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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ALSEP
CONSOLE HANDBOOK

APOLLO 12, ALSEP 1
THROUGH
APOLLO 17, ALSEP ARRAY E

1 GENERAL

2 MISSION SPECIFICS

MAY 15, 1971

3 OPERATIONAL PROCEDURES

PREPARED BY

FLIGHT CONTROL DIVISION

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

APOLLO

ALSEP CONSOLE HANDBOOK

APOLLO 12 ALSEP 1 THROUGH APOLLO 17 ALSEP ARRAY E

PCN-2

PREFACE

This page change notice (PCN) is a partial revision and should be incorporated into the basic document, dated May 15, 1971, according to the page change instruction sheet which follows this page. Incorporation of PCN-2 will make this handbook current as of November 2, 1972.

This document has been prepared by the Lunar/Earth Experiments Branch, Flight Control Division, to detail the operational responsibilities and procedures of the Lunar/Earth Experiments Branch personnel assigned to the flight control of Apollo lunar surface experiments package (ALSEP) missions. This shall be the governing document defining specific conduct of ALSEP operations and missions. This shall be the governing document defining specific conduct of ALSEP operations and pertains to all activities to be conducted in Room 314B of the Mission Control Center (the ALSEP control area) for the operational duration of ALSEP control. Procedures and positions which interface with these described herein shall be as specified in the applicable Flight Control Operations Handbook. Information contained within this document is effective as of November 2, 1972.

Questions and comments concerning the contents of this document should be directed to FC9/Mr. Keith K. Kundel, Lunar/Earth Experiments Branch, extension 3786.

Approved by:

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Chief, Lunar/Earth Experiments Branch

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P-CN-2

PAGE CHANGE INSTRUCTION SHEET

Update this document in accordance with the following instructions:

Remove and replace the following pages:

ii
iia
iib
vii

Add the following new SOP's:

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APOLLO

ALSEP CONSOLE HANDBOOK

APOLLO 12 ALSEP 1 THROUGH APOLLO 17 ALSEP ARRAY E

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1-7X	SOLAR WIND LO GAIN CHANGE
4-1X	2-HOUR SUPPORT
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*

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1 GENERAL

SECTION 1
GENERAL

1.1 INTRODUCTION

1.1.1 Purpose

This document comprises a set of operational philosophies, ground rules, procedures, and pertinent facility and equipment descriptions formulated by the Lunar/Earth Experiments Branch, Flight Control Division, to govern conduct of operations in the ALSEP control area, Mission Control Center Room 314B. It shall be used by ALSEP system flight controllers, in conjunction with other documentation defined herein, for real-time and near-real-time support of the ALSEP's for their operational duration.

1.1.2 Updates

This document shall be updated as deemed necessary by LEEB. However, it is not planned to update the general section on a mission basis.

1.2 ALSEP PREMISSION OPERATIONAL DOCUMENTATION

These documents will be originated by ALSEP flight controllers to present requisite plans, procedures, and contingency problem solutions.

1.2.1 ALSEP Systems Handbook

The ALSEP Systems Handbook is a functional representation of ALSEP systems prepared in a format for real-time use by flight controllers. Depth of detail will show telemetry and command interfaces and operational functions such that most contingencies can be determined and solved in real time.

1.2.2 ALSEP Mission Rules

Mission rules will be preplanned solutions to single-point failures. The ALSEP Senior Engineer (ASE) will govern when and if to apply a mission rule. Deviation from a mission rule will be documented in the mission log and, if justified, the specific rule will be updated. Mission rules are published by the Flight Operations Directorate with appropriate concurrence and approval of other center elements.

1.2.3 ALSEP Work Schedule

The work schedule is a detailed operations plan for deployment, activation, and planned experiment operations. The schedule will include support periods for previously deployed ALSEP's. The work schedule will terminate at LM ascent stage impact.

1.2.4 Console Handbook

The console handbook will contain information deemed necessary by ALSEP flight controllers for real-time support of the ALSEP.

1.3 ALSEP MISSION OPERATIONAL DOCUMENTATION

These documents and data will be collected during the mission for ALSEP analysis and historical purposes.

1.3.1 Activity Planning Guide

The planning guide will begin at LM ascent stage impact and be a real-time support schedule and activity guide for all deployed ALSEP's.

1.3.2 ALSEP Operations Report

The operations report is in two parts, a summary support plan and a parameter listing. The support plan is a weekly guide to the planned activities during real-time support. The parameter listing is to be completed with the last data slice before termination of support.

1.3.3 Data Book

Two identical data books will be kept for each ALSEP, one for the ALSEP ops room and one for the ALSEP office. A new data book will be started for an ALSEP at sunrise (sun angle of zero).

High-speed printer formats will be placed in the data book in the following order: Central Station, Experiment 1, Experiment 2, Experiment 3, Experiment 4, and Experiment 5. The central station format will have a tab placed on it with the following information written in black: day of year, date, and GMT. The formats will be obtained at the beginning and end of each support period and at even GMT hours.

A PSE format of "before" and "after" a leveling sequence will be placed in each book. A tab written in black will state axis leveled and if "forced" or "auto" mode. "Before" and "after" will be written on the appropriate sheet.

In the case of a contingency problem, a format of the contingency will be placed in each book and a tab written in red will state the problem and experiment affected.

1.3.4 Console Log

The console log will be a history of everything that occurred during a support period. It will reflect all commanding and anomalies. It will detail what has been accomplished and what inputs are to be done.

All ASE's will be knowledgeable of all inputs and all ASE's will use the console log to pass information on to other ASE's.

Important information will be written in red. Routine information in black.

1.3.5 Deployment Log

A deployment log will be originated and followed by the "Deployment ASE". It will be a detailed log of all operations accomplished from the time of initial deployment to the beginning of normal ALSEP operation.

1.3.6 SPAN/Mission Evaluation Action Request (SMEAR)

A SMEAR is generated for two reasons: 1) to determine the cause of ALSEP problems and 2) to request an action of an organization.

SMEAR's are sent to S&AD concerning science priority, to MER for engineering problems, and to FOD for operational procedures.

1.4 DATA

Data is defined as all high-speed printer copy, teletype copy, analog chart and drum recorder charts, and miscellaneous text generated during or as a result of real-time operations.

Data shall be collected for two purposes: operational and scientific. Operational data shall be used to assess operation of ALSEP systems and provide a baseline for future operations. Scientific data shall be distributed to the appropriate principal investigator (PI) for his use. No hardcopy format distinction is made between operational and scientific data — the difference is only in how the data will be used.

It must be stressed that any hardcopy data from ALSEP with any scientific content is privileged information to the responsible PI for a period of one year from acquisition and shall not be indiscriminately distributed even within the control center. In no case shall distribution of scientific data be made by flight control personnel to any parties not directly concerned with the actual operation of the particular instrument.

1.5 OPERATIONS PLANNING MEETINGS

Operations planning meetings shall be held periodically to discuss ALSEP status and decide the nature of and schedule for future operations. Meetings shall be chaired by an appropriate representative of the flight director, and shall have representation from S&AD, LSPO, PI's, ALSEP flight controllers, and any other personnel concerned with conduct of the mission.

1.6 REFERENCE FILE

A reference file shall be maintained in the control area and shall contain current information of three types:

A. MSC operational documentation (e.g., ALSEP Systems Handbook, FCOH, SODB, Mission Rules, and any other such documents generated on site which apply to ALSEP operations).

B. Appropriate vendor and contractor file material such as Bendix specifications, ATM's containing pertinent information not included in operational documents, such as calibration curves and the like. (It may be appropriate to secure the ALSEP flight systems logs from the Cape postlaunch.)

C. Data generated during ALSEP test and support periods. This category shall include but not be limited to fulfilled work schedules, high-speed printer hardcopy, teletype messages, plots, selected analog recorder charts, and selected operations log

and support summary information which may be needed for future reference. It is intended that the bulk of the above mentioned items shall be controlled by console handbook procedures so that old, no-longer-useful data shall be periodically discarded in the interests of good housekeeping and efficient access to data which are pertinent. (This minimizing of the volume of stored paper shall be the responsibility of the ALSEP Data Engineer.)

Inasmuch as is practicable, the reference file shall be limited to one of each type of document, and the documents in the file shall be the latest issues available. Marked-up documents in the file, based on real-time information, shall be the basic for any required future revisions to those documents.

1.7 ALSEP SYSTEMS FLIGHT CONTROLLERS

1.7.1 General

There shall be three ALSEP systems flight controller positions, designated:

A. ALSEP Senior Engineer - call sign "ASE"
B. ALSEP Systems Engineer - call sign "SYSTEMS"
C. ALSEP Data Engineer - call sign "DATA"

In all cases the ASE shall be charged with the responsibility for directing the conduct of all activity in the ALSEP control area, Room 314B of the MCC. The ASE position shall be manned during all operational periods.

1.7.2 ALSEP Senior Engineer

1.7.2.1 Duties of the ALSEP Senior Engineer.- The ASE shall perform the following:

A. Act as officer-in-charge of ALSEP control area
B. Act as prime voice contact with MOCR positions during Apollo missions
C. Act as prime systems voice contact with remote sites
D. Be responsible for initiating all ALSEP commands
E. Act as prime voice contact with LSPO/PI's for conversations pertinent to real-time operations
F. Conduct operations in accordance with ALSEP work schedule and applicable console handbook procedures
G. Certify by signature the operations log and activity summary for the support period
H. Participate in monitoring systems health and scientific data validity
I. Perform selected duties assigned SYSTEMS and DATA in the event these positions are not manned

1.7.3 ALSEP Systems Engineer

1.7.3.1 Duties of the ALSEP Systems Engineer.- The SYSTEMS shall perform the following:

A. Be responsible for configuring data display devices in accordance with work schedule
B. Act as prime voice contact with the ALSEP Computer Controller (ACC)
C. Act as prime voice contact with the M&O
D. Act as prime monitor and analyst of ALSEP systems health and scientific data validity
E. Participate in analyzing systems data and troubleshooting in case of non-nominal indications and recommend corrective action to the ASE
F. Contribute to maintenance of the operations log
G. Make required systems checks associated with command sequences, advising ASE of status at all times
H. Perform selected duties assigned to DATA in the event this position is not manned

1.7.4 ALSEP Data Engineer

1.7.4.1 Duties of the ALSEP Data Engineer.- The DATA shall perform the following:

A. Be responsible for the maintenance of hardcopy data files (analog recorder charts and printouts) in accordance with applicable procedures
B. Maintain group display status boards in a current configuration
C. Verify data to be logged is acquired, per applicable procedures
D. Plot selected data in concise analog form for logging
E. Act as prime interface with LSPO/PI's for non-real-time status briefings and for data retrieval, discussion, explanation, and interpretation
F. Annotate recorder chart paper and printer formats as required
G. Operate P-tube system and opaque televiewer as required.
H. Assist in area housekeeping by collating, filing, and selectively discarding data, per procedures, in a timely fashion
I. Review recorded data for significant long-term trends and characteristics and advise ASE if these are detected
J. Assist in maintaining operations log

1.7.5 ALSEP Flight Controller Certification

Certification of an individual as an ALSEP system flight controller will be accomplished by the Experiments Section Head of the LEEB. The actual certification criteria are based on various degrees of individual accomplishments in areas pertaining to the operations position in the staff support room (SSR). The assignment of individuals to operational positions will be accomplished by the Lunar/Earth Experiments Branch Chief based on the recommendations from the Experiments Section Head. These appointments are subject to approval by the FCD Chief and the mission flight director.

In order to become certified in the various ALSEP operational positions the ALSEP flight controller should

A. Be familiar with the MSFN operations or have completed the "Introduction to Flight Control" course taught by the FCD training section

B. Have completed the ALSEP familiarization course and other courses and briefings by Bendix

C. Be familiar with the contents of the following documents:
   1. SR-502, Rev 1 (ALSEP Generic Requirements)
   2. SR-502, Addendum 1 (ALSEP MCC Detailed Command Requirements)
   3. ALSEP Data Book, Volume V of the CSM/LM Spacecraft Operational Data Book
   4. Flight System Familiarization Manual, Revision A
   5. SR's 1070 - 1071 (ALSEP Remoted Site Telemetry and Command Programs)
   6. Interface Control Specification for MSFN/MCC/ALSEP Operation
   7. Network Operations Procedures
   8. ALSEP Data Pack

D. Have participated in simulations or have performed on-the-job training under the supervision of a qualified ALSEP flight controller during an actual mission

The above is included in this console handbook as a guide for ALSEP systems flight controller certification.

1.8 CONSOLE AREA

Figure 1-1 is a layout of ALSEP operations rooms. Figure 1-2 is Console 88 which is the ALSEP/P&FS operations console. Note: Only ALSEP peculiar items will be explained in this handbook.

1.8.1 Communications Positions

The following communications loops are provided from two comm positions, 4140 and 4141, to support ALSEP (figure 1-3):

	LOOP NAME	TALK/MONITOR CAPABILITY
1.	ALSEP SYS	T/M
2.	ALCS CMD/NWK	T/M
3.	PI COORD	T/M
4.	ALSEP GOSS	T/M
5.	FD (3RD FLOOR)	T/M
6.	FD (2ND FLOOR)	T
7.	SSR CONF (3RD FLOOR)	T/M
8.	SSR CONF (2ND FLOOR)	T/M
9.	SSR VEHICLE SYSTEM 3 (3RD FLOOR)	T/M
10.	SSR VEHICLE SYSTEM 3 (2ND FLOOR)	T/M
11.	GOSS CONF (3RD FLOOR)	M
12.	GOSS CONF (2ND FLOOR)	M

LOOP NAME	TALK/MONITOR CAPABILITY
13. ALSEP DISPLAY	T
14. GCC	T
15. COMM CALL	T
16. DISPLAY	T
17. AFD CONF	T/M
18. APOLLO CHIEF ENG	M
19. EO CONF	M/T
20. SCIENCE COORD	M/T
21. GOSS 2	M

The use of each loop is as follows:

A. ALSEP system - This loop is to be used for flight controller coordination with the Program Office, PI's, and EXPO.

B. ALCS COMMAND/NETWORK - This loop is to be used for flight controller coordination with ALCS operator and ALSEP network.

C. PI coordination - This loop is to be used by principal investigators for coordination with their support personnel.

D. ALSEP GOSS CONFERENCE - This loop is to be used by flight controllers and network controller for MSFN coordination.

E. FLIGHT DIRECTOR (2ND & 3RD FLOOR) - This loop is to be used by flight controllers to brief flight director on status of ALSEP.

F. SSR CONFERENCE & SSR VEHICLE SYSTEMS 3 (2ND & 3RD FLOOR) - Used for coordination between ALSEP flight controllers and EMU system engineer and PLSS support personnel.

G. GOSS CONFERENCE (2ND & 3 RD FLOOR) - To monitor the mission (primarily during ALSEP deployment).

H. ALSEP DISPLAY - This loop is to be used for flight controller coordination with M&O.

I. GCC - This loop is to be used by flight controllers to coordinate TTY messages and problems with GCC.

J. COMM CALL - This loop is to be used by flight controllers for coordination of problems with VOICE and GCC.

K. DISPLAY - Prime loops for TECH OPS. Used for flight controllers to report display problems.

L. GOSS 2 - Backup to GOSS CONF.

M. AFD CONF - Coordinate with MOCR AFD.

N. APOLLO CHIEF ENG - SPAN ROOM coordination.

O. EO CONF - EO conf with MOCR except FD.

P. SCIENCE COORD - S&AD coord with SPAN ROOM.

1.8.2 ALSEP Command System

A modified universal command system will be utilized for real-time commands. The system is comprised of two panels: the command control module and the digital select module.

1.8.2.1 Digital select module (figure 1-4).-

A. FUNCTION CODE - A three-digit thumbwheel device is used to dial in the octal number of the command to be executed. (Example: Octal Command 123 - dial in 1 using the left thumbwheel, 2 using the middle thumbwheel, and 3 using the right thumbwheel.)

B. COMMAND REQUEST windows - A four-place readout device will display the following information: Left window is to display the ALSEP number and decoder section that has been selected using the command control module, and the next three windows will display the three octal digits that have been selected by the thumbwheels.

C. ENTER/INVAL REQUEST PBI - Upon depression of this PBI the information as seen in the COMMAND REQUEST windows will appear in the COMMAND EXECUTE windows, and the top half (ENTER) of the PBI will illuminate. (Note that the same information now appears in both the COMMAND REQUEST windows and the COMMAND EXECUTE windows.) The lower half (INVAL REQUEST) will illuminate if the PBI has been depressed (to perform an enter function) if one or more of the following conditions exist:

1. Console is not site selected.
2. A RTC is selected without selecting a decoder address.
3. FC/M&O indicator indicates M&O mode.
4. Any octal number selected by FUNCTION CODE thumbwheels not identified by the ALCS as a valid ALSEP command.

The INVAL REQUEST will also be illuminated if a discrepancy exists between the enter function request and the execute function request. In any event the ALCS will not output an execute request to MSFN if the INVAL REQUEST PBI is illuminated. The top half (ENTER) will be extinguished upon depression of the EXECUTE PBI at which time the ALCS outputs the request to the MSFN. The lower half (INVAL REQUEST) can be extinguished by correcting the condition which caused the INVAL REQUEST to illuminate and redepressing the ENTER PBI.

D. ENABLE/DISABLE PBI - The ENABLE/DISABLE PBI is an alternate action PBI which will activate or deactivate command execute capability from the DSM. The top half of the PBI (ENABLE) is illuminated when command capability is available. Depressing the PBI when in the enable state will deactivate the command capability and illuminate the lower half (DISABLE).

In the disable mode, the enter and execute functions are deactivated. However, the light indications in the COMMAND EXECUTE readout windows, ENTER PBI, and EXECUTE/VERIFY PBI (light status for these indicators established in the enable

mode) are to be retained in the disable mode. The following functions are to active in both the enable and disable modes:

1. The FUNCTION CODE select thumbwheels
2. COMMAND REQUEST readout
3. All functions on the command control module

E. COMMAND EXECUTE WINDOWS - The information that is contained in the COMMAND REQUEST windows will appear in the COMMAND EXECUTE windows upon depressing the ENTER PBI.

NOTE

The ENABLE/DISABLE PBI must be in the ENABLE position.

The COMMAND EXECUTE windows will be extinguished upon depressing the EXECUTE PBI, at which time the ALCS outputs the request to the MSFN.

F. EXECUTE/VERIFY PBI - Upon depressing the EXECUTE/VERIFY PBI the ALCS will output the execute request to the MSFN, illuminate the top half (EXECUTE) of the PBI, and extinguish the COMMAND EXECUTE readout and the enter indication. Upon receipt by the ALCS of a CAP indicating verification, the lower half (VERIFY) will illuminate and the top half (EXECUTE) will be extinguished. If illuminated, either half of this PBI can be extinguished by depressing the ENTER PBI.

1.8.2.2 Command control panel (figure 1-5).-

A. ALSEP select PBI's - Four PBI's are required for selection of the ALSEP and decoder designated to receive a command. These PBI's will illuminate upon depression. They are to be interlocking such that selection of any ALSEP/decoder PBI when depressed will automatically deselect the previously selected one. These indicators can be extinguished by depressing the ADDRESS CLEAR PBI. The ALSEP/decoder PBI number selected for commanding will appear in the window of the COMMAND REQUEST readout on DSM.

B. ADDRESS CLEAR - Depression of this PBI is to clear all logic associated with the ALSEP PBI's and extinguish any one that is illuminated.

C. MAP OVERRIDE - This function is to allow RTC's to be transmitted without regard to command verification waiting period required in the normal mode. The MAP override function is an alternate action PBI. Depression of the PBI switches the command system to the MAP override mode and illuminates the PBI. Redepression is to extinguish the PBI and return command system to normal mode.

D. SITE SEL - When the PBI is illuminated it indicates that the console is selected to a remoted site for commanding. The ALSEP Command Controller has control of this function.

E. FC/M&O indicator - When the upper half is illuminated (FC) the flight controller has command capability. When the lower half (M&O) is illuminated the flight controller does not have command capability. The ALCS operator uses the M&O mode for checking his command program. The FC/M&O control function is located on the ALSEP Computer/Network Controller Console.

F. 1 KC/CVW - Two of these indicators are furnished (one for each ALSEP being displayed). The upper half (1 KC) will be illuminated when measurement AB-1 indicates that the corresponding ALSEP receiver is receiving the 1-kHz subcarrier of the remoted site USB command system. This 1 kHz is used by the command decoder to phase lock a voltage control oscillator to assure command bit synchronization. The lower half (CVW) will be illuminated when the command verification word (10-bits) departs from an all zeros bit pattern.

G. SITE VAL/RSCC INVAL - The upper half (SITE VAL) will be illuminated when the ALCS receives a CAP word which indicates that the remoted site accepted an execute and is going to act upon it. It will be extinguished upon ALCS receipt of a CAP word which indicates verification, S/C reject, or ground reject. It can also be extinguished by initiation of an execute, or by depressing the SITE VAL/RSCC INVAL PBI. The lower half (RSCC INVAL) will be illuminated when ALCS receives a CAP word which indicates that a good execute was received by the remoted site, but some onsite function in process prohibits processing the execute. The lower half can be extinguished by its depression or by initiation of an execute.

H. S/C REJ/GND REJ - The upper half (S/C REJ) will illuminate when the ALCS receives a CAP word that indicates that a command was transmitted to the ALSEP in response to an execute, but a verification could not be determined. The upper half can be extinguished by its depression or by initiation of an execute.

The lower half (GND REF) will be illuminated when the ALCS receives a CAP word which indicates that an execute had been received, but a problem was encountered in ground equipment and could not be executed properly. The lower half can be extinguished by its depression or by initiation of an execute.

1.8.3 High-Speed Printer Control Panels (Figures 1-6, 1-7)

The requirements to receive data from two ALSEP's at MCC and be able to have rapid access to hardcopy printout of either were the criteria for selecting a high-speed printer.

The control panels for the high-speed printer are located on the flight controller console. The control panels with their associated software program give great flexibility in displaying data. (See figures 1-6 and 1-7).

A. The capabilities are as follows:
   1. Select the desired ALSEP
   2. Select individual data formats
   3. Stack format requests

4. Limit sensing on key TM parameters located in central station with auto printout of central station format if out-of-limits conditions exist (two ALSEP's)
5. Auto print on ASE when ASE mark event (DS-18) is 00100

B. Two types of formats have been identified, they are:
   1. Hardcopy - Upon selection, the formats which will be printed out one time only are PSE, C/S, and ASE.
   2. Continuous - Upon selection, the other formats will be continuously printed until a stop is initiated.

C. Format select
   1. ALSEP select PBI's - PBI's ALSEP A and ALSEP B are provided for switching between ALSEP's for data monitoring. These PBI's will illuminate upon depression. They are interlocked such that selection of any ALSEP when depressed will deselect the previously selected one and the display guide. These PBI's can be extinguished by depressing the CLEAR PBI.
   2. ALSEP DISPLAY GUIDE - This PBI is interlocked with the ALSEP select PBI's. Depression of this PBI will cause it to illuminate, deselect any ALSEP selected PBI, and select the display guide for printout. Like the ALSEP select PBI's it can be extinguished by depressing the CLEAR PBI.
   3. Format request PBI's - The PBI's are interlocked such that selection of any format request PBI when depressed will deselect the previously selected one. These PBI's will illuminate upon depression and cause the selected format to be printed when executed. The format request PBI's can be extinguished by depressing the CLEAR PBI.
   4. EXECUTE PBI - After selection of ALSEP and format (and STOP if required) depressing this PBI will enter the request into the ALCS. This is a momentary PBI.
   5. INVAL REQUEST - This indicator will illuminate when the execute PBI is depressed if one of the following conditions exists:
      a. ALSEP PBI not selected.

      NOTE

      ALSEP DISPLAY GUIDE when depressed will deselect ALSEP PBI and is a valid request.

      b. ALSEP selected, but no format selected.
      c. A stop request executed without having executed a printout request of a format.
      d. A stop function executed and not cleared (by depressing the CLEAR PBI) and another format request executed.
      e. More than two formats selected at one time.
      f. The ALCS does not recognize the format selected as being a valid request for the ALSEP selected.

      The inval indicator can be extinguished by making a valid request and executing.

6. STOP PBI - When a continuous format is to be terminated the ALSEP PBI and the format PBI will have to be selected before depressing the STOP PBI. At this time the PBI will be illuminated and the CLEAR PBI must be depressed to deselect the STOP PBI. If the stop request is executed while the printer is printing, the format will be terminated at the end of that page. If the request is executed during data collection cycle, the format is terminated immediately.

7. CLEAR PBI - Upon depressing, all PBI's selected will be deselected and extinguished. However, there is no input to ALCS.

Stacking format requests can be accomplished dur to data collection time being longer than printout time and time-sharing the printer for printout.

The auto printout is printed immediately if the printer is not in use or at the end of the page being printed at that time. When an out-of-limits condition exists, a dollar sign ($) is printed to the right of the parameter out of limits. The capability to disable the auto forced printout of the central station and ASE formats by ALCS MED exists.

1.8.4 Analog Recorders

Four (8-pen) analog recorders are provided for displaying data. The capability for the flight controller to switch between ALSEP's and data formats in real time is provided by an analog recorder control panel located on the systems console (figure 1-8). The formats that are switchable are defined premission. The DAC's that drive these recorder are 8-bit DAC's.

A. ALSEP select PBI's - PBI's ALSEP A and ALSEP B are provided for switching between ALSEP's for data monitoring. These PBI's will illuminate upon depression. They are interlocked such that selection of any ALSEP when depressed will deselect the previously selected one. These PBI's can be extinguished by depressing the CLEAR PBI.

B. Recorder select PBI's - Individual PBI's are provided for selection of the recorder that a format is to be displayed on. These PBI's will illuminate upon depression. They are interlocked such that selection of any recorder when depressed will deselect the previously selected one. These PBI's can be extinguished by depressing the CLEAR PBI.

C. Format select PBI's - Individual PBI's are provided for selection of the format that is to be displayed on a recorder. These PBI's will illuminate upon depression. They are interlocked such that selection on any format when depressed will deselect the previously selected one.

D. EXECUTE PBI - After selection of ALSEP, recorder, and format, depressing this PBI will enter the request into the ALCS. This is a momentary PBI.

E. INVAL REQUEST - This indicator will illuminate when the EXECUTE PBI is depressed if one of the following conditions exists:

1. ALSEP PBI not selected.
2. RECORDER PBI not selected.
3. Format not selected.
4. The number of analog display devices that a DAC can drive (four maximum) has been exceeded. This includes meters and analog recorders.

This indicator can be extinguished by making a valid request and executing.

F. CLEAR PBI - Upon depressing, all PBI's selected will be deselected and extinguished. However, there is no input to ALCS.

G. To clear a recorder, select the recorder number with no format or ALSEP selected and execute.

1.8.5 Drum Recorders

Eight drum recorders are provided with variable input filters for support of PSE. The recorders will be driven by 10-bit DAC's. The recorders are divided into two groups (Group A and Group B) and each group will contain four recorders. A group of recorders are configured at one time with a predefined format. No control panel is provided to the flight controller for configuring the drum recorders. The ALCS operator will configure the recorders by his MED device upon request from the flight controller.

1.8.6 D/TV

Two TV monitors are provided. Provision to monitor ALSEP data by D/TV is not provided. The capability to channel-attach data being displayed in Mission Operations Control Room 1 and/or 2 is provided using a manual select keyboard (MSK). A module is provided beneath each TV monitor to indicate from which floor the data being displayed is being generated.

Manual select keyboard (figure 1-9)

A. MODE PBI - The capability to channel attach only requires one PBI which will be illuminated upon depressing.

B. SECOND FLOOR/THIRD FLOOR PBI's - Separate PBI's are provided for selecting the desired floor that data is to be monitored from. These PBI's will illuminate upon depression. They are interlocked such that selecting one will deselect the other.

C. SELECT NUMBER - A four-digit thumbwheel device is provided to dial in the TV channel that is to be monitored. The number of TV channels available only requires using the two right thumbwheels.

D. ENTER PBI's - Separate PBI's are provided for selection of the TV monitor that the data are to be displayed on. These PBI's are momentary PBI's.

1.8.7 Limit Sensing

A limit sensing routine is provided to indicate when a TM parameter exceeds predetermined limits. The limits can be changed in real time by the ALCS operator. A high-speed printer format is provided listing the TM parameters and the lower and upper limits assigned each parameter.

Out-of-limits conditions are displayed several ways:

A. Separate event indicators for individual TM parameters.

B. Category (where more than one TM parameter is assigned the same event indicator).

C. Flag appears by the TM parameter on high-speed printer formats.

1.8.8 Event Indicator Panels

1.8.8.1 18/36 event indicator panel.- The requirement to support more than one ALSEP simultaneously using the same console makes it necessary to drive each event indicator panel with data from a different ALSEP flight article. These four individual event panels will display the following types of data:

A. ALCS sync data

B. ALSEP status data

C. ALSEP limit-sensing data

1.8.8.2 72 event indicator panel.- This event indicator panel is to be used to support all ALSEP flight articles. The top two rows of indicators are to be used to support ALSEP 1. The other indicators will be configured at a later date to support the other three ALSEP's. The first two rows of indicators are used for limit sensing certain TM parameters located in the central station. The only way to extinguish any of these indicators is to change the limits by MED.

