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OCT 6 1955

Case No. 433.00
Ref. Sym: 1612 (251)
Project No. TM-322
H-350/430, 3-2

RECEIVED
OCT 10 1955
R & D FILES

SANDIA SYSTEMATIC DECLASSIFICATION MARKING
Review Date: 11/4/98
Authority: RBC Crane
2nd Review Date: 11/8/98
Authority: ADO
Name: W Layne
Notes: Declassify

TCG-NNT-1

MR. L. A. DUNN - 1284

Attn: G. Neun - 1284-1

Re: Ramp Test of the H-350/430

INVENTORIED
SEP 14 '65
3428-3

Summary of Results

A ramp test was conducted to subject an H-350/430 to simulated handling conditions and determine accelerations on the H-350/430 and on a contained H. J. cartridge and its components.

Tests were conducted with the H. J. cartridge and container oriented in the requested shipping direction and 90° to the requested shipping direction. Four test runs were made with the cartridge and container oriented in the requested shipping direction with impact velocities ranging from 4.98 to 7.06 mph. Two runs were made with the cartridge and container oriented 90° to the requested shipping direction with impact velocities of 4.96 and 7.01 mph.

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X RCF-H-430

The maximum faired accelerations measured with the H. J. cartridge and container oriented in the requested shipping direction are: 16.7 g longitudinal on the ramp dolly; 19.5 g longitudinal and 13.0 g vertical on the container base; 26.5 g longitudinal and 30.3 g vertical on the cartridge structure flange; 41.9 g longitudinal on the X1MC-234; and 38.1 g longitudinal on the MC-488.

The maximum faired accelerations measured with the cartridge and container oriented 90° to the requested shipping direction are: 15.8 g longitudinal on the ramp dolly; 20.6 g longitudinal and 13.7 g vertical on the container base; 31.2 g longitudinal and 33.5 g vertical on the cartridge structure flange; 31.5 g longitudinal on the X1MC-234; 36.6 g longitudinal on the MC-488; and 32.5 g longitudinal on the top of the cartridge structure.

INVENTORIED
AUG 6 1964
3427-1

CDL No. 92
ACCOUNTABILITY CARD
FILE No. H-350 3-2

During the test, the Robinson (Robinson No. 914-4A) Met-L-Flex vibration mounts were damaged but with no apparent fractures.

INVENTORIED
MAR 2 1959

Cartridge electrical checks were conducted at the conclusion of the test and the H. J. cartridge showed satisfactory operation.

CENTRAL M & R 52713
CONTROL NO. Q

THIS DOCUMENT CONSISTS OF 16 PAGE(S)

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SANDIA SYSTEMATIC DECLASSIFICATION MARKING
DOWNGRADED AT 3 YEAR INTERVALS
CLASSIFICATION CHANGED TO: U
Carmela Gallegos 12/9/98
PERSON CHANGING MARKING & DATE: W C Layne 12/16/98
PERSON VERIFYING MARKING & DATE
DATE: 11/9/98
REVIEWED: 99SN0396

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Object of Test

The object of this test was to subject the H-350/430 to simulated handling conditions and determine accelerations on the container, H. J. cartridge, XLMC-234, MC-488, and ramp dolly.

Reason for Test

This test was requested in a Work Order Authorization from L. A. Dunn, 1284 to P. H. Adams, 1612, dated August 9, 1955.

Summary of Past Tests

No previous ramp tests of the H-350/430 have been conducted by Department 1610.

Setup for Test

The setup for the test is as shown in Fig. 1. The components tested are as tabulated in Table I.

The following equipment was used to perform the test:

Engineering Test Ramp
Ramp Dolly
Miller Amplifiers, Type C-3, Model CA-12, Serial No. 7
Miller Oscillograph, Model J, Serial No. 99

The components tested were instrumented with Statham accelerometers for two container orientations. The instrumentation was as follows: Longitudinal and vertical accelerometers were mounted on the cartridge structure flange and on the container base as shown in Figs. 2 and 3. Longitudinal accelerometers were mounted on the MC-488, XLMC-234 and on the top of the cartridge structure (for the 90° orientation only) as shown in Figs. 3, 4, and 5. A longitudinal accelerometer was also mounted on the main frame of the ramp dolly. The Statham accelerometers used are as tabulated in Table II.

Procedure

The H-350/430 was attached to the ramp dolly as shown in Fig. 1. The H-194 shown in the figure was not instrumented or considered a part of this test. The ramp dolly was pulled up the ramp to a height sufficient to produce the desired impact velocity and then released.

Tests were conducted with the container and H. J. cartridge oriented in the requested shipping direction (0° orientation) and 90° to the requested shipping direction. New Robinson Met-L-Flex vibration mounts were used at the start of testing at each orientation. Four test runs were made with the 0° orientation at impact velocities of 4.98, 5.63, 6.12, and 7.06 mph. Two test runs were made with the 90° orientation at impact velocities of 7.01 and 4.96 mph. Existing test schedules did not allow sufficient time for completion of the test (with instrumentation) in accordance with SCS-5; however, George Neun, 1284-1. completed the test in accordance with SCS-5, without instrumentation.

Accurate measurements of impact velocity were made by placing a micro-switch on the ramp dolly. A voltage was applied to the micro-switch which was connected to a galvanometer in the oscillograph. Two micro-switch pip points with a known distance between them were set up on the ground near the fixed bumper. As the micro-switch on the ramp dolly traversed the pip points, voltage deflections for each point were made on the oscillograph record and therefore the time to traverse the known distance between the pip points was obtained.

Cartridge electrical checks were conducted by Division 1323 at the conclusion of the test.

Results

The maximum accelerations measured during the test are as given in Table III. Figures 6 and 7 show typical records of the shock signals for both container orientations.

At the conclusion of the test, the Robinson Met-L-Flex vibration mounts were found to be damaged as shown in Figs. 8 and 9.

The cartridge showed satisfactory operation at the conclusion of the test.

