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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date: 7/13/98
Authority: ☐ADC ☒ADD
Name: Whayne
2nd Review Date: 7/13/98
Authority: ADD
Name: R.B. Cranen
Determination (Circle Number(s)):
1. Classification Retained
2. Classification Changed to: U
3. Contains No DOE Classified Information
4. Coordinate With:
5. Contains UCNI? No
6. Comments: OK for Release

NOV 28 1961
File No: TX-53, 3-2
T-17626
Date Completed: 3-14-61

RECEIVED
NOV 2 1961
CENTRAL RECORD FILE

MR. E. I. BRUCE - 7117
Attn: L. F. Miller

Re: Drop Tower Test of Barrel Nose #4

Summary of Test

The object of the test was to study the shock mitigating characteristics of the Barrel Nose configuration for the TX-53 weapon. The Barrel Nose was designed to limit the longitudinal faired acceleration to 60g when dropped on concrete targets with velocity components of 62 fps vertical and 51 fps horizontal. These conditions simulated parachute retarded fall with a 35 MPH sidewind.

The weapon was instrumented with 3 Statham Accelerometers mounted in the nose section. One accelerometer measured in the longitudinal axis of the weapon and one each in the vertical and horizontal axes. Three Statham accelerometers were mounted in the aft section of the ballistic cylinder, one each in the longitudinal, verical and horizaontal axes.

The results of the test showed the nose crushed about 17.5" which is 1" more than expected. The maximum faired longitudinal acceleration was 84.4g on the aft weights at impact. The maximum faired vertical acceleration was 39.2g on the aft weights at slapdown. The movie film showed the weapon impact was 6° off the normal to a horizontal concrete target.

The film also showed the impact velocities to be 63 ft. per sec. vertical and 52 ft. per sec. horizontal.

Object of Test

The object of this test was to evaluate the shock mitigating characterics of the Barrel Nose configuration to be used on the TX-53 weapon. The Barrel Nose was designed to limit the faired longitudinal acceleration to 60g when dropped on concrete targets with velocity components of 62 fps vertical and 51 fps horizontal. These conditions simulated parachute retarded laydown in a 35 mph sidewind.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
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CLASSIFICATION CHANGED TO: U
Emilio Selch 7/21/98
PERSON CHANGING MARKING & DATE
W. Hayne 7/22/98
PERSON VERIFYING MARKING & DATE
AUTHORITY: R.B. Cranen
RECORD ID: 98SN2883
DATED: 7/13/98

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Authorization for Test

This test was requested in a Work Order Authorization from E. I. Bruce, 7117, dated 3-6-61. Don Baker, 7117-1, was the consultant.

Summary of Past Tests

Three prior drop tests of the Barrel Nose configuration have been made by Division 7323. They are reported under project Nos. T-17374, T-17407 and T-17493.

Setup for Test

Figure 1 shows the unit suspended from the drop tower before the test. The guy ropes shown in Figure 1 were tightened sufficiently to pull the longitudinal axis of the weapon about 5° off vertical. The weapon performs a pendulum type oscillation at carriage release if these guy ropes are not tight enough. This pendulum action continues during carriage slide and imparts an unstable condition to the unit at weapon release.

A list of the components making up the object tested were: Barrel Nose, Dwg. No. N-10603, Issue 3; outer panels, Dwg. No. 158661; Inner ballistic cylinder, no Dwg. No.; afterbody, Dwg No. 158674; wedges, Dwg. No. 158662.

The test equipment used on this test was: a Consolidated Electrodynamic Corp. Tape Recorder type 5-752, Serial No. T-01465; and six Kintel Amplifiers mounted in the tower instrument panel model 111-Bf, propery Nos. 99047, 99049, 99054, 99363 and 99575. Table I lists the instrumentation used on Barrel Nose test No. 4.

Procedure

The simulated TX-53 with 6 Statham accelerometers, three mounted in the contoured nose section and three mounted on the inner ballistic cylinder (Figure 2), was hung on the tower carriage (Figure 1). The carriage was raised to a pre-determined release position. The fire pulse, from the tower control building, fired the carriage release explosive cable cutters. The carriage with the simulated TX-53 attached rolled down the tower cable until the assembly attained a horizontal velocity component of 51 fps, at which time the simulated TX-53 was separated from the carriage by firing the weapon release cable cutters. The unit then gained the remainder of its vertical velocity in free fall. The required impact velocities were 51 fps horizontal and 62 fps vertical. The simulated TX-53 unit, with the 180° point of the unit trailing (Figure 2) impacted on the horizontal concrete target.

