

REPORT NUMBER: 8708-SLEDNCAP-18

**CHILD RESTRAINT SYSTEM IN
DYNAMIC SLED TEST
EVENFLO TITAN V WITH A HYIII 3 YEAR OLD
EVENFLO TITAN V WITH A CRABI**

TEST NUMBER: 08-3-18

**PREPARED BY:
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AUGUST 4TH, 2003

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-32005

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Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Dynamic Sled Test Program

Date of Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Child Restraint Systems in Dynamic Sled Test P3- Evenflo Titan V with a HYIII 3 year old P4- Evenflo Titan V with a Crabi		5. Report Date August 4 th , 2003	
		6. Performing Organization Code	
7. Author David P. Roberts		8. Performing Organization Report No. 8708-SLEDNCAP-18	
9. Performing Organization Name and Address Veridian Engineering 4455 Genesee Street Buffalo, NY 14225		10. Work Unit No.	
		11. Contract or Grant No. DTNH22-01-D-32005	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh St , S.W. Washington, DC 20590		13. Type of Report and Period Covered Final Report July 2003 – January 2004	
		14. Sponsoring Agency Code	
15. Supplementary Notes Reviewed by: _____ Program Manager Approved by: _____ Head, Occupant Protection & Safety Research Section, Transportation Sciences Center			
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 an Evenflo Titan V Child Restraint System. This seat was tested with a HYIII 3 year old ATD. Position 4 was an Evenflo Titan V Child Restraint System. This seat was tested with a Crabi ATD.			
17. Key Words FMVSS 213 Child Restraint Systems Indicant Compliance Testing		18. Distribution Statement	
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages	22. Price

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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 August 4th, 2003 at a speed of 47.4 kph (29.4 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 two (2) anthropomorphic test devices (ATDs). One (1) Hybrid III 3 Year Old ATD, Serial Number S/N 142, 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 an Evenflo Titan V child seat and the seat was located in Position 3 – Right Rear Passenger.

One (1) Crabi ATD, Serial Number S/N 093, was instrumented with head, chest, and pelvic tri-axial accelerometers, and upper neck load cells. This dummy was placed in an Evenflo Titan V child seat and the seat was located in Position 4 – Left Rear Passenger. The Crabi ATDs were 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.

Position 3 – Lower Neck My was clipped during the event.

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 08-3-18

Test Date: August 4th, 2003

POSITION 3

Child Restraint Type (forward-facing, rearward facing, booster)	FORWARD FACING
LATCH or NON-LATCH	LATCH WITH TETHER
Harness Type	5 POINT
Child Restraint Manufacturer	EVENFLO
Child Restraint Model	TITAN V
Model Number	3671213 P1
Date of Manufacture	06/11/2003
Child Restraint Height Limits (mm)	483 – 1016
Child Restraint Weight Limits (kg)	2.3 – 18.1
Weight of Child Restraint (kg)	5.0

POSITION 4

Child Restraint Type (forward-facing, rearward facing, booster)	FORWARD FACING
LATCH or NON-LATCH	LATCH WITH TETHER
Harness Type	5 POINT
Child Restraint Manufacturer	EVENFLO
Child Restraint Model	TITAN V
Model Number	3671213 P1
Date of Manufacture	06/11/2003
Child Restraint Height Limits (mm)	483 – 1016
Child Restraint Weight Limits (kg)	2.3 – 18.1
Weight of Child Restraint (kg)	5.2

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 08-3-18

Test Date: August 4th, 2003

POSITION 3

Child Seat	EVENFLO TITAN V
Belt Fraying	NONE
Stress Marks	NONE
Cracks	NONE
Buckle Stress	NONE
Latch Hooks	NONE
Max. Head Excursion (mm)	572
Max. Knee Excursion (mm)	656
Velocity (kph)	47.4
Acceleration (G's)	23.7

POSITION 4

Child Seat	EVENFLO TITAN V
Belt Fraying	NONE
Stress Marks	NONE
Cracks	NONE
Buckle Stress	NONE
Latch Hooks	NONE
Max. Head Excursion (mm)	480
Max. Knee Excursion (mm)	503
Velocity (kph)	47.4
Acceleration (G's)	23.7

SECTION 4

**ATD INJURY CRITERIA AND SENSOR DATA
POSITION 3 – HYIII THREE YEAR OLD**

Test No.: 08-3-18

Test Date: August 4th, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	27.3	197.2	-26.7	80.1
Head CG	Y	G's	1.4	238.3	-5.5	197.0
Head CG	Z	G's	46.6	72.7	-8.2	55.7
Head CG Resultant	N/A	G's	52.9	72.6		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	9.5	220.9	-30.7	80.7
Chest CG	Y	G's	2.6	61.9	-3.8	81.0
Chest CG	Z	G's	7.4	203.3	-30.6	52.0
Chest CG Resultant	N/A	G's	39.5	51.5		

SEAT BELT SENSOR PEAK VALUES

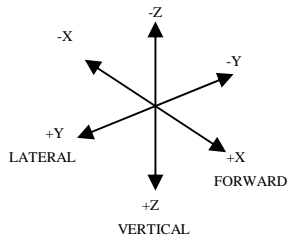
Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P3 (Right) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	341.0	40.1	64.9	98.4
Head CG Primary (15 msec)	237.3	47.8	69.5	84.5

CHEST CLIP (3 MSEC)

Location	P3 (Right) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	34.9	49.7	52.7



**ATD INJURY CRITERIA AND SENSOR DATA...(continued)
POSITION 3 - HYIII THREE YEAR OLD**

Test No.: 08-3-18

Test Date: August 4th, 2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	7.3	127.6	-44.3	59.1
Pelvis	Y	G's	1.8	89.0	-4.2	67.9
Pelvis	Z	G's	8.7	203.7	-36.5	51.1

UPPER NECK PEAK FORCES AND MOMENTS

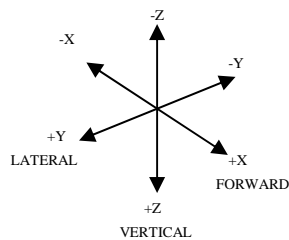
Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	31.6	194.3	-636.2	81.9
Neck Force	Y	Newtons	38.3	120.6	-36.1	101.9
Neck Force	Z	Newtons	1614.5	80.1	-276.5	55.9
Neck Moment	X	Nm	2.8	125.9	-2.8	216.8
Neck Moment	Y	Nm	17.5	60.6	-10.4	46.6
Neck Moment	Z	Nm	1.9	250.0	-1.2	176.4

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	217.7	195.4	-777.6	77.0
Neck Force	Y	Newtons	110.0	75.5	-43.8	196.3
Neck Force	Z	Newtons	883.0	76.3	-524.0	55.9
Neck Moment	X	Nm	5.2	122.5	-6.5	101.3
Neck Moment	Y	Nm	N/A	N/A	N/A	N/A
Neck Moment	Z	Nm	3.2	122.0	-4.3	77.2

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm	0.0	13.8	-12.1	91.0



SECTION 4

ATD INJURY CRITERIA AND SENSOR DATA POSITION 4 - CRABI

Test No.: 08-3-18

Test Date: August 4th, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	25.3	194.5	-25.3	61.2
Head CG	Y	G's	1.3	189.4	-3.4	85.5
Head CG	Z	G's	45.0	71.4	-2.7	36.4
Head CG Resultant	N/A	G's	48.0	71.3		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	9.6	225.8	-34.6	55.2
Chest CG	Y	G's	2.6	69.9	-4.0	58.5
Chest CG	Z	G's	16.4	71.2	-24.3	55.3
Chest CG Resultant	N/A	G's	42.4	55.2		

SEAT BELT SENSOR PEAK VALUES

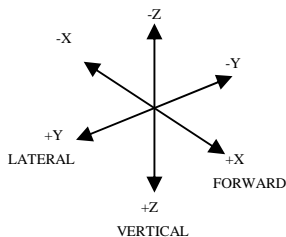
Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P4 (Left) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	317.8	37.9	55.0	91.0
Head CG Primary (15 msec)	194.8	44.2	63.5	78.5

CHEST CLIP (3 MSEC)

Location	P4 (Left) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	41.2	53.7	56.7



**ATD INJURY CRITERIA AND SENSOR DATA...(continued)
POSITION 4 - CRABI**

Test No.: 08-3-18

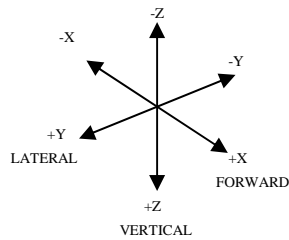
Test Date: August 4th, 2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	6.3	221.5	-35.2	59.8
Pelvis	Y	G's	2.5	181.1	-2.9	68.2
Pelvis	Z	G's	8.4	198.5	-44.9	55.2

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	25.1	173.1	-578.1	62.0
Neck Force	Y	Newtons	17.2	42.3	-74.2	86.2
Neck Force	Z	Newtons	1393.3	70.5	-92.0	224.1
Neck Moment	X	Nm	2.8	103.7	-1.6	70.8
Neck Moment	Y	Nm	3.3	95.9	-7.2	45.5
Neck Moment	Z	Nm	1.2	204.7	-0.9	102.6



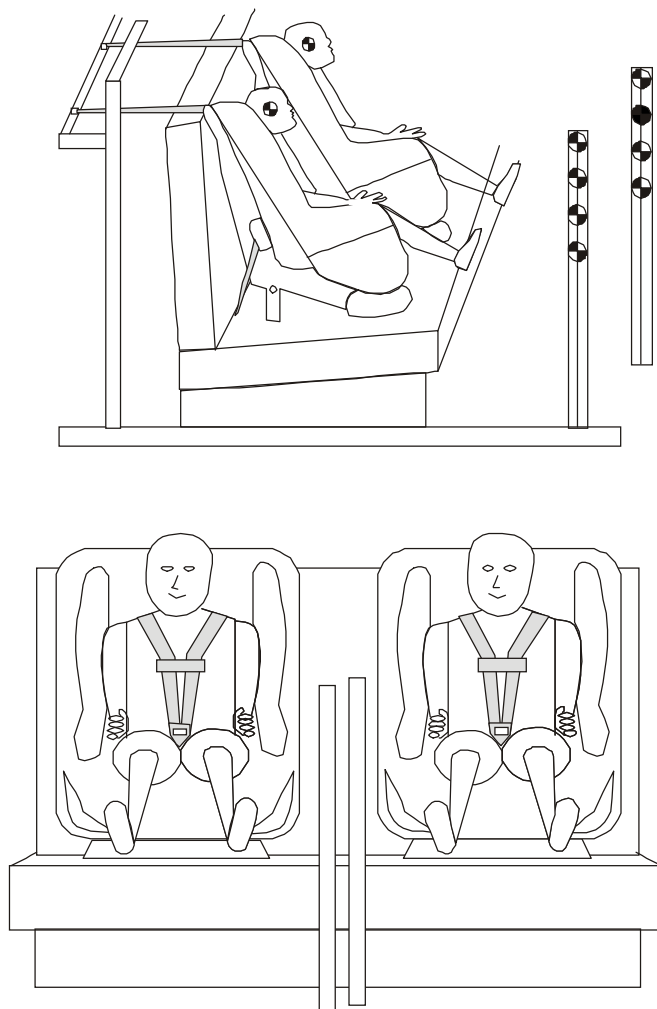
SECTION 5
SLED TEST SET-UP

Test No.: 08-3-18

Test Date: August 4th, 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 the seat back rotation.

Pre-test Infant and Car Seat Positions

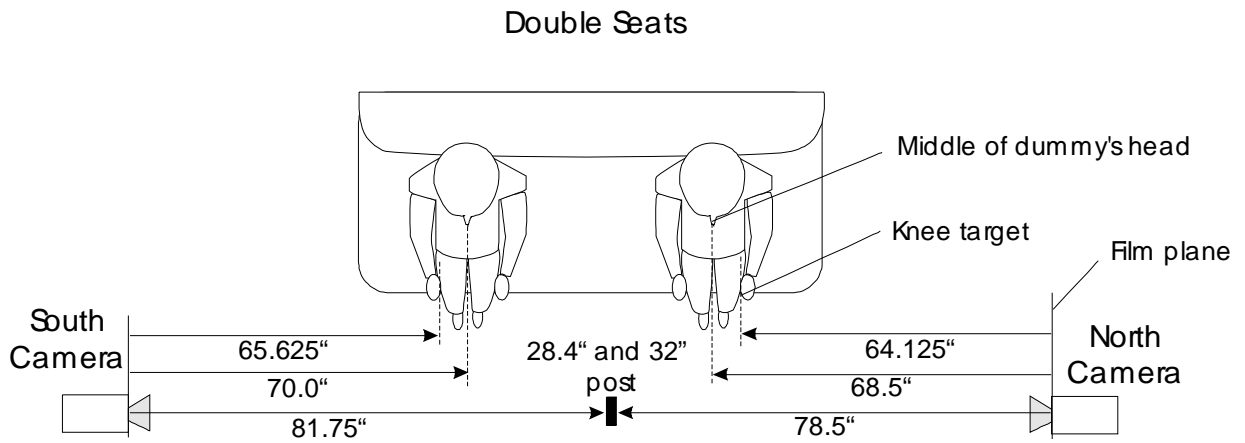


SECTION 6
CAMERA LOCATION

Test No.: 08-3-18

Test Date: August 4th, 2003

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



SECTION 7
PHOTOGRAPHS

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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

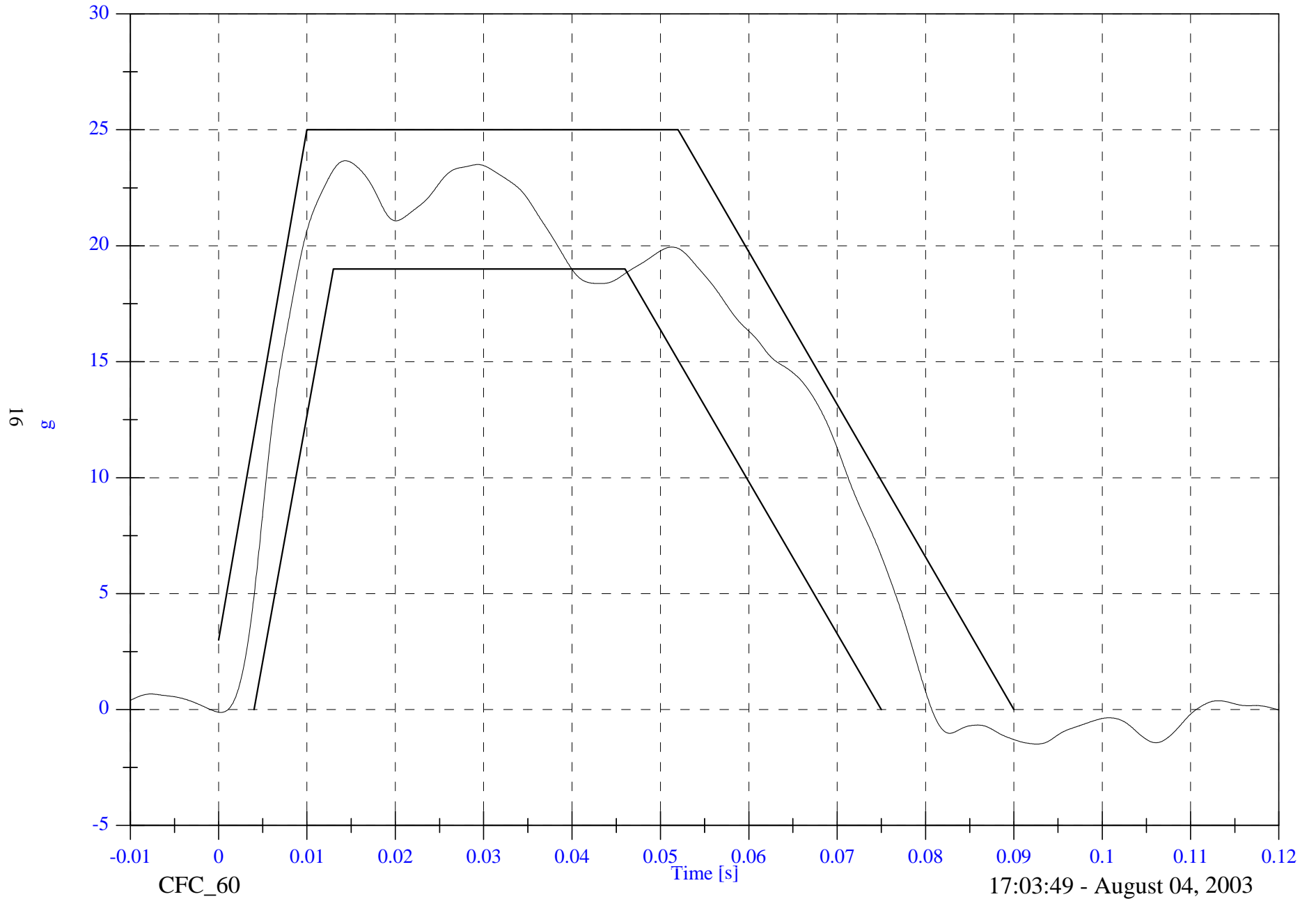
Data Plots

Sled Test NCAP SLED 08-3-18

Sled Pulse Corridor

Max: 23.7 [g] at 0.014 [s]

Min: -1.5 [g] at 0.093 [s]



FACILITY: HYGE SLED
 TEST#: 08-3-18
 TITLE: Sled Test NCAP SLED 08-3-18

DATE: August 04, 2003

CHN NAME	Unit	Max	msec	Min	msec	Filt	Comment
41 Sled Acceleration	g	23.7	14.4	-1.5	92.6	CFC_60	
42 Sled Acceleration Velocity	kph	47.4	80.7	-0.0	-20.0	CFC_180	
43 Sled Acceleration Displacement	mm	2723.4	250.0	-0.3	-10.8	CFC_180	
44 P3 Head x	g	27.3	197.2	-26.7	80.1	CFC_1000	
45 P3 Head y	g	1.4	238.3	-5.5	197.0	CFC_1000	
46 P3 Head z	g	46.6	72.7	-8.2	55.7	CFC_1000	
47 P3 Head Resultant	g	52.9	72.6	0.0	-4.2	CFC_1000	
48 P3 Upper Neck Fx	N	31.6	194.3	-636.2	81.9	CFC_1000	
49 P3 Upper Neck Fy	N	38.3	120.6	-36.1	101.9	CFC_1000	
50 P3 Upper Neck Fz	N	1614.5	80.1	-276.5	55.9	CFC_1000	
51 P3 Upper Neck F Resultant	N	1732.7	80.1	0.0	-13.5	CFC_1000	
52 P3 Upper Neck Mx	N-m	2.8	125.9	-2.8	216.8	CFC_600	
53 P3 Upper Neck My	N-m	17.5	60.6	-10.4	46.6	CFC_600	
54 P3 Upper Neck Mz	N-m	1.9	250.0	-1.2	176.4	CFC_600	
55 P3 Upper Neck M Resultant	N-m	17.5	60.6	0.0	-7.9	CFC_600	
56 P3 Lower Neck Fx	N	217.7	195.4	-777.6	77.0	CFC_1000	
57 P3 Lower Neck Fy	N	110.0	75.5	-43.8	196.3	CFC_1000	
58 P3 Lower Neck Fz	N	883.0	76.3	-524.0	55.9	CFC_1000	
59 P3 Lower Neck F Resultant	N	1168.6	76.3	0.1	-3.7	CFC_1000	
60 P3 Lower Neck Mx	N-m	5.2	122.5	-6.5	101.3	CFC_600	
61 P3 Lower Neck My	N-m	22.7	45.9	-13.4	195.2	CFC_600	
62 P3 Lower Neck Mz	N-m	3.2	122.0	-4.3	77.2	CFC_600	
63 P3 Lower Neck M Resultant	N-m	23.8	101.3	0.0	-15.4	CFC_600	
64 P3 Chest x	g	9.5	220.9	-30.7	80.7	CFC_180	
65 P3 Chest y	g	2.6	61.9	-3.8	81.0	CFC_180	
66 P3 Chest z	g	7.4	203.3	-30.6	52.0	CFC_180	
67 P3 Chest Resultant	g	39.5	51.5	0.0	-12.1	CFC_180	
68 P3 Pelvic x	g	7.3	127.6	-44.3	59.1	CFC_1000	
69 P3 Pelvic y	g	1.8	89.0	-4.2	67.9	CFC_1000	
70 P3 Pelvic z	g	8.7	203.7	-36.5	51.1	CFC_1000	
71 P3 Pelvic Resultant	g	53.3	59.1	0.0	-12.4	CFC_1000	

FACILITY: HYGE SLED
 TEST#: 08-3-18
 TITLE: Sled Test NCAP SLED 08-3-18

DATE: August 04, 2003

CHN NAME	Unit	Max	msec	Min	msec	Filt	Comment
72 P3 Head Red z	g	61.6	78.9	-19.1	43.4	CFC_1000	
73 P3 Chest Compression	mm	0.0	13.8	-12.1	91.0	CFC_600	
74 P3 Upper Neck Mocy	N-m	17.5	60.6	-10.4	46.6	CFC_600	
75 P4 Head x	g	25.3	194.5	-25.3	61.2	CFC_1000	
76 P4 Head y	g	1.3	189.4	-3.4	85.5	CFC_1000	
77 P4 Head z	g	45.0	71.4	-2.7	36.4	CFC_1000	
78 P4 Head Resultant	g	48.0	71.3	0.0	-18.6	CFC_1000	
79 P4 Upper Neck Fx	N	25.1	173.1	-578.1	62.0	CFC_1000	
80 P4 Upper Neck Fy	N	17.2	42.3	-74.2	86.2	CFC_1000	
81 P4 Upper Neck Fz	N	1393.3	70.5	-92.0	224.1	CFC_1000	
82 P4 Upper Neck F Resultant	N	1452.1	69.8	0.0	-12.8	CFC_1000	
83 P4 Upper Neck Mx	N-m	2.8	103.7	-1.6	70.8	CFC_600	
84 P4 Upper Neck My	N-m	3.3	95.9	-7.2	45.5	CFC_600	
85 P4 Upper Neck Mz	N-m	1.2	204.7	-0.9	102.6	CFC_600	
86 P4 Upper Neck M Resultant	N-m	7.2	46.1	0.0	-15.1	CFC_600	
87 P4 Chest x	g	9.6	225.8	-34.6	55.2	CFC_180	
88 P4 Chest y	g	2.6	69.9	-4.0	58.5	CFC_180	
89 P4 Chest z	g	16.4	71.2	-24.3	55.3	CFC_180	
90 P4 Chest Resultant	g	42.4	55.2	0.0	-14.0	CFC_180	
91 P4 Pelvic x	g	6.3	221.5	-35.2	59.8	CFC_1000	
92 P4 Pelvic y	g	2.5	181.1	-2.9	68.2	CFC_1000	
93 P4 Pelvic z	g	8.4	198.5	-44.9	55.2	CFC_1000	
94 P4 Pelvic Resultant	g	56.5	55.6	0.0	-11.7	CFC_1000	
95 P4 Upper Neck Mocy	N-m	6.0	96.0	-5.3	45.4	CFC_600	

