

ATM 825

Apollo Lunar Surface Experiments Package

ALSEP
Qualification Status List
(QSL Package)
Flight 3 Configuration

Prepared for
NASA/Manned Spacecraft Center

by



**Aerospace
Systems Division**

ALSEP
Qualification Status List
(QSL Package)
Flight 3 Configuration



NO.	REV. NO.
ATM 825	
PAGE _____	OF _____
DATE	1/29/69

ALSEP Array B QSL Data Sheets
Appendix B

CONTENTS

<u>Reference Section</u>	<u>Assembly Item</u>	<u>Sheet</u>
2.0	SUBPACKAGE #1	B1
2.1	SP #1, Antenna Assembly	B2
2.2	Central Station Components	(B3-B17)
	Filter Diplexer	B3
	Diplexer Switch	B4
	Command Receiver	B5
	Command Decoder	B6
	Data Processor	B8
	90 Channel Multiplexer	B10
	Transmitter	B12
	Power Distribution Unit	B13
	Power Conditioning Unit	B15
	C/S Timer	B17
2.3	Passive Seismic Experiment	(B18-B21)
	PSE Sensor Assembly	B18
	PSE C/S Electronics	B19
	PSE Thermal Control (Shroud)	B20
	PSE Gnomon Assembly	B21
2.4	Heat Flow Experiment	B22
2.5	Cold Cathode Gauge Experiment	B23
2.6	Charged Particle Experiment	B24
3.0	SUBPACKAGE #2	B25
3.1	RTG Assembly	B26
3.2	RTG Shorting Plug	B27
3.3	ALHT	B28
3.4	ALSD	B29
3.5	PSE Leveling Stool	B30
4.0	FUEL CASK ASSEMBLY	**

** Reference only, see text of ATM, Section 4.0.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>1</u>	OF <u>17</u>
DATE	1/29/69

1.0 INTRODUCTION

In compliance with NASA Contract NASA 9-5829 requirements, this document provides a Qualification Status List (QSL) for use as part of the ALSEP Flight 3 Acceptance Data Package (ADP).

As of the date of publication, the information herein reflects the status of qualification following the system level tests which are completed on the ALSEP Qual SB system model.

Minutes 974-1264, of the 1/29/69 "QAR Board Meeting on Qual SB" have established that ALSEP B Array qualification will be considered successfully completed with the closeout of Category II Open Items, i. e., open items which constrain qualification of Array B. These open items are summarized on page 2 and the equipment subsections which follow.

Minutes dated 1/28/69 on the "QAR, Qual SB General Meeting" defined the ALSEP hardware being qualified as:

Subpackage #1

Data Processor - Patch plane board only
Central Station Wire Harness
Sunshield
Antenna Gimbal Box
PSE Sensor/Shroud - Gnomon only
Heat Flow Experiment
Charged Particle Lunar Environment Experiment
Cold Cathode Gage Experiment

Subpackage #2

Drill Carrier Subpackage
Interface of Drill Carrier with Subpackage #2

General

Weight and C. G.

Reviewed by:


R. C. Roukas
Group Engineer
ALSEP Reliability

Approved by:


S. J. Ellison, Manager
ALSEP Reliability



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>2</u>	OF <u>17</u>
DATE 1/29/69	

The qualification data herein, however, covers all major assemblies and subassemblies which were qualified under either the Qual SA or the Qual SB test programs. The discussion data in the following subsections and the QSL Summary Sheets of the Appendix reflect the appropriate qual history comments and outstanding open items. The organization of these data is as follows:

<u>Section</u>	<u>Subtitle</u>
2.0	SUBPACKAGE #1
2.1	Antenna Assembly
2.2	Central Station Electronics Diplexer Filter & Diplexer Switch Command Receiver Command Decoder Transmitters Data Processor & Multiplexer Power Distribution Unit Power Conditioning Unit
2.3	Passive Seismic Experiment
2.4	Heat Flow Experiment
2.5	Cold Cathode Gage Experiment
2.6	Charged Particle Lunar Environment Experiment
3.0	SUBPACKAGE #2
3.1	RTG Assembly
3.2	RTG Shorting Plug Assembly
3.3	APOLLO Lunar Handling Tool (ALHT)
3.4	APOLLO Lunar Scientific Drill (ALSD)
4.0	FUEL CASK ASSEMBLY

Appendix

A-Figures 1-5 Vibration Specification; B-QSL Data Sheets

For convenience, a brief summary of outstanding Category II Open Items which were defined by the 1/29/69 QAR Board Meeting is as follows:

Subpackage #1: Center of Gravity out of tolerance. A Bendix defined specification change has been submitted by MSC to Grumman. GAEC action scheduled for 2/7/69.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>3</u>	OF <u>17</u>
DATE	1/29/69

Subpackage #1 & #2: Combined overweight condition to be defined by Bendix on 2/5/69 for MSC consideration of a specification change. Also, by 2/5/69, BxA to report technical feasibility of off-loading any experiment or subsystem on Flight 3 to achieve a combined weight of 215 pounds.

CPLEE: The following items are Category II and to be dispositioned as provided for in the Qual Verification Plan 9713-11-565, namely:

- 1) Intermittent Amplifier Operation;
FR 200/DR's 2499, 2488, 2489 and 2709.
- 2) High Science Counts in Detectors A-1 and B-1;
FR 199/DR 2468.
- 3) CPLEE Sync Loss at Lunar Noon;
FR 211/DR 2502 (19 bit problem).

PSE: Open items which remain are residual from the Qual SA program per "PSE Qual SB QAR Minutes" 9713-10-3021 and BxA Memo 9713-10-3007, "PSE Qual SA Plan to Close", namely:

- 1) Post qualification functional testing of PSE. To be closed by test of Sensor, SN/06 to be completed in March 69 and reported by 1 April 1969.
- 2) Caging Leak Test. To be completed on Sensor SN/02 and reported by 15 February 1969. Includes the completion of FAR #206/DR AB2869.

HFE: Qualified except for MSC approval of a specification change which will allow HFE to operate down to 0°F vs. plus 10°F (RFC H-1);

CCGE: The closeout of FR 204 on cracked case damage to CCGE SN/02 was defined as a constraint on qualification by the "Minutes of the ALSEP Qual SB ADP Review", dated 1/28/69. A CRD for weight specification change was identified in Minutes 9713-09-537.

Central Station: The completion of C/S Timer reliability evaluation tests (March 1969) is an outstanding open item against Array A qualification.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>4</u>	OF <u>17</u>
DATE 1/29/69	

2.0 SUBPACKAGE #1 (SP #1)

The qualification of Subpackage #1 was initially accomplished as a result of Qual SA model system level tests which are itemized in the Appendix QSL Sheet B-1. This QSL sheet is the top assembly record which is mechanically and environmentally applicable to all SP #1 equipment used in both the ALSEP Array A & B Configurations.

The basic structure thermal differences between the A & B Array are the Sunshield Assembly, Antenna Gimbal Container and Array B experiment interfaces were reviewed in the "QAR-Qual SB Structure Thermal Minutes dated 1/28/68" for Qual B test results and discrepancies. As a result of this review and the "QAR Board Meeting, Qual SB Minutes 974-1264," the Array B Subpackage #1 Structure/Thermal Configuration is considered to be fully qualified pending MSC approval specification changes on (1) SP #1 C.G. location tolerance, and (2) on SP #1/SP #2 total weight allowance.

Other Category II Open Items on Subpackage #1 installed equipment are against CPLEE, PSE, HFE and the CCGE as noted in the following subsections, as applicable.

The assemblies and components listed in the following subsections are the ArrayB/Flight 3 assemblies and experiments. The differences which exist are noted and justified on the basis of similarity, as applicable.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>5</u>	OF <u>17</u>
DATE 1/29/69	

2.1 Antenna Assembly

The qualification status of the antenna assembly has been established by system qualification testing, and the details are itemized in the Appendix QSL Sheet B-2. The subassemblies, i. e., helical antenna, antenna cable and aiming mechanism, were qualified by virtue of successful completion of the Qual SA system tests and subsequent (9/12/68) functional testing of the antenna subsystem per the as-run test procedure, BxA TP #2338629. The successful test results were documented in the test report BRL #4620 to close out the Qual SA open item qualification status.

The antenna gimbal package for stowing the aiming mechanism on the Configuration B Subpackage 1 is qualified by virtue of successful Qual SB testing with no open items as recorded by the "Minutes of the QAR Board Meeting, Qual SB 974-1264".

2.2 Central Station Electronics

The Central Station components are comprised of the following:

- Diplexer Filter
- Diplexer Switch
- Command Receiver
- Command Decoder
- Data Processor
- 90 Channel Multiplexer/Converter
- Transmitters
- Power Distribution Unit
- Power Conditioning Unit
- Central Station Harness
- Central Station Timer
- PSE Central Electronics (See Section 2.3)



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE 6	OF 17
DATE	1/29/69

With exception to those areas discussed below, the Central Station was successfully qualified under the Qual SA program. The QSL sheets provided in Appendix B for the Central Station Electronic Assemblies reflect the Qual SA test results except where noted on the applicable sheets or discussed herein.

Qualification Accomplished During Qual SB Testing

Data Processor - Except for the patch plane board, the Data Processor was fully qualified during the Qual SA program. The function of the patch plane board is to provide the telemetry format for the Flight 3 experiment array. The functional and environmental capability was fully demonstrated and thus no constraints on qualification are outstanding.

Command Decoder - The uplink command address format for Flight 3 was qualified as part of the Qual SB program. Hardware differences between the Qual SA and Qual SB command decoder consist of a patch plane similar to the one employed by in the Data Processor. The Command Decoder is considered qualified.

Central Station Harness - The Flight 3 configuration of the Central Station harness was successfully qualified during Qual SB testing.

Flight 3 Vs. Qual SB Hardware Differences

Differences between Qual SB and Flight 3 hardware were reviewed and documented in the FTRR Flight 3 minutes 9712-1075, dated 11/21/68. In comparing Flight 3 hardware and previously qualified hardware it was agreed by BxA and NASA that "there are certain known differences such as (1) new transmitter frequency, (2) command address, (3) Data Processor S/N identification, and (4) thermal plate has two (2) new holes, however, these known differences will not constrain Flight 3 Acceptance Test and are considered qualified by similarity." Based on the QTRR memo 971-476, there are no known differences between the Central Station Electronics Qual SB and Flight 3 items.

Constrains on C/S Electronics Qualification

Central Station Timer - Parametric qualification of the C/S Timer is contingent on the completion of a separate 36 cycle thermal/vacuum reliability evaluation test. BxA Memo 9721-1288, 1/27/69, summarizes the C/S Timer test history and status. The reliability evaluation test is scheduled for completion in February 1969.



**Aerospace
Systems Division**

Qualification Status List ALSEP Array B Configuration	NO. ATM 825	REV. NO.
	PAGE <u>7</u> OF <u>17</u>	
	DATE 1/29/69	

2.3 Passive Seismic Experiment

The qualification status of the PSE was initially established by Qual SA model system level tests and reports data which are itemized in the Appendix B-QSL Sheets B18 through B-20 on the Sensor, Electronics and Thermal Control Shroud.

The only Qual SA Category II open items which were outstanding after the Qual SB QAR on the PSE (per Minutes 9713-10-3021 dated 1/28/69) were:

- (a) Post qualification functional testing of the PSE which is scheduled to be closed on 4/1/69.
- (b) Caging leak modification vibration and thermal vacuum verification which is scheduled for close out by 2/15/69. FAR 206/DR AB2869 is outstanding on this test.

An additional open item for qualification is the SPZ bolt, 233161, which has been changed to 2338790. The material has been changed to Titanium 6AL-4V from commercial titanium. This item will remain open until the rationale for qualification has been provided.

The Gnomon was the only PSE article tested for qualification on the Qual SB model, with no open items as reflected by QSL Sheet B-21.

One difference between the Qual SB and Flight Gnomons is a teflon washer added to the flight models to ensure erection. This difference does not affect qual status, and the PSE Gnomon is considered fully qualified.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE 8	OF 17
DATE	1/29/69

2.4 Heat Flow Experiment (HFE)

The HFE has been functionally and environmentally qualified as a result of system level testing on the Qual SB Subpackage #1 configuration. The applicable tests, test levels and report references are itemized in Appendix B, QSL Sheet B-22.

Status of HFE qualification was reviewed on 1/28/69 as documented in Minutes 9713-13-345 and on 1/29/69 in Minutes 974-1264, the Qual SB QAR Board Meeting. One outstanding Category II open item is based on the HFE electronics temperature which went to 3°C at lunar night which is below the spec level of plus 10°C. Since the data indicates accuracy can be maintained to 0°C, BxA is submitting a request for specification change to 1C 314109, i. e., CRD #56290.

DR AB 2705 on the HFE Release Pin resulted in FAR #209 which was issued to complete this open item.

The HFE Qual SB vs. flight model differences were reviewed during the 1/28/69 QAR meeting and by the QTRR based on BxA Minutes 9713-13-422. PC Board hard wiring, RCR vs. ultronic resistors, and heater circuit resistance value differences were considered to be qualified by similarity.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE 9	OF 17
DATE	1/29/69

2.5 Cold Cathode Gage Experiment (CCGE)

The CCGE has been functionally and environmentally qualified as a result of system level testing on the Qual SB Subpackage #1 configuration. The applicable tests, test levels and report references are itemized in Appendix B, QSL Sheet B-23.

