

REPORT NUMBER: SLED-VER-2002-09

**CHILD RESTRAINT SYSTEM IN
DYNAMIC SLED TEST
SAFETY FIRST FORERUNNER, FORWARD-FACING UPRIGHT, CONVERTIBLE**

TEST NUMBER: 22292

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



March 25, 2002

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590**

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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Prepared by: _____ Date: _____
David P. Roberts, Project Engineer

Reviewed by: _____ Date: _____
David P. Roberts, Head of Occupant
Protection and Safety Research

FINAL REPORT ACCEPTED BY:

Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This dynamic sled testing is part of the FY' 02 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 Office of Crashworthiness Standards (OCS), New Car Assessment Program (NCAP).

The test was conducted at Veridian Engineering on March 25, 2002 at a speed of 46.9 kph (29.2 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 size ATD, Serial Number 040, was instrumented with head, chest, and pelvic tri-axial accelerometers, and upper and lower neck load cells. 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.

1.3 POST-TEST COMMENTS

None

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 22292S

Test Date: March 25, 2002

Child Restraint Type (forward-facing, rearward facing, booster)	Forward-Facing, Upright, Convertible
LATCH or NON-LATCH	Latch*
Child Restraint Manufacturer	Safety First
Child Restraint Model	Forerunner
Model Number	02925BRD
Date of Manufacture	1/09/2002
Child Restraint Height Limits (mm)	482.6 – 1016.0
Child Restraint Weight Limits (kg)	2.3 – 18.0
Weight of Child Restraint (kg)	4.35
Tether Location	upper

*Tether bar lowered to 355.6mm above sled floor.

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 22292S

Test Date: March 25, 2002

Child Seat	Safety First Forerunner
Belt Fraying	None
Stress Marks	None
Cracks	None
Buckle Stress	None
Latch Hooks	None
Max. Head Excursion (mm)	706.1
Max. Knee Excursion (mm)	706.1
Velocity	29.2 mph, 46.9 kph
Acceleration (G's)	23.2

SECTION 4

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22292S

Test Date: March 25, 2002

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	44.5	217.3	-43.0	95.4
Head CG	Y	G's	10.6	94.9	-5.0	78.0
Head CG	Z	G's	49.1	77.4	-1.0	246.7
Head CG Resultant	N/A	G's	51.8	78.0		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	10.5	227.9	-32.7	57.4
Chest CG	Y	G's	3.9	96.0	-2.8	172.3
Chest CG	Z	G's	7.1	95.0	-22.5	60.6
Chest CG Resultant	N/A	G's	38.9	59.6		

SEAT BELT SENSOR PEAK VALUES

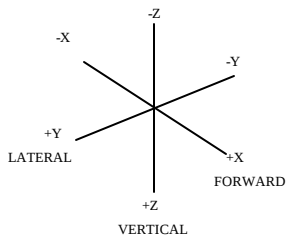
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P3 (South) Rear Passenger			
	HIC	Avg. G's	T ¹	T ²
Head CG Primary (36 msec)	480	44.7	66.0	102.0
Head CG Primary (15 msec)	257	49.4	71.5	86.5

CHEST CLIP (3 MSEC)

Location	P3 (South) Rear Passenger		
	Clip	T ¹	T ²
Chest CG Primary	38.5	57.8	60.8



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

Test No.: 22292S

Test Date: March 25, 2002

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	22.2	114.1	-41.1	56.4
Pelvis	Y	G's	2.6	134.4	-2.4	75.3
Pelvis	Z	G's	8.7	116.2	-32.1	56.2

UPPER NECK PEAK FORCES AND MOMENTS

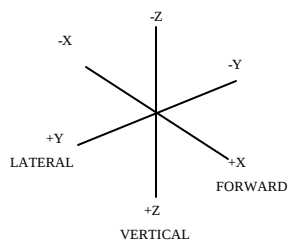
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	18.3	245.1	-868.3	98.8
Neck Force	Y	Newtons	51.1	86.3	-59.2	105.9
Neck Force	Z	Newtons	1316.1	93.3	-140.4	231.9
Neck Moment	X	Nm	2.9	174.7	-3.7	202.2
Neck Moment	Y	Nm	8.0	153.4	-16.9	227.1
Neck Moment	Z	Nm	2.6	103.2	-2.5	208.1

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	182.1	216.0	-1183.3	96.7
Neck Force	Y	Newtons	30.5	182.9	-124.7	65.5
Neck Force	Z	Newtons	979.4	75.4	-100.3	136.3
Neck Moment	X	Nm	8.7	92.3	-5.9	197.2
Neck Moment	Y	Nm	124.9	96.8	-15.1	215.9
Neck Moment	Z	Nm	2.5	79.2	-2.3	121.0

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			-26.8	105.3



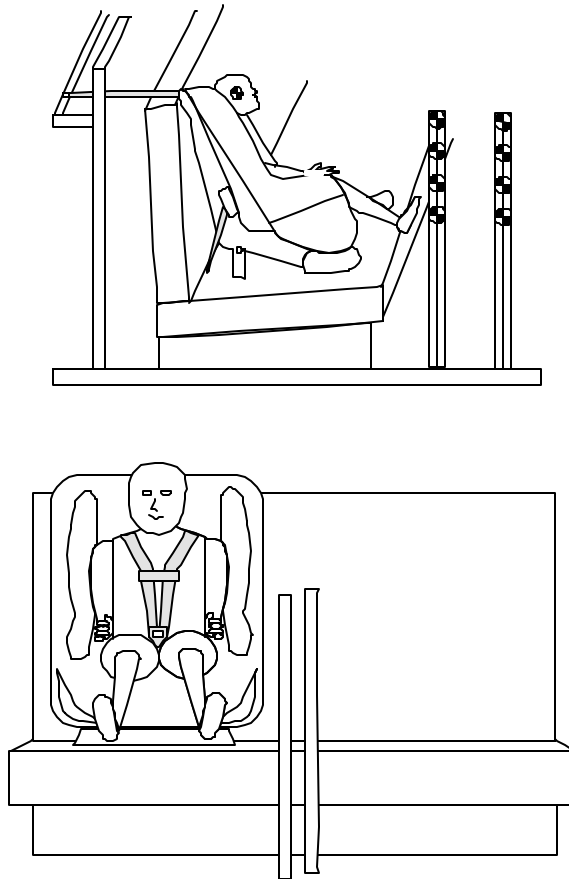
SECTION 5
SLED TEST SET-UP

Test No.: 22292

Test Date: March 25, 2002

An FMVSS 213 test bench was fixtured on the sled in order to simulate a frontal impact. One child seat was 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

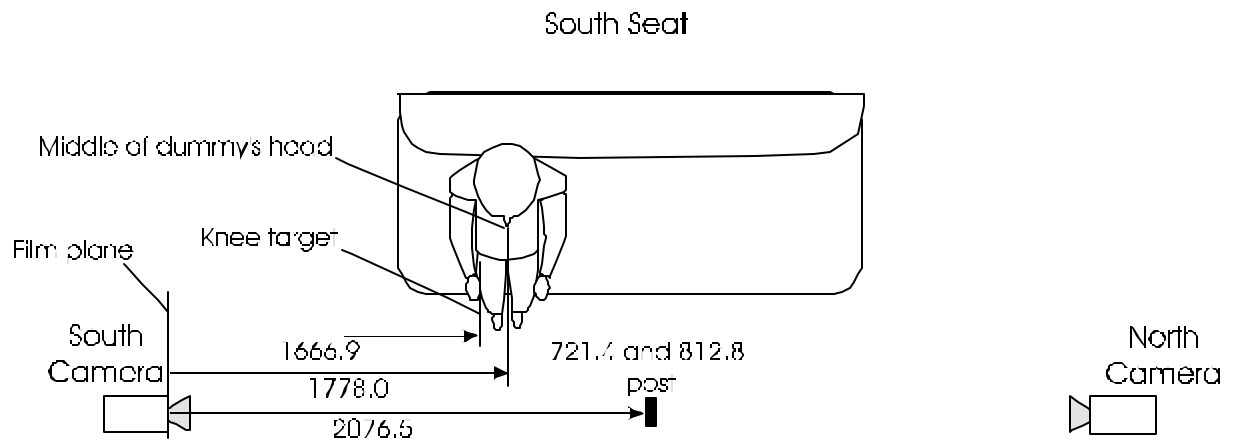


SECTION 6
CAMERA LOCATION

Test No.: 22292

Test Date: March 25, 2002

There were two cameras mounted onto the sled carriage for views of the left and right side of the child seat. All measurements are in millimeters.



SECTION 7
PHOTOGRAPHS

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Run #22292 Photo 1 - Pre-Test Right 3/4 View



Run #22292 Photo 2 - Post-Test Right 3/4 View



Run #22292 Photo 3 - Pre-Test Right Side View



Run #22292 Photo 4 - Post-Test Right Side View



Run #22292 Photo 5 - Pre-Test Left 3/4 View
13



Run #22292 Photo 6 - Post-Test Left 3/4 View

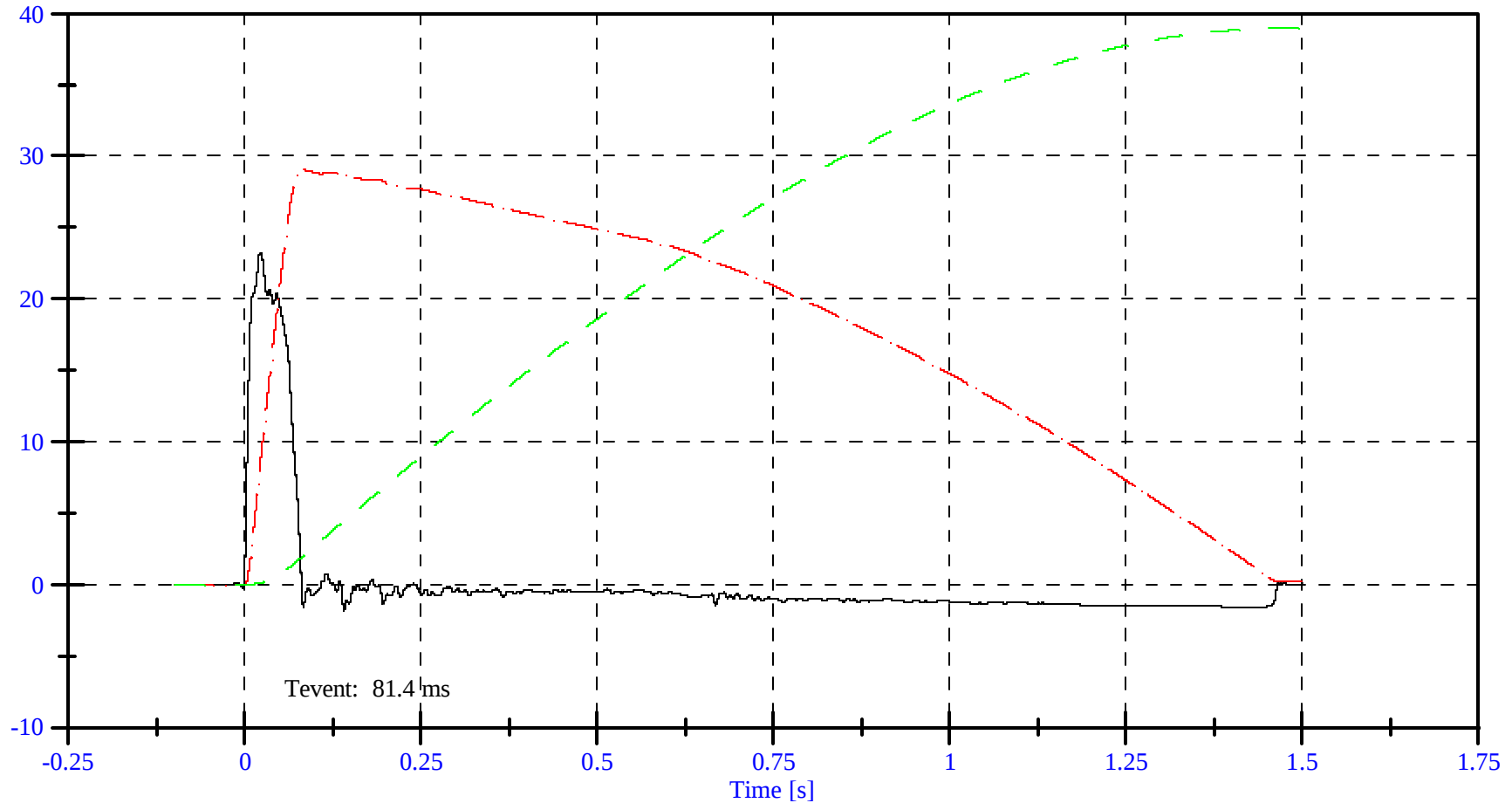


Run #22292 Photo 7 - Pre-Test Left Side View



Run #22292 Photo 8 - Post-Test Left Side View

SECTION 8
DATA PLOTS



		Maximum	Time (ms)	Minimum	Time (ms)	Filter Class
Sled Ax	(g)	23.2	23.1	-1.9	141.6	CFC_60
Sled Vx	(mph)	29.2	81.4	-0.0	-19.4	CFC_180
Sled Dx	(ft)	38.9	1500.9	-0.0	-9.9	CFC_180

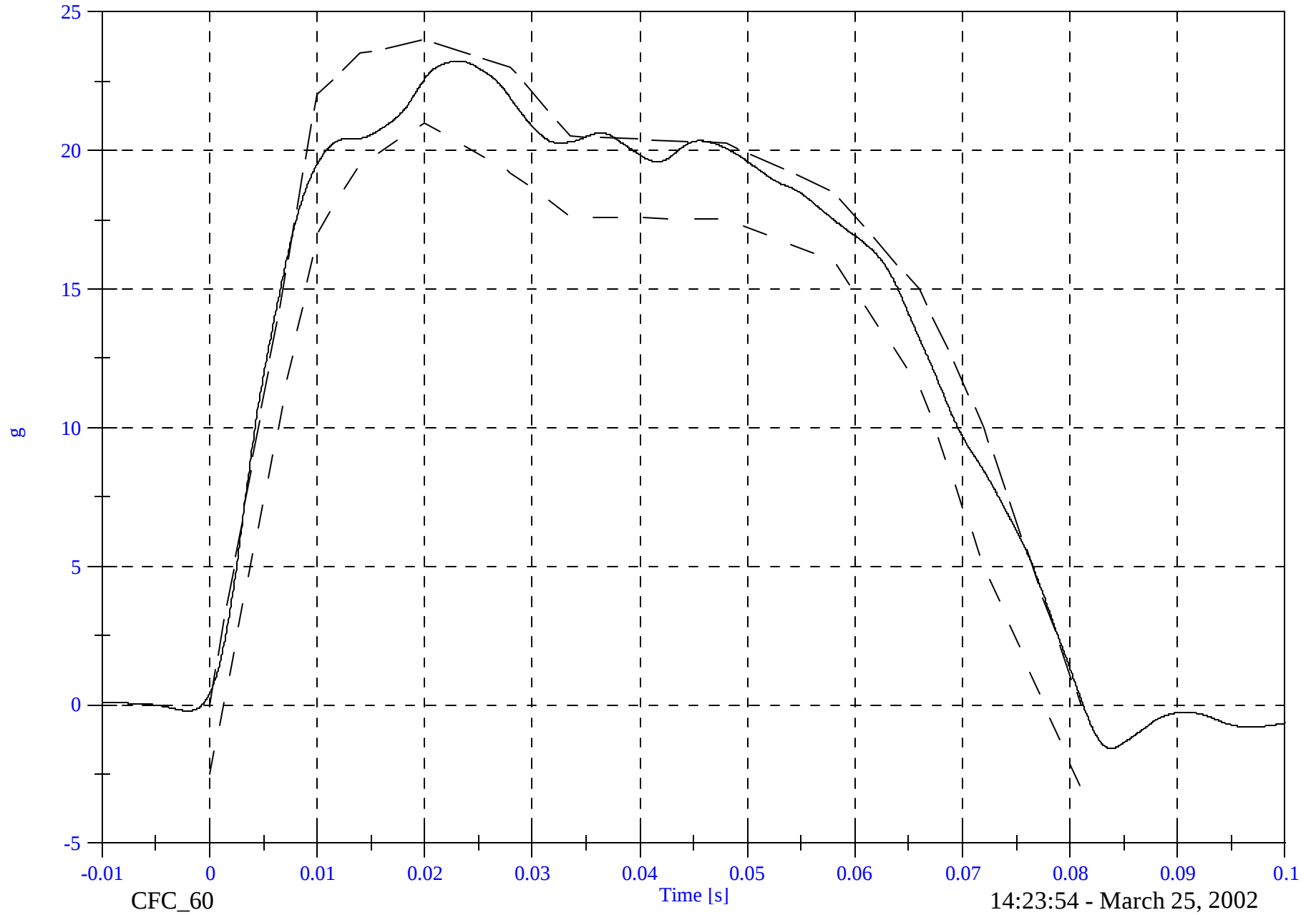
LEGEND	
—	Sled Ax
— · —	Sled Vx
- - -	Sled Dx

Sled Test Run 22292

Sled Pulse Corridor

Max: 23.2 [g] at 0.0231 [s]

Min: -1.9 [g] at 0.1416 [s]



FACILITY: VERF

DATE: March 25, 2002

TEST#: 22292

TITLE: Sled Test Run 22292

CHN NAME	Unit	Max	msec	Min	msec	Filt	Comment
26 Sled Acceleration	g	23.2	23.1	-1.9	141.6	CFC_60	
27 Sled Acceleration Velocity	kph	46.9	81.4	-0.0	-19.4	CFC_180	
28 Sled Acceleration Displacement	mm	2719.9	250.0	-0.0	-9.9	CFC_180	
29 P3 Head x	g	44.5	217.3	-43.0	95.4	CFC_1000	
30 P3 Head y	g	10.6	94.9	-5.0	78.0	CFC_1000	
31 P3 Head z	g	49.1	77.4	-1.0	246.7	CFC_1000	
32 P3 Head Resultant	g	51.8	78.0	0.0	-3.8	CFC_1000	
33 P3 Upper Neck Fx	N	18.3	245.1	-868.3	98.8	CFC_1000	
34 P3 Upper Neck Fy	N	51.1	86.3	-59.2	105.9	CFC_1000	
35 P3 Upper Neck Fz	N	1316.1	93.3	-140.4	231.9	CFC_1000	
36 P3 Upper Neck F Resultant	N	1557.4	96.8	0.0	-43.2	CFC_1000	
37 P3 Upper Neck Mx	N-m	2.9	174.7	-3.7	202.2	CFC_600	
38 P3 Upper Neck My	N-m	8.0	153.4	-16.9	227.1	CFC_600	
39 P3 Upper Neck Mz	N-m	2.6	103.2	-2.5	208.1	CFC_600	
40 P3 Upper Neck M Resultant	N-m	17.1	227.2	0.0	-17.4	CFC_600	
41 P3 Lower Neck Fx	N	182.1	216.0	-1183.3	96.7	CFC_1000	
42 P3 Lower Neck Fy	N	30.5	182.9	-124.7	65.5	CFC_1000	
43 P3 Lower Neck Fz	N	979.4	75.4	-100.3	136.3	CFC_1000	
44 P3 Lower Neck F Resultant	N	1264.8	77.1	0.0	-3.5	CFC_1000	
45 P3 Lower Neck Mx	N-m	8.7	92.3	-5.9	197.2	CFC_600	
46 P3 Lower Neck My	N-m	124.9	96.8	-15.1	215.9	CFC_600	
47 P3 Lower Neck Mz	N-m	2.5	79.2	-2.3	121.0	CFC_600	
48 P3 Lower Neck M Resultant	N-m	125.0	96.8	0.0	-26.3	CFC_600	
49 P3 Chest x	g	10.5	227.9	-32.7	57.4	CFC_180	
50 P3 Chest y	g	3.9	96.0	-2.8	172.3	CFC_180	
51 P3 Chest z	g	7.1	95.0	-22.5	60.6	CFC_180	
52 P3 Chest Resultant	g	38.9	59.6	0.0	-11.8	CFC_180	
53 P3 Pelvic x	g	22.2	114.1	-41.1	56.4	CFC_1000	
54 P3 Pelvic y	g	2.6	134.4	-2.4	75.3	CFC_1000	
55 P3 Pelvic z	g	8.7	116.2	-32.1	56.2	CFC_1000	
56 P3 Pelvic Resultant	g	52.1	56.4	0.0	-39.8	CFC_1000	
57 P3 Head Red z	g	61.3	94.9	-27.4	214.8	CFC_1000	
58 P3 Chest Compression	mm	0.0	15.9	-26.8	105.3	CFC_600	
59 P3 Upper Neck Mocyc	N-m	8.0	153.4	-16.9	227.1	CFC_600	

FACILITY: VERF

DATE: March 25, 2002

TEST#: 22292

TITLE: Sled Test Run 22292

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
61	P3 Head x	g	42.6	217.5	-38.6	96.0	CFC_60	
62	P3 Head x Velocity	kph	0.0	0.9	-63.9	206.2	CFC_180	
63	P3 Head y	g	7.5	94.6	-2.8	216.3	CFC_60	
64	P3 Head y Velocity	kph	2.8	103.2	-0.0	30.2	CFC_180	
65	P3 Head z	g	48.2	76.9	-0.8	243.3	CFC_60	
66	P3 Head z Velocity	kph	116.5	240.4	-0.0	-1.5	CFC_180	
67	P3 Head Red z	g	56.7	94.8	-21.7	214.9	CFC_60	
68	P3 Head Red z Velocity	kph	115.5	238.6	-0.0	3.5	CFC_180	
69	P3 Chest x	g	10.3	228.4	-32.6	57.1	CFC_60	
70	P3 Chest x Velocity	kph	0.0	-30.3	-58.1	128.1	CFC_180	
71	P3 Chest y	g	3.0	95.1	-2.7	171.5	CFC_60	
72	P3 Chest y Velocity	kph	4.5	156.2	-0.0	-5.9	CFC_180	
73	P3 Chest z	g	6.6	94.9	-22.3	60.6	CFC_60	
74	P3 Chest z Velocity	kph	0.8	37.2	-17.0	143.2	CFC_180	
75	P3 Pelvic x	g	20.3	114.7	-40.7	57.4	CFC_60	
76	P3 Pelvic x Velocity	kph	0.0	-11.7	-49.0	103.7	CFC_180	
77	P3 Pelvic y	g	2.3	135.0	-1.7	157.2	CFC_60	
78	P3 Pelvic y Velocity	kph	2.8	204.3	-0.0	12.3	CFC_180	
79	P3 Pelvic z	g	8.1	116.8	-31.6	57.1	CFC_60	
80	P3 Pelvic z Velocity	kph	0.2	31.4	-38.4	112.1	CFC_180	

FACILITY: HYG SLED

DATE: March 25, 2002

TEST#: 22292

TITLE: Sled Test Run 22292

=====

P3 HIC(FULL): 499.5

t1: 62.1 msec

t2: 106.9 msec

Duration: 44.9 msec

Average Acceleration: 41.6 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: 18.3 N 245.1 msec

Min: -868.3 N 98.8 msec

Input channel: P3 Upper Neck Fx (6) CFC_1000

P3 UP NECK Fz: Max: 1316.1 N 93.3 msec

Min: -140.4 N 231.9 msec

Input channel: P3 Upper Neck Fz (8) CFC_1000

P3 UP NECK MocY (3Y0 Child OOP)

Max: 8.0 N-m 153.4 msec

Min: -16.9 N-m 227.1 msec

Input channels: P3 Upper Neck Fx (6) CFC_600

P3 Upper Neck My (10) CFC_600

Docy: 0

P3 UP NECK Nij (3Y0 Child OOP)

Ntf: 0.63 Nij 93.0 msec CVt: 2120 CVf: 68

Nte: 0.76 Nij 100.7 msec CVt: 2120 Cve: 27

Ncf: 0.00 Nij -34.3 msec CVc: 2120 CVf: 68

Nce: 0.65 Nij 227.8 msec CVc: 2120 Cve: 27

Input channels: P3 Upper Neck Fz (8) CFC_600

P3 Upper Neck MocY [N-m, CFC_600] (84)

FACILITY: HYG SLED

DATE: March 25, 2002

TEST#: 22292

TITLE: Sled Test Run 22292

=====

P3 CLIP(3 ms): 38.5 g

t1: 57.8 msec

t2: 60.8 msec

Duration: 3.0 msec

P3 CSI: 232.0

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 15.9 msec

Min: -26.8 mm 105.3 msec

Input channel: P3 Chest Compression (21) CFC_600

=====

P3 HIC(36 ms): 479.7

t1: 66.0 msec

t2: 102.0 msec

Duration: 36.0 msec

Average Acceleration: 44.7 g

Input channels: P3 Head x (2) CFC_1000

P3 Head y (3) CFC_1000

P3 Head z (4) CFC_1000

=====

P3 HIC(15 ms): 256.8

t1: 71.5 msec

t2: 86.5 msec

Duration: 15.0 msec

Average Acceleration: 49.4 g

Input channels: P3 Head x (2) CFC_1000

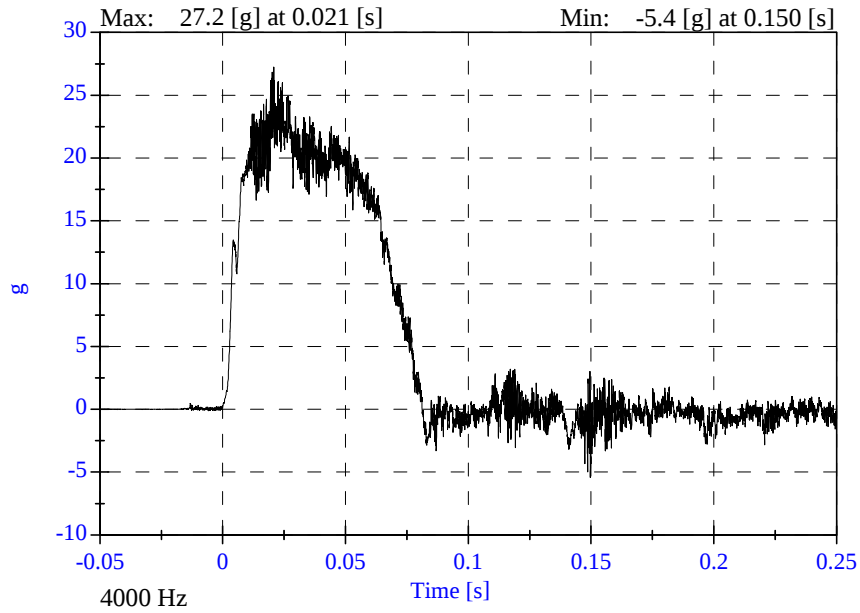
P3 Head y (3) CFC_1000

P3 Head z (4) CFC_1000

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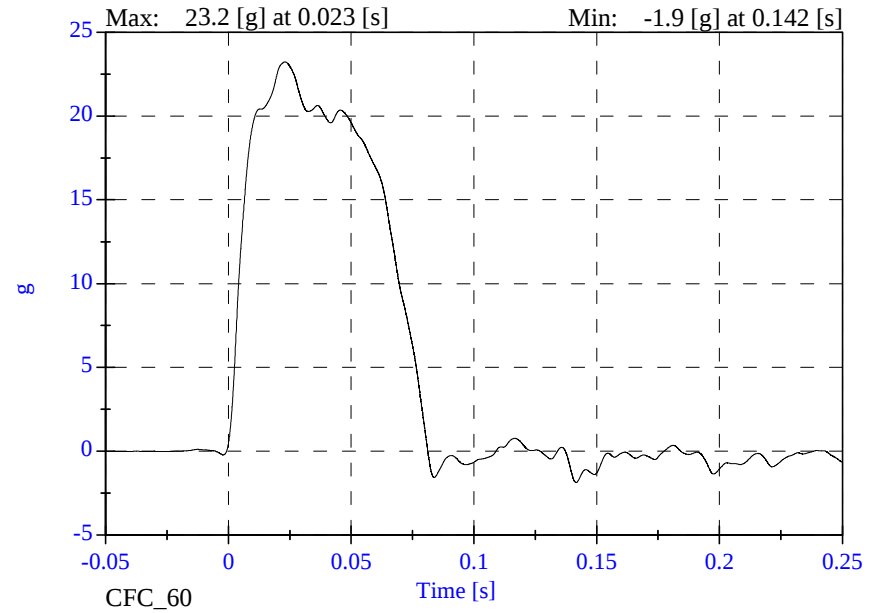
Sled Test Run 22292

Sled Acceleration

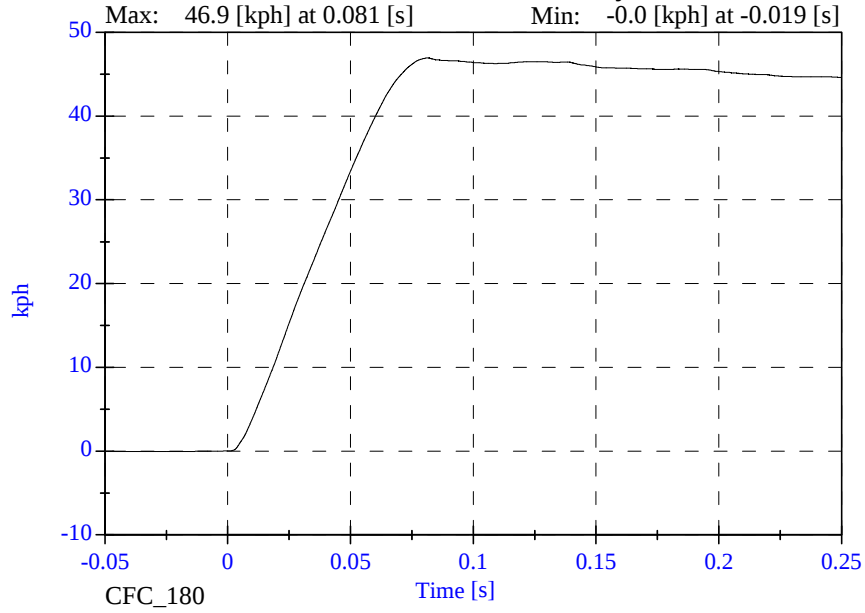


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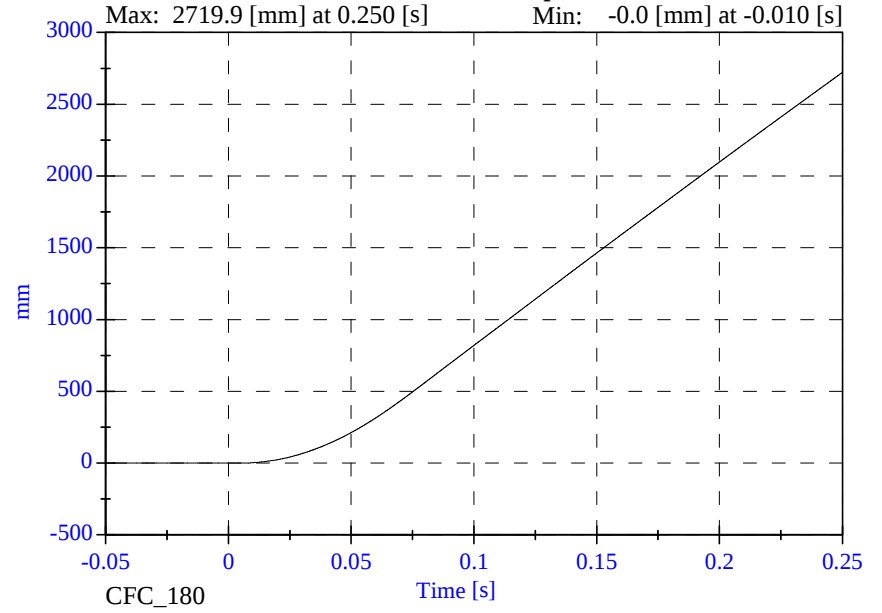
Sled Acceleration



Sled Acceleration Velocity

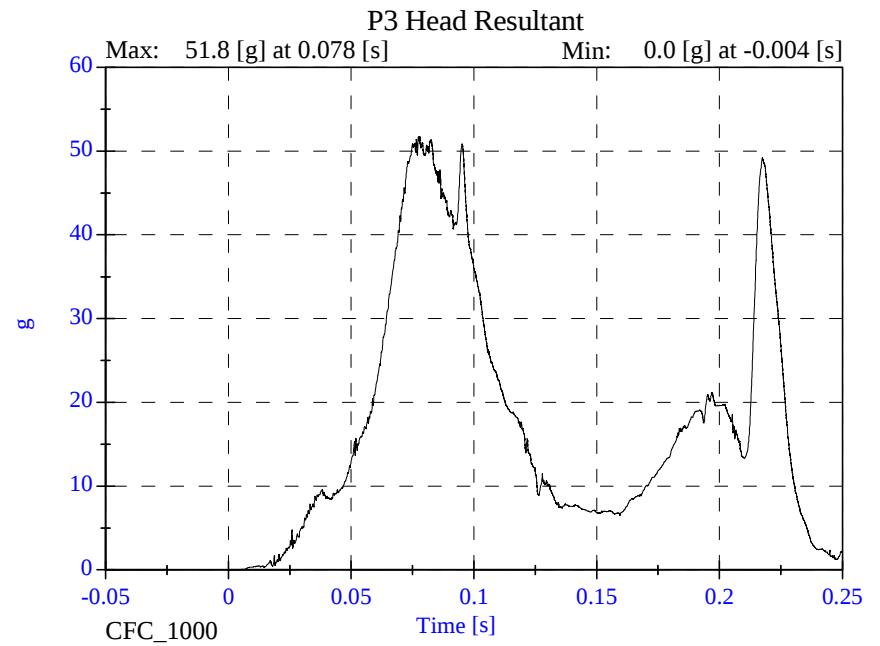
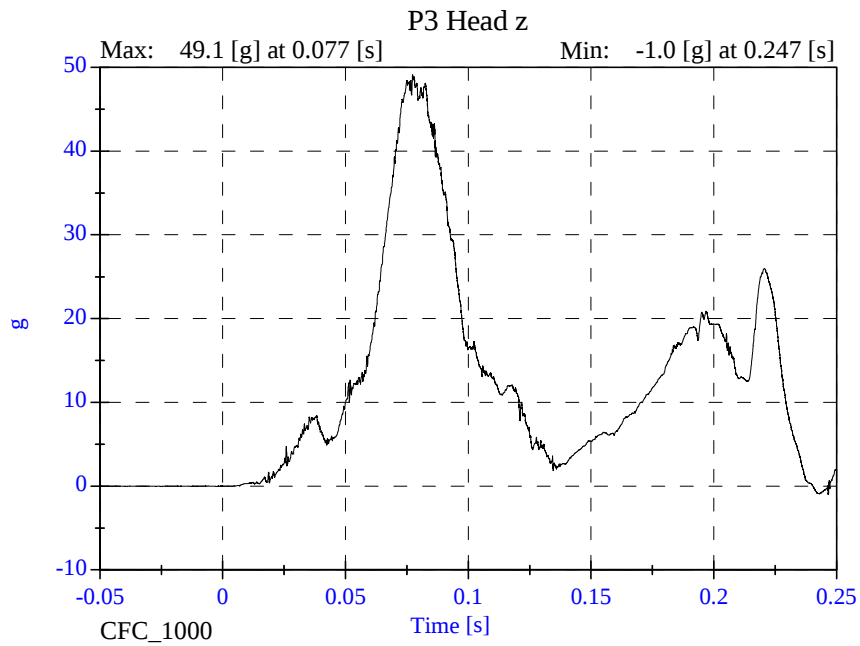
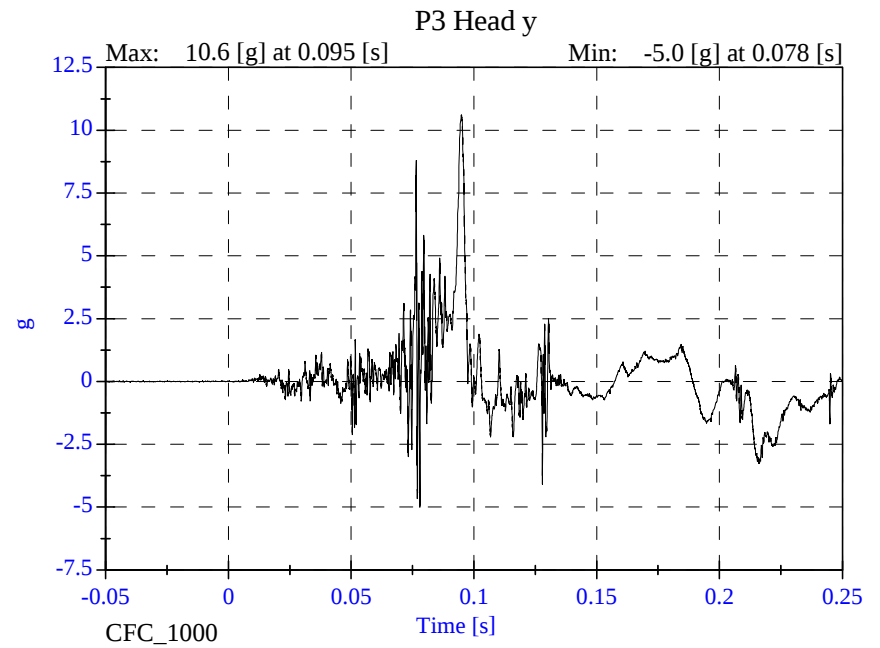
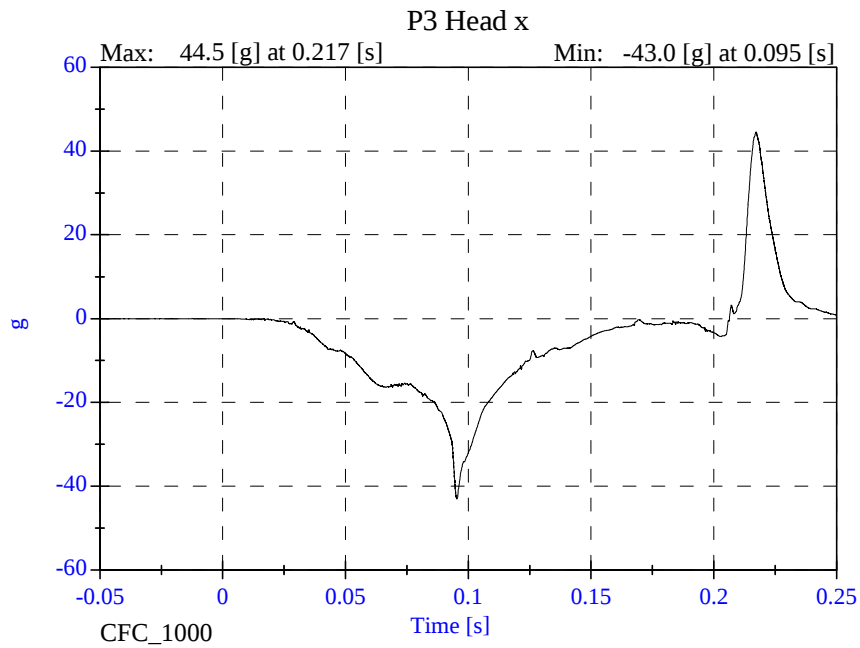


