

**QUALIFICATION ENVIRONMENTS**  
**FOR**  
**ARABSAT PROPELLANT TANK**  
**ATK P/N 80301-1**

**Table 1: P/N 80301-1 ARABSAT PROPELLANT TANK Assembly Specifications**

<b>Parameters</b>	<b>Requirements</b>
Operating Pressure	psig
Proof Pressure	psig, Actual Proof: psig
Burst Pressure	psig, Actual Burst: psig
External Pressure	Not Tested
Internal Vacuum	Not Tested
Material of Construction	Cylindrical titanium pressure vessel, with three ports at the polar boss of the ported hemisphere.
Membrane Thickness	"
Tank Mount(s)	Mounted by three radial lugs on the cylinder near the weld to the ported hemisphere and a polar boss on the blind hemisphere.
Expulsion Efficiency	%
Design Fill Fraction	-
Tank Capacity	in <sup>3</sup>
Internal Dimensions	27.5" Ø x 49"
Tank Weight	Maximum tank weight is 60.0 lbs, Actual tank weight is 56.69 lbs
Propellant Capacity	-
Shell Leakage	<1x10 <sup>-6</sup> std cc/sec He max, Actual: x10 <sup>-7</sup> scc/sec He @ psig
Failure Mode	Burst
Natural Frequency	-
Temperature Environment	-
On Orbit Life	-

**80301-1 was subjected to the following qualification tests:**

<u>TEST SEQUENCE</u>	<u>TEST DESCRIPTION</u>
1	GROUND-DRAIN SCAVENGING TUBE GAS-ARRESTOR BUBBLE POINT
2	STANDPIPE GAS- ARRESTOR BUBBLE POINT
3	PRESSURANT END GAS-ARRESTOR BUBBLE POINT
4	DOWNSTREAM GAS- ARRESTOR BUBBLE POINT
5	UPSTREAM GAS- ARRESTOR BUBBLE POINT
6	PICK-UP WINDOWS GAS-ARRESTOR BUBBLE POINT
7	PMD LEVEL EXPULSION
8	INSPECTION
9	PROOF PRESSURE & INTERNAL VOLUME
10	RADIOGRAPHIC
11	PENETRANT

12	PRESSURE CYCLING
13	LEAK TEST
14	EXPULSION
15	CLEANLINESS
16	RANDOM VIBRATION
17	SINE VIBRATION (LOADED)
18	SINE VIBRATION (EMPTY)
19	CLEANLINESS
20	ACCELERATION
21	EXPULSION
22	RADIOGRAPHIC
23	LEAK TEST
24	BURST PRESSURE
25	DATA REVIEW (ARIENE & STS QUALIFICATION)
26	SPIN UP ACCELERATION
27	EXPULSION
28	DATA REVIEW (DELTA QUALIFICATION)

The following tests are described in this report.

- 1) Pressure Log
- 2) Proof Pressure Test
- 3) Pressure Cycling Test
- 4) Random Vibration
- 5) Sine Vibration (Loaded)
- 6) Sine Vibration (Empty)
- 7) Acceleration Test
- 8) Burst Pressure Test

## **Pressure Cycling**

### **Proof Cycles**

The test specimen was pressurized to 375, +10, -0 PSIG and held for 10 seconds maximum.

