STDN No. 601/ALSEP

NETWORK OPERATIONS SUPPORT PLAN FOR ALSEP

REVISION 2

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GSFC

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

NETWORK

OPERATIONS SUPPORT PLAN

FOR

ALSEP

Revision 2

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PREFACE

The purpose of this Network Operations Support Plan (NOSP) is to provide operational configurations and procedures applicable to the Apollo Lunar Surface Experiments Packages (ALSEP). Some information on the Particles and Fields Subsatellite (P&FS) has been retained for historical purposes. The provisions of this document take precedence over procedures contained in other documents.

Changes to this document may be issued by Documentation Change Notice (DCN), or when applicable, printed revision.

Questions from Network stations concerning information in this document should be transmitted to NOCC using standard procedures. Comments from other sources should be addressed to:

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Greenbelt, Md. 20771

or sent via NASCOM teletype circuits to GCEN/NOD.

This revision includes all DCN's issued to the Network Operations Support Plan for ALSEP/P&FS, STDN No. 601/ALSEP/P&FS, Revision 1, dated August 1974, up to and including DCN 048. Changes other than those issued by DCN are marked by change bars. Appendix B, ALSEP Supplemental Support, has been deleted; all applicable information is incorporated in other sections. Section 34 has been deleted because it is not applicable to orbital support.

This NOSP will be authorized for use by Instrumentation Support Instruction (ISI) after all supporting stations have acknowledged receipt in accordance with the Automated Documentation Receipt System, STDN No. 519.1. This NOSP supersedes STDN No. 601/ALSEP/1-5, dated August 1974, and all changes thereto.

Status of the authorization may be obtained from the NOCC/Network Operations Director by SCAMA or by telephone by calling 301-982-6154.

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1.1 MISSION DESCRIPTION

1.1.1 ALSEP

1.1.1.1 General

a. The Apollo Lunar Surface Experiments Packages (ALSEP) consist of experiments which were deployed on the lunar surface during Apollo lunar landings. These experiments are being used to investigate and determine the composition and structure of the lunar surface and interior, and investigate the lunar environment.

b. Each ALSEP is a self-contained unit designed to transmit selenophysical information to earth via S-band frequencies for periods of 2 years or more. Each ALSEP consists of a power supply, central station, and various experiments.

1.1.1.2 ALSEP Experiments Description. Table 1-1 lists the experiments included in each ALSEP. The ALSEP experiments are:

a. Passive Seismic Experiment. The Passive Seismic Experiment (PSE) measures the natural seismicity of the moon, the lunar free oscillations, and the tidal deformations. The data from this experiment helps determine the strain regime and energy of the moon's interior, the overall elastic properties, and the correlation between seismic sources and visible surface features.

b. Active Seismic Experiment. The Active Seismic Experiment (ASE) is used primarily to generate and monitor artificial seismic waves in the 3- to 250-Hz range in the lunar surface and near subsurface. The ASE can also be used to monitor natural seismic waves in the same frequency range. Data acquired from the ASE aids in the determination of the physical properties of the lunar surface and near subsurface.

c. Lunar Surface Magnetometer Experiment. The Lunar Surface Magnetometer (LSM) experiment measures the temporal variations of the local magnetic field vector. Data from this experiment helps determine whether or not the moon has a molten core.

d. Solar Wind Spectrometer. The Solar Wind Spectrometer (SWS) provides information on the following:

(1) The interaction between the moon and the solar wind.

(2) The moon's gross electrical conductivity.

(3) The presence of a lunar atmosphere.

(4) The effects of radiation on the surface through the mechanisms of sputtering and charging.

(5) The effect of the earth's magnetic field at 384,000 km.

e. Suprathermal Ion Detector Experiment/Cold Cathode Gauge Experiment

(1) The Suprathermal Ion Detector Experiment (SIDE) is used to provide data pertaining to the density and temperature of the lunar ionosphere as it exists near the lunar surface.

(2) The Cold Cathode Gauge Experiment (CCGE) is used to determine the neutral particle density at the lunar surface and any variations in that density associated with solar activity. Specifically, the CCGE will be used to measure the pressure of the ambient lunar atmosphere.

f. Heat Flow Experiment. The Heat Flow Experiment (HFE) is designed to measure the subsurface vertical temperature gradients and brightness temperature in the lunar surface layer, and the absolute temperature and thermal conductivity of the lunar subsurface material to a depth of approximately 2.5 meters. The experiment includes two sensor probes which are placed in bore holes drilled with the Apollo Lunar Surface Drill (ALSD).

g. Charged Particle and Lunar Environment Experiment. The Charged Particle and Lunar Environment Experiment (CPLEE) measures the energy distribution, time variation, and direction of proton and electron fluxes at the lunar surface. The results of these measurements provide information on particle phenomena.

h. Dust, Thermal, and Radiation Engineering Measurement Package. The Dust, Thermal, and Radiation Engineering Measurement (DTREM) package measures the following:

(1) Radiation damage to three solar cells by monitoring the degradation in voltage output.

(2) Dust accumulation caused by the LM ascent or ASE motor activity.

(3) Reflected infrared energy, to obtain the lunar surface "brightness" temperature.

i. Lunar Ejecta and Meteorites Experiment. The Lunar Ejecta and Meteorites Experiment (LEAM) measures physical parameters of primary cosmic dust particle impacts on sensors in cislunar space, and of lunar ejecta emanating from the sites of meteorite impacts on the lunar surface. It measures the direction, mass distribution, and speed of both the primary and secondary particles.

j. Lunar Seismic Profiling Experiment. The Lunar Seismic Profiling Experiment (LSP) is designed to obtain data on physical properties of the lunar surface and subsurface by generating and monitoring artificial seismic waves in the surface and near subsurface in the active mode, and by detecting moonquakes and meteorite impacts in the passive listening mode. The experiment electronics package and the four-geophone array was deployed in the ALSEP area during EVA-1. Transport modules with explosive charges were mounted on the LRV and deployed during the EVA traverses within 3.5 km of ALSEP. The eight charges were detonated remotely from earth subsequent to lunar liftoff.

k. Lunar Mass Spectrometer Experiment. The Lunar Mass Spectrometer Experiment (LMS) is designed to obtain data on composition of the lunar atmosphere in the 1 to 110 amu mass range at the lunar surface. A secondary goal is the detection of transient changes in composition due to emission of gasses from the surface from man-made sources. The instrument is a magnetic sector field mass spectrometer with a Nier-type thermionic electronic bombardment ion source.

l. Lunar Surface Gravimeter. The Lunar Surface Gravimeter (LSG) is designed to gather the following information: absolute lunar gravity, tidal changes in local gravity due to the change in relative position of celestial bodies, low-level lunar gravity changes with periods between 10 seconds and 20 minutes due to natural oscillations of the moon excited by gravity waves, and vertical axis seismic activity. From this information conclusions may be drawn about the internal constitution of the moon, associated seismic activity, and the existence of gravity waves. The vertical component of gravity is measured in three different frequency ranges.

Table 1-1. ALSEP Experiments

Experiment	ALSEP Flight Article				
	1 AS-507 Array A Apollo 12	2 AS-510 Array A-2 Apollo 15	3 AS-511 Array D Apollo 16	4 AS-509 Array C Apollo 14	5 AS-512 Array E Apollo 17
PSE	EXP #1	EXP #1	EXP #1	EXP #1	
ASE			EXP #2	EXP #2	
LSM	EXP #2	EXP #2	EXP #3		
SWS	EXP #3	EXP #3			
SIDE/CCGE	EXP #4	EXP #4		EXP #3	
HFE		EXP #5	EXP #4		EXP #3
CPLEE				EXP #4	
DTREM	X	X		X	
LEAM					EXP #2
LSP					EXP #5
LMS					EXP #1
LSG					EXP #4

1.1.1.3 ALSEP Mission Support Description

a. Real-time Support

(1) Periodic MCC and STDN support is required for the ALSEP packages. Support is for approximately 2 hours a day and for two to four support periods of 4 hours duration each month. In general, no specific period is critical, however, several support periods each month are critical.

(2) Continuous MCC and STDN coverage may be required to support specific tests.

b. High Bit Rate (HBR) Support. High bit rate support of ALSEP 4 (ASE), ALSEP 3 (ASE), and ALSEP 5 (LSP) is required as scheduled. Unscheduled support utilizes any station that is supporting ALSEP at the time.

c. Receive/Record Support. All ALSEP require continuous 24-hour per day receive/record support from at least one STDN station for the life of each ALSEP. In the event of a station contingency, a nominal downtime for repair (2 hours) is acceptable except during a critical period. If a longer downtime is expected, a second station is scheduled for coverage.

d. Station Initiated CMD Support. Station initiated CMD support is scheduled as required.

e. ALSEP Contingency Support. In the event of an ALSEP contingency, real-time CMD/TLM support is provided as required.

f. LSP Contingency Bit Rate (CBR) Support. The LSP is commanded by MCC to CBR only in the event of a failure of the HBR downlink. The LSP can also downlink CBR as a result of a spurious command. Stations are required to record only the CBR downlink.

g. Supporting Stations. Table 1-2 defines the STDN ALSEP support.

1.1.2 PARTICLES AND FIELDS SUBSATELLITE

1.1.2.1 General

Note

The last contact with the subsatellite was on August 23, 1973. Further attempts to command the P&FS have not been successful. The following information is retained for historical purposes.

a. The Particles and Fields Subsatellite (P&FS) provided a means of making measurements of energy particles and magnetic fields while in lunar orbit, utilizing the moon as a large absorber. The subsatellite also provided the capability of making precise phase-locked two-way Doppler measurements. Analysis of this data permitted mapping of the moon's gravitational field.

b. The P&FS was included in the experimental complement of the Service Module (SM) Scientific Instrumentation Module (SIM) on Apollo 15 and ejected into lunar orbit on August 4, 1971. The totally self-sufficient subsatellite was activated after LM ascent stage impact.

c. The P&FS was powered by solar cells and a battery. The satellite contained a Unified S-band (USB) transponder (using LM uplink and downlink frequencies), data storage unit, Apollo command system decoder, and associated electronic and power systems.

1.1.2.2 P&FS Experiments Description. Experiments which were included in the P&FS flight article are described as follows:

a. S-173 Particle Measurement. The particle measurement obtained data on the physics of the interaction region or the boundary layer while the P&FS was in a lunar orbit. The characteristics of the boundary layer were determined by the properties of the plasma as well as by the properties of the moon. Thus the study of the interaction region yielded information on the external plasma, interior of the moon, lunar surface, and lunar ionosphere.

Table 1-2. ALSEP Supporting Stations and Equipment Configuration

Station	USB Antenna for TLM Uplink & Tracking			Telemetry Antenna		Voice (SCAMA)	TTY	RSDP (SCE/642B Computer)	High-speed Tracking Data
	26-m Dual	4.3-m Dual	9-m Dual	26-m Dish	12-m Dish				
JSC						X	X		
GSFC***						X	X	X	
ACN			X			X	X	X	X
AGO			X		X	X	X	X	
BDA			X			X	X	X	X
ETC			X		X	X	X	X	X
GDS	X		X		X	X	X	X	X
GWM			X			X	X	X	X
HAW			X			X	X	X	X
MIL			X			X	X	X	X
MAD	X		**			X	X	X	X
ORR			X	X		X	X	X	
ROS		X	**	X		X	X	X	
QUI		X			X	X	X	X	
ULA *			X	X	X	X	X	X	

Note

*Receive and record telemetry, three-way tracking support only.

**To be supplied.

***NOCC.

b. S-174 Magnetometer. This experiment provided vector surveys to study bow shock and magnetosphere of the interplanetary medium, and the solar wind boundary layer over the moon. The experiment was designed to study magnetic field interaction with the moon, measure particle flux near the plasma sheet, and monitor solar flare electron events.

c. S-164 S-band Transponder. This S-band transponder provided accurate S-band Doppler measurements of the subsatellite's natural lunar orbit position over periods of time allowing definition of a lunar mass model. Such a model when correlated with lunar shape information, enhances and supports future lunar activities by permitting greater alternate orbit determinations and gives the scientific community a basic model for such considerations as lunar origin and subsurface structure.

1.2 NETWORK OPERATIONS

1.2.1 NETWORK OPERATIONAL CONTROL

Network support has been subdivided into two phases for operational clarification.

1.2.1.1 Real-time Support Period (Phase II)

a. This phase is defined as real-time and station-initiated command support as identified in the Network operations schedule. During this period, the following operational support guidelines are in effect:

(1) MCC exercises operational direction of the supporting station(s) through the ALSEP Network as scheduled.

(2) All commands are initiated from, or as directed by MCC.

(3) Real-time TLM is transmitted to MCC except during station-initiated command support periods.

(4) USB carrier times are at MCC direction.

b. The basic operational interface during this period is between the ALSEP Network and the ALSEP OPS. During scheduled activities, operational direction to supporting station(s) is exercised through the ALSEP Network. Operational and configuration control is exercised through the ALSEP OPS in accordance with the following criteria:

(1) The ALSEP Network ensures that the MCC scheduling responsibilities in section 16 are met, and coordinates late changes (HBR uplink configuration) with ALSEP OPS to ensure proper station configuration.

(2) The ALSEP OPS utilizes the Network operations schedule to request voice and data circuits necessary for support (refer to table 8-1). These circuits are established no later than S-20 minutes. However, High-speed Data (HSD) circuits are not set into the GSFC Communications Processor (CP) until coordinated with Houston Comm Control.

(3) The ALSEP Network is responsible for initiating command mode changes and informing the station Operations Supervisor (OPSR).

(4) Station transfer (data responsibility transferred from one station to another) is in accordance with the Network operations schedule.

1.2.1.2 Receive and Record Support Period (Phase III). This phase is defined as all receive and record support. During this period, the following operational guidelines are in effect:

a. ALSEP OPS exercises operational control of the support station(s).

b. The basic interface during this period is between the ALSEP OPS and the station OPSR on an as required basis. All operational direction and control is exercised through the ALSEP OPS. Interface between the ALSEP Network and ALSEP OPS is on an as required basis and may be initiated by either the Network or OPS.

c. Stations support assigned ALSEP in accordance with the STDN schedule. Station recordings are scheduled to overlap 5 minutes at Acquisition of Signal (AOS) and Loss of Signal (LOS) whenever feasible.

1.2.2 INTERFACE TESTING

1.2.2.1 General. When supporting ALSEP, testing is in accordance with para 1.2.2.2 through 1.2.2.5.

1.2.2.2 ALSEP Support from S Minus 20 Count (Real Time)

Time	Position	Action
Prior to S-20 minutes	ALSEP OPS Comm Mgr	NASCOM interface established. Comm Mgr report problems or outages to ALSEP OPS 2 ON CCL-25.
S-20	ALSEP OPS OPSR	ALSEP OPS establish voice conference with station OPSR.
	ALSEP OPS ALSEP Network	ALSEP OPS establish voice coordination loop to ALSEP Network.
	ALSEP OPS OPSR	OPSR pass verbal status report to ALSEP OPS.
	ALSEP OPS ALSEP Network	ALSEP OPS brief ALSEP Network on station status.
	Comm Mgr MCC Comm Controller	Comm Mgr (with MCC concurrence) set HSD into GSFC CP.
S-15	ALSEP OPS Comm Mgr OPSR ALSEP Network	ALSEP OPS place ALSEP Network in voice conference with station OPSR (phase II only). ALSEP Network brief OPSR/ALSEP OPS on current pass activities.
	ALSEP OPS ALSEP Network OPSR	Start MCC ALSEP CMD and TLM interface test on ALSEP conference.
S-0	OPSR	Station transfer or support begin.
	ALSEP Network ALSEP OPS OPSR	ALSEP Network advise ALSEP OPS of ALSEP test results.

Note

The ALSEP OPS establishes voice conference with the oncoming and offgoing station when special or additional requirements necessitate voice communications. A voice conference may be initiated by the ALSEP NC or station OPSR through ALSEP OPS at any time.

1.2.2.3 ALSEP Support from S-Minus 10 Count (Station-Initiated Commands)

Time	Position	Action
S-10	ALSEP OPS OPSR	ALSEP OPS establish voice conference with station OPSR. ALSEP OPS establish voice coordination circuit to ALSEP Networks.
	ALSEP OPS OPSR	OPSR pass verbal status report to ALSEP OPS.
	ALSEP OPS ALSEP Network	ALSEP OPS brief ALSEP Network on station status.
S-5	ALSEP OPS Comm Mgr OPSR ALSEP Network	ALSEP OPS place ALSEP Network in voice conference with station OPSR (phase II only). ALSEP Network brief OPSR and ALSEP OPS on current pass activities (if required).
S-0	ALSEP Network OPSR	Support begins.

1.2.2.4 ALSEP Command Interface Test

a. General. Command interface testing is performed at the time specified in the support S minus 20 count or at any other time specified by the ALSEP Network.

b. Nominal Testing Sequence

Seq	Position	Action
1	ALSEP OPS, OPSR, ALSEP Network	Start MCC ALSEP CMD interface test on ALSEP conference.
2	OPSR	ALSEP carrier and subcarrier on radiating into dummy load. TEST/OPERATE switch set to OPERATE.
3	ALSEP Network	Execute site status requests.
4	ALSEP Network	Execute RTC's 171 and 172 for appropriate ALSEP.
5	OPSR	Remove modulation and carrier from dummy load. Execute low-speed history. When history is completed, enable critical groups requested by ALSEP Network.

b. Nominal Testing Sequence (cont)

Seq	Position	Action
6	ALSEP Network	Request ALSEP RTC inventory if critical groups were enabled.

1.2.2.5 ALSEP Data Loss

a. Purpose. To define required action if there is an ALSEP data loss.

b. Participants. ALSEP OPS, ALSEP Network,and Network Scheduling.

c. Procedure

(1) At the end of the GMT day when a 15-minute or more ALSEP data loss has occurred, the ALSEP OPS transmits a message to the ALSEP Network indicating that the loss occurred and the reason for this loss.

(2) The ALSEP Data Loss message is in section 16.

1.2.2.6 ALSEP Experiment Status

a. Purpose. To provide supporting stations with the current status of active experiments following a phase II support period, or at any other time the status changes.

b. Participants. ALSEP OPS, ALSEP Network, and OPSR.

c. Procedure. At the end of each phase II support period, the ALSEP Network advises ALSEP OPS of current experiment status. The ALSEP OPS transmits an ALSEP Experiment Status Message (AESM) to all supporting stations. This message is valid until the next phase II support period when a new AESM is issued. (Refer to section 16 for the AESM format.) This message will be transmitted any time there is a status change.

