

| SANDIA SYSTEMATIC DECLASSIFICATION REVIEW | |
|---|---|
| 1 st Review Date: 10/29/98 | Determination (Circle Number): |
| Authority: W.C. Layne | Classification Retained: U |
| Name: W.C. Layne | Classification Changed to: |
| 2 nd Review Date: 11/09/98 | Contains No DOE Classified Information: |
| Authority: W.C. Layne | Coordinate With: |
| Name: W.C. Layne | Contains UCAJ: |
| | Comments: OK for permit |

AUG 18 1955
 H-194, 3-2
 Case No. 433.00
 Ref. Sym: 1612 (228)
 Project No. Tri-302

TCG-NNT-1; TCG-SAFF-1

MR. P. E. JOCKLE, JR. - 1281

Re: Ramp and Drop Test of the H-194/303 Containing the MC-383A

Summary of Results

The H-194/303 containing the MC-383A was drop tested in accordance with SCS-5. The only damage sustained by either the components or the container was to the base of the container. After the 12-inch drop it was found that the bottom of the base had fractured in two places. One crack was perpendicular to one that had occurred previous to the drop test.

The maximum faired vertical acceleration on the MC-385 was 26 g on the four-inch drop while the maximum measured on the 12-inch drop was 121 g.

The test on the Engineering Test Ramp was run in accordance with SCS-5. After the 7.0 mph run one channel of the MC-73 was inoperative. Two more fractures occurred in the bottom of the base during the test runs.

On the MC-385, the maximum faired vertical acceleration was 10 g and the maximum faired longitudinal acceleration was 60 g.

Object of Test

The object of this test was to determine accelerations, frequencies, and rise and pulse times on the H-194 container base and MC-383A under simulated railroad humping and four-inch and twelve-inch drops flat onto concrete.

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Reason for Test

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This test was requested in a Work Order Authorization from W. A. Gardner, 1280, to Division 1612, dated May 10, 1955.

B&D FILES

Summary of Past Tests

A road test run on three H-194's with adapter kits H-302, H-303, and H-320 was conducted by Department 1610 and is reported in a memorandum to L. A. Dunn, 1284, from R. L. Ault, 1612, entitled, "Road Test of the H-194", Ref. Sym: 1612 (121), issued July 23, 1954.

| SANDIA SYSTEMATIC DECLASSIFICATION REVIEW | |
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| DOWNGRADING OR DECLASSIFICATION STAMP | |
| CLASSIFICATION CHANGED TO: U | AUTHORITY: W.C. Layne |
| PERSON CHANGING MARKING & DATE: 12/9/98 | RECORD ID: 99SN 0357 |
| PERSON VERIFYING MARKING & DATE: W.C. Layne 12/16/98 | DATED: 11/9/98 |

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|---------------------|----|
| CDL No. | |
| ACCOUNTABILITY CARD | 28 |
| FILE No. H-194/303 | |
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Mr. P. E. Jockle, Jr. - 1281

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The TPM-4 Finn Mounts on the H-194/303 failed after 34 miles of road testing. The Barry Mount 896-35G (air damped) on the H-194/320 started failing after 92 miles of the test, with complete failure at the end of the 247 mile test. The Met-L-Flex 7002-P mounts used to replace the Finn mounts and the Barry mounts 990-30 on the H-194/302 performed satisfactorily throughout the test.

A ramp test on an H-194/302 containing a TX-6-X4 X-Unit and ramp and drop tests on an H-194/303 container carrying an A-fuze were performed by Department 1610 and reported in a memorandum to P. E. Jockle, Jr., 1281, from R. A. Buck, 1612, entitled "Ramp and Drop Test of the H-194/302 and H-194/303", Ref. Sym: 1612 (163), issued April 6, 1955.

Two runs with a maximum velocity of 5.1 mph were made with the H-194/302. The TX-6-X4 was damaged and since no other was available further testing of the H-194/302 container was postponed.

During the 7.0 mph ramp test of the H-194/303 two of the MC-73 vibration-mount inserts in the fuze plate of the A-fuze were broken out of the plate allowing the MC-73 to move freely on its mounts. The setting of the MC-73 could not be changed following a 7.0 mph ramp test with the component tied down.

The shock and vibration mounts of the H-303 adapter kit became progressively dished and dented during the 12-inch drop tests. The bracket of one of the MC-394 vibration mounts was fractured during the 12-inch drop tests in which the component was free on its mounts, so that the mount was detached from the component.

A ramp and drop test was run on the H-194 with associated MC items by Division 1612 and is reported in a memorandum to J. O. Davis, 1281-1 from D. F. Hillyer, Jr., 1612, entitled "Ramp and Drop Test of the H-194 and Associated MC Items", Ref. Sym: 1612 (224), to be issued.

There were no complete failures in the container or components during the ramp and drop tests. The four Met-L-Flex mounts deformed during the ramp test.

For the ramp test with an impact velocity of 7.1 mph the faired longitudinal acceleration on the base was 25.5 g and on the mounting plate was 45.9 g.

The maximum vertical shock acceleration on the base for the four-inch drop was 310 g with a maximum faired vertical acceleration of 49.3 g on the mounting plate.

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For the 12-inch drop the maximum vertical shock acceleration on the base was 418 g with a maximum vertical faired acceleration on the mounting plate of 157 g.

Electrical checks were made of the major components after the completion of drop and ramp testing and all components checked satisfactorily.

Setup for Test

Figure 1 shows the H-194 in position for dropping flat onto concrete.

The H-194 fastened to the engineering test ramp is shown in Fig. 2.

The components tested during these tests are shown on Table I.

Test equipment used by Division 1612 for the four-inch drop test is listed below:

Miller oscillograph - Model H, Serial No. 159
3 Hathaway amplifiers, Model MRC-21

Test equipment for the 12-inch drop was:

Miller oscillograph - Model H, Serial No. 161
2 Hatahway amplifiers, Model MRC-21

Test equipment used during the ramp test was:

Miller oscillograph - Model J, Serial No. 99
Miller amplifiers, Type C-3, Model CA12, Serial No. 7

Electrical test equipment used by Division 1215:

T-1 Baro Tester, Serial No. AH-3040-H3
T-196 Tester consisting of XT-2002, Serial No. BRBOOLA4 and
XT-2003, Serial No. BRBOO2A4
T-242 X-Unit Simulator, Serial No. B-125551-B5

Instrumentation included:

Statham accelerometers as listed on Table II and shown in
Figs. 2, 3, 4, 5, and 6
Microswitch (Figs. 2 and 7)

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Procedure

The rubberized hair which was used as a shock and vibration isolator in this container was placed in the base (Fig. 3) as shown in Fig. 8. The MC-385 carrying various components was then set on the rubberized hair (Fig. 9) and the MC-435 fastened on (Fig. 10). The cover (Fig. 11) of the H-194 was next placed over the components and fastened down.

For the ramp tests the container was fastened to the dolly by the use of chains and turnbuckles secured to eyes on the dolly as shown in Fig. 2.

This test was run in accordance with SCS-5 with impact velocities of approximately 5.1, 5.6, 6.0, 6.5, 6.8, and 7.0 MPH. The velocity was measured by the use of a make and break circuit using a microswitch fastened to the dolly and two actuating arms four feet apart fastened to the track of the ramp (Fig. 7).

Accelerations were recorded from accelerometers 1 - 5.

The method of lifting the H-194 for the four-inch and twelve-inch drops is shown in Fig. 1.

The drop test was run in accordance with SCS-5 with twelve four-inch and six twelve-inch drops flat onto concrete.

Accelerations from accelerometers 1, 6, and 7 were recorded for the four-inch drops and from accelerometers 2 and 7 for the twelve-inch drops.

Electrical checks of the components were made after each ramp run and after the four-inch drops and after the twelve-inch drops.

Results

All of the components were operative after the ramp and drop tests except one channel of the MC-73 after the 7.0 mph run. The timer lead screw assembly on one channel had moved 0.038 inch and made this channel inoperative.

After the twelve-inch drop, it was found that the bottom of the base had fractured in two places. One crack was perpendicular to one that had occurred previous to the test. These fractures are shown in Fig. 12.

Another two fractures in the bottom of the base were found after the ramp test was completed. These are shown in Fig. 13.

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The accelerations for the ramp test are given in Table III and were read in accordance with SCS-10. The maximum accelerations occurred at different times after the initial impact. The maximum faired vertical acceleration on the MC-385 was 10 g and the maximum faired longitudinal acceleration was 60 g.

A typical record for the ramp test is shown in Fig. 14.

Table IV contains the accelerations measured during the four-inch and twelve-inch drops. The maximum measured faired acceleration on the MC-385 in the vertical direction on the four-inch drop was 26 g while the maximum measured on the twelve-inch drop was 121 g.

The typical records for the four-inch and twelve-inch drops are shown in Fig. 15.

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pictures have any D#s.

