[redacted]

1397

UNCLASSIFIED

MAY 15 1957

Case No. 433.00
Ref. Sym: 1612 (474)
Project No. TM-536
File: XH-512, 3-2

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date: 11/5/98
Authority: ADD
Name: R B Craner
2nd Review Date: 11/10/98
Authority: ADD
Name: W Loope
Classification Retained
Classification Changed to: U
Contains No DOE Classified Information
Coordinate With:
Contains UCAI? NO
Comments: OK [illegible]

TCG-NNT-1; TCG-SAFF-1

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

Attn: Mr. J. O. Davis - 1281-1

Re: Ramp and Drop Test of the XH-512

CDL No.
ACCOUNTABLE CARD SM
FILE No. H-512
3-2

RECEIVED
MAY 1957
R & D FILES

INVENTORIED
AUG 6 1964
3427-1

Summary of Results

The XH-512 was twice subjected to ramp and drop tests per SCS-5, paragraphs 3.4.1 and 3.4.2; once containing the Mark 15 spares package (Condition I), and once containing the warhead-to-bomb conversion components (Condition III). It was also subjected to two 4-inch drops, two 12-inch drops, and one 7.04 mph ramp test while containing the Mark 39 spares package (Condition II).

The XH-512 and its components were undamaged during the drop tests. The aft tiedown rings of the container cover were deformed during the ramp tests.

During the drop tests, maximum measured vertical deflections of the XH-512 cradle with respect to the container base were 2-15/16 inches, 2-7/8 inches, and 2-15/16 inches down for Conditions I, II, and III, respectively. Maximum measured faired vertical accelerations were: For Condition I, 7.3 g on the afterbody, 10.7 g on the XMC-665 baroswitch, and 8.3 g on the XMC-832 baroswitch; for Condition II, 7.3 g on the afterbody, 10.3 g on the XMC-665 baroswitch and 8.4 g on the XMC-832 baroswitch; and for Condition III, 7.5 g on the afterbody, 10.4 g on the XMC-665 baroswitch, and 9.3 g on the XMC-832 baroswitch.

During the ramp tests, maximum measured longitudinal deflections of the XH-512 cradle with respect to the container base were 4-5/16 inches, 4-1/16 inches, and 4 inches forward for Conditions I, II. and III, respectively. Maximum measured faired longitudinal accelerations were: For Condition I, 9.8 g on the afterbody, 12.0 g on the XMC-665 baroswitch, and 11.3 g on the XMC-832 baroswitch; for Condition II, 9.8 g on the afterbody, 11.0 g on the XMC-665 baroswitch, and 11.7 g on the XMC-832 baroswitch; and for Condition III, 9.5 g on the afterbody, 12.5 g on the XMC-665 baroswitch, and 12.1 g on the XMC-832 baroswitch.

INVENTORIED
MAR 2 1959
BY ORG. 4722

The maximum measured stress on the XH-512 cradle was 10,110 psi compression recorded on Condition I during the drop tests and 14,700 psi tension recorded on Condition II during the ramp tests. In general, recorded strains were slightly higher for Conditions I and II.

INVENTORIED
SEP 14 1965
3428-3

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO: U
Carmela Dalley 12/9/98
AUTHORITY: W C Loope
PERSON CHANGING MARKING & DATE: W C Loope 12/16/98
RECORD ID: 99SN0410
11/10/98

DOCUMENT CONSISTS OF 21 PAGE(S)
[redacted]
[redacted] CENTRAL M & R
CONTROL NO. Q 67902

UNCLASSIFIED

Object of Test

The object of this test was to perform ramp and drop tests with three different contained loads in the XH-512 and to record the resulting accelerations, deflections, and strains at locations requested by the consultant.

Reason for Test

This test was requested in a Work Order Authorization from J. C. Davis, 1281, to P. H. Adams, 1612, dated February 28, 1957.

Function of Object Tested

The XH-512 is a shipping and storage container for the rear bomb subassembly of the Mark 15 and Mark 39 weapons.

Summary of Past Tests

No previous ramp and drop tests of the XH-512 have been performed by Division 1612.

Setup for Test

The XH-512 shipping container was tested with three different contained loads.

They were:

Condition I - Containing the Mark 15 spares package
Condition II - Containing the Mark 39 spares package
Condition III - Containing the warhead-to-bomb conversion components.

Figure 1 shows the XH-512 in position for dropping.

Figure 2 shows the XH-512 mounted on the ramp dolly ready for the ramp tests.

The components tested are listed in Table I.

Test equipment used during the tests consisted of the following:

Consolidated amplifiers, 3 KC carrier, Type 1-113B
Consolidated oscillograph, Type 5114, Serial No. 701BL19
William Miller Oscillograph, Model J, Serial No. 99
William Miller amplifiers, Type C-3, Model CA-12, Serial Nos. 3 and 7.

Accelerometers used during the ramp and drop tests are listed in Table II and shown in Figs. 2 through 5.

Strain gages used are shown in Fig. 6 and listed in Table III.

Scratch type displacement gages were mounted as shown in Fig. 7.

Procedure

Accelerometers were mounted on the XH-512 and the contained units as requested. Scratch type displacement gages were mounted at each end of the XH-512 to measure the relative displacement between the cradle and the container frame. Three strain gages were located near the shear pad on one section of the cradle arm to measure the transient strains during the tests.

Conditions I, II, and III of the XH-512 were subjected to drop tests in that order.

Complete SCS-5 drop tests were conducted only on Conditions I and III. Two drops each from heights of 4 inches and 12 inches were performed on Condition II.

For the drop tests, the XH-512 was raised to the proper height with a chain hoist, released by means of a quick release (Fig. 1) and allowed to impact on the concrete floor. Accelerations were recorded by accelerometers A-1 through A-8. Strain readings on the cradle of the XH-512, taken during the 12-inch drops only, were measured by gages S-1, S-2, and S-3. Displacements of the XH-512 cradle with respect to the container base were measured during one 12-inch drop for each test configuration.

After completion of the drop tests, the XH-512 was fastened on the ramp dolly by chains and turnbuckles (Fig. 2). Two lag bolts, one on each side, were fastened through the aft end of the container base. The dolly was drawn up the inclined ramp a sufficient distance with a cable winch, released by means of a quick release mechanism, and allowed to impact upon two 4 x 4-inch pine blocks. Impact velocity was measured by means of a microswitch fastened to the ramp dolly and triggered by two actuating arms placed four feet apart on the track. Time of travel was recorded on the oscillograph.

Complete ramp tests as per SCS-5 were performed on Conditions III and I, in that order. Only one impact at 7.04 mph was performed on Condition II. Accelerations were recorded by accelerometers A-1 through A-14. Strain readings were recorded by strain gages S-1, S-2, and S-3 during the 7 mph runs only. Displacements of the XH-512 cradle were measured during the 7 mph runs.

[redacted]

UNCLASSIFIED MAY 15 1957

Ref. Sym: 1612 (474)
Project No. T14-536

Results

The components contained in the XH-512 were checked electrically, mechanically, and visually for damage upon completion of all tests. The components were undamaged. During the ramp tests, the aft tiedown rings of the container cover were elongated. This was the only damage noted.

Table IV lists accelerations, pulse times, and rise times recorded during all drop tests of the XH-512, containing the three different loads.

Table V lists accelerations, rise times, and pulse times recorded during all ramp tests.

Table VI shows the maximum stresses measured on the XH-512 cradle during the drop and ramp tests.

Table VII shows the maximum displacements of the XH-512 cradle measured during the 12-inch drop tests and the 7-mph ramp tests.

Figures 8 and 9, respectively, show typical oscillograph records for a ramp and drop test of Condition II. Oscillograph records of the other conditions were very similar and are not shown.

Conclusions

The XH-512 is structurally adequate to meet the requirements of the SCS-5 ramp and drop tests. Pear-shaped rings should be used for tiedowns to prevent elongation of the rings during rail shipment.

