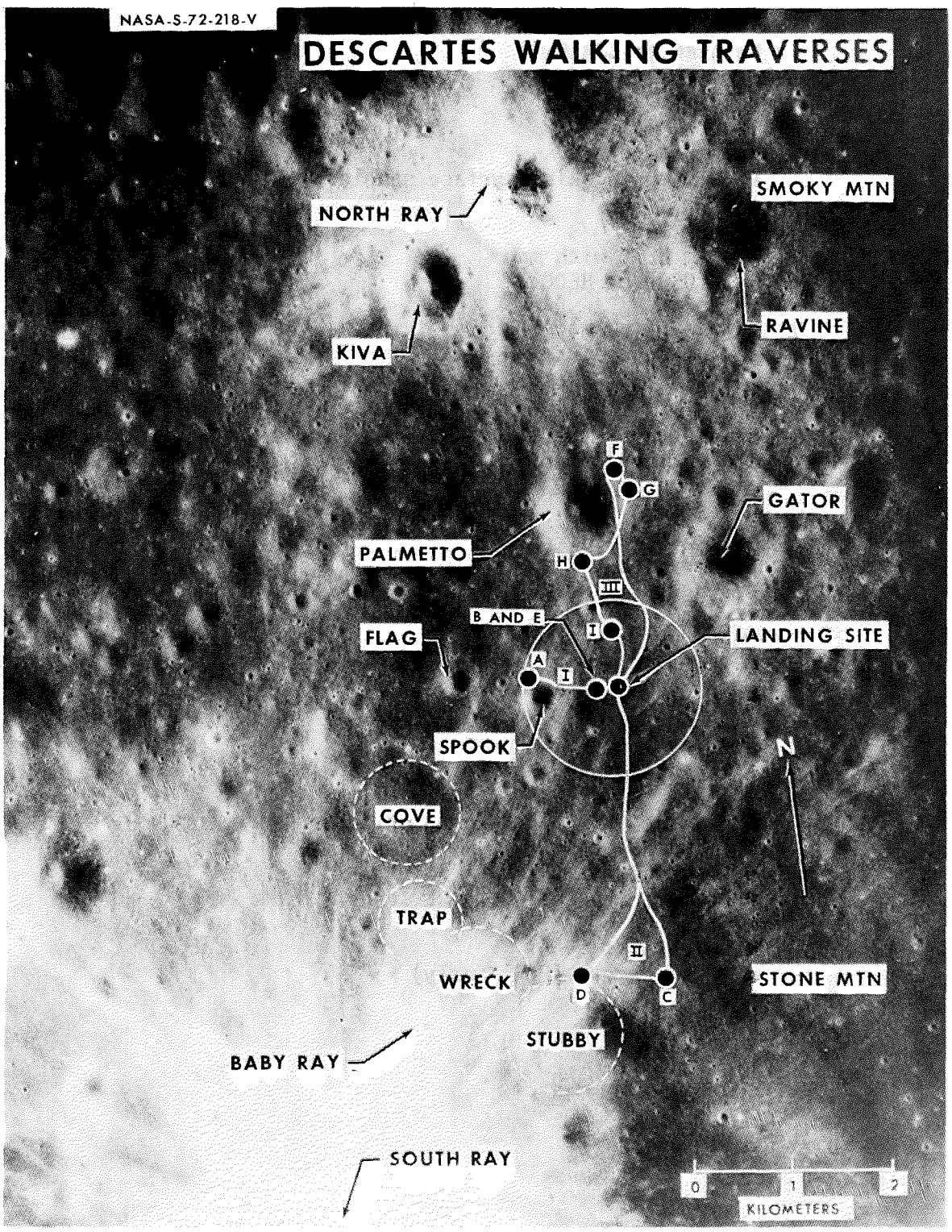
6. Tethered to LMP
   - Tongs

7. On LMP RCU
   - 70mm HEDC with mag
   - 20 DSBD on HEDC

8. Hand-carried by LMP
   - Extension handle with rake

9. Stowed in SCB's (Depending on EVA requirements)
   - 2-70mm Mags
   - 2 surface samplers
   - CSVC
   - SESC
   - Core tubes
   - 500mm camera (EVA 3 only)

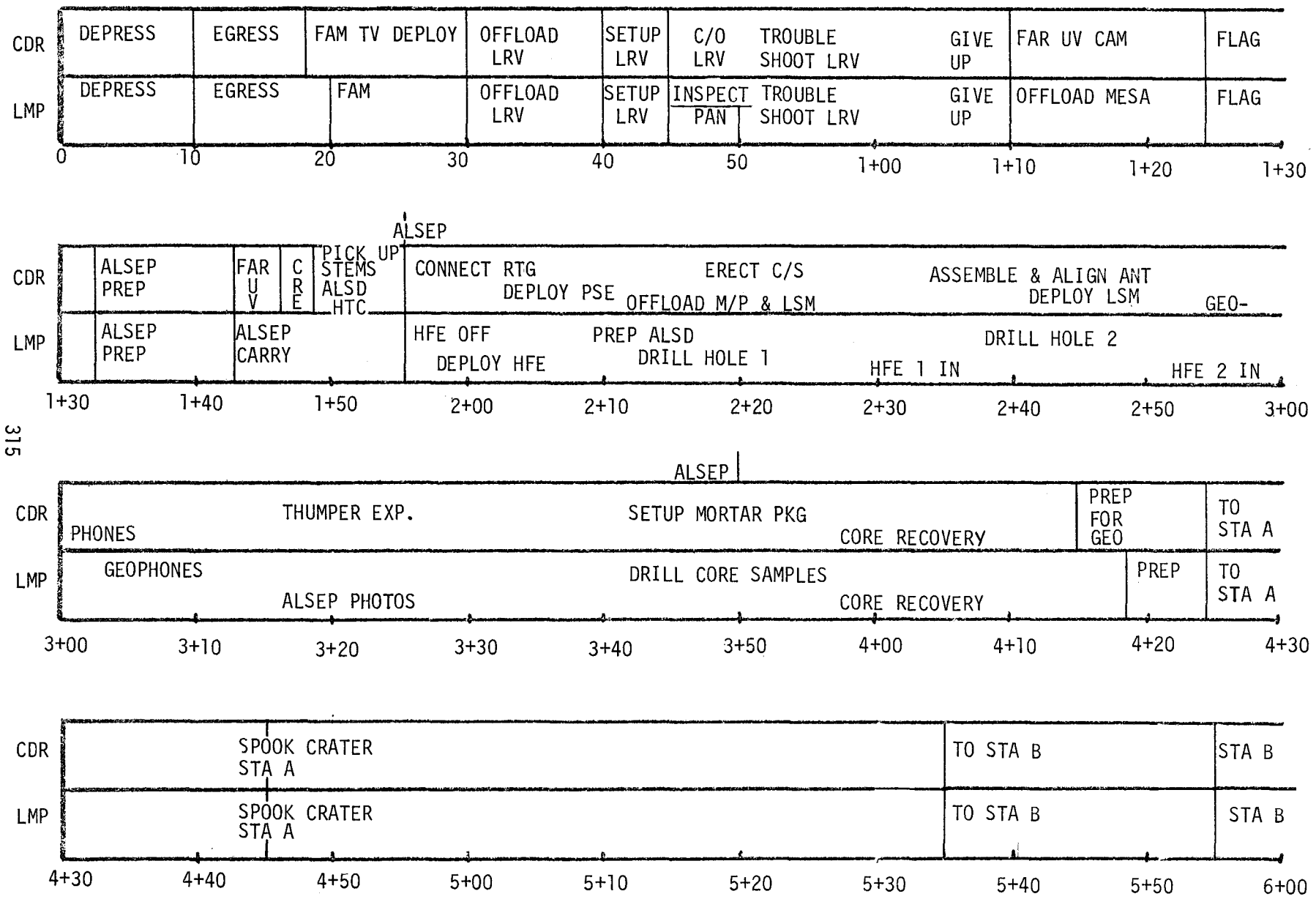
FIGURE 4.2-1


NASA-S-72-218-V
DESCARTES WALKING TRAVERSES
NORTH RAY
SMOKY MTN
KIVA
RAVINE
F
G
GATOR
PALMETTO
H
III
B AND E
I
FLAG
LANDING SITE
A
I
SPOOK
N
COVE
TRAP
II
WRECK
D
C
STONE MTN
STUBBY
BABY RAY
SOUTH RAY
0
1
2
KILOMETERS

4.2.1 EVA 1

For planning purposes, it is assumed that only 5 minutes more overhead time is used on EVA 1 as in the LRV traverses (1 hour 43 minutes versus 1 hour 37 minutes). This allowance would probably accommodate most cases where an LRV problem was discovered during deployment or initial checkout and some time was subsequently devoted in attempting to troubleshoot and correct the problem before abandoning the vehicle.(the Mission Rule allows up to 30 minutes for this situation.) Figure 4.2-2 is a summary timeline for EVA 1, Walking EVA.

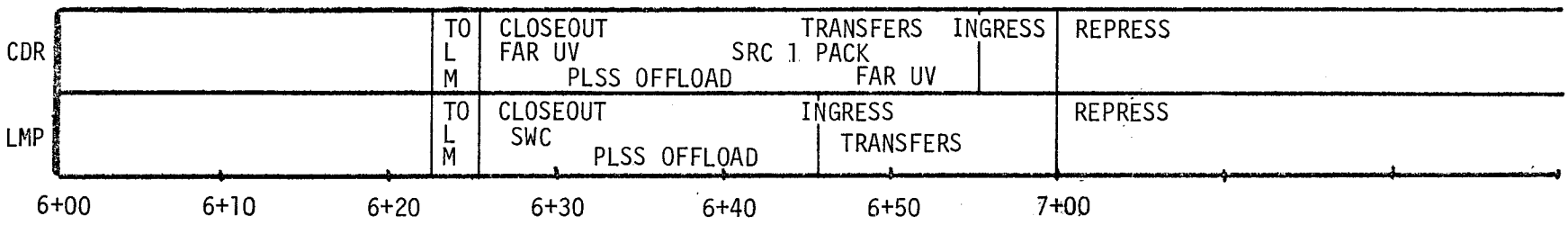
FIGURE 4.2-2
EVA 1 - 2 MAN WALKING



EVA 1 - 2 MAN WALKING

APOLLO 16

APRIL 197



During this initial 1 hour 43 minutes it is assumed that the other science objectives are accomplished as nominally planned (SWC deployment, cosmic ray detector deployment, and UV camera targets).

Following the abandonment of the LRV, ALSEP deployment and obtaining the 2.6 m core take place as nominally planned. At the conclusion of these operations, 4 hours 25 minutes into the EVA, the geology traverse begins.

Although the LRV traverse for EVA 1 visits both Flag and Spook Craters (Stations 1 and 2), the walking traverse is limited to only sampling Spook Crater. (Continuing on to Flag Crater and back would necessitate the investment of an additional 33 minutes walking time and would result in marginal station time at both locations.) Spook Crater is designated station "a" and 49 minutes is allocated to the stop. The sampling rationale and observations at Spook are identical to those on the LRV traverse (see Section 3.6.1.1). The absence of the LPM site measurement at this station allows somewhat more time to be devoted to sampling than on the LRV traverse.

Completing the Spook Crater station, the crew return to the LM/ALSEP vicinity to station "b", where 28 minutes are available for sampling activities at station b. Alternately, this time (or any portion of it) can be spent sampling at locations enroute based upon crew discretion. If circumstances permit, consideration should be given to obtaining the surface sampler samples on EVA 1 (the prime consideration here is availability of boulders in the area to shield the sample area from the effects of LM descent engine contamination).

Arming the mortar package and retrieval of the 2.6 meter core are accomplished upon return to the ALSEP area at the end of the traverse. The final 35 minutes of the EVA are spent in LM closeout activities. The detailed procedures for the EVA 1, Walking EVA are shown in the following pages in a vertical timeline format. A summary of the EVA 1 walking traverse parameters is presented in the tables that follow the detailed procedures.

MISSION: APOLLO 16, J-2
EVA: 1, TWO MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+30				
NOTE: FOR THE PURPOSE OF THIS TIMELINE PLAN, IT IS ASSUMED THAT THE EVA ACTIVITIES ARE NOMINAL UP TO LRV CHECKOUT AT 43 MINUTES. AT THIS POINT IT IS DISCOVERED THAT THE LRV HAS MALFUNCTIONED. 27 MINUTES ARE USED IN TRYING TO GET THE LRV OPERATIONAL. AT 1+10 IT IS DECIDED TO GO WITH A WALKING TRAVERSE.					
	0+40				
LM INSPECTION AND PANS Retrieve HEDC from ETB and mount on EMU					
Take photo pan 20 ft. off SEQ Bay (Quad II)					
Comment on: DPS erosion Strut stroking Pad penetration Soil patterns Any LM anomalies					
Photo Cosmic Ray panels (7 ft.) Remove HEDC; place on LRV floor pan					
	0+50				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	0+50				
Trouble shooting LRV		Trouble shooting LRV			
	1+00				
	1+10				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
	1+10				
OFFLOAD GEOLOGY PALLET		OFFLOAD FAR UV CAMERA			
Remove thermal blanket		Remove thermal blanket			
Pull pip pins; Remove pallet and place on -Z foot pad		Pull lanyard to split bag			
		Remove pallet from LM(optional)			
Remove pallet handrails (2)		Pull 4 pip pins and remove camera from pallet			
Remove HTC from pallet and set it up		Carry camera to deployment site in Quad I (in shadow)			
		Deploy Cam. legs & set on surface			
		Point cam. down sun			
OFFLOAD MESA		Place cam. battery in sun (Temp Label up)			
Unstow rake, stow on MESA; Discard rake bracket		Pull 2 elev. pins, azimuth pin and plate pin			
Unstow antenna canister and set aside; discard brackets		Remove dust cover			
		Level camera (Use 3 leveling knobs - and/or dig legs into surface to level)			
Unstow HEDC from MESA, install mag B and bag shoe on HEDC and place HEDC back in the ETB		Caution: Stay away from camera front after protective cover removed			
	1+20				
		Release azimuth lock, point cam. down sun; lock			
Unstow DAC and place in middle MESA, Remove excess brackets from right side MESA		Zero azimuth scale if req'd.			
		Set in first target coord. Az 14° El 48°			
		Position cam. power Sw - ON			
FLAG DEPLOY		FLAG DEPLOY			
Mount HEDC from ETB on EMU		Unstow flag from MESA			
		Walk to deploy site			
Assist CDR with flag deployment		Push lower shaft into surface			
Photo CDR by flag; hand HEDC to CDR		Extend flag; insert upper shaft into lower shaft			
	1+30				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972

EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	1+30	Photo LMP by flag			
ALSEP PREP		ALSEP PREP			
Remove therm. cover - SEQ Bay door		Pull lanyard - unlock PKG 1			
Open SEQ Bay door (white lanyard)		Pull PKG 1 from SEQ Bay, lower to surface			
Stow lanyard on strut Switch BATT TEMP MON - ON Pull lanyard - unlock PKG 2		Remove hockey stick & lanyard Remove tool restraint pins-PKG 1			
Pull PKG 2 from SEQ Bay, lower to surface		Remove tool bracket & UHT's; insert UHT'S in ALSEP PKGS.			
Remove hockey stick & lanyard		Join antenna mast sections to form carry bar; attach to PKG 1			
Unstow fuel cask lanyard; pull to rotate cask down		Hand DRT to LMP Rotate PKG to surface Remove RTG dust cover			
Receive DRT from CDR		Hand FTT to LMP			
Remove cask dome using DRT, discard under LM Receive FTT from CDR		Set Far UV Cam to target #2			
Remove fuel element from cask	1+40	• Push reset switch			
Insert fuel element into RTG		• Check film advance			
Rotate PKG 2 upright and attach to carry bar & PKG 1		• Set in target: Az 54°, El 77°			
ALSEP TO DEPLOY SITE					
Carry ALSEP Pkgs to deploy site		Shift CRE plate-pull RED ring			
		Report CRE dust condition Close SEQ Bay door			
		Retrieve core/bore stems and drill from +Y foot pad and HTC from -Z foot pad and proceed to ALSEP area			
	1+50				

MISSION: APOLLO 16, J-2
EVA: 1, TWO MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	1+50				
ALSEP PACKAGE PLACEMENT		Place HTC, ALSD, and stems in the HFE area			
Place ALSEP Pkgs on surface					
Move Pkg 2 8' West of Pkg 1, orient UHT'S pointing North					
Tether UHT					
REMOVE HFE SUBPALLET		CONNECT RTG			
Release pull rings (2); pull pip pins (3)		Tether UHT			
Pull M/P base pin #1; unwrap tape; remove cover; pull pin #2		Read RTG cable Temp Label Release RTG cable - 3 BB			
Remove M/P; set on surface		Remove RTG cable and pull pin to release connector			
Pull subpallet pip pin Rotate Pkg 2 to surface, align Remove HFE - 2 BB & connector		Verify shorting switch - OUT Report amp reading			
Place HFE on surface		Connect RTG cable to C/S, push down collar to lock			
Connect HFE to C/S - lock					
DEPLOY HFE	2+00	Remove subpallet & aim mech. from Pkg. 2 - 4 BB			
Carry HFE pallet 30' S of C/S, place on surface					
Remove probe box from pallet - 4 BB		Place subpallet & aim mech. NNE of C/S			
Split probe box (2 velcro straps)		Remove PSE stool from subpallet Position PSE stool on surface 8 ft ESE of C/S; dig out hole			
Carry half with rammer to HFE Hole #1 (~ 18' W)		Stow ant. amst on subpallet			
Place box half on surface		Remove Pkg 1 dust cover Place HEDC on dust cover			
Carry other box half to HFE Hole #2 (~ 18'E), place box on surface		Rotate Pkg 1 to surface and align			
		DEPLOY PSE			
		Remove PSE from Pkg 1 - 4 BB			
Configure ALSD hardware:		Carry PSE to stool			
• Verify motor operates		Remove 4 Boyd Bolts from PSE			
• Pull pin #2		Remove girdle pull pin			
• Rotate rack camloc 90°		Place PSE on stool; align			
• Rotate batt camloc 90° pull pin lanyard		Remove girdle and discard			
	2+10	Deploy PSE thermal shroud, smooth down edge			

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
• Remove handle and install on battery	2+10	Level & Report compass reading			
		Verify C/S sw #5 - CW			
• Rotate rack bracket up					
• Lift rack off treadle, extend legs and set on surface		Remove T/G from C/S - 1 BB			
		Deploy T/G			
		Verify T/G dial at "0"			
• Pull pin #5, move bracket & lift drill		Lean T/G against subpallet			
		OFFLOAD MORTAR PACKAGE			
Carry drill, rack and bore/core stem bag to HFE Hole #1 site		Remove M/P from C/S			
		Pull socket pin ring; deploy 1st leg			
		Rotate M/P on swivel socket			
		Deploy 2nd leg, position legs			
BORE HOLE 1 DRILLING		Place M/P NNE C/S; point NW			
Set drill on surface					
		REMOVE LSM			
Lean bore/core stem bag against rack; open bag		Release LSM from C/S - 2 BB			
		Lift LSM off C/S, ck. cable			
Insert 54" bore stem into drill		Set LSM on surface clear of C/S			
Pick up drill & push bit into surface as far as possible		ERECT CENTRAL STATION			
Remove batt. thermal shield	2+20	Level and align Pkg 1			
Energize drill until stem top approx. 16" above surface		Release C/S So. side - 5 BB			
		Release E side & ant. - 4 BB			
		Remove rear curtain cover; use UHT socket, pull pins, velcro			
Attach wrench to bore stem					
Remove drill from stem		Release ant. cable bracket			
Screw 28" bore section to section in surface					
Screw drill onto bore section		Release C/S N side - 3 BB			
Energize drill until stem top approx. 16" above surface					
		Release W side & ant. 4 BB			
Attach wrench to bore stem					
Remove drill from stem					
Screw 28" bore section to section in surface		Verify sunshield released			
Screw drill onto bore section		Release 2 N interior BB			
Energize drill until stem top approx 11" above surface	2+30	Release center BB and control sunshield erection			

MISSION: APOLLO 16, J-2
EVA: 1, TWO MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	2+30				
Attach wrench to bore stem Remove drill from stem, set on surface		Check side curtains deployed, discard covers Attach rear and front of side curtains			
EMPLACE HFE PROBE 1					
Remove HFE probe from box Deploy rammer, lean on rack Insert probe and first thermal shield into bore hole, using rammer		Attach rear thermal curtain to side thermal curtain			
Report probe depth & stem height above surface Emplace second thermal shield to 21" depth		ASSEMBLE & ALIGN ANTENNA Retrieve ant. mast from subpallet; install on C/S			
Place sunshield over top of stem		Retrieve aiming mech. from subpallet, remove dust cover Install aiming mech. on mast			
DRILL BORE HOLE 2					
Carry drill, rack, rammer and bore/core stems to hole 2		Remove aiming mech. housing and packing			
Set drill on surface Lean bore/core stem bag and rammer against rack	2+40	Install antenna on aiming mech.			
Insert 54" bore stem into drill		Level and align aiming mech.			
Pick up drill & push bit into surface as far as possible		Set antenna offsets: Az - 24.68			
Energize drill until stem top is approx. 16" above surface		El - 16.59			
		Push in shorting switch, report amps			
		Turn Sw #1 CW; Sw #5 CCW, report to Hou.			
Attach wrench to bore stem Remove drill from stem Screw 28" bore section to section in surface		DEPLOY LSM			
Screw drill onto bore section		Carry LSM to deploy site (50'WSW)			
Energize drill until stem top is approx. 16" above surface		Remove stowage bracket			
		Deploy legs & verify locked Set LSM on surface(striped leg E)			
	2+50				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
	2+50	Remove foam packing			
Attach wrench to bore stem		Deploy sensor arms (center one first)			
Remove drill from stem					
Screw 28" bore section		Remove sensor dust covers			
Screw drill onto bore stem					
Energize drill until stem top is approx. 11" above surface		Clean debris from top of LSM			
		Raise legs so that PRA cover will clear bottom			
		Pull striped ring to remove PRA cover; verify PRA deployed			
Attach wrench to bore stem					
Remove drill from stem, set on surface		Level & align LSM			
EMPLACE HFE PROBE 2					
Remove HFE probe from box					
Insert probe and first thermal shield into bore hole, using rammer					
Report probe depth & stem height above surface		DEPLOY GEOPHONES			
Emplace second thermal shield to 21" depth		Pick up T/G from pallet			
Place shunshield over top of stem					
Remove HFE elec. box from pallet		Walk approx. 8' N with T/G			
Remove dust cover (4BB)	3+00				
Level & align HFE elec box					
Remove all debris at least 16' away from HFE area					
Place UHT on LRV left floorboard					
ASSIST IN GEOPHONE DEPLOY					
Retrieve hammer from HTC; place in leg pocket					
Retrieve HEDC from dust cover mount on EMU		Coordinate with LMP; LMP stake power and geophone cable loops just N of C/S			
Remove T/G cable stakes from M/P pallet		Walk out (290°) until 1st geophone is reached			
Coordinate with CDR; stake power and geophone cable loops just N of C/S		Remove geophone clip end geophone #1			
		Walk out 150' until 2nd geophone is reached			
Emplace geophone #1 into surface (within 7° of vertical)		Remove geophone clip and geophone #2			
	3+10				

MISSION: APOLLO 16, J-2
EVA: 1, TWO MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	3+10				
Stake geophone cable at geophone #2		Walk out 150' until 3rd geophone is reached			
Emplace geophone #2 into surface (within 7° of vertical)		Remove geophone clip and geophone #3			
Photo CDR when he reaches end of geophone cable		Emplace geophone #3 into surface (within 7° of vertical)			
TAKE ALSEP PHOTOS		Remove flag and emplant by geophone #3			
Coordinate photo activity with CDR thumping		Unreel remaining power cable			
Photo:		THUMPER GEOPHONE EXP.			
• HFE Bore stems		Verify "GO" for thumping from MCC			
- Down sun, 11 ft (ea.)		To fire thumper:			
- Stereo pair, X Sun, 7 ft (ea)		- Select ASI			
• HFE Electronics Box		- Rotate arm switch			
- X Sun, 7 ft.		- Wait 4 sec.			
	3+20	- Depress switch to fire			
• LSM					
- Sun compass; X Sun, 3 ft.					
- Deploy sunshade					
- LSM with C/S in bkgnd, 7 ft.		Note: Each crewman must remain motionless 10 sec. before and 10 sec. after each thumper firing. CDR will alert LMP preceeding each firing.			
• RTG					
- With C/S in bkgnd; 7 ft.					
• CENTRAL STATION					
- X Sun, looking So., 7 ft.					
- X Sun, viewing switches, 7 ft.		The first thumper firing will be at geophone #3; subsequent firing will be at each white mark on the geophone line. A total of 19 thumper firings will be performed.			
	3+30				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	3+30				
• PSE					
- X Sun; Viewing bubble and suncompass; 3 ft.					
- With C/S in bkgnd.; 7 ft.					
• Panorama					
- 10 ft. So. of C/S					
Place HEDC on C/S					
	3+40				
DRILL CORE SAMPLE		SET UP MORTAR PACKAGE			
Take drill, rack and core stems to deep core site So. of C/S		Return to C/S			
		Turn astro sw #5 - CW			
Set drill on surface		Deploy M/P base (pull pin #3)			
Lean core stem bag against rack		Insert UHT in M/P base			
Insert core stem with adapter into drill		Using UHT & M/P base as sun compass, estimate geophone line heading			
Pick up drill and push stem into surface as far as possible					
Energize drill until stem top is approx. 12" above surface		Carry M/P and base ~ 50 ft NNE of C/S			
Attach wrench to core stem		Place M/P on surface			
Remove drill from stem		Deploy M/P base legs(pull pin #4)			
Screw another core stem section to section in surface		Using UHT, orient base to same heading as geophone line			
Screw drill onto core section					
Energize drill until stem top is approx. 12" above surface	3+50				

MISSION: APOLLO 16, J-2
EVA: 1, TWO MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	3+50				
Attach wrench to core stem Remove drill from stem Screw last core stem section to section in surface Screw drill onto core section Energize drill until stem top is approx. 8" above surface		Place base on surface and emplant legs. Verify base is flat on surface Place M/P on base; front pins 1st, then lock on rear posts Verify wires in front off base Check M/P bubble level reading Deploy M/P antenna Return to C/S Mount HEDC on EMU; leave UHT Check PSE shroud Photo M/P - Down sun; 7 ft. - Viewing NE; 7 ft. - Viewing SE, 7 ft. - With C/S in bkgnd, 15 ft.			
Keep drill energized for 15 sec. to clear flutes					
DRILL CORE RECOVERY		ASSIST CORE RECOVERY			
Pull drill string up as far as possible					
Attach wrench to core stem Remove drill from stem		Photo core stem X sun stereo & locator			
Retrieve stem caps from rack; cap top of core stem	4+00	Assist LMP in deep core recovery			
Pull core string out of surface by hand, or if difficult: - Assemble jack to treadle - Position jack/treadle over core stem in surface - Jack core out of surface Cap bit end of core					
Carry core stem back to LM		Carry HTC, Core caps & wrench back to LM			
	4+10				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
BREAK CORE STEM	4+10	BREAK CORE STEM			
		Set HTC down			
		Remove vise from dust brush pocket and place on top of pallet			
Place core string in vise					
Using wrench, break core string between 3rd & 4th section					
		Cap ends of core section			
Unstow core stem bag from MESA & place core stems in it		CONFIGURE FOR GEOLOGY TRAV			
		Unstow SRC #1 & place on SRC table			
		Open SRC, remove SCB & seal control sample in SRC			
Place core stem bag by ladder					
CONFIGURE FOR GEOLOGY TRAV		Remove from SCB #1			
Install mag G on LMP HEDC & place on EMU		• 2 20-Bag disp and place them on HEDC'S			
Place SCB #1 on CDR	4+20	• 1 core cap disp & place on LMP			
Retrieve rake from MESA & take to -Z foot pad area		Remove BSLSS from ETB & place on LMP			
		Remove SCB #5,6,7 or 8 from geology pallet & hang on LMP			
Remove extension handle from pallet & put rake on it & hand carry		Remove tongs from pallet & place on tether			
		Remove gnomon from pallet & hand carry			
TRAVERSE TO STA A		TRAVERSE TO STA A			
	4+30				

MISSION: APOLLO 16, J-2
EVA: 1, TWO-MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+30				
	4+40				
SPOOK CRATER Geology sta A		SPOOK CRATER Geology sta A			
	4+50				

MISSION: APOLLO 16, J-2
EVA: 1, TWO-MAN WALKING TRAVERSE

DATE: APRIL 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+50				
	5+00				
	5+10				

MISSION: APOLLO 16, J-2

DATE: APRIL 1972

EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM	TASK FUNCTION	
				LMP	CDR
	5+10				
	5+20				
	5+30				

MISSION: APOLLO 16, J-2

DATE: APRIL 1972

EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ. CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	5+30				
TRAVERSE TO STA B		TRAVERSE TO STA B			
	5+40				
	5+50				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972

EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	5+50				
GEOLOGY STA B		GEOLOGY STA B			
	6+00				
	6+10				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+10				
	6+20				
TRAVERSE TO LM		TRAVERSE TO LM			
CLOSEOUT		CLOSEOUT			
Place rake/ext handle by MESA		Place gnomon & tongs by MESA Reset Far UV cam. target:			
Unstow SWC from MESA		Az 126°			
Deploy SWC 60' at 2:00		El 33°			
Extend SWC staff sections		Photo Far UV Camera			
Press staff into surface		- X Sun; 20 ft; f5.6/60			
Deploy foil; hook on staff		- Dn Sun; 3 ft; f5.6/60			
	6+30				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972
EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+30				
Photo SWC:					
- X Sun; stereo pair of foil ans staff; 7 ft.					
- X Sun; upper foil; 7 ft.		Remove HEDC & place in ETB			
Remove HEDC & place in ETB					
CDR remove SCB from LMP		Remove SCB from LMP and stow on +Z foot pad			
Remove SCB #1 from CDR		LMP remove SCB #1 from CDR			
Place SCB #1 in SRC #1 on MESA table					
Remove seal protectors (2)		Remove sample containment bags (6) from MESA & place in ETB			
Verify bag material is free of seal area					
Close and seal SRC #1	6+40	Retrieve dust brush from pallet			
Tidy MESA blankets					
Clean EMU'S & stow PLSS antennas		Clean EMU'S & stow PLSS antennas			
INGRESS		Place dust brush on ladder hook			
Ascend ladder with SCB from +Z foot pad					
Descend ladder					
Ascend ladder with core/bore stems from +Z foot pad					
		Attach ETB to LEC			
Ingress LM with SCB & core/bore stems		Ascend ladder with SRC #1			
		Pass SRC #1 to LMP			
Obtain SRC #1 from CDR					
	6+50				

MISSION: APOLLO 16, J-2 DATE: APRIL 1972

EVA: 1, TWO-MAN WALKING TRAVERSE

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+50				
Obtain ETB from CDR		Pull up ETB Pass ETB to LMP Descend ladder to surface Reset Far UV cam. target: Az 230° El 53°			
		CDR INGRESS			
Assist CDR ingress		Ingress LM			
Close hatch					
NOTE: DETAILED PROCEDURES FOR FINAL EVA CLOSEOUT ARE PRESENTED IN THE LUNAR SURFACE CHECKLIST					
	7+00				

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 TIME
   TOTAL OPS TIME 80.5 MINUTES
   5 MIN BSLSS HOOKUP
   13 MIN LM INGRESS
   62.5 MIN AVAILABLE FOR WALKBACK

4. TIME MARGIN AT STATION METABOLIC RATE
   STATION / FINAL LM O/H } MARGIN = TIME REMAINING AFTER ALLOWANCE FOR WALKBACK, AND 13 MINUTES INGRESS

5. RESPIRATORY EXCHANGE QUOTIENT = .90

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

TABLE 4.2-2

APOLLO 16 DESCARTES WALKING TRAVERSES

EVA I CALCULATED DATA APR 10 1972

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+43	1+43
WALK	0.10	2.50	2				
ALSEP				0.10	1+45	2+40	4+25
WALK	0.85	2.50	20				
A				0.95	4+46	0+49	5+35
WALK	0.90	2.50	22				
B				1.85	0 5+56	0+28	6+24
WALK	0.05	2.50	1				
LM				1.90	6+26	0+35	7+ 1
TOTALS			45			6+15	7+ 1

STAT NO	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)
			-----PLSS FAILURE TRAVERSE CONTINGENCIES-----				
LM	0.00	0+ 0	****	****	****	0.00	1050.00
ALSEP	0.10	0+ 2	3+59	2+57	3+26	0.10	1049.55
A	0.95	0+16	2+12	1+24	2+ 2	0.91	1031.96
B	0.05	0+ 1	2+ 0	0+57	1+28	0.05	1024.19
LM	0.00	0+ 0	1+35	0+32	1+ 5	0.00	1026.27

TABLE 4.2-3

APOLLO 16 DESCARTES WALKING TRAVERSES

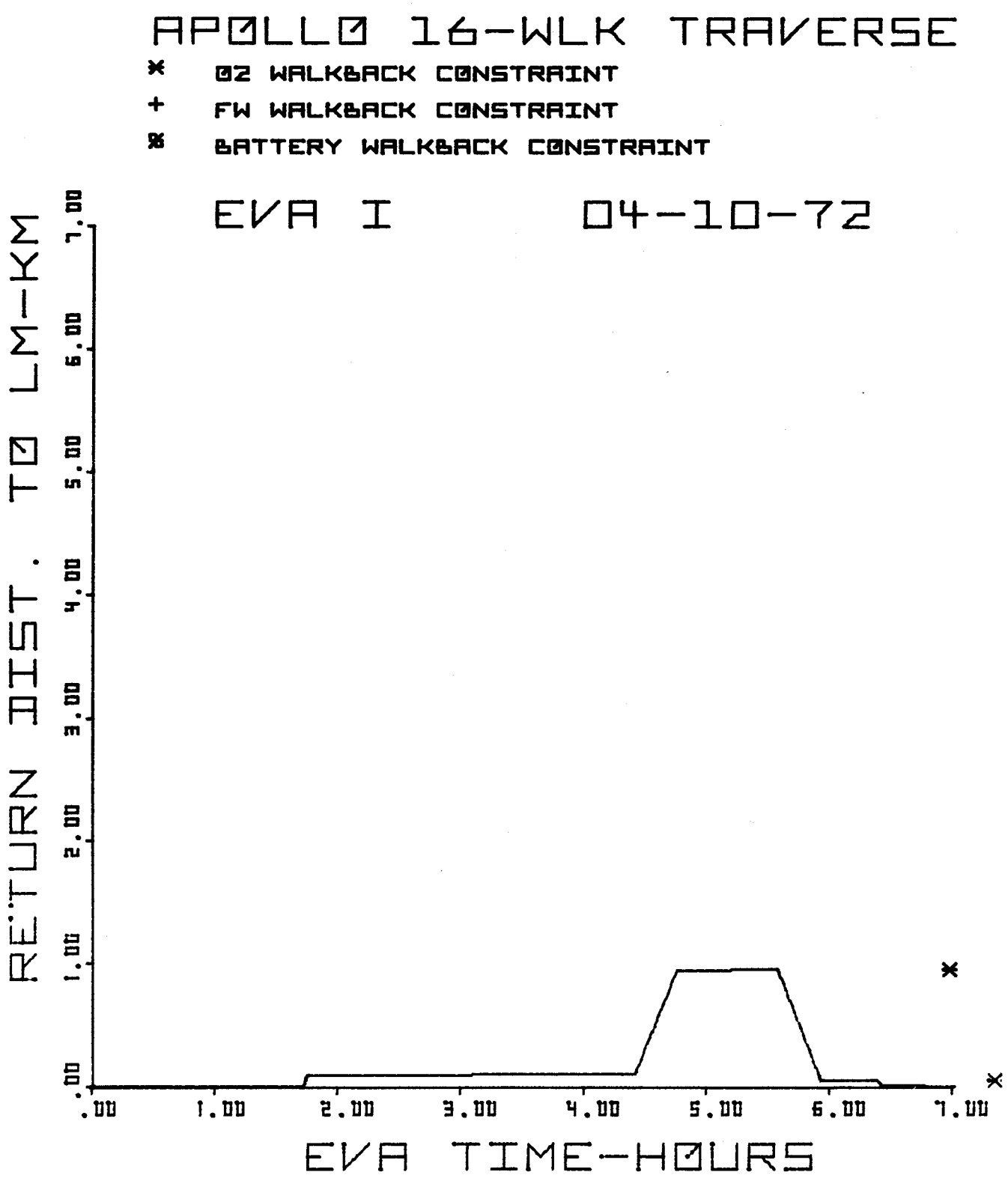
EVA I INPUT DATA APR 10 1972

STATION NO	STOP TIME (HR+MIN)	SEGM 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+43	0.00	0.00	-75.00	2.50	3.60	1000.0	1560.0
ALSEP	2+40	0.10	0.10	-75.00	2.50	3.60	1000.0	1560.0
A	0+49	0.85	0.95	-75.00	2.50	3.60	1000.0	1560.0
B	0+28	0.90	0.05	-75.00	2.50	3.60	1000.0	1560.0
LM	0+35	0.05	0.00	-75.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP (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	11.21	1.403	62.5

NOTE: OPS TIME IS TOTAL WALKING TIME AVAILABLE.

FIGURE 4.2-3


APOLLO 16-WLK TRAVERSE
* 02 WALKBACK CONSTRAINT
+ FW WALKBACK CONSTRAINT
⊠ BATTERY WALKBACK CONSTRAINT
EVA I 04-10-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

4.2.2 EVA 2

The objectives for walking traverse on EVA 2 are the same as the LRV traverses; namely, to investigate the Stone Mt. region and the South Ray ray area. Limitations on walking radius and slope climbing ability on foot, however, will limit the Stone Mt. operations to areas near the base. Figure 4.2-4 is a summary timeline for EVA 2, Walking EVA.