Fastax and Milliken movie cameras were used to record the drop trajectory and to show the attitude of the unit at impact.

The accelerometer signals were recorded on tape. The tape was played back in Area I on an Ampex FM tape recorder model 114-A, and a permanent

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record of the accelerometer signals was made on a type 5-119 C.E.C. oscillograph, using Ampex low-pass output data filters (625 C.P.S).

Results

The barrel nose, made of a forward section of 0.6" thick 6061 aluminum welded to an aft section of 0.6" thick 3003 aluminum, bottomed out completely as shown in Figure 3. The afterbody was also damaged severly (Figure 4) during slapdown.

Figure 5 shows the crushing of the side panel honeycomb, a result of the aft section of the Barrel Nose moving aft at impact.

The greatest longitudinal faired acceleration of 84.4g at impact was recorded at the aft weights (Sta. 80). The longitudinal faired acceleration recorded at the contoured nose plate (Sta. 21) was 82.5g at impact. The aft longitudinal accelerometer detected a longitudinal faired acceleration of 39.2g at slapdown. The rise time and pulse durations for these accelerations and all other acceleration data can be found in Table II. Figure 6 is an oscillograph record of the drop showing the acceleration signatures at impact and slapdown.

The movie film showed that the unit impacted with a pitch of 6° off vertical, the parachute can leading and with velocity components of 52 fps horizontal and 63 fps vertical.

J. H. Stoever

J. H. STOEVER - 7325

Dale Buchanan

7321 Project Engineer: D. K. BUCHANAN - 7321-5

JHS:mw

R. S. Hamilton for

Approved By: R. S. HOOPER - 7321-5

Encl: Figs. 1-6
Tables I, II

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R. S. Gauler, GMX-3, LASL, Attn: D. F. Mitchell

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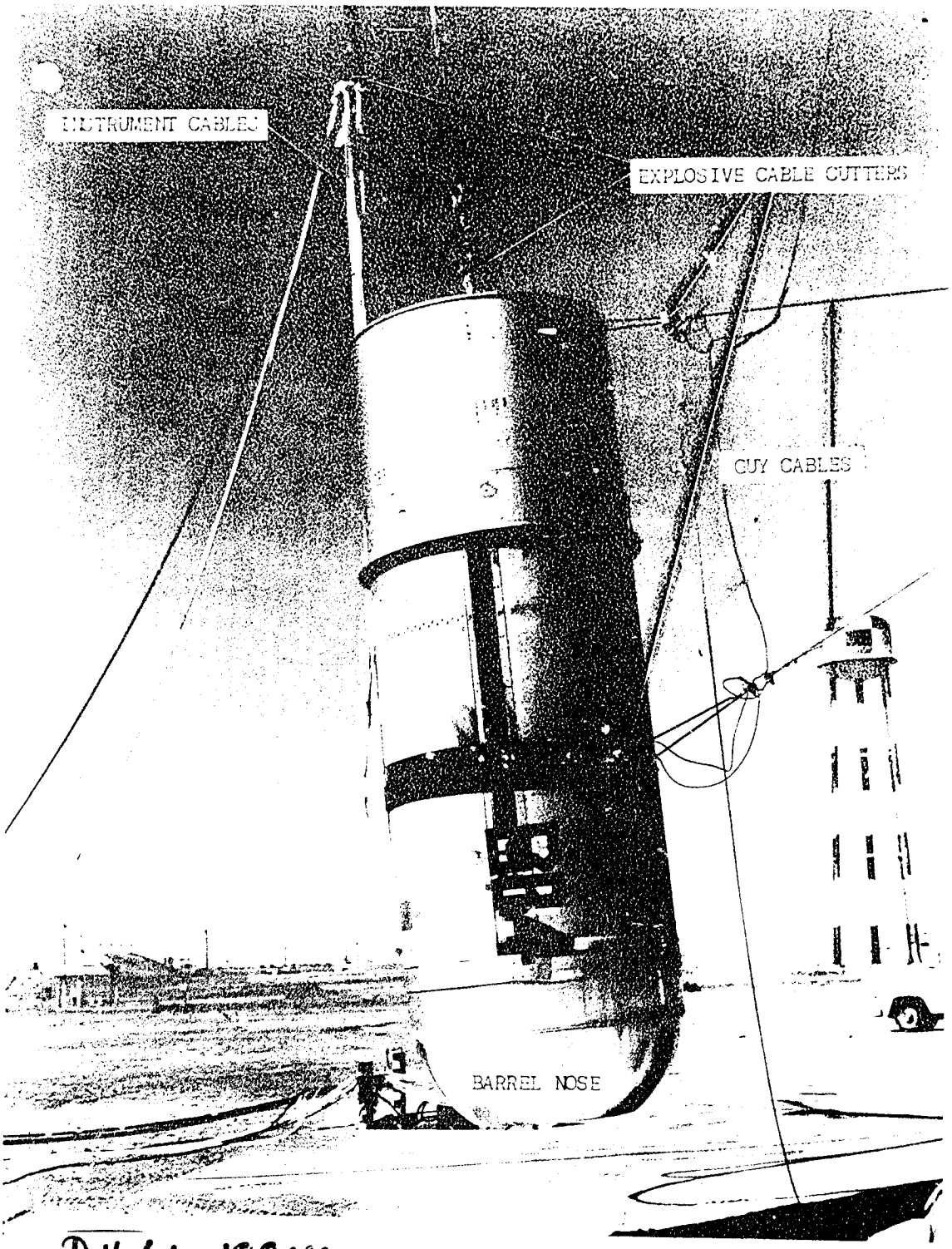


