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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ALSEP  
CONSOLE HANDBOOK

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

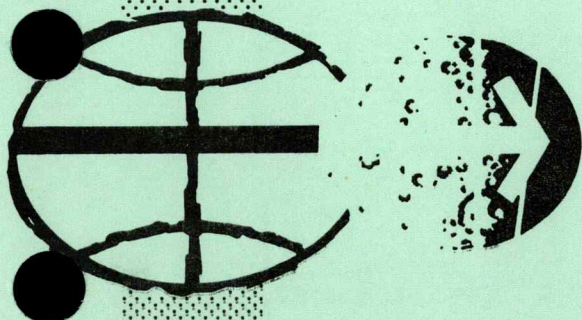
1 GENERAL

2 MISSION  
SPECIFICS

MAY 15, 1971

3 OPERATIONAL  
PROCEDURES

PREPARED BY  
FLIGHT CONTROL DIVISION



MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS



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*Cooper*  
FC035 ALSEP  
7/29/71

## APOLLO

### ALSEP CONSOLE HANDBOOK

APOLLO 12 ALSEP 1 THROUGH APOLLO 17 ALSEP ARRAY E

PCN-1

### 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-1 will make this handbook current as of July 29, 1971.

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 July 29, 1971.

Questions and comments concerning the contents of this document should be directed to FC9/Mr. Paul D. Nering, Jr., Lunar/Earth Experiments Branch, extension 3786.

This document is not to be reproduced without the written approval of the Chief, Lunar/Earth Experiments Branch, Flight Control Division, Manned Spacecraft Center, Houston, Texas.

Approved by:

  
James E. Saultz, Sr.  
Chief, Lunar/Earth Experiments Branch



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APOLLO

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PCN-1

PAGE CHANGE INSTRUCTION SHEET

Update this document in accordance with the following instructions:

Remove and replace the following pages:

✓ii  
✓vii  
✓1-36  
✓1-37

Add the following new pages:

✓iia  
✓iib

Remove and replace the following SOP:

✓2-15

Add the following new SOP's:

✓2-15A  
✓2-15B

9-1-71  
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APOLLO

ALSEP CONSOLE HANDBOOK

APOLLO 12 ALSEP 1 THROUGH APOLLO 17 ALSEP ARRAY E

CHRONOLOGICAL PUBLICATION HISTORY

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1-1X	2-HOUR SUPPORT
1-2X	SUNRISE SUPPORT
1-3X	SUNSET SUPPORT
1-4X	PSE AUTO LEVELING
1-5X	PSE FORCED LEVELING
1-6X	SOLAR WIND HI GAIN CHANGE
1-7X	SOLAR WIND LO GAIN CHANGE
4-1X	2-HOUR SUPPORT
4-2X	SUNRISE SUPPORT
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2-11	LSM SITE SURVEY
2-12	SWS ACTIVATION
2-13	SWS HI GAIN CHANGE
2-14	SWS LO GAIN CHANGE
2-15	SIDE/CCGE ACTIVATION

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<u>SOP No</u>	<u>Title</u>
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I 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

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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.



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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):

<u>LOOP NAME</u>	<u>TALK/MONITOR CAPABILITY</u>
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

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<u>LOOP NAME</u>	<u>TALK/MONITOR CAPABILITY</u>
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.

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- 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 print-out 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.



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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 de-select 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 due 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 de-select 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. INVALID 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

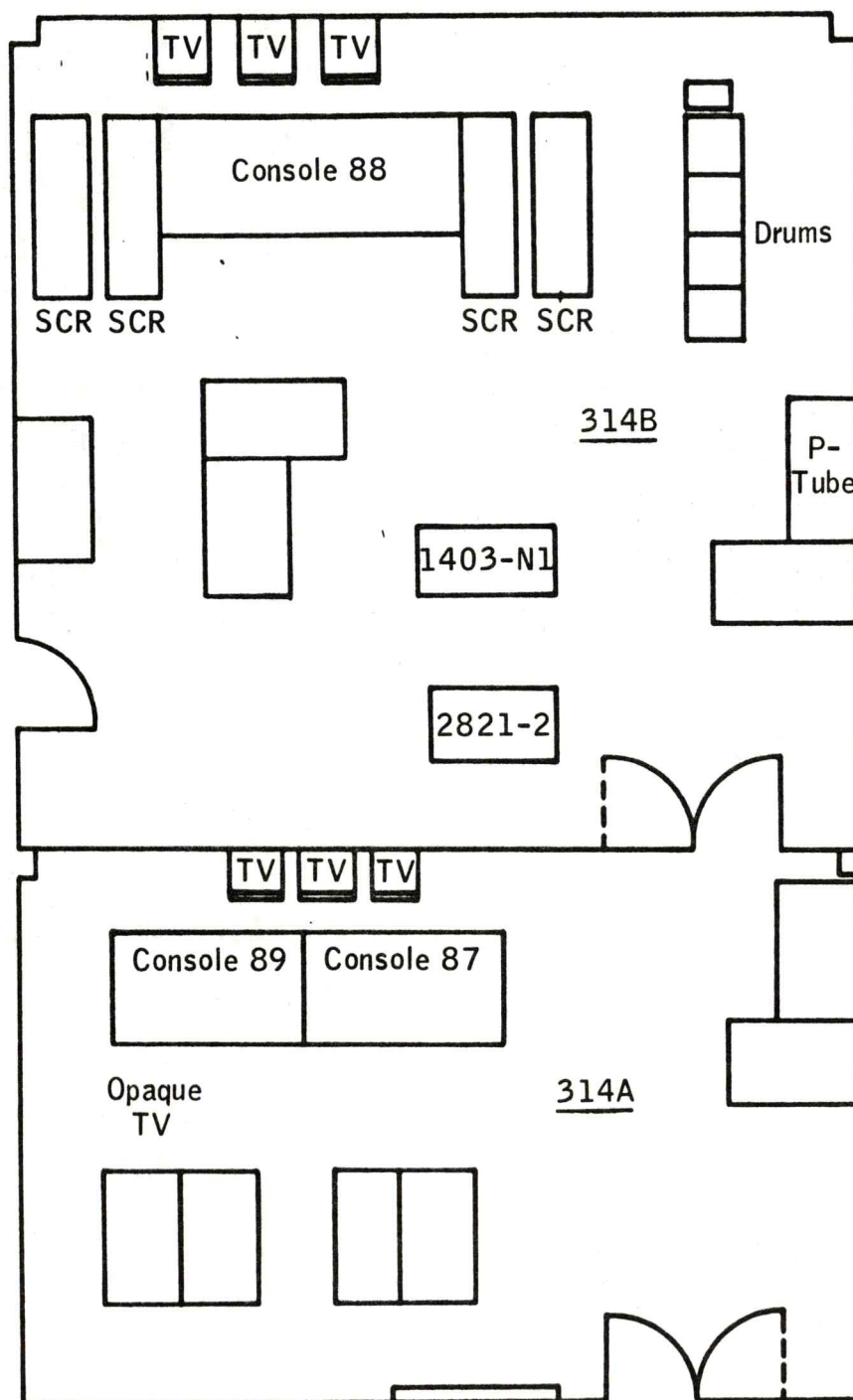


Figure 1-1. - ALSEP/P&FS Operations Rooms.

