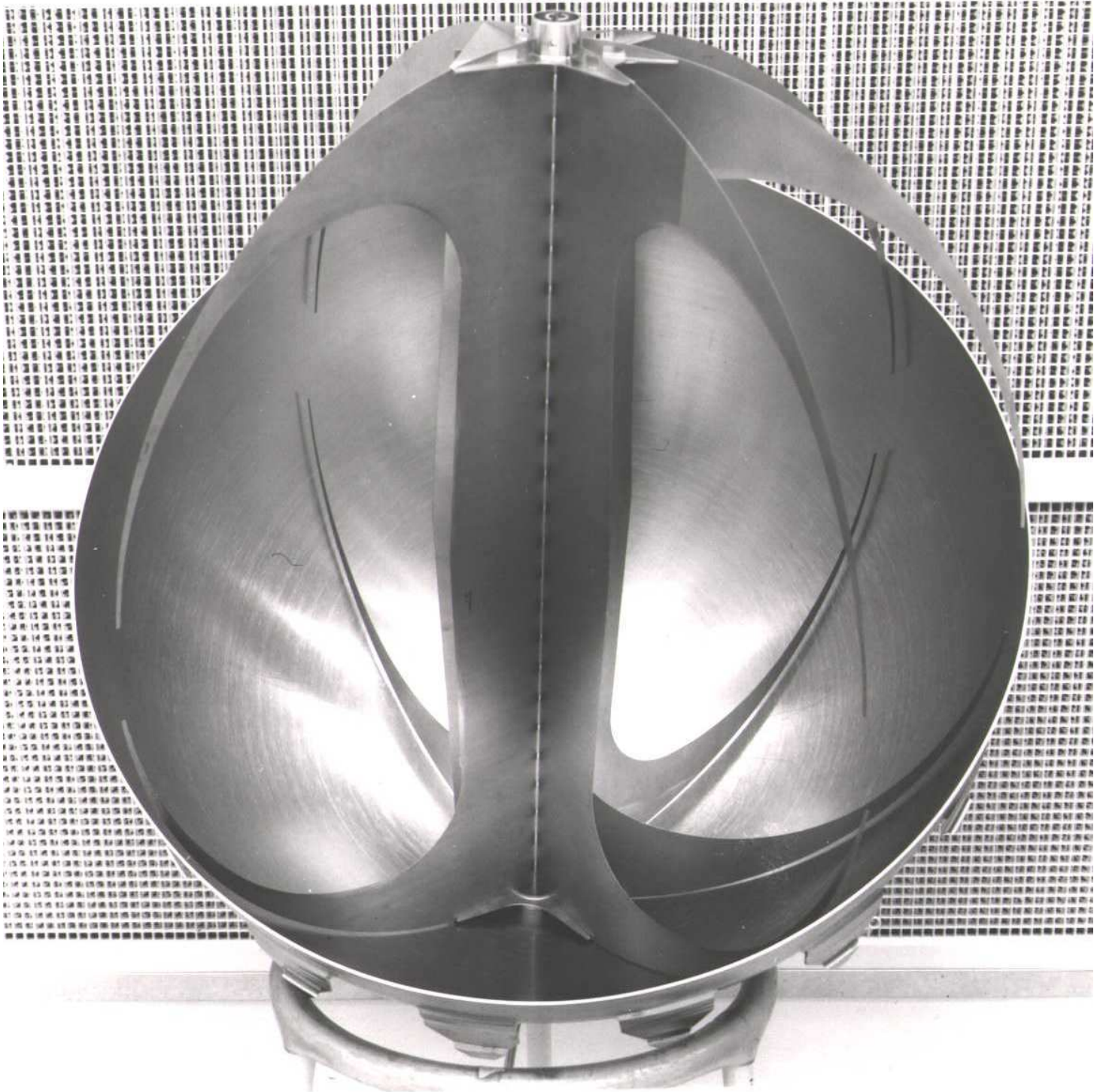


QUALIFICATION ENVIRONMENTS
FOR
PROPELLANT PRESSURE VESSEL
ATK P/N 80277-1

ATK P/N 80277-1



Specimen Configuration

 **PSI** | 2017 camfield avenue
los angeles, cal. 90040
PRESSURE SYSTEMS, INC.

PSI REPORT No. 56-000083
APPENDIX B, PAGE B-27

FIGURE 1
PROPELLANT PRESSURE VESSEL
CONFIGURATION

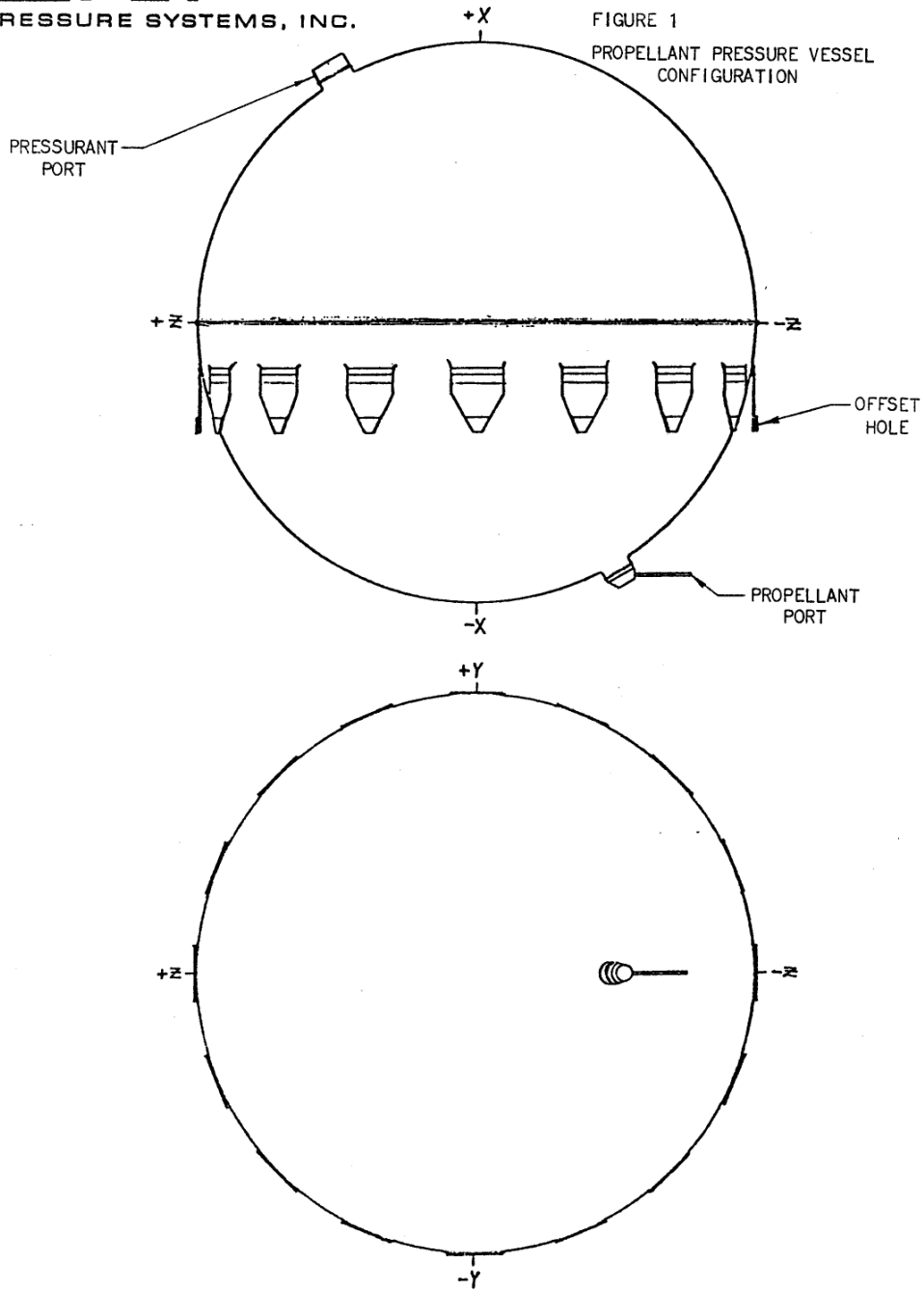


Table 1: P/N 80277-1 Propellant Pressure Vessel Assembly Specifications

Parameters	Requirements
Operating Pressure	250 psig
Proof Pressure	510 psig, Actual Proof: 515 psig
Burst Pressure	520 psig, Actual Burst: 525 psig,
External Pressure	Not tested
Internal Vacuum	Not tested
Material of Construction	This tank assembly is primarily fabricated from two closed die forgings of Ti-6AL-4V alloy. The propellant and pressurant ports are respectively 3/8 and 1/4 titanium to stainless steel transition tubes.
Membrane Thickness	0.039"
Tank Mount(s)	Mounted by 16 circumferential tabs.
Expulsion Efficiency	%
Design Fill Fraction	-
Tank Capacity	18450 in ³
Internal Dimensions	32.84" Ø
Tank Weight	Maximum tank weight is 32.6 lbs, Actual tank weight is 32.5 lbs
