

REPORT NUMBER: 8708-SLEDNCAP-08

**CHILD RESTRAINT SYSTEM IN
DYNAMIC SLED TEST
EVENFLO PORTABOUT 5, REAR FACING WITH BASE
EVENFLO PORTABOUT 5, REAR FACING WITHOUT BASE**

TEST NUMBER: 07-3-08

**PREPARED BY:
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July 31st, 2003

FINAL REPORT

**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Dynamic Sled Test Program

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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 an Evenflo Portabout 5 Child Restraint System with the seat base. Position 4 was an Evenflo Portabout 5 Child Restraint System without a seat base.			
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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 July 31st, 2003 at a speed of 46.7 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 two (2) anthropomorphic test devices (ATDs). 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 Portabout 5 child seat and the seat was located in Position 3 – Right Rear Passenger. This seat was tested with a seat base. The carrier separated from the base during the dynamic test. Shearing of the lips at the latch interface was noted during the post-test observation. Please see photo 5.

One (1) Crabi ATD, Serial Number S/N 102, was instrumented with head, chest, and pelvic tri-axial accelerometers, and upper neck load cells. This dummy was placed in an Evenflo Portabout 5 child seat and the seat was located in Position 4 – Left Rear Passenger. This seat was tested without a seat base.

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.

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 07-3-08

Test Date: July 31st, 2003

POSITION 3

Child Restraint Type (forward-facing, rearward facing, booster)	REARWARD FACING WITH BASE
LATCH or NON-LATCH	LATCH
Harness Type	5 POINT
Child Restraint Manufacturer	EVENFLO
Child Restraint Model	PORTABOUT 5
Model Number	3861352 P1
Date of Manufacture	2/13/03
Child Restraint Height Limits (mm)	480 - 660
Child Restraint Weight Limits (kg)	2.3 - 10
Weight of Child Restraint (kg)	5.3

POSITION 4

Child Restraint Type (forward-facing, rearward facing, booster)	REARWARD FACING WITHOUT BASE
LATCH or NON-LATCH	LATCH
Harness Type	5 POINT
Child Restraint Manufacturer	EVENFLO
Child Restraint Model	PORTABOUT 5
Model Number	3861352 P1
Date of Manufacture	7/02/03
Child Restraint Height Limits (mm)	480 - 660
Child Restraint Weight Limits (kg)	2.3 - 10
Weight of Child Restraint (kg)	3.0

SECTION 3
POST-TEST OBSERVATIONS

Test No.: 07-3-08

Test Date: July 31st, 2003

POSITION 3

Child Seat	EVENFLO PORTABOUT 5
Belt Fraying	NONE
Stress Marks	SEE INTRODUCTION
Cracks	SEE INTRODUCTION
Buckle Stress	NONE
Latch Hooks	NONE
Max. Seat Rotation (deg.)	NOT AVAILABLE
Velocity (kph)	46.7
Acceleration (G's)	23.3

POSITION 4

Child Seat	EVENFLO PORTABOUT 5
Belt Fraying	NONE
Stress Marks	NONE
Cracks	NONE
Buckle Stress	NONE
Latch Hooks	NONE
Max. Seat Rotation (deg.)	62
Velocity (kph)	46.7
Acceleration (G's)	23.3

SECTION 4

POSITION 3 - CRABI ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 07-3-08

Test Date: July 31st, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	41.6	73.3	-2.8	152.2
Head CG	Y	G's	3.6	97.2	-3.0	53.6
Head CG	Z	G's	46.3	50.5	-17.7	86.0
Head CG Resultant	N/A	G's	56.9	64.4		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	32.0	58.5	-2.6	152.7
Chest CG	Y	G's	5.4	77.4	-6.3	74.7
Chest CG	Z	G's	42.9	49.0	-16.8	83.9
Chest CG Resultant	N/A	G's	49.9	48.9		

SEAT BELT SENSOR PEAK VALUES

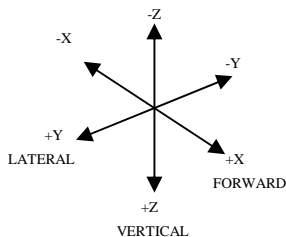
Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P3 (Right) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	435.5	45.0	45.0	77.0
Head CG Primary (15 msec)	268.6	50.3	59.5	74.5

CHEST CLIP (3 MSEC)

Location	P3 (Right) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	46.0	47.2	50.2



POSITION 3 - CRABI ATD INJURY CRITERIA AND SENSOR DATA...(continued)

Test No.: 07-3-08

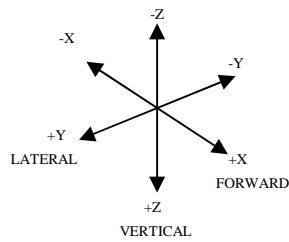
Test Date: July 31st, 2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	52.1	80.9	-2.4	136.0
Pelvis	Y	G's	13.0	78.2	-11.5	76.0
Pelvis	Z	G's	59.6	49.7	-9.1	83.2

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (Right) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	332.6	55.1	-138.0	104.8
Neck Force	Y	Newtons	33.0	105.5	-35.4	51.8
Neck Force	Z	Newtons	1114.1	52.6	-345.6	86.3
Neck Moment	X	Nm	0.8	47.0	-1.7	105.6
Neck Moment	Y	Nm	7.7	105.1	-10.8	54.6
Neck Moment	Z	Nm	0.7	148.4	-0.3	242.5



SECTION 4

POSITION 4 - CRABI ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 07-3-08

Test Date: July 31st, 2003

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	47.0	74.2	-5.8	249.3
Head CG	Y	G's	10.5	77.5	-3.5	57.8
Head CG	Z	G's	37.3	56.0	-3.8	90.5
Head CG Resultant	N/A	G's	49.7	72.7		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	36.3	47.2	-5.6	164.7
Chest CG	Y	G's	5.0	64.8	-2.6	36.8
Chest CG	Z	G's	26.6	47.2	-5.2	85.6
Chest CG Resultant	N/A	G's	45.1	47.2		

SEAT BELT SENSOR PEAK VALUES

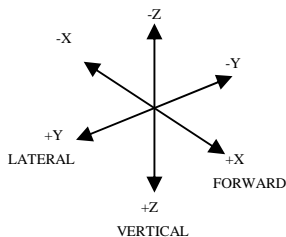
Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	NA	NA		

HEAD INJURY CRITERIA (HIC)

Location	P4 (Left) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	411.8	42.0	44.0	80.0
Head CG Primary (15 msec)	213.3	45.8	63.5	78.5

CHEST CLIP (3 MSEC)

Location	P4 (Left) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	43.7	45.8	48.8



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

Test No.: 07-3-08

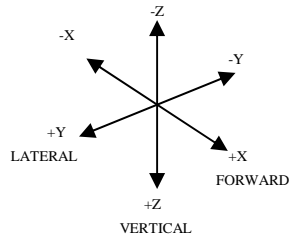
Test Date: July 31st, 2003

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	4.8	136.4	-31.2	44.3
Pelvis	Y	G's	4.3	59.0	-2.7	60.9
Pelvis	Z	G's	2.2	171.3	-47.2	48.0

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (Left) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	382.7	46.9	-7.5	24.9
Neck Force	Y	Newtons	31.7	51.9	-93.3	82.7
Neck Force	Z	Newtons	891.8	45.7	-102.3	89.8
Neck Moment	X	Nm	1.3	113.6	-3.7	82.7
Neck Moment	Y	Nm	4.7	250.0	-12.2	46.9
Neck Moment	Z	Nm	0.7	230.0	-0.9	88.0



SECTION 5
SLED TEST SET-UP

Test No.: 07-3-08

Test Date: July 31st, 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



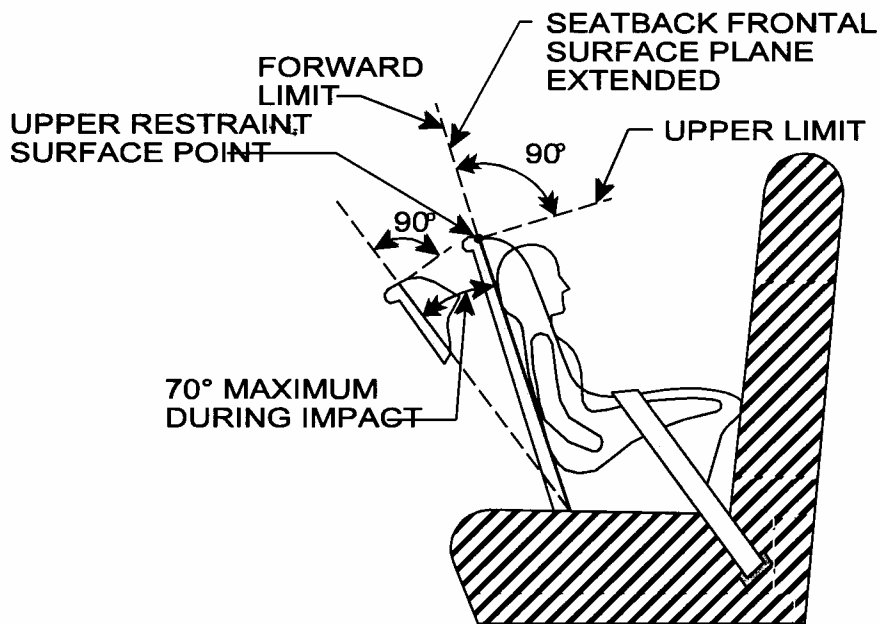
SECTION 6
CAMERA LOCATION

Test No.: 07-3-08

Test Date: July 31st, 2003

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

**REAR FACING CHILD RESTRAINT FORWARD AND
UPPER HEAD EXCURSION LIMITS**



NOTE: Limits illustrated move during dynamic testing

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Pre Test Right Side View



Post Test Right Side View



Pre Test Left Side View



Post Test Left Side View



Pre Test Left Rear Side View



Post Test Left Rear Side View



Post Test Seat Base View 1



Post Test Seat Base View 2

SECTION 8

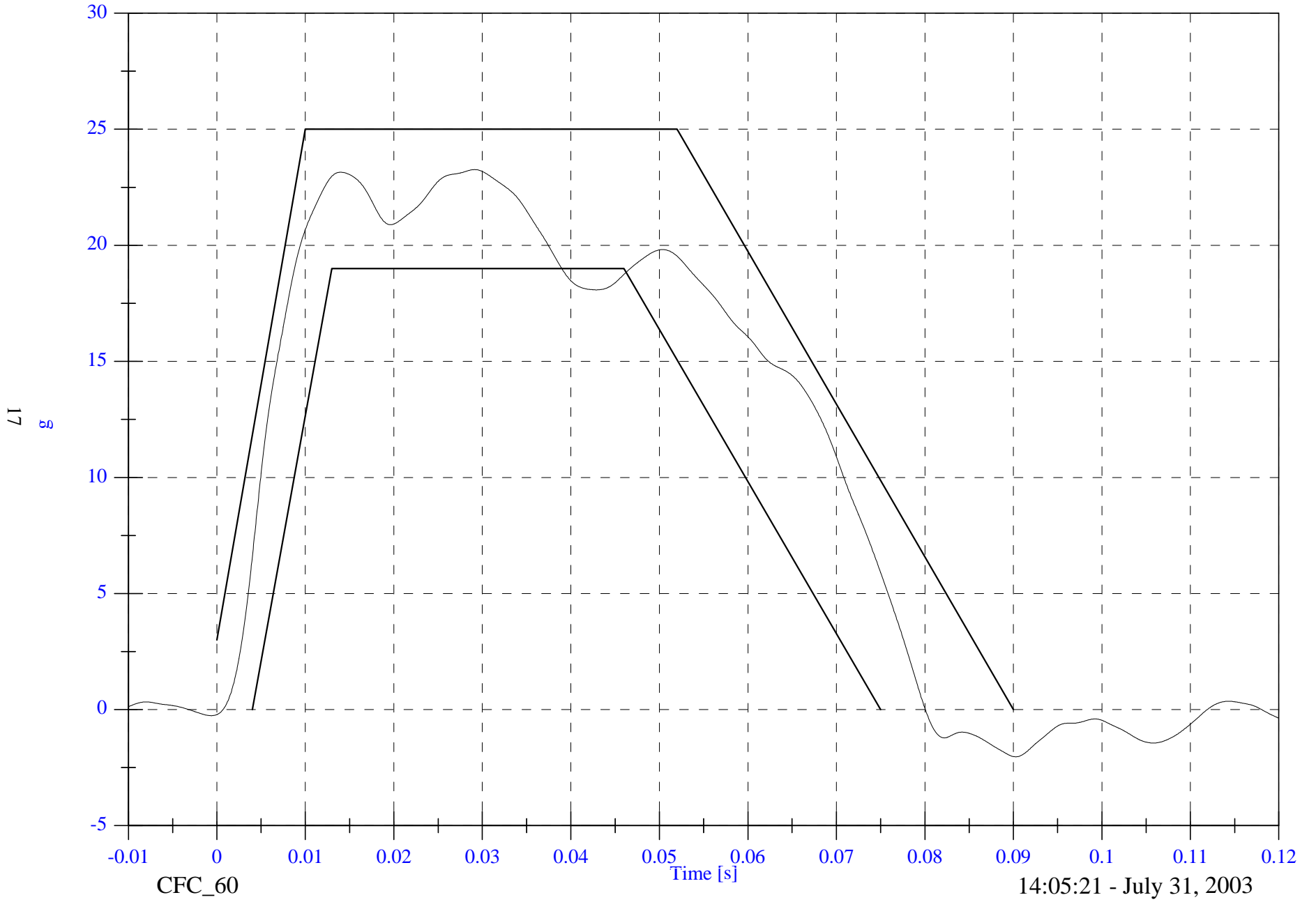
Data Plots

Sled Test NCAP SLED 07-3-08

Sled Pulse Corridor

Max: 23.3 [g] at 0.029 [s]

Min: -2.0 [g] at 0.090 [s]



17

CFC_60

14:05:21 - July 31, 2003

FACILITY: HYGE SLED

DATE: July 31, 2003

TEST#: 07-3-08

TITLE: Sled Test NCAP SLED 07-3-08

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
33	Sled Acceleration	g	23.3	29.1	-2.0	90.2	CFC_60	
34	Sled Acceleration Velocity	kph	46.7	80.0	-0.1	-10.1	CFC_180	
35	Sled Acceleration Displacement	mm	2652.3	250.0	-0.0	-2.9	CFC_180	
36	P3 Head x	g	41.6	73.3	-2.8	152.2	CFC_1000	
37	P3 Head y	g	3.6	97.2	-3.0	53.6	CFC_1000	
38	P3 Head z	g	46.3	50.5	-17.7	86.0	CFC_1000	
39	P3 Head Resultant	g	56.9	64.4	0.0	-6.9	CFC_1000	
40	P3 Upper Neck Fx	N	332.6	55.1	-138.0	104.8	CFC_1000	
41	P3 Upper Neck Fy	N	33.0	105.5	-35.4	51.9	CFC_1000	
42	P3 Upper Neck Fz	N	1114.1	52.6	-345.6	86.3	CFC_1000	
43	P3 Upper Neck F Resultant	N	1154.6	53.0	0.0	-11.0	CFC_1000	
44	P3 Upper Neck Mx	N-m	0.8	47.0	-1.7	105.6	CFC_600	
45	P3 Upper Neck My	N-m	7.7	105.1	-10.8	54.6	CFC_600	
46	P3 Upper Neck Mz	N-m	0.7	148.4	-0.3	242.5	CFC_600	
47	P3 Upper Neck M Resultant	N-m	10.8	54.6	0.0	-8.2	CFC_600	
48	P3 Chest x	g	32.0	58.5	-2.6	152.7	CFC_180	
49	P3 Chest y	g	5.4	77.4	-6.3	74.7	CFC_180	
50	P3 Chest z	g	42.9	49.0	-16.8	83.9	CFC_180	
51	P3 Chest Resultant	g	49.9	48.9	0.0	-7.5	CFC_180	
52	P3 Pelvic x	g	52.1	80.9	-2.4	136.0	CFC_1000	
53	P3 Pelvic y	g	13.0	78.2	-11.5	76.0	CFC_1000	
54	P3 Pelvic z	g	59.6	49.8	-9.1	83.2	CFC_1000	
55	P3 Pelvic Resultant	g	72.5	49.9	0.0	-13.7	CFC_1000	
56	P3 Upper Neck Mocy	N-m	8.5	105.1	-12.7	54.7	CFC_600	
57	P3 Upper Neck Mocy	N-m	8.5	105.1	-12.7	54.7	CFC_600	

FACILITY: HYGE SLED

DATE: July 31, 2003

TEST#: 07-3-08

TITLE: Sled Test NCAP SLED 07-3-08

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
58	P4 Head x	g	47.0	74.2	-5.8	249.3	CFC_1000	
59	P4 Head y	g	10.5	77.5	-3.5	57.8	CFC_1000	
60	P4 Head z	g	37.3	56.0	-3.8	90.5	CFC_1000	
61	P4 Head Resultant	g	49.7	72.7	0.0	-12.1	CFC_1000	
62	P4 Upper Neck Fx	N	382.7	46.9	-7.5	24.9	CFC_1000	
63	P4 Upper Neck Fy	N	31.7	51.9	-93.3	82.7	CFC_1000	
64	P4 Upper Neck Fz	N	891.8	45.7	-102.3	89.8	CFC_1000	
65	P4 Upper Neck F Resultant	N	967.4	45.7	0.0	-11.4	CFC_1000	
66	P4 Upper Neck Mx	N-m	1.3	113.6	-3.7	82.7	CFC_600	
67	P4 Upper Neck My	N-m	4.7	250.0	-12.2	46.9	CFC_600	
68	P4 Upper Neck Mz	N-m	0.7	230.0	-0.9	88.0	CFC_600	
69	P4 Upper Neck M Resultant	N-m	12.2	46.9	0.0	-9.6	CFC_600	
70	P4 Chest x	g	36.3	47.2	-5.6	164.7	CFC_180	
71	P4 Chest y	g	5.0	64.8	-2.6	36.8	CFC_180	
72	P4 Chest z	g	26.6	47.2	-5.2	85.5	CFC_180	
73	P4 Chest Resultant	g	45.1	47.2	0.0	-10.2	CFC_180	
74	P4 Pelvic x	g	4.8	136.4	-31.2	44.3	CFC_1000	
75	P4 Pelvic y	g	4.3	59.0	-2.7	60.9	CFC_1000	
76	P4 Pelvic z	g	2.2	171.3	-47.2	48.0	CFC_1000	
77	P4 Pelvic Resultant	g	54.7	45.6	0.0	-11.4	CFC_1000	
78	P4 Upper Neck Mocy	N-m	3.9	250.0	-14.4	46.9	CFC_600	

FACILITY: HYGE SLED

DATE: July 31, 2003

TEST#: 07-3-08

TITLE: Sled Test NCAP SLED 07-3-08

Version 5.00

=====

P3 HIC(36 ms): 435.5

t1: 45.0 msec

t2: 77.0 msec

Duration: 32.0 msec

Average Acceleration: 45.0 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: 332.6 N 55.1 msec

Min: -138.0 N 104.8 msec

Input channel: P3 Upper Neck Fx (5) CFC_1000

P3 UP NECK Fz: Max: 1114.1 N 52.6 msec

Min: -345.6 N 86.3 msec

Input channel: P3 Upper Neck Fz (7) CFC_1000

P3 UP NECK Mocy (1YO Infant OOP)

Max: 8.5 N-m 105.1 msec

Min: -12.7 N-m 54.7 msec

Input channels: P3 Upper Neck Fx (5) CFC_600

P3 Upper Neck My (9) CFC_600

Docy: 0.0058

P3 UP NECK Nij (1YO Infant OOP)

