



Qualification Status List
Fuel Cask and Structure Assembly Flight 1,
Flight Back-Up, Flight 2, Flight 3 and
Flight 4

NO.	REV. NO.
ATM 780	A
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DATE	Revised 5-7-69

In compliance with NASA Contract NASA 9-5829 requirements, this document provides a Qualification Status List (QSL) for use as part of the ALSEP Fuel Cask and Structure Assembly Flight 1 Acceptance Data Package (ADP). As of the date of publication, the information contained herein reflects the status of qualification following the system level thermal/vacuum, shock, and vibration tests conducted at the General Electric Missile and Space Division, Valley Forge, Pennsylvania and at BxA.

The following items represent Qualification and Flight model differences.

1. Inconel high temp helicoil inserts which were subjected to T/V test were replaced with CRES Helical Coil inserts. These inserts are considered to be qualified for the T/V environment by similarity of design. The CRES inserts were incorporated prior to Design Level Shock and Vibration Testing.
2. The Lanyard Assembly, part no. 2338128, was redesigned to replace the lanyard hook with a bolt and nut through a clevis link. This change provides a positive attachment of the lanyard assembly and does not impact T/V qualification. The change was incorporated prior to Qualification Shock and Vibration Tests.
3. The Baroswitch #2203114 and thermal systems sensory #5001-32 assembly was not a part of the T/V qualification model but did undergo T/V qualification at BxA as a subsystem. The switch 2338650 and sensor assembly were incorporated into the Fuel Cask and Structure Assembly prior to Qual Level Shock and Vibration Tests.
4. The Spline Retainer Bracket was incorporated subsequent to the T/V qualification test; however, a T/V environment would have little or no effect on its function and does not impact the T/V qualification. The spline retainer was incorporated prior to Qual Level Shock and Vibration Testing.

Based on the successful completion of thermal/vacuum, shock and vibration qualification testing of the ACA, it is concluded that the ACA is fully qualified for flight.