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FIGURE 1 - TEST UNIT HUNG ON THE DROP TOWER. DROP TOWER TEST OF BARREL NOSE, BB #4

PROJECT NO. T-17626

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A - STRAIN-GAGE TYPE ACCELEROMETERS

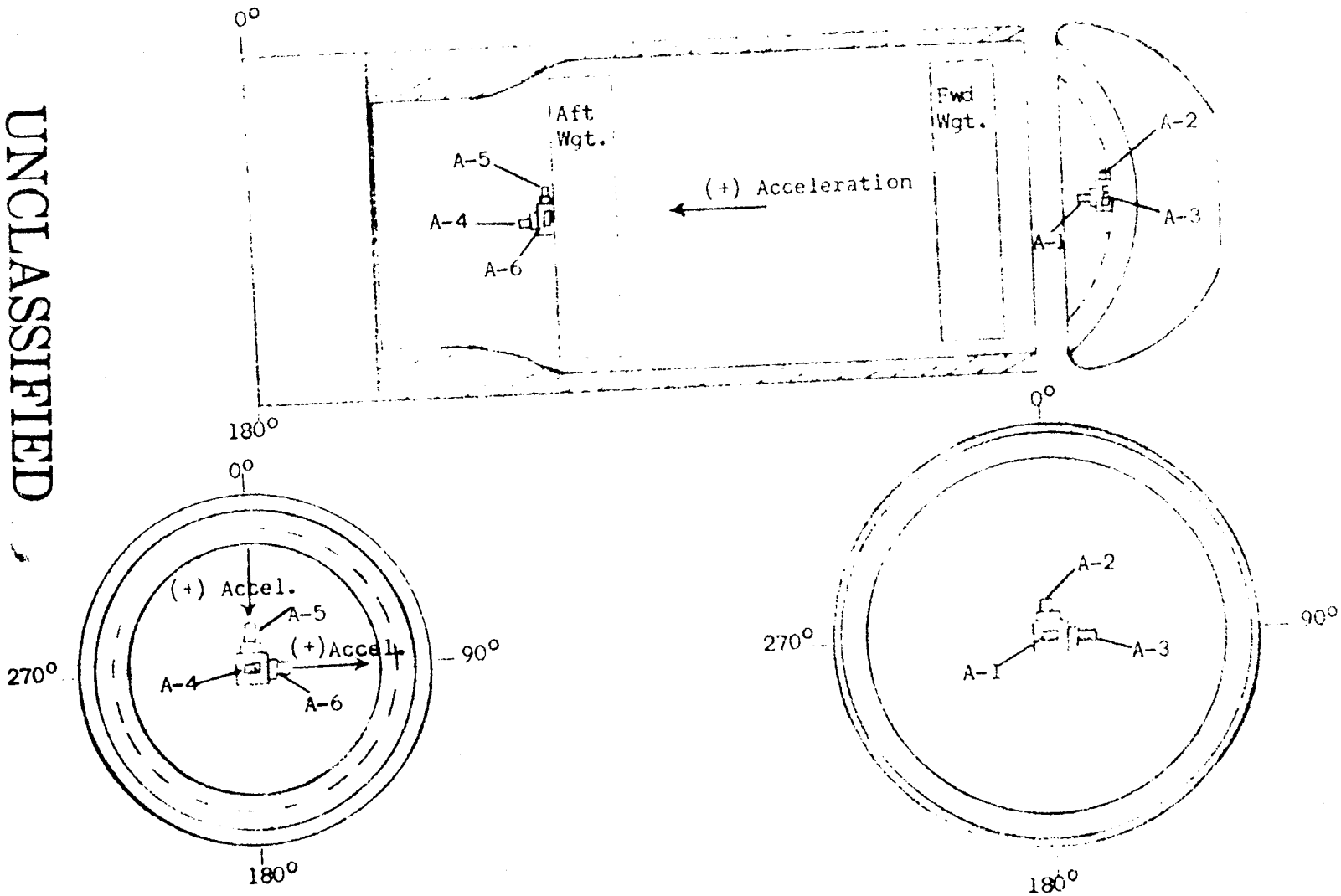


FIGURE 2 - INSTRUMENT LOCATIONS. DROP TOWER TEST OF BARREL NOSE, BB #4. PROJECT NO. T-17626

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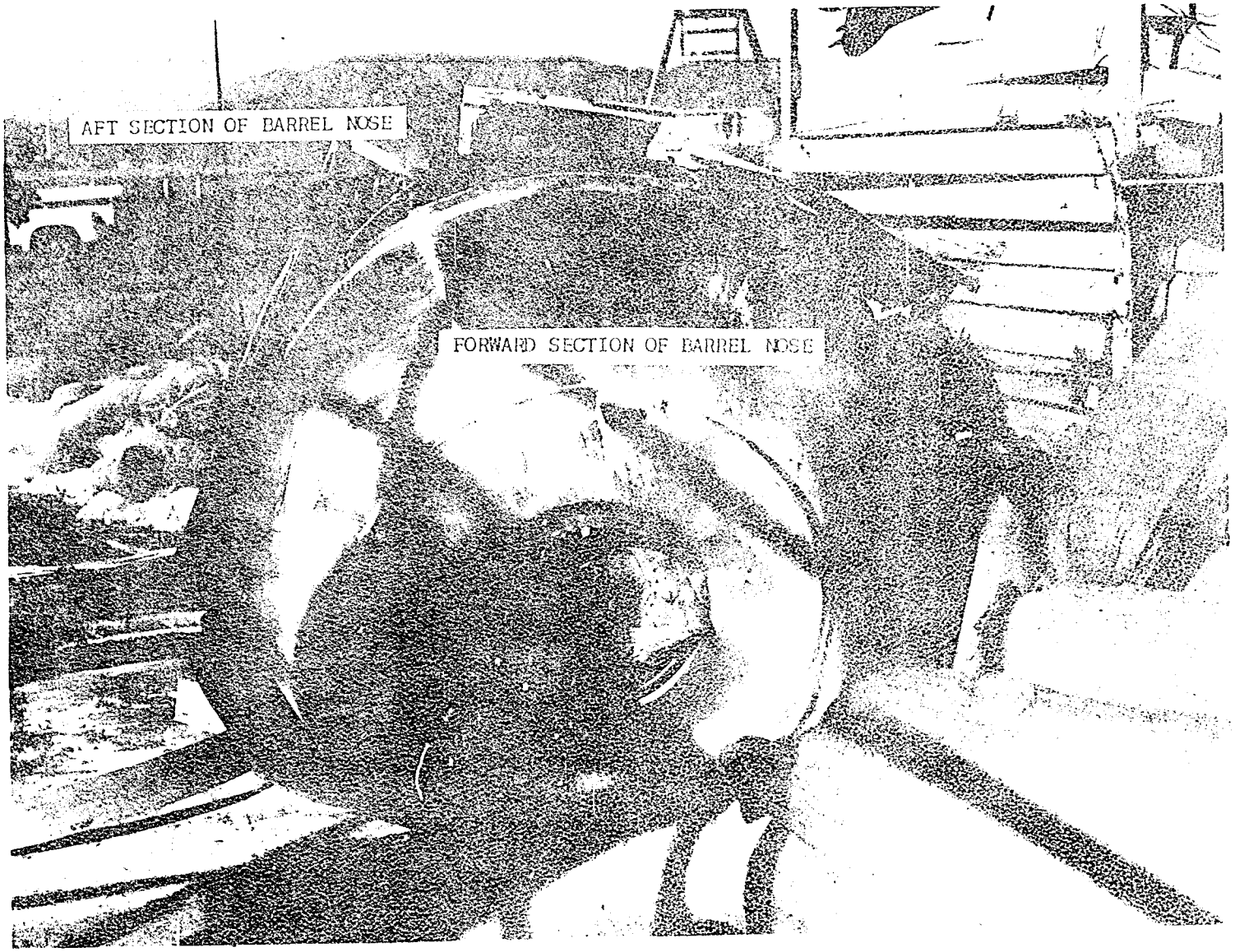


