SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date: 7/21/98
Authority: ADC
Name: W Lowe
1st Review Date: 7/23/98
Authority: ADD
Name: R.B. Cranes
Determination (Circle Numbers)
1 Classification Retained
2 Classification Changed to: U
3 Containing No DOE Classified Information
4 Coordinate With:
5 Contains UCNI? No
6 Comments:
OK for Openness

TX-53, 3.2
E-17371
868.00

MAY 3 1961

TO: DISTRIBUTION

Re: Drop Tower Test of Convair Pod No. 4

This was the fourth of a series of drop tests on the B-58 Two-Component Pod. The vertical component of velocity was reduced from 70 ft/sec, at which Pod No. 3 was dropped, to 65 ft/sec. The horizontal component of velocity remained unchanged at 51.3 ft/sec.

The maximum faired acceleration pulse at impact in the longitudinal direction was +45.8 g's with a rise time of 41.2 milliseconds and a duration of 82.3 milliseconds.

Upon slapdown, the maximum faired transverse acceleration was -167.8 g's with a rise time of 13.9 milliseconds and a duration of 17.5 milliseconds.

About 15 inches of uncrushed honeycomb remained in the nose section after impact.

Object of Test

This test was a continuation of the investigation and evaluation of the shock-mitigating characteristics of the Convair B-58 Pod with a dummy TX-53 mounted inside.

Authorization for Test

This test was requested in a Work Order Authorization from Mr. P. F. Jones, 7183, to Mr. E. H. Copeland, 7321. Mr. H. E. Kinney, 7183, was the consultant. The test was assigned to Division 7323 to be conducted on the 185-foot drop-test tower.

[redacted]

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO: U
Emilda Sabo 7/30/98
PERSON CHANGING MARKING & DATE
W. C. Lowe 7/30/98
PERSON VERIFYING MARKING & DATE
AUTHORITY: R.B. Cranes
RECORD ID: 98SN3077
DATED: 7/23/98

RECORD FILE
TX-53
3-2

RECEIVED
MAY 3 1961
CENTRAL RECORD FILE

[redacted]

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Summary of Test Results

The records of Test Nos. 1, 2, and 3 are on file with Division 7221 of Sandia Corporation.

Test No. 1 T-17076
Test No. 2 T-17228
Test No. 3 T-17283

Setup and Procedure for Test

Figure 1 shows the Pod as it was fastened to the carriage just prior to being hoisted to the dropping position. It was necessary to tighten the stabilizing cables such that they pulled the Pod about 3 degrees off vertical to be sure they would not become slack when the Pod was raised to dropping position. These cables tend to slacken as the carriage is raised because the angle of the load cable on the tower with respect to the ground increases at greater heights. If the stabilizing cables do not have a tensile load when the carriage is in the release position, a poor slide sequence results.

A 14-channel CEC Data Tape Recorder, Type 5-752A, Serial No. T-01465, was used to record the data. This was later played back through an Ampex FM Tape Recorder, Model 114-A, and recorded on a CEC Type 5-119 Recording Oscillograph, using Type 7-326 galvonometers. Ampex Low Pass Output Data Filters were used to filter out frequencies above 624 cps.

Table I lists the accelerometer specifications and locations used on this test. Figure 2 is a diagram showing the accelerometer locations and station numbers. Also shown in this figure are the locations of the Model A-12 Recording Accelerometers made by the Pace Engineering Company.

Results

The maximum faired acceleration in the longitudinal direction at impact was +45.8 g's with a rise time of 41.2 milliseconds and a duration of 82.3 milliseconds. The maximum faired transverse acceleration at slapdown was -167.8 g's with a rise time of 13.9 milliseconds and a duration of 17.5 milliseconds. Table II contains a tabulation of the filtered acceleration signature data from the Statham accelerometers, and Table III contains the data from the Pace Model A-12 Recording Accelerometers. The sign convention used in these tables to designate direction of acceleration is in accordance with the directions shown in Figures 2 and 3. Acceleration signatures were read according to Sandia Corporation's method outlined in SCS-10, Paragraphs 7.4 through 7.4.5. This method is illustrated graphically in Figure 4.

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Figure 5 shows the forward end of the Pod after the test. An average depth of 16 inches of accumulated honeycomb remained in the nose after the test. The depth on the pylon side was 18 inches, while that on the opposite side was 14 inches. This Pod was dropped with the pylon on the trailing side. Figure 6 is a view of the parachute cone after the test. Some of the damage shown was done when the Pod skidded well forward into the barricade.

