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FEB 8 1954

Case No. 433.00
Ref. Sym: 1612 (98)
Project No. TM-11381

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO U
Carmila Dalton 12/14/98
PERSON CHANGING MARKING & DATE
WC Layne 12/14/98
PERSON VERIFYING MARKING & DATE
WC Layne
99SN 0351
RECORD ID
DATED 11/9/98

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date 10/29/98
Authority RBC ADD
Name RBCramer
Review Date 11/09/98
Authority ADD
Name WC Layne
Determination (Circle Numbers)
1 Classification Retained
2 Classification Changed to U
3 Contains No DOE Classified Information
4 Coordinate With
5 Contains UCNI
6 Comments
Declassify

MR. L. A. DUNN - 1284

TCG-SAFF-1
TCG-NNT-1

Re: Ramp Test of H-190 and H-194

Summary of Results

The H-190, H-194, and their contents received no mechanical or electrical damage as a result of impact tests conducted with a 10-degree-incline ramp to determine the ability of the containers to withstand, and to protect their contents against shock loading. During the 14 and 16-foot runs on the H-190, the 2 x 4 shoring nailed to the floor of the ramp dolly pulled loose.

The H-190 was given seven impact tests with runs from 4 to 16-feet up the 10-degree-incline ramp. The H-194 was given four impact tests with runs from 4 to 10-feet up the ramp.

On the H-190 the maximum accelerations measured on the base of the container were 31.2 longitudinal with a 0.033-second rise time and a 0.061-second pulse duration; and a vertical vibrational acceleration of 36.2 g peak-to-peak with a frequency of 140 cps.

On the H-194 the maximum accelerations measured on the base of the container were 15.1 g longitudinal with a 0.021-second rise time and a 0.040-second pulse duration; and a vertical vibrational acceleration of 10.5 g peak-to-peak with a frequency of 370 cps.

No lateral accelerations were measured during this test.

CONTAINER CARD
FILE NO. H-190 H-194
3-2

Object of Test

The object of this test was:

a. to determine the ability of the H-190 and H-194 to withstand, and to protect their contents against impact accelerations.

b. to determine the adequacy of the tie-down method, and

c. to determine the accelerations at various positions throughout the test specimens.

Reason for Test

The test was requested in a Work Order Authorization to P. H. Adams, 1612, from L. A. Dunn, 1284, dated October 9, 1953. The accelerometer locations

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and length of ramp runs were specified verbally by the consultant, Mr. G. V. Lemmon.

Function of Object Tested

The H-190 is a shipping and storage container designed to hold the fuzing and firing components of the XW-7/HJ.

The H-194 is a cylindrical can designed as a basic container to hold various combinations of major components as provided by use of adapter kits XH-302, XH-303, and XH-320.

Summary of Past Tests

No previous dynamic tests have been performed on the H-190 or H-194 by Division 1612.

Setup for Test

Figure 1 shows a sketch of the H-190 and H-194 test setup on the ramp dolly.

The H-190 and H-194 components are listed below:

	COMPONENTS	SERIAL NUMBERS	PART NUMBERS*
	H-190	22-H3	None
	MC-83	XAE-144	None
	MC-83	XAE-598	None
	MC-73	X-324-A3	None
	MC-134	XAE-298-K2	None
	MC-227	X-035-A3	None
	MC-229	014	None
	MC-235	047	None
	MC-235	055	None
(2)	MC-234	Inoperable units No Serial Numbers	None
	H-194	Preproduction No Serial Number	None
	MC-83	XAE-611	None
	MC-83	XAE-552	None
	MC-134	XAE-488-F2	None

*No part numbers are available on these components because they were issued prior to the part numbering system.

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The test equipment used during this test was as follows:

Engineering test ramp and dolly
Miller Type C-3 amplifiers, Model C-12, Serial Nos. 3 and 7
Miller recording oscillographs, Model H, Serial Nos. 159 and 161

A list of the accelerometers, their serial numbers, type and natural frequencies is given in Table I. The locations of the accelerometers are shown in Figs. 2, 3, 4, and 5.

Procedure

The H-190 and H-194 were instrumented with Statham accelerometers and installed on the ramp dolly by using 2 x 4 lumber for shoring, and lashed down using wire rope and turnbuckles attached to the four hoist and tie-down fittings at the top of each container. Four tests were conducted on both containers by pulling the test dolly 4, 6, 8, and 10 feet up the 10-degree-incline ramp. After the test dolly had been positioned on the ramp, it was released and allowed to roll free striking a 4 x 4 pine block as a bumper. The H-194 was removed after the 10-foot run, and the H-190 was given three additional tests with distances of 12, 14, and 16 feet.