## 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

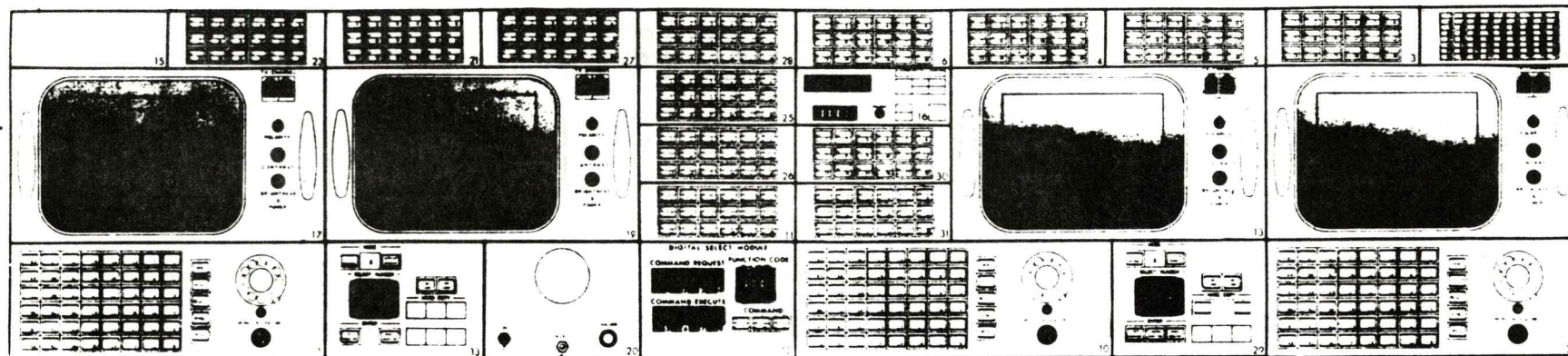
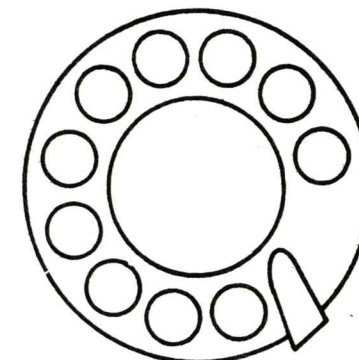


Figure 1-2. - Console 88, ALSEP/P&amp;FS.

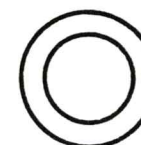


4 ALSEP DISPLAY	4 GCC	4 COMM CALL	3 DISPLAY				PABX
W T	W T	W T	W T				W T
3 GOSS CONF	3 GOSS CONF	3 FD CONF	3 EO CONF	3 GOSS 2	3 AFD CONF	3 AFD CONF	PABX
G *M	Y M	Y M	W T	Y M	Y M	W T	W T
3 FD	3 FD	3 FD	3 SSR CONF	3 SSR CONF	3 SSR VEH SYS	3 SSR VEH SYS	
G *M	Y M	W T	Y M	W T	Y M	W T	
4 ALSEP SYS	4 ALSEP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

HOLD
BUZZ CUT OFF
RING
REL



MONITOR VOLUME



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

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

1-18

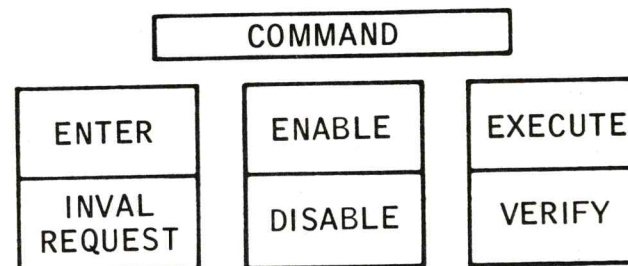
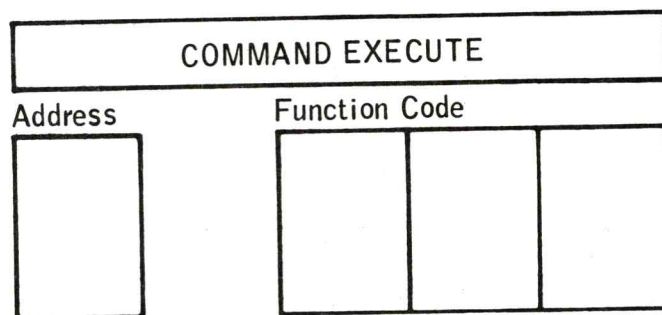


Figure 1-4. - Digital select module.

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			CPLLEE 1	HF 1
PFS C1-C4 MRO	PFS MAG #1 MRO			CPLLEE 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.

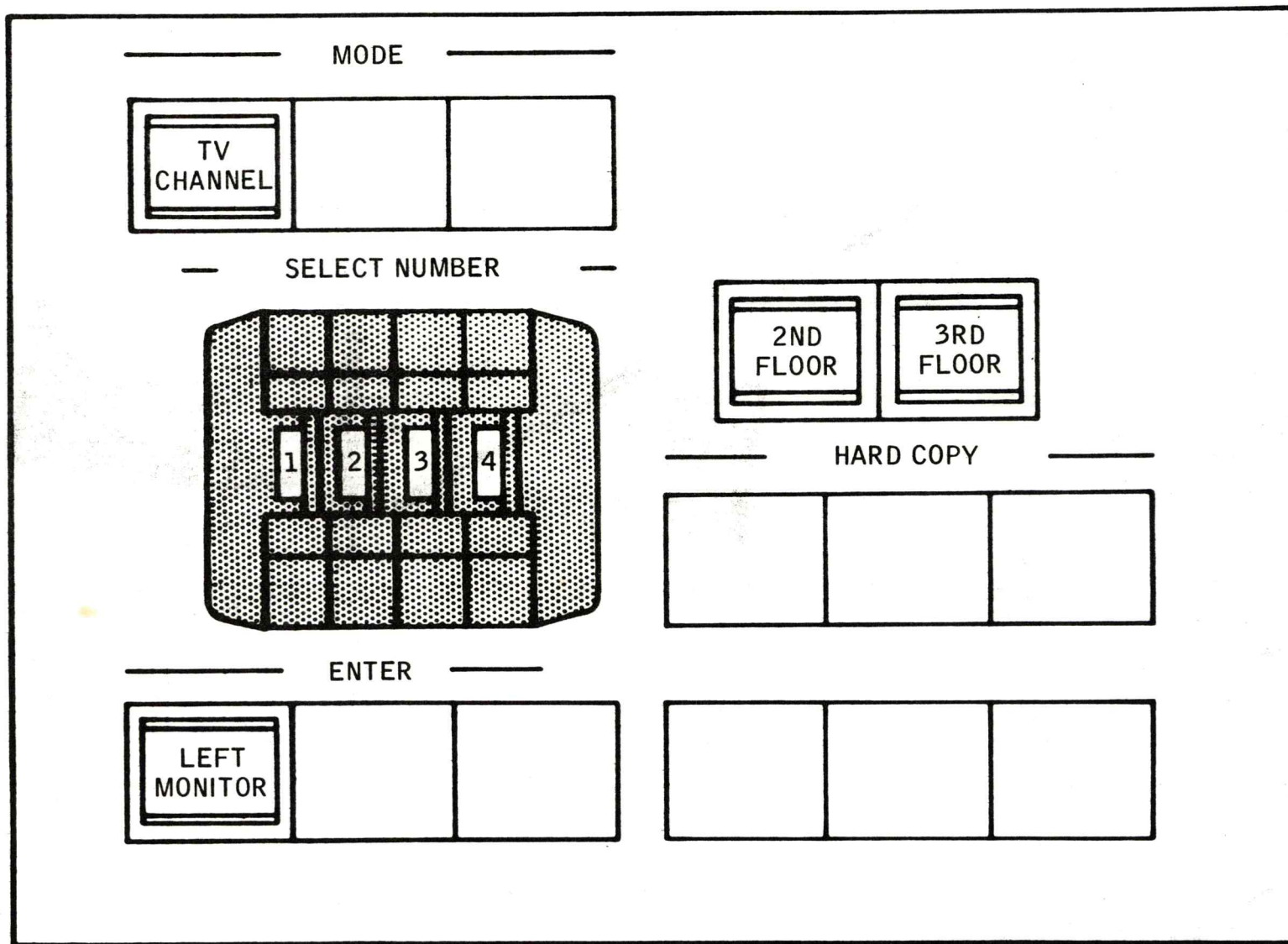


Figure 1-9. - Manual select keyboard, modules 29 and 33.

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.

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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

<u>Sequence</u>	<u>Function</u>	<u>Indication</u>	<u>Action</u>
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
<i>Nom. 3 SEC</i> 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.

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C. Command checklist

1. Depress ALSEP address 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.

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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 drifted 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.

