Asiana Airlines
San Francisco, CA
July 6, 2013
DCA13MA120

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ADDENDUM #1 – ATTACHMENT 1

Slide/raft Testing Report from MGA Research Corporation

174 Pages

REPORT NUMBER: MGA-C14S4-034M1.1

Accelerator Sled Test on Evacuation Slides as Part of Accident Investigation DCA13MA120

PREPARED BY:
MGA RESEARCH CORPORATION
11480 ROBERTSON DR.
MANASSAS, VA 20109

TEST DATES: January 21st & 22nd, 2014

FINAL REPORT DATE: February 11, 2014

FINAL REPORT

PREPARED FOR:
NTSB Human Performance and Survival Factors Division
490 L'Enfant Plaza East SW
Washington, D.C. 20594-0003

SIGNATURE APPROVAL PAGE

Procedure Number: NTSB 777 Sled Acceleration Test Plan
Accident Investigation DCA13MA12U

Prepared by: [redacted] Date: February 11, 2014
Patrick Smith, Project Engineer

Approved by: [redacted] Date: February 11, 2014
Steve Fazlovic, Project Engineer

Test Technicians: Thomas Miller

Secretary: Taylor Jukanovich

Engineer: Connor Hoover

The results presented in this report relate only to the specified test items. MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

This report replaces report number MGA-C14S4-034M.1 dated February 10, 2014.

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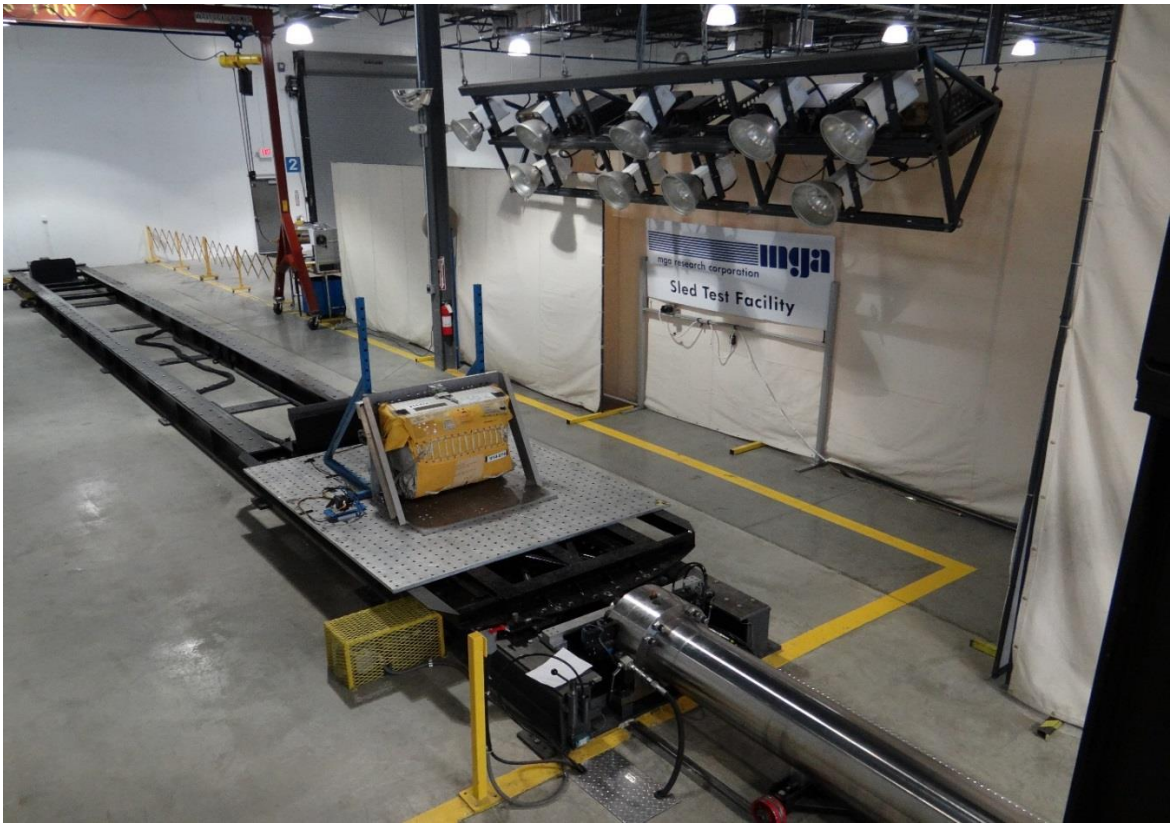
OVERALL TEST SUMMARY

MGA Research in Manassas, Virginia was contracted by the NTSB under contract number NTSBP140015 to perform a series of sled tests on an evacuation slide/raft as part of Accident Investigation DCA13MA120. The tests were based on the NTSB provided test plan EDN-4107 and any deviations made during testing were at the request of the NTSB investigation party.

Dynamic sled testing was performed on six (6) separate fully packed 777 evacuation slide/raft samples. The purpose of the testing was to understand the level of applied force needed to cause the slide/evacuation pack to release from the packboard. Three (3) orientations were used during the evaluation and are outlined in Table 1 – Summary of Test Data.

The tests were conducted on January 21st & 22nd, 2014.

Sled Facility used for Testing



Test Sample Information:

Sample Number	Serial Number	Slide/Raft Number	Slide/Raft Weight (lbs)
1	5002	62771-101	217.4
2	0278	62771-109	219.9
3	0024	62771-114	222.9
4	0032	62771-113	224.5
5	0003	65342-217	215.2
6	0006	62772-201	211.0

Table 1- Summary of Slide/Raft Identification

Test Results Summary:

MGA Test Number	Test Sample Number	Sample Orientation	Target Acceleration (g) Level	Actual Acceleration (g) Level	Time (ms) of Max Acceleration (g)	Damage	Time (ms) of Damage	Acceleration (g) Level at Time of Damage
V14-067	1	Inboard	3	3.2	140.7	No	N/A	N/A
V14-068	1	Inboard	7	5.1	121.4	No	N/A	N/A
V14-069	1	Inboard	7	7	116	No	N/A	N/A
V14-070	1	Inboard	9	8.9	120.3	No	N/A	N/A
V14-071	1	Inboard	11	10.8	109.3	No	N/A	N/A
V14-072	1	Inboard	13	12.6	100	No	N/A	N/A
V14-073	1	Inboard	15	14.8	92.6	Yes	99	14.4
V14-074	2	Inboard	15	15	91.1	Yes	86	14.2
V14-075	3	Down	6.8	7.2	108	No	N/A	N/A
V14-076	3	Down	9	9	118.3	No	N/A	N/A
V14-077	3	Down	11	10.9	107.6	No	N/A	N/A
V14-078	3	Down	13	13.5	100.9	Yes	94-96	12.7-12.9
V14-079	4	Down	13	12.9	98	No	N/A	N/A
V14-080	4	Down	14	14	94.4	Yes	101	13.5
V14-081	5	45° Combined	10	10.1	107	No	N/A	N/A
V14-082	5	45° Combined	12	12.2	101.8	No	N/A	N/A
V14-083	5	45° Combined	14	13.5	99.6	Yes	90	12.4
V14-084	6	45° Combined	14	13.2	98.2	Yes	94-105	12.9-12.6

Table 1-Summary of Test Data

DATA PLOTS AND PHOTOGRAPHS

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3g Inboard Load Test

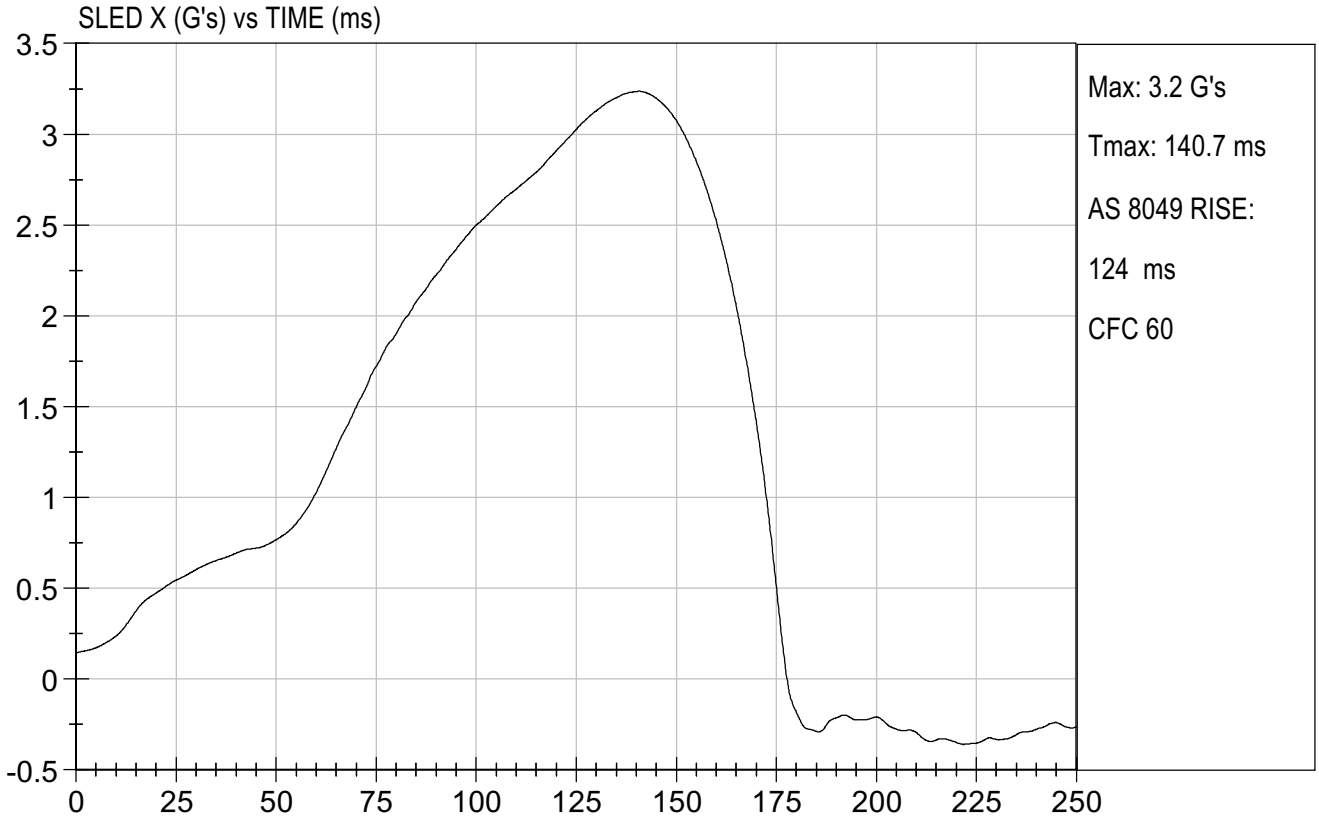
Test Information	
MGA Test Number	V14067
Test Date	01/21/2014
Run Number	1
Orientation	Inboard

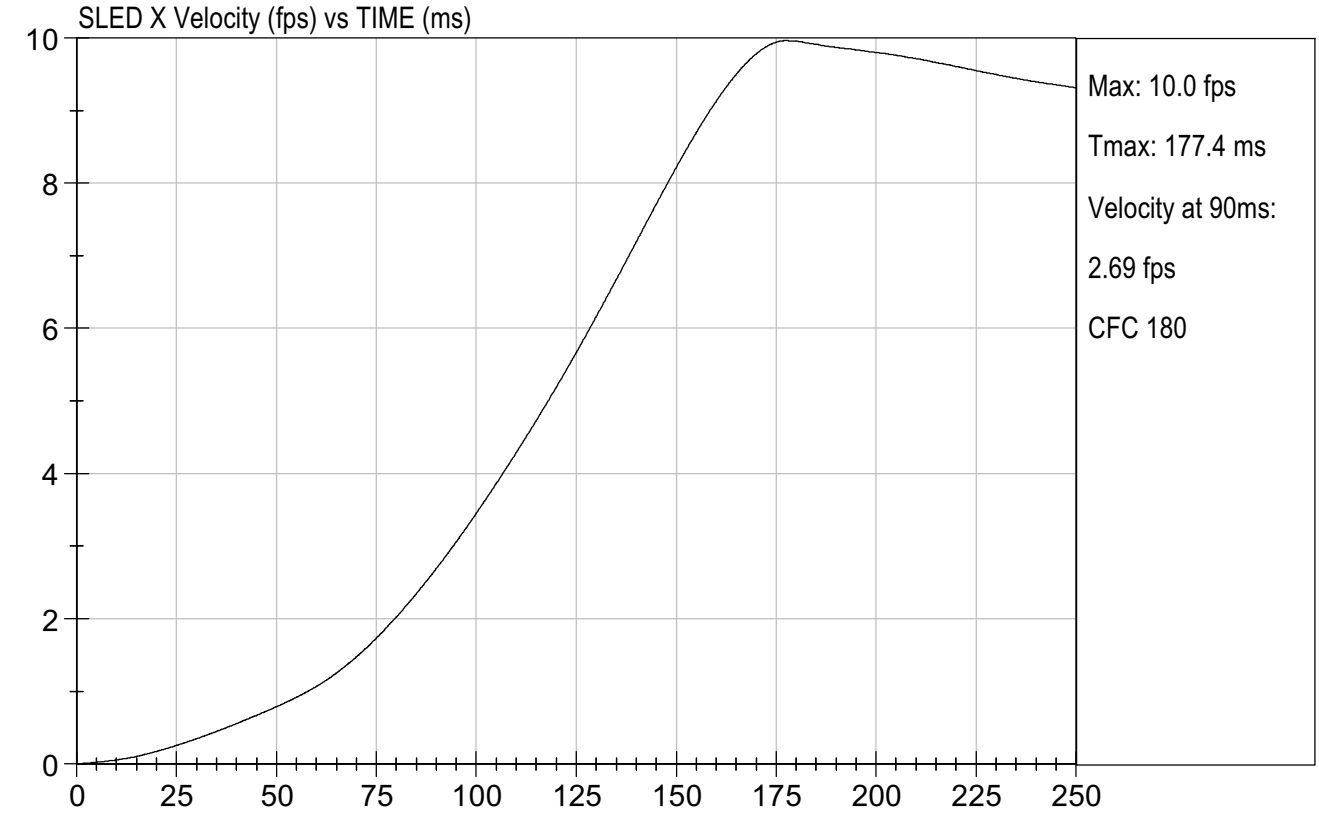
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	3.2
Time of Max Acceleration (ms)	140.7
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

(1) No damage observed
(2) Did not release

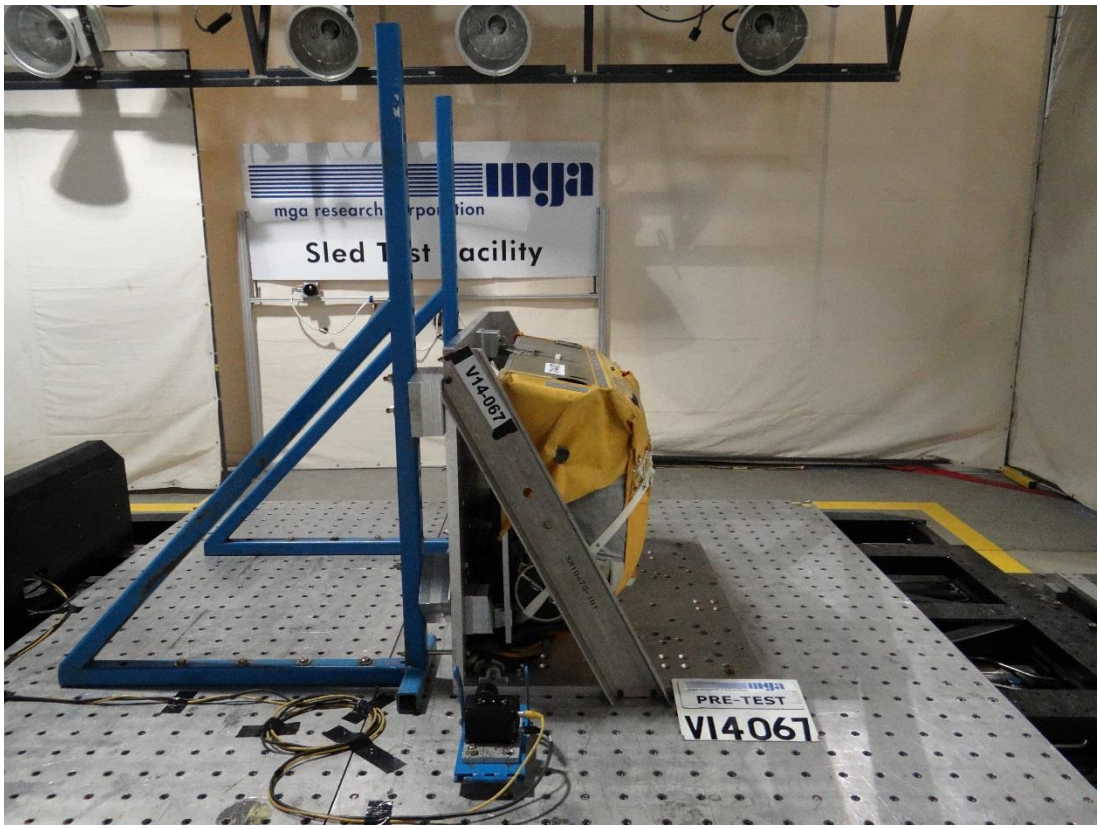

SLED X (G's) vs TIME (ms)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
0
25
50
75
100
125
150
175
200
225
250
Max: 3.2 G's
Tmax: 140.7 ms
AS 8049 RISE:
124 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
10
8
6
4
2
0
0
25
50
75
100
125
150
175
200
225
250
Max: 10.0 fps
Tmax: 177.4 ms
Velocity at 90ms:
2.69 fps
CFC 180

Pre Test Front View

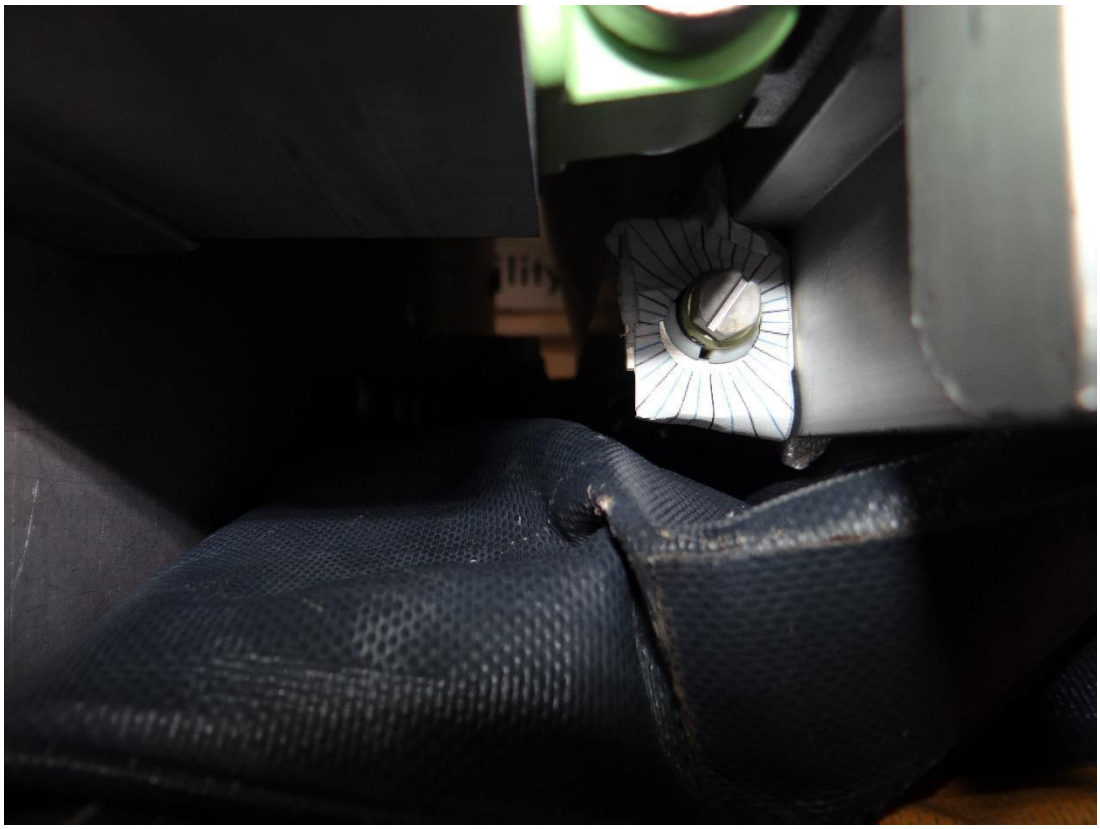
Pre Test Left Angle View

Pre Test Left Side View



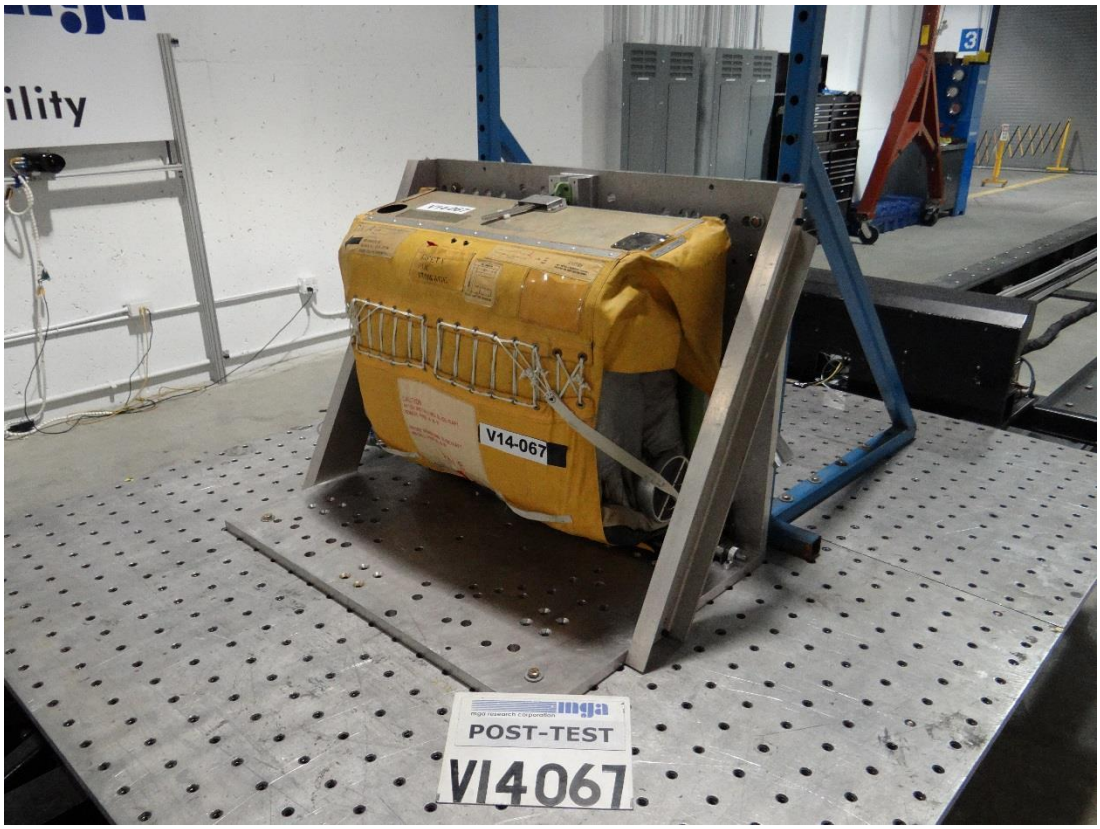
Pre Test Right Side View

Pre Test Right Angle View

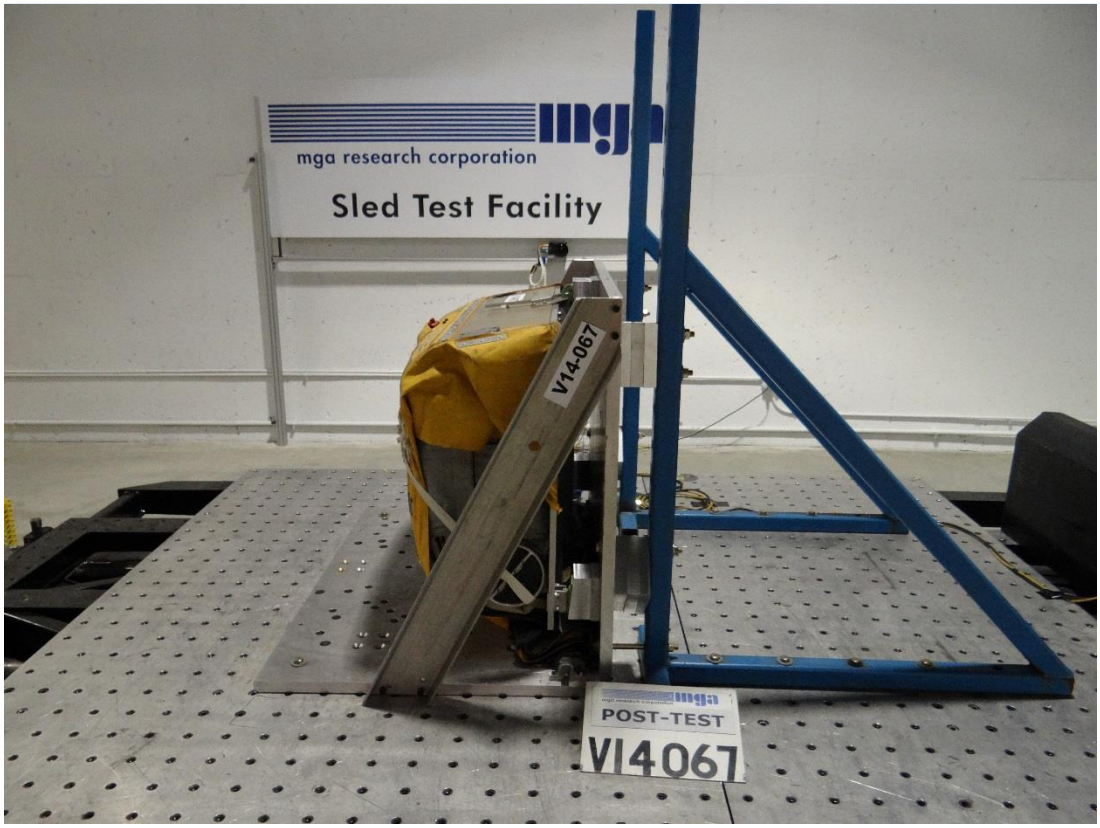


Pre Test Release Shaft Slotted Cap

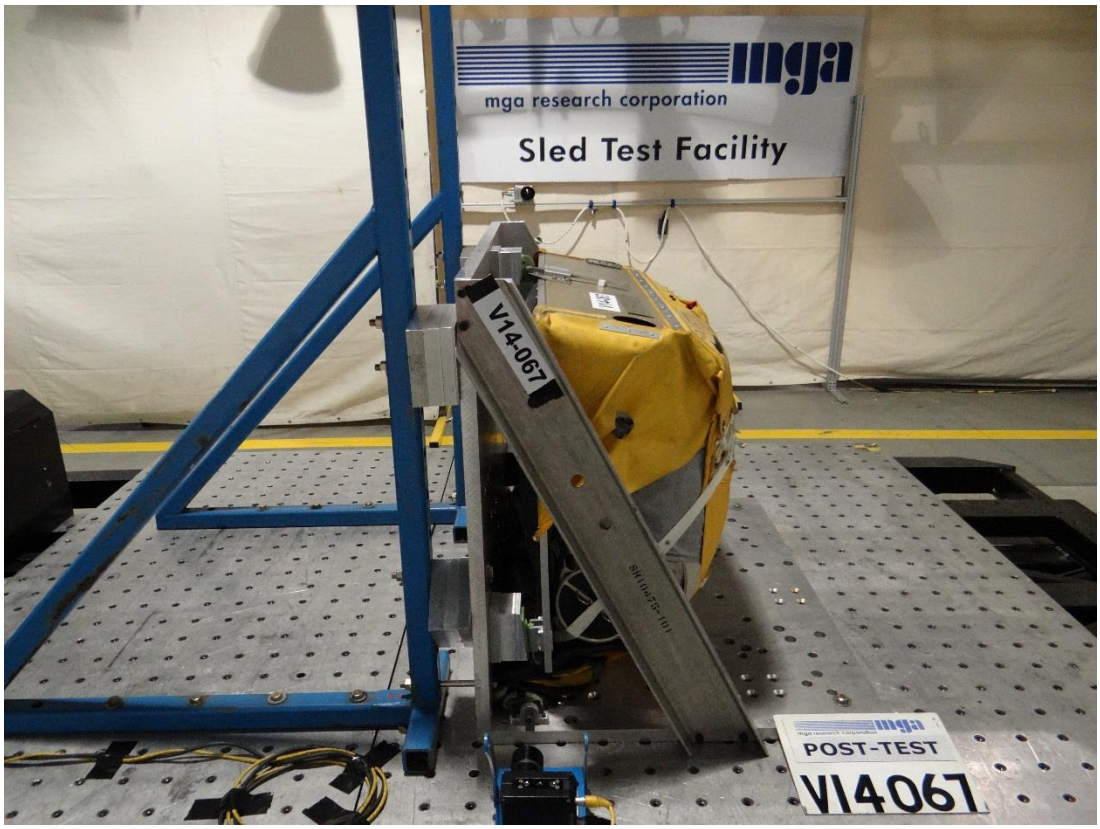
Post Test Front View



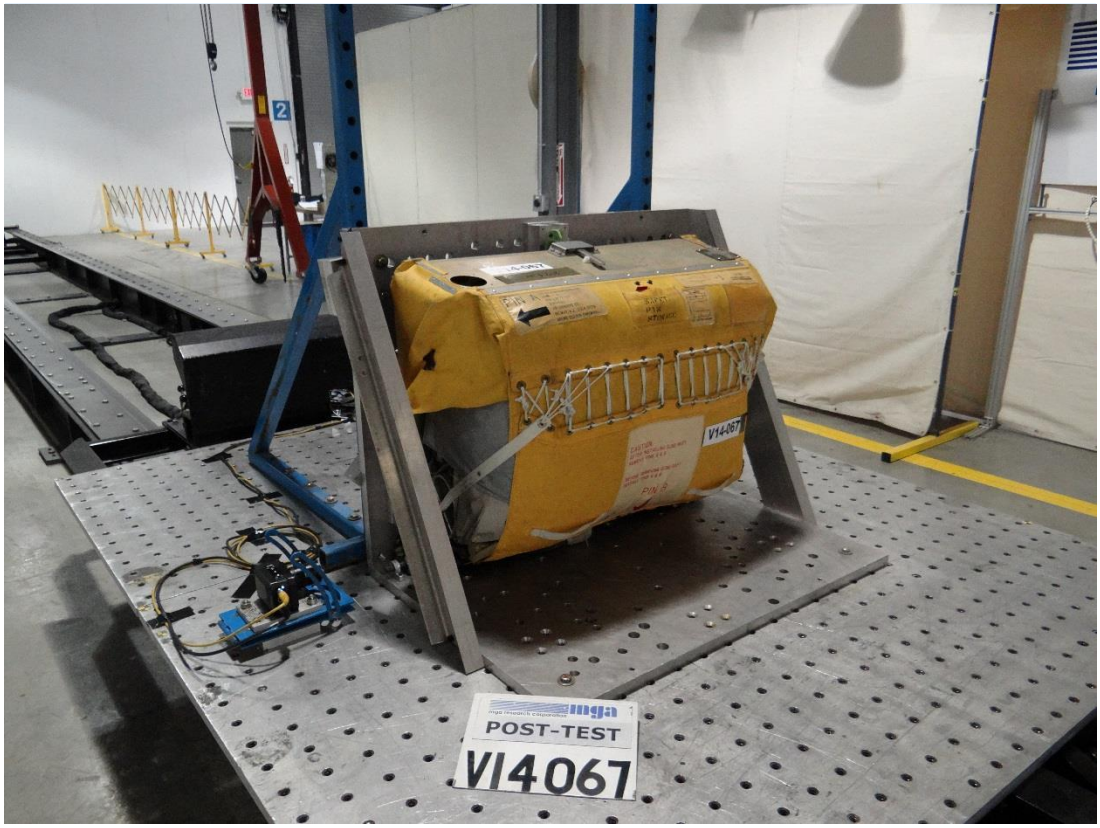
Post Test Left Angle View



Post Test Left Side View



Post Test Right Side View



Post Test Right Angle View

Post Test Release Shaft Slotted Cap

7g Inboard Load Test

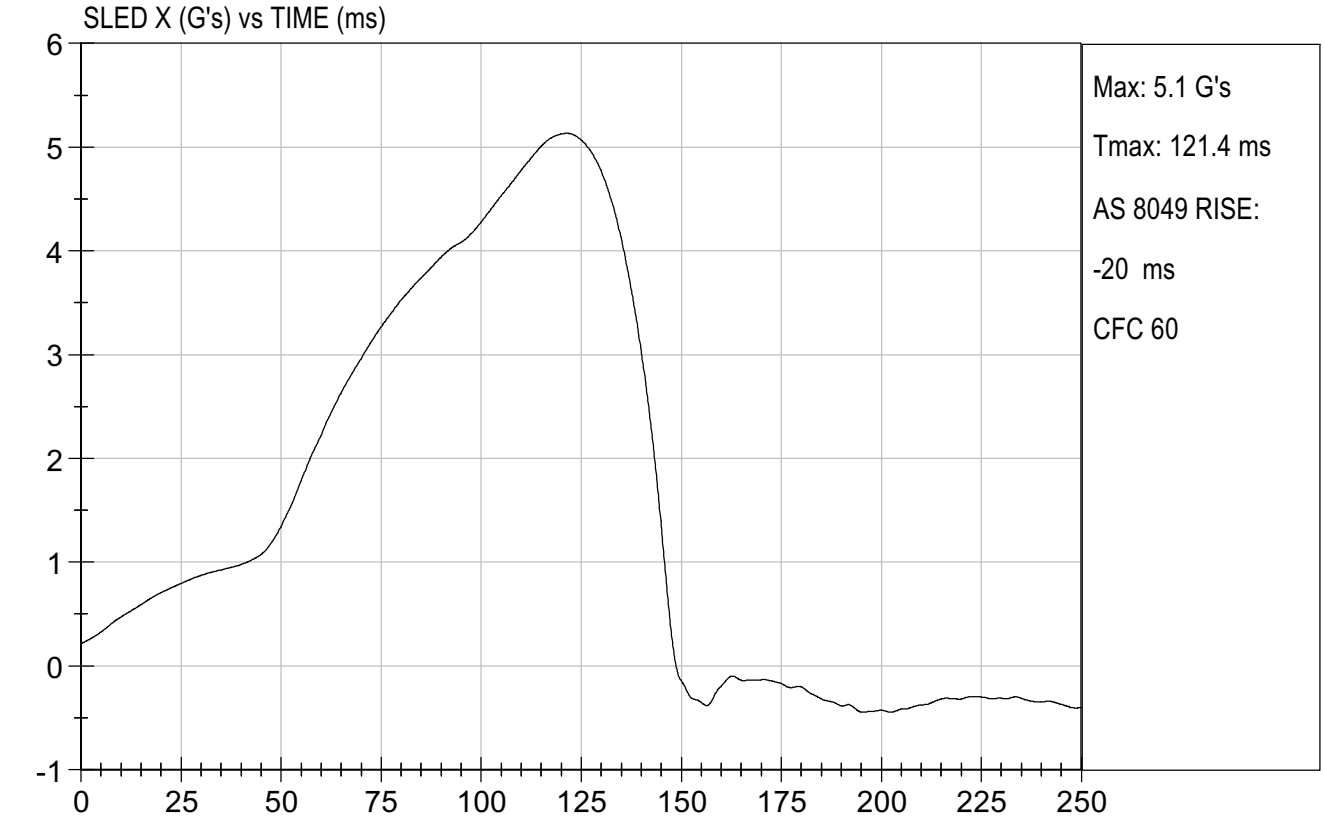
Test Information	
MGA Test Number	V14068
Test Date	01/21/2014
Run Number	2
Orientation	Inboard

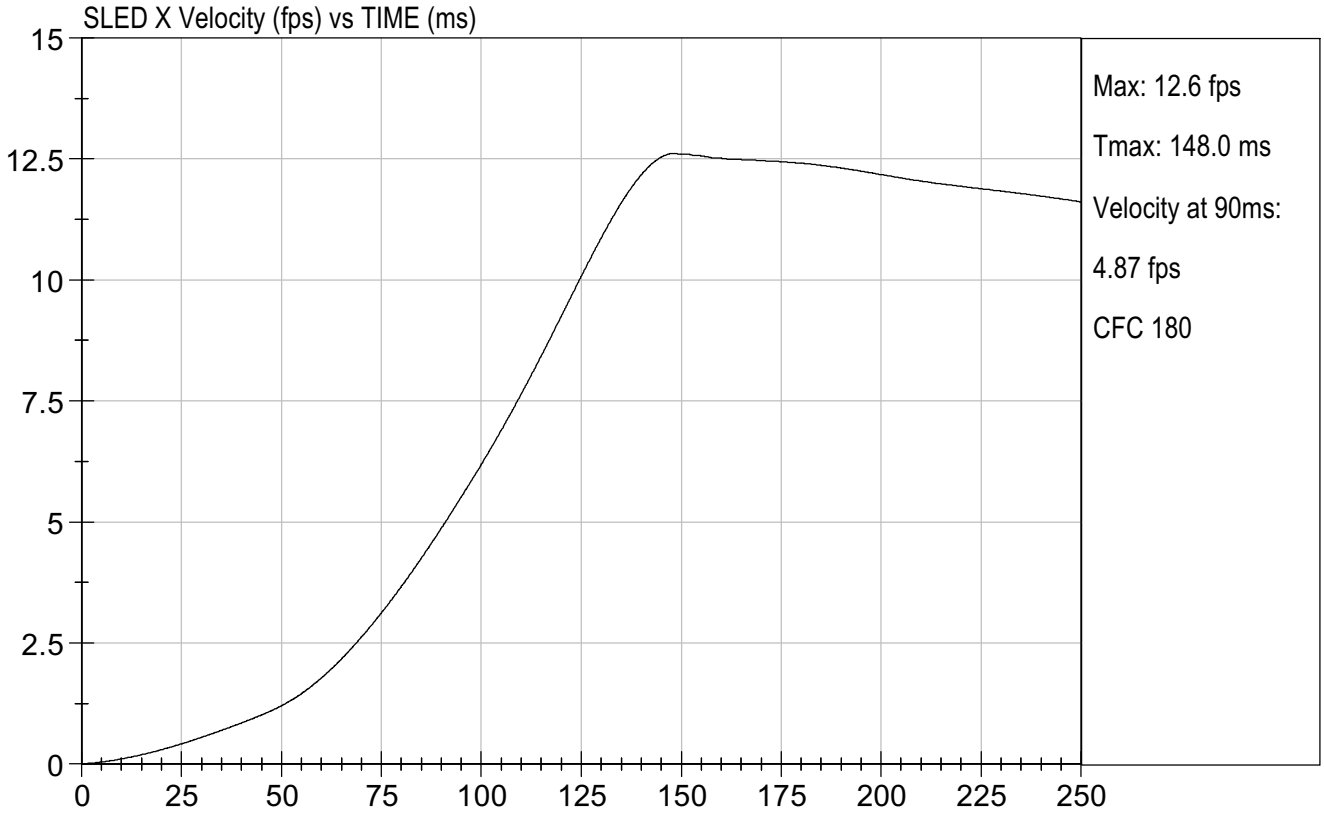
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	5.1
Time of Max Acceleration (ms)	121.4
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

(1) No damage observed
(2) Did not release

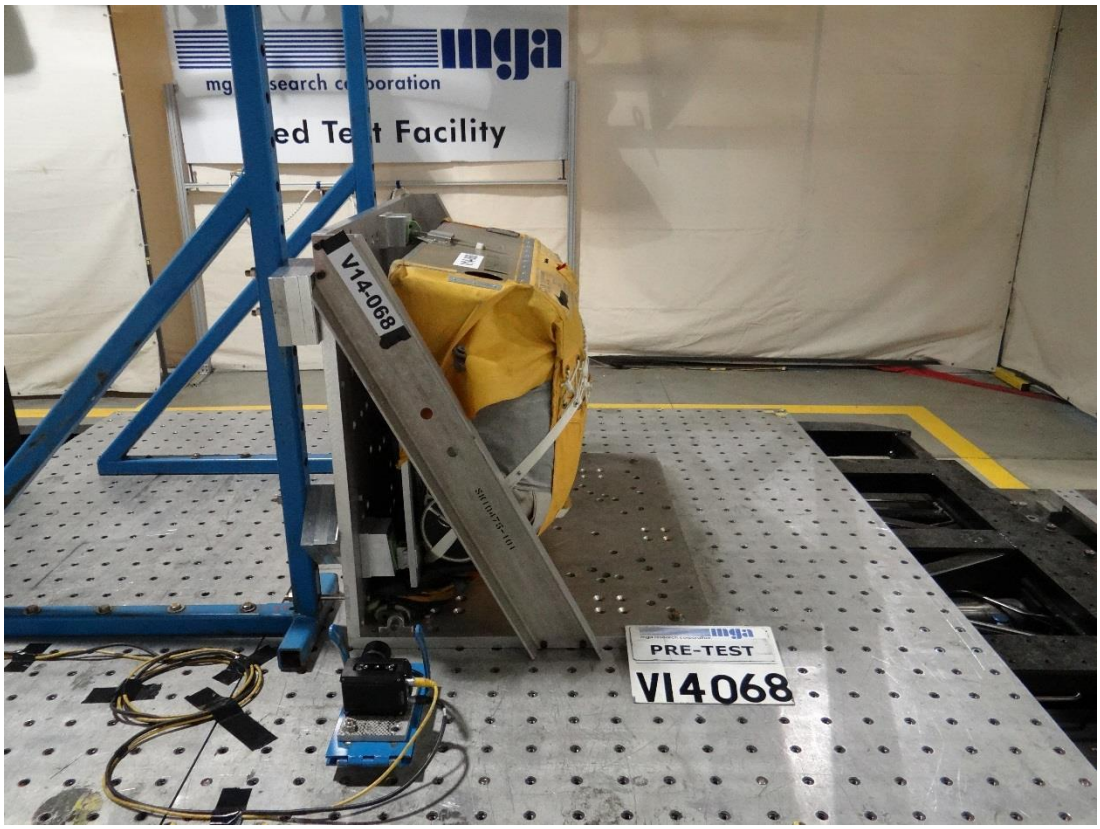

SLED X (G's) vs TIME (ms)
6
5
4
3
2
1
0
-1
0
25
50
75
100
125
150
175
200
225
250
Max: 5.1 G's
Tmax: 121.4 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 12.6 fps
Tmax: 148.0 ms
Velocity at 90ms:
4.87 fps
CFC 180

Pre Test Front View

Pre Test Left Angle View

Pre Test Left Side View



Pre Test Right Side View

Pre Test Right Angle View

Pre Test Release Shaft Slotted Cap

Post Test Front View

Post Test Left Angle View

Post Test Left Side View

Post Test Right Side View

Post Test Right Angle View

Post Test Release Shaft Slotted Cap

7g Inboard Load Test

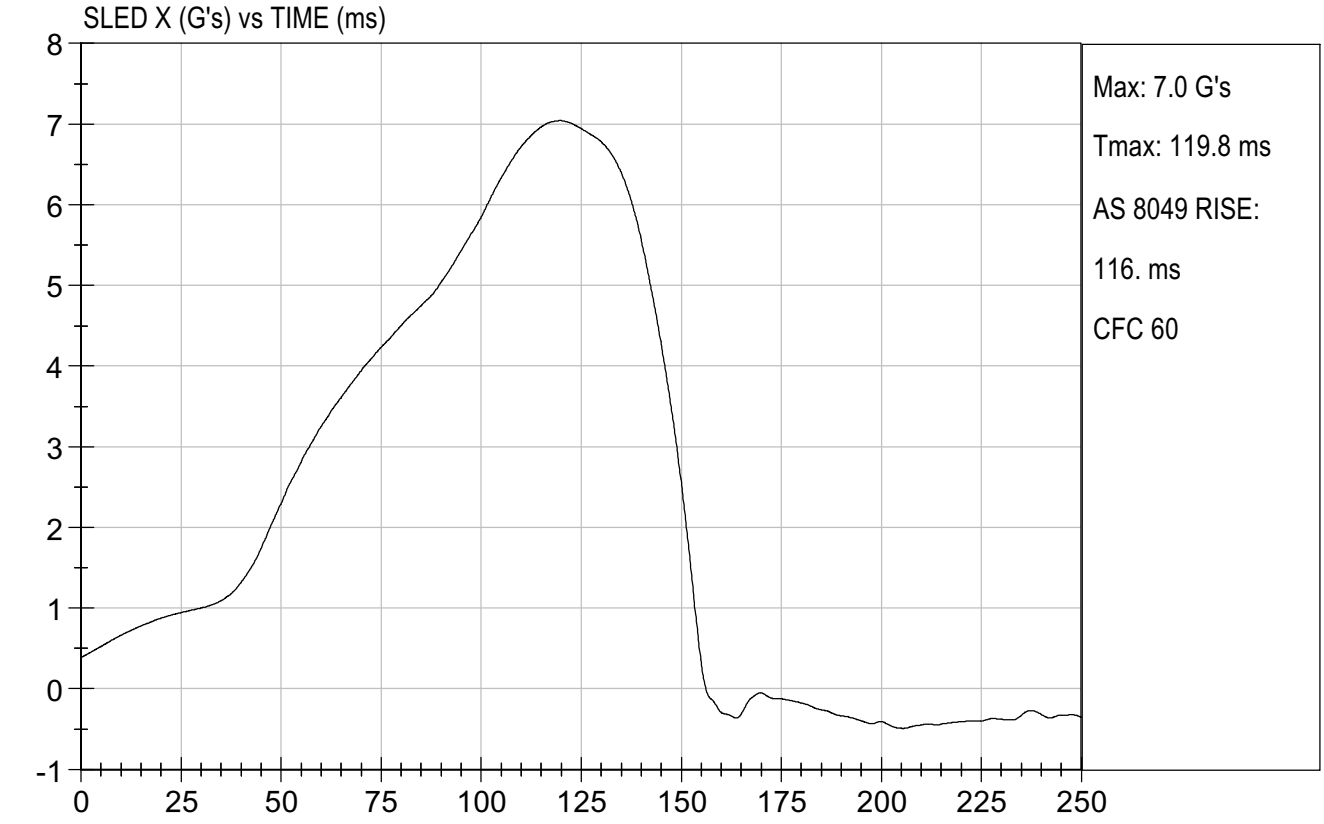
Test Information	
MGA Test Number	V14069
Test Date	01/21/2014
Run Number	3
Orientation	Inboard

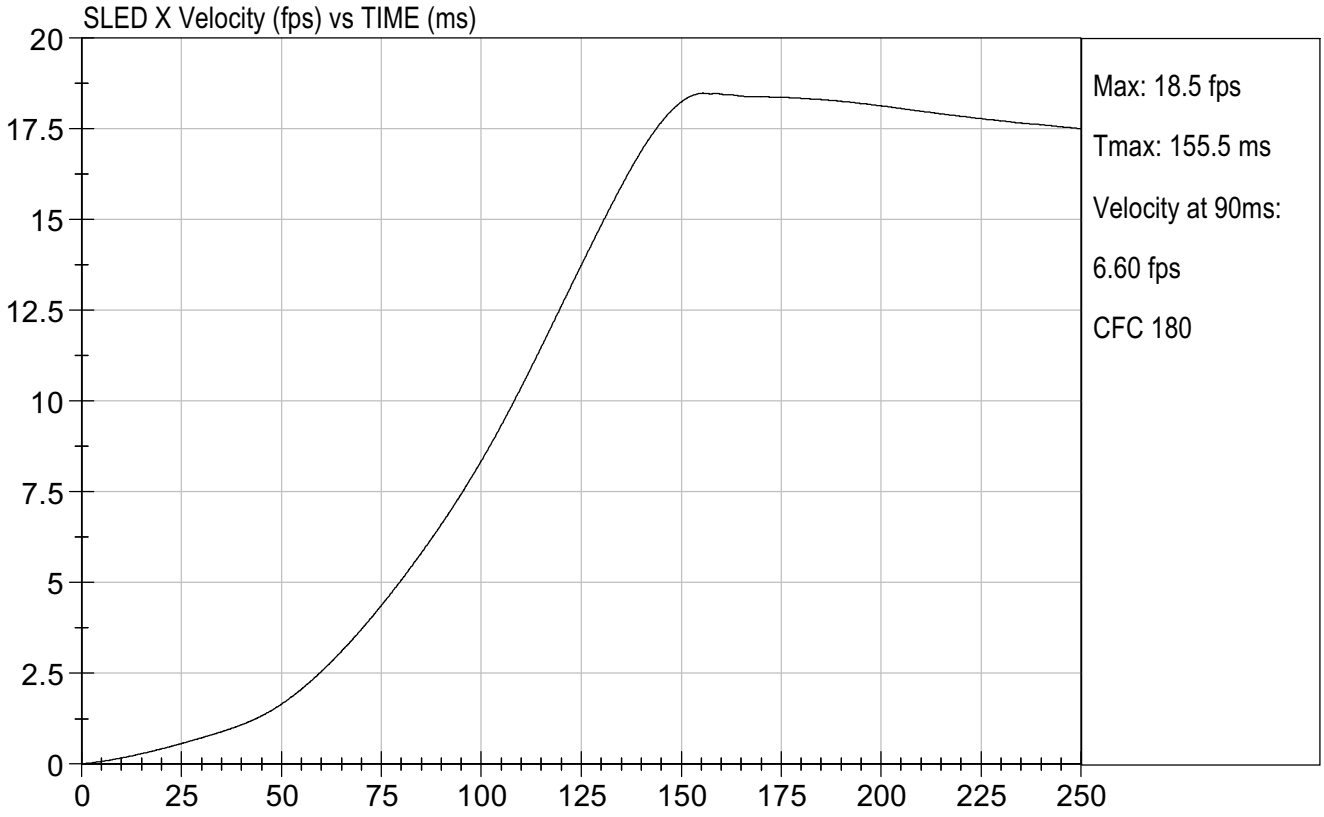
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	7
Time of Max Acceleration (ms)	116
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

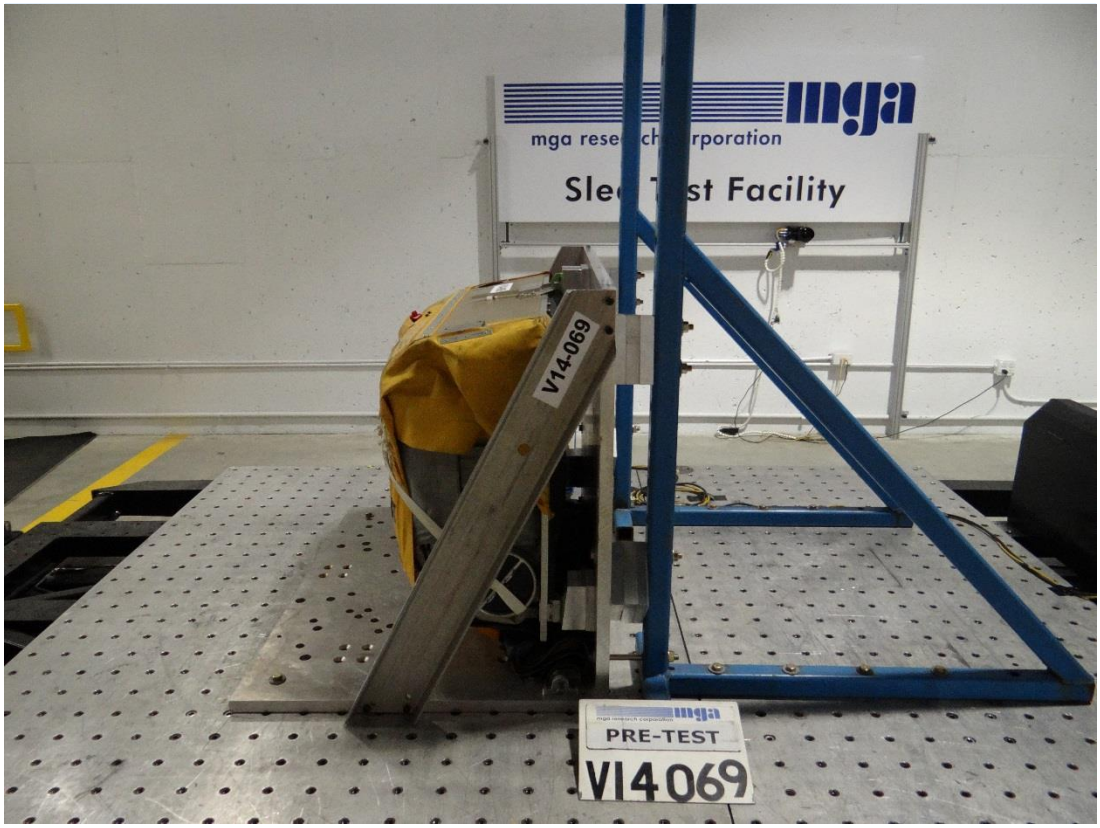
(1) No damage observed
(2) Did not release


SLED X (G's) vs TIME (ms)
8
7
6
5
4
3
2
1
0
-1
0
25
50
75
100
125
150
175
200
225
250
Max: 7.0 G's
Tmax: 119.8 ms
AS 8049 RISE:
116. ms
CFC 60

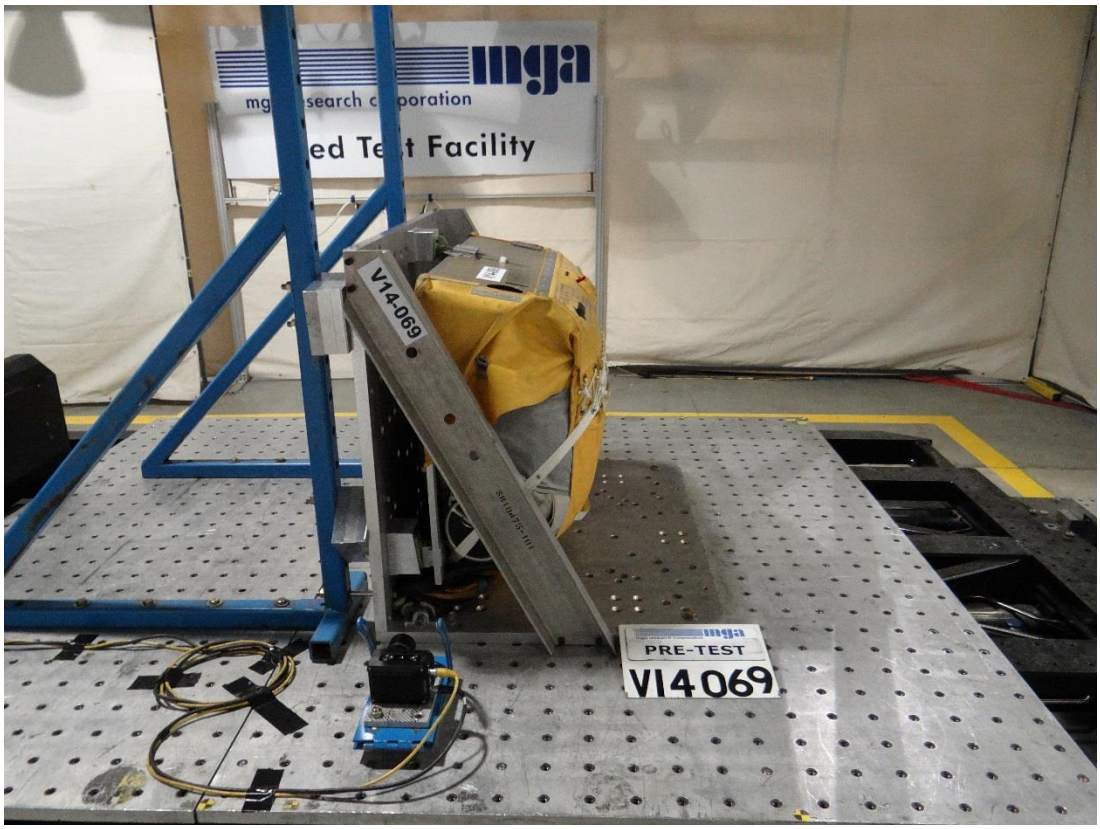

SLED X Velocity (fps) vs TIME (ms)
20
17.5
15
12.5
10
7.5
5
2.5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 18.5 fps
Tmax: 155.5 ms
Velocity at 90ms:
6.60 fps
CFC 180

Pre Test Front View

Pre Test Left Angle View



Pre Test Left Side View

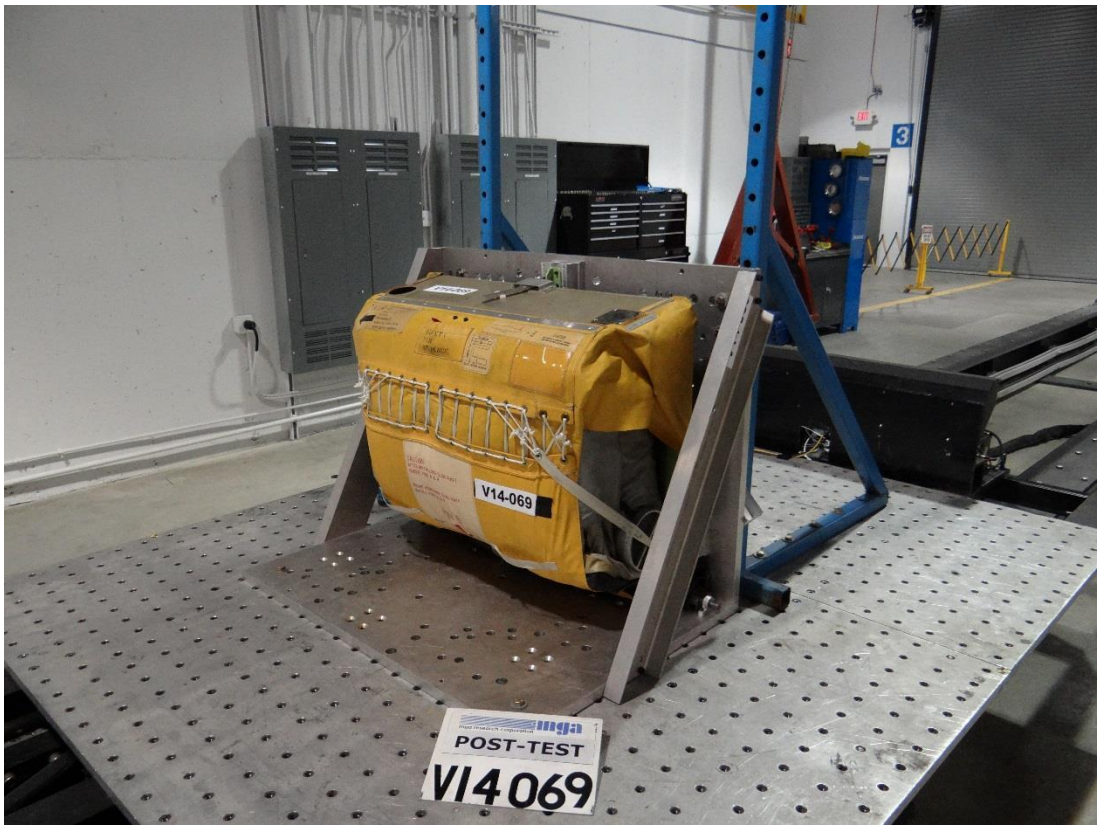


Pre Test Right Side View

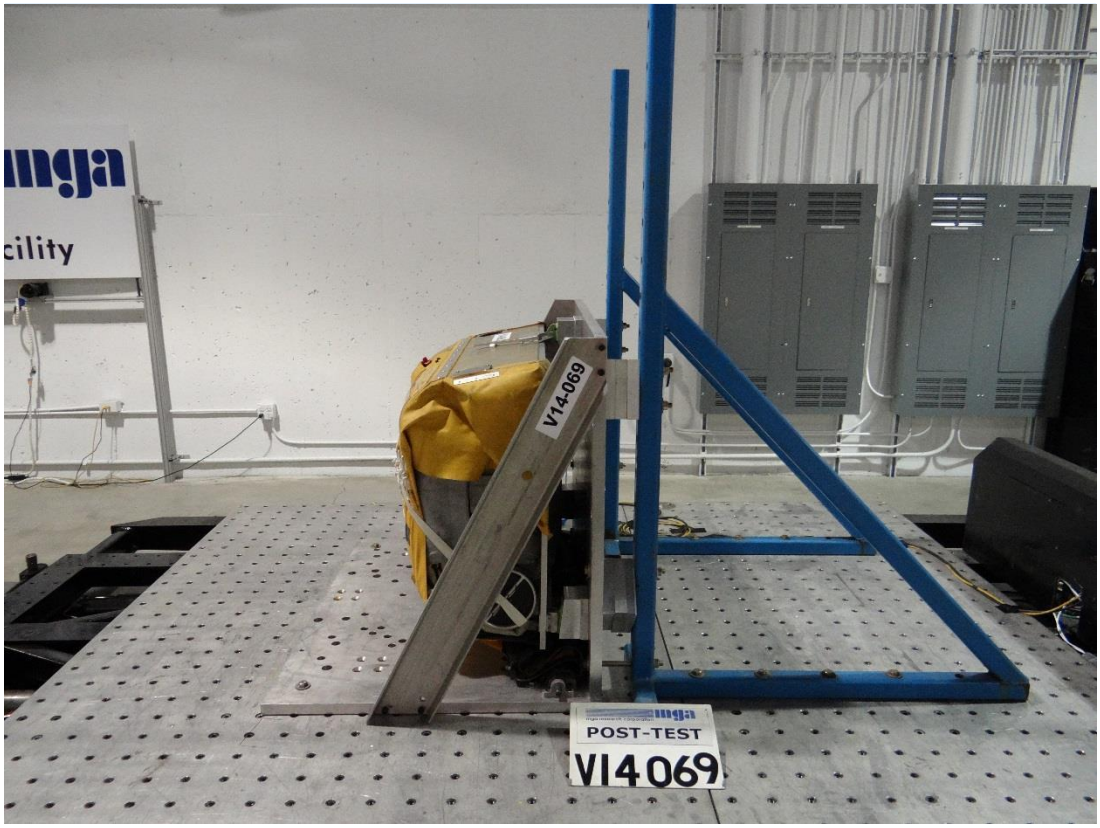
Pre Test Right Angle View

Pre Test Release Shaft Slotted Cap

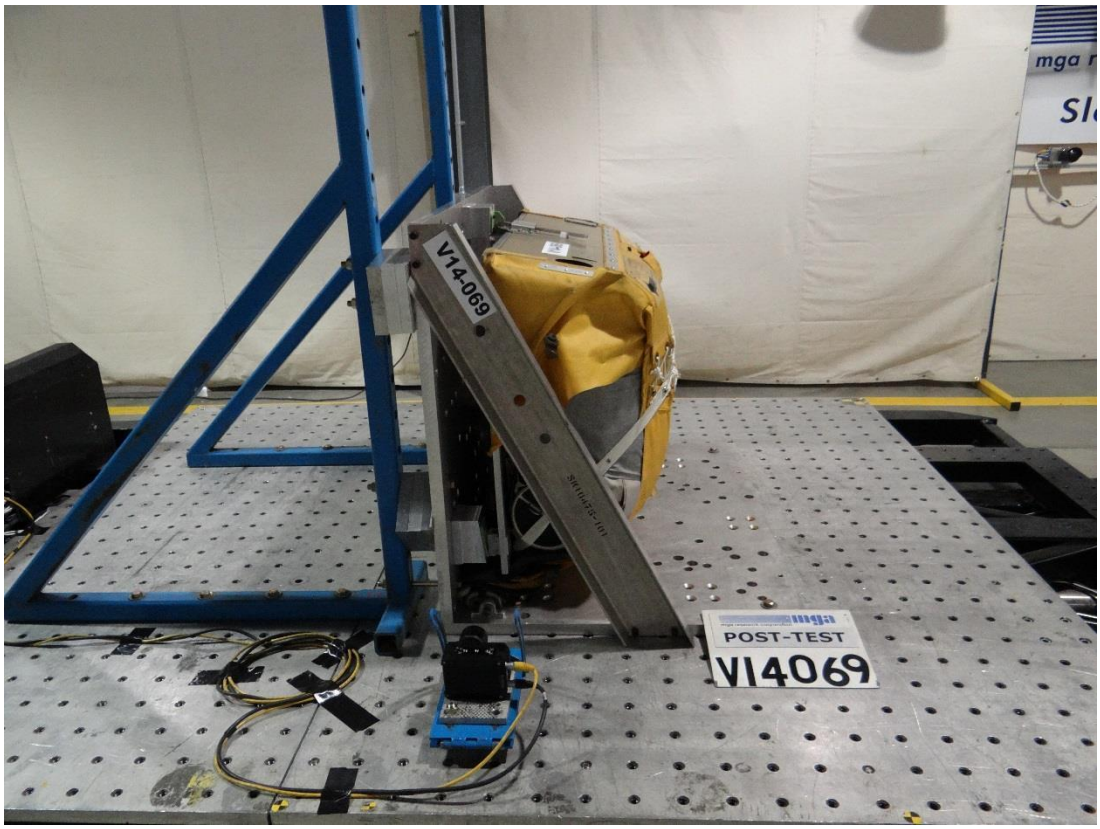
Post Test Front View



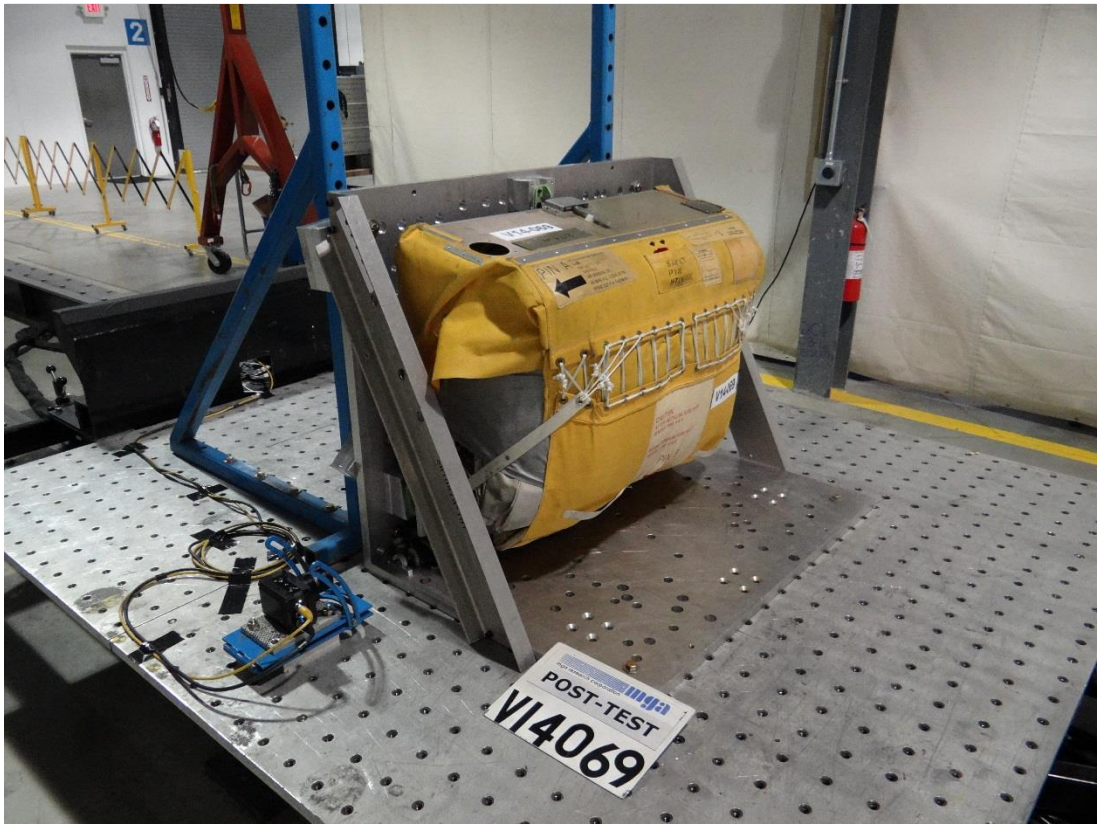
Post Test Left Angle View



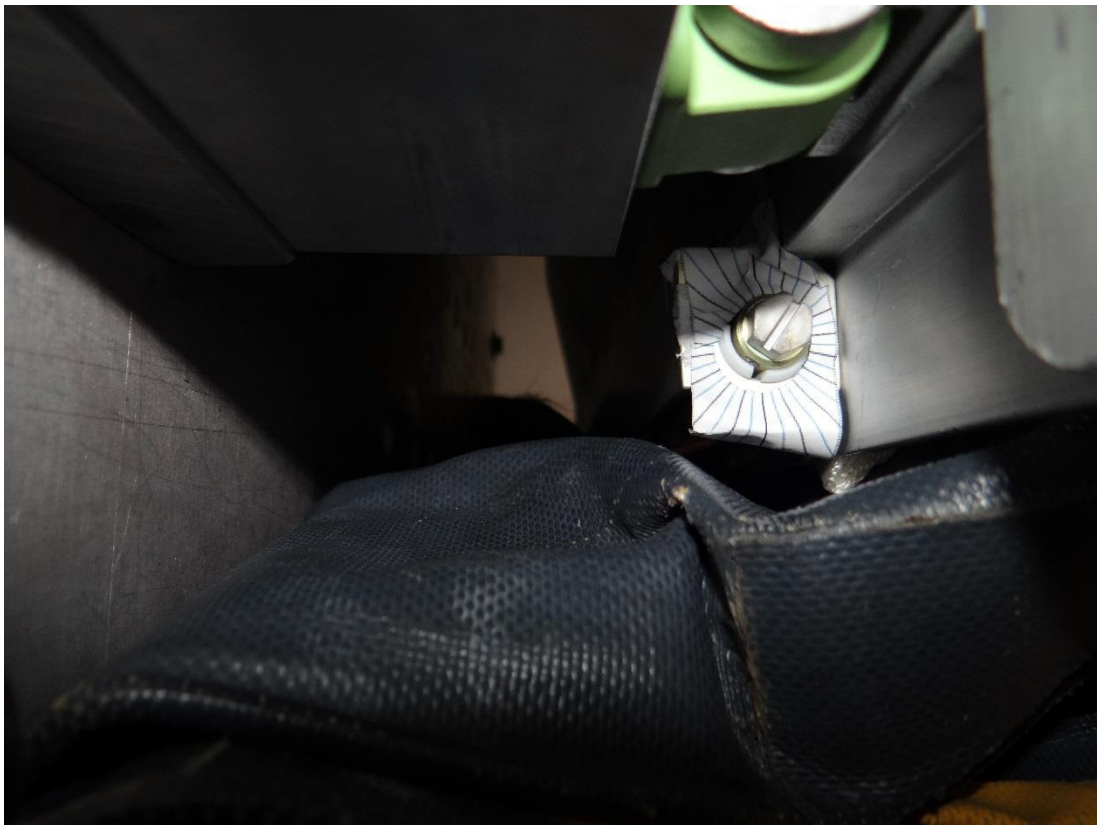
Post Test Left Side View



Post Test Right Side View



Post Test Right Angle View



Post Test Release Shaft Slotted Cap

9g Inboard Load Test

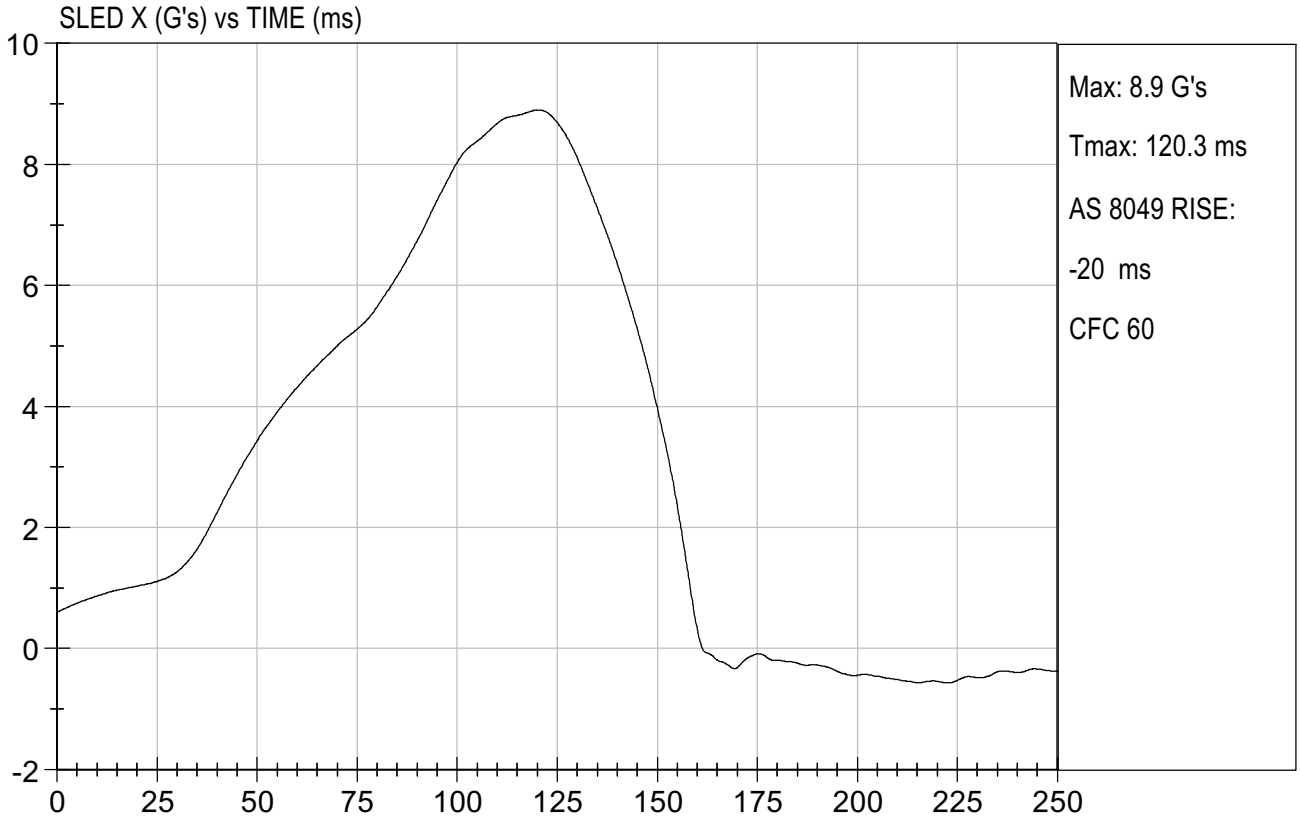
Test Information	
MGA Test Number	V14070
Test Date	01/21/2014
Run Number	4
Orientation	Inboard