1.3 STATION OPERATIONS

1.3.1 OPSR

1.3.1.1 Station Support Capability Reporting

a. Purpose. To keep GSFC and MCC aware of station status and configuration.

b. Participants. OPSR, ALSEP Network, ALSEP OPS

c. Procedures. The following procedures apply when a station is operationally manned. At other times, reporting is in accordance with STDN No. 502.16.

(1) When a mission-required equipment failure occurs that does not affect support capability and/or for which a backup capability exists, perform the following:

(a) Reconfigure, if required, to a backup mode as soon as possible to prevent loss of support capability.

(b) The OPSR will report the equipment failure, impact, and Estimated Time of Return to Operation (ETRO), by voice when time permits, to the ALSEP Network (phase II), or to the ALSEP OPS (phase III).

(c) When the problem is defined, the OPSR transmits the appropriate status report in accordance with STDN No. 502.16 and section 16.

(2) When a mission-required station equipment failure occurs that affects support capability, perform the following:

(a) Reconfigure station equipment to provide the maximum possible support.

(b) The OPSR immediately reports the failure, impact, ETRO, and corrective action being taken to the ALSEP Network and to the ALSEP OPS (Phase III).

(c) When the problem is defined, the OPSR transmits the appropriate status report in accordance with STDN No. 502.16 and section 16.

1.3.1.2 Station Readiness Testing

a. Purpose. To ensure station readiness for pass-time support.

b. Participants. OPSR and ALSEP OPS.

c. Procedure. The OPSR performs the following:

(1) Conduct Station Readiness Test (SRT's) prior to the Mission Prepass Support Counts or as directed by the Network operation schedule.

(2) Stations scheduled to support phase II real-time ALSEP, configure the USB uplink for ALSEP support. Stations are advised of any changes to this configuration by the ALSEP OPS during the CRT. All there bases are in accordance with network schedule.

(3) An SRT completion message is submitted only when a problem occurs affecting readiness testing. If a problem report is submitted, the SRT completion message contains the Date Time Group (DTG) of that message.

1.3.1.3 Frequency Synthesizer Reporting

a. Purpose. To advise the ALSEP NOM of a non-nominal frequency synthesizer setting.

b. Participants. ALSEP OPS, ALSEP Network, OPSR, and USB.

c. Procedures

(1) After successfully completing an uplink Radio Frequency (RF) acquisition, the USB supervisor reports the frequency synthesizer setting to the OPSR if it is other than nominal.

(2) Upon such notification, the OPSR reports the frequency synthesizer setting to the ALSEP OPS on the voice conference circuit.

(3) A TTY Operations Message (OPN) is transmitted to GUNV/ALSEP OPS, INFO HANC/ALSEP Network as soon as practical after the verbal report.

1.3.1.4 OPSR Announcements

a. Purpose. To define the required support announcements.

Note

ALSEP AOS is defined as the first indication of ALSEP RF or start of the station's scheduled period. Nominally, ALSEP AOS and LOS times are the same as those reflected in the Network operation schedule (phase II and III).

b. Participants. OPSR and ALSEP Network.

c. Procedures.

(1) Announcements. The station OPSR will make announcements described in table 1-3 as applicable. AOS and LOS announcement conditions are further described in para 1.3.1.4.

Note

1. Command sequence announcements are made using voice identification of ALSEP.

2. All announcements, other than command sequences, use the following for voice identification of ALSEP:

Vehicle	Voice ID
(a) ALSEP 1	A-1
(b) ALSEP 2	A-2
(c) ALSEP 3	A-3
(d) ALSEP 4	A-4
(e) ALSEP 5	A-5

(2) Acknowledgements. ALSEP Network will acknowledge all AOS, go for command, and unable to command announcements.

Table 1-3. OPSR Support Announcements

Seq	Conditions	Announcements
1	Upon acquisition of vehicle RF signal.	"(Station) AOS (A-X), signal strength minus XXX."
2	Upon decom lock on ALSEP downlink.	"(Station) decom lock on (A- X)," Announce ALSEP bit rate if other than NBR.
3	Upon bringing carrier up for ALSEP (OPSR will ensure that carrier modulation is off).	"(Station) ALSEP carrier is up."
4	After turning command modulation on (upon direction from MCC) following ALSEP carrier turn on.	"(Station) go for command, ALSEP."
5	If USB system is unable to command the vehicle.	"(Station) unable to command (ALSEP)." Give brief reason why the station is unable to command.
6	Loss of ALSEP downlink.	"(Station) LOS A-X due to ----------." (Give brief explanation for LOS.)
7	When the vehicle RF is lost coincident with the end of a station's support period or pass.	"(Station) final LOS on ALSEP."
8	Upon bringing ALSEP carrier down (OPSR will ensure that carrier modulation is off).	"(Station) ALSEP carrier is down."

1.3.1.5 Station Data Playback

a. Purpose. To define the operational procedure to perform an ALSEP data playback to MCC.

b. Participants. OPSR, Telemetry Tech, Recorder Tech, RSDP, ALSEP Network, and ALSEP OPS.

c. Procedures

(1) When MCC requests the OPSR to play back telemetry data received from ALSEP, he gives the following information:

(a) Vehicle (ALSEP No.).

(b) Greenwich Mean Time (GMT) and date of recording.

(c) Bit rate.

(d) Playback bit (set or not set).

(e) Playback start time and duration.

(f) High-speed data formats and slot assignments.

(g) Real GMT or playback GMT.

(2) The OPSR ensures that the station is configured for playback and notifies the ALSEP Network.

(3) The Recorder Tech starts the tape recorder on cue from the OPSR.

(4) The Telemetry Tech confirms solid decom lock and solid time code translator lock and ensures that the time displayed on the translator is valid.

(5) The RSDP operator assures the OPSR of proper data format selection.

(6) At completion of the playback, the ALSEP Network notifies the OPSR to reconfigure for real time or release the station to the ALSEP OPS.

1.3.1.6 OPSR Support Activities

a. Purpose. To define the required activities to support ALSEP phase II.

b. Participants. OPSR and all station personnel.

c. Procedure

Note

Support time in table 1-4 is defined as the start of station's scheduled support period.

Table 1-4. OPSR Activities

Support Time	Activity
S-20	Confirm that prepass console checklist is complete. Start voice recorders. Confirm that station is configured according to the Network operations schedule and this NOSP. Set horizon clocks to scheduled AOS. Request parameter listing and verify computer mode 2/FC. Confirm computer constants. Check each system for "go" indication. Log all "red" items. Give "Go/No Go" voice status to ALSEP OPS. Confirm that no HS telemetry on tracking data is being output from station.
S-15	Start MCC CMD/TLM interface test. Confirm RSDP HS TLM destination code initialized for MCC only (unless otherwise directed by MCC). Confirm system status; verify that recorders are loaded; prepass cals and prepass checklists are completed. Confirm that APP is loaded with acquisition tape.
S-10	Confirm via negative reporting from systems, that all local signal sources of RFI are off and no outside interference is present. Clear operating area of all nonoperational personnel. Confirm that SCE TEST/OPERATE switch is set to TEST.
S-8	Confirm that antenna is pointing to Initial Point (IP).
S-3	Reconfirm with GCC that data links are configured.

Table 1-4. OPSR Activities (cont)

Support Time	Activity
S-2	On paging system announce "Support start time in 2 minutes. All data recorders on."
S-0	Make AOS announcements on ALSEP conference. Log start time.
S plus	Confirm with GCC that data is online to MCC per ALSEP Network direction. Report frequency synthesizer setting to ALSEP Network when other than nominal. Report to ALSEP Network on ALSEP Conference any time during a tracking period when the station has a signal loss or gain greater than 1 dBm. When requested by ALSEP Network to bring up the ALSEP carrier, announce to systems, "ALSEP carrier up" and verify that status display shows system is radiating (no command modulation) announce, "ALSEP carrier on" When requested by ALSEP Network to apply modulation, set SCE TEST/OPERATE switch to OPERATE. Announce, "GO for command ALSEP." Hand over (as applicable), set SCE TEST/OPERATE switch to TEST. On OPSR loop, announce "Carrier down". For premature LOS with carrier up,set SCE TEST/OPERATE switch to TEST position and attempt to reacquire the ALSEP downlink. Announce, "USB has invalid ALSEP lock, am reacquiring; unable to command ALSEP." For premature LOS with carrier down, announce, "Am reacquiring ALSEP." For premature LOS reacquisition with carrier down, announce: "USB has valid lock ALSEP." For premature LOS reacquisition with carrier up, and when directed by ALSEP Network to apply modulation, reset the SCE TEST/OPERATE switch to OPERATE. Announce, "go for command ALSEP." At end of scheduled support period, log GMT. Obtain system status from system supervisors on OPSR loop. Announce to data recorders, "data recorder off. Ensure that CAM 992 is typed in. Verify HS TLM data terminated.

Table 1-4. OPSR Activities (cont)

Support Time	Activity
S plus (cont)	Execute appropriate CMD histories.
	Note OPSR transmit the Pass Summary (PASSUM) report within 45 minutes after LOS in accordance with section 16.

1.3.1.7 Reporting of ALSEP Anomalies

a. Purpose. To inform ALSEP NC/ALSEP NOM of anomalies.

b. Participants. ALSEP OPS, ALSEP Network, OPSR, and system supervisors.

c. Procedures

(1) Each system supervisor informs the OPSR of any ALSEP anomalies observed from his area.

(2) The OPSR verbally reports the anomaly in real time to the ALSEP Network or ALSEP OPS.

(3) The OPSR then reports the anomaly by spacecraft/vehicle Anomaly Report to the ALSEP OPS and ALSEP Network as soon as possible.

(4) The ALSEP RSDP can process up to four PCM inputs simultaneously. During real-time support, all ALSEP decom outputs should be enabled to the RSDP. This enables the OPSR to monitor the input channel sync status of all ALSEP vehicles being received. Any input channel sync losses are reported to the ALSEP Network.

1.3.2 TELEMETRY

1.3.2.1 PCM Bit Rate Change

a. Purpose. To provide the station with the operational procedure for an ALSEP bit rate change.

b. Participants. OPSR, USB, PCM Tech and SCE operator.

c. Procedures

(1) When MCC generates a command to change bit rate, and uplink is noted on station, OPSR announces on the OPSR loop: "NBR (Normal Bit Rate) on," "CBR (Contingency Bit Rate) on, " "HBR (High Bit Rate) on."

(2) The PCM Tech should switch formats and bit synchronizer rate to the proper bit rate.

(3) The USB Receiver Tech ensures proper receiver TLM bandwidth selection for bit rate change and rephases the TLM phase shifter.

(4) SCE operator should initiate a format change when the command is uplinked.

(5) MCC may announce a bit rate change as it is initiated.

(6) The Microdyne receiver is not used to support HBR. If an ALSEP being processed by the Microdyne receiver should change to HBR, reconfiguration to a USB receiver is necessary.

1.3.2.2 PCM Parameter Verification

a. Purpose. To define the types of readouts which can be requested and the station/MCC interfacing procedures.

b. Participants. OPSR, PCM Tech, and ALSEP Network.

c. Procedures

(1) TLM Readouts

(a) When requesting a TLM parameter readout, MCC gives the measurement number and vehicle identification. ALSEP readouts are given in octal unless otherwise specified by MCC.

(b) The OPSR directs the PCM Tech to dial up the requested parameter at the TLM station, convert it, and read it back. The OPSR passes the readout to MCC.

(c) Readouts are 10 bits in length for ALSEP.

(2) ALSEP ASE Readouts

(a) When a station is requested to read out an ASE parameter, MCC gives the downlink word number (1-32) and vehicle identification.

(b) ASE words consist of 20 bits (four 5-bit parameters). When an ASE readout is requested, the PCM Tech dials up the 20-bit word and reads it in two 10-bit octal syllables.

(3) ASLEP NBR/LBR Readout Capability

(a) Housekeeping. All 90 parameters in A-G word 33 can be read.

(b) PSE. All PSE parameters can be read out.

(c) CPLEE. No CPLEE parameters can be read out.

(d) HFE. No HFE parameters can be read out.

(e) LSM. Only LSM scientific parameters can be read out.

(f) SIDE. No SIDE parameters can be read out.

(g) SWS. No SWS parameters can be read out.

(h) LMS. No LMS parameters can be read out.

(i) LSG. No LSG parameters can be read out.

(j) LEAM. No LEAM parameters can be read out.

(4) ALSEP LSP Readout Capability

(a) When a station is requested to read out an LSP parameter, MCC gives the measurement number and the decom to select for the readout.

(b) Station selects the LSP display format in the decom called out by MCC.

(c) LSP readouts are given in octal and all syllables should be read out unless otherwise directed by MCC. (Refer to section 2 for LSP alpha-numeric listing.)

1.3.2.3 ALSEP Downlink and Parameter Monitoring

a. Purpose. To define downlink and parameter monitoring and reporting requirements.

b. Participants. OPSR, PCM Tech, and ALSEP OPS.

c. Procedures

(1) Stations are required to monitor certain ALSEP parameters only during support periods when Remote-site Data Processor (RSDP) real-time data is not being transmitted to MCC from any station. ALSEP parameter monitoring is specified in tables 2-8 through 2-13.

(2) Except for the Command Verification Words (CVW's), monitor the ALSEP parameters on the PCM decom. Read the parameters out once every 2 hours. If a parameter is out of limits, monitor it for 5 minutes. If it remains out of limits for the 5 minute period, the station voice reports it to the ALSEP OPS, and reports it in the ALSEP PASSUM. The station reports the AOS and LOS octal value of each parameter in the PASSUM.

(3) Monitor ALSEP CVW's on either a recorder or from the OPSR high-speed printer. Report only a CVW that has bit 10 set and contains in bits 3 through 9 a valid RTC for the vehicle from which it was monitored, as listed in section 5, in the ALSEP PASSUM. Voice report a bit 10 set CVW for a RTC listed in table 5-1 or 5-2 to the ALSEP OPS if it was monitored from a vehicle listed for the RTC.

Note

HSP CVW printout: AX CY CVW ZZZ M AAAA, indicates a CVW has been detected from ALSEP X. CY equals the input channel; ZZZ equals the RTC detected; M equals the MAP bit (10) where 1 equals a good MAP; and AAAA equals the number of frames in which the CVW occurred.

(4) ALSEP parameter monitoring locations for MSFTP-2 and MSFTP-3 are listed in table 2-8.

(5) During all support periods, the station is continously configured to monitor the ALSEP downlinks assigned. If the station has a significant change in an ALSEP downlink, voice report it to the ALSEP OPS and report it in the ALSEP PASSUM.

(6) When a station supports more downlinks then decoms available, configure the decoms to the highest priority ALSEP in accordance with the one station decom priority list (refer to table 2-6). The lowest priority ALSEP which are not configured to a decom require the following support:

(a) Once every 2 hours configure the lowest priority decom to the ALSEP not monitored in real time long enough to obtain the required parameter readouts. Playback of data for CVW monitoring, for the ALSEP from which the decom was reconfigured is not required for the period the decom was on the lower priority ALSEP.

(b) A station supporting all ALSEP's is not required to monitor ALSEP 3 and ALSEP 5 for CVW's.

(c) If during support less than three decoms are available, make a playback of ALSEP 1, 2, and 4 data for CVW monitoring at the end of the active scheduled support period.

1.3.2.4 RSDP/SCE, Decom, Simulator Programs, and Constants

a. Purpose. To identify the mission programs and initialization constants.

b. Participants. OPSR. SCE Operator, and PCM Tech

c. Procedure

(1) RSDP/SCE Program

(a) Program: 0781.

(b) Errata: per Software Support Instruction (SSI).

(c) Sta: (status ID).

(d) ALSEP MWP: 5000 msec.

(e) GMT: current.

(f) Station: FMT 1, 1A, 3B.

Note

Changes may be made by MCC during the interface test.

(2) MSFTP-2 Decom Program

(a) Program: 1048D.

(b) Errata: in accordance with latest SSI.

(3) MSFTP-3 Decom Program

(a) Program: 1057MS.

(b) Errata: in accordance with latest SSI.

(4) Simulator Program

(a) Program: 1049S.

(b) Errata: in accordance with latest SSI.

1.3.3 COMMAND

1.3.3.1 Computer Address Matrix Operation

a. Purpose. To provide a script giving an example of the sequence of events that occur between the station OPSR and MCC if the station is directed to switch to computer mode 1 and uplink commands.

b. Participants. ALSEP Network and OPSR.

c. Procedures

(1) Typical OPSR Computer Address Matrix (CAM) operation announcements are shown in table 1-5.

Table 1-5. Typical OPSR CAM Operation Announcements

Sequence	Position	Action and Remarks
1	MCC	"(Station), MCC , configure the computer for mode 1 commanding with MAP override (on/off)."
2	(Station)	" MCC , (Station), Roger, computer in mode 1 MAP override (on/off)."
3	MCC	"(Station), MCC , request RTC XXX for ALSEP X decoder.
4	(Station)	"(Station), Wilco."
5	(Station)	" MCC , (Station), RTC XXX for ALSEP X decoder.
6	MCC	"(Station), MCC , uplink RTC XXX."
7	(Station)	"(Station), uplinking RTC XXX."
8	(Station)	" MCC , (Station), RTC XXX CMD (verified, SC reject, ground reject)."
9	MCC	(If applicable) "(Station), MCC go to MAP override off, computer mode 2."
10	(Station)	" MCC , (Station), Roger, MAP override off, in computer mode 2."

(2) Terminate the CAM uplink procedure immediately if a ground or spacecraft reject should occur, or if the vehicle telemetry link is lost. No further CAM requests should be made until directed by MCC.

(3) Certain RTC's are disabled upon ALSEP program initialization.

(a) The ALSEP Network advises the station OPSR which groups of critical RTC's to use.

(b) The ALSEP Network instructs the station OPSR to safe the command system (if carrier is up), then go to mode 1, M&O mode, to enable or disable required critical RTC's.

(c) The OPSR should execute a status request after enabling or disabling critical RTC groups.

(d) The ALSEP Network takes or requests from the OPSR and RTC inventory after critical RTC groups are enabled or disabled.

1.3.3.2 USB Status Command Analysis Patterns

a. Purpose. To define the conditions which require the OPSR to transmit a status Command Analysis Pattern (CAP) to JSC.

b. Participant. OPSR.

c. Procedures

(1) After the OPSR announces, "go for command," he initiates a request for USB loop test (CAM 988).

(2) If the USB uplink is lost or terminated, or command capability is lost, the OPSR initiates a request for USB loop test.

(3) After enabling or disabling critical RTC groups the OPSR initiates a request for a USB loop test.

1.3.3.3 Command History

a. Purpose. To obtain a history of commands uplinked to the ALSEP.

b. Participant. RSDP.

c. Procedures

(1) End-of-file

(a) At completion of MCC CMD/TLM interface testing place an End-of-file (EOF) on the command history tape.

