

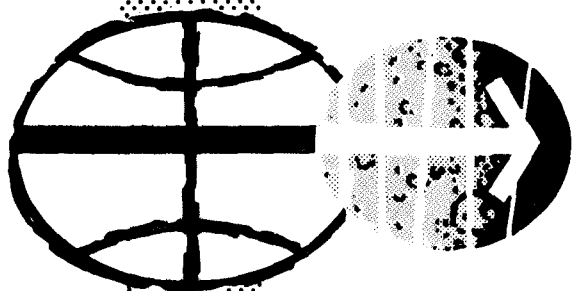


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

LUNAR SURFACE EXPERIMENTS

DEPLOYMENT CRITERIA

MISSION J-2/APOLLO 16



MANNED SPACECRAFT CENTER

HOUSTON, TEXAS  
October 15, 1971

LUNAR SURFACE EXPERIMENTS DEPLOYMENT CRITERIA

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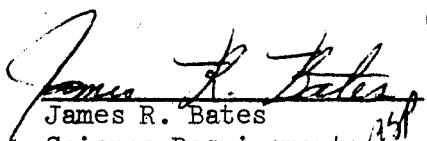
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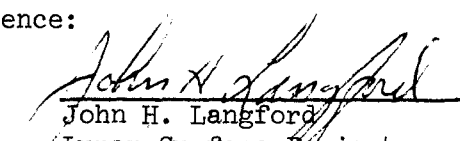
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Science and Applications Directorate

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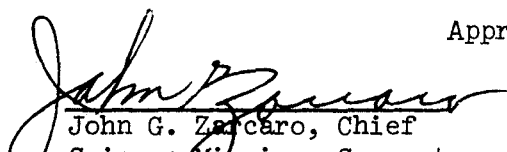
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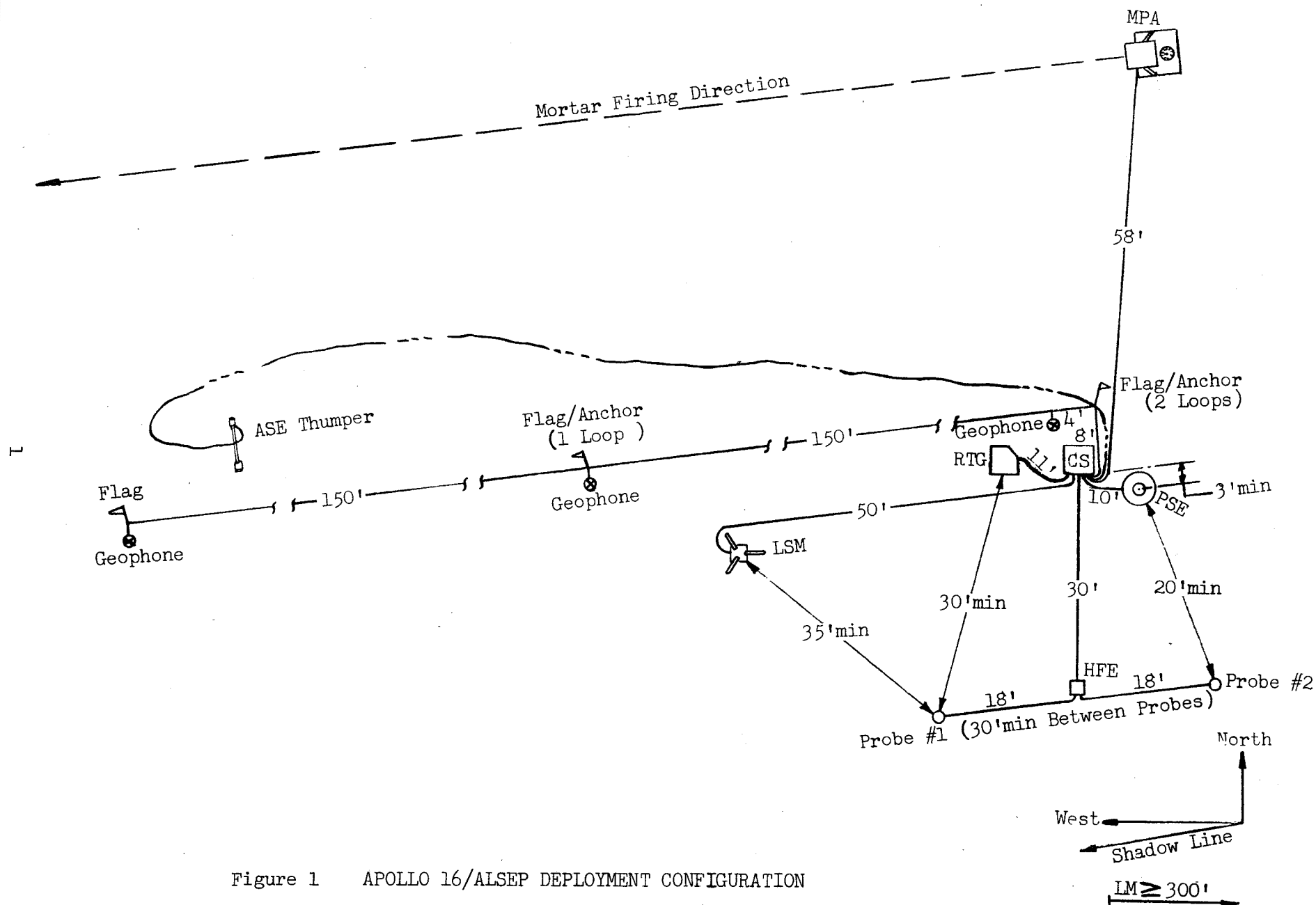


Figure 1 APOLLO 16/ALSEP DEPLOYMENT CONFIGURATION

# CENTRAL STATION DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Site Selection	ALSEP deployment site should be a minimum of 300 feet west of LM with the carry handle side of Central Station facing south.	ALSEP deployment area should be in direct sunlight and generally level, free from craters, boulders, and debris which might restrict view of space seen by thermal control surfaces.
Leveling	While sun shield is still down in the stowed position, level unit within 5 degrees so that bubble is within the outer case circle of bubble level.	Bubble should be free from case circle to be within 5 degrees.
Alignment	Align Central Station within 5 degrees of the shadow line using the "S" compass rose. Align gnomon shadow with alignment decal.	Alignment devices are usable at sun elevation angles between 5 and 45 degrees. Curtained sides of Central Station face east and west.
Thermal Control	Central Station radiator requires clear field-of-view for good thermal control.	Central Station should not be shaded from the sun more than absolutely necessary prior to deployment.
Photographic Requirements	<p>One photograph of the Central Station from 7 feet behind the station looking south.</p> <p>One photograph of the Central Station from 7 feet looking north to show position of switches.</p> <p>Panoramic photographs from vicinity of Central Station to show entire ALSEP deployment.</p>	<p>Panoramic photographs required to properly orient deployed ALSEP with the Central Station and terrain.</p>

# CENTRAL STATION DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Precautions	<p>After the RTG has been connected to the Central Station by way of shorting plug switch, this plug should <u>not</u> be disconnected. If the circuit is broken, an unwanted irrevocable switching function will occur.</p> <p>After Central Station deployment, do not bump or twist sunshield because of possible Hunter Spring damage.</p>	

# CENTRAL STATION

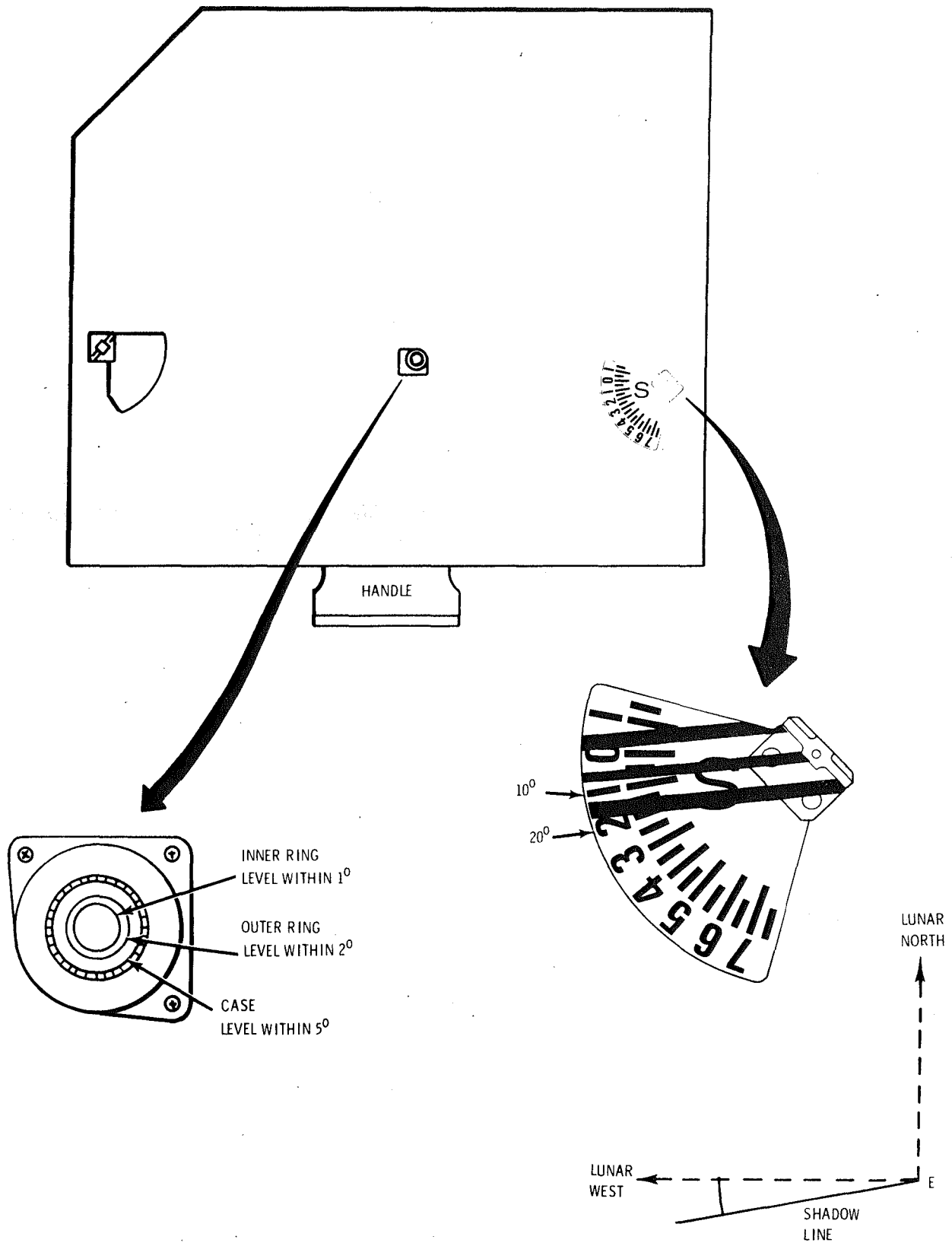


Figure 2 CENTRAL STATION LEVELING AND ALIGNMENT



# CENTRAL STATION ANTENNA DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Antenna Deployment	With the antenna mechanism still in unit stowage container, position the antenna aiming mechanism on the mast with the arrow pointed toward the sun.	This will ensure that the alignment shadowgraph is on the east side of the mechanism.
Antenna Level	Level antenna within 0.5 degrees of vertical as indicated by bubble level.	Bubble should be free from case circle to be level within 0.5 degrees.
Antenna Alignment	Align antenna within 0.5 degrees of sun line as determined by sun dial.	When shadow covers shadow reference block, antenna is aligned within 0.5 degrees.
Antenna Azimuth	Set azimuth dial to value shown on cuff check list to assure adequate signal strength for life of ALSEP.	For sun angle of (TBD) degrees set azimuth CCW to: Coarse Scale: TBD
Antenna Elevation	Set elevation dial to value shown on cuff check list to assure adequate signal strength for life of ALSEP.	For sun angle of (TBD) degrees set elevation CCW to: Coarse Scale: TBD
Precautions	Verify visually that antenna is properly seated into Central Station fixture and generally pointed toward earth.	

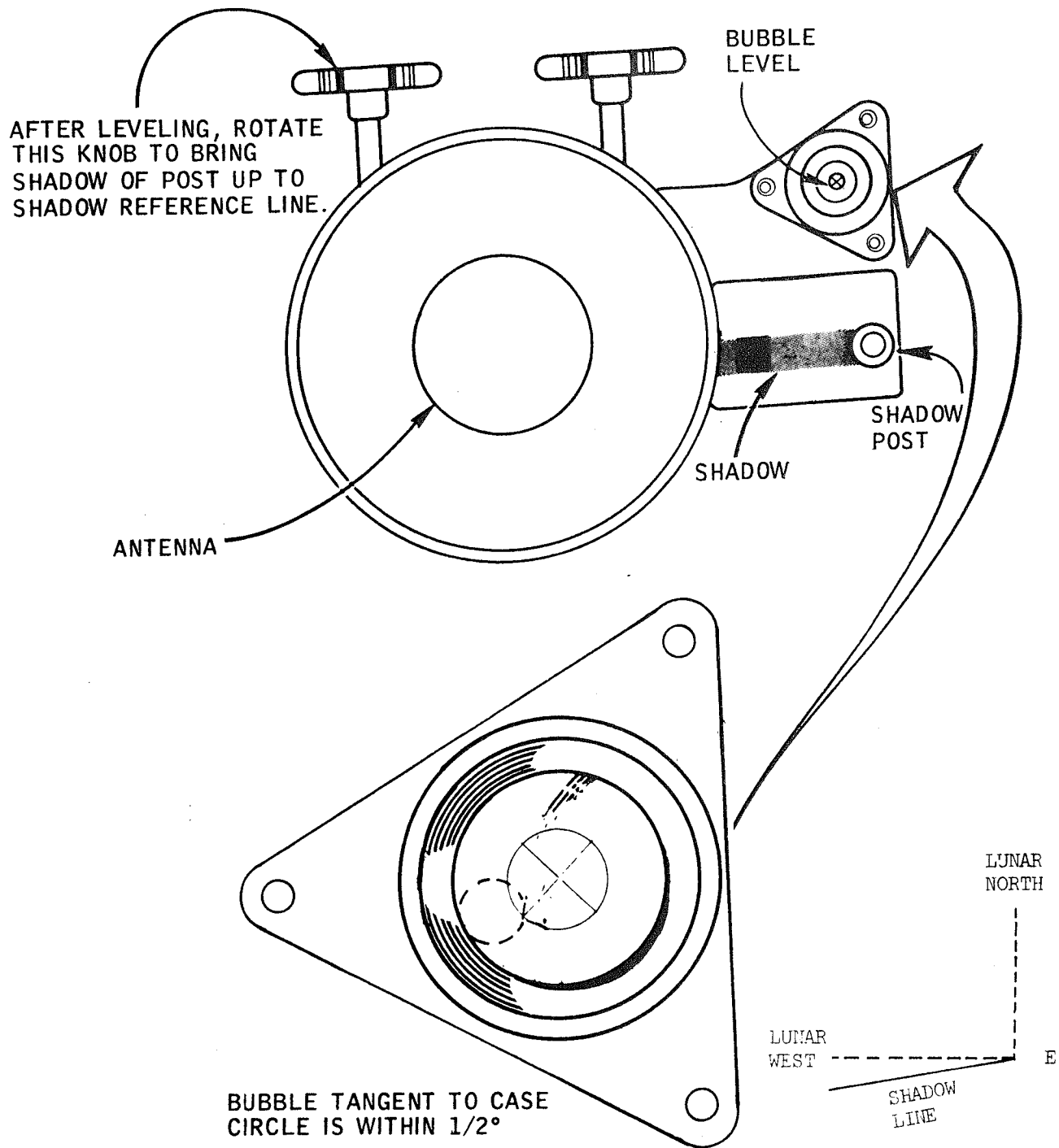


Figure 3 CENTRAL STATION LEVELING AND ALIGNMENT

# RADIOISOTOPE THERMOELECTRIC GENERATOR DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Separation between RTG and Central Station	Deploy the RTG 9 to 12 feet west of Central Station.	Limited by 13-foot cable. Hot RTG should be separated from Central Station as far as possible to provide maximum heat radiation into free space.
Leveling	Pallet should be horizontal as visually determined.	Avoid craters and slopes which impede dissipation of heat from RTG. No mechanical provisions to level RTG.
Alignment	Align RTG so that cable exit from the sub-pallet points toward the Central Station.	
Interrelation	Read ammeter on shorting switch box and verify a value greater than zero before connecting RTG cable to Central Station.	Actuate shorting switch later in deployment and verify that ammeter reading drops to zero.
Photographic Requirements	One photograph of the RTG on the subpackage at a distance of 7 feet to show leveling of RTG/pallet and view of surrounding area.	
Precautions	Exercise caution to not damage RTG fins during deployment.	