Sled Acceleration Displacement



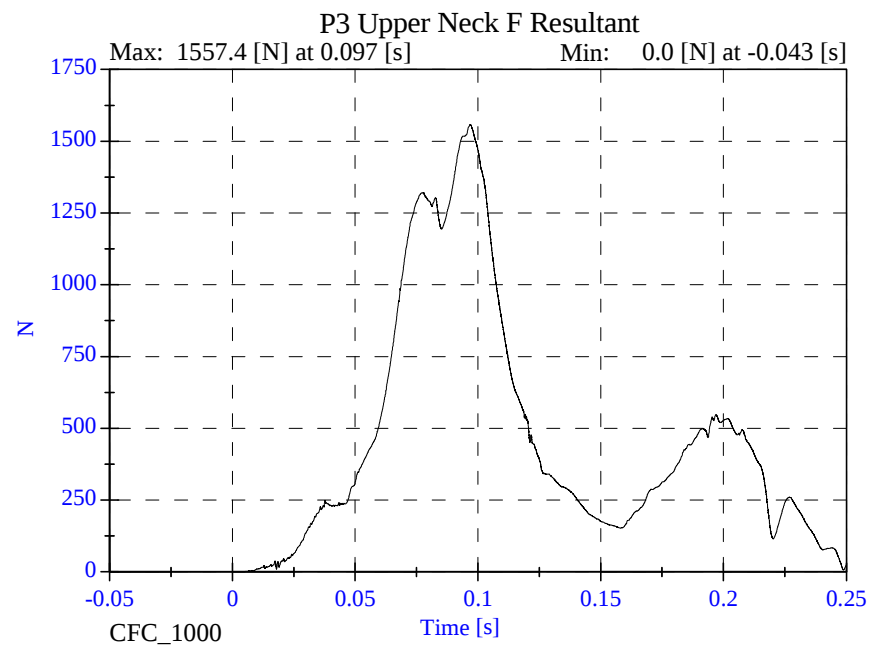
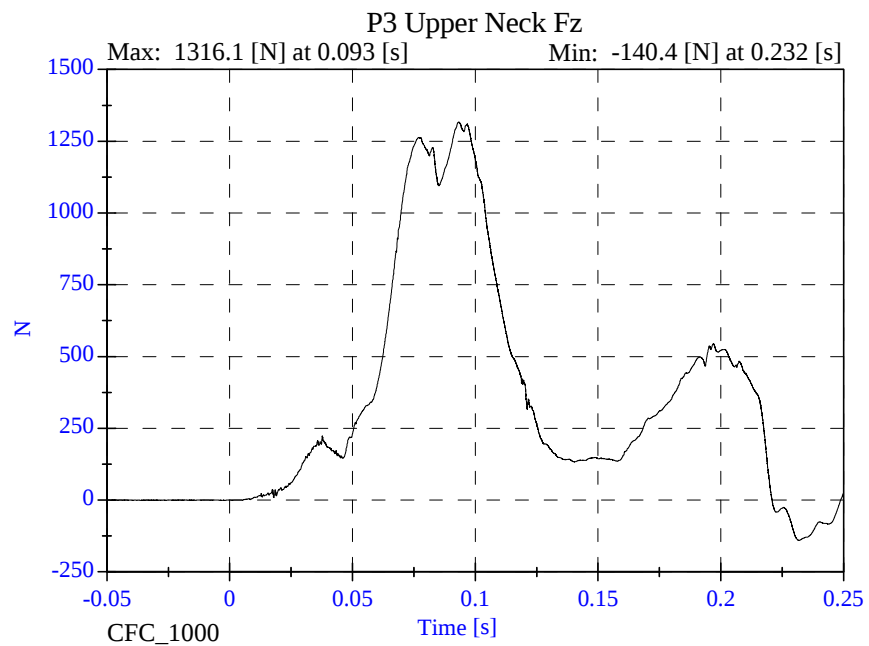
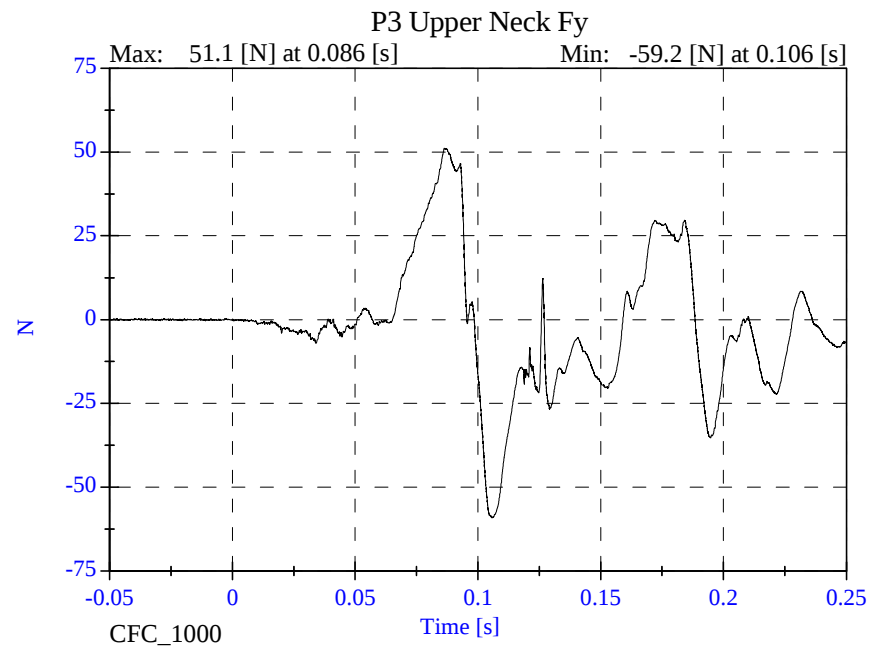
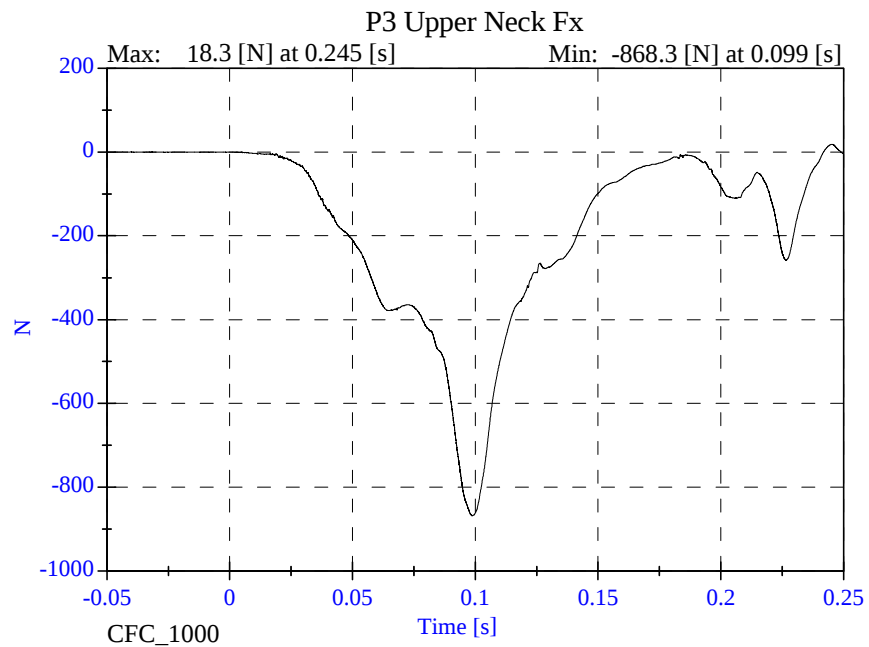
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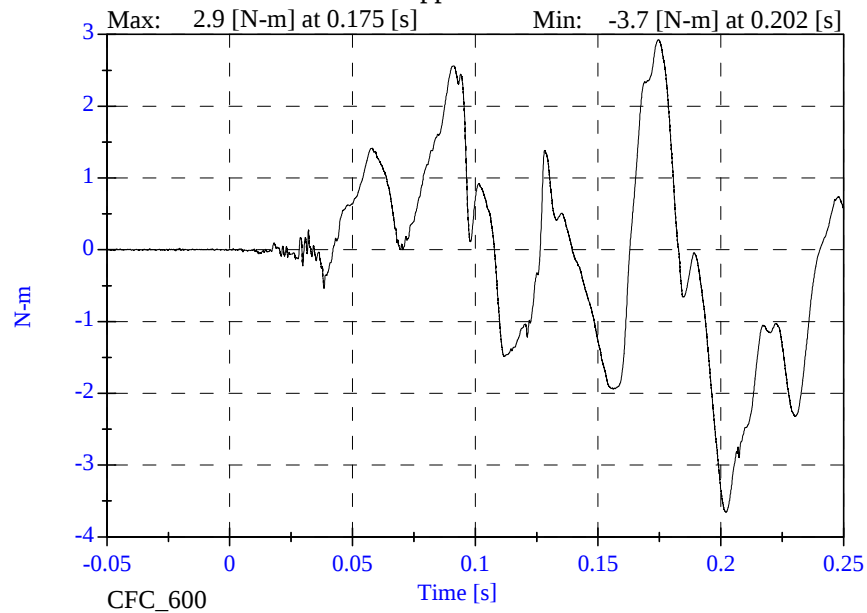
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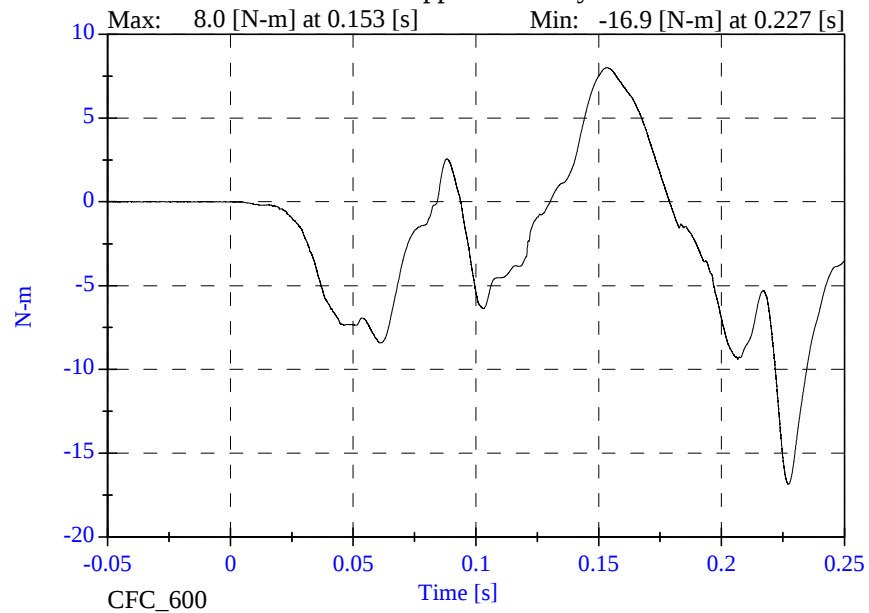
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P3 Upper Neck Mx

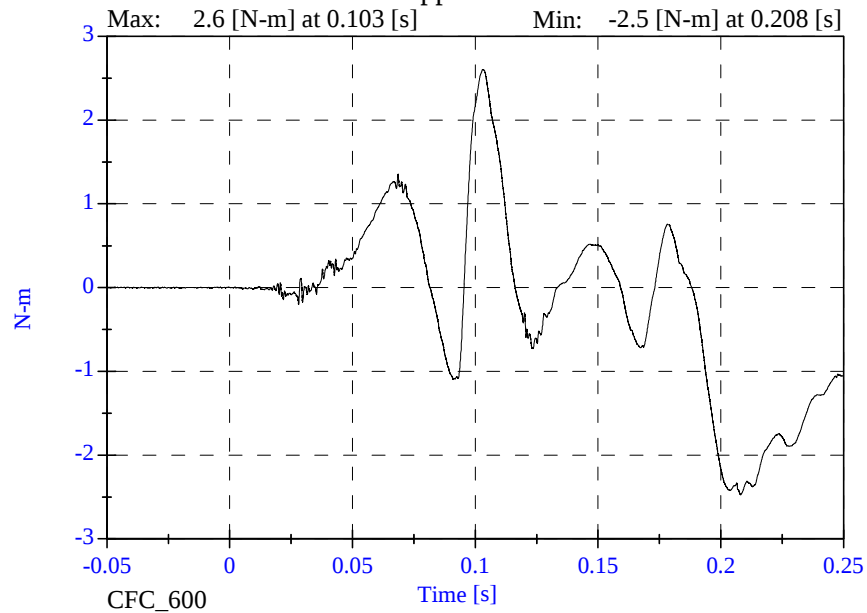


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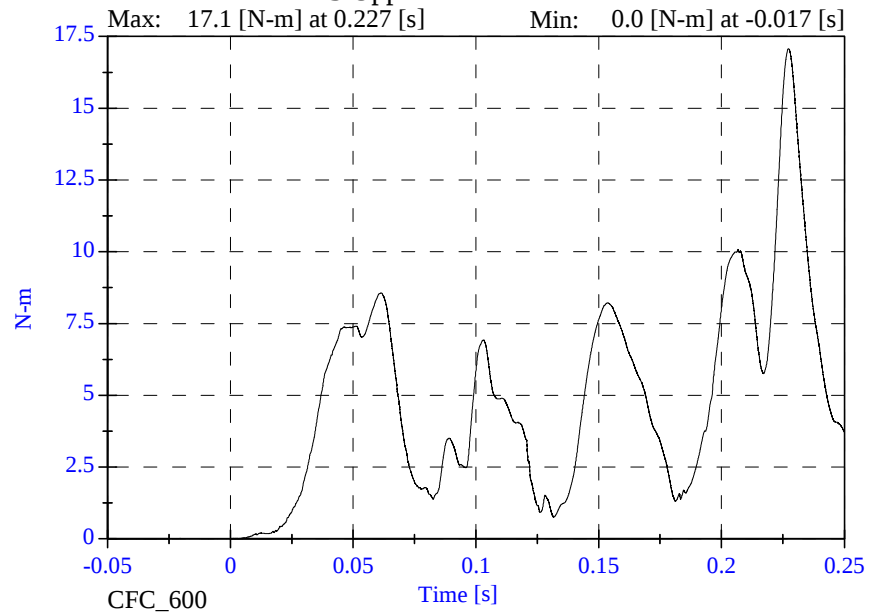
P3 Upper Neck My



P3 Upper Neck Mz

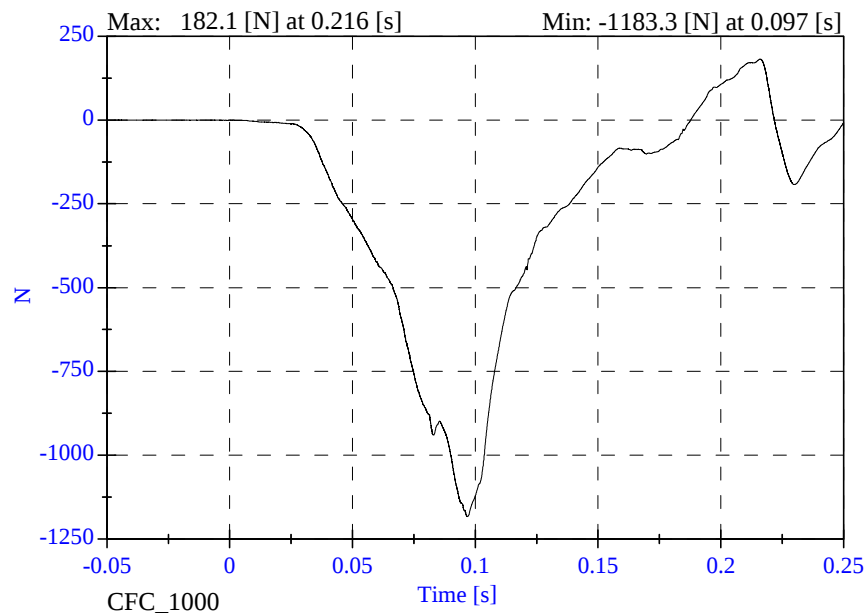


P3 Upper Neck M Resultant



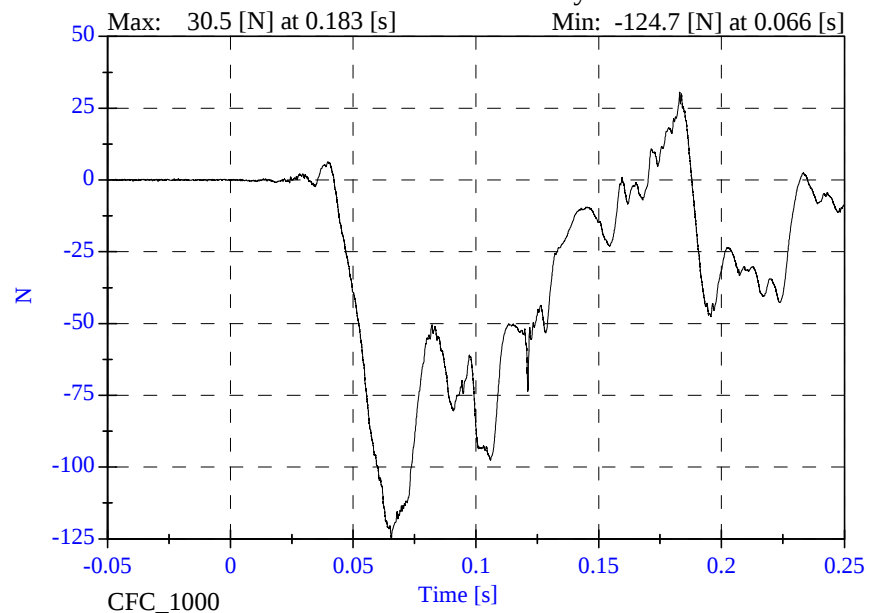
Sled Test Run 22292

P3 Lower Neck Fx

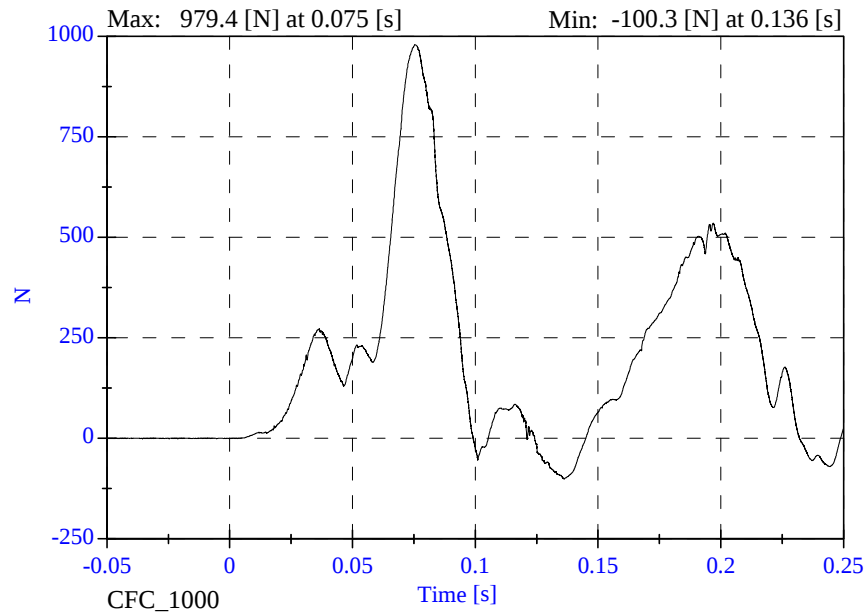


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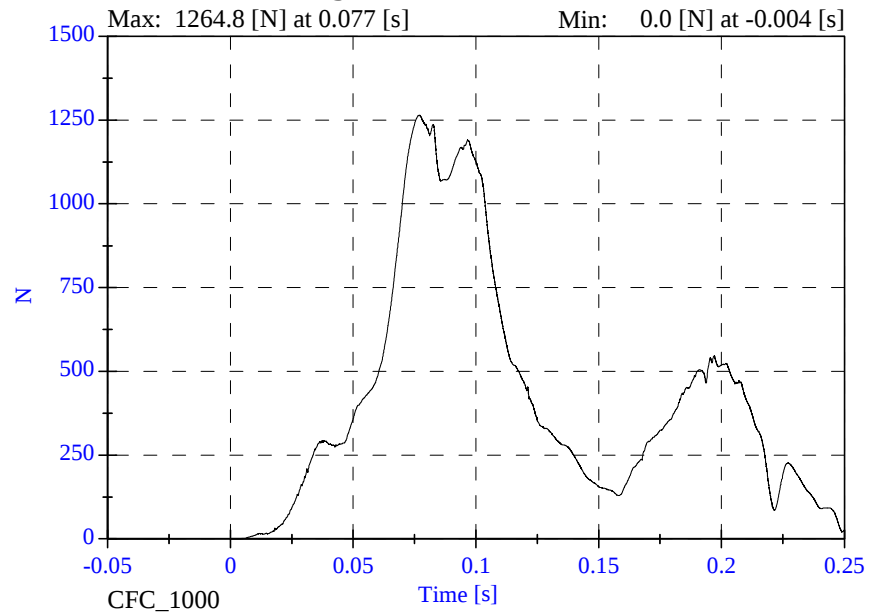
P3 Lower Neck Fy



P3 Lower Neck Fz

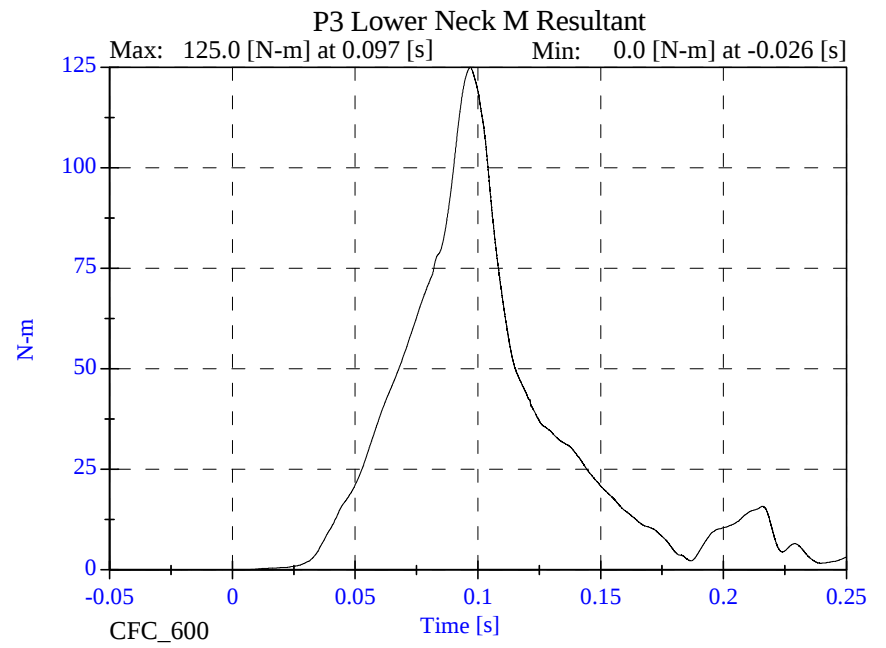
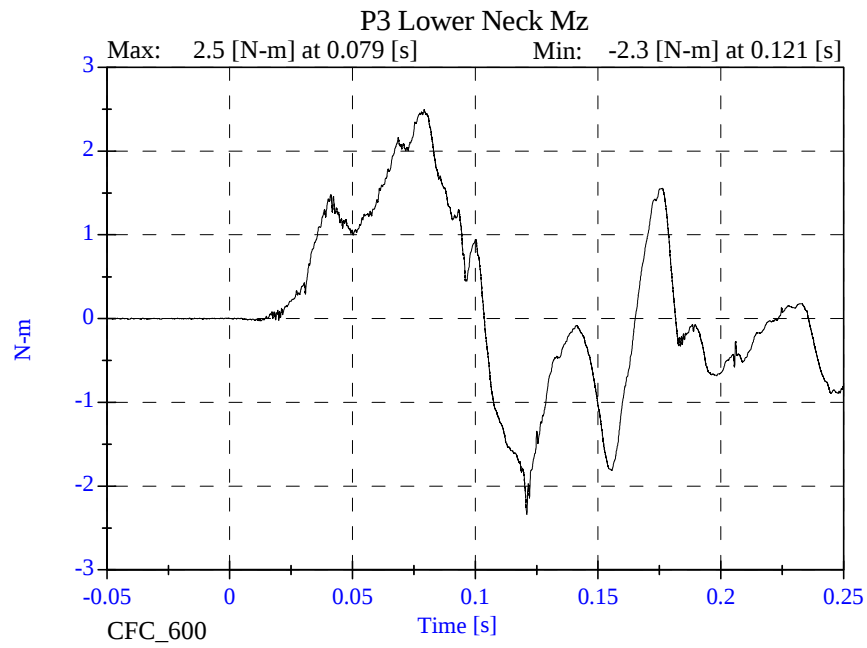
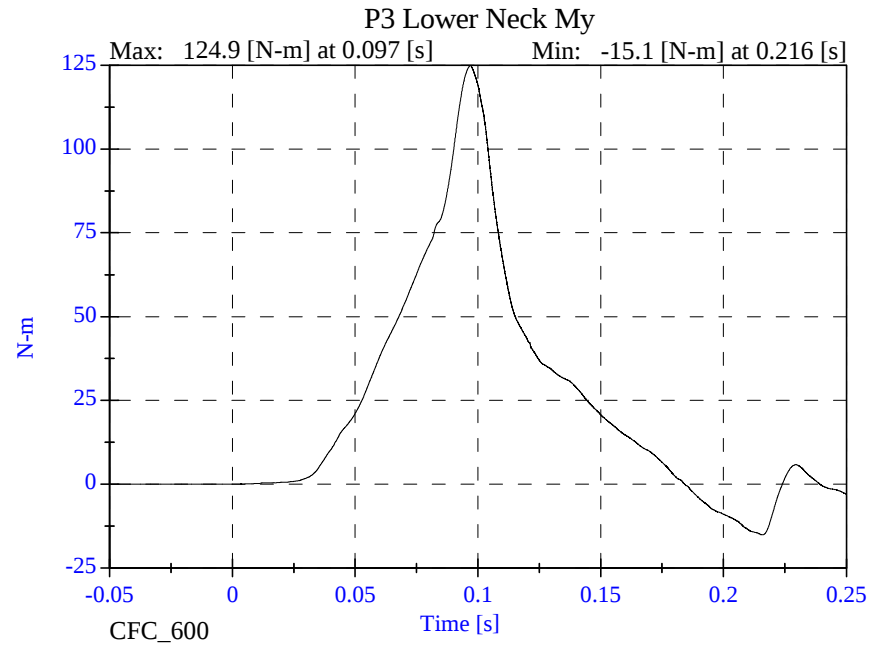
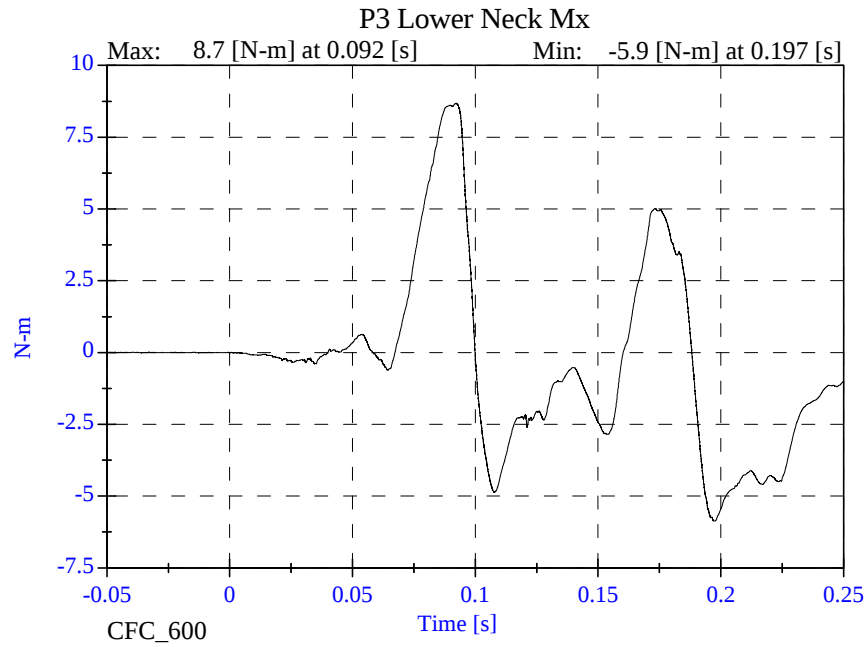


P3 Lower Neck F Resultant



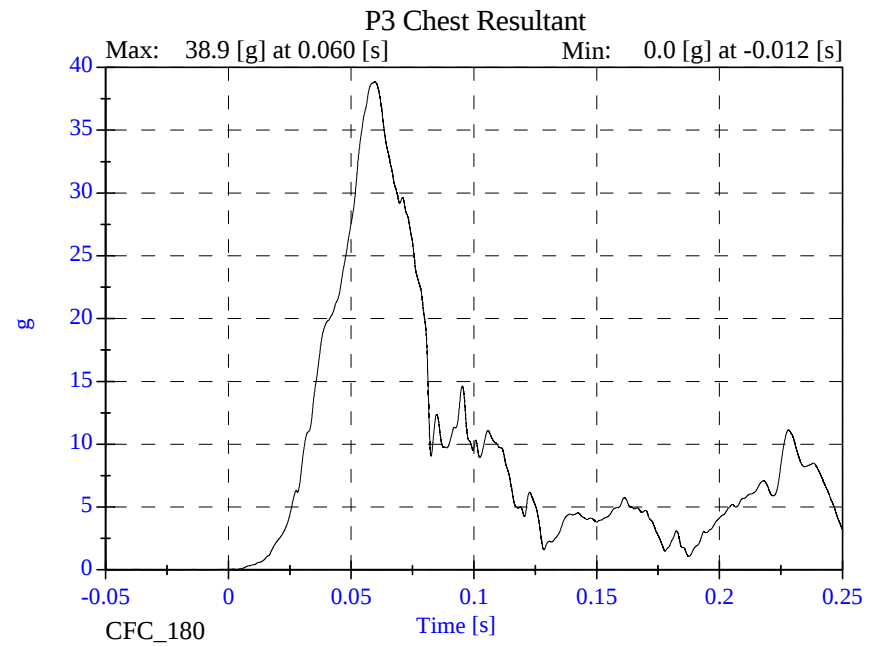
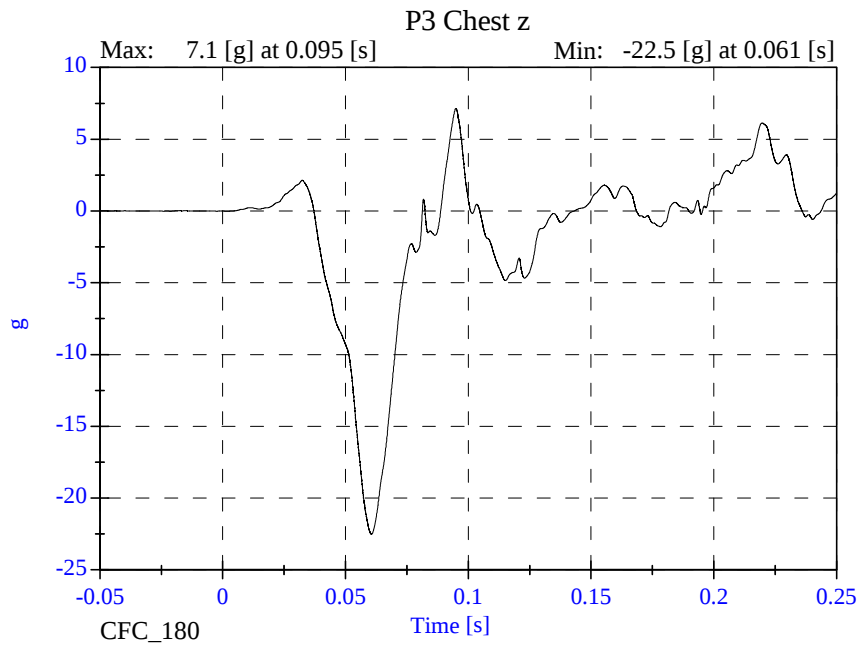
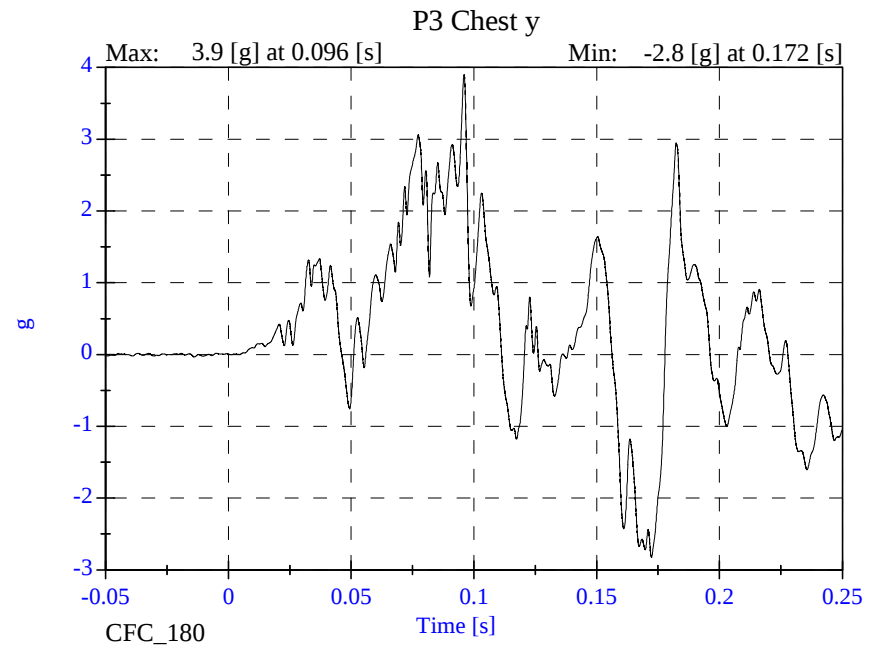
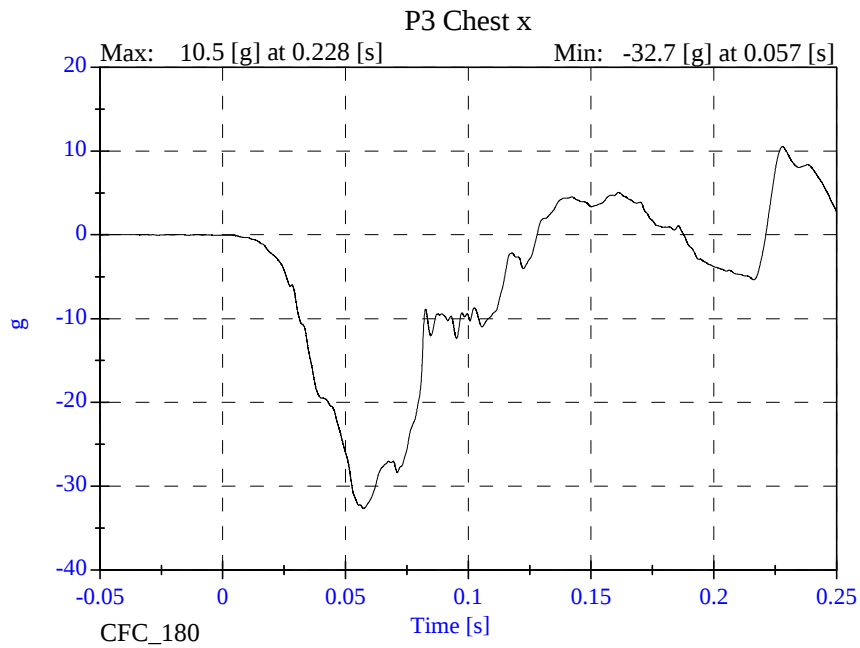
Sled Test Run 22292