1.8.9 ALSEP Identification Panel (Module 30)

This panel will tell which ALSEP is on System A or System B. The following will be used for coordination:

ALSEP 1	Apollo 12	ALSEP 1
ALSEP 4	Apollo 14	ALSEP 4
ALSEP 2	Apollo 15	ALSEP A2
ALSEP 3	Apollo 16	ALSEP Array D
ALSEP 6	Apollo 17	ALSEP Array E

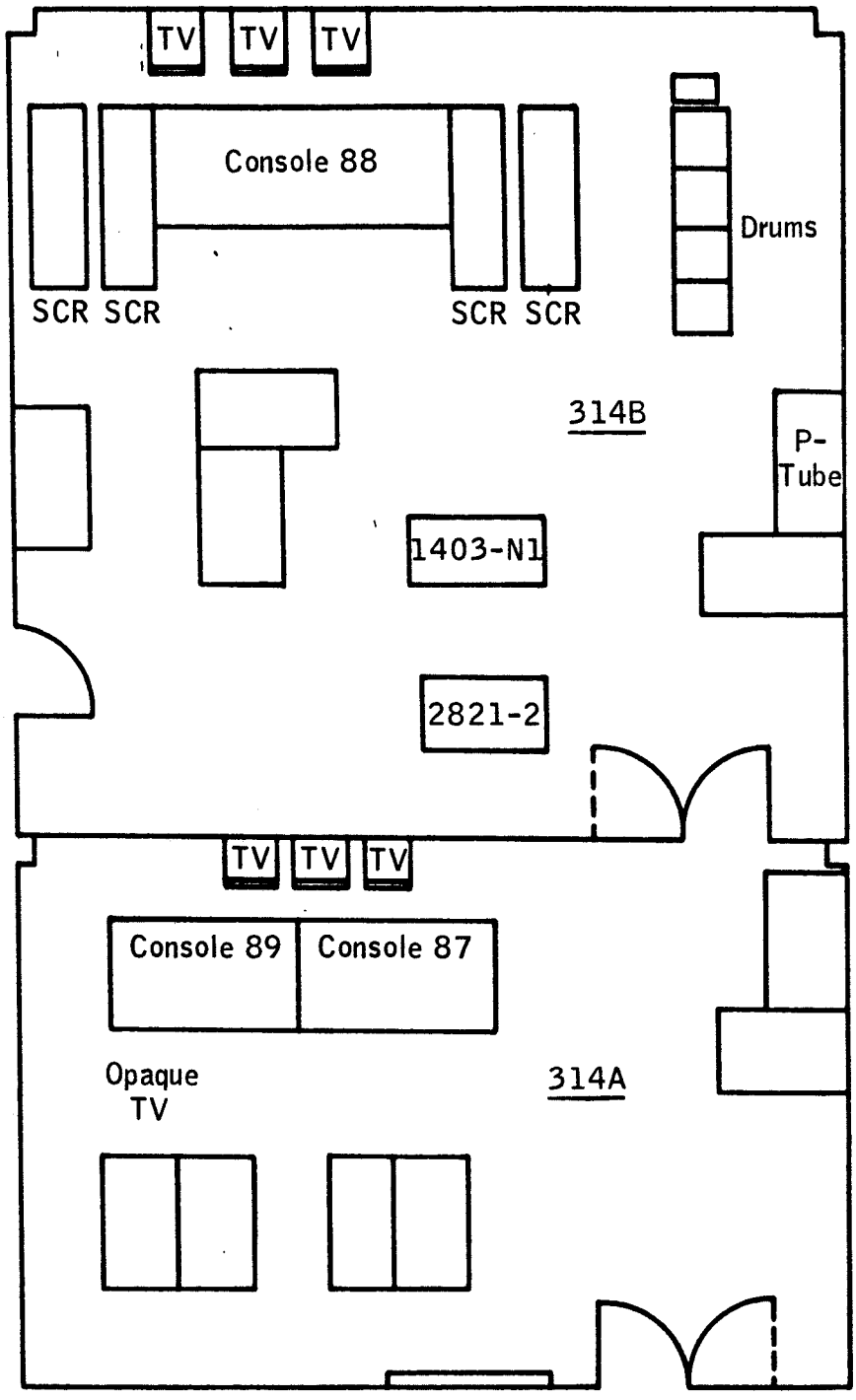

Figure 1-1. - ALSEP/P&FS Operations Rooms.

LOC	DESCRIPTION
01	VOICE COMM POSITION-4140
02	EVENT INDICATOR (72)
03	EVENT INDICATOR
04	EVENT INDICATOR
05	EVENT INDICATOR
06	EVENT INDICATOR
10	VOICE COMM POSITION-4141
11	COMMAND CONTROL
12	DIGITAL SELECT
13	TV MONITOR PRECISION
14	TV MONITOR PRECISION
15	BLANK PANEL
16	STOP CLOCK (4DIGIT)

LOC	DESCRIPTION
17	TV MONITOR 14 PRECISION
19	TV MONITOR 14 PRECISION
20	VOICE COMM SPEAKER
21	EVENT INDICATOR
23	SWITCH MODULE
25	SWITCH MODULE
26	SWITCH MODULE
27	SWITCH MODULE
28	SWITCH MODULE
29	MANUAL SELECT KEYBOARD
30	EVENT INDICATOR
31	SWITCH MODULE
32	VOICE COMM POSITION-
33	MANUAL SELECT KEYBOARD

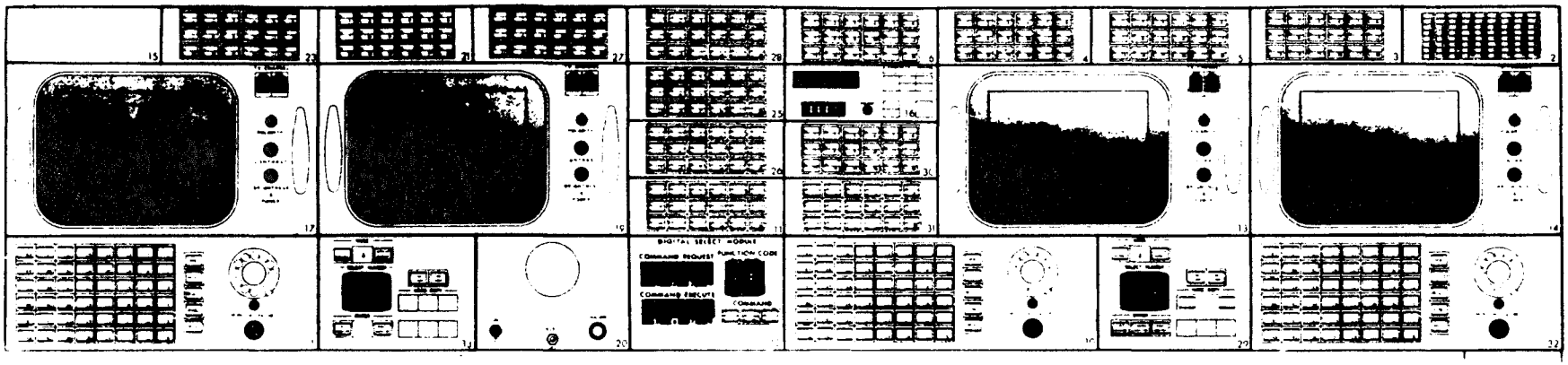

Figure 1-2. - Console 88, ALSEP/P&FS.

4 ALSEP DISPLAY W T	4 GCC W T	4 COMM CALL W T	3 DISPLAY W T				PABX W T
3 GOSS CONF G *M	3 GOSS CONF Y M	3 FD CONF Y M	3 EO CONF W T	3 GOSS 2 Y M	3 AFD CONF Y M	3 AFD CONF W T	PABX W T
3 FD G *M	3 FD Y M	3 FD W T	3 SSR CONF Y M	3 SSR CONF W T	3 SSR VEH SYS Y M	3 SSR VEH SYS W T	
4 ALSEP SYS Y M	4 ALSEP SYS W T	4 ALCS CMD NWK Y M	4 ALCS CMD NWK W T	4 ALSEP GOSS Y M	4 ALSEP GOSS W T		
4 APOLLO CHIEF ENGR Y M		3 SCIENCE COORD Y M	3 SCIENCE COORD W T	4 PI COORD Y M	4 PI COORD W T		
	2 FD W T	2 SSR CONF Y M	2 SSR CONF W T	2 SSR VEH SYS Y M	2 SSR VEH SYS W T		

T = TALK (WHITE)
M = MONITOR (YELLOW)
* M = HIGH-LEVEL MONITOR (GREEN)

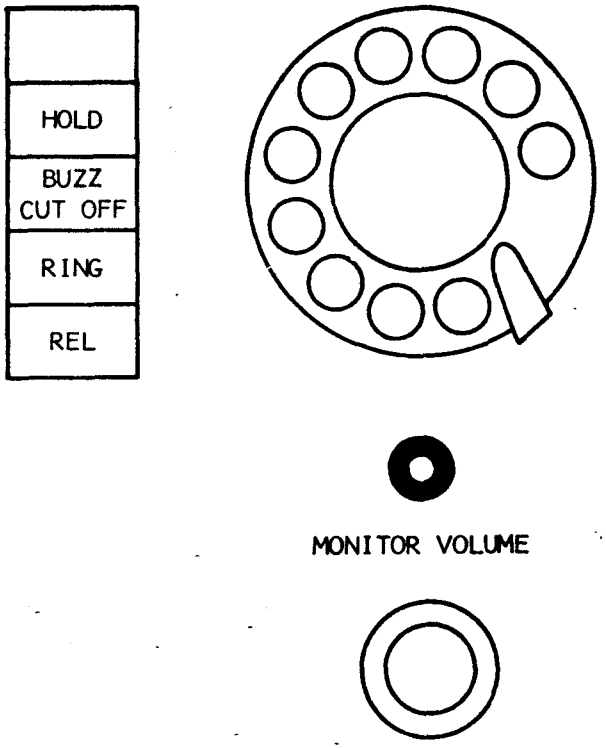

Figure 1-3.- Comm panel - positions 10 and 32.

Mission ALSEP

Console 88

Module 12

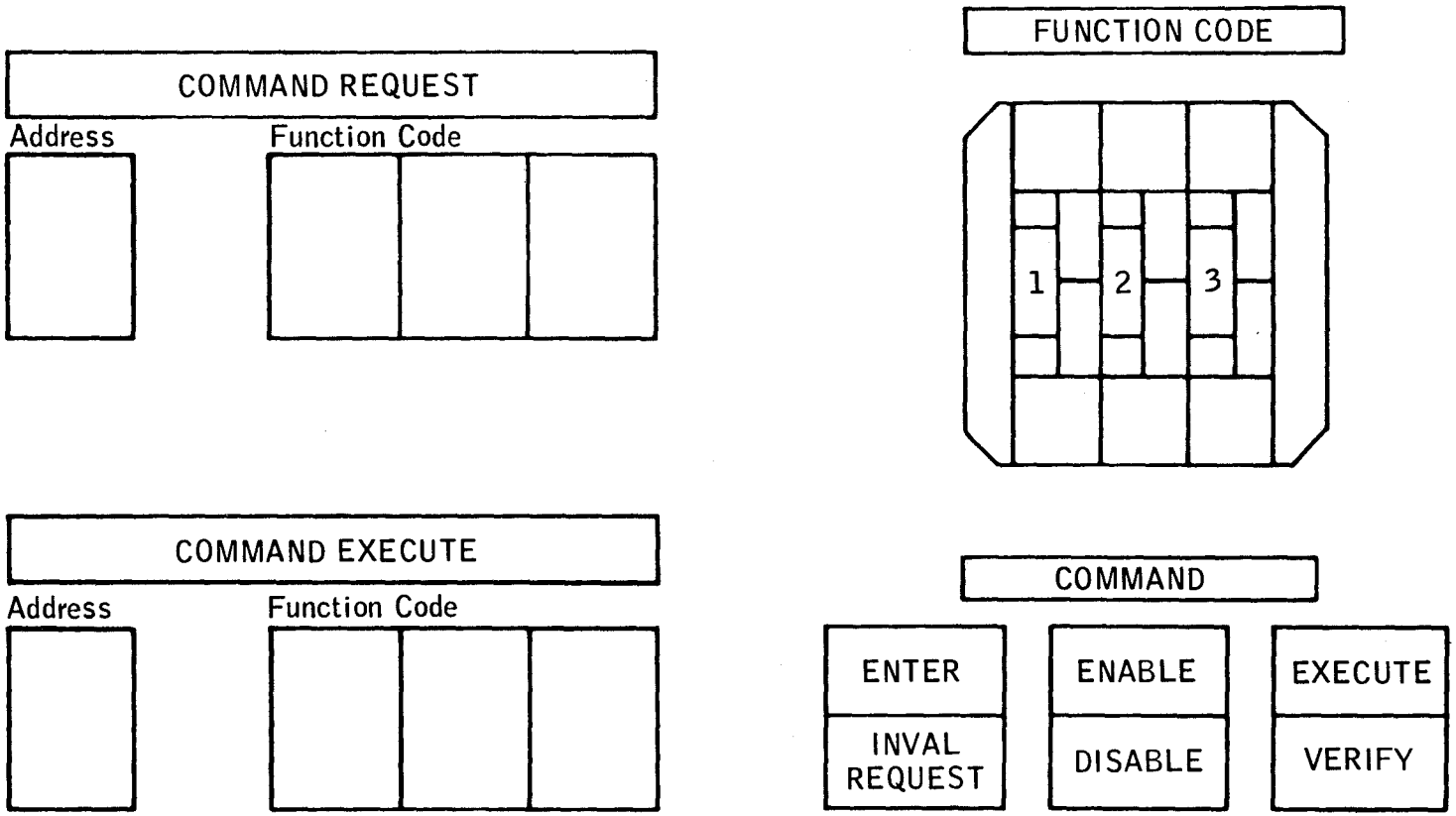

Figure 1-4. - Digital select module.

Mission ALSEP

Console 88

Module 11

P&FS 1	SYSTEM A DECODER A	SYSTEM B DECODER A		ADDRESS CLEAR	MAP OVERRIDE
P&FS 2	SYSTEM A DECODER B	SYSTEM B DECODER B		SITE SEL	FC M&O
Ø LCK	1 KC	1 KC		SITE VAL	S/C REJ
MAP	CVW	CVW		RSCC INVAL	GND REJ

Figure 1-5.- Command control panel.

Mission ALSEP

Console 88

Module 25

PFS 1	PFS 2	ALSEP A	ALSEP B	DISPLAY GUIDE	STOP
PSE	LSM 1	SWS	SIDE/ CCIG 1	ALSEP LIMITS TABLE	CLEAR
CENTRAL STATION	LSM 2		SIDE/ CCIG 2	INVAL REQUEST	EXECUTE

Figure 1-6.- High-speed printer control panel 1.

Mission ALSEP

Console 88

Module 26

PFS RT	PFS LIMITS			CPLEE 1	HF 1
PFS C1-C4 MRO	PFS MAG #1 MRO			CPLEE 2	HF 2
PFS TELE MRO	PFS MAG #2 MRO			CCGE	ASE

Figure 1-7.- High-speed printer control panel 2.

Mission ALSEP

Console 88

Module 28

FORMAT 1	FORMAT 2	RECORDER 1	RECORDER 2	RECORDER 3	RECORDER 4
FORMAT 3	FORMAT 4	FORMAT 5	ALSEP A	ALSEP B	CLEAR / INVAL REQUEST
FORMAT 6	FORMAT 7	FORMAT 8	PFS 1	PFS 2	EXECUTE

Figure 1-8.- Analog recorder control panel.

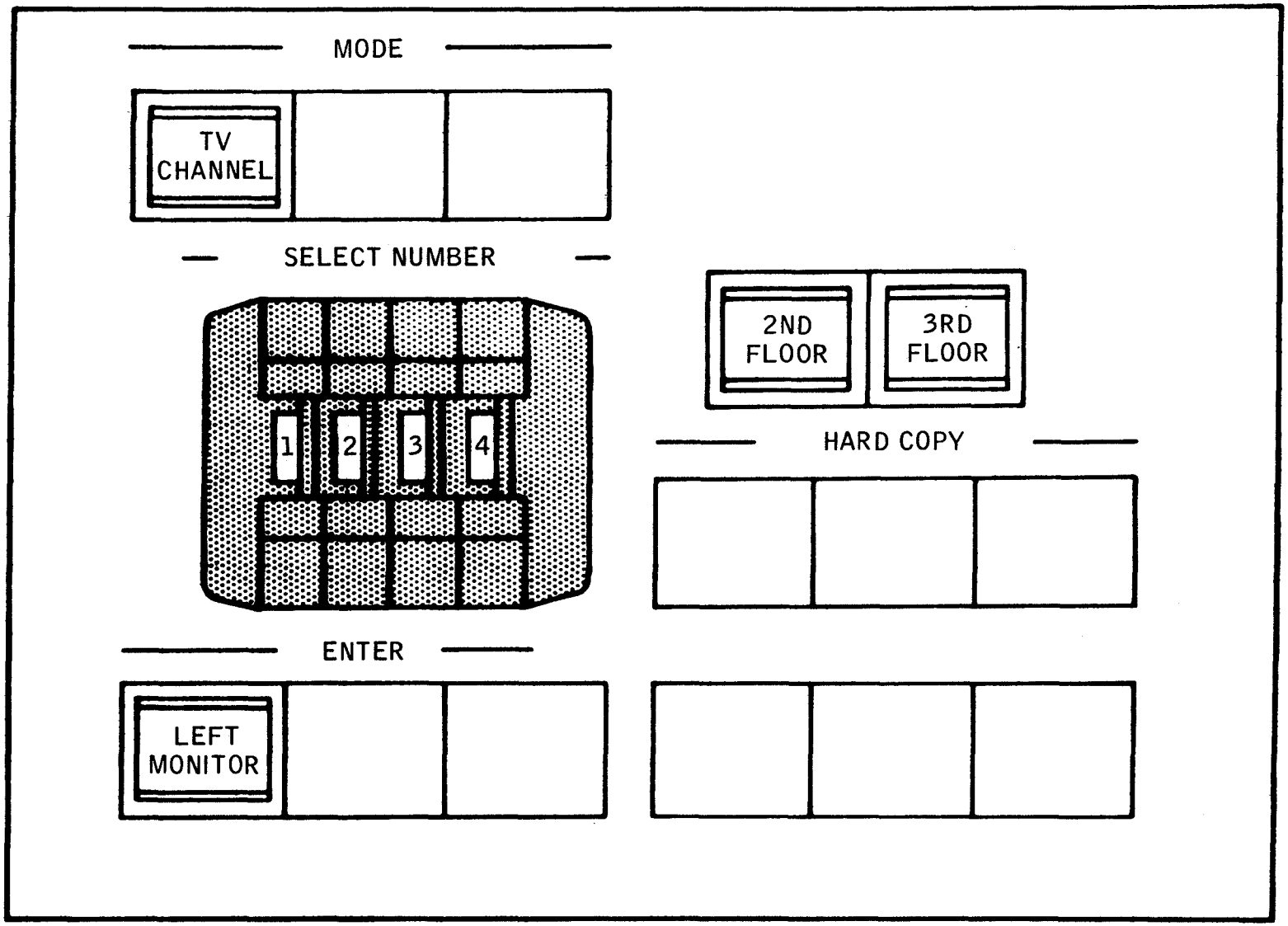

Figure 1-9. - Manual select keyboard, modules 29 and 33.

Mission _____

Console _____

Module 30

A ALSEP 1	B ALSEP 1				
A ALSEP 2	B ALSEP 2				
A ALSEP 4	B ALSEP 4				
A ALSEP 3	B ALSEP 3				
A ALSEP 5	B ALSEP 5				

Figure 1-10.- ALSEP identification panel.

1.9 GENERAL OPERATING PROCEDURES (GOP)

1.9.1 GOP 1 REAL-TIME COMMANDING

PURPOSE

To describe the normal constraints and techniques for real-time commanding

PROCEDURE

A. Precommand checklist

Sequence	Function	Indication	Action
1	SITE SEL	Illuminated Extinguished	None Call up ACC
2	FC/M&O	FC illuminated M&O illuminated	None Call up ACC
3	ENABLE/DISABLE	DISABLE illuminated ENABLE illuminated	None Depress PBI
4	MAP OVERRIDE	Extinguished Illuminated	None Depress PBI
5	ALSEP 1 KC	Illuminated Extinguished	None Depress PBI
6	S/C REJ	Extinguished Illuminated	None Depress PBI
7	GND REJ	Extinguished Illuminated	None Depress PBI
8	SITE VAL	Extinguished Illuminated	None Depress PBI
9	CVW	Extinguished Illuminated	None Call up ACC
10	RSCC INVAL	Extinguished Illuminated	None Depress PBI
11	90 FRAME SYNC	Illuminated Extinguished	None Call up ACC
12	MAIN FRAME SYNC	Illuminated Extinguished	None Call up ACC

B. The ALSEP GOSS CONF loop must be monitored so as not to command during command handover.

C. Command checklist

1. Depress ALSEP adress PBI. Verify that PBI illuminates. Verify that ALSEP address appears in left window of COMMAND REQUEST display.
2. Enter octal command on thumbwheels. Verify that command appears in the three right windows of the COMMAND REQUEST display.
3. Depress ENABLE/DISABLE PBI. Verify that ENABLE is illuminated.
4. Depress ENTER/INVAL REQUEST PBI. Verify that ENTER is illuminated. Verify that ALSEP address and octal command displayed in the COMMAND REQUEST windows now also appears in the COMMAND EXECUTE windows.
5. Depress EXECUTE/VERIFY PBI. Verify that EXECUTE is illuminated.

D. Command verification - Verify the following sequence:

1.	SITE VAL PBI	Illuminated
2.	CVW PBI	Illuminated momentarily
3.	VERIFY PBI	Illuminated
4.	EXECUTE PBI	Extinguished
5.	SITE VAL PBI	Extinguished

E. Depress ENABLE/DISABLE PBI. Verify that DISABLE is illuminated.

1.9.2 GOP 2 HIGH-SPEED PRINTER FORMAT SELECTION

PURPOSE

To establish a procedure for using high-speed printer (and high-speed printer control panels) for monitoring ALSEP data in predetermined formats

PROCEDURE

A. Selecting a hardcopy format
   1. Select ALSEP data to be monitored by depressing appropriate ALSEP PBI.
   2. Select data display format by depressing appropriate format PBI.
   3. Enter the request into the LACS by depressing the EXECUTE PBI.

   NOTE: The ALSEP display guide supports all ALSEP's and can be initiated by
   1. Depressing ALSEP DISPLAY GUIDE PBI
   2. Depressing the EXECUTE PBI.

B. Selecting continuous format
   1. Select the ALSEP that data is to be monitored from by depressing the proper ALSEP PBI.
   2. Select the format that the data is to be displayed in by depressing the proper format PBI.
   2. Enter the request into the ALCS by depressing the EXECUTE PBI.

   NOTE: A continuous format can be terminated by executing the stop procedure.

C. Stacking format requests
   1. Selecting the first format
      a. Select the ALSEP that data is to be monitored from by depressing the proper ALSEP PBI.
      b. Select the format that the data is to be displayed in by depressing the proper format PBI.
      c. Enter the request into the ALCS by depressing the EXECUTE PBI.
   2. Selecting the second format
      a. Select the ALSEP that data is to be monitored from by depressing the proper ALSEP PBI.
      b. Select the format that the data is to be displayed in by depressing the proper format PBI.
      c. Enter the request into the ALCS by depressing the EXECUTE PBI.

      NOTE: If one or both are continuous format they can be terminated by executing the stop procedure for each format.

D. INVAL REQUEST indication

The INVAL indicator can be extinguished by making a valid request and reexecuting.

E. Stopping a continuous format

1. Select the ALSEP that data is being printed from by depressing the proper ALSEP PBI.
2. Select the format that is to be terminated by depressing the proper format PBI.
3. Depress the STOP PBI.
4. Depress the EXECUTE PBI.
5. Depress the CLEAR PBI to deselect the STOP PBI.

1.9.3 GOP 3 ANALOG RECORDER FORMAT SELECTION

PURPOSE

To establish a procedure to configure the analog chart recorders by using the analog recorder control panel

PROCEDURE

Predefined analog formats and the recorders they can be displayed on will be selected by the following:

A. Select the ALSEP that data is to be monitored from by depressing the proper ALSEP PBI.

B. Select the recorder that the data is to be displayed on by depressing the proper recorder format PBI.

C. Select the format that the data is to be displayed in by depressing the proper format PBI.

D. Depress the EXECUTE PBI.

NOTE

INVAL REQUEST/EXECUTE indication - the INVAL REQUEST indicator can be extinguished by making a valid request and reexecuting.

1.9.4 GOP 4 DRUM RECORDER FORMAT SELECTION

PURPOSE

To establish a procedure for configuring the drum recorders

PROCEDURE

Two groups of drum recorders are provided (four per group). The two groups are identified as Group A and Group B. Group A and/or Group B will be configured by the following:

A. Contact the ALCS operation on the ALCS CMD NETWORK comm loop, and identify the ALSEP format to be assigned each group. (The ALCS operator will do this by MED.)

B. Verify the input filters adjustments as per work schedule or PI request.

1.9.5 GOP 5 ALSEP DATA AND DISPLAY PROBLEMS

PURPOSE

To define the procedure to be followed by ALSEP flight controllers in reporting equipment malfunctions, loss of command capability, loss of data, and potential loss of data

PARTICIPATION

ASE	DISPLAY
SYSTEMS	INTERFACE
DATA	VOICE
NETWORK	GCC
ACC	

PROCEDURES

A. High-speed printer (HSP) paper supply is low - If DATA notices that the paper supply is one-fourth or less he will call ACC on the ALCS CMD NWK loop and report that the HSP paper supply is low and give ACC an estimated time (ET) when the HSP will require more paper. DATA will use the work schedule and the known and anticipated usage rate to arrive at the ET of paper depletion. ACC will dispatch a HSP tech to the room by the ET of paper depletion.

B. Removal of Brush recorder record is required — All requests for removal of any of the analog recorder records from the recorders will be made to ASE. Upon verbal request from the PI or ALSEP flight controller for a recorder record, ASE will call INTERFACE on ALSEP DISPLAY and advise him that Brush recorder paper removal is required and give a time. INTERFACE will provide a technician in the ops room at the time estimated by ASE to remove the Brush record. ASE will advise ACC on ALCS CMD NWK that Brush no.____paper is being changed or removed and will require recalibration at ET. After removal of the record paper, ASE will request from the INTERFACE TECH that the recorder be recalibrated. When INTERFACE TECH is ready to recalibrate the recorder, ASE will call ACC on ALCS CMD NWK and advise ACC to meet INTERFACE on the DISPLAY MAINTENANCE loop for recorder no.____calibration.

C. Unscheduled calibration of an analog recorder is required — If for some reason (i.e., flight controller or PI think that the paper has slipped or an amplifier has driften or a new test phase is to be run) an unscheduled calibration of the analog recorders is required, ASE will call INTERFACE on ALSEP DISPLAY and request a calibration or recorder no.____at____ET. ASE will then call ACC on ALCS CMD NWK and advise him that a recalibration of recorder no.____ will be required at____ET. INTERFACE will call ACC on DISPLAY MAINTENANCE loop to coordinate the calibration.

D. Gain change or any adjustments are required — No one but the display techs are allowed to adjust or turn on or off the display equipment (this includes the Brush recorders, drum recorders, event lights, and other equipment). When a gain change or adjustment is required of any of the display equipment (other than the HSP), the flight controller will call INTERFACE on DISPLAY and tell him what is required and when. During active periods such as initial setup of an experiment, a display tech will be stationed in the room. (This is especially true for the drum recorders.)

E. High-speed printer problems — Flight controllers are allowed to remove copies from the HSP paper and to advance the paper in the printer to remove copies. If any other adjustments or changes are required the flight controller will call ACC on ALCS CMD NWK and obtain the required support. The original copy of HSP will go to the flight controller for the central station format and to the PI from any experiment data. The second copy will be distributed as necessary by DATA, and the third copy will be retained as record copy.

F. Problems with key sets, headsets, or communication equipment — All problems with communication equipment will be reported by the flight controller to VOICE on the COMM CALL loop.

G. Teletype problems — The flight controller will call GCC on the GCC loop for any problems pertaining to teletype traffic.

H. Command problems — All commanding problems will be coordinated with ALSEP NETWORK. Whenever any commanding is performed ASE will monitor the ALSEP GOSS to hear any R/S reports of failures. Anytime a command anomaly occurs the ASE will call NETWORK on ALCS CMD NWK and advise him of the problem and request that he determine the cause. The ASE will take the best corrective action based on the cause. Normally the R/S M&O will report any anomaly on ALSEP GOSS as they occur.