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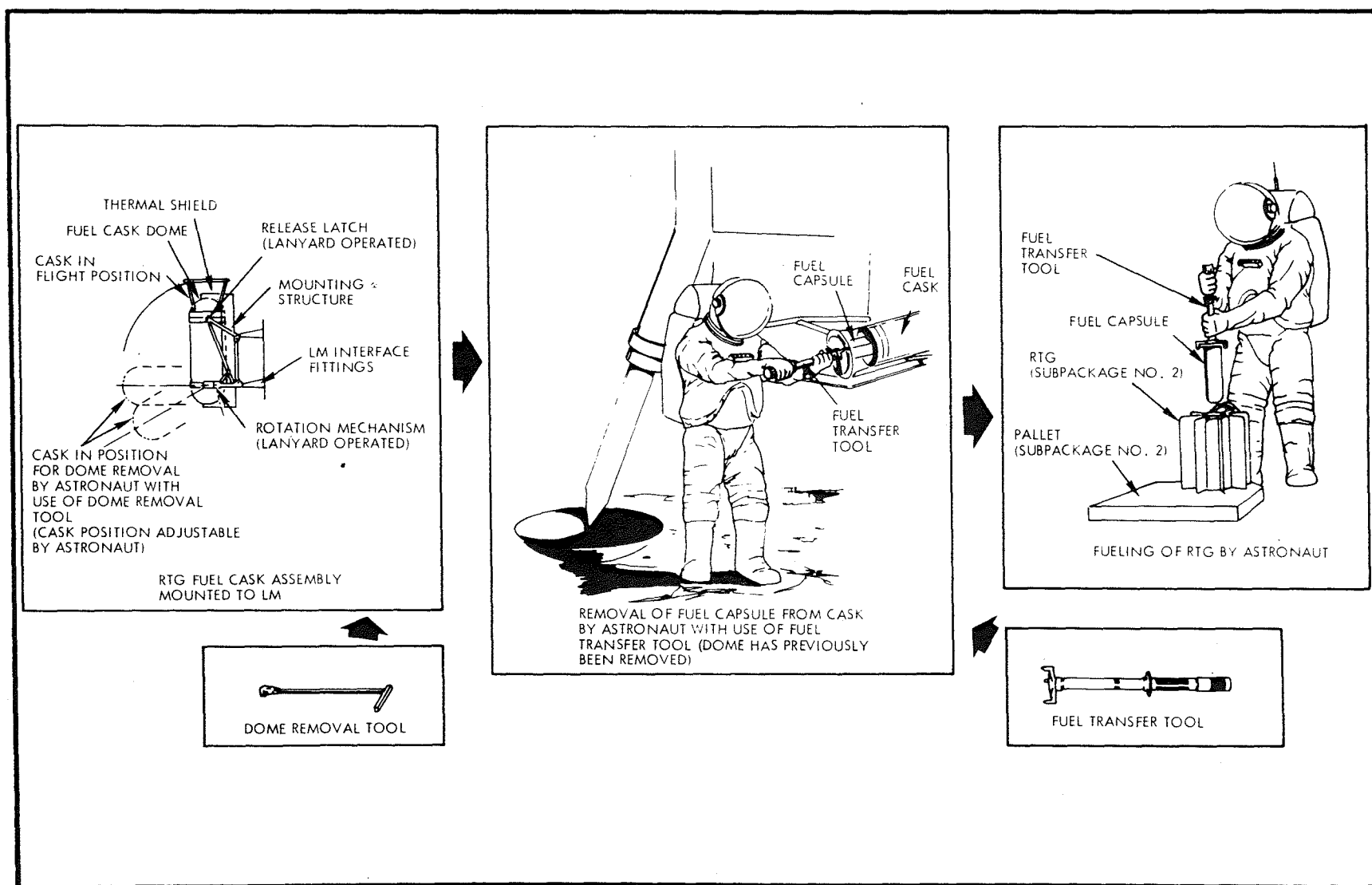
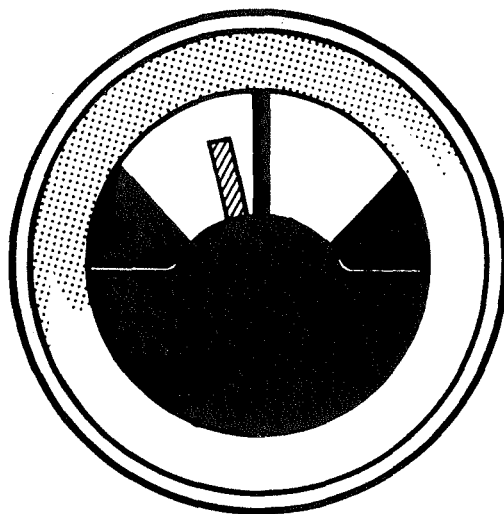
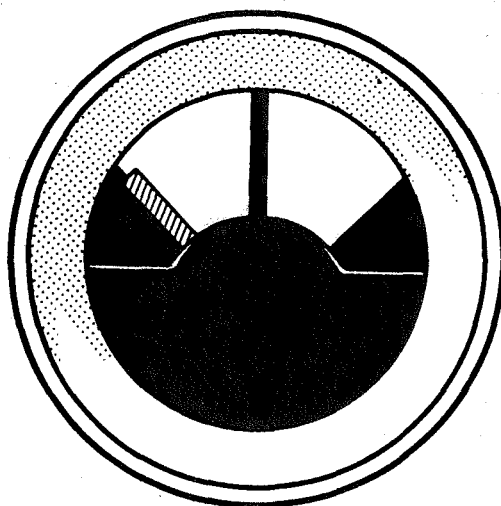


Figure 4 RTG FUEL TRANSFER ACTIVITIES



a. First Reading Nominal Configuration  
(RTG Short-circuited)



b. Second Reading Nominal Configuration  
(RTG Short Removed)

Figure 5 RTG CURRENT INDICATOR

# PASSIVE SEISMIC EXPERIMENT DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
PSE Deployment Site	Approximately level spot, free from loose material.	PSE should be no less than 10 feet from other units to minimize pickup of stray vibrations by PSE.
PSE Stool Deployment	Compact surface material as much as possible before putting down stool.	Stool should not sink in deeply enough to allow sensor bottom to touch soil.
PSE - to - Central Station Separation	8 to 9 feet southeast of Central Station, on opposite side from the RTG.	Limited by 10-foot cable with 1-foot slack.
PSE - to - RTG Separation	15-feet minimum.	Separation from RTG is necessary to avoid thermal input.
PSE Alignment	Before removing the PSE girdle, coarse align the PSE within 20 degrees of the sun line by pointing the arrow on the girdle toward the sun. Fine alignment will be reported after removing girdle and spreading thermal shroud.	Read and report, to the nearest degree, the intersection of the shadow of the gnomon on the compass rose. Final azimuth alignment must be known within 5 degrees accuracy with reference to sun line utilizing shadowgraph.
PSE Leveling	Coarse level the PSE to within 5 degrees of vertical utilizing the bubble level.	Bubble should be free from case circle to be within 5 degrees. 5 degrees is the limit of the automatic leveling gimbal system.
PSE Thermal Shroud Deployment	Outer edge of thermal shroud skirt should be flat on the surface.	If thermal shroud is not flat on surface, temperature could get too low at night and too high during the day.

PASSIVE SEISMIC EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Photographic Requirements	<p>One photograph of the PSE taken cross-sun from a distance of 3 feet and showing the bubble level and the gnomon shadow on the compass rose.</p> <p>One photograph of the PSE taken from a distance of 7 feet and showing the Central Station in the background.</p>	The Hasselblad electric data camera should be used to take these photographs.
Precautions	<p>Tunneling, tenting or folding of the thermal skirt must be avoided to prevent the formation of radiative heat paths.</p> <p>If necessary, Boyd bolts, small lunar rocks or similar small objects may be placed on the outer edge of the thermal skirt to hold it flat. Avoid placing large objects or dirt on the skirt, if possible.</p>	

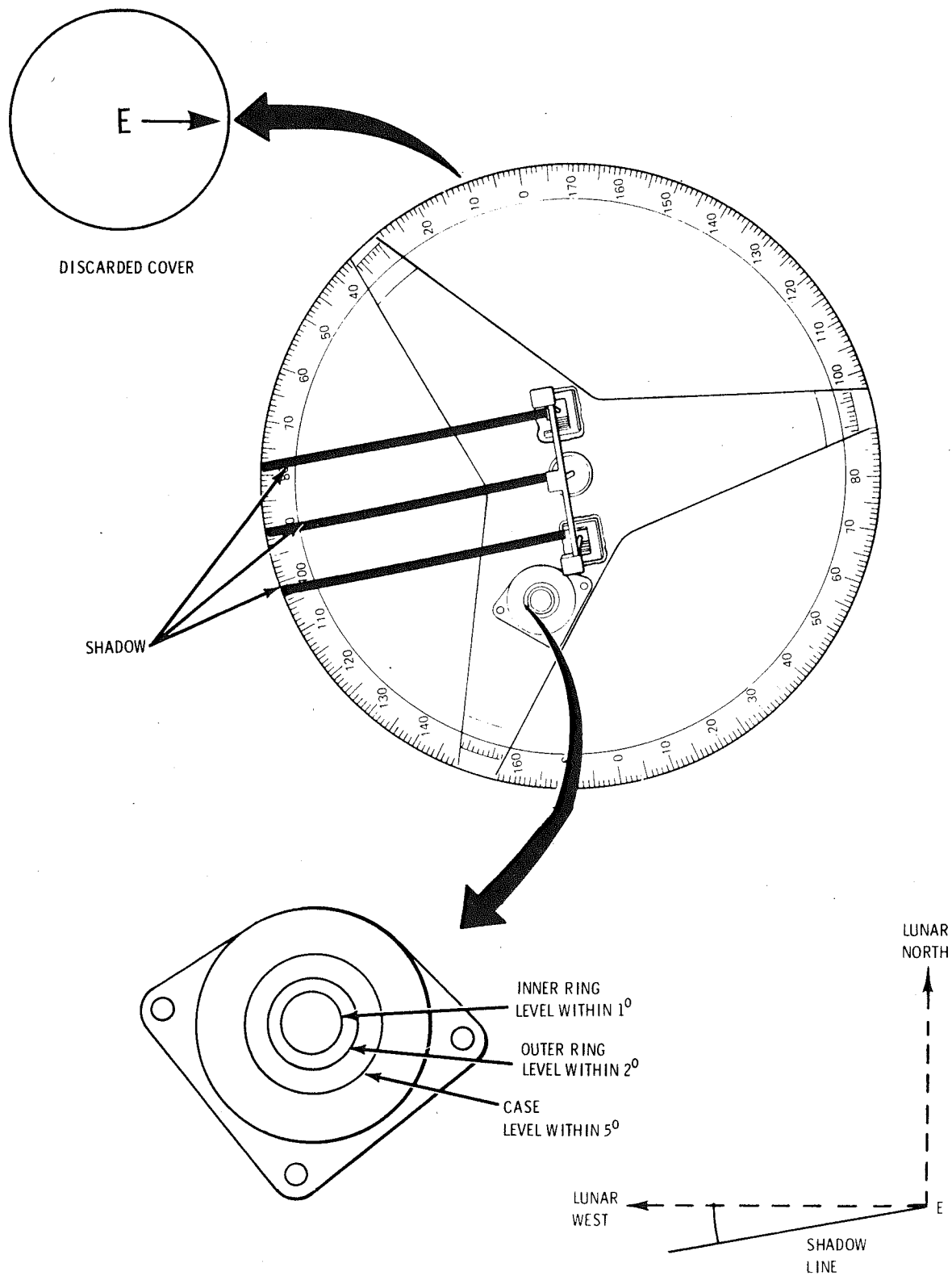


FIGURE 6 PSE LEVELING AND ALIGNMENT INDICATORS



# HEAT FLOW EXPERIMENT DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
HFE Electronics Package		
HFE Site Selection	Deploy the HFE Electronics Package 25 to 30 feet south of Central Station.	Limited by 30-foot cable. HFE Electronics Package should be placed in an approximately level area, removed from any surface irregularities or rocks that may obscure the field-of-view of the HFE sunshield reflector.
HFE Alignment	Align the HFE Electronics Package to within 5 degrees of the shadow line decal utilizing the shadowgraph.	Radiator must face south away from equator and the Central Station. Alignment of HFE package is accomplished by rotating package until shadow cast by UHT covers alignment decal.
HFE Leveling	Level the HFE Electronics Package to within 5 degrees of vertical for maximum utilization of the thermal sunshield utilizing the bubble level.	Bubble should be free from case circle to be within 5 degrees.