FACILITY: HYGE SLED
TEST#: 08-3-18
TITLE: Sled Test NCAP SLED 08-3-18
Version 5.00

DATE: August 04, 2003

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P3 HIC(36 ms): 341.0
t1: 64.9 msec
t2: 98.4 msec
Duration: 33.5 msec
Average Acceleration: 40.1 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: 31.6 N 194.3 msec
Min: -636.2 N 81.9 msec
Input channel: P3 Upper Neck Fx (6) CFC_1000

P3 UP NECK Fz: Max: 1614.5 N 80.1 msec
Min: -276.5 N 55.9 msec
Input channel: P3 Upper Neck Fz (8) CFC_1000

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P3 UP NECK MocY (3YO Child OOP)
Max: 17.5 N-m 60.6 msec
Min: -10.4 N-m 46.6 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: 0.76 Nij 77.5 msec CVt: 2120 CVf: 68
Nte: 0.79 Nij 85.6 msec CVt: 2120 CVe: 27
Ncf: 0.25 Nij 59.3 msec CVc: 2120 CVf: 68
Nce: 0.40 Nij 46.2 msec CVc: 2120 CVe: 27
Input channels: P3 Upper Neck Fz (8) CFC_600
P3 Upper Neck MocY [N-m, CFC_600] (85)

FACILITY: HYGE SLED
TEST#: 08-3-18
TITLE: Sled Test NCAP SLED 08-3-18
Version 5.00

DATE: August 04, 2003

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P3 CLIP(3 ms): 34.9 g
t1: 49.7 msec
t2: 52.7 msec
Duration: 3.0 msec

P3 CSI: 244.4
Input channels: P3 Chest x (18) CFC_180
P3 Chest y (19) CFC_180
P3 Chest z (20) CFC_180

P3 CHEST DISP: Max: 0.1 mm 1490.5 msec
Min: -12.1 mm 91.0 msec
Input channel: P3 Chest Compression (21) CFC_600

=====

P3 HIC(15 ms): 237.3
t1: 69.5 msec
t2: 84.5 msec
Duration: 15.0 msec
Average Acceleration: 47.8 g
Input channels: P3 Head x (2) CFC_1000
P3 Head y (3) CFC_1000
P3 Head z (4) CFC_1000

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FACILITY: HYGE SLED
TEST#: 08-3-18
TITLE: Sled Test NCAP SLED 08-3-18
Version 5.00

DATE: August 04, 2003

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P4 HIC(36 ms): 317.8
t1: 55.0 msec
t2: 91.0 msec
Duration: 36.0 msec
Average Acceleration: 37.9 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: 34.5 N 448.9 msec
Min: -578.1 N 62.0 msec
Input channel: P4 Upper Neck Fx (28) CFC_1000

P4 UP NECK Fz: Max: 1393.3 N 70.5 msec
Min: -92.0 N 224.1 msec
Input channel: P4 Upper Neck Fz (30) CFC_1000

P4 UP NECK MocY (1YO Infant OOP)
Max: 6.0 N-m 96.0 msec
Min: -5.3 N-m 45.4 msec
Input channels: P4 Upper Neck Fx (28) CFC_600
P4 Upper Neck My (32) CFC_600
Docy: 0.0058

P4 UP NECK Nij (1YO Infant OOP)
Ntf: 0.84 Nij 65.5 msec CVt: 1460 CVf: 43
Nte: 1.05 Nij 71.5 msec CVt: 1460 CVe: 17
Ncf: 0.04 Nij 341.3 msec CVc: 1460 CVf: 43
Nce: 0.30 Nij 42.3 msec CVc: 1460 CVe: 17
Input channels: P4 Upper Neck Fz (30) CFC_600
P4 Upper Neck MocY [N-m, CFC_600] (91)

FACILITY: HYGE SLED
TEST#: 08-3-18
TITLE: Sled Test NCAP SLED 08-3-18
Version 5.00

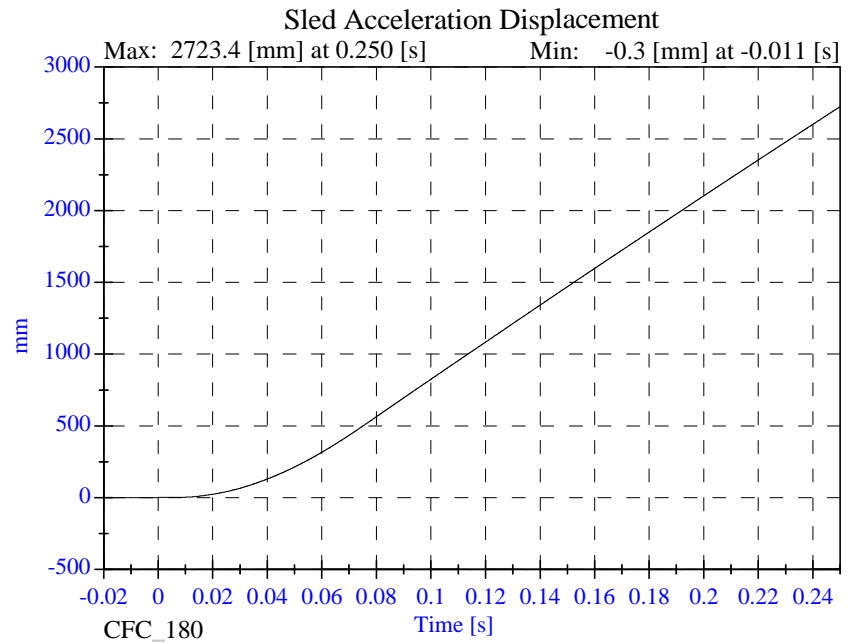
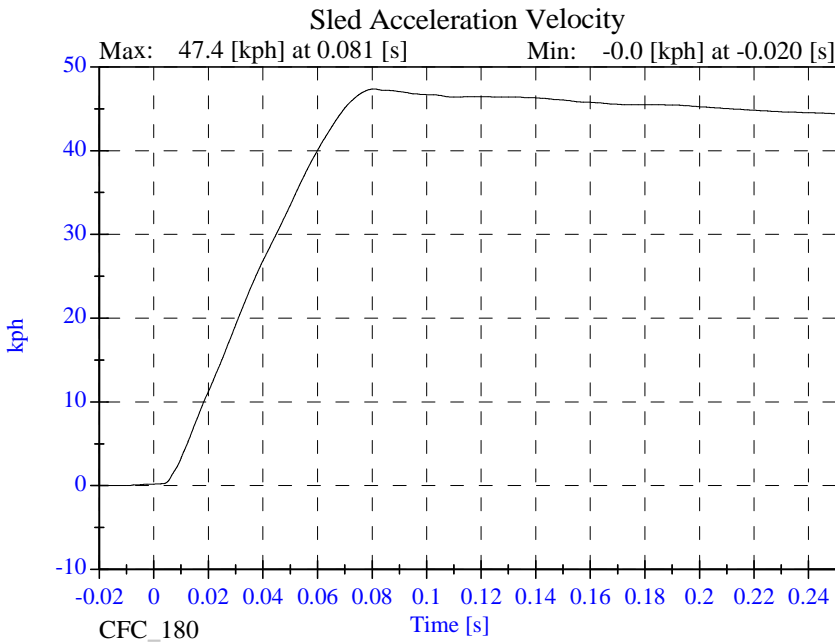
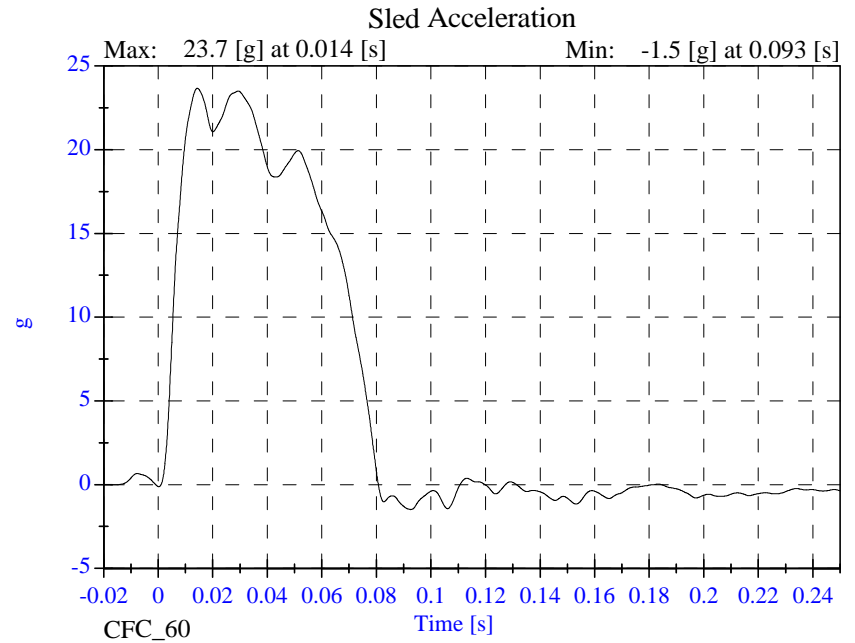
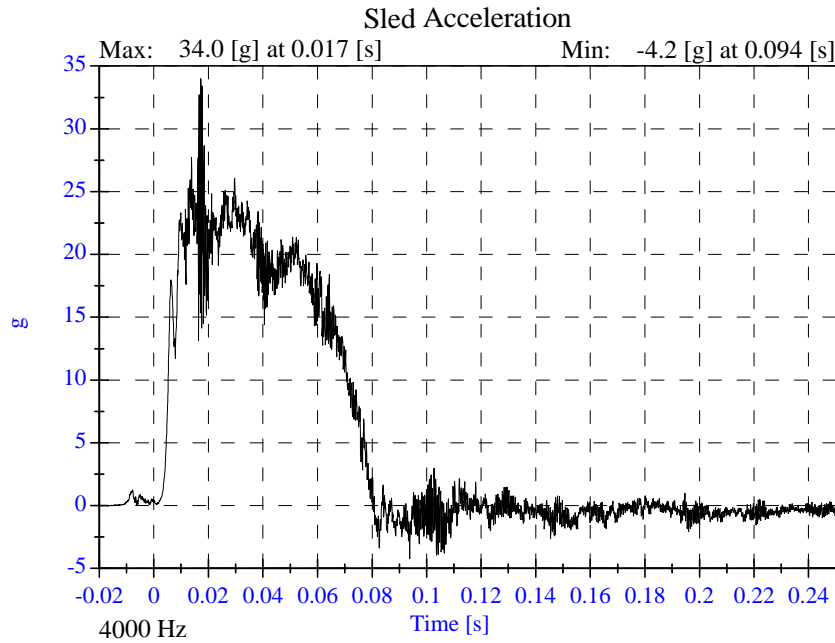
DATE: August 04, 2003

=====
P4 CLIP(3 ms): 41.2 g
 t1: 53.7 msec
 t2: 56.7 msec
 Duration: 3.0 msec
P4 CSI: 275.6
 Input channels: P4 Chest x (34) CFC_180
 P4 Chest y (35) CFC_180
 P4 Chest z (36) CFC_180

=====
P4 HIC(15 ms): 194.8
 t1: 63.5 msec
 t2: 78.5 msec
 Duration: 15.0 msec
 Average Acceleration: 44.2 g
 Input channels: P4 Head x (25) CFC_1000
 P4 Head y (26) CFC_1000
 P4 Head z (27) CFC_1000
=====

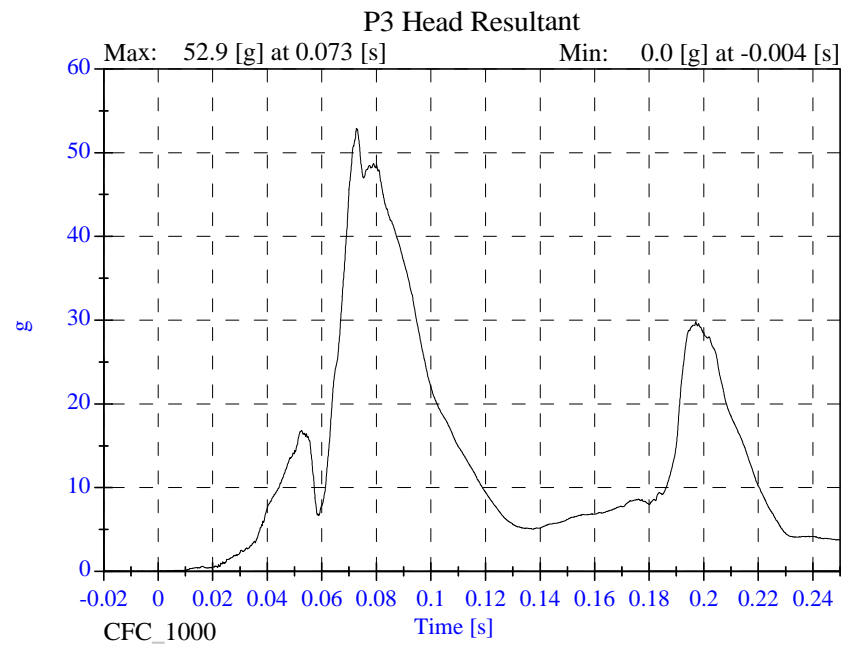
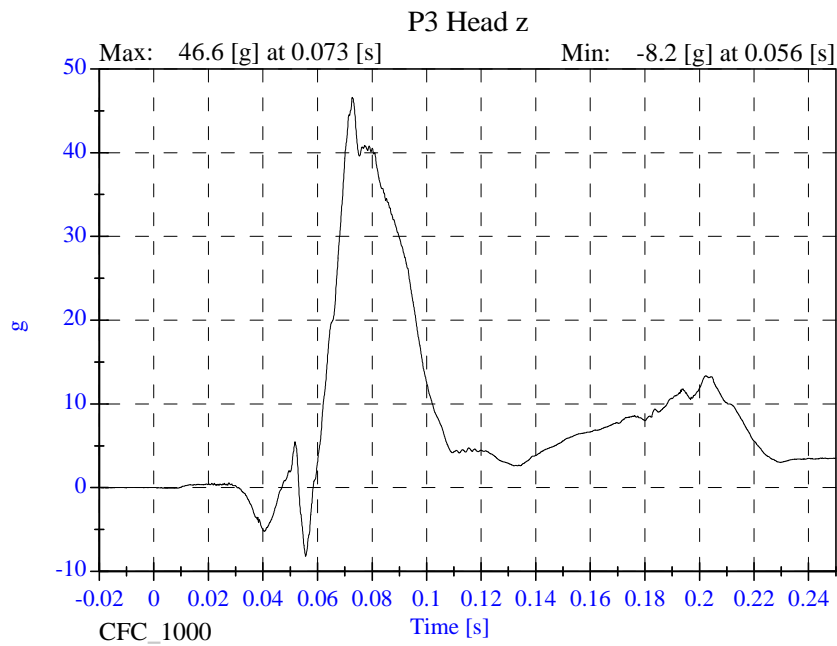
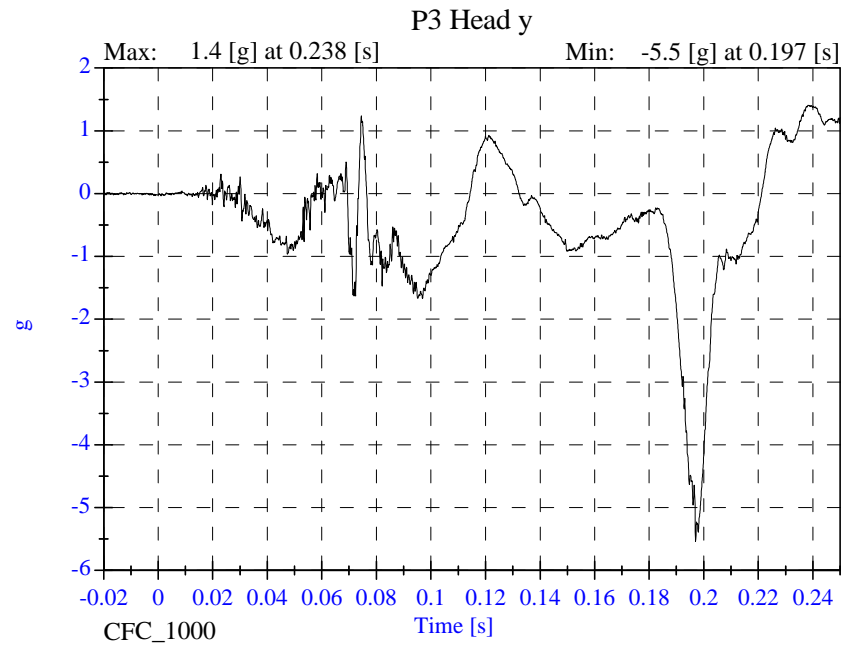
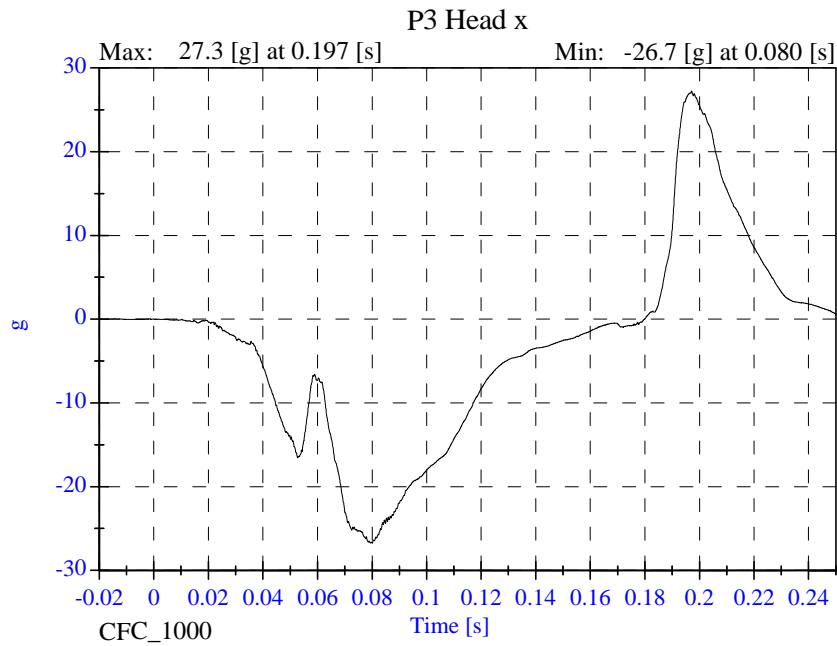
Sled Test NCAP SLED 08-3-18