1.9.6 GOP 6 P-TUBE ROUTING

PURPOSE

To establish a procedure for routing P-tube messages to ACC and ALSEP NETWORK

PROCEDURE

A. Send the message to P-Tube Station 31.

B. Notify ACC or NTWK on ALCS CMD NWK comm loop that a message is being sent.

1.9.7 GOP 7 DIGITAL HISTORY DELOG REQUEST

PURPOSE

To establish a procedure for requesting a digital history delog

PROCEDURE

The digital history delog form (figure 1-10) will be filled out in the following manner and sent to ALSEP Computer Controller (ACC).

A. Approved by: Signed by ASE

B. Requested by: To indicate the experiment and PI or flight controller who made the request.

C. Date/time: The data and time the request is initiated.

D. Number of copies: Number of copies required of the digital history.

E. Format name: Name of the format or formats requested.

F. ALSEP number: This is the number of the ALSEP from which the above format data is to be delogged.

G. Start time: This is the GMT in days, hours, minutes, and seconds of the data where the delog is to begin.

H. Stop time: This is the GMT in days, hours, minutes, and seconds of the data where the delog is to terminate.

I. Delog intervals: (Applicable to hardcopy formats only) if all data is to be deloged between the start and stop times or selected cycles use example on form for appropriate number.

NOTE

Central station and PSE are the only hardcopy formats available for delog.

NOTE

At the bottom of form any information can be added to help in completion and delivery of delog [i.e., person and telephone number to be called when job is complete; if more than one format is to be delogged, specify if they can be run simultaneously (which will interleave the two formats) or if they are to be run separately].

APPROVED BY_____

REQUESTED BY_____ DATE/TIME_____ NUMBER OF COPIES_____

FORMAT NAME EXAMPLE: LSM1	ALSEP NUMBER	START TIME GMT DDD/HH/MM/SS	STOP TIME GMT DDD/HH/MM/SS	DELOG INTERVAL (01-99) - APPLICABLE TO HARDCOPY FORMATS ONLY EXAMPLES: 01 - ALL CYCLES 02 - EVERY OTHER CYCLE 05 - EVERY FIFTH CYCLE

Figure 1-10. - Digital history delog request.

1.9.8 GOP 8 CALIBRATION CURVE CHANGES IN REAL TIME

PURPOSE

To establish a procedure for changing calibration curves in real time

PROCEDURE

Determine from the following list the appropriate curve for each parameter. Call ACC on ALCS CMD NWK loop and have the computer controller make a manual entry for each parameter.

The computer will initialize with the highest number curve for each parameter.

Measurement no.	Determining factor	Cal curve
Central station		
AE-4	PCU-1 ON	6
	PCU-2 ON	7
AE-11	AE-7 reads 28.5 Vdc	6
	29.0 Vdc	7
	29.5 Vdc	8
AE-12	AE-7 reads 28.5 Vdc	6
	29.0 Vdc	7
	29.5 Vdc	8
AE-13	AT-7 reads -10° F	1
	+10° F	2
	+78° F	3
	+100° F	4
	+140° F	5
AE-14	AT-21 indicates OSC "A" on and AT-7 reads	
	-10° F	1
	+10° F	2
	+78° F	3
	+100° F	4
	+140° F	5
	AT-22 indicates OSC "B" on and AT-7 reads	
	-10° F	6
	+10° F	7
	+78° F	8
	+100° F	9
	+140° F	0
AE-17	AT-24 reads -10° F	1
	+10° F	2
	+78° F	3
	+100° F	4
	+140° F	5

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1.9.8 GOP 8 CALIBRATION CURVE CHANGES IN REAL TIME

PURPOSE

To establish a procedure for changing calibration curves in real time

PROCEDURE

Determine from the following list the appropriate curve for each parameter. Call ACC on ALCS CMD NWK loop and have the computer controller make a manual entry for each parameter.

The computer will initialize with the highest number curve for each parameter.

Measurement no.	Determining factor	A5	Cal curve
Central station			
AE-4	PCU-1 ON		6
	PCU-2 ON		7
AE-11	AE-7 reads 28.5 Vdc		6
	29.0 Vdc		7
	29.5 Vdc		8
AE-12	AE-7 reads 28.5 Vdc		6
	29.0 Vdc		7
	29.5 Vdc		8
AE-13	AT-7 reads -10° F		1
	+10° F		2
	+78° F		3
	+100° F		4
	+140° F		5
AE-14	AT-21 indicates OSC "A" on and AT-7 reads		
	-10° F		1
	+10° F		2
	+78° F		3
	+100° F		4
	+140° F		5
	AT-22 indicates OSC "B" on and AT-7 reads		
	-10° F		6
	+10° F		7
	+78° F		8
	+100° F		9
	+140° F		0
AE-15	AT-24 reads -22° F	AT-24 -10°F	1
	+14° F	+10°F	2
	+86° F	+77°F	3
	+100° F	+100°F	4
	+122° F	+140°F	5

B-1

Measurement no.	Determining factor		A5		Cal curve	
AE-16	AT-26 reads	-22° F	AT-26	-10° F	1	
		+14° F		+10° F	2	
		+86° F		+77° F	3	P-1
		+100° F		+100° F	4	
		+122° F		+140° F	5	
AE-17	AT-24 reads	-10° F			1	
		+10° F			2	
		+78° F			3	
		+100° F			4	
		+140° F			5	
AE-18	AT-26 reads	-10° F			1	
		+10° F			2	
		+78° F			3	
		+100° F			4	
		+140° F			5	
AE-19	AT-40 reads	-10° F			1	
		+10° F			2	
		+75° F			3	
		+100° F			4	
		+140° F			5	
AE-20	AT-04 reads	-10° F			1	
		+10° F			2	
		+75° F			3	
		+100° F			4	
		+140° F			5	
CPLEE						
AC-2	AC-6 reads	-38° C			1	
		-5° C			2	
		+25° C			3	
		+48° C			4	
		+72° C			5	
AC-3	AC-6 reads	-38° C			1	
		-5° C			2	
		+25° C			3	
		+48° C			4	
		+72° C			5	
HFE						
AH-2	AH-3 reads	+14 dc			7	
		+15 dc			8	
		+16 dc			9	
AH-4	AH-3 reads	+14 dc			7	
		+15 dc			8	
		+16 dc			9	

NOV 20 1972

Measurement no.	Determining factor	A5	Cal curve
CCGE			
DG-12	DG-11 reads +12 volts		1
	+13 volts		2
	+14 volts		3
	+15 volts		4
	+16 volts		5
ASE			
DS-6, DS-7	AS-3 reads -20° C		1
	0° C		2
	+25° C		3
	+55° C		4
	+82° C		5
LMS			
AM-11	AM-41 reads -13° F		1
	-5° F		2
	+77° F		3
	+112° F		4
	+149° F		5
AM-14	AM-41 reads -13° F		1
	-5° F		2
	+77° F		3
	+112° F		4
	+149° F		5
AM-44	AM-41 -13° F		1
	-5° F		2
	+77° F		3
	+112° F		4
	+149° F		5

Measurement no.	Determining factor		Cal curve
AE-18	AT-26 reads	-10° F	1
		+10° F	2
		+78° F	3
		+100° F	4
		+140° F	5
CPLEE			
AC-2	AC-6 reads	-38° C	1
		-5° C	2
		+25° C	3
		+48° C	4
		+72° C	5
AC-3	AC-6 reads	-38° C	1
		-5° C	2
		+25° C	3
		+48° C	4
		+72° C	5
HFE			
AH-2	AH-3 reads	+14 dc	7
		+15 dc	8
		+16 dc	9
AH-4	AH-3 reads	+14 dc	7
		+15 dc	8
		+16 dc	9
CCGE			
DG-12	DG-11 reads	+12 volts	1
		+13 volts	2
		+14 volts	3
		+15 volts	4
		+16 volts	5
ASE	AS-3 reads	-20° C	1
DS-6, DS-7		0° C	2
		+25° C	3
		+55° C	4
		+82° C	5

1.9.9 GOP 9 SHIFT CHANGE

PURPOSE

This GOP defines the ALSEP system shift change procedures and contents of the briefing and associated documentation

PROCEDURE

A. Reporting time
   1. Deployment - T-4 hours 00 min
   2. Routine - The relieving team will be at their respective consoles approximately 1 hour prior to the shift change.

B. Documentation
   1. ALSEP log book
   2. Latest HSP copy of display guide
   3. Latest HSP copy of limits printout
   4. Work schedule
   5. Status sheet
   6. Console handbook
   7. Systems handbook
   8. Flight Controllers Operations Handbook
   9. Flight Mission Rules
   10. Flight Plan
   11. Calibration curves

C. Retiring ALCO will summarize activities, completed and planned, and give the brief on the vehicle status and anomalies.

D. Relieving team members will review documentation.

E. Retiring team members will brief their counterparts in detail.

F. Relieving team will review together the work schedule and the anomalies before assuming responsibility of the console.

1.9.10 GOP 10 PRESUPPORT

PURPOSE

To establish the tasks to be performed prior to real-time support

PROCEDURE

A. Notify NETWORK and ACC that ALSEP team at the console.
B. Monitor Network and Remote Suit Interface Checkout.
C. Select analog recorder formats and speed required.
D. Verify on command panel
    1. FC mode
    2. CMD panel disabled
    3. All zeros selected in COMMAND REQUEST window
    4. ALSEP select is clear.
E. Verify RTC command inventory.
F. Verify limits table.
G. Call ALSEP DISPLAY to start analog and drum recorder.
H. Call ACC to send up ALSEP messages.
I. Annotate console log ALSEP team ready to support.

1.9.11 GOP 11 CLEAN DOWN PROCEDURE FOR TERMINATION OF SUPPORT

PURPOSE

Tasks to be performed prior to terminating ALSEP operations

PROCEDURE

A. Notify NETWORK and ACC of time of termination.
B. Obtain final HSP formats of ALSEP C/S and experiments data for two data books.
C. Check data for abnormal values.
D. Call GCC to hold ALSEP messages.
E. Call ALSEP DISPLAY to turn off the analog and drum recorders.
F. Notify NETWORK and ACC to terminate support.
G. Update data log.
H. Sign off in console log.
I. Police the area.

1.9.12 GOP 12 CONTINGENCY SUPPORT

PURPOSE

To define the action necessary to collect data when the contingency occurs during non-real-time support

PROCEDURE

A. Determine from the NETWORK CONTROLLER the GMT of the contingency.
B. Have NETWORK inform the remote site to cue the recorder to 10 minutes prior to the contingency GMT.
C. With the start of the playback data being displayed at the ALSEP operations room, start the contingency subsystem formats on both an analog recorder and high-speed printer. Continually collect the contingency data and any other pertinent data until determined sufficient by the ASE.
D. The original analog recording and high-speed printer formats will be given to the flight controller responsible for the subsystem for permanent record.

2 MISSION SPECIFICS

SECTION 2

MISSION SPECIFIC

2.1 APOLLO 12 ALSEP 1

2.1.1 EVENT LIGHT PANEL (FIGURE 2.1)

LIGHT	COLOR	NAME	ILLUMINATE
1U	G	MAIN FRAME SYNC	DA-1 SYNC PATTERN
1L	G	90 FRAME SYNC	DA-2 TWO CONSECUTIVE FRAME COUNTS
2U	G	NORM BIT RATE	DA-2 = CNT OF 1 DA-3 = 1
2L	G	LOW BIT RATE	DA-2 = CNT OF 2 DA-3 = 1
3U	G	REALTIME DATA	CAP WORD
3L	G	PLAYBACK DATA	CAP WORD
4U	G	XMTR A	AE-15 > 2 PCM
4L	G	XMTR B	AE-16 > 2 PCM
5U	R	C/S CRITICAL	CMPB(1)
5L	(BLANK)		
6U	A	C/S WARNING	CMPA(1)
6L	(BLANK)		
7U	G	PCU 1	AE-5 > 2 PCM
7L	R	RES PWR 1	RES PWR < 6.4 W
8U	A	EXP 1 STBY	AB-4 { 72±10, 192±10
8L	A	EXP 2 STBY	AB-4 { 131±10, 192±10
9U	R	SIDE CRITICAL	CMP D(1)
9L	R	PSE CRITICAL	CMP F(1)
10U	(BLANK)		
10L	(BLANK)		
11U	A	SIDE WARNING	CMP C(1)
11L	A	PSE WARNING	CMP E(1)
12U	(BLANK)		
12L	(BLANK)		
13U	G	PCU 2	AE-6 > 2 PCM
13L	R	RES PWR 2	RES PWR < 6.4 W
14U	A	EXP 3 STBY	AB-5 { 131±10, 160±10, 188±10, 214±10
14L	A	EXP 4 STBY	AB-5 { 69±10, 100±10, 188±10, 214±10
15U	R	LSM CRITICAL	CMP G(1)
15L	R	SWS CRITICAL	CMP J(1)

(1) SEE PARAGRAPH 2.1.4 LIMIT SENSING

LIGHT	COLOR	NAME	ILLUMINATE
16U	(BLANK)		
16L	(BLANK)		
17U	A	LSM WARNING	CMP H(1)
17L	A	SWS WARNING	CMP I(1)
18U	(BLANK)		
18L	(BLANK)		

(1) SEE PARAGRAPH 2.1.4 LIMIT SENSING

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Module 6

MAIN FRME SYNC G DA-1	NORMAL BIT RATE G CW-1	REAL TIME DATA G ST-3	XMTR A G CS-10	CS CRITICAL R CMP-B	CS WARNING G CMP-A
90 FRAME SYNC G DA-2	LOW BIT RATE G CW-2	PLAYBACK DATA G ST-3	XMTR B G CS-11		
PCU 1 G CS-8	EXP 1 STBY STATUS A CS-13	SIDE LIMS CRITICAL 1 R CMP-D		SIDE LIMS WARNING 2 A CMP-C	
RES PWR 1 R CS-6	EXP 2 STBY STATUS A CS-14	PSE LIMS CRITICAL 3 R CMP-F		PSE LIMS WARNING 4 A CMP-D	
PCU 2 G CS-9	EXP 3 STBY STATUS A CS-15	LSM LIMS CRITICAL 5 R CMP-G		LSM LIMS WARNING 6 A CMP-H	
RES PWR 2 R CS-7	EXP 4 STBY STATUS A CS-16	SWS LIMS CRITICAL 7 R CMP-J		SWS LIMS WARNING 8 A CMP-I	

Figure 2-1.- Apollo 12 ALSEP 1 event light panel.

2.1.2 HIGH SPEED PRINTER FORMATS

1. CENTRAL STATION
2. PASSIVE SEISMIC EXPERIMENT
3. SOLAR WIND SPECTROMETER EXPERIMENT
4. SIDE/CCIG FMT 1
5. SIDE/CCIG FMT 2
6. LSM FMT 1
7. LSM FMT 2
8. LIMITS TABLE
9. DISPLAY GUIDE

2.1.3 ANALOG RECORDER FORMATS

PEN	PARAMETER	NUMBER	COMMENT
FORMAT 1 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8MSB
2	LONG PERIOD Y SEISMIC	DL-2	8MSB
3	LONG PERIOD Z SEISMIC	DL-3	8MSB
4	SHORT PERIOD Z SEISMIC	DL-8	8MSB
5	LONG PERIOD X TIDAL	DL-4	8MSB
6	LONG PERIOD Y TIDAL	DL-5	8MSB
7	LONG PERIOD Z TIDAL	DL-6	8MSB
8	PSE INST TEMP	DL-7	8MSB
FORMAT 2 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8LSB
2	LONG PERIOD Y SEISMIC	DL-2	8LSB
3	LONG PERIOD Z SEISMIC	DL-3	8LSB
4	SHORT PERIOD Z SEISMIC	DL-8	8LSB
5	LONG PERIOD X TIDAL	DL-4	8LSB
6	LONG PERIOD Y TIDAL	DL-5	8LSB
7	LONG PERIOD L TIDAL	DL-6	8LSB
8	PSE INST TEMP	DL-7	8LSB
FORMAT 3 (SIDE/CCIG)			
1	HECPA STEPPER VOLTAGE	WD47 ENVFR	
2	HE DATA (MSD)	DI-61	8LSB
3	HE DATA (LSD)	DI-62	8MSB
4	CCIG	DI-3	
5	VELOCITY FILTER VOLTAGE	WD31 ODDFR	
6	LECPA STEPPER VOLTAGE	WD47 ODDFR	
7	LE DATA (MSD)	DF-5	8LSB
8	LE DATA (LSD)	DF-6	8MSB

PEN	PARAMETER	NUMBER	COMMENT
FORMAT 4 (SIDE/CCIG)			
1	HE DATA (MSD)	DI-61	8LSB
2	HE DATA (LSD)	DI-62	8MSB
3	LE DATA (MSD)	DF-5	8LSB
4	LE DATA (LSD)	DF-6	8MSB
5	CCIG RANGE	DI-8	
6	4.5 KV	DI-7	
7	TEMP NO. 1	DI-4	
8	CCIG	DI-3	
FORMAT 5 (LSM)			
1	X AXIS SCI	LM-35	
2	Y AXIS SCI	LM-36	
3	Z AXIS SCI	LM-37	
4	X SNSR TEMP	DM-1	
5	Y SNSR TEMP	DM-2	
6	Z SNSR TEMP	DM-3	
7	LSM INSTR TEMP	DM-5	
8	SPECIAL PROCESSING		
FORMAT 6 (LSM)			
1	X AXIS SCI	LM-35	
2	Y AXIS SCI	LM-36	
3	Z AXIS SCI	LM-37	
4	BASE TEMP C	DM-5	
5	5 V SUPPLY	DM-8	
6	LVL 1 DEG	DM-6	
7	LVL 2 DEG	DM-7	
8	SPECIAL PROCESSING		
FORMAT 7 (CENTRAL STATION PCU 1)			
1	RES PWR 1	CS-2	(AE-3)(AE-5)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	
6	THERM PLT 2 TEMP	AT-4	
7	PCU 1 REG TEMP	AT-38	
8	PCU 1 OSC TEMP	AT-36	
FORMAT 8 (CENTRAL STATION PCU 2)			
1	RES PWR 2	CS-4	(AE-3)(AE-6)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	
6	THERM PLT 2 TEMP	AT-4	
7	PCU 2 REG TEMP	AT-39	
8	PCU 2 OSC TEMP	AT-37	

2.1.4 LIMIT SENSING EVENT LIGHTS

PARAMETER	NUMBER
CENTRAL STATION CRITICAL	
PCU +29V	AE-7
PCU +12V	AE-9
PCU +5V	AE-10
XMTR A AGC V	AE-15
XMTR B AGC V	AE-16
THERM PLT 5 TEMP	AT-7
PCU 1 REG TEMP	AT-38
PCU 2 REG TEMP	AT-39
RTG OUTPUT WATTS	CS-1
RES PWR 1	CS-2
RES PWR 2	CS-4
CENTRAL STATION WARNING	
0.25 CAL VOLT	AE-1
4.75 CAL VOLT	AE-2
PCU VOLTS	AE-3
PCU AMPS	AE-4
PCU 1 SHUNT AMPS	AE-5
PCU 2 SHUNT AMPS	AE-6
PCU +15V	AE-8
PCU -12V	AE-11
PCU -6V	AE-12
RCVR DBM	AE-13
RCVR L/O DBM	AE-14
HOT FRAME 1 T	AR-1
HOT FRAME 2 T	AR-2
HOT FRAME 3 T	AR-3
CLD FRAME 1 T	AR-4

PARAMETER	NUMBER
CLD FRAME 2 T	AR-5
CLD FRAME 3 T	AR-6
SUNSHIELD 1 T	AT-1
SUNSHIELD 2 T	AT-2
THERM PLT 3 T	AT-5
THERM PLT 4 T	AT-6
PRI/ST W1 T	AT-8
PRI/ST W2 T	AT-9
PRI/ST B1 T	AT-10
RCVR XTAL A T	AT-21
RCVR XTAL B T	AT-22
DSS/A BASE T	AT-27
DSS/D BASE T	AT-29
CMD DEC BASE T	AT-31
PDU BASE T	AT-34
DUST CELL 1T	AX-1
DUST CELL 2T	AX-2
DUST CELL 3T	AX-3
INT REG DISIP WATTS	CS-3
INT REG DISIP WATTS	CS-5
PSE CRITICAL	
PSE INT T	DL-7
PSE WARNING	
TIDAL X	DL-4
TIDAL Y	DL-5
TIDAL Z	DL-6
LSM CRITICAL	
SNSR X TEMP	DM-1
SNSR Y TEMP	DM-2
SNSR Z TEMP	DM-3

PARAMETER	NUMBER
BASE TEMP	DM-4
INT TEMP	DM-5
LSM WARNING	
LVL 1 TILT	DM-6
LVL 2 TILT	DM-7
+5V SUPPLY	DM-8
SWS CRITICAL	
MOD 100 T	DW-11
MOD 200 T	DW-12
MOD 300 T	DW-13
SNSR TEMP	DW-14
PROG VOLT	DW-16
STEP GEN VOLT	DW-17
MOD OK/NOK PCM	DW-18
SWS WARNING	
ADC MVOLT	DW-3
ADC 90 MV	DW-4
ADC 900 MV	DW-5
ADC 3000 MV	DW-6
ADC 9000 MV	DW-7
SUN REF VOLT	DW-15
SIDE CRITICAL	
TEMP 2	DI-5
TEMP 3	DI-6
CCIG 4.5 KV	DI-7
TEMP 4	DI-9
TEMP 5	DI-10
TEMP 6	DI-19
-3.5 KV	DI-20

PARAMETER	NUMBER
SIDE WARNING	
+5 V ANALOG	DI-2
CCIG TEMP	DI-4
+60 VOLT	DI-13
+30 VOLT	DI-14
+5 V DIGITAL	DI-15
GND VOLTS	DI-16
-5 VOLTS	DI-17
-30 VOLTS	DI-18
+1 VOLT CAL	DI-21
+30 MV CAL	DI-22
ADC POS REF	DI-23
ADC NEG REF	DI-25
-1 VOLT CAL	DI-26
-12 VOLT CAL	DI-27
+12 VOLT CAL	DI-28
PRE/REG PCT	DI-29
-30 MV CAL	DI-30

2.1.5 DRUM RECORDERS

PEN	PARAMETER	NUMBER
1	LONG PERIOD X SEISMIC	DL-1
2	LONG PERIOD Y SEISMIC	DL-2
3	LONG PERIOD Z SEISMIC	DL-3
4	SHORT PERIOD Z SEISMIC	DL-8

2.2 APOLLO 14 ALSEP 4

2.2.1 EVENT LIGHT PANEL (FIGURE 2.2)

LIGHT	COLOR	NAME	ILLUMINATE
1U	G	MAIN FRAME SYNC	DA-1 SYNC PATTERN
1L	G	90 FRAME SYNC	DA-2 TWO CONSECUTIVE FRAME COUNTS
2U	G	NORM BIT RATE	DA-2 = CNT OF 1 DA-3 = 1 DA-2 - CNT OF 2
2L	G	LOW BIT RATE	DA-3 = 1
3U	G	REALTIME DATA	CAP WORD
3L	G	PLAYBACK DATA	CAP WORD
4U	G	XMTR A	AE-15 > 2 PCM
4L	G	XMTR B	AE-16 > 2 PCM
5U	R	CS CRITICAL	CMP B(1)
5L	R	ARM THUMPER	DS-13 = 2 PCM
6U	A	CS WARNING	CMP A(1)
6L	R	ARM GRENADE	DS-13 = 1 PCM
7U	G	PCU 1	AE-5 > 2 PCM
7L	R	RES PWR 1	RES PWR < 6.4 W
8U	A	EXP 1 STBY	AB-4 { 72±10, 192±10
8L	A	EXP 2 STBY	AB-4 { 131±10, 192±10
9U	R	SIDE CRITICAL	CMP D(1)
9L	R	PSE CRITICAL	CMP F(1)
10U	(BLANK)		
10L	(BLANK)		
11U	A	SIDE WARNING	CMP C(1)
11L	A	PSE WARNING	CMP E(1)
12U	(BLANK)		
12L	(BLANK)		
13U	G	PCU 2	AE-6 > 2 PCM
13L	R	RES PWR 2	RES PWR < 6.4 W
14U	A	EXP 3 STBY	AB-5 { 131±10, 160±10, 188±10, 214±10
14L	A	EXP 4 STBY	AB-5 { 69±10, 100±10, 188±10, 214±10
15U	R	CPLEE CRITICAL	CMP J(1)
15L	(BLANK)		
16U	(BLANK)		
16L	G	HBR SYNC	CAP WORD
17U	A	CPLEE WARNING	CMP I(1)
17L	A	HBR LIM	CMP G(1)

(1) SEE PARAGRAPH 2.2.4 LIMIT SENSING

LIGHT	COLOR	NAME	ILLUMINATE
18U	(BLANK)		
18L	(BLANK)		

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Module 3

MAIN FRME SYNC G DA-1	NORM BIT RATE G CW-1	REAL-TIME DATA G ST-3	XMTR A G CS-10	CS CRITICAL R CMP-B	CS WARNING A CMP-A
90 FRAME SYNC G DA-2	LOW BIT RATE G CW-2	PLAYBACK DATA G ST-3	XMTR B G CS-11	ARM THUMPER R DS-13	ARM GRENADE R DS-13
PCU 1 G CS-8	EXP 1 STBY STATUS A CS-13	SIDE LIMS CRITICAL R CMP-D		SIDE LIMS WARNING A CMP-C	
RES PWR 1 R CS-6	EXP 2 STBY STATUS A CS-14	PSE LIMS CRITICAL R CMP-F		PSE LIMS WARNING A CMP-C	
PCU 2 G CS-9	EXP 3 STBY STATUS A CS-15	CPLEE LIMS CRITICAL R CMP-J		CPLEE LIMS WARNING A CMP-I	
RES PWR 2 R CS-7	EXP 4 STBY STATUS A CS-16		HBR SYNC G AS-39	HBR LIMS A CMP-G	

Figure 2-2.- Apollo 14 ALSEP 4 event light panel.