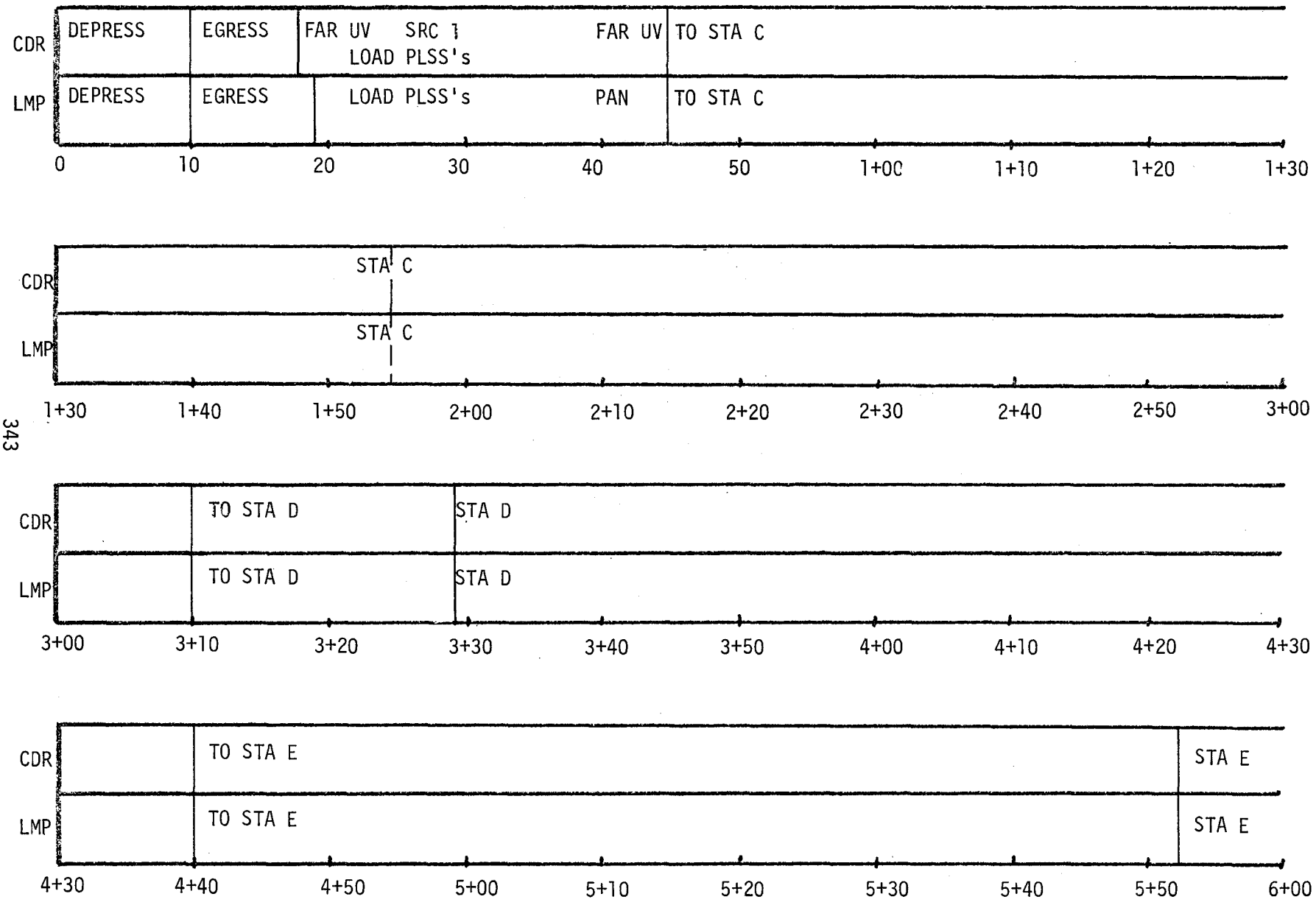
The first station on the traverse (station "c") is in the region of the LRV traverse station 6. It is approximately 3 km away from the LM and is reached after an estimated 1 hour 10 minutes walk. The station time allotted is 1 hour 15 minutes which is spent in sampling along the base of Stone Mt. ranging over an area to the north of Stubby Crater.

Station "d" is located in the vicinity of the LRV traverse station 8 and 1 hour 11 minutes is allotted to the stop. Activities at station "d" are identical to the station 8 activities, being principally concerned with the sampling of material from South Ray Crater including boulder operations.

Leaving station "d", the traverse continues northeast to pick up the outbound tracks which are then followed back to the LM area where station "e" is located. Activities at "e" are identical to those of the nominal LRV traverse station 10; 30 minutes are alloted for these activities consisting of the trench, trench samples, double core, and penetrometer measurements. The final 35 minutes of EVA 2 are devoted to closeout activities.

A summary of the EVA 2 walking traverse parameters is presented in the following tables.

FIGURE 4.2-4
EVA 2 - 2 MAN WALKING



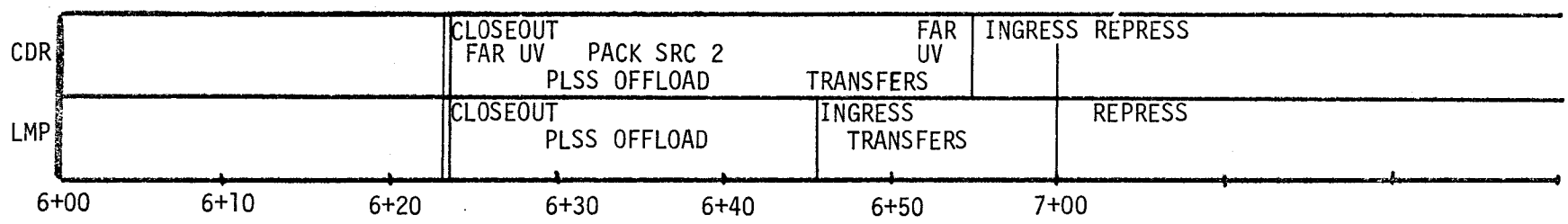

CDR
CLOSEOUT
FAR UV
PACK SRC 2
PLSS OFFLOAD
FAR UV
TRANSFERS
INGRESS
REPRESS
LMP
CLOSEOUT
PLSS OFFLOAD
INGRESS
TRANSFERS
REPRESS
6+00
6+10
6+20
6+30
6+40
6+50
7+00

TABLE 4.2-4

APOLLO 16 DESCARTES WALKING TRAVERSES

EVA II CALCULATED DATA MAR 20 1972

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	2.90	2.50	70				
C				2.90	1+55	1+15	3+10
WALK	0.80	2.50	19				
D				3.70	3+29	1+11	4+40
WALK	3.00	2.50	72				
E				6.70	5+52	0+32	6+24
WALK	0.05	2.50	1				
LM				6.75	6+25	0+35	7+ 0
TOTALS			162			4+18	7+ 0

		-----PLSS FAILURE TRAVERSE CONTINGENCIES-----					
		CONT.	STATION MARGIN			MIN	
	RETURN DISTANCE	WALKBACK TIME	ABOVE WALKBACK REQT (PRIMARY CREWMAN)			WALKBACK SPEED	AVG EVA
STAT NO	TO LM (KM)	TO LM (HR+MIN)	FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	REQ (KM/HR)	MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
C	2.90	0+48	2+45	2+41	4+ 1	2.78	992.09
D	3.10	0+52	1+ 6	1+ 4	2+28	2.98	981.95
E	0.05	0+ 1	1+22	0+36	1+34	0.05	982.67
LM	0.00	0+ 0	0+58	0+11	1+12	0.00	988.33

TABLE 4.2-5

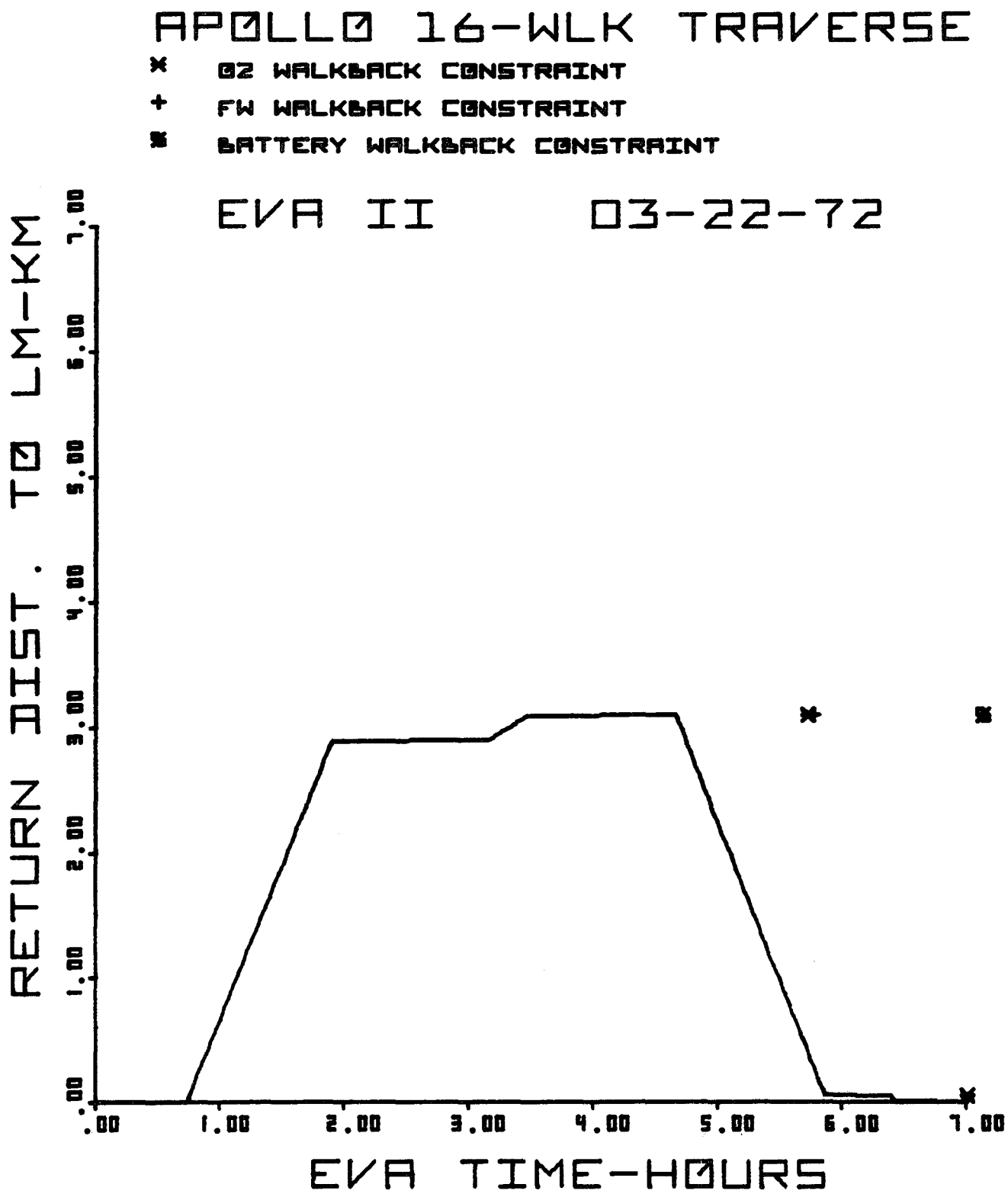
APOLLO 16 DESCARTES WALKING TRAVERSES

EVA II INPUT DATA MAR 20 1972

STATION NO	STOP TIME (HR+MIN)	SEGM 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	125.00	2.50	3.60	1000.0	1560.0
C	1+15	2.90	2.90	125.00	2.50	3.60	1000.0	1560.0
D	1+11	0.80	3.10	125.00	2.50	3.60	1000.0	1560.0
E	0+32	3.00	0.05	125.00	2.50	3.60	1000.0	1560.0
LM	0+35	0.05	0.00	125.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP (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)
1050.0	950.0	1050.0	0.028	11.64	1.353

FIGURE 4.2-5


APOLLO 16-WLK TRAVERSE
02 WALKBACK CONSTRAINT
FW WALKBACK CONSTRAINT
BATTERY WALKBACK CONSTRAINT
EVA II 03-22-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

4.2.3 EVA 3

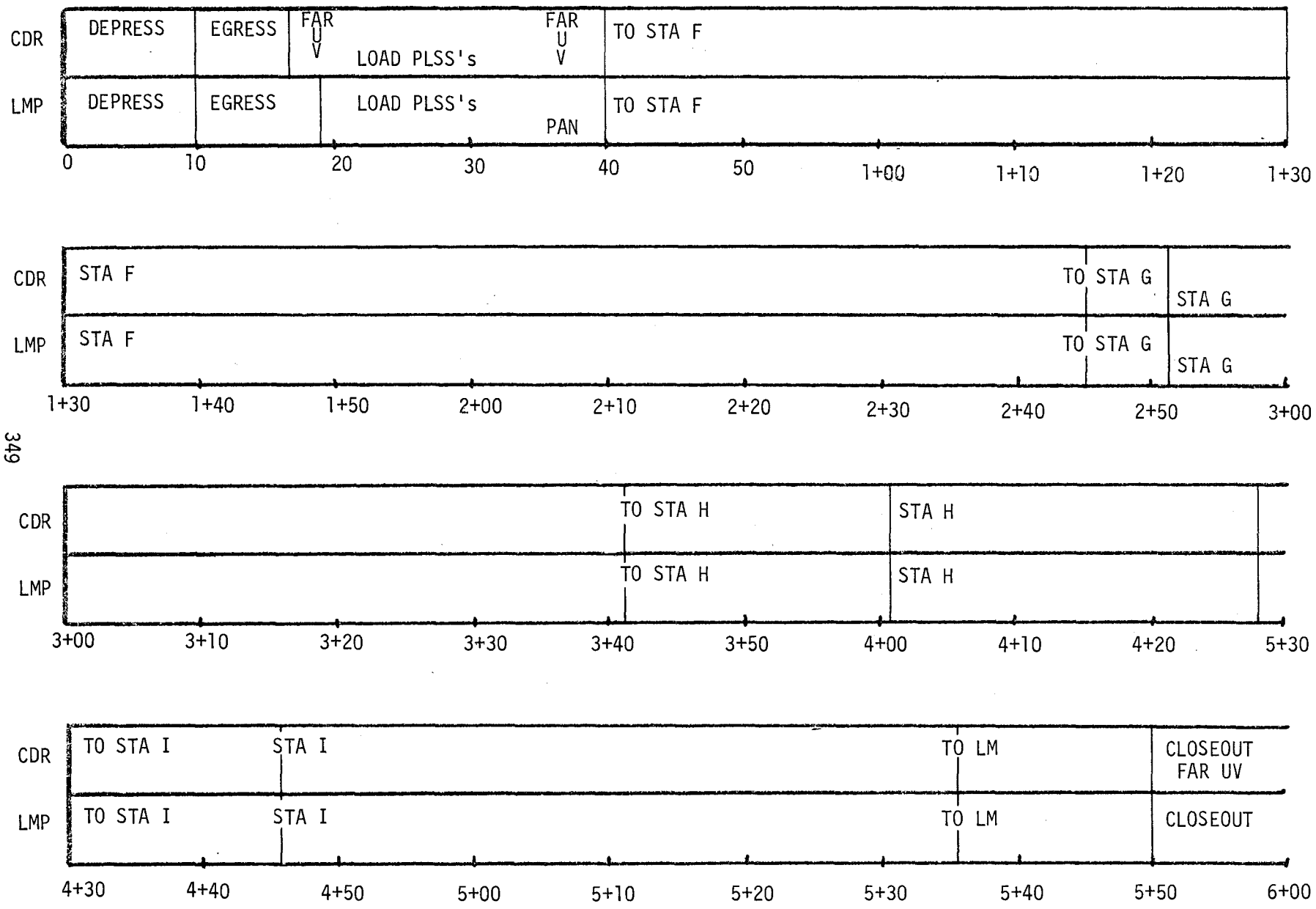
Although the prime objectives of the EVA 3 LRV traverses were North Ray Crater and Smoky Mt., both of these points are beyond the range of the walking traverse (5.5 km and 4.4 km, respectively). A substitute for the Descartes Formation sampling (Smoky Mt.) is not available within walking range, but Palmetto Crater can serve as a substitute for the Cayley sampling originally planned for North Ray. Figure 4.2-6 is a summary timeline for EVA 3, Walking EVA.

The EVA 3 walking traverse, therefore, ranges northward from the LM to Palmetto Crater where three stations are planned (f, g and h) for a total station time of about 2-1/2 hours. After departing the Palmetto vicinity, the traverse continues to station "i" where 50 minutes are spent sampling at an intermediate size crater in the Cayley plains.

Returning to the LM, the final hour of the EVA is spent in closeout activities. The total duration of the EVA is slightly under the usual 7 hours (6 hours 55 minutes) due to limitations on PLSS oxygen.

Details of the EVA 3 traverse parameters are presented in the following tables.

FIGURE 4.2-6
EVA 3 - 2 MAN WALKING



EVA 3 - 2 MAN WALKING APOLLO 16 APRIL 1972

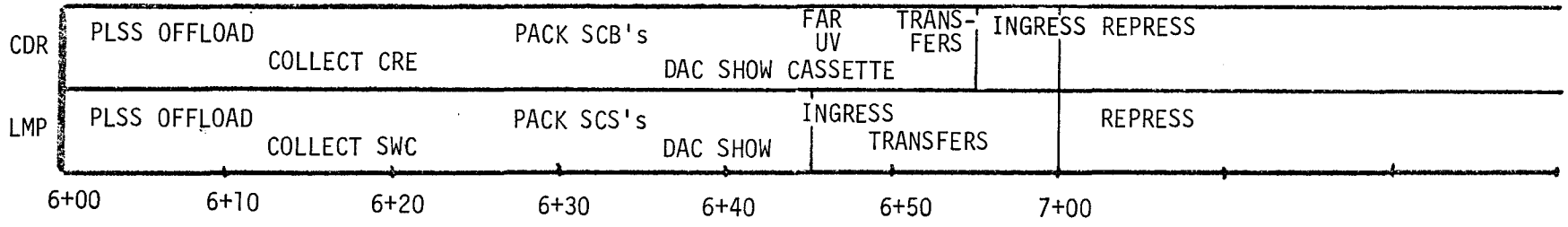


TABLE 4.2-6

APOLLO 16 DESCARTES WALKING TRAVERSES

EVA III CALCULATED DATA MAR 22 1972

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	2.10	2.50	50				
F				2.10	1+30	1+15	2+45
WALK	0.25	2.50	6				
G				2.35	2+51	0+50	3+41
WALK	0.80	2.50	19				
H				3.15	4+ 1	0+26	4+27
WALK	0.80	2.50	19				
I				3.95	4+46	0+50	5+36
WALK	0.60	2.50	14				
LM				4.55	5+50	1+ 5	6+55
TOTALS			108			5+ 6	6+55

		-----PLSS FAILURE TRAVERSE CONTINGENCIES-----					
		CONT.	STATION MARGIN			MIN	
	RETURN DISTANCE	WALKBACK TIME	ABOVE WALKBACK REQT (PRIMARY CREWMAN)			WALKBACK SPEED	AVG EVA
STAT NO	TO LM (KM)	TO LM (HR+MIN)	FW (HR+MIN)	O2 (HR+MIN)	AMP-HRS (HR+MIN)	REQ (KM/HR)	MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	1050.00
F	2.10	0+35	3+26	3+11	4+39	2.02	989.42
G	2.00	0+33	2+34	2+17	3+44	1.92	980.80
H	1.40	0+23	2+12	1+47	3+ 9	1.34	979.18
I	0.60	0+10	1+34	0+57	2+13	0.58	976.03
LM	0.00	0+ 0	0+45	0+ 0	1+17	0.00	988.44

TABLE 4.2-7

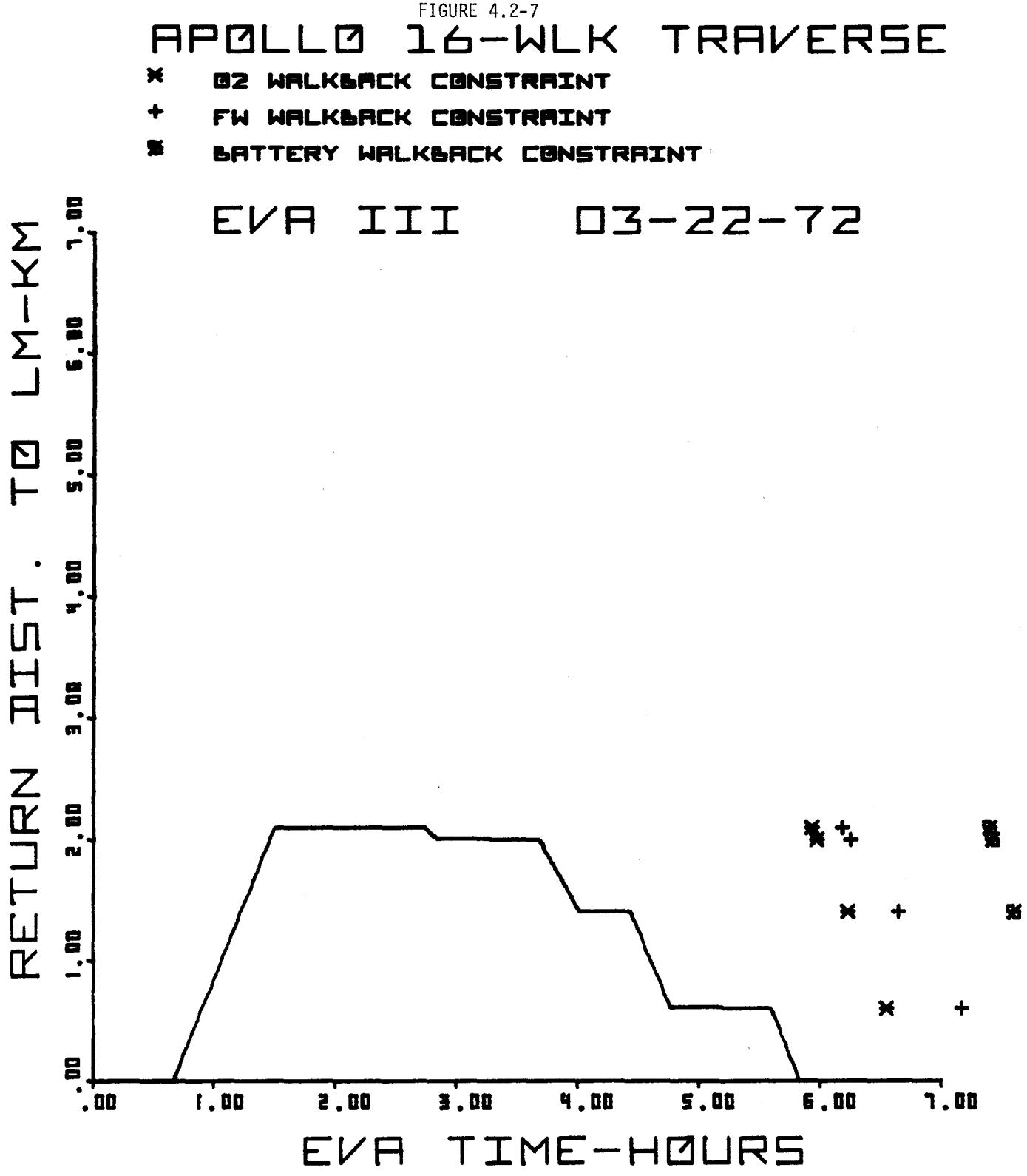
APOLLO 16 DESCARTES WALKING TRAVERSES

EVA III INPUT DATA MAR 22 1972

STATION NO	STOP TIME (HR+MIN)	SEGM 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	180.00	2.50	3.60	1000.0	1560.0
F	1+15	2.10	2.10	180.00	2.50	3.60	1000.0	1560.0
G	0+50	0.25	2.00	180.00	2.50	3.60	1000.0	1560.0
H	0+26	0.80	1.40	180.00	2.50	3.60	1000.0	1560.0
I	0+50	0.80	0.60	180.00	2.50	3.60	1000.0	1560.0
LM	1+ 5	0.60	0.00	180.00	2.50	3.60	1000.0	1560.0

MET RATE ALSEP (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)
1050.0	950.0	1050.0	0.035	11.64	1.353

FIGURE 4.2-7


APOLLO 16-WLK TRAVERSE
O2 WALKBACK CONSTRAINT
FW WALKBACK CONSTRAINT
BATTERY WALKBACK CONSTRAINT
EVA III 03-22-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

4.3 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 4.3-1 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.

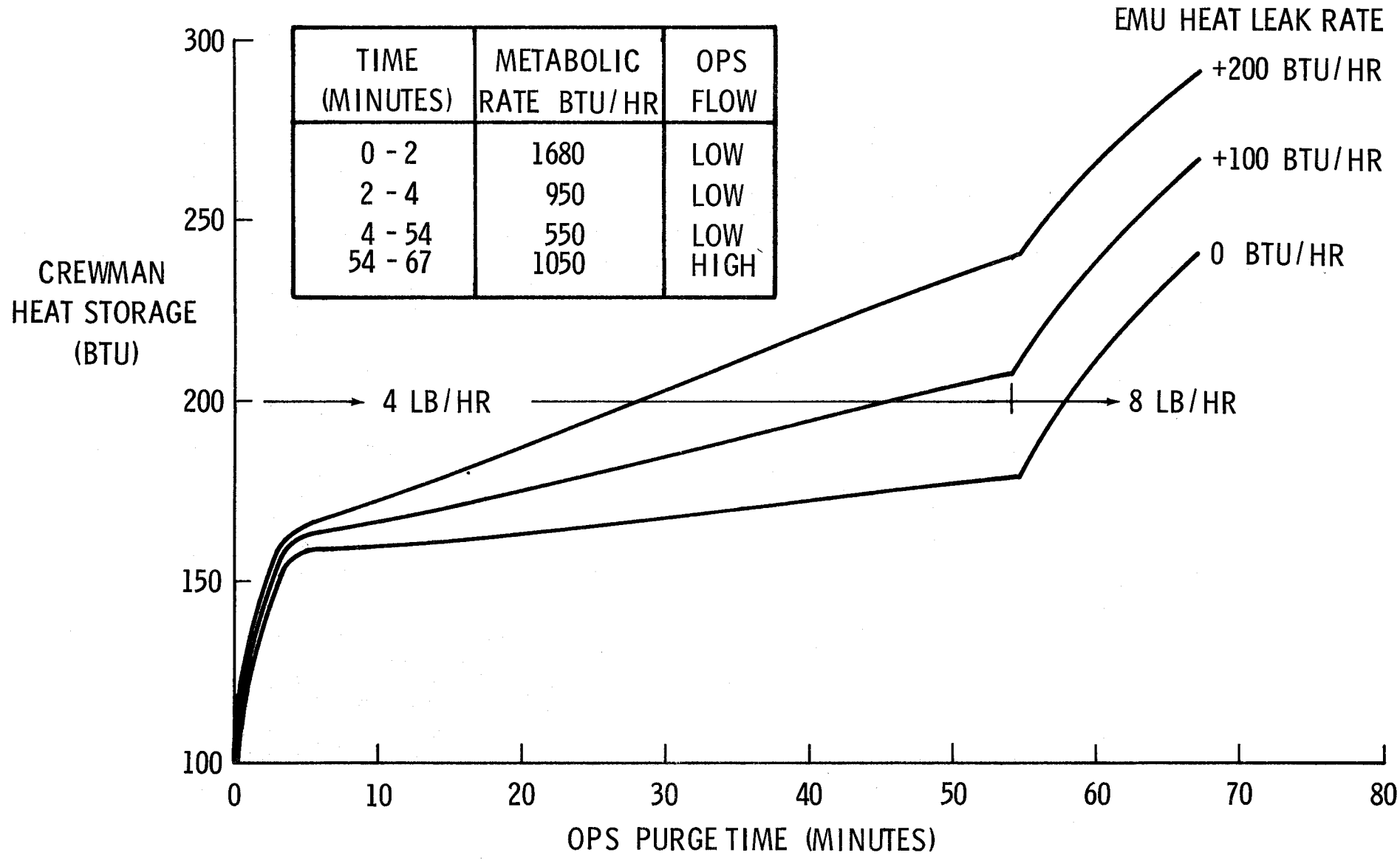


Figure 4.3-1 - Crewman heat storage for contingency LRV Traverse with OPS cooling only (Low- and high-flow mode).

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.

The following is a brief discussion on one man EVA's which were constructed within the framework of the above constraints.

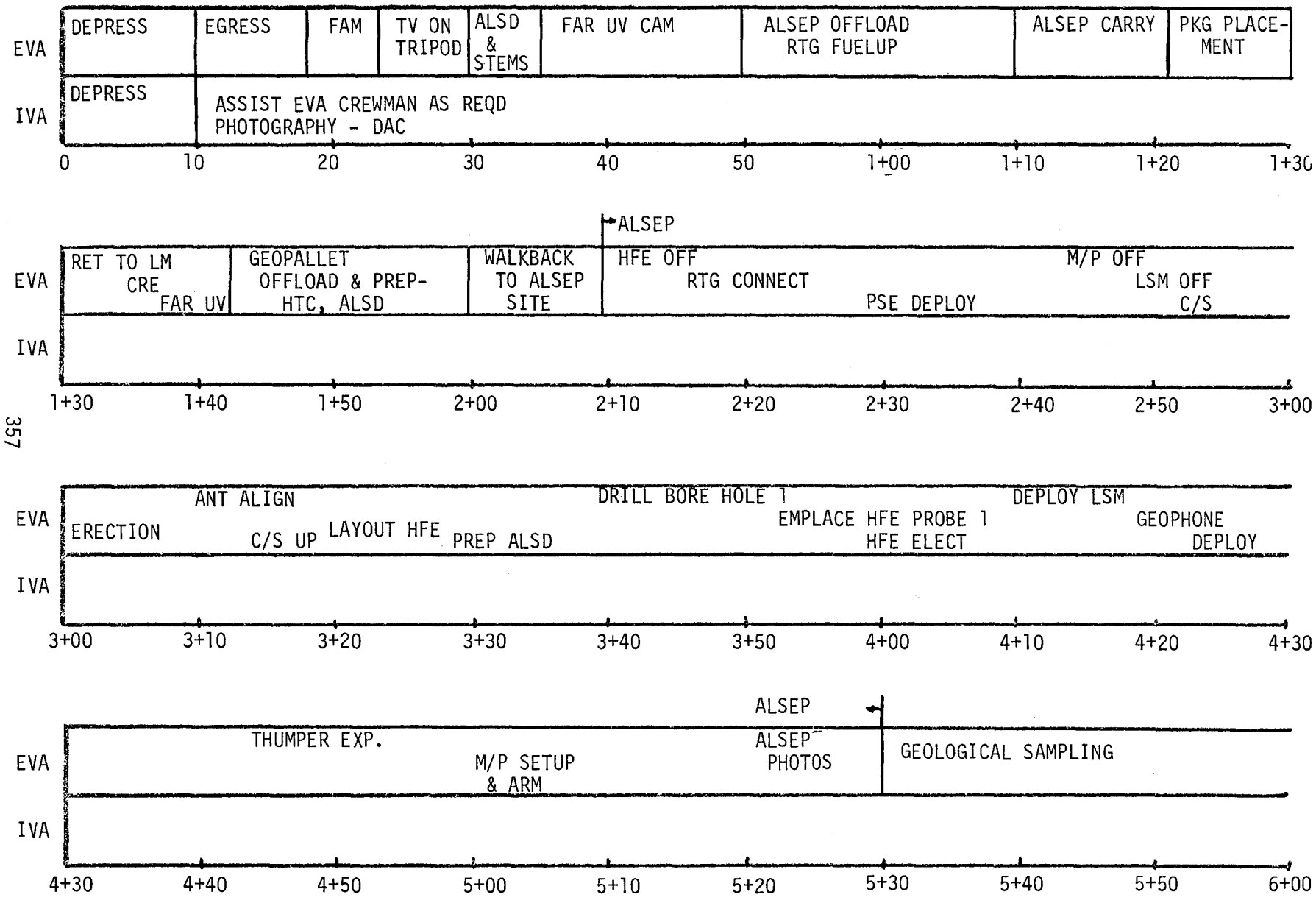
4.3.1 EVA 1

EVA 1 is largely occupied with ALSEP deployment as shown in the summary timeline in figure 4.3-2. Other activities in the LM vicinity are also accomplished such as UV camera photography and cosmic ray detector deployment. About 6 minutes are provided for sampling activities which must be restricted to the vicinity of the LM since the LRV has not been deployed. Other nominal EVA 1 activities which are not performed under this contingency case are the emplacement of the second Heat Flow Experiment probe and part of the Thumper operations associated with the Active Seismic Experiment. The 2.6 m core operation is postponed to EVA 2.

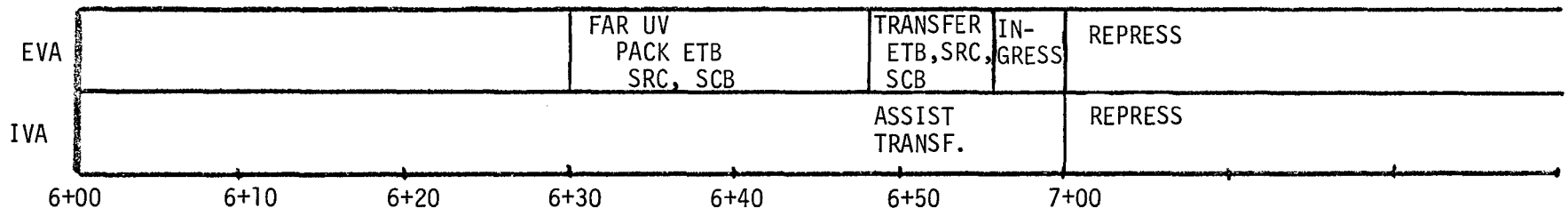
The detailed procedures for EVA 1, One Man EVA are shown in the following pages in a vertical timeline format. A summary of the EVA 1 walking traverse parameter is presented in the tables that follow the detailed procedures.