- August 04, 2003



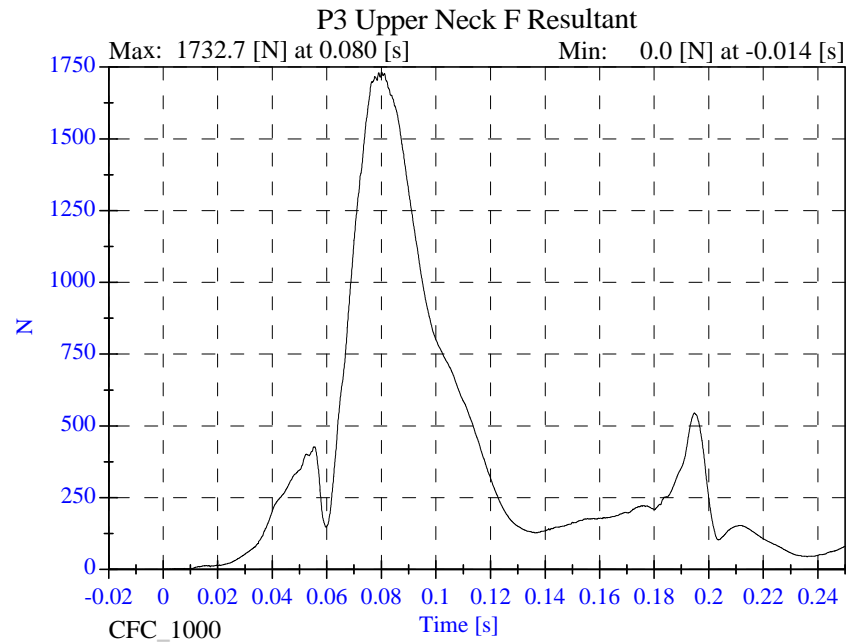
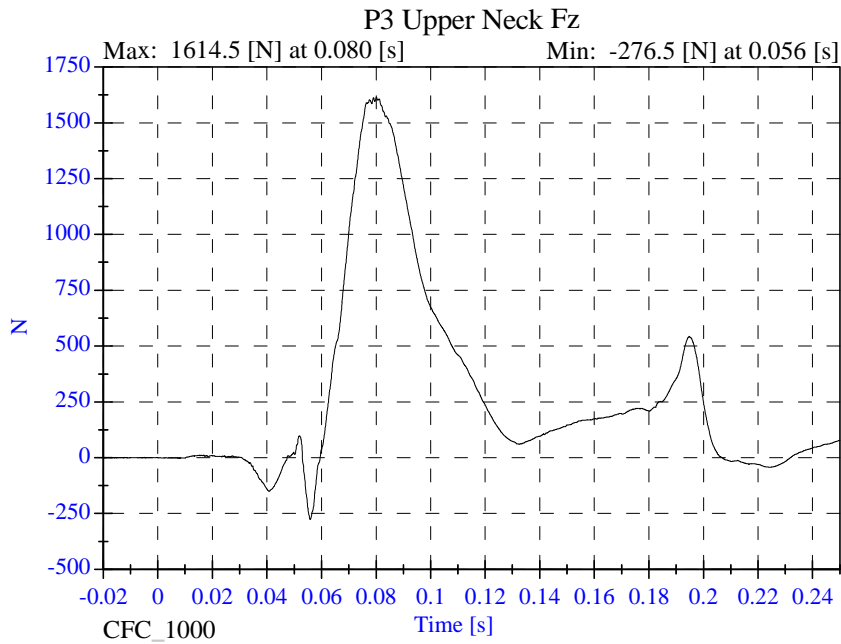
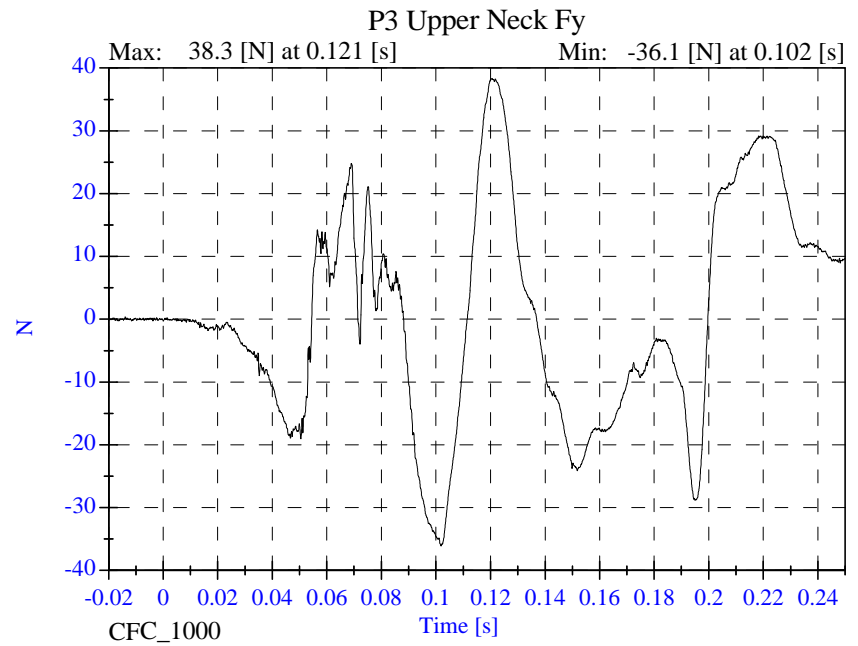
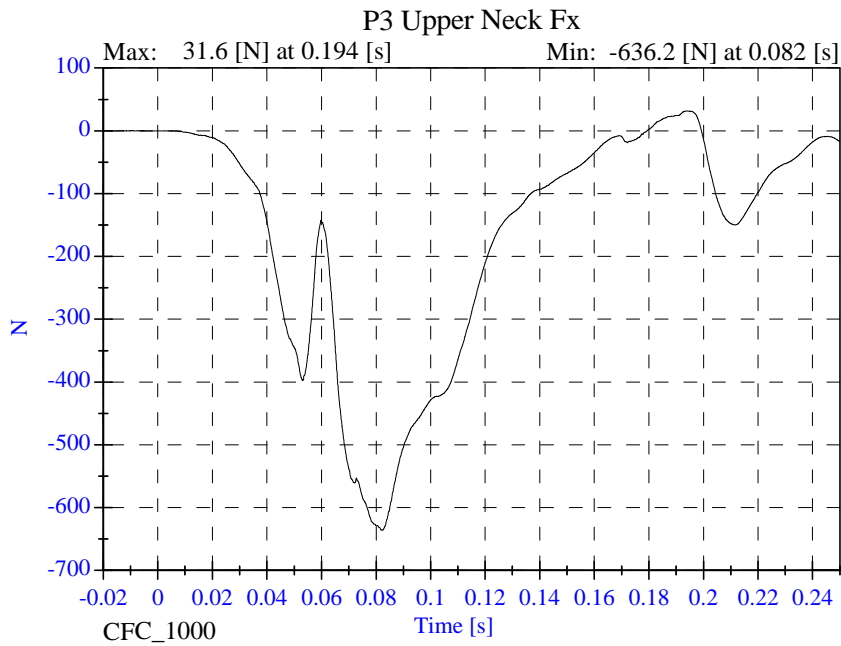
Sled Test NCAP SLED 08-3-18

- August 04, 2003



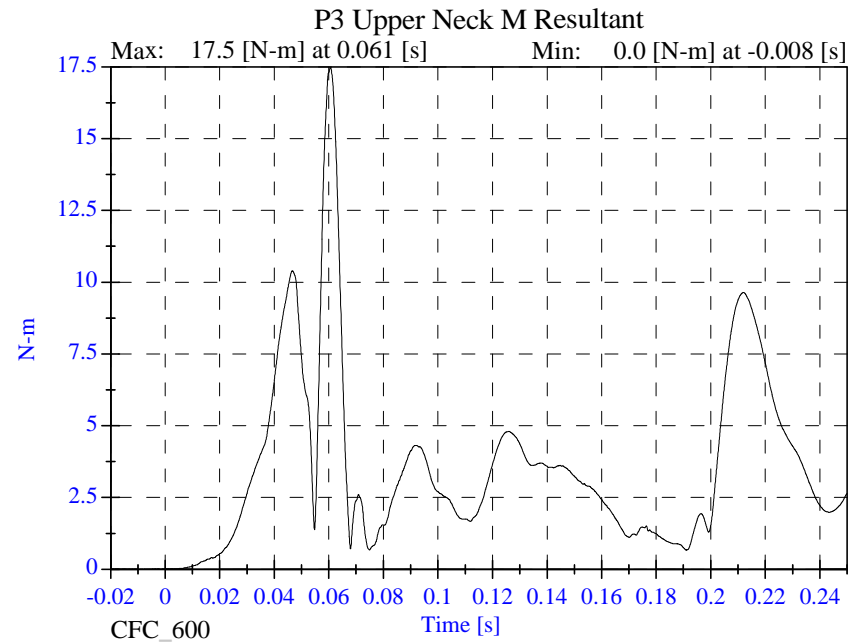
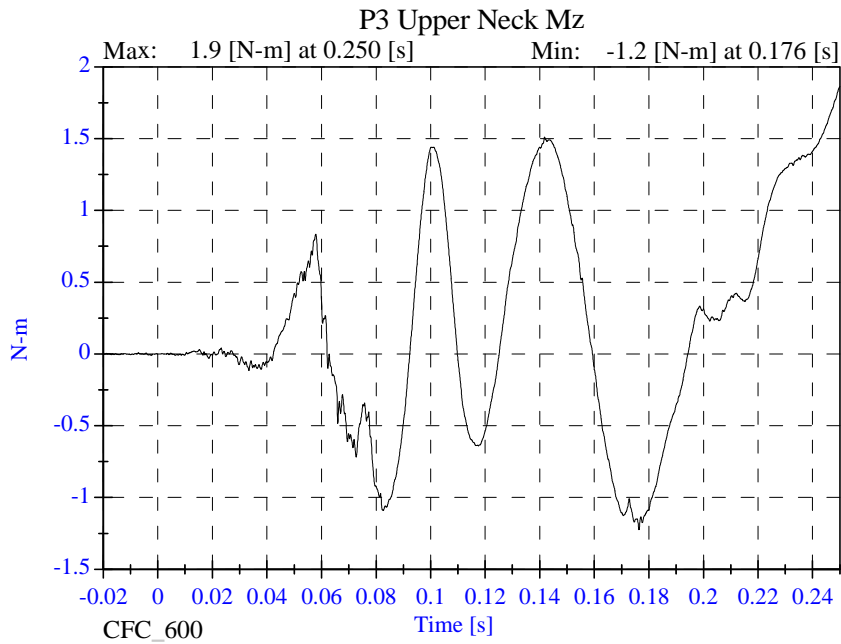
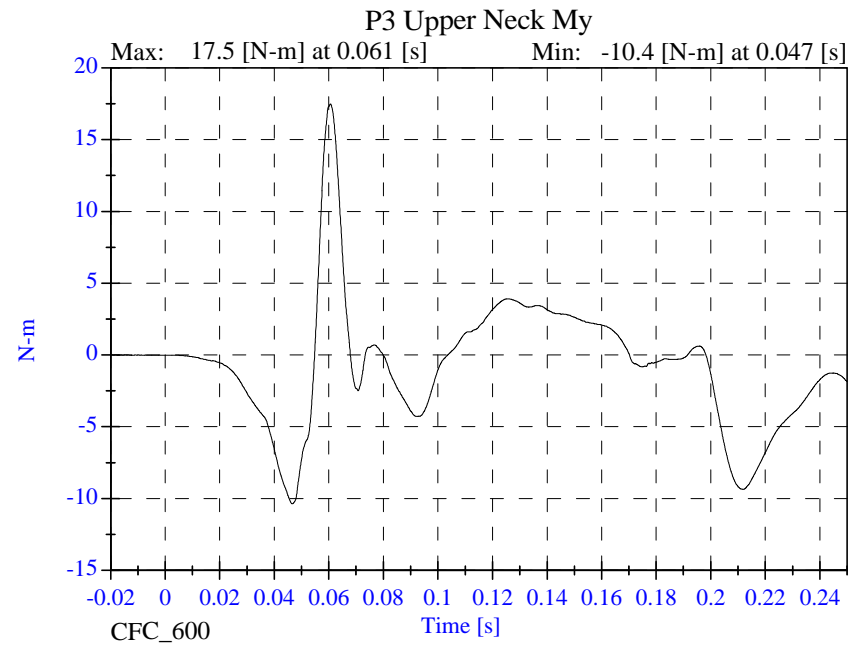
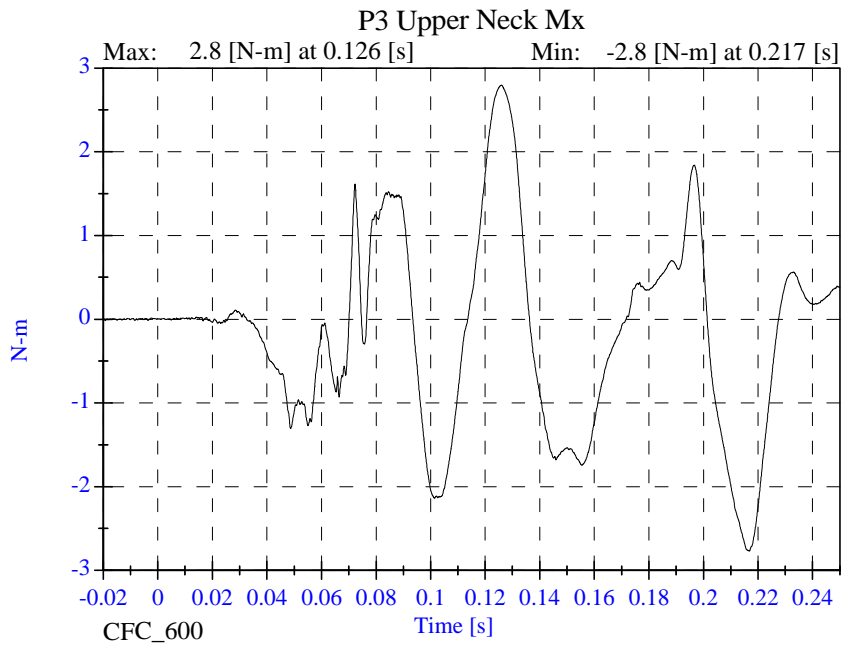
Sled Test NCAP SLED 08-3-18

- August 04, 2003



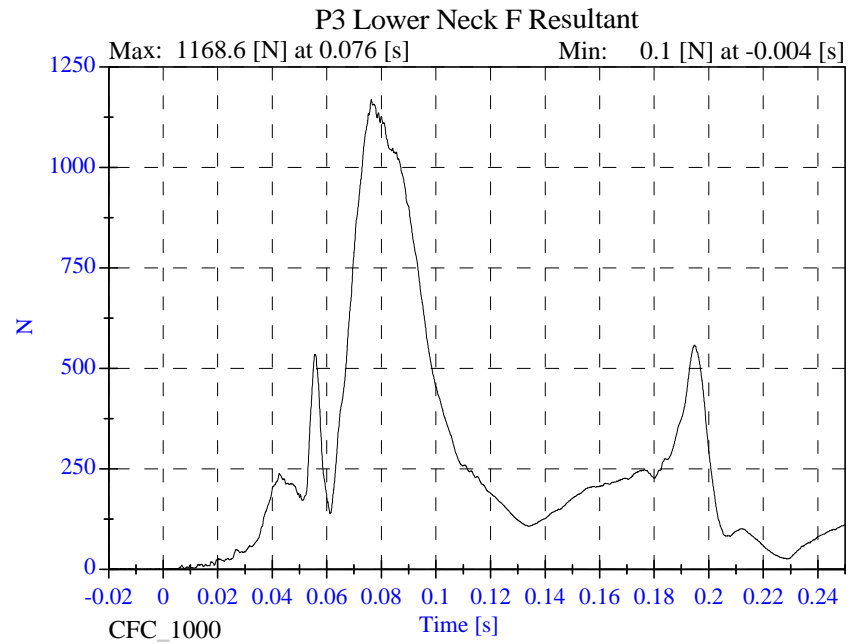
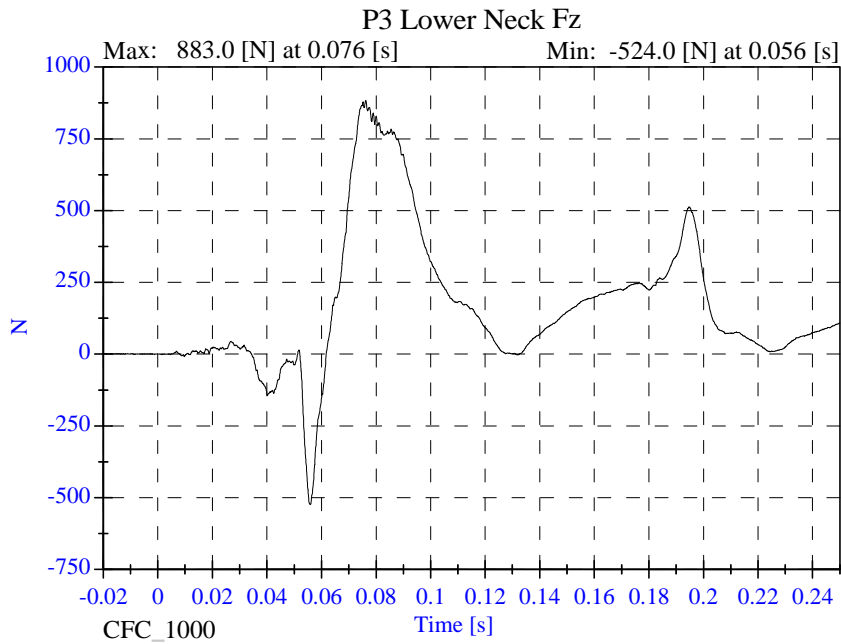
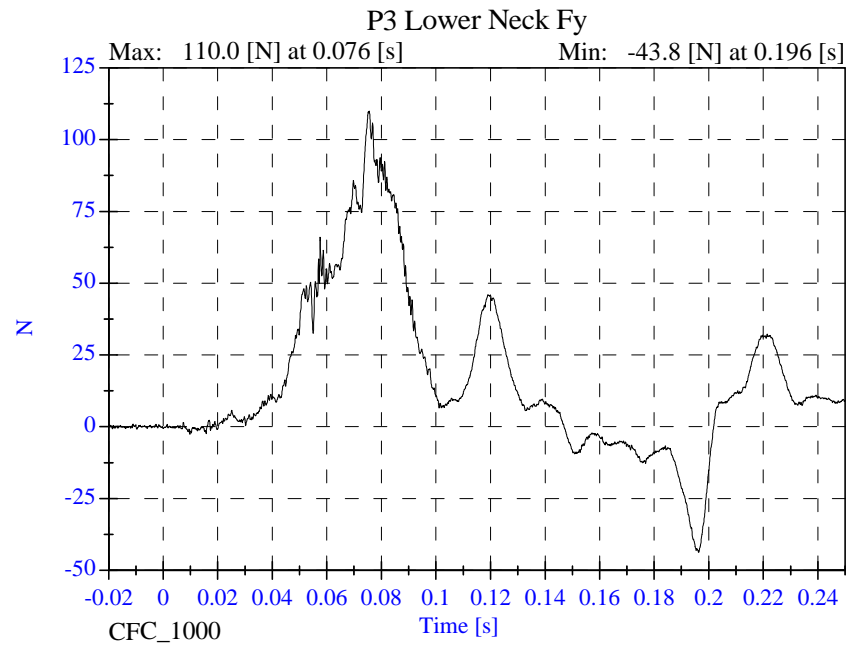
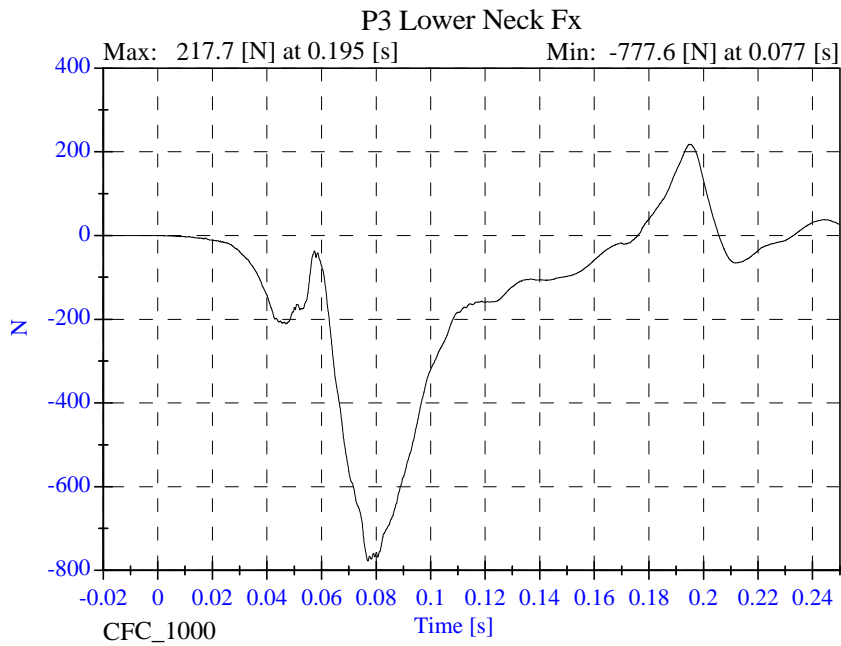
Sled Test NCAP SLED 08-3-18

- August 04, 2003



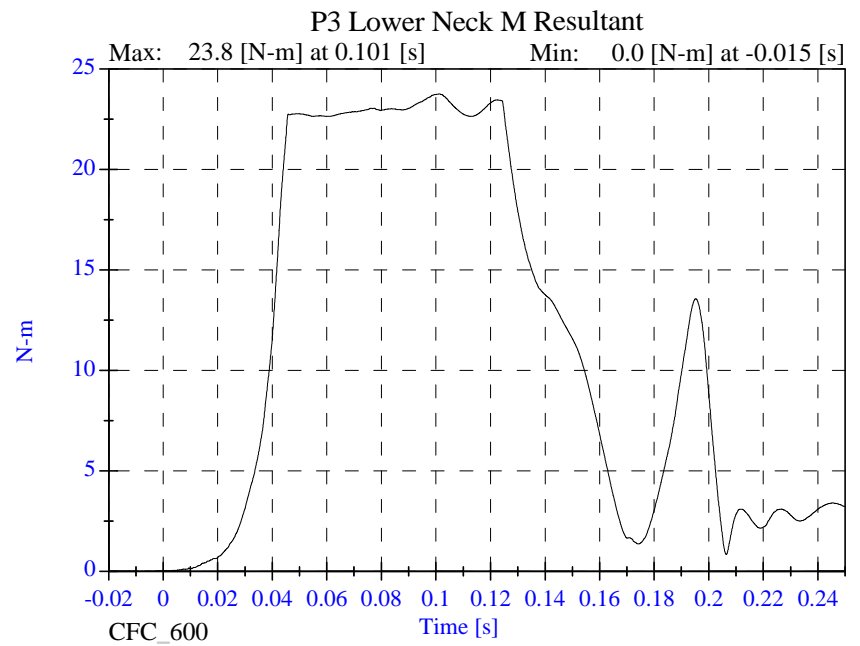
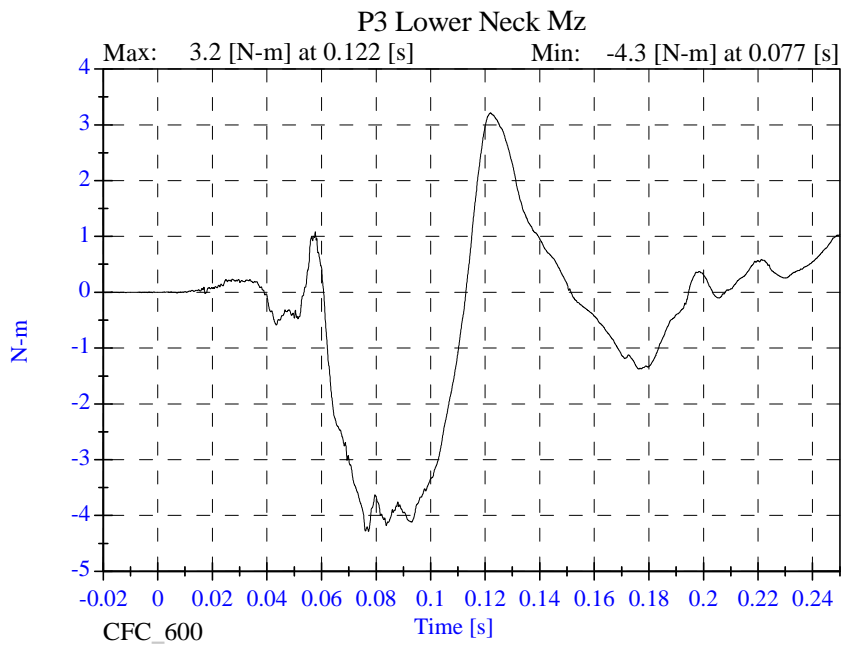
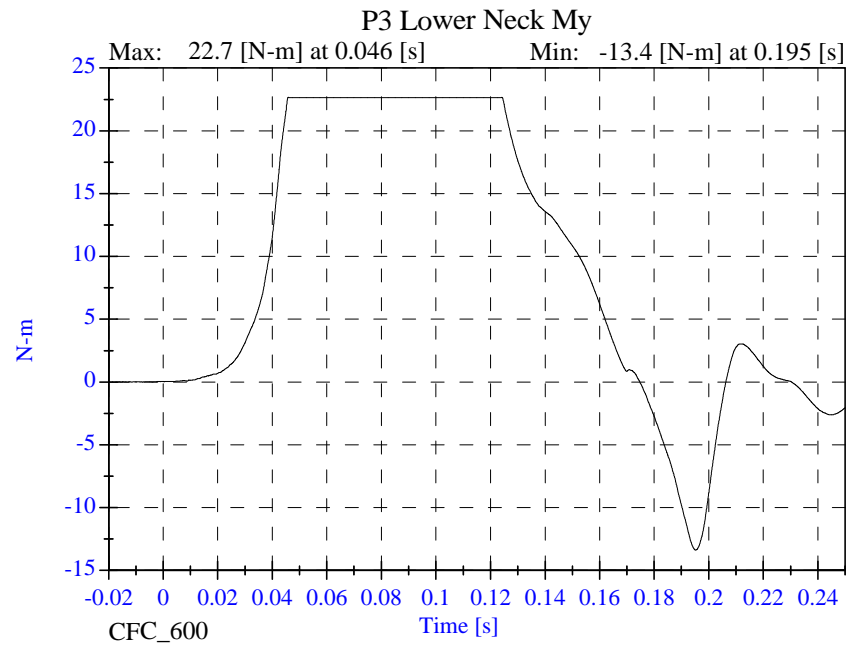
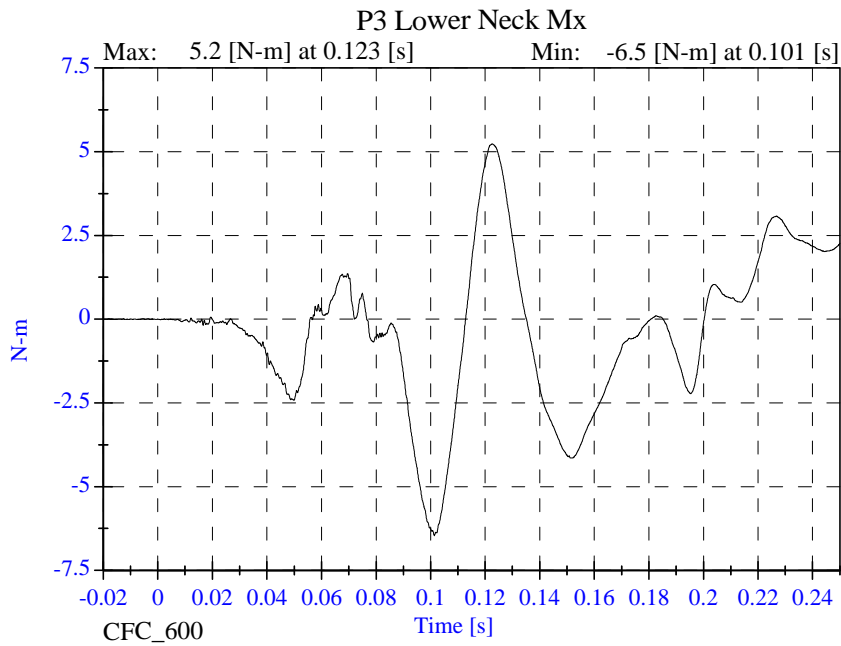
Sled Test NCAP SLED 08-3-18