2.2.2 HIGH SPEED PRINTER FORMATS

1. CENTRAL STATION
2. PSE
3. CPLEE FMT 1
4. CPLEE FMT 2
5. SIDE/CCIG FMT 1
6. SIDE/CCIG FMT 2
7. ACTIVE SEISMIC
8. LIMITS TABLE
9. DISPLAY GUIDE

2.2.3 ANALOG RECORDER FORMATS

PEN	PARAMETER	NUMBER	COMMENT
FORMAT 1 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8MSD
2	LONG PERIOD Y SEISMIC	DL-2	8MSD
3	LONG PERIOD Z SEISMIC	DL-3	8MSD
4	SHORT PERIOD Z SEISMIC	DL-8	8MSD
5	LONG PERIOD X TIDAL	DL-4	8MSD
6	LONG PERIOD Y TIDAL	DL-5	8MSD
7	LONG PERIOD Z TIDAL	DL-6	8MSD
8	INSTR TEMP	DL-7	8MSD
FORMAT 2 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8LSB
2	LONG PERIOD Y SEISMIC	DL-2	8LSB
3	LONG PERIOD Z SEISMIC	DL-3	8LSB
4	SHORT PERIOD Z SEISMIC	DL-8	8LSB
5	LONG PERIOD X TIDAL	DL-4	8LSB
6	LONG PERIOD Y TIDAL	DL-5	8LSB
7	LONG PERIOD Z TIDAL	DL-6	8LSB
8	INSTR TEMP	DL-7	8LSB
FORMAT 3 (SIDE/CCIG)			
1	HECPA STEPPER VOLTAGE	WD47 EVNFR	
2	HE DATA (MSD)	DI-61	8LSB
3	HE DATA (LSD)	DI-62	8MSB
4	CCIG	DI-3	
5	VELOCITY FILTER VOLTAGE	WD31 ODDFR	
6	LECPA STEPPER VOLTAGE	WD47 ODDFR	
7	LE DATA (MSD)	DF-5	8LSB
8	LE DATA (LSD)	DF-6	8MSB

PEN	PARAMETER	NUMBER	COMMENT
FORMAT 4 (SIDE/CCIG)			
1	HE DATA (MSD)	DI-61	8LSB
2	HE DATA (LSD)	DI-62	8MSB
3	LE DATA (MSD)	DF-5	8LSB
4	LE DATA (LSD)	DF-6	8MSB
5	CCIG RANGE	DI-8	
6	4.5 KV	DI-7	
7	TEMP NO. 1	DI-4	
8	CCIG	DI-3	
FORMAT 5 (ASE)			
1	GEOPHONE 1	DS-1	
2	GEOPHONE 2	DS-2	
3	GEOPHONE 3	DS-3	
4	MODE ID	DS-13	
5	MARK EVENT	DS-18	
6	WORD COUNT	DS-19	
7	EVEN BIT COUNT	DS-20	
8	CAL SIG V	DS-8	
FORMAT 6 (ASE)			
1	PITCH ANGLE	DS-7	
2	ROLL ANGLE	DS-6	
3	GLA TEMP	AS-3	
4	INT PKG TEMP	AS-1	
5	HOT FRAME 1 TEMP	AR-1	
6	CLD FRAME 1 TEMP	AR-4	
7	RTG VOLTAGE	AE-3	
8	RTG CURRENT	AE-4	
FORMAT 7 (CENTRAL STATION PCU 1)			
1	RES PWR 1	CS-2	(AE-3)(AE-5)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	
6	THERM PLT 2 TEMP	AT-4	
7	PCU 1 REG TEMP	AT-38	
8	PCU 1 OSC TEMP	AT-36	
FORMAT 8 (CENTRAL STATION PCU 2)			
1	RES PWR 2	CS-4	(AE-3)(AE-6)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	
6	THERM PLT 2 TEMP	AT-4	
7	PCU 2 REG TEMP	AT-39	
8	PCU 2 OSC TEMP	AT-37	

2.2.4 LIMIT SENSING EVENT LIGHTS

PARAMETER	NUMBER
CENTRAL STATION CRITICAL	
PCU +29V	AE-7
PCU +12V	AE-9
PCU +5V	AE-10
XMTR A AGC V	AE-15
XMTR B AGC V	AE-16
THERM PLT 5 TEMP	AT-7
PCU 1 REG TEMP	AT-38
PCU 2 REG TEMP	AT-39
RTG OUTPUT WATTS	CS-1
RESERVE POWER 1	CS-2
RESERVE POWER 2	CS-4
CENTRAL STATION WARNING	
.25 VOLT CAL	AE-1
4.75 VOLT CAL	AE-2
PCU IN VOLTS	AE-3
PCU IN AMPS	AE-4
PCU 1 SHUNT AMPS	AE-5
PCU 2 SHUNT AMPS	AE-6
PCU +15V	AE-8
PCU -12V	AE-11
PCU -6V	AE-12
RCVR DBM	AE-13
RCVR L/O DBM	AE-14
HOT FRAME 1 T	AR-1
HOT FRAME 2 T	AR-2
HOT FRAME 3 T	AR-3
CLD FRAME 1 T	AR-4
CLD FRAME 2 T	AR-5

PARAMETER	NUMBER
CLD FRAME 3 T	AR-6
ASE INT TEMP	AS-1
MOTOR BOX T	AS-2
GLA TEMP	AS-3
GEOPHONE T	AS-4
SUNSHIELD 1 T	AT-1
SUNSHIELD 2 T	AT-2
THERM PLT 3 T	AT-5
THERM PLT 4 T	AT-6
PRI/ST W1 T	AT-8
PRI/ST W2 T	AT-9
PRI/ST B1 T	AT-10
RCVR XTAL A T	AT-21
RCVR XTAL B T	AT-22
DSS/A BASE T	AT-27
DSS/D BASE T	AT-29
CMD DEC BASE T	AT-31
PDU BASE T	AT-34
DUST CELL 1 T	AX-1
DUST CELL 2 T	AX-2
DUST CELL 3 T	AX-3
INT REG DISIP WATTS	CS-3
INT REG DISIP WATTS	CS-5
PSE CRITICAL	
PSE INT T	DL-7
PSE WARNING	
TIDAL X	DL-4
TIDAL Y	DL-5
TIDAL Z	DL-6

PARAMETER	NUMBER
SIDE CRITICAL	
TEMP 2	DI-5
TEMP 3	DI-6
CCIG 4.5 KV	DI-7
TEMP 4	DI-9
TEMP 5	DI-10
TEMP 6	DI-19
-3.5 KV	DI-20
SIDE WARNING	
+5V ANALOG	DI-2
CCIG T	DI-4
+60V	DI-13
+30V	DI-14
+5V DIGITAL	DI-15
GND VOLTS	DI-16
-5 V	DI-17
-30 V	DI-18
+1.0 VOLT CAL	DI-21
+30 MV CAL	DI-22
ADC POS REF	DI-23
ADC NEG REF	DI-25
-1.0 V CAL	DI-26
-12 V CAL	DI-27
+12 V CAL	DI-28
PRE/REG PCT	DI-29
-30 MV CAL	DI-30
ASE (HBR LIM)	
PCU IN VOLTS	AE-3
PCU IN AMPS	AE-4
HOT FR 1 T	AR-1

PARAMETER	NUMBER
CLD FR 1 T	AR-4
INT PKG T	AS-1
GLA T	AS-3
RTG OUTPUT WATTS	CS-1
MOTOR BOX GND	DS-5
ROLL ANGLE	DS-6
PITCH ANGLE	DS-7
ADC 1.25 V	DS-10
ADC 3.75 V	DS-11
CPLEE CRITICAL	
CPE CHAN/1 VOLTS	AC-2
CPE CHAN/2 VOLTS	AC-3
CPE CONV VOLTS	AC-4
CPLEE WARNING	
PHY/AN	AC-5
DEF P/S	AC-6

2.2.5 DRUM RECORDERS

PEN	PARAMETER	NUMBER
1	LONG PERIOD X SEISMIC	DL-1
2	LONG PERIOD Y SEISMIC	DL-2
3	LONG PERIOD Z SEISMIC	DL-3
4	SHORT PERIOD Z SEISMIC	DL-8

2.3 APOLLO 15 ALSEP A-2

2.3.1 EVENT LIGHT PANEL (FIGURE 2.3)

LIGHT	COLOR	NAME	ILLUMINATE
1U	G	MAIN FRAME SYNC	DA-1 SYNC PATTERN
1L	G	90 FRAME SYNC	DA-2 TWO CONSECUTIVE FRAME COUNTS
2U	G	NORM BIT RATE	DA-2 = CNT OF 1 DA-3 = 1
2L	G	LOW BIT RATE	DA-2 = CNT OF 2 DA-3 = 1
3U	G	REALTIME DATA	CAP WORD
3L	G	PLAYBACK DATA	CAP WORD
4U	G	XMTR A	AE-15 > 2 PCM
4L	G	XMTR B	AE-16 > 2 PCM
5U	G	PROCESSOR X	AB-6 > 112 PCM
5L	G	PROCESSOR Y	AB-6 < 112 PCM
6U	R	CS CRITICAL	CMP B(1)
6L	A	CS WARNING	CMP A(1)
7U	G	PCU 1	AE-5 > 2 PCM
7L	R	RES PWR 1	RES PWR < 6.4 W
8U	A	EXP 1 STBY	AB-4 (72±10, 192±10 / 131±10, 192±10)
8L	A	EXP 2 STBY	
9U	R	PSE CRITICAL	CMP F(1)
9L	R	LSM CRITICAL	CMP G(1)
10U	A	PSE WARNING	CMP E(1)
10L	A	LSM WARNING	CMP H(1)
11U	A	EXP 5 STBY	AB-5 (35±10, 100±10 / 160±10, 214±10)
11L	(BLANK)		
12U	R	HFE LIMITS	CMP K(1)
12L	(BLANK)		
13U	G	PCU 2	AE-6 > 2 PCM
13L	R	RES PWR 2	RES PWR < 6.4 W
14U	A	EXP 3 STBY	AB-5 (131±10, 160±10, 188±10, 214±10 / 69±10, 100±10, 188±10, 214±10)
14L	A	EXP 4 STBY	
15U	R	SWS CRITICAL	CMP J(1)
15L	R	SIDE CRITICAL	CMP D(1)
16U	A	SWS WARNING	CMP I(1)
16L	A	SIDE WARNING	CMP C(1)

(1) SEE PARAGRAPH 2.3.4 LIMIT SENSING

ALSEPCH
BASIC

LIGHT	COLOR	NAME	ILLUMINATE
17U	(BLANK)		
17L	R	TIMER CNTR 1	AZ-2 = >120 PCM
18U	(BLANK)		
18L	R	TIMER CNTR 2	AZ-3 = >120 PCM

Mission Apollo 15 ALSEP A2

Console 88

Module 4

MAIN FRME SYNC DA-1 G	NORM BIT RATE G	REAL-TIME DATA G	XMTR A G	PROCESSOR X G	CS CRITICAL R
90 FRAME SYNC DA-2 G	LOW BIT RATE G	PLAYBACK DATA G	XMTR B G	PROCESSOR Y G	CS WARNING A
PCU 1 G	EXP 1 STBY STATUS A	PSE LIMS CRITICAL R	PSE LIMS WARNING A	EXP 5 STBY STATUS A	HFE LIMITS R
RES PWR 1 R	EXP 2 STBY STATUS A	LSM LIMS CRITICAL R	LSM LIMS WARNING A		
PCU 2 G	EXP 3 STBY STATUS A	SWS LIMS CRITICAL R	SWS LIMS WARNING A		
RES PWR 2 R	EXP 4 STBY STATUS A	SIDE LIMS CRITICAL R	SIDE LIMS WARNING A	TIMER COUNTER 1 R	TIMER COUNTER 2 R

Figure 2-3.- Apollo 15 ALSEP A2 event light panel.

2.3.2 HIGH SPEED PRINTER FORMATS

1. CENTRAL STATION
2. PASSIVE SEISMIC EXPERIMENT
3. SOLAR WIND EXPERIMENT
4. SIDE/CCGE FMT 1
5. SIDE/CCGE FMT 2
6. LSM FMT 1
7. LSM FMT 2
8. HEAT FLOW FMT 1
9. HEAT FLOW FMT 2
10. LIMITS TABLE
11. DISPLAY GUIDE

2.3.3 ANALOG RECORDER FORMATS

PEN	PARAMETER	NUMBER	COMMENT
FORMAT 1 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8MSB
2	LONG PERIOD Y SEISMIC	DL-2	8MSB
3	LONG PERIOD Z SEISMIC	DL-3	8MSB
4	SHORT PERIOD Z SEISMIC	DL-8	8MSB
5	LONG PERIOD X TIDAL	DL-4	8MSB
6	LONG PERIOD Y TIDAL	DL-5	8MSB
7	LONG PERIOD Z TIDAL	DL-6	8MSB
8	PSE INST TEMP	DL-7	8MSB
FORMAT 2 (PSE)			
1	LONG PERIOD X SEISMIC	DL-1	8LSB
2	LONG PERIOD Y SEISMIC	DL-2	8LSB
3	LONG PERIOD Z SEISMIC	DL-3	8LSB
4	SHORT PERIOD Z SEISMIC	DL-8	8LSB
5	LONG PERIOD X TIDAL	DL-4	8LSB
6	LONG PERIOD Y TIDAL	DL-5	8LSB
7	LONG PERIOD Z TIDAL	DL-6	8LSB
8	PSE INST TEMP	DL-7	8LSB
FORMAT 3 (SIDE/CCGE)			
1	HECPA STEPPER VOLTAGE	WD47 EVNFR	
2	HE DATA (MSD)	DI-61	8LSB
3	HE DATA (LSD)	DI-62	8MSB
4	CCGE	DI-3	

PEN	PARAMETER	NUMBER	COMMENT
5	VELOCITY FILTER VOLTAGE	WD31 ODDFR	
6	LECPA STEPPER VOLTAGE	WD47 ODDFR	
7	LE DATA (MSD)	DF-5	8LSB
8	LE DATA (LSD)	DF-6	8MSB

FORMAT 4 (SIDE/CCGE)

1	HE DATA (MSD)	DI-61	8LSB
2	HE DATA (LSD)	DI-62	8MSB
3	LE DATA (MSD)	DF-5	8LSB
4	LE DATA (LSD)	DF-6	8MSB
5	CCGE RANGE	DI-8	
6	4.5 KV	DI-7	
7	TEMP NO. 1	DI-4	
8	CCGE	DI-3	

FORMAT 5 (LSM)

1	X AXIS SCI	LM-35
2	Y AXIS SCI	LM-36
3	Z AXIS SCI	LM-37
4	X SNSR TEMP	DM-1
5	Y SNSR TEMP	DM-2
6	Z SNSR TEMP	DM-3
7	LSM INST TEMP	DM-5
8	SPECIAL PROCESSING	

FORMAT 6 (LSM)

1	X AXIS SCI	LM-35
2	Y AXIS SCI	LM-36
3	Z AXIS SCI	LM-37
4	BASE TEMP	DM-5
5	5V SUPPLY	DM-8
6	LVL 1 DEG	DM-6
7	LVL 2 DEG	DM-7
8	SPECIAL PROCESSING	

FORMAT 7 (CENTRAL STATION PCU 1)

1	RES PWR 1	CS-2	(AE-3)(AE-5)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	
6	THERM PLT 2 TEMP	AT-4	
7	PCU 1 REG	AT-38	
8	PCU 1 OSC	AT-36	

FORMAT 8 (CENTRAL STATION PCU 2)

1	RES PWR 2	CS-4	(AE-3)(AE-6)
2	INPUT WATTS	CS-1	(AE-3)(AE-4)
3	+12 VDC	AE-9	
4	+5 VDC	AE-10	
5	THERM PLT 1 TEMP	AT-3	

PEN	PARAMETER	NUMBER	COMMENT
6	THERM PLT 2 TEMP	AT-4	
7	PCU 2 REG	AT-39	
8	PCU 2 OSC	AT-37	

2.3.4 LIMIT SENSING EVENT LIGHTS

PARAMETER	NUMBER
CENTRAL STATION CRITICAL	
PCU +29V	AE-7
PCU +12V	AE-9
PCU +5V	AE-10
XMTR A AGC V	AE-15
XMTR B AGC V	AE-16
THERM PLT 5 T	AT-7
PCU 1 REG T	AT-38
PCU 2 REG T	AT-39
RTG OUTPUT WATTS	CS1
RES PWR 1	CS2
RES PWR 2	CS4
CENTRAL STATION WARNING	
.25 VOLT CAL	AE-1
4.75 VOLT CAL	AE-2
PCU IN VOLTS	AE-3
PCU IN AMPS	AE-4
PCU 1 SHUNT AMPS	AE-5
PCU 2 SHUNT AMPS	AE-6
PCU +15V	AE-8
PCU -12V	AE-11
PCU -6V	AE-12
RCVR DBM	AE-13
RCVR L/O DBM	AE-14
HOT FRAME 1 T	AR-1

PARAMETER	NUMBER
HOT FRAME 2 T	AR-2
HOT FRAME 3 T	AR-3
CLD FRAME 1 T	AR-4
CLD FRAME 2 T	AR-5
CLD FRAME 3 T	AR-6
SUNSHIELD 1 T	AT-1
SUNSHIELD 2 T	AT-2
THERM PLT 3 T	AT-5
THERM PLT 4 T	AT-6
PRI/ST W1	AT-8
PRI/ST W2	AT-9
PRI/ST B1	AT-10
RCVR XTAL A T	AT-21
RCVR XTAL B T	AT-22
DSS/A BASE T	AT-27
DSS/D BASE T	AT-29
CMD DEC BASE T	AT-31
PDU BASE T	AT-34
DUST CELL 1 T	AX-1
DUST CELL 2 T	AX-2
DUST CELL 3 T	AX-3
INT REG DIS WATTS	CS-3
INT REG DIS WATTS	CS-5
PSE CRITICAL	
PSE INT T	DL-7
PSE WARNING	
TIDAL X	DL-4
TIDAL Y	DL-5
TIDAL Z	DL-6

PARAMETER	NUMBER
LSM CRITICAL	
SENSOR X TEMP	DM-1
SENSOR Y TEMP	DM-2
SENSOR Z TEMP	DM-3
BASE TEMP	DM-4
INT TEMP	DM-5
LSM WARNING	
LVL 1 TILT	DM-6
LVL 2 TILT	DM-7
+5 VOLT SUPPLY	DM-8
SWS CRITICAL	
MOD 100 TEMP	DW-11
MOD 200 TEMP	DW-12
MOD 300 TEMP	DW-13
SNSR TEMP	DW-14
PROG VOLTS	DW-16
STEP GEN VOLTS	DW-17
MOD OK/NOK PCM	DW-18
SWS WARNING	
ADC MV	DW-3
ADC 90 MV	DW-4
ADC 900 MV	DW-5
ADC 3000 MV	DW-6
ADC 9000 MV	DW-7
SUN REF VOLTS	DW-15
SIDE CRITICAL	
TEMP 2	DI-5
TEMP 3	DI-6
CCGE 4.5 KV	DI-7

PARAMETER	NUMBER
TEMP 4	DI-9
TEMP 5	DI-10
TEMP 6	DI-19
-3.5 KV	DI-20
SIDE WARNING	
+5V ANALOG	DI-2
CCIG T	DI-4
+60 VOLTS	DI-13
+30 VOLTS	DI-14
+5V DIGITAL	DI-15
GND VOLTS	DI-16
-5 VOLTS	DI-17
-30 VOLTS	DI-18
+1 VOLT CAL	DI-21
+30 MV CAL	DI-22
ADC POS REF	DI-23
ADC NEG REF	DI-25
-1 VOLT CAL	DI-26
-12 VOLT CAL	DI-27
+12 VOLT CAL	DI-28
PRE/REG PCT	DI-29
-30 MV CAL	DI-30
HFE LIMITS	
+5V SUPPLY	AH-1
-5V SUPPLY	AH-2
+15V SUPPLY	AH-3
-15V SUPPLY	AH-4

2.3.5 DRUM RECORDERS

PEN	PARAMETER	NUMBER
1	LONG PERIOD X SEISMIC	DL-1
2	LONG PERIOD Y SEISMIC	DL-2
3	LONG PERIOD Z SEISMIC	DL-3
4	SHORT PERIOD Z SEISMIC	DL-8

2.4 APOLLO 16 ALSEP ARRAY D

TO BE SUPPLIED

2.5 APOLLO 17 ALSEP ARRAY E

TO BE SUPPLIED

2.6 72 EVENT LIGHT PANEL

LIGHT NO.	TITLE	MEAS NO.	E.U. VALUE TO ILLUMINATE
1*,19,37,55	PCU 1 OSC T	AT-36	<-20/<+160
2,20,38,56	XMTR A XTAL T	AT-23	<-15/>+160
3,21,39,57	XMTR A HT/ST	AT-24	<-15/>+160
4,22,40,58	XMTR A DBLR MA	AE-17	<158/>190
5,23,41,59	PDU INT T	AT-35	<0/>+160
6,24,42,60	CMD DEC VCO T	AT-33	<-20/>+140
7,25,43,61	CMD DEC INT T	AT-32	<-20/>+140
8,26,44,62	DSS/A INT T	AT-28	<-20/>+140
9,27,45,63	DSS/D INT T	AT-30	<-20/>+140
10,28,46,64	PCU 2 OSC T	AT-37	<-20/>+160
11,29,47,65	XMTR B XTAL T	AT-25	<-15/>+160
12,30,48,66	XMTR B HT/ST	AT-26	<-15/>+160
13,31,49,67	XMTR B DBLR MA	AE-18	<158/>190
14,32,50,68	THRM PLT ONE T	AT-3	<-20/>+140
15,33,51,69	THRM PLT TWO T	AT-4	<-20/>+140
16,34,52,70	INSUL EXT T	AT-13	<-135/>+210
17,35,53,71	INSUL INT T	AT-12	<-20/>+157
18,36,54,72	PRI/ST WALL T 3	AT-11	<-210/>+236

* NO. 1 TO 18 APOLLO 12 ALSEP 1

NO. 19 TO 36 APOLLO 15 ALSEP A-2

NO. 37 TO 54 APOLLO 16 ALSEP ARRAY D (ALSEP 5)

NO. 55 TO 72 APOLLO 14 ALSEP 4

3 OPERATIONAL PROCEDURES

SECTION 3

STANDARD OPERATING PROCEDURES

Due to the individuality of each ALSEP, it is necessary to have two sets of SOP's for each ALSEP.

The first set of SOP's will be distributed prior to each mission. These will, in the main, concern deployment, activation, and normal operations.

The second set of SOP's will be distributed after the 45-day support and will replace the first set in their entirety. These will be the standard procedures that have evolved due to non-normal operation of the ALSEP package.

Bluntly, the first set is written about what is hoped will happen and the second set is written about what really happened.

The operational sequence numbering is as follows:

ALSEP	Apollo	First Set	Second Set
1	12	Discard	1-NX
4	14	3-N*	4-NX
A2	15	2-N	2-NX
Array D	16	3-N	3-NX
Array E	17	6-N	6-NX

*N is SOP number.

Step No.	ASE	SYSTEMS	DATA	Comments
1	PICK UP DATA BOOK FROM OFFICE			
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTERFACE	SELECT ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM RECORDERS AND MULTIPEN	SELECT FOLLOWING HSP FORMATS FOR BOTH DATA BOOKS 4 C/S (1 FOR BXA) 3 PSE 3 LSM NO. 2 3 SWS 3 SIDE NO. 1 (IF SIDE IS ON)		
6	COMPARE DATA WITH PREVIOUS DAY	CHECK SETTINGS ON DRUM RECORDERS. ANNOTATE MULTIPEN.		
7	CMD SIDE ON IF SIDE IS OFF CMD 052	OBTAIN HSP FORMATS SIDE NO. 1 FOR DATA BOOKS AND SIDE NO. 2 FOR PI		
8		FILL IN DATA LOG		
9	LEVEL PSE AXIS AS REQUIRED	OBTAIN PSE HSP FORMATS FOR DATA BOOKS BEFORE AND AFTER LEVELING SEQUENCE		TURN DRUM RECORDER GAIN TO INFINITY
10	CMD PSE LP CAL ON AND OFF PER SUMMARY SUPPORT SCHEDULE. CMD 066.	ANNOTATE DRUM RECORDERS		
11	CMD LSM FLIP CAL PER SUMMARY SUPPORT SCHEDULE. CMD 131. NOTE: TWO FLIP CALS MUST BE CMDED TO MAINTAIN HEADS AT 180°			

Step No.	ASE	SYSTEMS	DATA	Comments
12	IF SIDE IS TO BE CMDED OFF (SEE SUMMARY SUPPORT SCHEDULE) SEND CMD 053 THEN CMD 054	OBTAIN HSP FORMAT SIDE NO. 1 PRIOR TO CMD 053		
13	IF REQUIRED, CMD DSS NO. 1 HEATER ON CMD 055	VERIFY 10 W DECREASE IN RESERVE POWER		DSS NO. 1 HEATER WILL BE CMDED "ON" DURING 2-HOUR SUPPORT PERIOD PRIOR TO SUNSET
14		GET FINAL HSP FORMATS FOR DATA BOOKS (SEE STEP NO. 5). COMPARE DATA WITH FIRST CUT OF DATA.		
15	NOTIFY NETWORK TO TERMINATE REAL-TIME SUPPORT AND OF PLAY-BACK REQUIREMENTS	CALL DISPLAY TO TURN DRUM RECORDERS AND MULTIPEN OFF. TURN OFF ANALOG RECORDERS AND ANNOTATE.		
16	CALL GCC TO HOLD ALSEP MESSAGES	ANNOTATE MULTIPEN		
17	WRITE DAILY REPORT AND SMEARS AS REQUIRED	FILL IN DATA LOG		
18	VERIFY ALL TASKS COMPLETED	PLACE CONSOLE LOG IN CABINET AND LOCK		
19	RETURN DATA BOOK TO OFFICE			
	NOTE: REMOVE MULTIPEN RECORDING FOR PI DURING SUPPORT PERIOD CLOSEST TO SUN ANGLE OF 270°			

Step No.	ASE	SYSTEMS	DATA	Comments
1	START NEW ALSEP 1 DATA BOOKS			
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTERFACE	SELECT THE ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM RECORDERS AND MULTIPEN	SELECT FOLLOWING HSP FORMATS FOR BOTH DATA BOOKS 4 C/S (1 FOR BXA) 3 PSE 3 LSM NO. 2 3 SWS 3 SIDE NO. 1 (IF SIDE IS ON)		THESE FORMATS WILL BE OBTAINED EVERY EVEN GMT HOUR FOR BOTH DATA BOOKS AND UPDATE DATA LOG
6	COMPARE DATA WITH PREVIOUS DAY	CHECK SETTINGS ON DRUM RECORDERS. ANNOTATE MULTIPEN		
7		FILL-IN DATA LOG		ALSO EVERY EVEN GMT HOUR (SEE COMMENT STEP 5)
8	OBTAIN SUNRISE TIME FROM NETWORK			SUNRISE IS WHEN AX-06 CHANGES FROM OFF-SCALE LOW TO SOME INITIAL VALUE. NOTE: REMOTE SITES WILL BE REQUESTED TO MONITOR BY AN ISI
9	LEVEL PSE AS REQUIRED	OBTAIN PSE HSP FORMATS FOR BOTH DATA BOOKS BEFORE AND AFTER LEVELING SEQUENCE		TURN Z MOTOR OFF PRIOR TO LEVELING IF IT IS "ON" FOR THERMAL CONTROL. TURN DRUM RECORDER GAINS TO INFINITY.
10	TURN DSS NO. 1 HEATER OFF 8-HOURS AFTER SUNRISE. CMD 056 THEN CMD 057.	VERIFY 10 W INCREASE IN RESERVE POWER		

Step No.	ASE	SYSTEMS	DATA	Comments
11	TURN PSE Z MOTOR OFF 12 HOURS AFTER SUNRISE	VERIFY 3 W INCREASE IN RESERVE POWER. GET PSE HSP FORMAT FOR EACH DATA BOOK		
12	CMD LSM DOUBLE FLIP CALS EVERY 6 HOURS BEGINNING APPROXIMATELY 24 HOURS AFTER SUNRISE IF THERE IS LSM DATA			USE CLOSEST 0000, 0600, 1200, OR 1800 GMT TO 24 HOURS AFTER SUNRISE. LSM DATA WILL RE-APPEAR ABOUT 30 HOURS AFTER SUNRISE.
13	LEVEL PSE X AND Y AXIS AS REQUIRED	OBTAIN PSE HSP FORMATS BEFORE AND AFTER LEVELING FOR DATA BOOKS		Z MOTOR IS ON. TURN DRUM RECORDER GAINS TO INFINITY.
14		GET FINAL HSP FORMATS FOR DATA BOOKS (SEE STEP 5)		
15	NOTIFY NETWORK TO TERMINATE REAL-TIME SUPPORT AND OF PLAYBACK REQUIREMENTS	CALL DISPLAY TO TURN DRUM RECORDERS AND MULTIPEN OFF. TURN OFF ANALOG RECORDERS AND ANNOTATE.		
16	CALL GCC TO HOLD ALSEP MESSAGES	ANNOTATE MULTIPEN		
17	WRITE DAILY REPORT AND SMEARS AS REQUIRED	FILL-IN DATA LOG		
18	VERIFY ALL TASKS COMPLETED	PLACE CONSOLE LOG IN CABINET AND LOCK		
19	RETURN DATA BOOK TO OFFICE			

Step No.	ASE	SYSTEMS	DATA	Comments
1	PICK UP DATA BOOK FROM OFFICE			
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTERFACE	SELECT THE ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM RECORDERS AND MULTIPEN	SELECT FOLLOWING HSP FORMATS FOR BOTH DATA BOOKS 4 C/S (1 FOR BXA) 3 PSE 3 LSM NO. 2 3 SWS 3 SIDE NO. 1 (IF SIDE IS ON)		THESE FORMATS WILL BE OBTAINED EVERY EVEN GMT HOUR FOR BOTH DATA BOOKS AND UPDATE DATA LOG
6	COMPARE DATA WITH PREVIOUS DAY	CHECK SETTINGS ON DRUM RECORDERS. ANNOTATE MULTIPEN.		
7		FILL IN DATA LOG		ALSO EVERY EVEN GMT HOUR (SEE COMMENT STEP 5)
8	LEVEL PSE AS REQUIRED	OBTAIN PSE HSP FORMAT FOR DATA BOOKS BEFORE AND AFTER LEVELING		TURN DRUM RECORDER GAINS TO INFINITY
9	OBTAIN SUNSET TIME			HAVE NETWORK NOTIFY REMOTE SITE TO MONITOR WHEN AX-04 GOES TO OFF-SCALE LO
10	CMD PSE Z MOTOR ON CMD 072 7 HOURS AFTER SUNSET	VERIFY 3 W DROP IN RESERVE POWER		Z MOTOR LEFT ON FOR PSE THERMAL CONTROL
11		GET FINAL HSP FORMATS FOR DATA BOOKS (SEE STEP 5)		
12	NOTIFY NETWORK TO TERMINATE REAL-TIME SUPPORT AND OF PLAY-BACK REQUIREMENTS	CALL DISPLAY TO TURN DRUM RECORDERS AND MULTIPEN OFF. TURN OFF ANALOG RECORDERS AND ANNOTATE.		