Status of the CCGE qualification was reviewed during the 1/28/69 QAR, Qual SB, Minutes 9713-09-537. The FR #204 on the cracked case, and a CRD to change the weight specification were the only open items identified as required for closeout. MSC Letter TF 4/M18-69 which discusses the cracked fiberglass housing was cited in Minutes 9713-09-537 as the basis for considering qual test results to be acceptable.

Qual vs. flight model differences for the CCGE were reviewed in the QAR Qual SB Minutes 9713-09-537; CCGE reel stowage and minor wiring differences previously reviewed at QTRR and Flight 3 FTRR were resolved as having no affect on qualification (BxA Memo 971-476).



**Aerospace
Systems Division**

Qualification Status List ALSEP Array B Configuration	NO. ATM 825	REV. NO.
	PAGE <u>10</u> OF <u>17</u>	
	DATE 1/29/69	

2.6 Charged Particle Lunar Environment Experiment (CPLEE)

The CPLEE has been functionally and environmentally qualified during Qual SB system level tests as reflected by the test and report data itemized in Appendix B, QSL Sheet B-24, except for outstanding problems in thermal vacuum environment.

Status of the CPLEE qualification was reviewed in the QAR Board Minutes 974-1264. This meeting on 1/29/69 established that the following items are Category II constraints to closeout of qualification in accordance with the CPLEE Qual Verification Plan outlined in Memo 9713-11-56:

- 1) Resolution of Intermittent Amplifier Operation -
FR 200; DR's 2499, 2488, 2489 and 2709.
- 2) High Science Data Counts in Detectors A-1 and B-1 -
FR 199; DR 2468
- 3) CPLEE Sync Loss at Lunar Noon -
FR 211; DR 2502, 19 bit problem

Design differences between the SN/2 qual and flight models were reviewed in the 9713-11-565 Qual SB QAR Minutes. Signal ground changes resulting from FR #197, changes in grounding connections, and high voltage enable plug modifications reviewed were judged to have no affect on the validity of qual test results.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>11</u> OF <u>17</u>	
DATE	1/29/69

3.0 SUBPACKAGE #2 (SP #2)

The qualification of Subpackage #2 was initially accomplished as a result of Qual SA system level tests which are itemized in Appendix B, QSL Sheet B-25. This QSL sheet is mechanically environmentally applicable to all SP #2 equipment used in both the ALSEP Array A and B Configurations.

The basic structure differences to be qualified in the Qual SB Configuration were identified in the QAR Qual SB General Meeting Minutes of 1/28/69 as:

- a) Drill Carrier Subpackage, and
- b) Interface of Drill Carrier with Subpackage #2

The only Category II open item which constrains the closeout of qual status was identified in the 1/29/69 QAR Board Meeting Minutes 974-1264 as a combined overweight condition for Subpackages #1 and 2. This condition is to be defined for MSC consideration of a specification change, and/or the consideration of off-loading any experiment as subsystem to achieve a combined weight of 115 pounds.

The assemblies and components listed in the following subsections are SP #2 installed equipment items reviewed for qualification and qual/flight difference considerations, as applicable.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>12</u>	OF <u>17</u>
DATE	1/29/69

3.1 RTG Assembly

The qualification of the RTG was initially accomplished by the subcontractor test and report documents cited in the Appendix B QSL Sheet B-26, and subsequently by BxA system level tests on Qual SA as recorded on QSL Sheet B-26.

No qual vs. flight model differences or outstanding qual test open items exist on this hardware.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE 13	OF 17
DATE 1/29/69	

3.2 RTG Shorting Plug Assembly

The qualification of the RTG Shorting Plug Assembly was qualified during Qual SA model system tests to configuration drawing BxA 2335520, and in accordance the test and report documentation "itemized" in Appendix B, QSL Sheet B-27.

The B Configuration Shorting Plug Assembly which is identified by a BxA 2338017 drawing is identical to the Revision C BxA 2335520 part number qualified in the Array A configuration.

No outstanding open items constraining qualification exist on this hardware.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE 14	OF 17
DATE 1/29/69	

3.3 ALSEP Lunar Handling Tool (ALHT)

The ALHT mass simulator rather than Flight Hardware was used in the Qual SB system level dynamic tests. The test conditions and reports data identified for SP #2 is applicable from a dynamic environment interface standpoint (QSL Sheet B-25).

The QAR-Qual SB Structural/Thermal Minutes of Meeting dated 1/28/69 reviewed the qual status of the ALHT, however, no Category II open items to constrain qualification were identified.

The ALHT has been previously qualified by MSC.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>15</u>	OF <u>17</u>
DATE 1/29/69	

3.4 ALSEP Lunar Surface Drill (ALSD)

The ALSD (~~9000101165~~) is GFE and was previously qualified at a subsystem level by Martin prior to Drill/ALSEP-Interface qualification on BxA Qual SB system level tests. The test conditions and report documents itemized for SP #2 dynamic environment testing recorded on QSL Sheet B-25 is applicable.

The QAR-Qual SB Minutes of Meeting 9713-13-345 reviewed the qualification status of the ALSD interface and established that no Category II open items exist to constrain qualification.



Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>16</u>	OF <u>17</u>
DATE	1/29/69

3.5 Passive Seismic Experiment Leveling Stool

The PSE Leveling Stool was qualified as a result of the Qual SA Test Program as reflected by the QSL Sheet B-30 in Appendix B.

No outstanding open items constraining qualification exist on this hardware.



**Aerospace
Systems Division**

Qualification Status List
ALSEP Array B Configuration

NO.	REV. NO.
ATM 825	
PAGE <u>17</u>	OF <u>17</u>
DATE 1/29/69	

4.0 Fuel Cask Assembly

The ALSEP Fuel Cask Assembly Qualification Test Program (CCP #89) was defined separate from the BxA Qual model tests on ALSEP for conduct at GE facilities (BxA Letter 68-500-507).

A separate document, BxA ATM 780, has been established as the means by which QSL data will be documented for the subject hardware.

The ATM 780 QSL will be submitted for MSC review with flight model Fuel Cask ADP documentation at the Flight 1 CAR on Fuel Cask Assembly equipment.



**Aerospace
Systems Division**

NO.	REV. NO.
ATM 825	
PAGE <u>1</u>	OF <u>6</u>
DATE 1/29/69	

Qualification Status List
ALSEP Array B Configuration

APPENDIX A

QSL SHEET COMPARISON CRITERIA

The qualification status defined in the Appendix B QSL Sheets (BxA format 970-12) is presented in a manner to compare ALSEP equipment specified environment or parametric requirements to the stress levels achieved during ALSEP system level or previous equipment level testing.

The qualification status has been established by the qualification testing accomplished at BxA and is reflected on the applicable QSL sheets by the listing of the appropriate test procedure, test reports and remarks relative to each test.

Qualification testing of ALSEP for vibration shock, and acceleration was required at the ~~system~~ level only. That is, all equipments that comprise ALSEP were subjected to design limit levels for a stowed configuration, simulating the mounting of ALSEP into the LM compartment. The qualification vibration levels are depicted in Figures 1 through 5. These levels are in accordance with those specified by NASA Letter TD3/LO23/68/B-26(JAC).

With exception to the pressure, the intention is to demonstrate each environmental and/or parametric capability to equal to exceed the specified requirement under test. In the instance of pressure, the low level is limited by the capability of the test equipment.



**Aerospace
Systems Division**

Qualification Status List
Appendix A

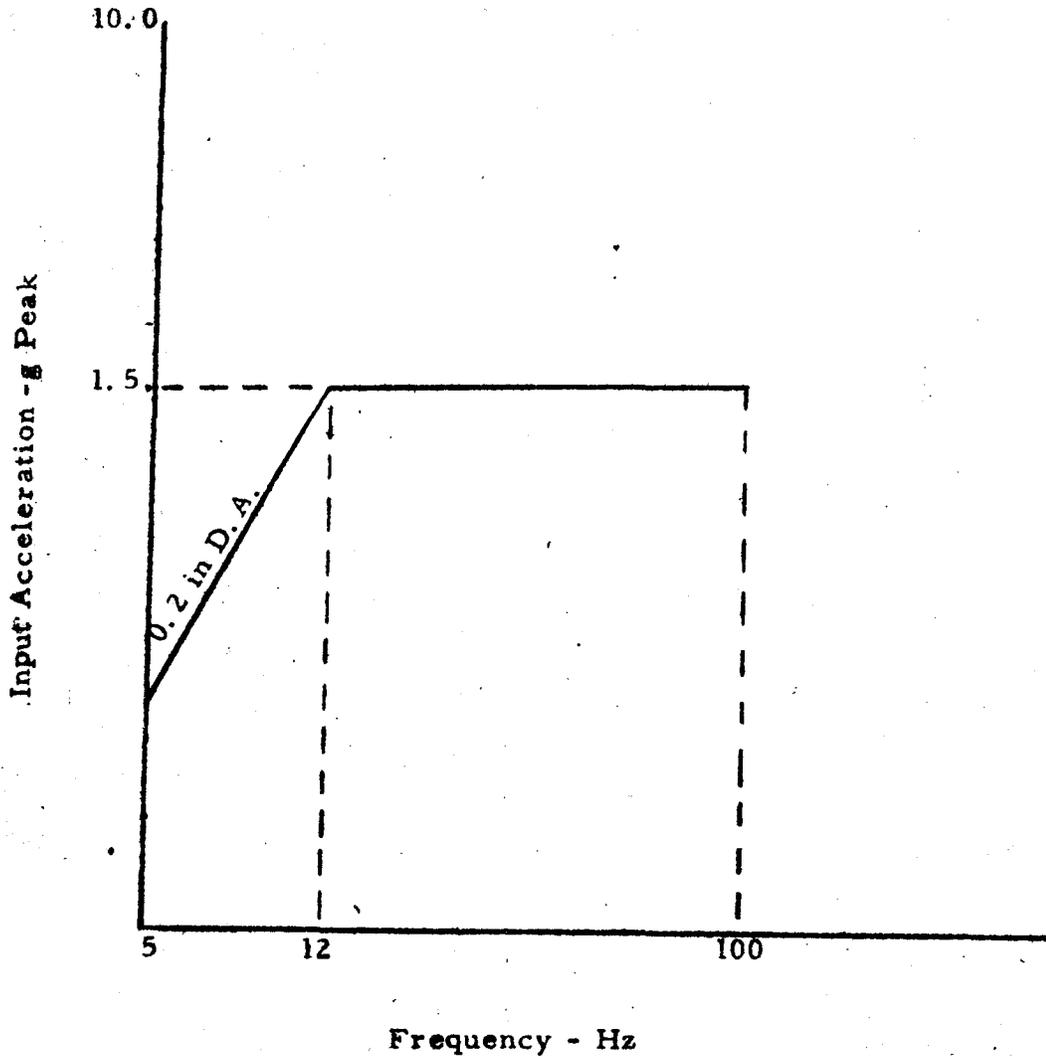
NO. REV. NO.

ATM-825

PAGE A2 OF 6

DATE 1/29/69

Sweep Rate = 3/4 Octave/Minute
(5-100-5 cps), g-peak Tolerance $\pm 10\%$



Subpackage 1 & 2
Launch Boost & Lunar Descent, Sine
Vibration Design Limit. All-Axes