- August 04, 2003



Sled Test NCAP SLED 08-3-18

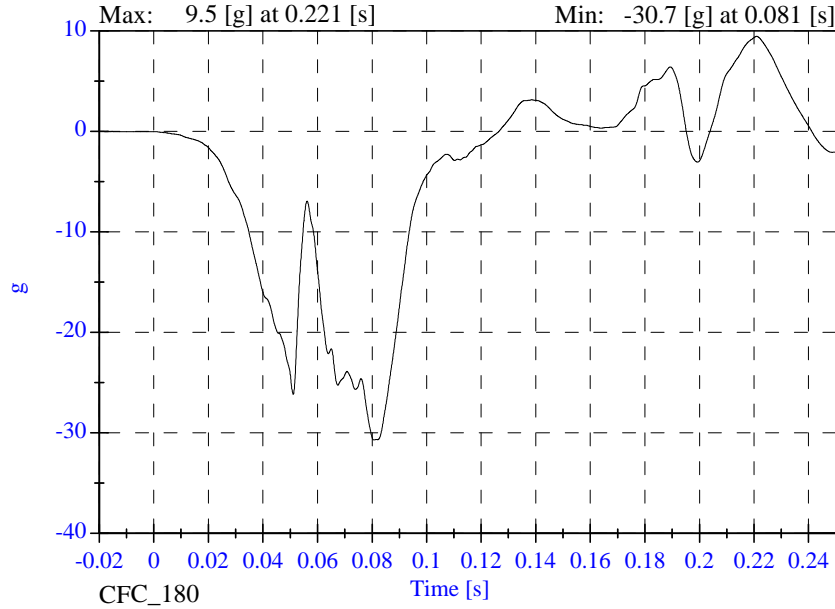
- August 04, 2003



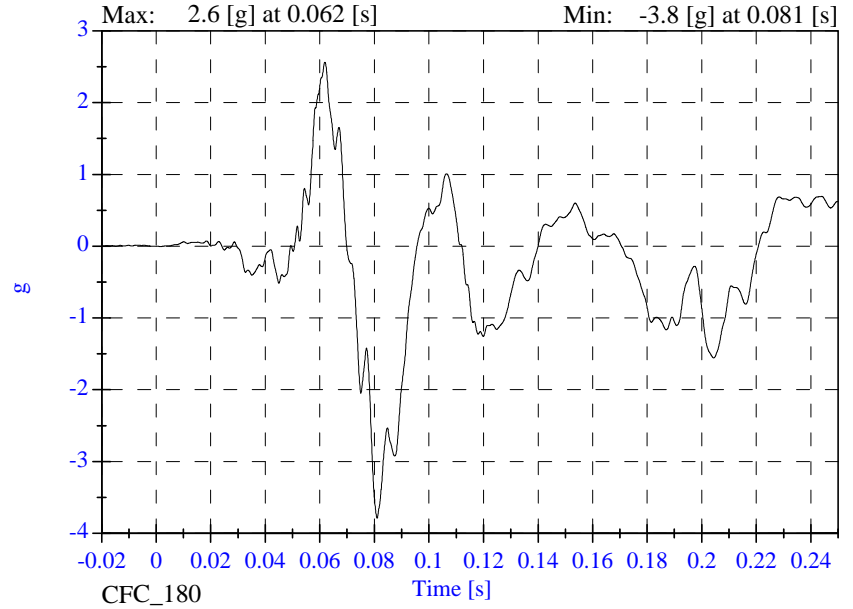
Sled Test NCAP SLED 08-3-18

- August 04, 2003

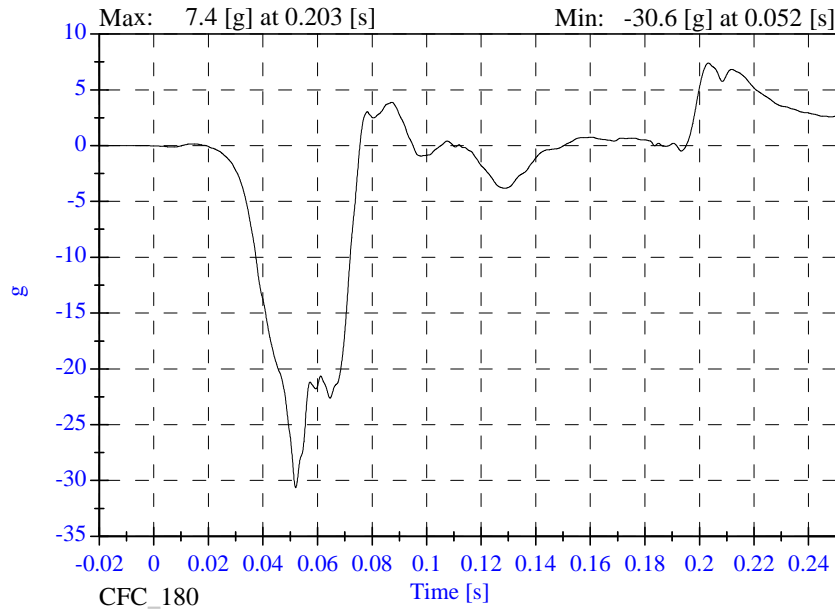
P3 Chest x



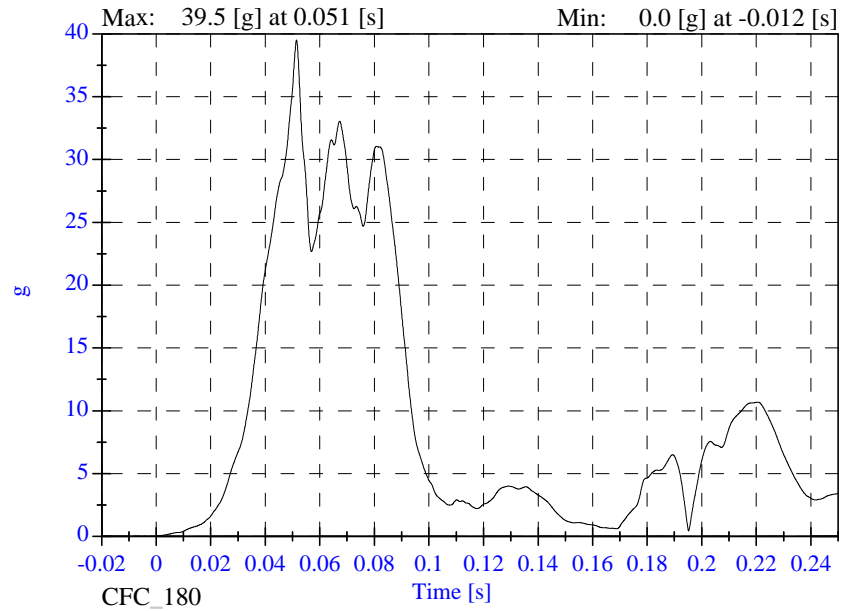
P3 Chest y



P3 Chest z

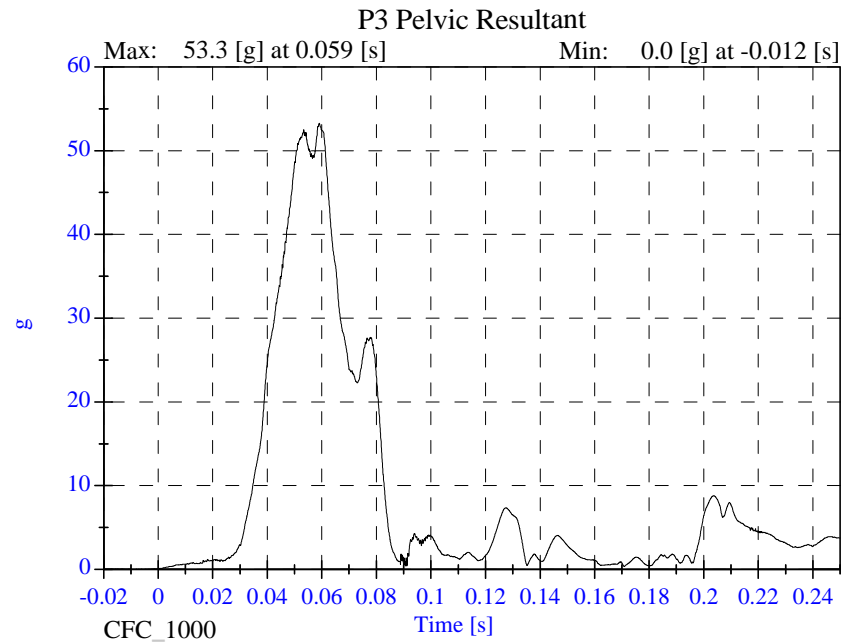
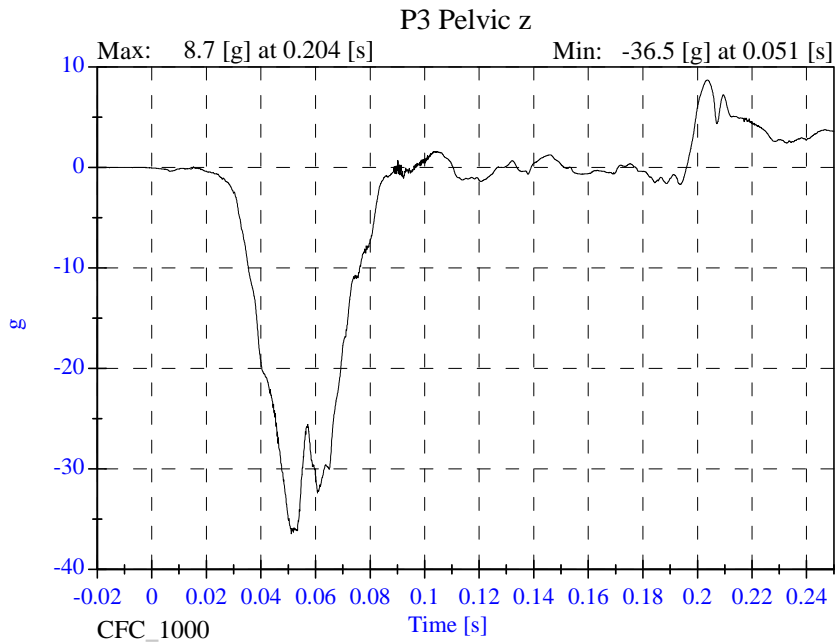
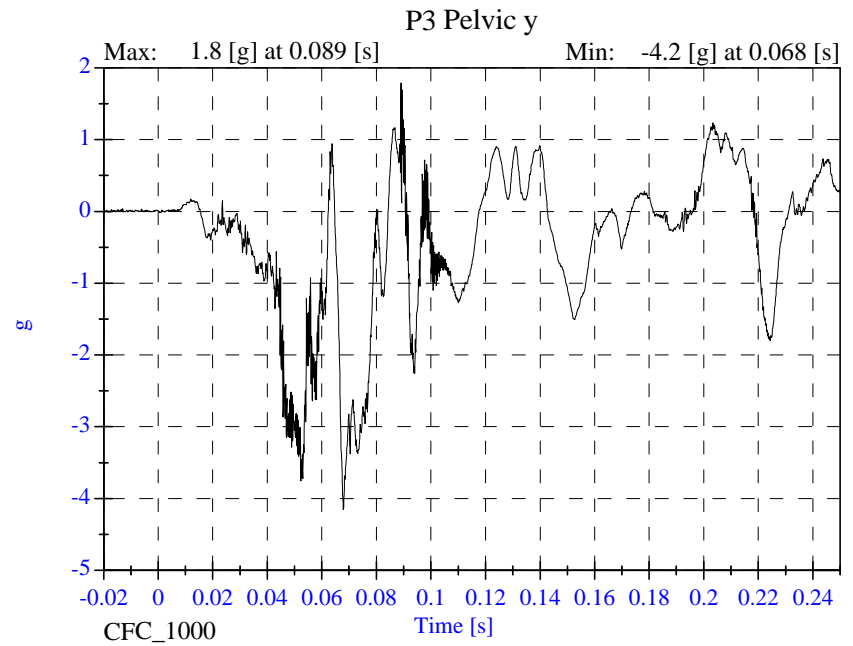
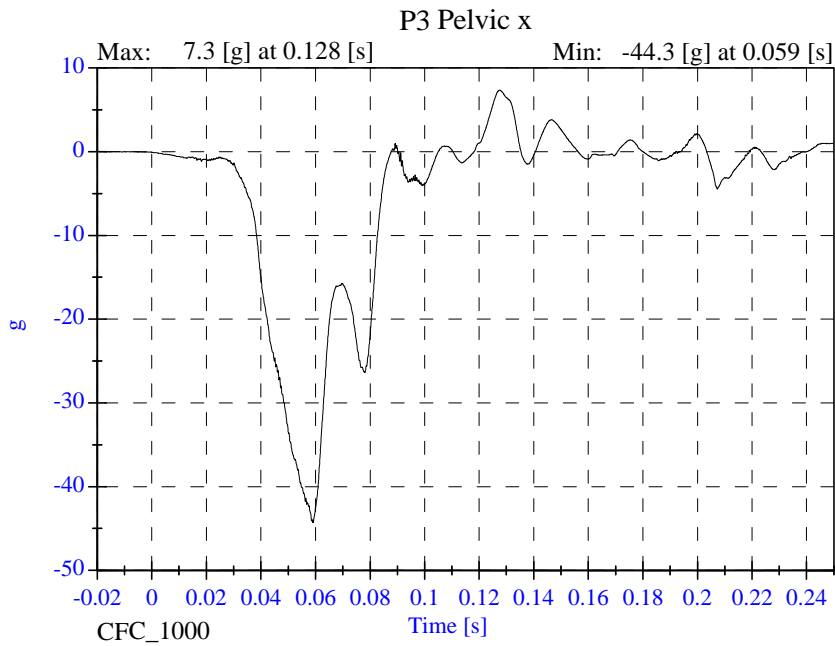