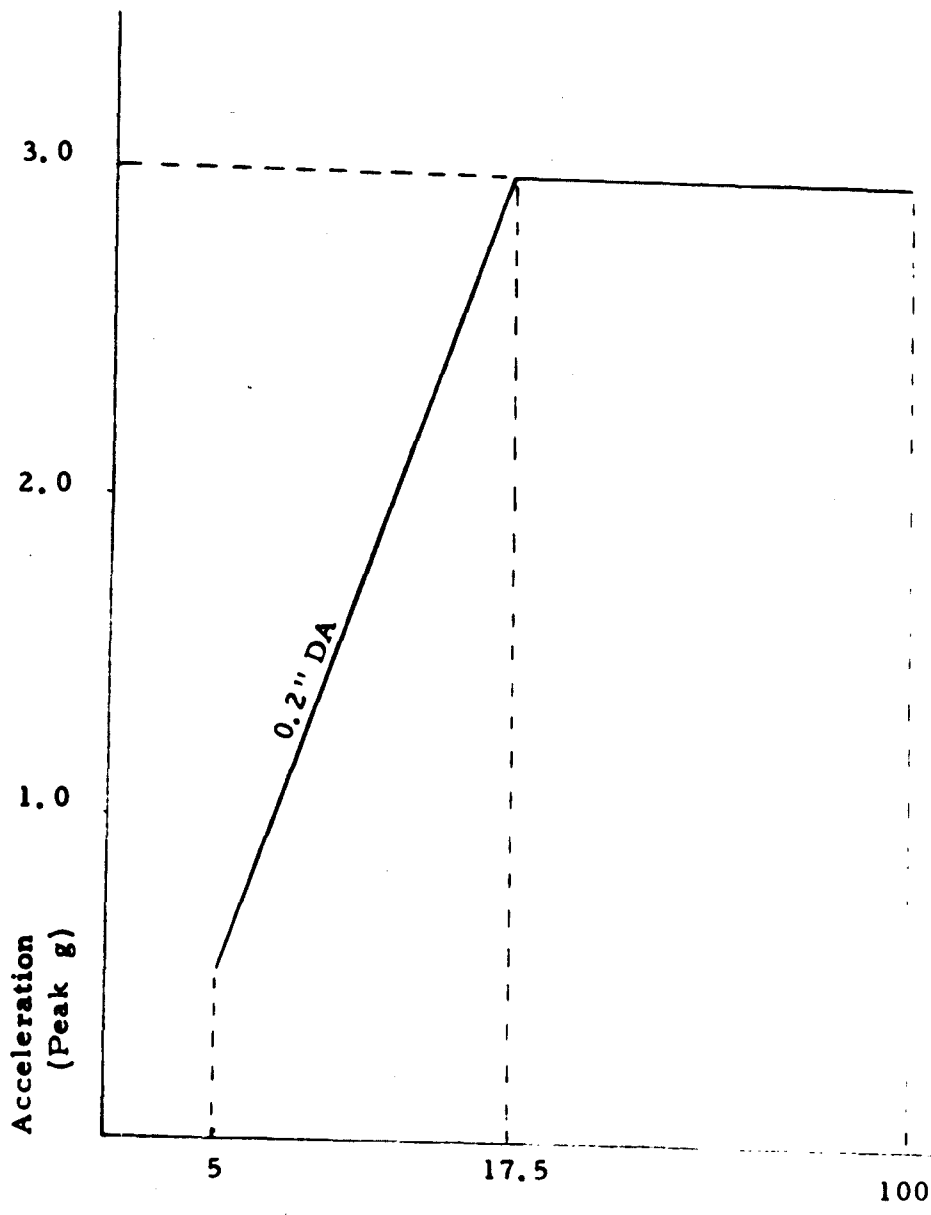
Prepared by: J. T. Staats
J. T. Staats

Approved by: S. J. Ellison
S. J. Ellison, Manager
ALSEP Reliability



**Aerospace
Systems Division**

ACA Qual Level Sine Wave Vibration
Launch and Boost Phase
Figure 1



5 - 100 - 5 Hz

Scan Rate - 3 oct/minute

Tolerance - $\pm 10\%$

NOTE: A slight overtest may be experienced at the ACA resonance frequency (40Hz) during sinusoidal "Y" axis vibration, due to the characteristic of the vibration system servo loop's inability to maintain the input at the ACA resonance.