### **MEOP Cycles**

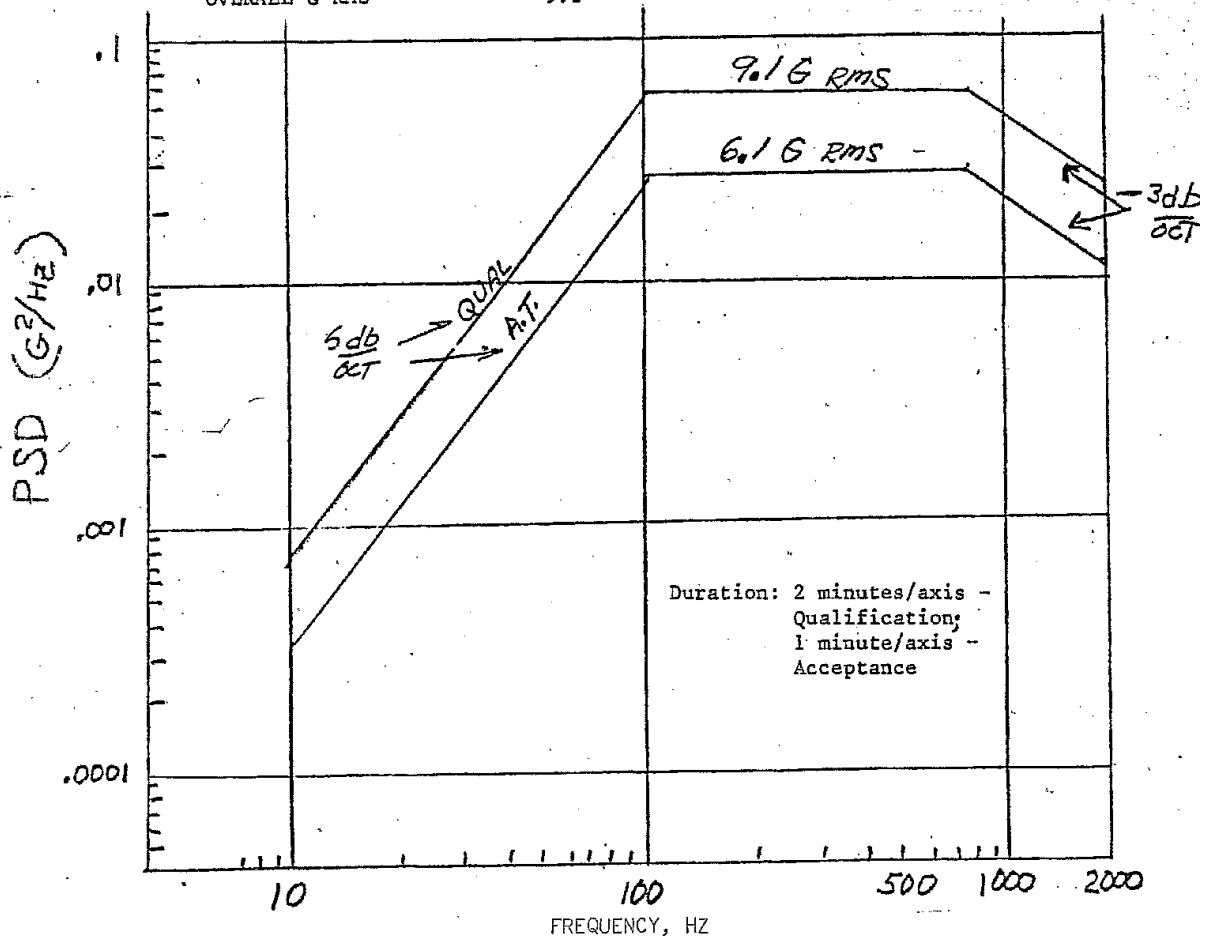
A total of 5 cycles were conducted. The test specimen was pressurized to 250, +10, -0 PSIG for a total of 50 cycles.

## Random Vibration

Specimen was loaded with 1129, +10, -0 lbs. test fluid.