Figures 7 and 8 show, respectively, the filtered and unfiltered tape playback records. Referring to Figure 7 and noting the signatures from accelerometers A-13, A-10, A-7, and A-4, a more or less constant acceleration is seen which exists during the time interval between the impact and slapdown sequence. This is caused from the centrifugal force which acts on each longitudinal accelerometer as the Pod rotates about its CG during the period between impact and slapdown. Only the longitudinal accelerometers are affected since the axes of the other accelerometers are not parallel to the longitudinal axis of the Pod.

The signature of A-7 at slapdown does not, at first observation, appear to be recording in the direction one might expect at slapdown. The other longitudinal accelerometers record a pulse at slapdown which is opposite in direction to the pulse at impact.

At the instant before slapdown, the Pod is approximately 31 degrees from the horizontal, with the nose pointing skyward, and is revolving approximately about its CG. In this attitude, the absolute velocity of accelerometer A-7, due to its geometric location with respect to the CG, is in such a direction as to cause the pulse at slapdown (shown in A-7 of Figure 7) to be positive.

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Conclusions

This test was somewhat more realistic than Pod Test No. 3, which had a vertical component of velocity of 70 ft/sec. The transverse accelerations at slapdown for this Pod test were only about half as large as those for Pod Test No. 3.

C. G. COALSON - 7323-3

TEST PROJECT ENGINEER: BILL JOHNSON - 7321-5

APPROVED BY: R. S. HOOPER - 7321-5

CGC:7323-3:5/dke

Enc: Figs. 1-8
Tables I-III

Copy to:
Commander, AFSWC, Attn: Chief, Mail and Message Center, for Capt. H. H. Liechty
Convair, AF Plant Rep., Attn: R. E. Cole (9)
P. F. Jones, 7183, Attn: H. E. Kinney
J. M. Wiesen, 1442
E. I. Bruce, 7117
D. M. Bruce, 7182, Attn: John Risse
E. H. Copeland, 7321
J. R. Harrison, 7523
R. K. Smeltzer, Central Record File, 3421-3

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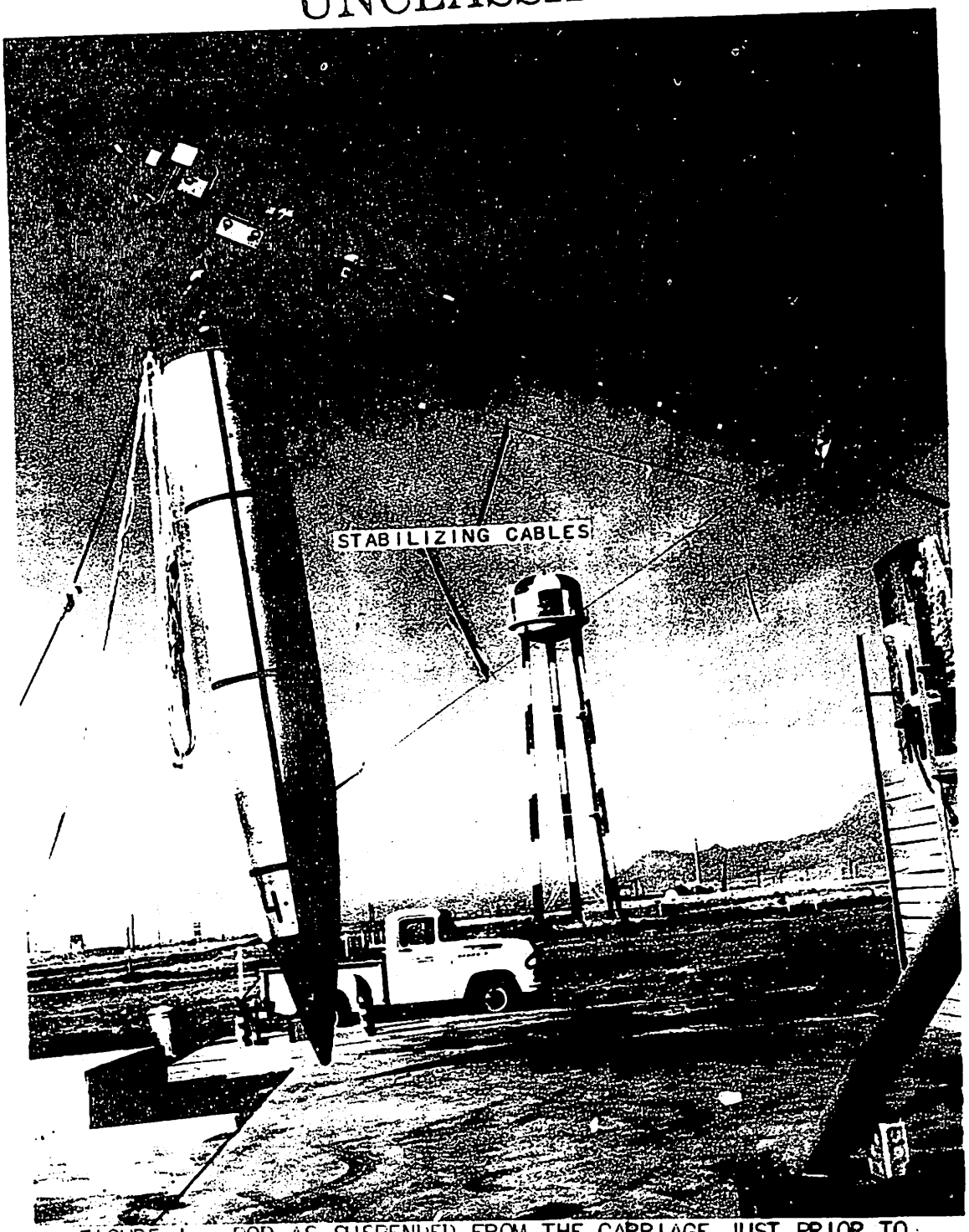

