REPORT NUMBER: SLED-VER-2002-03

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

TEST NUMBER: 22223

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

March 18, 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

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

TABLE OF CONTENTS

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 18, 2002 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 one anthropomorphic test device (ATD). One (1) Hybrid III 3 year old size ATD, Serial Number 142, 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.: 22223 Test Date: March 18, 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	1/12/2002
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

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 22223 Test Date: March 18, 2002

Child Seat	Safety First Forerunner
Belt Fraying	None
Stress Marks	None
Cracks	None
Buckle Stress	None
Latch Hooks	None
Max. Head Excursion (mm)	607.1
Max. Knee Excursion (mm)	652.8
Velocity	29.0 mph, 46.7 kph
Acceleration (G's)	23.1

SECTION 4

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22223 Test Date: March 18, 2002

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	34.1	185.7	-38.8	91.0
Head CG	Y	G's	12.1	90.9	-1.5	102.7
Head CG	Z	G's	57.0	70.8	0.0	43.4
Head CG Resultant	N/A	G's	61.0	71.5		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	11.0	166.2	-34.4	51.3
Chest CG	Y	G's	3.7	77.5	-1.9	187.5
Chest CG	Z	G's	17.9	78.6	-37.5	53.9
Chest CG Resultant	N/A	G's	49.9	52.7		

SEAT BELT SENSOR PEAK VALUES

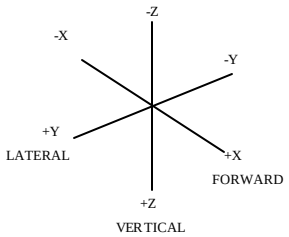
Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P6 (Center) Rear Passenger			
	HIC	Avg. G's	T^1	T^2
Head CG Primary (36 msec)	493	45.2	58.2	94.2
Head CG Primary (15 msec)	350	55.8	64.4	79.4

CHEST CLIP (3 MSEC)

Location	P6 (Center) Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	48.9	51.4	54.4



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

Test No.: 22223 Test Date: March 18, 2002

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	24.4	107.0	-45.3	53.7
Pelvis	Y	G's	3.6	189.5	-3.5	60.6
Pelvis	Z	G's	9.1	190.0	-50.4	55.8

UPPER NECK PEAK FORCES AND MOMENTS

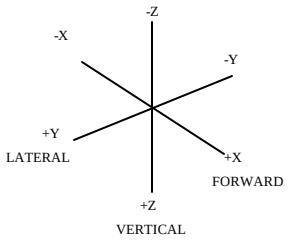
Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	123.1	165.5	-780.0	86.1
Neck Force	Y	Newtons	73.8	86.9	-31.0	112.0
Neck Force	Z	Newtons	1641.8	74.3	-1.2	23.2
Neck Moment	X	Nm	5.7	182.0	-2.0	120.1
Neck Moment	Y	Nm	6.1	150.4	-10.9	196.6
Neck Moment	Z	Nm	3.4	191.1	-1.5	165.7

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	278.2	180.7	-1147.7	75.0
Neck Force	Y	Newtons	60.8	190.1	-82.0	63.8
Neck Force	Z	Newtons	895.2	68.3	-230.9	53.0
Neck Moment	X	Nm	10.4	189.6	-3.4	114.9
Neck Moment	Y	Nm	114.9	83.9	-17.0	180.9
Neck Moment	Z	Nm	7.3	72.6	-1.9	161.3

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P6 (Center) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			-19.6	85.6



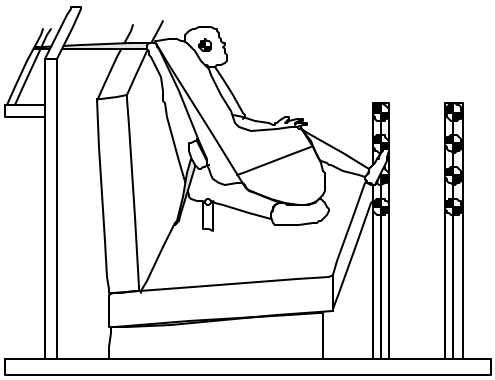
SECTION 5

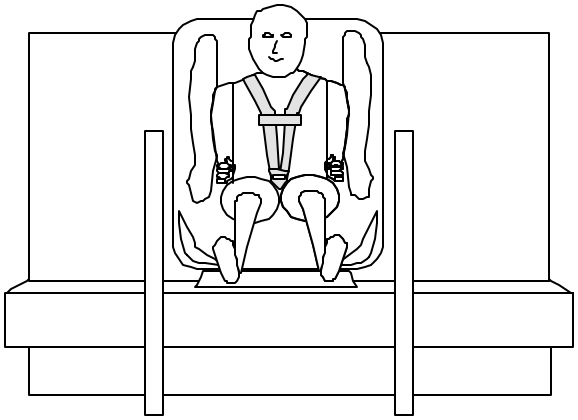
SLED TEST SET-UP

Test No.: 22223 Test Date: March 18, 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



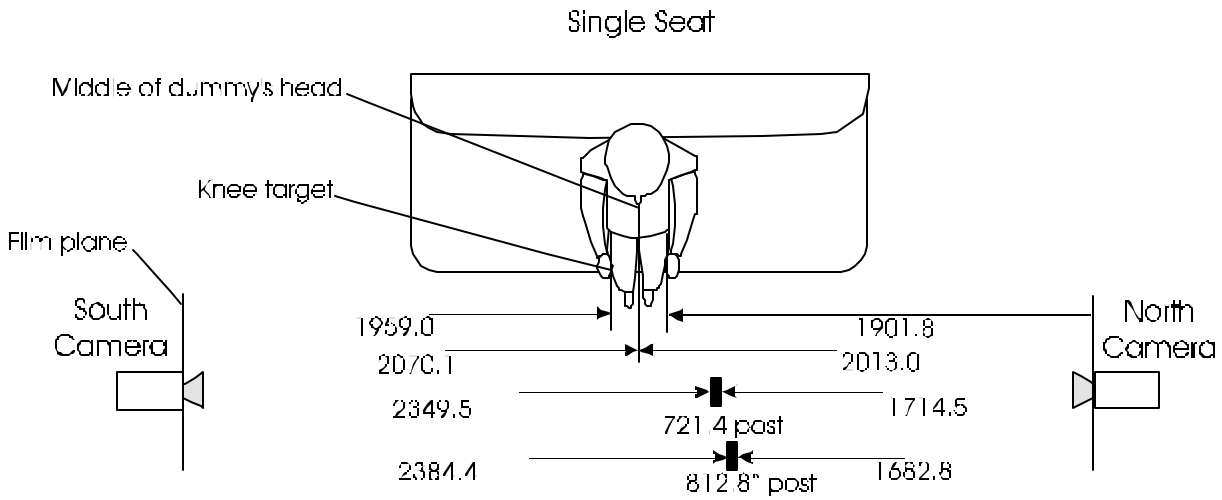


SECTION 6

CAMERA LOCATION

Test No.: 22223 Test Date: March 18, 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

TABLE OF PHOTOGRAPHS

Run #22223 Photo 1 - Pre-Test Right 3/4 View

Run #22223 Photo 2 - Post-Test Right 3/4 View

Run #22223 Photo 3 - Pre-Test Right Side View

Run #22223 Photo 4 - Post-Test Right Side View

Run #22223 Photo 5 - Pre-Test Left 3/4 View

Run #22223 Photo 6 - Post-Test Left 3/4 View

Run #22223 Photo 7 - Pre-Test Left Side View

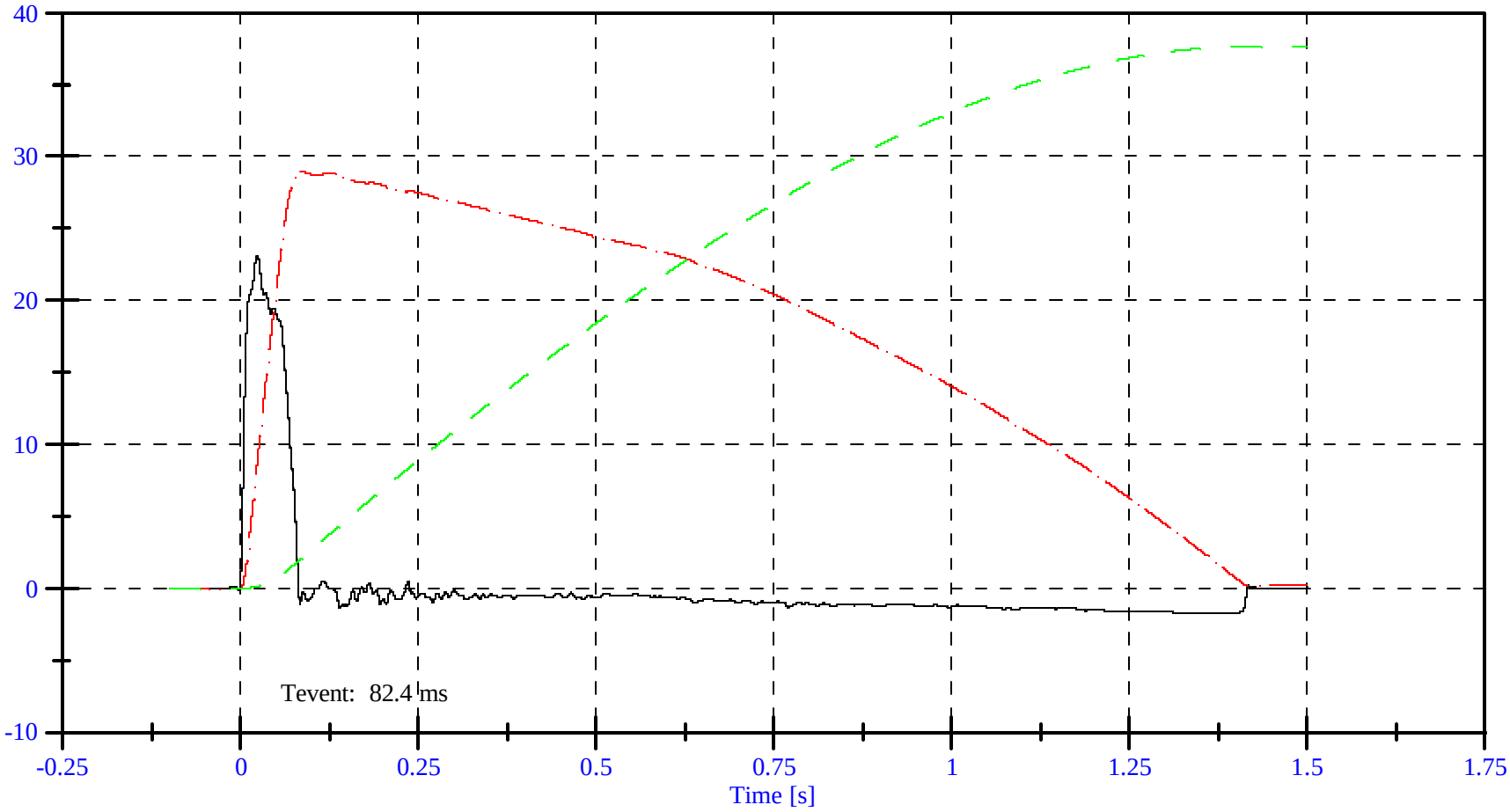
Run #22223 Photo 8 - Post-Test Left Side View

SECTION 8

DATA PLOTS

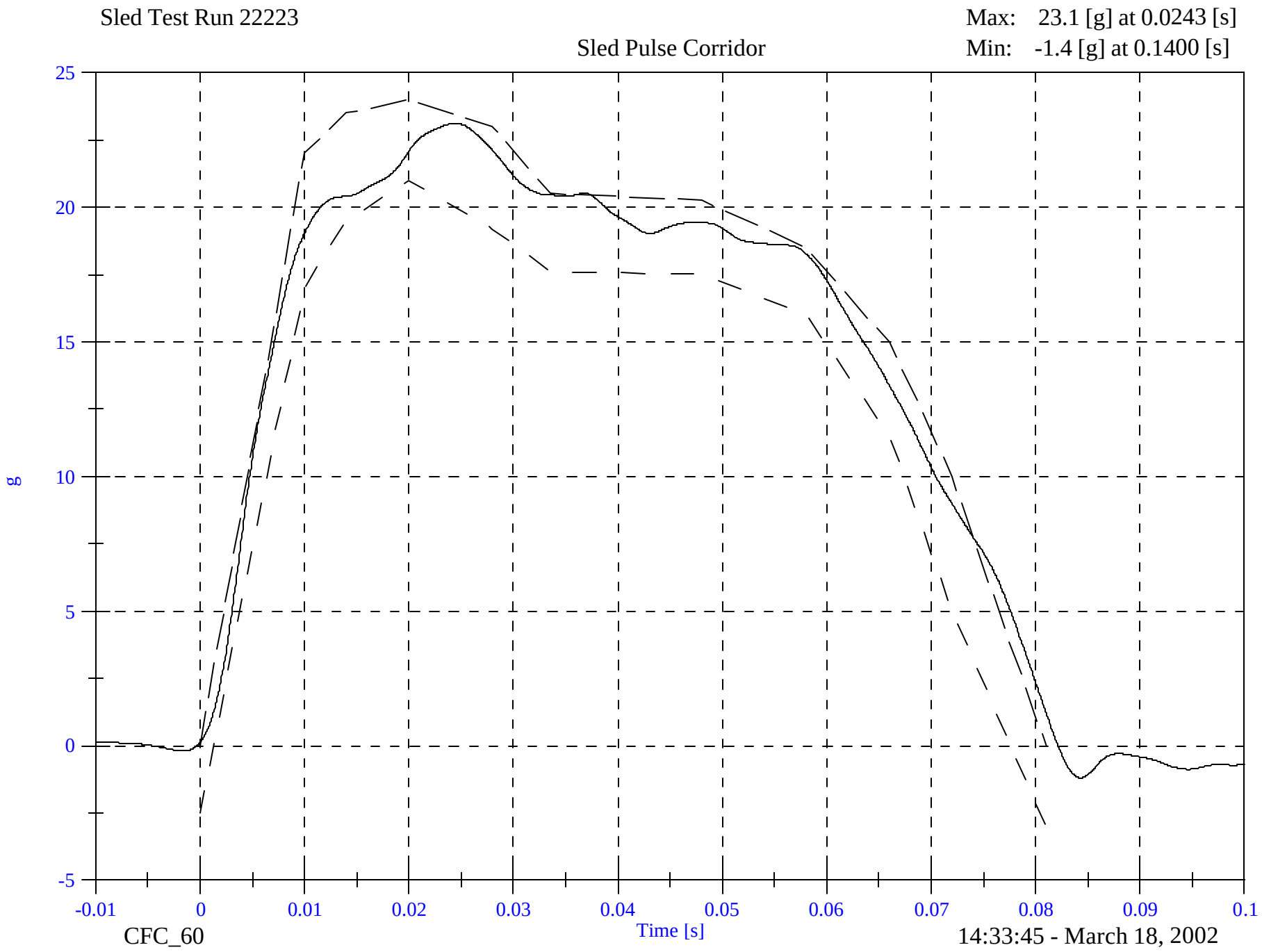
Sled Test Run 22223

March 18, 2002



	Maximum	Time (ms)	Minimum	Time (ms)	Filter Class
Sled Ax (g)	23.1	24.4	-1.8	1366.0	CFC_60
Sled Vx (mph)	29.0	82.4	-0.0	-19.8	CFC_180
Sled Dx (ft)	37.7	1500.6	-0.0	-10.0	CFC_180

LEGEND
- Sled Ax
- Sled Vx
- Sled Dx


Sled Test Run 22223
Sled Pulse Corridor
Max: 23.1 [g] at 0.0243 [s]
Min: -1.4 [g] at 0.1400 [s]
25
20
15
10
5
0
-5
g
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
Time [s]
CFC_60
14:33:45 - March 18, 2002

FACILITY: HYGE SLED DATE: March 18, 2002
TEST#: 22223
TITLE: Sled Test Run 22223

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
27	Sled Acceleration	g	23.1	24.3	-1.4	140.0	CFC_60	
28	Sled Acceleration Velocity	kph	46.7	82.3	-0.0	-20.0	CFC_180	
29	Sled Acceleration Displacement	mm	2699.8	249.8	-0.0	-10.1	CFC_180	
30	P6 Head x	g	34.1	185.7	-38.8	91.0	CFC_1000	
31	P6 Head y	g	12.1	90.9	-1.5	102.7	CFC_1000	
32	P6 Head z	g	57.0	70.8	-0.0	-43.4	CFC_1000	
33	P6 Head Resultant	g	61.0	71.5	0.0	-46.3	CFC_1000	
34	P6 Chest x	g	11.0	166.2	-34.4	51.3	CFC_180	
35	P6 Chest y	g	3.7	77.4	-1.9	187.5	CFC_180	
36	P6 Chest z	g	17.9	78.6	-37.5	53.9	CFC_180	
37	P6 Chest Resultant	g	49.9	52.7	0.0	-9.8	CFC_180	
38	P6 Pelvic x	g	24.4	107.0	-45.3	53.7	CFC_1000	
39	P6 Pelvic y	g	3.6	189.5	-3.5	60.6	CFC_1000	
40	P6 Pelvic z	g	9.1	190.0	-50.4	55.8	CFC_1000	
41	P6 Pelvic Resultant	g	67.5	55.9	0.0	-26.9	CFC_1000	
42	P6 Upper Neck Fx	N	123.1	165.5	-780.0	86.1	CFC_1000	
43	P6 Upper Neck Fy	N	73.8	86.9	-31.0	112.0	CFC_1000	
44	P6 Upper Neck Fz	N	1641.8	74.2	-1.2	-23.2	CFC_1000	
45	P6 Upper Neck F Resultant	N	1734.6	74.8	0.0	-9.7	CFC_1000	
46	P6 Upper Neck Mx	N-m	5.7	182.0	-2.0	120.1	CFC_600	
47	P6 Upper Neck My	N-m	6.1	150.4	-10.9	196.6	CFC_600	
48	P6 Upper Neck Mz	N-m	3.4	191.1	-1.5	165.7	CFC_600	
49	P6 Upper Neck M Resultant	N-m	11.7	196.3	0.0	-43.9	CFC_600	
50	P6 Lower Neck Fx	N	278.2	180.7	-1147.7	75.0	CFC_1000	
51	P6 Lower Neck Fy	N	60.8	190.1	-82.0	63.7	CFC_1000	
52	P6 Lower Neck Fz	N	895.2	68.3	-230.9	53.0	CFC_1000	
53	P6 Lower Neck F Resultant	N	1403.6	74.0	0.0	-19.3	CFC_1000	
54	P6 Lower Neck Mx	N-m	10.4	189.6	-3.4	114.9	CFC_600	
55	P6 Lower Neck My	N-m	114.9	83.9	-17.0	180.9	CFC_600	
56	P6 Lower Neck Mz	N-m	7.3	72.6	-1.9	161.3	CFC_600	
57	P6 Lower Neck M Resultant	N-m	115.3	83.9	0.0	-37.6	CFC_600	
58	P6 Head Red z	g	71.0	74.1	-19.4	184.8	CFC_1000	
59	P6 Chest Compression	mm	0.2	249.8	-19.6	85.5	CFC_600	
60	P6 Head x	g	33.4	185.7	-34.8	90.8	CFC_60	

61	P6 Head x Velocity	kph	0.0	-18.8	-59.1	156.0	CFC_180
62	P6 Head y	g	7.1	90.9	-1.4	115.8	CFC_60
63	P6 Head y Velocity	kph	2.5	249.8	-0.4	179.9	CFC_180
64	P6 Head z	g	56.7	71.4	-0.0	-12.6	CFC_60
65	P6 Head z Velocity	kph	98.1	249.8	-0.0	-10.2	CFC_180
66	P6 Head Red z	g	70.2	74.7	-17.9	183.9	CFC_60
67	P6 Head Red z Velocity	kph	99.4	248.1	-6.4	56.8	CFC_180
68	P6 Chest x	g	10.4	164.8	-34.1	50.9	CFC_60
69	P6 Chest x Velocity	kph	0.0	-49.8	-55.7	110.4	CFC_180
70	P6 Chest y	g	3.2	77.2	-1.7	187.7	CFC_60
71	P6 Chest y Velocity	kph	3.8	132.5	-0.2	35.3	CFC_180
72	P6 Chest z	g	16.0	78.2	-37.5	54.4	CFC_60
73	P6 Chest z Velocity	kph	0.2	30.7	-24.4	69.1	CFC_180
74	P6 Pelvic x	g	21.4	106.8	-45.4	54.8	CFC_60
75	P6 Pelvic x Velocity	kph	0.0	-18.4	-48.3	90.7	CFC_180
76	P6 Pelvic x Displacement	mm	0.0	-50.1	-2178.8	249.8	CFC_180
77	P6 Pelvic y	g	3.4	189.7	-2.7	60.9	CFC_60
78	P6 Pelvic y Velocity	kph	0.0	8.7	-2.7	99.9	CFC_180
79	P6 Pelvic y Displacement	mm	0.0	11.6	-102.2	249.8	CFC_180
80	P6 Pelvic z	g	8.4	189.7	-50.2	54.9	CFC_60
81	P6 Pelvic z Velocity	kph	0.0	-16.6	-44.2	87.1	CFC_180
82	P6 Pelvic z Displacement	mm	0.0	-35.9	-2161.4	249.8	CFC_180
83	P6 Upper Neck Mocy	N-m	6.1	150.4	-10.9	196.6	CFC_600

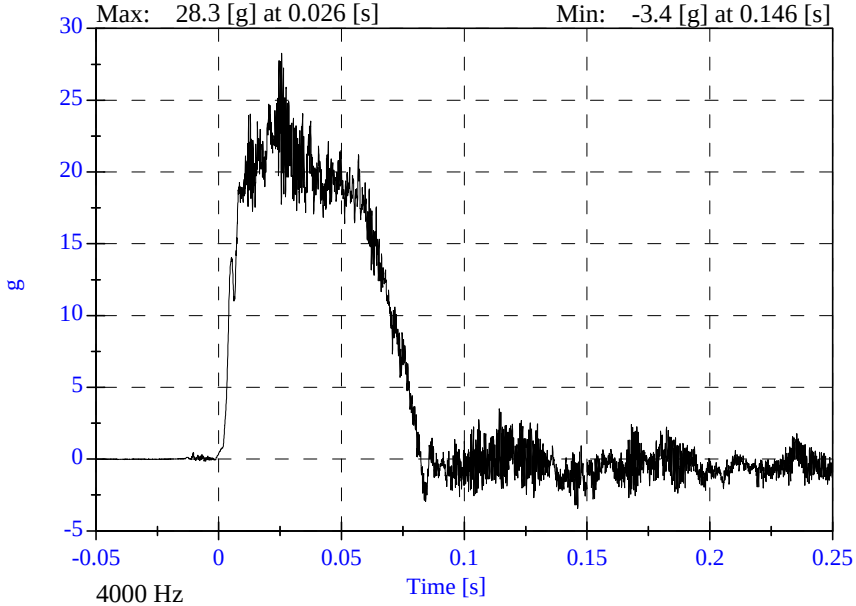
```
FACILITY: HYGE SLED                          DATE: March 18, 2002
TEST#: 22223
TITLE: Sled Test Run 22223
Version 5.00
=========================
P6 HIC(FULL): 493.2
    t1: 58.1 msec
    t2: 94.3 msec
    Duration: 36.2 msec
    Average Acceleration: 45.1 g
    Input channels: P6 Head x (3) CFC_1000
                    P6 Head y (4) CFC_1000
                    P6 Head z (5) CFC_1000

P6 UP NECK Fx:  Max:    123.1 N 165.5 msec
                Min:   -780.0 N  86.1 msec
    Input channel: P6 Upper Neck Fx (14) CFC_1000

P6 UP NECK Fz:  Max:   1641.8 N  74.2 msec
                Min:     -1.2 N -23.2 msec
    Input channel: P6 Upper Neck Fz (16) CFC_1000

P6 UP NECK Mocy (3YO Child OOP)
                Max:      6.1 N-m 150.4 msec
                Min:    -10.9 N-m 196.6 msec
    Input channels: P6 Upper Neck Fx (14) CFC_600
                    P6 Upper Neck My (18) CFC_600
              Docy: 0

P6 UP NECK Nij (3YO Child OOP)
                Ntf:  0.82 Nij  74.8 msec    CVt: 2120 CVf: 68
                Nte:  0.60 Nij 180.5 msec    CVt: 2120 CVe: 27
                Ncf:  0.00 Nij -23.3 msec    CVc: 2120 CVf: 68
                Nce:  0.00 Nij   1.2 msec    CVc: 2120 CVe: 27
    Input channels: P6 Upper Neck Fz (16) CFC_600
                    P6 Upper Neck Mocy [N-m, CFC_600] (92)

P6 CLIP(3 ms): 48.9 g
    t1: 51.4 msec
```

```
    t2: 54.4 msec
    Duration: 3.0 msec
P6 CSI: 360.8
    Input channels: P6 Chest x (7) CFC_180
                    P6 Chest y (8) CFC_180
                    P6 Chest z (9) CFC_180

P6 CHEST DISP:  Max:      0.2 mm 249.8 msec
                Min:    -19.6 mm  85.5 msec
    Input channel: P6 Chest Compression (10) CFC_600

=========================
P6 HIC(36 ms): 493.2
    t1: 58.2 msec
    t2: 94.2 msec
    Duration: 36.0 msec
    Average Acceleration: 45.2 g
    Input channels: P6 Head x (3) CFC_1000
                    P6 Head y (4) CFC_1000
                    P6 Head z (5) CFC_1000

=========================
P6 HIC(15 ms): 349.5
    t1: 64.4 msec
    t2: 79.4 msec
    Duration: 15.0 msec
    Average Acceleration: 55.8 g
    Input channels: P6 Head x (3) CFC_1000
                    P6 Head y (4) CFC_1000
                    P6 Head z (5) CFC_1000
```

Sled Test Run 22223 - March 18, 2002

Sled Acceleration

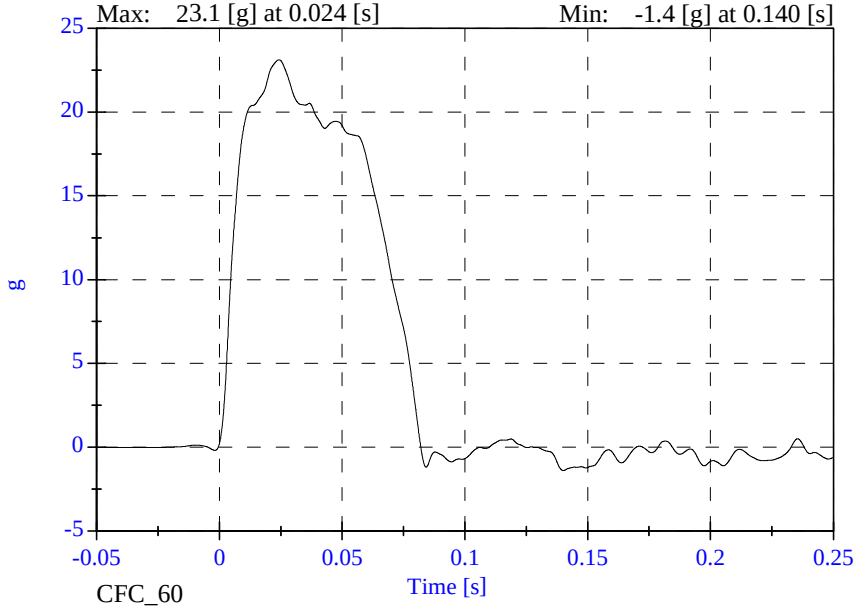
Max: 28.3 [g] at 0.026 [s] Min: -3.4 [g] at 0.146 [s]



