

REPORT NUMBER: 8708-SLEDNCAP-41

**CHILD RESTRAINT SYSTEM IN
DYNAMIC SLED TEST
LAROCHE POLAR BEAR BOOSTER WITH A HYIII THREE YEAR OLD
LAROCHE POLAR BEAR BOOSTER WITH A HYIII SIX YEAR OLD**

TEST NUMBER: 09-3-45

**PREPARED BY:
VERIDIAN ENGINEERING
4455 GENESEE STREET
BUFFALO, NEW YORK 14225**



SEPTEMBER 2ND, 2003

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
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Date of Acceptance

COTR, NCAP Dynamic Sled Test Program

Date of Acceptance

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16. Abstract This report contains the results of tests performed in accordance with FMVSS 213 Final Rule Published June 24th, 2003 for FMVSS 213 Child Restraint Systems. Two (2) seats were tested during this run. Position 3 was a LaRoche Polar Bear Booster Child Restraint System. This seat was tested with a HYIII 3 year old ATD. Position 4 was a LaRoche Polar Bear Booster Child Restraint System. This seat was tested with a HYIII 6 year old ATD.			
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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This dynamic sled testing is part of the FY' 03 New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract Number DTNH22-01-D-32005. The purpose of this test is to obtain child seat research data for frontal dynamic testing.

1.2 TEST PROCEDURE

This frontal dynamic sled test was conducted in accordance with the child restraint test procedure provided by the FMVSS No. 213 Final Rule published June 24th, 2003. Any reference to FMVSS No. 213 in this document refers to the Final Rule published June 24th, 2003, for FMVSS No. 213 Child Restraint Systems.

The test was conducted at Veridian Engineering on September 2nd, 2003 at a speed of 46.6 kph (29.0 mph). The FMVSS No. 213 sled pulse was used as a crash pulse. The requirements specified in the FMVSS No. 213 were also followed.

The bench seat contained one anthropomorphic test device (ATD). One (1) Hybrid III 3 Year Old ATD, Serial Number 044, was instrumented with head, chest, and pelvic tri-axial accelerometers. This ATD was also instrumented with upper and lower neck load cells. This dummy was placed in a LaRoche Polar Bear Booster child seat and the seat was located in Position 3 – Right Rear Passenger.

Position 3 – Upper Neck My was clipped and did not record accurately. Position 3 – Lower Neck My was clipped and did not record accurately.

One (1) Hybrid III 6 Year Old ATD, Serial Number 182, was instrumented with head, chest, and pelvic tri-axial accelerometers. This ATD was also instrumented with an upper neck load cell. This dummy was placed in a LaRoche Polar Bear Booster child seat and the seat was located in Position 4 – Left Rear Passenger.

The child ATD was positioned according to the child seat manufacturer's instructions. The data was digitally sampled at 20,000 samples per second and processed per Section IP11 of the Laboratory Test Procedure.

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 09-3-45

Test Date: September 2nd, 2003

POSITION 3

Child Restraint Type (forward-facing, rearward facing, booster)	FORWARD FACING
LATCH or NON-LATCH	LAP BELT WITH TOP TETHER
Harness Type	BELT POSITIONING BOOSTER
Child Restraint Manufacturer	LAROCHE
Child Restraint Model	POLAR BEAR BOOSTER
Model Number	POLAR BEAR
Date of Manufacture	8/29/2002
Child Restraint Height Limits (mm)	838 - 1448
Child Restraint Weight Limits (kg)	13.6 - 45.3
Weight of Child Restraint (kg)	1.9

POSITION 4

Child Restraint Type (forward-facing, rearward facing, booster)	FORWARD FACING
LATCH or NON-LATCH	LAP BELT WITH TOP TETHER
Harness Type	BELT POSITIONING BOOSTER
Child Restraint Manufacturer	LAROCHE
Child Restraint Model	POLAR BEAR BOOSTER
Model Number	POLAR BEAR
Date of Manufacture	8/29/2002
Child Restraint Height Limits (mm)	838 - 1448
Child Restraint Weight Limits (kg)	13.6 - 45.3
Weight of Child Restraint (kg)	1.9

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 09-3-45

Test Date: September 2nd, 2003

POSITION 3

Child Seat	LAROCHE POLAR BEAR BOOSTER
Belt Fraying	NONE
Stress Marks	NONE
Cracks	NONE
Buckle Stress	NONE
Latch Hooks	NONE
Max. Head Excursion (mm)	467
Max. Knee Excursion (mm)	551
Velocity (kph)	46.6
Acceleration (G's)	23.0

POSITION 4

Child Seat	LAROCHE POLAR BEAR BOOSTER
Belt Fraying	NONE
Stress Marks	NONE
Cracks	NONE
Buckle Stress	NONE
Latch Hooks	NONE
Max. Head Excursion (mm)	475
Max. Knee Excursion (mm)	597
Velocity (kph)	46.6
Acceleration (G's)	23.0

SECTION 4

POSITION 3 - HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 09-3-45

Test Date: September 2nd, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	12.7	204.4	-54.6	71.1
Head CG	Y	G's	44.9	83.4	-7.3	76.2
Head CG	Z	G's	56.0	53.6	-0.0	-18.5
Head CG Resultant	N/A	G's	65.2	51.2		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	4.6	236.3	-50.1	48.6
Chest CG	Y	G's	7.5	80.6	-4.8	86.0
Chest CG	Z	G's	3.4	206.1	-13.1	59.6
Chest CG Resultant	N/A	G's	50.6	48.6		

SEAT BELT SENSOR PEAK VALUES

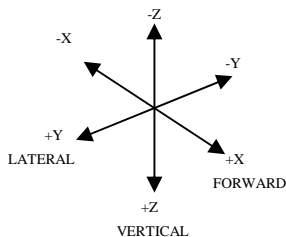
Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P3 (Right) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	720.1	52.5	41.9	78.0
Head CG Primary (15 msec)	392.4	58.5	45.7	60.7

CHEST CLIP (3 MSEC)

Location	P3 (Right) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	48.2	47.2	50.2



POSITION 3 - HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA...(continued)

Test No.: 09-3-45

Test Date: September 2nd, 2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	11.5	113.8	-35.1	48.6
Pelvis	Y	G's	4.5	44.1	-8.7	56.2
Pelvis	Z	G's	4.0	113.7	-21.5	60.3

UPPER NECK PEAK FORCES AND MOMENTS

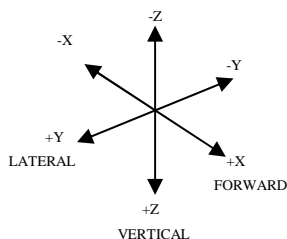
Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	69.4	169.2	-1257.1	72.2
Neck Force	Y	Newtons	259.1	69.6	-45.4	221.0
Neck Force	Z	Newtons	1995.9	70.5	-22.3	240.0
Neck Moment	X	Nm	12.6	71.4	-9.7	54.9
Neck Moment	Y	Nm	N/A	N/A	-6.5	65.3
Neck Moment	Z	Nm	1.8	65.1	-6.1	51.1

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	186.6	203.3	-1677.2	72.0
Neck Force	Y	Newtons	587.2	70.8	-40.0	216.7
Neck Force	Z	Newtons	1263.7	51.1	-360.1	73.0
Neck Moment	X	Nm	44.0	67.6	-6.8	220.4
Neck Moment	Y	Nm	N/A	N/A	-13.9	203.5
Neck Moment	Z	Nm	9.0	61.3	-3.7	86.5

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm	0.0	-19.3	-38.3	76.3



SECTION 4

POSITION 4 - HYBRID III 6 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 09-3-45

Test Date: September 2nd, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	11.6	202.7	-35.5	82.4
Head CG	Y	G's	1.3	225.8	-9.7	80.3
Head CG	Z	G's	10.6	103.8	-39.7	40.1
Head CG Resultant	N/A	G's	43.4	42.2		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	5.5	134.8	-45.4	42.4
Chest CG	Y	G's	2.1	155.1	-4.5	46.7
Chest CG	Z	G's	8.8	81.5	-13.6	56.8
Chest CG Resultant	N/A	G's	45.7	42.5		

SEAT BELT SENSOR PEAK VALUES

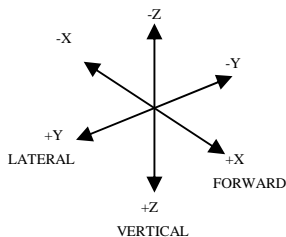
Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P4 (Left) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	269.4	35.5	29.6	65.6
Head CG Primary (15 msec)	148.2	39.6	36.8	51.8

CHEST CLIP (3 MSEC)

Location	P4 (Left) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	45.3	41.3	44.3



POSITION 4 - HYBRID III 6 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA...(continued)

Test No.: 09-3-45

Test Date: September 2nd, 2003

PELVIC PEAK ACCELERATIONS

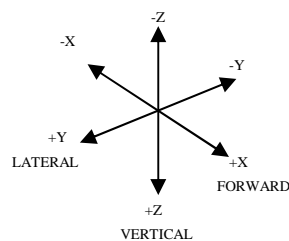
Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	47.4	63.2	-0.0	-18.0
Pelvis	Y	G's	33.8	67.1	-221.0	20.7
Pelvis	Z	G's	5.6	103.8	-16.4	63.1

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	190.2	83.5	-665.2	52.0
Neck Force	Y	Newtons	91.9	82.4	-41.1	73.7
Neck Force	Z	Newtons	2711.1	82.0	-2.0	-18.5
Neck Moment	X	Nm	2.5	63.9	-12.9	82.8
Neck Moment	Y	Nm	40.5	82.8	-32.9	46.4
Neck Moment	Z	Nm	7.9	85.0	-2.7	162.6

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm	0.0	-20.0	-39.4	54.2



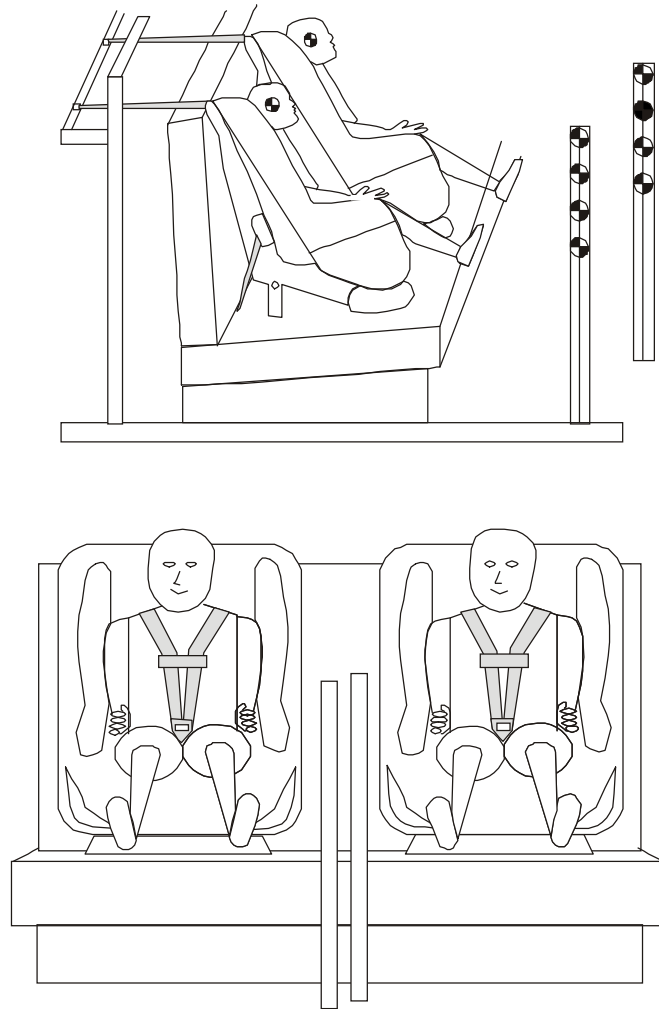
SECTION 5
SLED TEST SET-UP

Test No.: 09-3-45

Test Date: September 2nd, 2003

An FMVSS 213 test bench was fastened on the sled in order to simulate a frontal impact. Two child seats were placed on the bench and fastened in a manner suggested in the owner's manual of the child seat. Stadia poles were set up to measure dummy head and knee excursions.

Pre-test Infant and Car Seat Positions

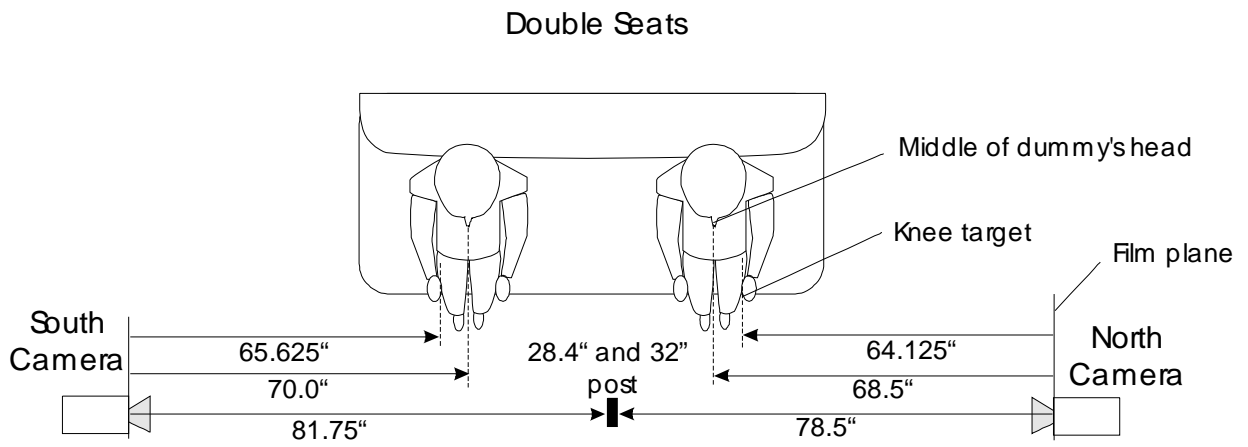


SECTION 6
CAMERA LOCATION

Test No.: 09-3-45

Test Date: September 2nd, 2003

There were two cameras mounted onto the sled carriage for views of the left and right side of the child seat.



SECTION 7
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Pre Test Right Side View



Post Test Right Side View



Pre Test Right Front View



Post Test Right Front View



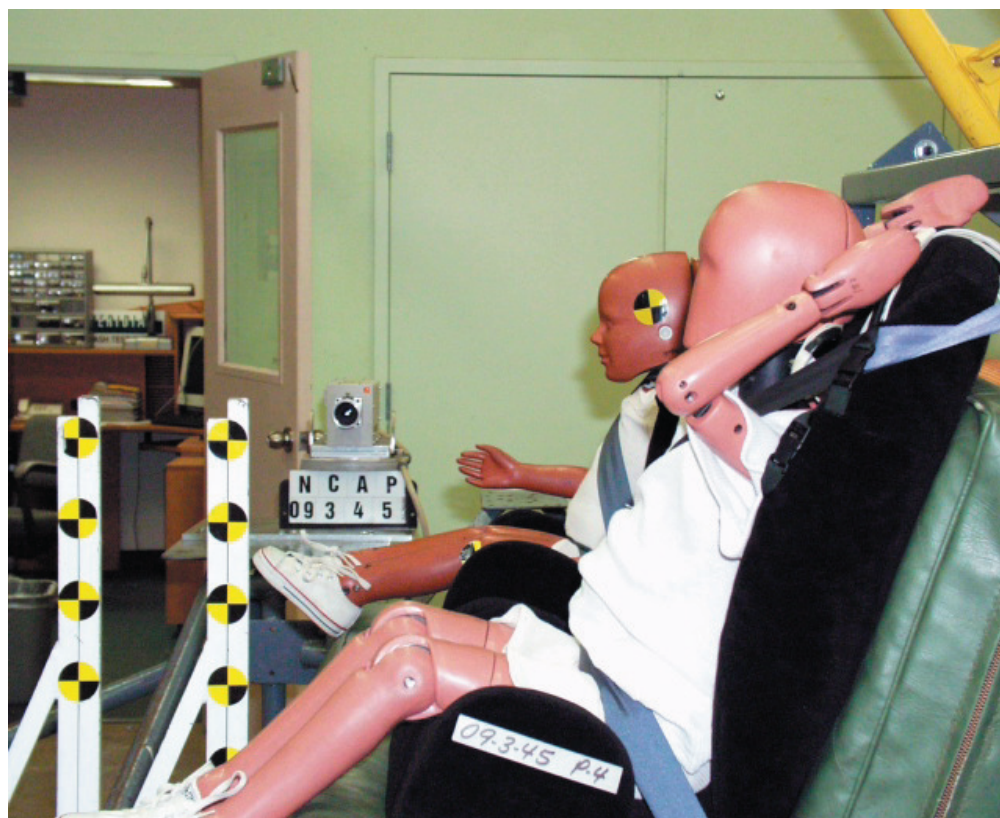
Pre Test Left Front View



Post Test Left Front View



Pre Test Left Side View



Post Test Left Side View

SECTION 8

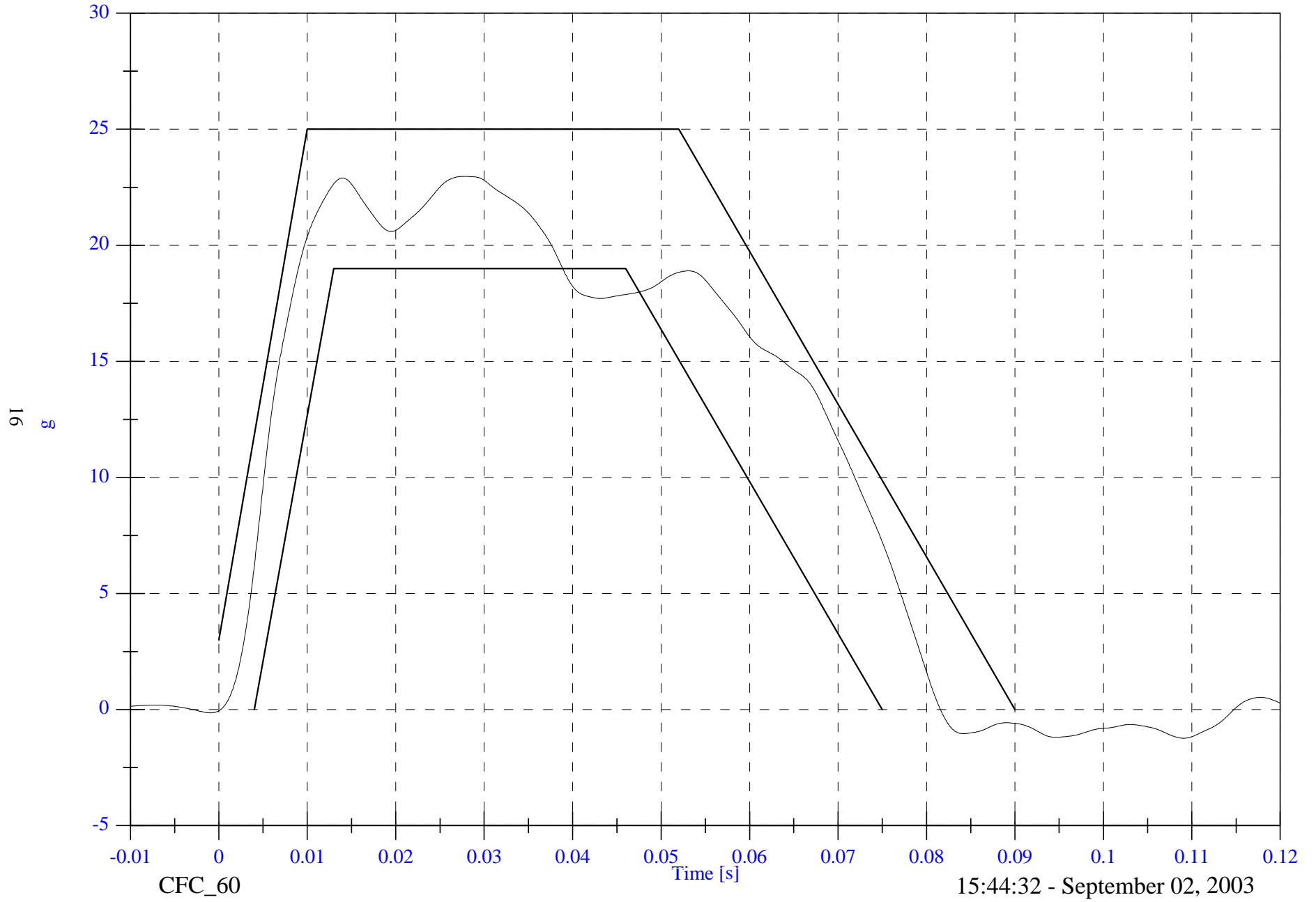
Data Plots

Sled Test NCAP SLED 09-3-45

Sled Pulse Corridor

Max: 23.0 [g] at 0.028 [s]

Min: -1.5 [g] at 0.154 [s]



CFC_60

15:44:32 - September 02, 2003

FACILITY: HYGE SLED

DATE: September 02, 2003

TEST#: 09-3-45

TITLE: Sled Test NCAP SLED 09-3-45

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
42	Sled Acceleration	g	23.0	27.7	-1.5	153.9	CFC_60	
43	Sled Acceleration Velocity	kph	46.6	81.4	-0.0	-11.5	CFC_180	
44	Sled Acceleration Displacement	mm	2658.9	250.0	-0.0	-2.0	CFC_180	
45	P3 Head x	g	12.7	204.4	-54.6	71.1	CFC_1000	
46	P3 Head y	g	44.9	83.4	-7.3	76.2	CFC_1000	
47	P3 Head z	g	56.0	53.6	-0.0	-18.5	CFC_1000	
48	P3 Head Resultant	g	65.2	51.2	0.0	-2.3	CFC_1000	
49	P3 Upper Neck Fx	N	69.4	169.2	-1257.1	72.2	CFC_1000	
50	P3 Upper Neck Fy	N	259.1	69.6	-45.4	221.0	CFC_1000	
51	P3 Upper Neck Fz	N	1995.9	70.5	-22.3	240.0	CFC_1000	
52	P3 Upper Neck F Resultant	N	2346.7	71.2	0.1	-14.2	CFC_1000	
53	P3 Upper Neck Mx	N-m	12.6	71.4	-9.7	54.9	CFC_600	
54	P3 Upper Neck My	N-m	22.5	41.6	-6.5	65.3	CFC_600	
55	P3 Upper Neck Mz	N-m	1.8	65.1	-6.1	51.1	CFC_600	
56	P3 Upper Neck M Resultant	N-m	24.3	51.9	0.0	-9.8	CFC_600	
57	P3 Lower Neck Fx	N	186.6	203.3	-1677.2	72.0	CFC_1000	
58	P3 Lower Neck Fy	N	587.2	70.8	-40.0	216.7	CFC_1000	
59	P3 Lower Neck Fz	N	1263.7	51.1	-360.1	73.0	CFC_1000	
60	P3 Lower Neck F Resultant	N	1797.7	71.9	0.0	-14.5	CFC_1000	
61	P3 Lower Neck Mx	N-m	44.0	67.6	-6.8	220.4	CFC_600	
62	P3 Lower Neck My	N-m	169.6	68.9	-13.9	203.5	CFC_600	
63	P3 Lower Neck Mz	N-m	9.0	61.3	-3.7	86.5	CFC_600	
64	P3 Lower Neck M Resultant	N-m	175.0	68.8	0.0	-15.2	CFC_600	
65	P3 Chest x	g	4.6	236.3	-50.1	48.6	CFC_180	
66	P3 Chest y	g	7.5	80.6	-4.8	86.0	CFC_180	
67	P3 Chest z	g	3.4	206.1	-13.1	59.6	CFC_180	
68	P3 Chest Resultant	g	50.6	48.6	0.0	-10.9	CFC_180	
69	P3 Pelvic x	g	11.5	113.8	-35.1	48.6	CFC_1000	
70	P3 Pelvic y	g	4.5	44.1	-8.7	56.2	CFC_1000	
71	P3 Pelvic z	g	4.0	113.7	-21.5	60.3	CFC_1000	
72	P3 Pelvic Resultant	g	39.9	48.5	0.0	-10.3	CFC_1000	
73	P3 Head Red z	g	72.7	69.5	-7.4	187.8	CFC_1000	
74	P3 Chest Compression	mm	0.0	-19.3	-38.3	76.3	CFC_600	
75	P3 Upper Neck Mocy	N-m	22.5	41.6	-6.5	65.3	CFC_600	