FIGURE 3 - THE CRUSHED BARREL NOSE SHOWN AFTER THE DROP TEST. [illegible]

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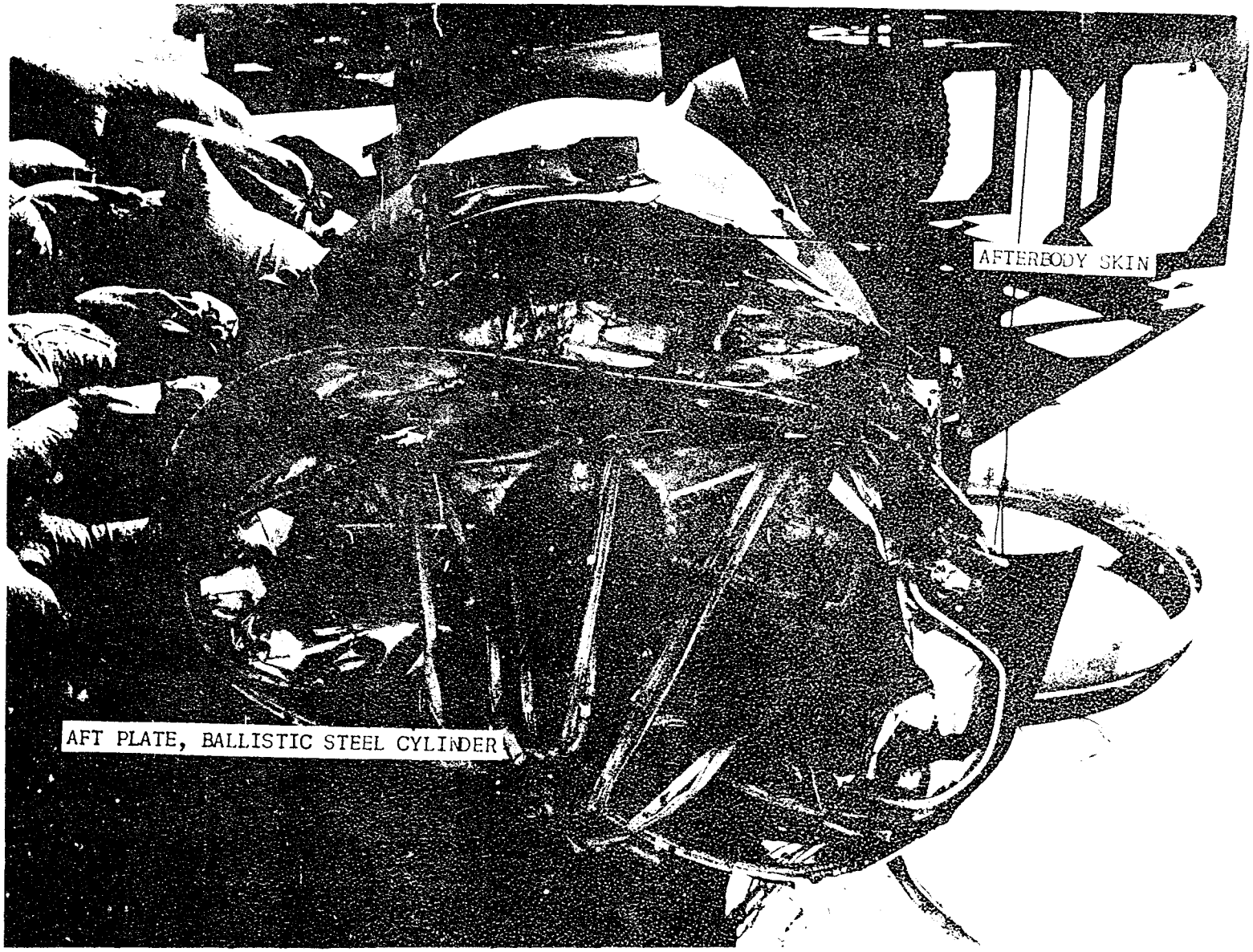


