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VIBRATION TEST OF SHAPED CHARGE
(U)

Organization 7300 Environmental Test Report

R. R. Horton - 7324

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7331 Test Project Engineer

CENTRAL TECHNICAL FILE
ACCOUNTABILITY CARD
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VIBRATION TEST OF SHAPED CHARGE

Introduction

Two series of acceleration controlled vibration test runs were performed on the Shaped Charge test unit. The first series of tests was performed on the test unit containing a dummy explosive charge and consisted of Test Runs 1, 2, and 3. Test Runs 4, 5, and 6 made up the second series of tests and were performed on the test unit containing a live HE charge.

Test Runs 1 and 4 were conducted with the input in the vertical axis of the test unit; Runs 2 and 5 were in the lateral axis; and Runs 3 and 6 were in the longitudinal axis of the test unit.

The object of this test was to qualify the fiberglass structure to vibration inputs it may experience in use.

A list of instrumented components can be found in Table I.

The requested test specifications for each run were:

Input Control	Frequency Range
.2" DA	10 - 17 cps
3g	17 - 60 cps
3"/sec vel.	60 - 100 cps
5g	100 - 2000 cps
Total test time	60 minutes
Sweep rate	1/2 octave/minute

The test was requested by J. A. Anderson, 1514, on March 13, 1967. L. P. Navoda, 7331, was the Test Coordinator. The test item was instrumented and ready for the first series of tests on July 6, 1967. The first series of tests was completed on July 7, 1967. The test item was ready for the second series of tests on July 26, 1967. The test was completed on July 28, 1967.

Summary

The unit was tested with dummy and live charges at the requested test levels and for the required length of time in each axis. Some of the screws holding the unit to the test fixture were found to be loose after Test Runs 2, 4, and 5. The internal mounting ring was found to be loose after Test Run 3. Some of the screws holding the sections of the unit together were loose after Test Run 4.

Table I lists input and response plot figure numbers for each test run. Unit instrumentation for Runs 4, 5, and 6 consisted of an input and a check on the input only.

Procedure and Results

Instrumentation of the test unit for the first series of tests consisted of three triaxial accelerometers mounted to the outside skin of the unit as shown in Figures 1 and 2, and a single accelerometer mounted to the test fixture. This single accelerometer was used as the input control and is also shown in Figures 1 and 2.

In the second series of tests, using the "live" charge, the instrumentation consisted of the input control accelerometer and a second accelerometer mounted in the direction of shake and used as verification of the input. No other accelerometers were used.

The input control signal for all test runs was filtered using a 10 cps bandwidth filter from 10 - 100 cps and a 135 cps bandwidth filter from 100 - 2000 cps. The response and input signals from all test runs were recorded on magnetic tape and played back through a 25 cps bandwidth filter. The resulting data plots are listed in Table I.

Prior to the first series of tests, the Polysulfone 5/16" flat head screws in the main joint were exchanged for nylon screws.

Each test run was conducted at the requested test levels and for a total test time of 60 minutes. The test runs were performed in two 30-minute cycles from 10-2000-10 cps.

Tests on Dummy Charge

Test Run 1 - Input in Direction of Vertical Axis of Unit

The unit was mounted to the horizontal table top as shown in Figure 1. No apparent damage to the unit or fixture was noted after this test. Plots of input control and response are shown in Figures 3 through 12.

Test Run 2 - Input in Direction of Lateral Axis of Unit

For this test run, the unit was rotated 90° with respect to the orientation shown in Figure 1. Plots of input control and response are shown in Figures 13 through 20. After this test run, the screws holding the unit to the test fixture were found loose. Response data from Accelerometers No's. 8 and 10 were lost due to bad tape channels.

Test Run 3 - Input in Direction of Longitudinal Axis of Unit

For this test run, the unit was mounted to the vibration table top as shown in Figure 2. Plots of input control and response are shown in Figures 22 through 29. After this test run, the unit was disassembled and the internal clamp was found loose. It is not known in which test run the clamp came loose. Response data from Accelerometer No. 9 was lost due to a bad tape channel.

Tests on "Live" Unit

Test Run 4 - Input in Direction of Vertical Axis of Unit

The unit was mounted to the horizontal table top as shown in Figure 1. After this test, several mounting and structural screws were found loose. Figures 30 and 31 show input and response plots.

Test Run 5 - Input in Direction of Lateral Axis of Unit

The unit was rotated 90° from the setup in Figure 1. A few of the mounting screws were loose after this test. Figures 32 and 33 show plots of input control and fixture response.

Test Run 6 - Input in Direction of Longitudinal Axis of Unit

The unit was mounted to the vibration exciter as shown in Figure 2. Figures 34 and 35 show plots of input control and fixture response.

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TABLE I

ACCELEROMETER LOCATIONS AND RESPONSE PLOT FIGURE NUMBERS

Accel. No.	Orientation	Location	Response Plots					
			Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
A-1 (Input)	Dir. of Shake	Test Fixture Fig.1,2	Fig. 3	Fig.13	Fig.21	Fig.30	Fig.32	Fig.34
A-2	Long	Bottom Section	Fig. 4	Fig.14	Fig.22	None	None	None
A-3	Vert	Figure 1 and 2	Fig. 5	Fig.15	Fig.23	None	None	None
A-4	Lat	Figure 1 and 2	Fig. 6	Fig.16	Fig.24	None	None	None
A-5	Long	Mid-section	Fig. 7	Fig.17	Fig.25	None	None	None
A-6	Vert	Figure 1 and 2	Fig. 8	Fig.18	Fig.26	None	None	None
A-7	Lat	Figure 1 and 2	Fig. 9	Fig.19	Fig.27	None	None	None
A-8	Long	Top Section	Fig.10	None	Fig.28	None	None	None
A-9	Vert	Figure 1 and 2	Fig.11	Fig.20	None	None	None	None
A-10	Lat	Figure 1 and 2	Fig.12	None	Fig.29	None	None	None
A-11	Dir. of Shake	Test Fixture Fig.1,2	None	None	None	Fig.31	Fig.33	Fig.35

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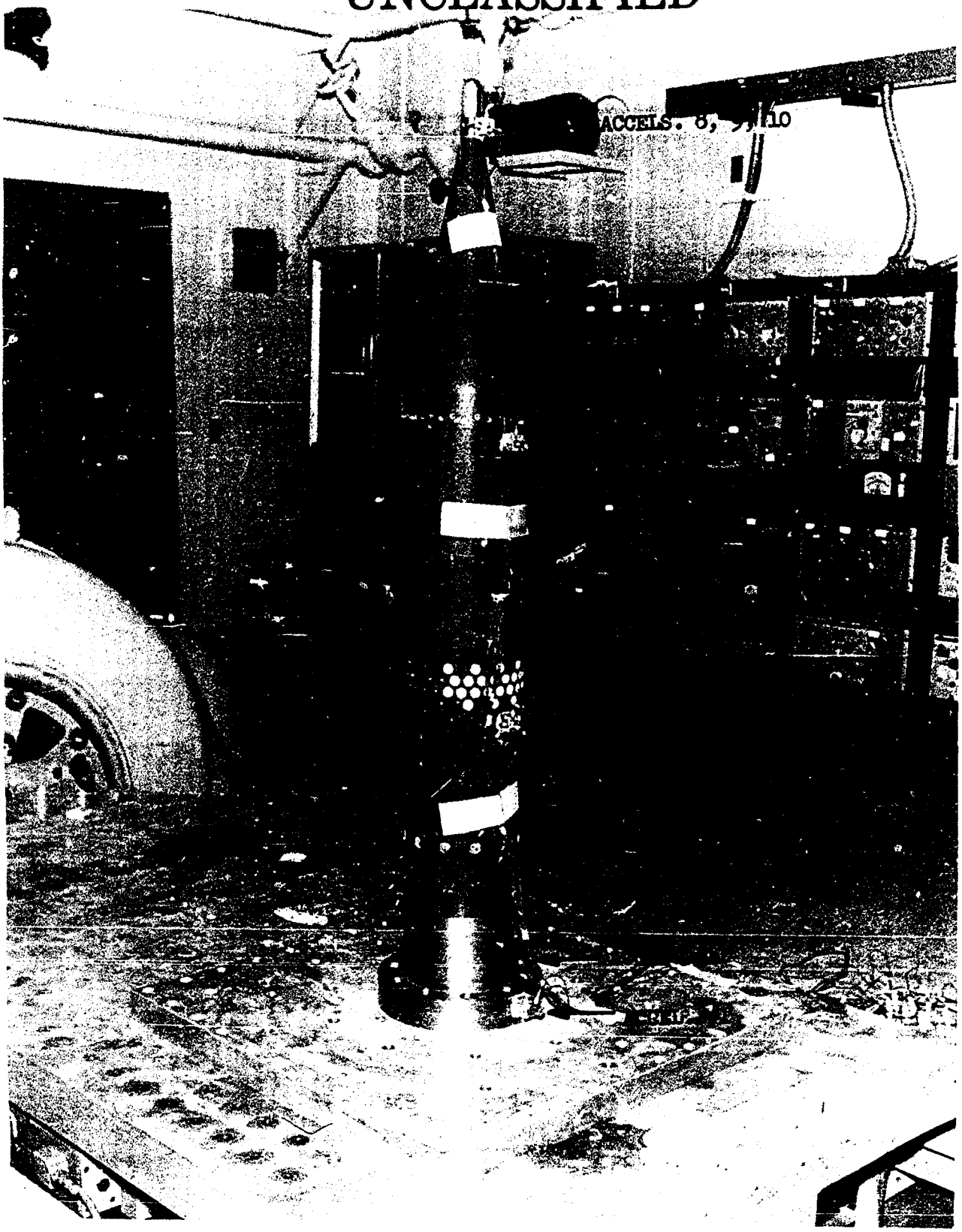

FIGURE 1. VERTICAL AND LATERAL TEST SETUP AND INSTRUMENTATION.

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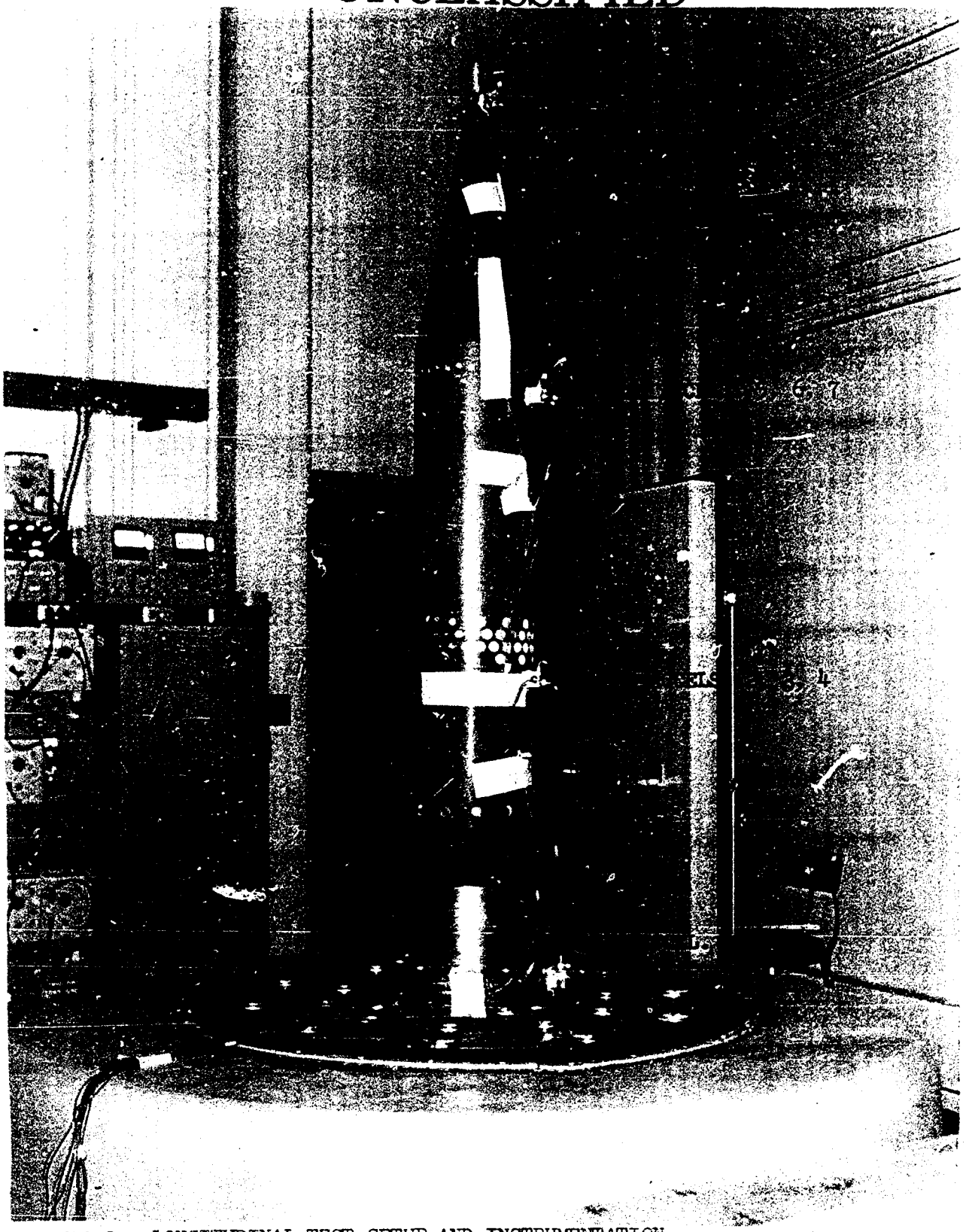

FIGURE 2. LONGITUDINAL TEST SETUP AND INSTRUMENTATION.

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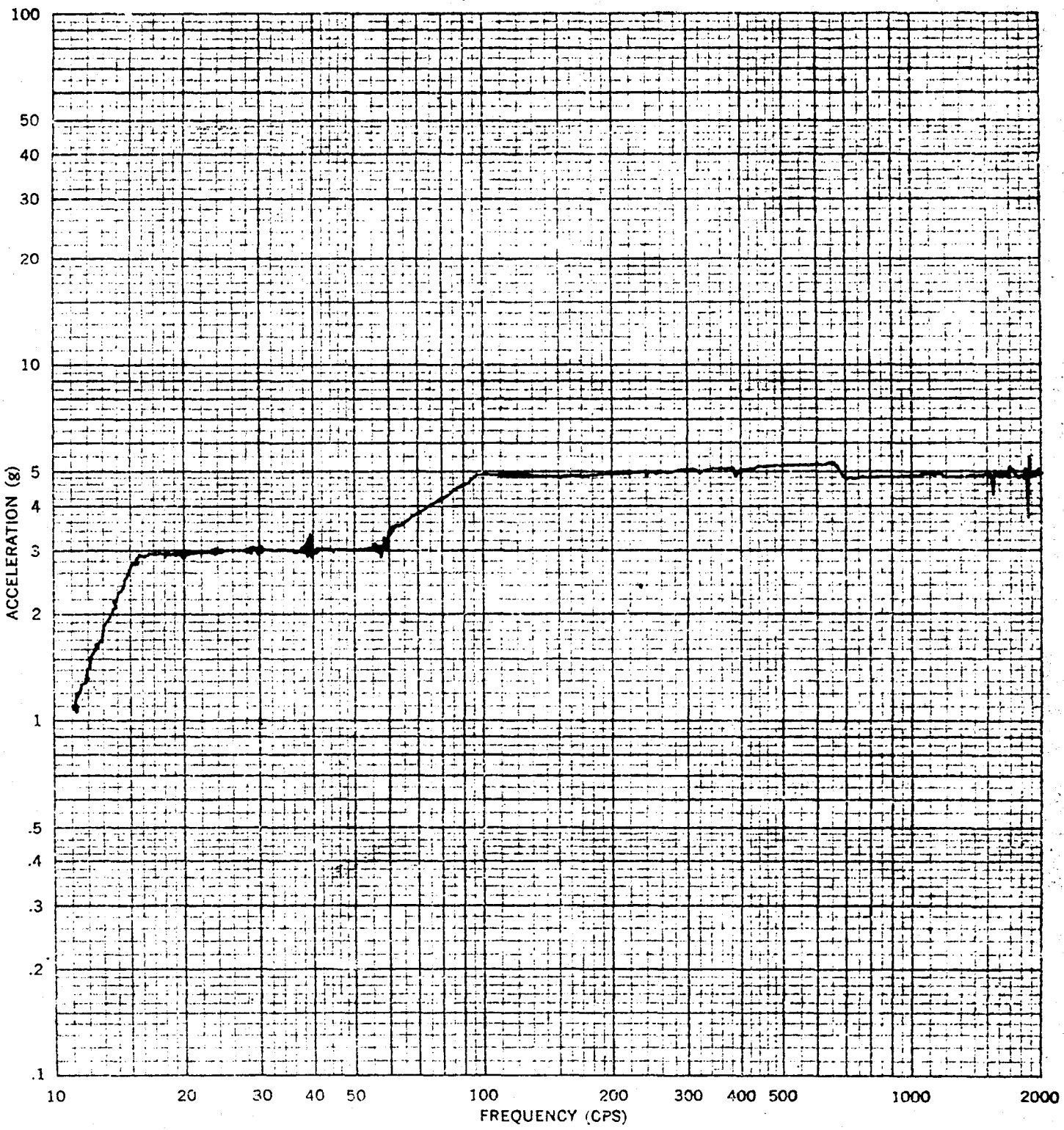

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-1 (INPUT CONTROL) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 3