Results

There was no mechanical or electrical damage to the H-190, H-194, or their contents after being subjected to seven and four impact tests, respectively, on the Engineering test ramp. The acceleration data for these tests are contained in Table II, and a typical shock record is shown in Fig. 6. During the 14 and 16-foot runs (sixth and seventh impacts) on the H-190, the 2 x 4 shoring came loose where it was nailed to the dolly floor. No damage occurred to the tie-down systems on either the H-190 or H-194. Because of the three additional tests on the H-190, the maximum longitudinal acceleration measured on the base of the container was 31.2 g with a 0.033-second rise time and a 0.061-second pulse duration. On the H-194 the maximum longitudinal acceleration measured on the base of the container was 15.1 g with a 0.021-second rise time and a 0.040-second pulse duration.

In the H-194 the vertical acceleration on the MC-83 mounting bracket had vibration durations for the 4, 6, 8, and 10-foot runs of 0.2, 0.3, 0.6, and 0.65-second, respectively, at frequencies between 52 and 56 cps before the vibrations damped out. In the H-190 the vertical accelerations on the top of the MC-229 exhibited similar characteristics with vibration durations of 0.2, 0.3, 0.6, 0.65, 0.77, 0.97, and 1.20 seconds at frequencies between 130 and 155 cps for the 4 through 16-foot runs, respectively.

At times these accelerations went through several vibration cycles before they built up to a peak. This is shown by the large time to maximum signal in Table II for the vertical acceleration on the MC-83 bracket during the 8-foot run, and for the vertical accelerations on the base of the MC-229 during the 12-foot run.

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The long vibration durations on the MC-229 are probably due to resonance of the vibration mounts on the H-190 whereas the long duration of the vibration on the MC-83 mounting bracket is probably due to the simple beam-type construction of this bracket.

No correlation can be drawn between the longitudinal acceleration on the ramp dolly and the longitudinal accelerations on the containers. The discrepancy between these accelerations is probably due to the loosening of the 2 x 4 shoring which pulled loose completely on the 14 and 16-foot runs.

Conclusions

The only comparison possible at the present time between this ramp test and railroad switching is a comparison with a previous ramp test. This comparison is possible in terms of the longitudinal accelerations only; during railroad switching, the lateral and vertical accelerations are more severe than those imposed by the ramp tests. The shock spectrum (equivalent static acceleration versus frequency) for a 19.7-g longitudinal impact, with a 0.049-second pulse duration, on the ramp dolly was comparable to the shock spectrum obtained from a longitudinal acceleration recorded during an actual railroad switching operation with an impact velocity of approximately 4 mph. As will be noted in Table II this would fall somewhere between the 16.7-g impact of the 4-foot run and the 21.8-g impact of the 6-foot run. No comparison is possible for the higher magnitude impacts of this test, and especially for the 14 and 16-foot runs where the time to maximum signal and the pulse durations changed considerably from those of the previous runs.

Since the nails holding the 2 x 4 shoring to the floor boards pulled loose on the 14 and 16-foot runs, it is suggested that fasteners of greater holding power (possibly lag bolts) be used to hold the shoring during actual rail shipment.

R. E. McKay
R. E. McKAY - 1612-1

Approved by: Paul H. Adams
P. H. ADAMS - 1612

REM:1612:dd

DISTRIBUTION:
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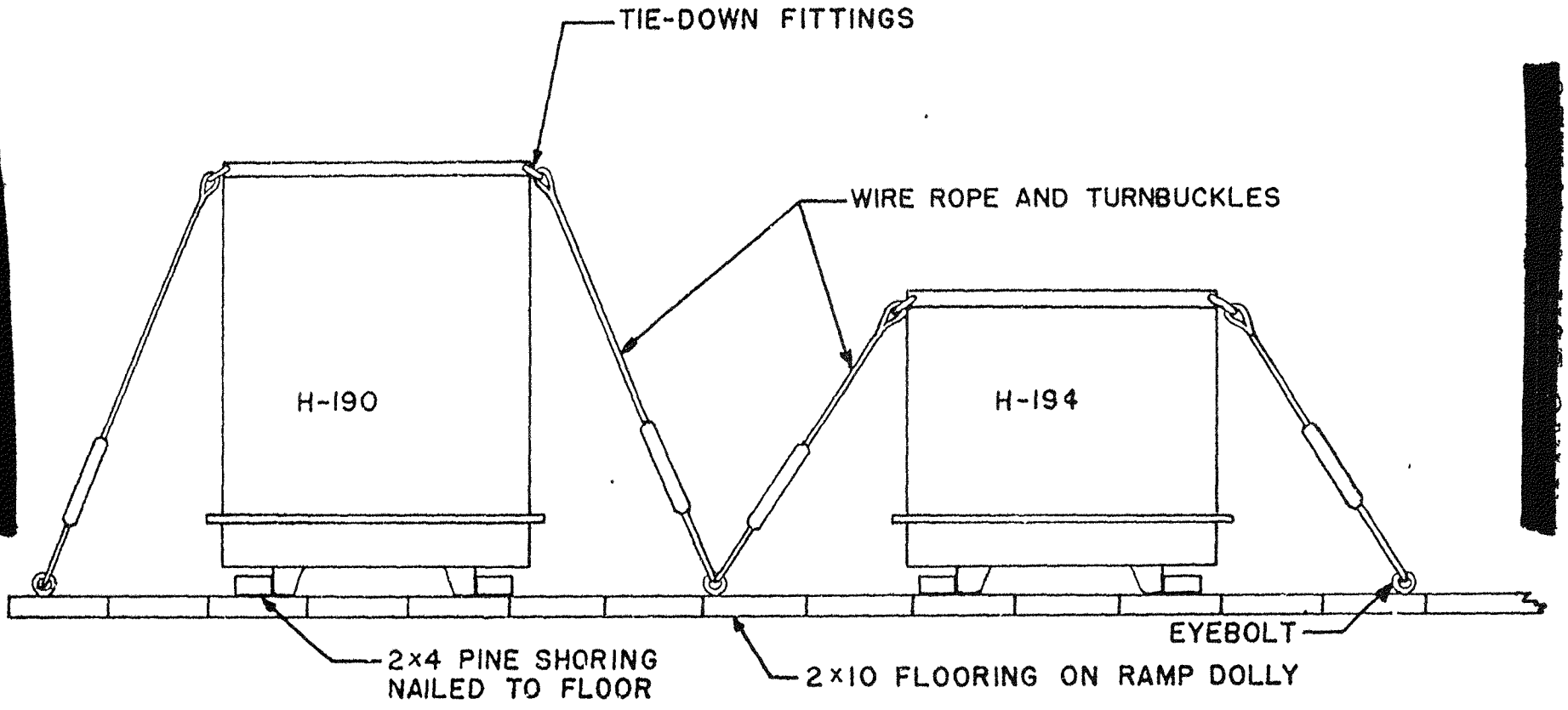