FIGURE 4 - DAMAGED AFTERBODY SHOWN AFTER THE DROP TEST. DROP TOWER TEST OF BARREL [illegible], [illegible].

D# 61-18916

PROJECT NO. [illegible]

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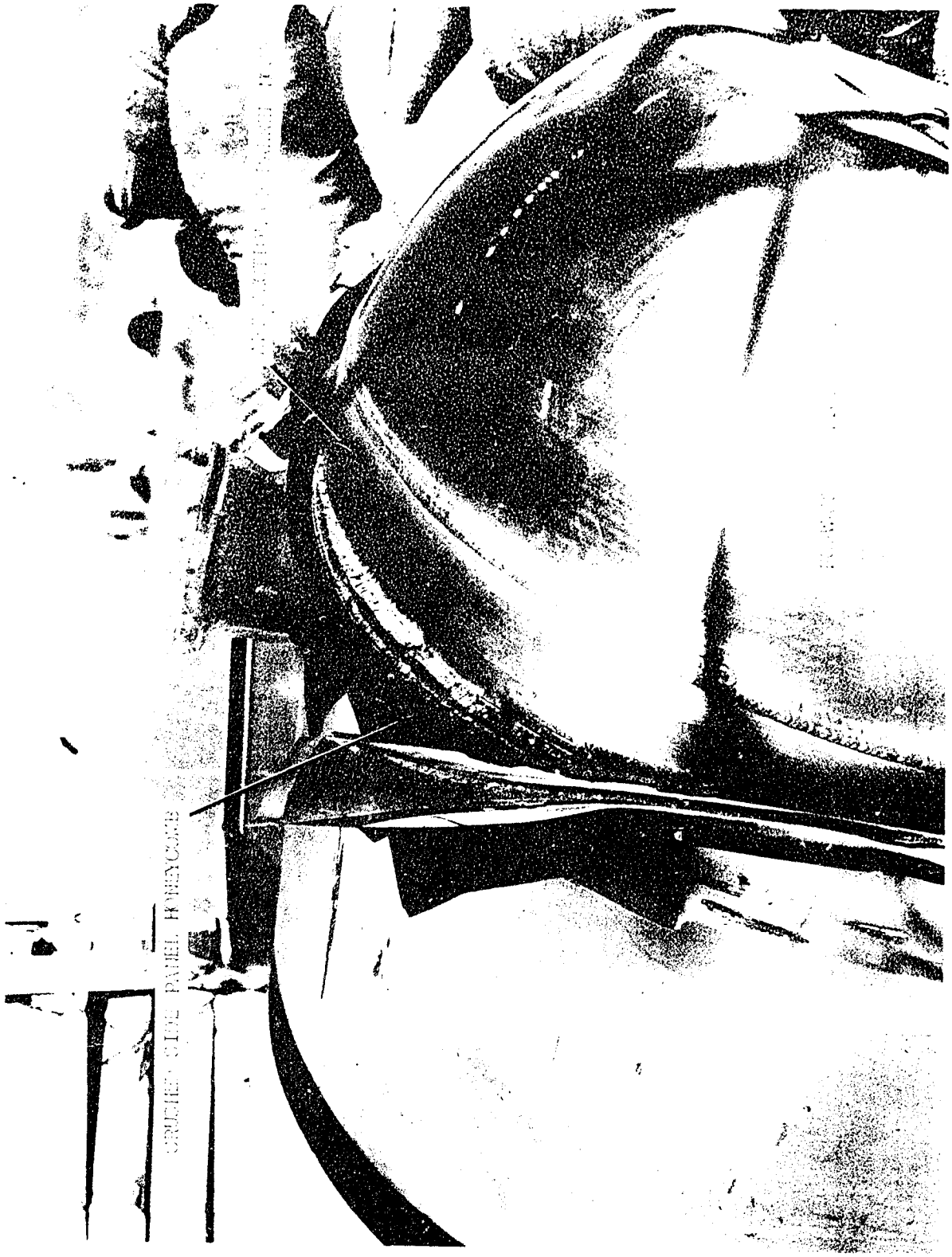