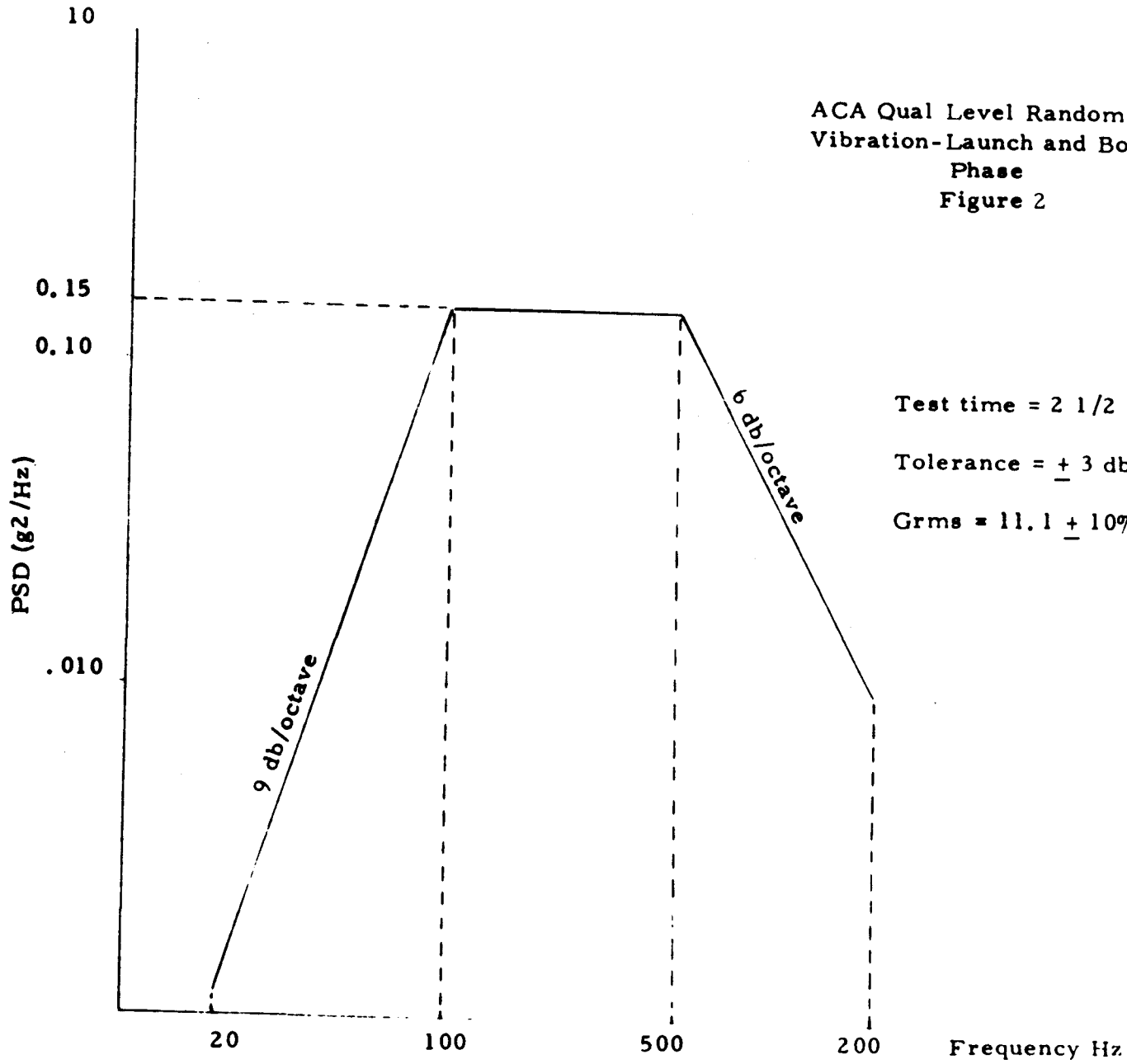
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ACA Qual Level Random
Vibration-Launch and Boost
Phase
Figure 2