Ntf: 0.30 Nij 77.2 msec CVt: 1460 CVf: 43

Nte: 1.48 Nij 53.6 msec CVt: 1460 CVe: 17

Ncf: 0.40 Nij 87.0 msec CVc: 1460 CVf: 43

Nce: 0.01 Nij 21.5 msec CVc: 1460 CVe: 17

Input channels: P3 Upper Neck Fz (7) CFC_600

P3 Upper Neck Mocy [N-m, CFC_600] (69)

FACILITY: HYGE SLED
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DATE: July 31, 2003

=====
P3 CLIP(3 ms): 46.0 g
 t1: 47.2 msec
 t2: 50.2 msec
 Duration: 3.0 msec
P3 CSI: 357.1
 Input channels: P3 Chest x (11) CFC_180
 P3 Chest y (12) CFC_180
 P3 Chest z (13) CFC_180
=====
P3 HIC(15 ms): 268.6
 t1: 59.5 msec
 t2: 74.5 msec
 Duration: 15.0 msec
 Average Acceleration: 50.3 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: July 31, 2003

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TITLE: Sled Test NCAP SLED 07-3-08

Version 5.00

=====

P4 HIC(36 ms): 411.8

t1: 44.0 msec

t2: 80.0 msec

Duration: 36.0 msec

Average Acceleration: 42.0 g

Input channels: P4 Head x (17) CFC_1000

P4 Head y (18) CFC_1000

P4 Head z (19) CFC_1000

P4 UP NECK Fx: Max: 382.7 N 46.9 msec

Min: -7.5 N 24.9 msec

Input channel: P4 Upper Neck Fx (20) CFC_1000

P4 UP NECK Fz: Max: 891.8 N 45.7 msec

Min: -102.3 N 89.8 msec

Input channel: P4 Upper Neck Fz (22) CFC_1000

P4 UP NECK Mocy (1YO Infant OOP)

Max: 3.9 N-m 250.0 msec

Min: -14.4 N-m 46.9 msec

Input channels: P4 Upper Neck Fx (20) CFC_600

P4 Upper Neck My (24) CFC_600

Docy: 0.0058

P4 UP NECK Nij (1YO Infant OOP)

Ntf: 0.23 Nij 75.8 msec CVt: 1460 CVf: 43

Nte: 1.44 Nij 46.2 msec CVt: 1460 CVe: 17

Ncf: 0.07 Nij 89.8 msec CVc: 1460 CVf: 43

Nce: 0.08 Nij 91.5 msec CVc: 1460 CVe: 17

Input channels: P4 Upper Neck Fz (22) CFC_600

P4 Upper Neck Mocy [N-m, CFC_600] (75)

FACILITY: HYGE SLED
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Version 5.00

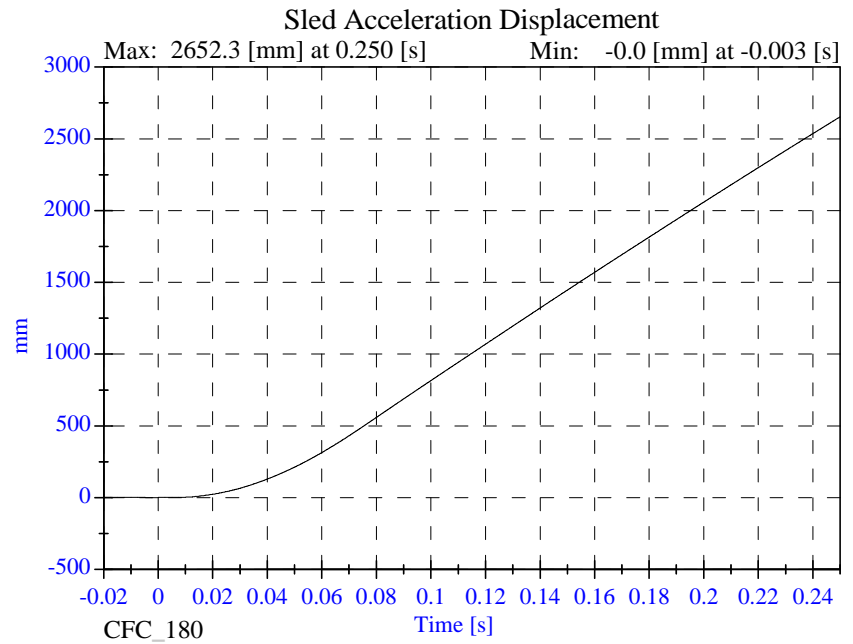
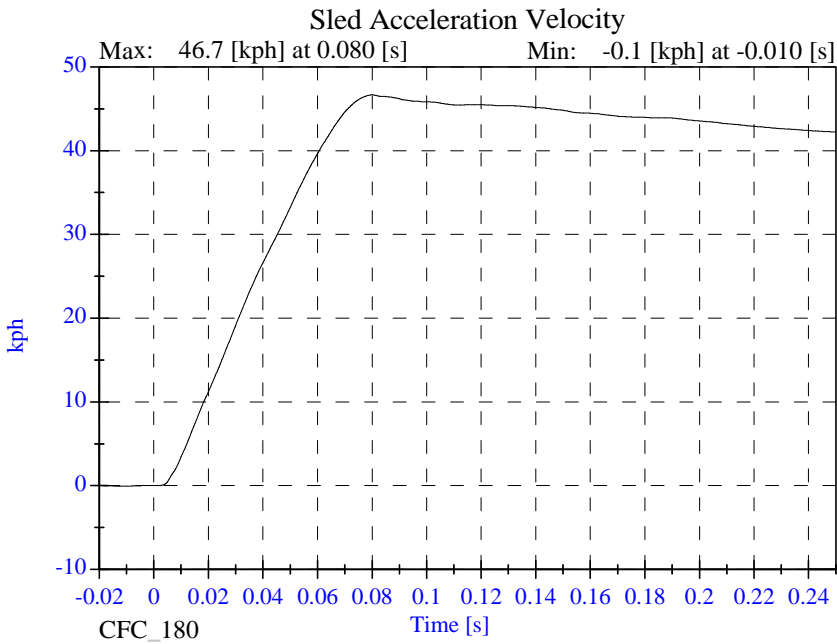
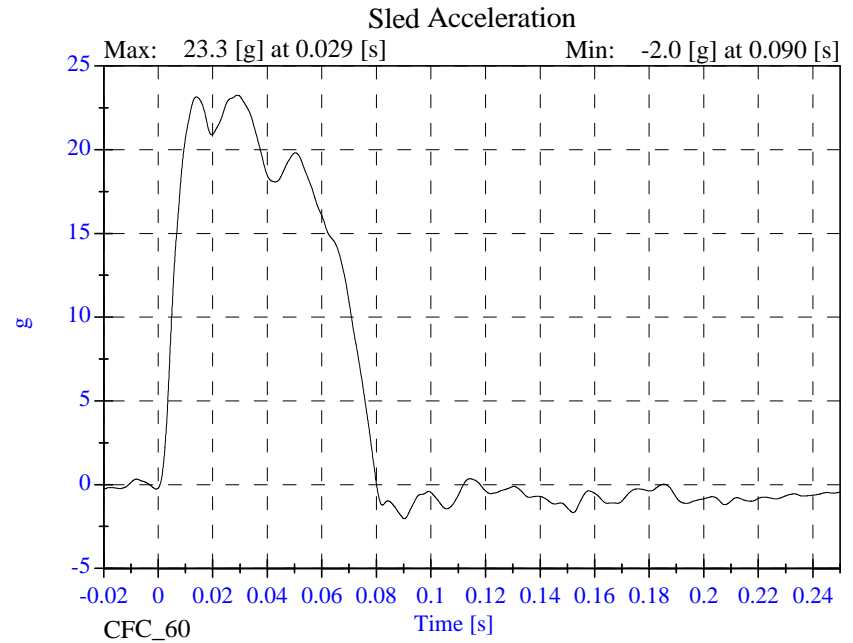
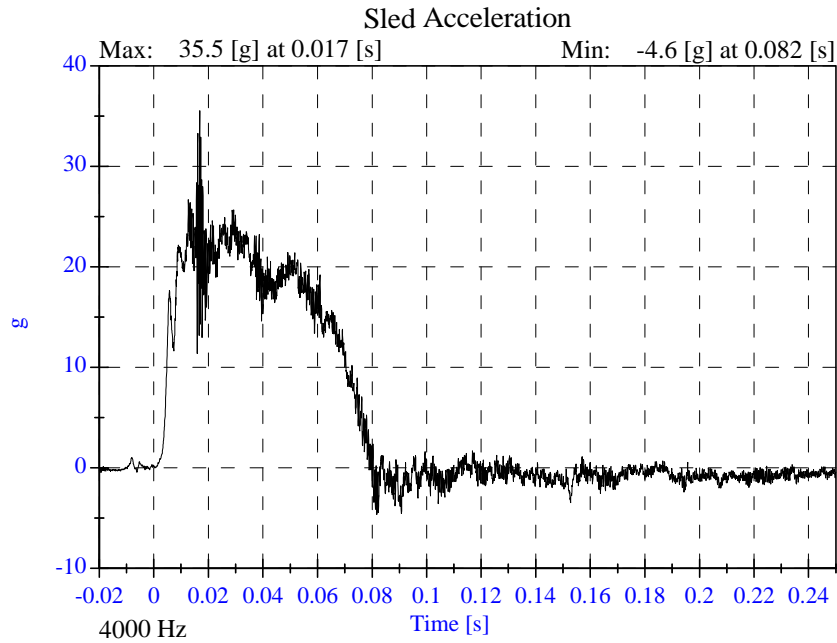
DATE: July 31, 2003

=====
P4 CLIP(3 ms): 43.7 g
 t1: 45.8 msec
 t2: 48.8 msec
 Duration: 3.0 msec
P4 CSI: 317.0
 Input channels: P4 Chest x (26) CFC_180
 P4 Chest y (27) CFC_180
 P4 Chest z (28) CFC_180

=====
P4 HIC(15 ms): 213.3
 t1: 63.5 msec
 t2: 78.5 msec
 Duration: 15.0 msec
 Average Acceleration: 45.8 g
 Input channels: P4 Head x (17) CFC_1000
 P4 Head y (18) CFC_1000
 P4 Head z (19) CFC_1000
=====

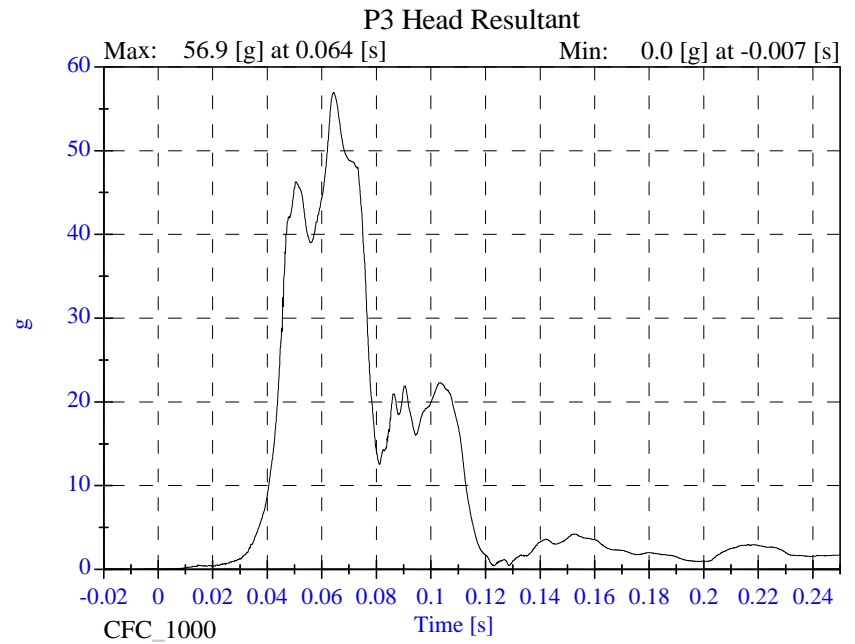
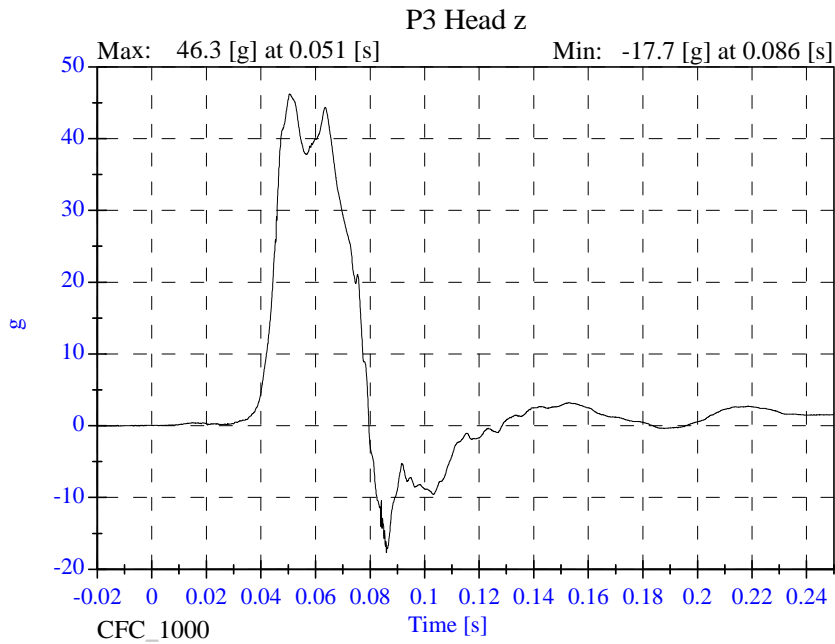
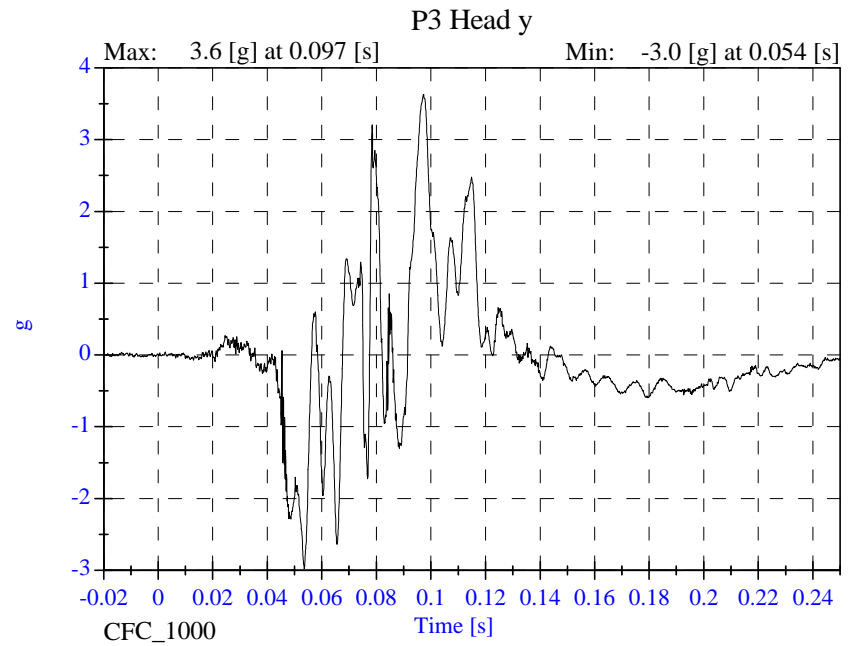
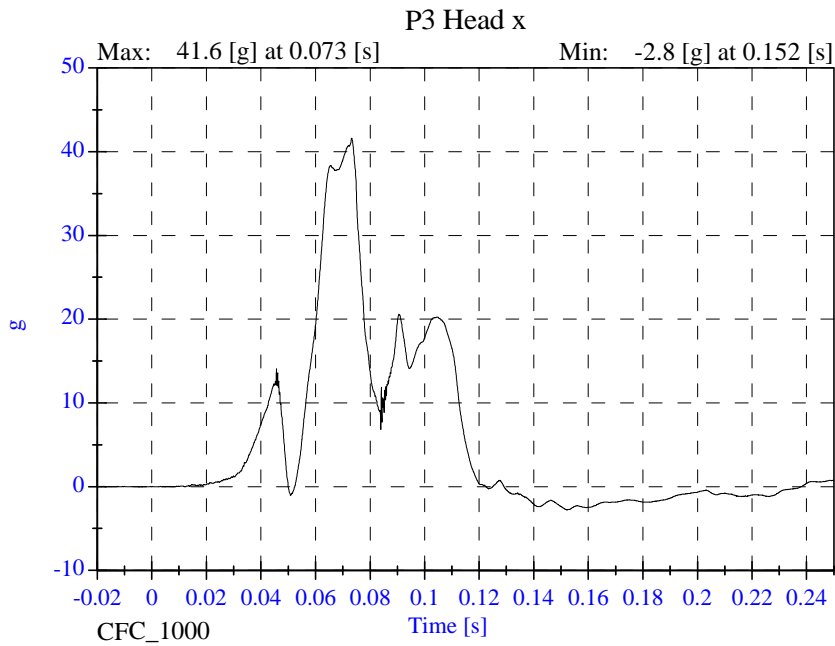
Sled Test NCAP SLED 07-3-08