P3 Chest Resultant



Sled Test NCAP SLED 08-3-18

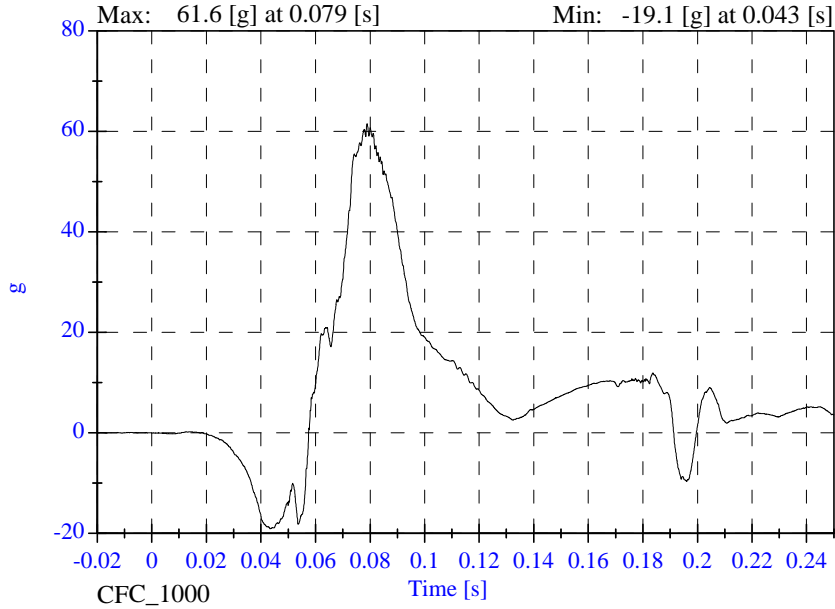
- August 04, 2003



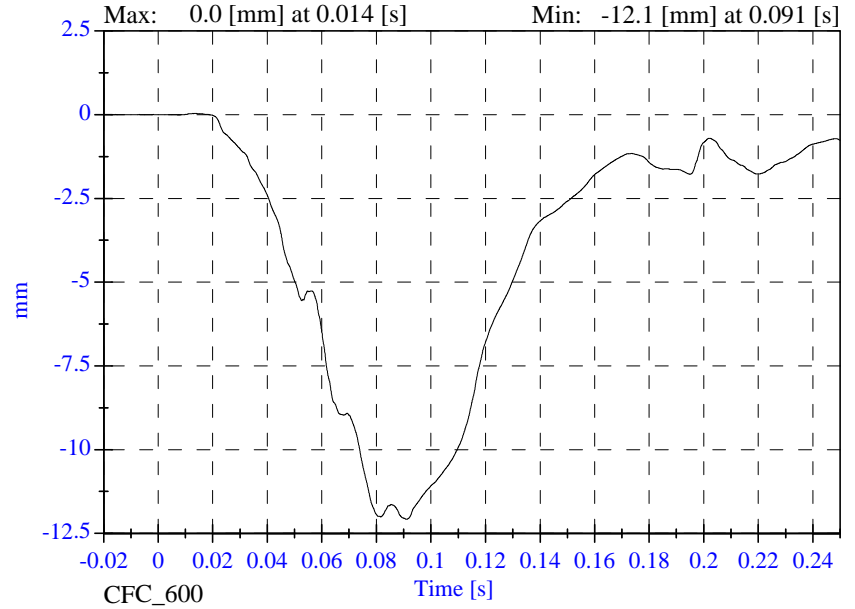
Sled Test NCAP SLED 08-3-18

- August 04, 2003

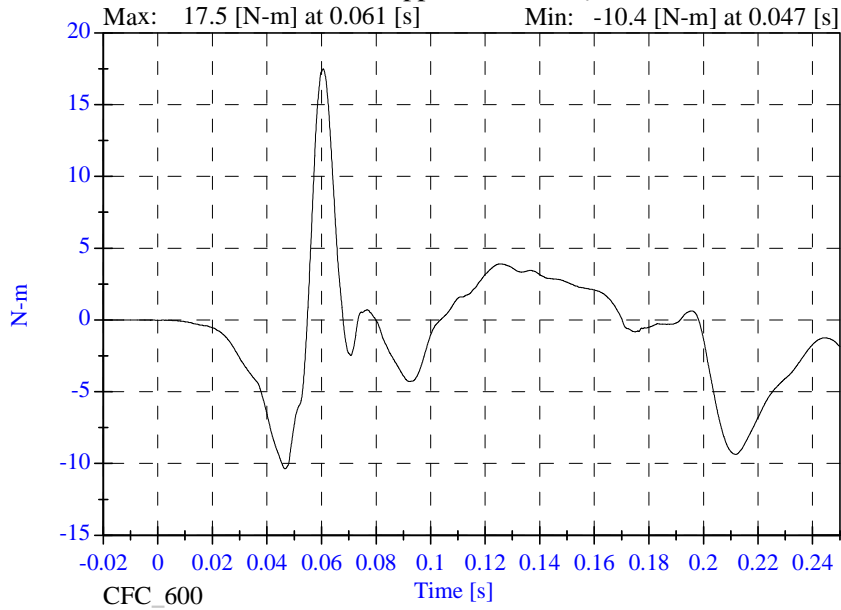
P3 Head Red z



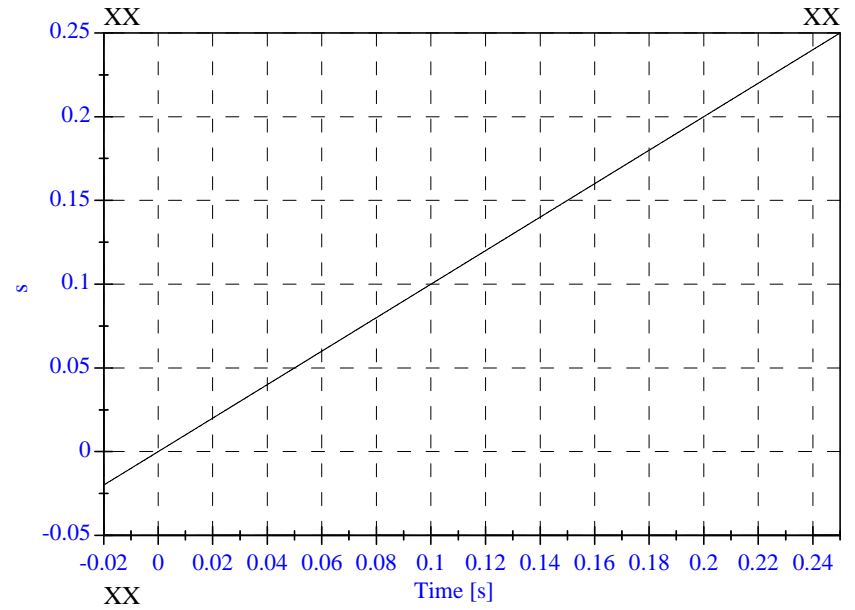
P3 Chest Compression



P3 Upper Neck Mocyc

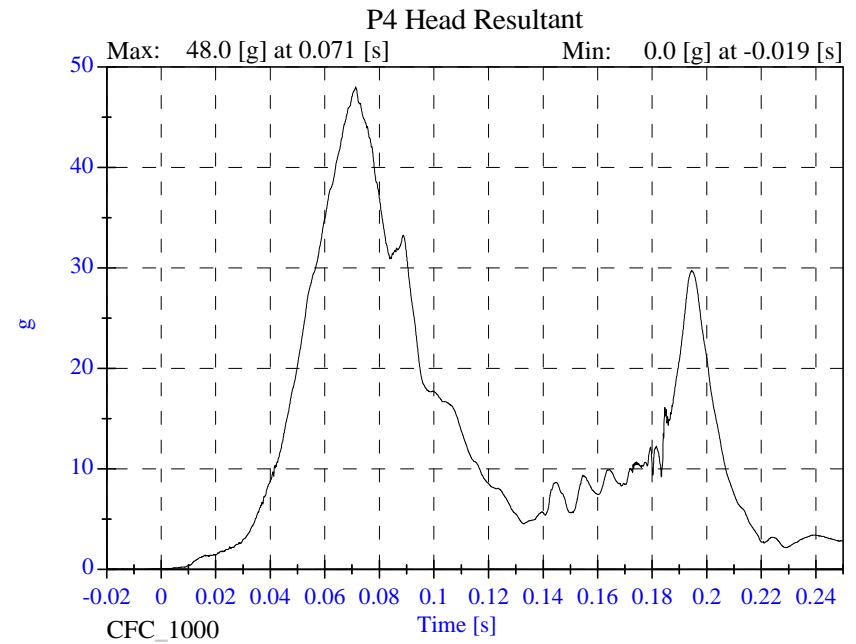
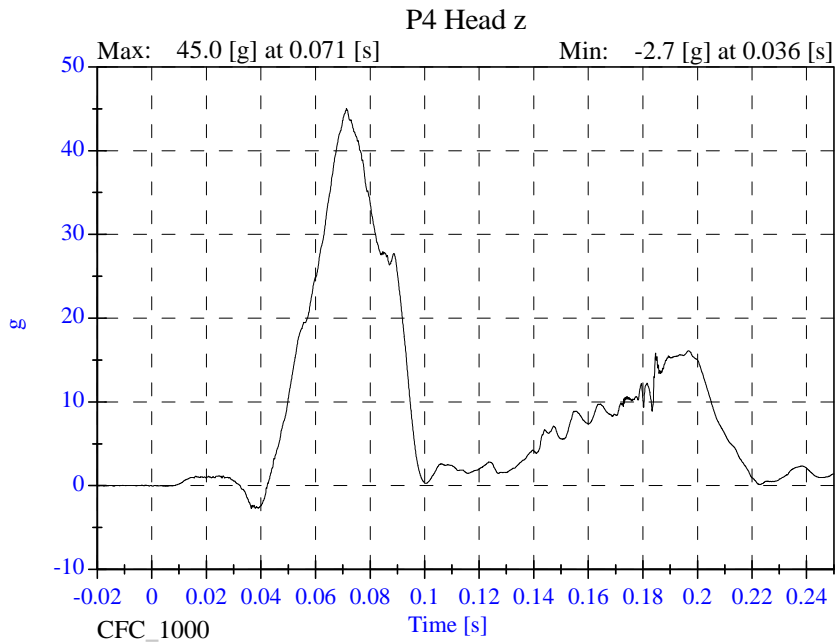
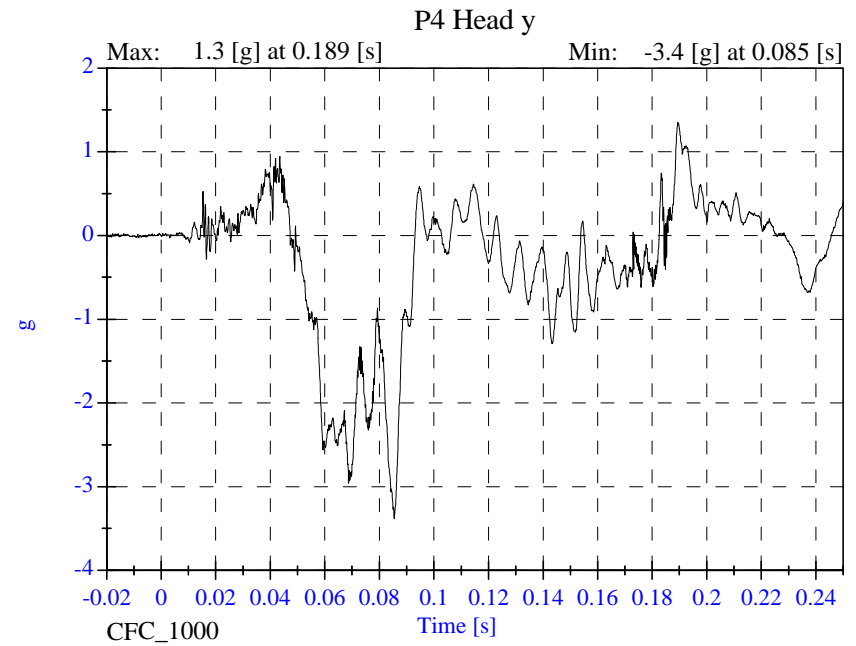
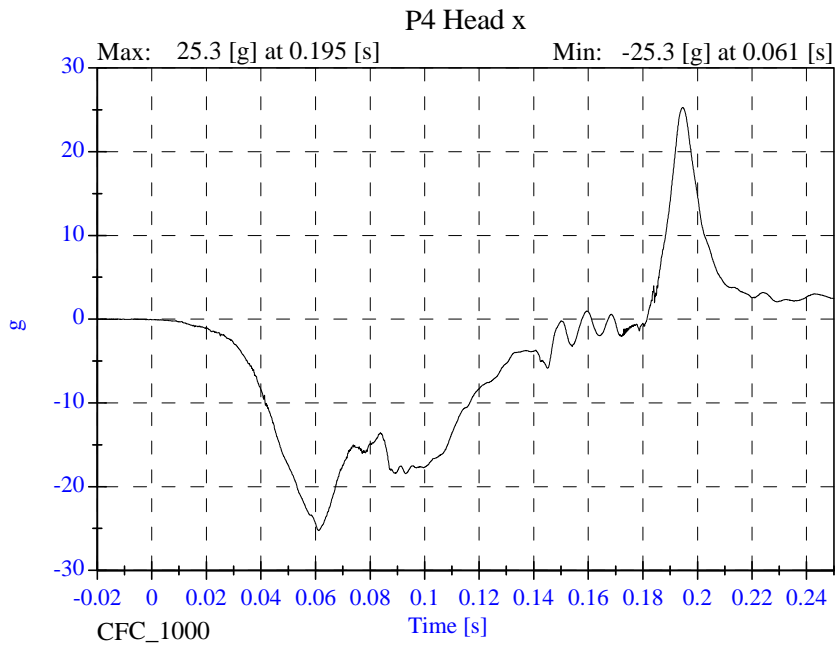


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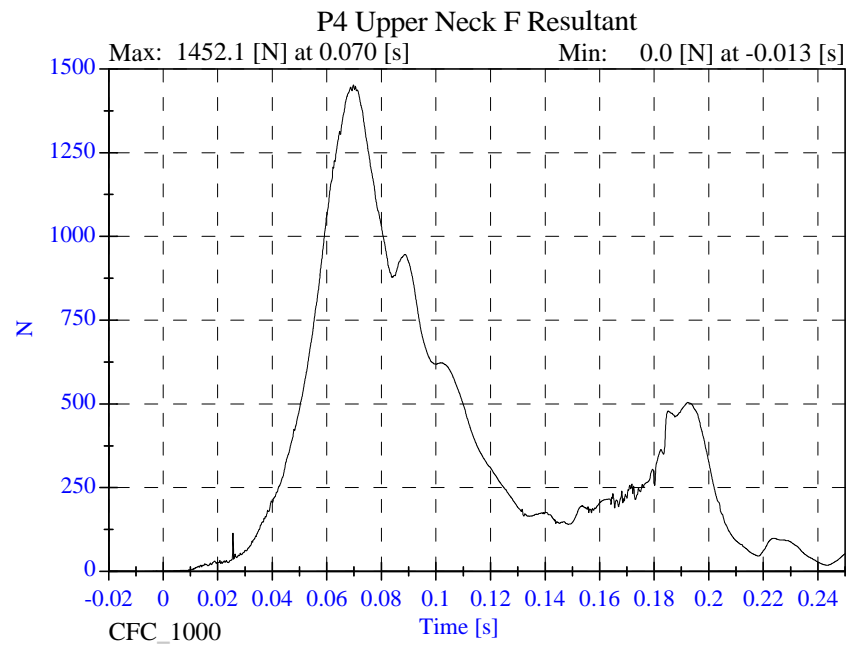
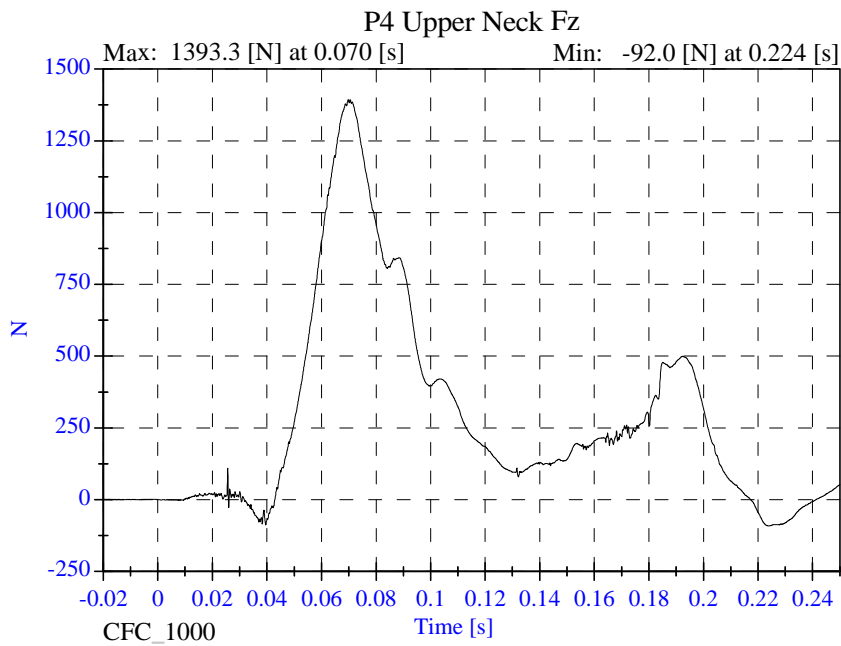
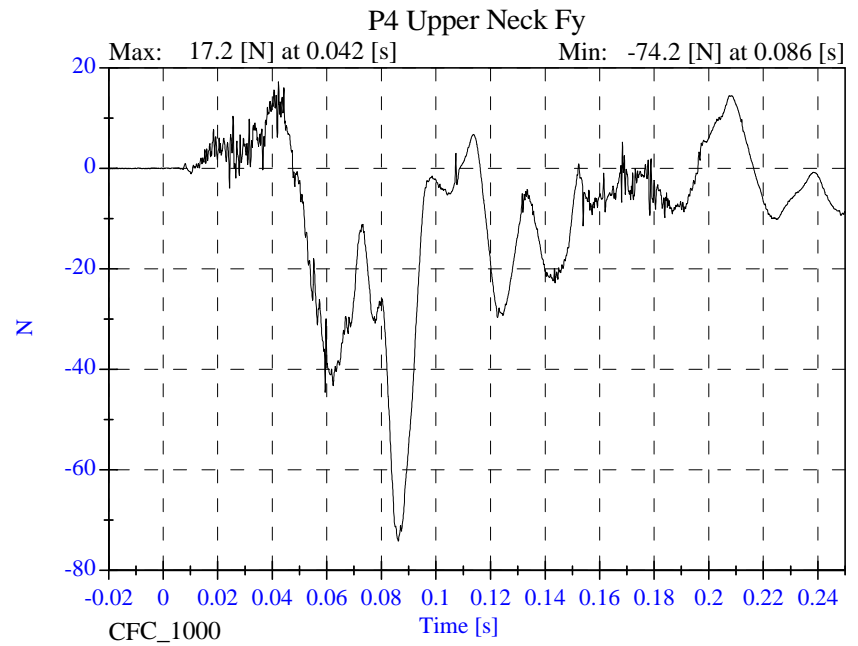
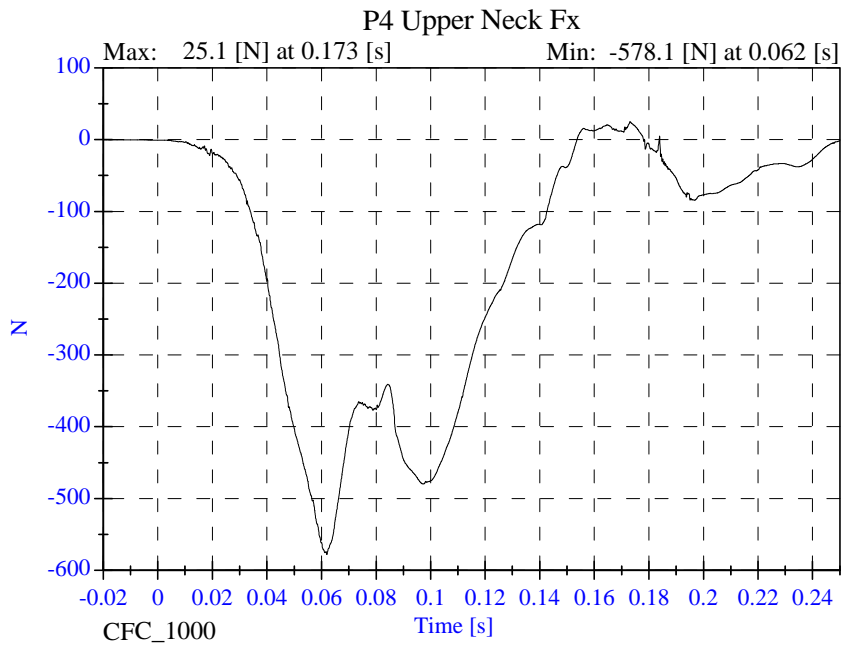
Sled Test NCAP SLED 08-3-18