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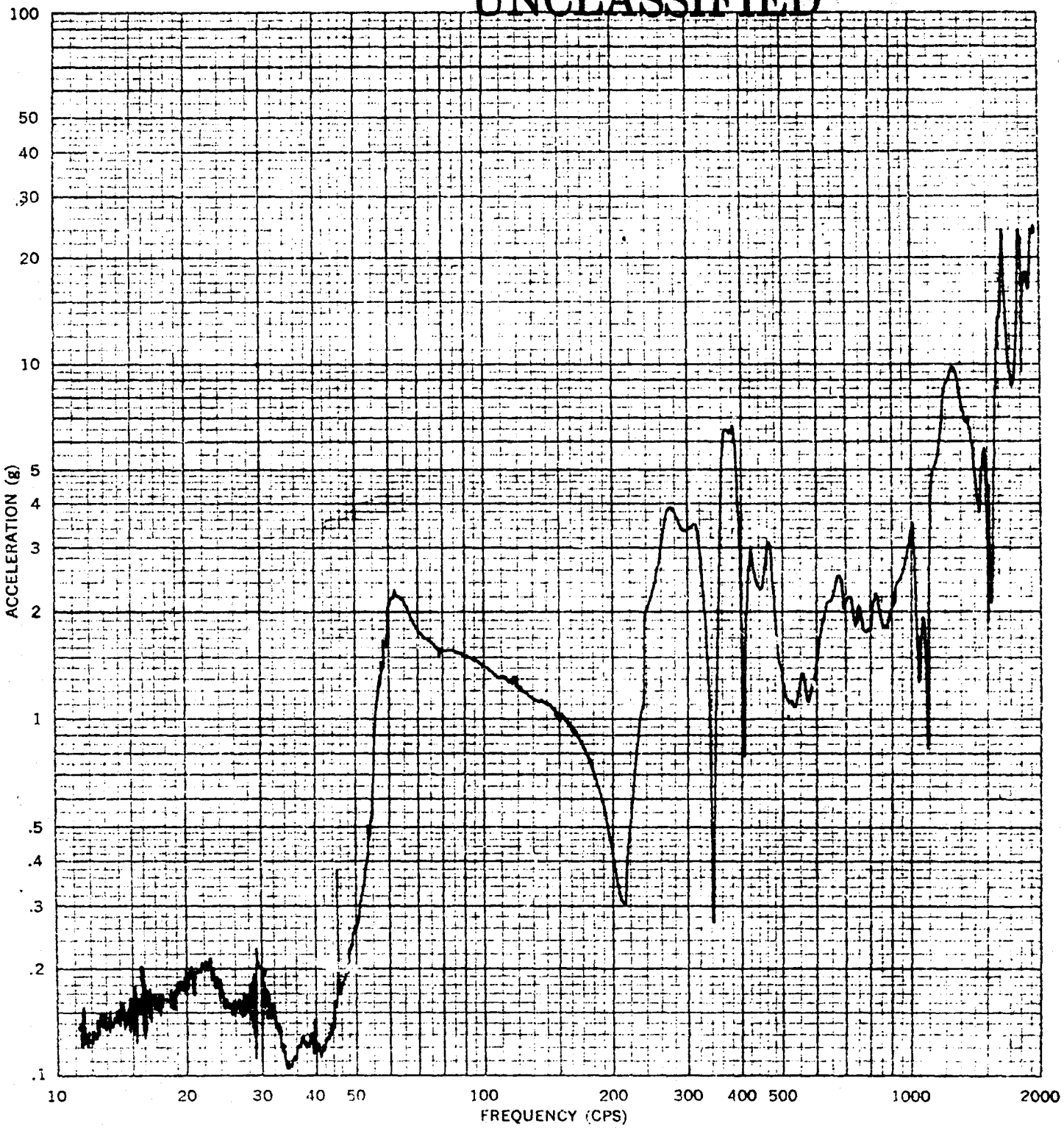

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-2 REF. SYM.

FIGURE REFERENCE FIGS. 1 and 2 TEST DATE 7/6/67

AXIS LONG FIGURE 4

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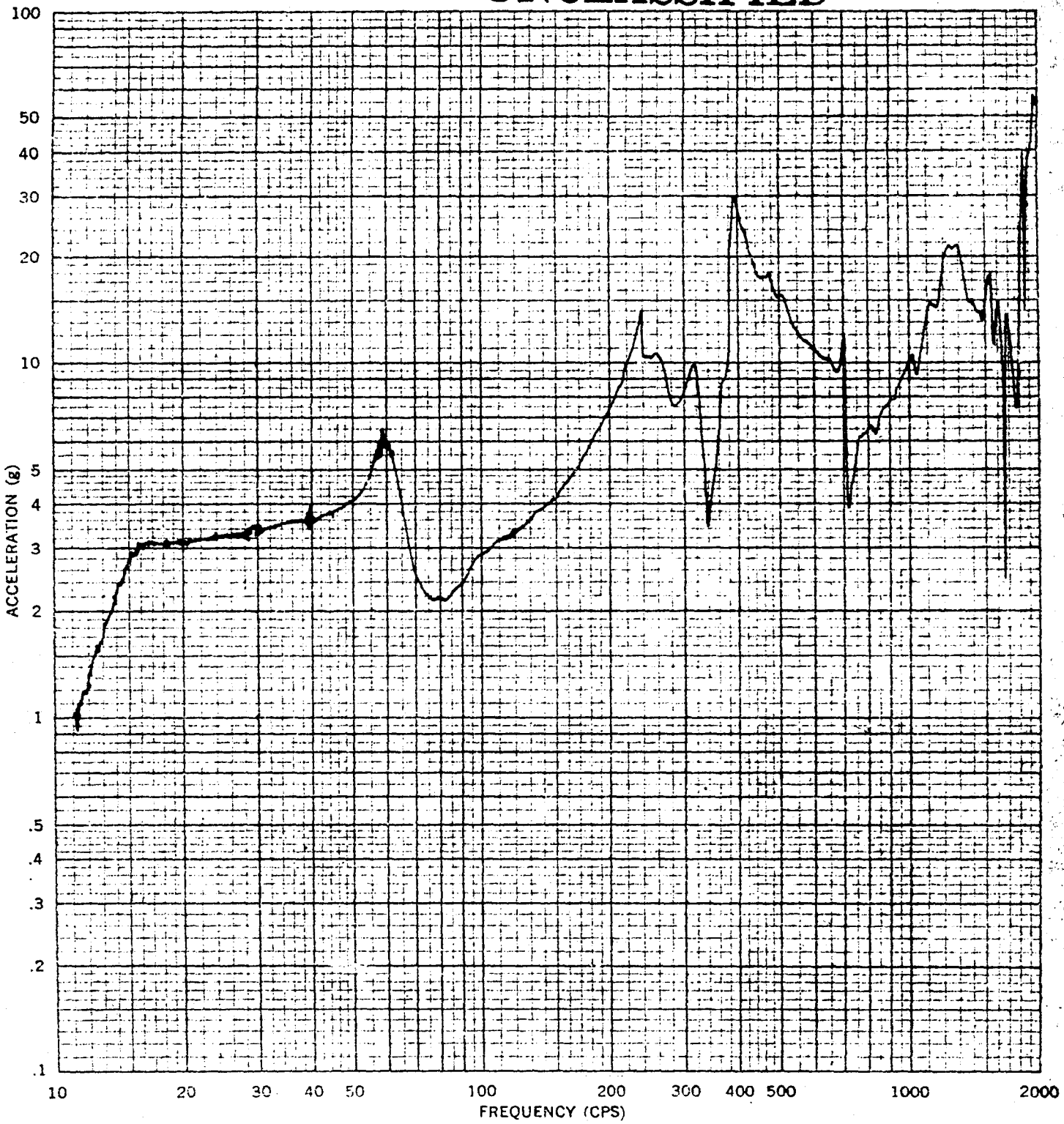

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-3 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 5

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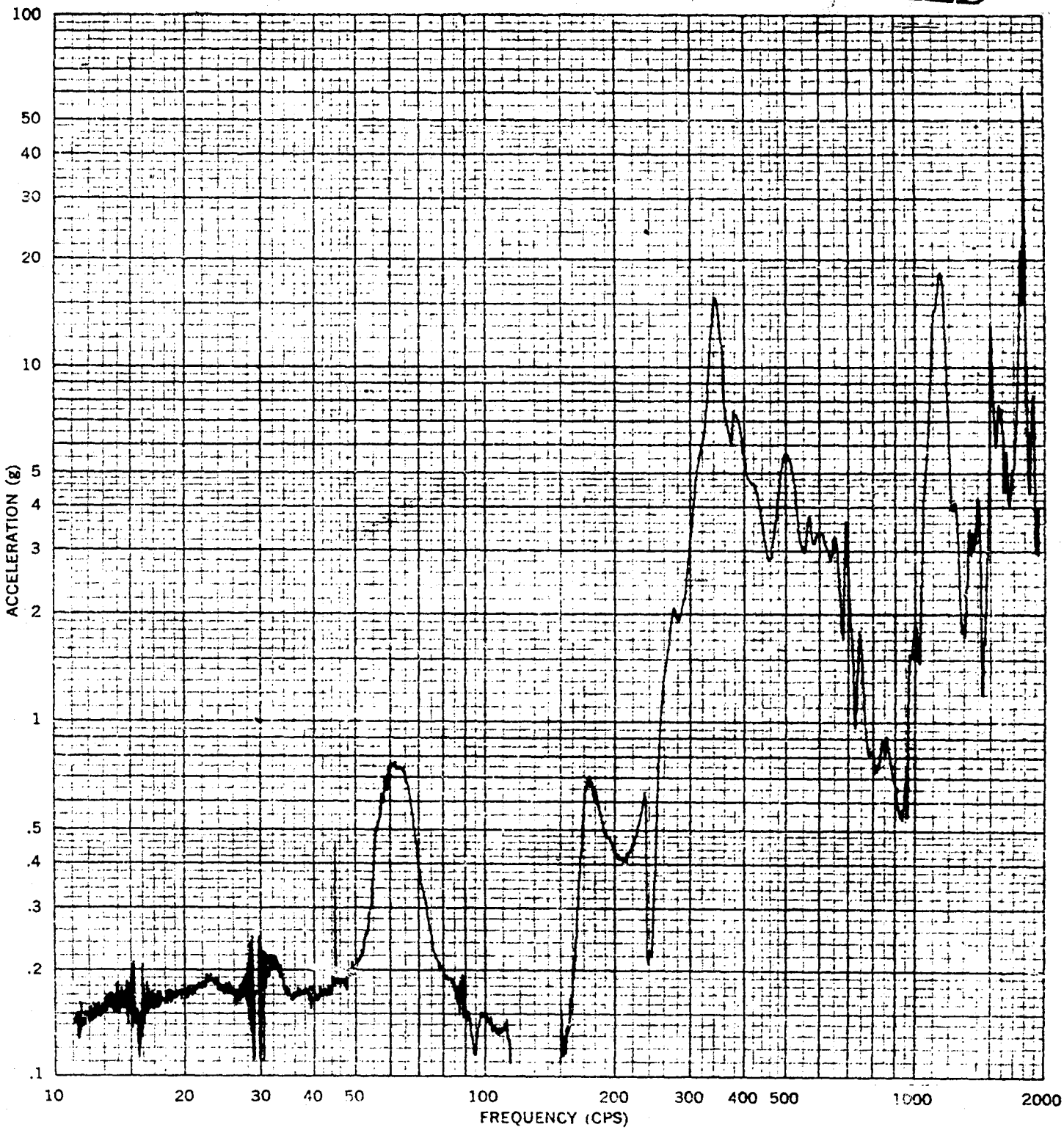

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-4 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 6

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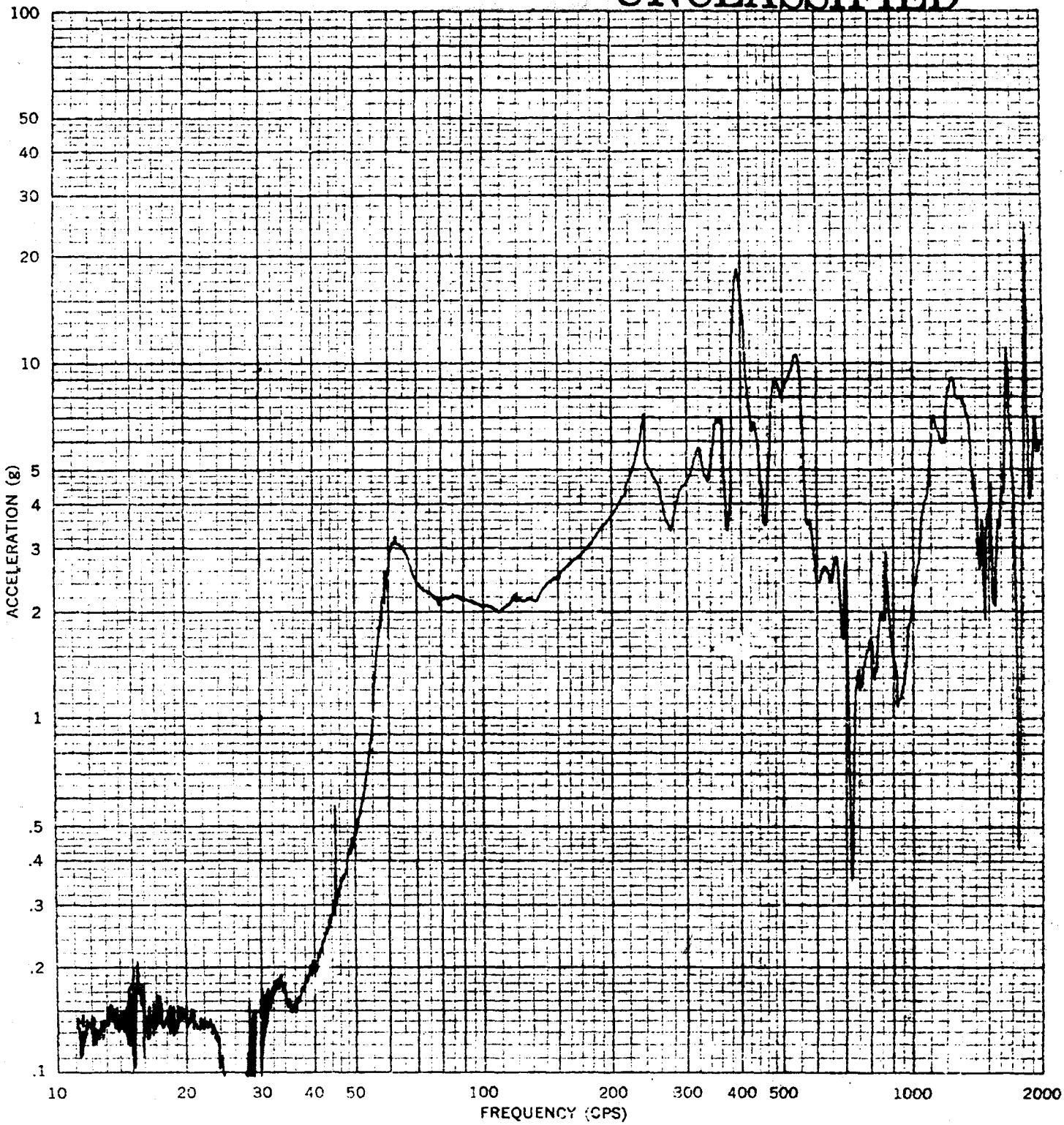

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-5 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LONGITUDINAL FIGURE 7

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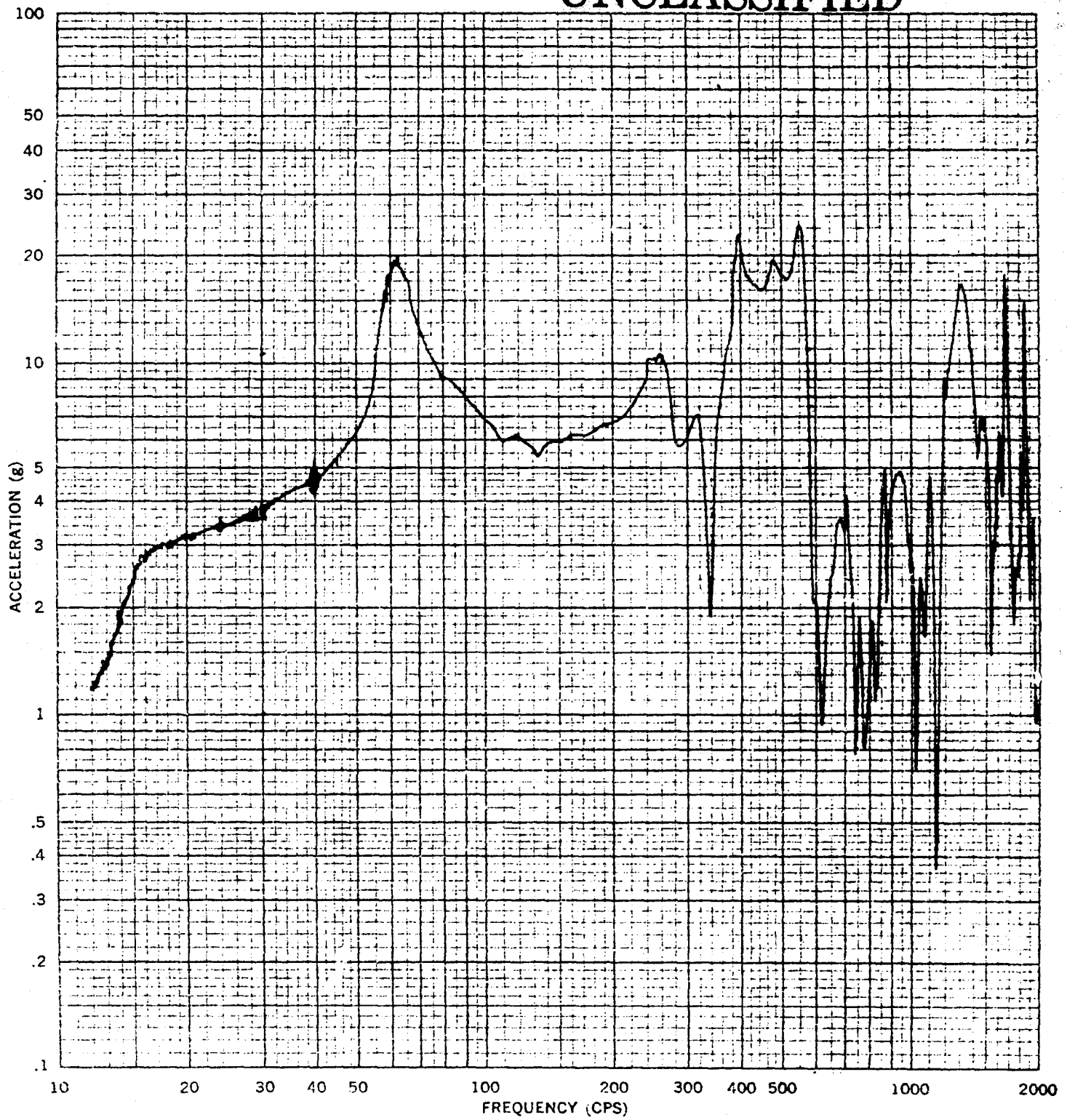