- July 31, 2003



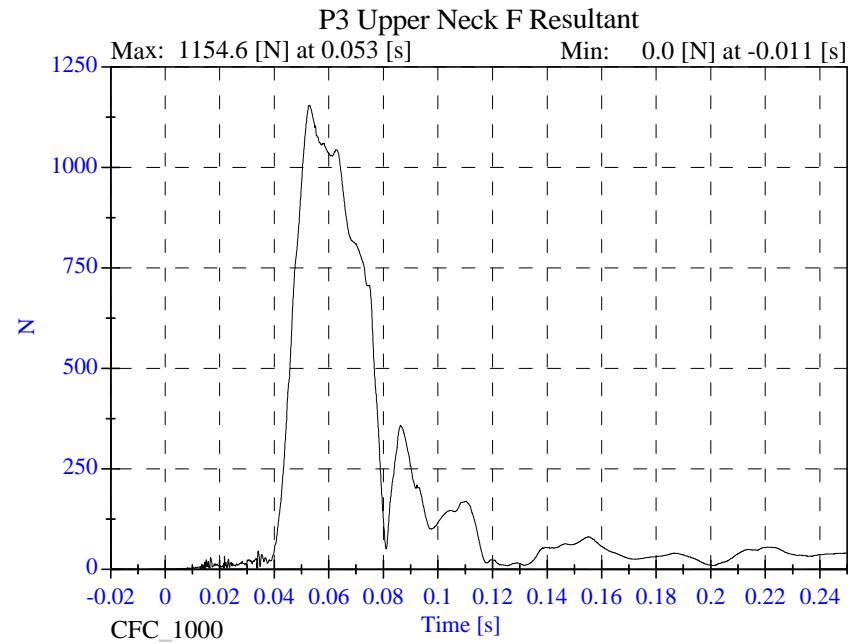
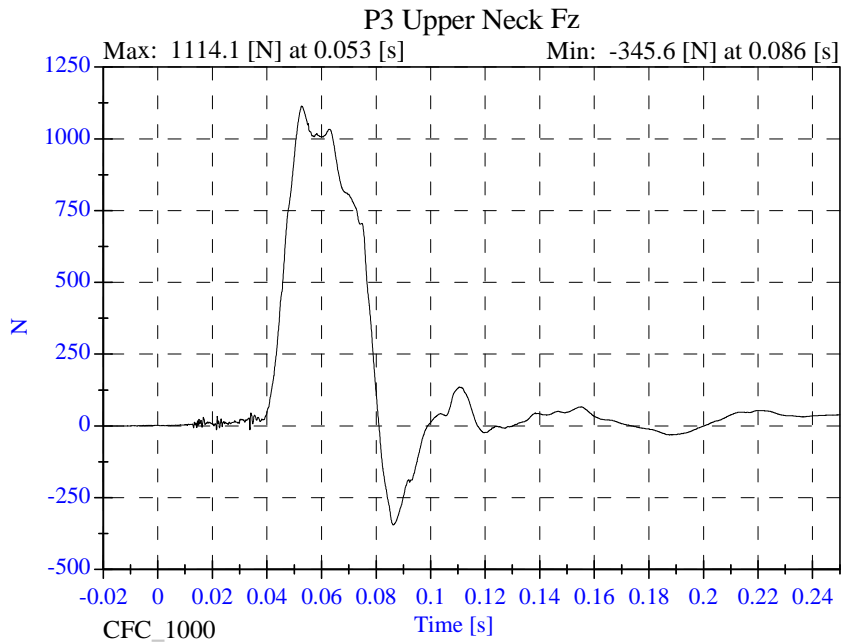
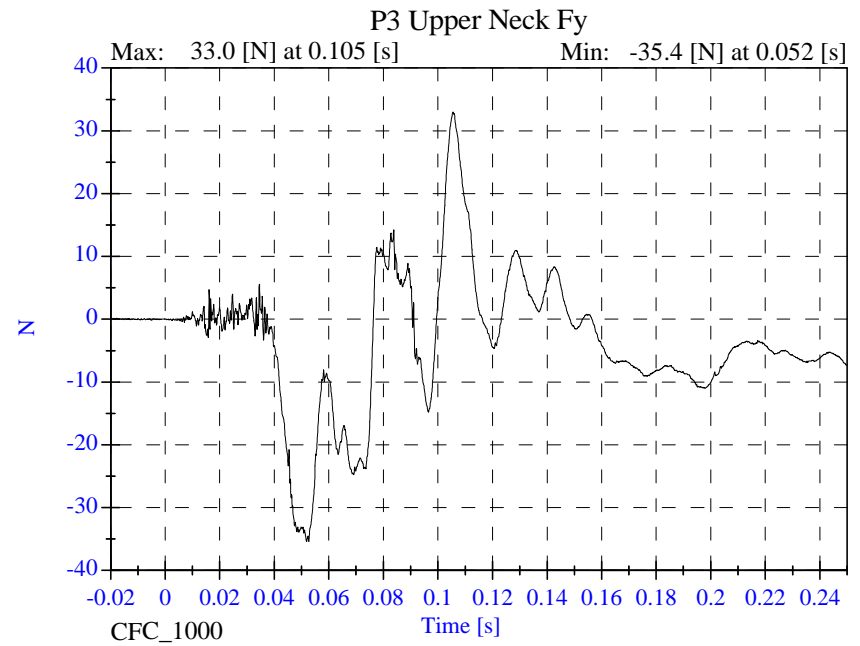
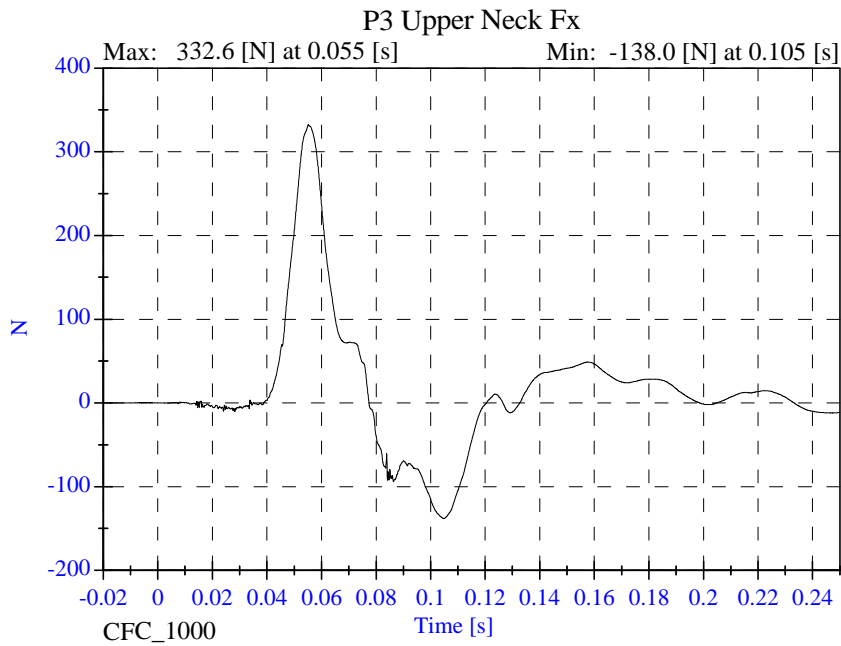
Sled Test NCAP SLED 07-3-08

- July 31, 2003



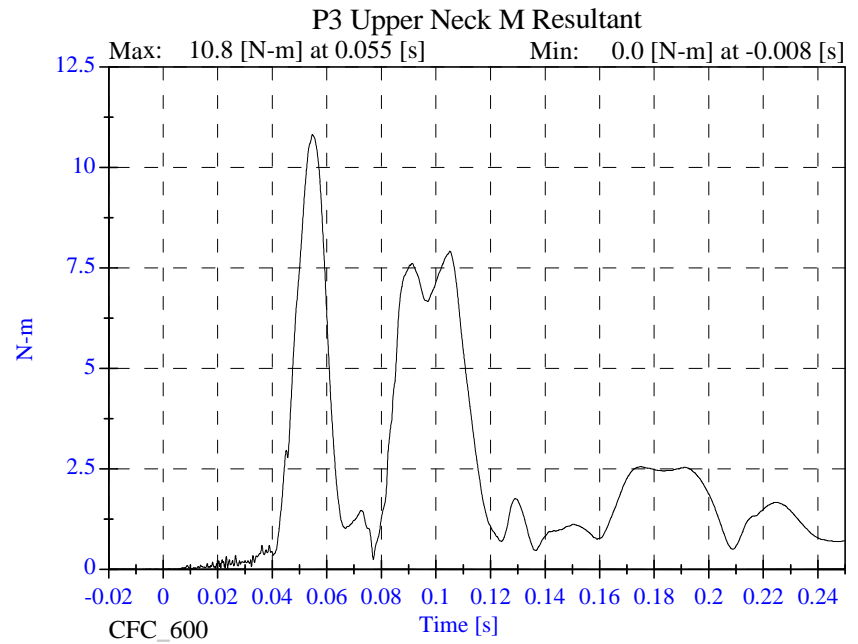
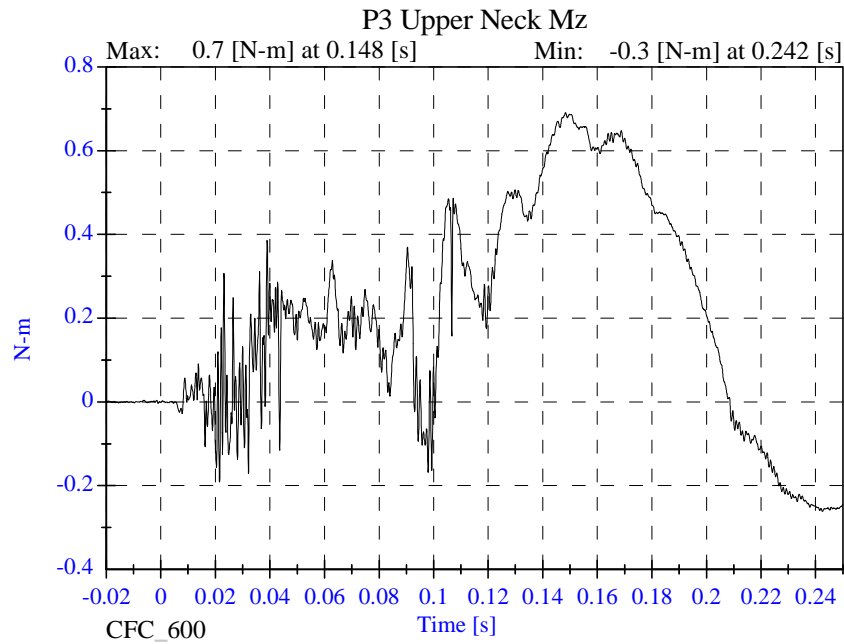
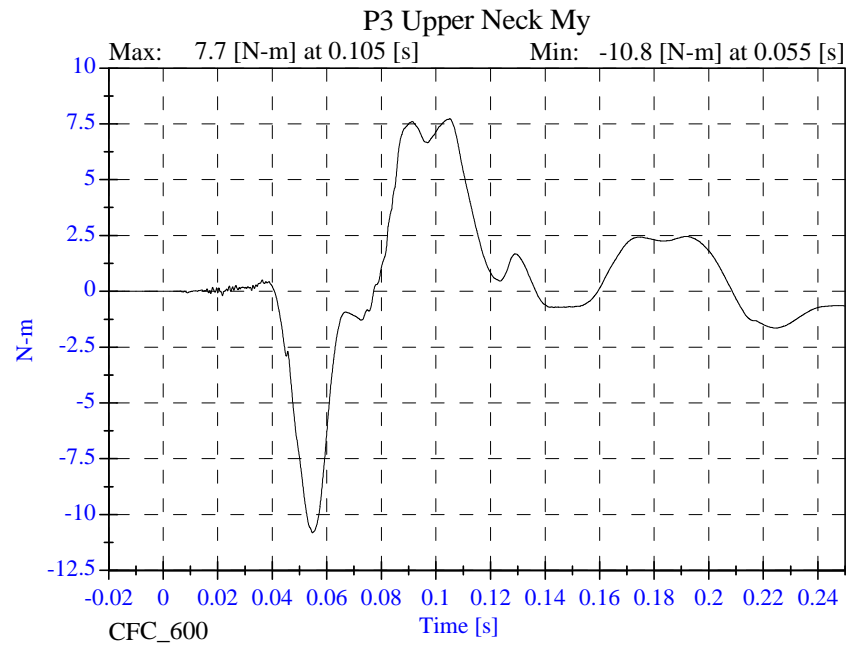
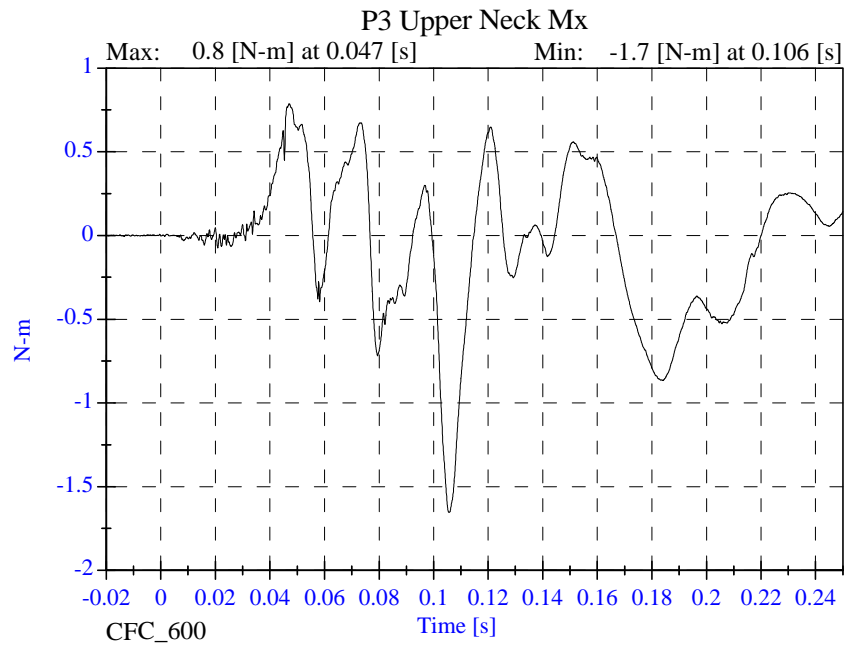
Sled Test NCAP SLED 07-3-08

- July 31, 2003



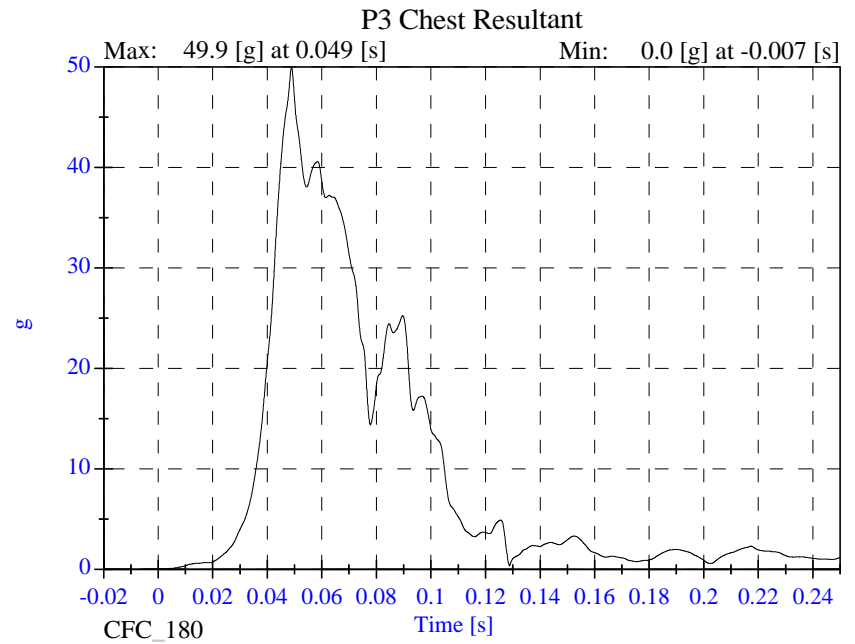
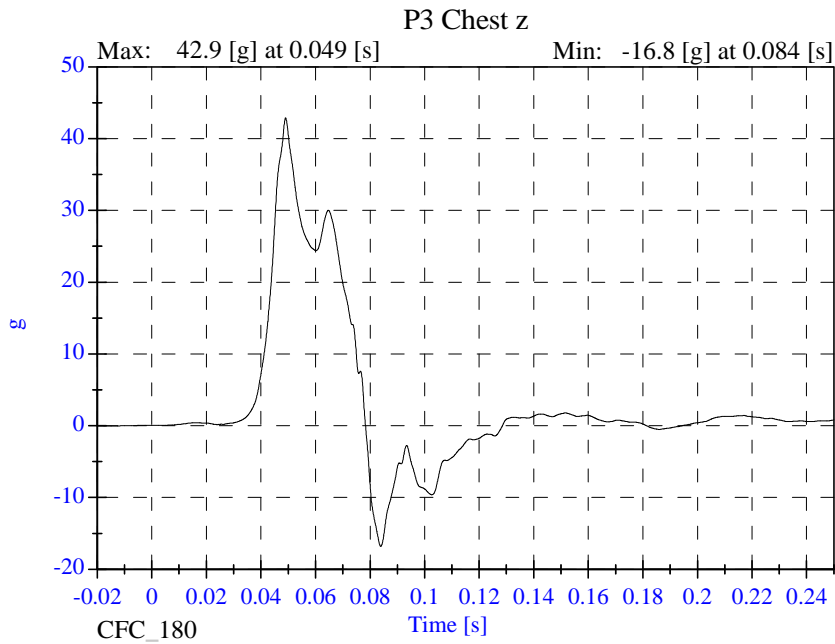
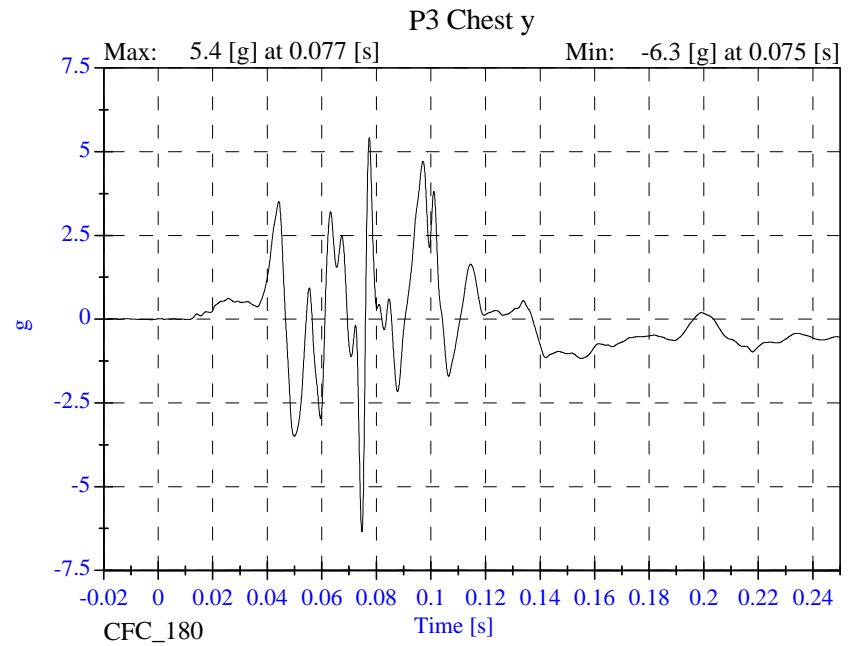
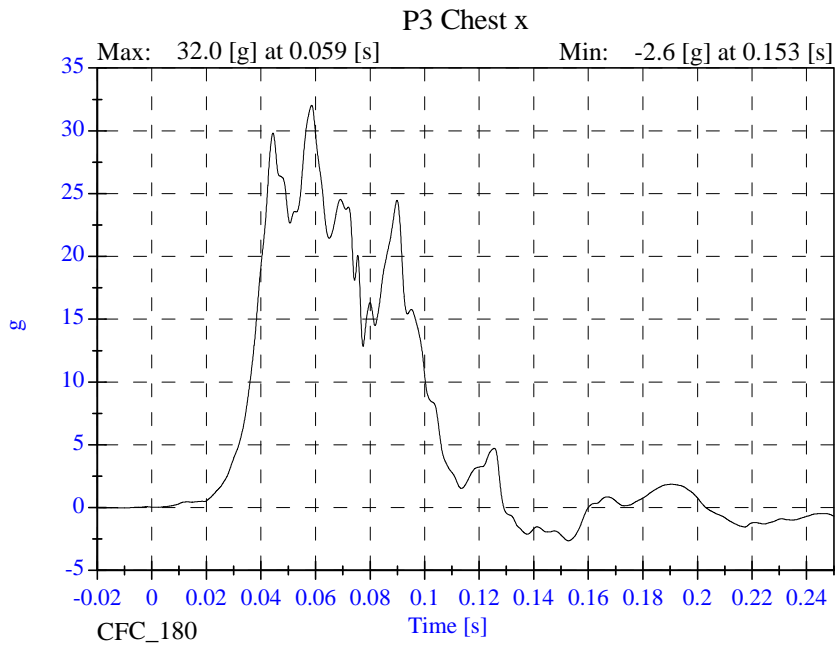
Sled Test NCAP SLED 07-3-08

