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This ATM presents the scope of information and format to be included in the ALSEP General Familiarization Manual. This outline is submitted as per requirement contained in:

ALSEP-MA-17; Management Control Plan, System Support, 9752, Dated 10 February 1966; Support Manuals Task No. 2, page 21, and Support Manuals MCP Schedule, page 37.

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BENDIX SYSTEMS DIVISION ANN ARBOR, MICH.

ALSEP General Familiarization
Manual; Topical Outline

NO.

ATM-300

REV. NO.

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ALSEP
GENERAL FAMILIARIZATION MANUAL

TOPICAL OUTLINE

PREPARED BY
ALSEP SUPPORT MANUALS SECTION
SYSTEMS SUPPORT GROUP 9752

27 May 1966



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FRONT MATTER

Title Page

(The Title Page will contain the following elements of information:

1. The technical manual number positioned in the upper right corner of the title page.
2. The technical manual title positioned in the upper center portion of the page and slightly below the technical manual number. MSC contract NAS9-5829, Exhibit C requirement: "(Type I) documents shall be marked "Preliminary - NASA Approval Pending or Approved by NASA as appropriate" is not applicable to the ALSEP General Familiarization Manual.
3. Nomenclature of the ALSEP System will be positioned immediately below the title.
4. The manufacturers identification will appear below the system nomenclature.
5. The contract number applicable to the technical manual procurement will appear just below the manufacturers identification.
6. The authority notice -- "Published Under Authority of NASA/Manned Spacecraft Center" will be positioned in the lower center portion of the page.
7. The publication date (the date at which the last material to be included was received) will be positioned in the lower right portion of the page, slightly below the authority notice.)



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List of Effective Pages

(The List of Effective Pages (referred to as "A" Page) will contain a complete list of all pages in the technical manual.)

Table of Contents

(The Table of Contents will contain a centered title, section number and title, subsection number and title, and page number for all first and second order paragraph headings.)

List of Illustrations

(The List of Illustrations will follow the table of contents and will contain a centered title, figure number and title, and page number of all illustrations in the technical manual.)

List of Tables

(The List of Tables will follow the list of illustrations and will contain a centered title, table number and title, and page number of all tables in the technical manual.)

Introduction

(The Introduction will start a right hand page and will identify the ALSEP system by NASA approved nomenclature and will contain a brief statement of the ALSEP Systems purpose and use. The Introduction will also briefly outline the scope of the technical manual by describing the contents of each section so that the user of the manual may readily locate needed information.)



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SECTION I

MISSION DESCRIPTION

1-1 GENERAL

1-2 (An introductory paragraph will outline the scope of information presented in Section I of the manual. A composite illustration of ALSEP (Figure 1-1) will be included.)

1-3 APOLLO MISSION PROFILE

1-4 (A brief introductory paragraph will describe the Apollo mission and its general mission objectives. This information will provide background data for the introduction of the ALSEP System and how it interfaces in the Apollo mission.)

1-5 ALSEP MISSION OBJECTIVES

1-6 (This paragraph will detail the relationship of the ALSEP program and the Apollo program. It will describe the ALSEP objectives for obtaining long-term scientific measurements of various physical and environmental properties of the moon. It will also introduce the lunar geological equipment (LGE) and describe its purpose, objectives, and relationship to the ALSEP mission.)

1-7 ALSEP SYSTEM DESCRIPTION

1-8 (This part of Section I will describe and tie-in the functional operation and physical description of the experiment subsystems, the data subsystem, the electrical power subsystem, and the structural/thermal subsystem. The functional



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operation will be written on a block diagram basis and will describe the operational characteristics of each subsystem. It will list the experiments and relate each experiment with the scientific data for which it was designed to measure and transmit back to earth. The physical description of ALSEP will be on a system basis and will relate how it interfaces with LEM. The LEM scientific equipment bay, and particularly compartments 1 and 2, will be illustrated to reflect how the ALSEP is physically located in LEM. Weight, size, and form data will be included in the physical description of ALSEP.



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SECTION II

ALSEP SUBSYSTEM DESCRIPTION

2-1 GENERAL

2-2 (An introductory paragraph will outline the scope of information presented in Section II of the manual.)

2-3 EXPERIMENT SUBSYSTEMS

2-4 (This part of Section II will identify and illustrate all the experiments in the experiment subsystem. A table will be provided to list the experiment subsystems, indicate CFE or GFE, and cross-reference the experiment subsystems to applicable project investigators. Also included in this section will be an introduction to Array "A" and Array "B" experiment configurations and a description of the experiments purpose, size, weight, power requirements, interconnecting cabling, interchangeability characteristics, and electronics.)