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- 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.



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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 delogged 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.

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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.

<u>Measurement no.</u>	<u>Determining factor</u>	<u>Cal curve</u>
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
AE-15	AT-24 reads -22° F	1
	+14° F	2
	+86° F	3
	+100° F	4
	+122° F	5

P-1



\*

Measurement no.	Determining factor		Cal curve	
AE-16	AT-26 reads	-22° F	1	P-1
		+14° F	2	
		+86° F	3	
		+100° F	4	
		+122° 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	
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				
DS-6, DS-7	AS-3 reads	-20° C	1	
		0° C	2	
		+25° C	3	
		+55° C	4	
		+82° C	5	

P-1

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

(1) SEE PARAGRAPH 2.1.4 LIMIT SENSING

ALSEPCH  
BASIC

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

(1) SEE PARAGRAPH 2.1.4 LIMIT SENSING



Mission Apollo 12 ALSEP 1

Console 88

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-E		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

ALSEPCH  
BASIC

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

ALSEPCH  
BASIC

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 1L	G G	MAIN FRAME SYNC 90 FRAME SYNC	DA-1 SYNC PATTERN 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 3L	G G	REALTIME DATA PLAYBACK DATA	CAP WORD CAP WORD
4U 4L	G G	XMTR A XMTR B	AE-15 > 2 PCM AE-16 > 2 PCM
5U 5L	R R	CS CRITICAL ARM THUMPER	CMP B <sup>(1)</sup> DS-13 = 2 PCM
6U 6L	A R	CS WARNING ARM GRENADE	CMP A <sup>(1)</sup> DS-13 = 1 PCM
7U 7L	G R	PCU 1 RES PWR 1	AE-5 > 2 PCM RES PWR < 6.4 W
8U 8L	A A	EXP 1 STBY EXP 2 STBY	AB-4 $\left\{ \begin{array}{l} 72 \pm 10, 192 \pm 10 \\ 131 \pm 10, 192 \pm 10 \end{array} \right.$
9U 9L	R R	SIDE CRITICAL PSE CRITICAL	CMP D <sup>(1)</sup> CMP F <sup>(1)</sup>
10U 10L	(BLANK) (BLANK)		
11U 11L	A A	SIDE WARNING PSE WARNING	CMP C <sup>(1)</sup> CMP E <sup>(1)</sup>
12U 12L	(BLANK) (BLANK)		
13U 13L	G R	PCU 2 RES PWR 2	AE-6 > 2 PCM RES PWR < 6.4 W
14U 14L	A A	EXP 3 STBY EXP 4 STBY	AB-5 $\left\{ \begin{array}{l} 131 \pm 10, 160 \pm 10, \\ 188 \pm 10, 214 \pm 10 \\ 69 \pm 10, 100 \pm 10, \\ 188 \pm 10, 214 \pm 10 \end{array} \right.$
15U 15L	R (BLANK)	CPLEE CRITICAL	CMP J <sup>(1)</sup>
16U 16L	(BLANK) G	HBR SYNC	CAP WORD
17U 17L	A A	CPLEE WARNING HBR LIM	CMP I <sup>(1)</sup> CMP G <sup>(1)</sup>

(1) SEE PARAGRAPH 2.2.4 LIMIT SENSING

ALSEPCH  
BASIC

LIGHT

COLOR

NAME

ILLUMINATE

18U  
18L

(BLANK)  
(BLANK)

Mission Apollo 14 ALSEP 4

Console 88

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



ALSEPCH  
BASIC

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
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### 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

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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

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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

CPLLE CRITICAL

CPE CHAN/1 VOLTS	AC-2
CPE CHAN/2 VOLTS	AC-3
CPE CONV VOLTS	AC-4

CPLLE 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 1L	G G	MAIN FRAME SYNC 90 FRAME SYNC	DA-1 SYNC PATTERN 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 3L	G G	REALTIME DATA PLAYBACK DATA	CAP WORD CAP WORD
4U 4L	G G	XMTR A XMTR B	AE-15 > 2 PCM AE-16 > 2 PCM
5U 5L	G G	PROCESSOR X PROCESSOR Y	AB-6 > 112 PCM AB-6 < 112 PCM
6U 6L	R A	CS CRITICAL CS WARNING	CMP B <sup>(1)</sup> CMP A <sup>(1)</sup>
7U 7L	G R	PCU 1 RES PWR 1	AE-5 > 2 PCM RES PWR < 6.4 W
8U 8L	A A	EXP 1 STBY EXP 2 STBY	>AB-4< $\begin{matrix} 72\pm 10, 192\pm 10 \\ 131\pm 10, 192\pm 10 \end{matrix}$
9U 9L	R R	PSE CRITICAL LSM CRITICAL	CMP F <sup>(1)</sup> CMP G <sup>(1)</sup>
10U 10L	A A	PSE WARNING LSM WARNING	CMP E <sup>(1)</sup> CMP H <sup>(1)</sup>
11U 11L	A (BLANK)	EXP 5 STBY	>AB-5< $\begin{matrix} 35\pm 10, 100\pm 10 \\ 160\pm 10, 214\pm 10 \end{matrix}$
12U 12L	R (BLANK)	HFE LIMITS	CMP K <sup>(1)</sup>
13U 13L	G R	PCU 2 RES PWR 2	AE-6 > 2 PCM RES PWR < 6.4 W
14U 14L	A A	EXP 3 STBY EXP 4 STBY	>AB-5< $\begin{matrix} 131\pm 10, 160\pm 10, \\ 188\pm 10, 214\pm 10 \\ 69\pm 10, 100\pm 10, \\ 188\pm 10, 214\pm 10 \end{matrix}$
15U 15L	R R	SWS CRITICAL SIDE CRITICAL	CMP J <sup>(1)</sup> CMP D <sup>(1)</sup>
16U 16L	A A	SWS WARNING SIDE WARNING	CMP I <sup>(1)</sup> CMP C <sup>(1)</sup>

(1) SEE PARAGRAPH 2.3.4 LIMIT SENSING

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LIGHT

COLOR

NAME

ILLUMINATE

17U  
17L

(BLANK)  
R

TIMER CNTR 1

AZ-2 = >120 PCM

18U  
18L

(BLANK)  
R

TIMER CNTR 2

AZ-3 = >120 PCM

Mission Apollo 15 ALSEP A2

Console 88

Module 4

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

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	

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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	



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BASIC

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

ALSEPCH  
BASIC

PARAMETER	NUMBER
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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