Conclusion

Inspection of the results of the test show that there is an amplification of the applied shock pulse on the cartridge side of the vibration mounts. This condition is probably caused by the small displacements allowed by the vibration mounts which result in the vibration mount top cap bottoming on the auxiliary cushions (steel wool limiter pads) in both directions. The load deflection curve for this type isolator experiences

an abrupt change in slope upon engagement with the limiter pads. The abrupt change in characteristics may cause the impressed shock level to be amplified two to six times.*

WILLIAM H. CROSS - 1612-1

JAMES H. STOEVER - 1612-1

Approved by: PAUL H. ADAMS - 1612

WHC:1612-1:as

DISTRIBUTION:
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2/8A - T. B. Morse, 1610
3/8A - R. H. Schultz, 1323, Attn: H. F. Devaney, 1323-2
4/8A - J. P. Wamser, 1282
5/8A - R. E. Fisher, 1621
6/8A - C. L. Gomel, 5523
7/8A - R. K. Smeltzer, 1922-2
8/8A - F. C. Hale, 1922-3

* Protection of Airborne Electronic Equipment for Improved Reliability Under Combined Vibration and Shock Measurements by B. E. Lamial and B. L. Powell, Shock and Vibrations Bulletin No. 22, July 1955.

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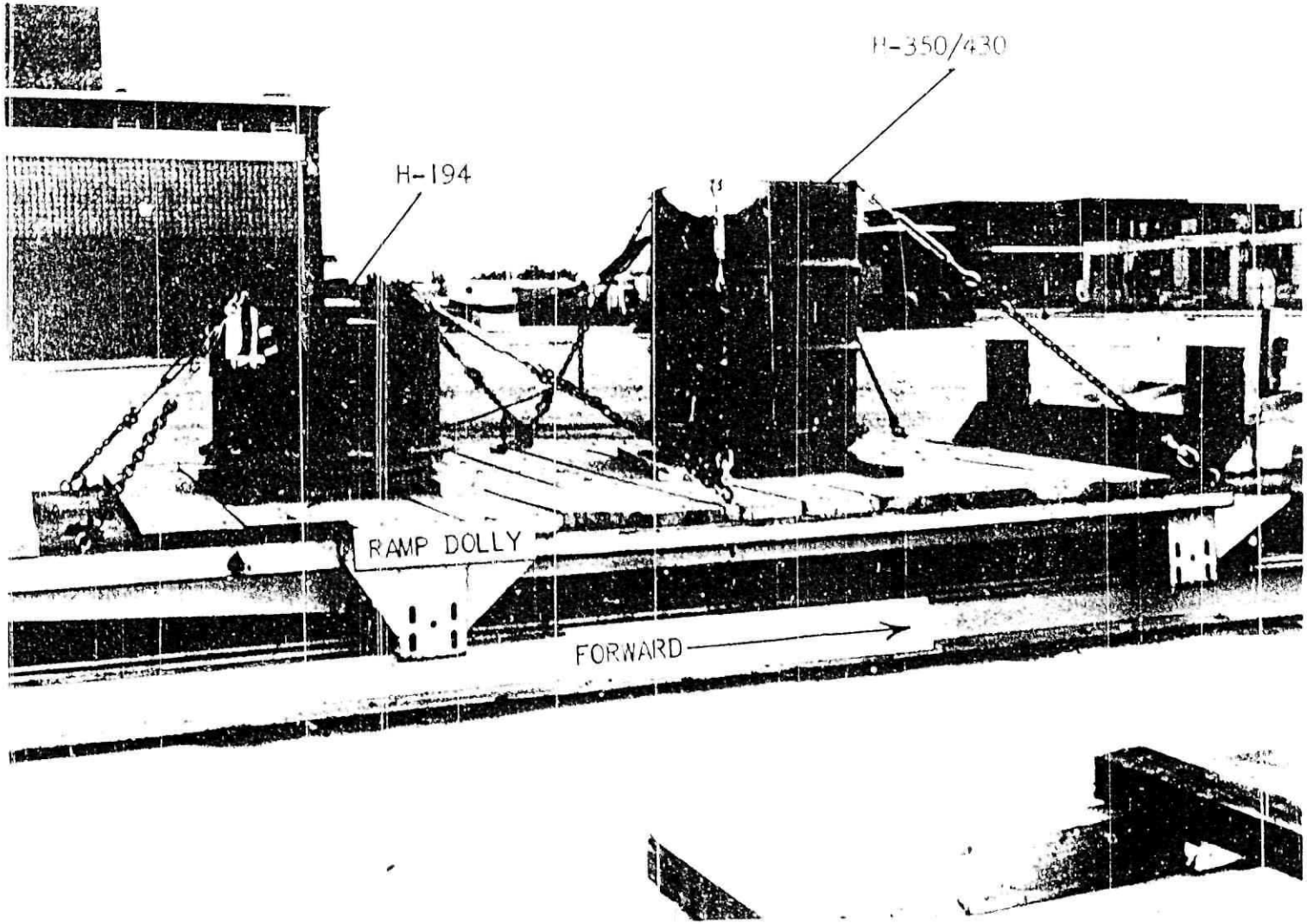

FIG. 1 TEST SETUP - RAMP TEST OF THE H-350/430.