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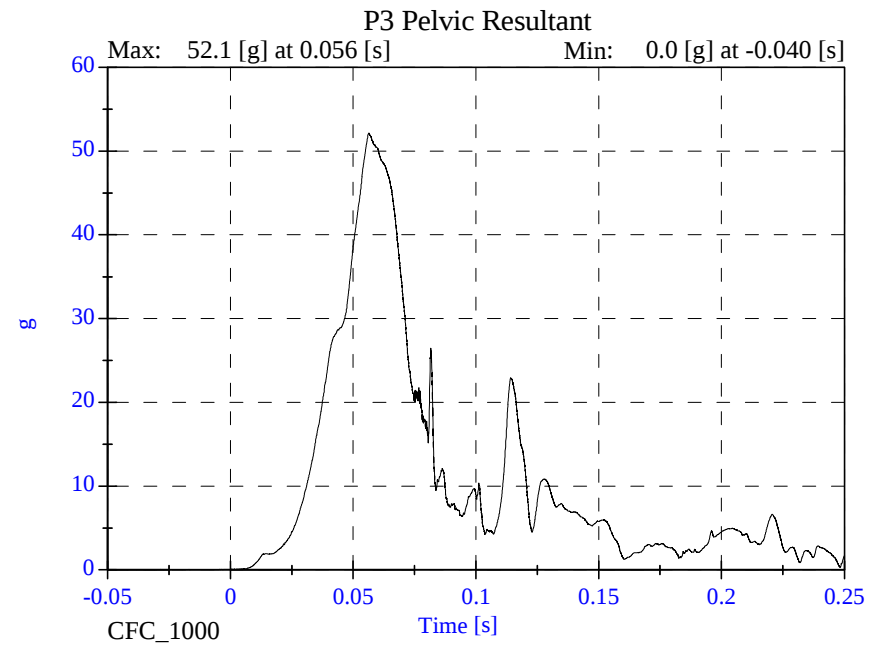
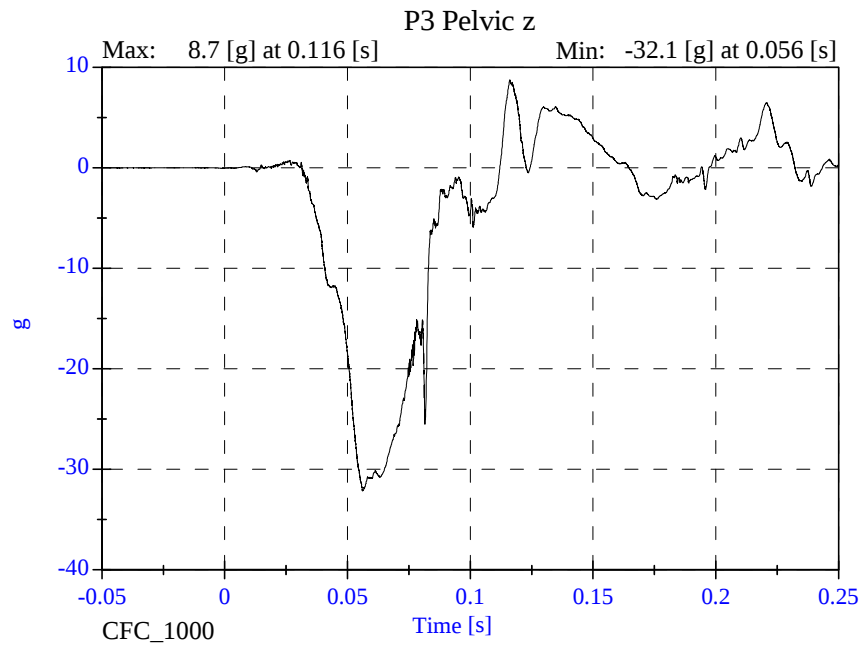
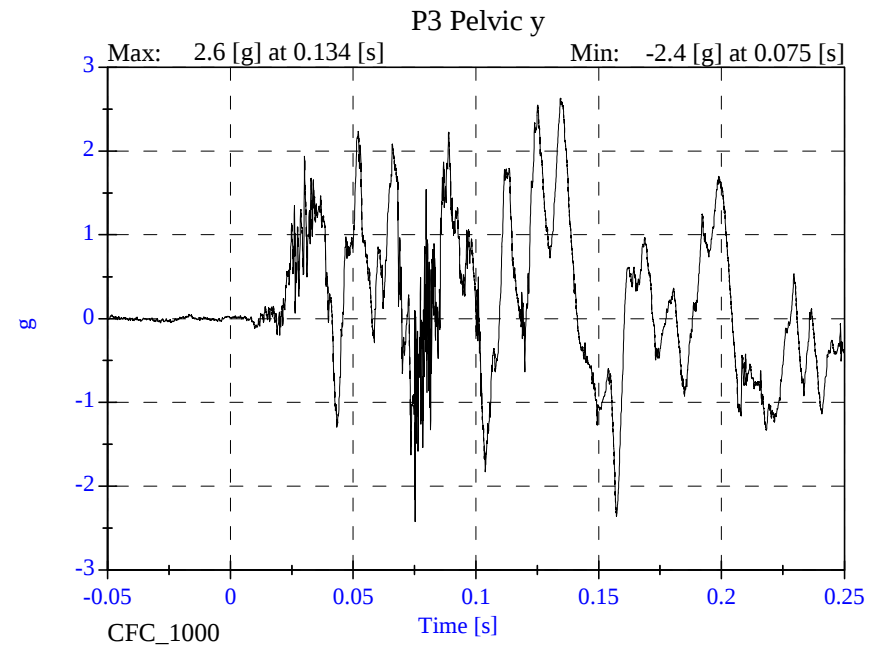
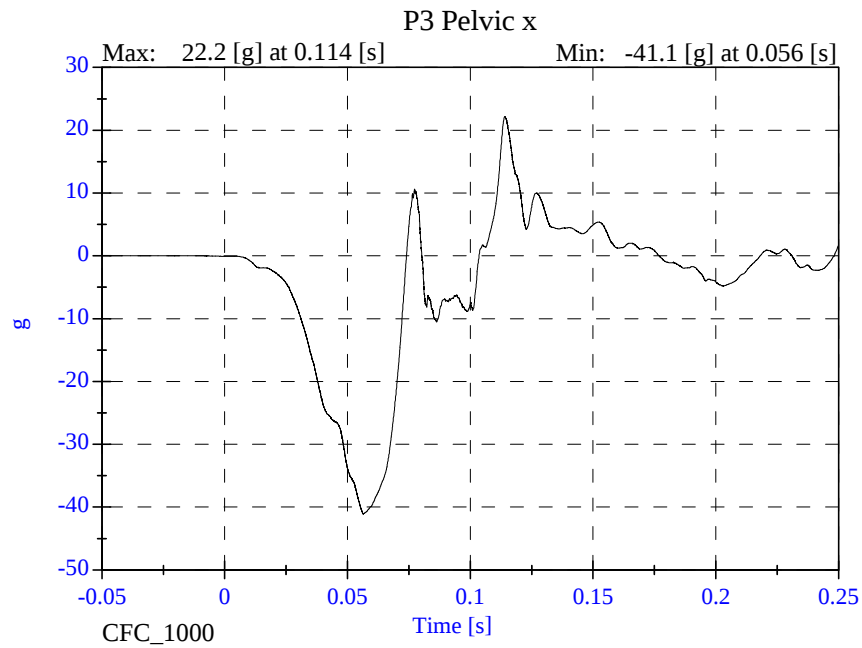
Sled Test Run 22292

- March 25, 2002



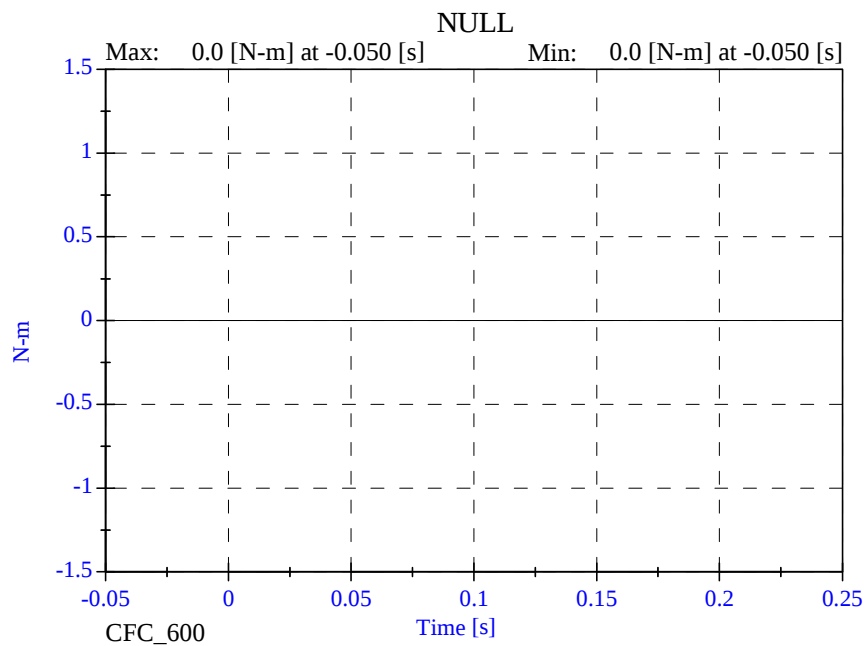
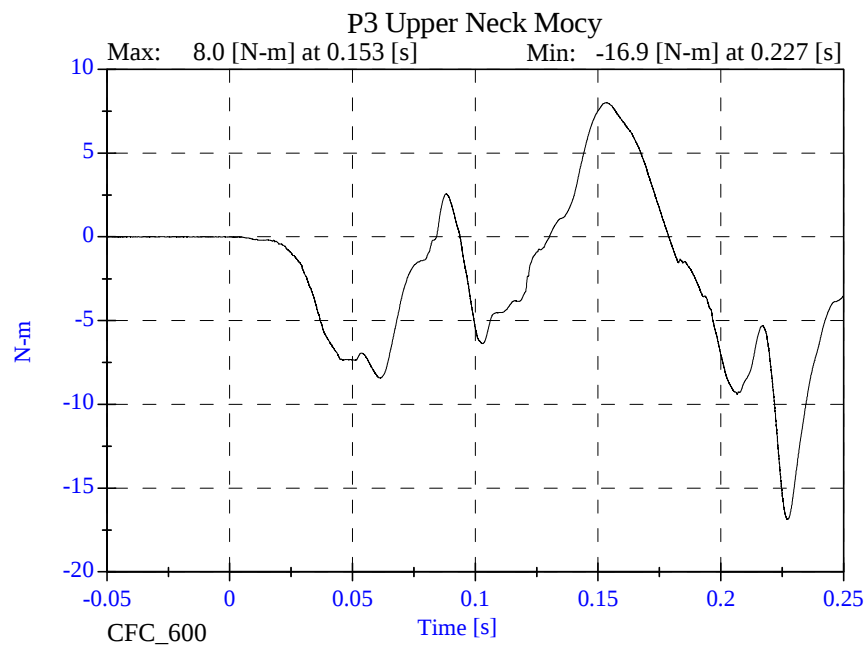
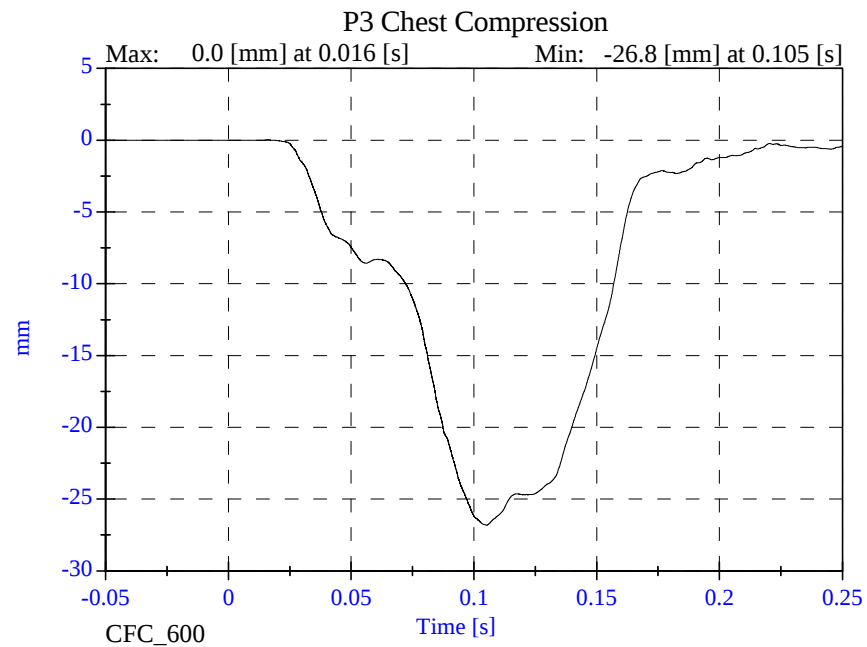
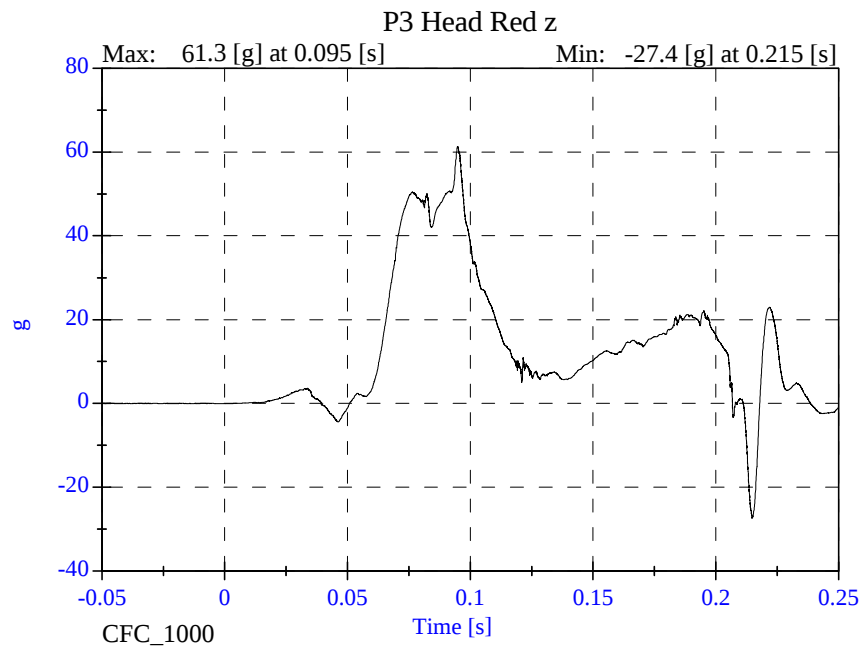
Sled Test Run 22292

- March 25, 2002



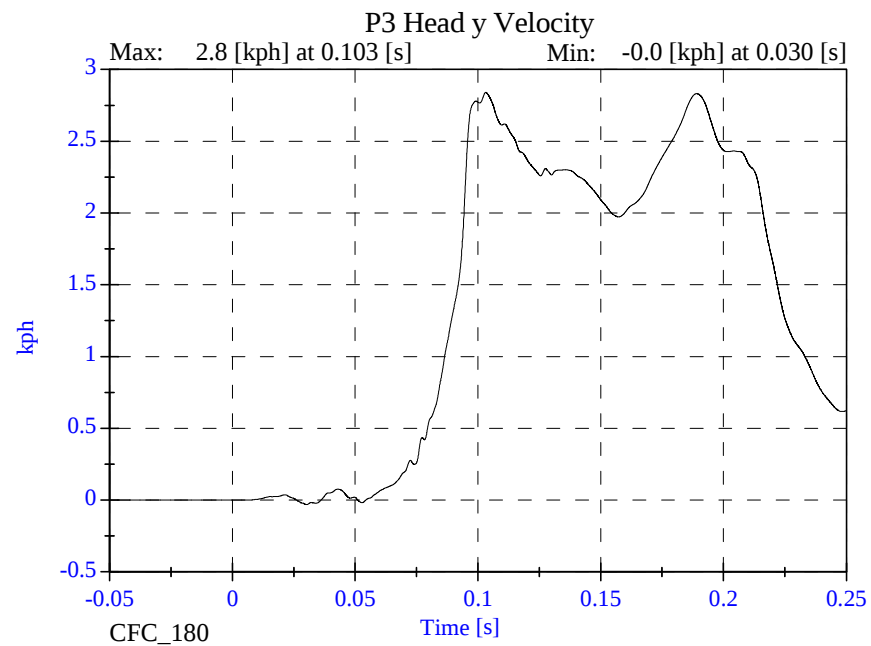
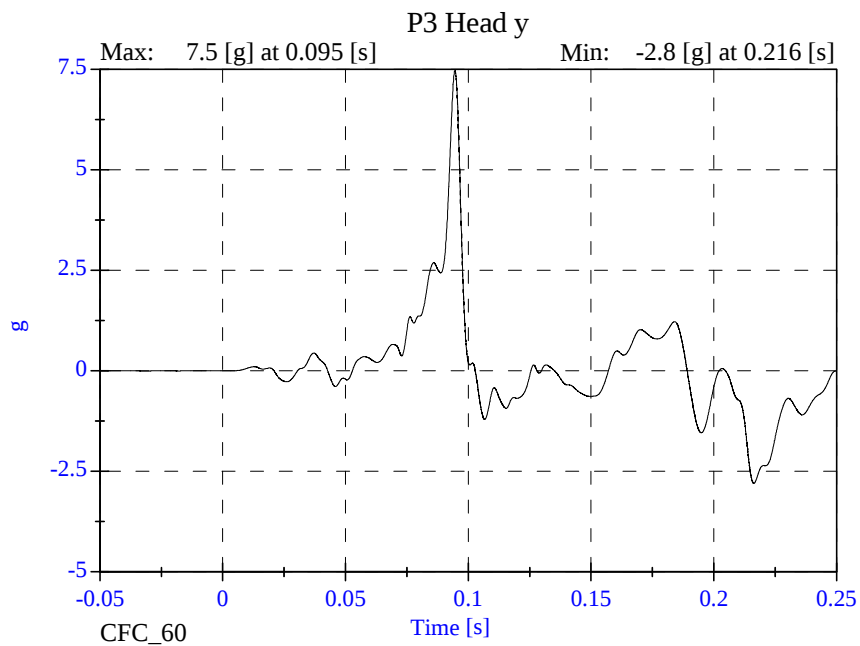
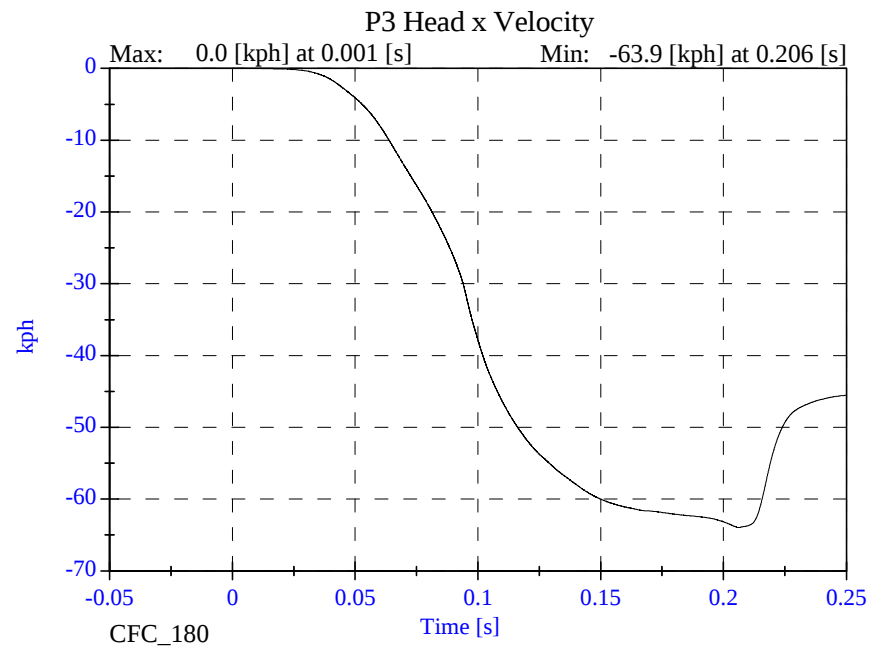
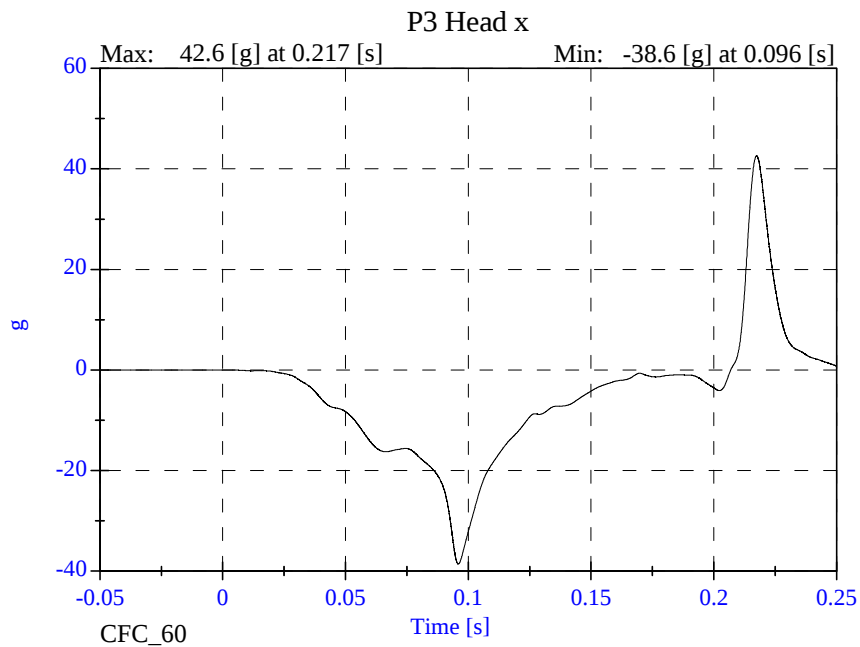
Sled Test Run 22292

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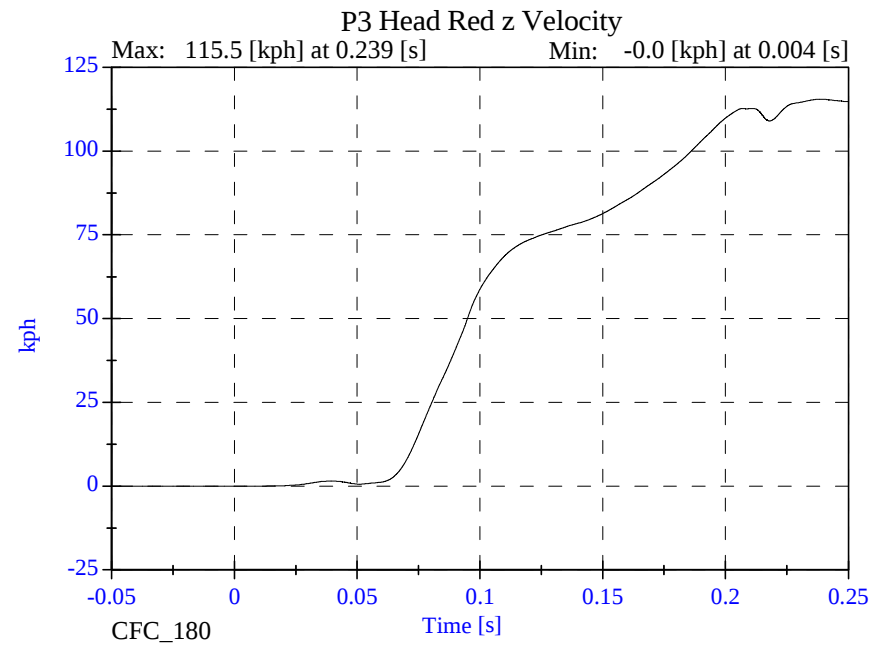
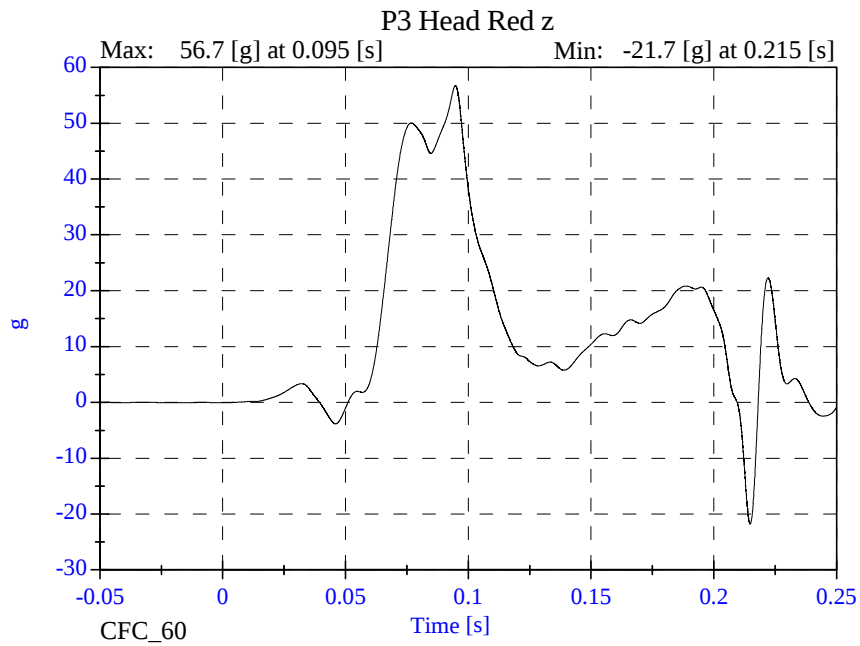
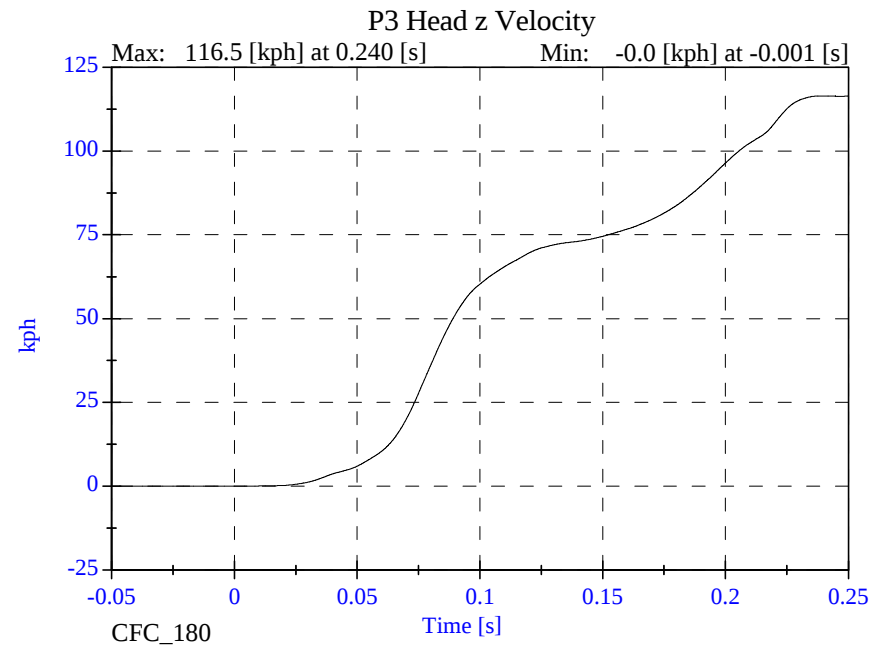
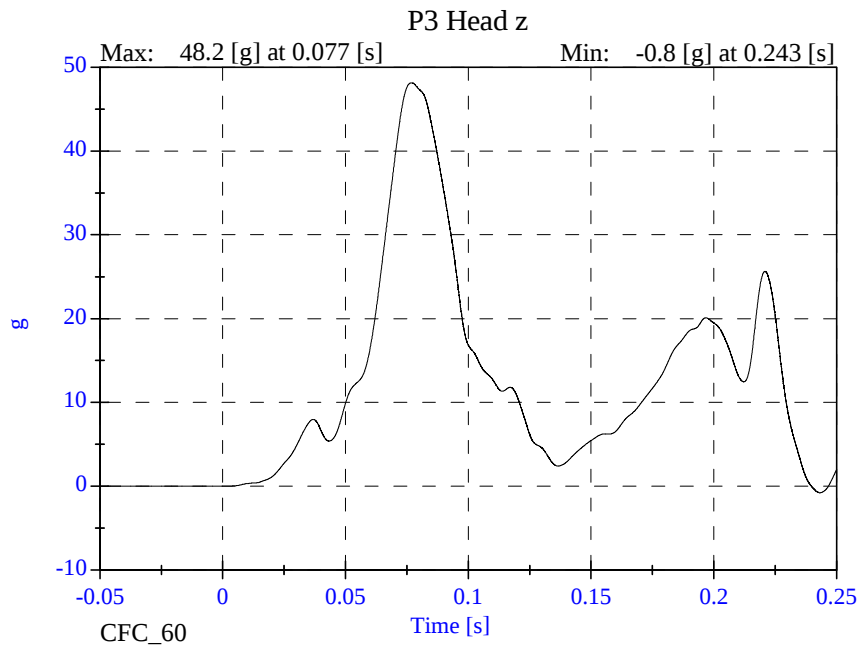
Sled Test Run 22292

- March 25, 2002



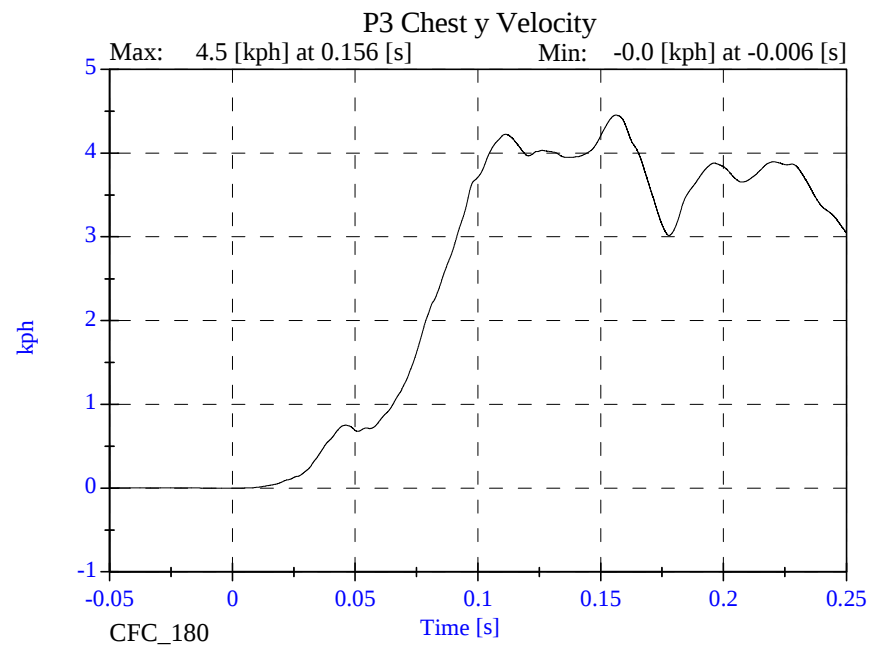
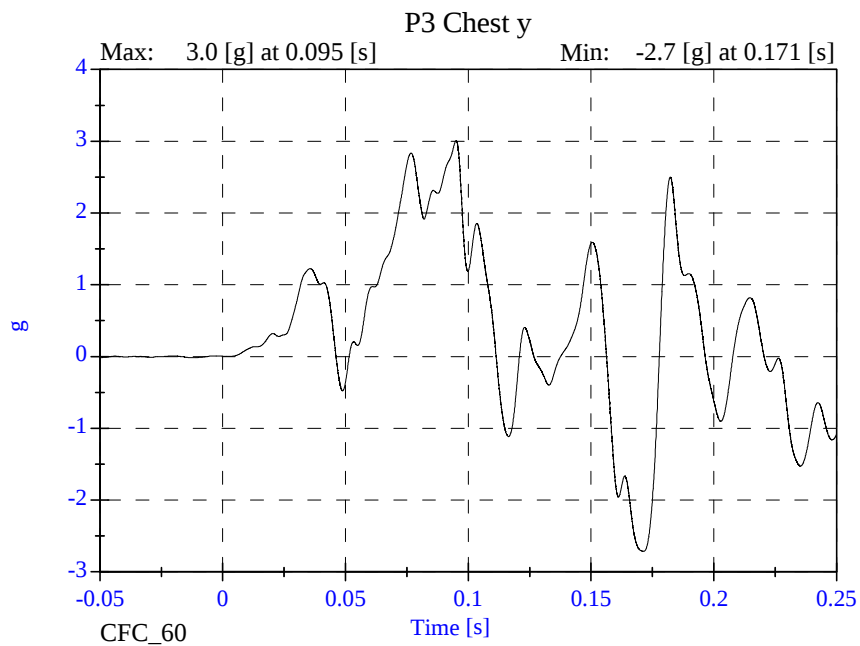
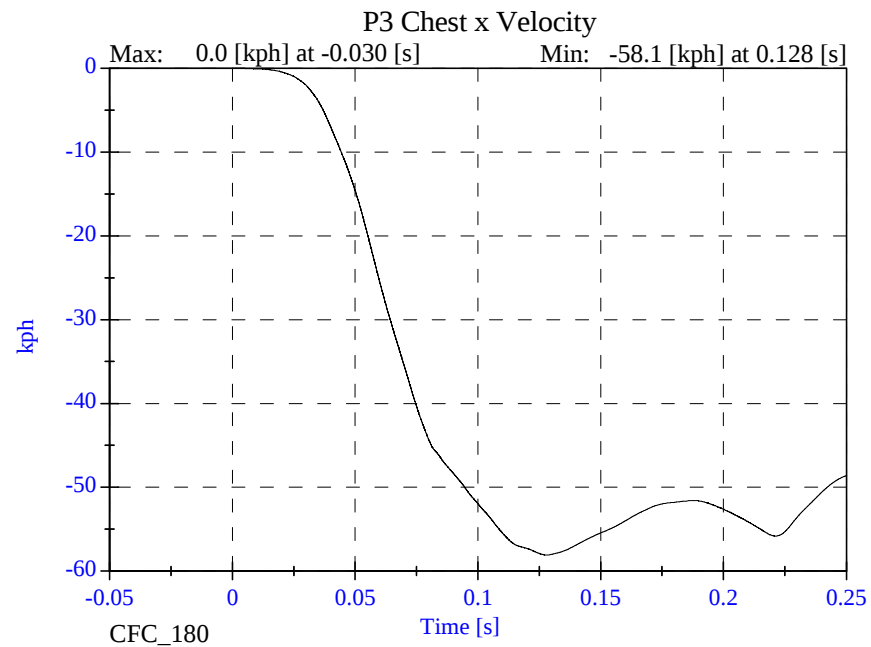
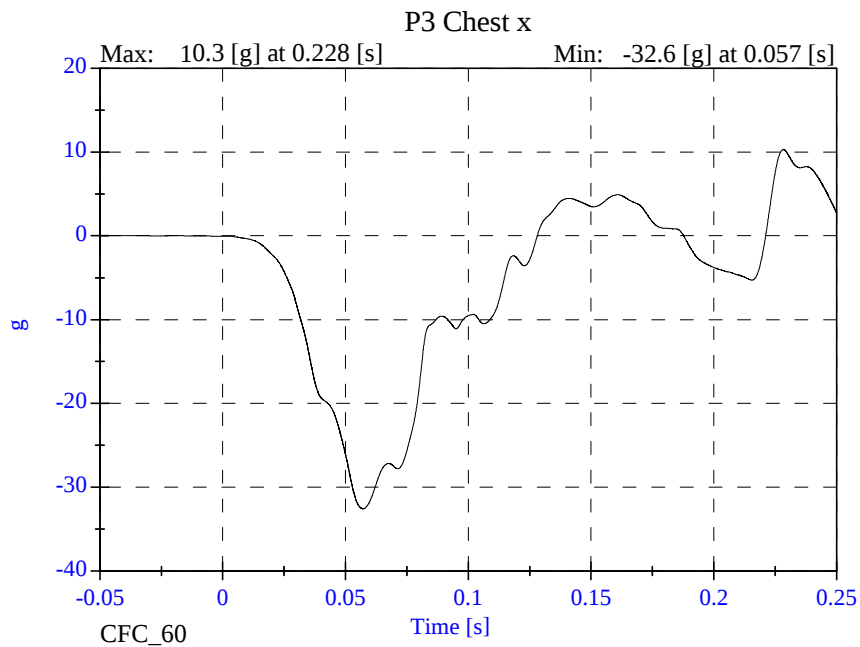
Sled Test Run 22292

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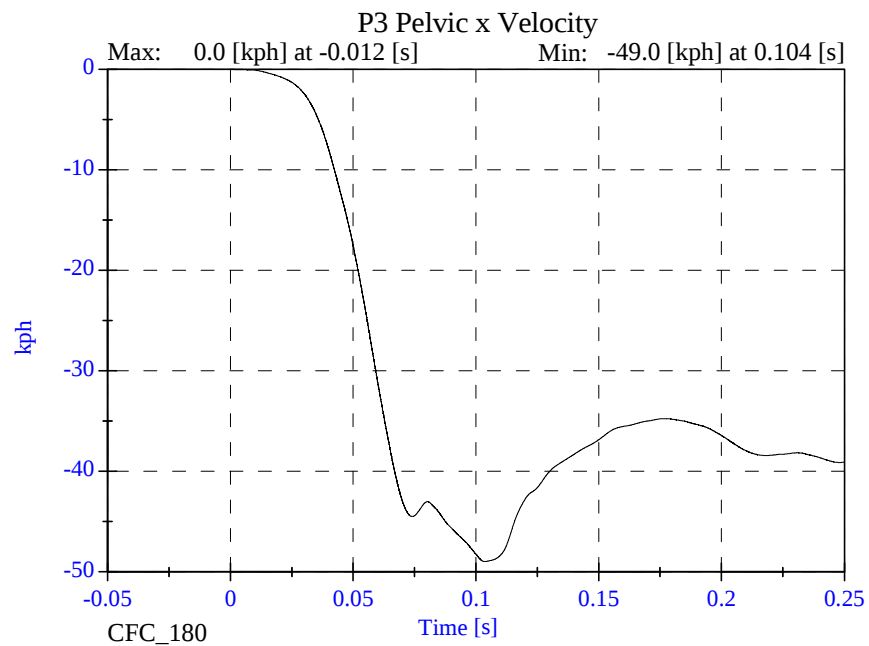
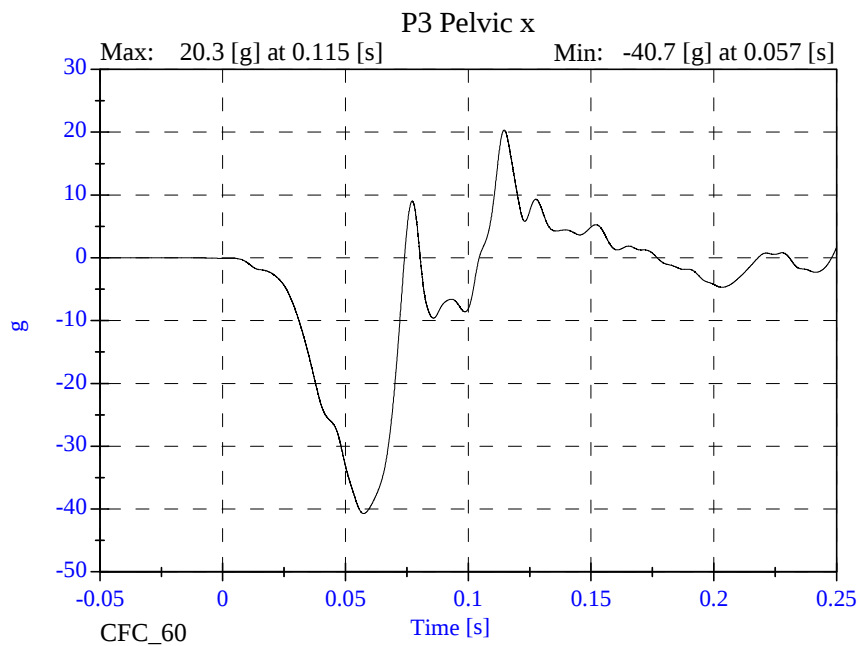
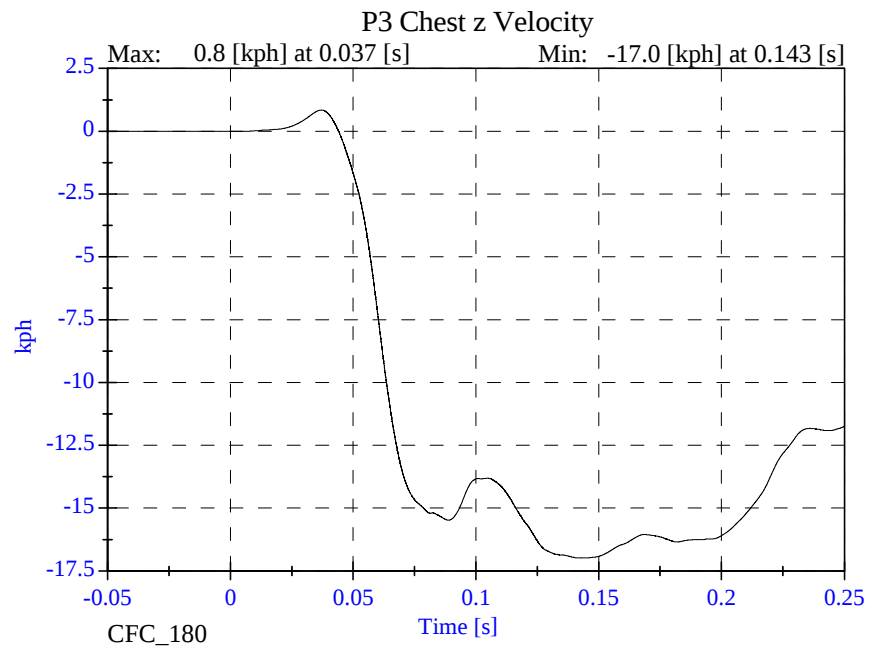
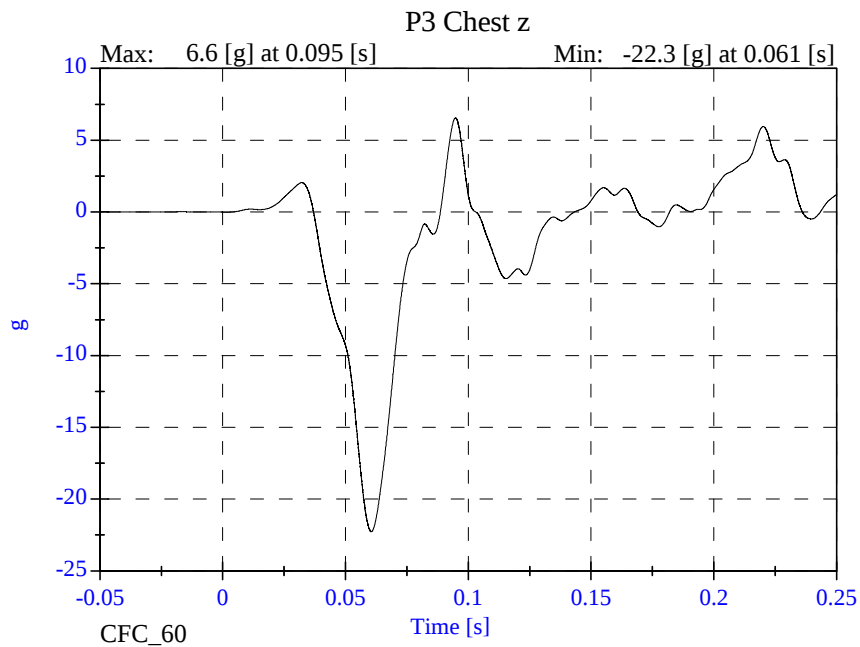
Sled Test Run 22292