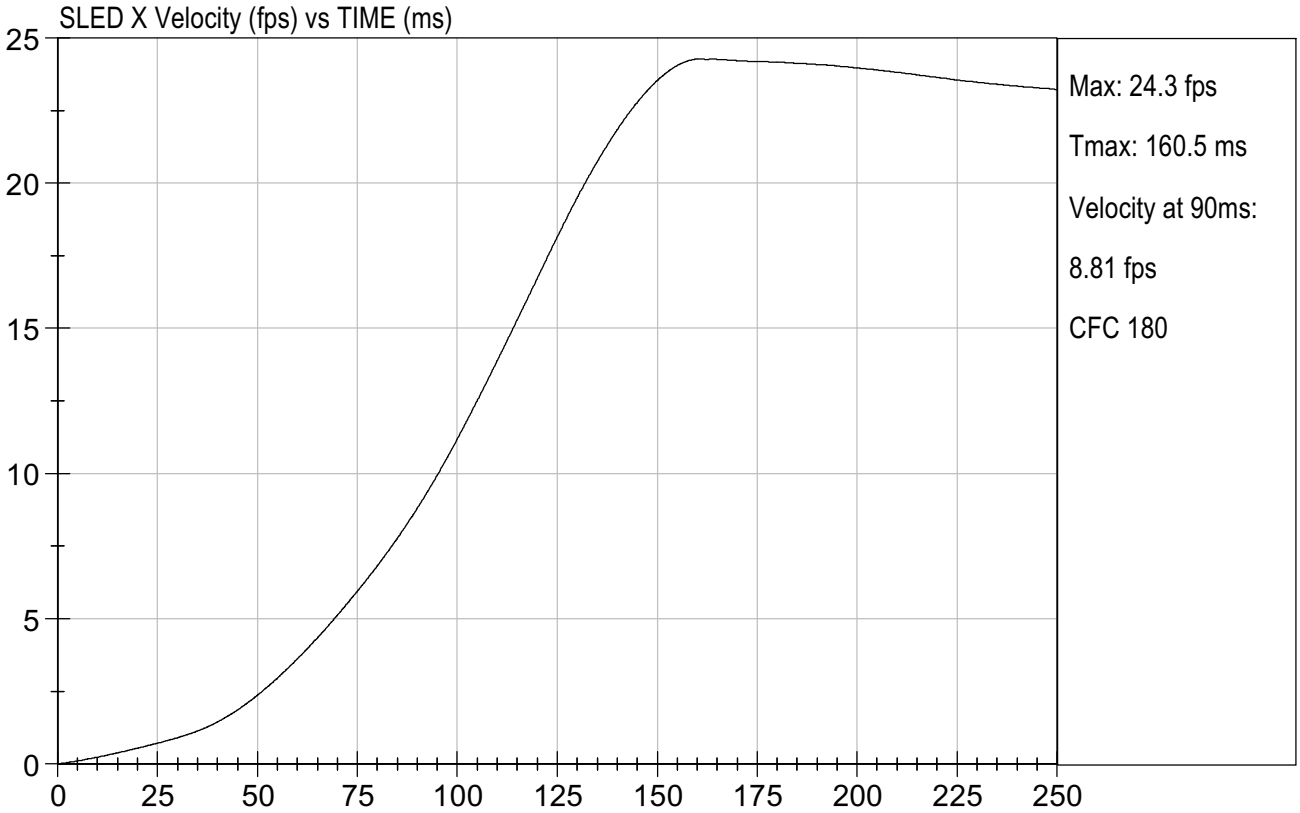
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	8.9
Time of Max Acceleration (ms)	120.3
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

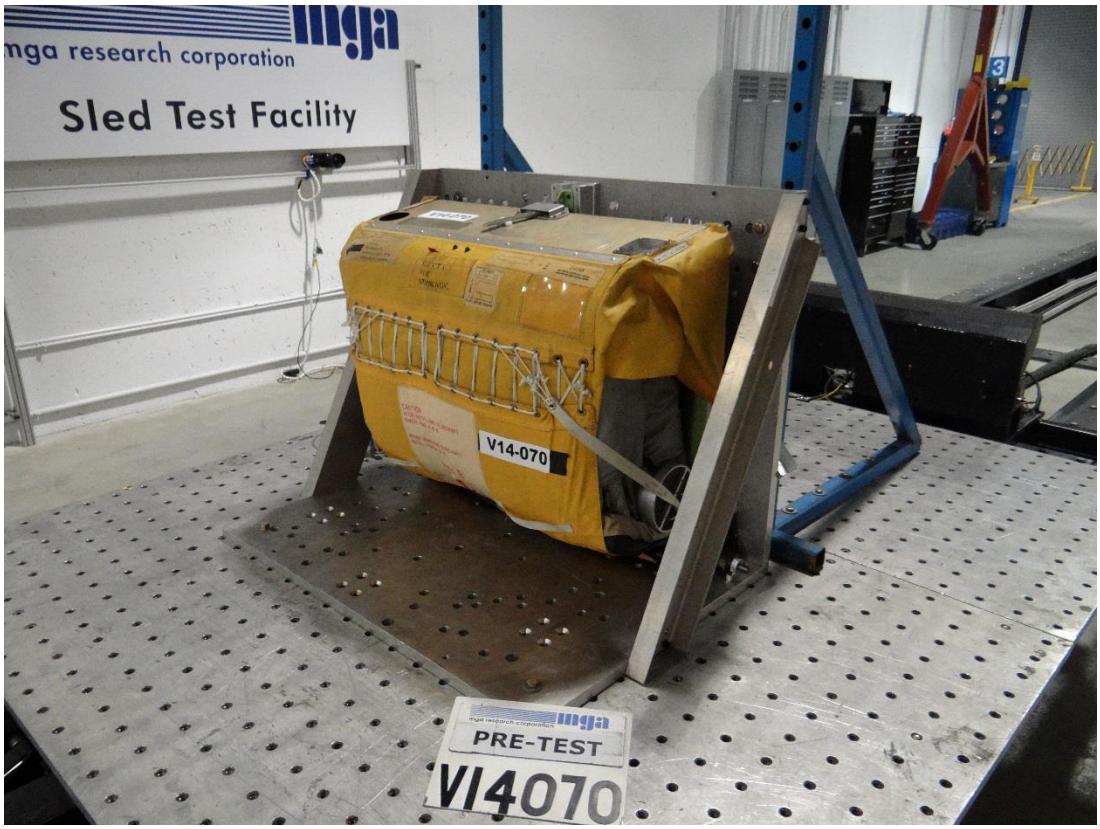
Comments:

(1) No damage observed
(2) Did not release

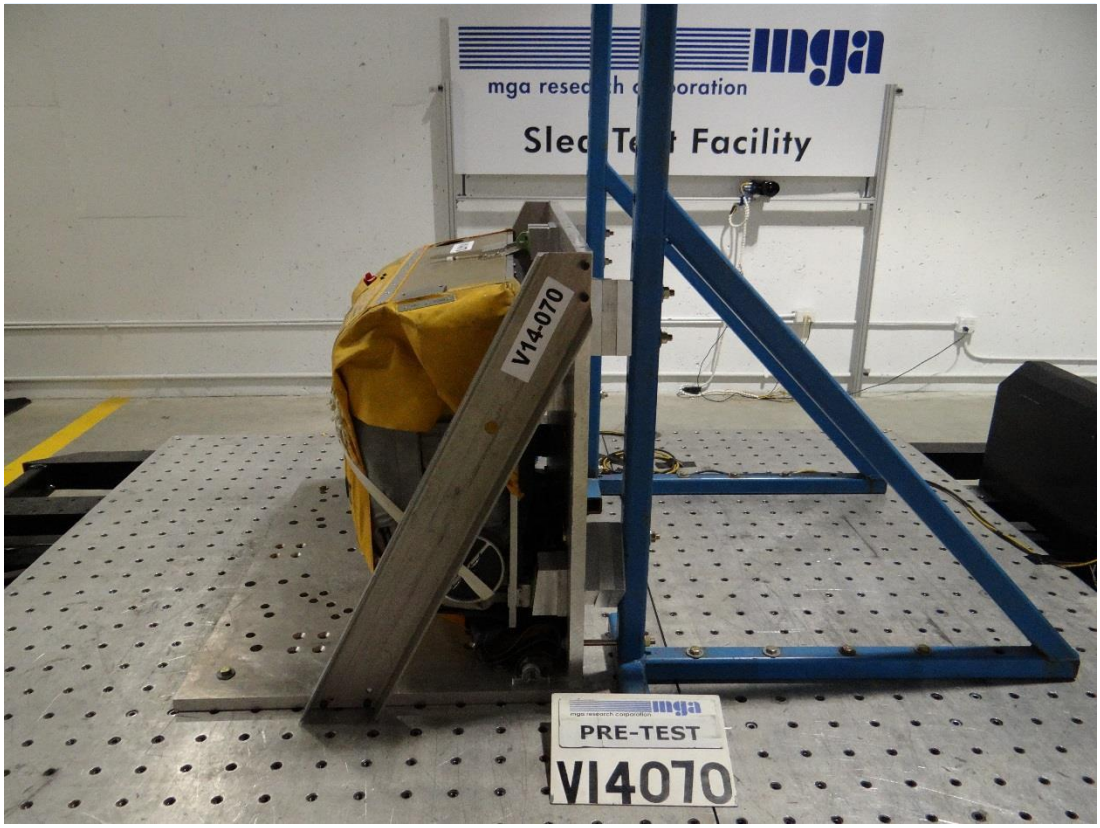

SLED X (G's) vs TIME (ms)
10
8
6
4
2
0
-2
0
25
50
75
100
125
150
175
200
225
250
Max: 8.9 G's
Tmax: 120.3 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 24.3 fps
Tmax: 160.5 ms
Velocity at 90ms:
8.81 fps
CFC 180

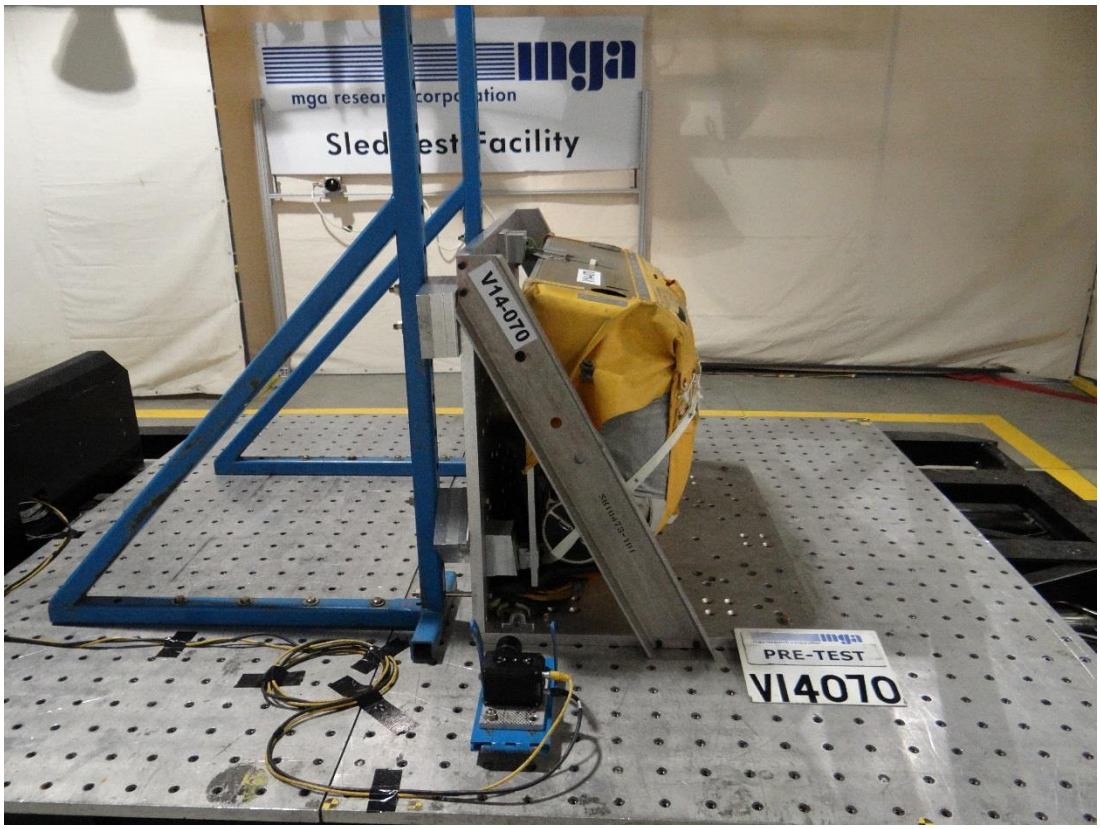
Pre Test Front View



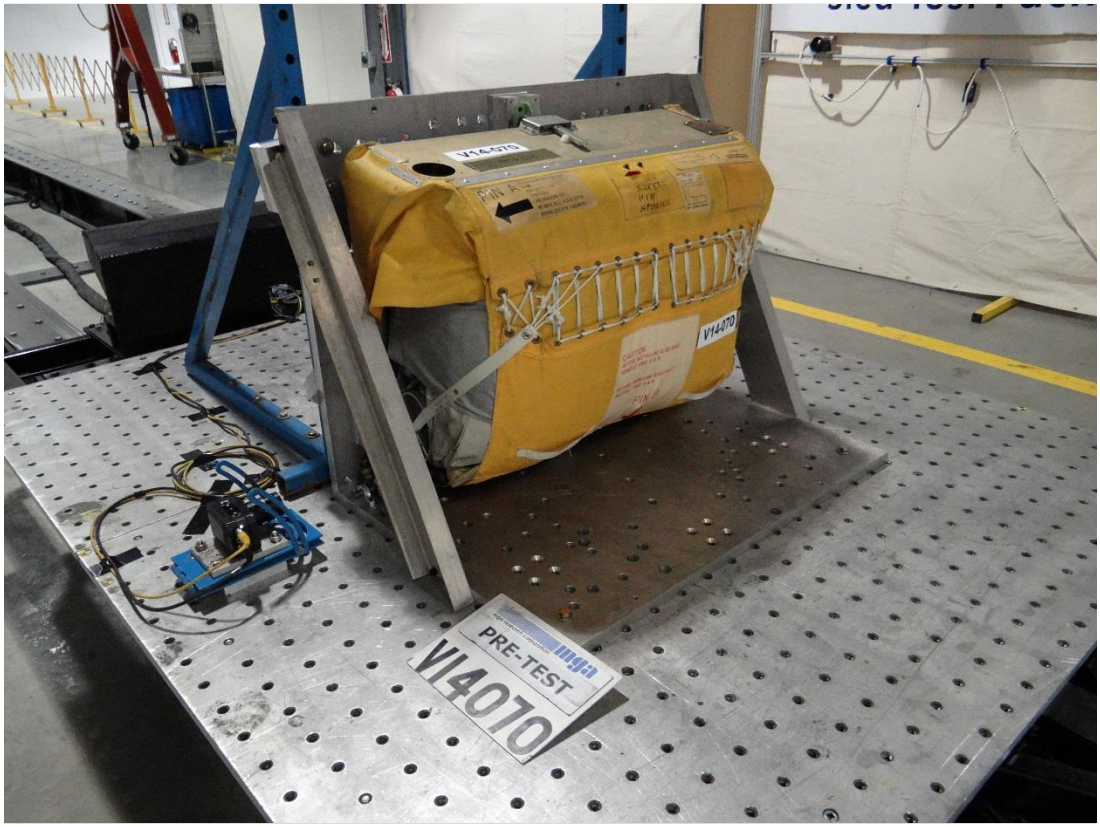
Pre Test Left Angle View



Pre Test Left Side View



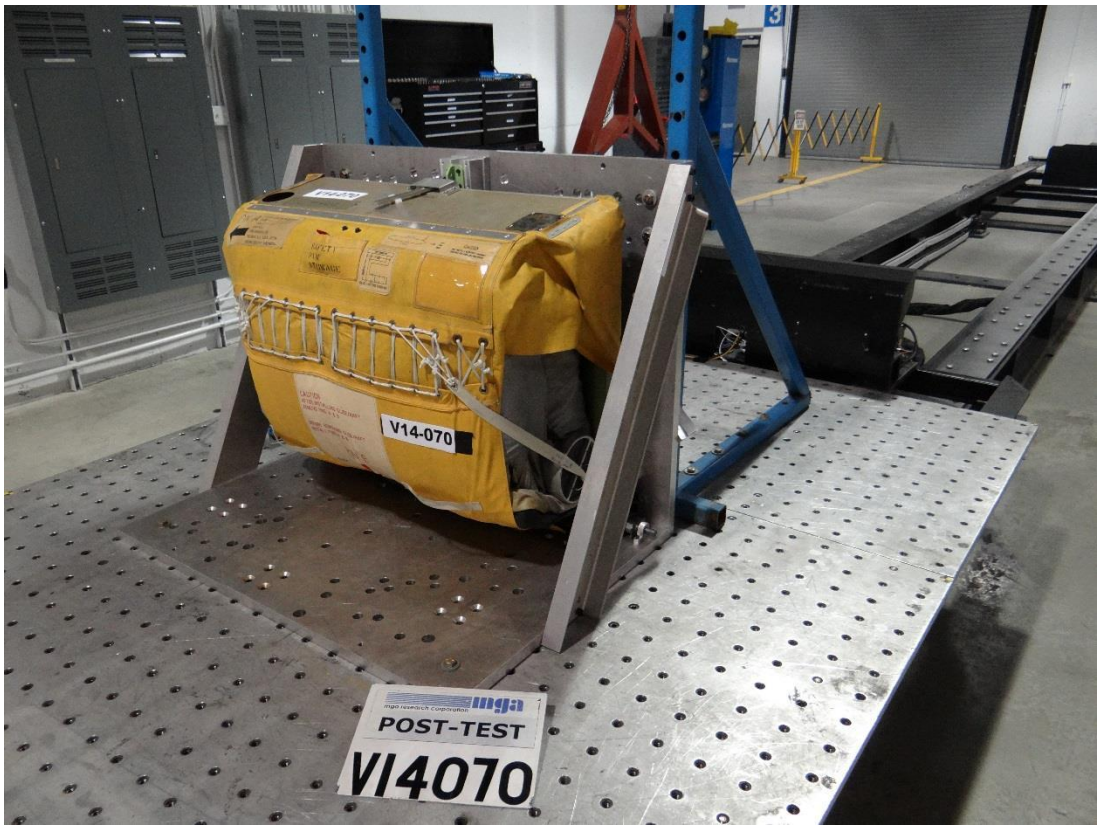
Pre Test Right Side View



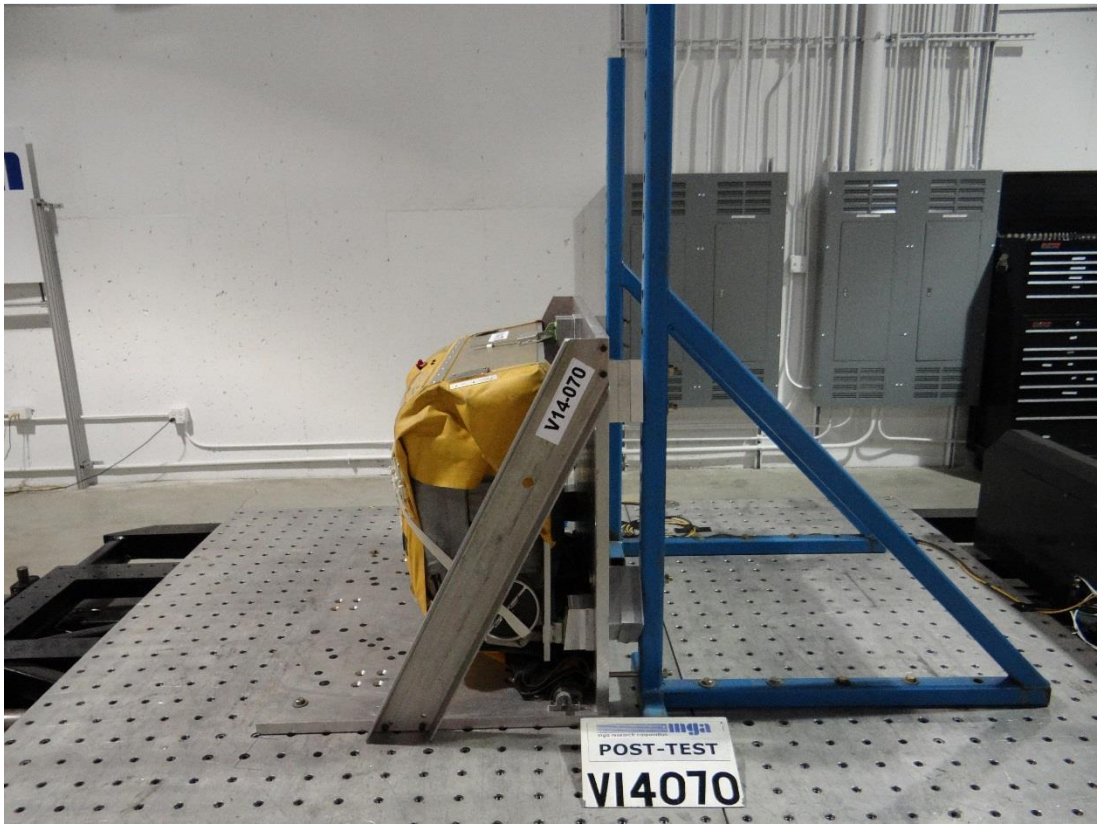
Pre Test Right Angle View

Pre Test Release Shaft Slotted Cap

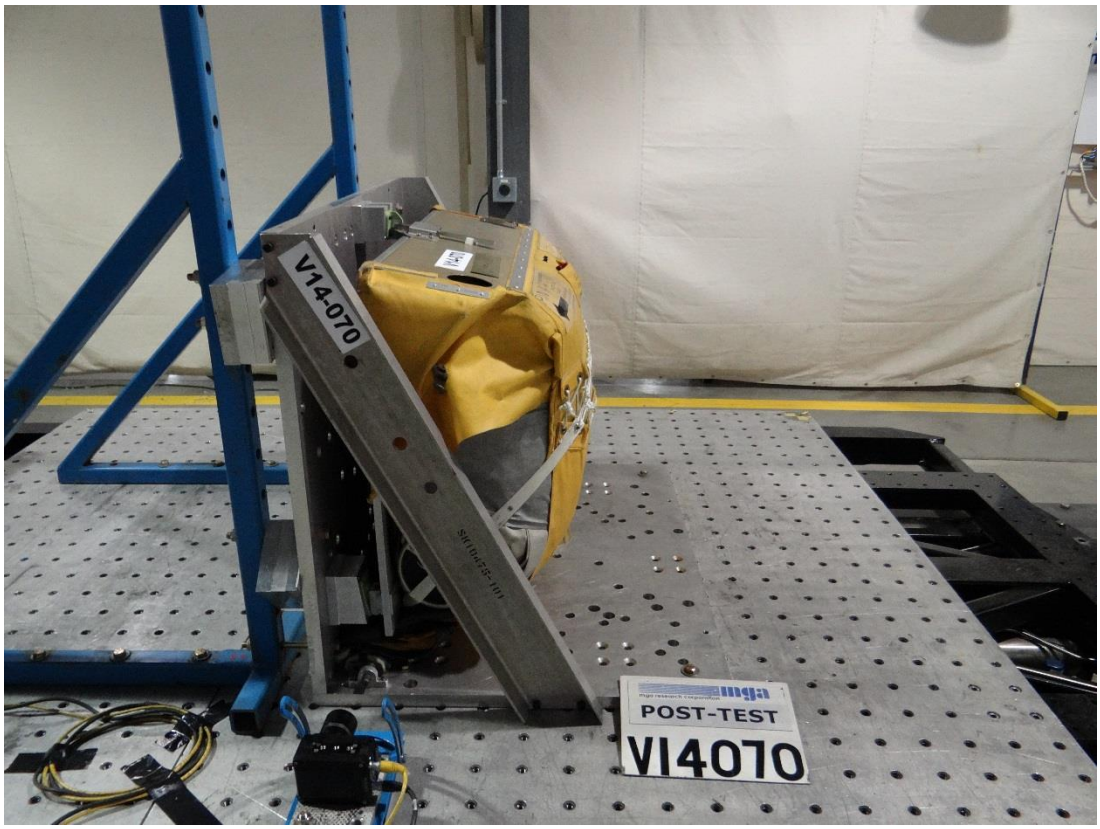
Post Test Front View



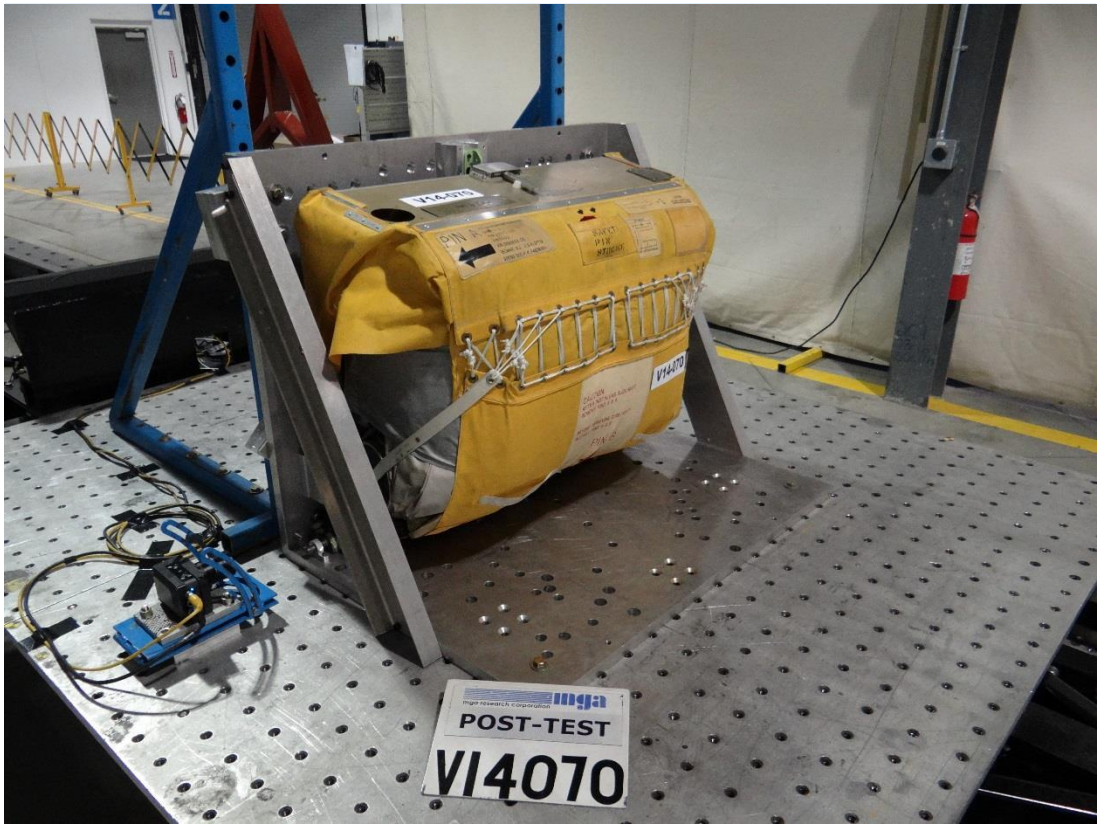
Post Test Left Angle View



Post Test Left Side View



Post Test Right Side View



Post Test Right Angle View

Post Test Release Shaft Slotted Cap

11g Inboard Load Test

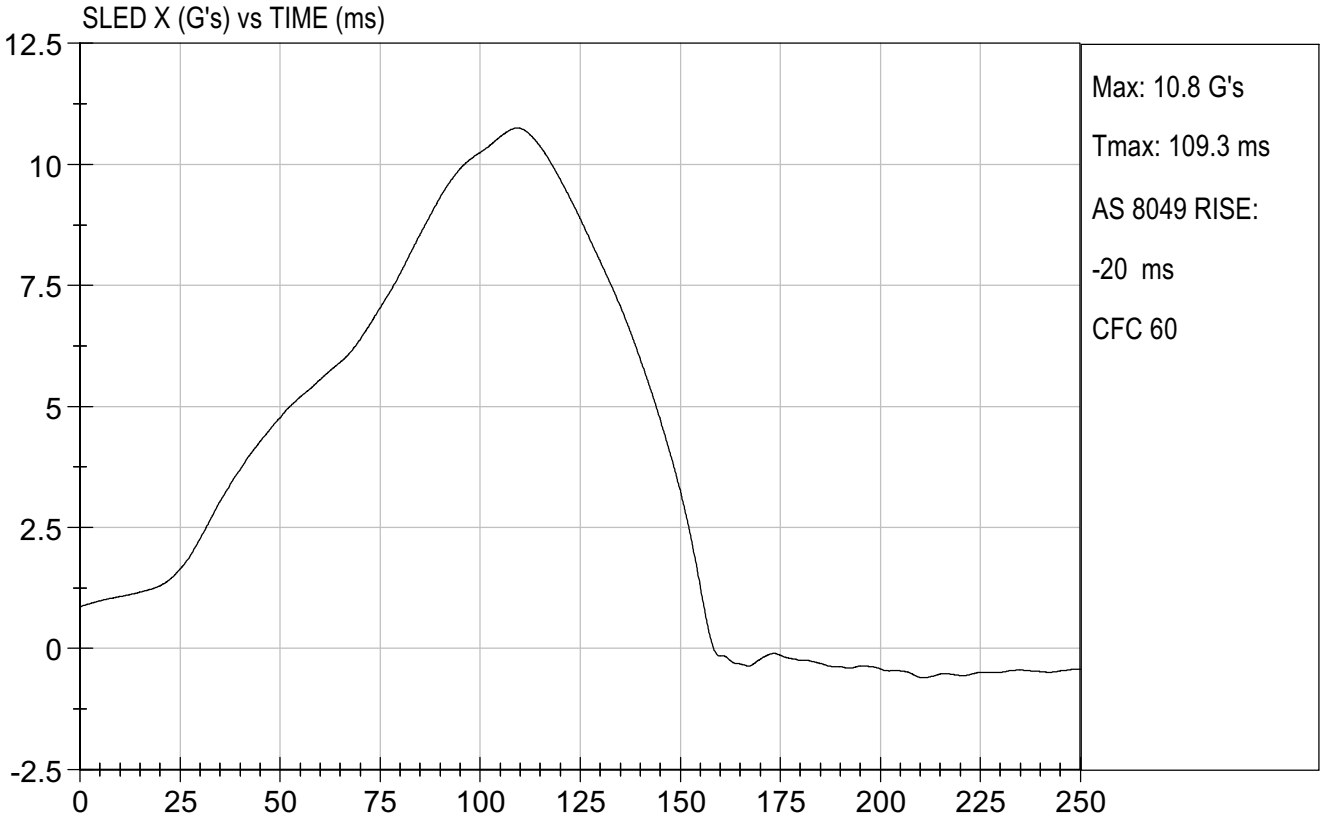
Test Information	
MGA Test Number	V14071
Test Date	01/21/2014
Run Number	5
Orientation	Inboard

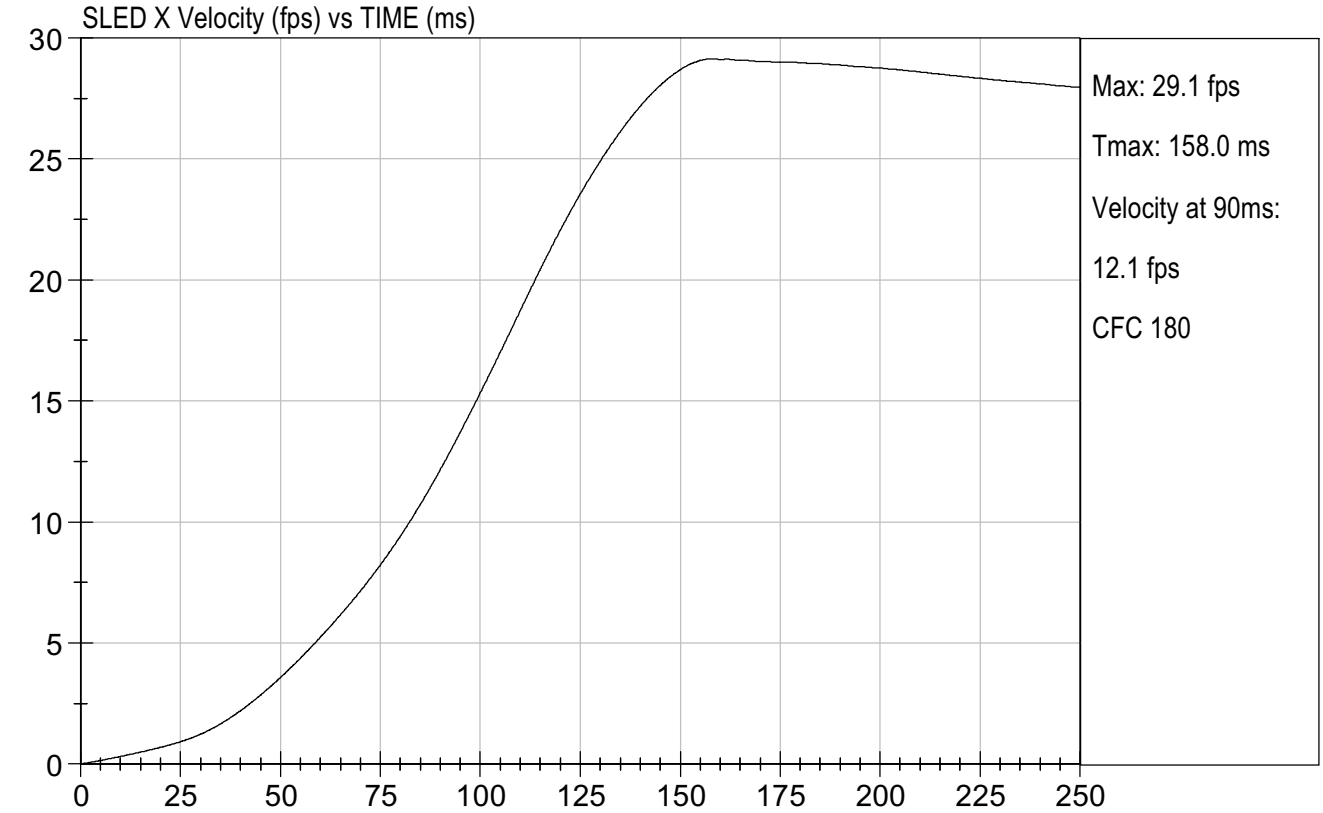
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	10.8
Time of Max Acceleration (ms)	109.3
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

(1) No damage observed
(2) Did not release

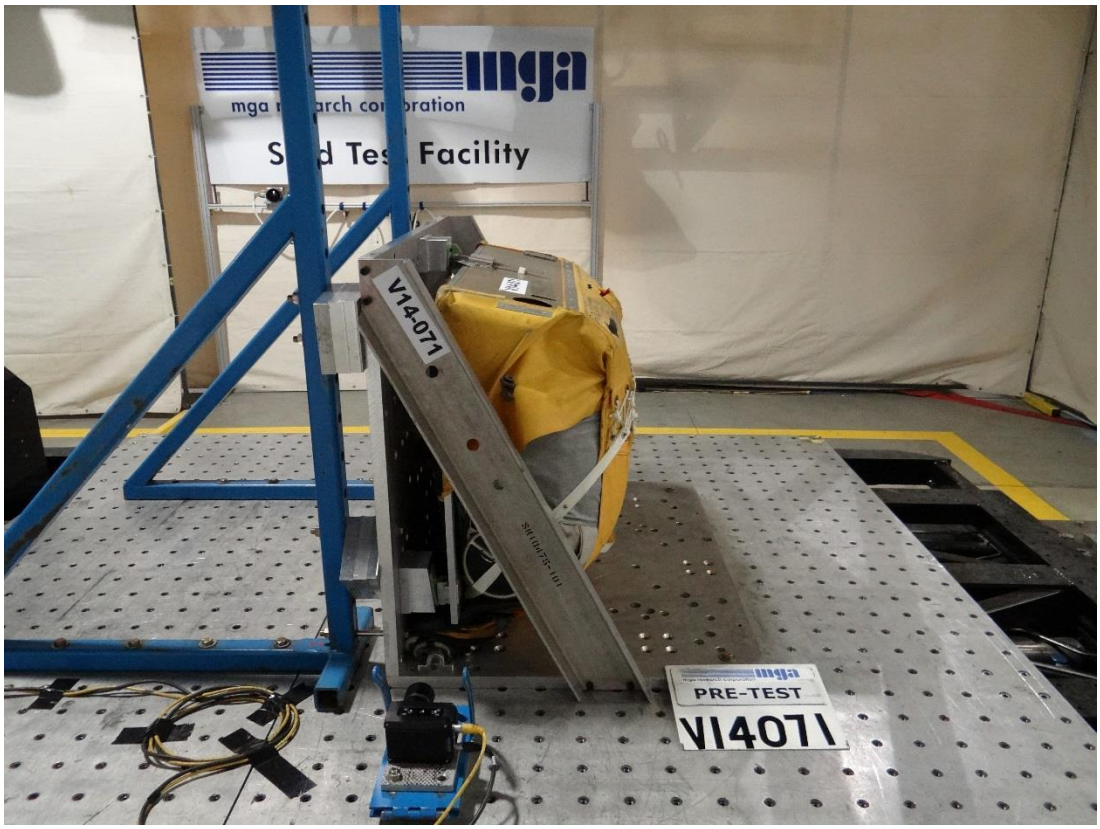

SLED X (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 10.8 G's
Tmax: 109.3 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 29.1 fps
Tmax: 158.0 ms
Velocity at 90ms:
12.1 fps
CFC 180

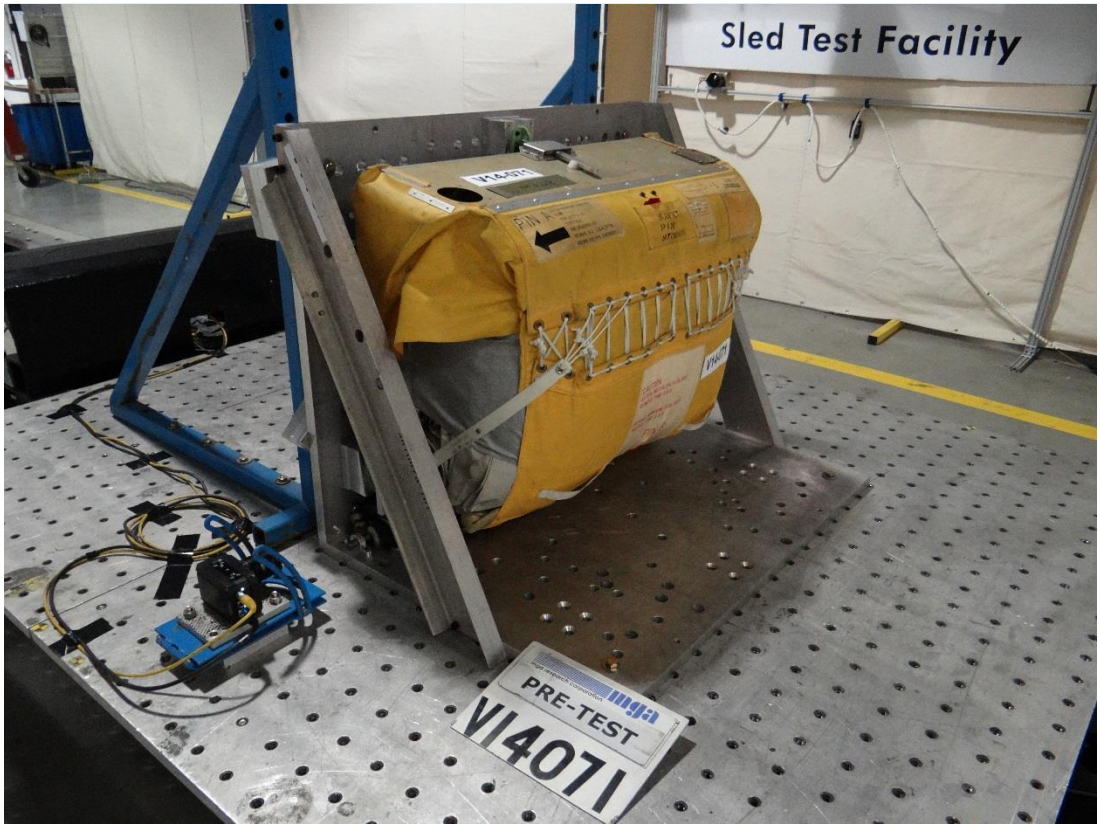
Pre Test Front View

Pre Test Left Angle View

Pre Test Left Side View



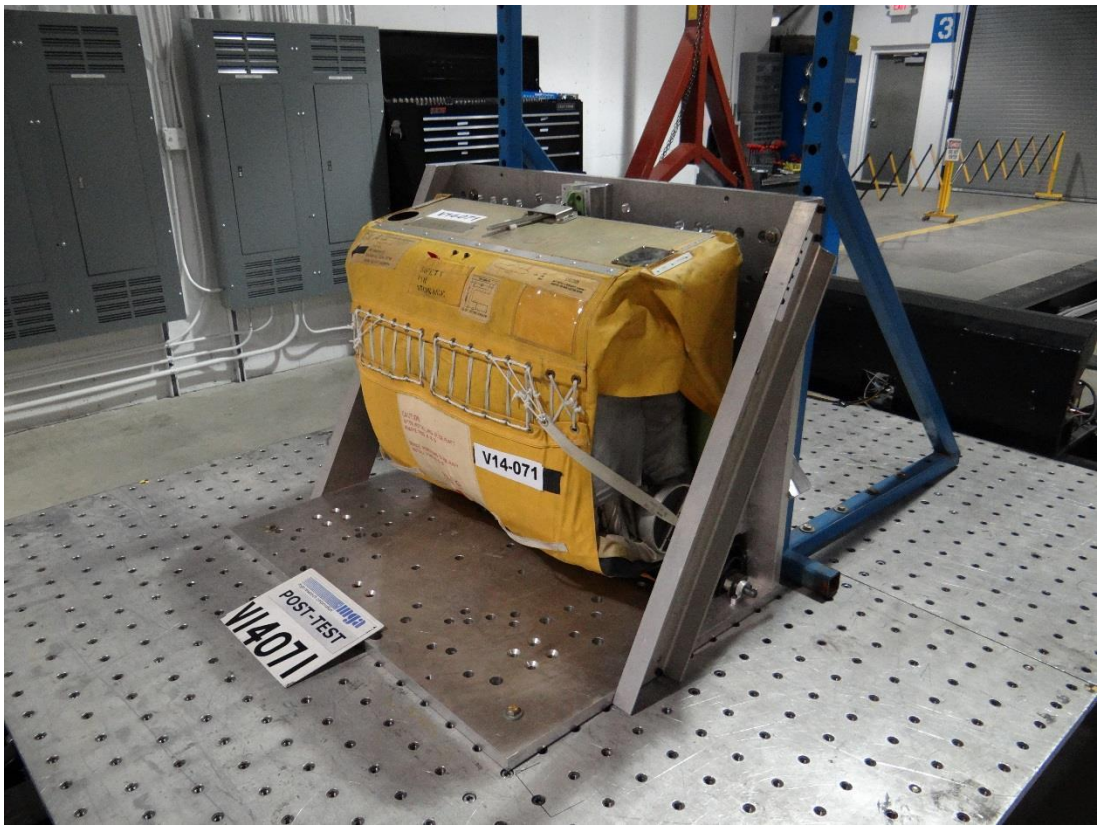
Pre Test Right Side View



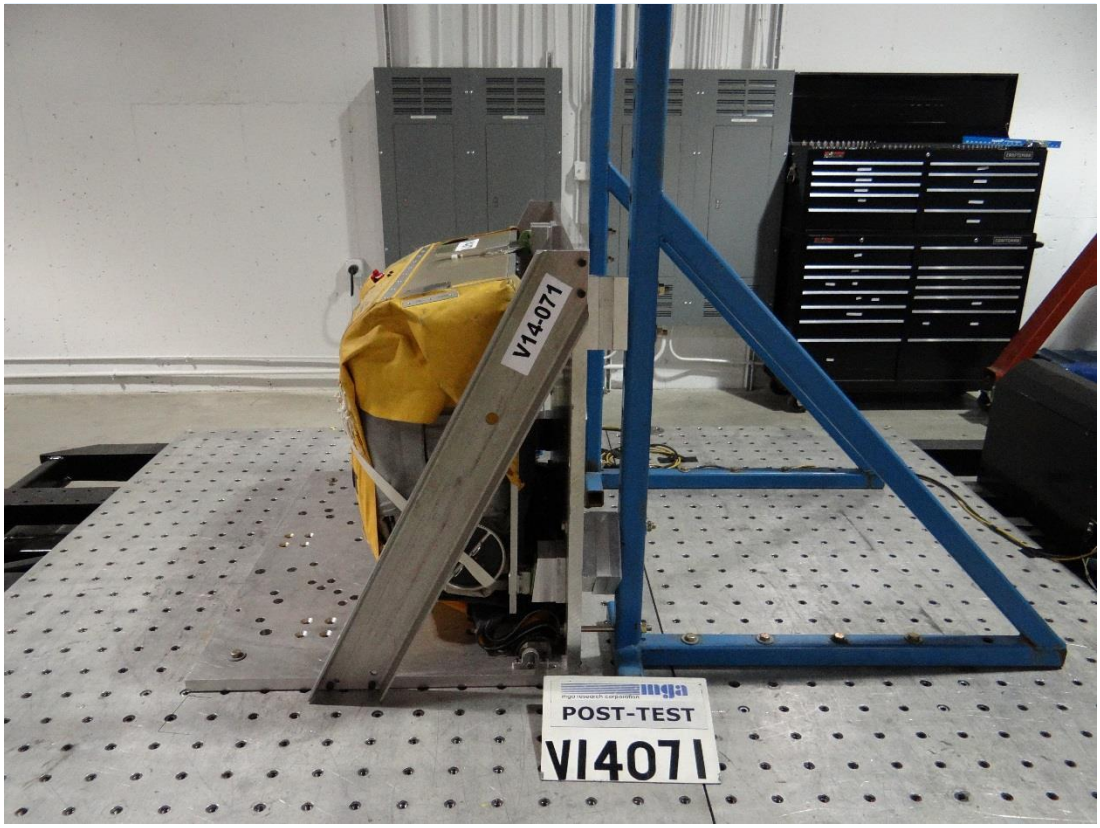
Pre Test Right Angle View

Pre Test Release Shaft Slotted Cap

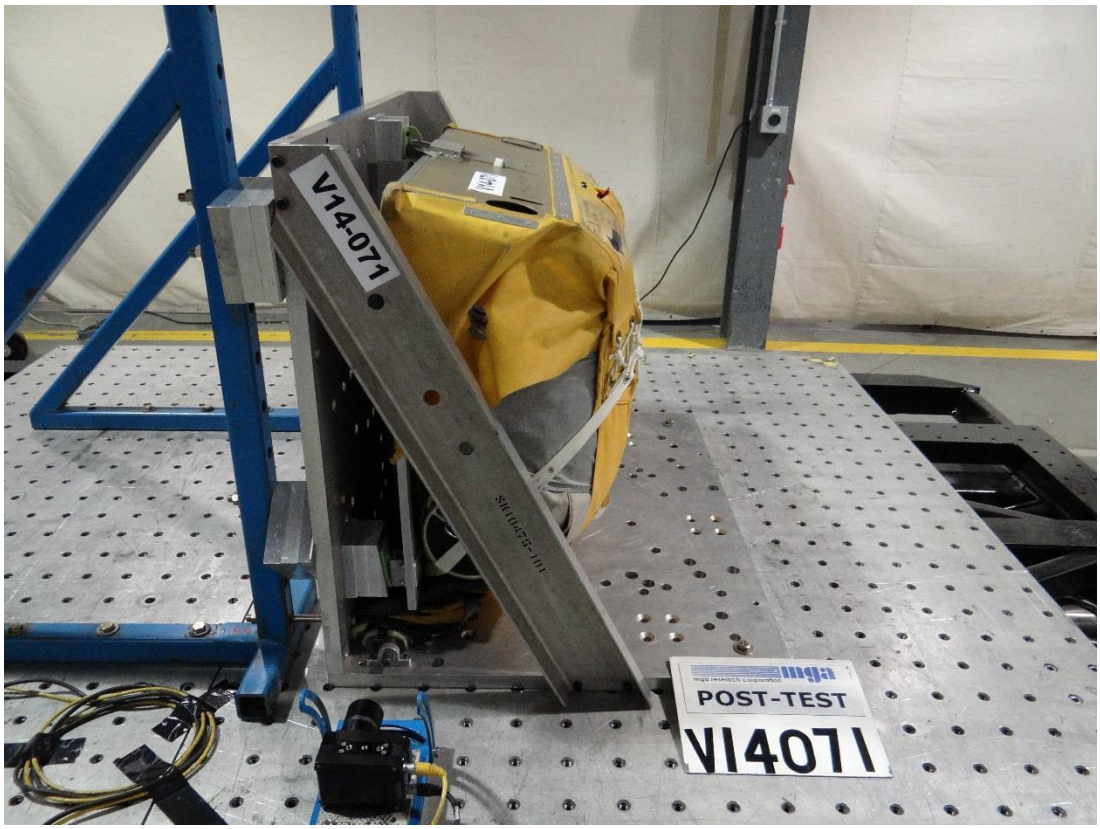
Post Test Front View



Post Test Left Angle View



Post Test Left Side View



Post Test Right Side View

Post Test Release Shaft Slotted Cap

13g Inboard Load Test

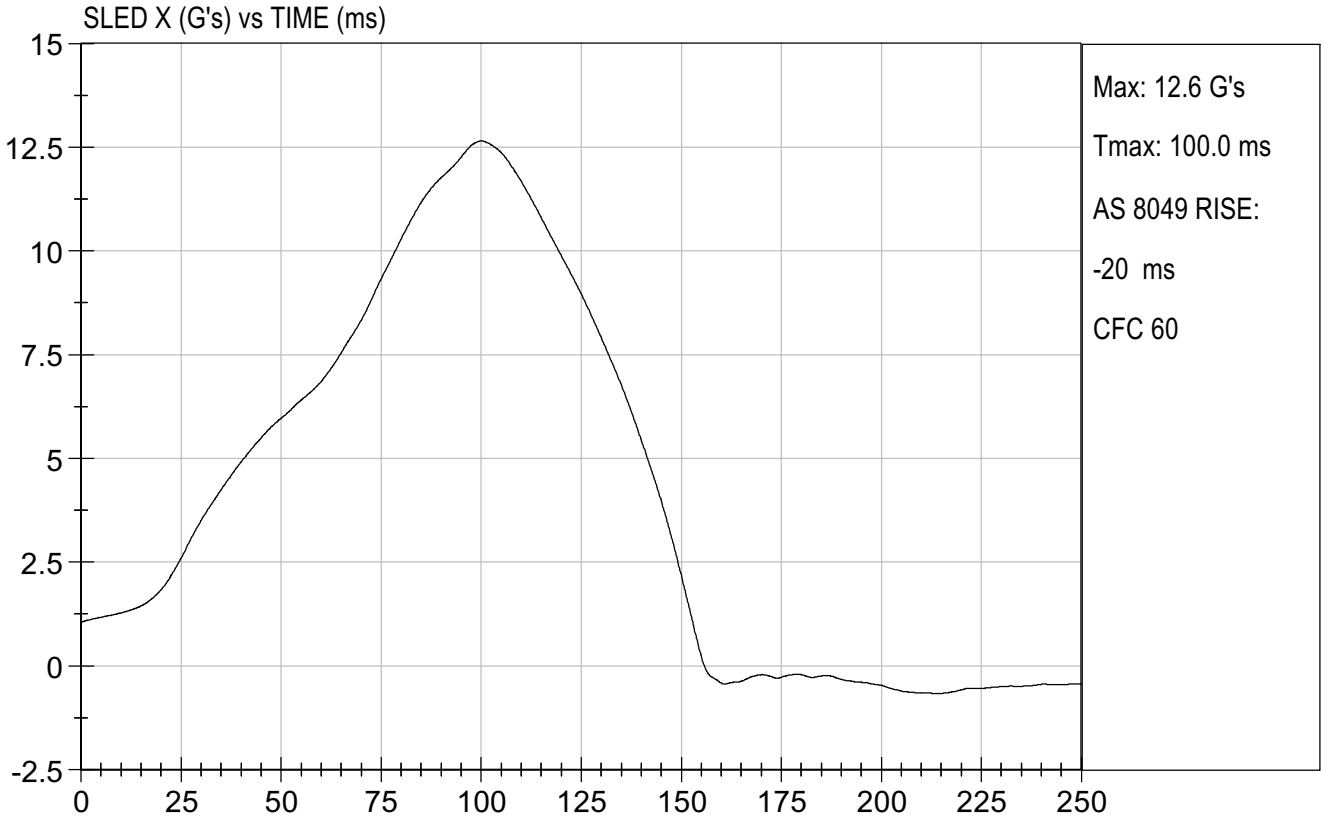
Test Information	
MGA Test Number	V14072
Test Date	01/21/2014
Run Number	6
Orientation	Inboard

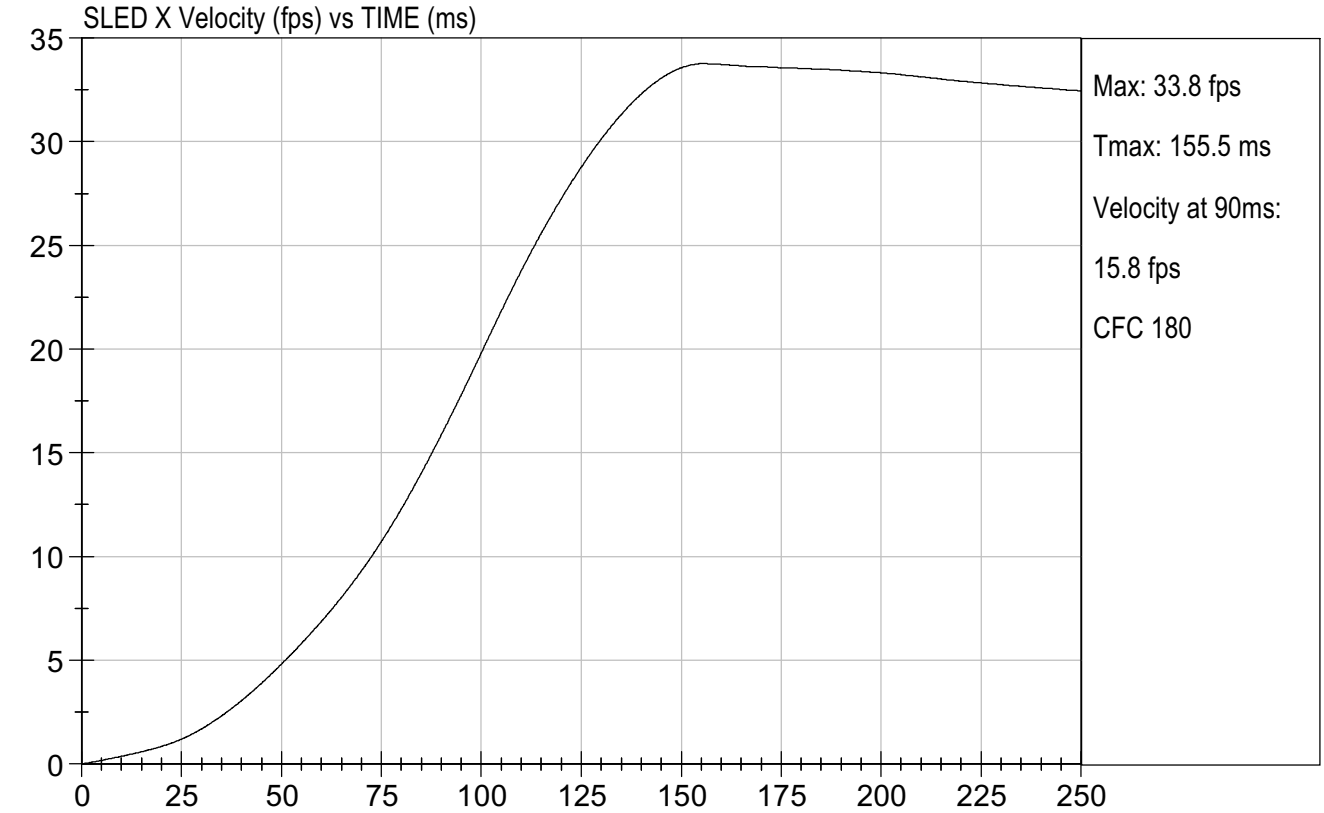
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	12.6
Time of Max Acceleration (ms)	100.0
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

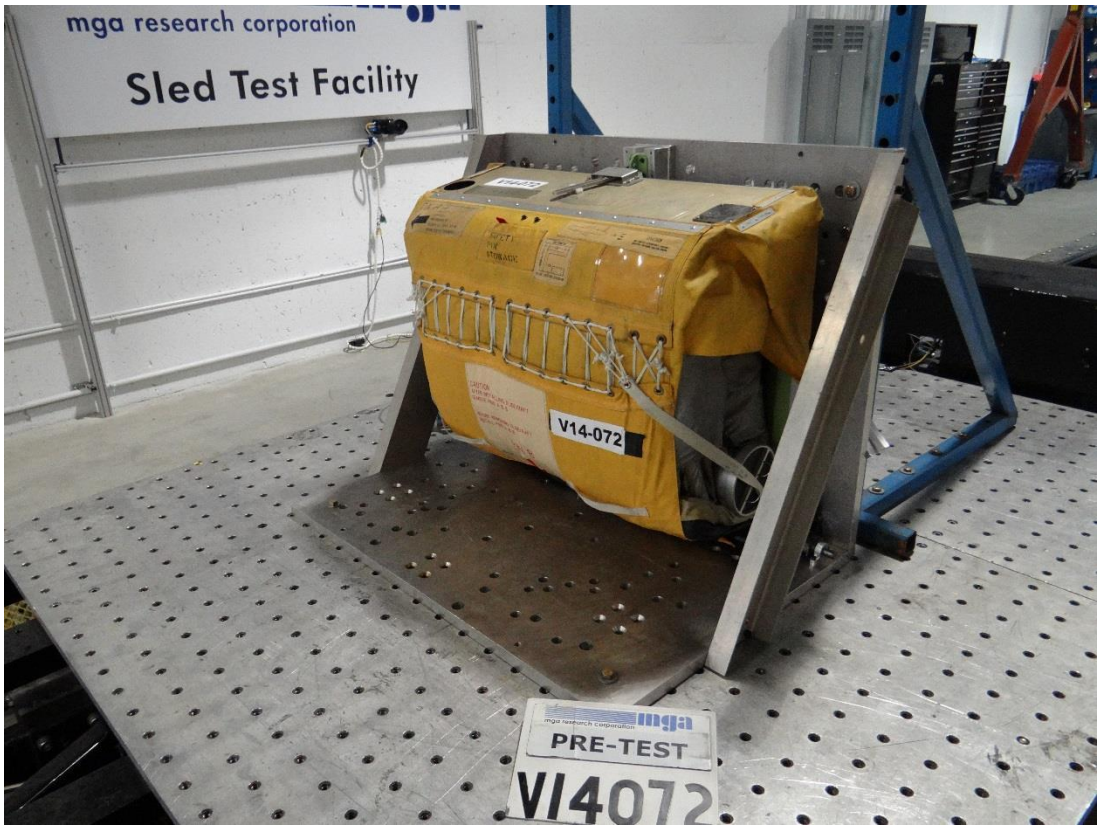
Comments:

(1) No damage observed
(2) Did not release

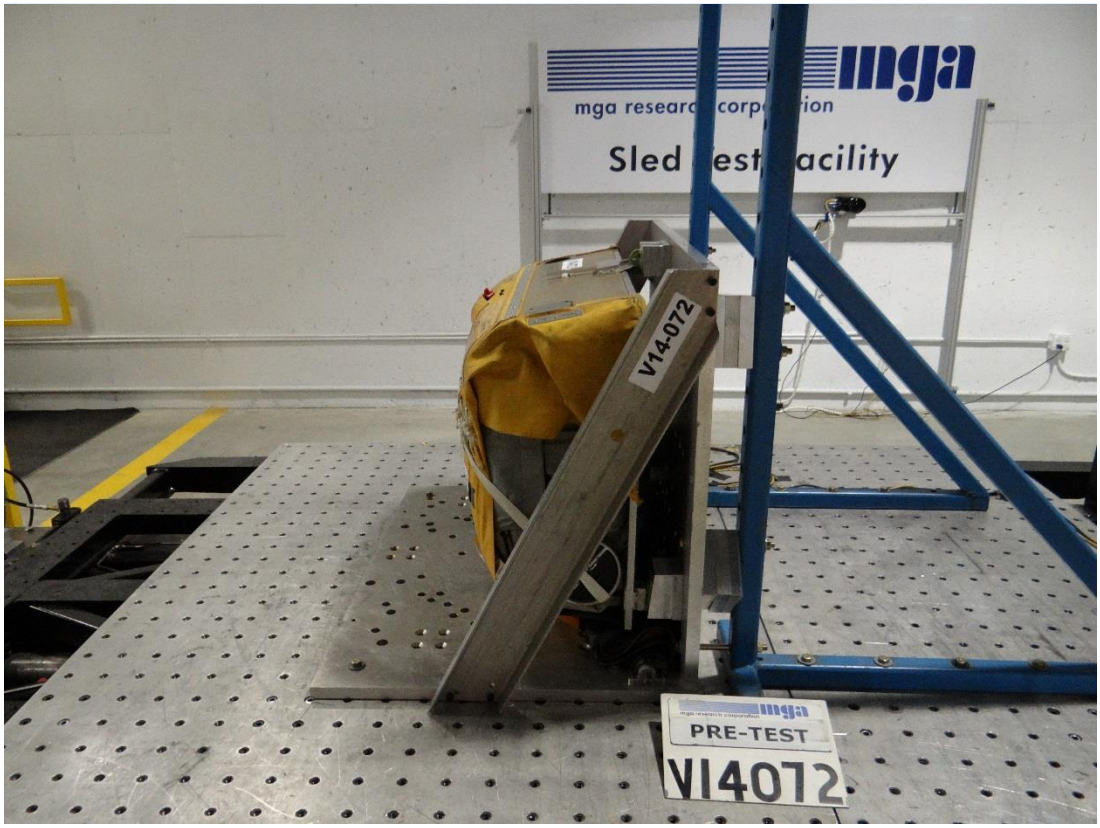

SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 12.6 G's
Tmax: 100.0 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 33.8 fps
Tmax: 155.5 ms
Velocity at 90ms:
15.8 fps
CFC 180

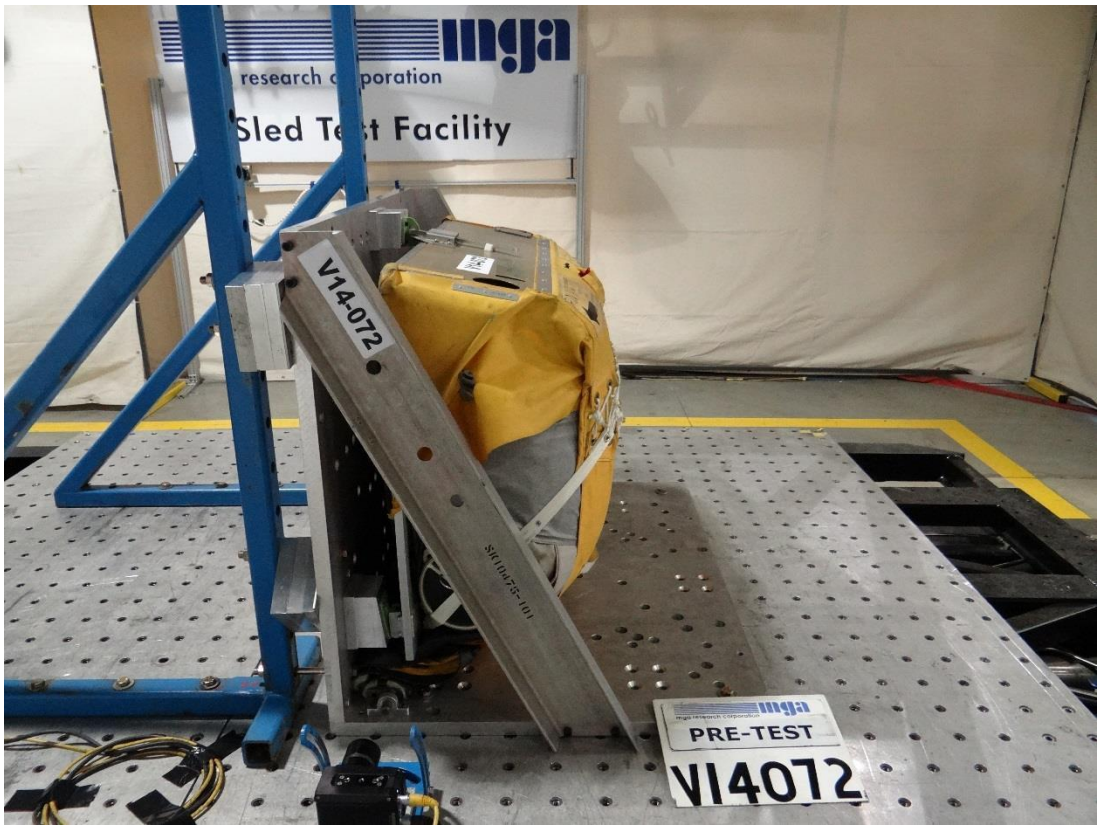
Pre Test Front View



Pre Test Left Angle View

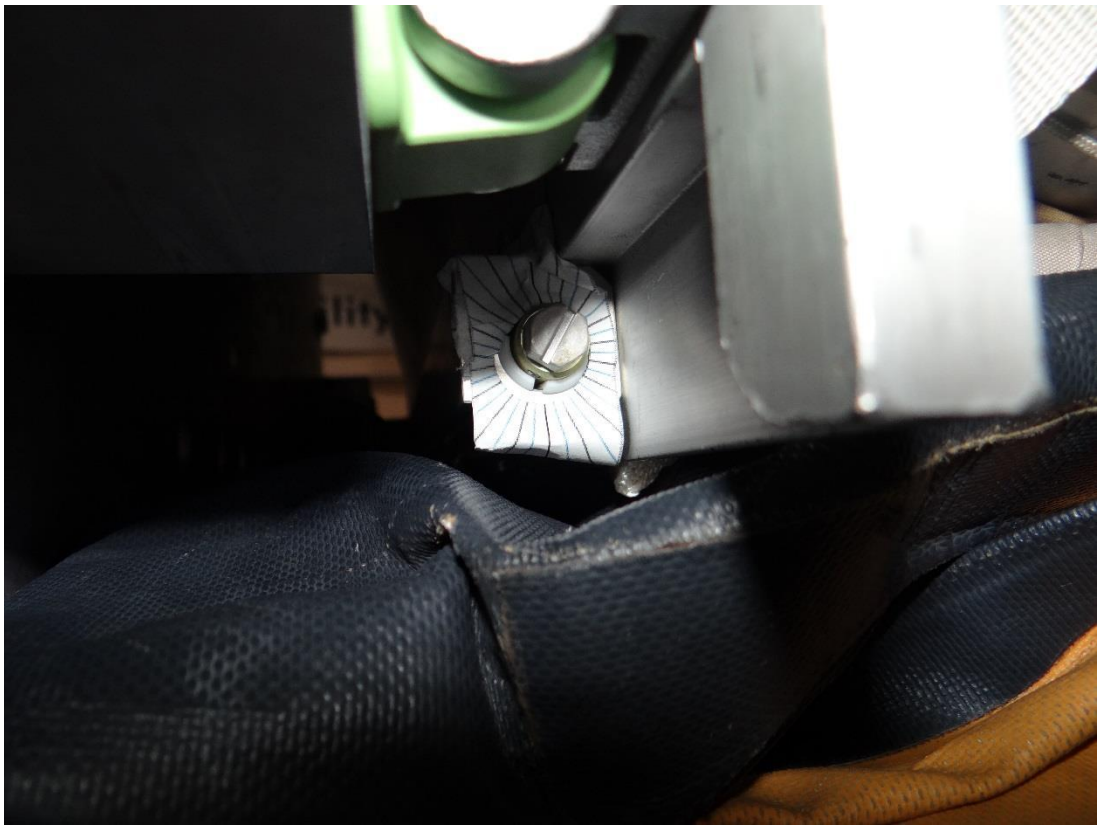


Pre Test Left Side View



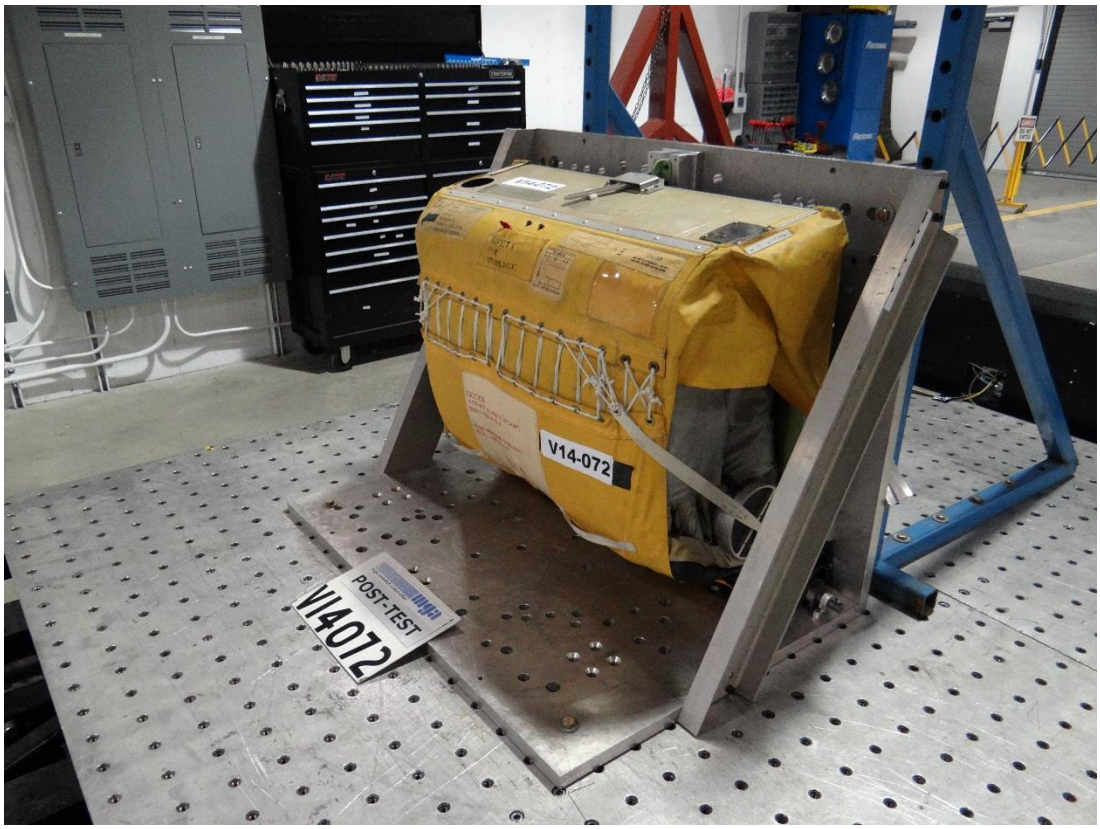
Pre Test Right Side View

Pre Test Right Angle View

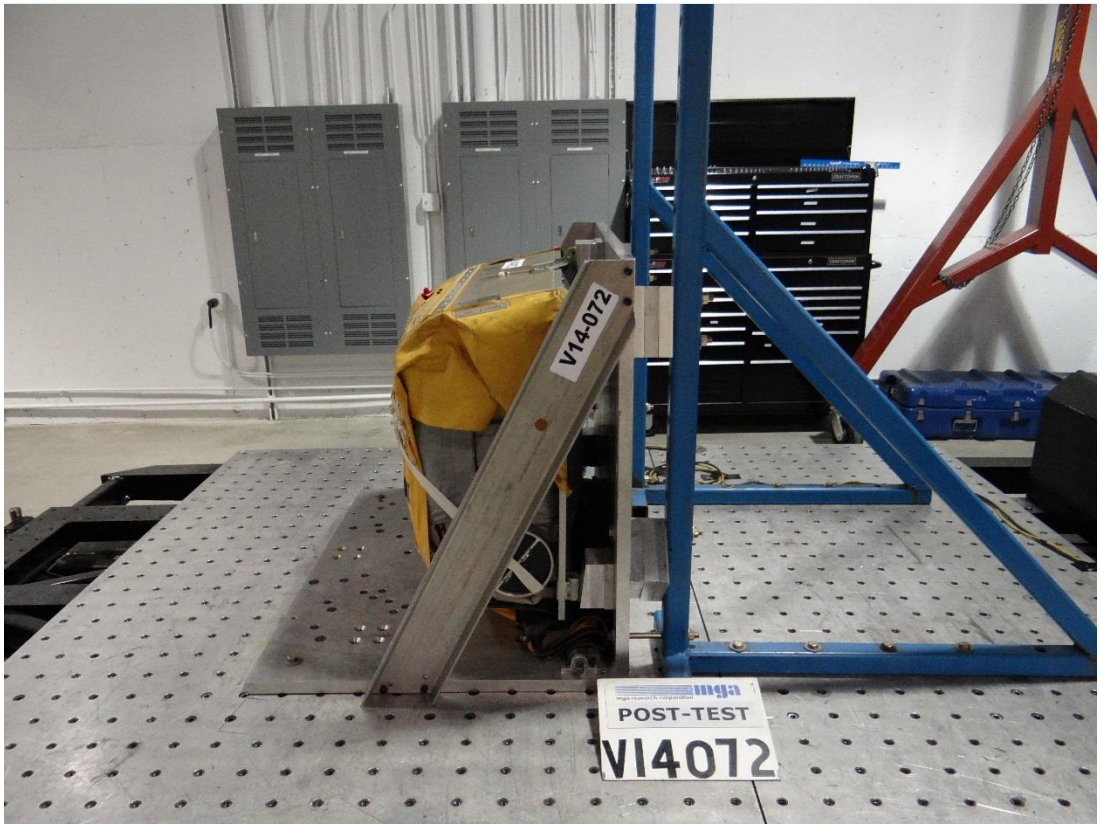


Pre Test Release Shaft Slotted Cap

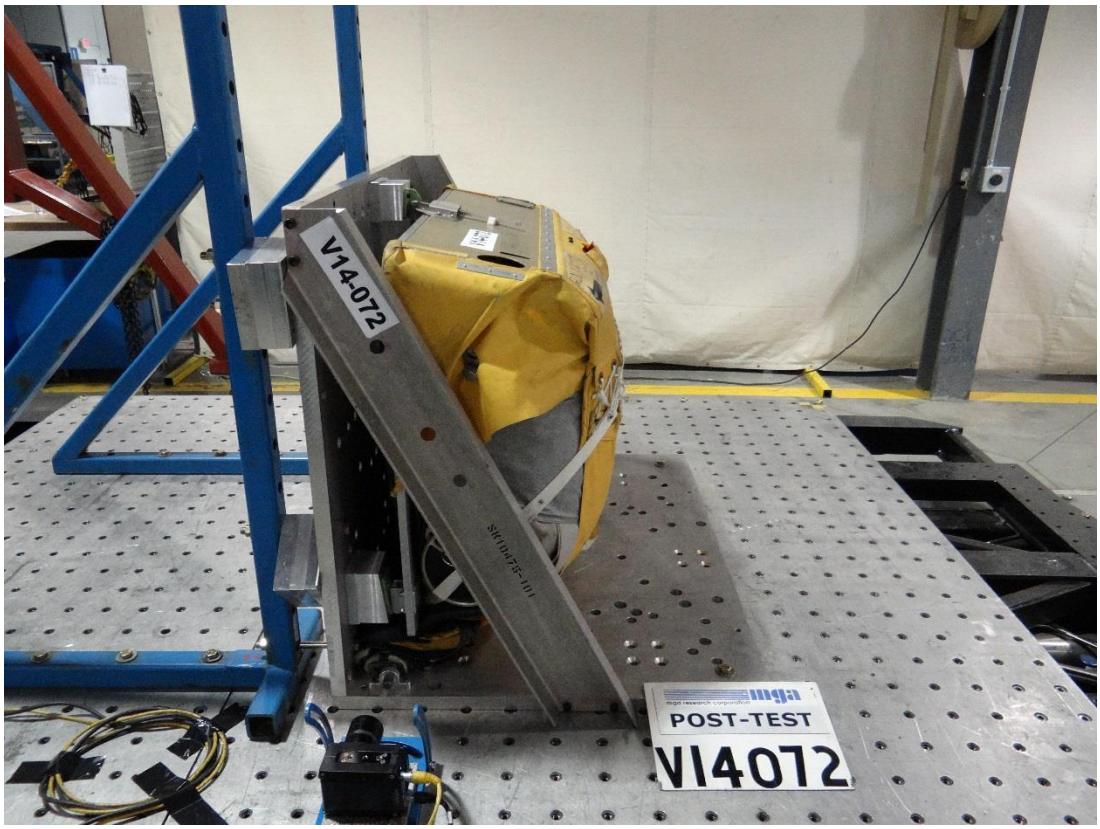
Post Test Front View



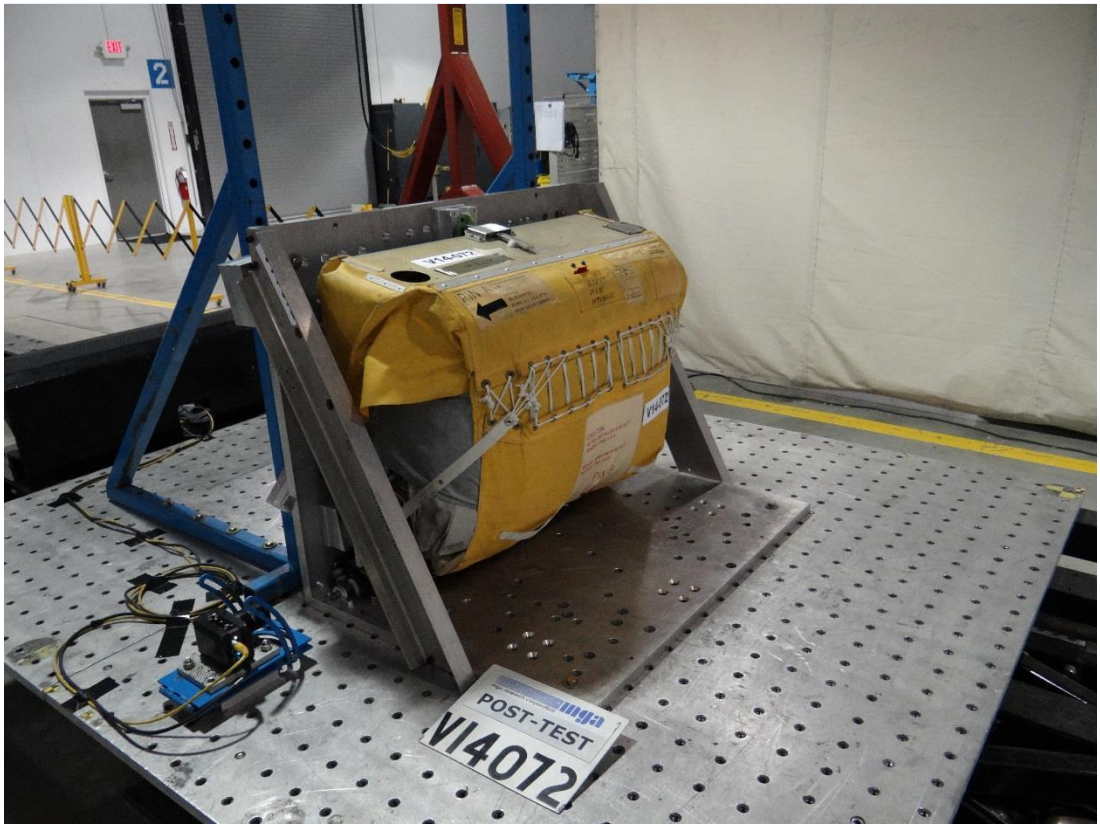
Post Test Left Angle View



Post Test Left Side View



Post Test Right Side View



Post Test Right Angle View

Post Test Release Shaft Slotted Cap

15g Inboard Load Test

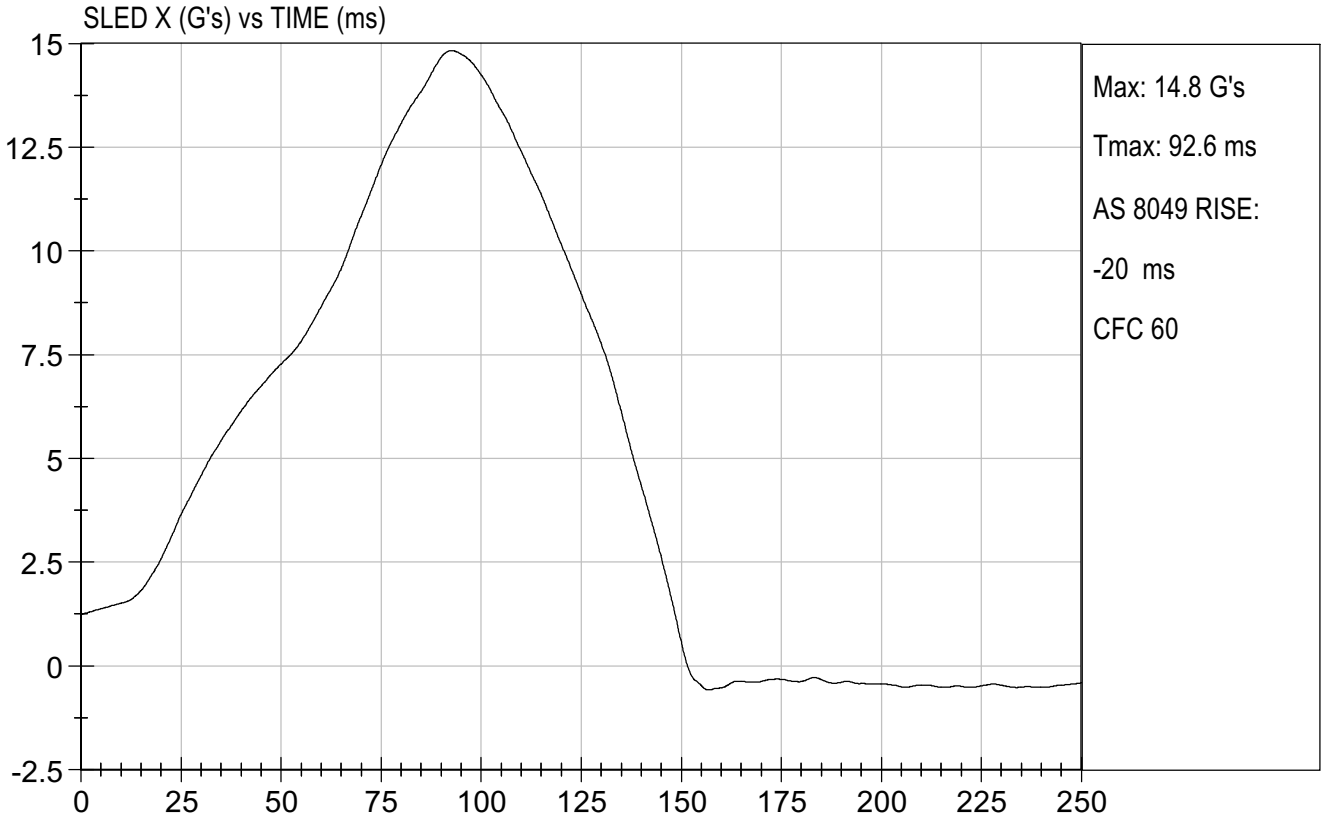
Test Information	
MGA Test Number	V14073
Test Date	01/21/2014
Run Number	7
Orientation	Inboard