- July 31, 2003



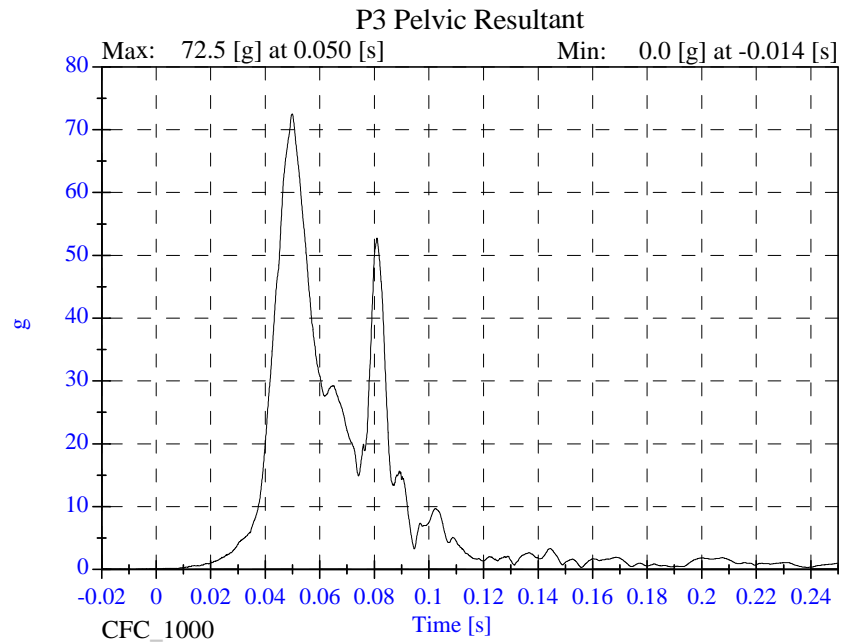
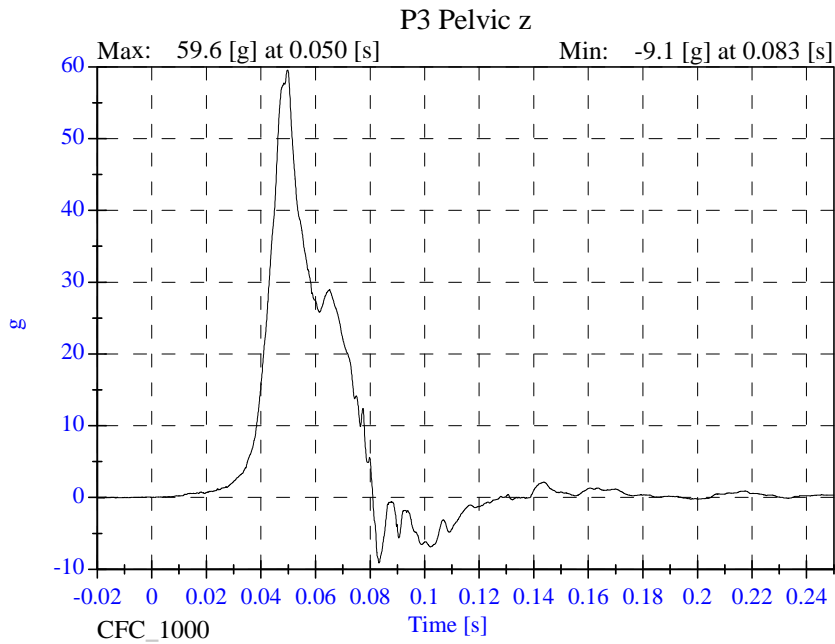
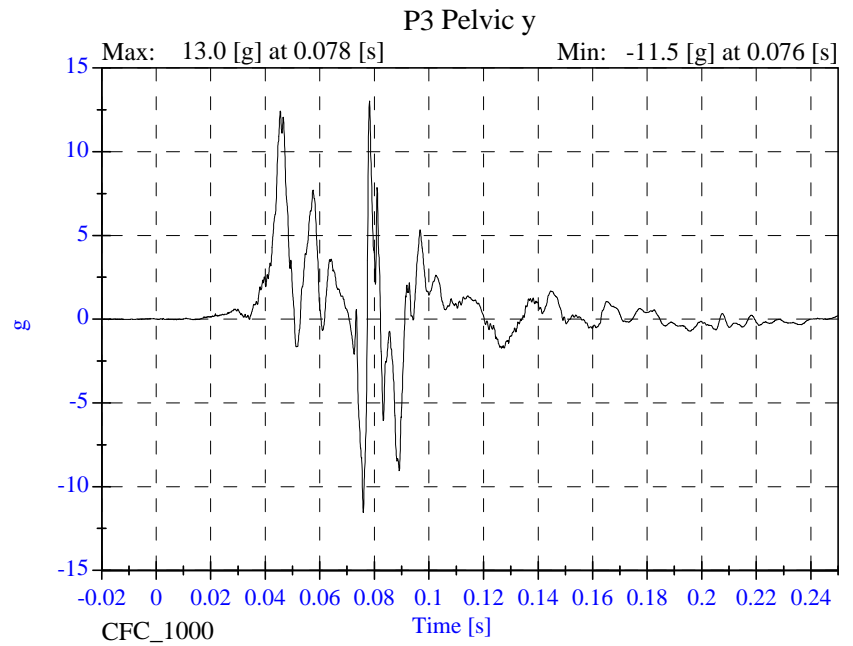
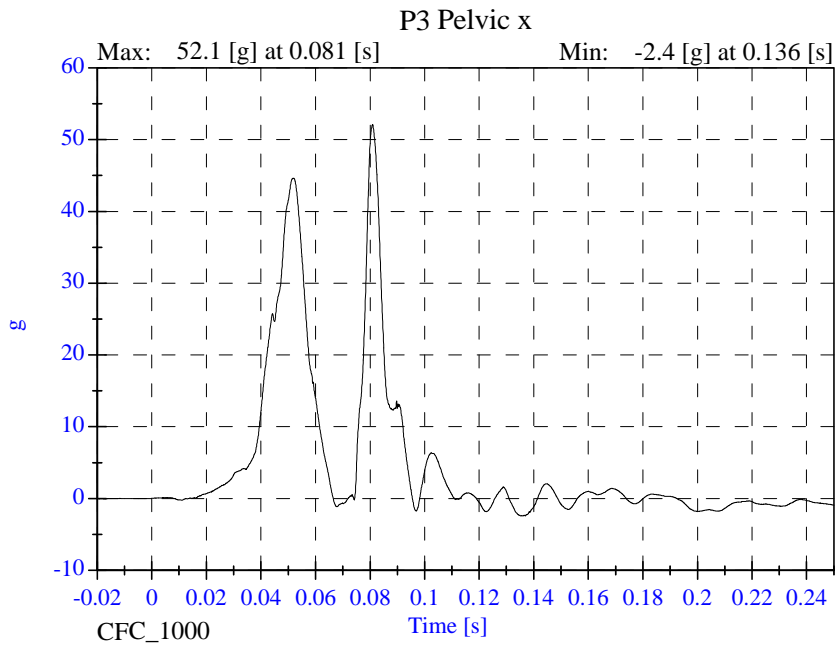
Sled Test NCAP SLED 07-3-08

- July 31, 2003



Sled Test NCAP SLED 07-3-08

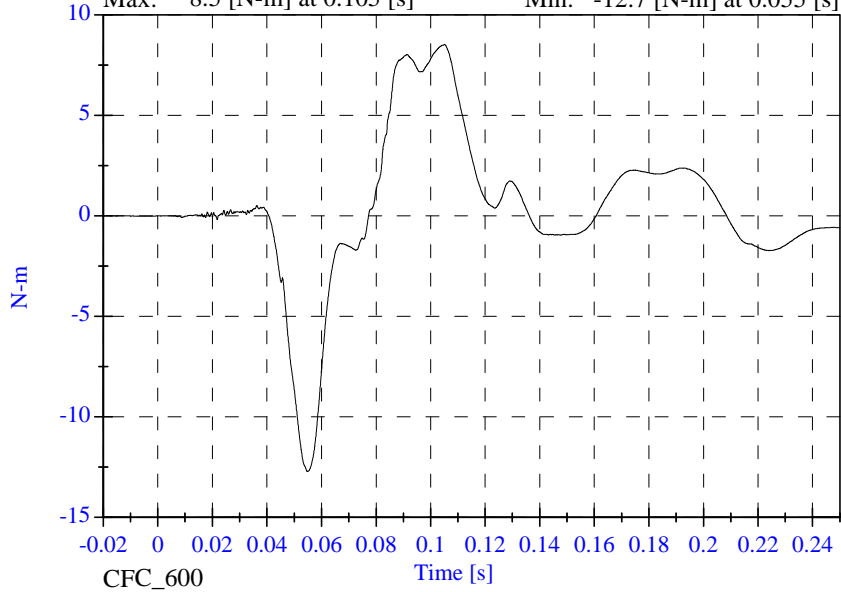
- July 31, 2003



Sled Test NCAP SLED 07-3-08

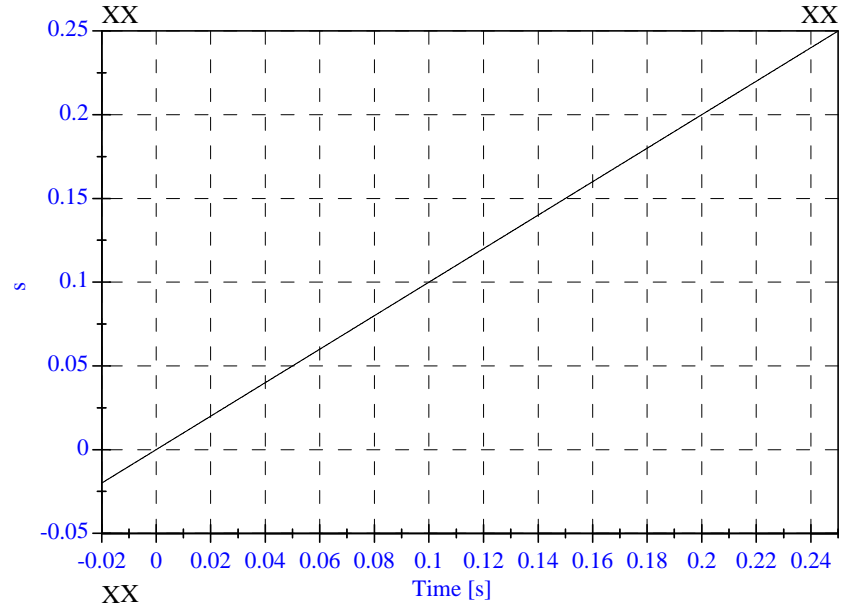
P3 Upper Neck Mocyc

Max: 8.5 [N-m] at 0.105 [s] Min: -12.7 [N-m] at 0.055 [s]

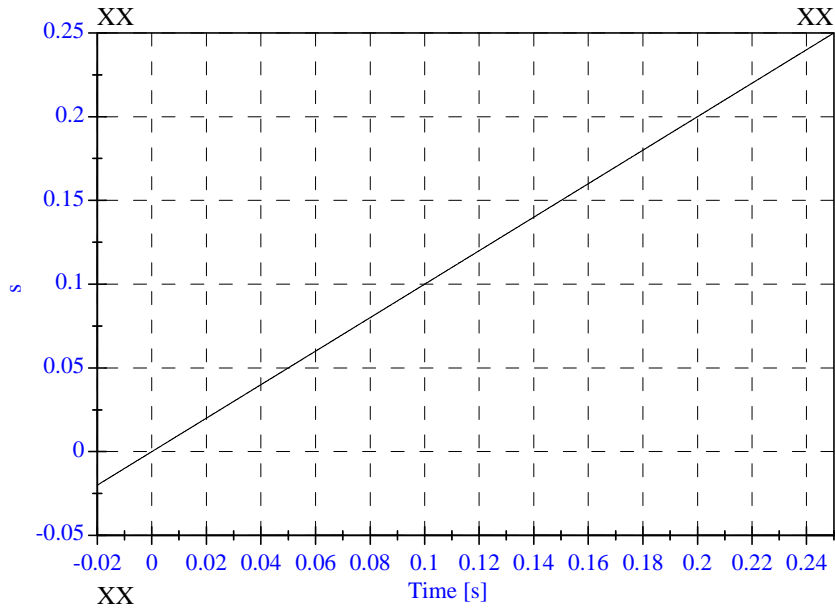


- July 31, 2003

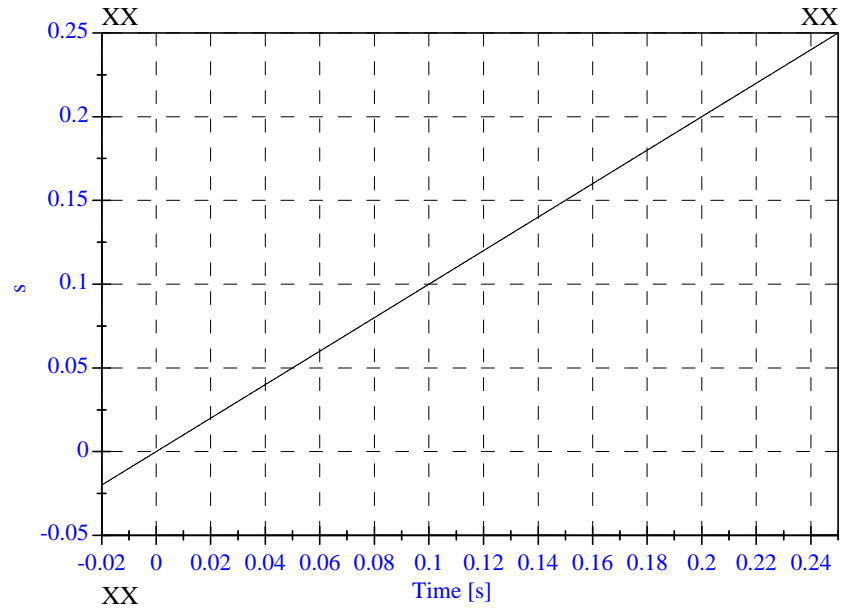
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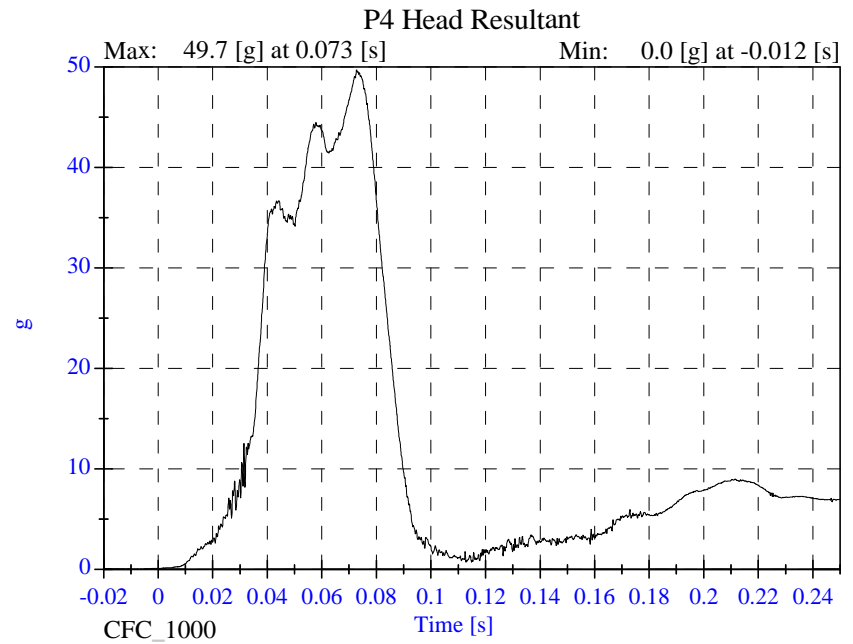
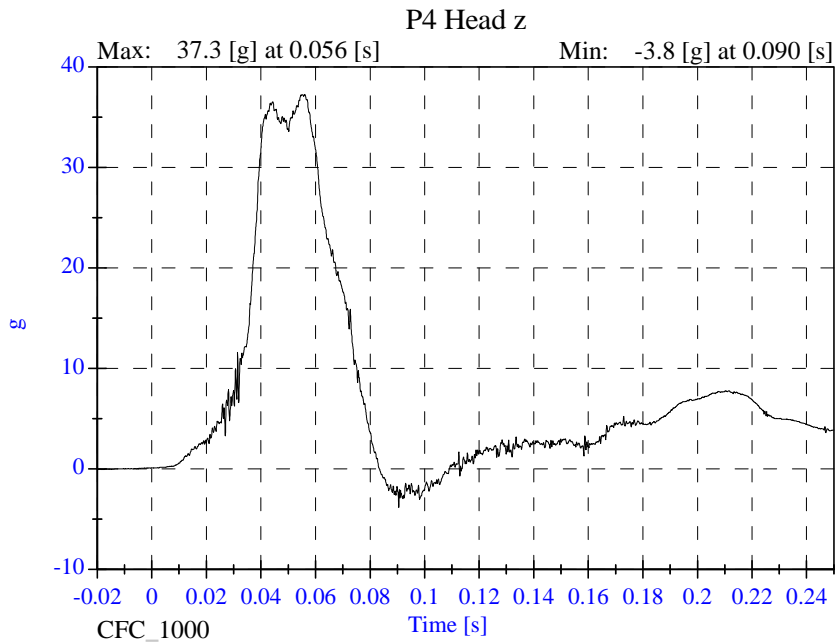
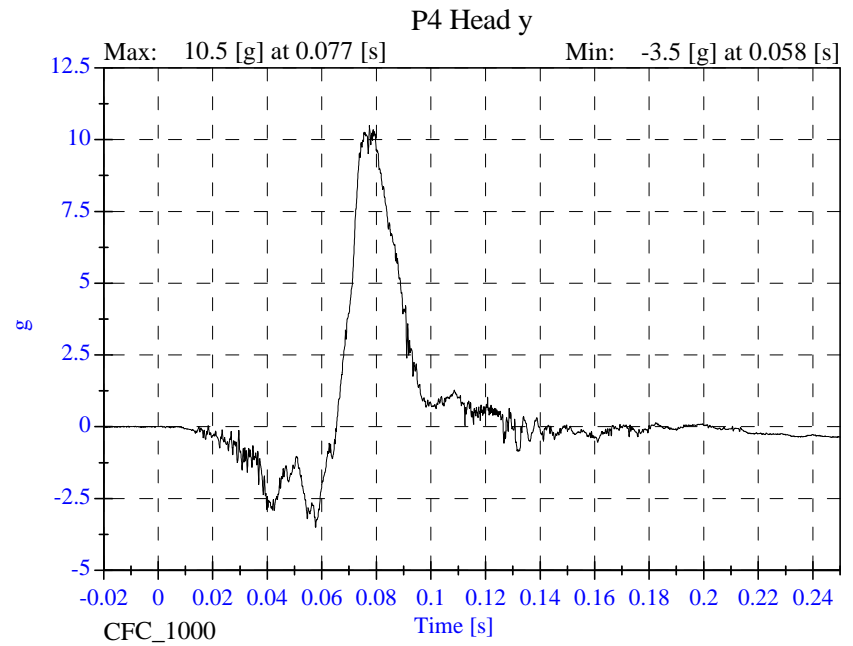
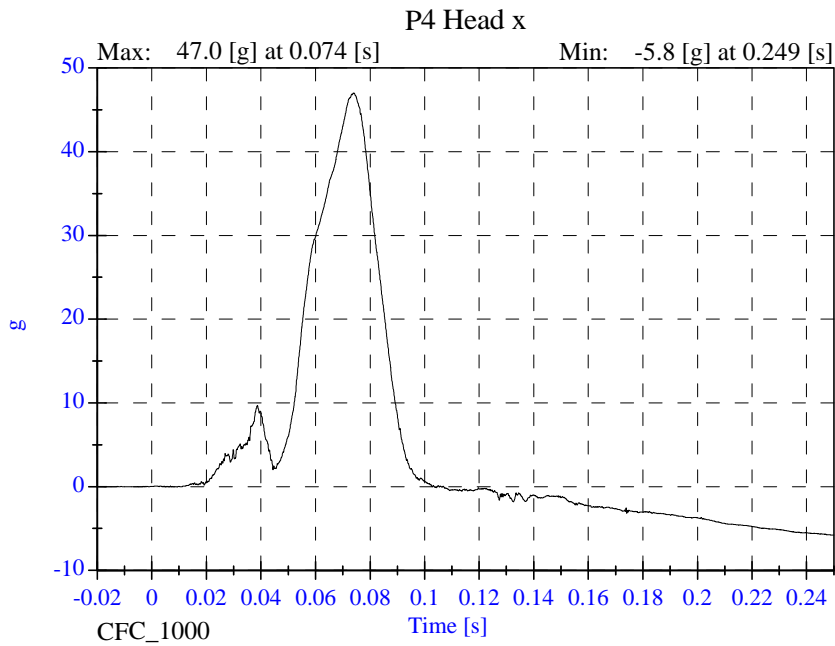