4000 Hz

Sled Acceleration

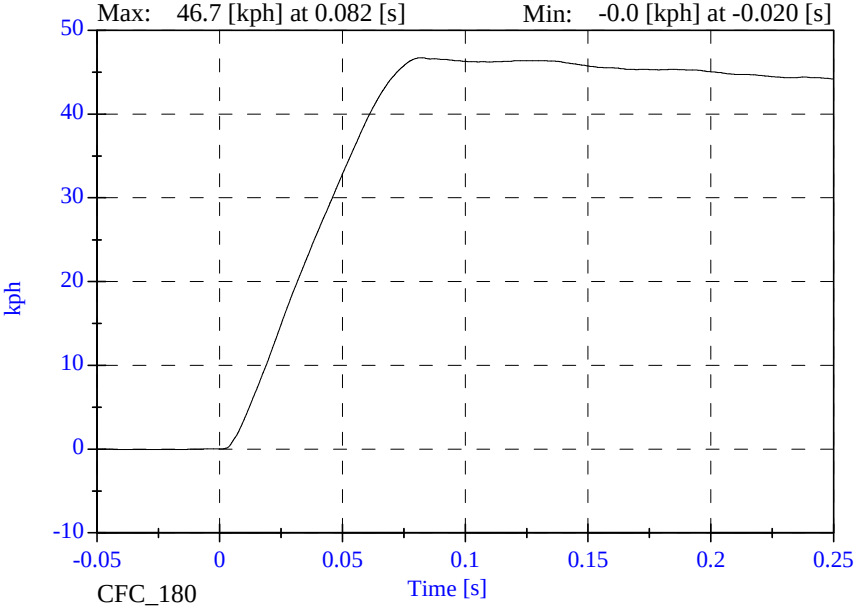
Max: 23.1 [g] at 0.024 [s] Min: -1.4 [g] at 0.140 [s]



CFC_60

Sled Acceleration Velocity

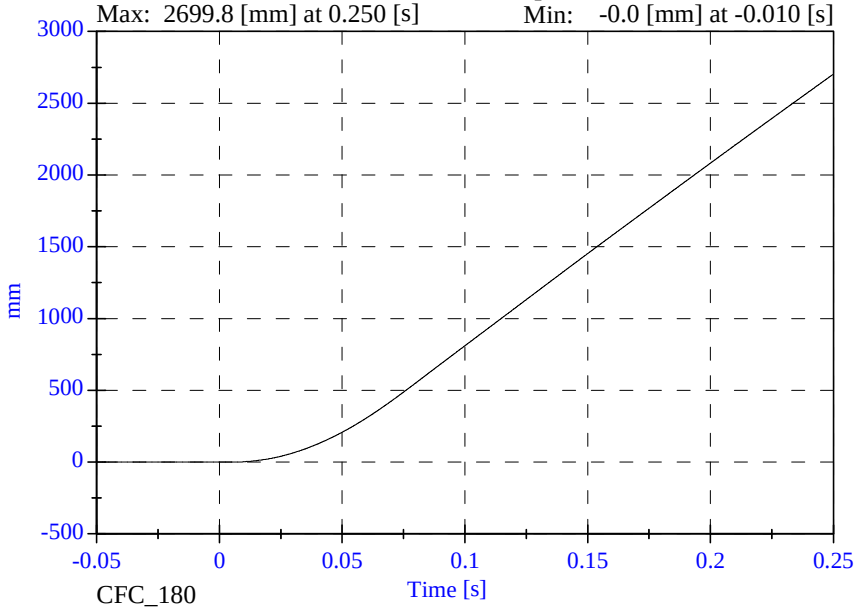
Max: 46.7 [kph] at 0.082 [s] Min: -0.0 [kph] at -0.020 [s]



CFC_180

Sled Acceleration Displacement

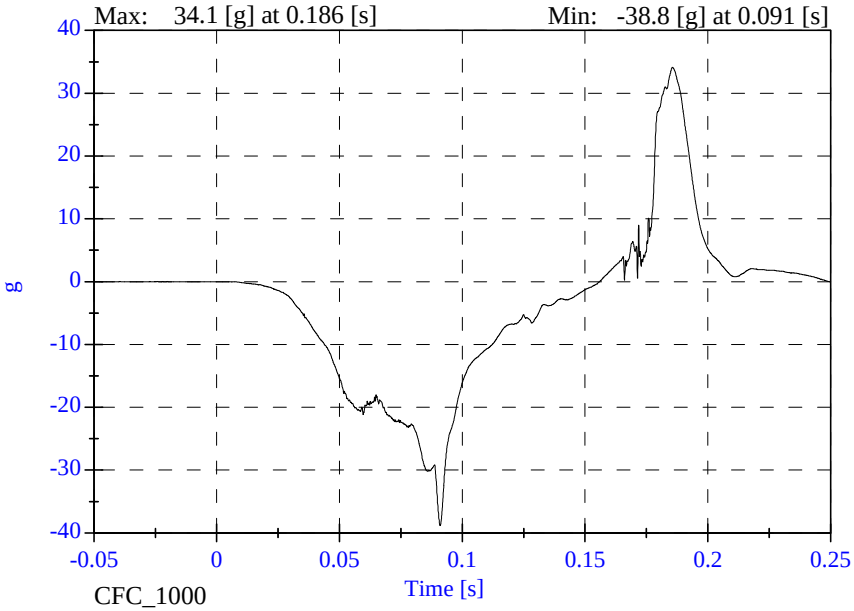
Max: 2699.8 [mm] at 0.250 [s] Min: -0.0 [mm] at -0.010 [s]



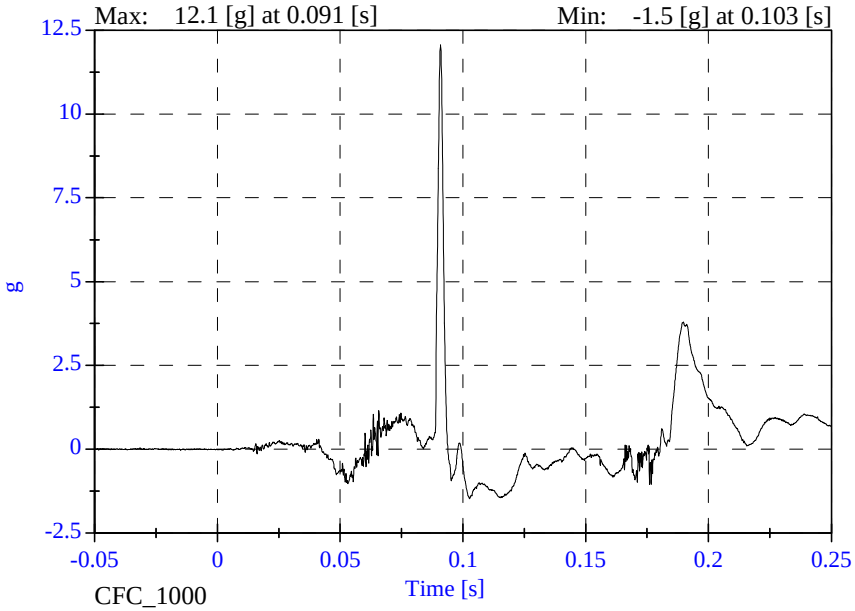
CFC_180

Sled Test Run 22223 - March 18, 2002

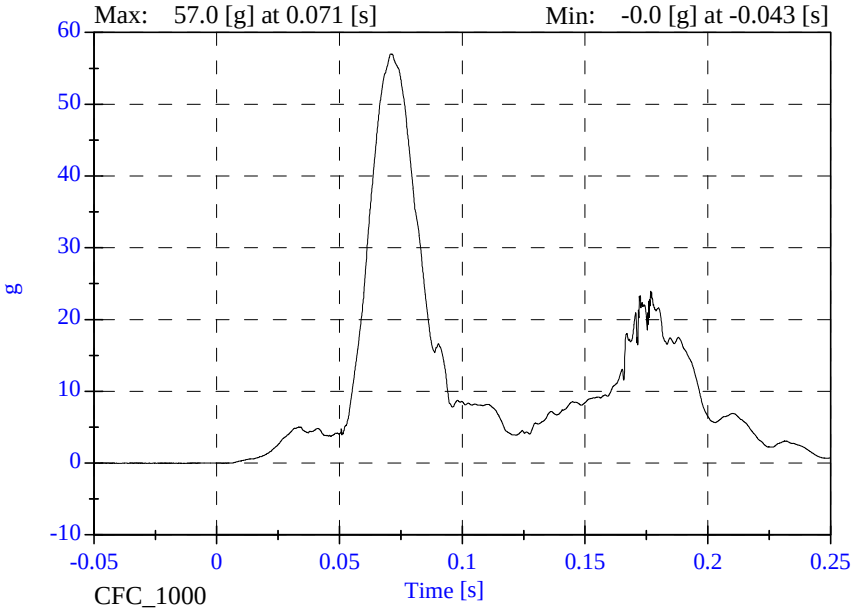
P6 Head x



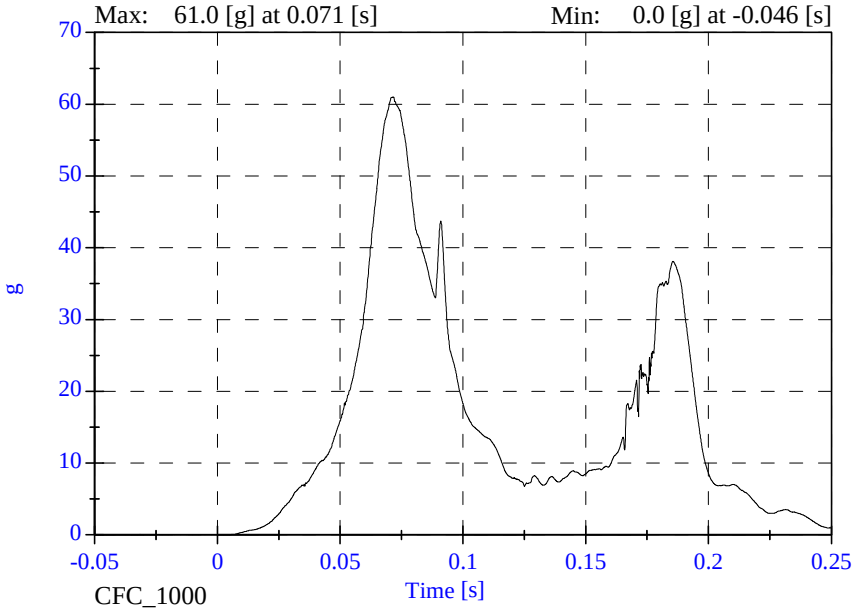
P6 Head y



P6 Head z



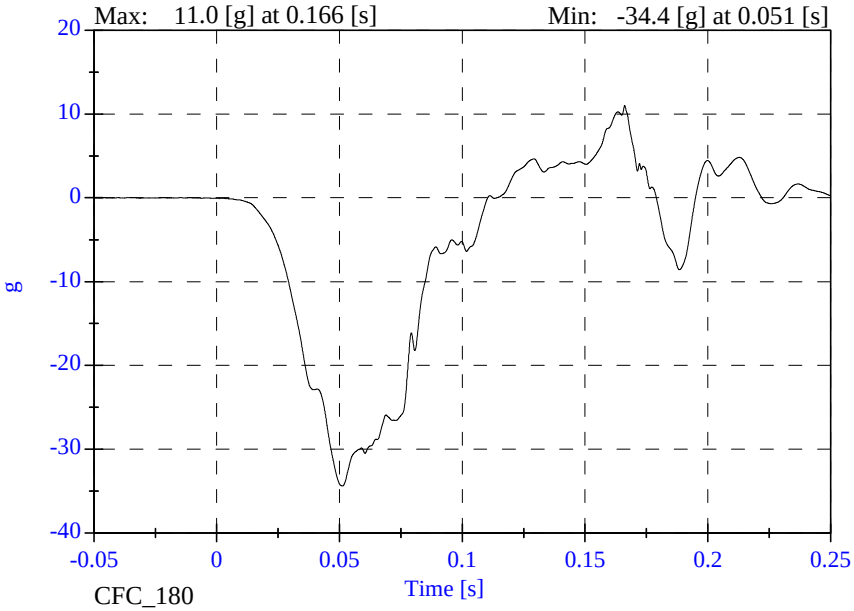
P6 Head Resultant



Sled Test Run 22223 - March 18, 2002

P6 Chest x

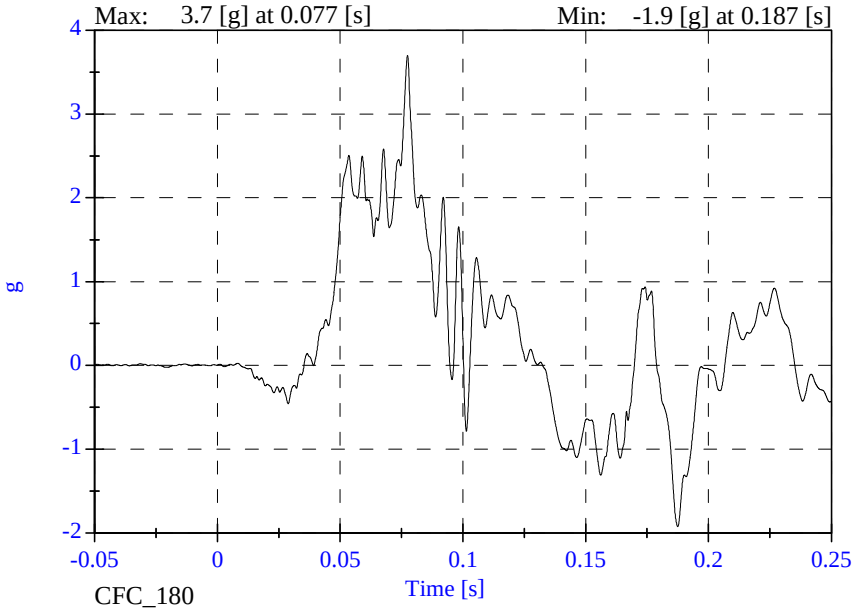
Max: 11.0 [g] at 0.166 [s] Min: -34.4 [g] at 0.051 [s]



CFC_180

P6 Chest y

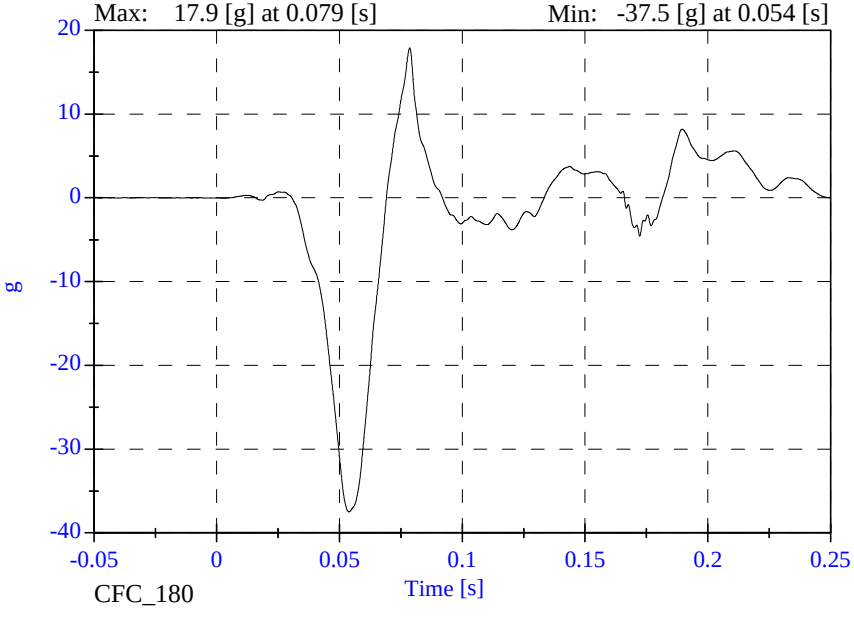
Max: 3.7 [g] at 0.077 [s] Min: -1.9 [g] at 0.187 [s]



CFC_180

P6 Chest z

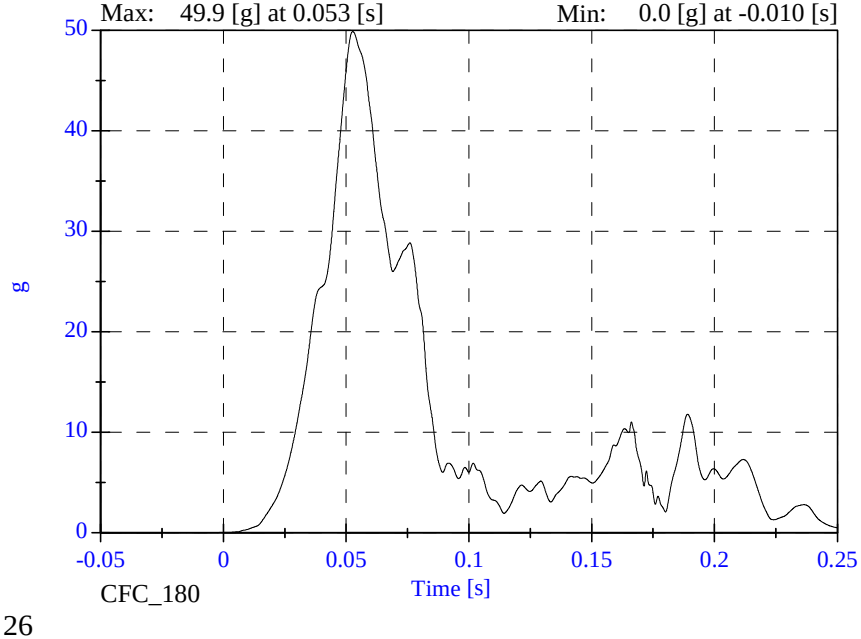
Max: 17.9 [g] at 0.079 [s] Min: -37.5 [g] at 0.054 [s]



CFC_180

P6 Chest Resultant

Max: 49.9 [g] at 0.053 [s] Min: 0.0 [g] at -0.010 [s]

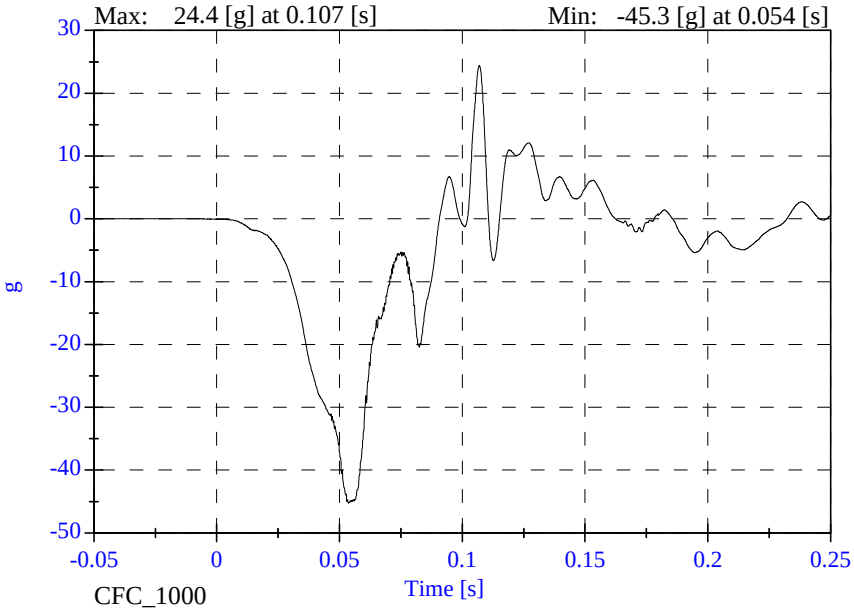


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Pelvic x

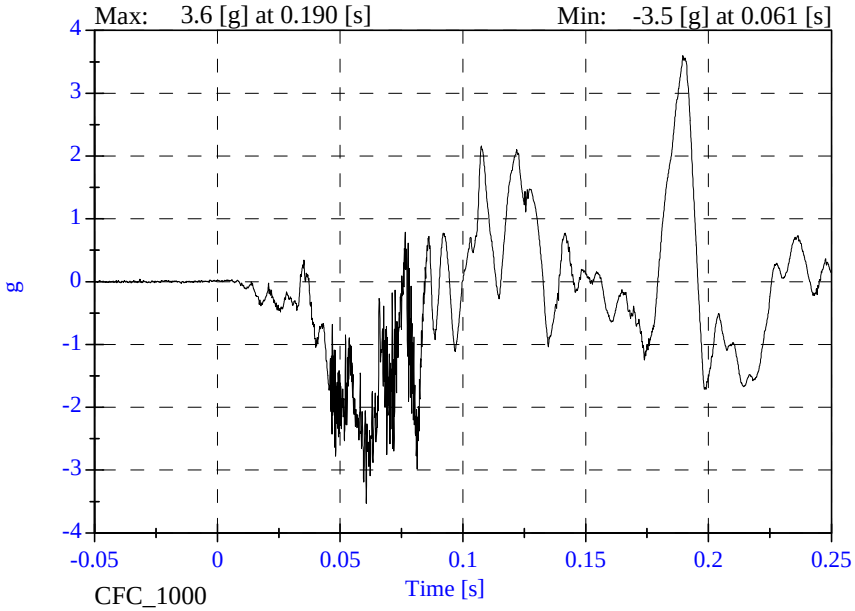
Max: 24.4 [g] at 0.107 [s] Min: -45.3 [g] at 0.054 [s]



CFC_1000

P6 Pelvic y

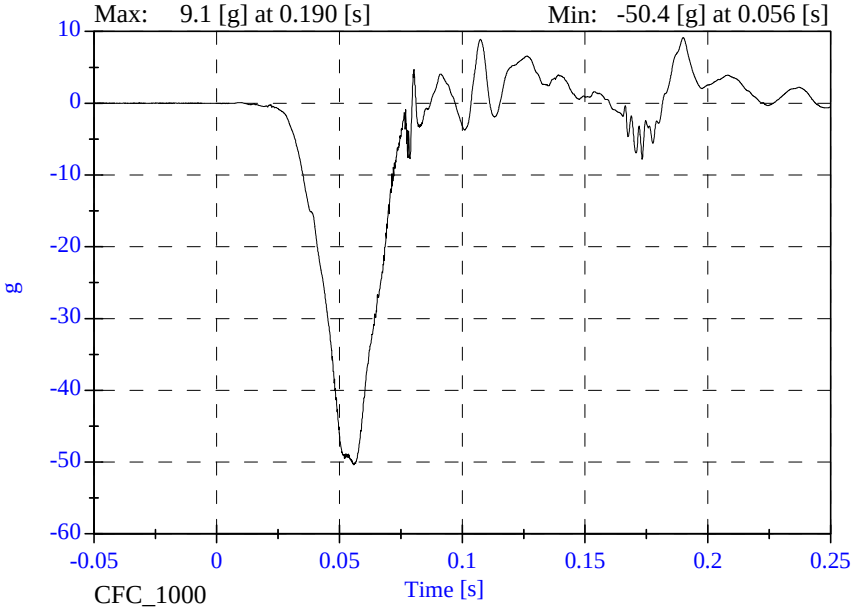
Max: 3.6 [g] at 0.190 [s] Min: -3.5 [g] at 0.061 [s]



CFC_1000

P6 Pelvic z

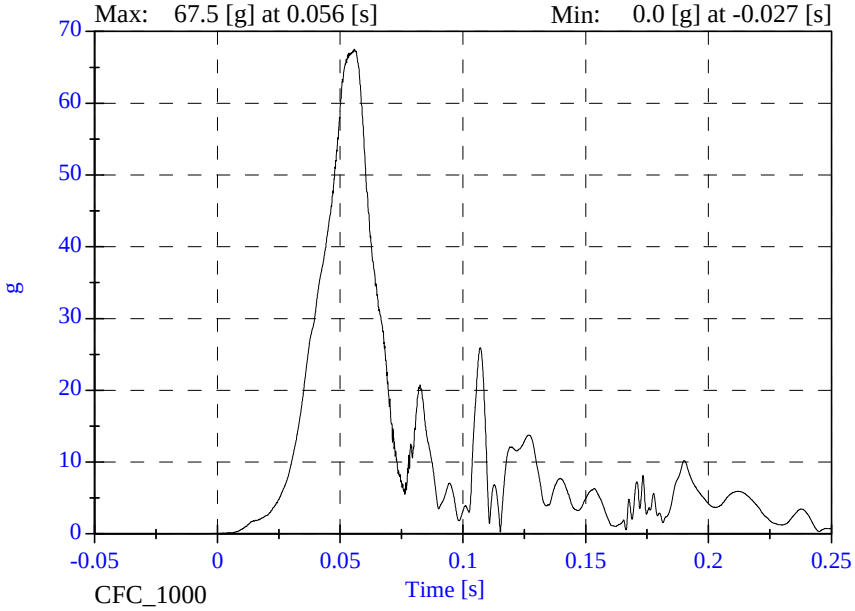
Max: 9.1 [g] at 0.190 [s] Min: -50.4 [g] at 0.056 [s]



CFC_1000

P6 Pelvic Resultant

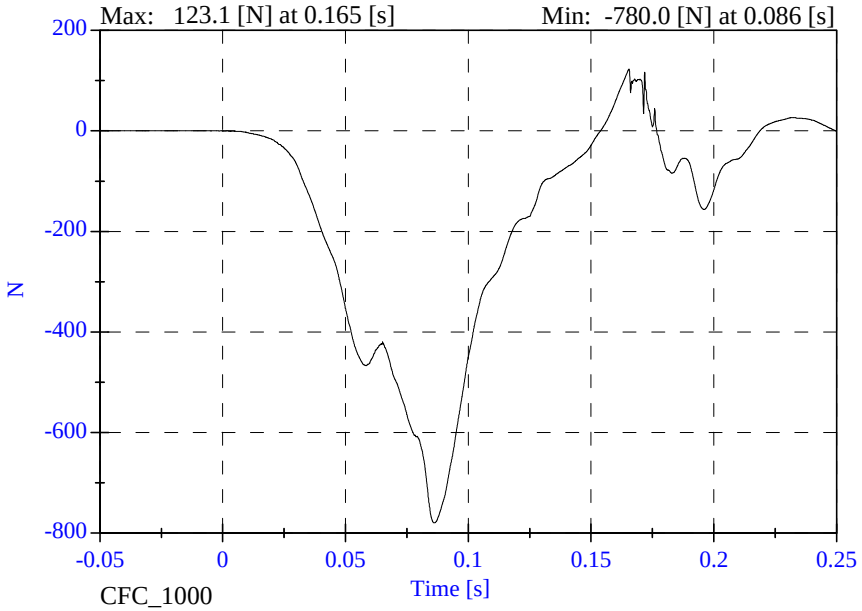
Max: 67.5 [g] at 0.056 [s] Min: 0.0 [g] at -0.027 [s]