(b) The EOF should be the last item placed on the history tape before a station comes up for ALSEP support.

(c) Place an EOF on the command history tape each time the USB carrier is brought down.

(2) Off-line Command History

(a) The station takes a low-speed history following the station support period if commands were uplinked; use the Real-time Off-line ALSEP Command History (ROACH) off-line operating procedure as defined in the Software Catalog for the Network (SCAN) for 642B Computer, STDN No. 504.6 (refer to SCAN No. 6-750.8).

(b) Unless otherwise requested by MCC, high-speed printer histories are not required after a support period.

(3) Disposition of Command History Tape

(a) Mount a new command history tape on the Magnetic Tape Unit (MTU) for each 24-hour support period.

(b) Refer to STDN Network Operations Procedures for Data Management, STDN No. 502.11, for instructions on identification and disposition of magnetic tape.

Note

The 24-hour support period begins with the SRT activities in preparation for ALSEP support. This means that a station could have more than one block of support (CMD) data on the new command history tape. Mount a new command history tape the following day before performing the SRT.

1.3.3.4 ALSEP Command Handover

a. Purpose. This procedure provides transfer of ALSEP command capability from one station to another.

b. Participants. ALSEP Network, OPSR, and USB.

c. Procedures

(1) Station command handover is conducted by the ALSEP Network, and accomplished with a 1-minute separation between the respective stations' carrier on and off.

(2) No modulation is applied to the USB carriers while they are being turned on or off. Turn modulation on at the direction of the ALSEP Network only.

(3) A station directed to bring its carrier down set the SCE TEST/OPERATE switch to TEST, bring the carrier down, and report, "carrier down" to the ALSEP Network.

(4) Prior to bringing up its carrier, a station directed to bring its carrier up ensures that the SCE TEST/OPERATE switch is set to TEST.

(5) When ALSEP Network instructs the station to turn on command modulation, the OPSR sets the SCE TEST/OPERATE switch to OPERATE.

Note

It has been determined that if the ALSEP receiver is acquired with uplink modulation or by two modulated carriers simultaneously, the idle 1's pattern that is uplinked results in random command executions by the ALSEP receiver/decoder.

1.3.3.5 Dump and Reload the System (DARTS)

a. Purpose. To reload the operational program after a computer fault.

b. Participants. ALSEP Network, OPSR, and computer operator.

c. Procedures

(1) Operating Instructions. Refer to SCAN for DARTS operating instructions.

(2) DARTS Reloads

(a) If the computer faults and DARTS instantly reloads the operational program, the operator immediately performs computer recovery.

(b) The OPSR then verifies the parameter list, and reports by voice to the ALSEP Network.

(3) DARTS Will Not Reload

(a) If the computer faults and DARTS or the recovery tape does not reload, the operator immediately attempts to manually reload DARTS three times.

(b) The OPSR immediately notifies ALSEP Network whether or not the attempt was successful.

(c) If unsuccessful, the computer operator immediately begins to reload the ALSEP program from the systems tape and the OPSR informs the ALSEP Network that the ALSEP computer is being reloaded.

Note

Critical RTC's are not retained in the uplink storage area after a DARTS.

1.3.3.6 Computer Operating Procedures

a. Purpose. To define the normal computer operations during an ALSEP pass.

b. Participants. OPSR and RSDP Tech.

c. Procedures

(1) ALSEP System Constants

(a) Command Constants. The OPSR directs the computer operator to insert specific constants during initialization. When initialization is complete, the program automatically prints an ALSEP parameter listing. The OPSR should verify that the constants are correct.

(b) Telemetry Constants. MCC advises the station of any change to the initialization constants listed in this section.

(2) Command Program

(a) General. Command executes for RTC's are initiated by MCC in mode 2. Unless so directed by MCC, under no circumstances will the OPSR switch to mode 1 to initiate a command uplink.

(b) Processing Command Loads. Command load processing is not required for ALSEP support.

(c) Flight Controller/M&O Mode. Operate the computer in the Flight Controller (FC) mode unless required to go to the M&O mode to perform an MCC-requested function.

(d) Message Acceptance Pulse Override. If requested by MCC, initiate the Message Acceptance Pulse (MAP) override function when command uplinks are to be initialized without having the computer search for valid MAP's.

(3) Telemetry Program

(a) High-speed TLM Initiation. The OPSR ensures that ROS T is entered into the computer and High-speed (HS) TLM output is on line as directed by the ALSEP Network. The on-station HSP indicates this activity and the OPSR should verify by negative reporting that HSD is leaving the station. The OPSR ensures that LOS T is entered into the computer at end of the support period.

(b) TLM Manual Input/Output Routines. The 1232 typewriter inputs system initialization constants and accesses the program for performing manual Input/Output (I/O) routines.

(c) TLM HSD Formats. The computer can output three different HS TLM formats. The OPSR directs the computer operator to change formats at the direction of MCC. HS TLM data output is on Net 4 on direction of MCC.

(d) TLM Destination Codes. The computer can output three different HS TLM destination codes. MCC advises the station regarding the HS destination codes to be initialized. When transmitting data to MCC, initialize the RSDP for MCC unless otherwise directed by MCC.

1.3.3.7 Network Safe

a. Purpose. To ensure that no commands are transmitted to ALSEP.

b. Participants. ALSEP Network and OPSR.

c. Procedures

(1) Set the SCE TEST/OPERATE switch to the TEST position under the following conditions:

(a) When command modulation is not required.

(b) When requested to safe the command system.

(c) When instructed to remove command modulation.

(2) The switch remains in the TEST position when the station is configured for ALSEP uplink support until directed by ALSEP Network to apply modulation to the ALSEP carrier.

1.3.4 TRACKING

1.3.4.1 ALSEP Antenna Positioning Procedure

a. Purpose. To provide the station with procedures for positioning the USB antenna.

b. Participants. OPSR, 1218 operator, and USB.

c. Procedures

(1) 26-meter Antenna Stations

(a) If A5 is not being supported, antenna pointing may be accomplished either by autotrack of A1, A2, A3, or A4, or program track (X equals 2) with MOONSTAR at station option.

(b) When supporting A5, antenna pointing may be accomplished either by autotrack of A2 or A3, or program track (X equals 2) with MOONSTAR at station option. Do not accomplish antenna pointing by autotrack of A5 unless directed otherwise by ALSEP Network or ALSEP OPS.

(2) 9-meter Antenna Stations. Antenna pointing may be accomplished by autotrack of any ALSEP or program track (X equals 2) with MOONSTAR (if available) at station option.

Note

1. The station generates a nominal APP tape in accordance with para 1.3.4.2.

2. When the USB antenna is in program track, the 1218 operator prior to redesignating the antenna should notify the USB servo operator so he can monitor antenna performance during redesignate.

1.3.4.2 ALSEP Acquisition Messages

a. Purpose. To define the acquisition data generation procedures available in providing ALSEP pointing data.

b. Participants. OPSR, 1218 operator, ALSEP OPS, and ALSEP Network.

c. Procedure. All supporting stations generate a nominal APP drive tape for moon center (X equals 2) at a sample rate (selected at station option) of 1 sample/10 seconds minimum to 1 sample/90 seconds maximum, using the MOONSTAR program. Generate the pointing data for all scheduled support as soon as practical after notification of scheduled support.

1.3.5 ALSEP SCHEDULING

a. Purpose. To define the criteria and configuration for scheduling ALSEP support.

b. Participants. NOCC Forecaster, NOCC Scheduler, MCC Scheduling ALSEP Network, and ALSEP OPS.

c. Procedures

(1) Use the applicable portions of STDN No. 502.16 along with this procedure to schedule ALSEP support.

(2) Each Monday, no later than 2100Z, MCC Scheduling provides NOCC with an ALSEP schedule request containing phase II support for the upcoming schedule week (Monday through Sunday). The request also contains tentative phase support for the following schedule week.

(3) GSFC (NOCC Forecasting) determines the stations for all ALSEP support.

(4) When a station is scheduled to support all downlinks simultaneously, schedule the station for all phase II and phase III support. The station initially configures the uplink in accordance with the Network operations schedule.

(5) If equipment availability requires that two stations be scheduled to support ALSEP, distribute the downlinks between the two stations. Uplink assignments are in accordance with the Network operations schedule.

(6) The scheduled support is always telemetry receive and record. Indicate additional support in the Network operation schedule. The following SUPIDEN numbers are assigned to the ALSEP vehicle:

(a) 0780 - All ALSEP (A1 through 5)

(b) 0781 - ALSEP-1 (A1)

(c) 0782 - ALSEP-2 (A2)

(d) 0783 - ALSEP-3 (A3)

(e) 0784 - ALSEP-4 (A4)

(f) 0785 - ALSEP-5 (A5)

Note

Schedule stations with a 5-minute overlap of recording at AOS and LOS whenever feasible.

(7) When STDN resources are such that all downlinks cannot be supported, schedule the downlinks in accordance with the current ALSEP priority list (refer to table 2-5).

(8) Transmit the Confirmation Schedule Request Message (CSRM) for the week to MCC each Friday. In addition a daily CSRM is transmitted 24 hours in advance of the start of the ZULU day which supersedes the corresponding portions of the weekly CSRM and incorporates updates processed as of transmission time. The CSRM is sectionalized on a daily basis, and contains all the ALSEP support, as well as other JSC support.

(9) Examples of MCC scheduling phase II schedule request message and the NOCC Forecaster CRSM are presented in section 16.

1.4 STATION CONFIGURATION

Station configurations are shown in figures 1-1 and 1-2.

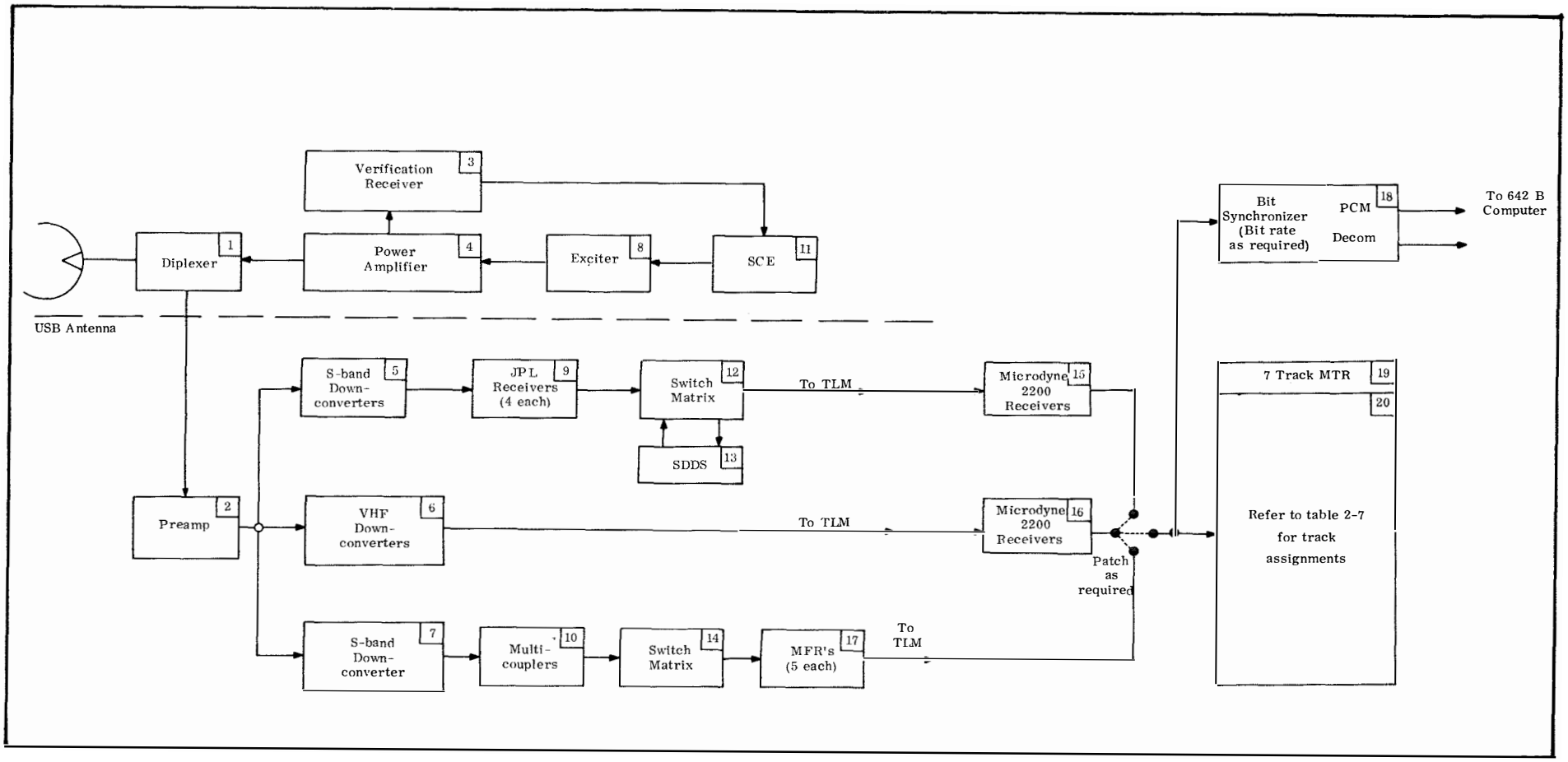

Figure 1-1. 4.3, 9-, and 26-meter ALSEP USB Station Configuration

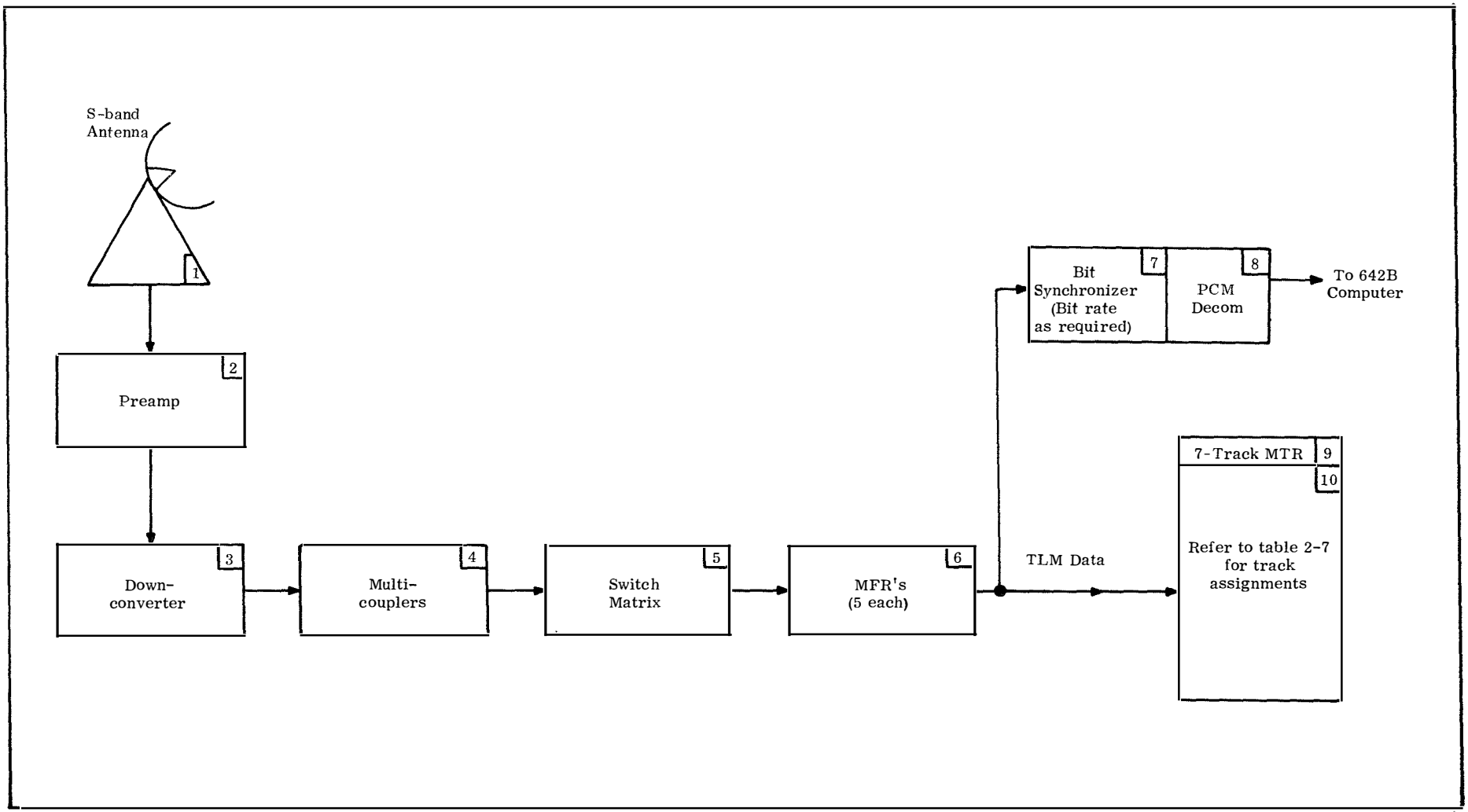

Figure 1-2. 12- and 26-meter ALSEP S-band Station Configurations

SECTION 2. TELEMETRY

Note

This section is revised in its entirety; therefore, change bars are not used.

2.1 GENERAL

STDN stations at ACN, AGO, BDA, ETC, GDS, GWM, HAW, MAD, MIL, ORR, QUI, ROS, and ULA provide ALSEP support as scheduled.

2.2 LAUNCH VEHICLE SUPPORT

Not applicable.

2.3 SPACECRAFT SUPPORT

2.3.1 GENERAL

When scheduled, stations configure to support five ALSEP's simultaneously. In the event five downlinks cannot be supported simultaneously, limited support is provided.

2.3.2 LINK DESCRIPTION

Downlink characteristics are as follows:

a. Frequencies

(1) ALSEP 1: 2278.5 MHz ±30 kHz.

(2) ALSEP 2: 2278.0 MHz ±30 kHz.

(3) ALSEP 3: 2276.0 MHz ±30 kHz.

(4) ALSEP 4: 2279.5 MHz ±30 kHz.

(5) ALSEP 5: 2275.5 MHz ±30 kHz.

b. Basic Telemetry Format. Each ALSEP can transmit PCM telemetry in a normal or contingency bit rate. In addition, the Active Seismic Experiment (ASE) and the Lunar Seismic Profiling (LSP) experiment are capable of transmitting in High Bit Rate (HBR). The basic characteristics of the ALSEP PCM telemetry formats are listed in table 2-1.

