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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date 11/9/98
Authority: Name: R Blanar
2nd Review Date 11/19/98
Authority: ADD
Name: W Lane
Classification Changed to: U
Contains No DOE Classified Information
Coordinate With
Contains UCNI
Comments: OK to Release

TCG-NNT-1

JUN 12 1958
Case No. 433.00
Ref. Sym: 1612 (738)
Project No. TM-784
File: H-525, 3-2

MR. L. A. DUNN - 1284

Attn: Mr. W. C. Womack - 1284

Re: Ramp Test of Tie-Down Bands

INVENTORIED
SEP 14 1965
3428-3

INVENTORIED
AUG 6 1964
3427-1

## Summary of Results

Three types of wire fabric slings used as tie-down bands on the rear position of an XH-525 atomic weapon trailer containing a dummy XW-27 weapon were subjected to ramp tests as specified in SCS-5, paragraph 3.4.2 and one maximum velocity (about 9.8 mph) ramp test each. Two of the slings were four inches wide, one of which was neoprene covered, and one six inches wide neoprene covered.

The maximum vertical accelerations the dummy XW-27 weapon received while using: The four-inch plain wire fabric sling was 3.2 g; the four-inch neoprene covered wire fabric sling was 3.0 g; and the six-inch neoprene covered wire fabric sling was 2.5 g. No damage to the sling was noted due to the accelerations.

INVENTORIED
MAR 2 1959
BY ORG. 4/22

## Object of Test

The object of this test was to subject three wire fabric slings used as tie-down bands on an XH-525 atomic weapon trailer containing a XW-27 weapon to ramp tests in accordance with SCS-5, paragraph 3.4.2, and maximum velocity ramp tests.

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## Reason for Test

This test was requested in a Work Order Authorization from L. A. Dunn, 1284, to P. H. Adams, 1612, dated February 12, 1958.

## Summary of Past Tests

No previous ramp test of tie-down bands has been conducted by Department 1610.

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FILE No. H-525 3-2

## Setup for Test

The test setup was as shown in Fig. 1.

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Carmelita Gallegos 11/9/98
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RECORD #
WC Layne 12/16/98
PERSON VERIFYING MARKING & DATE
DATED: 11/10/98

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The components tested were as follows:

XW-27 weapon (dummy), Serial No. AA-2008-G6,
XH-525 trailer, atomic weapon, Serial No. GF-1009-Q7,
Four-inch wire mesh tie-down band,
Four-inch wire mesh tie-down band, neoprene covered, and
Six-inch wire mesh tie-down band, neoprene covered.

The following equipment was used to conduct the test:

Engineering test ramp,
Miller amplifiers, Type C-3, Model CA-12, Serial No. 7,
Miller recording oscillograph, Model J, Serial No. 99.

Statham accelerometers were used to measure accelerations on the XW-27 weapon, the XH-525 trailer and the ramp dolly as shown in Figs. 1 and 2. Table I is a tabulation of the accelerometers used and their locations.

Procedure

The ramp test was performed by attaching the XH-525 trailer to the ramp dolly as shown in Fig. 1. The three tie-down bands (Fig. 2) were each subjected ramp tests in accordance with SCS-5, paragraph 3.4.2, and maximum velocities obtainable.

Impact velocities were measured during the ramp tests by a microswitch on the ramp dolly which was operated by two switch operators on the ground a known distance apart as shown in Fig. 1. A voltage was applied through the microswitch to a galvanometer in the recording oscillograph.

The ramp test was conducted using two 4 x 4-inch wood blocks as bumpers.

Results

There was no damage to the tie-down bands as a result of the ramp tests.

Tables II, III, and IV are tabulations of the maximum accelerations, durations, and impact velocities recorded during the tests on each tie-down band.