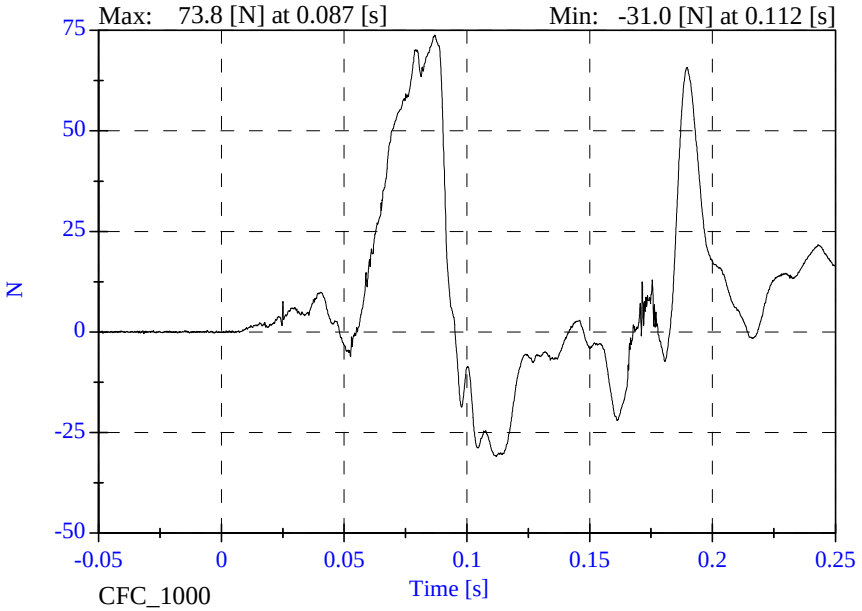
CFC_1000

Sled Test Run 22223 - March 18, 2002

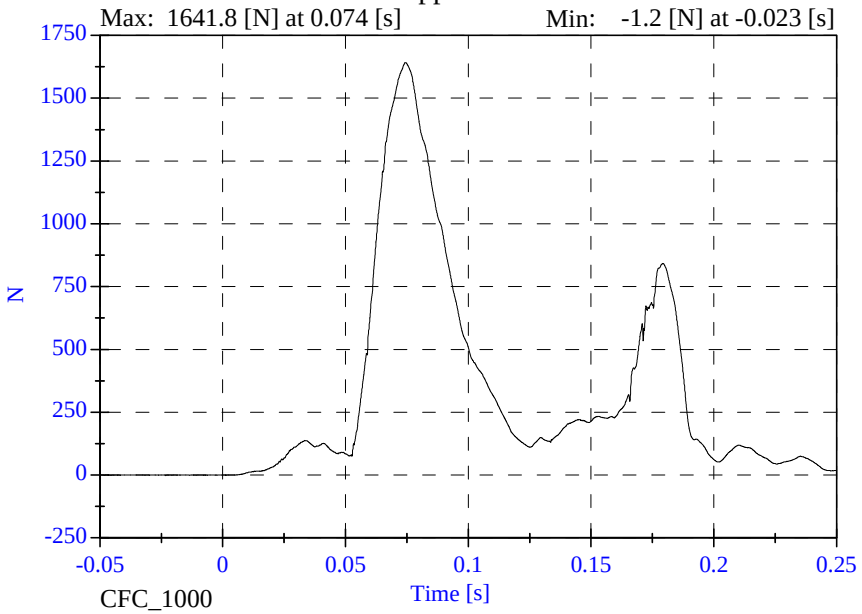
P6 Upper Neck Fx



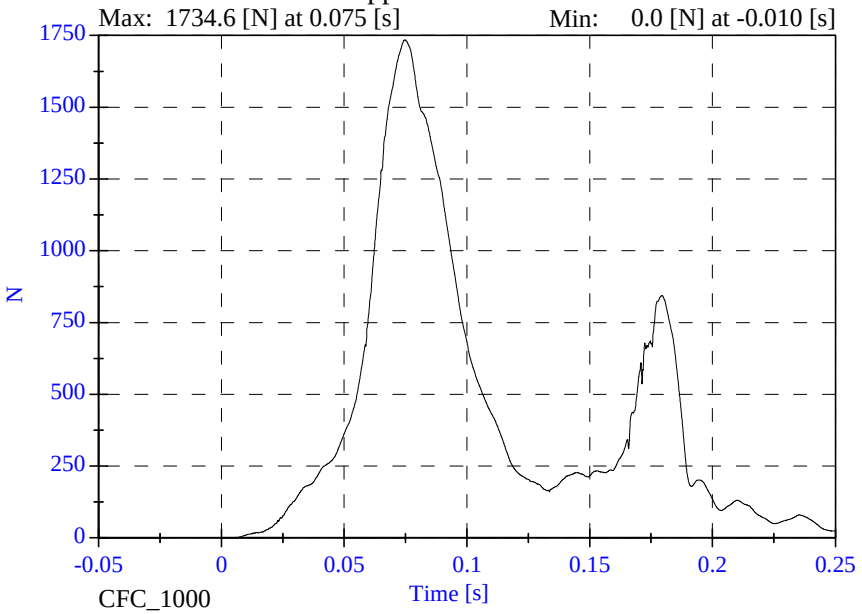
P6 Upper Neck Fy



P6 Upper Neck Fz



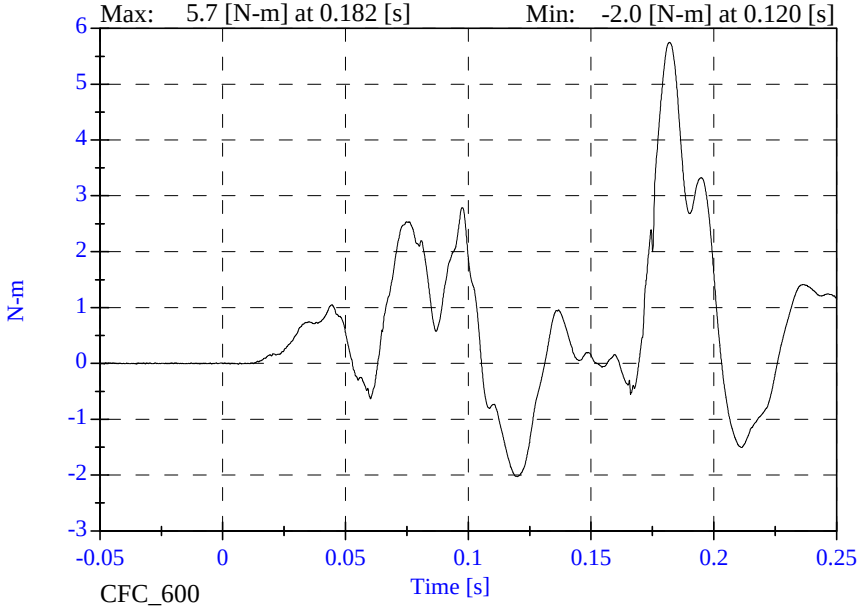
P6 Upper Neck F Resultant



Sled Test Run 22223 - March 18, 2002

P6 Upper Neck Mx

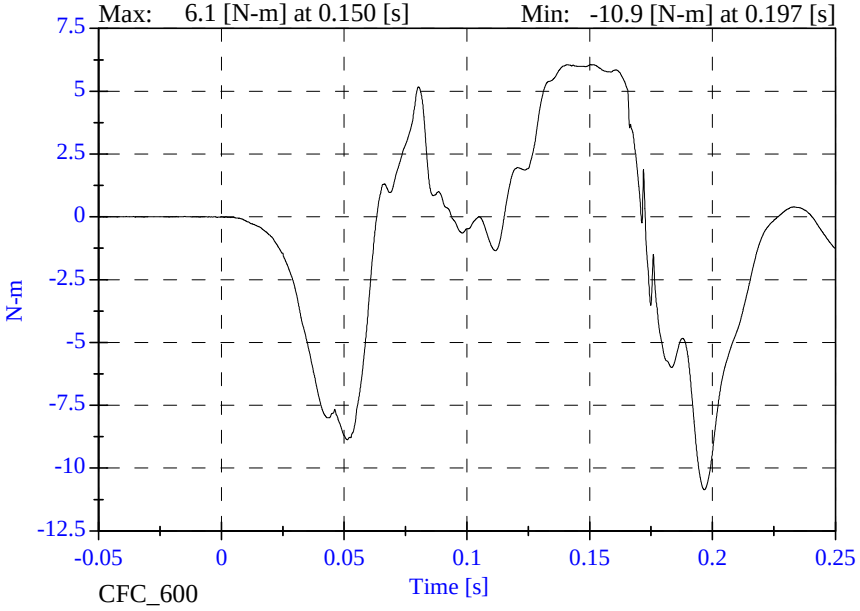
Max: 5.7 [N-m] at 0.182 [s] Min: -2.0 [N-m] at 0.120 [s]



CFC_600

P6 Upper Neck My

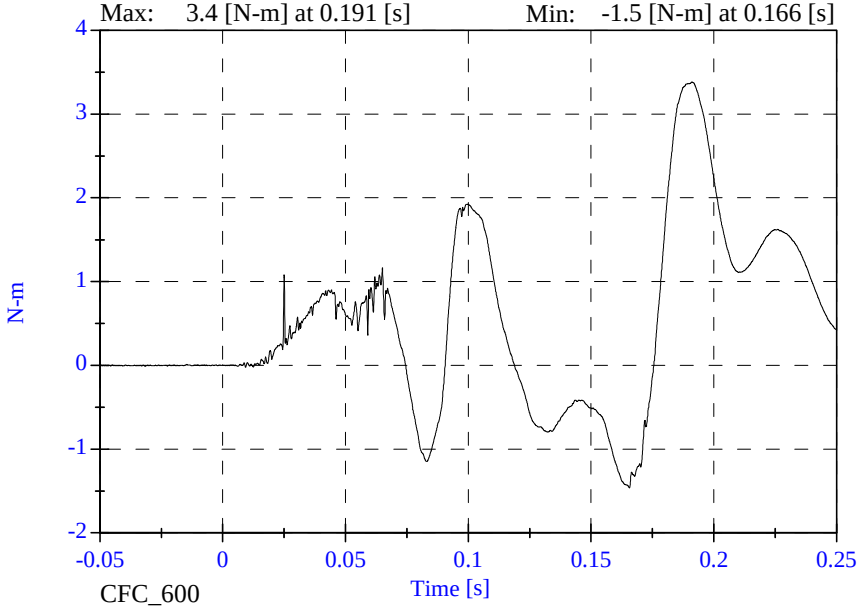
Max: 6.1 [N-m] at 0.150 [s] Min: -10.9 [N-m] at 0.197 [s]



CFC_600

P6 Upper Neck Mz

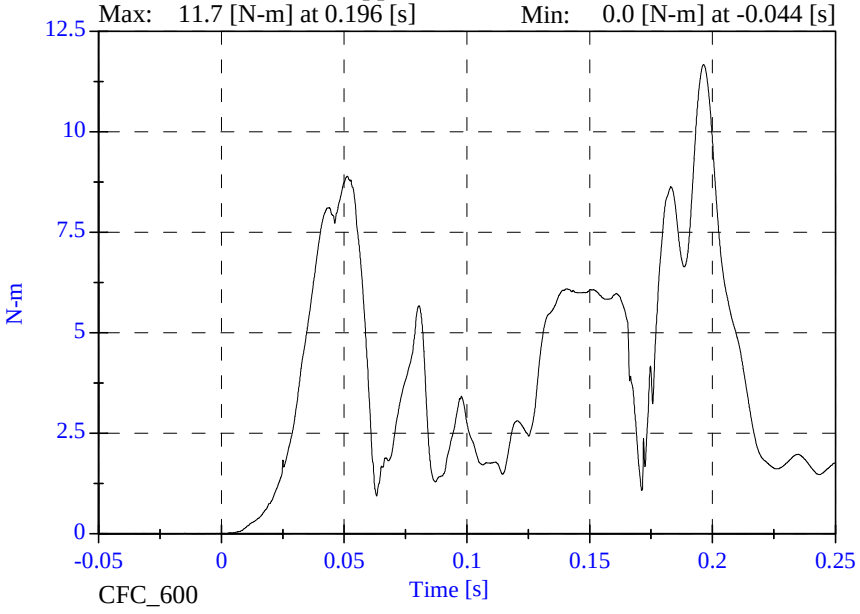
Max: 3.4 [N-m] at 0.191 [s] Min: -1.5 [N-m] at 0.166 [s]



CFC_600

P6 Upper Neck M Resultant

Max: 11.7 [N-m] at 0.196 [s] Min: 0.0 [N-m] at -0.044 [s]

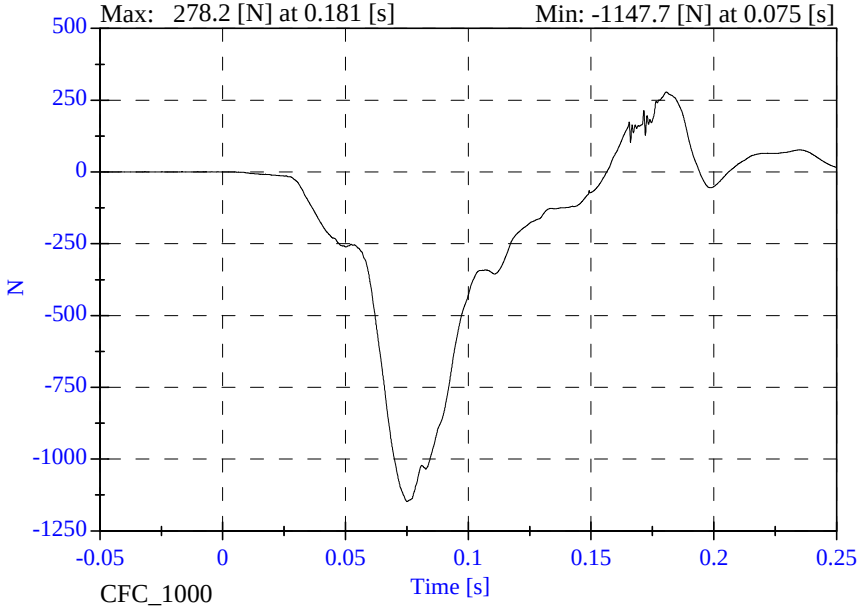


CFC_600

Sled Test Run 22223 - March 18, 2002

P6 Lower Neck Fx

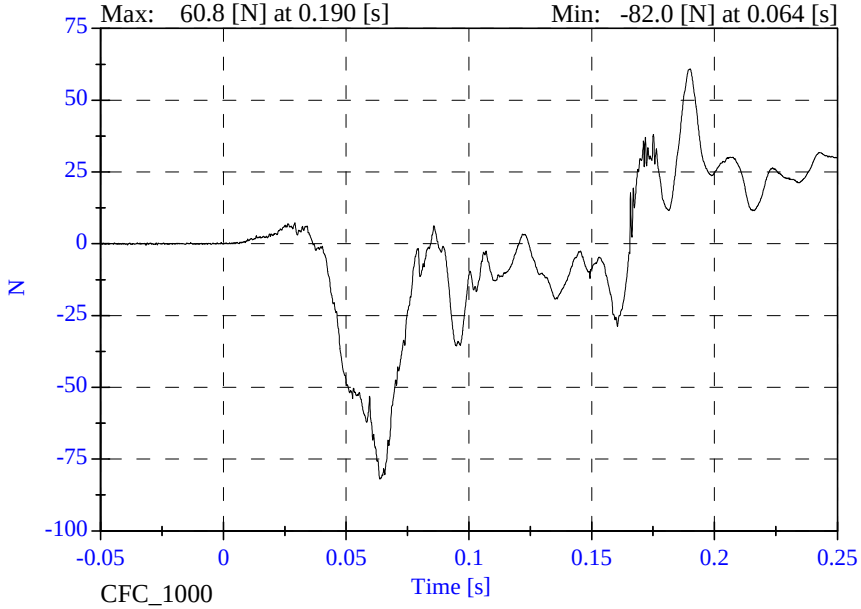
Max: 278.2 [N] at 0.181 [s] Min: -1147.7 [N] at 0.075 [s]



CFC_1000

P6 Lower Neck Fy

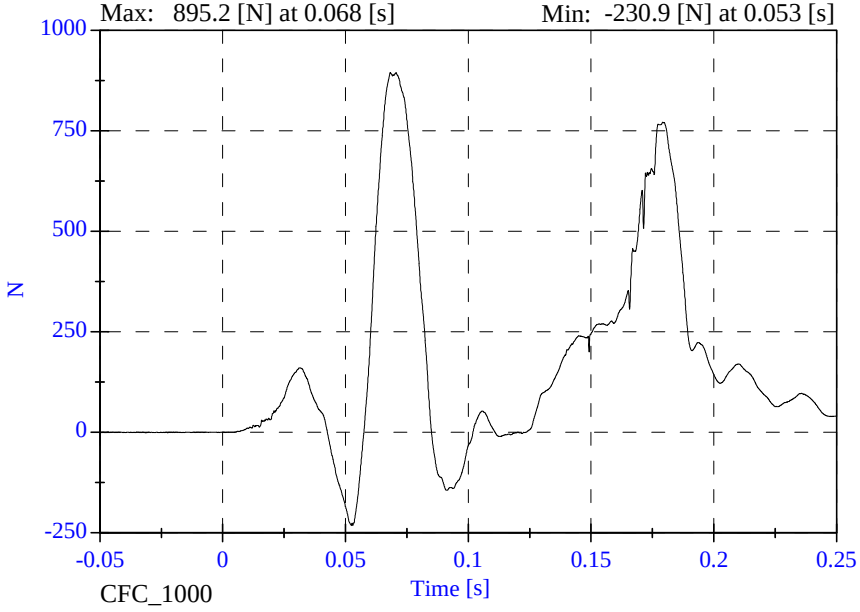
Max: 60.8 [N] at 0.190 [s] Min: -82.0 [N] at 0.064 [s]



CFC_1000

P6 Lower Neck Fz

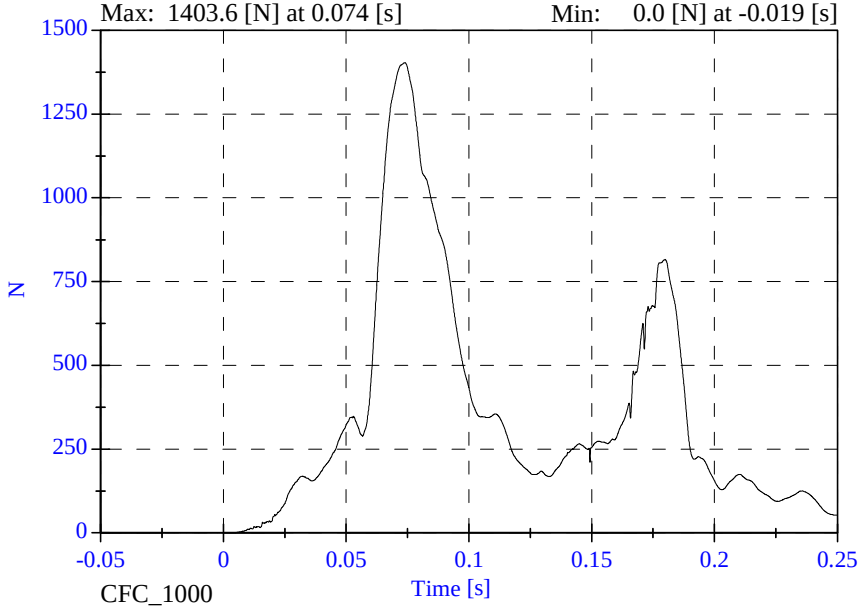
Max: 895.2 [N] at 0.068 [s] Min: -230.9 [N] at 0.053 [s]



CFC_1000

P6 Lower Neck F Resultant

Max: 1403.6 [N] at 0.074 [s] Min: 0.0 [N] at -0.019 [s]

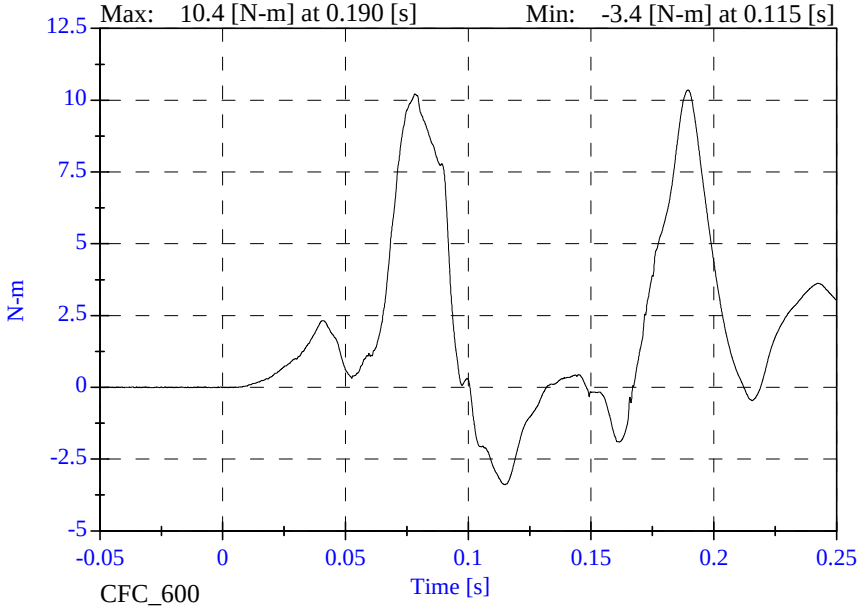


CFC_1000

Sled Test Run 22223 - March 18, 2002

P6 Lower Neck Mx

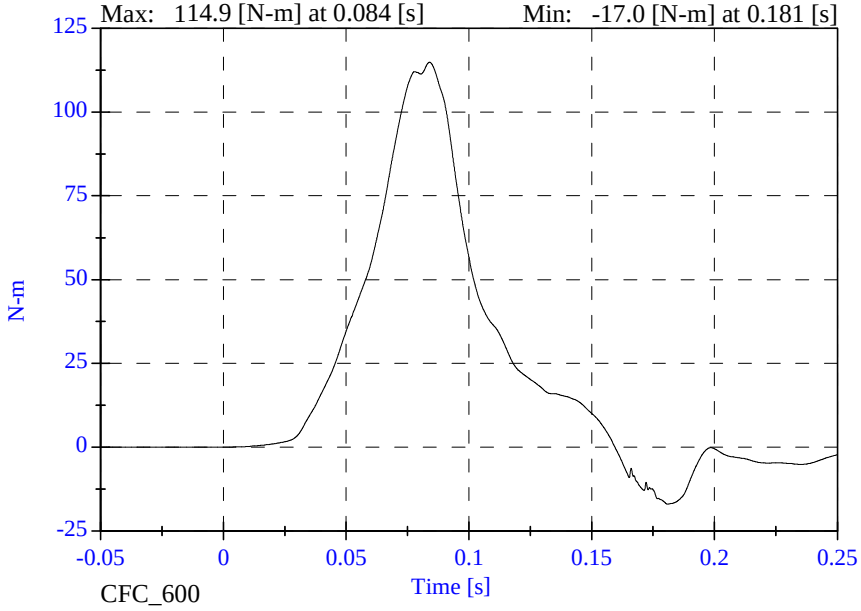
Max: 10.4 [N-m] at 0.190 [s] Min: -3.4 [N-m] at 0.115 [s]



CFC_600

P6 Lower Neck My

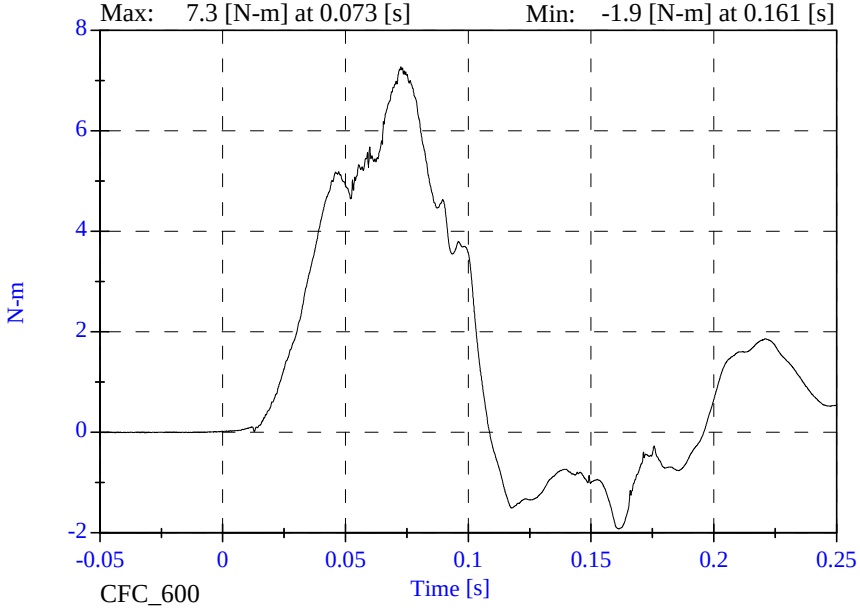
Max: 114.9 [N-m] at 0.084 [s] Min: -17.0 [N-m] at 0.181 [s]



CFC_600

P6 Lower Neck Mz

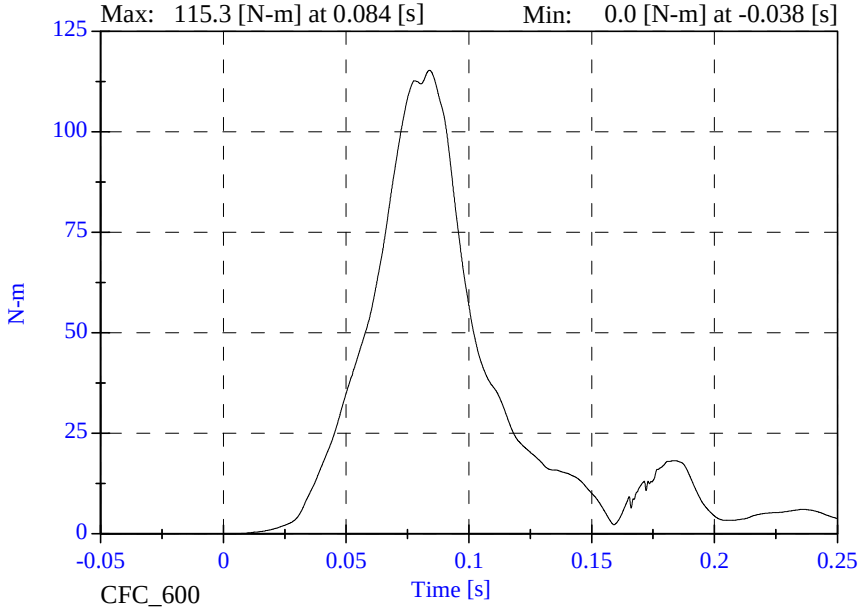
Max: 7.3 [N-m] at 0.073 [s] Min: -1.9 [N-m] at 0.161 [s]