FIG-1 TEST SETUP-RAMP TEST OF H-190 AND H-194

TM-184
REF SYM 1612(98)

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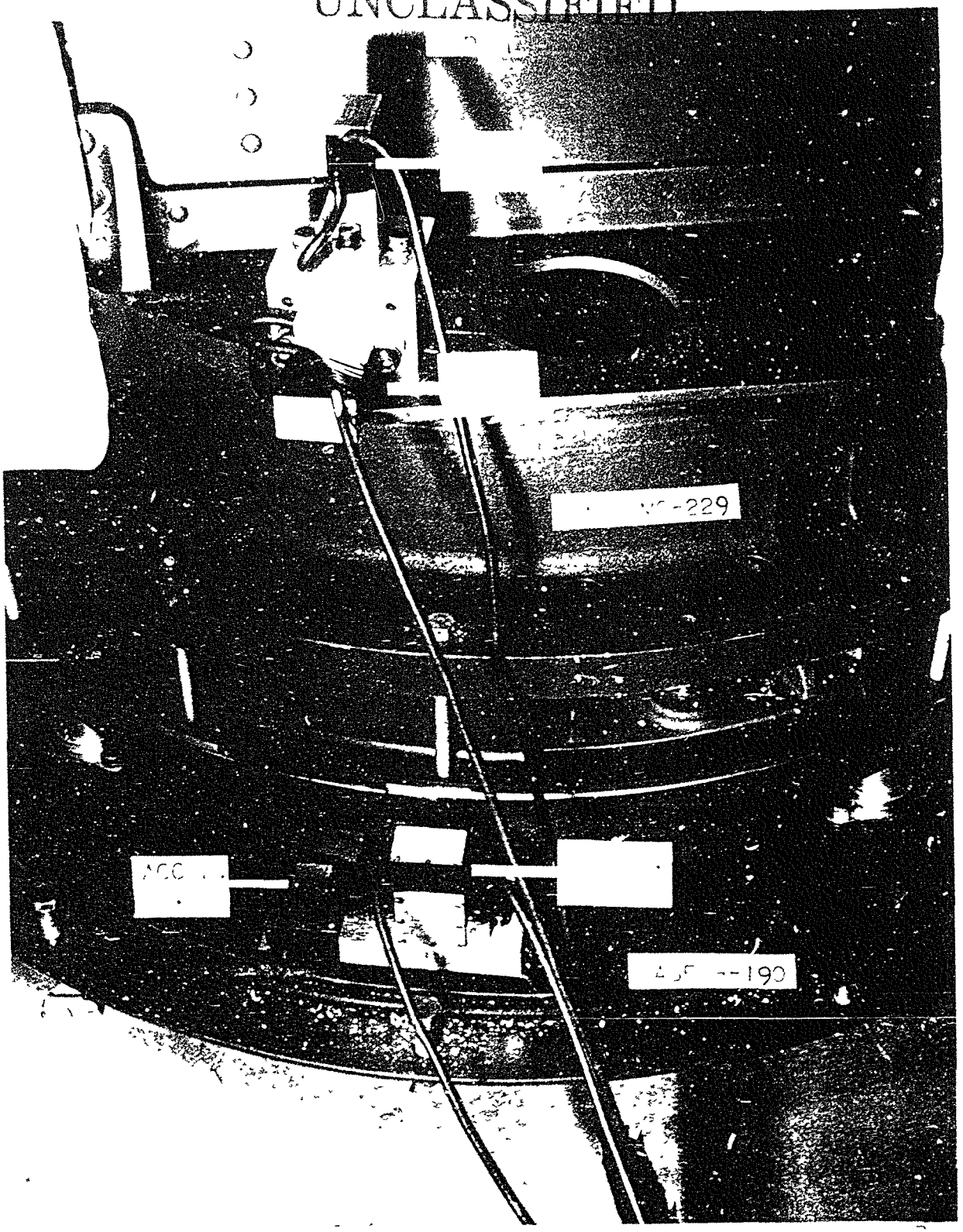