Figure 1

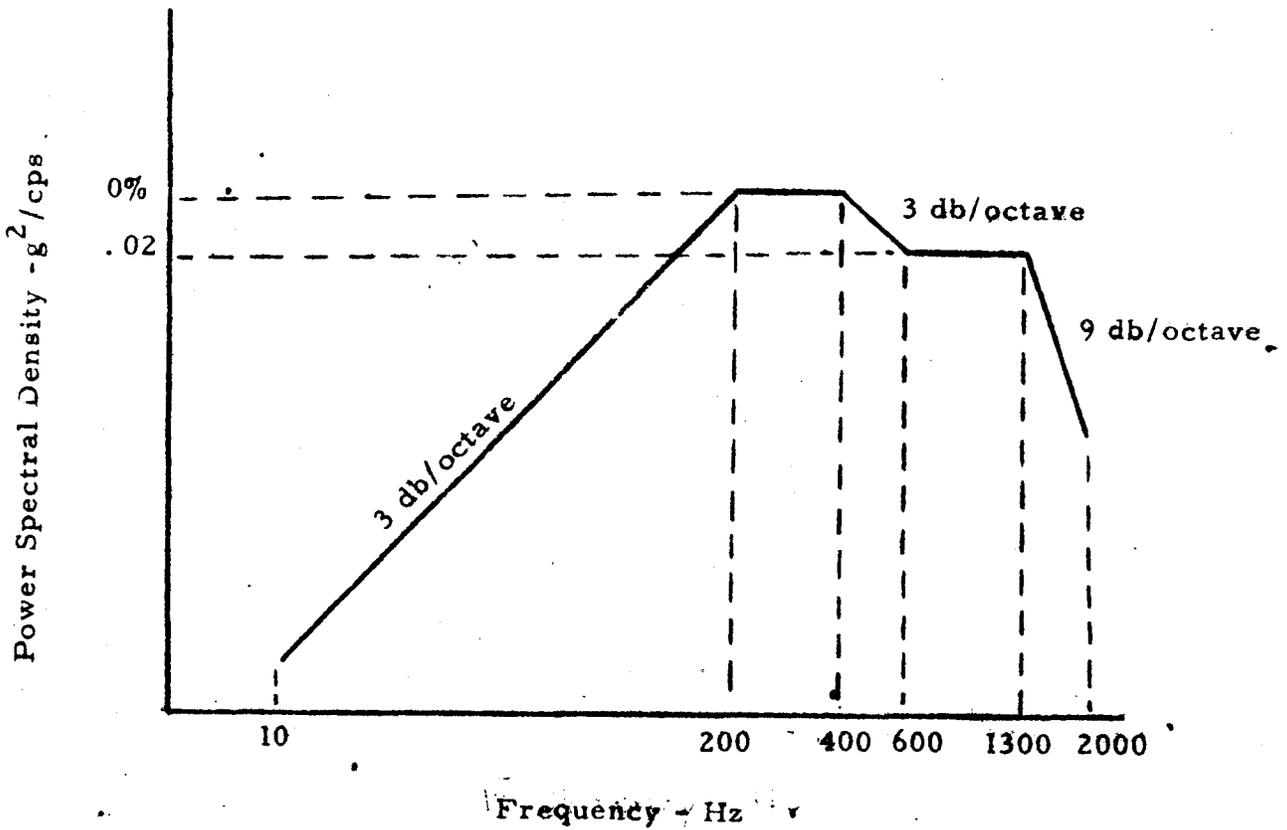


**Aerospace
Systems Division**

Qualification Status List
Appendix A

NO.	ATM-825	REV. NO.	
PAGE	A3	OF	6
DATE	1/29/69		

Test duration 2.5 minutes power spectral density tolerance ± 3 db



Subpackage 1
Earth Launch Boost Phase Random
Vibration Spectrum Design Limit.
X-Axis only

Figure 2

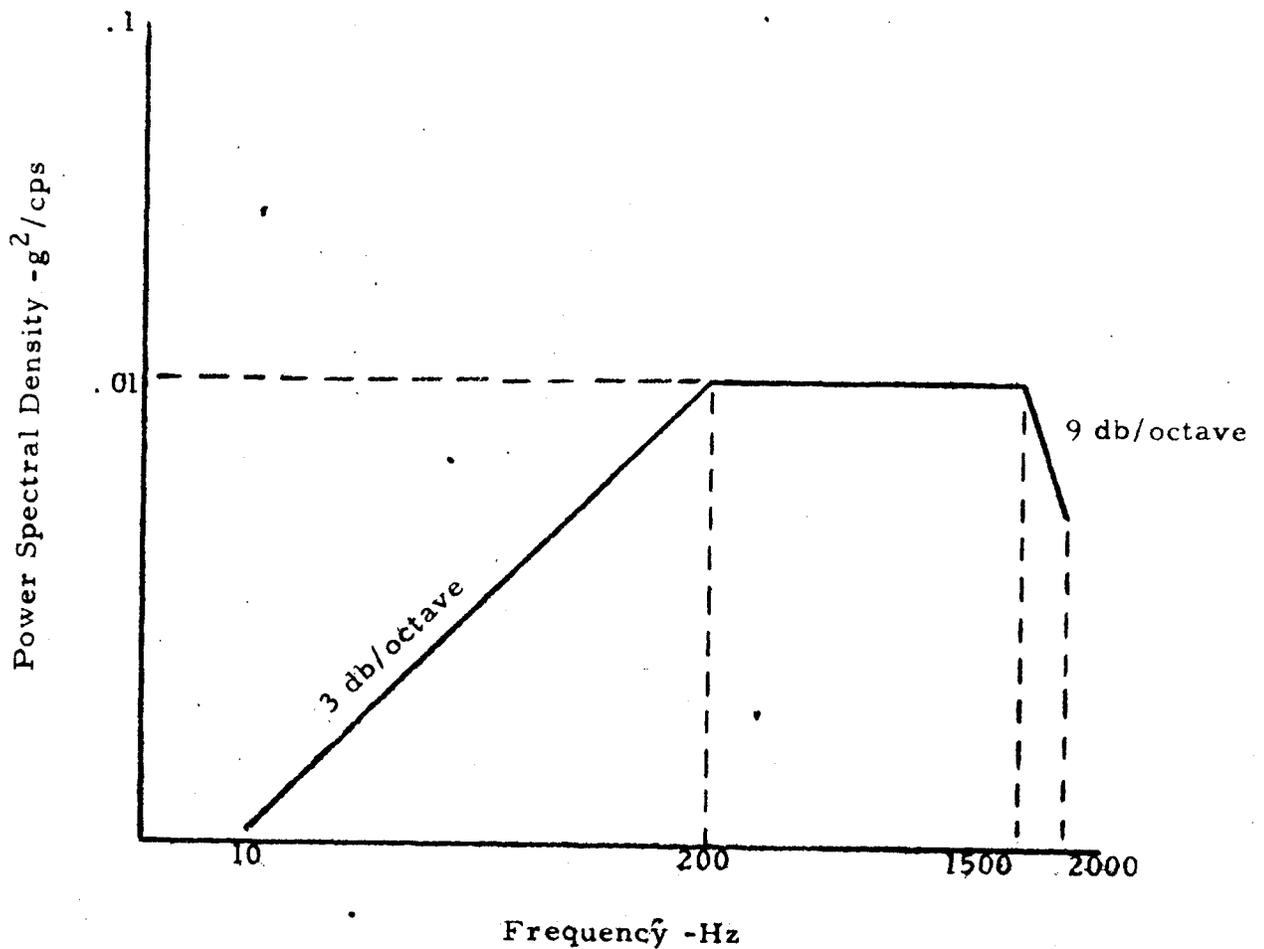


**Aerospace
Systems Division**

Qualification Status List
Appendix A

NO.	ATM-825	REV. NO.	
PAGE	A4	OF	6
DATE	1/29/69		

Test Duration 2.5 Minutes
Power Spectral Density tolerance
+3 db



Subpackage 1 & 2
Earth Launch Boost Phase Random Vibration
Spectrum Design Limit, Y - Axis only

Figure 3

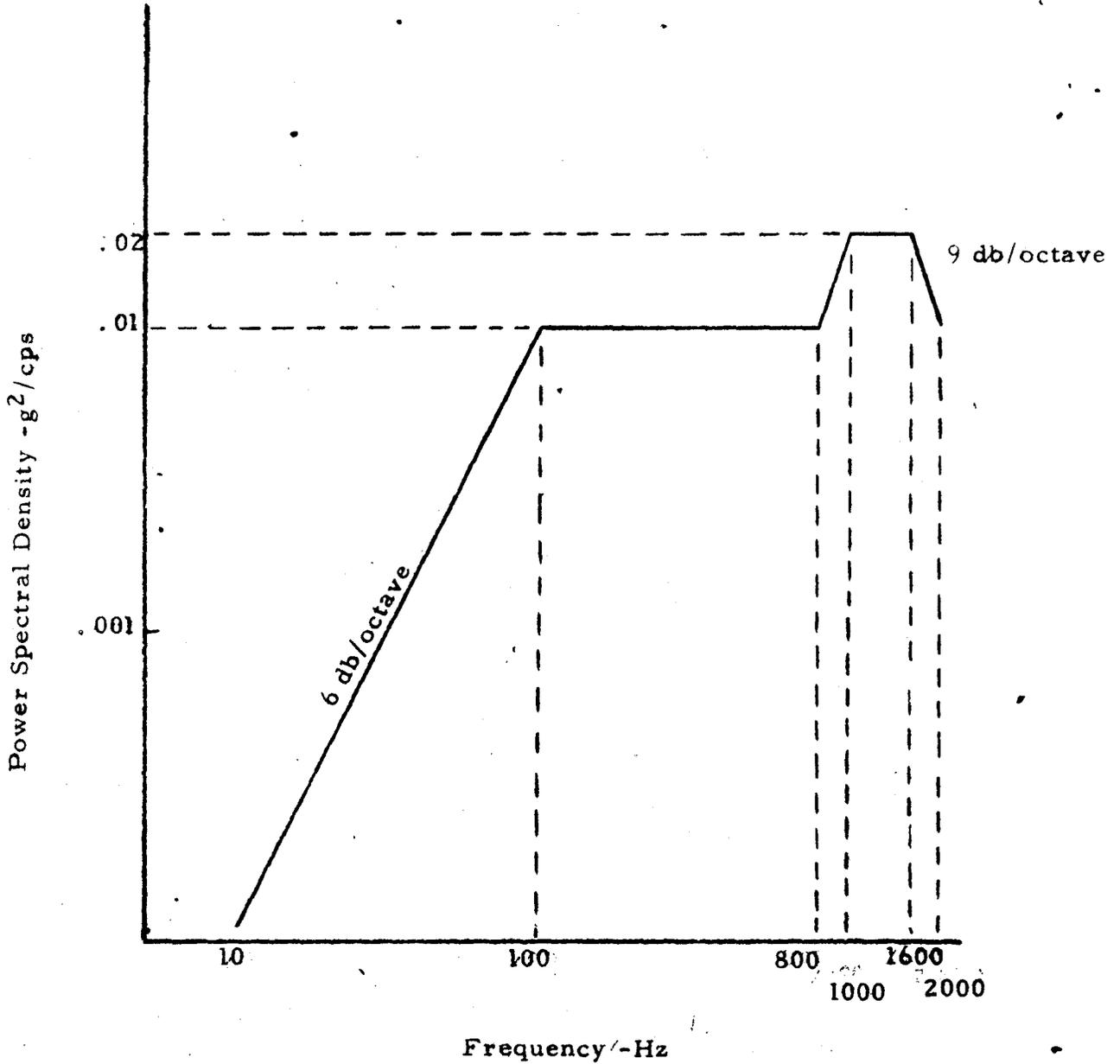


**Aerospace
Systems Division**

Qualification Status List
Appendix A

NO.	REV. NO.
ATM-825	
PAGE <u>A5</u>	OF <u>6</u>
DATE 1/29/69	

Power Spectral Density Tolerance ± 3 db
Test duration 2.5 minutes



Subpackage 1 & 2
Earth Launch Boost Phase Random Vibration
Spectrum Level, Z-Axis only