FACILITY: HYGE SLED

DATE: September 02, 2003

TEST#: 09-3-45

TITLE: Sled Test NCAp SLED 09-3-45

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
76	P4 Head x	g	11.6	202.7	-35.5	82.4	CFC_1000	
77	P4 Head y	g	1.3	225.8	-9.7	80.3	CFC_1000	
78	P4 Head z	g	10.6	103.8	-39.7	40.1	CFC_1000	
79	P4 Head Resultant	g	43.4	42.2	0.0	-13.6	CFC_1000	
80	P4 Upper Neck Fx	N	190.2	83.5	-665.2	52.0	CFC_1000	
81	P4 Upper Neck Fy	N	91.9	82.4	-41.1	73.7	CFC_1000	
82	P4 Upper Neck Fz	N	2711.1	82.0	-2.0	-18.5	CFC_1000	
83	P4 Upper Neck F Resultant	N	2717.4	82.1	0.1	-7.8	CFC_1000	
84	P4 Upper Neck Mx	N-m	2.5	63.9	-12.9	82.8	CFC_600	
85	P4 Upper Neck My	N-m	40.5	82.8	-32.9	46.4	CFC_600	
86	P4 Upper Neck Mz	N-m	7.9	85.0	-2.7	162.6	CFC_600	
87	P4 Upper Neck M Resultant	N-m	43.2	82.9	0.0	-10.6	CFC_600	
88	P4 Chest x	g	5.5	134.8	-45.4	42.4	CFC_180	
89	P4 Chest y	g	2.1	155.1	-4.5	46.7	CFC_180	
90	P4 Chest z	g	8.8	81.5	-13.6	56.8	CFC_180	
91	P4 Chest Resultant	g	45.7	42.5	0.0	-10.0	CFC_180	
92	P4 Pelvic x	g	47.4	63.2	-0.0	-18.0	CFC_1000	
93	P4 Pelvic y	g	33.8	67.1	-221.0	20.7	CFC_1000	
94	P4 Pelvic z	g	5.6	103.8	-16.4	63.1	CFC_1000	
95	P4 Pelvic Resultant	g	221.0	20.7	0.0	-8.9	CFC_1000	
96	P4 Chest Pot	mm	0.0	-20.0	-39.4	54.2	CFC_600	
97	P4 Upper Neck Mocy	N-m	37.3	82.5	-22.0	45.5	CFC_600	

FACILITY: HYGE SLED

DATE: September 02, 2003

TEST#: 09-3-45

TITLE: Sled Test NCAP SLED 09-3-45

Version 5.00

=====

P3 HIC(36 ms): 720.1

t1: 41.9 msec

t2: 78.0 msec

Duration: 36.0 msec

Average Acceleration: 52.5 g

Input channels: P3 Head x (2) CFC_1000

P3 Head y (3) CFC_1000

P3 Head z (4) CFC_1000

P3 UP NECK Fx: Max: 69.4 N 169.2 msec

Min: -1257.1 N 72.2 msec

Input channel: P3 Upper Neck Fx (6) CFC_1000

P3 UP NECK Fz: Max: 1995.9 N 70.5 msec

Min: -22.3 N 240.0 msec

Input channel: P3 Upper Neck Fz (8) CFC_1000

P3 UP NECK Mocy (3YO Child OOP)

Max: 22.5 N-m 41.6 msec

Min: -6.5 N-m 65.3 msec

Input channels: P3 Upper Neck Fx (6) CFC_600

P3 Upper Neck My (10) CFC_600

Docy: 0

P3 UP NECK Nij (3YO Child OOP)

Ntf: 1.01 Nij 72.2 msec CVt: 2120 CVf: 68

Nte: 0.99 Nij 67.8 msec CVt: 2120 CVe: 27

Ncf: 0.05 Nij 238.9 msec CVc: 2120 CVf: 68

Nce: 0.00 Nij -16.7 msec CVc: 2120 CVe: 27

Input channels: P3 Upper Neck Fz (8) CFC_600

P3 Upper Neck Mocy [N-m, CFC_600] (87)

FACILITY: HYGGE SLED
TEST#: 09-3-45
TITLE: Sled Test NCAP SLED 09-3-45
Version 5.00

DATE: September 02, 2003

=====

P3 CLIP(3 ms): 48.2 g
t1: 47.2 msec
t2: 50.2 msec
Duration: 3.0 msec

P3 CSI: 337.1
Input channels: P3 Chest x (18) CFC_180
P3 Chest y (19) CFC_180
P3 Chest z (20) CFC_180

P3 CHEST DISP: Max: 0.0 mm -19.3 msec
Min: -38.3 mm 76.3 msec
Input channel: P3 Chest Compression (21) CFC_600

=====

P3 HIC(15 ms): 392.4
t1: 45.7 msec
t2: 60.7 msec
Duration: 15.0 msec
Average Acceleration: 58.5 g
Input channels: P3 Head x (2) CFC_1000
P3 Head y (3) CFC_1000
P3 Head z (4) CFC_1000

=====

FACILITY: HYGE SLED

DATE: September 02, 2003

TEST#: 09-3-45

TITLE: Sled Test NCAP SLED 09-3-45

Version 5.00

=====

P4 HIC(36 ms): 269.4

t1: 29.6 msec

t2: 65.6 msec

Duration: 36.0 msec

Average Acceleration: 35.5 g

Input channels: P4 Head x (25) CFC_1000

P4 Head y (26) CFC_1000

P4 Head z (27) CFC_1000

P4 UP NECK Fx: Max: 190.2 N 83.5 msec

Min: -665.2 N 52.0 msec

Input channel: P4 Upper Neck Fx (28) CFC_1000

P4 UP NECK Fz: Max: 2711.1 N 82.0 msec

Min: -2.0 N -18.5 msec

Input channel: P4 Upper Neck Fz (30) CFC_1000

P4 UP NECK Mocy (6YO Child OOP)

Max: 37.3 N-m 82.5 msec

Min: -22.0 N-m 45.5 msec

Input channels: P4 Upper Neck Fx (28) CFC_600

P4 Upper Neck My (32) CFC_600

Docy: 0.01778

P4 UP NECK Nij (6YO Child OOP)

Ntf: 1.34 Nij 82.1 msec CVt: 2880 CVf: 93

Nte: 1.00 Nij 47.3 msec CVt: 2880 CVe: 37

Ncf: 0.00 Nij -18.5 msec CVc: 2880 CVf: 93

Nce: 0.00 Nij 4.4 msec CVc: 2880 CVe: 37

Input channels: P4 Upper Neck Fz (30) CFC_600

P4 Upper Neck Mocy [N-m, CFC_600] (93)

FACILITY: HYG SLED

DATE: September 02, 2003

TEST#: 09-3-45

TITLE: Sled Test NCAP SLED 09-3-45

Version 5.00

=====

P4 CLIP(3 ms): 45.3 g

t1: 41.3 msec

t2: 44.3 msec

Duration: 3.0 msec

P4 CSI: 294.0

Input channels: P4 Chest x (34) CFC_180

P4 Chest y (35) CFC_180

P4 Chest z (36) CFC_180

P4 CHEST DISP: Max: 0.0 mm -20.0 msec

Min: -39.4 mm 54.2 msec

Input channel: P4 Chest Pot (37) CFC_600

=====

P4 HIC(15 ms): 148.2

t1: 36.8 msec

t2: 51.8 msec

Duration: 15.0 msec

Average Acceleration: 39.6 g

Input channels: P4 Head x (25) CFC_1000

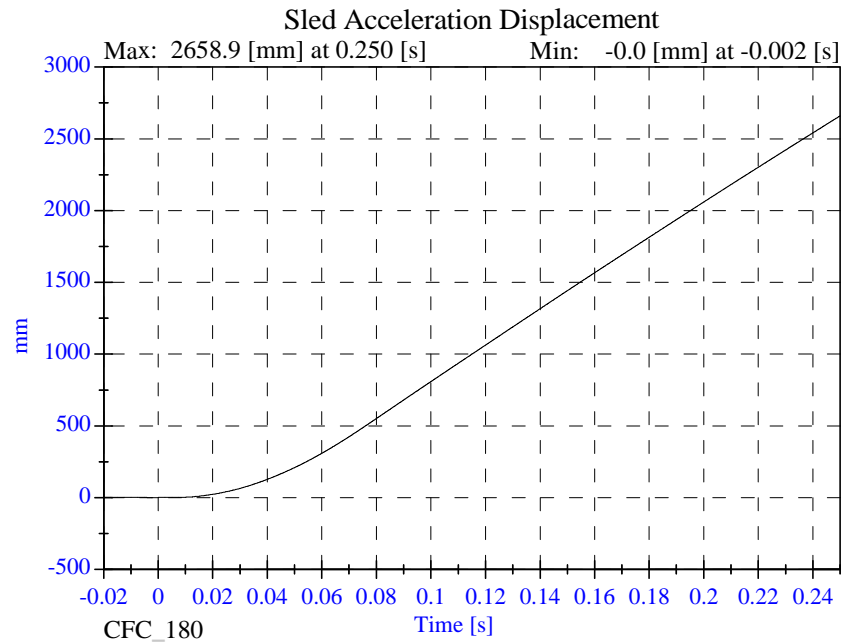
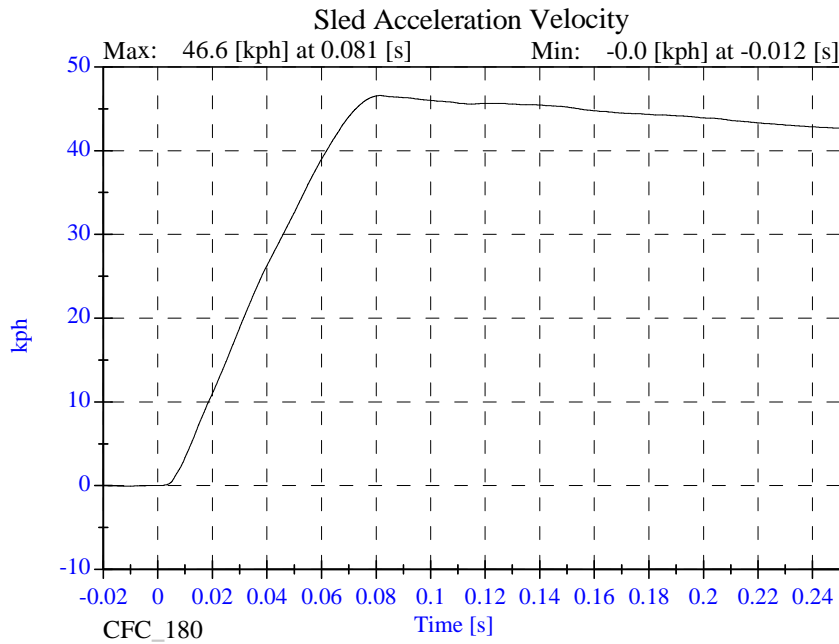
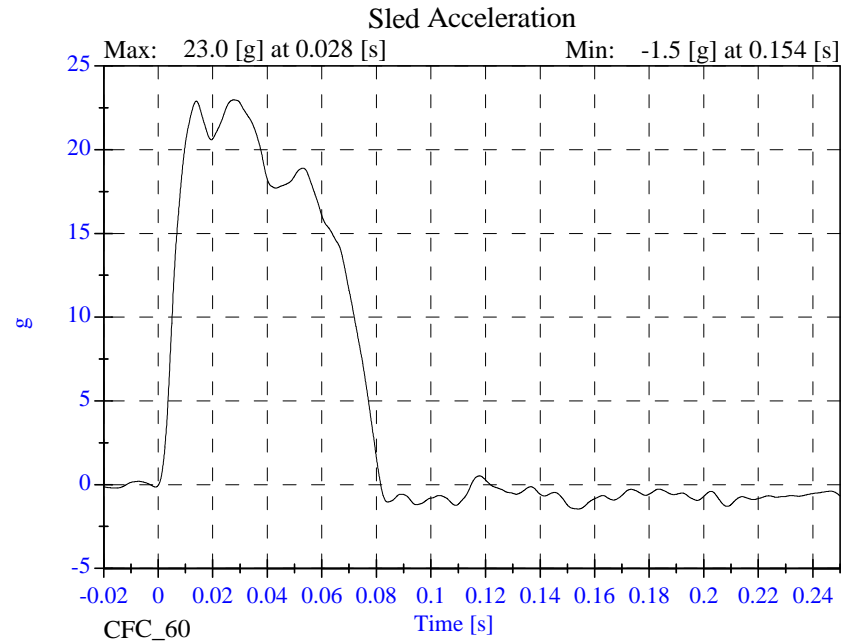
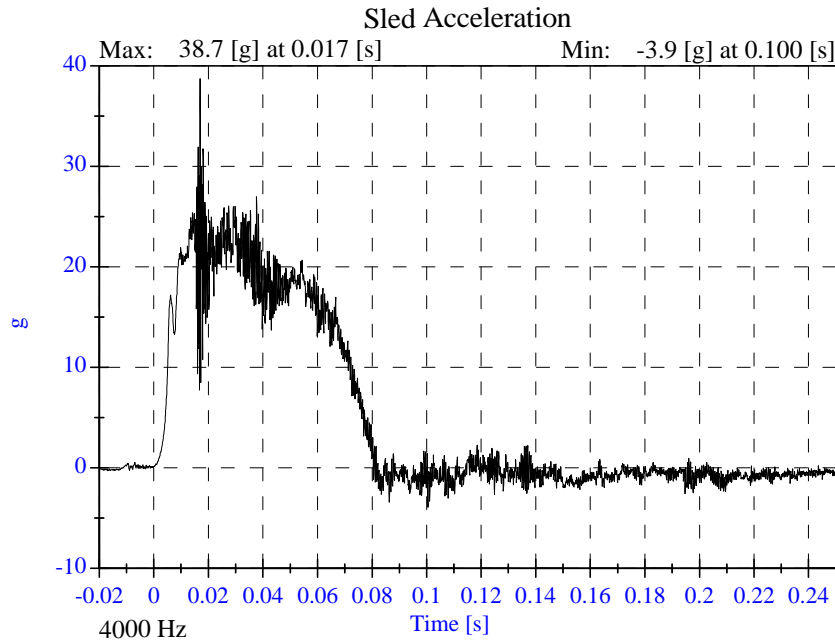
P4 Head y (26) CFC_1000

P4 Head z (27) CFC_1000

=====

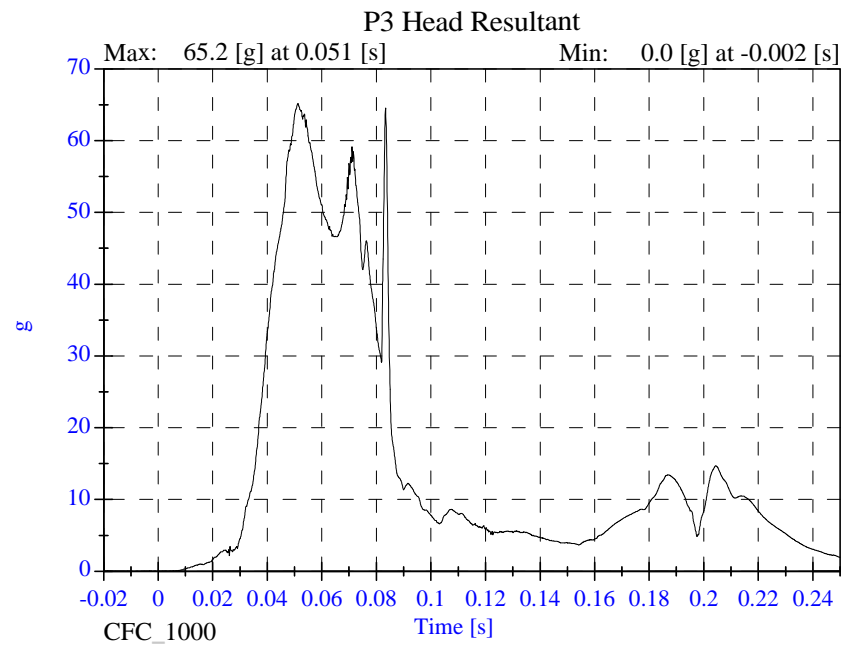
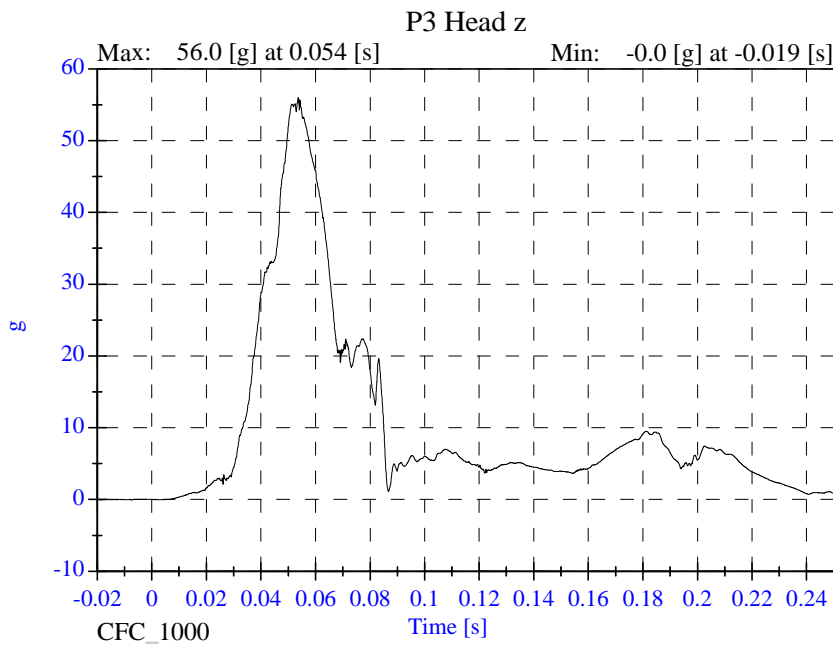
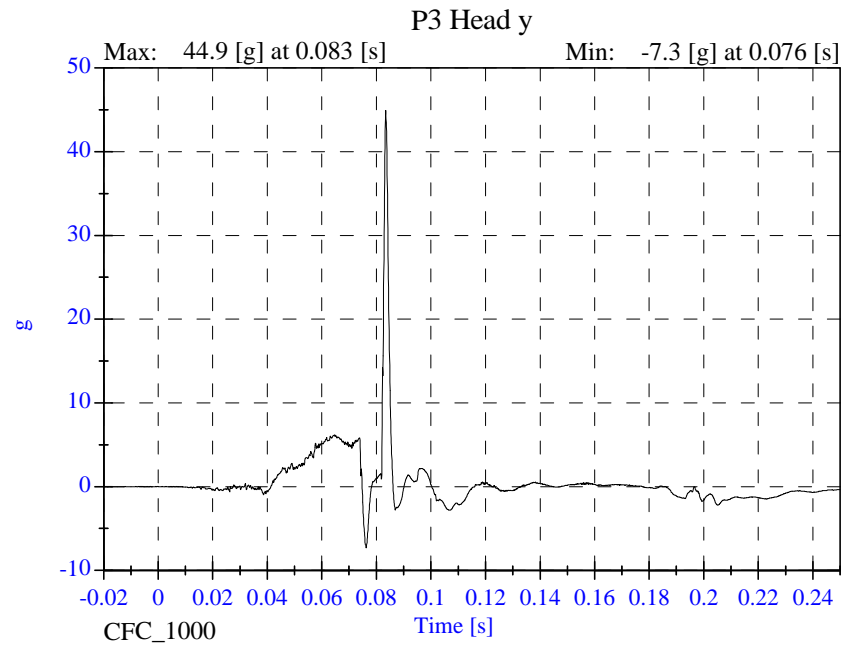
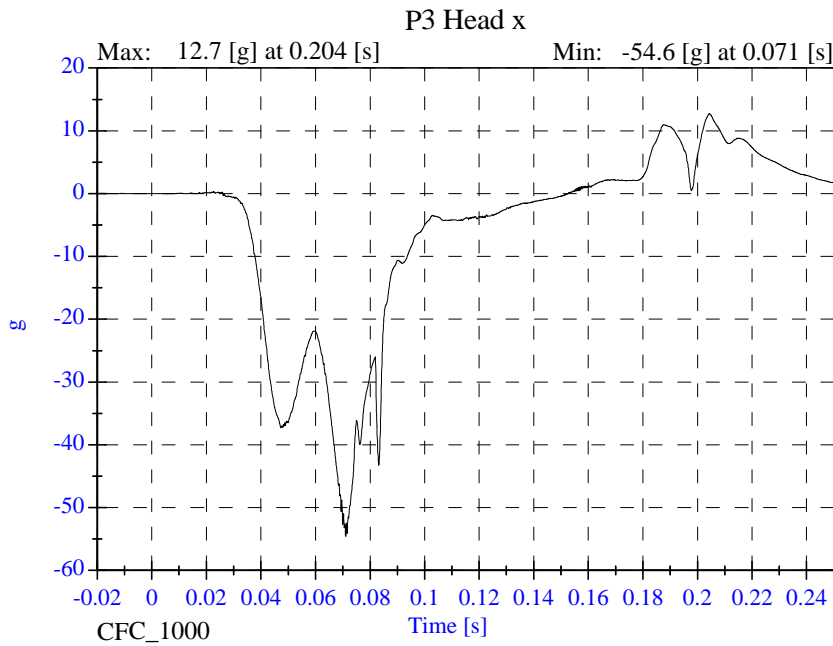
Sled Test NCAP SLED 09-3-45

