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TCG-NNT-1 [redacted] 1327

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
Review Date: 10/29/98
Authority: ADC ADD
Name: R B Craner
Review Date: not req'd per
Authority: ADD
Name: DOE/OD 8/7/97 memo.
Determination (Circle Numbers)
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2. Classification Changed to: U
3. Contains No DOE Classified Information
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5. Contains UCAI? No
6. Comments: to Openmet

MAR 16 1953

Case No. 433.0
Ref. Symbol: 1611
Project No. ET-852
Completed 10/6/52

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MR. L. A. DUNN - 1284

Re: Vibration Test of the H-189 Container with XMC-156 Cartridge

Object of Test

The object of this test was to determine the performance of the H-189 container, when subjected to vibration, with the XMC-156 cartridge mounted inside the container on any of three different sets of vibration mounts. General Rubber Company vibration mounts of the following ratings were supplied: 150-pound, MDI No. 802226; 100-pound, MDI No. 813817; and 50-pound, no number available.

Function of Object Tested

The H-189 is the shipping and storage container for the XMC-156 cartridge.

Authorization for Test

This test was requested by Division 1284 in a Work Order Authorization dated June 18, 1952. Mr. G. V. Lemmon was the consultant.

Summary of Results

All vibration tests were performed in one plane, normal to the axis of the container and at 23 degrees with the longitudinal axis of the battery boxes. Natural frequencies of the cartridge mounted on the different vibration mounts ranged from 48 to 86 cps. Maximum vibration amplification factors, with respect to the shake table, ranged from 10.2 to 15.6 at the MC-158 junction box cover plate and from 3.8 to 7.5 at the cartridge mounting ring.

Procedure and Results

A. Test Conditions and Results:

All vibration tests were performed in one plane.

CENTRAL RECORD FILE
ACCOUNTING CARD
FILE No. H-189
3-2

Natural frequencies of the cartridge on the vibration mounts were determined prior to the vibration tests, by shock exciting the cartridge. Acceleration measurements were made at the MC-158 cover plate. Since the proper battery box mounts were not available, the cartridge was supplied with the battery boxes loosely mounted on machine screws with approximately six flat steel washers used as spacers on each screw between the battery boxes and the mounting surface. Because this allowed excessive vibration of the battery boxes and interfered with the natural frequency determinations, the battery boxes were removed for these measurements. Natural frequencies are shown in Fig. 1.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
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Carmela Gallegos 12/14/98
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RECORD ID: 99SN0333
W C Layne 12/16/98
PERSON VERIFYING MARKING & DATE
DATED: 10/29/98

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Amplification factors were then determined, using the 150-pound vibration mounts, for vibration from 10 to 60 cps at a double amplitude of 0.010 inch. Accelerations were measured at the MC-158 cover plate.

Using the 150-pound vibration mounts, an attempt was made to perform vibration tests in accordance with SCS-5, section 2.1.4.3 (10-60-10 cps in 10 minutes at a double amplitude of 0.030 inch for 45 minutes in each plane); however, the performance of the vibration jig was unsatisfactory. The consultant specified that the container be mounted on the table in a manner closely approximating shipping conditions. Therefore, it was decided, with the consultant, to fasten the container to the table by blocking the feet of the container base on the table and anchoring the top of the container by means of 1/4-inch steel cables fastened to the table and to a steel rod through the handling hole. The cables were tightened by means of turnbuckles. Three runs were made, but it was impossible to cycle through the entire frequency range because of extreme vibration of the cables (3 to 4 inches double amplitude) and because of shifting of the steel rod and possible shifting of the container. Inspection after these runs showed that of the eight 5/16-inch mounting screws holding the cartridge to the ring support in the container, two were broken, four were loose, and two remained tight.

Since the cartridge was available for only two days, it was decided that rather than modifying the jig, succeeding runs would be made at a double amplitude of 0.010 inch for the purpose of determining amplification factors. The jig performed satisfactorily at this amplitude. Amplification factors for the 100-pound and 50-pound vibration mounts and for the cartridge bolted directly to the supporting ring were then determined. Acceleration measurements were made at the cartridge mounting ring as well as at the MC-158 cover plate. After these measurements were made, the cartridge was returned and it was not possible to repeat amplification tests using the 150-pound vibration mounts and measuring accelerations at the cartridge mounting ring.

Vibration amplification factors are plotted in Fig. 1 in terms of peak g ratio with respect to the shake table.

One battery box was visible through the small port in the container, and excessive vibration of this box, up to approximately 3/4 inch double amplitude, was noted throughout the tests.

B. Equipment Used:

Sonntag shake table No. 3
Brush dual-channel oscillograph, BL 202, Serial No. 703
Two Brush universal analyzers. Model BL 320, Serial Nos. 162 and 173
Two Statham accelerometers, Model A5A-50-240, Serial No. 518, and Model A5A-50-300, Serial No. 645, range of both ±50 g

Conclusions and Recommendations

Inspection of the graphs of Fig. 1 shows that the 100-pound or 150-pound vibration mounts are preferable throughout the frequency range.