FIG.-2 ACCELEROMETER LOCATIONS, RAMP TEST OF H-1 0 AND H-104

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TM-154
REF SYM 1612(08)

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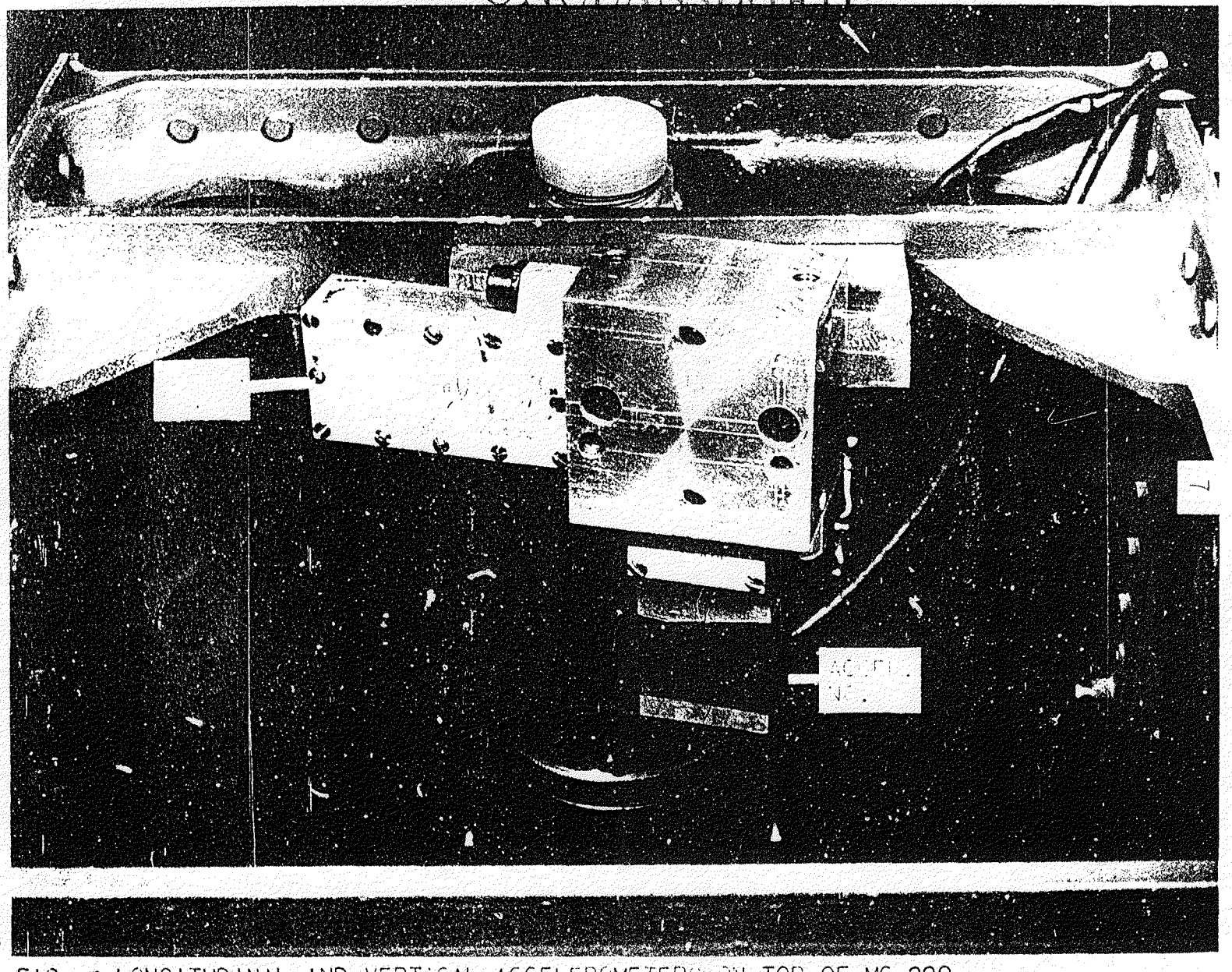

FIG.-3 LONGITUDINAL AND VERTICAL ACCELEROMETERS ON TOP OF MC-229 RAMP TEST OF H-190 AND H-194

TM-184
REF SYM 1612(98)