FIGURE 4.3-2

EVA 1 - 1 MAN APOLLO 16 APRIL 1972



EVA 1 - 1 MAN APOLLO 16 APRIL 1972



APOLLO 16
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ONE-MAN TIMELINE

LUNAR SURFACE EVA 1

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LRU TV	TASK FUNCTION	
				LMP	CDR
Start watch	0+00	Start watch (Call mark)		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		Note: Detailed procedures are presented in "Lunar Surface Checklist" - 1 Man EVA 1 prep.			
	0+10				

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EVA: 1 -1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
Assist	0+10	Move through hatch			
Deploy PLSS ant (EVA)		Deploy PLSS antenna			
Place jettison bag in hatch		Comm check			
Attach LEC to ETB		Descend ladder			
Pass ETB/LEC to CDR		Toss jett bag to Quad I			
		Deploy MESA			
		Deploy LEC/ETB to gnd			
		Descend to footpad			
Note: IVA crewman assists EVA crewman as required with procedures and information. He also photos EVA crewman where possible with DAC.		Step to surface			
		FAMILIARIZATION			
(This IVA column will be dropped until end of the EVA to conserve space)		Check mobility & stability			
	0+20				
		Comment on surroundings			
		Kick jett bag under LM			
		DEPLOY TV CAMERA			
		Adjust MESA height Loosen blanket around lens			
		Open MESA blankets Unstow & deploy TV tripod			
		Unstow TV camera			
		Mount TV camera on tripod			
		Pull TV cable slack from MESA			
		Position TV 12:00/50 ft (f:16,20mm,PK)			
		Check reception with MCC			
		Remove & discard MESA TV Stowage bracket			
	0+30				

MISSION: APOLLO 16
EVA: 1 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
0+30 Offload ALSD from MESA place on +Y pad	0+50	ALSEP PREP			
Offload bore/core stem pkg from MESA; place on +Y pad		Remove therm. cover - SEQ Bay door			
Hang ETB on SRC table		Open SEQ Bay door (white lanyard)			
Unstow antenna canister and set aside; discard brackets		Stow lanyard on strut			
OFFLOAD FAR UV CAMERA		Switch BATT TEMP MON - ON			
Remove thermal blanket		Pull lanyard - unlock PKG 2			
Pull lanyard to split bag		Pull PKG 2 from SEQ Bay, lower to surface			
Remove pallet from LM(optional)		Remove hockey stick & lanyard			
Pull 4 pip pins and remove camera from pallet		Pull lanyard - unlock PKG 1			
Carry camera to deployment site in Quad I (in shadow)		Pull PKG 1 from SEQ Bay, lower to surface			
Deploy Cam. legs & set on surface		Remove hockey stick & lanyard			
Point cam. down sun		Remove tool restraint pins-PKG 2			
Place cam. battery in sun (Temp Lable up)		Remove tool bracket & UHT's; insert UHT's in ALSEP PKGS.			
0+40 Pull 2 elev. pins, azimuth pin and plate pin		Join antenna mast sections to form carry bar; attach to PKG 1			
Remove dust cover	1+00	Put DRT & FTT in SEQ Bay			
Level camera (Use 3 leveling knobs - and/or dig legs into surface to level)		Rotate PKG to surface			
		Remove RTG dust cover			
Caution: Stay away from camera front after protective cover removed		Unstow fuel cask lanyard; pull to rotate cask down			
		Get DRT from SEQ Bay			
Release azimuth lock, point cam. down sun; lock		Remove cask dome using DRT, discard under LM			
Zero azimuth scale if req'd.		Get FTT from SEQ Bay			
Set in first target coord. AZ. 14 ° El. 48 °		Remove fuel element from cask			
Position cam. power Sw - ON		Insert fuel element into RTG			
		Rotate PKG 2 upright and attach to carry bar & PKG 1			
		Close SEQ Bay door			
		Pick up ALSEP Pkgs			
0+50	1+10				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 1 -1 MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
1+~~10~~ ALSEP TO DEPLOY SITE	1+30	Return to LM			
Carry ALSEP PKGS to deploy site ≥ 300 ft W of LM					
		Shift CRE plate-pull RED ring			
		Report CRE dust condition			
		Set Far UV Cam to target #2			
		• Push reset switch			
		• Check film advance			
		• Set in target coordinates			
1+~~20~~ ALSEP PACKAGE PLACEMENT	1+40				
Place ALSEP Pkgs on surface					
Move Pkg 2 8' West of Pkg 1, orient UHT's pointing North		OFFLOAD GEOPALLET			
		Remove thermal blanket Pull pip pins; remove pallet			
		Carry pallet to LRV and install; check latches engaged			
		Remove pallet handrails (2) Pull 2 outboard penetro. lanyards			
		Remove HTC pip pins			
		Take HTC off pallet (Lean pallet against +Y pad on MESA)			
1+30	1+50				

MISSION: APOLLO 16
EVA: 1 -1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
1+50 Assemble XT handle to scoop		2+10 Release pull rings (2); pull pip pins (3)			
Place tongs on HTC		Pull M/P base pin #1; unwrap tape; remove cover; pull pin #2			
Place SCB on HTC		Remove M/P; set on surface			
Offload SRC 1		Pull subpallet pip pin Rotate Pkg 2 to surface, align			
		Remove HFE - 2 BB & connector Place HFE on surface			
Open SRC 1		Connect HFE to C/S - lock			
Place SCB 1 on HTC		Carry HFE pallet 10' S of C/S, place on surface			
Hang ETB on HTC					
Turn TV to cover ALSEP					
Pick up ALSD, HTC, and stems		CONNECT RTG Tether UHT			
		Read RTG cable Temp Lable			
Walk back to ALSEP area		Release RTG cable - 3 BB			
		Remove RTB cable and pull pin to release connector			
2+00		2+20			
		Verify shorting switch - OUT Report amp reading			
		Connect RTG cable to C/S, push down collar to lock			
		Remove subpallet & aim mech. from Pkg 2 - 4 BB			
		Place subpallet & aim mech. NNE of C/S			
		Remove PSE stool from subpallet Position PSE stool on surface 8 ft ESE of C/S; dig out hole			
		Stow ant. mast on subpallet			
		Remove Pkg 1 dust cover Rotate Pkg 1 to surface and align			
Deposit HTC, ALSD & stems 30' S C/S					
HFE OFFLOAD					
2+10		2+30			

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 1 -1 MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
2+30 DEPLOY PSE		2+50 REMOVE LSM			
Remove PSE from Pkg 1 - 4 BB		Release LSM from C/S - 2 BB			
		Lift LSM off C/S, ck. cable			
Carry PSE to stool		Set LSM on surface clear of C/S			
Remove 4 Boyd Bolts from PSE					
Remove girdle pull pin					
Place PSE on stool; align					
Remove girdle and discard					
Deploy PSE thermal shroud, smooth down edge		ERECT CENTRAL STATION			
Level & Report compass reading		Level and align Pkg 1			
		Release C/S So. side - 5 BB			
		Release E side & ant. - 4 BB			
		Remove rear curtain cover; use UHT socket, pull pins, velcro			
2+40		3+00 Release ant. cable bracket			
Verify C/S sw #5 - CW					
		Release C/S N side - 3 Bb			
Remove T/G from C/S - 1 BB					
Deploy T/G					
Verify T/G dial at "0"					
Lean T/G against subpallet		Release W side & ant. 4 BB			
		Verify sunshield released			
OFFLOAD MORTAR PACKAGE		Release 2 N interior BB			
Remove M/P from C/S		Release center BB and			
Pull socket pin ring; deploy 1st leg		control sunshield erection			
Rotate M/P on swivel socket					
		Check side curtains deployed			
		discard covers			
Deploy 2nd leg, position legs		Attach rear and front of			
Place M/P NNE C/S; point NW		side curtains			
2+50		3+10			

MISSION: APOLLO 16
EVA: 1 -1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
3+10 Attach rear thermal curtain to side thermal curtain	3+30	Configure ALSD hardware:			
ASSEMBLE & ALIGN ANTENNA		•Verify motor operates			
Retrieve ant. mast from subpallet; install on C/S		•Pull pin #2			
Retrieve aiming mech. from subpallet, remove dust cover		•Rotate rack camloc 90°			
Install aiming mech. on mast		•Rotate batt camloc 90° pull pin lanyard			
Remove aiming mech. housing and packing		•Remove handle and install on battery			
Install antenna on aiming mech.		•Rotate rack bracket up			
Level and align aiming mech.		•Lift rack off treadle, extend legs and set on surface			
Set antenna offsets:		•Pull pin #5, move bracket & lift drill			
Az - 24.68					
El - 16.59		Carry drill, rack and bore/core stem bag to HFE Hole #1 site			
Push in shorting switch, report amps					
3+20 Turn Sw #1 CW; report to Hou.	3+40	BORE HOLE 1 DRILLING			
LAYOUT HFE		Set drill on surface			
Remove probe box from pallet - 4 BB		Lean bore/core stem bag against rack; open bag			
Split probe box (2 velcro straps)		Insert 54" bore stem into drill			
Carry half with rammer to HFE Hole #1 (~ 18' W)		Pick up drill & push bit into surface as far as possible			
Place box half on surface		Remove batt. thermal shield			
Carry other box half 10' away place box on surface		Energize drill until stem top approx. 16" above surface			
		Attach wrench to bore stem			
Set up HTC/Drill support		Remove drill from stem			
Place ALSD on HTC		Screw 28" bore section to section in surface			
3+30	3+50				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 1 -1MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
3+50 Screw drill onto bore section Energize drill until stem top approx 16" above surface	4+10	DEPLOY LSM Carry LSM to deploy site (50'WSW)			
		Remove stowage bracket Deploy legs & verify locked Set LSM on surface(striped leg E)			
Attach wrench to bore stem Remove drill from stem Screw 28" bore section to section in surface Energize drill until stem top approx 11" above surface		Remove foam packing Deploy sensor arms (center one first)			
		Remove sensor dust covers			
		Clean debris from top of LSM			
Attach wrench to bore stem Remove drill from stem, set on surface		Raise legs so that PRA cover will clear bottom			
EMPLACE HFE PROBE 1		Pull striped ring to remove PRA cover;verify PRA deployed			
Remove HFE probe from box Deploy rammer, lean on rack Insert probe and first thermal shield into bore hole, using rammer		Level & align LSM			
4+00	4+20	DEPLOY GEOPHONES			
Report probe depth & stem height above surface Emplace second thermal shield to 30" depth		Turn Sw 5 - CCW Pick up T/G from pallet			
Place sunshield over top of stem, place probe wire N		Walk approx. 8'N with T/G			
DEPLOY HFE ELECTRONICS Remove HFE elec. box from pallet Remove dust cover (4BB) Level & align HFE elec box		Get stakes from M/P base. Deploy 1, put 1 in pocket stake power and geophone cable loops just N of C/S			
Remove all debris at least 16' away from HFE area		Walk out (290°) until 1st geophone is reached			
		Remove geophone clip end geophone #1 Emplace geophone #1 into surface (within 7° of vertical)			
		Walk out 150' until 2nd geophone is reached			
4+10	4+30				

MISSION: APOLLO 16
EVA: 1 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+30				
	4+50	Do thumper positions 1,6,11,16,21 only			
Remove geophone clip and geophone #2					
Put down T/G					
Stake geophone cable at geophone #2					
Emplace geophone #2 into surface (within 7° of vertical)					
Walk out 150' until 3rd geophone is reached					
Remove geophone clip and geophone #3					
Emplace geophone #3 into surface (within 7° of vertical)	4+40				
	5+00	SET UP MORTAR PACKAGE			
Remove flag and emplant by geophone #3		Return to C/S			
Unreel remaining power cable		Turn astro sw #5 - CW			
		Deploy M/P base (pull pin #3)			
THUMPER GEOPHONE EXP.		Insert UHT in M/P base			
Verify "GO" for thumping from MCC		Using UHT & M/P base as sun compass, estimate geophone line heading			
To fire thumper:					
- Select ASI		Carry M/P and base ~ 50 ft NNE of C/S			
- Rotate arm switch		Place M/P on surface			
- Wait 4 sec.		Deploy M/P base legs(pull pin #4)			
- Depress switch to fire		Using UHT, orient base to same heading as geophone line			
Remain motionless 10 sec. before and 10 sec. after each thumper firing					
	4+50				
	5+10				

MISSION: APOLLO 16 DATE: APRIL 1972

EVA: 1 - 1 MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
5+10 Place base on surface and emplant legs. Verify base is flat on surface	5+30	Pick up HTC - move to West for sampling			
Place M/P on base; front pins 1st, then lock on rear posts		(Note: extent of traverse and locale TBD in real time for a 1-man contingency.)			
Verify wires in front off base					
Check M/P bubble level reading					
Deploy M/P antenna					
Return to C/S					
Mount HEDC on EMU; leave UHT					
Check PSE shroud					
Photo M/P					
- Down sun; 7 ft.					
- Viewing NE; 7 ft.					
- Viewing SE; 7 ft.					
- With C/S in bkgnd; 15 ft.					
Arm Mortar package:					
• Rotate latch with UHT					
• Remove safety pin (lanyard)					
• Rotate 2 Safe/Arm					
• switches with UHT					
• Verify alignment and level					
5+20 Position C/S Sw #5 - CCW	5+40				
TAKE ALSEP PHOTOS					
Coordinate photo activity with CDR thumping					
Photo:					
• HFE Bore stems					
- Down sun, 11 ft (ea.)					
- Stereo pair, X Sun, 7 ft (ea)					
• HFE Electronics Box					
- X Sun, 7 ft.					
• Panorama S of C/S					
• Xsun photo of C/S taken from North					
5+30	5+50				

MISSION: APOLLO 16
EVA: 1 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
5+50	6+10				
6+00	6+20				
6+10	6+30	Return to LM Turn TV to face LM			

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 1 - 1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+30	Reset Far UV camera			
		Enter azimuth & elevation (verify with MCC)			
		Photo Far UV camera - Xsun; 20 ft, f5.6/60 - Dnsun; 3 ft, f5.6/60			
		Pack (or Prep) ETB • HEDC • Extra mag • Map(s) (attach to LEC)			
Photo CDR;	6+40				
Prepare to assist in transfers		Prep SCB for transfer			
		Pack SRC 1			
		(Note: MCC may advise holding SRC 1 over to EVA 2)			
		Deploy SWC 60' at 2:00 Extend SWC staff sections Press staff into surface Deploy foil; hook on staff			
		Offload Pallet 1 Tidy MESA blankets			
		TRANSFERS			
Open hatch		Ascend ladder with pallet Pass pallet thru hatch			
Receive Pallet 1					
	6+50				

MISSION: APOLLO 16
EVA: 1 - 1 MAN

DATE: APRIL 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM	TASK FUNCTION LMP	TASK FUNCTION CDR
Strip pallet 1 of expendables	6+50	Ascend ladder with SCB			
		Place on platform			
		Descend ladder			
		Ascend ladder with SRC (if any)			
Receive SCB and SRC		Pass SCB and SRC into cabin			
Pass pallet 1 out		Jettison Pallet 1 (watch out for Far UV Camera)			
Detach ETB, pass out LEC end		Pull up ETB & pass into cabin			
		Drop LEC			
Fold EVA PLSS antenna		Move through hatch			
Close hatch					
NOTE: DETAILED PROCEDURES FOR FINAL EVA 1 CLOSEOUT ARE PRESENTED IN THE "LUNAR SURFACE CHECKLIST"	7+00				

TABLE 4.3-1
CALCULATED DATA
EVA 1 ONE MAN EVA

TABLE 4.3-2
INPUT DATA
EVA 1 ONE MAN EVA

For a one man EVA 1, geology sampling will be conducted near the LM hence there is no data in the above two tables for a walking traverse.

4.3.2 EVA 2

The LRV is deployed at the beginning of EVA 2 and configured for the traverse which begins about 2 hours into the EVA (See figure 4.3-3).

Approximately 3-3/4 hours are available for the traverse and the crewman returns to the LM with sufficient time to obtain the 2.6 m core which was deferred from EVA 1. Closeout activities occupy the last 45 minutes of EVA 2.

The traverse proceeds first towards the base of Stone Mountain along the same route as the normal LRV traverse. The allotted time for emergency drive-back on the OPS will represent the maximum distance the traverse will be permitted to extend, the distance being a function of LRV speed and will be determined in realtime. If possible, it will be desirable to reach the vicinity of station 5 so that the Descartes Formation can be sampled. (If this is not possible, the first sampling station will be as near to station 5 as the drive-back constraints permit.) Approximately 1 hour will be spent at this station. The traverse will then range over to the vicinity of station 8 where the sampling activities have also been allotted 1 hour. Proceeding northward, 28 minutes will be spent at station 9, at which point the traverse swings over to the outbound LRV tracks and the crewman proceeds back to the LM.

The detailed procedures for EVA 2, One Man EVA are shown in the following pages in a vertical timeline format. A summary of the EVA 2 traverse parameter is presented in the tables that follow the detailed procedures.

FIGURE 4.3-3

EVA 2 - 1 MAN

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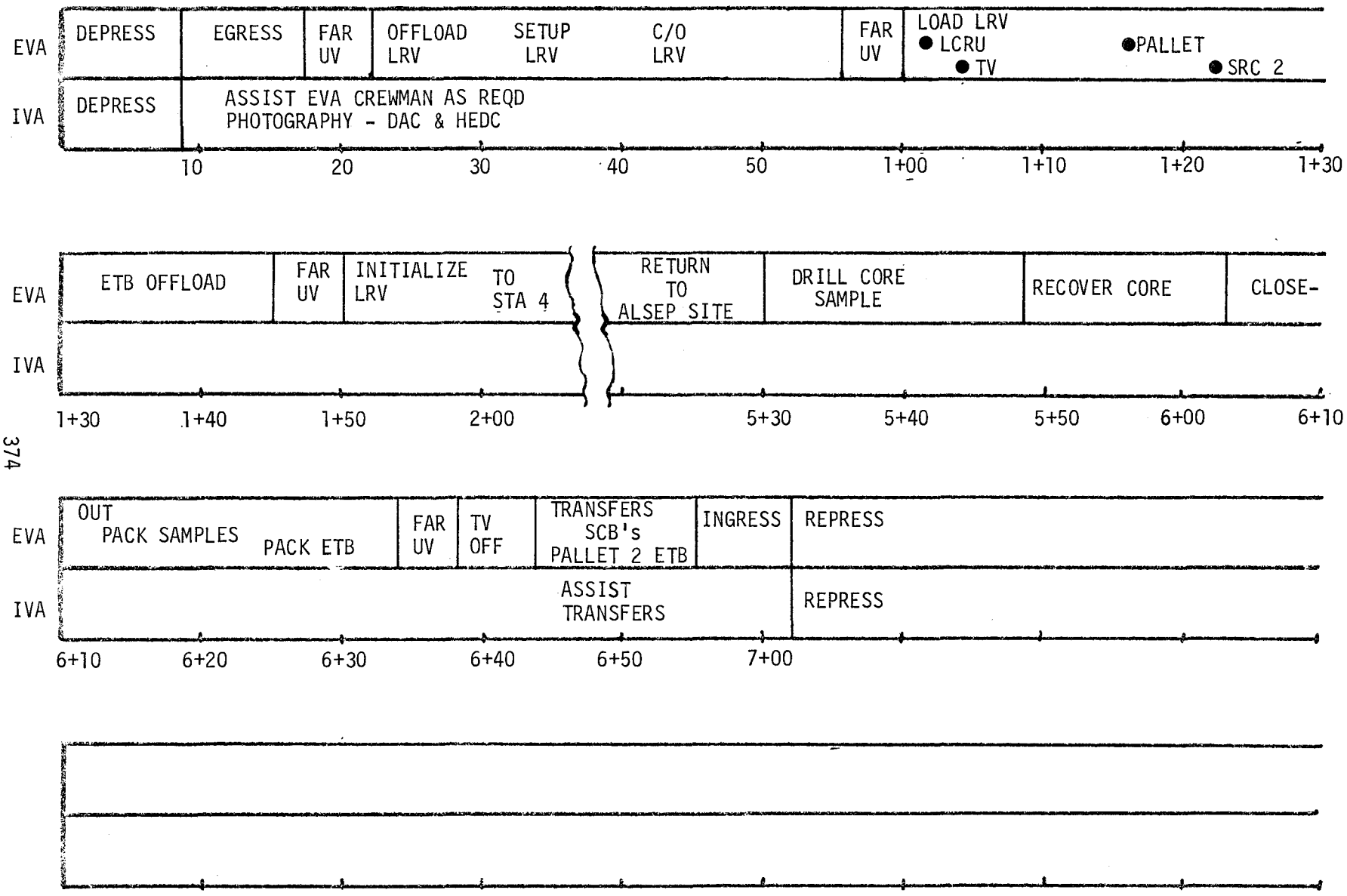

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ONE-MAN TIMELINE

LUNAR SURFACE EVA 2

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
Start watch	0+00	Start watch (Call MARK)		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		Note: Detailed procedures are presented in "Lunar Surface Checklist"			
	0+10				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 2 - 1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
Assist	0+10	Move thru hatch			
Deploy PLSS Antenna (EVA) Place jettison bag in hatch Attach ETB to LEC pass back out		Deploy PLSS Antenna Comm check Pass LEC into cabin Toss jettison bag to quad I			
		Lower ETB to surface			
		Descend ladder to footpad			
Note; IVA crewman assists EVA crewman as required with procedures & information. He also photos EVA crewman where possible with DAC (This IVA column will be dropped until end of the EVA to conserve space)		Step to surface Kick jettison bag under LM <u>RESET FAR UV CAMERA</u> Punch reset Enter new azimuth & elevation (Check with MCC for updates)			
	0+20				
		<u>OFFLOAD LRV</u> Remove LRV thermal blankets Unstow deploy cable; stow on +Z strut Unstow left side deploy tape Verify: • Walking hinges engaged • Chassis parallel alignment • Outrigger cables taut Unstow right side deploy tape Ascend ladder Pull LRV deploy D-handle verify LRV rotates outboard Descend ladder, pick up deploy cable Pull right side tape until aft wheels on surface & cables slack			
	0+30				

MISSION: APOLLO 16
EVA: 2 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
0+30 While pulling tape, maintain tension on deploy cable until LRV in walling hinges	0+50	Report: AMP-HR; AMPS VOLTS; TEMPS			
		Verify: PWM SEL sw - BOTH			
		Position: • DR EN LF & RF - PWM 1			
		• DR EN LR & RR - PWM 2			
Pull pin - rt. side outrig. cable		• 15 V DC - SEC			
Pull pin - left side outrig. cable		• STEER FWD - BUS A			
Pull left side tape until fwd. wheels on surface & cables slack*		• STEER REAR - BUS D			
Pull saddle release cable		• DR PWR LF & RF - BUS A			
		• DR PWR LR & RR - BUS D			
Tug LRV away from LM		Drive LRV to MESA area			
		15 VDC sw - OFF; AUX CB - close			
Pull pin & discard deploy cable					
Raise geopallet post					
SET UP LRV		RETARGET FAR UV CAM			
Deploy left rear fender					
Verify rear hinge pin - o.k.		Punch reset			
Erect left seat; unstow seat belt		Check film advance			
Lower & lock console					
Pull att. indicator, C&W pins		Enter new azimuth & elevation (verify with MCC)			
Remove tripod & install toehold					
0+40 Erect left footrest	1+00	LOAD LRV			
Ver. front hinge pin & steering seal - o.k.		Lift LCRU posts on frt. of LRV			
		Disconnect Y-cable connectors			
Deploy left front fender		Discard cable adapters			
Deploy right rear fender		Unstow LCRU from MESA and install on LRV			
Verify rear hinge pin & steer seal - o.k.		Connect Y-cable conn. to LCRU			
Erect right seat; unstow seat belt		Unstow TCU from MESA and install on LRV			
Lower & lock console					
Remove tripod & install toehold					
Erect right footrest		Unstow rake, stow on MESA; discard rake bracket			
Verify front hinge pin - o.k.		Unstow LGA and install on LRV; point ant. straight up			
Deploy right front fender		Connect LGA cable to LCRU			
Verify batt. covers closed		Unstow HGA and install on LRV			
Place LRV conting. tool on floor		Remove HGA yellow bracket			
CHECKOUT LRV					
Verify parking brake on					
Mount LRV					
Close all CB's except AUX, NAV.					
0+50 *Pull on deploy cable during this operation as req'd	1+10				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 2 - 1 MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
1+10 Erect ant. mast; lock Connect HGA cable to LCRU; velcro cable to ant. mast Deploy and lock HGA dish	1+30	Re-install HTC on pallet			
Point HGA to earth					
Go to TV camera location		Place SCB on HTC (any 1 of NO's 5-8)			
Position TV cam pwr sw - OFF Disconnect TV pwr. cable		Unstow SRC 2			
Remove TV cam. from tripod and install on LRV (stow TV pwr. cable conn. on LM)		Place SRC 2 on MESA table*			
		Open SRC 2			
Connect TCU/TV cable to TV		Take out SCB 2 and install on HTC			
Connect Y-cable conn. to TCU Deploy LCRU VHF antenna					
Configure LCRU: • CB - closed • Mode sw - PM1/NB • Power sw - INT • Report - AGC,TEMP,POWER		Close organic Control sample			
		Unstow DAC; install mag; place on LRV			
1+20 • LCRU Blkts - (MCC)	1+40	Unstow HEDC from MESA, stow in ETB			
• Power sw - EXT • Mode sw - FM/TV (2) • Verify - AGC & POWER > 2		Take ETB to LRV Install bag shoe on HEDC; Stow under CDR seat: 500mm Cam 3 HEDC mags; 2 DAC mags			
Discard ant. container brackets		2 lens brushes; sun compass Stow padded bags under LMP seat			
PALLET ON LRV Carry pallet to LRV and install; check latches engaged		Install maps/holder on LRV (L side) Don HEDC			
		Place ETB on SRC table			
Remove pallet handrails (2)		Tidy MESA Blankets			
Pull 2 outboard penetro. lanyards		RETARGET FAR UV CAM			
Place LPM tripod in bag Place penetro. in pallet hole		Punch reset Check film advance			
Remove penetro. cone cover Install vise on pallet top		Enter new azimuth & elevation (verify with MCC)			
Place gnomon in bag on CDR Seat		LRV NAV INITIALIZATION LCRU mode sw - 1			
Stow dust brush on LCRU		Mount LRV			
Stow rake in pallet hole		Align LRV NAV system (Ref. LRV Decal)			
1+30	1+50	* if SRC 1 held over, put SRC 1 on +Y pad			

MISSION: APOLLO 16
EVA: 2 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
1+50 Leave for Station 4 (Stone Mountain)	5+20				
Note: number of Stations visited, activities at Stations, and time at Stations TBD in real time between EVA's in the event of a 1 - man EVA. See foregoing discussion for general guidelines		Return to ALSEP Site			
		Power down LRV			
		Sw LCRU - Mode 3 Align HGA			
	5+30				
		Dust TV, TCU, & LCRU			
		Walk over to HFE area			
		Activate ALSD momentarily to check operability			
		DRILL CORE SAMPLE			
		Take drill, rack and core stems to deep core site So. of C/S			
		Set drill on surface			
		Lean core stem bag against rack			
		Insert core stem with adapter into drill			
		Pick up drill and push stem into surface as far as possible			
5+20	5+40				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 2 - 1 MAN

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
5+40 Energize drill until stem top is approx. 12" above surface	6+00	Take core string to LRV; install string in vise on pallet			
Attach wrench to core stem		Using wrench, break core string between 3rd & 4th section			
Remove drill from stem		Cap ends of core sections			
Screw another core stem section to section in surface		Place stems on floor of LRV			
Screw drill onto core section		Mount LRV			
Energize drill until stem top is approx. 12" above surface		± 15 VDC Sw - ON			
Attach wrench to core stem		Return to LM			
Remove drill from stem					
Screw last core stem section to section in surface		EVA CLOSEOUT			
Screw drill onto core section		Park LRV at MESA; in sun; Heading = 351°			
Energize drill until stem top is approx. 8" above surface		± 15 VDC Sw - OFF			
		Dismount LRV			
		LCRU mode Sw - 3			
		Align HGA			
Keep drill energized for 15 sec. to clear flutes		Dust LCRU & GCTA			
5+50	6+10				
DRILL CORE RECOVERY		Reset Far UV cam.			
		Punch reset			
Pull drill string up as far as possible		Check film advance			
		Enter new azimuth & elevation			
Attach wrench to core stem					
Remove drill from stem					
Retrieve stem caps from rack; cap top		PACK SAMPLES			
		Take SCB(s) off HTC and place on +Z pad			
Pull core string out of surface by hand or if difficult:		Place SCB 1 in SRC 1			
		(if still out)			
-assemble jack to treadle		Place SCB 2 in SRC 2*			
-position jack/treadle over core stem in surface					
-jack core out of surface		* Note: MCC may advise holding SRC 2			
6+00	6+20	over to EVA 3			

MISSION: APOLLO 16
EVA: 2 - 1 MAN

DATE: APRIL 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+20	Place SRC(s) on +Z pad			
		Bag two core stem strings			
		Photo pan (20 ft off +Z pad)			
		Pack ETB: 2 - HEDC w/Mags 2 - 70 MM Mags			
Photo EVA crew man (tgts of opportunity)		3 - DAC Mags			
		(take mag off - DAC Batt to Sun)			
		1 - 500 MM Mag			
	6+30	Maps			
		2 - padded bags			
		Take ETB to LM, attach to LEC			
		Offload pallet 2			
		Place on +Z pad			
		RETARGET FAR UV CAM			
		Punch reset Check film advance			
		Enter new azimuth & elevation			
		CLOSEOUT TV & LRV			
		LCRU pwr. Sw - OFF			
	6+40				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 2 - 1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+40	Open LRV batt covers; dust if dirty			
		Dust LCRU			
		LCRU covers (ask MCC)			
		Configure LRV CB's - A, B, C, D - OPEN			
TRANSFERS		TRANSFERS			
Open hatch		Take pallet 2 up ladder to platform			
		Hand pallet 2 to IVA			
Receive pallet 2, Strip & stow expendables					
		Return to surface, pick up stems & SCB's			
		Take stems & SCB's up ladder to A/S pass thru hatch			
Receive stems & SCB's - Stow	6+50	Take pallet 2 back to surface, jettison under LM			
Hand out Pallet 2					
Receive & Stow SRC(s)		Take SRC(s) to A/S pass thru hatch			
Receive ETB, detach from LEC, pass LEC back		Pull up ETB, pass thru hatch			
		Drop LEC to surface			
Fold EVA PLSS antenna		INGRESS			
		Move thru hatch			
Close hatch					
NOTE: Detailed procedures for final EVA 2 closeout are presented in the lunar surface Checklist	7+00				

TABLE 4.3-3

APOLLO 16 DESCARTES TRAVERSES

EVA II CALCULATED DATA MAR 14 1972

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+53	1+53
RIDE	4.10	7.30	34				
5				4.10	2+27	1+ 0	3+27
RIDE	2.50	7.30	21				
8				6.60	3+47	1+ 0	4+47
RIDE	0.45	7.30	4				
9				7.05	4+51	0+28	5+19
RIDE	2.60	7.30	21				
LM				9.65	5+40	1+20	7+ 0
TOTALS			80			5+41	7+ 0

ONE MAN EVA

NOTES:

- STATIONS 4, 6, 7 AND 10 DELETED
- STATION 5 INCREASED FROM 40 MIN TO 1 HR
- STATION 9 INCREASED FROM 25 TO 28 MINUTES

		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
5	4.10	1+31	2+26	1+38	2+51	3.94	4.69	939.46
8	3.15	0+52	1+50	1+ 3	2+ 9	3.02	3.60	913.80
9	2.60	0+43	1+34	0+47	1+47	2.50	2.97	912.76
LM	0.00	0+ 0	1+22	0+36	1+12	0.00	0.00	920.44

TABLE 4.3-4

APOLLO 16 DESCARTES TRAVERSES

EVA II INPUT DATA MAR 14 1972

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+53	0.00	0.00	125.00	3.60	7.30	1560.0
5	1+ 0	4.10	4.10	125.00	2.70	7.30	1290.0
8	1+ 0	2.50	3.15	125.00	3.60	7.30	1560.0
9	0+28	0.45	2.60	125.00	3.60	7.30	1560.0
LM	1+20	2.60	0.00	125.00	3.60	7.30	1560.0

ONE MAN EVA

NOTES:

- STATIONS 4, 6, 7 AND 10 DELETED
- STATION 5 INCREASED FROM 40 MIN TO 1 HR
- STATION 9 INCREASED FROM 25 TO 28 MINUTES

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM D/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.028	11.64	1.353

4.3.3 EVA 3

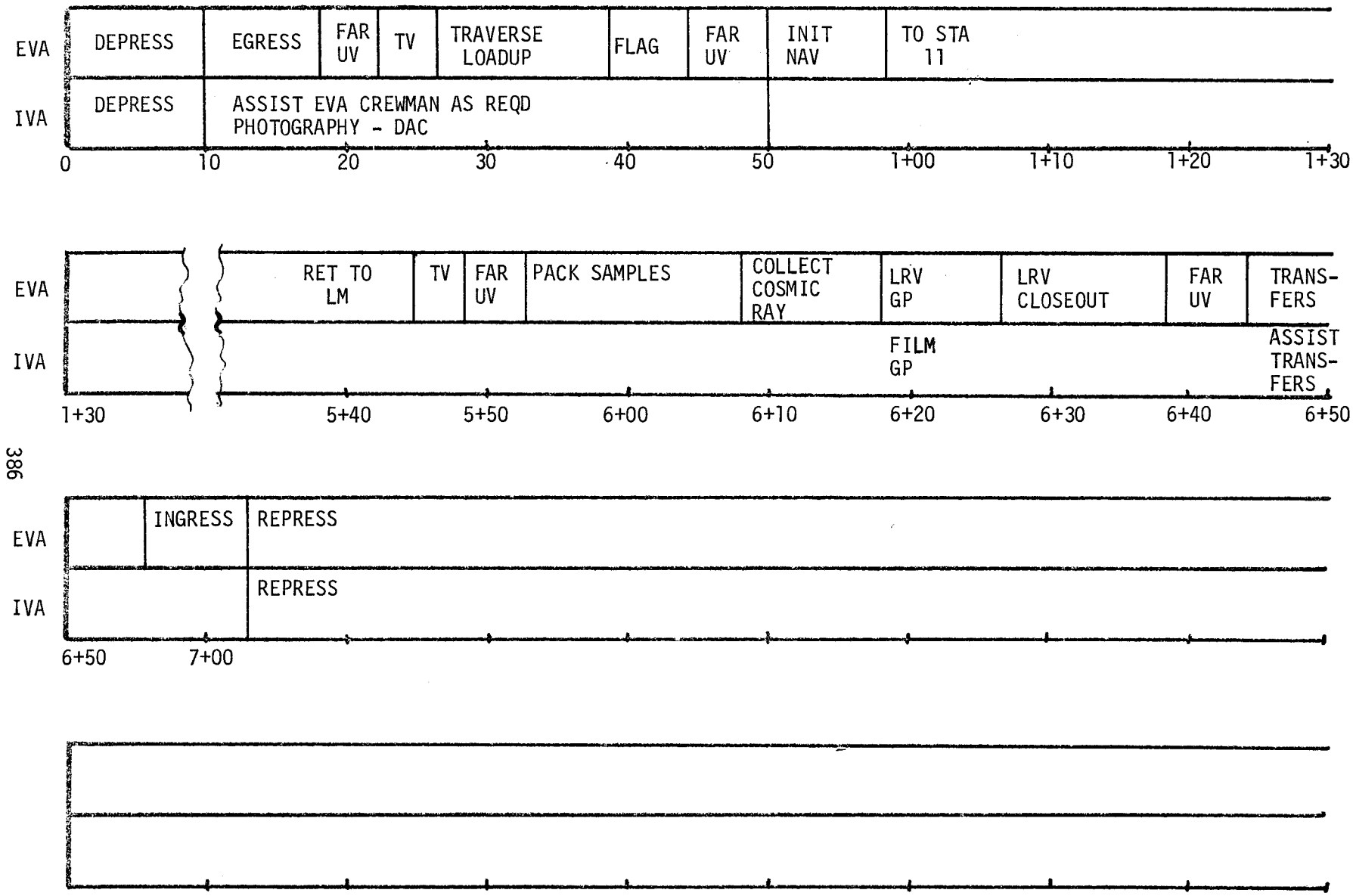
The traverse gets underway about 1 hour into EVA 3 and approximately 5 hours are available for traverse activities. (See figure 4.3-4.)

Proceeding northward along the nominal route, the traverse objective is to reach the visible ejecta blanket from North Ray crater. Again, the distance reached will be a function of the actual LRV speed over the time allowed for emergency return. At the northernmost limit, a sampling station of 41 minutes duration has been provided. At the completion of this station, the traverse will return to Palmetto Crater where 1-1/2 hours has been allotted to two stations coincident with the nominal stations 16 and 17. Following these stations, the traverse returns to Spook Crater (station 2 on the nominal traverse) for an additional sampling point in the Cayley. Approximately 1 hour is available for this station. Finally, the traverse returns to the LM/ALSEP vicinity where a portion of the nominal station 10 activities are performed. The final hour of the EVA is spent in closeout activities at the LM.

The detailed procedures for EVA 3 shown in the following pages is a vertical timeline format. A summary of the EVA 3 traverse parameters is presented in the tables that follow the detailed procedures.