- March 25, 2002



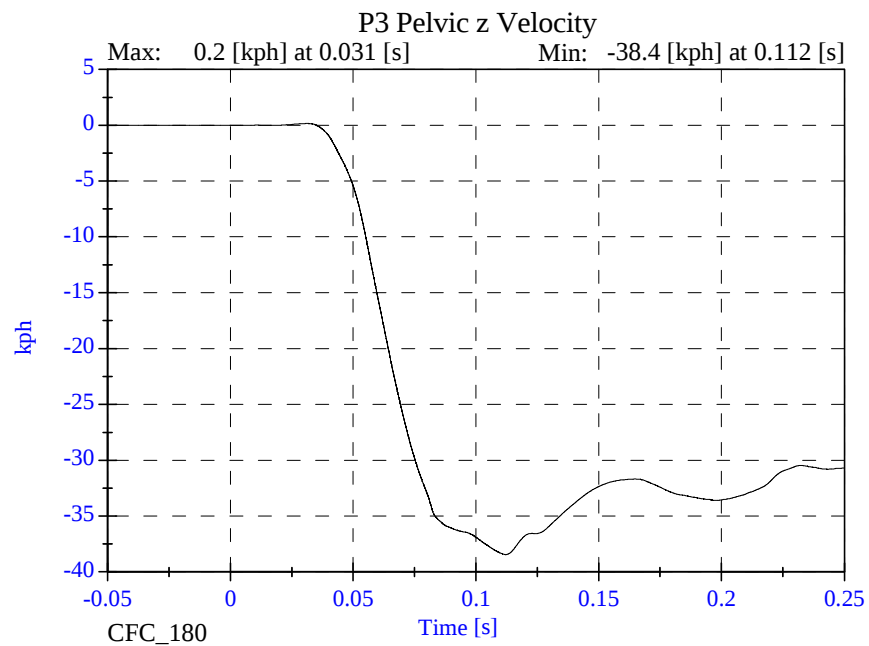
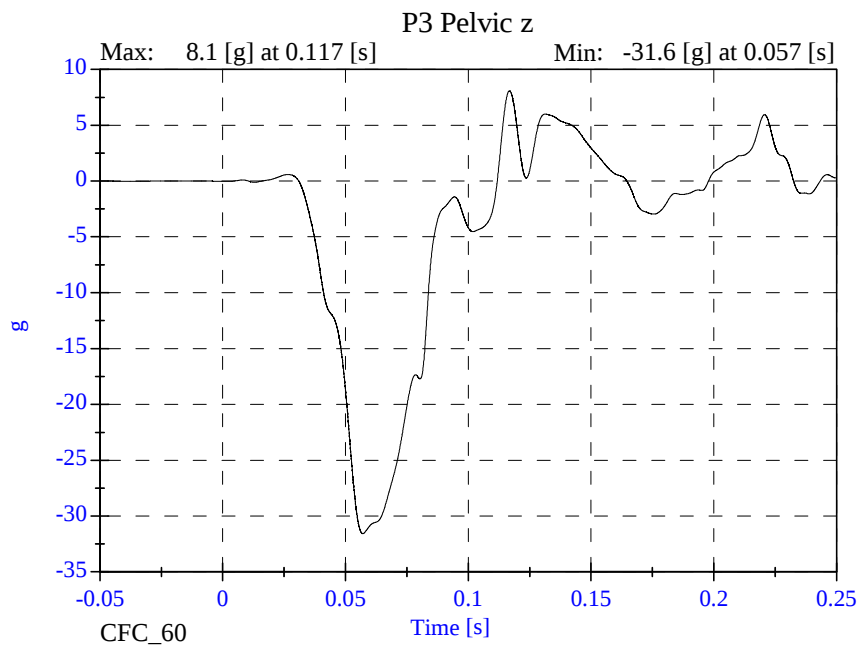
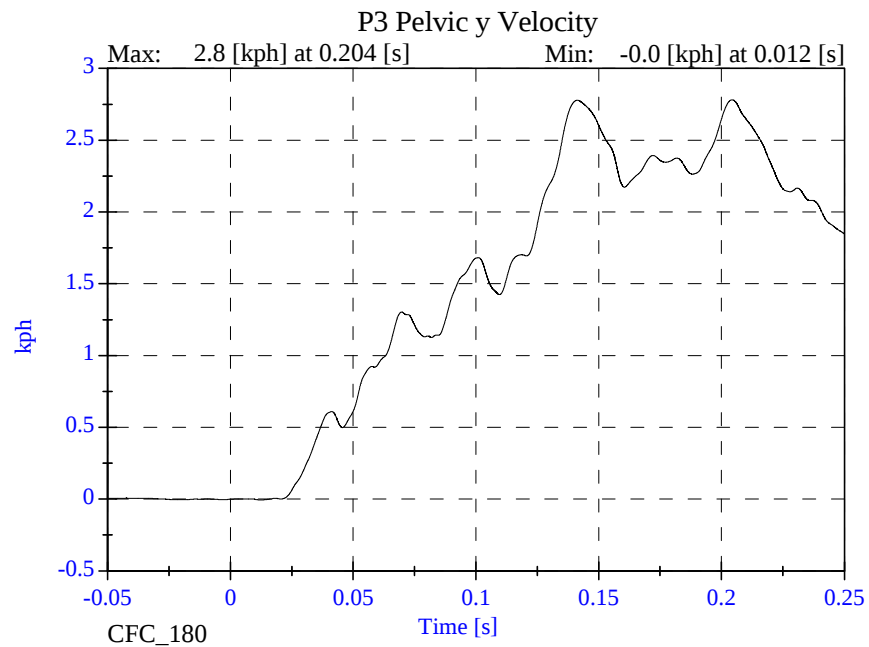
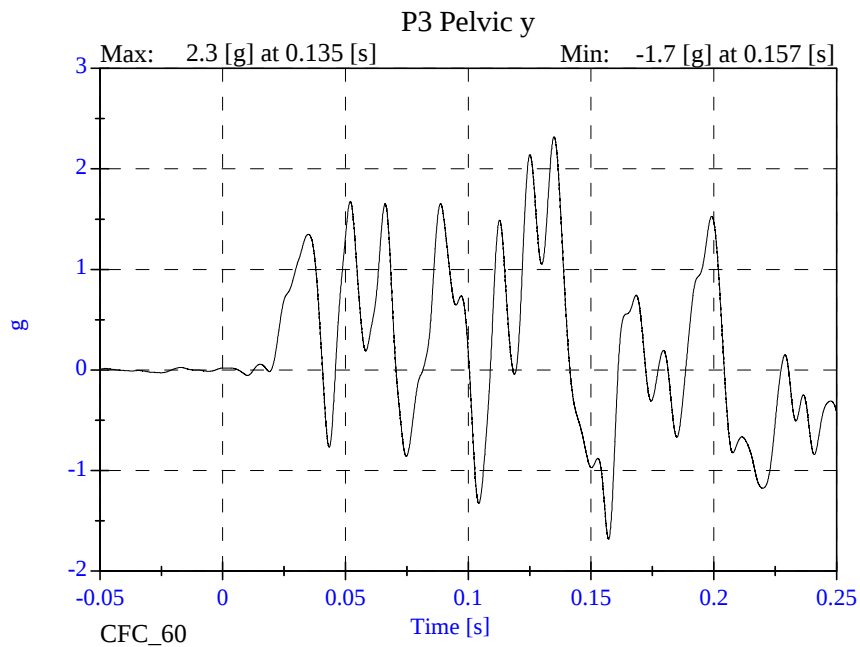
Sled Test Run 22292

- March 25, 2002



Sled Test Run 22292

- March 25, 2002

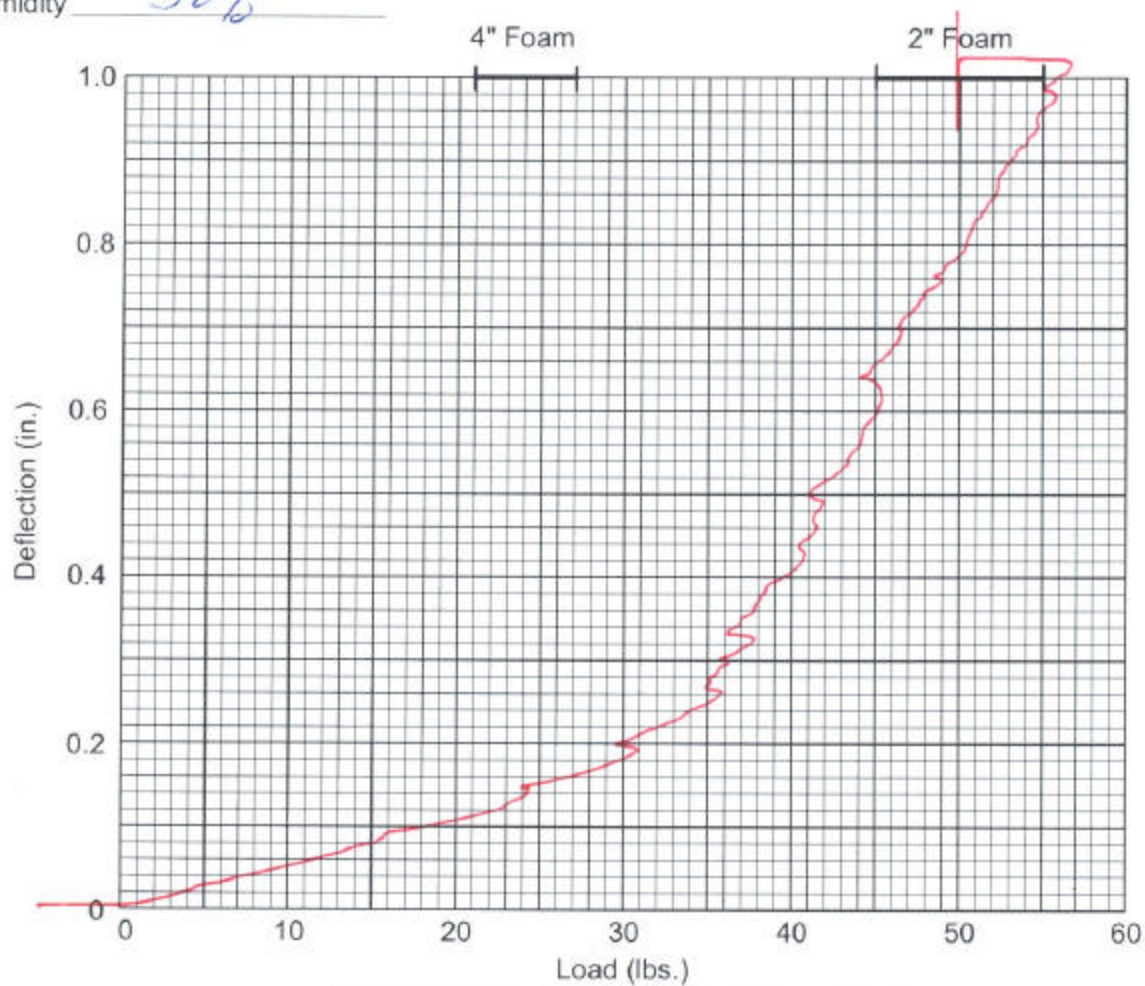


SECTION 9

COMPRESSION – DEFLECTION RESISTANCE TEST

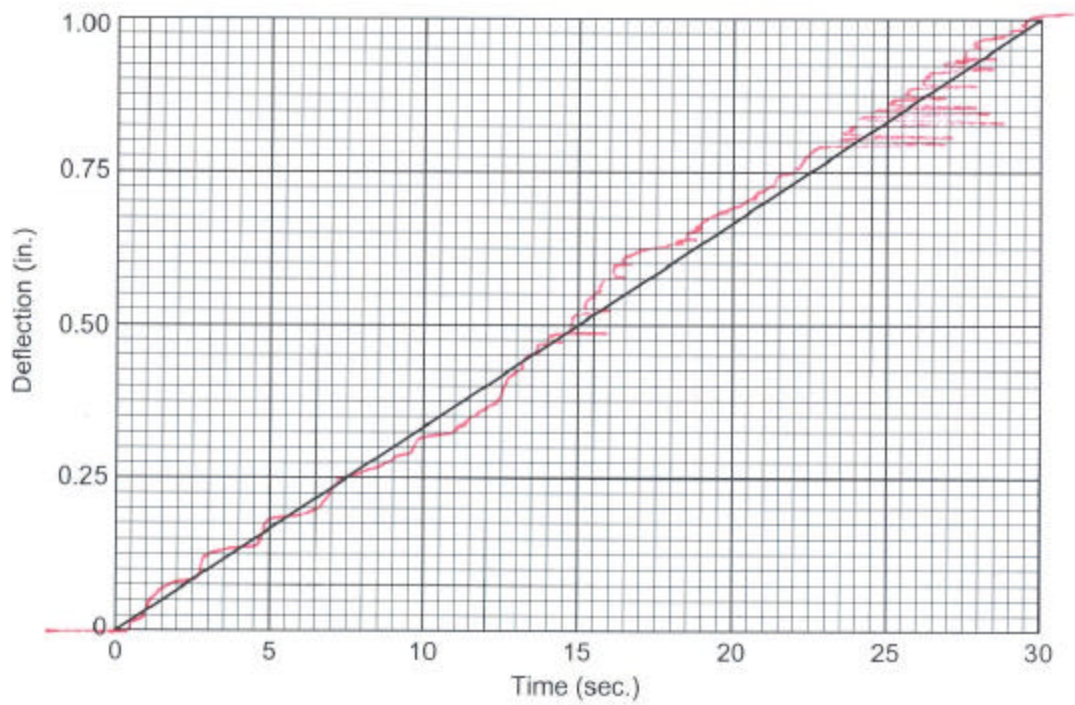
Date 3/25/02
Performed By SD
Temp. 70°
Humidity 50%

Foam No. 2" x 20" x 24" H3



Compression - Deflection Resistance Test
Child Seat Foam

Date 3/5/02
Temp 70°
Humidity 50%
Foam No. 2"X 20" 2"X 24" H3



Compression - Deflection Resistance Test Child Seat Foam

001-R01

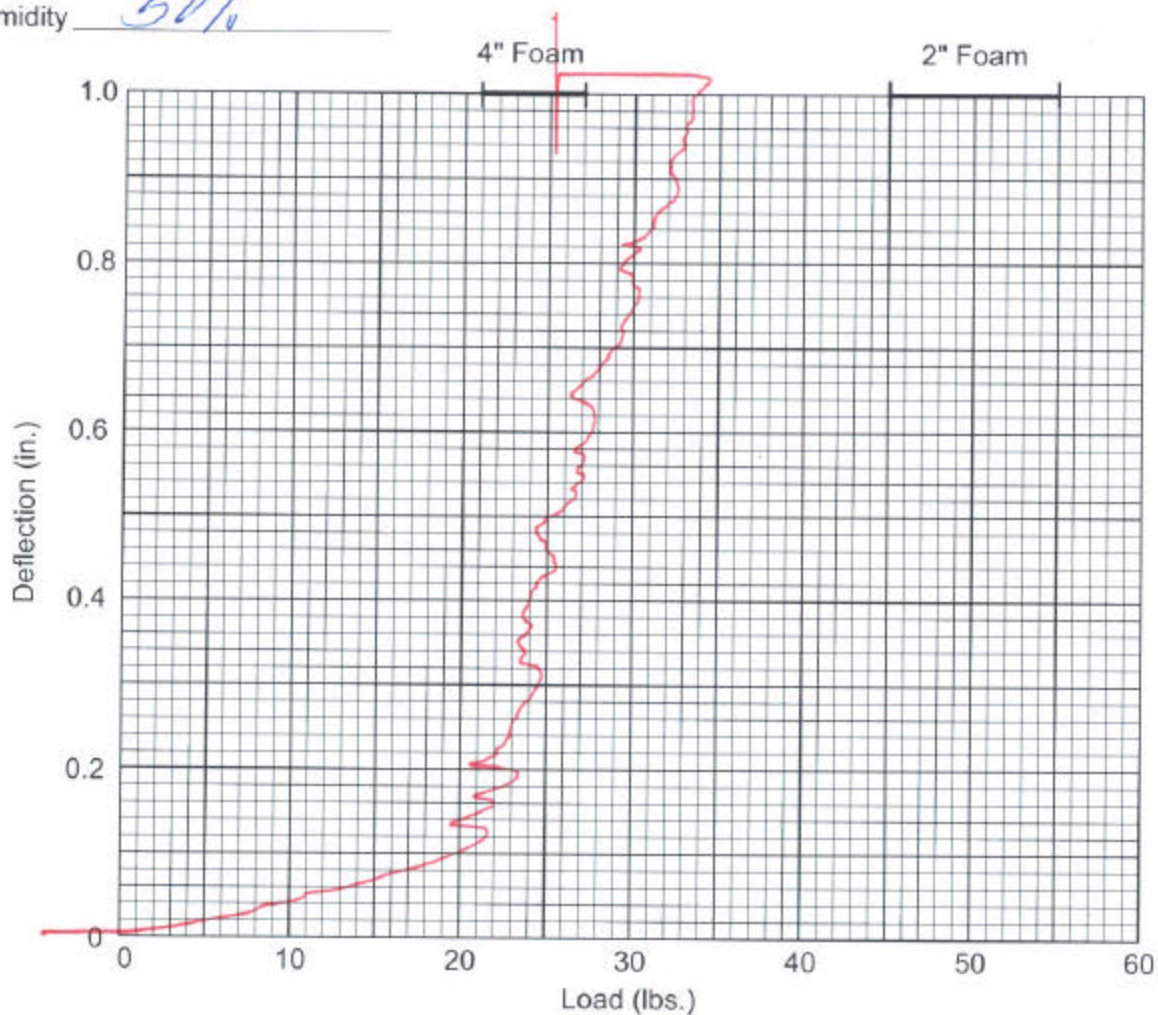
SEAT FOAM USAGE LOG

Foam I.D. Number 2'x20" 2'x24" H3

Date	Peak Load	Pass/Fail
3/25/02	50 LBS	

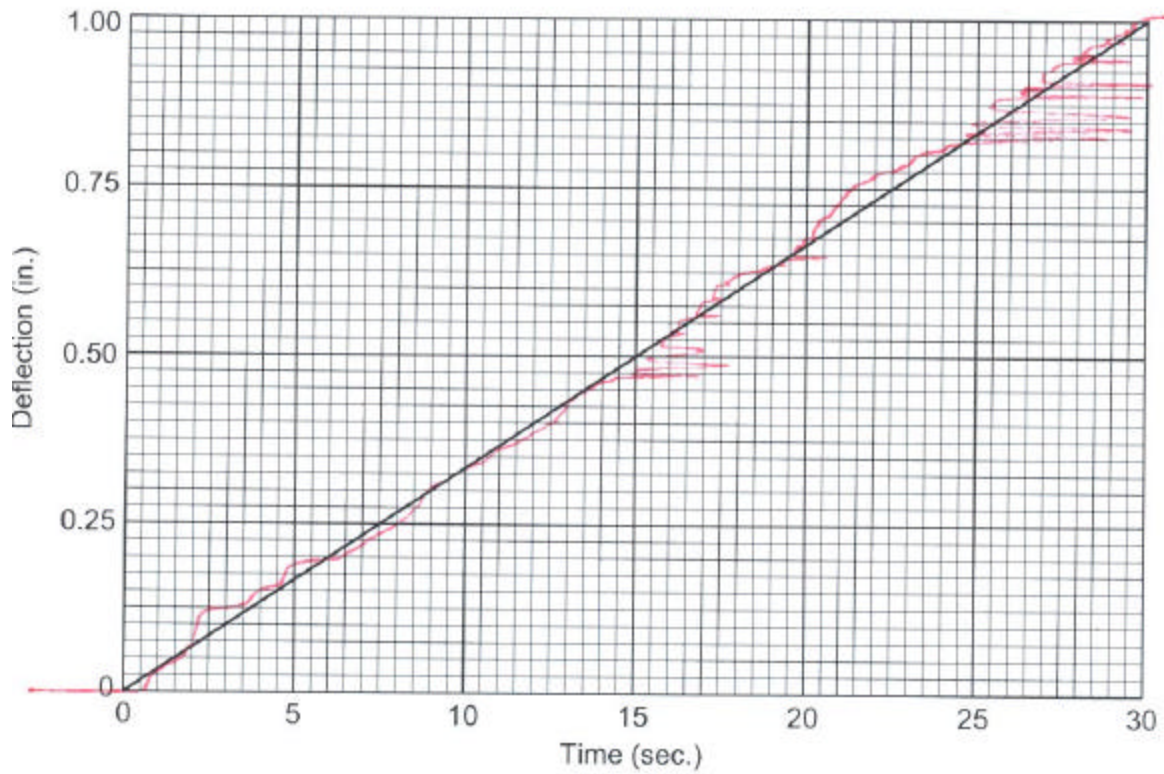
Date 3/25/02
Performed By S.D.
Temp. 70°
Humidity 50%

Foam No. 4" X 20" H3



Compression - Deflection Resistance Test
Child Seat Foam

Date 3/25/02
Temp 70°
Humidity 50%
Foam No. 4"x20" H3



Compression - Deflection Resistance Test Child Seat Foam

001 2001

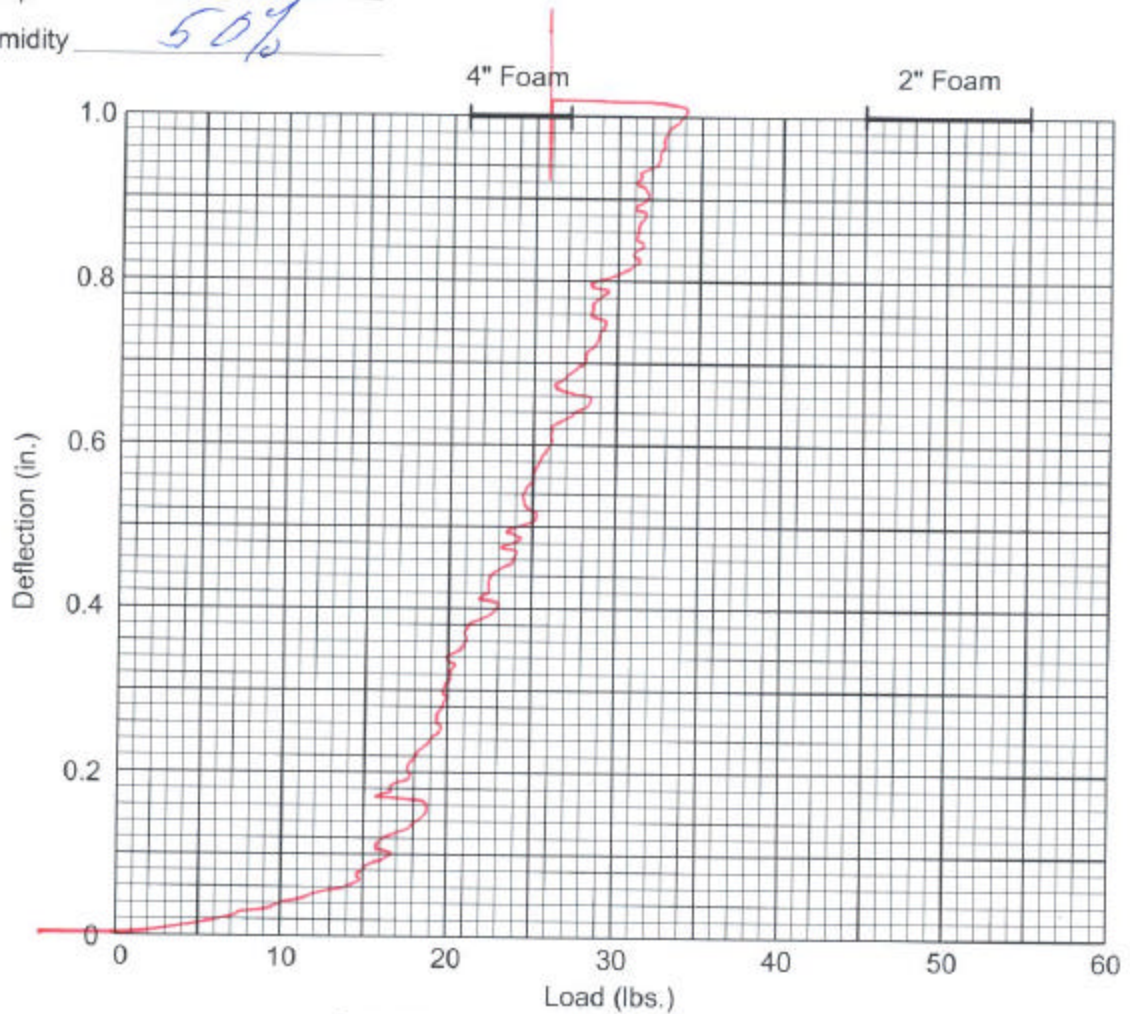
SEAT FOAM USAGE LOG

Foam I.D. Number 1" X 20" H3

Date	Peak Load	Pass/Fail
3/25/02	25.25 LBS	Pass

Date 3/5/02
Performed By SD
Temp. 70°
Humidity 50%

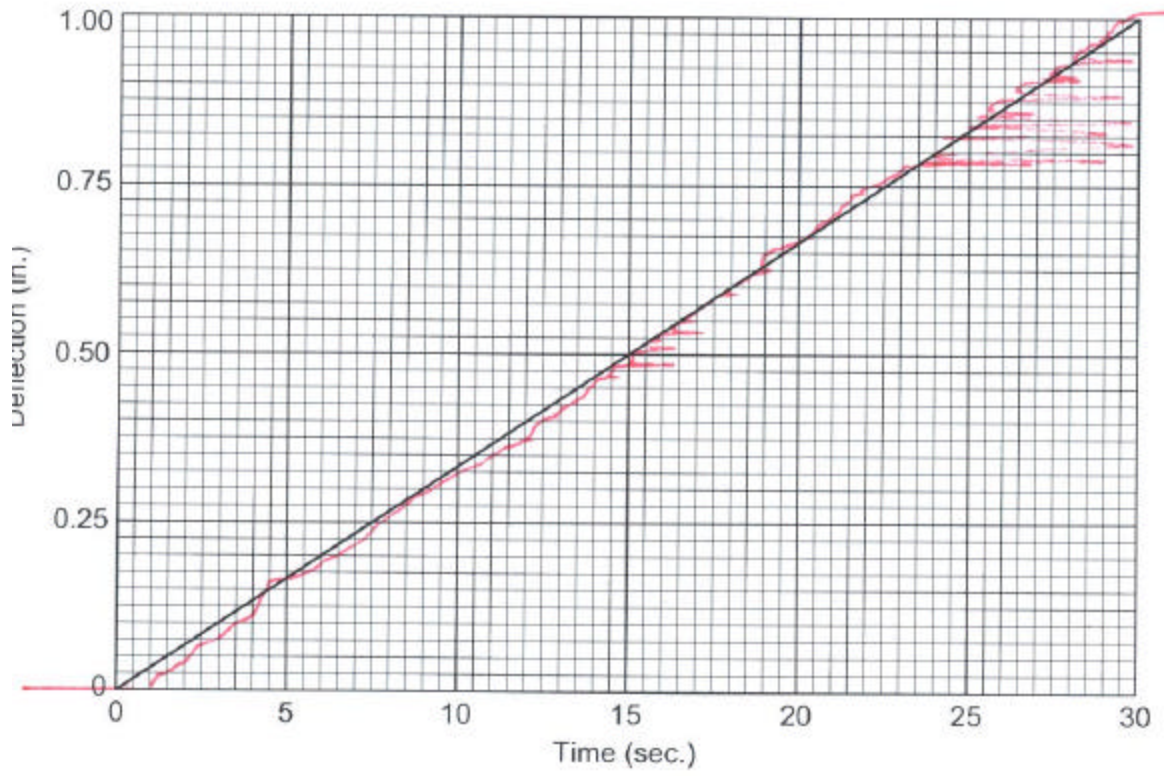
Foam No. 4-1 24" H3



Compression - Deflection Resistance Test
Child Seat Foam

FM-052-CERT-002-R01

Date 3/5/02
Temp 70°
Humidity 50%
Foam No. 1' x 24" H3



Compression - Deflection Resistance Test Child Seat Foam

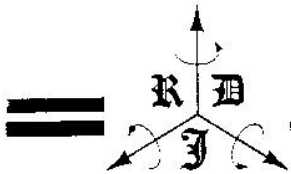
SEAT FOAM USAGE LOG

Foam I.D. Number A¹ X 24¹ H3

Date	Peak Load	Pass/Fail
3/25/02	26 LBS	 ASS

SECTION 10

CHILD DUMMY CALIBRATION DATA TRACES AND TABLES



ROBERT A. DENTON, INC.

2967 Waterview Dr., Rochester Hills, MI 48309-4600

Tel (248) 852-5100 • Fax (248) 852-6060 • email: info@radenton.com • www.radenton.com

LOWER 01 1-14-02

040

Calibration Report Uni-Directional Calibration

Automated Load Cell Calibration System
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Calibration No. C2624017
Model No. 3303
Technician J. Kovalchuk
Customer VRTC
Description Child Neck

Date Jan 7, 2002 Due Jan 7, 2003
Serial No. 210
Temp (C) / Hum. (%) 22.2 / 25.9
Last Calibrated Nov 28, 2000
Customer Tag Number N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	1000.0 lbf	0.0053 mV/V	0.03 % FS	0.04 % FS	2.3341 mV/V	0.10 % FS
FY	1000.0 lbf	-0.0028 mV/V	0.06 % FS	0.06 % FS	2.3262 mV/V	0.12 % FS
FZ	1500.0 lbf	0.0197 mV/V	0.01 % FS	0.07 % FS	-1.3346 mV/V	0.21 % FS
MX	1500.0 in-lbf	0.0108 mV/V	0.15 % FS	0.25 % FS	1.7200 mV/V	1.06 % FS
MY	1500.0 in-lbf	-0.0094 mV/V	0.07 % FS	0.17 % FS	1.7061 mV/V	0.27 % FS
MZ	1000.0 in-lbf	-0.0093 mV/V	0.08 % FS	0.57 % FS	1.7930 mV/V	-0.47 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	60.0 K Ohms	630.9 lbf	350.0 Ohms
FY	60.0 K Ohms	634.7 lbf	350.0 Ohms
FZ	200.0 K Ohms	-986.5 lbf	700.0 Ohms
MX	120.0 K Ohms	645.3 in-lbf	350.0 Ohms
MY	120.0 K Ohms	651.2 in-lbf	350.0 Ohms
MZ	120.0 K Ohms	815.4 in-lbf	700.0 Ohms

NOTE: Positive shunt is between +Exc_+Sig Negative shunt is between -Exc_+Sig

Wire Color Codes

FX-MX		FY-MY		FZ-MZ	
Brown	+ Exc.	Red Stripe	+ Exc.	Green	+ Exc.
Red	+ Sig.	Black	+ Sig.	Blue	+ Sig.
Orange	- Exc.	White	- Exc.	Violet	- Exc.
Yellow	- Sig.	Black Stripe	- Sig.	Grey	- Sig.

Reference Load Cell

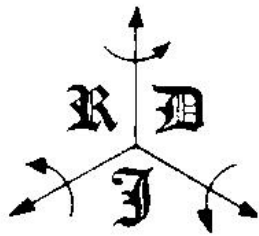
Manufacturer	Model No.	Serial No.	Calibration Due Date
Interface	SSM-AF-2000	102751	Oct 4, 2002

Calibrated by

Robert A. Denton, Inc. Authorized Representative

01/07/02

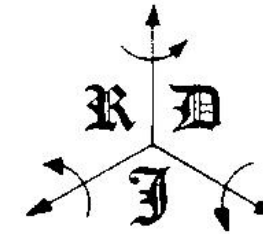
15:58:43



CALIBRATION REPORT

Uni-Directional Calibration Loading Sequence Summary

Automated Load Cell Calibration System
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Calibration Number	C2624017	This Calibration	15:46:41	Jan 7, 2002
Model Number	3303	Calibration Due		Jan 7, 2003
Serial Number	210	Last Calibrated		Nov 28, 2000
Description	Child Neck	Temp (C) / Hum. (%)		22.2 / 25.9
Customer	VRTC	Customer Tag Number		N/A

Loading Sequence

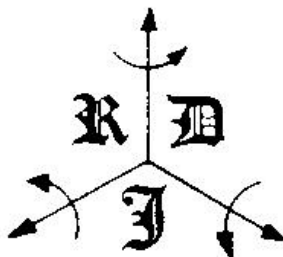
Axis	FS Load EU	FS Output mV/V	Sensitivity mV/V/EU	Nonlinearity % FS	Hysteresis % FS	Moment Arm EU
FX	1000.0 lbf	2.3341	0.0023341	0.03	0.04	0.00
FY	1000.0 lbf	2.3262	0.0023262	0.06	0.06	0.00
FZ	1500.0 lbf	-1.3346	-0.0008897	0.01	0.07	0.00
MX	1500.0 in-lbf	1.7200	0.0011466	0.15	0.25	2.00
MY	1500.0 in-lbf	1.7061	0.0011374	0.07	0.17	2.00
MZ	1000.0 in-lbf	1.7930	0.0017930	0.08	0.57	2.00

Bridge Unbalance

FX Axis 0.0053 mV/V
FY Axis -0.0028 mV/V
FZ Axis 0.0197 mV/V
MX Axis 0.0108 mV/V
MY Axis -0.0094 mV/V
MZ Axis -0.0093 mV/V

Linearization

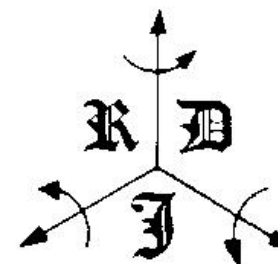
Force (	FX	)	=	0.1	+	428.4	* Output (mV/V)
Force (	FY	)	=	0.2	+	429.9	* Output (mV/V)
Force (	FZ	)	=	0.0	+	-1124.0	* Output (mV/V)
Force (	MX	)	=	-1.0	+	872.1	* Output (mV/V)
Force (	MY	)	=	-0.4	+	879.1	* Output (mV/V)
Force (	MZ	)	=	0.2	+	557.9	* Output (mV/V)



CALIBRATION REPORT

Uni-Directional Calibration Crosstalk Summary

Automated Load Cell Calibration System
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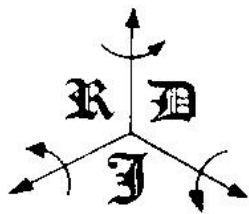
Calibration Number	C2624017	This Calibration	15:46:41	Jan 7, 2002
Model Number	3303	Calibration Due		Jan 7, 2003
Serial Number	210	Last Calibrated		Nov 28, 2000
Description	Child Neck	Temp (C) / Hum. (%)		22.2 / 25.9
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge		FX	FY	FZ	MX	MY	MZ
	<u>Applied Load</u>	1000.0	1000.0	1500.0	1500.0	1500.0	1000.0
		<u>lbf</u>	<u>lbf</u>	<u>lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>
FX	1000.0 lbf	2.3341	-0.0036	-0.0073	0.0147	-0.0141	-0.0125
FY	1000.0 lbf	0.0006	2.3262	0.0094	0.0120	-0.0076	-0.0232
FZ	1500.0 lbf	-0.0022	0.0049	-1.3346	0.0226	0.0059	0.0002
MX	1500.0 in-lbf	0.0043	-0.0002	-0.6678	1.7200	-0.0073	-0.0084
MY	1500.0 in-lbf	0.0014	0.0073	-0.6669	0.0062	1.7061	0.0011
MZ	1000.0 in-lbf	1.1643	-0.0013	-0.0074	0.0021	-0.0078	1.7930

% FS Crosstalk *

Bridge		FX	FY	FZ	MX	MY	MZ
	<u>Applied Load</u>	1000.0	1000.0	1500.0	1500.0	1500.0	1000.0
		<u>lbf</u>	<u>lbf</u>	<u>lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>
FX	1000.0 lbf	0.00%	-0.16%	0.54%	0.85%	-0.83%	-0.70%
FY	1000.0 lbf	0.03%	0.00%	-0.71%	0.70%	-0.45%	-1.29%
FZ	1500.0 lbf	-0.09%	0.21%	0.00%	1.31%	0.35%	0.01%
MX	1500.0 in-lbf	0.18%	-0.01%	0.04%	0.00%	-0.43%	-0.47%
MY	1500.0 in-lbf	0.06%	0.31%	0.03%	0.36%	0.00%	0.06%
MZ	1000.0 in-lbf	0.12%	-0.05%	0.55%	0.12%	-0.46%	0.00%

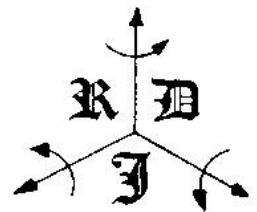


Measurement Report

Load Cell Bridge Impedance

Measurement Summary

Automated Load Cell Impedance Measurement System
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Calibration Number	C2624017	This Calibration	15:46:41	Jan 07, 2002
Model Number	3303	Calibration Due		Jan 07, 2003
Serial Number	210	Last Calibrated		Nov 28, 2000
Description	Child Neck	Temp (°C) / Hum (%)		22.6 / 20.8
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements *

<u>Axis</u>	<u>Input Impedance</u>	<u>Output Impedance</u>	
Channel 1 FX	355.70	355.63	Ohms
Channel 2 FY	355.72	355.52	Ohms
Channel 3 FZ	703.28	703.33	Ohms
Channel 4 MX	356.16	355.92	Ohms
Channel 5 MY	356.21	356.14	Ohms
Channel 6 MZ	705.00	704.94	Ohms

Bridge High Short Measurement **

<u>Axis</u>	<u>Bridge to Transducer Body</u>	
Channel 1 FX	>= 5.00	G Ohms (10 ⁹ Ohms)
Channel 2 FY	>= 5.00	G Ohms (10 ⁹ Ohms)
Channel 3 FZ	>= 5.00	G Ohms (10 ⁹ Ohms)
Channel 4 MX	>= 5.00	G Ohms (10 ⁹ Ohms)
Channel 5 MY	>= 5.00	G Ohms (10 ⁹ Ohms)
Channel 6 MZ	>= 5.00	G Ohms (10 ⁹ Ohms)

Measurement Equipment

Serial Number

Measurement Accuracy

Keithley Model 7001 Switch System	0698562	N/A
Keithley Model 2000 Multimeter	0643818	±0.045 Ohms/Year @ 23°C ±5°C
Keithley Model 6517A Electrometer/High Resistance Meter	0695446	±(11.25 x 10 ⁶) + 10 ⁵ Ohms/Year @ 18°C-28°C

* NOTE: Input impedance measurements taken between ±excitation, output impedance measurements taken between ±signal

** NOTE: High short measurements are taken between +excitation and the transducer body. Measurements are made at +50.0 VDC.