G. M. WILLSON - 1612-1

J. H. STOEVER - 1612-1

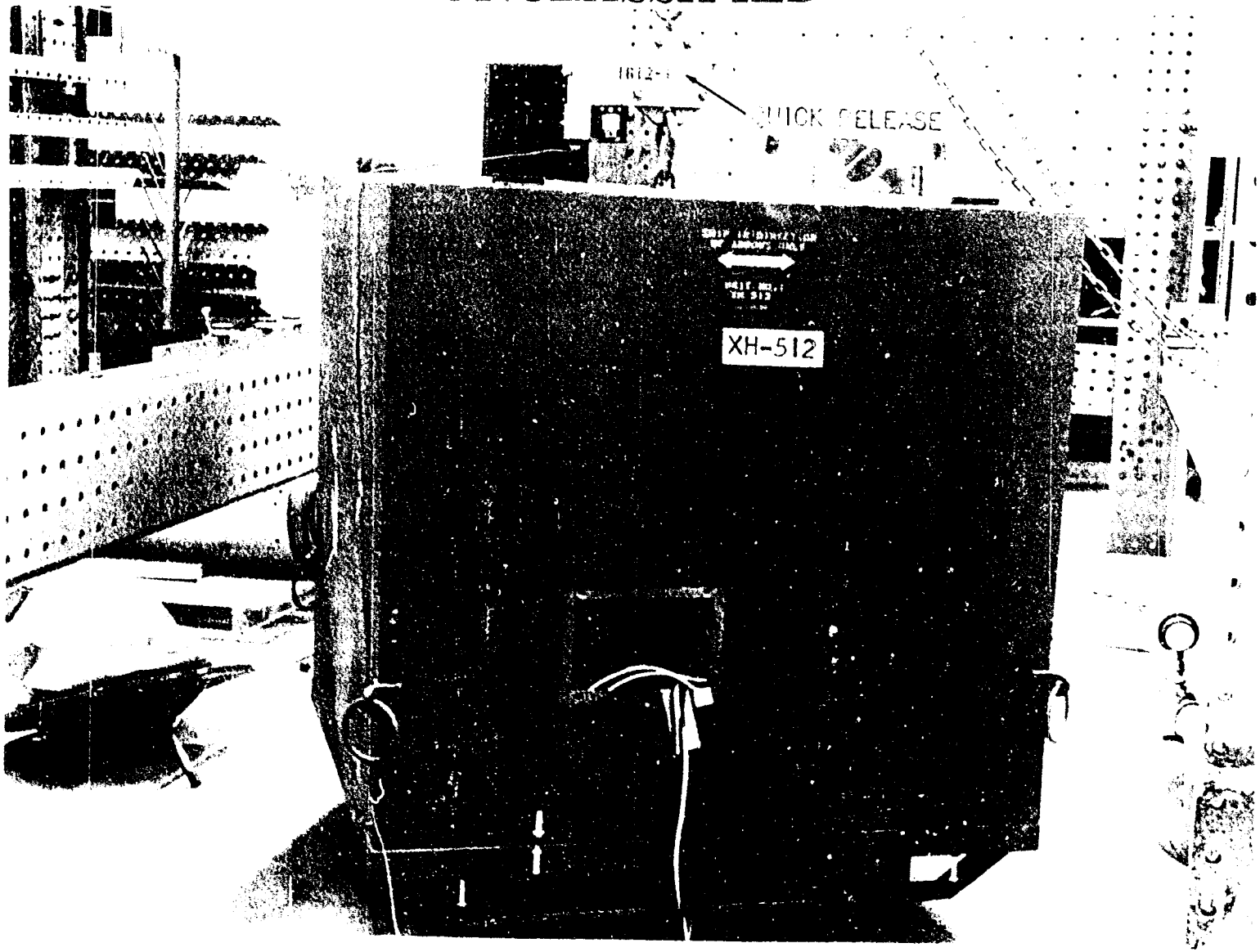
GMW:1612-1:as

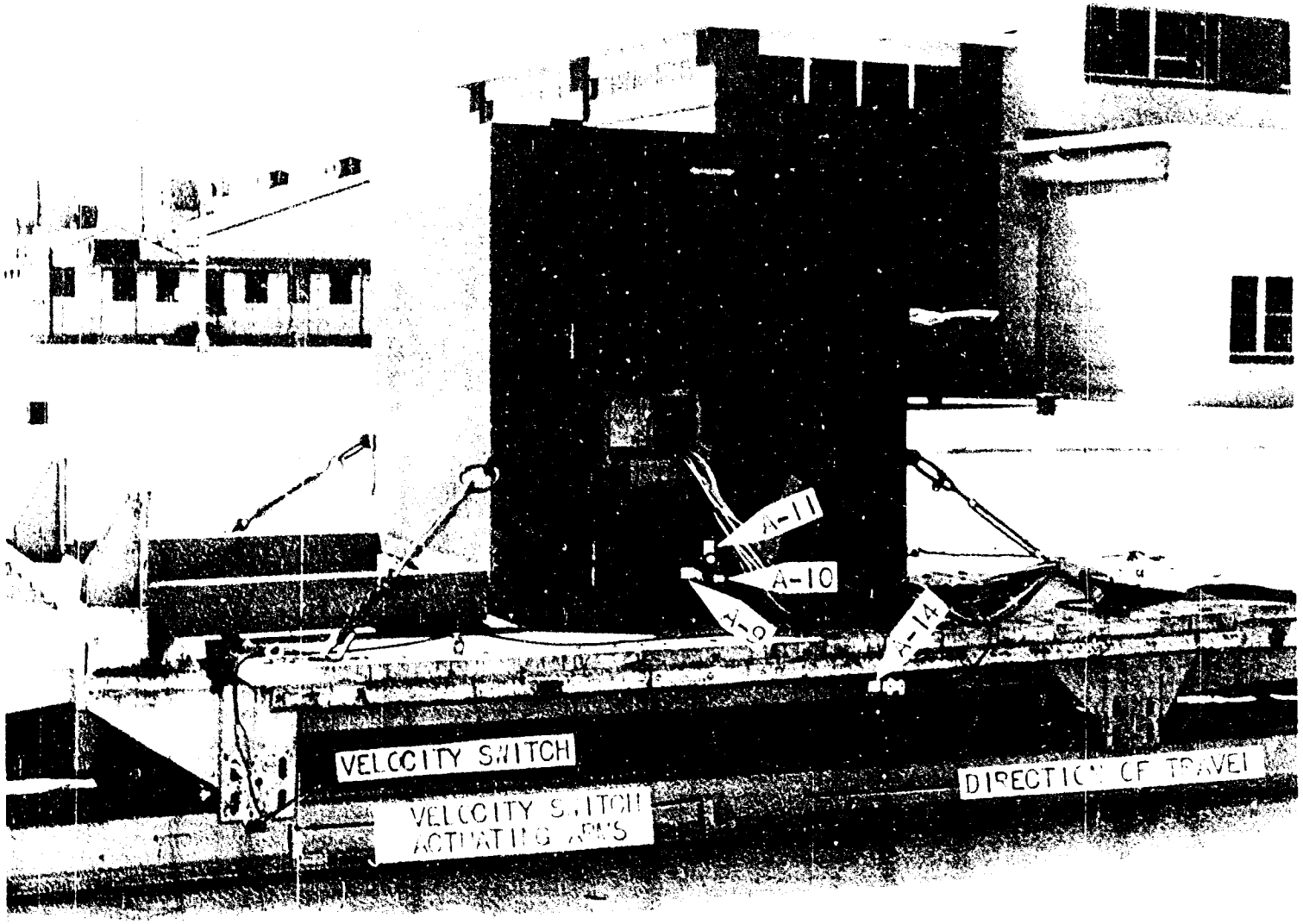
Approved by: PAUL H. ADAMS - 1612

DISTRIBUTION:
1/6A - P. E. Jockle, Jr., 1281
Attn: J. O. Davis, 1281-1
2/6A - W. A. Gardner, 1610
3/6A - D. M. Bruce, 1282
4/6A - C. L. Gomel, 5523
5/6A - R. K. Smeltzer, 7221-3
6/6A - Tech. Ref. File, 7221-3
(Bldg. 880)

UNCLASSIFIED

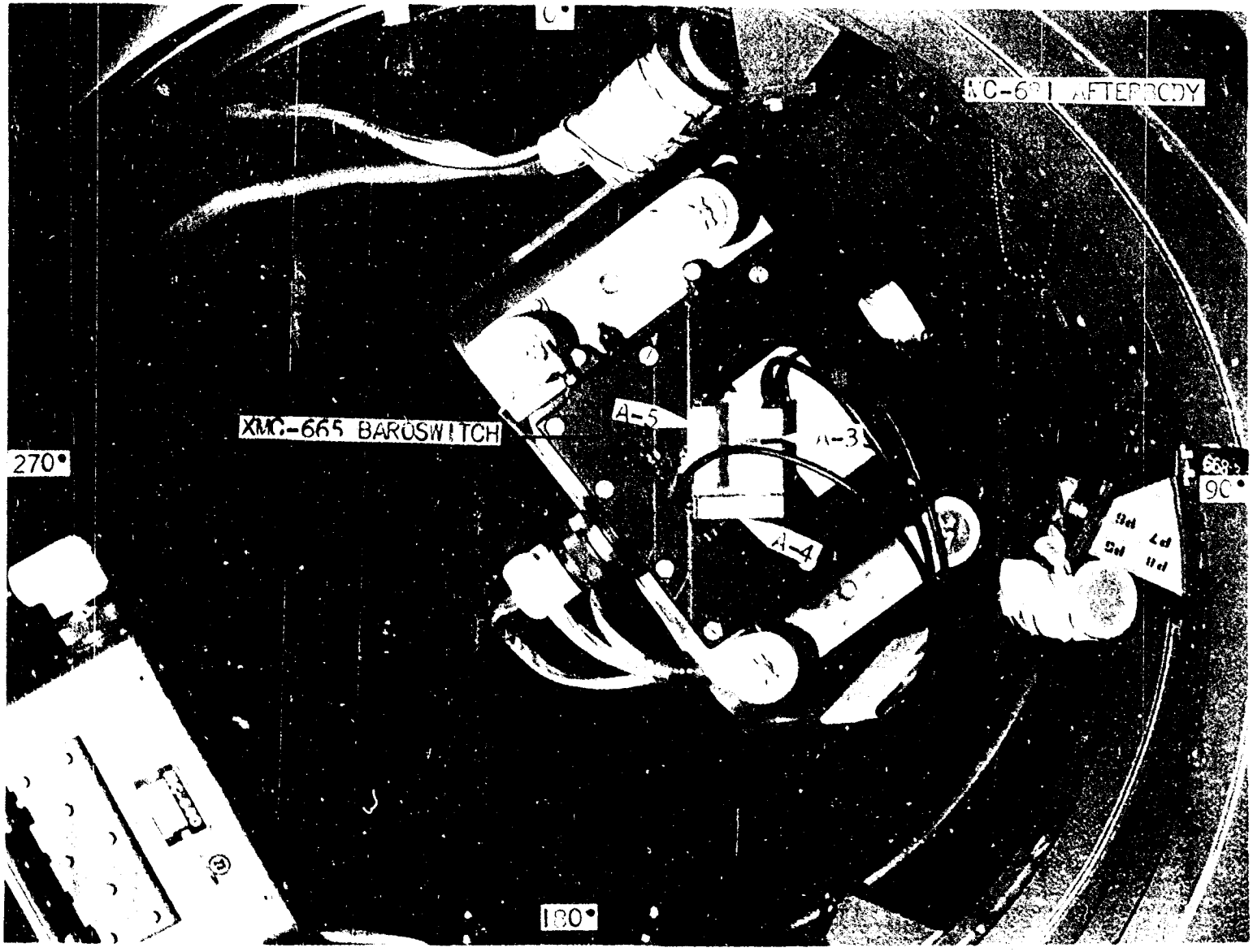
[redacted]


