

QUALIFICATION ENVIRONMENTS
FOR
RCS PROPELLANT TANK ASSEMBLY
ATK P/N 80216-1

Table 1: P/N 80216-1 RCS Propellant Tank Assembly

Specifications

Parameters	Requirements
Operating Pressure	396 psig
Proof Pressure	594 psig, Actual Proof: 600 psig
Burst Pressure	792 psig, Actual Burst: Not tested
External Pressure	Not tested
Internal Vacuum	Not tested
Material of Construction	Lightweight spherical 6AL-4V titanium pressure vessel. The tank has two (2) ports (pressurant and propellant)
Membrane Thickness	0.019"
Tank Mount(s)	Mounting is accomplished by a base mount.
Expulsion Efficiency	99.9 %
Design Fill Fraction	-
Tank Capacity	1090 in ³
Internal Dimensions	12.88" Ø
Tank Weight	Maximum tank weight is 6.0 lbs, Actual tank weight is 5.10 lbs
Propellant Capacity	760 lbs of hydrazine
Shell Leakage	<1x10 ⁻⁶ std cc/sec He max, Actual: none
Failure Mode	Burst
Natural Frequency	-
Temperature Environment	-
On Orbit Life	-

80216-1 was subjected to the following qualification tests:

TEST SEQUENCE NUMBER	DESCRIPTION OF TEST
1	EXAMINATION OF PRODUCT, PRELIMINARY
2	PRE-PROOF VOLUME
3	PROOF PRESSURE
4	POST-PROOF VOLUME
5	VIBRATION, ACCEPTANCE LEVEL (A)
6	INTERNAL HE LEAK (HIGH PRESSURE)
7	INTERNAL HE LEAK (LOW PRESSURE)
8	EXTERNAL HE LEAK TEST
9	EXAMINATION OF PRODUCT, FINAL (B)
10	PRE-PROOF VOLUME
11	PROOF PRESSURE (3 CYCLES)
12	POST-PROOF VOLUME
13	VIBRATION, QUALIFICATION LEVEL
14	INTERNAL HE LEAK (HIGH PRESSURE)
15	INTERNAL HE LEAK (LOW PRESSURE)
16	EXTERNAL HE LEAK TEST
17	CYCLE LIFE & EXPULSION EFFICIENCY
18	INTERNAL HE LEAK (HIGH PRESSURE)
19	INTERNAL HE LEAK (LOW PRESSURE)
20	EXTERNAL HE LEAK TEST
21	CLEANLINESS (C)

The following tests are listed in this document:

- 1) Proof Pressure Test
- 2) Random Vibration Test (Acceptance Test)
- 3) Cycle and Expulsion Efficiency

Proof Pressure Test

Tank is pressurized to 600 psig and held for five minutes. One cycle total is performed.

 **PSI** 2017 camfield avenue
los angeles, cal. 90042
PRESSURE SYSTEMS, INC.

PSI TEST PROCEDURE NO. 30-000150
PAGE 25

REV | N/C | | | | | |

DATA SHEET C
PROOF PRESSURE TEST
(PARA. 4.3)

DATE: 11-4-75

PART NAME: PROPELLANT TANK ASSY (RCS)