2-5 PASSIVE SEISMOMETER EXPERIMENT

2-6 (This paragraph will describe the physical characteristics and functional operation of the passive seismometer experiment.)

2-7 MAGNETOMETER EXPERIMENT

2-8 (This paragraph will describe the physical characteristics and functional operation of the magnetometer experiment.)



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2-9 SOLAR WIND EXPERIMENT

2-10 (This paragraph will describe the physical characteristics and functional operation of the solar wind experiment.)

2-11 SUPRATHERMAL ION DETECTOR EXPERIMENT

2-12 (This paragraph will describe the physical characteristics and functional operation of the suprathemal ion detector experiment.)

2-13 HEAT FLOW EXPERIMENT

2-14 (This paragraph will describe the physical characteristics and functional operation of the heat flow experiment.)

2-15 CHARGED-PARTICLE LUNAR ENVIRONMENT

2-16 (This paragraph will describe the physical characteristics and functional operation of the charged-particle lunar environment experiment.)

2-17 ACTIVE SEISMOMETER EXPERIMENT

2-18 (This paragraph will describe the physical characteristics and functional operation of the active seismometer experiment.)

2-19 LUNAR GEOLOGICAL EQUIPMENT (LGE) SUBSYSTEM

2-20 (This portion of Section II will identify and describe the use of the tool components of the lunar geological equipment subsystem.)

2-21 DATA SUBSYSTEM

2-22 (This part of Section II will describe (on a functional block diagram basis) and illustrate all the components in the data subsystem.)



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2-23 ANTENNA

2-24 (This paragraph will describe the physical characteristics and functional operation of the antenna component of the data subsystem.)

2-25 DIPLEXER AND SWITCH

2-26 (This paragraph will describe the physical characteristics and functional operation of the diplexer and switch component of the data subsystem.)

2-27 TRANSMITTER

2-28 (This paragraph will describe the physical characteristics and functional operation of the transmitter component of the data subsystem.)

2-29 COMMAND RECEIVER

2-30 (This paragraph will describe the physical characteristics and functional operation of the command receiver component of the data subsystem.)

2-31 COMMAND DECODER

2-32 (This paragraph will describe the physical characteristics and functional operation of the command decoder component of the data subsystem.)

2-33 DATA PROCESSOR

2-34 (This paragraph will describe the physical characteristics and functional operation of the data processor component of the data subsystem.)



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2-35 SIGNAL CONDITIONER

2-36 (This paragraph will describe the physical characteristics and functional operation of the signal conditioner component of the data subsystem.)

2-37 ELECTRICAL POWER SUBSYSTEM

2-38 (This part of Section II will describe (on a functional block diagram basis) and illustrate all the components in the electrical power subsystem. Physical characteristics and CFE and/or GFE data will also be included.)

2-39 RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG)

2-40 (This paragraph will describe (generally) the physical characteristics and functional operation of the radioisotope thermoelectric generator component of the electrical power subsystem.)

2-41 POWER CONDITIONING UNIT

2-42 (This paragraph will describe the physical characteristics and functional operation of the power conditioning unit component of the electrical power subsystem.)

2-43 RTG CAPSULE HANDLING TOOL

2-44 (This paragraph will describe the physical characteristics and functional use of the RTG capsule handling tool component of the electrical power subsystem.)

2-45 STRUCTURAL/ THERMAL SUBSYSTEM

2-46 (This part of Section II will describe and illustrate (or reference illustrations which ever is applicable) the structural and thermal subsystems of the ALSEP system.)



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2-47 STRUCTURAL SUBSYSTEM

2-48 (This paragraph will describe the physical and functional characteristics of the structural subsystem.)

2-49 THERMAL SUBSYSTEM

2-50 (This paragraph will describe the physical and functional characteristics of the thermal subsystem.)

2-51 DUST DETECTOR

2-52 (This paragraph will describe the physical characteristics and functional operation of the dust detector.)

2-53 ALSEP MAINTENANCE CONCEPT

2-54 (This part of Section II will describe the ALSEP maintenance concept and the two levels of which it is divided into. It will describe the ALSEP System maintenance concept for equipment, facilities, spares, support manuals, and personnel skills and training.)