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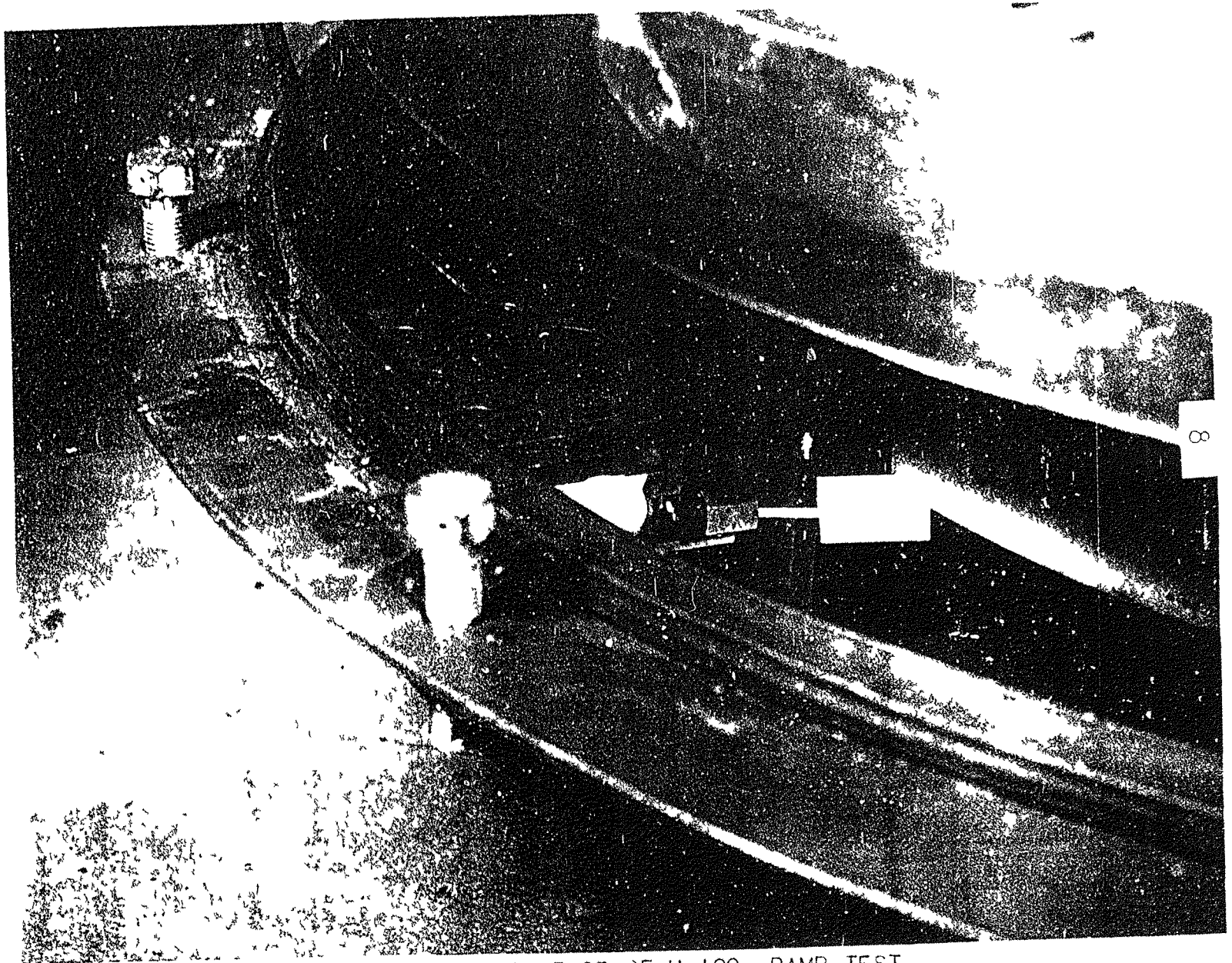

FIG-4 LONGITUDINAL ACCELEROMETER ON BASE OF H-190 RAMP TEST OF H-190 AND H-194

TM-194
REF SY 1612(93)

#1388

[redacted]