FIGURE 4.3-4

EVA 3 - 1 MAN APOLLO 16 APRIL 1972



APOLLO 16
APRIL 1972

ONE-MAN TIMELINE

LUNAR SURFACE EVA 3

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU IV	TASK FUNCTION JMP	TASK FUNCTION CDR
Start Watch	0+00	Start Watch (Call MARK)		PRE-EGRESS OPERATIONS	PRE-EGRESS OPERATIONS
		Note: Detailed Procedures are presented in "Lunar Surface Checklist"			
	0+10				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 3 - 1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU IV	TASK FUNCTION LMP	TASK FUNCTION CDR
Deploy EVA crewman's antenna	0+10	Move thru hatch			
Pass jettison bag out		Toss jettison bag to Quad I area			
Attach ETB to LEC, pass out to EVA Crewman		Pass LEC inside cabin Lower ETB to surface			
Assist EVA Crewman as required with procedures		Descend ladder to surface			
Photo EVA Crewman with DAC		RETARGET FAR UV CAM			
		Punch reset Check film advance			
	0+20	Enter new azimuth & elevation			
Note: this column will be dropped until the end of this EVA to conserve space		Check Batt temp & report BRING UP TV			
		Configure LRV CB's A, B, C, D. Verify NAV in.			
		Close batt covers (verify closure mated)			
		LCRU Sw - INT			
		Align HGA			
		LCRU Covers - 100%			
		TRAVERSE LOADUP			
		Take ETB to LRV			
		Offload • 2 HEDC's • 2 DAC Mags • 4 70 MM Mags			
	0+30				

MISSION: APOLLO 16
EVA: 3 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
0+30 • Polarizing filter (on HEDC) • Maps Place Mag L on 500 Cam Place 1 DAC Mag (R) on R seat & (CDR) HEDC Everything else under L seat. Maps in holder Place mag R on DAC Take ETB back to MESA Offload LCRU battery from MESA Stow LCRU battery under CDR seat Get flag kit out of MESA	0+50	Turn TV CCW against stop & horizontal Mount LRV Power up LRV Maneuver to nav initialization area and perform initialization per LRV decal Leave for Sta. 11 Note: duration of time at stations, number of stations, and tasks at stations is TBD in real time for a one-man EVA. Refer to foregoing discussion for pre-mission general guidelines for this contingency.			
0+40 Deploy flag	1+00				
RETARGET FAR UV CAM Punch reset Check film advance Enter new azimuth & elevation Don HEDC INITIALIZE NAV SYSTEM SW LCRU Mode - 1					
0+50	1+10				

MISSION: APOLLO 16
EVA: 3 - 1 MAN

DATE: APRIL 1972

EVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
1+10	5+50	Check film advance			
		Enter new azimuth and elevation			
		PACK SAMPLES			
		Take SCB's off HTC and place on +Z pad			
		(if SRC 2 is held over from EVA 2, place SCB 2 - also held over - in SRC 2 Close SRC 2 & place on +Z pad)			
		Place any large rocks collected (any EVA) in Big Rock Bag (from MESA)			
5+40 Return to LM	6+00				
(homeward leg)		Place Big Rock Bag on +Z pad			
		Bring ETB to LRV			
		Load: • 5 HEDC mags • 2 DAC mags • Maps			
ARRIVE AT LM		Return ETB to LM			
		SWC			
Park LRV near MESA in Sun		Photo SWC, 7' upper part Collect foil from mast			
Power down & dismount LRV		Bag SWC and place in ETB			
		COLLECT COSMIC RAY			
LCRU Mode Sw - 3 Align HGA		Pull White ring, pin, & remove CRE from SEQ Bay			
RETARGET FAR UV CAM					
Punch reset					
5+50	6+10				

MISSION: APOLLO 16
EVA: 3 - 1 MAN

DATE: APRIL 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+10	Bring CRE to MESA			
		Pull blue ring, slide CRE out of frame			
		Report temp labels as they appear - fold CRE			
		Bag CRE (Bag in MESA) and place in ETB			
		Take drum off penetrometer			
		Bag in DSB, place in ETB			
		LRV GRAN PRIX			
Get ready for GP out A/S window		Notify IVA crewman			
		LCRU Mode Sw - 1			
DAC - f8/250/24		Mount LRV			
		Power up LRV			
		Drive W in front of LM at distance of 50 ft			
	6+20				
		Perform GP maneuvers			
Film GP					
DAC off		LRV CLOSEOUT			
		Return to LM and initialize NAV system			
		Drive on heading of 085° - 0.1 km (Bearing to LM 265°)			
	6+30				

MISSION: APOLLO 16 DATE: APRIL 1972
EVA: 3 - 1 MAN

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU IV	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+30				
		Park LRV on heading of 165°. Closeout per Decal: open all CB xcept AUX, BUS A&C AUX Bypass Sw - ON Align HGA			
		Dust GCTA & TV Lens			
		Open LRV Battery Covers Dust batteries if dirty Dust LCRU & tear off 65% cover			
		Cover LCRU panel with 65% cover			
		Return to LM with HEDC			
	6+40	Place HEDC mag in ETB			
		FAR UV CAMERA Punch reset Sw 3 times			
		Power Sw - OFF Pull pin on cassette			
		Twist cassette CW and remove from camera			
		Place cassette in ETB Hang ETB from LEC			
DOCKING LIGHT TEST CB(16) LTG Track - CLOSE EXT LTG Sw - TRACK (Report from EVA)		DOCKING LIGHT TEST (Observe docking light during transfers)			
EXT LTG Sw - OFF CB(16) LTG Track - OPEN Receive & stow SCB's		TRANSFERS Take SCB's to A/S pass thru hatch			
		Descend to surface Take SRC 2 (if on			
	6+50				

MISSION: APOLLO 16
EVA: 3 - 1 MAN

DATE: APRIL 1972

IVA ACTIVITIES	EVA TIME	EVA ACTIVITIES	LCRU/V	TASK FUNCTION LMP	TASK FUNCTION CDR
	6+50	this EVA) & Big Rock Bag to A/S			
Receive SRC 2 & Big Rock Bag - Stow		Pass thru hatch			
		Pull up ETB			
Receive ETB, detach from LEC. Pass LEC back		Pass thru hatch			
		Drop LEC			
Fold EVA PLSS antenna		INGRESS			
		Move thru hatch			
Close hatch					
NOTE: DETAILED PROCEDURES FOR FINAL EVA 3 CLOSEOUT ARE PRESENTED IN THE "LUNAR SURFACE CHECKLIST					
	7+00				

TABLE 4.3-5

APOLLO 16 DESCARTES TRAVERSES

EVA III CALCULATED DATA MAR 14 1972

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+55	0+55
RIDE	3.65	7.30	30				
13				3.65	1+25	0+41	2+ 6
RIDE	0.95	7.30	8				
16				4.60	2+14	0+30	2+44
RIDE	0.70	7.30	6				
17				5.30	2+50	1+ 0	3+50
RIDE	2.25	7.30	18				
2				7.55	4+ 8	1+ 0	5+ 8
RIDE	0.90	7.30	7				
10				8.45	5+15	0+34	5+49
RIDE	0.05	7.30	0				
LM				8.50	5+50	1+10	7+ 0
TOTALS			69			5+50	7+ 0

ONE MAN EVA

NOTES:

- STATIONS 11, 12, 14 AND 15 DELETED
- STATIONS 2 AND 10 ADDED
- STATION 13 REPOSITIONED AND INCREASED FROM 10 TO 41 MINUTES
- STATION 16 INCREASED FROM 10 TO 30 MINUTES
- STATION 17 INCREASED FROM 38 MIN TO 1 HR

	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
13	3.65	1+21	3+46	3+ 0	4+22	3.50	4.17	898.41
16	2.70	0+45	3+47	3+ 1	4+20	2.59	3.09	891.25
17	2.00	0+33	3+ 1	2+15	3+26	1.92	2.29	898.05
2	0.95	0+16	2+15	1+30	2+25	0.91	1.09	887.28
10	0.05	0+ 1	1+58	1+14	1+59	0.05	0.06	886.24
LM	0.00	0+ 0	1+ 7	0+22	1+12	0.00	0.00	913.21

TABLE 4.3-6

APOLLO 16 DESCARTES TRAVERSES

EVA III INPUT DATA MAR 14 1972

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+55	0.00	0.00	180.00	3.60	7.30	1560.0
13	0+41	3.65	3.65	180.00	2.70	7.30	1290.0
16	0+30	0.95	2.70	180.00	3.60	7.30	1560.0
17	1+ 0	0.70	2.00	180.00	3.60	7.30	1560.0
2	1+ 0	2.25	0.95	180.00	3.60	7.30	1560.0
10	0+34	0.90	0.05	180.00	3.60	7.30	1560.0
LM	1+10	0.05	0.00	180.00	3.60	7.30	1560.0

ONE MAN EVA

NOTES:

- STATIONS 11, 12, 14 AND 15 DELETED
- STATIONS 2 AND 10 ADDED
- STATION 13 REPOSITIONED AND INCREASED FROM 10 TO 41 MINUTES
- STATION 16 INCREASED FROM 10 TO 30 MINUTES
- STATION 17 INCREASED FROM 38 MIN TO 1 HR

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM D/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.035	11.64	1.353

4.3.4 One man EVA 1 & 2 after nominal EVA 1

For the case where EVA 1 was the nominal 2 man case, LRV & ALSEP deployment will have been completed, and the one man EVA 2 & 3 cases will take on a somewhat different form than above.

EVA 2 can be performed essentially the same as the nominal LRV EVA 2 with the exception that the radius of action constraint will probably not permit ranging any further than station 5.

Similarly, the one man EVA 3 will take on the same form as the nominal EVA 3 except that the range limit will probably be around station 13. For this case, additional station time will be allocated to doing a more thorough investigation of Palmetto Crater in lieu of North Ray.

4.4 Traverses From Off-Nominal Landing Point

Under nominal conditions, the 3σ landing dispersion ellipse is approximately ±1 km down-range and ±1.4 km cross-range. Any landing point within this ellipse is considered nominal and the planned traverse 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 above 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. The magnitude of these latter two effects is shown in Figure 4.4-1.

Pre-mission planning of new traverses to accommodate the range of these off-nominal landing points is a prohibitive job. However, certain guidelines can be agreed to beforehand and traverse planning tools can be constructed to facilitate planning when the actual landing point is determined. This section discusses such guidelines and sample traverses are presented to illustrate the effects of off-nominal landing points in attaining the original objectives on EVA's 2 and 3.

4.4.1 EVA 1

Rationale for replanning the traverse on EVA 1 must consider the following points:

(a) Relatively little time will be available for replanning before egress.

(b) The LM location may be imprecise and uncertain.

(c) Traverse station time is more limited on EVA 1, therefore, little or no additional driving time should be spent on trying to find or reach the original stations.

Fortunately, the traverse objectives of EVA 1 are sufficiently flexible to accommodate the above considerations. Sampling the Cayley plains in two locations at craters of sufficient size to reveal any stratigraphy is the prime objective of the first traverse. Flag and Spook craters on the nominal traverse are particularly good locations to accomplish this objective, but a multitude of other craters in the Cayley plain also satisfy the criterion.

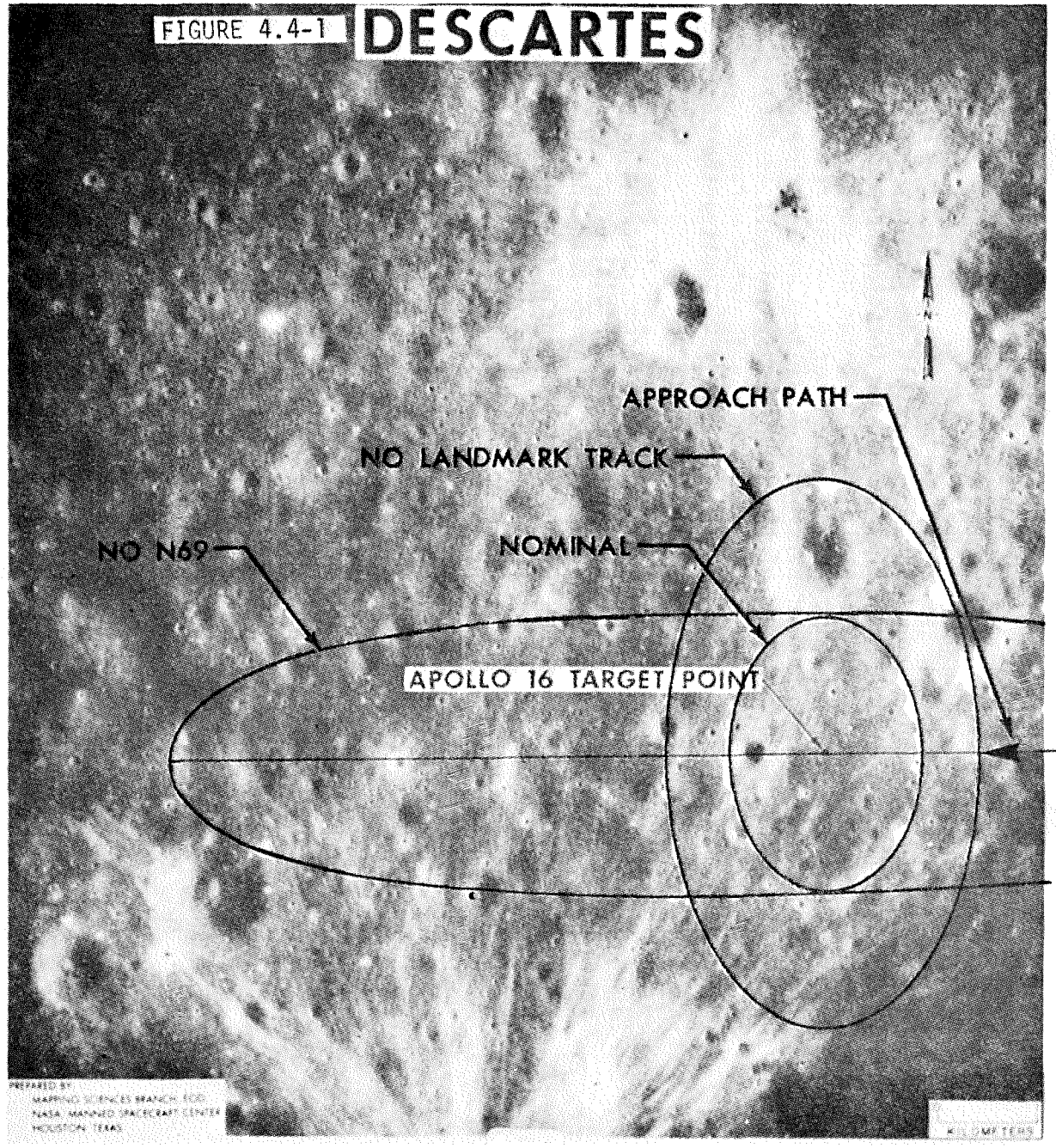


FIGURE 4.4-1
DESCARTES
APPROACH PATH
NO LANDMARK TRACK
NOMINAL
NO N69
APOLLO 16 TARGET POINT

If the landing point is known, the new traverse will be designed to visit such sampling areas within approximately the same radius as the nominal traverse, with the station times and station activities the same as nominal.* If the landing point is not known, the crew will seek out such sampling areas that meet the original objectives, within the time limitations available. Finally, if the LM location is still uncertain (after successive attempts by the CMP to locate the LM from orbit), time will be allotted during the traverse to take sun compass sightings (from some nearby promontory) on distant features such as Stone Mountain and Smoky Mountain. Using this information along with the LRV navigational data will allow the ground to determine the LM position prior to EVA 2.

*The rationale for the LPM site measurement at one of these stations and how it fits in with the other scheduled LPM measurements will be re-evaluated for the new landing point.

4.4.2 EVA 2 and 3

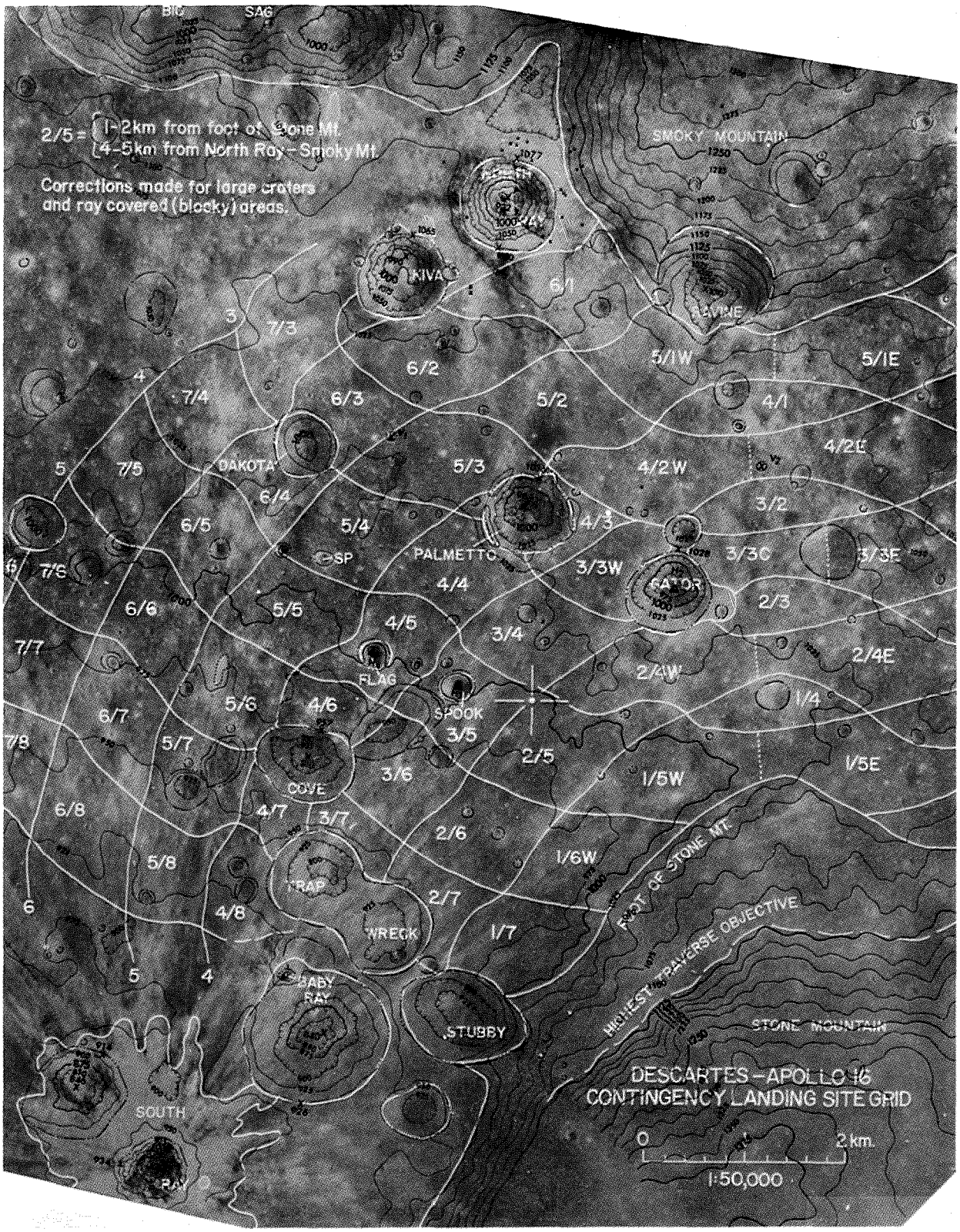
The objectives for EVA's 2 and 3 remain the same as for the nominal: Stone Mountain/South Ray ray on EVA 2 and North Ray/Smoky Mountain on EVA 3. The ability to reach these locations and spend sufficient time at them to make it worthwhile, depend of course, on the actual landing point and how much extra driving time is required.

For preliminary planning purposes, it is assumed that the minimum acceptable station times at these primary objectives are 2 hours in the Stone Mountain/South Ray ray region (nominal time for stations 4-8 is 3 hours 13 minutes), and 1-1/2 hours in the North Ray/Smoky Mountain region (nominal time for stations 11-14 is 2 hours 40 minutes).

Considerations will be given to reconfiguring the entire traverse if these minimum times cannot be met.

Figure 4.4-2 can be used as a quick reference to determine new distances to the primary traverse objectives from a wide range of landing points. Subtracting the distances from the nominal landing point and applying the 7.3 km/hr LRV rate used for pre-mission planning will yield the difference in driving time to the objectives from off-nominal landing points. For a more detailed analysis, actual traverse routes must be generated and the new traverse tested against emergency walk-back and drive-back constraints. Two such traverses are included in the following tables for illustrative purposes: EVA 2 traverse from the northerly limit of the no landmark tracking ellipse (see Figure 4.4-1) and EVA 3 from the southerly limit.

FIGURE 4.4-2


2/5 = 1-2km from foot of Stone Mt.
4-5km from North Ray - Smoky Mt.
Corrections made for large craters and ray covered (blocky) areas.
SMOKY MOUNTAIN
NIVA
RAWIE
DAKOTA
PALMETTO
SP
FLAG
SPOOK
COVE
TRAP
WRECK
BABY RAY
STUBBY
SOUTH RAY
STONE MOUNTAIN
HIGHEST PRIORITY TRAVERSE OBJECTIVE
DESCARTES - APOLLO 16
CONTINGENCY LANDING SITE GRID
0
2 km
1:50,000

Examination of these two cases indicate that EVA 2 from the northerly point meets the criterion of at least 2 hours in the Stone Mountain/South Ray ray vicinity, but the EVA 3 traverse from the southerly point only marginally provides the desired time in the North Ray/Smoky Mountain area. Furthermore, the EVA 3 traverse requires an emergency LRV drive-back speed of 9 km/hr from North Ray for the case where the crewmen had a 10 minute walk-back to the LRV from their sampling location. Unless better than expected trafficability conditions were encountered, this traverse would not be acceptable and considerations would be given by the traverse planning team to reconfiguring EVA 3 to the southwest with South Ray/Baby Ray as the prime objective.

TABLE 4.4-1

APOLLO 16 DESCARTES TRAVERSES

EVA II CALCULATED DATA MAR 14 1972

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
RIDE	6.80	7.30	56				
4				6.80	1+46	0+58	2+44
RIDE	0.80	7.30	7				
5				7.60	2+50	0+40	3+30
RIDE	1.40	7.30	12				
8				9.00	3+42	0+59	4+41
RIDE	2.45	7.30	20				
9				11.45	5+ 1	0+25	5+26
RIDE	0.55	7.30	5				
10				12.00	5+31	0+27	5+58
RIDE	2.65	7.30	22				
LM				14.65	6+19	0+40	6+59
TOTALS			122			4+59	6+59

2.6 KM NORTH OFF-NOMINAL LANDING

NOTES:

- STATIONS 6 AND 7 DELETED
- STATION 8 DECREASED 1 MINUTE
- STATION 10 DECREASED FROM 34 TO 27 MINUTES

		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
4	6.80	2+31	2+ 4	1+17	2+34	6.53	7.77	844.10
5	6.00	2+13	1+43	0+56	2+ 5	5.76	6.86	855.04
8	5.65	2+ 6	0+46	0+ 0	1+ 2	5.42	6.46	862.49
9	3.20	0+53	1+29	0+43	1+30	3.07	3.66	849.90
10	2.65	0+44	1+13	0+27	1+ 7	2.54	3.03	853.67
LM	0.00	0+ 0	1+46	1+ 0	1+13	0.00	0.00	856.62

TABLE 4.4-2

APOLLO 16 DESCARTES TRAVERSES

EVA II INPUT DATA MAR 14 1972

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	125.00	3.60	7.30	1560.0
4	0+58	6.80	6.80	125.00	2.70	7.30	1290.0
5	0+40	0.80	6.00	125.00	2.70	7.30	1290.0
8	0+59	1.40	5.65	125.00	2.70	7.30	1290.0
9	0+25	2.45	3.20	125.00	3.60	7.30	1560.0
10	0+27	0.55	2.65	125.00	3.60	7.30	1560.0
LM	0+40	2.65	0.00	125.00	3.60	7.30	1560.0

2.6 KM NORTH OFF-NOMINAL LANDING

NOTES:

- STATIONS 6 AND 7 DELETED
- STATION 8 DECREASED 1 MINUTE
- STATION 10 DECREASED FROM 34 TO 27 MINUTES

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM D/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.028	11.64	1.353

TABLE 4.4-3

APOLLO 16 DESCARTES TRAVERSES

EVA III CALCULATED DATA MAR 14 1972

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	7.90	7.30	65				
11				7.90	1+50	0+44	2+34
RIDE	0.35	7.30	3				
12				8.25	2+37	0+30	3+ 7
RIDE	1.50	7.30	12				
14				9.75	3+19	0+30	3+49
RIDE	2.45	7.30	20				
16				12.20	4+ 9	0+10	4+19
RIDE	0.55	7.30	5				
17				12.75	4+24	0+36	5+ 0
RIDE	4.85	7.30	40				
LM				17.60	5+40	1+11	6+51
TOTALS			145			4+26	6+51

2.6 KM SOUTH OFF-NOMINAL LANDING

NOTES:

- STATIONS 13 AND 15 DELETED
- STATION 11 DECREASED FROM 55 TO 44 MIN
- STATION 12 DECREASED FROM 55 TO 30 MIN
- STATION 14 DECREASED FROM 40 TO 30 MIN
- STATION 17 DECREASED FROM 38 TO 36 MIN

		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
11	7.90	2+56	1+30	0+43	2+20	7.58	9.03	810.51
12	7.80	2+53	1+ 1	0+14	1+49	7.49	8.91	828.90
14	7.00	2+36	0+45	0+ 0	1+24	6.72	8.00	829.75
16	5.40	2+ 0	1+ 7	0+22	1+30	5.18	6.17	812.66
17	4.85	1+48	0+44	0+ 0	1+ 1	4.66	5.54	825.19
LM	0.00	0+ 0	1+41	0+58	1+21	0.00	0.00	837.34

TABLE 4.4-4

APOLLO 16 DESCARTES TRAVERSES

EVA III INPUT DATA MAR 14 1972

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	180.00	3.60	7.30	1560.0
11	0+44	7.90	7.90	180.00	2.70	7.30	1290.0
12	0+30	0.35	7.80	180.00	2.70	7.30	1290.0
14	0+30	1.50	7.00	180.00	2.70	7.30	1290.0
16	0+10	2.45	5.40	180.00	2.70	7.30	1290.0
17	0+36	0.55	4.85	180.00	2.70	7.30	1290.0
LM	1+11	4.85	0.00	180.00	3.60	7.30	1560.0

2.6 KM SOUTH OFF-NOMINAL LANDING

NOTES:

- STATIONS 13 AND 15 DELETED
- STATION 11 DECREASED FROM 55 TO 44 MIN
- STATION 12 DECREASED FROM 55 TO 30 MIN
- STATION 14 DECREASED FROM 40 TO 30 MIN
- STATION 17 DECREASED FROM 38 TO 36 MIN

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM D/H (BTU/HR)	LEAK RATE 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.035	11.64	1.353

4.5 Shortened EVA's (with prior knowledge before EVA begins)

Under certain circumstances, it may be necessary to shorten the EVA's (duration and number) and replan the traverses accordingly. These circumstances could range from having relatively minor effects such as replanning EVA 2 and 3 based on slightly higher than predicted PLSS consumables usage on EVA 1, to circumstances which could have drastic effects such as a leak in the descent water tank which reduced the lunar surface staytime to only a few hours or less. Figure 4.5-1 provides a chart from which the EVA configurations can be estimated dependent upon the predicted staytime capability.

As in the previous section dealing with off-nominal landing points, there are too many of these situations to permit pre-planning. Therefore, this section is limited to discussing general guidelines, providing some planning tools (See Figure 4.5-2) and detailing three cases of specific interest.

In general, with prior knowledge of the situation in terms of EVA time and number of EVA's, the traverses (and other EVA activities) will be replanned in accordance with the priorities previously listed (Experiment, traverse station and station task priorities). In attempting to accomplish as many of these objectives as possible under the circumstances, the traverse planning team must exercise careful judgment in abridging the objectives of a given experiment before proceeding on to embrace the next lower priority experiment. The final product to fit the particular circumstances will receive thorough review by the cognizant elements (science, operations, and management) before implementation.

Three cases are of sufficient interest to warrant a more detailed discussion:

(a) EVA 1 is shortened by 2 hours as a result of a one rev delay in landing. (Rest requirements on the landing day preclude maintaining the 7 hour EVA 1 for this case.)

(b) Staytime limitations dictate a single EVA of only "x" hours duration.

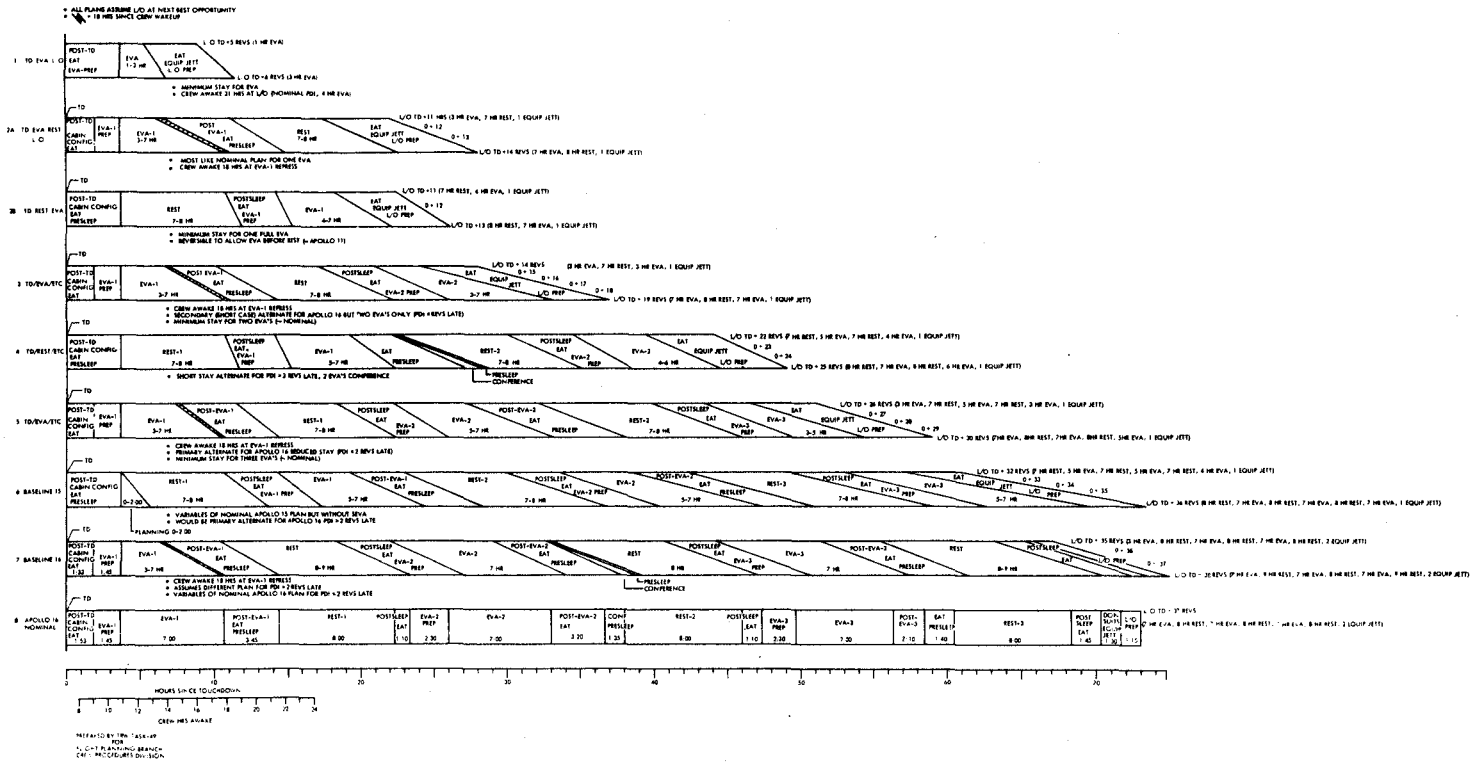
(c) Staytime limitations dictate an absolute minimum lunar staytime resulting in a one man 45 minute EVA. Detailed procedures for this case are shown in the following pages in vertical timeline format.

The first case is accommodated by shortening the LRV traverse from the nominal 2 hour 17 minute to the minimum of 55 minutes and deferring certain activities at the ALSEP site (notably, the 2.6 m core operations) until the end of EVA 2. Thus, in

FIGURE 4.5-1

LUNAR SURFACE EVA CONTINGENCIES

NOMINALLY PLANNED REST PERIODS ARE 8 HOURS DURATION, HOWEVER IN EVENT OF CREW WAKEUP AT 7 HOURS, EVA'S WILL BE INITIATED WITH 7 HOURS REST



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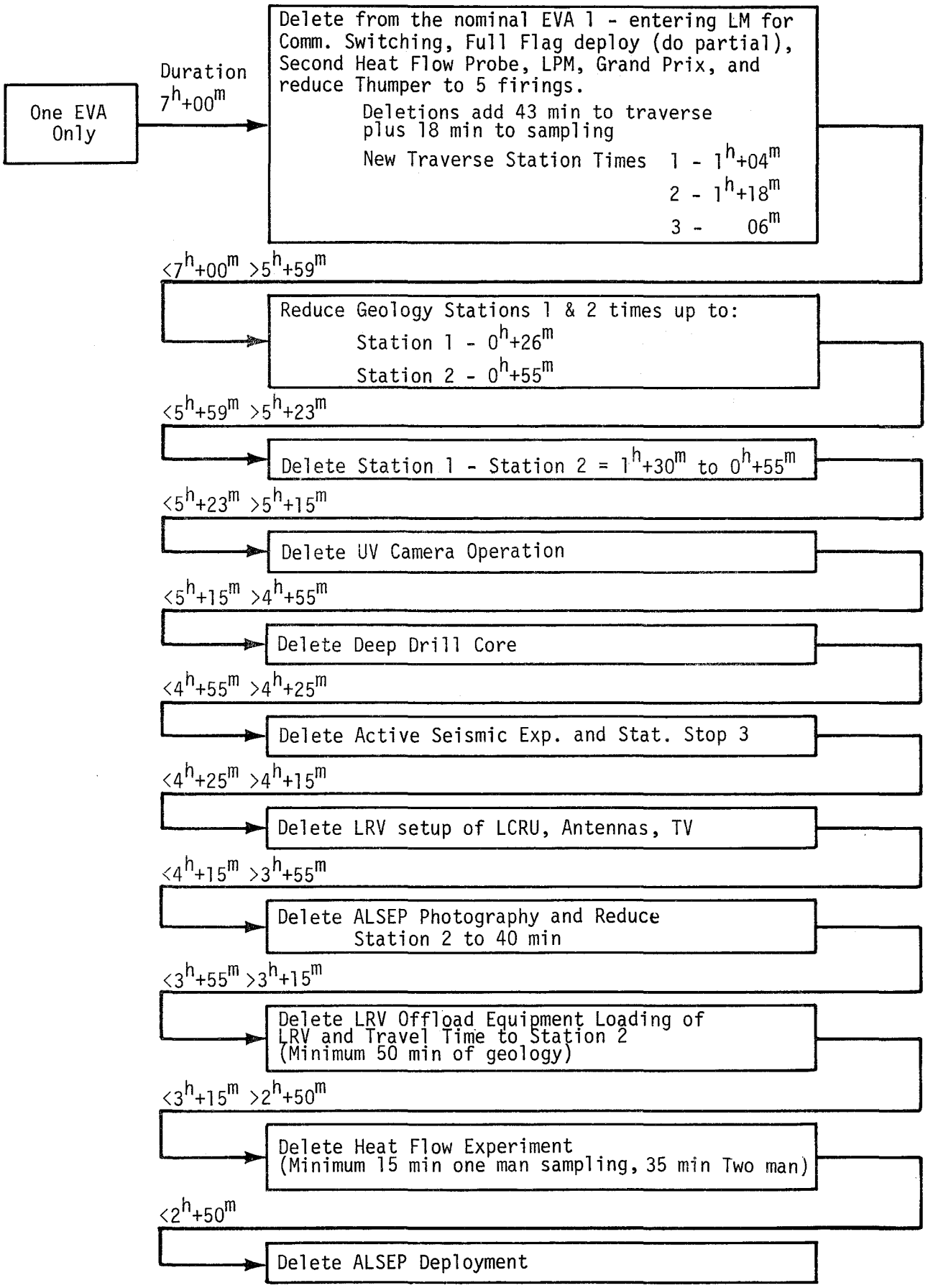
Guidelines for Alternate Surface Stay Situations

the 5 hour EVA 1, the LRV off-loading and outfitting is completed, ALSEP deployment is accomplished, and the minimum EVA 1 geology objectives are obtained. EVA 2 is impacted by about 30 minutes and this is accommodated by the elimination of an equal amount of traverse time.

The second case considered, a single EVA, is diagrammed on figure 4.5-2. In addition to dropping the traverse activities which had been scheduled for EVA 2 & 3, certain other activities (listed on the figure) are dropped at the outset in order to allow additional sampling time in the 7 hr. EVA case. As the EVA time is progressively shortened from 7 hr., this sampling time is reduced to a minimum value, and subsequently ALSEP experiments (and other activities) are dropped in order to maintain this minimum sampling time. Finally, with only a 2 hr. 50 min. EVA time available, ALSEP deployment must be dropped entirely and the available time will be spent in sampling activity.

FIGURE 4.5-2 ONE EVA ONLY CONTINGENCY PLANNING



MISSION: Apollo 16
EVA: ONE MAN - MINIMUM TIME

DATE: March 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	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 16 DATE: March 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 16
EVA: ONE MAN - MINIMUM TIME

DATE: March 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU IV	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				

4.6 Behind time during EVA

During an EVA, the ground operations team must be prepared to make revisions to the planned EVA to accommodate "lost" time. This could happen as a result of several circumstances: activities could simply take longer than estimated, an unscheduled traverse stop may have occurred because of some unanticipated item of scientific interest, or EMU consumables may be depleting faster than predicted so that the EVA duration will have to be reduced. In general, the priorities discussed previously will be the guidelines for dealing with these cases. However, since there is a high likelihood of encountering the "behind time" situation, several cases have been preplanned in detail. These cases are presented in this section for each EVA.

4.6.1 EVA 1

Since EVA 2 and 3 both represent ambitious traverse objectives with little room for accommodating spillover tasks from EVA 1, it will be important to try to accommodate behind time situations on EVA 1 without impacting subsequent EVA's. This is accomplished insofar as possible by allowing the traverse time on EVA 1 to be reduced down to a minimum acceptable value while attempting to complete the planned ALSEP deployment. Beyond this point, portions of the ALSEP area operations are deferred to the end of EVA 2.

Figure 4.6-1 illustrates the logic flow which will be used for the behind time situations on EVA 1. Significant branch points shown in the figure are as follows:

(a) Station 1 is dropped if EVA is more than 32 minutes behind.

(b) Gran Prix is dropped from station 3 when EVA is 1 hour behind time.

(c) LPM site measurement is dropped from station 2 when EVA is 1 hour 08 minutes behind (will be accomplished on EVA 3).

(d) When the EVA is 1 hour 24 minutes behind, the minimum 55 minutes of traverse activities will be maintained and further delays will impact ALSEP area activities in the order shown.

(e) For more than 2 hours 29 minutes behind time ALSEP area activities will not be attempted on EVA 1 and the available time will be spent on the traverse which will be essentially the same as the nominal EVA 1 traverse. ALSEP deployment will be rescheduled for the beginning of EVA 2 and about 3 hours will be available for a traverse. Figures 4.6-2 and 4.6-3 illustrate the impact on EVA's 2 and 3 of behind time situations on EVA 1.