Step No.	ASE	SYSTEMS	DATA	Comments
13	CALL GCC TO HOLD ALSEP MESSAGES	ANNOTATE MULTIPEN		
14	WRITE DAILY REPORT AND SMEARS AS REQUIRED	FILL IN DATA LOG		
15	VERIFY ALL TASKS COMPLETED	PLACE CONSOLE LOG IN CABINET AND LOCK		
16	RETURN DATA BOOK TO OFFICE			

Step No.	ASE	SYSTEMS	DATA	Comments
1		TURN DRUM RECORDER GAINS TO INFINITY		
2		OBTAIN PSE HSP FORMAT FOR EACH DATA BOOK. VERIFY AUTO MODE.		
3	CMD Z MOTOR OFF (CMD 072) IF REQUIRED	ANNOTATE PSE ANALOG RECORDER		Z MOTOR ON DURING LUNAR NIGHT FOR THERMAL CONTROL
4	IF REQUIRED CMD X MOTOR ON (CMD 070)	ANNOTATE PSE ANALOG RECORDER		
5	WHEN X TIDAL ON PSE ANALOG RECORDER IS 50%, TURN X MOTOR OFF (CMD 070)			
6	IF REQUIRED CMD Y MOTOR ON (CMD 071)	ANNOTATE PSE ANALOG RECORDER		
7	WHEN Y TIDAL ON PSE ANALOG RECORDER IS 50%, TURN Y MOTOR OFF (CMD 071)			
8	IF REQUIRED CMD Z MOTOR ON (CMD 072)	ANNOTATE PSE ANALOG RECORDER		SEE COMMENT STEP 3
9	WHEN Z TIDAL ON PSE ANALOG RECORDER IS 50%, TURN Z MOTOR OFF (CMD 072)			THIS STEP VALID ONLY DURING LUNAR DAY FOR LEVELING Z AXIS
10		OBTAIN PSE HSP FORMATS FOR EACH DATA BOOK		
11		TURN DRUM RECORDER GAIN BACK TO -30 DB. ANNOTATE MULTIPOINT RECORDER.		
12	RECORD ACTIVITY IN CONSOLE LOG AND COMMAND LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1		TURN DRUM RECORDER GAINS TO INFINITY		
2		OBTAIN PSE HSP FORMATS FOR EACH DATA BOOK. VERIFY SPEED LO AND AUTO MODE.		
3	CMD Z MOTOR OFF (CMD 072) IF REQUIRED	ANNOTATE PSE ANALOG RECORDER		Z MOTOR ON DURING LUNAR NIGHT FOR THERMAL CONTROL
4	DETERMINE DIRECTION TO DRIVE X AXIS AND SEND CMD 074 IF REQUIRED	VERIFY DIRECTION		
5	SEND CMD 103 (FORCED MODE)	VERIFY FORCED MODE		
6	ENABLE MAP OVERRIDE			
7	GUESSTIMATE TIME X MOTOR TO BE ON	VERIFY GUESSTIMATE		BAND EDGE TO BAND EDGE IS APPROX 4 SEC
8	NOTIFY NETWORK OF MAP OVERRIDE AND DURATION OF X MOTOR ON			
9	SEND CMD 070 (X MOTOR ON)			
10	SEND CMD 070 (X MOTOR OFF) AFTER APPROPRIATE TIME INTERVAL			
11	INITIATE CMD 103 (AUTO MODE) IMMEDIATELY AFTER CMD 070 (X MOTOR OFF). TURN MAP OVERRIDE OFF.	ANNOTATE ANALOG RECORDER		
12	DETERMINE DIRECTION TO DRIVE Y AXIS AND SEND CMD 074 IF REQUIRED	VERIFY DIRECTION		
13	SEND CMD 103 (FORCED MODE)	VERIFY FORCED MODE		
14	GUESSTIMATE TIME Y MOTOR TO BE ON. TURN MAP OVERRIDE ON.	VERIFY GUESSTIMATE		BAND EDGE TO BAND EDGE IS APPROX 4 SEC

Step No.	ASE	SYSTEMS	DATA	Comments
15	NOTIFY NETWORK OF MAP OVERRIDE AND DURATION OF Y MOTOR ON			
16	SEND CMD 071 (Y MOTOR ON)			
17	SEND CMD 071 (Y MOTOR OFF) AFTER APPROPRIATE TIME INTERVAL			
18	INITIATE CMD 103 (AUTO MODE) IMMEDIATELY AFTER CMD 071 (Y MOTOR OFF)	ANNOTATE ANALOG RECORDER		
19	DISABLE MAP OVERRIDE	VERIFY AUTO MODE		
20	CMD Z MOTOR ON (CMD 072) IF REQUIRED			Z AXIS WILL BE LEVELED IN AUTO MODE ONLY BECAUSE OF LOW DRIFT RATES
21		OBTAIN PSE HSP FORMAT FOR EACH DATA BOOK		
22		RETURN DRUM RECORDER GAINS TO -30 DB. ANNOTATE MULTIPOINT RECORDER.		
23	RECORD ACTIVITY IN CONSOLE LOG AND COMMAND LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1		VERIFY THAT CUP 14 SUM IS EQUAL TO OR GREATER THAN 40 FOR ONE COMPLETE SOLAR WIND CYCLE		
2	ENABLE MAP OVERRIDE			
3	SEND CMD 122 THREE TIMES WITHIN 10 SEC (SWS HI GAIN)			CUP 14 SUM WILL GO TO SOME NUMBER DIFFERENT FROM LO GAIN

Step No.	ASE	SYSTEMS	DATA	Comments
1		VERIFY THAT CUP 14 SUM IS 5 OR MORE LESS THAN WHEN COMMANDED TO HI GAIN		
2	SEND CMD 046 (SWS STBY)	VERIFY EXP 3 STBY STATUS LIGHT ON		
3	SEND CMD 045 (SWS ON)	VERIFY EXP 3 STBY STATUS LIGHT OFF		

Step No.	ASE	SYSTEMS	DATA	Comments
1	PICK UP DATA BOOK FROM OFFICE			
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTERFACE	SELECT THE ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM RECORDERS AND MULTIPEN	SELECT FOLLOWING HSP FORMATS FOR BOTH DATA BOOKS 4 C/S (1 FOR BXA) 3 PSE 3 CPLEE 3 SIDE NO. 1		
6	COMPARE DATA WITH PREVIOUS DAY	CHECK SETTINGS ON DRUM RECORDERS. ANNOTATE MULTIPEN.		
7		FILL IN DATA LOG		
8	LEVEL PSE AXIS AS REQUIRED	OBTAIN PSE HSP FORMATS FOR DATA BOOKS BEFORE AND AFTER LEVELING SEQUENCE		TURN DRUM RECORDER GAIN TO INFINITY
9	CMD PSE LP CAL ON AND OFF PER SUMMARY SUPPORT SCHEDULE. CMD 066.	ANNOTATE DRUM RECORDERS		
10	IF REQUIRED, CMD DSS NO. 1 HEATER ON. CMD 055.	VERIFY 10 W DECREASE IN RESERVE POWER		DSS NO. 1 HEATER WILL BE CMDED "ON" DURING 2-HOUR SUPPORT PERIOD PRIOR TO SUNSET
11		GET FINAL HSP FORMATS FOR DATA BOOKS (SEE STEP NO. 5). COMPARE DATA WITH FIRST CUT OF DATA.		

Step No.	ASE	SYSTEMS	DATA	Comments
12	NOTIFY NETWORK TO TERMINATE REAL-TIME SUPPORT AND OF PLAYBACK REQUIREMENTS	CALL DISPLAY TO TURN DRUM RECORDERS AND MULTIPEN OFF. TURN OFF ANALOG RECORDERS AND ANNOTATE.		
13	CALL GCC TO HOLD ALSEP MESSAGES	ANNOTATE MULTIPEN		
14	WRITE DAILY REPORT AND SMEARS AS REQUIRED	FILL IN DATA LOG		
15	VERIFY ALL TASKS COMPLETED	PLACE CONSOLE LOG IN CABINET AND LOCK		
16	RETURN DATA BOOK TO OFFICE			

Step No.	ASE	SYSTEMS	DATA	Comments
1		START NEW DATA BOOKS		
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTER-FACE	SELECT THE ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM RECORDERS AND MULTIPEN	SELECT FOLLOWING HSP FORMATS FOR BOTH DATA BOOKS 4 C/S (1 FOR BXA) 3 PSE 3 CPLEE 3 SIDE NO. 1		THESE FORMATS WILL BE OBTAINED EVERY EVEN GMT HOUR FOR BOTH DATA BOOKS AND UPDATE DATA LOG
6	COMPARE DATA WITH PREVIOUS DAY	CHECK SETTINGS ON DRUM RECORDERS. ANNOTATE MULTIPEN.		
7		FILL IN DATA LOG		ALSO EVERY EVEN GMT HOUR (SEE COMMENT STEP 5)
8	OBTAIN SUNRISE TIME DATA			
9	TURN DSS NO. 1 HEATER OFF AT START OF SUPPORT PERIOD. CMD 056 THEN CMD 057.	VERIFY 10 W INCREASE IN RESERVE POWER		
10	LEVEL PSE AS REQUIRED	OBTAIN PSE HSP FORMATS FOR BOTH DATA BOOKS BEFORE AND AFTER LEVELING SEQUENCE		
11		GET FINAL HSP FORMATS FOR DATA BOOKS (SEE STEP 5)		

Step No.	ASE	SYSTEMS	DATA	Comments
12	NOTIFY NETWORK TO TERMINATE REAL-TIME SUPPORT AND OF PLAY-BACK REQUIREMENTS	CALL DISPLAY TO TURN DRUM RECORDERS AND MULTIPEN OFF. TURN OFF ANALOG RECORDERS AND ANNOTATE.		
13	CALL GCC TO HOLD ALSEP MESSAGES	ANNOTATE MULTIPEN		
14	WRITE DAILY REPORT AND SMEARS AS REQUIRED	FILL IN DATA LOG		
15	VERIFY ALL TASKS COMPLETED	PLACE CONSOLE LOG IN CABINET AND LOCK		
16	RETURN DATA BOOK TO OFFICE			

Step No.	ASE	SYSTEMS	DATA	Comments
1		TURN DRUM RECORDER GAINS TO INFINITY		
2		OBTAIN PSE HSP FORMAT FOR EACH DATA BOOK. VERIFY AUTO MODE.		
3	CMD THERMAL CONTROL MODE TO "OFF" (CMD 076)			
4	IF REQUIRED, CMD X MOTOR ON (CMD 070)	ANNOTATE PSE ANALOG RECORDER		
5	WHEN X TIDAL ON PSE ANALOG RECORDER IS 50%, TURN X MOTOR OFF (CMD 070)			
6	IF REQUIRED, CMD Y MOTOR ON (CMD 071)	ANNOTATE PSE ANALOG RECORDER		
7	WHEN Y TIDAL ON PSE ANALOG RECORDER IS 50%, TURN Y MOTOR OFF (CMD 071)			Y MOTOR SOMETIME STICKS, LEAVE MOTOR ON FOR 5 MINUTES. IF IT DOESN'T LEVEL AFTER 5 MINUTES, TURN MOTOR OFF THEN ON FOR ANOTHER 5 MINUTES. REPEAT UNTIL Y LEVELS.
8	IF REQUIRED, CMD Z MOTOR ON (CMD 072)	ANNOTATE PSE ANALOG RECORDER		
9	WHEN Z TIDAL ON PSE ANALOG RECORDER IS 50%, TURN Z MOTOR OFF (CMD 072)			
10	CMD THERMAL CONTROL MODE TO "AUTO ON" (CMD 076 THREE TIMES)			
11		OBTAIN PSE HSP FORMATS FOR EACH DATA BOOK		
12		TURN DRUM RECORDER GAIN BACK TO -30 DB. ANNOTATE MULTIPOINT RECORDER.		
13	RECORD ACTIVITY IN CONSOLE LOG AND COMMAND LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1		TURN DRUM RECORDER GAINS TO INFINITY		
2		OBTAIN PSE HSP FORMATS FOR EACH DATA BOOK. VERIFY SPEED LO AND AUTO MODE.		
3	CMD THERMAL CONTROL MODE TO "OFF" (CMD 076)			
4	DETERMINE DIRECTION TO DRIVE X AXIS AND SEND CMD 074 IF REQUIRED	VERIFY DIRECTION		
5	SEND CMD 103 (FORCED MODE)	VERIFY FORCED MODE		
6	ENABLE MAP OVERRIDE			
7	GUESSTIMATE TIME X MOTOR TO BE ON	VERIFY GUESSTIMATE		BAND EDGE TO BAND EDGE IS APPROX 4 SEC
8	NOTIFY NETWORK OF MAP OVERRIDE AND DURATION OF X MOTOR ON			
9	SEND CMD 070 (X MOTOR ON)			
10	SEND CMD 070 (X MOTOR OFF) AFTER APPROPRIATE TIME INTERVAL			
11	INITIATE CMD 103 (AUTO MODE) IMMEDIATELY AFTER CMD 070 (X MOTOR OFF)	ANNOTATE ANALOG RECORDER		
12				Y AXIS WILL BE LEVELED IN AUTO MODE ONLY
13	DISABLE MAP OVERRIDE	VERIFY AUTO MODE		
14				Z AXIS WILL BE LEVELED IN AUTO MODE ONLY BECAUSE OF LOW DRIFT RATES

Step No.	ASE	SYSTEMS	DATA	Comments
15	CMD THERMAL CONTROL MODE TO "AUTO ON" (CMD 076 THREE TIMES)			
16		OBTAIN PSE HSP FORMAT FOR EACH DATA BOOK		
17		RETURN DRUM RECORDER GAINS TO -30 DB. ANNOTATE MULTIPOINT RECORDER.		
18	RECORD ACTIVITY IN CONSOLE LOG AND COMMAND LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE C/S HSP. ASSURE THAT AS-1 IS ABOVE +35° C.		
2	INITIATE CMD 042 (ASE OPER SEL)	ANNOTATE CMD ACTION ON C/S ANALOG RECORDER		
3	NOTIFY NETWORK TIME OF INTENDED HBR CMD	VERIFY NOTHING UNUSUAL OR OF SPECIAL INTEREST IS GOING ON WITH THE OTHER EXPERI-MENTS		ALLOW 15 MINUTES MINIMUM BETWEEN ASE OPER SEL AND HBR ON CMD TO ALLOW GEO-PHONE AMPS TO WARM UP
4	INITIATE CMD 003 (HBR ON) AFTER 15 MIN WARM-UP AND LOW ACTIVITY ON OTHER EXP	SELECT ASE FORMAT 5 ON RECORDER NO. 2 AND FORMAT 6 ON RECORDER NO. 3 AT HBR SYNC LOCK-UP. CONFIRM "ARM GRENADE" EVENT LIGHT EXTINGUISHED.		RECORDER SPEED IS 10 MM/SEC
5	INITIATE CMD 156 (GEO CAL GO)	ANNOTATE CMD ACTION OF RECORDER NO. 2		DO NOT SEND GEO CAL IF AS-4 (GEO TEMP) IS LESS THAN -20° C
6	NOTIFY NETWORK TIME OF INTENDED NBR CMD			HBR ON TIME WILL BE APPROXIMATELY 30 MINUTES
7	INITIATE CMD 005 (HBR OFF)	ANNOTATE CMD ACTION OF RECORDERS 2 AND 3		
8		VERIFY NBR LOCK-UP AND ALL RECORDERS AND DRUMS TO PRE-HBR FORMATS		
9	INITIATE CMD 043 (ASE STAY)	ANNOTATE ACTION ON C/S ANALOG RECORDER		
10	CHECK TEST COMPLETE ON WORK SCHEDULE AND LOG ANOMOLIES			

PREREQUISITES:
1. VERIFY COMMAND GROUP 4 ENABLED
2. VERIFY THAT ALL ANALOG RECORDERS HAVE NEW ROLL OF PAPER AND INK
3. AS-1, AS-2, AND AS-3 ABOVE -20°C

Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE C/S HSP, ASSURE THAT AS-2 AND AS-3 ARE ABOVE -20°C	READ AS-2 AND AS-3 TEMPS	
2	INITIATE CMD 042 (EXP #2 OPER SEL)	CALCULATE THE NECESSARY TIME FOR WARMUP	ANNOTATE CMD ACTION ANALOG RECORDER	
3	NOTIFY NTWK TIME OF INTENDED HBR COMMAND AND GIVE TIME AND GET GO FROM NTWK	SELECT ASE FORMAT ON THE ANALOG RECORDERS	ANNOTATE FORMAT CHANGE ON ANALOG RECORDER	RECORDER 2 - FORMAT 5 RECORDER 3 - FORMAT 6
4	AFTER WARMUP TIME, INITIATE CMD 003 (HBR ON)	WATCH FOR REMOTE SITE LOCK UP ON HBR SIGNAL AND MARK TIME	ANNOTATE CMD ON ALL ANALOG AND DRUM RECORDERS	OBTAIN HSP EVERY 2 MIN DURING PASSIVE LISTENING MODE
5	INITIATE CMD 156 (GEO CAL GO)	SELECT SPEED ON ANALOG RECORDERS	ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
6	INITIATE CMD 170 (GRENADES ARM)	ASSURE THAT AT LEAST A 60 SEC INTERVAL EXISTS BETWEEN ARM AND FIRE COMMANDS	ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
7		GIVE "GO" FOR GRENADE FIRE	GIVE "GO" FOR GRENADE FIRE	
8	INITIATE CMD 164 (GRENADE #2)		ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
9		GIVE "GO" FOR GRENADE FIRE	GIVE "GO" FOR GRENADE FIRE	
10	INITIATE CMD 170 (GRENADES ARM)	ASSURE THAT AT LEAST A 60 SEC INTERVAL EXISTS BETWEEN ARM AND FIRE COMMANDS	ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
11	INITIATE CMD 166 (GRENADE #4)		ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
12		GIVE "GO" FOR GRENADE FIRE	GIVE "GO" FOR GRENADE FIRE	
13	INITIATE CMD 170 (GRENADES ARM)	ASSURE THAT AT LEAST A 60 SEC INTERVAL EXISTS BETWEEN ARM AND FIRE COMMANDS	ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
14	INITIATE CMD 165 (GRENADE #3)		ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
15		GIVE "GO" FOR GRENADE FIRE	GIVE "GO" FOR GRENADE FIRE	
16	INITIATE CMD 170 (GRENADES ARM)	ASSURE THAT AT LEAST A 60 SEC INTERVAL EXISTS BETWEEN ARM AND FIRE COMMANDS	ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
17	INITIATE CMD 163 (GRENADE #1)		ANNOTATE CMD ACTION ON ASE ANALOG RECORDER	
18	AFTER SUFFICIENT DATA HAS BEEN GATHERED, NOTIFY NTWK OF TIME TO RETURN TO NORMAL BIT RATE AND GET GO FROM NTWK			
19	INITIATE CMD 005 (HBR OFF)	RESELECT ANALOG FORMATS, AND WATCH FOR REMOTE SITE LOCK UP ON THE NORMAL BIT RATE DATA	ANNOTATE CMD ACTION ON ALL ANALOG RECORDERS	
20	INITIATE CMD 043 (EXP #2 STBY SEL)		ANNOTATE CMD ACTION ON C/S ANALOG RECORDER	
21	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANOMALIES			

Step No.	ASE	SYSTEMS	DATA	Comments
1	CMD 111 (CPE OPR HTR ON) TO TURN THERMAL CONTROL MODE TO MANUAL ON	VERIFY 5 W RES PWR		
2	CMD 112 (CPE OPR HTR OFF) TO TURN THERMAL CONTROL MODE TO MAN-UAL OFF			
3	TO TURN THERMAL CON-TROL MODE TO AUTO CMD	VERIFY 4 W RES PWR		NOTE 1: THIS LEAVES THE EXPERI-MENT IN STANBY
4	INITIATE CMD 052 (EXP 4 OPER SEL) TO TURN EXPERIMENT TO OPERATE (NOTE 2)	VERIFY 5 W RES PWR		NOTE 2: WHEN THE CPLEE GOES TO OPER-ATE THE THER-MAL CONTROL INITIALIZES IN THE AUTO MODE
5		INITIATE CPLEE HSP	CHECK CPLEE STATUS	
6	RECORD ACTION AND ANOMALIES IN CONSOLE LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE CMD 117 (CPE DEF SEQ OFF) TO STOP AUTOMATIC SEQUENCE	INITIATE CPLEE HSP FORMAT	OBTAIN CPLEE HSP FORMAT AND DETERMINE WHERE THE SEQUENCE STOPPED (USE CPLEE HSP FORMAT 2)	
2	INITIATE CMD 115 (CPE DEF STEP) TO ADVANCE THE VOLTAGE ONE STEP (NOTE 1)	VERIFY ADVANCE OF VOLTAGE		NOTE 1: REPEAT THE STEP AS MANY TIMES AS IS NECESSARY TO REACH THE DESIRED DEFLECTION VOLTAGES
3	INITIATE CMD 114 (CPE DEF SEQ ON) TO AUTOMATIC SEQUENCE	INITIATE CPLEE HSP FORMAT	OBTAIN CPLEE HSP FORMAT AND DETERMINE CPLEE STATUS	
4	RECORD ACTION AND ANOMALIES IN CONSOLE LOG			

Step No.	ASE	SYSTEMS	DATA	Comments
1	ALSEP BRIEFING ON WORK SCHEDULE IN SSR			
2	CHECK COMM LOOPS	CHECK COMM LOOPS	CHECK COMM LOOPS	
3	VERIFY WITH NETWORK CONTROLLER R/S CMD AND TM PROGRAMS LOADED AND READY FOR R/T SUPPORT	VERIFY WITH ALCS OPERATOR CAPABILITY OF R/T SUPPORT		
4	VERIFY WITH NETWORK CONTROLLER THAT ALL CRITICAL CMD GROUPS ARE DISABLED	INITIATE HSP LIMIT SENSE TABLE FORMAT	OBTAIN HSP LIMITS TABLE PRINTOUT AND COMPARE WITH PRE-DEFINED LIMITS TABLE	
5	REQUEST RTC INVENTORY FROM ALSEP NETWORK CONTROLLER	IF NECESSARY, UPDATE THE LIMITS	OBTAIN RTC INVENTORY FROM TTY PRINTER AND VERIFY ALL CRITICAL CMD DISABLED	
6			COORDINATE DISPLAY EQUIPMENT CALIBRATION WITH ALCS OPERATOR AND DISPLAY PERSONNEL 1. CAL DRUM RECORDER 2. CAL ANALOG METERS 3. CAL ANALOG RECORDER	
7			START DRUM AND ANALOG RECORDERS AS DEFINED IN WORK SCHEDULE	
8		CONTACT ALCS OPERATOR TO CONFIGURE DRUM RECORDERS AS DEFINED IN WORK SCHEDULE		
9	CHECK STATUS OF REMOTE ANALOG RECORDERS AND TV	CONFIGURE ANALOG CHART RECORDERS AS DEFINED IN WORK SCHEDULE	THE ANALOG RECORDER EVENT INDICATOR SELECT SWITCHES SHOULD BE SET AS DEFINED IN WORK SCHEDULE	
10		INITIATE HSP DISPLAY GUIDE FORMAT		
11	VERIFY ON CMD PANEL 1. FC MODE (NOTE 1) 2. CMD PANEL DISABLE 3. ALL ZEROS SELECTED IN THE CMD REQUEST WINDOW 4. ALSEP SELECT CLEAR		OBTAIN HSP DISPLAY GUIDE AND VERIFY EQUIPMENT CONFIGURED AS PER WORK SCHEDULE	NOTE 1: IF IN M&O MODE REQUEST NETWORK OPERATOR TO GO TO FC MODE

Step No.	ASE	SYSTEMS	DATA	Comments
1	REQUEST ALSEP NETWORK OPERATOR TO SITE SELECT THE CONSOLE			
2	LOG: 1. TIME OF RTG FUEL INSERTION. 2. TIME OF RTG PLUG-IN. 3. AMP METER READING. 4. SIDE LEVEL AND ORIENTATION COMMENT. 5. LSM ORIENTATION. 6. PSE GNOMON READING. 7. PSE ORIENTATION COMMENT. 8. SWS ORIENTATION. 9. TIME OF RTG SHORT REMOVAL. 10. HFE ORIENTATION. 11. PROBE DRILL TIMES.	VERIFY ON EVENT INDICATOR.		
3	LOG CLOSURE OF SWITCH NO. 1	CHECK STATUS OF C/S AND VERIFY RESERVE POWER EQUAL TO OR GREATER THAN 38 W	OBTAIN C/S HSP FORMAT AND VERIFY THE FOLLOWING: CS-2 RES PWR EQUAL TO OR GREATER THAN 38 W. AE-9 +12 VDC AE-7 +29 VDC AE-8 +15 VDC AE-10 +5 VDC AE-11 -12 VDC AE-12 -6 VDC AE-1 0.25 CAL AE-2 4.75 CAL	

Step No.	ASE	SYSTEMS	DATA	Comments
1	REQUEST ALSEP NETWORK OPERATOR TO SITE SELECT CONSOLE			
2		CHECK FOR RES PWR ON C/S ANALOG RECORDER INITIATE C/S HSP	OBTAIN C/S HSP FORMAT AND CHECK THE FOLLOWING: CS-2 RES PWR EQUAL TO OR GREATER THAN 7.0 W AE-9 BUS VOLT +12 VDC AE-7 BUS VOLT +29 VDC AE-8 BUS VOLT +15 VDC AE-10 BUS VOLT +5 VDC AE-11 BUS VOLT -12 VDC AE-12 BUS VOLT -6 VDC AE-1 DSS ADC 0.25 V AE-2 DSS ADC 4.75 V	
3		GIVE GO/NO-GO FOR PSE TURN-ON	GIVE GO/NO-GO FOR PSE TURN-ON	
4	INITIATE CMD-(EXP 1 OPER SEL) (CMD 036)	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE & C/S ANALOG RECORDER	
5		VERIFY EXP 1 STBY STATUS EVENT INDICATOR IS EXTINGUISHED CHECK RES PWR ON C/S ANALOG RECORDER FOR A DECREASE OF APPROX 5 W	OBTAIN PSE HSP FORMAT AND READ STATUS OF THE FOLLOWING: AL-1 -30 DB AL-2 -30 DB AL-3 POS AL-3 LO AL-4 -30 DB AL-5 AUTO AL-5 COARSE LVL OUT AL-6 AUTO ON AL-7 BOTH OFF AL-8 CAGED AT-5 -20 DEG F TO +40 DEG F CS-2 RESERVE PWR DL-7 SNSR TEMP	

Step No.	ASE	SYSTEMS	DATA	Comments
6		NOTIFY ASE THAT PSE IS OPERATING AND IS READY FOR UNCAGING		
7	INITIATE CMD 073 (PSE UNCAGE ARM/FIRE) TO ARM THE PSE UNCAGING MECHANISM	ASSURE THAT THE UNCAGE ARM IS ALLOWED 30 SECONDS TO CHARGE UP, PRIOR TO FIRING CMD	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
8	INITIATE CMD 073 (PSE UNCAGE ARM/FIRE) TO FIRE THE PSE UNCAGING MECHANISM	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
9		ON LATEST C/S HSP FORMAT CHECK THE FOLLOWING C/S PARAMETERS: CAL VOLTAGES CHECK AE-01 0.25 CAL AE-02 4.75 CAL RTG OUTPUT CHECK AE-03 VDC AE-04 AMPS CS-01 WATTS	OBTAIN PSE HSP FORMAT AND READ AL-8 INDICATIONS	
10	IF NECESSARY, INITIATE CMD 067 (SP Z GAIN CHANGE) TO OBTAIN DESIRED GAIN	PCU VDC OUTPUT CHECK AE-09 +12 VDC AE-07 +29 VDC AE-08 +15 VDC AE-10 +5 VDC AE-11 -12 VDC AE-12 -6 VDC	ANNOTATE CMD ACTION ON PSE ANALOG	
11	MONITOR PSE ANALOG RECORDER FOR GAIN CHANGE ON SP Z CHANNEL	INTERNAL TEMPS CHECK AT-03 TEMP 1 F AT-04 TEMP 2 F AT-05 TEMP 3 F AT-06 TEMP 4 F AT-07 TEMP 5 F AT-12 INSUL F	MONITOR PSE ANALOG RECORDER FOR GAIN CHANGE ON SP Z CHANNEL	
12	SPEED UP RECORDER TO 50 MM/SEC FOR SP CAL	PCU 1 CHECK (NOTE 1) CS-2 RES PWR 1 CS-3 INT REG DISSIP AE-05 SHUNT 1 AMPS AT-36 OSC TEMP F AT-38 REG TEMP F		NOTE 1: PCU 2 CHECK CS-04 RES PWR 2 CS-05 INT REG DISSIP AE-06 SHUNT 2 AMPS AT-37 OSC TEMP F AT-39 REG TEMP F
13	INITIATE CMD 065 (SP CAL) TO TURN CAL PULSE ON	DISCRETES CHECK AB-04 EXP 1 STBY STA AB-05 DSS HTR 2	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
14	MONITOR PSE ANALOG RECORDER FOR INDICATION OF CAL PULSE	STRUCTURAL TEMP CHECK AT-11 PRI/ST W3 F AT-01 PNL LEFT 1 F AT-02 PNL RIGHT 2 F AT-08 PRI/ST W1 F AT-09 PRI/ST W2 F AT-10 PRI/ST B1 F AT-13 INSUL EXT F	MONITOR PSE ANALOG RECORDER FOR INDICATION OF CAL PULSE. READ SP CAL STATUS FROM PSE HSP.	
15	INITIATE CMD 065 (SP CAL) TO TURN CAL PULSE OFF	DUST DETECTOR CHECK AX-01 CELL 1 C AX-02 CELL 2 C AX-03 CELL 3 C AX-04 CELL 1 MV AX-05 CELL 2 MV AX-06 CELL 3 MV	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
16	MONITOR PSE ANALOG RECORDER FOR INDICATION OF CAL PULSE IN OPPOSITE DIRECTION FROM FIRST	PDU CHECK AT-34 BASE F AT-35 INT F	MONITOR PSE ANALOG RECORDER FOR INDICATION OF CAL PULSE IN OPPOSITE DIRECTION FROM FIRST	
17	RETURN ANALOG RECORDER TO 0.5 MM/SEC	RECEIVER CHECK AB-01 RCVR 1 KHZ PCM AE-13 PRE/LIM DEM AE-14 L/O LVL DEM AT-21 XTAL A F AT-22 XTAL B F AT-07 TEMP 5 F	READ SP CAL STATUS FROM PSE HSP	
18		DECODER CHECK AT-31 BASE F AT-32 INT F AT-33 VCO F		
19		ANALOG MUX CHECK AT-27 BASE F AT-28 INT F		
20		DIGITAL PROCESSOR CHECK AT-29 BASE F AT-30 INT F		
21		XMTR A CHECK (NOTE 2) AT-23 XTAL F AT-24 HT/S F AE-15 AGC VDC AE-17 DOUBLER MA		NOTE 2: XMTR B CHECK AT-25 XTAL F AT-26 HT/S F AE-16 AGC VDC AE-18 DOUBLER MA