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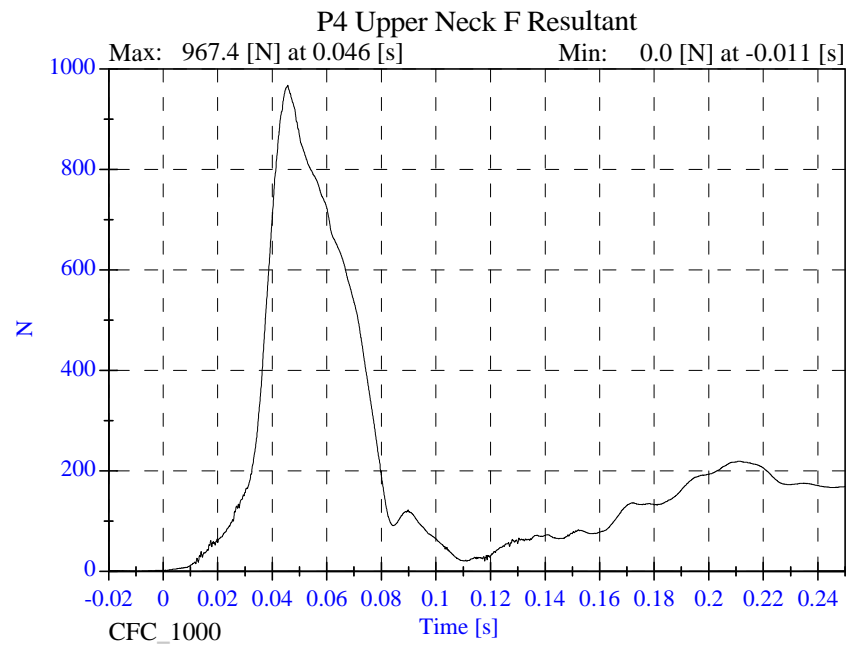
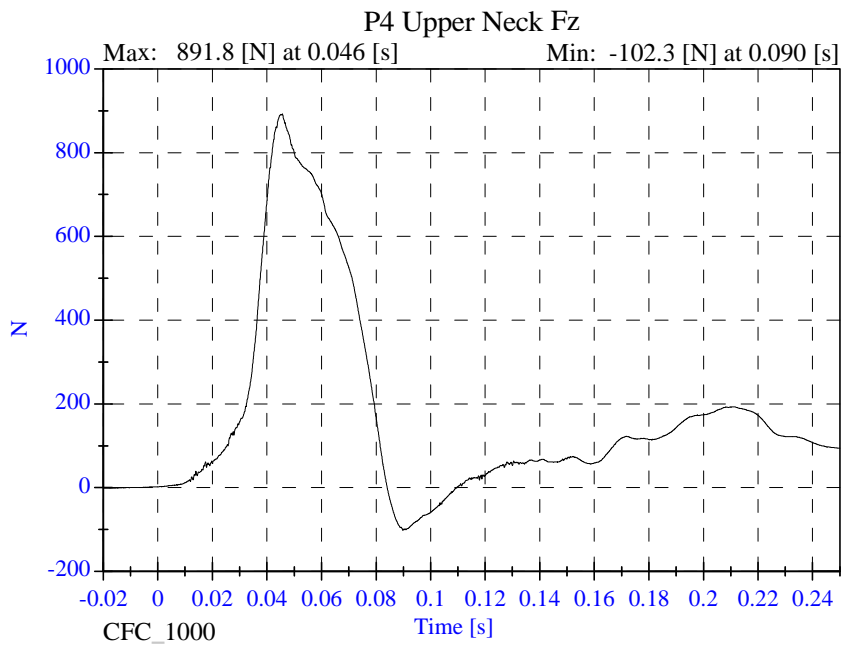
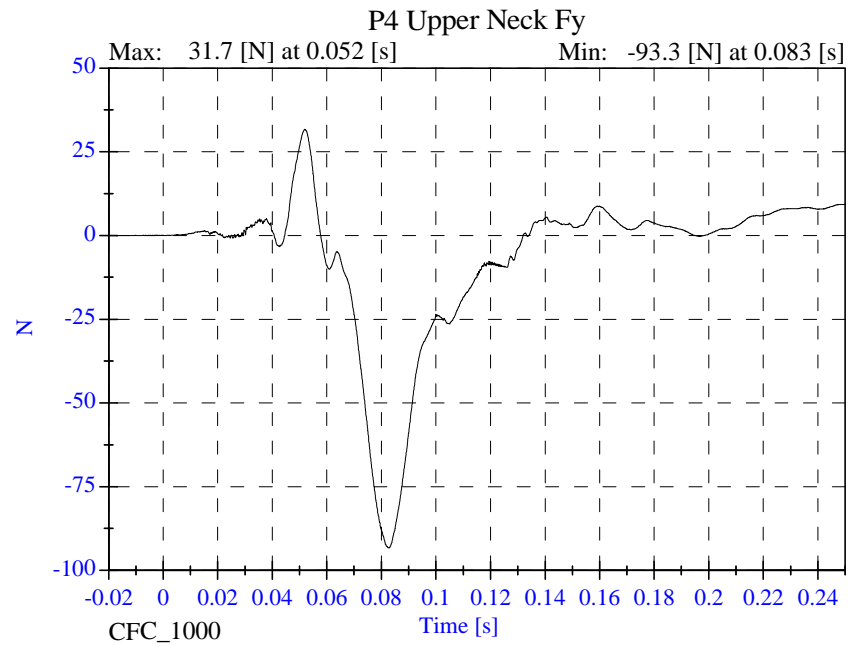
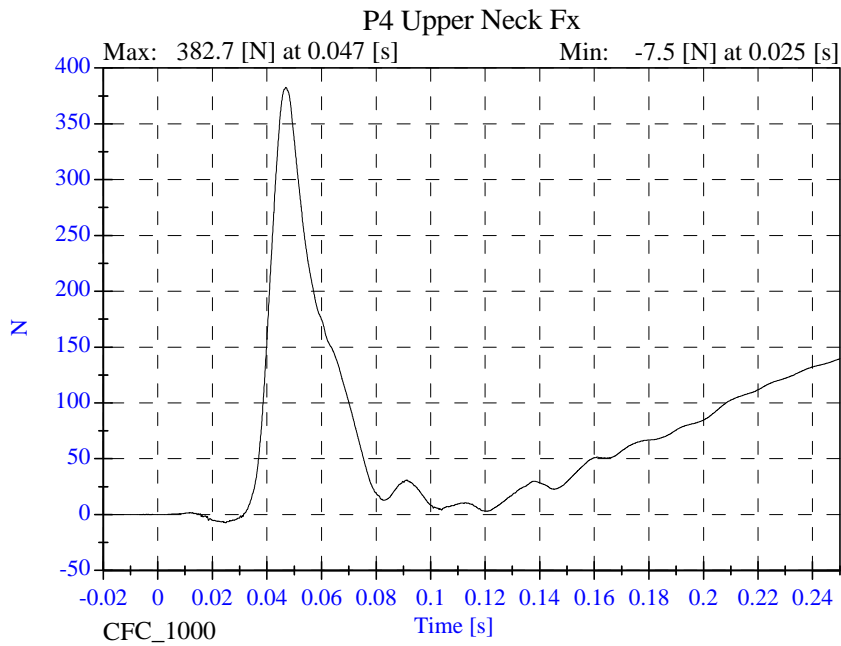
Sled Test NCAP SLED 07-3-08

- July 31, 2003



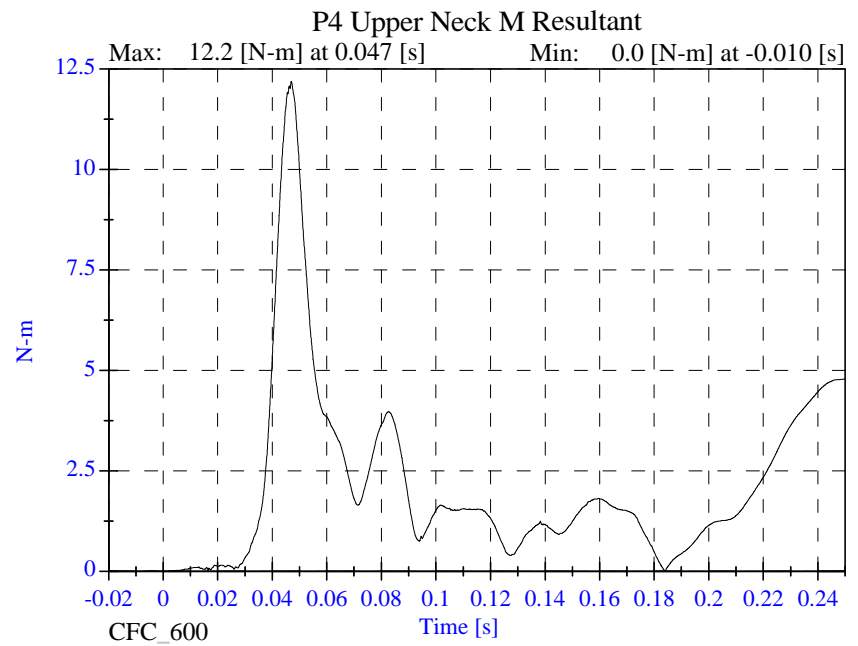
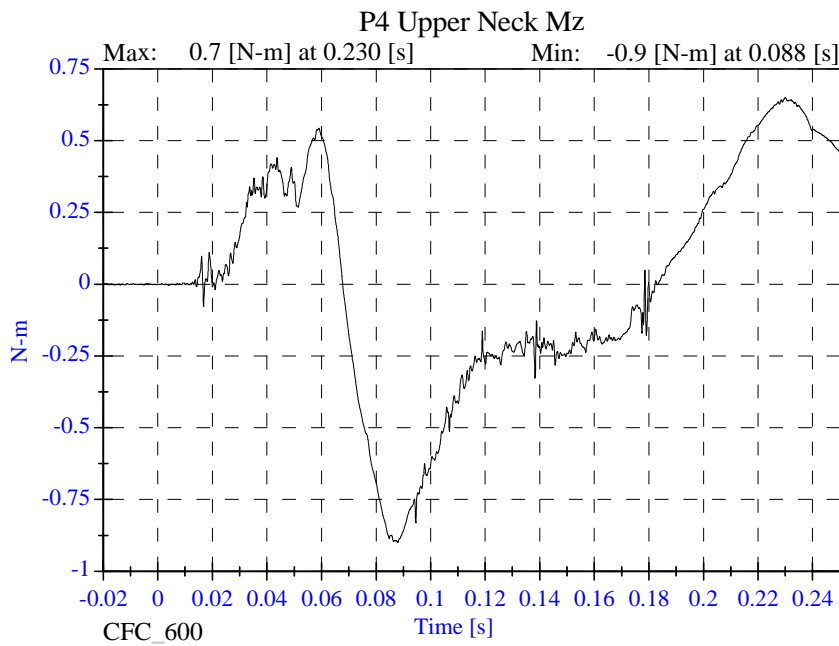
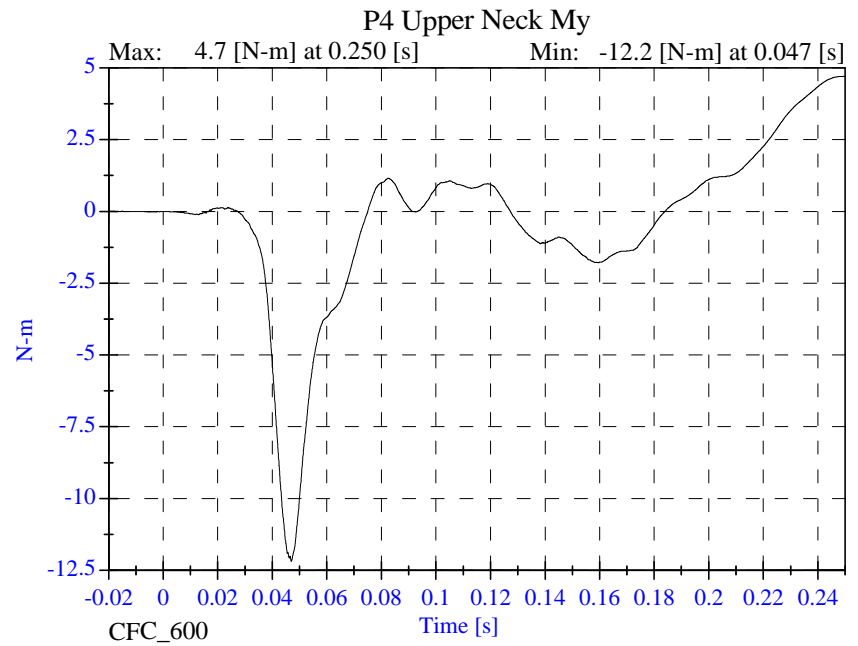
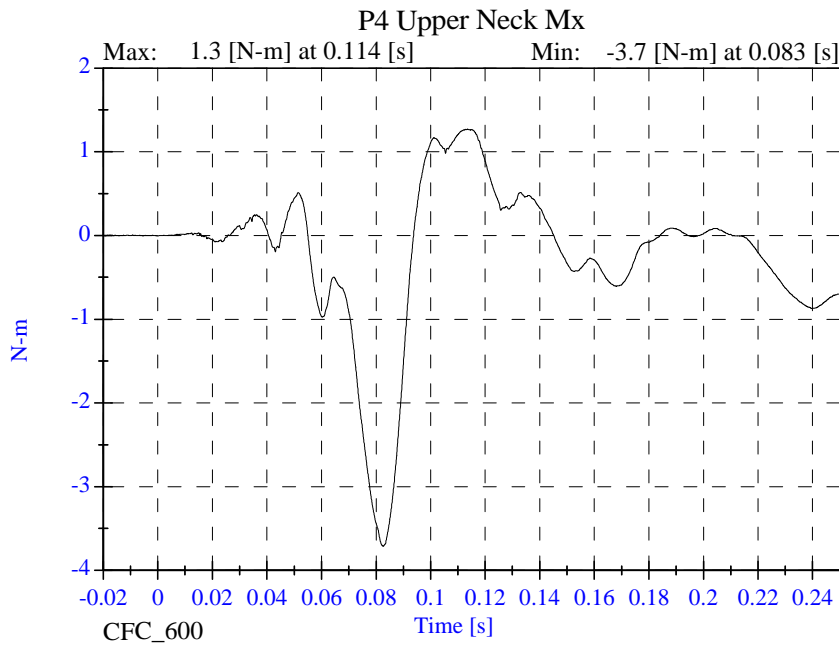
Sled Test NCAP SLED 07-3-08