## HEAT FLOW EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
HFE Probes		Probe cables should not be crossed.
HFE Probe Deployment	Deploy the Probes 16 to 18 feet east-west of the HFE Electronics Package along the sun line.	Limited by length of cable. Maintain a 30-foot minimum separation between Probe and RTG.
HFE Probe-to-Probe Separation	HFE Probe-to-Probe separation should be at least 30 feet.	The HFE probes should be 20 feet minimum from the PSE, 30 feet minimum from the RTG, 35 feet minimum from the LSM, and at least 10 feet from all other experiments.
HFE Bore Holes	Use the Apollo Lunar Surface Drill to make a lined bore hole greater than 2.3 meters deep in the lunar surface and align the HFE Probe to within 15 degrees of vertical.	<p>Each hole should be <math>1\frac{1}{2}</math> diameters from the rims of "fresh" craters more than 1 meter across.</p> <p>Each hole should be 3 or more diameters from boulders more than 1 meter across.</p> <p>Try to avoid having a "fresh" crater greater than 2 meters across between bore holes.</p> <p>Try to avoid having a "fresh" crater greater than 5 meters across between the HFE bore holes and the core sample hole.</p>
Precautions	<p>Disturbance of the lunar surface within 17' of probes to be minimal.</p> <p>Once the probe is in the hole, do <u>not</u> try to remove it. Bottom hole latching will be damaged.</p>	

# HEAT FLOW EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Lunar Surface Drill	Place drill on lunar surface with battery end down and oriented such that back of the battery is directed toward the sun.	Do not place Lunar Surface Drill in any shaded area.
Drill Operations	<p>Drilling rate <math>&lt; 5</math> in./min. with first drill sections. Remove drill section and move 3 feet to new location.</p> <p>HFE Bore Holes should be drilled within 15 degrees of vertical.</p> <p>During Coring operations, drill should be held underhanded to control rate of descent into lunar surface.</p>	<p>If unsuccessful during third location, continue drilling until 10 minutes power-on time has elapsed.</p> <p>The total amount of core recovered is dependent upon the rate of descent into the surface.</p>
Precautions	<p>If severe jamming of the drill string is encountered, an upward force should be applied to the drill handle until torque forces return to normal.</p> <p>Before placing core stems into vice or using hand wrench, direction of reaction of locking pawl should be noted. The hand wrench lock when turning in a counterclockwise direction and the treadle lock in a clockwise direction.</p> <p>Under normal drilling operations the drill should be allowed to operate at its own descent rate with no downward pressure applied.</p>	

HEAT FLOW EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Photographic Requirements	<p>One photograph of each bore stem with probe emplaced taken down-sun at a distance of 11 feet.</p> <p>One photograph of the HFE electronics package taken from the north at a distance of 7 feet.</p> <p>One stereo pair of each bore stem with probe emplaced, taken from the north at a distance of 7 feet.</p>	<p>These photographs should be taken with the Hasselblad electric data camera after the HFE deployment is completed.</p>

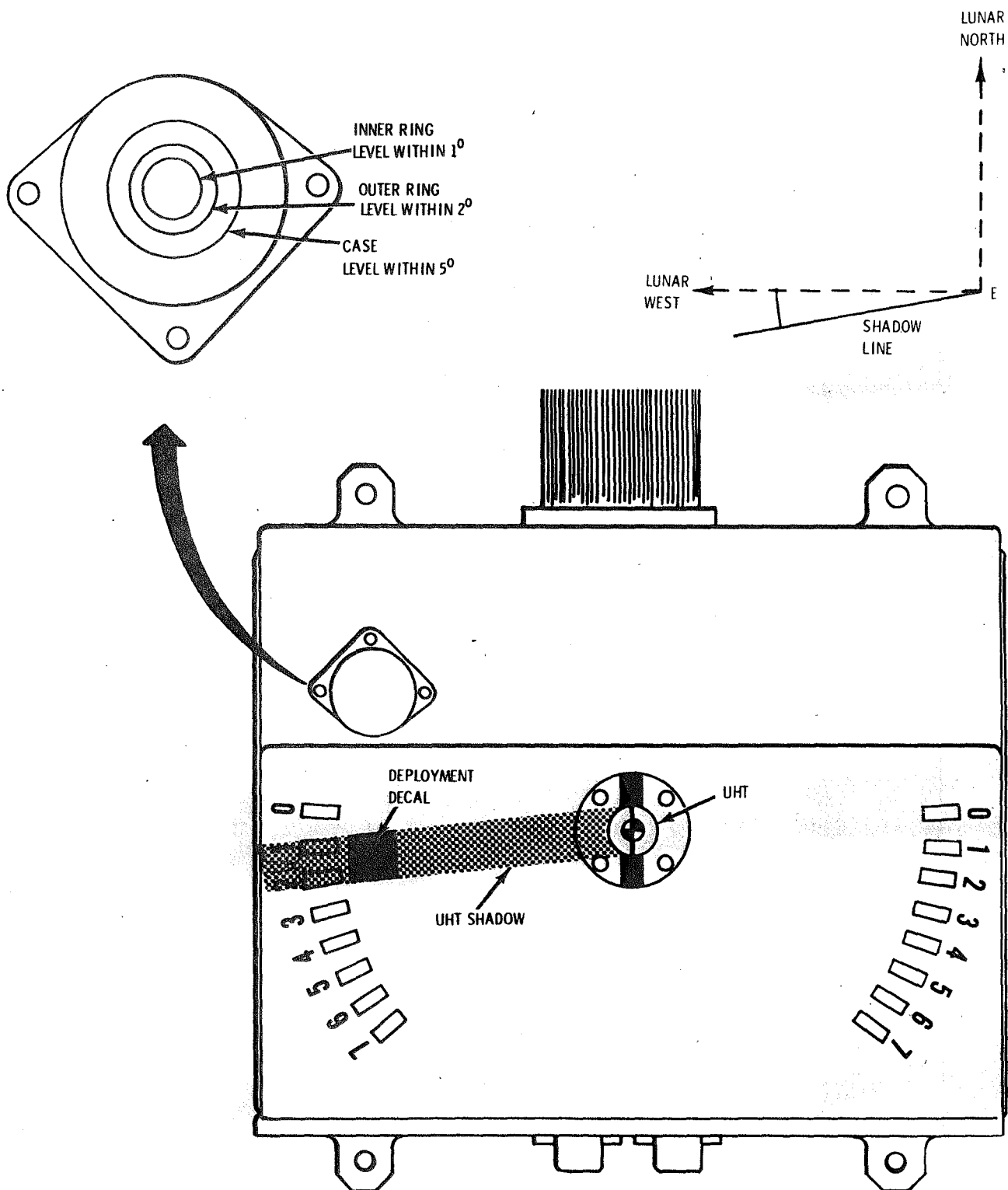


Figure 7 HFE LEVEL AND ALIGNMENT INDICATORS

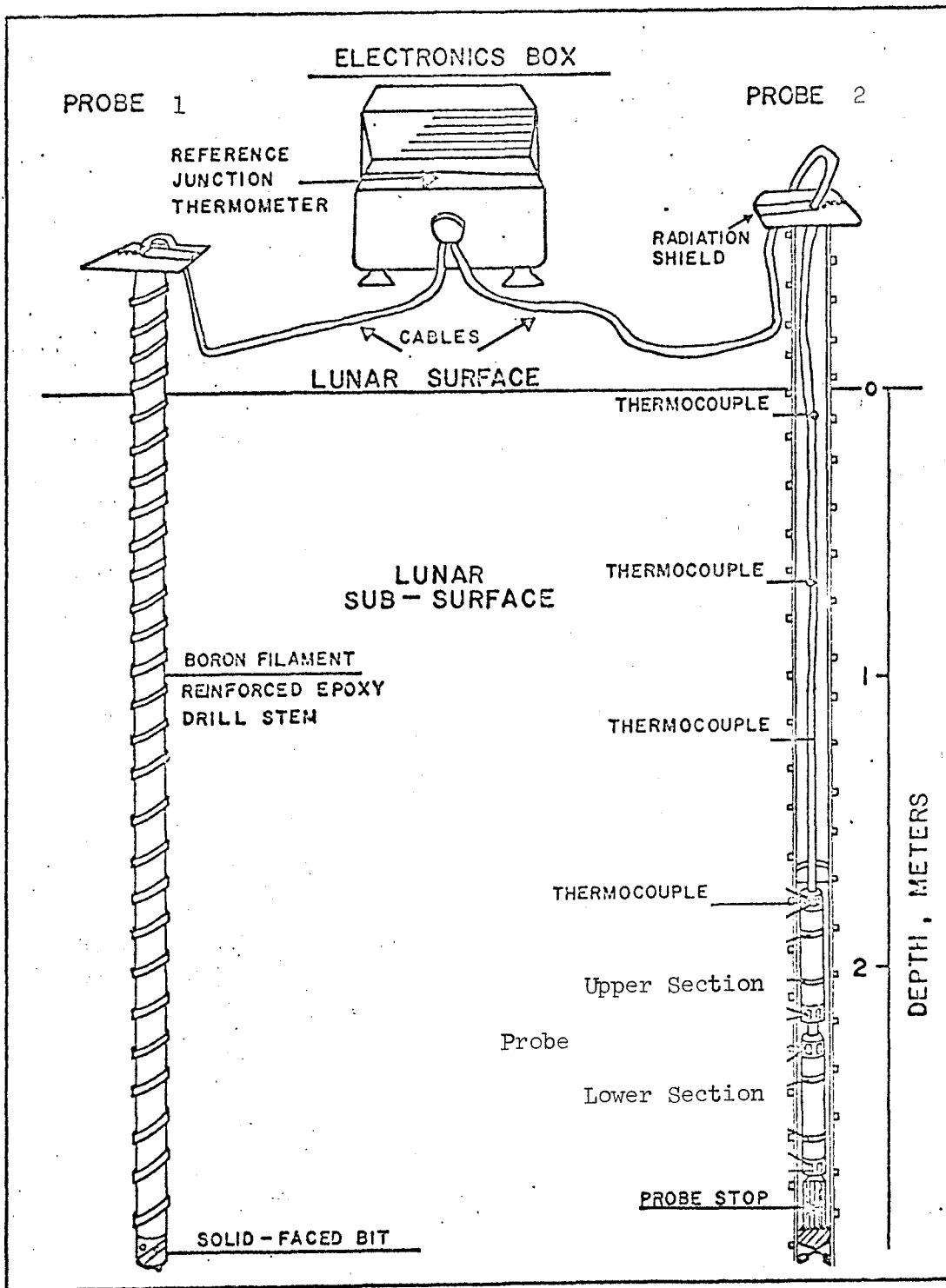


Figure 8 HEAT FLOW EXPERIMENT PROBE EMPLACEMENT

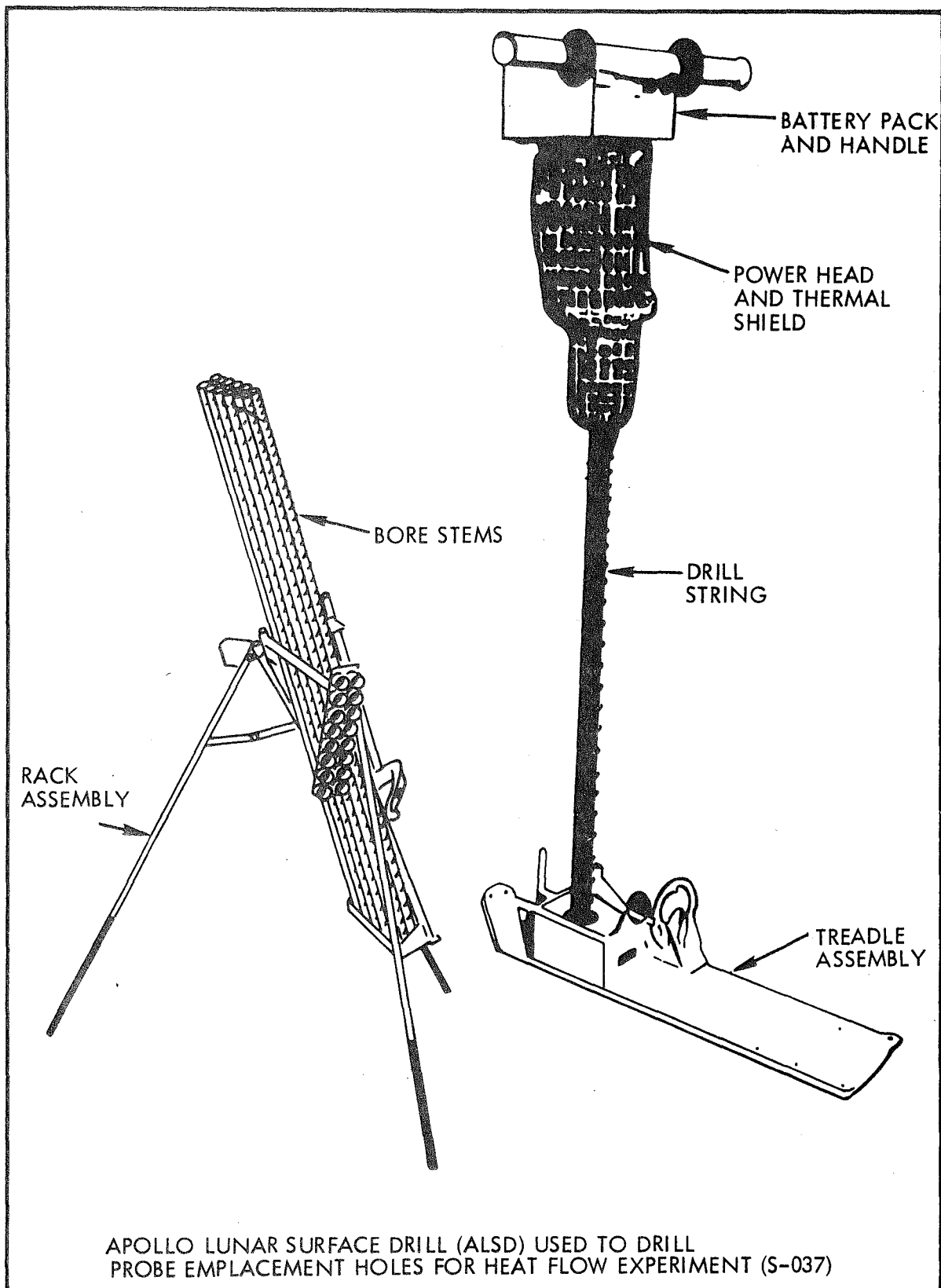


Figure 9 LUNAR SURFACE DRILL

# LUNAR SURFACE MAGNETOMETER DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
LSM Site Selection	Deploy LSM 45 to 50 feet west of Central Station down sun.	Limited by 50-foot cable.
LSM Alignment	Deploy Shadowgraph, assuring that it is tilted to proper degree angle. Align LSM within 3 degrees of shadow line using shadowgraph.	Report shadowgraph reading within 1 degree. Exact alignment must be known to interpret LSM data.
LSM Leveling	Level the LSM within 3 degrees using bubble level and leg adjustment screws.	Turn leg adjustment screw clockwise to raise that corner of LSM. Bubble should be free from case circle to be level within 3 degrees.
Sunshade Deployment	Deploy sunshade by pulling ring on sensor head, then recheck level.	
Photographic Requirements	<p>One photograph of the LSM taken from a distance of 3 feet and focused directly on the shadowgraph prior to sunshade deployment.</p> <p>One photograph of the LSM taken from a distance of 7 feet with the Central Station in the background, if possible, with sunshade deployed.</p>	The Hasselblad electric data camera should be used to take these photographs.
Precautions	Before concluding mission, park the LRV a distance greater than 200 feet from the LSM due to possible long-term magnetic effects.	