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-6 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 8

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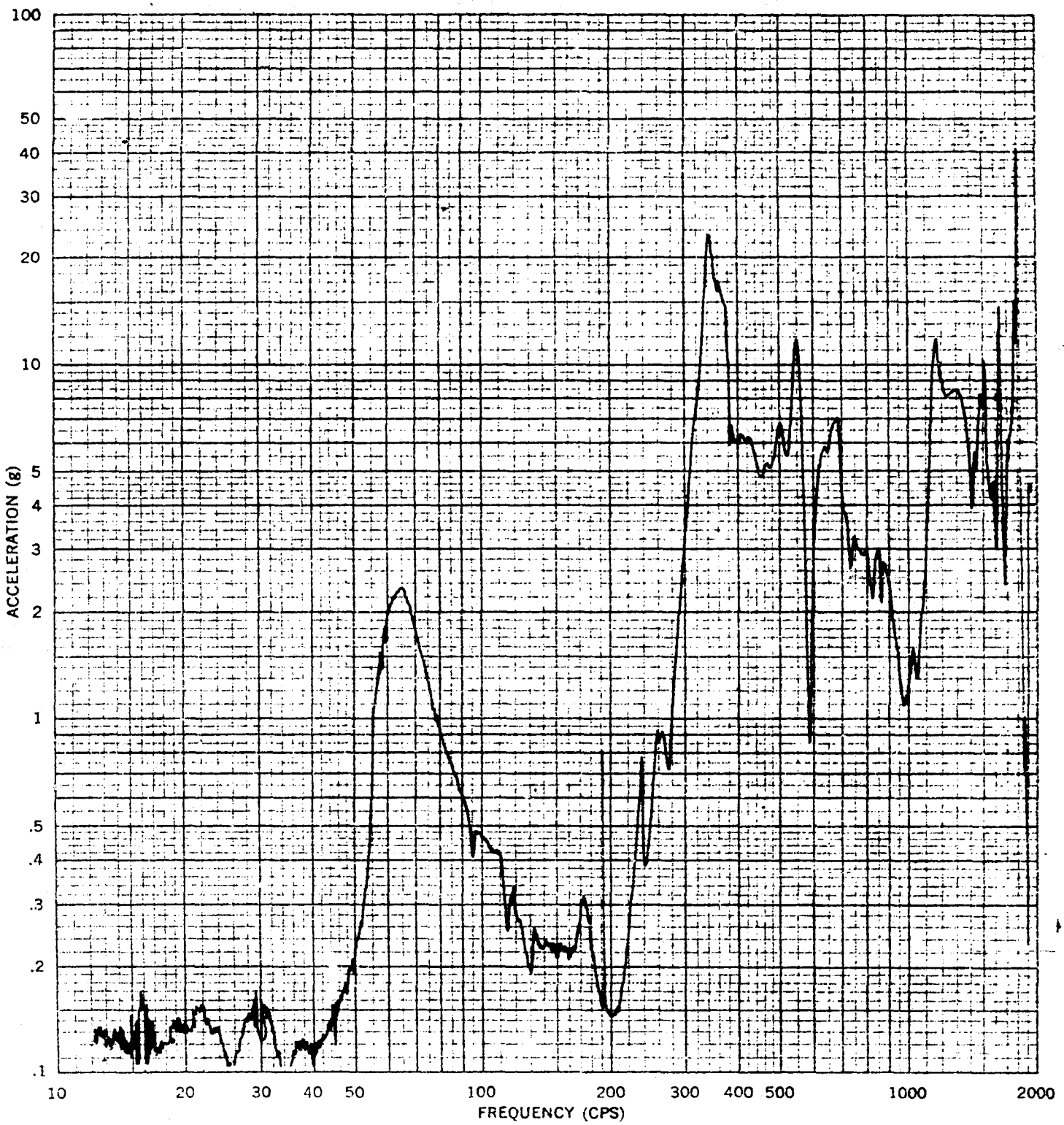

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-7 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 9

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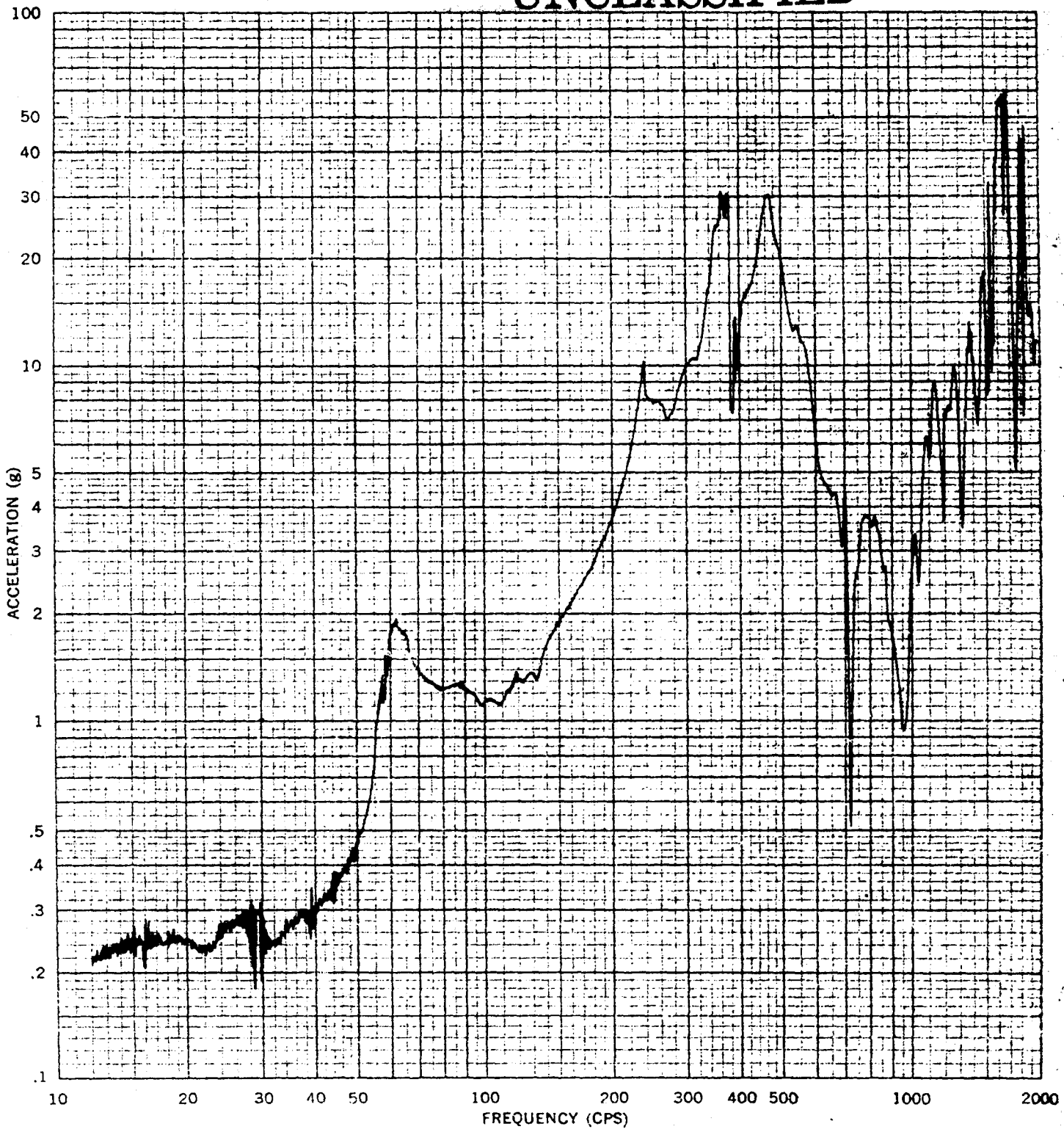

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-8 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LONGITUDINAL FIGURE 10

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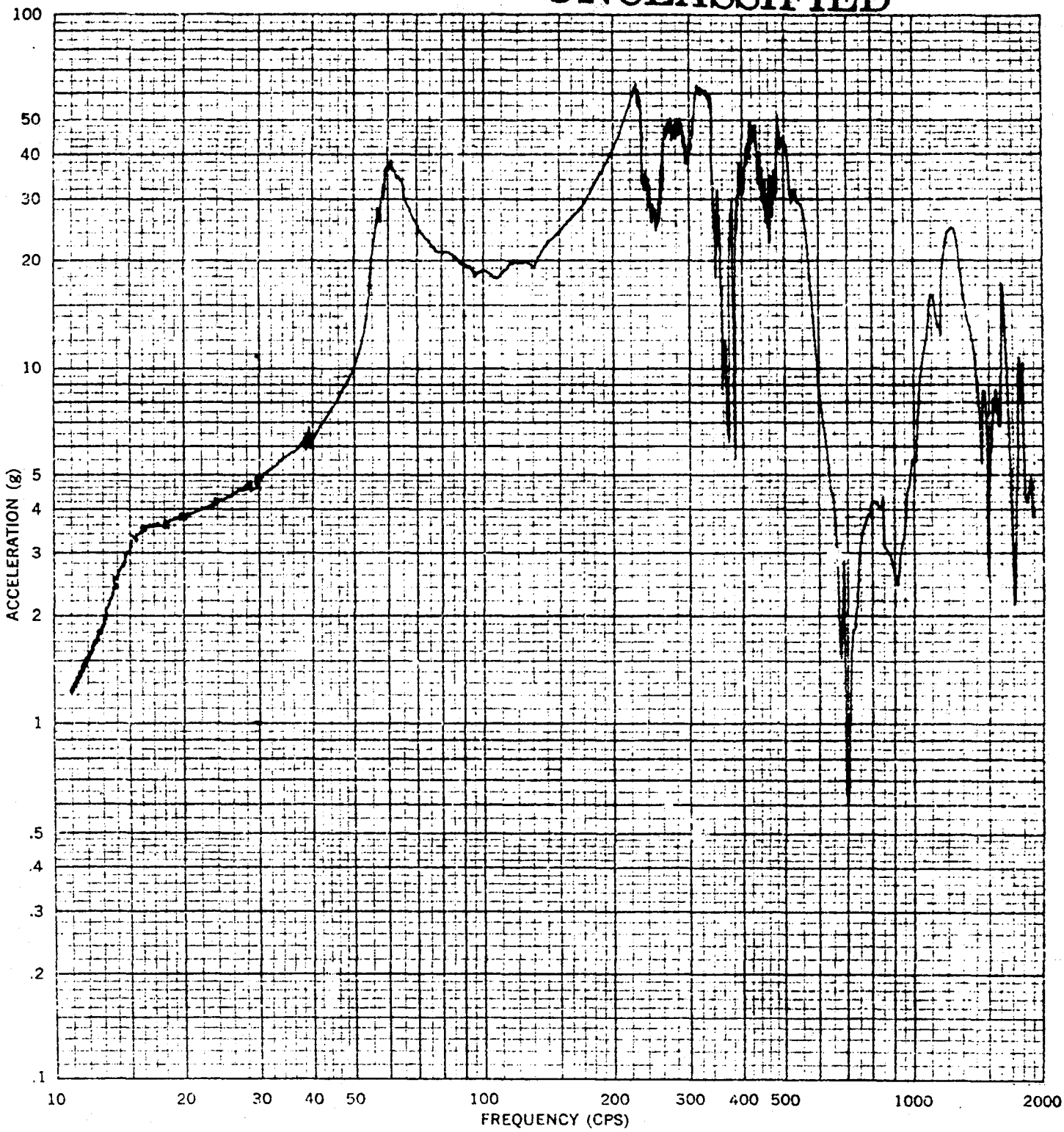

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-9 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 11

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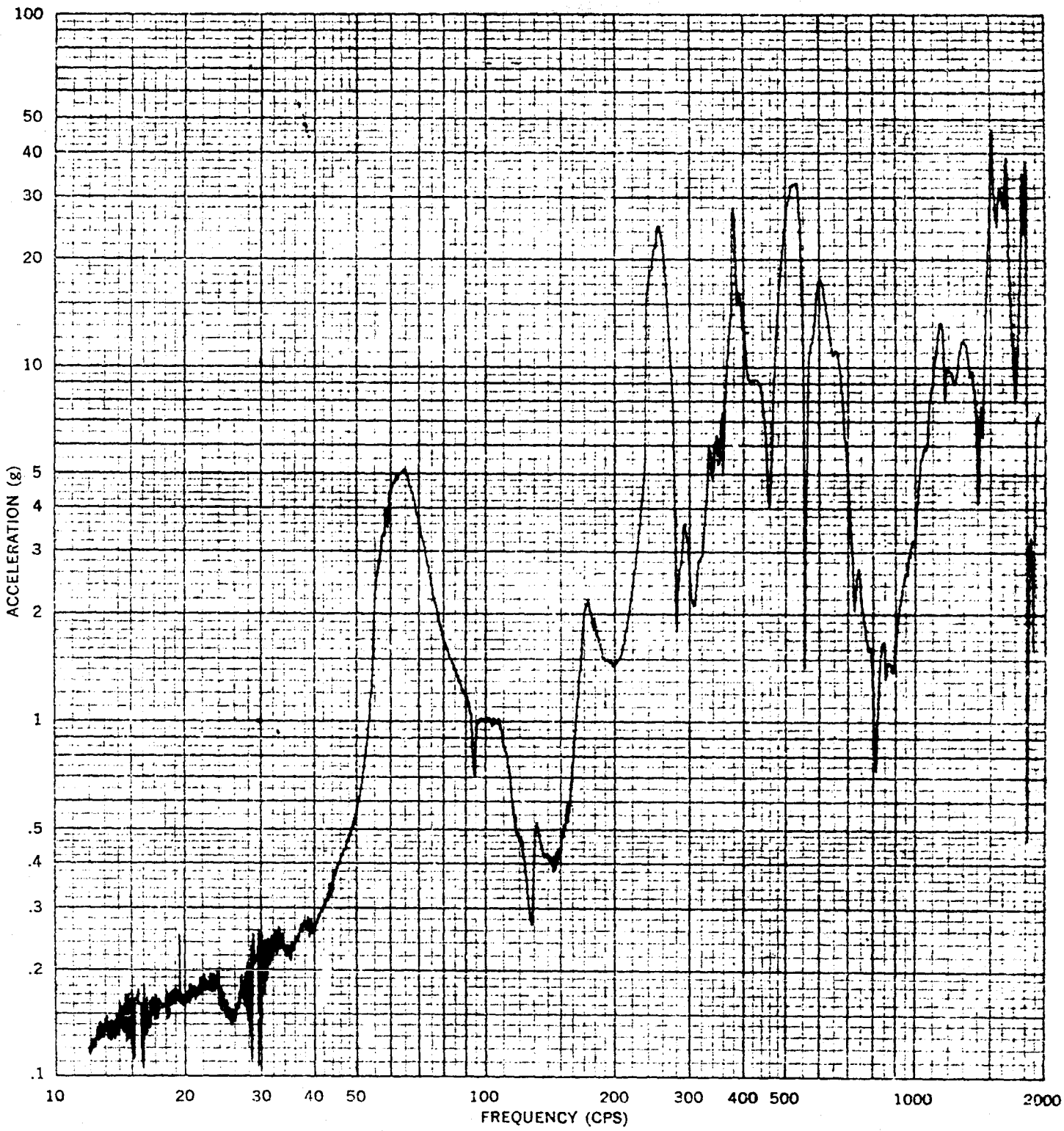

VIBRATION TEST OF SHAPED CHARGE RUN 1

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-10 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 12