CFC_600

P6 Lower Neck M Resultant

Max: 115.3 [N-m] at 0.084 [s] Min: 0.0 [N-m] at -0.038 [s]

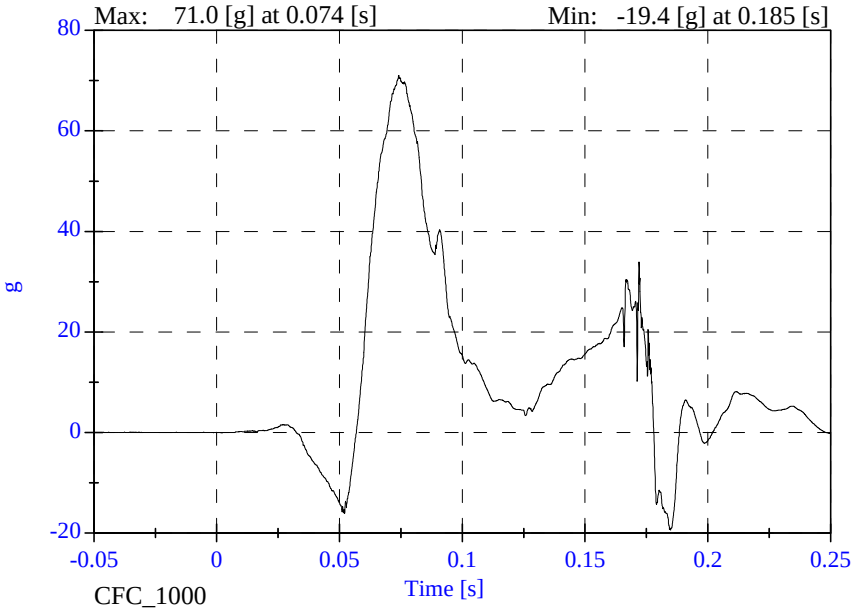


CFC_600

Sled Test Run 22223 - March 18, 2002

P6 Head Red z

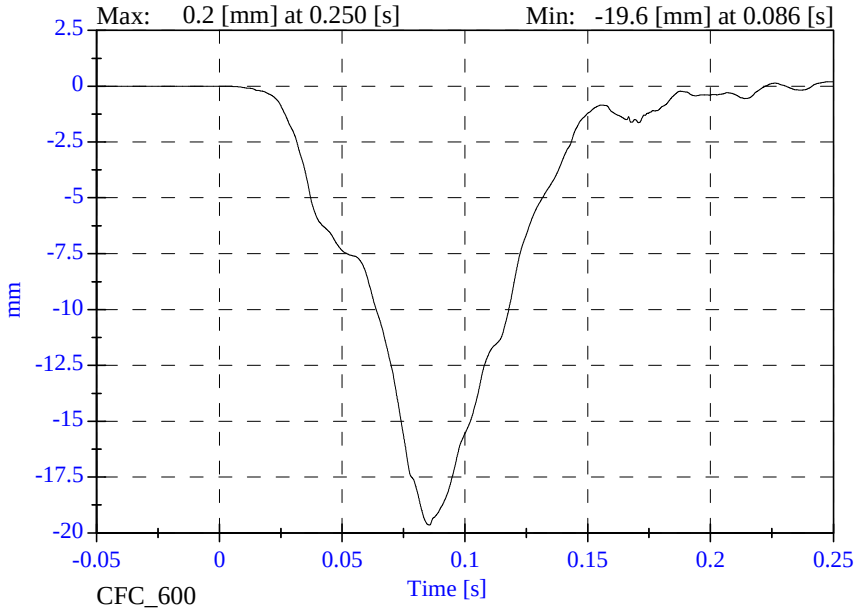
Max: 71.0 [g] at 0.074 [s] Min: -19.4 [g] at 0.185 [s]



CFC_1000

P6 Chest Compression

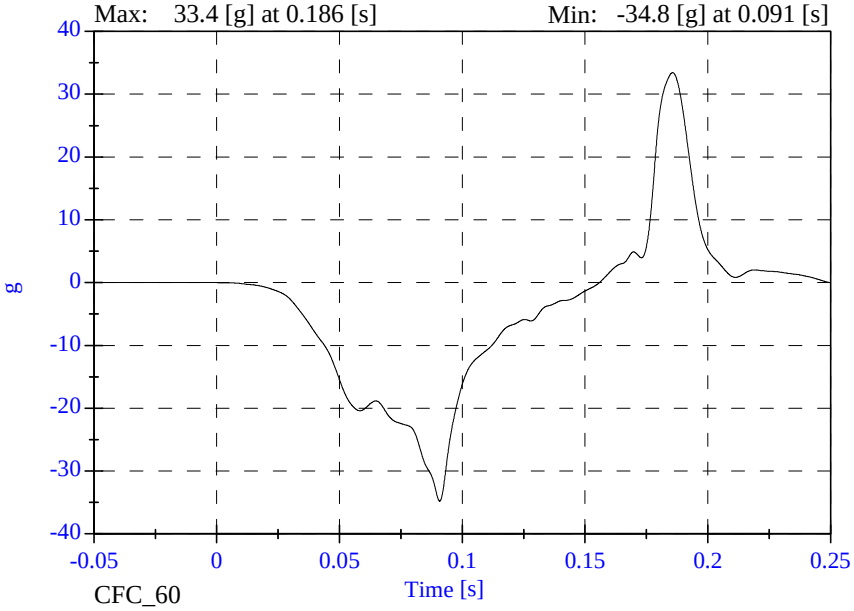
Max: 0.2 [mm] at 0.250 [s] Min: -19.6 [mm] at 0.086 [s]



CFC_600

P6 Head x

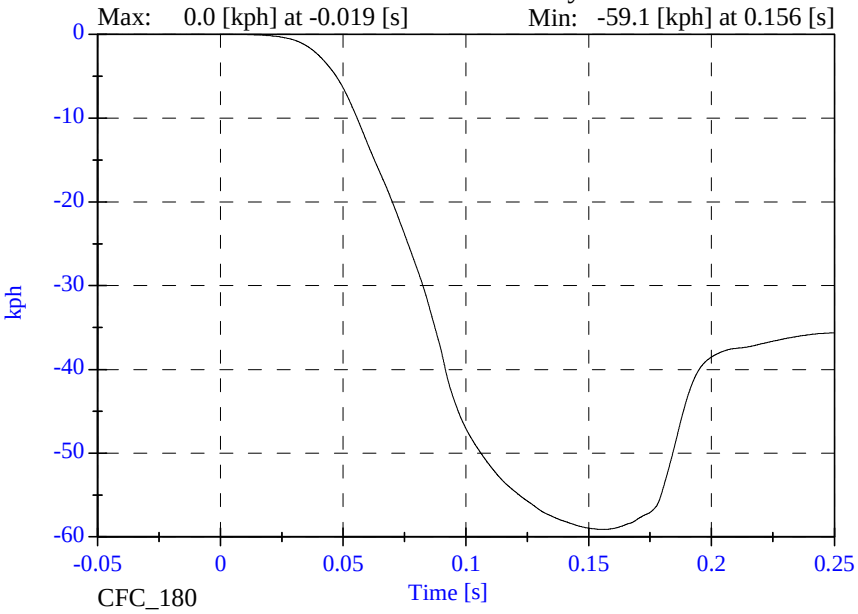
Max: 33.4 [g] at 0.186 [s] Min: -34.8 [g] at 0.091 [s]



CFC_60

P6 Head x Velocity

Max: 0.0 [kph] at -0.019 [s] Min: -59.1 [kph] at 0.156 [s]

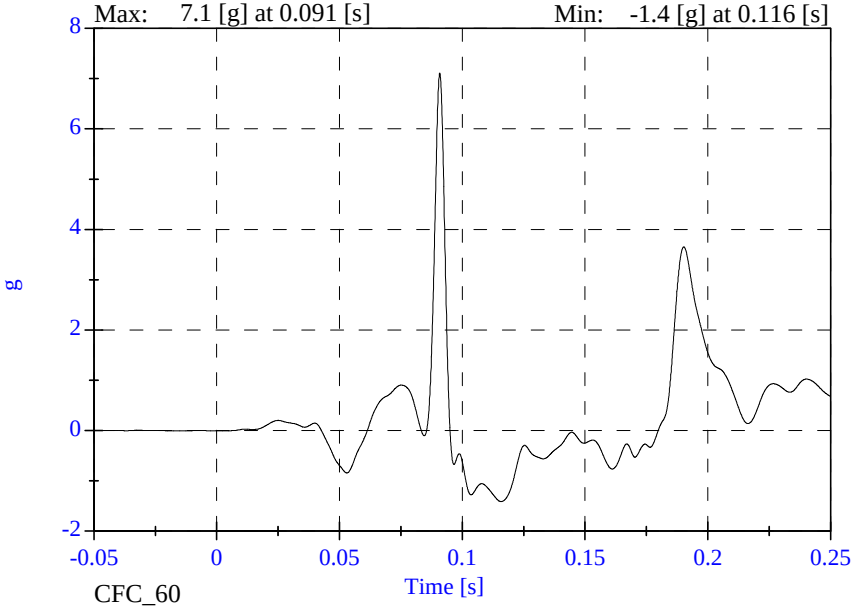


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Head y

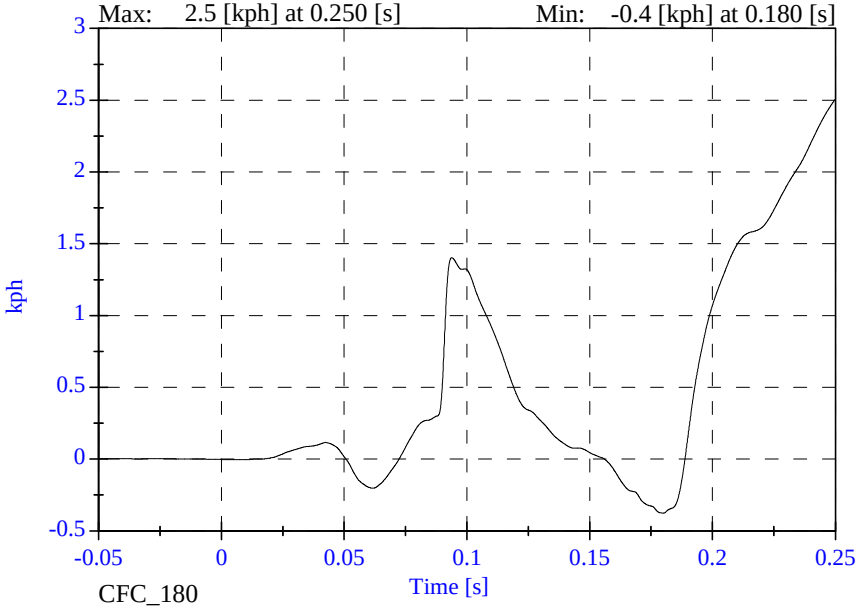
Max: 7.1 [g] at 0.091 [s] Min: -1.4 [g] at 0.116 [s]



CFC_60

P6 Head y Velocity

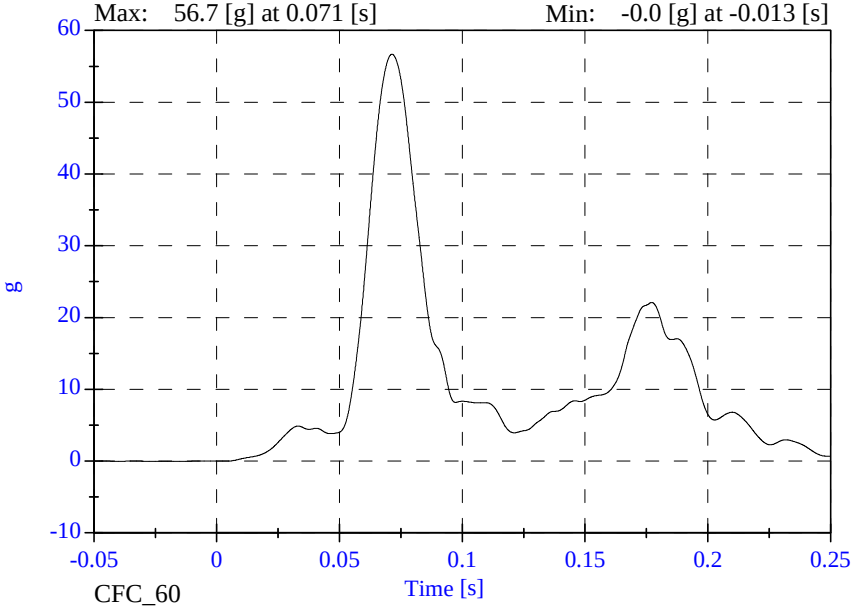
Max: 2.5 [kph] at 0.250 [s] Min: -0.4 [kph] at 0.180 [s]



CFC_180

P6 Head z

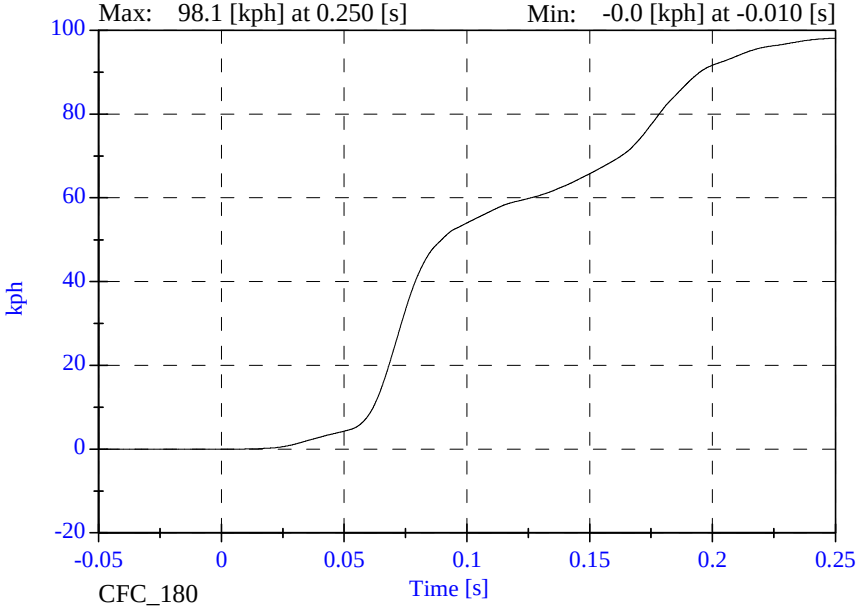
Max: 56.7 [g] at 0.071 [s] Min: -0.0 [g] at -0.013 [s]



CFC_60

P6 Head z Velocity

Max: 98.1 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.010 [s]

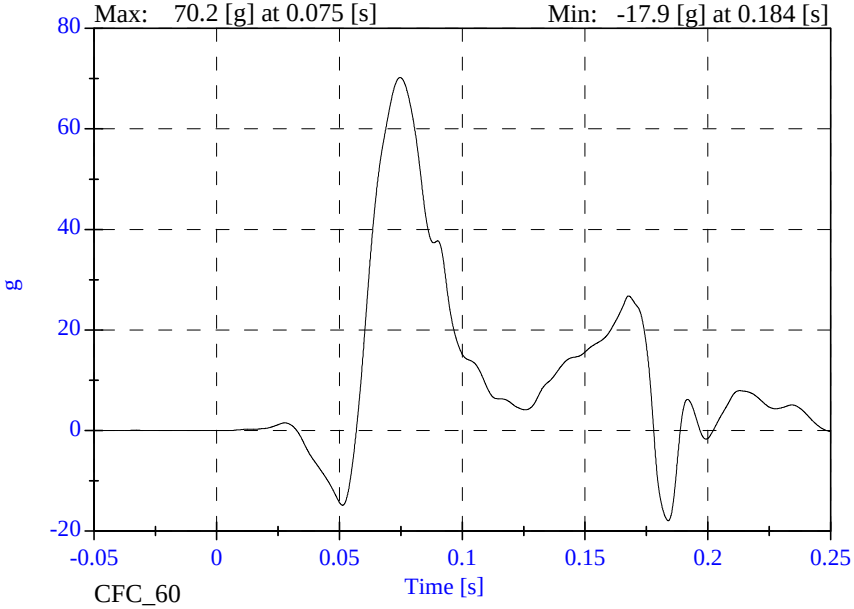


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Head Red z

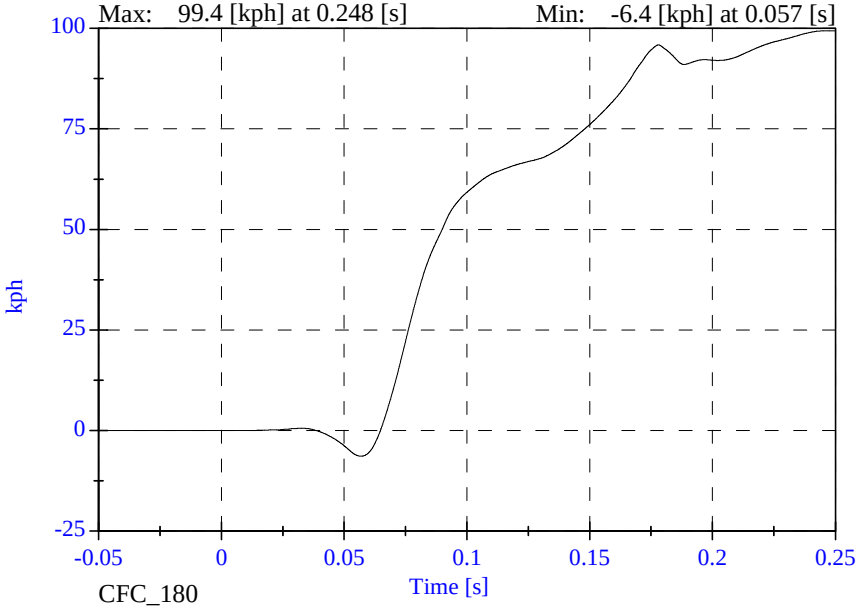
Max: 70.2 [g] at 0.075 [s] Min: -17.9 [g] at 0.184 [s]



CFC_60

P6 Head Red z Velocity

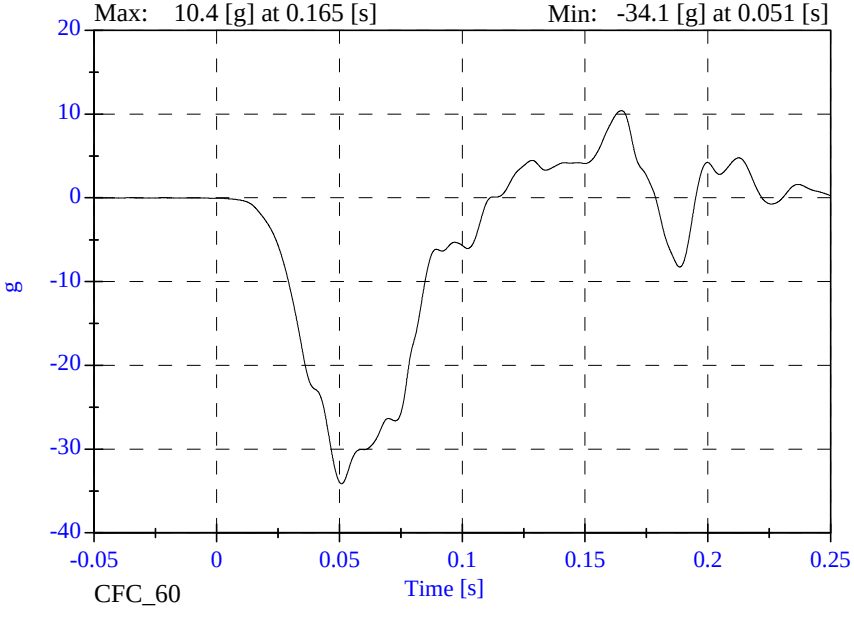
Max: 99.4 [kph] at 0.248 [s] Min: -6.4 [kph] at 0.057 [s]



CFC_180

P6 Chest x

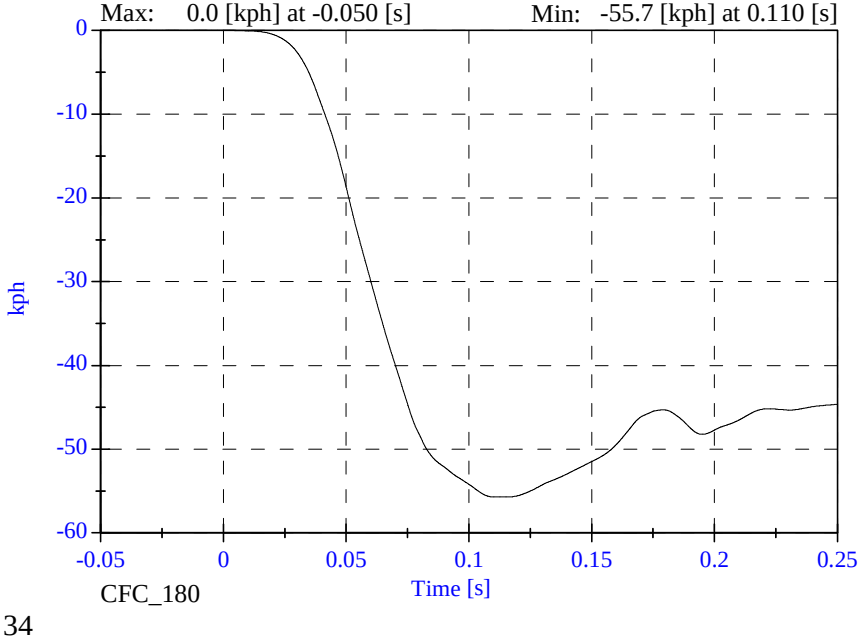
Max: 10.4 [g] at 0.165 [s] Min: -34.1 [g] at 0.051 [s]



CFC_60

P6 Chest x Velocity

Max: 0.0 [kph] at -0.050 [s] Min: -55.7 [kph] at 0.110 [s]

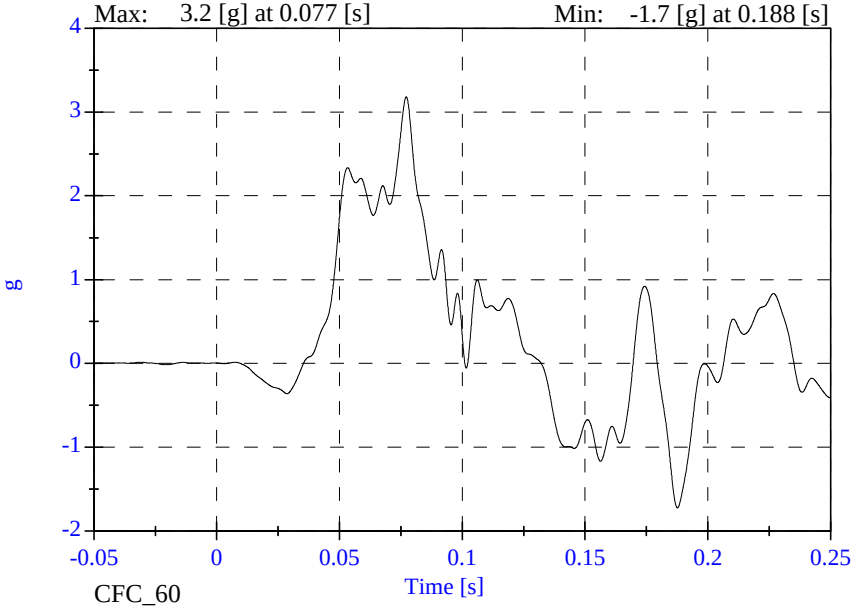


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Chest y

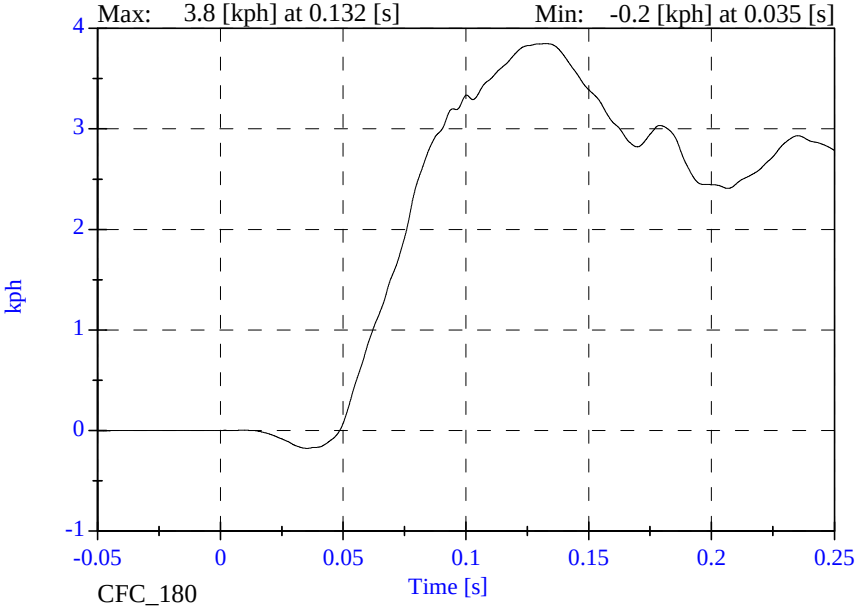
Max: 3.2 [g] at 0.077 [s] Min: -1.7 [g] at 0.188 [s]



CFC_60

P6 Chest y Velocity

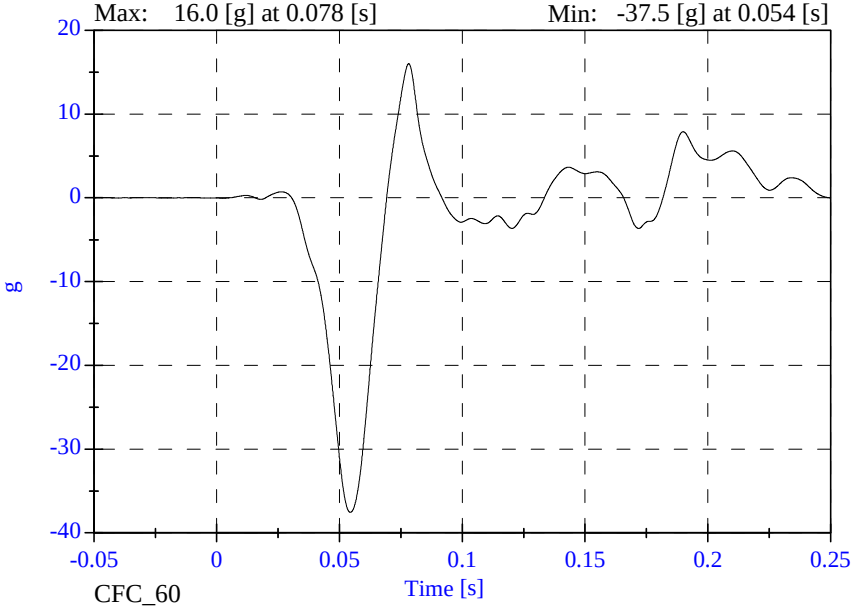
Max: 3.8 [kph] at 0.132 [s] Min: -0.2 [kph] at 0.035 [s]