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TM-322

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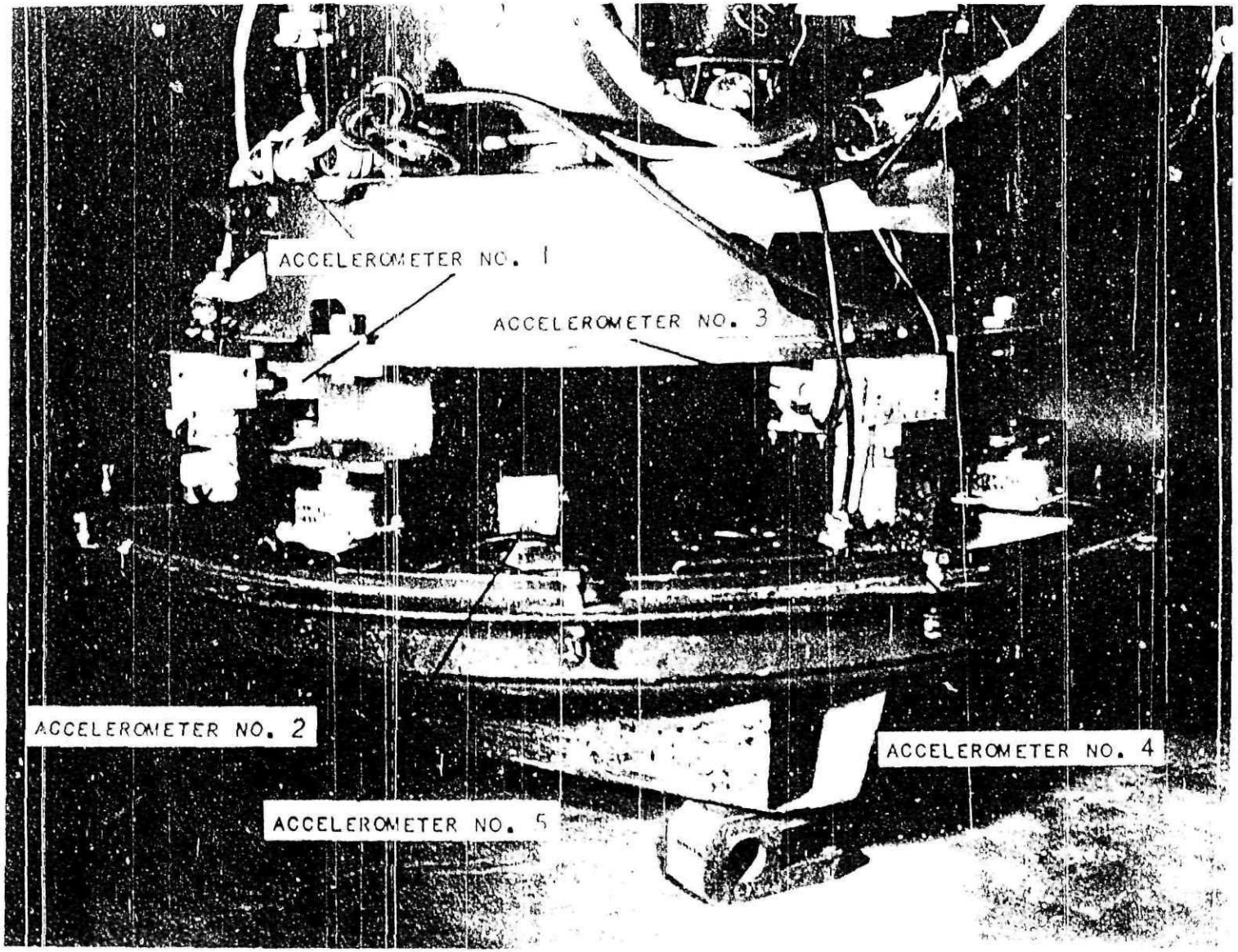

FIG. 2 ACCELEROMETERS LOCATED ON THE CARTRIDGE STRUCTURE FLANGE AND ON THE CONTAINER BASE - RAMP TEST OF THE H-350/430.

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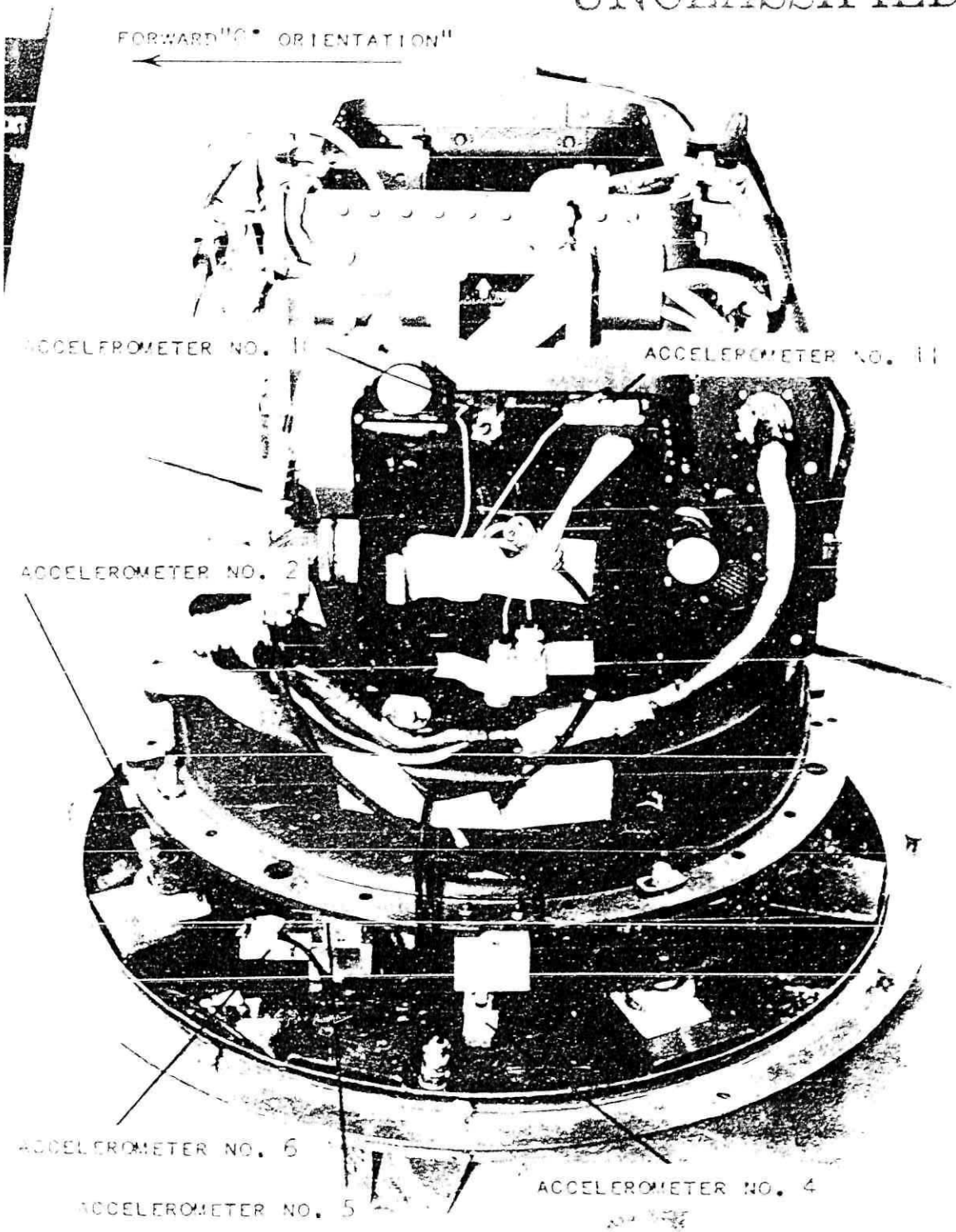

FIG. [illegible] ACCELEROMETERS LOCATED ON THE CONTAINER BASE, CARTRIDGE STRUCTURE FLANGE [illegible] - RAMP TEST OF THE [illegible].

