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SEP 28 1959

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Classification Changes: U
Contains No DOE Classified Information
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Comments: Declassify

TCG-BTS-1; TCG-NNT-1

B-4
Project No. T-16528
Case No. 863.00
Ref. Sym: 1613(83)

TO: DISTRIBUTION

Re: Vibration of Dummy Gas Bottle

Summary of Test

A resonance survey indicated that the frequency of resonance for each of the three mutually perpendicular axes were as follows:

X-axis - 401 cps
Y-axis - 403 cps
Z-axis - 500 cps (or above)

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Figure 1 shows the axes of vibration and accelerometer placement. With an input of five g, the maximum response was 16.6 g. This was measured during vibration at resonance along the X axis.

No damage resulted from vibration.

Authorization for Test

This test was requested by W. R. Green, Division 1215, in a Work Order Authorization dated August 18, 1959.

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Procedure and Results

The straps retaining the reservoir to its mounting were tightened with approximately 120 in-lb torque on the nuts. The assembly was then subjected to vibration in accordance with Procedure III of SCS-5 (Paragraph 2.4).

The vibration was performed in the following order for the elapsed time shown:

1 - Resonance Survey	Z axis	45 min.
2 - Vibrational Cycling	Z axis	60 min.
3 - Vibration at Resonance	Z axis	30 min.
4 - Resonance Survey	X axis	40 min.
5 - Vibrational Cycling	X axis	60 min.
6 - Vibration at Resonance	X axis	30 min.
7 - Resonance survey	Y axis	32 min.
8 - Vibration Cycling	Y axis	60 min.
9 - Vibration at Resonance	Y axis	30 min.

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Total vibration time: 387 min.

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CLASSIFICATION CHANGED TO: U
Carmela Gallegos 10/26/98
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S DOCUMENT CONSISTS OF 6 PAGE(S)

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The complete tabulated results of the resonance surveys are given in Tables I thru 3. For the constant g acceleration portion of the test the accelerometer measuring the input to the jig was used for controlling the table. In Tables I thru 3 it will be noted that the acceleration at each end of the specimen can be compared with that of the jig. The first three columns show the acceleration in the direction of shake. The last six columns show the acceleration along the two mutually perpendicular axes 90° from the direction of input.

There was no apparent damage to the specimen as a result of vibration. There were no excessive amplifications in any axis at any frequency up to 500 cps. However, the response of the assembly was increasing as 500 cps was reached during the survey along the Z axis. It is apparent that resonance is above this frequency and the response ratio was not determined.

R. G. Hamilton

1613 Project Engineer: R. G. HAMILTON - 1613-3

Approved by: R. S. HOOPER - 1613-3

RGH:1613-3:sc

DISTRIBUTION:

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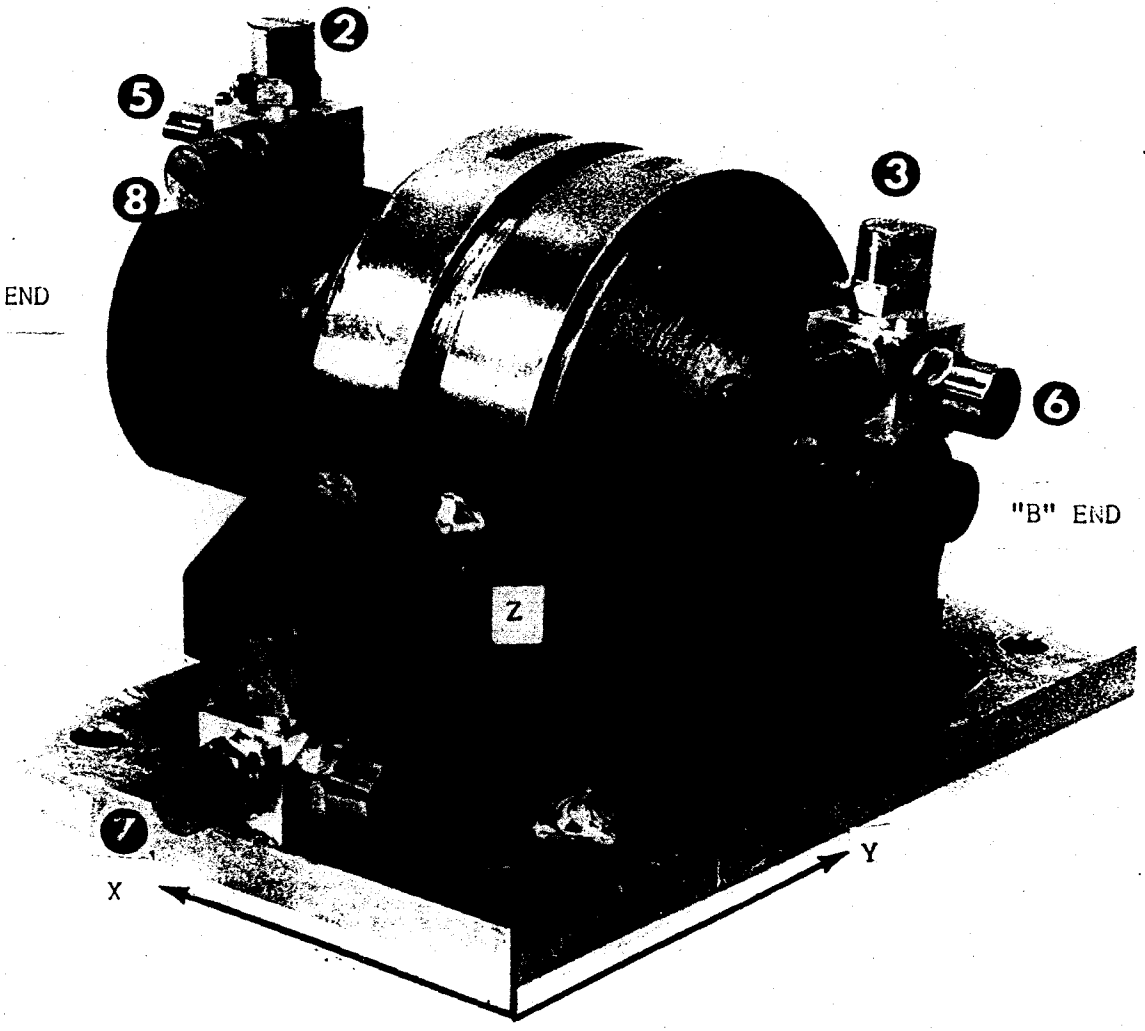

FIGURE 1 - ACCELEROMETER PLACEMENT AND AXES OF VIBRATION

PROJECT NO. T-16528
REF. SYM: 1613(83)