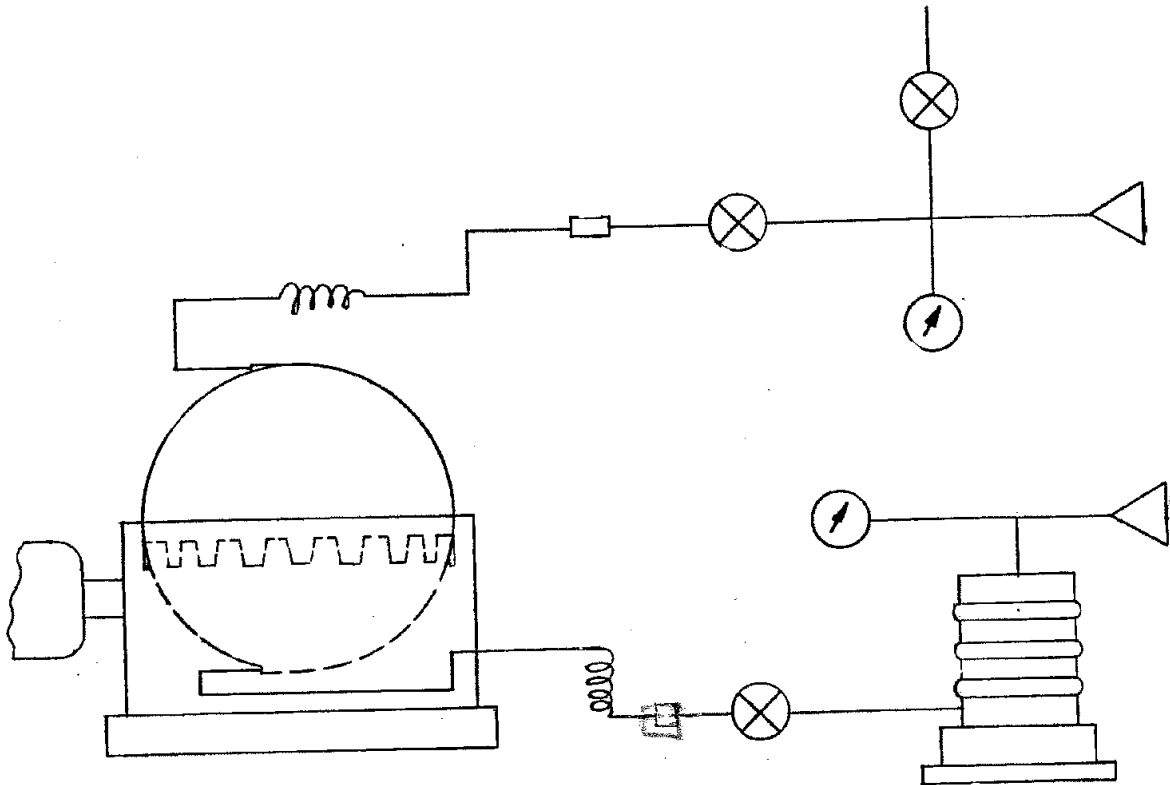
### RANDOM VIBRATION INPUT LEVEL

SPEC	QUAL	ACCEPTANCE
10-100 HZ	+6dB/OCT	+6dB/OCT
100-800 HZ	.06 G <sup>2</sup> /HZ	.0267 G <sup>2</sup> /HZ
800-2000 HZ	-3dB/OCT	-3dB/OCT
OVERALL G RMS	= 9.1	= 6.1