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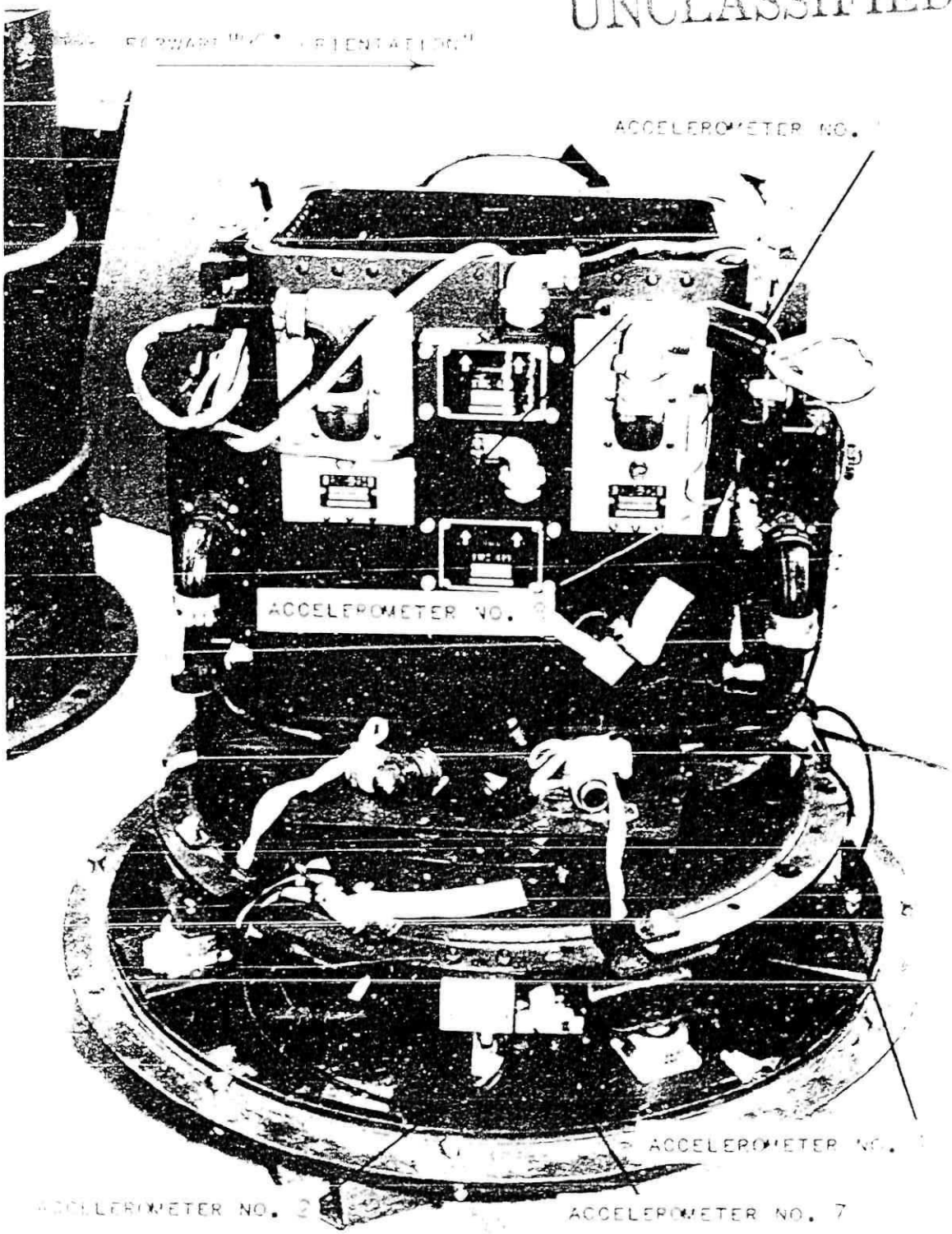

FIG. 4 ACCELEROMETERS LOCATED ON THE XIVC-234, CARTRIDGE STRUCTURE FLANGE AND ON THE CONTAINER BASE - RAMP TEST OF THE [illegible]/430.