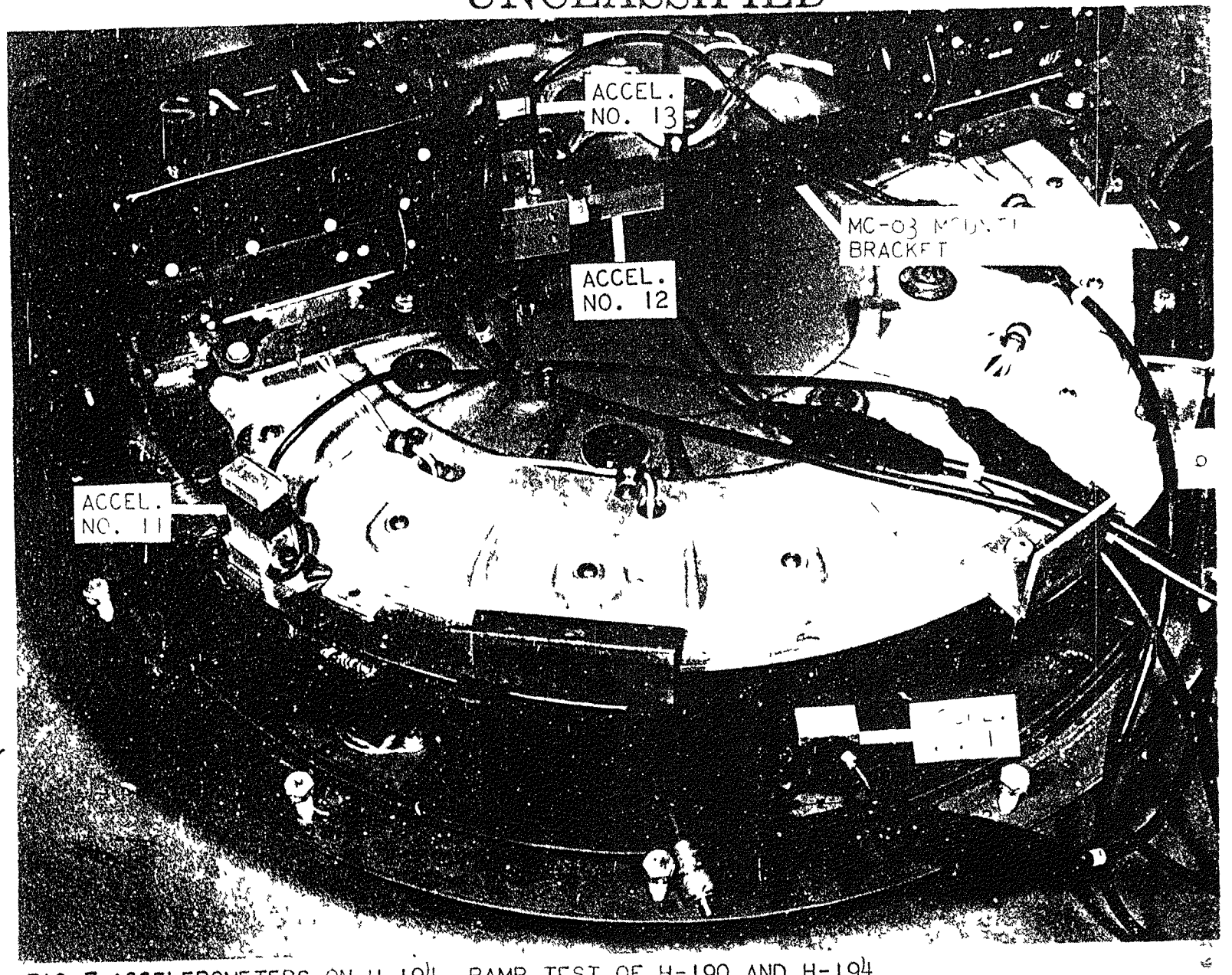

FIG-5 ACCELEROMETERS ON H-194, RAMP TEST OF H-190 AND H-194

TM-184
REF SYM 1612(98)