FIGURE 1 - POD AS SUSPENDED FROM THE CARRIAGE JUST PRIOR TO TEST NO. 4, V_V = 65 FPS, V_H = 51.3 FPS -- DROP TOWER TEST OF CONVAIR B-58 POD

D# 1-5227

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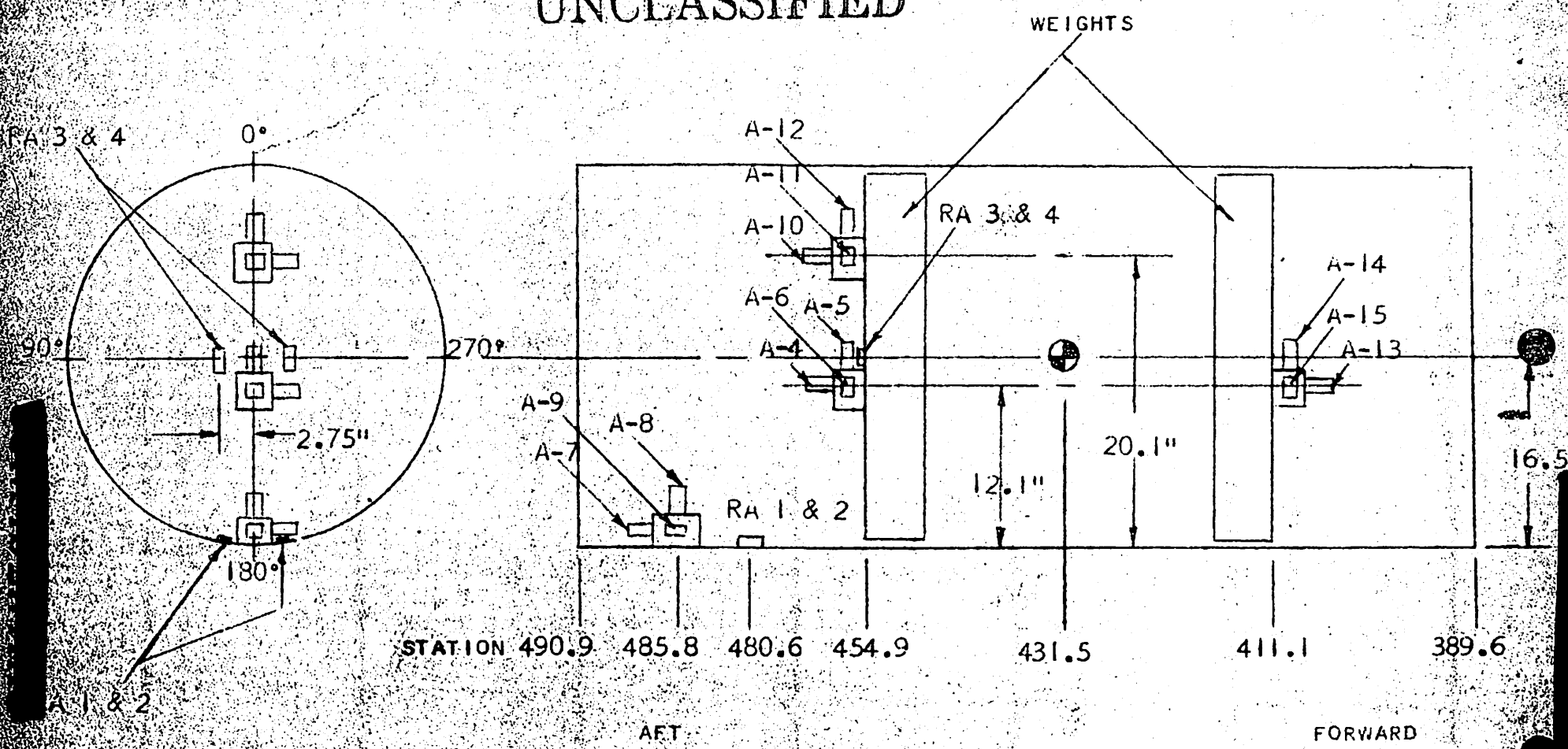