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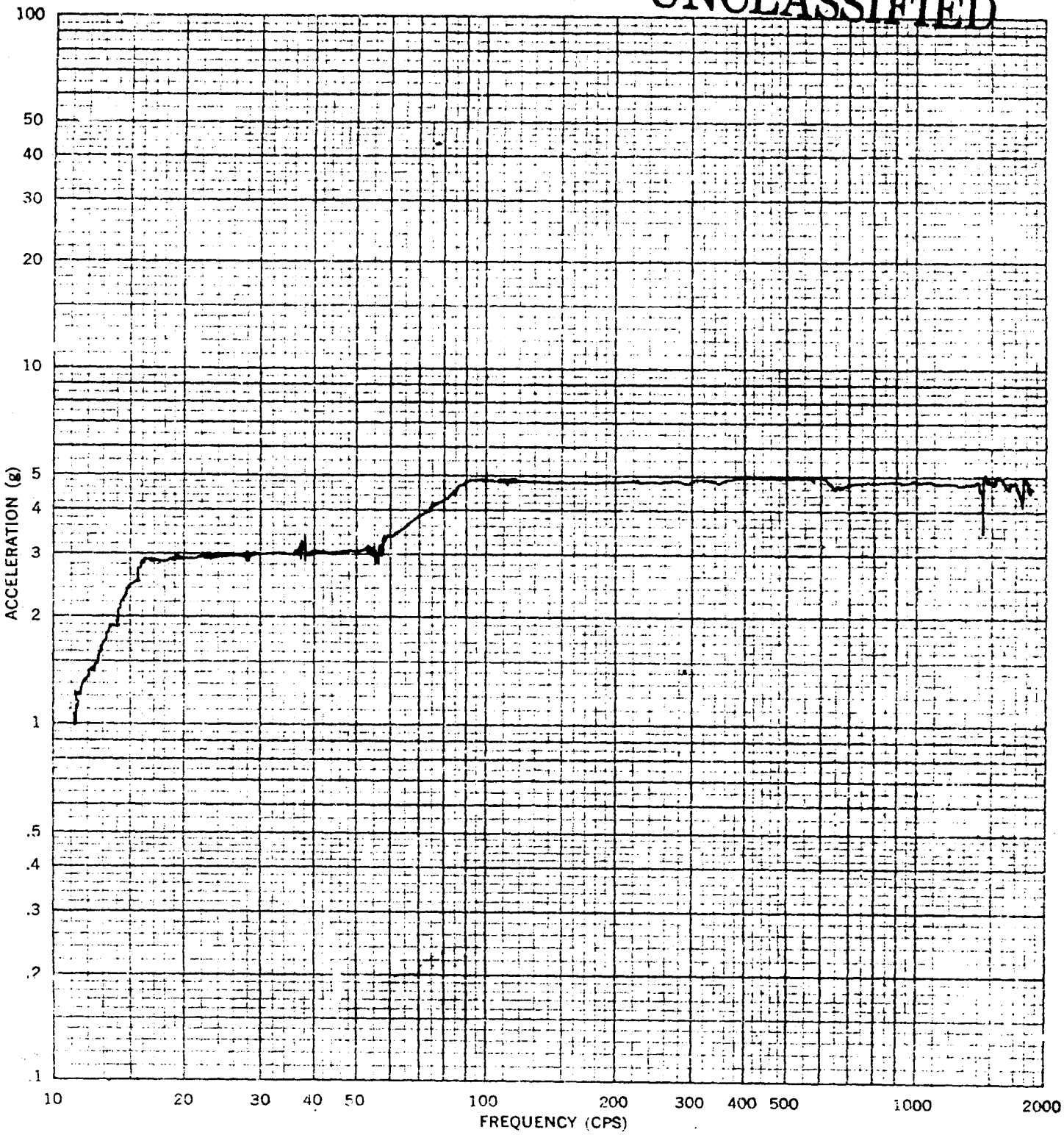

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-1 (INPUT) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 13

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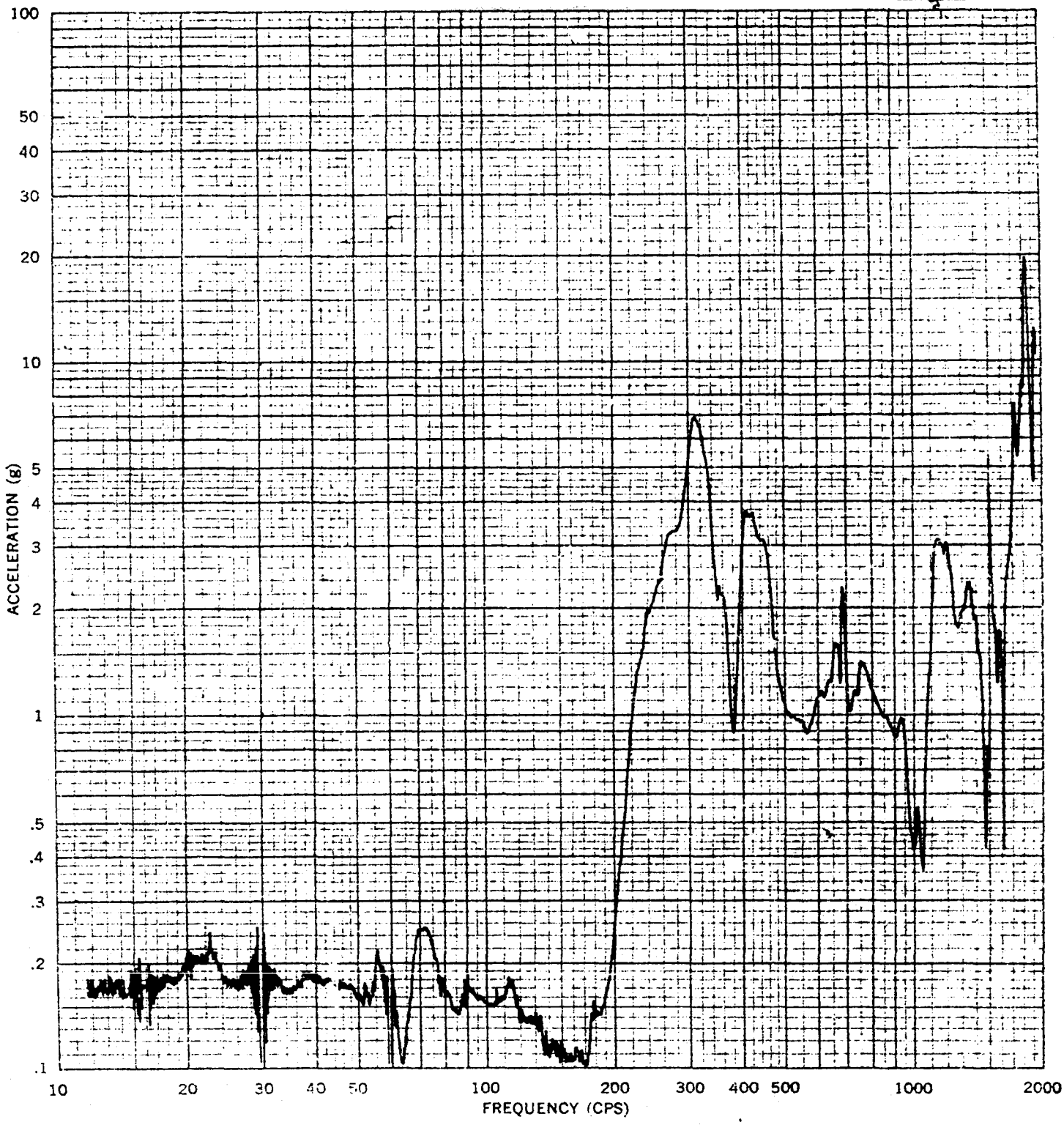

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-2 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LONGITUDINAL FIGURE 14

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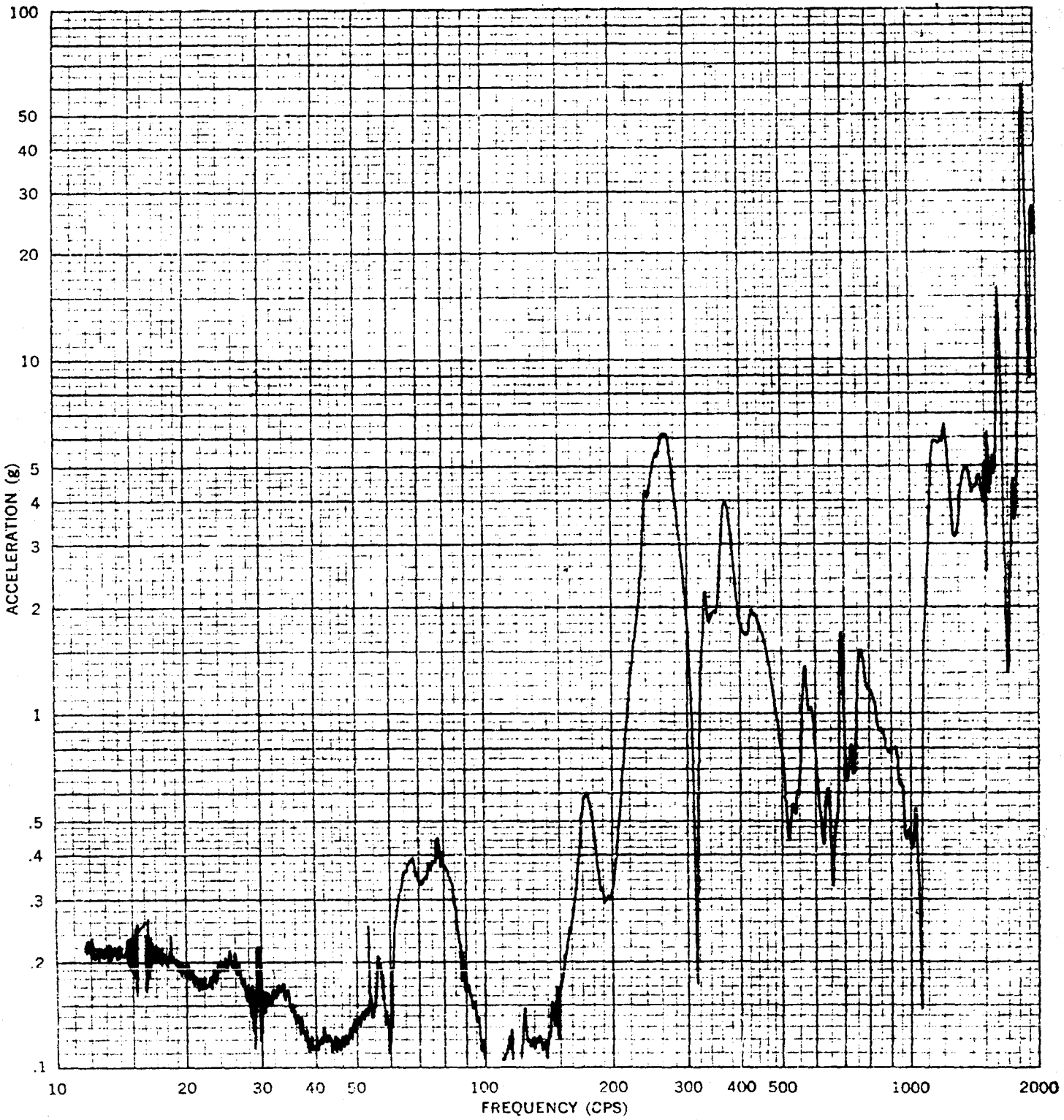

VIBRATION TEST OF SHAPED CHARGW RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-3 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 15

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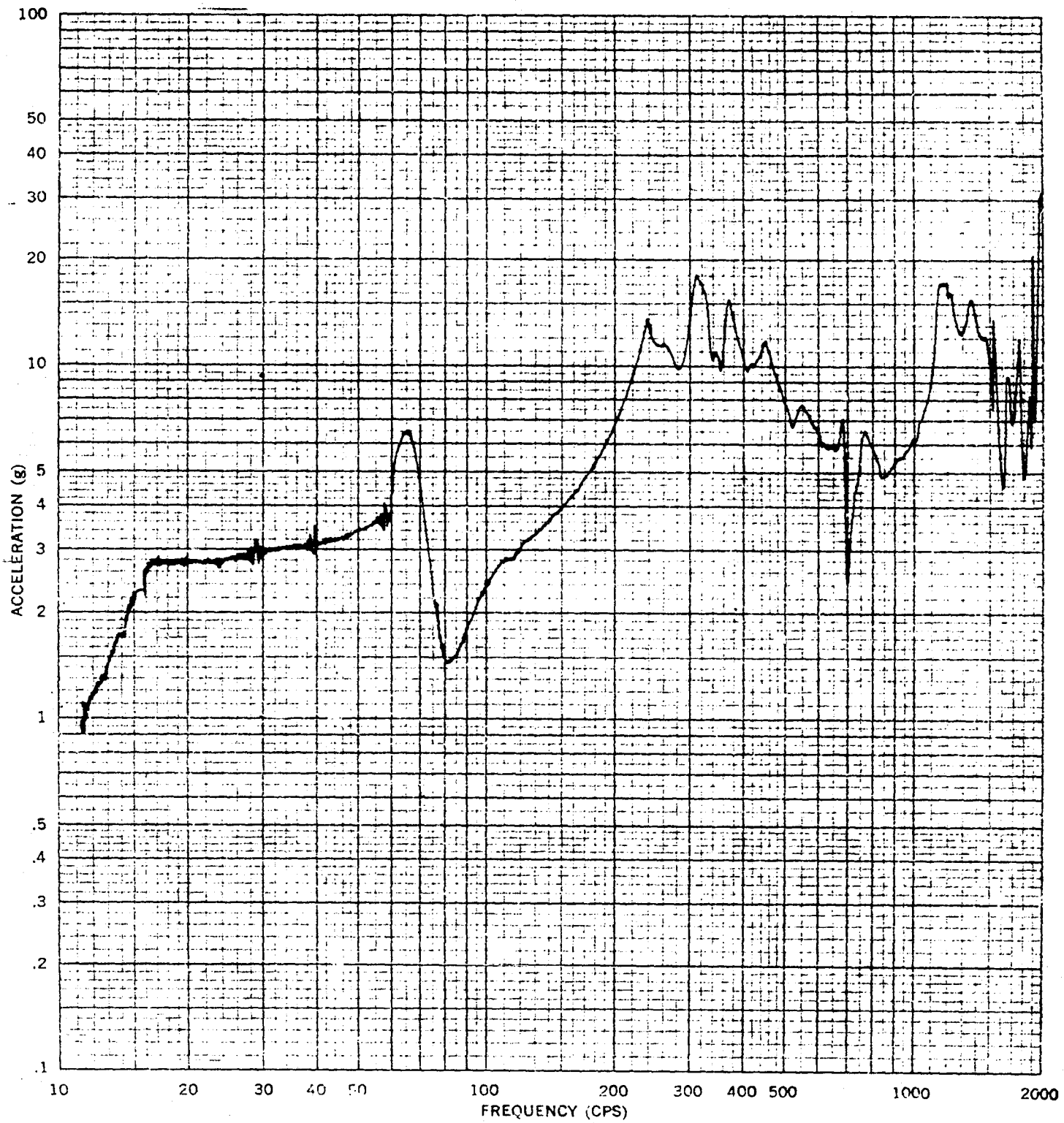

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-4 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 16

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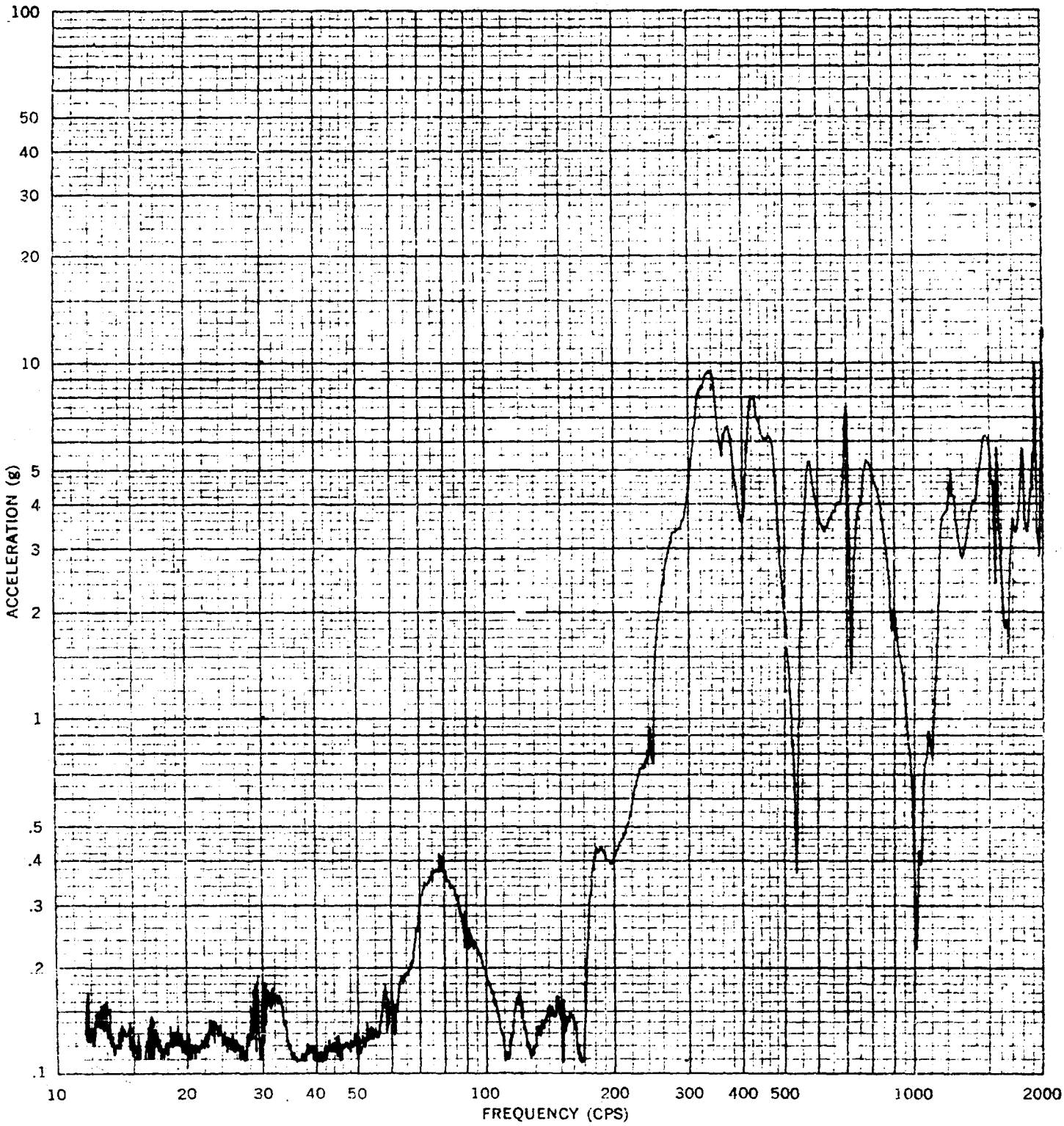

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-5 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LONGITUDINAL FIGURE 17