QUICK RELEASE
XH-512


A-11
A-10
A-9
A-14
VELOCITY SWITCH
VELOCITY SWITCH ACTUATING ARMS
DIRECTION OF TRAVEL

881888 #1

#140


0°
XMC-665 BAROSWITCH
A-5
A-3
A-4
270°
90°
180°

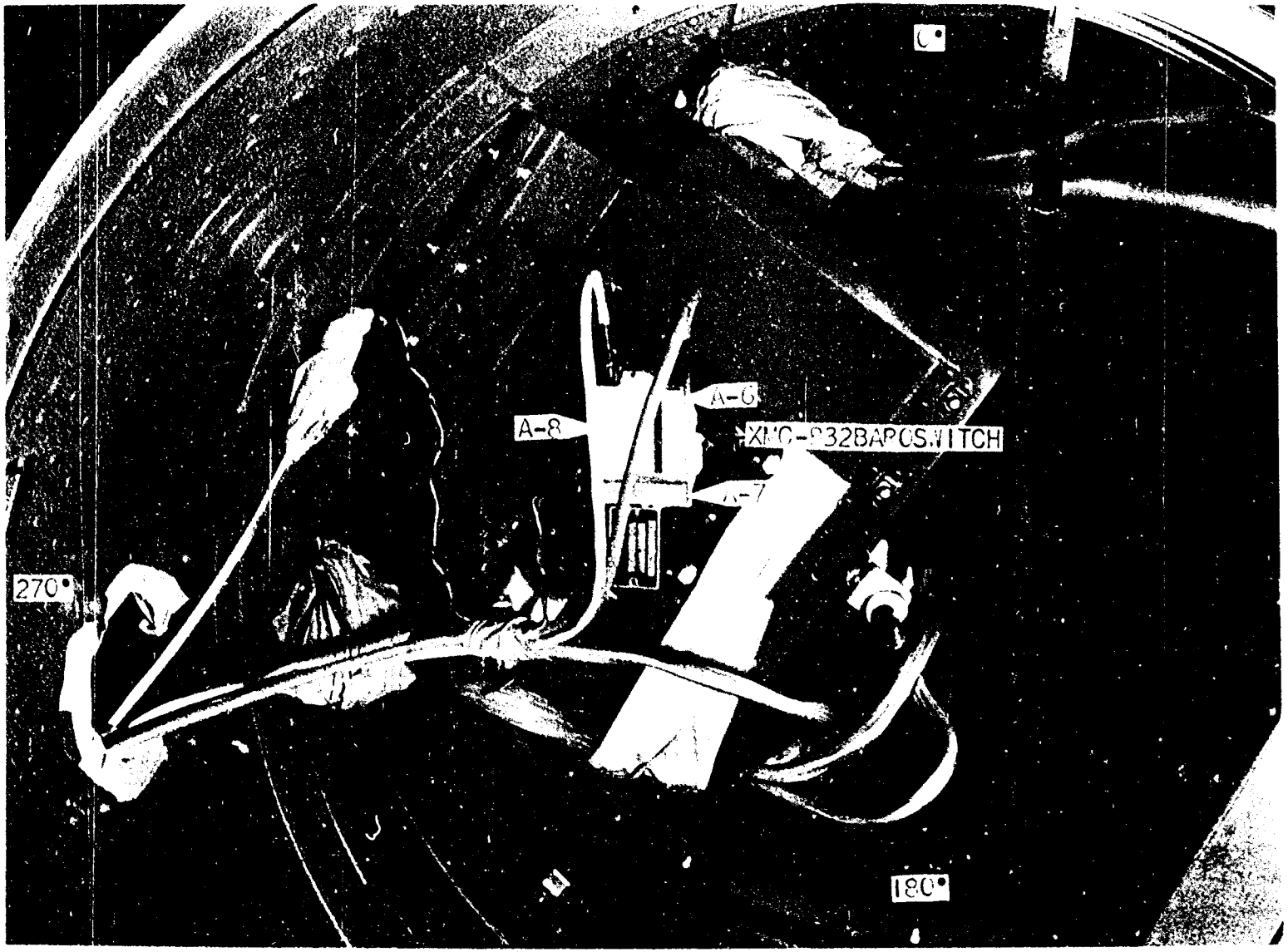


FIG. 4 ACCELEROMETERS MOUNTED ON THE XMC-832 BAROSWITCH, RAMP AND DROP TEST OF THE [illegible]

#8187

#1404

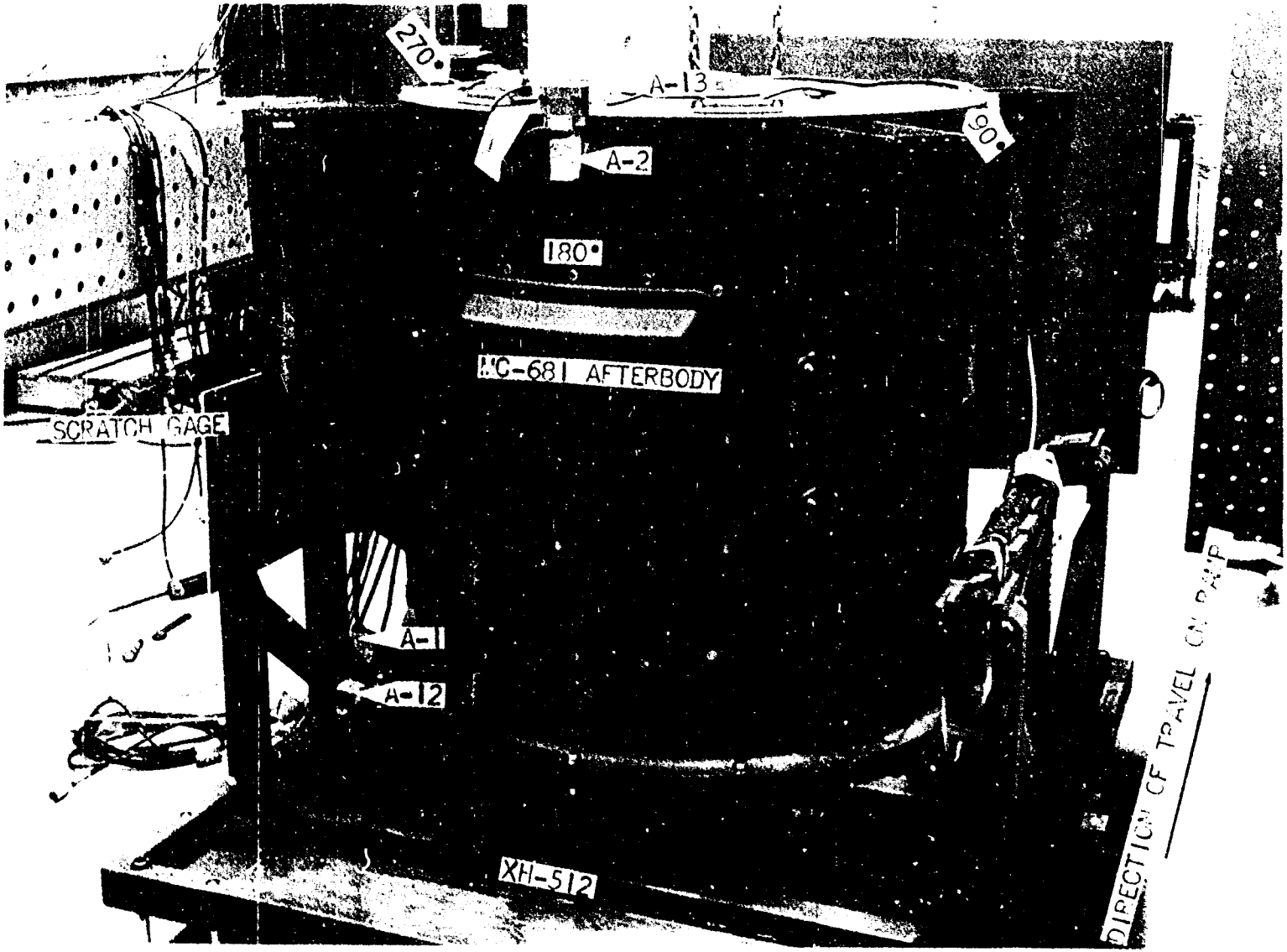
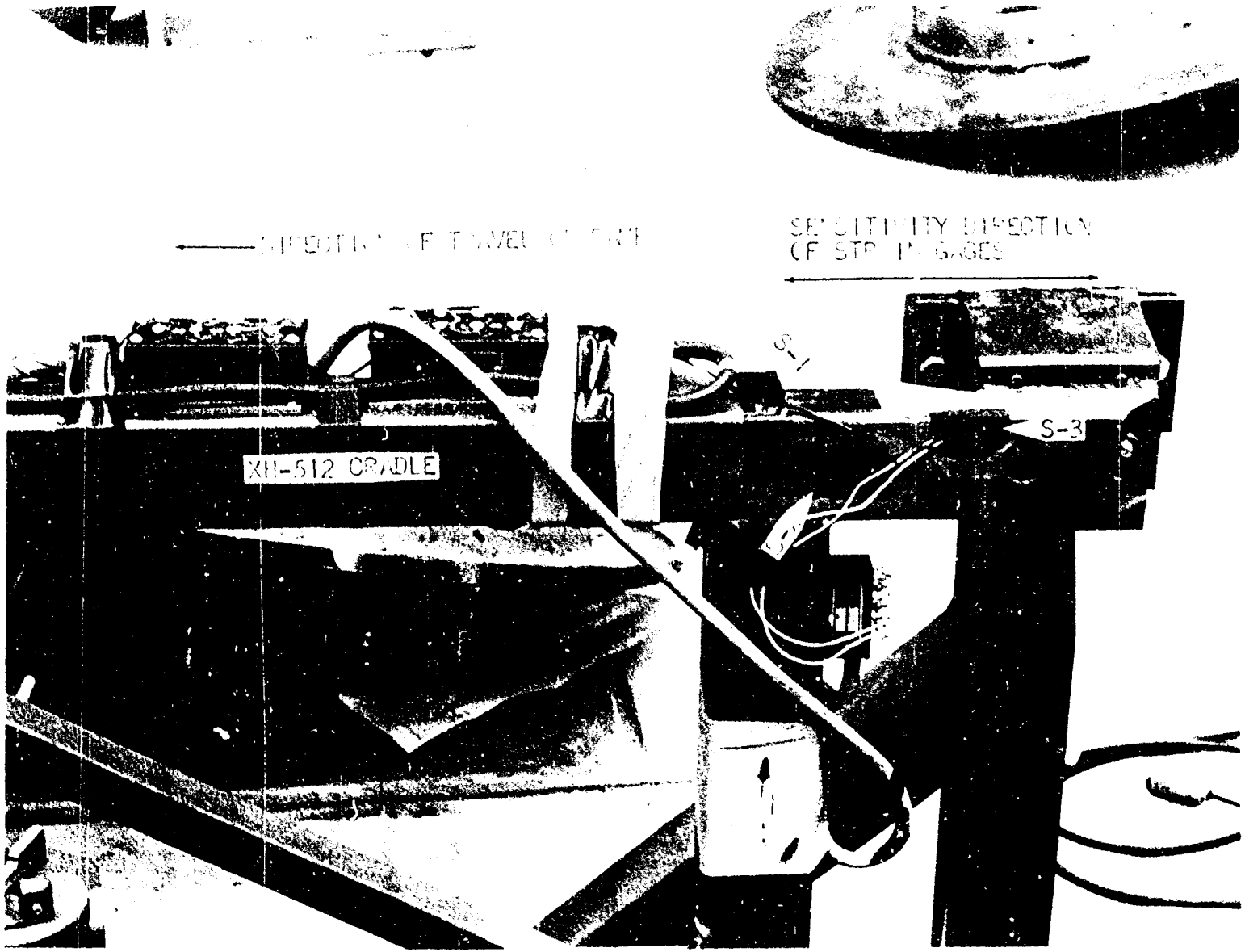