Figure 4

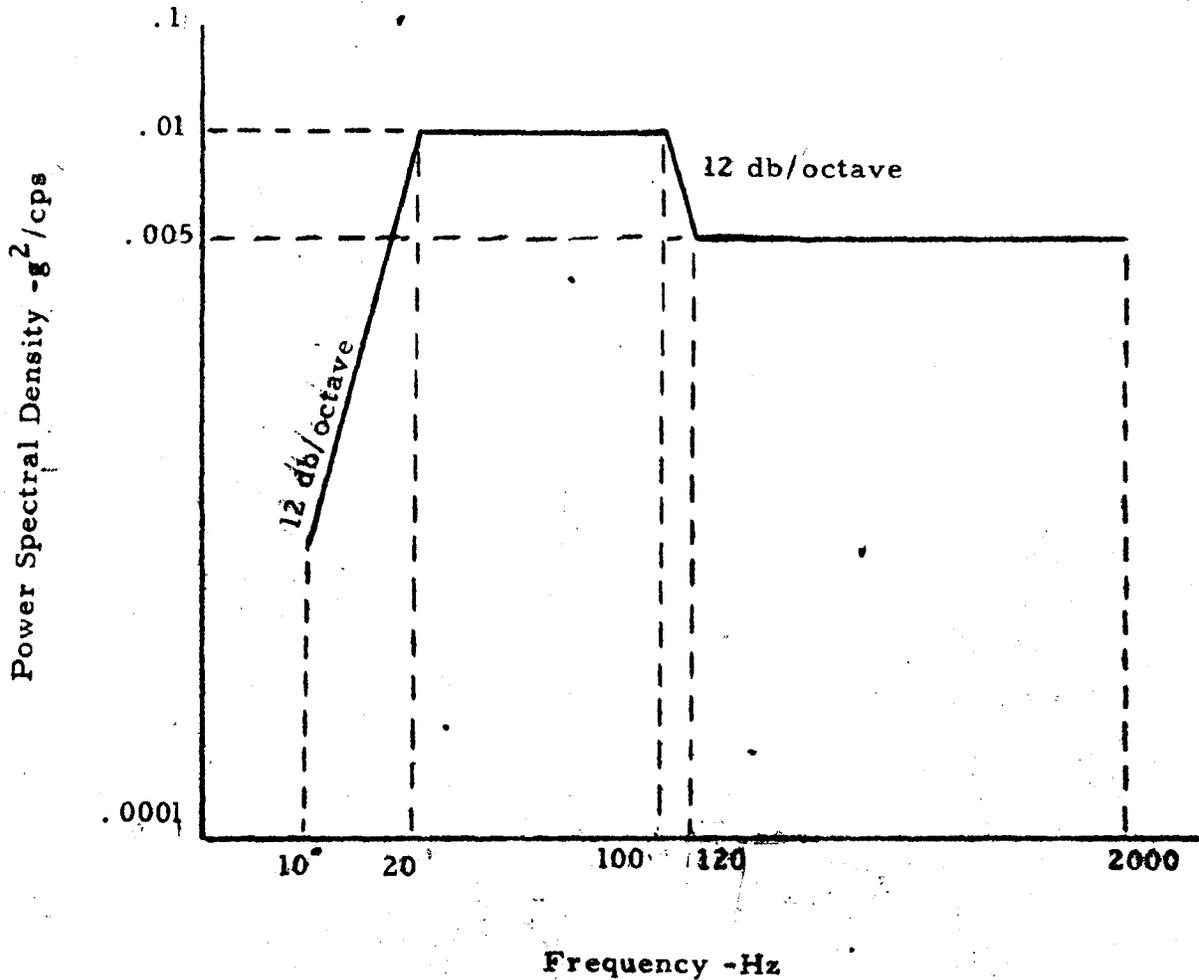


**Aerospace
Systems Division**

Qualification Status List
Appendix A

NO.	REV. NO.
ATM-825	
PAGE <u>A6</u>	OF <u>6</u>
DATE 1/29/69	

Test Duration 12.5 minutes Power Spectral Density ± 3 db



Subpackage 1 & 2
Lunar Descent Random Vibration Spectrum
Design Limit. All Axes

Figure 5



**Aerospace
Systems Division**

ALSEP Array B QSL Data Sheets
Appendix B

NO.	REV. NO.
ATM 825	
PAGE _____	OF _____
DATE	1/29/69

CONTENTS

<u>Reference Section</u>	<u>Assembly Item</u>	<u>Sheet</u>
2.0	SUBPACKAGE #1	B1
2.1	SP #1, Antenna Assembly	B2
2.2	Central Station Components	(B3-B17)
	Filter Diplexer	B3
	Diplexer Switch	B4
	Command Receiver	B5
	Command Decoder	B6
	Data Processor	B8
	90 Channel Multiplexer	B10
	Transmitter	B12
	Power Distribution Unit	B13
	Power Conditioning Unit	B15
	C/S Timer	B17
2.3	Passive Seismic Experiment	(B18-B21)
	PSE Sensor Assembly	B18
	PSE C/S Electronics	B19
	PSE Thermal Control (Shroud)	B20
	PSE Gnomon Assembly	B21
2.4	Heat Flow Experiment	B22
2.5	Cold Cathode Gauge Experiment	B23
2.6	Charged Particle Experiment	B24
3.0	SUBPACKAGE #2	B25
3.1	RTG Assembly	B26
3.2	RTG Shorting Plug	B27
3.3	ALHT	B28
3.4	ALSD	B29
3.5	PSE Leveling Stool	B30
4.0	FUEL CASK ASSEMBLY	**

** Reference only, see text of ATM, Section 4.0.

QUALIFICATION STATUS LIST-ALSEP PROGRAM - ASSEMBLY, SUBPACKAGE #1

Date 1-31-69 No. ATM-825 Rev. No.
Analyst Page B1 of 31 Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Subpackage #1 BxA 2334843 S/N-6	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-300 °F to +250 °F -65 °F to +160 °F -300 °F to +250 °F	-300 °F to +250 °F (See Note 1) -300 °F to +250 °F	BxA	Ann Arbor, Michigan	TP2334335 TP2333032 ATR-60, 70 BSR-2367, 2376	6/10/68	Successfully Qualified on Qual SA, See Note 1
	Pressure Operating Non-Operating	10 ⁻¹² Torr SL to 10 ⁻¹² Torr	Tested to 5 x 10 ⁻⁶ Torr	BxA	Ann Arbor, Michigan	Same as above	6/10/68	Test level limited by test equipment capabilities
	Humidity Operating Non-Operating	N/A 15 - 100%	Design to meet Requirements	BxA	Ann Arbor, Michigan	N/A	N/A	No testing planned to the 100% humidity level: ALSEP QTRR Board decision
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to CEI Specification CP100001	Tested to Design Limit Vib. Levels indicated in Figures 1-5	BxA	Ann Arbor, Michigan	TP2334343 ATR-82, 83 BSR-2402, 2403	6/28/68	Successfully qualified on QSA See Note 1 and 2
	Acceleration Operating Non-Operating	N/A CP100001	Tested to 14 ± 1g 1 min du- ration each axis	BxA	Ann Arbor, Michigan	TP 2334343 ATR-90, 91 BSR-2412, 2413	7/4/68	
	Shock Operating Non-Operating	N/A CP100001	Tested to 15 ± 2g 11 ms saw- tooth ea. axis	BxA	Ann Arbor, Michigan	TP2334328 ATR-86, 87 BSR-2406, 2407	6/29/68	
	Salt Spray	N/A						No test required
	Sand & Dust	Not Defined						No test required
	Fungus	N/A						No test required
	Acoustical Noise	Not Defined						No test required
	Rain	N/A						No test required
	Radiation	LED-5 20	130W/FT ² , IR	BxA	Ann Arbor, Mich	TP 2334335	6/10/68	See operating temperature
	Explosion Proof	N/A						No test required
	<u>PARAMETRIC</u> Mission Simulation	ATM-785 Section 5. 3	Capable of startup and operation lunar surface	BxA	Ann Arbor, Michigan	TP 2334345 TP 2338610 ATR, 101-102	8/7/68	Qualified on Qual SA
Note 1: Temperature storage tests may be replaced by an added hot deployment test per MSC Letter BG931/L226/T97 (CCP-122)		Note 2: Differences for Array B configuration defined in 2.0 were qualified to comparable environmental levels in accordance with as run test procedures and reports referenced in Addendum I dated 1/27/69 of ALSEP TM-321.						
Note 3: See Section 2.0 discussion								

QUALIFICATION STATUS LIST-ALSEP PROGRAM SUBPACKAGE I, ANTENNA ASSEMBLY

Revised 1/31/69

Date 9/20/68	No. ATM-825	Rev. No. ■
Analyst R. O. J.	Page _____ of _____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Antenna Assembly Helical Antenna BxA 2330307 Flt. #3 SN-10	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-250°F to +300°F -65°F to +160°F N/A	Tested in Space Simulation Chamber for temp excursions of -300°F to +250°F	Bendix Aerospace Systems	Ann Arbor, Mich	TP 2334335 ATR-60, 70 BSR-2367, 2376	May-June 1968	Qualification of the Antenna Assy has been accomplished at the system level.
	Pressure Operating Non-Operating	1x10 ⁻¹² mmHg Sea L to 10 ⁻⁸ mmHg	Verified to 5x10 ⁻⁶ Torrs in Space Sim Cham	Bendix Aerospace Systems	Ann Arbor, Mich	TP2334335 ATR-60, 70 BSR-2367, 2376		
	Humidity Operating Non-Operating	N/A 15% to 100% RH	Designed to meet Humidity Req'mt	Bendix Aerospace Systems	Ann Arbor, Mich	N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to ATR-16 Addendum 1	Tested in stowed configuration to vibration design limits indicated in Figs 1 thru 5	Bendix Aerospace Systems	Ann Arbor, Mich	T. P. 2334346 ATR-82, 83 BSR-2402, 2403	June-July 1968	In stowed configuration, the aiming mechanism is mounted on S/P#2. Refer to ATM-776 for x-Axis Random Vibration Qual level for Earth Launch
Antenna Gimbal Package BxA 2335765 Flt. #3 SN-3	Acceleration Operating Non-Operating	N/A ATR-16, Add. 1	Tested in stowed configuration 14 ± 1g, 1 min 5 tests ea axis	Bendix Aerospace Systems	Ann Arbor, Mich	TP 2334343 ATR-90, 91 BSR-2412, 2413	July 1968	Boost Phase
	Shock Operating Non-Operating	N/A ATR-16, Add. 1	Tested in stowed configuration 15g±2, 11 ms 3 times ea axis	Bendix Aerospace Systems	Ann Arbor, Mich	TP 2334328 ATR-86, 87 2406, 2407	July 1968	
	Salt Spray	N/A						
	Sand & Dust	LED-520	Exceeds Req	Bendix Research Labs	Southfield, Mich	Design Verif.	June 1967	Verified by Analysis
	Fungus	N/A						
	Acoustical Noise	N/A						
	Rain	N/A						
	Radiation	LED-520	Exceeds Req	Bendix Research Labs	Southfield, Mich	Design Verif.	June 1967	Verified by Analysis
	Explosion Proof	N/A						
	<u>PARAMETRIC</u> Radiated Power (Eff. Beamwidth Transmit/Receive)	42.5 dbm 27°@ 11.7 db 27°@11.0 db	42.5 dbm 29°@ 11.7 db 31°@11.0 db		Bendix Research Labs	Southfield, Mich	Design Verif. Report #4028	June 1967
Input VSWR @Transmitter f _o @Receiver f _o	1.25:1 1.5:1	1.25:1 1.50:1		Bendix Research Labs	Southfield, Mich.	Design Verif. Report #4028		on 9/12/68 per TP2338629 and documented by Report BRL #4620
Minimum Power Handling Capability Maximum Aiming Error	1.5w CW @Transmitter f _o 1.16° RMS	1.5w CW @Transmitter f _o 0.75° RMS		Bendix Research Labs	Southfield, Mich	Design Verif. Design Verif. Report #4037		

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised 1-31-69

Date	No. ATM-825	Rev. No.
Analyst Rantec	Page _____ of _____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Filter, Diplexer BxA #2330525 Flt #3 S/N 10	ENVIRONMENTAL Temperature: Operating	-25°F to +160°F	OK per reqm	Rantec	Calabasas, Calif	Rantec #66279-QTP	2/19/67	Qualified as part of an integrated system in the space simulation chamber. TP 2333032 ATR-60, 70 June 1968
	Non-Operating	-65°F to +160°F	OK per reqm	Wyle Labs	El Segundo, Calif		2/6/67	
	Earth							
	Moon							
	Pressure Operating	< 10-12 Torr	1 x 10 ⁻⁵ Torr	Wyle Labs	El Segundo, Calif		2/20/67	
	Non-Operating	30 to 1.3 Torr	OK					
	Humidity Operating	NYD	100% RH at 160°F				2/8/67	
	Non-Operating	15 to 100% R. H.	100% RH at 120°F					
	Vibration-Operating	N/A					2/13/67	
	Non-Operating	Random: 15 to 150 cps, 0.2g ² /cps Sine: 5 to 20 cps 0.4 in. D.A. 20 to 100 cps 8g's	OK per reqm.					
	Acceleration Non-Operating	N/A 25 g's ea. axis	OK per reqm				2/10/67	
	Shock Operating	N/A	OK per reqm.				2/9/67	
	Non-Operating	20 g's ea. axis						
	Salt Spray	N/A	N/A					
	Sand & Dust	N/A	N/A					
Fungus	N/A	N/A						
Acoustical Noise	N/A	N/A						
Rain	N/A	N/A						
Radiation EMI	Radiated at fo=**	52db	Bunker Ramo	Canoga Park Calif	66279-QTP	2/22/67		
Explosion Proof	N/A	N/A						
PARAMETRIC								
VSWR	1.36:1 Max all ports	1.22:1 max 33 Mc Min	Rantec	Calabasas, Calif.	66279-PTP-D	Before and after each environmental test		
Insertion Loss	0.8 db Max	0.73 db max	Rantec	Calabasas, Calif.	66279-PTP-D	1/16/67 to 2/23/67		
Isolation between Channels	50 db f _r to f _{LO} 80 db f _t to f _r	90 db min > 100 db min	Rantec	Calabasas, Calif.	66279-PTP-D	1/16/67 to 2/23/67		

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised 1-31-69

Date	No. ATM-825	Rev. No.
Analyst Rantec	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Diplexer Switch BxA #2330526 Flt #2 S/N 10	<u>ENVIRONMENTAL</u>							
	Temperature: Operating	-25°F to -160°F	OK per reqm.	Rantec	Calabasas, Calif	66279-QTP	2/19/67	
	Non-Operating Earth Moon	-65°F to -160°F ---	OK per reqm.	Wyle Labs	El Segundo Calif		2/6/67	
	Pressure Operating	10-12 Torr	1 x 10 ⁻⁵ Torr	Wyle Labs	El Segundo Calif	66279-QTP	2/20/67	Qualified in system to 5 x 10 ⁻⁶ Torrs
	Non-Operating	30 to 1.3 Torr	OK					
	Humidity Operating	NYD	100% RH at 160°F				2/8/67	
	Non-Operating	15 to 100% R. H.	100% RH at 120°F					
	Vibration -Operating	N/A	OK per reqm				2/13/67	
	Non-Operating	Random: 15 to 150 cps, 0.2g ² /cps Sine: 5 to 20 cps 0.4 in. D. A. 20 to 100 cps, 8 ¹ gs						
	Acceleration Operating	N/A	OK per reqm.				2/10/67	
	Non-Operating	25g's ea axis						
	Shock Operating	N/A	OK per reqm				2/9/67	
	Non-Operating	20 g's ea axis						
	Salt Spray	N/A	N/A					
	Sand & Dust	N/A	N/A					
Fungus	N/A	N/A						
Acoustical Noise	N/A	N/A						
Rain	N/A	N/A						
Radiation	Radiated at fo=**	50 db	Bunker Ramo	Canoga Park Calif	66279-QTP	2/22/67		
Explosion Proof	N/A	N/A						
<u>PARAMETRIC</u>								
VSWR	1.36:1 Max	1.21:1 max (130 Mc min)	Rantec	Calabasas, Calif	66279-PTP-S	Before and after each environmental test	Qualified as part of an integrated system in the space simulation chamber.	
Insertion Loss	0.7 db Max	0.63 db max	Rantec	Calabasas, Calif	66279-PTP-S	1/16/67 to 2/23/67		
Isolation between Channels	20 db Min Port A to Port B or vice versa	22 db min	Rantec	Calabasas, Calif	66279-PTP-S	1/16/67 to 2/23/67		