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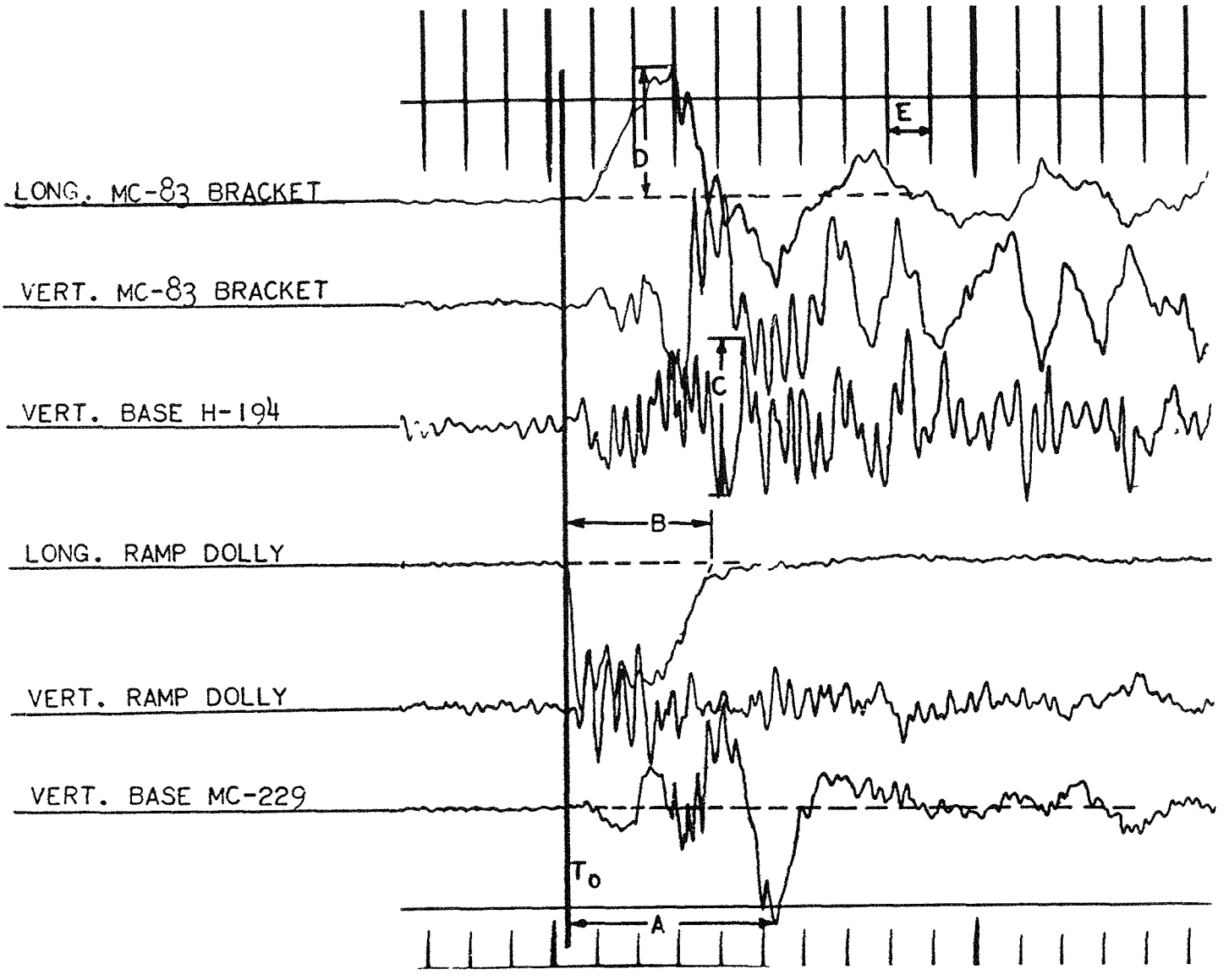

T_0- TIME ZERO
A- TIME TO MAXIMUM SIGNAL
B- PULSE DURATION
C- PEAK-TO-PEAK VIBRATION ACCELERATION
D- MAXIMUM SIGNAL ACCELERATION
E- 0.01 SECOND

FIG.-6 TYPICAL SHOCK RECORD- RAMP TEST OF H-190 AND H-194

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TM-184
REF SYM 1612(98)

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TABLE I

ACCELEROMETER NUMBERS, TYPE, SERIAL NUMBER, RANGE, AND NATURAL FREQUENCIES USED DURING RAMP TEST OF H-190 AND H-194

Number	Location Measuring Direction	Serial Number	Type	Range (g)	Natural Frequency (cps)
1	Long. Ramp Dolly	620	A5A-100-300	± 100	760
2	Vert. Ramp Dolly	277	A5A- 50-240	± 50	570
3	Long. Base H-190	615	A5A-100-300	± 100	760
4	Vert. Base H-190	636	A5A- 50-300	± 50	500
5	Long. Base MC-229	634	A5A-100-300	± 100	750
6	Vert. Base MC-229	284	A5A- 50-240	± 50	580
7	Long. Top MC-229	614	A5A-100-300	± 100	760
8	Vert. Top MC-229	274	A5A- 50-240	± 50	550
9	Long. Base H-194	624	A5A-100-300	± 100	740
10	Vert. Base H-194	276	A5A- 50-240	± 50	640
11	Vert. MC-137 Mounting Ring	279	A5A- 50-240	± 50	560
12	Long. MC-83 Bracket	618	A5A-100-300	± 100	740
13	Vert. MC-83 Bracket	275	A5A- 50-240	± 50	550

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TABLE II

SHOCK AND VIBRATION ACCELERATIONS DURING RAMP TEST OF H-190 AND H-194

4-foot Run

	Shock Acc. (g)	Time to Max. Sig. (sec.)	Pulse Duration (sec.)	Vib.* Acc. (g)	Time to Max. Sig. (sec.)	Freq. (cps)
Long. ramp dolly	16.7	0.007	0.054	-	-	-
Vert. ramp dolly	-	-	-	7.9	0.018	230
Long. base H-190	13.7	0.017	0.033	-	-	-
Vert. base H-190	-	-	-	23.1	0.011	170
Long. base MC-229	13.6	0.026	0.046	-	-	-
Vert. base MC-229	3.7	0.032	0.053	-	-	-
Long. top MC-229	22.5	0.028	0.043	-	-	-
Vert. top MC-229	-	-	-	4.9	0.028	155
Long. base H-194	13.4	0.021	0.037	-	-	-
Vert. base H-194	-	-	-	9.2	0.039	270
Vert. MC-137 Mounting ring	8.9	0.043	0.051	-	-	-
Long. MC-83 bracket	Off record					
Vert. MC-83 bracket	-	-	-	22.3	0.033	62