- August 04, 2003



Sled Test NCAP SLED 08-3-18

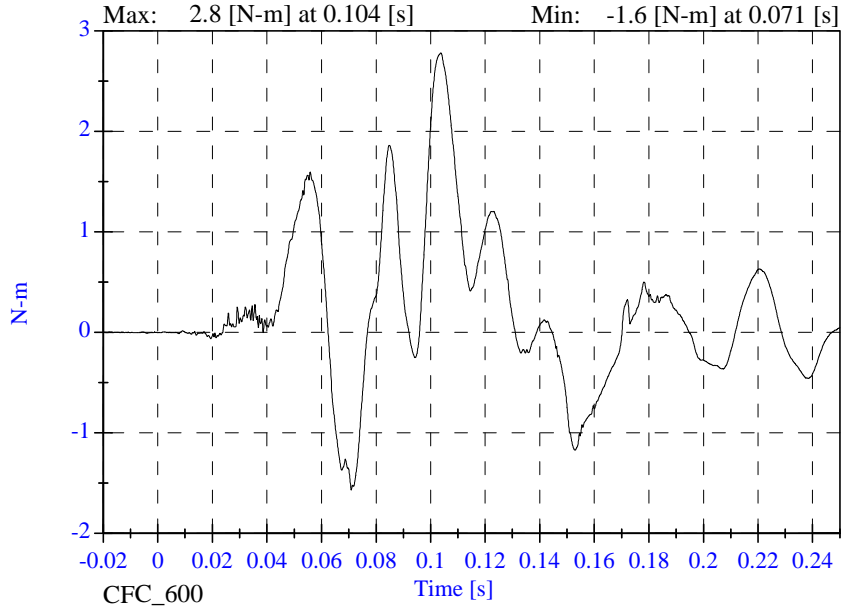
- August 04, 2003



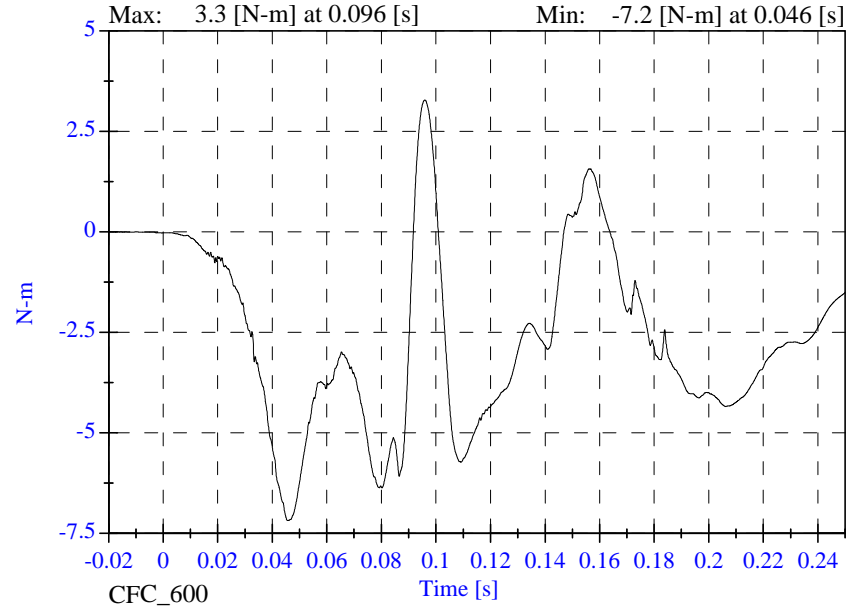
Sled Test NCAP SLED 08-3-18

- August 04, 2003

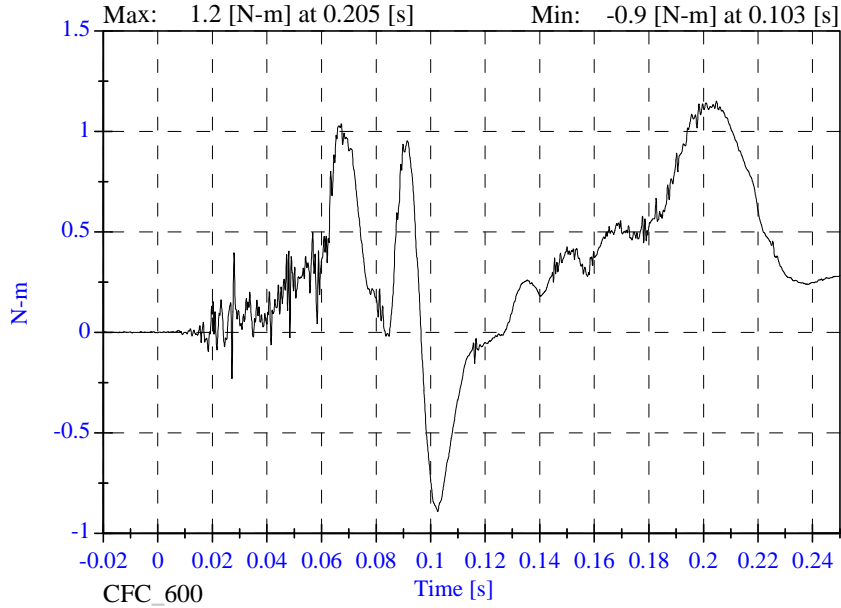
P4 Upper Neck Mx



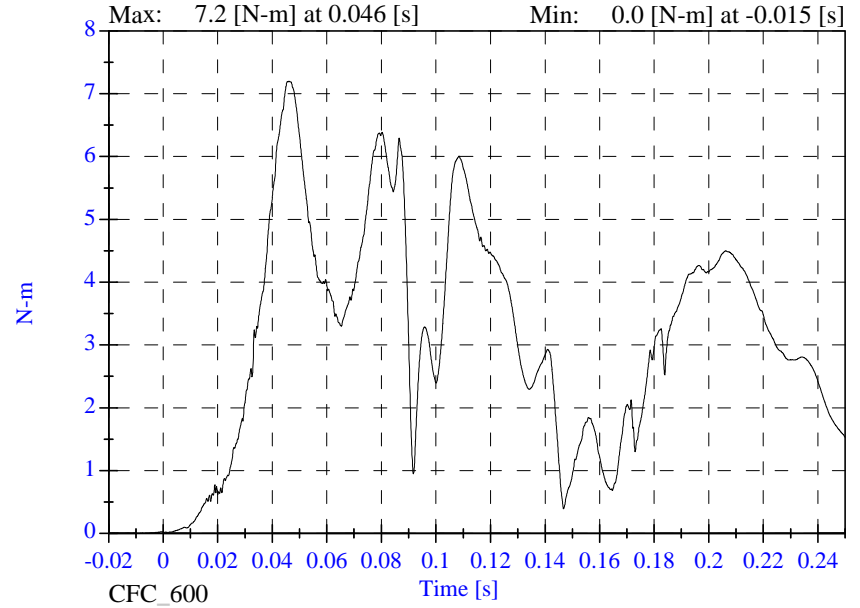
P4 Upper Neck My



P4 Upper Neck Mz



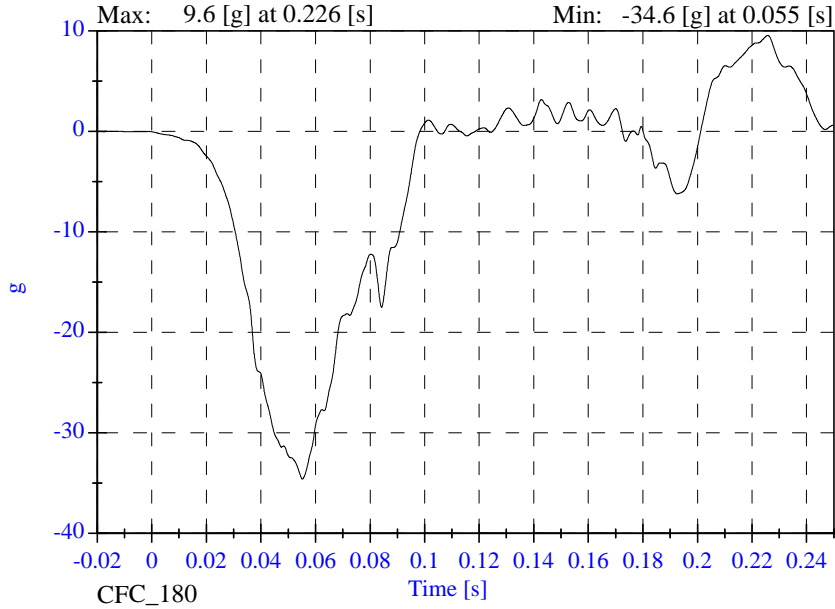
P4 Upper Neck M Resultant



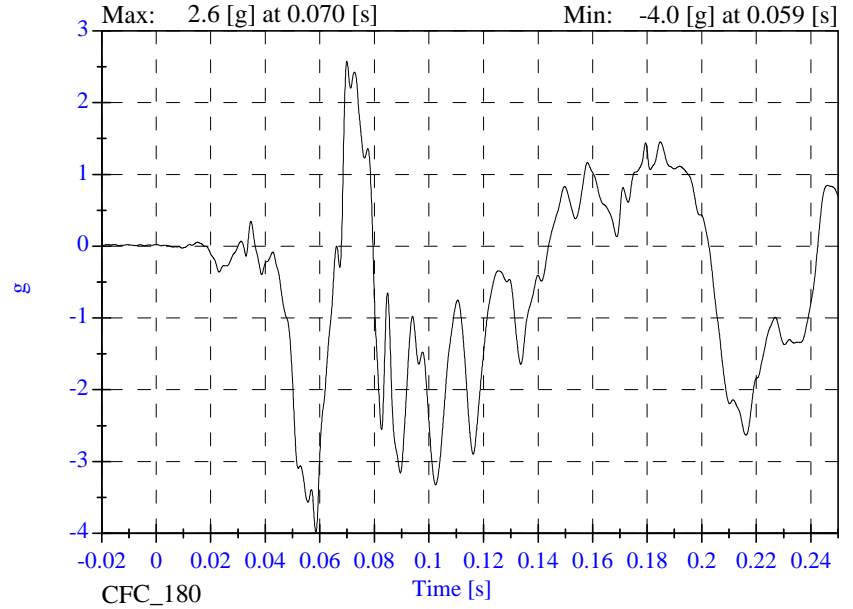
Sled Test NCAP SLED 08-3-18

- August 04, 2003

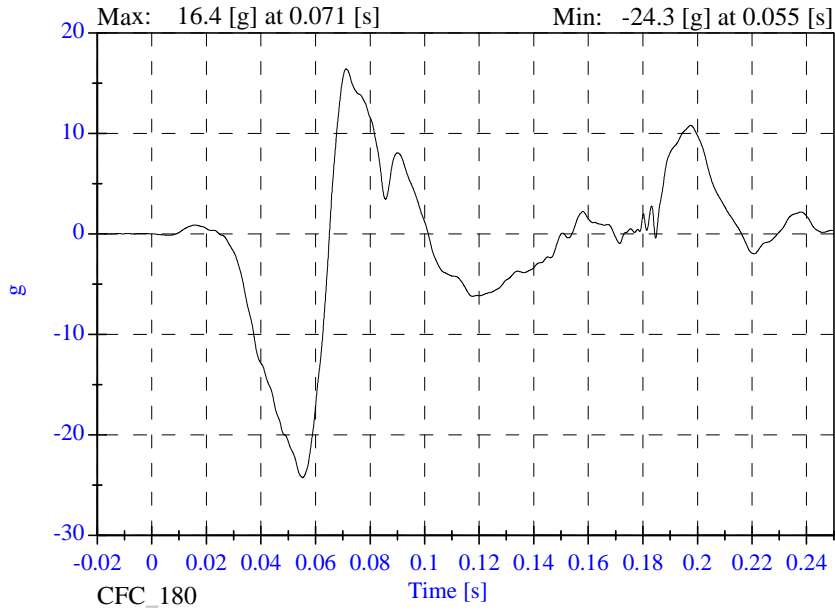
P4 Chest x



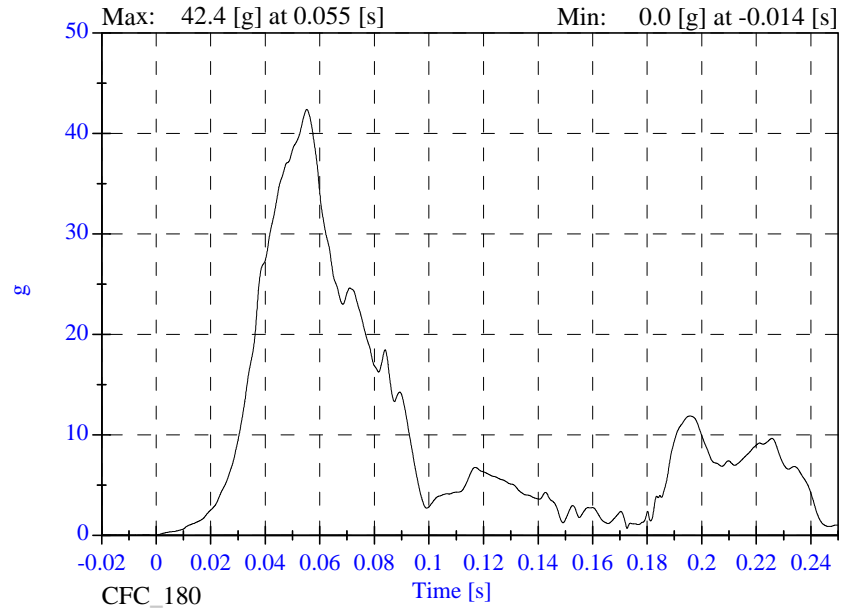
P4 Chest y



P4 Chest z

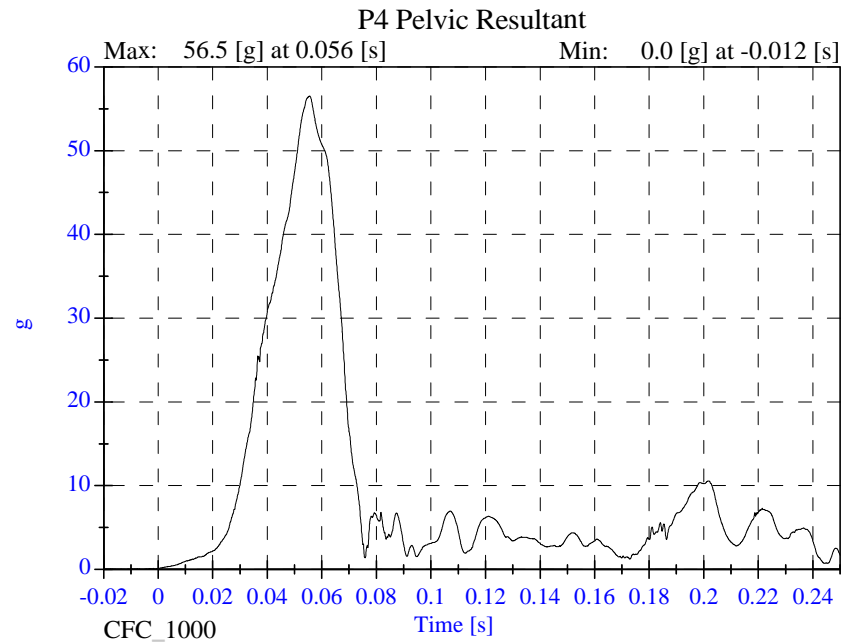
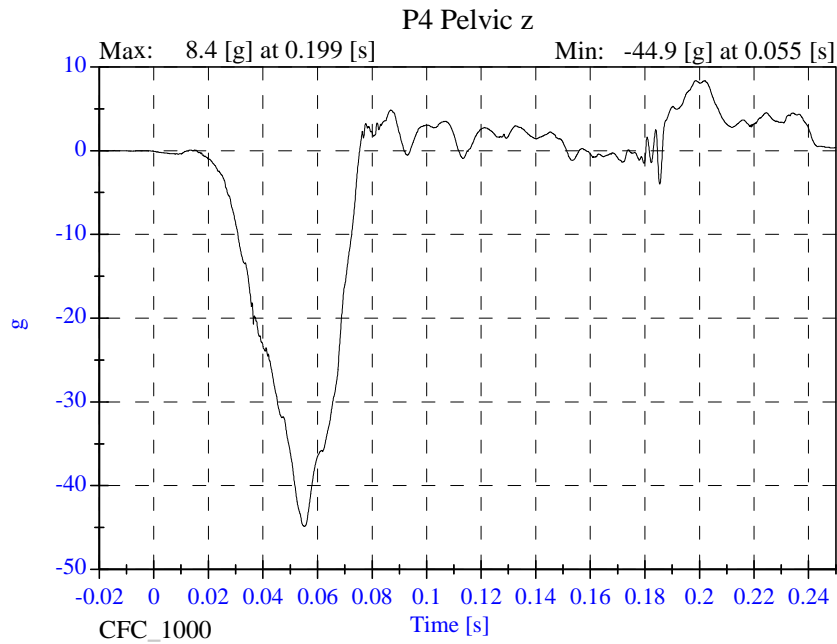
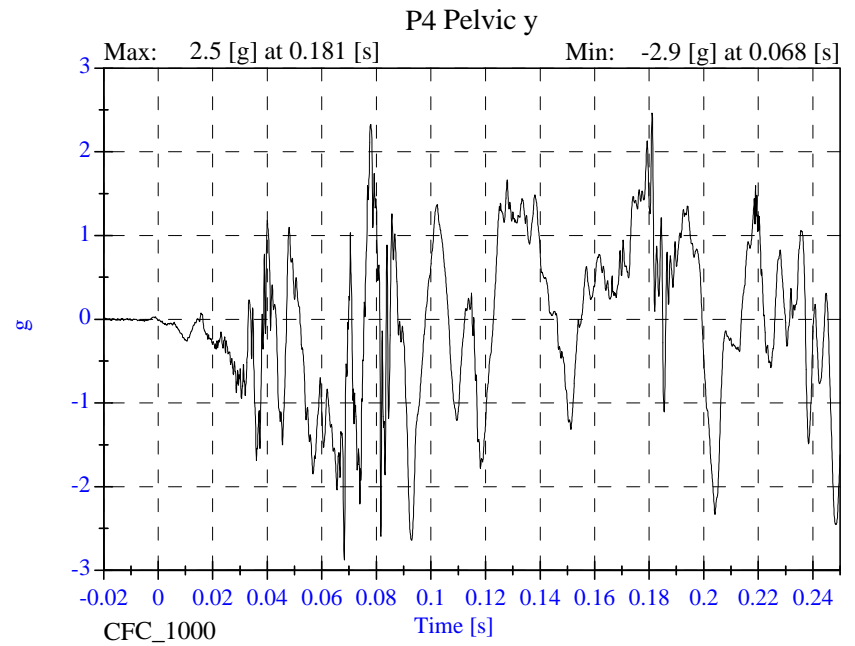
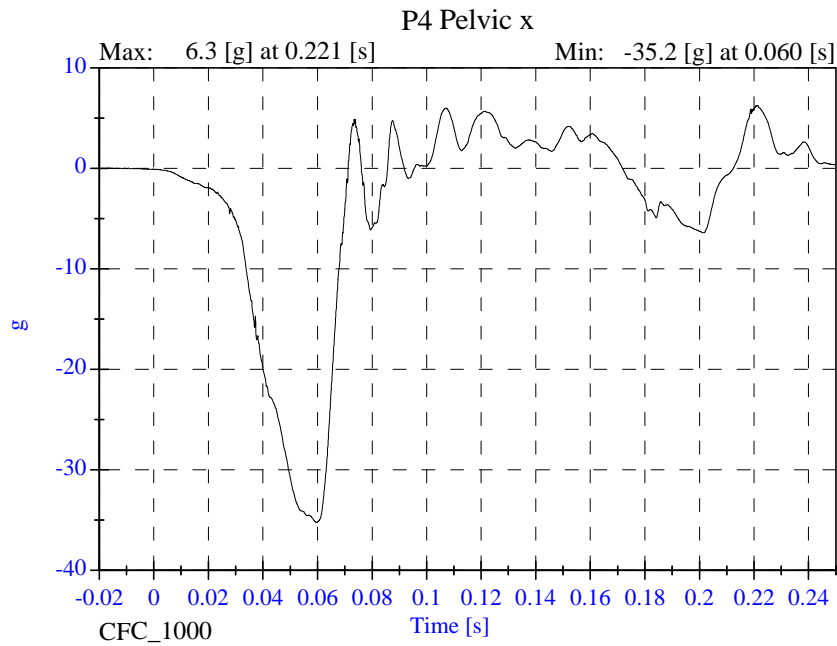


P4 Chest Resultant



Sled Test NCAP SLED 08-3-18

- August 04, 2003

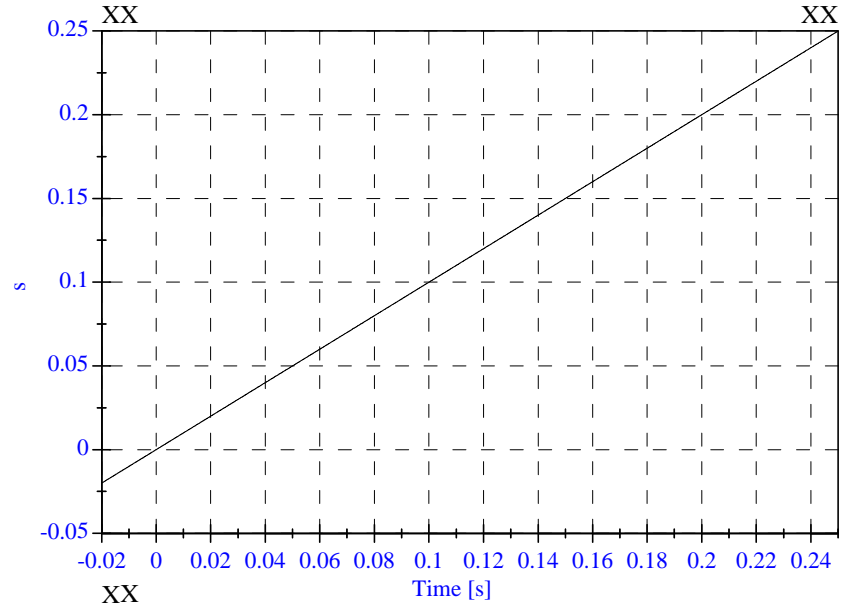
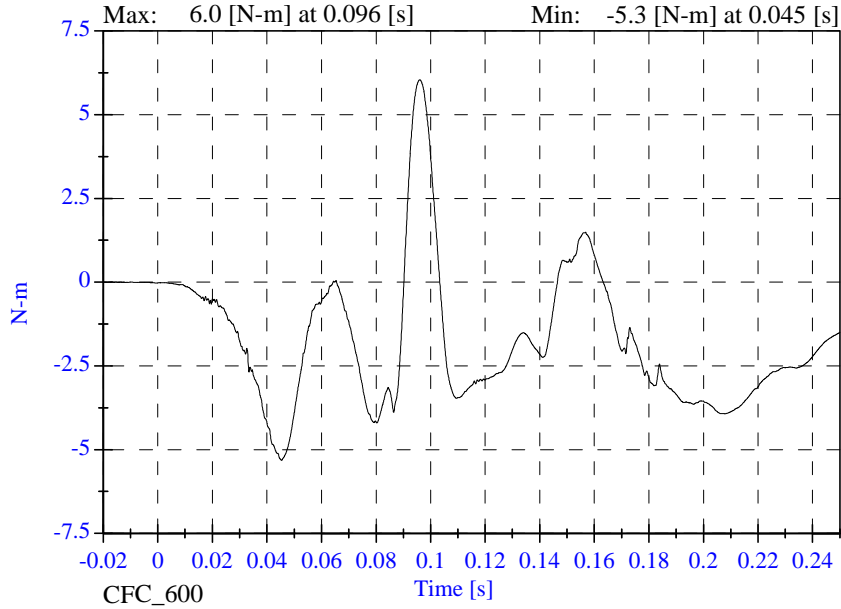


Sled Test NCAP SLED 08-3-18

- August 04, 2003

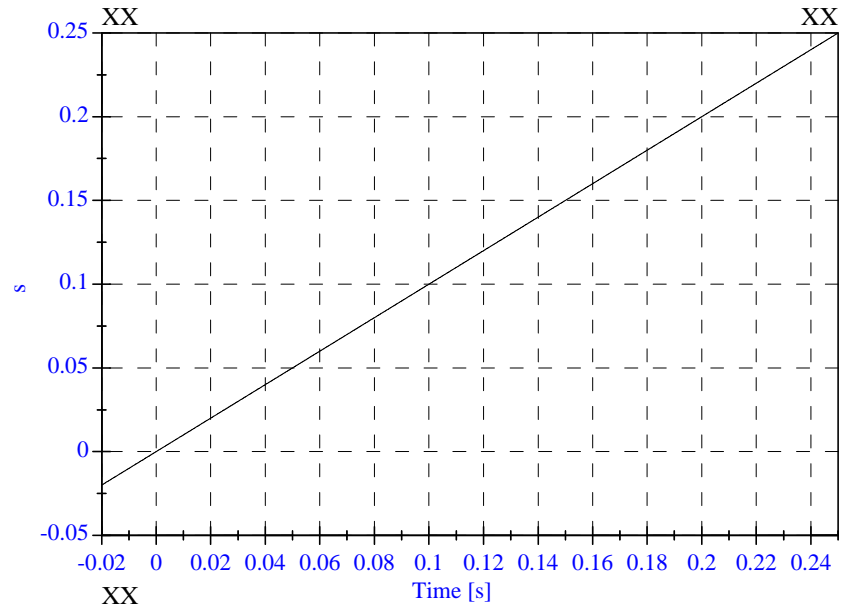
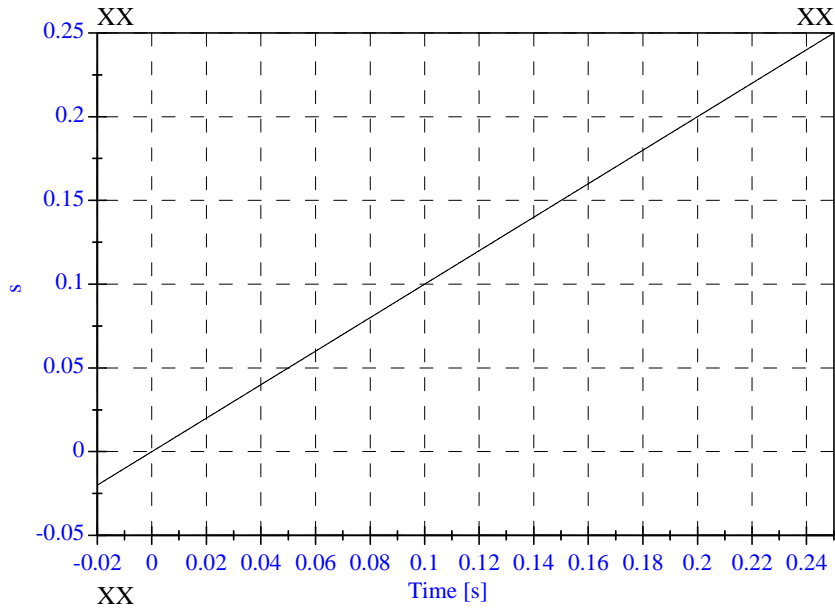
P4 Upper Neck Mocyc

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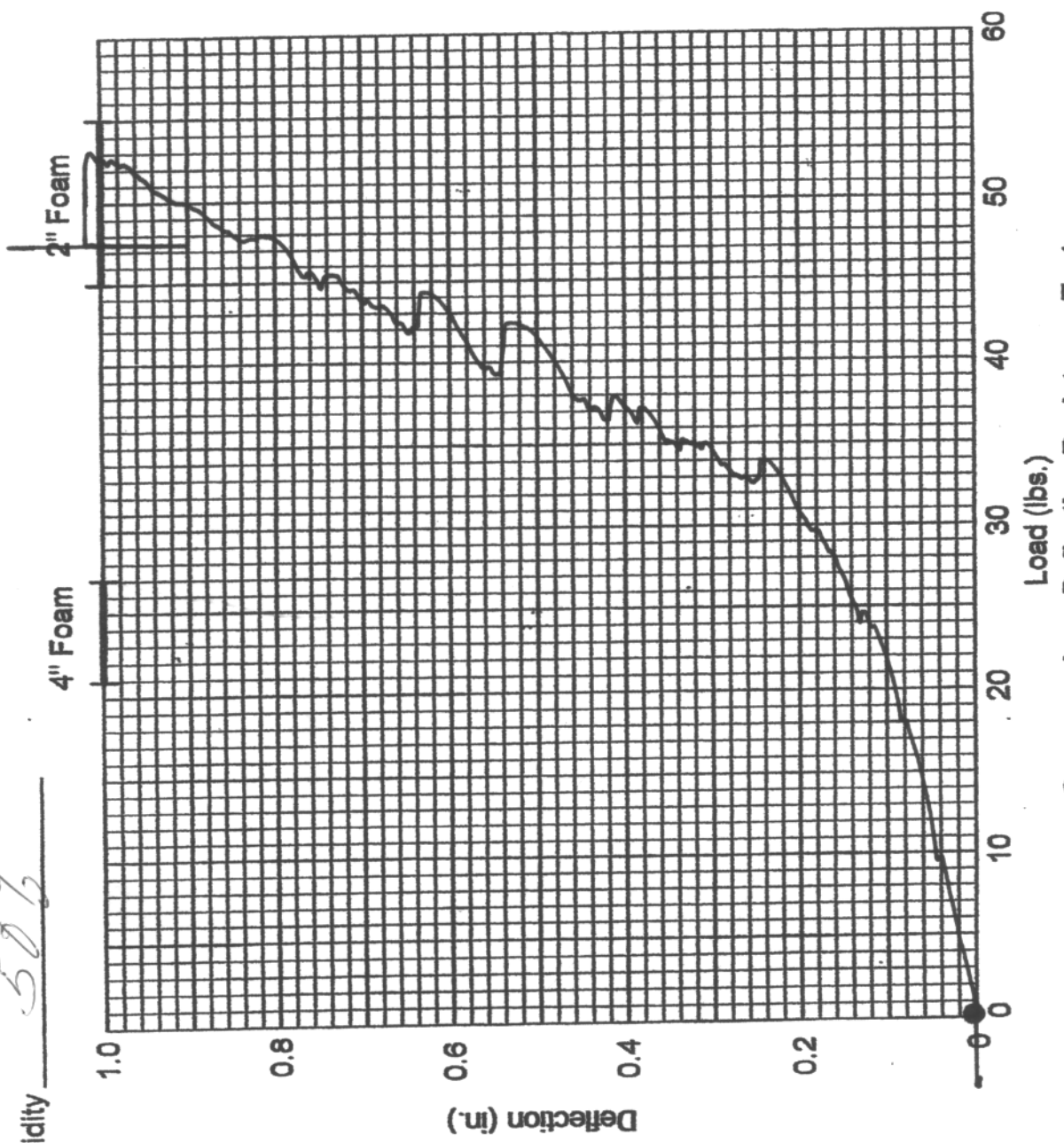