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised 1/31/69

Date 9/20/68	No. ATM-825	Rev. No.
Analyst J. M.	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Command Decoder BxA #2330509 Flt #3 S/N 6	ENVIRONMENTAL Temperature: Operating Non-Operating Earth Moon	-22°F to +158°F -65°F to +160°F N/A	-22°F to +158°F -65°F to +160°F N/A	Bendix Aerospace	Ann Arbor, Mich.	TP 2334335 ATR-60, 70 BSR-2363, 2376	May-June 1968	
	Pressure Operating Non-Operating	1 x 10 ⁻¹² mmHg S/L to 1 x 10 mmHg	Tested in Spare Sim. Chamber to 5 x 10 ⁻⁶ Torr	Bendix Aerospace	Ann Arbor, Mich.	BSR-2363, 2376	May-June 1968	Test Level Limited by Equipment Capability
	Humidity Operating Non-Operating	N/A 15% to 100%	Designed to meet Humidity Requirements	Bendix Aerospace	Ann Arbor, Mich.	N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to ATR-16 Addendum 1	Tested to S/P #1 Design Limit Test Levels Refer to figures 1 through 5	Bendix Aerospace	Ann Arbor, Mich.	TP2334346 ATR-82, 83 BSR-2402, 2403	June 1968	Qualified to Design Limit Test Levels for Subpackage #1 (in the stowed configuration)
	Acceleration Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 14 ± 1 g 1 Min Duration 5 times in Axis	Bendix Aerospace	Ann Arbor, Mich.	TP 2334343 ATR-90, 91 BSR-2414, 2413	July 1968	Qualified to Design Limit Test Levels for Subpackage #1 (in the stowed configuration)
	Shock Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 15 ± 2 g 11 ms Saw-tooth 3 times in Axis	Bendix Aerospace	Ann Arbor, Mich.	TP 2334328 ATR-86, 87 BSR-2406, 2407	July 1968	Qualified to Design Limit Test Levels for Subpackage #1 (in the stowed configuration)
	Salt Spray	N/A	N/A	Bendix Aerospace	Ann Arbor, Mich.			
	Sand & Dust	Not Defined	Designed to Meet	Bendix Aerospace	Ann Arbor, Mich.			
	Fungus	N/A	N/A	Bendix Aerospace	Ann Arbor, Mich.			
	Acoustical Noise	Not Defined		Bendix Aerospace	Ann Arbor, Mich.			
	Rain	N/A	N/A	Bendix Aerospace	Ann Arbor, Mich.			
	Radiation	Not Defined	I. R. 130 w/ft ²	Bendix Aerospace	Ann Arbor, Mich.	TP 2334335	May-June 1968	
	Explosion Proof	N/A	N/A	Bendix Aerospace	Ann Arbor, Mich.			
	PARAMETRIC See Table 1 Sheet B-7	Tested as part of Integrated System in space Chamber	Simulation	Bendix Aerospace	Ann Arbor, Mich.	TP 2333032 ATR-60, 70 BSR-2367, 2376	May-June 1968	Qualified via Integrated System Thermal Vacuum Test for a Simulated Lunar Mission
	EMI Performance	Tested as part of Integrated System		Bendix Aerospace	Ann Arbor, Mich.	TP2333087 ATR-27, 33 BSR-2300, 2320	May-June 1968	

Note: See Section 2.2 discussion



**Aerospace
Systems Division**

Qualification Status List
Command Decoder Assembly

NO.	REV. NO.
ATM-825	
PAGE <u>B-7</u>	OF <u>31</u>
DATE 1/29/69	

TABLE I

COMMAND DECODER PARAMETRIC REQUIREMENTS

PARAMETER	REQUIREMENT
Demodulator Input NRZ Bi-Phase Mod.	2kc Subcarrier 1kc sync. 5vpp +10% 29.4 db SNR
Command Format	61 Bits
Preamble	20 Bits (zeros)
Decoder Address	7 Bits
Cmd Complement	7 Bits
Command	7 Bits
Cmd Execution Timing	20 Bits (ones)
Command Verification	7 Bits + parity
Normal Cmd Rate	1 message/second
Slow Cmd Rate	1 message/2 sec.
Command Capability	100
Commands Used	66

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised
1/31/69

Date 2/29/66	No. ATM-825	Rev. No.
Analyst J. M.		Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks				
		Requirement AL 310900	Capability	Agent	Location	Document Reference	Date					
Data Processor (DA06) BxA #2330521 S/N 8 Flight #3	ENVIRONMENTAL Temperature: Operating Non-Operating Earth Moon	-22°F to +158°F -65°F to +185°F N/A	-22°F to +158°F -65°F to +185°F	Bendix Aerospace Systems Division	Ann Arbor, Mich	T. P. 2334335 ATR-60, 70 BSR-2367, 2376	May-June 1968	Successfully tested on Qual SA model				
	Pressure Operating Non-Operating	1x10 ⁻¹² mmHg AMB to 1x10 ⁻¹² mmHg	Tested in spare chamber to 5 x 10 ⁻⁶ Torr									
	Humidity Operating Non-Operating	N/A 15% to 100%	Designed to meet humidity requirements							N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	NA Refer to ATR-16 Addendum 1	Tested to S/P #1 Design Limit Test Levels. Refer to figures 1 thru 5.							T. P. 2334346 ATR-82, 83 BSR-2402, 2403	June-July 1968	Qualified at Subpackage #1 Design Limit Test Levels for a stowed configuration.
	Acceleration Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 14 ± 1g 1 Min Duration 5 times ea. Axis.							T. P. 2334343 ATR-90, 91 BSR-2412, 2413		
	Shock Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 15 ± 2g 11 ms sawtooth 3 times ea. Axis.							T. P. 2334328 ATR-86, 87 BSR-2406, 2407		
	Salt Spray	N/A	N/A									
	Sand & Dust	Not Defined										
	Fungus	N/A	N/A									
	Acoustical Noise	Not Defined	--									
	Rain	N/A	N/A									
	Radiation	Not Defined	130 w/ft ² IR Lamp							T. P. 2334335	May-June '68	
	Explosion Proof	N/A	N/A									
	PARAMETRIC See Table I Sheet B-9	Tested as part of Integrated System in Space Simulation Chamber								T. P. 2333032 ATR-60, 70 BSR-2367, 2376	May-June 1968	Qualified via Integrated System Thermal Vacuum Test for a simulated lunar mission.
	EMI Performance	Tested as part of Integrated System								TP2333087 ATR-27, 33 BSR-2300, 2320	May-June 1968	



**Aerospace
Systems Division**

Qualification Status List
Data Processor & 90 Channel
Multiplexer/Converter Assemblies

NO. ATM-825	REV. NO.
PAGE <u>B-9</u> OF <u>31</u>	
DATE 1/29/69	

Table I

Environment and/or Parameter	Stress Level	
	Requirement AL 310900	Capability
<u>TELEMETRY FORMAT</u>		
Frame Format	64 Words	64 Words
Word Length	10 Bits	10 Bits
<u>FRAME FORMAT</u>		
Control Words	3	3
Passive Seismic Exp.	43	43
Magnetometer Exp.	7	7
Solar Wind Exp.	4	4
SIDE/CCG Exp.	5	5
Command Verification Word	1	1
Housekeeping Word	<u>1</u>	<u>1</u>
Total	64	64
<u>OPERATIONAL MODES</u>		
Normal Bit Rate	1060 bps	1060 bps
Slow Bit Rate	530 bps	530 bps
Active Seismic Bit Rate	N/A	N/A
<u>OUTPUT DATA TO XMTR</u>		
Split-Phase-Modulated (Square Wave Data)	5.0v + 0.5v, -2.5v 0.0v, + 0.4v	5.0v, +0.5, -2.5v 0.0v, + 0.4v
<u>TIMING & CONTROL SIGNALS</u>		
Frame Mark	118 μ s	118 μ s
Even Frame Mark	118 μ s	118 μ s
Shift Pulse	472 μ s	472 μ s
Data Demand Pulse	9.4 ms/18.8 ms	9.4 ms/18.8 ms
Data Gate Pulse	118 μ s	118 μ s
90th Frame Pulse	> 1 μ s	> 1 μ s
Analog Multiplexer Advance	> 1 μ s No less than	> 1 μ s, No less than
A/D Start Pulse	118 μ s apart	118 μ s apart

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised
1/28/69

Date 1/9/67	No. ATM-825	Rev. No.
Analyst R. Dillard	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks					
		Requirement	Capability	Agent	Location	Document Reference	Date						
Data Processor, 90 Channel Analog Multiplexer/Con- verter BxA 2330524 S/N 11	<u>ENVIRONMENTAL</u> Temperature: Operating	-22°F to +158°F	Tested to Same	Dynatronics	Orlando, Florida	Qualification Test Report 90 Channel Ana- log Mult/Conv.	7 March 1967						
	Non-Operating Earth Moon	-65°F to +185°F											
	Pressure Operating Non-Operating	Sea Level to 10-12mm Hg	Tested to 10 ⁻⁵ mm Hg @ +158°F										
	Humidity Operating Non-Operating	50% R. H. Max 15% - 100% R. H.	Tested to 72 Hr @ 95% RH During Temp. Cycle +25°C to +70°C										
	Vibration Operating N/A Non-Operating Launch & Flight Lunar Landing	Random 7g RMS 20 min Sinusoidal 0.4 ir DA 5-20cps, 8g 20-100cps 2cyat 1 oct/min	Random - Same Sinusoidal - same plus 9g 50-100 cps for 2 min										
	Acceleration Operating Non-Operating	ATR-16 Adden 1	Tested to 14 ± 1g 1 Min Duration 5 times ea. Axis.						Bendix Aerospace	Ann Arbor, Michigan	TP2334343 ATR-90, 91 BSR-2412, 2413	July 1968	Verified at S/P #1 Level Qualification, Qual SA
	Shock Operating Non-Operating	N/A 20g for 11 ms	N/A Same						Dynatronics, Inc.	Orlando, Florida	Qualification Test Report 90 ch. Mult/Conv.	7 March 1967	
	Salt Spray	N/A	N/A										
	Sand & Dust	N/A	N/A										
	Fungus	N/A	N/A										
	Acoustical Noise	N/A	N/A										
	Rain	N/A	N/A										
	Radiation	N/A	N/A										
	Explosion Proof	N/A	N/A										
<u>PARAMETRIC</u> Multiplexer Analog Input Volt. Analog Accuracy Crosstalk (F. Scale)	0 - 5.0 v 0.33% ± 0.1% (max)	-0.0196 to 5.0196v 0.33% ± 0.1%	Dynatronics, Inc.	Orlando, Florida	Qualification Test Report 90 Ch. Analog Mult/Converter	7 March 1967							
Leakage Current: ON OFF Input Impedance: ON OFF	<0.5 µa <0.2 µa >50 Megohms >1 Megohms	<20 nano amp < 2.3 nano amp >100 Megohms >1 Megohms											
Analog Overvoltage: Operating Non Operating Power Consumption	See Remarks ± 12 v (max) 738 mw	Same ± 12 Same					Ch. 6, 7, 26, 52, 67, 70:+8v, -9v Ch. 21, 36, 45, 80:+8v, -6.5v All remaining Chs:+8v, -5v						

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised
9/20/68

Date	No. ATM-825	Rev. No.
Analyst	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
90 Channel Multiplexer/ Converter (cont.)	<u>PARAMETRIC</u> A/D Converter Resolution Quantizing Error	8 bits ± 1/2 bit	8 bits ± 1/2 bit	Dynatronics	Orlando, Florida	Qualification Test Report 90 Channel Analog Multi-plexer/Converter	7 March 1967	
	Output Signal Level Logical "1" Logical "0"	0 to +0.4 v +2.5 to 5.5v	Same	↓	↓	↓	↓	
	Data Availability (After Encode Pulse)	165 μ sec	118 μ sec	↓	↓	↓	↓	
	Power Consumption	593.3 mw	Same	↓	↓	↓	↓	
	Multiplexer/Conv. Operating Life	1 Year	1 Year with Probability of 0.953	↓	↓	Reliability Analysis Report for 90 channel System	1 March 1967	
	Storage Life	2 Years	Unit does not contain parts or material with known age limitations	↓	↓	"	"	
Functional Performance	Tested as part of Integrated System in space Simulation Chamber			BxA	Ann Arbor, Michigan	TP2333032 ATR-60, 70 BSR, 2367, 2376	May, -June 1968	Qualified as part of an integrated system, Qual SA
EMI Performance	Tested as part of Integrated System			BxA	Ann Arbor, Michigan	TP2333087 ATR-27, 33 BSR-2300, 2320	May 1968	↓