Test time = 2 1/2 minutes/axis

Tolerance = + 3 db

Grms = 11.1 + 10%

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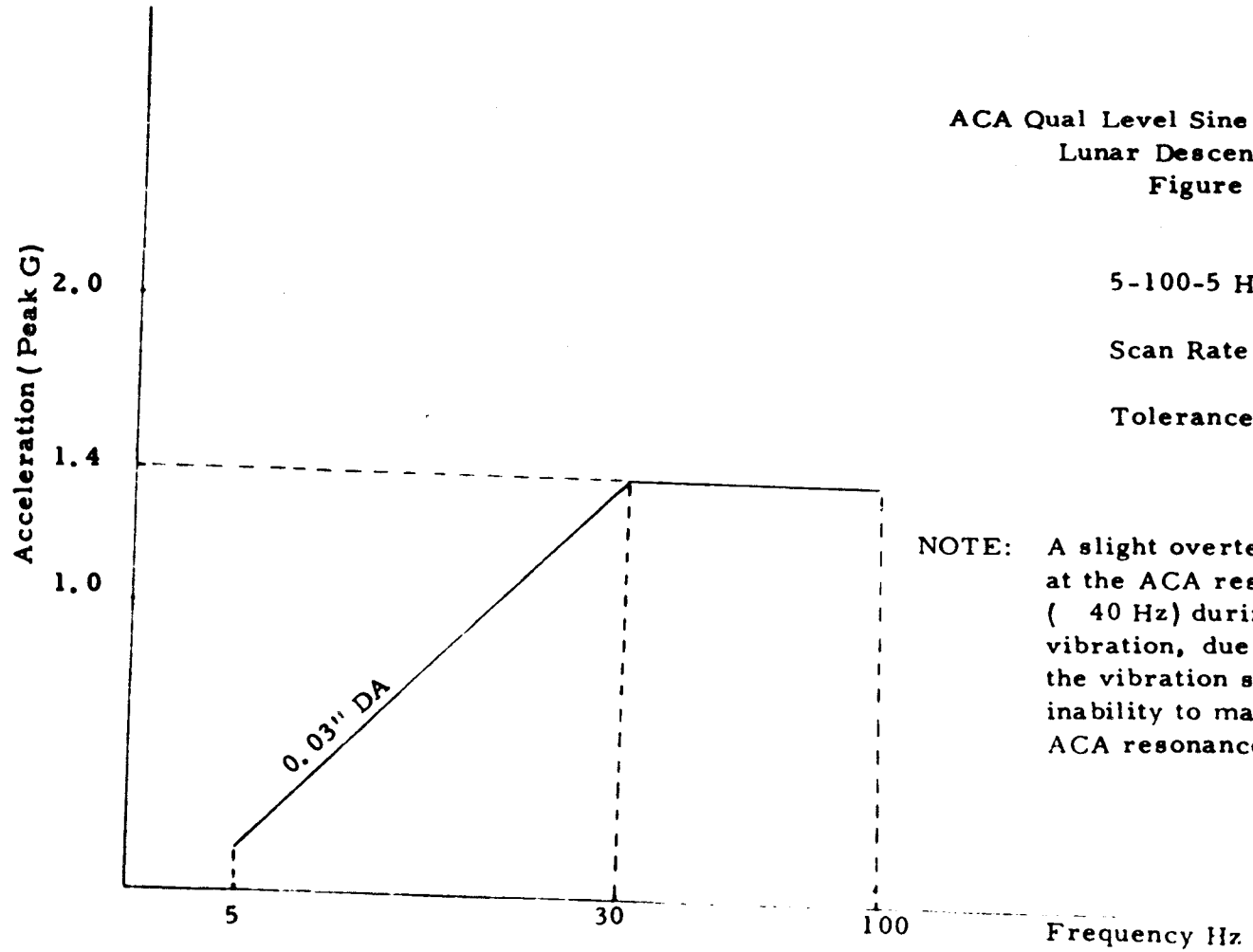
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**ACA Qual Level Sine Wave Vibration
Lunar Descent Phase
Figure 3**

5-100-5 Hz

Scan Rate - 1 oct/minute

Tolerance $\pm 10\%$



NOTE: A slight overttest may be experienced at the ACA resonance Frequency (40 Hz) during sinusoidal "Y" axis vibration, due to the characteristic of the vibration system servo loop's inability to maintain the input at the ACA resonance.