FIG. 1 MC-681 AFTERBODY MOUNTED ON THE XH-512 CRADLE SHOWING SOME OF THE INSTRUMENTATION USED. RUN AND DROP TEST OF THE XH-512.


XH-512 CRADLE
S-1
S-3

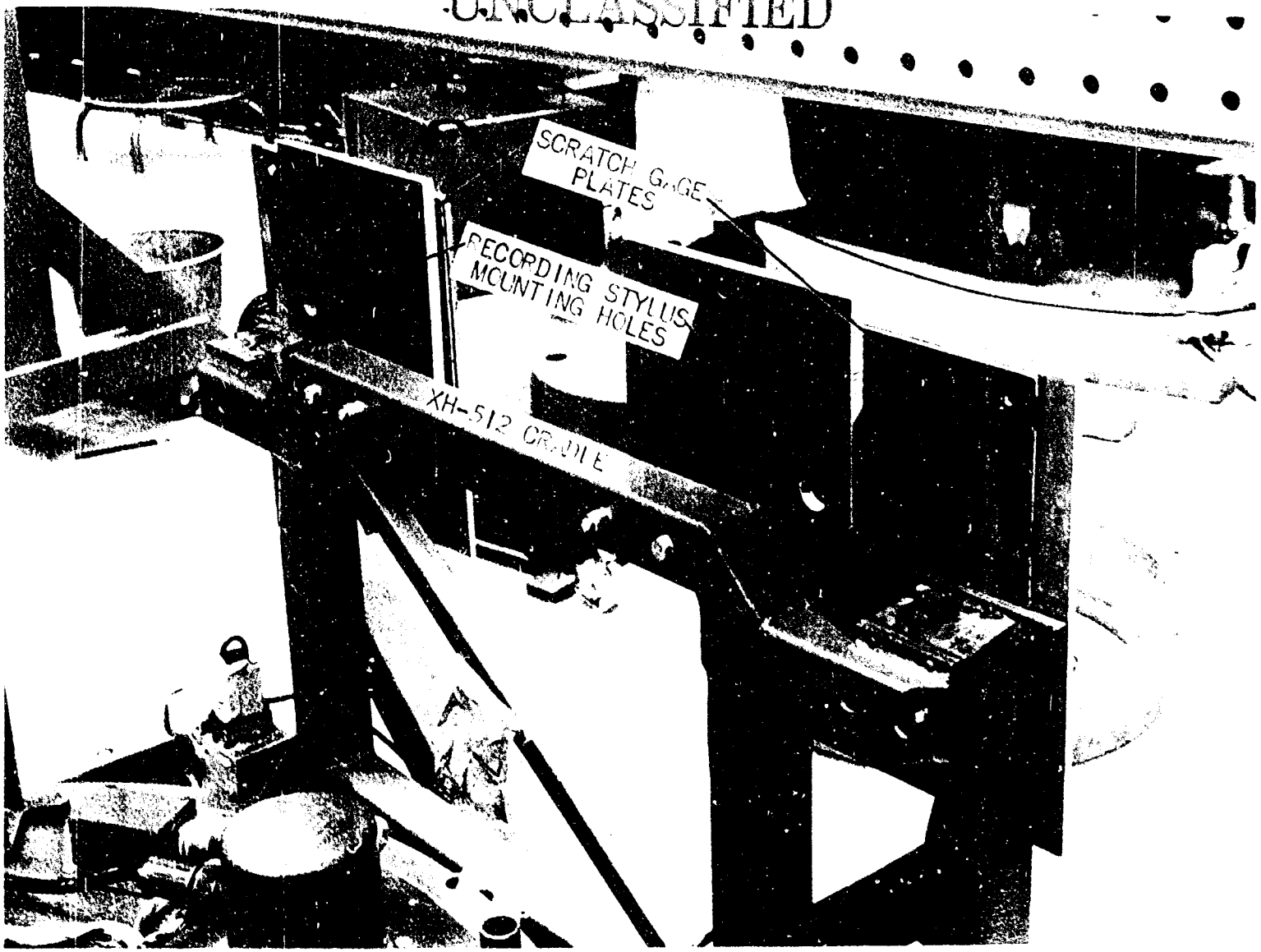


FIG. [illegible] SCRATCH-TYPE DISPLACEMENT GAGES MOUNTED FORE AND AFT ON THE [illegible] - 1[illegible]. [illegible] THE XH-512.