6-foot Run

	Shock Acc. (g)	Time to Max.Sig. (sec.)	Pulse Duration (sec.)	Vib. * Acc. (g)	Time to Max. Sig. (sec.)	Fr
Long. ramp dolly	21.8	0.003	0.044	-	-	
Vert. ramp dolly	-	-	-	10.8	0.017	25
Long. base H-190	13.3	0.019	0.038	-	-	
Vert. base H-190	-	-	-	27.9	0.011	1
Long. base MC-229	15.9	0.030	0.047	-	-	
Vert. base MC-229	5.2	0.068	0.019	-	-	
Long. top MC-229	23.6	0.029	0.048	-	-	
Vert. top MC-229	-	-	-	7.8	0.057	1
Long. base H-194	15.1	0.021	0.040	-	-	
Vert. base H-194	-	-	-	10.5	0.034	3
Vert. MC-137 Mounting ring	10.5	0.045	0.015	-	-	
Long. MC-83 bracket	20.7	0.022	0.032	-	-	
Vert. MC-83 bracket	-	-	-	9.9	0.046	

12-foot Run

	Shock Acc. (g)	Time to Max. Sig. (sec.)	Pulse Duration (sec.)	Vib.* Acc. (g)	Time to Max. Sig. (sec.)	Freq. (cps)
Long. ramp dolly	30.2	0.003	0.045	-	-	-
Vert. ramp dolly	Bad Amplifier					
Long. base H-190	16.6	0.021	0.049	-	-	-
Vert. base H-190	-	-	-	27.2	0.019	260
Long. base MC-229	19.7	0.034	0.054	-	-	-
Vert. base MC-229	-	-	-	11.9	0.115	24
Long. top MC-229	26.1	0.039	0.053	-	-	-
Vert. top MC-229	-	-	-	17.2	0.063	130

14-foot Run

	Shock Acc. (g)	Time to Max.Sig. (sec.)	Pulse Duration (sec.)	Vib. * Acc. (g)	Time to Max.Sig. (sec.)	F (
Long. ramp dolly	61.1	0.023	0.034	-	-	
Vert. ramp dolly	Bad Amplifier					
Long. base H-190	25.1	0.076	0.061	-	-	
Vert. base H-190	-	-	-	33.9	0.073	2
Long. base MC-229	23.9	0.072	0.061	-	-	
Vert. base MC-229	-	-	-	24.5	0.054	
Long. top MC-229	35.0	0.034	0.067	-	-	
Vert. top MC-229	-	-	-	31.8	0.045	1

*Vibration accelerations are peak-to-peak accelerations

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8-foot Run

Freq. (cps)	Shock Acc. (g)	Time to Max. Sig. (sec.)	Pulse Duration (sec.)	Vib. * Acc. (g)	Time to Max.Sig. (sec.)	Freq. (cps)
	24.3	0.003	0.044	-	-	-
-	-	-	-	8.5	0.010	200
250	14.1	0.034	0.048	-	-	-
-	-	-	-	34.5	0. 10	180
180	14.5	0.039	0.055	-	-	-
-	3.2	0.047	0.015	-	-	-
-	15.1	0.036	0.056	-	-	-
-	-	-	-	10.4	0.067	140
150						
	13.3	0.034	0.040	-	-	-
-	-	-	-	10.3	0.029	310
370	8.3	0.063	0.015	-	-	-
-	13.7	0.037	0.041	-	-	-
-	-	-	-	28.7	0.119	54
56						

10-foot Run

Shock Acc. (g)	Time to Max.Sig. (sec.)	Pulse Duration (sec.)	Vib. * Acc. (g)	Time to Max.Sig. (sec)	Freq. (cps)
25.8	0.008	0.052	-	-	-
-	-	-	9.4	0.007	250
14.9	0.018	0.049	-	-	-
-	-	-	22.5	0.011	170
14.1	0.023	0.053	-	-	-
5.9	0.074	0.021	-	-	-
26.0	0.079	0.055	-	-	-
-	-	-	10.4	0.064	150
12.6	0.069	0.044	-	-	-
-	-	-	9.0	0.021	280
4.7	0.017	0.031	-	-	-
19.3	0.016	0.030	-	-	-
-	-	-	27.0	0.032	53

16-foot Run

Freq. (cps)	Shock Acc. (g)	Time to Max.Sig. (sec.)	Pulse Duration (sec.)	Vib. * Acc. (g)	Time to Max.Sig. (sec.)	Freq. (cps.)
	81.0	0.022	0.032	-	-	-
-	Bad Amplifier					
	31.2	0.033	0.061	-	-	-
-	-	-	-	36.2	0.028	140
260	28.2	0.031	0.060	-	-	-
-	-	-	-	23.5	0.041	65
59	44.6	0.030	0.049	-	-	-
-	-	-	-	36.6	0.041	135
135						

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