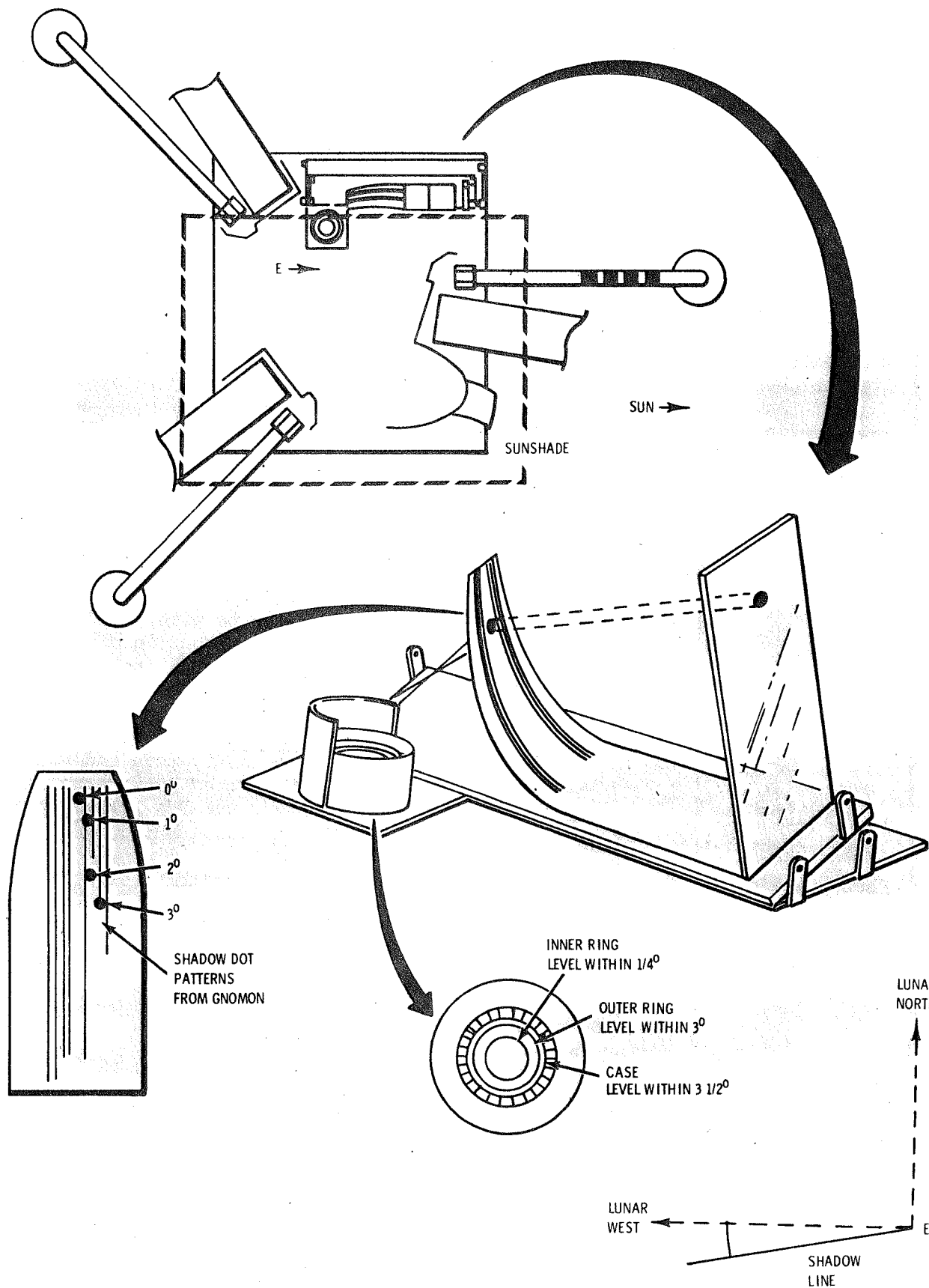


Figure 10 LSM LEVEL AND ALIGNMENT INDICATORS

# ACTIVE SEISMIC EXPERIMENT DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Mortar Package Assembly (MPA)		
Separation between ASE Mortar Package Assembly (MPA) and Central Station	Deploy the Mortar Package 55 feet north of the Central Station and RTG.	Limited by 58-foot cable.
MPA Leveling	After mounting the MPA to the pallet, coarse level the MPA within 5 degrees using bubble level.	Bubble should be free from case circle to be within 5 degrees.
MPA Alignment	Align the MPA within 5 degrees from assumed Geophones deployment lines.	<p><u>Caution:</u> Alignment must assure that Mortar Package fires parallel to geophone line (to within 5 degrees) but in opposite direction from Central Station and LM.</p> <p><u>Caution:</u> Do not remove the safety rods and arm the Mortar Package until after the EVA 1 geology traverse.</p>
Photographic Requirements	<p>One photograph of the Mortar Package should be taken from a distance of 15 feet, showing the Central Station in the background.</p> <p>One photograph of the Mortar Package at a distance of 7 feet looking down-sun toward the grenade impact area.</p>	The Hasselblad electric data camera should be used to take these photographs.
Precautions	The Mortar Package antenna is fragile and is subject to damage. Do <u>not</u> carry or orient package using the antenna as a handle.	

ACTIVE SEISMIC EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Geophones		
Geophone Deployment	Deploy geophone cable anchor/flag 8 feet north of Central Station and Geophone #1 four feet down-sun from anchor/flag. Deploy Geophone #2 and #3 at 150 feet increments each down-sun and in line with Geophone #1.	Geophone #1 should be deployed a minimum of 300 feet west of LM. The Geophones should be on flat terrain and not in craters.
Geophone Alignment	Geophone cable line should run down-sun of the Central Station. Geophones should be in a straight line within 3 degrees as visually determined, utilizing marker flags.	Geophone cable line should be in line with LM within $\pm 45$ degrees.
Geophone Emplacement	Plumb geophones to within 7 degrees of vertical.	Vertical alignment of geophones is very critical to successful operation of the geophone since complete loss of data occurs if 15 degrees off vertical.  Note: Geophone cable deployment over lunar surface depressions deeper than 2 feet should include enough slack to assure that the cable follows the surface contour.
Thumper Operations	During the firing of the ASI's, both crewmen should remain still when within 300 feet of the nearest geophone.	The time constraint for no movement is 15 seconds before firing and 10 seconds after firing the thumper ASI.

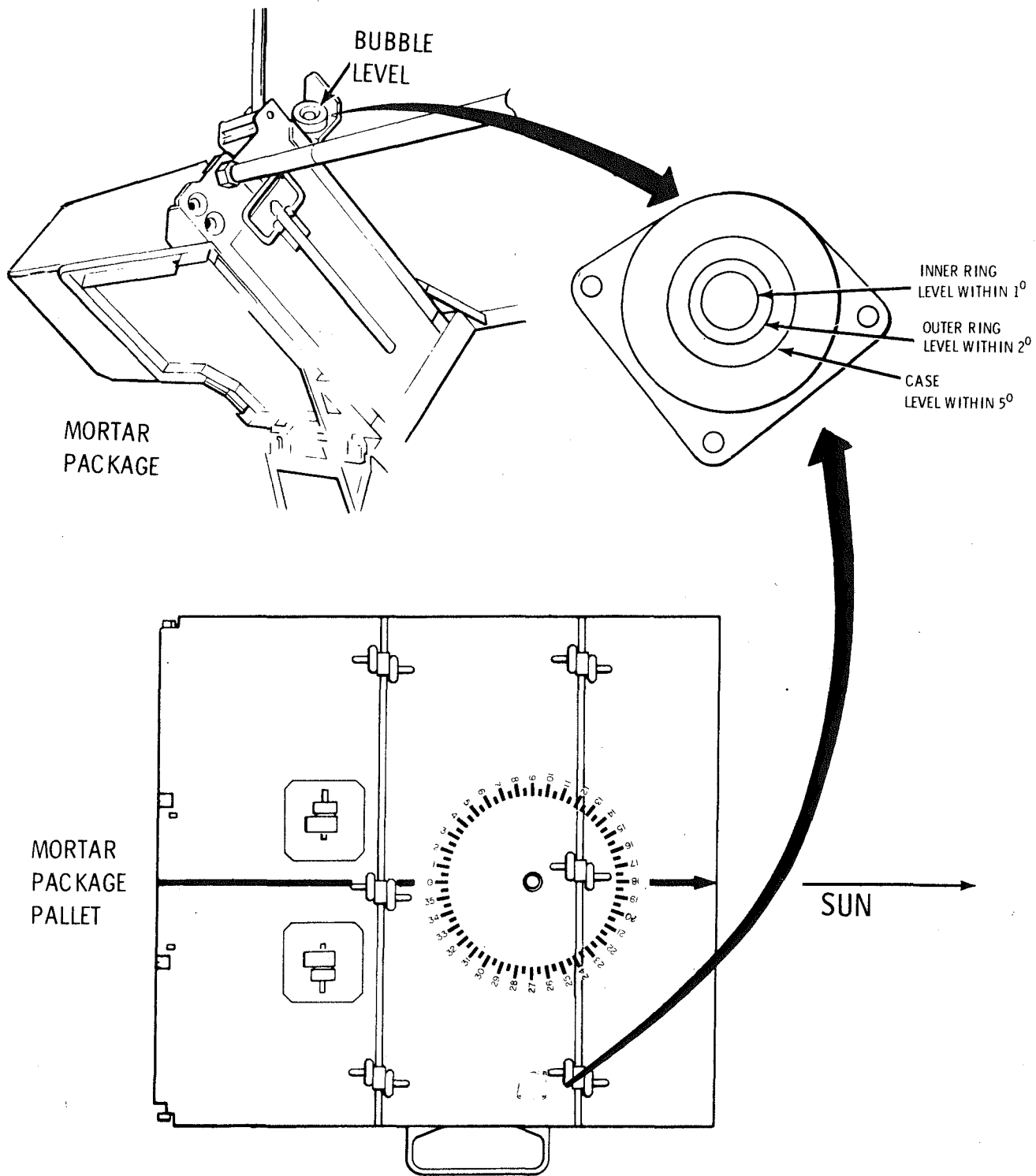


FIGURE 11 ASE LEVELING AND ALIGNMENT INDICATORS

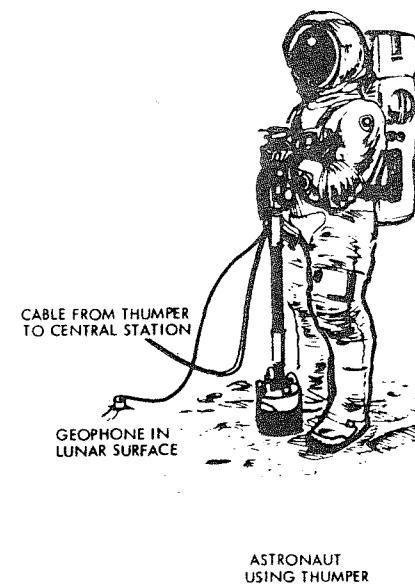
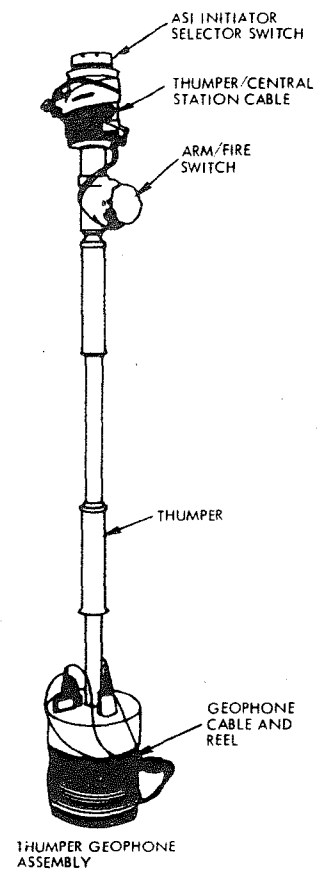


Figure 12

THUMPER/GEOPHONE CONFIGURATION

# LUNAR PORTABLE MAGNETOMETER EXPERIMENT DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Offload LPM from LM	a. Remove sensor/tripod and electronics packages from LM and attach to LRV for transporting to the traverse measurement locations.	<p>Read the temperature label on the electronics box as soon as possible after removing from packing.</p> <p>The recommended magnetic field measurement areas listed below should be taken at a point on the traverse a maximum distance from the LM and should be as widely separated as possible.</p> <ol style="list-style-type: none"> <li>1) One measurement in the South Hills region.</li> <li>2) One measurement in the North Hills region.</li> <li>3) One measurement in the Cayley Formation region.</li> <li>4) Three measurements at one of the craters within the Descartes Traverse area: (1) a position as near the crater rim as possible, (2) approximately one crater diameter from crater's rim, (3) approximately two crater diameters from the crater's rim.</li> </ol>
LPM Deployment	<p>b. Turn power switch ON.</p> <p>c. Deploy LPM sensor/tripod 50 feet from electronics assembly.</p>	<p>A stripe on the 50-foot ribbon cable indicates that approximately 47 feet of cable has been reeled out.</p>

LUNAR PORTABLE MAGNETOMETER EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
	<p>d. Sensor should be level within 5 degrees, utilizing bubble level on tripod.</p> <p>e. Align sensor to within 3 degrees of sunline utilizing shadowgraph on tripod.</p> <p>f. Report shadowgraph and bubble level indications to MCC.</p> <p>g. Verify sensor head is in the number 1 position and return to the electronics box on the LRV.</p> <p>h. Move the display panel switch to READ, then read the three panels sequentially (XYZ) three different times and report to MCC.</p> <p>i. Switch Display Panel to OFF.</p> <p>j. Return to sensor/tripod assembly, rotate sensor head to position number 2.</p>	<p>Bubble should be free from case circle to be within 5 degrees.</p> <p>After deploying sensor assembly and returning to LRV, astronaut should allow a minimum of 60 seconds for magnetometer stabilization.</p> <p>Turn Display Switch Off momentary between each XYZ readings.</p>

LUNAR PORTABLE MAGNETOMETER EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
	<p>k. Level and align the sensor assembly as required per steps d, e, and f above.</p> <p>l. Verify sensor head is in the number 2 position and return to the electronics box on the LRV.</p> <p>m. Move the display panel switch to READ, then read the three panels sequentially (XYZ) three different times and report to MCC.</p> <p>n. Switch Display Panel to OFF.</p> <p>o. Return to sensor/tripod assembly, rotate sensor head to position number 3.</p> <p>p. Level and align the sensor assembly as required per steps d, e, and f above.</p>	<p>After rotating sensor assembly and returning to LRV, astronaut should allow a minimum of 60 seconds for magnetometer stabilization.</p> <p>Turn Display Switch Off momentary between each XYZ readings.</p>



LUNAR PORTABLE MAGNETOMETER EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Photographic Requirements	q. Verify sensor head is in the number 3 position and return to the electronics box on the LRV.	After rotating sensor assembly and returning to LRV, astronaut should allow a minimum of 60 seconds for magnetometer stabilization.
	r. Move the display panel switch to READ, then read the three panels sequentially (XYZ) three different times and report to MCC.	Turn Display Switch Off momentary between each XYZ readings.
	s. Turn READ switch and power switch OFF.	
	t. Document the site point and sensor head location photographically.	
	u. Stow sensor/tripod assembly on LRV and proceed to next magnetic field measurement area.	Rewind LPM cable and secure reel on LRV.
	v. Repeat steps b thru f and q through u for all magnetic field measurement areas.	The sensor head should remain in position number 3 at all times.
	w. After completion of all magnetic field measurements, turn LPM experiment OFF.	Read the temperature label.
	One photograph should be taken from near the LRV using the Hasselblad electric data camera for each traverse measurement site.	The photograph should include the sensor head, the LRV, and/or distinguishable surface feature.