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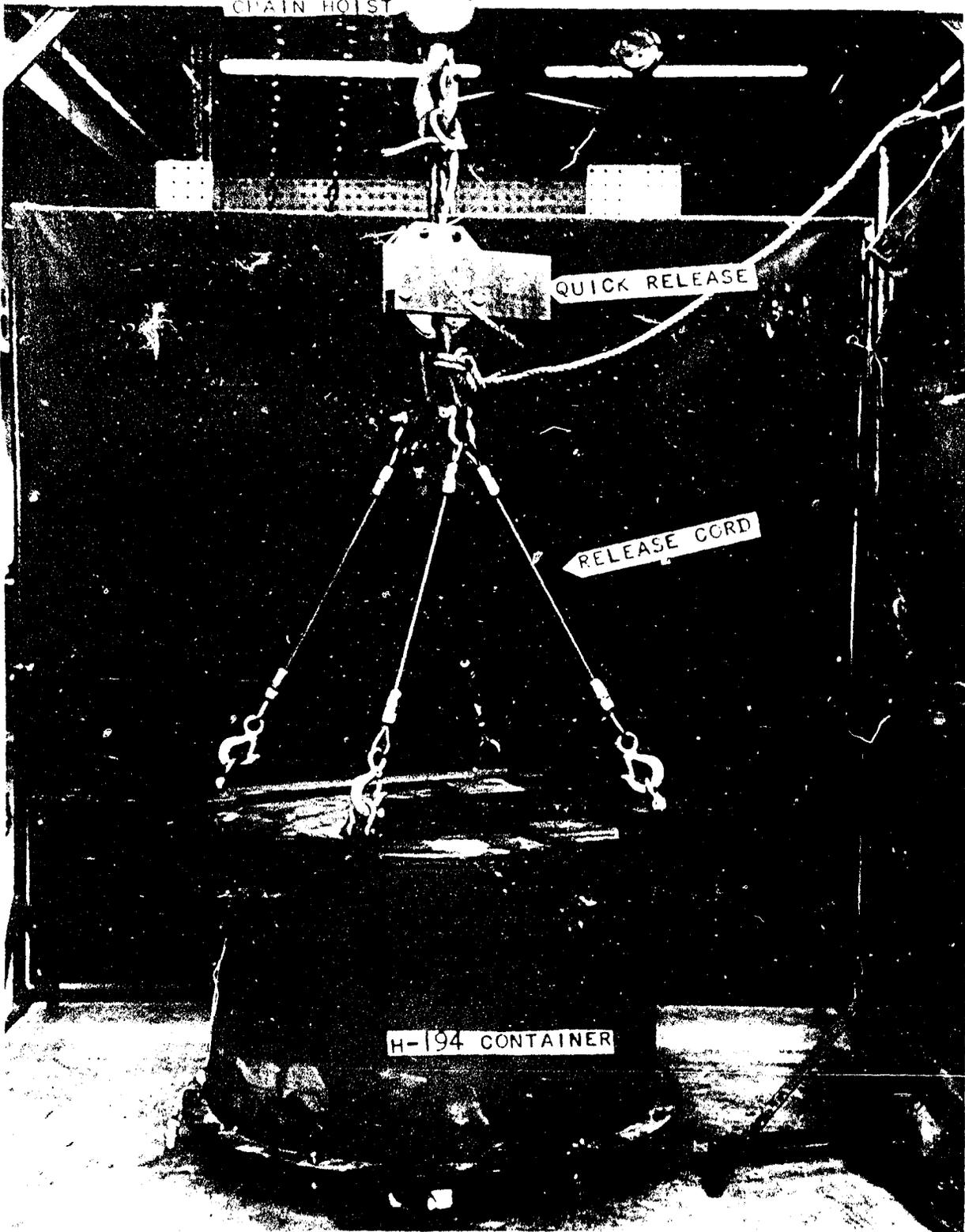


FIG. 1 H-194 CONTAINER AND DROP TEST SET-UP- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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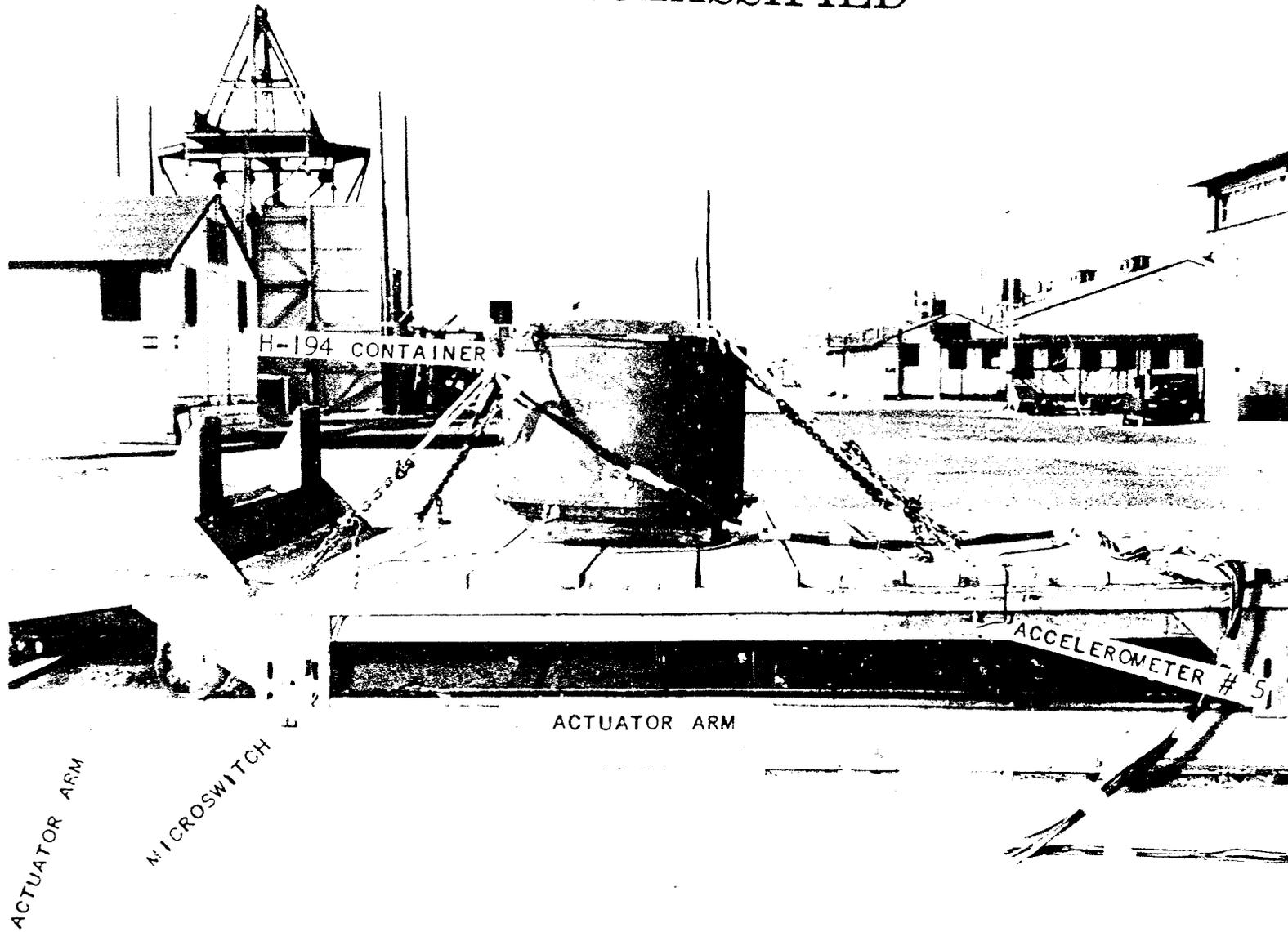


FIG. 2 H-194 CONTAINER MOUNTED ON RAMP DOLLY- RAMP AND DRCP TEST OF THE H-194/303 CONTAINING THE MC-383A

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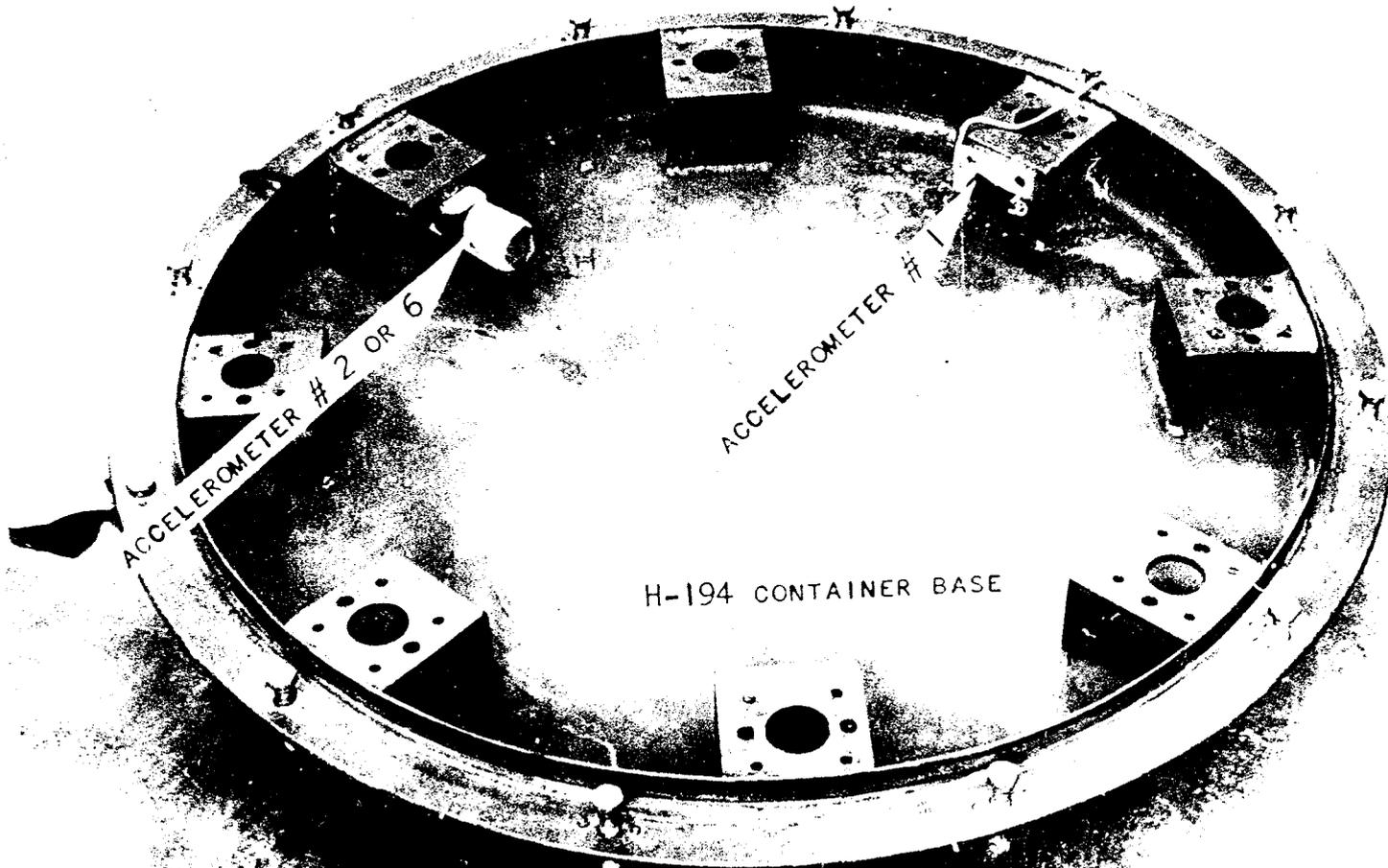