- September 02, 2003



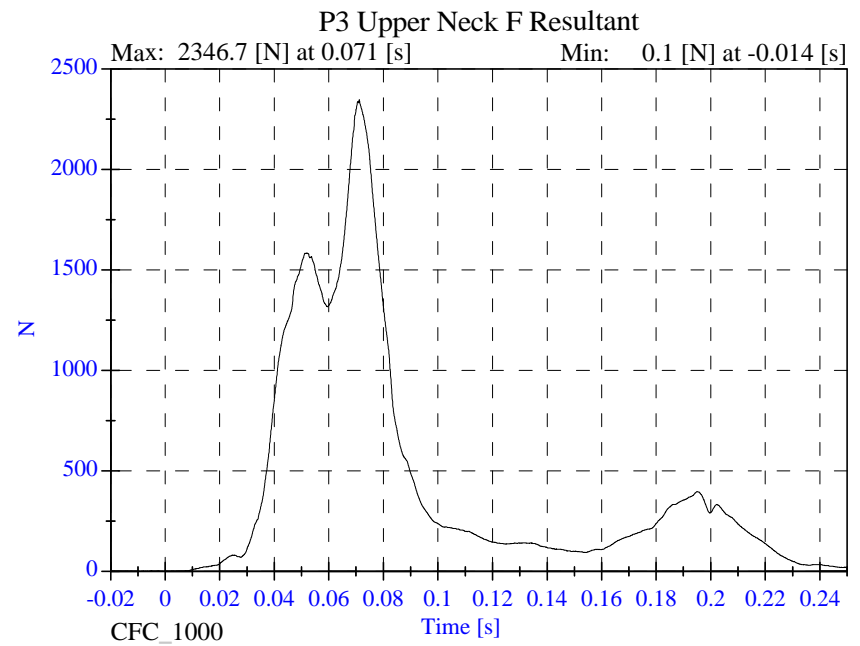
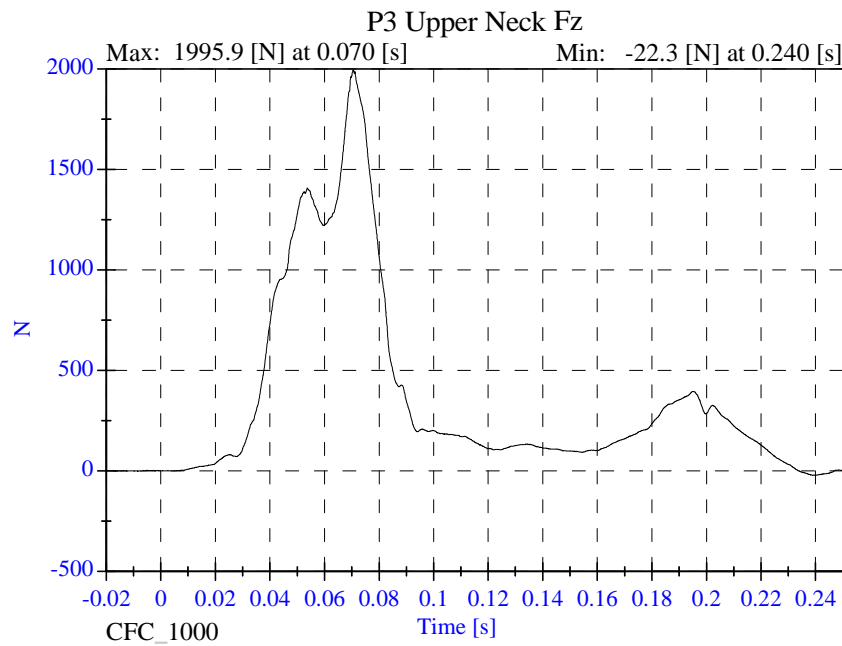
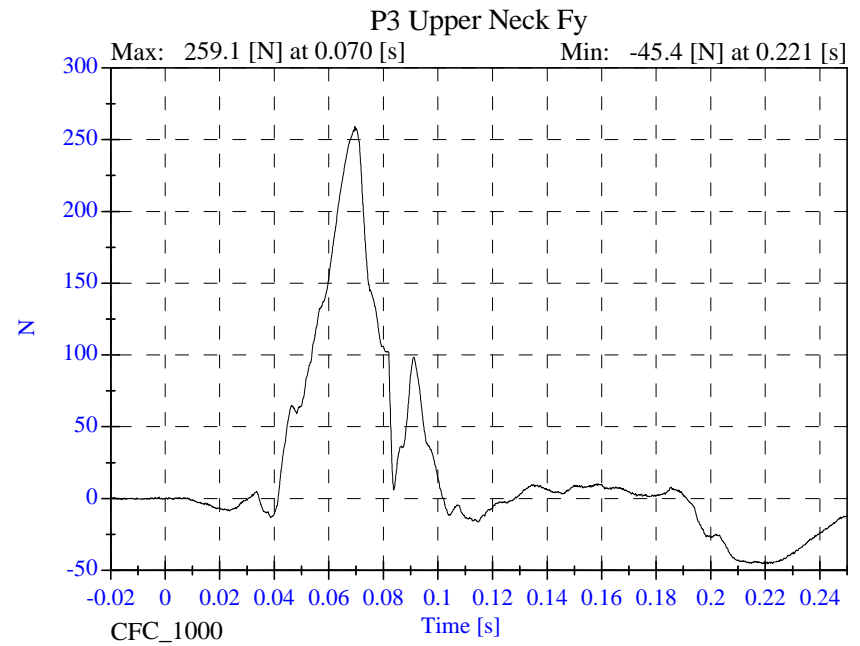
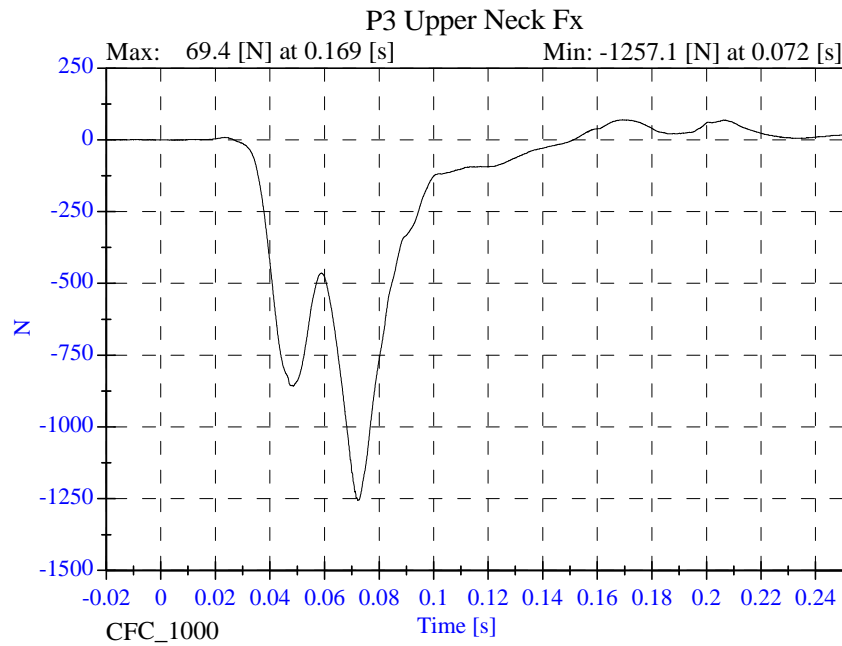
Sled Test NCAP SLED 09-3-45

- September 02, 2003



Sled Test NCAP SLED 09-3-45

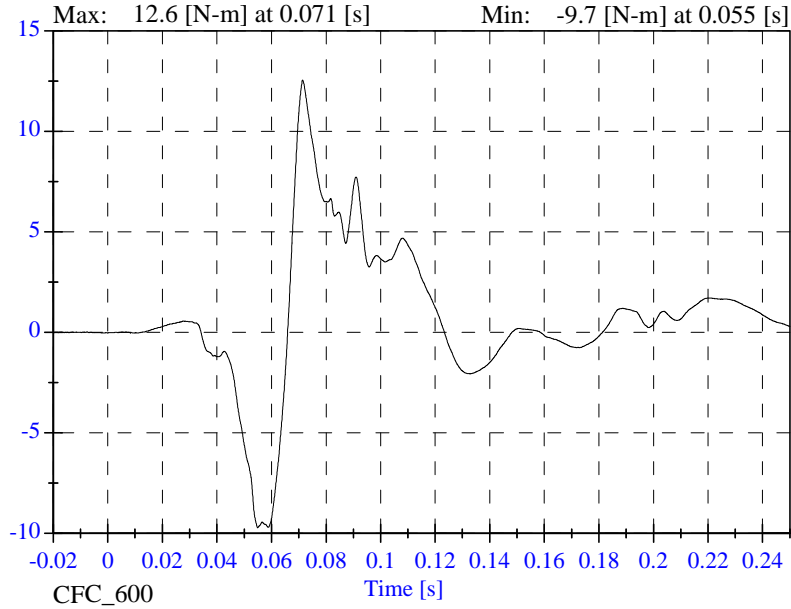
- September 02, 2003



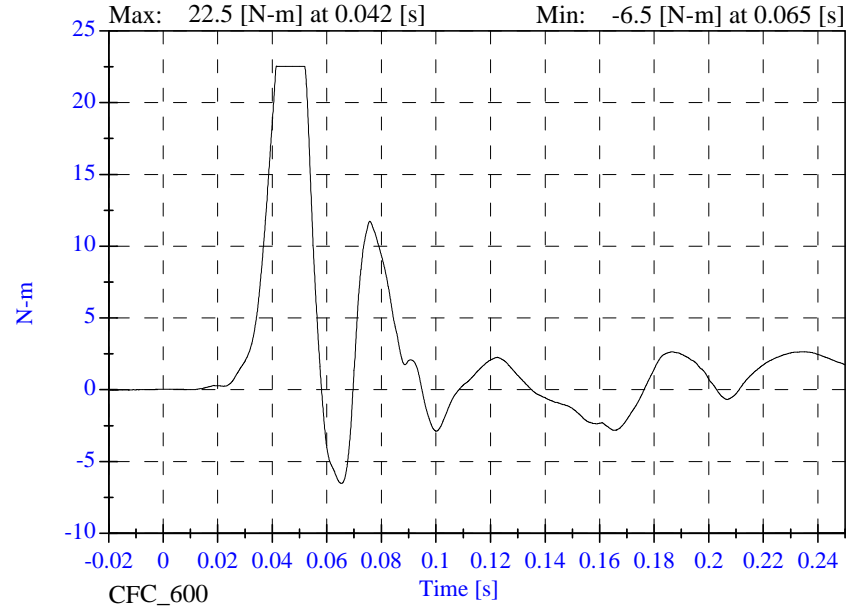
Sled Test NCAP SLED 09-3-45

- September 02, 2003

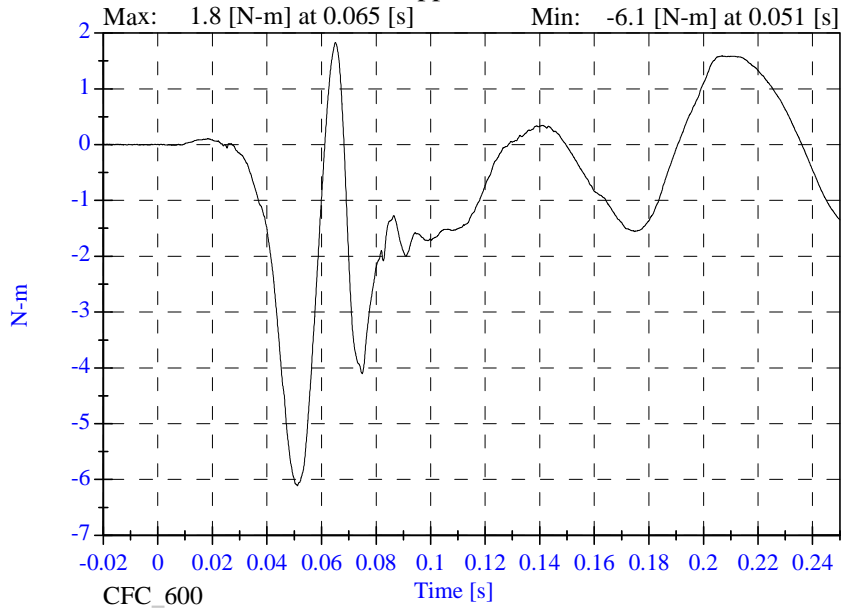
P3 Upper Neck Mx



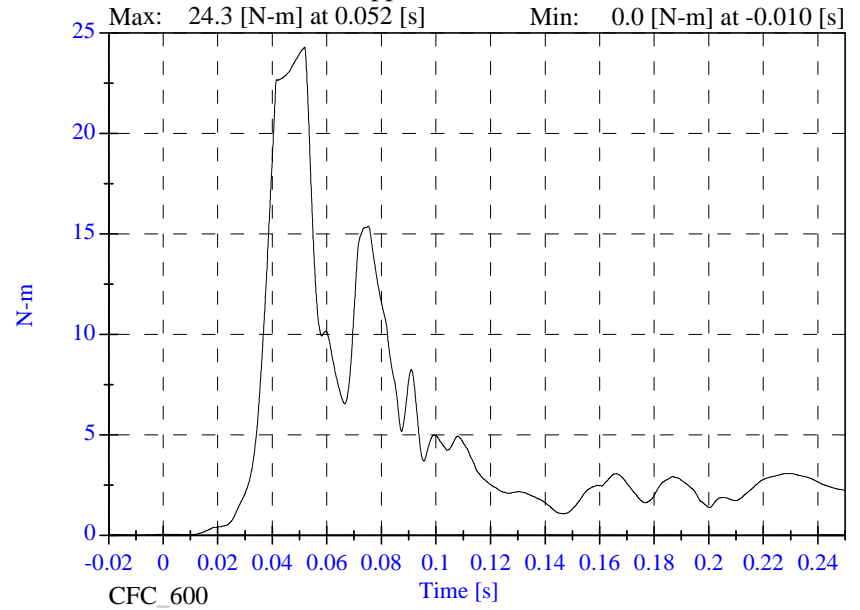
P3 Upper Neck My



P3 Upper Neck Mz

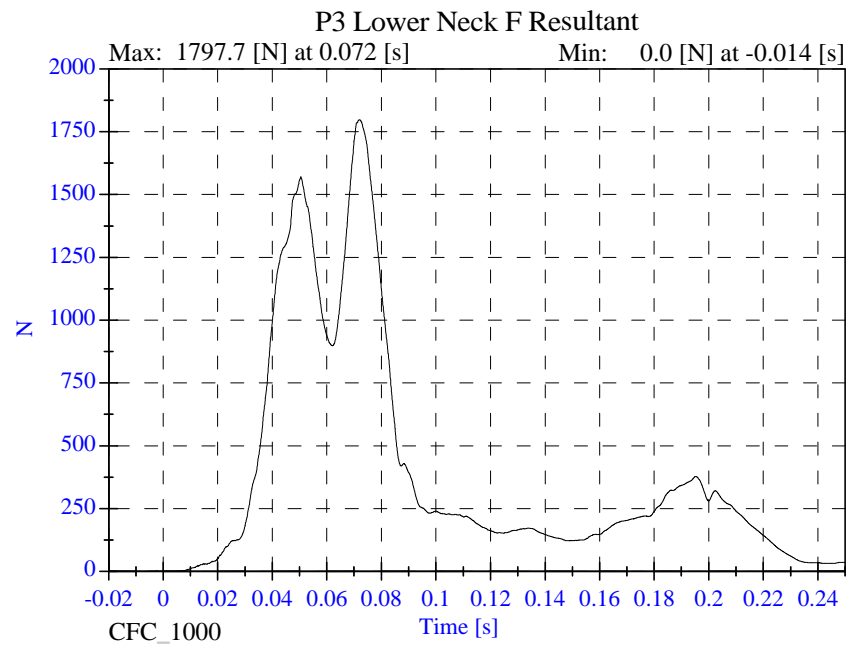
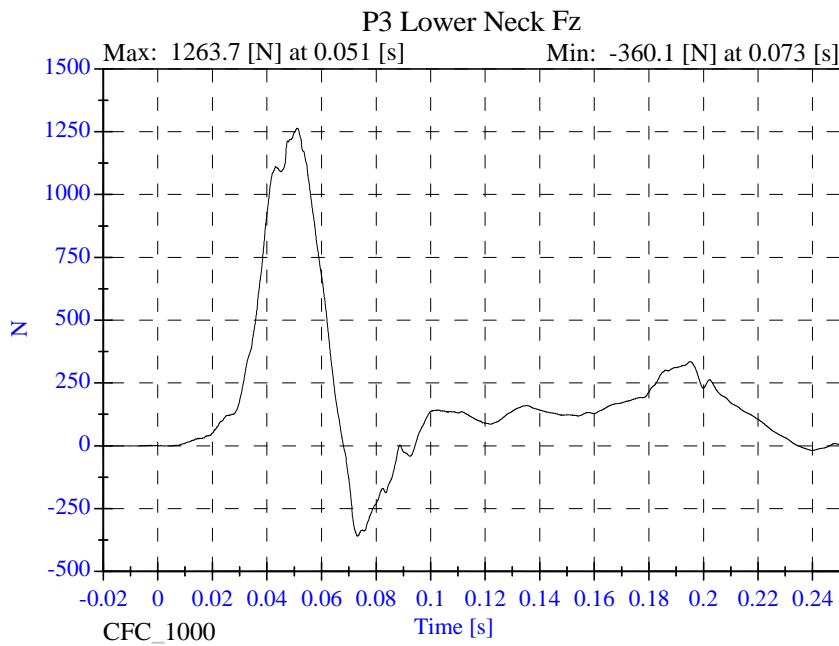
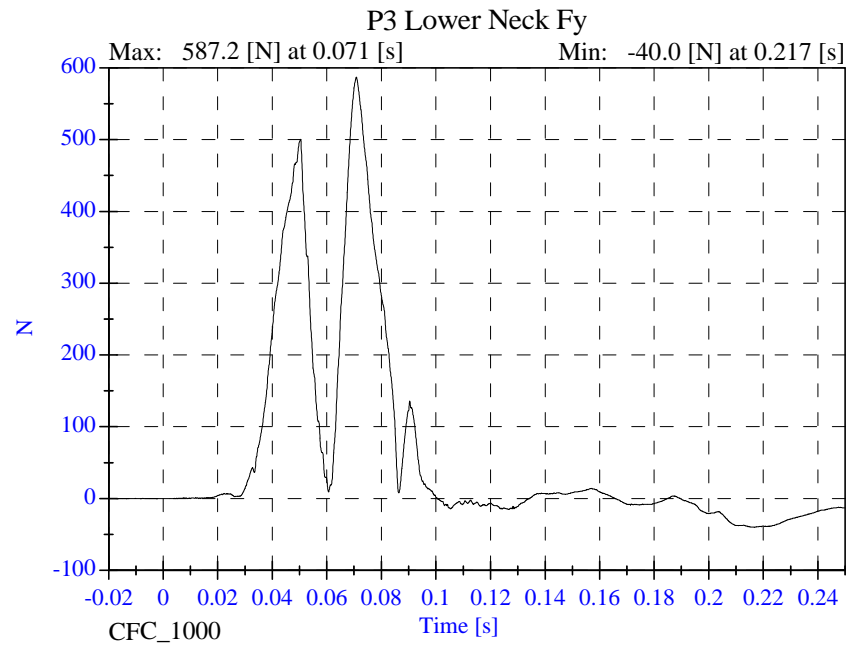
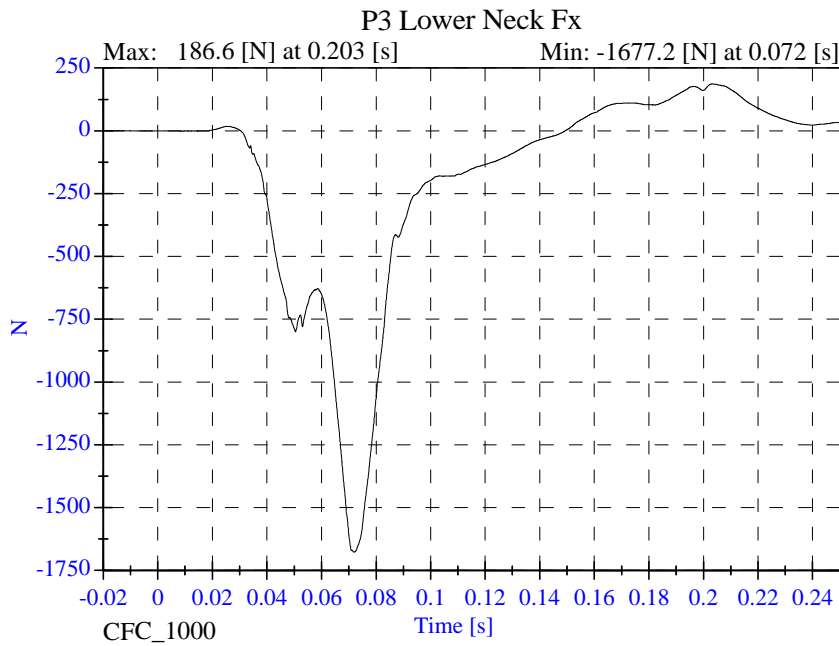