# LUNAR PORTABLE MAGNETOMETER EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Precautions	<p>Between readings do <u>not</u> leave READ switch on since only 17 minutes of ON <u>time</u> exists in the battery. Approximately 4 hours total of sensor time exists.</p> <p>LPM electronics package storage time in the shade is limited to a maximum of 3 hours. Thereafter, degraded and limited battery operation can be expected. The cooling rate is 5°C per hour in the shade.</p> <p>A distance greater than 2 feet should always be maintained between the LPM and Lunar Surface Ultraviolet Camera due to possible LPM damage from the permanent magnetics on the camera.</p> <p>Deploy the LPM a minimum of 250 feet from the LM and approximately 50 feet from other deployed equipment.</p>	

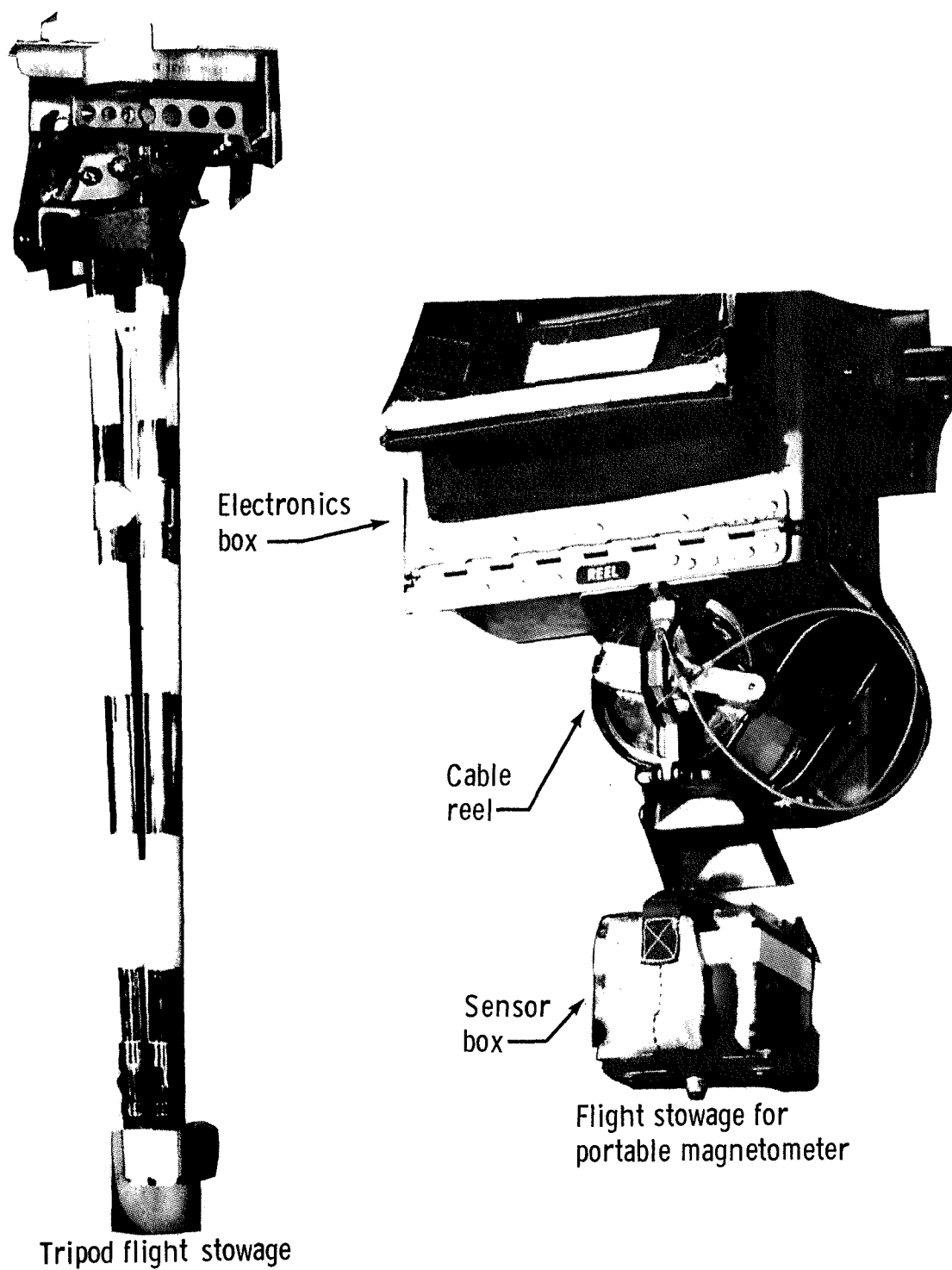


Figure 13 LUNAR PORTABLE MAGNETOMETER  
FLIGHT STOWAGE CONFIGURATION

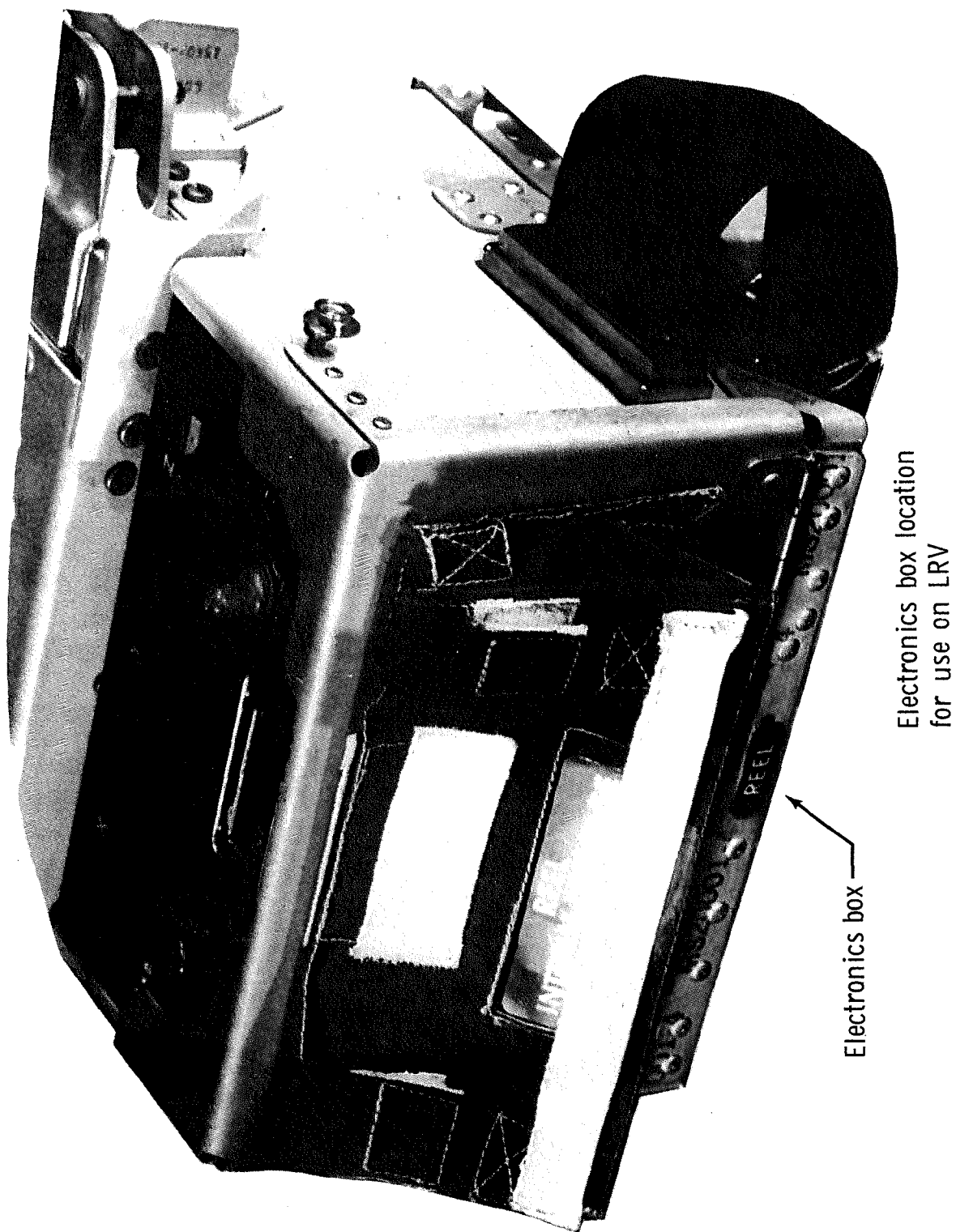
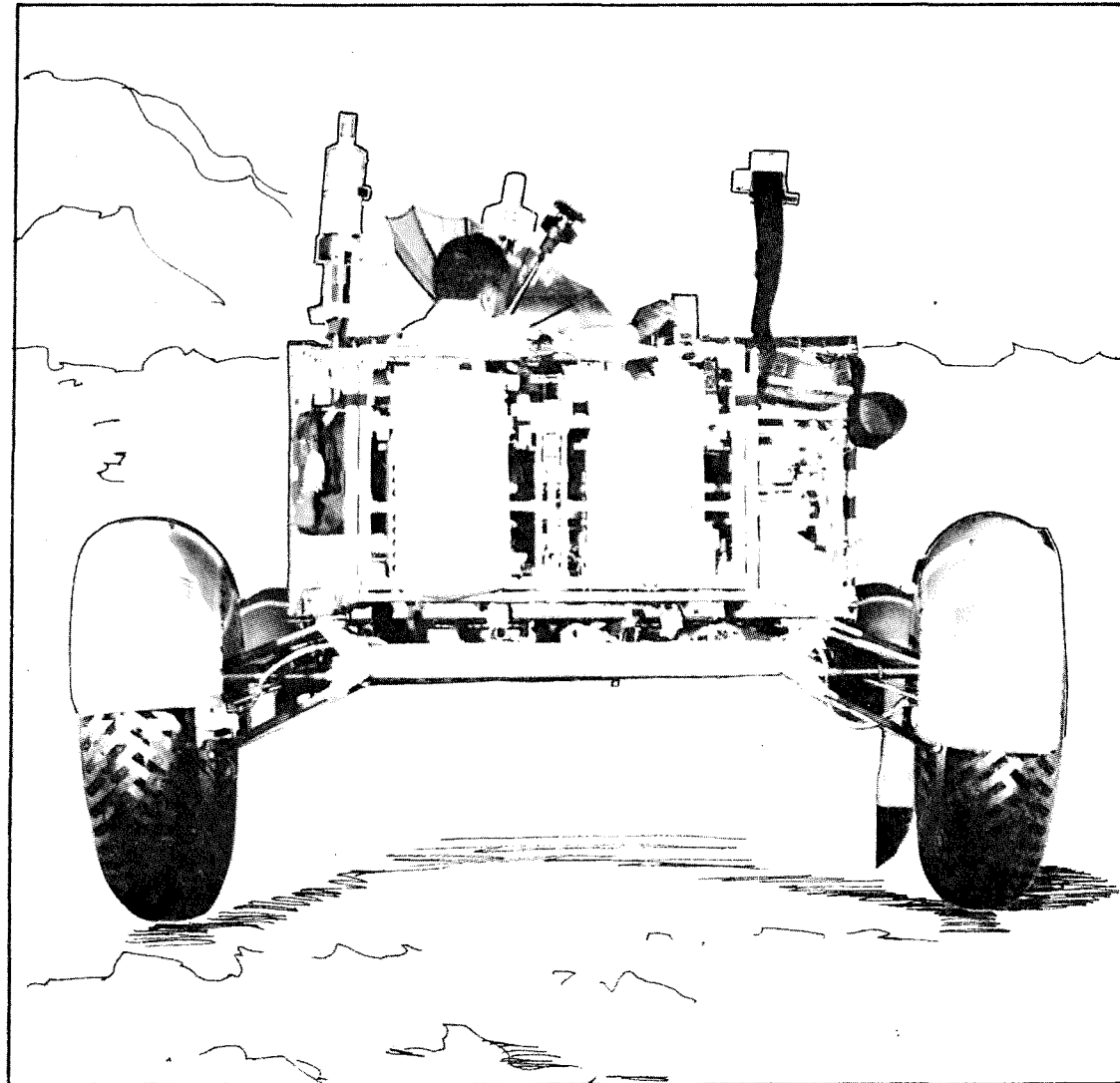
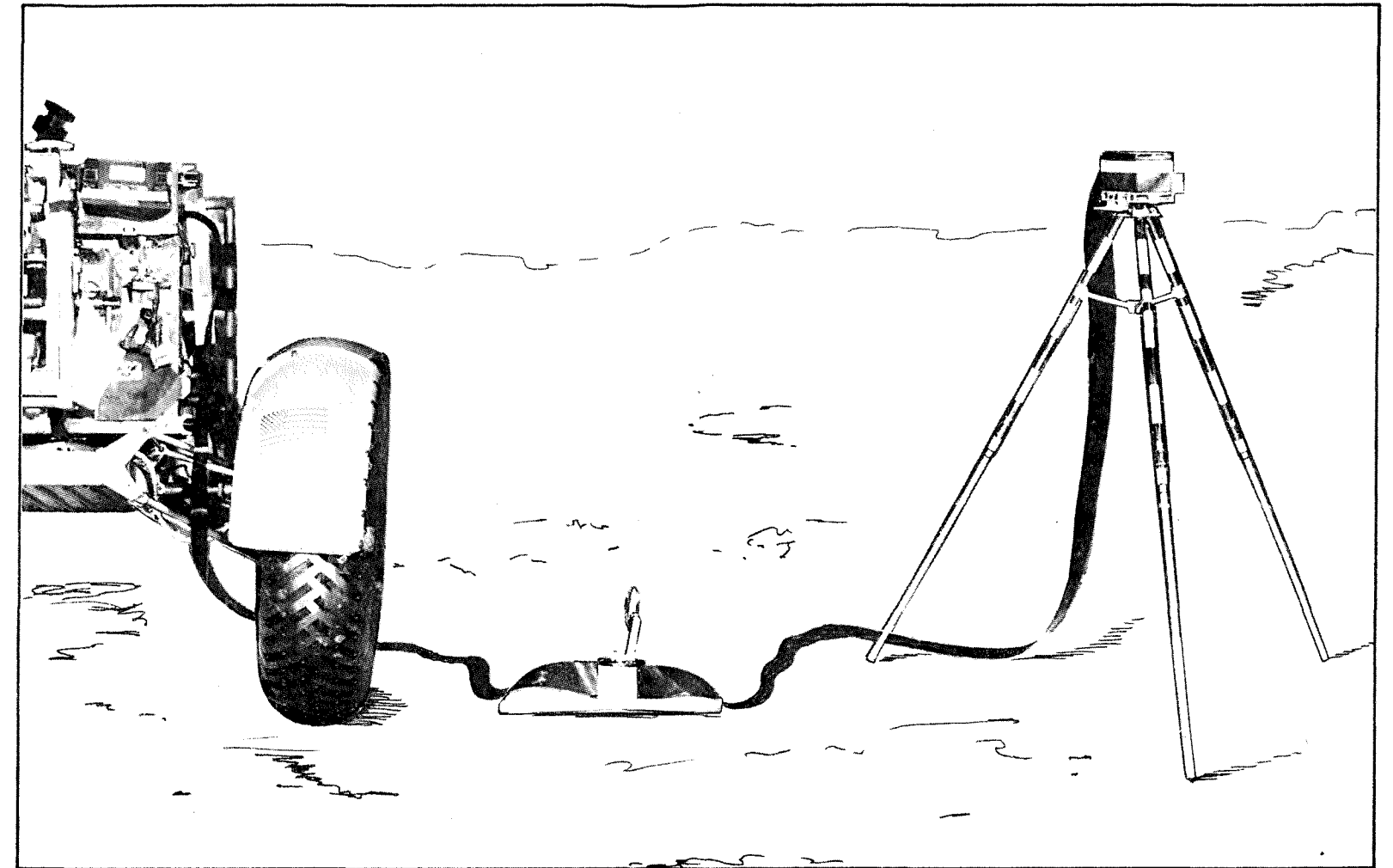


Figure 14 LUNAR PORTABLE MAGNETOMETER  
ELECTRONICS ASSEMBLY



Transporting and stowage of lunar portable magnetometer.