FIGURE 4.6-1

EVA 1 OFF NOMINAL PLANNING GUIDE

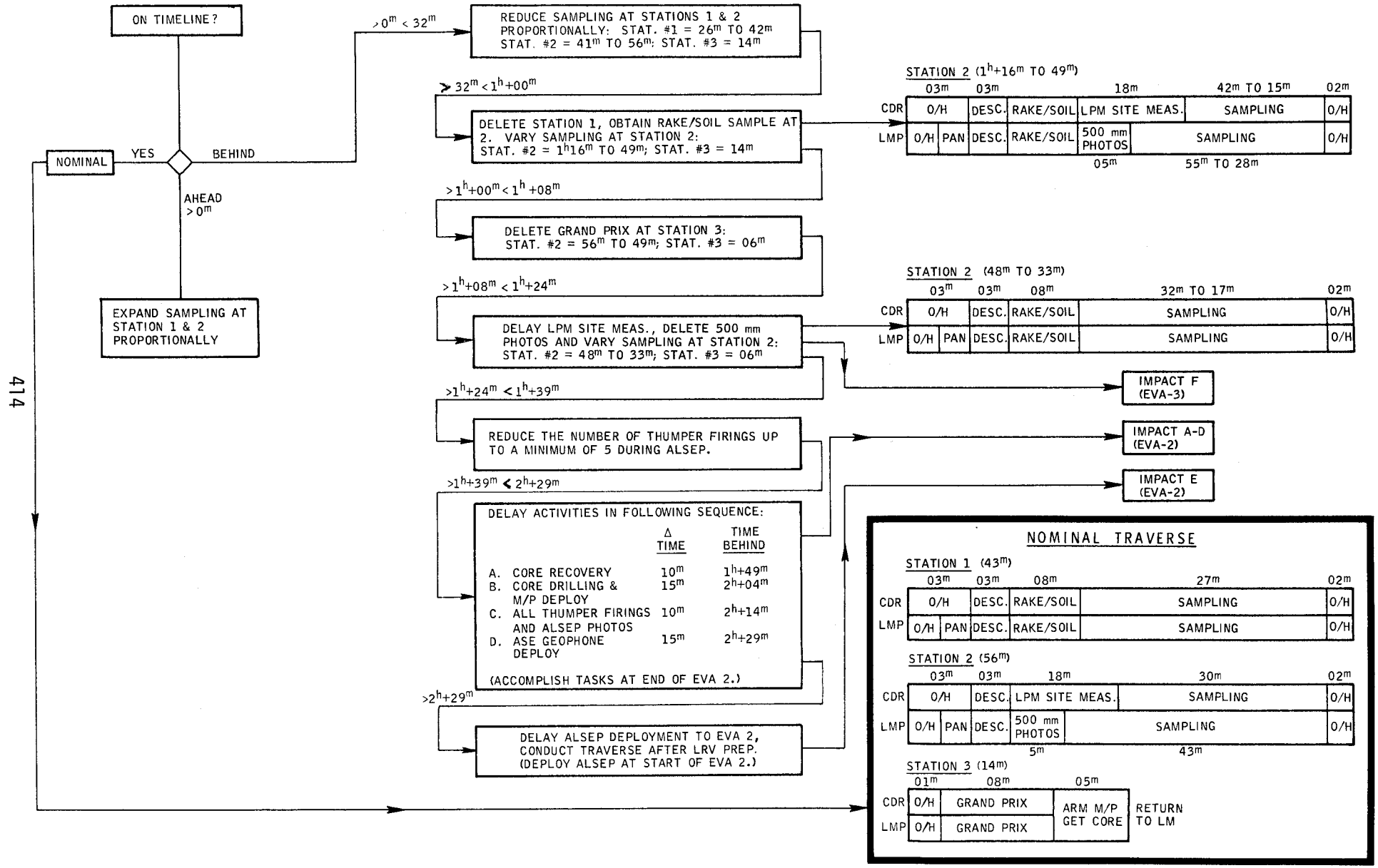
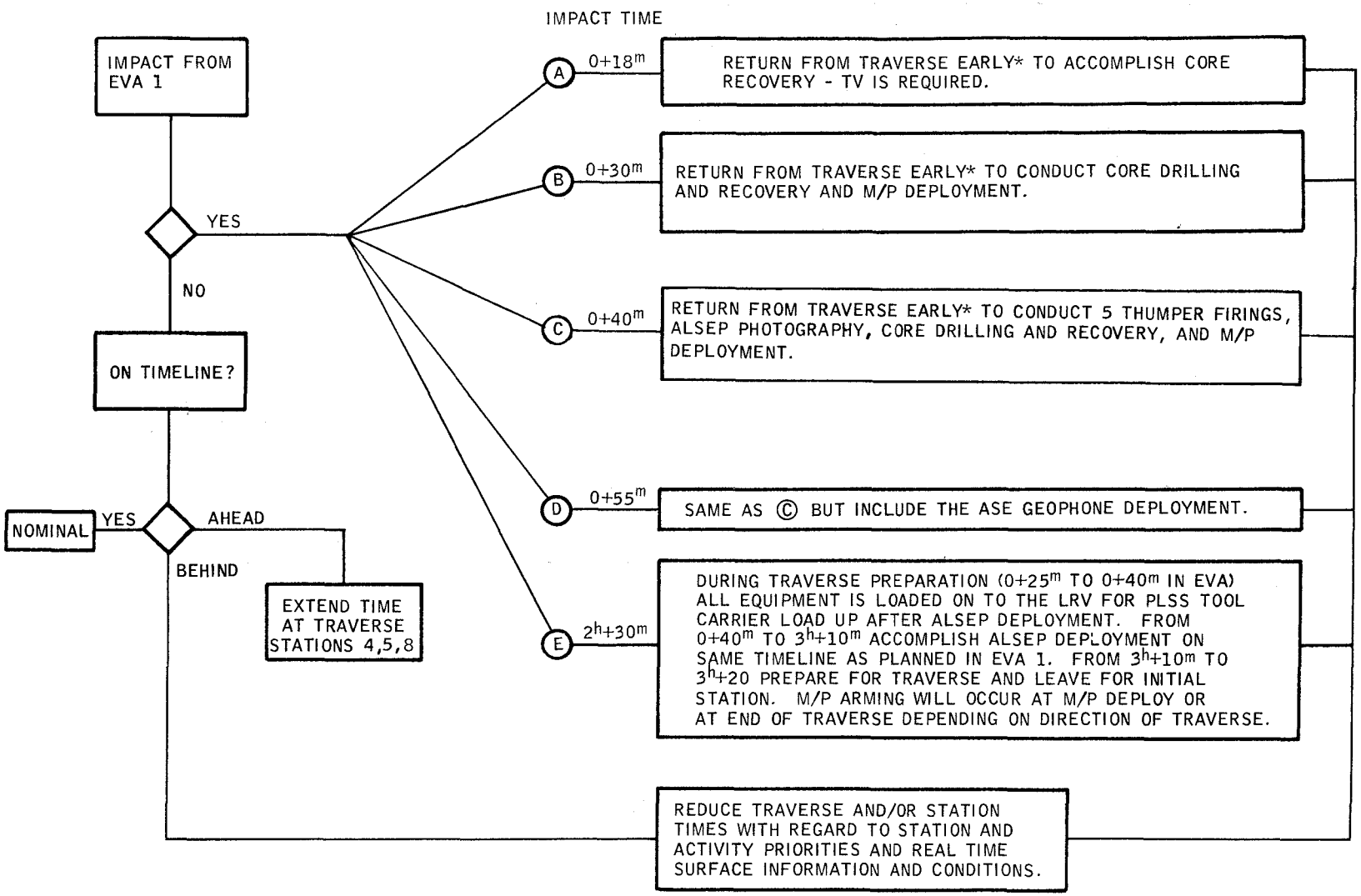


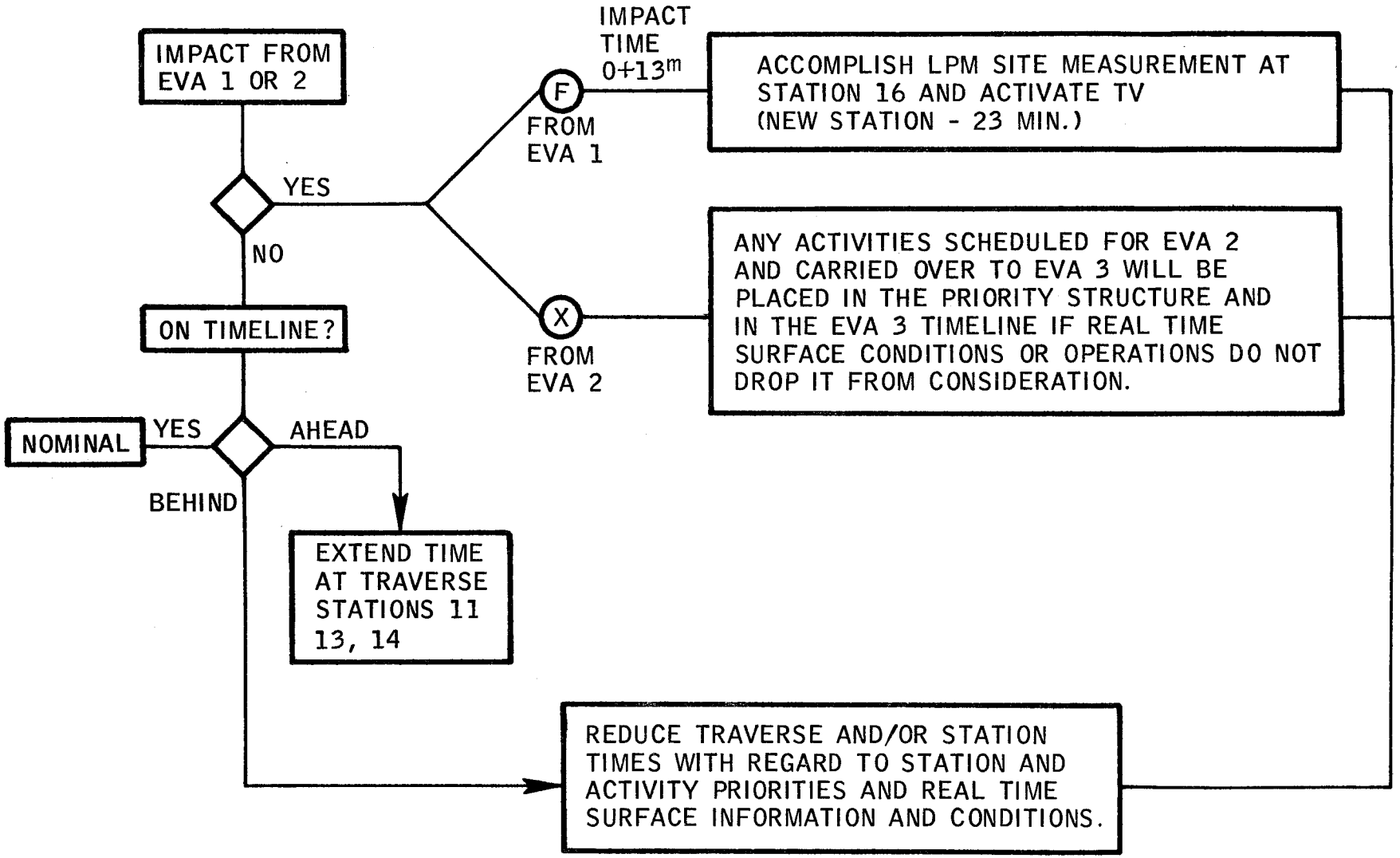
FIGURE 4.6-2
EVA 2 OFF NOMINAL PLANNING



*NOTE: ANY UNPLANNED EVA 2 CREW ACTIVITIES IN THE LM/ALSEP AREA WILL BE ACCOMPLISHED AFTER THE TRAVERSE SO NOT TO AFFECT THE PLSS CONSUMABLE WALK BACK CONSTRAINTS ON THE TRAVERSE EXCEPT FOR A FULL ALSEP DEPLOYMENT.

FIGURE 4.6-3

EVA 3 OFF NOMINAL PLANNING



4.6.2 EVA 2

In general, behind time situations on EVA 2 and 3 will be accommodated by eliminating the lower priority stations from the traverse entirely. However, in cases where these lower priority stations contain activities essential to the success of a given experiment, consideration will be given to reducing the station time at a higher priority station. Traverse replanning which involves reshuffling tasks from one station to another should be avoided as much as possible since this approach unduly complicates crew procedures. As in the previous discussions on contingency traverses, the replanned traverse must 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.

The following cases are discussed briefly as examples of EVA 2 traverse changes for various behind time situations leaving the LM vicinity:

(a) 30 minutes behind: delete station 7, delete station 9, move CSVC sample from 9 to 8 (increasing station 8 time to provide for CSVC task) and perform surface sampler activity on EVA 3.

(b) 60 minutes behind: same as above plus delete station 10.

(c) 90 minutes behind: same as above, plus delete station 6 and reduce stations 4 - 5 by 10 minutes.

(d) >90 minutes behind: consider reorienting entire traverse since Stone Mountain/South Ray ray station times are near minimum.

4.6.3 EVA 3

EVA 3 replanning is not as straightforward an application of station priorities as EVA 2 since the nominal margins at the distant stations are not as great.

The following cases are discussed briefly to illustrate various behind time situations on EVA 3:

(a) 30 minutes behind time: delete station 15; reduce 11-12 station time by 20 minutes (see following tables for new traverse tabulations)

(b) 55 minutes behind time: since previous case showed only a 19 minute O_2 margin at station 14, 6 minutes must be reduced from 11-14 area to maintain walk-back; therefore, the new traverse will show deletion of station 15, reduction in 11-12 time by 20 minutes, reduction in station 14 time to 30 minutes and reduction of station 17 time by 15 min. (See following table for new traverse tabulations.)

(c) 70 minutes behind time: same as case "b" plus deletion of station 13

(d) >70 minutes behind time: further reductions in station 11-12 time below 1-1/2 hours and station 14 time below 30 minutes make achieving the original objectives of EVA 3 questionable. Consideration should be given to reorienting the EVA to concentrate on only one of the two objectives depending on how well the Cayley and Descartes materials were investigated on EVA's 1 and 2.

TABLE 4.6-1a

APOLLO 16 DESCARTES TRAVERSES

EVA II CALCULATED DATA APR 4 1972

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+20	1+20
RIDE	4.20	7.30	35				
4				4.20	1+55	0+58	2+53
RIDE	0.80	7.30	7				
5				5.00	2+59	0+40	3+39
RIDE	0.40	7.30	3				
6				5.40	3+42	0+20	4+ 2
RIDE	1.00	7.30	8				
8				6.40	4+11	1+10	5+21
RIDE	3.05	7.30	25				
10				9.45	5+46	0+34	6+20
RIDE	0.05	7.30	0				
LM				9.50	6+20	0+40	7+ 0
TOTALS			78			5+42	7+ 0

30 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 7 AND 9 DELETED
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 10 MINUTES

	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
4	4.20	1+33	3+ 0	2+13	3+23	4.03	4.80	916.33
5	3.40	0+57	2+50	2+ 3	3+13	3.26	3.89	911.49
6	3.00	0+50	2+38	1+51	2+57	2.88	3.43	909.76
8	3.05	0+51	1+22	0+34	1+38	2.93	3.49	909.32
10	0.05	0+ 1	1+47	1+ 1	1+28	0.05	0.06	889.24
LM	0.00	0+ 0	1+28	0+42	1+12	0.00	0.00	904.22

TABLE 4.6-1b

APOLLO 16 DESCARTES TRAVERSES

EVA II INPUT DATA APR 4 1972

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+20	0.00	0.00	125.00	3.60	7.30	1560.0
4	0+58	4.20	4.20	125.00	2.70	7.30	1290.0
5	0+40	0.80	3.40	125.00	3.60	7.30	1560.0
6	0+20	0.40	3.00	125.00	3.60	7.30	1560.0
8	1+10	1.00	3.05	125.00	3.60	7.30	1560.0
10	0+34	3.05	0.05	125.00	3.60	7.30	1560.0
LM	0+40	0.05	0.00	125.00	3.60	7.30	1560.0

30 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 7 AND 9 DELETED
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 10 MINUTES

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE O2 (LB/HR)	EVA START (F/W-LB)	EVA START (O2-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.028	11.64	1.353	62.5

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

FIGURE 4.6-4

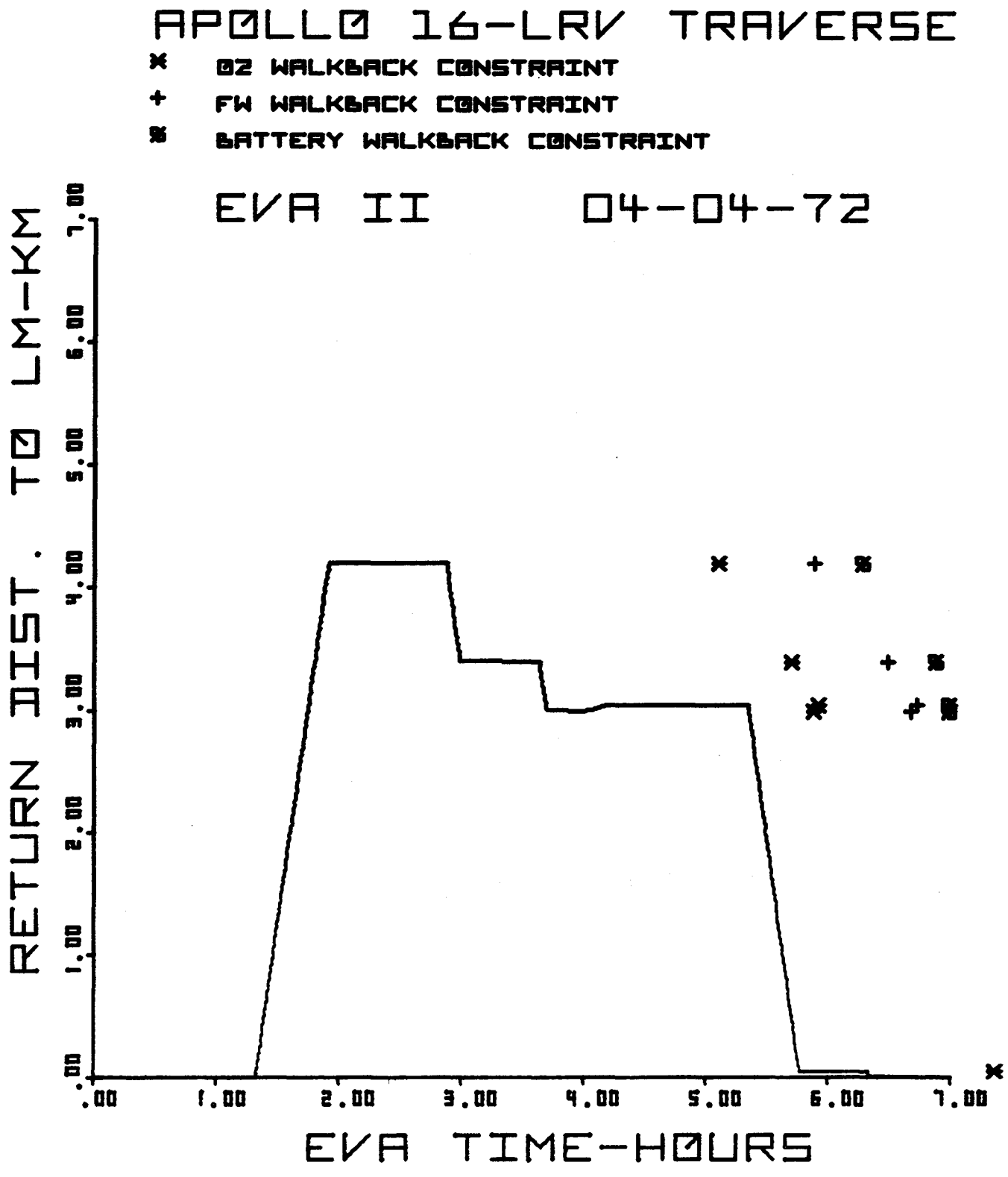

APOLLO 16-LRV TRAVERSE
02 WALKBACK CONSTRAINT
FW WALKBACK CONSTRAINT
BATTERY WALKBACK CONSTRAINT
EVA II 04-04-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

TABLE 4.6-2a

APOLLO 16 DESCARTES TRAVERSES

EVA II CALCULATED DATA APR 4 1972

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+50	1+50
RIDE	4.20	7.30	35				
4				4.20	2+25	0+58	3+23
RIDE	0.80	7.30	7				
5				5.00	3+29	0+40	4+ 9
RIDE	0.40	7.30	3				
6				5.40	4+12	0+20	4+32
RIDE	1.00	7.30	8				
8				6.40	4+41	1+13	5+54
RIDE	3.05	7.30	25				
LM				9.45	6+19	0+40	6+59
TOTALS			78			5+41	6+59

60 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 7, 9 AND 10 DELETED
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 13 MINUTES

		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
4	4.20	1+33	2+28	1+40	2+53	4.03	4.80	936.13
5	3.40	0+57	2+18	1+30	2+43	3.26	3.89	928.17
6	3.00	0+50	2+ 6	1+18	2+27	2.88	3.43	925.21
8	3.05	0+51	0+46	0+ 0	1+ 5	2.93	3.49	921.60
LM	0.00	0+ 0	1+27	0+41	1+13	0.00	0.00	911.62

TABLE 4.6-2b

APOLLO 16 DESCARTES TRAVERSES

EVA II INPUT DATA APR 4 1972

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+50	0.00	0.00	125.00	3.60	7.30	1560.0
4	0+58	4.20	4.20	125.00	2.70	7.30	1290.0
5	0+40	0.80	3.40	125.00	3.60	7.30	1560.0
6	0+20	0.40	3.00	125.00	3.60	7.30	1560.0
8	1+13	1.00	3.05	125.00	3.60	7.30	1560.0
LM	0+40	3.05	0.00	125.00	3.60	7.30	1560.0

60 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 7, 9 AND 10 DELETED
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 13 MINUTES

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM D/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	11.64	1.353	62.5

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

FIGURE 4.6-5

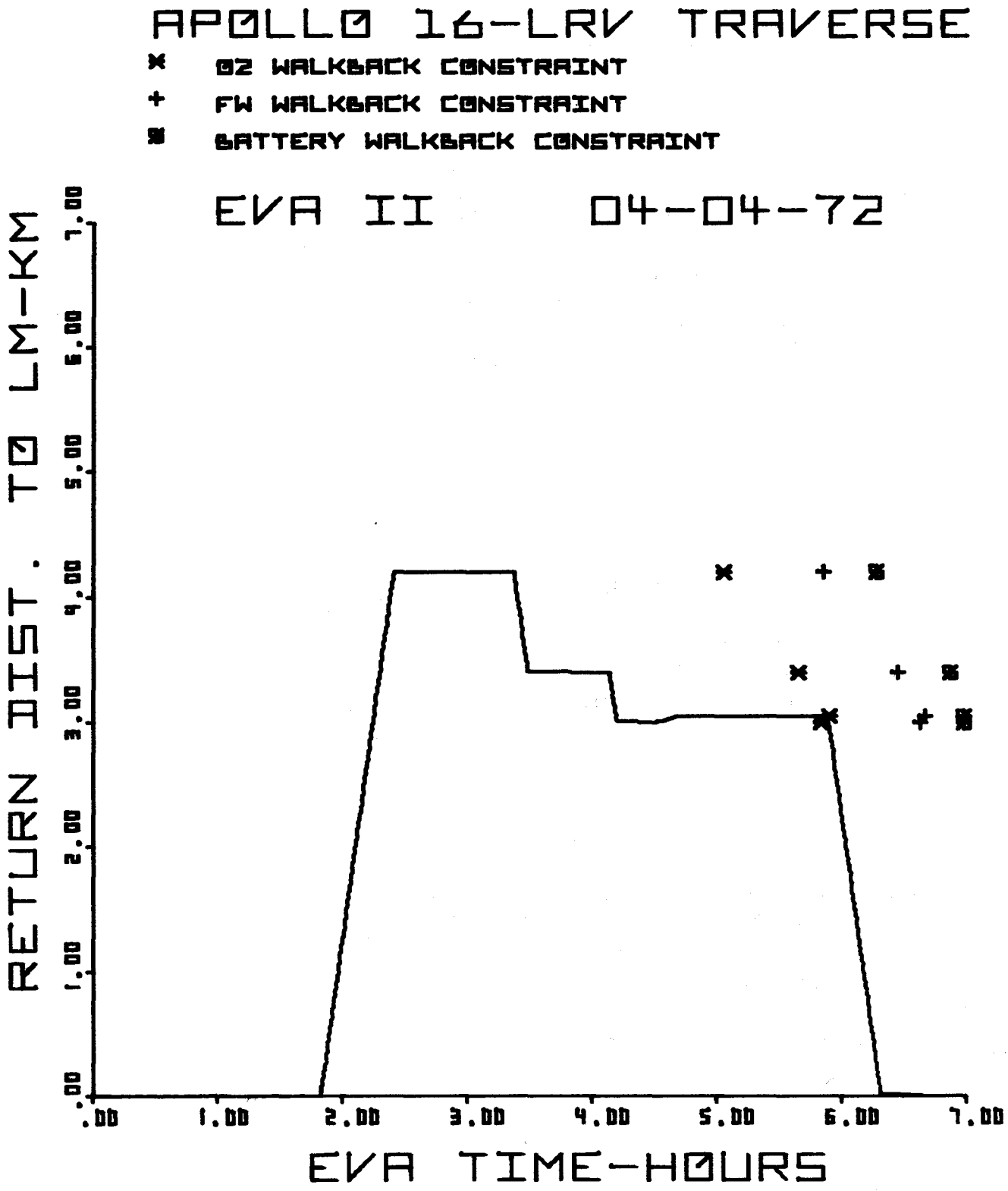

APOLLO 16-LRV TRAVERSE
O2 WALKBACK CONSTRAINT
FW WALKBACK CONSTRAINT
BATTERY WALKBACK CONSTRAINT
EVA II 04-04-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

TABLE 4.6-3

APOLLO 16 DESCARTES TRAVERSES

EVA II CALCULATED DATA APR 4 1972

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+20	2+20
RIDE	4.20	7.30	35				
4				4.20	2+55	0+53	3+48
RIDE	0.80	7.30	7				
5				5.00	3+54	0+35	4+29
RIDE	1.40	7.30	12				
8				6.40	4+41	1+10	5+51
RIDE	3.05	7.30	25				
LM				9.45	6+16	0+40	6+56
TOTALS			79			5+38	6+56

90 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 6, 7, 9 AND 10 DELETED
- STATIONS 4 AND 5 EACH DECREASED BY 5 MINUTES
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 10 MINUTES

		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
4	4.20	1+33	2+ 0	1+13	2+28	4.03	4.80	950.84
5	3.40	0+57	1+55	1+ 8	2+23	3.26	3.89	940.94
8	3.05	0+51	0+47	0+ 0	1+ 8	2.93	3.49	929.92
LM	0.00	0+ 0	1+27	0+41	1+16	0.00	0.00	918.56

TABLE 4.6-4

APOLLO 16 DESCARTES TRAVERSES

EVA II INPUT DATA APR 4 1972

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+20	0.00	0.00	125.00	3.60	7.30	1560.0
4	0+53	4.20	4.20	125.00	2.70	7.30	1290.0
5	0+35	0.80	3.40	125.00	3.60	7.30	1560.0
8	1+10	1.40	3.05	125.00	3.60	7.30	1560.0
LM	0+40	3.05	0.00	125.00	3.60	7.30	1560.0

90 MINUTE BEHIND TIME CONTINGENCY

NOTES:

- STATIONS 6, 7 AND 10 DELETED
- STATIONS 4 AND 5 EACH DECREASED BY 5 MINUTES
- STATION 8 INCREASED FROM 1 HOUR TO 1 HOUR + 10 MINUTES

MET RATE ALSEP (BTU/HR)	MET RATE RIDING (BTU/HR)	MET RATE STATION (BTU/HR)	MET RATE LM O/H (BTU/HR)	LEAK RATE O2 (LB/HR)	EVA START (F/W-LB)	EVA START (O2-LB)	OPS TIME (MIN)
1050.00	550.00	950.00	1050.00	0.028	11.64	1.353	62.5

NOTE: OPS TIME IS TOTAL DRIVING TIME AVAILABLE!

FIGURE 4.6-6

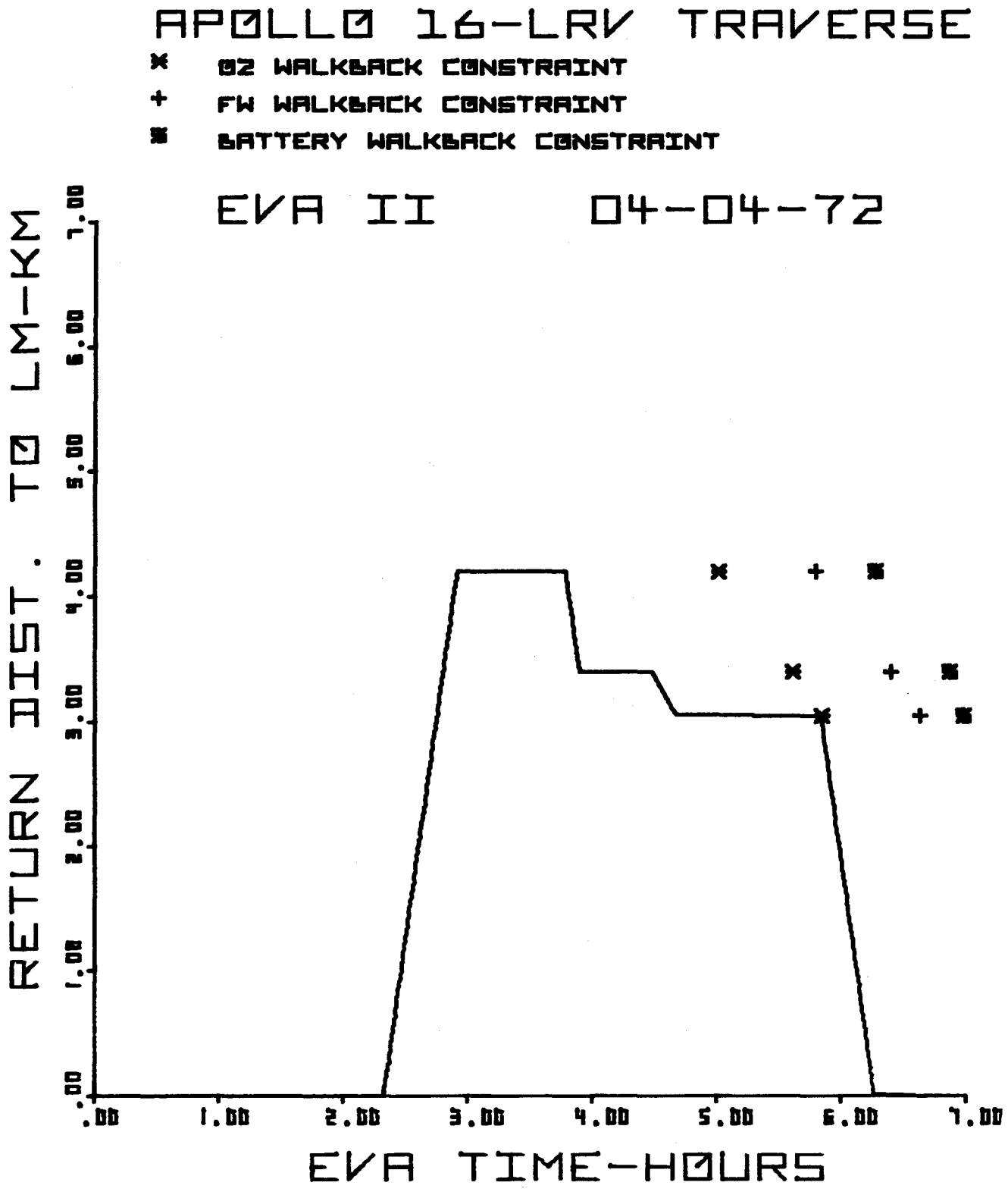

APOLLO 16-LRV TRAVERSE
02 WALKBACK CONSTRAINT
FW WALKBACK CONSTRAINT
BATTERY WALKBACK CONSTRAINT
EVA II 04-04-72
RETURN DIST. TO LM-KM
.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
EVA TIME-HOURS

TABLE 4.6-5

APOLLO 16 DESCARTES TRAVERSES

EVA III CALCULATED DATA MAR 7 1972

30 MINUTES BEHIND TIME CONTINGENCY

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+15	1+15
RIDE	5.30	7.30	44				
11				5.30	1+59	0+45	2+44
RIDE	0.35	7.30	3				
12				5.65	2+46	0+45	3+31
RIDE	0.65	7.30	5				
13				6.30	3+37	0+10	3+47
RIDE	0.85	7.30	7				
14				7.15	3+54	0+40	4+34
RIDE	1.35	7.30	11				
15				8.50	4+45	0+10	4+55
RIDE	1.65	7.30	14				
17				10.15	5+ 8	0+38	5+46
RIDE	2.25	7.30	18				
LM				12.40	6+ 5	0+55	7+ 0
TOTALS			102			5+18	7+ 0

NOTE:
STATION 16 DELETED
STATIONS 11 AND 12 EACH DECREASED BY 10 MINUTES

		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
11	5.30	1+58	2+25	1+38	3+ 8	5.09	6.06	889.32
12	5.20	1+56	1+41	0+54	2+22	4.99	5.94	897.62
13	4.70	1+44	1+41	0+55	2+18	4.51	5.37	891.74
14	4.40	1+38	1+ 5	0+19	1+37	4.22	5.03	891.53
15	3.40	0+57	1+28	0+42	1+57	3.26	3.89	880.66
17	2.25	0+37	1+ 9	0+24	1+25	2.16	2.57	875.32
LM	0.00	0+ 0	1+17	0+32	1+12	0.00	0.00	883.87

TABLE 4.6-6

APOLLO 16 DESCARTES TRAVERSES

EVA III INPUT DATA MAR 7 1972

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+15	0.00	0.00	180.00	3.60	7.30	1560.0
11	0+45	5.30	5.30	180.00	2.70	7.30	1290.0
12	0+45	0.35	5.20	180.00	2.70	7.30	1290.0
13	0+10	0.65	4.70	180.00	2.70	7.30	1290.0
14	0+40	0.85	4.40	180.00	2.70	7.30	1290.0
15	0+10	1.35	3.40	180.00	3.60	7.30	1560.0
17	0+38	1.65	2.25	180.00	3.60	7.30	1560.0
LM	0+55	2.25	0.00	180.00	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 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.035	11.64	1.353

TABLE 4.6-7

APOLLO 16 DESCARTES TRAVERSES

EVA III CALCULATED DATA MAR 7 1972

55 MINUTES BEHIND TIME CONTINGENCY

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+40	1+40
RIDE	5.30	7.30	44				
11				5.30	2+24	0+45	3+ 9
RIDE	0.35	7.30	3				
12				5.65	3+11	0+45	3+56
RIDE	0.65	7.30	5				
13				6.30	4+ 2	0+10	4+12
RIDE	0.85	7.30	7				
14				7.15	4+19	0+30	4+49
RIDE	1.35	7.30	11				
15				8.50	5+ 0	0+10	5+10
RIDE	1.65	7.30	14				
17				10.15	5+23	0+23	5+46
RIDE	2.25	7.30	18				
LM				12.40	6+ 5	0+55	7+ 0
TOTALS			102			5+18	7+ 0

NOTES:
STATION 16 DELETED
STATIONS 11, 12, and 14 EACH DECREASED BY 10 MINUTES
STATION 17 DECREASED BY 15 MINUTES

		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 SPEED REQUIRED 0 MIN (KM/HR)	RIDEBACK 10 MIN (KM/HR)	AVG EVA MET RATE (BTU/HR)
LM	0.00	0+ 0	****	****	****	0.00	0.00	1050.00
11	5.30	1+58	1+58	1+11	2+43	5.09	6.06	910.62
12	5.20	1+56	1+14	0+27	1+57	4.99	5.94	913.73
13	4.70	1+44	1+14	0+28	1+53	4.51	5.37	907.45
14	4.40	1+38	0+48	0+ 2	1+22	4.22	5.03	903.23
15	3.40	0+57	1+11	0+25	1+42	3.26	3.89	892.09
17	2.25	0+37	1+ 7	0+22	1+25	2.16	2.57	882.54
LM	0.00	0+ 0	1+15	0+30	1+12	0.00	0.00	889.83

TABLE 4.6-8

APOLLO 16 DESCARTES TRAVERSES

EVA III INPUT DATA MAR 7 1972

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+40	0.00	0.00	180.00	3.60	7.30	1560.0
11	0+45	5.30	5.30	180.00	2.70	7.30	1290.0
12	0+45	0.35	5.20	180.00	2.70	7.30	1290.0
13	0+10	0.65	4.70	180.00	2.70	7.30	1290.0
14	0+30	0.85	4.40	180.00	2.70	7.30	1290.0
15	0+10	1.35	3.40	180.00	3.60	7.30	1560.0
17	0+23	1.65	2.25	180.00	3.60	7.30	1560.0
LM	0+55	2.25	0.00	180.00	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 02 (LB/HR)	EVA START (F/W-LB)	EVA START (02-LB)
1050.00	550.00	950.00	1050.00	0.035	11.64	1.353

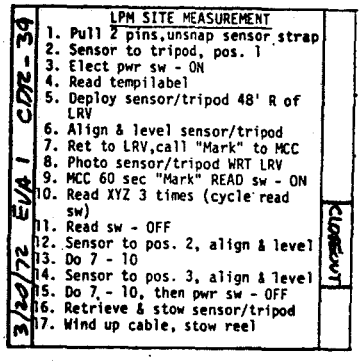
Pages 423 - 426 omitted intentionally

The following pages are referred
to in instruction 4 of the preface
to this supplement.