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A subsequent test of the container (ET-1039, report forthcoming) indicates that the cartridge has two resonant frequencies while mounted on the vibration mounts. The first resonance occurs from 15 to 25 cps and the second occurs from 40 to 80 cps. This is substantiated by the curves in Fig. 1, for two resonant frequency peaks are shown. However, at the MC-158 cover plate, only the higher resonant frequency point was present. In the later test, measurements were made at more points on the cartridge and cartridge mounting ring.

It is recommended that in any future vibration tests the battery boxes be fastened more securely to the cartridge.

R. S. Jacobsen

Test Conducted by R. S. JACOBSEN - 1611

Original Signed By
R. L. WAGAR

Approved by R. L. WAGAR - 1611

RSJ:1611:nj

Encls: Fig. 1

Copy to:
J. R. Townsend - 1600
A. F. Cone - 1510
T. B. Morse - 1610
S. A. Moore - 1322
J. M. Halls - 1521-4 Attn: 1500 Drawing File

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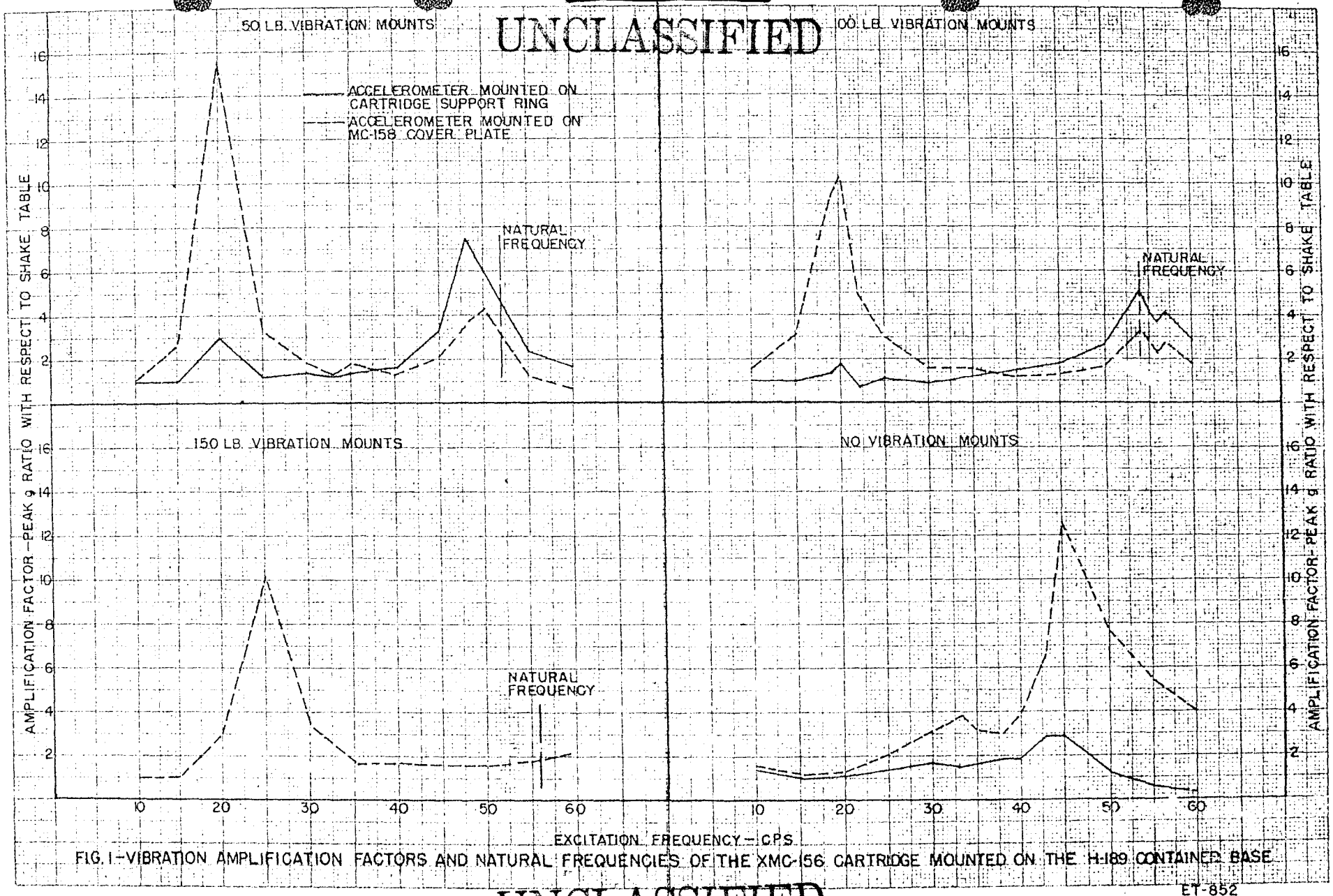

FIG. 1—VIBRATION AMPLIFICATION FACTORS AND NATURAL FREQUENCIES OF THE XMC-156 CARTRIDGE MOUNTED ON THE H-189 CONTAINER BASE

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