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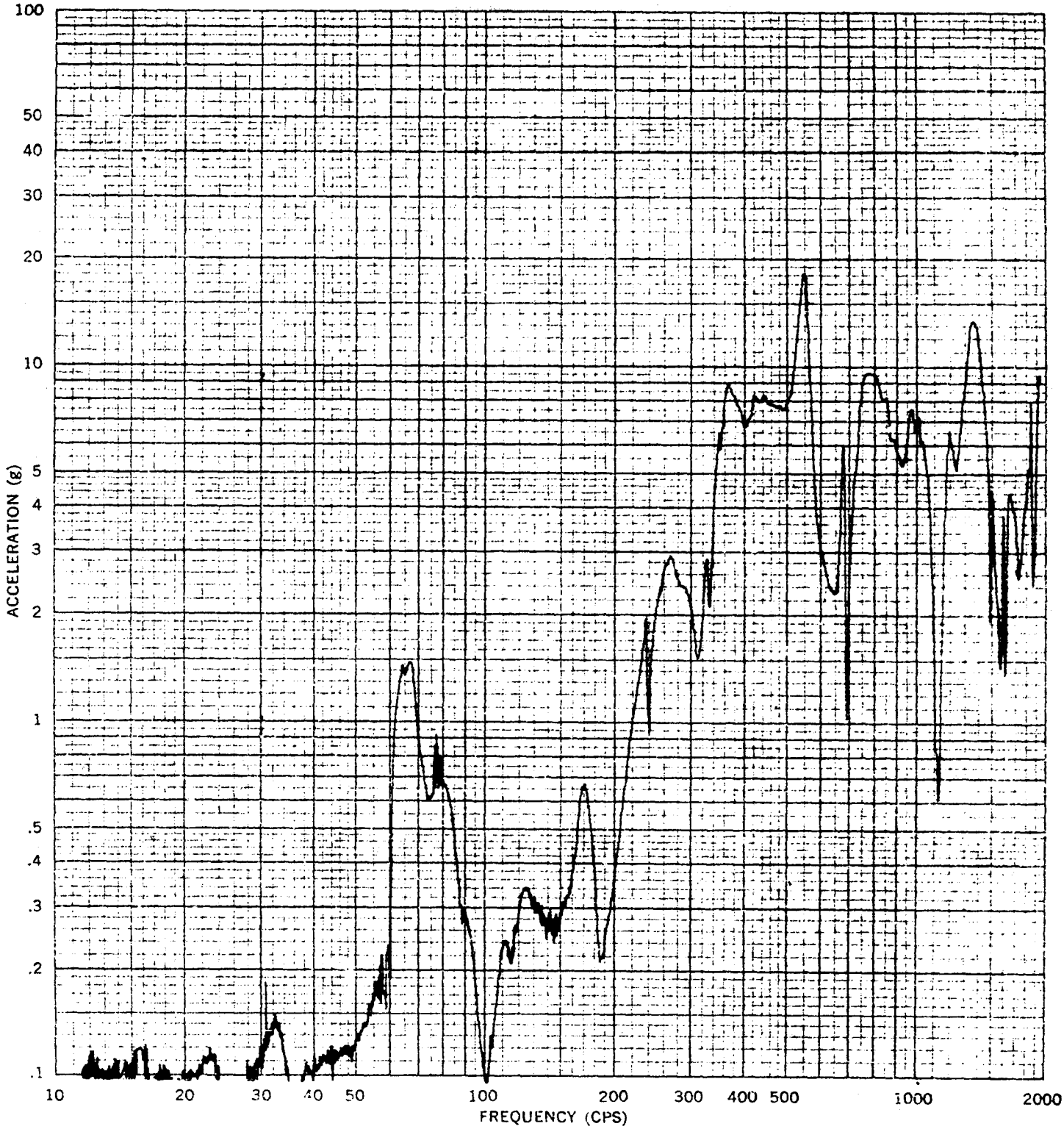

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-6 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 18

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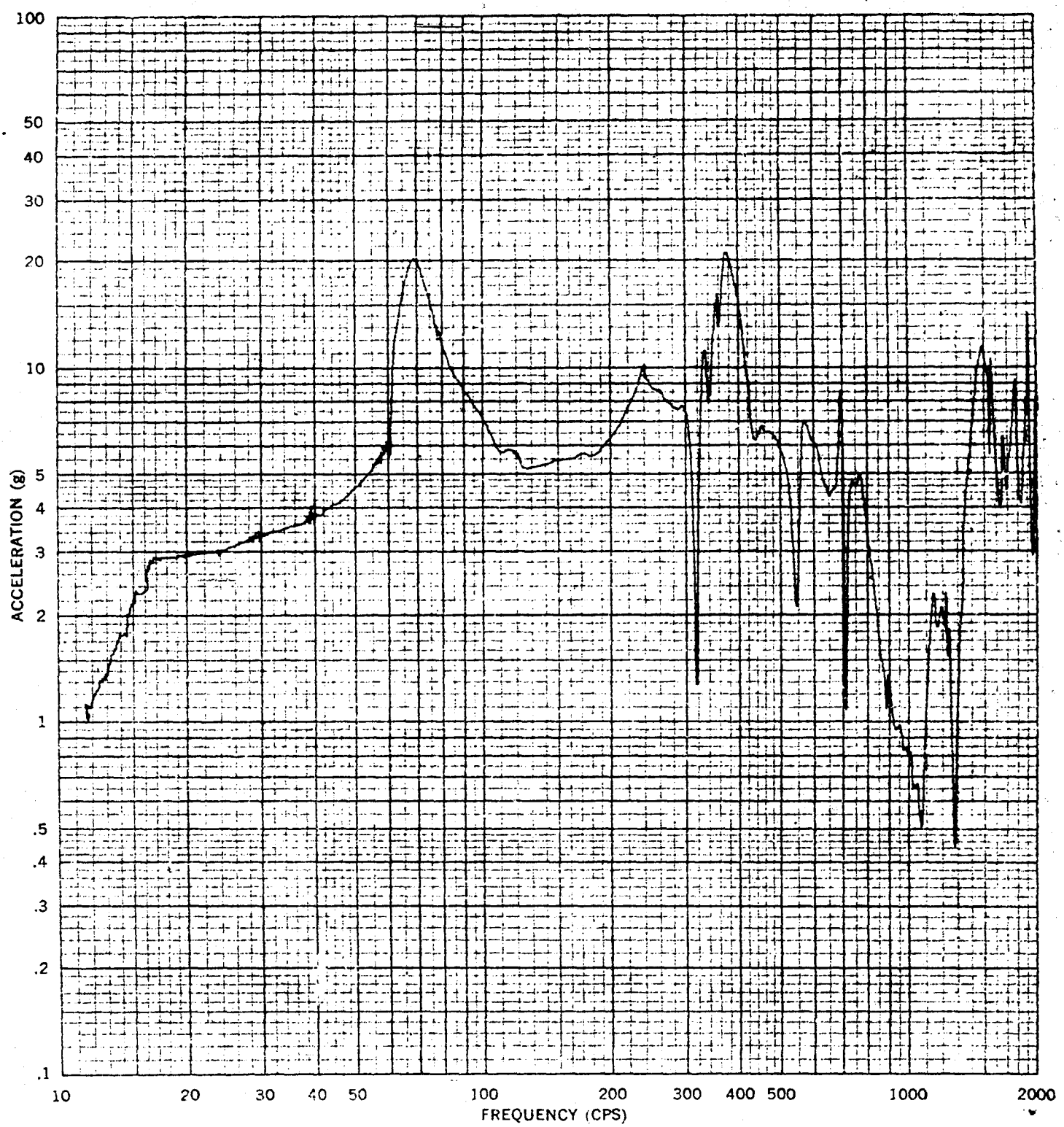

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-7 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS LATERAL FIGURE 19

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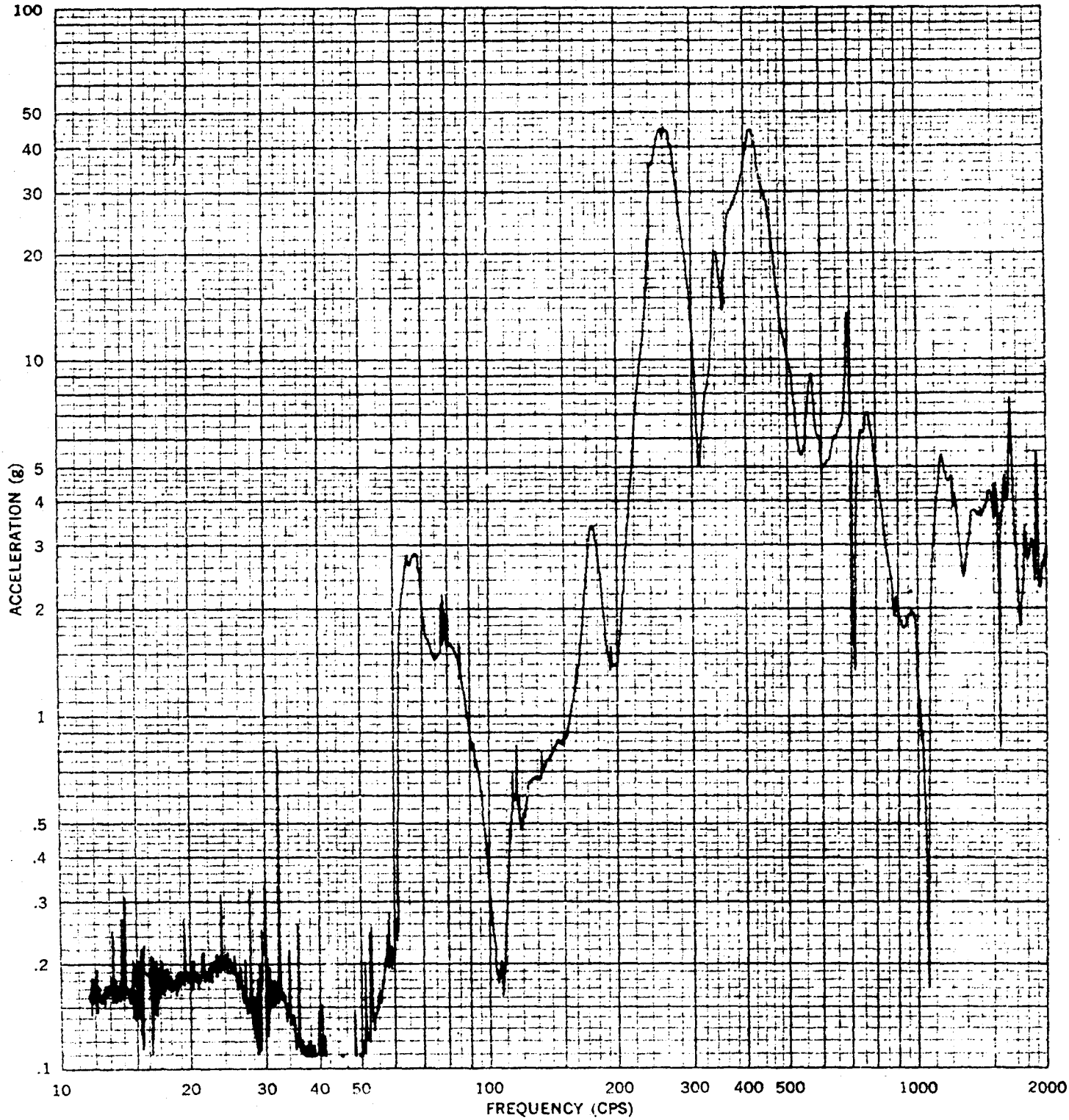

VIBRATION TEST OF SHAPED CHARGE RUN 2

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-9 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/6/67

AXIS VERTICAL FIGURE 20

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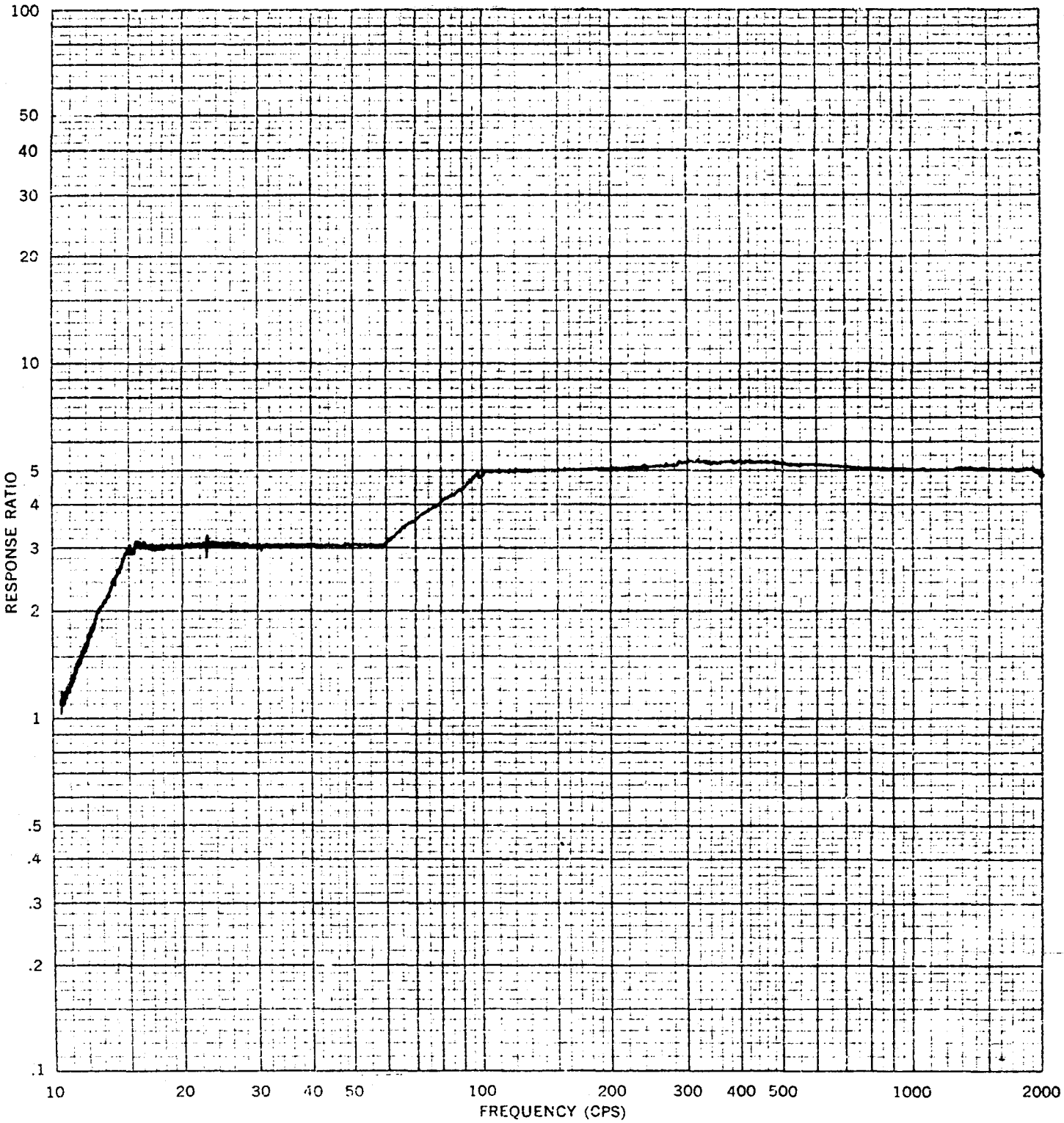

VIBRATION TEST OF SHAPED CHARGE RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-1 (INPUT) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LONGITUDINAL FIGURE 21

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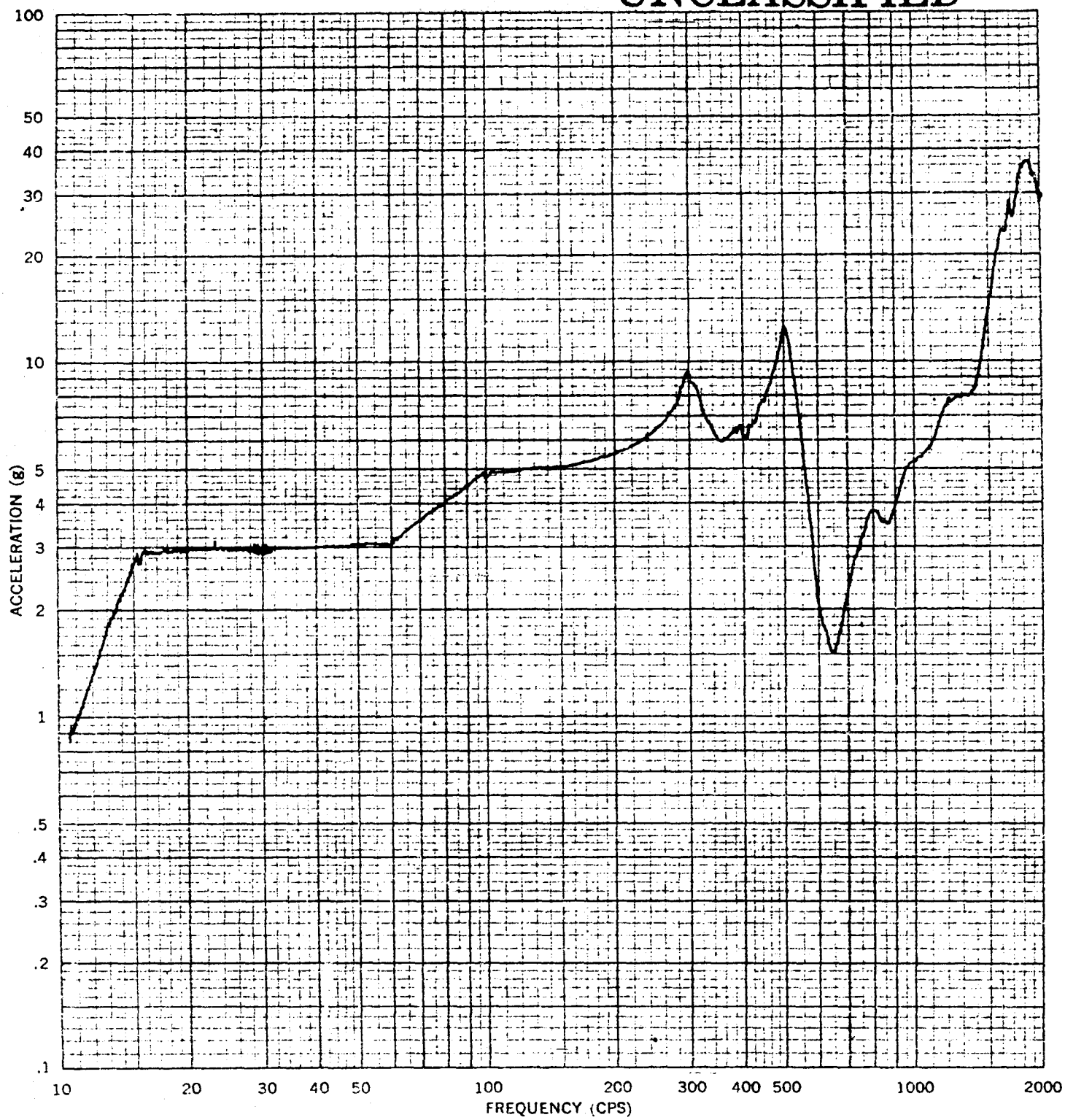