ALSEPCH  
BASIC

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

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BASIC

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



ALSEPCH  
BASIC

2.4 APOLLO 16 ALSEP ARRAY D

TO BE SUPPLIED

ALSEPCH  
BASIC

2.5 APOLLO 17 ALSEP ARRAY E

TO BE SUPPLIED

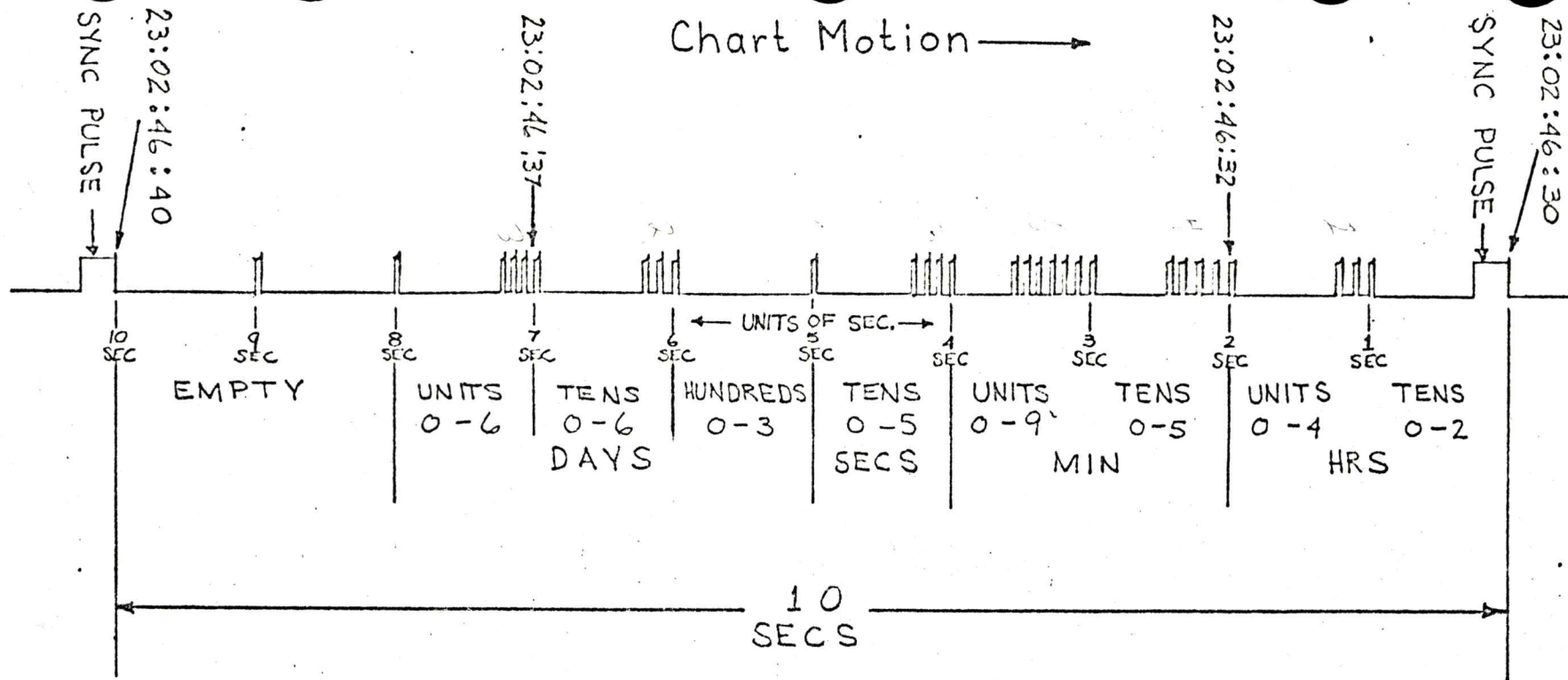
ALSEPCH  
BASIC

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

Chart Motion →



NOTES: 1. Sync Pulse (double pulse)-  
All pulses in excess of the  
double pulse indicate Tens  
of Hours. Sync pulse marks  
the beginning of time word.  
Exclude the double pulse from  
the count.

2. Tens of seconds - This point  
also represents the 4 unit  
of Seconds point.

3. Day Count - starting at  
1 January.

SERIAL DECIMAL TIME DISPLAY





### 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.

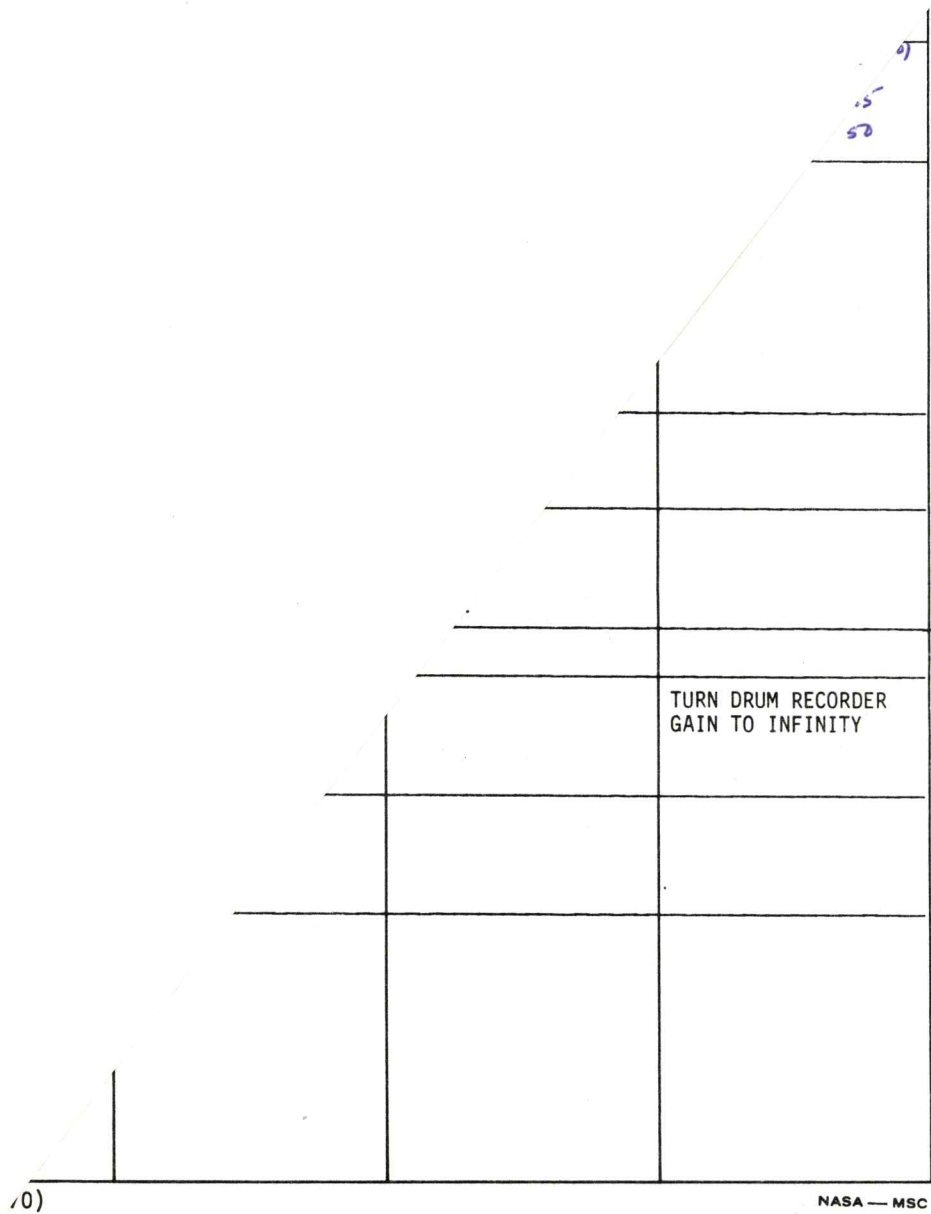
Bluntly, the first set is written about what is hoped will happen and the second set is written about what really happened.

The operational sequence numbering is as follows:

<u>ALSEP</u>	<u>Apollo</u>	<u>First Set</u>	<u>Second Set</u>
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.	<div> <div>Recdr</div> <div>1</div> <div>2</div> <div>3</div> <div>4</div> </div> <div> <div>Fmt</div> <div>3</div> <div>1</div> <div>7</div> <div>506</div> </div>	<div> <div>Speed ÷ 100</div> <div>1.0 (100 n/g)</div> <div>0.05 5</div> <div>0.025 2.5</div> <div>0.5 50</div> </div>
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°			

SOP 1-2X  
 SUNRISE SUPPORT (7-HOURS TO 31-HOURS AFTER PREDICTED SUNRISE)  
 PREREQUISITES:

ALSEPCH  
 BASIC  
 PAGE 1 OF 2

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		

SOP 1-2X  
 SUNRISE SUPPORT (7-HOURS TO 31-HOURS AFTER PREDICTED SUNRISE)  
 PREREQUISITES:

ALSEPCH  
 .BASIC  
 PAGE 2 OF 2

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			

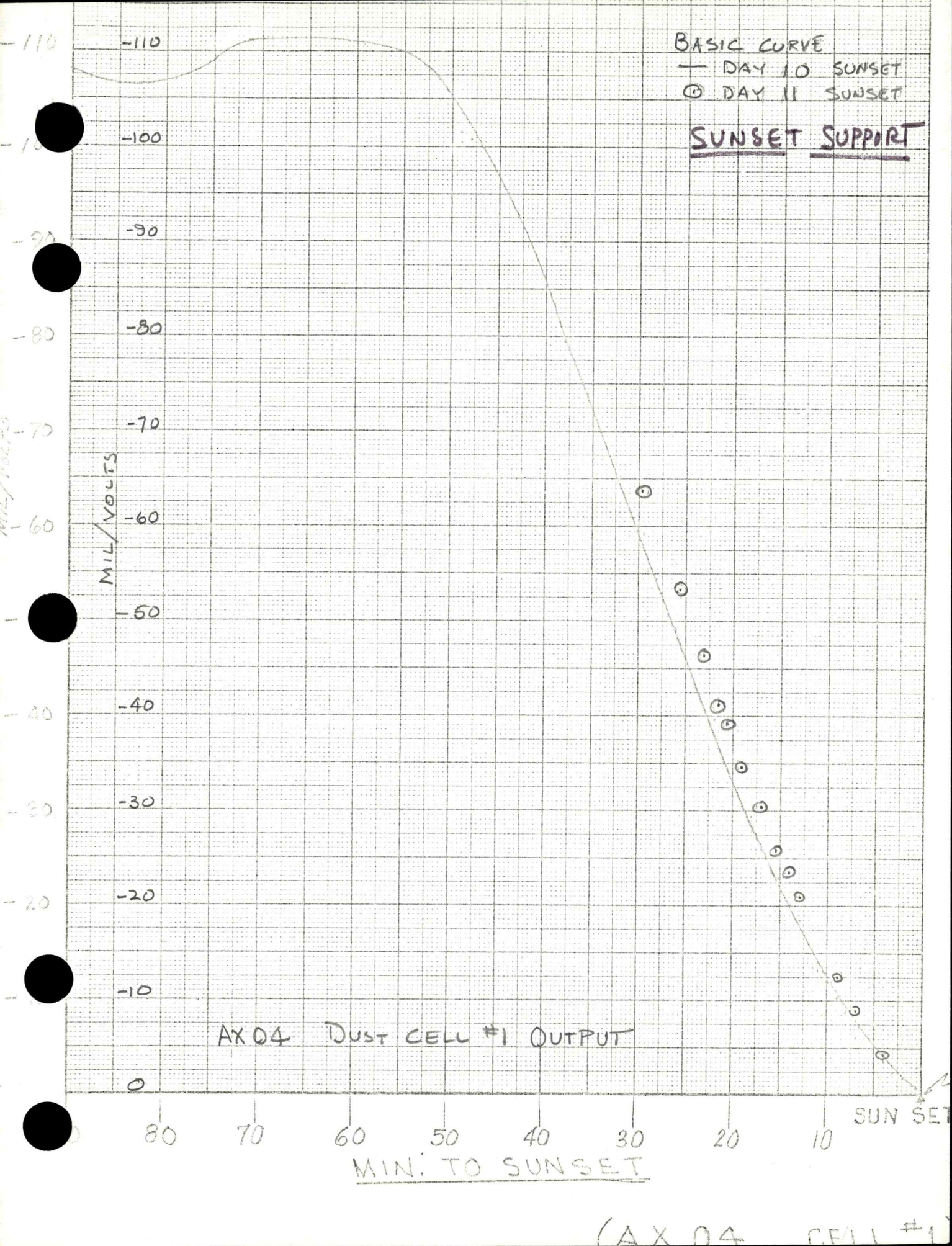


Step No.	ASE	SYSTEMS	DATA	Comments
1	PICK UP DATA BOOK FROM OFFICE			
2	CALL GCC TO SEND ALSEP MESSAGES			
3	READ MESSAGES AND LOG SPURIOUS CVW'S WITH MAP BIT SET			
4	HAVE REAL-TIME DATA DURING CMD INTERFACE	SELECT THE ANALOG RECORDERS AS REQUIRED. ANNOTATE RECORDERS.		
5	CALL DISPLAY TO START DRUM 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.		



PREREQUISITES:

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			





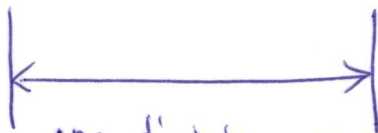
*through recorder*

*Multi Point*

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			

# Computing Drift Rates - PSE

## MULTIPOINT



100 divisions per  
paper width.

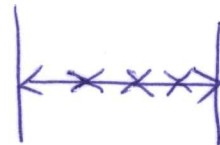
$$= \underline{12.5} \text{ microradians}$$

$$\therefore 1 \text{ division} = 0.125 \mu\text{r}$$

4 passes on multipoint

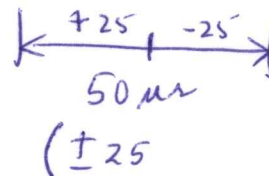
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## ANALOG RECDR



$\frac{1}{4}$  width of  
paper

1 pass on Analog



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			



Manual Leveling of X axis for  
Sunset terminator after **Z drive motor**  
has been turned ON

① HSP PSE Print cuts before leveling

② Drums ATTENUATION to  $\infty$

③ 072 Z Mtr OFF

Note: to reduce the amount of  
perturbations to the data - keep time  
to minimum from Z Mtr OFF to Z Mtr ON

④ 103 Manual Mode

Verify by SITEVAL and VERIFY

⑤ MAP OR ON

⑥ 070 X Mtr ON (4 to 5 seconds)

⑦ 070 X Mtr OFF

⑧ 103 Auto Mode

Verify off Brush recorder - don't wait for HSP Print.

⑨ MAP OR OFF

⑩ 072 Z Mtr ON

Total elapsed time should  
be about 1 minute max.

from Z Mtr OFF to Z Mtr ON.

⑪ Drums Attenuation to 30

⑫ 2 HSP PSE after leveling.

RM

SOP 1-6X  
SOLAR WIND HI GAIN CHANGE  
PREREQUISITES:

ALSEPCH  
BASIC  
PAGE 1 OF 1

[illegible]

[illegible]

	SWS	LOW	HIGH
9	DW03 MV		
90	DW04 MV		
900	DW05 MV		
3000	DW06 MV		
9000	DW07 MV		
MOD 100	DW11 DEGC		
MOD 200	DW12 DEGC		
MOD 300	DW13 DEGC		
SNSR	DW14 DEGC		
SUN REF	DW15 VDC		
PROG	DW16 VDC		
STEP GEN	DW17 VDC		
MOD MON	DW18 PCM		

	SIDE / CCGE
+5	DI02 VDC
CCGE	DI04 DEGC
TEMP 2	DI05 DEGC
TEMP 3	DI06 DEGC
CCGE 4.5	DI07 KVDC
TEMP 4	DI09 DEGC
TEMP 5	DI10 DEGC
+60	DI13 VDC
+30	DI14 VDC
+5	DI15 VDC
GND	DI16 VDC
-5	DI17 VDC
-30	DI18 VDC
TEMP 6	DI19 DEGC
SIDE -3.5	DI20 KVDC
+1.0	DI21 VDC
+30	DI22 MVDC
ADC POS REF	DI23 VDC
ADC NEG REF	DI25 VDC
-1.0	DI26 VDC
-12	DI27 VDC
+12	DI28 VDC
PRE/REG	DI29 PCT
-30	DI30 MVDC