#88184

#1407

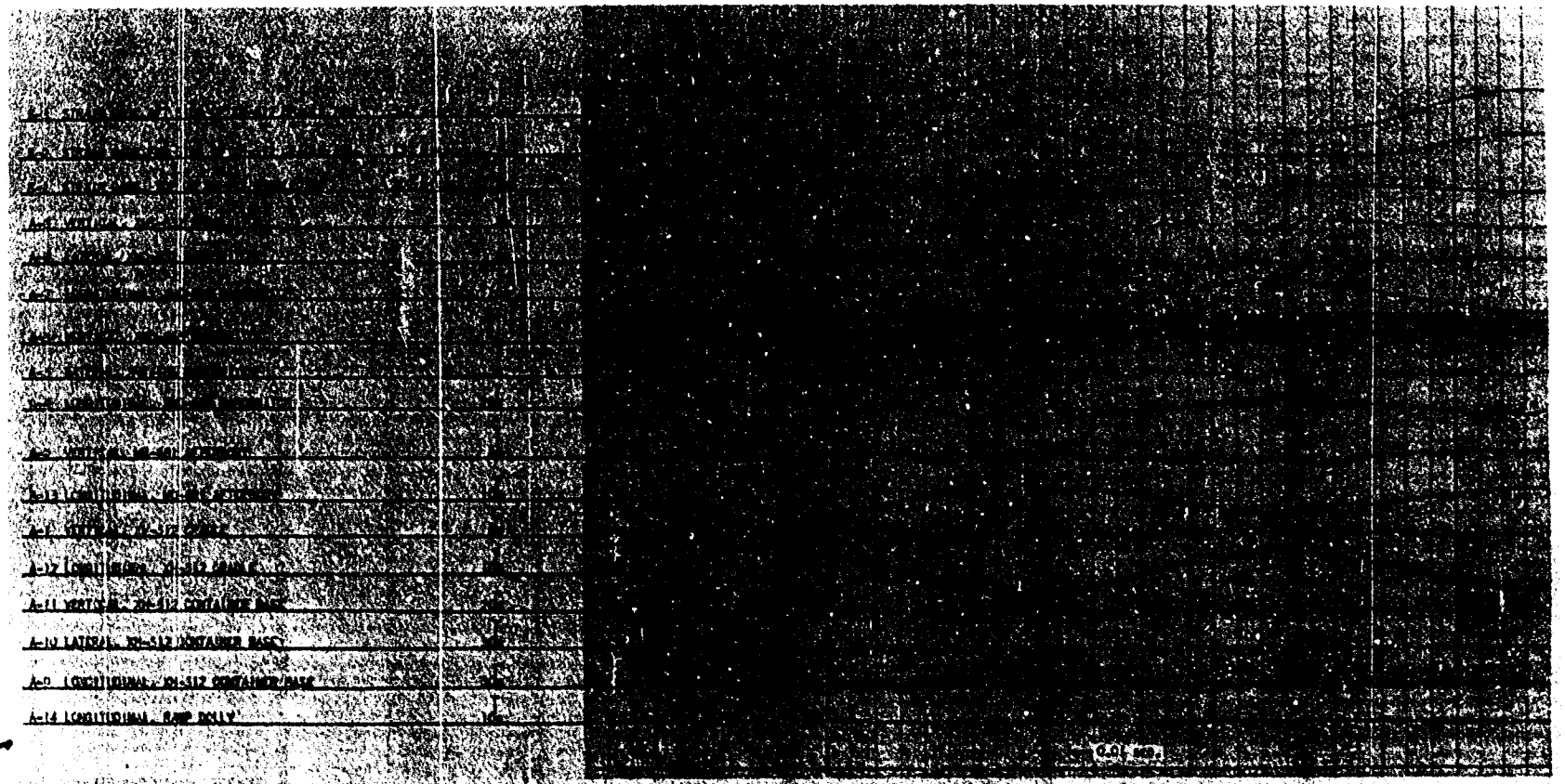


FIG. 5 TYPICAL OSCILLOGRAPH RECORD FOR RAMP TEST NO. 1 (7.01 M.P.H.) OF CONDITION II —— RAMP AND DROP TEST OF THE XU-512.

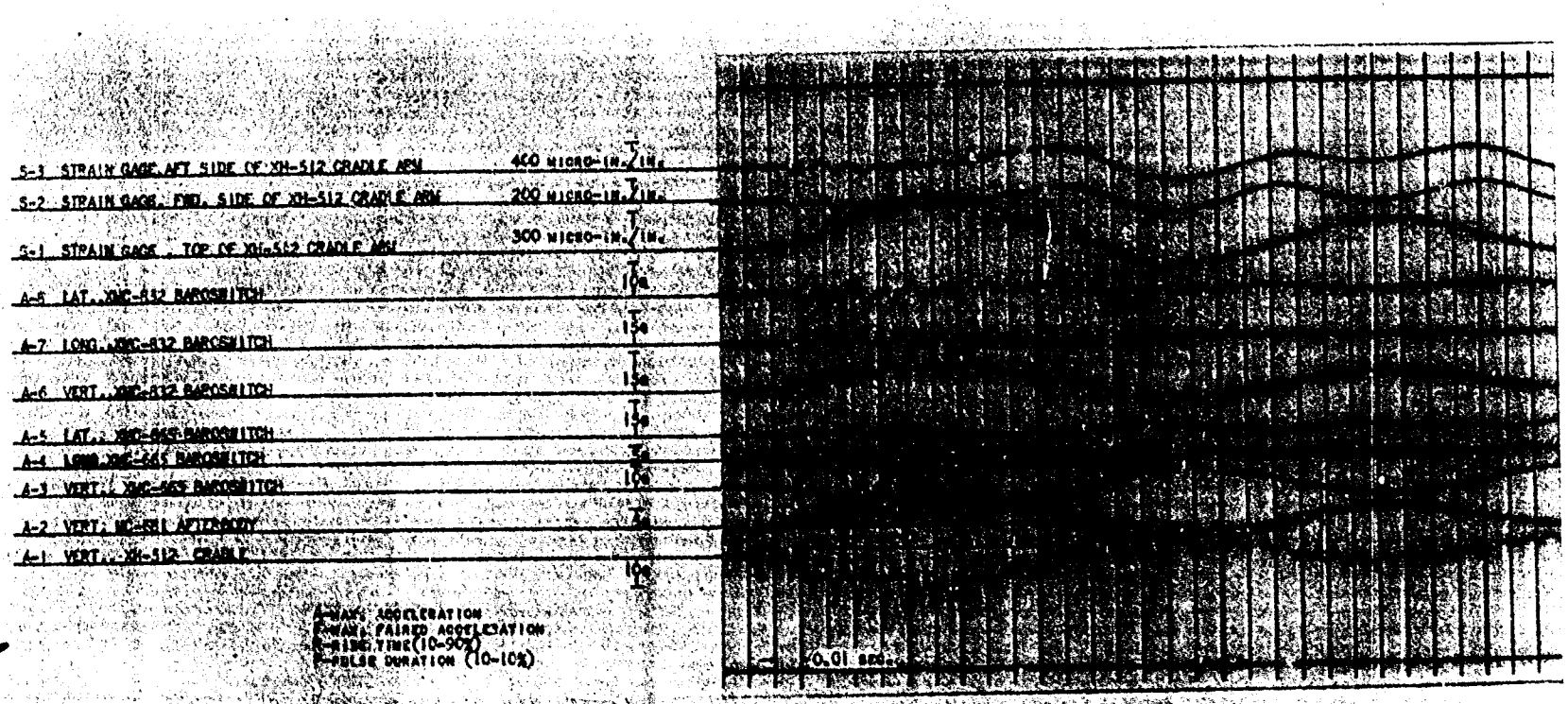


FIG. 9 TYPICAL OSCILLOGRAPH RECORD FOR 12" DROP NO. 2, CONDITION-II ---- RAMP AND DROP TEST OF THE XH-512.

REF. SYM. 1612 (474)
PROJECT NO. TM-536

TABLE I

COMPONENTS TESTED DURING RAMP AND DROP TEST OF THE XH-512

Component and MC Number		Drawing No.	Serial No.
XH-512	Box, Storage Rear Bomb, Subassembly	321157-00	Unit No. 1
MC-621	Case Section, Ballistic, Tail	310246-03	AA-3047-H6
MC-845	Generator Assembly, Pulse, Igniting	310488-00	AA-0088-J6
MC-640	Battery Pack, Thermal	310203-02	AS-1054-J6
XMC-665	Baroswitch, Arming	310229	BL-X007-L6
XMC-832	Switch, Pressure, Fixed Differential	310460-00	BL-523-L6
MC-788	Switch, Rotary, Safing	310390-00	AA-3038-B7
MC-641	Battery Pack, Thermal	310204-02	AA-1022-K6
MC-790	Interconnecting Box	310392-00	AA-0026-J6
XMC-789	Fuse Pack, Electrical	310391-01	AA-4002-16
MC-787	Pulse Circuit, Triggered, Cold Cathode	310389-00	FT-55116-16
MC-772	Switch, Electrical, Arming-Safing	310374-00	AA-3039-J6
MC-690	Nose Cap	310243	--
MC-781	Alignment Plate	310382	--

TABLE II

ACCELEROMETERS USED DURING RAMP AND DROP TEST OF THE XH-512

Accel. No.	Location*	Figure Reference	Serial No.	Statham Model No.	Range (g)	Nat. Freq. (cps)	Test When Used
A-1	Vert., XH-512 Cradle	5, 7	520	A5A-50-240	±50	640	Ramp and Drop
A-2	Vert., MC-681 Afterbody	5	521	A5A-50-240	±50	700	Ramp and Drop
A-3	Vert., XMC-665 Baroswitch	3	2314	Fa-100-350	±100	700	Ramp and Drop
A-4	Long., XMC-665 Baroswitch	3	1374	F-100-300	±100	520	Ramp and Drop
A-5	Lat., XMC-665 Baroswitch	3	1375	F-100-300	±100	730	Ramp and Drop
A-6	Vert., XMC-832 Baroswitch	4	2080	Fa-100-300	±100	510	Ramp and Drop
A-7	Long., XMC-832 Baroswitch	4	2078	Fa-100-300	±100	--	Ramp and Drop
A-8	Lat., XMC-832 Baroswitch	4	1300	F-100-300	±100	630	Ramp and Drop
A-9	Long., XH-512 Container Base	2	639	A5A-50-300	±50	500	Ramp
A-10	Lat., XH-512 Container Base	2	646	A5A-50-300	±50	510	Ramp
A-11	Vert., XH-512 Container Base	2	640	A5A-50-300	±50	550	Ramp
A-12	Long., XH-512 Cradle	5, 7	519	A5A-50-240	±50	700	Ramp
A-13	Long., MC-681 Afterbody	5	522	A5A-50-240	±50	640	Ramp
A-14	Long., Ramp Dolly	2	654	A5A-50-300	±50	490	Ramp

* All directions are with respect to the axes of the XH-512 when mounted on the ramp dolly, shown in Fig. 5.