VIBRATION TEST OF SHAPED CHARGE RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-2 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LONGITUDINAL FIGURE 22

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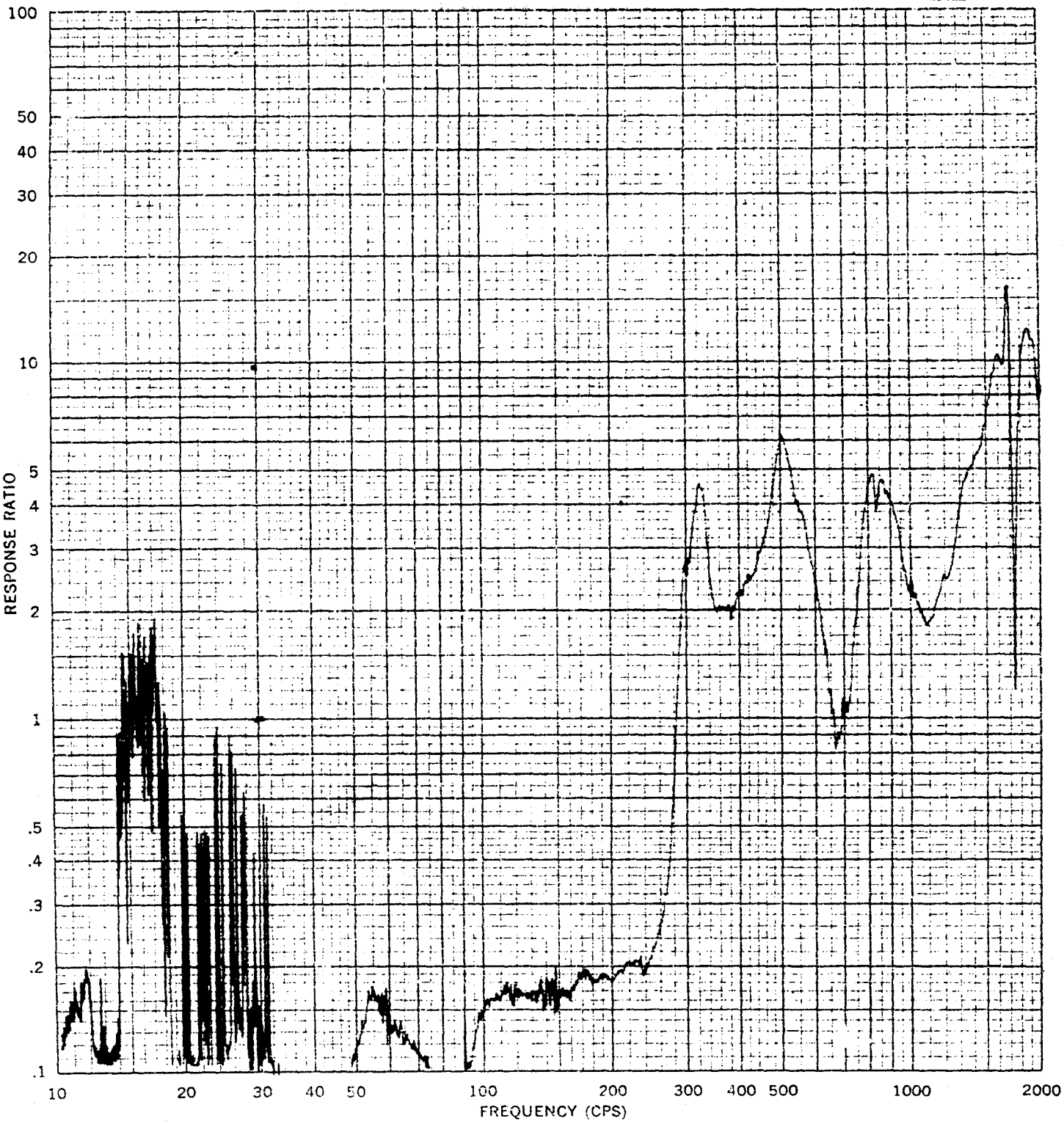

VIBRATION TEST OF SHAPED CHARGE RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-3 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS VERTICAL FIGURE 23

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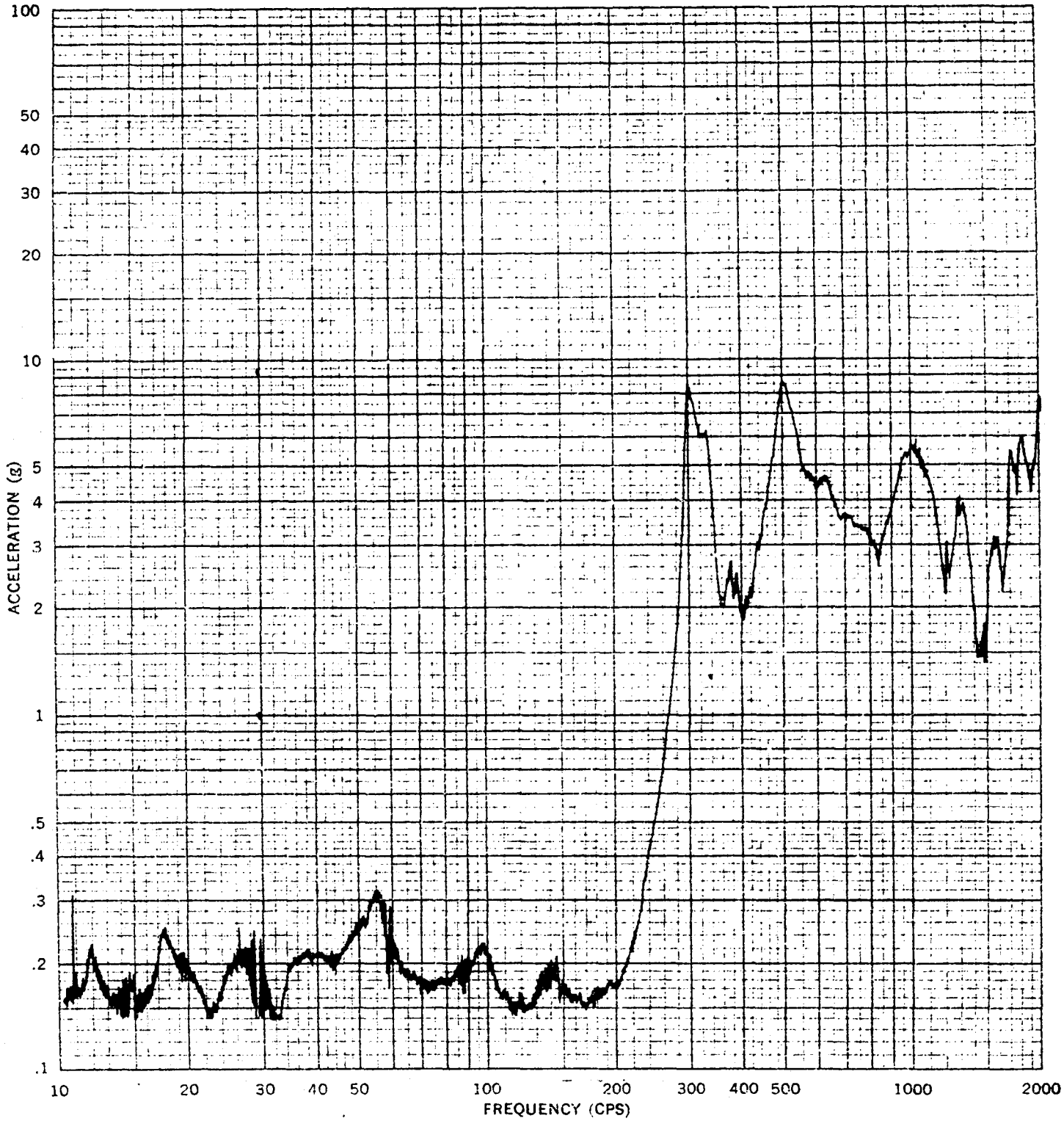

VIBRATION TEST OF SHAPED CHARGW RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-4 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LATERAL FIGURE 24

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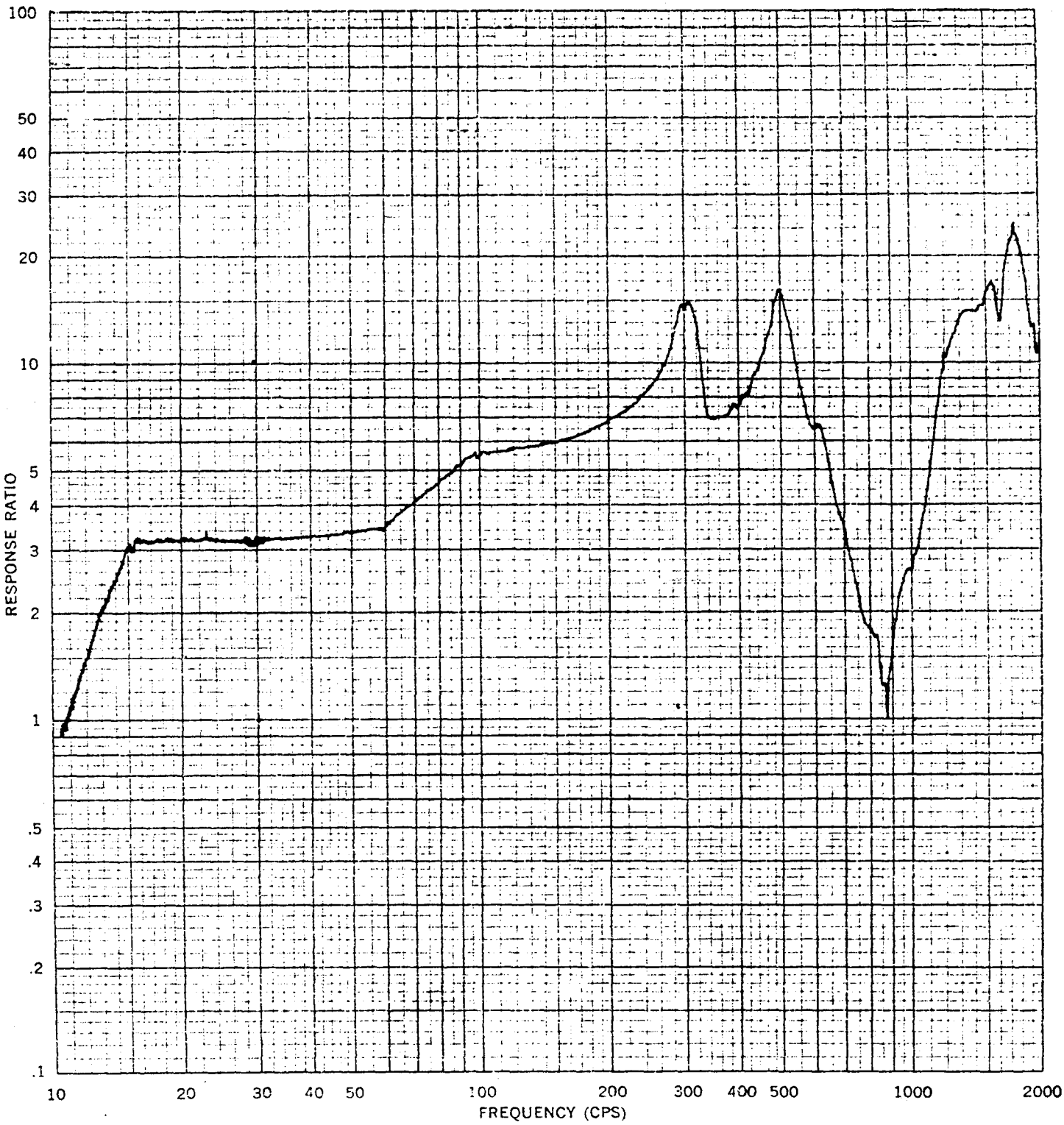

VIBRATION TEST OF SHAPED CHARGW RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-5 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LONGITUDINAL FIGURE 25

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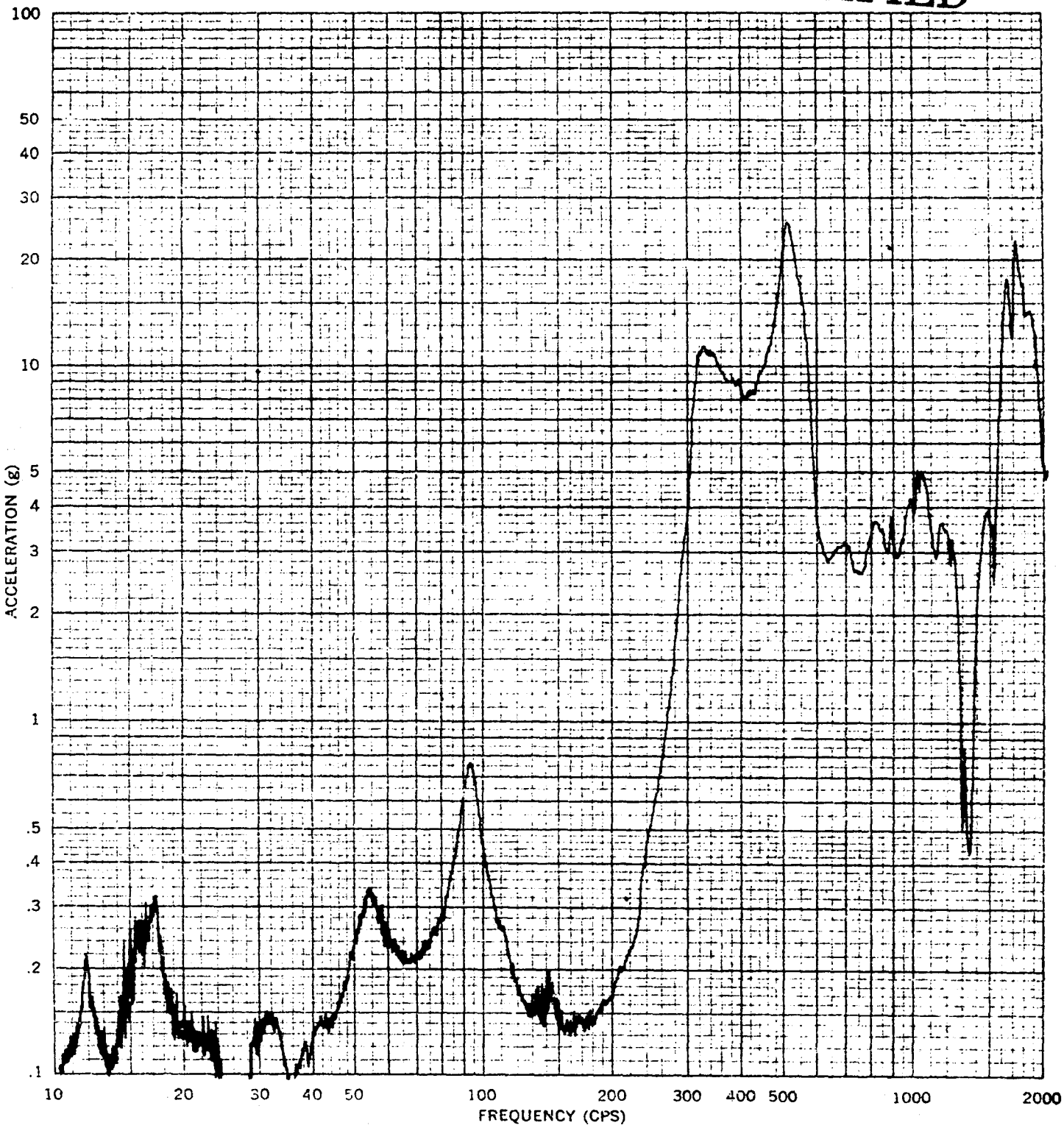

VIBRATION TEST OF SHAPED CHARGE RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-6 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS VERTICAL FIGURE 26