FIGURE 2 - SCHEMATIC SHOWING ACCELEROMETER LOCATIONS AND STATION NUMBERS FOR POD DROP NO. 4 -- DROP TOWER TEST OF CONVAIR B-58 POD

PROJECT NO. T-17371

[redacted]

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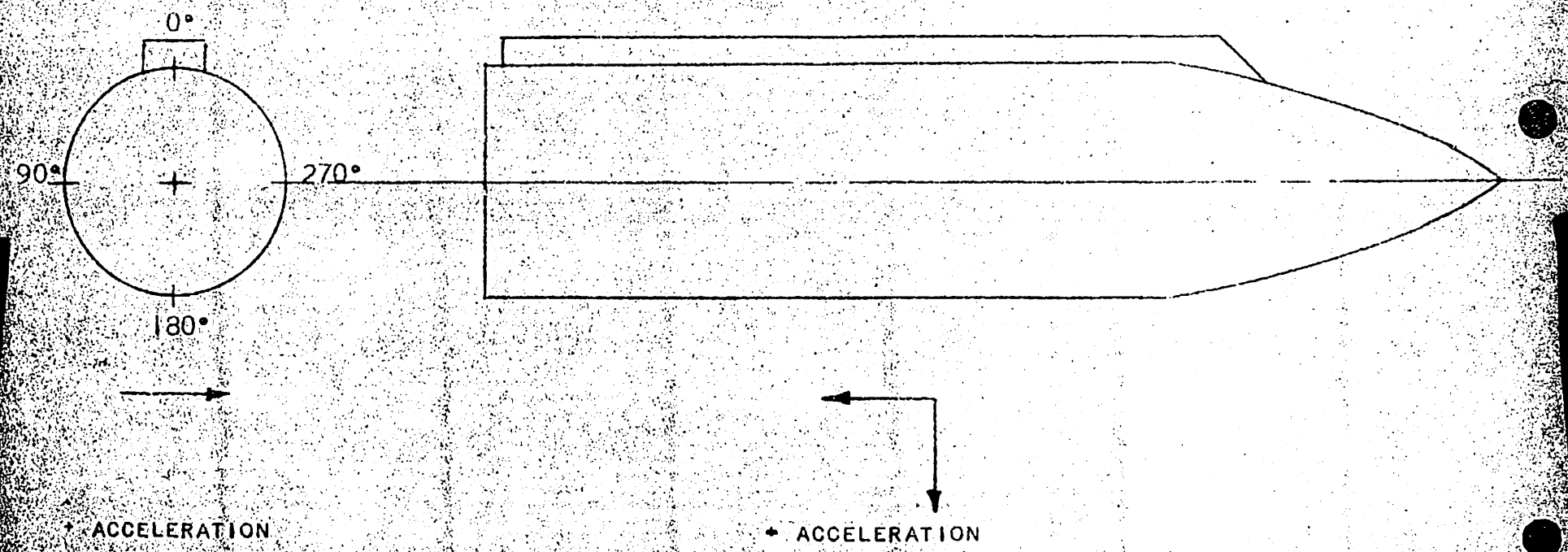
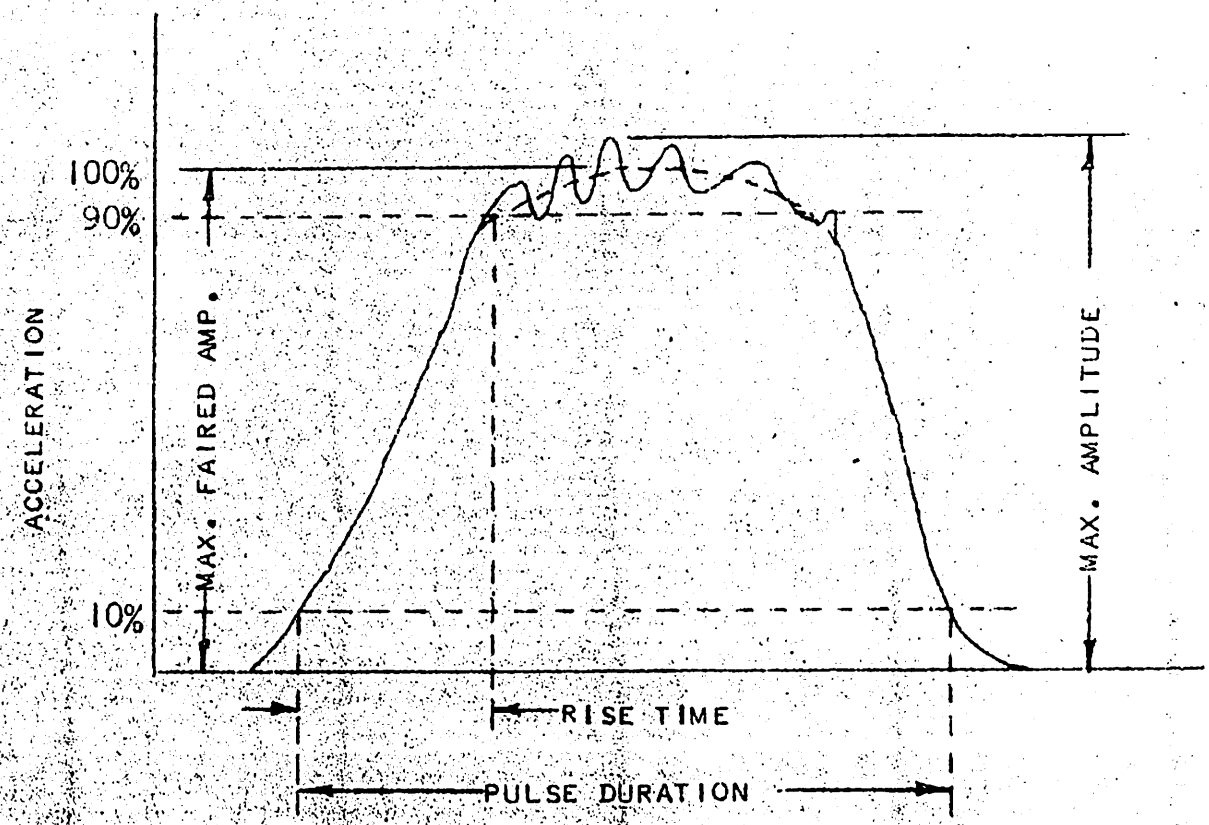


[redacted]

FIGURE 3
SCHEMATIC SHOWING SIGN CONVENTION USED TO DESIGNATE DIRECTION OF ACCELERATION -- DROP TOWER TEST OF CONVAIR B-58 POD

PROJECT NO. T-17371

[redacted]



[redacted] **FIGURE 4**
DIAGRAM ILLUSTRATING TECHNIQUE OF READING AN ACCELERATION SIGNATURE PER S.C.S. 10, PARAGRAPH 7.4 TO 7.4.5 -- DROP TOWER TEST OF CONVAIR B-58 POD

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FIGURE 5 - VIEW OF FORWARD END, TEST NO. 4, V_V = 65 FPS, V_H = 51.3 FPS -- DROP TOWER TEST OF CONVAIR B-58 POD

D# 1-5228

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FIGURE 6 - VIEW OF AFT END SHOWING SEPARATION OF BULKHEAD JOINT, TEST NO. 4, V_V = 65 FPS, V_H = 51.3 FPS -- DROP TOWER TEST OF CONVAIR B-58 POD