012

## TABLE 2 (continued)



## ALSEP 1 LIMITS TABLE

LOW			HIGH			LOW			HIGH			SWS		LOW		HIGH	
AE01	VDC	0.23	0.26	AT29	DEGF	10.0	100.0										
AE02	VDC	4.72	4.85	AT30	DEGF	10.0	110.0					DW03	MV	8.00	10.00		
AE03	VDC	15.40	16.90	AT31	DEGF	10.0	100.0					DW04	MV	80.00	100.00		
AE04	AMPS	3.90	5.00	AT32	DEGF	10.0	100.0					DW05	MV	800.00	1000.00		
AE05	AMPS	0.40	2.70	AT33	DEGF	10.0	100.0					DW06	MV	2650.00	3300.00		
AE06	AMPS	0.40	2.70	AT34	DEGF	20.0	110.0					DW07	MV	8000.00	9800.00		
AE07	VDC	28.50	29.40	AT35	DEGF	20.0	130.0					DW11	DEGC	-20.00	70.00		
AE08	VDC	14.90	15.36	AT36	DEGF	20.0	125.0					DW12	DEGC	-20.00	70.00		
AE09	VDC	11.90	12.15	AT37	DEGF	20.0	125.0					DW13	DEGC	-20.00	70.00		
AE10	VDC	4.90	5.17	AT38	DEGF	50.0	180.0					DW14	DEGC	-138.00	65.00		
AE11	VDC	-12.35	-11.90	AT39	DEGF	0.0	180.0					DW15	VDC	-0.10	1.70		
AE12	VDC	-6.10	-5.88									DW16	VDC	4.60	5.15		
AE13	DBM	-450.0	10.0	AX01	DEGF	0.0	200.0					DW17	VDC	0.8500	0.9100		
AE14	DBM	3.0	7.2	AX02	DEGF	0.0	200.0					DW18	PCM	0	2		
AE15	VDC	0.80	2.50	AX03	DEGF	0.0	200.0										
AE16	VDC	0.80	2.50														
AE17	MA	143.0	175.0	CS1	WATTS	70.00	74.00										
AE18	MA	128.0	175.0	CS2	WATTS	6.40	43.00					DI02	VDC	4.500	5.300		
				CS3	WATTS	5.00	15.50					DI04	DEGK	95.00	413.00		
AR01	DEGF	1000	1150	CS4	WATTS	6.40	35.00					DI05	DEGC	0.00	54.00		
AR02	DEGF	-2	2	CS5	WATTS	5.00	14.00					DI06	DEGC	-20.00	60.00		
AR03	DEGF	1000	1150									DI07	KVDC	0.000	75.000		
AR04	DEGF	405	500	PSE								DI09	DEGC	0.00	60.00		
AR05	DEGF	0	500									DI10	DEGC	5.00	60.00		
AR06	DEGF	-2	2	DL04	URAD	-20.50	20.50					DI13	VDC	55.00	65.00		
				DL05	URAD	-20.50	20.50					DI14	VDC	27.00	32.00		
AT01	DEGF	-300	300	DL06	MGAL	-3.200	3.200					DI15	VDC	4.500	5.300		
AT02	DEGF	-300	300	DL07	DEGF	125.00	142.50					DI16	VDC	0.0000	0.0180		

APOLLO 14  
ALSEP C

OCTAL NO.

COMMAND TITLE

03

ASE HBR ON

ASE HBR OFF

NORM BIT RT

LOW BIT RT

NORM BIT RT

RST

ASEL

ALSEP 4  
PROCEDURES  
(2)

LEE

1 SEL (2)  
CU 2 SEL (2)

APOLLO 14  
ALSEP C

OCTAL NO.      COMMAND TITLE

063	PSE XY GAIN CH	
064	PSE Z GAIN CH	
065	PSE SP CAL	
066	PSE LP CAL	
067	PSE SP GAIN CH	
070	MTR X ON/OFF	
071	MTR Y ON/OFF	
072	MTR Z ON/OFF	
073	PSE UNCAGE	PSE
074	DIR POS/NEG	
075	SPD HI/LO	
076	THER CUTL CH	
101	PSE FLTR IN/OUT	
102	LVL SNSR IN/OUT	
103	LVL MODE A/F	
104	SIDE LOAD 1	
105	SIDE LOAD 2	
106	SIDE LOAD 3	SIDE
107	SIDE LOAD 4	
110	SIDE EXECUTE	
111	CPLLEE HTR ON	
112	CPLLEE HTR OFF	
113	CPLLEE CVR GO (1)	
114	CPE DEF SEQ ON	
115	CPE DEF STEP	CPLLEE
117	CPE DEF SEQ OFF	
120	CPE CHAN HI	
121	CPE CHAN LO	
156	GEO CAL GO	
162	ASE SEQ FIRE (4)	
163	GRENAD 1 FIRE (4)	
164	GRENAD 2 FIRE (4)	ASE
165	GRENAD 3 FIRE (4)	
166	GRENAD 4 FIRE (4)	
170	GRENAD ARM (4)	

OCTAL NO.      COMMAND TITLE

003	ASE HBR ON	
005	ASE HBR OFF	
006	NORM BIT RT	
007	LOW BIT RT	
011	NORM BIT RT	RST
012	XMTR A SEL	
013	XMTR ON	
014	XMTR OFF	
015	XMTR B SEL	
017	7W PDR ON	
021	7W PDR OFF	
022	14W PDR ON	
023	14W PDR OFF	
024	HTR 3 ON	
025	HTR 3 OFF	
027	DUST CELL ON	
031	DUST CELL OFF	
032	TIMER OUT ACCPT	
033	TIMER OUT INHIB (2)	
034	PROC X SEL	
035	PROC Y SEL	
036	PSE ON	
037	PSE STBY	PSE
041	PSE OFF	
042	ASE ON	
043	ASE STBY	ASE
044	ASE OFF	
045	SIDE ON	
046	SIDE STBY	SIDE
050	SIDE OFF	
052	CPLLEE ON	
053	CPLLEE STBY	CPLLEE
054	CPLLEE OFF	
055	10W HTR ON	
056	5W HTR ON	
057	HTRS OFF	
060	PCU 1 SEL (2)	
062	PCU 2 SEL (2)	





Jan. 13, 1971  
October 5, 1970CENTRAL STATION (CONT'D)

	<u>LOW</u>	<u>HIGH</u>		<u>LOW</u>	<u>HIGH</u>
<u>ASE</u>					
AS01 DEGC	-20.0	+60.0	DI19 DEGC	-10.00	55.00
AS02 DEGC	<del>-30.0</del> <del>-60.0</del>	+85.0	DI20 KVDC	-3.820	-3.370
AS03 DEGC	<del>-30.0</del> <del>-60.0</del>	+85.0	DI21 VDC	0.940	1.040
AS04 DEGC	-200.0	+130.0	DI22 MVDC	24.000	36.000

ASE HIGH BIT RATE LIMITS TABLE

AE03 VDC	15.60	16.40	DI23 VDC	5.800	7.600
AE04 AMP	3.90	4.70	DI25 VDC	-7.600	-5.800
AR01 DEGF	1060	1150	DI26 VDC	-1.040	-.940
AR04 DEGF	415	500	DI27 VDC	-12.400	-11.100
CS1 WATTS	60.00	76.00	DI28 VDC	11.100	12.400
DS05 MV	-10.00	400.00	DI29 PCT	80.0	95.0
DS06 DEG	-10.00	10.00	DI30 MVDC	-36.000	-24.000
DS07 DEG	-10.00	10.00	<u>CPLLE</u>		
DS10 VOLTS	1.15	1.35	AC02 VDC	2700.0	3400.0
DS11 VOLTS	3.65	4.05	AC03 VDC	2700.0	3400.0
AS01 DEGC	-10.0	60.0	AC04 VDC	2.80	3.20
AS03 DEGC	-60.0	85.0	AC05 DEGC	-20.00	40.00
			AC06 DEGC	-20.00	40.00

SIDE/CCGE

DIO2 VDC	4.500	5.300
DIO4 DEGC	95.00	380.00
DIO5 DEGC	0.00	55.00
DIO6 DEGC	-15.00	55.00
DIO7 KVDC	3.700	5.400
DIO9 DEGC	10.00	55.00
DI10 DEGC	0.00	55.00
DI13 VDC	55.00	65.00
DI14 VDC	27.00	32.00
DI15 VDC	4.500	5.300
DI16 VDC	0.0000	0.0180
DI17 VDC	-5.300	-4.500
DI18 VDC	-32.00	-27.00



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 <u>BOTH</u> DATA BOOKS 4 C/S (1 FOR BX) 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.		