B. W. DUGGIN - 1612-1

L. P. NAVODA - 1612-1

Approved by: PAUL H. ADAMS - 1612

JUN 1 2 1958

Ref. Sym: 1612 (738)
Project No. TM-784



BWD:1612-1:as

DISTRIBUTION:
1/5A - L. A. Dunn, 1284
2/5A - W. A. Gardner, 1610
3/5A - D. M. Bruce, 1282
4/5A - C. L. Gomel, 5523
5/5A - R. K. Smeltzer, 7221-3

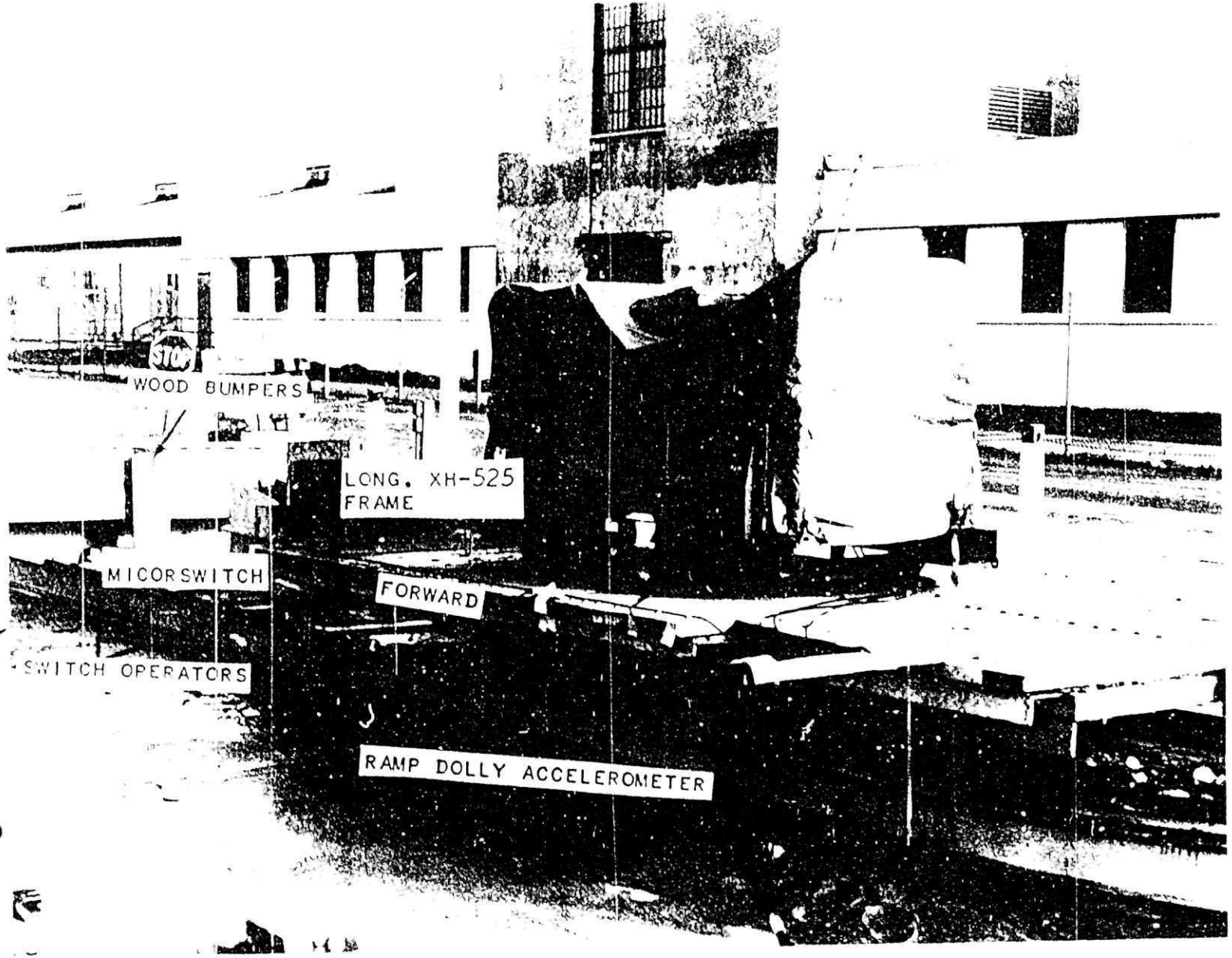


FIG. 1 -- TEST SETUP AND INSTRUMENTATION USED DURING DRY TEST OF TIE-DOWN BANDS.