**Random Vibration (Wet)**

WET VIBRATION SET-UP

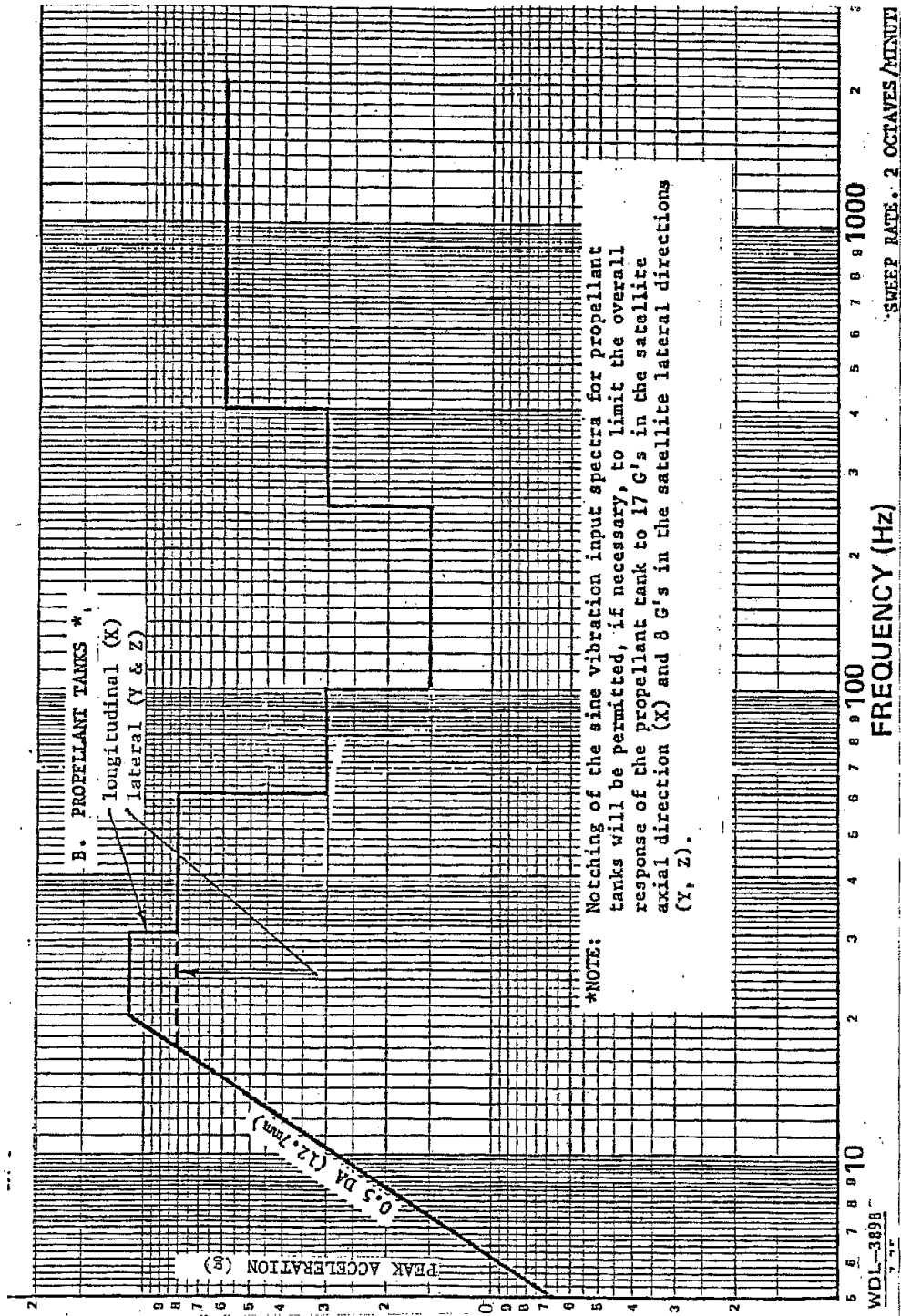