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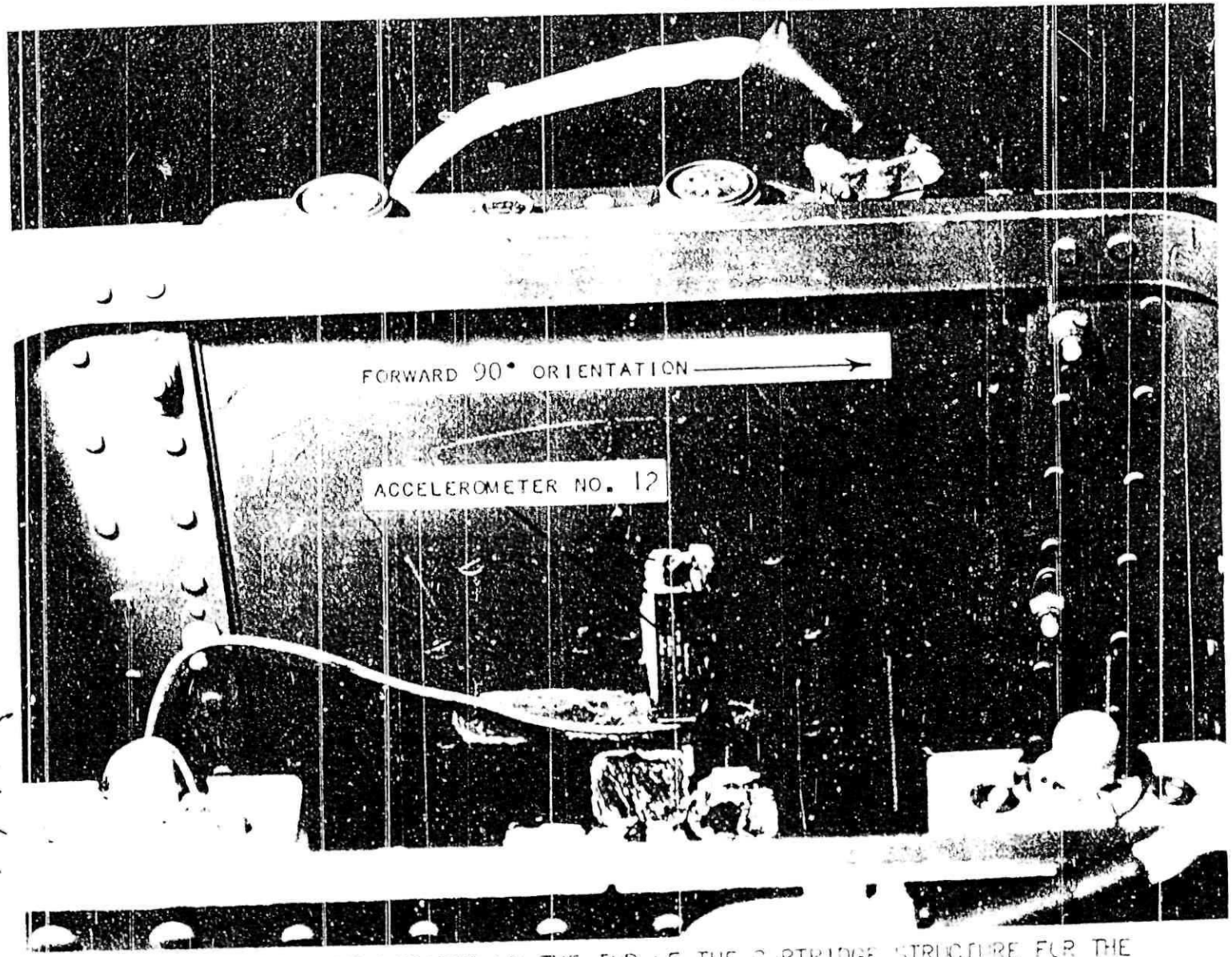

FIG. 5 ACCELEROMETER LOCATED ON THE TOP OF THE CARTRIDGE STRUCTURE FOR THE 90° CONTAINER ORIENTATION - RAMP TEST OF THE H-[illegible]/430.

REF. SYM. 1[illegible]
IM-[illegible]

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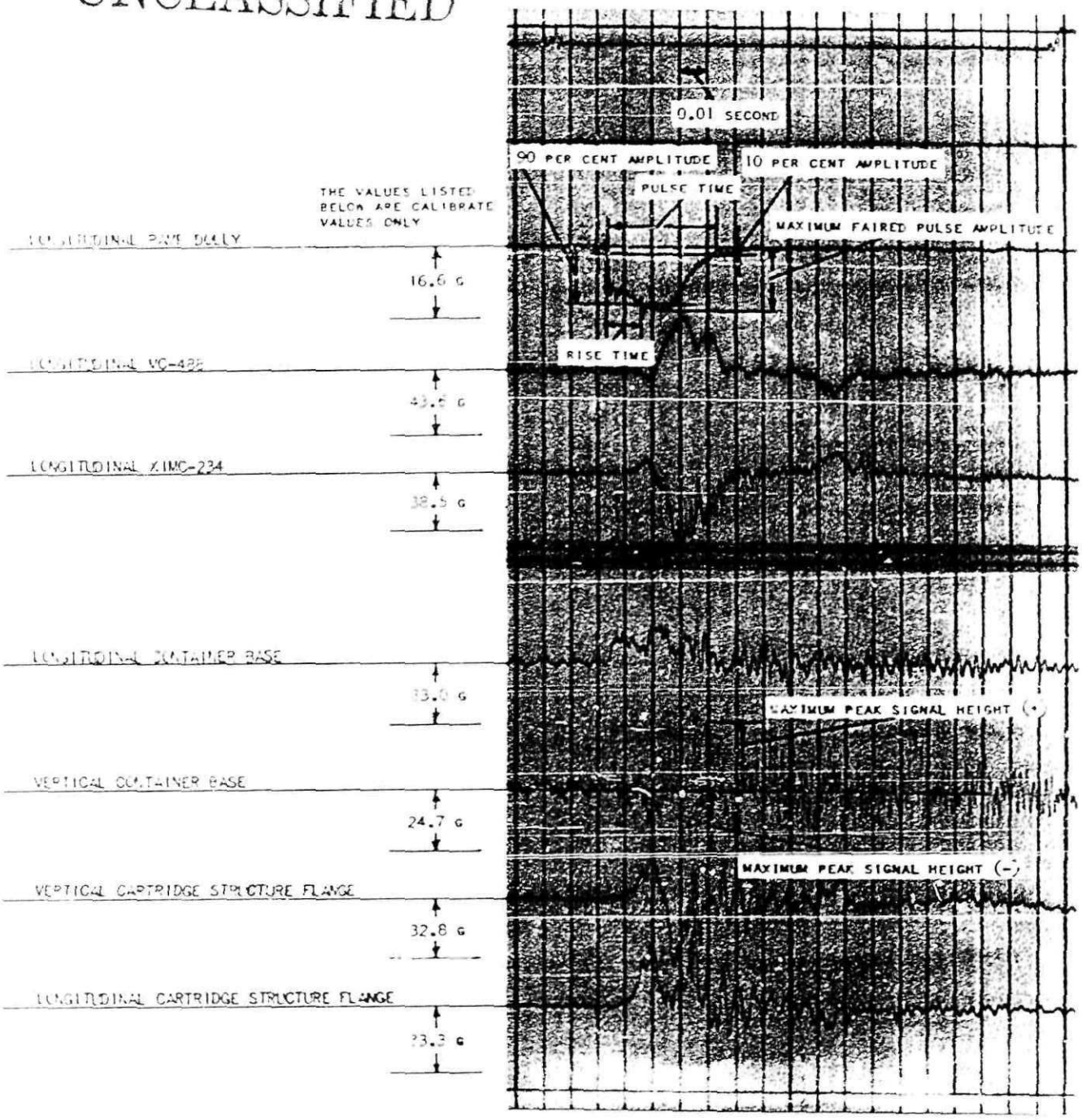

FIG. 6 TYPICAL RECORD OF THE SHOCK SIGNALS MEASURED DURING RUN 4 (7.06 MPH - 0° ORIENTATION) - RAMP TEST OF THE H-350/430.