FIG. 3 H-194 CONTAINER BASE AND ACCELEROMETER LOCATIONS- RAMP AND DRCP TEST OF THE H-194/303 CONTAINING THE MC-383A

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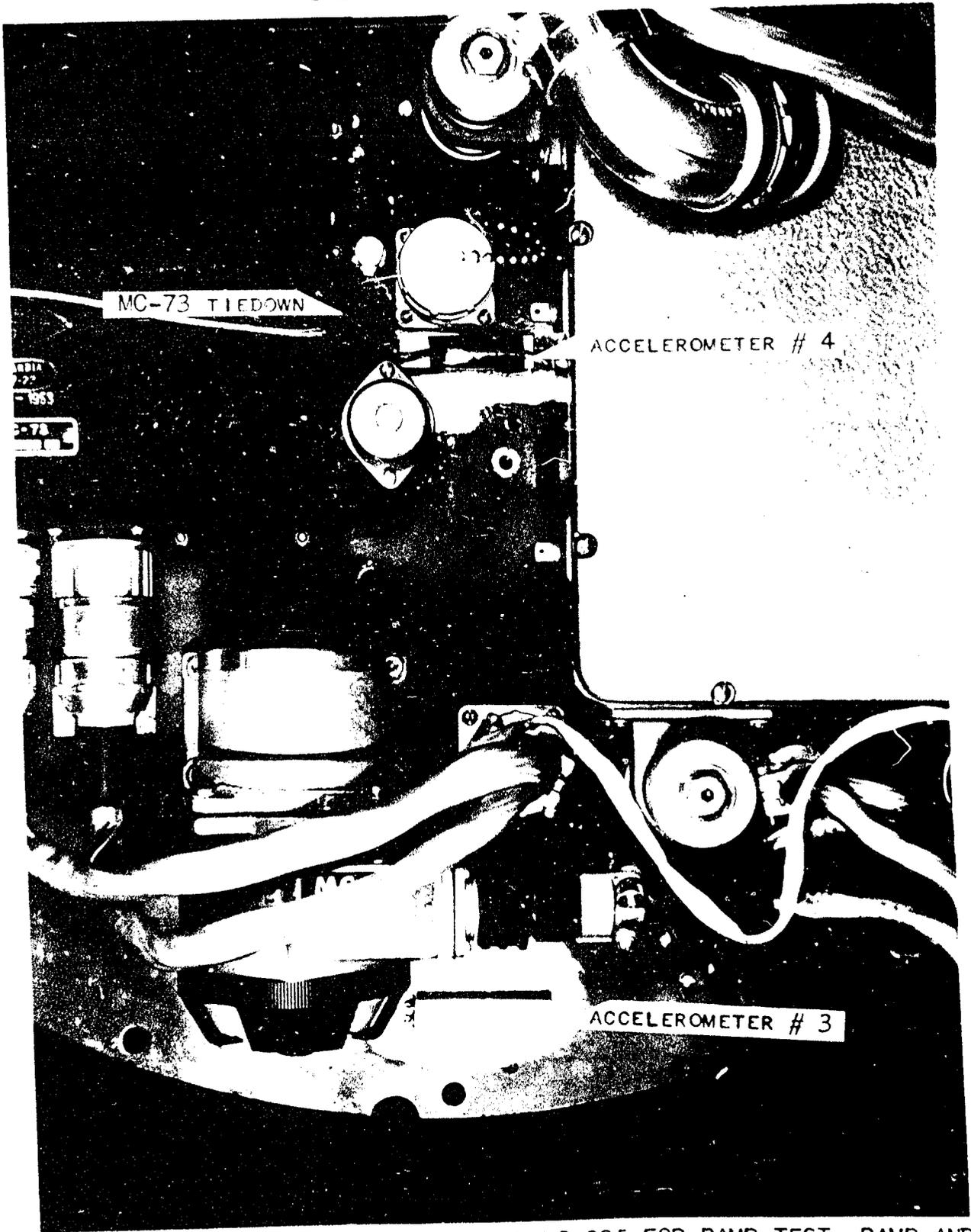


FIG. 4 ACCELEROMETER LOCATIONS ON MC-385 FOR RAMP TEST- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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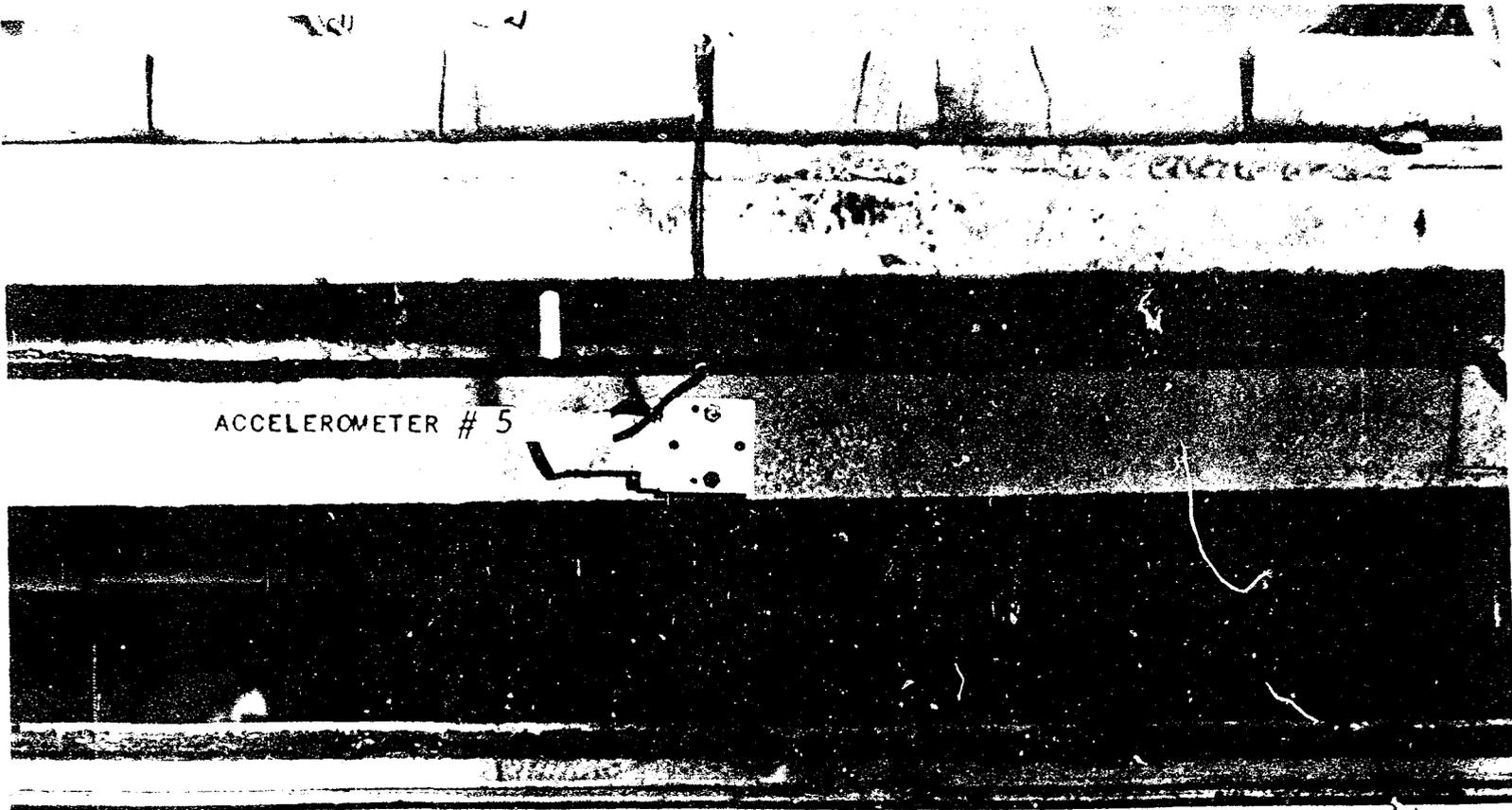