Propellant Capacity	-
Shell Leakage	<1x10 ⁻⁶ std cc/sec He max, Actual: none
Failure Mode	Burst
Natural Frequency	-
Temperature Environment	-
On Orbit Life	-

80277-1 was subjected to the following qualification tests:

<u>TEST SEQUENCE</u>	<u>TEST DESCRIPTION</u>
1	INSPECTION
2	PROOF PRESSURE
3	RADIOGRAPHIC
4	PENETRANT
5	LEAKAGE
6	EXPULSION TEST
7	PRESSURE CYCLING
8	CLEANLINESS
9	RANDOM VIBRATION
10	SINE VIBRATION (LOADED)
11	SINE VIBRATION (EMPTY)
12	CLEANLINESS
13	ACCELERATION
14	EXPULSION TEST
15	RADIOGRAPHIC
16	LEAKAGE
17	BURST PRESSURE
18	DATA REVIEW

The following tests are listed in this document:

- 1) Proof Pressure Test
- 2) Pressure Cycling Test
- 3) Random Vibration Test
- 4) Sine Vibration Test
- 5) Acceleration Test
- 6) Burst Test

Proof Pressure Test

Tank is pressurized to 515 psig.



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APPENDIX A, PAGE A-2

N/C

DATA SHEET B
PROOF PRESSURE

DATE 11-30-79

PSI PART No. 80277-1

PSI SERIAL No. 0001

TEST PROCEDURE PARA. No. 4.2

TEST EQUIPMENT ASHCROFT GAUGE (ST0090) 0-1000 PSIG, CALIBRATION DUE 3-78

TEST MEDIA: DEIONIZED WATER		REQUIREMENTS			