FILTER BANDWIDTH 25 CPS PAGE 32

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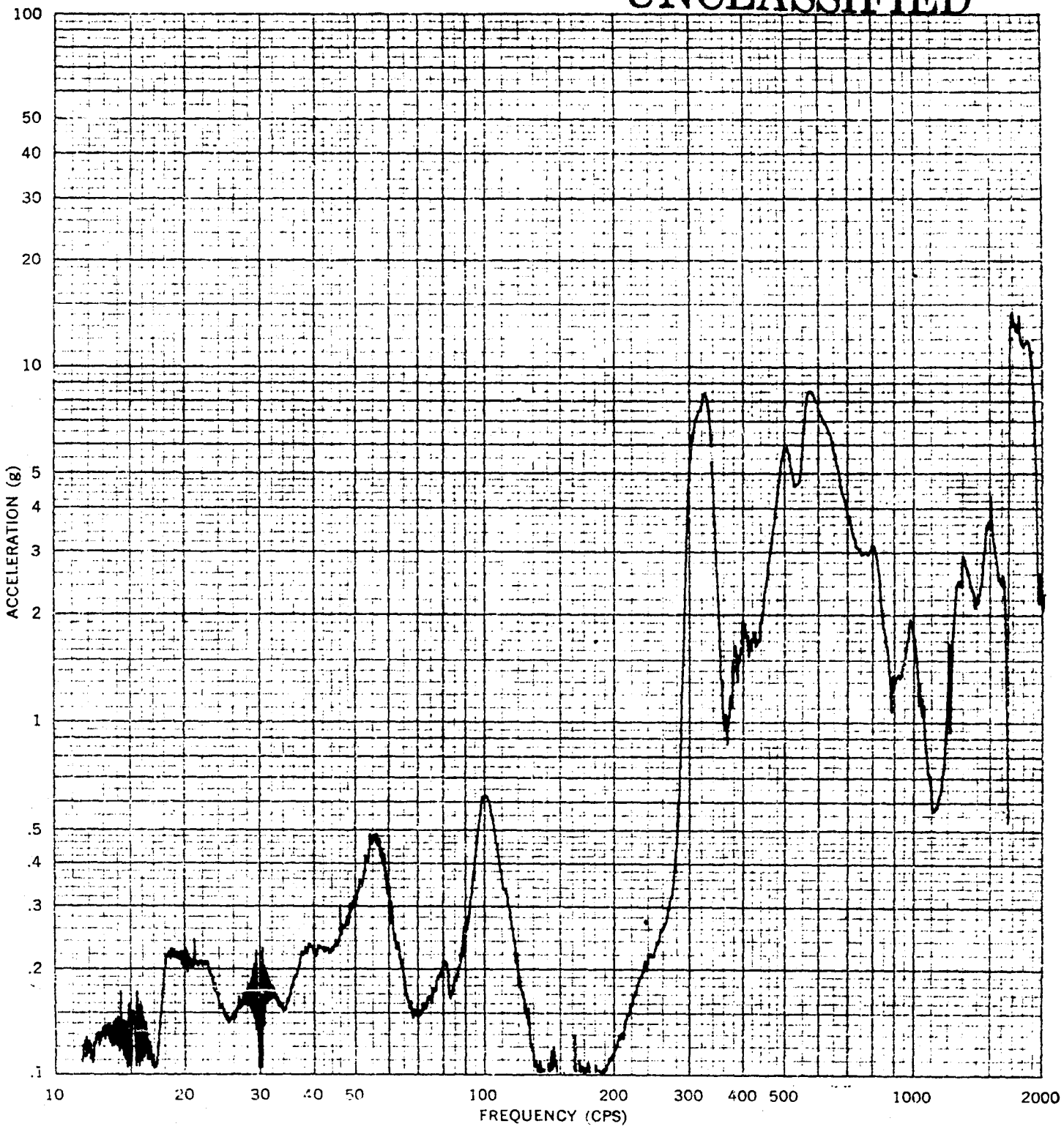

VIBRATION TEST OF SHAPED CHARGE RUN 3

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM °F T. 12364

ACCEL. LOCATION A-7 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LATERAL FIGURE 27

FILTER BANDWIDTH 20 CPS PAGE 33

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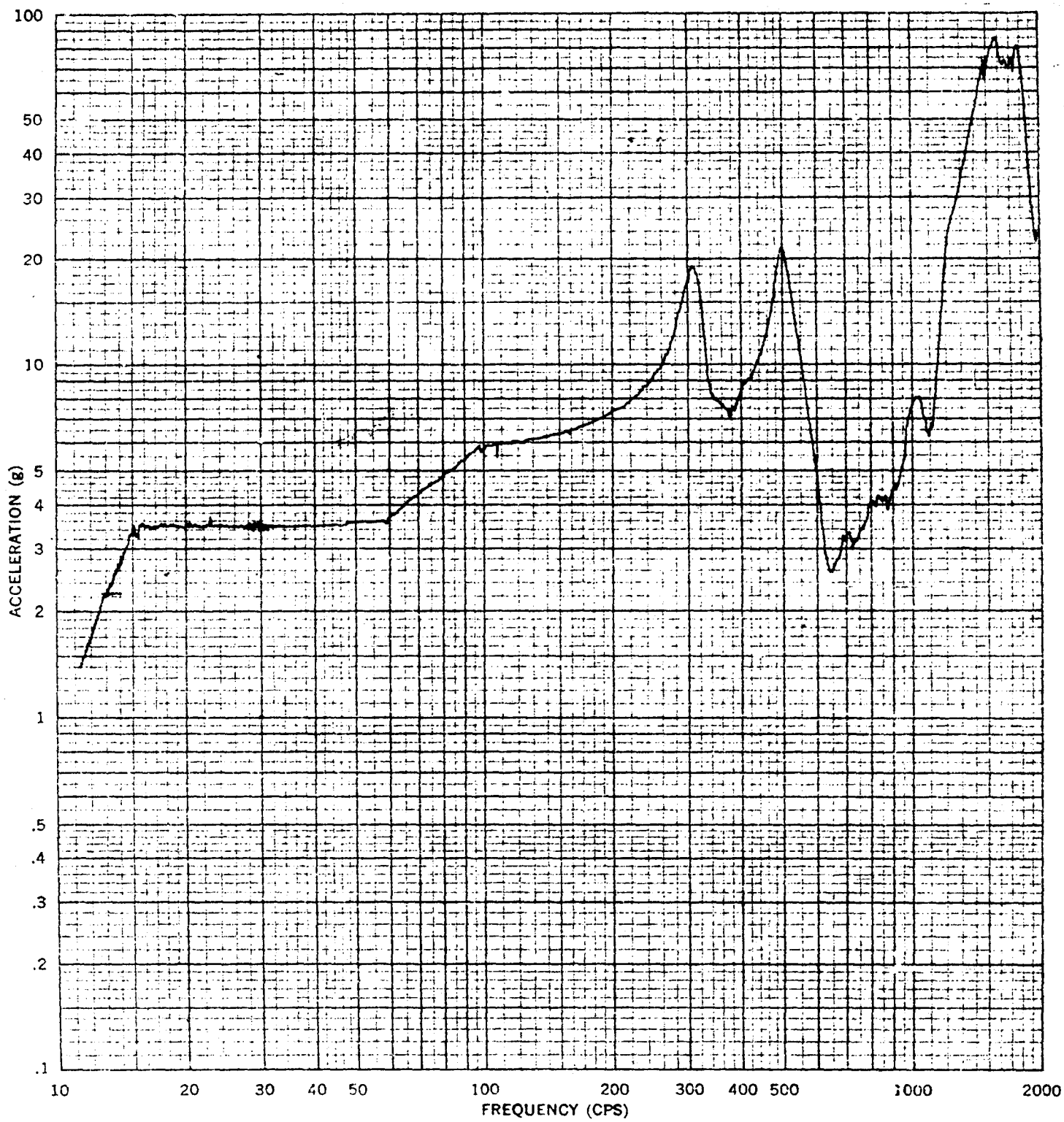
[redacted]



VIBRATION TEST OF SHAPED CHARGE RUN 3

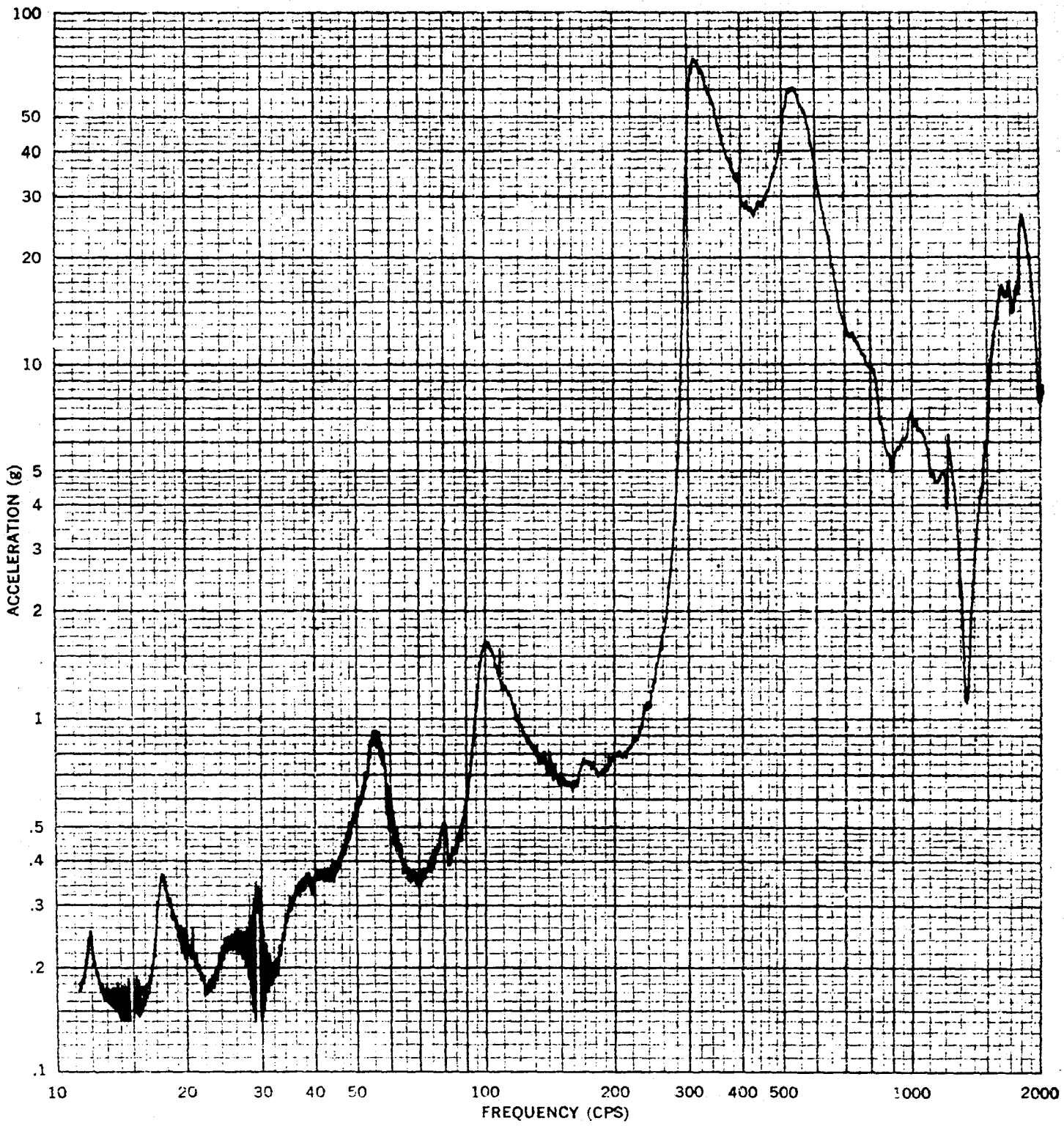
WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T- 12364

ACCEL. LOCATION A-8 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LONGITUDINAL FIGURE 28

FILTER BANDWIDTH 25 CPS PAGE 34



VIBRATION TEST OF SHAPED CHARGW RUN #3

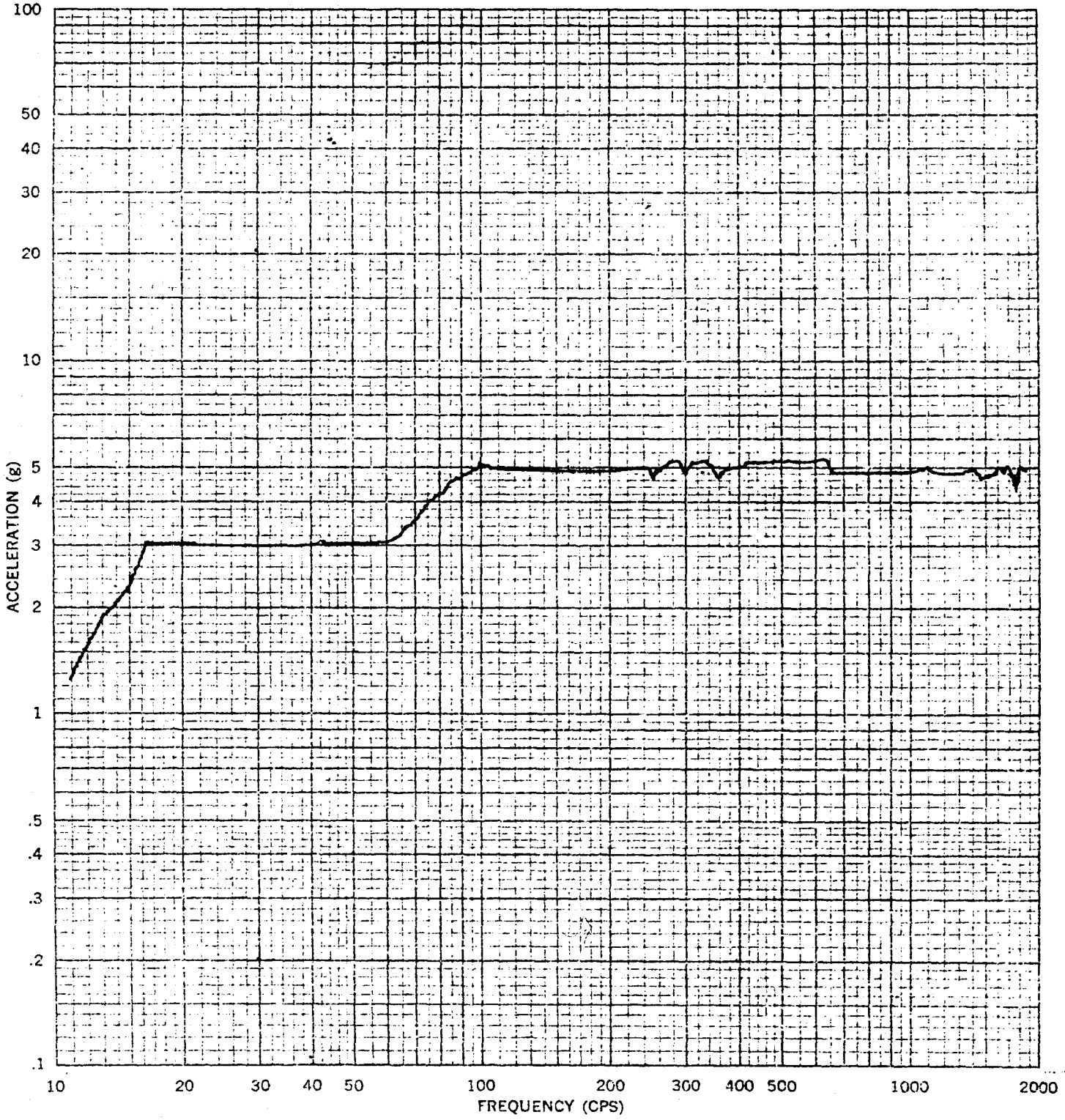
WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T-12364

ACCEL. LOCATION A-10 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/7/67

AXIS LATERAL FIGURE 29

FILTER BANDWIDTH 25 CPS PAGE 35



VIBRATION TEST OF SHAPED CHARGE RUN 4

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-1 (INPUT) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/27/67

AXIS VERTICAL FIGURE 30

FILTER BANDWIDTH 25 CPS PAGE 36

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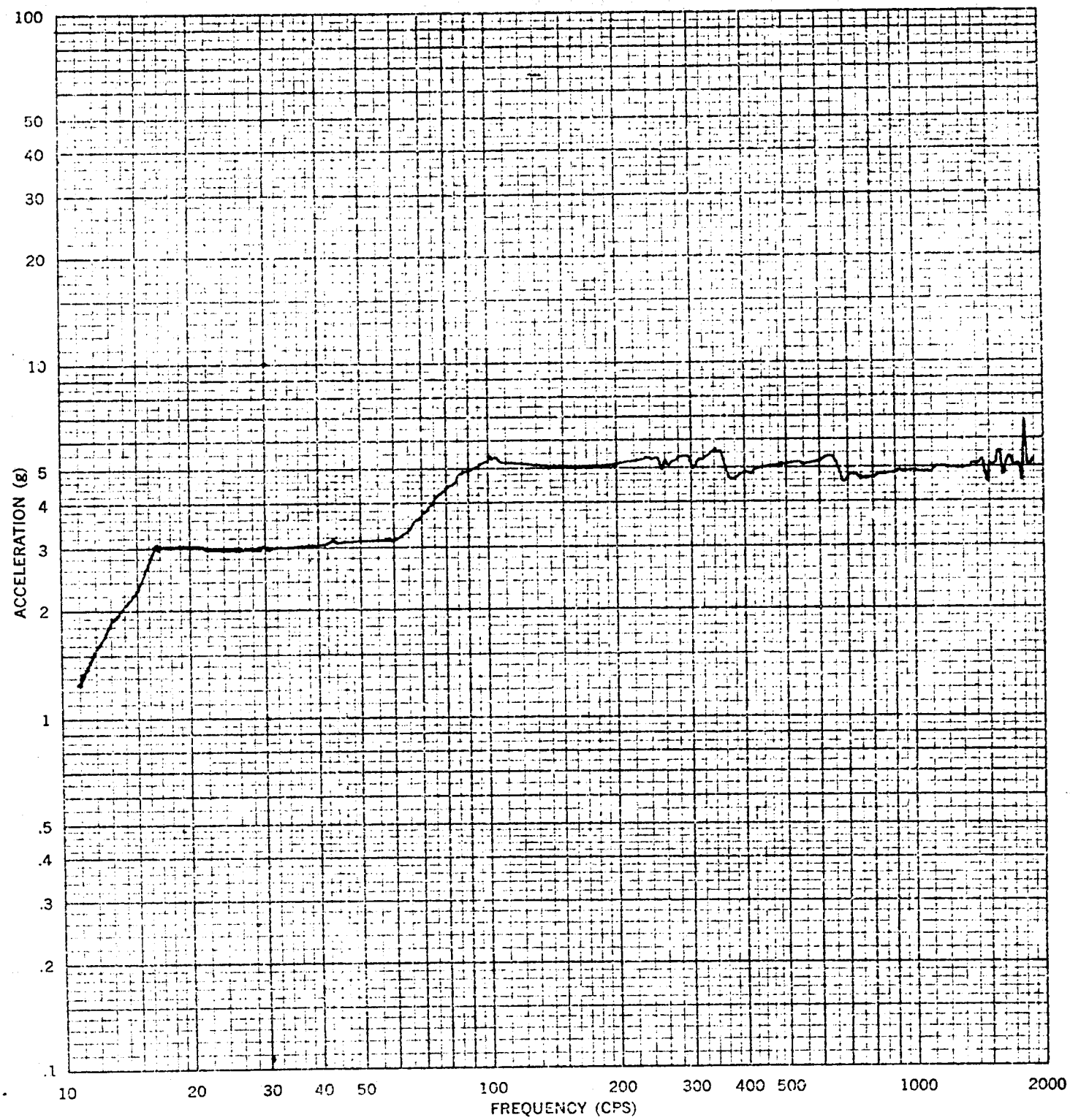