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	X-Axis			Y-Axis			Z-Axis		
	4	5	6	7	8	9	1	2	3
	INPUT	"A"	"B"		"A"	"B"		"A"	B
	TO JIG	END	END	JIG	END	END	JIG	END	END
CPS	↓	↓	↓	↓	↓	↓	↓	↓	↓
20	1.01	1.02	0.96	0.07	0.07	0.06	0.11	0.16	0.05
30	1.02	1.04	0.96	0.02	0.06	0.04	0.13	0.11	0.08
40	1.02	1.05	0.97	0.06	0.09	0.07	0.11	0.12	0.03
50	1.49	1.53	1.45	0.09	0.12	0.34	0.20	0.71	0.11
60	1.95	2.01	1.89	0.19	0.18	0.21	0.36	0.45	0.2
70	2.84	3.00	2.80	0.42	0.33	0.39	0.55	0.43	0.5
80	3.55	3.80	3.55	0.48	0.47	0.45	0.66	0.53	0.4
90	4.45	4.70	4.45	0.39	0.51	0.50	0.94	0.64	0.5
100	5.0	5.40	5.10	0.39	0.57	0.51	0.71	0.74	0.4
120	↑	5.40	5.15	0.25	0.42	0.41	0.58	0.97	0.4
140		5.45	5.25	0.23	0.38	0.38	0.66	0.76	0.4
160		5.50	5.30	0.21	0.35	0.31	0.65	0.81	0.3
180		5.60	5.40	0.22	0.36	0.35	0.66	0.89	0.4
200		6.00	5.70	0.26	0.51	0.47	0.66	1.48	0.9
220		6.05	5.75	0.89	0.78	1.04	0.64	1.11	0.6
240		6.05	5.80	0.20	0.37	0.39	0.82	1.27	0.8
260		6.20	5.95	0.20	0.55	0.35	0.62	1.34	0.8
280		6.55	6.15	0.24	0.58	0.41	0.74	1.62	0.9
300		6.80	6.30	0.24	0.48	0.41	0.75	1.83	1.1
320		7.35	6.70	0.27	0.49	0.52	0.79	2.25	1.4
340		7.80	7.10	0.32	0.62	0.60	0.92	2.80	1.7
360		8.00	7.40	1.18	4.20	3.60	1.70	3.05	2.1
380		8.95	8.00	0.36	1.94	1.46	0.29	3.75	3.0
400		12.60	11.60	0.48	3.20	2.38	0.29	7.20	6.2
420		4.90	5.00	0.56	2.20	1.45	1.02	2.15	2.6
440		6.60	6.25	0.32	1.11	0.50	0.83	1.35	0.7
460		9.45	8.80	0.65	1.00	2.05	0.81	2.85	1.3
480	↓	10.90	9.70	0.58	1.53	1.12	0.84	4.75	2.7
500	5.0	12.60	11.10	0.52	1.26	2.35	0.95	6.35	4.0
			RESONANCE - 401 CPS						
	5.0	16.60	13.00	1.54	7.40	5.70	1.52	1.31	1.3

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TABLE 1 - VIBRATION OF GAS BOTTLE ALONG X-AXIS

	Y-AXIS			Z-AXIS			X-AXIS		
	7	8	9	1	2	3	4	5	6
	INPUT TO JIG	"A" END	"B" END	JIG	"A" END	"B" END	JIG	"A" END	"B" END
CPS	↓	↓	↓	↓	↓	↓	↓	↓	↓
20	1.00	0.95	0.98	0.05	0.04	0.04	0.07	0.08	0.07
30	1.00	0.89	0.97	0.06	0.04	0.03	0.07	0.08	0.04
40	1.00	0.94	0.98	0.02	—	0.03	0.06	0.08	0.04
50	1.50	1.44	1.45	0.05	0.08	0.05	0.10	0.15	0.08
60	1.98	1.94	1.94	0.08	0.14	0.12	0.16	0.22	0.13
70	2.82	2.80	2.74	0.14	0.18	0.19	0.30	0.33	0.25
80	3.81	3.72	3.80	0.15	0.26	0.25	0.11	0.68	0.22
90	4.80	4.80	4.80	0.24	0.36	0.30	0.21	0.76	0.33
100	5.0	4.95	4.95	0.28	0.47	0.40	0.24	0.76	0.33
120	↑	5.10	5.05	0.17	0.38	0.37	0.26	0.69	0.28
140		5.15	5.00	0.12	0.27	0.29	0.31	0.59	0.25
160		5.40	5.10	0.12	0.31	0.29	0.33	0.64	0.26
180		5.50	5.15	0.11	0.27	0.26	0.34	0.61	0.26
200		5.45	5.15	0.12	0.33	0.27	0.39	0.60	0.33
220		5.60	5.30	0.14	0.37	0.31	0.80	0.81	0.87
240		5.60	5.30	0.10	0.41	0.45	0.37	0.63	0.37
260		5.75	5.55	0.11	0.35	0.29	0.28	0.88	0.27
280		6.00	5.60	0.17	0.37	0.42	0.42	0.71	0.39
300		6.20	5.75	0.18	0.43	0.46	0.46	0.69	0.38
320		6.40	5.85	0.27	0.46	0.53	0.52	0.61	0.45
340		7.00	6.20	0.53	0.71	0.88	0.72	0.68	0.82
360		6.80	6.00	0.68	2.15	2.05	0.93	3.85	2.70
380		8.00	6.70	0.77	0.95	0.50	0.24	2.00	0.93
400		10.30	8.40	2.73	1.94	0.55	0.22	3.00	1.50
420		6.10	4.40	2.39	2.10	0.76	0.92	1.53	1.45
440		7.30	4.45	1.63	1.78	0.77	1.50	1.04	1.20
460		5.40	6.40	1.14	1.39	0.92	1.63	0.76	0.94
480	↓	8.00	6.80	0.63	1.67	1.03	0.17	0.85	1.02
500	5.0	8.80	7.10	0.54	2.20	1.21	0.22	0.98	1.22
RESONANCE - 403 CPS									
403	5.0	13.20	10.90	7.60	5.90	3.15	1.00	0.68	4.35