Lunar portable magnetometer deployed from LRV.

Figure 15 LUNAR PORTABLE MAGNETOMETER  
DEPLOYMENT CONFIGURATION

# LUNAR SURFACE ULTRAVIOLET CAMERA DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Off load LSUC	The LSUC should be removed from Quad III of the LM prior to the temperature in Quad III reaching 140°F.	Protection against temperatures greater than 140°F is necessary for protection of the film.
LSUC Deployment	<p>Unfold tripod legs and deploy LSUC near the south edge of the LM shadow and approximately eight feet from the down-sun LM foot pad with the camera aperture pointing down-sun.</p> <p>Remove the battery box from the camera assembly and place in sunlight about ten feet south of the instrument with the patch containing the chemical temperature indicators being visible.</p> <p>Utilize leveling jacks as necessary to center the level bubble within the case and then turn leveling jack to lock the base in level position.</p> <p>Release the azimuth axis lock and rotate the camera head to point the aperture as nearly "down-sun" as can be determined and re-set the azimuth lock.</p>	<p>The LSUC should be located to remain within the shadow of the LM during the lunar surface stage.</p> <p><u>Caution:</u> With the LSUC aperture pointing down-sun, the instrument is somewhat unstable due to its top-heavy condition and care should be taken to avoid inadvertently turning it over.</p> <p>The battery box should be located to remain in direct sunlight during at least the first two-thirds of the lunar surface stay.</p> <p><u>Caution:</u> The baseplate can be warped by excessive loading of the jack screw.</p>

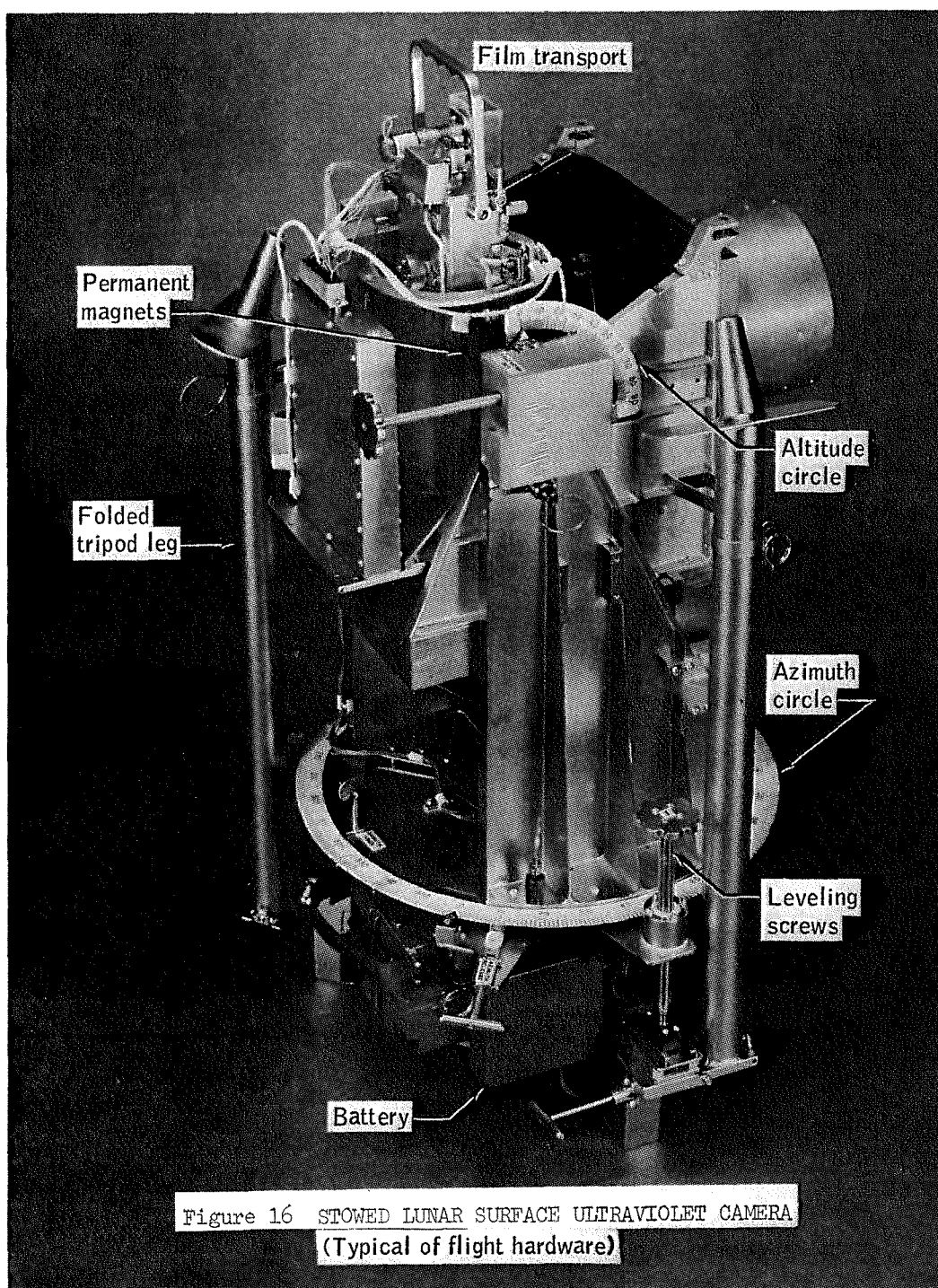
# LUNAR SURFACE ULTRAVIOLET CAMERA DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
LSUC Retargeting	Rotate the azimuth scale to bring the zero mark to the azimuth pointer.	
	Remove dust cover.	
	Direct camera toward earth by using the elevation and azimuth axis controls and center the earth in the reticles of the earth sight.	Read azimuth and elevation coordinates. These azimuth and elevation coordinates will be used to update the settings in real time.
	Turn power switch to the "ON" position.	Verify that film transport gears advance when power is activated.
	Aim camera to first target assigned using setting circle coordinates, depress the momentary RESET switch. (Targets and settings are attached to camera).	<u>Note:</u> Astronaut should leave the vicinity of the camera as soon as possible after retargeting due to the venting of waste gases from the life support system which could locally increase the ambient pressure thus causing the camera to stop operating.
	Press the RESET switch immediately on arrival at instrument.	At specified points in the mission time line, the astronaut will return to the LSUC and retarget.
	Aim camera toward next target using setting circle coordinates and depress RESET switch.	The RESET switch will advance the film one frame to clear data from the film gate.
		Astronaut should leave the vicinity of the instrument as soon as possible.

LUNAR SURFACE ULTRAVIOLET CAMERA DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
LSUC Data Recovery	Upon returning to LSUC, immediately press momentary switch to RESET at least four times.  Disconnect electrical connection on film transport and stow the film transport in the LM.	This will clear last data frame of film out of film gate.
Photographic Requirements	One photograph of U.V. Camera taken from approximately 20 feet and related to LM and shadow.  One close up photograph from 3 feet taken down-sun showing azimuth circle of camera.	
Precautions	During use, retrieval and storage, protect film from heat since a maximum temperature constraint of 120°F exists for the film.	





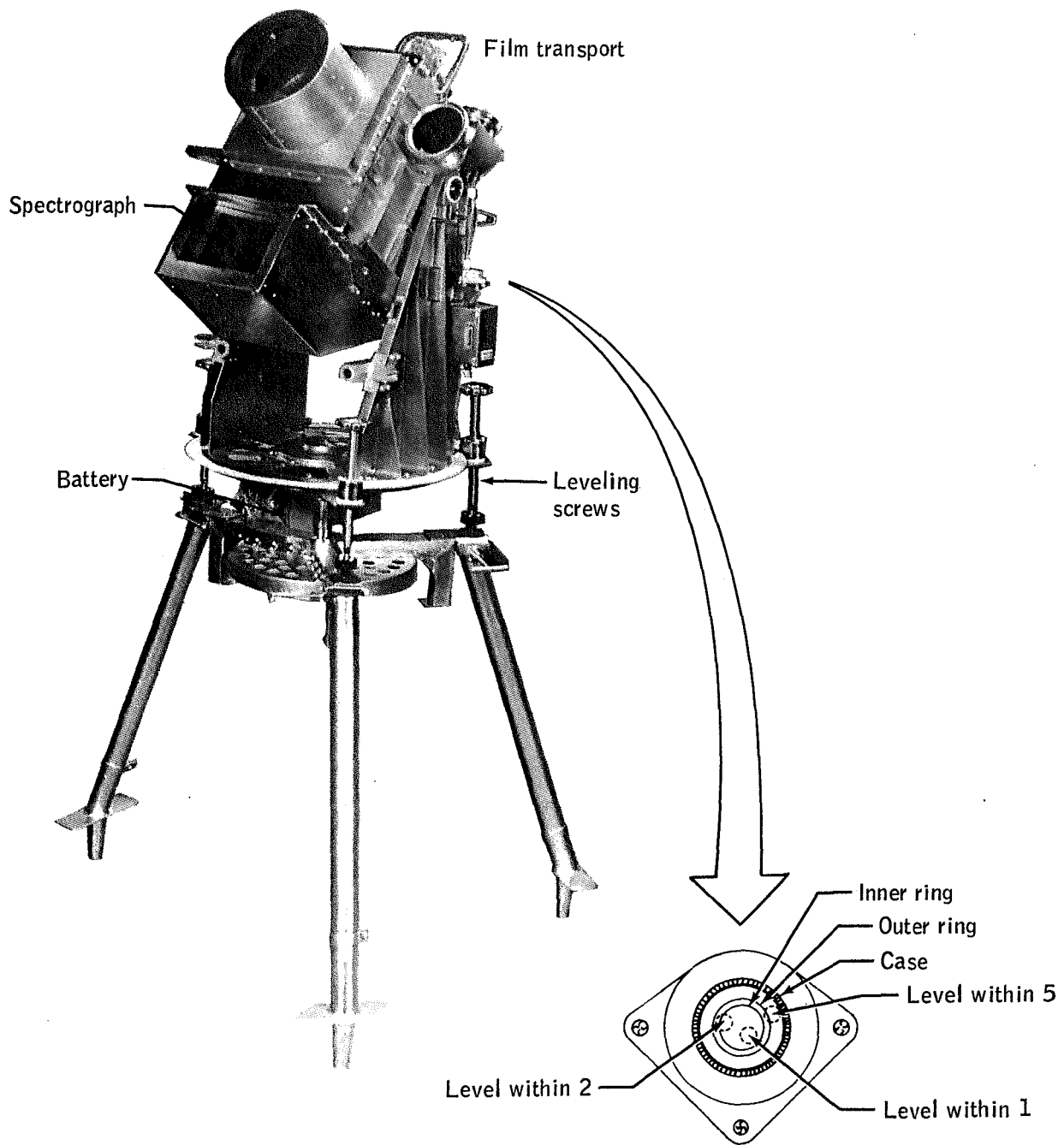


Figure 17 DEPLOYED LUNAR SURFACE ULTRAVIOLET CAMERA  
(Typical of flight hardware)

# COSMIC RAY DETECTOR (SHEETS) EXPERIMENT DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Deployment	<p>Document the Cosmic Ray Detector photographically.</p> <p>As soon as the RTG fuel capsule is removed from the LM area, pull lanyard number 1 (red ring) downward and free of the instrument.</p> <p>Describe the amount of lunar dust on the visible outboard surfaces of the detector panels.</p>	<p><u>Note:</u> Do not pull red ring on Cosmic Ray Detector Sheets while the RTG is in the vicinity of the LM</p> <p>This will move portions of the highest detector panel to reveal a concealed surface and activates the Neutron detector portions of panel 4.</p> <p>This should be reported as soon as possible after pulling lanyard number 1.</p> <p>Thermal plates are very sensitive and excessive dust exposure may require early retrieval.</p>

COSMIC RAY DETECTOR (SHEETS) EXPERIMENT DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Retrieval	<p>Pull lanyard number 2 (white ring) downward releasing the detector frame from the mounting fixture.</p> <p>Position the detector frame in the MESA area and pull lanyard number 3 (blue ring) upwards to release the detector panels.</p> <p>Remove panels from frame, fold and place in designated bag.</p> <p>When the panels are placed in the bag for storage, the astronaut should report the temperature indicated by each of the four temperature indicators.</p>	<p>This should be done prior to the close out of the final EVA or when the sun angles reached approximately 45.7 degrees.</p> <p>Detector panels should be carefully protected from dust during removal from the frame and folding.</p> <p>The temperature indicators are located in the following area: one indicator in stowage bag, two indicators on detector panel number 4, and one indicator on detector panel number 1.</p>
Photographic Requirements	<p>A Hasselblad electric data camera photograph should be taken of detector panels prior to pulling the red ring, lanyard number 1, of the detector panel array at a distance of 7 feet down-sun.</p> <p>A second photograph should be taken in the same manner as the first one after the red ring, lanyard number 1, is pulled.</p>	