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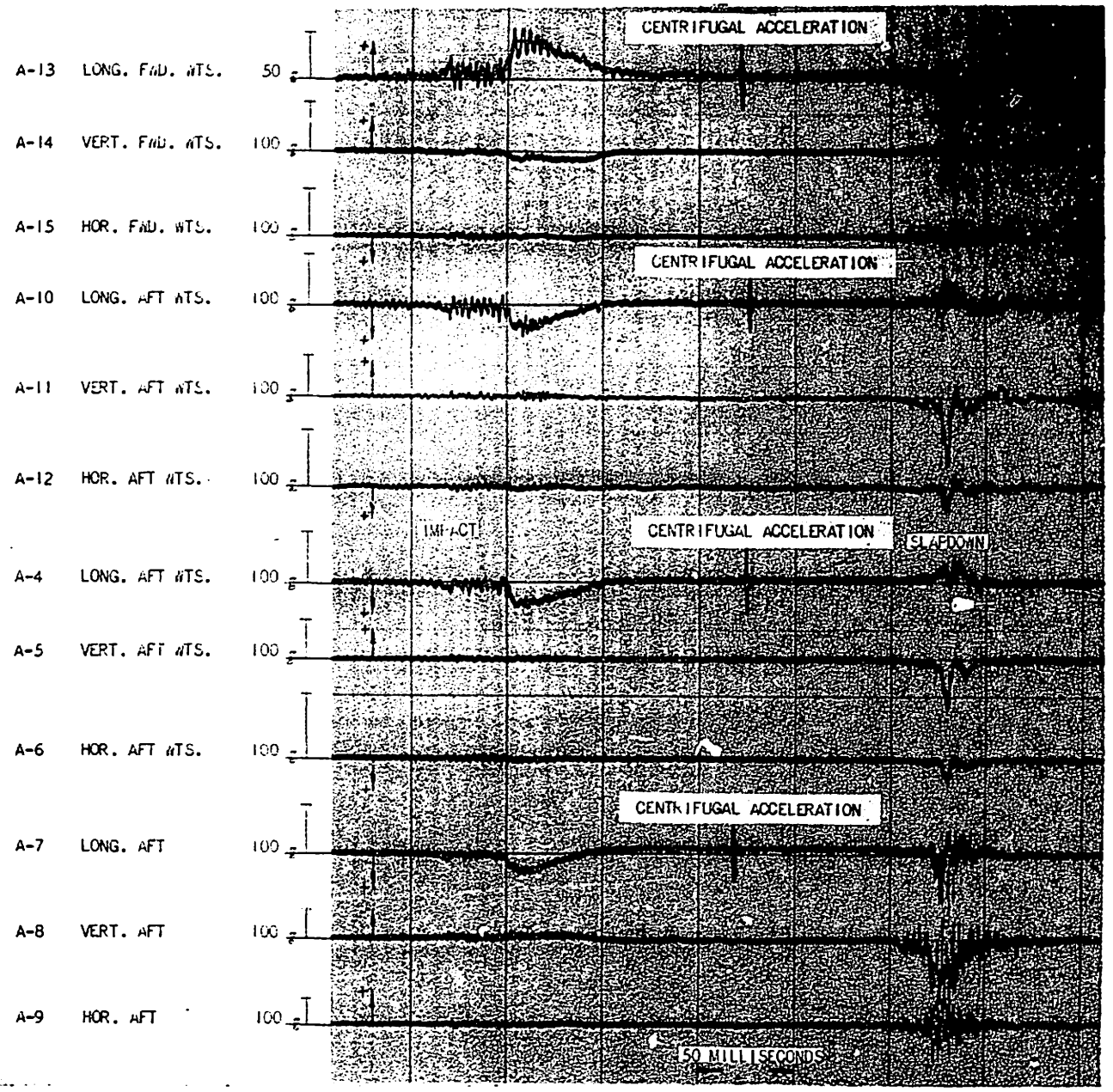

FIGURE 7 - FILTERED RECORD OF ACCELERATION SIGNATURES, POD DROP NO. 4, V_V = 65 FPS, V_H = 51.3 FPS -- DROP TOWER TEST OF CONVAIR B-58 POD

