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MC-1

MC-1 3-2

Ref. Symbol: 1531
Project No. ET-315
OCT 22 1951

MR. L. E. LAMKIN - 1281

Re: Vibration Damping Characteristics of the Packaged MC-1

Object of Test

The object of this test was to determine the vibration damping coefficient for the packaged MC-1, and to determine whether vibration of the packaged unit would affect the operation of the MC-1.

Function of Object Tested

The container and packing are used for shipping and handling of the MC-1. The packing is Curled Hair, specification AN-H-5A as made by Armour Packing, Swift Packing and Sponge Rubber Products Company.

Requested By

This test was requested by Division 1281 in a Work Order Authorization dated June 21, 1951. Mr. B. E. Arthur was the consultant.

Summary of Results

The coefficient of damping for the packaged MC-1, when excited parallel to the major axis of the container, was .051. The natural frequency for the packaged unit in this plane was 20 cps.

The coefficient of damping perpendicular to the major axis was .070, with a natural frequency of 22.5 cps.

Results of the vibration test were to be determined by the requesting division.

Procedure

a. Test Conditions

The test was conducted under ambient temperature conditions. A "dummy" weight (to duplicate the units weight) was mounted inside an empty MC-1 container, which in turn was packaged according to the standard procedure.

A General Radio accelerometer was attached inside the Abee can and connected through a dc amplifier to a Brush recorder which gave a record of the displacement (the output of an accelerometer is proportional to displacement at any one vibration frequency) and the natural frequency of the packaged MC-1 when excited. To excite unit parallel to its major axis, the top of the container in which it was packaged was pushed down and quickly released. The MC-1 was excited perpendicular to its major axis by inserting a small rod through a hole drilled in the side of the container, displacing the MC-1 laterally and then releasing.

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After the damping test the "dummy" MC-1 was replaced with an operational unit and the packaged unit placed on the Sonntag vibration table, where it was subjected to a constant displacement vibration (10g acceleration at 55 cps) through a frequency range of 10-55-10 cps in a 10 minute period. The container and contents were vibrated for 45 minutes in each of three mutually perpendicular planes. The requesting division then took the vibrated MC-1 for analysis.

b. Equipment Used

1. General radio accelerometer, Type No. 761

2. Brush dc amplifier, Type No. BL 905 and recorder, Type No. BL 202

3. Sonntag vibration table

Results

The coefficient of damping for the packaged unit was determined by using the following equation from "Elements of Mechanical Vibration" by Freberg and Kemler:

$$\frac{r}{r_c} = \sqrt{\frac{1}{\left(\frac{2\pi}{\delta}\right)^2 + 1}}$$

where: $\frac{r}{r_c}$ = the ratio of measured damping to critical damping.

and, $\delta = \ln \frac{X_1}{X_2}$

where: $\frac{X_1}{X_2}$ = the ratio of the maximum amplitudes of two consecutive wave forms taken from the Brush recorder.

No information is as yet available on the electrical tests that were conducted on the MC-1 by the requesting division.

G. P. Barnett

Test Conducted by G. P. BARNETT - 1531

Original Signed By
R. L. WAGAR

Approved by R. L. WAGAR - 1531

GPB:nj

Copy to:
L. J. Paddison-1500
T. S. Bills-1510
G. H. Roth-1520
T. B. Morse-1530
W. O. McCord-1290 D. N. Evans-2461
T. F. Marker-1212
A. E. Leopold-2112

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