CUSTOMER SERIAL NUMBER: NA

PSI PART NUMBER: 80216-1

PSI SERIAL NUMBER: 0002

TEST EQUIPMENT: IF DIFFERENT FROM PARAGRAPH 3.4.1

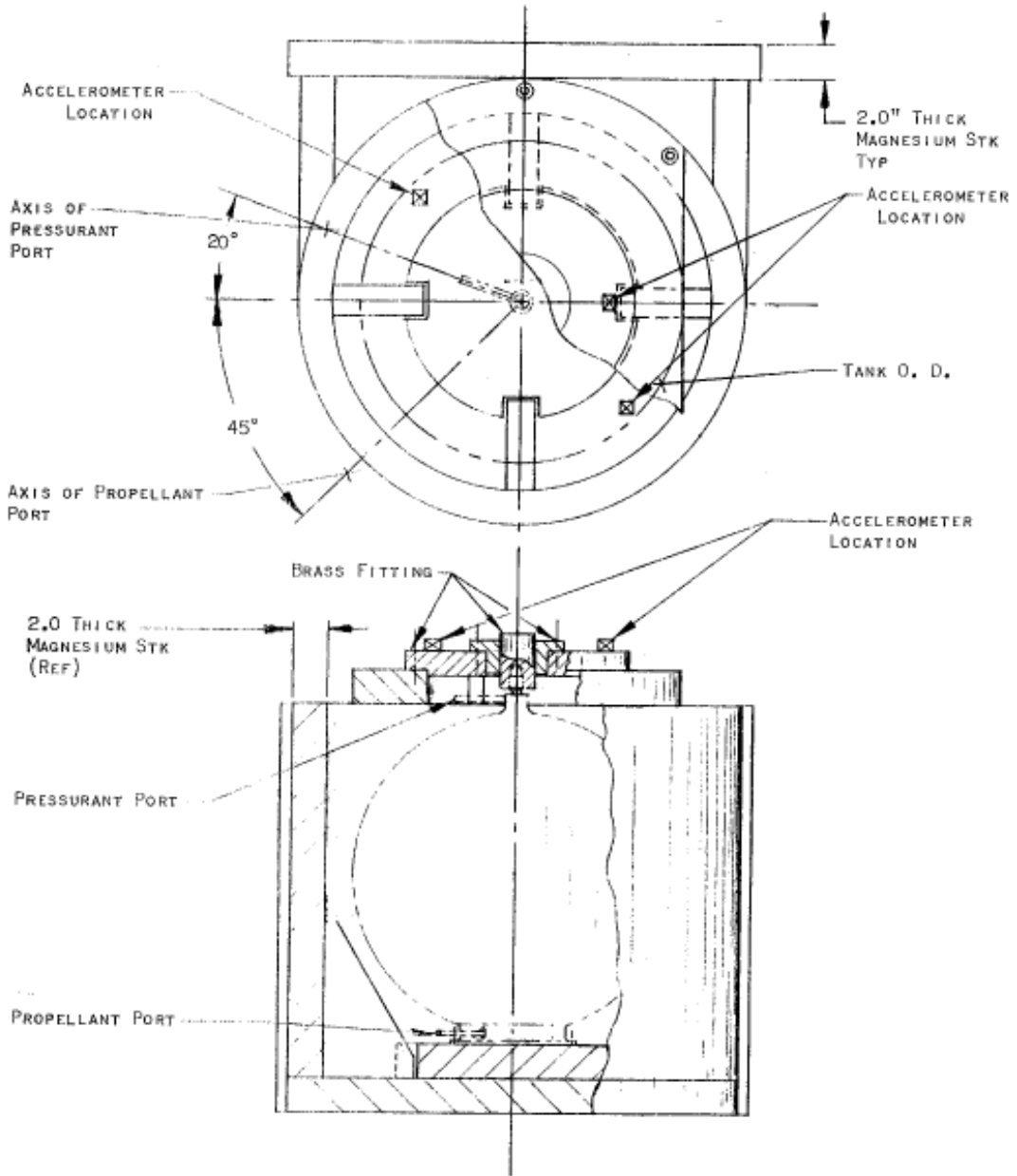
TEST MEDIA: DISTILLED, DEIONIZED WATER

	<u>ACTUAL</u>	<u>REQUIRED</u>
SPECIMEN PRESSURE	<u>600 PSIG</u>	<u>594 +15, -0 PSIG</u>
PRESSURE HOLD PERIOD	<u>5 MINUTES</u>	<u>5 +1, -0 MIN.</u>
PRESSURE CYCLES	<u>ONE</u>	<u>1</u>