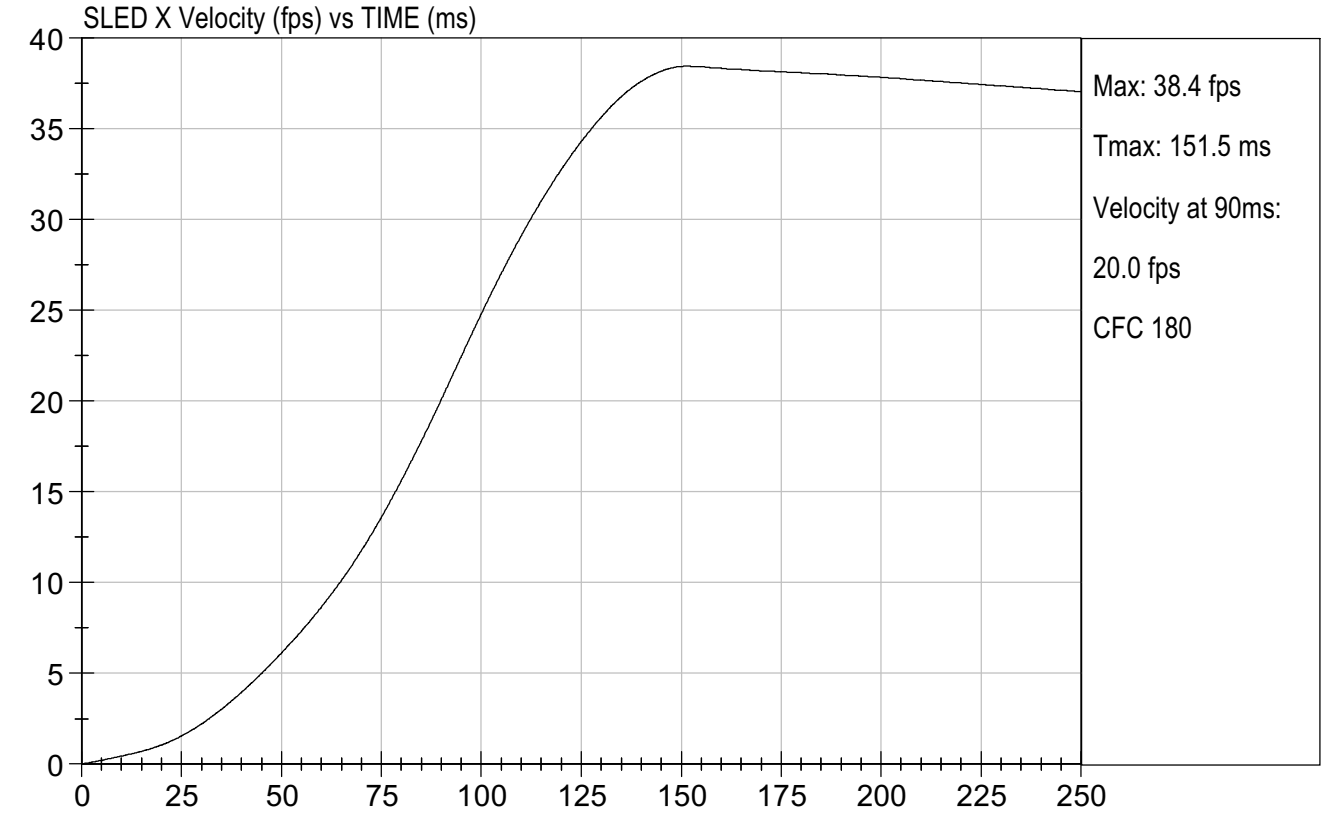
Test Sample Information	
Serial Number	5002
Part Number	62771-101
Weight	217.4 lbs

Results	
Max Acceleration (g)	14.8
Time of Max Acceleration (ms)	92.6
Damage	Yes
Time of Damage (ms)	99.0
Acceleration at Time of Damage (g)	14.4

Comments:

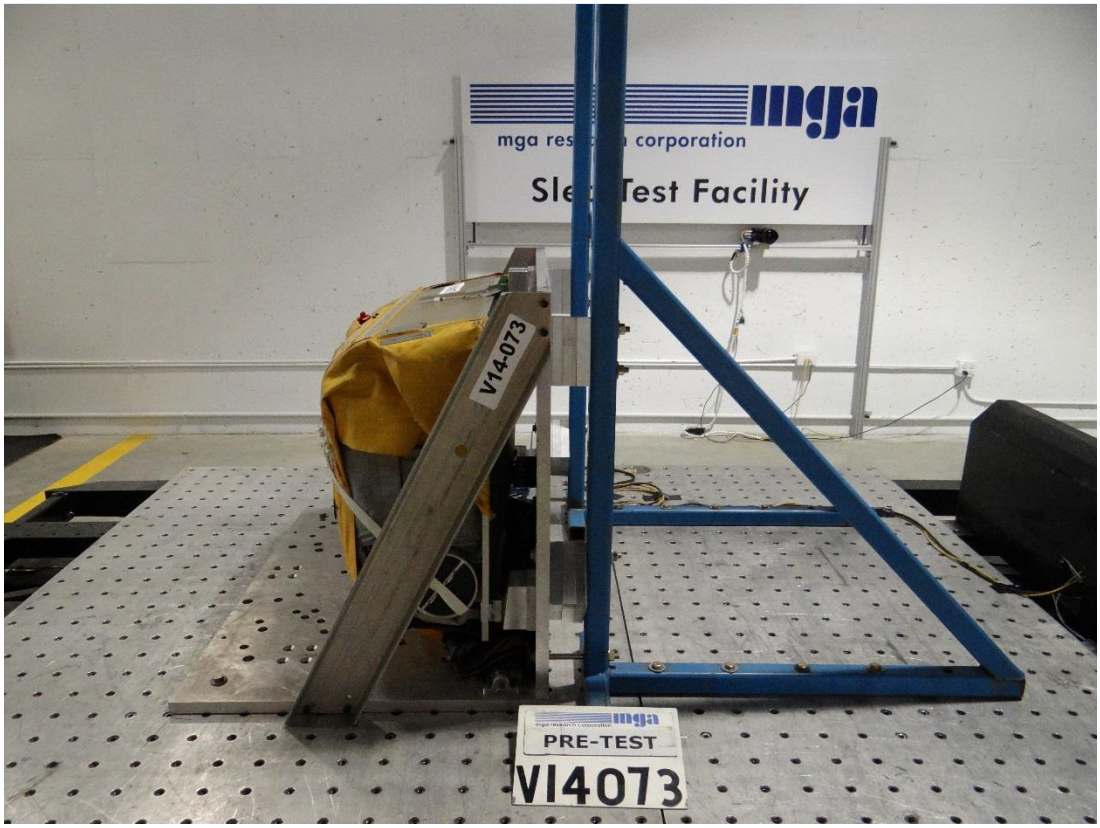
(1) Pack partially released
(2) Seven of the eight release cable ball ends broke off of release cables
(3) Right aspirator strap released
(4) No damage in tang area of release shaft


SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 14.8 G's
Tmax: 92.6 ms
AS 8049 RISE:
-20 ms
CFC 60

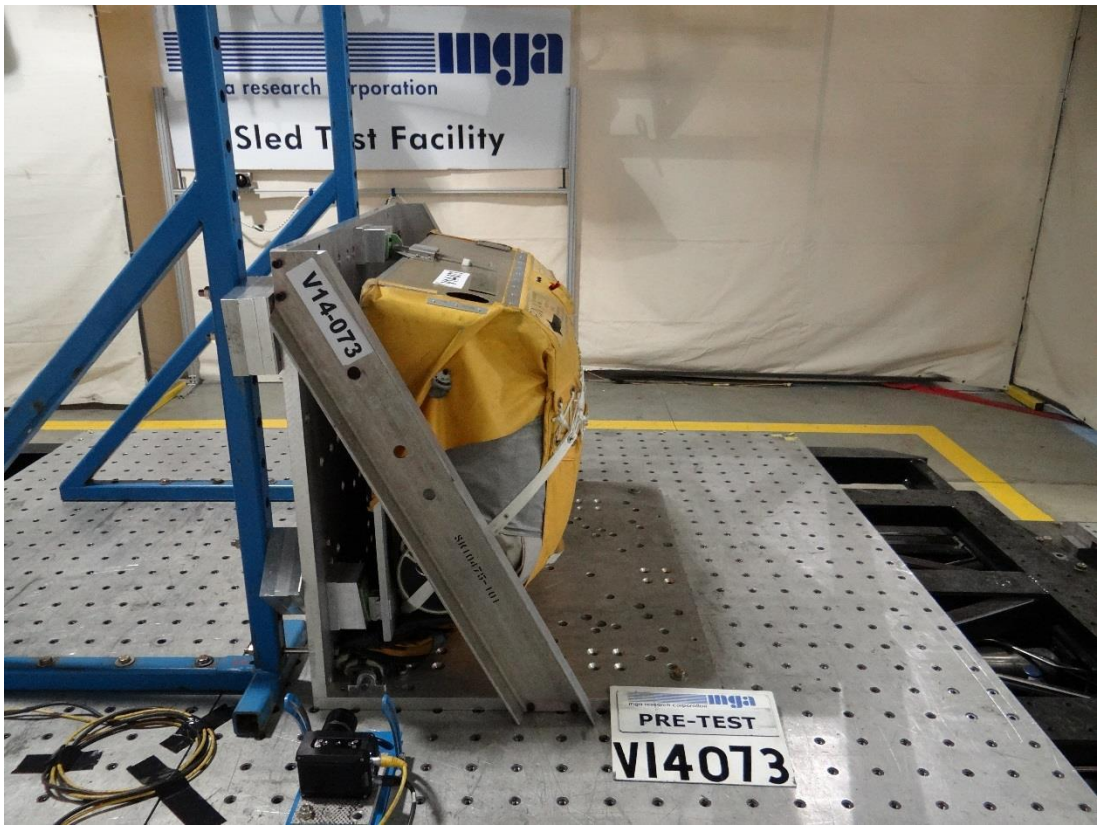

SLED X Velocity (fps) vs TIME (ms)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 38.4 fps
Tmax: 151.5 ms
Velocity at 90ms:
20.0 fps
CFC 180

Pre Test Front View

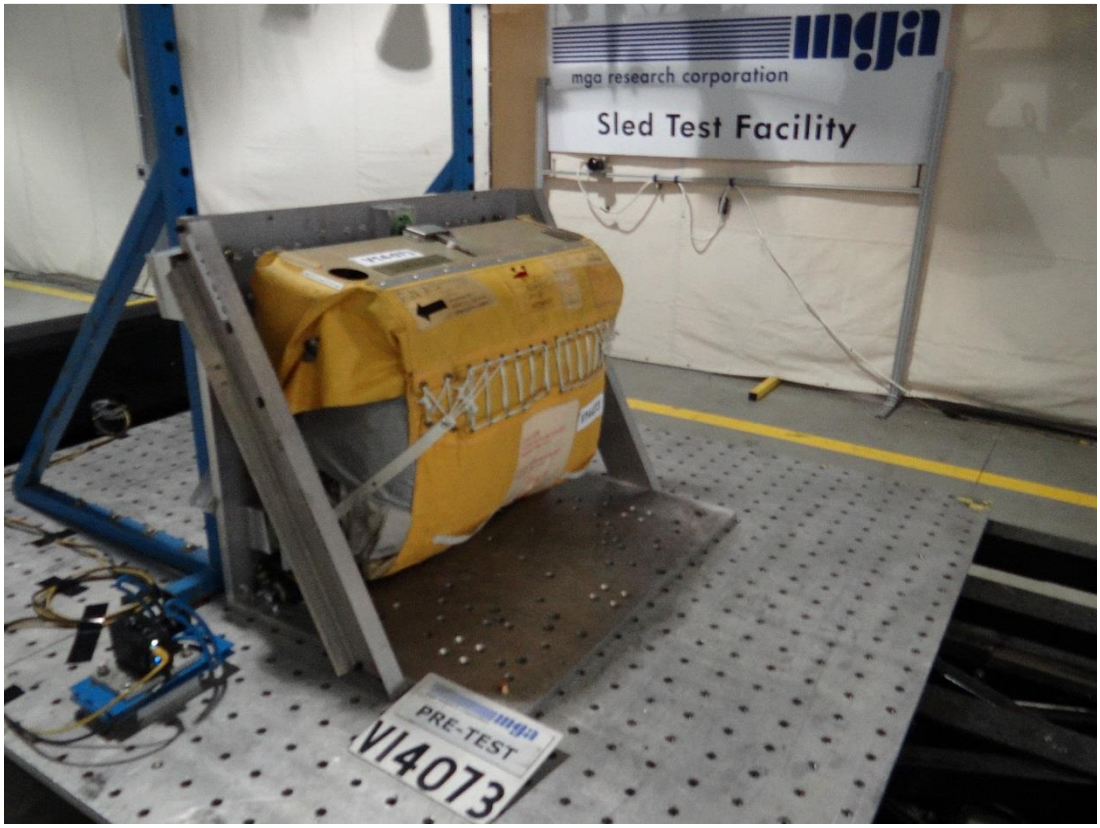
Pre Test Left Angle View



Pre Test Left Side View



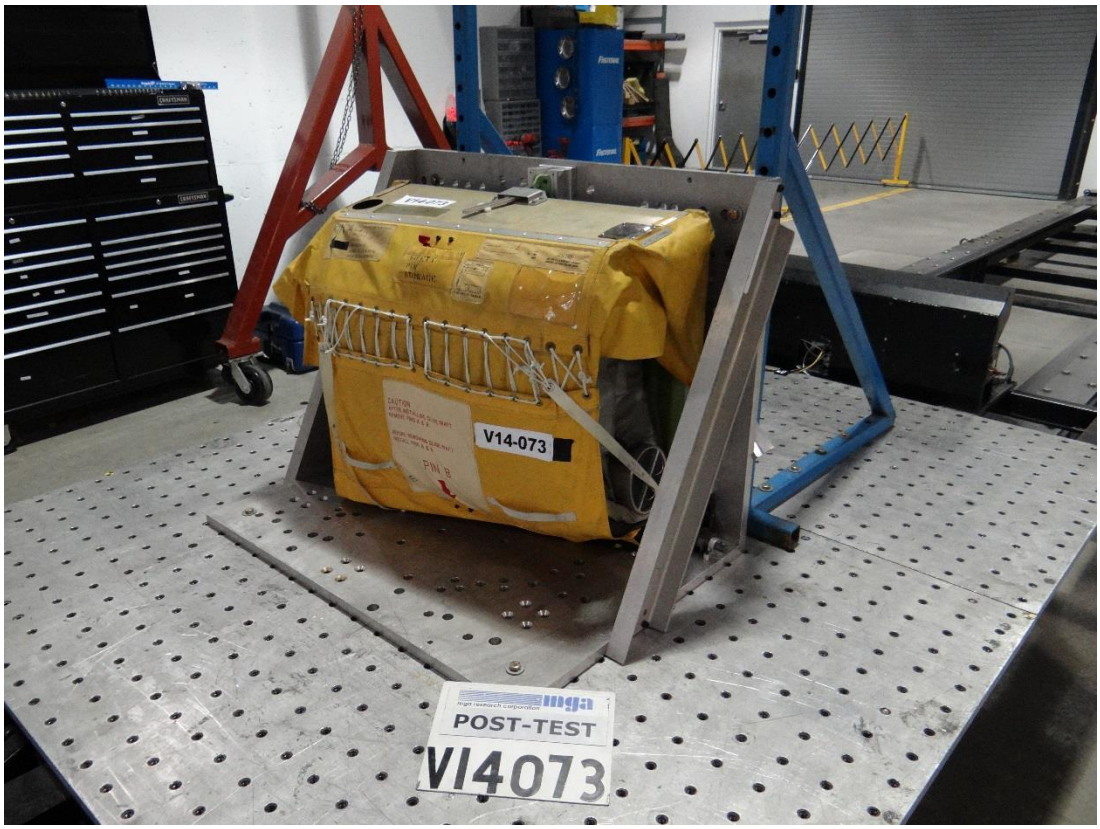
Pre Test Right Side View



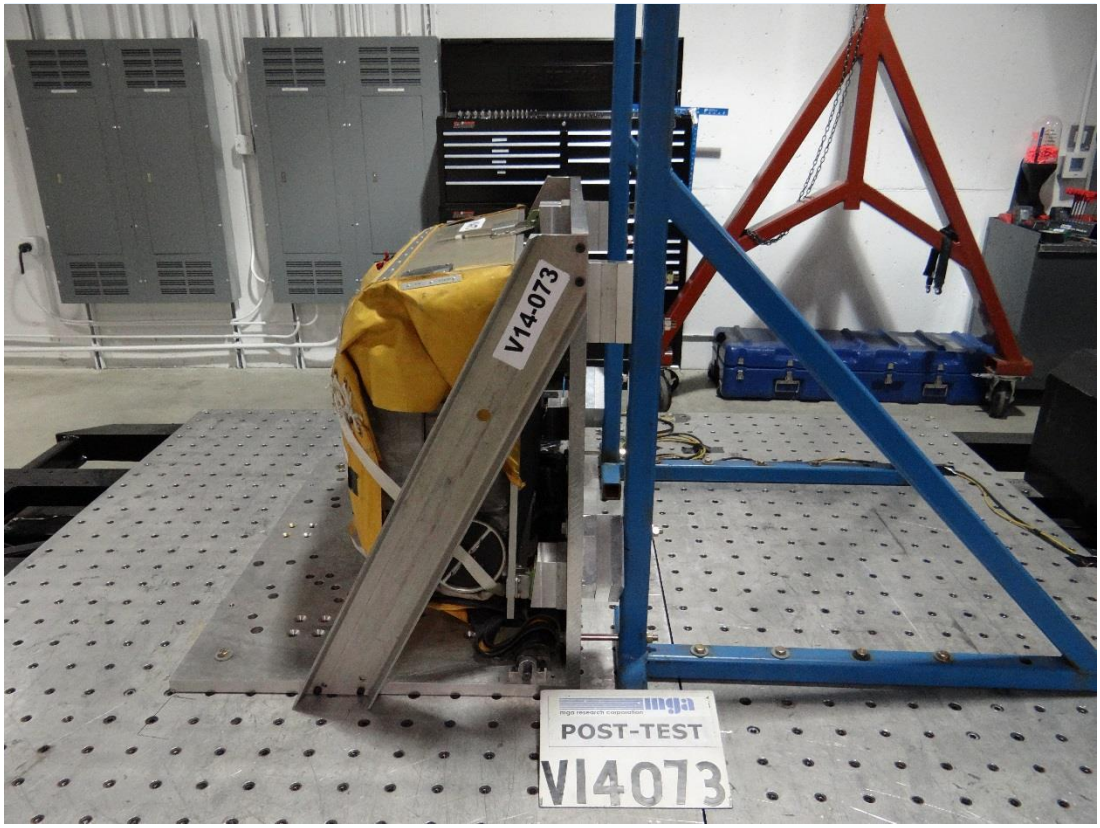
Pre Test Right Angle View

Pre Test Release Shaft Slotted Cap

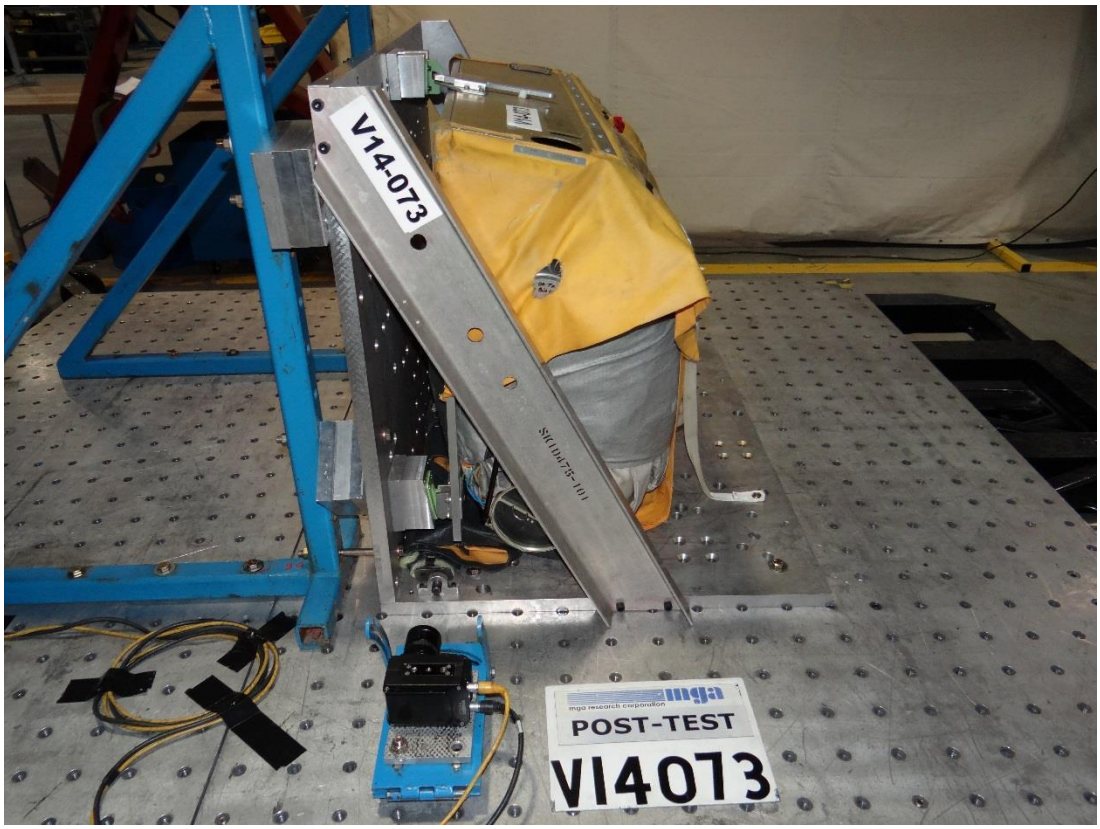
Post Test Front View



Post Test Left Angle View

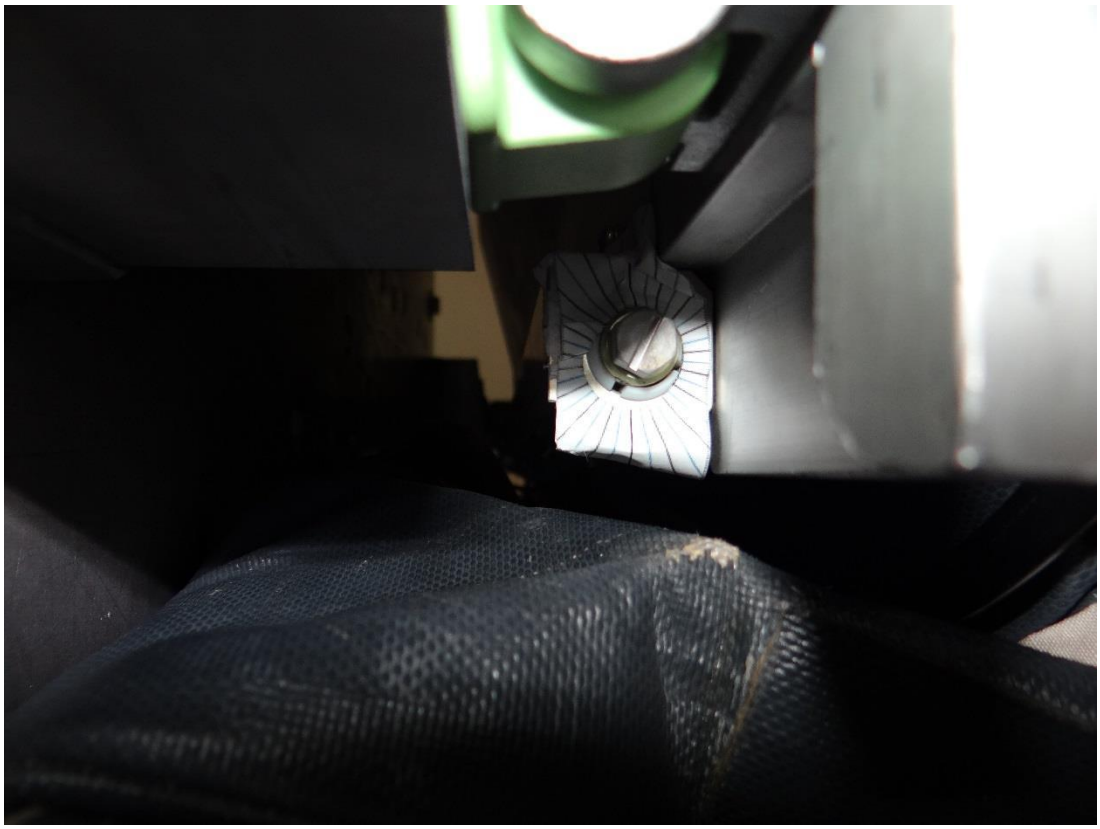


Post Test Left Side View

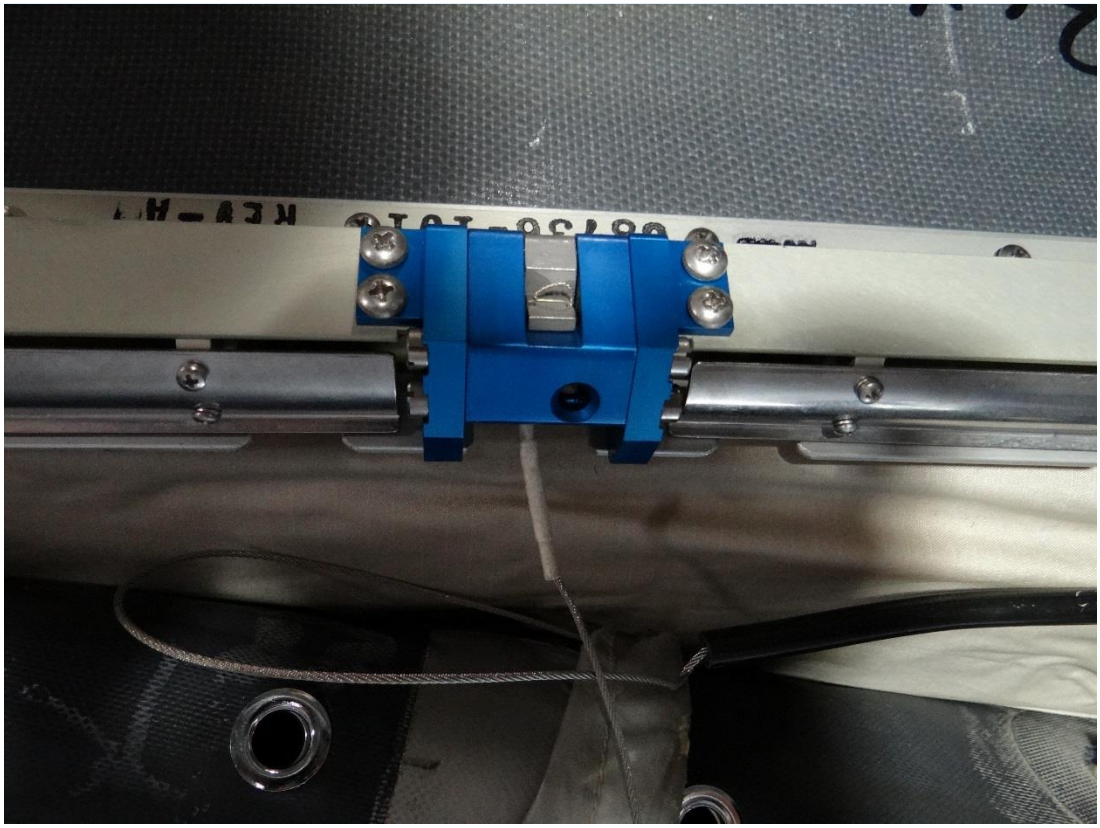


Post Test Right Side View

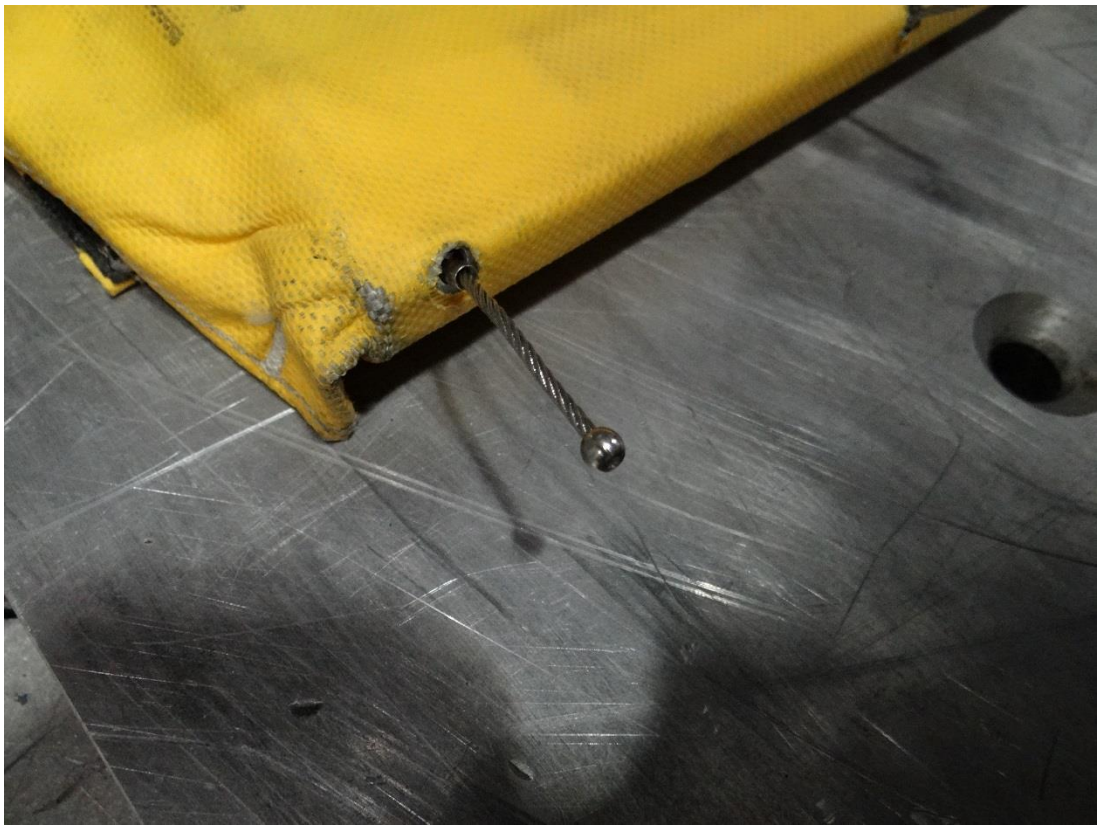
Post Test Right Angle View



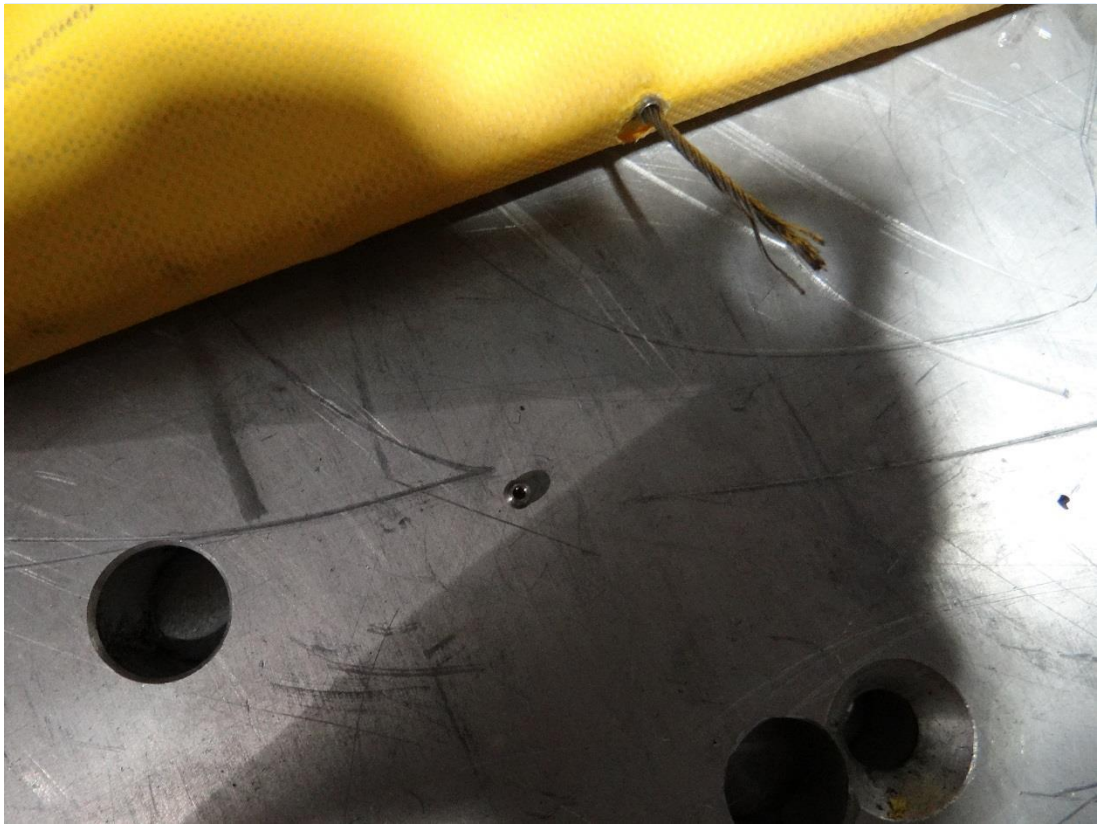
Post Test Release Shaft Slotted Cap



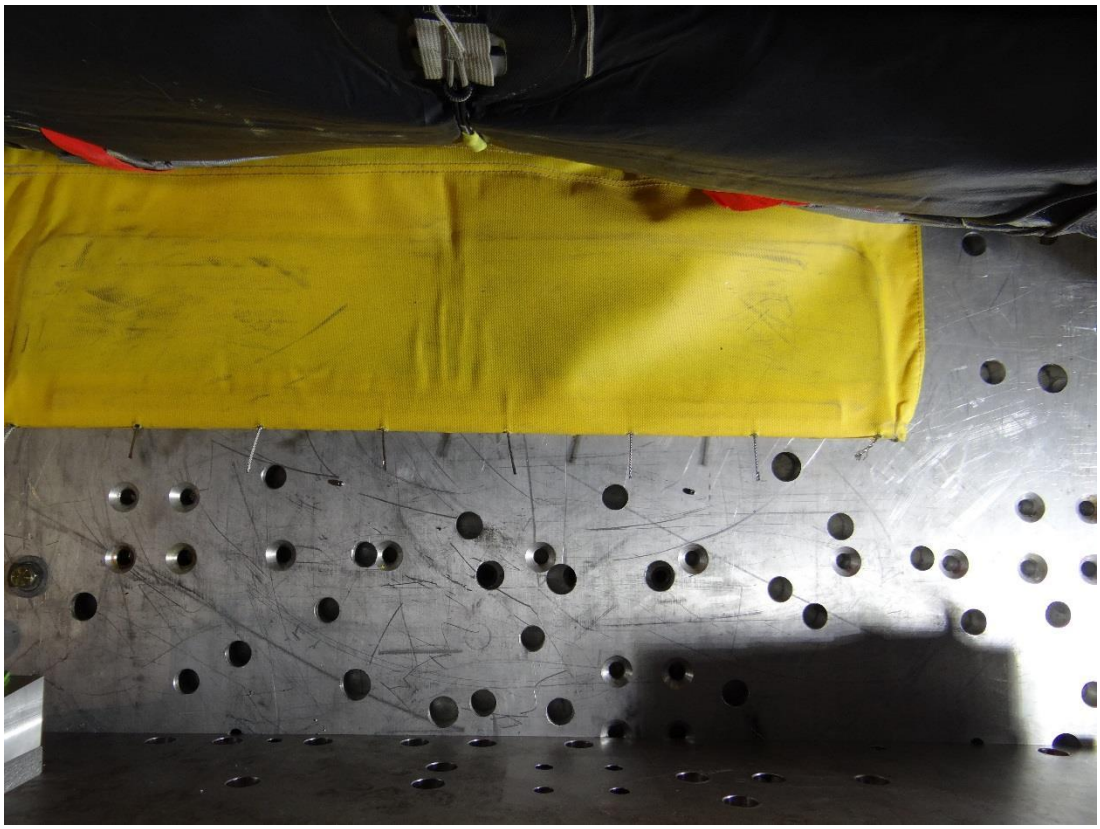
Detail View



Detail View



Detail View



Detail View

15g Inboard Load Test

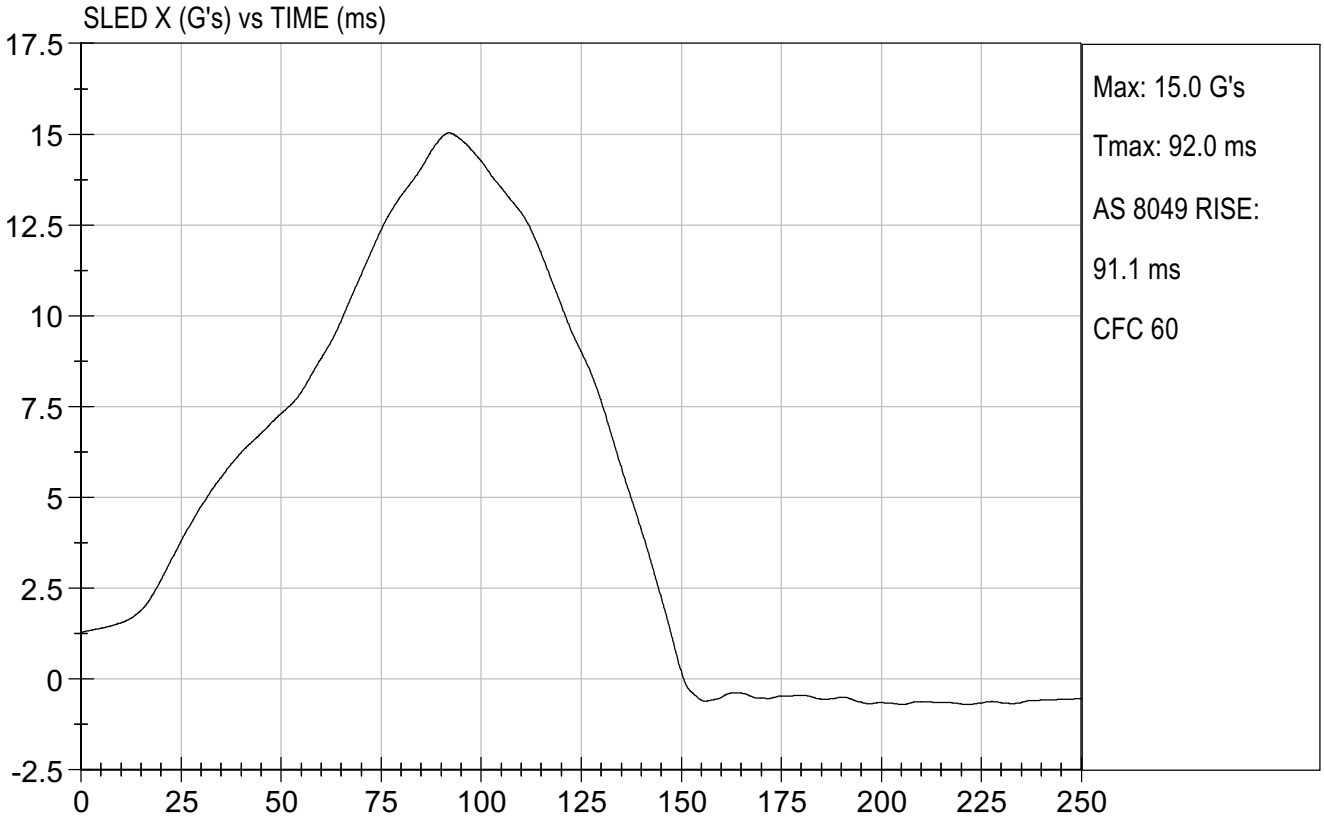
Test Information	
MGA Test Number	V14074
Test Date	01/21/2014
Run Number	1
Orientation	Inboard

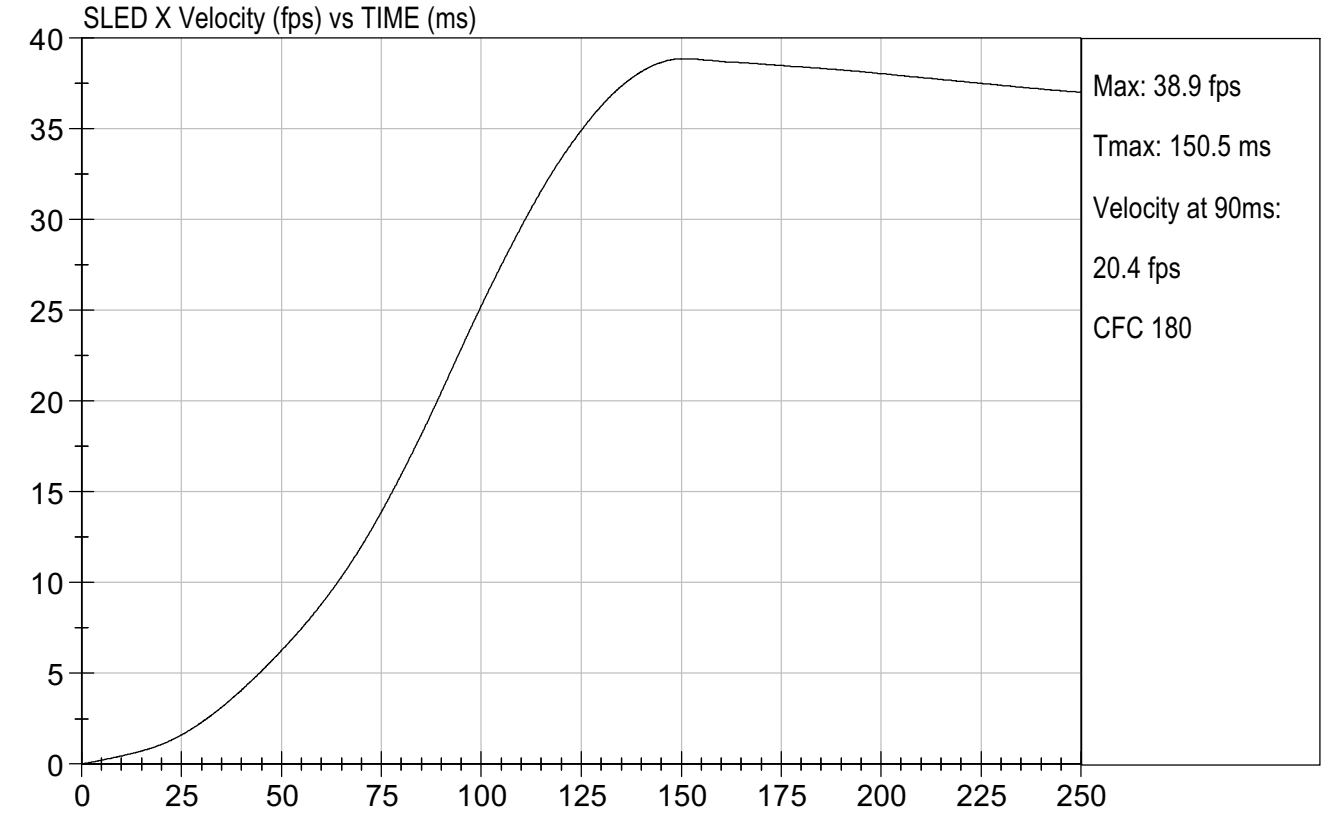
Test Sample Information	
Serial Number	0278
Part Number	6271-109
Weight	219.9

Results	
Max Acceleration (g)	15
Time of Max Acceleration (ms)	91.1
Damage	Yes
Time of Damage (ms)	86
Acceleration at Time of Damage (g)	14.2

Comments:

(1) Pack released
(2) Seven of the eight release cable ball ends broke off of release cables
(3) Right and left aspirator straps released
(4) No damage in the tang area of the release shaft
(5) Very slight rotation of the valve pulley, could not re-insert the safety pin

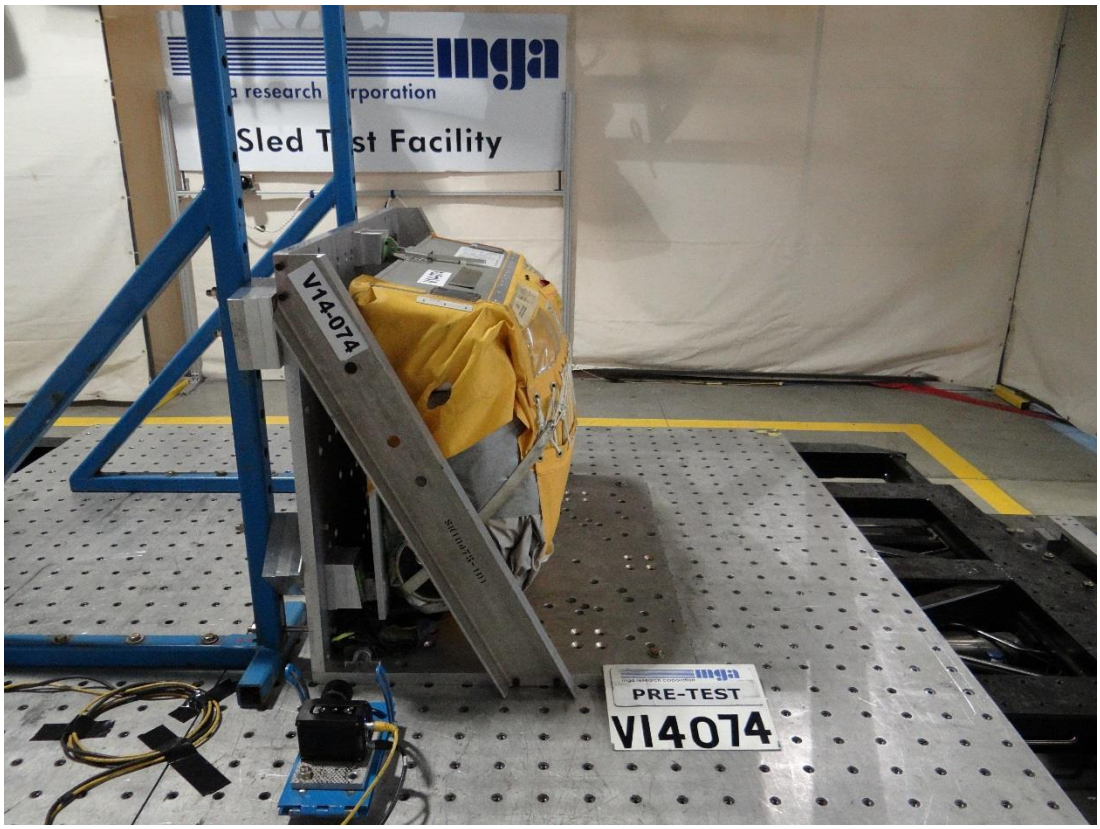

SLED X (G's) vs TIME (ms)
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 15.0 G's
Tmax: 92.0 ms
AS 8049 RISE:
91.1 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 38.9 fps
Tmax: 150.5 ms
Velocity at 90ms:
20.4 fps
CFC 180

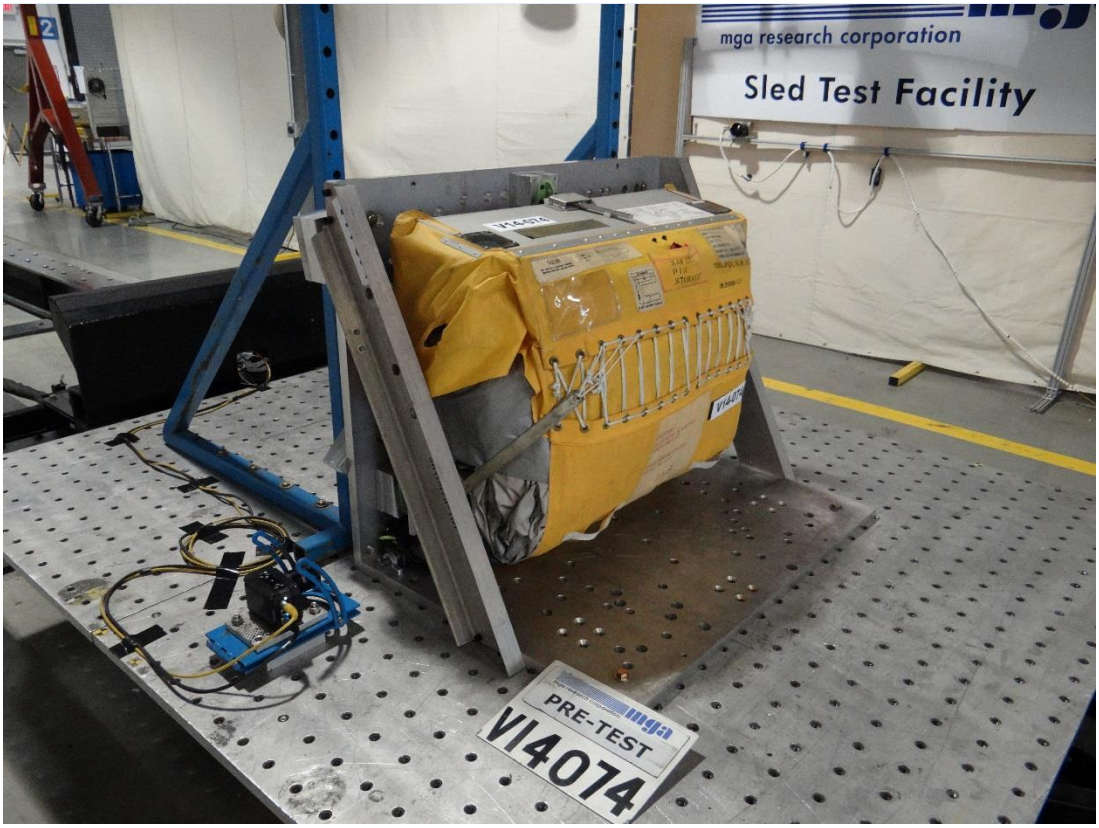
Pre Test Front View

Pre Test Left Angle View

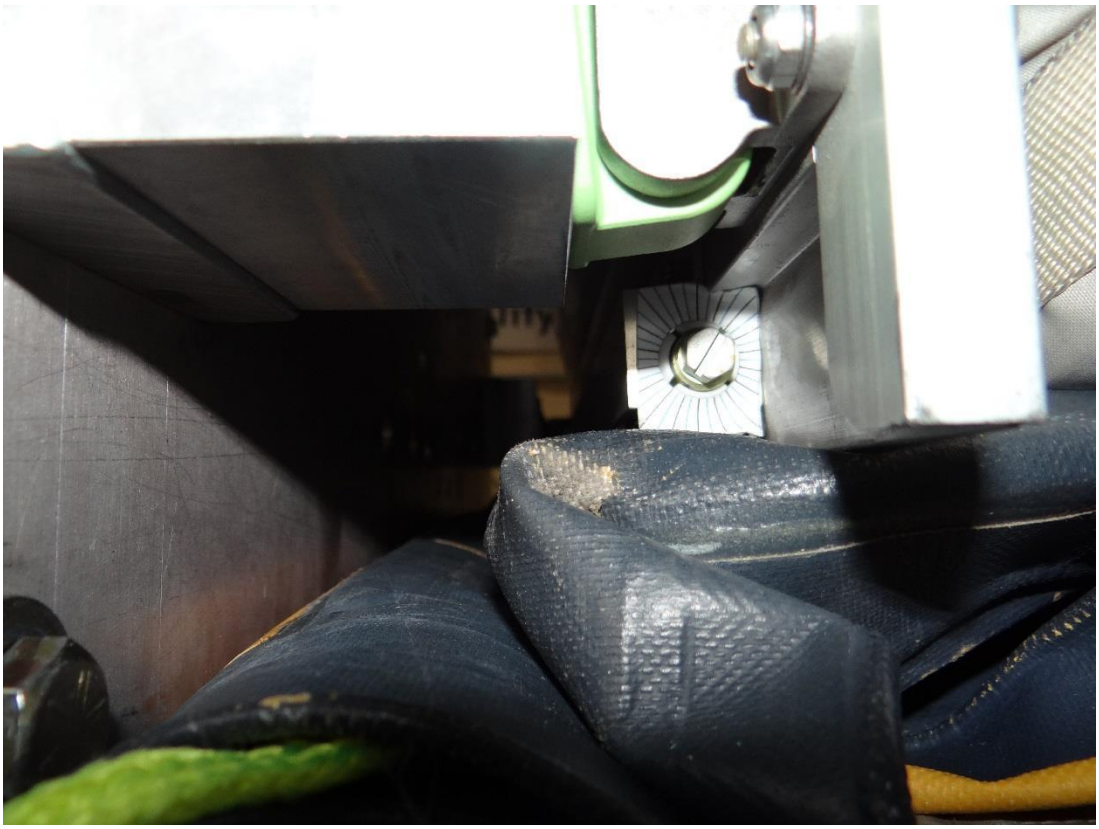
Pre Test Left Side View



Pre Test Right Side View



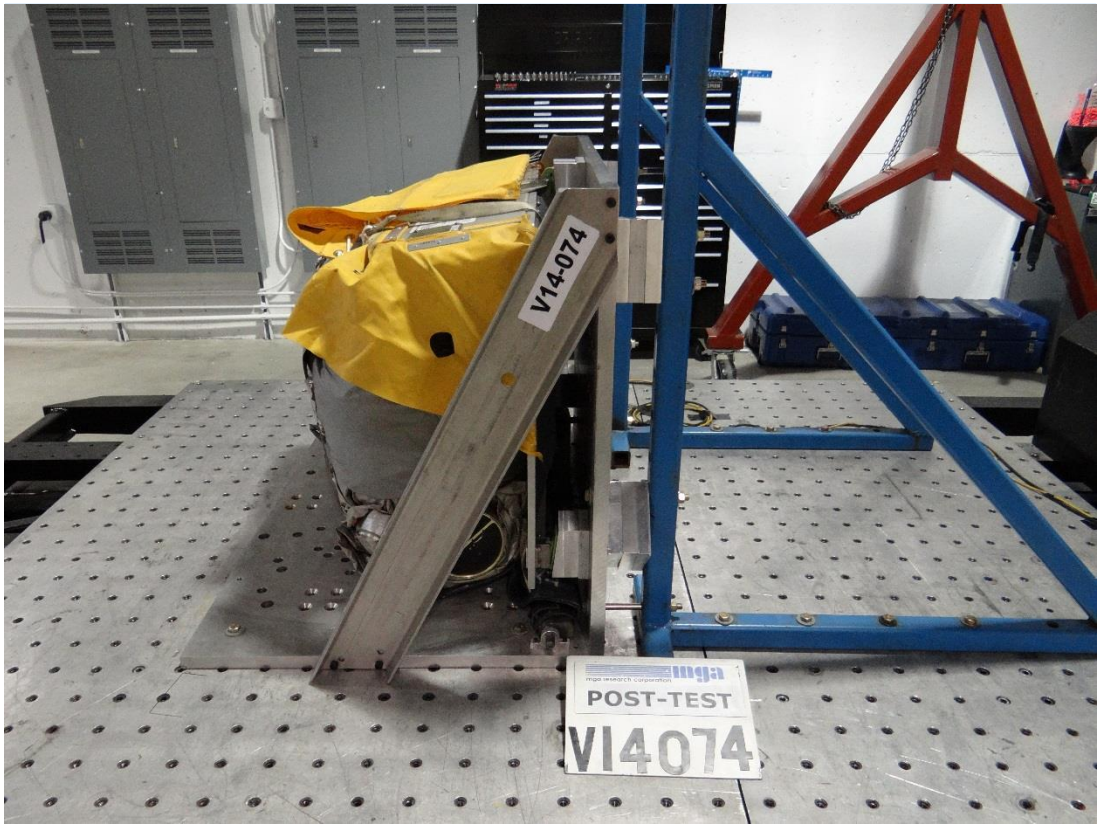
Pre Test Right Angle View



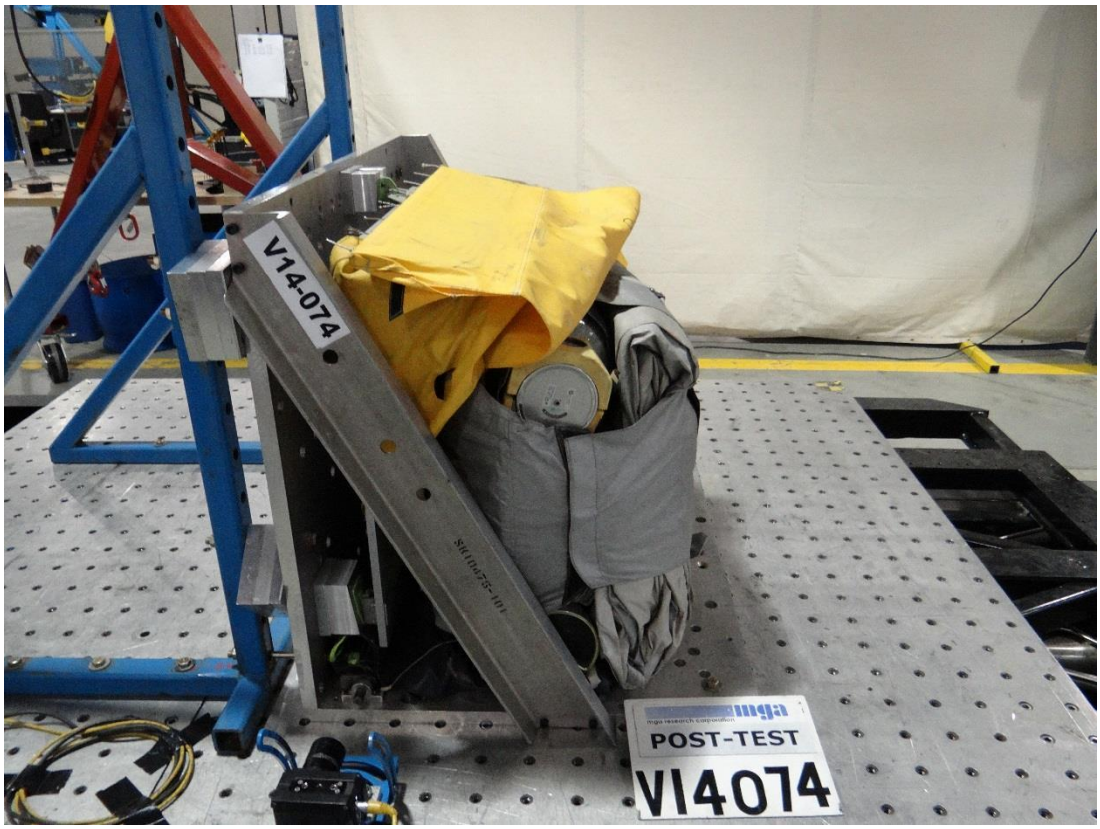
Pre Test Release Shaft Slotted Cap

Post Test Front View

Post Test Left Angle View

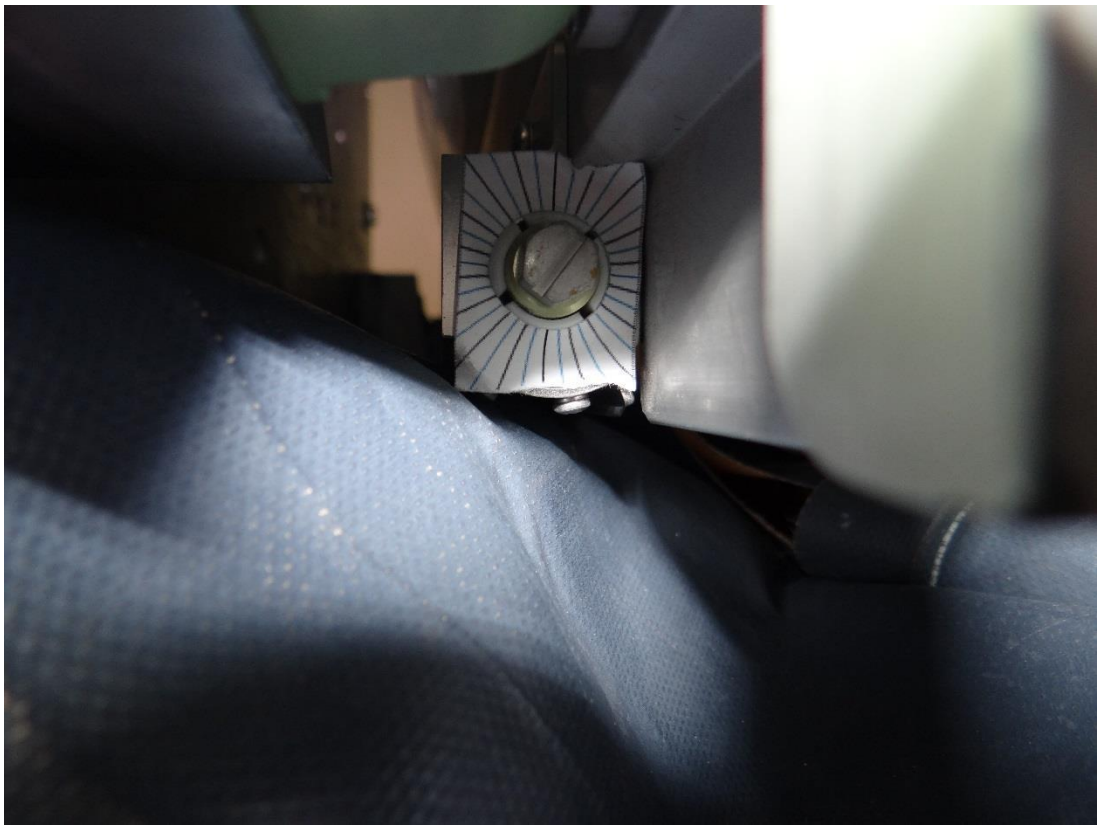


Post Test Left Side View



Post Test Right Side View

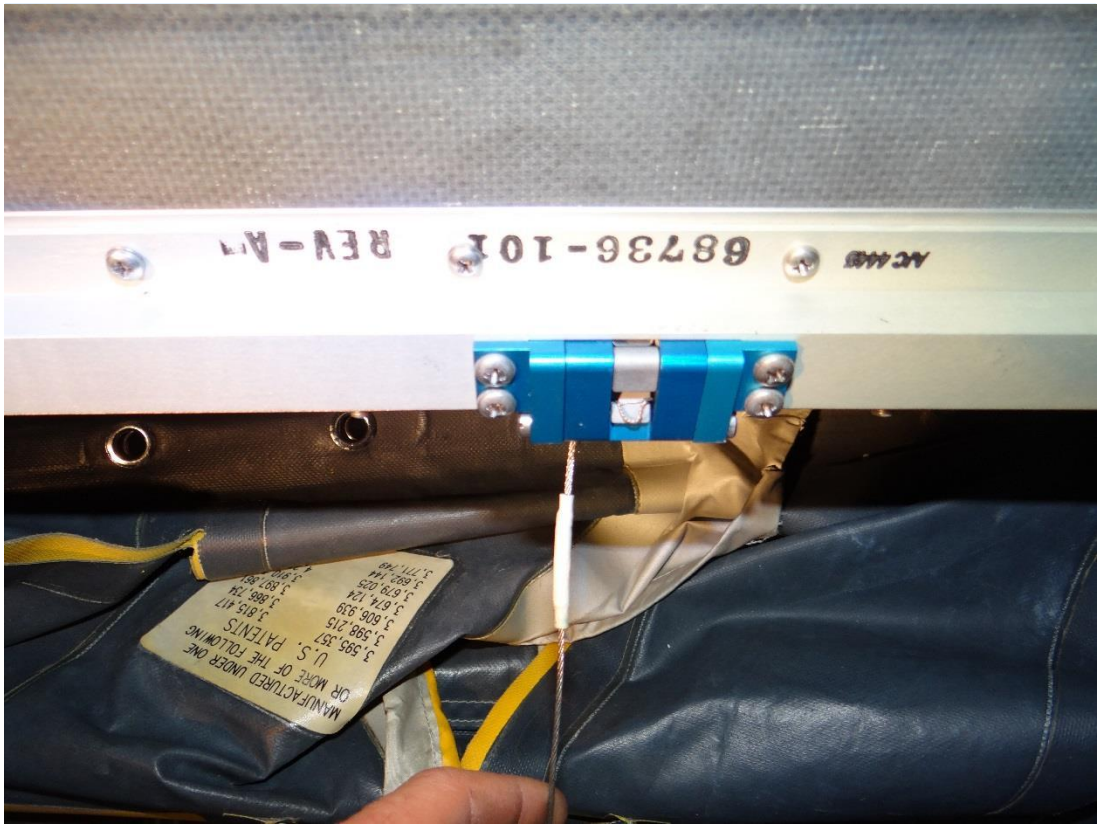
Post Test Right Angle View



Post Test Release Shaft Slotted Cap

Detail View

Detail View


MANUFACTURED UNDER ONE
OR MORE OF THE FOLLOWING
U.S. PATENTS
3,595,357
3,598,215
3,606,939
3,674,124
3,679,025
3,802,144
3,815,417
3,886,734
3,897,685
3,911,748
AC44B
68736-101
REV-A1