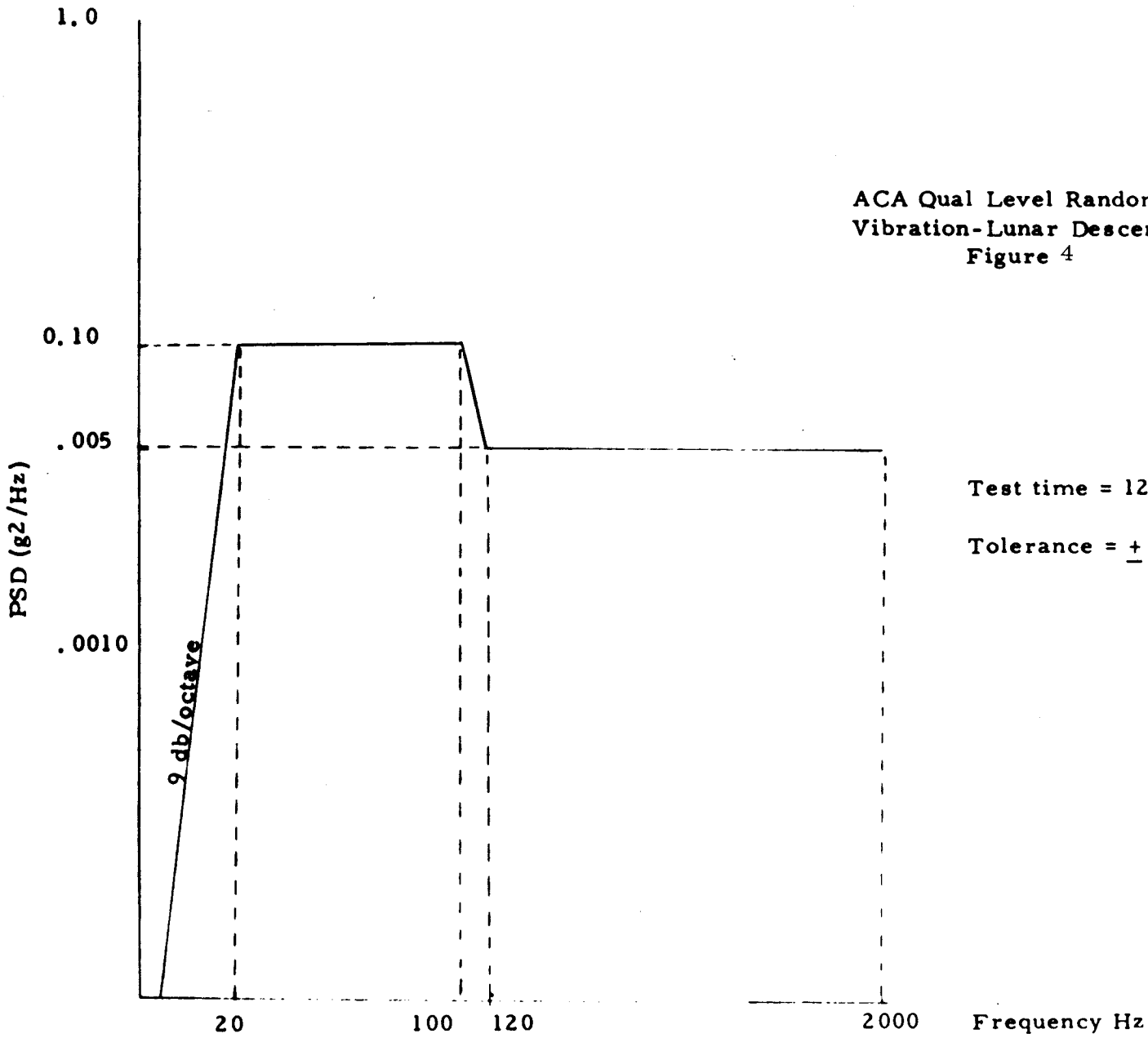
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**Aerospace
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ACA Qual Level Random
Vibration-Lunar Descent Phase
Figure 4