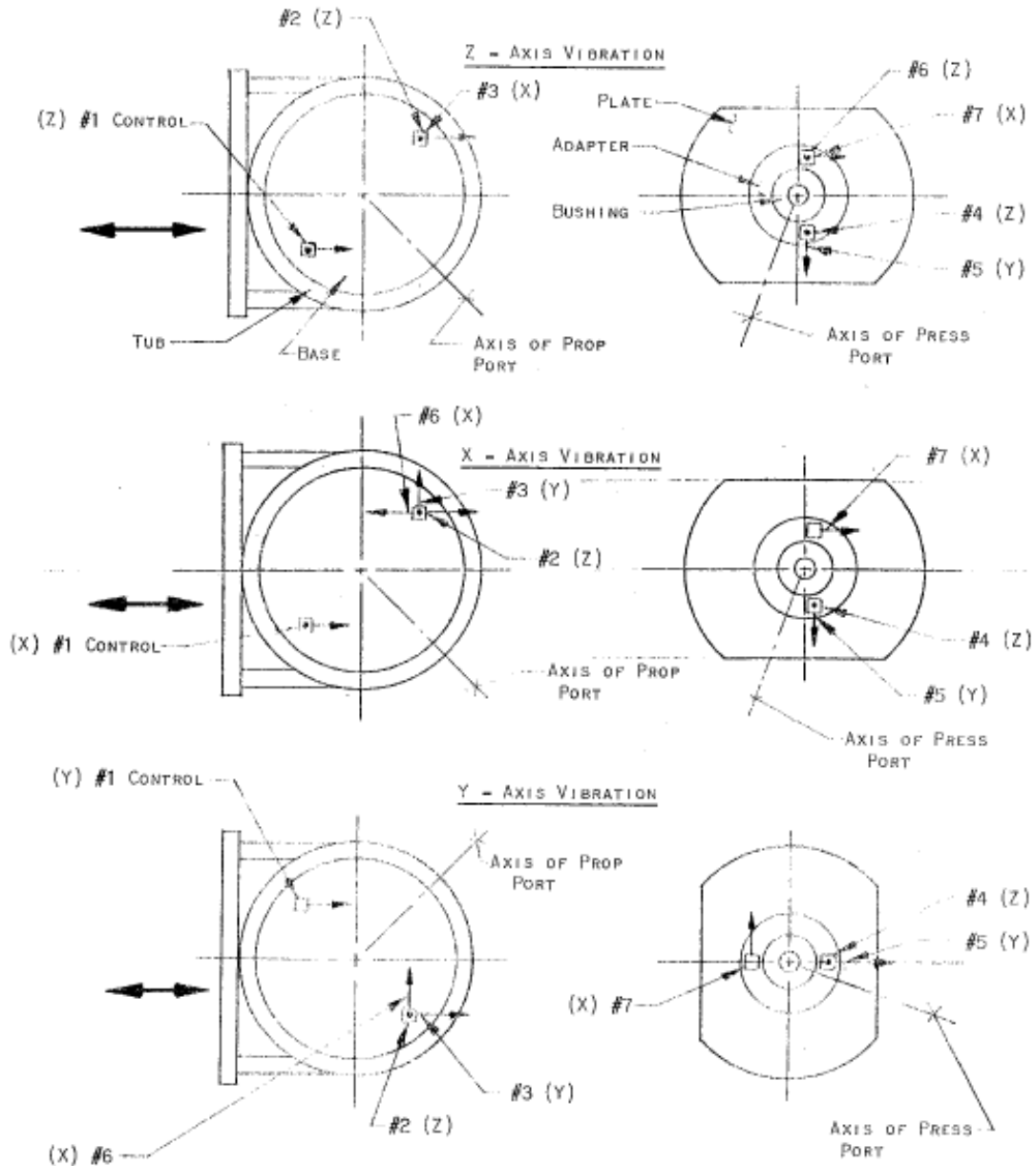
DEFORMATION OBSERVED NONE

TESTED BY LA R  DATE 11-4-75 SPECIMEN PASSED 

Vibration Test Set-Up



VIBRATION FIXTURE SCHEMATIC
FIGURE 2



FIXTURE EVALUATION & ACCELEROMETER LOCATION

FIGURE 3

Random Vibration

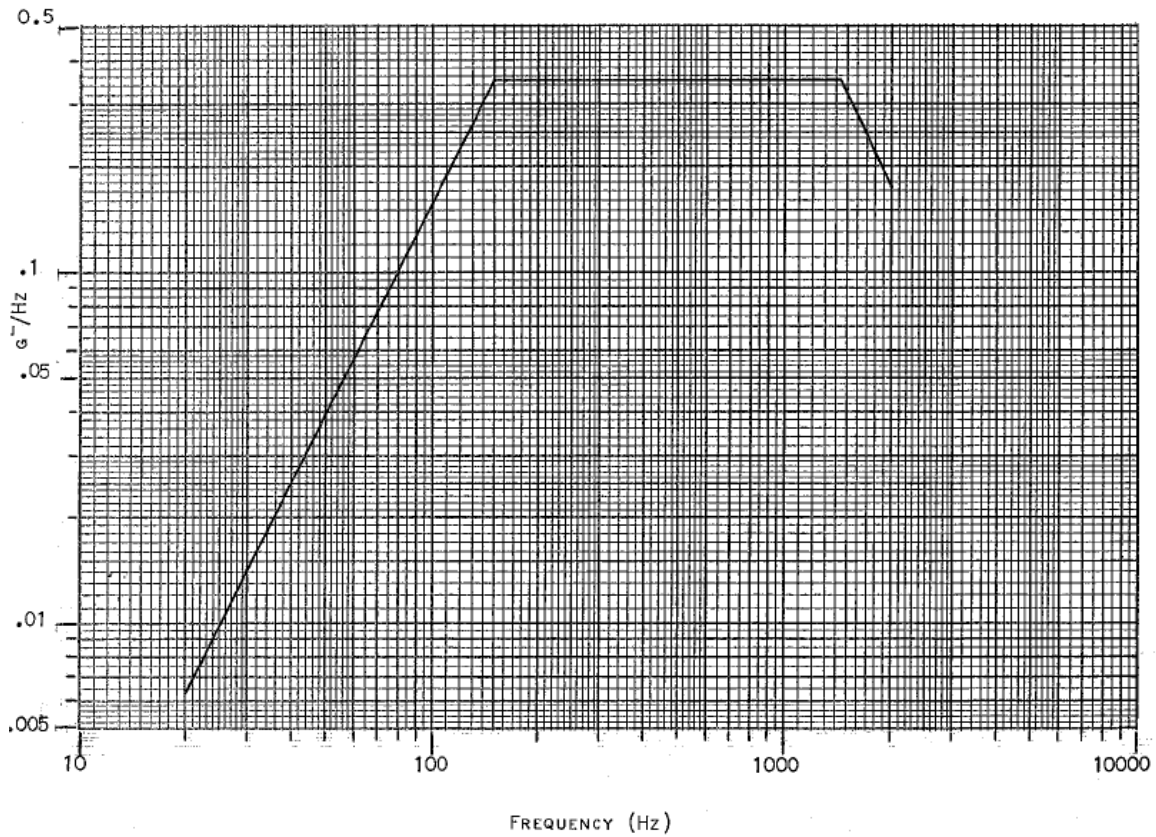
RANDOM VIBRATION SPECTRUM

AXIS	FREQUENCY	SPECTRAL DENSITY
X, Y AND Z	20 - 150	+ 6DB/OCT
	150 - 1432	0.35 G ² /Hz
	1432 - 2000	-6DB/OCT

"A"

TOLERANCE ON ALL FREQUENCIES IS ± 2 PERCENT.

DURATION: 3 MINUTES ON EACH AXIS



Tank is loaded with 33, +0/-3 lbs of distilled, deionized water and pressurized to 330 ± 10 psig.