FIG. 5 ACCELEROMETER LOCATION ON RAMP DOLLY- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

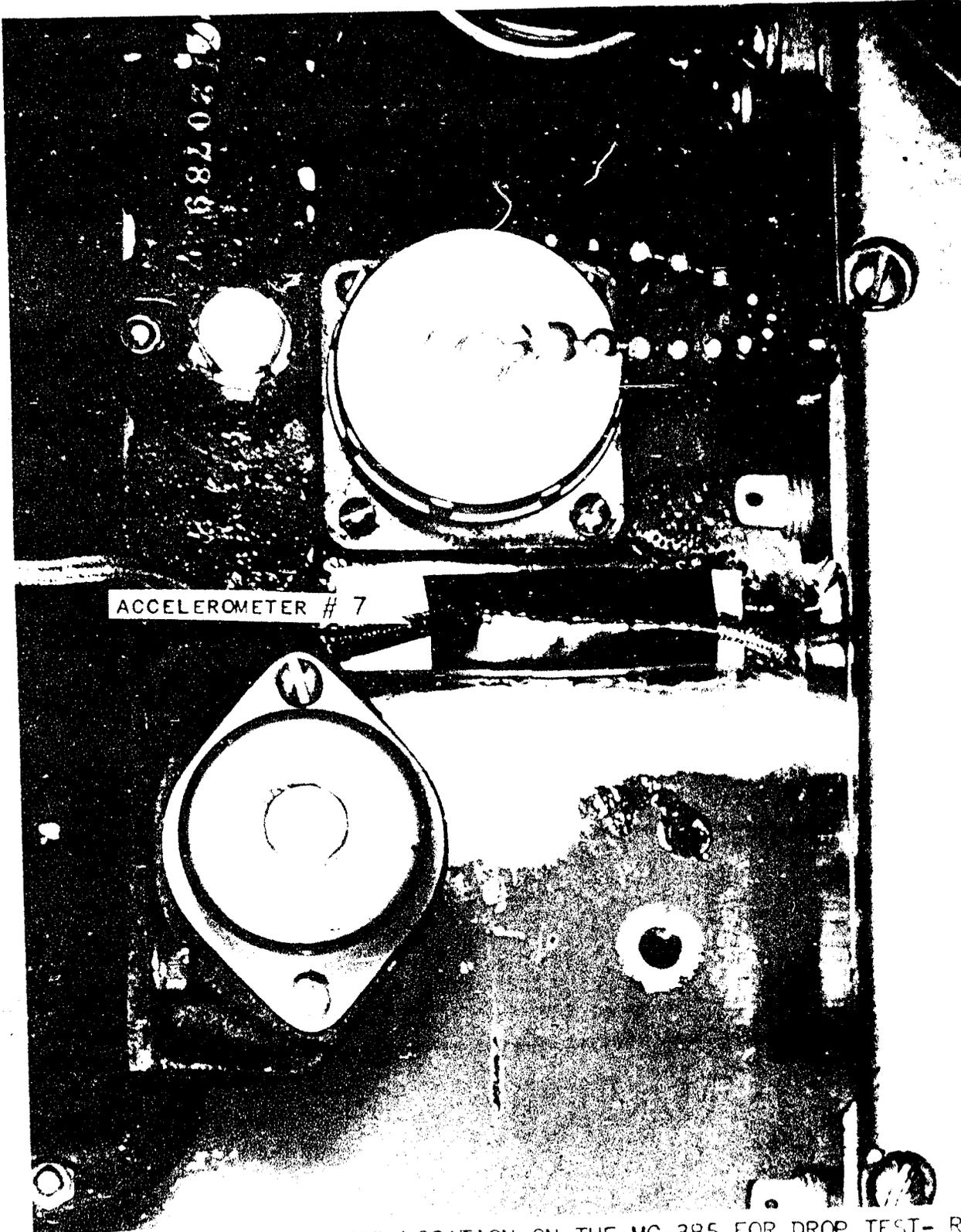
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ACCELEROMETER # 7

FIG. 6 ACCELEROMETER LOCATION ON THE MC-385 FOR DROP TEST- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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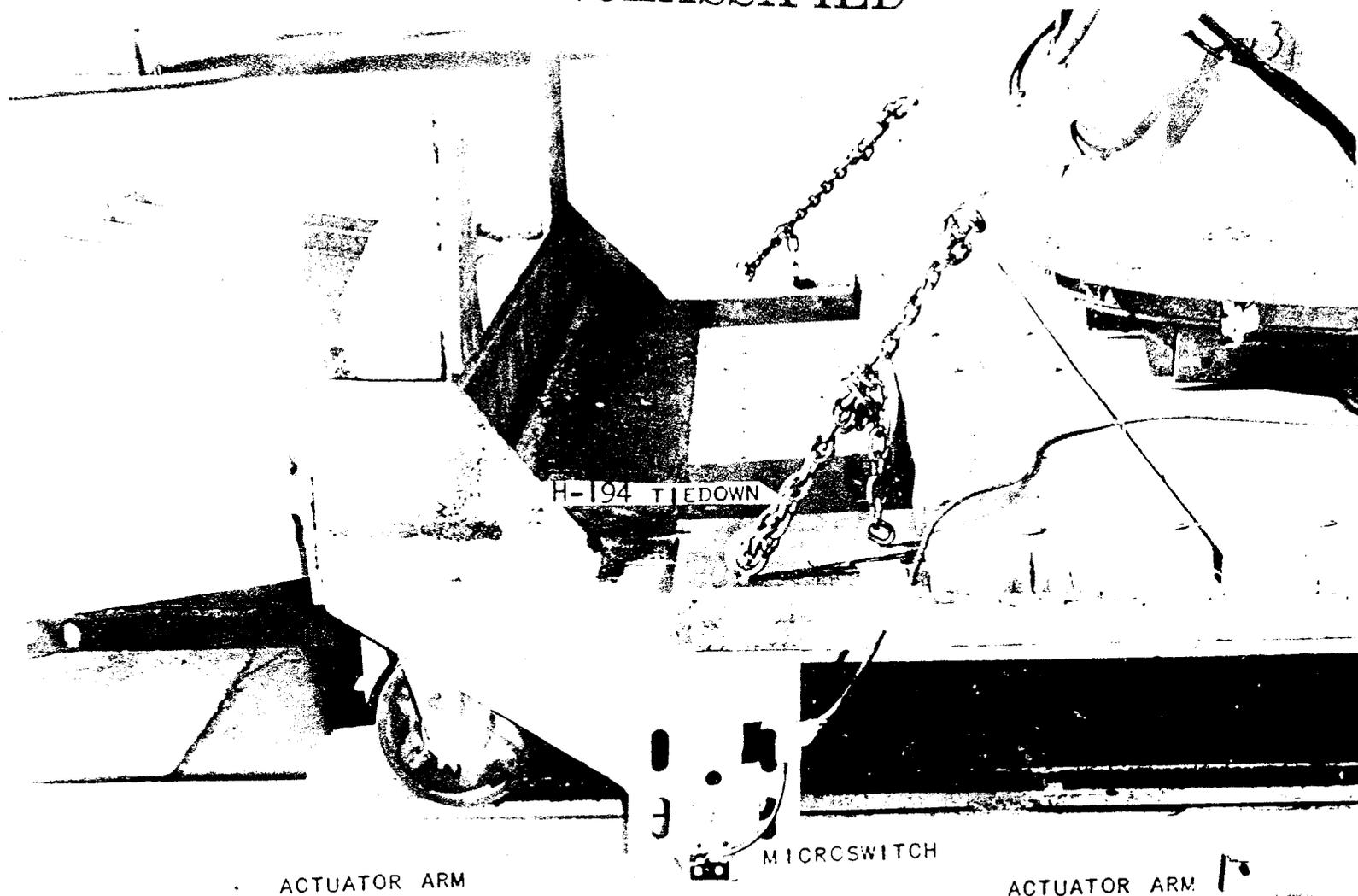