MISSION: APOLLO 16
EVA: 1

DATE: MARCH 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	SEQ CAM.	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+50			GEOLOGY STATION 1 (CONT'D)	GEOLOGY STATION 1 (CONT'D)
Stow ext. handle/scoop on HTC		Stow gnomon in LRV bag			
Verify HTC is secure		LCRU mode sw-1; pos. TV horiz, CCW Mount LRV			
Mount LRV		Configure LRV per decal			
TRAVERSE TO STATION 2		TRAVERSE TO STATION 2			
Drive to Station 2		Drive to Station 2		TRAV. TO GEO. STAT. 2	TRAV. TO GEO. STAT. 2
	5+00				
SPOOK CRATER GEOLOGY STATION 2		SPOOK CRATER GEOLOGY STATION 2			
Read LRV displays		Park LRV; Heading = 180°			
Dismount LRV		Set brake ± 15 VDC Sw - OFF			
Take photo pan		Dismount LRV LCRU mode Sw - 2			
		Align HGA to earth Dust GCTA, LCRU & TV lens		GEOLOGY STATION 2	GEOLOGY STATION 2
Describe surrounding area		Describe surrounding area			
Take 500 mm cam. photos		Perform LPM site measurement ● Sensor position #1,#2,#3			
	5+10				



3/20/72 EVA 1 CDR-39

LPM SITE MEASUREMENT

1. Pull 2 pins, unsnap sensor strap
2. Sensor to tripod, pos. 1
3. Elect pwr sw - ON
4. Read tempilabel
5. Deploy sensor/tripod 48' R of LRV
6. Align & level sensor/tripod
7. Ret to LRV, call "Mark" to MCC
8. Photo sensor/tripod WRT LRV
9. MCC 60 sec "Mark" READ sw - ON
10. Read XYZ 3 times (cycle read sw)
11. Read sw - OFF
12. Sensor to pos. 2, align & level
13. Do 7 - 10
14. Sensor to pos. 3, align & level
15. Do 7 - 10, then pwr sw - OFF
16. Retrieve & stow sensor/tripod
17. Wind up cable, stow reel

CURRENT

5+10

(1) CDR - LPM measurement:
- Level_____
- Align_____
- Temp Lable_____(on elec. box)
- Report position relative to LRV

POS	READING	X	Y	Z
1	•(1)	____	____	____
	•(2)	____	____	____
	•(3)	____	____	____
2	(1)	____	____	____
	(2)	____	____	____
	(3)	____	____	____
3	(1)	____	____	____
	(2)	____	____	____
	(3)	____	____	____

5+20

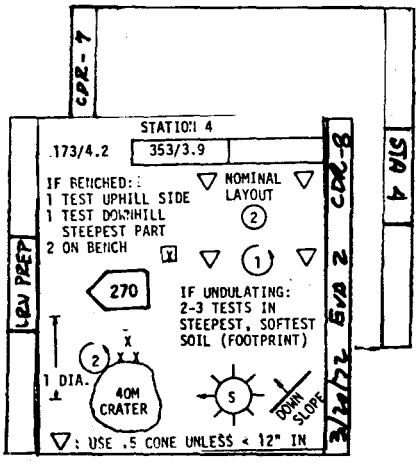
(1) CDR - Verify LPM Pwr - OFF after measurements complete

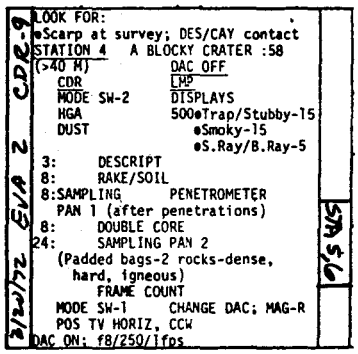
5+30

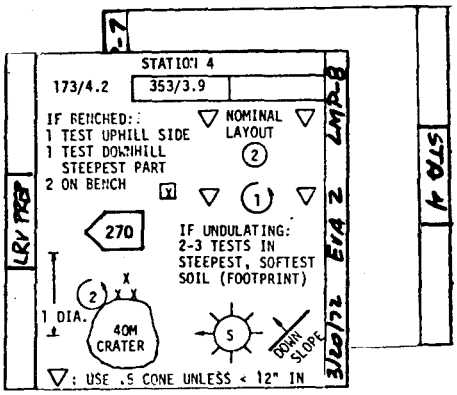
MISSION: APOLLO 16
EVA: 2

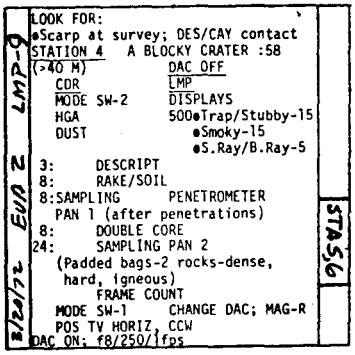
DATE: MARCH 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU IV	TASK FUNCTION LMP	TASK FUNCTION CDR
o Core tubes - 1U, 1L	0+30	Place 2-70mm mags D & I under seat		EQUIPMENT PREP (CONT'D)	EQUIPMENT PREP (CONT'D)
o 2-20 bag dispensers					
o 1-core tube cap assy		Place 2-16mm mags R & S under seat			
Put SCB 3(or 4) on R floor board					
		Return ETB to table on MESA			
Put 16mm mag Q on DAC - check DAC out (ensure green light)					
		Tidy MESA blankets			
Place maps in holder					
PLSS LOADUP	0+40	PLSS LOADUP			
Hold still		Get extra SCB (No's 5-8) from pallet, place on LMP		PLSS LOAD UP/PAN	PLSS LOAD UP/UV CAM
Put SCB 2 on CDR		Get Core tube cap assy & place on LMP			
		Put hammer in pocket - hold still			
PAN		RESET FAR UV CAMERA			
Don CDR HEDC, move to Quad III		Punch "reset" verify new target (6) with MCC			
Pan 20' off Quad III, 7' vertical pan Cosmic Ray Experiment		Enter new azimuth, elevation			
Replace CDR HEDC on L seat					
LRV PREP		LRV PREP			
Don LMP HEDC & 20 DSBD		Switch LCRU Mode - 1			
Put SCB 3(or 4) under R seat		Position TV horizontal and CCW to stop		LRV PREP	LRV PREP
Mount LRV		Don HEDC & 20 DSBD			
		Mount LRV			
As move out, turn on DAC f4/250/1 fps		Power up			
	0+50	Initialize NAV System			









0+50

HEADING		Volts Bat 1	
BEARING		Volts Bat 2	
DISTANCE		Temp Bat 1	
RANGE		Temp Bat 2	
Amp-Hr Bat 1		Temp LF mtr	
Amp-Hr Bat 2		Temp RF mtr	
Amps Bat 1		Temp LR mtr	
Amps Bat 2		Temp RR mtr	
SSD		ROLL	PITCH
COMPUTED NAV HEADING			

(1) CDR - MARK DEPART TIME _____ (0+50)

(1) CDR/LMP - AT SIGNIFICANT FEATURES

BEARING _____, _____, _____, _____

RANGE _____, _____, _____, _____

(2) CDR/LMP - Slope (ESTIMATE) _____°

AMPS _____, SPEED _____

(2) CDR/LMP - Slope (EST.) _____°

AMPS _____, SPEED _____

(1) Cap Com-- If Slope OK, Park Down Sun for Nav up-date at station 4

(1) LMP - MARK DAC OFF

(1) CDR - MARK STOP TIME _____ (1+25)

1+25 (1) LMP - LRV READ OUT

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

(1) CDR - Rpt 70mm Mag/Frame

___/_____

1+30 (1) LMP - Rpt 70mm Mag/Frame

___/_____

MISSION: APOLLO 16
EVA: 2

DATE: MARCH 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
Depart for Sta 4	0+50	Depart for Sta 4
Ride time: 35 min @ 7.3 kph distance: 4.2 km		
Climb Stone Mountain to highest negotiable point		
	1+20	
GEOLOGY STATION 4 DAC OFF Readout NAV displays Read Amp Hrs and Temps Dismount LRV Get 500mm cam 15 photos Trap/Stubby 15 photos Smoky 5 photos S. Ray/Baby Ray		GEOLOGY STATION 4 Powerdown LRV Dismount LRV Sw LCRU Mode - 2 Align HGA Dust off TV, TCU, LCRU
	1+30	

LCRU TV

TASK FUNCTION

LMP	CDR
TRAVERSE TO GEOLOGY STATION 4	TRAVERSE TO GEOLOGY STATION 4
GEOLOGY STATION 4	GEOLOGY STATION 4

1+30

(1) LMP - Rpt 500mm Mag/Frame
___/_____

(1) CDR/LMP - ROCK BAG NO. _____
Soil Bag NO. _____
in SCB _____

1+40

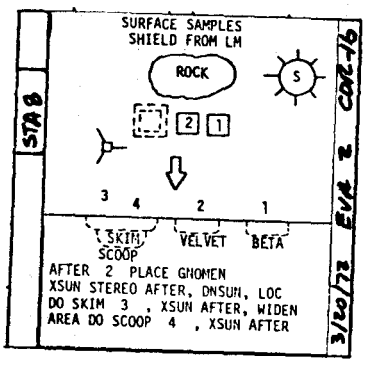
(1) LMP - Rpt Penetrometer
INDEX _____, _____, _____, _____
Cone _____, _____
Depth _____, _____, _____, _____

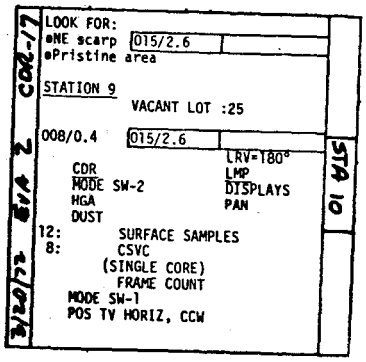
1+50

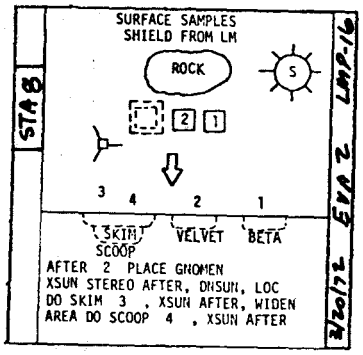
MISSION: APOLLO 16
EVA: 2

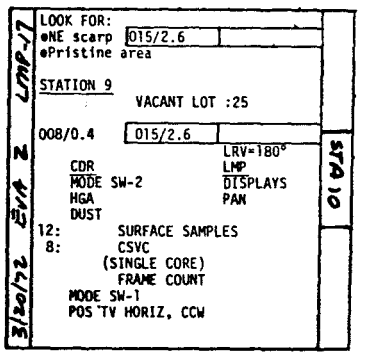
DATE: MARCH 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	TV	TASK FUNCTION LMP	TASK FUNCTION CDR
	4+30				
Sampling		Sampling		GEOLOGY STATION 8 (CONT'D)	GEOLOGY STATION 8 (CONT'D)
	4+40				
	4+50				









4+50

(1) CDR/LMP - EMU Check

	CDR	LMP
O2		
FLAGS		
PRESS		
COOL		

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

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

(1) CDR - LRV Heading _____ (IF NAV UPDATE)
- Torque Gyro

(1) CDR - MARK DEPART TIME _____ (4+56)

(1) CDR - MARK STOP TIME _____ (4+59)

5+00 (1) LMP - LRV Readout

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 - Core tube _____

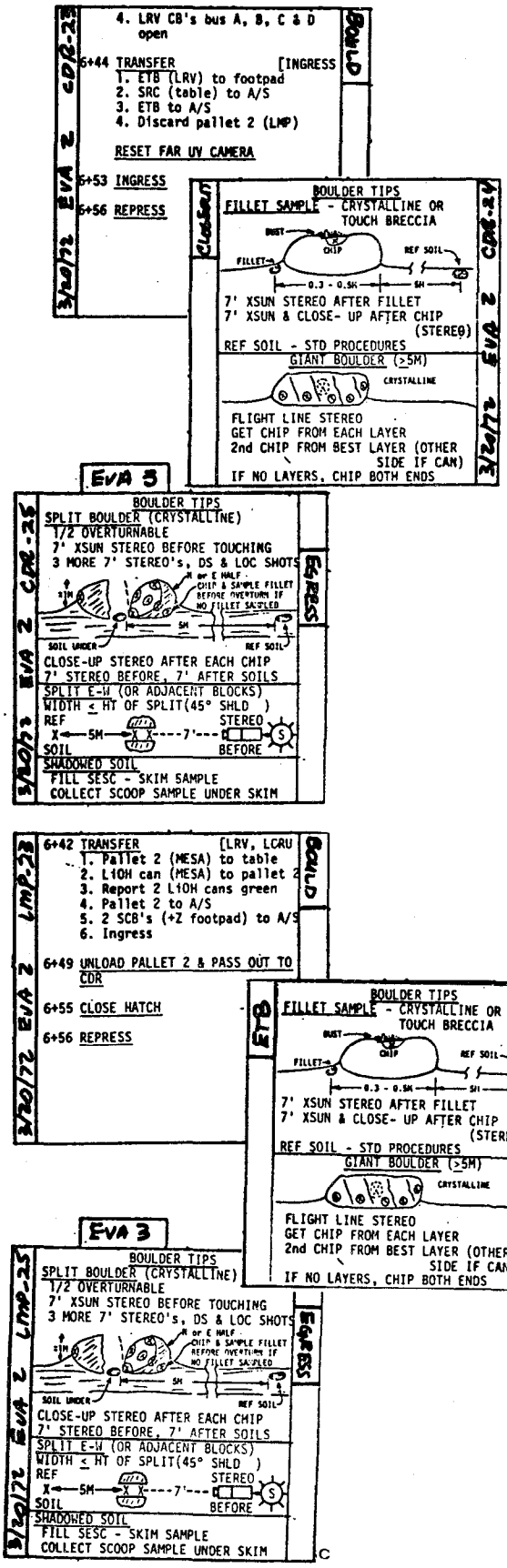
(1) LMP - Rpt CSVC IN (CDR) _____ Bag

5+10

MISSION: APOLLO 16
EVA: 2

DATE: MARCH 1972

LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES	LCRU TV	TASK FUNCTION LMP	TASK FUNCTION CDR
ARRIVE AT LM	6+20	ARRIVE AT LM			
Readout all LRV Displays		Park LRV at MESA in sun x sun (heading 351°)			
Dismount LRV		Power down LRV (± 15 VDC Sw - OFF)			
TV		Dismount LRV			
Switch LCRU Mode - 3		RESET FAR UV CAMERA			
Align HGA		Punch "reset", verify target (7) with MCC			
Dust TV, TCU, LCRU		Enter new azimuth, elevation			
Put HEDC on L seat		UNLOAD PLSS			
UNLOAD PLSS		Take SCB off LMP, place on +Z foot pad			
Hold Still		Throw away core cap dispenser			
		Stow core rammer on HTC			
		Put hammer, tongs on HTC			
Take SCB 2 off CDR, put on HTC		Stow LMP antenna			
Put tongs on HTC	6+30	Hold Still			
Stow CDR antenna					
PACK SRC 2		PACK ETB			
Get SCB 2 from HTC		Bring ETB to L floor board			
Place SCB pouches up in SRC 2		Place in ETB:			
Remove skirt & seal protector		2 - HEDC's (with mags)			
Close & seal SRC 2		2 - 70mm mags			
Place SRC 2 by ladder on pad		2 - 16mm mags			
		2 - Padded Bags			
		1 - mag from 500mm cam restow cam under seat			
		Take ETB to R floor board			
Put any large rocks collected during EVA 2 on +Z pad		Pack:			
		1 - mag from DAC - turn DAC battery to sun			
		1 - set of maps			
EMU CLEANUP		EMU CLEANUP			
Clean EMU's		Get brush off LCRU - clean EMU's			
	6+40			EVA CLOSEOUT	EVA CLOSEOUT



6+40

(1) LMP - Rpt PLSS LiOH CANS

PINS _____ (Green)

(1) CDR - Batt Covers - Open

(1) CDR - LRV Mirrors (Clean)/(Dirty)

(1) CDR - LCRU Covers Open (100%)

(1) CDR - Dust LCRU

ITEMS Transferred to A/S

- SCB _____ (6)
- Pallet No. 2 W/ECS LiOH CAN
- ETB
- SRC

6+50

(2) CDR - Rpt Pallet Nº 2 Jettison

(1) CDR - Mark UV CAM Reset

Film Advance _____

AZ _____ (137), EL _____ (39)

(1) LMP - Report hatch closed

(1) CDR - Report cabin repress

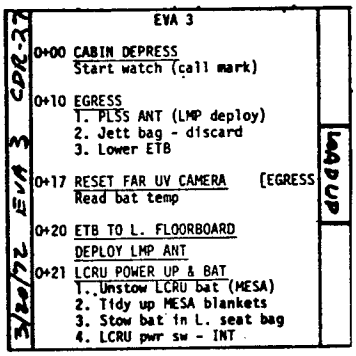
7+00 (END EVA 2)

NOMINAL TIMELINE

LUNAR SURFACE EVA 3

MARCH 1972

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


EVA 3

0+00 CABIN DEPRESS
Start watch (call mark)

0+10 EGRESS
1. PLSS ANT (LMP deploy)
2. Jett bag - discard
3. Lower ETB

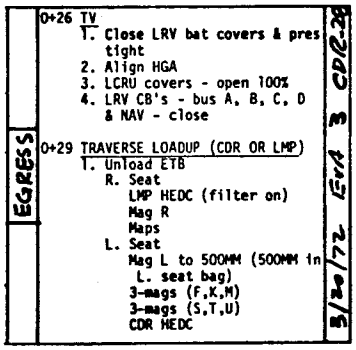
0+17 RESET FAR UV CAMERA [EGRESS
Read bat temp

0+20 ETB TO L. FLOORBOARD
DEPLOY LMP ANT

0+21 LCRU POWER UP & BAT
1. Unstow LCRU bat (MESA)
2. Tidy up MESA blankets
3. Stow bat in L. seat bag
4. LCRU pwr sw - INT

LOADUP

3/20/72 EVA 3 CDR-27


0+26 TV
1. Close LRV bat covers & pres tight
2. Align HGA
3. LCRU covers - open 100%
4. LRV CB's - bus A, B, C, D & NAV - close

0+29 TRAVERSE LOADUP (CDR OR LMP)
1. Unload ETB
R. Seat
LMP HEDC (filter on)
Mag R
Maps
L. Seat
Mag L to 500MM (500MM in L. seat bag)
3-mags (F,K,M)
3-mags (S,T,U)
CDR HEDC

EGRESS

BR-2 CDR 3 EVA 3/21/72

0+10

(1) LMP - Deploy CDR PLSS Antenna

(2) LMP - ETB Contents

(1) LMP - Confirm "GO" for 2 man EVA

(1) CDR - EMU Check

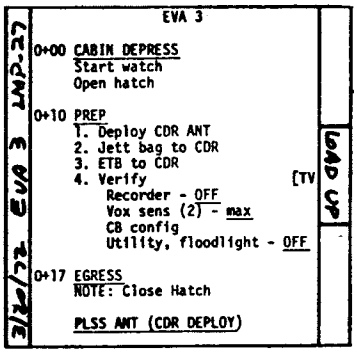
O2	
FLAGS	
PRESS	
COOL	

O2	
FLAGS	
PRESS	
COOL	

(2) LMP - EMU Check

(1) CDR - Far UV Cam Reset
MARK _____
FILM ADVANCE _____
AZ _____(198), EL. _____(38)
BATT TEMP _____

0+20


EVA 3

0+00 CABIN DEPRESS
Start watch
Open hatch

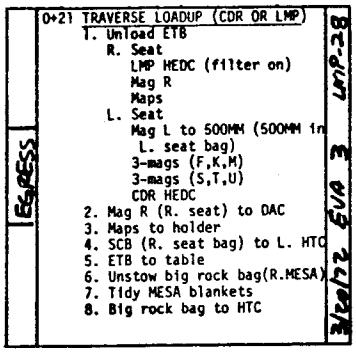
0+10 PREP
1. Deploy CDR ANT
2. Jett bag to CDR
3. ETB to CDR
4. Verify [TV
Recorder - OFF
Vox sens (2) - max
CB config
Utility, floodlight - OFF

0+17 EGRESS
NOTE: Close Hatch

PLSS ANT (CDR DEPLOY)

LOAD UP

3/22/72 EVA 3 LMP-27


0+21 TRAVERSE LOADUP (CDR OR LMP)
1. Unload ETB
R. Seat
LMP HEDC (filter on)
Mag R
Maps
L. Seat
Mag L to 500MM (500MM in L. seat bag)
3-mags (F,K,M)
3-mags (S,T,U)
CDR HEDC
2. Mag R (R. seat) to DAC
3. Maps to holder
4. SCB (R. seat bag) to L. HTC
5. ETB to table
6. Unstow big rock bag(R.MESA)
7. Tidy MESA blankets
8. Big rock bag to HTC

EGRESS

BR-2 LMP 3 EVA 3/21/72

(1) CDR - LCRU BATT (FROM MESA) UNDER LEFT SEAT

(1) CDR - LRV BATT COVERS CLOSED & PRESS TIGHT

(1) CDR - LCRU POWER SW - INTERNAL

(1) CDR - LCRU COVERS OPEN (100%)

(1) CDR - DUST BRUSH ON LCRU

(1) CDR - LRV CB'S - BUS A,B,C,D & NAV - CLOSE

(1) LMP - MAG _____(L) ON 500MM

(1) LMP - 70MM MAGS _____(F),_____(K),_____(M) UNDER SEAT

(1) LMP - 16MM MAGS _____(S),_____(T),_____(U) UNDER SEAT

(1) CDR - 16MM MAG _____(R) ON DAC

0+30

MISSION: APOLLO 16
EVA: 3

DATE: MARCH 1972

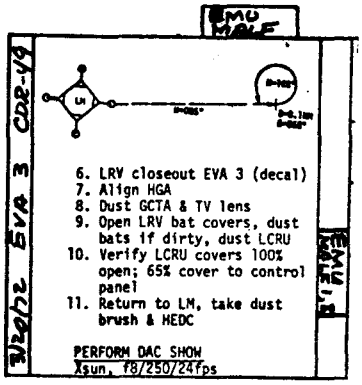
LMP ACTIVITIES	EVA TIME	CDR ACTIVITIES
	6+10	
UNLOAD PLSS		UNLOAD PLSS
Hold still		Put LMP SCB on footpad (+Z)
		Quick release PLSS tool carrier (optional)
Put CDR SCB on foot pad (+Z) Quick release PLSS tool carrier		Hold still
PACK ETB		COSMIC RAY
Get ETB, place on L floor board Pack in ETB: 500 mm cam mag 3 HEDC mags Mag R (16 mm)		Pull white ring & pin, take Cosmic Ray experiment & Case to SRC Table
		Pull blue ring & slide cosmic ray panels out of CRE case
Put 16 mm mags T, U on R Seat Transfer ETB to R Side		Report Temp labels as they come up
Put DAC mag in ETB Put Mag T on DAC		Fold panels and place in bag - leave bag on table
Take mag U & DAC to SRC table		
Assist CDR with CRE if req'd Return to LRV	6+20	
Place maps in ETB Remove drum from penetrometer		Get Big Rock Bag off HTC, take it to footpad, load up other rocks stowed there
Bag (DSB) and place drum in ETB		Hang BRB on Ladder Hook
		LRV PLACEMENT & GP
Take ETB to SRC table - hang it up		Sw LCRU Mode - 1
		Mount LRV
Put CRE bag in ETB Get HEDC (R Seat) place on MESA		
Ready DAC for Gran Prix		Perform Gran Prix
Photo Gran Prix		
	6+30 End Gran Prix	

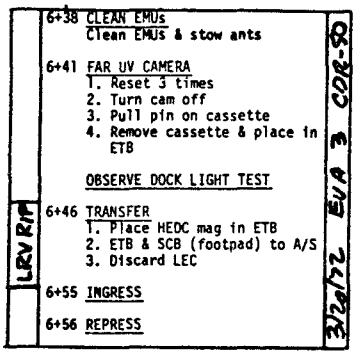
SEQ CAM.

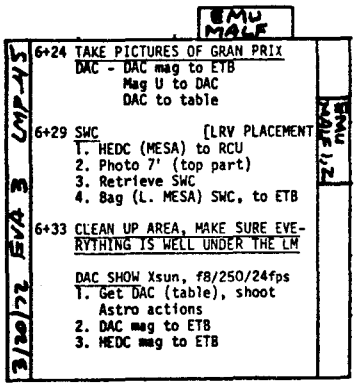
TASK FUNCTION: LMP, CDR

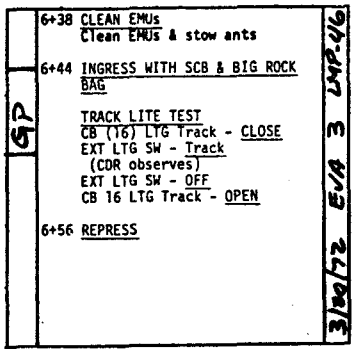
EVA CLOSEOUT (CONT'D)

EVA CLOSEOUT (CONT'D)









6+30

(1) CDR - NAV SYS Reset

(1) CDR - Report
Heading out _____(085°)
DISTANCE _____(0.1 Km)
Bearing _____(265°)
Heading Final _____(165°)

(1) CDR - Batt Covers - Open

(1) CDR - LRV Mirrors (Clean)/(Dirty)

(1) CDR - Rpt Aux CB By PASS SW - ON

(1) CDR - Confirm LCRU panel covered

(1) CDR - DUST LCRU

(1) CDR - Brush returned to LM

(1) LMP - ETB Pack:

6+40

SWC in bag _____
2 HEDC Mags _____ (F), (K)
Far UV Cassette _____
2 16mm Mags_____ (U), (T)

(1) CDR/LMP - Antennas Stowed

(1) LMP - Transfer Check =
SCB from +Z footpad _____
Big Rock Bag from ladder
hook _____