CRUCIFORM PANEL HONEYCOMB

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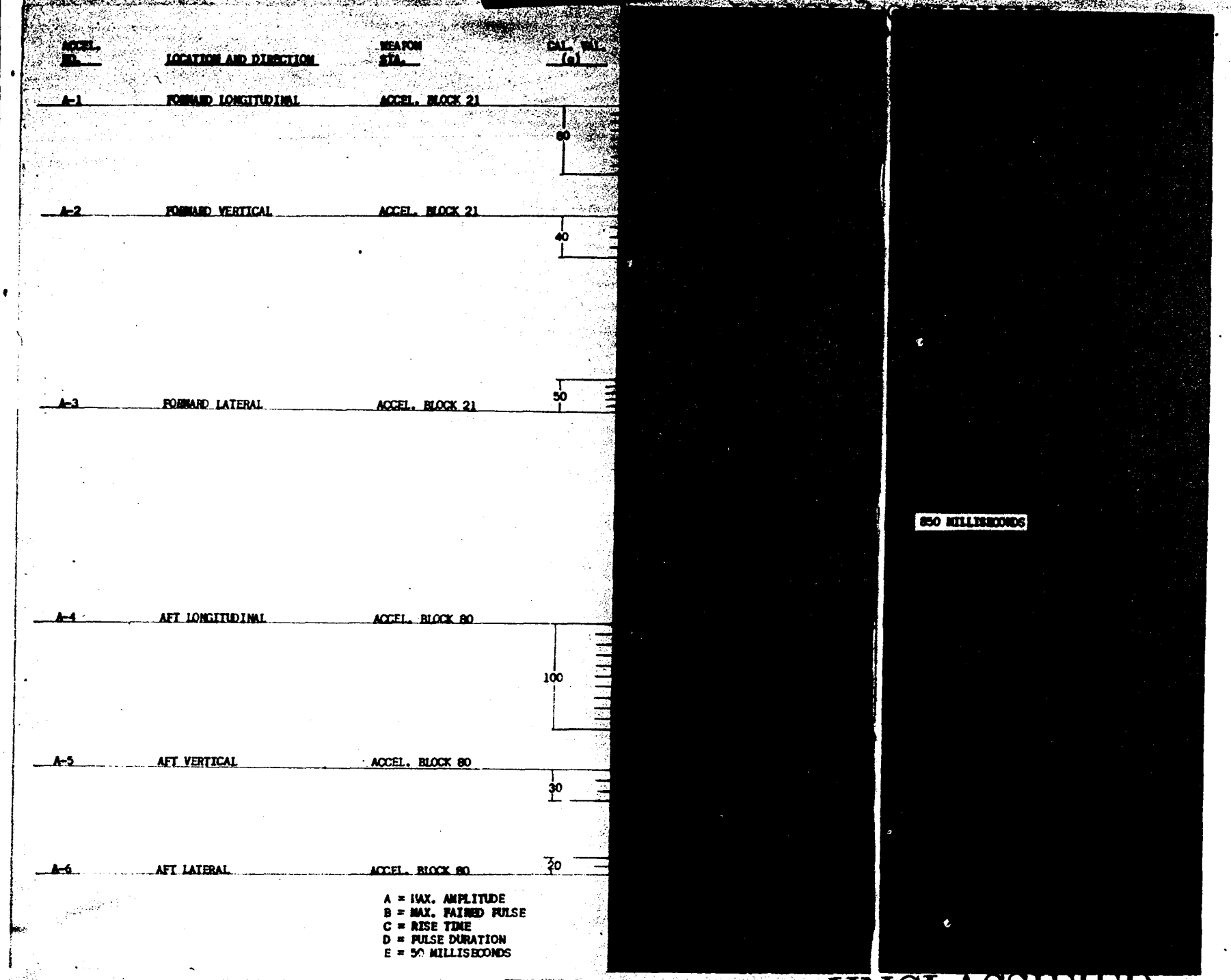