PROJECT NO. T-17371

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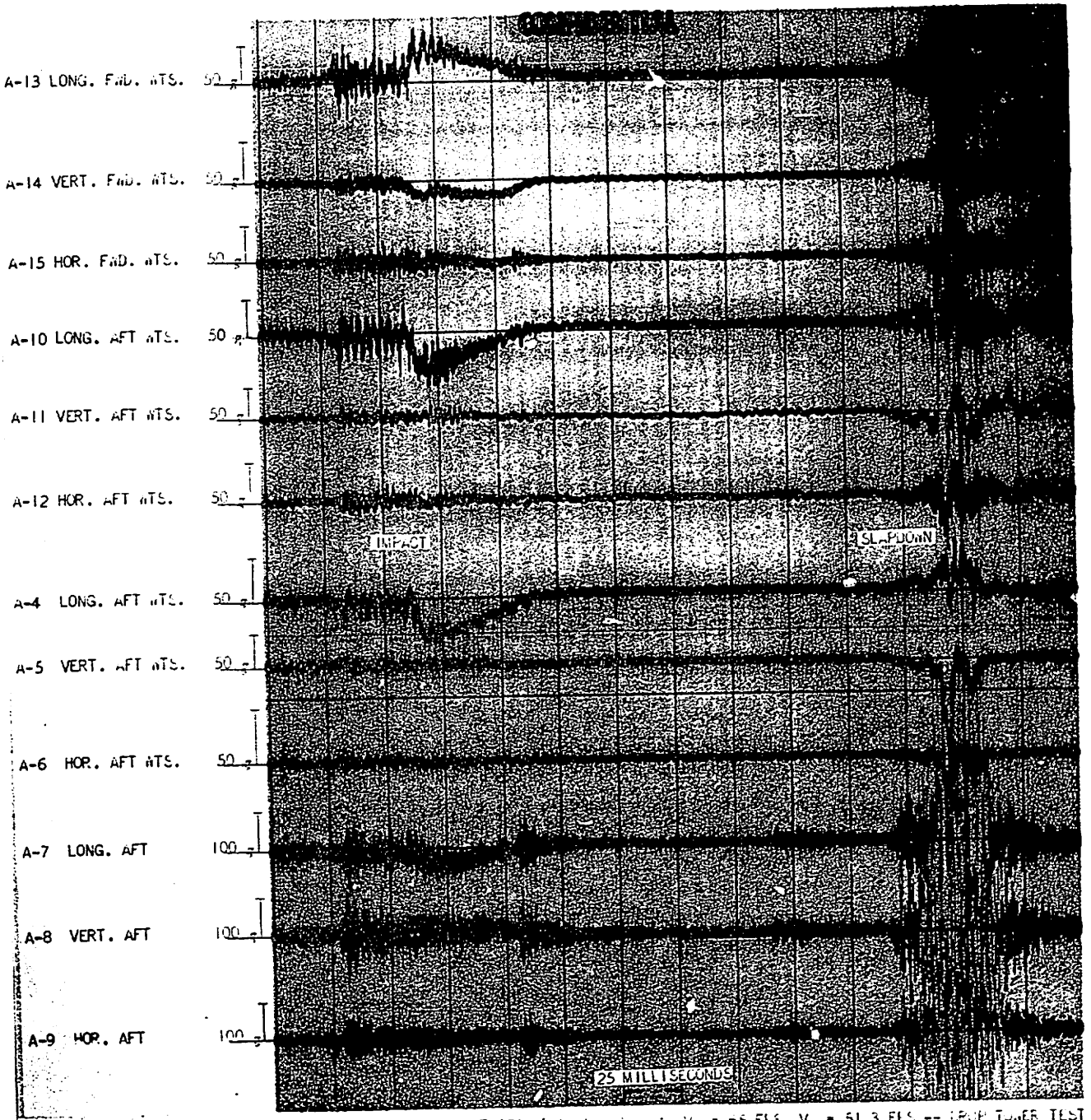

FIGURE 8 - UNFILTERED RECORD OF ACCELERATION SIGNATURES, POD DROP NO. 4, V_V = 55 FPS, V_H = 51.3 FPS -- DROP TOWER TEST OF CONVAIR B-58 POD

