[redacted]

UNCLASSIFIED

45

10/15/98 O U
RB Cramer
10/26/98 O
W Jope OK for Opennet

TCG-BTS-1; TCG-NNT-1

JUN 21 1961
File No: P-19
T-17702
Project No: 13.884.00
RS 7321/9786

TO: DISTRIBUTION

Re: Vibration of Gas Reservoir with Locking Device

Summary

Two locking devices were used, one with a felt pad, and one metal to metal. Both proved effective with the latter apparently the more acceptable.

With the felt pad, resonances along both axes of the reservoir were approximately the same as without. There was a possible slight loosening of one collar using the felt, some tightening of both without.

Object of Test

This test was performed to determine the adequacy of a device to lock the threaded retaining collars of the gas reservoir. The device was tested both with and without a felt pad.

Authorization for Test

This test was requested by Division 7115. Mr. W. R. Green was the consultant.

Procedure and Results

The gas bottle was instrumented and mounted on a flat plate as shown in Fig. 1. The plate was recessed on the bottom side to accept the valve assembly. The actual mounting surface approximated the service mounting in thickness.

Vibrational force was applied along each of two axis in turn. Vibration along each axis was performed with three different inputs before the orientation was changed. The input levels are given below:

1	-	0.036"	10-34 cps;	2G	34-2000 cps
2	-	0.036"	10-50 cps;	5G	50-2000 cps
3	-	0.036"	10-73 cps;	10G	73-2000 cps

One nominal 30 minute frequency sweep was made at each of the inputs along each of the two axis. The frequency at which maximum response occurred was established for each condition. The responses and inputs, both filtered and unfiltered are given in Tables I and II. While vibration was performed along two axes only, tri-axial readings were taken. Figure 1 shows the location of the accelerometers used.

Following vibration with the felt pad on the locking device, the specimen was dismantled and inspected. The upper and lower mounting collars, which

UNCLASSIFIED

had been torqued to 45 and 35 ft-lb, respectively, broke away at 50 and 32 ft-lb. The screws in the locking device, torqued to 40 in-lb, broke away at 25 in-lb. Some fretting corrosion was evident in the valve assembly.

The specimen was reassembled without the felt pad on the lock. The same torque values were used on the collars. Glyptal was used to secure the lock screws, the outer of which was torqued to 60 in-lb and the inner to 45 in-lb. Break-away torque for both collars was approximately 60 ft-lb. while the lock screws broke away at about the pre-torqued valve.

Disassembly disclosed considerable fretting corrosion in the valve assembly. Also noted was the fact that there was not full surface contact between the lock and the collar. One edge of the lock exerted a tightening moment on the collar.

Conclusions

Inasmuch as the conditions of this test are much more severe than the anticipated use environment, the locking device seems to have proven efficient either with or without the felt pad.

However, the deletion of the felt pad seems advisable. There is considerable chance of deterioration when such materials are used, with consequent lack in dependability. A more carefully fitted metal to metal lock would probably obviate the tightening effect of the lock on the collar.

R. G. Hamilton

7321 Project Engineer: R. G. HAMILTON - 7321-5

Approved By: R. S. HOOPER - 7321-5

RGH:mw

Distribution
1,2/7A - A. V. Engel, Jr., 7115
Attn: W. R. Green
3/7A - D. M. Bruce, 7182
4/7A - D. S. Bliss, 2344
5/7A - E. H. Copeland, 7321
6/7A - J. R. Harrison, 7523
7/7A - R. K. Smeltzer, 3421-3

UNCLASSIFIED

#4461

[redacted]