VIBRATION TEST OF SHAPED CHARGE RUN 4

WITH INPUT ALONG THE VERTICAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-11 REF. SYM.:

FIGURE REFERENCE 1 and 2 TEST DATE 7/27/67

AXIS VERTICAL FIGURE 31

FILTER BANDWIDTH 25 CPS PAGE 37

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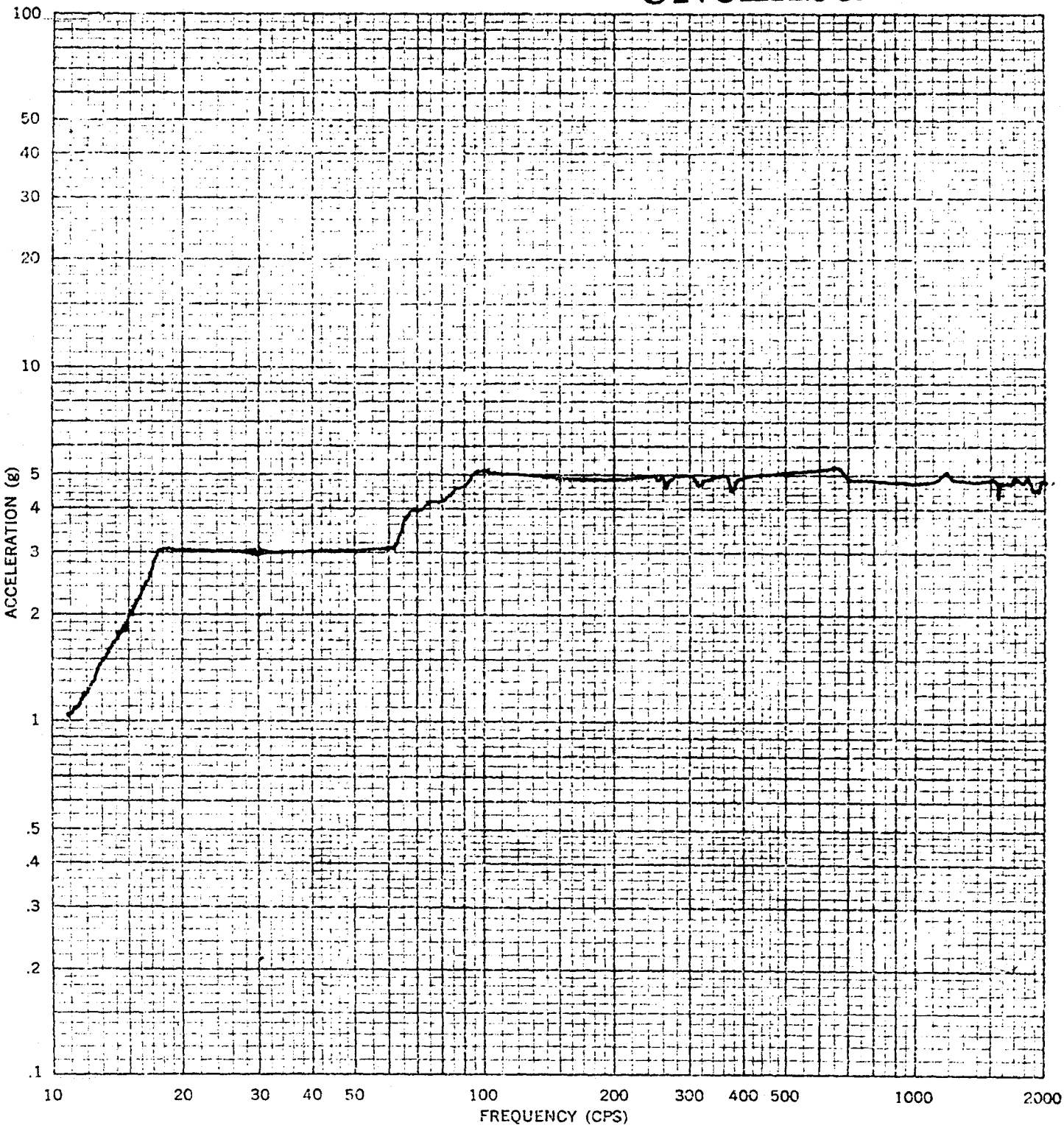

VIBRATION TEST OF SHAPED CHARGE RUN 5

WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-1 (INPUT) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/27/67

AXIS LATERAL FIGURE 32

FILTER BANDWIDTH 25 CPS PAGE 38

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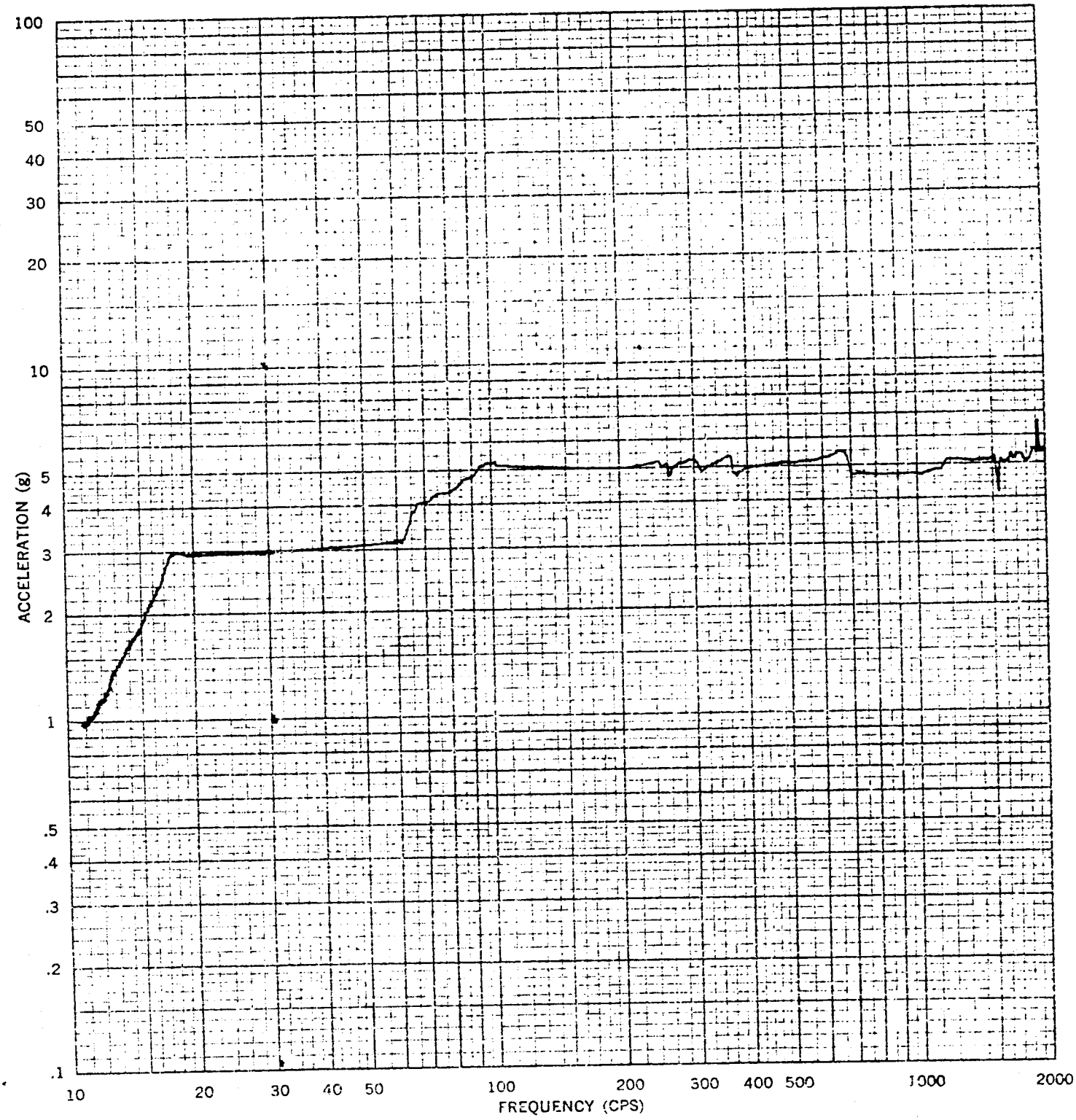


VIBRATION TEST OF SHAPED CHARGE RUN 5

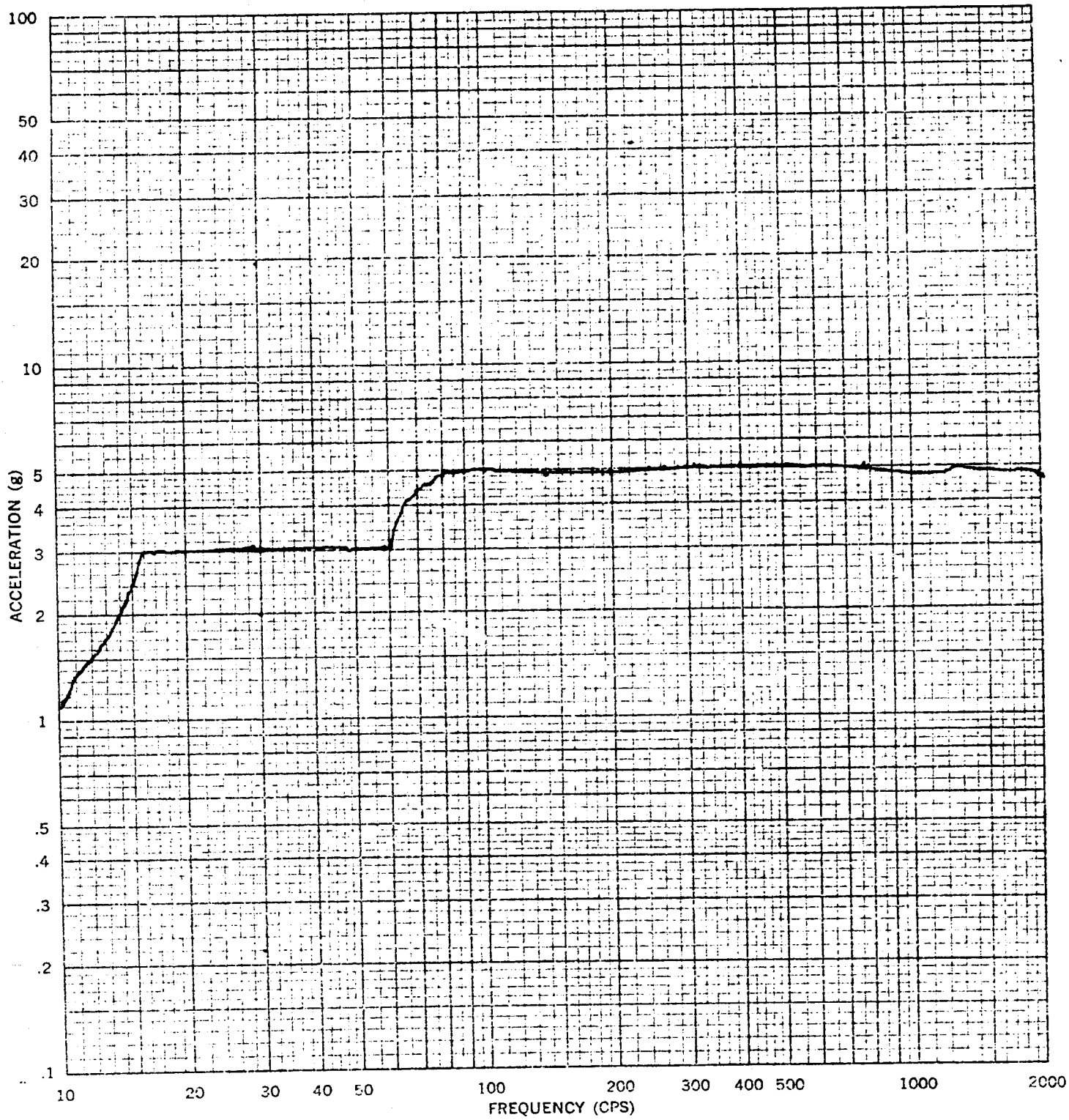
WITH INPUT ALONG THE LATERAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-11 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/27/67

AXIS LATERAL FIGURE 33

FILTER BANDWIDTH 25 CPS PAGE 39



VIBRATION TEST OF SHAPED CHARGE RUN 6

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F T. 12364

ACCEL. LOCATION A-1 (INPUT) REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/28/67

AXIS LONGITUDINAL FIGURE 34

FILTER BANDWIDTH 25 CPS PAGE 40

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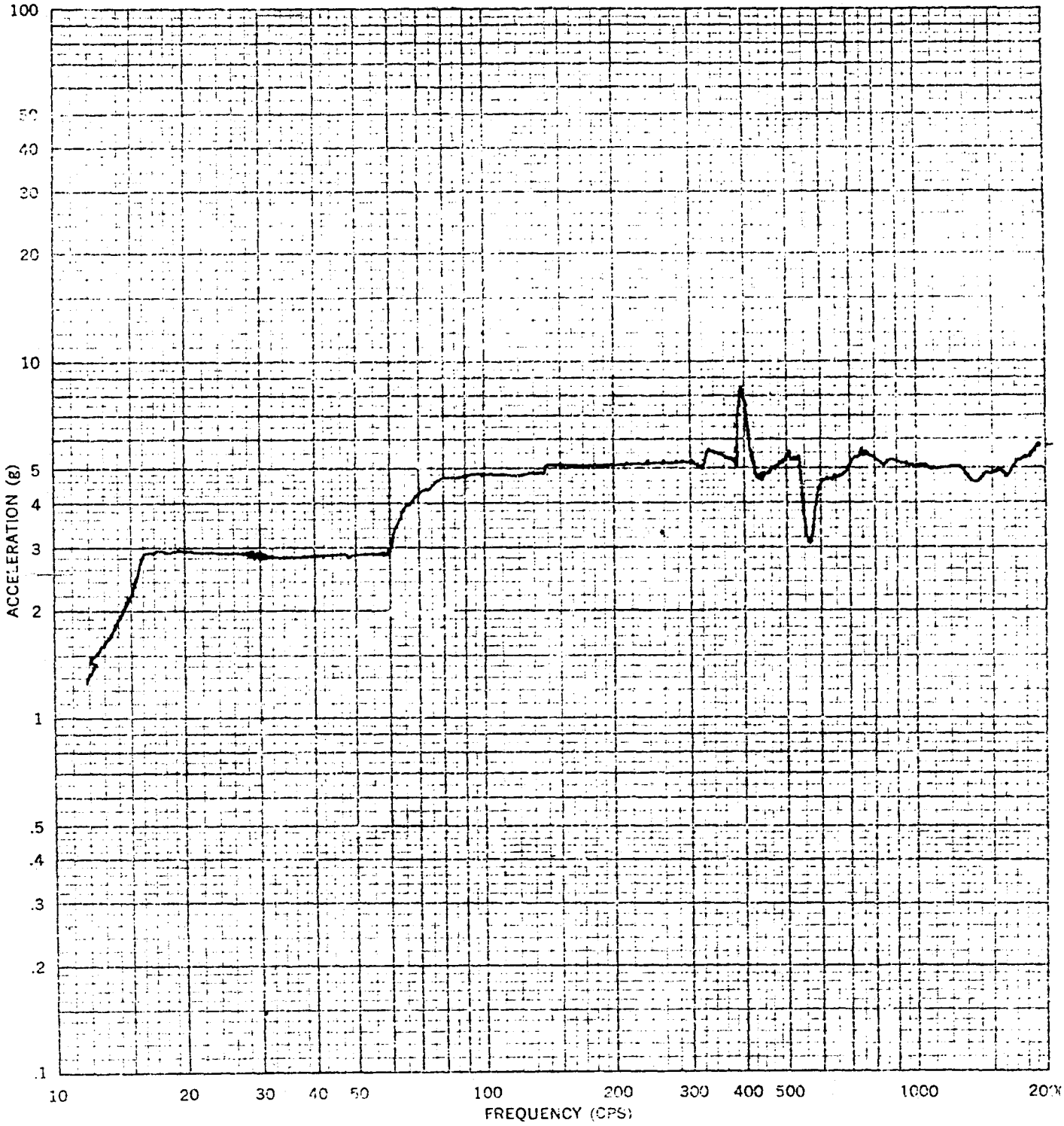

VIBRATION TEST OF SHAPED CHARGE RUN 6

WITH INPUT ALONG THE LONGITUDINAL AXIS, AT ROOM TEMP °F. T- 12364

ACCEL. LOCATION A-11 REF. SYM.

FIGURE REFERENCE 1 and 2 TEST DATE 7/28/67

AXIS LONGITUDINAL FIGURE 35

FILTER BANDWIDTH 25 CPS