P3 Upper Neck M Resultant



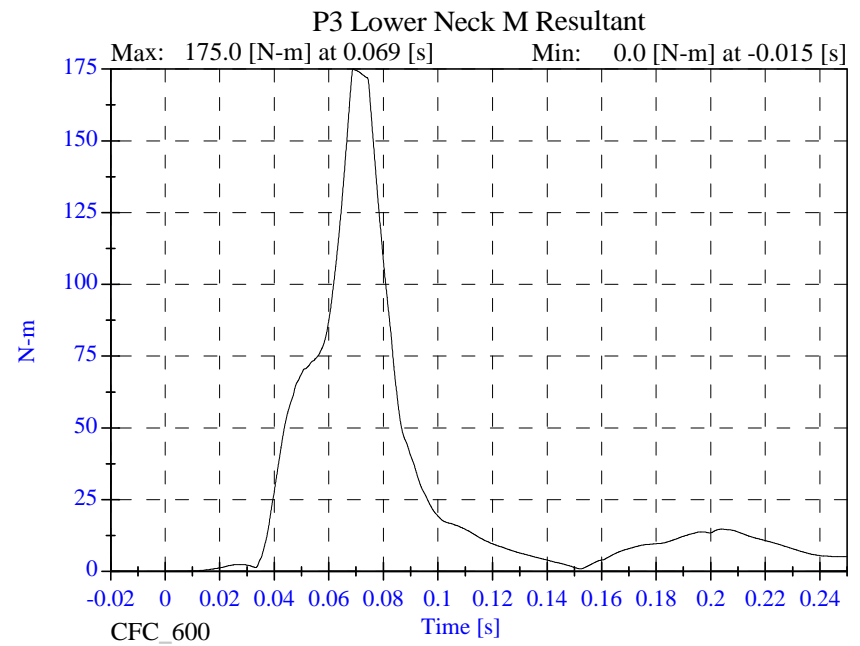
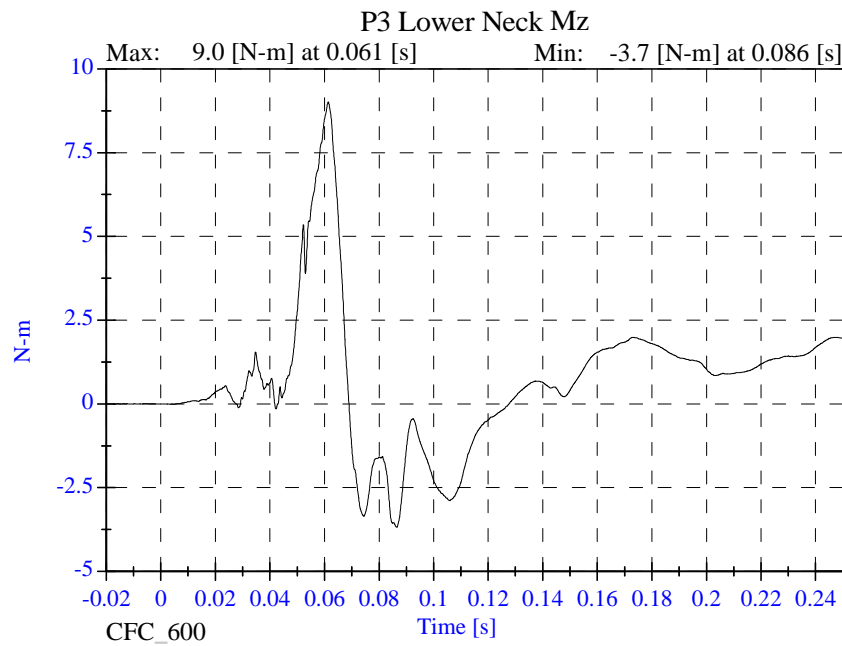
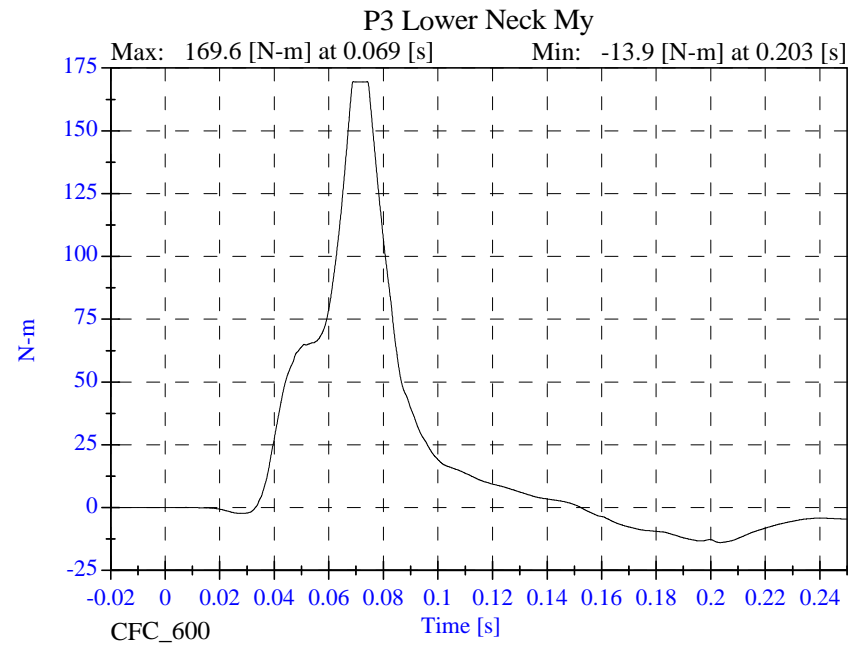
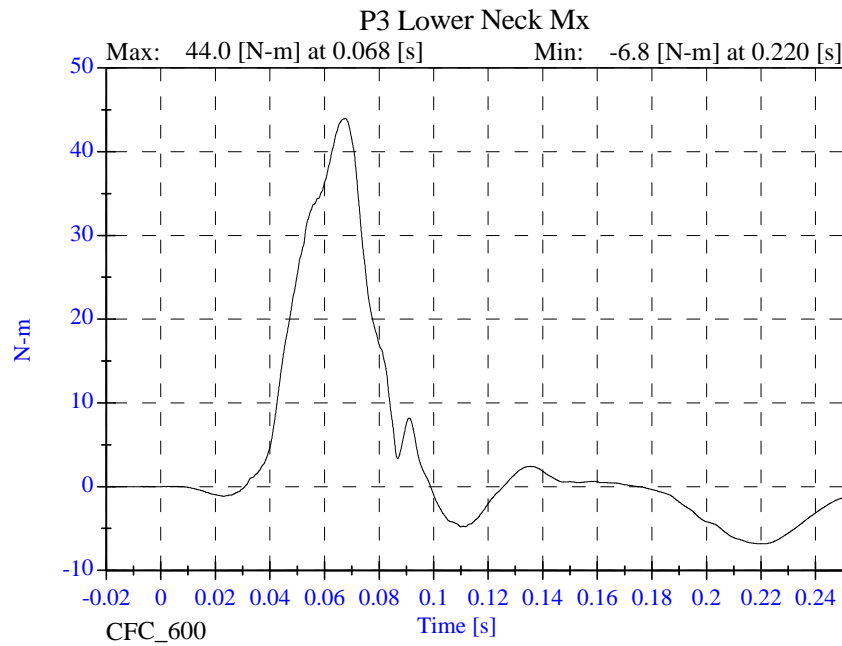
Sled Test NCAP SLED 09-3-45

- September 02, 2003



Sled Test NCAP SLED 09-3-45

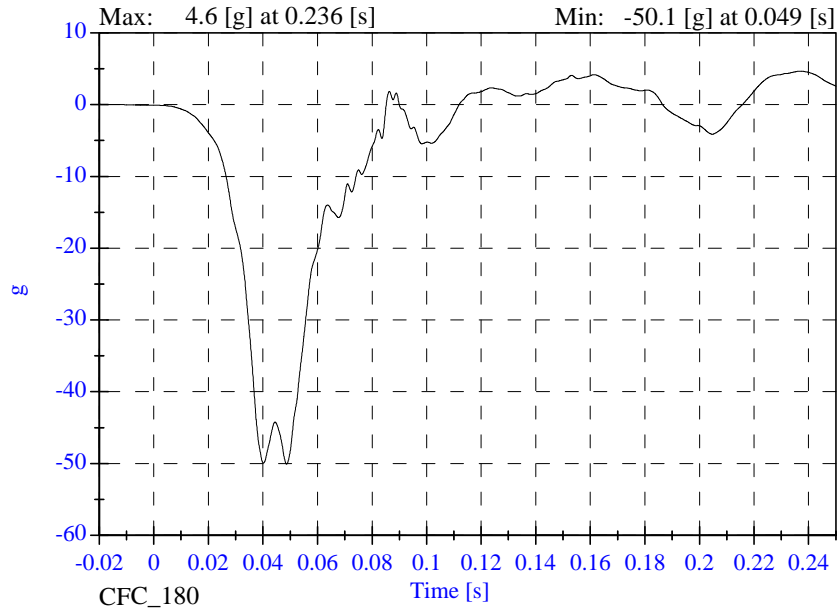
- September 02, 2003



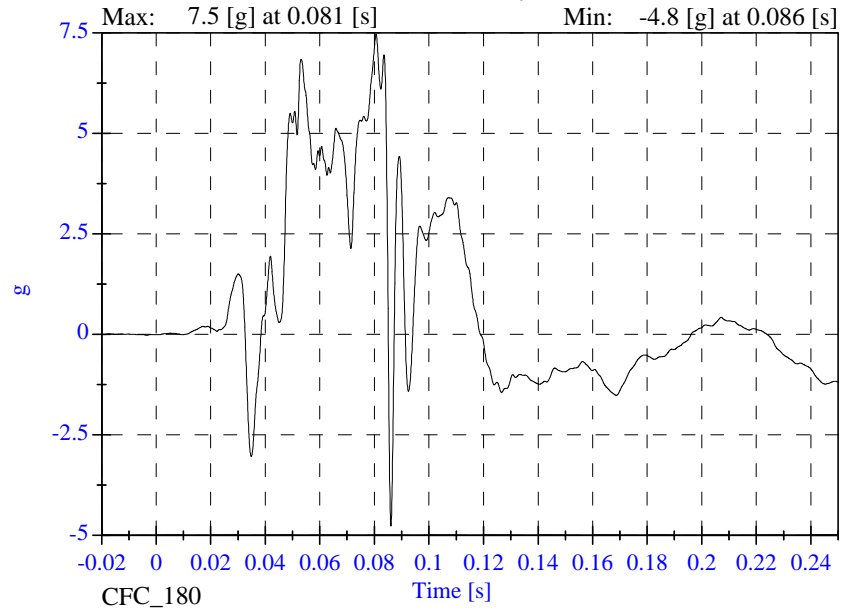
Sled Test NCAP SLED 09-3-45

- September 02, 2003

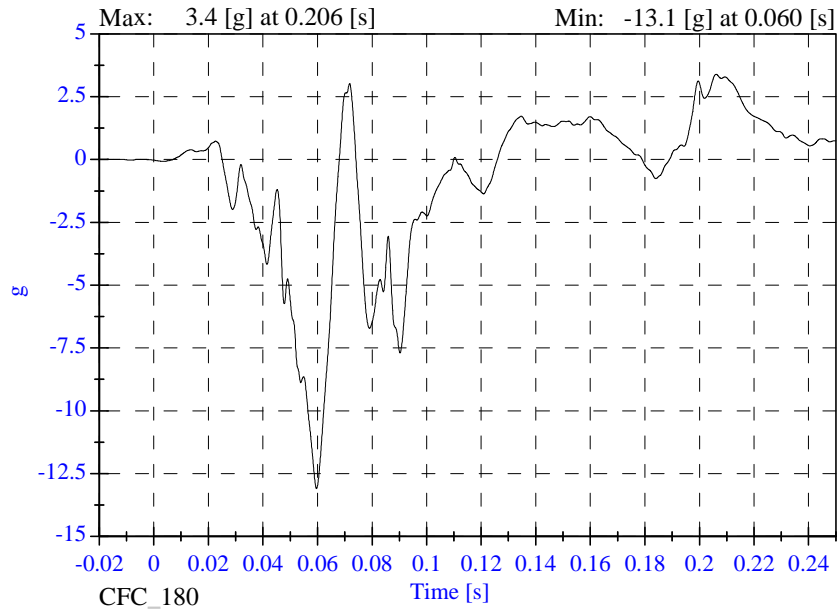
P3 Chest x



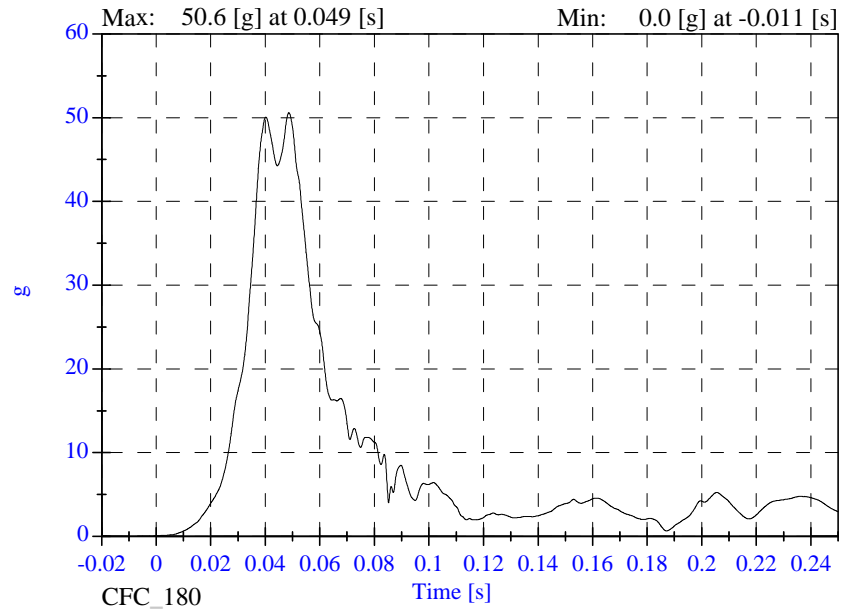
P3 Chest y



P3 Chest z

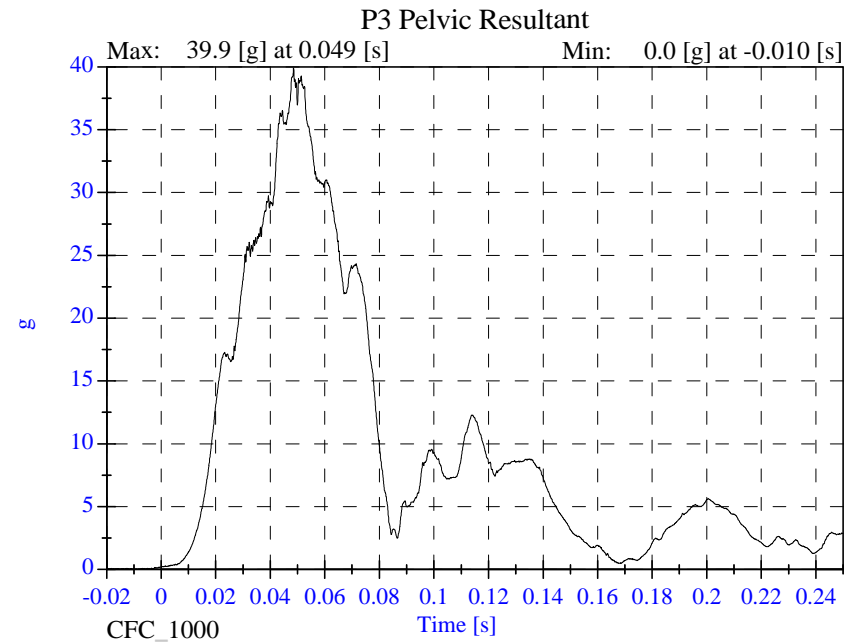
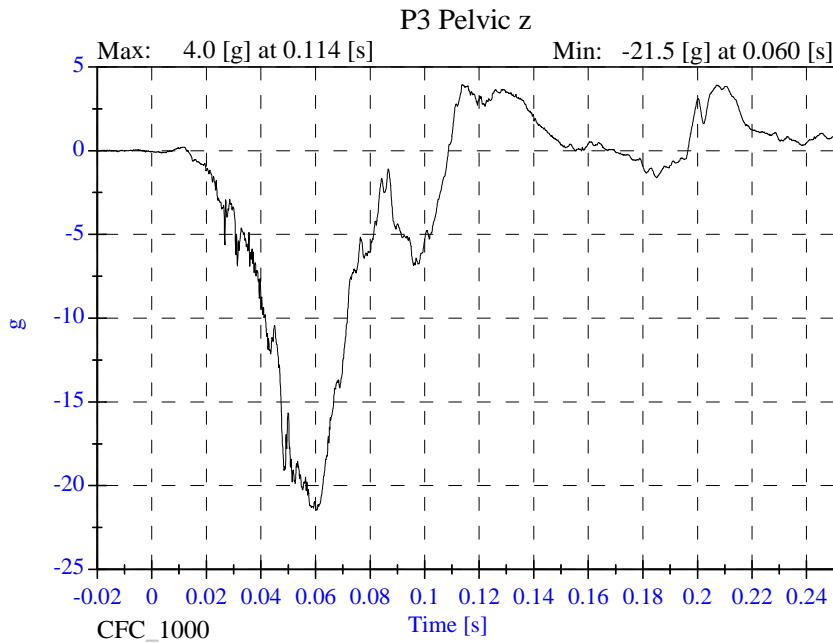
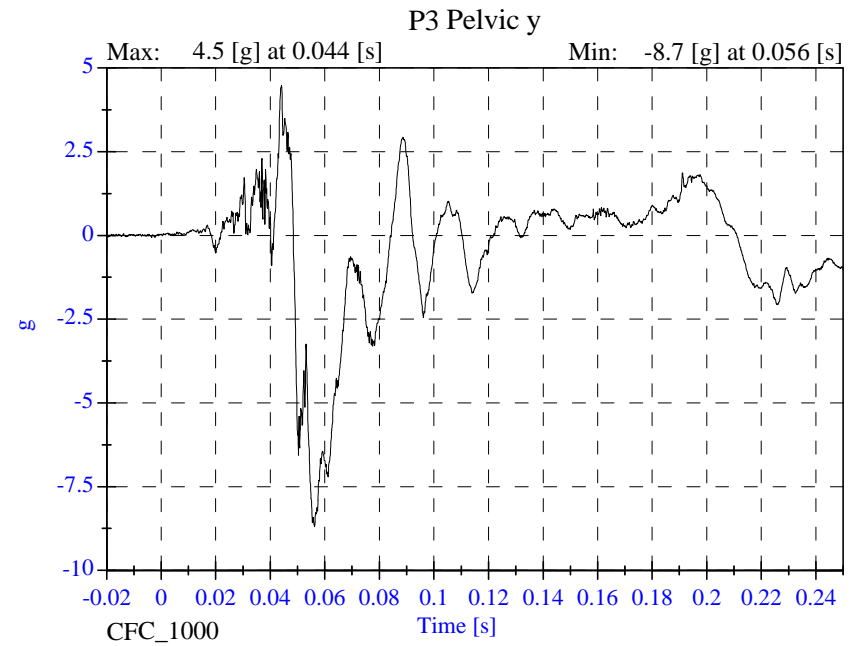
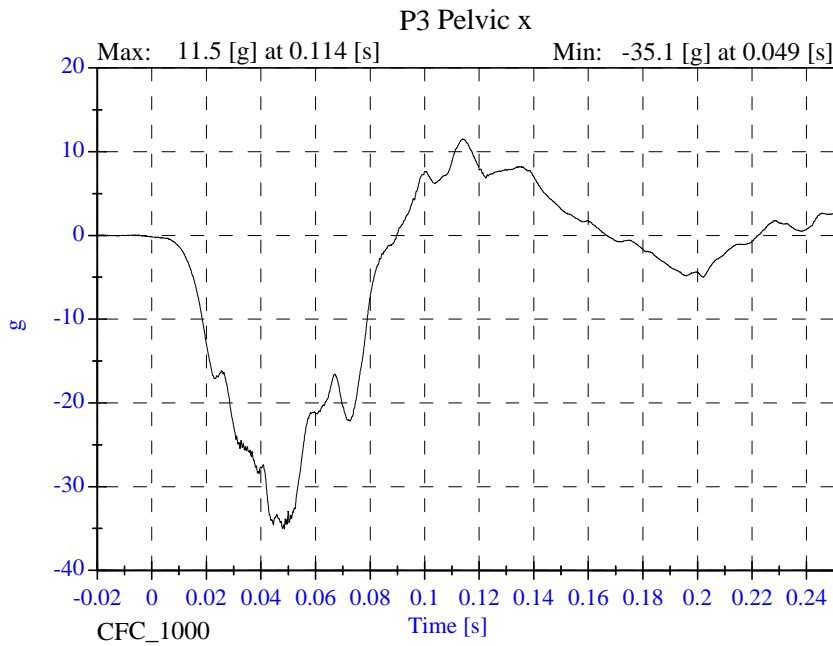