SECTION 9

Compression – Deflection Resistance Test

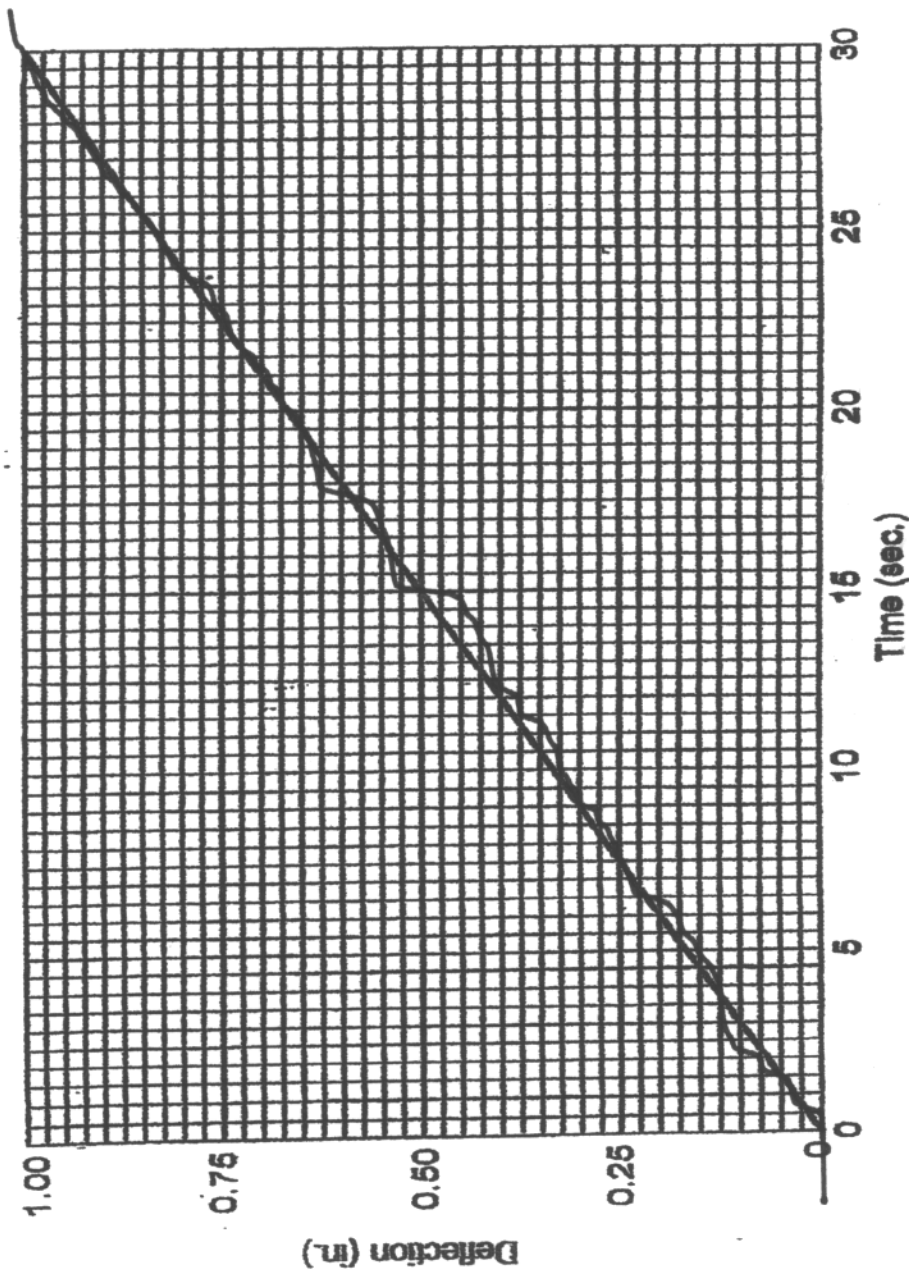
Foam No. 2" x 20" 2 x 29" IR

Date 8/4/03
Performed By SD
Temp. 70°
Humidity 50%



Compression - Deflection Resistance Test
Child Seat Foam

Date 8/4/03
 Temp 70°
 Humidity 50%
 Foam No. 2" X 20" 2X24" IZ



Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

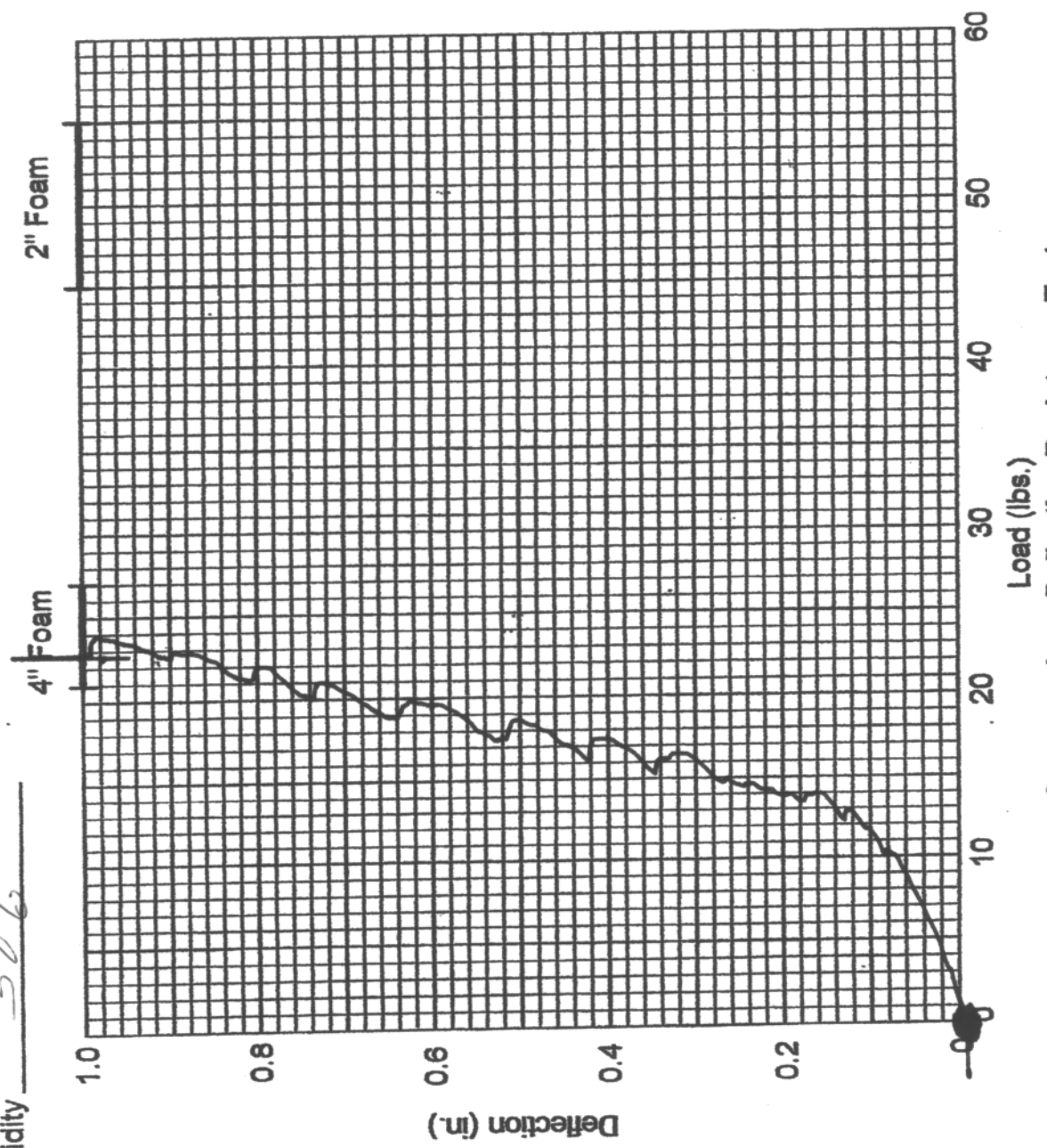
2" X 20" X 24" IZ

Foam I.D. Number

Date	Peak Load	Pass/Fail
8/4/03	417.25 LBS	Pass

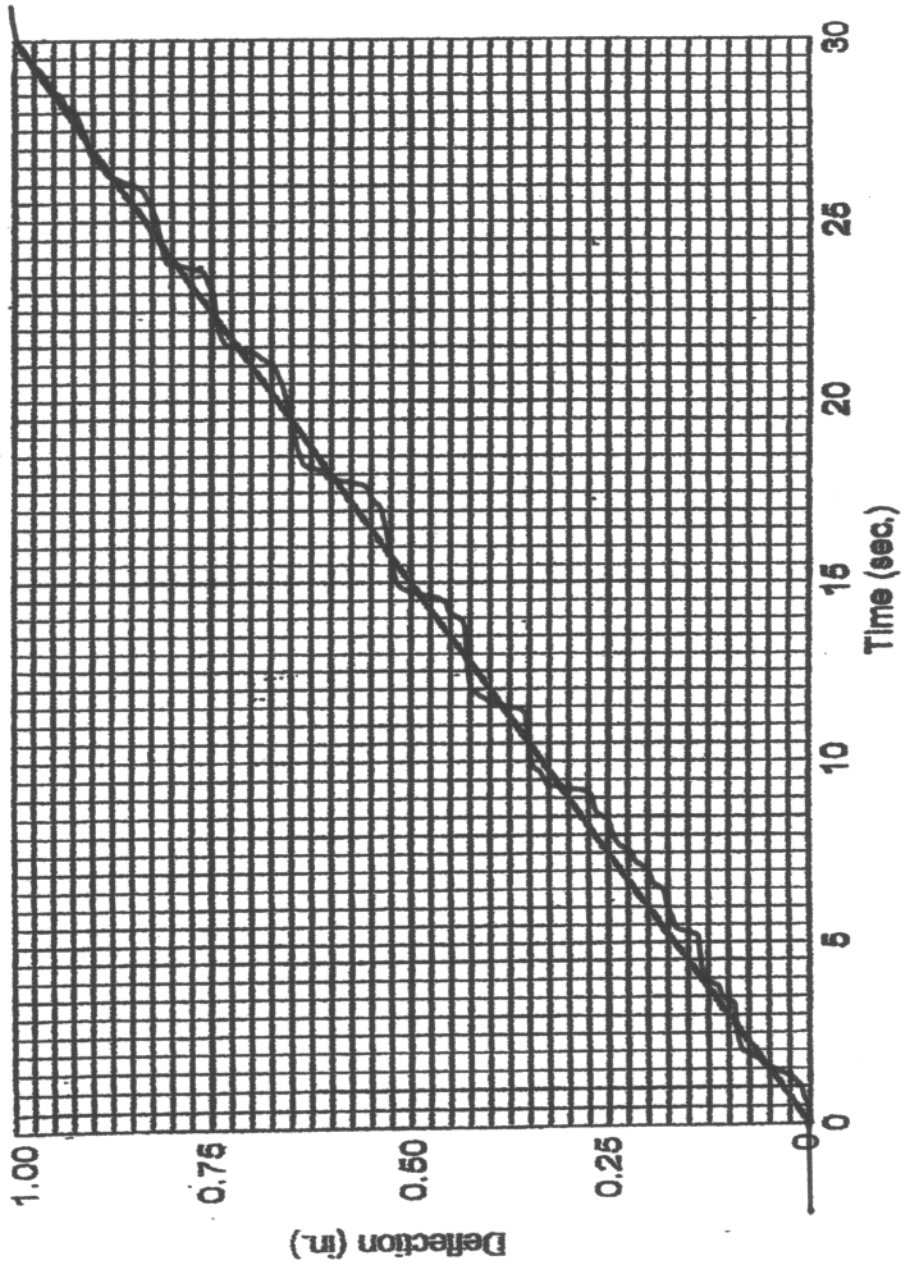
Foam No. 4" x 20" IZ

Date 9/10/09
Performed By [Signature]
Temp. 70°
Humidity 50%



Compression - Deflection Resistance Test
Child Seat Foam

Date 8/4/03
 Temp 75°
 Humidity 50%
 Foam No. A" X 20' IN



Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

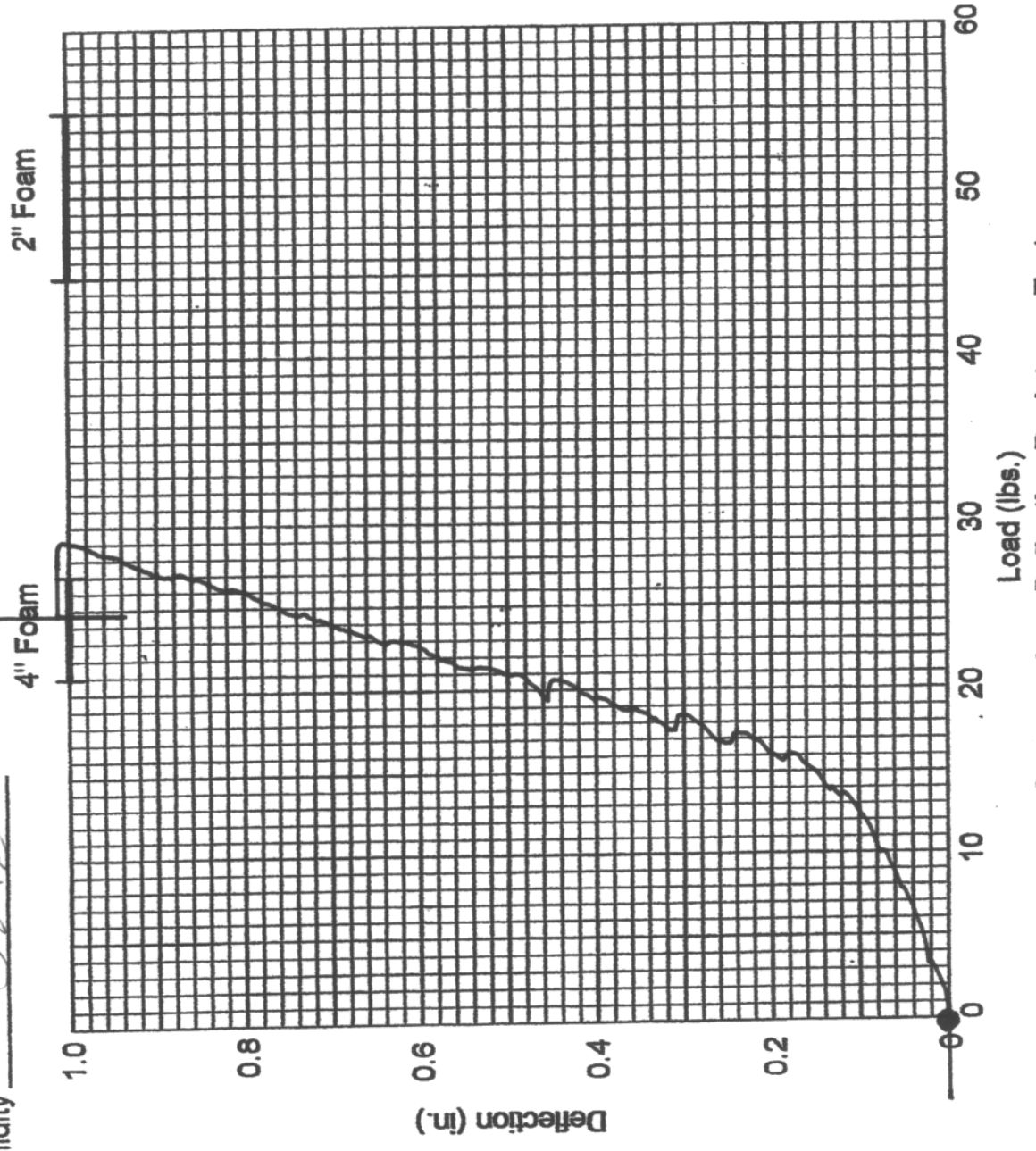
4" x 20" IZ

Foam I.D. Number

Date	Peak Load	Pass/Fail
8/4/03	22.5 LBS	[Signature]

Foam No. 9" X 24" IZ

Date 8/4/03
Performed By [Signature]
Temp. 70°
Humidity 58%



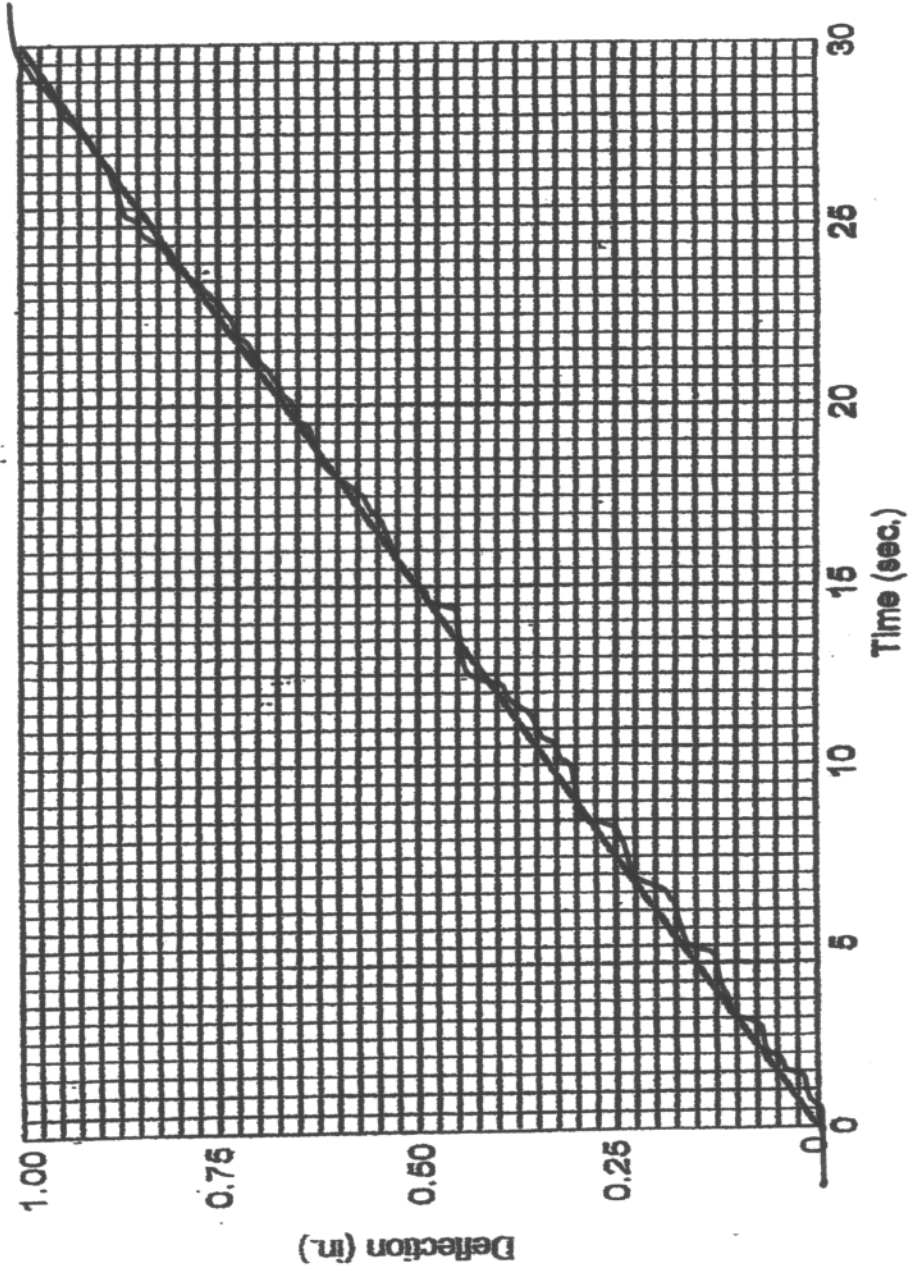
Compression - Deflection Resistance Test
Child Seat Foam