PROJECT NO. T-17371

D# 1-5231

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Distribution

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TABLE 2

Accelerometers Used on Rod Drop Test 4
Drop Tower Data of Generic T-33 Rod

Location	Station No.	Station No.	Station Model	Range (g's)	Natural Frequency (cps)
A-4	454.9	7120	ASA-1000-350	1000	2200
A-5	454.9	7177	ASA-1000-350	1000	2200
A-6	454.9	7407	ASA-1000-350	1000	2200
A-7	485.8	7169	ASA-1000-350	1000	2200
A-8	485.8	7162	ASA-1000-350	1000	2200
A-9	485.8	7164	ASA-1000-350	1000	2200
A-10	454.9	6914	ASA-200-350	200	900
A-11	454.9	6019	ASA-200-350	200	910
A-12	454.9	5594	ASA-200-350	200	900
A-13	411.1	7161	ASA-1000-350	1000	2200
A-14	411.1	5380	ASA-1000-350	1000	2200
A-15	411.1	7173	ASA-1000-350	1000	2200

RA-1	480.6	Pace Engineering Recording Accelerometer Model A-12, 10-100-g range
RA-2	480.6	Pace Engineering Recording Accelerometer Model A-12, 10-100-g range
RA-3	454.9	Pace Engineering Recording Accelerometer Model A-12, 10-100-g range
RA-4	454.9	Pace Engineering Recording Accelerometer Model A-12, 10-100-g range

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TABLE II

Acceleration, Rise Time, and Pulse Duration from Accelerometers
A-4 through A-15 for Pod Drop No. 4
Drop Tower Test of Convair B-58 Pod

Position	Location	Recording Direction	Station No.	Faired Pulse (g's)	Max Pos Peak (g's)	Max Neg Peak (g's)	Rise Time (ms)	Duration (ms)
				Impact				
A-13	Long., Fwd Weights	Long.	411.1	+42.2	55	11.9	40.7	113.2
A-14	Vert., Fwd Weights	0-180°	411.1	-16.4	6.8	19.1	8.8	53.6
A-15	Hor., Fwd Weights	90-270°	411.1	+9.9	12.9	8.9	11.9	30.7
A-10	Long., Aft Weights	Long.	454.9	+45.8	63.3	20.1	41.2	82.9
A-11	Vert., Aft Weights	0-180°	454.9	-	14.5	11.3	-	-
A-12	Hor., Aft Weights	90-270°	454.9	-	9.4	8.8	-	-
A-4	Long., Aft Weights	Long.	454.9	+42.9	49.9	7.9	32.8	79.5
A-5	Vert., Aft Weights	0-180°	454.9	-	10.5	10.5	-	-
A-6	Hor., Aft Weights	90-270°	454.9	-	7.4	8.3	-	-
A-7	Long., Aft	Long.	485.8	+35.7	40.2	6.8	60.8	72.1
A-8	Vert., Aft	0-180°	485.8	+14.1	28.2	12.5	3.2	47.9
A-9	Hor., Aft	90-270°	485.8	-	13.9	13.5	-	
				Slapdown				
A-13	Long., Fwd Weights	Long.	411.1	-47.9	25.6	72.7	2.9	14.6
A-14	Vert., Fwd Weights	0-180°	411.1	10.5	38.7	31.7	22.9	34.1
A-15	Hor., Fwd Weights	90-270°	[illegible]	-	35.8	29.2	-	
A-10	Long., Aft Weights	Long.	454.9	-28.0	47.6	64.1	6.0	15.3
A-11	Vert., Aft Weights	0-180°	454.9	-167.8	33.0	169.8	13.9	17.5
A-12	Hor., Aft Weights	90-270°	454.9	+37.7	39.4	19.4	2.8	3.7
A-4	Long., Aft Weights	Long.	454.9	-29.6	19.7	48.2	11.9	24.4
A-5	Vert., Aft Weights	0-180°	454.9	-135.0	6.5	135.3	13.9	17.4
A-6	Hor., Aft Weights	90-270°	454.9	+34.4	34.5	3.5	12.8	16.6
A-7	Long., Aft	Long.	485.8	+55.9	122.5	48.4	2.2	4.6
A-8	Vert., Aft	0-180°	485.8	-143.5	78.8	343.5	17.4	45.4
A-9	Hor., Aft	90-270°	485.8	-	98.0	128.3	-	-

TABLE III

Acceleration Recorded from Recording Accelerometers
Drop Tower Test of Convair B-58 Pod

Position	Location	Recording Direction	Station No.	Acceleration (g's)
RA-1	Long., Aft Case	Long.	480.6	-35
RA-2	Long., Aft Case	Long.	480.6	-50
RA-3	Vert., Aft Weights	0-180°	454.9	+105
RA-4	Vert., Aft Weights	0-180°	454.9	+100