Table 2-1. ALSEP PCM Telemetry Format Basic Characteristic

Normal Bit Rate (NBR)	Contingency Bit Rate (CBR)	ASE High Bit Rate	LSP High Bit Rate (HBR)
1060 b/sec	530 b/sec	10,600 b/sec	3533 1/3 b/sec
10 b/wd	10 b/wd	20 b/wd	30 b/wd
64 wd/frm	64 wd/frm	32 wd/frm	20 wd/subfrm
640 b/frm	640 b/frm	640 b/frm	1800 b/frm
603.733 msec/frm	1.21 sec/frm	60.37 msec/frm	509.43 msec/frm 3 subfrm/frm

Note

1. Data is transmitted Most Significant Bit (MSB) first.

2. The 90:1 subframe uses the ID count located in word 3 for reference.

3. All ALSEP telemetry is PCM/PM Split Phase (SØ).

2.3.3 RECEIVER CONFIGURATION

Stations supporting with Multifunction Receivers (MFR) refer to para 4.3.4.4 for receiver settings. Stations using Microdyne 2200 receivers use the following receiver settings:

Unit/Function	Indication/Setting
a. Frequency (MHz)	As required (desired link)
b. IF bandwidth	30 kHz
c. Video bandwidth	
(1) CBR, NBR, and LSP	
(2) ASE	
d. Demod type	PM
e. Loop bandwidth	100 Hz

2.3.4 DECOM/DEMOD/AMQ CONFIGURATION

2.3.4.1 PAM/PDM/Discriminators. Not applicable.

2.3.4.2 Bit Synchronizers. Configure the Model 317, 330, and 335 bit synchronizers as follows:

Unit/Function	Indication/Setting
a. Code type	BiØ-L
b. Bit rate	
(1) CBR	5.300×10^2
(2) NBR	10.600×10^3
(3) ASE	10.600×10^4
(4) LSP	3.533×10^3
c. CONV	Not applicable

2.3.4.3 PCM Decoms. The PCM decom software is listed in tables 2-1 through 2-5. The ALSEP decom link priorities are listed in table 2-6. Use the standard 22-bit transfer computer buffer patching instructions listed in STDN Network Operations Procedures for Telemetry Systems, STDN No. 502.2. Configure the MSFTP-2, MSFTP-3, and Data Handling System (DHS) decom as follows:

a. MSFTP-2

(1) Decommuntator Control Panel Setup

Unit/Function	Indication/Setting
(a) FORMAT SELECT	As required
(b) COMP 1 INHIBIT	OFF
(c) COMP 2 INHIBIT	OFF
(d) FS III error	2
(e) TAPE PLAYBACK C1	OFF
(f) TAPE PLAYBACK C2	OFF

(2) Synchronizer Section Setup

Unit/Function	Indication/Setting
(a) ID pattern errors	
(1) PSE	2
(2) LSP	1

(b) Frame synchronization

Mode	I		II		III	
	Ø1	Ø2	Patt	Err	Patt	Err
	1	0	1	0	2	0

(c) Subframe synchronization

Mode	I		II		III	
	Ø1	Ø2	Ø	Ø2	Ø1	Ø2
	1	0	1	0	2	0

b. MSFTP-3

(1) Central Control Unit

Unit/Function	Indication/Setting
(a) FORMAT SELECT	As required
(b) SENSE 1 and 2	As required

(c) Sense switch options are as follows:

	SENSE 1	SENSE 2	Option
1	Down	Down	ALSEP 1, 2, and 3, Passive Seismic Experiment (PSE) processing
2	Up	Down	ALSEP 4 PSE processing
3	Down	Up	ALSEP 5 PSE processing

Note

SENSE 1 and SENSE 2 switches must be properly set for the specific vehicle being processed. Improper combinations of these settings cause erroneous printer, digital store and optional Digital-to-Analog Converter (DAC) outputs (wrong words).

Table 2-2. MSFTP-2 Decom/Simulator Formats and Programs

Seq. No.	Description	Format	Bit Configuration Format ID (Octal)	Vehicle ID
1048D	PSE-A1	1	10110 (26)	A1-010
	A2			A2-011
	A3			A3-001
	PSE-A4	2	10110 (26)	A4-110
	PSE-A5	3	10110 (26)	A5-100
	ASE HBR	4	10111 (27)	
	LSP CMPTR XFR	6	11001 (31)	
	LSP display monitor	7	11001 (31)	
1049S	PSE-A1, A2, A3	1		
	PSE-A4	2		
	PSE-A5	3		
	ASE HBR	4		
	LSP HBR	6		

Table 2-3. MSFTP-3 Decom Formats and Programs

Seq No.	Description	Format	Format ID	Vehicle ID
1057.1 MD	PSE A1	26	26	010
	A2			011
	A3			001
	A4			110
				100
	ASE	27	27	
	LSP CMPTR XFR	31	31	
	LSP DISPLAY	32	Not applicable	

Table 2-4. Dynatronic DHS Decom/Simulator Formats and Programs

Seq. No.	Description	Format
454.1DS	PSE, all vehicles (mod)	1
454.1DD	PSE, all vehicles (mod)	1

Table 2-5 ALSEP Program Errata

Seq No.	Errata	Date	Station Applicability	Description
1048D	A	10/25/72	A11	Deletes DAC 45 from frame
	B	11/09/72	A11	Reprograms LSP format 6 FSUL's 11 and 12 to prevent EI generation in FS mode II
	C	02/14/75	A11	Programs bit synchronizer setup

Table 2-6. ALSEP Decom Link Priorities

Priorities				
A2	A1	A3	A5	A4

(2) Synchronizer and I/O Control Panel

Unit/Function	Indication/Setting
(a) COMP BUFF 1 INHIBIT	OFF
(b) COMP BUFF 2 INHIBIT	OFF
(c) COMP BUFF 1 PLAYBIT bit	Down
(d) COMP BUFF 2 PLAYBIT bit	Down

c. Dynatronics DHS

(1) Decommutator Memory Address Display Control Panel

Unit/Function	Indication/Setting
START ADDRESS	0010

(2) Peripheral Control Panel

Unit/Function	Indication/Setting
SYNC VALIDITY	All switches OFF

2.3.4.4 PSK Demods. Not applicable.

2.3.4.5 AMQ. Not applicable.

2.3.5 MIXER CONFIGURATION

Not applicable.

2.3.6 RECORDER CONFIGURATION

2.3.6.1 Magnetic Tape Recorders. Data will be recorded on a 1/2-inch seven-track WBMTR. If not available, a seven-track IBMTR may be used. A 1-inch 14-track WBMTR may be used in contingencies. Recording speed will be 3-3/4 inch/sec except during the ASE HBR mode when recorder speed will be 7-1/2 inch/sec. If a station requires more than one tape during a view period, serial recordings will be required with a 2-minute overlap. Stations will ensure that clear annotations are made on the tape label so that no possible confusion could exist during analysis by the data users. The tape length will be determined by the station for the support required. The tape thickness is 1 or 1/2 mm and the reel size is 10.5 or 14 inch. Standard recording specifications are contained in the STDN Network Operations Procedures for Recorders Systems, STDN No. 502.28.

2.3.6.2 Stripchart Recorders. Refer to table 2-8 for ALSEP parameter monitoring locations, tables 2-9 through 2-13 for ALSEP parameters to be monitored and table 5-1 for CVW voice reporting. Except for CVW's, recording of parameters listed in tables 2-9 through 2-13 is required only during playback to establish the time of a parameter change. CVW monitoring will be in accordance with paragraph 1.3.2.3c (3). If recording of more than eight parameters is required, a second function/event recorder (DSS 559) will be used.

Table 2-7. ALSEP Track Assignments

TRK	Sta: All DSS 631 Type: 1/2 in. 7-Track WBMTR Speed: 3-3/4 or 7-1/2 in./sec	Mode
1	IRIG constant amplitude reference (6.25 or 12.5 kHz)	Dir
2	2278.5 MHz video ALSEP 1	FM
3	2275.5 MHz video, ALSEP 5	FM
4	2279.5 MHz video, ALSEP 4	FM
5	2278.0 MHz video, ALSEP 2	FM
6	2276.0 MHz video, ALSEP 3	FM
7	Code 1 time on 1 kHz	FM
8		
9		
10		
11		
12		
13		
14		

TRK	Sta: All DSS 630 Type: 1 in. 14-Track WBMTR Speed: 3-3/4 or 7-1/2 in./sec	Mode
1	Blank	
2	2279.5 MHz video, ALSEP 4	FM
3	Blank	
4	2278.5 MHz video, ALSEP 1	FM
5	IRIG constant amplitude reference (6.25 or 12.5 kHz)	Dir
6	2276.0 MHz video, ALSEP 3	FM
7	Blank	
8	2275.5 MHz video, ALSEP 5	FM
9	Blank	
10	Code 1 time on 1 kHz	FM
11	Blank	
12	2278.0 MHz video, ALSEP 2	FM
13	Blank	
14	Blank	

TRK	Sta: All DSS 632 Type: 1/2 in. 7-track IBMTR Speed 3-3/4 or 7-1/2 in./sec	Mode
1	2278.5 MHz video ALSEP 1	Dir
2	IRIG constant amplitude reference (6.25 or 12.5 kHz)	Dir
3	2275.5 MHz video ALSEP 5	Dir
4	2279.5 MHz video ALSEP 4	Dir
5	2278.0 MHz video ALSEP 2	Dir
6	Code 1 time on 1 kHz	Dir
7	2276.0 MHz video ALSEP 3	Dir
8		
9		
10		
11		
12		
13		
14		

TRK		Mode
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

Table 2-8. ALSEP Parameter Monitoring Locations

Item No.	Vehicle No.	Para No.	Downlink			MSFTP-2			MSFTP-3		
			WD	FR	Bit	ADD	DS	DAC	WD/FR	DS	DAC
1	1/2/3	CVW	46	All	3		1		Fmt 26	8	
	Array				4		2		46	7	
	A/A2/D				5	Fmt 1	3			6	
					6		4			5	
					7	431	5			4	
					8		6			3	
					9		7			2	
					10		8			1	
2	4	CVW	5	All	3		1			8	
	Array				4		2			7	
	C				5		3		5	6	
						Fmt 2					
					6		4			5	
					7	431	5			4	
					8		6			3	
					9		7			2	
					10		8			1	
3	5	CVW	7	All	3		1		Fmt 26	8	
	Array				4		2		7	7	
	E				5		3			6	
					6	Fmt 3	4			5	
					7		5			4	
					8		6			3	
					9		7			2	
					10		8			1	
4	All	AB-04	33	12	3-10	Fmt 1	300	12	Fmt 26		12
						Fmt 2	577	12	33/12		
						Fmt 3	1050	12			

Table 2-8. ALSEP Parameter Monitoring Locations (Cont)

Item No.	Vehicle No.	Para No.	Downlink			MSFTP-2			MSFTP-3		
			WD	FR	Bit	ADD	DS	DAC	WD/FR	DS	DAC
5	All	AB05	33	14	3-10	Fmt 1 Fmt 2 Fmt 3	302 601 1052	13 13 13	Fmt 26 33/14		13
6	A1/2/3/4 Array A/A2/ C/D	AL05	33	24	3-10	Fmt 1 Fmt 2	314 613	14	Fmt 26 33/14		14
7	A5 Array E	AB-11	33	73	3-10	Fmt 3	1145	15	Fmt 26 33/73		15
8	A5 Array	AB-13	33	76	3-10	Fmt 3	1150	16	Fmt 26 33/76		16

Note

Recorder speed is 2 mm/sec. Recorder timing is SDT with 1 minute frame rate from slow-code generator.

Table 2-9. ALSEP 1 Parameter Monitoring

Item	Parameter	When Required	Out of Limits Condition
1	AB04	All support periods	Greater than 0002 octal
2	AB05	SIDE on, SWS on	Greater than 0007 octal
		SWS on, SWS STBY	Greater than 0002 octal, less than 171 octal, or greater than 215 octal.
		SIDE off, SWS on	Greater than 0007 octal Word 15 dynamic
		SIDE STBY, SWS STBY	Less than 0262 or greater than 0306 octal Word 15 dynamic
		SIDE off, SWS STBY	Less than 0171 or greater than 0215 octal Word 15 dynamic
		SIDE off, SWS off	Greater than 0007 Word 15 dynamic
3	AL05	Lunar night support periods	Greater than 0030 octal
4	CVW	All support periods	Not applicable

Table 2-10. ALSEP 2 Parameter Monitoring

Item	Parameter	When Required	Out of Limits Condition
1	AB04	All support periods	Greater than 0002 octal
2	AB05	SIDE on, HFE on	Greater than 0007 octal
		SIDE STDY, HFE on	Less than 0073 or greater than 0117 octal Word 15 dynamic
		SIDE STBY, HFE STBY	Less than 0132 or greater than 0156 octal Word 15 dynamic
		SIDE on, HFE STBY	Less than 0031 or greater than 0055 octal
		SIDE off, HFE STBY	Less than 0031 or greater than 0055 octal Word 15 dynamic
		SIDE STBY, HFE off	Less than 0073 or greater than 0117 octal Word 15 dynamic
		SIDE OFF, HFE off	Greater than 0007 octal Word 15 dynamic
3	CVW	All support periods	Not applicable

Table 2-11. ALSEP 3 Parameter Monitoring

Item	Parameter	When Required	Out of Limits Condition
1	AB04	All support periods	Greater than 0002 octal
2	AB05	All support periods	Greater than 0002 octal
3	CVW	All support periods	Not applicable

Table 2-12. ALSEP 4 Parameter Monitoring

Item	Parameter	When Required	Out of Limits Condition
1	AB04	All support periods	Less than 0171 or greater than 0215 octal
2	AB05	All support periods. With CPLEE standby	Less than 0073 or greater than 0117 octal
		All support periods. With CPLEE on	Greater than 0005 octal
3	CVW	All support periods	Not applicable

Table 2-13. ALSEP 5 Parameter Monitoring

Item	Parameter	When Required	Out of Limits Condition
1	AB11	All support periods	Greater than 036 octal
2	AB13	All support periods	Less than 0330 or greater than 0377 octal
3	CVW	All support	Not Applicable
4	AG04	Lunar day	Greater than 312 octal

2.3.6.3 Calibration Procedures. Not applicable.

2.3.7 QUICK-LOOK REQUIREMENTS

Stations configure one PCM decom for ALSEP parameter monitoring. Refer to section 1 for reporting procedures.

a. General. The alphanumeric listing for LSP readouts is in table 2-14.

b. Housekeeping Parameters

(1) Read out the analog housekeeping parameters in octal when requested by MCC. Construction of the octal word (8 bits) is shown in figure 2-1. Read out all syllables unless otherwise specified by MCC.

Syllable 1		Syllable 2		Syllable 3		Syllable 4	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Octal Digit 1		Octal Digit 2				Octal Digit 3	

Figure 2-1. Housekeeping Octal Word Construction

(2) The analog housekeeping parameters are AB-4, AB-5, AE-3, AE-4, AE-24, AT-16, DP-2, DP-3, DP-5, DP-10, and DP-14.

c. Status Parameters

(1) Read out parameters DP-18 and DP-19 as a 1 or a 0.

(2) Read out parameter DP-20 as two binary digits, i.e., 10.

d. Geophone Parameters. Read out the geophone parameters DP-1, DP-6, DP-12, and DP-16 on octal (12 bits). Read out both syllables unless otherwise specified by MCC. Construction of the octal word is shown in figure 2-2.

Syllable 1 5 LSB					Syllable 2 7 LSB						
1	2	3	4	5	1	2	3	4	5	6	7
Octal digit 1			Octal digit 2		Octal digit 3				Octal digit 3		

Figure 2-2. Geophone Octal Word Construction

2.3.8 DATA TRANSMISSION

2.3.8.1 FM Remoting. Not applicable.

2.3.8.2 High-speed Data. Not applicable.

2.3.9 SPECIAL REQUIREMENTS

2.3.9.1 PCM Decom DAC Outputs. Provide or report the following ALSEP DAC output measurements to the appropriate USB or tracking area on station when needed:

Table 2-14. Alphanumeric Listing for LSP Readouts

Measurement No.	MSFTP-2 (Display Program) Address	MSFTP-2 Bit No.	MSFTP-2 Sim Address	MSFTP-3 Display Word	Remarks
AB-4	2047	1 & 2	1566	116	Bits 2^7 & 2^6
	2053	1 & 2	1567	116	Bits 2^5 & 2^4
	2057	1 & 2	1570	116	Bits 2^3 & 2^2
	2063	1 & 2	1571	116	Bits 2^1 & 2^0
AB-5	2127	1 & 2	1602	118	Bits 2^7 & 2^6
	2133	1 & 2	1603	118	Bits 2^5 & 2^4
	2137	1 & 2	1604	118	Bits 2^3 & 2^2
	2143	1 & 2	1605	118	Bits 2^1 & 2^0
AE-3	2051	1 & 2	1543	112	Bits 2^7 & 2^6
	2055	1 & 2	1544	112	Bits 2^5 & 2^4
	2061	1 & 2	1545	112	Bits 2^3 & 2^2
	2065	1 & 2	1546	112	Bits 2^1 & 2^0
AE-4	2131	1 & 2	1557	115	Bits 2^7 & 2^6
	2135	1 & 2	1560	115	Bits 2^5 & 2^4
	2141	1 & 2	1561	115	Bits 2^3 & 2^2
	2145	1 & 2	1562	115	Bits 2^1 & 2^0
AE-24	2110	1 & 2	1530	129	Bits 2^7 & 2^6
	2114	1 & 2	1531	129	Bits 2^5 & 2^4
	2120	1 & 2	1532	129	Bits 2^3 & 2^2
	2124	1 & 2	1533	129	Bits 2^1 & 2^0
AT-16	2071	1 & 2	1547	113	Bits 2^7 & 2^6
	2075	1 & 2	1550	113	Bits 2^5 & 2^4
	2101	1 & 2	1551	113	Bits 2^3 & 2^2
	2105	1 & 2	1552	113	Bits 2^1 & 2^0
DP-1	2005	1 to 5	1506	101	5 MSB of geophone 1
	2012	1 to 7	1512	101	7 LSB of geophone 1
DP-2	2050	1 & 2	1520	107	Bits 2^7 & 2^6
	2054	1 & 2	1521	107	Bits 2^5 & 2^4
	2060	1 & 2	1522	107	Bits 2^3 & 2^2
	2064	1 & 2	1523	107	Bits 2^1 & 2^0

Table 2-14. Alphanumeric Listing for LSP Readouts (cont)