Robert A. Denton, Inc. certifies that all equipment used to perform measurements expressed in this report are traceable to the National Institute of Standards and Technology and are in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).



ROBERT A. DENTON, INC.

2967 Waterview Dr., Rochester Hills, MI 48309-4600

Tel: (248) 852-5100 Fax: (248) 852-6060 email: info@radenton.com www.radenton.com

Calibration Report Summary

Page 1 of 1

Calibration No. C2624017
Customer Name Vehicle Research & Test Center/USDOT
Address 10820 St. Rte. 347 Logan County Bldg 60
East Liberty, OH 43319

Report Issue

Date* 1/8/02

* Note: "Report Issue Date" indicates confirmation of calibration data and should be used to increment calibration interval

Manufacturer Denton
Serial Number 210

Model Number 3303

As Received Condition

In Tolerance ☐
Out of Tolerance ☒
Operational ☐
Not Operational ☐
Damaged ☐
N/A ☐

As Shipped Condition

In Tolerance ☒
Out of Tolerance ☐
Operational ☐
Not Operational ☐
Damaged ☐
N/A ☐

Action Taken

Repair ☒
Full Calibration ☐
Special Calibration ☐
Returned As Is ☐

Received Notes

FZ offset out of spec. (0.175 mV/V)

As Shipped Notes

Action Notes

Calibration Standards Used³

Standard ID Report No Due Date

2K03 SN102751-1002179034 10/04/02

Laboratory Scope:²

Robert A. Denton, Inc. offers A2LA commercial laboratory calibration services to the following criteria: (Mechanical)



Parameter/Equipment	Range	Best Uncertainty ¹ (±)	Comments
Force			
Dead Weights	4 oz – 400 lbf	0.067%	Class F Weights
Load Cells	50 – 500 lbf	0.065%	Axial Load
	100 – 1000 lbf	0.087%	
	200 – 2000 lbf	0.076%	
	500 – 5000 lbf	0.082%	
	1000 – 10000 lbf	0.080%	
	2500 – 25000 lbf	0.082%	
	5000 – 50000 lbf	0.084%	
	8000 – 80000 lbf	0.110%	
Moment			
Load Cells	50 – 500 in – lbf	0.15%	Moment Load
	100 – 1000 in – lbf	0.11%	
	200 – 2000 in – lbf	0.10%	
	500 – 5000 in – lbf	0.16%	

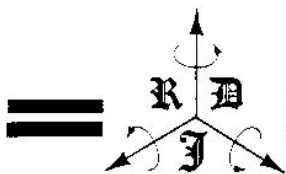
ELF014

Revision 2/12/01

¹ The uncertainties stated are expressed at approximately 95% confidence level using a coverage factor of k = 2.

² Robert A. Denton's calibration program is accredited to ISO/IEC Guide 25 1990 & ANSI/NCSL Z-540-1-1994 - Certificate # 1644.01, Valid to: December 31, 2002

³ Standards used in the calibration of this transducer are traceable to National Institute of Standards and Technology (NIST) values



ROBERT A. DENTON, INC.

2967 Waterview Dr., Rochester Hills, MI 48309-4600

Tel (248) 852-5100 • Fax (248) 852-6060 • email: info@radenton.com • www.radenton.com

040

UPPER

600 1-14-02

Lower

Calibration Report Uni-Directional Calibration

Automated Load Cell Calibration System
Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	C2624016	Date	Jan 7, 2002	Due	Jan 7, 2003
Model No.	3303	Serial No.	86		
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	22.2 / 26.1		
Customer	VRTC	Last Calibrated	Nov 25, 1998		
Description	Child Neck	Customer Tag Number	N/A		

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	1000.0 lbf	0.0118 mV/V	0.02 % FS	0.04 % FS	2.3333 mV/V	-0.16 % FS
FY	1000.0 lbf	-0.0014 mV/V	0.05 % FS	0.05 % FS	2.3230 mV/V	-0.07 % FS
FZ	1500.0 lbf	-0.0125 mV/V	0.02 % FS	0.05 % FS	-1.3368 mV/V	0.06 % FS
MX	1500.0 in-lbf	0.0108 mV/V	0.05 % FS	0.32 % FS	1.7256 mV/V	0.20 % FS
MY	1500.0 in-lbf	-0.0169 mV/V	0.08 % FS	0.20 % FS	1.7150 mV/V	-1.45 % FS
MZ	1000.0 in-lbf	-0.0046 mV/V	0.26 % FS	0.60 % FS	1.8205 mV/V	0.04 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	60.0 K Ohms	633.0 lbf	350.0 Ohms
FY	60.0 K Ohms	636.7 lbf	350.0 Ohms
FZ	200.0 K Ohms	-983.7 lbf	700.0 Ohms
MX	120.0 K Ohms	642.8 in-lbf	350.0 Ohms
MY	120.0 K Ohms	647.4 in-lbf	350.0 Ohms
MZ	120.0 K Ohms	803.7 in-lbf	700.0 Ohms

NOTE: Positive shunt is between +Exc_+Sig Negative shunt is between -Exc_+Sig

Wire Color Codes

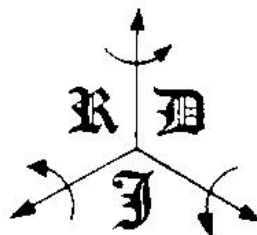
FX-MX		FY-MY		FZ-MZ	
Brown	+ Exc.	Red Stripe	+ Exc.	Green	+ Exc.
Red	+ Sig.	Black	+ Sig.	Blue	+ Sig.
Orange	- Exc.	White	- Exc.	Violet	- Exc.
Yellow	- Sig.	Black Stripe	- Sig.	Grey	- Sig.

Reference Load Cell

Manufacturer	Model No.	Serial No.	Calibration Due Date
Interface	SSM-AF-2000	102751	Oct 4, 2002

Calibrated by

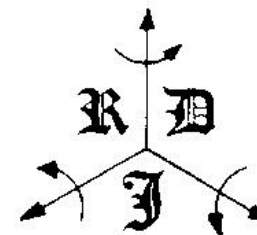
[Signature]
Robert A. Denton, Inc. Authorized Representative



CALIBRATION REPORT

Uni-Directional Calibration Loading Sequence Summary

Automated Load Cell Calibration System
Copyright (c)1987-2000 Robert A. Denton, Inc.



Calibration Number	C2624016	This Calibration	15:21:49	Jan 7, 2002
Model Number	3303	Calibration Due		Jan 7, 2003
Serial Number	86	Last Calibrated		Nov 25, 1998
Description	Child Neck	Temp (C) / Hum. (%)		22.2 / 26.1
Customer	VRTC	Customer Tag Number		N/A

Loading Sequence

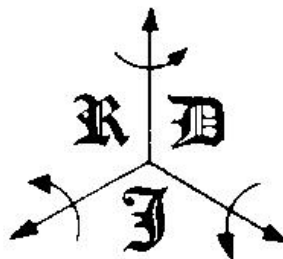
Axis	FS Load EU	FS Output mV/V	Sensitivity mV/V/EU	Nonlinearity % FS	Hysteresis % FS	Moment Arm EU
FX	1000.0 lbf	2.3333	0.0023333	0.02	0.04	0.00
FY	1000.0 lbf	2.3230	0.0023230	0.05	0.05	0.00
FZ	1500.0 lbf	-1.3368	-0.0008912	0.02	0.05	0.00
MX	1500.0 in-lbf	1.7256	0.0011504	0.05	0.32	2.00
MY	1500.0 in-lbf	1.7150	0.0011433	0.08	0.20	2.00
MZ	1000.0 in-lbf	1.8205	0.0018205	0.26	0.60	2.00

Bridge Unbalance

FX Axis 0.0118 mV/V
FY Axis -0.0014 mV/V
FZ Axis -0.0125 mV/V
MX Axis 0.0108 mV/V
MY Axis -0.0169 mV/V
MZ Axis -0.0046 mV/V

Linearization

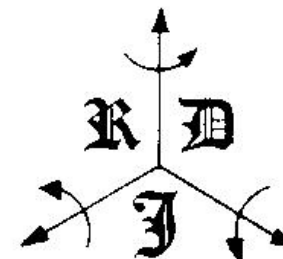
Force (	FX	)	=	0.1	+	428.6	* Output (mV/V)
Force (	FY	)	=	0.2	+	430.5	* Output (mV/V)
Force (	FZ	)	=	-0.1	+	-1122.0	* Output (mV/V)
Force (	MX	)	=	0.3	+	869.0	* Output (mV/V)
Force (	MY	)	=	-0.4	+	874.5	* Output (mV/V)
Force (	MZ	)	=	0.9	+	549.6	* Output (mV/V)



CALIBRATION REPORT

Uni-Directional Calibration Crosstalk Summary

Automated Load Cell Calibration System
Copyright (c)1987-2000 Robert A. Denton, Inc.



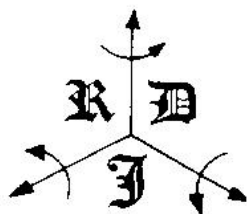
Calibration Number	C2624016	This Calibration	15:21:49	Jan 7, 2002
Model Number	3303	Calibration Due		Jan 7, 2003
Serial Number	86	Last Calibrated		Nov 25, 1998
Description	Child Neck	Temp (C) / Hum. (%)		22.2 / 26.1
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

<u>Bridge</u>		FX	FY	FZ	MX	MY	MZ
	<u>Applied Load</u>	1000.0	1000.0	1500.0	1500.0	1500.0	1000.0
		<u>lbf</u>	<u>lbf</u>	<u>lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>
FX	1000.0 lbf	2.3333	-0.0066	0.0196	-0.0081	-0.0324	-0.0046
FY	1000.0 lbf	0.0103	2.3230	-0.0105	0.0421	-0.0277	-0.0221
FZ	1500.0 lbf	0.0046	0.0002	-1.3368	0.0285	0.0107	0.0044
MX	1500.0 in-lbf	-0.0058	-0.0100	-0.6780	1.7256	-0.0022	0.0047
MY	1500.0 in-lbf	0.0104	-0.0117	-0.6539	0.0088	1.7150	0.0063
MZ	1000.0 in-lbf	1.1691	0.0013	0.0214	-0.0150	-0.0216	1.8205

% FS Crosstalk *

<u>Bridge</u>		FX	FY	FZ	MX	MY	MZ
	<u>Applied Load</u>	1000.0	1000.0	1500.0	1500.0	1500.0	1000.0
		<u>lbf</u>	<u>lbf</u>	<u>lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>	<u>in-lbf</u>
FX	1000.0 lbf	0.00%	-0.29%	-1.46%	-0.47%	-1.89%	-0.25%
FY	1000.0 lbf	0.44%	0.00%	0.79%	2.44%	-1.62%	-1.21%
FZ	1500.0 lbf	0.20%	0.01%	0.00%	1.65%	0.62%	0.24%
MX	1500.0 in-lbf	-0.25%	-0.43%	0.72%	0.00%	-0.13%	0.26%
MY	1500.0 in-lbf	0.45%	-0.50%	1.09%	0.51%	0.00%	0.35%
MZ	1000.0 in-lbf	0.10%	0.05%	-1.60%	-0.87%	-1.26%	0.00%



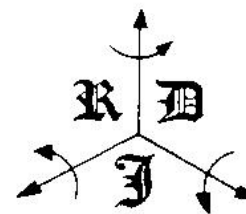
Measurement Report

Load Cell Bridge Impedance

Measurement Summary

Automated Load Cell Impedance Measurement System

Copyright © 1998 Robert A. Denton, Inc.



Calibration Number
Model Number
Serial Number
Description
Customer

C2624016
3303
86
Child Neck
VRTC

This Calibration
Calibration Due
Last Calibrated
Temp (°C) / Hum (%)
Customer Tag

15:21:49

Jan 07, 2002
Jan 07, 2003
Nov 25, 1998
22.4 / 18.3
N/A

Bridge Impedance Measurements *

Axis	Input Impedance	Output Impedance	
Channel 1 FX	356.16	356.11	Ohms
Channel 2 FY	356.26	356.08	Ohms
Channel 3 FZ	702.76	702.80	Ohms
Channel 4 MX	356.36	356.14	Ohms
Channel 5 MY	356.34	356.27	Ohms
Channel 6 MZ	705.25	705.22	Ohms

Bridge High Short Measurement **

Axis	Bridge to Transducer Body	
Channel 1 FX	>= 5.00	G Ohms (10^9 Ohms)
Channel 2 FY	>= 5.00	G Ohms (10^9 Ohms)
Channel 3 FZ	>= 5.00	G Ohms (10^9 Ohms)
Channel 4 MX	>= 5.00	G Ohms (10^9 Ohms)
Channel 5 MY	>= 5.00	G Ohms (10^9 Ohms)
Channel 6 MZ	>= 5.00	G Ohms (10^9 Ohms)

Measurement Equipment

Serial Number

Measurement Accuracy

Keithley Model 7001 Switch System

0698562

N/A

Keithley Model 2000 Multimeter

0643818

± 0.045 Ohms/Year @ 23°C $\pm 5^\circ\text{C}$

Keithley Model 6517A Electrometer/High Resistance Meter

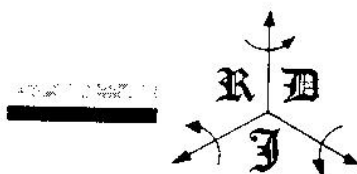
0695446

$\pm(11.25 \times 10^6) + 10^5$ Ohms/Year @ 18°C-28°C

* NOTE: Input impedance measurements taken between $\pm$ excitation, output impedance measurements taken between $\pm$ signal

NOTE: High short measurements are taken between $\pm$ excitation and the transducer body. Measurements are made at +50.0 VDC.

** Robert A. Denton, Inc. certifies that all equipment used to perform measurements expressed in this report are traceable to the National Institute of Standards and Technology and are in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).



ROBERT A. DENTON, INC.

2967 Waterview Dr., Rochester Hills, MI 48309-4600

Tel (248) 852-5100 · Fax (248) 852-6060 · email: info@radenton.com www.radenton.com

Calibration Report Summary

Page 1 of 1

Calibration No. C2624016
Customer Name Vehicle Research & Test Center/ USDOT
Address 10820 St. Rte. 347 Logan County Bldg 60
East Liberty, OH 43319

Report Issue

Date* 1/8/02

* Note: "Report Issue Date" indicates confirmation of calibration data and should be used to increment calibration interval

Manufacturer Denton
Serial Number 86

Model Number 3303

As Received Condition

In Tolerance ☐
Out of Tolerance ☒
Operational ☐
Not Operational ☐
Damaged ☐
N/A ☐

As Shipped Condition

In Tolerance ☒
Out of Tolerance ☐
Operational ☐
Not Operational ☐
Damaged ☐
N/A ☐

Action Taken

Repair ☒
Full Calibration ☒
Special Calibration ☐
Returned As Is ☐

Received Notes

FZ offset out of spec. (0.124 mV/V)

As Shipped Notes

Action Notes

Calibration Standards Used³

Standard ID Report No Due Date

2K03 SN102751:1002179034 10/04/02

Laboratory Scope:²

Robert A. Denton, Inc. offers A2LA commercial laboratory calibration services to the following criteria: (Mechanical)



Parameter/Equipment	Range	Best Uncertainty ¹ (±)	Comments
Force			
Dead Weights	4 oz – 400 lbf	0.067%	Class F Weights
Load Cells	50 – 500 lbf	0.065%	Axial Load
	100 – 1000 lbf	0.087%	
	200 – 2000 lbf	0.076%	
	500 – 5000 lbf	0.082%	
	1000 – 10000 lbf	0.080%	
	2500 – 25000 lbf	0.082%	
	5000 – 50000 lbf	0.084%	
	8000 – 80000 lbf	0.110%	
Moment			
Load Cells	50 – 500 in – lbf	0.15%	Moment Load
	100 – 1000 in – lbf	0.11%	
	200 – 2000 in – lbf	0.10%	
	500 – 5000 in – lbf	0.16%	

C1.F014

Revision 2/12/01

¹ The uncertainties stated are expressed at approximately 95% confidence level using a coverage factor of k = 2.

² Robert A. Denton's calibration program is accredited to ISO/IEC Guide 25:1990 & ANSI/NCSL Z-540-1-1994 - Certificate # 1644.01. Valid to December 31, 2002

³ Standards used in the calibration of this transducer are traceable to National Institute of Standards and Technology (NIST) values

*****CALIBRATION CERTIFICATE*****

Vehicle Research & Test Center - PO Box 37 - E. Liberty, Ohio 43319

	Type	Manufacturer	Model	Serial No.
Transducer:	Chest pot	Servo	N/A	cst040
Cal. Equip:	Power Supply DMM	Elect. Development Kiethley	Cce-10d 197a	4876 us-894d0

Label	Pin	Color	Excitation	
+ Excit.	(3)	RED	10 Volts	INPUT RESISTANCE: _____ ohms
- Excit.	(7)	BLACK		
+ Signal	(2)	GREEN		SIGNAL RESISTANCE: _____ ohms
- Signal	(8)	WHITE		
Shield	(5)			COMPUTED OFFSET: 1.778195 [Volts]

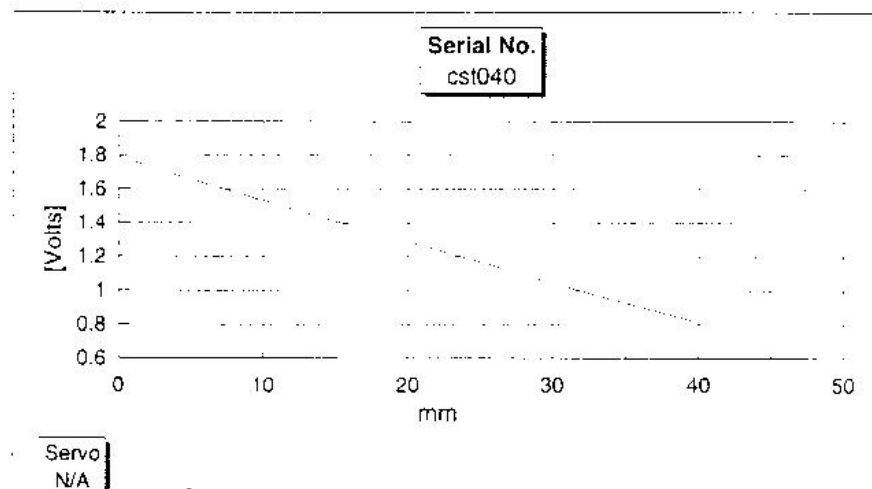
CAL. ROOM TEMP: 70 Deg F MAX NON-LINEARITY: _____ %

CAL ROOM HUMIDITY: _____ % FULL SCALE: 40 mm

CAL. ROOM BAROMETER: _____ inches SENSITIVITY: -2.43529 mV/Volt/mm

TECHNICIAN: Dustin Walborn Date: 1/4/2002

ENGINEER UNITS mm	Y-axis READING [Volts]	NON- LINEARITY [%]	%FULL SCALE ERROR	
0	1.788	ERR	1.01%	Regression Output:
5	1.6569	0.41%	0.05%	Constant 1.778195
10	1.5299	-1.93%	-0.49%	Std Err of Y Est 0.005857
15	1.40818	-1.27%	-0.48%	R Squared 0.99973
20	1.2871	-0.80%	-0.41%	No. of Observations 9
25	1.1667	-0.41%	-0.27%	Degrees of Freedom 7
30	1.044	-0.47%	-0.37%	
35	0.9277	0.24%	0.19%	X Coefficient(s) -0.02435
40	0.81175	0.81%	0.79%	Std Err of Coef. 0.000151



040 HILL 340
lead X Fwd

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5891

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: AC9F9

Input Resistance (ohms): 2825.5

ZMO (mV): -32.34
Resonance Frequency (Hz): 20180

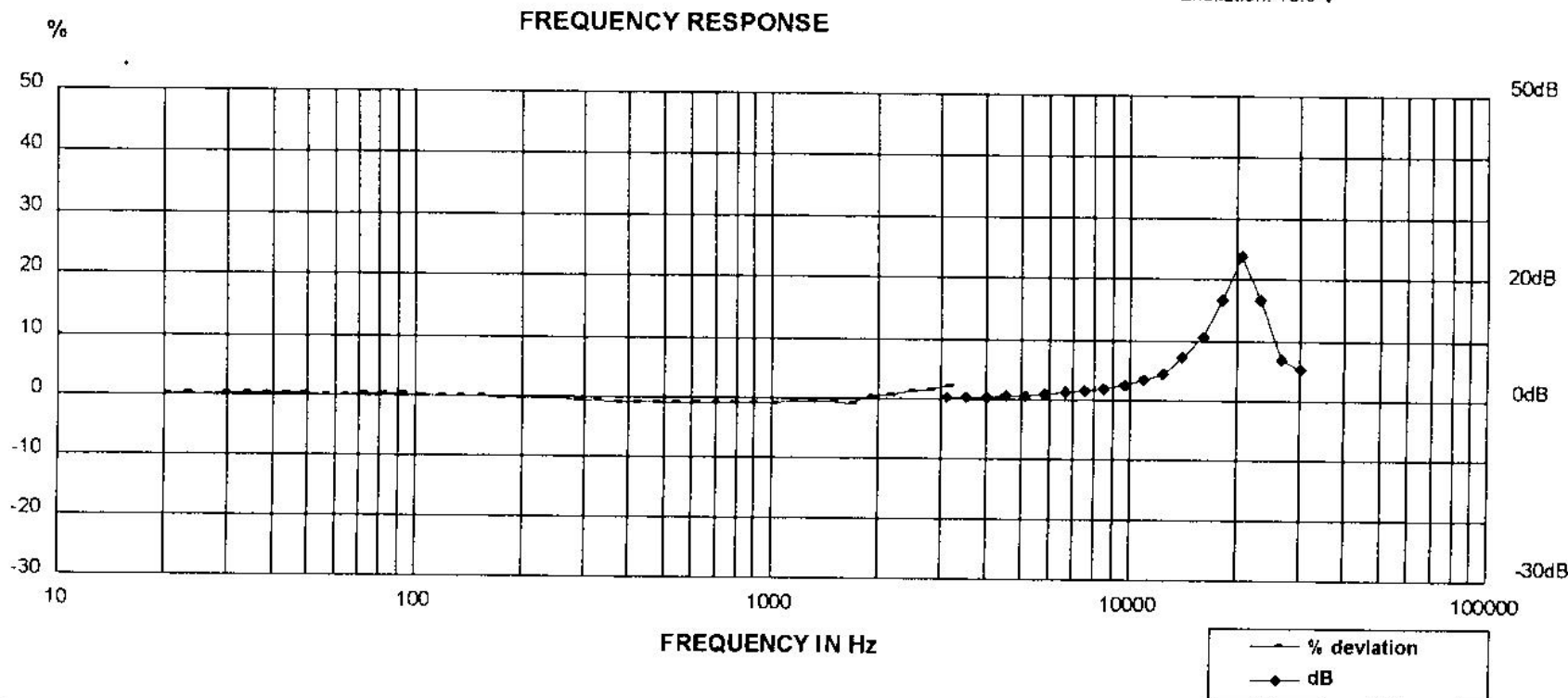
0.2956 mV/g @ 100 Hz, 10g pk

Last Sens: 2.945E-1, Change: 0.38

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)

Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By:
P. KRAMP

Date: 12/27/2001

Endevco
Transportation Research Center

040 HIII 340
Head Y-Left

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5895

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: AAMD5

Input Resistance (ohms): 2505.2

ZMO (mV): -27.92
Resonance Frequency (Hz): 18651

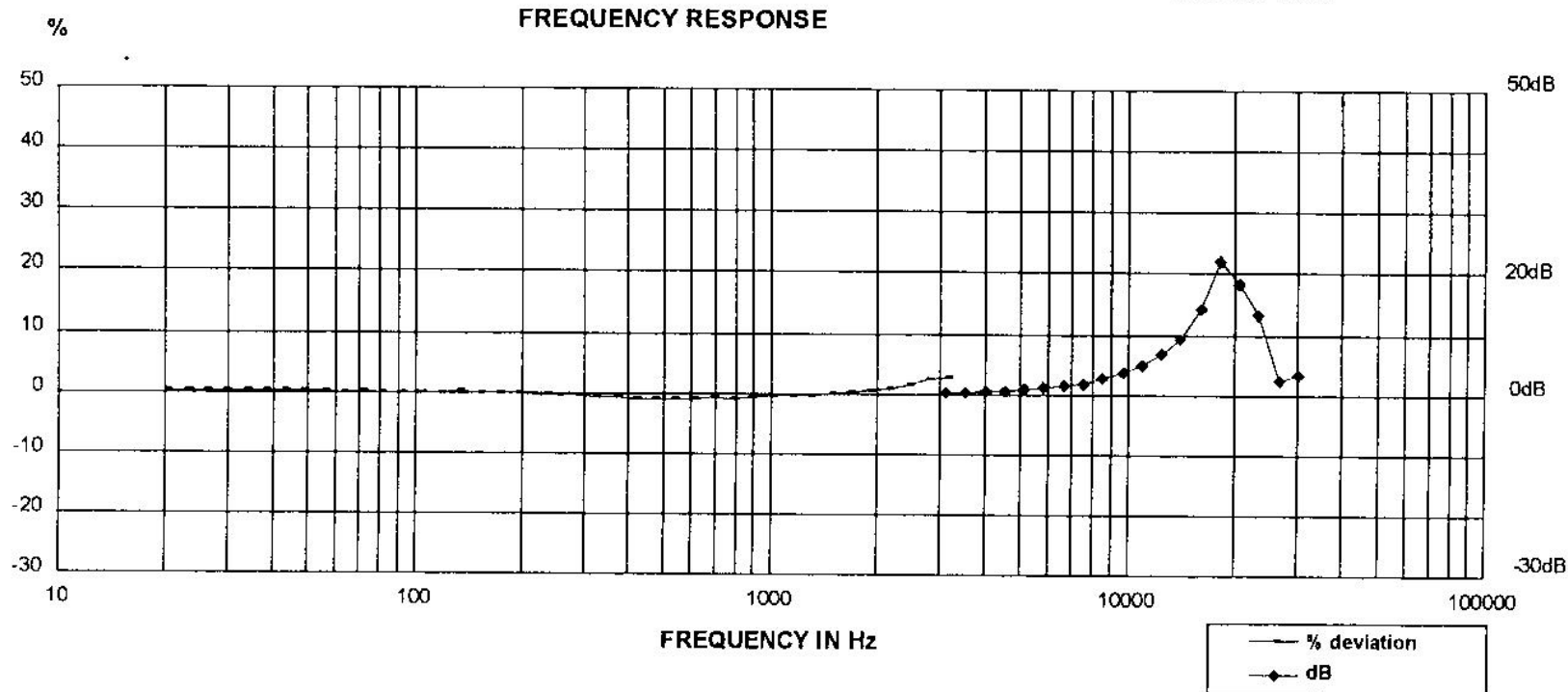
0.2577 mV/g @ 100 Hz, 10g pk

Last Sens: 2.649E-1, Change: -2.7

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)

Insol serial number:	AC27	+/- 1.1 %	100.0 Hz Sensitivity
NIST traceability #:	822/262802-00	+/- 5.0 %	10.0 to 20.0 Hz
Equipment used:	2901	+/- 1.5 %	20.0 to 2000.0 Hz
Test definition:	FINAL	+/- 2.5 %	2000.0 to 10000.0 Hz
		+/- 4.0 %	10000.0 to 20000.0 Hz

By:

P. KRAMP

Date: 12/27/2001

Endevco

Transportation Research Center

2 HILL 340
Head Z - nP

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5901

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2000LC
Serial Number: AAKC3

Input Resistance (ohms): 2541.6

ZMO (mV): -0.939

Resonance Frequency (Hz): 23141

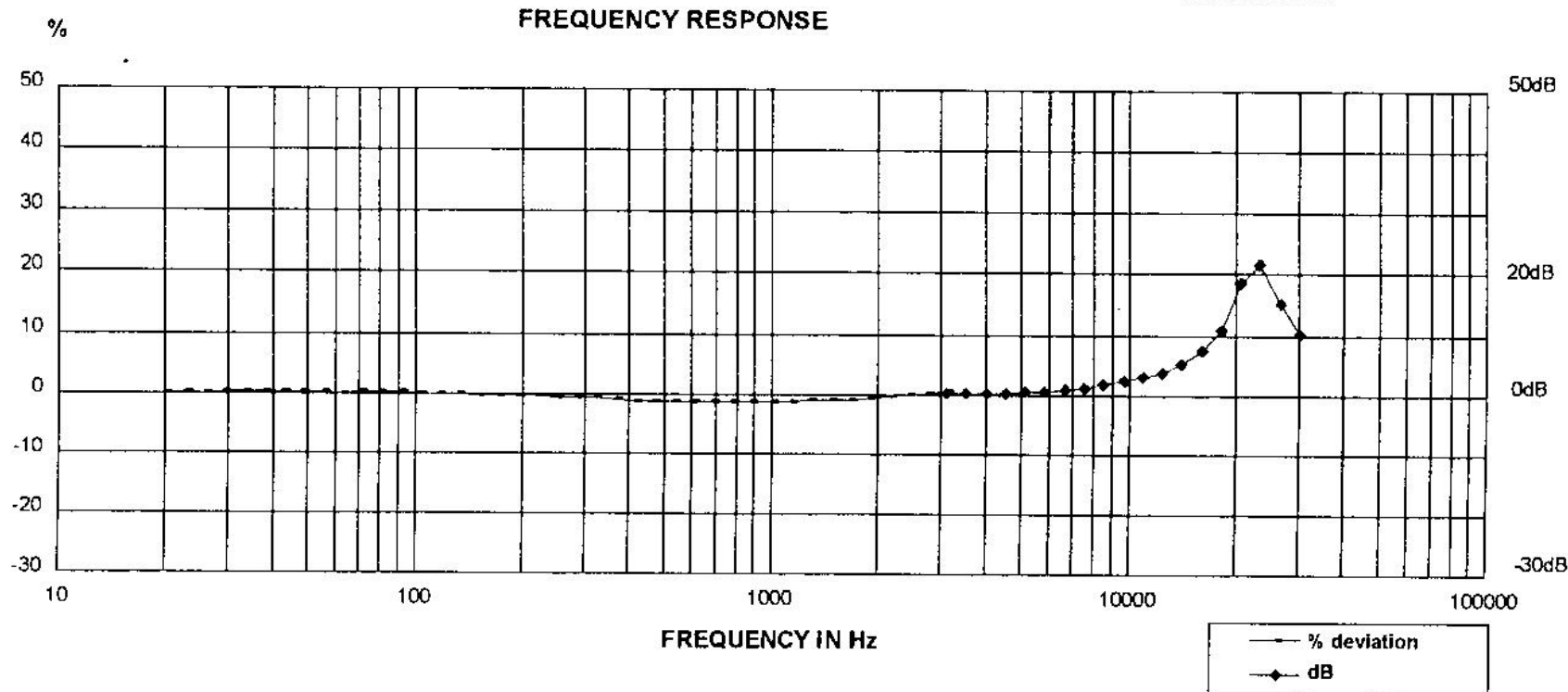
0.2796 mV/g @ 100 Hz, 10g pk

Last Sens: 2.793E-1, Change: 0.11

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NC SL Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)

Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By:
P. KRAMP

Date: 12/27/2001

Endevco
Transportation Research Center

540 H III 340

Head Red & WP

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5885

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: J20014

Input Resistance (ohms): 2746.4
ZMO (mV): 6.1260
Resonance Frequency (Hz): 23221

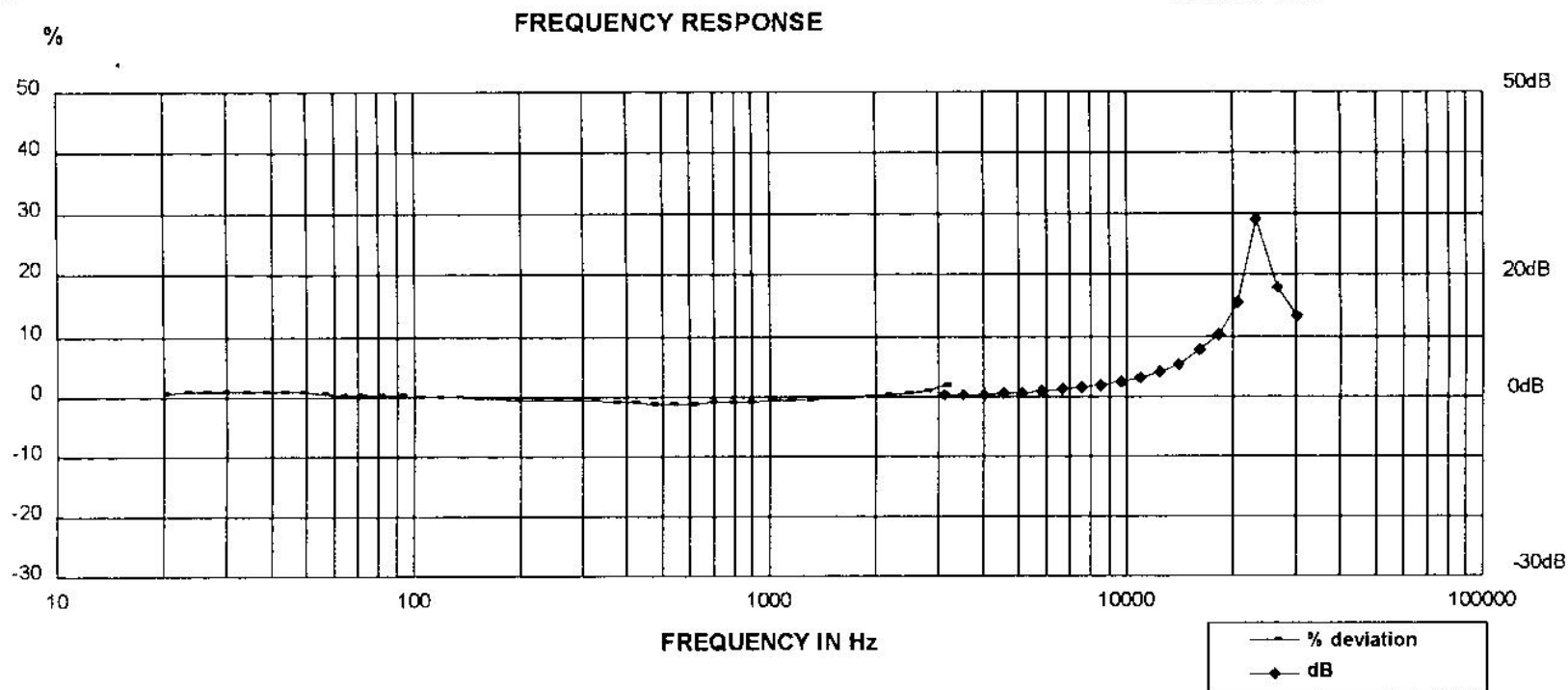
0.2339 mV/g @ 100 Hz, 10g pk

Last Sens: 2.337E-1, Change: 0.12

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)

Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By: *P. Kramp*
P. KRAMP

Date: 12/27/2001

Endevco
Transportation Research Center

#040 H11340
Chest X Fwd

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5881

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: AJ7R1

Input Resistance (ohms): 2259.7

ZMO (mV): 242.14
Resonance Frequency (Hz): 21554

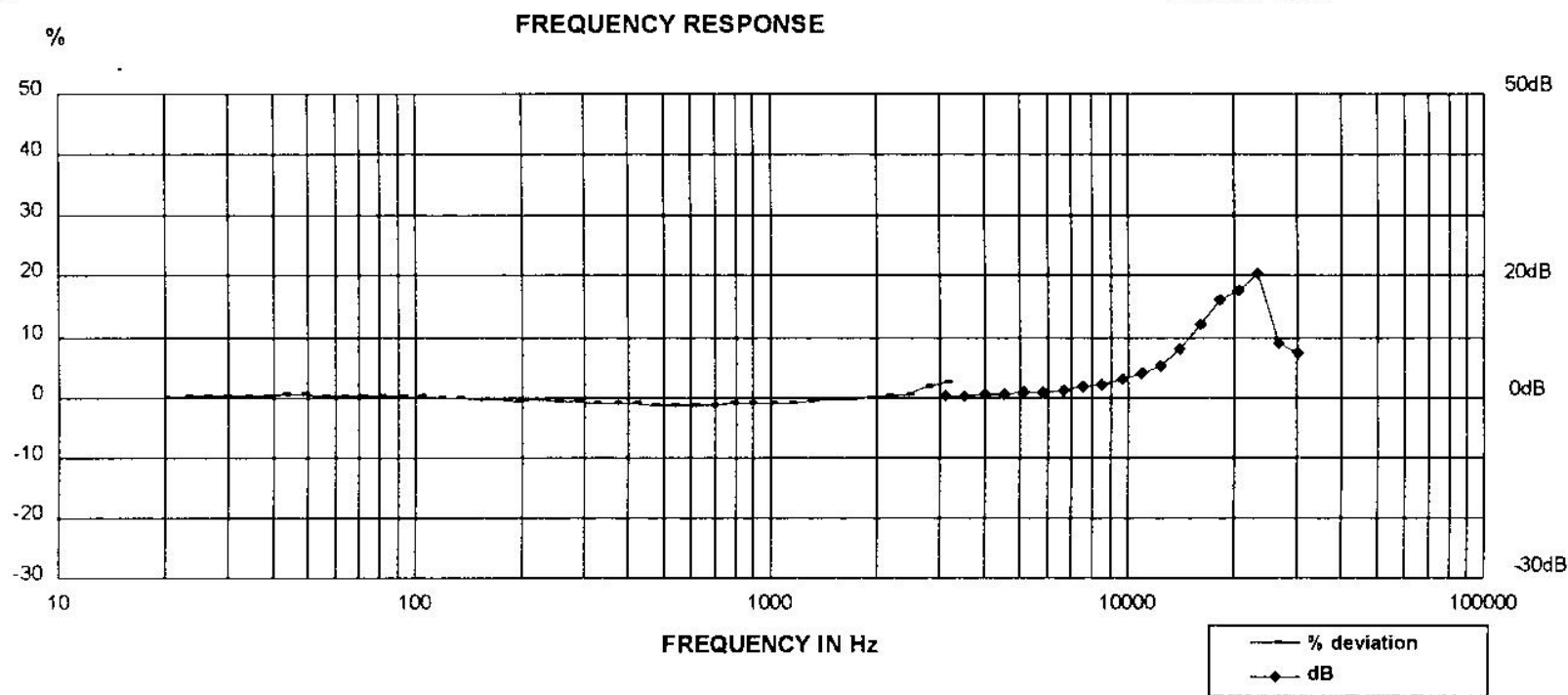
0.2308 mV/g @ 100 Hz, 10g pk

Last Sens: 2.228E-1, Change: 3.61

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



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Uncertainty estimate (96% confidence, k=2)

Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By:

P. KRAMP

Date: 12/27/2001

Endevco

Transportation Research Center

040 HIII 340
best Y-Left

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5898

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: J23996

Input Resistance (ohms): 2501.5
ZMO (mV): 10.798
Resonance Frequency (Hz): 28100

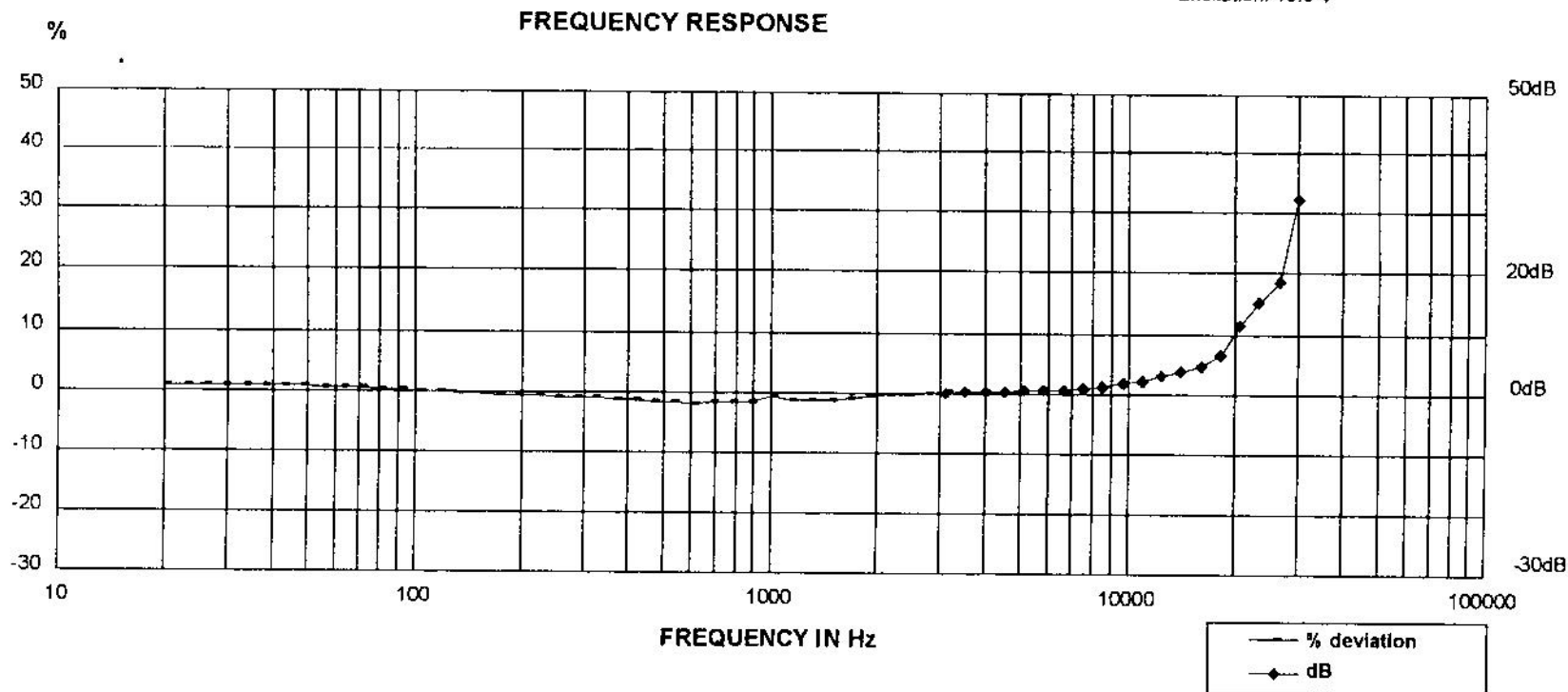
0.213 mV/g @ 100 Hz, 10g pk

Last Sens: 2.130E-1, Change: -0.02

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)		
onsole serial number: AC27	+/- 1.1 %	100.0 Hz Sensitivity
NIST traceability #: 822/262802-00	+/- 5.0 %	10.0 to 20.0 Hz
Equipment used: 2901	+/- 1.5 %	20.0 to 2000.0 Hz
Test definition: FINAL	+/- 2.5 %	2000.0 to 10000.0 Hz
	+/- 4.0 %	10000.0 to 20000.0 Hz

By:

P. KRAMP

Date: 12/27/2001

Endevco

Transportation Research Center

040 HILL 340

Chest 2 WP

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5877

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-738QE0-2000BF
Serial Number: 99H12-F08

Input Resistance (ohms): 967.13

ZMO (mV): 3.6412
Resonance Frequency (Hz): 23642

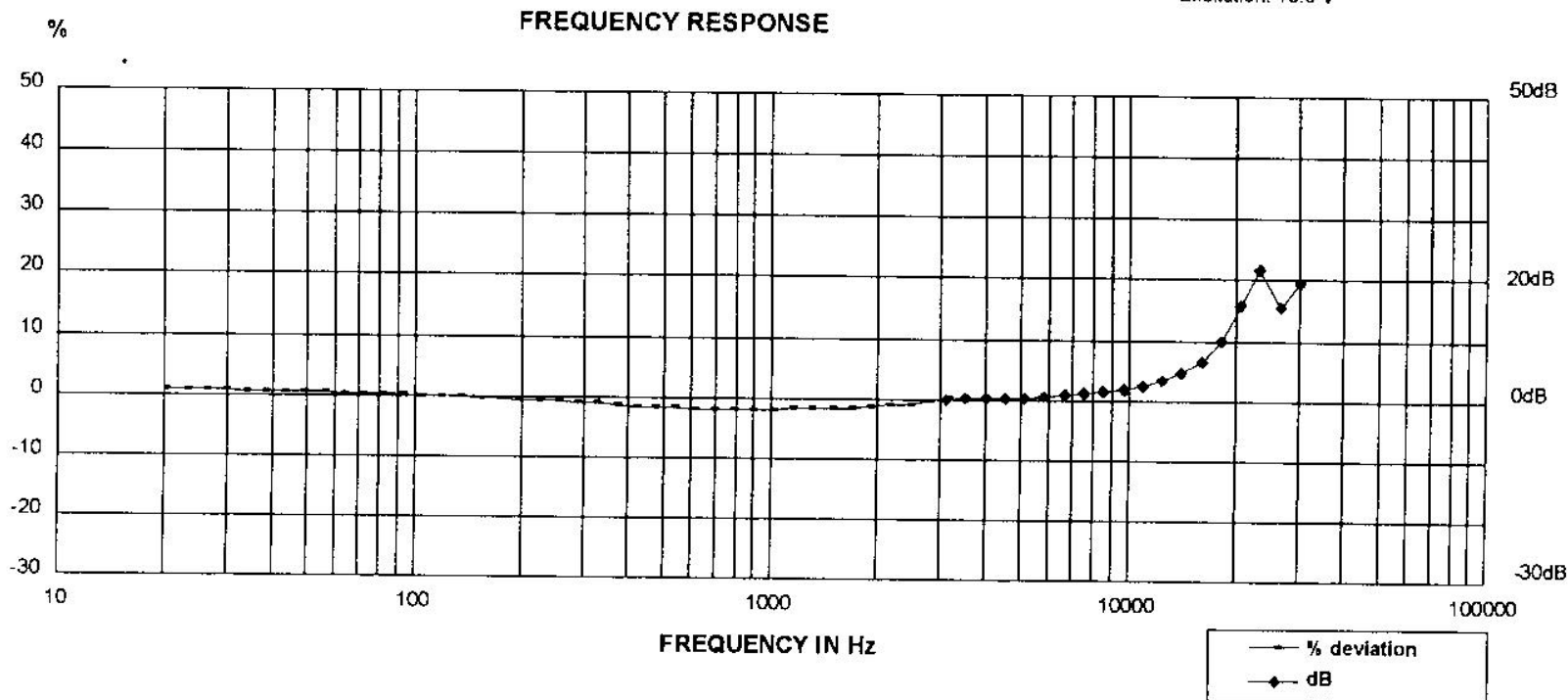
0.1765 mV/g @ 100 Hz, 10g pk

Last Sens: 1.776E-1, Change: -0.6

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



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Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

Uncertainty estimate (95% confidence, k=2)

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By: *P. Kramp*
P. KRAMP

Date: 12/27/2001

Endevco
Transportation Research Center

10 HIII 3VO
Pelvis X Rear

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5888

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: BG37J

Input Resistance (ohms): 2387.0

ZMO (mV): 25.223
Resonance Frequency (Hz): 17441

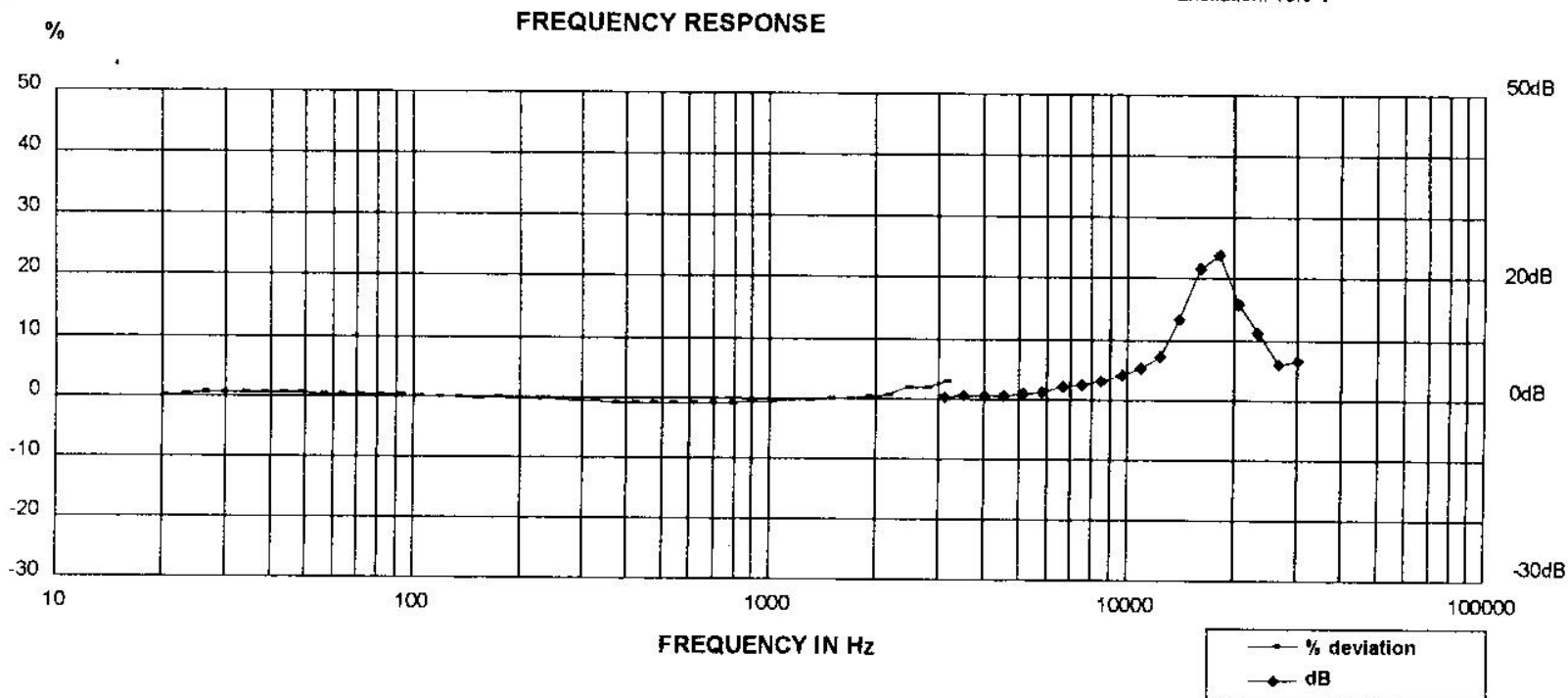
0.3455 mV/g @ 100 Hz, 10g pk

Last Sens: 3.416E-1, Change: 1.16

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Console serial number:	AC27	Uncertainty estimate (95% confidence, k=2)	
NIST traceability #:	822/262802-00	+/- 1.1 %	100.0 Hz Sensitivity
Equipment used:	2901	+/- 5.0 %	10.0 to 20.0 Hz
Test definition:	FINAL	+/- 1.5 %	20.0 to 2000.0 Hz
		+/- 2.5 %	2000.0 to 10000.0 Hz
		+/- 4.0 %	10000.0 to 20000.0 Hz

By:
P. KRAMP

Date: 12/27/2001

Endevco
Transportation Research Center

040 H111 340
Pelvis Y Left

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5897

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: J35560

Input Resistance (ohms): 2344.9

ZMO (mV): 2.3662

Resonance Frequency (Hz): 24873

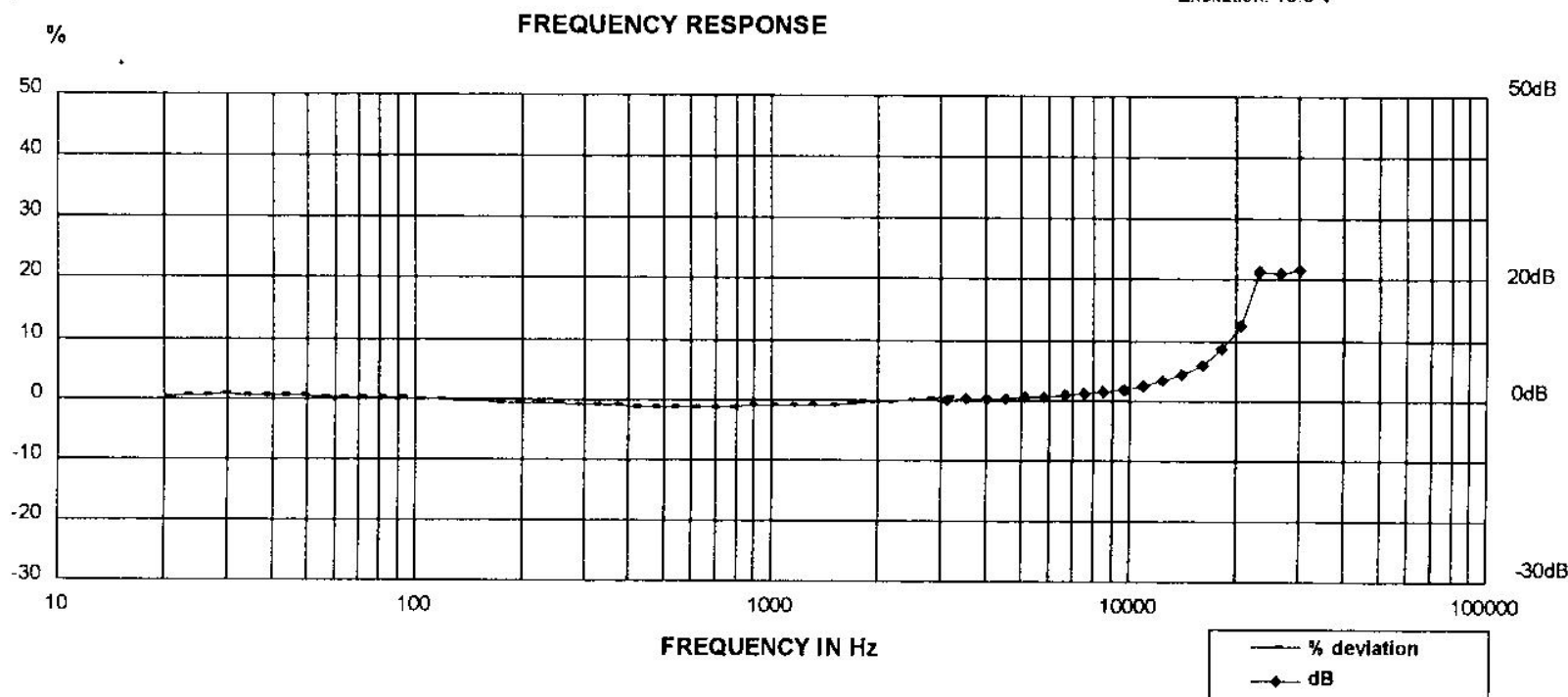
0.2445 mV/g @ 100 Hz, 10g pk

Last Sens: 2.427E-1, Change: 0.71

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSL Z540-1-1994 (MIL-STD 45662A).

Console serial number: AC27
NIST traceability #: 822/262802-00
Equipment used: 2901
Test definition: FINAL

Uncertainty estimate (95% confidence, k=2)

+/- 1.1 %	100.0 Hz Sensitivity
+/- 5.0 %	10.0 to 20.0 Hz
+/- 1.5 %	20.0 to 2000.0 Hz
+/- 2.5 %	2000.0 to 10000.0 Hz
+/- 4.0 %	10000.0 to 20000.0 Hz

By:

P. KRAMP

Date: 12/27/2001

Endevco

Transportation Research Center

Delvis E WP

Calibration Certificate

Customer: VTRC
19950311-0130

Document number: 5900

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: DE15J

Input Resistance (ohms): 2495.9
ZMO (mV): 4.9151
Resonance Frequency (Hz): 24914

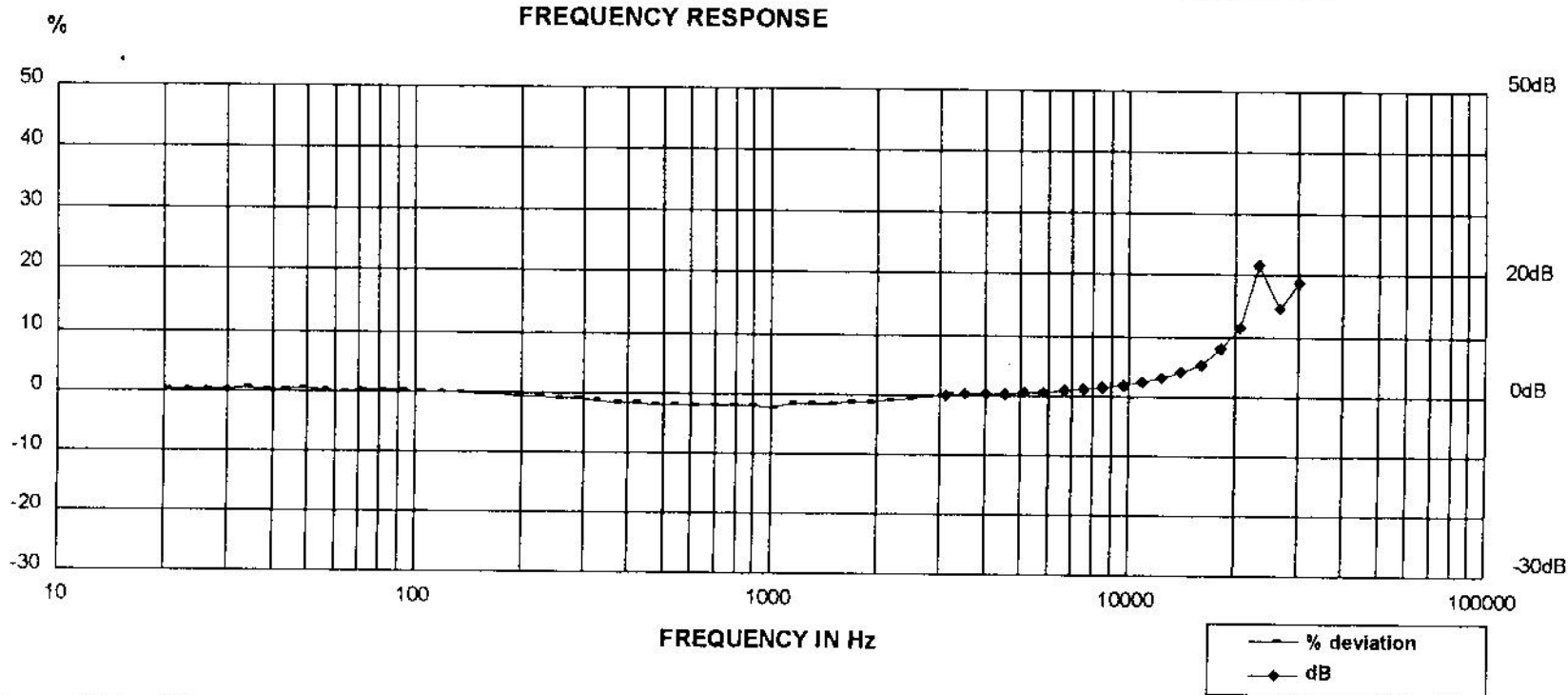
0.2266 mV/g @ 100 Hz, 10g pk

Last Sens: 2.268E-1, Change: -0.06

Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V



Endevco, a division of Meggitt, located at 30700 Rancho Viejo Road, San Juan Capistrano, CA, certifies that the above instrument was tested using comparison calibrations per ANSI S2.2 using Endevco IM68357. This calibration is traceable to the National Institute of Standards and Technology and is in accordance with ANSI/NCSS Z540-1-1994 (MIL-STD 45662A).

Uncertainty estimate (95% confidence, k=2)

onsole serial number: AC27	+/- 1.1 %	100.0 Hz Sensitivity
NIST traceability #: 822/262802-00	+/- 5.0 %	10.0 to 20.0 Hz
Equipment used: 2901	+/- 1.5 %	20.0 to 2000.0 Hz
Test definition: FINAL	+/- 2.5 %	2000.0 to 10000.0 Hz
	+/- 4.0 %	10000.0 to 20000.0 Hz

By:

P. KRAMP

Date: 12/27/2001

Endevco

Transportation Research Center

**TRANSPORTATION RESEARCH CENTER INC.
HYBRID III THREE-YEAR-OLD EXTERNAL DIMENSIONS**

SN: 040

MFG: Denton

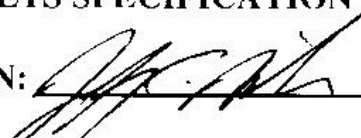
DATE: 15-Jan-02

TRC INC. TEST NO: 040C01ED

572P SN040EXT. DIMENSION CAL 01

TEST PARAMETER	DIMEN.	SPECIFICATION	TEST RESULTS
Total Sitting Height	A	538.5 - 553.7 MM	548.6 MM
Shoulder Pivot Height	B	307.4 - 322.6 MM	312.4 MM
Hip Pivot Height	C	33 - 43.2 MM	38.1 MM
Hip Pivot from Backline	D	56.9 - 67.1 MM	61.0 MM
Shoulder Pivot from Backline	E	58.4 - 68.6 MM	66.0 MM
Thigh Clearance	F	81 - 91.2 MM	83.8 MM
Back of Elbow to Wrist Pivot	G	247.4 - 262.6 MM	248.9 MM
Head Back from Backline	H	48.2 - 58.4 MM	53.3 MM
Shoulder to Elbow Length	I	185.4 - 200.6 MM	193.0 MM
Elbow Rest Height	J	133.6 - 148.8 MM	137.2 MM
Buttock to Knee Length	K	287.3 - 302.5 MM	299.7 MM
Popliteal Height	L	221 - 236.2 MM	231.1 MM
Knee to Floor Height	M	241.6 - 256.8 MM	254.0 MM
Buttock Popliteal Length	N	218 - 233.2 MM	226.1 MM
Chest Depth	O	134.6 - 149.8 MM	142.2 MM
Foot Length	P	137.6 - 147.8 MM	139.7 MM
Stature	Q	932.2 - 957.6 MM	942.3 MM
Buttock to Knee Pivot Length	R	251.4 - 261.6 MM	256.5 MM
Head Breadth	S	128.3 - 143.5 MM	139.7 MM
Head Depth	T	167.4 - 182.6 MM	177.8 MM
Hip Breadth	U	200.7 - 215.9 MM	205.7 MM
Shoulder Breadth	V	236.5 - 251.7 MM	238.8 MM
Foot Breadth	W	53.6 - 63.8 MM	57.2 MM
Head Circumference	X	500.4 - 515.6 MM	502.9 MM
Chest Circumference with Jacket	Y	527.1 - 552.5 MM	530.9 MM
Waist Circumference	Z	527.1 - 552.5 MM	541.0 MM
Reference Location for Chest Circumference	AA	248.9 - 259.1 MM	254.0 MM
Reference Location for Waist Circumference	BB	160 - 170.2 MM	165.1 MM

DUMMY MEETS SPECIFICATION

TECHNICIAN: 

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III THREE YEAR OLD

14-JAN-02

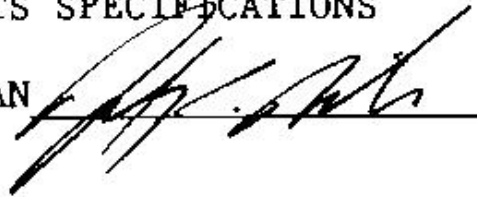
TRC INC.

TEST NO: 040C01HD1

572P 3YO SN040 HEAD DROP CAL01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	20.6 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PEAK RESULTANT ACCELERATION	250 - 280 G	252.61 G
PEAK LATERAL ACCELERATION	15 G MAX	12.80 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 011402.1417;1

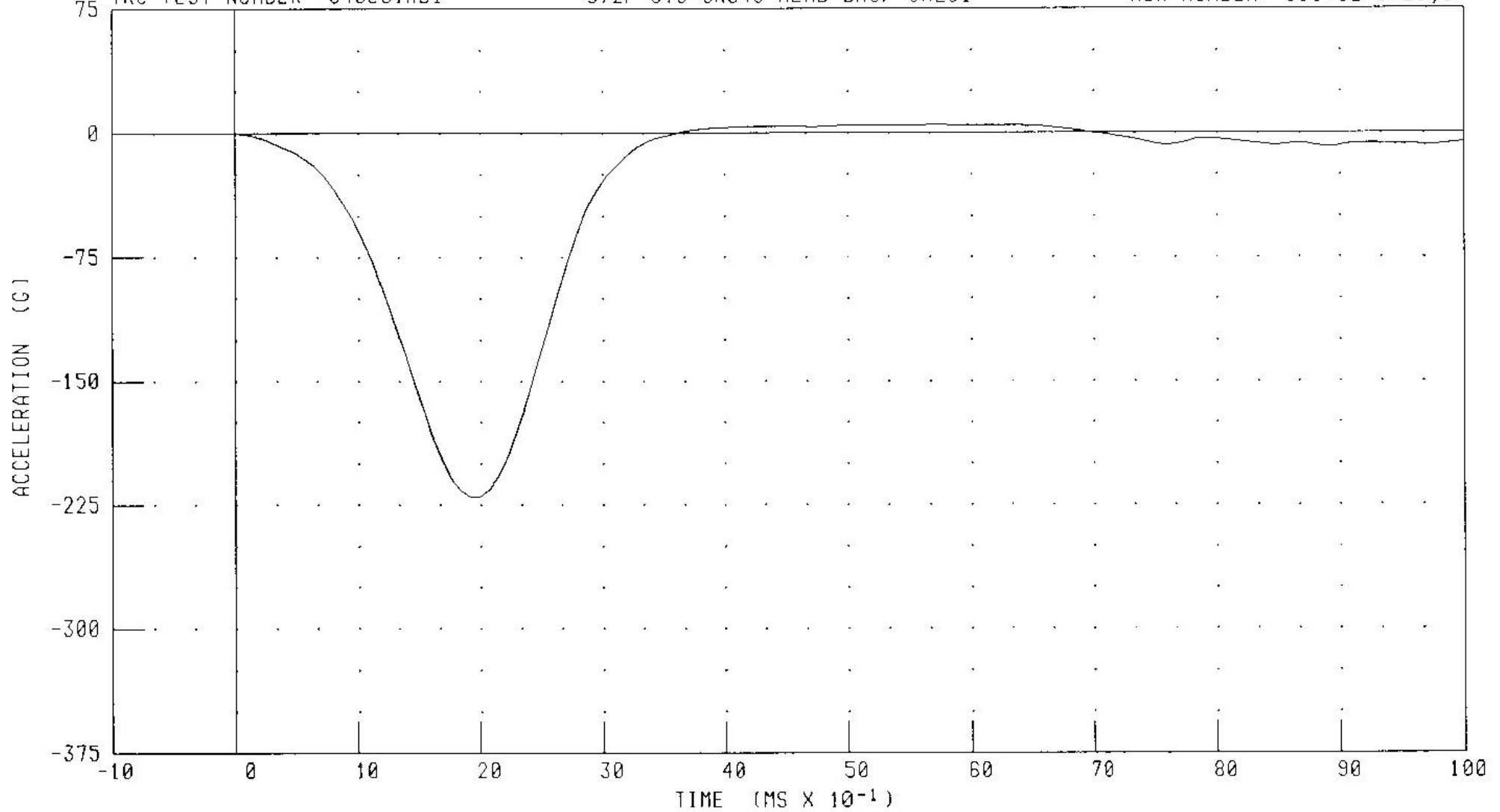
HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER 040C01HD1

572P 3YD SN040 HEAD DROP CAL01

RUN NUMBER: 011402 1420;1



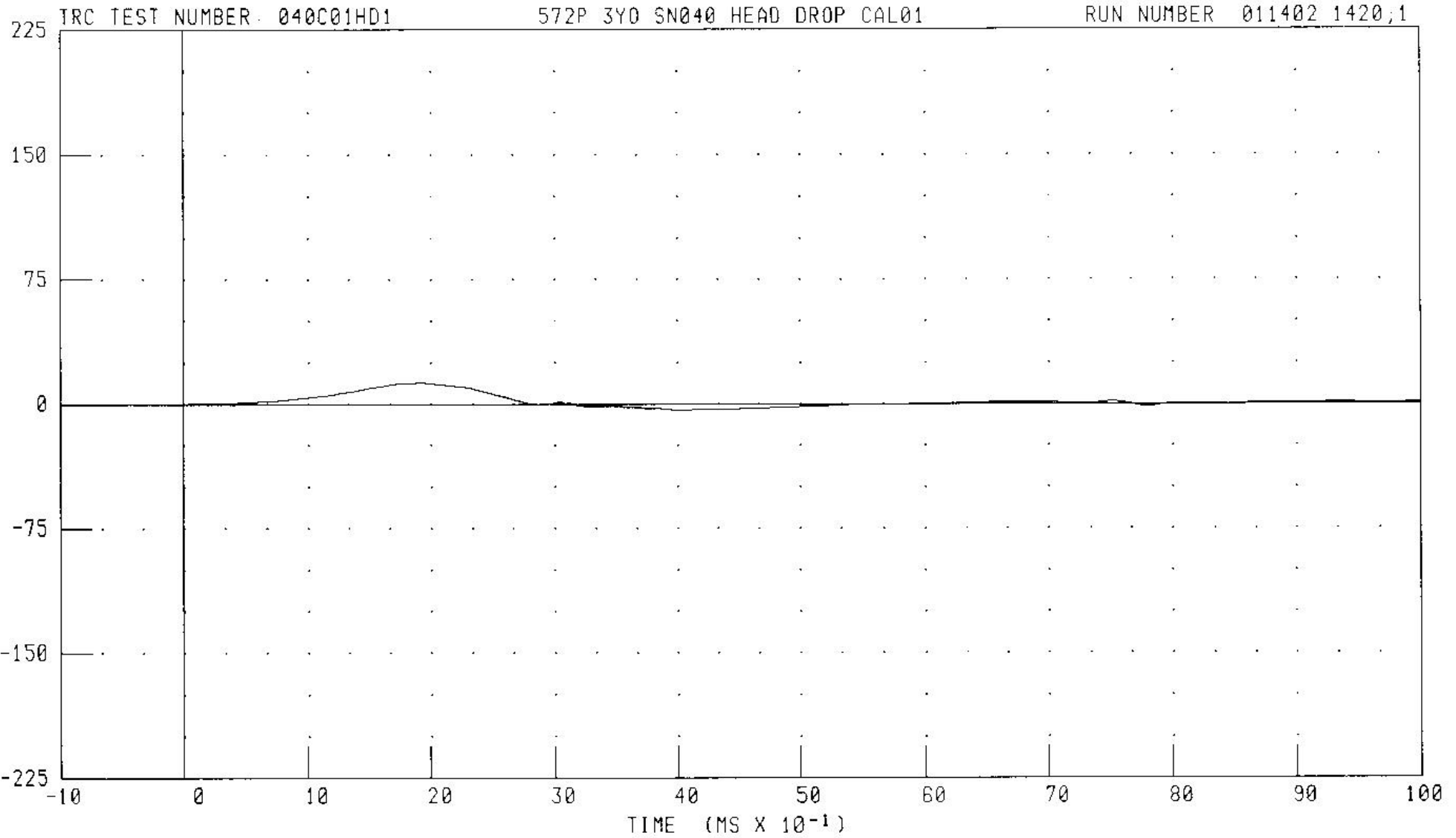
CHANNEL: HEDXC

FILTER: CH CLASS 1000

PEAK DATA: 5.00 G @ 5.76 MS; -220.43 G @ 1.92 MS

HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION Y AXIS



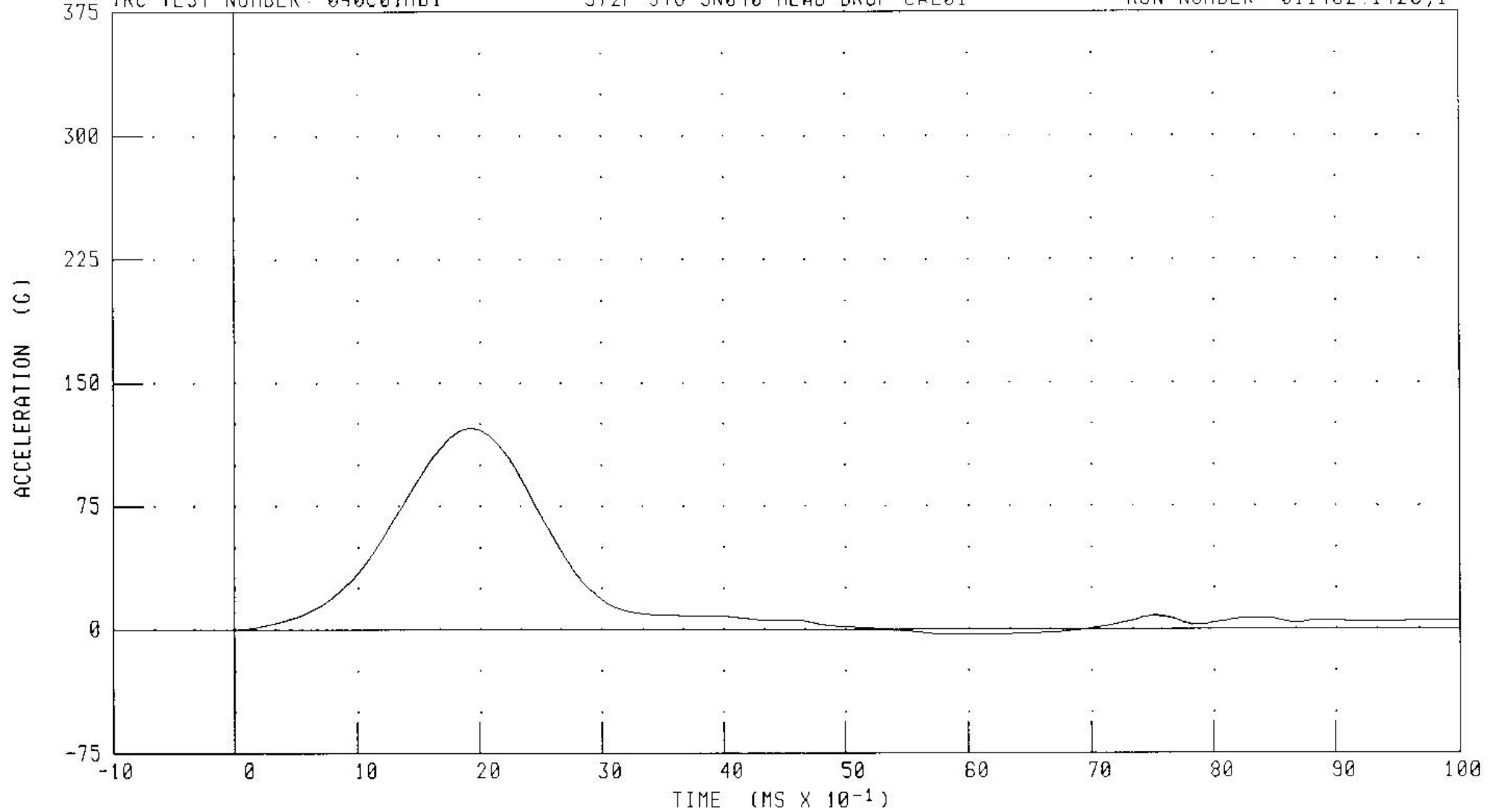
HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 040C01HD1