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TM-372

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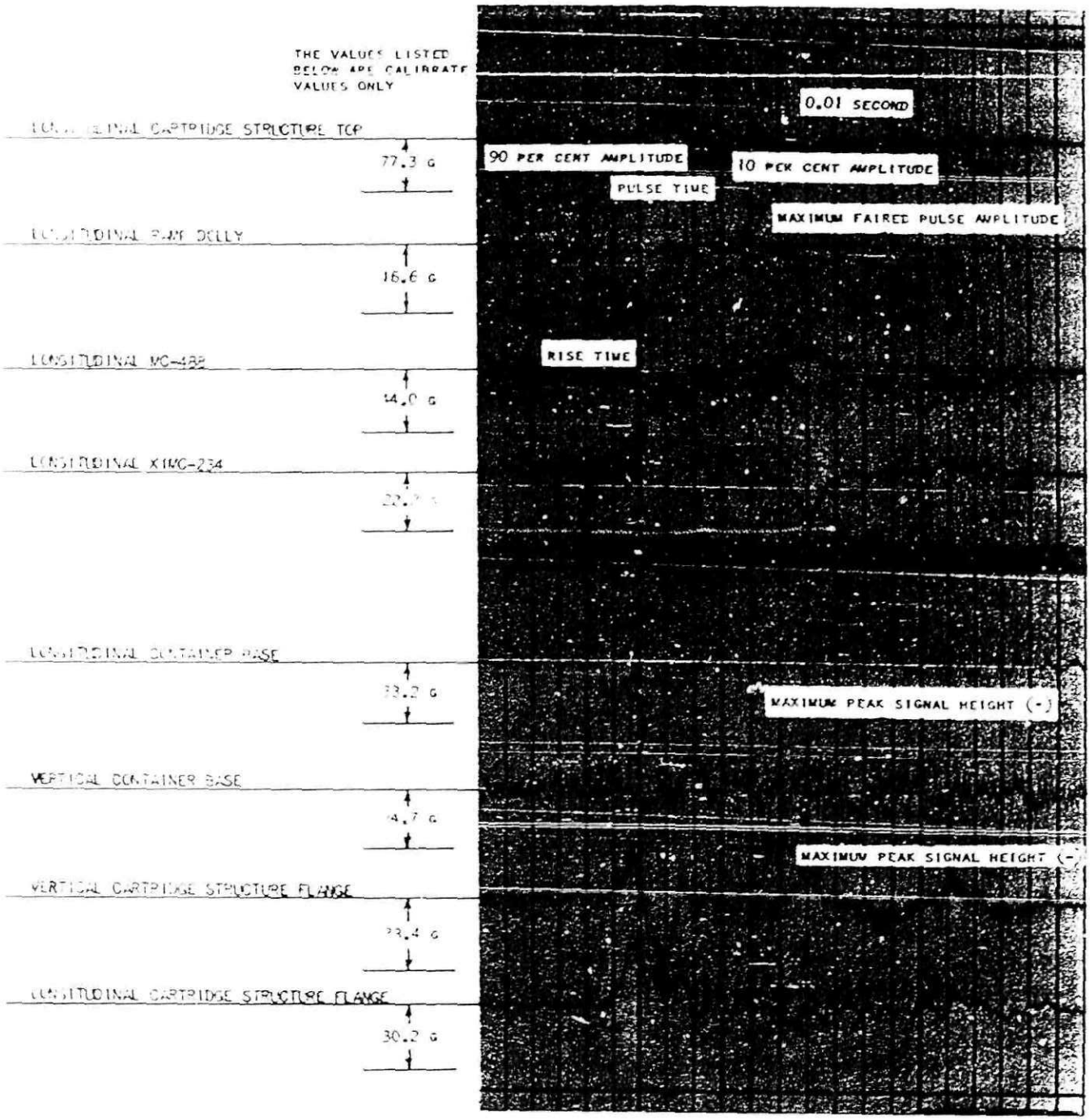

FIG. 7 TYPICAL RECORD OF THE SHOCK SIGNALS MEASURED DURING RUN 5(7.01 MPH-90° ORIENTATION)-RAM TEST OF THE M-350/430.