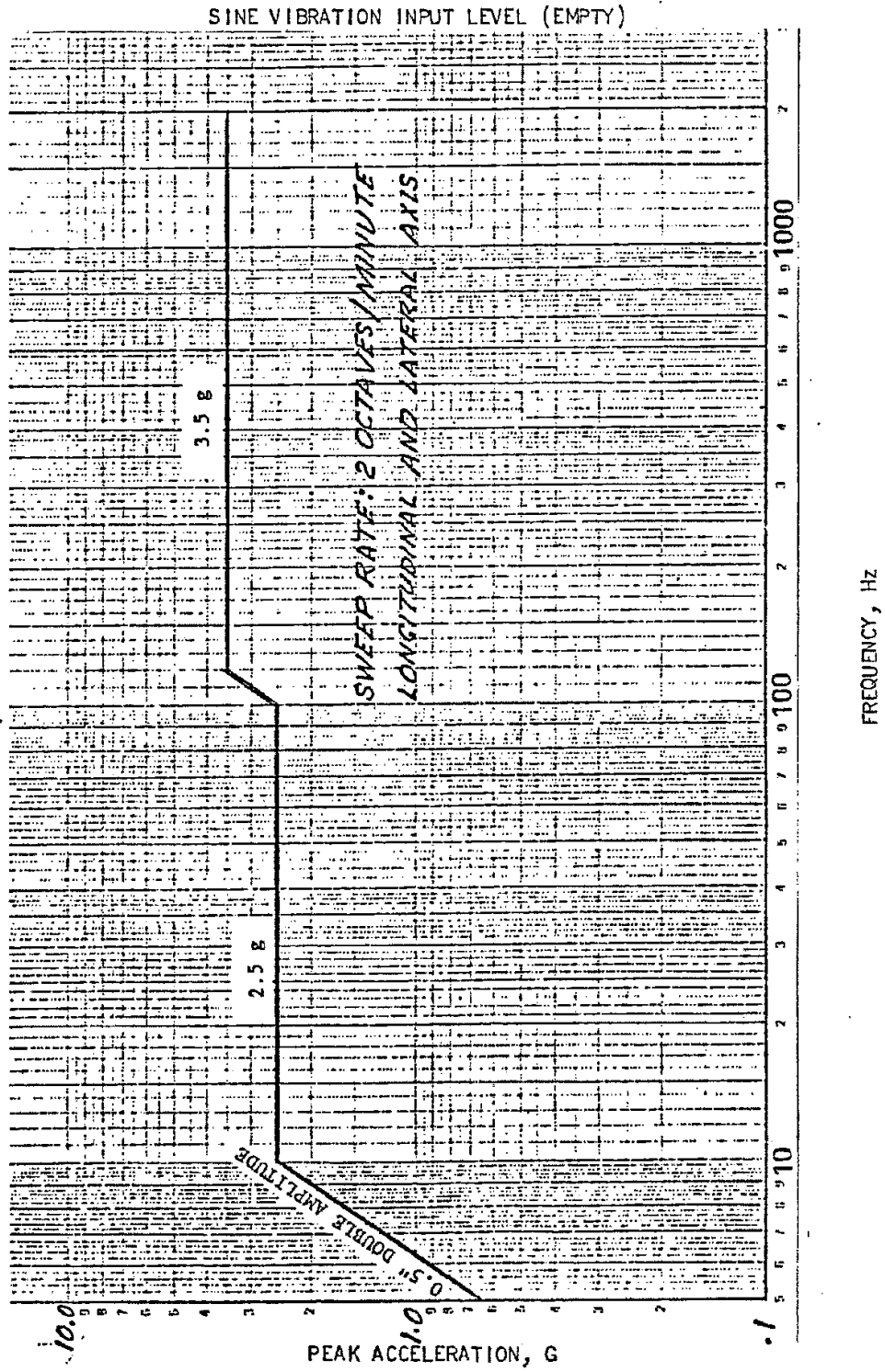
# Sine Vibration (Loaded)