WATER SPECIFIC RESISTANCE		<u>17 MEGOHMS</u>			500,000 OHMS MIN
WATER PH		<u>7.2</u>			5.5 TO 8.0
INITIAL FILL RATE		<u>2.8 GAL/MIN</u>			22.0 LB/MIN MINIMUM
	PRESSURE (PSI)	TEMP (°F)	WEIGHT (LB)		VOLUME (IN ³)
WEIGHT EFFECT OF WATER FILLED LINE (WE)				*	
EMPTY TANK & FIXTURE			<u>466.2</u>		
LOADED TANK & FIXTURE (INITIAL)	0	<u>76°</u>	<u>1133.4</u>		<u>18520.2</u>
LOADED TANK & FIXTURE (FINAL)	0	<u>78°</u>	<u>1133.4</u>		<u>18525.3</u>
OPERATING PRESSURE 250, +10, -0 PSIG	<u>250</u>	<u>78°</u>	<u>1139.3</u>		<u>18641.9</u> (VOLUME AT 250 PSIG)
PROOF PRESSURE 510, +10, -0 PSIG	<u>515</u>	<u>78°</u>	<u>1143.6</u>		
(REQUIRED PROOF PRESSURE 510, +10, -0 PSIG)		(REQUIRED POST PROOF VOLUME 18500 ± 100)			

*INCLUDED IN THE EMPTY TANK AND FIXTURE WEIGHT.

$$\text{VOLUME} = \left[\text{WEIGHT LOADED} - (\text{WE} + \text{WEIGHT EMPTY}) \right] \times \text{WATER SPECIFIC VOLUME (FIGURE 3)}$$

	ACTUAL	REQUIRED
VOLUME CHANGE $\frac{\text{FINAL VOLUME} - \text{INITIAL VOLUME}}{\text{INITIAL VOLUME}} \times 100 =$	<u>.0275</u>	<u>+2% MAX</u>

TESTED BY Am. Quilich DATE 11-30-79 SPECIMEN PASSED YES

Pressure Cycling

Tank is filled with deionized water.