CFC_180

P6 Chest z

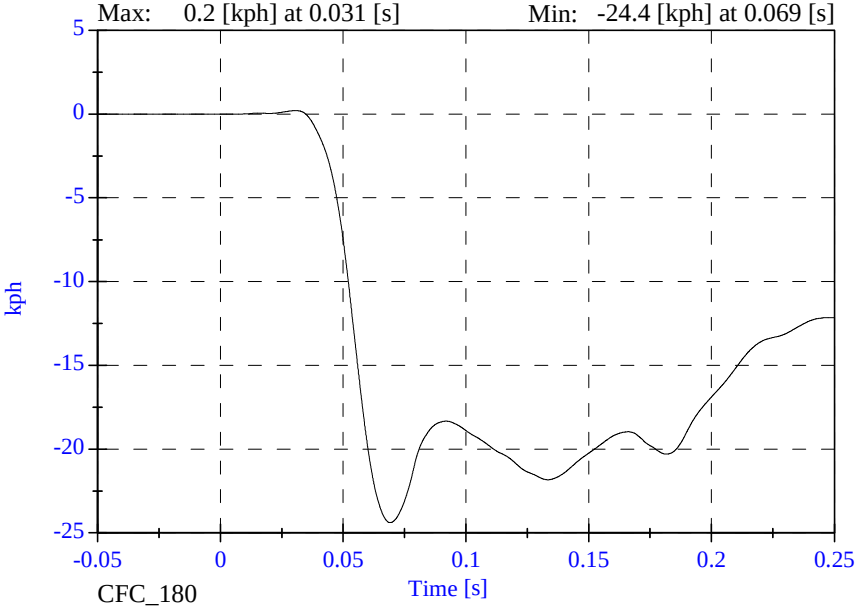
Max: 16.0 [g] at 0.078 [s] Min: -37.5 [g] at 0.054 [s]



CFC_60

P6 Chest z Velocity

Max: 0.2 [kph] at 0.031 [s] Min: -24.4 [kph] at 0.069 [s]

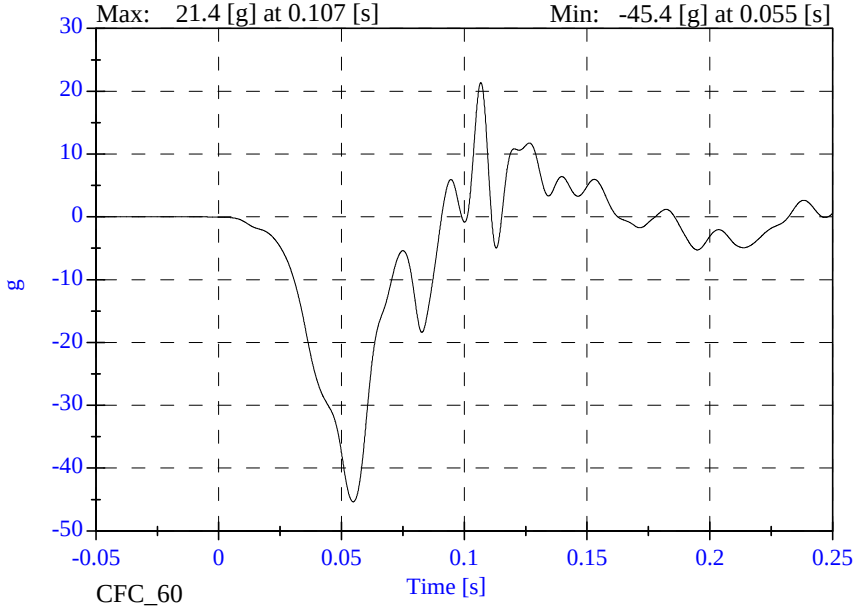


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Pelvic x

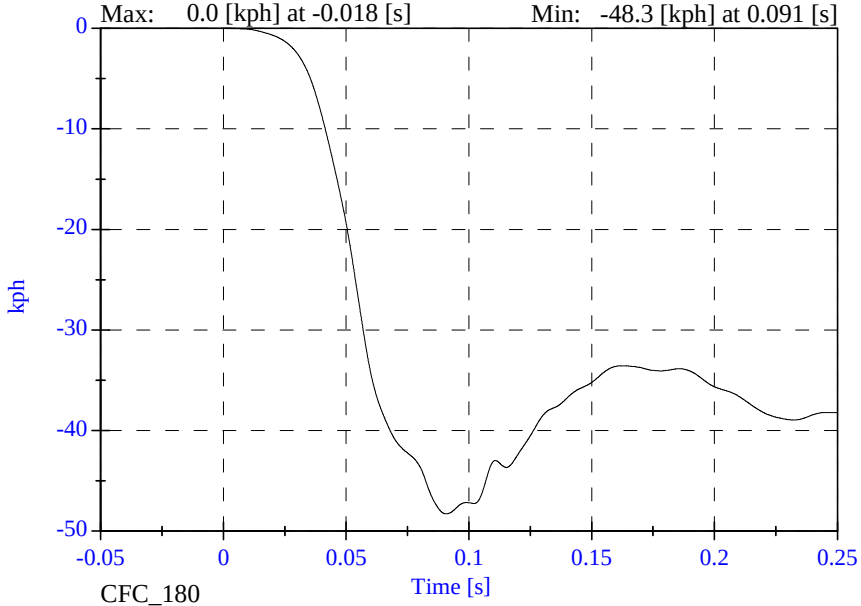
Max: 21.4 [g] at 0.107 [s] Min: -45.4 [g] at 0.055 [s]



CFC_60

P6 Pelvic x Velocity

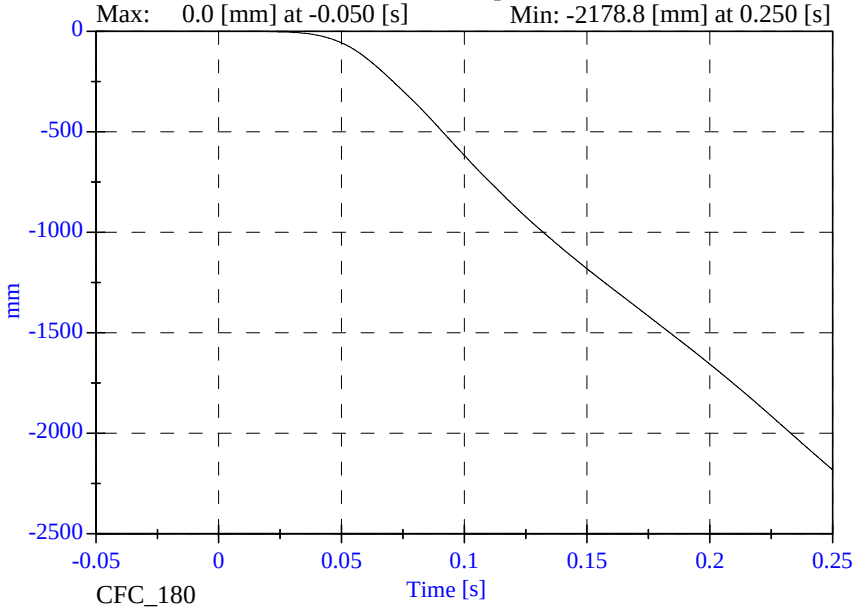
Max: 0.0 [kph] at -0.018 [s] Min: -48.3 [kph] at 0.091 [s]



CFC_180

P6 Pelvic x Displacement

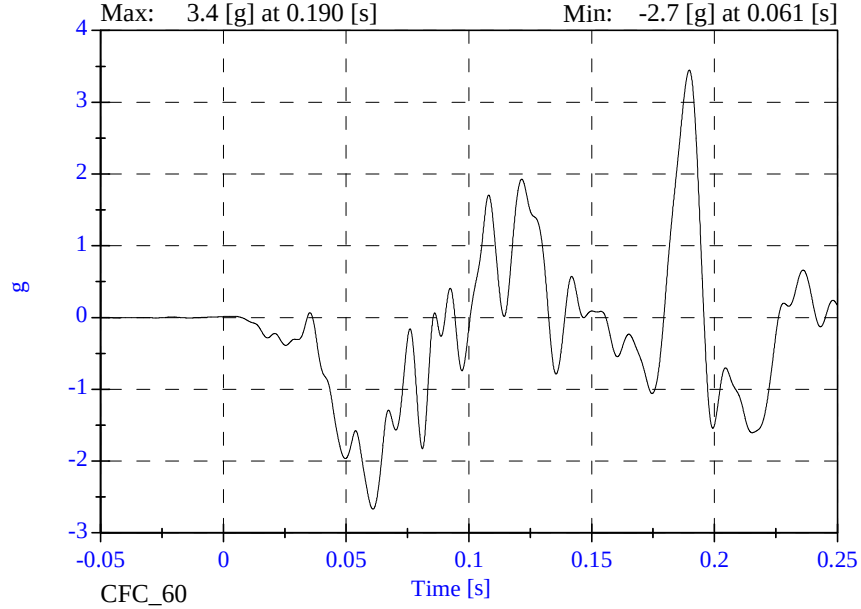
Max: 0.0 [mm] at -0.050 [s] Min: -2178.8 [mm] at 0.250 [s]



CFC_180

P6 Pelvic y

Max: 3.4 [g] at 0.190 [s] Min: -2.7 [g] at 0.061 [s]

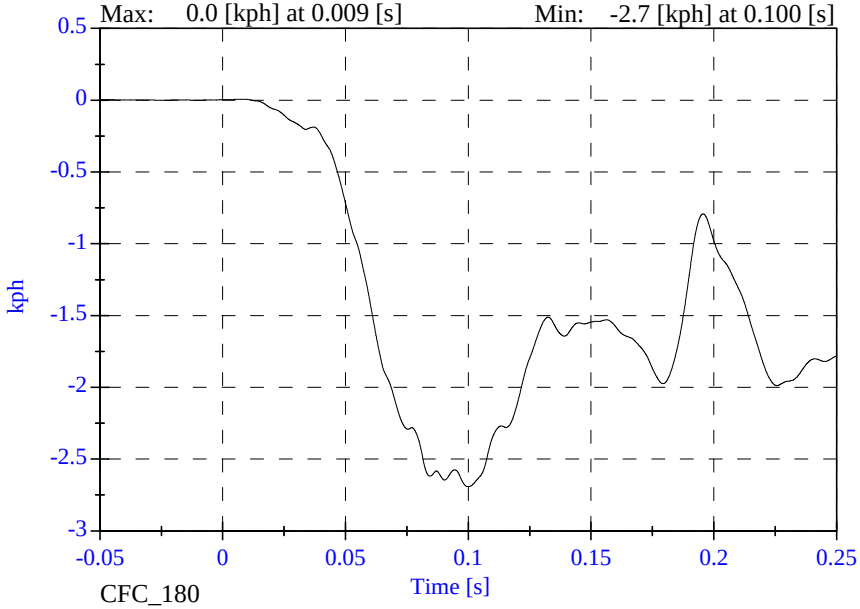


CFC_60

Sled Test Run 22223 - March 18, 2002

P6 Pelvic y Velocity

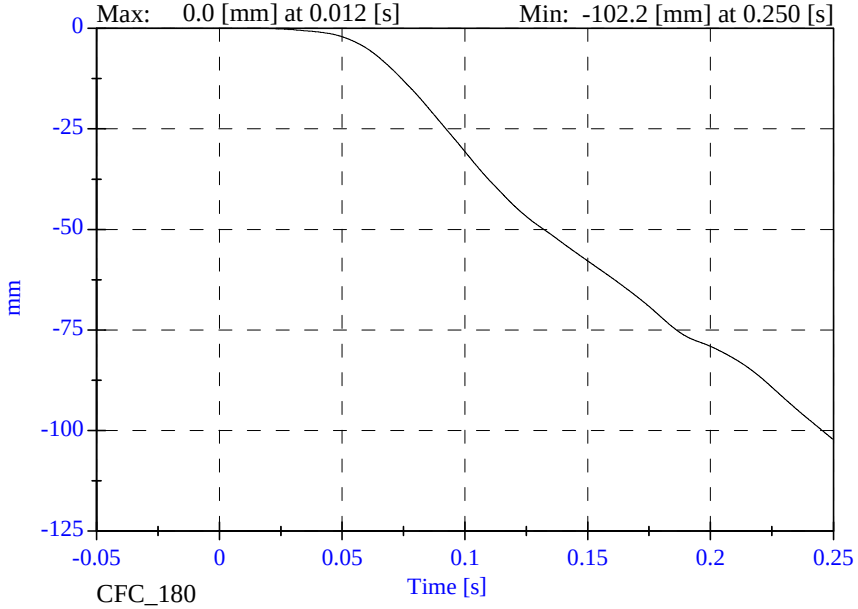
Max: 0.0 [kph] at 0.009 [s] Min: -2.7 [kph] at 0.100 [s]



CFC_180

P6 Pelvic y Displacement

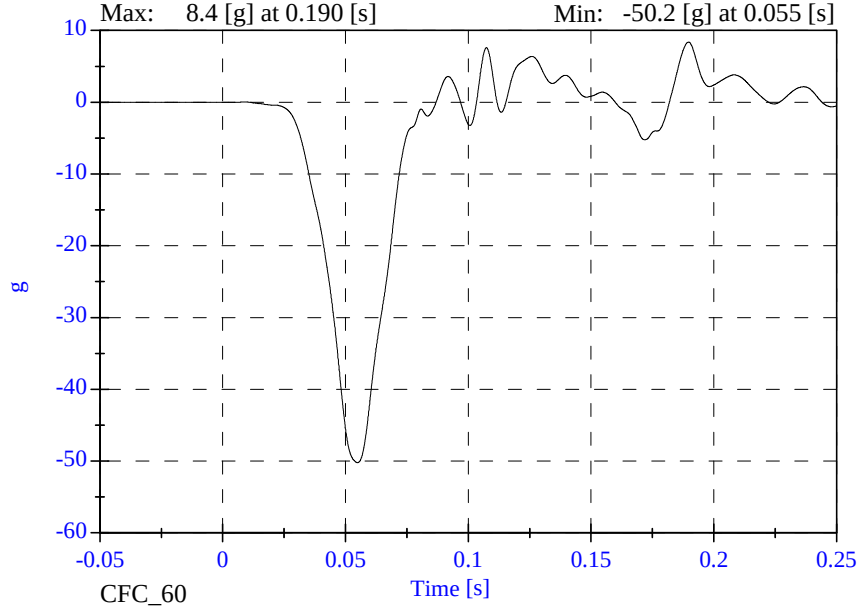
Max: 0.0 [mm] at 0.012 [s] Min: -102.2 [mm] at 0.250 [s]



CFC_180

P6 Pelvic z

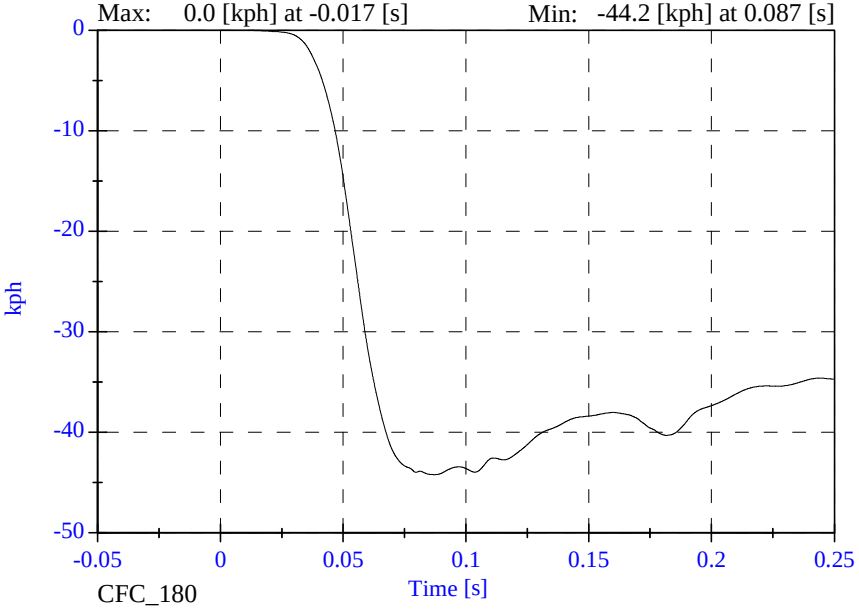
Max: 8.4 [g] at 0.190 [s] Min: -50.2 [g] at 0.055 [s]



CFC_60

P6 Pelvic z Velocity

Max: 0.0 [kph] at -0.017 [s] Min: -44.2 [kph] at 0.087 [s]

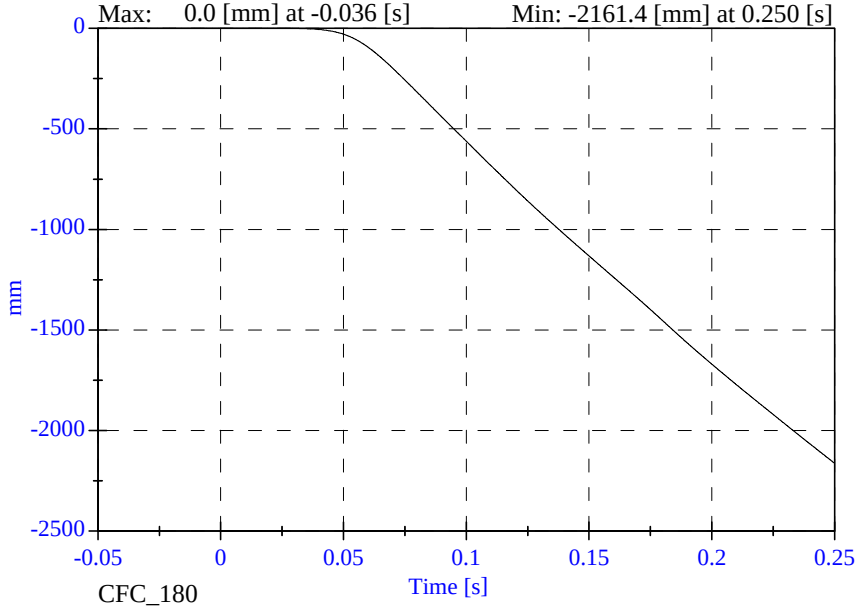


CFC_180

Sled Test Run 22223 - March 18, 2002

P6 Pelvic z Displacement

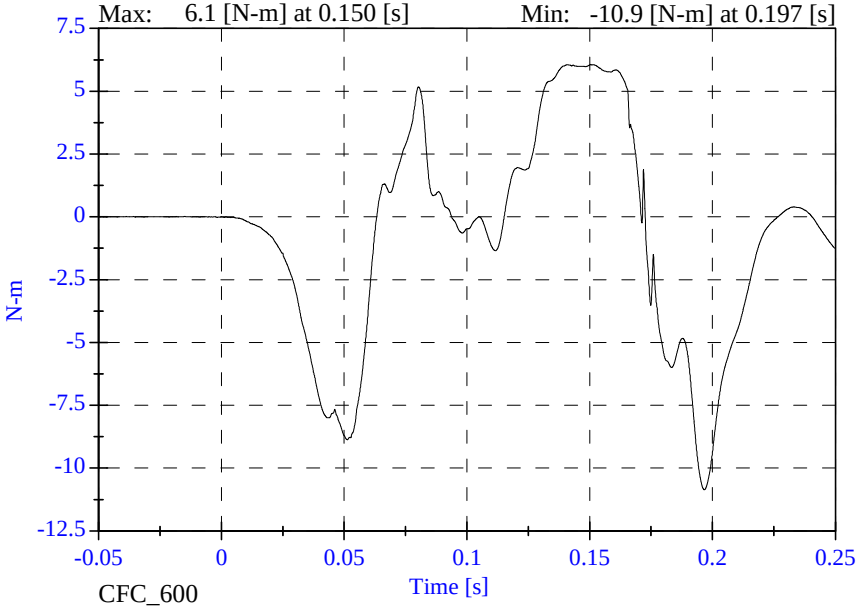
Max: 0.0 [mm] at -0.036 [s] Min: -2161.4 [mm] at 0.250 [s]



CFC_180

P6 Upper Neck Mocy

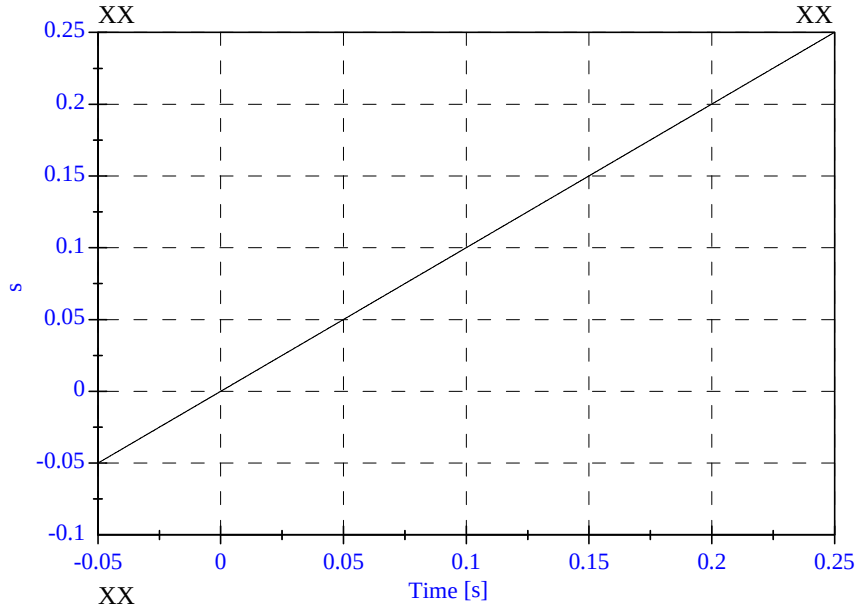
Max: 6.1 [N-m] at 0.150 [s] Min: -10.9 [N-m] at 0.197 [s]