572P 3YO SN040 HEAD DROP CAL01

RUN NUMBER: 011402.1420,1



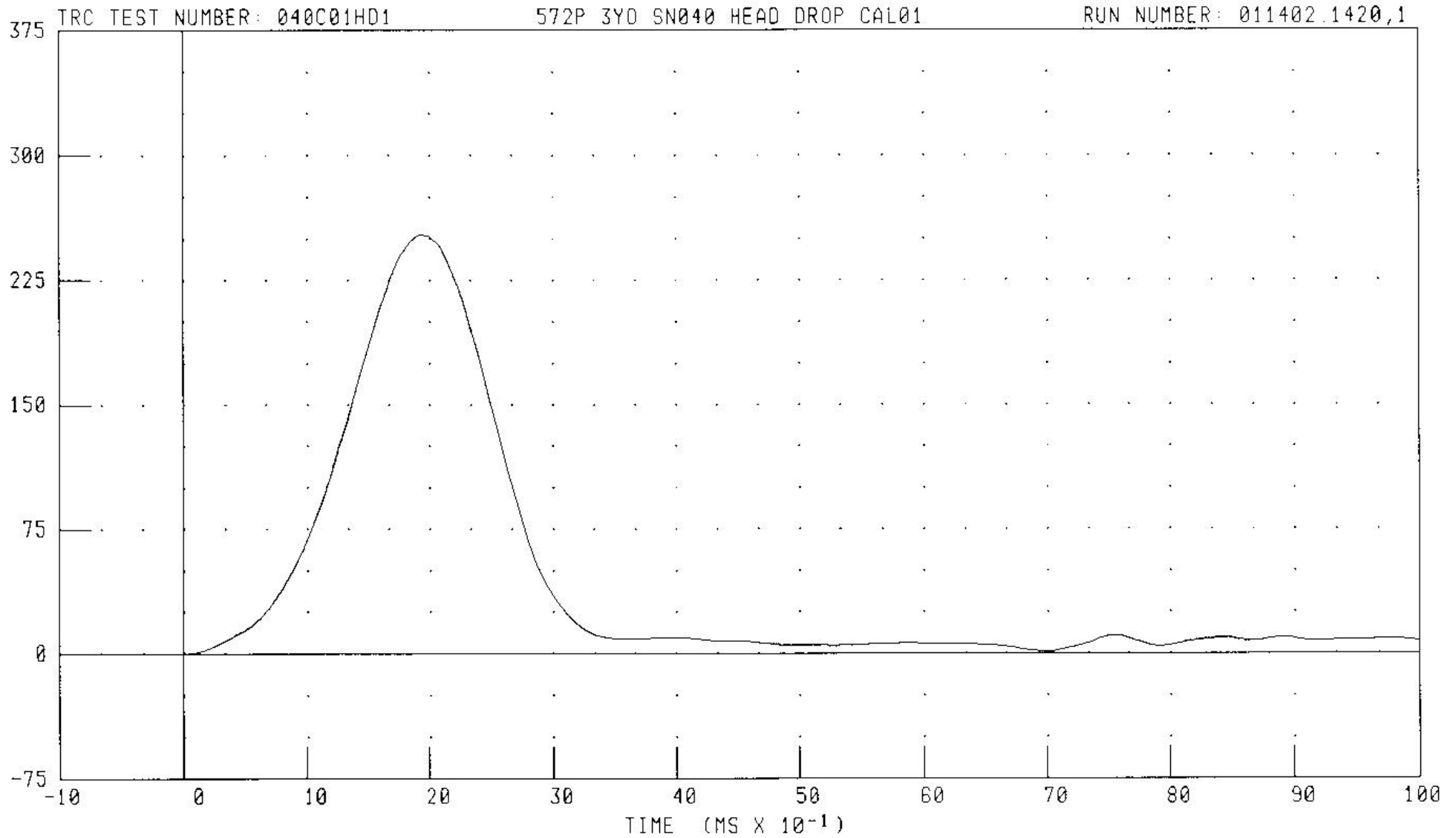
CHANNEL: HEDZG

FILTER: CH. CLASS 1000

PEAK DATA: 122.72 G @ 1.92 MS, -3.48 G @ 5.84 MS

HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD RESULTANT ACCELERATION



CHANNEL: HEDRG

FILTER: CH. CLASS 1000

PEAK DATA 252.61 G @ 1.92 MS, 0.00 G @ -0.80 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III THREE YEAR OLD

17-JAN-02

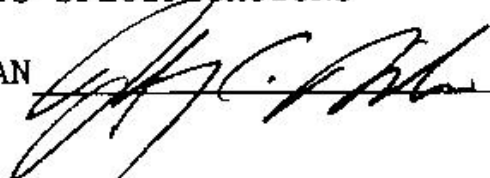
NECK FLEXION TEST

TRC INC. TEST NO: 040C01NF3 572P 3YO SN040 NECK FLEX CAL01

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	18.0 %
IMPACT VELOCITY		5.40 - 5.60 M/S	5.60 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.0 - 2.7 M/S	2.48 M/S
	15 MS	3.0 - 4.0 M/S	3.67 M/S
	20 MS	4.0 - 5.1 M/S	5.02 M/S
PEAK D-PLANE ROTATION		70 - 82 DEG.	70.70 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		42 - 53 NM	45.48 NM
POSITIVE MOMENT DECAY TIME TO 10 NM LEVEL		60 - 80 MS	64.64 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 011702.0817;1

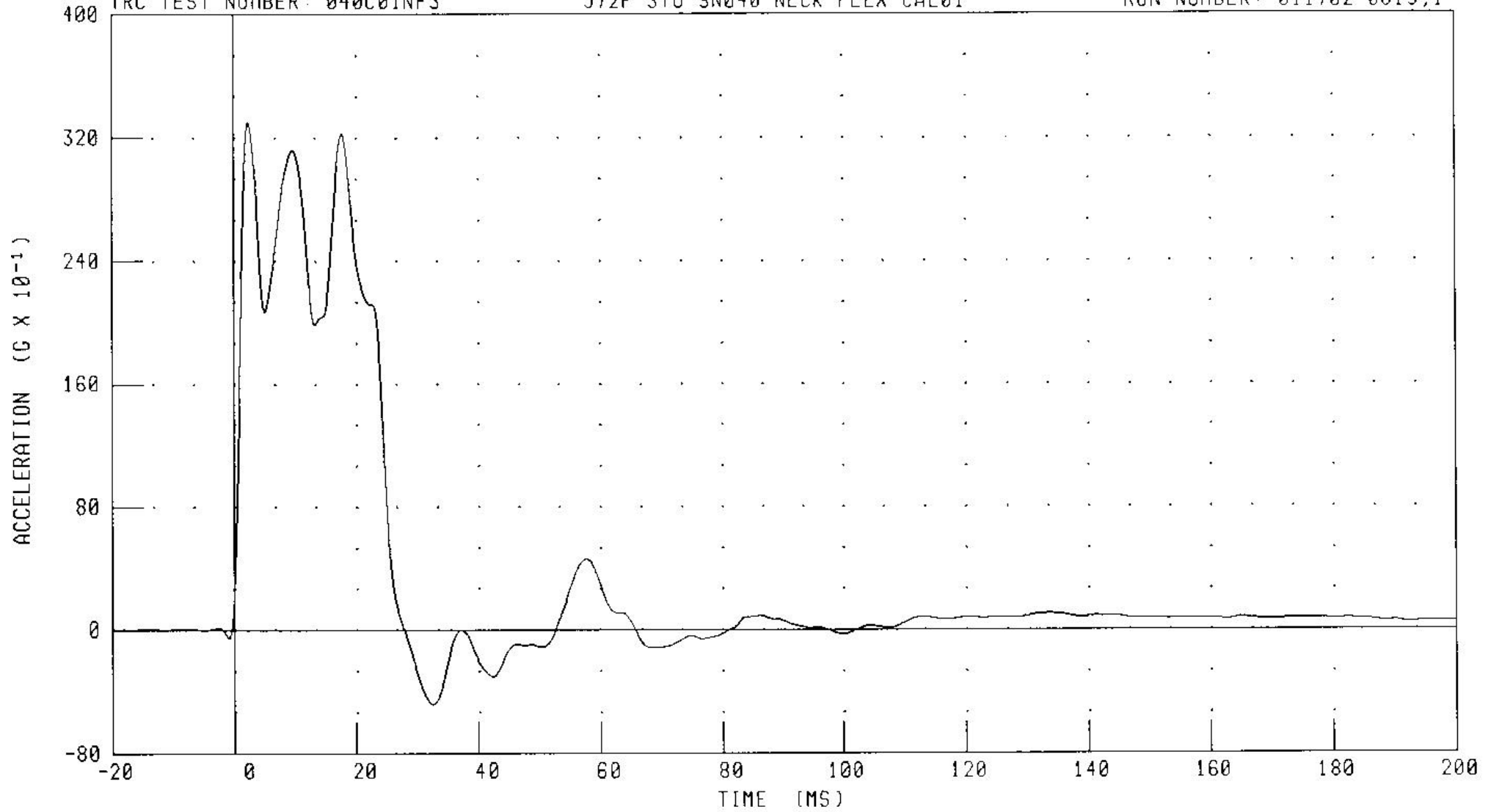
HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 040C01NF3

572P 3YO SN040 NECK FLEX CAL01

RUN NUMBER: 011702 0819,1



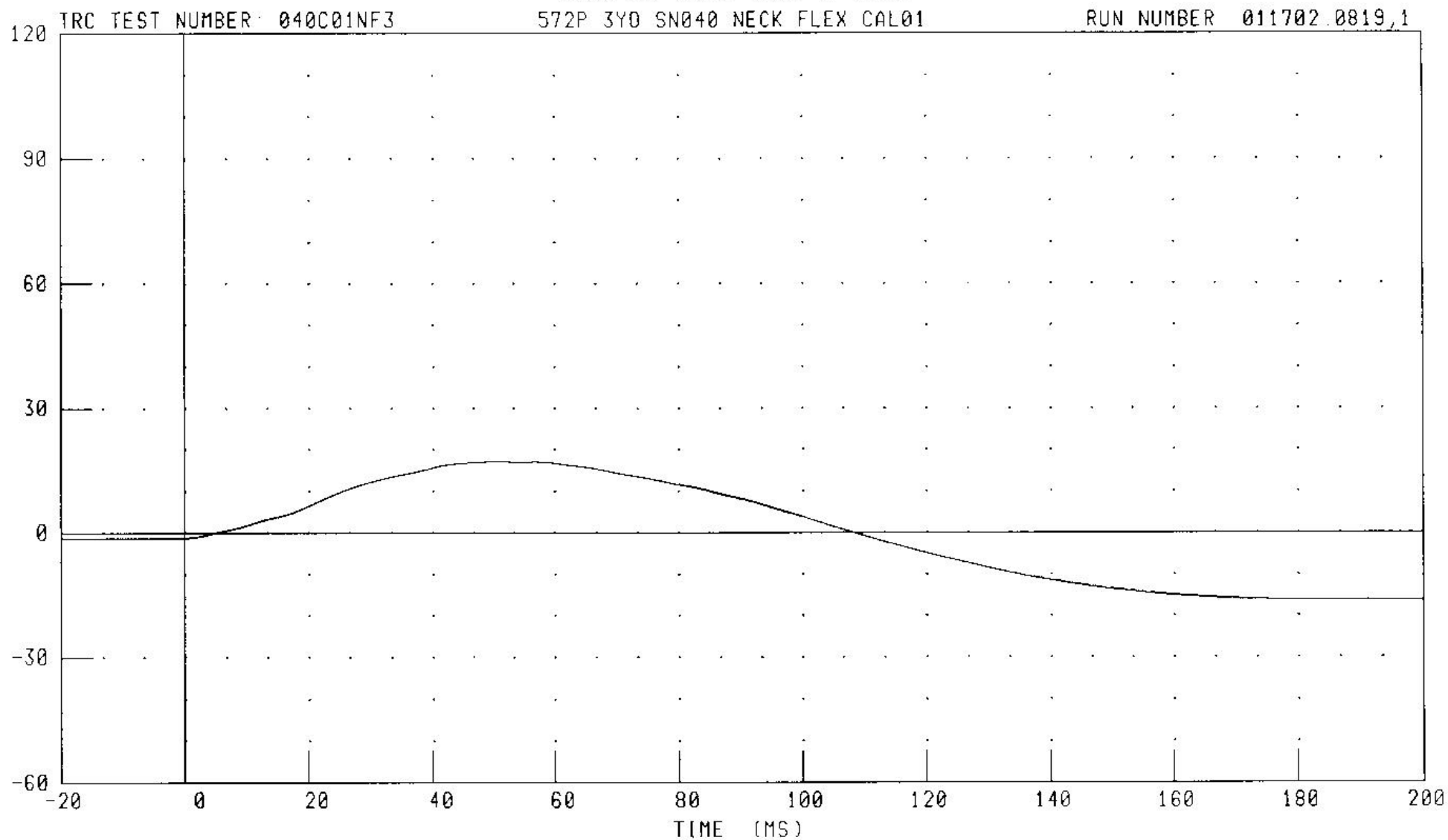
CHANNEL: PENXC

FILTER: CH. CLASS 180

PEAK DATA: 33.04 G @ 2.32 MS, -4.82 G @ 32.48 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK



CHANNEL: BETA

FILTER: CH. CLASS 60

PEAK DATA: 17.12 ° @ 50.48 MS, -16.45 ° @ 190.16 MS

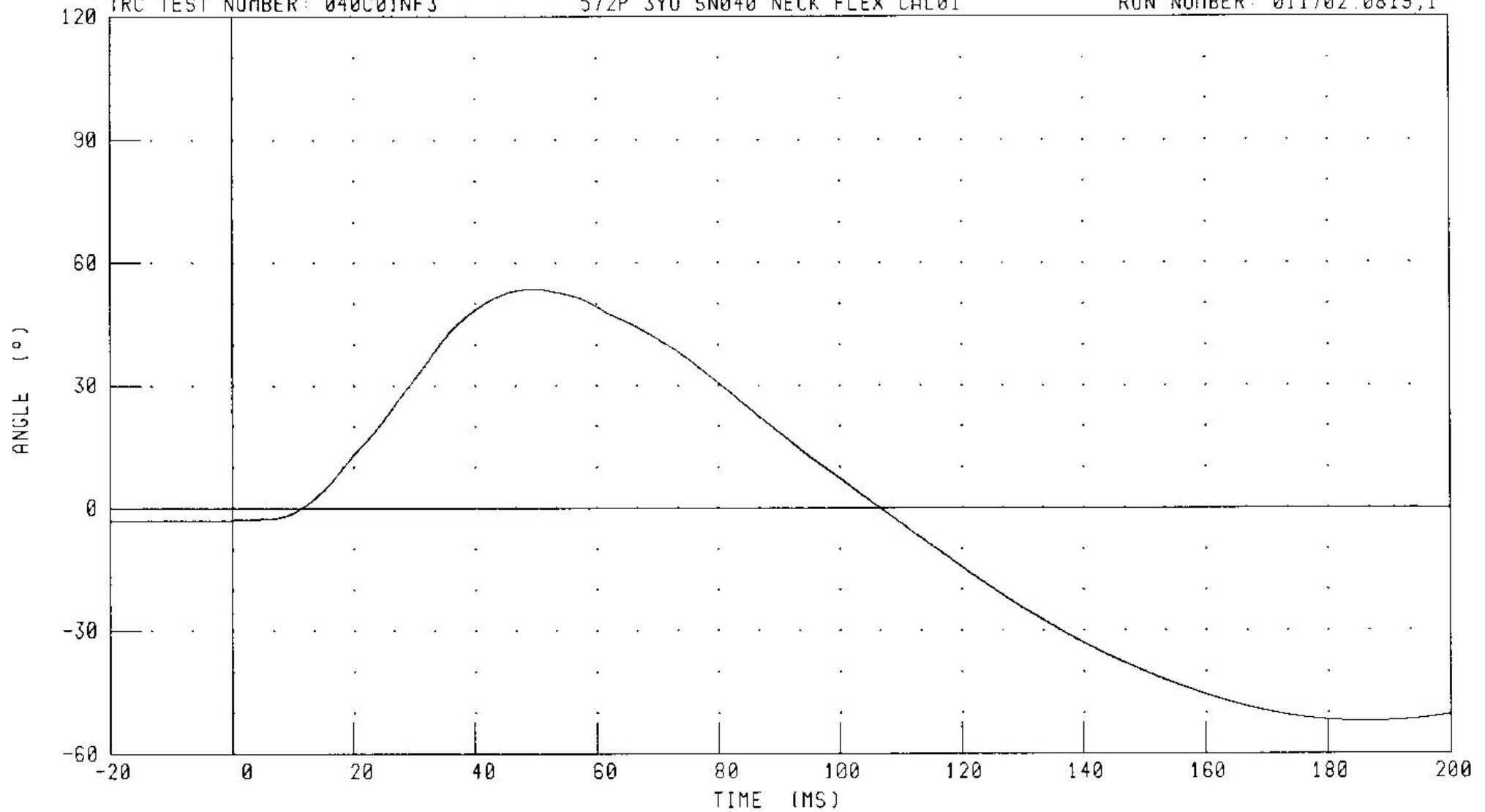
HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 040C01NF3

572P 3YO SN040 NECK FLEX CAL01

RUN NUMBER: 011702.0819,1

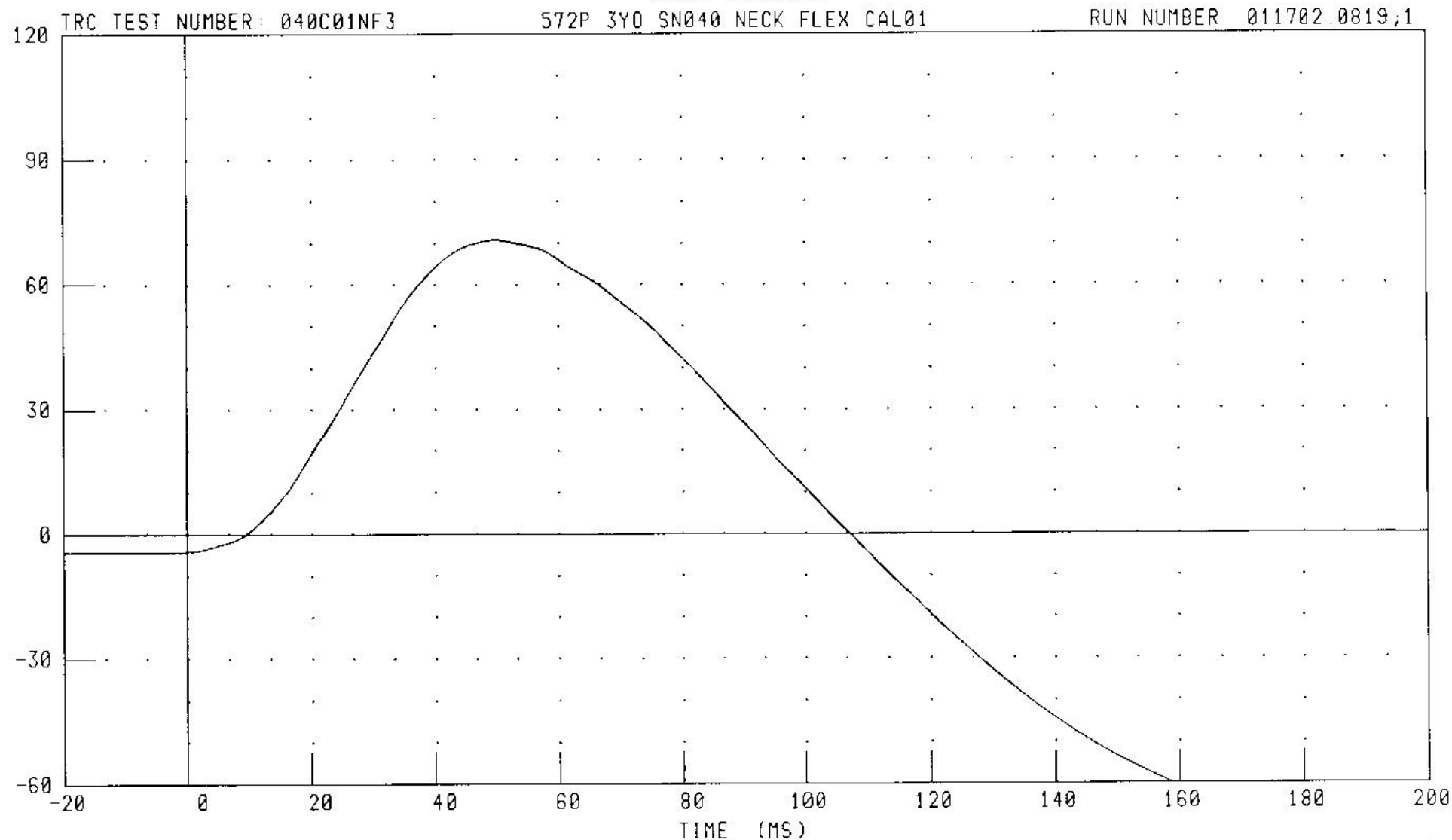


CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 53.59 ° @ 49.68 MS, -52.19 ° @ 186.16 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TOTAL ROTATION



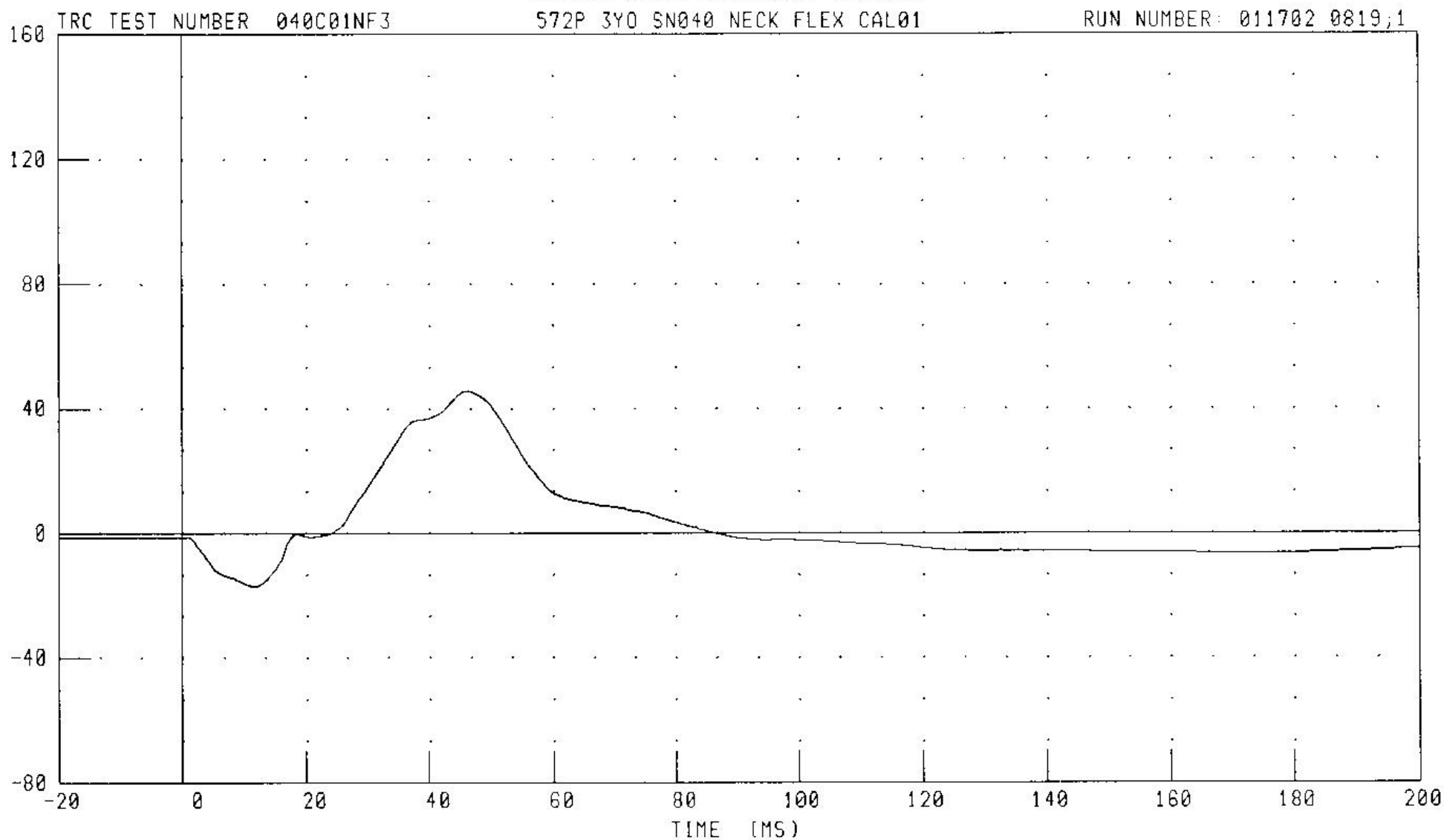
CHANNEL: TOTAN

FILTER: CH. CLASS 60

PEAK DATA: 70.70 ° @ 49.84 MS, -60.63 ° @ 186.24 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

MOMENT ABOUT OCCIPITAL CONDYLE



CHANNEL: NEKYM

FILTER: CH. CLASS 600

PEAK DATA: 45.75 N·M @ 46.00 MS, -17.17 N·M @ 11.60 MS

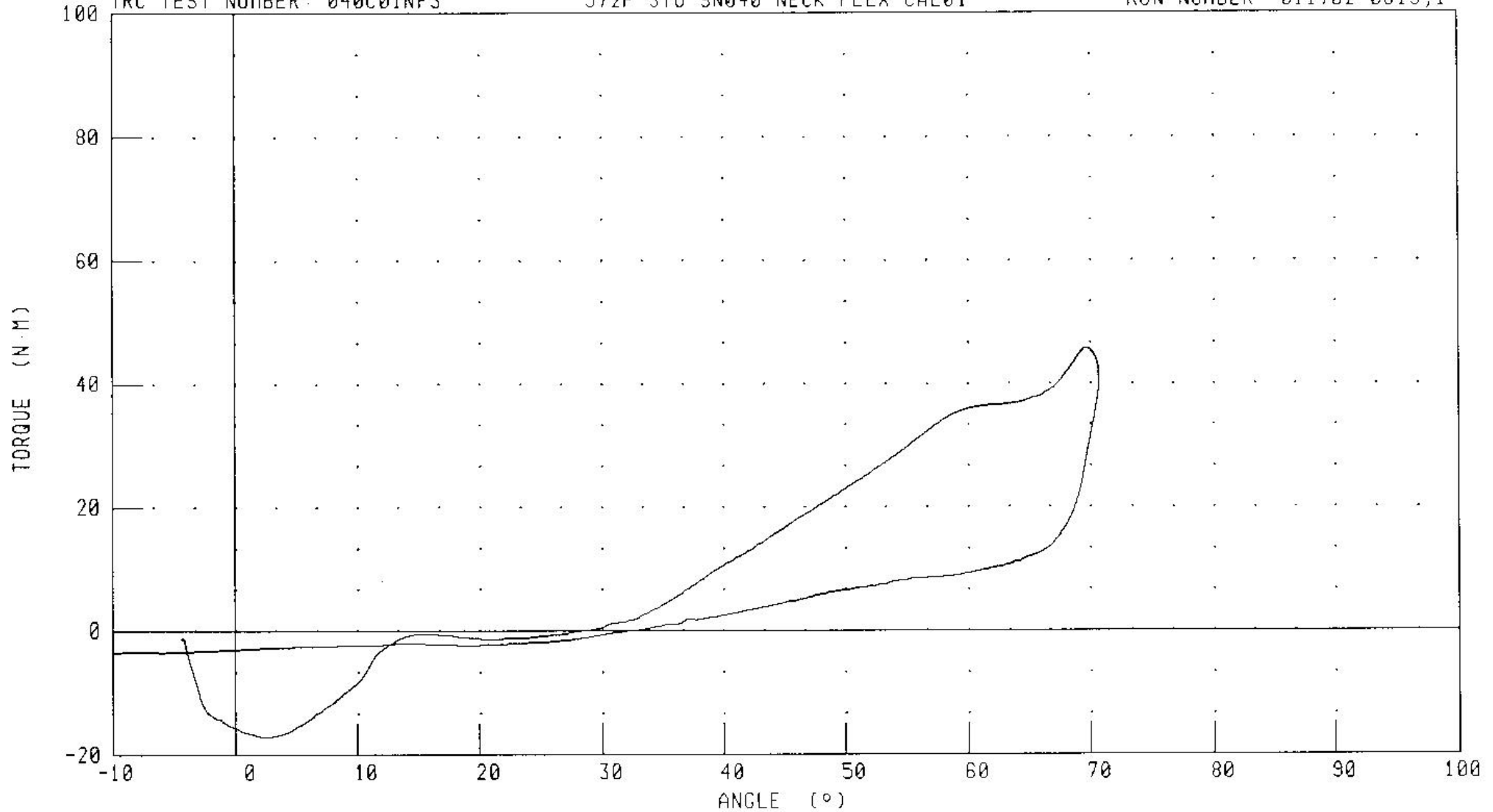
HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER: 040C01NF3

572P 3Y0 SN040 NECK FLEX CAL01

RUN NUMBER: 011702 0819;1



CHANNEL: TOTAN
NEKYM

FILTER: CH. CLASS 60
CH. CLASS 600

PEAK DATA: 70.70 ° @ 49.84 MS; -68.63 ° @ 186.24 MS
45.75 N M @ 46.00 MS; -17.17 N M @ 11.60 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III THREE YEAR OLD

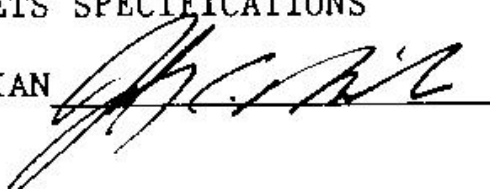
15-JAN-02

NECK EXTENSION TEST

TRC INC. TEST NO: 040C01NE1 572P 3Y0 SN040 NECK EXT CAL01

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	22.0 %
IMPACT VELOCITY		3.55 - 3.75 M/S	3.70 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	1.0 - 1.4 M/S	1.26 M/S
	10 MS	1.9 - 2.5 M/S	2.32 M/S
	30 MS	2.8 - 3.5 M/S	3.37 M/S
PEAK D-PLANE ROTATION		83 - 93 DEG.	87.48 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		-43.7 / -53.3 NM	-46.94 NM
NEGATIVE MOMENT DECAY TIME TO -10 NM LEVEL		60 - 80 MS	82.64 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 011502.0758;1

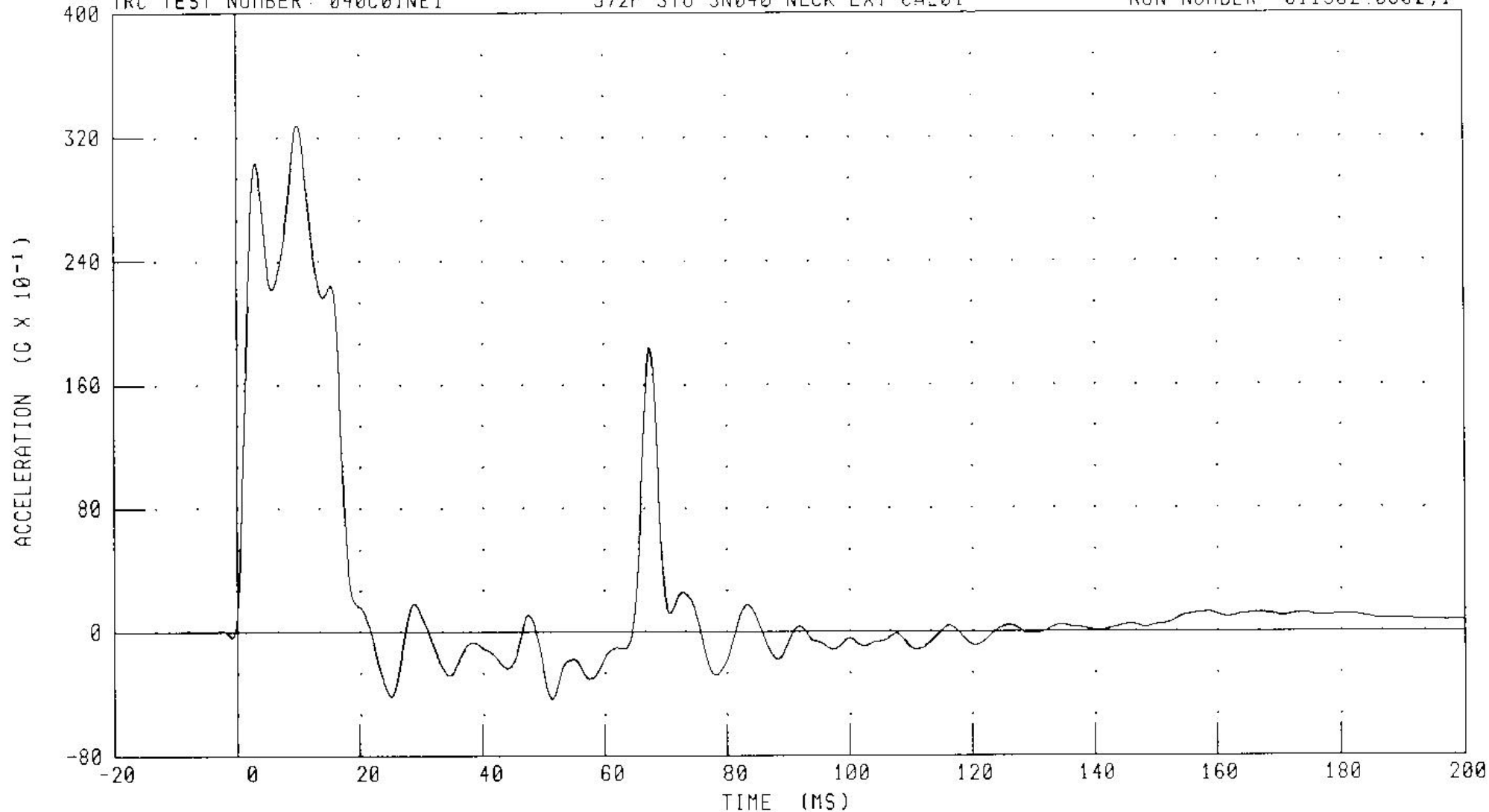
HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 040C01NE1

572P 3Y0 SN040 NECK EXT CAL01

RUN NUMBER 011502.0802,1



CHANNEL: PENXC

FILTER: CH CLASS 180

PEAK DATA: 32.80 G @ 10.00 MS; -4.34 G @ 51.52 MS

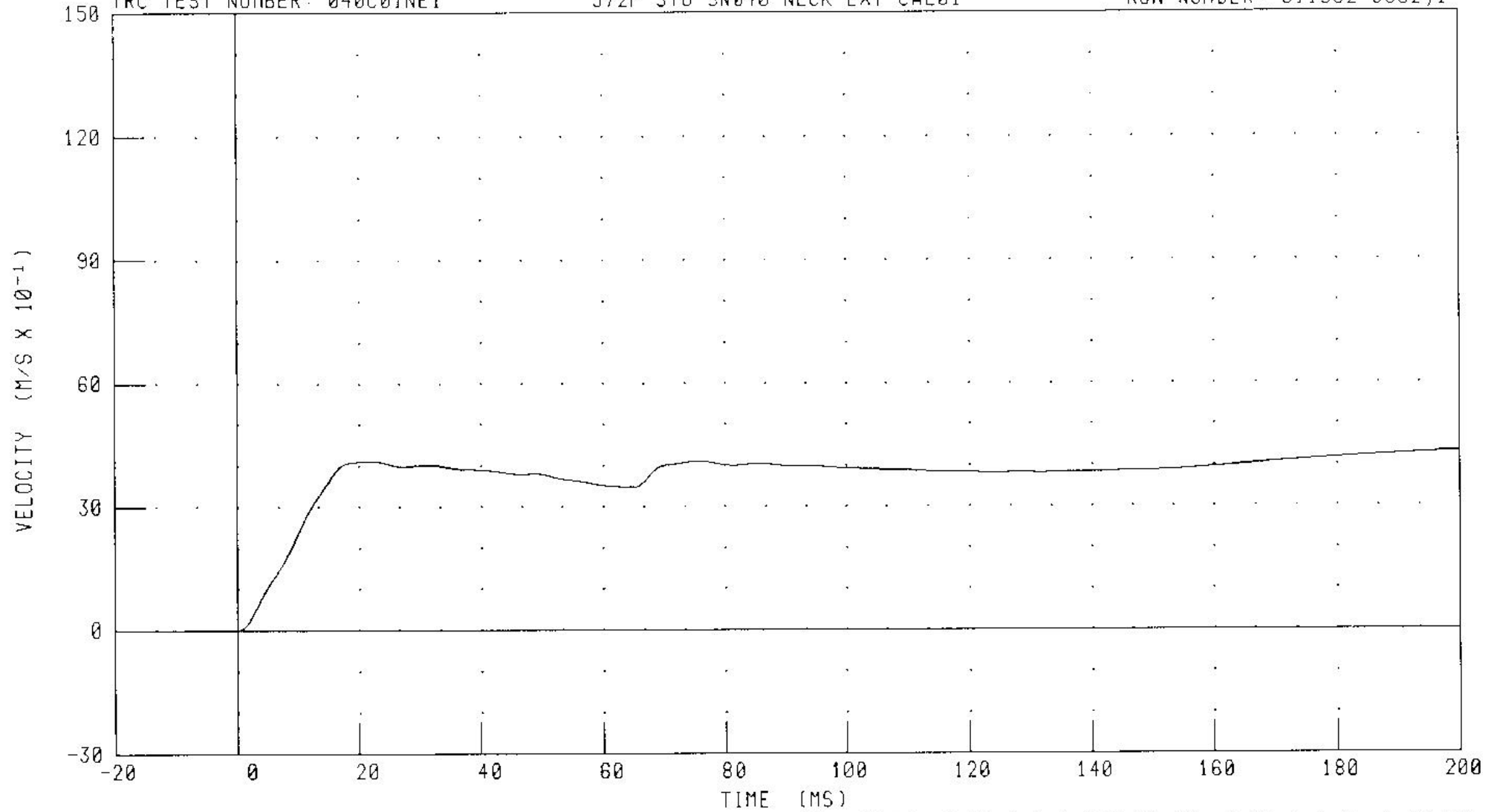
HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