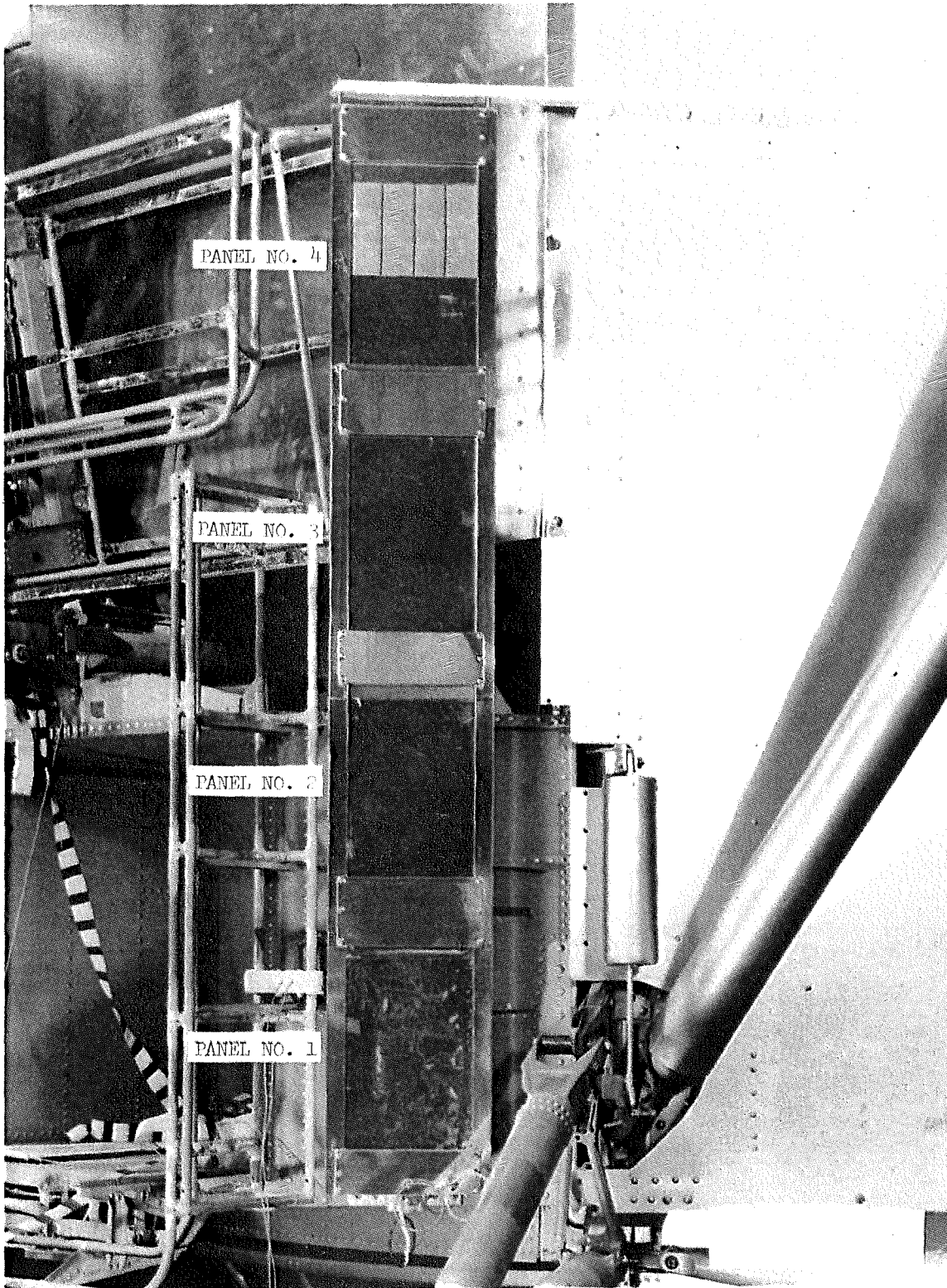


Figure 18 DEPLOYED COSMIC RAY DETECTOR

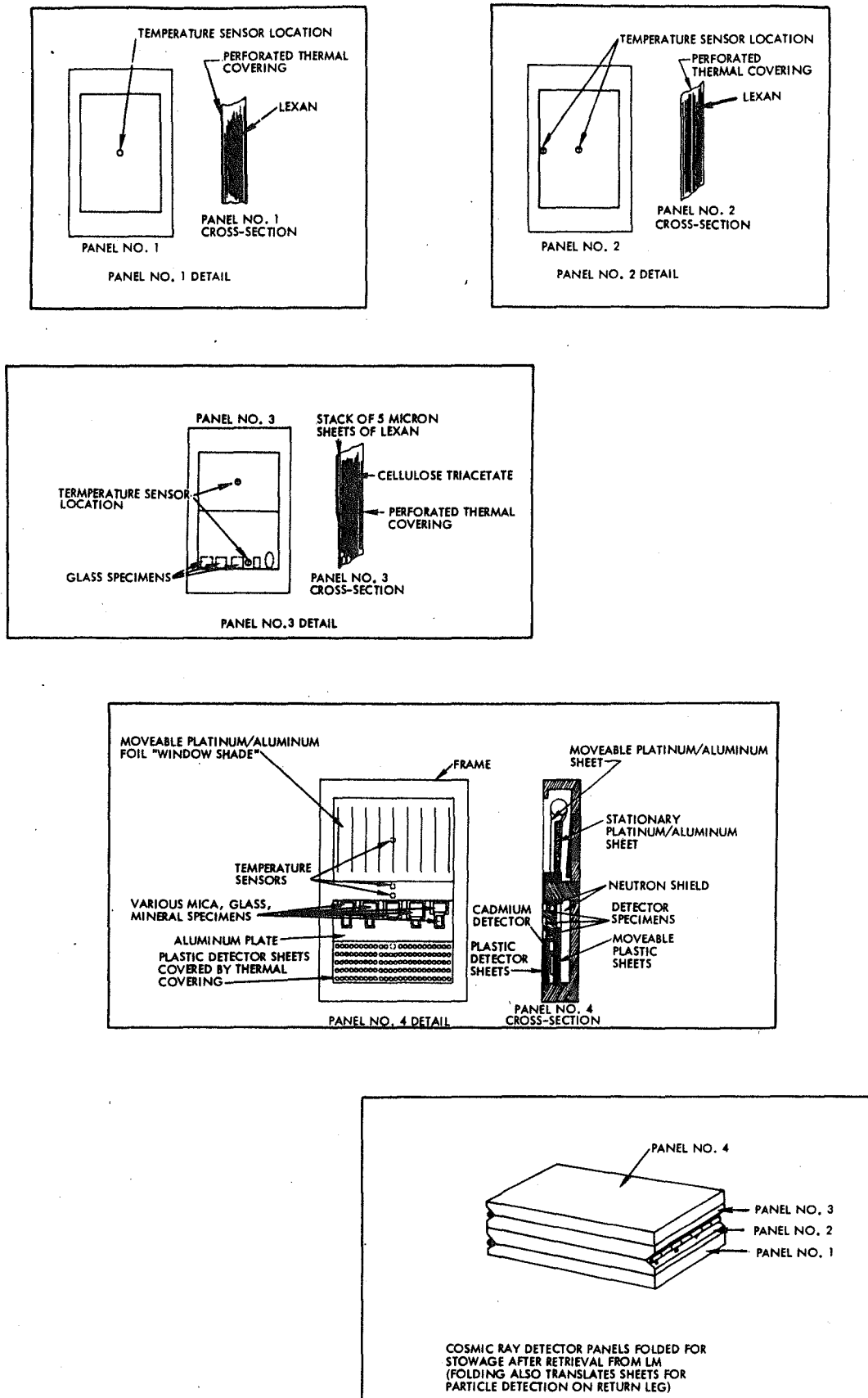
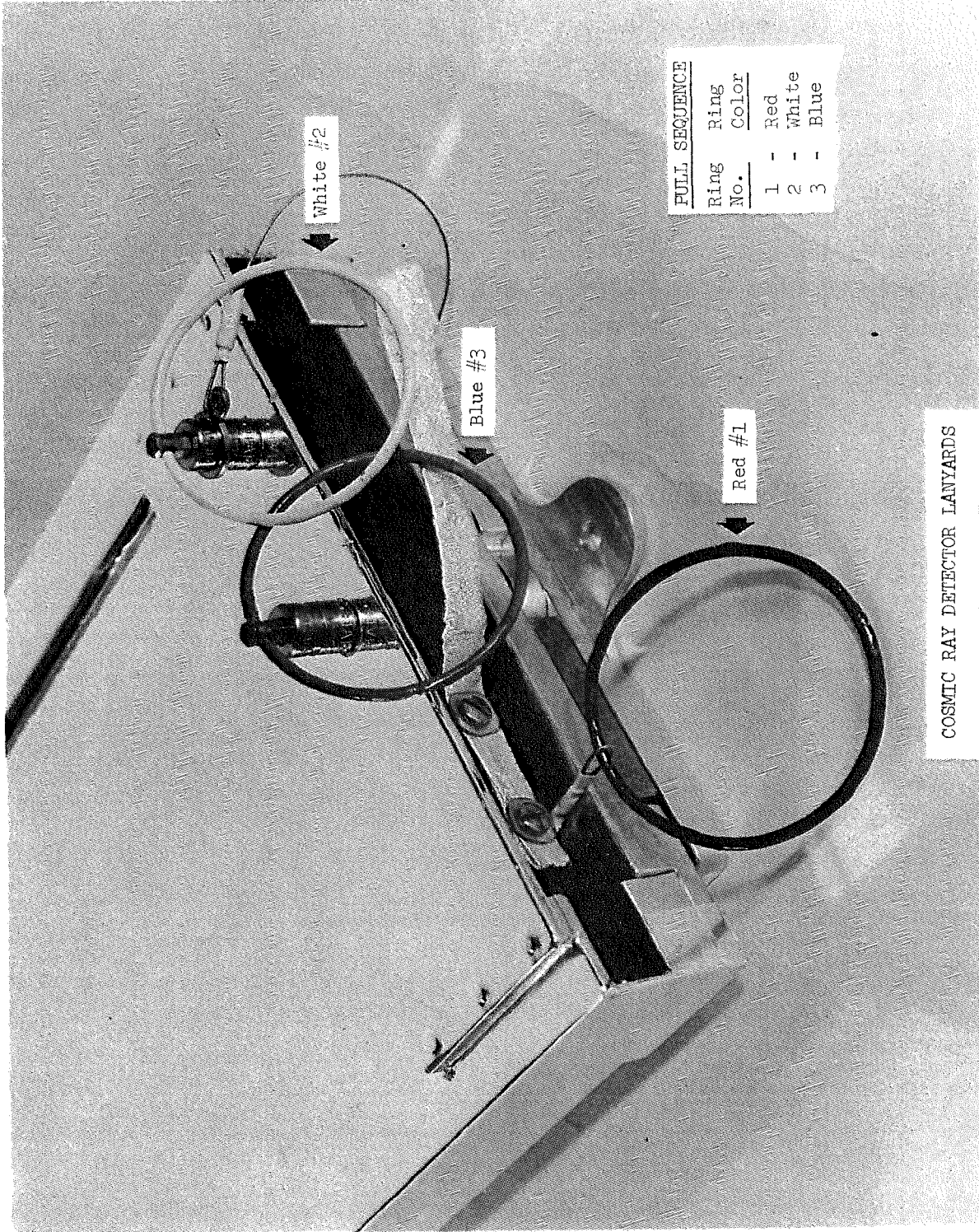


Figure 19 COSMIC RAY DETECTOR PANEL DETAIL





COSMIC RAY DETECTOR LANYARDS

# SOLAR WIND COMPOSITION DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
SWC Deployment	<p>Deploy the SWC 60 to 100 feet from the LM.</p> <p>Orient the SWC facing the sun.</p> <p>Level the SWC in a vertical position.</p> <p>Align the SWC to within 30 degrees of the sun line.</p> <p>Retrieve the SWC after completion of all other EVA tasks.</p>	<p>Deployment distance should prevent dust due to crew activity or residue from vented gases from settling on the aluminum foil.</p>
Photographic Requirements	<p>One stereo pair of the deployed SWC showing the staff in the lunar surface and the entire foil and staff filling the field-of-view and taken in the cross-sun direction.</p> <p>Two photographs of the upper part of the deployed SWC taken from approximately 7 feet to show the Red Marking on the Reel and the upper part of the foil and staff.</p>	<p>One photograph to be taken immediately after deployment. One photograph to be taken just prior to retrieval of the foil and reel at the end of the foil exposure period.</p>



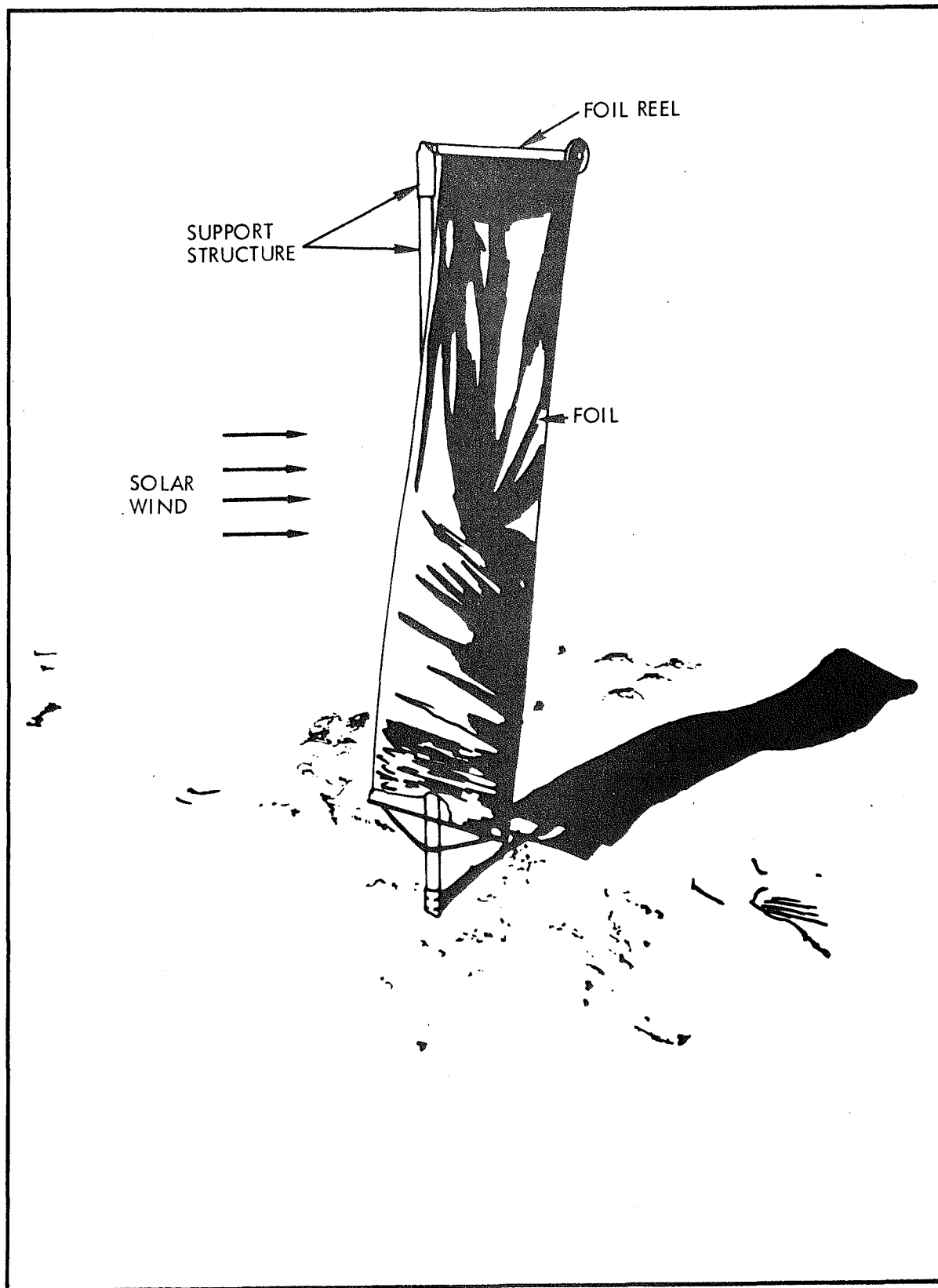


Figure 21 SOLAR WIND COMPOSITION EXPERIMENT

# PENETROMETER DEPLOYMENT CRITERIA

PARAMETER	CRITERIA	REMARKS
Penetrometer Deployment	<p>Remove from interim stowage and attach extension handle. (Use of extension handle is crew performance.)</p> <p>Discard protective tip and install cone.</p>	<p>Lunar Reference Plane should remain locked.</p>
Penetrometer Measurement	<p>Remove Lunar Reference Plane Pit Pin (lock).</p> <p>Lower Lunar Reference plane to "0" penetration position.</p>	<p>The Penetrometer should be held as nearly vertical as possible and pressure applied with a smooth, steady force.</p> <p>The Lunar Reference plane must be returned to its full up maximum penetration position after each penetration and prior to indexing.</p> <p>The Penetrometer should be indexed after each penetration measurement.</p> <p>Lunar Reference plane should be in its full up position when changing cones and pressure plate.</p> <p>The "0" position is when the Lunar Reference plane is in its full down position.</p>