- July 31, 2003



Sled Test NCAP SLED 07-3-08

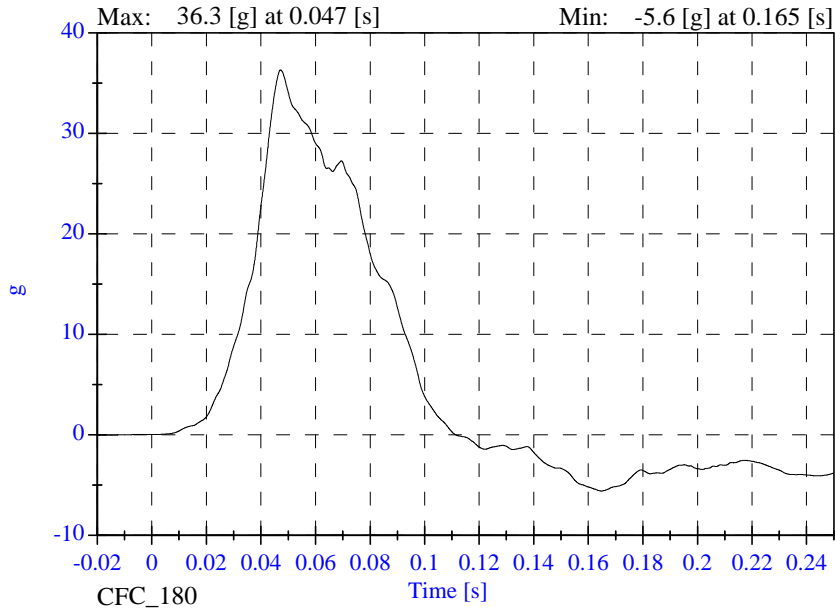
- July 31, 2003



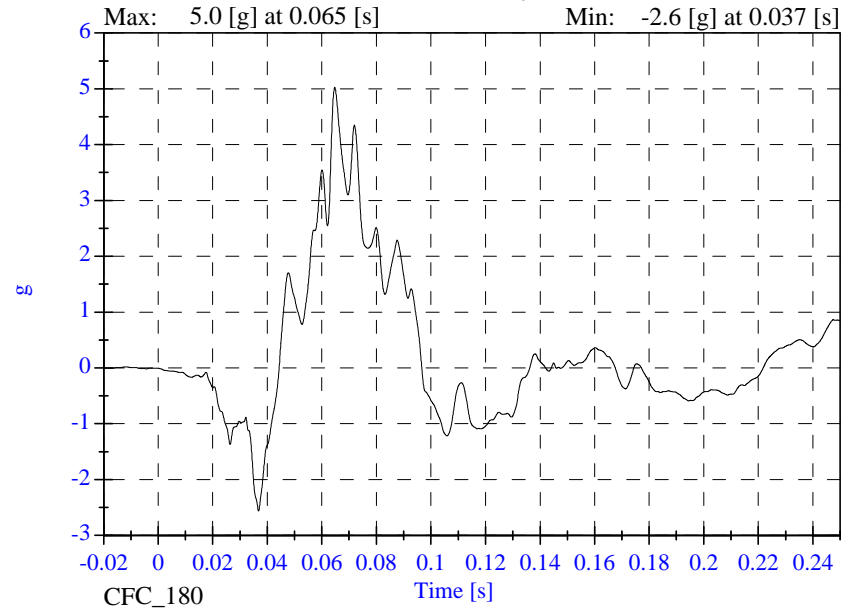
Sled Test NCAP SLED 07-3-08

- July 31, 2003

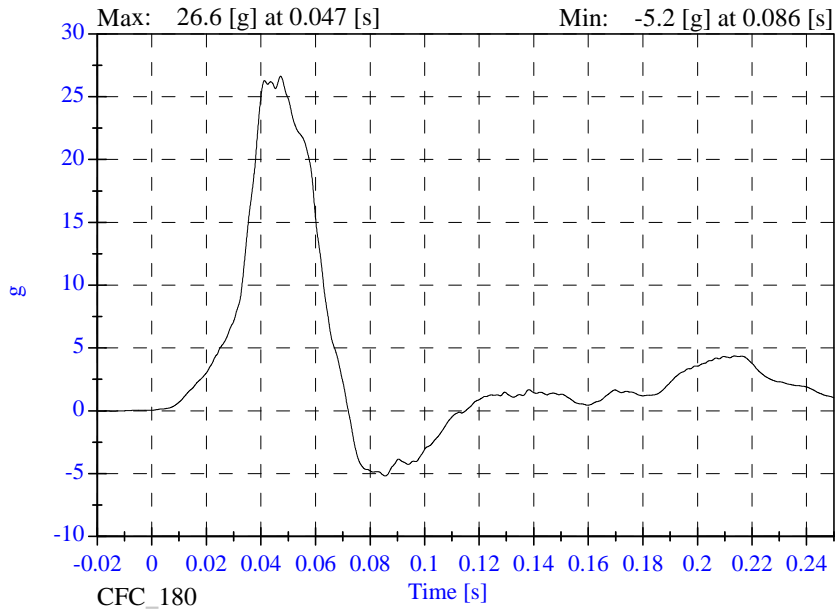
P4 Chest x



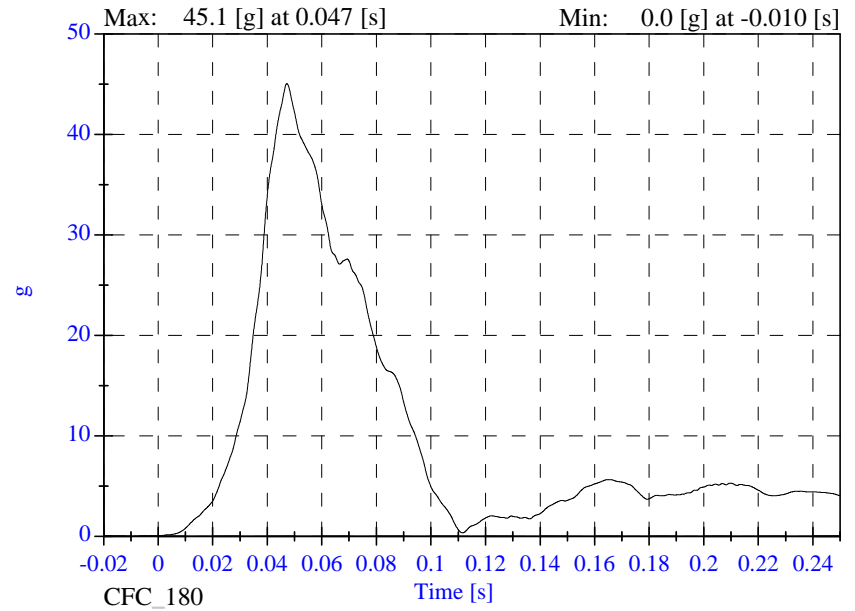
P4 Chest y



P4 Chest z



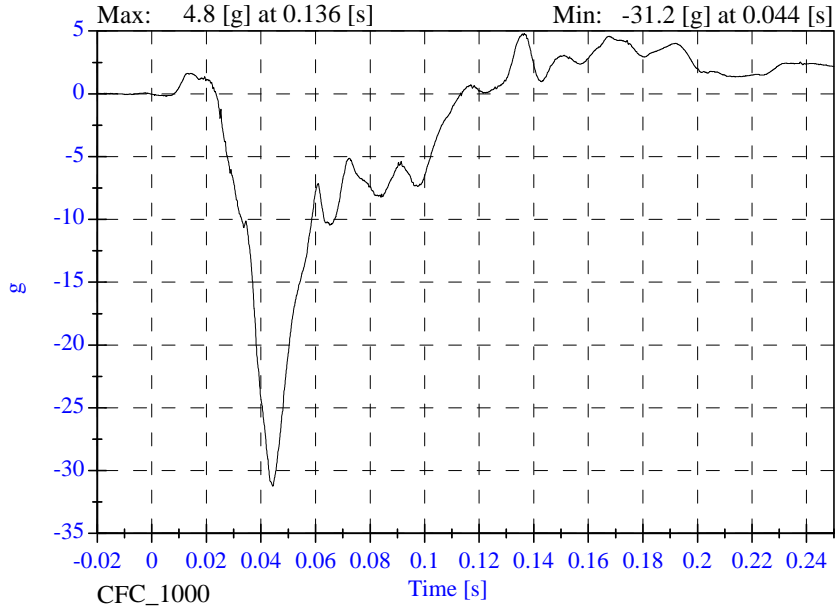
P4 Chest Resultant



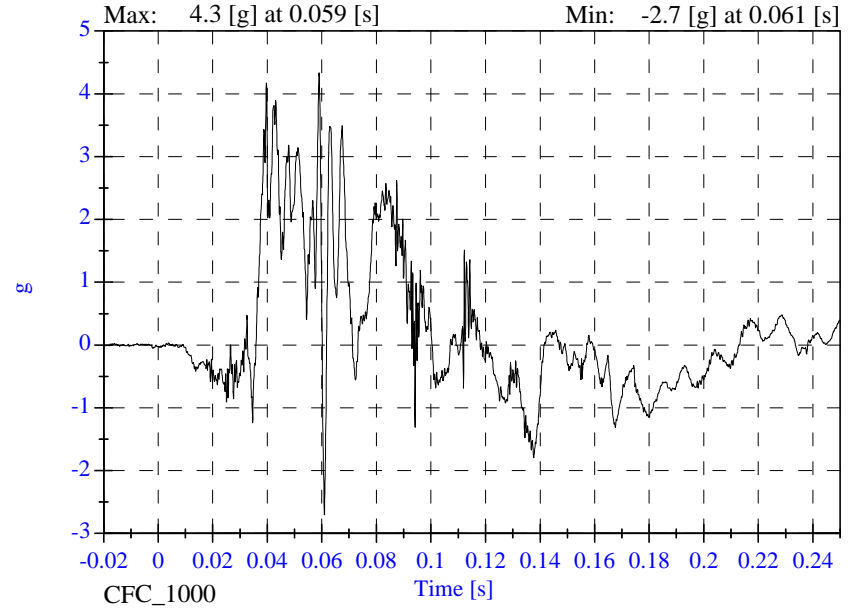
Sled Test NCAP SLED 07-3-08

- July 31, 2003

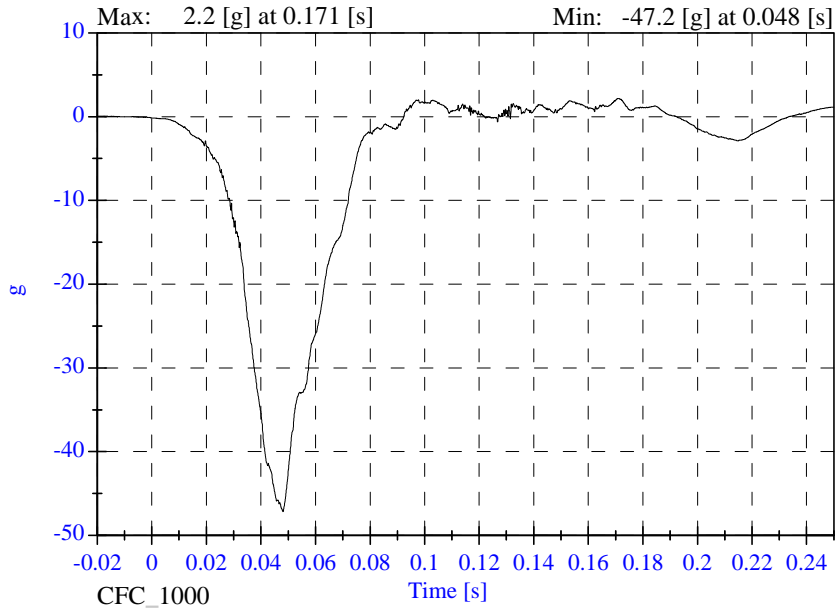
P4 Pelvic x



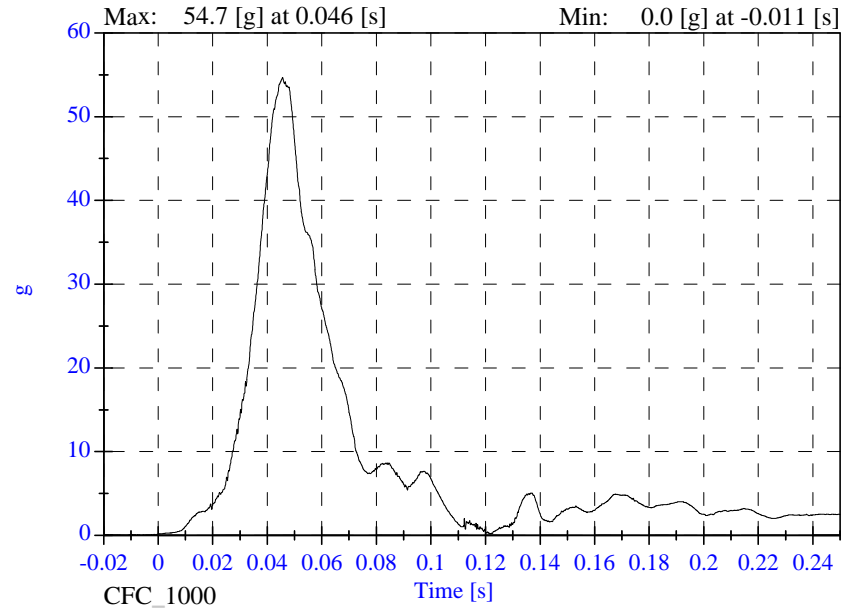
P4 Pelvic y



P4 Pelvic z



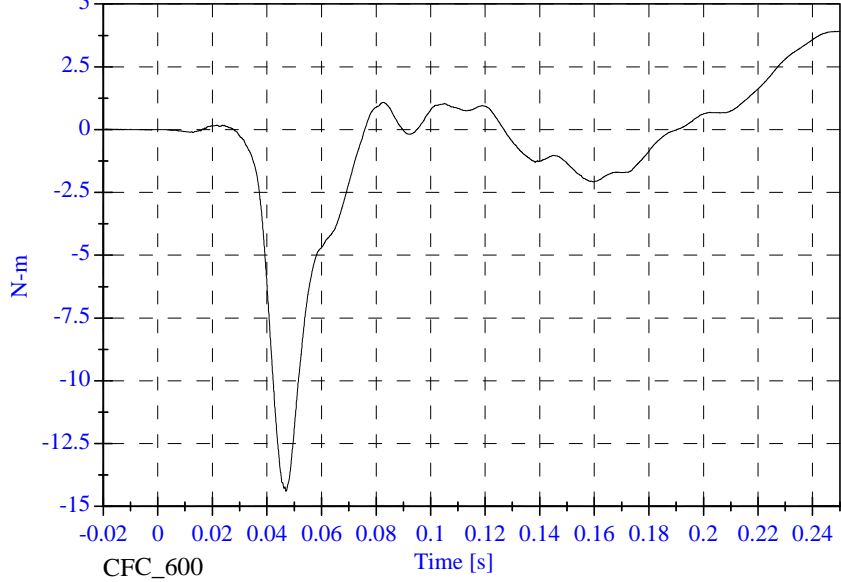
P4 Pelvic Resultant



Sled Test NCAP SLED 07-3-08

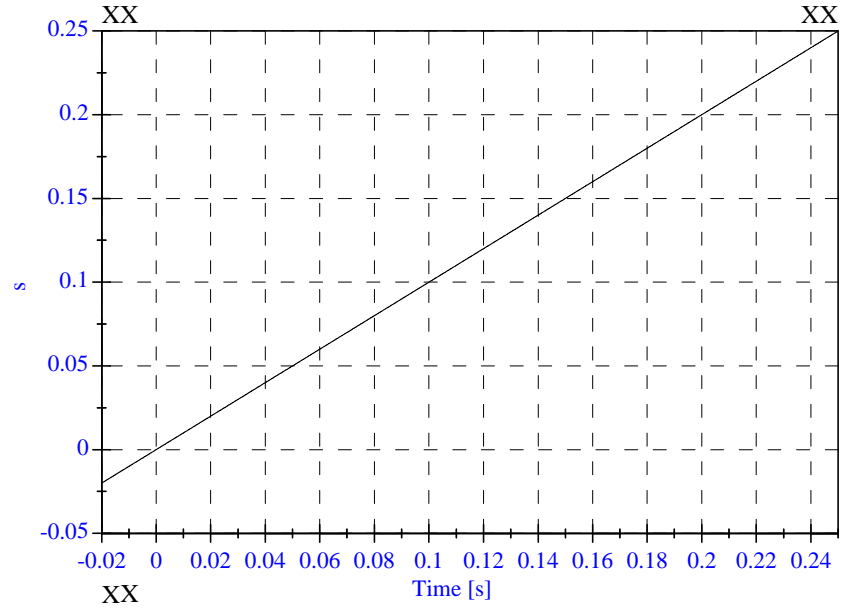
P4 Upper Neck Mocy

Max: 3.9 [N-m] at 0.250 [s] Min: -14.4 [N-m] at 0.047 [s]

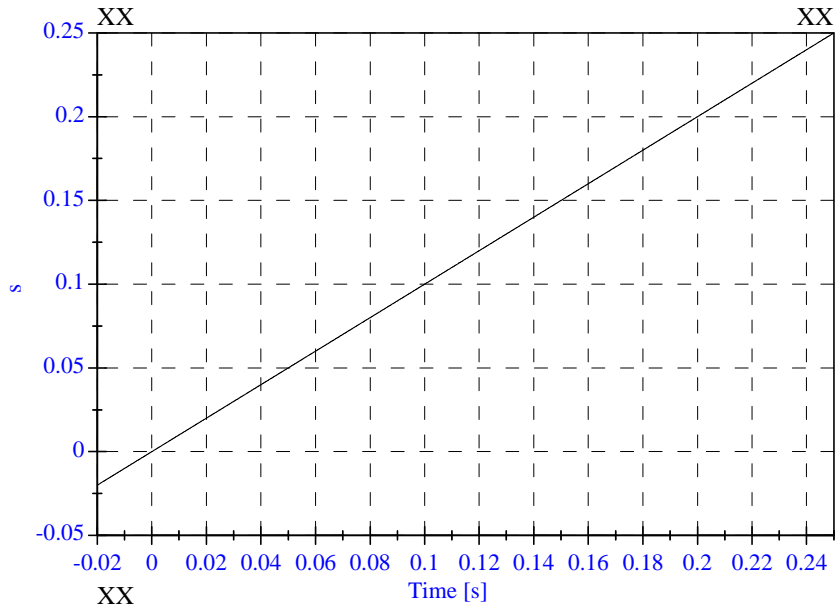


- July 31, 2003

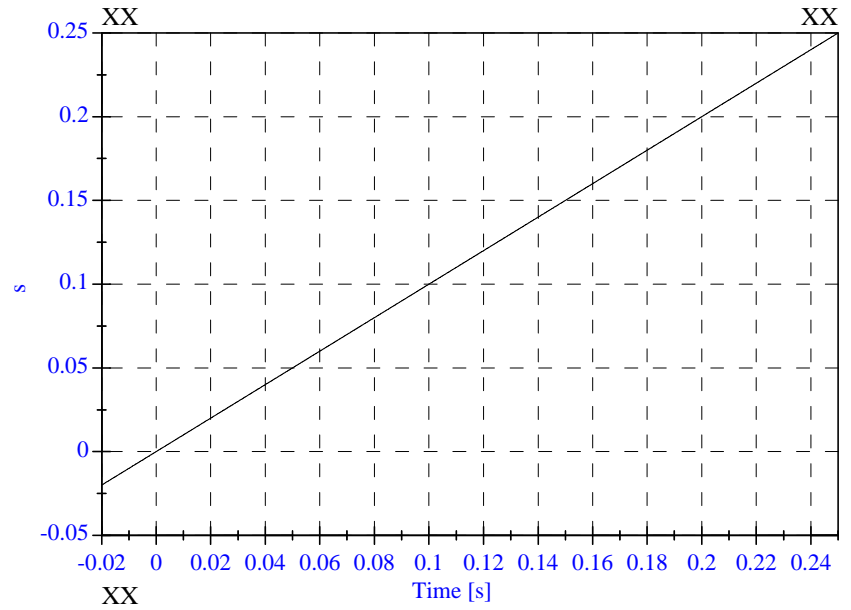
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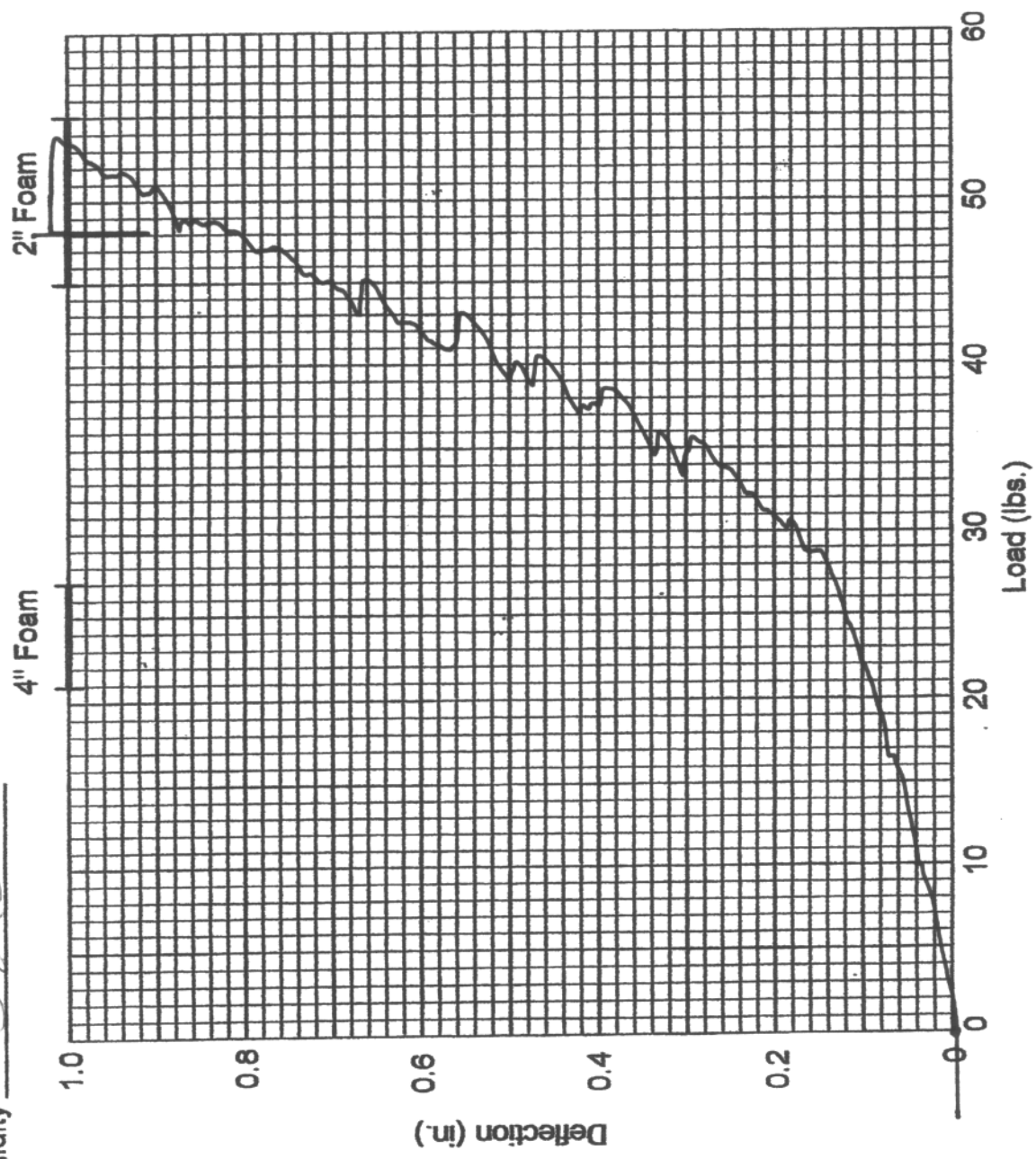