REF. SYM: 1612 (738)
PROJECT NO. TW-784

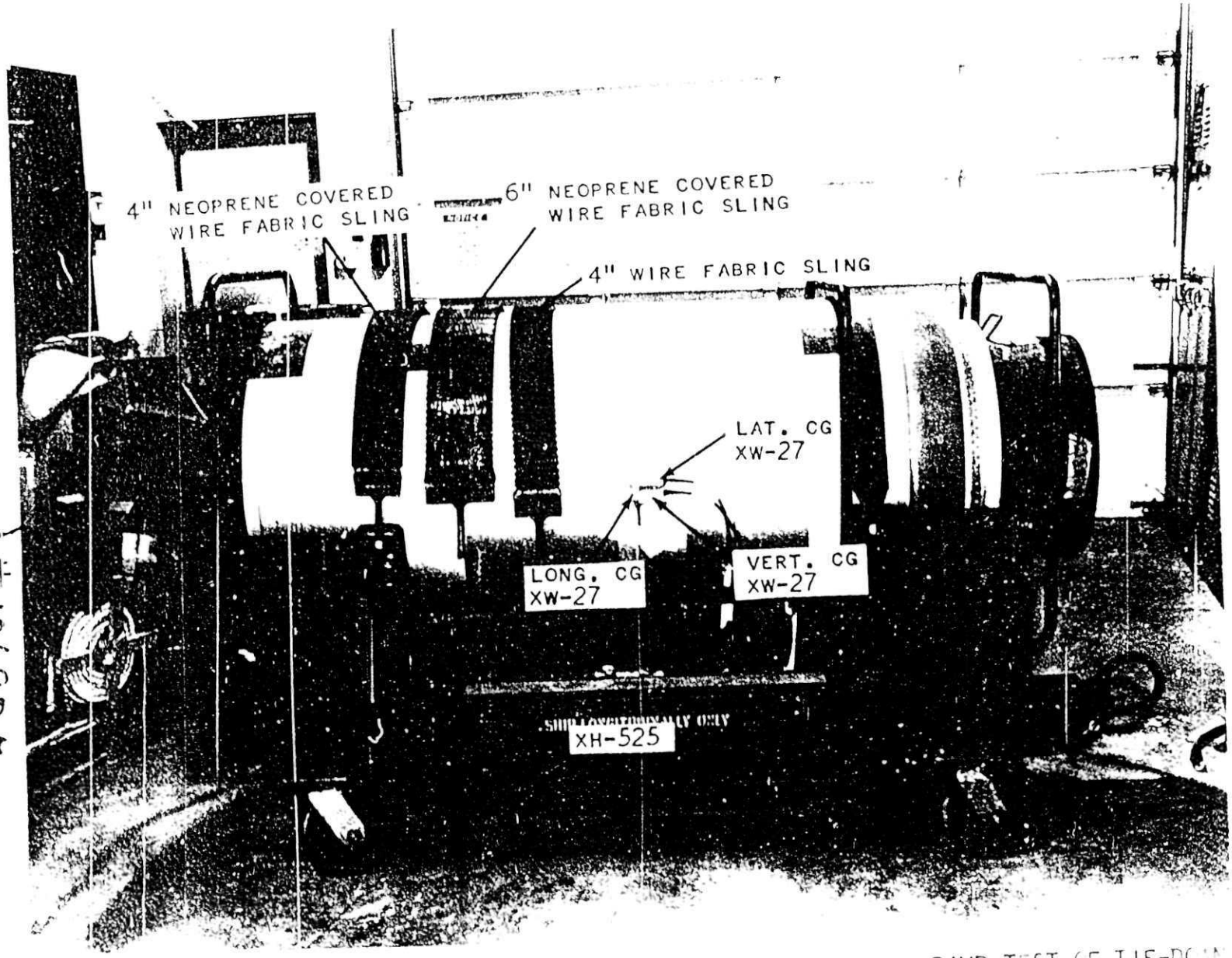


FIG. 2 -- TIE-DOWN BANDS TESTED AND INSTRUMENTATION USED DURING RAMP TEST OF TIE-DOWN BANDS.

REF. SYW: 1612 (73P)
PROJECT NO. TN-784

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Ref. Sym: 1612 (738)
Project No. TM-784

TABLE I

ACCELEROMETERS AND THEIR LOCATIONS USED DURING RAMP TEST OF TIE-DOWN BANDS

| Accelerometer No. | Accelerometer Location | Serial No. | Model No. |
|---|---|---|---|
| 1 | Long., Ramp Dolly | 278 | A5A-50-240 |
| 2 | Long., XH-525 Frame | 2190 | A5A-100-350 |
| 3 | Long., CG XW-27 | 1373 | Fa-100-300 |
| 4 | Vert., CG XW-27 | 2078 | Fa-100-350 |
| 5 | Lat., CG XW-27 | 2564 | Fa-50-300 |

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TABLE II

MAXIMUM *ACCELERATIONS, DURATIONS, AND IMPACT VELOCITIES RECORDED DURING RAMP TEST OF TIE-DOWN BANDS

FOUR-INCH WIRE MESH BAND

| Accelerometer No. and Location | Run 1 - 5.5 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 2 - 5.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 13.0 | -11.0 | 0.075 | 0.036 | -- | 15.5 | -12.0 | 0.005 | 0.029 |