Measurement No.	MSFTP-2 (Display Program Address	MSFTP-2 Bit No.	MSFTP-2 Sim Address	MSFTP-3 Display Word	Remarks
DP-3	2070	1 & 2	1524	108	Bits 2^7 & 2^6
	2074	1 & 2	1525	108	Bits 2^5 & 2^4
	2100	1 & 2	1526	108	Bits 2^3 & 2^2
	2104	1 & 2	1527	108	Bits 2^1 & 2^0
DP-5	2130	1 & 2	1534	110	Bits 2^7 & 2^6
	2134	1 & 2	1535	110	Bits 2^5 & 2^4
	2140	1 & 2	1536	110	Bits 2^3 & 2^2
	2144	1 & 2	1537	110	Bits 2^1 & 2^0
DP-6	2007	1 to 5	1507	102	5 MSB of geophone 2
	2013	1 to 7	1513	102	7 LSB of geophone 2
DP-10	2111	1 & 2	1553	114	Bits 2^7 & 2^6
	2115	1 & 2	1554	114	Bits 2^5 & 2^4
	2121	1 & 2	1555	114	Bits 2^3 & 2^2
	2025	1 & 2	1556	114	Bits 2^1 & 2^0
DP-11	2010	1 to 5	1510	103	5 MSB of geophone 3
	2014	1 to 7	1514	103	7 LSB of geophone 3
DP-14	2067	1 & 2	1572	117	Bits 2^7 & 2^6
	2073	1 & 2	1573	117	Bits 2^5 & 2^4
	2077	1 & 2	1574	117	Bits 2^3 & 2^2
	2103	1 & 2	1575	117	Bits 2^1 & 2^0
DP-16	2011	1 to 5	1511	104	5 MSB of geophone 4
	2015	1 to 7	1515	104	7 LSB of geophone 4
DP-17	2004	1 to 10	1505	001	Frame sync
DP-18	2016	1	1516-SF1 1564-SF3 1541-SF2	105	
DP-19	2016	2	1516-SF1 1564-SF3 1541-SF2	105	
DP-20	2044	1 & 2	1517	106	
DP-21	2047-2151	1 & 2	1540-SF1 1606-SF3 1563-SF2	111	Subframe ID

	MSFTP-2	MSFTP-3
a. Receiver AGC		
(1) ALSEP 1, 2 & 4 rcvr AGC prelimit level (AE-13 from)	DAC 43	DAC 17
(2) ALSEP 3 & 5 (AE-19) rcvr A input signal level from	DAC 43	DAC 17
or		
(3) AE-20 rcvr B input signal level from	DAC 42	DAC 18
b. Transmitter Power		
(1) ALSEP 1, 2, 3, & 4 (AE-15) transmitter A RF power from	DAC 45	DAC 19
or		
(2) AE-16 transmitter B RF power from	DAC 45	DAC 20

2.3.9.2 ALSEP Receiver and Transmitter Telemetered AGC

a. Receiver AGC (Prelimit) ALSEP 1 (AE-13)

Signal Strength (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -150	3.12	80
(2) -140	3.32	85
(3) -130	3.52	90
(4) -120	3.72	95
(5) -110	4.43	113
(6) -100	5.93	151
(7) -90	6.52	166
(8) -80	6.68	170
(9) -70	6.76	172

b. Transmitter AGC ALSEP 1 and 4 (AE-15 Transmitter A ; AE-16 Transmitter B)

AGC (Vdc)	DAC Output (Vdc)	PCM Count (Decimal)
(1) 0.968	1.936	050
(2) 1.956	3.912	100
(3) 2.944	5.888	150
(4) 4.999	9.998	254

c. Receiver AGC (Prelimit) ALSEP 4 (AE-13)

Signal Strength (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -150	3.36	86
(2) -140	3.44	88
(3) -135	3.48	89
(4) -130	3.52	90
(5) -125	3.56	91
(6) -120	3.60	92
(7) -115	3.72	95
(8) -110	4.11	105
(9) -105	5.02	128
(10) -100	6.01	153
(11) -95	6.72	171
(12) -90	7.08	180
(13) -85	7.31	186
(14) -80	7.47	190
(15) -70	7.59	193

d. Receiver AGC (Prelimit) ALSEP 2 (AE-13)

Signal Strength (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -120 (end of dynamic range)	0.08	3
(2) -120	3.24	83
(3) -110	4.11	105
(4) -105	5.22	133
(5) -100	5.85	149
(6) -95	6.36	162
(7) -90	6.64	169
(8) -85	6.80	173
(9) -80	6.88	175
(10) -70	6.96	177
(11) -60	7.00	178
(12) -60 (end of dynamic range)	9.99	254

e. Transmitter A RF Power ALSEP 2 (AE-15)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) 32.0 (end of dynamic range)	9.99	254
(2) 32.0	5.53	141
(3) 31.5	5.14	131
(4) 31.0	4.78	122
(5) 30.5	4.43	113
(6) 30.0	4.11	105
(7) 29.5	3.87	99
(8) 29.0	3.79	97
(9) 28.0	3.75	96
(10) 27.0	3.72	95
(11) 27.0 (end of dynamic range)	0.08	3

f. Transmitter B RF Power ALSEP 2 (AE-16)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) 32.0 (end of dynamic range)	9.99	254
(2) 32.0	5.30	135
(3) 31.5	4.90	125
(4) 31.0	4.51	115
(5) 30.5	4.15	106
(6) 30.0	3.95	101
(7) 28.5	3.83	98
(8) 27.0	3.79	97
(9) 27.0 (end of dynamic range)	0.08	3

g. Receiver A Input Signal Level ALSEP 3 (AE-19)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -60.0 (end of dynamic range)	9.99	254
(2) -60.0	9.01	229
(3) -70.0	8.30	211
(4) -80.7	7.08	180
(5) -85.6	6.28	160
(6) -90.3	5.49	140
(7) -95.1	4.51	115
(8) -100.8	3.32	85
(9) -105.3	2.53	65
(10) -110.0	1.54	40
(11) -110.0 (end of dynamic range)	0.00	1

h. Receiver B Input Signal Level ALSEP 3 (AE-20)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -60.0 (end of dynamic range)	9.99	254
(2) -60.0	9.01	229
(3) -70.0	8.30	211
(4) -81.2	7.08	180
(5) -86.0	6.28	160
(6) -90.7	5.49	140
(7) -95.0	4.51	115
(8) -100.2	3.32	85
(9) -105.0	2.53	65
(10) -110.0	1.54	40
(11) -110.0 (end of dynamic range)	0.00	1

i. Transmitter A RF Power ALSEP 3 (AE-15)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) 33.0	7.47	190
(2) 32.5	7.04	179
(3) 32.0	6.64	169
(4) 31.5	6.28	160
(5) 31.0	5.81	148
(6) 30.5	5.49	140
(7) 30.0	5.18	132
(8) 29.5	4.86	124
(9) 29.0	4.58	117
(10) 28.5	4.31	110
(11) 28.0	4.11	105
(12) 27.0	3.91	100

j. Transmitter B RF Power ALSEP 3 (AE-16)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) 32.7	7.47	190
(2) 32.2	7.04	179
(3) 31.8	6.64	169
(4) 31.4	6.28	160
(5) 30.8	5.81	148
(6) 30.4	5.49	140
(7) 29.9	5.18	132
(8) 29.5	4.86	124
(9) 29.1	4.58	117
(10) 28.6	4.31	110
(11) 28.1	4.11	105
(12) 26.0	3.91	100

k. Receiver A Input Signal Level ALSEP 5 (AE-19)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -110 (end of dynamic range)	0.08	3
(2) -110	2.13	55
(3) -100	4.03	103
(4) -90	6.28	160
(5) -80	7.83	199
(6) -70	8.70	221
(7) -60	9.25	235
(8) -60 (end of dynamic range)	9.99	254

1. Receiver B Input Signal Level ALSEP 5 (AE-20)

RF Power (dBm)	DAC Output (Vdc)	PCM Count (Decimal)
(1) -110 (end of dynamic range)	0.08	3
(2) -110	1.54	40
(3) -100	2.81	72
(4) -90	5.14	131
(5) -80	6.96	177
(6) -70	8.22	209
(7) -60	9.09	231
(8) -60 (end of dynamic range)	9.99	254

2.4 REPORTS

Pass Summary (PASSUM) reports are required. Refer to section 16 and Network Operations Control Center and Station Interface Procedures, STDN No. 502.16 for message header and format information.

SECTION 4. UNIFIED S-BAND

Note

This section is revised in its entirety; therefore, change bars are not used.

4.1 GENERAL

The information in this section supplements the procedures in the STDN Network Operations Procedures for Unified S-band Systems, STDN No. 502.4, which are necessary for support of ALSEP.

4.2 SUPPORT REQUIREMENTS

4.2.1 GENERAL

STDN stations at ACN, AGO, BDA, ETC, GDS, GWM, HAW, MAD, MIL, ORR, QUI, ROS, and ULA provide unified S-band (USB) ALSEP support as scheduled. In addition, QUI and ROS provide contingency uplink support with the 4.3-meter antennas.

4.2.2 SCHEDULING/PREDICTED COVERAGE

Tracking schedules provided by NOCC describe station support.

4.2.3 LINK DESCRIPTION

Table 4-1 lists the uplink and downlink frequencies for ALSEP.

4.2.4 MODE ASSIGNMENTS AND MOD INDICES

Table 4-2 lists the uplink modulation characteristics and table 4-3 lists the downlink modulation characteristics.

4.2.5 SUPPORT CONDIGURATION

USB support consists of transmitting commands (except ETC) and providing telemetry data to other onstation systems. Individual station configurations vary because of support hardware; therefore, support capabilities and only those equipment portions which are applicable to an individual station are used. Station configurations are shown in figures 1-1 and 1-2.

4.2.6 ACQUISITION DATA

Refer to para 1.3 for the type of program track to be used.

4.2.7 TRACKING DATA REQUIREMENTS

Not applicable.

4.2.8 RECORDING REQUIREMENTS

Analog stripchart recordings are required.

4.2.9 REPORTING

Follow applicable reporting procedures contained in sections 1 and 16 throughout the mission.

Table 4-1. S-band Uplink and Downlink Frequencies

Vehicle	Uplink (MHz)	Downlink (MHz)
ALSEP 1 (A1) Apollo 12	2119.0	2278.5
ALSEP 2 (A2) Apollo 15	2119.0	2278.0
ALSEP 3 (A3) Apollo 16	2119.0	2276.0
ALSEP 4 (A4) Apollo 14	2119.0	2279.5
ALSEP 5 (A5) Apollo 17	2119.0	2275.5

Table 4-2. Uplink Modes

Mode	Information	Modulation Technique	Peak Carrier Deviation (Rad)	Carrier Suppression (dB)
00				No carrier
09	Carrier only			
16	Updata	PSK/PM	3.0	15.4

Table 4-3. ALSEP Downlink Modes

Mode	Information	Modulation Technique	Peak Carrier Deviation (Rad)	Carrier Suppression (dB)
01	530-b/sec PCM	PM	1.25	10
02	1060-b/sec PCM	PM	1.25	10
03	10.6-kb/sec PCM	PM	1.25	10
04	3.533-kb/sec	PM	1.25	10

4.3 OPERATIONAL SUPPORT PROCEDURES

4.3.1 EQUIPMENT PREPASS CHECKLIST

Accomplish the prepass checklist prior to support using the normal pass configuration listed in STDN No. 502.4 and USB system settings listed in para 4.3.1.1 through 4.3.1.7.

4.3.1.1 Exciter Console (JPL)

Unit/Function	Indication/Setting
a. Acquisition Control Panel	
(1) Spacecraft Position	Zenith
(2) Bias bandwidth	Wide
(3) Rcvr 1	STDN (set to DSN for 530 b/sec)
b. Synthesizer	Set for 22.072917 MHz
c. Exciter control panel	
(1) Modulation selector	ALSEP
(2) Exc VCO selector	Release all pushbuttons
(3) Acquisition sweep	Rcvr 1

4.3.1.2 Exciter Console (RFC)

Unit/Function	Indication/Setting
a. Frequency	2119.0 MHz
b. Mode select matrix	In accordance with PBM
c. Loop BW	Wide
d. Search	Out
e. Control	Local or remote
f. Modulation mode	PM
g. Range kHz	Not applicable
h. Time seconds	Not applicable

4.3.1.3 Receiver Control (JPL)

Unit/Function	Indication/Setting
a. Telemetry bandwidth	
(1) Mode 1 or 2	4.5 kHz
(2) Mode 3	60 kHz
(3) Mode 4	20 kHz

Unit/Function	Indication/Setting
b. Loop bandwidth	Narrow
c. AGC bandwidth	Narrow
d. VCO select	2
e. Remote VCO control panel	Desired ALSEP frequency
f. Receiver loop filter	Short (operate after AOS)
g. Acquisition control	Nominal ALSEP frequency

4.3.1.4 Multifunction Receiver

Unit/Function	Indication/Setting
a. Frequency	Desired ALSEP frequency
b. AGC speed	
(1) Mode 1, 2, and 4	30 msec
(2) Mode 3	300 msec
c. IF bandwidth	
(1) Mode 1, 2, and 4	10 kHz
(2) Mode 3	30 kHz
d. Video bandwidth	
(1) Mode 1 and 2	1.5 kHz
(2) Mode 3	15 kHz
(3) Mode 4	5 kHz
e. TLM demod	Syn PM
f. Tuning mode	Loop open (manual acq after AOS)
g. SNR	Off
h. NB ALC	Off
i. Coupling	ac
j. Loop bandwidth	
(1) Mode 1, 2, and 4	30 Hz
(2) Mode 3	100 Hz
k. VCO range	15 kHz

4.3.1.5 Verification Receiver (Nems-Clark)

Unit/Function	Indication/Setting
a. XTAL installed	ALSEP
b. XTAL select	2
c. Demod installed	PMD-120A-1
d. Video output	Adjusted for 0dB
e. Video filter	12.5 kHz

4.3.1.6 Switch Matrix

Unit/Function	Indication/Setting
a. LEM B/B prime	Desired ALSEP rcvr
b. LEM B/B alternate	Desired ALSEP rcvr
c. Bypass 1	Desired ALSEP rcvr
d. Bypass 2	Desired ALSEP rcvr

4.3.1.7 Uplink Power

Unit/Function	Indication/Setting
a. 26-meter stations	2 kW
b. 9-meter stations	10 kW
c. 4.3-meter stations	10 kW

Note

Radiation of ALSEP frequencies for station testing between local moon rise and set is prohibited. Perform all ALSEP testing in this time frame using the dummy load.

4.3.2 ACQUISITION SOURCES AND PROCEDURES

Program track is the prime source for ALSEP support. Manual acquisition of ALSEP is possible using the antenna TV optics system. Perform acquisition procedures in accordance with STDN No. 502.4.

4.3.3 CONTINGENCY PROCEDURES

Real-time contingency action performed by station personnel is restricted to ALSEP NC or NOM approval.

4.3.4 DATA TRANSMISSION PROCEDURES

Not applicable.

4.3.5 DATA RECORDING PROCEDURES

4.3.5.1 General

a. USB stations record each parameter listed in para 4.3.5.3 for recorder No. 3. Station personnel may use any of the blank channels to record parameters considered necessary for systems analysis during operational support.

b. Configure recorders No. 1 and 2 in accordance with STDN No. 502.4.

4.3.5.2 Record Speed. Operate recorders at 2mm/sec.

4.3.5.3 Pen Assignments. Pen assignments for recorder No. 3 (DSS 658) are listed in table 4-4.

Table 4-4. Recorder No. 3 Pen Assignments (DSS 658)

Pen No.	Event	Pen No.	Analog
E1	NASA 28-bit code	A1	ALSEP analog AGC (receiver prelimit)
E2		A2	ALSEP transmitter AGC
E3		A3	ALSEP receiver AGC (receiver prelimit)
E4		A4	ALSEP transmitter AGC
E5		A5	
E6		A6	
E7		A7	
E8		A8	
E9	NASA 28-bit code		

4.4 DATA FORMATS

Not applicable.

SECTION 5. STATION COMPUTER SYSTEMS

Note

This section is revised in its entirety; t erefore, change bars are not used.

5.1 INTRODUCTION

5.1.1 GENERAL

This section summarizes the data acquisition and processing requirements for support of ALSEP.

5.1.2 SUPPORTING DOCUMENTATION

5.1.2.1 STDN Network Operations Procedures for Network Computer Systems, STDN No. 502.5, contains a description of the basic computing system and associated equipment.

5.1.2.2 The Software Catalog for the Network (SCAN) Policies and Specifications, STDN No. 504, contains instructions for all software required for ALSEP support.

5.1.3 SUPPORT SOFTWARE

The supporting software required for ALSEP is contained on magnetic tape. This system tape contains all logic necessary to process any ALSEP vehicle. The Remote Off-line ALSEP Command History (ROACH) subprogram is contained in the ALSEP program. The ROACH program satisfies all requirements for postpass command histories and for on-line or off-line command history processing.

Supporting software updates or changes are issued in the form of errata and disseminated as follows:

a. The high-speed errata transmission scheme is used to transmit errata to the 642B stations. The 642B STARS programs is uded for receipt and validation.

b. Errata verification is in accordance with the Network Operations Control Center and Station Interface Procedures, STDN No. 502.16.

c. Errata implementation will be specifically authorized. No errata, patch, or change to the authorized software will be incorporated into a supporting system without authorization.

5.1.4 SOFTWARE ANOMALIES

5.1.4.1 Report all software anomalies in a problem report.

5.1.4.2 In the event of a program fault, halt, or loop condition, all recorded data and printouts associated with the problem will be retained on station pending disposition instructions from GSFC.

5.2 642B COMPUTER

5.2.1 GENERAL

All 642B stations are scheduled as required.