SOP 2-4
PSE INITIAL AUTOMATIC LEVELING
PREREQUISITES: 1. EXP 1 MUST BE IN OPERATE MODE
2. EXP 1 MUST BE UNCAGED
3. RES PWR GREATER THAN 5 W

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Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE PSE HSP FORMAT	READ PSE STATUS	
2	INITIATE CMD 076 TO TURN THERMAL CNTL STATUS TO AUTO OFF	INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
3	NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1) SYMBOL NAME STATUS REQ FOR AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED N/A AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR IN AL-6 T CTL AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UNCAGE UNCAGED	MONITOR X, Y, & Z TIDAL DATA OF PSE ANALOG RECORDER	VERIFY SPEED OF PSE ANALOG RECORDER AT 0.5 MM/SEC OR GREATER	NOTE 1: THERE ARE NO STATUS PARAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON- PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MTR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF
4	IF NECESSARY INITIATE CMD 067 (SP GAIN CH) TO OBTAIN GAIN DESIRED BY PI FOR LEVELING		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
5	IF NECESSARY INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN THE AUTO LVL MDE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
6	INITIATE CMD 102 (LVL SNSR IN/OUT) TO PUT LVL SNSR IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER, VERIFY ON HSP	

Step No.	ASE	SYSTEMS	DATA	Comments
7		INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
8	VERIFY STATUS OF THE FOLLOWING: SYMBOL NAME STATUS AL-1 XY GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED N/A AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR IN AL-6 T CTL STA AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UNCAGE STA UNCAGED	VERIFY RESERVE POWER FROM C/S ANALOG RECORDER GREATER THAN 5.0 W	TURN DRUM RECORDER ATTENTUATION TO INFINITY	
9	INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
10	VERIFY THAT X MOTOR IS DRIVING VIA COARSE SENSOR BY NOTING HIGH PULSE RATE ON SP Z CHANNEL APPROX 40 PPS (NOTE 2)	VERIFY ON C/S ANALOG RECORDER AND ON THE HSP A DECREASE IN RES PWR OF APPROX 3 W. LOG CHANGE.		NOTE 2: NOTE THAT COARSE SENSOR HAS AUTOMATICALLY CUT OUT BY NOTING CHANGE OF MOTOR DRIVE RATE FROM APPROX 40 PPS TO APPROX 1 PPS

SOP 2-4
PSE INITIAL AUTOMATIC LEVELING
PREREQUISITES: 1. EXP 1 MUST BE IN OPERATE MODE
2. EXP 1 MUST BE UNCAGED
3. RES PWR GREATER THAN 5 W

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Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE PSE HSP FORMAT	READ PSE STATUS	
2	INITIATE CMD 076 TO TURN THERMAL CNTL STATUS TO AUTO OFF	INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
3	NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1) SYMBOL NAME STATUS REQ FOR AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED N/A AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR IN AL-6 T CTL AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UNCAGE UNCAGED	MONITOR X, Y, & Z TIDAL DATA OF PSE ANALOG RECORDER	VERIFY SPEED OF PSE ANALOG RECORDER AT 0.5 MM/SEC OR GREATER	NOTE 1: THERE ARE NO STATUS PAPAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON- PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MTR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF
4	IF NECESSARY INITIATE CMD 067 (SP GAIN CH) TO OBTAIN GAIN DESIRED BY PI FOR LEVELING		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
5	IF NECESSARY INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN THE AUTO LVL MDE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
6	INITIATE CMD 102 (LVL SNSR IN/OUT) TO PUT LVL SNSR IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER, VERIFY ON HSP	

Step No.	ASE	SYSTEMS	DATA	Comments
7		INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
8	VERIFY STATUS OF THE FOLLOWING: SYMBOL NAME STATUS AL-1 XY GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED N/A AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR IN AL-6 T CTL STA AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UNCAGE STA UNCAGED	VERIFY RESERVE POWER FROM C/S ANALOG RECORDER GREATER THAN 5.0 W	TURN DRUM RECORDER ATTENTUATION TO INFINITY	
9	INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
10	VERIFY THAT X MOTOR IS DRIVING VIA COARSE SENSOR BY NOTING HIGH PULSE RATE ON SP Z CHANNEL APPROX 40 PPS (NOTE 2)	VERIFY ON C/S ANALOG RECORDER AND ON THE HSP A DECREASE IN RES PWR OF APPROX 3 W. LOG CHANGE.		NOTE 2: NOTE THAT COARSE SENSOR HAS AUTOMAT-ICALLY CUT OUT BY NOTING CHANGE OF MOTOR DRIVE RATE FROM APPROX 40 PPS TO APPROX 1 PPS

Step No.	ASE	SYSTEMS	DATA	Comments
11	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. IF X TIDAL DATA DOESN'T REACH APPROX +/- 12 URAD WITHIN 7.5 MIN INITIATE CMD 102 (LVL SNSR IN/OUT) TO COMMAND COARSE SENSOR OUT. WHEN X TIDAL DATA INDICATES WITHIN APPROX +/- 12 URAD, OR WHEN THE MOTOR HAS DRIVEN FOR 35 MIN, INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X MTR OFF. (NOTES 3 AND 4).	VERIFY ON C/S ANALOG RECORDER THAT RES PWR INCREASES APPROX 3 W	ANNOTATE ALL CMD ACTION ON PSE ANALOG RECORDER	NOTE 3: TIME REQD TO COARSE LEVEL X AXIS IS APPROX 20-25 MINUTES. DO NOT RUN X MOTOR ANY LONGER THAN NECESSARY. TIDAL DATA IS TEMPERATURE SENSITIVE. NOTE 4: IF THE X MOTOR IS COMMANDED OFF WITHOUT BEING LEVELED COMPLETE LEVELING THE OTHER AXES AND REFER TO MISSION RULES FOR ACTION TO BE TAKEN ON X AXIS.
12	IF NECESSARY, INITIATE CMD 102 (LVL SNSR IN/OUT) TO PUT LEVEL SENSOR IN	INITIATE PSE HSP	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER AND READ SENSOR STATUS FROM PSE HSP	
13	INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
14	VERIFY THAT Y MOTOR IS DRIVING VIA COARSE SENSOR BY MONITORING HIGH PULSE RATE ON SP Z CHANNEL (NOTE 5)	VERIFY C/S ANALOG RECORDER AND THE HSP THAT THE RES PWR DECREASE APPROX 3 W. LOG CHANGE IN RES POWER		NOTE 5: NOTE THAT COARSE SENSOR HAS AUTOMATICALLY CUT OUT BY NOTING CHANGE OF MOTOR RATE FROM APPROX 40 PPS TO APPROX 1 PPS

Step No.	ASE	SYSTEMS	DATA	Comments
15	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. IF THE Y TIDAL DATA DOES NOT REACH APPROX +/- 12 URAD WITHIN 7.5 MIN, INITIATE CMD 102 (LVL SENSOR IN/OUT) TO COMMAND COURSE SENSOR OUT. WHEN Y TIDAL DATA INDICATES +/- 12 URAD, OR WHEN THE MOTOR HAS DRIVEN FOR 35 MIN, INITIATE CMD 071 (LVL MTR ON/OFF) TO TURN Y MTR OFF. (NOTE 6 AND 7).	VERIFY ON C/S ANALOG RECORDER AND THE HSP THAT THE RES PWR INCREASES APPROX 3 W	ANNOTATE ALL CMD ACTIONS ON PSE ANALOG RECORDER	NOTE 6: TIME REQD TO COARSE LEVEL Y AXIS IS APPROX 20-25 MINUTES. DO NOT RUN Y MOTOR ANY LONGER THAN NECESSARY. TIDAL DATA IS TEMPERATURE SENSITIVE. NOTE 7: IF THE Y MTR IS COMMANDED OFF WITHOUT BEING LEVELED, COMPLETE LEVELING OF OTHER AXES AND REFER TO MISSION RULES FOR ACTION TO BE TAKEN ON Y AXIS.
16	INITIATE CMD 102 (LVL SENSOR IN/OUT) TO PUT LVL SENSOR OUT	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
17	MONITOR X AND Y TIDAL DATA ON PSE ANALOG RECORDER. IF NO ADDITIONAL LEVELING IS REQUIRED, GO TO STEP 24.		VERIFY ON PSE HSP FORMAT THAT THE LVL SENSOR IS OUT	
18	IF NECESSARY INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
19	VERIFY ON PSE ANALOG RECORDER SP Z CHANNEL THAT X LEVELING MOTOR IS DRIVING AT LOW RATE (APPROX 1 PPS) CAUSED BY X TIDAL SIGNAL DRIVE	VERIFY ON C/S ANALOG RECORDER AND THE HSP THAT THE RES PWR DECREASES APPROX 3 W (NOTE 8)		NOTE 8: IF THE CMDS FOR ON AND OFF ARE CLOSE, THE C/S ANALOG MAY NOT CATCH THE CHANGE IN RES PWR

Step No.	ASE	SYSTEMS	DATA	Comments
20	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN X TIDAL DATA INDICATES LESS THAN +/- 5 URAD, INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X MTR OFF	VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR DECREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
21	IF NECESSARY, INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR ON		ANNOTATE CMD ACTION TO PSE ANALOG RECORDER	
22	VERIFY ON PSE ANALOG RECORDER SP Z CHANNEL THAT Y LEVELING MOTOR IS DRIVING AT LOW RATE (APPROX 1 PPS) CAUSED BY Y TIDAL SIGNAL DRIVE	VERIFY ON C/S ANALOG RECORDER AND THE HSP THAT THE RES PWR DECREASES APPROX 3 W (NOTE 9)		NOTE 9: IF THE CMDS FOR ON AND OFF ARE CLOSE, THE C/S ANALOG MAY NOT CATCH THE CHANGE IN RES PWR
23	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Y TIDAL DATA INDICATES LESS THAN +/- 5 MURAD INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR OFF.	VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
24	INITIATE CMD 103 (LVL MDE A/F) TO PLACE THE PSE IN THE FORCE LVL MDE	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
25			VERIFY ON PSE HSP FORMAT THE STATUS OF THE LVL SPEED AND LVL DIR	
26	IF NECESSARY, INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN HI LVL SPEED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
27	INITIATE CMD 074 (LVL DIR POS/NEG) TO POS	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
28			OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	

Step No.	ASE	SYSTEMS	DATA	Comments
29	VERIFY THE FOLLOWING STATUS- SYMBOL NAME STATUS AL-1 X&Y AS REQD GAIN AL-2 Z AS REQD GAIN AL-3 LVL POS DIR AL-3 LVL HI SPEED AL-4 SP AS REQD GAIN AL-5 LVL FORCED MDE AL-5 LVL OUT SNSR AL-6 T CTL AUTO OFF AL-7 LP/SP BOTH OFF CAL AL-8 UNCAGE UNCAGED			
30	INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
31	VERIFY Z MTR HI SPEED OPERATION BY NOTING HIGH PULSE RATE ON SP Z CHANNEL	VERIFY ON C/S ANALOG RECORDER AND HSP A DECREASE IN RES PWR OF APPROX 3 W		
32	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Z TIDAL DATA GOES THRU ZERO, INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN AUTO LVL MODE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
33	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Z TIDAL DATA INDICATES +/- 1 MGAL, INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR OFF	VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
34	INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
35	MONITOR CHANGE IN LP DATA ON PSE ANALOG RECORDER TO VERIFY THE PSE FILTER IS IN	INITIATE PSE HSP FORMAT	READ RES PWR. RETURN DRUM RECORDER ATTENUATION TO NORMAL SETTINGS	
36	INITIATE CMD 076 THREE TIMES (PSE TCTL CH) TO RETURN TO THERMAL CONTROL MODE AUTO ON	INITIATE PSE HSP FORMAT AFTER EACH 076 STEP	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER. READ RES PWR AFTER EACH 076 STEP	
37	INITIATE CMD 075 (LVL SPEED HI/LO) TO TURN THE LVL SPEED TO LO		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
38		INITIATE HSP FORMAT	OBTAIN PSE HSP FORMAT AND VERIFY STATUS OF THE FOLLOWING- SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR AS REQD AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR OUT AL-6 T CTL AUTO ON AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	
39	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANY ANOMALIES IN CONSOLE LOG BOOK			

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE 076 THERMAL CNTL AUTO OFF	INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
2	NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1) SYMBOL NAME STATUS REQ FOR RELVL AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR OUT AL-6 T CTL AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	MONITOR X, Y, & Z TIDAL DATA ON PSE ANALOG RECORDER	VERIFY SPEED OF PSE ANALOG RECORDER AT 0.5 MM/SEC OR GREATER	NOTE 1: THERE ARE NO STATUS PARAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON- PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MTR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF
3	IF NECESSARY, INITIATE CMD 067 (SP GAIN CH) TO OBTAIN GAIN DESIRED FOR RELEVELING		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
4	IF NECESSARY, INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER OUT		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
5	OBTAIN PSE HSP FORMAT AND VERIFY STATUS OF THE FOLLOWING:	VERIFY 5 W RES RWR FROM C/S ANALOG RECORDER		

Step No.	ASE	SYSTEMS	DATA	Comments
	SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR N/A AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR OUT AL-6 T CTL STA AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE STA UN-CAGED			
6	INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
7	VERIFY THAT X MOTOR IS DRIVING	VERIFY ON C/S ANALOG RECORDER A DECREASE IN RES PWR OF APPROX 3 W		
8	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN X TIDAL DATA INDICATES WITHIN APPROX +/- 5 URAD, INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X MTR OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
9		VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W		
10	INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
11	VERIFY THAT Y MOTOR IS DRIVING	VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR DECREASES APPROX 3 W		

Step No.	ASE	SYSTEMS	DATA	Comments
12	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Y TIDAL DATA INDICATES +/- 5 MURAD, INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
13		VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W		
14	INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
15	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Z TIDAL DATA INDICATES LESS THAN 0.67 MGAL, INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR OFF	VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR DECREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
16		VERIFY ON C/S ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W		
17	INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
18	MONITOR CHANGE IN LP DATA ON PSE ANALOG RECORDER TO VERIFY THE PSE FILTER IS IN		RETURN DRUM RECORDER ATTENUATION TO NORMAL SETTING	
19	INITIATE CMD 076 THREE TIMES TO OBTAIN THERMAL CNTL MODE TO AUTO ON			
20		INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND VERIFY STATUS OF THE FOLLOWING:	

Step No.	ASE	SYSTEMS	DATA	Comments
			SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR AS REQD AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR OUT AL-6 T CTL AUTO ON AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	
21	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANY ANOMALIES IN CONSOLE LOG BOOK			

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE CMD 076 TO THERMAL CNTL MODE AUTO OFF	INITIATE PSE HSP	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
2	NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1) SYMBOL NAME — STATUS REQ FOR LVL AL-1 X&Y GAIN AL-1 X&Y GAIN — AS REQD AL-2 Z GAIN — AS REQD AL-3 LVL DIR — NOTE 2 AL-3 LVL SPEED — LO AL-4 SP GAIN — AS REQD AL-5 LVL MDE — AUTO AL-5 LVL SNSR — OUT AL-6 T CTL — AUTO OFF AL-7 LP/SP CAL — BOTH OFF AL-8 UN-CAGE — UNCAGED	MONITOR X, Y, & Z TIDAL DATA ON PSE ANALOG RECORDER	VERIFY SPEED OF PSE ANALOG RECORDER AT 0.5	NOTE 1: THERE ARE NO STATUS PARAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON: PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MOTOR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF NOTE 2: MONITOR X TIDAL DATA ON PSE ANALOG RECORDER TO DETERMINE LEVELING DIRECTION. IF X TIDAL IS POS, NEG DIRECTION REQUIRED. IF X TIDAL IS NEG, POS DIRECTION REQUIRED
3	IF NECESSARY, INITIATE CMD 067 (SP GAIN CH) TO OBTAIN GAIN DESIRED	VERIFY 5 W RESERVE POWER FROM CS ANALOG RECORDER	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
4			TURN DRUM RECORDER ATTENUATION TO INFINITY	
5	INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER OUT		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
6	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVELING. IF X TIDAL DATA IS POS, USE NEG DIR. IF X TIDAL DATA IS NEG, USE POS DIR.			
7	INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
8	INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN HI LVL SPEED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
9	INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN THE FORCED LVL MDE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
10		INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	

Step No.	ASE	SYSTEMS	DATA	Comments
11	VERIFY STATUS OF THE FOLLOWING: SYMBOL NAME STATUS AL-1 XY GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR NOTE 4 AL-3 LVL SPEED HI AL-4 SP GAIN AS REQD AL-5 LVL MDE FORCED AL-5 LVL SNSR OUT AL-6 T CTL STA AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE STA UN-CAGED			
12	ENTER MAP OVERRIDE ON			
13	INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
14		VERIFY ON CS ANALOG RECORDER A DECREASE IN RES PWR OF APPROX 3 W		

Step No.	ASE	SYSTEMS	DATA	Comments
15	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN X TIDAL DATA GOES THRU ZERO, INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN LO LVL SPEED AND CMD 074 (LVL DIR POS/NEG) TO REVERSE LVL DIR		ANNOTATE ALL CMD ACTION ON PSE ANALOG RECORDER	
16	INITIATE PSE HSP	VERIFY SPEED LO AND LEVEL DIRECTION		
17	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN X TIDAL DATA GOES THRU +/- 15 MURAD, INITIATE CMD 103 (PSE AUTO MODE)		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
18	TURN MAP OVERRIDE "OFF"			
19	INITIATE CMD 070 X MOTOR OFF WHEN TIDAL DATA $\pm$ 5 MRAD	VERIFY ON CS ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
20	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVELING; IF Y TIDAL DATA IS POS, USE NEG DIR. IF Y TIDAL DATA IS NEG, USE POS DIR.			
21	IF NECESSARY, INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
22	INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN HI LVL SPEED		ANNOTATE CMD ACTION ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
23	INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN FORCED LVL MODE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
24	INITIATE MAP OVERRIDE			
25	INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
26		VERIFY ON CS ANALOG RECORDER THAT THE RES PWR DECREASES APPROX 3 W		
27	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Y TIDAL DATA GOES THRU ZERO, INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN LO LVL SPEED AND CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE ALL CMD ACTION ON PSE ANALOG RECORDER	
28	INITIATE PSE HSP	VERIFY SPEED LO AND DIR AS REQUIRED		
29	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Y TIDAL DATA GOES THRU +/- 15 MURAD, INITIATE CMD 103 (AUTO MODE)		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
30	RELEASE MAP OVERRIDE			
31	INITIATE CMD 071 WHEN TIDAL $\pm$ 5 MRAD	VERIFY ON CS ANALOG RECORDER THAT THE RES PWR INCREASES APPROX 3 W	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
32	INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR POS		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
33	INITIATE CMD 075 (LVL SPEED HI/LO) TO PLACE PSE IN HI LVL SPEED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
34	INITIATE CMD 103 (LVL MDE A/F) TO PLACE PSE IN FORCED LVL MODE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
35	INITIATE CMD 072 (LVL MTR 2 ON/OFF) TO TURN Z MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
36	INITIATE MAP OVERRIDE	VERIFY ON CS ANALOG RECORDER A DECREASE IN RES PWR OF APPROX 3 W		
37	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Z TIDAL DATA GOES THRU ZERO, INITIATE CMD 075 (LVL SPEED HI-LO) TO PLACE PSE IN LO LVL SPEED AND CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR NEG		ANNOTATE ALL CMD ACTION ON PSE ANALOG RECORDER	
38	INITIATE PSE HSP		VERIFY SPEED LO DIRECTION NEG	
39	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. WHEN Z TIDAL DATA GOES THRU +/- 2 MGAL, INITIATE CMD 103 (PSE AUTO MODE)		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
40	RELEASE MAP OVERRIDE			
41	INITIATE CMD 072 (Z MOTOR OFF) WHEN TIDAL DATA ± 0.67 MGAL			
42	INITIATE 076 THREE TIMES FOR THERM MODE AUTO ON			
43	INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
44		INITIATE PSE HSP FORMAT	RETURN DRUM RECORDER ATTENUATION TO NORMAL SETTINGS	
45			OBTAIN PSE HSP FORMAT AND VERIFY STATUS OF THE FOLLOWING- SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR NEG AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MDE AUTO AL-5 LVL SNSR OUT AL-6 T CTL AUTO ON AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	
46	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANY ANOMALIES IN CONSOLE LOG BOOK			

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE CMD 101 PSE FILTER OUT			
2	INITIATE CMD 076 THERM CNTL AUTO OFF	INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
3	NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1) SYMBOL NAME STATUS REQ FOR LVL AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR NOTE 2 AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MODE FORCED AL-5 LVL SNSR OUT AL-6 T CTL AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	VERIFY 5 W RESERVE POWER		NOTE 1: THERE ARE NO STATUS PARAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON: PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MTR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF NOTE 2: MONITOR X TIDAL DATA ON PSE ANALOG RECORDER TO DETERMINE LEVELING DIRECTION. IF X TIDAL IS POS, NEG DIRECTIONS REQUIRED. IF X TIDAL IS NEG, POS DIRECTION REQUIRED.
4	IF NECESSARY, CMD 067 (SP GAIN CH) TO OBTAIN GAIN DESIRED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
5	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVELING. IF X TIDAL DATA IS POS, USE NEG DIR. IF Z TIDAL DATA IS NEG, USE POS DIR.			

Step No.	ASE	SYSTEMS	DATA	Comments
6	INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
7	INITIATE CMD 102 (LVL SNSR IN/OUT) TO PUT LVL SNSR OUT. ANNOTATE CMD.		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
8	INITIATE CMD 103 (LVL MODE A/F) TO PLACE PSE IN THE FORCED LVL MODE		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
9			TURN DRUM RECORDER ATTENTUATION TO INFINITY	
10		INITIATE PSE HSP FORMAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE	
11	VERIFY STATUS OF THE FOLLOWING - SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR NOTE 2 AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MODE FORCED AL-5 LVL SNSR OUT AL-6 T CTL STA AUTO OFF AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE STA UN-CAGED			
12	ADVISE NETWORK THAT X AXIS WILL BE LEVELED FOR 4 SECONDS			
13	INITIATE MAP OVERRIDE			
14	INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	

Step No.	ASE	SYSTEMS	DATA	Comments
15	LET MOTOR RUN FOR ONLY 4 SECONDS, INITIATE CMD 070 (LVL MTR X ON/OFF) TO TURN X LVL MTR OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
16	INITIATE CMD 103 (LVL MODE A/F) TO TURN LVL MODE TO AUTO IMMEDIATELY		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
17	RELEASE MAP OVERRIDE			
18	MONITOR Y AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVELING. IF Y TIDAL DATA IS POS, USE NEG DIR. IF Y TIDAL DATA IS NEG, USE POS DIR.			
19	IF NECESSARY, INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
20	ADVISE NETWORK THAT Y AXIS WILL BE LEVELED FOR 4 SEC			
21	INITIATE CMD 103 (FORCED MODE)			
22	INITIATE MAP OVERRIDE			
23	INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
24	LET MOTOR RUN FOR ONLY 4 SECS, INITIATE CMD 071 (LVL MTR Y ON/OFF) TO TURN Y MOTOR OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
25	INITIATE CMD 103 (LVL MODE A/F) TO TURN LVL MODE TO AUTO IMMEDIATELY		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
26	RELEASE MAP OVERRIDE			

Step No.	ASE	SYSTEMS	DATA	Comments
27	MONITOR Z AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVELING. IF Z TIDAL DATA IS POS, USE NEG DIR. IF Z TIDAL DATA IS NEG, USE POS DIR.			
28	IF NECESSARY, INITIATE CMD 074 (LVL DIR POS/NEG) TO PLACE LVL DIR AS REQUIRED		ANNOTATE ACTION ON PSE ANALOG RECORDER	
29	ADVISE NETWORK THAT Z AXIS WILL BE LEVELED FOR 4 SECONDS			
30	INITIATE CMD 103 (FORCED MODE)			
31	INITIATE MAP OVERRIDE			
32	INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
33	LET THE MOTOR RUN FOR ONLY 4 SECONDS. INITIATE CMD 072 (LVL MTR Z ON/OFF) TO TURN Z MTR OFF.		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
34	INITIATE CMD 103 (LVL MODE A/F) TO TURN LVL MODE TO AUTO IMMEDIATELY		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
35	RELEASE MAP OVERRIDE			
36	INITIATE CMD 076 THREE TIMES FOR THERM CNTL AUTO ON			
37	INITIATE CMD 101 (PSE FILTER IN/OUT) TO PUT THE PSE FILTER IN		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
38			RETURN DRUM RECORDER ATTENTUATION TO NORMAL SETTING	
39		INITIATE PSE HSP FORMAT		

Step No.	ASE	SYSTEMS	DATA	Comments
40			OBTAIN PSE HSP FORMAT AND VERIFY STATUS OF THE FOLLOWING - SYMBOL NAME STATUS AL-1 X&Y GAIN AS REQD AL-2 Z GAIN AS REQD AL-3 LVL DIR AS REQD AL-3 LVL SPEED LO AL-4 SP GAIN AS REQD AL-5 LVL MODE AUTO AL-5 LVL SNSR OUT AL-6 T CTL AUTO ON AL-7 LP/SP CAL BOTH OFF AL-8 UN-CAGE UN-CAGED	
41	LOG TASK AND ANOMALIES IN THE CONSOLE HANDBOOK			

SOP 2-8
PSE GAIN CHANGE (LP X, Y, OR Z AND SP Z)
PREREQUISITES: 1. PSE MUST BE IN OPERATE MODE
2. PSE MUST BE IN A NORMAL REFERENCE MODE (I.E., NOT LEVELING OR CAL)
3. PSE ANALOG RECORDERS AND DRUM RECORDERS CONFIGURED FOR PSE AS PER WORK SCHEDULE

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE CMD 062 (XY GAIN) AS NECESSARY TO OBTAIN GAIN REQUIRED (NOTE 1)		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	NOTE 1: GAIN STEPS THROUGH THE FOLLOWING STEPS ONCE PER CMD 0 DB -10 -20 -30 AND REPEAT
2	INITIATE CMD 064 (Z GAIN) AS NECESSARY TO OBTAIN GAIN REQUIRED (NOTE 1)		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
3	INITIATE CMD 067 (SP GAIN) AS NECESSARY TO OBTAIN GAIN REQUIRED (NOTE 1)	INITIATE PSE HSP FORMAT	ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
4			VERIFY ON PSE HSP FORMAT THAT PSE GAIN HAS CHANGES AS REQUIRED	

SOP 2-9
PSE SP OR LP CALIBRATION
PREREQUISITES:
1. PSE 1 MUST BE IN OPERATE MODE.
2. PSE MUST BE IN A NORMAL SCIENCE MODE (I.E., NOT LEVELING).
3. PSE ANALOG RECORDERS AND DRUM RECORDERS CONFIGURED FOR PSE AS PER WORK SCHEDULE.