Tank is pressurized to 375, +10/-0 psig and held for 10 seconds maximum. Number of cycles is 5.

Tank is pressurized to 250, +10/-0 psig. Number of cycles is 50.

Tank is drained, and then evacuated to a pressure of 0.1 psig (5 mm of Hg) maximum and held for 5, +1/-0 minutes. Number of cycles is 10.

N/C

DATA SHEET F
PRESSURE CYCLING

DATE 12-4-79

PSI PART No. 80277-1

SERIAL No. N/A

PSI SERIAL No. 0001

TEST PROCEDURE PARA. No. 4.7

TEST EQUIPMENT ASHCROFT GAGE (L014) 0-400 PSIG, CALIBRATION DUE 7-2-80
WALLACE-TIERMAN (S10488) 0-20 MM PSIA, CALIBRATION DUE 6-05-80

TEST MEDIA: DEIONIZED WATER (FOR INTERNAL PRESSURE CYCLES)

		REQUIRED
WATER SPECIFIC RESISTANCE	<u>17 MEG OHMS</u>	500,000 OHMS MIN
WATER PH	<u>7.2</u>	5.5 TO 8.0

5 CYCLES 1.5 X MEOP

	PRESSURE	HOLD TIME
CYCLE #1	<u>380</u>	<u>5 SEC</u>
CYCLE #2	<u>380</u>	<u>4 SEC</u>
CYCLE #3	<u>380</u>	<u>5 SEC</u>
CYCLE #4	<u>380</u>	<u>5 SEC</u>
CYCLE #5	<u>380</u>	<u>4 SEC</u>
REQUIREMENT	375, +10, -0 PSIG	10 SEC MAX