5.2.2 KEY PROGRAM ADDRESSES

5.2.2.1 Command

a. 642B Manual I/O Routines and Input Buffer Addresses

Routine/Input Buffer	Address
(1) CAM	10555
(2) CAM keyboard	10606
(3) GMT TP	
a. BCD	33115
b. Binary	33220 and 33221
(4) GMT RT	
(a) BCD	33047
(b) Binary	33216 and 33217
(5) HSD INPUT	10621 through 10633
(6) SCE INPUT	35575 through 35707
(7) SCE OUTPUT	
(a) Loop test	35234 through 35346
(b) Uplink	35347 through 35461
(c) Ack	35462 through 35574
(8) LAD	
(a) A1	25302
(b) B1	25303
(c) A2	25304
(d) B2	25305
(e) A3	25306
(f) B3	25307
(g) A4	25310
(h) B4	25311
(i) A5	25312
(9) MVP	25316
(10) CAM - IN CONTROL	25326

Routine/Input Buffer	Address
(11) CAM SELECTION	25147 (upper)
(12) HSP EX-COM	25147 (lower)
(13) SCE SELECTION	25140
(14) SCE EX-COM	25145
(15) DTU SELECTION	25133
(16) DESTINATION	25333

b. SCE High-speed CMD (HSCL) Buffer Addresses

Buffer	Address
(1) 1	4242 through 4355
(2) 2	4356 through 4471
(3) 3	4472 through 4605
(4) 4	4606 through 4721
(5) 5	4722 through 5035
(6) 6	5036 through 5151

c. ALSEP/CMD Fault Addresses. If the ALSEP command program illegally enters specific subroutines, the program inhibits all outputs and automatically faults without activating the fault light. The following addresses indicate where the program faulted but do not indicate the reason:

Subroutine	Address
(1) CMD program	121141
(2) CMD output	130412
(3) CMD uplink	131455
(4) CMD control	131720
(5) CMD backup (CMDR)	122417
(6) HSCL	125043
(7) Bad recovery	64577

5.2.2.2 Telemetry Output Buffers. The program output buffer addresses are as follows:

Buffer	Addresses
a. 1	1150 through 11427
b. 2	11430 through 12007
c. 3	12010 through 12367
d. 4	12370 through 13327
e. 5	13330 through 14267
f. 6	14270 through 14647

5.2.3 ALSEP PREPASS CHECKLIST

5.2.3.1 642B Computer. Configure the 642B computer as follows:

Unit/Function	Indication/Setting
a. Auto recovery	Down
b. Address mode	Up (17 bit)
c. Bootstrap	I
d. INDICATE/OFF/SET	INDICATE
e. Stop	Down
f. Jump	Down
g. Disconnect	Down
h. Fault alarm	Enabled

5.2.3.2 1299 Computer. Configure the 1299 computer as follows:

Unit/Function	Indication/Setting
a. Transmitter	SCE mux
b. Receiver	SCE mux
c. PAM	neutral
d. AMQ	neutral

5.2.3.3 1540 Computer. Configure the 1540 computer as follows:

Unit/Function	Indication/Setting
a. MAN/OFF/AUTO	AUTO (all)
b. Clock control	Normal
c. Address 1	System tape (write off, all others on)

Unit/Function	Indication/Setting
d. Address 2	History tape
e. Address 3	Recovery tape
f. Address 4	Log/fault dump

5.2.3.4 1232 I/O Console. Configure the 1232 I/O console as follows:

Unit/Function	Indication/Setting
a. ON-LINE/OFF-LINE	ON-LINE
b. Tape levels	6-7
c. Tape reader	DARTS mounted

5.2.3.5 DTU. Configure the DTU as follows:

Unit/Function	Indication/Setting
a. 2010/2011	2010
b. Transmit disabled/enabled	Green (TLM)
c. Receive enabled/disabled	Green (CMD)

5.2.3.6 SCE Mux. Configure the SCE multiplexer as follows:

Unit/Function	Indication/Setting
a. OPERATE/TEST	OPERATE
b. ERR request button	Press
c. Reset button	Press
d. SCE clock source	INT
e. Digiswitches	278 (7.2 kb/sec)

5.2.3.7 CIT-68. Configure the CIT-68 as follows:

Unit/Function	Indication/Setting
a. AUX/reperforator	On
b. TTY motor	On
c. Page printer	Send
d. T-D	RCV

Unit/Function	Indication/Setting
e. Keyboard	Neutral
f. Selector	K-T
g. OPERATE/TEST	OPERATE

5.2.3.8 HSP and 1222 Translator. Configure the HSP and translator as follows:

Unit/Function	Indication/Setting
Power on	Lit

5.2.4 REAL-TIME COMMANDS

Table 5-1 list the ALSEP 1, 2, 3, and 4 RTC's and the vehicles for which they are valid. ALSEP 5 RTC's are listed in table 5-2.

5.2.5 CRITICAL COMMANDS

Critical commands are listed in table 5-1 and 5-2.

5.2.6 CONTINGENCY PROCEDURES

Refer to STDN No. 502.5 for contingency procedures.

Table 5-1. Real-time Commands

CAM No	ALSEP No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
003	1,2,3,4		ASE HBR ON
005	1,2,3,4		ASE HBR OFF
006	1,2,3,4		NORM BIT RT SEL
007	1,2,3,4		LOW BIT RT SEL
011	1,2,3,4		NORM BIT RT RST
012	1,2,3,4		XMTR A SEL
013	1,2,3,4		XMTR ON
014	1,2,3,4		XMTR OFF
015	1,2,3,4		XMTR B SEL
017	1,2,3,4		DISSIP R1 ON
021	1,2,3,4		DISIP R2 OFF
022	1,2,3,4		DISSIP R2 ON
023	1,2,3,4		DISSIP R2 OFF
024	1,2,3,4		DSS HTR 3 ON
025	1,2,4		DSS HTR 3 OFF
027	1,2,4		DUST CELLS ON
031	1,2,4		DUST CELLS OFF
032	1,2,3,4		TIMER OUT ACCPT
033	1,2,3,4	Group 2	TIMER OUT INHIB
034	1,2,3,4		DSS/PROC X SEL
035	1,2,3,4		DSS/PROC Y SEL
036	1,2,3,4		EXP 1 OPER SEL

Table 5-1. Real-time Commands (cont)

CAM No.	ALSEP No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
037	1,2,3,4		EXP 1 STBY SEL
041	1,2,3,4		EXP 1 STBY OFF
042	1,2,3,4		EXP 2 OPER SEL
043	1,2,3,4		EXP STBY 2 SEL
044	1,2,3,4		EXP 2 STBY OFF
045	1,2,3,4		EXP 3 OPER SEL
046	1,2,3,4		EXP 3 STBY SEL
050	1,2,3,4		EXP 3 STBY OFF
052	1,2,3,4		EXP 4 OPER SEL
053	1,2,3,4		EXP 4 STBY SEL
054	1,2,3,4		EXP 4 STBY OFF
055	1,2,3,4		DSS HTR 1 SEL
056	1,2,3,4		DSS HTR 2 SEL
057	1,2,3,4		DSS HTR 2 OFF
060	1,2,3,4	Group 2	PCU 1 SEL
062	1,2,3,4	Group 2	PCU 2 SEL
063	1,2,3,4		PSE/XY GAIN CH
064	1,2,3,4		PSE/Z GAIN CH
065	1,2,3,4		PSE/SP CAL CH
066	1,2,3,4		PSE/LP CAL CH
067	1,2,3,4		PSE/SP GAIN CH
070	1,2,3,4		LVL MTRX ON/OFF
071	1,2,3,4		LVL MTRY ON/OFF
072	1,2,3,4		LVL MTRZ ON/OFF
073	1,2,3,4		UNCAGE ARM/FIRE
074	1,2,3,4		LVL DIR POS/NEG
075	1,2,3,4		LVL SPEED HI/LO

Table 5-1. Real-time Commands (cont)

CAM No.	ALSEP No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
076	1, 2, 3, 4		PSE T CTL CH
101	1, 2, 3, 4		PSE FILT IN/OUT
102	1, 2, 3, 4		LVL SNSR IN/OUT
103	1, 2, 3, 4		PSE LVL MDE A/M
104	1, 2, 4		SIDE LOAD 1
105	1, 2, 4		SIDE LOAD 2
106	1, 2, 4		SIDE LOAD 3
107	1, 2, 4		SIDE LOAD 4
110	1, 2, 4		SIDE EXECUTE
111	4		CPE OPR HTR ON
112	4		CPE OPR HTR OFF
113	4	Group 1	CPE CVR GO
114	4		CPE DEF SEQ ON
115	4		CPE DEF STEP
117	4		CPE DEF SEQ OFF
120	4		CPE CHAN/HI SEL
121	4		CPE CHAN/LO SEL
122	1, 2	Group 1	SWS CVR GO
123	1, 2, 3		LSM RANGE STEPS
124	1, 2, 3		LSM FLD O/S CH
125	1, 2, 3		LSM O/S ADD CH
127	1, 2, 3		FLIP/CAL INHIB
131	1, 2, 3		FLIP/CAL GO
132	1, 2, 3		LSM FILT IN/OUT
133	1, 2, 3	Group 3	SITE SURVEY XYZ
134	1, 2, 3		LSM T CTL XYO
135	2, 3		HFE MODE/G SEL

Table 5-1. Real-time Commands (cont)

CAM No.	ALSEP No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
136	2,3		HFE MODE/HK SEL
140	2,3		HFE MODE/HK SEL
141	2,3		HFE SEQ/FUL SEL
142	2,3		HFE SEQ P1 SEL
143	2,3		HFE SEQ/P2 SEL
144	2,3		HFE LOAD 1
145	2,3		HFE LOAD 2
146	2,3		HFE LOAD 3
150	2,3		TIMER RESET
152	2,3		HFE HTR STEPS
153	2		SIDE ON
154			SPARE 3
155			SPARE 4
156	3,4		GEO CAL GO
160			SPARE 5
162	3,4	Group 4	ASE SEQ/S FIRE
163	3,4	Group 4	GRENADE 1 FIRE
164	3,4	Group 4	GRENADE 2 FIRE
165	3,4	Group 4	GRENADE 3 FIRE
166	3,4	Group 4	GRENADE 4 FIRE
170	3,4	Group 4	GRENADE ARM
171			SPARE 6
172			SPARE 7
174			SPARE 8

Table 5-2. ALSEP 5 Real-time Commands

CAM No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
003		LSP FMT ON
005		DP FMT ON
006		NBR
007		LBR
011		SPARE 11
012		XMTR A ON
013		XMTR A OFF
014		XMTR B OFF
015		XMTR B ON
017		PDR 1 ON
021		PDR 1 OFF
022		PDR 2 ON
023		PDR 2 OFF
024		ADP X SEL
025		ADP Y SEL
027		APM 1 ON
031		APM 1 OFF
032		RIPPLE-OFF RST
033		SPARE 33
034		DDP X SEL
035		DDP Y SEL
036		LMS ON
037		LMS STBY
041		LMS OFF
042		LEAM ON
043		LEAM STBY
044		LEAM OFF

Table 5-2. ALSEP 5 Real-time Commands (cont)

CAM No.	Critical Group No.	Review, Uplink, Inventory, and History Printouts
045		HFE ON
046		HFE STBY
050		HFE OFF
052		LSG ON
053	Group 5	LSG STBY
054	Group 5	LSG OFF
055		LSP ON
056		LSP STBY
057		LSP OFF
060	Group 5	PCU 1 SEL
062	Group 5	PCU 2 SEL
063		LSG HTR ON
064		LSG HTR OFF
065		SPARE 65
066		SPARE 66
067		LSG CMD EX
070		LSG DECODER ON
071		LSG DECODER OFF
072		LSG STEP UP
073		SPARE 73
074		LSG STEP ON
075		SPARE 75
076		SPARE 76
101		SPARE 101
102		SPARE 102
103		SPARE 103
104		PER CMDS EN
105		PER CMDS INH

Table 5-2. ALSEP 5 Real-time Commands (cont)

CAM No.	Critical Group No.	Review, Uplink, Inventory, and History Printout
106		SPARE 106
107		ADP BKUP
110		ADP PRI
111		LEAM CAL
112		LEAM MIR CVR
113		APM 2 OFF
114		LEAM SEN CVR
115		APM 2 ON
117		LEAM HTR STEP
120		PCU 1 AUTO SW
121		PCU 2 AUTO SW
122		DECODER SW
123		LMS LOAD 1
124		LMS LOAD 2
125		LMS LOAD 3
127		LMS LOAD 4
131		SPARE 131
132		LMS LOAD 5
133		LMS LOAD 6
134		LMS EX
135		HFE MODE/G SEL
136		HFE MODE/LK SEL
140		HFE MODE/HK SEL
141		HFE SEQ/FULL SEL
142		HFE SEQ/P1 SEL
143		HFE SEQ P2 SEL
144		HFE LOAD 1

Table 5-2. ALSEP 5 Real-time Commands (cont)

CAM No.	Critical Group No.	Review, Uplink, Inventory and History Printout
145		HFE LOAD 2
146		HFE LOAD 3
150		SPARE 150
152		HFE HTR STEP
153		EXP 4 PWR ON
154		SPARE 154
155		SPARE 155
156	Group 6	LSP XMTR ON
160		SPARE 160
162		LSP XMTR OFF
163		LSP GAIN NORM
164		LSP GAIN LOW
165		SPARE 165
166		SPARE 166
170		LSP GEO CAL
171		SPARE 171
172		SPARE 172
174		DECODER SW INH

5.3 1218 COMPUTERS

During ALSEP support, all 26-meter prime and 9-meter USB stations provide real-time designation to the Antenna Position Programer (APP) and generate backup paper drive tapes for the APP by using the MOONSTAR program.

SECTION 6. COMMAND

Note

This sectio is new; therefore, change bars are not used.

6.1 INTRODUCTION

6.1.1 GENERAL

This section summarizes the requirements and methods of providing command data support for ALSEP. Use the Spacecraft Command Encoder (SCE) system for this support.

6.1.2 APPLICABLE DOCUMENTATION

6.1.2.1 The STDN Network Operations Procedures for Command Systems, STDN No. 502.6, contains a description of the SCE systems located at the STDN stations.

6.1.2.2 The Software Catalog for the Network (SCAN) for H316 Computer, STDN No. 504.7, describes the operational procedures for ALSEP.

6.1.3 SCE COMMAND PARAMETERS

Set the SCE command parameters as follows:

Unit/Function	Indication/Setting
(a) Command mode	PCM/PSK/SUM
(b) Subcarrier frequency (Fo)	2 kHz
(c) Clock frequency (Fc)	1 kHz
(d) Clock tc subcarrier amplitude ratio	1:1
(e) Clock to data frequency ratio	2
(f) Clock to data phase angle	0 degree
(g) Uplink data coding	NRZ
(h) idle pattern	All ones

6.2 SCE SYSTEM OPERATIONS

6.2.1 GENERAL

The SCE system uses the SCAN No. 7-616 ALSEP program and all authorized errata to support ALSEP. Command transmission is initiated by the Mission Control Center (MOCC) or the Station Link Controller. There is no requirement for PCM interface with SCE for command verification. The SCE operator must be familiar with the command procedures outlined in para 1.3.

6.2.2 COMMAND DESCRIPTION

Refer to sections 4 and 5 for command descriptions.

6.2.3 OPERATIONAL PROCEDURES

6.2.3.1 Loading and Initialization. The ALSEP program and appropriate errata are loaded in accordance with STDN No. 504.7 SCAN No. 7-616. All manual Input/Output (I/O) routines and program advisory messages are listed in this procedure.

6.2.3.2 Test Mode (Safe Mode). When required to make in-house loops checks of the 642B/SCE interface, place the SCE in the test mode (old safe mode for Updata Buffer [UDB]) by pressing the TEST Pushbutton Indicator (PBI) on the Analog Command Generation Equipment (ACGE) panel. When the TEST PBI lights, commands sent to SCE from the MCC or Link Controller will not be transmitted. The SCE operator places the SCE system in the operations mode only on direction of the Link Controller.

6.2.3.3 Pass Mode (OP Mode). On direction to go to the operations mode, the SCE operator presses the TEST PBI on the ACGE panel (not lit) and types:

PAS, N/L

This places SCE in the pass mode. The SCE operator informs the Link Controller that SCE is ready to uplink commands.

6.2.3.4 Ground Verification. Place the SCE Ground Verification Unit (GVU) in the USB enabled position. (The DISABLE PBI is not lit.) The GVU does not terminate commands because of a failure, but reports all different failures in the Pass Progress Message (PPM) sent back to the 642B computer. Unlike the UDB verification system, the GVU remains active regardless of mode other than disable.

6.2.4 CONTINGENCY PROCEDURES

There are no contingency procedures for SCE using the ALSEP program.

6.3 COMMAND LIST

Refer to section 5 table 5-1 and 5-2 for the command list.

6.4 RF SYSTEM AND EQUIPMENT OPERATIONS

Refer to section 4 for the RF system and equipment operations.

SECTION 7. COMPUTER SUPPORT

Note

This section is deleted.

SECTION 8. COMMUNICATIONS

SECTION 8. COMMUNICATIONS

The ALSEP Program Requirements Document (PRD) is applicable to ALSEP with the following additions:

a. Voice conferencing is accomplished by GSFC Switching, Conferencing, and Monitoring Arrangement (SCAMA). Configuration control is under the direction of the ALSEP OPS.

b. Mission traffic originates from Network Operations Control Center (NOCC) and commands originate from MCC. Messages include in the first line of the text mission traffic identification, SUPIDEN test number, and mission identification (e.g., USB, SUPIDEN M0780, ALSEP).

c. Table 8-1 represents the Network communications configuration for phase II and III of ALSEP support.

Table 8-1. Network Communications Configuration (Phase II and III Only)

Station	ALSEP Conference (Phase II)	Net 4 (PhaseII)	TTY A (Phase II/III)	TTY B (Phase II/III)
ACN	X	X	X	X
AGO	X	X	X	X
BDA	X	X	X	X
GDS	X	X	X	X
GWM	X	X	X	X
HAW	X	X	X	X
MAD	X	X	X	X
MIL	X	X	X	X
ORR	X	X	X	X
ROS	X	X	X	X
QUI	X	X	X	X
ULA*	X		X	X
ETC*	X		X	X
JSC	X	X	X	X
NOC	X	X	X	X

*Receive and record only

Note

1. ALSEP Conference: required during phase II between stations and ALSEP Network and ALSEP OPS.

2. Net 4: required only during real-time phase II.

3. Additional circuits: in the event of an ALSEP contingency, ALSEP Network and ALSEP OPS contact Voice Control for additional circuits to make necessary off-net calls.

4. Do not patch the CIT-68 to the receive communications lines.

SECTION 11. DATA MANAGEMENT

11.1 GENERAL

This section describes the data management procedures to be followed by all STDN stations supporting ALSEP. Except as otherwise noted in this NOSP, identify, annotate, label, package, and ship all mission recorded data in accordance with the STDN Network Operations Procedures for Data Management, STDN No. 502.11. During the phase II and phase III support periods, handle all recorded data in accordance with this NOSP.

11.2 DATA REQUIREMENTS AND DISPOSITION

The data requirements and disposition instructions for all recorded data are specified in table 11-1. The procedures in the following paragraphs are also applicable.

11.2.1 MAGNETIC TAPES

Hold ALSEP magnetic tapes (DSS 630 and 632) recorded during scheduled support period on any given day, on station for 24 hours after the final LOS of that day, for possible playback. After 24 hours, ship the tapes by airfreight or airmail in accordance with the shipping instructions in para 11.4.