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised
1/31/69

Date 1/30/68	No. ATM-825	Rev. No.
Analyst Jones		Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Transmitter BxA #2330527 S/N 17 } FI#3 S/N 18 }	<u>ENVIRONMENTAL</u> Temperature: Operating	-10°F to +140°F	-10°F to +140°F	Philco-Ford	Palo Alto California	Qualification Test Report RN-DA-1795		
	Non-Operating	-65°F to +160°F	-65°F to +160°F					
	Earth	N/A						
	Moon							
	Pressure Operating	1 x 10 ⁻¹² mm	1x10 ⁻⁵ mmHg					
	Non-Operating	Sea Level-10 ⁻⁸ mm	1x10 ⁻⁵ mmHg					
	Humidity Operating	50%	15% - 100%					
	Non-Operating	15% - 100%	15% - 100%					
	Vibration Operating	N/A	N/A					
	Non-Operating	Refer to ATR-16	9.0G - peak					
	Launch & Flight	Addendum #1	20 - 100 cps					
	Lunar Landing							
	Acceleration Operating	N/A	N/A					
	Non-Operating	ATR-16, Add. #1	14G - 1 min. each of 3 axes					
Shock Operating	N/A	N/A						
Non-Operating	ATR-16, Add. #1	20G - 10 ms rise each of 3 axes						
Salt Spray	N/A	N/A						
Sand & Dust	N/A	N/A						
Fungus	N/A	N/A						
Acoustical Noise	N/A	N/A						
Rain	N/A	N/A						
Radiation	N/A	N/A						
Explosion Proof	N/A	N/A						
<u>PARAMETRIC</u> Functional Performance	Tested as part of Integrated System in Space Simulation Chamber		BxA	Ann Arbor, Michigan	TP 2333032 ATR-60, 70 BSR-2367, 2376	May-June 1968	Successful	
EMI Performance	Tested as part of Integrated System		BxA	Ann Arbor, Michigan	TP 2333087 ATR-27, 33 BSR-2300, 2320	May-June 1968	FAR-139 analyzed as not significant on 285 KHZ EMI	

Note: See Section 2.2 Discussion

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Revised 1-31-69

Date 12/29/66	No. ATM-825	Rev. No.
Analyst J. M.	Page _____ of _____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks	
		Requirement	Capability	Agent	Location	Document Reference	Date		
Power Distribution Unit BxA 2330450-2 S/N 8	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-22°F to +158°F -65°F to +160°F N/A	-22°F to +158°F -65°F to +160°F	Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP 2334335 ATR-60, 70 BSR-2367, 2376	May-June 1968		
	Pressure Operating Non-Operating	1x10 ⁻¹² mmHg S/L to 1x10 ⁻¹² mm	Tested in Space Simul. Chamber to 5x10 ⁻⁶ Torrs						Bendix Aerospace Systems Division
	Humidity Operating Non-Operating	N/A 15% to 100%	Hg Designed to meet Humidity Re- quirements			N/A	N/A		
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to ATR-16 Addendum 1	Tested to S/P #1 Design Limit Test Levels Refer to fig 1 thru 5			TP 2334346 ATR-82, 83 BSR-2402, 2403	July 1968		Qualified at Subpackage(S/P)#1 Design Limit Test Levels for a Stowed Configuration
	Acceleration Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 14 ± 1g 1 Min. Dur- ation, 5 times ea Axis			TP 2334343 ATR-90, 91 BSR-2412, 2413	July 1968		
	Shock Operating Non-Operating	N/A ATR-16, Add. 1	Tested to 15 ± 2g, 11 mo Saw- tooth 3 times ea Axis			TP 2334328 ATR-86, 87 BSR-2406, 2407	July-Aug 1968		
	Salt Spray	N/A	N/A						
	Sand & Dust	Not Defined	Designed to Meet						No testing required
	Fungus	N/A	N/A						
	Acoustical Noise	Not Defined							No testing required
	Rain	N/A	N/A						
	Radiation	Not Defined	tested to 130w/ft ²	IR					
	Explosion Proof	N/A	N/A						
<u>PARAMETRIC</u> Assembly Performance Specifications	See Table I Sheet B-14	See Table I Sheet B-14	BxA	Ann Arbor, Michigan					
Functional Performance	Tested as part of Integrated System in Space Chamber	Simulation	BxA	Ann Arbor, Michigan	TP 2333032 ATR-60, 70 BSR-2367, 2376	May-June 1968			
EMI Performance	Tested as part of Integrated System		BxA	Ann Arbor, Michigan	TP 2333087 ATR-27, 33 BSR-2300, 2320				

TABLE I
QUALIFICATION STATUS LIST
PDU

Parametric Reqm'ts	Requirements	Capability
Exp. Pwr Control: Operational Modes	ON/OFF/STDBY	ON/OFF/STDBY
Overload Circuit Protection:		
Experiments (+29v)	500 ma \pm 10%	500 ma \pm 10%
Transmitter (+29v)	600 ma \pm 100 ma	600 ma \pm 100 ma
Transmitter (+12v)	150 ma + 75, - 40 ma	150 ma + 75, - 40 ma
Cmd Receiver (+12v)	150 ma, + 75,- 40 ma	150 ma, + 75, -40 ma
PDU Pwr Rqmt:		
Quiescent State	3.0 W (Max)	3.0 W (Max)
Cmd Execution	4.4 W Peak	4.4 W Peak
Signal Conditioning:		
Housekeeping Data	0-5 v	0 - 5 v
PCU Loading:		
Reserve Pwr. Dump Capability	0 - 10 w	0 - 10 w
Experiment Ripple-off:		
Response Time (1st Exp)	135 ms \pm 15 ms	135 ms \pm 15 ms
Sequential Switching (3 Experiments)	8 \pm 1 ms ea Exp.	8 \pm 1 ms ea Exp.
Redundant Pwr. Control		
Transmitter	Selects A or B	Selects A or B
Data Processor	Selects X or Y	Selects X or Y
Power Switching Control:		
Switching Relays		
Coil Voltage	26.5 v (Nominal)	26.5 v (Nominal)
Coil Current	22.5 ma (Max)	22.5 ma (Max)
Response Time	8 ms (Max)	8 ms (Max)
Relay Drivers		
Active State (+29.0v)	36 ma (min.)	36 ma (min.)
Inactive State	2 mw (max)	2 mw (max)

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS
COMPONENTS

Revised 1-31-68

Date 20 June 68	No. ATM-825	Rev. No. <input type="checkbox"/>
Analyst J. T.	Page ___ of ___ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks			
		Requirement AL 410100	Capability	Agent	Location	Document Reference	Date				
Power Conditioning Unit (P. C. U.) S/N 6	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-22°F to +158°F	-22°F to +158°F	Bendix Aerospace Systems Division	Ann Arbor, Mich.	T. P. 2334335 ATR-60, 70 BSR-2367, 2376	May-June 1968	Qualified in Subpackage #1 system level tests			
		-65°F to +160°F	-65°F to +160°F								
	Pressure Operating Non-Operating	Sea Level to 1x10 ⁻¹² Torr	Tested to 5x10 ⁻⁶ Torr						T. P. 2334335 ATR-60, 70 BSR-2367, 2376		Test level limited by Test Equipment Capability
	Humidity Operating Non-Operating	50% relative max 15 to 100%	Designed to meet humidity requirements						N/A	N/A	Testing Not Required
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	ATR-16 Adden. #1	Tested to S/P#1 Design Limits Test Levels(Refer to Fig 1 thru 5)						T. P. 2334346 ATR-82, 83 BSR-2402, 2403	July 1968	Qualified at Subpackage #1 Design Limit Test Levels for a stowed configuration
	Acceleration Operating Non-Operating	ATR-16 Adden. #1	Tested to 14±1g, 1 min duration, 5 times per axis						T. P. 2334343 ATR-90, 91 BSR-2412, 2413	July 1968	Verified at Subpackage #1 Design Limit Test and for a stowed configuration
	Shock Operating Non-Operating	ATR-16 Adden. #1	Tested to 15±2g, 11 ms 3 times each axis						T. P. 2334328 ATR-86, 87 BSR-2406, 2407	July 1968	Verified at Subpackage #1 Design Limit Test and for a stowed configuration
	Salt Spray	N/A	N/A								
	Sand & Dust	Not Defined	N/A								No Test Required
	Fungus	N/A	N/A								
	Acoustical Noise	Not Defined	NYD								No Test Required
	Rain	N/A	N/A								
	Radiation	Not Defined	NYD								
	Explosion Proof	Not Defined	N/A								
<u>PARAMETRIC</u> Regulation Ripple	Refer to Table I Refer to Table II	Refer to Table I Refer to Table II	Sheet B-16					Waiver or change to Specification pending on ripple and voltage regulation limits.			
Functional Performance	Tested as part of	Integrated System in Space Simulation Chamber	BxA	Ann Arbor, Mich.	T. P. 2333032 ATR-60, 70 BSR-2367, 2376	May-June 1968					
EMI Performance	Tested as part of	Integrated System	BxA	Ann Arbor, Mich.	T. P. 2333087 ATR-27, 33 BSR-2300, 2320	May-June 1968					

TABLE I
 QUALIFICATION STATUS LIST
 PCU

ATM-825
 Page B-16 of 31
 1/29/69

	<u>Voltage Range (AVG)</u>	<u>Range of Loads</u>	<u>Nominal Loads</u>
Output #1	28.59 to 29.40 VDC	18.0 to 45 watts	34.5 watts
Output #2	14.80 to 15.30 VDC	0.12 to 1.2 watts	1.2 watts
Output #3	11.85 to 12.10 VDC	2.4 to 3.6 watts	3.6 watts
Output #4	4.85 to 5.25 VDC	2.25 to 4.5 watts	4.5 watts
Output #5	-5.86 to -6.10 VDC	0.21 to 0.27 watts	0.27 watts
Output #6	-11.80 to -12.40 VDC	0.48 to 1.8 watts	1.8 watts

TABLE II
 PCU PEAK-TO-PEAK RIPPLE VOLTAGE LIMITS

	<u>Volts Peak-to-Peak</u>	<u>Frequency Band</u>	<u>Resistive Loading (watts)</u>
Output #1 (+ 29 VDC Nom.)	0.20	< 100 KHz	45 Maximum
	0.50	> 100 KHz	18 Minimum
Output #2 (+15 VDC Nom.)	0.20	< 100 KHz	1.2 Maximum
	0.50	> 100 KHz	0.12 Minimum
Output #3 (+12 VDC Nom.)	0.20	< 100 KHz	3.6 Maximum
	0.50	> 100 KHz	2.4 Minimum
Output #4 (+5 VDC Nom.)	0.20	< 100 KHz	4.5 Maximum
	0.50	> 100 KHz	2.25 Minimum
Output #5 (-6 VDC Nom.)	0.20	< 100 KHz	0.27 Maximum
	0.50	> 100 KHz	0.21 Minimum
Output #6 (-12 VDC Nom.)	0.20	< 100 KHz	1.8 Maximum
	0.50	> 100 KHz	0.48 Minimum

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CENTRAL STATION ELECTRONICS COMPONENTS

Date 1-31-69 No. ATM-825 Rev. No.
 Analyst Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Timer, Central Station P/N 2330626	<u>ENVIRONMENTAL</u> Temperature:							
	Operating	-30°C to +80°C	-30°C to +80°C	Bendix Aerospace Systems Division (BxA)	Ann Arbor, Michigan	TP 2334335 ATR-60, 70 BSR-2367, 2376	May-June 1968	Qualification of the Timer has been accomplished at the System Level.
	Non-Operating	-55°C to +100°C	-55°C to +100°C					
	Earth	-30°C to +80°C	-30°C to +80°C					
	Moon							
	Pressure							
	Operating	1 x 10 ⁻¹² Torrs	Verified to 5x10 ⁻⁶ Torrs in space	BxA	Same	Same	Same	Pressure limited by test chamber capability
	Non-Operating	1 x 10 ⁻⁸ Torrs	Simulation Chamber					
	Humidity							
	Operating	N/A	Designed to meet Humidity Requirements	N/A	N/A	N/A	N/A	No Testing Planned to the 100% Humidity Level.
	Non-Operating	50% to 100% RH						
	Vibration							
	Operating	N/A						
	Non-Operating			BxA	Ann Arbor, Michigan	TP 2334346 ATR-82, 83 BSR-2402, 2403	July-Aug. 1968	Qualification of the Timer was accomplished at the System Level.
Launch & Flight Lunar Landing	Refer to ATR-16 Addendum 1	See Fig 1 thru 5						
Acceleration								
Operating	N/A	Tested at 14±g 1 Min Duration	BxA	Same	TP 2334343 ATR-90, 91 BSR-2412, 2413	July 1968	Qualified to S/P#1 Design Limit Test for a Stowed Configuration	
Non-Operating	ATR-16, Add. 1	ea Axis						
Shock								
Operating	N/A	Tested to 15±2g 11 ms Sawtooth	BxA	Same	TP 2334328 ATR-86, 87 BSR-2406, 2407	July 1968	Same as above	
Non-Operating	ATR-16, Add. 1	ea Axis						
Salt Spray	N/A	N/A						
Sand & Dust								
Fungus								
Acoustical Noise								
Rain								
Radiation								
Explosion Proof	N/A	N/A						
<u>PARAMETRIC</u>								
Power Requirements	1.2 to 1.5 VDC	1.2 to 1.5 VDC	BxA	Same	TP2334345 ATR-101, 102	August 1968	Qualified contingent on completion of separate 36-cycle reliability evaluation tests, February 1969	
Volts								
Current								
Start Mode	12µ amp max	12 µ amp max						
Stop Mode	7µ amp max	7 µ amp max						
Switch Closures:								
Repetitive	1 minute	1 Minute						
Non-Repetitive	12 Hr	12 Hr	BxA	Same	Same	Same	Same as above	
	720 Day	720 Day						