P3 Chest Resultant



Sled Test NCAP SLED 09-3-45

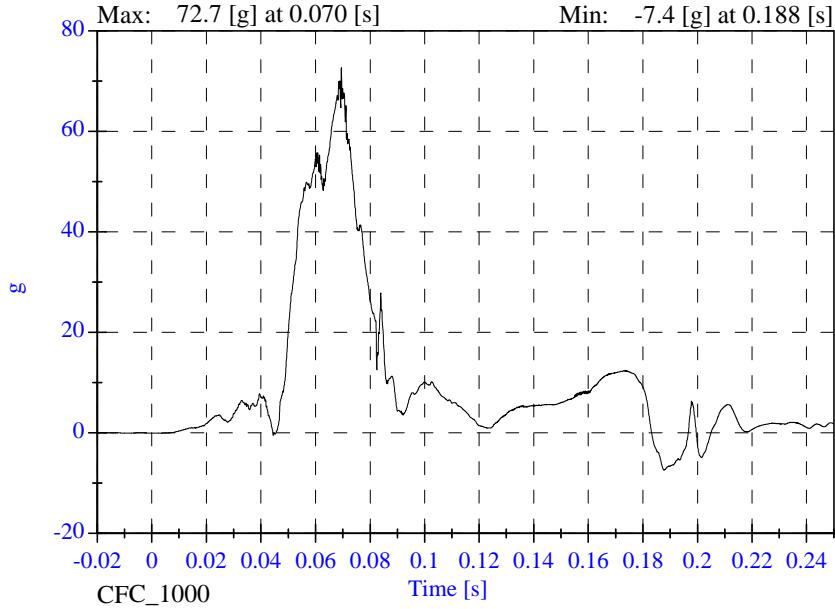
- September 02, 2003



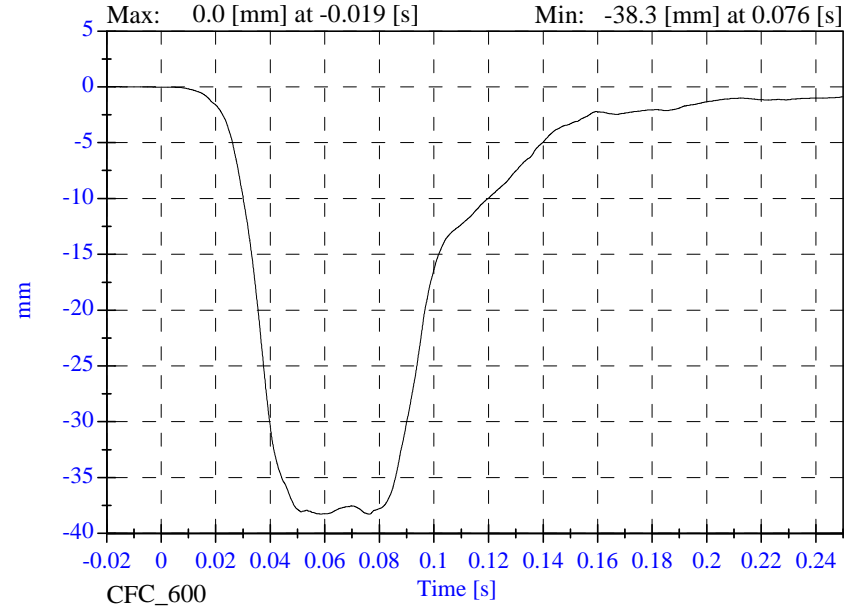
Sled Test NCAP SLED 09-3-45

- September 02, 2003

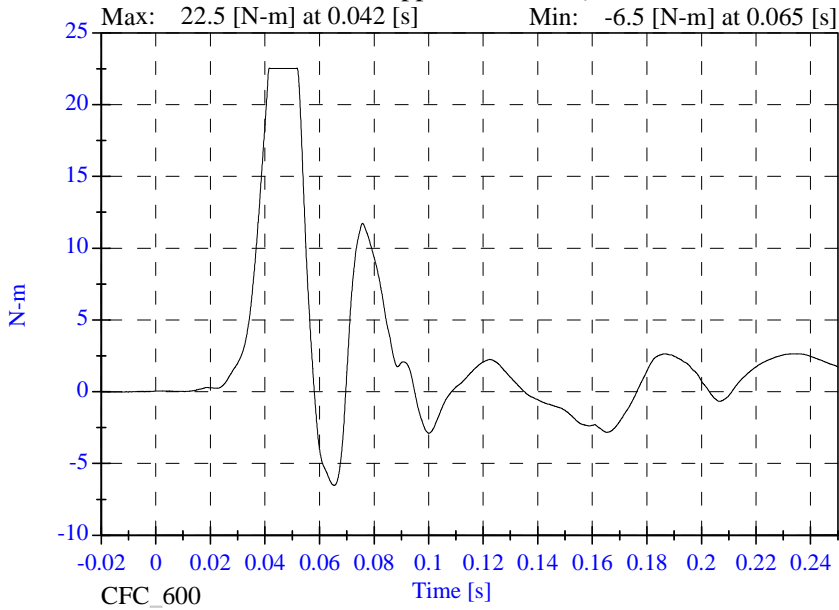
P3 Head Red z



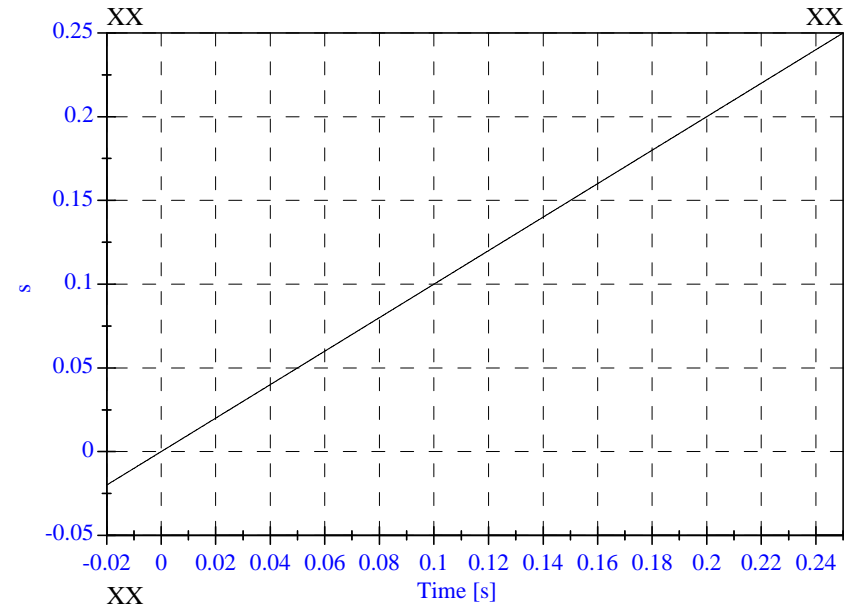
P3 Chest Compression



P3 Upper Neck Mocy

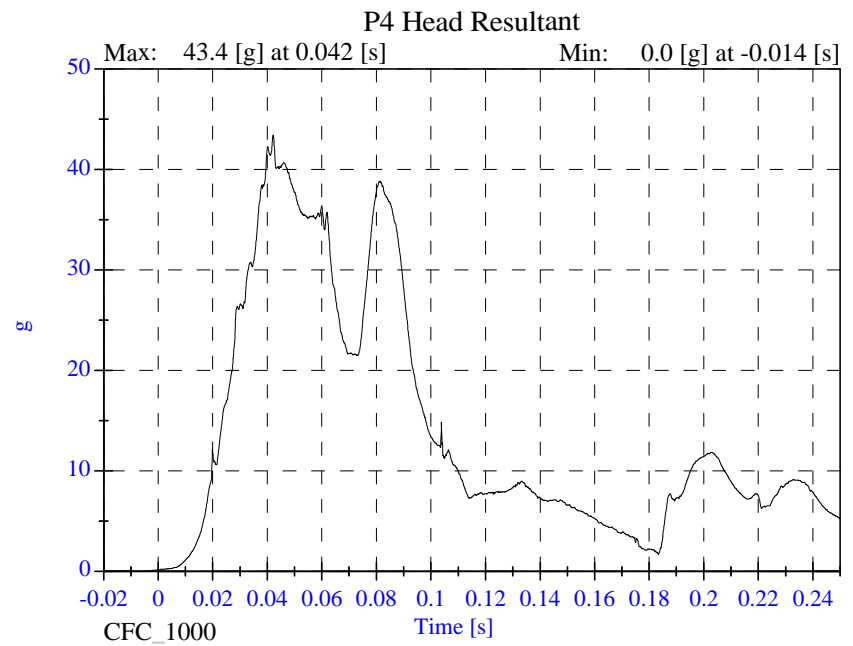
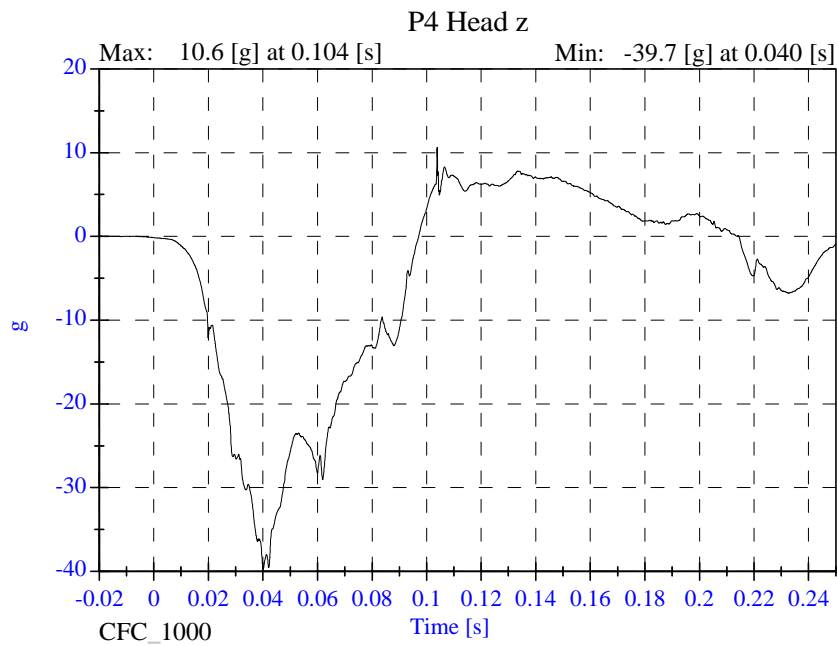
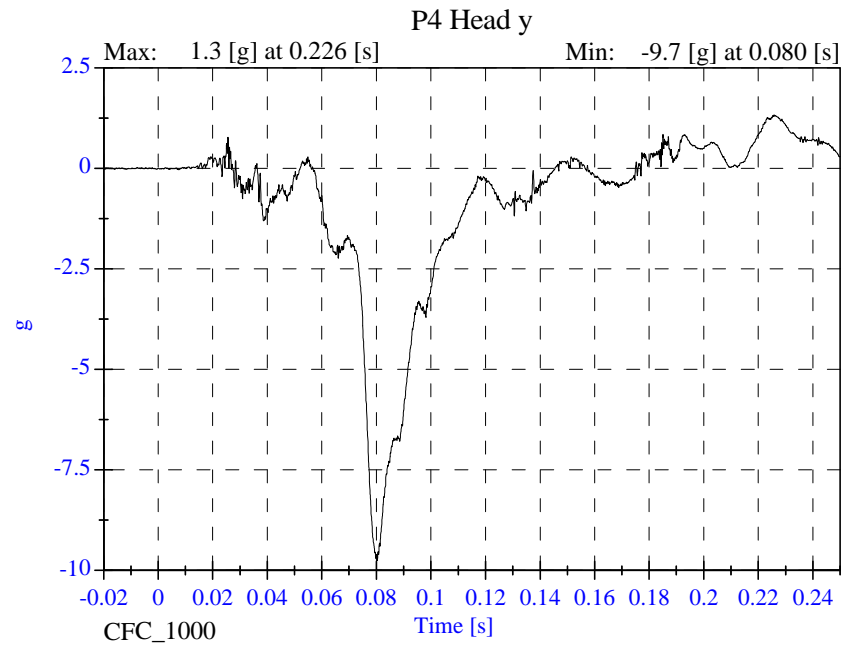
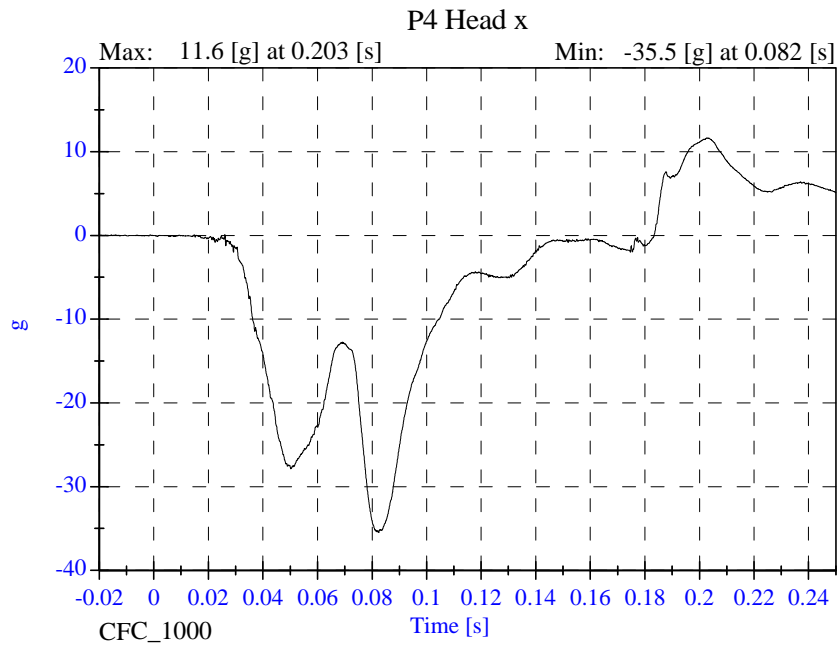


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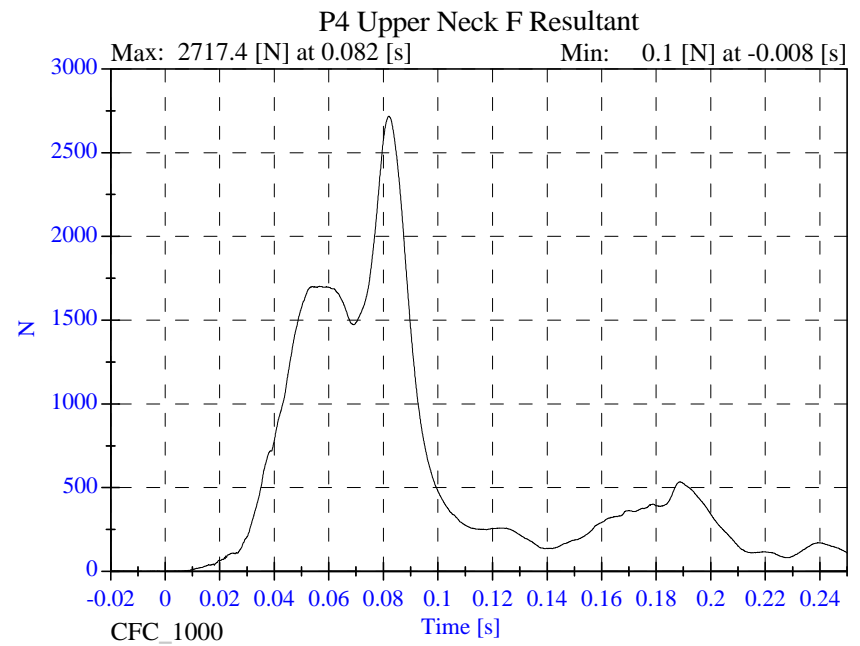
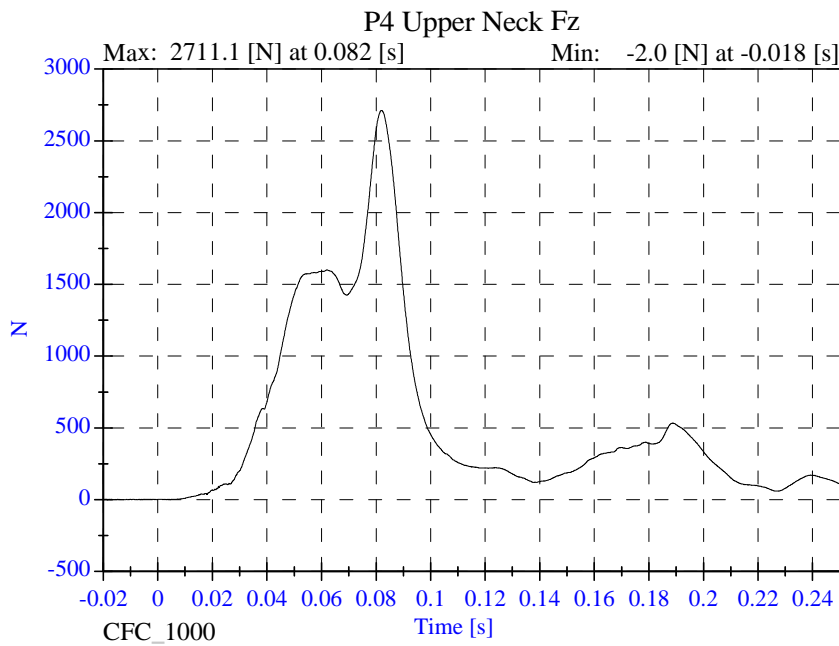
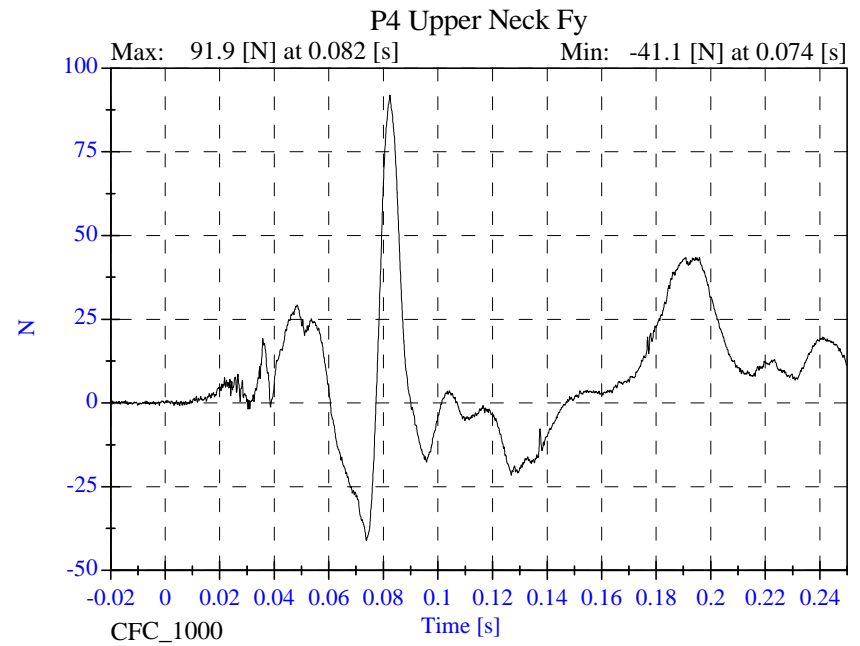
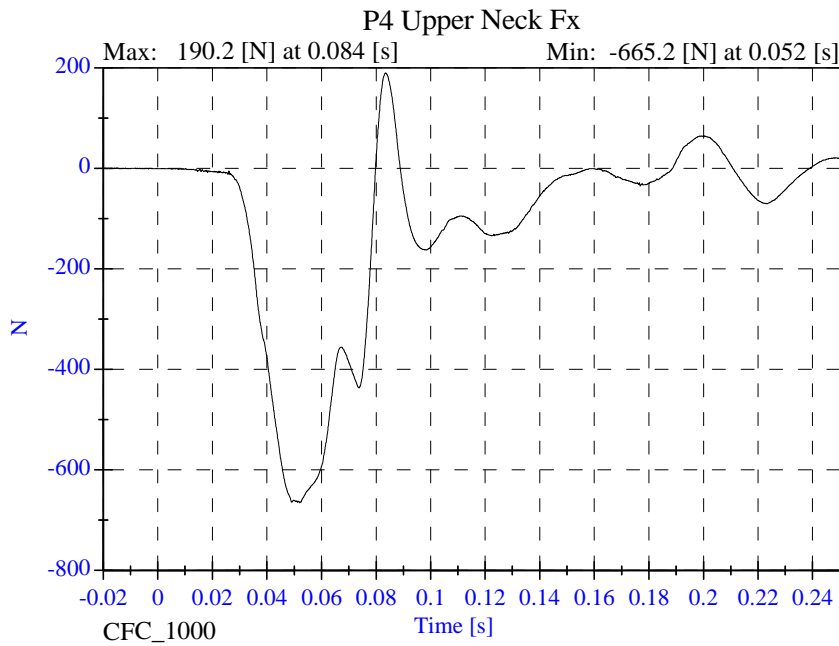
Sled Test NCAP SLED 09-3-45