SECTION 9

Compression – Deflection Resistance Test

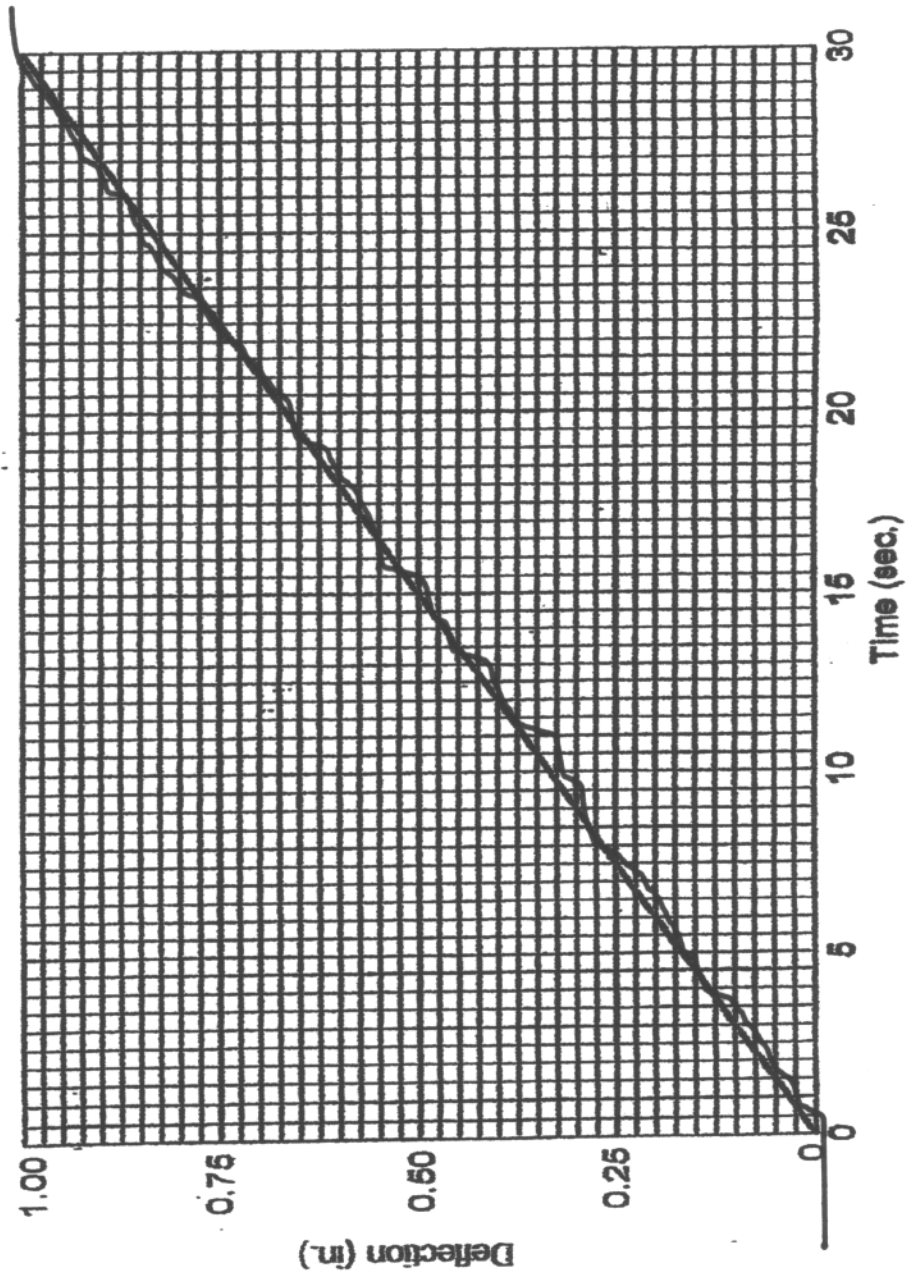
Foam No. 2" x 50" 2" x 29" ID

Date 07/31/09
Performed By [Signature]
Temp. 70°
Humidity 50%



Compression - Deflection Resistance Test
Child Seat Foam

Date 7/31/03
 Temp 76°
 Humidity 50%
 Foam No. 2" X 20" ZY2A' IY



Compression - Deflection Resistance Test Child Seat Foam

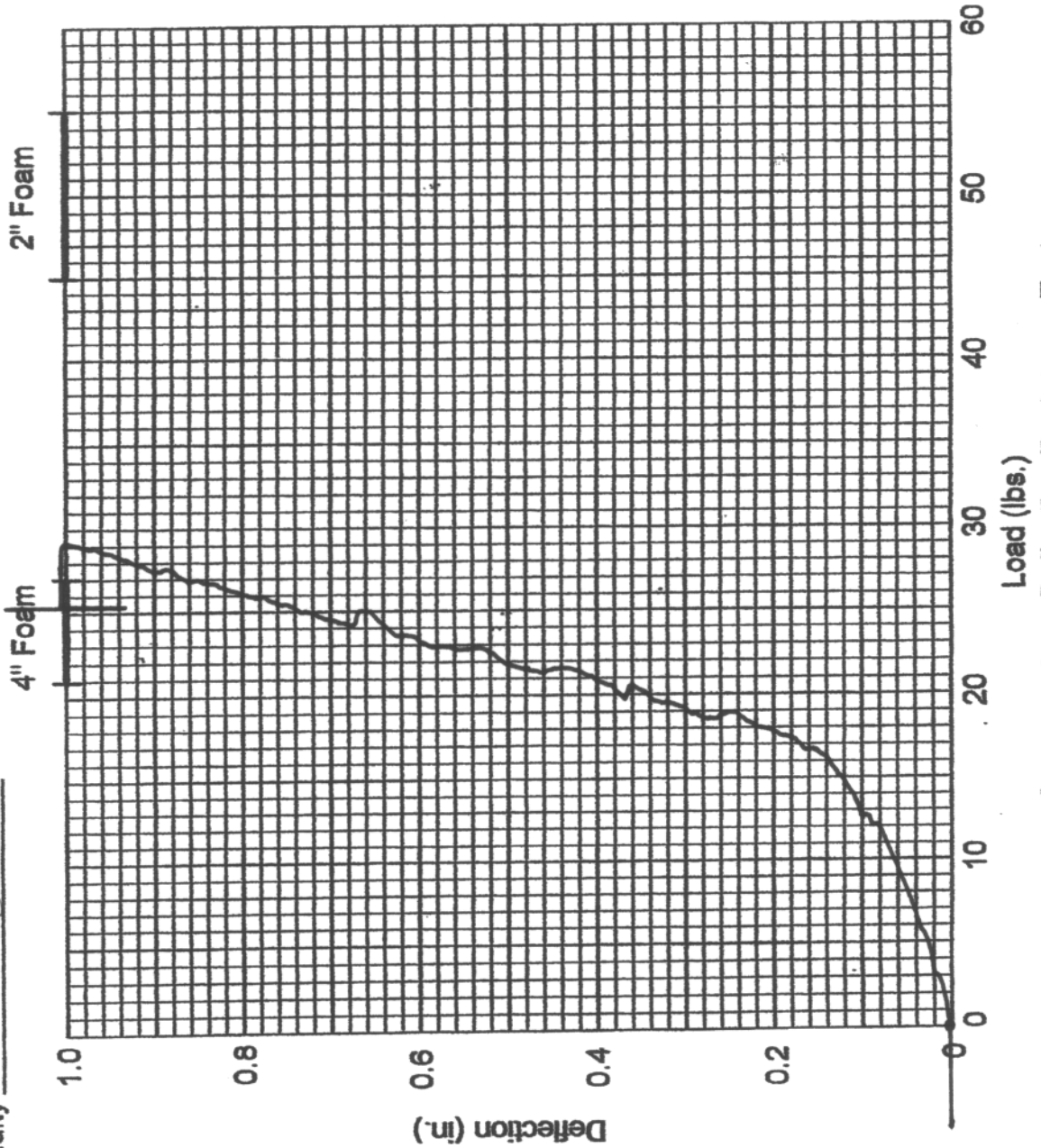
SEAT FOAM USAGE LOG

Foam I.D. Number 2" X 20" 2" X 24" IY

Date	Peak Load	Pass/Fail
7/3/03	98 LBS	PASS

Foam No. 4 (X 20) I M

Date 7/31/03
Performed By [Signature]
Temp. 70°
Humidity 50%



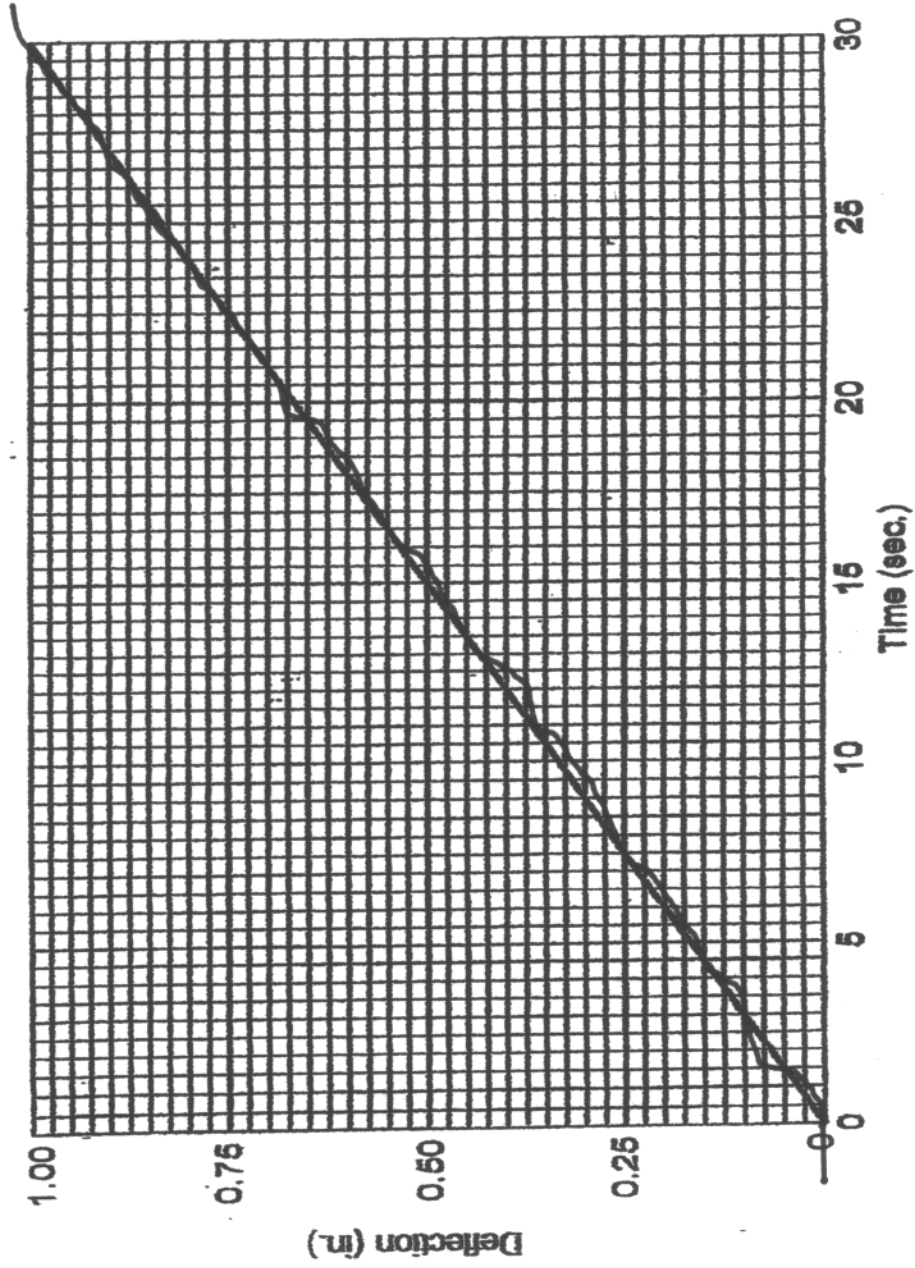
Compression - Deflection Resistance Test
Child Seat Foam

Date 7/31/03

Temp 70°

Humidity 50%

Foam No. A'X20' I 7



Compression - Deflection Resistance Test Child Seat Foam

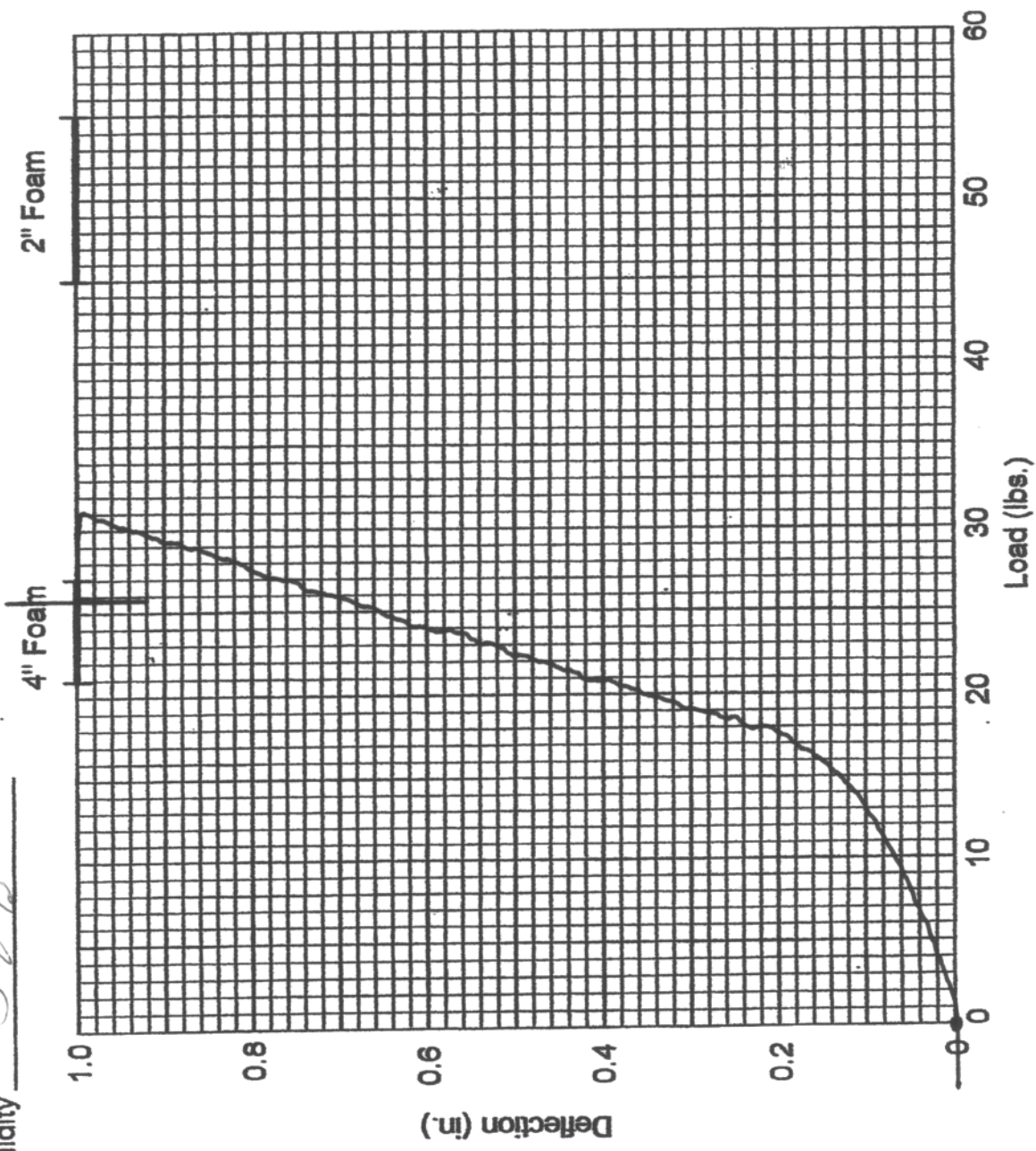
SEAT FOAM USAGE LOG

Foam I.D. Number 4" X 20" I7

Date	Peak Load	Pass/Fail
7/31/03	25.5 LBS	PASS

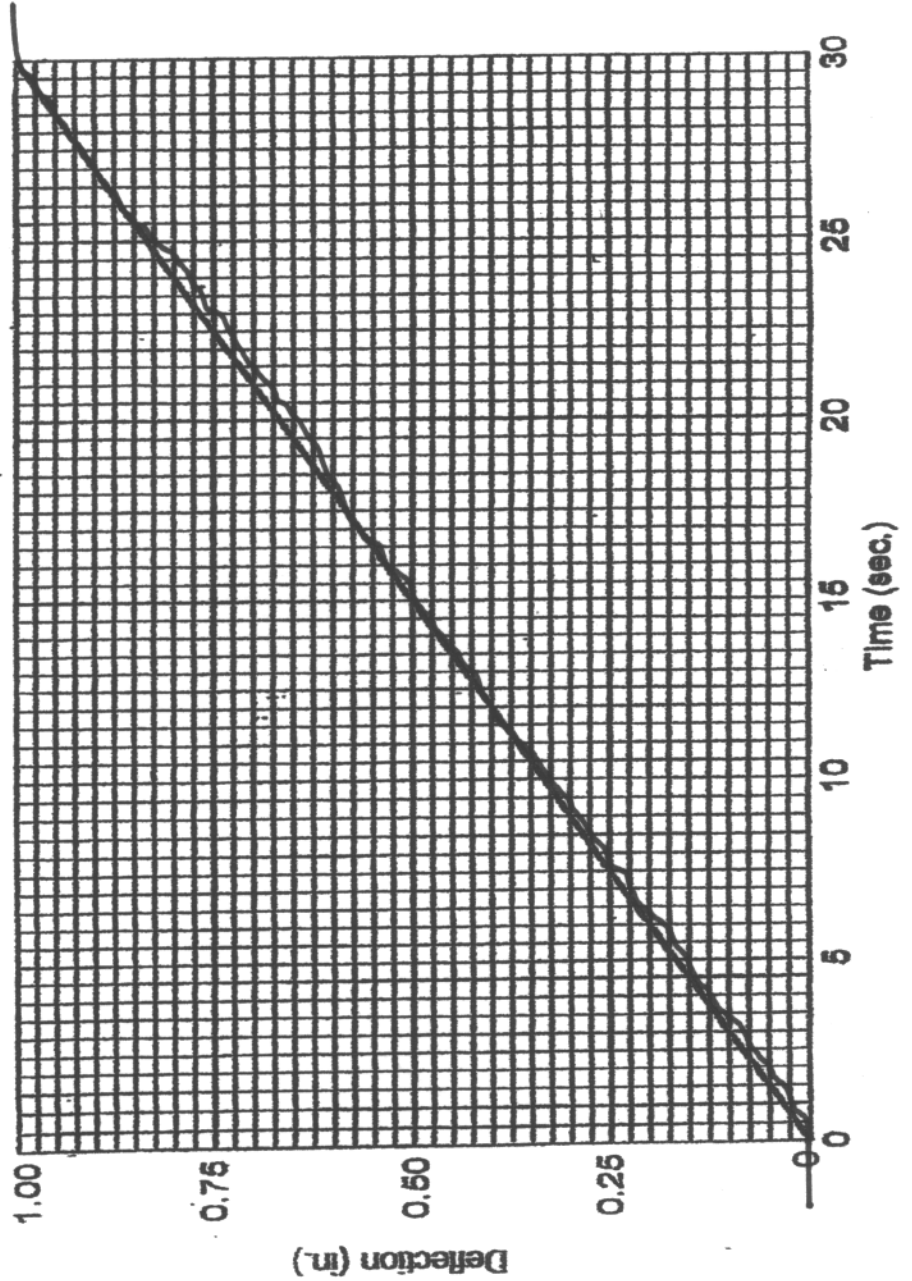
Date 7/31/05
 Performed By [Signature]
 Temp. 70°
 Humidity 50%