Detail View

6.8g Down Load Test

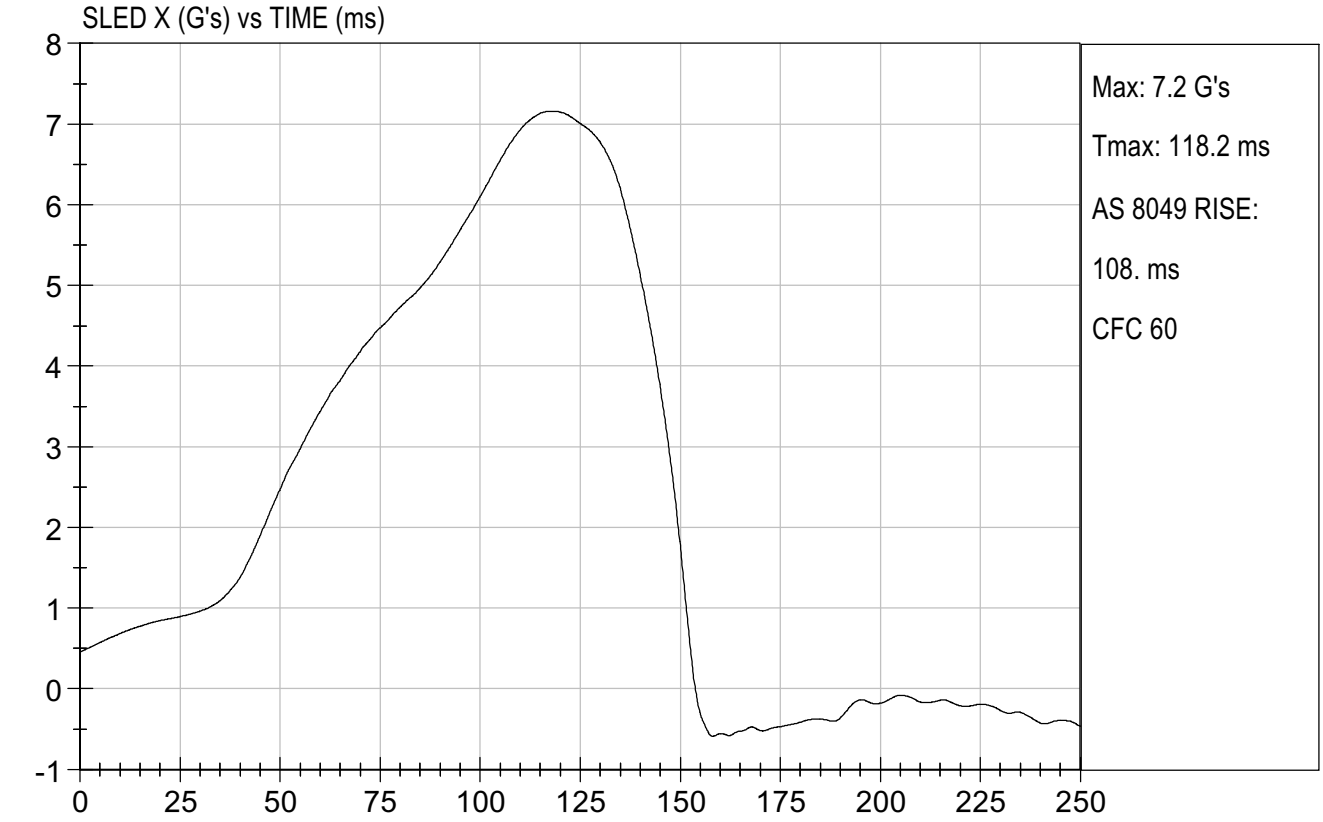
Test Information	
MGA Test Number	V14075
Test Date	01/21/2014
Run Number	1
Orientation	Down

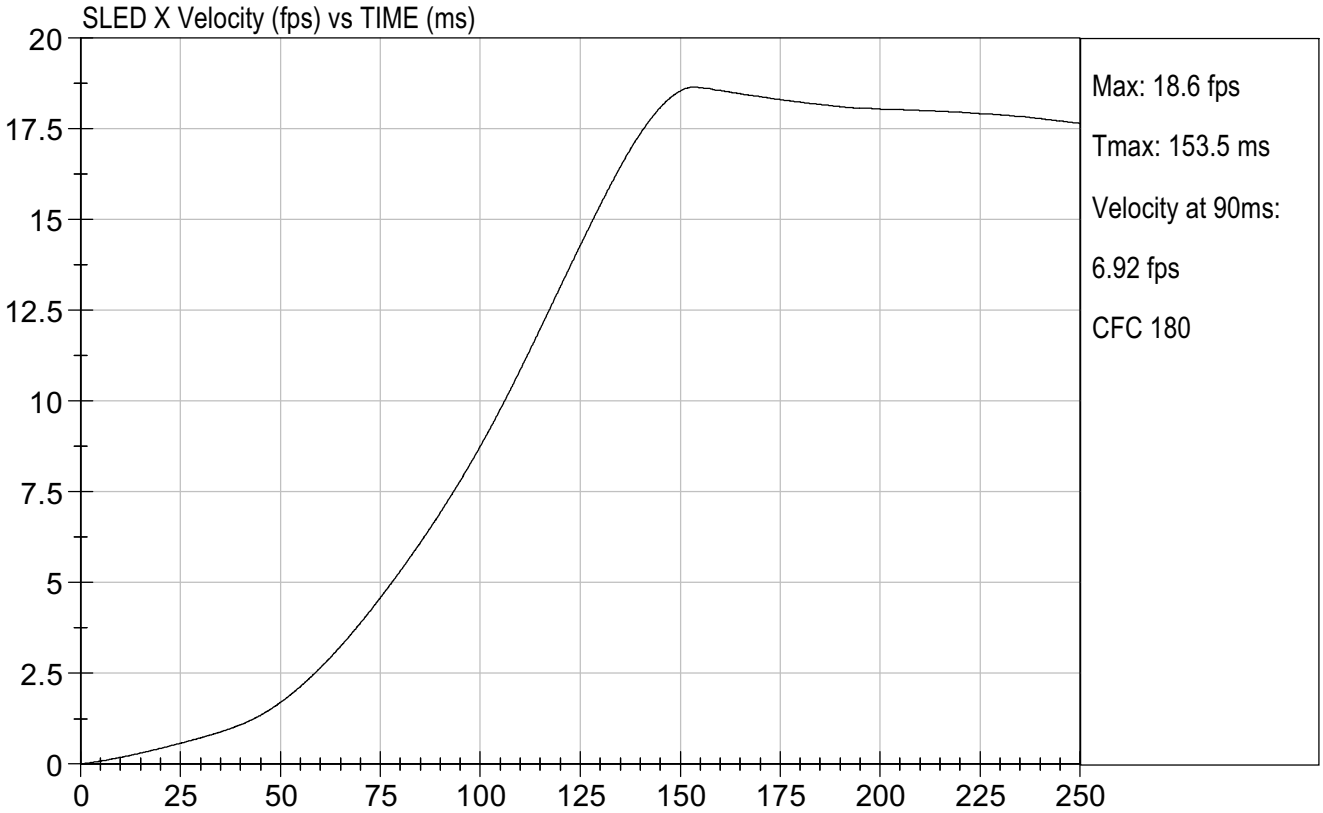
Test Sample Information	
Serial Number	0024
Part Number	62771-114
Weight	222.9 lbs

Results	
Max Acceleration (g)	7.2
Time of Max Acceleration (ms)	108.0
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

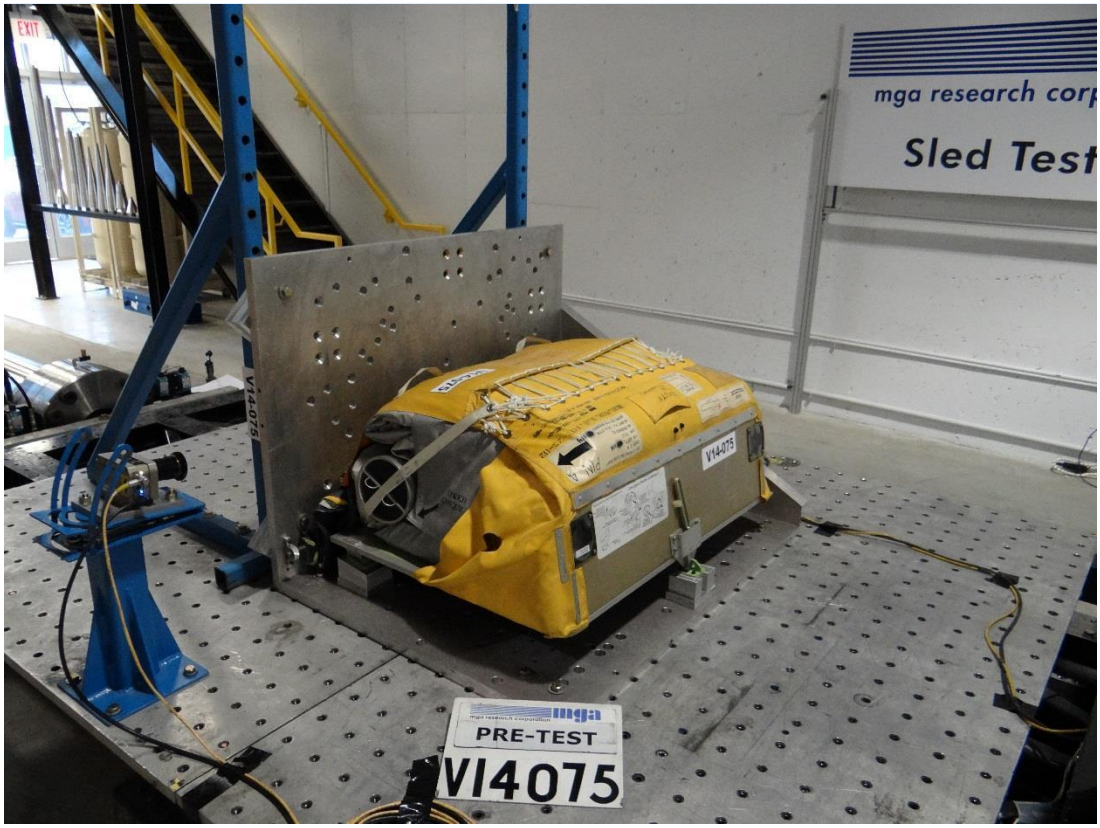
(1) No damage observed
(2) Did not release


SLED X (G's) vs TIME (ms)
8
7
6
5
4
3
2
1
0
-1
0
25
50
75
100
125
150
175
200
225
250
Max: 7.2 G's
Tmax: 118.2 ms
AS 8049 RISE:
108. ms
CFC 60

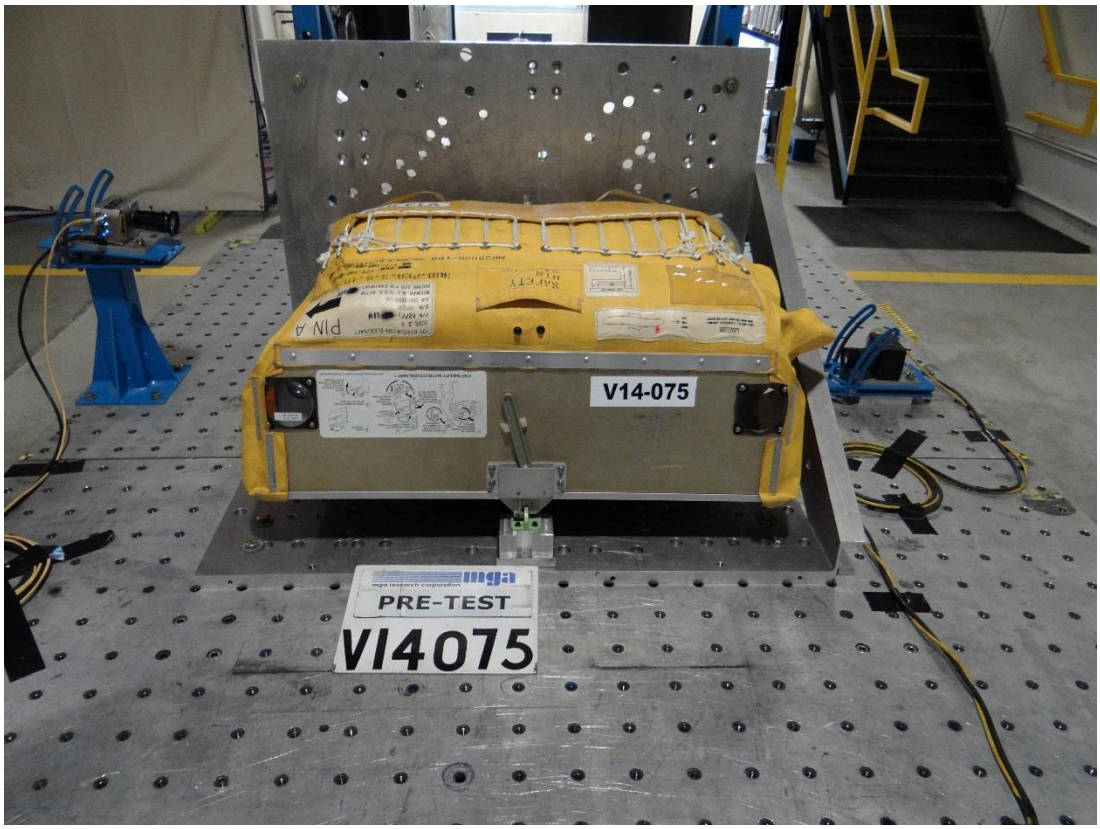

SLED X Velocity (fps) vs TIME (ms)
20
17.5
15
12.5
10
7.5
5
2.5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 18.6 fps
Tmax: 153.5 ms
Velocity at 90ms:
6.92 fps
CFC 180

Pre Test Front View

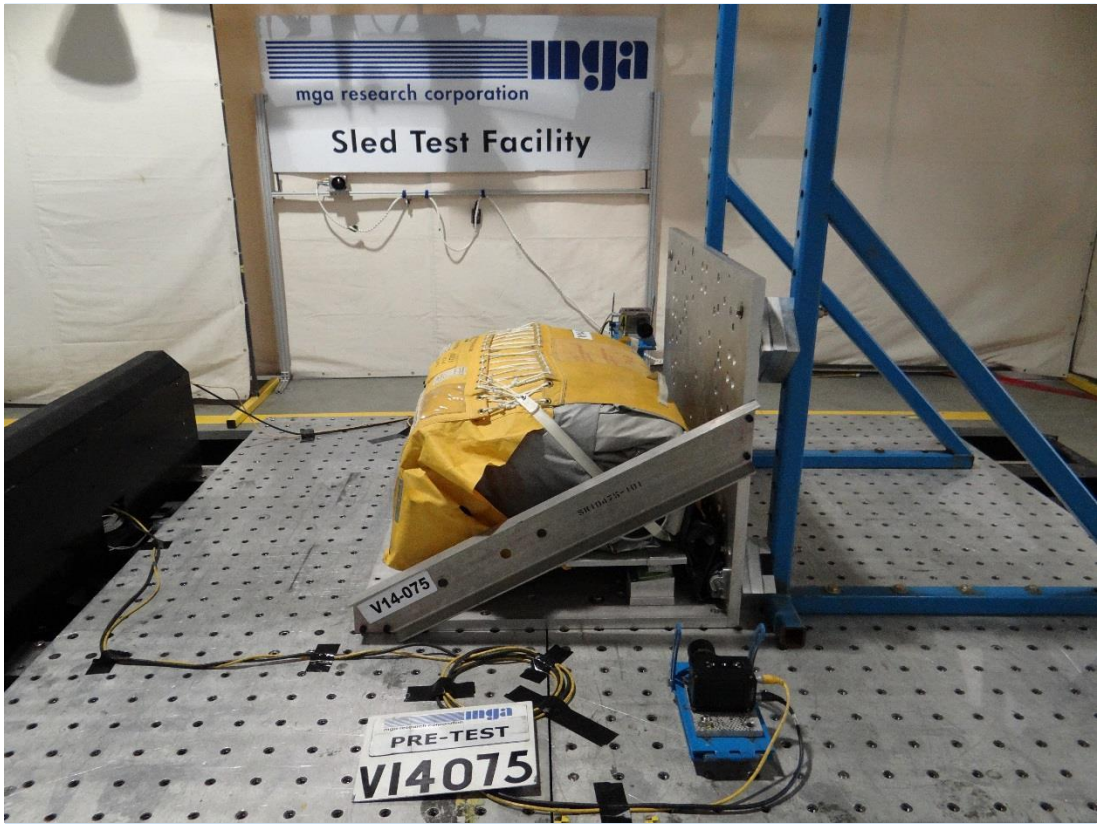
Pre Test Left Side View



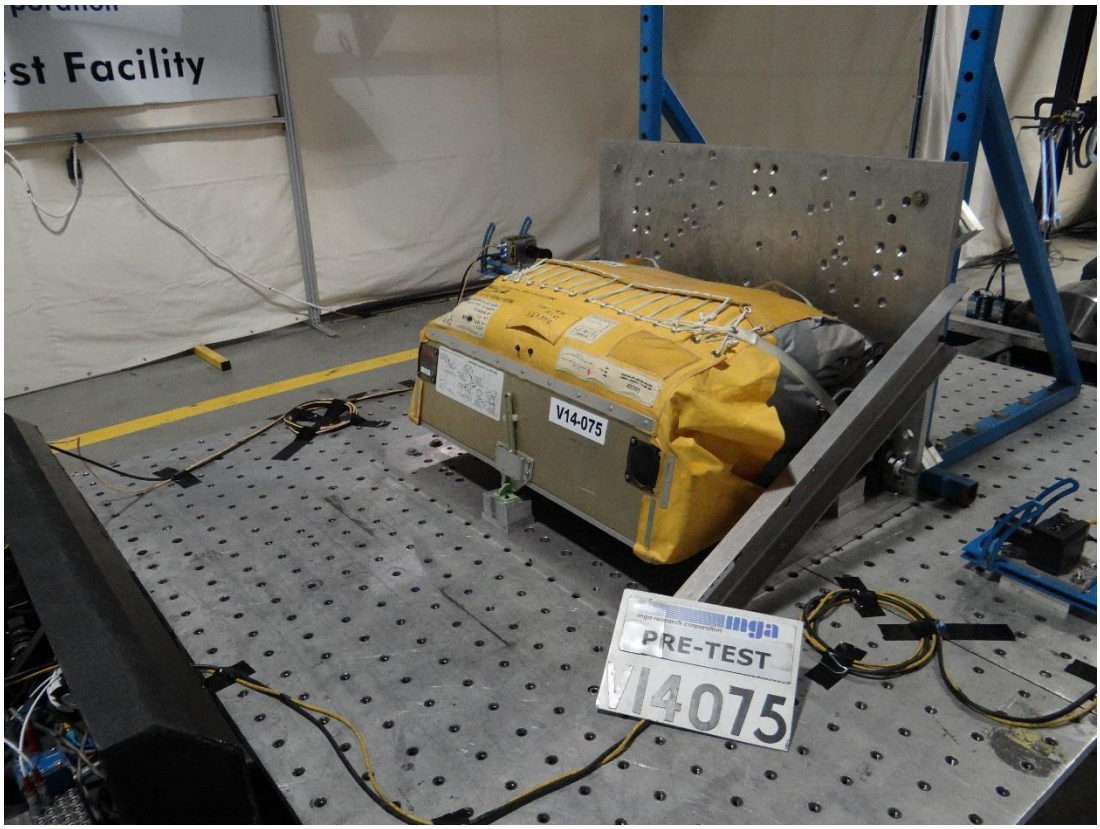
Pre Test Left Angle View



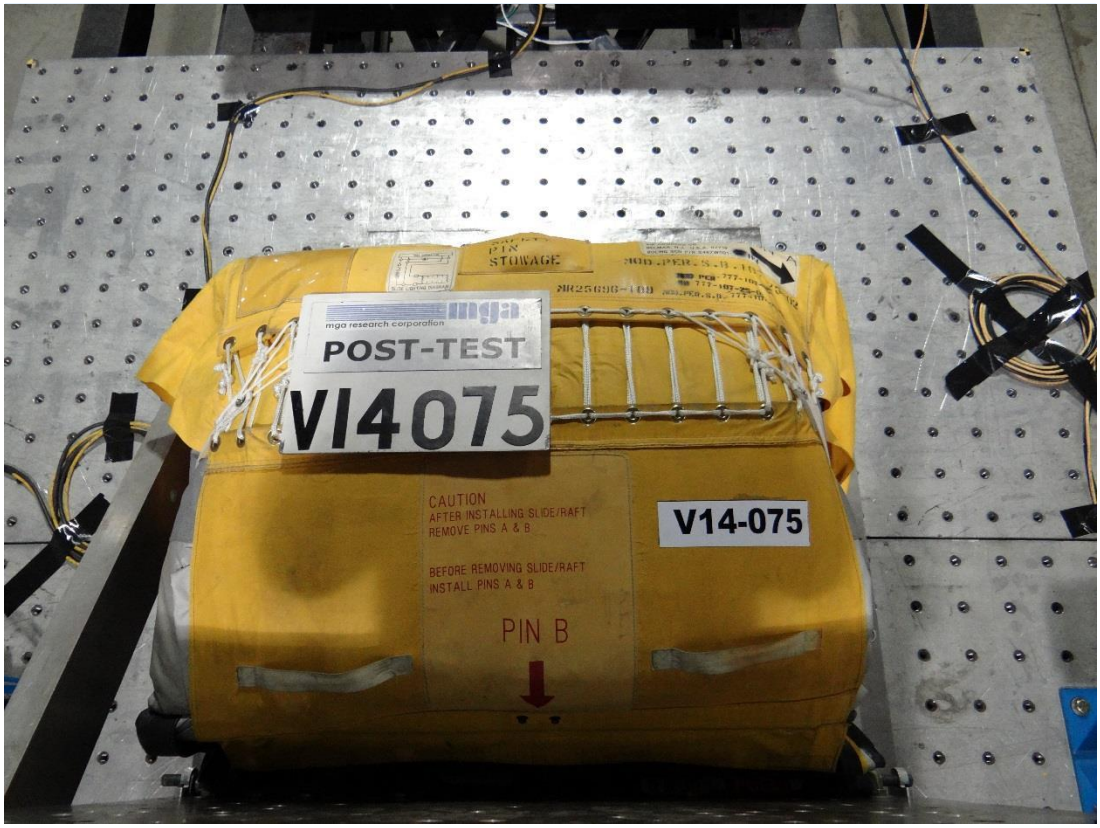
Pre Test Rear View



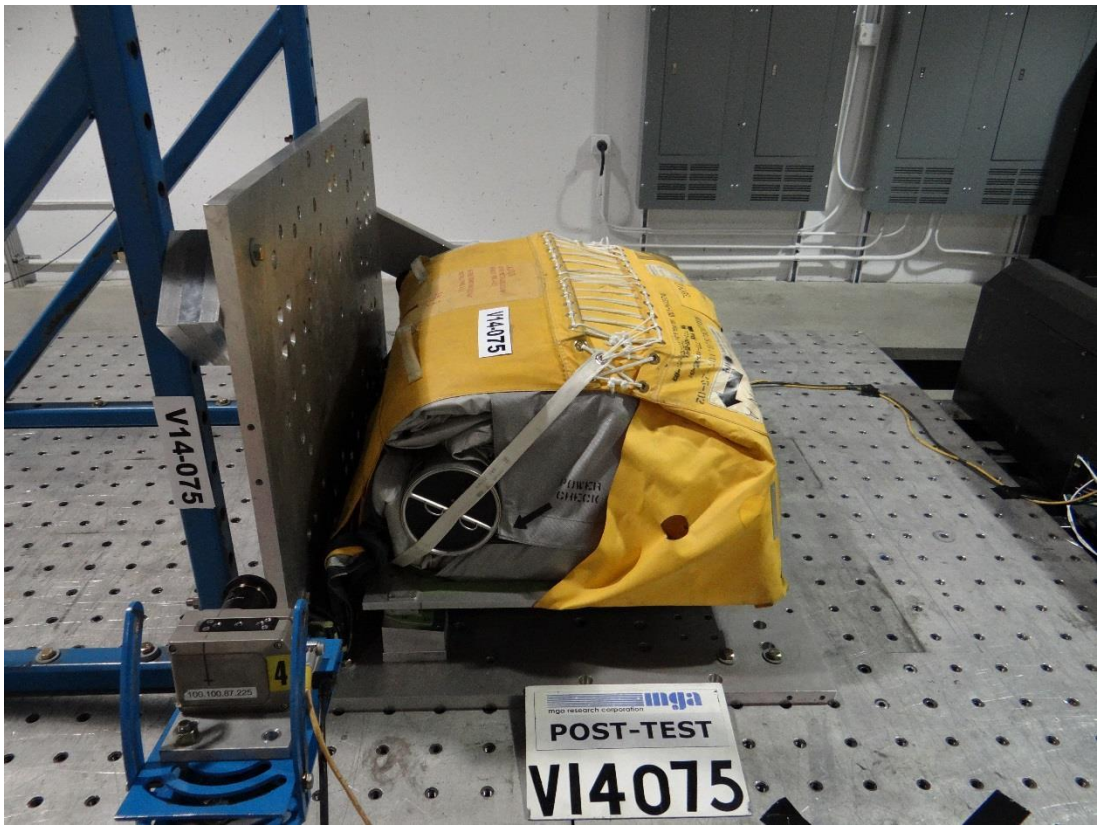
Pre Test Right View



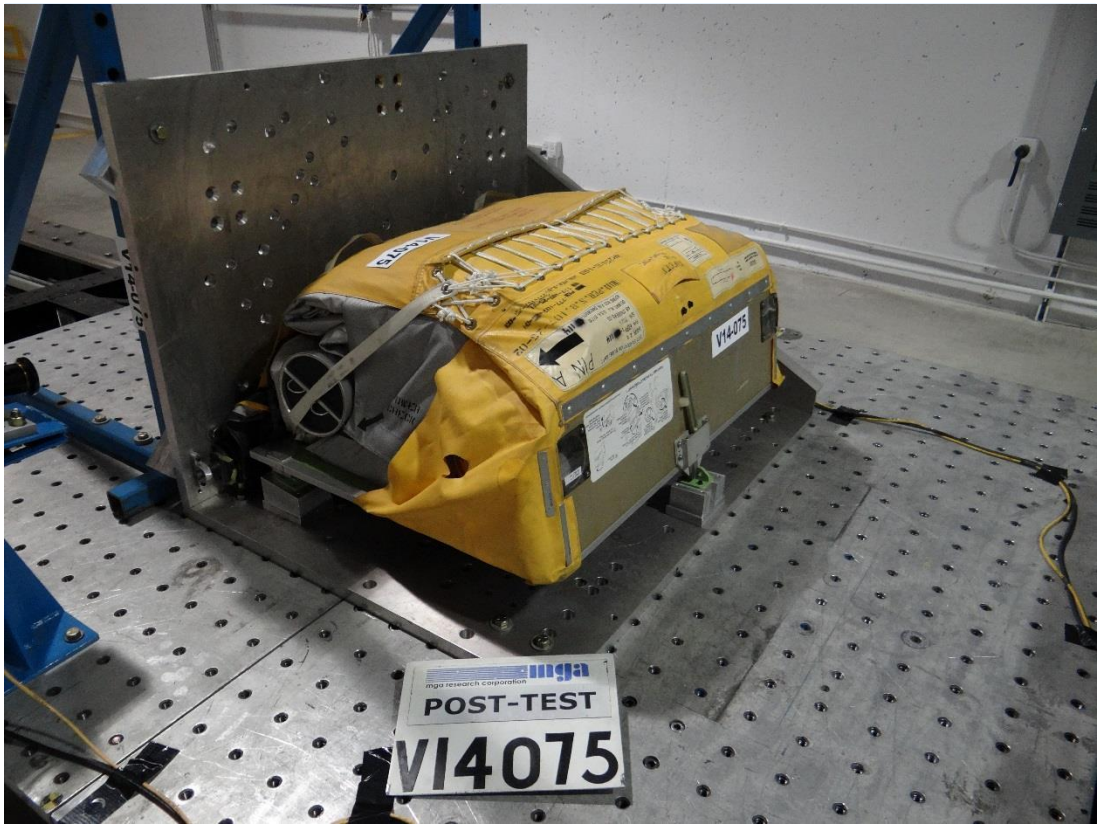
Pre Test Right Angle View



Post Test Front View

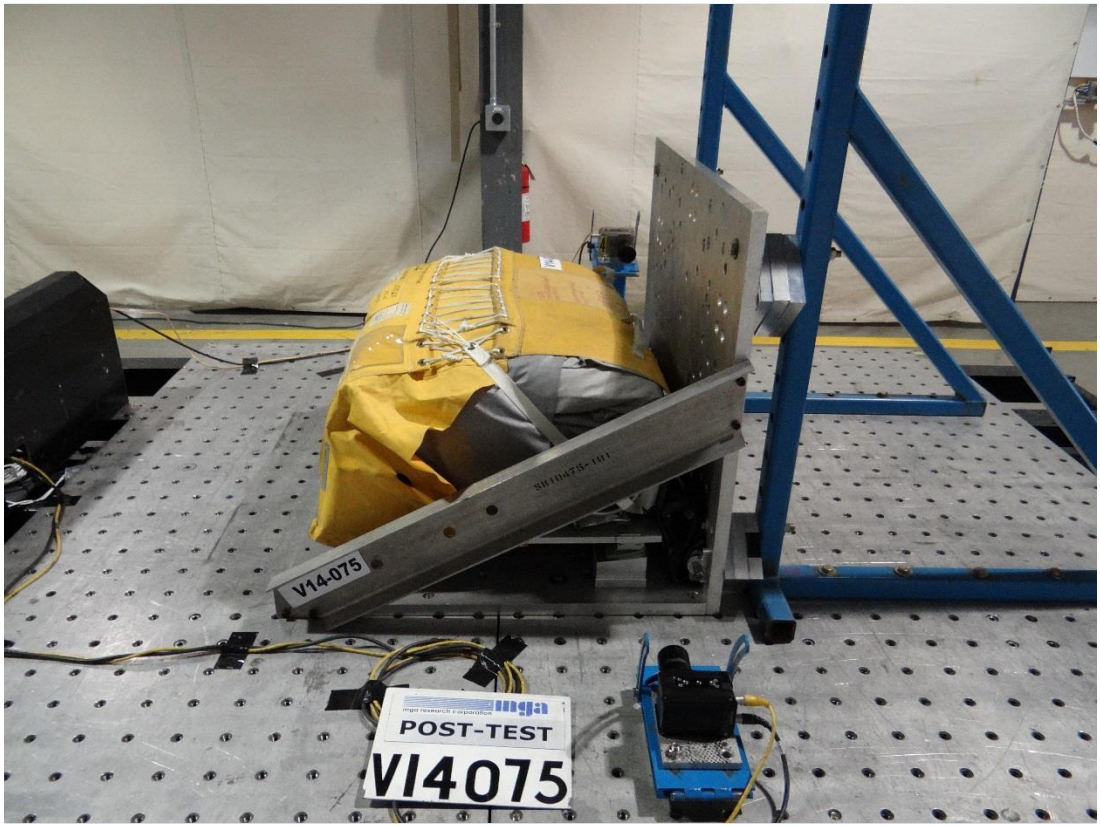


Post Test Left Side View

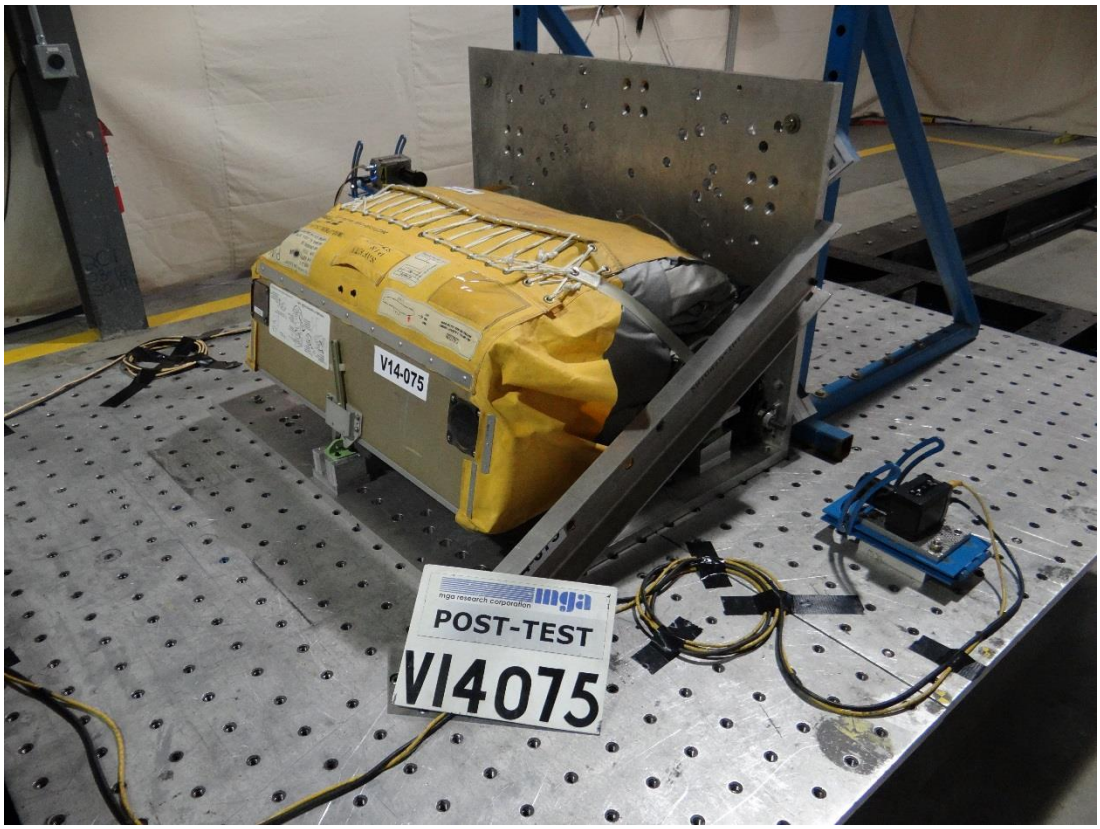


Post Test Left Angle View

Post Test Rear View



Post Test Right Side View



Post Test Right Angle View

9g Down Load Test

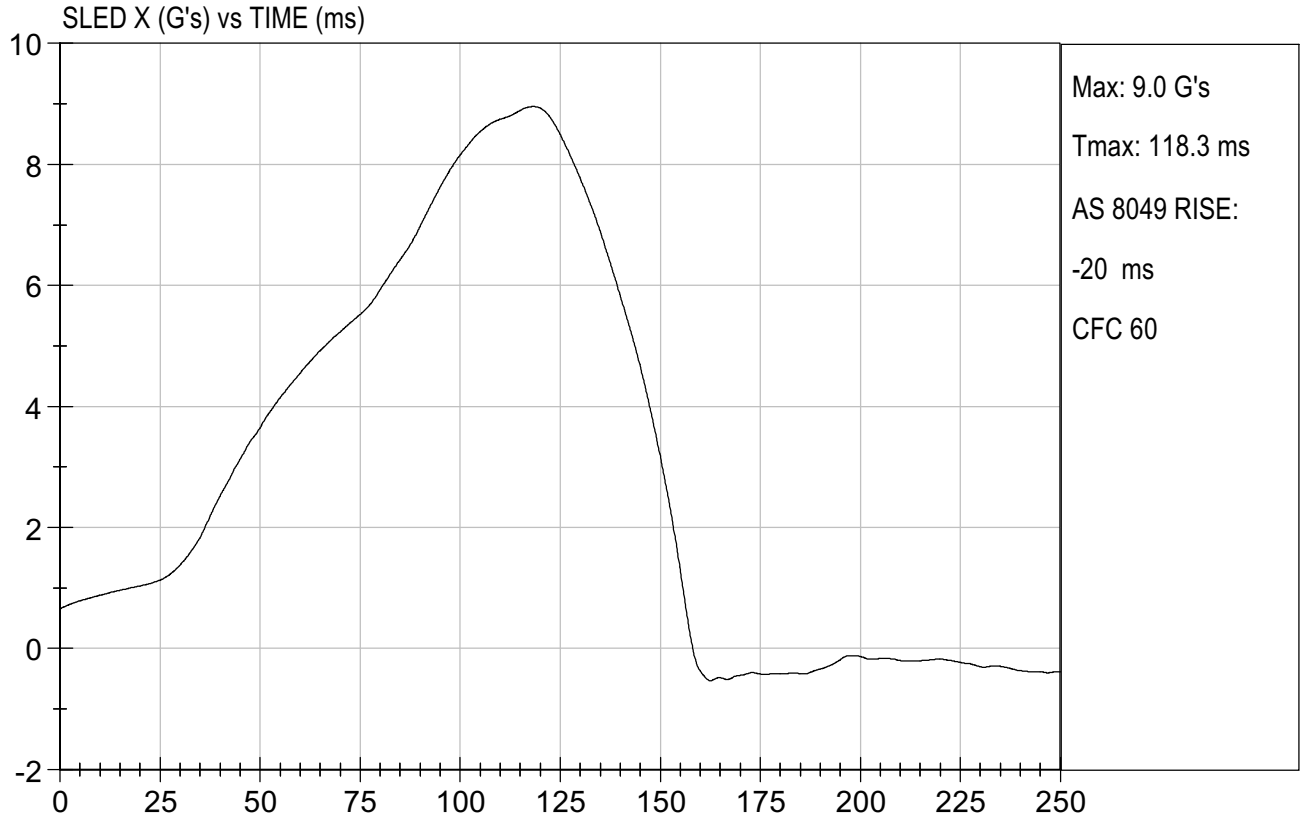
Test Information	
MGA Test Number	V14076
Test Date	01/21/2014
Run Number	2
Orientation	Down

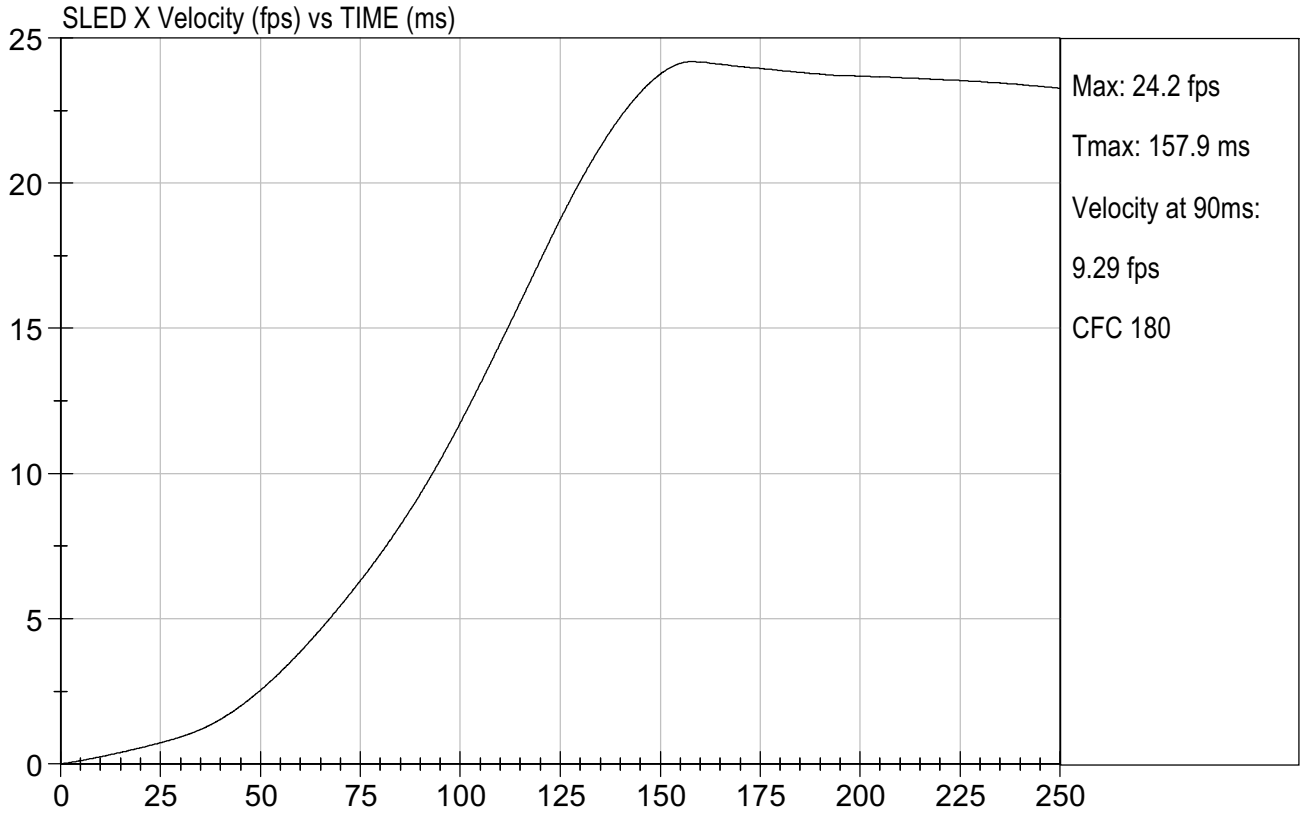
Test Sample Information	
Serial Number	0024
Part Number	62771-114
Weight	222.9 lbs

Results	
Max Acceleration (g)	9
Time of Max Acceleration (ms)	118.3
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

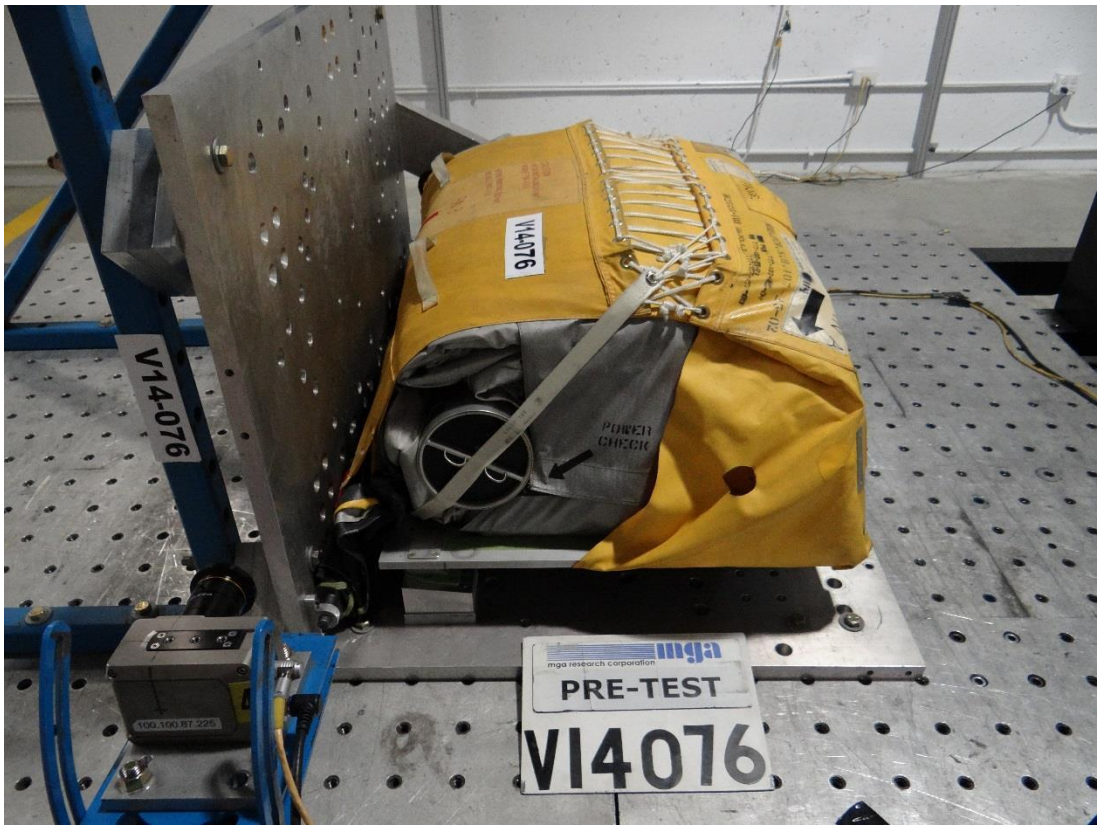
Comments:

(1) No damage observed
(2) Did not release


SLED X (G's) vs TIME (ms)
10
8
6
4
2
0
-2
0
25
50
75
100
125
150
175
200
225
250
Max: 9.0 G's
Tmax: 118.3 ms
AS 8049 RISE:
-20 ms
CFC 60

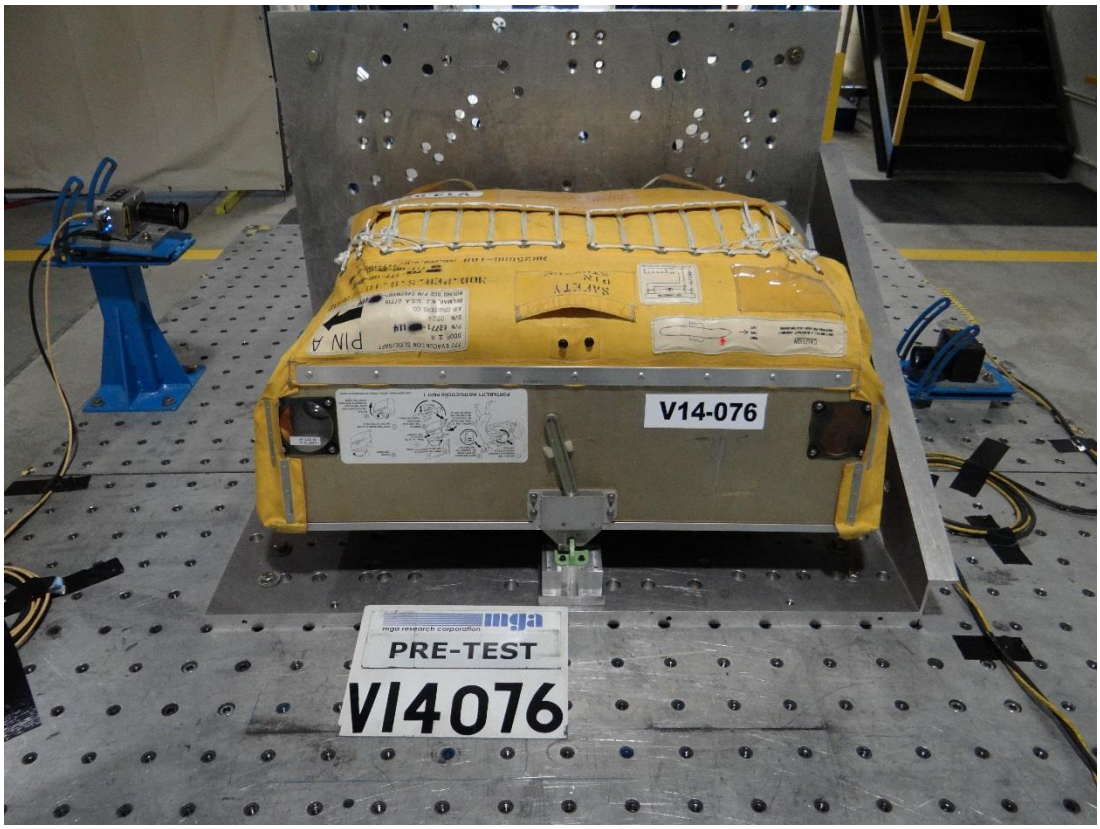

SLED X Velocity (fps) vs TIME (ms)
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 24.2 fps
Tmax: 157.9 ms
Velocity at 90ms:
9.29 fps
CFC 180

Pre Test Front View



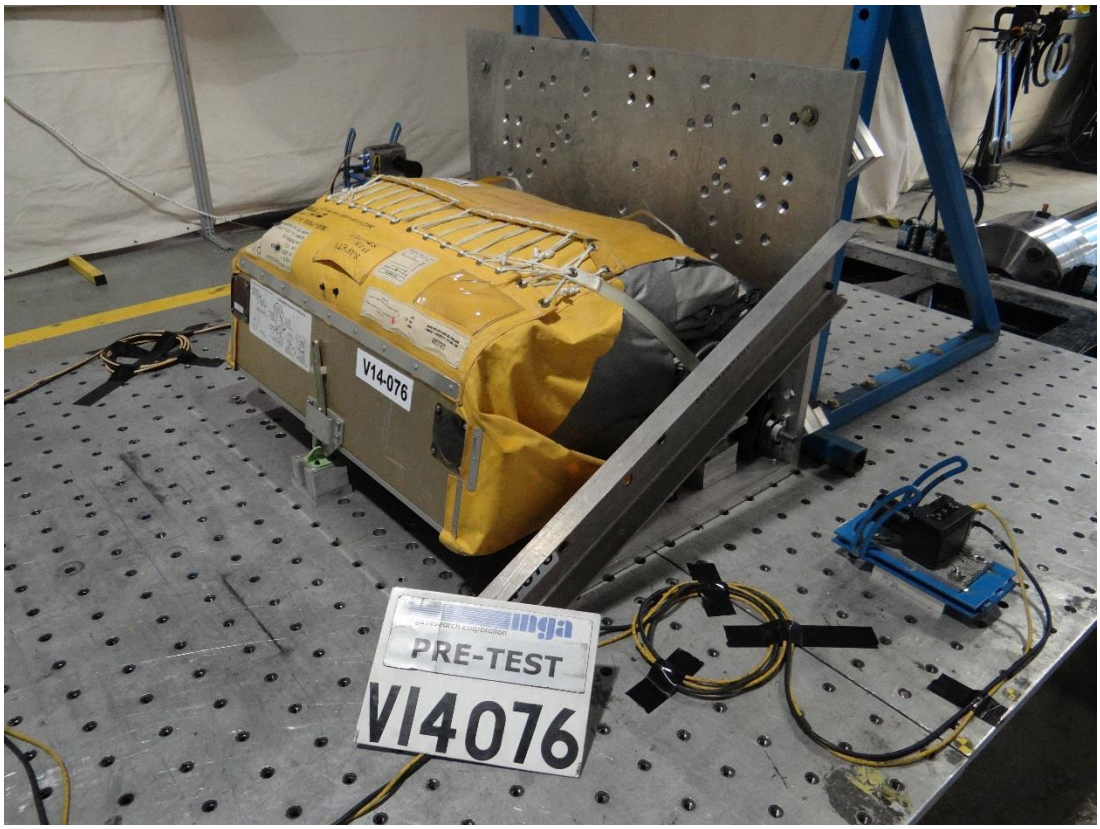
Pre Test Left Side View

Pre Test Left Angle View

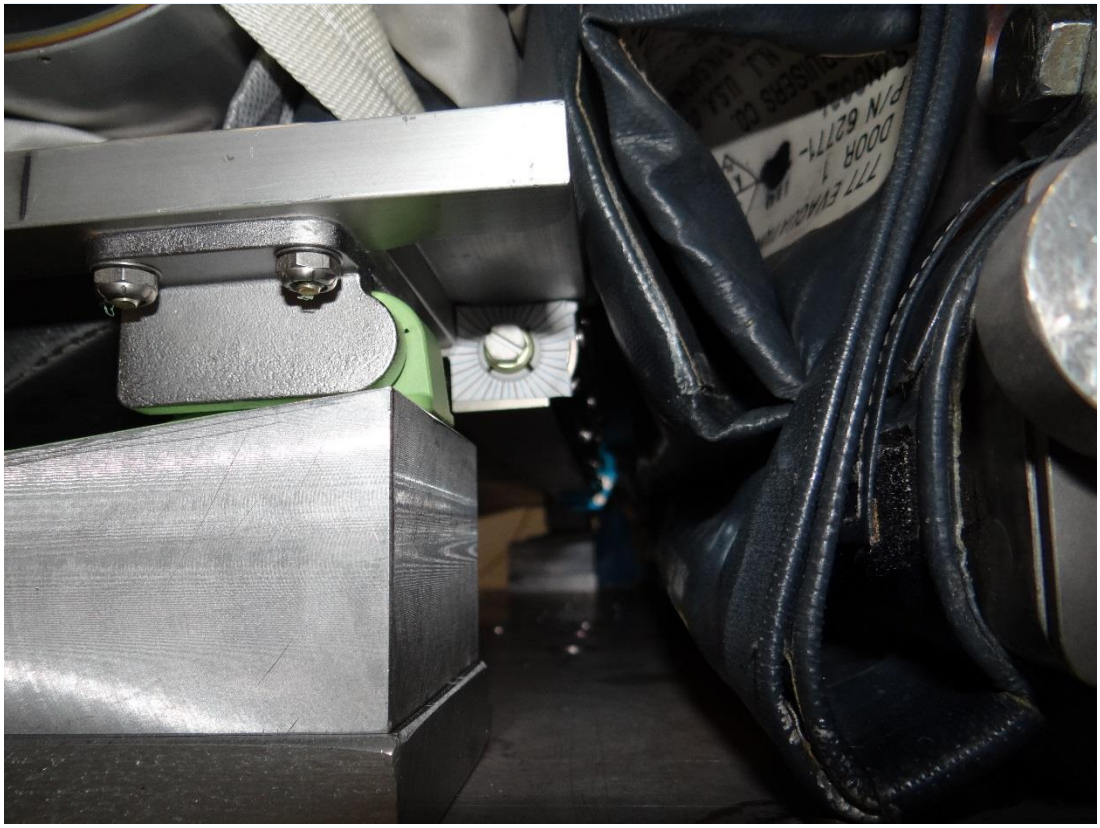


Pre Test Rear View

Pre Test Right Side View

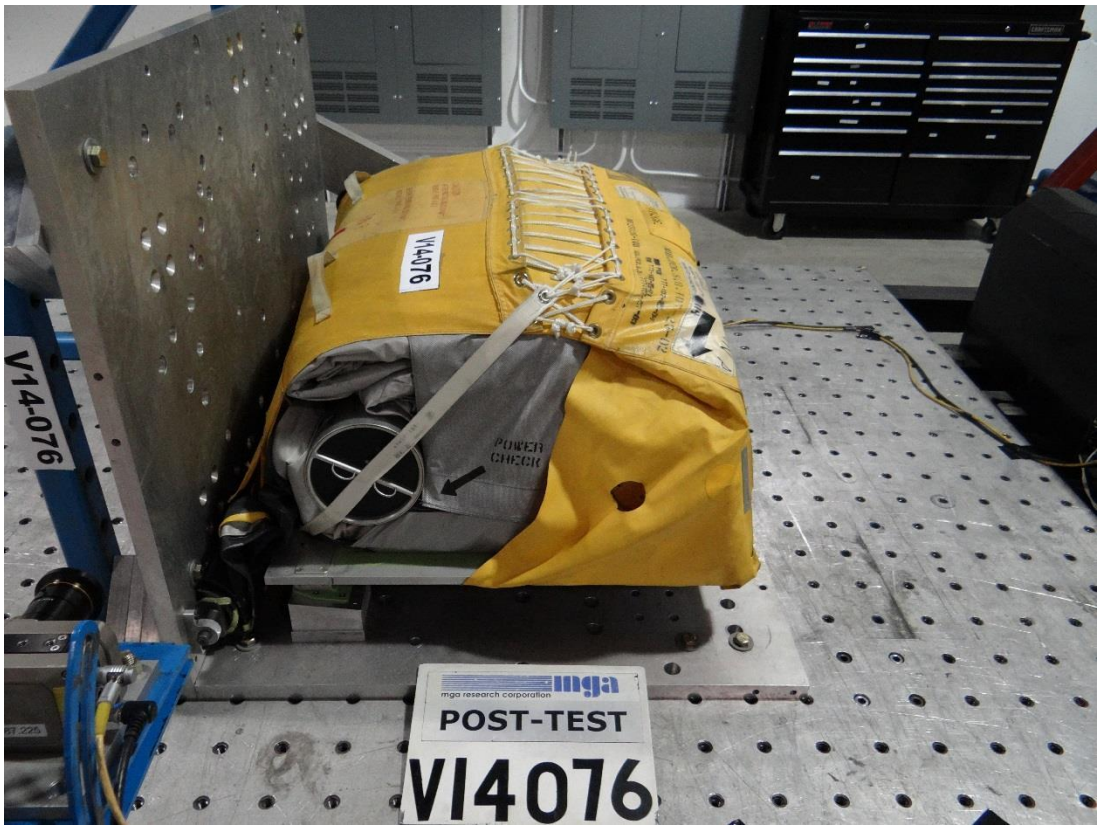


Pre Test Right Angle View

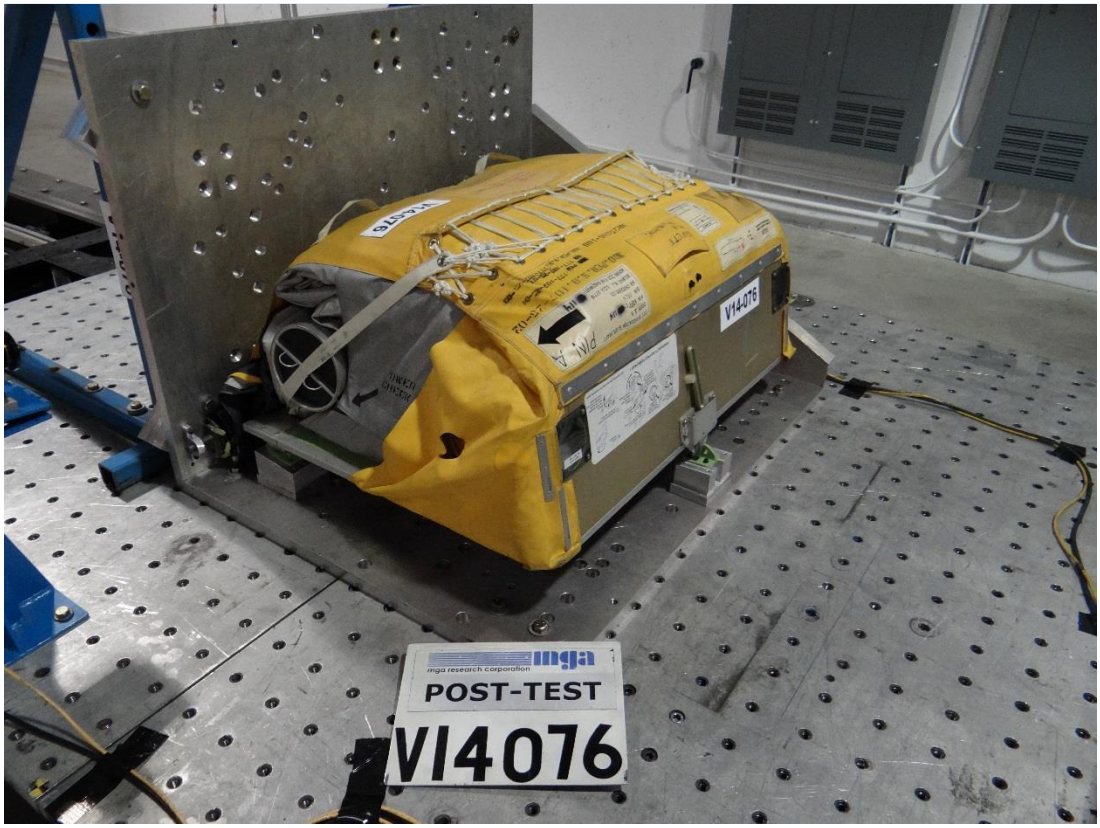


Pre Test Release Shaft Slotted Cap

Post Test Front View

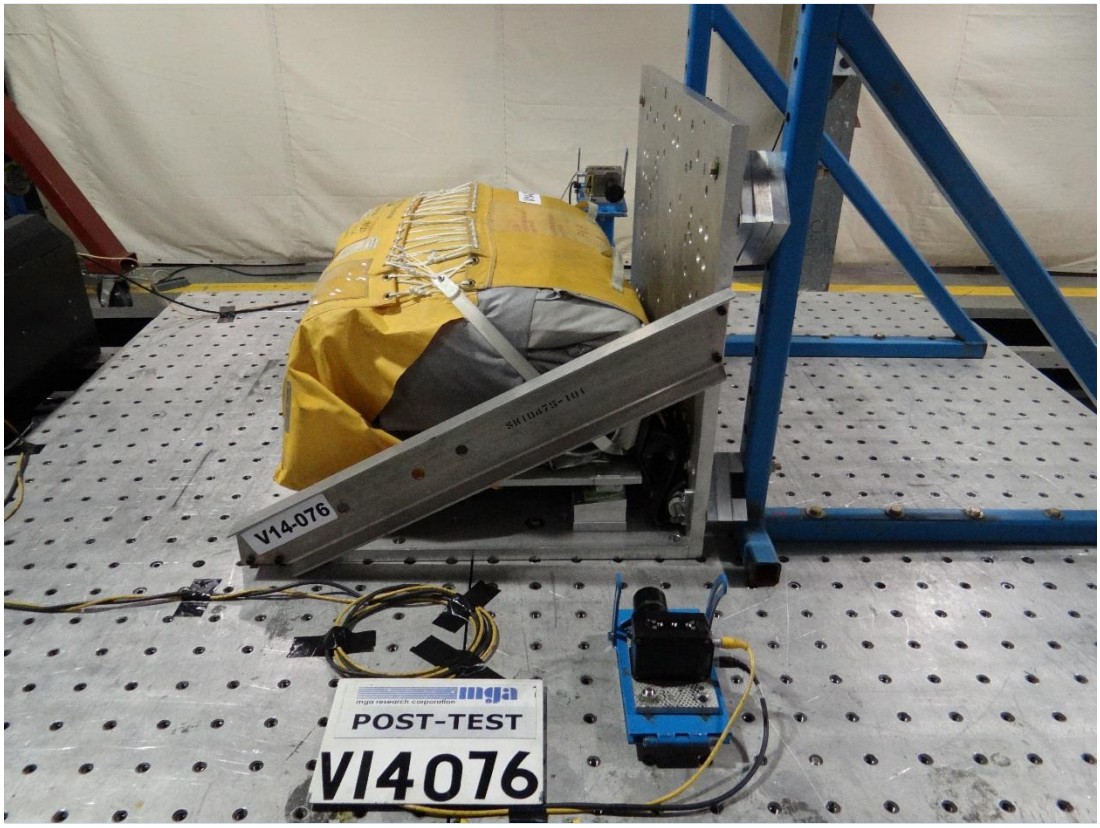


Post Test Left Side View

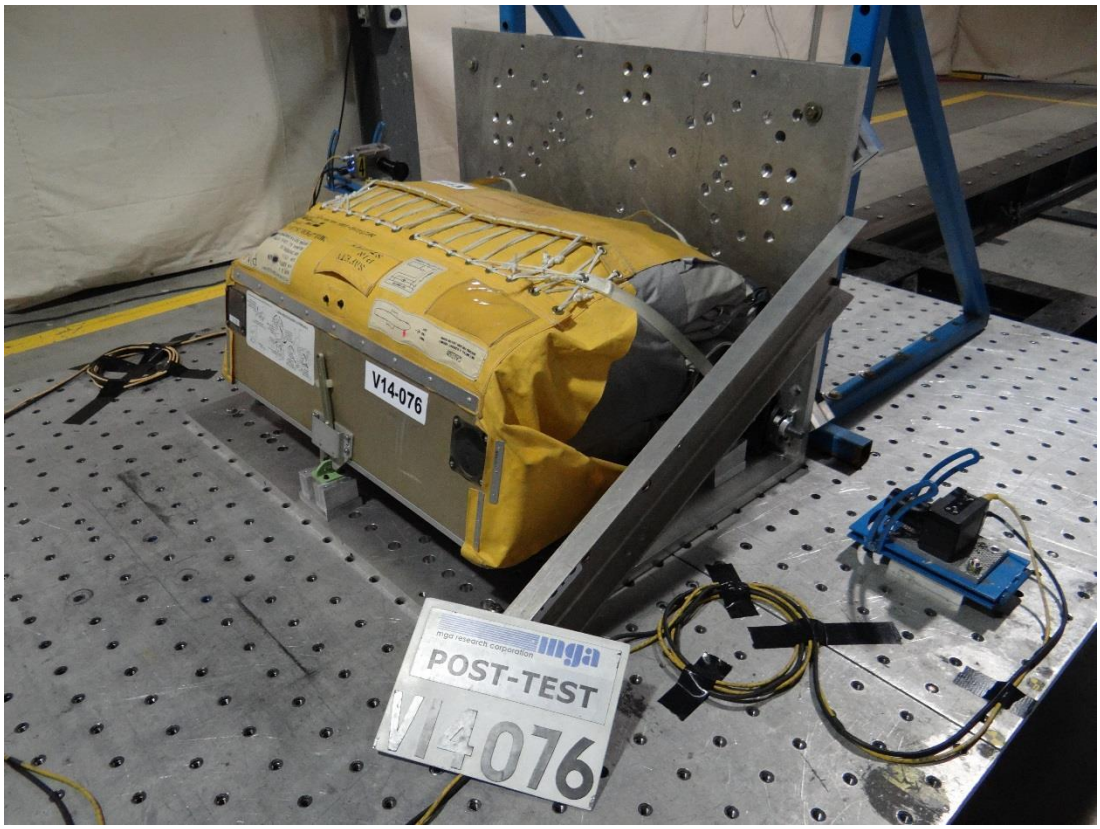


Post Test Left Angle View

Post Test Rear View



Post Test Right Side View



Post Test Right Angle View

Post Test Release Shaft Slotted Cap

11g Down Load Test

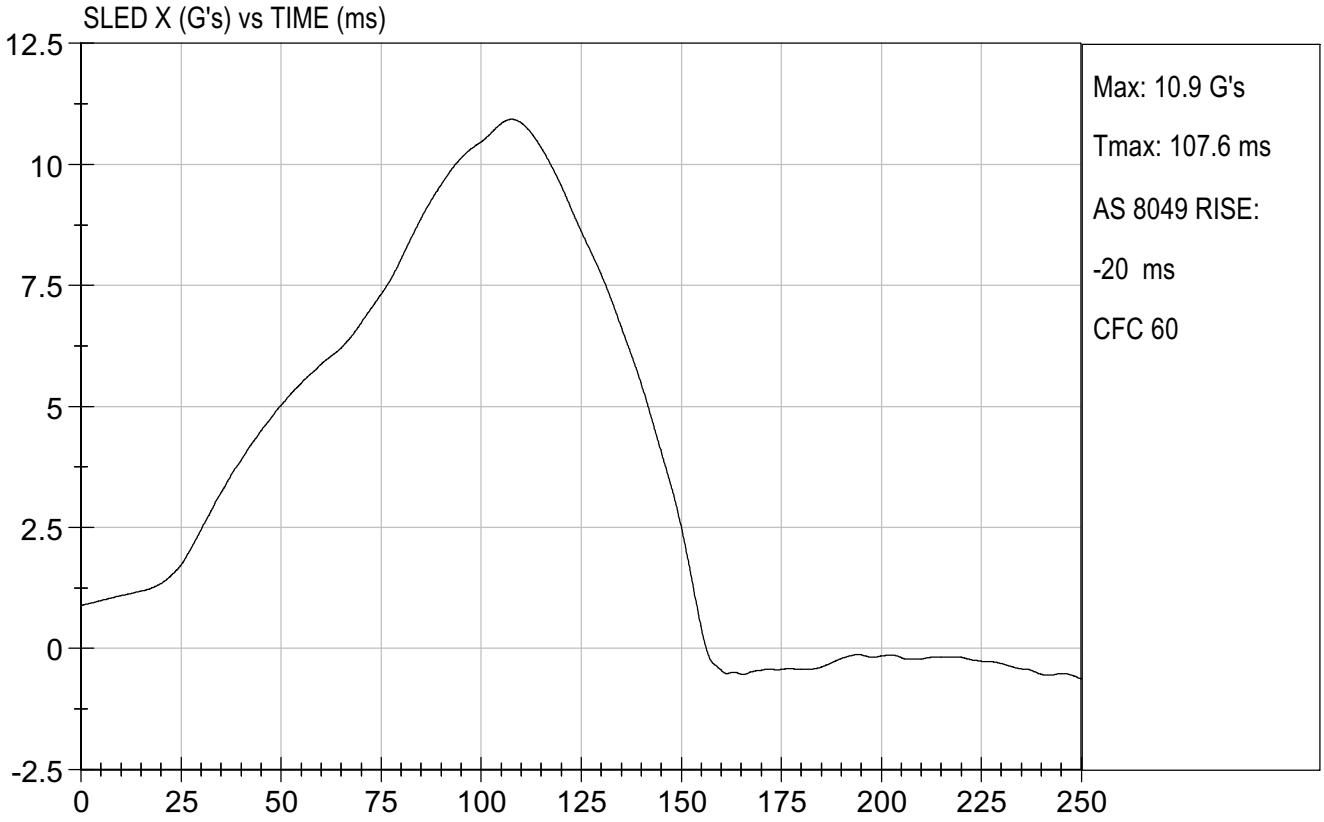
Test Information	
MGA Test Number	V14077
Test Date	01/21/2014
Run Number	3
Orientation	Down

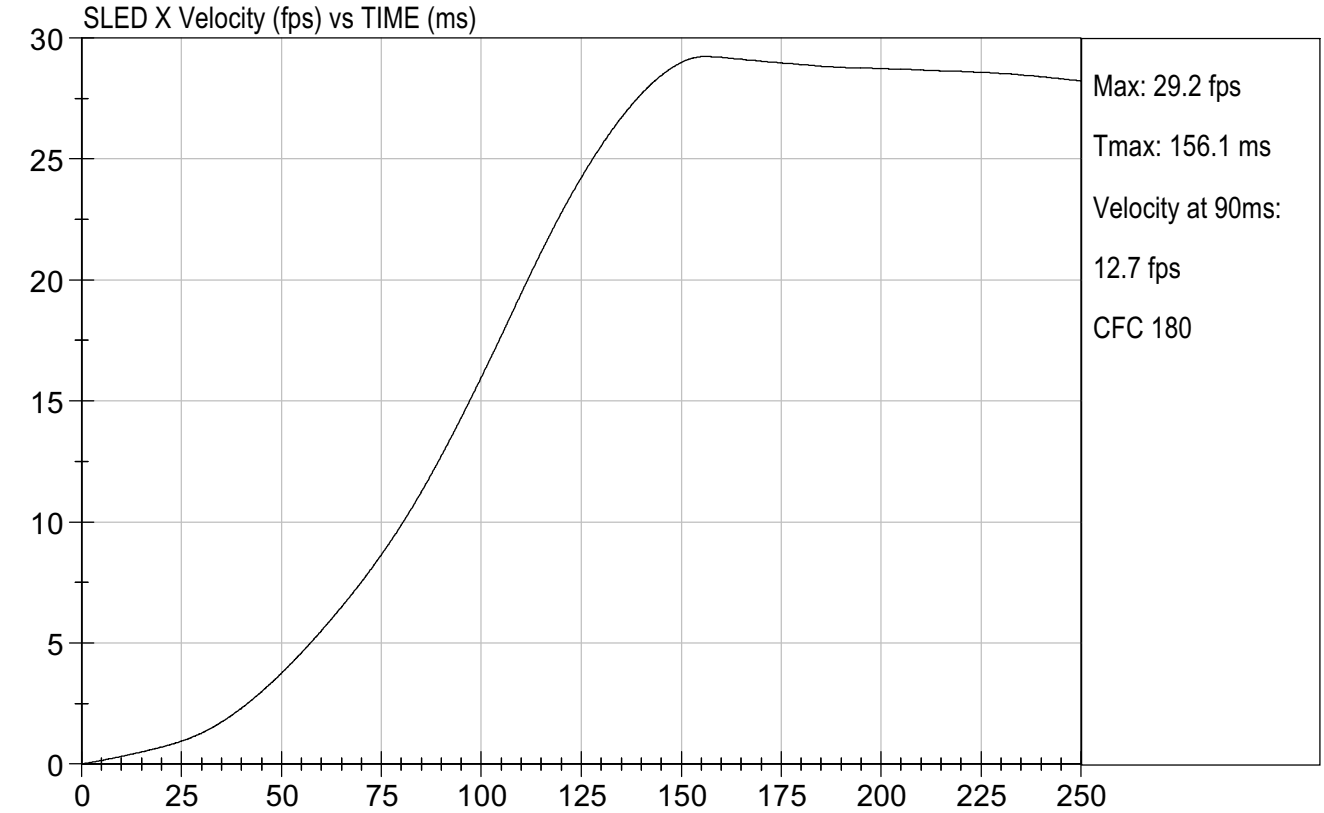
Test Sample Information	
Serial Number	0024
Part Number	62771-114
Weight	222.9 lbs

Results	
Max Acceleration (g)	10.9
Time of Max Acceleration (ms)	107.6
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

Comments:

(1) No damage observed
(2) Did not release


SLED X (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 10.9 G's
Tmax: 107.6 ms
AS 8049 RISE:
-20 ms
CFC 60

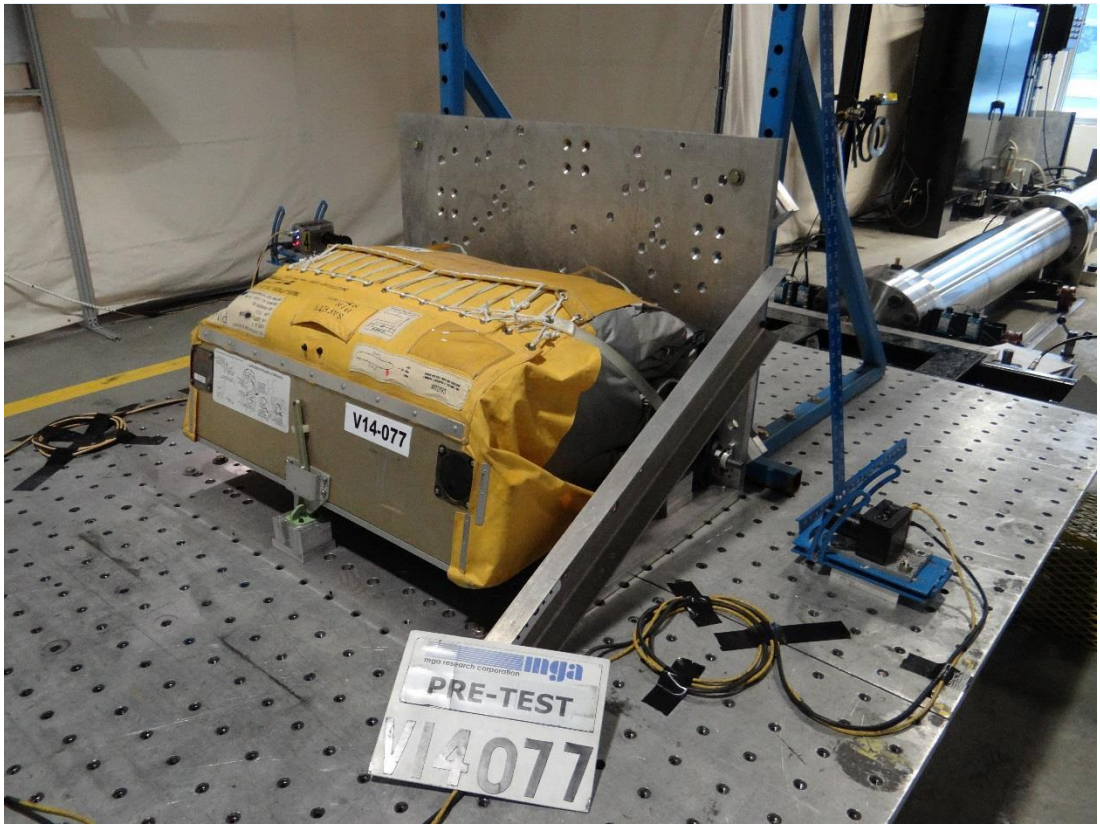

SLED X Velocity (fps) vs TIME (ms)
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 29.2 fps
Tmax: 156.1 ms
Velocity at 90ms:
12.7 fps
CFC 180