2-55 SYSTEM MAINTENANCE LEVEL A (FIELD)

2-56 (This paragraph will describe the system Level A maintenance concept and the general requirements it dictates for field maintenance of the ALSEP System. Major types of maintenance which will be described are: preventive maintenance, corrective system maintenance, and system test set corrective maintenance.)



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2-57 SPECIALIZED MAINTENANCE LEVEL B (FACTORY)

2-58 (This paragraph will describe the specialized maintenance Level B concept and the general requirements it dictates for factory maintenance of malfunctioning components replaced at KSC. Level B maintenance will provide a total maintenance capability which will be described in this part of Section II of the manual.)



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SECTION III

TEST AND HANDLING EQUIPMENT DESCRIPTION

3-1 GENERAL

3-2 (An introductory paragraph will outline the scope of information presented in Section III of this manual.)

3-3 GROUND SUPPORT EQUIPMENT (GSE)

3-4 (This part of Section III will describe and illustrate the major items of ground support equipment for the ALSEP System. It will describe the major physical and electrical characteristics of the GSE, the maintenance function the GSE serves, and the level of maintenance in which the GSE will be utilized.)

3-5 ELECTRICAL GSE

3-6 (This part of Section III will describe and list the major items of electrical GSE for level A and Level B maintenance of the ALSEP System.)

3-7 SYSTEM TEST SET. (This paragraph will describe the system test set and its application and test objectives for field maintenance of the ALSEP System.)



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3-8 SUBSYSTEM TEST SETS. (This paragraph will describe and list the subsystem test sets (experiments test sets, data subsystem test set, etc.) used for maintenance of the ALSEP System. It will also describe the level of maintenance of which the subsystem test sets will be utilized and indicate their test objectives.)

3-9 MECHANICAL GSE

3-10 (This part of Section III will describe and list the major ALSEP mechanical GSE equipment for support of the ALSEP System)

3-11 ASSEMBLY AND TRANSPORTATION EQUIPMENT. (This paragraph will describe and list the assembly and transportation equipment for maintenance of the ALSEP System. It will describe the level of maintenance for which it will be utilized and describe its application and use in the ALSEP System.)

3-12 RTG HANDLING EQUIPMENT. (This paragraph will describe and list the RTG handling equipment used in the ALSEP System. It will describe the level of maintenance for which it will be utilized and its application and use in the ALSEP System Operation.)



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SECTION IV

ALSEP OPERATION

4-1 GENERAL

4-2 (An introductory paragraph will outline the scope of information presented in Section IV of this manual.)

4-3 TRAINING

4-4 (This part of Section IV will describe the ALSEP training program and its purpose of crew and support personnel familiarization training for achieving ALSEP operational objectives. The purpose and objectives of the four and 16-hour training courses provided by Bendix will be included.

4-5 PRELAUNCH INSTALLATION AND CHECKOUT.

4-6 (This portion of Section IV will describe the basic events to be accomplished related to receipt of ALSEP equipment from the factory (Bendix), pre-installation inspection of the ALSEP, system checkout of the ALSEP and installation of the ALSEP into the LEM.)



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4-7 EQUIPMENT RECEIPT AND CHECKOUT.

4-8 (This paragraph will describe and illustrate the activities of ground operations personnel for; receipt of ALSEP equipment from Bendix, pre-installation checkout of the ALSEP, ALSEP assembly, and system functional test.)

4-9 ALSEP INSTALLATION INTO LEM.

4-10 (This paragraph will describe and illustrate the activities of ground operations personnel for installation of the ALSEP System into the lunar excursion module and RTG fuel cask loading.)

4-11 LUNAR SURFACE OPERATIONS

4-12 (This part of Section IV will describe and illustrate the astronaut's activities and operations for deployment and activation of the ALSEP System on the lunar surface.)

4-13 SYSTEM DEPLOYMENT

4-14 (This paragraph will describe and illustrate the sequence of events and operations for deployment of ALSEP Array "A" and Array "B" Systems on the lunar surface and the activation of the ALSEP by the Apollo astronaut.)



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4-15 POST-FLIGHT OPERATIONS

4-16 (This part of Section IV will describe the ground operation activities (after ALSEP deployment and activation) necessary to fulfill the scientific operational objectives of ALSEP. The ground operation activities to be described will be: (a) Manned Space Flight Network (MSFN), (b) Mission Control Center (MCC) activities, and (c) Principle Investigator (PI) activities. Also included will be a general description of the long-term operational objectives of ALSEP.