UNCLASSIFIED

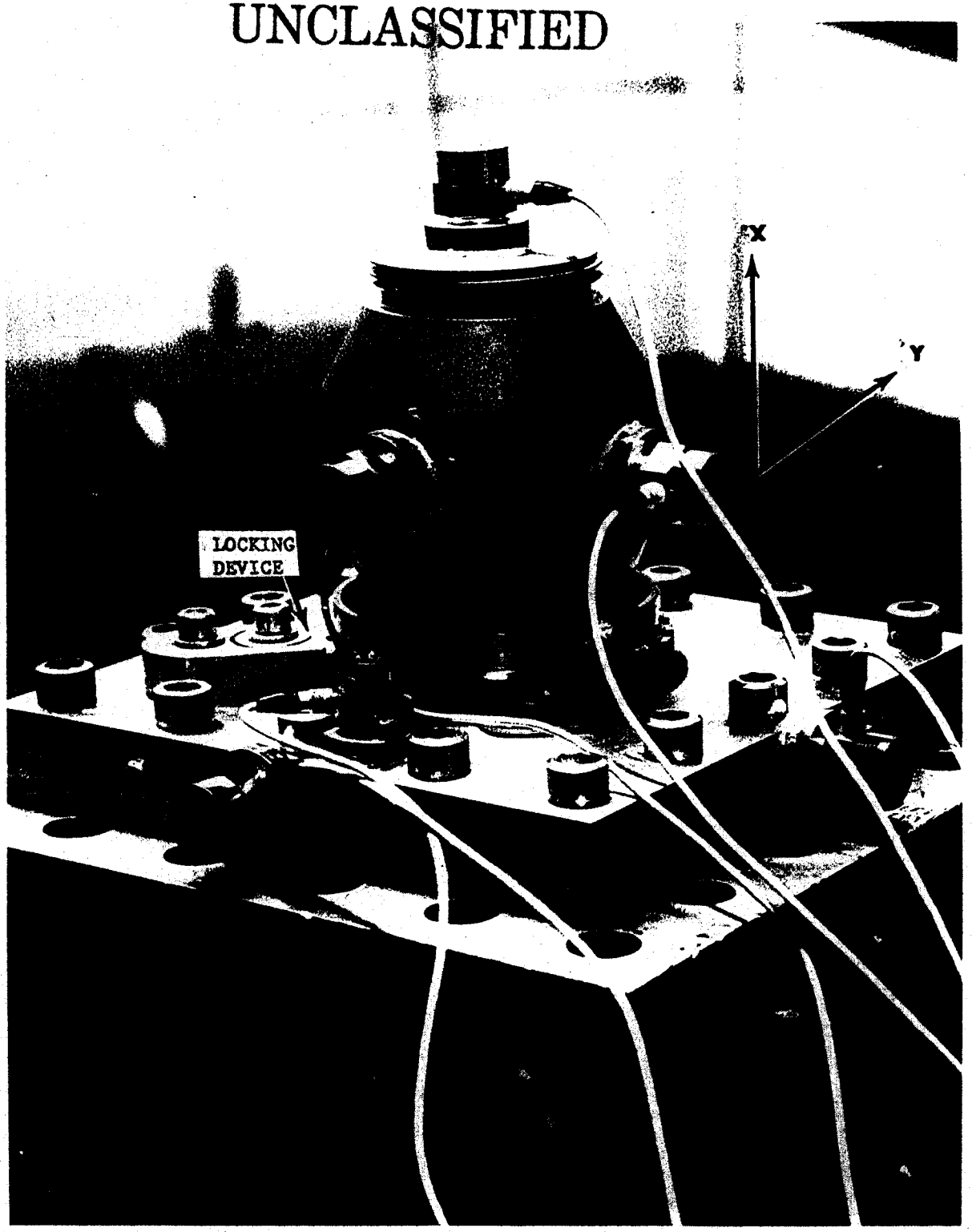

FIG. 1 - PHOTO SHOWING AXES OF VIBRATION AND ACCELEROMETER LOCATION

D#61-7805

7321/9736
T-17702

[redacted]

UNCLASSIFIED

UNCLASSIFIED

[redacted]

T-17702
RS 7321/9786

TABLE I

Vibration of Gas Bottle and Locking Device
Felt Pad

X-Axis

2-g Input - 647 cps

	Jig-X	Out-X	Jig-Y	Out-Y	Jig-Z	Out-Z
Unfiltered	2.4	27.0	1.6	6.4	1.3	6.0
Filtered	1.67	25.8	0.482	6.16	0.533	5.33

5-g Input - 598 cps

Unfiltered	6.5	54.0	4.3	6.0	4.9	9.0
Filtered	5.0	52.5	0.633	5.0	0.915	0.825

10-g Input - 544 cps

Unfiltered	37.0	175.0	28.0	-	47.0	39.0
Filtered	10.0	154.0	0.667	-	1.0	6.67

Y-Axis

2-g Input - 1483 cps

Unfiltered	7.5	6.7	8.2	50.0	9.4	9.9
Filtered	7.16	6.4	2.0	48.3	4.5	9.66

5-g Input - 1471 cps

Unfiltered	9.4	8.8	15.0	59.0	15.5	10.0
Filtered	9.0	7.9	5.0	55.8	4.5	9.83

10-g Input - 1471 cps

Unfiltered	8.8	6.0	14.5	41.0	12.5	5.5
Filtered	8.0	5.16	10.0	35.0	3.33	4.5

Vibration Time (minutes)

	X-Axis	Y-Axis	Total
2 g's	30	42	72
5 g's	45	38	83
10 g's	45	30	75
			230 = 3 hours 50 minutes

Note: Underscored values are measured by control accelerometers.

UNCLASSIFIED

UNCLASSIFIED

T-17702
RS 7321/9786

TABLE II

Vibration of Gas Bottle and Locking Device - No Pad

X-Axis

2-g Input - 590 cps

	Jig-X	Out-X	Jig-Y	Out-Y	Jig-Z	Out-Z
Unfiltered	3.1	44.0	0.42	3.9	3.3	3.5
Filtered	2.16	40.8	0.175	3.0	0.5	2.75

5-g Input - 550 cps

Unfiltered	11.0	70.0	0.88	4.5	12.5	7.8
Filtered	4.83	66.7	0.667	3.17	5.0	7.08

10-g Input - 530 cps

Unfiltered	90.0	330.0	5.4	64.0	90.0	62.0
Filtered	9.9	297.0	6.5	3.99	1.08	19.2

Y-Axis

2-g Input - 1501 cps

Unfiltered	6.7	4.4	4.6	29.0	7.2	5.3
Filtered	6.33	3.91	1.915	27.5	4.08	5.08

5-g Input - 1507 cps

Unfiltered	3.6	5.6	8.4	46.0	8.7	5.2
Filtered	3.0	4.75	5.5	44.1	4.08	4.55

10-g Input - 1465 cps

Unfiltered	10.8	11.5	25.0	70.0	24.5	16.0
Filtered	10.0	9.82	9.58	61.6	5.33	14.5

Vibration Time (minutes)

	X-Axis	Y-Axis	Total
2 g's	30	30	60
5 g's	30	45	75
10 g's	45	30	75
			210 = 3 hours 30 minutes

Note: Underscored values are measured by control accelerometers.

UNCLASSIFIED