Pre Test Front View

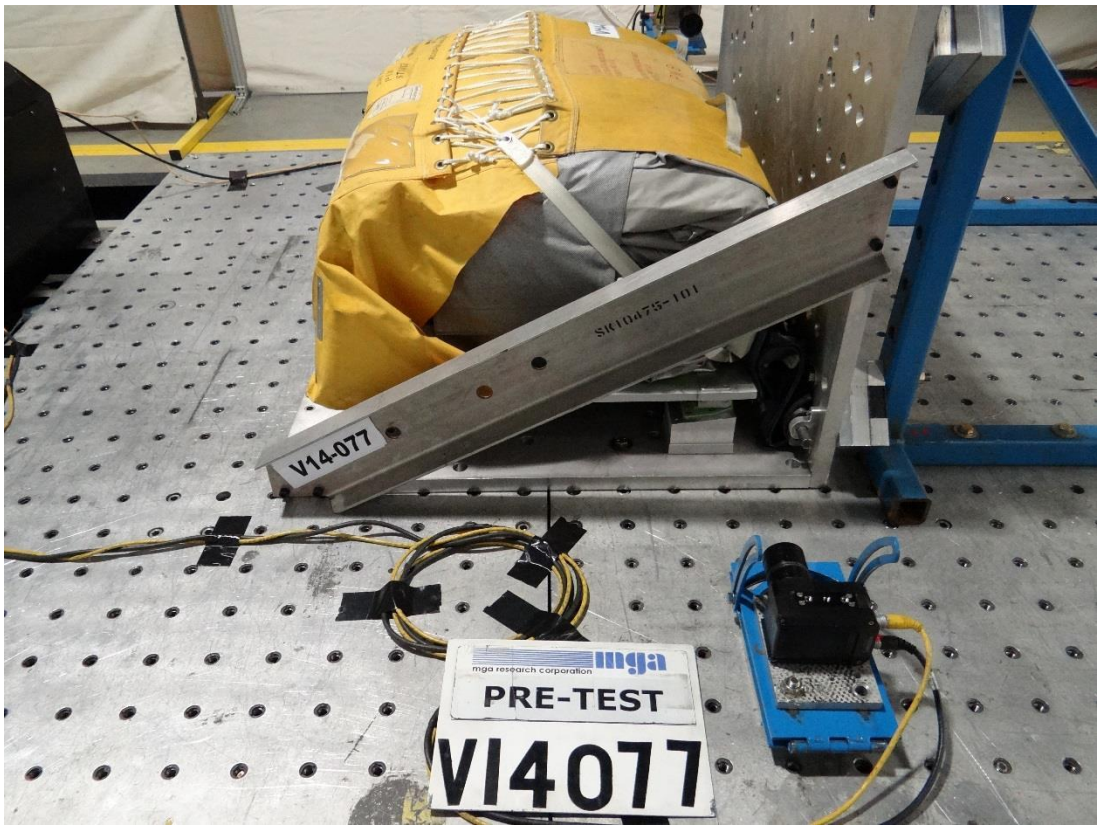
Pre Test Left Side View

Pre Test Left Angle View

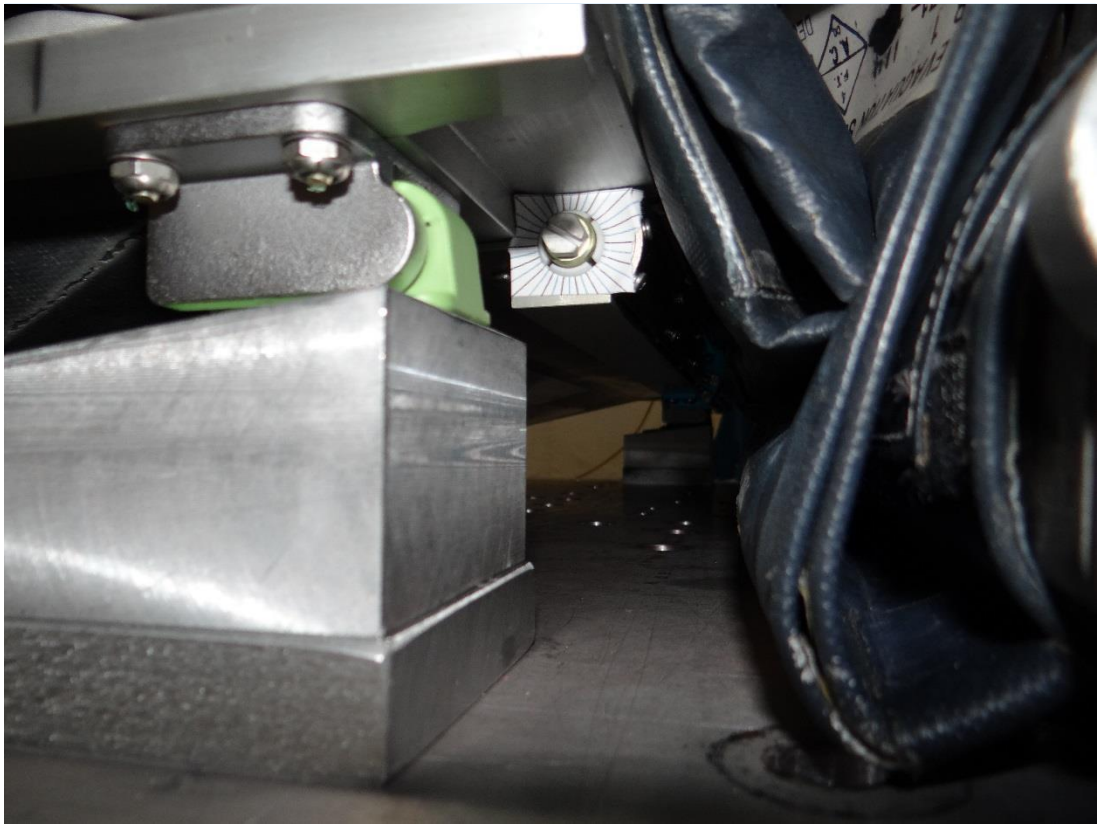
Pre Test Rear View



Pre Test Right Angle View

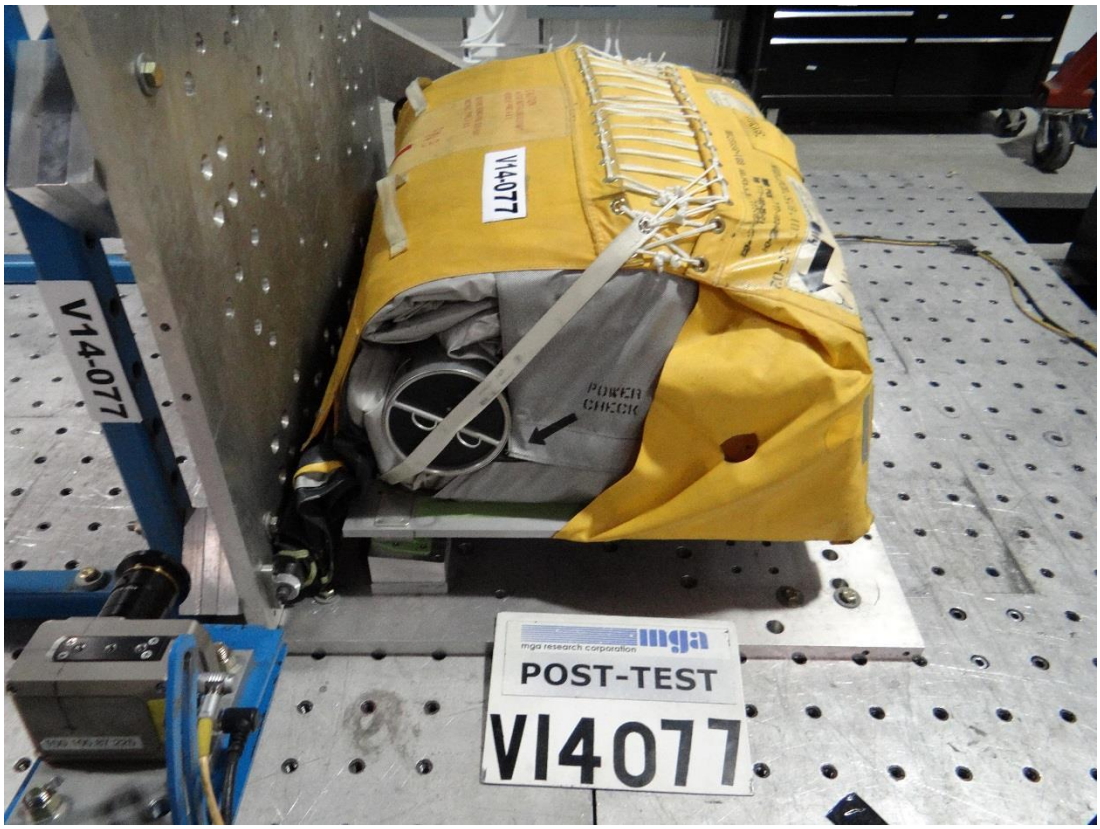


Pre Test Right Side View



Pre Test Release Shaft Slotted Cap

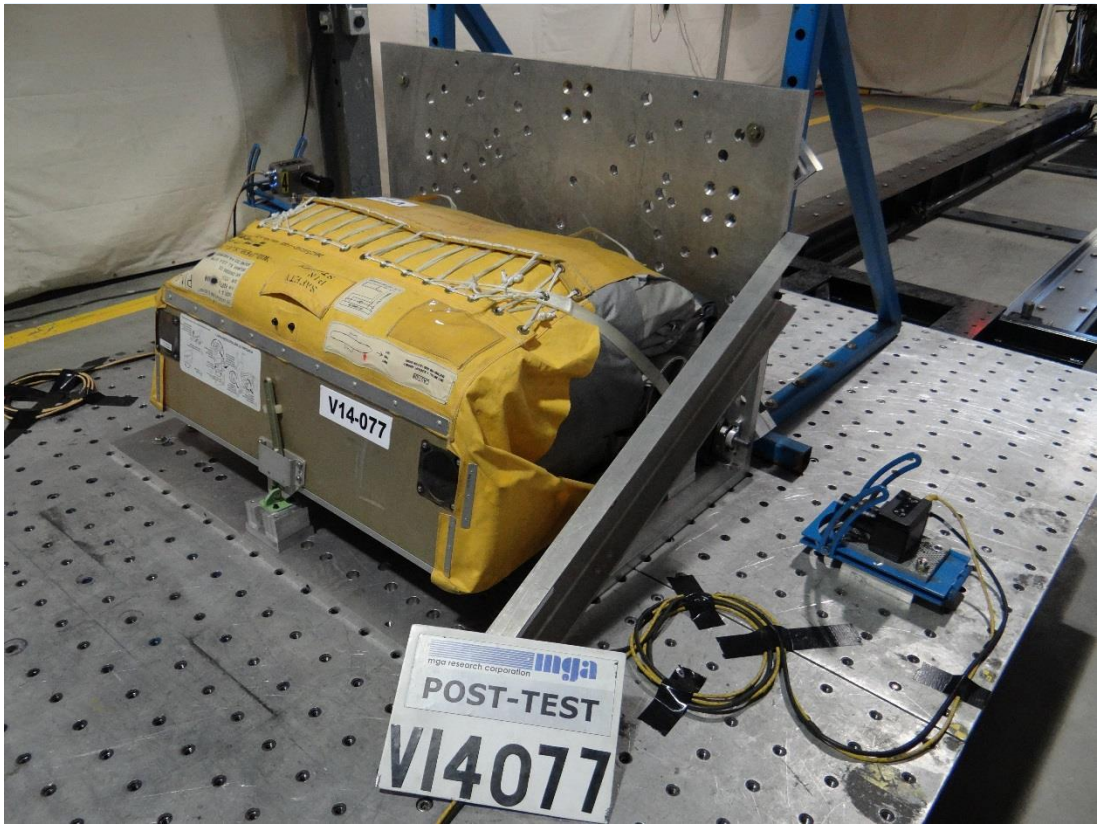
Post Test Front View



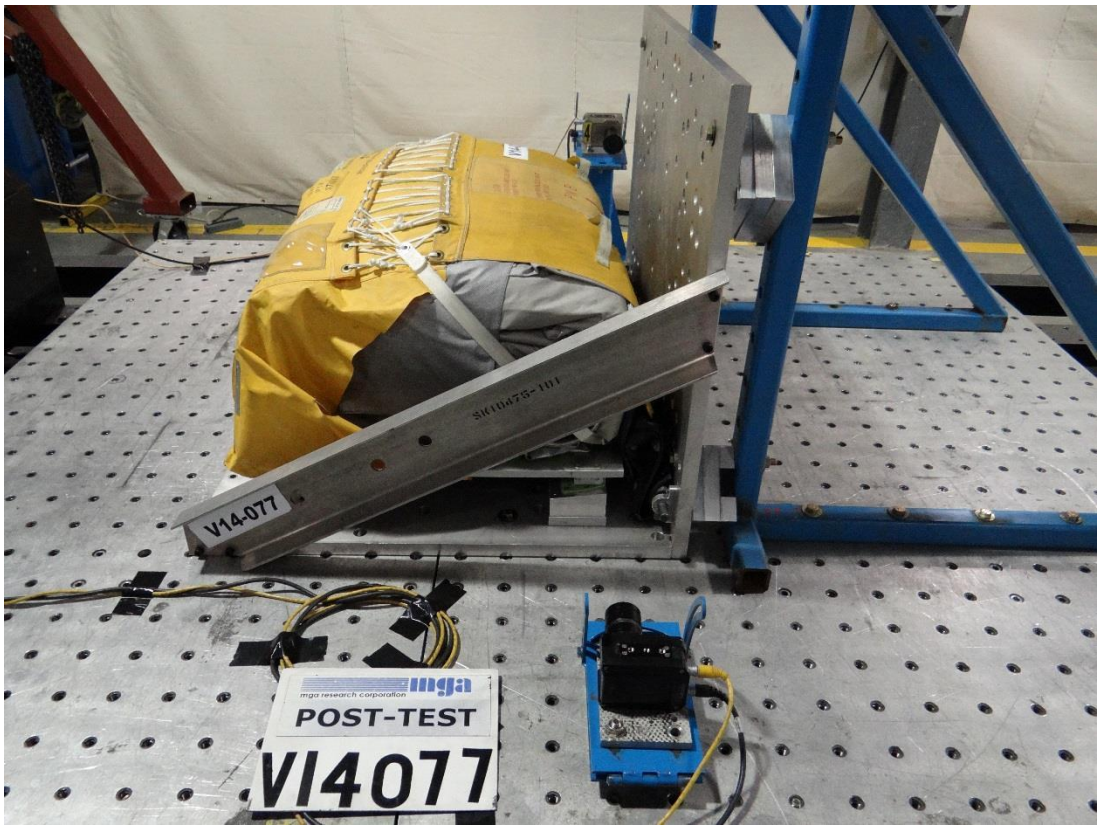
Post Test Left Side View

Post Test Left Angle View

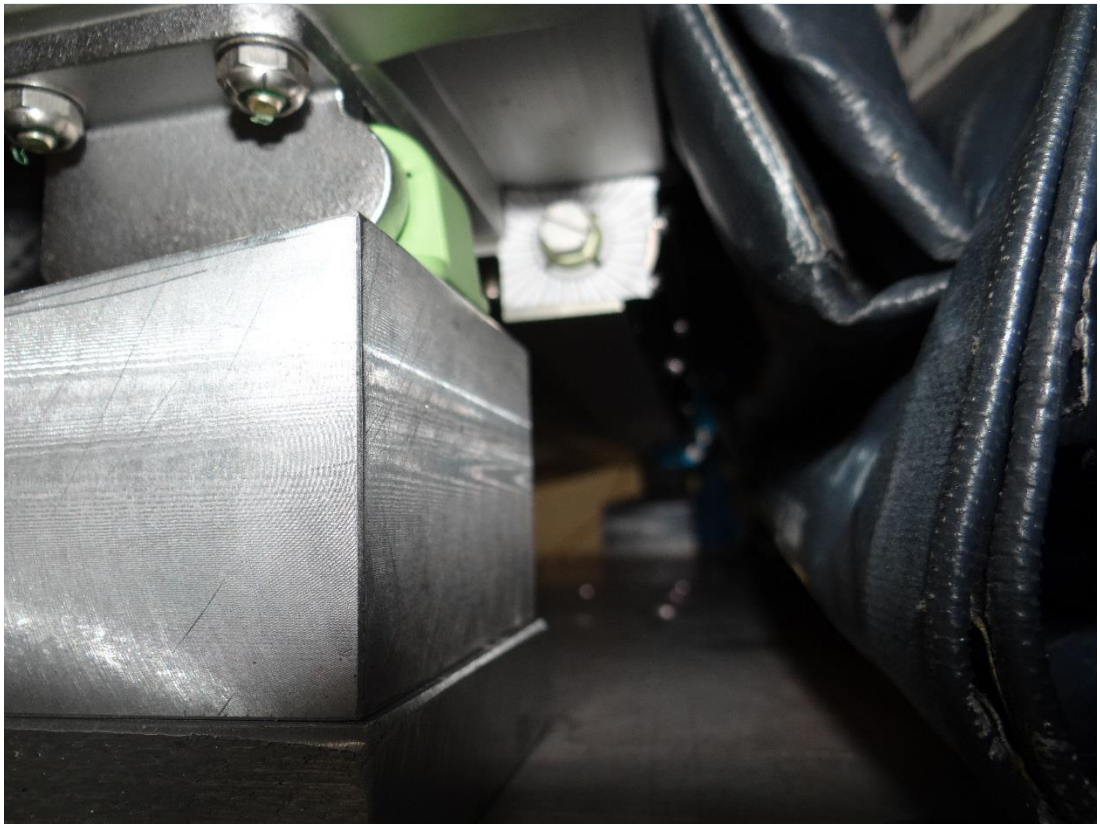
Post Test Rear View



Post Test Right Angle View



Post Test Right Side View



Post Test Release Shaft Slotted Cap

13g Down Load Test

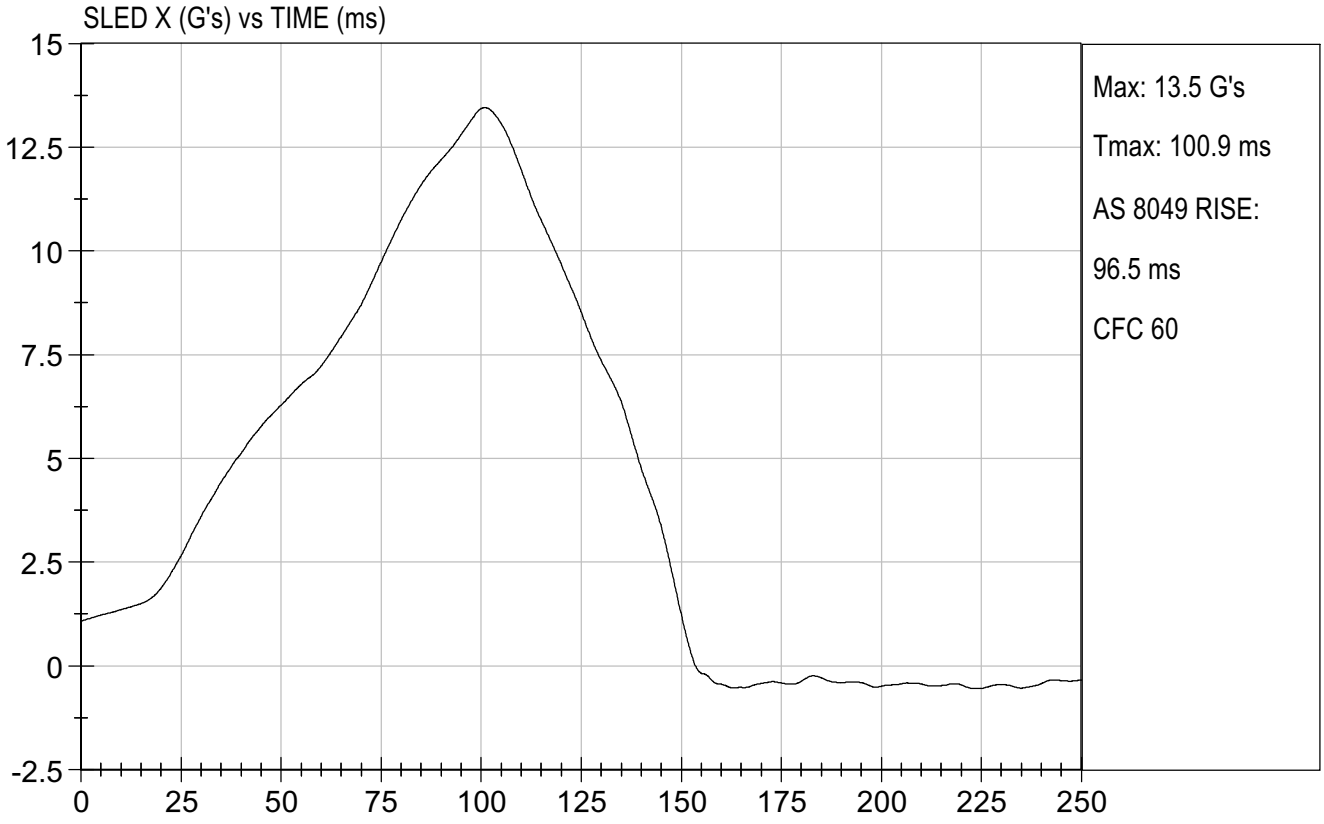
Test Information	
MGA Test Number	V14078
Test Date	01/21/2014
Run Number	4
Orientation	Down

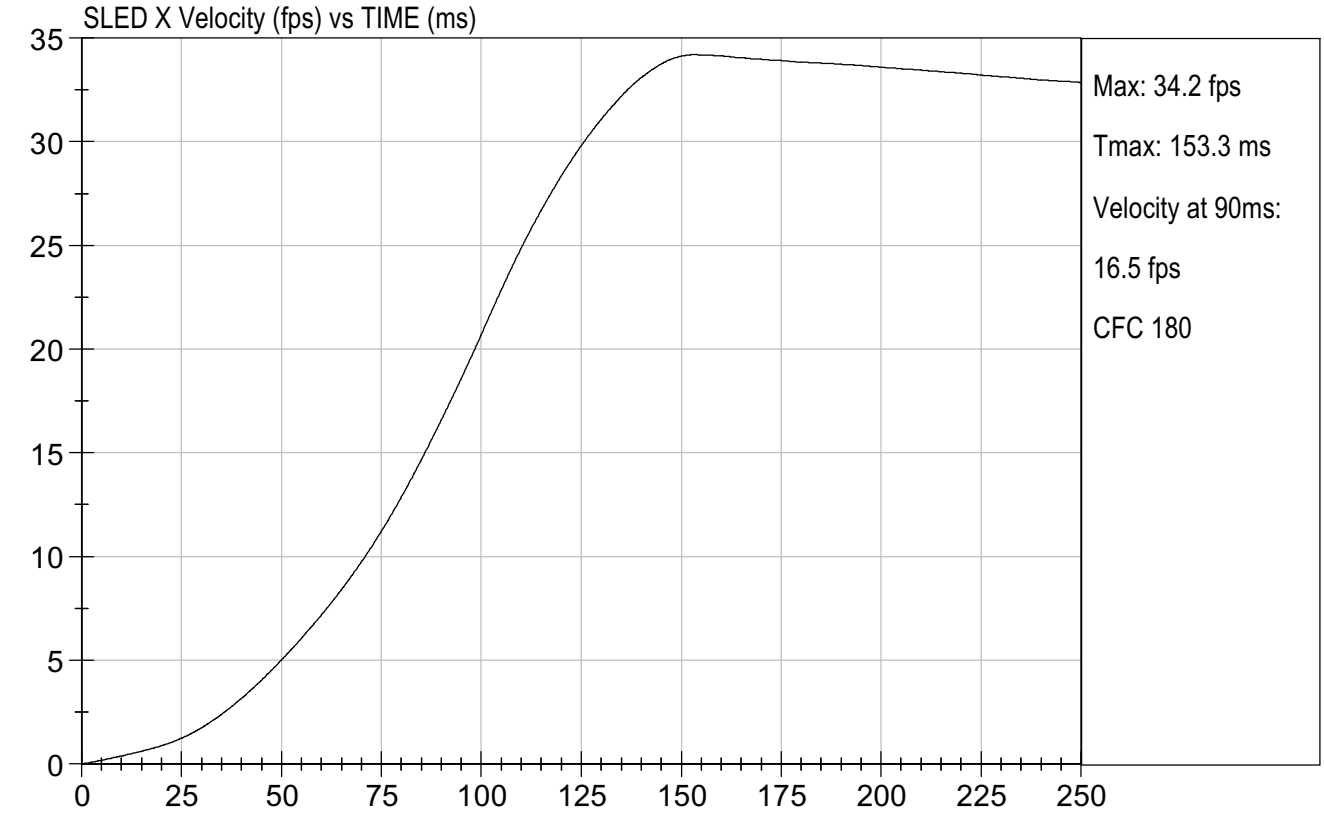
Test Sample Information	
Serial Number	0024
Part Number	62771-114
Weight	222.9 lbs

Results	
Max Acceleration (g)	13.5
Time of Max Acceleration (ms)	100.9
Damage	Yes
Time of Damage (ms)	94-96
Acceleration at Time of Damage (g)	12.7-12.9

Comments:

(1) Pack released
(2) Tang tore through release shaft
(3) Release shaft rotated
(4) Right and left aspirator strap released
(5) Witness marks on inside surface of pin shields
(6) Release cable ball ends were intact and the cables were curved with a permanent set


SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 13.5 G's
Tmax: 100.9 ms
AS 8049 RISE:
96.5 ms
CFC 60

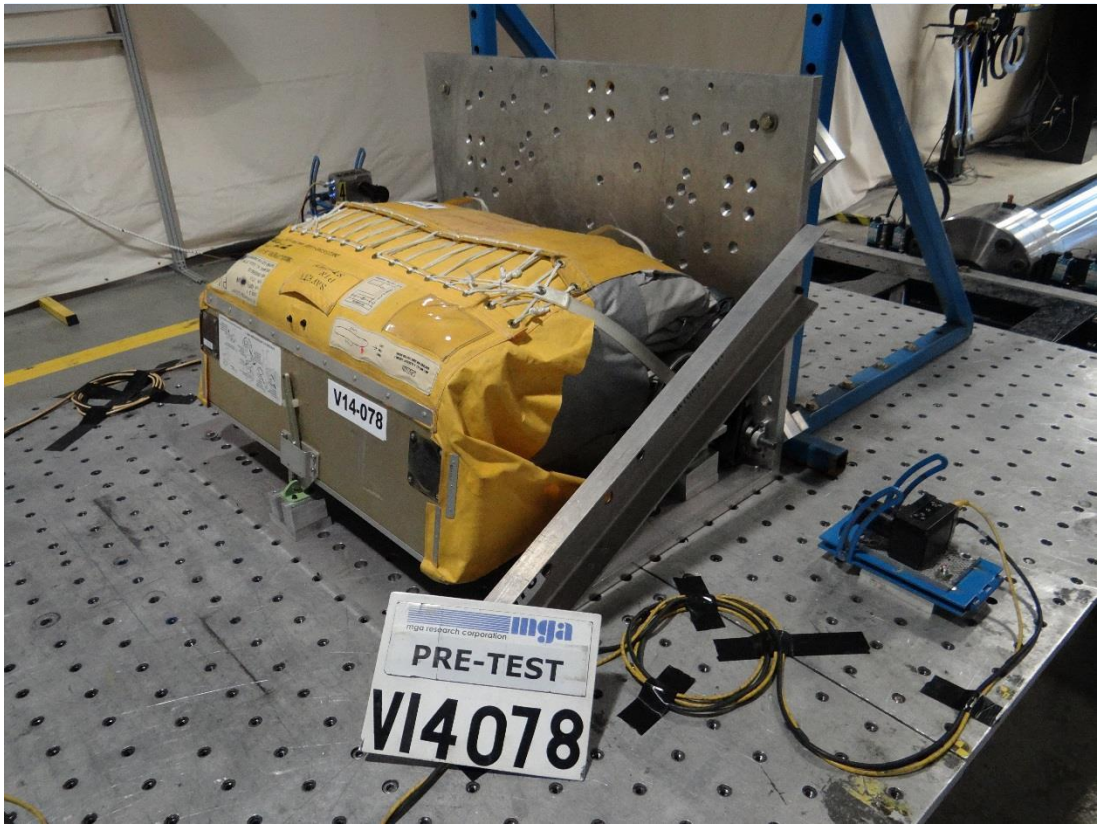

SLED X Velocity (fps) vs TIME (ms)
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 34.2 fps
Tmax: 153.3 ms
Velocity at 90ms:
16.5 fps
CFC 180

Pre Test Front View

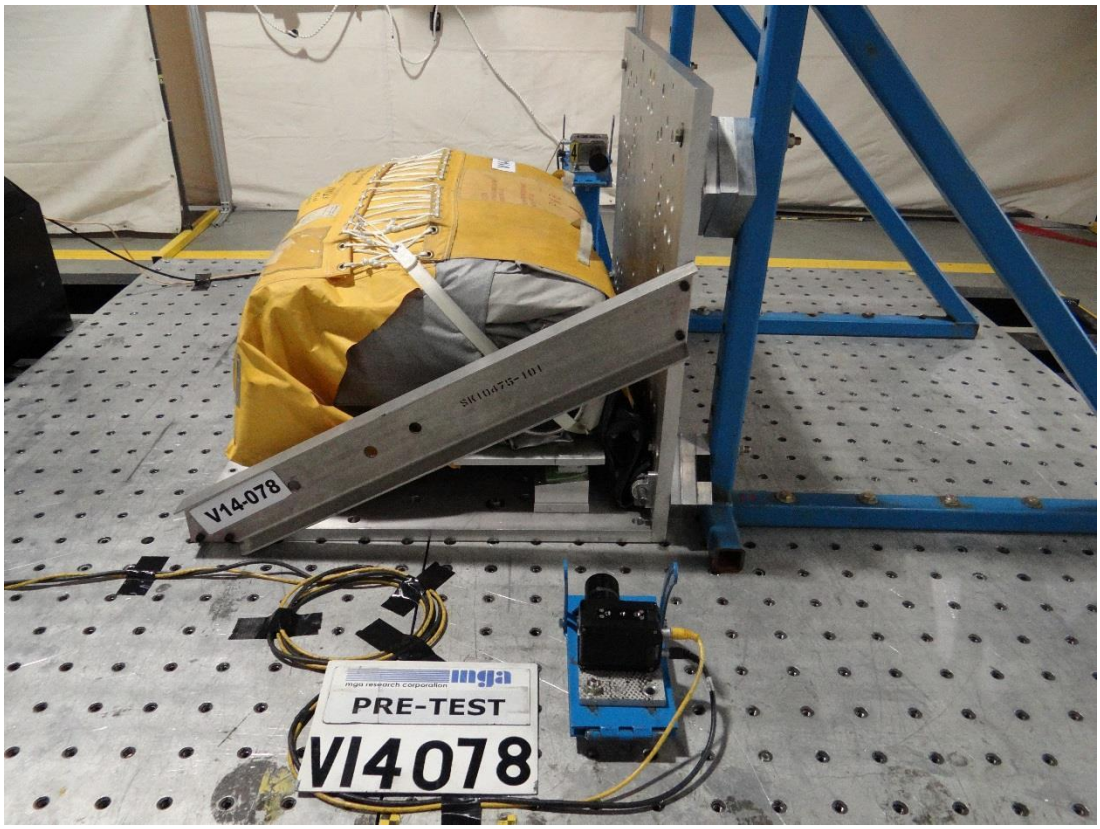
Pre Test Left Side View

Pre Test Left Angle View

Pre Test Rear View



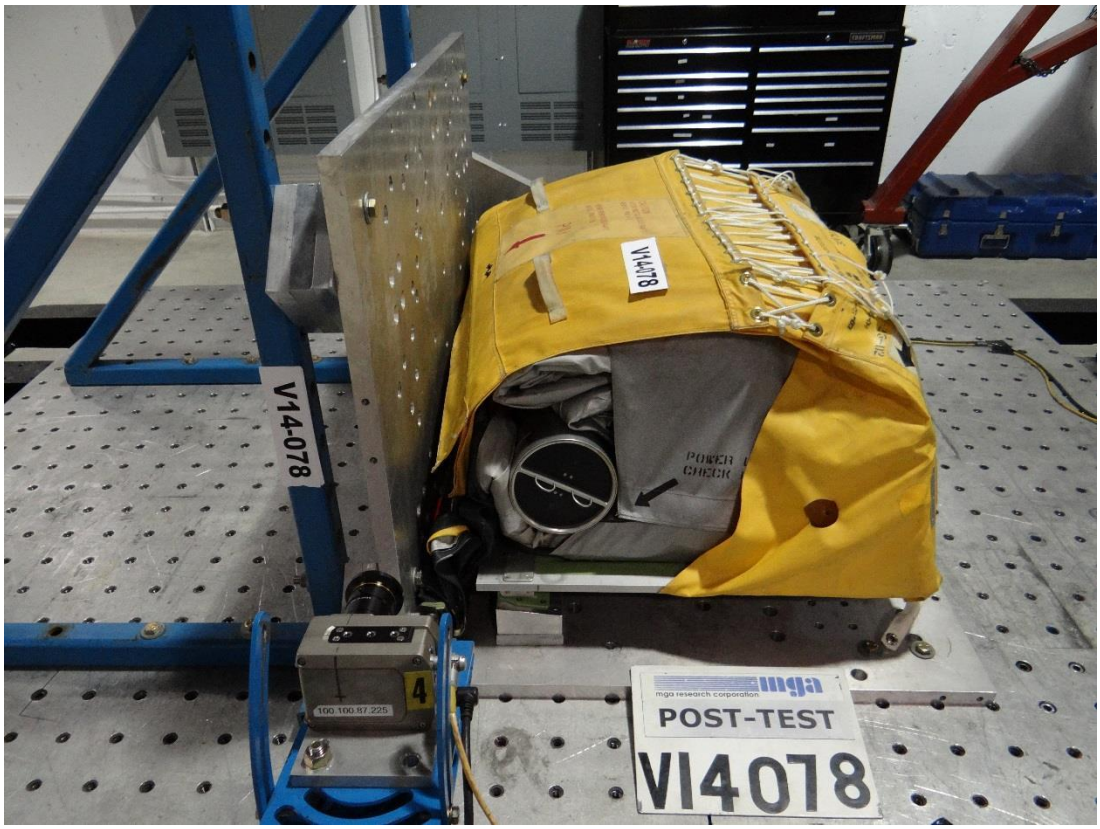
Pre Test Right Angle View



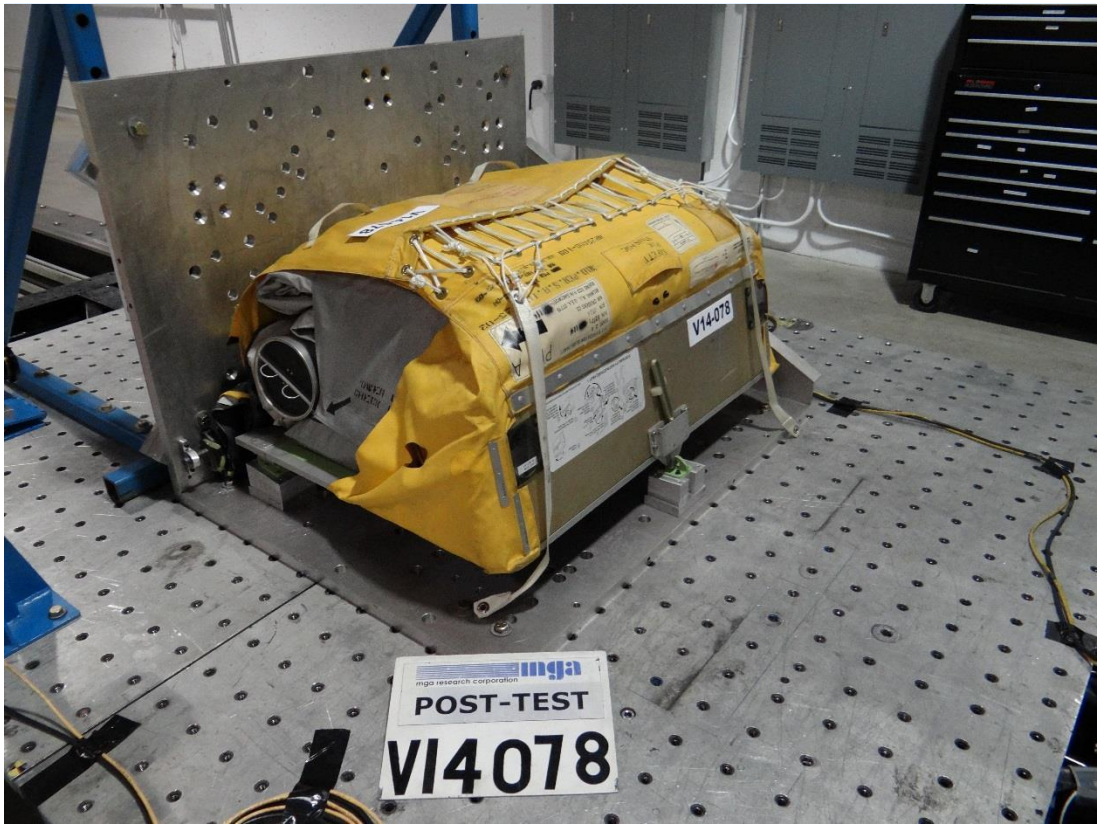
Pre Test Right Side View

Pre Test Release Shaft Slotted Cap

Post Test Front View

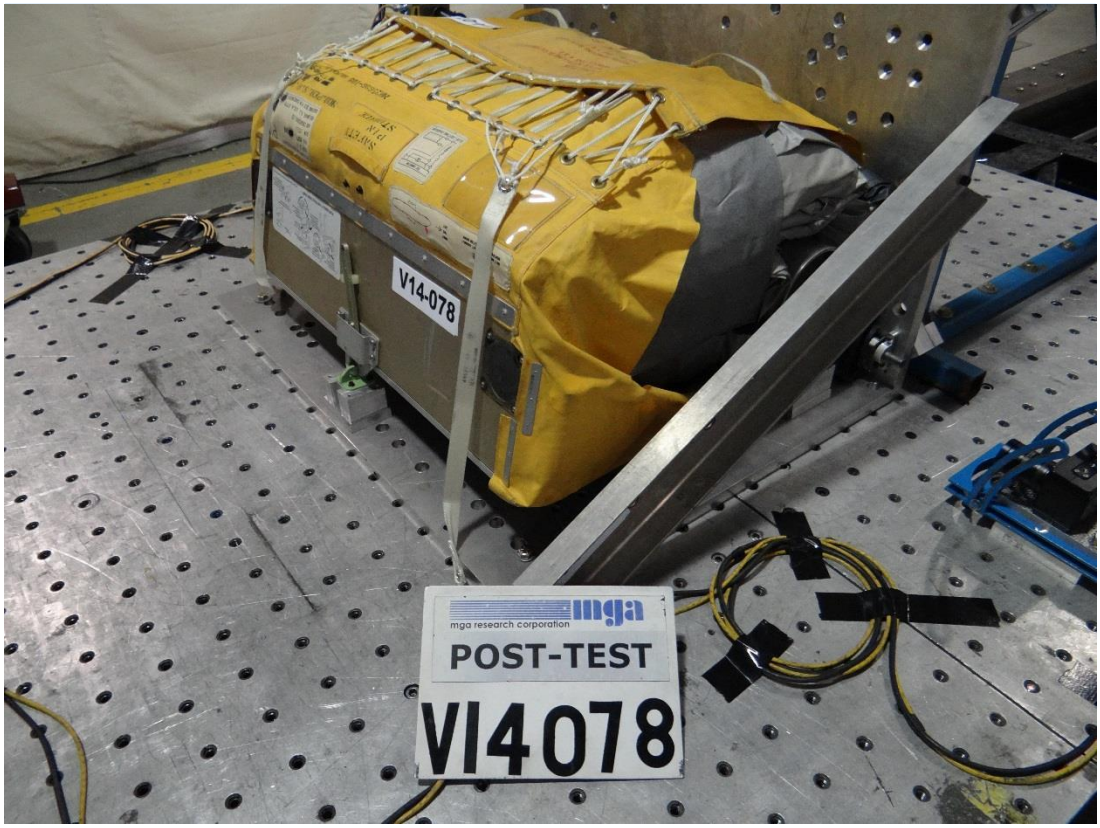


Post Test Left Side View

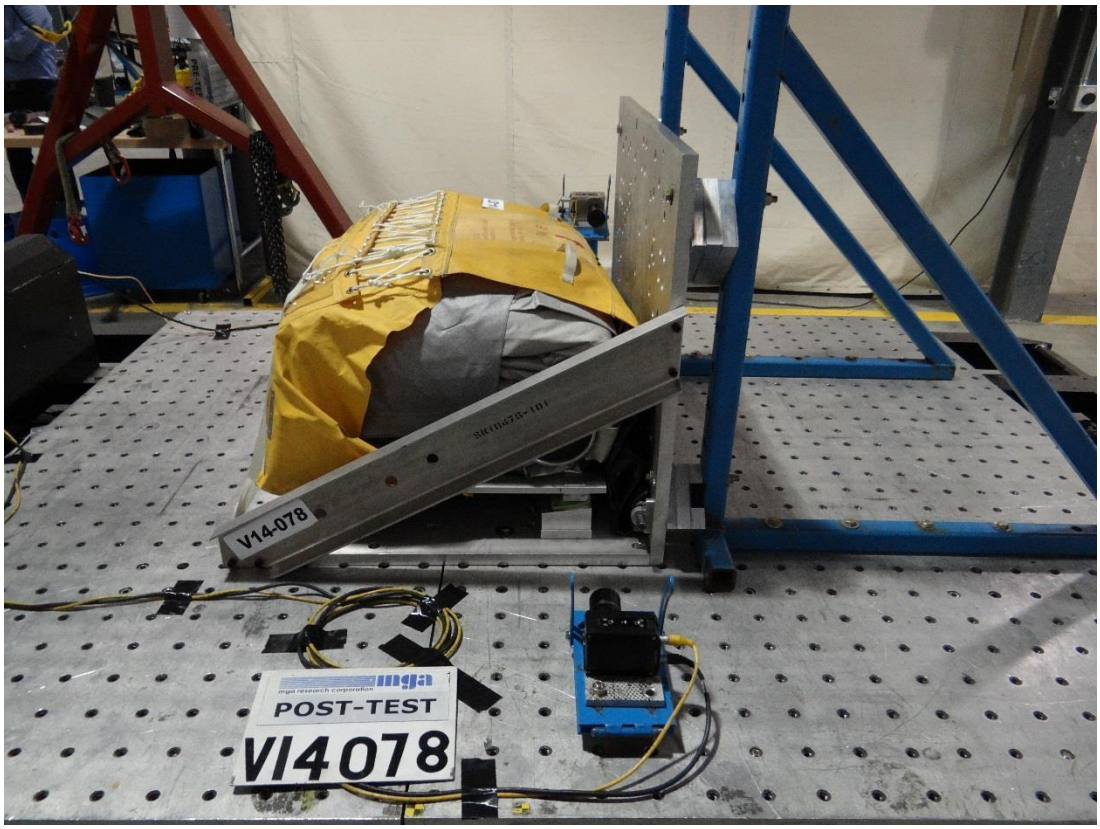


Post Test Left Angle View

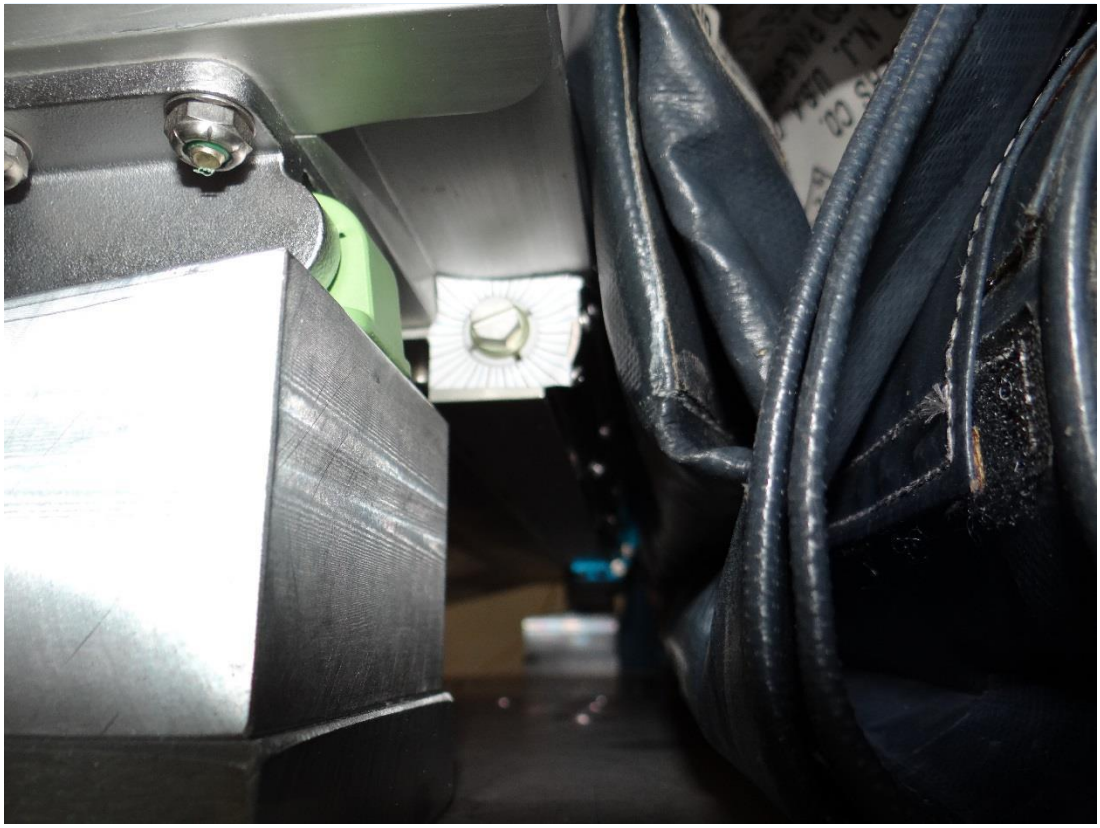
Post Test Rear View



Post Test Right Angle View



Post Test Right Side View



Post Test Release Shaft Slotted Cap

Detail View

Detail View

13g Down Load Test

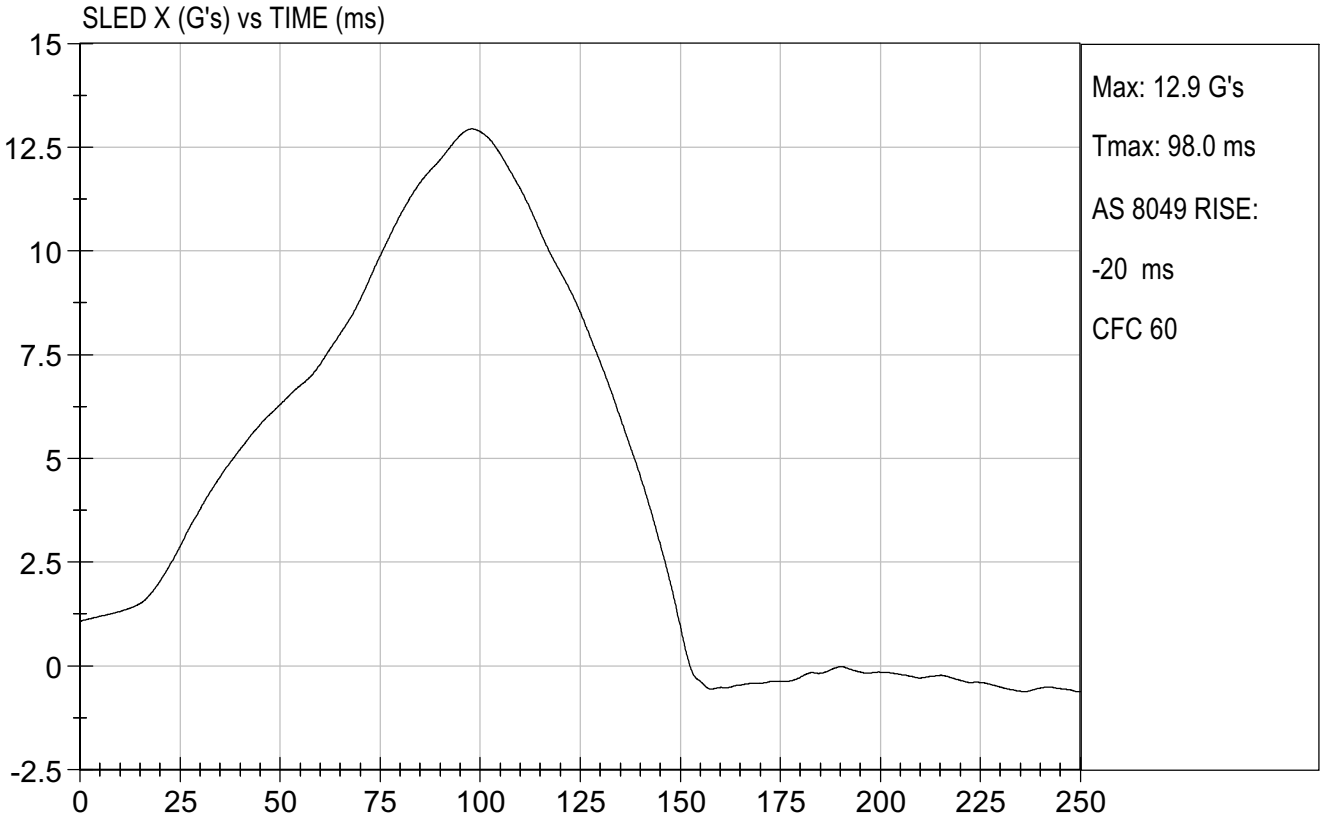
Test Information	
MGA Test Number	V14079
Test Date	01/21/2014
Run Number	1
Orientation	Down

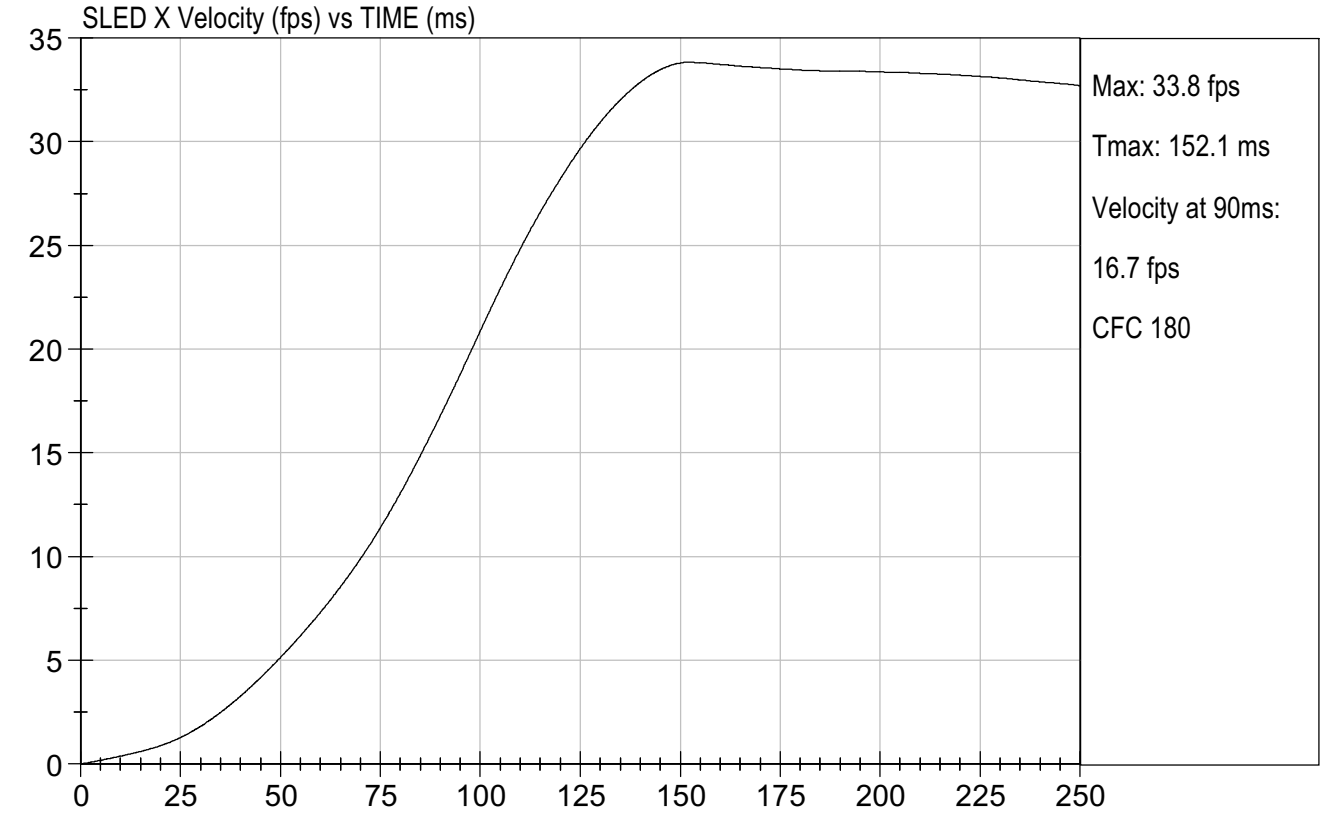
Test Sample Information	
Serial Number	0032
Part Number	62771-113
Weight	224.5 lbs

Results	
Max Acceleration (g)	12.9
Time of Max Acceleration (ms)	98
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

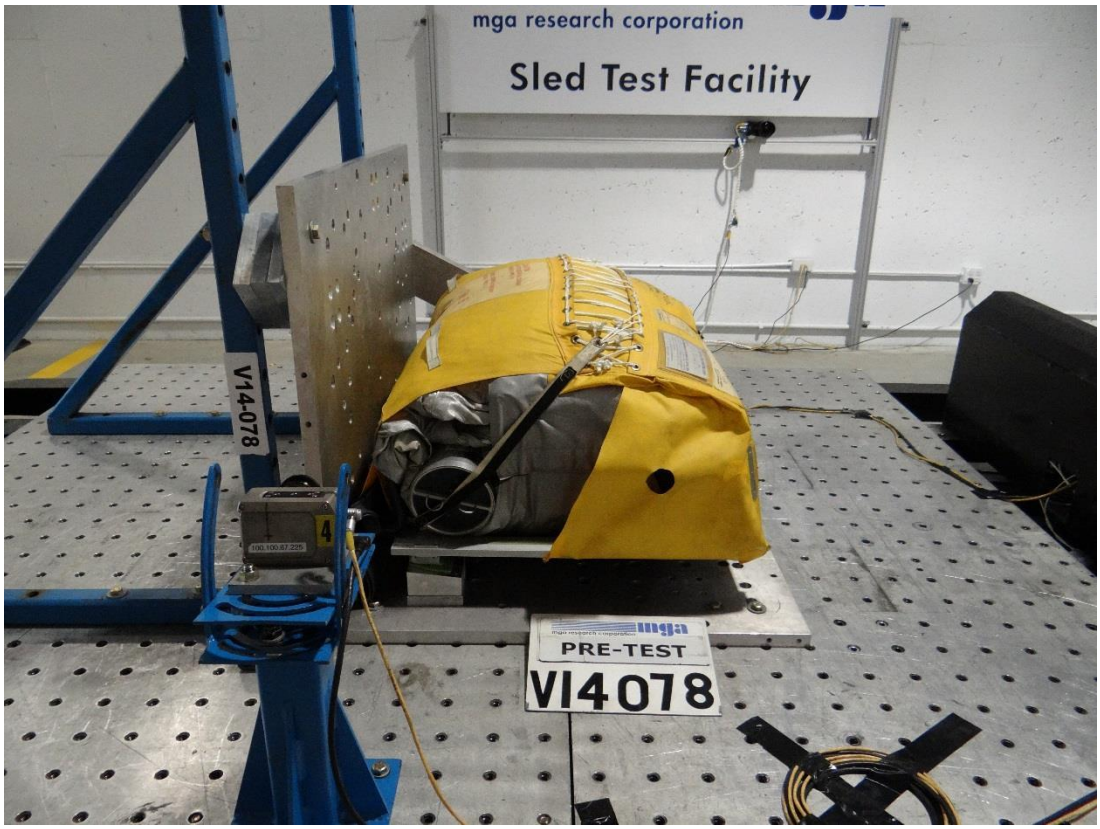
Comments:

(1) No damage observed
(2) Did not release
(3) All Pre-Test photos are labeled with the incorrect test number; This was corrected for Post-Test photos


SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 12.9 G's
Tmax: 98.0 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 33.8 fps
Tmax: 152.1 ms
Velocity at 90ms:
16.7 fps
CFC 180

Pre Test Front View



Pre Test Left Side View

*All Pre Test photos are labeled with the incorrect test number-This was corrected for Post Test photos

Pre Test Left Angle View

Pre Test Rear View

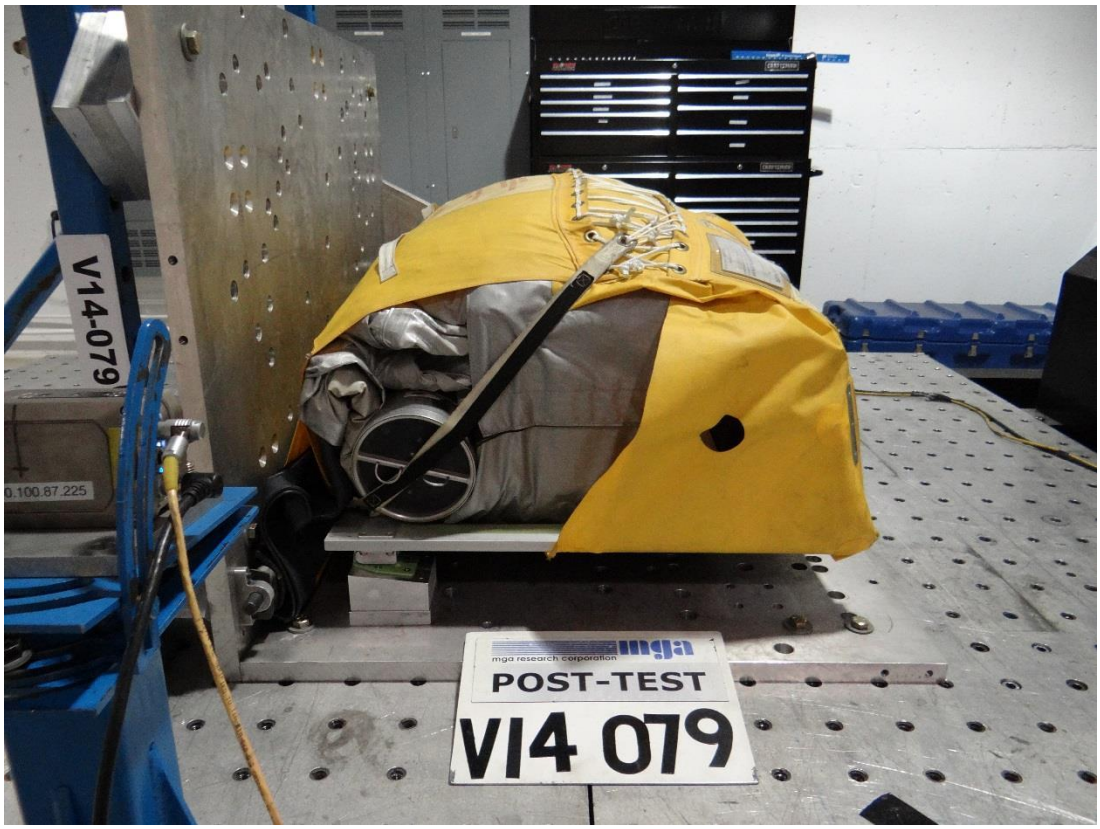
*All Pre Test photos are labeled with the incorrect test number-This was corrected for Post Test photos

Pre Test Right Angle View

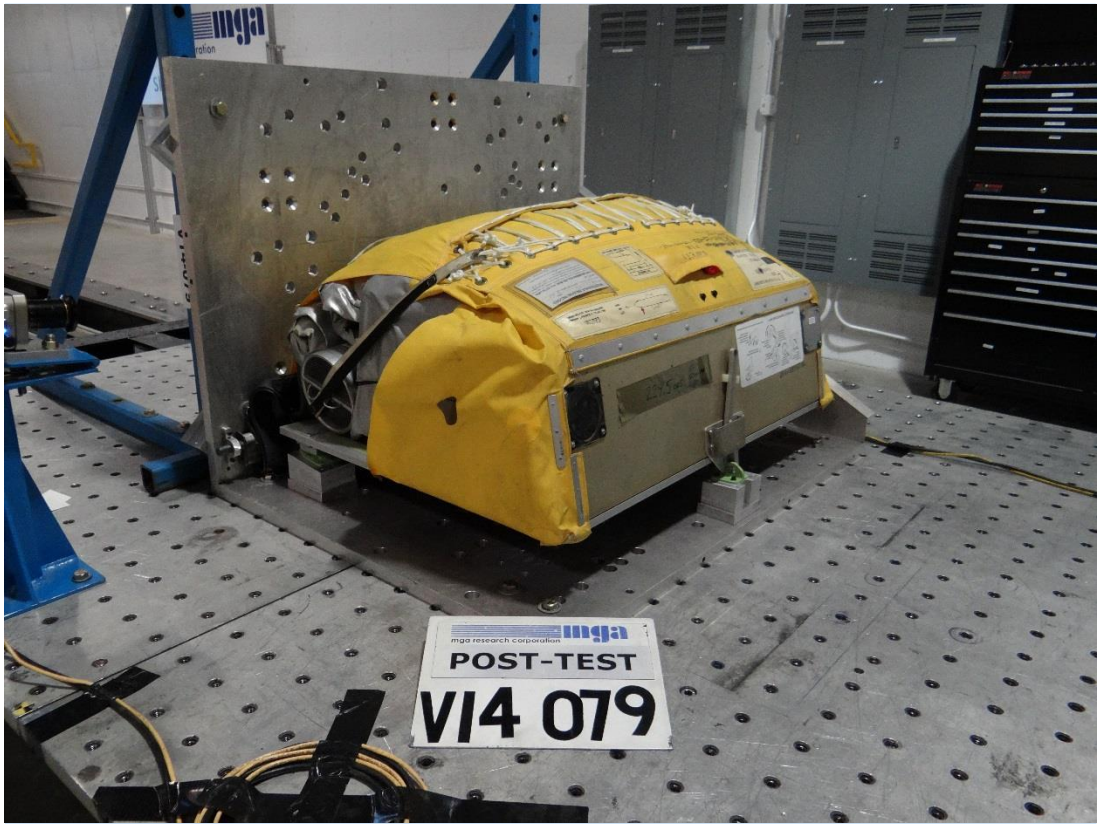
Pre Test Right Side View

*All Pre Test photos are labeled with the incorrect test number-This was corrected for Post Test photos

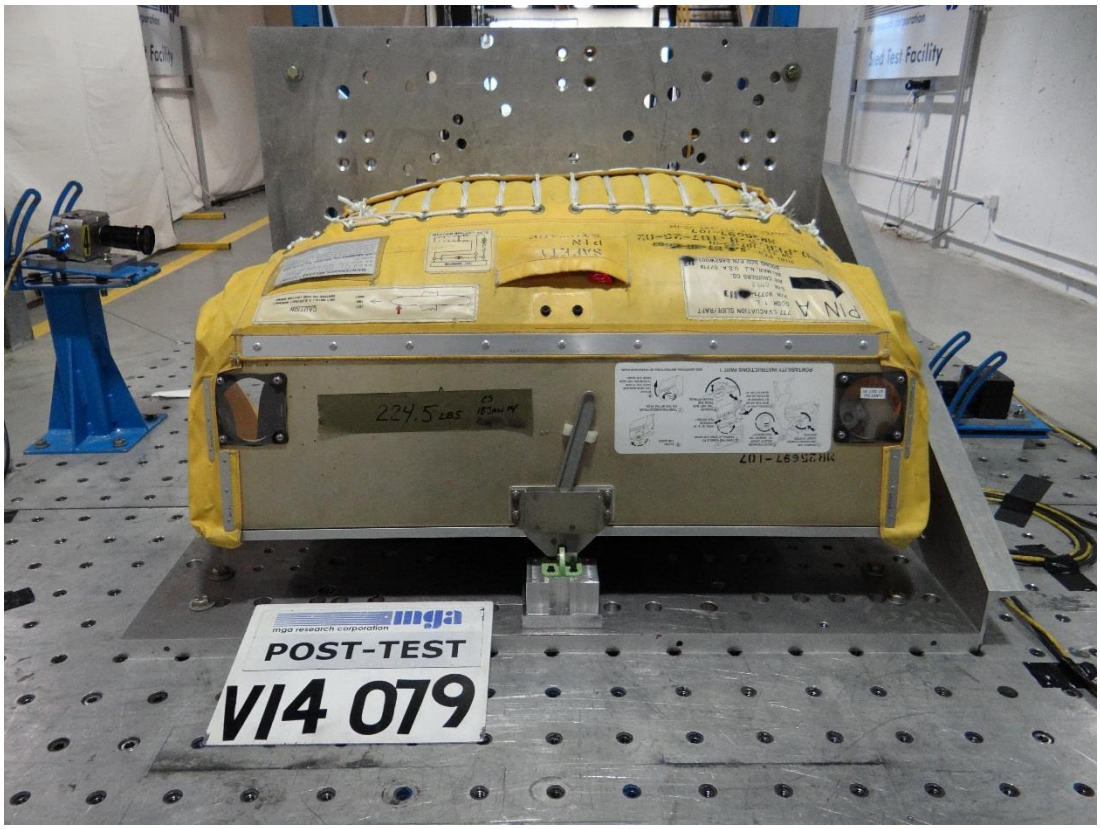
Post Test Front View



Post Test Left Side View

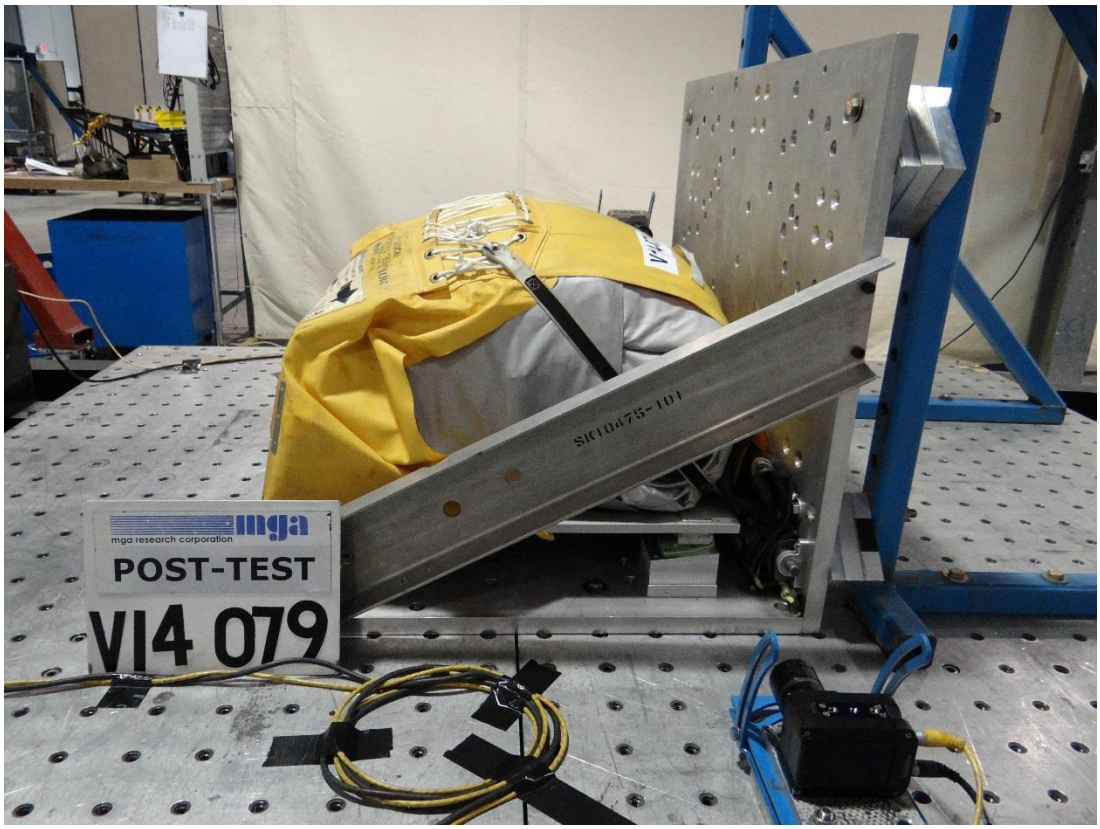


Post Test Left Angle View



Post Test Rear View

Post Test Right Angle View



Post Test Right Side View

14g Down Load Test

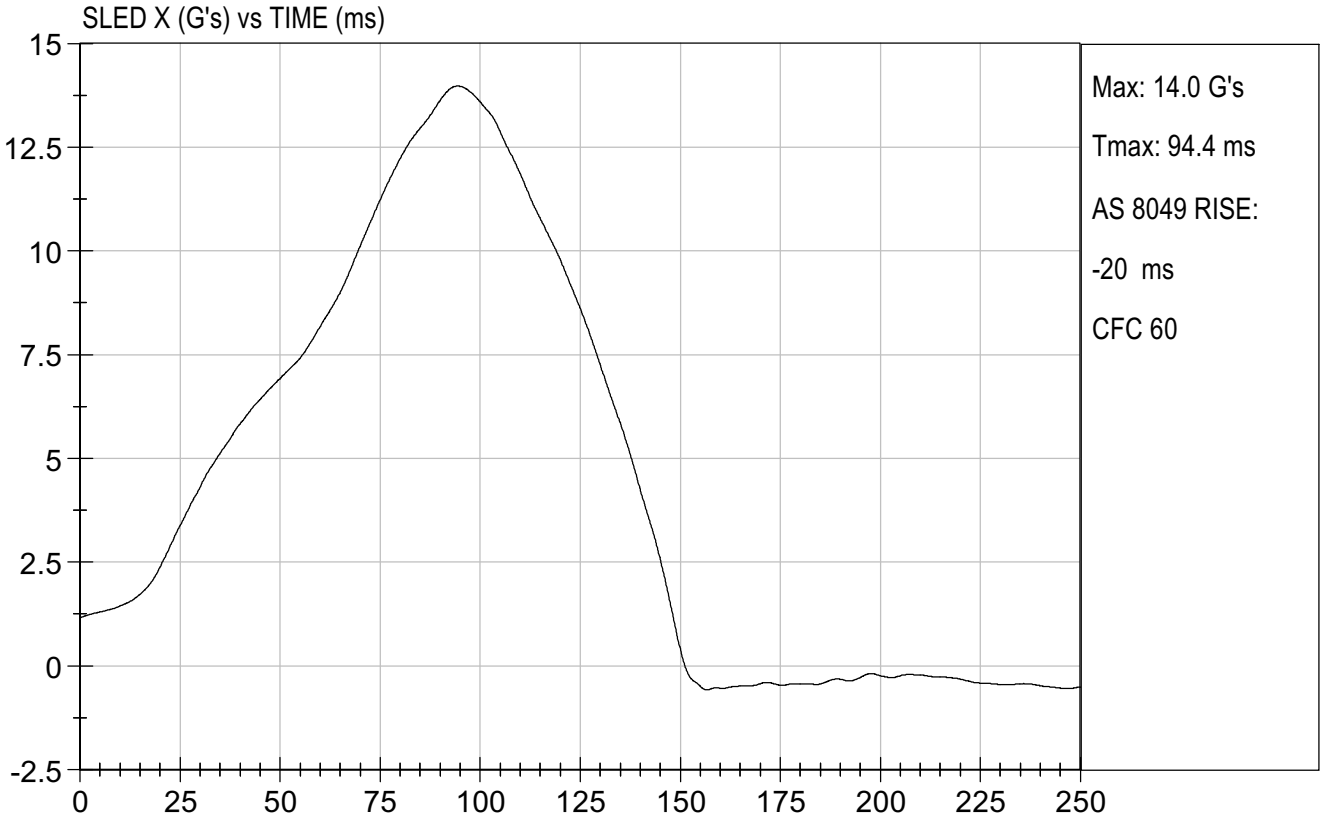
Test Information	
MGA Test Number	V14080
Test Date	01/21/2014
Run Number	2
Orientation	Down