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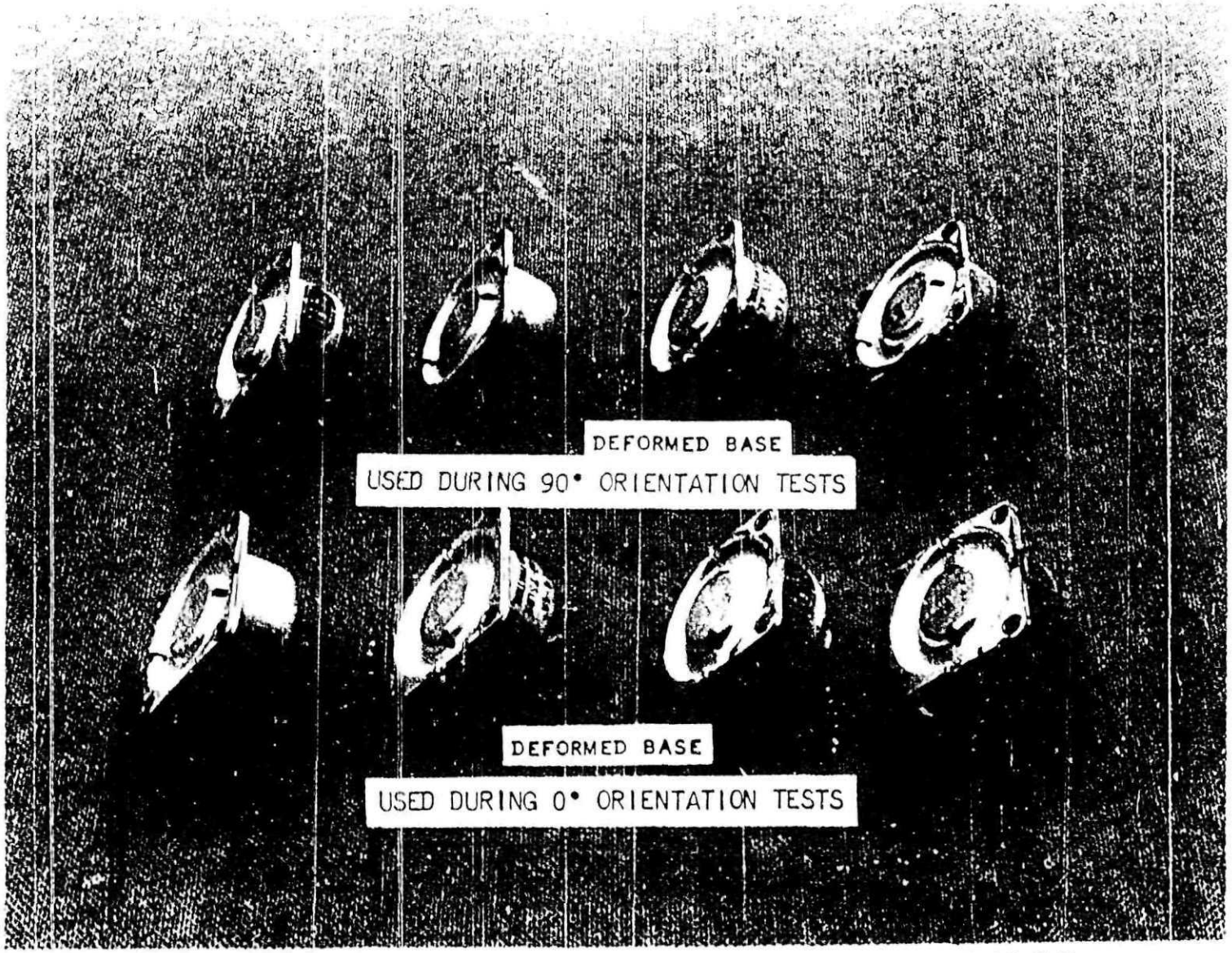

FIG. 8 DAMAGED ROBINSON MET-L-FLEX MOUNTS USED DURING RAMP TEST OF THE H-350/430.

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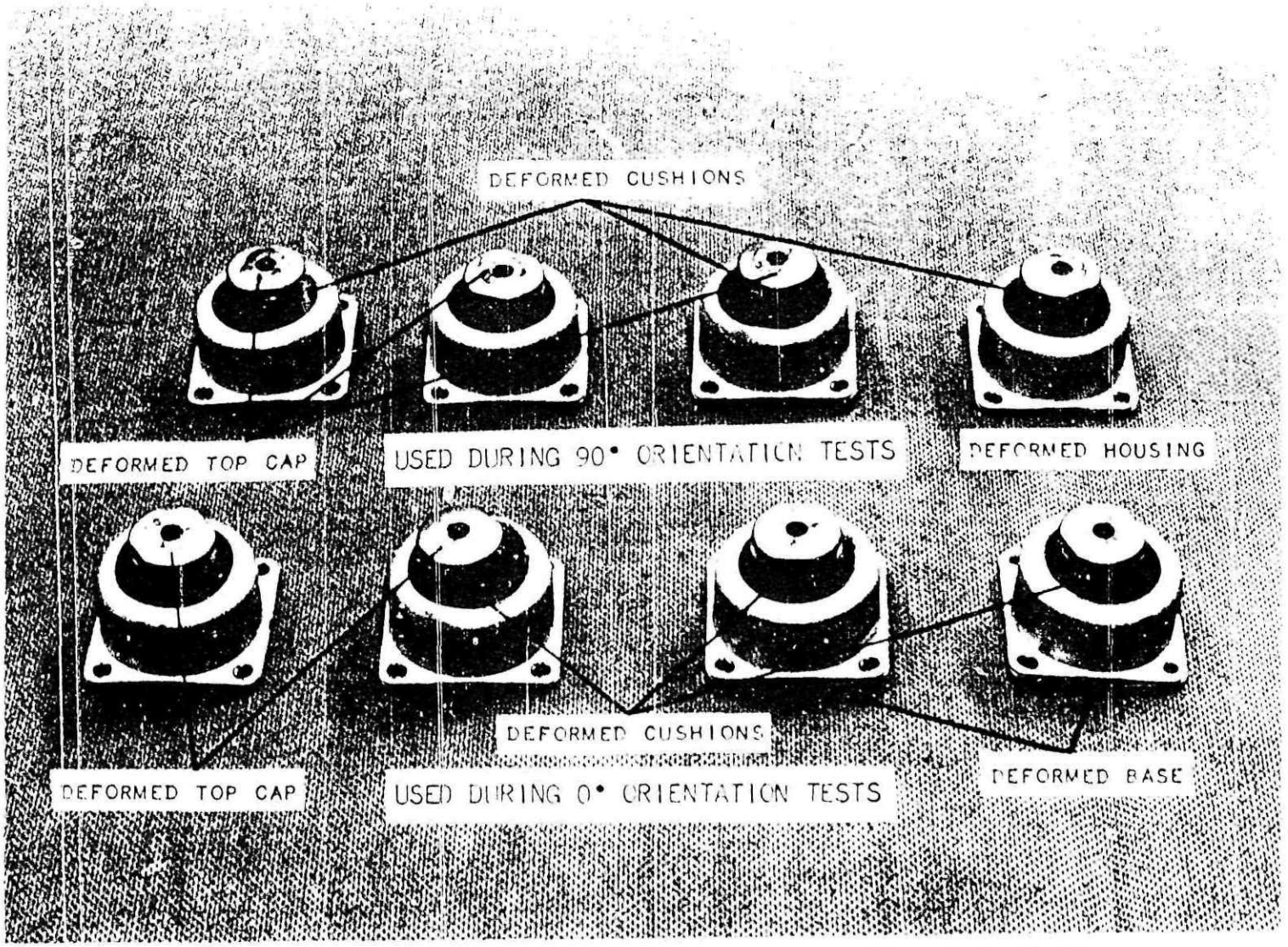

FIG. 9 DAMAGED ROBINSON MET-L-FLEX MOUNTS USED DURING RAMP TEST OF THE H-350/430.