FCD Form 101 (April 70)

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)		

ALSEPCH  
BASIC  
PAGE 2 OF 2

[illegible]

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

ALSEPCH  
BASIC  
PAGE 2 OF 2

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			

*Cooper*

FC93

April 5, 1971

MEMORANDUM

TO: ALSEP Flight Controllers  
FROM: FC9/Chief, Lunar/Earth Experiments Branch  
SUBJECT: High Bit Rate Turn ON

The high bit rate support periods have been tentatively scheduled for 0900 to 0930 CST on Fridays to facilitate scheduling from a Network and PI standpoint. There is nothing hard and fast about going to HBR at that time. The HBR should not be turned ON without checking to make sure that nothing unusual or of special interest is going on with the other experiments. For instance, if there is a seismic event occurring wait until it is complete before cmding HBR ON. The ASE experiment should be turned ON approximately 10 minutes before turning the HBR ON. In general, the CMD carrier should be left ON and safed until the HBR is turned ON to preclude spurious CVWs.

If there is an event occurring that precludes the HBR ON at 0900 the support period can be extended for an hour or so to get the 30 minutes of ASE HBR data. If the event looks like it may require more than an hour's extension then reschedule the ASE for the next day or some relatively quiet time (scientifically).

NOTE: Always check the drums before cmding HBR ON. The other A4 experiments should also be checked.

*James E. Saultz, Sr.*  
James E. Saultz, Sr.

FC93/KKKundel:jcc

*Burt - Have console procedures updated  
to reflect this Saultz.*

SOP 4-5X  
ASE PASSIVE LISTENING MODE  
PREREQUISITES:

ALSEPCH  
BASIC  
PAGE 1 OF 1

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			



SOP 4-6X  
ASE MORTAR MODE

- 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

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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 NECES- SARY 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 LISTEN- ING 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 NTKW OF TIME TO RETURN TO NORMAL BIT RATE AND GET GO FROM NTKW			
19	INITIATE CMD 005 (HBR OFF)	RESELECT ANALOG FOR- MATS, 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 MANUAL OFF			
3	TO TURN THERMAL CONTROL MODE TO AUTO CMD	VERIFY 4 W RES PWR		NOTE 1: THIS LEAVES THE EXPERIMENT 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 OPERATE THE THERMAL CONTROL INITIALIZES IN THE AUTO MODE
5		INITIATE CPLEE HSP	CHECK CPLEE STATUS	
6	RECORD ACTION AND ANOMALIES IN CONSOLE LOG			

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FCD Form 101 (April 70)

1 2 etc = additive

SIDE/CCIG COMMANDS

FUNCTION	1	2	4	8	-
	<u>104</u>	<u>105</u>	<u>106</u>	<u>107</u>	<u>110</u>
One Time Commands { BREAK CCIG SEAL		X			X
REMOVE DUST COVER				X	X
1. GND PLANE STEP PROGRAMER ON/OFF	X				X
2. RST FRAME CNTR AT 10		X			X
3. RST FRAME CNTR AT 39	X	X			X
4. RST VELOCITY FILT AT 9			X		X
5. RST FRAME CNTR AT 79	X		X		X
6. RST FRAME CNTR AT 79 & <sup>VEL FIL</sup> AT 9		X	X		X
7. X10 ACCUMULATION INTERVAL ON/OFF	X	X	X		X
8. MASTER RESET				X	X
9. VEL FILT VOLTAGE ON/OFF	X			X	X
10. LECPA HIVOLTAGE ON/OFF		X		X	X
11. HECPA HIVOLTAGE ON/OFF	X	X		X	X
12. FORCE CONTINUOUS CAL (RST TO 120)			X	X	X
13. CCIG HIVOLTAGE ON/OFF	X		X	X	X
14. CHANNELTRON HIVOLTAGE ON/OFF		X	X	X	X
15. RST COMMAND REGISTER	X	X	X	X	X

Team Members



3 OPERATIONAL  
PROCEDURE

APOLLO 15 ALSEP  
A-2



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                      AS REQD GAIN AL-2    Z GAIN                   AS REQD  AL-3    LVL                      N/A DIR AL-3    LVL                      N/A SPEED AL-4    SP                        AS REQD GAIN AL-5    LVL                        AUTO MDE AL-5    LVL                        IN SNSR AL-6    T CTL                    AUTO OFF AL-7    LP/SP                    BOTH CAL                       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       N/A SPEED AL-4   SP       AS REQD GAIN AL-5   LVL MDE   AUTO AL-5   LVL       IN SNSR AL-6   T CTL     AUTO STA       OFF AL-7   LP/SP    BOTH CAL       OFF AL-8   UNCAGE   UNCAGED STA	VERIFY RESERVE POWER FROM C/S ANALOG RECORDER GREATER THAN 5.0 W	TURN DRUM RECORDER ATTENUATION 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

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

SOP 2-4  
PSE INITIAL AUTOMATIC LEVELING  
PREREQUISITES:

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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 AS REQD GAIN AL-2 Z AS REQD GAIN AL-3 LVL AS REQD DIR AL-3 LVL LO SPEED AL-4 SP AS REQD GAIN AL-5 LVL AUTO MDE AL-5 LVL OUT SNSR AL-6 T CTL AUTO ON AL-7 LP/SP BOTH OFF CAL AL-8 UN- UN- CAGE CAGED	
39	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANY ANOMALIES IN CONSOLE LOG BOOK			

SOP 2-5  
PSE AUTOMATIC RELEVELING  
PREREQUISITES: 1. EXP 1 MUST BE IN OPERATE MODE  
2. RES PWR GREATER THAN 5 W

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Step No.	ASE	SYSTEMS	DATA	Comments																																	
1	INITIATE 076 THERMAL CNTL AUTO OFF	INITIATE PSE HSP FOR-MAT	OBTAIN PSE HSP FORMAT AND GIVE COPY TO ASE																																		
2	<div>NOTE STATUS OF THE FOLLOWING TO DETER-MINE CMD ACTION RE-QUIRED (NOTE 1)</div> <table><tr><td></td><td>SYMBOL NAME</td><td>STATUS REQ FOR RELVL</td></tr><tr><td>AL-1</td><td>X&amp;Y GAIN</td><td>AS REQD</td></tr><tr><td>AL-2</td><td>Z GAIN</td><td>AS REQD</td></tr><tr><td>AL-3</td><td>LVL DIR</td><td>N/A</td></tr><tr><td>AL-3</td><td>LVL SPEED</td><td>LO</td></tr><tr><td>AL-4</td><td>SP GAIN</td><td>AS REQD</td></tr><tr><td>AL-5</td><td>LVL MDE</td><td>AUTO</td></tr><tr><td>AL-5</td><td>LVL SNSR</td><td>OUT</td></tr><tr><td>AL-6</td><td>T CTL</td><td>AUTO OFF</td></tr><tr><td>AL-7</td><td>LP/SP CAL</td><td>BOTH OFF</td></tr><tr><td>AL-8</td><td>UN-CAGE</td><td>UN-CAGED</td></tr></table>		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	<div>NOTE 1: THERE ARE NO STATUS PA-RAMETERS FOR THE PSE FIL-TER OR THE THREE AXIS LEVELING MO-TORS. AT PSE TURN ON-</div> <div>PSE FILTER INITIALIZES TO OUT</div> <div>LVL X MTR INITIALIZES TO OFF</div> <div>LVL Y MTR INITIALIZES TO OFF</div> <div>LVL Z MTR INITIALIZES TO OFF</div>
	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																																			
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    AS REQD GAIN AL-2    Z GAIN    AS REQD AL-3    LVL DIR    N/A AL-3    LVL    LO SPEED AL-4    SP    AS REQD GAIN AL-5    LVL    AUTO MDE AL-5    LVL    OUT SNSR AL-6    T CTL    AUTO STA    OFF AL-7    LP/SP    BOTH CAL    OFF AL-8    UN-    UN- CAGE    CAGED STA			
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 AS GAIN REQD AL-2 Z AS GAIN REQD AL-3 LVL AS DIR REQD AL-3 LVL LO SPEED AL-4 SP AS GAIN REQD AL-5 LVL AUTO MDE AL-5 LVL OUT SNSR AL-6 T CTL AUTO ON AL-7 LP/SP BOTH CAL OFF AL-8 UN- UN- CAGE CAGED	
21	CHECK TASK COMPLETE ON WORK SCHEDULE AND LOG ANY ANOMALIES IN CONSOLE LOG BOOK			