FIG. 7 VELOCITY MEASUREMENT DEVICE- RAMP AND DROP TEST OF THE H-194/303
CONTAINING THE MC-383A

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TM-302

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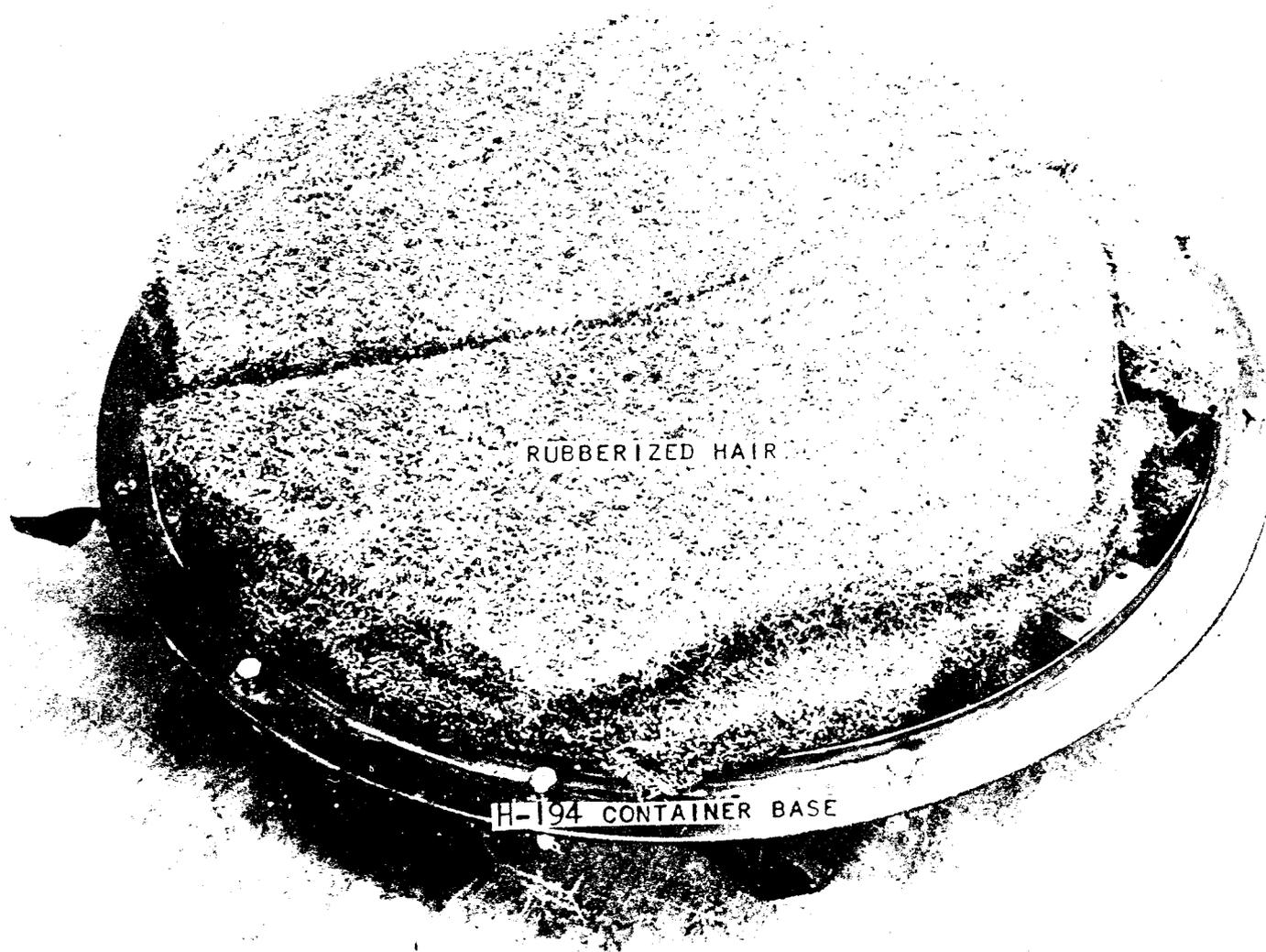


FIG. 8 H-194 BASE CONTAINING RUBBERIZED HAIR- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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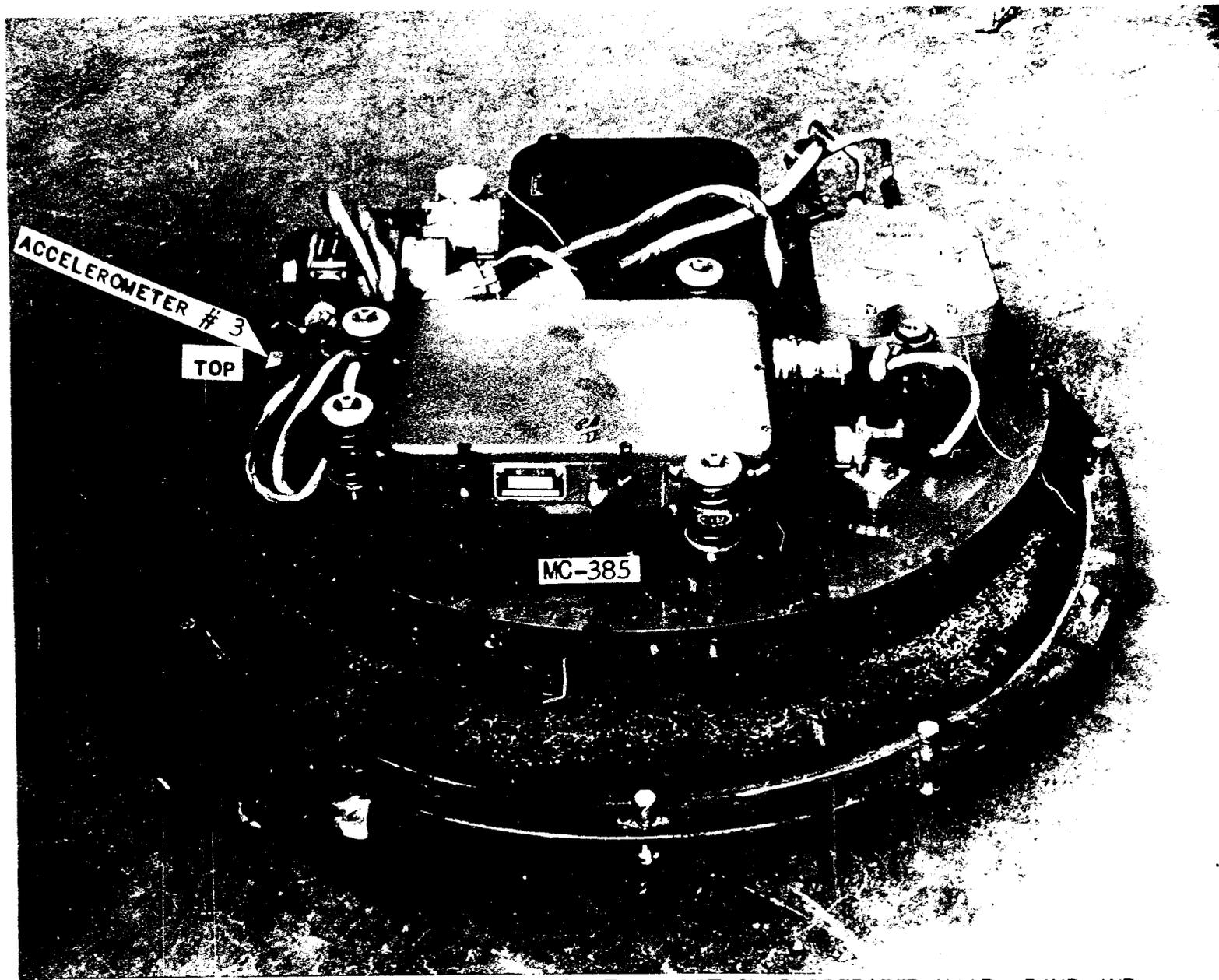


FIG. 9 MC-385 AND ASSOCIATED MC ITEMS SET ON RUBBERIZED HAIR- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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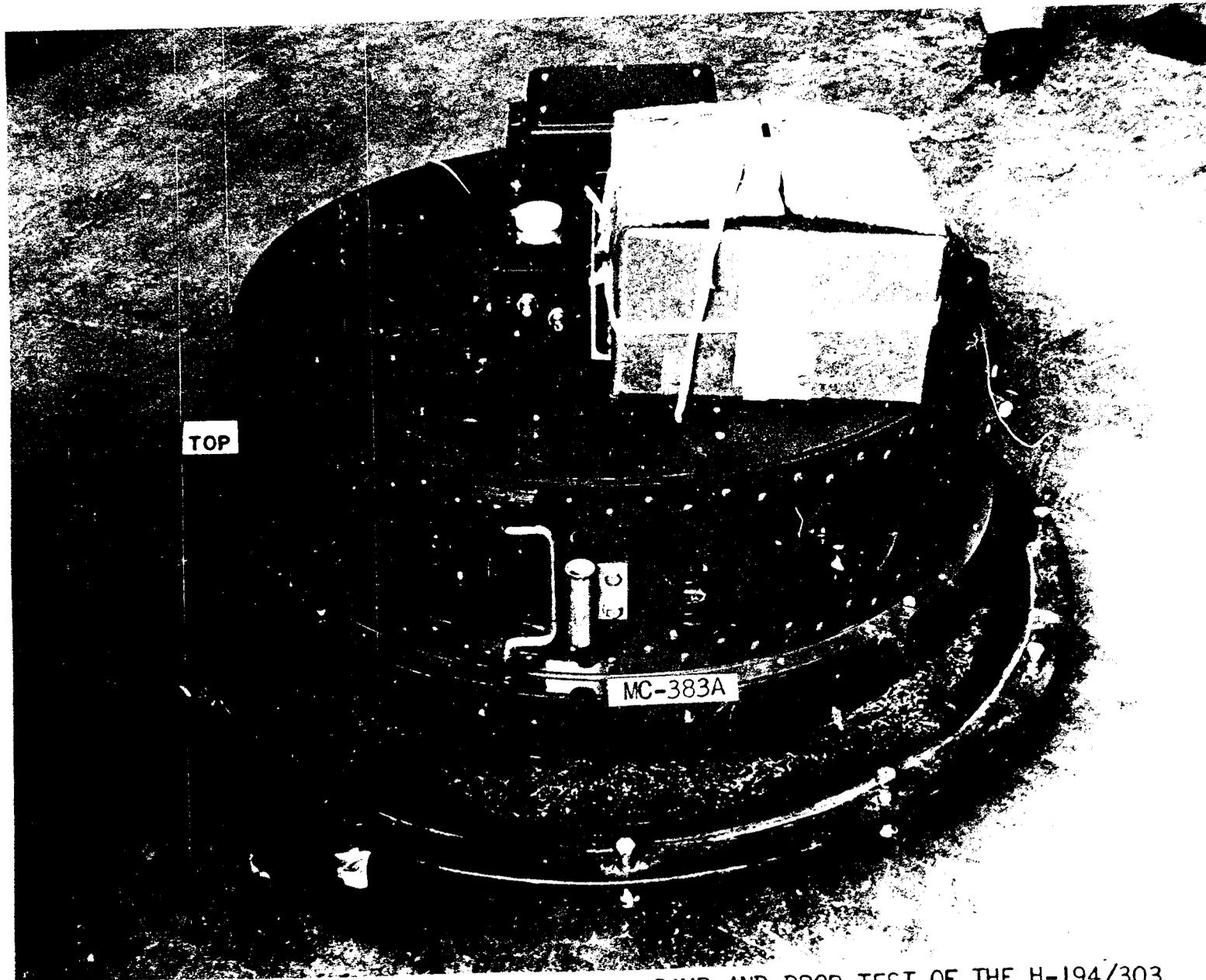