11.2.2 OTHER DATA RECORDING

Handle all other data recordings (stripcharts, paper tapes, etc.) in accordance with the disposition instructions in table 11-1. Dispose of data items which have been held for the time period specified in table 11-1, and have not been requested, in accordance with existing station procedures.

11.3 DATA ANNOTATION

11.3.1 GENERAL

Detailed procedures for annotating and attaching data labels are described in STDN No. 502.11.

11.3.2 SUPIDEN LABEL ANNOTATIONS

Enter the applicable SUPIDEN on all data labels in the SUPIDEN space provided. In addition, enter the abbreviated vehicle codes corresponding to all vehicles recorded in the VEHICLE(S) space on the data label. Vehicle codes are as follows:

SUPIDEN No.	Vehicle	Abbreviated Vehicle Code
a. M0780	ALSEP 1-5	A1-5
b. M0781	ALSEP 1	A1
c. M0782	ALSEP 2	A2
d. M0783	ALSEP 3	A3
e. M0784	ALSEP 4	A4
f. M0785	ALSEP 5	A5

11.4 SHIPPING

11.4.1 STDN STATIONS

11.4.1.1 All stations (except ACN) making shipments that require customs clearance ship via airfreight to GSFC Code 863.4. In order to take advantage of airfreight weight/price breaks, stations make one shipment per week vice daily shipments except for special support specified in para 11.4.3. Send shipments to the following address:

NASA - Goddard Space Flight Center
Building 16
Greenbelt Road
Greenbelt, Maryland 20771
M/F: Archiving and Distribution Section, Code 863.4

11.4.1.2 All stations making shipments not requiring customs clearance may use either of the following methods except for the special support specified in para 11.4.3:

a. Ship via airfreight once per week.

b. Ship via the U.S. Postal Service as registered, certified, or insured (minimum fee) air mail daily.

c. Send all shipments directly to the following address:

University of Texas
Marine Science Institute
Suite 105
Galveston, Texas 77550
Attn: John Kunselman/J. Bates

11.4.1.3 ACN ship magnetic tapes (DSS 630, 631, and 632) via Eastern Test Range (ETR) aircraft to:

Transportation Officer
Building 310
Patrick Air Force Base, Florida 32925
Attn: NASA/Bendix Traffic Coordinator

Note

The NASA/Bendix Traffic Coordinator is responsible for forwarding the shipments to the University of Texas and furnishing shipping information to JSC/J. Bates, TN-3 by telephone at 713-483-2711.

11.4.1.4 ETC forward magnetic tapes to GSFC Code 863.4.

11.4.2 GSFC CODE 863.4

GSFC/Code 863.4 trans-ship all magnetic tapes (DSS 630, 631, and 632) received from stations to the University of Texas.

11.4.3 SPECIAL ALSEP SHIPPING

Stations occasionally are required to support ALSEP under special conditions. Special support requirements are normally issued by NSI, which may also specify unique data disposition and shipping instructions. If the NSI does not give such instructions, stations will ship the magnetic tapes (DSS 630, 631, and 632) by airfreight on the next available

flight (instead of holding the data on station for 24 hours). Shipments requiring customs clearance will be forwarded to GSFC Code 863.4 for shipment to University of Texas. Shipments that do not require customs clearance will be shipped directly to the University of Texas address specified in para 11.4.1.2.

11.5 PASS SUMMARY REPORT

Stations include a copy of the Pass Summary (PASSUM) report with all magnetic tapes shipped.

11.6 DATA SHIPMENT ADVISORY MESSAGE

All stations send a Data Shipment Advisory message within 3 hours after a data shipment is turned over to a carrier. This message will be addressed to GCEN/NOCC, with an information copy to HMSC/UT GALVESTON-KUNSELMAN. The message format is contained in STDN No. 502.16, and message header information is contained in section 16.

11.7 MAGNETIC TAPE DEGAUSSING AND RECERTIFICATION

Degauss and reuse magnetic tapes held on station for the time period specified in table 11-1 and not requested. It is not feasible to set a firm number of times that tapes can be degaussed and reused before any deterioration; therefore, this will be determined by each station. Stations ensure that no deterioration of recording occurs due to utilizing bad tapes. Return tapes determined to be unfit for reuse by degaussing to GSFC for recertification.

11.8 MAGNETIC TAPE NUMBERING

Sequentially number all magnetic tapes in accordance with procedures contained in STDN No. 502.11 and this NOSP.

Table 11-1. Data Requirements and Disposition

DSS No.	STDN Data Label No.	Data Description	Disposition	
			Station	GSFC Code 863.4
Computer Complex (RSDP)				
111	2090	RSDP HSP hard-copy printout	Hold on station 1 week only if an anomaly occurs, then destroy. Otherwise destroy after support release.	
112	2090	HSP CDP tabular printout (VAN only)	Hold on station 1 week only if an anomaly occurs, then destroy. Otherwise destroy after support release.	
Command				
200	NA	CMD history paper tape	Hold on station 1 week only if an anomaly occurs, then destroy. Otherwise destroy after support release.	
231	2096	CMD history magnetic tape	Hold on station for 1 week, then handle in accordance with para 11.7.	
248	2096	CMD recovery magnetic tape	Hold on station 1 week only if an anomaly occurs. After 1 week, or if no anomaly occurs, handle in accordance with para 11.7.	
249	2096	CMD log/fault dump magnetic tape	Hold on station 1 week only if an anomaly occurs. After 1 week, or if no anomaly occurs, handle in accordance with para 11.7.	

Table 11-1. Data Requirements and Disposition (cont)

DSS No.	STDN Data Label No.	Data Description	Disposition	
			Station	GSFC Code 863.4
Telemetry				
554	2096	Event stripchart (ALSEP CVW's)	Hold on station for 1 week, then destroy	
558	2090	Function/event stripchart (ALSEP analogs)	Hold on station for 1 week, then destroy.	
559	2090	Function/event stripchart (ALSEP analog, if required)	Hold on station for 1 week, then destroy.	
Unified S-band (USB)				
630	2097 or 2099	Magnetic tape	Ship in accordance with para 11.4. Report in accordance with para 11.6.	
631	2097 or 2099	Magnetic tape (1/2 inch, 7 track)	Ship in accordance with para 11.4. Report in accordance with para 11.6.	
632	2097 or 2099	Magnetic tape (1/2 inch, 7 track)	Ship in accordance with para 11.4. Report in accordance with para 11.6	
658	2090	Function/event stripchart	Hold on station for 1 week, then destroy.	
659	2090	Function/event stripchart	Hold on station for 1 week, then destroy.	
660	2090	Function/event stripchart	Hold on station for 1 week, then destroy.	

Table 11-1. Data Requirements and Disposition (cont)

DSS No.	STDN Data Label No.	Data Description	Disposition	
			Station	GSFC Code 863.4
Miscellaneous				
975	NA	PASSUM	Transmit post-pass via TTY. Include one copy with each magnetic tape.	

SECTION 16. NOCC/STATION INTERFACE

16.1 NOCC/NETWORK STANDARD OPERATING PROCEDURES

16.1.1 GENERAL

This section designates the applicable Network operating procedures for ALSEP. Refer to the Network Operations Control Center and Station Interface Procedures, STDN No. 502.16, for all Network operations procedures not covered in this NOSP.

16.1.2 VOICE CALLSIGNS

ALSEP voice callsigns for MCC console positions are:

Position	Callsign
a. JSC ALSEP Network Controller	ALSEP NETWORK
b. GSFC ALSEP Network Controller	ALSEP OPS
c. ALSEP Flight Controller	ALSEP FLIGHT CONTROL

16.1.3 MISSION STATUS

The Network is on mission status for ALSEP until the terminating ISI is issued by the Network Director (ND).

16.1.4 STATION RELEASE

16.1.4.1 Phase II. During phase II operations, stations are released to the ALSEP OPS as soon as possible after their scheduled support (except personnel required for data playback). Stations are released verbally by ALSEP OPS.

16.1.4.2 Phase III. Stations are released upon completion of scheduled activities.

16.1.5 STATION BRIEFING

Verbal station briefings take place normally at S minus 15 minutes and other times as required.

16 2 REPORTING

The reporting procedures in STDN No. 502.16 apply.

16.3 TELETYPE MESSAGE FORMATS AND PROCEDURES

16 3.1 GENERAL

16.3.1.1 This paragraph defines and authorizes the use of operational teletype messages peculiar to ALSEP. For messages not contained in this NOSP, refer to STDN No. 502.16.

16.3.1.2 Transmit ISI's and Requests for Instrumentation Clarification (RIC's) in numerical sequence. If any deployed package deteriorates to a point where all data becomes useless, stations receive a terminating ISI. The documentation is then recycled as required. The implementation of STDN No. 601/ALSEP and revisions is by ISI during mission periods. Changes are issued by DCN.

16.3.2 REQUEST FOR INSTRUMENTATION CLARIFICATION

16.3.2.1 General

a. RIC's are generated by participating stations to request information on all items relating to mission instrumentation support. RIC's should be addressed to GUNV/ ALSEP OPS, with information copies to HANC/ALSEP NETWORK.

b. ALSEP RIC procedures remain in effect until the issuance of the terminating ALSEP ISI.

16.3.2.2 Message Sample

```
RR GUNV HANC
DE GBDA 015
26/1326Z
FM OPSR
TO GUNV/ALSEP OPS
INFO HANC/ALSEP NETWORK

RIC
ALSEP
.......Text .......

26/1352Z APR 76 GBDA
```

16.3.2.3 RIC Answers. RIC Answers are sent to the originating station OPSR with information copies to HANC/ALSEP NETWORK.

16.3.3 INSTRUMENTATION SUPPORT INSTRUCTIONS

16.3.3.1 ISI 001. If a station is not on mission status from a previous ALSEP support period, ISI 001 is retransmitted placing the supporting stations on mission status.

16.3.3.2 Subsequent ISI's. Subsequent ISI's are coordinated with the ALSEP Network and issued by the ALSEP OPS. Stations implement ISI's as required or respond by RIC if the ISI cannot be implemented.

16.3.3.3 Recycling of ISI's. ISI's are normally recycled to 000 when the NOSP is revised. Outstanding ISI's are reissued with new ISI numbers.

16.3.3.4 Message Sample

RR DSDD HANC HMSC
DE GCEN 010A
26/1455Z
FM NOCC
TO (action stations)
INFO HANC/ALSEP NETWORK
SDI-104D
HMSC/TDX-BENDIX
ISI
ISI NO. 072 ALSEP
SUBJECT:
ACTION: STADIR/OPSR

....

26/1505Z AUG 71 GCEN

16.3.4 DOCUMENTATION CHANGE NOTICE

16.3.4.1 DCN Header. The DCN header is the same as the ISI header except "TO ALL" must be inserted vice "TO (action stations)," GTWL is added to the RR line, and GTWL/DSO is added to the INFO line.

16.3.4.2 DCN Coordination. DCN's impacting MCC operations must be coordinated with ALSEP Network prior to being issued by ALSEP OPS. Exceptions will be those required to be transmitted as a result of transmission errors.

16.3.5 PASS SUMMARY (PASSUM) REPORT

16.3.5.1 General. All stations are required to transmit a Pass Summary (PASSUM) report within 45 minutes after each support period. When complete information concerning non-nominal support is not available prior the PASSUM required transmission time, transmit a problem report. Total support provided is identified in quick-look and general remarks section of the PASSUM. If a station support period extends through a GMT day, the station submits a single PASSUM.

16.3.5.2 Message Sample

PP DSDD DSDS HANC HMSC
DE LMAD 025
24/2128Z
FM OPSR
TO HANC/ALSEP NETWORK
INFO HMSC/TDX-BENDIX, FC9-KUNDEL, UT GALVESTON/KUNSELMAN

PSM MAD 6904405
A. ACTIVITY

STA	SUPIDEN	YRMODA	STRT	DA/AOS	LOS	STOP	PARAMSIDEN	REMARKS
MAD	M0780MS	740524	1115	1125	2100	2102		IRQ

B. TAPES

NUMERID	TYPES	STRTED	STOPED	MINS	SF	FILE	PARAMSIDEN	DSSNR	REMARKS
00000065	R	112000	210500			001	F	631	

E. QUICKLOOK

MEAS	A1	A2	A3	A4	A5
	AOS LOS	AOS LOS	AOS LOS	AOS LOS	AOS LOS
AB04	000-000	000-000	001-001	202-202	226-226
AB05	000-000	202-202	001-000	000-000	242-242
AL05	000-003				
AB11					000-000
AB13					342-342

G. GENERAL REMARKS

1. AGC

		A1	A2	A3	A4	A5
AOS	24/1115Z	-129	-129	-130	-129	-132
MAX EL		-129	-130	-126	-128	-133
LOS	24/2100	-129	-129	-127	-128	-132

2. STATION PROBLEM DESCRIPTION: NONE

3. CVW REPORTING: NONE

4. STATION COMMENTS ON SUPPORT: PHASE II SUPPORT FROM 1327Z to 1607Z. A5 HBR FROM 1500Z TO 1530Z

24/2136Z MAY 76 MAD

16.3.5.3 Text Explanation

a. Activity (Para A) The column title, contents, and locations are as follows:

(1) The unit descriptions, locations, and widths are as follows:

Unit	Description	Start Character	Column Width
(a) 1	Report identification (PSM)	1	3
(b) 2	Station identifier (3 Letter designator)	5	3
(c) 3	SATIDEN (7 digit designator)	9	7
(d) 4	Orbit number (5 digit number)	17	5

(2) The column title, contents, and locations are as follows:

Column/Title	Content	Start Character	Column Width
(a) (STA)	Station identifier	1	3
(b) (SUPIDEN)	Support identification code	5	7
(c) (YRMODA)	Year; month; day	13	6
(d) (STRT)	Scheduled start time	20	4
(e) DA/AOS	Scheduled AOS time	25	7
(f) (LOS)	Scheduled LOS time	33	4
(g) (STOP)	Scheduled stop time	38	4
(h) (PARAMSIDEN)	Equipment parameters	43	10
	Unassigned	54	5
(i) (REMARKS)	Remarks/results	60	Variable

b Tapes (Para B). The column title, contents, and locations are as follows:

Column/Title	Content	Start Character	Column Width
(1) (NUMBR)	Tape number	1	5
(2) (TYPES)	Bit rate and data type	7	5
(3) (STRT)	Recorder start	13	4
(4) (STOP)	Recorder stop	18	4
(5) (MINS)	Estimated minutes of data	23	4
(6) (SF)	Speed/frequency link	28	2
(7) (FILE)	File number	31	4
(8) (PARAMS)	Equipment parameters	36	6
(9) (DSSNR)	DSS number	43	5
(10) (REMARKS)	Remarks code	49	Variable

c. Quick Look (Para E). Vehicle, measurement, and AOS and LOS octal value for each required parameter as stated in section 1. Report vehicle, octal value change, and GMT date and time of change for each parameter that is out of limits.

d. General Remarks (Para G)

(1) AGC (Para 1). USB receiver signal strength in dBm for AOS, maximum elevation, and LOS. Indicate GMT date and time of AOS and LOS.

(2) Station Problem Description (Para 2). GMT date and time of signal loss (except for nominal LOS) and of weak signal strength or intermittent dropouts. (Weak signal strength is predicted as below -140 dBm at 9-meter stations, and below -131 dBm at 26-meter stations.) Enter the reason for the signal condition in the comments section (4).

(3) CVW Reporting (Para 3). ALSEP Command Verification Words (CVW) with bit 10 set are reported as follows: GMT date and time of activity, vehicle, and bits 3 through 9 in octal.

(4) Station Comments (Para 4). Comments by station personnel concerning ALSEP support should include, but not be restricted to, any anomalies experienced. In evaluating the anomaly, the station should indicate whether command or telemetry (real-time or recorded) data was affected. The station should determine if loss of data was due to equipment failure, operator error, procedural error, spacecraft anomaly, or of unknown origin. This information may provide MCC with indications of critical vehicle problems and alert GSFC to station problems which occurred during support. Stations utilizing a Microdyne receiver for support must comment on which ALSEP(s) were supported using this system.

16.3.6 SPACECRAFT/VEHICLE ANOMALY REPORT

OO DSDD HANC GTWL GNOC
DE GROS 003A
12/1631Z
TO GNOC/ALSEP OPS
INFO HANC/ALSEP NETWORK
GTWL/CODE 863

16.3.7 DATA SHIPMENT ADVISORY MESSAGE

RR GCEN HMSC GTPC
DE AORR 046A
08/2145Z
FM OPSR
TO GCEN/NOCC
INFO HMSC/UT GALVESTON/KUNSELMAN
GTPC

16.3.8 COMPUTER FAULT MESSAGE

16.3.8.1 General. Refer to section 5 for a description of this message.

16.3.8.2 Message Sample

RR GNOC
DE GMIL 009B
20/1228Z
FM OPSR
TO GNOC/NOCC

16.3.9 DOCUMENTATION ADVISORY MESSAGE

RR DSDD HANC
DE GCEN 006
23/0110Z
FM NOCC
ADVISORY ALSEP

16.3.10 SCHEDULE REQUEST MESSAGE

16.3.10.1 General. M0781/0782/0783/0784/0785 Phase II Schedule Request Message (SRM).

16.3.10.2 Message Sample

RR GUNV
DE HMSC
10/1547Z
FM SCHEDULING
TO FORECASTING

SRM M0780 FOR THE PERIOD 05 THRU 11 JAN 76.

1. DY CMD STRT STOP
   05 MCC 1500 1700
   08 MCC 1500 1700
   09 MCC 1500 1700
   10 MCC 1500 1700
   11 STA 1500 1700
   11 MCC 1700 1900

2. COMMENTS: HBR A5 11/1500-1900.

16.3.10.3 Text Explanation

a. Field 1 (DY): indicates day of support.

b. Field 2 (CMD): indicates source of command initiation.
   MCC: indicates Mission Control Center
   STA: indicates STDN Network station.

c. Field 3 (STRT)
   XXXX: indicates start of phase II support period.

d. Field 4 (STOP)
   XXXX: indicates stop of phase II support period.