| 2. Long., XH-525 Frame | 7.0 | 20.0 | -11.0 | 0.002 | 0.042 | 10.0 | 24.0 | -11.0 | 0.002 | 0.036 |
| 3. Long., CG XW-27 | 3.2 | 5.0 | -5.0 | 0.041 | 0.128 | 3.7 | 5.5 | -5.5 | 0.044 | 0.135 |
| 4. Vert., CG XW-27 | 1.5 | 1.0 | +1.0 | 0.026 | 0.086 | 1.7 | 1.0 | +1.7 | 0.027 | 0.095 |
| 5. Lat., CG XW-27 | 0.5 | 1.0 | -- | -- | -- | 0.7 | 1.0 | -- | -- | -- |

| Accelerometer No. and Location | Run 3 - 6.3 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 4 - 6.8 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 18.0 | -18.0 | 0.002 | 0.023 | -- | 16.5 | -15.5 | 0.010 | 0.033 |
| 2. Long., XH-525 Frame | 12.0 | 32.0 | -19.5 | 0.003 | 0.024 | 12.0 | 24.5 | -19.0 | 0.007 | 0.033 |
| 3. Long., CG XW-27 | 4.0 | 5.7 | -5.7 | 0.028 | 0.132 | 4.4 | 6.2 | -6.2 | 0.042 | 0.128 |
| 4. Vert., CG XW-27 | 1.0 | 1.0 | +1.0 | 0.032 | 0.098 | 1.4 | 1.0 | +1.4 | 0.031 | 0.099 |
| 5. Lat., CG XW-27 | 1.7 | 1.7 | -- | -- | -- | 2.0 | 1.2 | -- | -- | -- |