FIG. 10 MC-383A SET ON RUBBERIZED HAIR- RAMP AND DROP TEST OF THE H-194/303
CONTAINING THE MC-383A

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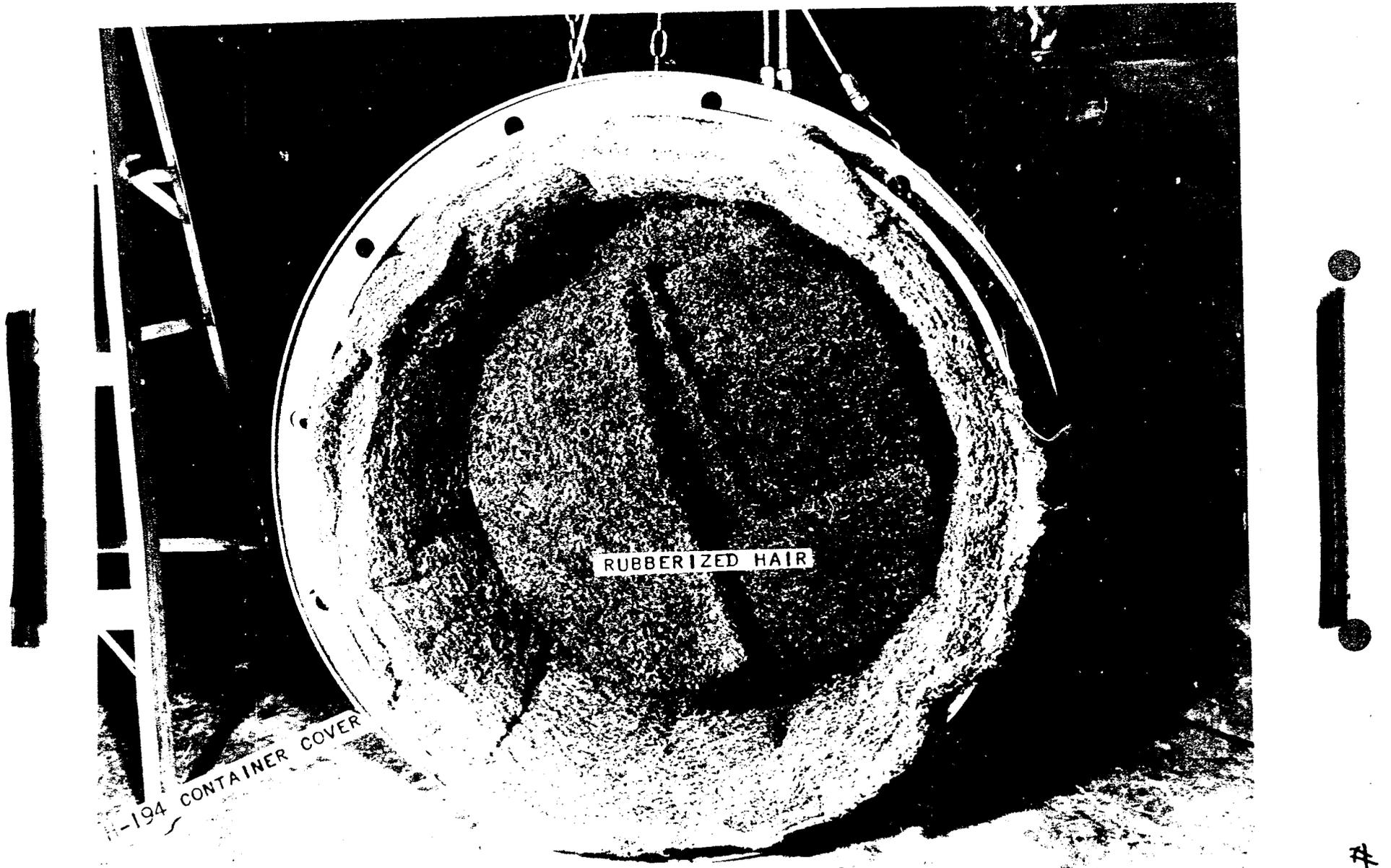


FIG. 11 RUBBERIZED HAIR INSTALLED IN H-194 COVER- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-333A

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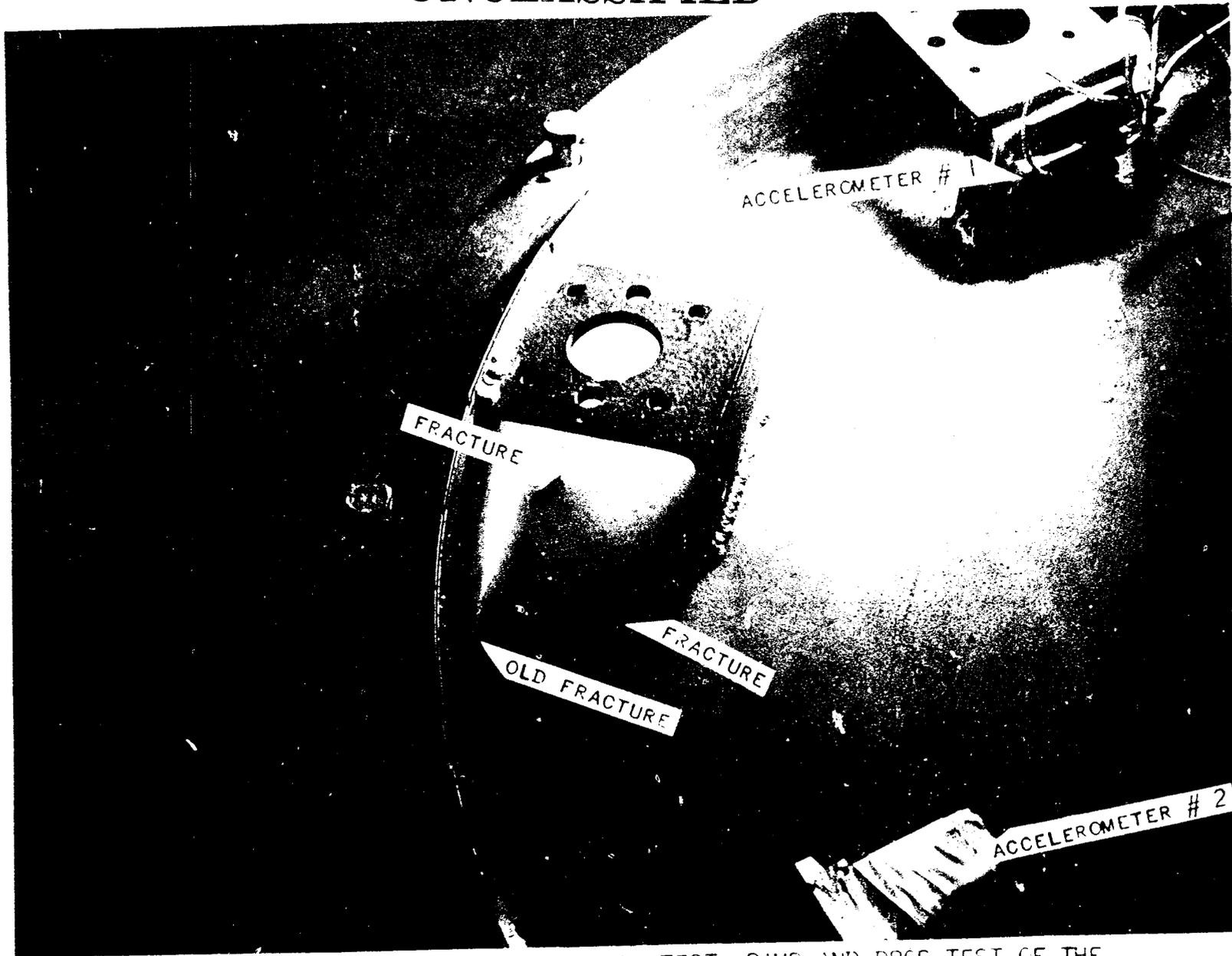