[redacted]

UNCLASSIFIED

Ref. Sym: 1612 (474)
Project No. TM-536

TABLE III

STRAIN GAGES USED DURING RAMP AND DROP TEST OF THE XH-512

Gage No.	Gage Location	Fig. Ref.	Gage Type	Gage Factor	Gage Resistance
S-1	Top of XH-512 Cradle Arm	6	A-5-1	1.98 ± 1%	119.6 ± .2
S-2	Side of XH-512 Cradle Arm	6	A-5-1	1.98 ± 1%	119.6 ± .2
S-3	Side of XH-512 Cradle Arm	6	A-7	1.98 ± 2%	120.0 ± .3

UNCLASSIFIED

[redacted]

UNCLASSIFIED

TABLE IV

ACCELERATIONS, RISE TIMES, AND PULSE DURATIONS RECORDED DURING THE DROP TEST OF THE XH-512

Accel. No.	Location[1]	Condition I -- 4-Inch Drop: 4-Inch Drop No. 12 Max. Accel. (g) +	4-Inch Drop No. 12 Max. Accel. (g) - Over	4-Inch Drop No. 12 Max. Faired Pulse (g)	4-Inch Drop No. 12 Rise Time (sec)	4-Inch Drop No. 12 Pulse Dur. (sec)	4-Inch Drop No. 11 Max. Accel. (g) +	4-Inch Drop No. 11 Max. Accel. (g) - Over	4-Inch Drop No. 11 Max. Faired Pulse (g)	4-Inch Drop No. 11 Rise Time (sec)	4-Inch Drop No. 11 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	4.6	11.8*	-7.5	0.036	0.107	3.9	11.6*	-8.1	0.032	0.112
A-2	Vert., MC-681 Afterbody	4.5	6.0	-3.5	0.042	0.103	4.5	5.6	-4.1	0.041	0.104
A-3	Vert., XMC-665 Baroswitch	3.9	5.7	-5.5	0.039	0.114	3.8	5.3	-5.2	0.039	0.100
A-4	Long., XMC-665 Baroswitch	0.8	0.9	--	--	--	0.8	0.9	--	--	--
A-5	Lat., XMC-665 Baroswitch	2.4	1.6	+2.2	0.016	0.062	2.5	1.6	+2.1	0.024	0.064
A-6	Vert., XMC-832 Baroswitch	3.6	5.8	-4.1	0.047	0.097	4.0	5.8	-4.4	0.043	0.095
A-7	Long., XMC-832 Baroswitch	4.7	4.2	--	--	--	3.3	2.7	--	--	--
A-8	Lat., XMC-832 Baroswitch	4.8	5.9	--	--	--	4.7	6.4	--	--	--

Accel. No.	Location[1]	Condition II -- 4-Inch Drop: 4-Inch Drop No. 1 Max. Accel. (g) +	4-Inch Drop No. 1 Max. Accel. (g) -	4-Inch Drop No. 1 Max. Faired Pulse (g)	4-Inch Drop No. 1 Rise Time (sec)	4-Inch Drop No. 1 Pulse Dur. (sec)	4-Inch Drop No. 2 Max. Accel. (g) +	4-Inch Drop No. 2 Max. Accel. (g) -	4-Inch Drop No. 2 Max. Faired Pulse (g)	4-Inch Drop No. 2 Rise Time (sec)	4-Inch Drop No. 2 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	7.9	14.7	-5.4	0.056	0.102	6.5	11.6	-4.4	0.045	0.114
A-2	Vert., MC-681 Afterbody	5.2	6.8	-3.9	0.042	0.099	5.7	6.2	-3.9	0.041	0.105
A-3	Vert., XMC-665 Baroswitch	4.0	5.2	-5.0	0.033	0.101	4.0	5.3	-4.8	0.033	0.102
A-4	Long., XMC-665 Baroswitch	0.9	0.9	--	--	--	0.9	0.9	--	--	--
A-5	Lat., XMC-665 Baroswitch	1.7	1.9	+1.7	0.014	0.057	2.2	1.9	-1.5	0.011	0.051
A-6	Vert., XMC-832 Baroswitch	4.0	6.5	-4.0	0.035	0.087	4.2	7.1	-4.2	0.036	0.098
A-7	Long., XMC-832 Baroswitch	4.1	4.1	--	--	--	5.1	5.0	--	--	--
A-8	Lat., XMC-832 Baroswitch	4.1	5.8	--	--	--	4.9	6.9	--	--	--

Accel. No.	Location[1]	Condition III -- 4-Inch Drop: 4-Inch Drop No. 1 Max. Accel. (g) +	4-Inch Drop No. 1 Max. Accel. (g) -	4-Inch Drop No. 1 Max. Faired Pulse (g)	4-Inch Drop No. 1 Rise Time (sec)	4-Inch Drop No. 1 Pulse Dur. (sec)	4-Inch Drop No. 2 Max. Accel. (g) +	4-Inch Drop No. 2 Max. Accel. (g) -	4-Inch Drop No. 2 Max. Faired Pulse (g)	4-Inch Drop No. 2 Rise Time (sec)	4-Inch Drop No. 2 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	7.3	13.7	-5.1	0.037	0.101	8.4	11.4	-5.2	0.037	0.086
A-2	Vert., MC-681 Afterbody	5.7	11.2	-4.1	0.042	0.104	7.4	14.8	-5.9	0.036	0.096
A-3	Vert., XMC-665 Baroswitch	5.2	5.2	-5.2	0.042	0.096	4.6	6.0	-5.4	0.041	0.101
A-4	Long., XMC-665 Baroswitch	0.7	0.8	--	--	--	1.0	0.9	--	--	--
A-5	Lat., XMC-665 Baroswitch	1.7	1.6	+1.7	0.010	0.052	1.8	1.8	+1.8	0.009	0.044
A-6	Vert., XMC-832 Baroswitch	4.9	7.0	-4.5	0.044	0.091	5.1	8.8	-4.5	0.044	0.100
A-7	Long., XMC-832 Baroswitch	4.5	5.7	--	--	--	4.7	6.1	--	--	--
A-8	Lat., XMC-832 Baroswitch	3.6	3.3	--	--	--	4.7	4.2	--	--	--

Accel. No.	Location[1]	Condition I -- 12-Inch Drop: 12-Inch Drop No. 2 Max. Accel. (g) +	12-Inch Drop No. 2 Max. Accel. (g) -	12-Inch Drop No. 2 Max. Faired Pulse (g)	12-Inch Drop No. 2 Rise Time (sec)	12-Inch Drop No. 2 Pulse Dur. (sec)	12-Inch Drop No. 6 Max. Accel. (g) +	12-Inch Drop No. 6 Max. Accel. (g) -	12-Inch Drop No. 6 Max. Faired Pulse (g)	12-Inch Drop No. 6 Rise Time (sec)	12-Inch Drop No. 6 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	10.0	22.8	-9.6	0.038	0.098	6.4	18.9	-8.7	0.039	0.098
A-2	Vert., MC-681 Afterbody	6.8	11.2	-7.0	0.043	0.092	6.3	11.4	-7.3	0.042	0.097
A-3	Vert., XMC-665 Baroswitch	6.5	11.1	-10.6	0.040	0.101	6.6	10.7	-10.7	0.041	0.096
A-4	Long., XMC-665 Baroswitch	0.9	0.9	--	--	--	0.9	0.9	--	--	--
A-5	Lat., XMC-665 Baroswitch	2.5	2.4	+2.4	0.011	0.062	2.0	2.2	-2.1	0.013	0.030
A-6	Vert., XMC-832 Baroswitch	7.3	10.0	-7.4	0.032	0.092	6.6	10.9	-8.3	0.036	0.095
A-7	Long., XMC-832 Baroswitch	7.6	5.1	--	--	--	5.4	7.8	--	--	--
A-8	Lat., XMC-832 Baroswitch	6.4	8.1	--	--	--	7.7	6.7	--	--	--

Accel. No.	Location[1]	Condition II -- 12-Inch Drop: 12-Inch Drop No. 1 Max. Accel. (g) +	12-Inch Drop No. 1 Max. Accel. (g) -	12-Inch Drop No. 1 Max. Faired Pulse (g)	12-Inch Drop No. 1 Rise Time (sec)	12-Inch Drop No. 1 Pulse Dur. (sec)	12-Inch Drop No. 2 Max. Accel. (g) +	12-Inch Drop No. 2 Max. Accel. (g) -	12-Inch Drop No. 2 Max. Faired Pulse (g)	12-Inch Drop No. 2 Rise Time (sec)	12-Inch Drop No. 2 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	9.7	20.2	-9.3	0.029	0.100	8.7	16.0	-9.4	0.032	0.097
A-2	Vert., MC-681 Afterbody	7.5	12.7	-7.3	0.037	0.097	7.5	15.4	-7.3	0.035	0.094
A-3	Vert., XMC-665 Baroswitch	6.3	10.2	-10.2	0.035	0.094	6.5	10.3	-10.3	0.036	0.093
A-4	Long., XMC-665 Baroswitch	1.3	1.3	--	--	--	1.1	0.8	--	--	--
A-5	Lat., XMC-665 Baroswitch	1.8	2.5	-2.0	0.022	0.044	1.6	2.1	-2.1	0.014	0.035
A-6	Vert., XMC-832 Baroswitch	6.2	11.8	-8.4	0.042	0.096	6.3	11.7	-8.3	0.037	0.093
A-7	Long., XMC-832 Baroswitch	6.4	6.9	--	--	--	5.5	6.2	--	--	--
A-8	Lat., XMC-832 Baroswitch	5.6	7.4	--	--	--	5.1	7.1	--	--	--