QUALIFICATION STATUS LIST-ALSEP PROGRAM PASSIVE SEISMIC EXPERIMENT

Date 1/31/69 No. ATM-825 Rev. No.
Analyst Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
PSE Sensor Assembly P/N 233425 BxA #2338460-2 Flt #3, S/N 6	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	107° to 125°F -65°F to 160°F Same as Operating	Tested in Space Simulation Chamber for Temperature	Bendix Aerospace Systems Division	Ann Arbor, Michigan	T13022 TP2334335 ATR-60, 70 BSR-2367,2376	11 Jan 69 June 10, 1968	See Note 4 Qualified contingent on resolution of major items listed in Note 1 below at the System Level.
	Pressure Operating Non-Operating	1 x 10 ⁻¹² mm Hg 1 x 10 ⁻⁸ mm Hg	Verified to 5 x 10 ⁻⁵ Torrs in Space Sim. Cham.					Test level limited by test equipment capability
	Humidity Operating Non-Operating	Not applicable 50-100% R.H.	Designed to Meet Humidity Requirement			N/A	N/A	N/A
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	Not Applicable Refer to ATR-16 Addendum 1	Tested in Stowed Configuration to Vibration Design Limits Indicated in Fig 1 Thru 5			TP2334346 ATR-82, 83 BSR-2402,2403	6/28/68	
	Acceleration Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 14 ± 1g, 1 Min.			TP2334343 ATR-90, 91 BSR-2412,2413	7/4/68	
	Shock Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 15 ± 2g 11ms 3 Times Ea. Axis			TP2334328 ATR-86, 87 BSR-2406,2407	6/24/68	
	Salt Spray	Not Applicable	Not Applicable					
	Sand & Dust	LED-520	Designed to Meet					
	Fungus	Not Applicable	Not Applicable					
	Acoustical Noise	Not Applicable	Not Applicable					
	Rain	Not Applicable	Not Applicable					
	Radiation	LED-520	Designed to Meet					
	Explosion Proof	Not Applicable	Not Applicable					
	<u>PARAMETRIC</u> Functional Performance	Tested as part of Integrated System in Space Chamber	Simulation	BxA		TP 2333032 ATR-60, 70 BSR-2367,2376	June 10 1968	Qualification contingent on resolution of major open items listed in Notes 2 & 3
	EMI Performance	Tested as part of integrated system		BxA		TP 2333087 ATR-27, 33 BSR-2300,2320	April 1968	
Note 1: FR-192 PSE S/N 3 uncage; Final FAR-132A issued Note 2: FR 125 PSE Uncage Final FAR-125A issued Note 3: Retest of PSE S/N 2 required after QSA system level testing Note 4: Thermal Control Qualified per as run T/P T13022 & accepted by MSC per Qual SB QAR Meeting Minutes 9713-10-3021 1/27/69								

QUALIFICATION STATUS LIST-ALSEP PROGRAM

PASSIVE SEISMIC EXPERIMENT

Date 1/31/69 No. ATM-825 Rev. No.
Analyst Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
PSE Central Station Electronics BxA #2334670 Flt #3 S/N 5	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	107°F to 125°F -65°F to 160°F Same as Operating	Tested in Space Simulation Chamber for Temperature	Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP2334335 ATR-60, 70 BSR-2367,2376	June 10 1968	Successfully tested on BxA Qual SA model
	Pressure Operating Non-Operating	1 x 10 ⁻¹² mm Hg 1 x 10 ⁻⁸ mm Hg	Verified to 5 x 10 ⁻⁵ Torrs in Space Sim. Cham					
	Humidity Operating Non-Operating	Not Applicable	Designed to Meet Humidity Requirements			N/A	N/A	N/A
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	Not Applicable Refer to ATR-16 Addendum 1	Tested in Stowed Configuration to Vibration Design Limits Indicated in Figs. 1 Thru 5.			TP2334346 ATR-82, 83 BSR-2402,2403	6/28/68	Successfully Tested
	Acceleration Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 14 ± 1g. 1 Min.			TP2334343 ATR-90, 91 BSR-2412,2413	7/4/68	Successfully Tested
	Shock Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 15 ± 2g 11ms 3 Times Ea. Axis			TP2334328 ATR-86, 87 BSR-2406,2407	6/24/68	Successfully Tested
	Salt Spray	Not Applicable	Not Applicable					
	Sand & Dust	LED-520	Designed To Meet					
	Fungus	Not Applicable	Not Applicable					
	Acoustical Noise	Not Applicable	Not Applicable					
	Rain	Not Applicable	Not Applicable					
	Radiation	LED-520	Designed to Meet					
	Explosion Proof	Not Applicable	Not Applicable					
	<u>PARAMETRIC</u> Functional Performance	Tested as part of the integrated system in the space simulation chamber		BxA	Ann Arbor, Michigan	TP 2333032 ATR-60-70 BSR-2367,2376	June 10, 1968	
EMI Performance	Tested as part of the integrated system		BxA	Ann Arbor, Michigan	TP 2333087 ATR-27, 33 BSR-2300,2320	April 1968		

QUALIFICATION STATUS LIST-ALSEP PROGRAM

PASSIVE SEISMIC EXPERIMENT

Date 1/31/69	No. ATM-825	Rev. No.
Analyst	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
PSE Gnomon Assembly BxA #2338016	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	107° F to 125° F -65° F to 160° F Same as Operating	Tested in Space Simulation Chamber for Temperature	Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP2334378 ATR-160 BSR-2570	12/30/68	Successfully Tested at System Level as a Result of Qual SB Test Program
	Pressure Operating Non-Operating	1 x 10 ⁻¹² mmHg 1 x 10 ⁻⁸ mmHg	Verified to 5 x 10 ⁻⁵ Torrs in Space Sim. Cham					
	Humidity Operating Non-Operating	Not Applicable	Designed to Meet Humidity Requirements			N/A	N/A	N/A
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	Not Applicable Refer to ATR-16 Addendum 1	Tested in Stowed Configuration to Vibration Design Limits Indicated in Figs. 1 Thru 5.			TP2337905 ATR-149 BSR-2546	12/19/68	Successfully Tested at System Level as a Result of Qual SB Test Program
	Acceleration Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 14 ± 1g. 1Min.	BMSD	Mishawauka Indiana	TP2337915 ATR-164 BSR-2574	1/15/69	
	Shock Operating Non-Operating	Not Applicable ATR-16, Add. 1	Tested in Stowed Configuration to 15 ± 2g 11ms 3 Times Ea. Axis	Bendix Aerospace Systems Division	Ann Arbor Michigan	TP2337917 ATR-161 BSR-2571	1/7/69	
	Salt Spray	Not Applicable	Not Applicable					
	Sand & Dust	LED-520	Designed to Meet					
	Fungus	Not Applicable	Not Applicable					
	Acoustical Noise	Not Applicable	Not Applicable					
	Rain	Not Applicable	Not Applicable					
	Radiation	LED-520	Designed to Meet					
	Explosion Proof	Not Applicable	Not Applicable					
<u>PARAMETRIC</u>								

QUALIFICATION STATUS LIST-ALSEP PROGRAM

Date 1-31-69	No. ATM 825	Rev. No.
Analyst JTS	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Heat Flow Experiment 2330661 S/N 05	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating	-300°F to +250°F	-300°F to +250°F	BxA	Ann Arbor, Michigan	TP 2334387 ATR-160 BSR-2570	Dec 1968	Qual SB Test
	Earth	-65°F to +160°F	Not Tested					
	Moon	-300°F to +250°F						
	Pressure Operating Non-Operating	Sea Level to 10 ⁻¹² TORR	5 x 10 ⁻⁷ TORR	BxA	Ann Arbor, Michigan	TP 2334387 ATR-160 BSR-2570	Dec 1968	BxA facilities will not allow testing to below 5 x 10 TORR
	Humidity Operating Non-Operating	15 to 100%	Designed to Meet Humidity Requirement	BxA	Ann Arbor, Michigan	N/A	N/A	No testing planned to 100% level.
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A LTA-3D/R LTA-3D/R	Tested without failure to levels shown in figures 1-5	BxA	Ann Arbor, Michigan	TP 2337905 ATR-149 BSR-2546	Dec 1968	Qual SB Design Limit Test
	Acceleration Operating Non-Operating	N/A ATR-16 ADD. 1	14g ± 1g/1 min.	BxA/BMSD	Mishawauka Indiana	TP 2337915 ATR-164 BSR-2574	Dec 1968	Qual SB Design Limit Test
	Shock Operating Non-Operating	N/A 15g± 2g Sawtooth	15g± 2g Sawtooth	BxA	Ann Arbor, Michigan	TP 2337917 ATR-161 BSR-2571	Jan 1969	Qual SB Design
	Salt Spray	N/A						
	Sand & Dust	N/A						
	Fungus	N/A						
	Acoustical Noise	N/A						
	Rain	N/A						
	Radiation	N/A						
	Explosion Proof	N/A						
<u>PARAMETRIC</u> functional performance	Tested as a part of integrated system in the Space Simulation chamber		BxA	Ann Arbor, Michigan	TP 2338640 (Mod. IST) ATR-163 BSR-2573	Jan 1969	Qual SB Test	
	Note: See Section 2.4 discussion							

QUALIFICATION STATUS LIST-ALSEP PROGRAM

COLD CATHODE GAUGE EXPERIMENT

Date 1-31-69 No. ATM-825 Rev. No.
Analyst JTS Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Cold Cathode Gauge Experiment BxA 2338549 S/N 1003	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-300°F to +250°F	-300°F to +250°F	BxA	Ann Arbor, Michigan	TP2334387 ATR 60 BSR-2570	Dec. 1968	Qual SB Test
	Pressure Operating Non-Operating	10 ⁻¹² Torr SL-10 ⁻¹² Torr	Tested to 5 x 10 ⁻⁶ Torr	BxA	Ann Arbor, Michigan	TP2334387 ATR 60 BSR-2570	Dec. 1968	Test level limited by test equipment capability
	Humidity Operating Non-Operating	N/A 15-100%	Designed to meet Humidity Requirements	BxA	Ann Arbor, Michigan	N/A	N/A	No testing planned to 100% level
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A IC 314105	Tested in stowed conf. to design limit levels indicated in figures 1-5	BxA	Ann Arbor, Michigan	TP2337905 ATR 149 BSR-2546	Dec. 1968	
	Acceleration Operating Non-Operating	N/A IC 314105	Tested to 14 ± 1 g 1 Min Duration	BxA	Ann Arbor, Michigan	TP2337915 ATR 164	Jan. 1969	Tested in stowed configuration during design limit test
	Shock Operating Non-Operating	N/A IC 314105	Tested to 15g±2g 1ms sawtooth ea Axis	BxA	Ann Arbor, Michigan	TP2337917 ATR 161 BSR-2571	Jan. 1969	Tested in stowed configuration during design limit test
	Salt Spray	N/A						
	Sand & Dust	N/A Not defined						No testing planned
	Fungus	N/A						
	Acoustical Noise	Not Defined						No testing planned
	Rain	N/A						
	Radiation	N/A						
	Explosion Proof	N/A						
	<u>PARAMETRIC</u> Functional Performance		Tested as part of Integrated System	BxA	Ann Arbor, Michigan	TP2338640 ATR-163 BSR-2573	Jan. 1969	Modified IST (Post Shock)

QUALIFICATION STATUS LIST-ALSEP PROGRAM

CHARGED PARTICLE LUNAR ENVIRONMENT EXPERIMENT

Date 1-31-69	No. ATM-825	Rev. No.
Analyst J. T.	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
CPLLE BRL#2165701	ENVIRONMENTAL Temperature:			Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP2334387 TP2337912	12/30/68	Qualification contingent on resolution of FR 199, FR 200 and FR 211.
	Operating	-300°F to +250°F	-300°F to +250°F					
	Non-Operating	-65°F to +160°F						
	Earth	-300°F to +250°F	-300°F to +250°F			ATR160/BSR2570		
	Moon							
	Pressure			"	"	TP2334387 and TP2337912	12/30/68	
	Operating	10 ⁻¹² torr	Tested to 10 ⁻⁶ torr					
	Non-Operating	10 ⁻¹² torr	10 ⁻⁶ torr			ATR160/BSR2570		
	Humidity			"	"	NA	NA	
	Operating	NA	Designed to meet Humidity Requirements					
	Non-Operating	15% to 100% Relative						
	Vibration			"	"	TP2337905C ATR149/BSR2546 TP2338640 ATR163/BSR2573	12/19/68 1/13/69	
	Operating	NA	Tested to Design Limit vib.					
	Non-Operating	Design Limit vib. Defined in figures 1-5	Levels indicated in figures 1-5					
	Launch & Flight			BMSD	Mishawauka, Indiana	TP2337915A ATR149/BSR2546 TP2338640 ATR163/BSR2573	12/19/68 1/13/69	
Lunar Landing								
Acceleration			Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP2337917A ATR161/BSR2571 TP2338640 ATR163/BSR2573	1/7/69 1/13/69		
Operating	NA	Tested to 15g±2g 11ms						
Non-Operating	14g±1g min in the +X Direction	14±1g 1 min in the +X Direction						
Shock								
Operating	NA	Tested to 15g±2g 11ms						
Non-Operating	15g±2g, 11ms Sawtooth ea axis	15g±2g 11ms Sawtooth ea axis						
Salt Spray	NA							
Sand & Dust	NA							
Fungus	NA							
Acoustical Noise	NA							
Rain	NA							
Radiation	NA							
Explosion Proof	NA							
PARAMETRIC					TP2334375			
Functional Performance	Tested as part of integrated system in Space Chamber.	Simulation	"	"		1/15/69	See First Remark.	
					ATR167/BSR2577			
	Note: See Section 2.6 discussion.							