50 CYCLES AT MEOP

	ACTUAL	REQUIREMENT
PRESSURE	<u>256</u>	250, +10, -0 PSIG
CYCLES	<u>50</u>	50 MINIMUM

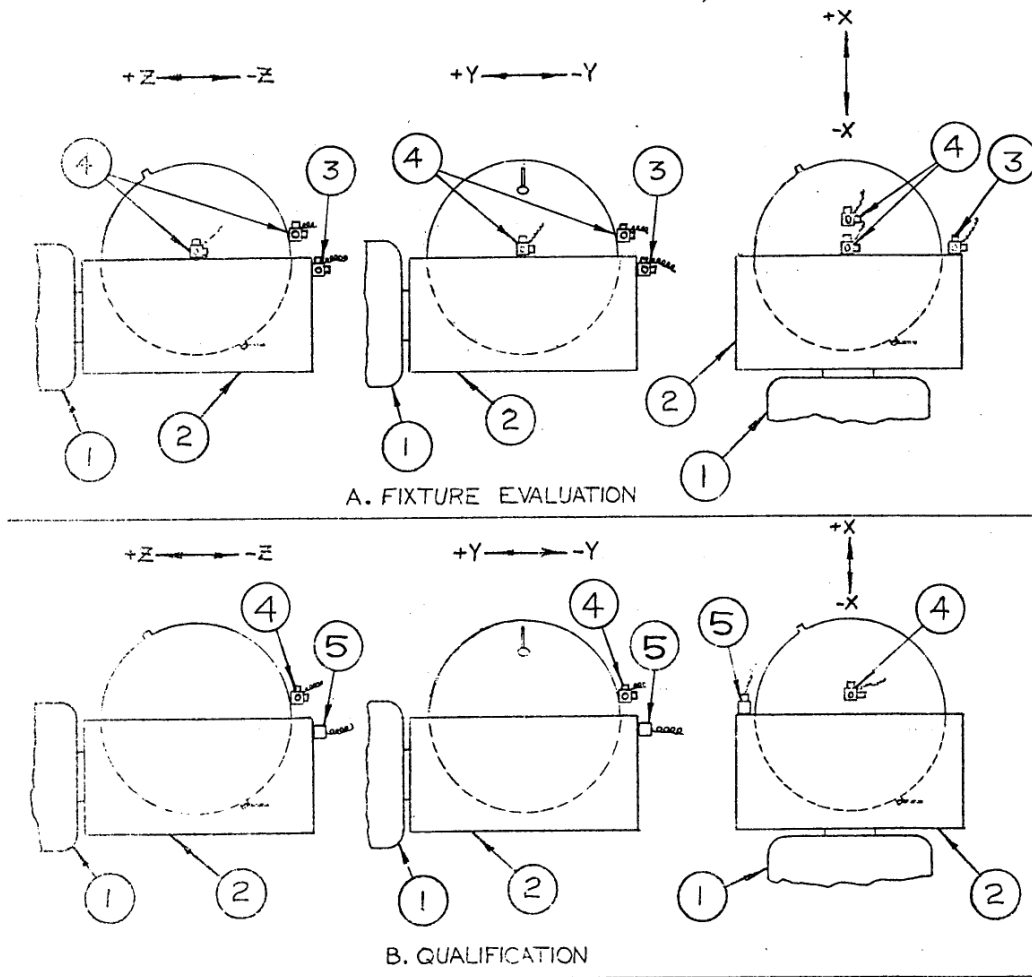
10 CYCLES INTERNAL VACUUM

	ACTUAL	REQUIREMENT
PRESSURE	<u>2.5 MM</u>	.1 PSIA MAX (5MM)
CYCLES	<u>10</u>	10

TESTED BY [Signature] DATE 12-5-79 SPECIMEN PASSED YES

Vibration Test Set-Up

FIGURE 8
VIBRATION TEST SET-UP



- | | |
|---|--|
| 1. VIBRATION EXCITER | 4. RESPONSE ACCELEROMETER (TRI-AXIAL) |
| 2. RIGID VIBRATION FIXTURE | 5. CONTROL ACCELEROMETER (SINGLE AXIS) |
| 3. CONTROL AND RESPONSE ACCELEROMETER (TRI-AXIAL) | |