FIG. 12 FRACTURES IN H-194 BASE- DROP TEST- PUMP AND DROP TEST OF THE
H-194/303 CONTAINING THE MC-393A

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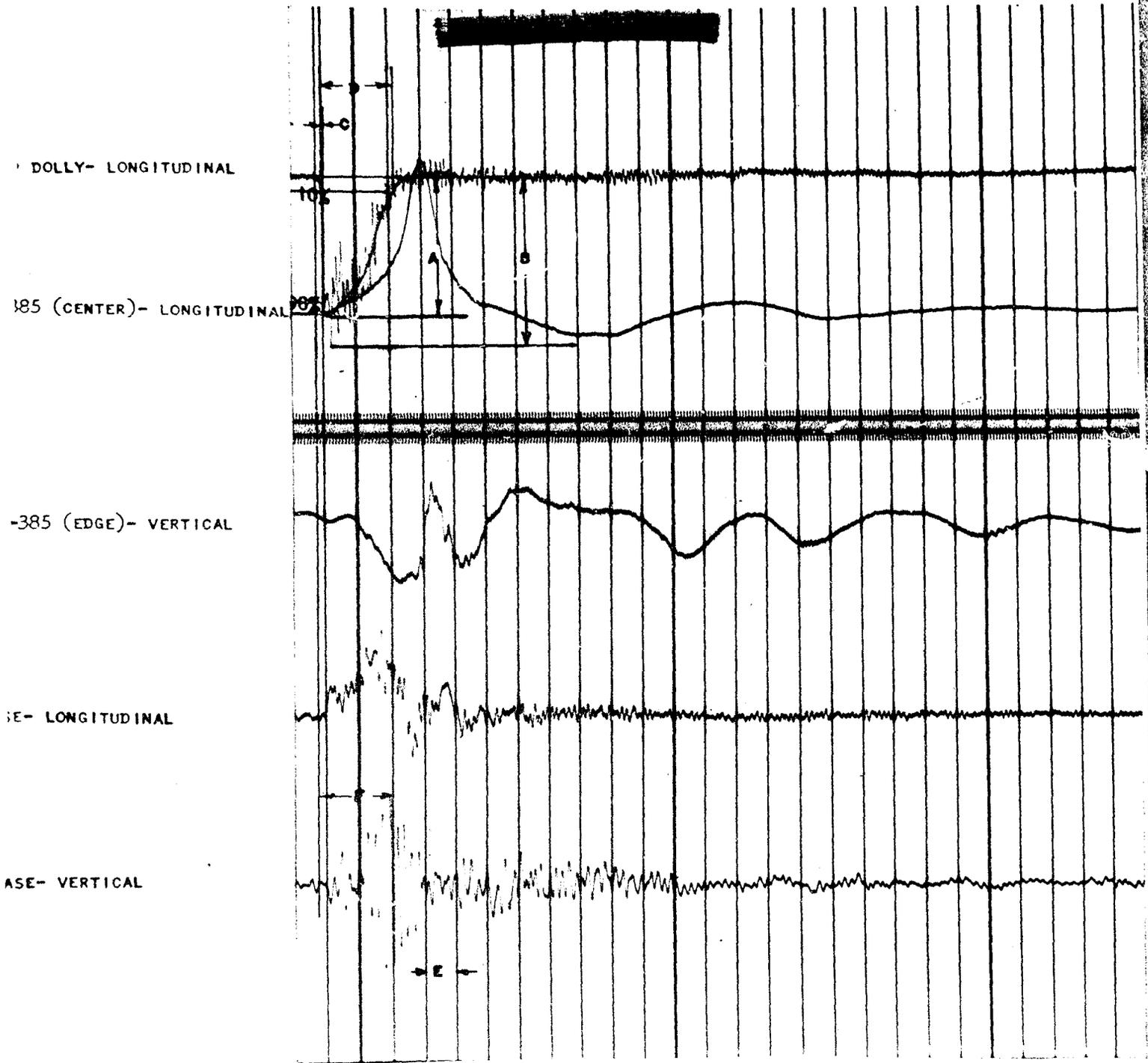


FIG. 13 FRACTURES IN H-194 BASE- RAMP TEST- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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- A- MAXIMUM FAIRED VALUE (100%)
- B- MAXIMUM AMPLITUDE
- C- RISE TIME
- D- PULSE TIME
- E- 0.01 SECOND
- F- 0 TO MAXIMUM- TIME

FIG. 14 TYPICAL RECORD-RAMP TEST- RAMP AND DROP TEST OF THE H-194,'303 CONTAINING THE MC-383A

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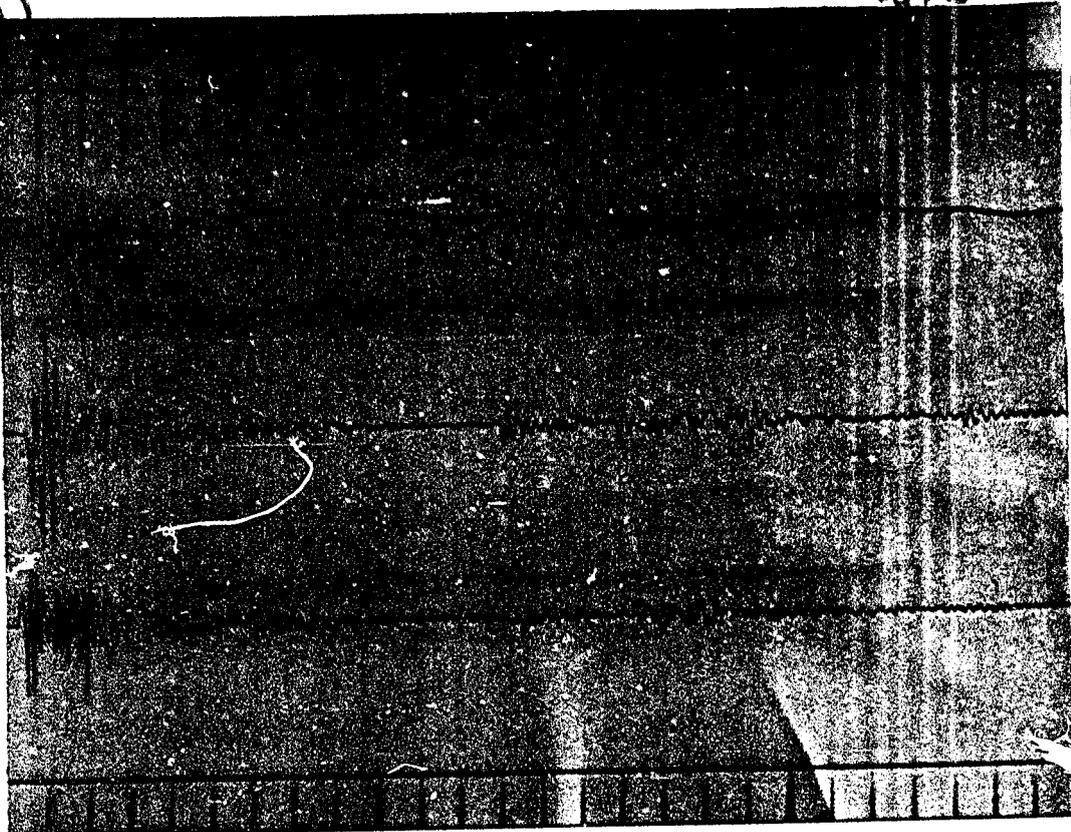
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MC-385 (CENTER)- VERTICAL