CFC_600

BLANK

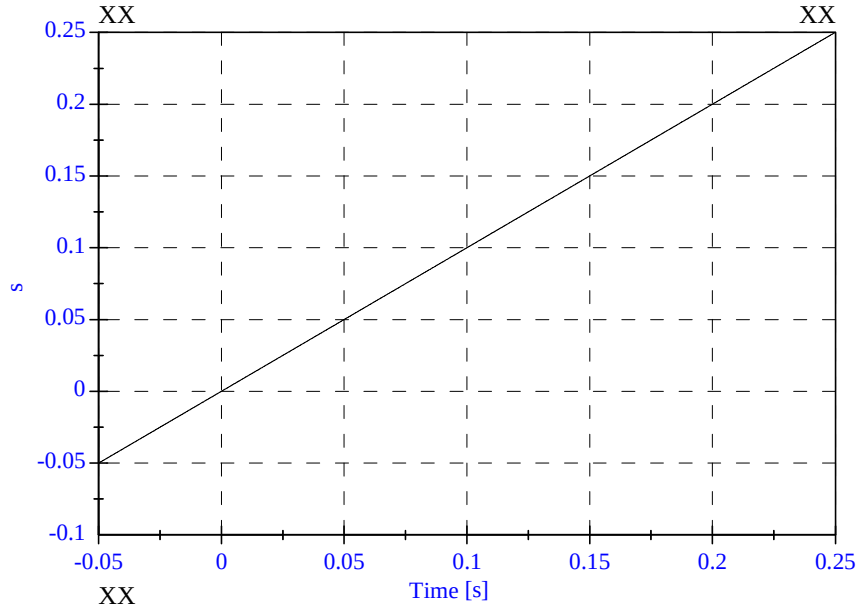
XX XX



XX

BLANK

XX XX



XX

SECTION 9

COMPRESSION – DEFLECTION RESISTANCE TEST

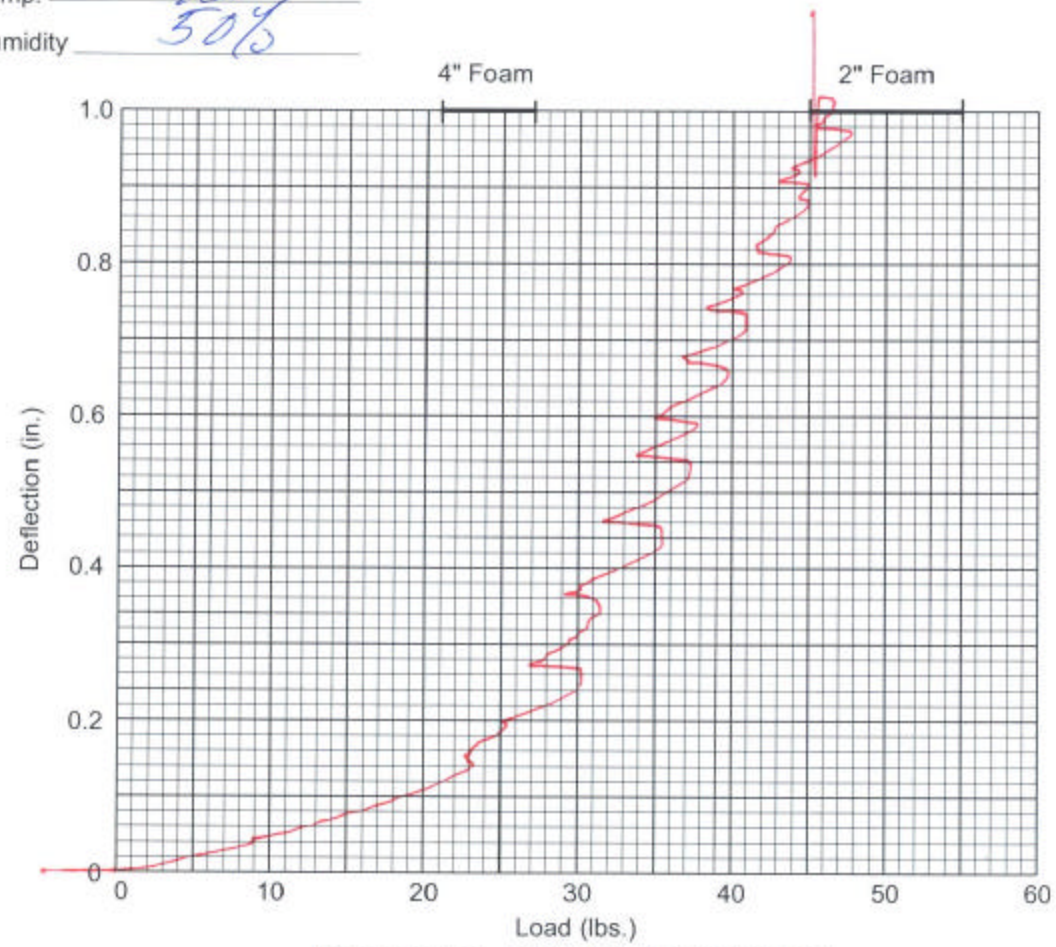
Date 3/18/09

Performed By SD

Temp. 70°

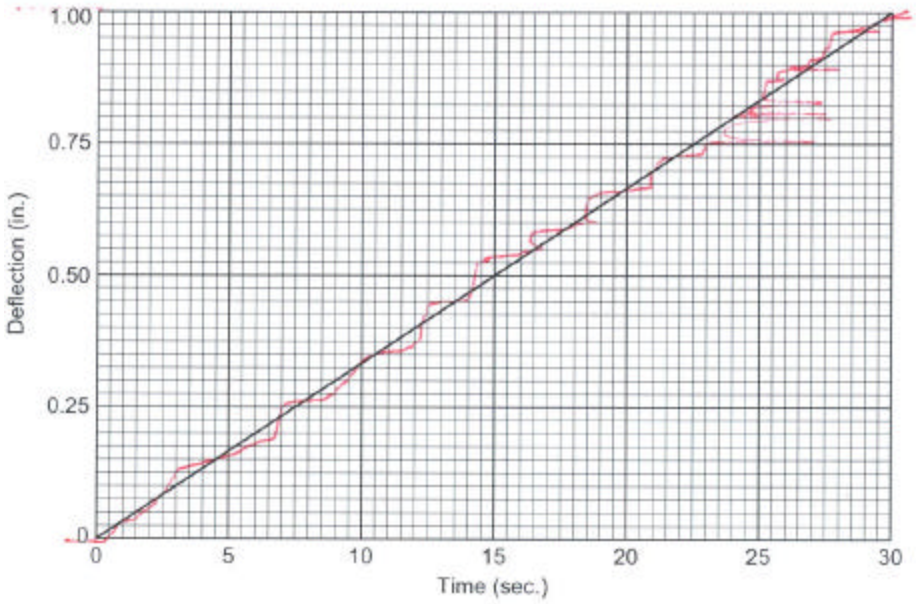
Humidity 50%

Foam No. 2"X20" 2"X24" H1



Compression - Deflection Resistance Test
Child Seat Foam

Date 3/18/02
Temp 70°
Humidity 50%
Foam No. 2"X20" 2"X24" HI



Compression - Deflection Resistance Test Child Seat Foam

001-RD1

Fo.. .2-SFUL-001-R00

SEAT FOAM USAGE LOG

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

Date	Peak Load	Pass/Fail
3/18/02	45.5 LBS	PASS

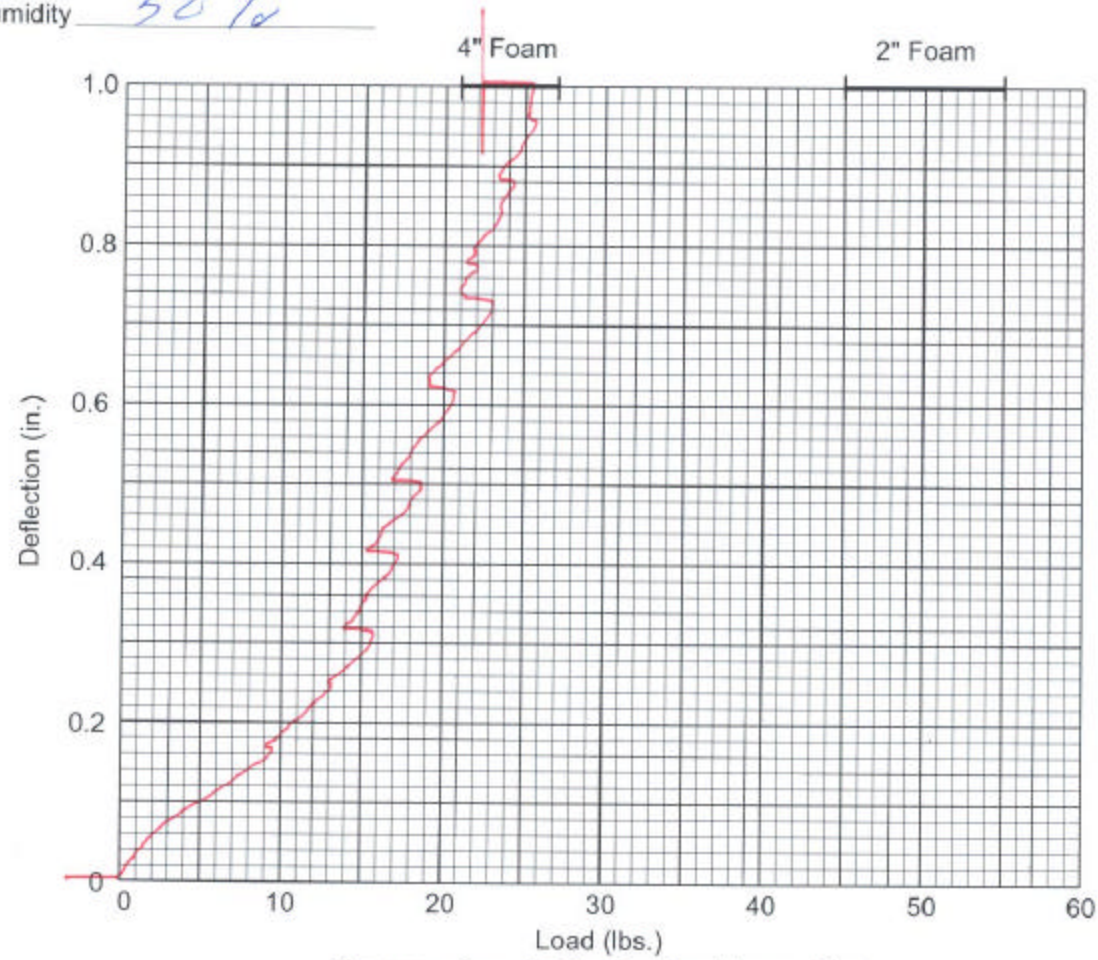
Date 3/18/02

Performed By SO

Temp. 70°

Humidity 50%

Foam No. 4"X20"HI



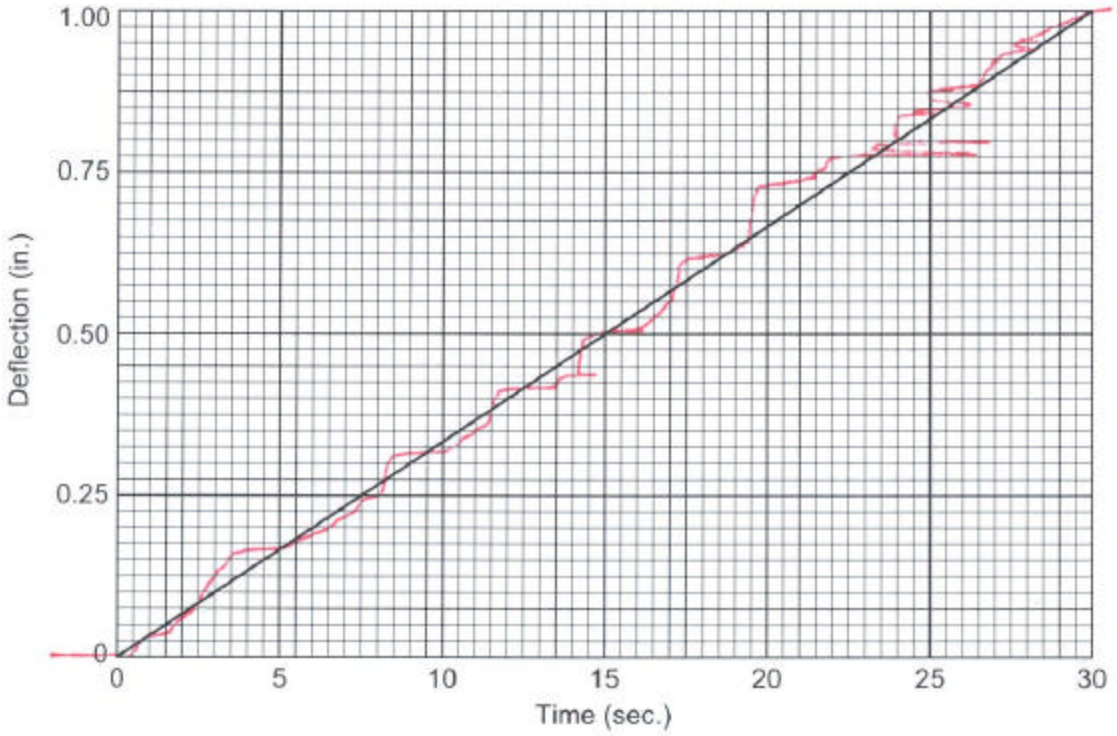
Compression - Deflection Resistance Test
Child Seat Foam

Date 3/18/02

Temp 70°

Humidity 50%

Foam No. 4"X20"H1



Compression - Deflection Resistance Test Child Seat Foam

-001-R01

SEAT FOAM USAGE LOG

Foam I.D. Number 4"X20" H1

Date	Peak Load	Pass/Fail
3/18/02	22.25 LBS	

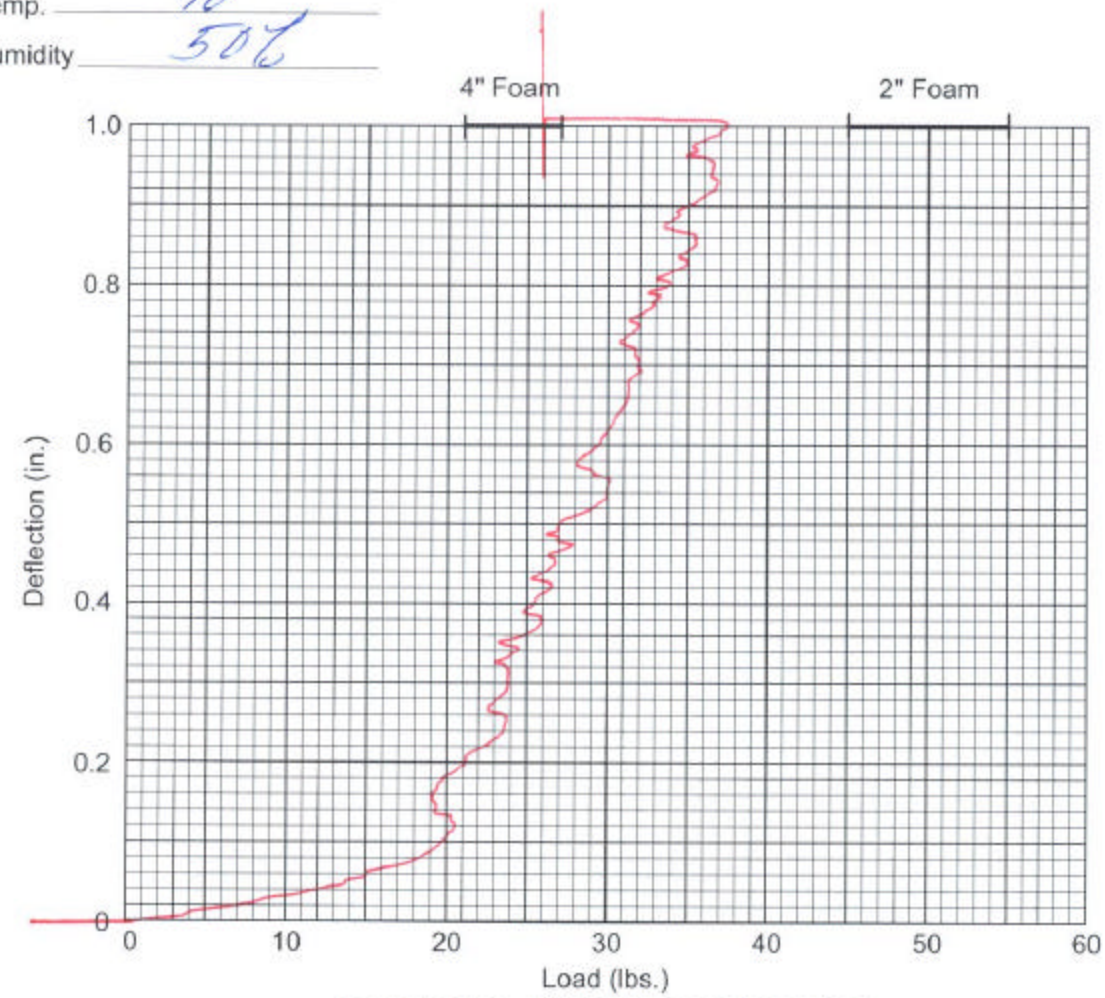
Date 3/6/02

Performed By SD

Temp. 70°

Humidity 50%

Foam No. 4" x 24" H1



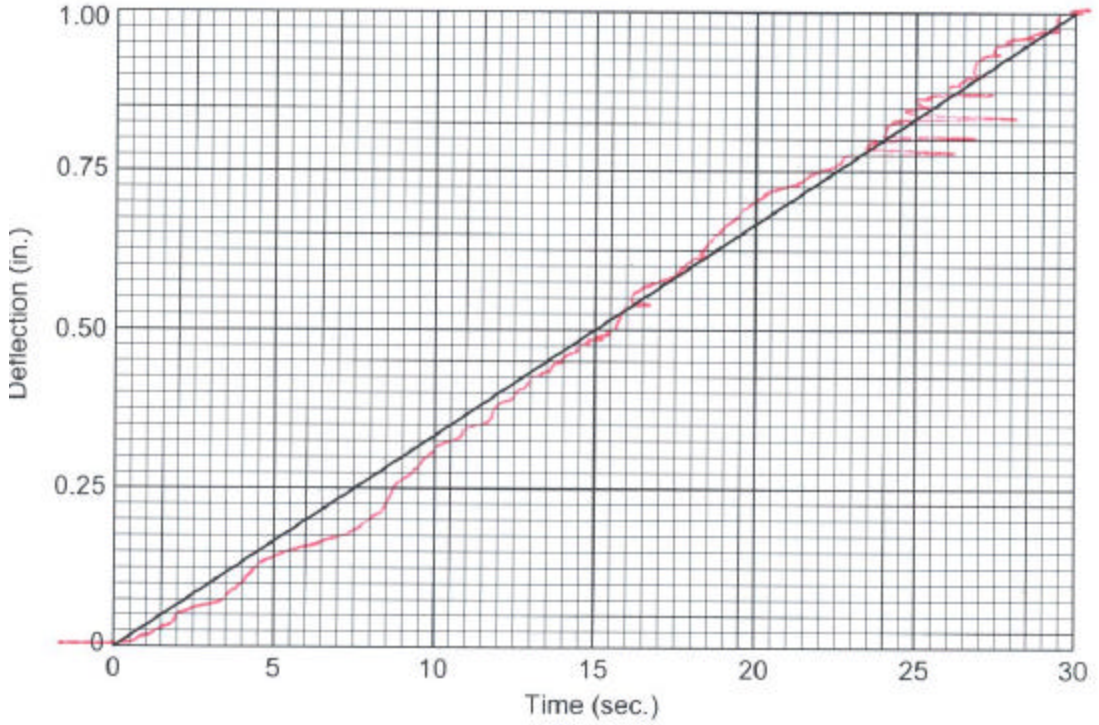
Compression - Deflection Resistance Test
Child Seat Foam

Date 3/18/02

Temp 70°

Humidity 50%

Foam No. 4" X 24" Hi



Compression - Deflection Resistance Test Child Seat Foam

001-R01

F..._2-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 4"X24" H1

Date	Peak Load	Pass/Fail
3/18/02	26LBS	PASS

SECTION 10

CHILD DUMMY CALIBRATION DATA TRACES AND TABLES

First Technology
Innovative Solutions

First Technology Safety Systems
47460 Galleon Drive
Plymouth
MI 48170, USA
Tel: 734 451 7878
Fax: 734 451 9549
Email: sales@ftss.com
Website: www.ftss.com

1612
upper

Certificate Of Calibration

Calibration ID	10890	**Date of Calibration**	08-Nov-00
Model	IF-234	**Calibration Due Date**	09-May-01
Model Description	CHILD NECK	**Customer**	VRTC US DOT NHTSA
Serial Number	121	**Customer ID**	D02910
Temp(F)/Humidity	72.0 / 37.0	**Customer Order Number**	16659
Technician	DENNIS	**Units**	IMPERIAL

Voltage Calibration Summary

	Direction	Capacity lb/in-lb	Offset mV/V	NonLinearity %Full Scale	Hysteresis %Full Scale	Output@Capacity mV/V	Change %
FX	Positive	1000	0.0145	0.08	0.19	2.6463	0.0
FY	Positive	1000	0.0143	0.15	0.31	2.6745	0.0
FZ	Negative	-1500	-0.0339	0.13	0.13	-1.4467	0.0
MX	Positive	1500	-0.0005	0.13	0.30	2.1227	0.0
MY	Positive	1500	0.0206	0.08	0.29	2.1323	0.0
MZ	Positive	1000	0.0016	0.45	0.79	2.3597	0.0

Wire Color Codes

FX and MX		FY and MY		FZ and MZ	
Brown	+Excitation	Red-Stripe	+Excitation	Green	+Excitation
Red	+Signal	Black	+Signal	Blue	+Signal
Orange	-Excitation	White	-Excitation	Violet	-Excitation
Yellow	-Signal	Black-Stripe	-Signal	Gray	-Signal

Reference Load Cell

Manufacturer	Interface - GOLDEN		
Model	1610ARC-2K	**Calibration Date**	07-Sep-00
Serial Number	113739	**Calibration Due Date**	07-Sep-01

Reference loadcell calibrated by Interface Inc.
Tracable to the National Institute of Standards and Technology (NIST)

Measurement Accuracy within 0.05% full scale output.

Calibration Certified by _____

FTSS Authorized Representative

Calibration in conformance with FTSS Loadcell Calibration Procedure

First Technology
Innovative Solutions

First Technology Safety
47460 Galleon Drive
Plymouth
MI 48170, USA
Tel: 734 451 7878
Fax: 734 451 9549
Email: sales@ftss.com
Website: www.ftss.com

Certificate Of Calibration

Calibration ID	10890	**Date of Calibration**	08-Nov-00
Model	IF-234	**Calibration Due Date**	09-May-01
Model Description	CHILD NECK	**Customer**	VRTC US DOT NHTSA
Serial Number	121	**Customer ID**	D02910
Temp(F)/Humidity	72.0 / 37.0	**Customer Order Number**	16659
Technician	DENNIS	**Units**	IMPERIAL

% Full Scale Crosstalk

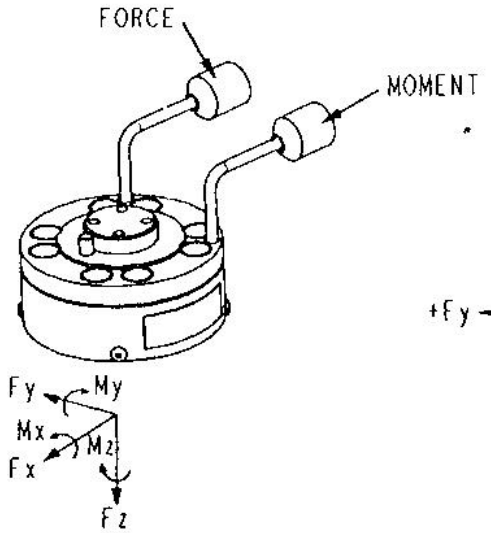
	Direction	Load lb/in-lb	FX %Full Scale	FY %Full Scale	FZ %Full Scale	MX %Full Scale	MY %Full Scale	MZ %Full Scale
FX	Positive	1000	0.00	-1.25	1.27	0.38	1.97	0.30
FY	Positive	1000	1.23	0.00	0.63	-2.49	-0.19	-0.58
FZ	Negative	-1500	0.09	-0.34	0.00	-0.46	-0.24	-0.01
MX	Positive	1500	-0.23	0.60	-2.05	0.00	-1.14	-0.30
MY	Positive	1500	-0.42	-0.03	-1.68	1.19	0.00	-0.39
MZ	Positive	1000	0.42	0.53	-2.05	0.13	0.39	0.00

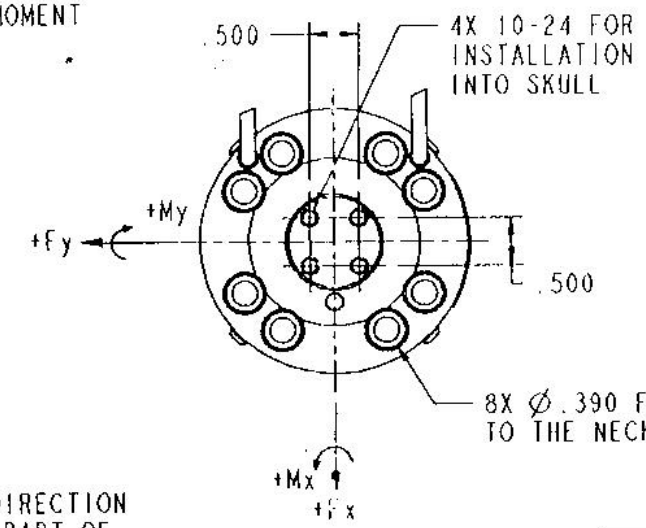
Shunt Calibration

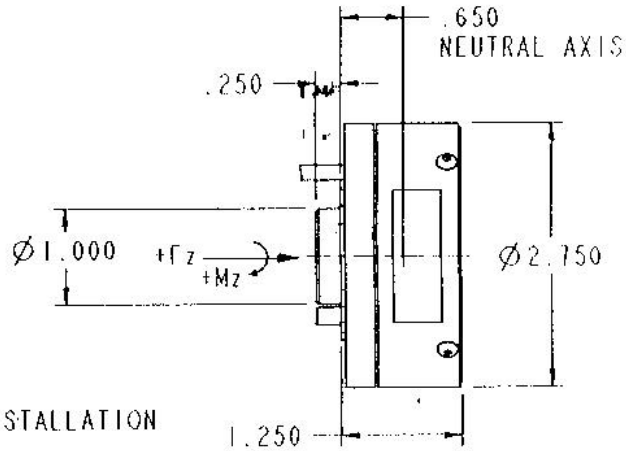
	Loading	Shunt (Ohms)	+Ex to +Sig	+Ex to -Sig	-Ex to +Sig	-Ex to -Sig	Units	Bridge (Ohms)
FX	Positive	60000	555.6	-555.9	-554.9	555.6	LBF	350
	Positive	80000	417.4	-417.7	-416.6	417.0	LBF	350
	Positive	100000	334.0	-334.4	-333.4	333.9	LBF	350
FY	Positive	60000	549.8	-549.9	-549.5	549.4	LBF	350
	Positive	80000	412.9	-412.8	-412.5	412.4	LBF	350
	Positive	100000	330.5	-330.6	-330.2	330.0	LBF	350
FZ	Negative	120000	1509.4	-1513.3	-1506.4	1509.7	LBF	700
	Negative	150000	1209.4	-1211.6	-1206.0	1208.6	LBF	700
	Negative	300000	605.7	-606.3	-603.4	604.9	LBF	700
MX	Positive	60000	1036.8	-1038.8	-1038.0	1039.4	IN-LBF	350
	Positive	80000	778.8	-779.4	-779.1	780.0	IN-LBF	350
	Positive	100000	623.3	-624.0	-623.5	624.5	IN-LBF	350
MY	Positive	60000	1032.5	-1032.2	-1033.1	1033.5	IN-LBF	350
	Positive	80000	775.6	-775.6	-775.5	775.7	IN-LBF	350
	Positive	100000	620.9	-620.9	-621.0	620.9	IN-LBF	350
MZ	Positive	80000	925.9	-924.9	-926.4	926.3	IN-LBF	700
	Positive	100000	742.0	-741.3	-742.1	741.8	IN-LBF	700
	Positive	120000	618.6	-618.1	-618.7	618.5	IN-LBF	700

All shunt resistors are of 0.01% accuracy.

When the equivalent loads are calculated, the sensitivities of a channel for both positive and negative loading directions are assumed to be the same.







THE AXIS SHOWN ILLUSTRATE THE DIRECTION OF APPLIED FORCES TO THE LOWER PART OF LOADCELL FOR POSITIVE LOADCELL OUTPUT WHEN THIS LOADCELL IS USED AS AN UPPER NECK LOADCELL.

HOWEVER, WHEN THIS LOADCELL IS USED AS A LOWER NECK LOADCELL, THE POLARITY OF THE DATA FOR Fx AND Mx MUST BE CHANGED TO CONFORM TO S.A.E. J-211 SIGN CONVENTION.

	Fx	Fy	Fz	Mx	My	Mz
CAPACITY (LBF/IN-LBF)	1,000	1,000	1,500	1,500	1,500	1,000
OUTPUT (mV/V)	2.8	2.8	1.5	2.2	2.2	2.4
BRIDGE RES. (Ω)	350	350	700	350	350	700

WIRING CODE

Fx-Mx		Fy-My		Fz-Mz	
COLOR	FUNCTION	COLOR	FUNCTION	COLOR	FUNCTION
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.

SPECIFICATIONS

CAPACITY (LBF/IN-LBF)	CHARTED
OVERLOAD CAPACITY (%F.S.)	150
OUTPUT @ F.S. (mV/V) NOMINAL	CHARTED
EXCITATION (VDC) MAX.	15
BRIDGE RESISTANCE (Ω) NOMINAL	CHARTED
NON-LINEARITY (%F.S.)	1.0
HYSTERESIS (%F.S.)	1.0
OPERATING TEMP. RANGE (°F)	-65 TO +250
CROSSTALK (%F.S.)	<5%
WEIGHT (LBS)	0.52

FIRST TECHNOLOGY SAFETY SYSTEMS

CHILD SIX CHANNEL NECK LOADCELL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DWG NO. 1F-234

REV A

First Technology
Innovative Solutions

First Technology Safety Systems
47460 Galleon Drive
Plymouth
MI 48170, USA
Tel: 734 451 7878
Fax: 734 451 9549
Email: sales@ftss.com
Website: www.ftss.com

142 Lower

Certificate Of Calibration

Calibration ID	10839	**Date of Calibration**	06-Nov-00
Model	IF-234	**Calibration Due Date**	06-May-01
Model Description	CHILD NECK	**Customer**	VRTC US DOT NHTSA
Serial Number	120	**Customer ID**	D02910
Temp(C)/Humidity	22.2 / 27.0	**Customer Order Number**	16659
Technician	DENNIS	**Units**	METRIC

Voltage Calibration Summary

	Direction	Capacity N/N-M	Offset mV/V	NonLinearity %Full Scale	Hysteresis %Full Scale	Output@Capacity mV/V	Change %
FX	Positive	4450	-0.0099	0.14	0.29	2.7148	0.0
FY	Positive	4450	0.0001	0.17	0.34	2.7001	0.0
FZ	Negative	-6670	0.0131	0.12	0.11	-1.4629	0.0
MX	Positive	170	-0.0148	0.10	0.29	2.1545	0.0
MY	Positive	170	-0.0065	0.09	0.33	2.1515	0.0
MZ	Positive	110	0.0220	0.47	0.85	2.3500	0.0

Wire Color Codes

FX and MX		FY and MY		FZ and MZ	
Brown	+Excitation	Red-Stripe	+Excitation	Green	+Excitation
Red	+Signal	Black	+Signal	Blue	+Signal
Orange	-Excitation	White	-Excitation	Violet	-Excitation
Yellow	-Signal	Black-Stripe	-Signal	Gray	-Signal

Reference Load Cell

Manufacturer	Interface - GOLDEN		
Model	1610ARC-2K	**Calibration Date**	07-Sep-00
Serial Number	113739	**Calibration Due Date**	07-Sep-01

Reference loadcell calibrated by Interface Inc.
Tracable to the National Institute of Standards and Technology (NIST)

Measurement Accuracy within 0.05% full scale output.