- September 02, 2003



Sled Test NCAP SLED 09-3-45

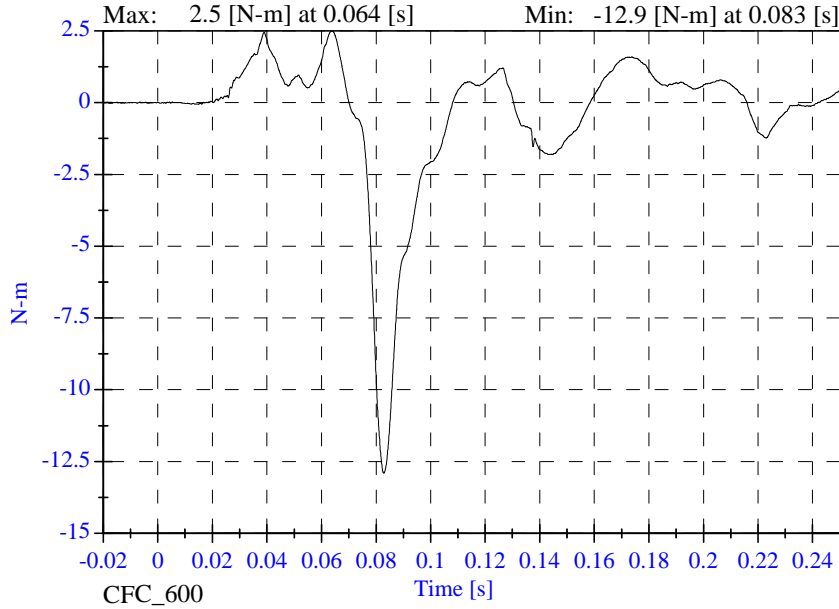
- September 02, 2003



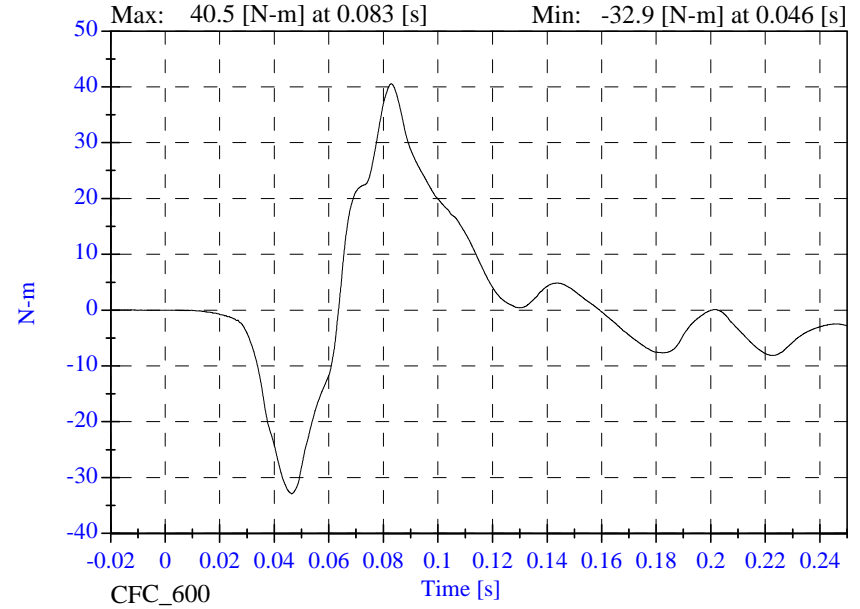
Sled Test NCAP SLED 09-3-45

- September 02, 2003

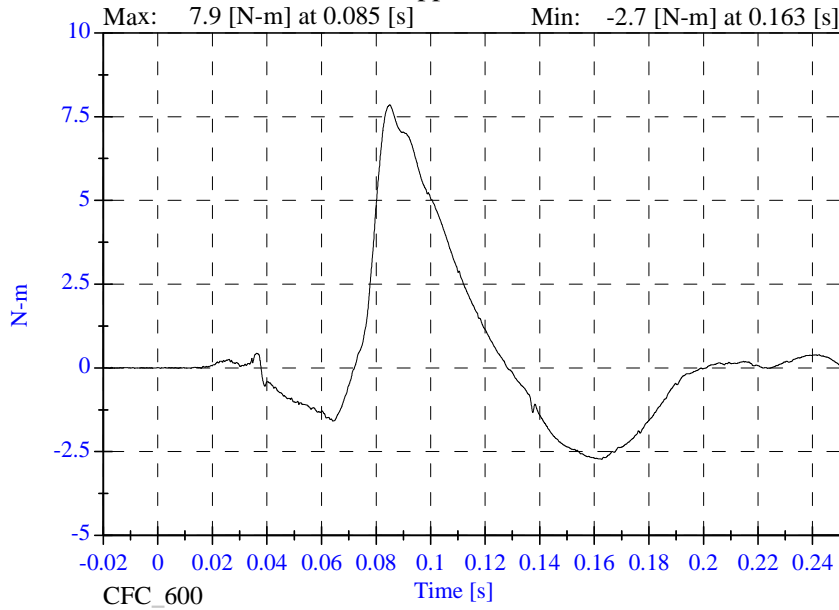
P4 Upper Neck Mx



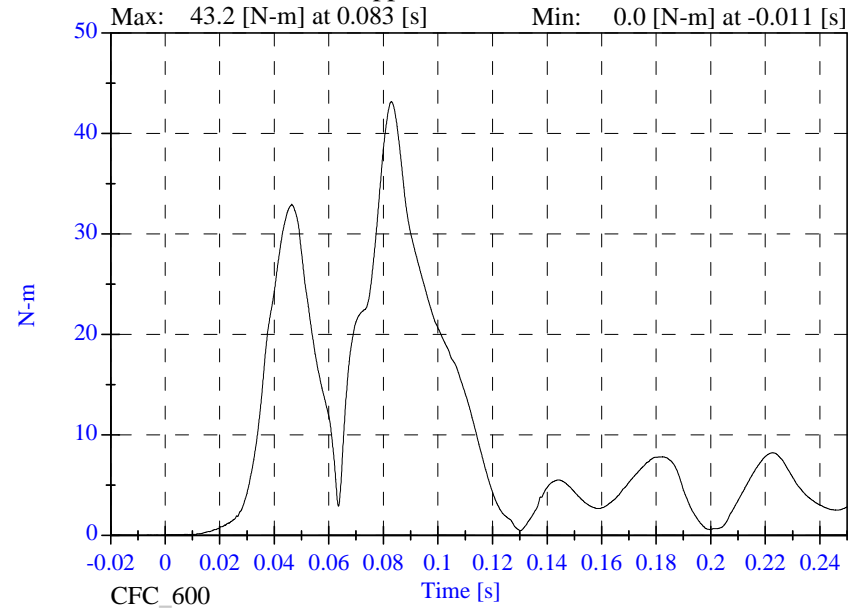
P4 Upper Neck My



P4 Upper Neck Mz



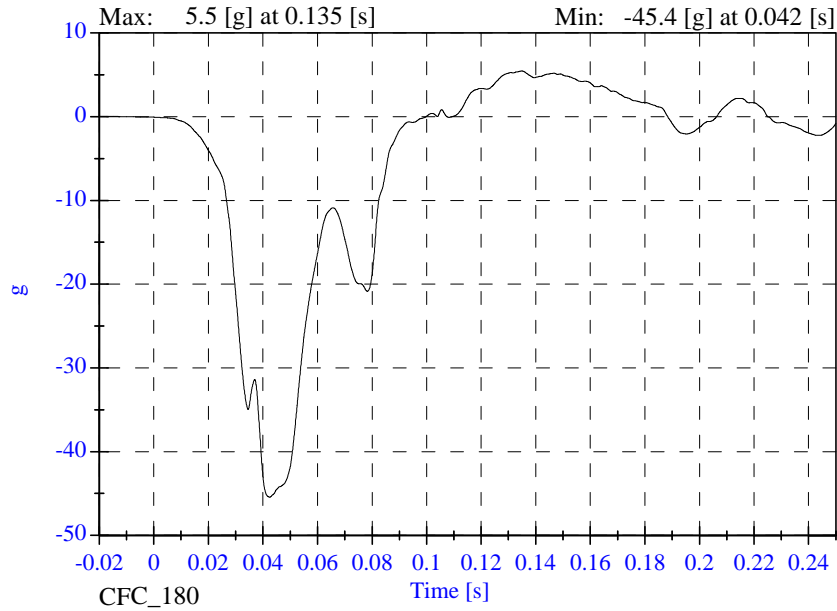
P4 Upper Neck M Resultant



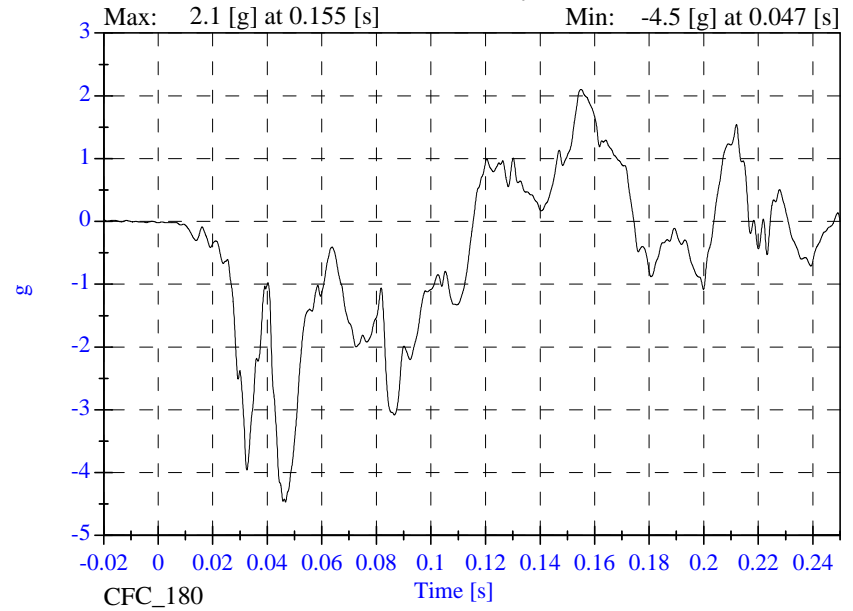
Sled Test NCAP SLED 09-3-45

- September 02, 2003

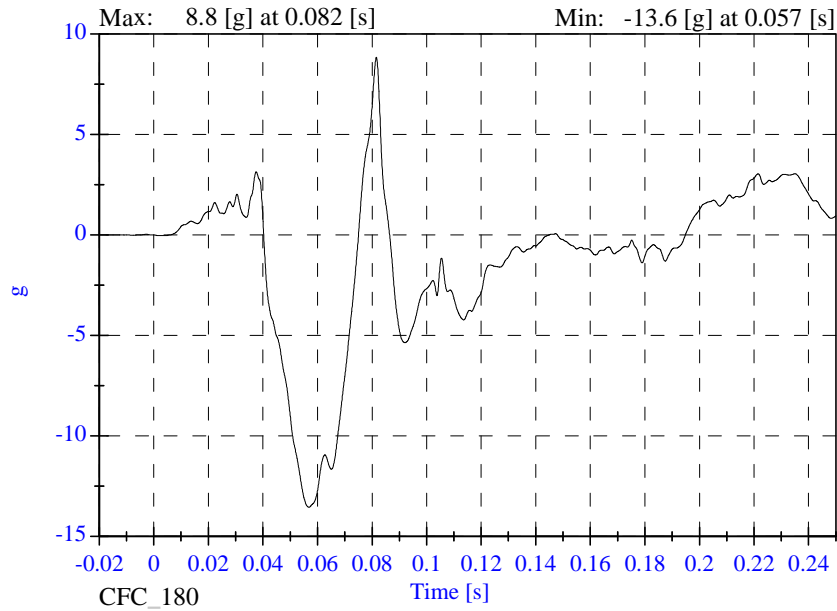
P4 Chest x



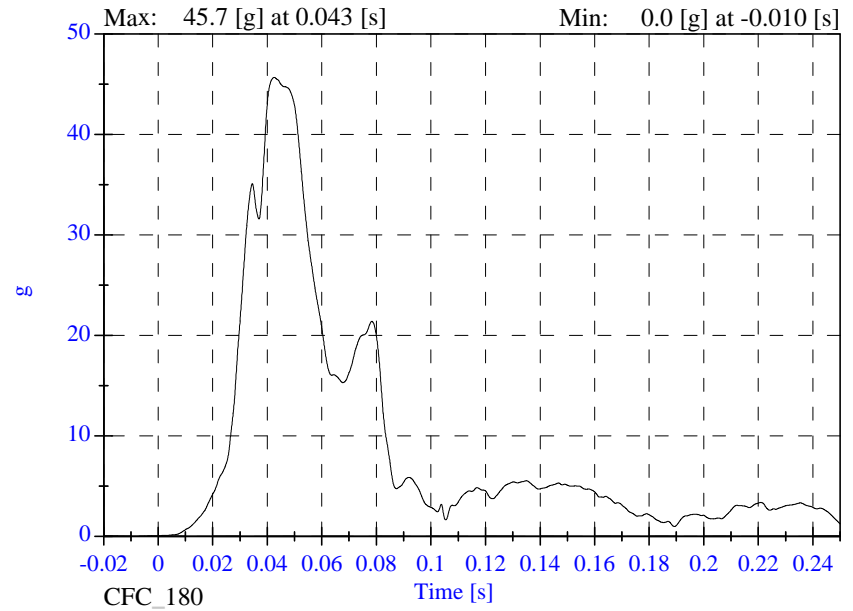
P4 Chest y



P4 Chest z

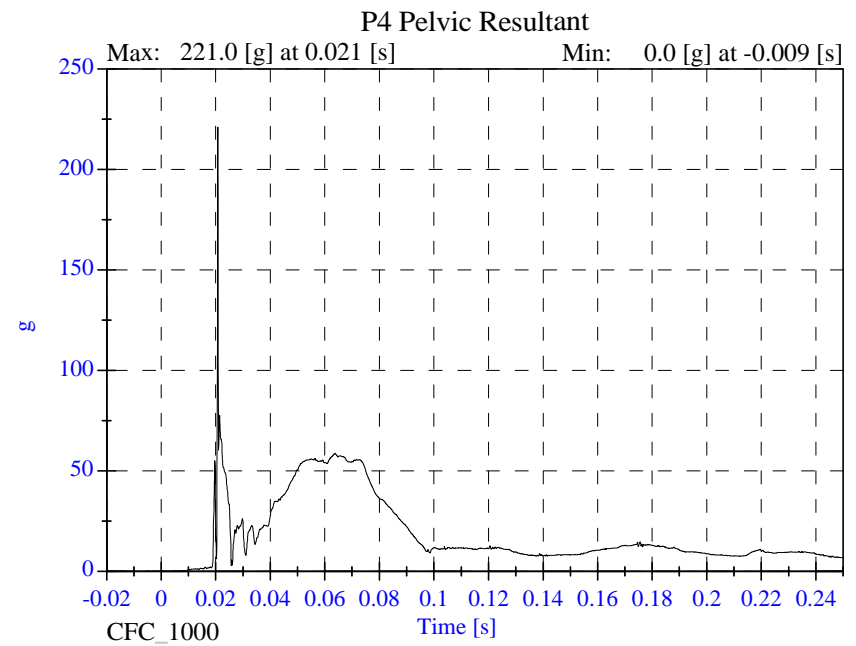
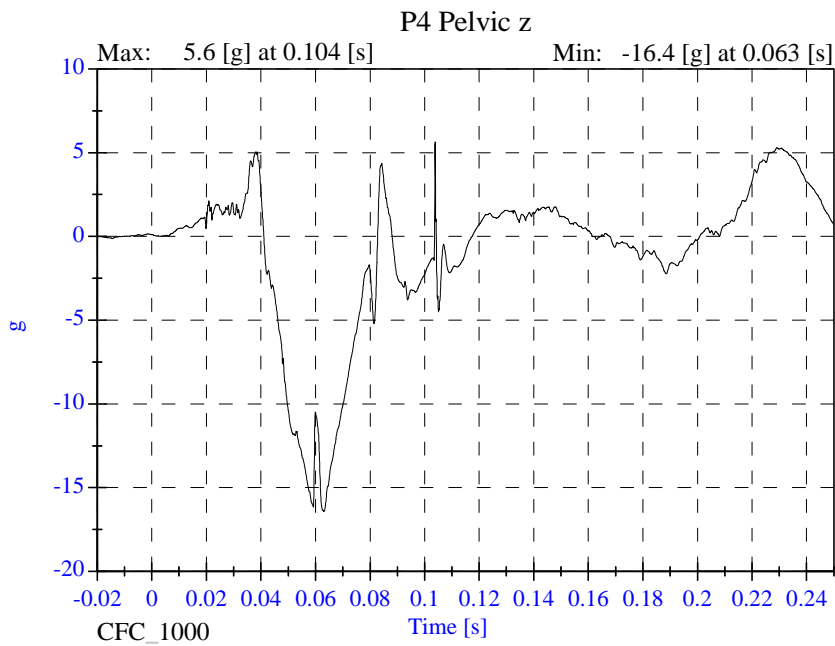
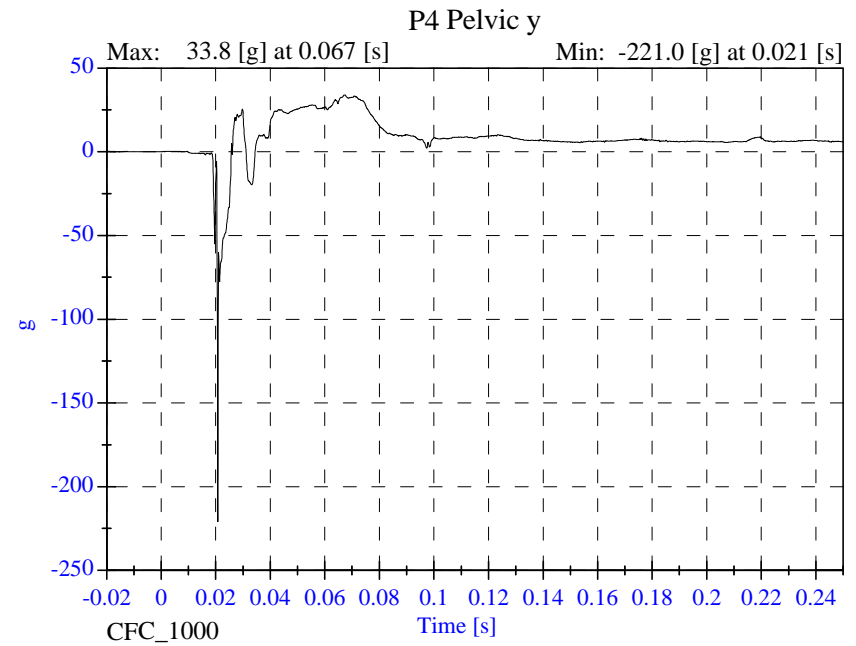
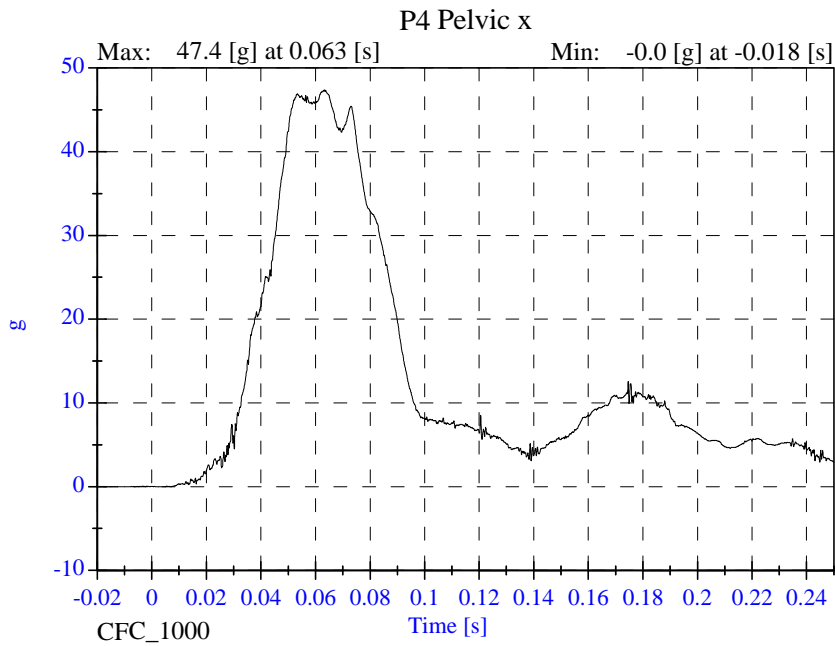


P4 Chest Resultant



Sled Test NCAP SLED 09-3-45

- September 02, 2003

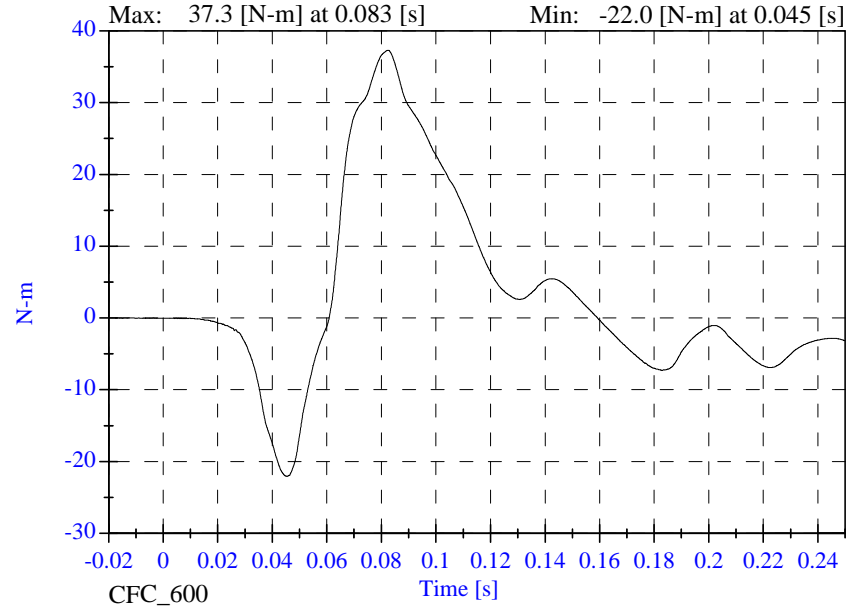
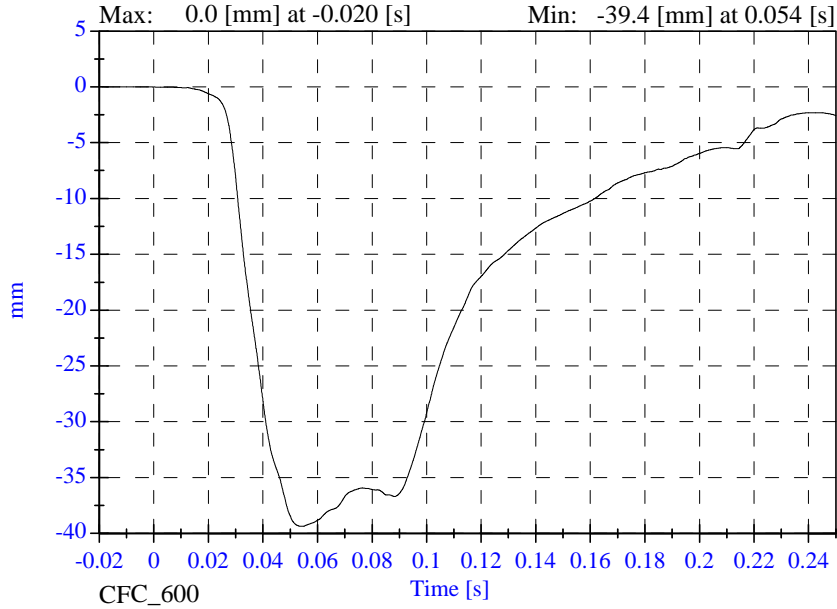


Sled Test NCAP SLED 09-3-45

- September 02, 2003

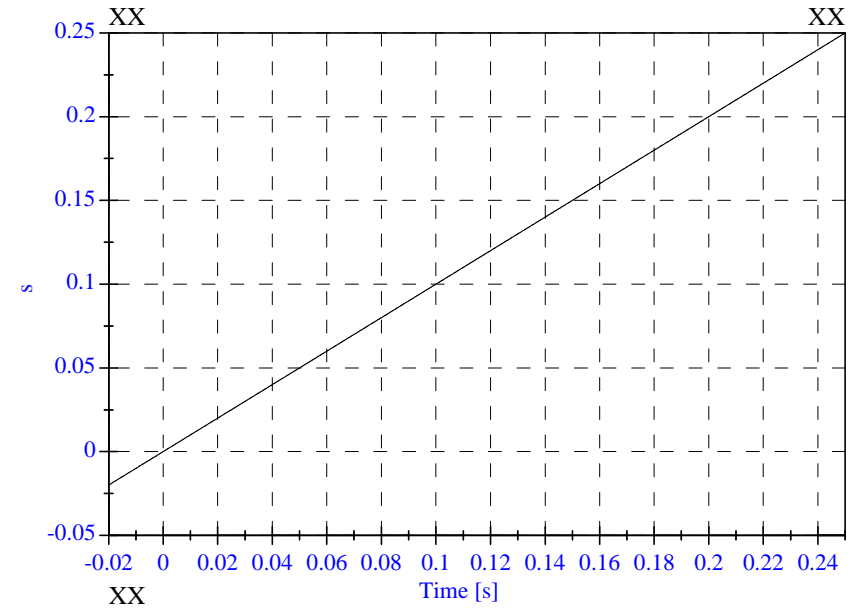
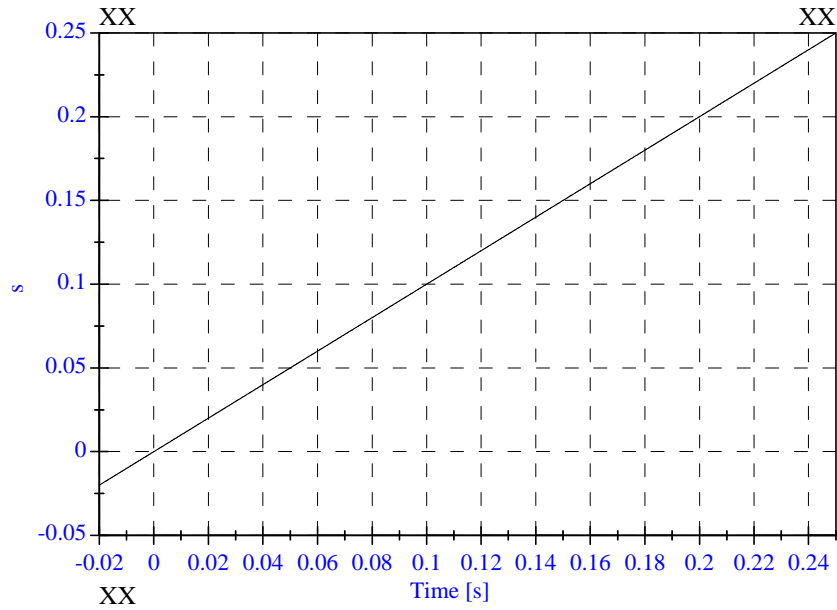
P4 Chest Pot

P4 Upper Neck Mocyc



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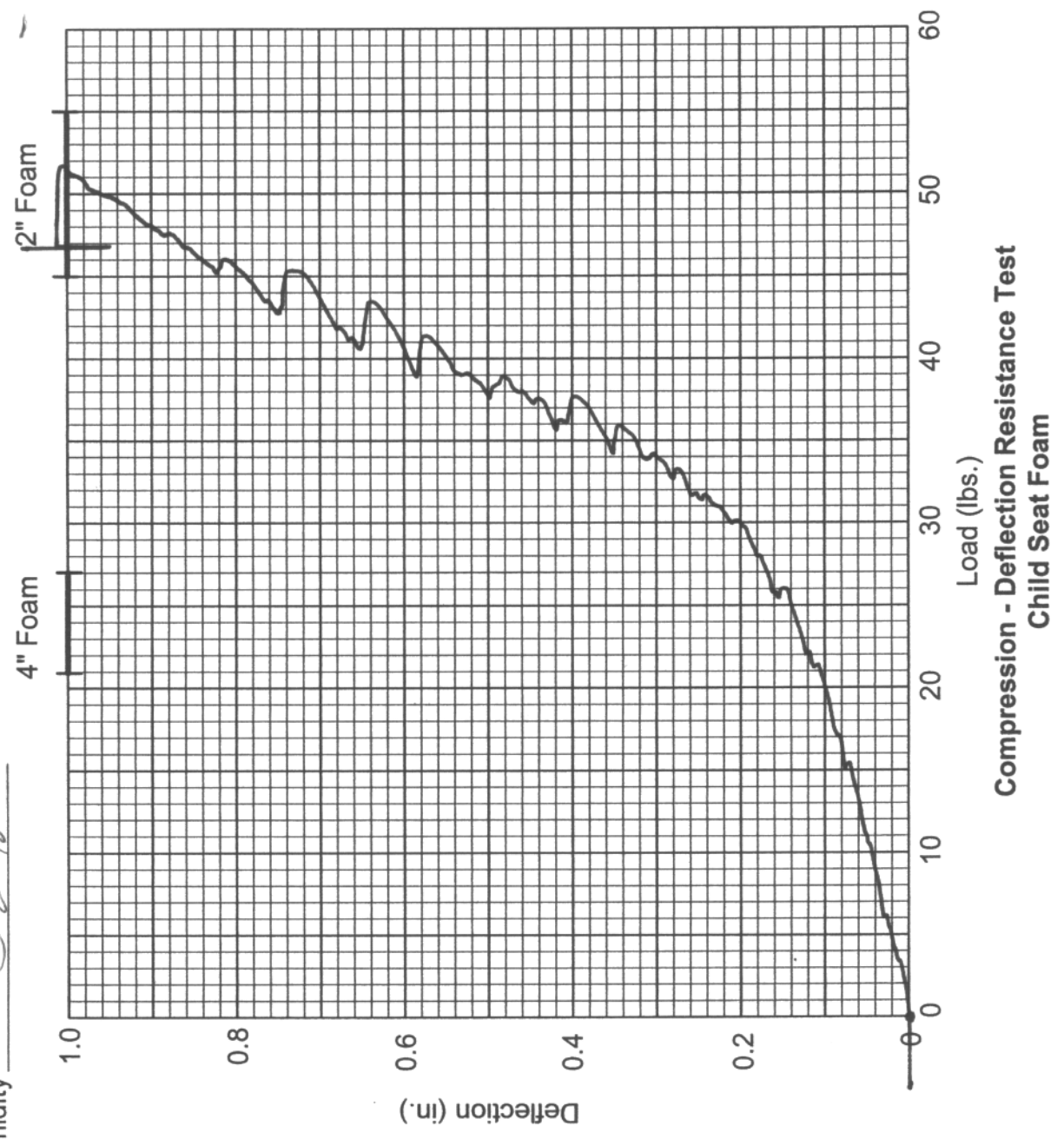