QUALIFICATION STATUS LIST-ALSEP PROGRAM - ASSEMBLY, SUBPACKAGE #2

Date 1-31-69 No. ATM-825 Rev. No.
 Analyst Page ____ of ____ Pages

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Subpackage #2 BxA 2334844 Flt. #3 S/N 8	ENVIRONMENTAL Temperature: Operating Non-Operating Earth Moon	-300°F to +250°F -65°F to +160°F -300°F to +250°F	-300°F to +270°F (See note 1) -300°F to +250°F	BxA	Ann Arbor, Michigan	TP2334335 (ENV) TP2333032 (IST) ATR-60, 70 BSR-2367, 2376	6/10/68	Completed testing with no open items
	Pressure Operating Non-Operating	10 ⁻¹² Torr SL to 10 ⁻¹² Torr	Tested to 5 x 10 ⁻⁶ Torr	BxA	Ann Arbor, Michigan	Same as above	6/10/68	Test level limited by test equipment capabilities.
	Humidity Operating Non-Operating	N/A 15-100%	Designed to Meet Humidity Requirement	BxA	Ann Arbor, Michigan	N/A	N/A	No Testing planned to the 100% humidity level: ALSEP QTRR Board decision
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to CP 100001	Tested in Stowed Configuration to Desing Limit Levels Indicated in Figures 1-5.	BxA	Ann Arbor, Michigan	TP 2334348 ATR-84, 85 BSR 2404, 2405	6/28/68	Qualified
	Acceleration Operating Non-Operating	N/A CP100001	Tested to 14± 1g each axis	BxA	Ann Arbor, Michigan	TP 2334330 ATR-92, 93	7/6/68	Successful test
	Shock Operating Non-Operating	N/A CP100001	Test to 15 ± 2g each axis	BxA	Ann Arbor, Michigan	TP2334331 ATR - 88, 89 BSR - 2408, 2409	6/30/68	Successful test
	Salt Spray	N/A						} No test required
	Sand & Dust	Not Defined						
	Fungus	N/A						
	Acoustical Noise	Not Defined						
	Rain	N/A						
	Radiation	LED-520	130 w/ft ² I.R.	BxA	Ann Arbor, Michigan	TP2334335	6/10/68	See operating temperature
	Explosion Proof	N/A						No test required
	PARAMETRIC Mission Simulation	ATM-785 Section 5.3	Capable of startup and operation on lunar surface	BxA	Ann Arbor, Michigan	TP 2334345 TP 2338610 ATR-101, 102	8/7/68	Qualified contingent on completion of open items in note 3
	Note 1: Temperature storage tests may be replaced by an added deployment test per MSC Letter BG 931/L226/T97(CCP-122). Note 2: Differences for Array B configuration is defined in Section 3.0 were qualified to comparable environment levels in accordance with test procedures and reports referenced in addendum #1 dated 1/27/69 of ALSEP TM-321. Note 3: See Section 3.0 discussion.							

QUALIFICATION STATUS LIST-ALSEP PROGRAM

SUBPACKAGE II, RTG ASSEMBLY

Revised
1/31/69

Date 20 June	No. ATM-825	Rev. No. ■
Analyst F, W	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Radioisotope Thermoelectric Generator (R. T. G) G. E. #47E300779 Mod. 21 632011	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	1000°F to 1140°F -380°F to 440°F	1170° F 500° F	BxA	Ann Arbor, Michigan	TP 2334335 ATR-60 BSR-2387	May-June 1968	Qualification at assembly level was performed by G. E. Refer to test reports ANSQ Doc. No. 6300-281, ANSQ Doc. No. 6300-288
	Pressure Operating Non-Operating	Sea Level to 1x10 ⁻¹² torr	5x10 ⁻⁵ torr 16x10 ⁻⁸ torr	BxA	Ann Arbor, Michigan	↓	↓	Test level limited by test equipment capability
	Humidity Operating Non-Operating	15 to 100%	Designed to meet humidity requirements	N/A	N/A	N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	ATR-16 Addendum 1	Refer to Table 1	General Electric Valley Forge Technology Center Philadelphia, Pa.	General Electric	GE Doc. #6300 Doc. #6300-288	Jan 1968	Qualified at Subpackage #2 Design limit level in the stowed configuration. Refer to ATR-84, 85
	Acceleration Operating Non-Operating	ATR-16 Addendum 1	7. SG 3 to 4 min each axis	BxA	Ann Arbor, Michigan	TP 2334330 ATR-92, 93	June 1968	Successfully Tested, Qual SA
	Shock Operating Non-Operating	ATR-16 Addendum 1	15 G each axis 11 msec±10%	BxA	↓	TP 2334331 ATR-88, 89 BSR-2408, 2409	June 1968	" "
	Salt Spray	N/A	N/A	N/A	N/A	N/A		
	Sand & Dust	NYD	G. E.	Phil. Penn.	NYD	NYD		
	Fungus	N/A	N/A	N/A	N/A	N/A		
	Acoustical Noise	NYD	NYD	G. E.	Phil. Penn.	NYD		
	Rain	N/A	N/A	N/A	N/A	N/A		
	Radiation	NYD	NYD	G. E.	Phil. Penn.	NYD		
	Explosion Proof	NYD	NYD	G. E.	Phil. Penn.	NYD		
	<u>PARAMETRIC</u>							

QUALIFICATION STATUS LIST-ALSEP PROGRAM

SUBPACKAGE II, RTG SHORTING PLUG

Revised
1/31/69

Date	No. ATM-825	Rev. No. <input type="checkbox"/>
Analyst	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
RTG Shorting Plug BxA 2338017 Flt. #3 S/N-5 See Note 1.	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-300°F to +50°F -60°F to +160°F	-300°F to +250°F -60°F to +160°F	Bendix Aerospace System	Ann Arbor Michigan	TP2334335 TP2333032 ATR-60, 70 BSR-2367, 2376	June 1968	Successfully tested on Qual SA model.
	Pressure Operating Non-Operating	1x10 ⁻¹² Torrs SL to 1x10 ⁻¹²	Tested to 5x10 ⁻⁶ Torrs					Capability limited by test Equipment Capability
	Humidity Operating Non-Operating	N/A	Designed to meet Humidity Requirements		N/A	N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	N/A Refer to Fig. 1-5	Tested in stowed configuration to Design Limit levels indicated by Fig. 1-5		Ann Arbor Michigan	TP2334348 ATR-84, 85 BSR-2404, 2405	July 1968	Successfully Tested, Qual SA
	Acceleration Operating Non-Operating	N/A LTA-3D/R	Tested to 14 ± 1g 1 min duration 5 times @ axis			TP2334330 ATR-92, 93	June 1968	" "
	Shock Operating Non-Operating	N/A LTA-3D/R	Tested to 15 ± 2g 11 ms sawtooth 5 times @ axis.			TP2334331 ATR-88, 89 BSR-2408, 2409	June 1968	" "
	Salt Spray	N/A						
	Sand & Dust	Not Defined						
	Fungus	N/A						
	Acoustical Noise	Not Defined						
	Rain	N/A						
	Radiation	Not Defined	IR 130W/ft ²					
	Explosion Proof	N/A						
	<u>PARAMETRIC</u>							
		Note 1: Qualified on Qual SA configuration as BxA 2335520 Assembly Revision C which is identical to BxA 2338017 Assembly used on Array B.						

QUALIFICATION STATUS LIST-ALSEP PROGRAM

SUBPACKAGE #2, APOLLO LUNAR HANDLING TOOL (ALHT)

Date 1/29/69	No. ATM-825	Rev. No.
Analyst JTS	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
ALHT SEB39101165 SN/102	<u>ENVIRONMENTAL</u>							See Notes Below
	Temperature:							
	Operating							
	Non-Operating							
	Earth							
	Moon							
	Pressure							
	Operating							
	Non-Operating							
	Humidity							
	Operating							
	Non-Operating							
	Vibration							
	Operating							
	Non-Operating							
Launch & Flight								
Lunar Landing								
Acceleration								
Operating								
Non-Operating								
Shock								
Operating								
Non-Operating								
Salt Spray								
Sand & Dust								
Fungus								
Acoustical Noise								
Rain								
Radiation								
Explosion Proof								
<u>PARAMETRIC</u>								
Note 1:	The ALHT mass simulator rather than a flight configuration model was used for the BxA Qual SB system level dynamic tests.							
Note 2:	Refer to SP#2 QSL Sheet B-25 for shock, vibration and acceleration environment levels which apply to the interface qualification.							
Note 3:	Minutes 974-1264 on the QAR Board Meeting for Qual SB reflect that no category II open items exist to contain qualification.							

QUALIFICATION STATUS LIST-ALSEP PROGRAM

SUBPACKAGE #2, APOLLO LUNAR SCIENTIFIC DRILL (ALSD)

Date 1/29/69	No. ATM-825	Rev. No.
Analyst JTS	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
ALSD 467A805000 -029 Serial Number 0000003	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon							See Notes Below
	Pressure Operating Non-Operating							
	Humidity Operating Non-Operating							
	Vibration Operating Non-Operating Launch & Flight Lunar Landing							
	Acceleration Operating Non-Operating							
	Shock Operating Non-Operating							
	Salt Spray							
	Sand & Dust							
	Fungus							
	Acoustical Noise							
	Rain							
	Radiation							
	Explosion Proof							
	<u>PARAMETRIC</u>							
		Note 1: The ALSD is GFE and was previously qualified at a subsystem level by the Martin Co. prior to DRILL/ALSEP interface testing on the BxA Qual SB system.						
	Note 2: Refer to SP#2 QSL sheet B-25 for shock, vibration and acceleration levels which apply to interface qualification							
	Note 3: Minutes 9713-13-345 of the QAR Qual SB meeting established that no category II open items exist to constrain qual status.							

QUALIFICATION STATUS LIST-ALSEP PROGRAM

SUBPACKAGE #2, PSE LEVELING STOOL

Date 1/31/69	No. ATM-825	Rev. No.
Analyst PM/ J. Brent	Page ____ of ____ Pages	

Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
PSE Leveling Stool Assembly P/N 233400 BxA #2333795	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	107°F to 125°F -65°F to 160°F Same as Operating	Tested in Space Simulation Chamber for Temperature	Bendix Aerospace Systems Division	Ann Arbor, Michigan	TP2334335 ATR-60, 70 BSR-2367 2376	May-June 1968	Qualification Accomplished at the System Level, QSA
	Pressure Operating Non-Operating	1 x 10 ⁻¹² mm Hg 1 x 10 ⁻⁸ mm Hg	Verified to 5 x 10 ⁻⁵ Torrs in Space Sim. Cham					
	Humidity Operating Non-Operating	Not Applicable	Designed to Meet Humidity Requirements			N/A	N/A	
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	Not Applicable Refer to ATR-16 Addendum 1	Tested in Stowed Configuration to Vibration Design Limits Indicated in Figs. 1 Thru 5			TP 2334348 ATR-84, 85 BSR-2404, 2405	July-Aug 1968	
	Acceleration Operating Non-Operating	Not Applicable	Tested in Stowed Configuration to 14 ± 1g 1 Min.			TP 2334330 ATR-92, 93	7/4/68	
	Shock Operating Non-Operating	Not Applicable ATR-16- Add 1	Tested in Stowed Configuration to 15 ± 2g 11ms 3 Times Ea Axis			TP 2334331 ATR-88, 89 BSR-2408, 2409	6/24/68	
	Salt Spray	Not Applicable	Not Applicable					
	Sand & Dust	LED-520	Designed to Meet					
	Fungus	Not Applicable	Not Applicable					
	Acoustical Noise	Not Applicable	Not Applicable					
	Rain	Not Applicable	Not Applicable					
	Radiation	LED-520	Designed to Meet					
	Explosion Proof	Not Applicable	Not Applicable					
	<u>PARAMETRIC</u>							