6+50

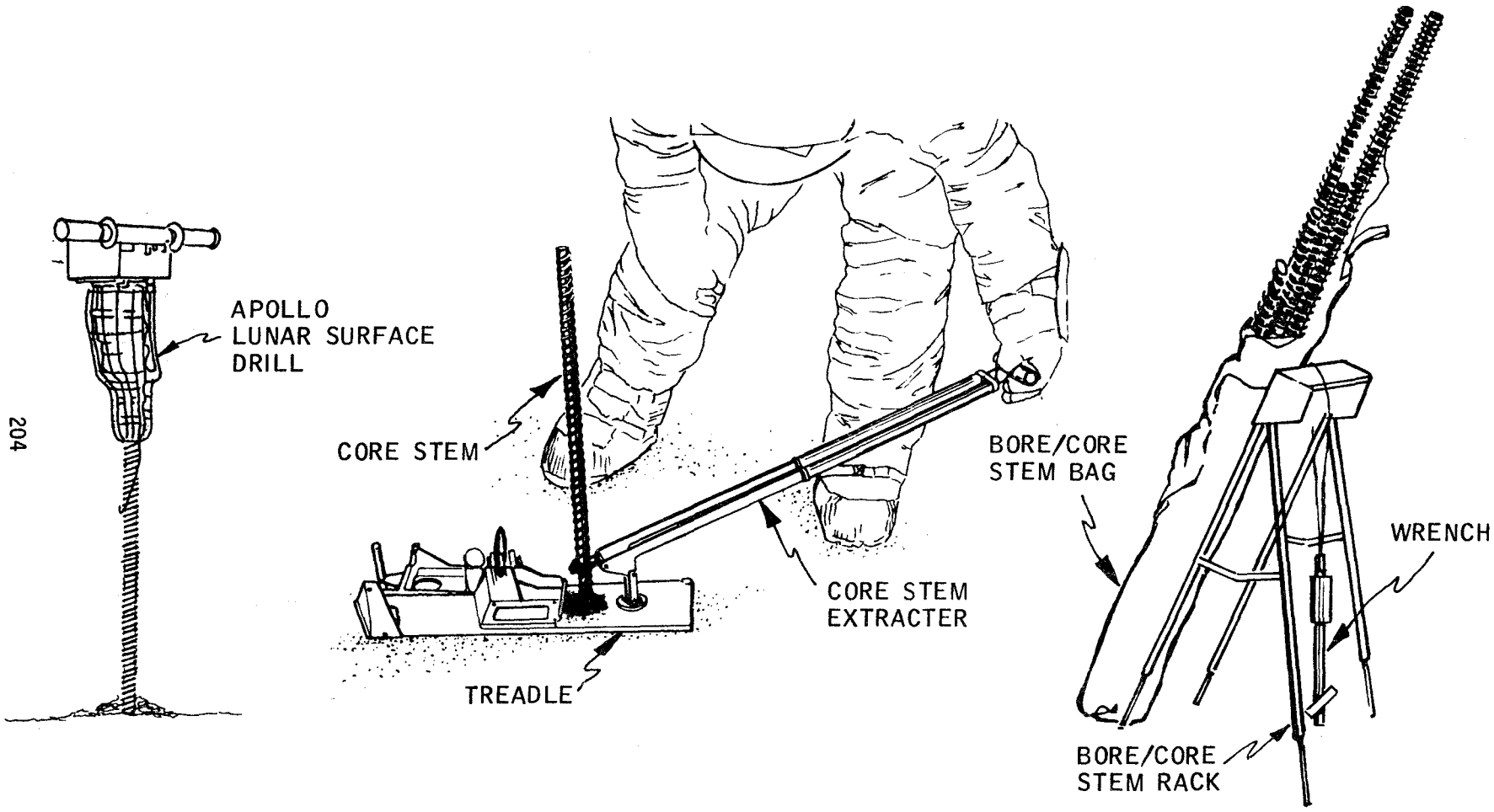


Figure 3.5-4 LUNAR SURFACE BORING & CORING HARDWARE

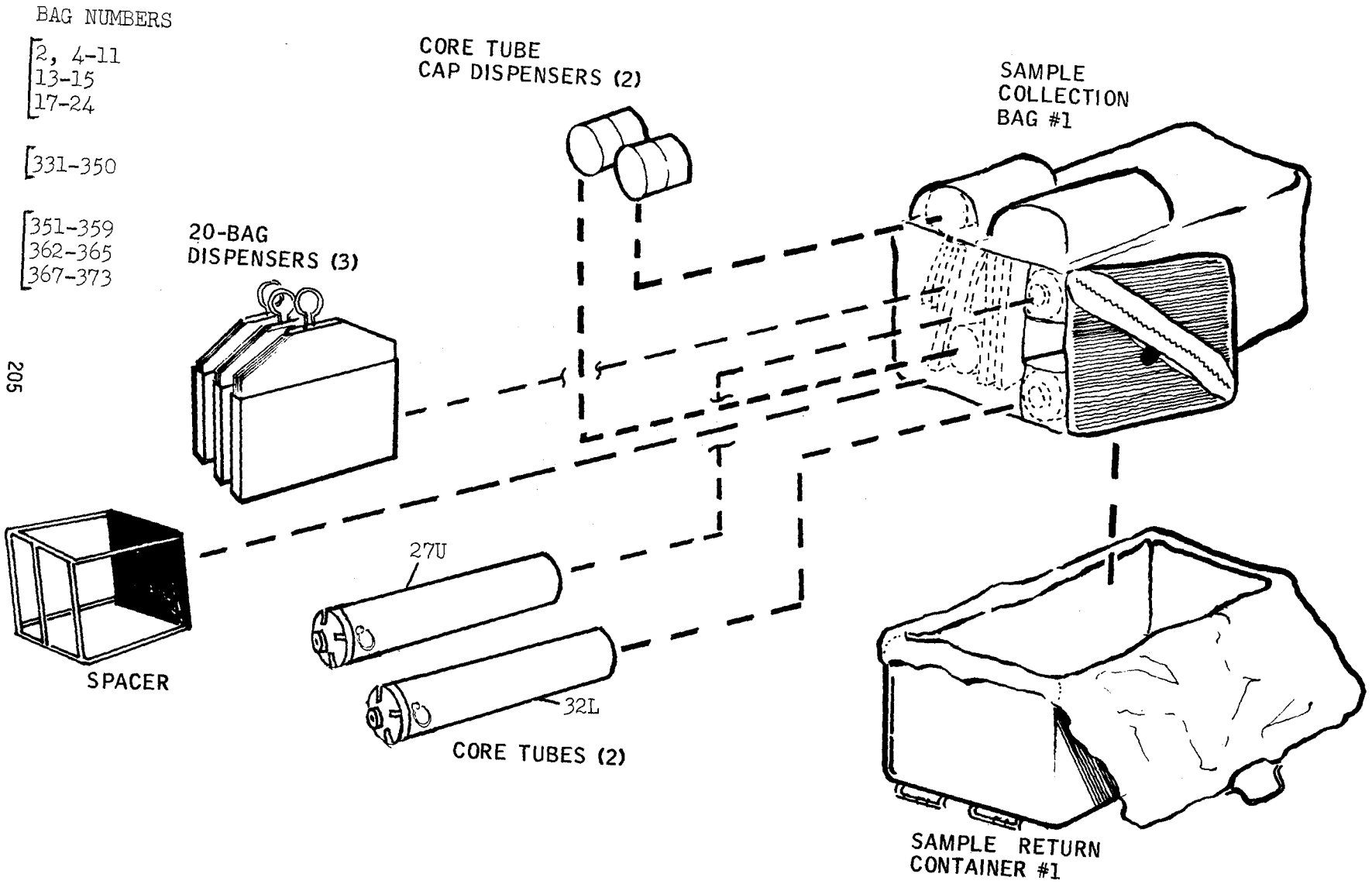


Figure 3.5-5a GEOLOGY SAMPLING ITEMS STOWED IN SRC # 1

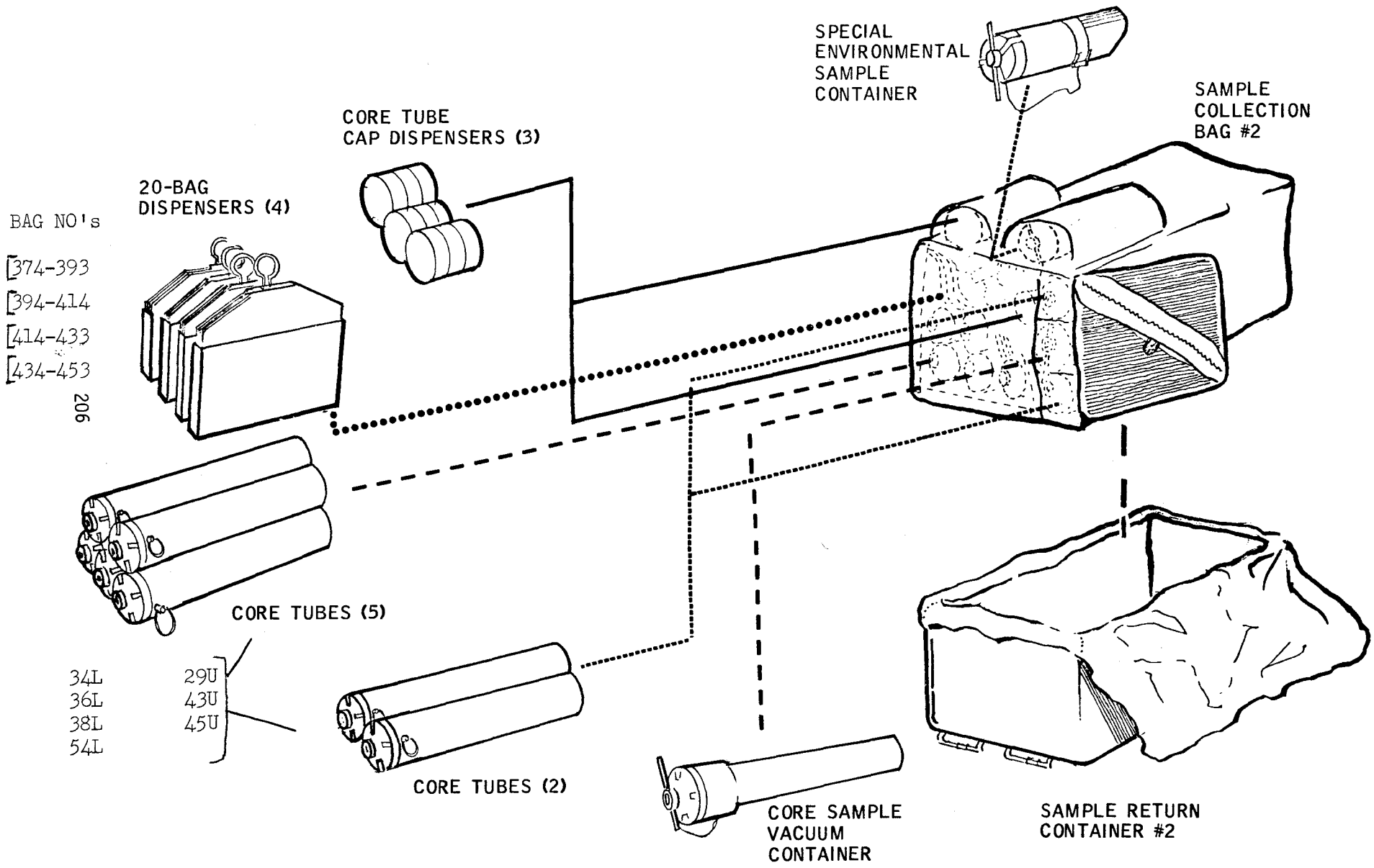


Figure 3.5-5b GEOLOGY SAMPLING ITEMS STOWED IN SRC # 2

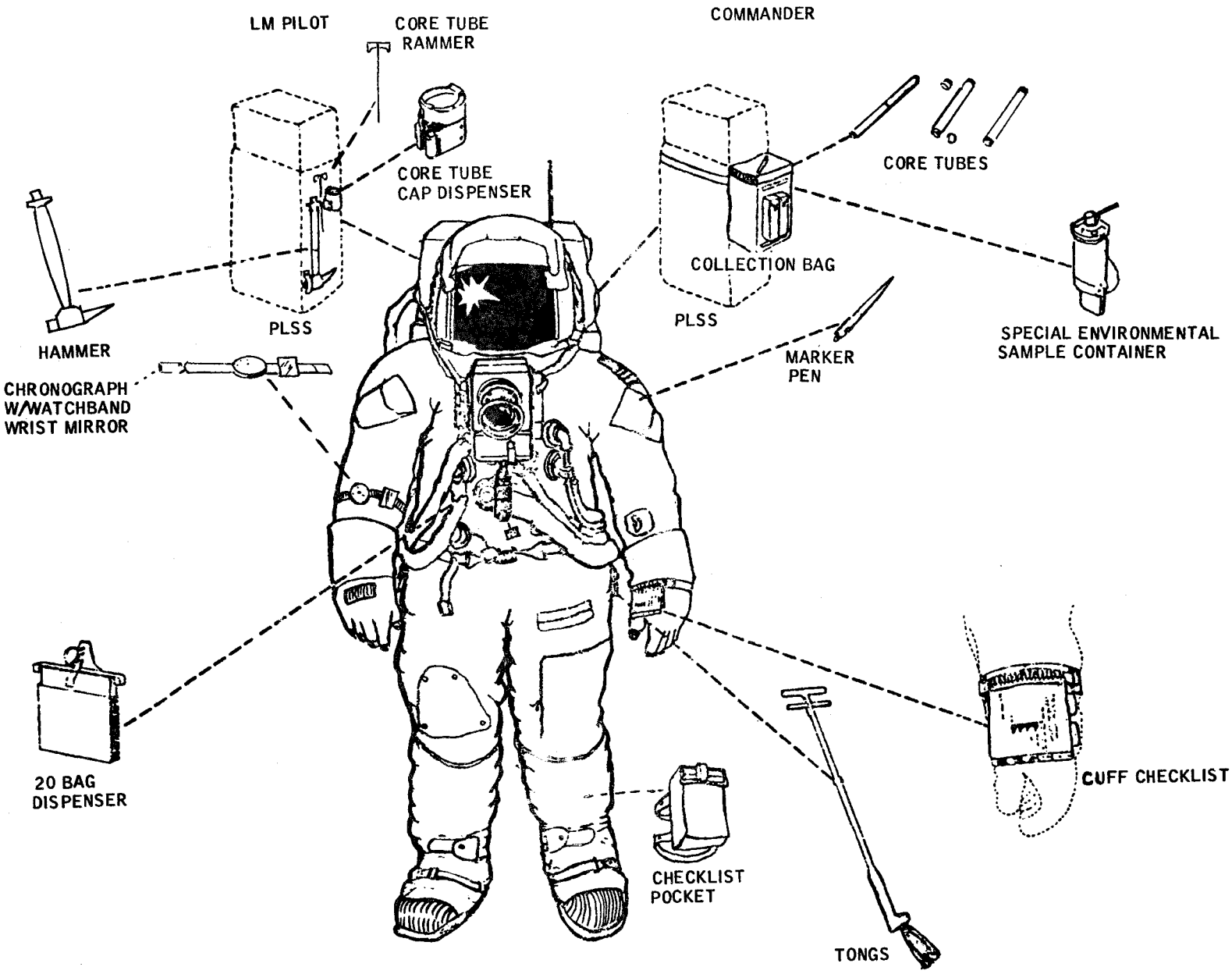
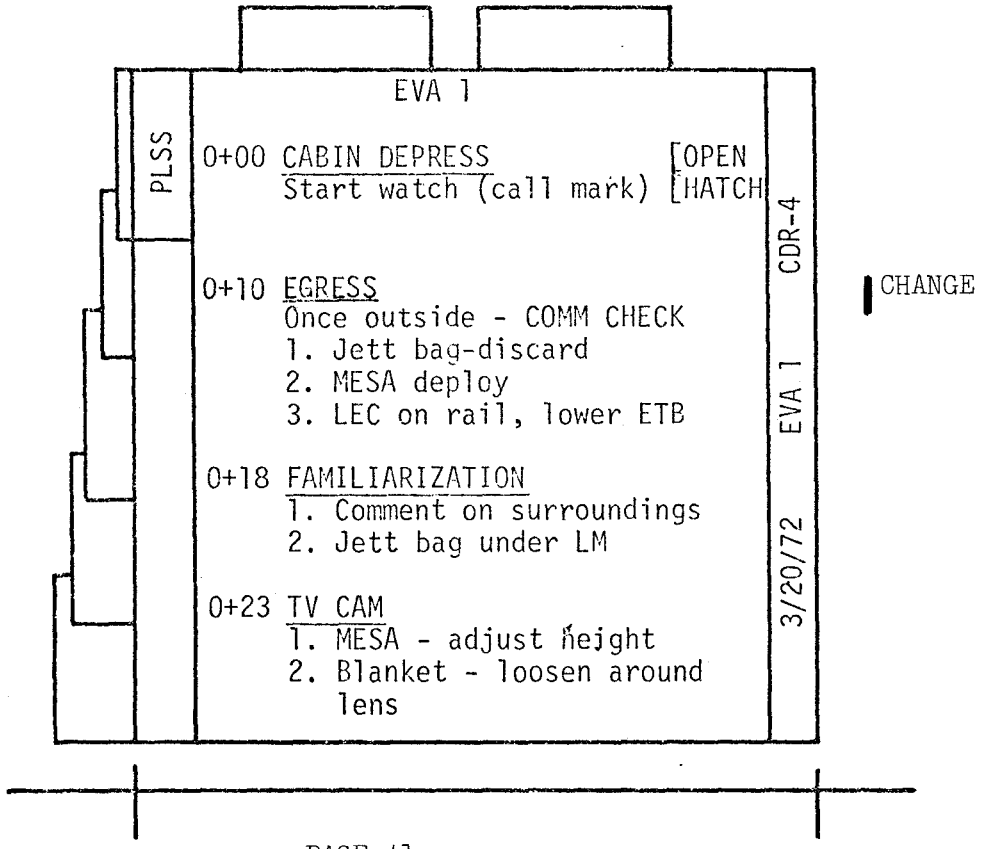
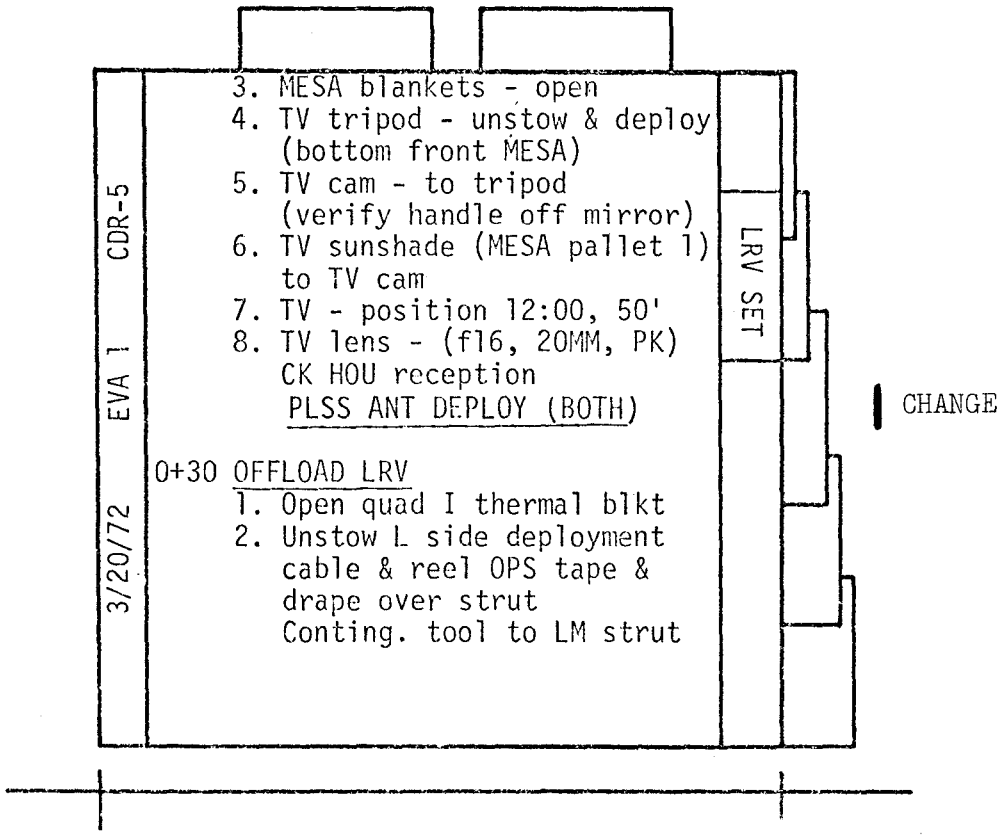


Figure 3.5-6 LUNAR SURFACE EQUIPMENT STOWED ON EMU

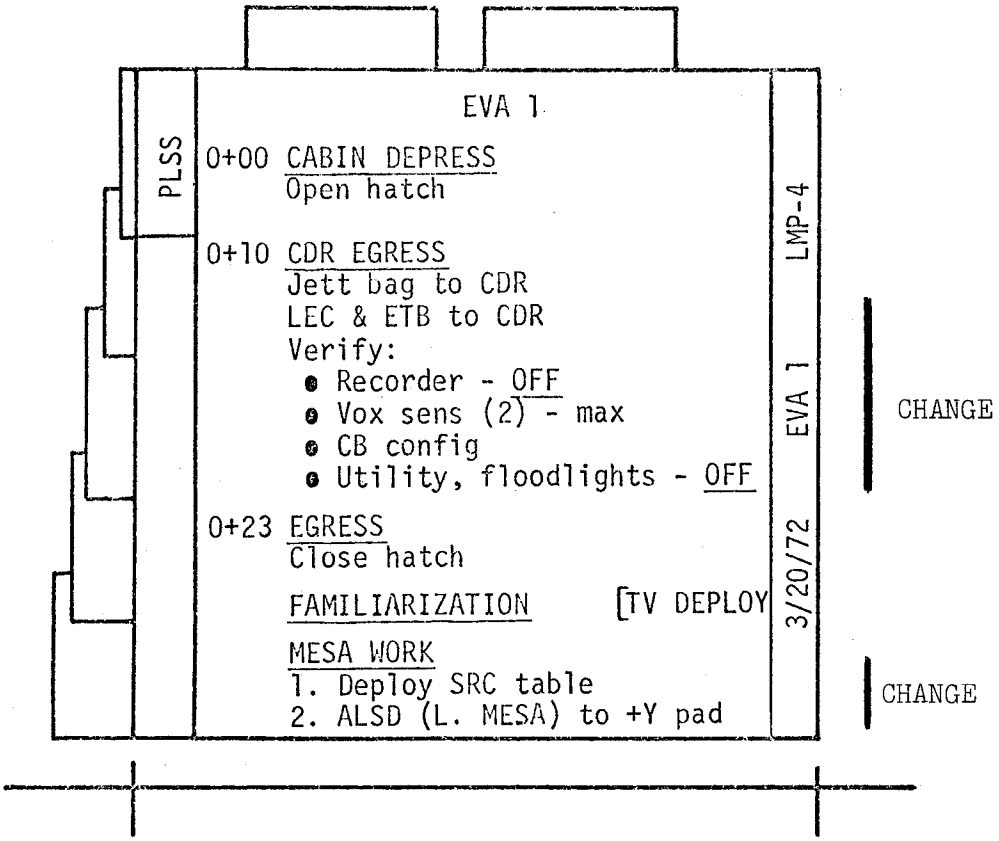
The following pages are referred to in instruction 6 of the preface to this supplement.


EVA 1
PLSS
0+00 CABIN DEPRESS
Start watch (call mark)
OPEN HATCH
0+10 EGRESS
Once outside - COMM CHECK
1. Jett bag-discard
2. MESA deploy
3. LEC on rail, lower ETB
0+18 FAMILIARIZATION
1. Comment on surroundings
2. Jett bag under LM
0+23 TV CAM
1. MESA - adjust height
2. Blanket - loosen around lens
CDR-4
EVA 1
3/20/72
CHANGE

NASA — MSC


3. MESA blankets - open
4. TV tripod - unstow & deploy (bottom front MESA)
5. TV cam - to tripod (verify handle off mirror)
6. TV sunshade (MESA pallet 1) to TV cam
7. TV - position 12:00, 50'
8. TV lens - (f16, 20MM, PK)
CK HOU reception
PLSS ANT DEPLOY (BOTH)
0+30 OFFLOAD LRV
1. Open quad I thermal blkt
2. Unstow L side deployment cable & reel OPS tape & drape over strut
Conting. tool to LM strut
CDR-5
EVA 1
3/20/72
LRV SET
CHANGE

A



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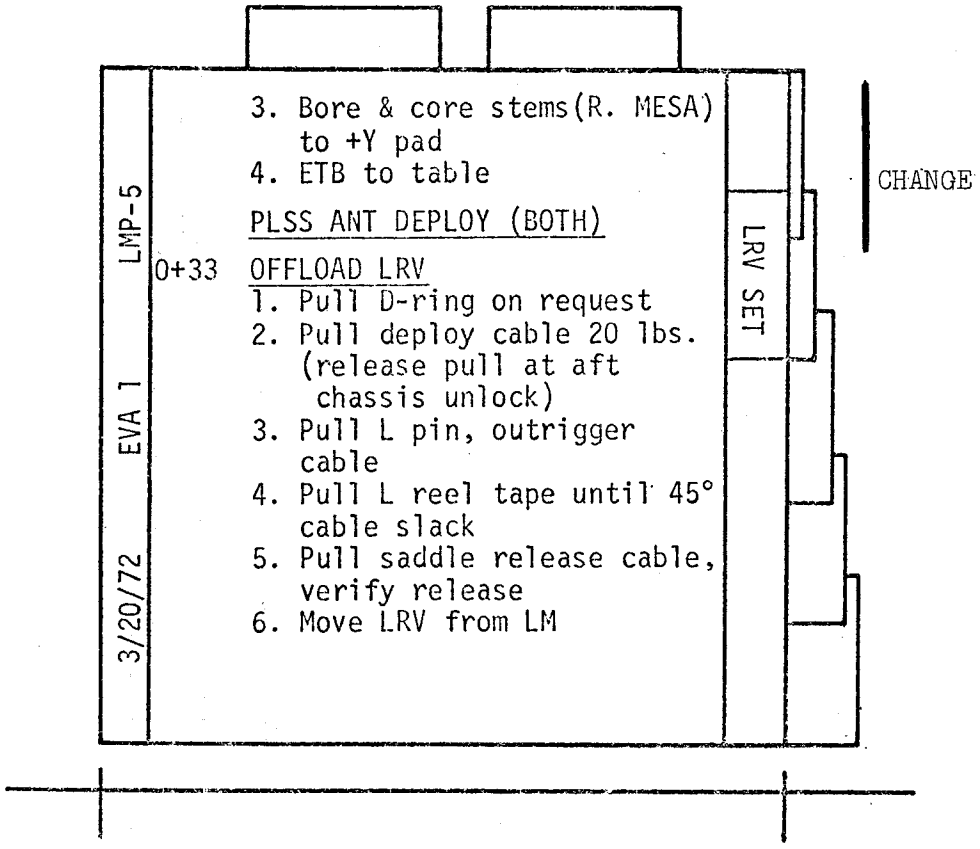
NASA — MSC

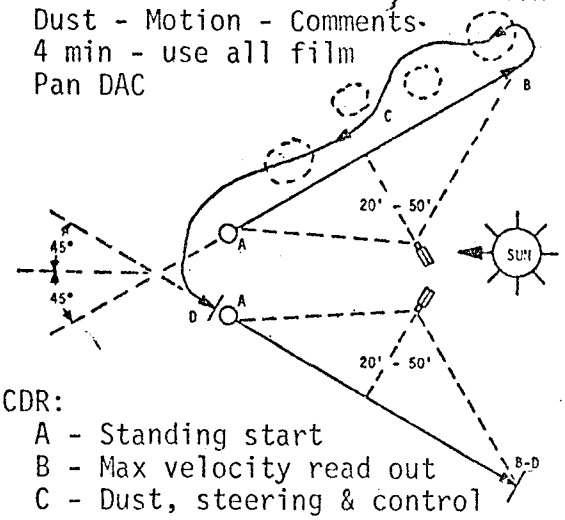
PAGE 43



B

STA 2

LMP:
DAC - Mag P - 24fps - f:8 - 1/250
Mark DAC on & off - front button
Dust - Motion - Comments
4 min - use all film
Pan DAC



CDR:
A - Standing start
B - Max velocity read out
C - Dust, steering & control
- Comments
D - Braking comments

3/20/72 EVA 1 CDR-36/LMP-26

CHANGE

PAGE 75

LPM

6+20 CLOSEOUT
1. LRV at MESA: in sun;
H=~~354°~~ 360°
2. + 15 VDC sw - OFF
3. LCRU mode sw - 3
4. Align HGA
5. Dust LCRU & GCTA
6. Reset Far UV [SWC
Photo
X-sun 20' f 5.6/60
Dwn sun 3' f 5.6/60
7. HEDC to L. seat
8. From LMP PLSS
SCB to HTC
9. LMP unload CDR
10. Tongs to HTC, hammer to
L. seat

3/20/72 EVA 1 CDR-40

CHANGE

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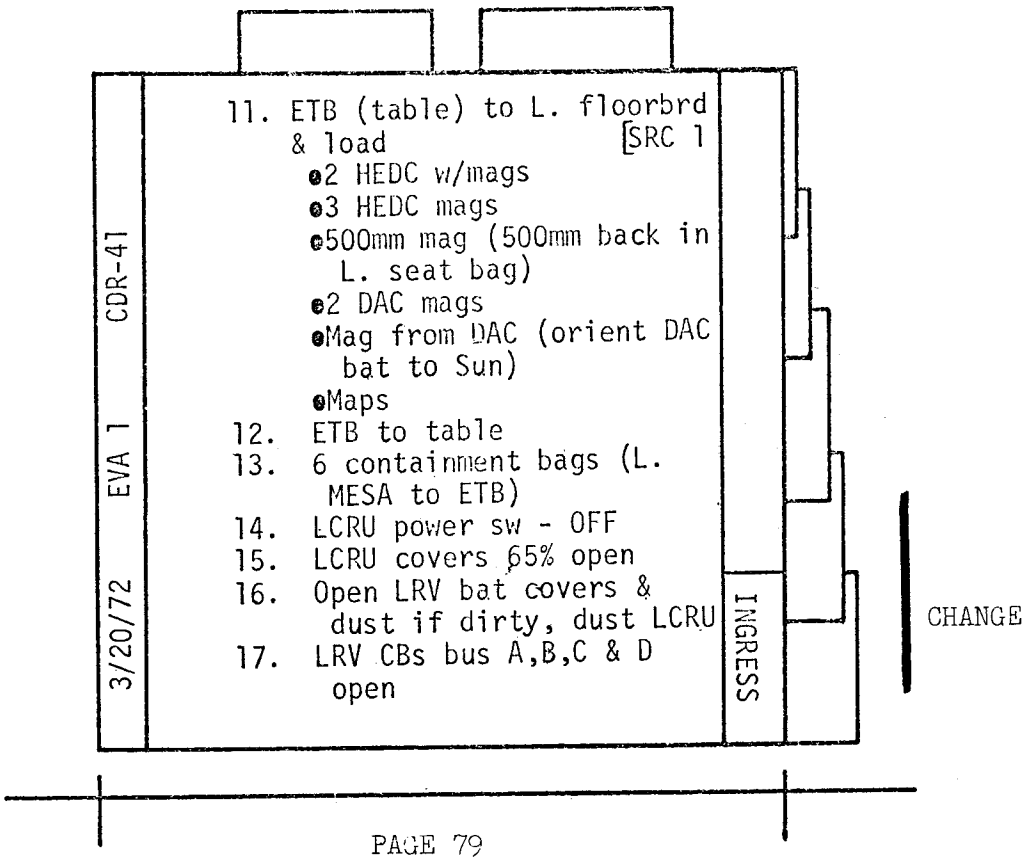
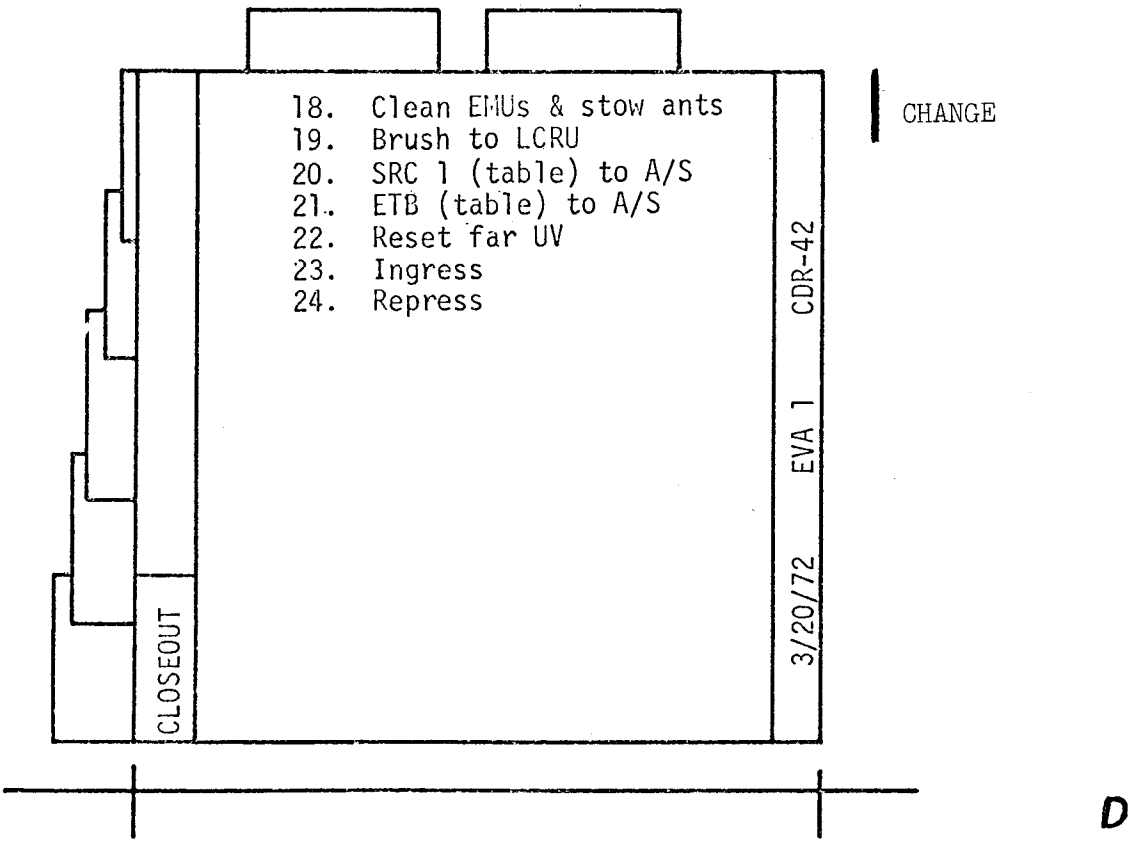
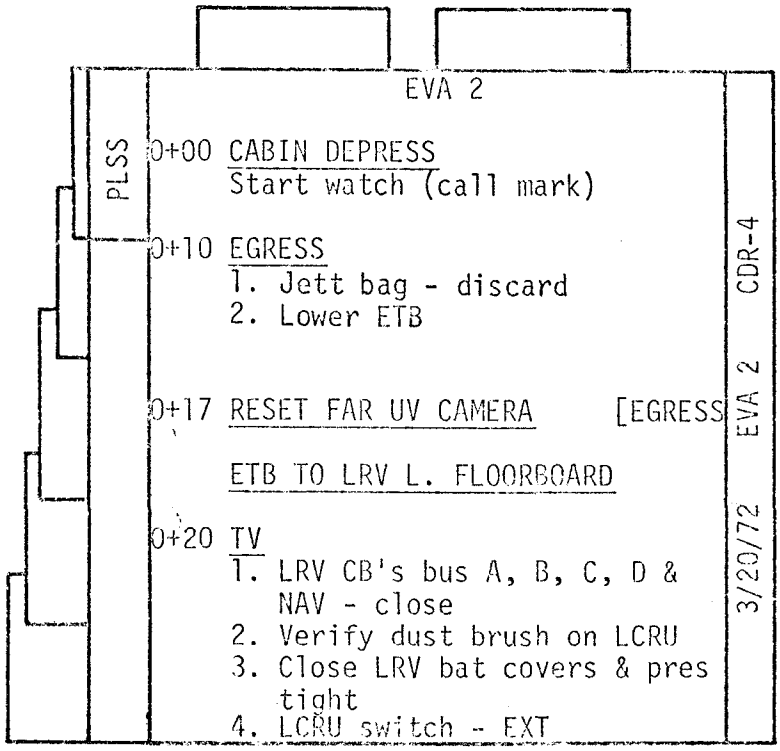
C

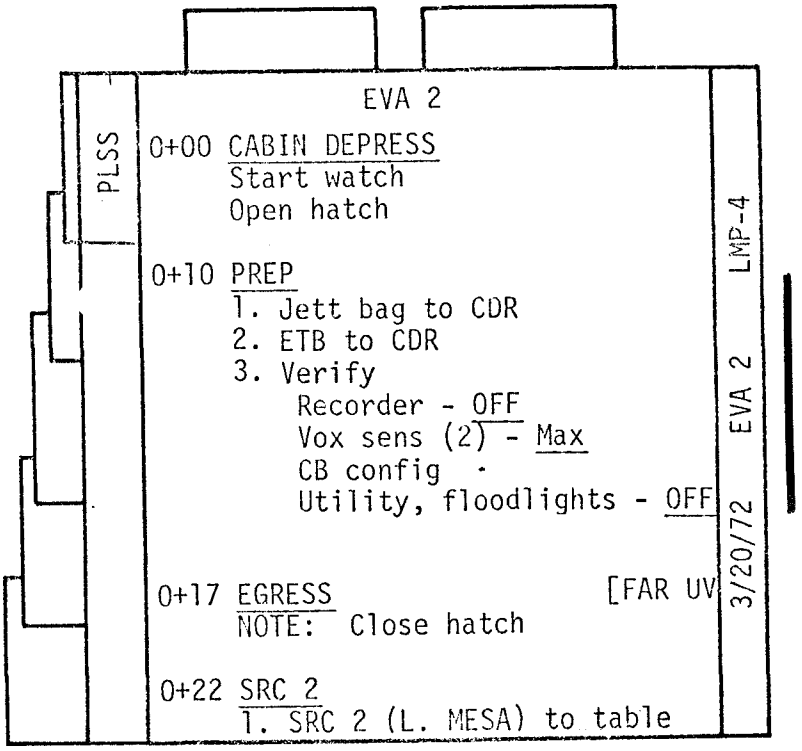

11. ETB (table) to L. floorbrd & load [SRC 1
•2 HEDC w/mags
•3 HEDC mags
•500mm mag (500mm back in L. seat bag)
•2 DAC mags
•Mag from DAC (orient DAC bat to Sun)
•Maps
12. ETB to table
13. 6 containment bags (L. MESA to ETB)
14. LCRU power sw - OFF
15. LCRU covers 65% open
16. Open LRV bat covers & dust if dirty, dust LCRU
17. LRV CBs bus A,B,C & D open
3/20/72 EVA 1 CDR-41
INGRESS
CHANGE


18. Clean EMUs & stow ants
19. Brush to LCRU
20. SRC 1 (table) to A/S
21. ETB (table) to A/S
22. Reset far UV
23. Ingress
24. Repress
CLOSEOUT
3/20/72 EVA 1 CDR-42
CHANGE

D

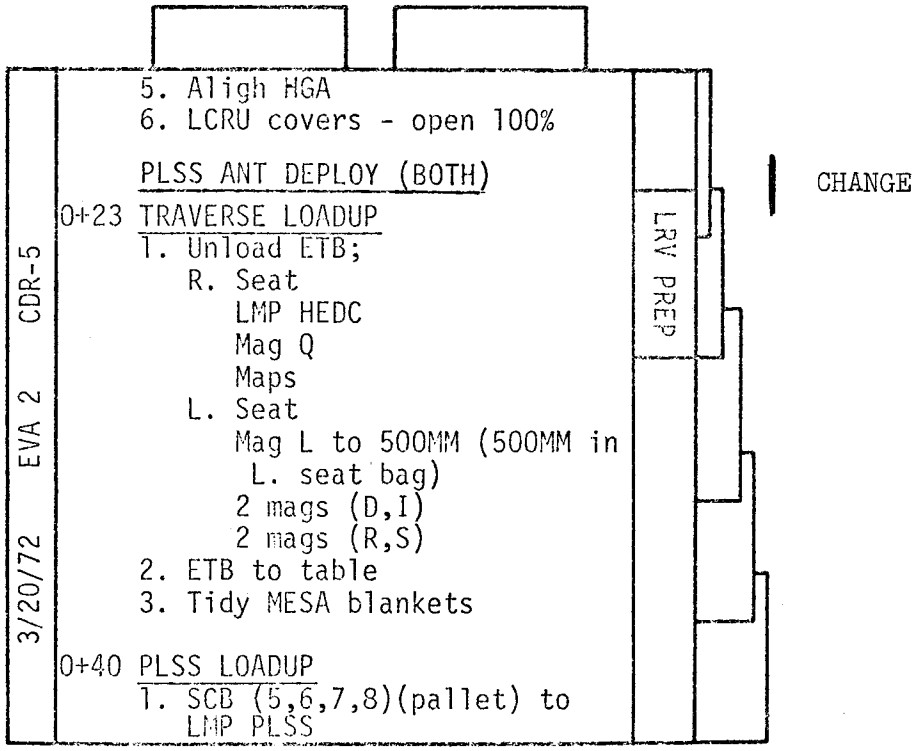


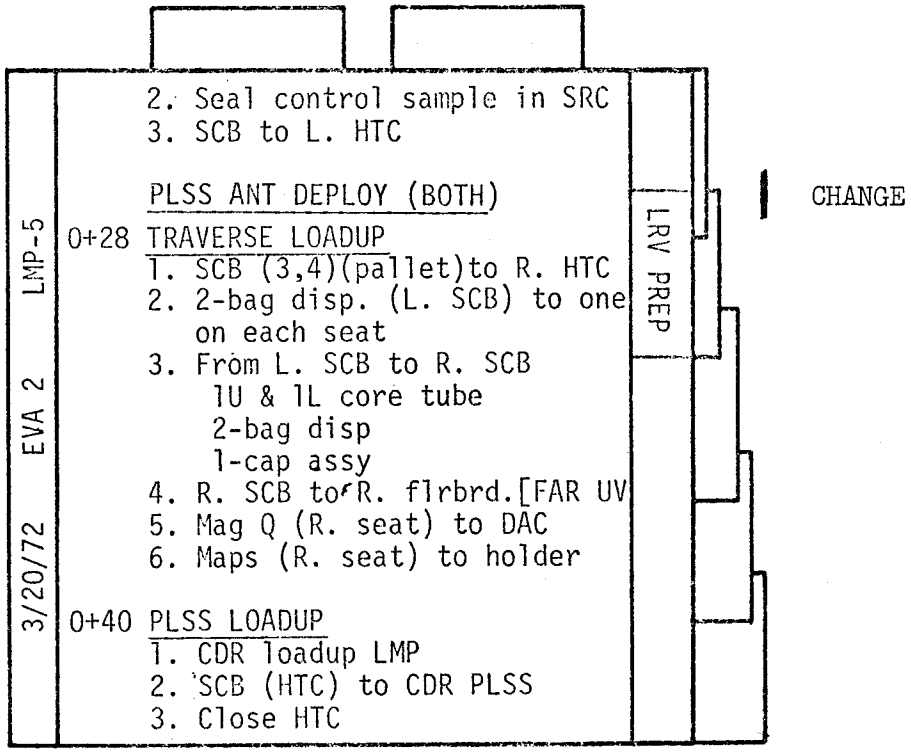
CHANGE



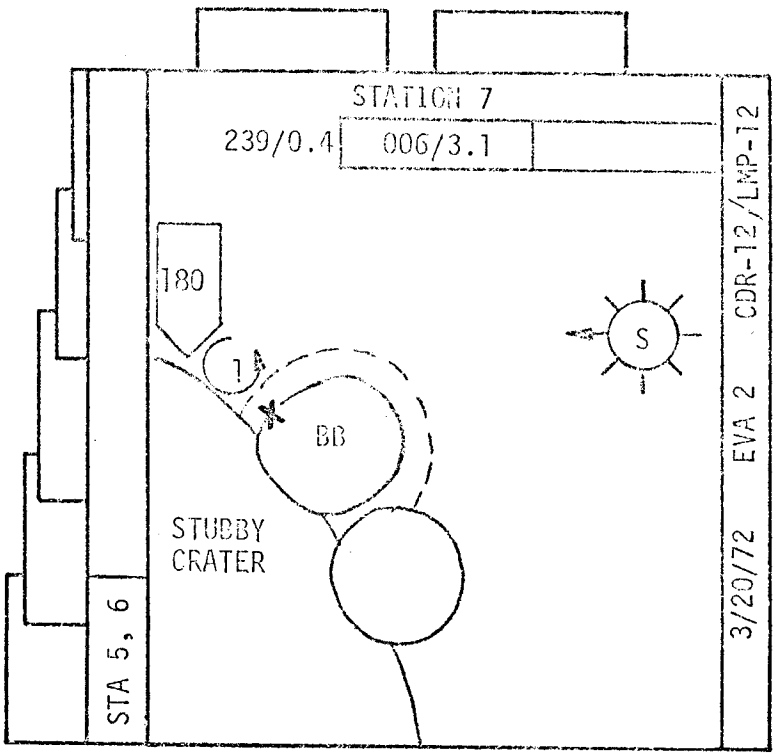
CHANGE

E


3/20/72 EVA 2 CDR-5
5. Aligh HGA
6. LCRU covers - open 100%
PLSS ANT DEPLOY (BOTH)
0+23 TRAVERSE LOADUP
1. Unload ETB;
R. Seat
LMP HEDC
Mag Q
Maps
L. Seat
Mag L to 500MM (500MM in L. seat bag)
2 mags (D,I)
2 mags (R,S)
2. ETB to table
3. Tidy MESA blankets
0+40 PLSS LOADUP
1. SCB (5,6,7,8)(pallet) to LMP PLSS
LRV PREP
CHANGE

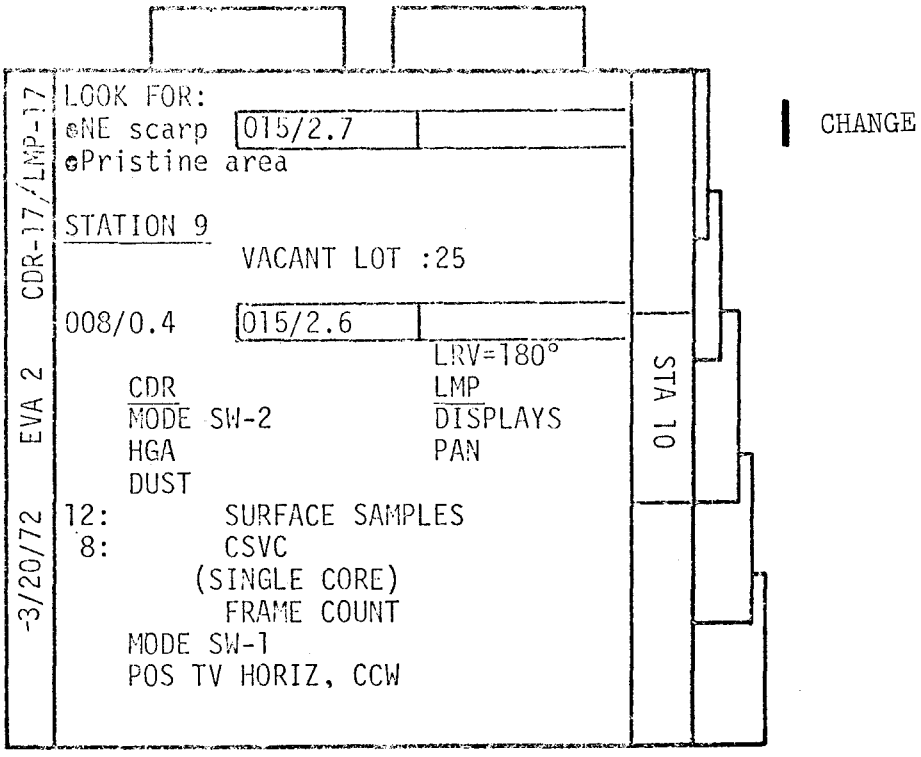

3/20/72 EVA 2 LMP-5
2. Seal control sample in SRC
3. SCB to L. HTC
PLSS ANT DEPLOY (BOTH)
0+28 TRAVERSE LOADUP
1. SCB (3,4)(pallet)to R. HTC
2. 2-bag disp. (L. SCB) to one on each seat
3. From L. SCB to R. SCB
1U & 1L core tube
2-bag disp
1-cap assy
4. R. SCB to R. flrbrd.[FAR UV
5. Mag Q (R. seat) to DAC
6. Maps (R. seat) to holder
0+40 PLSS LOADUP
1. CDR loadup LMP
2. SCB (HTC) to CDR PLSS
3. Close HTC
LRV PREP
CHANGE