FIGURE 7
ACCELEROMETER LOCATIONS
VIBRATION FIXTURE EVALUATION
"X" AXIS

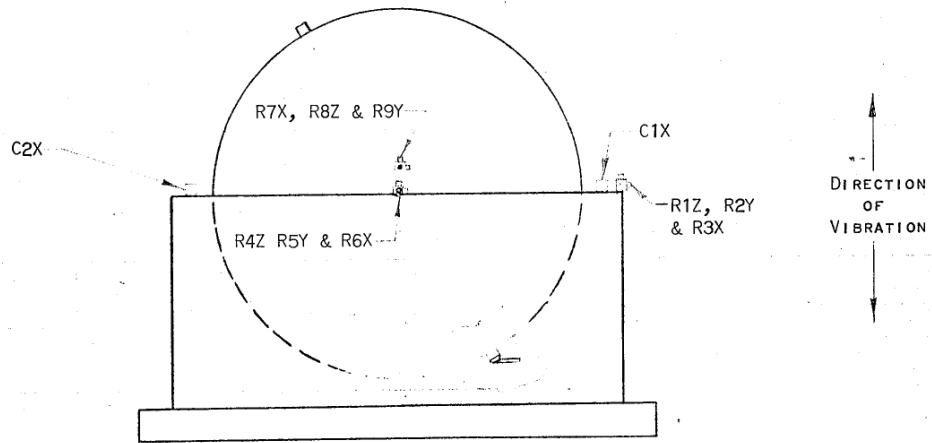


FIGURE 8
ACCELEROMETER LOCATIONS
VIBRATION FIXTURE EVALUATION
"Y" AXIS

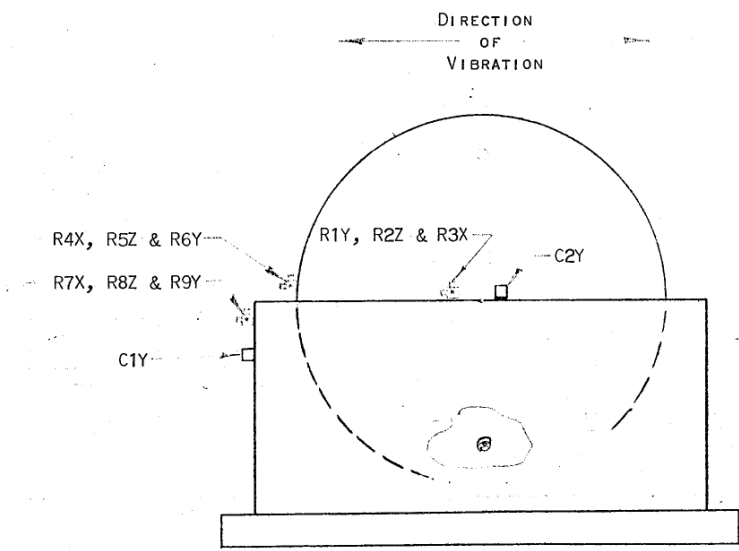
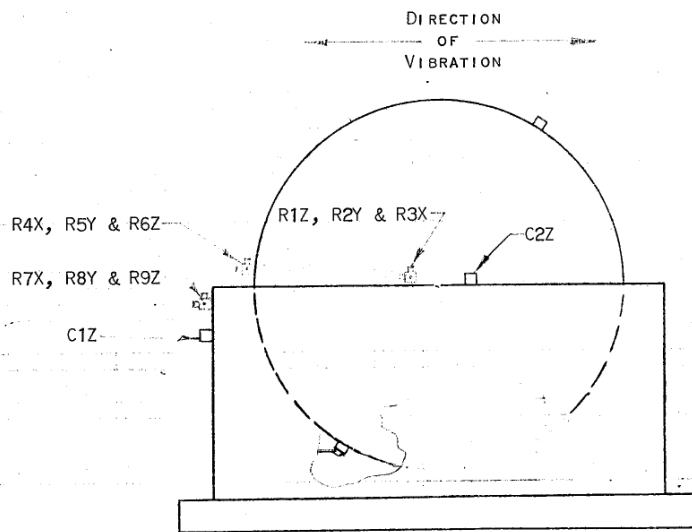
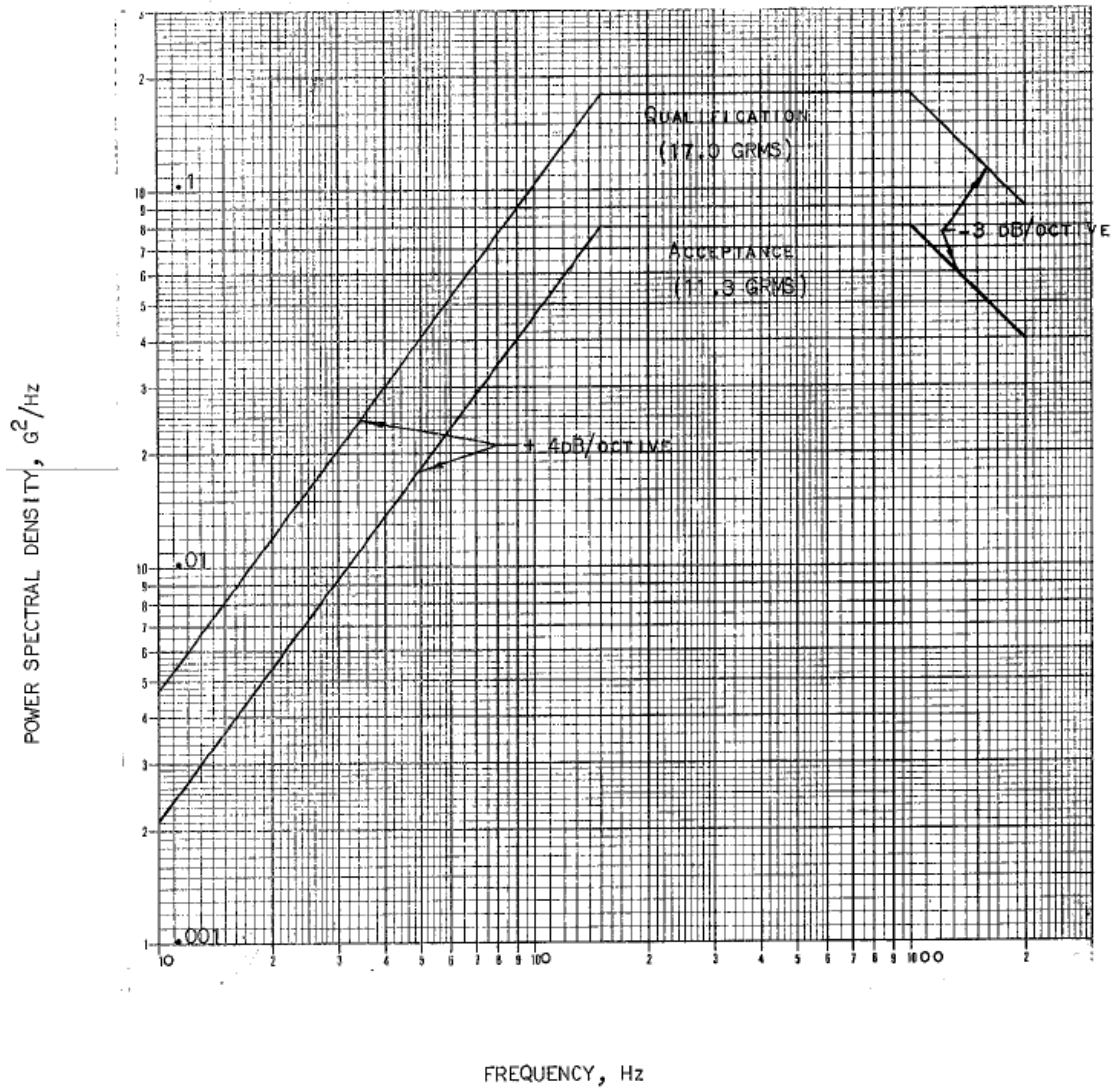