Specimen was loaded with 1129, +10, -0 lbs. test fluid.

SINE VIBRATION INPUT LEVEL

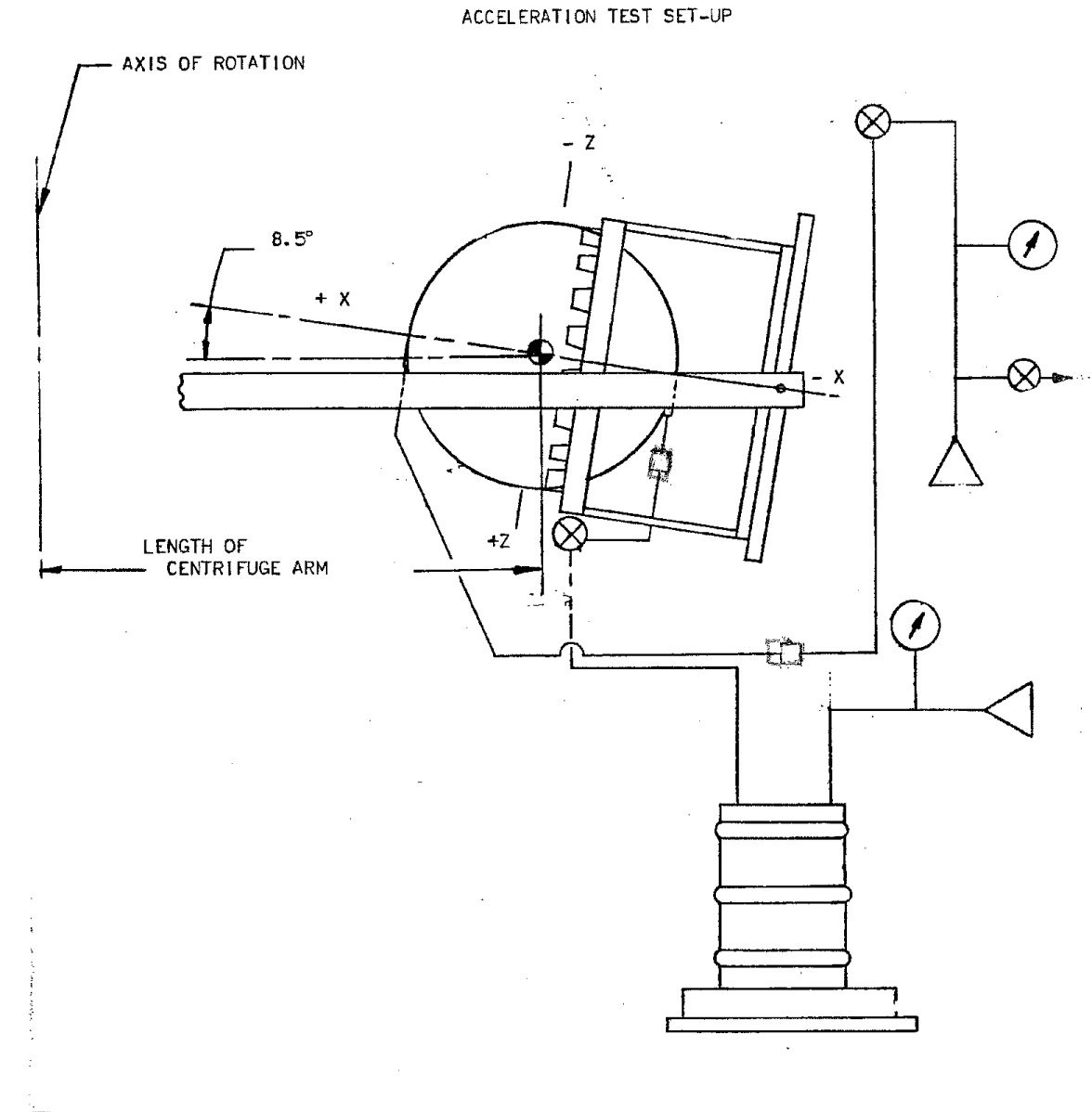


# Sine Vibration (Empty)



## Acceleration Test

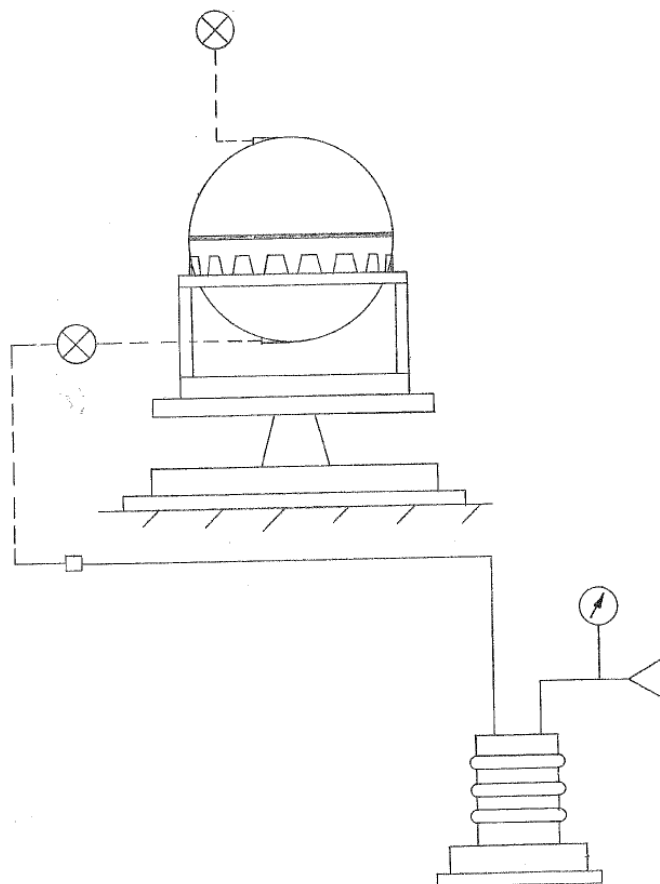
An acceleration load of 17.0, +1, -0g was applied for 60, +10, -0 seconds.



Conduct the spin-up of acceleration test in the following steps:

- A) Mount the test specimen into the test set-up as shown in Figure 17. Propellant and pressurant tubes shall be adequately secured during acceleration to prevent failure of the tubes.
- B) To achieve the specified maximum spin-up acceleration of  $10.5 \text{ rad/sec}^2$ , either one of the two following methods may be used:

SPIN-UP ACCELERATION TEST SET-UP



## Burst Pressure

With the test specimen installed in the test set-up  
conduct the burst test in the following steps:

- A) Fill the test specimen.  
Vent all air from the specimen. Measure the temperature,  
specific resistance and pH of the water.
  
- B) Pressurize the test specimen at a rate of  $200 \pm 100$  psi/minute  
to 540, +10, -0 psig. Hold for 5 seconds maximum then  
depressurize to 0 psig. THE SPECIMEN SHALL NOT RUPTURE OR  
LEAK.
  
- C) Drain all water from the test specimen