F

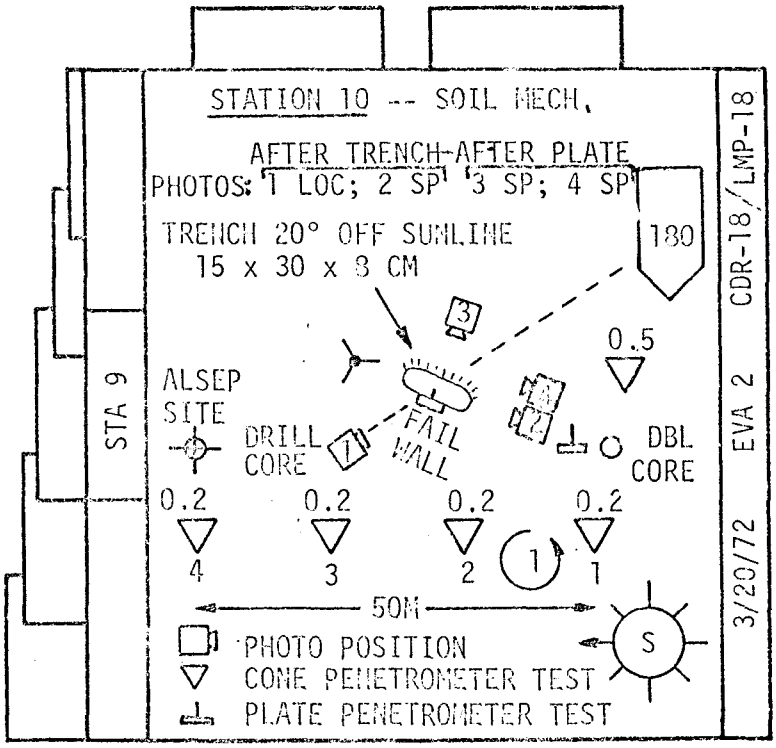

STATION 7
239/0.4
006/3.1
180
1
BB
S
STUBBY
CRATER
STA 5, 6
3/20/72
EVA 2
CDR-12/LMP-12

CHANGE

G

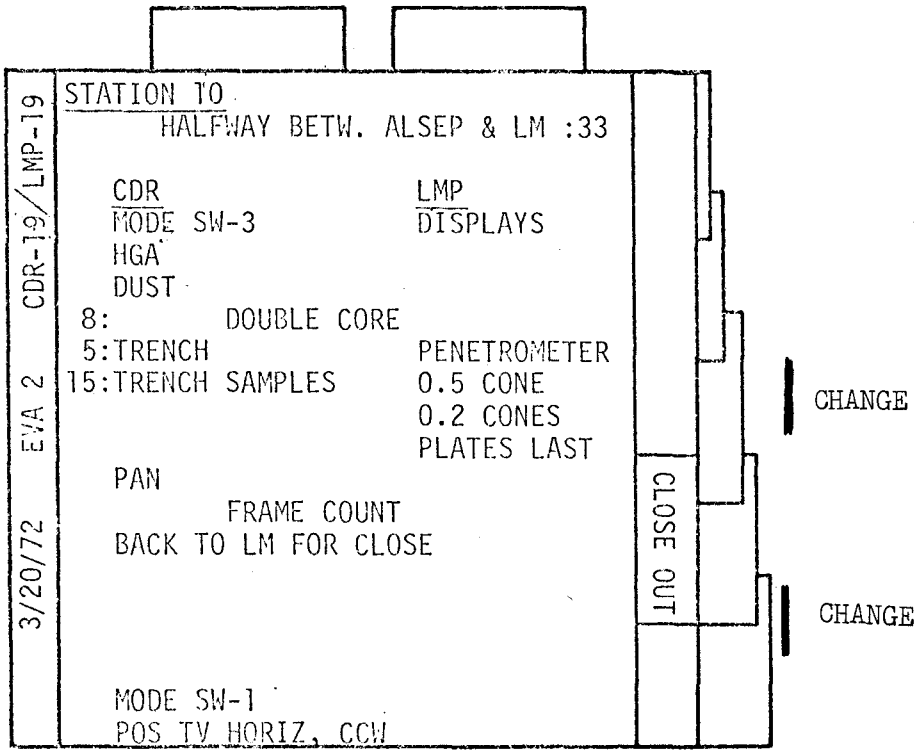

-3/20/72 EVA 2 CDR-17/LMP-17
LOOK FOR:
•NE scarp
015/2.7
•Pristine area
STATION 9
VACANT LOT :25
008/0.4
015/2.6
LRV=180°
CDR
MODE SW-2
HGA
DUST
LMP
DISPLAYS
PAN
12: SURFACE SAMPLES
8: CSVC
(SINGLE CORE)
FRAME COUNT
MODE SW-1
POS TV HORIZ, CCW
STA 10
CHANGE

H



CHANGE

CHANGE



CHANGE

CHANGE

I

EVA 2

6+20 LRV PWR DWN 360°
1. LRV at MESA; H=~~357°~~ in sun
2. ± 15 VDC sw - OFF

6+23 RESET FAR UV CAMERA

6+26 UNLOAD PLSS
1. LMP SCB to +Z footpad
2. Discard core cap disp
3. Tongs to HTC
4. Hammer to L. seat
5. LMP unload CDR

6+29 PACK ETB (CDR OR LMP)
1 ETB (SRC table) to floorboard

CDR-21 EVA 2 3/20/72

CLOSEOUT

2. Place in ETB:
- 2-HEDC w/mags
- 2-HEDC mags
- 2-DAC mags
- 1-mag from 500mm (restow 500mm under seat)
- 1-mag from DAC
- 1-set Maps
- 2-padded bags (HTC)

DAC bat to Sun

6+38 LRV, LCRU CONFIGURE
1. LCRU power - OFF
2. LCRU blankets 100% open
3. Open LRV bat covers (dust if dirty), dust LCRU
4. LRV CBs bus A, B, C&D open

CLOSEOUT

CDR-22 EVA 2 3/20/72

EVA 2

6+20 LRV PWR DWN
1. Readout LRV displays

6+22 TV
1. Switch LCRU - 3 [FAR UV
2. Align HGA
3. Dust GCTA & LCRU

PLACE HEDC & BAG DISP ON L. SEAT

6+26 UNLOAD PLSS
1. CDR unload LMP
2. SCB (CDR) to L. HTC
3. Tongs to HTC

6+29 PACK SRC 2
1. SCB from LHTC to SRC 2

LMP-21 EVA 2 3/20/72

ETB

2. Seal SRC 2

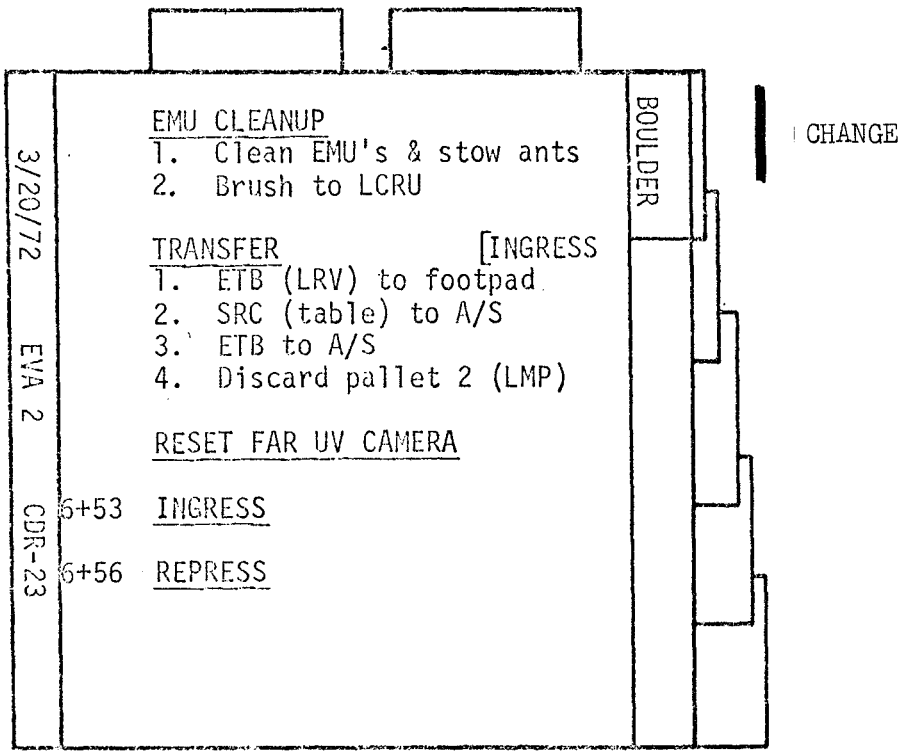
6+34 PACK ETB (CDR OR LMP)
1. ETB (table) to L. flrbrd
2. Place in ETB
- 2-HEDC W/mags
- 2-HEDC mags
- 2-DAC mags
- 1-mag from 500MM (restow 500MM under seat)
- 1-mag from DAC
- 1-set maps
- 2-padded bags (L. seat bag)

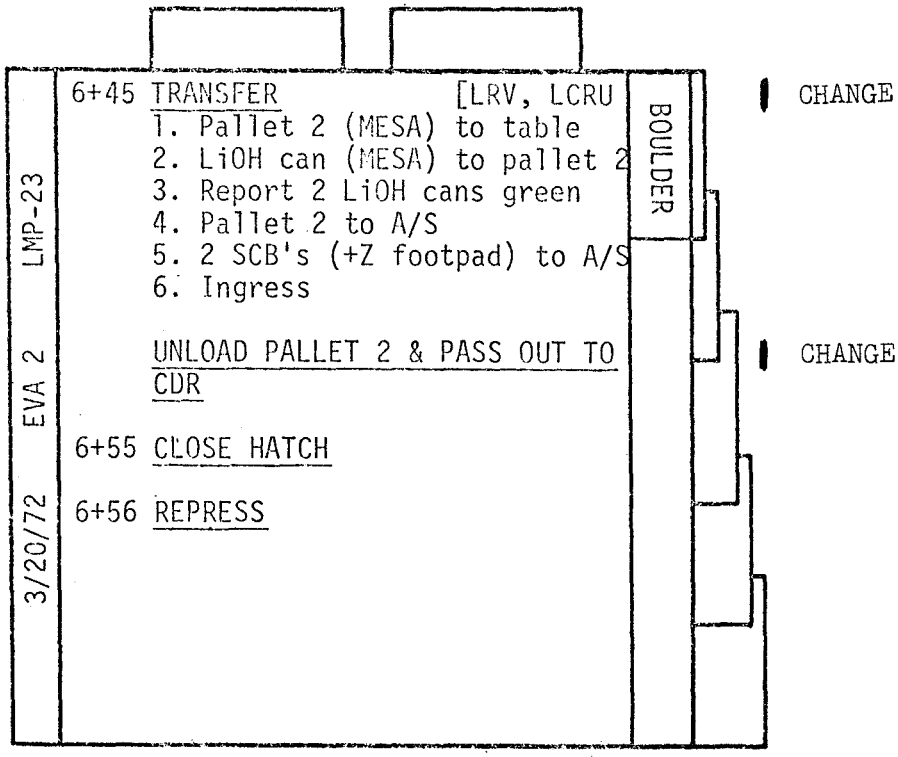
DAC bat to sun
LARGE ROCKS (LRV) TO SCB (PALLET) TO +Z PAD

EMU CLEANUP
Clean EMU's & stow ants

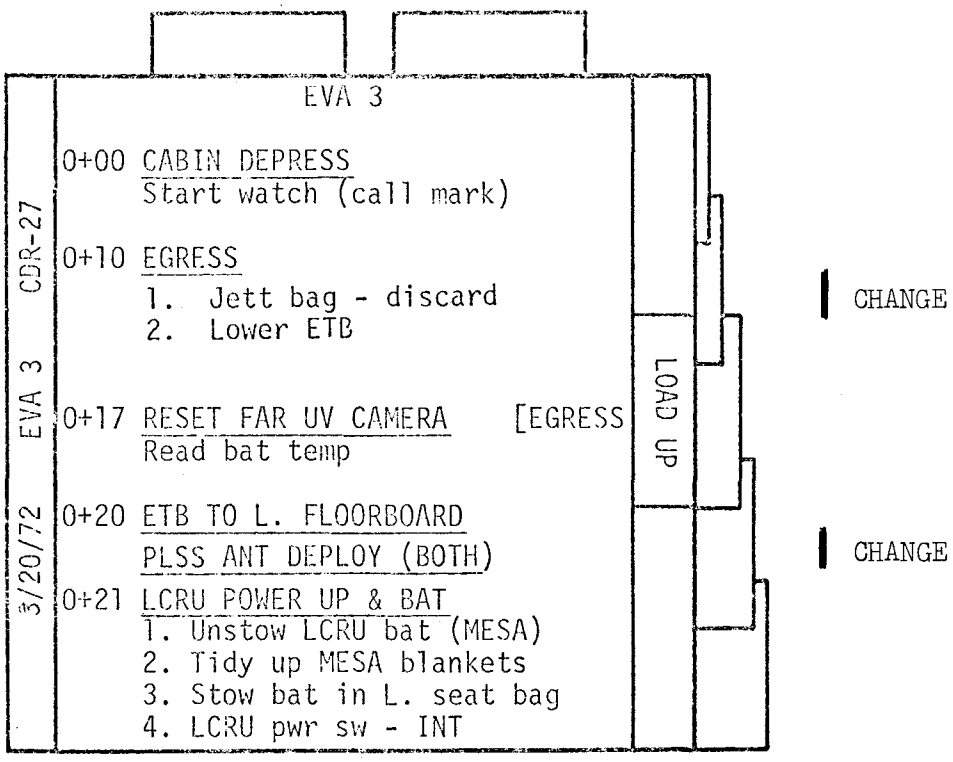
CLOSEOUT

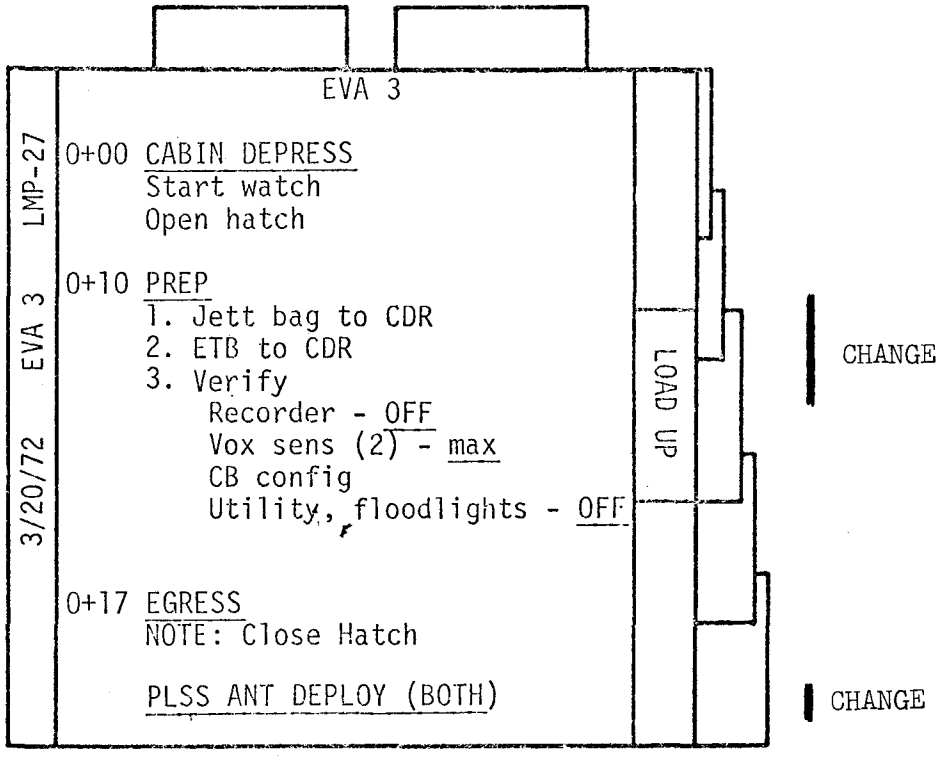
LMP-22 EVA 2 3/20/72


3/20/72
EVA 2
CDR-23
EMU CLEANUP
1. Clean EMU's & stow ants
2. Brush to LCRU
TRANSFER [INGRESS
1. ETB (LRV) to footpad
2. SRC (table) to A/S
3. ETB to A/S
4. Discard pallet 2 (LMP)
RESET FAR UV CAMERA
6+53 INGRESS
6+56 REPRESS
BOULDER
CHANGE

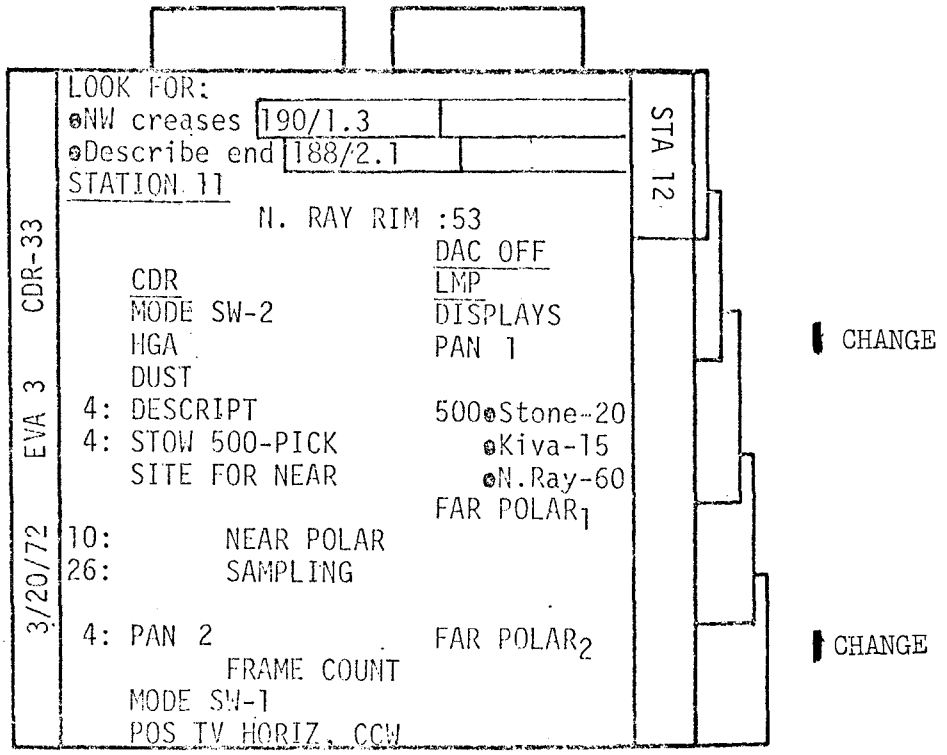

3/20/72
EVA 2
LMP-23
6+45 TRANSFER [LRV, LCRU
1. Pallet 2 (MESA) to table
2. LiOH can (MESA) to pallet 2
3. Report 2 LiOH cans green
4. Pallet 2 to A/S
5. 2 SCB's (+Z footpad) to A/S
6. Ingress
UNLOAD PALLET 2 & PASS OUT TO CDR
6+55 CLOSE HATCH
6+56 REPRESS
BOULDER
CHANGE
CHANGE

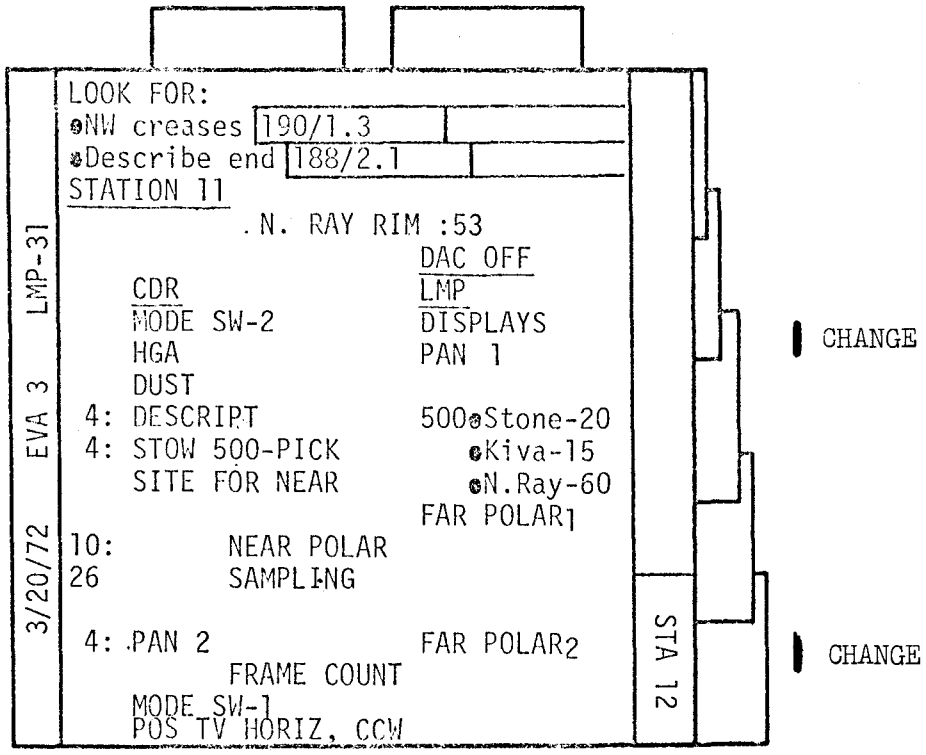
k


EVA 3
0+00 CABIN DEPRESS
Start watch (call mark)
0+10 EGRESS
1. Jett bag - discard
2. Lower ETB
0+17 RESET FAR UV CAMERA [EGRESS
Read bat temp
0+20 ETB TO L. FLOORBOARD
PLSS ANT DEPLOY (BOTH)
0+21 LCRU POWER UP & BAT
1. Unstow LCRU bat (MESA)
2. Tidy up MESA blankets
3. Stow bat in L. seat bag
4. LCRU pwr sw - INT
CDR-27 EVA 3 3/20/72
LOAD UP
CHANGE
CHANGE

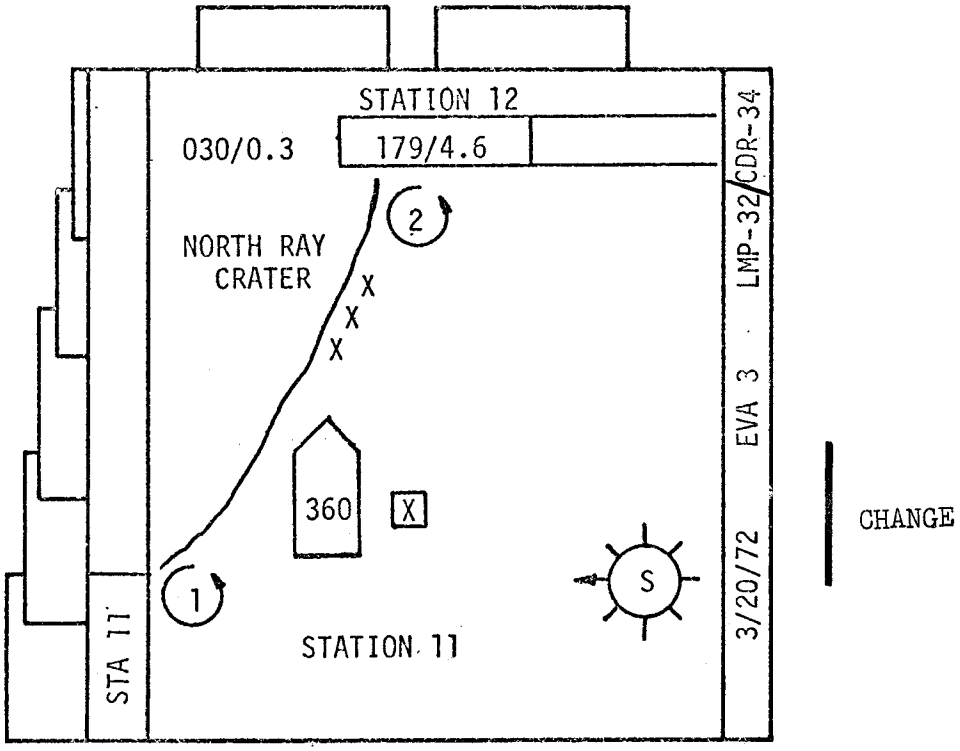

EVA 3
0+00 CABIN DEPRESS
Start watch
Open hatch
0+10 PREP
1. Jett bag to CDR
2. ETB to CDR
3. Verify
Recorder - OFF
Vox sens (2) - max
CB config
Utility, floodlights - OFF
0+17 EGRESS
NOTE: Close Hatch
PLSS ANT DEPLOY (BOTH)
LMP-27 EVA 3 3/20/72
LOAD UP
CHANGE
CHANGE

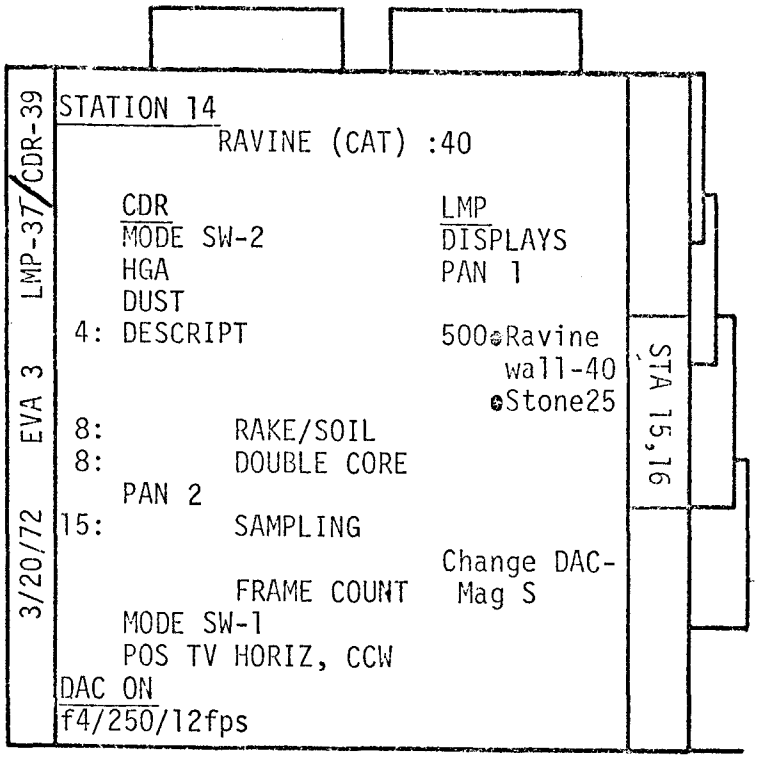
L

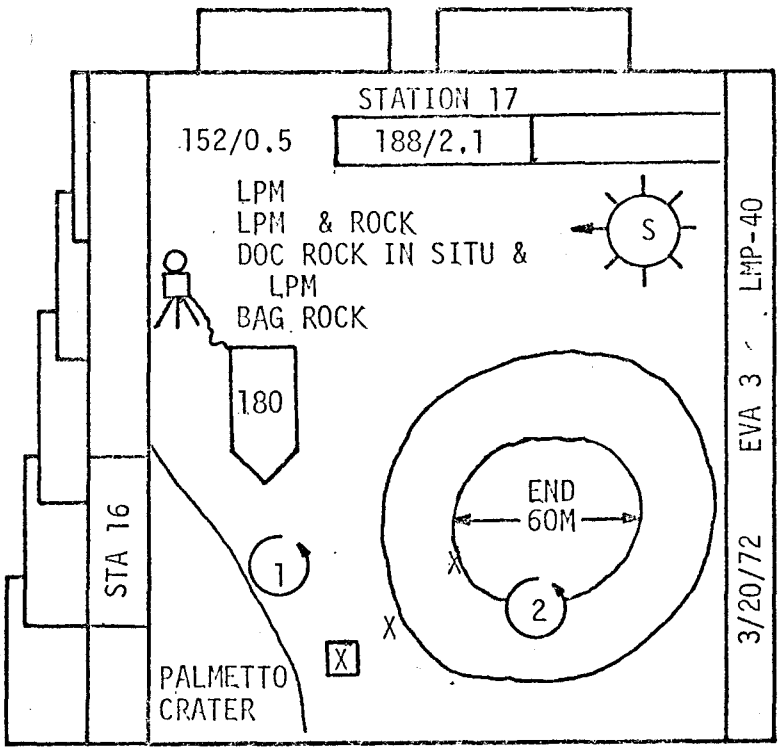

LOOK FOR:
•NW creases 190/1.3
•Describe end 188/2.1
STATION 11
N. RAY RIM :53
DAC OFF
CDR
LMP
MODE SW-2
DISPLAYS
HGA
PAN 1
DUST
4: DESCRIPT
500•Stone-20
4: STOW 500-PICK
•Kiva-15
SITE FOR NEAR
•N.Ray-60
FAR POLAR1
10: NEAR POLAR
26: SAMPLING
4: PAN 2
FAR POLAR2
FRAME COUNT
MODE SW-1
POS TV HORIZ, CCW
3/20/72 EVA 3 CDR-33
STA 12
CHANGE
CHANGE


LOOK FOR:
•NW creases 190/1.3
•Describe end 188/2.1
STATION 11
N. RAY RIM :53
DAC OFF
CDR
LMP
MODE SW-2
DISPLAYS
HGA
PAN 1
DUST
4: DESCRIPT
500•Stone-20
4: STOW 500-PICK
•Kiva-15
SITE FOR NEAR
•N.Ray-60
FAR POLAR1
10: NEAR POLAR
26 SAMPLING
4: PAN 2
FAR POLAR2
FRAME COUNT
MODE SW-1
POS TV HORIZ, CCW
3/20/72 EVA 3 LMP-31
STA 12
CHANGE
CHANGE

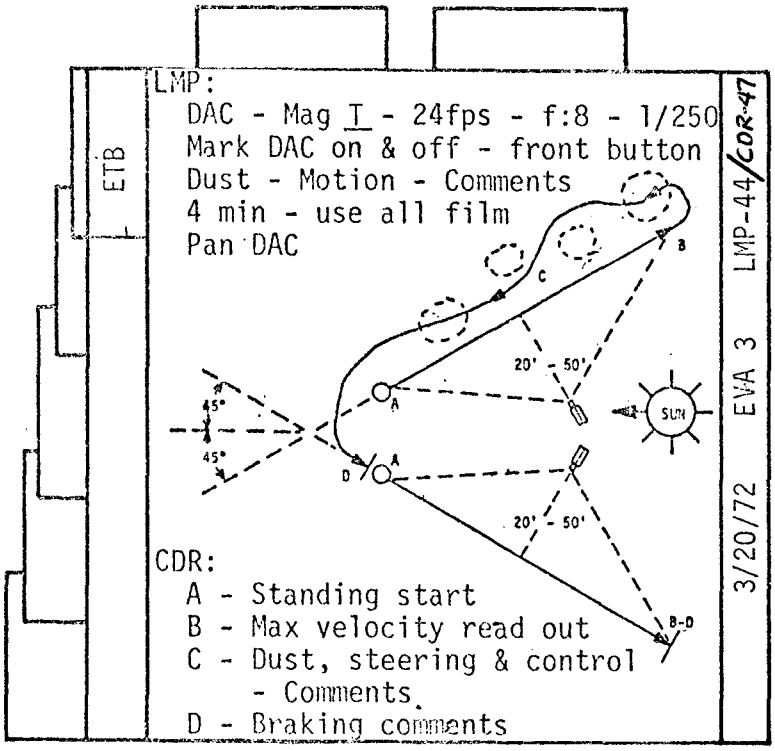
M


STATION 12
030/0.3
179/4.6
NORTH RAY
CRATER
2
X
X
X
360
X
1
S
STATION 11
STA 11
LMP-32/CDR-34
EVA 3
3/20/72
CHANGE
N


3/20/72 EVA 3 LMP-37/CDR-39
STATION 14
RAVINE (CAT) :40
CDR
MODE SW-2
HGA
DUST
4: DESCRIPT
8: RAKE/SOIL
8: DOUBLE CORE
PAN 2
15: SAMPLING
FRAME COUNT
MODE SW-1
POS TV HORIZ, CCW
DAC ON
f4/250/12fps
LMP
DISPLAYS
PAN 1
500 Ravine wall-40
Stone25
Change DAC-Mag S
STA 15,16
CHANGE
CHANGE

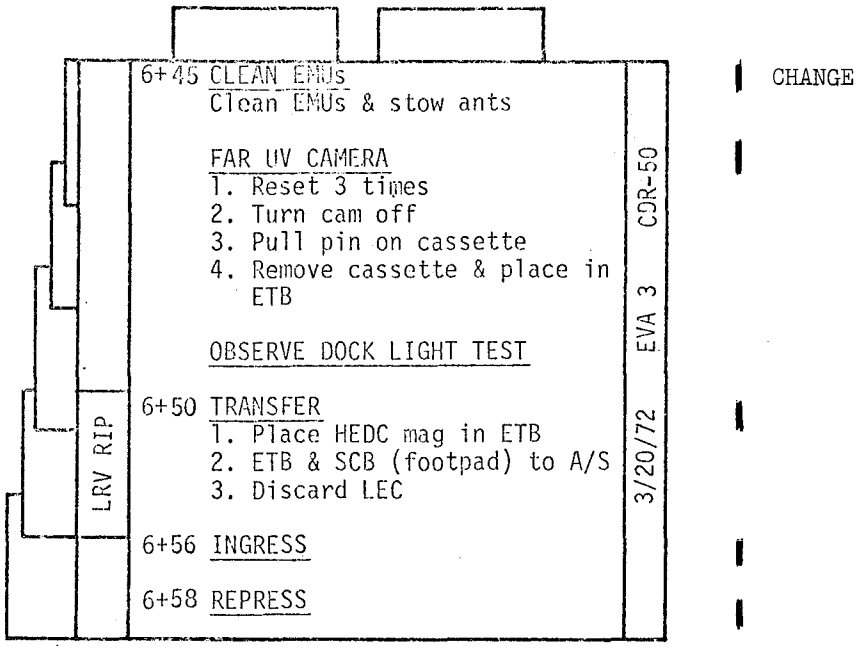

STATION 17
152/0.5
188/2.1
LPM
LPM & ROCK
DOC ROCK IN SITU &
LPM
BAG ROCK
S
180
STA 16
1
2
END
60M
X
X
X
PALMETTO
CRATER
EVA 3
LMP-40
3/20/72
CHANGE

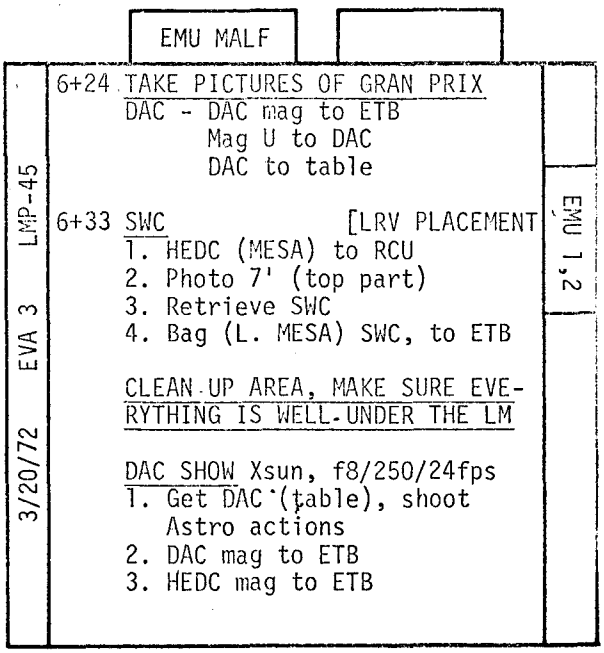
P

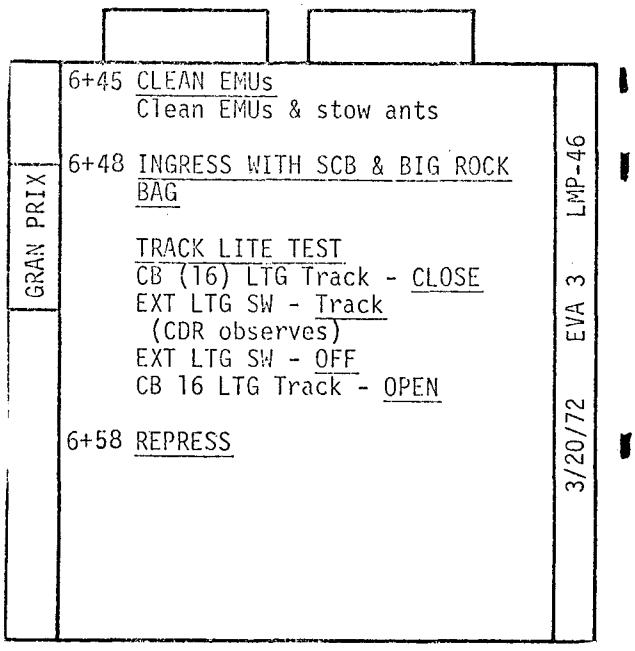

ETB
LMP:
DAC - Mag I - 24fps - f:8 - 1/250
Mark DAC on & off - front button
Dust - Motion - Comments
4 min - use all film
Pan DAC
CDR:
A - Standing start
B - Max velocity read out
C - Dust, steering & control
- Comments
D - Braking comments
20' - 50'
45°
45°
SUN
3/20/72 EVA 3 LMP-44/COR-47

CHANGE

Q


6+45 CLEAN EMUs
Clean EMUs & stow ants
FAR UV CAMERA
1. Reset 3 times
2. Turn cam off
3. Pull pin on cassette
4. Remove cassette & place in ETB
OBSERVE DOCK LIGHT TEST
6+50 TRANSFER
1. Place HEDC mag in ETB
2. ETB & SCB (footpad) to A/S
3. Discard LEC
6+56 INGRESS
6+58 REPRESS
LRV RIP
EVA 3 CDR-50
3/20/72
CHANGE


EMU MALF
6+24 TAKE PICTURES OF GRAN PRIX
DAC - DAC mag to ETB
Mag U to DAC
DAC to table
6+33 SWC [LRV PLACEMENT
1. HEDC (MESA) to RCU
2. Photo 7' (top part)
3. Retrieve SWC
4. Bag (L. MESA) SWC, to ETB
CLEAN UP AREA, MAKE SURE EVERYTHING IS WELL-UNDER THE LM
DAC SHOW Xsun, f8/250/24fps
1. Get DAC (table), shoot Astro actions
2. DAC mag to ETB
3. HEDC mag to ETB
EMU 1,2
3/20/72 EVA 3 LMP-45


6+45 CLEAN EMUs
Clean EMUs & stow ants
6+48 INGRESS WITH SCB & BIG ROCK BAG
TRACK LITE TEST
CB (16) LTG Track - CLOSE
EXT LTG SW - Track
(CDR observes)
EXT LTG SW - OFF
CB 16 LTG Track - OPEN
6+58 REPRESS
GRAN PRIX
3/20/72 EVA 3 LMP-46

R