Accel. No.	Location[1]	Condition III -- 12-Inch Drop: 12-Inch Drop No. 3 Max. Accel. (g) +	12-Inch Drop No. 3 Max. Accel. (g) -	12-Inch Drop No. 3 Max. Faired Pulse (g)	12-Inch Drop No. 3 Rise Time (sec)	12-Inch Drop No. 3 Pulse Dur. (sec)	12-Inch Drop No. 4 Max. Accel. (g) +	12-Inch Drop No. 4 Max. Accel. (g) -	12-Inch Drop No. 4 Max. Faired Pulse (g)	12-Inch Drop No. 4 Rise Time (sec)	12-Inch Drop No. 4 Pulse Dur. (sec)
A-1	Vert., XH-512 Cradle	7.9	16.3	-9.0	0.039	0.096	9.7	20.1	-9.6	0.032	0.098
A-2	Vert., MC-681 Afterbody	7.5	15.0	-7.1	0.035	0.096	9.7	14.5	-7.5	0.035	0.094
A-3	Vert., XMC-665 Baroswitch	7.2	10.5	-9.8	0.030	0.091	11.2	6.8	-10.4	0.035	0.096
A-4	Long., XMC-665 Baroswitch	0.9	1.2	-1.2	0.019	0.045	1.0	1.7	-1.7	0.022	0.046
A-5	Lat., XMC-665 Baroswitch	2.0	2.2	-2.2	0.013	0.030	2.7	2.0	+2.7	0.022	0.060
A-6	Vert., XMC-832 Baroswitch	7.0	14.0	-8.4	0.036	0.096	8.2	15.0	-9.3	0.027	0.090
A-7	Long., XMC-832 Baroswitch	6.2	5.9	--	--	--	9.5	8.5	--	--	--
A-8	Lat., XMC-832 Baroswitch	5.1	6.1	--	--	--	6.7	9.0	--	--	--

NOTE: 1. All directions are with respect to the ramp dolly axes.
2. Plus accelerations are: Vert., down; long., fwd. towards 0°; and lateral, towards 270° (shown in Fig. 5).
3. Accelerations were read as per SCS-10.

* Acceleration trace went off the record.

UNCLASSIFIED

[redacted]

Ref. Sym: 1[redacted] (474)
Project No. TM-536

TABLE V

ACCELERATIONS, RISE TIMES, AND PULSE DURATIONS RECORDED DURING RAMP TESTS OF THE XH-512

Condition I

Accel. No.	Location*	Run No. 1 -- 5.11 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Run No. 2 -- 5.57 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Run No. 3 -- 6.05 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Run No. 4 -- 6.52 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)
A-14	Long., Ramp Dolly	1.1	10.0	-9.0	0.010	0.033	1.8	16.0	-12.7	0.002	0.032	1.8	14.5	-12.5	0.010	0.033	2.0	17.7	-15.7	0.011	0.031
A-9	Long., XH-512 Container Base	12.0	13.9	-9.3	0.004	0.032	21.0	39.2	-25.2	0.004	0.026	13.9	22.3	-14.8	0.003	0.028	13.6	23.2	-17.6	0.003	0.029
A-10	Lat., XH-512 Container Base	9.7	9.7	--	--	--	16.6	14.2	--	--	--	12.7	10.6	--	--	--	11.6	13.2	--	--	--
A-11	Vert., XH-512 Container Base	7.7	9.9	-4.0	0.004	0.025	12.0	15.3	-5.6	0.013	0.022	10.2	13.0	+6.7	0.006	0.015	14.4	13.7	-5.3	0.018	0.027
A-12	Long., XH-512 Cradle	6.5	7.7	-7.7	0.042	0.105	8.0	9.2	-9.0	0.034	0.092	9.1	10.1	-9.5	0.035	0.098	9.6	10.4	-10.2	0.039	0.101
A-1	Vert., XH-512 Cradle	1.2	1.9	--	--	--	3.3	3.2	--	--	--	2.2	2.4	--	--	--	1.3	2.4	--	--	--
A-13	Long., MC-681 Afterbody	5.5	6.8	-6.7	0.034	0.099	9.0	8.0	-8.1	0.040	0.103	8.3	8.8	-8.3	0.037	0.100	8.9	9.1	-8.3	0.034	0.096
A-2	Vert., MC-681 Afterbody	2.5	1.1	+1.6	0.035	0.102	3.1	1.5	-1.5	0.033	0.078	3.0	2.1	-2.1	0.035	0.095	2.7	2.1	-2.1	0.039	0.103
A-4	Long., XMC-665 Baroswitch	6.5	8.1	-8.1	0.032	0.102	8.2	8.9	-8.9	0.021	0.095	8.3	9.5	-9.5	0.025	0.096	8.4	10.7	-10.7	0.027	0.098
A-5	Lat., XMC-665 Baroswitch	1.0	1.0	-1.0	0.023	0.033	1.9	3.0	+1.9	0.005	0.035	1.6	2.2	-2.2	0.025	0.071	1.3	1.8	-1.8	0.004	0.044
A-3	Vert., XMC-665 Baroswitch	0.7	0.6	+0.7	0.023	0.054	0.7	0.8	+0.7	0.005	0.010	0.9	0.9	+0.8	0.022	0.052	1.2	1.2	-1.2	0.034	0.070
A-7	Long., XMC-832 Baroswitch	6.6	7.9	-7.2	0.036	0.100	9.0	9.0	-7.9	0.037	0.096	8.8	9.5	-8.9	0.034	0.096	8.4	10.7	-10.1	0.037	0.099
A-8	Lat., XMC-832 Baroswitch	1.3	1.4	--	--	--	2.6	2.5	+1.5	0.021	0.049	2.2	2.8	-1.7	0.020	0.066	1.6	1.6	+0.8	0.022	0.068
A-6	Vert., XMC-832 Baroswitch	0.7	0.9	--	--	--	1.4	0.9	+0.4	0.013	0.026	0.9	1.0	-0.8	0.030	0.080	1.1	0.9	+0.7	0.017	0.056

Accel. No.	Location*	Run No. 5 -- 6.8 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Run No. 6 -- 7.04 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Run No. 7 -- 7.04 mph Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)
A-14	Long., Ramp Dolly	1.8	16.4	-14.5	0.010	0.034	2.0	14.4	-13.3	0.010	0.036	2.1	18.1	-15.0	0.011	0.034
A-9	Long., XH-512 Container Base	12.1	21.8	-18.7	0.004	0.028	13.0	21.4	-18.5	0.008	0.031	11.6	19.6	-16.5	0.004	0.030
A-10	Lat., XH-512 Container Base	17.3	15.1	--	--	--	14.5	11.9	--	--	--	14.7	15.9	--	--	--
A-11	Vert., XH-512 Container Base	10.8	15.0	-5.5	0.016	0.025	10.8	15.6	-5.8	0.008	0.025	14.8	15.9	-8.2	0.005	0.017
A-12	Long., XH-512 Cradle	10.1	11.1	-10.8	0.039	0.102	10.4	11.3	-11.3	0.037	0.097	10.2	11.4	-11.4	0.003	0.093
A-1	Vert., XH-512 Cradle	2.1	2.7	--	--	--	1.9	2.3	--	--	--	2.9	2.9	--	--	--
A-13	Long., MC-681 Afterbody	9.7	9.8	-9.2	0.036	0.096	9.3	9.7	-9.6	0.035	0.097	9.6	10.5	-9.8	0.038	0.098
A-2	Vert., MC-681 Afterbody	3.1	2.2	-2.0	0.038	0.096	2.9	2.2	-1.8	0.047	0.098	2.4	2.4	-1.8	0.051	0.101
A-4	Long., XMC-665 Baroswitch	9.3	10.7	-10.7	0.025	0.093	9.4	12.0	-12.0	0.031	0.100	10.3	11.6	-11.6	0.026	0.098
A-5	Lat., XMC-665 Baroswitch	1.5	1.9	-1.9	0.006	0.043	1.1	1.9	-1.9	0.009	0.024	1.2	1.4	-1.4	0.005	0.019
A-3	Vert., XMC-665 Baroswitch	1.1	1.1	-1.1	0.028	0.037	1.2	1.4	-1.4	0.028	0.036	1.2	1.3	-1.3	0.031	0.039
A-7	Long., XMC-832 Baroswitch	9.7	11.1	-10.7	0.037	0.097	10.3	12.0	-11.3	0.042	0.101	10.2	11.6	-10.9	0.038	0.097
A-8	Lat., XMC-832 Baroswitch	1.6	1.7	+1.3	0.020	0.058	1.7	3.3	+1.1	0.015	0.043	2.2	2.9	+1.8	0.016	0.069
A-6	Vert., XMC-832 Baroswitch	1.0	1.8	-0.8	0.015	0.044	0.9	1.0	-0.6	0.017	0.057	1.2	1.7	+0.6	0.011	0.077

NOTE: 1. Accelerations were read as per SCS-10.
2. Plus accelerations are vertical, down; longitudinal, forward towards 0°; lateral, towards 270° (shown in Fig. 5).

* All directions are with respect to the ramp dolly axes.