TABLE 2 - VIBRATION OF GAS BOTTLE ALONG Y-AXIS.
ACCELERATION IN G.

	Z-AXIS			X-AXIS			Y-AXIS		
	1	2	3	4	5	6	7	8	9
	INPUT TO JIG	"A" END	"B" END	JIG	"A" END	"B" END	JIG	"A" END	"B" END
CPS	↓	↓	↓	↓	↓	↓	↓	↓	↓
20	1.00	1.09	1.07	0.08	0.07	0.10	0.08	0.08	0.02
30	1.01	1.13	1.10	0.08	0.02	0.09	0.08	0.08	0.03
40	1.00	1.13	1.10	0.10	0.06	0.11	0.08	0.09	0.04
50	1.25	1.50	1.28	0.26	0.29	0.33	0.11	0.13	0.09
60	1.85	1.90	1.99	0.04	0.23	0.16	0.12	0.15	0.11
70	2.60	2.75	2.80	0.09	0.37	0.22	0.17	0.24	0.16
80	3.45	3.68	3.70	0.14	0.48	0.34	0.20	0.30	0.2[illegible]
90	4.15	4.40	4.40	0.18	0.48	0.35	0.21	0.29	0.25
100	5.00	5.40	5.35	0.24	0.50	0.41	0.22	0.35	0.29
120	↑	5.00	4.70	0.64	0.57	0.85	1.36	2.20	2.0[illegible]
140		5.65	5.65	0.09	0.51	0.34	0.74	1.01	0.7[illegible]
160		5.60	5.50	0.17	0.45	0.35	0.49	0.60	0.4[illegible]
180		5.60	5.45	0.19	0.43	0.35	0.40	0.52	0.3[illegible]
200		5.70	5.45	0.20	0.45	0.38	0.31	0.44	0.3[illegible]
220		5.75	5.40	0.21	0.46	0.42	0.28	0.39	0.32
240		5.90	5.60	0.10	0.47	0.32	1.58	1.84	1.4[illegible]
260		5.90	5.50	0.12	0.44	0.41	0.30	0.45	0.38
280		6.00	5.40	0.25	0.45	0.43	0.47	0.56	0.35
300		6.05	5.40	0.16	0.44	0.44	0.45	0.46	0.42
320		6.20	5.40	0.15	0.48	0.49	0.43	0.48	0.37
340		6.35	5.40	0.13	0.49	0.50	0.44	0.42	0.3[illegible]
360		6.55	5.40	0.12	0.59	0.57	0.43	0.38	0.3[illegible]
380		6.80	5.35	0.15	0.97	0.88	0.42	0.45	0.4[illegible]
400		7.15	5.15	0.32	0.84	0.75	0.38	0.45	0.8[illegible]
420		7.20	5.25	1.56	0.92	0.85	0.44	1.58	1.2[illegible]
440		7.25	5.20	0.48	0.89	0.81	0.44	0.64	0.2[illegible]
460		7.35	5.20	0.19	0.69	0.61	0.39	0.38	0.3[illegible]
480	↓	9.00	4.45	0.33	2.00	1.55	0.43	0.52	0.3[illegible]
500	5.00	12.00	3.45	0.43	4.40	3.15	0.44	1.03	0.[illegible]

WORST FREQUENCY 500 CPS

TABLE 3 - VIBRATION OF GAS BOTTLE ALONG Z-AXIS
ACCELERATION [illegible]