16.3.11 CONFIRMATION OF SCHEDULE REQUEST MESSAGE

16.3.11.1 Message Sample. The confirmation of schedule request message format is as follows:

760111 GENERAL SCHEDULE

SUPIDEN	STA	START	AOS	LOS	STOP	RTMODE	REMARKS
M0780MS	HAW	0000	0000	0330	0333	QXXXXX	SEG
M0780MS	GWM	0240	0330	0955	0958	QXXXXX	
M0780MS	VAN	0905	0955	1500	1503	QXXXXX	
M0781MS	ETC	1440	1500	1700	1703	QXXXXX	
		1440	1700	01 VOIC	NOCC/MCC		S/V ALSEP-2
M0782MS	ETC	1440	1500	1700	1703	QXXXXX	
		1440	1700	01 VOIC	NOCC/MCC		S/V ALSEP-1
M0783MS	GDS	1410	1500	1700	1703	QQXXXX	S/1500-1700
		CMD ALSEP 1 THRU 5					
		1430	1700	01 VOIC	NOCC/MCC		S/V ALSEP-4&5
M0784MS	GDS	1410	1500	1700	1703	QQXXXX	S/1500-1700
		1430	1700	01 VOIC	NOCC/MCC		S/V ALSEP-3&5
M0785MS	GDS	1410	1500	1700	1703	QQXXXX	S/1500-1700 HBR
		1430	1700	01 VOIC	NOCC/MCC		S/V ALSEP-3&4
M0780MS	GDS	1610	1700	2300	2303	AAXXXX	M/1700-1900
		HBR A5 1700-1900					
		1640	2300	01 VOIC	NOCC/MCC		
		1640	1900	01 VODA	MCC		
M0780MS	HAW	2210	2300	0030	0033	QXXXXX	

16.3.11.2 Text Explanation

a. Event Line. The event line explanation is as follows:

(1) SUPIDEN: support identification number (in accordance with STDN No. 808).

(2) Station: supporting STDN station.

(3) Start: the time of start of station prepass setup activity.

(4) AOS: the time of start of support period.

(5) LOS: the time of end of support period.

(6) Stop: the time of termination of station postpass activity.

(7) RTMODE: preferred antenna and equipment configuration (STDN No. 808 and NOSP)

(8) Remarks:
M - Mission control center initiates commands.
S - STDN station initiaties commands.
XXXX-XXXX: Indicates the real-time CMD/TLM support period.
HBR: Indicates high-bit rate support required.
SEG: Indicates activity segmented in accordance with STDN No. 502.16.

b. Remarks Line. The NOCC schedule format contains provisions for 2 additional lines of 50 alphanumeric characters each for use as needed.

c. Communications Line Entries. The communications line entries consists of the following fields:

(1) Start: start time of communications requirements.

(2) Stop: stop time of communications requirements.

(3) Remarks: quantity and type of lines and the users (S/V ALSEP-X: indicates the voice circuit is shared when ALSEP packages are scheduled separately).

16.3.12 ALSEP DATA LOSS MESSAGE (ADLM)

16.3.12.1 General. Use of this message is discussed in section 1.

16.3.12.2 Message Sample

RR HANC HMSC
DE GCEN
14/2330Z
FM NOCC
TO HANC/ALSEP NETWORK
INFO HMSC/TDX-BENDIX, FC9-KUNDEL, UT GALVESTON-KUNSELMAN

ADLM
ALSEP

VEH	TIME
A1, A4	14/1300-1405

REASON: NETWORK RESOURCES NOT AVAILABLE

16.3.12.3 Text Explanation

a. VEH: indicates affected vehicle.

b. TIME: indicates GMT date and time period that vehicle was not supported.

c. Reason: indicates reason vehicle not supported. If reason has to do with another project, specify other project by name.

16.3.13 ALSEP EXPERIMENT STATUS MESSAGE (AESM)

16.3.13.1 General. This message is transmitted to all supporting stations each time there is an experiment status change.

16.3.13.2 Message Sample

```
OO DSDD HANC
DE GCEN
21/1440Z
FM NOCC
TO ALL OPSR
INFO HANC/ALSEP NETWORK

AESM
ALSEP

  VEH          EXP          STATUS
   A1          SIDE           ON
   A2          SIDE           ON
   A4          CPLEE          STBY

21/1505Z MAR 76 GCEN
```

16.3.13.3 Text Explanation

a. VEH: indicates affected vehicle.

b. EXP: indicates specific experiment.

c. Status: indicated the mode of operation the experiment was in at the completion of the last phase II period of support and any time there is a status change.

SECTION 26. NETWORK TESTING AND SIMULATIONS

Note

This section is new; therefore, change bars are not used.

Supporting stations perform applicable portions of the STDN Station Readiness Test for Apollo Lunar Surface Experiments Packages, STDN No. 401.1/ALSEP, prior to each support period.

SECTION 29. 12-METER (40-FOOT) TRACKING ANTENNA SYSTEM

Note

This section is new; therefore, change bars are not used.

SECTION 29. 12-METER (40-FOOT) TRACKING ANTENNA SYSTEM

29.1 GENERAL

The information in this section supplements the procedures in the STDN Network Operations Procedures for the 12-meter (40-foot) Tracking Antenna System, STDN No. 502.29, which are necessary for ALSEP support.

29.2 SUPPORT REQUIREMENTS

29.2.1 GENERAL

AGO, ETC, QUI, and ULA are required to provide S-band support of ALSEP as scheduled.

29.2.2 SCHEDULING/PREDICTED COVERAGE

Tracking schedules provided by NOCC describe station support.

29.2.3 LINK DESCRIPTION

Table 29-1 lists the ALSEP downlink frequencies.

29.2.4 MODE ASSIGNMENTS AND MOD INDICES

Table 29-2 lists the downlink modulation characteristics.

29.2.5 SUPPORT CONFIGURATION

S-band support consists of providing telemetry data to other on-station systems. Figure 1-2 shows the support capability configuration.

29.2.6 ACQUISITION DATA

Refer to para 1.3 for the type of program track to be used.

29.2.7 TRACKING DATA REQUIREMENTS

Not applicable.

29.2.8 RECORDING REQUIREMENTS

Analog stripchart recordings are required.

29.2.9 REPORTING

Follow applicable reporting procedures contained in section 1 and 16 throughout the mission.

29.3 OPERATIONAL SUPPORT PROCEDURES

29.3.1 EQUIPMENT PREPASS CHECKLIST

The prepass checklist is accomplished prior to support using the normal pass configuration listed in STDN No. 502.29 and the following system settings for the Multifunction Receiver (MFR):

Unit/Function	Indication/Setting
a. Frequency	Desired ALSEP frequency
b. AGC speed	
(1) Mode 1, 2, and 4	30 msec
(2) Mode 3	300 msec
c. IF bandwidth	
(1) Mode 1, 2, and 4	10 kHz
(2) Mode 3	30 kHz
d. Video bandwidth	
(1) Mode 1 and 2	1.5 kHz
(2) Mode 3	15 kHz
(3) Mode 4	5 kHz
e. TLM demod	Sync PM
f. Tuning mode	Loop open (manual acq after AOS)
g. SNR	Off
h. NB ALC	Off
i. Coupling	ac
j. Loop bandwidth	
(1) Mode 1, 2, and 4	30 Hz
(2) Mode 3	100 Hz
k. VCO range	15 kHz

29.3.2 ACQUISITION SOURCE AND PROCEDURES

Program track is the prime source for ALSEP support. Manual acquisition is possible using the antenna TV optics system. Perform acquisition procedures in accordance with STDN No. 502.29.

29.3 3 CONTINGENCY PROCEDURES

Station personnel must have approval from the ALSEP Network or ALSEP OPS prior to performing real-time contingency procedures.

29.3.4 DATA TRANSMISSION PROCEDURES

Not applicable.

Table 29-1. S-band Downlink Frequencies

Vehicle	Downlink (MHz)
ALSEP 1 (A1) Apollo 12	2278.5
ALSEP 2 (A2) Apollo 15	2278.0
ALSEP 3 (A3) Apollo 16	2276.0
ALSEP 4 (A4) Apollo 14	2279.5
ALSEP 5 (A5) Apollo 17	2275.5

Table 29-2. ALSEP Downlink Modes

Mode	Information	Modulation Technique	Peak Carrier Deviation (Rad)	Carrier Suppression (dB)
01	530-b/sec PCM	PM	1.25	10
02	1060-b/sec PCM	PM	1.25	10
03	10.6-kb/sec PCM	PM	1.25	10
04	3.533-kb/sec	PM	1.25	10

29.3.5 DATA RECORDING PROCEDURES

Configure analog stripchart recorders in accordance with STDN No. 502.29. Set recorder speed to 2 mm/sec.

29.4 DATA FORMATS

Not applicable.

SECTION 30. 26-METER (85-FOOT) TRACKING ANTENNA SYSTEM

Note

This section is new; therefore, change bars are n t used.

SECTION 30. 26-METER (85-FOOT) TRACKING ANTENNA SYSTEM

30.1 GENERAL

The information in this section supplements the procedures in the STDN Network Operations Procedures for the 26-meter (85-foot) Tracking Antenna System, STDN No. 502.30, which are necessary for ALSEP support.

30.2 SUPPORT REQUIREMENTS

30.2.1 GENERAL

ORR, ROS, and ULA provide S-band support for the duration of ALSEP.

30.2.2 SCHEDULING/PREDICTED COVERAGE

Tracking schedules provided by NOCC describe station support.

30.2.3 LINK DESCRIPTION

Table 30-1 lists the ALSEP downlink frequencies.

30.2.4 MODE ASSIGNMENTS AND MOD INDICES

Table 30-2 lists the downlink modulation characteristics.

30.2.5 SUPPORT CONFIGURATION

S-band support consists of providing telemetry data to other on-station systems. Figure 1-2 shows the support configuration.

30.2.6 ACQUISITION DATA

Refer to section 1 for the type of program track to be used.

30.2.7 TRACKING DATA REQUIREMENTS

Not applicable.

30.2.8 RECORDING REQUIREMENTS

Analog stripchart recordings are required.

30.2.9 REPORTING

Follow applicable reporting procedures contained in section 1 and 16 throughout the mission.

Table 30-1. S-band Downlink Frequencies

Vehicle	Downlink (MHz)
ALSEP 1 (A1) Apollo 12	2278.5
ALSEP 2 (A2) Apollo 15	2278.0
ALSEP 3 (A3) Apollo 16	2276.0
ALSEP 4 (A4) Apollo 14	2279.5
ALSEP 5 (A5) Apollo 17	2275.5

Table 30-2. ALSEP Downlink Modes

Mode	Information	Modulation Technique	Peak Carrier Deviation (Rad)	Carrier Suppression (dB)
01	530-b/sec PCM	PM	1.25	10
02	1060-b/sec PCM	PM	1.25	10
03	10.6-kb/sec PCM	PM	1.25	10
04	3.533-kb/sec	PM	1.25	10

30.3 OPERATIONAL SUPPORT PROCEDURES

30.3.1 EQUIPMENT PREPASS CHECKLIST

The prepass checklist is accomplished prior to support using the normal pass configuration listed in STDN No. 502.30 and the following system settings for the Multifunction Receiver (MFR):

Unit/Function	Indication/Setting
a. Frequency (MHz)	Desired ALSEP frequency
b. AGC speed	
(1) Mode 1, 2, and 4	30 msec
(2) Mode 3	300 msec
c. IF bandwidth	
(1) Mode 1, 2, and 4	10 kHz
(2) Mode 3	30 kHz
d. Video bandwidth	
(1) Mode 1 and 2	1.5 kHz
(2) Mode 3	15 kHz
(3) Mode 4	5 kHz
e. TLM demod	Syn PM
f. Tuning mode	Loop open (manual acq after AOS)
g. SNR	Off
h. NB ALC	Off
i. Coupling	ac
j. Loop bandwidth	
(1) Mode 1, 2, and 4	30 Hz
(2) Mode 3	100 Hz
k. VCO range	15 kHz

30.3.2 ACQUISITION SOURCE AND PROCEDURES

Program track is the prime source for ALSEP support. Manual acquisition is possible using the antenna TV optics system. Perform acquisition in accordance with STDN No. 502.30.

30.3.3 CONTINGENCY PROCEDURES

Station personnel must have approval from the ALSEP Network or ALSEP OPS prior to performing real-time contingency procedures.

30.3.4 DATA TRANSMISSION PROCEDURES

Not applicable.

30.3.5 DATA RECORDING PROCEDURES

Configure analog stripchart recorders in accordance with STDN No. 502.30. Set recorder speed to 2 mm/sec.

30.4 DATA FORMATS

Not applicable.

SECTION 34. DOCUMENTATION BRIEFING REPORT

Note

This section is deleted.

APPENDIX A

ALSEP SUNRISE/SUNSET PREDICTIONS

APPENDIX A. ALSEP SUNRISE/SUNSET PREDICTIONS 1976

	ALSEP 5 20.17N 30.80E	ALSEP 3 9.00S 15.52E	ALSEP 2 26.10N 3.65E	ALSEP 4 3.67S 17.35W	ALSEP 1 2.99S 23.41W
LUN	39	47	56	62	77
SR	JAN 6/2053	JAN 8/0255	JAN 9/0219	JAN 10/2003	JAN 11/0813
SS	JAN 21/1643	JAN 22/2249	JAN 23/2213	JAN 25/1556	JAN 26/0230
LUN	40	48	57	53	78
SR	FEB 5/1128	FEB 6/1729	FEB 7/1653	FEB 9/1035	FEB 9/2247
SS	FEB 20/0705	FEB 21/1309	FEB 22/1234	FEB 24/0613	FEB 24/1648
LUN	41	49	53	54	79
SR	MAR 6/0130	MAR 7/0729	MAR 8/0652	MAR 10/0031	MAR 10/1239
SS	MAR 20/2042	MAR 22/0244	MAR 23/0206	MAR 24/1944	MAR 25/0622
LUN	42	50	59	65	80
SR	APR 4/1439	APR 5/2036	APR 6/1956	APR 8/1333	APR 9/0138
SS	APR 19/0923	APR 20/1521	APR 21/1442	APR 23/0315	APR 23/1357
LUN	43	51	60	66	81
SR	MAY 4/0253	MAY 5/0847	MAY 6/0804	MAY 8/0138	MAY 8/1332
SS	MAY 18/2108	MAY 20/0306	MAY 21/0225	MAY 22/1956	MAY 23/0642
LUN	44	52	61	67	82
SR	JUN 2/1417	JUN 3/2010	JUN 4/1926	JUN 6/1259	JUN 7/0047
SS	JUN 17/0818	JUN 18/1413	JUN 19/1331	JUN 21/0701	JUN 21/1750
LUN	45	53	62	68	83
SR	JUL 2/0116	JUL 3/0708	JUL 4/0625	JUL 5/2356	JUL 6/1140
SS	JUL 16/1912	JUL 18/0108	JUL 19/0026	JUL 20/1757	JUL 21/0445
LUN	46	54	63	69	84
SR	JUL 31/1213	AUG 1/1806	AUG 2/1724	AUG 4/1056	AUG 4/2221
SS	AUG 15/0619	AUG 16/1216	AUG 17/1135	AUG 19/0506	AUG 19/1553
LUN	47	55	64	70	85
SR	AUG 29/2335	AUG 31/0529	SEP 1/0443	SEP 2/2223	SEP 3/1006
SS	SEP 13/1759	SEP 14/2358	SEP 15/2318	SEP 17/1653	SEP 13/0342
LUN	48	56	65	71	86
SR	SEP 28/1137	SEP 29/1736	SEP 30/1655	OCT 2/1034	OCT 2/2221
SS	OCT 13/0629	OCT 14/1231	OCT 15/1153	OCT 17/0531	OCT 17/1616
LUN	49	57	66	72	87
SR	OCT 28/0036	OCT 29/0636	OCT 30/0558	OCT 31/2338	NOV 1/1132
SS	NOV 11/1955	NOV 13/0159	NOV 14/0123	NOV 15/1904	NOV 16/0544
LUN	50	58	67	73	88
SR	NOV 26/1429	NOV 27/2030	NOV 28/1953	NOV 30/1336	DEC 1/0142
SS	DEC 11/1008	DEC 12/1614	DEC 13/1540	DEC 15/0923	DEC 15/1050
LUN	51	59	68	74	89
SR	DEC 26/0458	DEC 27/1100	DEC 28/1025	DEC 30/0410	DEC 30/1610
SS	JAN 10/0048	JAN 11/0654	JAN 12/0619	JAN 14/0002	JAN 14/1041

Legend

All date time groups are in GMT.

LUN equals lunation.

SR equals sunrise.

SS equals sunset.

1. STANDARD DISTRIBUTION

NASA		Quantity
500	E. Carter	1
512	C. Maskaleris	1
513	D. Fahnestock	1
570.1	R. Mazur	1
801	R. Nuttall	1
815.1	E. Kirwan	1
841.1	COMM ENGR	1
842	L. Manning	2
850	W. LaFleur	1
850.1	D. Call	1
851	C. Roberts	1
851.1	E. Danko	1
851.2	E. Young	1
852	J. McAdory	1
852.1	W. Stonesifer	2
852.2	F. Wulff	5
852.3	G. Borkenhagen	1
861	E. Ferrick	1
861.2	G. David	1
861.3	F. Stocklin	1
862	J. Shaughnessy	1
862.2	L. Covington	1
862.3	R. Stanley	2
863	F. Kalil	1
863.1	D. Tinari	1
863.3	R. Morgan/ Library	1
863.4	F. Keith	1

BFEC		Quantity
CC	T. Helm	1
CSS	J. Johnson	1
DDS	F. Sorrels	1
DOC	I. Collins	3
	J. McDowell	3
	Storage (Redbranch)	30
MLG	R. Lutz	3
	H. Cunningham	1
MDO	M. Daniels	3
NTTF	J. McCarthy	10
OC	D. Duffy	2
OCO	D. Gandy	1
OPS	J. Haddaway	1
PEO	M. Hampton	3
	J. Harper	1
	Y. Park	3

BFEC		Quantity
RUS	C. Rohland	1
	NOCC Library	14
SEO	H. Kay	1
TOP	E. Martin	1
	J. Adams	3
	A. House	3
	A. Roloff	3
	R. Woodring	4

Switching Centers	Quantity
CSW	2
MAD	2
LDN	2
JPL	2

2. STATIONS

Supporting Stations	Quantity
ACN	7
AGO	10
BDA	10
GDS	10
GWM	10
HAW	10
MAD	10
MIL	10
ETC	10
ORR	5
QUI*	7
ROS	10
ULA	10

*One copy via Embassy Pouch

Nonsupporting Stations	Quantity
WNK	1
VAN	1

3. SPECIAL DISTRIBUTION

	Quantity
JSC	
FS-4	25
W. Easter	1
APB	
R. Leslie	1
NASA Hq.	
Code SL/Flinn	1
John Kunselman Marine Science Institute University of Texas 700 The Strand, Suite 106 Galveston, Texas 77550	1

4. DISTRIBUTION TOTAL

	Quantity
STANDARD:	139
STATIONS:	121
SPECIAL:	29
GRAND TOTAL:	289

STDN No.
601 ALSEP

NETWORK OPERATIONS SUPPORT PLAN FOR ALSEP

REVISION 2