Test time = 12 1/2 minutes/axis

Tolerance = + 3 db

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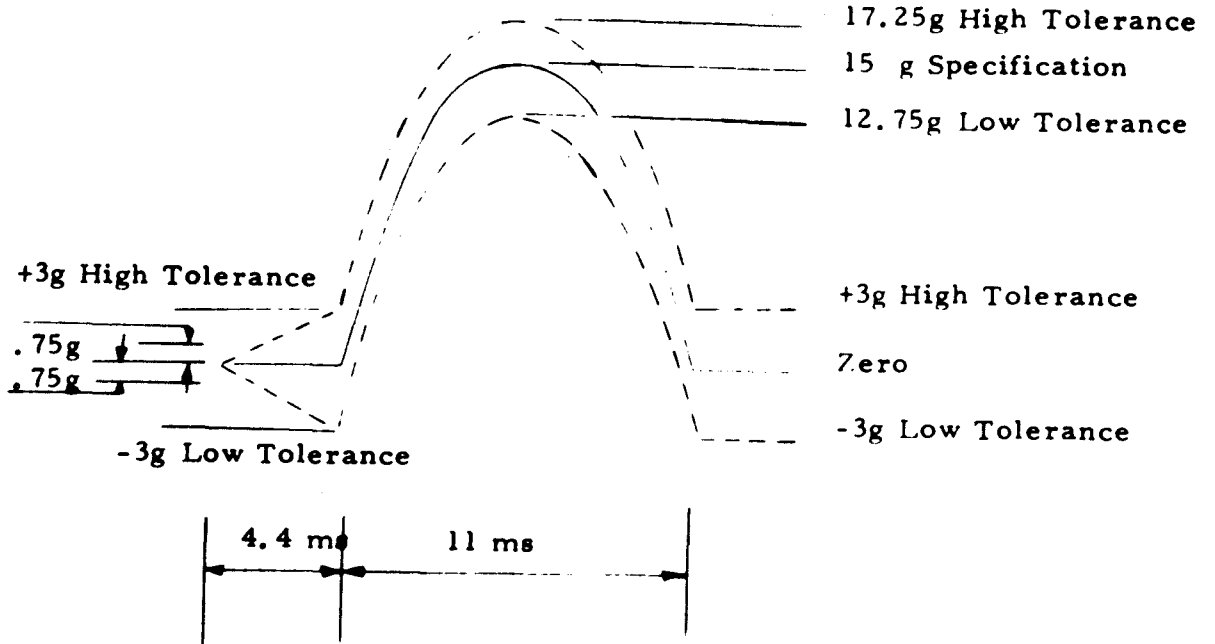


FIGURE 5

**HALF SINE SHOCK PULSE CONFIGURATION AND ITS TOLERANCE LIMITS
(+X, +Y, +Z DIRECTION)**

QUALIFICATION STATUS LIST-ALSEP PROGRAM

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Item Nomenclature	Environment and/or Parameter	Stress Level		Verification of Stress Level Capability				Remarks
		Requirement	Capability	Agent	Location	Document Reference	Date	
Fuel Cask Band & Structure Assembly 2333650 Astronaut Guard 2333675	<u>ENVIRONMENTAL</u> Temperature: Operating Non-Operating Earth Moon	-460°F to +270°F	-460°F to +270°F	General Electric Missile & Space Division	Valley Forge, Pa.	As Run T/V TP SI 249205 and ATR 200/BSR 2634	2/4/69	Successfully Tested
	Pressure Operating Non-Operating	Sea Level to 10 ⁻¹² TORR	Tested to 1 x 10 ⁻⁵ TORR	General Electric Missile & Space Div.	Valley Forge, Pa.	ATR 200/BSR 2634 As Run T/V TP SI 249205	2/4/69	Successfully tested to 1 x 10 ⁻⁵ TORR
	Humidity Operating Non-Operating	15% to 100%	Designed to meet the requirement	N/A				No testing required
	Vibration Operating Non-Operating Launch & Flight Lunar Landing	Vibration Levels as defined in Figures 1 thru 4.	Meets the vibration levels defined in figures 1 thru 4	General Electric Missile & Space Div.	Valley Forge, Pa.	Cask Assy. Dynamic Test Procedure SI 249203 and ATR 200/BSR 2634	3/29/69	Successfully Tested
	Acceleration Operating Non-Operating	N/A	N/A	N/A				
	Shock Operating Non-Operating	Shock Level as defined in Figure 5	15 g half sine 15.4 MS	General Electric Missile & Space Div.	Valley Forge, Pa.	Cask Assy. Dynamic TP SI 249203 ATR 200/BSR 2634	3/29/69	Successfully Tested
	Salt Spray	N/A						
	Sand & Dust	N/A						
	Fungus	N/A						
	Acoustical Noise	N/A						
	Rain	N/A						
	Radiation Explosion Proof							
	<u>PARAMETRIC</u> NOTE: The Baroswitch and sensors were successfully qualified at BxA for Thermal Vacuum per TP 2333650 (ALSEP-TM-417).							