[redacted]

UNCLASSIFIED

TABLE V (Continued)

ACCELERATIONS, RISE TIMES, AND PULSE DURATIONS RECORDED DURING RAMP TESTS OF THE XH-512

Accel. No.	Location*	Condition II					Condition III																
		Run No. 1 -- 7.01 mph					Run No. 3 -- 5.12 mph					Run No. 4 -- 5.57 mph					Run No. 5 -- 6.05 mph				
		Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)
A-14	Long., Ramp Dolly	2.0	18.5	-15.5	0.010	0.031	2.0	17.2	-14.4	0.009	0.023	1.6	13.5	-12.3	0.011	0.032	1.9	18.3	-15.4	0.001	0.025
A-9	Long., XH-512 Container Base	13.5	25.4	-20.3	0.006	0.028	20.8	20.0	-15.0	0.002	0.022	12.8	15.4	-12.2	0.005	0.030	20.5	26.8	-17.8	0.002	0.026
A-10	Lat., XH-512 Container Base	14.0	12.5	--	--	--	12.1	12.9	--	--	--	12.4	10.2	--	--	--	16.2	16.4	--	--	--
A-11	Vert., XH-512 Container Base	16.2	16.2	+6.2	0.005	0.014	10.7	13.5	+6.5	0.006	0.014	9.8	10.6	+6.1	0.007	0.015	15.8	16.8	+8.1	0.005	0.014
A-12	Long., XH-512 Cradle	10.5	12.3	-12.0	0.033	0.093	8.0	8.2	-7.8	0.036	0.096	8.6	9.3	-8.9	0.033	0.092	9.7	10.5	-9.7	0.030	0.089
A-1	Vert., XH-512 Cradle	3.6	3.3	-1.6	0.020	0.030	2.8	3.2	--	--	--	2.0	2.3	-1.3	0.027	0.097	2.7	2.9	-1.9	0.031	0.089
A-13	Long., MC-681 Afterbody	10.2	10.2	-9.8	0.033	0.091	7.3	7.6	-6.5	0.024	0.094	8.8	8.5	-7.5	0.029	0.097	8.6	10.0	-8.5	0.029	0.096
A-2	Vert., MC-681 Afterbody	2.6	2.1	-1.4	0.056	0.081	2.3	3.0	-2.1	0.026	0.082	2.5	2.7	-2.3	0.027	0.085	2.5	3.1	-2.6	0.029	0.082
A-4	Long., XMC-665 Baroswitch	9.4	11.0	-11.0	0.020	0.091	6.7	9.0	-9.0	0.024	0.091	7.3	9.4	-9.4	0.027	0.098	8.7	10.6	-10.6	0.024	0.090
A-5	Lat., XMC-665 Baroswitch	1.6	1.3	+1.6	0.004	0.011	1.5	2.0	-2.0	0.005	0.039	1.3	1.7	+1.3	0.008	0.020	1.1	2.0	-2.0	0.003	0.013
A-3	Vert., XMC-665 Baroswitch	0.9	1.7	-1.7	0.019	0.062	1.1	0.8	+0.8	0.008	0.019	0.9	0.8	-0.8	0.007	0.064	1.1	1.1	+0.9	0.005	0.013
A-7	Long., XMC-832 Baroswitch	9.3	12.1	-11.7	0.038	0.098	8.2	9.0	-8.0	0.030	0.090	8.3	9.9	-8.6	0.030	0.093	9.7	11.5	-10.0	0.035	0.091
A-8	Lat., XMC-832 Baroswitch	1.6	2.2	-1.2	0.039	0.090	2.3	2.9	+1.6	0.006	0.054	1.5	1.7	+1.0	0.024	0.046	2.0	2.5	+0.9	0.023	0.056
A-6	Vert., XMC-832 Baroswitch	2.7	2.7	+2.5	0.007	0.051	3.1	3.0	-0.8	0.024	0.080	1.8	1.4	-0.7	0.012	0.068	2.7	2.6	-1.0	0.059	0.115

Accel. No.	Location*	Condition III														
		Run No. 6 - 6.35 mph					Run No. 7 -- 6.3 mph					Run No. 8 - 7.04 mph				
		Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)	Max. Accel. (g) +	Max. Accel. (g) -	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Dur. (sec)
A-14	Long., Ramp Dolly	1.8	21.3	-18.3	0.002	0.023	2.0	18.7	-17.5	0.010	0.025	2.0	20.1	-17.7	0.002	0.031
A-9	Long., XH-512 Container Base	17.4	32.5	-28.8	0.004	0.020	23.0	25.0	-23.0	0.003	0.018	15.1	32.3	-27.9	0.005	0.027
A-10	Lat., XH-512 Container Base	27.1	19.5	--	--	--	18.1	24.0	--	--	--	18.5	16.7	--	--	--
A-11	Vert., XH-512 Container Base	26.4	25.1	-10.7	0.005	0.015	19.8	23.1	+7.4	0.006	0.012	13.8	10.6	+7.5	0.006	0.017
A-12	Long., XH-512 Cradle	10.3	11.4	-10.7	0.020	0.088	11.8	12.3	-11.9	0.030	0.082	11.5	12.2	-11.5	0.037	0.096
A-1	Vert., XH-512 Cradle	4.2	4.2	--	--	--	4.5	4.1	-2.8	0.036	0.087	2.8	4.2	-2.1	0.032	0.102
A-13	Long., MC-681 Afterbody	9.8	9.5	-8.1	0.028	0.082	9.7	10.6	-9.5	0.032	0.097	9.9	10.7	-9.3	0.031	0.094
A-2	Vert., MC-681 Afterbody	4.3	3.3	-2.7	0.034	0.086	3.8	3.8	-3.1	0.024	0.083	3.0	3.8	-3.0	0.026	0.082
A-4	Long., XMC-665 Baroswitch	9.5	11.4	-11.4	0.022	0.091	11.3	11.5	-11.5	0.021	0.086	10.3	12.5	-12.5	0.026	0.094
A-5	Lat., XMC-665 Baroswitch	1.6	1.7	-1.7	0.008	0.020	1.4	1.8	-1.8	0.009	0.046	1.8	2.6	-2.6	0.007	0.013
A-3	Vert., XMC-665 Baroswitch	1.2	1.1	+1.2	0.007	0.017	1.3	1.2	+1.3	0.006	0.016	1.1	1.1	+1.1	0.006	0.017
A-7	Long., XMC-832 Baroswitch	9.7	11.7	-10.5	0.036	0.094	12.9	11.1	-10.9	0.031	0.088	10.9	13.2	-12.1	0.022	0.091
A-8	Lat., XMC-832 Baroswitch	3.1	3.9	-1.4	0.002	0.064	2.3	3.8	-1.8	0.015	0.054	2.7	2.0	-2.0	0.008	0.024
A-6	Vert., XMC-832 Baroswitch	2.1	1.6	+0.9	0.039	0.058	2.5	3.9	+0.6	0.021	0.076	1.9	2.8	-0.9	0.014	0.069

NOTE: 1. Accelerations were read as per SCS-10.
2. Only one run was made with Condition II. Runs No. 1 and 2 for Condition III were approximately 5.1 mph, but test records were unreadable.
3. Plus accelerations are vertical, down; longitudinal, forward towards 0°; lateral, towards 270° (shown in Fig. 5).

* All directions are with respect to the ramp dolly axes.

[redacted]

UNCLASSIFIED

TABLE VI

MAXIMUM CALCULATED STRESSES ON THE XH-512 CRADLE DURING THE RAMP AND DROP TEST OF THE XH-512

Configuration Tested	Strain Gage No.	Strain Gage Location	Maximum Stresses Calculated from Strain Readings During Tests (psi)					
			Two Recorded 24-Inch Drop Tests				7-Inch Ramp Test	
			First Drop		Second Drop			
			Tension	Compression	Tension	Compression	Tension	Compression
Condition I	S-1	Top of XH-512 Cradle Arm	6,790	10,110	6,765	10,[illegible]	4,220	[illegible]
	S-2	Side of XH-512 Cradle Arm	4,740	[illegible]	[illegible]	[illegible]	4,510	[illegible]
	S-3	Side of XH-512 Cradle Arm	7,970	4,590	8,570	4,170	11,630	[illegible]
Condition II	S-1	Top of XH-512 Cradle Arm	6,540	[illegible]	6,510	[illegible]	[illegible]	[illegible]
	S-2	Side of XH-512 Cradle Arm	[illegible]	[illegible]	4,890	[illegible]	[illegible]	[illegible]
	S-3	Side of XH-512 Cradle Arm	[illegible]	[illegible]	[illegible]	[illegible]	14,720	10,130
Condition III	S-1	Top of XH-512 Cradle Arm	6,120	9,120	6,360	9,130	3,090	2,480
	S-2	Side of XH-512 Cradle Arm	4,950	3,070	4,920	3,240	4,430	1,730
	S-3	Side of XH-512 Cradle Arm	8,190	5,420	8,520	5,280	13,550	8,470

NOTE: All stresses were calculated from recorded strain readings, using a modulus of elasticity of steel of 30×10^6 lbs./in.^{2}.

TABLE VII

MAXIMUM MEASURED DISPLACEMENTS OF THE XH-512 CRADLE -- RAMP AND DROP TEST OF THE XH-512

Loading Condition	Test Condition	Cradle Maximum Displacements[1] (Inches)							
		Forward Gage				Aft. Gage			
		Up	Down	Fwd.	Aft.	Up	Down	Fwd.	Aft.
Condition I	12 in Drop No. 6	2-1/8	2-7/8	3/16	3/8	2	2-15/16	3/16	3/8
	7.04 mph Ramp No. 7	5/8	11/16	4-5/16	3-11/16	11/16	11/16	4-1/4	3-3/4
Condition II	12 in Drop No. 2	2-1/8	2-7/8	3/16	5/16	2-1/8	2-7/8	1/4	1/4
	7.01 mph Ramp No. 1	1/2	9/16	4-1/16	3-1/16	--*	--*	4-1/16	--*
Condition III	12 in Drop No. 4	2-1/16	2-13/16	3/16	5/16	2-1/16	2-15/16	3/16	5/16
	7.04 mph Ramp No. 8	1/2	5/8	4	3-5/8	7/8	1	4	3-9/16

* No record; the displacement gage jammed during the test.

NOTE: 1. All displacements were relative between the XH-512 cradle and the container frame. Directions are with respect to the longitudinal axis of the container as mounted on the ramp dolly.