INTEGRATED PENDULUM VELOCITY

TRC TEST NUMBER: 040C01NE1

572P 3Y0 SN040 NECK EXT CAL01

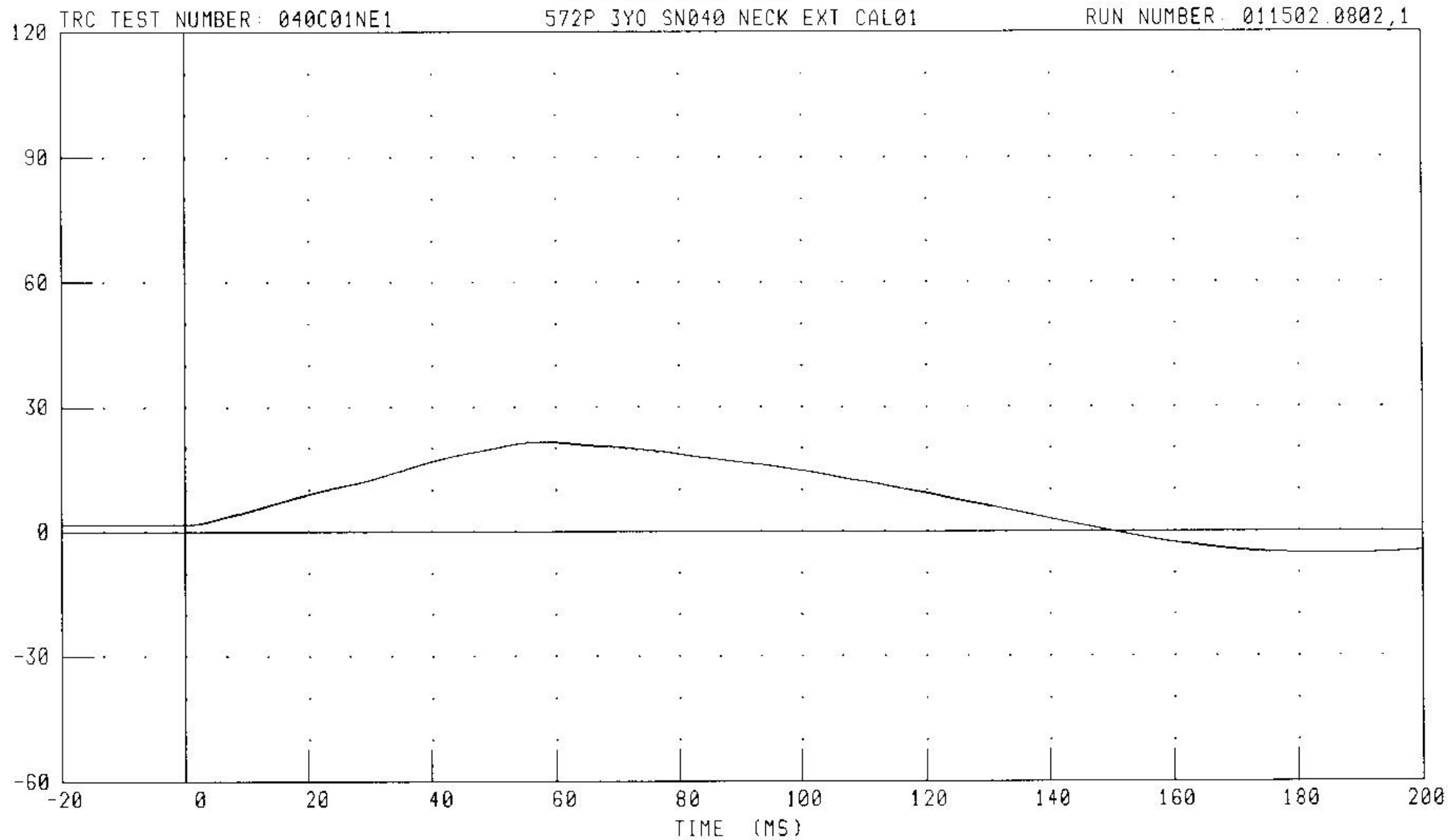
RUN NUMBER: 011502 0802;1



CHANNEL: PENXVI FILTER CH. CLASS 180

PEAK DATA: 4.32 M/S @ 200.00 MS, 0.00 M/S @ -0.40 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

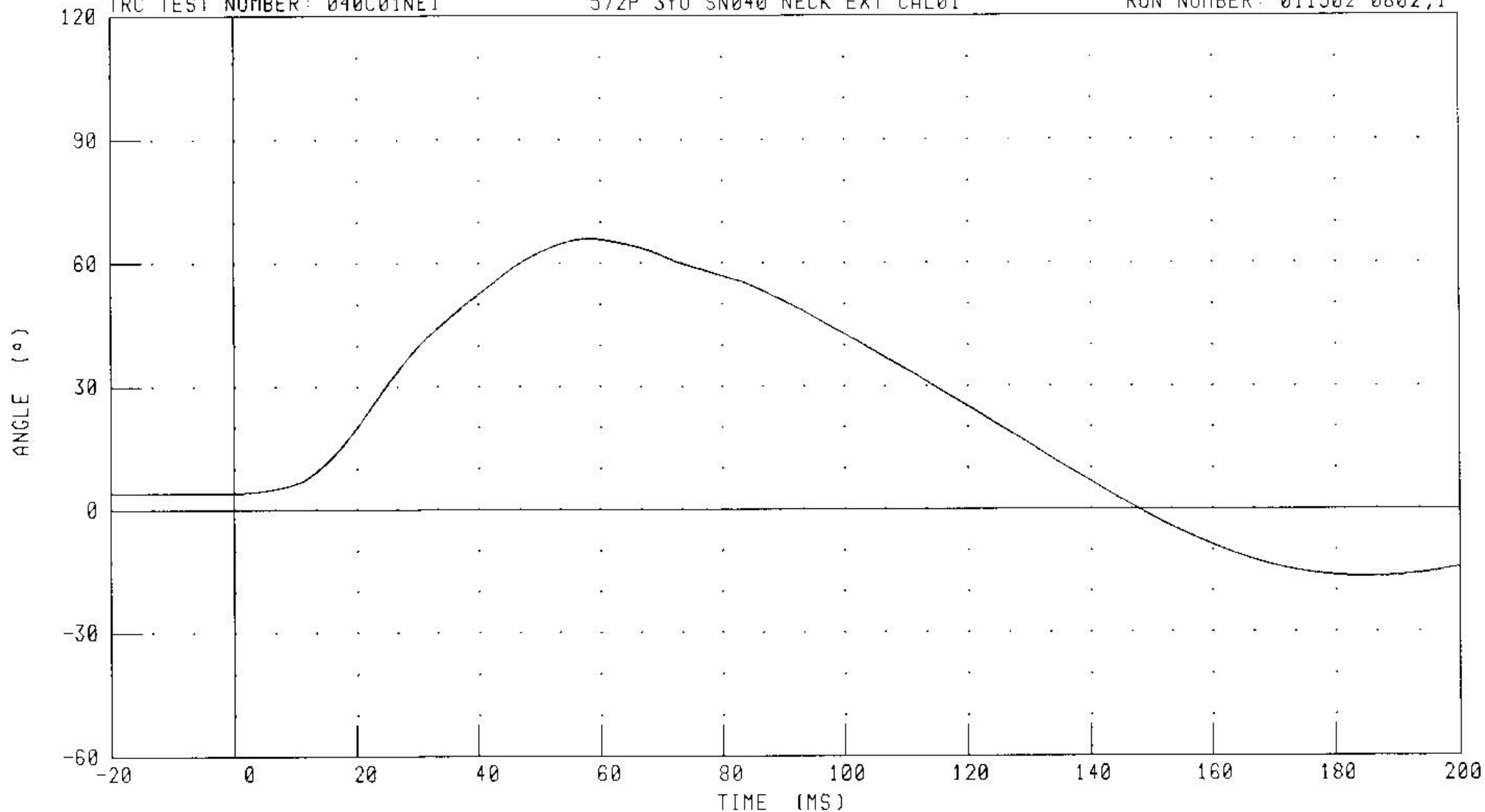


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 040C01NE1

572P 3YO SN040 NECK EXT CAL01

RUN NUMBER: 011502 0802;1

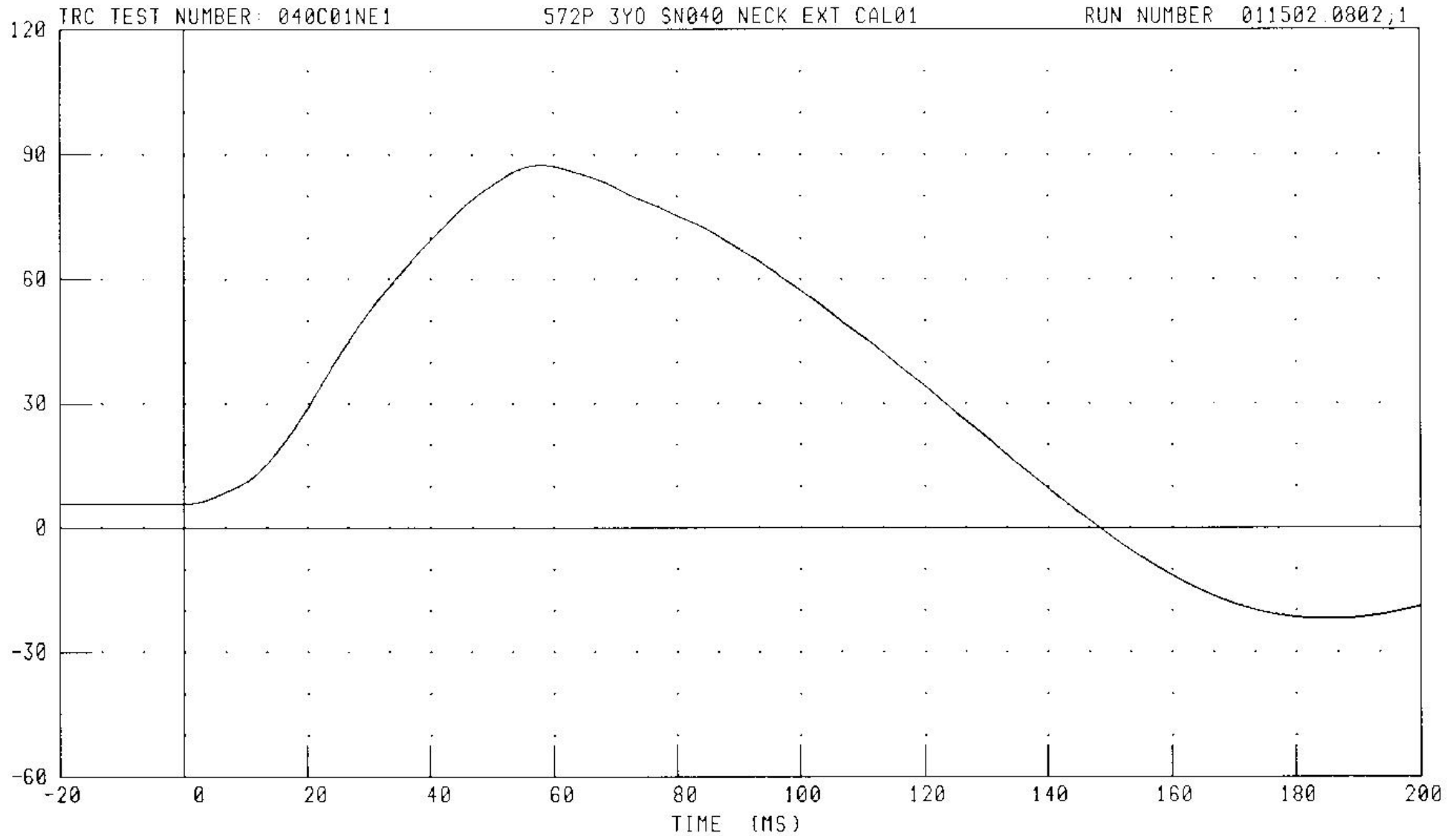


CHANNEL: THETA FILTER: CH CLASS 60

PEAK DATA 65.93 ° @ 58.32 MS, -16.55 ° @ 185.28 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

TOTAL ROTATION



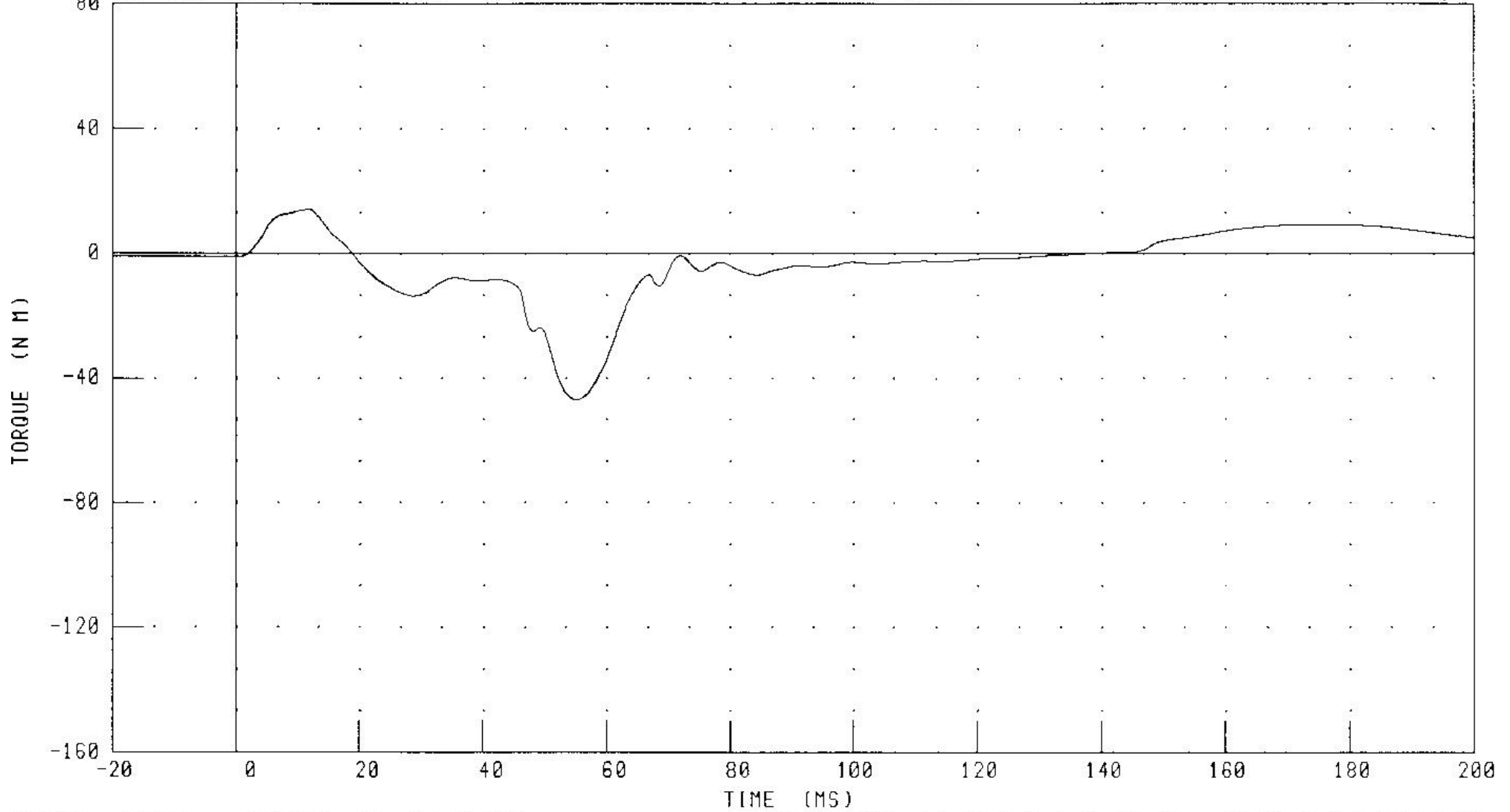
CHANNEL: TOTAN

FILTER CH. CLASS 60

PEAK DATA: 87.48 ° @ 58.08 MS, -21.98 ° @ 185.28 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 040C01NE1 572P 3Y0 SN040 NECK EXT CAL01 RUN NUMBER 011502.0802,1



CHANNEL NEKYM FILTER: CH. CLASS 600

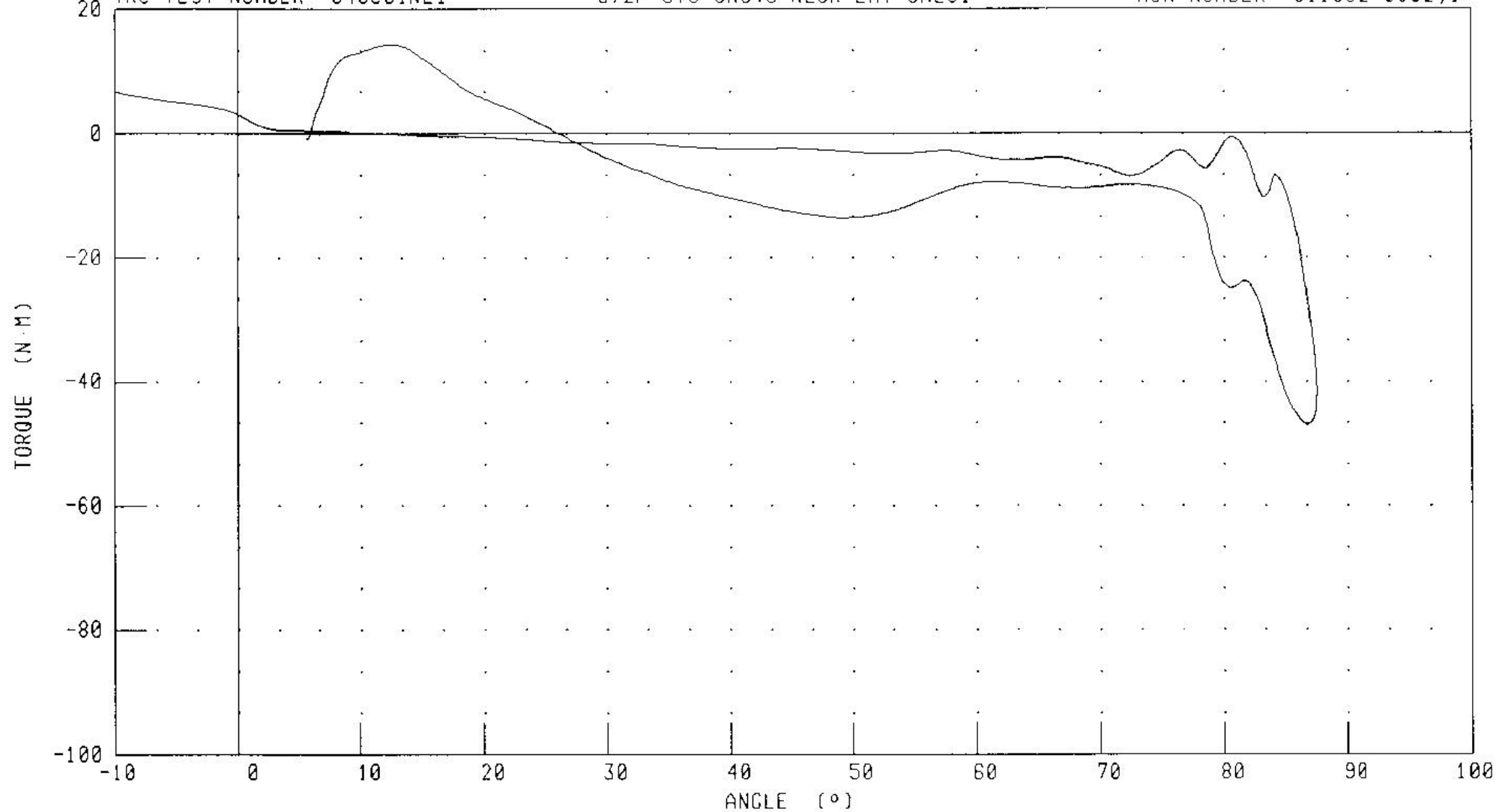
PEAK DATA 14.27 N·m @ 11.68 MS, -46.94 N·m @ 55.04 MS

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
 TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER: 040C01NE1

572P 3YO SN040 NECK EXT CAL01

RUN NUMBER: 011502 0802,1



CHANNEL: TOTAN
 NEKYM

FILTER: CH. CLASS 60
 CH. CLASS 600

ANGLE (°)

PEAK DATA: 87.48 ° @ 58.08 MS; -21.98 ° @ 185.28 MS
 14.27 N·M @ 11.68 MS; -46.94 N·M @ 55.04 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III THREE YEAR OLD

15-JAN-02

TRC INC.

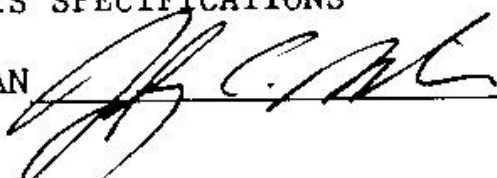
TEST NO: 040C01TH1

572P 3YO SN040 THORAX CAL 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	21.0 %
PENDULUM VELOCITY	5.90 - 6.10 M/S	5.97 M/S
MAXIMUM DEFLECTION	32 - 38 MM	33.7 MM
MAXIMUM FORCE DURING DEFLECTION INTERVAL	680 - 810 N	720. N
INTERNAL HYSTERESIS	65% - 85%	72.2%
MAXIMUM FORCE BETWEEN 12.5 & 32 MM OF DEFLECTION	<= 910 N	744. N

TEST MEETS SPECIFICATIONS

TECHNICIAN



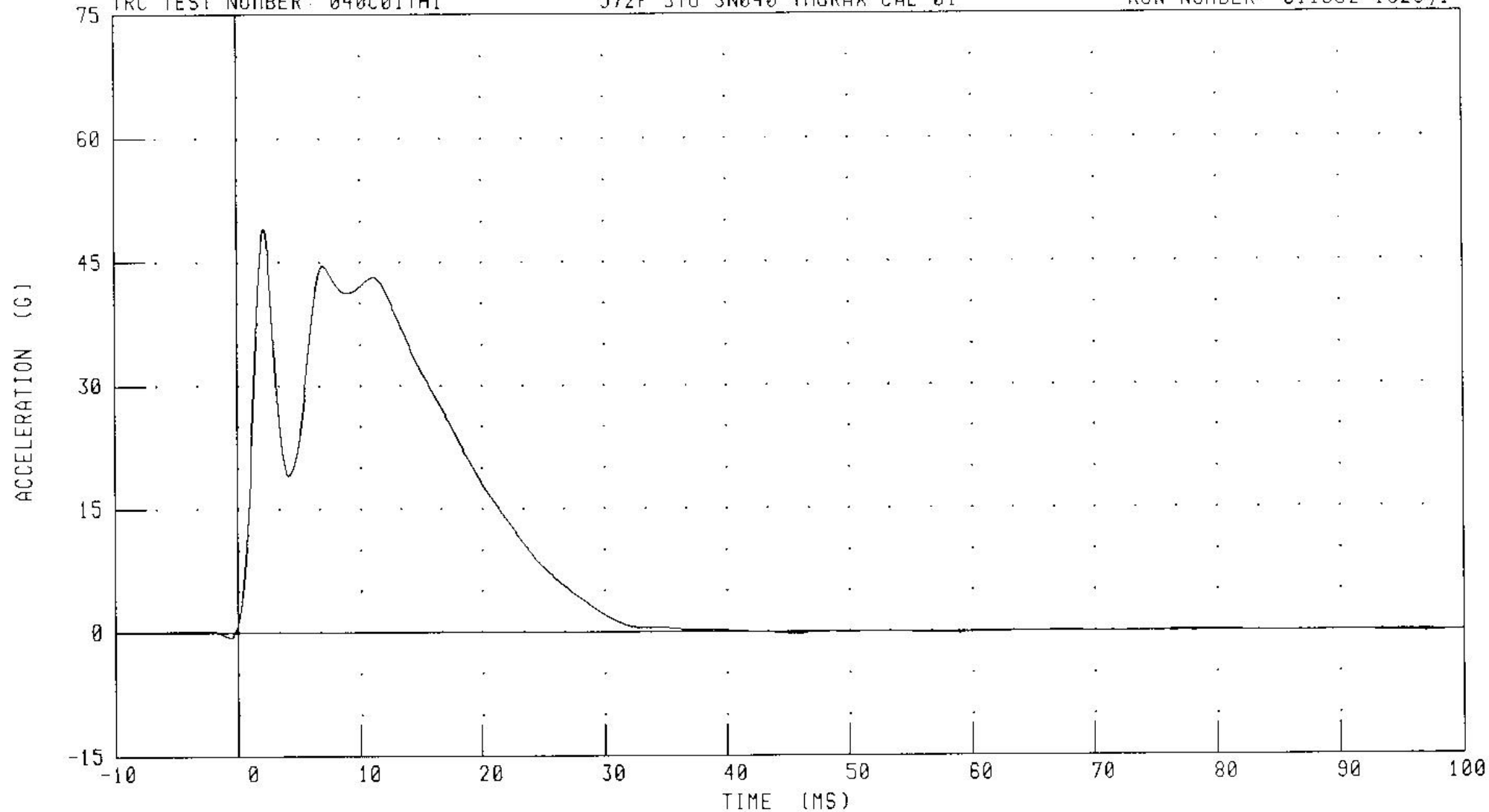
RUN NUMBER: 011502.1022;1

HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 040C01TH1

572P 3Y0 SN040 THORAX CAL 01

RUN NUMBER: 011502 1029,1

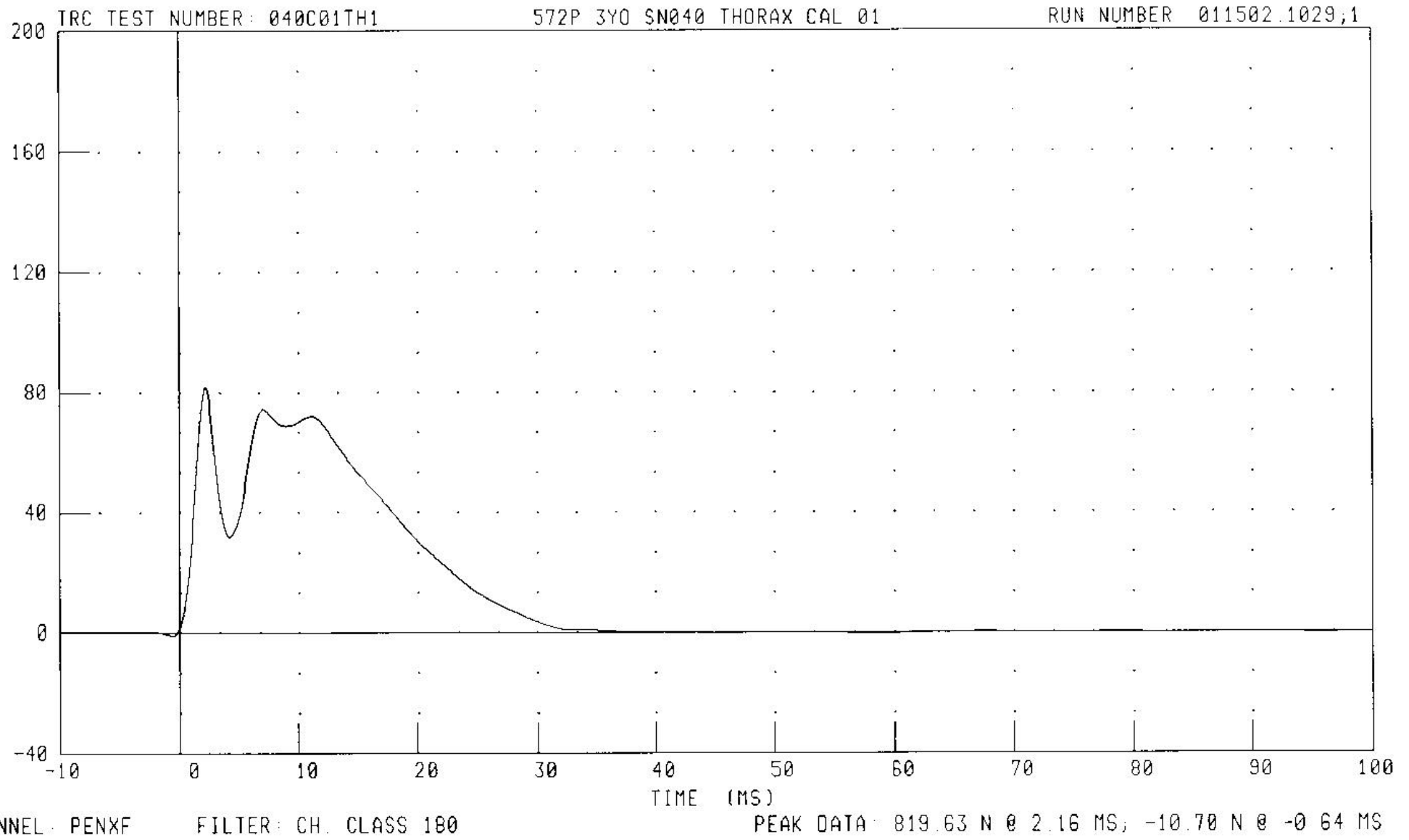


CHANNEL: PENXG

FILTER: CH. CLASS 180

PEAK DATA: 49.14 G @ 2.16 MS, -0.64 G @ -0.64 MS

HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM FORCE

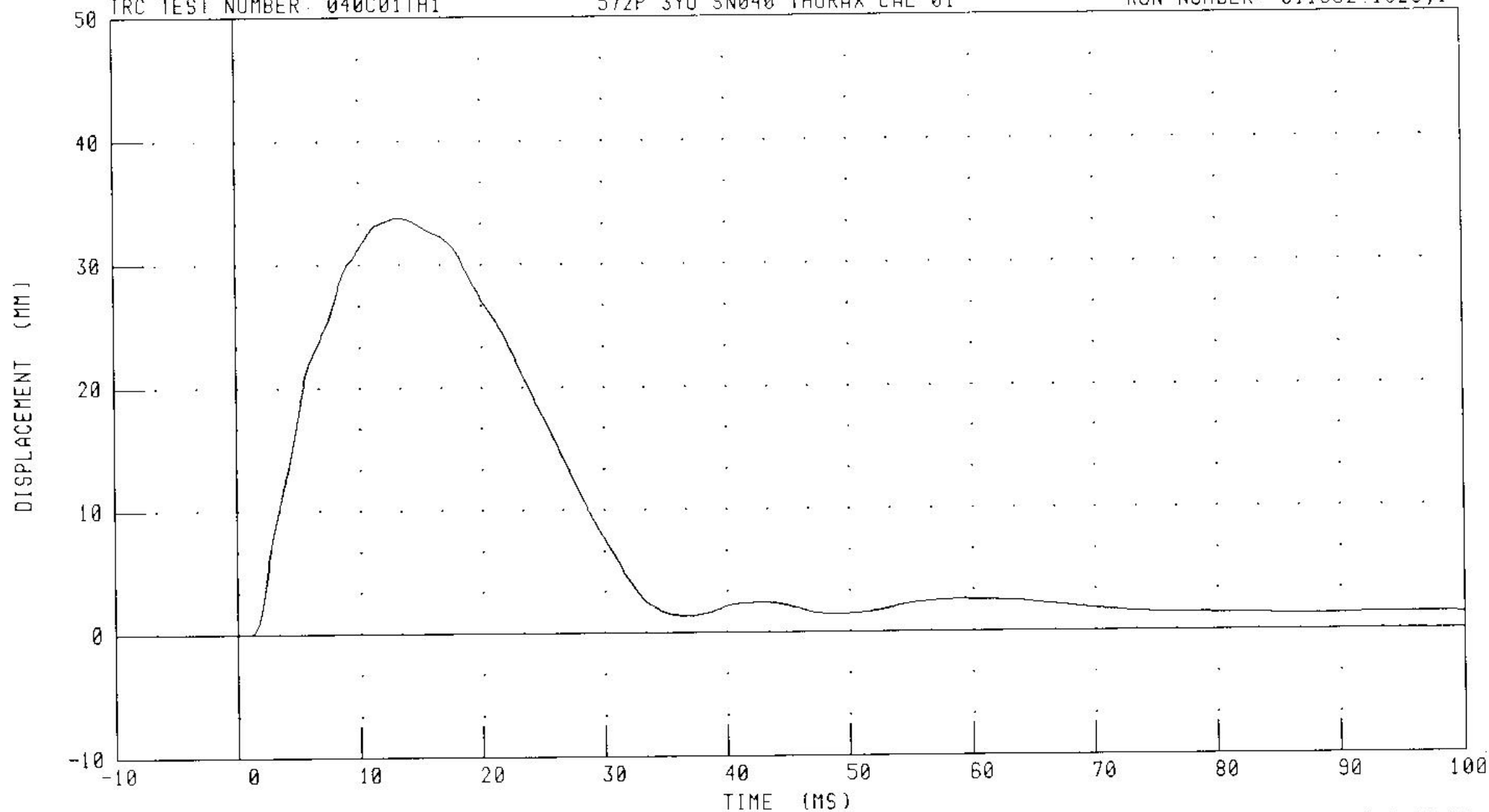


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 040C01TH1

572P 3Y0 SN040 THORAX CAL 01

RUN NUMBER: 011502.1029;1



CHANNEL: CSTXD

FILTER CH. CLASS 600

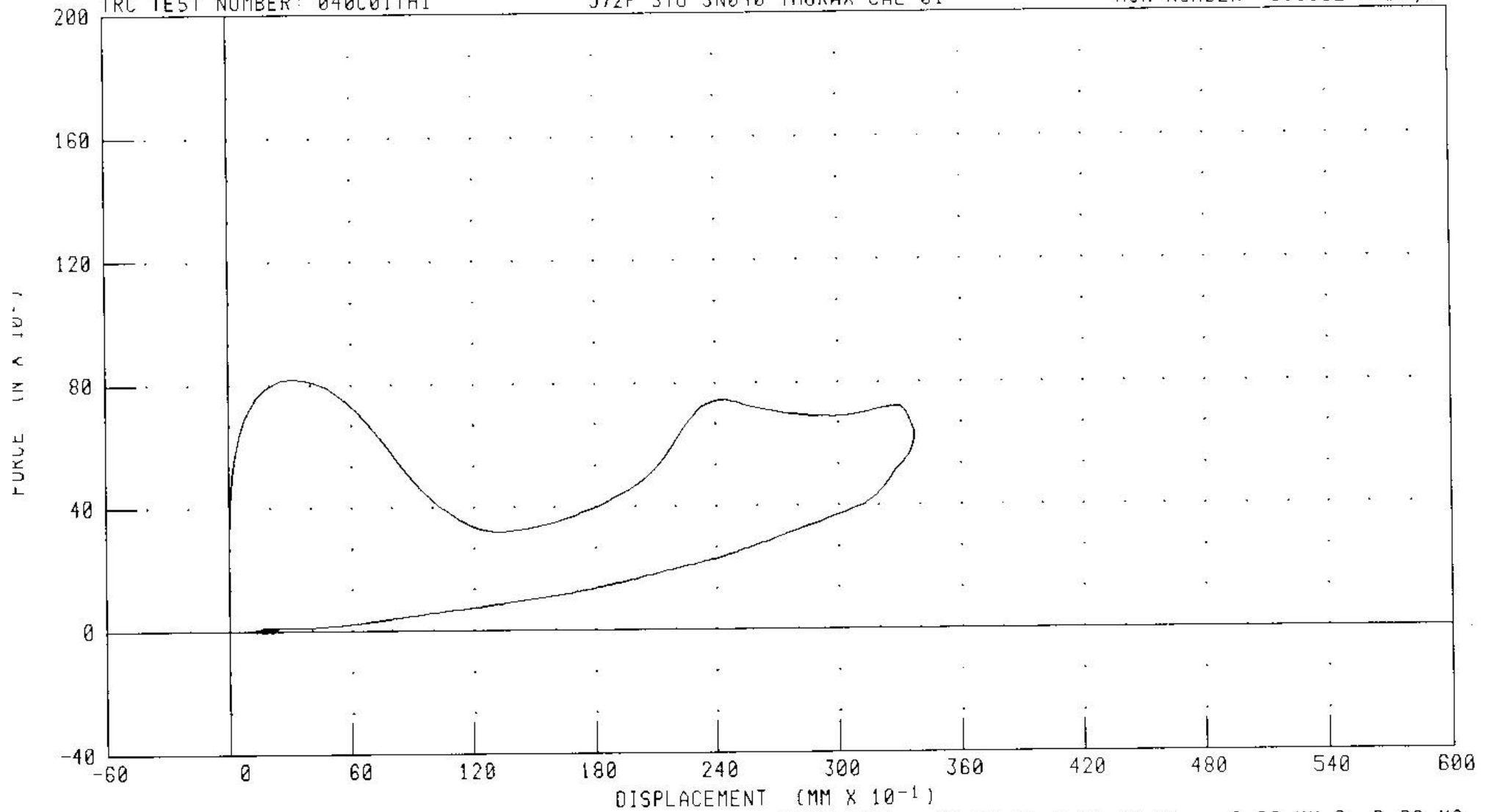
PEAK DATA: 33.78 MM @ 13.36 MS; 0.00 MM @ 0.80 MS

HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 040C01TH1

572P 3YO SN040 THORAX CAL 01

RUN NUMBER 011502 1029,1



HANNEL: CSTXD
PENXF

FILTER: CH. CLASS 600
CH. CLASS 180

PEAK DATA 33.78 MM @ 13.36 MS, 0.00 MM @ 0.80 MS
819.63 N @ 2.16 MS, -10.70 N @ -0.64 MS

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III THREE-YEAR-OLD

CAL DATE: 15-Jan-02

TRC, INC.

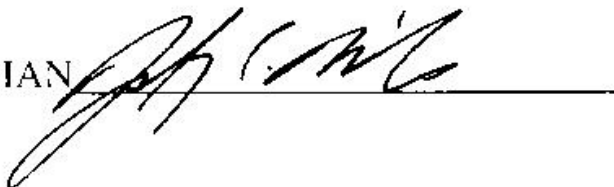
TEST NO: 040C01TF1

572 P SN040 TORSO FLEX CAL 01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 – 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 – 70 %	24 %
INITIAL ANGLE OF UNSUPPORTED DUMMY	<= 15 DEG. REFERENCED TO VERTICAL	2 DEG.
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	130 – 180 N	169 N
RETURN ANGLE	+/- 10 DEG OF INITIAL ANGLE	4 DEG.

TEST MEETS SPECIFICATIONS

TECHNICIAN



SECTION 11

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

CERTIFICATION INSTRUMENTATION

Instrument	Certification Test	Calibration Date	Due Date
Slide Potentiometer Oceanside Mfg. Co. Model LCP 20-50 2.0 inches travel, 10,000 ohms	Neck Pendulum	3/02	9/02
C.G. Head Potentiometer Oceanside Mfg. Co. Model SP 221 Serial HNR2 10K, linearity = 1.5%	Neck Pendulum	3/02	9/02
C.G. Pendulum Potentiometer Oceanside Mfg. Co. Model SP 221 Serial HNR1 10K, linearity = 1.5%	Neck Pendulum	3/02	9/02
Bourns Potentiometer Model 3520S--1-502 5K +/-, linearity = 0.3%	Lumbar Spine Flexion	5/02	11/02
Transducer Inc. Load Cell S/N 20051, 50#	Lumbar Spine Flexion	2/02	6/02
Lebow Load Cell Model 3397-100 S/N 11564	Lumbar Spine Flexion	6/02	12/02
Endevco Accelerometers S/N AC-A183 +/- .075% Accuracy	Neck Pendulum (ATD)	12/01 6/02	6/02 12/02

CERTIFICATION INSTRUMENTATION (cont'd)

Instrument	Certification Test	Calibration Date	Due Date
Chatillon 20 Pound Gauge +/- 8 oz. Accuracy		2/02	8/02
Chatillon 40 Pound Gauge +/- 1% Accuracy		2/02	8/02
Belt Tension Gauge, +/- 1 lb.		2/02	8/02
Force Gauge, Chatillon Model DPTH 250		2/02	8/02
Weather Measure Cord Temp. & Humidity Recorder S/N 1545 +/- 3% Accuracy		6/01	7/02
Pot. #6 CIC Linear Potentiometer (Foam Certification)		2/02	8/02
Load Cell for Foam S/N 72952 +/- .10% Accuracy		2/02	8/02
Load Cell, Lap Belt North Sensotec S/N 283076 +/- 1.32 lbs. Accuracy		5/02	11/02
Load Cell, Lap Belt South Sensotec S/N 288386 +/- 1.32 lbs. Accuracy		5/02	11/02
Dillon Force Gauge Model E Serial # 4346 50#		3/02	9/02

SECTION 12

AVI FILES

AVI FILES (continued)