Date 8/4/03

Temp 70°

Humidity 50%

Foam No. 4'X 2A' IR



Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

4" X 24" IR

Foam I.D. Number

Date	Peak Load	Pass/Fail
8/4/03	24.5 LBS	PASS

SECTION 10

Child Dummy Calibration Data Traces and Tables

HYIII 3 Year Old Head Drop Test S/N:142

Part 572P Head Drop

Calibration Date: July 21, 2003

Serial No: 142

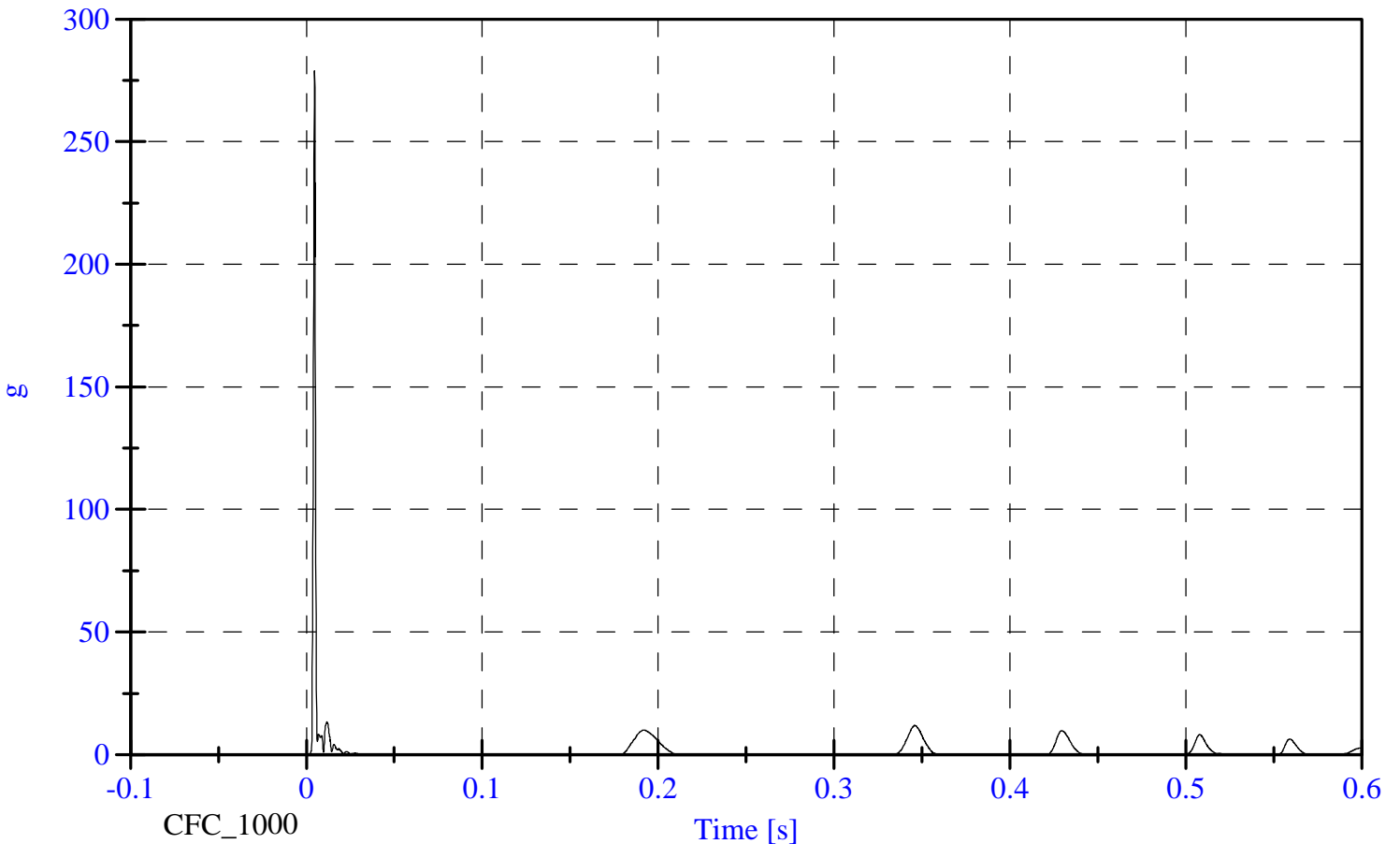
Work File: 4001

-----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	279.06 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	14.76 Gs	Passed
Curve PerCent NonModal:	< 10%	4.82 %	Passed

HYIII 3 Year Old Head Drop Test S/N:142 Head Resultant

Max: 279.1 [g] at 0.005 [s]
 Min: 0.0 [g] at 0.398 [s]



Hybrid III Head Neck Extention Test S/N:142

Part 572P Neck Extension Test Calibration Date: July 16, 2003
Serial No: 142 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	3.88 ft/s	Passed
Pulse at 10 ms:	6.20- 8.20 ft/s	6.82 ft/s	Passed
Pulse at 14 ms:	9.20-11.50 ft/s	9.36 ft/s	Passed

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

Maximum Rotation:	83.0-93.0 Deg	84.20 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	-53.30--43.70 N-m	-44.75 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	65.30 ms	Passed

Hybrid III 3 Year Old Head Neck Flexion Test S/N:142

Part 572P Neck Flexion Test Calibration Date: July 16, 2003
Serial No: 142 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:	17.65-18.45 ft/s	18.34 ft/s	Passed

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

Pulse at 10 ms:	6.60- 8.90 ft/s	7.19 ft/s	Passed
Pulse at 15 ms:	9.80-13.10 ft/s	10.46 ft/s	Passed
Pulse at 20 ms:	13.10-16.70 ft/s	14.31 ft/s	Passed

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

Maximum Rotation:	70.0-82.0 Deg	77.80 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	42.00- 53.00 N-m	50.03 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	73.8 ms	Passed

Hybrid III 3 Year Old Thorax Test S/N:142

Part 572P Thorax Impact

Calibration Date: July 21, 2003

Serial No: 142

Work File: 4001

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

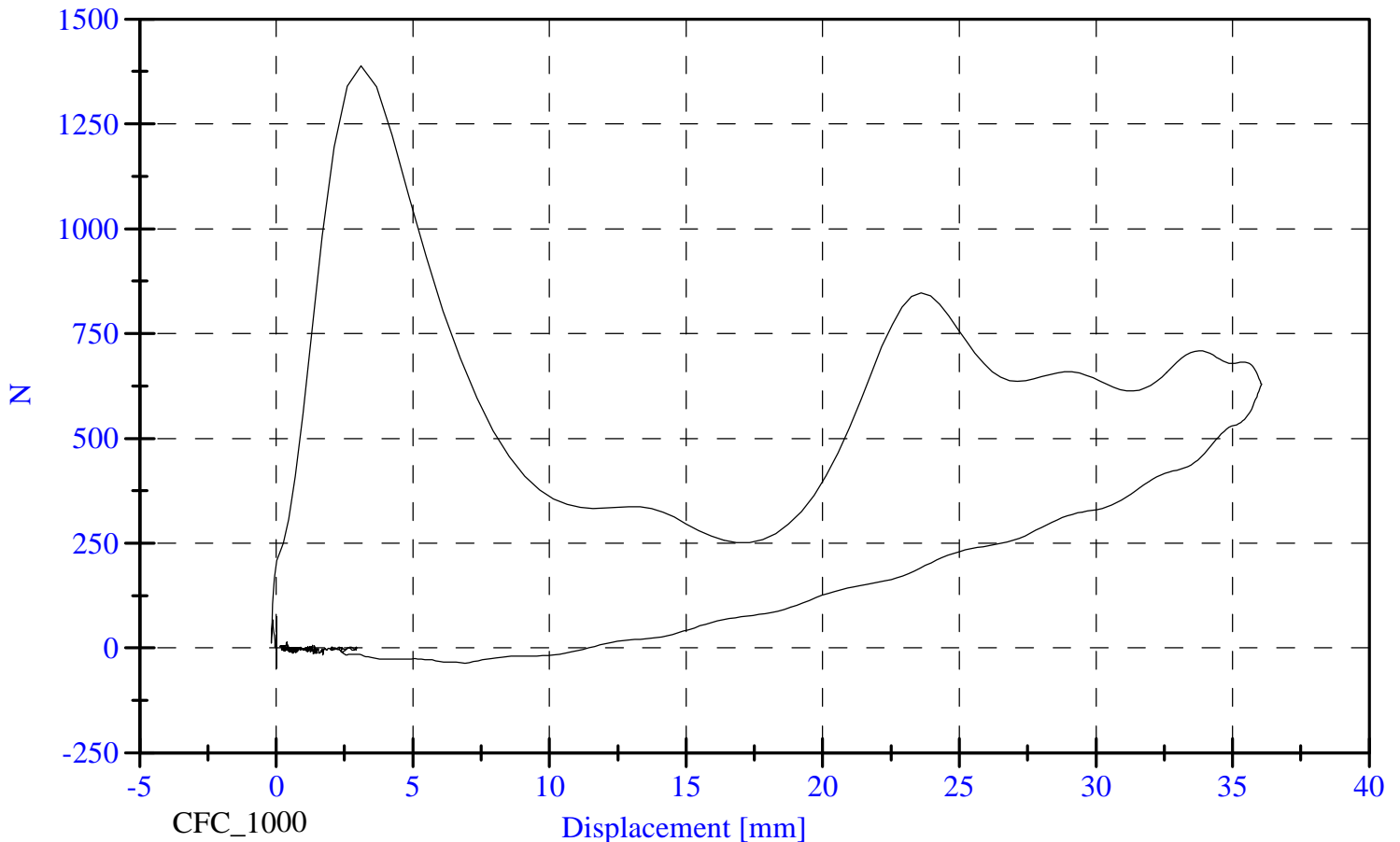
<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	34.00 %	Passed
Pendulum Velocity:	5.90- 6.10 m/s	6.07 m/s	Passed
Maximum Deflection:	32.00-38.00 mm	36.06 mm	Passed
Maximum Res. Force:	680.00- 810.00 N	709.45 N	Passed
Internal Hysteresis:	65-85 %	75.47 %	Passed
Pass Sternum Force Criteria?:	860.00 N	846.79	Passed

Hybrid III 3 Year Old Thorax Test S/N:142

Probe Force vs. Displacement

Max: 1388.0 [N] at 3.104 [mm]

Min: -48.5 [N] at 0.011 [mm]



CRABI 1 Year Old Frontal Head Drop Test S/N:093

Part 572R Frontal Head Drop

Calibration Date: July 22, 2003

Serial No: 093

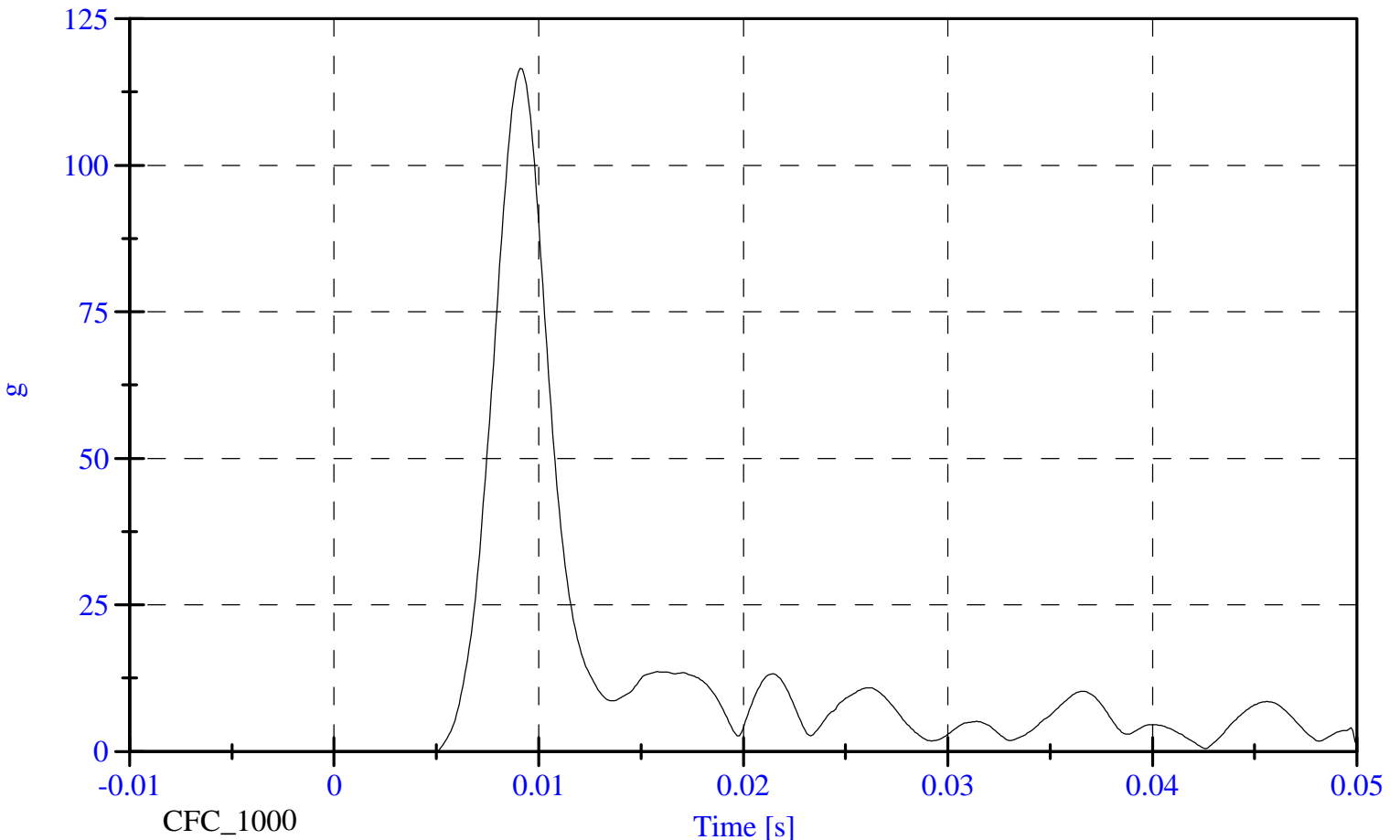
Work File: 4001

-----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.:	100-120 Gs	116.59 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	14.34 Gs	Passed
Curve PerCent NonModal:	< 17%	11.67 %	Passed

CRABI 1 Year Old Frontal Head Drop Test S/N:093
Head Resultant

Max: 116.6 [g] at 0.009 [s]
Min: 0.0 [g] at -0.008 [s]



CRABI 1 Year Old Rear Head Drop Test S/N:093

Part 572R Rear Head Drop

Calibration Date: July 23, 2003

Serial No: 093

Work File: 4001

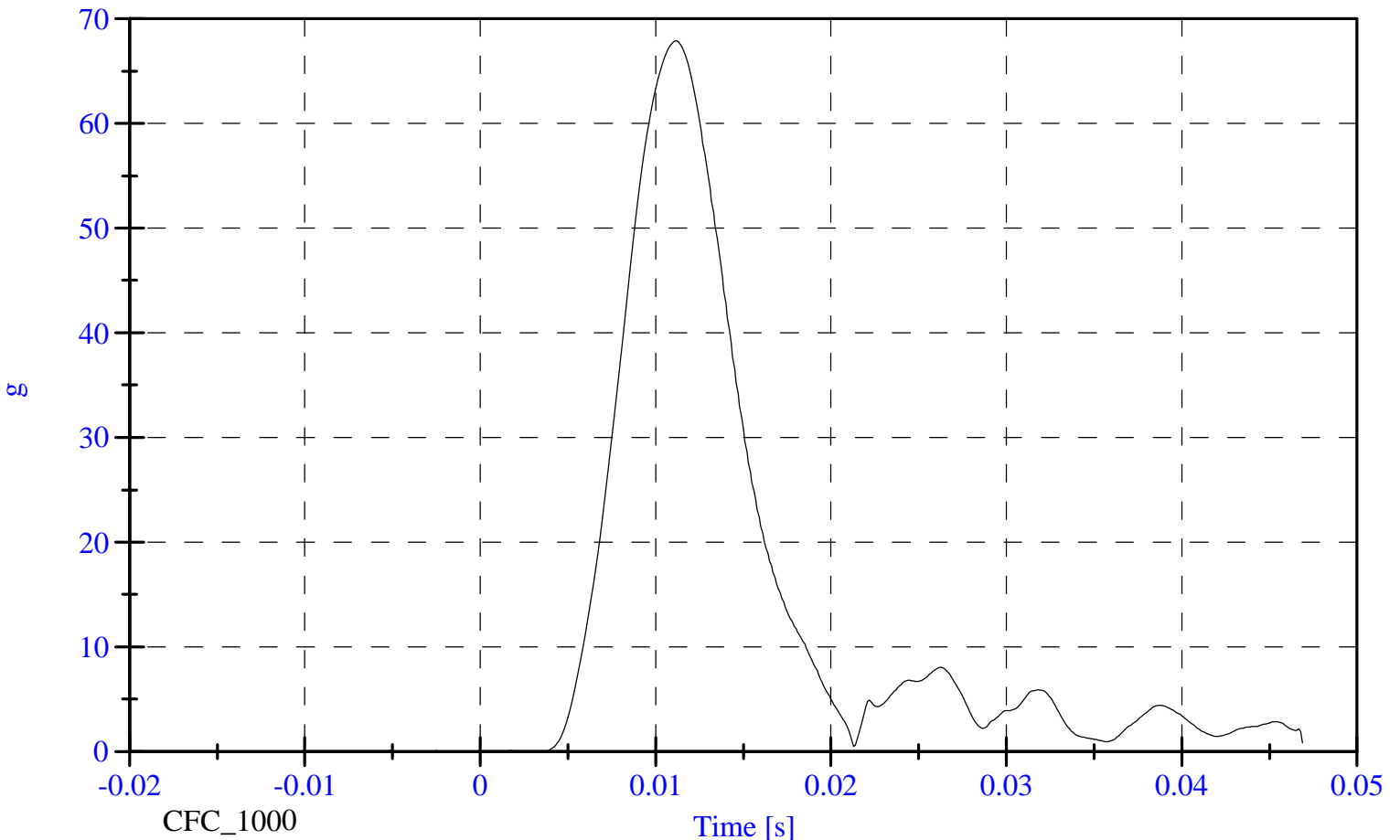
-----TEST RESULTS-----

<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.:	55-71 Gs	67.89 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	1.82 Gs	Passed
Curve PerCent NonModal:	< 17%	11.85 %	Passed

CRABI 1 Year Old Rear Head Drop Test S/N:093
Head Resultant

Max: 67.9 [g] at 0.011 [s]

Min: 0.0 [g] at -0.007 [s]



Crabi 1 Year Old Head Neck Extention Test S/N:093

Part 572R Neck Extension Test Calibration Date: July 24, 2003
Serial No: 093 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:	2.40- 2.60 m/s	2.47 m/s	Passed

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

Pulse at 6 ms:	0.80- 1.20 m/s	1.08 m/s	Passed
Pulse at 10 ms:	1.50- 2.10 m/s	1.92 m/s	Passed
Pulse at 14 ms:	2.20- 2.90 m/s	2.65 m/s	Passed

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

Maximum Rotation:	80.0-92.0 Deg	87.68 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	-23.00--12.00 N-m	-21.92 N-m	Passed
Occipital Moment Decay:	76.0-90.0 ms	81.60 ms	Passed

Crabi 1 Year Old Head Neck Flexion Test S/N:093

Part 572R Neck Flexion Test Calibration Date: July 24, 2003
Serial No: 093 Work File: 4093

-----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 %	35.00 %	Passed
Test Pendulum Speed:	5.10- 5.30 m/s	5.30 m/s	Passed

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

Pulse at 10 ms:	1.60- 2.30 m/s	2.12 m/s	Passed
Pulse at 20 ms:	3.40- 4.20 m/s	4.16 m/s	Passed
Pulse at 25 ms:	4.30- 5.20 m/s	5.07 m/s	Passed

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

Maximum Rotation:	75.0-86.0 Deg	80.58 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	36.00- 45.00 N-m	41.66 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	65.50 ms	Passed

SECTION 11

Test Equipment and Instrumentation Calibration

Calibration for test 08-3-18

SHORTNAME	SENSCOM	CALDATE
P3 HDCG Ax	MFG: ENTRAN S/N: 99108-F29	7/15/2003
P3 HDCG Ay	MFG: ENTRAN S/N: 99102-F12	7/15/2003
P3 HDCG Az	MFG: ENTRAN S/N: 00L13-F03	7/15/2003
P3 HDCG RAz	MFG: ENTRAN S/N: 98G18-F18	7/15/2003
P3 CHST Ax	MFG: ENTRAN S/N: 99108-F30	7/15/2003
P3 CHST Ay	MFG: ENTRAN S/N: 99108-F28	7/15/2003
P3 CHST Az	MFG: ENTRAN S/N: 99H30-Z04	7/15/2003
P3 CHST Dx	MFG: SERVO S/N: 142	7/22/2003
P3 PVCN Ax	MFG: ENTRAN S/N: 99102-F06	7/15/2003
P3 PVCN Ay	MFG: ENTRAN S/N: 99102-F15	7/15/2003
P3 PVCN Az	MFG: ENTRAN S/N: 99G29-Q13	7/15/2003
P3 NEKU Fx	MFG: Denton S/N: 213-FX	7/21/2003
P3 NEKU Fy	MFG: Denton S/N: 213-Fy	7/21/2003
P3 NEKU Fz	MFG: Denton S/N: 213-Fz	7/21/2003
P3 NEKU Mx	MFG: Denton S/N: 213-Mx	7/21/2003
P3 NEKU My	MFG: Denton S/N: 213-My	7/21/2003
P3 NEKU Mz	MFG: Denton S/N: 213-Mz	7/21/2003
P3 NEKL Fx	MFG: Denton S/N: 214Fx	7/21/2003
P3 NEKL Fy	MFG: Denton S/N: 214-Fy	7/21/2003
P3 NEKL Fz	MFG: Denton S/N: 214-Fz	7/21/2003
P3 NEKL Mx	MFG: Denton S/N: 214-Mx	7/21/2003
P3 NEKL My	MFG: Denton S/N: 214-My	7/21/2003
P3 NEKL Mz	MFG: Denton S/N: 214-Mz	7/21/2003
P4 HDCG Ax	MFG: ENTRAN S/N: 02I02I05-F20	7/14/2003
P4 HDCG Ay	MFG: ENTRAN S/N: 02I02I10-N19	7/14/2003
P4 HDCG Az	MFG: ENTRAN S/N: 02I02I05-F03	7/14/2003
P4 CHST Ax	MFG: ENTRAN S/N: 02I02I05-F16	7/14/2003
P4 CHST Ay	MFG: ENTRAN S/N: 02I02I05-F06	7/14/2003
P4 CHST Az	MFG: ENTRAN S/N: 02I02I05-F07	7/14/2003
P4 PVCN Ax	MFG: ENTRAN S/N: 02I02I05-F11	7/14/2003
P4 PVCN Ay	MFG: ENDEVCO S/N: P10092	7/30/2003
P4 PVCN Az	MFG: ENTRAN S/N: 02I02I16-A05	7/14/2003
P4 NEKU Fx	MFG: DENTON S/N: 280-FX	7/16/2003
P4 NEKU Fy	MFG: DENTON S/N: 280-FY	7/16/2003
P4 NEKU Fz	MFG: DENTON S/N: 280-FZ	7/16/2003
P4 NEKU Mx	MFG: DENTON S/N: 280-MX	7/16/2003
P4 NEKU My	MFG: DENTON S/N: 280-MY	7/16/2003
P4 NEKU Mz	MFG: DENTON S/N: 280-MZ	7/16/2003
Sled Ax	MFG: ENDEVCO S/N: 24144	7/24/2003

SECTION 12

Link to High Speed Movies

Test 08-3-18 North View

Test 08-3-18 South View