# PENETROMETER DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Penetrometer Measurement (Continued)		<p>The recommended Penetrometer measurements and locations are listed below:</p> <p><u>Double Core Tube Site</u></p> <ol style="list-style-type: none"><li>1) Two measurements adjacent to LRV with the 0.2 sq. in. cone.</li><li>2) Nine measurements on a 3 x 3 grid near trench with 0.2 sq. in. cone.</li><li>3) One measurement adjacent to LRV with the 1.0 sq. in. cone.</li><li>4) One measurement with 1" x 5" plate on trench wall until wall collapses.</li><li>5) One measurement adjacent to LRV with pressure plate.</li></ol> <p><u>Traverse Station Stops</u></p> <p>Take one measurement at four different station stops adjacent to LRV with the 0.5 sq. in. cone.</p>
	Prior to move to next traverse stop, remove handle and stow in interim stowage location.	

PENETROMETER DEPLOYMENT CRITERIA (Continued)

PARAMETER	CRITERIA	REMARKS
Penetrometer Retrieval	Remove the upper housing and place in designated bag for return, after final traverse.	
Photographic Requirements	All penetrometer measurement sites should be photo documented.	
Precautions	<p>To prevent extraneous unwanted scribes on the penetrometer recording drum, care should be exercised when the lunar surface plane assembly is unlocked from the body of the penetrometer.</p> <p>In preparing for actual penetration the Penetromeer must be held by its body -- not the extension handle or the cap assembly.</p>	

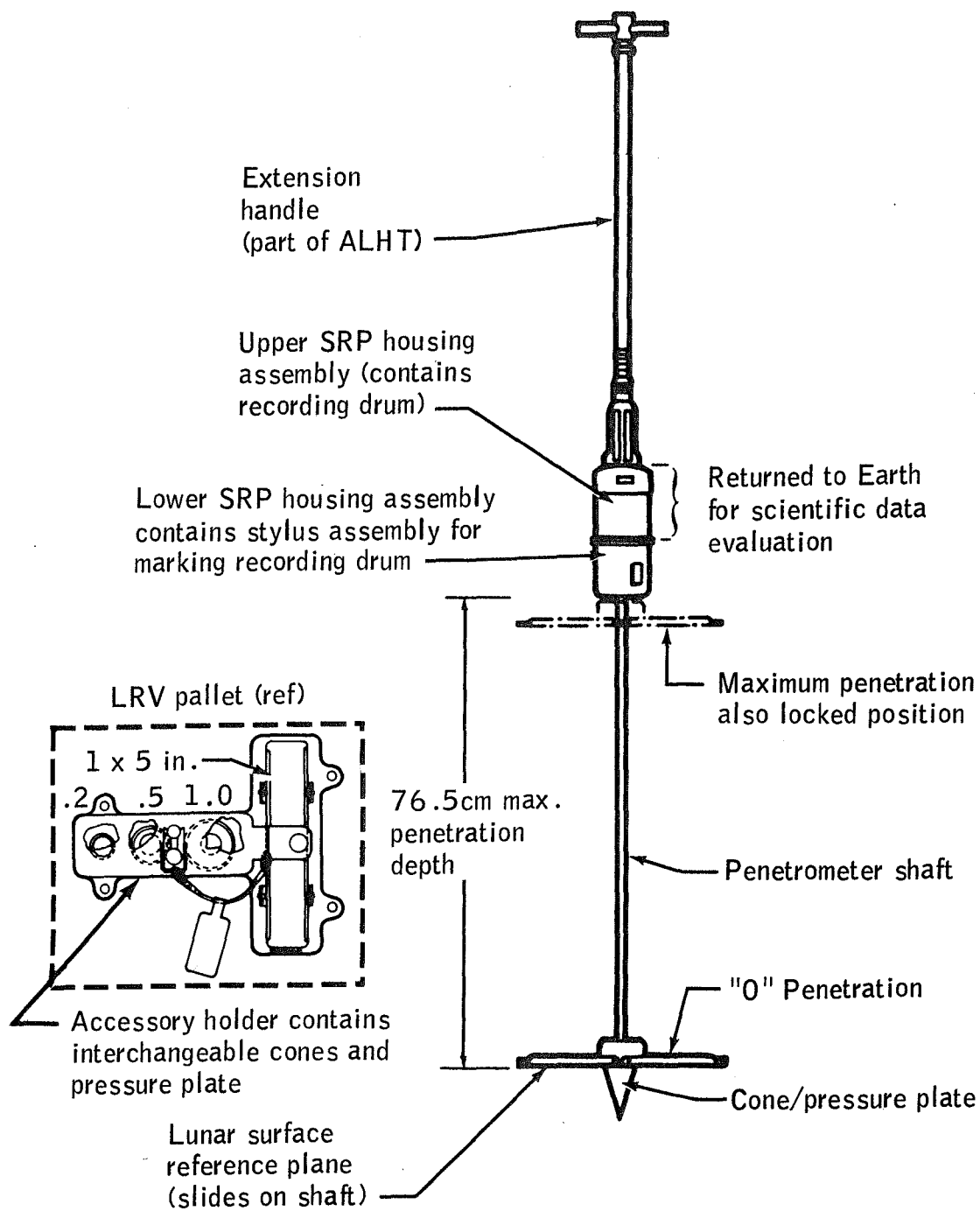


Figure 22 DEPLOYED PENETROMETER EXPERIMENT

# SAMPLE RETURN CONTAINER CLOSEOUT CRITERIA

PARAMETER	CRITERIA	REMARKS
Sample Collec- tion Bag Installation	Lift SCB by the two hand loops on side of SCB that has inboard seams and place in SRC.  Remove flaps from the SESC and cap dispenser pockets prior to closing SRC lid.	These pockets should be pressed down so that the soft aluminum strips sewed in the pocket rims will hold them in a position away from the SRC seal area.
SRC Lid Closure	Flatten the strap on top of the lid to aid in engage- ment of the strap latch cam.	A slow, even force should be applied to the handle when closing SRC lid.  <u>NOTE</u>  Before closing SRC lid, assure that seal area is clear of foreign objects.

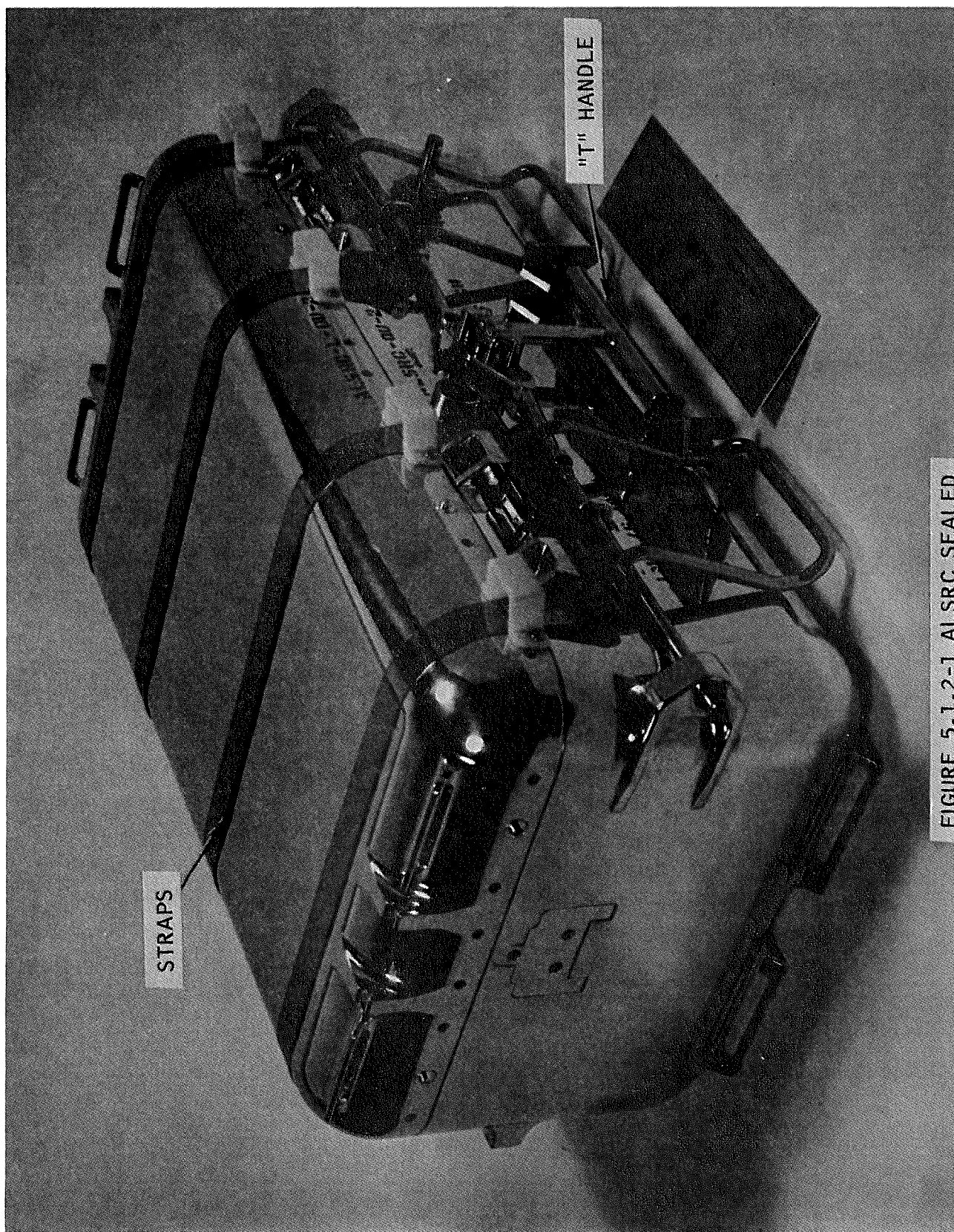


Figure 23 SAMPLE RETURN CONTAINER

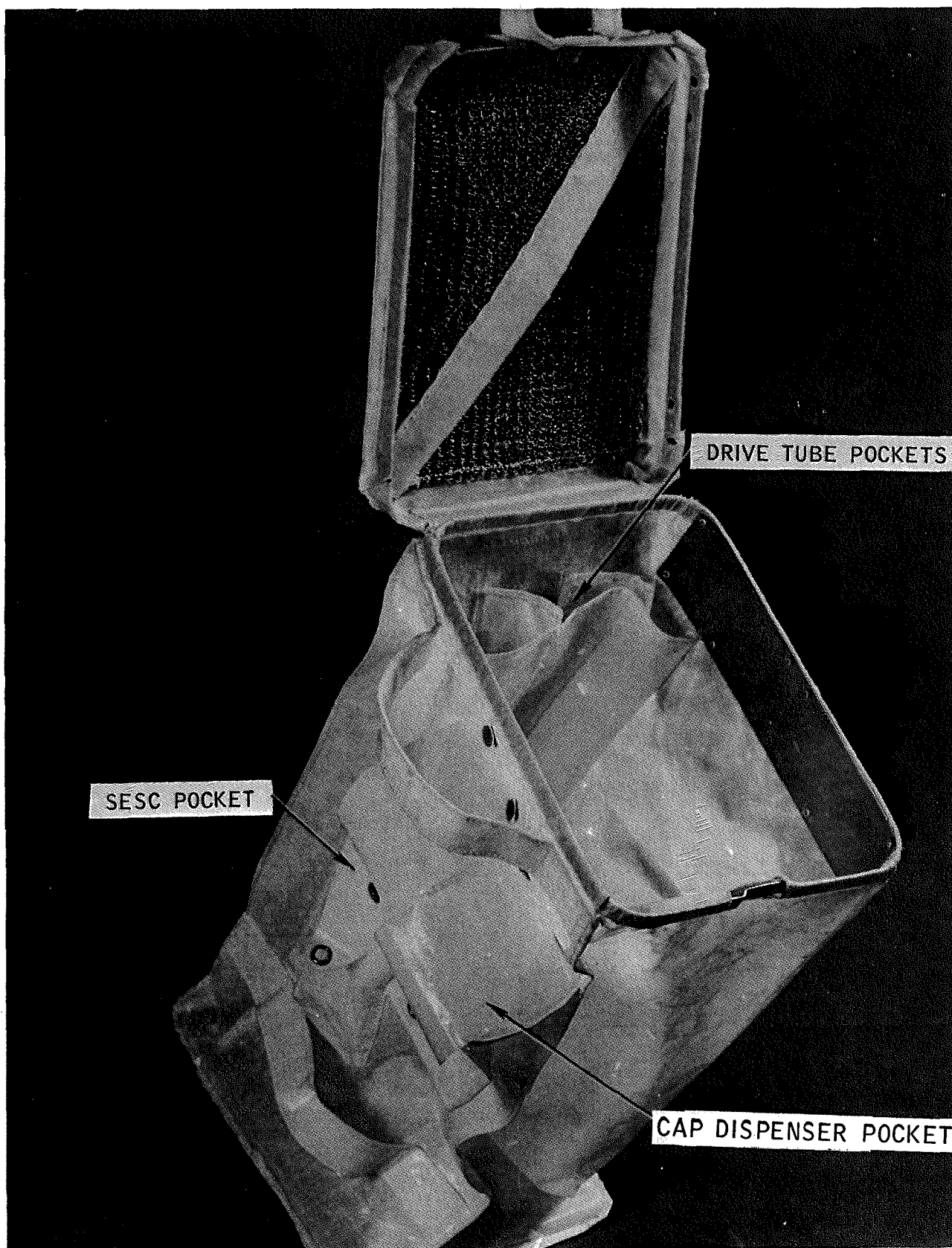


Figure 24 SAMPLE COLLECTION BAG