BASE- LONGITUDINAL

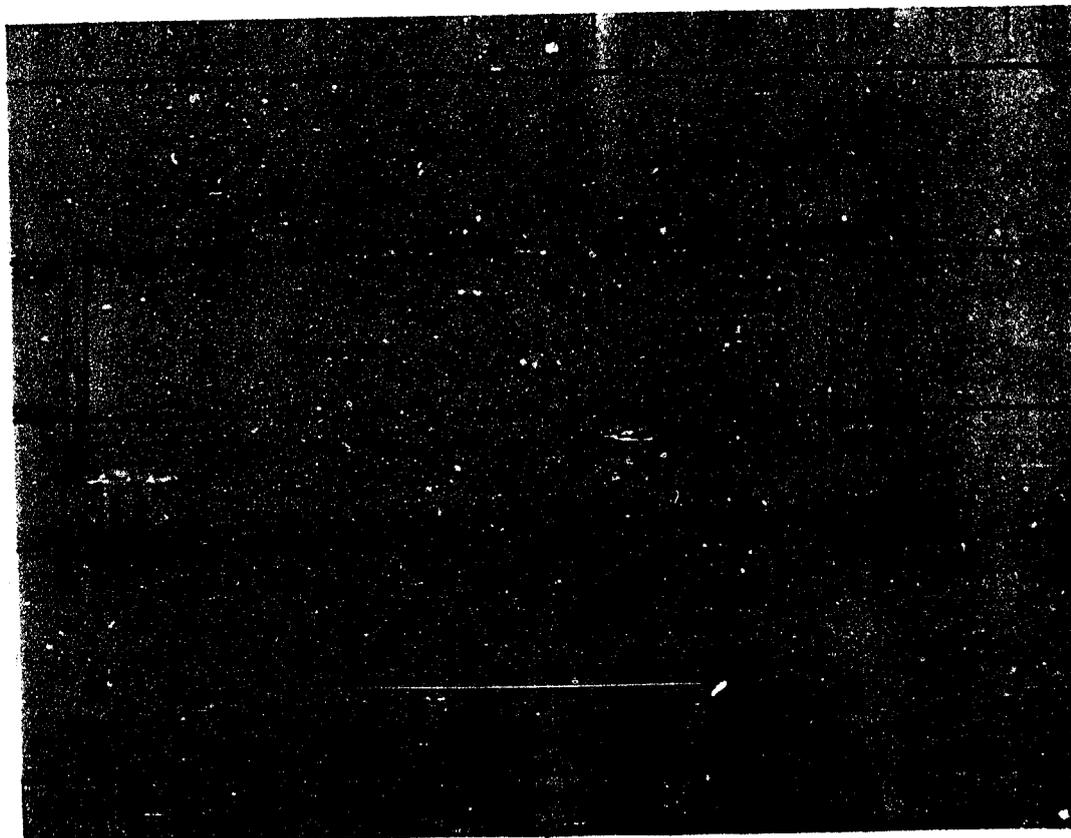
BASE- VERTICAL



4-INCH DROP

MC-385 (CENTER)- VERTICAL

BASE- LONGITUDINAL



12-INCH DROP

- A- MAXIMUM FAIRED VALUE (100%)
- B- MAXIMUM AMPLITUDE
- C- RISE TIME
- D- PULSE TIME
- E- 0.01 SECOND

FIG. 15 TYPICAL RECORD-DROP TEST- RAMP AND DROP TEST OF THE H-194/303 CONTAINING THE MC-383A

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TABLE I

COMPONENTS TESTED

RAMP TEST OF THE H-194/303 CONTAINING THE MC-383A

| <u>Component</u> | <u>Drawing No.</u> | <u>Serial No.</u> |
|------------------|--------------------|-------------------|
| H-194 | 115477-00 | ES-1134-C4 |
| MC-73 | 113800 | CO-2178-33 |
| MC-273 | 115550 | AH-1688-B4 |
| MC-372 | 118637 | AA-1050-D4 |
| MC-382 | 119682 | AA-1028-E4 |
| MC-384 | 120689 | AA-1070-F4 |
| MC-385 | 120067 | AS-1047-G4 |
| MC-394 | 119848 | AH-26274-A4D4 |
| MC-435 | 119935 | AA-1050-E4 |


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TABLE II

ACCELEROMETERS AND LOCATIONS

RAMP TEST OF THE H-194/303 CONTAINING THE MC-383A

| Accel. No. | Location | Range (g) | Serial No. | Statham Model No. | Nat. Freq. (cps) |
|-----------------------|--------------------------------|--------------|---------------|----------------------|---------------------|
| RAMP TEST | | | | | |
| 1 | Base - Vertical | ± 100 | 1300 | F-100-300 | 630 |
| 2 | Base - Longitudinal | ± 100 | 615 | A5A-100-300 | 760 |
| 3 | MC-385 (edge) - Vertical | ± 50 | 1296 | F-50-300 | 565 |
| 4 | MC-385 (center) - Longitudinal | ± 100 | 1299 | F-100-300 | 690 |
| 5 | Ramp Dolly - Longitudinal | ± 50 | 517 | A5A-50-240 | 620 |
| FOUR-INCH DROP TEST | | | | | |
| 1 | Base - Vertical | ± 100 | 1300 | F-100-300 | 630 |
| 6 | Base - Longitudinal | ± 50 | 641 | A5A-50-300 | 490 |
| 7 | MC-385 (center) - Vertical | ± 100 | 1299 | F-100-300 | 690 |
| TWELVE-INCH DROP TEST | | | | | |
| 2 | Base - Longitudinal | ± 100 | 615 | A5A-100-300 | 760 |
| 7 | MC-385 (center) - Vertical | ± 100 | 1299 | F-100-300 | 690 |

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TABLE III

ACCELERATIONS AND FREQUENCIES - RAMP TEST
RAMP TEST OF THE H-194/303 CONTAINING THE MC-383A

| Accel. No. | Location | Direction | 4.78 MPH | | | | | | | | 5.57 MPH | | | | | | | | | |
|------------|-----------------|--------------|--------------------|----------|-------------|----------------|------------|-------|------------|------------|-----------------|--------------------|----------|-------------|----------------|------------|-------|------------|------------|-----------------|
| | | | Acceleration (g)** | | | | Time (sec) | | | | *** Freq. (cps) | Acceleration (g)** | | | | Time (sec) | | | | *** Freq. (cps) |
| | | | Max. (+) | Max. (-) | Max. Paired | Max. Amplitude | Rise | Pulse | O-Max. (+) | O-Max. (-) | | Max. (+) | Max. (-) | Max. Paired | Max. Amplitude | Rise | Pulse | O-Max. (+) | O-Max. (-) | |
| 1 | Base | Vertical | 11 | 10 | | | | | 0.040 | 0.012 | 400 | 30 | 37 | | | | | 0.0008 | 0.0004 | 450 |
| 2 | Base | Longitudinal | | | | | | | | 0.009 | 580 | 31 | 44 | | | | | 0.026 | 0.028 | 670 |
| 3 | MC-385 (edge) | Vertical | | | +2.4 | +2.5 | 0.008 | 0.024 | 0.115 | | 620 | | 8 | +3.7 | +3.9 | 0.010 | 0.056 | 0.067 | 0.034 | 540 |
| 4 | MC-385 (center) | Longitudinal | | | -10 | -10 | 0.027 | 0.053 | | 0.036 | --- | | | -28 | -33 | 0.016 | 0.033 | | 0.031 | --- |
| 5 | Ramp Dolly | Longitudinal | | | -11 | -13 | 0.001 | 0.037 | | 0.003 | 720 | | | -18 | -23 | 0.002 | 0.022 | | 0.005 | 670 |
| | | | 6.07 MPH | | | | | | | | 6.59 MPH | | | | | | | | | |
| 1 | Base | Vertical | 33 | 36 | | | | | 0.021 | 0.022 | 460 | 40 | 37 | | | | | 0.017 | 0.045 | 470 |
| 2 | Base | Longitudinal | | | -18 | -29 | 0.012 | 0.025 | | 0.020 | 700 | 51 | 33 | -23 | -29 | 0.009 | 0.026 | 0.045 | 0.046 | 680 |
| 3 | MC-385 (edge) | Vertical | 4.4 | 5.4 | -4.9 | -4.9 | 0.009 | 0.019 | 0.035 | 0.026 | 580 | | | -10 | -12 | 0.009 | 0.014 | | 0.022 | --- |
| 4 | MC-385 (center) | Longitudinal | | | -26 | -26 | 0.019 | 0.038 | | 0.032 | --- | | | -36 | -36 | 0.001 | 0.028 | | 0.030 | --- |
| 5 | Ramp Dolly | Longitudinal | | | -22 | -27 | 0.001 | 0.023 | | 0.005 | 640 | | | -24 | -30 | 0.001 | 0.020 | | 0.004 | 630 |
| | | | 6.31 MPH | | | | | | | | 6.99 MPH | | | | | | | | | |
| 1 | Base | Vertical | 80+* | 37 | | | | | 0.036 | 0.036 | 620 | 27 | 30 | | | | | 0.056 | 0.025 | 450 |
| 2 | Base | Longitudinal | | 30 | -14 | -20 | 0.013 | 0.030 | | 0.031 | 620 | | 48 | -27 | -36 | 0.014 | 0.021 | | 0.024 | 750 |
| 3 | MC-385 (edge) | Vertical | | | -5.4 | -6.1 | 0.007 | 0.016 | | 0.021 | --- | | 13 | -10 | -10 | 0.009 | 0.021 | | 0.029 | --- |
| 4 | MC-385 (center) | Longitudinal | | | -33 | -35 | 0.017 | 0.036 | | 0.033 | --- | | | -60 | -62 | 0.008 | 0.016 | | 0.025 | --- |
| 5 | Ramp Dolly | Longitudinal | | | -20 | -23 | 0.002 | 0.026 | | 0.003 | 720 | | | -26 | -31 | 0.002 | 0.019 | | 0.005 | 820 |

* Signal went off the paper.

** Plus directions are: vertical, upward; longitudinal, toward top of MC-383A and toward front of dolly.

*** The accelerations are measured with a seismic mass type accelerometer with a damping coefficient of 0.7; therefore, accelerations occurring at frequencies greater than 0.5 of the natural frequency of the accelerometer will be attenuated.

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TABLE IV

ACCELERATIONS AND FREQUENCIES - DROP TESTS

RAMP TEST OF THE H-194/303 CONTAINING THE MC-383A

| Accel. No. | Location | Direction | Acceleration (g)* | | | | Time (sec) | | Freq.** (cps) |
|------------------|-----------------|--------------|-------------------|-------------|----------------|-------------------|------------|-------|------------------|
| | | | Max. (+) | Max. (-) | Max. Faired | Max. Amplitude | Rise | Pulse | |
| FOUR-INCH DROP | | | | | | | | | |
| 1 | Base | Vertical | 56 | 46 | | | | | 760 |
| 6 | Base | Longitudinal | 139 | 137 | | | | | 450 |
| 7 | MC-385 (center) | Vertical | | | -26 | -27 | 0.009 | 0.027 | -- |
| TWELVE-INCH DROP | | | | | | | | | |
| 2 | Base | Longitudinal | 84 | 104 | | | | | 670 |
| 7 | MC-385 (center) | Vertical | | | -121 | -126 | 0.003 | 0.005 | 640 |

* Plus directions are: vertical, upward; longitudinal, toward top of MC-383A

** The accelerations are measured with a seismic mass type accelerometer with a damping coefficient of 0.7; therefore, accelerations occurring at frequencies greater than 0.6 of the natural frequency of the accelerometer will be attenuated.

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