REV	N/C	A			
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DATA SHEET D
RANDOM VIBRATION
(PARA. 4.5)

DATE: 11-7-75

PART NAME: PROPELLANT TANK ASSY (RCS)

CUSTOMER SERIAL NUMBER: NA

PSI PART NUMBER: 80216-1

PSI SERIAL NUMBER: 0002

TEST EQUIPMENT: IF DIFFERENT FROM PARAGRAPH 3.4.1

NO.	FREQUENCY		G RMS	G ² /Hz	DB/OCT	DB/OCT	RUN TIME	DATE
	FROM	TO						
X	20	150	12.33		+ 6 ROLLUP		1 MIN.	11-7-75
	150	1432		.0875				
	1432	2000			- 6 ROLL DOWN			

DATE	TIME	LOG ENTRIES
11-7-75	14:00	10 SECOND BURST #1 10 SECOND BURST #2
		10 SECOND BURST #3
		RUN FOR 30 SECONDS - TOTAL RUN 1 MINUTE

TESTED BY ML Mustard DATE 11-7-75 SPECIMEN PASSED

REV	N/C	A				
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DATA SHEET D
RANDOM VIBRATION
(PARA. 4.5)

DATE: 11-7-75

PART NAME: PROPELLANT TANK ASSY (RCS)

CUSTOMER SERIAL NUMBER: N/A

PSI PART NUMBER: 80216-1

PSI SERIAL NUMBER: 0002

TEST EQUIPMENT: IF DIFFERENT FROM PARAGRAPH 3.4.1

AGE	FREQUENCY		G RMS	G ² /Hz	DB/OCT	DB/OCT	RUN TIME	DATE
	FROM	TO						
Y	20	150	12.33		+6 ROLL UP		1 MINUTE	11-7-75
	150	1432		.0875				
	1432	2000			-6 ROLL DOWN			

DATE	TIME	LOG ENTRIES	
11-7-75	17:20	10 SECOND BULLET #1	10 SECOND BULLET #2
		10 SECOND BULLET #3	
		RUN FOR 90 SECONDS - TOTAL RUN 1 MINUTE	

TESTED BY MR. MANTON

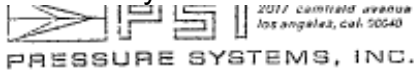
DATE 11-7-75

SPECIMEN PASSED

Cycle Life

Tank is loaded with 33, +0/-3 lbs of distilled, deionized water and pressurized to 330 ± 10 psig. Tank is then discharged and vented.

Number of cycles is 100.



PSI TEST PROCEDURE No. 50-000191
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REV	N/C	A				
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DATA SHEET G
LIFE CYCLE AND
EXPULSION EFFICIENCY TEST
(PARA. 4.8)

DATE: 11-19-75

PART NAME: PROPELLANT TANK ASSY (RCS)

CUSTOMER SERIAL NUMBER: NA



PSI PART NUMBER: 80216-1

PSI SERIAL NUMBER: 0002

TEST EQUIPMENT: IF DIFFERENT FROM PARAGRAPH 3.4.1

TEST MEDIA: DISTILLED DEIONIZED WATER		
	TEST VALUE	REQUIREMENTS
SIMULATED PROPELLANT LOAD	<u>34</u> LBS.	<u>33, + 3, -0 LBS.</u>
INITIAL EXPULSION PRESSURE	<u>330</u> PSIG	<u>330, + 10, -0 PSIG</u>
FINAL PRESSURE	<u>70</u> PSIG	<u>70 ± 10 PSIG</u>
NUMBER OF CYCLES	<u>100</u>	<u>100</u>
RESIDUAL PROPELLANT	<u>6</u> ML	<u>RECORD</u>
EXPULSION EFFICIENCY	<u>99.9</u> %	<u>99.5% MINIMUM</u>

NOTE: 15 ML = .1% REDUCTION IN EFFICIENCY,
75 ML = MAXIMUM ALLOWABLE RESIDUAL PROPELLANT

TESTED BY Les Kane  DATE 11-19-75  SPECIMEN PASSED