Step No.	ASE	SYSTEMS	DATA	Comments
1	INITIATE CMD 066 (LP CAL ON/OFF) TO TURN THE PSE LP CAL PULSE ON		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
2		MONITOR PSE ANALOG RECORDER FOR INDICATION OF CAL PULSE ON		
3	INITIATE CMD 066 (LP CAL ON/OFF) TO TURN THE PSE LP CAL PULSE OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
4		MONITOR PSE ANALOG RECORDER LP CHANNEL FOR INDICATION OF CAL PULSE IN OPPOSITE DIRECTION FROM FIRST		
5	INITIATE CMD 065 (SP CAL ON/OFF) TO TURN THE PSE SP CAL PULSE ON		SPEED UP ANALOG RECORDER TO 25.0 MM/SEC FOR SP CAL PULSE AND ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
6		MONITOR PSE ANALOG RECORDER SP CHANNEL FOR INDICATION OF CAL PULSE ON		
7	INITIATE CMD 065 (SP CAL ON/OFF) TO TURN PSE SP CAL PULSE OFF		ANNOTATE CMD ACTION ON PSE ANALOG RECORDER	
8		MONITOR PSE ANALOG RECORDER SP CHANNEL FOR INDICATION OF CAL PULSE IN OPPOSITE DIRECTION FROM FIRST		
9		INITIATE PSE HSP FORMAT	RETURN PSE ANALOG RECORDER TO 0.05 MM/SEC SPEED	
10			OBTAIN PSE HSP FORMAT AND CHECK PSE CAL STATUS. SYMBOL NAME STATUS AL-7 LP/SP CAL BOTH OFF	

Step No.	ASE	SYSTEMS	DATA	Comments
1	LOG CREW COMMENT OF LSM LEVELING			
2		START LSM NO. 1 AND NO. 2 HSP FORMATS SELECT FORMAT 5 ON ANALOG RECORDER NO. 4	VERIFY RESERVE POWER >8 WATTS	
3	SEND CMD 042 (OPER SEL)	ANNOTATE C/S AND LSM ANALOG RECORDERS		
4		DETERMINE FROM LSM ANALOG RECORDER AND PARAMETERS DM-12 X GIM POS DM-13 Y GIM POS DM-14 Z GIM POS THE MINIMUM SENSOR RANGE SO THAT ALL THREE PARAMETERS ARE NOT OFF SCALE	VERIFY ON LSM HSP FORMAT NO. 2: RANGE STEP - 200 GAMMA FLD O/S - 0% O/S ADD - OFF FLIP/CAL INHIB - INHIBITED FILTER - IN T CTL XYO - X	PRESET CONDITIONS STEP RANGES ARE ±50, ±100, ±200 GAMMA
5	IF NECESSARY, SEND CMD 123 (RANGE STEP) TO PLACE SENSORS IN DESIRED RANGE			FIRST CMD 123 ±50 GAMMA SECOND CMD 123 ±100 GAMMA
6		DETERMINE FROM THE LSM ANALOG RECORDER, THE AMOUNT OF OFF-SET IN EACH AXIS REQUIRED TO PRODUCE 50% PFS		OFF-SETS ARE 0, ±25%, ±50%, ±75% OF THE GAMMA RANGE
7	IF NECESSARY, SEND CMD 125 (O/S ADD CH) TO ADDRESS THE X AXIS			CMD 125 IS A FOUR STATE COMMAND; X, Y, Z, NEUTRAL
8	IF NECESSARY, SEND CMD 124 (FLD O/S CH) THE REQUIRED TIMES TO PRODUCE A 50% PFS OF DM-12 (X GIM POS)			CMD 124 IS A SEVEN STATE COMMAND; 0, +25%, +50%, +75%, -75%, -50%, -25%
9	IF NECESSARY, REPEAT STEPS 8 AND 9 FOR DM-13 (Y GIM POS) AND DM-14 (Z GIM POS)			
10	SEND CMD 127 (FLIP/ CAL ENABLE)		VERIFY FLIP/CAL ENABLE	

Step No.	ASE	SYSTEMS	DATA	Comments
11	SEND CMD 131 (FLIP/ CAL GO)	VERIFY ON LSM ANALOG RECORDER		REQUIRES 5 MIN OF LSM HSP FORMAT NO. 1 BEFORE AND AFTER THE FLIP/CAL
12	SEND CMD 127 FLIP/CAL INHIBIT		VERIFY FLIP/CAL INHIBIT	

SOP 2-11
LSM SITE SURVEY
PREREQUISITES: FOUR LSM FLIP/CALS

Step No.	ASE	SYSTEMS	DATA	Comments
1	NOTIFY NETWORK TO ENABLE CRITICAL RTC LOAD NO. 3 (CMD 133)	START LSM HSP FORMAT NO. 1 AND NO. 2 5 MIN PRIOR TO CMD 133		
2	SEND CMD 133 (X AXIS SURVEY)			CMD 133 ACTIVATES THE SITE SURVEY GENERATOR. FIRST APPLICATION SURVEYS THE X AXIS. SECOND AND THIRD SURVEY Y AND Z.
3			NOTIFY ASE WHEN LSM HAS RETURNED TO SCIENCE MODE	
4	REPEAT STEPS 2 AND 3 FOR Y AXIS SURVEY AND Z AXIS SURVEY		REPEAT STEPS 2 AND 3 FOR Y AXIS SURVEY AND Z AXIS SURVEY	

Step No.	ASE	SYSTEMS	DATA	Comments
1		START SWS HSP FORMAT	VERIFY RES PWR >8.2 W	
2	SEND CMD 045 (SWS OPER SEL)		VERIFY SWS DATA IS CYCLING PROPERLY	SWS WILL BE TURNED ON DURING THE EVA IN CASE GND CMD DOESN'T FUNCATION AND CREW MUST ACTIVATE SW NO. 3
3		STOP SWS HSP FORMAT		
4		START SWS HSP FORMAT		STEPS 4, 5, AND 6 WILL BE INITIATED AFTER LM ASCENT
5	NOTIFY NETWORK LOAD CRITICAL GROUP 1			
6	SEND CMD 122 (CVR GO)		VERIFY DATA	

Step No.	ASE	SYSTEMS	DATA	Comments
1		VERIFY THAT CUP 14 SUM IS EQUAL TO OR GREATER THAN 40 FOR ONE COMPLETE SOLAR WIND CYCLE		
2	ENABLE MAP OVERRIDE			
3	SEND CMD 122 THREE TIMES WITHIN 10 SEC (SWS HI GAIN)			CUP 14 SUM WILL GO TO SOME NUMBER DIFFERENT FROM LO GAIN

Step No.	ASE	SYSTEMS	DATA	Comments
1		VERIFY THAT CUP 14 SUM IS 5 OR MORE LESS THAN WHEN COMMANDED TO HI GAIN		
2	SEND CMD 046 (SWS STBY)	VERIFY EXP 3 STBY STATUS LIGHT ON		
3	SEND CMD 045 (SWS ON)	VERIFY EXP 3 STBY STATUS LIGHT OFF		

Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE C/S HSP	OBTAIN C/S HSP FORMAT AND VERIFY THE FOLLOWING - CS-2 RES PWR GREATER THAN 15 W AE-9 BUS VOLT +12 VDC AE-7 BUS VOLT +29 VDC AE-8 BUS VOLT +15 VDC AE-10 BUS VOLT +5 VDC AE-11 BUS VOLT -12 VDC AE-12 BUS VOLT -6 VDC AE-1 DSS ADC 0.25 V AE-2 DSS ADC 4.75 V	
2		GIVE GO/NO-GO FOR SIDE TURN ON	GIVE GO/NO-GO FOR SIDE TURN ON	
3	INITIATE CMD 045 EXP 3 OPER SEL	INITIATE SIDE HSP FORMATS 1 AND 2	ANNOTATE CMD ACTION ON C/S AND SIDE RCDRS	
4	DUST COVER REMOVAL CMD 107 THEN 110 TO EXECUTE	VERIFY RES PWR > 8 W. INITIATE SIDE HSP FORMAT 1.	VERIFY CMD REGISTER READS "MSTR" ON HSP AFTER CMD 107. VERIFY MODE REGISTER READS "MSTR" AND CMD REGISTER READS "CLR" AFTER CMD 110. CHECK DI-12, SOLAR CELL OUTPUT, ON HSP.	
5	CCIG SEAL BREAK CMD 105 THEN 110 TO EXECUTE	SELECT SIDE FORMAT 4 ON ANALOG RECORDER. INITIATE SIDE HSP FORMAT 1.	VERIFY CMD REGISTER READS "RSF10" ON HSP AFTER CMD 105. VERIFY MODE REGISTER READS "RSF10" AND CMD REGISTER READS "CLR."	

Step No.	ASE	SYSTEMS	DATA	Comments
1		ENABLE HFE LIMIT SENSING CATEGORY 5 AND CHECK C/S RES PWR ON THE ANALOG RECORDER	OBTAIN C/S HSP FORMAT AND CHECK THE FOLLOWING: CS-2 RES PWR GREATER THAN OR EQUAL TO 8 W AE-9 BUS VOLT +12 VDC AE-7 BUS VOLT +29 VDC AE-8 BUS VOLT +15 VDC AE-10 BUS VOLT +5 VDC AE-11 BUS VOLT -12 VDC AE-12 BUS VOLT -6 VDC AE-1 DSS ADC 0.25 V AE-2 DSS ADC 4.75 V (NOTE 1)	NOTE 1: LIMITS AS IN SODB
2		GIVE GO/NO-GO FOR HFE TURN-ON	GIVE GO/NO-GO FOR HFE TURN-ON	
3	INITIATE CMD 036 (EXP 5 OPER SEL) TO TURN THE HFE ON	VERIFY CHANGE IN RES PWR	ANNOTATE CMD ACTION ON THE C/S ANALOG RECORDER	
4		INITIATE HFE HSP FORMAT 2	VERIFY STATUS OF HFE HOUSEKEEPING AH01 +5 VDC AH02 -5 VDC AH03 15 VDC AH04 -15 VDC AH06 HTR LK AH07 HTR HK	NOTE 2: AH06 AND AH07 SHOULD READ OFF
5			VERIFY THAT EXPERIMENT IS IN MODE 2 AND IN FULL SEQ	

Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE HFE HSP FORMAT 2		
2			VERIFY MODE OF EXPERIMENT AND HEATER STEP	
3	IF NECESSARY, INITIATE CMD 135 (HFE MODE/G SEL) TO PLACE IN MODE 1	DETERMINE THE NUMBER OF TIMES CMD 152 WILL HAVE TO BE SENT TO OBTAIN THE PROPER STEP (NOTE 1)		
4	INITIATE CMD 152 (HFE HTR STEPS) AS MANY TIMES AS REQUIRED TO REACH THE DESIRED STEP (NOTE 1)	VERIFY THE FIRST COMMAND OF 152, THE NEXT TO THE LAST COMMAND OF 152, AND THE LAST COMMAND OF 152 ON THE HSP		NOTE 1: THE ORDER OF HEATER STEPS IS: 12 OFF 12 ON 14 OFF 14 ON 11 OFF 11 ON 13 OFF 13 ON 22 OFF 22 ON 24 OFF 24 ON 21 OFF 21 ON 23 OFF 23 ON 12 OFF 1 MIN INTERVAL BETWEEN COMMANDS
5	RETURN TO DESIRED OPERATING MODE	VERIFY MODE CHANGE ON HSP	VERIFY THE CHANGE IN DATA INDICATING THAT THE PROPER HEATER IS FUNCTIONING	

Step No.	ASE	SYSTEMS	DATA	Comments
1		INITIATE HFE HSP FORMAT	VERIFY OPERATING STATE OF EXPERIMENT AND REPORT TO ASE	
2	INITIATE THE NECESSARY COMMANDS TO REACH DESIRED OPERATING STATE (NOTE 1)			
3		VERIFY THAT EXPERIMENT IS IN THE PROPER OPERATING STATE FROM HFE HSP FORMAT		

NOTE 1

I. TO CHANGE MODES:
MODE I - 135
MODE II - 136
MODE III - 140 AND 144

II. TO CHANGE PROBES:
BOTH PROBES - 141 (FUL SEQ)
PROBE I ONLY - 142
PROBE II ONLY - 143

III. TO CHANGE SUB-SEQUENCES IN MODE I AND MODE II:

FROM \ TO	ATH	ATL	TC	T
ATH		145	145	146
ATL	144		146 146	144 146
TC	144	144 145		144 146
T	144	144 145	145	

STEP	LEO	SYSTEMS/DATA
1. REQUEST ALSEP NETWORK OPERATOR TO SITE SELECT CONSOLE		
2.		OBTAIN C/S HSP FORMAT AND CHECK RESERVE PWR EQUAL TO OR GREATER THAN 11.1 WATTS
3.		GIVE GO/NO-GO FOR LSG TURN ON
4. INITIATE CMD 5A052 EXP. 4 POWER ON		CHECK RESERVE POWER ON CHART RECORDER FOR A CHANGE OF 2.75 W MINIMUM, 9.2 W MAXIMUM. INITIATE LSG HSP FORMAT
5. NOTE: AG01 - SEISMIC AG02 - TIDE AG03 - FREE MODE PEN 1 - SEISMIC - DG01 2 - TIDE - DG02 3 - FREE MODE - DG03 4 - TIDE - AG02 5 - FREE MODE - AG03 6 - SEISMIC - AG01 7 - SENSOR TEMP - AG04 8 - SENSOR TEMP - DG04 FORMAT 1 (CHART RCDR)		VERIFY LSG STATUS FROM HSP FORMAT AG04 - SNSR TEMP AG05 - OSL AG06 - 4.552 (CAGED) AG07 - 15 ± 1 VOLTS AG08 - +15 V AG09 - -15 V AG10 - +5 V DG11 - RLYS 1, 2, 4, 5 SEL DG12 - OFF DG13 - OFF AND N/SL DG14 - OFF DG15 - ON DG16 - ON DG17 - OFF DG18 - LOW DG19 - RANDOM
6.		NOTIFY ASE OF LSG STATUS AND ANY ANOMALOUS READINGS REQUIRING COMMAND ACTION TO CORRECT

STEP	LEO	SYSTEMS/DATA
7. READ SHAFT ENCODERS	INITIATE CMD 5A070 & 5A072 TO INCREMENT CMD REG TO READ 01	
8. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REG READS 01 (READ SHAFT ENCODER)
9. EXECUTE	INITIATE CMD 5A067	
10. OBTAIN VALID ENCODER READINGS		INITIATE 4 HSP FORMATS AT 20 SECOND INTERVALS

STEP	LEO	SYSTEMS/DATA
11. MAKE CMD LISTING	DETERMINE FROM THE CMD LIST THOSE COMMANDS REQUIRED TO RESTORE THE LSG TO PROPER INITIAL CONFIGURATION.	
12. INITIATE COMMANDS	TO INITIATE LSG MULTIPLEXED COMMANDS DO THE FOLLOWING: A. INITIATE ALSEP CMD 5A070 (THIS INSURES THAT COMMAND DECODER IS TURNED ON AND RESETS THE COMMAND REGISTER TO ALL ZEROS) B. INITIATE ALSEP COMMAND 5A072 OR 5A074. (THIS CAUSES THE LSG COMMAND REGISTER TO INCREMENT (STEP) UPWARD OR DOWNWARD ONE BINARY COUNT EACH TIME THE COMMAND IS EXECUTED) C. WHEN THE PROPER COMMAND IS CONTAINED IN THE LSG REGISTER, AS READ OUT ON THE HSP FORMAT, INITIATE COMMAND 5A067. (THIS CAUSES EXECUTION OF THE COMMAND CONTAINED IN THE REGISTER. REPEATED INITIATION OF 5A067 WILL CAUSE REPEATED EXECUTION OF THE COMMAND CONTAINED IN THE LSG REGISTER.) D. INITIATE ALSEP COMMAND 5A070, 5A072, OR 5A074 TO CAUSE THE COMMAND REGISTER TO INCREMENT EITHER UP OR DOWN AS REQUIRED TO SET THE LSG REGISTER FOR THE NEXT COMMAND. E. CONTINUE COMMAND ACTION UNTIL LSG INITIAL CONFIGURATION AS READ OUT ON THE HSP FORMAT IS IN AGREEMENT WITH STEP 5.	
NOTE: INITIATE ALSEP COMMANDS 070, 072, AND 074 AS REQUIRED TO STEP THE LSG COMMAND REGISTER THE MINIMUM NUMBER OF TIMES TO REACH THE DESIRED STATE. FOR EXAMPLE, IF THE REGISTER READS 2 AND THE NEXT COMMAND DESIRED IS 28, THEN THE QUICKEST WAY TO ACHIEVE THIS IS TO SEND 5A070 (CMD DECODER ON), THEN 5A074 (COUNTDOWN) FOUR TIMES. IN THIS EXAMPLE THE 070 RESETS THE REGISTER TO ALL ZEROS, AND THE FIRST 074 STEPS THE REGISTER TO ALL ONES (BINARY 31). EACH SUBSEQUENT 074 INCREMENTS THE REGISTER DOWNWARD ONE BINARY COUNT PER COMMAND. WHEN THE DESIRED BINARY 28 IS REACHED, IT IS EXECUTED WITH A 5A067.		

STEP	LEO	SYSTEMS/DATA
1. SITE SELECT CONSOLE	REQUEST NETWORK CONTROLLER TO SITE SELECT CONSOLE FOR ALSEP COMMANDING.	SELECT LSG CHART RECORDER FORMAT #1 ON RECORDERS 2 & 4. SELECT C/S FORMAT ON RECORDER #3.
2.		INITIATE LSG HSP FORMAT. VERIFY STATUS (SEE STEP 5, SOP 6-1).
3. VERIFY RESERVE POWER 6.5 W		VERIFY RESERVE POWER IS 6.5 WATTS OR GREATER FROM CHART RECORDER. GIVE GO/NO-GO FOR CONTINUATION.
4. COMMAND SLAVE HEATER OFF	INITIATE COMMAND 5A-064	
5. VERIFY FUNCTION		INITIATE HSP AND CONFIRM DG16 READS OFF.
6. READ COMMAND REGISTER		READ FROM HSP THE DECIMAL VALUE OF DG-19 (CMD REG).
7. RESET ALL TEMPERATURE RELAYS TO N/SEL	INCREMENT THE COMMAND REGISTER BY INITIATING COMMAND 5A070, 5A072, OR 5A074 UNTIL DG-19 READS DECIMAL 28.	
8. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY COMMAND REGISTER READS 28 (TEMP RESET).
9. EXECUTE	INITIATE COMMAND 067	
10. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 ALL READ N/SEL

STEP	LEO	SYSTEMS/DATA
11. RESET POST AMP GAIN	INITIATE CMDS 5A070, 5A072, OR 5A074 TO INCREMENT CMD REGISTER TO 30	
12. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 30 (P AMP GAIN RST).
13. EXECUTE	INITIATE CMD 067	
14. SET POST AMP GAIN TO SECOND STEP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 29	
15. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 29 (P AMP GAIN INC)
16. EXECUTE	INITIATE CMD 5A067 & EXECUTE TWICE.	VERIFY DG01 READS APPROX -3.0V & DG02 APPROX 0.0 W/CORRESPONDING CHANGE ON AG01.
17. ACTIVATE PRESS TRANSDUCER	INITIATE CMDS 5A070, 5A072, OR 5A074 TO INCREMENT CMD REGISTER TO 13.	
18. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 13 (PRES XDUCER ON)
19. EXECUTE	INITIATE CMD 5A067.	VERIFY DG17 READS "ON."
20. VERIFY FUNCTION		INITIATE HSP FORMAT AND READ PRESSURE
21. TURN PRESSURE XDUCER OFF	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 12.	

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STEP	LEO	SYSTEMS/DATA
22. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 12 (TILT MASS SERVO OFF).
23. EXECUTE	INITIATE CMD 5A067	
24. VERIFY P XDUCER OFF FUNCTION		INITIATE HSP FORMAT & VERIFY AG05 READS OSL & DG17 READS OFF.
25. TURN MASS CHNG MOTOR ON	INITIATE CMD 5A070, 5A072, OR 5A074 UNTIL CMD REGISTER READS 2.	INSURE RESERVE POWER IS AT LEAST 14 WATTS.
26. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 2 (MASS MTR ON).
27. EXECUTE	INITIATE CMD 5A067.	
28. VERIFY FUNCTION & IMMEDIATELY PROCEED		INITIATE HSP FORMAT & VERIFY DG12 READS "ON" & AG06 READS 4.552 V.
29. UNCAGE MASS & SET TO STATE 3	INITIATE CMD 5A072 TO INCREMENT CMD REGISTER TO 14.	
30. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 14 (MASS INCREMENT).
31. EXECUTE	INITIATE CMD 5A067 & EXECUTE TWO TIMES.	
32. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 3.860 VOLTS. (+ .1V)
33. EXECUTE	INITIATE CMD 5A067	
34. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 3.897 VOLTS. (±.1V)
35. STOP MASS CHG	INITIATE CMDS 5A070, 5A072, OR 5A074 TO INCREMENT THE CMD RE-ISTER TO 12.	

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STEP	LEO	SYSTEMS/DATA
36. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 12 (TILT MASS SERVO OFF).
37. EXECUTE	INITIATE CMD 5A067	
38. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG12 READS OFF.
39. UNCAGE BEAM	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 10.	
40. VERIFY COMMAND REGISTER		INITIATE HSP & VERIFY DG19 READS 10 (SNSR BEAM UNCAGED).
41. EXECUTE	INITIATE CMD 5A067.	
42. VERIFY FUNCTION		DETERMINE FROM CHART RECORDER THE VALUE OF ΔG01 (SEISMIC SIGNAL VOLTAGE).
43. CAGE BEAM	IF DG01 IS HIGH PROCEED TO STEP 60. IF DG01 DOES NOT CHANGE VALUE INITIATE CMD 5A074 TO INCREMENT THE COMMAND REGISTER TO 9.	H. $\cong$ +5.6V L. $\cong$ -6.0 (MAX & MIN RDG ON THE STOPS WITH GAIN AT STEP 2)
44. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 9.
45. EXECUTE	INITIATE CMD 5A067	
46. CMD MASS MOTOR ON	INITIATE CMD 5A070 & 5A072 UNTIL CMD REGISTER READS 2	

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STEP	LEO	SYSTEMS/DATA
47. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 2.
48. EXECUTE	INITIATE CMD 5A067	
49. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG12 READS "ON" & AG06 READS 4.552 +.3V.
50. REMOVE MASS #1	INITIATE CMD 5A070 & 5A072 UNTIL CMD REGISTER READS 14.	
51. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 14 (MASS INCREMENT).
52. EXECUTE	INITIATE CMD 5A067 FOUR TIMES.	
53. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 3.141 VOLTS.
54. EXECUTE	INITIATE CMD 5A 067	
55. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 3.173)
56. TURN MASS MOTOR OFF	INITIATE CMD 5A074 UNTIL CMD REGISTER READS 12.	
57. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 12 (TILT MASS SERVO OFF).
58. EXECUTE	INITIATE CMD 5A067	
59. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG12 READS "OFF."
60. UNCAGE BEAM	INITIATE CMDS 5A070, 5A072, OR 5A074 UNTIL CMD REGISTER READS 10	

STEP	LEO	SYSTEMS/DATA
61. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY. DG19 READS 10 (SNSR BEAM UNCAGED).
62. EXECUTE	INITIATE CMD 5A067	
63. VERIFY FUNCTION		DETERMINE FROM CHART RECORDER THE VALUE OF DG01.
64.	IF DG01 DOES NOT CHANGE IN VALUE, REPEAT STEPS 43 THRU 51--THEN PROCEED TO STEP 65. IF HIGH OR IF ON SCALE PROCEED TO STEP 70.	
65. EXECUTE MASS INCREMENT CMD (REMOVE TWO MASSES)	INITIATE CMD 5A067 SIX TIMES.	
66. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 2.451 VOLTS.
67. EXECUTE	INITIATE CMD 5A067	
68. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY AG06 READS 2.488 VOLTS.
69.	REPEAT STEPS 56 THRU 63 THEN PROCEED TO STEP 70.	
70. TURN SLAVE HTR ON	INITIATE CMD 5A063	
71. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG16 READS "ON."
72. START COARSE SCREW SERVO	IF DG01 IS ON SCALE PROCEED TO STEP 81 IF HIGH INITIATE CMDS 5A070, 072, OR 074 UNTIL CMD REGISTER READS 11.	

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STEP	LEO	SYSTEMS/DATA
73. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 11 (COARSE SERVO ON).
74. EXECUTE	INITIATE CMD 5A067	
75. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG13 READS "SLEW."
76. SELECT GROSS DOWN COMMAND	INITIATE CMD 5A070, 072, OR 074 UNTIL CMD REGISTER READS 16.	
77. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 16 (GROSS DOWN, TILT DOWN).
78. EXECUTE	INITIATE CMD 5A067	
79. CONTINUE DRIVING COARSE SCREW	REPEAT STEP 78 EVERY 5.5 MIN UNTIL DG01 CROSSES OVER ON CHART RECORDER. (UP TO 31 TIMES.)	OBSERVE DG01 ON CHART RECORDER FOR CROSSOVER FROM HIGH TO LOW.
80. AFTER EACH FOURTH REPEAT OF STEP 78 TURN OFF SLAVE HTR AND CAGE THEN UNCAGE THE BEAM.		
81. SELECT PROPER DRIVE DIRECTION & CHANGE TO VERNIER	ACTUATE MAP OVERRIDE AND INITIATE CMD 5A072 AND FOLLOW WITH CMD 5A067.	
82. VERIFY FUNCTION	STAY IN MAP OVERRIDE	INITIATE HSP FORMAT & VERIFY DG19 READS 17 (VERNIER UP).
83. CONTINUE DRIVING IN UP DIRECTION	REPEAT CMD 5A067 EACH 3 SECONDS UNTIL DG01 READS ON SCALE. TURN OFF MAP OVERRIDE.	OBSERVE CHART RECORDER FOR DG01 ON SCALE CONDITION.

STEP	LEO	SYSTEMS/DATA
84. INCREASE POST AMP GAIN ONE STEP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT COMMAND REGISTER TO 29.	
85. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 29 (P AMP GAIN INC).
86. EXECUTE	INITIATE CMD 5A067	
87. SWITCH TO FINE SCREW SERVO	INITIATE CMD 5A074 UNTIL CMD REGISTER READS 19.	
88. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 19 (FINE SERVO ON).
89. EXECUTE	INITIATE CMD 5A067	
90. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG13 READS "NOT SLEW."
91. START VERNIER DRIVE	INITIATE CMD 5A074 UNTIL CMD REGISTER READS 17.	
92. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 17 (VERNIER UP).
93. EXECUTE	INITIATE CMD 5A067 UNTIL AG01 READS CENTER SCALE.	OBSERVE CHART RECORDER FOR AG01 TO MOVE TO CENTER SCALE.
94. TURN SERVO MOTOR OFF	INITIATE CMD 5A074 UNTIL CMD REGISTER READS 12.	

STEP	LEO	SYSTEMS/DATA
95. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY DG19 READS 12 (TILT MASS SERVO OFF).
96. EXECUTE	INITIATE CMD 5A067	
97. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG13 READS "OFF."
98. READ SHAFT ENCODER	INITIATE CMD 5A070, 072, OR 074 UNTIL CMD REGISTER READS 01.	
99. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY COMMAND REGISTER READS 01 (READ SHAFT ENCODER).
100. EXECUTE	INITIATE COMMAND 5A067	
101. OBTAIN VALID ENCODER READINGS		INITIATE 4 HSP FORMATS AT 20 SECOND INTERVALS.
102. INCREASE POST AMP GAIN AS REQUIRED	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT COMMAND REGISTER TO 29.	
103. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY COMMAND REGISTER READS 29 (P AMP GAIN INC).
104. EXECUTE	INITIATE CMD 5A067 AS REQUIRED.	
105. SET SEISMIC GAIN TO HIGH (CMD 08)		
106. BEGIN TEMP STAB. PERIOD		PLOT DG04 VS. DG01.

STEP	LEO	SYSTEMS/DATA
107. RELEVEL BEAM	ALLOW AG01 TO DRIFT TO NEAR BANDEDGE BEFORE RE-CENTERING BEAM. REPEAT STEPS 80 THRU 94, AS REQUIRED.	
108. DETERMINE TEMP HAS STABILIZED		VERIFY FROM HSP AND FROM PLOT THAT DG04 TEMP HAS STABILIZED AND THAT DG01 DRIFT RATE IS ZERO OR NEAR ZERO. THE PARAMETER VALUE OF DG04 SHOULD BE IN GOOD AGREEMENT WITH THE VALUE OF DG11 SELECTED TEMP.
109. BEGIN TILT ADJUSTMENTS	USE TILT ADJUSTMENT PROCEDURE SOP 6.3	

LSG TILT ADJUSTMENT

PREREQUISITES: INITIAL ADJUSTMENT COMPLETE PER SOP 6-2
INTEGRATOR: NORMAL BIAS: IN SEISMIC GAIN: LOW POST AMP GAIN: STEP 8

STEP	LEO	SYSTEMS/DATA
1. VERIFY BEAM CENTERED & TEMP STABILIZED.		INITIATE HSP FORMAT & LOG VALUES OF DG01 & DG04.
2. START A PLOT OF DG02 (TIDAL) VS. TILT MOTOR POSITION.		PREPARE A PLOT OF DG02 VS. N-S TILT MOTOR STEPS. (±5V Y AXIS; 0-26 STEPS X-AXIS.)
3. ACTUATE N-S TILT MOTOR.	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT THE CMD REGISTER TO 20.	
4. VERIFY CMD REGISTER.		INITIATE HSP FORMAT TO VERIFY CMD REGISTER READS 20 (N/S TILT ON).
5. EXECUTE.	INITIATE CMD 5A067.	
6. VERIFY FUNCTION.		INITIATE HSP FORMAT TO VERIFY DG14 READS "ON."
7. SELECT TILT MOTOR "UP."	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT THE CMD REGISTER TO 15.	
8. VERIFY CMD REGISTER.		INITIATE HSP FORMAT TO VERIFY CMD REGISTER READS 15 (GROSS UP TILT UP).
9. EXECUTE.	INITIATE CMD 5A067.	
10. REPEAT STEP 9 UNTIL TILT MOTOR REACHES FULL UP (STEP 26).		VERIFY FROM HSP THAT DG02 VALUE DOES NOT CHANGE WITH EXECUTION OF CMD 15 (TILT MOTOR IS FULL UP). PLOT TILT MOTOR STEP 26 VS. DG02.