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TABLE I

COMPONENTS TESTED DURING FAST TEST OF THE H-350/430

Component	Serial No.	Drawing No.
H-350, Container	FK-1262-B5	320018-00
H-430, Adaptor	Engineering Model, no Serial No.	320062-00
MC-503, Cartridge Structure	34127 (4-7-F-14)	DS(1322)34891
X1MC-234, Integrator	SC-00016-B5	310250
X1MC-234, Integrator	SC-00013-B5	310250
MC-488, Timer	SN 029	310022
MC-488, Timer	SN 021	310022
MC-489, Acceleration Switch	2159-A5	310023
MC-489, Acceleration Switch	2160-A5	310023
MC-489, Acceleration Switch	2158-A5	310023
MC-489, Acceleration Switch	2152-A5	310023
MC-497, Junction Box	AA-0009-J4	581478

TABLE II

STATHAM ACCELEROMETERS USED IN RAMT TEST OF THE M-550/430

Accel. No.	Accelerometer Location	Container Orientation*	Accel. Ser. No.	Range (g)	Model No.	Natural Frequency (cps)
1	Long.-Cartridge Structure Flange	0°	638	±50	A5A-50-300	500
2	Vert.-Cartridge Structure Flange	0°	519	±50	A5A-50-240	700
3	Long.-Cartridge Structure Flange	90°	653	±50	A5A-50-300	640
4	Vert.-Cartridge Structure Flange	90°	654	±50	A5A-50-300	490
5	Vert.-Container Base	0° and 90°	2190	±100	A5A-100-300	760
6	Long.-Container Base	0°	641	±50	A5A-50-300	490
7	Long.-Container Base	90°	648	±50	A5A-50-300	500
8	Long.-X1MC-234	0°	1300	±100	F-100-300	630
9	Long.-X1MC-234	90°	1297	±50	F-50-300	530
10	Long.-MC-488	0°	1298	±50	F-50-300	565
11	Long.-MC-488	90°	1296	±50	F-50-300	565
12	Long.-Top Of Cartridge Structure	90°	1299	±100	F-100-300	690
13	Long.-Ramp Dolly	--	644	±50	A5A-50-300	500

* The 0° orientation is the requested shipping orientation.

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Project No. TM-322

TABLE III

MAXIMUM ACCELERATIONS* MEASURED DURING RAMP TEST OF THE H-350/430

Accelerometer No. and Location	Run 1 - 0° Orientation Impact Vel. 4.98 mph					Run 2 - 0° Orientation Impact Vel. 5.63 mph					Run 3 - 0° Orientation Impact Vel. 6.12 mph					Run 4 - 0° Orientation Impact Vel. 7.06 mph				
	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1. Long. Cart. Structure Flange	5.7	21.0	-18.8	0.008	0.020	10.9	23.9	-22.4	0.008	0.030	11.4	23.5	-14.5	0.007	0.031	13.4	31.7	-26.5	0.007	0.030
2. Vert. Cart. Structure Flange	27.1	14.8	+26.0	0.006	0.011	32.8	18.3	+27.6	0.004	0.013	31.6	20.2	+28.4	0.002	0.013	36.5	25.6	+30.3	0.002	0.009
5. Vert. Container Base	13.9	12.6	+7.0	0.008	0.014	20.5	24.3	+12.8	0.003	0.008	21.5	21.9	+9.9	0.003	0.007	27.1	25.1	+13.0	0.004	0.009
6. Long. Container Base	12.2	23.2	-18.4	0.018	0.024	11.3	21.8	-19.5	0.016	0.023	11.4	18.8	-16.0	0.015	0.038	13.6	24.2	-18.9	0.015	0.038
8. Long. X1MC-234	10.3	36.5	-34.8	0.009	0.022	15.6	47.5	-41.9	0.008	0.025	18.2	45.3	-39.6	0.006	0.024	14.3	44.9	-40.6	0.006	0.025
10. Long. MC-488	9.8	34.1	-33.6	0.010	0.020	14.7	38.8	-38.1	0.006	0.026	16.8	37.1	-36.5	0.007	0.023	15.5	37.7	-36.8	0.008	0.024
13. Long. Ramp Dolly	1.2	17.7	-16.7	0.002	0.021	0.8	14.6	-12.6	0.002	0.032	0.5	14.0	-13.0	0.010	0.038	0.7	14.8	-14.1	0.012	0.041

Accelerometer No. and Location	Run 5 - 90° Orientation Impact Vel. 7.01 mph					Run 6 - 90° Orientation Impact Vel. 4.96 mph				
	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. (+)g	Max. Accel. (-)g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
3. Long. Cart. Structure Flange	9.6	31.8	-31.2	0.007	0.030	6.0	22.7	-19.0	0.006	0.015
4. Vert. Cart. Structure Flange	32.9	19.4	+28.7	0.005	0.011	36.6	31.1	+33.5	0.005	0.009
5. Vert. Container Base	22.2	22.2	+13.7	0.005	0.011	20.1	20.9	+10.0	0.003	0.009
7. Long. Container Base	8.0	24.3	-20.6	0.005	0.035	11.6	21.4	-20.1	0.004	0.019
9. Long. X1MC-234	17.0	32.0	-30.9	0.011	0.029	15.0	32.4	-31.5	0.010	0.025
11. Long. MC-488	19.0	38.4	-36.6	0.011	0.024	21.3	40.8	-27.9	0.010	0.023
12. Long. Cart. Structure Top	11.3	35.0	-32.5	0.011	0.031	14.2	29.7	-29.1	0.014	0.025
13. Long. Ramp Dolly	0.9	17.5	-15.8	0.008	0.032	0.8	14.2	-12.9	0.002	0.028

* Records read as per SCS-10

Directions of accelerations are: (+) Forward (-) Aft
(+) Up (-) Down

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