SECTION 9

Compression – Deflection Resistance Test

Foam No. 2x20" x 29 1/8"

Date 9/2/03
Performed By [Signature]
Temp. 77.0
Humidity 50%



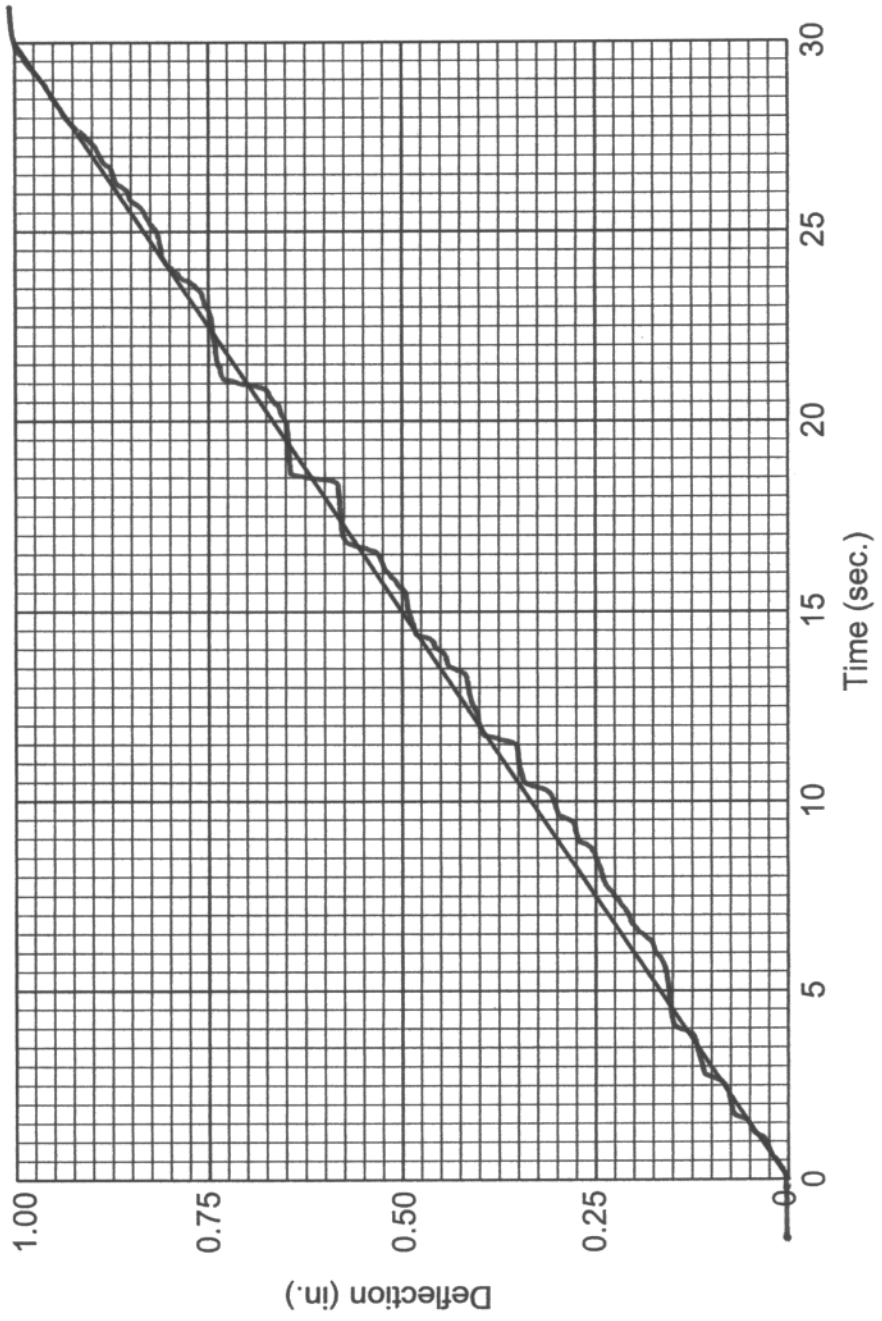
Compression - Deflection Resistance Test
Child Seat Foam

Date 9/2/03

Temp 70°

Humidity 50%

Foam No. 2" X 20" 2" X 24" IB




Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

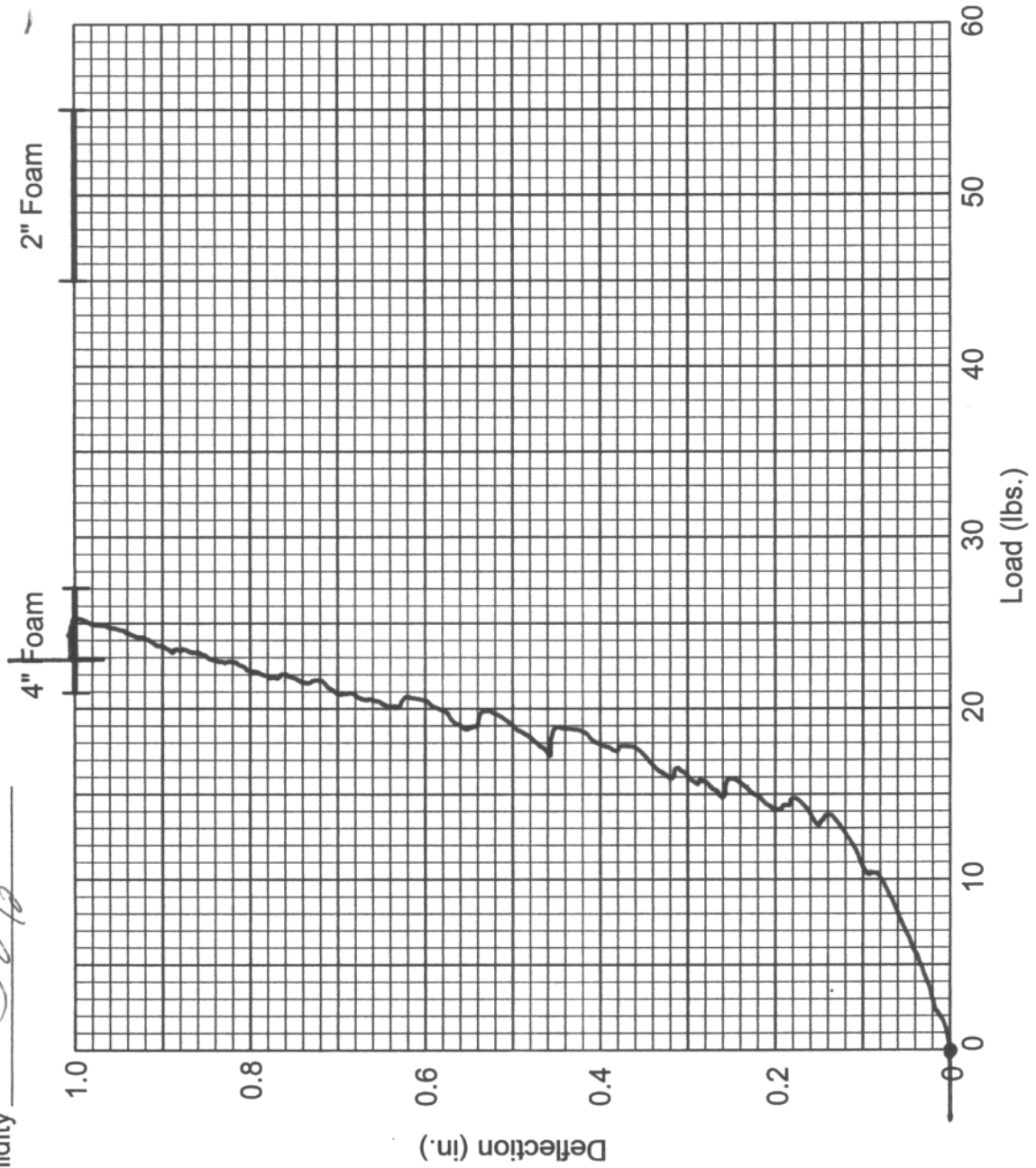
2" X 20" 2" X 29" IB

Foam I.D. Number _____

Date	Peak Load	Pass/Fail
9/2/03	476BS	

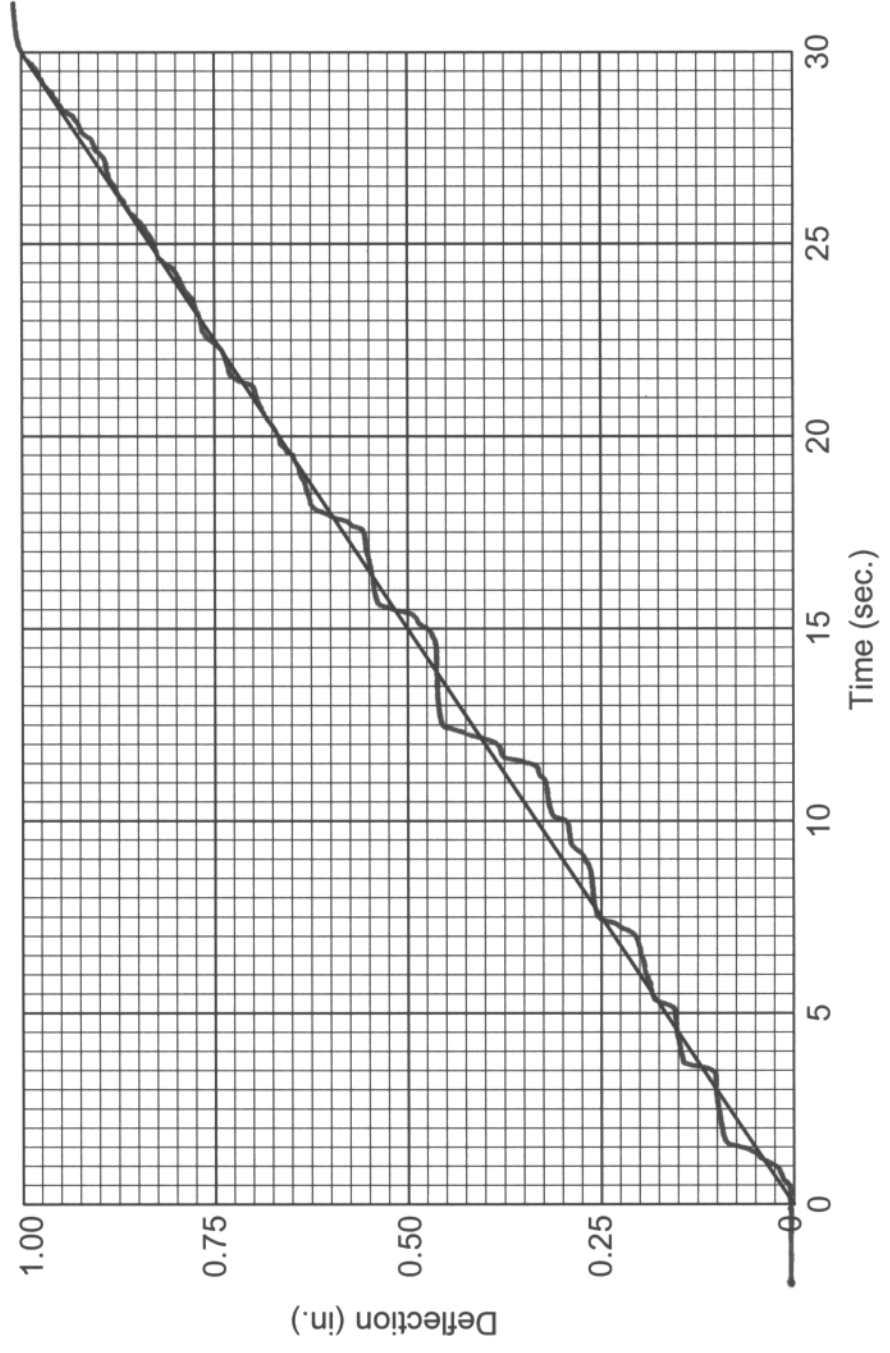
Date 9/2/09
Performed By SDA
Temp. 70°
Humidity 50%

Foam No. 4" X 20" I B



Compression - Deflection Resistance Test
Child Seat Foam

Date 9/2/03
 Temp 70°
 Humidity 50%
 Foam No. 4" X 20" I8



Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

4" X 20" I8

Foam I.D. Number

Date	Peak Load	Pass/Fail
9/2/03	23435	Pass

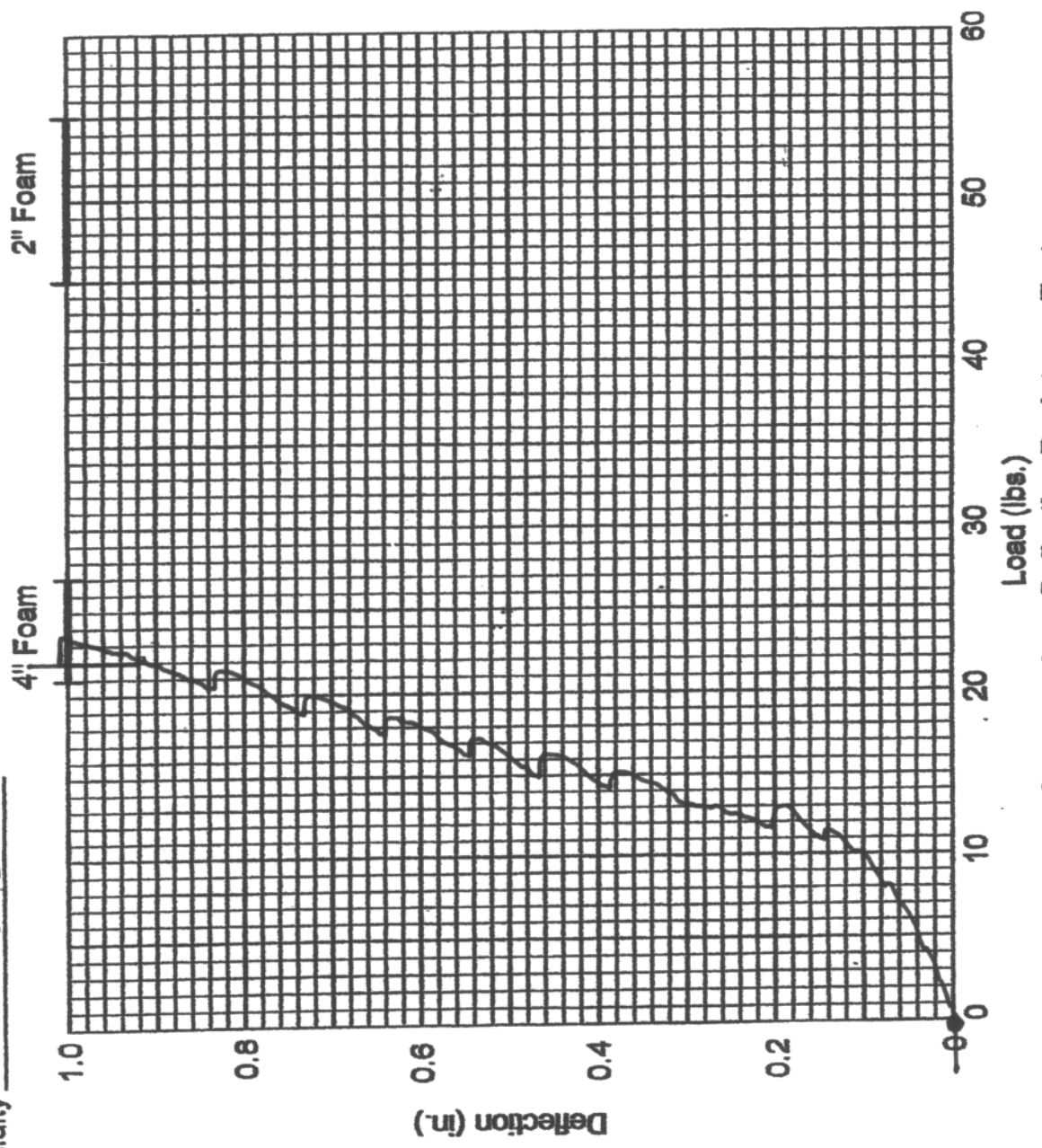
Foam No. 4" X 24" I-B

Date 9/2/93

Performed By SDG

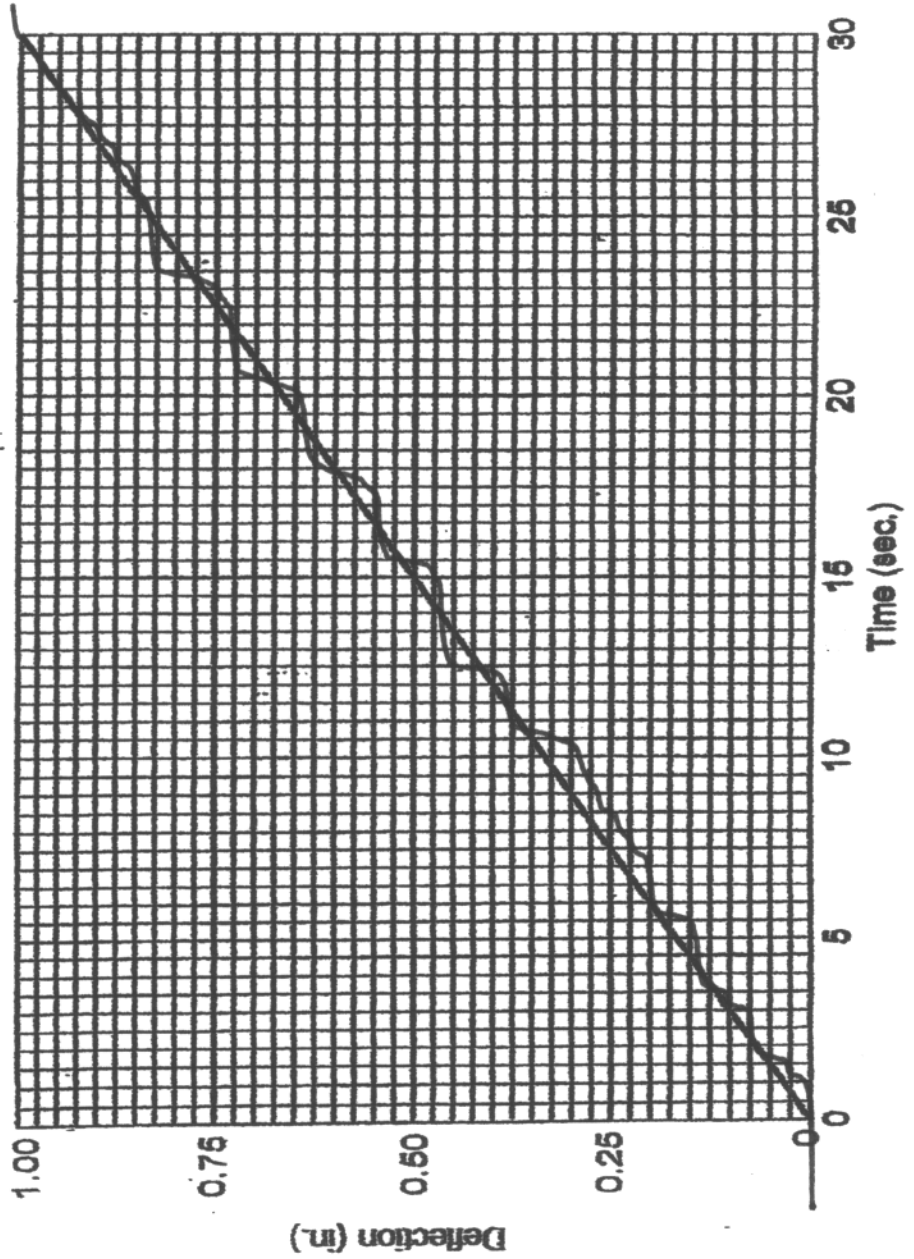
Temp. 70°

Humidity 50%



Compression - Deflection Resistance Test
Child Seat Foam

Date 2/2/03
Temp 17.9°
Humidity 50%
Foam No. 4" X 24" I8




Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

4" x 24" I8

Foam I.D. Number

Date	Peak Load	Pass/Fail
9/2/03	22 LBS	

SECTION 10

Child Dummy Calibration Data Traces and Tables

HYIII 3 Year Old Head Drop Test S/N:044

Part 572P Head Drop

Calibration Date:

July 22, 2003

Serial No: 044

Work File:

4001

-----TEST RESULTS-----

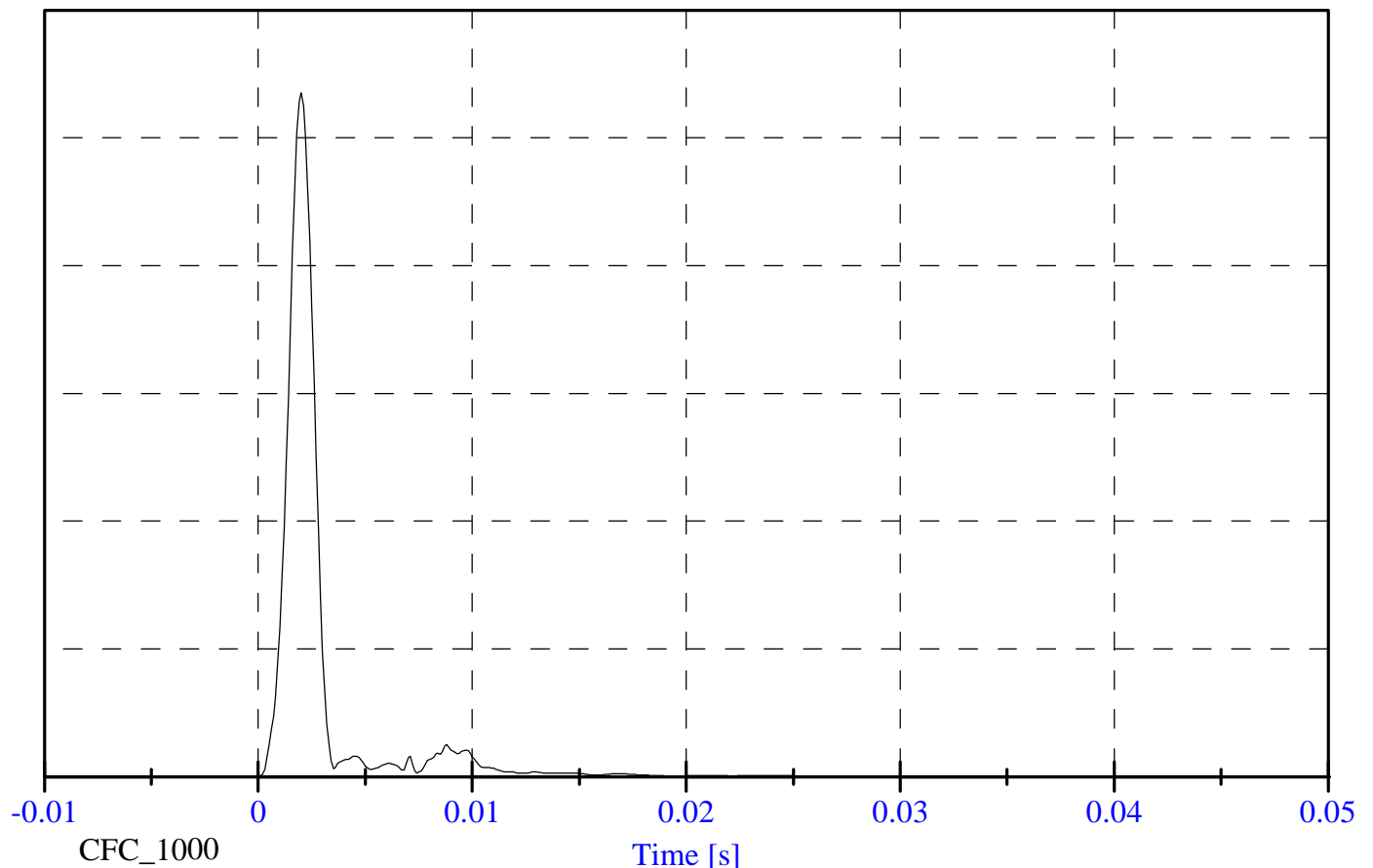
<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	66.0-78.0 F	70.0 F	Passed
Lab Humidity:	10-70 %	35.00 %	Passed
Peak Resultant Accel.:	250-280 Gs	267.66 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	5.53 Gs	Passed
Curve PerCent NonModal:	< 10%	6.05 %	Passed

HYIII 3 Year Old Head Drop Test S/N:044

Head Resultant

Max: 267.7 [g] at 0.002 [s]

Min: 0.0 [g] at -0.080 [s]



Hybrid III Head Neck Extention Test S/N:044

Part 572P Neck Extension Test Calibration Date: July 22, 2003
Serial No: 144 Work File: 4001

-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	69.0-72.0 F	70.00 F	Passed
Lab Humidity:	10-70 %	35.00 %	Passed
Test Pendulum Speed:	11.58-12.38 ft/s	12.30 ft/s	Passed

-----PENDULUM PULSE-----

Pulse at 6 ms:	3.30- 4.60 ft/s	3.89 ft/s	Passed
Pulse at 10 ms:	6.20- 8.20 ft/s	6.94 ft/s	Passed
Pulse at 14 ms:	9.20-11.50 ft/s	9.47 ft/s	Passed

-----D PLANE ROTATION-----

Maximum Rotation:	83.0-93.0 Deg	86.18 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	-53.30--43.70 N-m	-45.61 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	71.60 ms	Passed

Hybrid III 3 Year Old Head Neck Flexion Test S/N:044

Part 572P Neck Flexion Test Calibration Date: July 22, 2003
Serial No: 044 Work File: 4001

-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.11 C	Passed
Lab Humidity:	10-70 %	36.00 %	Passed
Test Pendulum Speed:	5.40- 5.60 m/s	5.60 m/s	Passed

-----PENDULUM PULSE-----

Pulse at 10 ms:	2.00- 2.70 m/s	2.13 m/s	Passed
Pulse at 15 ms:	3.00- 4.00 m/s	3.10 m/s	Passed
Pulse at 20 ms:	4.00- 5.10 m/s	4.20 m/s	Passed

-----D PLANE ROTATION-----

Maximum Rotation:	70.0-82.0 Deg	81.53 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	42.00- 53.00 N-m	47.85 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	74.00 ms	Passed

Hybrid III 3 Year Old Thorax Test S/N:044

Part 572P Thorax Impact

Calibration Date: July 22, 2003

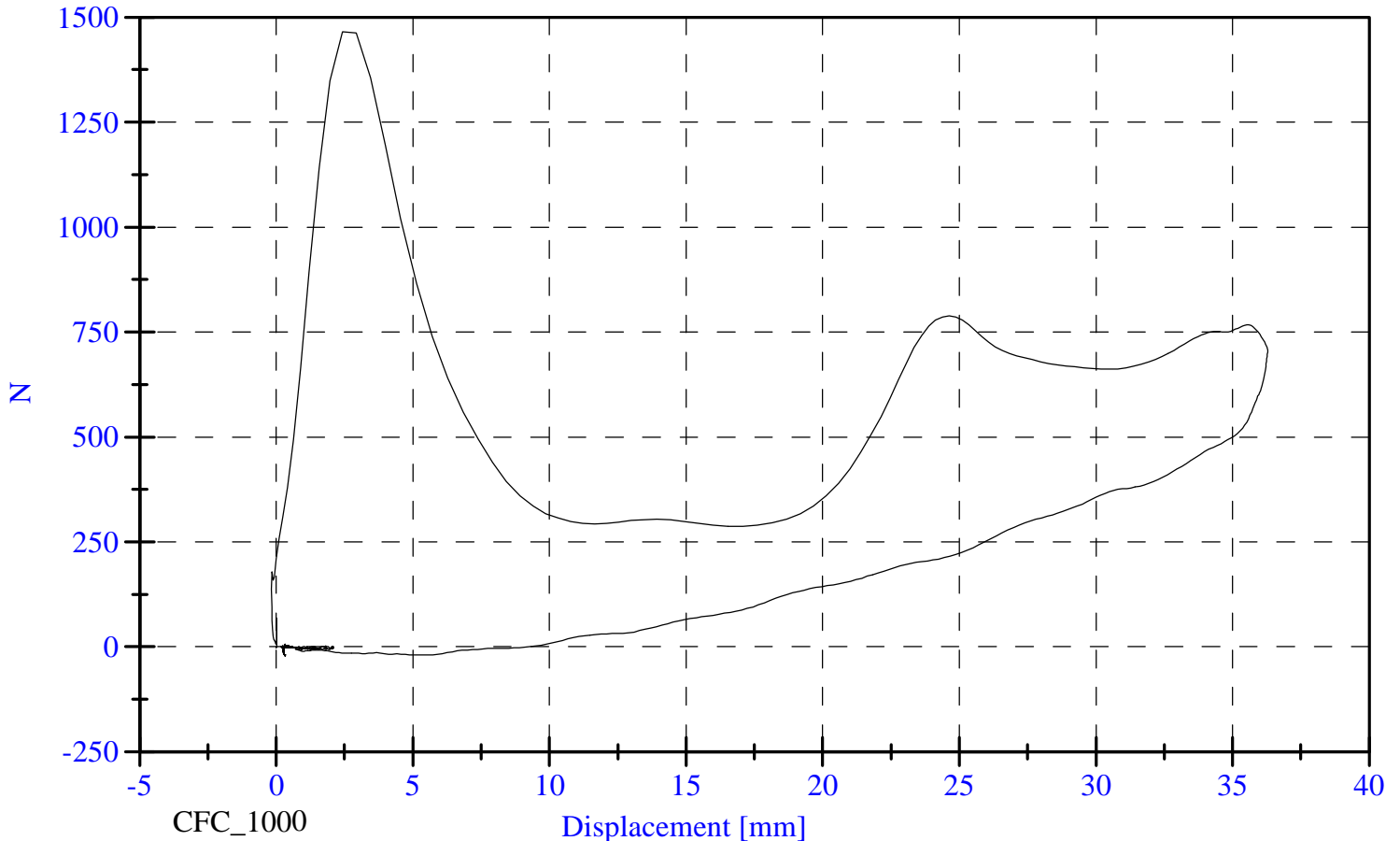
Serial No: 044

Work File: 4001

-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	36.00 %	Passed
Pendulum Velocity:	5.90- 6.10 m/s	6.08 m/s	Passed
Maximum Deflection:	32.00-38.00 mm	36.28 mm	Passed
Maximum Res. Force:	680.00- 810.00 N	767.48 N	Passed
Internal Hysteresis:	65-85 %	73.20 %	Passed
Pass Sternum Force Criteria?:	860.00 N	788.71	Passed

Hybrid III 3 Year Old Thorax Test S/N:044 Probe Force vs. Displacement
 Max: 1465.5 [N] at 2.421 [mm]
 Min: -21.7 [N] at 0.325 [mm]



Head Drop

Part 572N Head Drop

Calibration Date: 07-31-03

Serial No: 182

Work File: 182H 07-31-03

-----TEST RESULTS-----

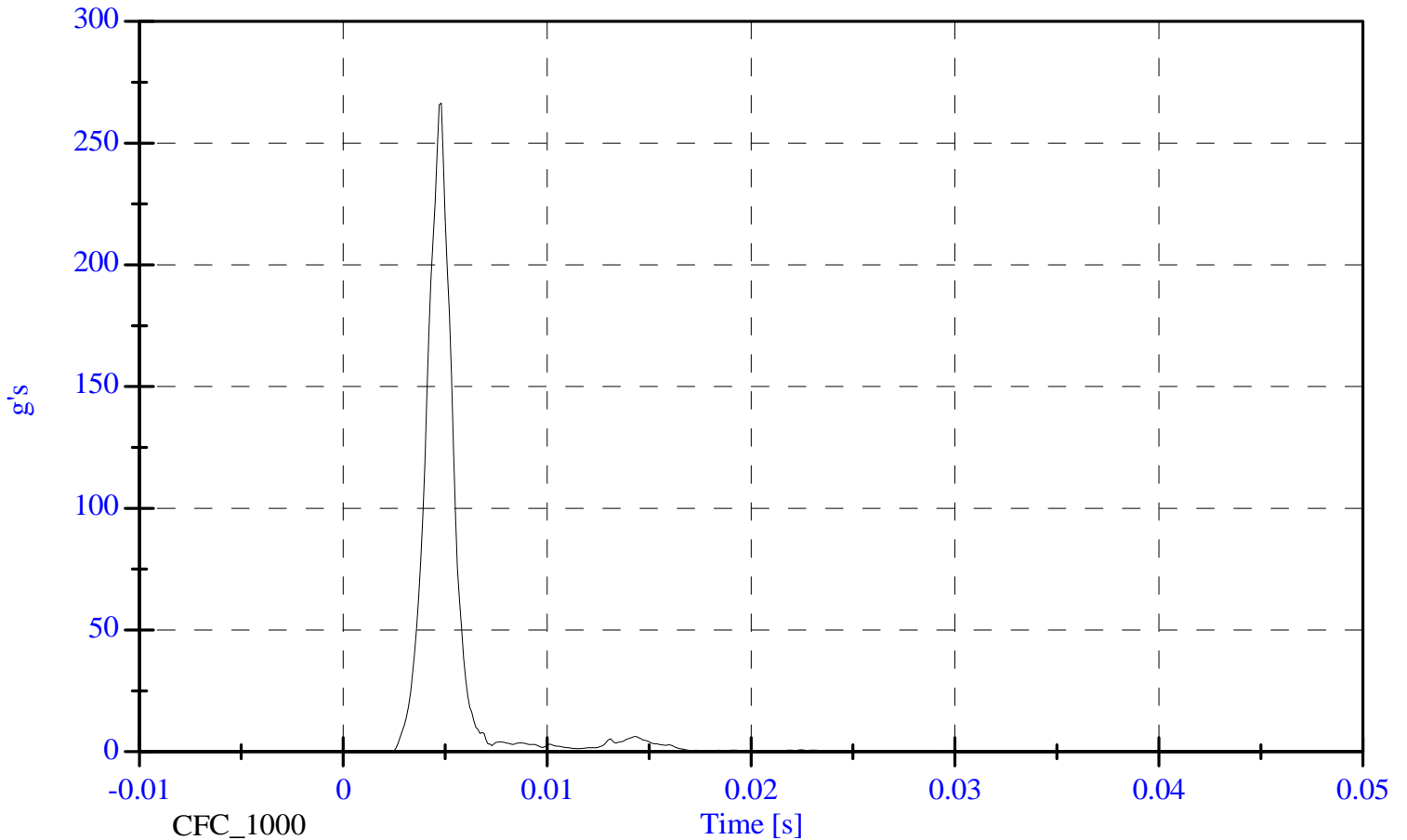
<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	66.0-78.0 F	70.0 F	Passed
Lab Humidity:	10-70 %	29.00 %	Passed
Peak Resultant Accel.:	245-300 Gs	266.52 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	13.92 Gs	Passed
Curve PerCent NonModal:	< 10%	2.97 %	Passed

Head Drop

Head Resultant

Max: 266.5 [g's] at 0.005 [s]

Min: 0.0 [g's] at 0.050 [s]



Neck Extension

Part 572N Neck Extension Test Calibration Date: 08-01-03
Serial No: 182 Work File: 182NE1 08-01-03

-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.11 C	Passed
Lab Humidity:	10-70 %	33.00 %	Passed
Test Pendulum Speed:	4.18- 4.42 m/s	4.27 m/s	Passed

-----PENDULUM PULSE-----

Pulse at 10 ms:	1.00- 1.40 m/s	1.39 m/s	Passed
Pulse at 20 ms:	2.20- 3.00 m/s	2.82 m/s	Passed
Pulse at 30 ms:	3.20- 4.20 m/s	4.07 m/s	Passed

-----D PLANE ROTATION-----

Maximum Rotation:	85.0-103.0 Deg	94.77 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	-24.00--19.00 N-m	-22.95 N-m	Passed
Occipital Moment Decay:	123.0-147.0 ms	128.20 ms	Passed

Neck Flexion

Part 572N Neck Flexion Test Calibration Date: 08-01-03
Serial No: 182 Work File: 182NF 08-01-03

-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.11 C	Passed
Lab Humidity:	10-70 %	33.00 %	Passed
Test Pendulum Speed:	4.83- 5.07 m/s	4.96 m/s	Passed

-----PENDULUM PULSE-----

Pulse at 10 ms:	1.20- 1.60 m/s	1.60 m/s	Passed
Pulse at 20 ms:	2.40- 3.40 m/s	3.19 m/s	Passed
Pulse at 30 ms:	3.80- 5.00 m/s	4.60 m/s	Passed

-----D PLANE ROTATION-----

Maximum Rotation:	74.0-92.0 Deg	89.49 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	27.00- 33.00 N-m	29.37 N-m	Passed
Occipital Moment Decay:	103.0-123.0 ms	114.50 ms	Passed

Thorax Impact

Part 572N Thorax Impact

Calibration Date: 08-04-03

Serial No: 182

Work File: 182T1 08-04-03

-----TEST RESULTS-----

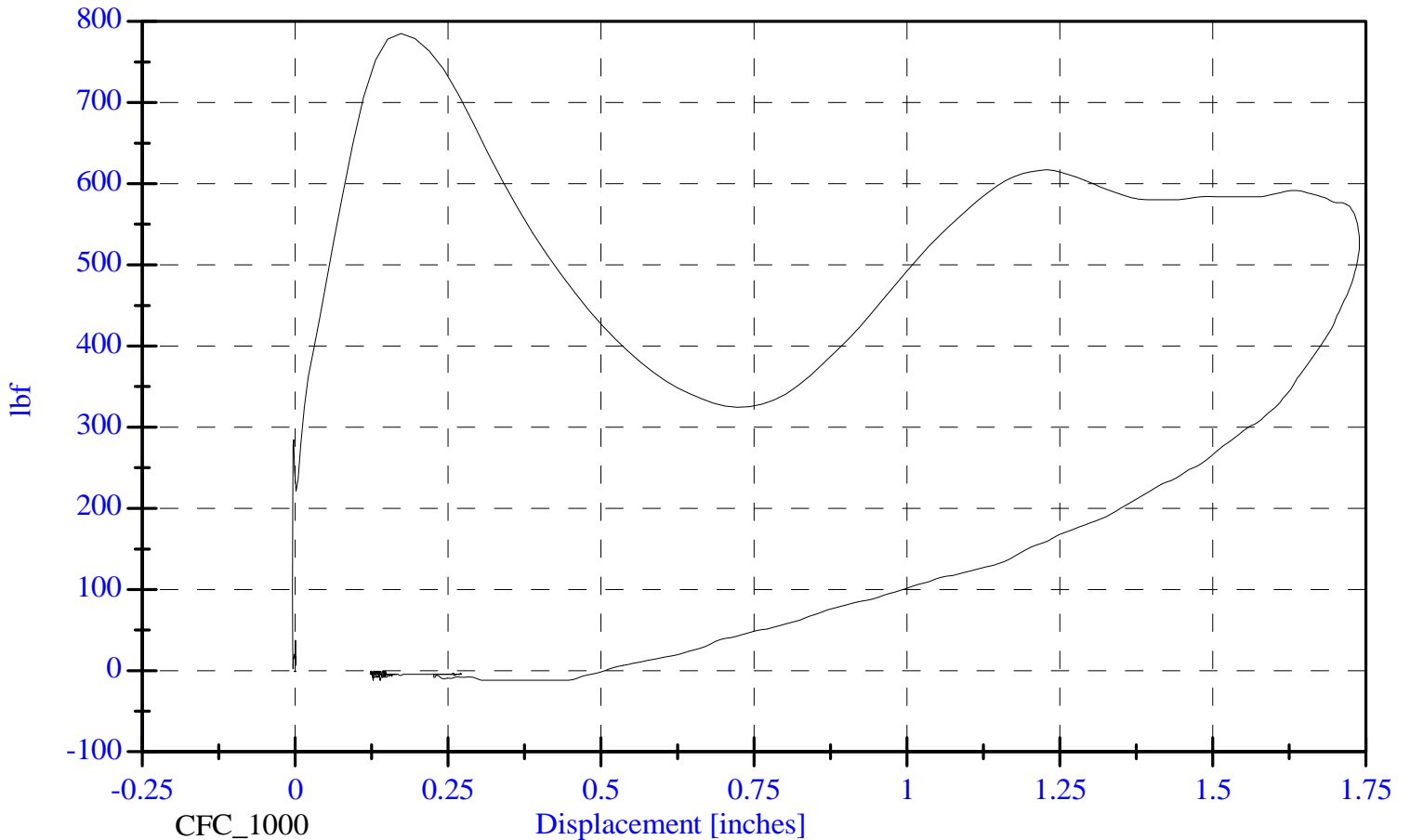
<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	69.0-72.0 F	70.0 F	Passed
Lab Humidity:	10-70 %	33.00 %	Passed
Pendulum Velocity:	21.60-22.40 ft/s	22.00 ft/s	Passed
Maximum Deflection:	1.50- 1.80 inche	1.74 inche	Passed
Maximum Res. Force:	259.00- 310.00 lbf	264.41 lbf	Passed
Internal Hysteresis:	65-85 %	78.80 %	Passed

Thorax Impact

Probe Force vs. Displacement

Max: 785.1 [lbf] at 0.173 [incl

Min: -12.0 [lbf] at 0.139 [inch



SECTION 11

Test Equipment and Instrumentation Calibration

Calibrations for Test 09-3-45

SHORTNAME	SENSCOM	CALDATE
Sled Ax	MFG: ENDEVCO S/N: 10301	6/23/2003
P3 HDCG Ax	MFG: ENDEVCO S/N: P17912	7/17/2003
P3 HDCG Ay	MFG: ENDEVCO S/N: P17743	7/17/2003
P3 HDCG Az	MFG: ENDEVCO S/N: P15319	6/26/2003
P3 HDCG RAz	MFG: ENDEVCO S/N: P16279	6/25/2003
P3 CHST Ax	MFG: ENDEVCO S/N: P15334	7/17/2003
P3 CHST Ay	MFG: ENDEVCO S/N: P15321	7/17/2003
P3 CHST Az	MFG: ENDEVCO S/N: P17758	7/17/2003
P3 CHST Dx	MFG: SERVO S/N: 044	7/22/2003
P3 PVCN Ax	MFG: ENDEVCO S/N: P16755	7/17/2003
P3 PVCN Ay	MFG: ENDEVCO S/N: P15591	7/17/2003
P3 PVCN Az	MFG: ENDEVCO S/N: P16155	7/17/2003
P3 NEKU Fx	MFG: Denton S/N: 248-FX	7/18/2003
P3 NEKU Fy	MFG: Denton S/N: 248-FY	7/18/2003
P3 NEKU Fz	MFG: Denton S/N: 248-FZ	7/18/2003
P3 NEKU Mx	MFG: Denton S/N: 248-MX	7/18/2003
P3 NEKU My	MFG: Denton S/N: 248-MY	7/18/2003
P3 NEKU Mz	MFG: Denton S/N: 248-MZ	7/18/2003
P3 NEKL Fx	MFG: Denton S/N: 249Fx	7/18/2003
P3 NEKL Fy	MFG: Denton S/N: 249Fy	7/18/2003
P3 NEKL Fz	MFG: Denton S/N: 249Fz	7/18/2003
P3 NEKL Mx	MFG: Denton S/N: 249Mx	7/18/2003
P3 NEKL My	MFG: Denton S/N: 249My	7/18/2003
P3 NEKL Mz	MFG: Denton S/N: 249Mz	7/18/2003
P4 HDCG Ax	MFG: ENDEVCO S/N: AGN83	7/21/2003
P4 HDCG Ay	MFG: ENDEVCO S/N: ACC63	7/21/2003
P4 HDCG Az	MFG: ENDEVCO S/N: P10095	7/30/2003
P4 CHST Ax	MFG: ENDEVCO S/N: ACC02	7/21/2003
P4 CHST Ay	MFG: ENDEVCO S/N: AKAA4	7/21/2003
P4 CHST Az	MFG: ENDEVCO S/N: AJ4R6	7/21/2003
P4 PVCN Ax	MFG: ENDEVCO S/N: AJ4G1	7/21/2003
P4 PVCN Ay	MFG: ENDEVCO S/N: AJ7H0	7/21/2003
P4 PVCN Az	MFG: ENDEVCO S/N: J20047	7/21/2003
P4 NEKU Fx	MFG: DENTON S/N: 1563Fx	1/7/2003
P4 NEKU Fy	MFG: DENTON S/N: 1563Fy	1/7/2003
P4 NEKU Fz	MFG: DENTON S/N: 1563Fz	1/7/2003
P4 NEKU Mx	MFG: DENTON S/N: 1563Mx	1/7/2003
P4 NEKU My	MFG: DENTON S/N: 1563My	1/7/2003
P4 NEKU Mz	MFG: DENTON S/N: 1563Mz	1/7/2003
P4 CHST Dx	MFG: SERVO S/N: 182	2/11/2003

SECTION 12

Link to High Speed Movies

Test 09-3-45 North View

Test 09-3-45 South View