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STEP	LEO	SYSTEMS/DATA
11. CHANGE TILT MOTOR DIRECTION.	INITIATE CMD 5A072 TO INCREMENT CMD REGISTER TO 16.	
12. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 16 (GROSS DOWN TILT DOWN).
13. EXECUTE.	INITIATE CMD 5A067. (1)	30 SEC INTERVALS.
14. PLOT VALUE.		INITIATE HSP FORMAT & PLOT DG02 AT EACH TILT MOTOR STEP.
15. REPEAT STEPS 13 & 14 UNTIL DG02 VALUE PASSES THROUGH A MINIMUM VALUE AND FOUR(4) MOTOR STEPS YIELD RISING VALUES OF DG02.		PLOT EACH MOTOR STEP, INSURING ACCURATE COUNT OF MOTOR STEPS.
16. CHANGE TILT MOTOR DIRECTION.	INITIATE CMDS5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 15.	
17.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 15 (GROSS UP TILT UP).
18. EXECUTE.	INITIATE CMD 5A067. (2)	30 SEC INTERVALS.
19. PLOT VALUE.		INITIATE HSP FORMAT & PLOT VALUE OF DG02 VS. MOTOR STEP
20. REPEAT STEPS 18 & 19 UNTIL DG02 VALUE PASSES THROUGH A MINIMUM VALUE & FOUR(4) MOTOR STEPS YIELD RISING VALUES OF DG02.		PLOT EACH MOTOR STEP INSURING ACCURATE COUNT OF MOTOR STEPS

STEP	LEO	SYSTEMS/DATA
21. REPEAT STEPS 11 THROUGH 14 UNTIL THAT MOTOR STEP CORRESPONDING TO THE LOWEST VALUE OF DG02, AS DETERMINED FROM THE PLOT, IS REACHED.		INITIATE HSP & VERIFY THAT THE VALUE OF DG02 AGREES WITH MINIMUM VALUE PREVIOUSLY PLOTTED.
22. SWITCH TO E/W TILT MOTOR.	INITIATE CMDS 070, 072, OR 074 TO INCREMENT THE CMD REGISTER TO 21.	PREPARE A NEW PLOT OF DG01 VS. E/W TILT MOTOR STEPS. (±5V, Y-AXIS; 0-26 STEPS, X-AXIS).
23. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 21 (E/W TILT ON).
24. EXECUTE.	INITIATE CMD 5A067.	PLOT CURRENT VALUE OF DG02 AT STEP 22 ON THE "X" AXIS.
25. SELECT TILT UP DIRECTION.	INITIATE CMD 074 TO INCREMENT THE CMD REGISTER TO 15.	
26. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 15 (GROSS UP TILT UP).
27. EXECUTE.	INITIATE CMD 5A067.	
28. REPEAT STEP 27 UNTIL TILT MOTOR REACHES FULL "UP" POSITION (STEP 26)		VERIFY FROM HSP THAT DG02 VALUE DOES NOT CHANGE WITH EXECUTION OF CMD 15 (TILT MOTOR IS IN FULL "UP" POSITION). PLOT TILT MOTOR STEP 26 VS. DG02.

STEP	LEO	SYSTEMS/DATA
29. CHANGE TILT MOTOR DIRECTION.	INITIATE CMD 5A072 TO INCREMENT AND REGISTER TO 16.	
30. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 16 (GROSS DOWN TJLT DOWN).
31. EXECUTE.	INITIATE CMD 5A067.	
32. PLOT VALUE.		INITIATE HSP FORMAT & PLOT DGO2 AT STEP 25.
33. REPEAT STEPS 31 & 32 UNTIL DGO2 PASSES THROUGH A MINIMUM VALUE & FOUR (4) MOTOR STEPS YIELD RISING VALUES OF DGO2.		PLOT EACH MOTOR STEP, INSURING ACCURATE COUNT OF MOTOR STEPS.
34. CHANGE TILT MOTOR DIRECTION.	INITIATE CMD 5A072 TO INCREMENT CMD REGISTER TO 15.	
35. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 15 (GROSS UP TILT UP).
36. EXECUTE.	INITIATE CMD 5A067.	
37. PLOT VALUE.		INITIATE HSP FORMAT & PLOT DGO2 VS. MOTOR STEP.
38. REPEAT STEPS 36 & 37 UNTIL TILT MOTOR REACHES FULL "UP."		PLOT DGO2 VS. MOTOR STEP.

STEP	LEO	SYSTEMS/DATA
39. REPEAT STEPS 29 THROUGH 31 UNTIL THAT MOTOR STEP CORRESPONDING TO THE LOWEST VALUE OF DGO2, AS DETERMINED FROM THE PLOT, IS REACHED.		INITIATE HSP FORMAT & VERIFY THAT THE VALUE OF DGO2 AGREES WITH MINIMUM VALUE PREVIOUSLY PLOTTED.
40. TURN TILT MOTOR OFF.	INITIATE CMDS 5A070, 072, OR 074 UNTIL CMD REGISTER READS 12.	
41. VERIFY CMD REGISTER.		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 12.
42. EXECUTE.	INITIATE CMD 5A067.	
43. VERIFY FUNCTION.		INITIATE HSP & VERIFY MASS CHANGE MOTOR READS OFF.

LSG TEMPERATURE INCREMENTING oINTEGRATOR: SHORTED

PREREQUISITES: oCOMPLETION OF INITIAL SET-UP (SOP 6-2) - oCOMPLETION OF TILT ADJUSTMENTS (SOP 6-3) - oPARAMETERS DG01 & DG04 STABLE

STEP	LEO	SYSTEMS/DATA
1. NULL SENSOR BEAM	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 19.	
2. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 19 (FINE SERVO ON).
3. EXECUTE	INITIATE CMD 5A067.	
4. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG13 READS "ON."
5. SELECT VERNIER UP (OR VERNIER DOWN)	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 17 (OR 18).	
6. VERIFY CMD REGISTER		INITIATE HSP & VERIFY CMD REGISTER READS 17 (OR 18) (VERNIER UP) (OR VERNIER DOWN).
7. EXECUTE	INITIATE CMD 5A067 REPEATEDLY UNTIL DG01 REACHES A VALUE OF ZERO.	MONITOR PARAMETER AG01 ON CHART RECORDER UNTIL ITS VALUE APPROACHES MIDSCALE.
8. VERIFY DATA		INITIATE HSP FORMAT AFTER EACH 5A067 CMD. EXECUTE AND VERIFY WHEN DG01 VALUE IS ZERO.
9. STOP SCREW SERVO	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT THE CMD REGISTER TO 12.	
10. VERIFY CMD REGISTER		INITIATE HSP FORMAT AND VERIFY CMD REGISTER READS 12 (TILT MASS SERVO OFF).

STEP	LEO	SYSTEMS/DATA
11. EXECUTE	INITIATE CMD 5A067	
12. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG13 READS "OFF."
13. READ ENCODERS	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 1.	
14. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 1 (READ SHAFT ENC).
15. EXECUTE	INITIATE CMD 5A067	
16. READ SHAFT ENCODER		INITIATE HSP FORMAT AND DETERMINE & LOG SHAFT ENCODER VALUES AND SENSOR TEMP.
17. INCREMENT TEMP	INITIATE CMDS5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 25.	PREPARE A TABLE OF DG09/DG10 (SHAFT ENCODER) VS. DG04 (SENSOR TEMP).
18. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 25 (TEMP INC 4).
19. EXECUTE	INITIATE CMD 5A067	
20. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 READS TEMP RELAY 4 "SEL." (ALL OTHER RELAYS "N/SEC.")
21. WAIT FOR TEMP TO STABILIZE AT A NEW VALUE. (≅ 3 HOURS)		INITIATE HSP FORMATS PERIODICALLY UNTIL DG04 (SENSOR TEMP) & DG01 (SEISMIC SIGNAL VOLTAGE) HAVE STABILIZED.

STEP	LEO	SYSTEMS/DATA
22. REPEAT STEPS 5 THROUGH 16		
23. RESET TEMP RELAYS	INITIATE CMDS 5A070, 072, 074 TO INCREMENT CMD REGISTER TO READ 28.	
24. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 28 (TEMP RESET).
25. EXECUTE	INITIATE CMD 5A067	
26. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG11 READS N/SEL FOR ALL TEMP RELAYS.
27. INCREMENT TEMP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 26.	
28. VERIFY CMD REGISTER		INITIATE HSP FORMAT AND VERIFY CMD REGISTER READS 26 (TEMP INC 5).
29. EXECUTE	INITIATE CMD 5A067	
30. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG11 READS TEMP RELAY 5 "SEL" (ALL OTHER RELAYS N/SEL).
31. WAIT FOR TEMP TO STABILIZE AT A NEW VALUE ($\cong$ 3 HOURS)		INITIATE HSP FORMATS PERIODICALLY UNTIL DG04 (SENSOR TEMP) & DG01 (SEISMIC SIGNAL VOLTAGE) HAVE STABILIZED.

STEP	LEO	SYSTEMS/DATA
32. REPEAT STEPS 5 THROUGH 19		
33. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG-11 READS TEMP RELAY 4 "SEL" AND TEMP RELAY 5 "SEL."
34. REPEAT STEPS 21 THROUGH 22		
35. INCREMENT TEMP	INITIATE CMDS 5A070, 072, OR 074 AND INCREMENT CMD REGISTER TO 22.	
36. VERIFY CMD REGISTER		INITIATE HSP FORMAT AND VERIFY CMD REGISTER READS 22 (TEMP INC 1).
37. EXECUTE	INITIATE CMD 5A056	
38. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG11 READS: TEMP RELAY 1 "SEL" TEMP RELAY 4 "SEL" TEMP RELAY 5 "SEL" (ALL OTHER RELAYS N/SEL).
39. INCREMENT TEMP	INITIATE CMDS 5A070, 072, 074 TO INCREMENT CMD REGISTER TO 23.	
40. VERIFY CMD REGISTER		INITIATE HSP FORMAT AND VERIFY CMD REGISTER READS 23 (TEMP INC 2).
41. EXECUTE	INITIATE CMD 5A067	

STEP	LEO	SYSTEMS/DATA
42. VERIFY FUNCTION		INITIATE HSP FORMAT AND VERIFY DG11 READS: TEMP RLY 1 "SEL" TEMP RLY 2 "SEL" TEMP RLY 4 "SEL" TEMP RLY 5 "SEL" (ALL OTHER RELAYS N/SEL)
43. REPEAT STEPS 21 THROUGH 26		
44. INCREMENT TEMP	INITIATE CMDS 5A070, 072, AND 074 TO INCREMENT CMD REGISTER TO 26.	
45. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 26 (TEMP INC 5).
46. EXECUTE	INITIATE CMD 5A067	
47. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT AND REGISTER TO 25.	
48. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 25 (TEMP INC 4).
49. EXECUTE	INITIATE CMD 5A076	
50. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 24.	
51. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 24 (TEMP INC 3).

STEP	LEO	SYSTEMS/DATA
52. EXECUTE	INITIATE CMD 5A067	
53. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 23.	
54. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 23 (TEMP INC 2).
55. EXECUTE	INITIATE CMD 5A067	
56. VERIFY FUNCTION		INITIATE HSP & VERIFY DG11 READS: TEMP RELAY 2 "SEL" TEMP RELAY 3 "SEL" TEMP RELAY 4 "SEL" TEMP RELAY 5 "SEL" (ALL OTHER RELAYS N/SEL)
57. REPEAT STEPS 21 THROUGH 26		
58. INCREMENT TEMP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 27.	
59. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 27 (TEMP RELAY 6).
60. EXECUTE	INITIATE CMD 5A067	
61. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 23.	

STEP	LEO	SYSTEMS/DATA
62. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 23 (TEMP INC 2).
63. EXECUTE	INITIATE CMD 5A067	
64. INCREMENT TEMP	INITIATE CMD 5A072 TO INCREMENT CMD REGISTER TO 24.	
65. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 24 (TEMP INC 3).
66. EXECUTE	INITIATE CMD 5A067	
67. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 READS: TEMP RELAY 2 "SEL" TEMP RELAY 3 "SEL" TEMP RELAY 6 "SEL" (ALL OTHER RELAYS N/SEL)
68. REPEAT STEPS 21 THROUGH 22		
69. INCREMENT TEMP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 25.	
70. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 25 (TEMP INC 4).
71. EXECUTE	INITIATE CMD 5A067	

STEP	LEO	SYSTEMS/DATA
72. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 READS: TEMP RELAY 2 "SEL" TEMP RELAY 3 "SEL" TEMP RELAY 4 "SEL" TEMP RELAY 6 "SEL" (ALL OTHER RELAYS N/SEL)
73. REPEAT STEPS 21 THROUGH 26		
74. INCREMENT TEMP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 27.	
75. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 27 (TEMP RELAY 6).
76. EXECUTE	INITIATE CMD 5A067	
77. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 26.	
78. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 26 (TEMP RELAY 5).
79. EXECUTE	INITIATE CMD 5A067	
80. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 24.	
81. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 24 (TEMP RELAY 3).

STEP	LEO	SYSTEMS/DATA
82. EXECUTE	INITIATE CMD 5A067	
83. INCREMENT TEMP	INITIATE CMD 5A074 TO INCREMENT CMD REGISTER TO 23.	
84. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 23 (TEMP RELAY 2).
85. EXECUTE	INITIATE CMD 5A067	
86. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 READS: TEMP RELAY 2 "SEL" TEMP RELAY 3 "SEL" TEMP RELAY 5 "SEL" TEMP RELAY 6 "SEL"
87. REPEAT STEPS 21 THROUGH 22		
88. INCREMENT TEMP	INITIATE CMDS 50070, 072, OR 074 TO INCREMENT CMD REGISTER TO 25.	
89. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 25 (TEMP RELAY 4).
90. EXECUTE	INITIATE CMD 5A067	
91. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY DG11 READS: TEMP RELAY 2 "SEL" TEMP RELAY 3 "SEL" TEMP RELAY 4 "SEL" TEMP RELAY 5 "SEL" TEMP RELAY 6 "SEL" (TEMP RELAY 1 "N/SEL")

STEP	LEO	SYSTEMS/DATA
92. REPEAT STEPS 21 THROUGH 22		
93. PLOT TEMP DATA		PREPARE A GRAPH OF SENSOR TEMPS VS. FINE ENCODER VALUES. DETERMINE TEMP RELAY SETTING CORRESPONDING TO THE VERTEX OF THE PARABOLIC CURVE DESCRIBED BY THE PLOT.
94. SET INVERSION TEMP	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT THE CMD REGISTER AS REQUIRED TO SET TEMP RELAYS AS DETERMINED FROM STEP 93.	VERIFY CMD REGISTER BEFORE EACH 5A067 EXECUTE.
95. REPEAT STEPS 21 THROUGH 22		

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SOP 6-5
FINAL INSTRUMENT SETUP
PREREQUISITES: COMPLETION OF SOPs 6-1, 6-2, 6-3, & 6-4

STEP	LEO	SYSTEMS/DATA
1. BIAS IN	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 3.	
2. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 3 (BIAS IN).
3. EXECUTE	INITIATE CMD 5A067.	
4. VERIFY FUNCTION		VERIFY FROM CHART RECORDER THAT SEISMIC OUTPUT CHANGES.
5. POST AMP GAIN ADJUSTMENT	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 29.	
6. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 29 (POST AMP GAIN INCREMENT).
7. EXECUTE	INITIATE CMD 5A067 FOR EACH GAIN INCREASE INCREMENT DESIRED.	
8. SEISMIC GAIN AS REQUIRED.	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 8.	
9. VERIFY COMMAND REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 8 (SEISMIC HIGH GAIN).
10. EXECUTE	INITIATE CMD 5A067	
11. VERIFY FUNCTION		VERIFY FROM CHART RECORDER THAT SEISMIC OUTPUT HAS INCREASED.

STEP	LEO	SYSTEMS/DATA
12. INTEGRATOR NORMAL	INITIATE CMDS 5A070, 072, OR 074 TO INCREMENT CMD REGISTER TO 5.	
13. VERIFY CMD REGISTER		INITIATE HSP FORMAT & VERIFY CMD REGISTER READS 5 (INTG, NORM).
14. EXECUTE	INITIATE CMD 5A067	
15. VERIFY FUNCTION		VERIFY FROM CHART RECORDER THAT TIDAL OUTPUT DEPARTS FROM ZERO AND FREE MODE GOES OFF SCALE. (40 MINUTE RESPONSE PERIOD TO RETURN TO ON SCALE.)
16. TURN OFF COMMAND DECODER	INITIATE CMD 5A071	
17. VERIFY FUNCTION		INITIATE HSP FORMAT & VERIFY COMMAND REGISTER (DG-19) READS "NO FUNCTION."

SOP 6-7
LMS EMISSION MODE CONTROL

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1	EMISSION OFF OCT 123, 132, 134	VERIFY	~~AM-12~~ AND ~~AM 13~~ ZERO DM-20
	CYCLIC MODE OCT 124, 133, 134 FIL 2 ON OCT ~~123~~ 124, ~~133~~ 125, 134 OR 2A. 125, 127, 134	DISCRIMINATOR LOW command	NOV 21 1972 (FILAMENT 2 ONLY)
	FIXED MODE OCT 123, 125, 134 FIL 1 ON OCT ~~124~~ 123, ~~125~~ 133, 134		DM-20 & DM-19
3	HV ON OCT 123, 124, 134	VERIFY FILAMENT	~~FILAMENT CURRENT IS 100 m A FOR CYCLIC AND 250 m A FOR FIXED~~
4	RECONFIGURE EXP. TO DESIRED CONDITION		CYCLIC MODE CMD AND FIXED MODE CMD ARE MULTIFUNCTIONAL.

SOP 6-6
LMS ACTIVATION
PREREQUISITES: VERIFY 12 WATTS RESERVE POWER

LSP NO.	LEO	SYSTEMS/DATA	COMMENTS
AFTER DEPLOYMENT			
1	LMS ON OCT 036.	VERIFY HV OFF AND BAKE OUT HTR OFF.	10-WATT DECREASE IN RESERVE POWER. (CMDs 125, 133, & 134).
2	LMS OFF OCT 041.		10-WATT INCREASE IN RESERVE POWER.
AFTER LSP DETONATIONS			
3	LMS ON OCT 036.		10-WATT DECREASE IN RESERVE POWER.
4	DUST COVER GO OCT 127, 132, 134.	VERIFY COVER GO.	DM-17
5	BAKE-OUT HTR ON OCT 125, 132, 134.	VERIFY HTR ON.	DM-18
6	LMS STBY OCT 37.		
	REPEAT STEPS 3, 5, & 6 EVERY 3 HOURS FOR A TOTAL OF 9 HOURS	READ ION PMP SOURCE TEMP WHEN LMS IS ON. ~210°C	AM-06 AND AM-05 NOV 21 1972 MISSION RULE 32-2-C
8	AFTER 9 HOURS OF BAKE-OUT, TURN LMS ON OCT 036.		
8A	OCTAL 125, 133, 134	BAKE OUT HEATER OFF	
9	ION PMP ON OCT 127, 133, 134.	READ ION PMP PRESS.	AM-03 AND AM-04
10	ION PMP OFF — AM-03 OCT 132, 133, 134	<0.3 μA	
NEAR SUNSET			AM-05 ≥ +10°C AM-03 < 0.3 μA
11	SELECT FIXED MODE OCT 123, 125, 134		STEP 9. → REQUIRES AM-05 < 0°C AND AM-03 < 0.3 μA
12	SELECT FIL #1 OCT 123, 133, 134	VERIFY FILTER ON HSP.	
13	CMD HV ON OCT 123, 124, 134	VERIFY HV ON AND SCIENCE DATA.	

SOP 6-8
LMS J. PLATE STEP
PREQUISITES: FIXED MODE

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1	LOCK SWEEP OCT 123, 125, 134	VERIFY	
	J-PLATE STEP EN OCT 124, 133, 134	DISC. HIGH	
3	SW STEP OCT 123, 127, 134		SEND NUMBER OF TIMES REQUIRED TO GET TO PROPER STEP.
4	J STEP OCT 123, 125, 134		SEND NUMBER OF TIME REQUIRED.
5	J-PLATE STEP INH OCT 125, 127, 134		
6	HV ON OCT 123, 124, 134	DM-19 NOV 21 1972	

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1	EMISSION OFF OCT 123, 132, 134 SELECT REDUNDANT FIL OCT 123, 133, 134 (FIL #1) OCT 124, 125, 134 (FIL #2)	VERIFY	~~AM-12 AND AM-13 ZERO~~ DM-20
~~3~~	~~HV ON~~ ~~OCT 123, 124, 134~~		

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
	AFTER DEPLOYMENT		
1	LEAM ON OCT 042.	OBTAIN HSP AND CHECK ENG. DATA.	3-WATT DECREASE IN RESERVE POWER. LEAVE ON FOR 2 HOURS.
2	LEAM CALS OCT 111.		
3	LEAM OFF OCT 044.		3-WATT INCREASE IN RESERVE POWER.
	AFTER LSP DETONATIONS		
4	LEAM ON OCT 042.	VERIFY LEAM ON.	3-WATT INCREASE IN RESERVE POWER.
5	MIRROR CVR GO OCT 112.	VERIFY CVR GO ON HSP.	
	48-HOURS AFTER SUNSET		
6	SENSOR CVR GO OCT 114.		

LSP EXPLOSIVE PACKAGE DETONATION LISTENING MODE

PREREQUISITES: 1. VERIFY THAT ALL ANALOG RECORDERS HAVE NEW ROLL OF PAPER & INK.
2. VERIFY 6.3 WATTS RESERVE PWR

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1	INITIATE CMD 055 (LSP OPER SEL).	ON C/S HSP VERIFY 5.3 WATT DECREASE IN RESERVE POWER. ANNOTATE CMD ACTION ON C/S ANALOG RECORDER.	LOWER RESERVE POWER
#5	INITIATE CMD 156 (LSP PULSES ON).	ON C/S HSP VERIFY 0.7 WATT DECREASE IN RESERVE POWER. ANNOTATE CMD ACTION ON C/S ANALOG RECORDER.	CODED FIRE PULSES MUST BE RECEIVED BY EXPLOSIVE PACKAGE FOR DETONATION WHEN TIMERS TIME-OUT. DP-20 ONCE EVERY 29 SEC SWITCHES FROM ONE TO ZERO
#2	NOTIFY NETWORK TIME OF INTENDED LSP FORMAT MODE SEL CMD.	VERIFY NOTHING UNUSUAL OR OF SPECIAL INTEREST IS GOING ON WITH THE OTHER ALSEP EXPERIMENTS.	BIT RATE OF 3533 BPS IN THE NORMAL DATA RATE LSP FMT MODE.
#3	IF SYSTEM IS IN LOW BIT RATE, INITIATE CMD 006 (NORMAL BIT RATE SEL).		NORMAL OPERATION IS DP FORMATTING AND NORMAL BIT RATE.
#4	INITIATE CMD 003 (LSP FORMAT ON).	SELECT LSP FORMATS 4 OR 5 ON RECORDER NO. 2 AND FORMAT 6 ON RECORDER NO. 3. ANNOTATE RECORDERS.	RECORDER SPEED IS ~~10~~ 25 MM/SEC.
6	INITIATE CMD 170 (LSP GEO CAL), AS REQUIRED.	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3	
7	INITIATE CMD 163 (LSP GAIN NORM) AND CMD 164 (LSP GAIN LOW), AS REQUIRED.	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3.	LOW GAIN DECREASES THE NORMAL GEOPHONE GAIN BY A FACTOR OF 10.

FORMAT 4 - LOW
FORMAT 5 - HIGH
FORMAT 6 - MEDIUM

NOV 21 1972

PREREQUISITES: 1. VERIFY THAT ALL ANALOG RECORDERS HAVE NEW ROLL OF PAPER & INK.
2. VERIFY 6.3 WATTS RESERVE PWR

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
8	NOTIFY NETWORK TIME OF INTENDED DP FORMATTING MODE CMD.		DETONATION OF ALL EXPLOSIVE PACKAGES SHOULD HAVE OCCURRED.
9	INITIATE CMD 005 (DP FORMAT ON).	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3.	
10		VERIFY DP FORMAT LOCK-UP AND SET ALL DRUMS AND RECORDERS TO PRE-LSP MODE FORMATS.	DP FORMAT NORMAL BIT RATE IS 1060 BPS.
11	INITIATE CMD 162 (LSP PULSES OFF).	ON C/S HSP VERIFY 0.7 WATT INCREASE IN RESERVE POWER. ANNOTATE CMD ACTION ON C/S ANALOG RECORDER.	STEP IS NOT NECESSARY command 057
12	INITIATE CMD 057 (LSP OFF SEL).	ANNOTATE CMD ACTION ON C/S ANALOG RECORDER. VERIFY 5.3 WATT INCREASE IN RESERVE POWER.	LSP HAS NO STANDBY HEATERS AND WILL NOT BE COMMANDED TO STANDBY.
13	CHECK TEST COMPLETE ON WORK SCHEDULE AND LOG ANOMALIES.		

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1	INITIATE CMD 055 (LSP OPER SEL).	ON C/S HSP VERIFY 5.3 WATT DECREASE IN RESERVE POWER. ANNOTATE CMD ACTION ON C/S ANALOG RECORDER.	
2	NOTIFY NETWORK TIME OF INTENDED LSP FORMAT MODE SEL CMD.	VERIFY NOTHING UNUSUAL OR OF SPECIAL INTEREST IS GOING ON WITH THE OTHER ALSEP EXPERIMENTS.	BIT RATE OF 3533 BPS IN THE NORMAL DATA RATE LSP FMT MODE.
3	IF SYSTEM IS IN LOW BIT RATE, INITIATE CMD 006 (NORMAL BIT RATE SEL).		NORMAL OPERATION IS DP FORMATTING AND NORMAL BIT RATE.
4	INITIATE CMD 003 (LSP FORMAT ON).	SELECT LSP FORMATS 4 OR 5 ON RECORDER NO. 2 AND FORMAT 6 ON RECORDER NO. 3. ANNOTATE RECORDERS.	RECORDER SPEED IS 10 MM/SEC.
5	INITIATE CMD 170 (LSP GEO CAL).	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3.	
6	INITIATE CMD 163 (LSP GAIN NORM) AND CMD 164 (LSP GAIN LOW), AS REQUIRED.	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3.	LOW GAIN DECREASES THE NORMAL GEOPHONE GAIN BY A FACTOR OF 10.
7	INITIATE CMD 170 (LSP GEO CAL).	ANNOTATE CMD ACTION ON RECORDER NO. 2	
8	NOTIFY NETWORK TIME OF INTENDED DP FORMATTING MODE CMD.		LSP FORMATTING MODE ON TIME WILL BE APPROXIMATELY 30 MINUTES.
	INITIATE CMD 005 (DP FORMAT ON).	ANNOTATE CMD ACTION ON RECORDERS NO. 2 AND NO. 3.	

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
10		VERIFY DP FORMAT LOCK-UP AND SET ALL DRUMS AND RECORDERS TO PRE-LSP MODE FORMATS.	DP FORMAT NORMAL BIT RATE IS 1060 BPS.
11	INITIATE CMD 057 (LSP OFF SEL).	ANNOTATE CMD ACTION ON C/S ANALOG RECORDER. VERIFY 5.3 WATT INCREASE IN RESERVE POWER.	LSP HAS NO STANDBY HEATERS AND WILL NOT BE COMMANDED TO STANDBY.
12	CHECK TEST COMPLETE ON WORK SCHEDULE AND LOG ANOMALIES.		

SOP 6-13
HFE TCR LESS THAN 273°K

NOV 20 1972

STEP NO.	LEO	SYSTEMS/DATA	COMMENTS
1		READ RES. PWR	
2	CMD HFE TO STBY	READ RES. PWR IN STBY	CMD 046
3	CMD HFE TO OFF	READ RES. PWR IN OFF	CMD 050
4	A. IF STBY PWR GREATER THAN 4 WATTS, CMD HFE ON. LEAVE ON UNTIL TEMP DECREASES TO 250°K, THEN CMD TO STBY UNTIL LUNAR SUNRISE.		
	B. IF STBY PWER LESS THAN 4 WATTS, CMD HFE TO EITHER STBY OR ON WHICHEVER IS MAXIMUM PWR DISSIPATION.		
	NOTE	DAY / NIGHT HFE ON 3.9W / 10.7W HFE STBY 4.2W / 4.2W	

APOLLO

ACH

ALSEP CONSOLE HANDBOOK

APOLLO 12, ALSEP 1
THROUGH
APOLLO 17, ALSEP E

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