SOP 2-6

PSE INITIAL FORCED LEVELING

PREREQUISITES: 1. EXP 1 MUST BE IN OPERATE MODE  
 2. EXP 1 MUST BE UNCAGED  
 3. RES PWK GREATER THAN 5 W

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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	<div>NOTE STATUS OF THE FOLLOWING TO DETERMINE CMD ACTION REQUIRED (NOTE 1)</div> <table><tr><td></td><td></td><td>STATUS REQ FOR LVL</td></tr><tr><td>SYMBOL</td><td>NAME</td><td></td></tr><tr><td>AL-1</td><td>X&amp;Y GAIN</td><td></td></tr><tr><td>AL-1</td><td>X&amp;Y GAIN</td><td>AS REQD</td></tr><tr><td>AL-2</td><td>Z GAIN</td><td>AS REQD</td></tr><tr><td>AL-3</td><td>LVL DIR</td><td>NOTE 2</td></tr><tr><td>AL-3</td><td>LVL SPEED</td><td>LO</td></tr><tr><td>AL-4</td><td>SP GAIN</td><td>AS REQD</td></tr><tr><td>AL-5</td><td>LVL MDE</td><td>AUTO</td></tr><tr><td>AL-5</td><td>LVL SNSR</td><td>OUT</td></tr><tr><td>AL-6</td><td>T CTL</td><td>AUTO OFF</td></tr><tr><td>AL-7</td><td>LP/SP CAL</td><td>BOTH OFF</td></tr><tr><td>AL-8</td><td>UN-CAGE</td><td>UN-CAGED</td></tr></table>			STATUS REQ FOR LVL	SYMBOL	NAME		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	UN-CAGED	MONITOR X, Y, & Z TIDAL DATA ON PSE ANALOG RECORDER	VERIFY SPEED OF PSE ANALOG RECORDER AT 0.5	<div>NOTE 1: THERE ARE NO STATUS PARAMETERS FOR THE PSE FILTER OR THE THREE AXIS LEVELING MOTORS. AT PSE TURN ON:</div> <div>PSE FILTER INITIALIZES TO OUT LVL X MTR INITIALIZES TO OFF LVL Y MOTOR INITIALIZES TO OFF LVL Z MTR INITIALIZES TO OFF</div> <div>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</div>
		STATUS REQ FOR LVL																																									
SYMBOL	NAME																																										
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	UN-CAGED																																									
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      AS REQD GAIN AL-2   Z      AS REQD GAIN AL-3   LVL    NOTE DIR      4 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 STA      OFF AL-7   LP/SP   BOTH CAL      OFF AL-8   UN-      UN- CAGE      CAGED STA			
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 MRAD, 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 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 $\pm$ 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- <table><tr><td>SYMBOL</td><td>NAME</td><td>STATUS</td></tr><tr><td>AL-1</td><td>X&amp;Y GAIN</td><td>AS REQD</td></tr><tr><td>AL-2</td><td>Z GAIN</td><td>AS REQD</td></tr><tr><td>AL-3</td><td>LVL DIR</td><td>NEG</td></tr><tr><td>AL-3</td><td>LVL SPEED</td><td>LO</td></tr><tr><td>AL-4</td><td>SP GAIN</td><td>AS REQD</td></tr><tr><td>AL-5</td><td>LVL MDE</td><td>AUTO</td></tr><tr><td>AL-5</td><td>LVL SNSR</td><td>OUT</td></tr><tr><td>AL-6</td><td>T CTL</td><td>AUTO ON</td></tr><tr><td>AL-7</td><td>LP/SP CAL</td><td>BOTH OFF</td></tr><tr><td>AL-8</td><td>UN-CAGE</td><td>UN-CAGED</td></tr></table>	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	
SYMBOL	NAME	STATUS																																			
AL-1	X&Y GAIN	AS REQD																																			
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AL-3	LVL DIR	NEG																																			
AL-3	LVL SPEED	LO																																			
AL-4	SP GAIN	AS REQD																																			
AL-5	LVL MDE	AUTO																																			
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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																																				

SOP 2-7

PSE FORCED RELEVELING TO BAND EDGE

PREREQUISITES: 1. PSE IN OPER SEL  
 2. PSE UNCAGED  
 3. RES PWR GREATER THAN 5 W

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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 DETER- MINE CMD ACTION REQUIRED (NOTE 1)  SYMBOL    NAME    STATUS REQ FOR LVL  AL-1       X&Y    AS GAIN    REQD AL-2       Z       AS GAIN    REQD AL-3       LVL    NOTE 2 DIR AL-3       LVL    LO SPEED AL-4       SP       AS GAIN    REQD AL-5       LVL    FORCED MODE AL-5       LVL    OUT SNSR AL-6       T CTL    AUTO OFF AL-7       LP/SP    BOTH CAL    OFF AL-8       UN-       UN- CAGE    CAGED	VERIFY 5 W RESERVE POWER		NOTE 1: THERE ARE NO STATUS PARA- METERS 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 ANA- LOG 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 DE- SIRED		ANNOTATE CMD ACTION ON PSE ANALOG RE- CORDER	
5	MONITOR X AXIS TIDAL DATA ON PSE ANALOG RECORDER. DETERMINE DIRECTION FOR LEVEL- ING. IF X TIDAL DATA IS POS, USE NEG DIR. IF Z TIDAL DATA IS NEG, USE POS DIR.			



SOP 2-7  
PSE FORCED RELEVELING TO BAND EDGE  
PREREQUISITES:

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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 ATTENUATION 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   AS GAIN   REQD AL-2   Z   AS GAIN   REQD AL-3   LVL   NOTE 2 DIR AL-3   LVL   LO SPEED AL-4   SP   AS GAIN   REQD AL-5   LVL   FORCED MODE AL-5   LVL   OUT SNSR AL-6   T CTL   AUTO STA   OFF AL-7   LP/SP   BOTH CAL   OFF AL-8   UN-   UN- CAGE   CAGED STA			
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			

SOP 2-7  
PSE FORCED RELEVELING TO BAND EDGE  
PREREQUISITES:

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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 ATTENUATION 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    AS GAIN    REQD AL-2      Z       AS GAIN    REQD AL-3      LVL    AS DIR     REQD AL-3      LVL    LO SPEED AL-4      SP     AS GAIN    REQD AL-5      LVL    AUTO MODE AL-5      LVL    OUT SNSR AL-6      T       AUTO CTL     ON AL-7      LP/SP   BOTH CAL     OFF AL-8      UN-    UN- CAGE   CAGED	
41	LOG TASK AND ANOMALIES IN THE CONSOLE HANDBOOK			

PSE GAIN CHANGE (LP X, Y, OR Z AND SP Z)

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- 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    BOTH CAL      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 $\pm 50$ , $\pm 100$ , $\pm 200$ GAMMA
5	IF NECESSARY, SEND CMD 123 (RANGE STEP) TO PLACE SENSORS IN DESIRED RANGE			FIRST CMD 123 $\pm 50$ GAMMA SECOND CMD 123 $\pm 100$ 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, $\pm 25\%$ , $\pm 50\%$ , $\pm 75\%$ 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	

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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	

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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 153 EXP 4 OPER SEL	INITIATE SIDE HSP FORMATS 1 AND 2	ANNOTATE CMD ACTION ON C/S AND SIDE RCDRS	

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Step No.	ASE	SYSTEMS	DATA	Comments
1		SELECT SIDE FORMAT 4 ON ANALOG RECORDER. INITIATE SIDE HSP FORMAT 1.		
2	CCGE SEAL BREAK CMD 105 THEN 110 TO EXECUTE.		VERIFY CMD REGISTER READS "RSF10" ON HSP AFTER CMD 105. VERIFY MODE REGISTER READS "RSF10" AND CMD REGISTER READS "CLR" AFTER CMD 110.	



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:

TO FROM	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	



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