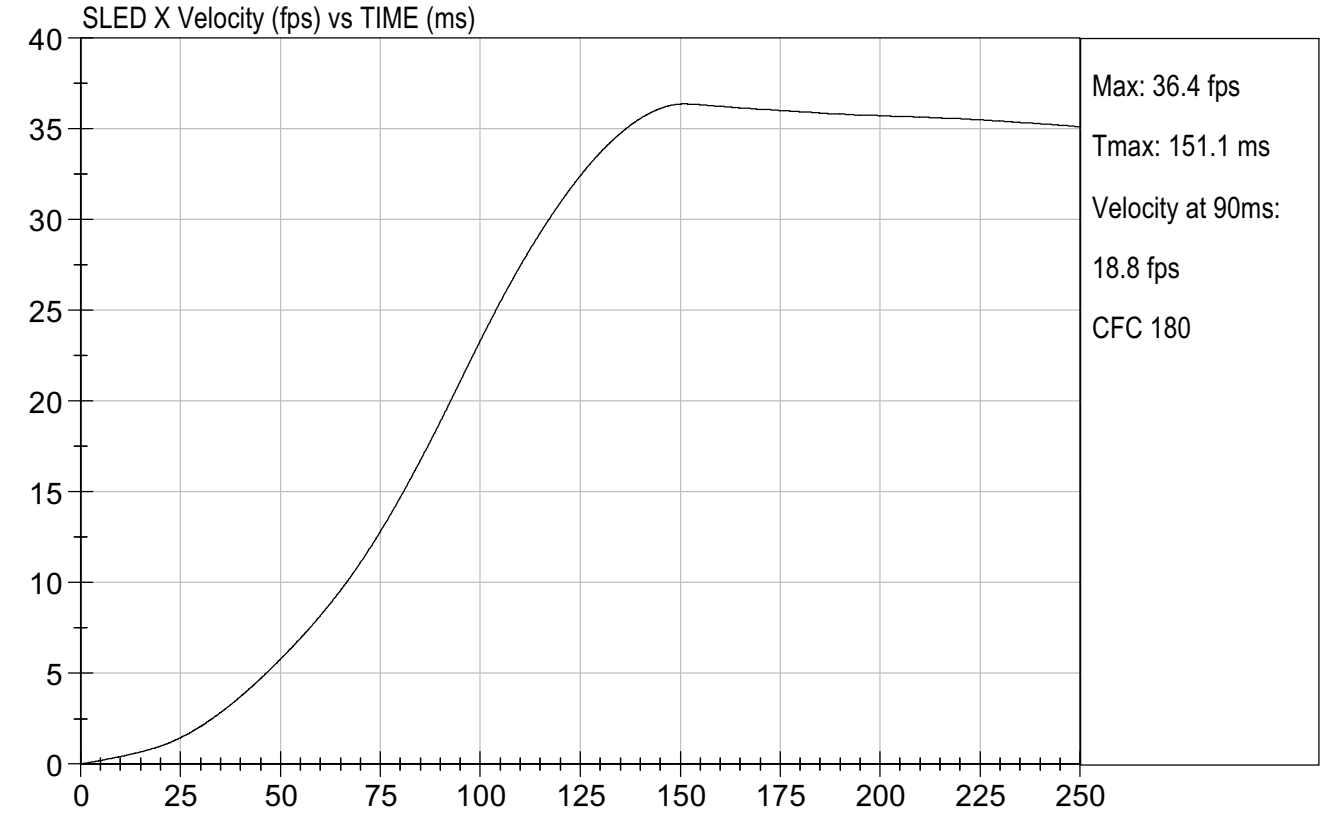
Test Sample Information	
Serial Number	0032
Part Number	62771-113
Weight	224.5 lbs

Results	
Max Acceleration (g)	14
Time of Max Acceleration (ms)	94.4
Damage	Yes
Time of Damage (ms)	101
Acceleration at Time of Damage (g)	13.5

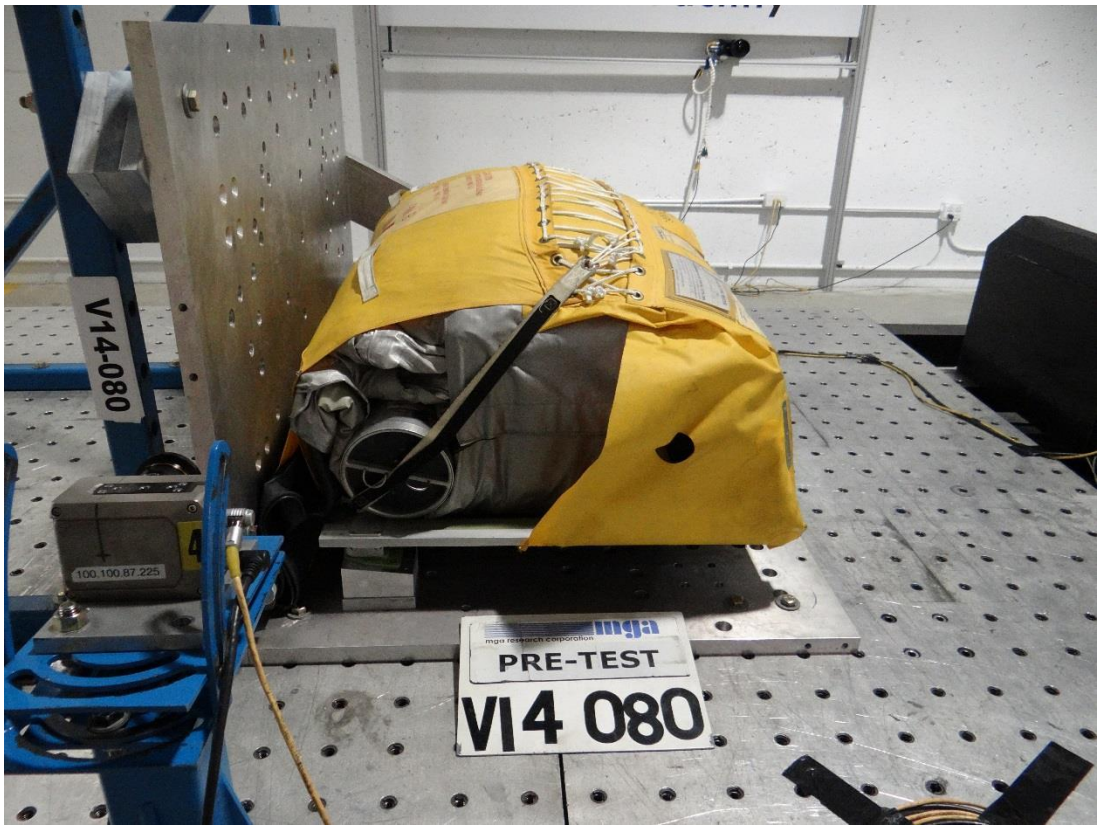
Comments:

(1) Pack released
(2) Tang tore through release shaft
(3) Release shaft rotated
(4) Right aspirator strap released
(5) Witness marks seen on inside surface of pin shields
(6) Release cable ball ends were intact and the cables were curved with a permanent set

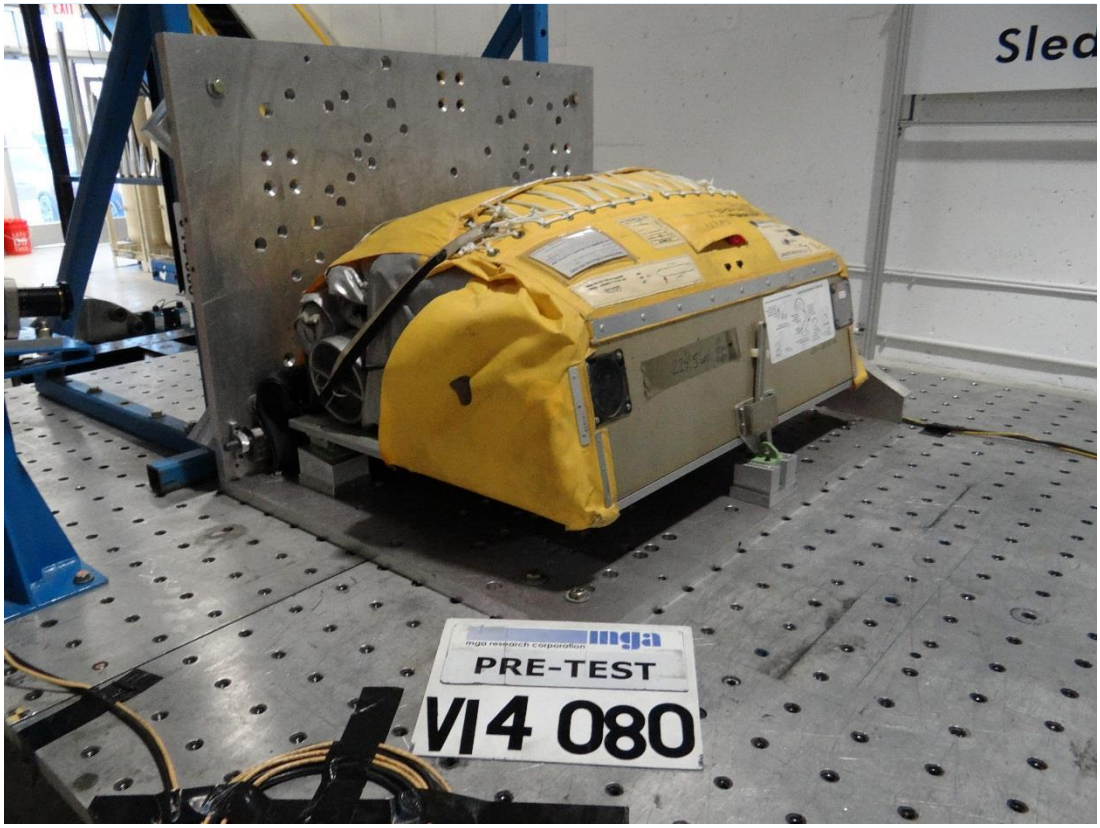

SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 14.0 G's
Tmax: 94.4 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 36.4 fps
Tmax: 151.1 ms
Velocity at 90ms:
18.8 fps
CFC 180

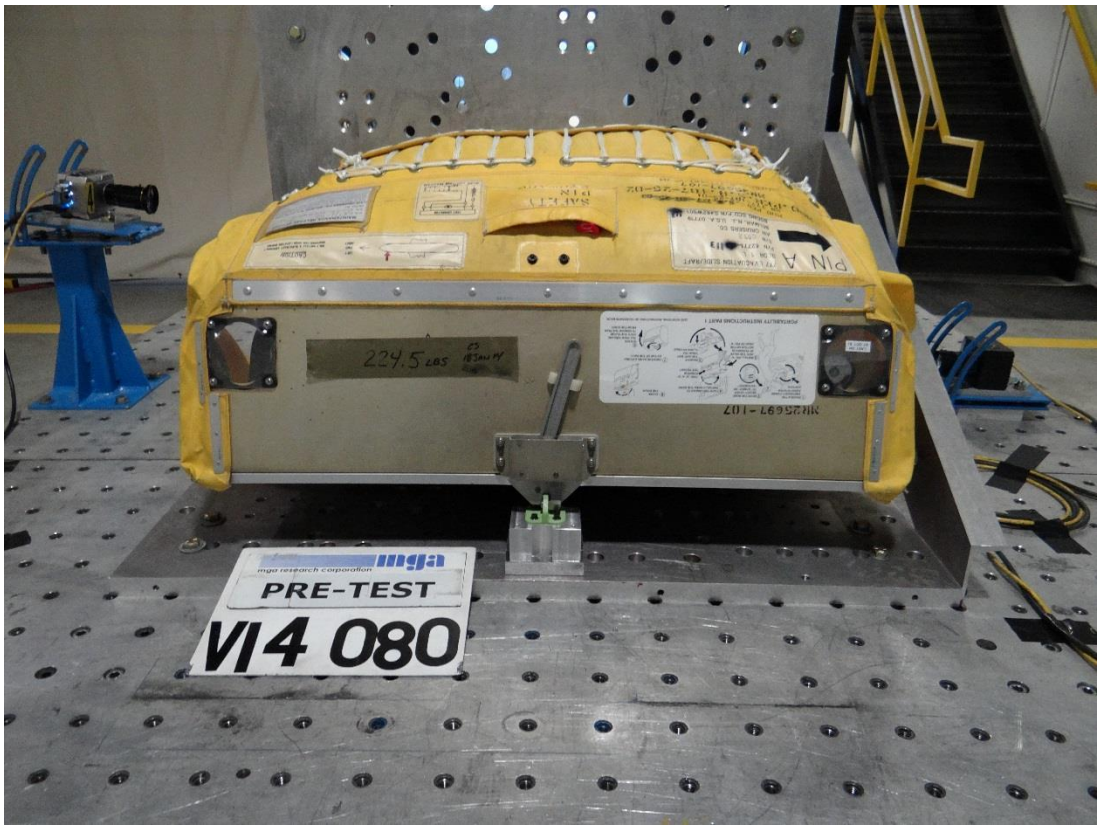
Pre Test Front View



Pre Test Left Side View

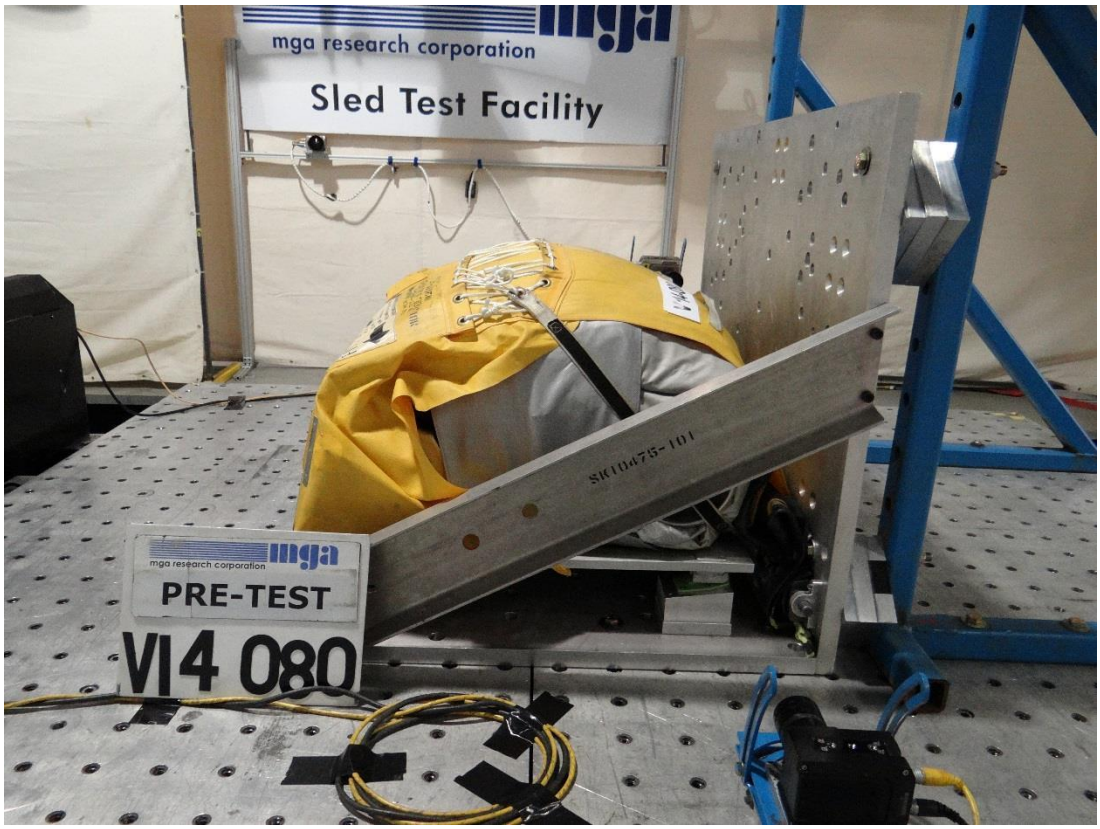


Pre Test Left Angle View



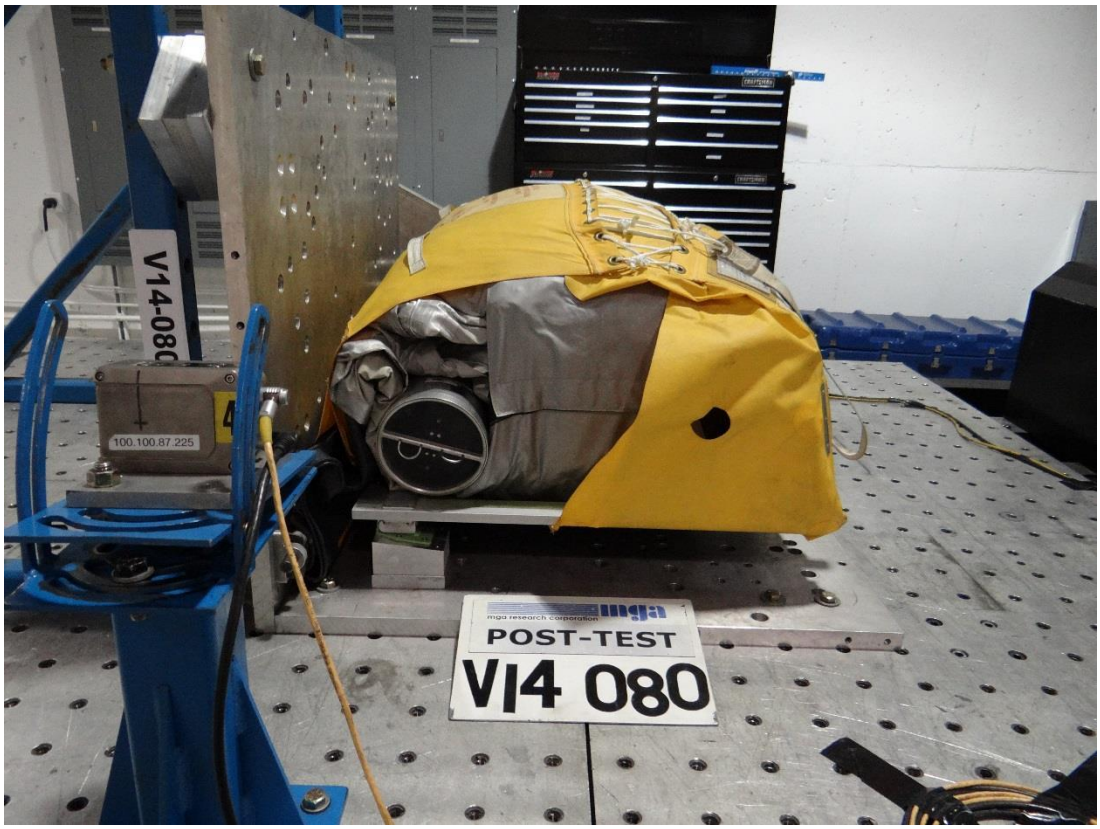
Pre Test Rear View

Pre Test Right Angle View

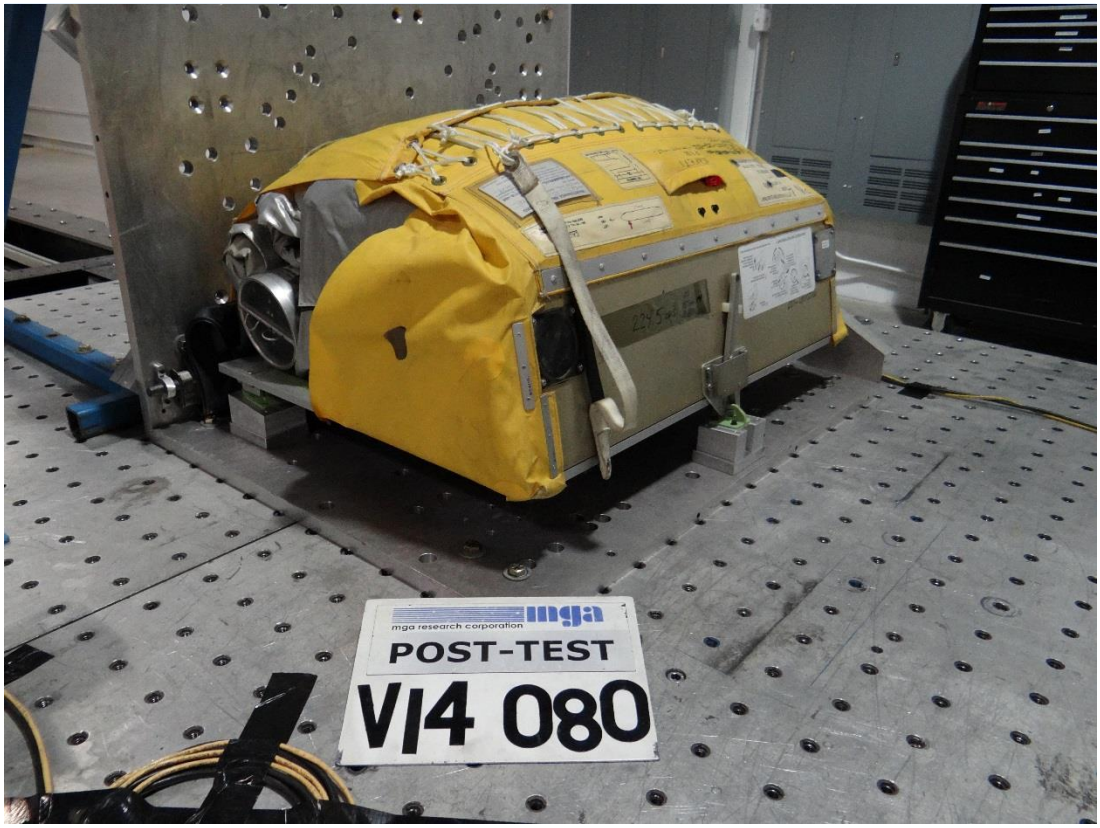


Pre Test Right Side View

Post Test Front View

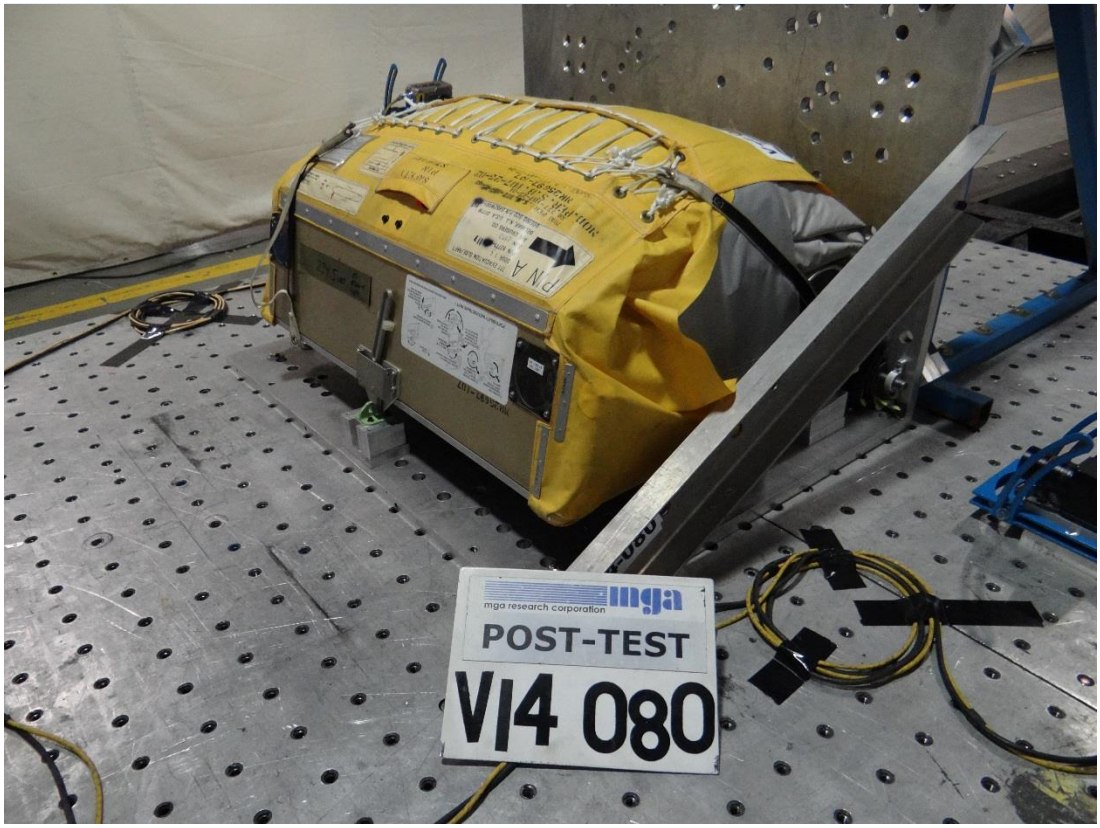


Post Test Left Side View

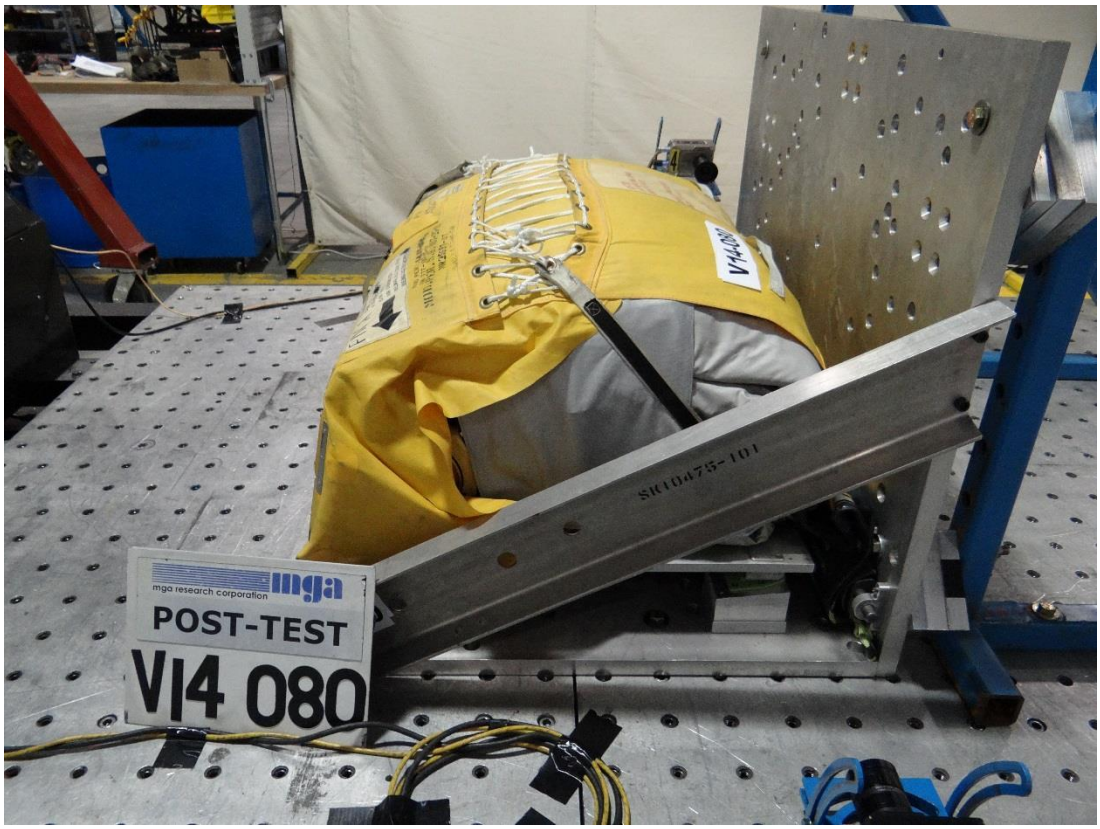


Post Test Left Angle View

Post Test Rear View



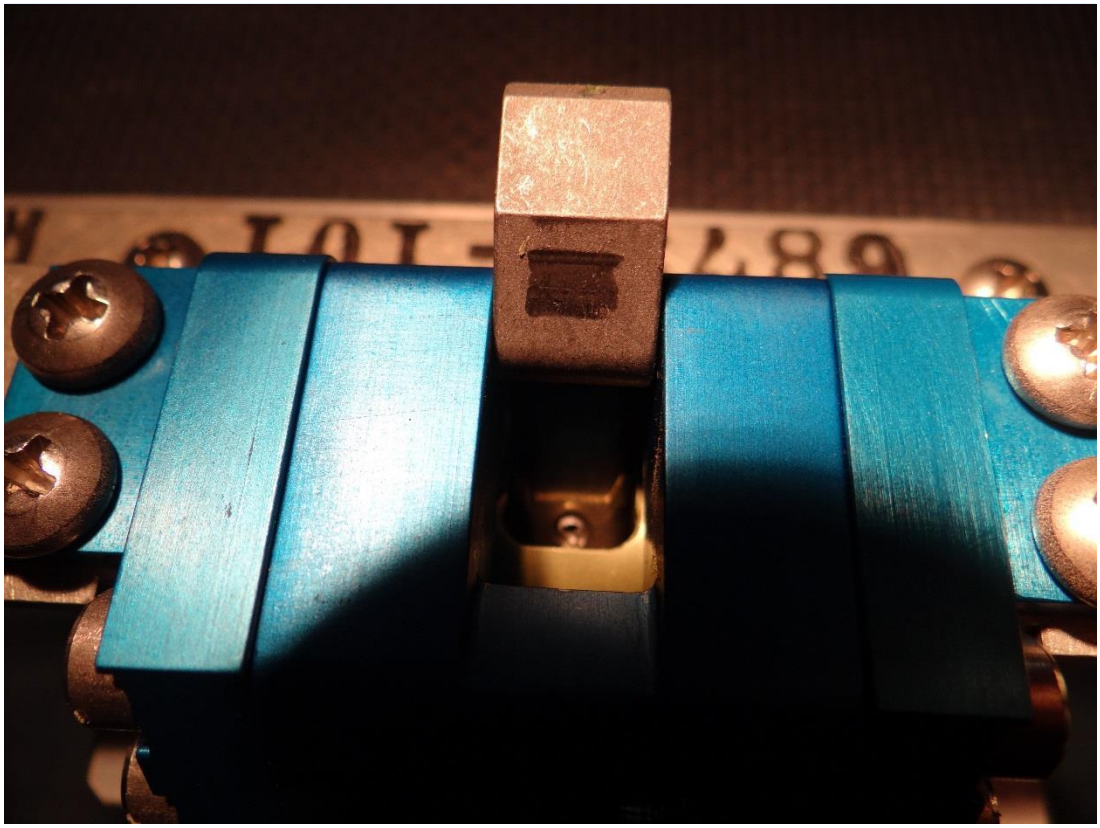
Post Test Right Angle View



Post Test Right Side View

Detail View

Detail View



Detail View

Detail View

10g 45°Combined Load Test

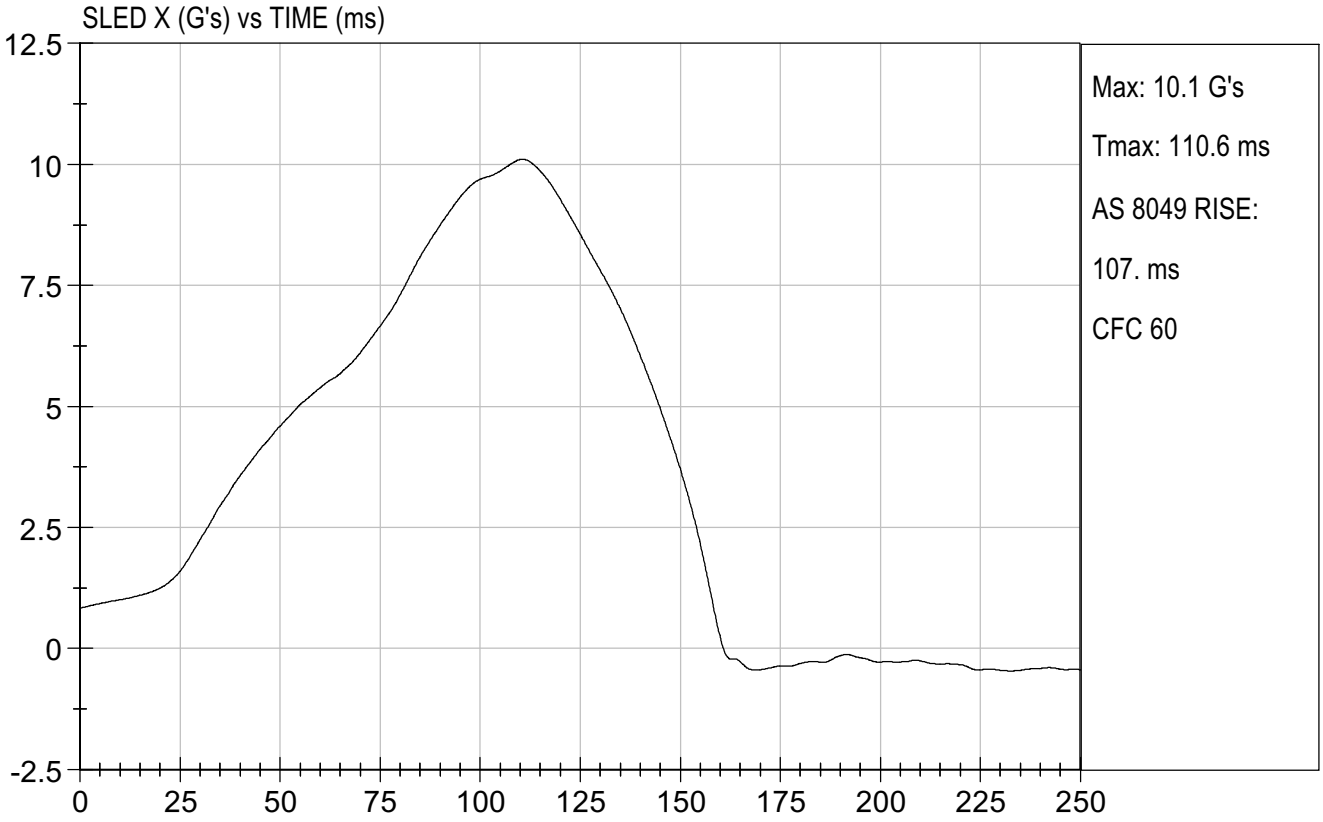
Test Information	
MGA Test Number	V14081
Test Date	01/22/2014
Run Number	1
Orientation	45° Combined

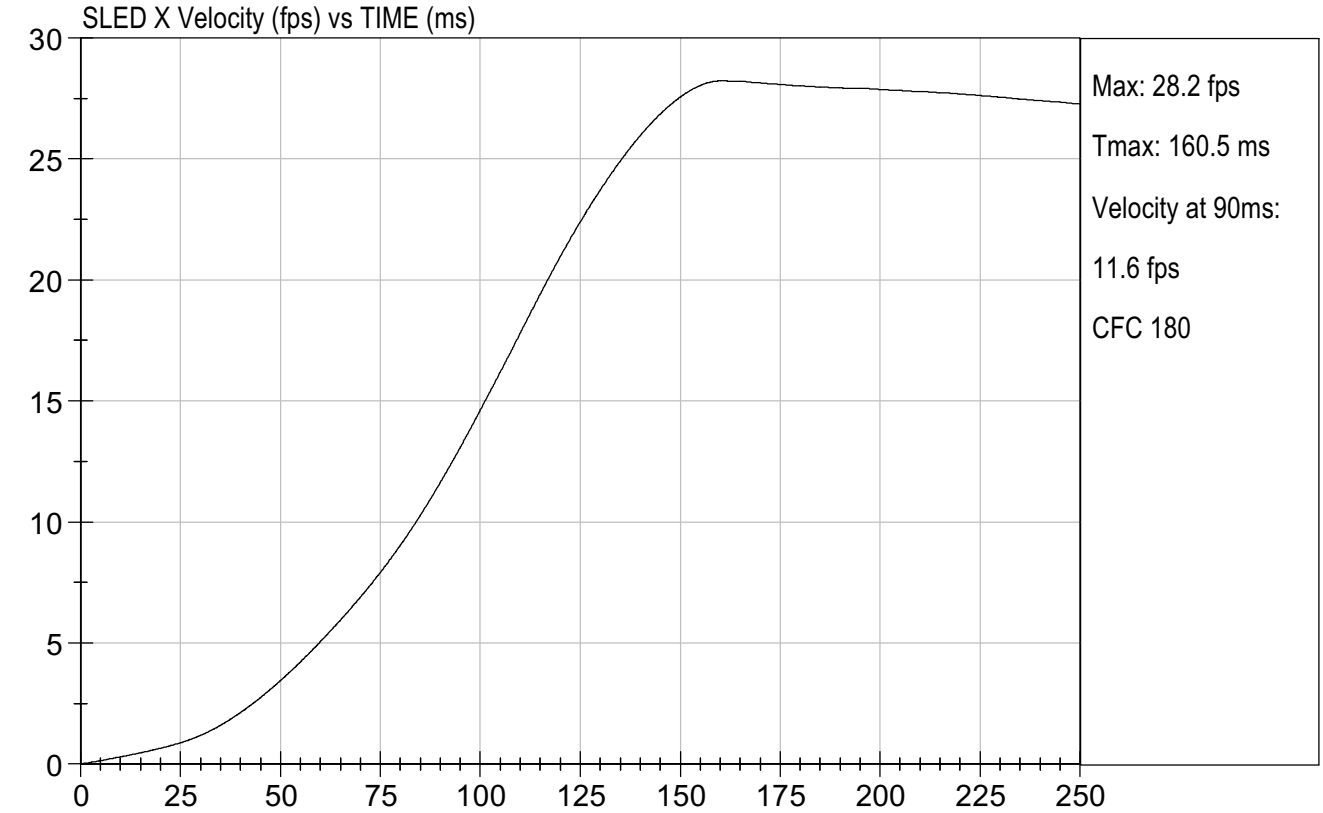
Test Sample Information	
Serial Number	0003
Part Number	65342-217
Weight	215.2 lbs

Results	
Max Acceleration (g)	10.1
Time of Max Acceleration (ms)	107
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

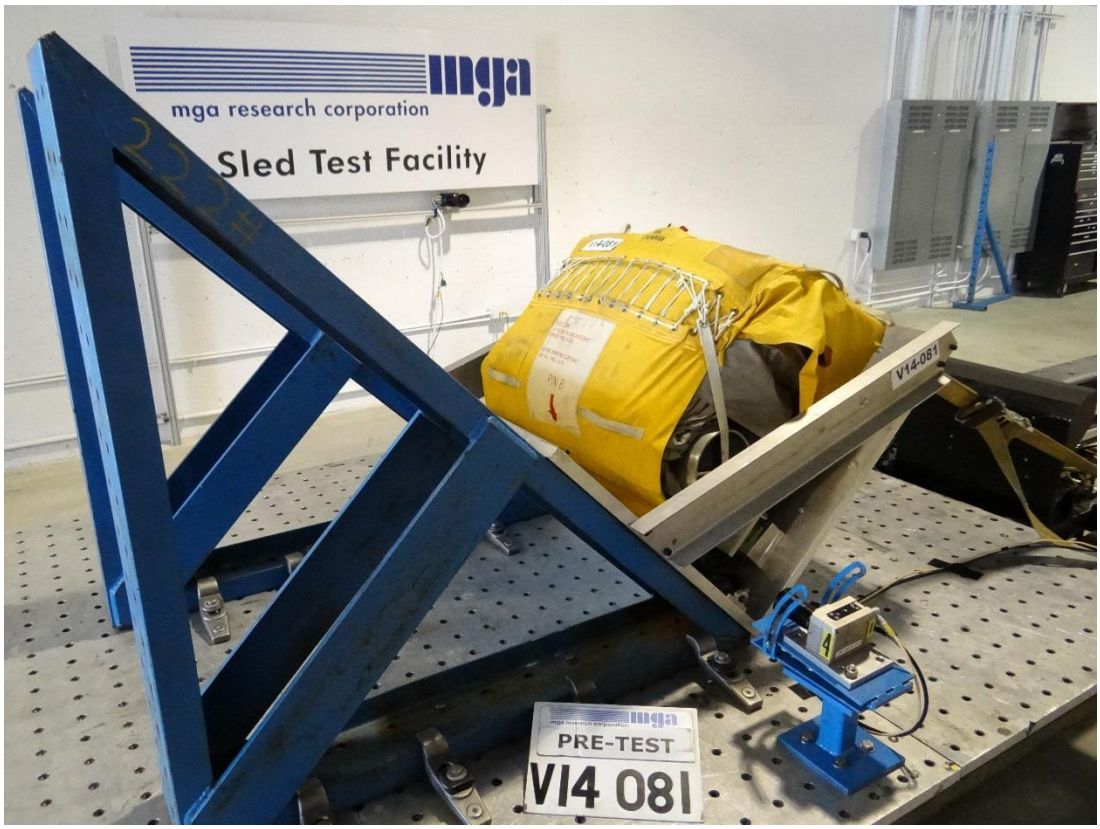
Comments:

(1) No damage observed
(2) Did not release

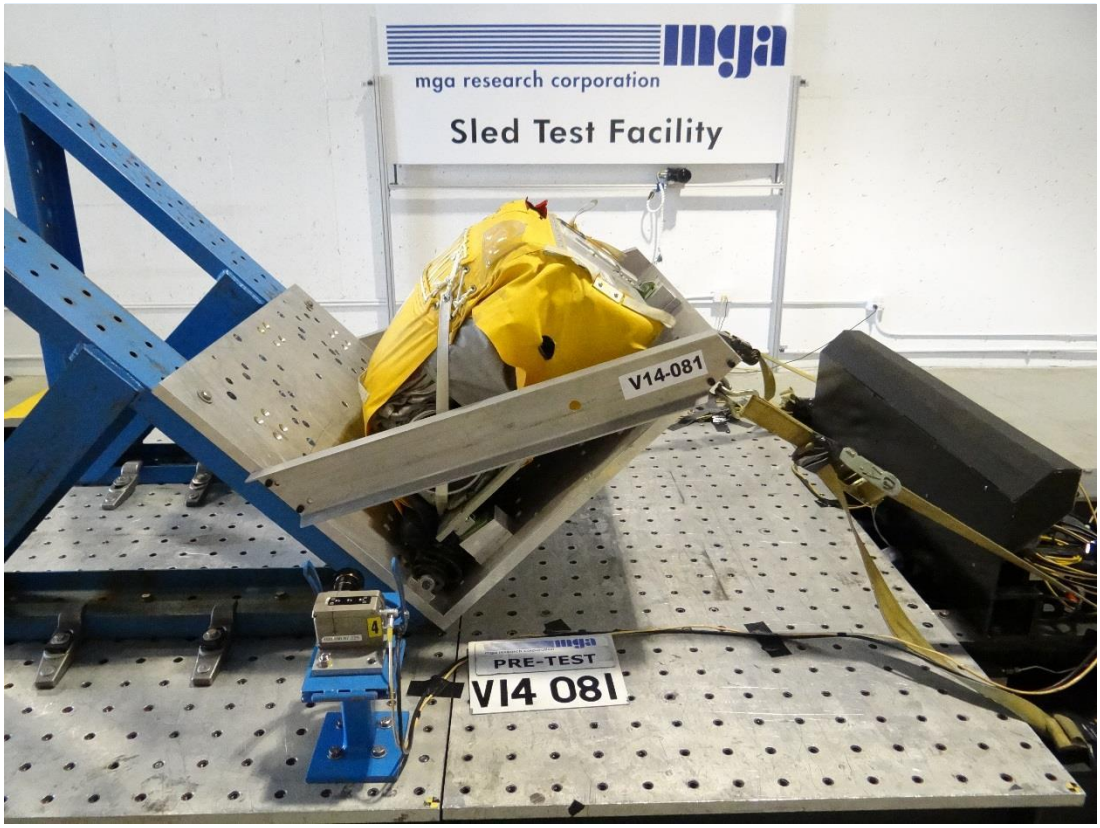

SLED X (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 10.1 G's
Tmax: 110.6 ms
AS 8049 RISE:
107. ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 28.2 fps
Tmax: 160.5 ms
Velocity at 90ms:
11.6 fps
CFC 180

Pre Test Front View

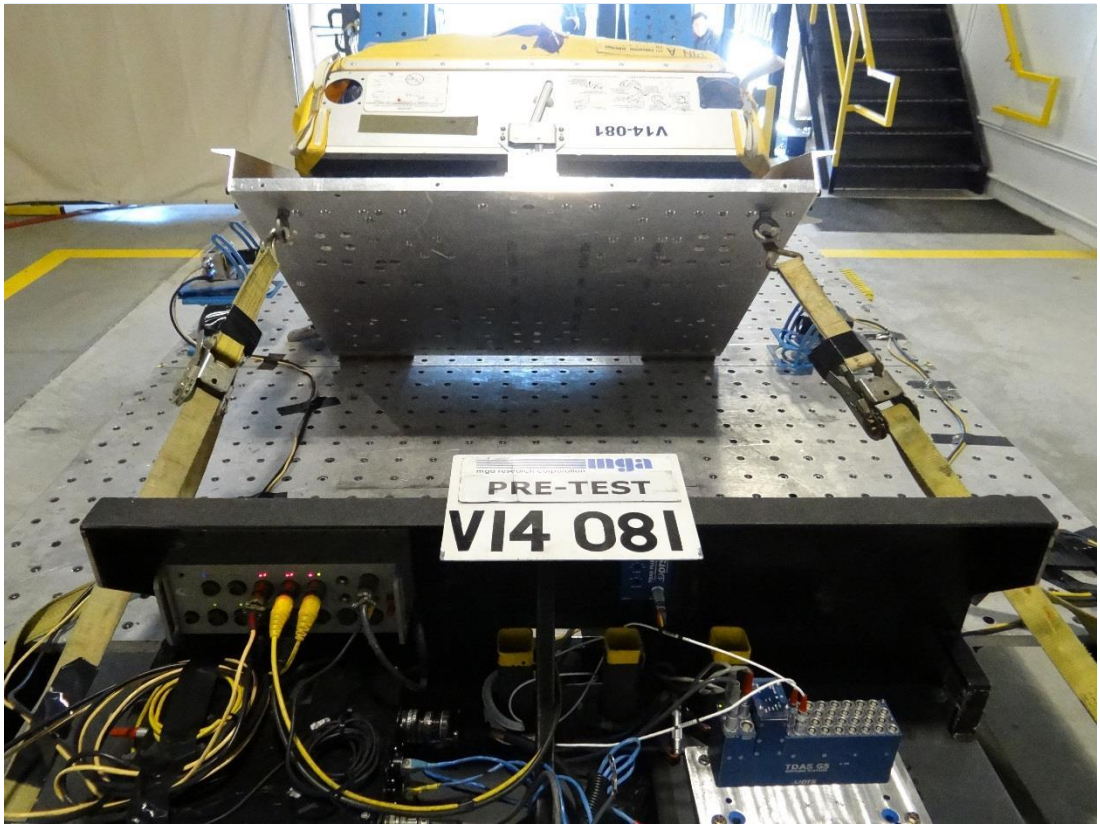


Pre Test Left Angle View

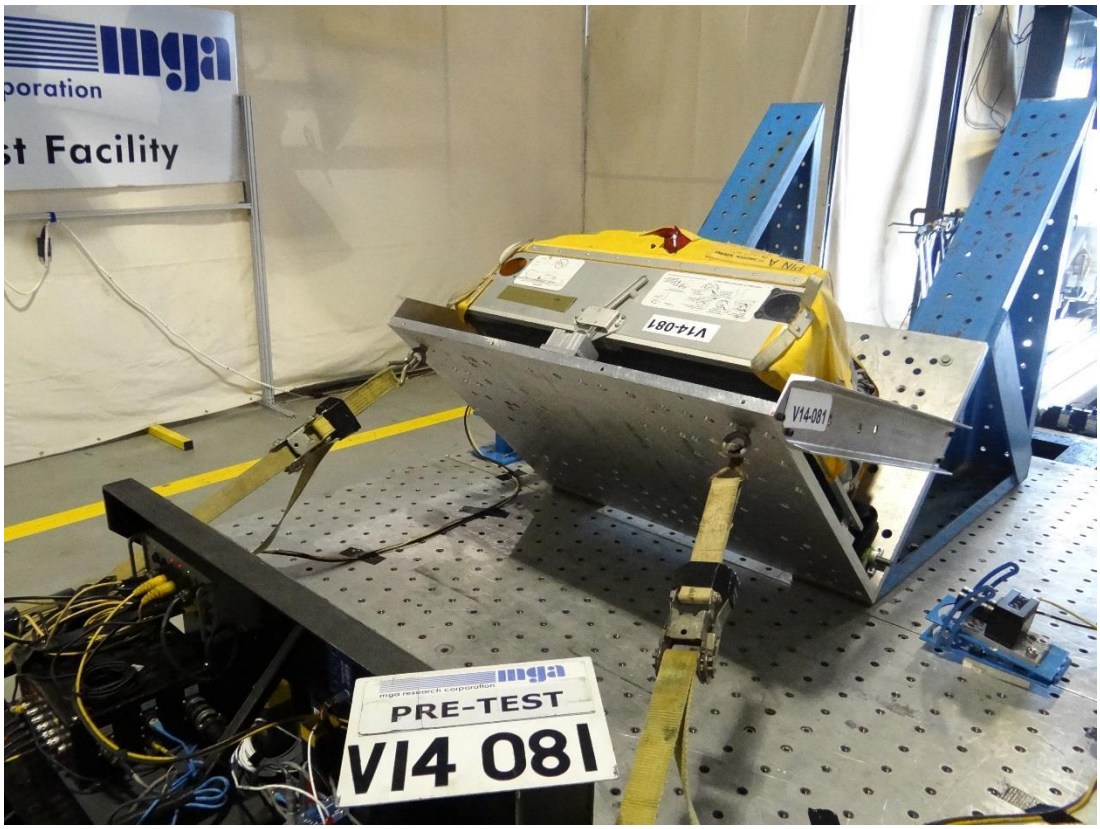


Pre Test Left Side View

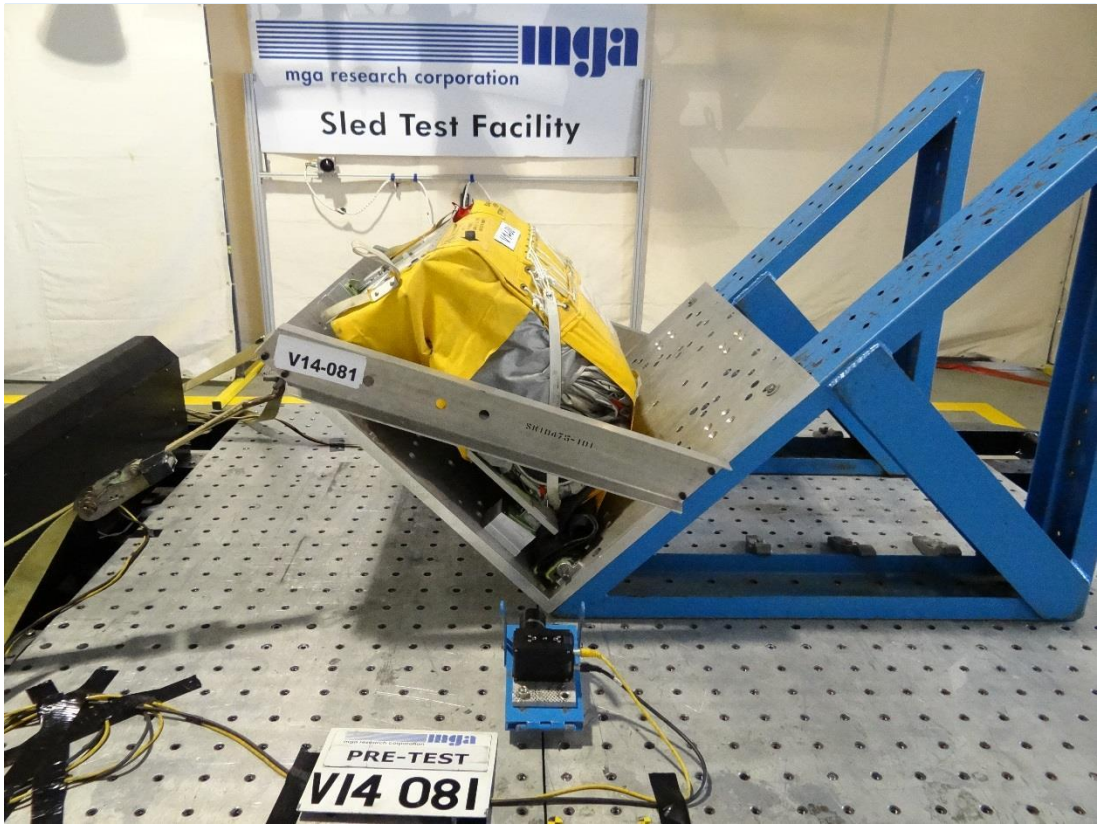
Pre Test Left Rear Angle



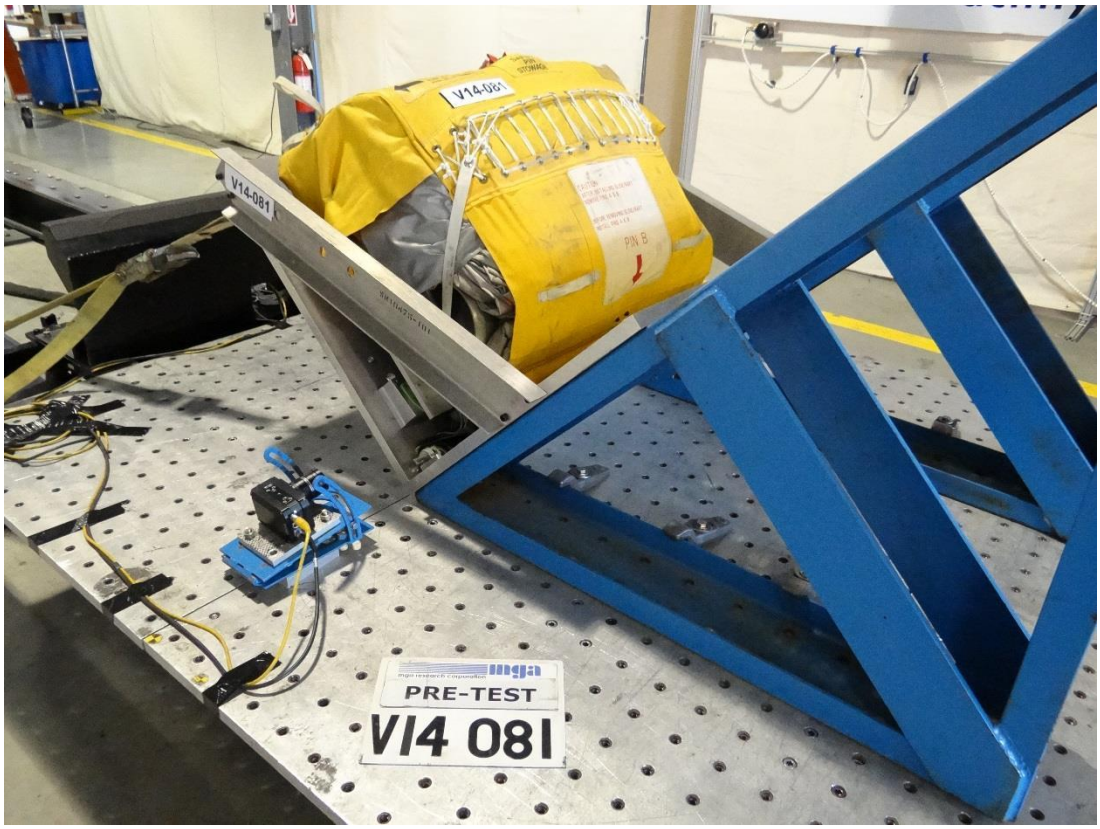
Pre Test Rear View



Pre Test Right Rear Angle View

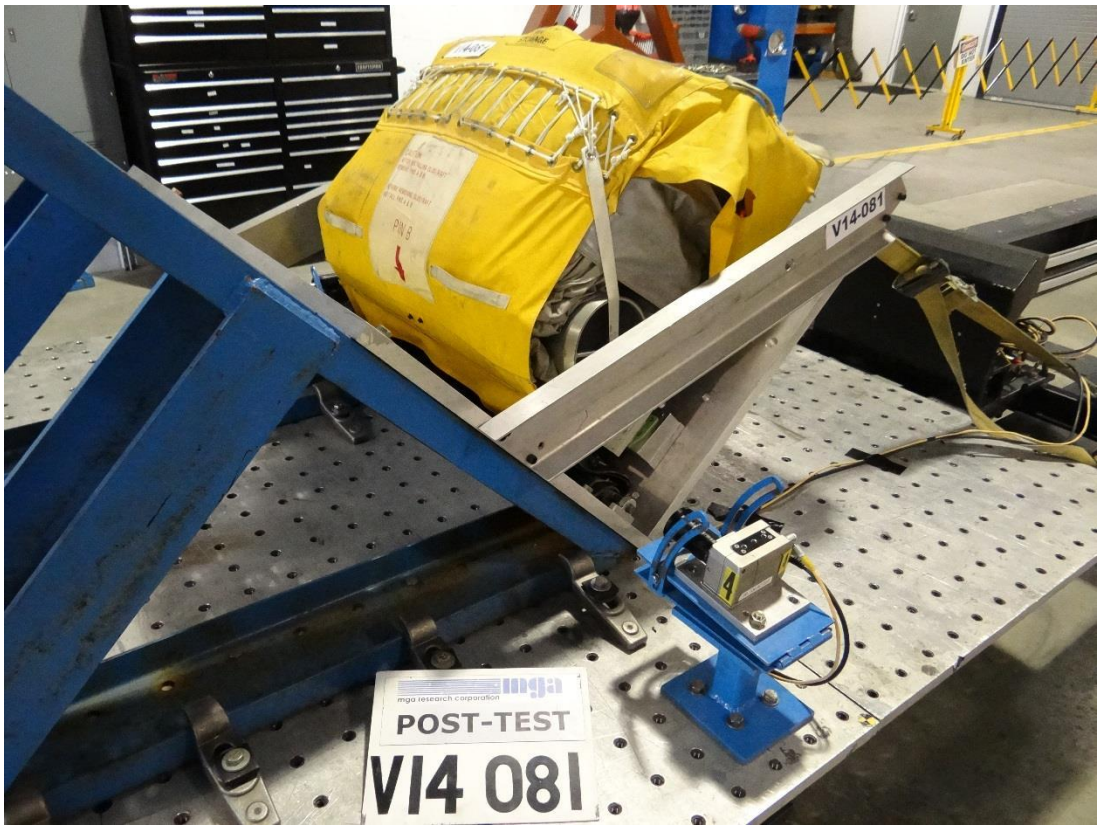


Pre Test Right Side View

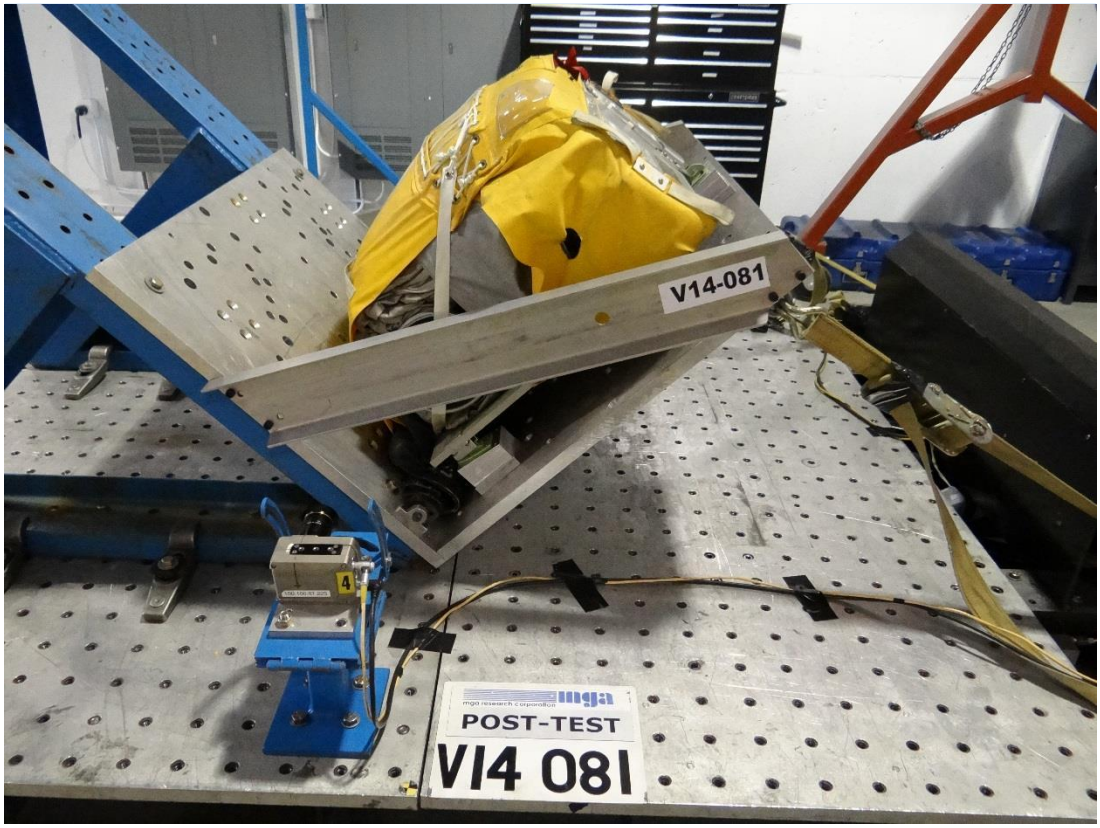


Pre Test Right Angle View

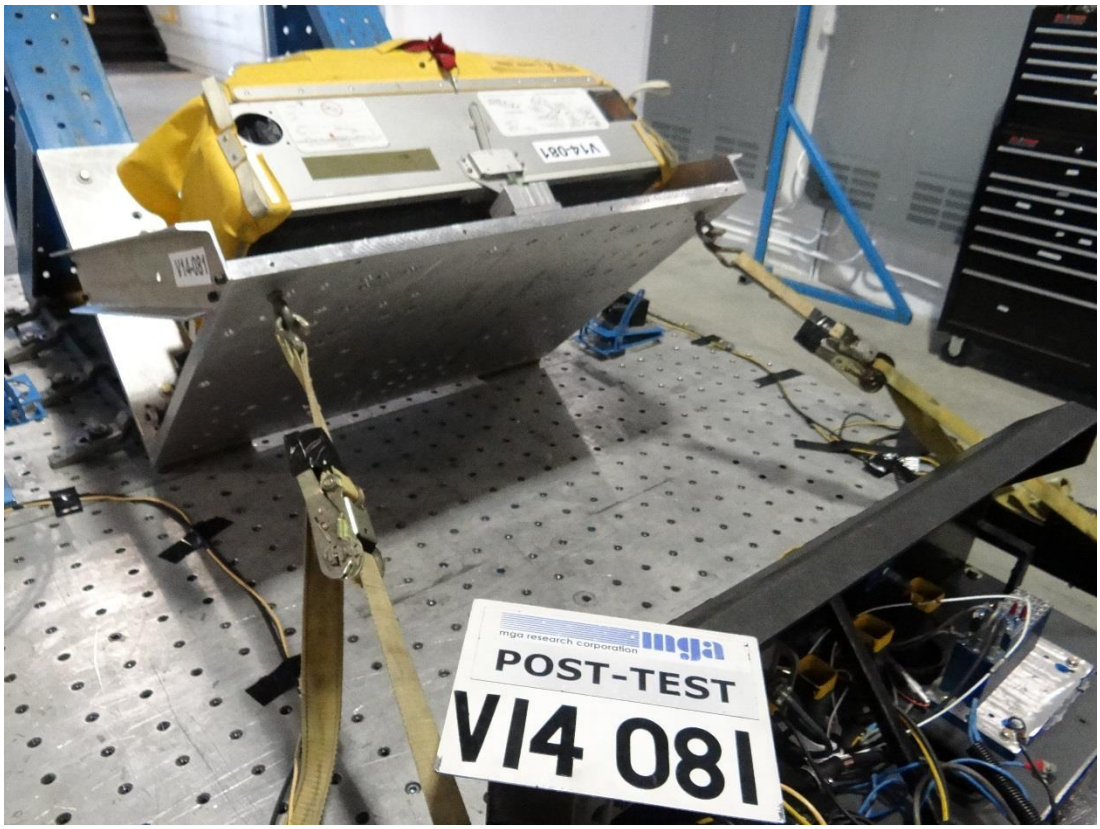
Post Test Front View



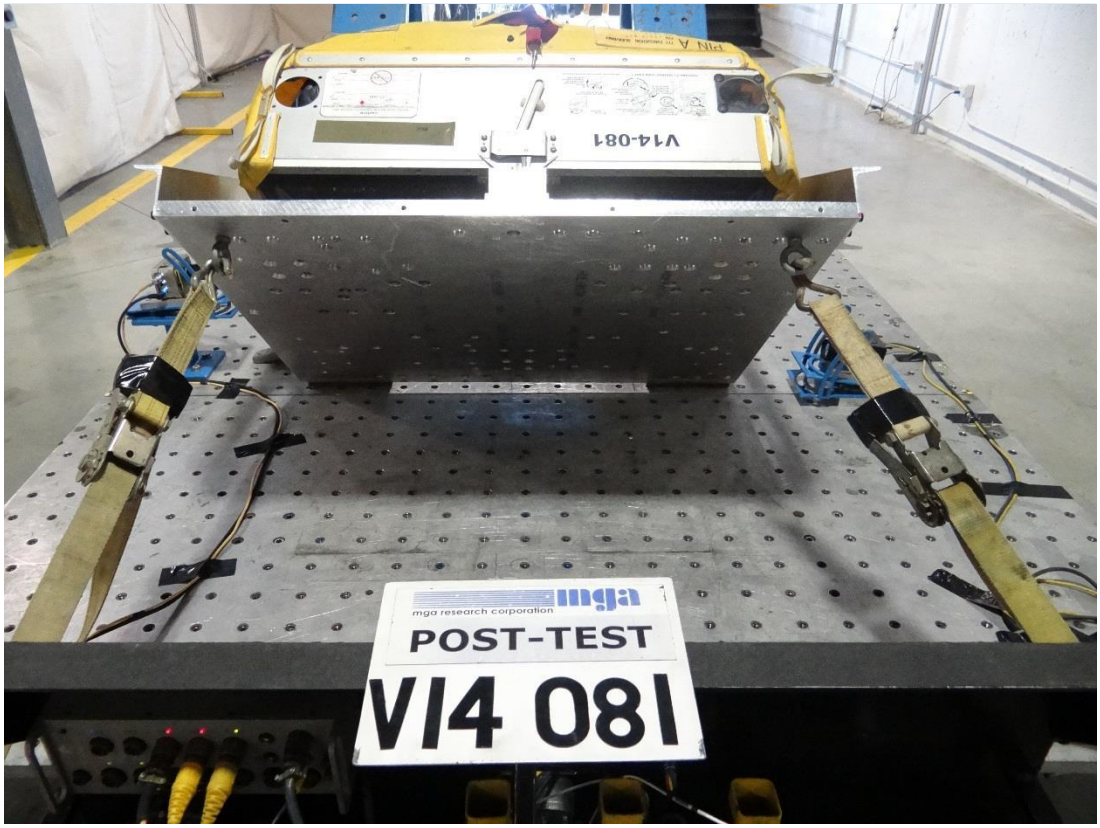
Post Test Left Angle View



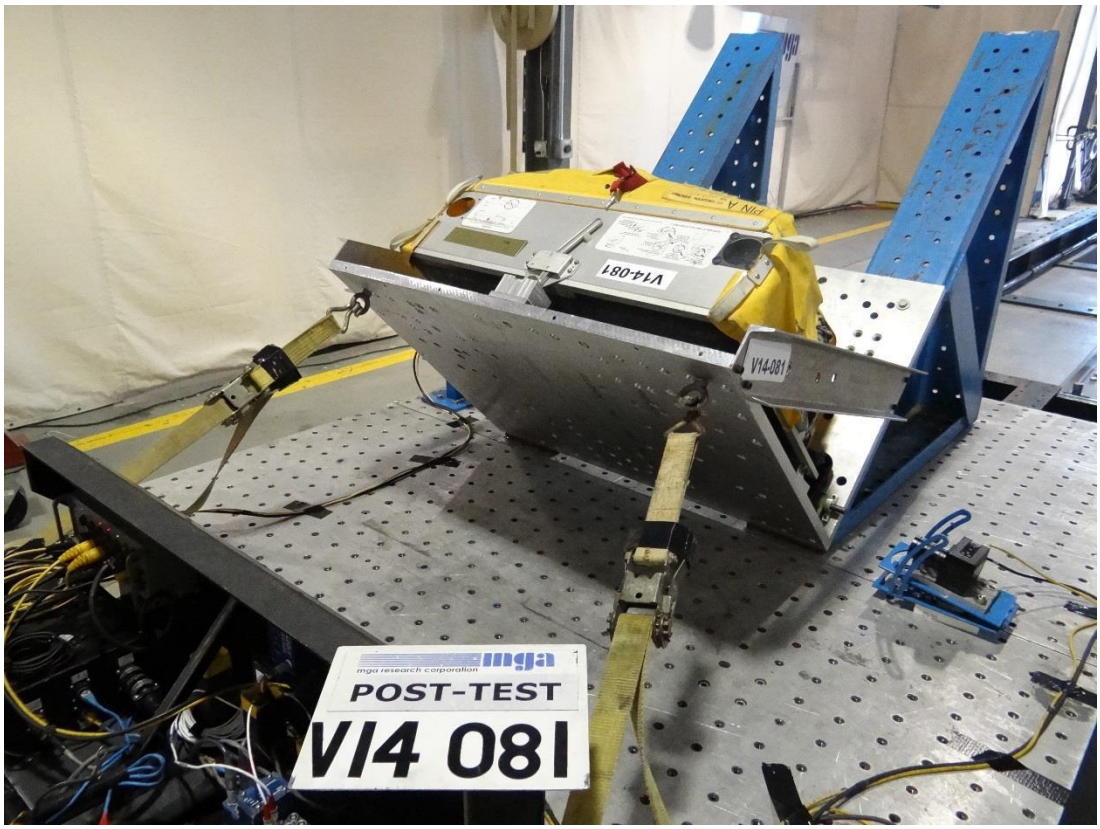
Post Test Left Side View



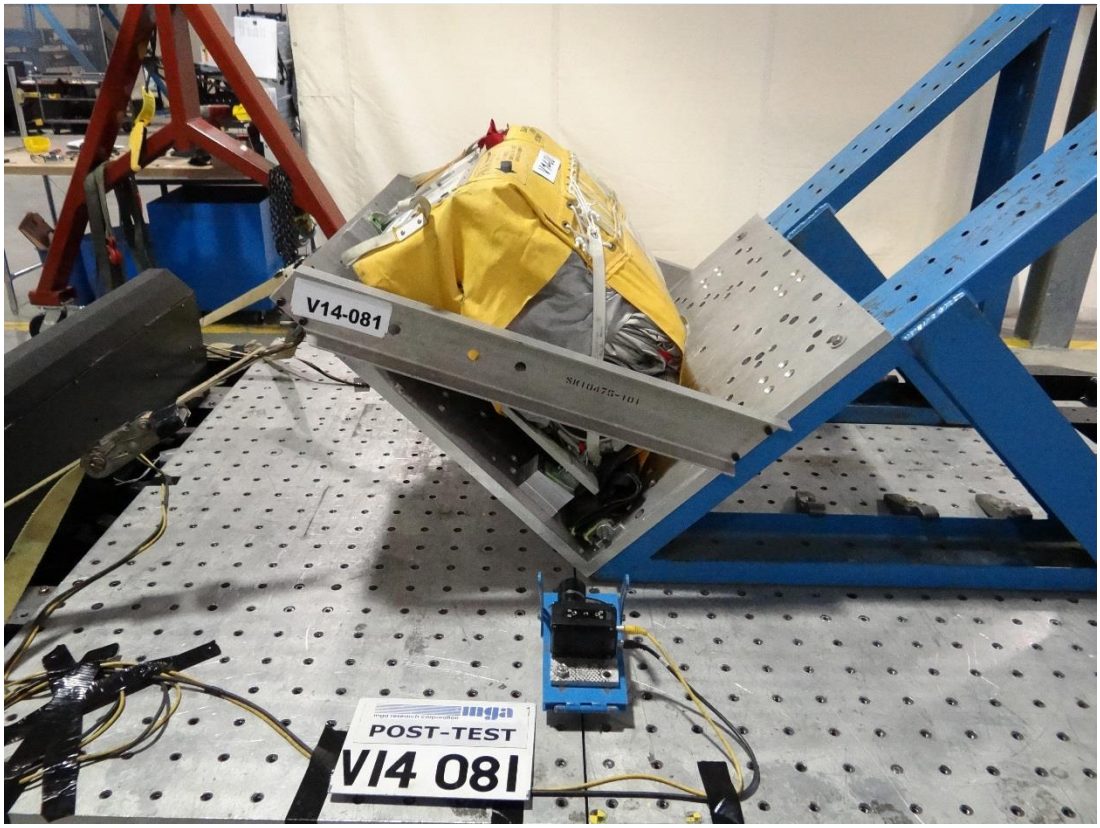
Post Test Left Rear Angle View



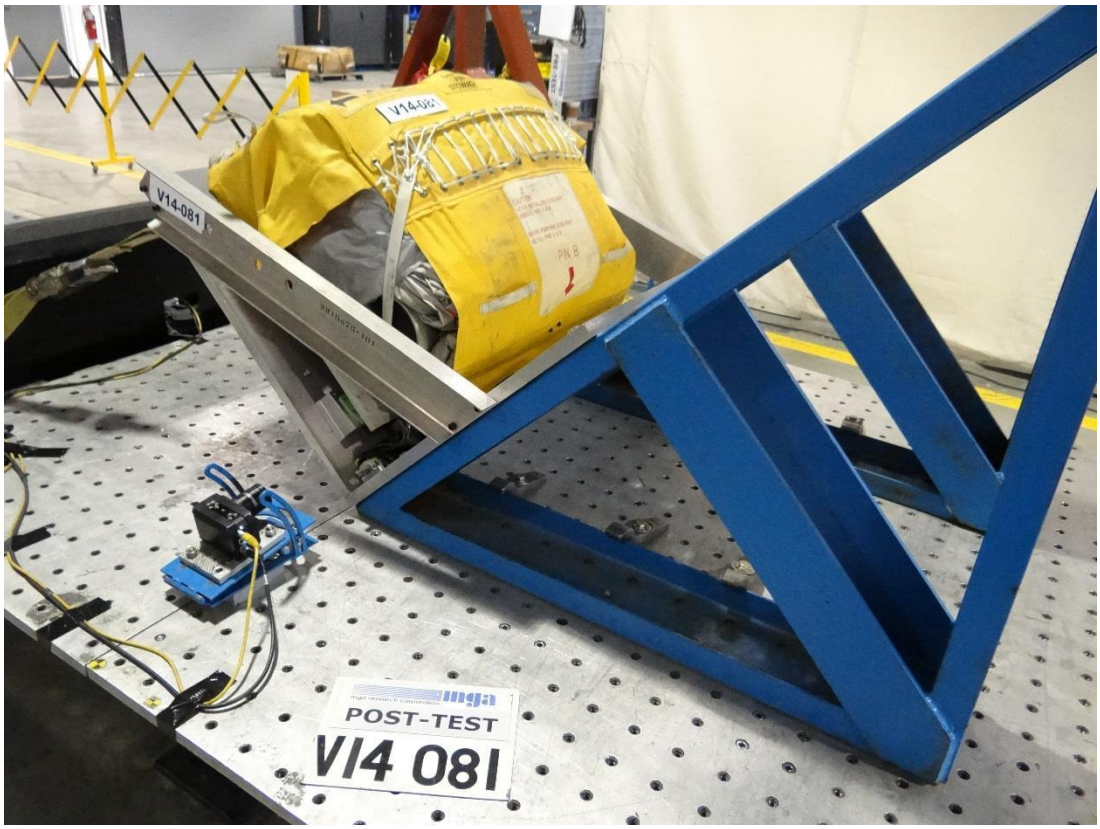
Post Test Rear View



Post Test Right Rear Angle View



Post Test Right Side View



Post Test Right Angle View

12g 45°Combined Load Test

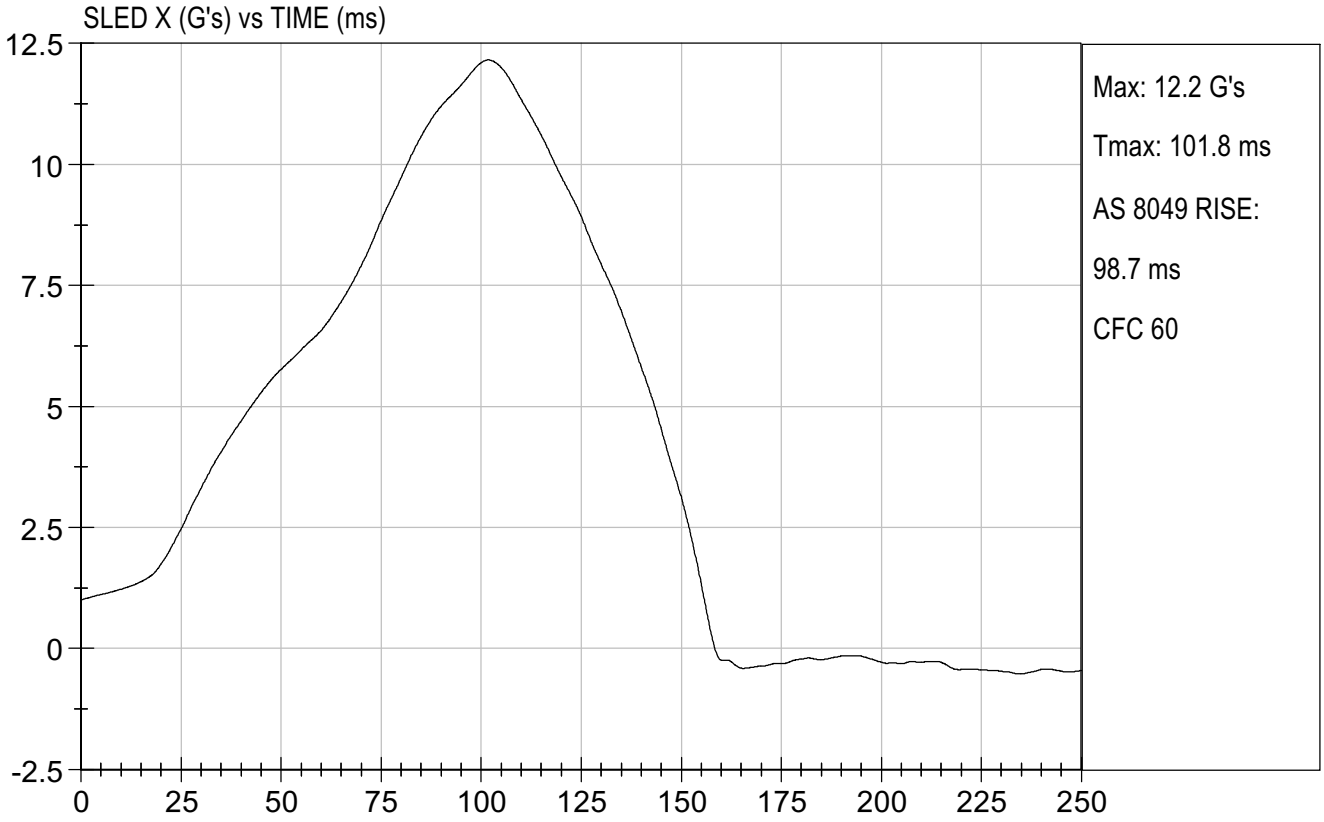
Test Information	
MGA Test Number	V14082
Test Date	01/22/2014
Run Number	2
Orientation	45° Combined