FIGURE 9
ACCELEROMETER LOCATIONS
VIBRATION FIXTURE EVALUATION
"Z" AXIS



Random Vibration (Wet)

RANDOM VIBRATION INPUT LEVEL



Tank is loaded with 894, +10/-0 lbs of trichlorotrifluorethane and pressurized to 255 ± 5 psig with nitrogen.

N/C

DATA SHEET H
RANDOM VIBRATION

DATE February 7, 1980
PSI PART No. 80277-1
SERIAL No. N/A PSI SERIAL No. 0001
TEST PROCEDURE PARA. No. 4.9.6
TEST EQUIPMENT SMI

TEST MEDIA: TRI CHLORO TRI FLUORETHANE, NITROGEN

	REQUIRED	ACTUAL
SPECIMEN LOAD	894, +0, +10 LBS	900
SPECIMEN PRESSURE	255 ± 5 PSIG	255

LMSC
DATA
REVIEW
3/21/80

AXIS	FREQUENCY		G ² /Hz	DB/OCT	RUN TIME 2 MINUTE MINIMUM	DATE
	FROM	TO				
"X"	10 Hz	150 Hz	_____	+4 dB		2-07-1980
"X"	150 Hz	800 Hz	.18	-----		2-07-1980
"X"	800 Hz	1000 Hz	.18	-----		2-07-1980
"X"	1000 Hz	2000 Hz	-----	-3 dB	Total run time 2.0 Min.	2-07-1980

DATE TIME LOG ENTRIES

DATE	TIME	LOG ENTRIES
2-07-1980	9:40	10-800 Hz for (1) min., stop, inspect for broken bolts, None found.
2-07-1980		10-800 Hz for (1) min., stop, inspect for broken bolts, None found.
2-07-1980		800-2000 Hz for (1) min., Stop, Inspect for broken bolts, None found.
2-07-1980		800-2000 Hz for (1) min., Stop, Inspect for broken bolts, None found.

Test completed.

TESTED BY G. LEWIS

DATE 2-7-80 SPECIMEN PASSED ✓

N/C

DATA SHEET H
RANDOM VIBRATION

DATE December 28, 1979
PSI PART No. 80277-1
SERIAL No. N/A PSI SERIAL No. 0001
TEST PROCEDURE PARA. No. 4.9.6
TEST EQUIPMENT SMI

TEST MEDIA: TRI CHLOROTRI FLUORETHANE, NITROGEN

	REQUIRED	ACTUAL
SPECIMEN LOAD	894, +0, +10 LBS	900
SPECIMEN PRESSURE	255 ± 5 PSIG	255

AXIS	FREQUENCY		G ² /Hz	DB/OCT	RUN TIME 2 MINUTE MINIMUM	DATE
	FROM	TO				
"Y"	40 Hz	150 Hz	.024	----		12-28-1979
"Y"	151 Hz	1000 Hz	.18	----		12-28-1979
"Y"	1000 Hz	2000 Hz	---	-3 dB	Total run time 2.0 min.	12-28-1979

DATE	TIME	LOG ENTRIES
12-28-1979	22.30	Completed Qualification Level - No damage indicated.
		Overall grms = 16.7

LMSC
DATA
REVIEW
[Signature]
12/28/79

TESTED BY M. G. ULLIS

DATE 12-28-79 SPECIMEN PASSED ✓