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FIGURE 6 - OSCILLOGRAPH RECORD SHOWING THE ACCELEROMETER TRACES. DROP TOWER TEST OF BARREL NOSE, RB #4. PROJECT NO. T-17626

TABLE I

Accelerometers
Drop-Tower Test of Barrel Nose, BB No. 4

| Accel. No. | Location | Station No. | Direction | Model No. | Serial No. | Range (± g's) | Nat. Freq. (cps) | Figure Reference |
|---|---|---|---|---|---|---|---|---|
| A-1 | Forward longitudinal | 21 | Longitudinal | A5A-100-300 | 633 | 100 | 810 | 2 |
| A-2 | Forward vertical | 21 | Vertical | A5A-100-335 | 1686 | 100 | 670 | 2 |
| A-3 | Forward lateral | 21 | Lateral | A5A-1000-350 | 4911 | 1000 | >1500 | 2 |
| A-4 | Aft longitudinal | 80 | Longitudinal | A5A-100-350 | 4178 | 100 | 750 | 2 |
| A-5 | Aft vertical | 80 | Vertical | A5A-100-335 | 1688 | 100 | 720 | 2 |
| A-6 | Aft vertical | 80 | Lateral | A5A-100-300 | 622 | 100 | 700 | 2 |

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TABLE II

Acceleration Data - Drop-Tower Test of Barrel Nose BB No. 4

| Inst. No. | Location | Sta. No. | Direction | Impact, Conditions $V_v$ 62 ft/sec, $V_h$ 51 ft/sec on Flat Concrete Target, Unit Impact 6° off Vertical: Acceleration (g's or rad/sec$^2$) Max (+) | Max (-) | Faired | Time (ms) Rise | Pulse | Slapdown into Barricade Approximately 975 ms After Impact: Acceleration (g's or rad/sec$^2$) Max (+) | Max (-) | Faired | Time (ms) Rise | Pulse |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted]-1 | Forward longitudinal | 21 | Longitudinal | 87.2 | 24.7 | +82.5 | 32.1 | 48.5 | - | 37.2 | -36.0 | 48.3 | 71.6 |
| [redacted]-2 | Forward vertical | 21 | Vertical | 16.1 | 37.0 | -16.5 | 3.8 | 31.6 | 15.6 | 7.4 | +12.5 | 6.0 | 21.6 |
| [redacted]-3 | Forward lateral | 21 | Lateral | 183.0 | 85.4 | +55.0 | 4.5 | 42.6 | 29.1 | 29.0 | +20.0 | 5.0 | 17.4 |
| [redacted]-4 | Aft longitudinal | 80 | Longitudinal | 91.1 | 19.3 | +84.4 | 29.6 | 42.4 | 11.3 | 43.7 | -39.2 | 43.4 | 60.7 |
| [redacted]-5 | Aft vertical | 80 | Vertical | 8.5 | 17.0 | -14.0 | 21.9 | 39.7 | 27.9 | 13.7 | +23.7 | 13.5 | 22.2 |
| [redacted]-6 | Aft lateral | 80 | Lateral | 6.0 | 6.0 | - | - | - | 20.0 | 5.5 | - | - | - |

All accelerometers used were of the strain-gage seismic mass type.
All accelerometer pulses were read according to SC-4452(M) Section D para 2.1.1.
The direction of positive (+) accelerations is shown on Figure 2.

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