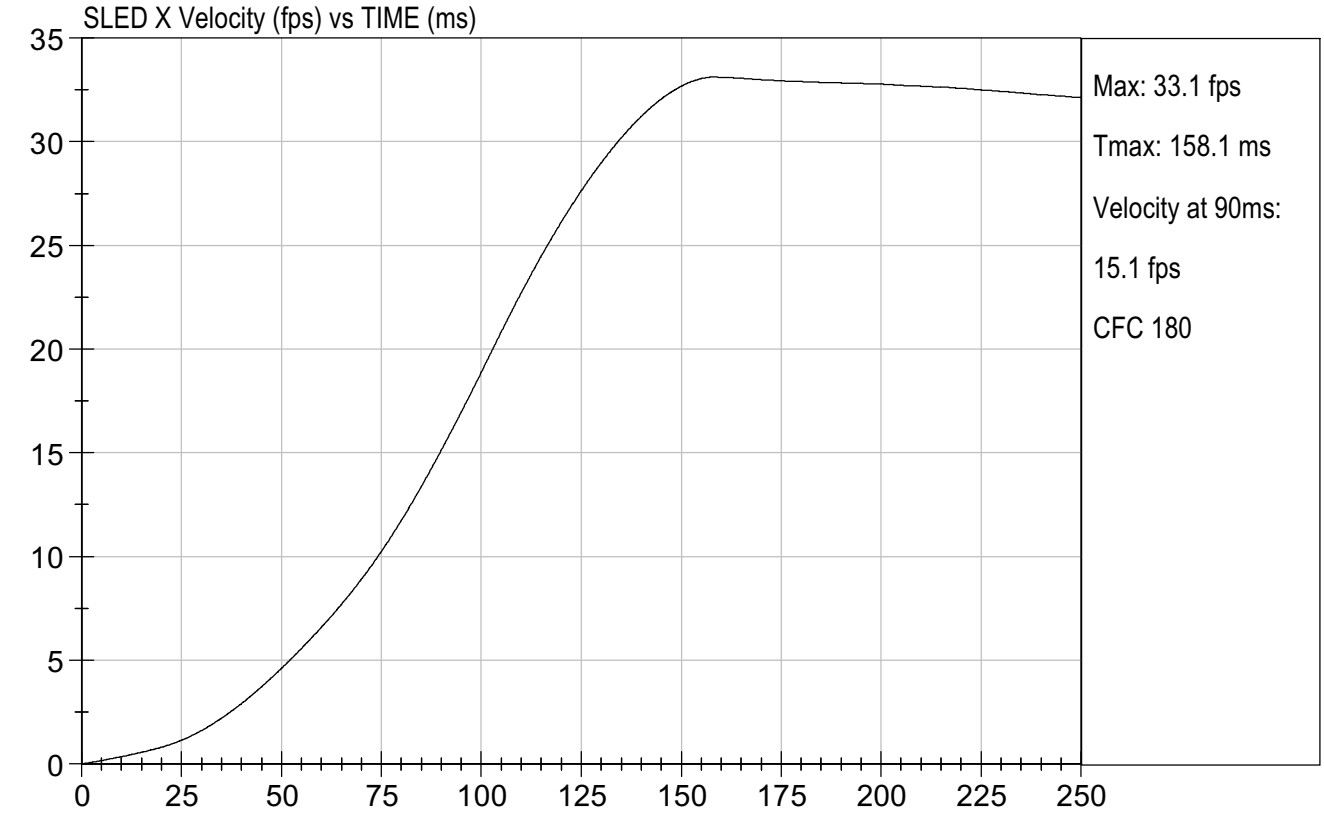
Test Sample Information	
Serial Number	0003
Part Number	65342-217
Weight	215.2 lbs

Results	
Max Acceleration (g)	12.2
Time of Max Acceleration (ms)	101.8
Damage	No
Time of Damage (ms)	N/A
Acceleration at Time of Damage (g)	N/A

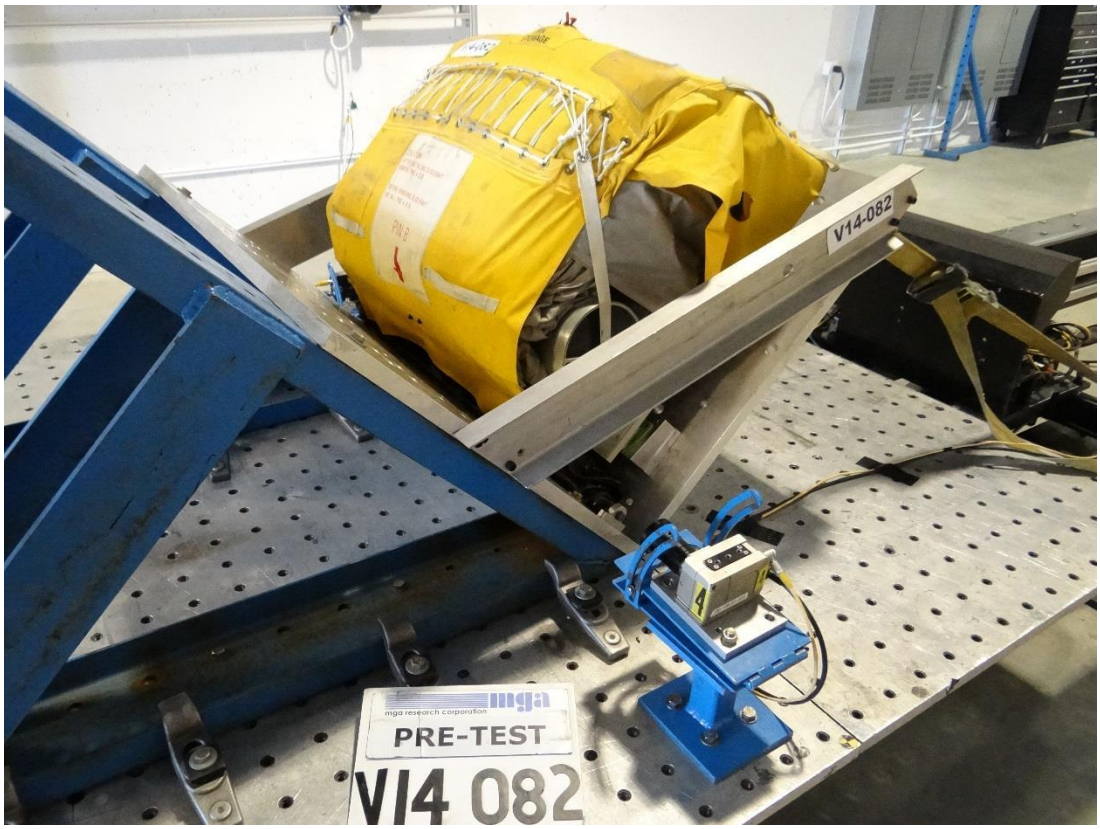
Comments:

(1) No damage observed
(2) Did not release

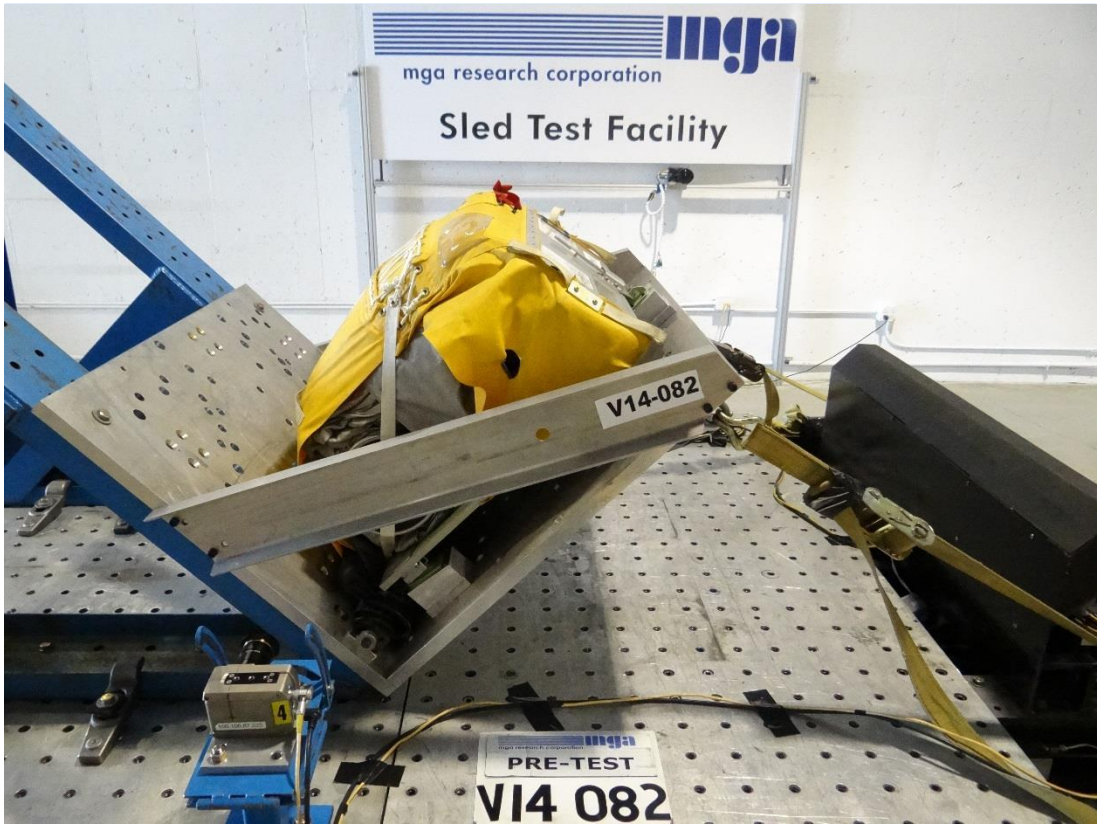

SLED X (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 12.2 G's
Tmax: 101.8 ms
AS 8049 RISE:
98.7 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 33.1 fps
Tmax: 158.1 ms
Velocity at 90ms:
15.1 fps
CFC 180

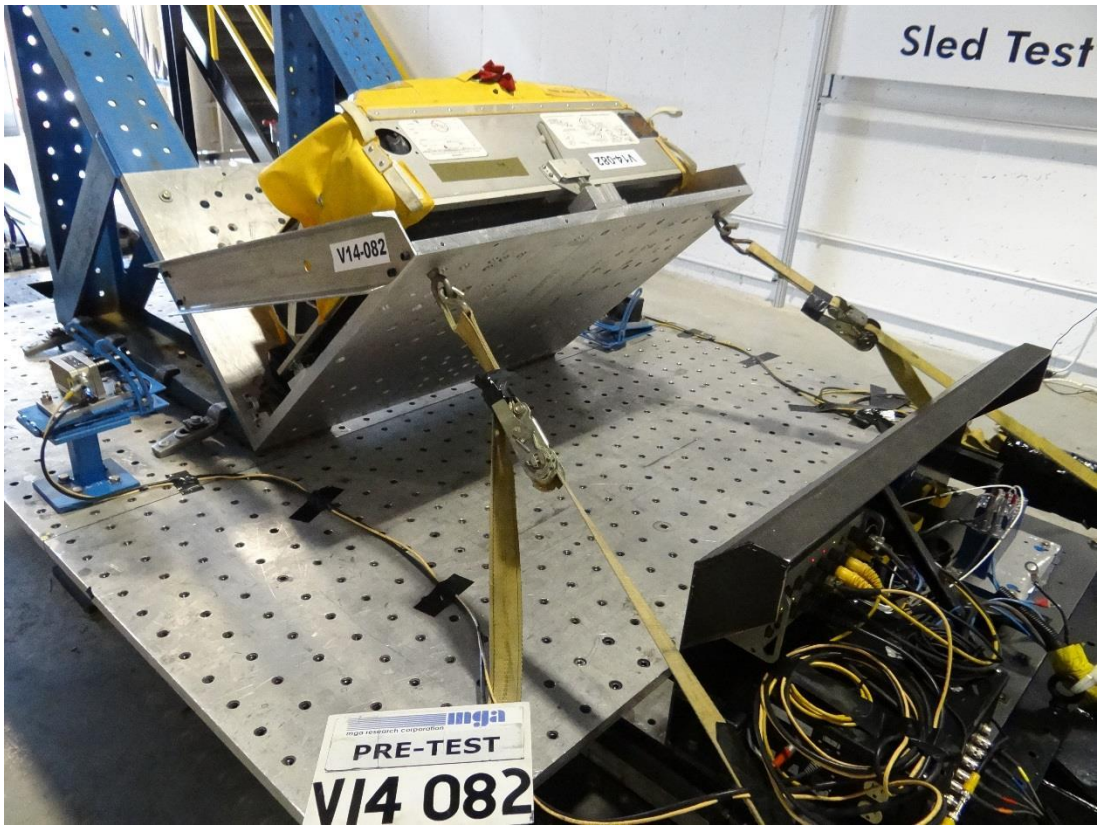
Pre Test Front View



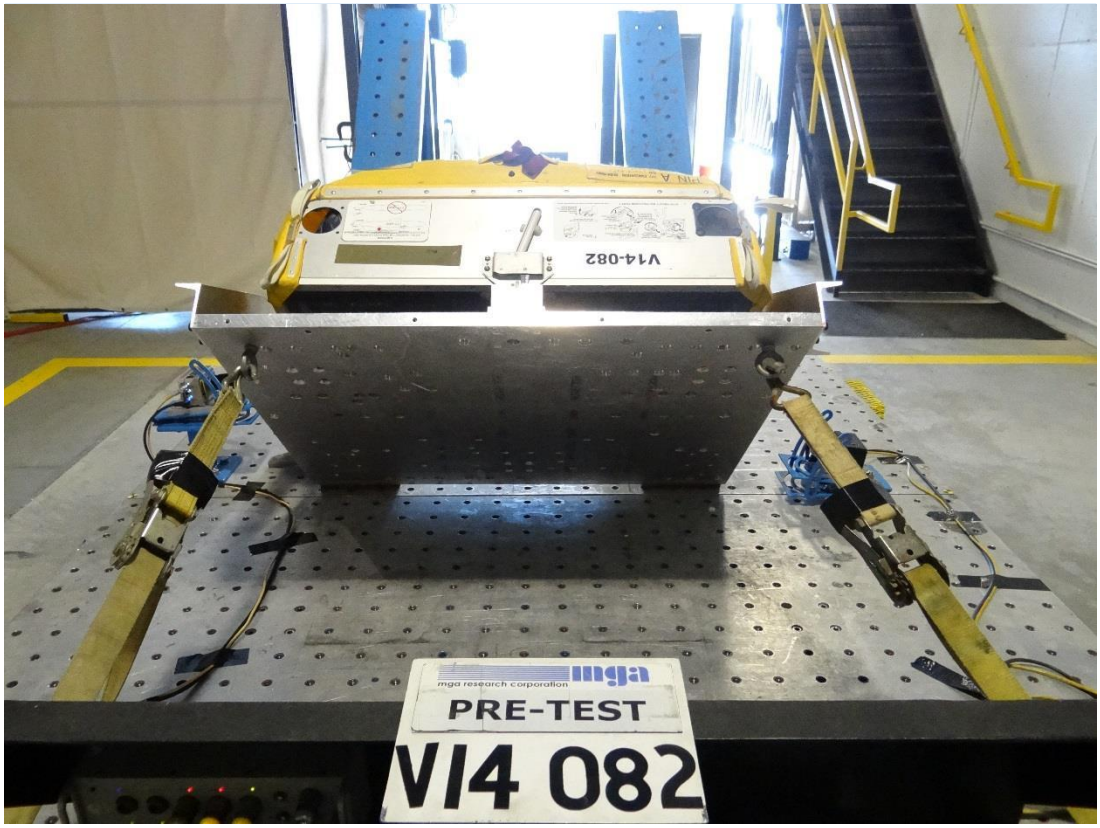
Pre Test Left Angle View



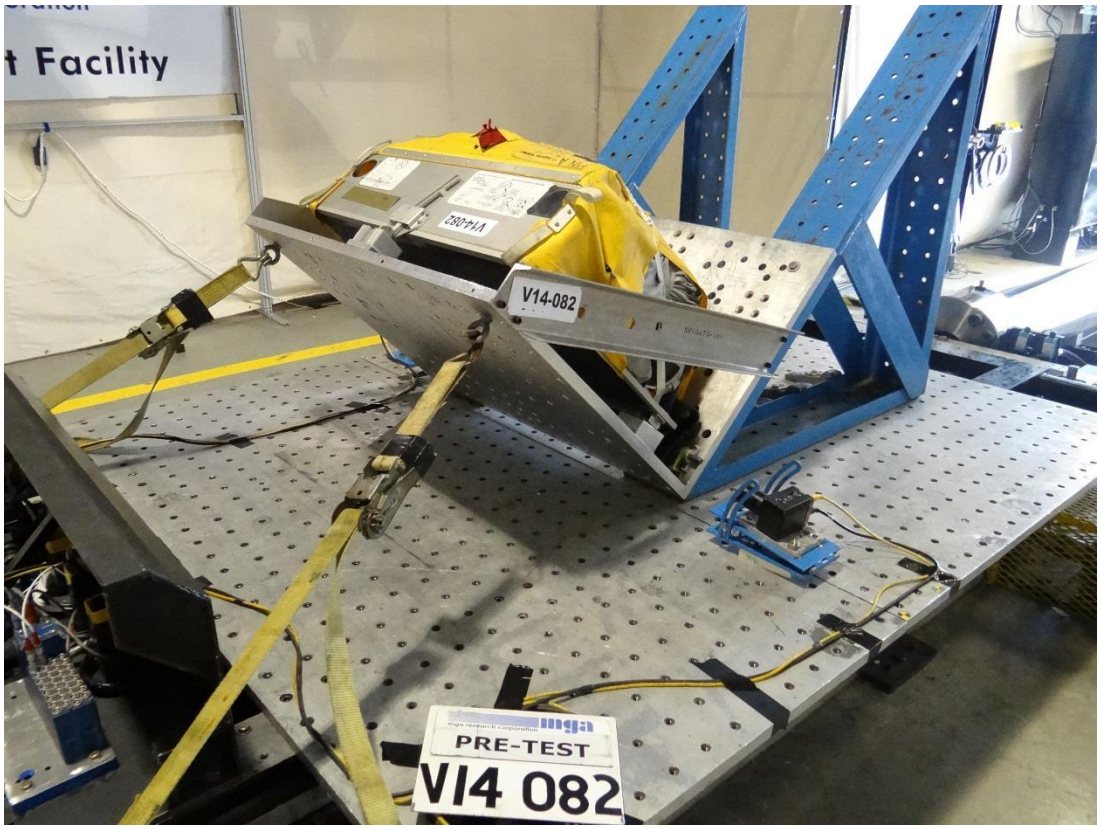
Pre Test Left Side View



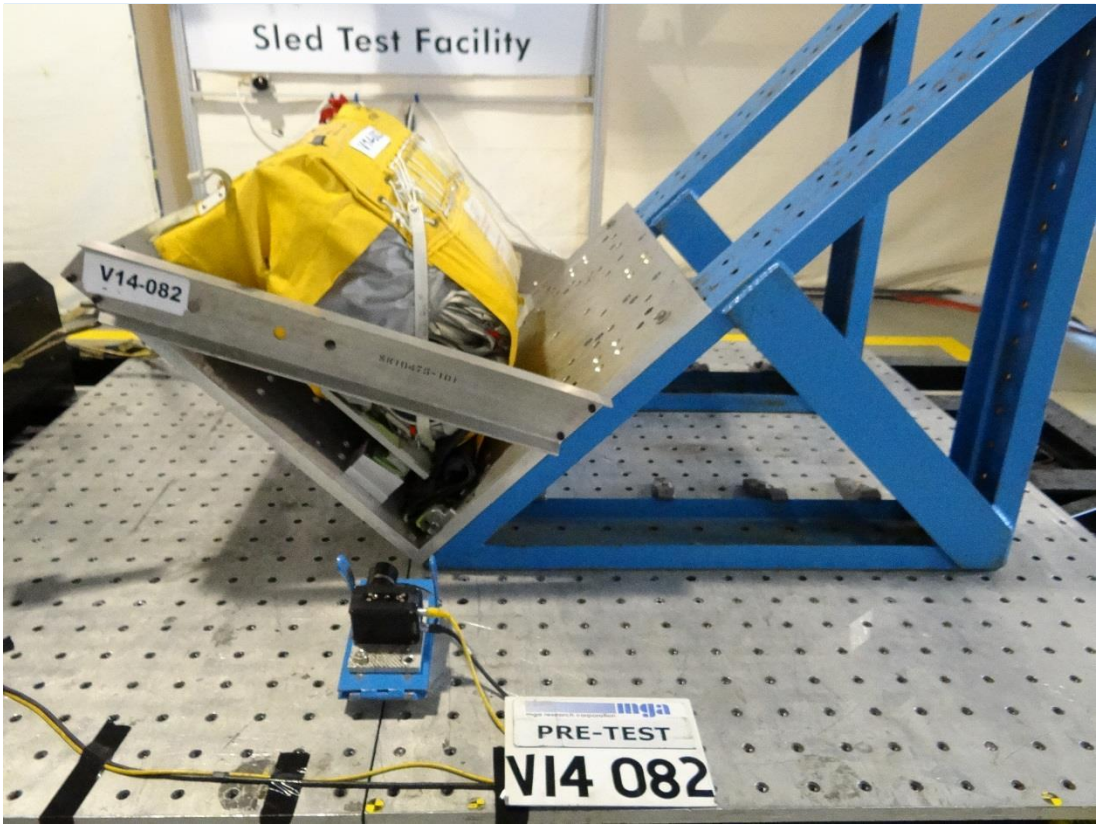
Pre Test Left Rear Angle



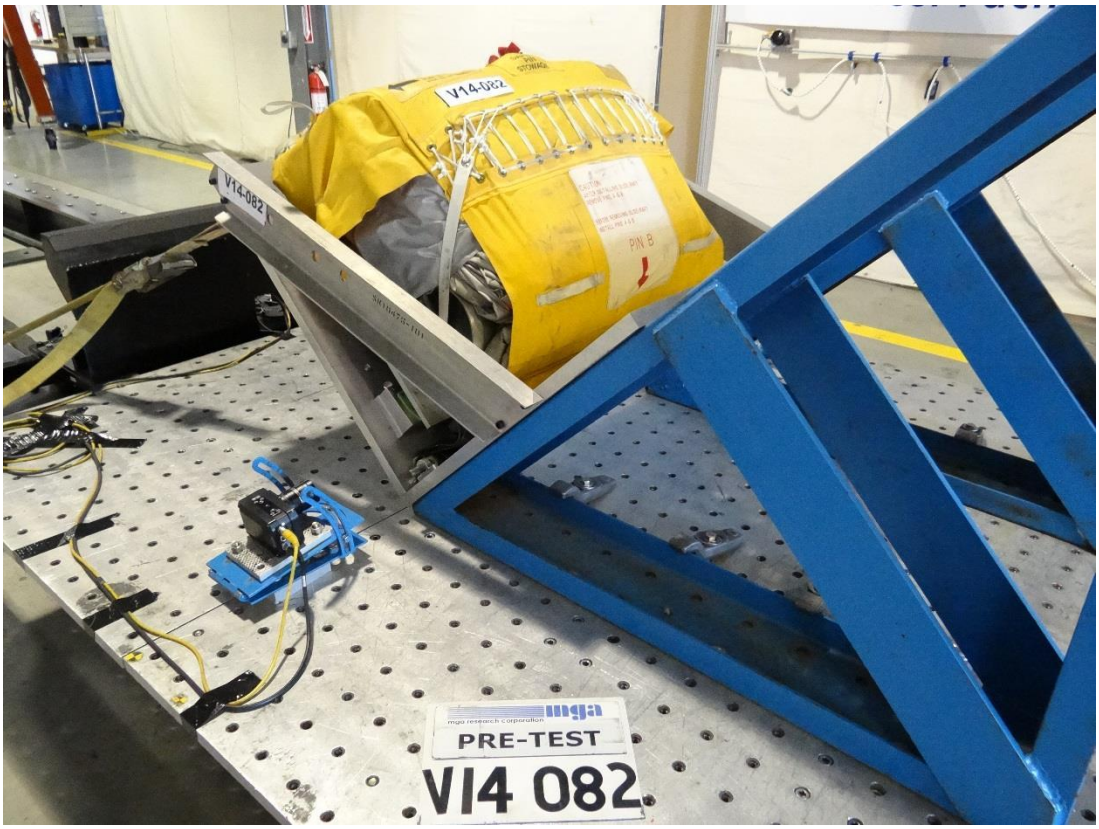
Pre Test Rear View



Pre Test Right Rear Angle View

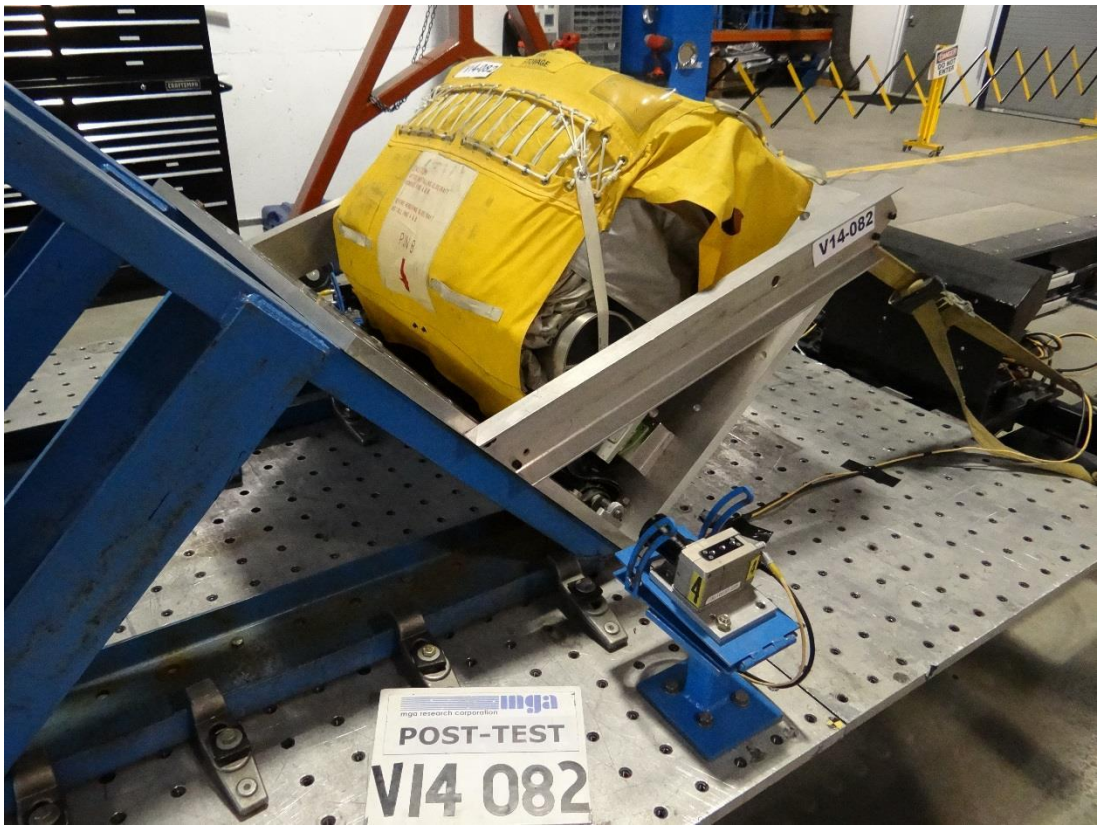


Pre Test Right Side View

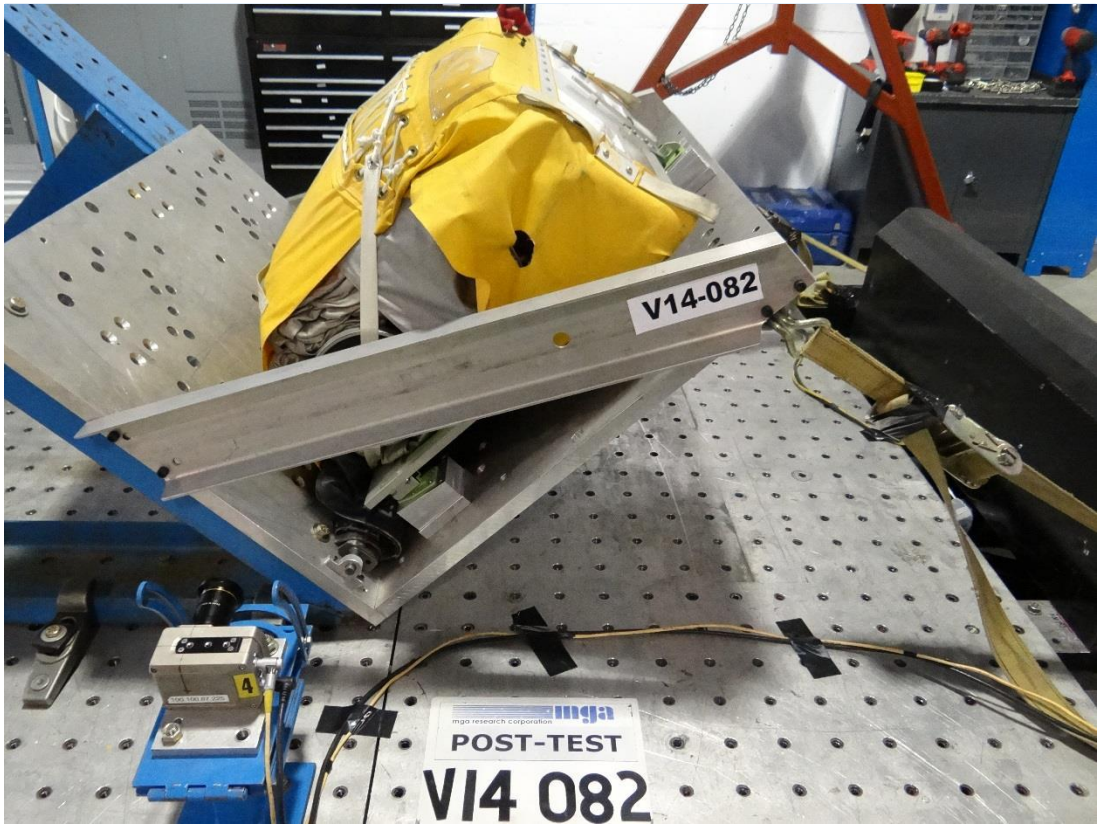


Pre Test Right Angle View

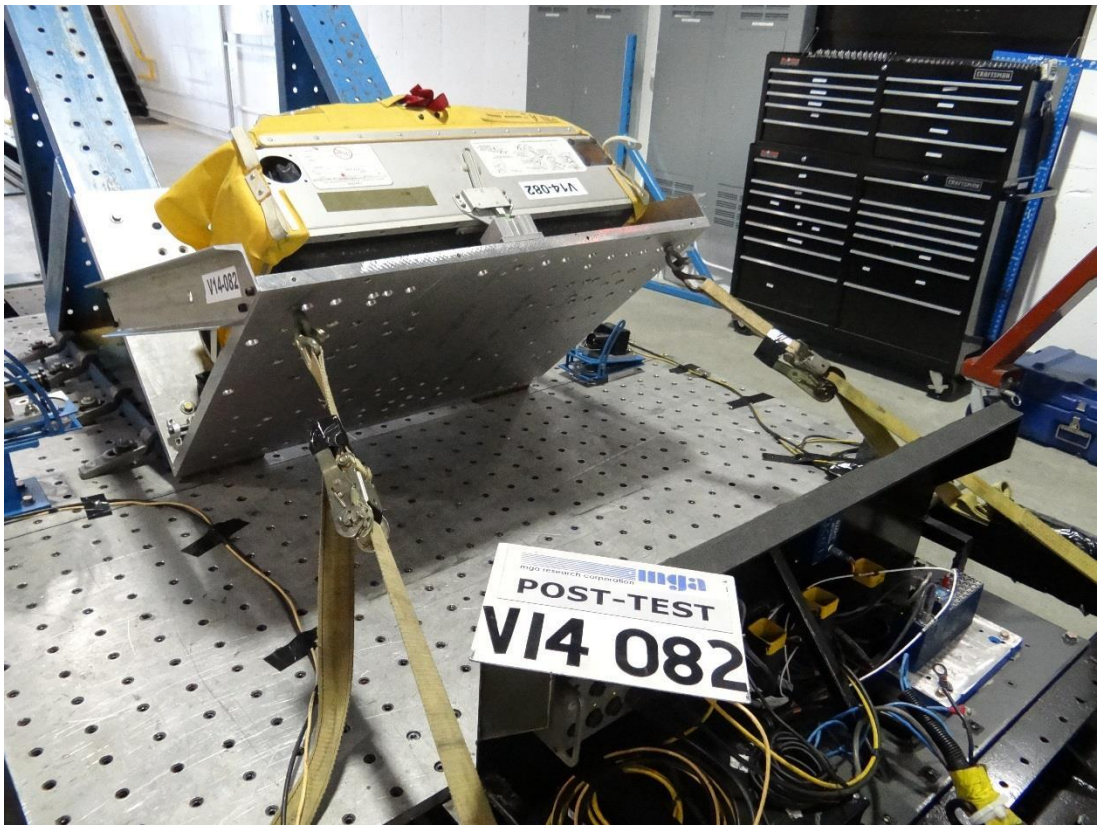
Post Test Front View



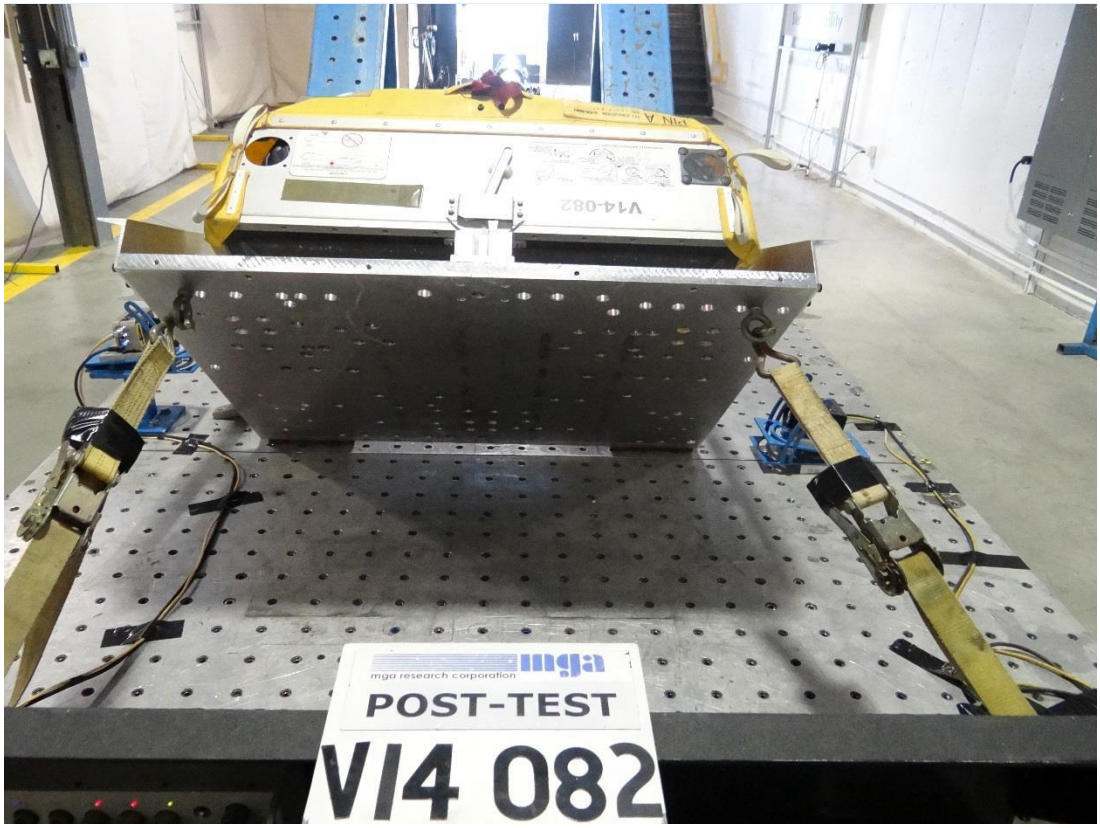
Post Test Left Angle View



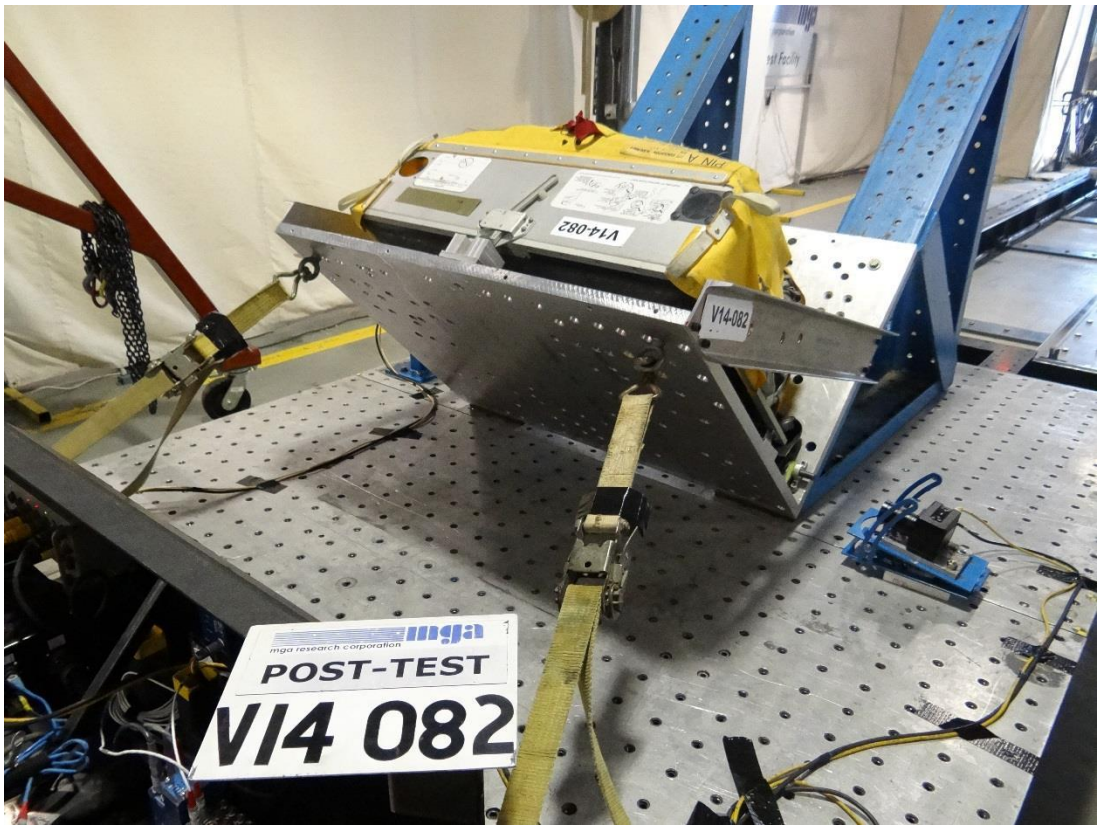
Post Test Left Side View



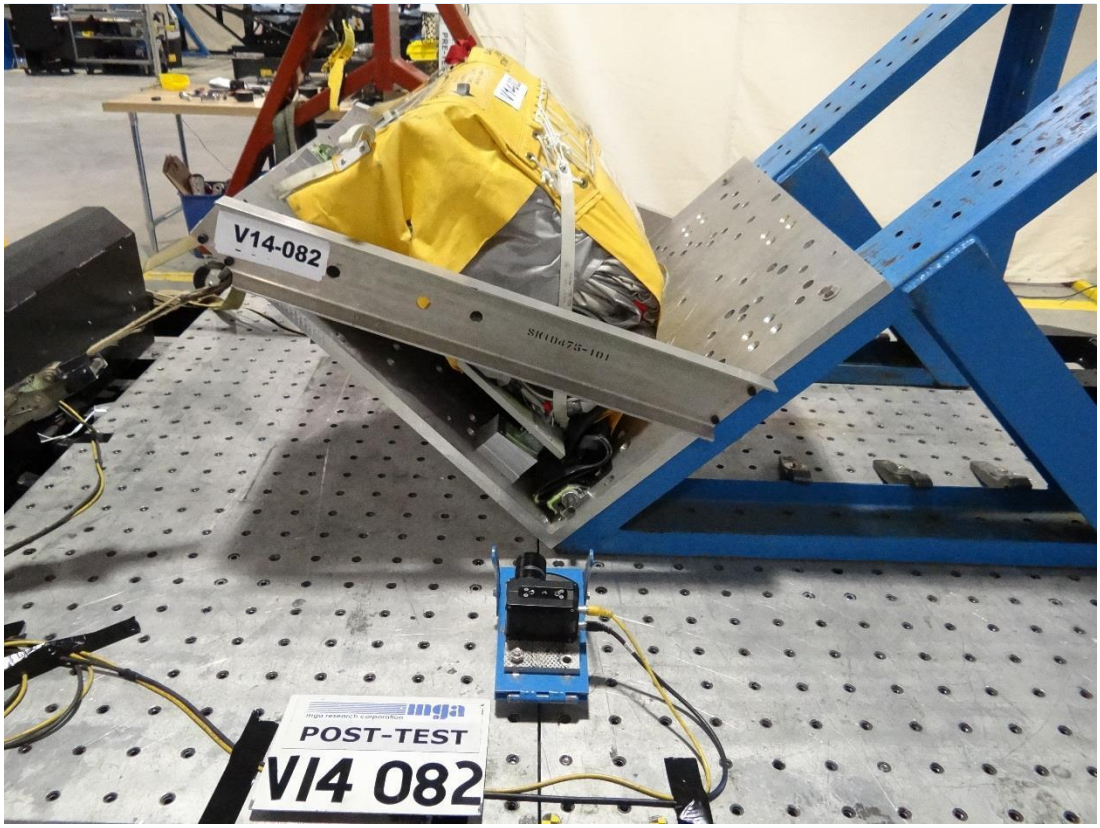
Post Test Left Rear Angle View



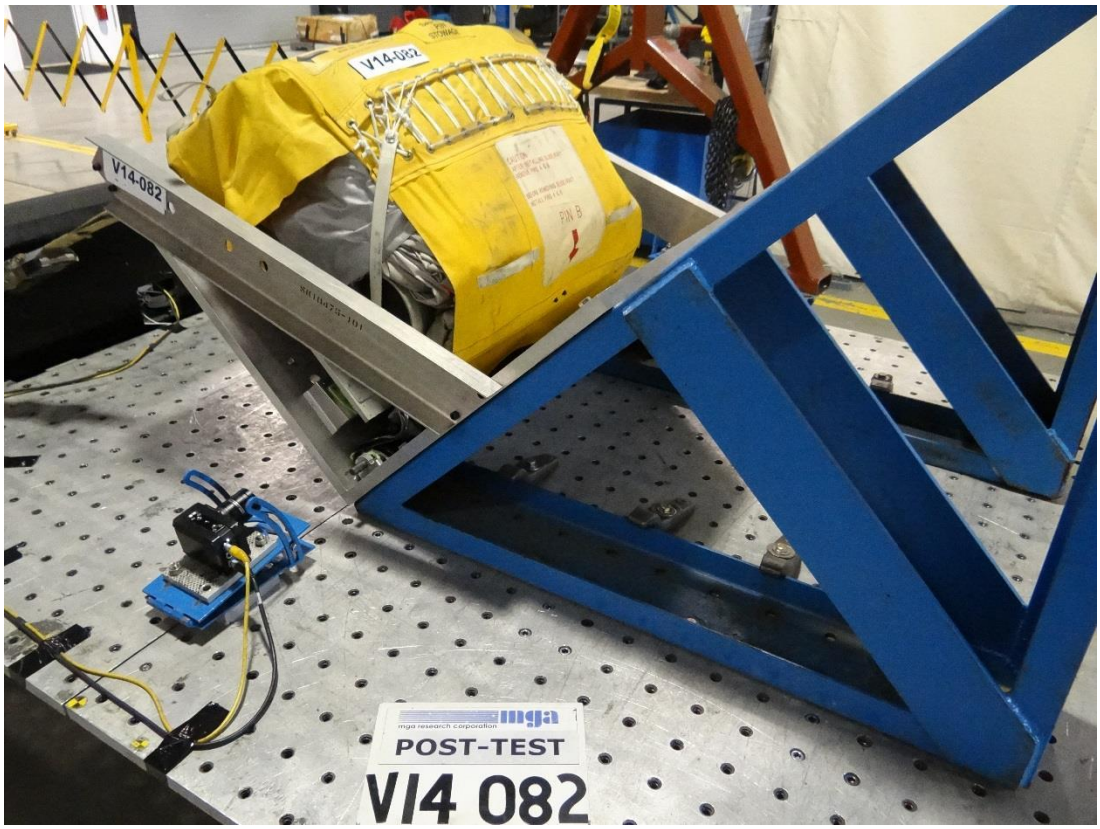
Post Test Rear View



Post Test Right Rear Angle View



Post Test Right Side View



Post Test Right Angle View

14g 45°Combined Load Test

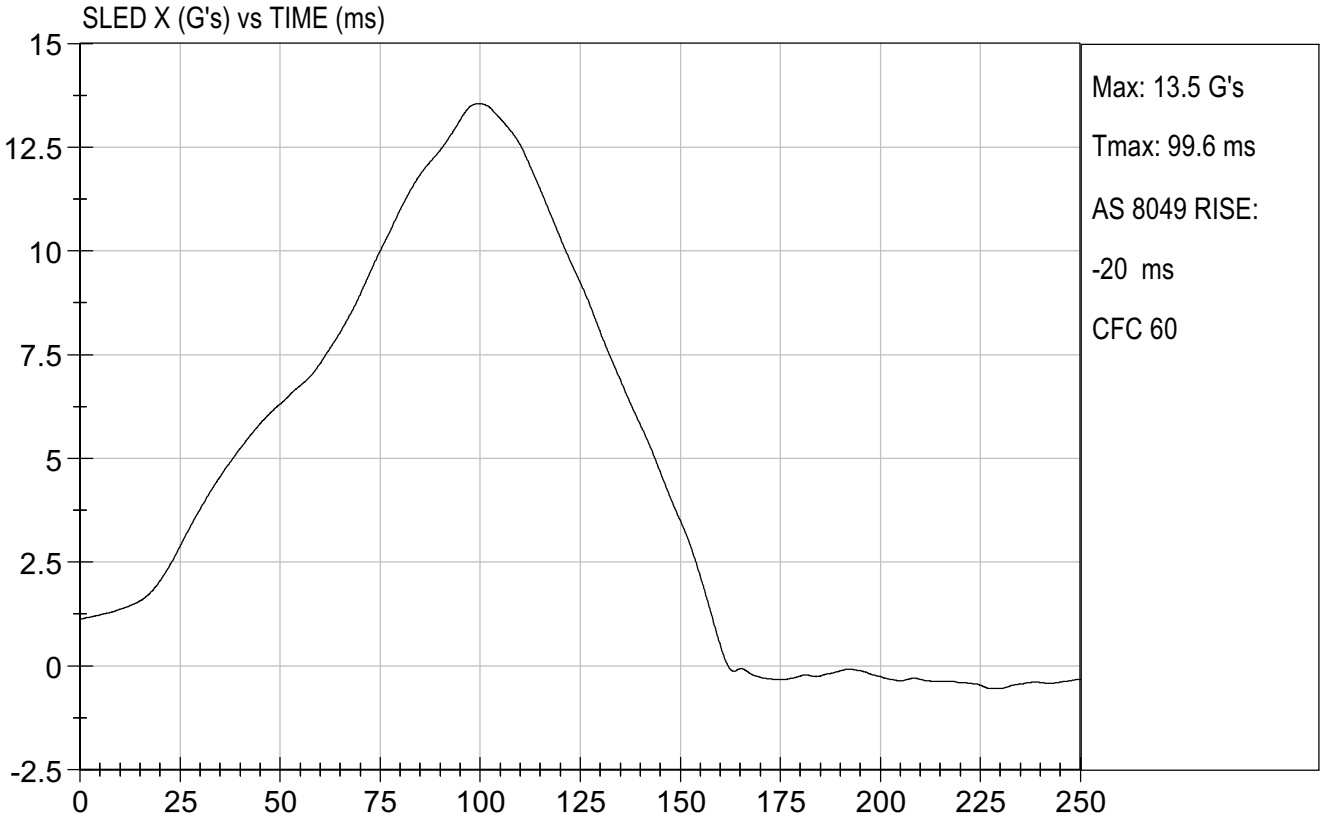
Test Information	
MGA Test Number	V14083
Test Date	01/22/2014
Run Number	3
Orientation	45° Combined

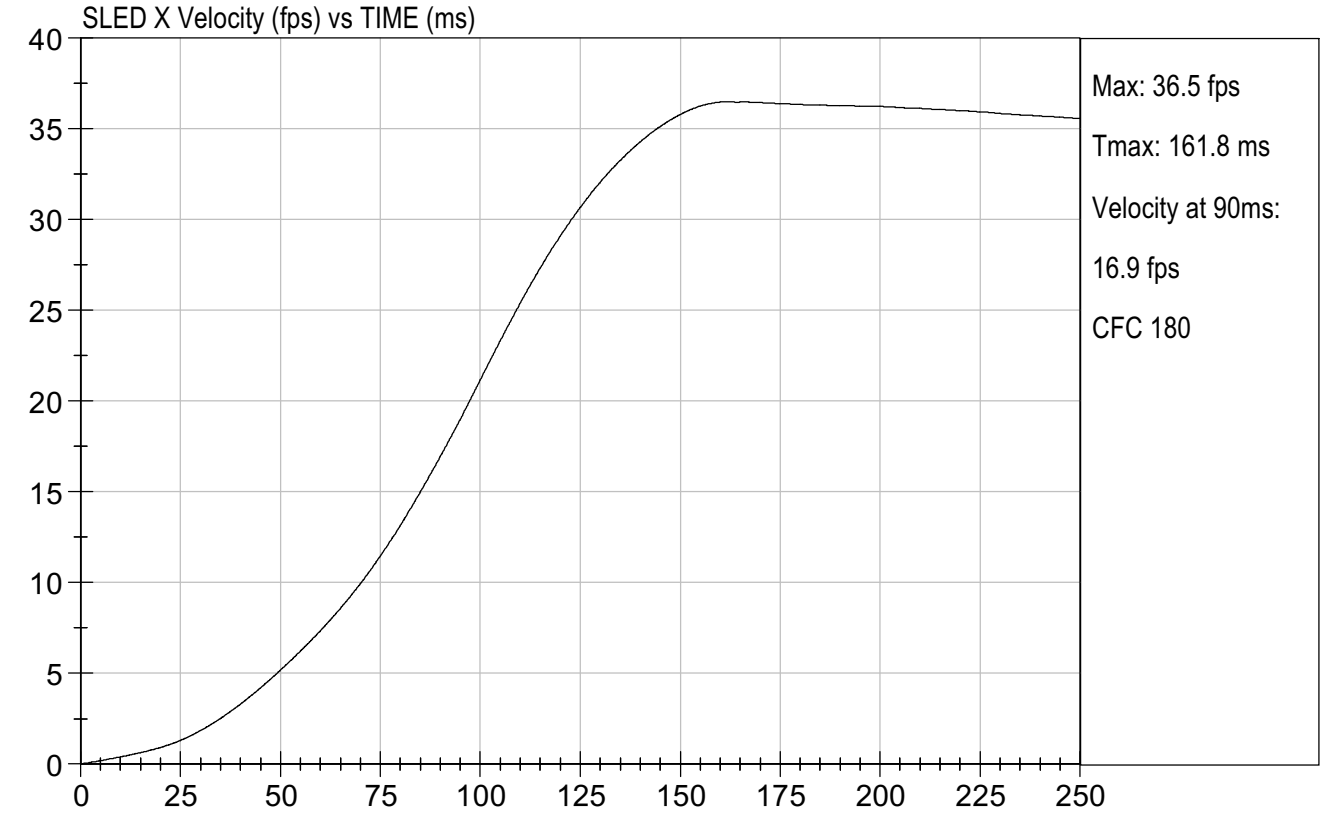
Test Sample Information	
Serial Number	0003
Part Number	65342-217
Weight	215.2 lbs

Results	
Max Acceleration (g)	13.5
Time of Max Acceleration (ms)	99.6
Damage	Yes
Time of Damage (ms)	90
Acceleration at Time of Damage (g)	12.4

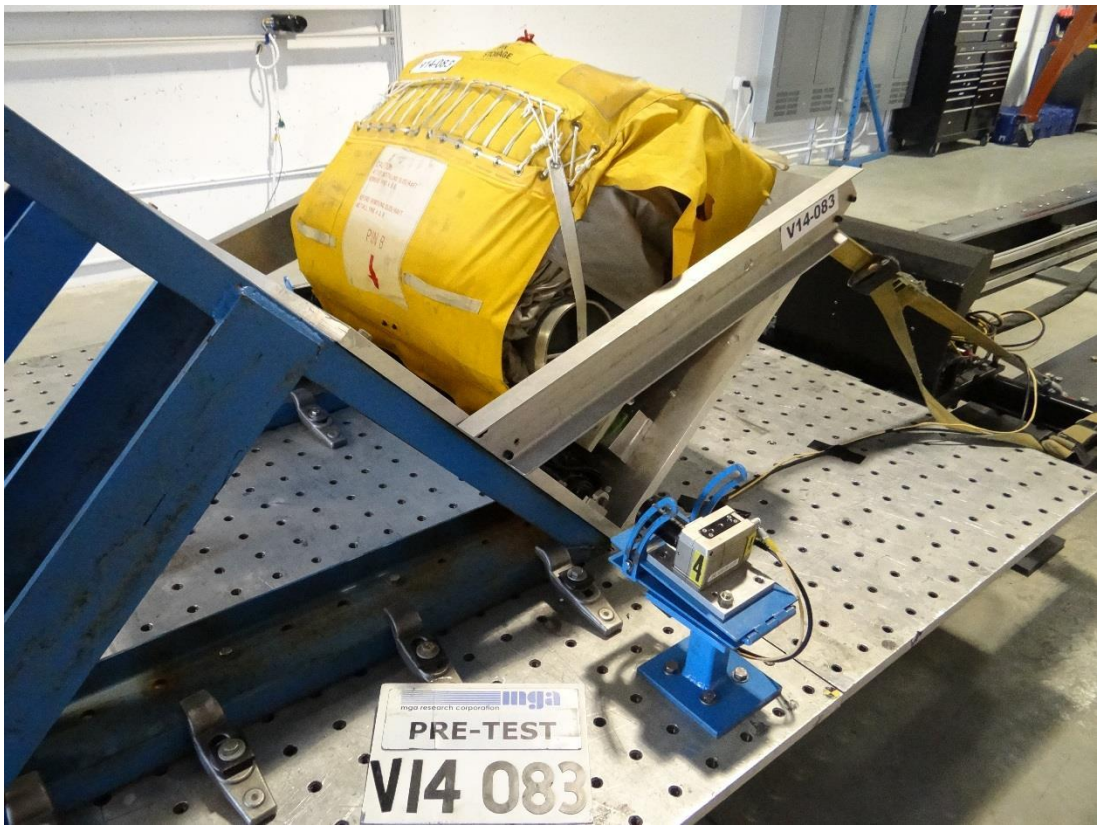
Comments:

(1) Pack released
(2) Tang tore through release shaft
(3) Release shaft rotated
(4) Right and left aspirator strap released
(5) Witness marks seen on inside surface of pin shields
(6) Release cable ball ends were intact and the cables were curved with a permanent set

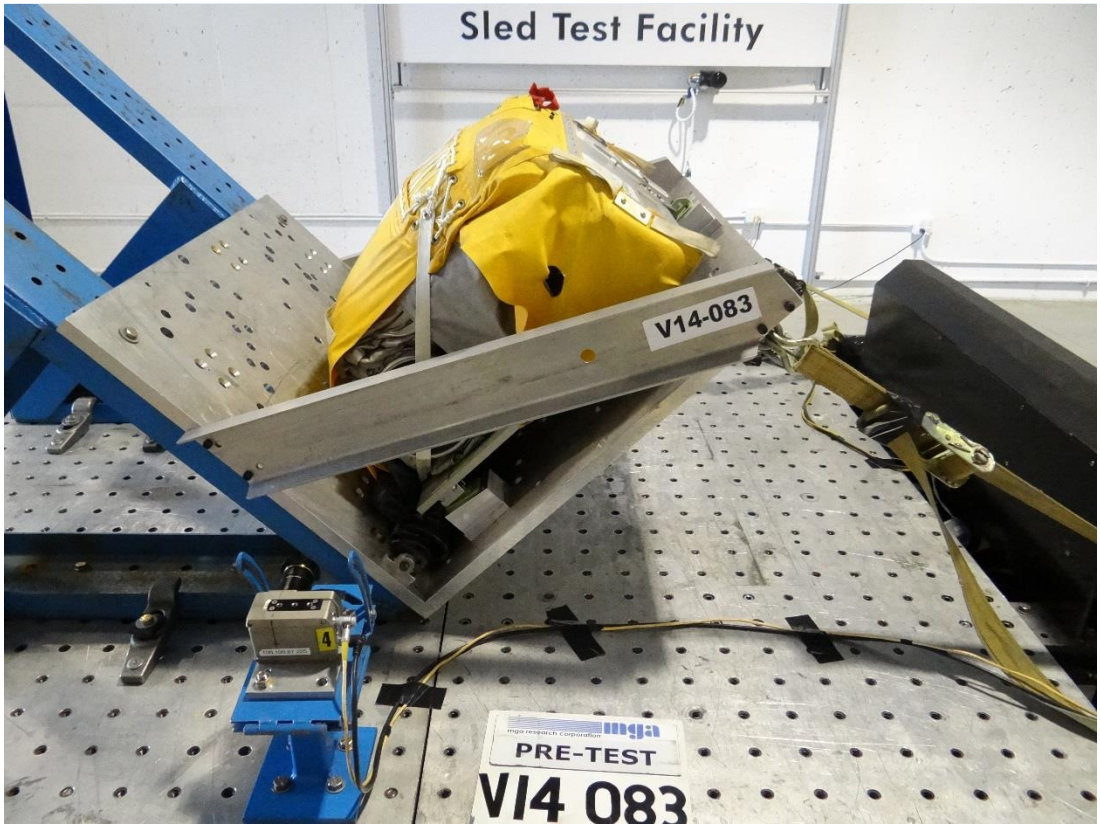

SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 13.5 G's
Tmax: 99.6 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 36.5 fps
Tmax: 161.8 ms
Velocity at 90ms:
16.9 fps
CFC 180