Foam No. AX 29 " I-D



Compression - Deflection Resistance Test
 Child Seat Foam


Date 7/31/03
Temp 70°
Humidity 50%
Foam No. 4'X24'77



Compression - Deflection Resistance Test Child Seat Foam

SEAT FOAM USAGE LOG

Foam I.D. Number 4" X 24" I7

Date	Peak Load	Pass/Fail
7/31/03	264 BS	

SECTION 10

Child Dummy Calibration Data Traces and Tables

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

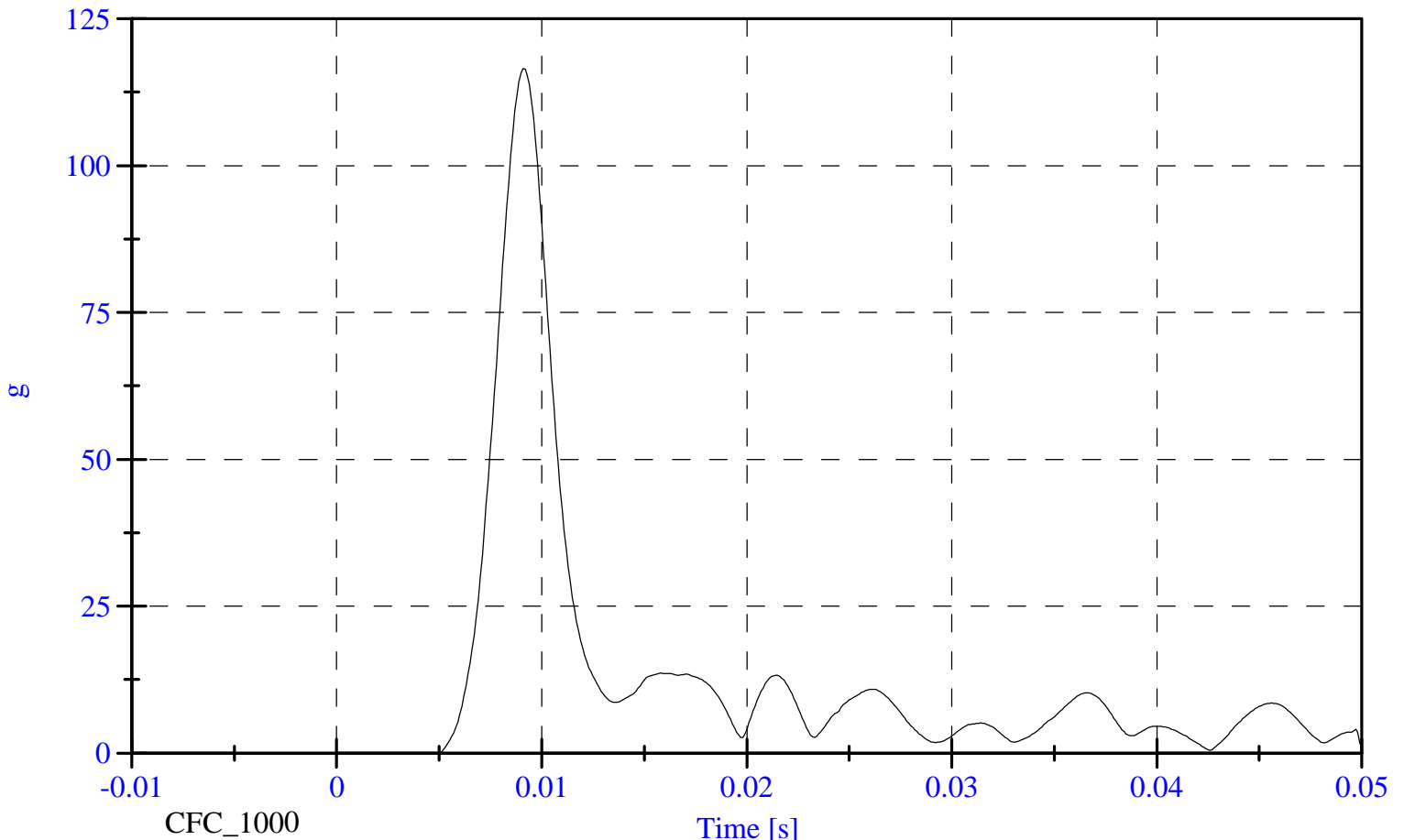
-----TEST RESULTS-----

<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

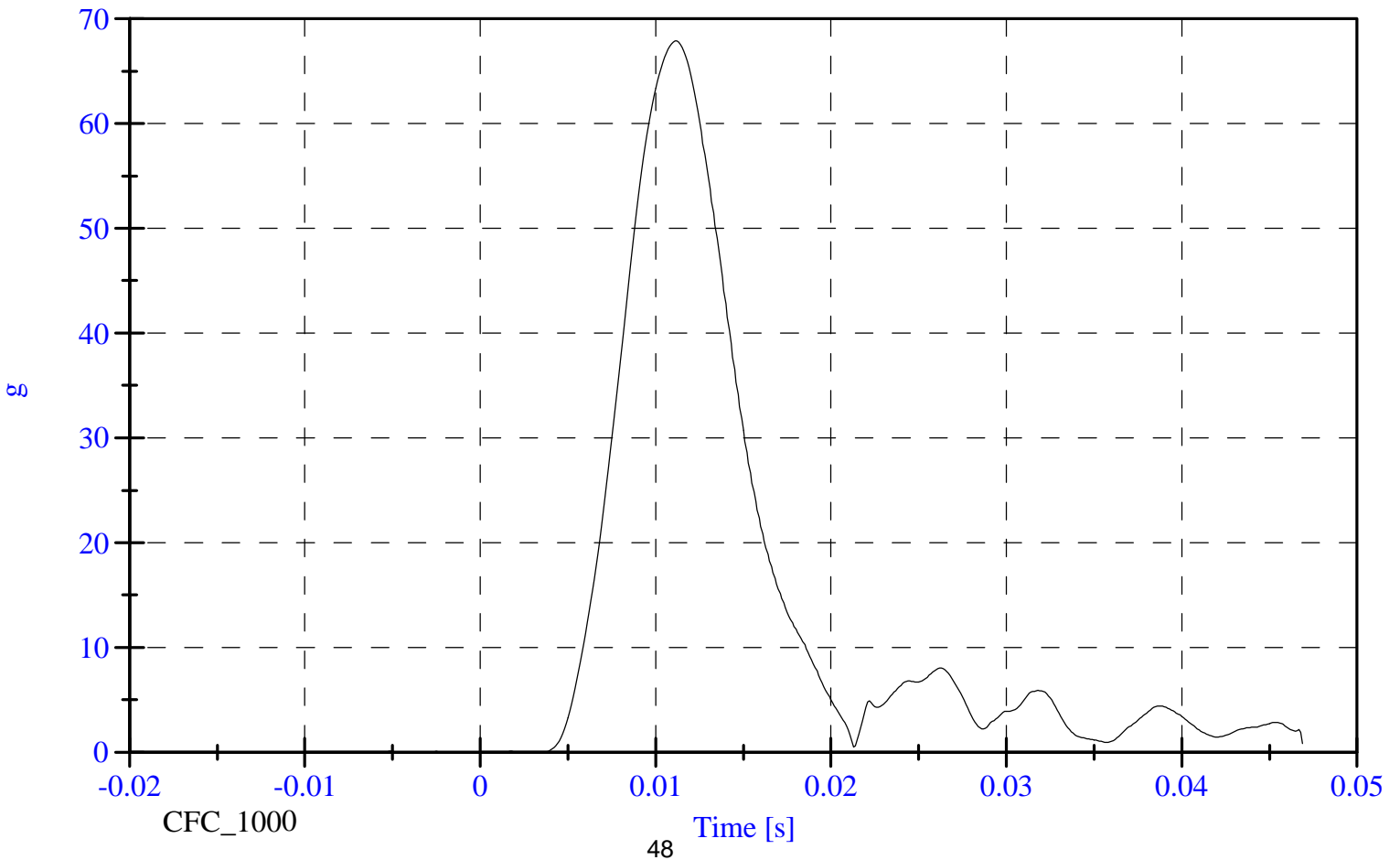
-----TEST RESULTS-----

<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 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

CRABI 1 Year Old Front Head Drop Test S/N:102

Part 572R Frontal Head Drop

Calibration Date: July 22, 2003

Serial No: 102

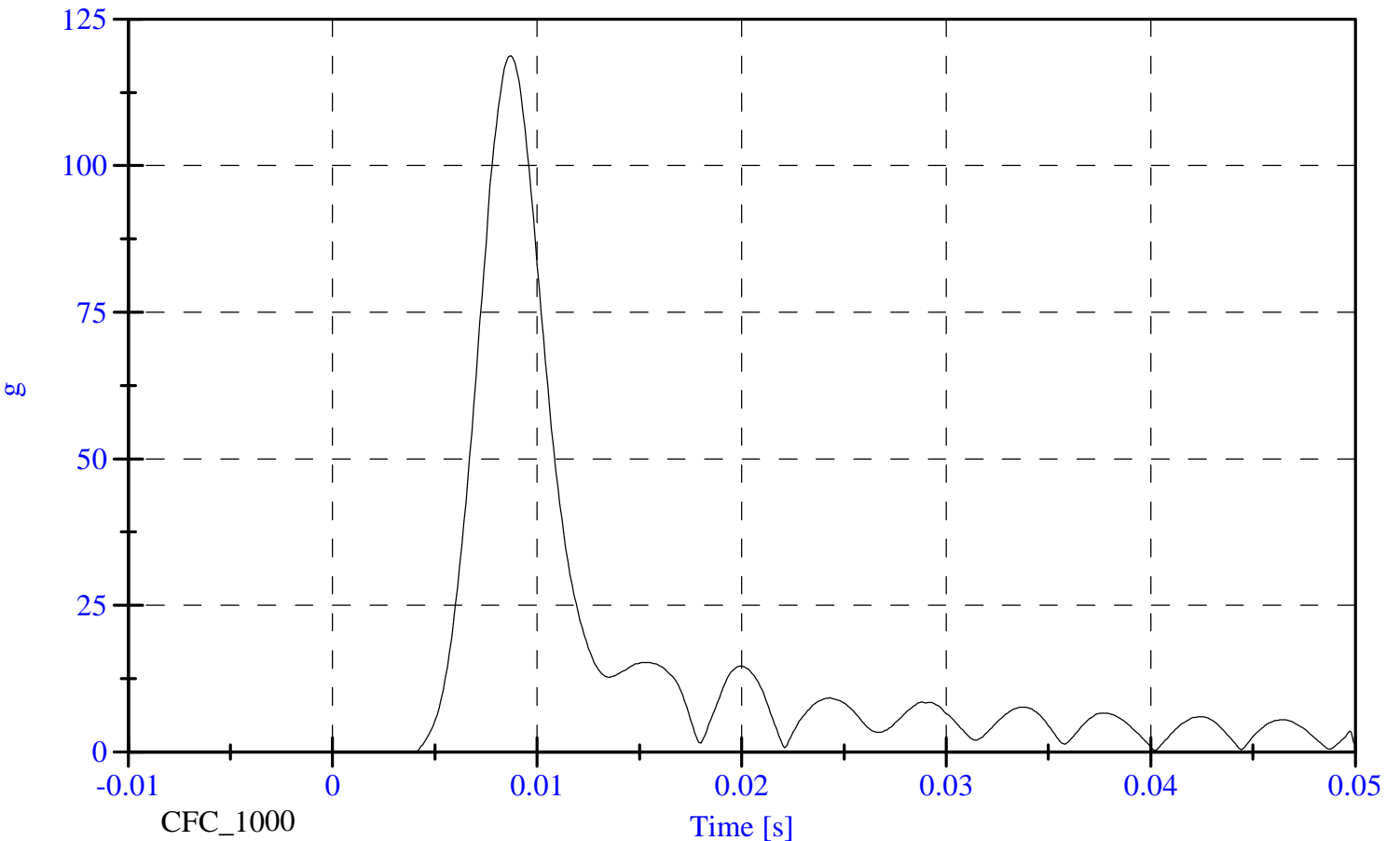
Work File: 4001

-----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	118.77 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	1.38 Gs	Passed
Curve PerCent NonModal:	< 17%	12.87 %	Passed

CRABI 1 Year Old Head Drop Test S/N:102 Head Resultant

Max: 118.8 [g] at 0.009 [s]
 Min: 0.0 [g] at -0.004 [s]



CRABI 1 Year Old Rear Head Drop Test S/N:102

Part 572R Rear Head Drop

Calibration Date: July 22, 2003

Serial No: 102

Work File: 4001

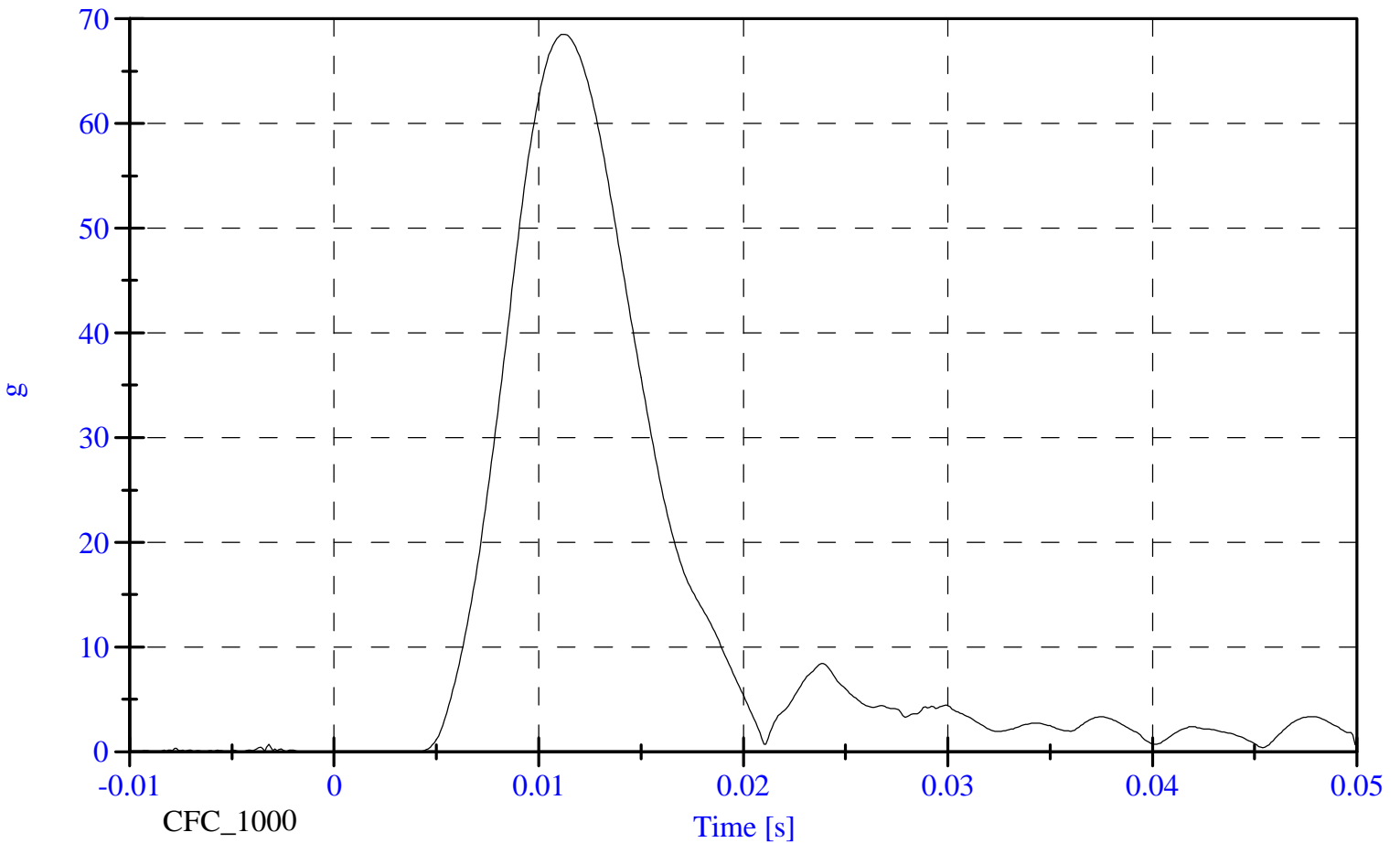
-----TEST RESULTS-----

<u>TEST CONDITION</u>	<u>PARAMETERS</u>	<u>RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.6 C	21.1 C	Passed
Lab Humidity:	10-70 %	35.00 %	Passed
Peak Resultant Accel.:	55-71 Gs	68.52 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	2.06 Gs	Passed
Curve PerCent NonModal:	< 17%	12.32 %	Passed

CRABI 1 Year Old Rear Head Drop Test S/N:102
Head Resultant

Max: 68.5 [g] at 0.011 [s]

Min: 0.0 [g] at -0.006 [s]



Crabi 1 Year Old Head Neck Flexion Test S/N:102

Part 572R

Neck Flexion Test

Calibration Date:

July 24, 2003

Serial No:

102

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 %	36.00 %	Passed
Test Pendulum Speed:	5.10- 5.30 m/s	5.20 m/s	Passed

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

Pulse at 10 ms:	1.60- 2.30 m/s	2.13 m/s	Passed
Pulse at 20 ms:	3.40- 4.20 m/s	4.18 m/s	Passed
Pulse at 25 ms:	4.30- 5.20 m/s	5.02 m/s	Passed

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

Maximum Rotation:	75.0-86.0 Deg	84.26 Deg	Passed
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-----MOMENT ABOUT THE OCCIPITAL CONDYLE-----

Max Occipital Moment:	36.00- 45.00 N-m	38.52 N-m	Passed
Occipital Moment Decay:	60.0-80.0 ms	69.10 ms	Passed

SECTION 11

Test Equipment and Instrumentation Calibration

CALIBRATION DATA FOR TEST 07-3-08

SHORTNAME	SENSCOM	CALDATE
Sled Ax	MFG: ENDEVCO S/N: 24144	7/24/2003
P3 HDCG Ax	MFG: ENTRAN S/N: 02I02I05-F20	7/14/2003
P3 HDCG Ay	MFG: ENTRAN S/N: 02I02I10-N19	7/14/2003
P3 HDCG Az	MFG: ENTRAN S/N: 02I02I05-F03	7/14/2003
P3 CHST Ax	MFG: ENTRAN S/N: 02I02I05-F16	7/14/2003
P3 CHST Ay	MFG: ENTRAN S/N: 02I02I05-F06	7/14/2003
P3 CHST Az	MFG: ENTRAN S/N: 02I02I05-F07	7/14/2003
P3 PVCN Ax	MFG: ENTRAN S/N: 02I02I05-F11	7/14/2003
P3 PVCN Ay	MFG: ENTRAN S/N: 02I02I10-N06	7/14/2003
P3 PVCN Az	MFG: ENTRAN S/N: 02I02I16-A05	7/14/2003
P3 NEKU Fx	MFG: DENTON S/N: 280-FX	7/16/2003
P3 NEKU Fy	MFG: DENTON S/N: 280-FY	7/16/2003
P3 NEKU Fz	MFG: DENTON S/N: 280-FZ	7/16/2003
P3 NEKU Mx	MFG: DENTON S/N: 280-MX	7/16/2003
P3 NEKU My	MFG: DENTON S/N: 280-MY	7/16/2003
P3 NEKU Mz	MFG: DENTON S/N: 280-MZ	7/16/2003
P4 HDCG Ax	MFG: ENDEVCO S/N: J27496	7/15/2003
P4 HDCG Ay	MFG: ENDEVCO S/N: J27366	7/15/2003
P4 HDCG Az	MFG: ENDEVCO S/N: AJ7G1	7/15/2003
P4 CHST Ax	MFG: ENDEVCO S/N: J19625	7/14/2003
P4 CHST Ay	MFG: ENDEVCO S/N: J14381	7/14/2003
P4 CHST Az	MFG: ENDEVCO S/N: J20054	7/14/2003
P4 PVCN Ax	MFG: ENDEVCO S/N: ACC14	7/15/2003
P4 PVCN Ay	MFG: ENDEVCO S/N: ALA71	7/15/2003
P4 PVCN Az	MFG: ENDEVCO S/N: J14687	7/15/2003
P4 NEKU Fx	MFG: DENTON S/N: 283-FX	7/16/2003
P4 NEKU Fy	MFG: DENTON S/N: 283-FY	7/16/2003
P4 NEKU Fz	MFG: DENTON S/N: 283-FZ	7/16/2003
P4 NEKU Mx	MFG: DENTON S/N:	7/16/2003
P4 NEKU My	MFG: DENTON S/N: 283-MY	7/16/2003
P4 NEKU Mz	MFG: DENTON S/N: 283-MZ	7/16/2003

SECTION 12

Link to High Speed Movies

Test 07-3-08 North View

Test 07-3-08 South View