Calibration Certified by _____
FTSS Authorized Representative

Calibration in conformance with FTSS Loadcell Calibration Procedure.

First Technology
Innovative Solutions

First Technology Safety Systems
47460 Galleon Drive
Plymouth
MI 48170, USA
Tel: 734 451 7878
Fax: 734 451 9549
Email: sales@ftss.com
Website: www.ftss.com

Certificate Of Calibration

Calibration ID	10839	**Date of Calibration**	06-Nov-00
Model	IF-234	**Calibration Due Date**	06-May-01
Model Description	CHILD NECK	**Customer**	VRTC US DOT NHTSA
Serial Number	120	**Customer ID**	D02910
Temp(C)/Humidity	22.2 / 27.0	**Customer Order Number**	16659
Technician	DENNIS	**Units**	METRIC

% Full Scale Crosstalk

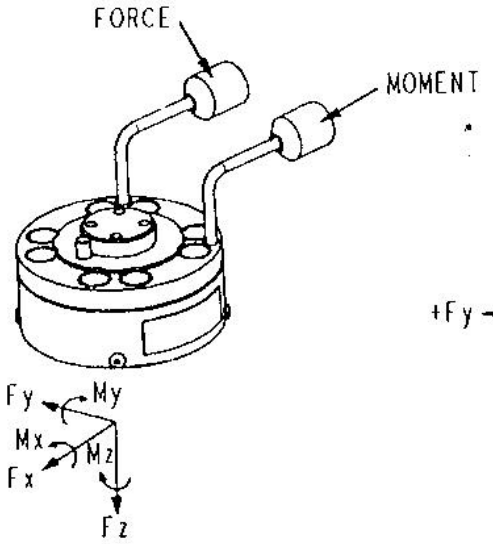
	Direction	Load N/N-M	FX %Full Scale	FY %Full Scale	FZ %Full Scale	MX %Full Scale	MY %Full Scale	MZ %Full Scale
FX	Positive	4450	0.00	0.12	1.09	0.63	2.46	3.00
FY	Positive	4450	-0.35	0.00	-1.45	-2.99	-1.34	2.24
FZ	Negative	-6670	0.12	0.13	0.00	0.12	-0.42	0.14
MX	Positive	170	-0.05	0.20	-0.80	0.00	1.14	-0.52
MY	Positive	170	-0.36	-0.23	-1.14	0.07	0.00	0.38
MZ	Positive	110	0.19	-0.24	-0.55	-0.21	-0.15	0.00

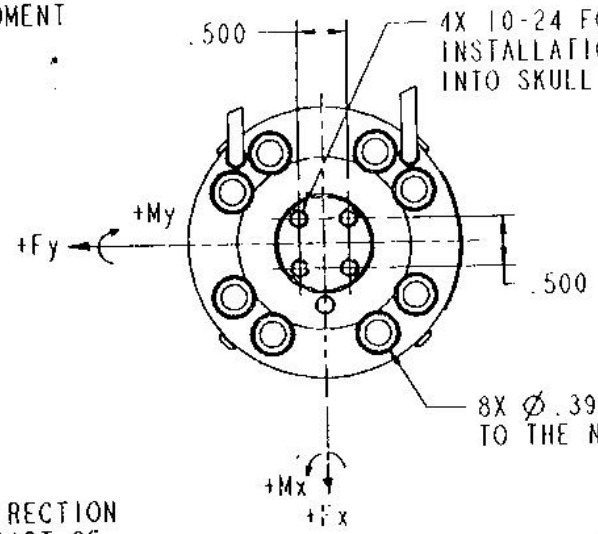
Shunt Calibration

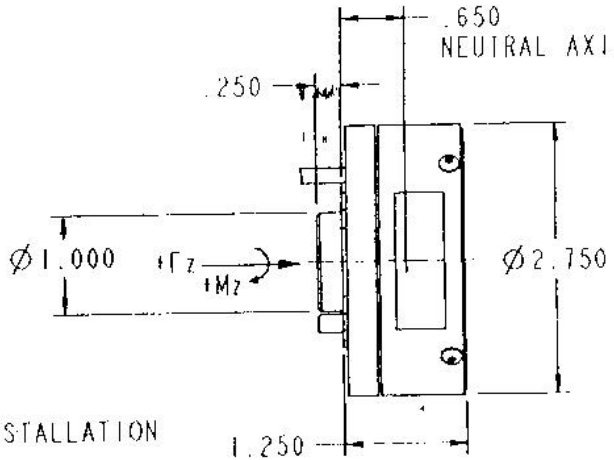
	Loading	Shunt (Ohms)	+Ex to +Sig	+Ex to -Sig	-Ex to +Sig	-Ex to -Sig	Units	Bridge (Ohms)
FX	Positive	60000	2407.4	-2406.9	-2406.5	2405.2	N	350
	Positive	80000	1808.2	-1808.2	-1804.6	1806.4	N	350
	Positive	100000	1447.0	-1447.5	-1444.8	1446.1	N	350
FY	Positive	60000	2424.3	-2419.8	-2420.7	2418.9	N	350
	Positive	80000	1820.7	-1817.5	-1818.0	1817.5	N	350
	Positive	100000	1457.2	-1454.6	-1455.0	1455.0	N	350
FZ	Negative	120000	6649.2	-6645.2	-6650.1	6642.5	N	700
	Negative	150000	5321.0	-5324.5	-5322.7	5320.5	N	700
	Negative	300000	2664.5	-2666.3	-2665.4	2664.0	N	700
MX	Positive	60000	115.6	-115.8	-115.5	115.8	N-M	350
	Positive	80000	87.0	-87.0	-86.9	86.9	N-M	350
	Positive	100000	69.6	-69.6	-69.5	69.6	N-M	350
MY	Positive	60000	115.8	-115.4	-116.0	115.8	N-M	350
	Positive	80000	87.0	-86.8	-87.1	86.8	N-M	350
	Positive	100000	69.6	-69.5	-69.7	69.5	N-M	350
MZ	Positive	80000	102.3	-102.1	-102.3	102.2	N-M	700
	Positive	100000	82.0	-81.8	-81.9	81.8	N-M	700
	Positive	120000	68.3	-68.2	-68.3	68.2	N-M	700

All shunt resistors are of 0.01% accuracy.

When the equivalent loads are calculated, the sensitivities of a channel for both positive and negative loading directions are assumed to be the same.







THE AXIS SHOWN ILLUSTRATE THE DIRECTION OF APPLIED FORCES TO THE LOWER PART OF LOADCELL FOR POSITIVE LOADCELL OUTPUT WHEN THIS LOADCELL IS USED AS AN UPPER NECK LOADCELL.

HOWEVER, WHEN THIS LOADCELL IS USED AS A LOWER NECK LOADCELL, THE POLARITY OF THE DATA FOR Fx AND Mx MUST BE CHANGED TO CONFORM TO S.A.E. J-211 SIGN CONVENTION.

	Fx	Fy	Fz	Mx	My	Mz
CAPACITY (LBF/IN-LBF)	1,000	1,000	1,500	1,500	1,500	1,000
OUTPUT (mV/V)	2.8	2.8	1.5	2.2	2.2	2.4
BRIDGE RES. (Ω)	350	350	700	350	350	700

SPECIFICATIONS	
CAPACITY (LBF/IN-LBF)	CHARTED
OVERLOAD CAPACITY (%F.S.)	150
OUTPUT @ F.S. (mV/V) NOMINAL	CHARTED
EXCITATION (VDC) MAX.	15
BRIDGE RESISTANCE (Ω) NOMINAL	CHARTED
NON-LINEARITY (%F.S.)	1.0
HYSTERESIS (%F.S.)	1.0
OPERATING TEMP. RANGE (°F)	-65 TO +250
CROSSTALK (%F.S.)	<5%
WEIGHT (LBS)	0.52

WIRING CODE

Fx-Mx		Fy-My		Fz-Mz	
COLOR	FUNCTION	COLOR	FUNCTION	COLOR	FUNCTION
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.

FIRST TECHNOLOGY SAFETY SYSTEMS

CHILD SIX CHANNEL NECK LOADCELL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	DWG NO. IF-234	REV. A

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

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

	Type	Manufacturer	Model	Serial No.
Transducer:	Chest pot	Servo	N/A	142
Cal. Equip:	Power Supply	Elect. Developement Co	e-10d	4876
	DMM	Kiethley	197a	us-894d0

Label	Pin	Color	Excitation
+ Excit.	(3)	RED	10 Volts
- Excit.	(7)	BLACK	
+ Signal	(2)	GREEN	
- Signal	(8)	WHITE	
Shield	(5)		

INPUT RESISTANCE: _____ ohms

SIGNAL RESISTANCE: _____ ohms

COMPUTED OFFSET: 5.241133 [Volts]

CAL. ROOM TEMP: 70 Deg F

MAX NON-LINEARITY: _____ %

CAL ROOM HUMIDITY: _____ %

FULL SCALE: 45 mm

CAL. ROOM BAROMETER: _____ inches

SENSITIVITY: 2.421 mV/Volt/ mm

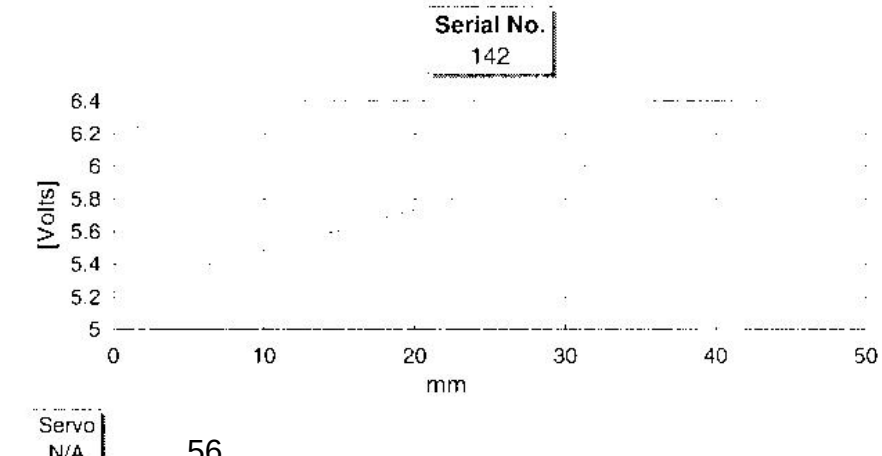
TECHNICIAN: _____ Date: 1/14/2002

Joshua Smith

ENGINEER UNITS mm	Y-axis READING [Volts]	NON-LINEARITY [%]	%FULL SCALE ERROR
0	5.231	ERR	0.93%
5	5.357	4.37%	0.48%
10	5.486	-1.05%	-0.25%
15	5.609	-1.20%	-0.43%
20	5.734	-1.69%	-0.80%
25	5.854	-1.16%	-0.70%
30	5.974	-0.81%	-0.60%
35	6.095	-0.67%	-0.60%
40	6.188	2.32%	1.98%

Regression Output:

Constant		5.241133
Std Err of Y Est		0.010967
R Squared		0.999043
No. of Observations		9
Degrees of Freedom		7
X Coefficient(s)	0.02421	
Std Err of Coef.	0.000283	



#142 HIII 340

Head X Fnd

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5932

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99108-F29

Input Resistance (ohms): 944.51

ZMO (mV): 16.825
Resonance Frequency (Hz): 25146

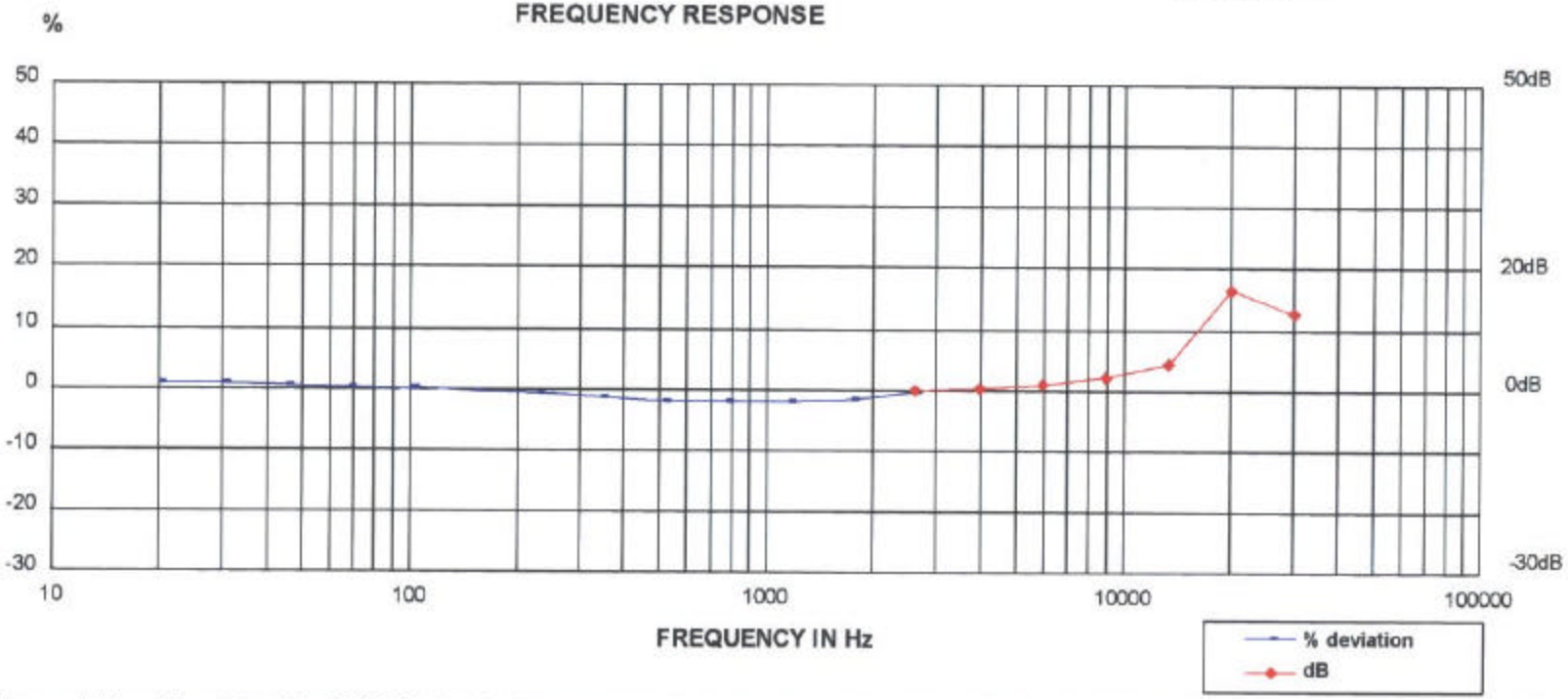
0.1987 mV/g @ 100 Hz, 10g pk

Last Sens: 1.987E-1, Change: -0.02
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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)

+/- 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

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

By: _____
P.KRAMP
Date: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

F142 HIII 3YO
Head Y - LEft

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5929

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99102-F12

Input Resistance (ohms): 997.42

ZMO (mV): -11.12
Resonance Frequency (Hz): 27776

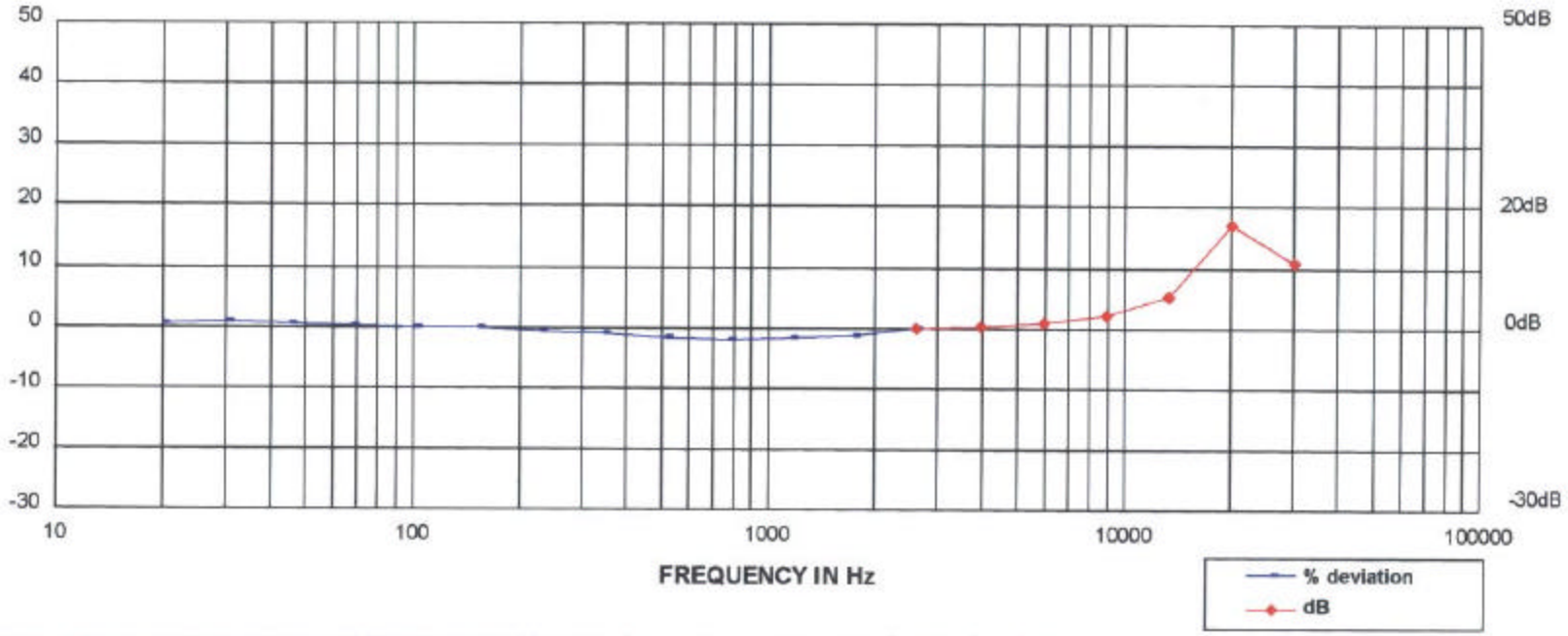
0.1839 mV/g @ 100 Hz, 10g pk

Last Sens: 1.836E-1, Change: 0.19
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

142 HIII 340

Head 2 L-P

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5934

Description: VRTC - Full Bridge Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BQ-2000BF
Serial Number: 00L13-F03

Input Resistance (ohms): 455.2
Output Resistance (ohms): 458.82
ZMO (mV): -7.172
Resonance Frequency (Hz): 18429

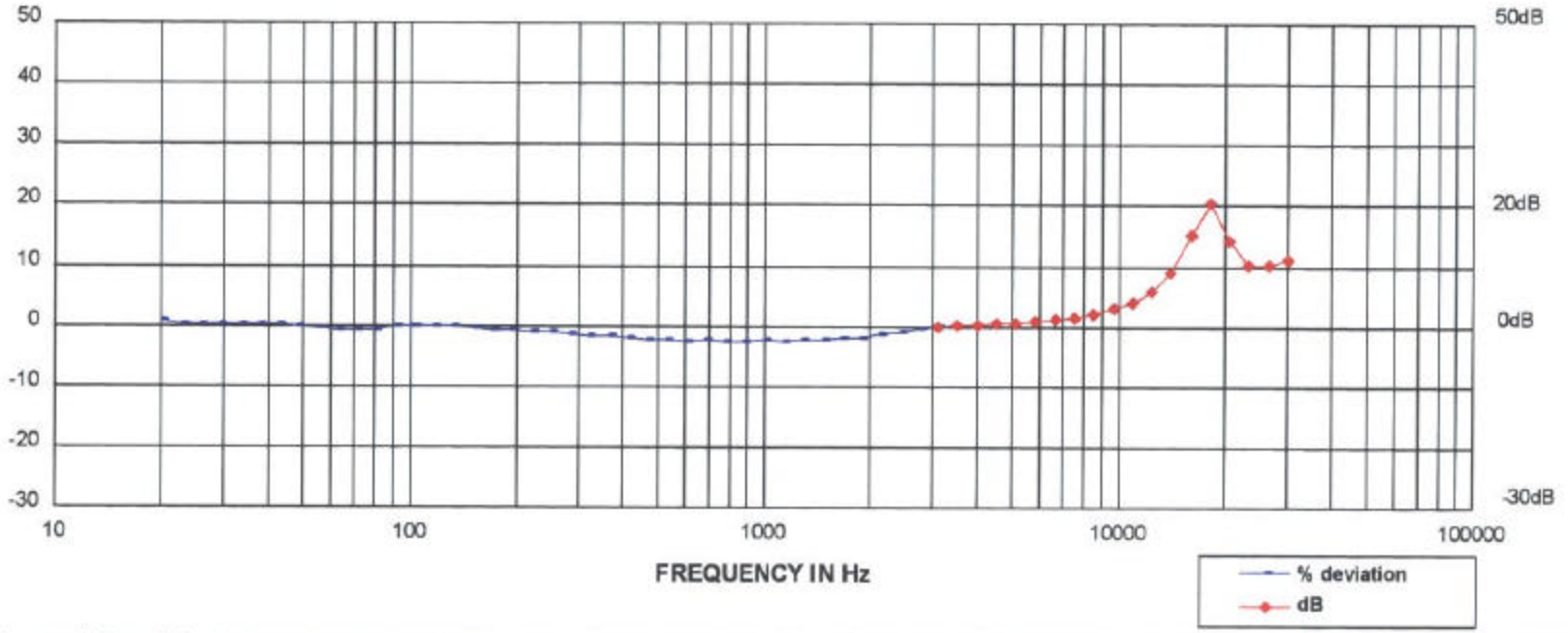
0.2506 mV/g @ 100 Hz, 10g pk

Last Sens: 2.486E-1, Change: 0.79
Next cal date: 1/9/2003

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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).

onsole 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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 HIII 340

Head Rec z uP

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5933

Description: VRTC - Full Bridge Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BQ-2000BF
Serial Number: 98G18-F18

Input Resistance (ohms): 501.49
Output Resistance (ohms): 500.5
ZMO (mV): 14.539
Resonance Frequency (Hz): 19536

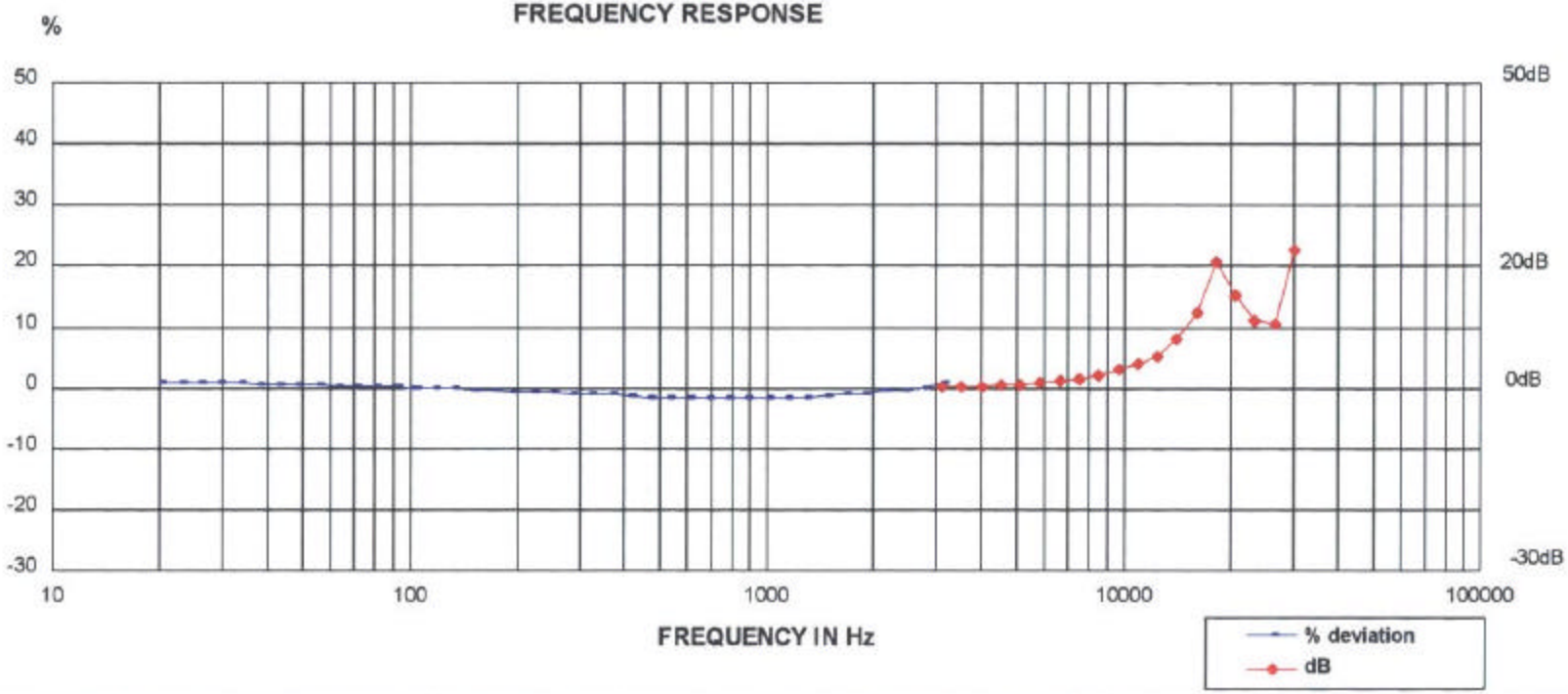
0.1861 mV/g @ 100 Hz, 10g pk

Last Sens: 1.852E-1, Change: 0.46
Next cal date: 1/9/2003

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

12 HIII 3YO

Chest X Fwd

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5920

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99H30-Z04

Input Resistance (ohms): 986.93

ZMO (mV): 0.6887
Resonance Frequency (Hz): 18207

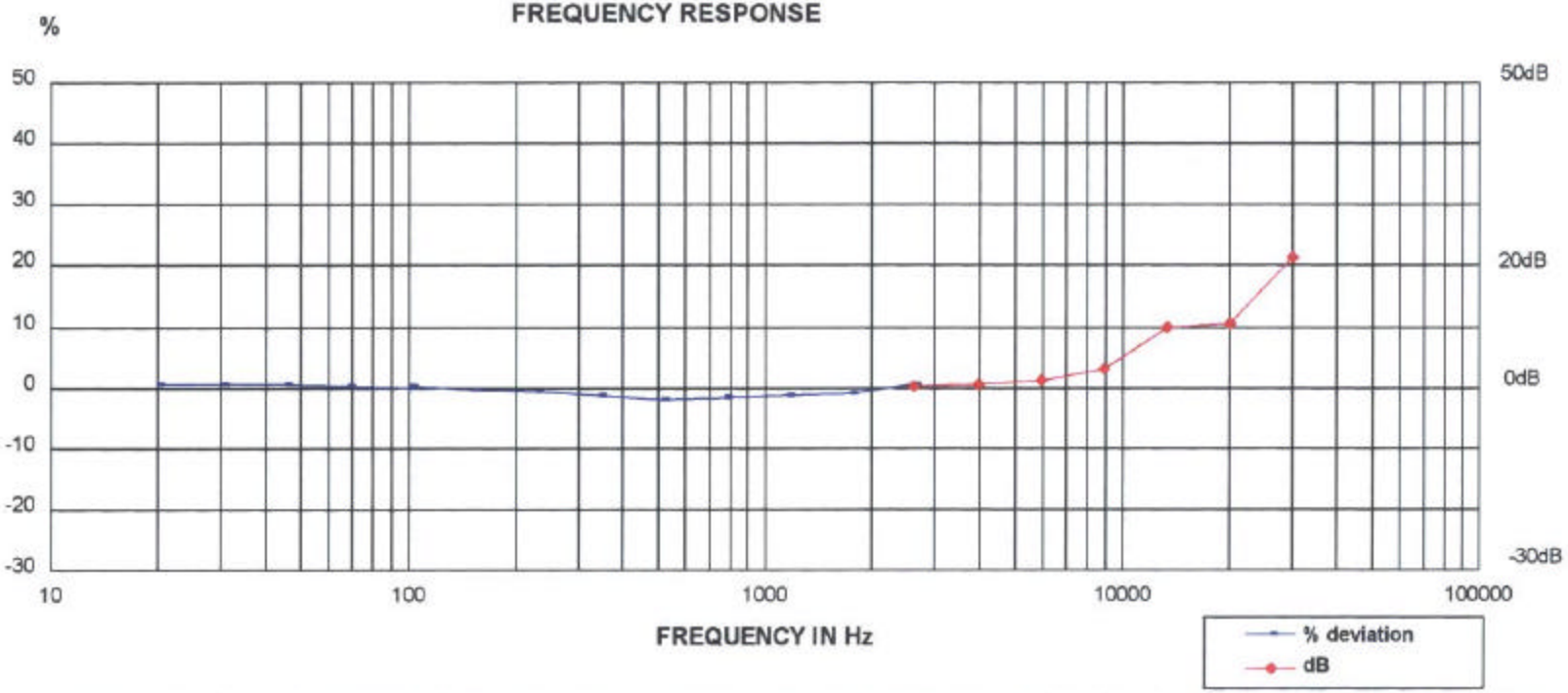
0.2054 mV/g @ 100 Hz, 10g pk

Last Sens: 2.042E-1, Change: 0.59
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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	+/- 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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 HTII 340