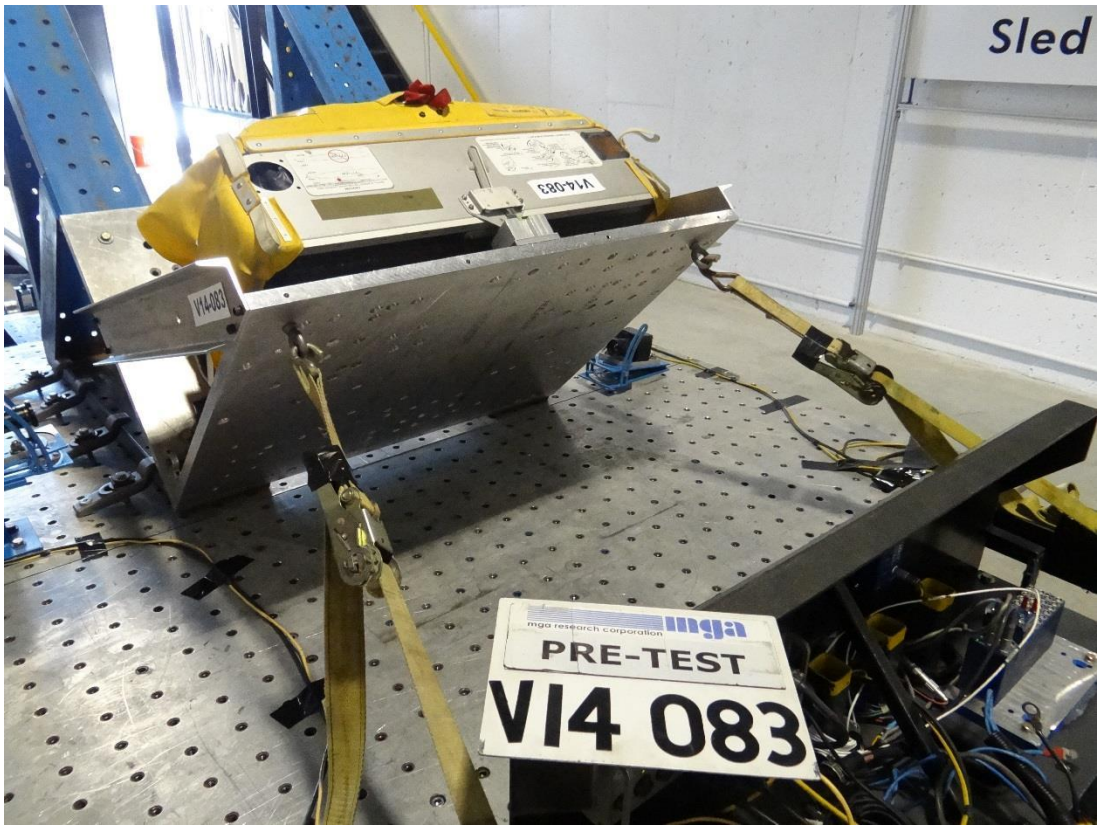
Pre Test Front View



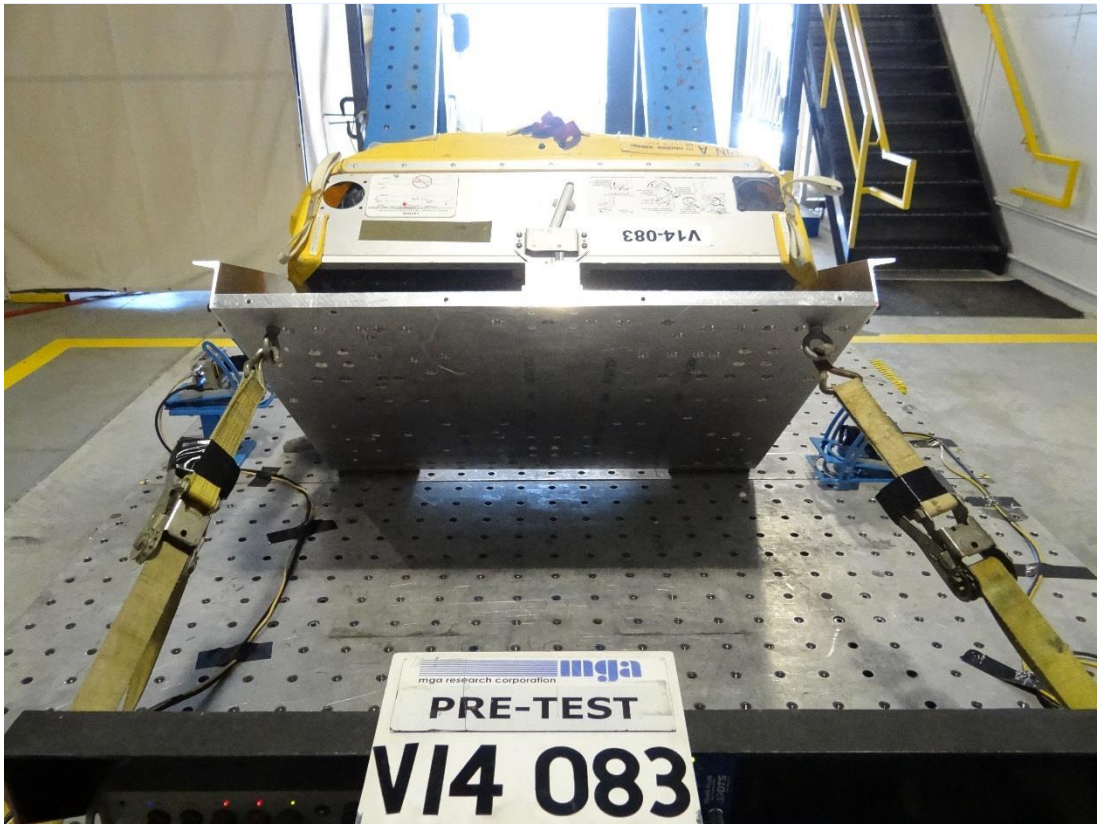
Pre Test Left Angle View



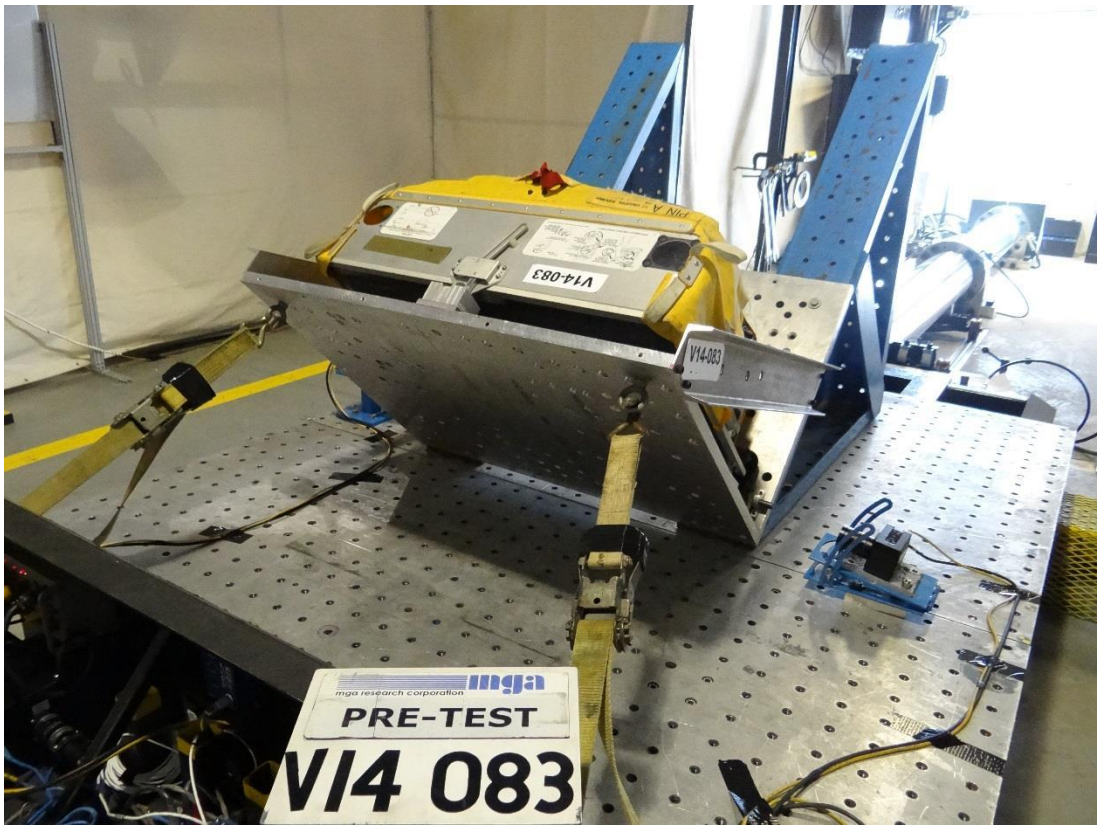
Pre Test Left Side View



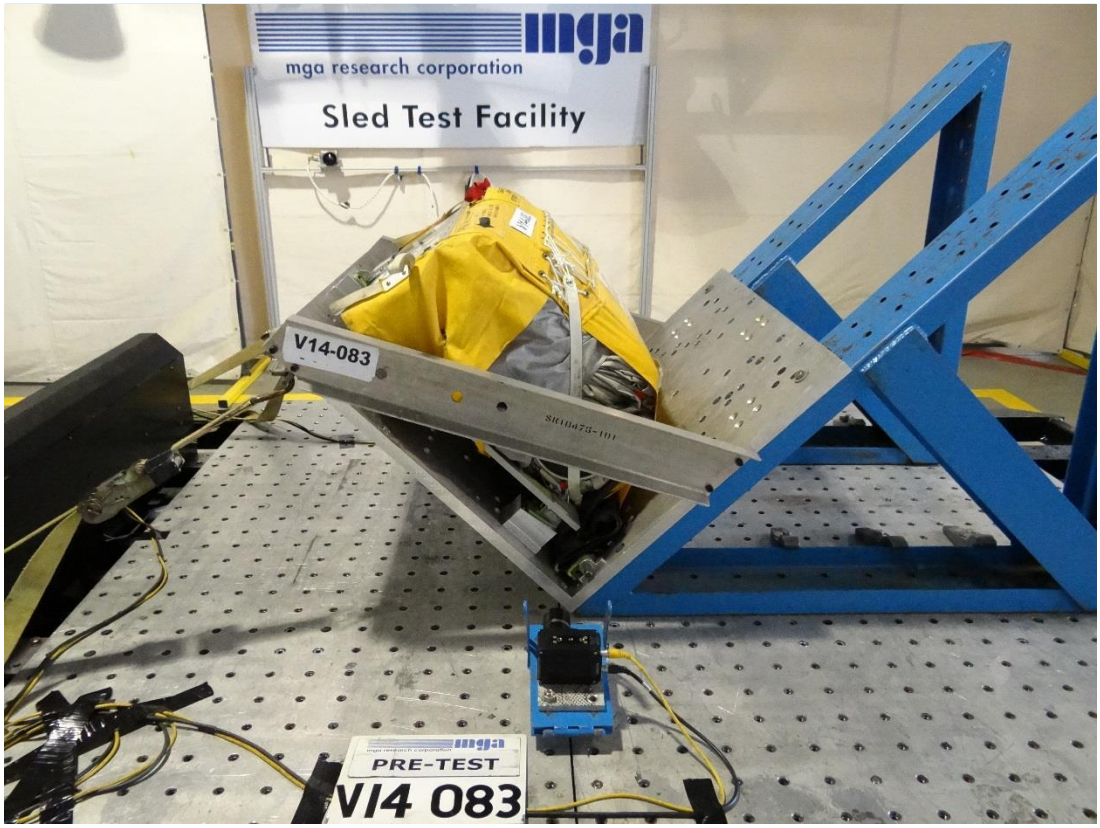
Pre Test Left Rear Angle



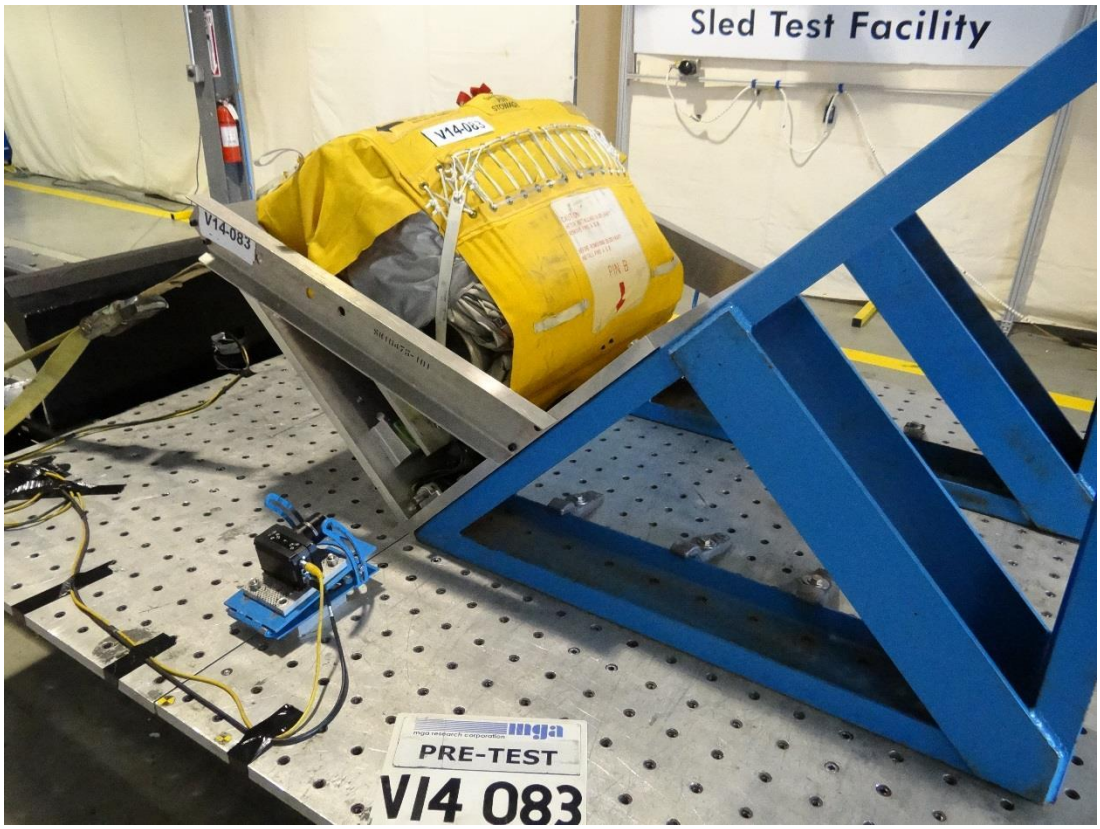
Pre Test Rear View



Pre Test Right Rear Angle View

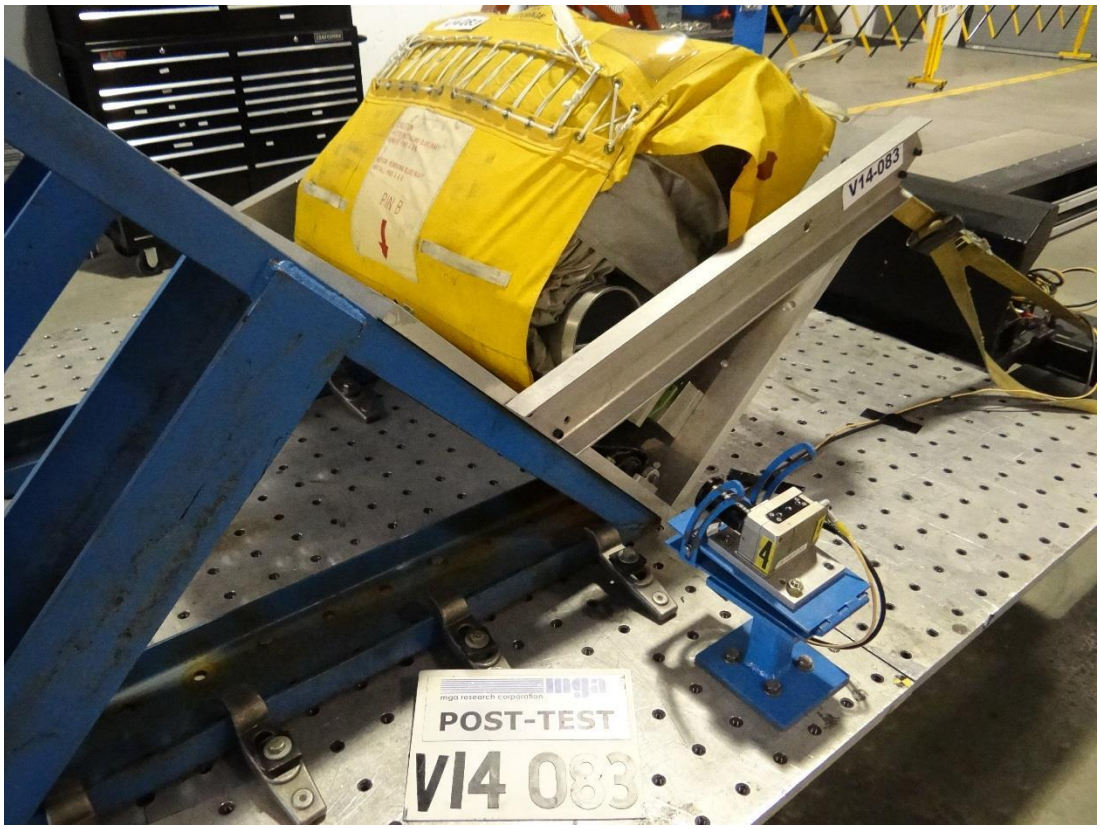


Pre Test Right Side View

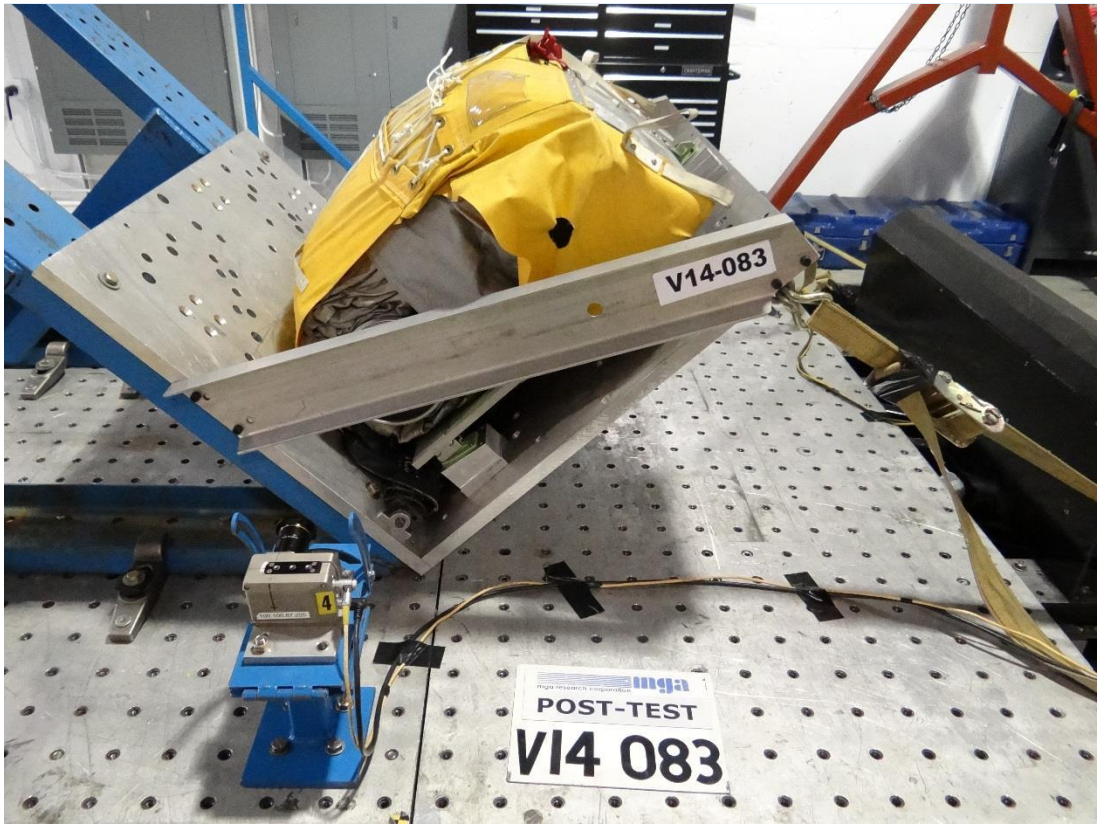


Pre Test Right Angle View

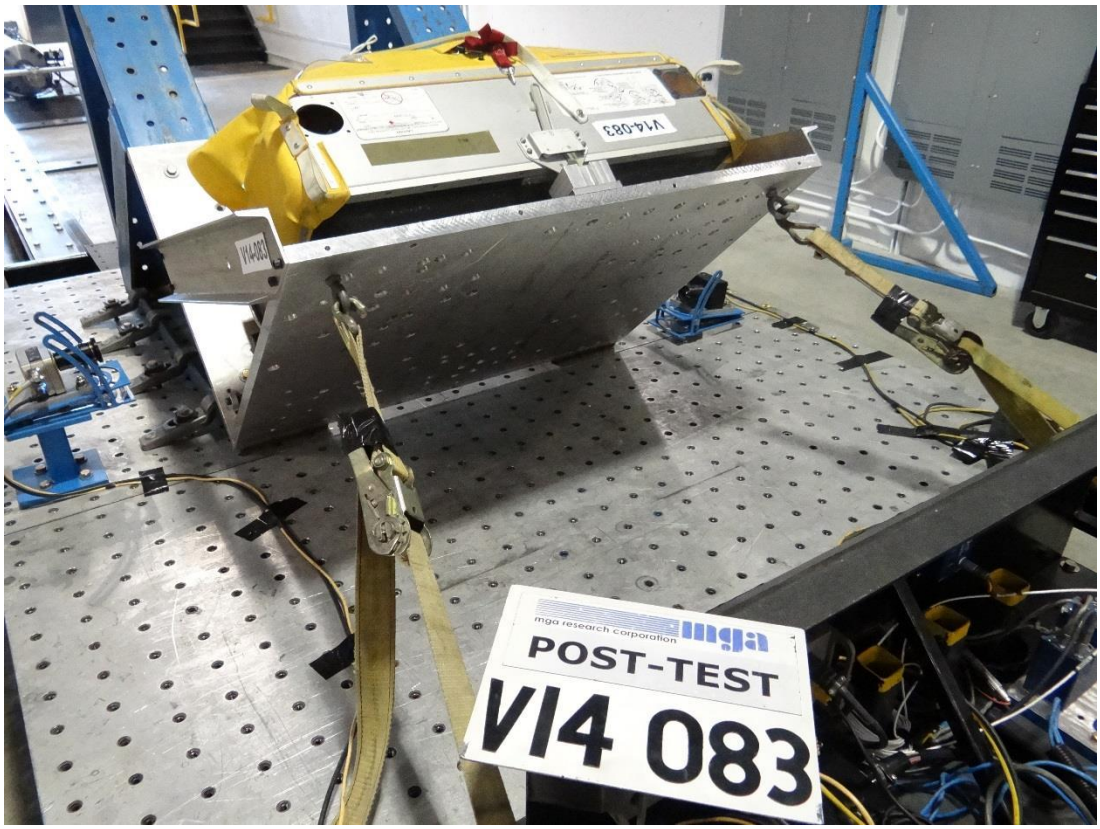
Post Test Front View



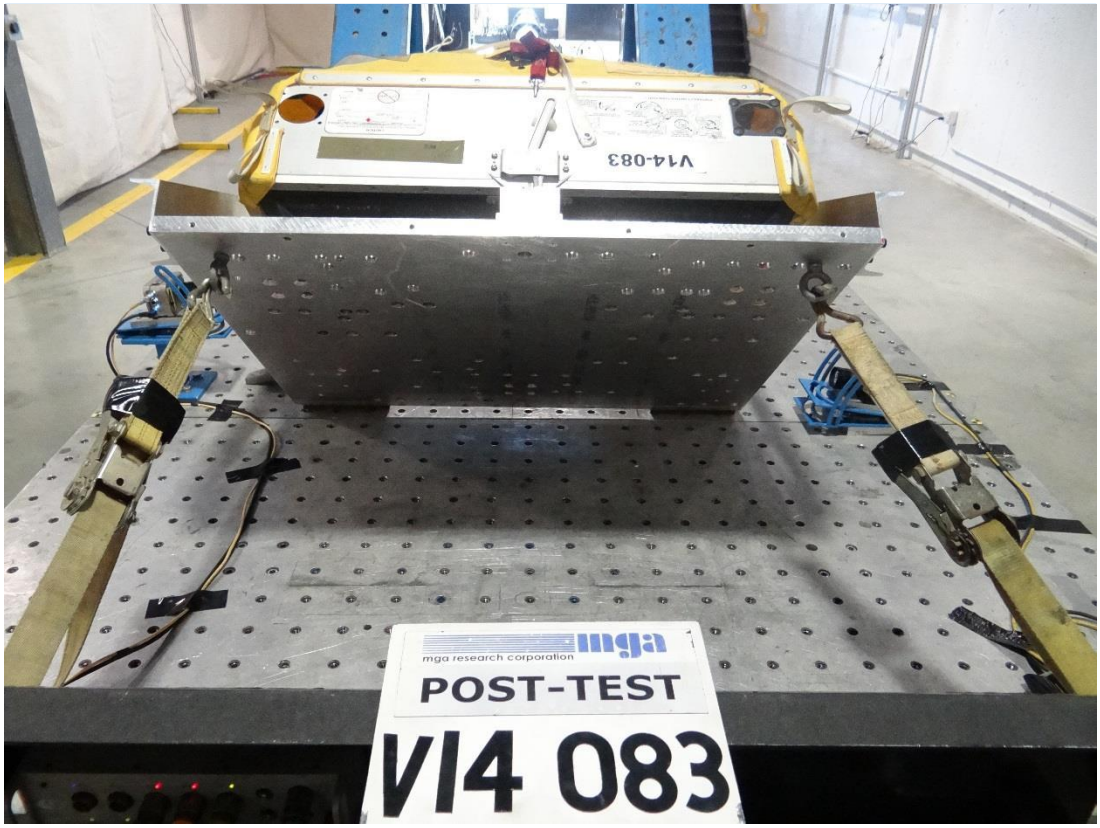
Post Test Left Angle View



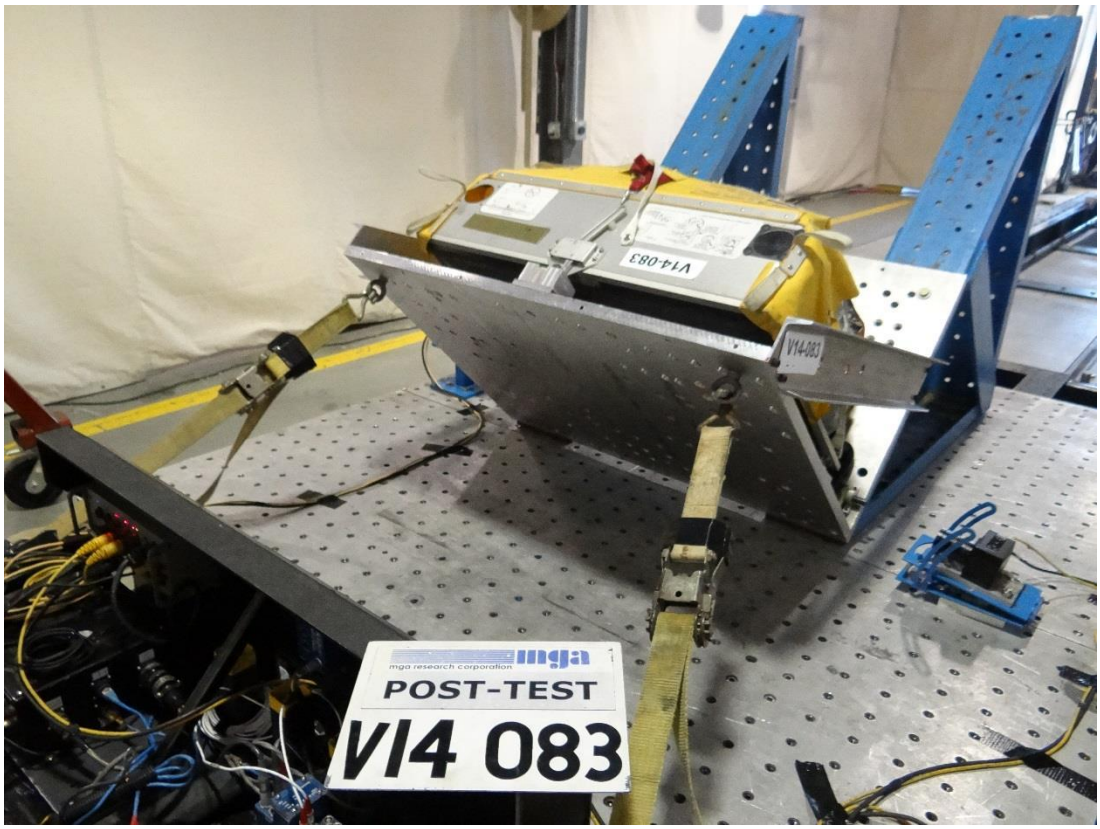
Post Test Left Side View



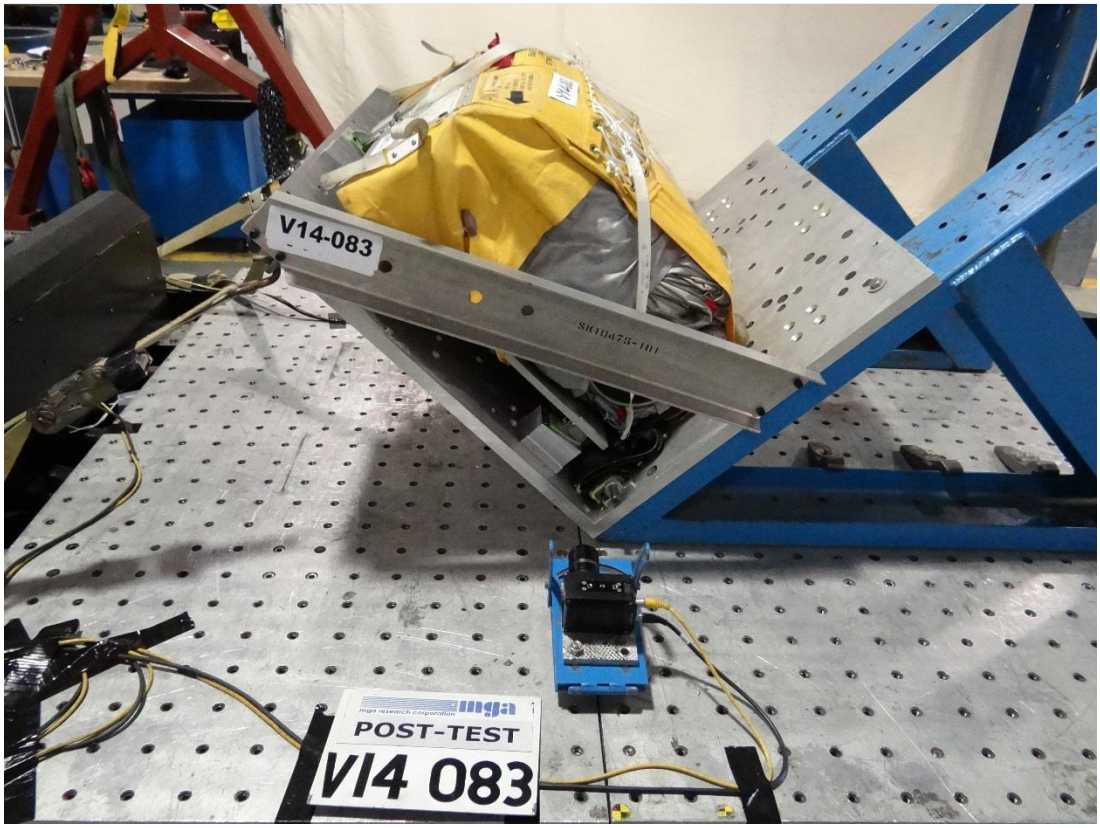
Post Test Left Rear Angle View



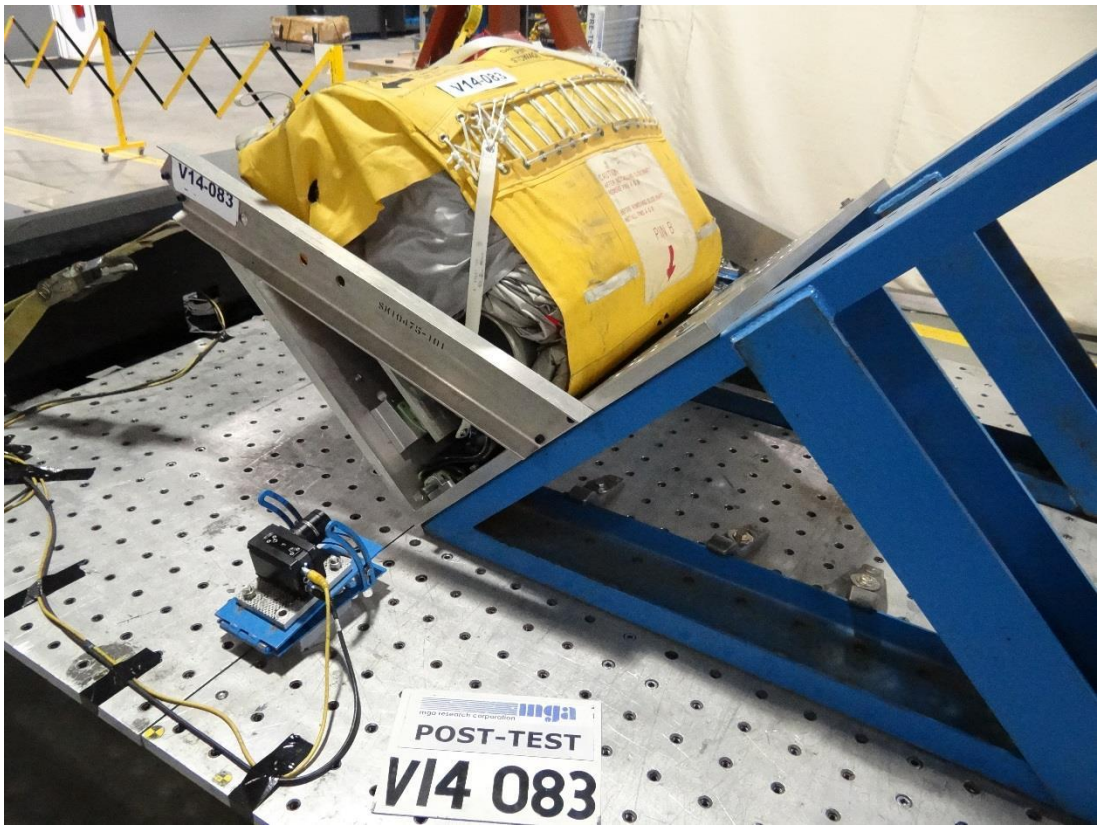
Post Test Rear View



Post Test Right Rear Angle View

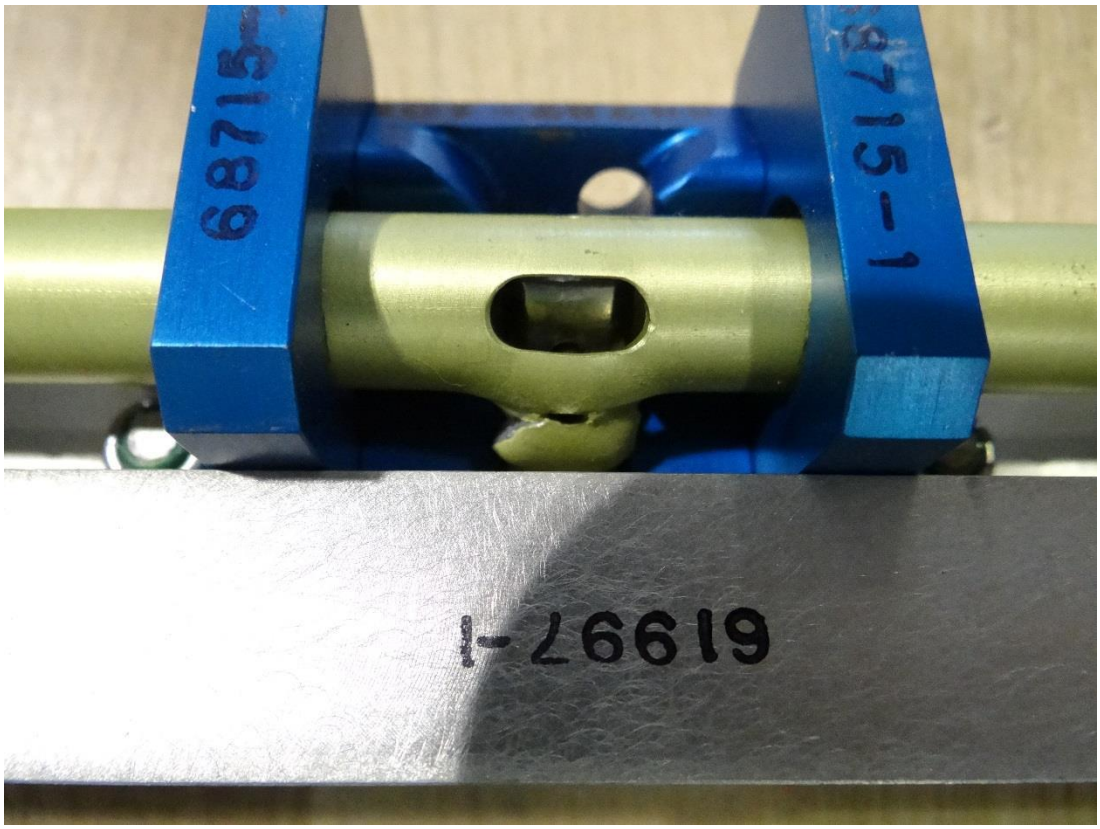


Post Test Right Side View



Post Test Right Angle View

Detail View



Detail View

14g 45°Combined Load Test

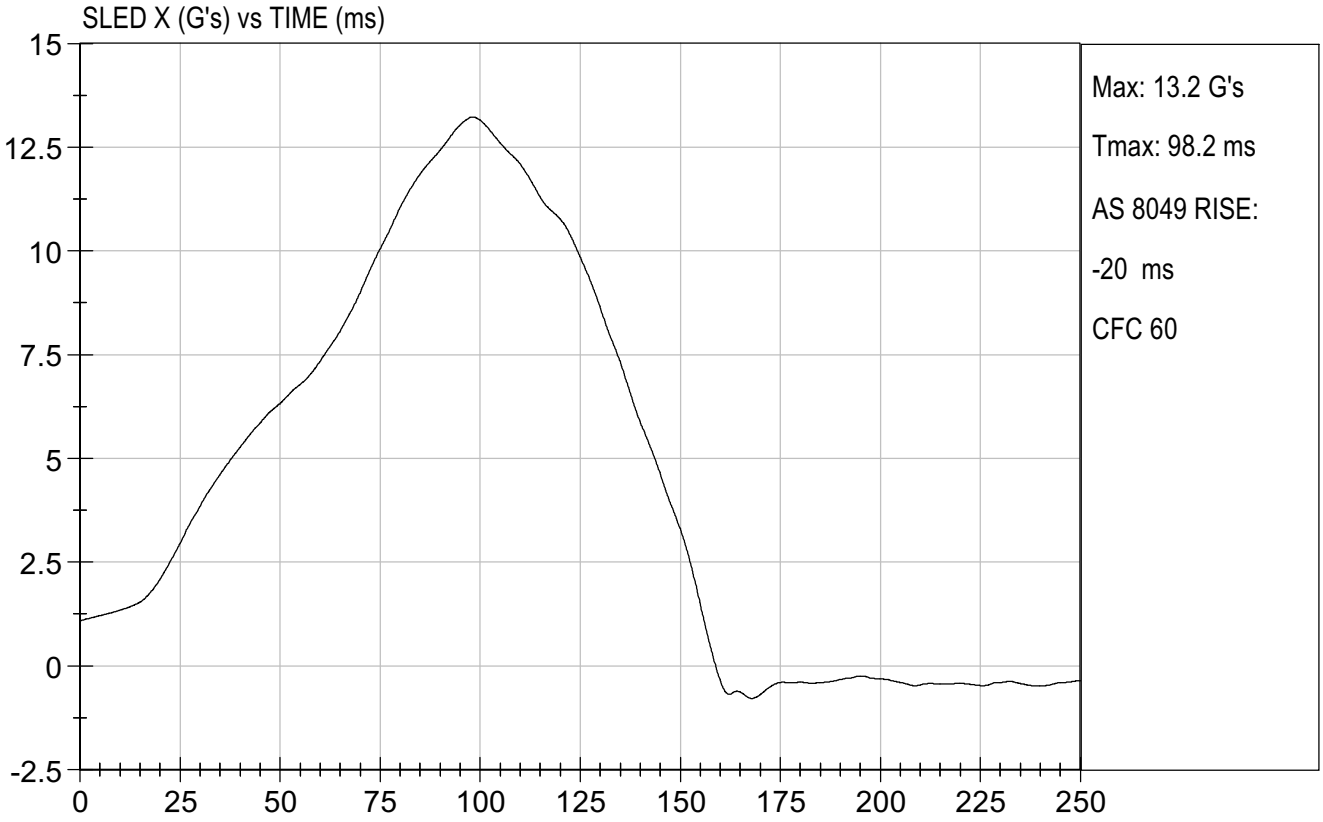
Test Information	
MGA Test Number	V14084
Test Date	01/22/2014
Run Number	1
Orientation	45° Combined

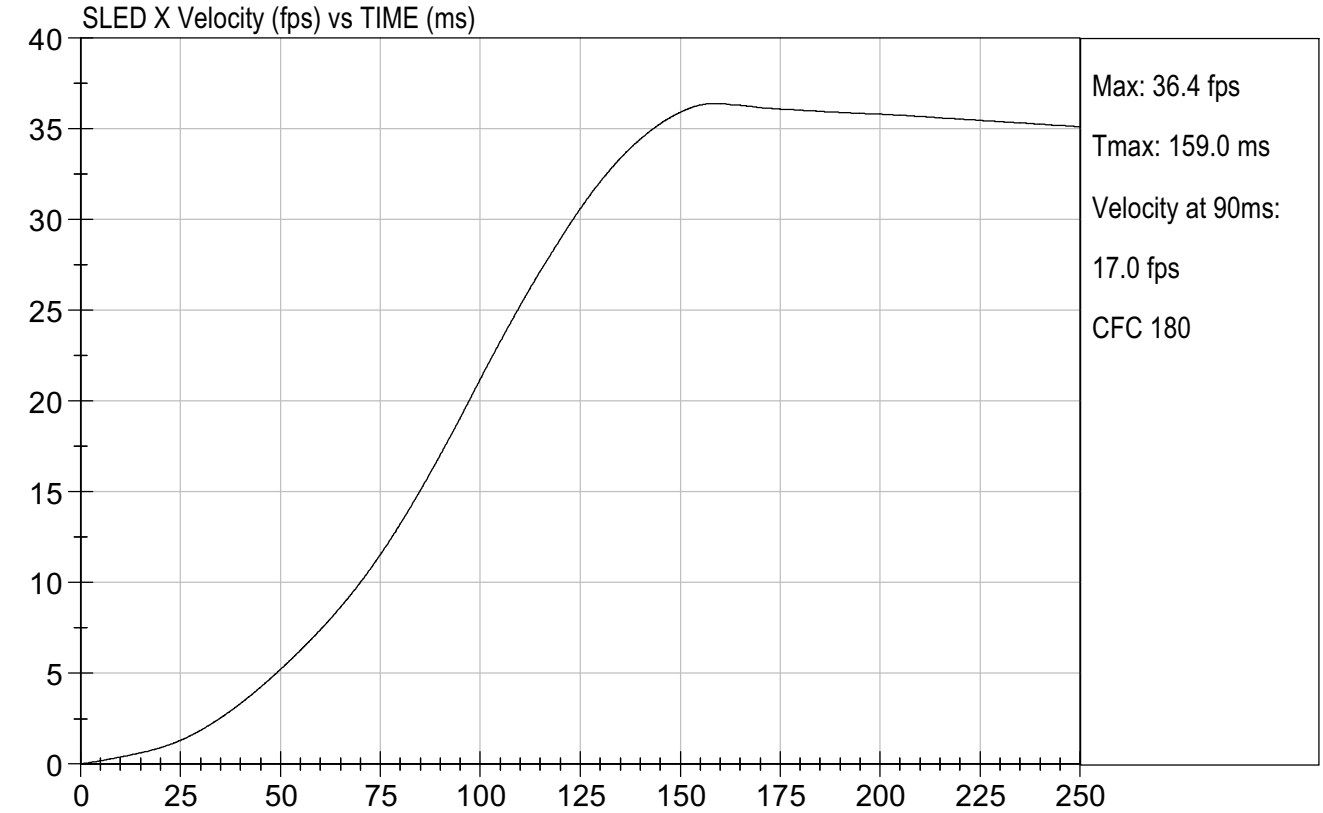
Test Sample Information	
Serial Number	0006
Part Number	62772-201
Weight	211.0 lbs

Results	
Max Acceleration (g)	13.2
Time of Max Acceleration (ms)	98.2
Damage	Yes
Time of Damage (ms)	94-105
Acceleration at Time of Damage (g)	12.9-12.6

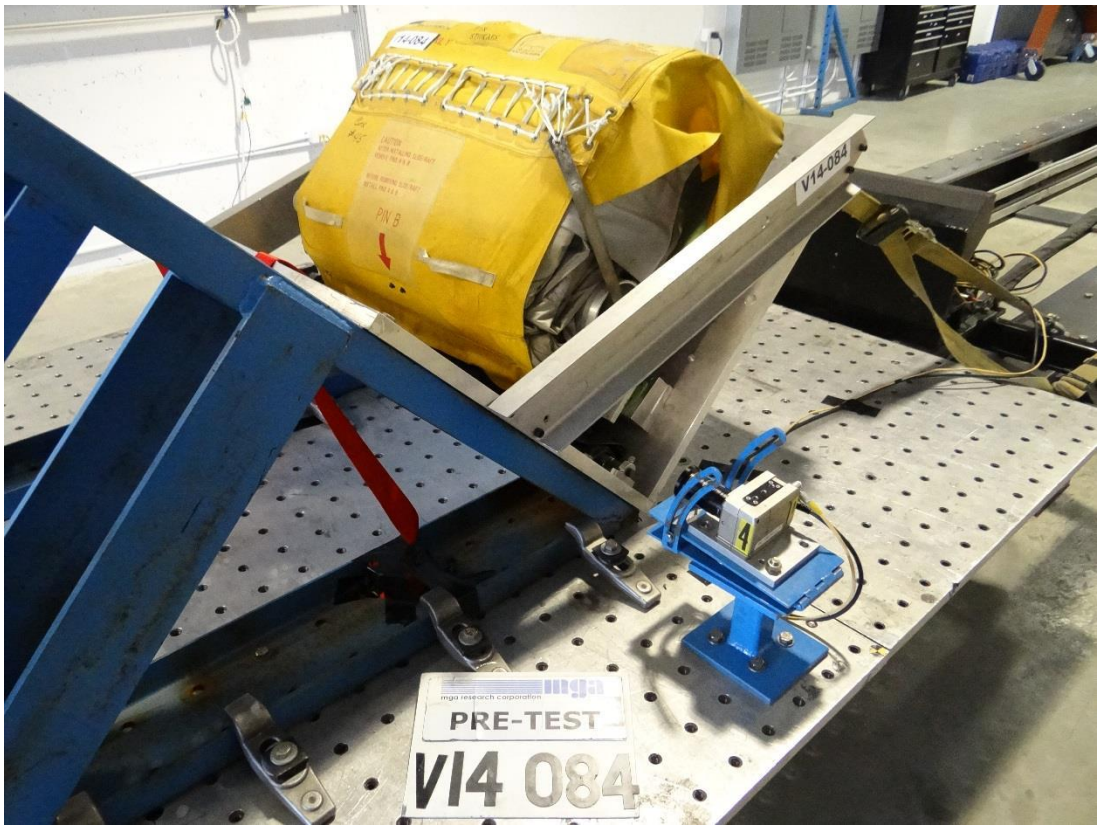
Comments:

(1) Pack released
(2) Tang tore through release shaft
(3) Release shaft rotated
(4) Right and left aspirator straps released
(5) Witness marks seen on inside surface of pin shields
(6) Release cable ball ends were intact and the cables were curved with a permanent set

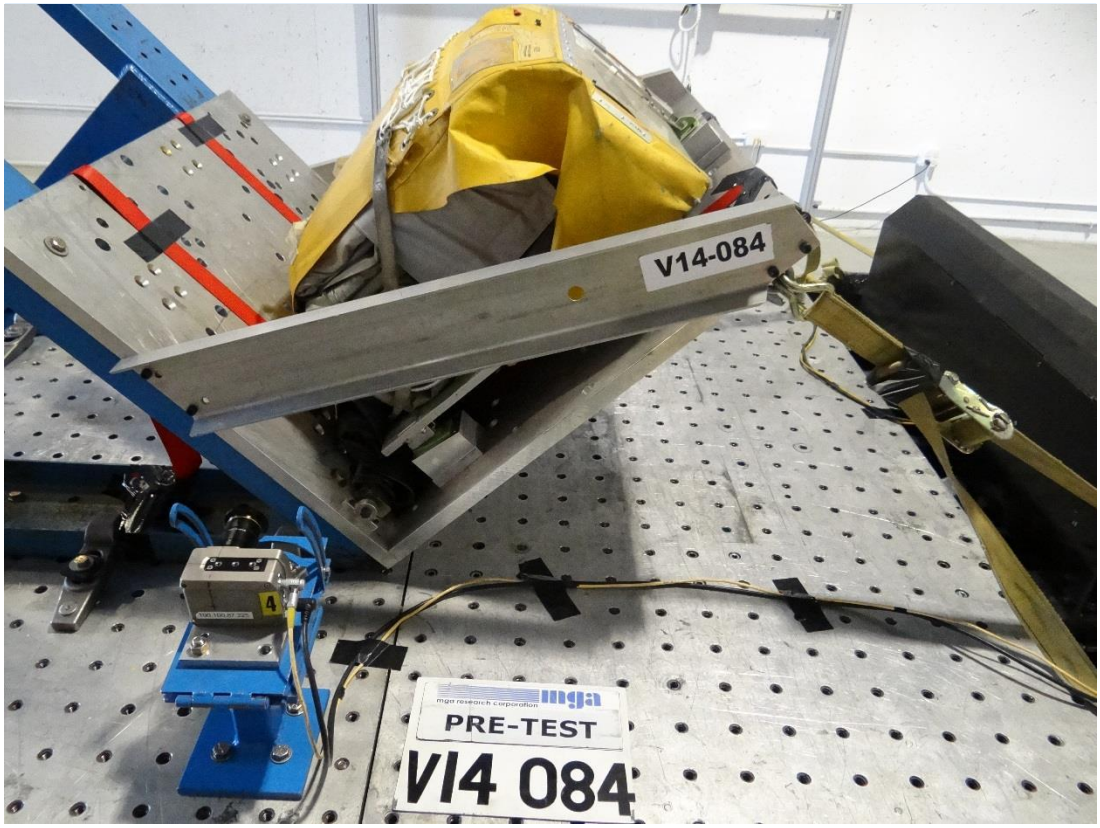

SLED X (G's) vs TIME (ms)
15
12.5
10
7.5
5
2.5
0
-2.5
0
25
50
75
100
125
150
175
200
225
250
Max: 13.2 G's
Tmax: 98.2 ms
AS 8049 RISE:
-20 ms
CFC 60


SLED X Velocity (fps) vs TIME (ms)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200
225
250
Max: 36.4 fps
Tmax: 159.0 ms
Velocity at 90ms:
17.0 fps
CFC 180

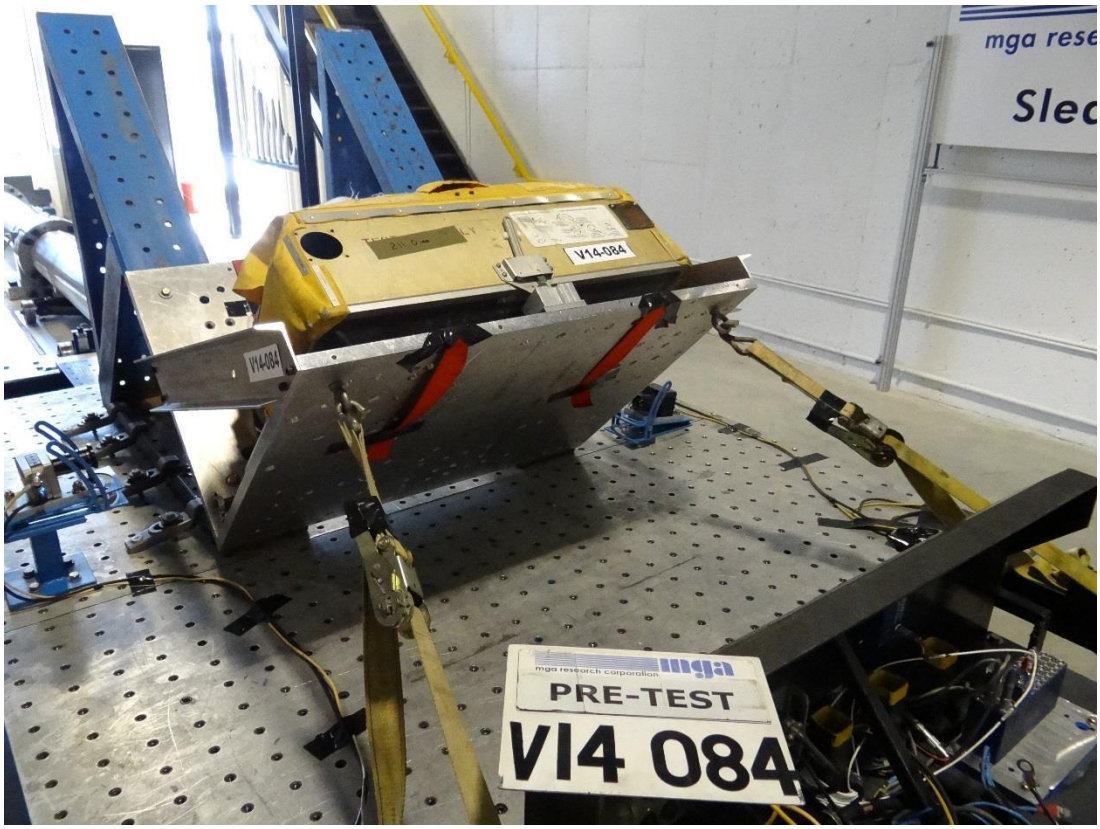
Pre Test Front View



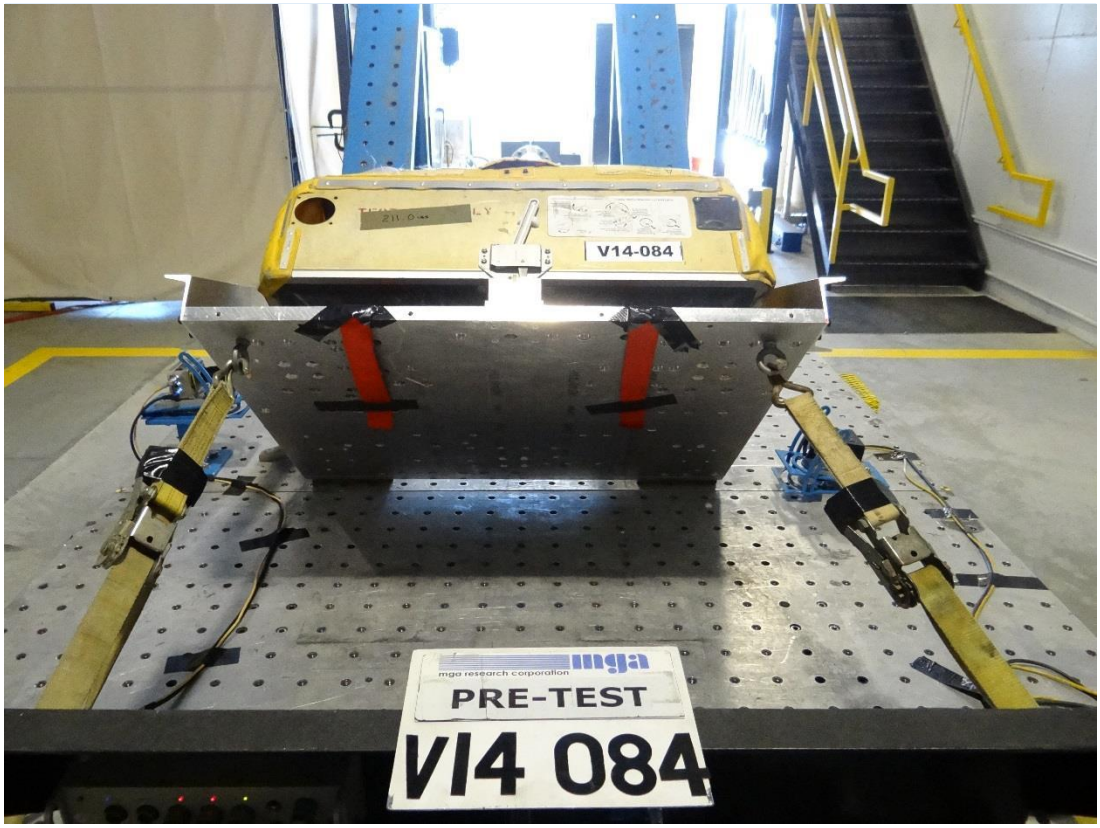
Pre Test Left Angle View



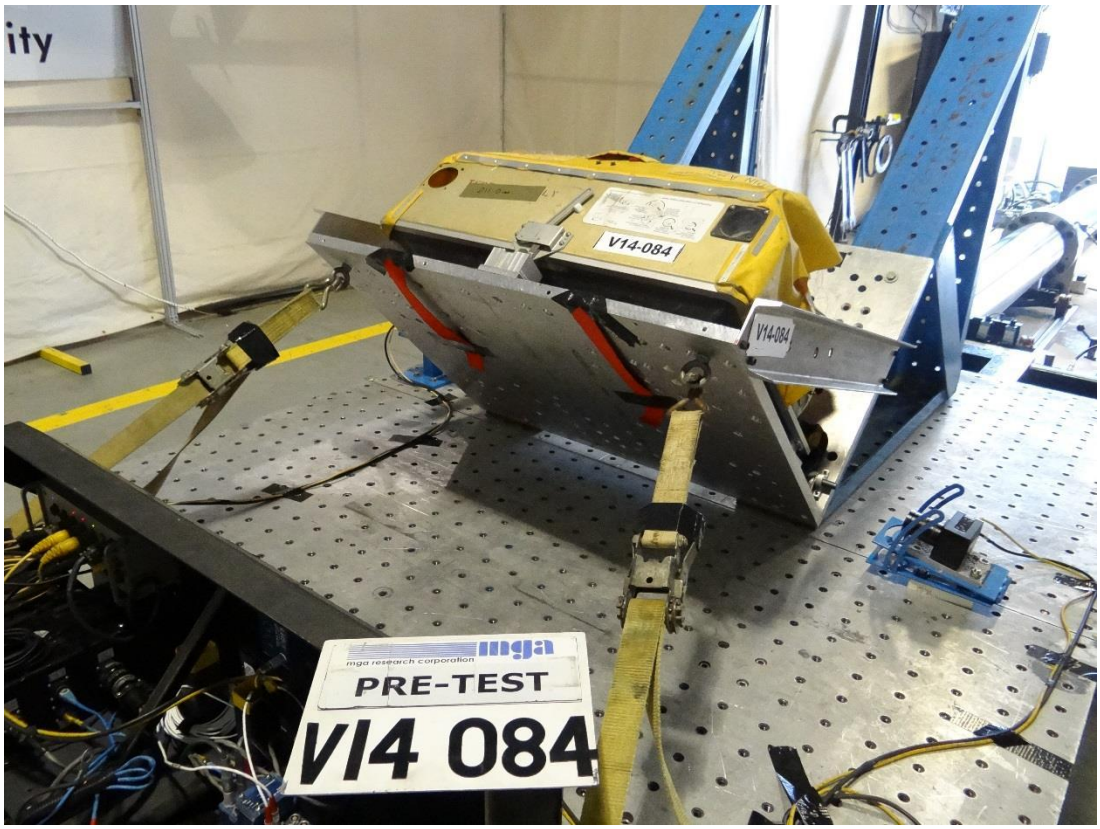
Pre Test Left Side View



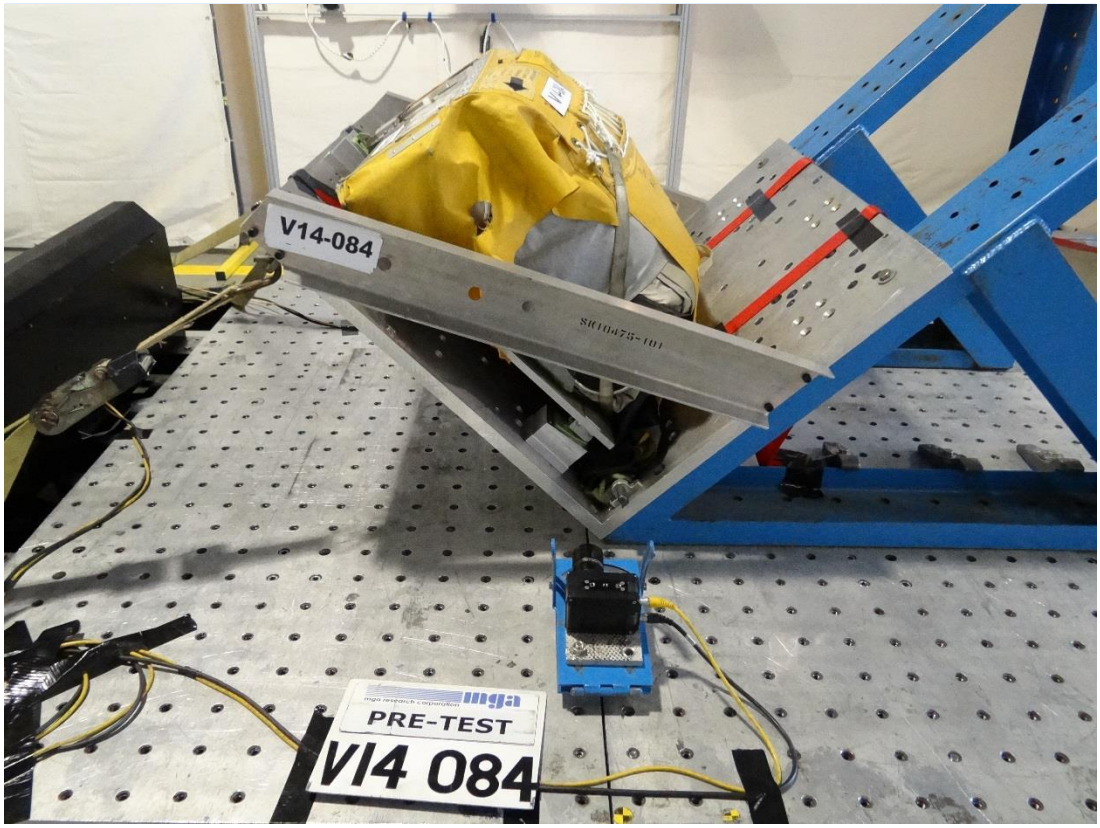
Pre Test Right Rear Angle



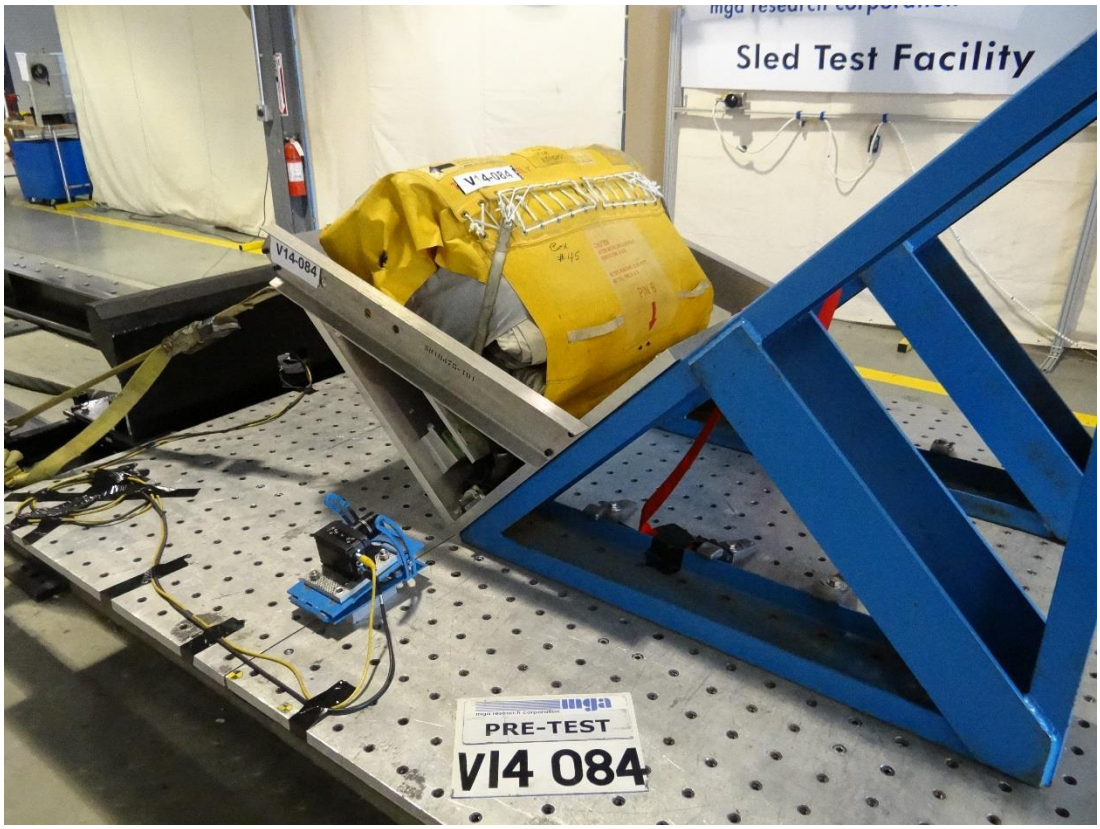
Pre Test Rear View



Pre Test Right Rear Angle View



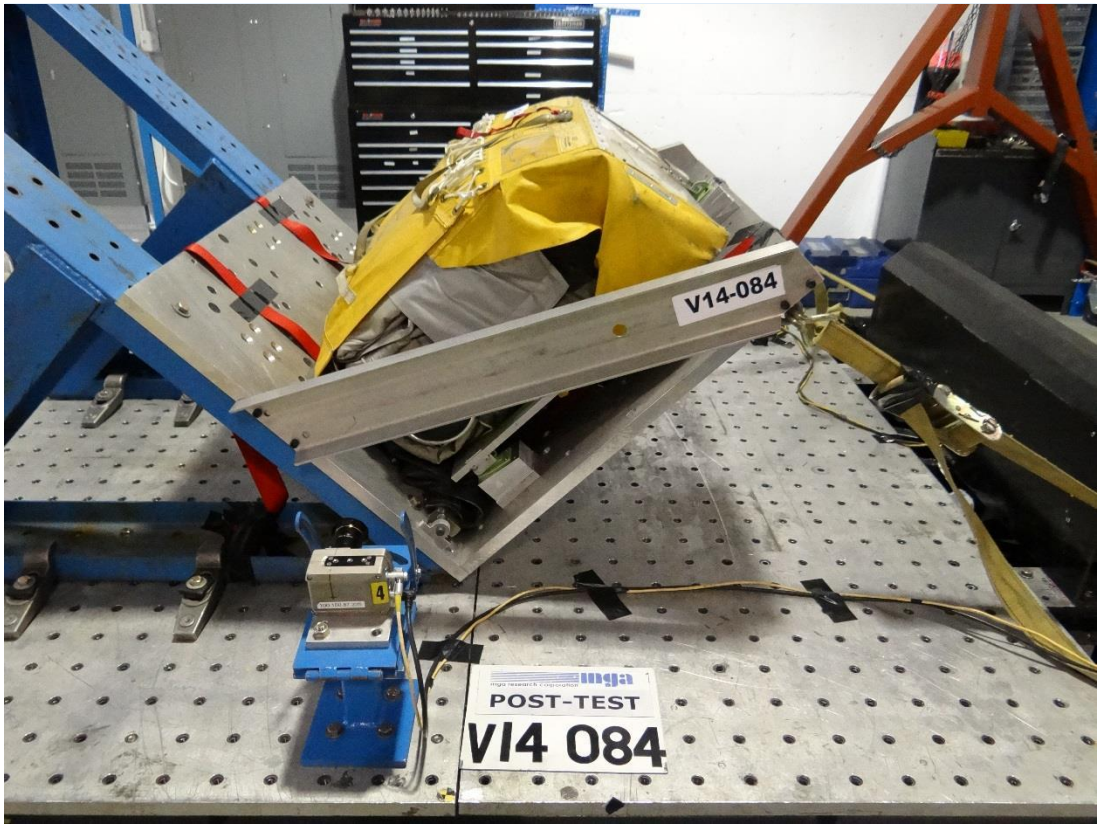
Pre Test Right Side View



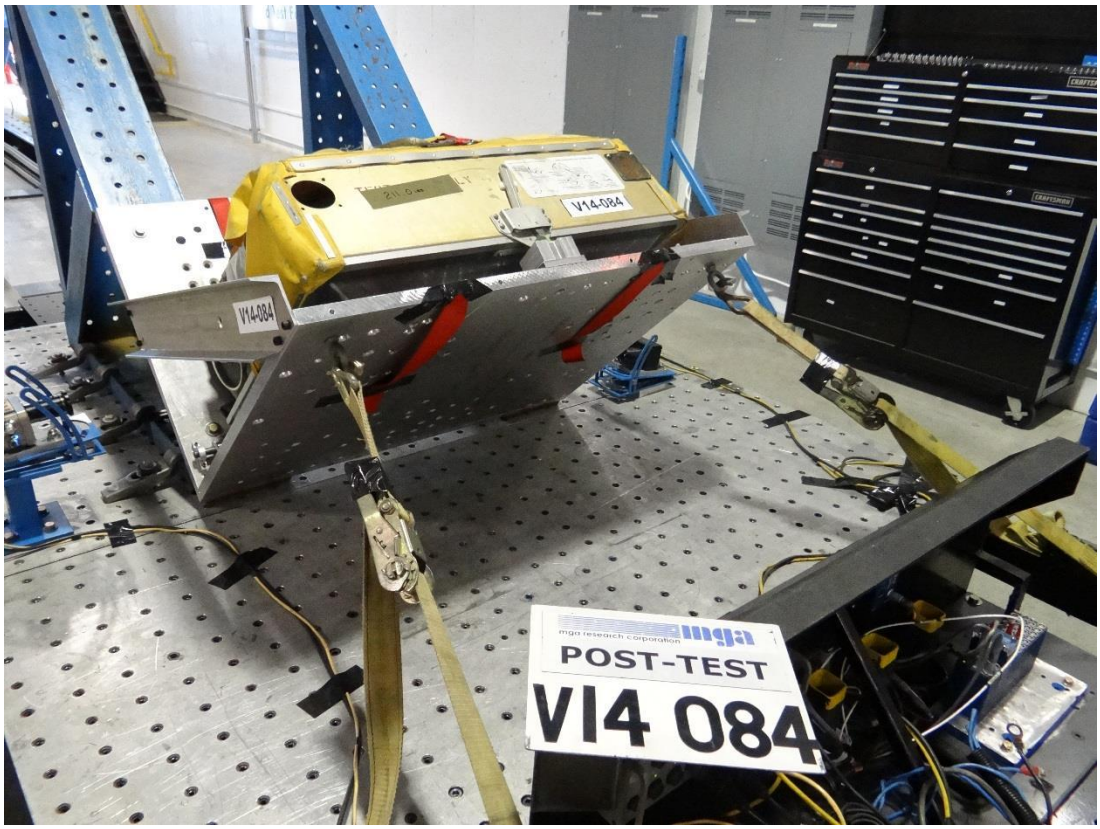
Pre Test Right Angle View

Post Test Front View

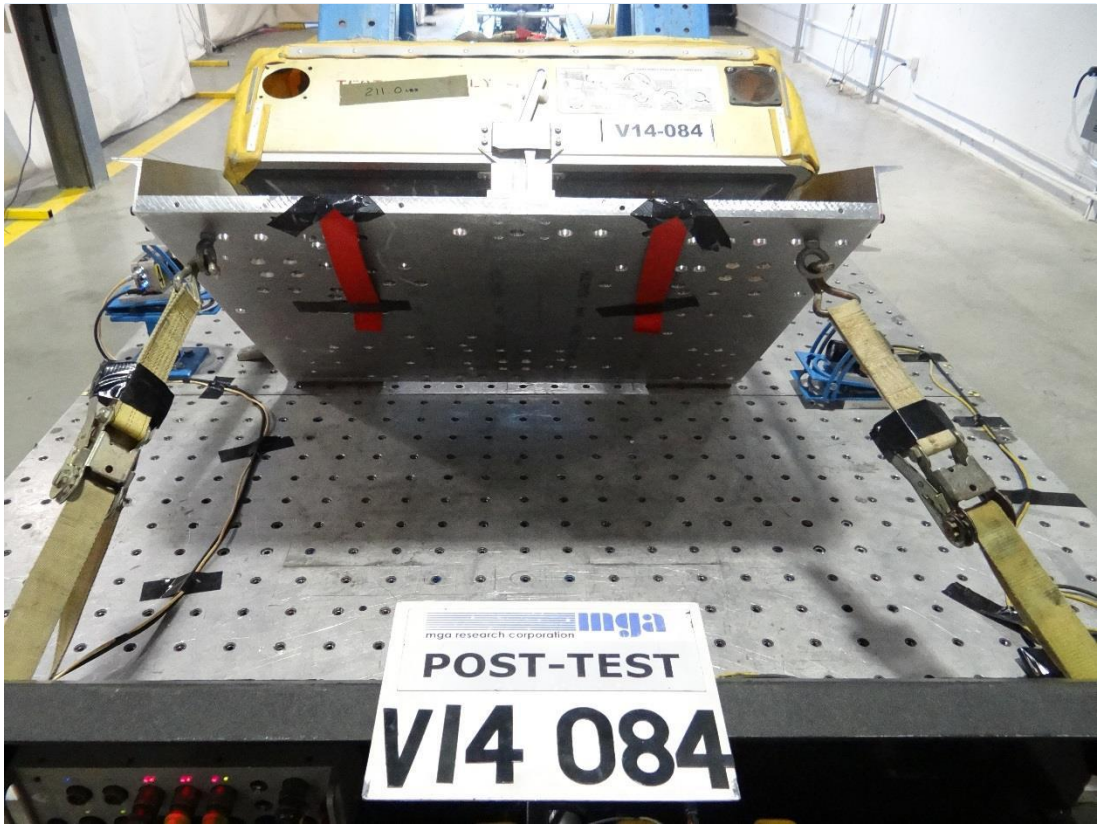
Post Test Left Angle View



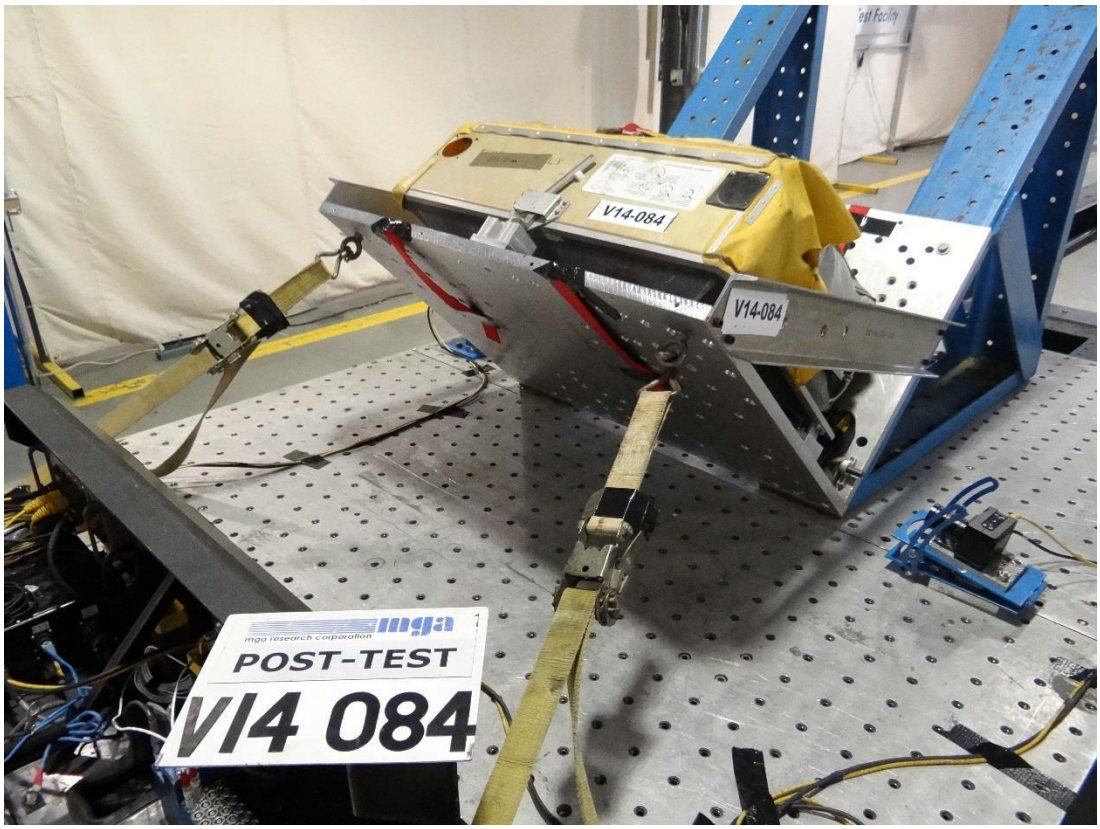
Post Test Left Side View



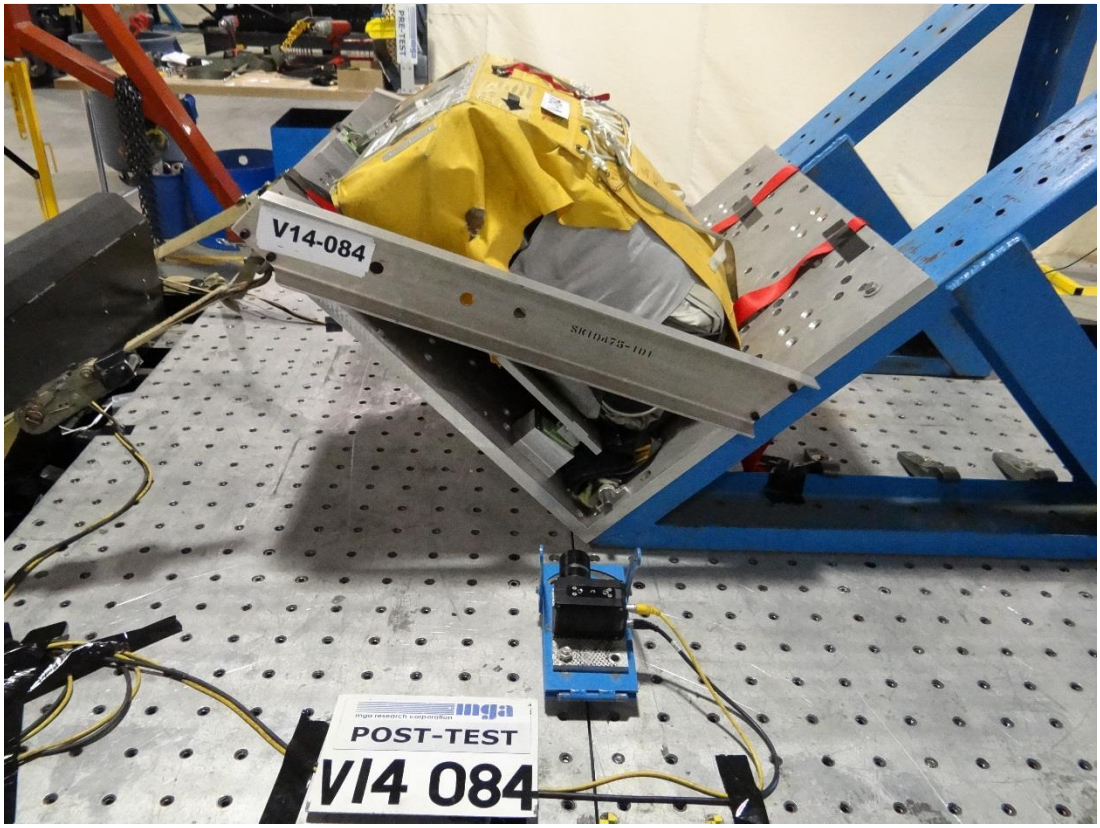
Post Test Left Rear Angle View



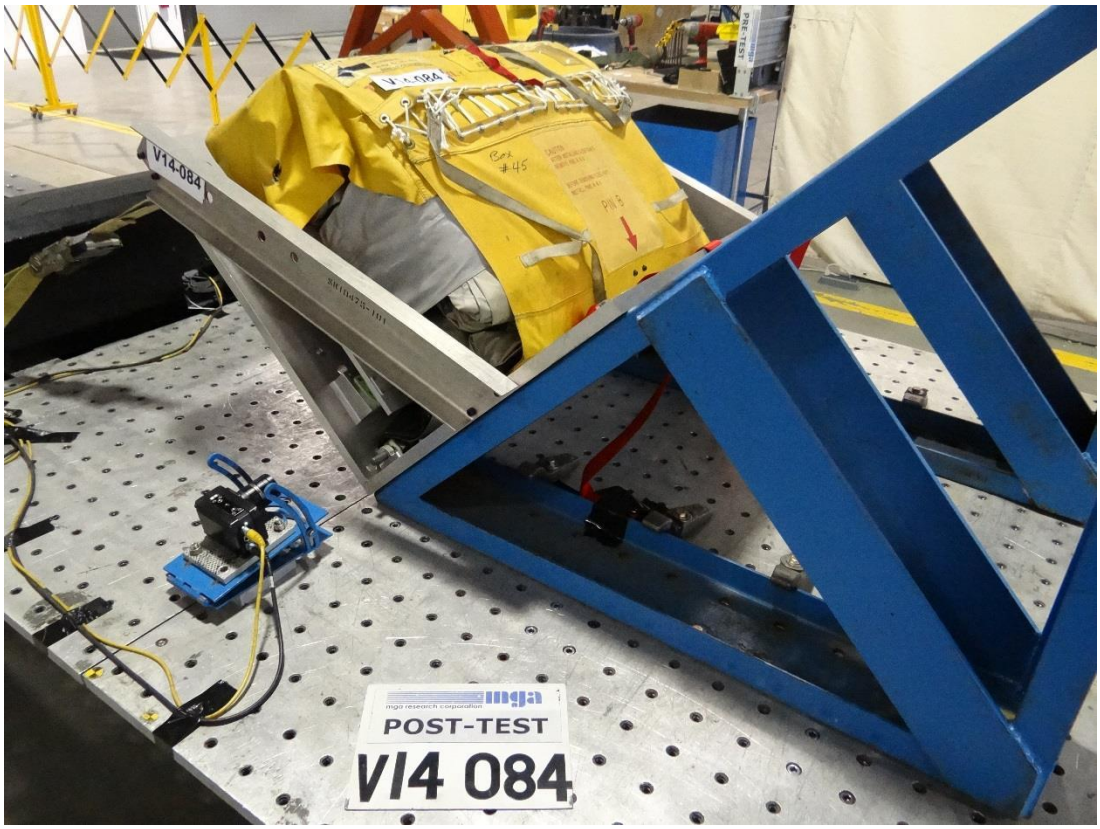
Post Test Rear View



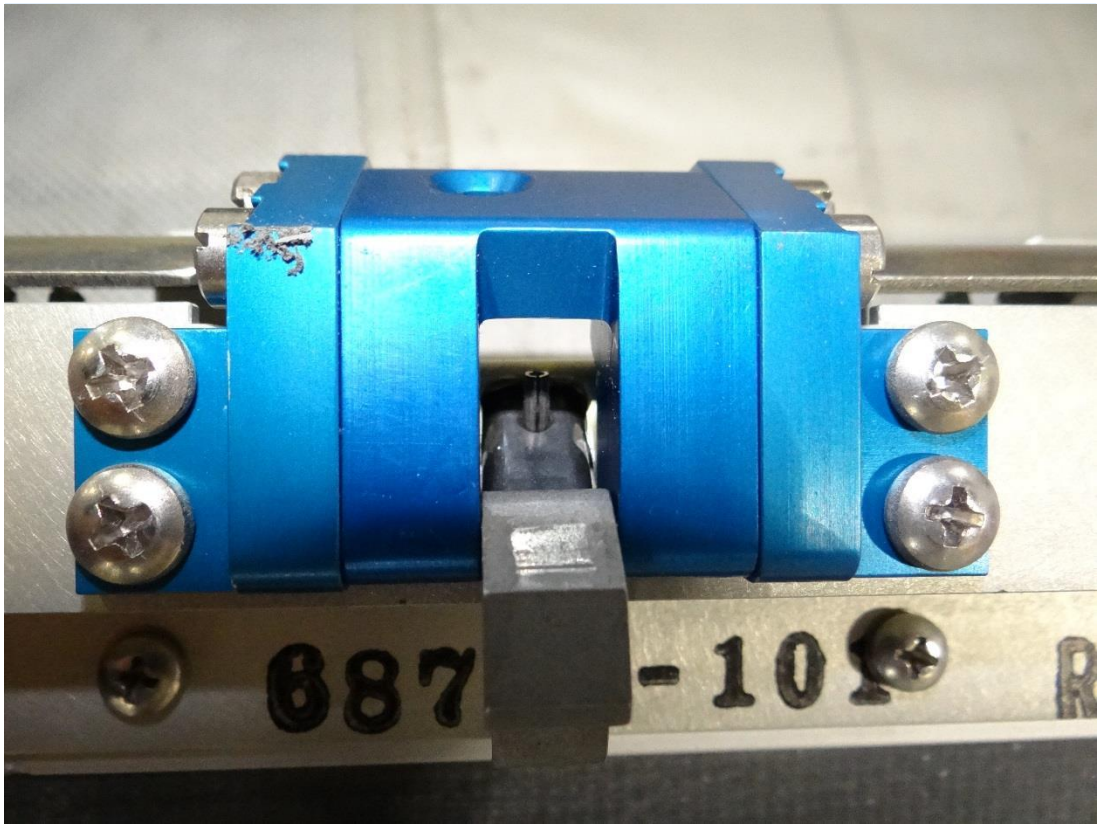
Post Test Left Rear Angle View



Post Test Right Side View



Post Test Right Angle View



Detail View