| Accelerometer No. and Location | Run 5 - 6.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 6 - 9.7 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 17.5 | -15.8 | 0.009 | 0.031 | -- | 27.0 | -24.5 | 0.012 | 0.024 |
| 2. Long., XH-525 Frame | 9.0 | 28.0 | -18.0 | 0.007 | 0.027 | 24.0 | 37.0 | -27.0 | 0.015 | 0.025 |
| 3. Long., CG XW-27 | 4.0 | 6.5 | -6.5 | 0.045 | 0.132 | 6.5 | 11.8 | -10.5 | 0.044 | 0.127 |
| 4. Vert., CG XW-27 | 1.5 | 1.0 | +1.5 | 0.043 | 0.097 | 3.2 | 2.5 | +2.0 | 0.048 | 0.113 |
| 5. Lat., CG XW-27 | 1.7 | 1.5 | -- | -- | -- | 3.7 | 3.2 | -- | -- | -- |

* Accelerations directions are plus (+) up, forward and to the right

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TABLE III

MAXIMUM *ACCELERATIONS, DURATIONS, AND IMPACT VELOCITIES RECORDED DURING RAMP TEST OF TIE-DOWN BANDS

SIX-INCH WIRE MESH BAND NEOPRENE COVERED

| Accelerometer No. and Location | Run 7 - 5.1 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 8 - 5.5 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 15.0 | -12.0 | 0.002 | 0.032 | — | 22.2 | -16.5 | 0.001 | 0.020 |
| 2. Long., XH-525 Frame | 9.0 | 27.0 | -16.0 | 0.006 | 0.012 | 14.0 | 34.0 | -21.0 | 0.003 | 0.019 |
| 3. Long., CG XW-27 | 2.8 | 6.0 | -4.5 | 0.041 | 0.141 | 3.0 | 4.6 | -4.6 | 0.041 | 0.135 |
| 4. Vert., CG XW-27 | 1.0 | 1.0 | — | -- | — | 1.0 | 1.5 | -- | -- | — |
| 5. Lat., CG XW-27 | 2.6 | 3.2 | -- | — | -- | 1.4 | 2.0 | — | -- | -- |

| Accelerometer No. and Location | Run 9 - 6.0 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 10 - 6.4 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | — | 20.0 | -18.0 | 0.002 | 0.024 | -- | 17.5 | -14.5 | 0.009 | 0.025 |
| 2. Long., XH-525 Frame | 14.0 | 42.0 | -21.0 | 0.006 | 0.022 | 24.0 | 28.0 | -17.0 | 0.007 | 0.025 |
| 3. Long., CG XW-27 | 2.2 | 3.0 | -2.6 | 0.040 | 0.137 | 4.0 | 6.0 | -5.4 | 0.042 | 0.140 |
| 4. Vert., CG XW-27 | 2.5 | 1.5 | — | -- | — | 2.0 | 2.0 | — | — | -- |
| 5. Lat., CG XW-27 | 3.0 | 3.0 | — | -- | -- | 3.5 | 3.3 | — | -- | -- |

* Accelerations directions are plus (+) up, forward, and to the right.

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TABLE III (Continued)

MAXIMUM *ACCELERATIONS, DURATIONS, AND IMPACT VELOCITIES RECORDED DURING RAMP TEST OF TIE-DOWN BANDS

SIX-INCH WIRE MESH BAND NEOPRENE COVERED

| Accelerometer No. and Location | Run 11 - 6.7 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 12 - 6.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | — | 19.0 | -16.5 | 0.006 | 0.027 | — | 17.0 | -15.5 | 0.009 | 0.033 |
| 2. Long., XH-525 Frame | 13.0 | 35.0 | -19.0 | 0.006 | 0.026 | 8.0 | 28.0 | -17.0 | 0.009 | 0.032 |
| 3. Long., CG XW-27 | 4.5 | 6.0 | -6.0 | 0.049 | 0.130 | 4.2 | 6.5 | -6.5 | 0.046 | 0.142 |
| 4. Vert., CG XW-27 | 2.0 | 2.0 | -- | — | — | 2.4 | 2.0 | -- | — | -- |
| 5. Lat., CG XW-27 | 4.0 | 3.8 | — | -- | -- | 4.2 | 4.5 | — | — | -- |

| Accelerometer No. and Location | Run 13 - 9.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 30.0 | -27.0 | 0.019 | 0.032 |
| 2. Long., XH-525 Frame | 8.0 | 36.0 | -32.0 | 0.019 | 0.030 |
| 3. Long., CG XW-27 | 4.8 | 11.0 | -11.0 | 0.045 | 0.130 |
| 4. Vert., CG XW-27 | 2.5 | 2.0 | — | -- | -- |
| 5. Lat., CG XW-27 | 3.6 | 4.5 | -- | — | — |

* Accelerations directions are plus (+) up, forward, and to the right.

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Project No. TM-784

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TABLE IV

MAXIMUM *ACCELERATIONS, DURATIONS, AND IMPACT VELOCITIES RECORDED DURING RAMP TEST OF TIE-DOWN BANDS

FOUR-INCH WIRE MESH BAND NEOPRENE COVERED

| Accelerometer No. and Location | Run 14 - 5.4 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 15 - 5.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 7.0 | -7.0 | 0.019 | 0.054 | -- | 12.0 | -11.0 | 0.004 | 0.037 |
| 2. Long., XH-525 Frame | 17.0 | 19.0 | -7.0 | 0.007 | 0.053 | 5.0 | 20.0 | -12.0 | 0.007 | 0.035 |
| 3. Long., CG XW-27 | 3.0 | 5.0 | -4.5 | 0.044 | 0.138 | 3.0 | 5.2 | -5.2 | 0.041 | 0.136 |
| 4. Vert., CG XW-27 | 1.0 | 1.1 | -- | -- | -- | 1.6 | 1.4 | -- | -- | -- |
| 5. Lat., CG XW-27 | 3.4 | 3.9 | -- | -- | -- | 3.6 | 4.6 | -- | -- | -- |

| Accelerometer No. and Location | Run 16 - 6.3 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 17 - 6.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | -- | 13.0 | -12.0 | 0.005 | 0.038 | -- | 14.5 | -12.0 | 0.009 | 0.041 |
| 2. Long., XH-525 Frame | 9.0 | 19.0 | -13.0 | 0.006 | 0.036 | 14.0 | 25.0 | -13.0 | 0.004 | 0.035 |
| 3. Long., CG XW-27 | 3.1 | 6.0 | -6.0 | 0.044 | 0.139 | 3.0 | 6.0 | -6.0 | 0.043 | 0.132 |
| 4. Vert., CG XW-27 | 2.5 | 1.8 | -- | -- | -- | 2.0 | 1.4 | -- | -- | -- |
| 5. Lat., CG XW-27 | 4.5 | 6.7 | -- | -- | -- | 3.8 | 4.5 | -- | -- | -- |

| Accelerometer No. and Location | Run 18 Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) | Run 19 - 9.9 mph Max. Accel. +(g) | Max. Accel. -(g) | Max. Faired Pulse (g) | Rise Time (sec) | Pulse Duration (sec) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long., Ramp Cart | - - - - - - - - - -No Record- - - - - - - - - - | | | | | -- | 29.0 | -27.0 | 0.014 | 0.022 |
| 2. Long., XH-525 Frame | | | | | | 11.0 | 35.0 | -26.0 | 0.015 | 0.024 |
| 3. Long., CG XW-27 | | | | | | 5.0 | 11.2 | -11.2 | 0.043 | 0.132 |
| 4. Vert., CG XW-27 | | | | | | 3.0 | 2.5 | -- | -- | -- |
| 5. Lat., CG XW-27 | | | | | | 4.5 | 3.7 | -- | -- | -- |

* Accelerations directions are plus (+) up, forward, and to the right.

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