Chest Y Left

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5927

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99108-F28

Input Resistance (ohms): 1007.1

ZMO (mV): 1.4745
Resonance Frequency (Hz): 17533

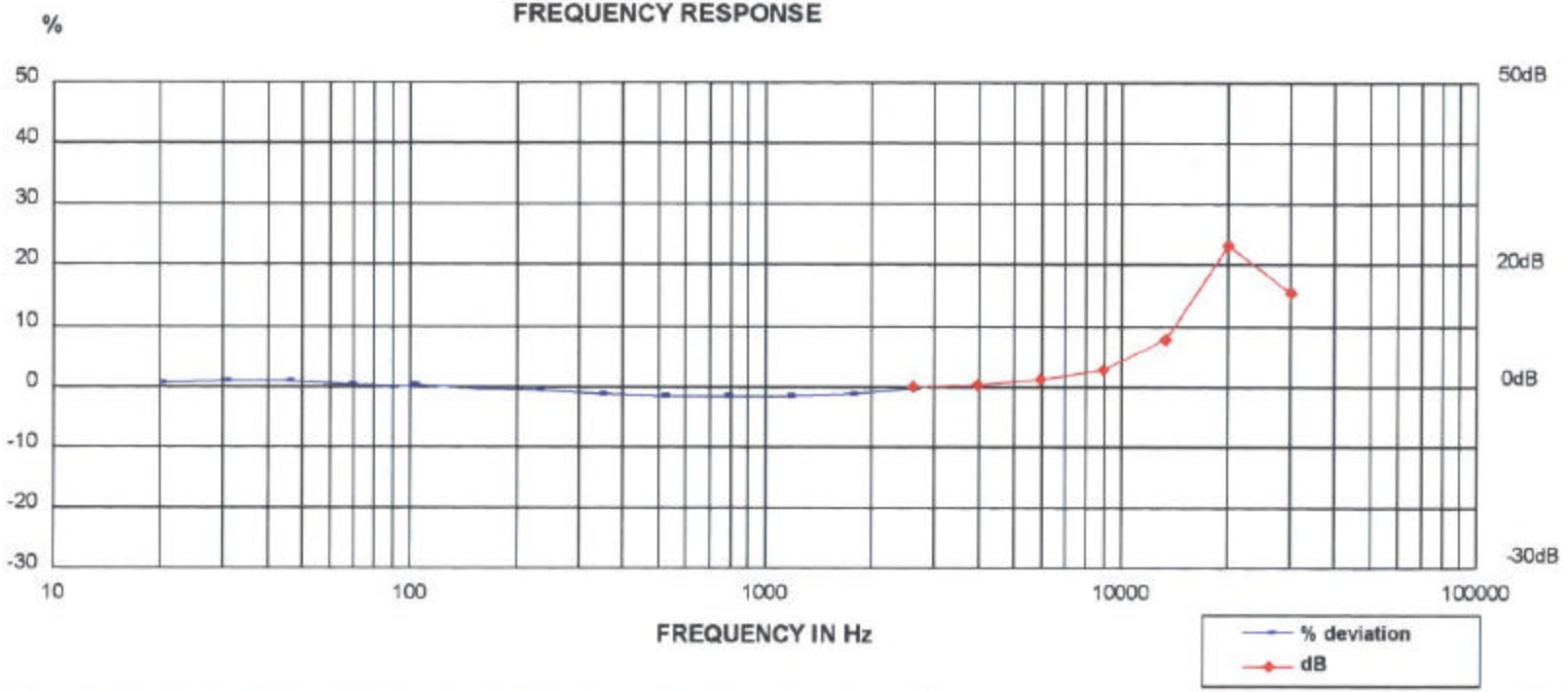
0.2226 mV/g @ 100 Hz, 10g pk

Last Sens: 2.220E-1, Change: 0.27
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 HIII 3YO

Chest Z mP

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5924

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99108-F30

Input Resistance (ohms): 1039.0

ZMO (mV): -12.98
Resonance Frequency (Hz): 17523

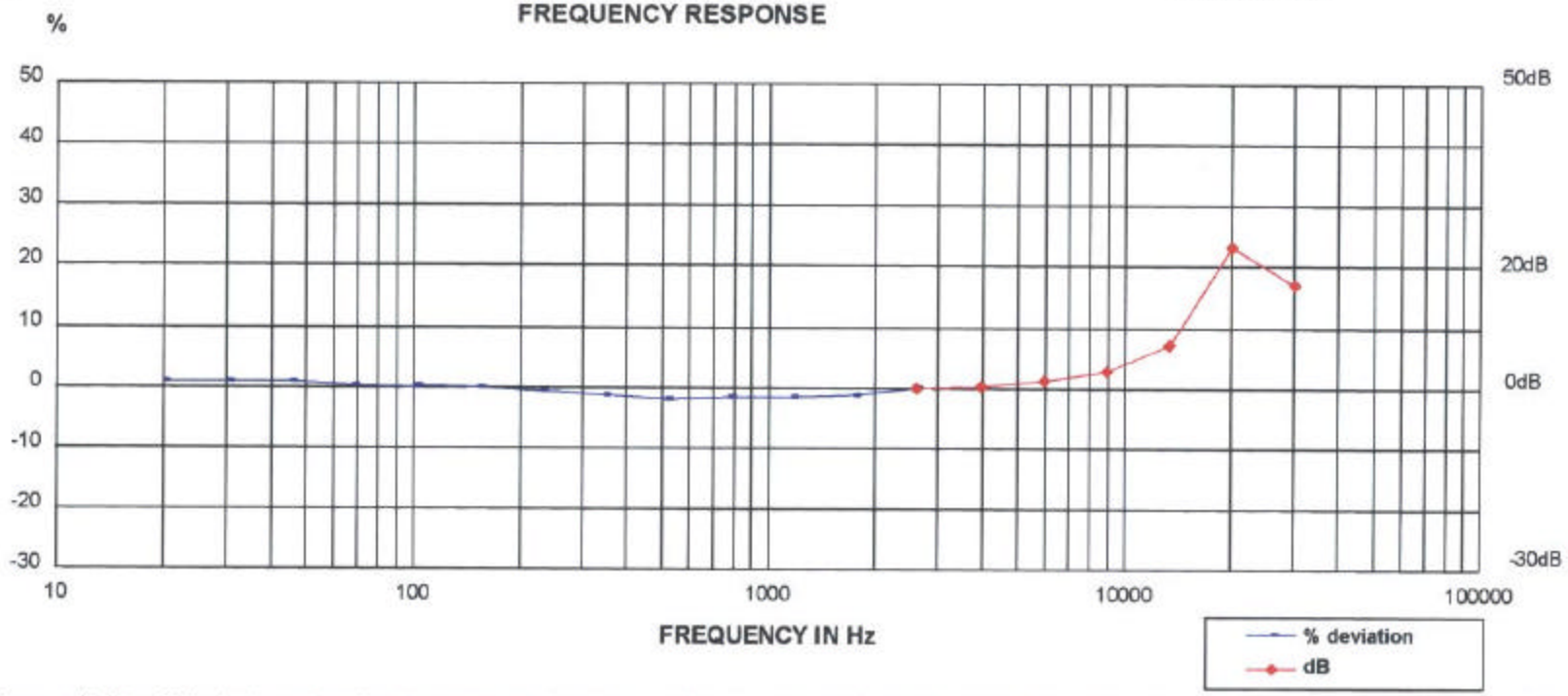
0.2347 mV/g @ 100 Hz, 10g pk

Last Sens: 2.343E-1, Change: 0.16
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 HIII 3YO Pelvis X Rear

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5923

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99102-F06

Input Resistance (ohms): 935.54

ZMO (mV): -6.56
Resonance Frequency (Hz): 28185

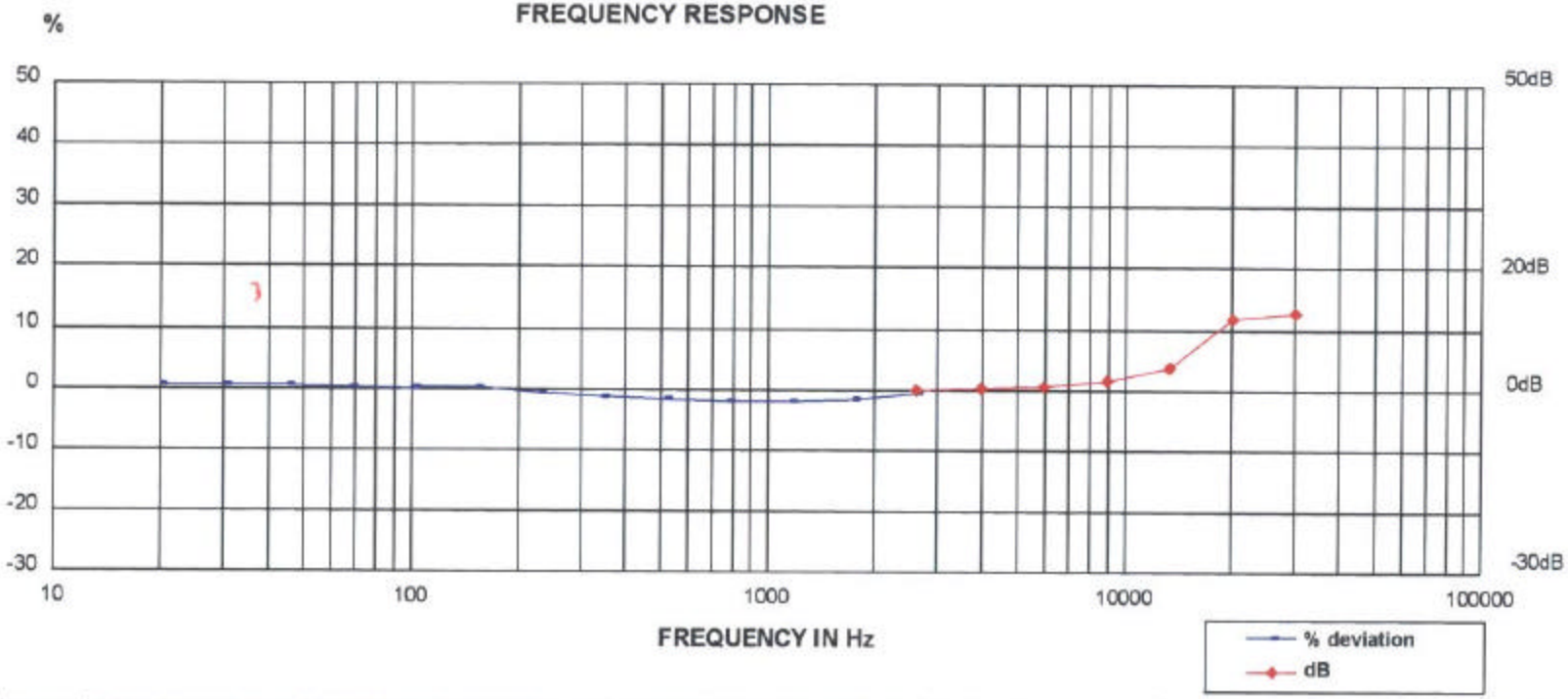
0.1859 mV/g @ 100 Hz, 10g pk

Last Sens: 1.860E-1, Change: -0.01
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 #III 340
Pelvis Y Left

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5922

Description: VRTC - Acceerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99102-F15

Input Resistance (ohms): 958.27

ZMO (mV): -6.154
Resonance Frequency (Hz): 25281

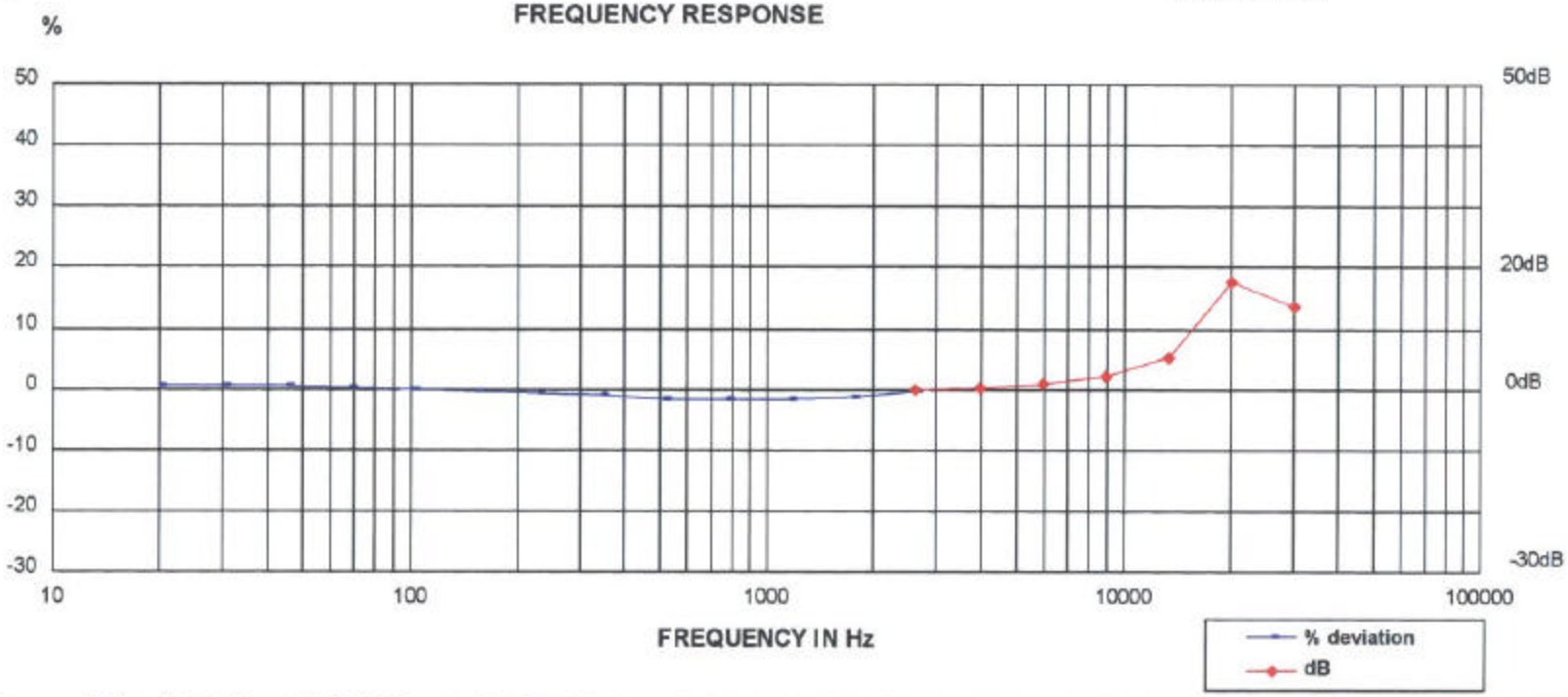
0.1854 mV/g @ 100 Hz, 10g pk

Last Sens: 1.852E-1, Change: 0.14
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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 #: 822/262602-00
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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

#142 HIII 3YD

Pelvis Z n P

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5921

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99G29-Q13

Input Resistance (ohms): 632.69

ZMO (mV): -25.21
Resonance Frequency (Hz): 18488

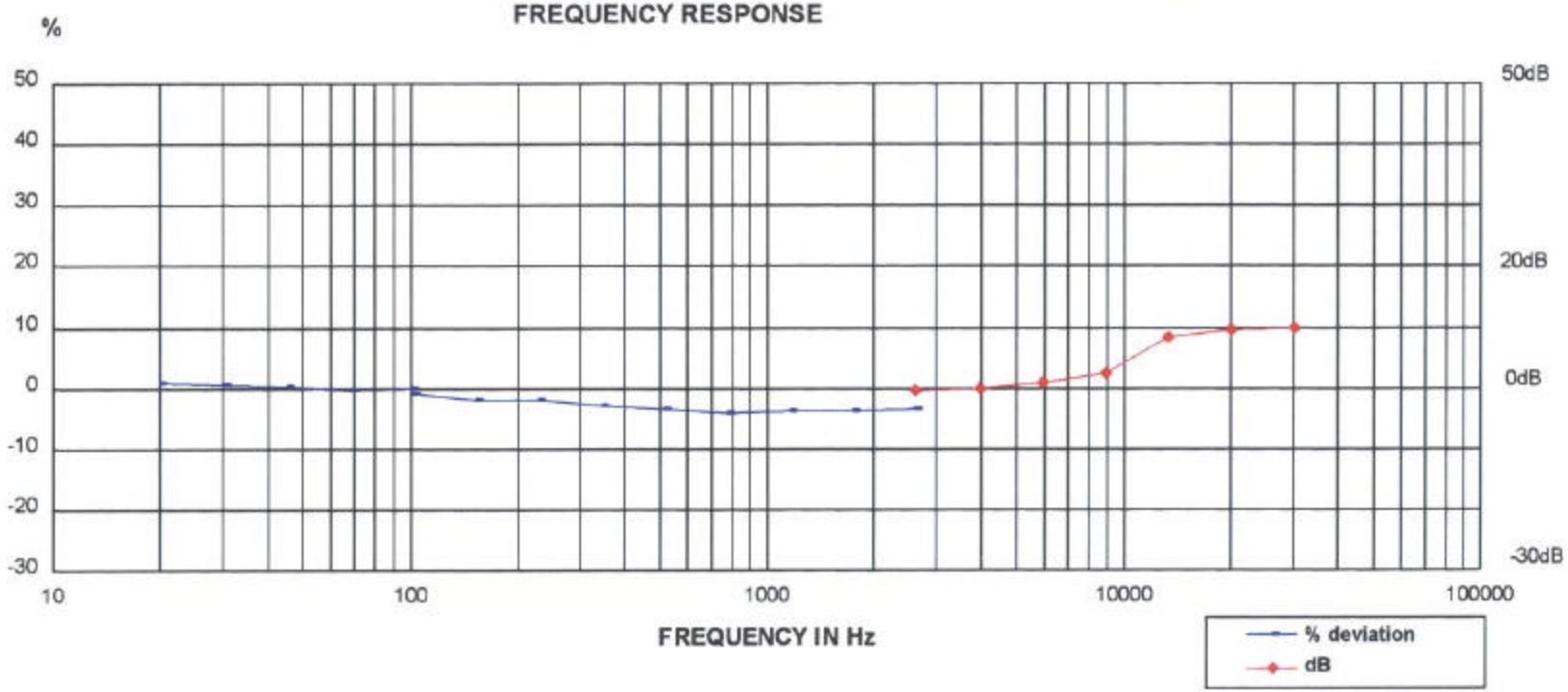
0.2320 mV/g @ 100 Hz, 10g pk

Last Sens: 2.278E-1, Change: 1.83
Next cal date: 7/9/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III THREE-YEAR-OLD EXTERNAL DIMENSIONS
SN: 142 MFG: FTSS

DATE: 17-Jan-02

TRC INC. TEST NO: 142C01ED 572P SN142EXT. 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	317.5 MM
Hip Pivot Height	C	33 - 43.2 MM	33.0 MM
Hip Pivot from Backline	D	56.9 - 67.1 MM	63.5 MM
Shoulder Pivot from Backline	E	58.4 - 68.6 MM	66.0 MM
Thigh Clearance	F	81 - 91.2 MM	86.4 MM
Back of Elbow to Wrist Pivot	G	247.4 - 262.6 MM	256.5 MM
Head Back from Backline	H	48.2 - 58.4 MM	53.3 MM
Shoulder to Elbow Length	I	185.4 - 200.6 MM	190.5 MM
Elbow Rest Height	J	133.6 - 148.8 MM	139.7 MM
Buttock to Knee Length	K	287.3 - 302.5 MM	292.1 MM
Popliteal Height	L	221 - 236.2 MM	226.1 MM
Knee to Floor Height	M	241.6 - 256.8 MM	254.0 MM
Buttock Popliteal Length	N	218 - 233.2 MM	223.5 MM
Chest Depth	O	134.6 - 149.8 MM	144.8 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	251.5 MM
Head Breadth	S	128.3 - 143.5 MM	137.2 MM
Head Depth	T	167.4 - 182.6 MM	172.7 MM
Hip Breadth	U	200.7 - 215.9 MM	205.7 MM
Shoulder Breadth	V	236.5 - 251.7 MM	241.3 MM
Foot Breadth	W	53.6 - 63.8 MM	57.2 MM
Head Circumference	X	500.4 - 515.6 MM	510.5 MM
Chest Circumference with Jacket	Y	527.1 - 552.5 MM	535.9 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.

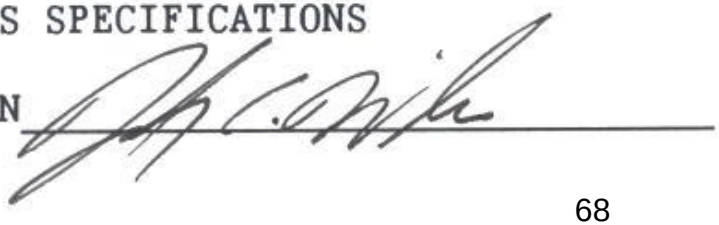
HEAD DROP TEST

HYBRID III THREE YEAR OLD 17-JAN-02

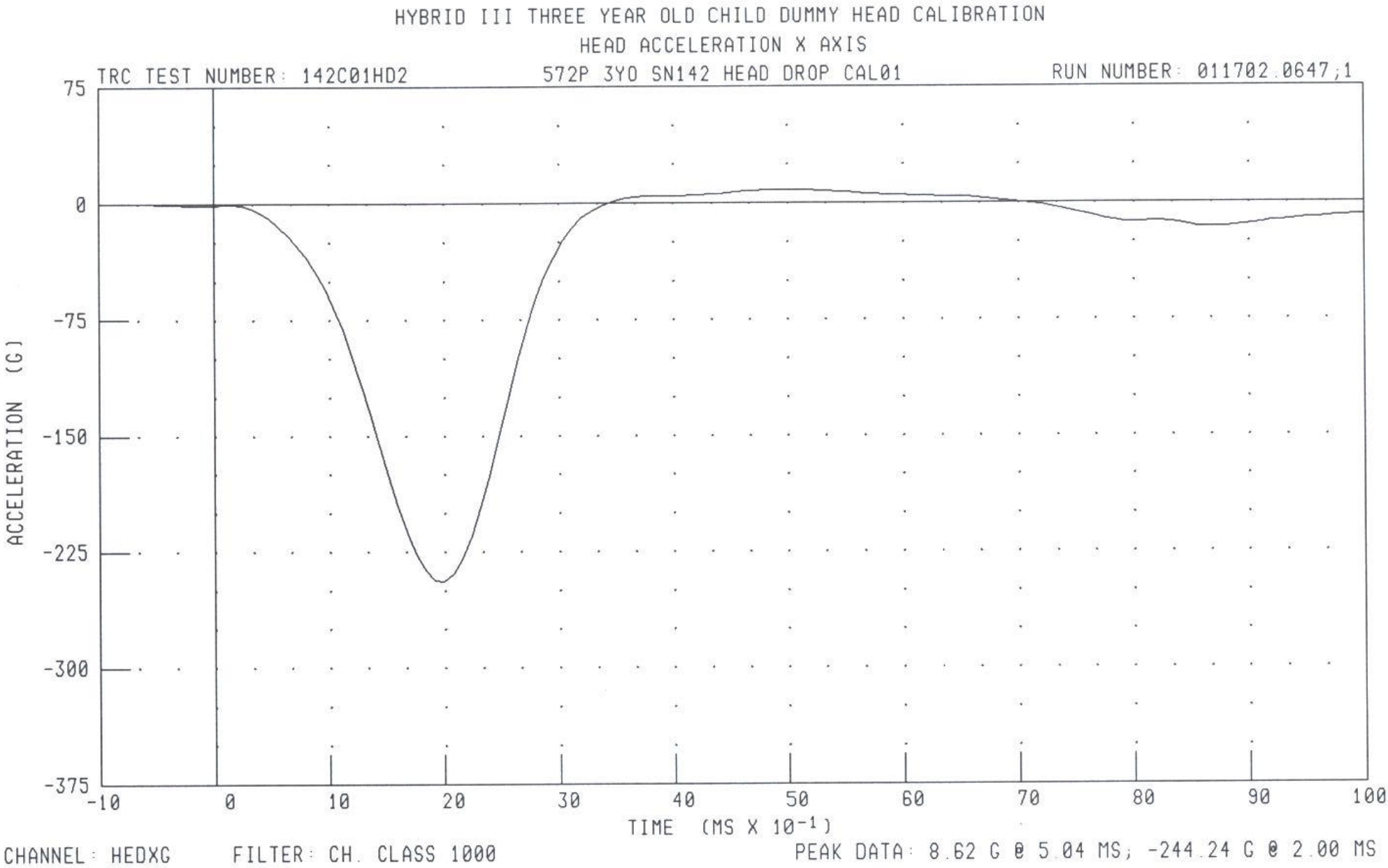
TRC INC. TEST NO: 142C01HD2 572P 3YO SN142 HEAD DROP CAL01

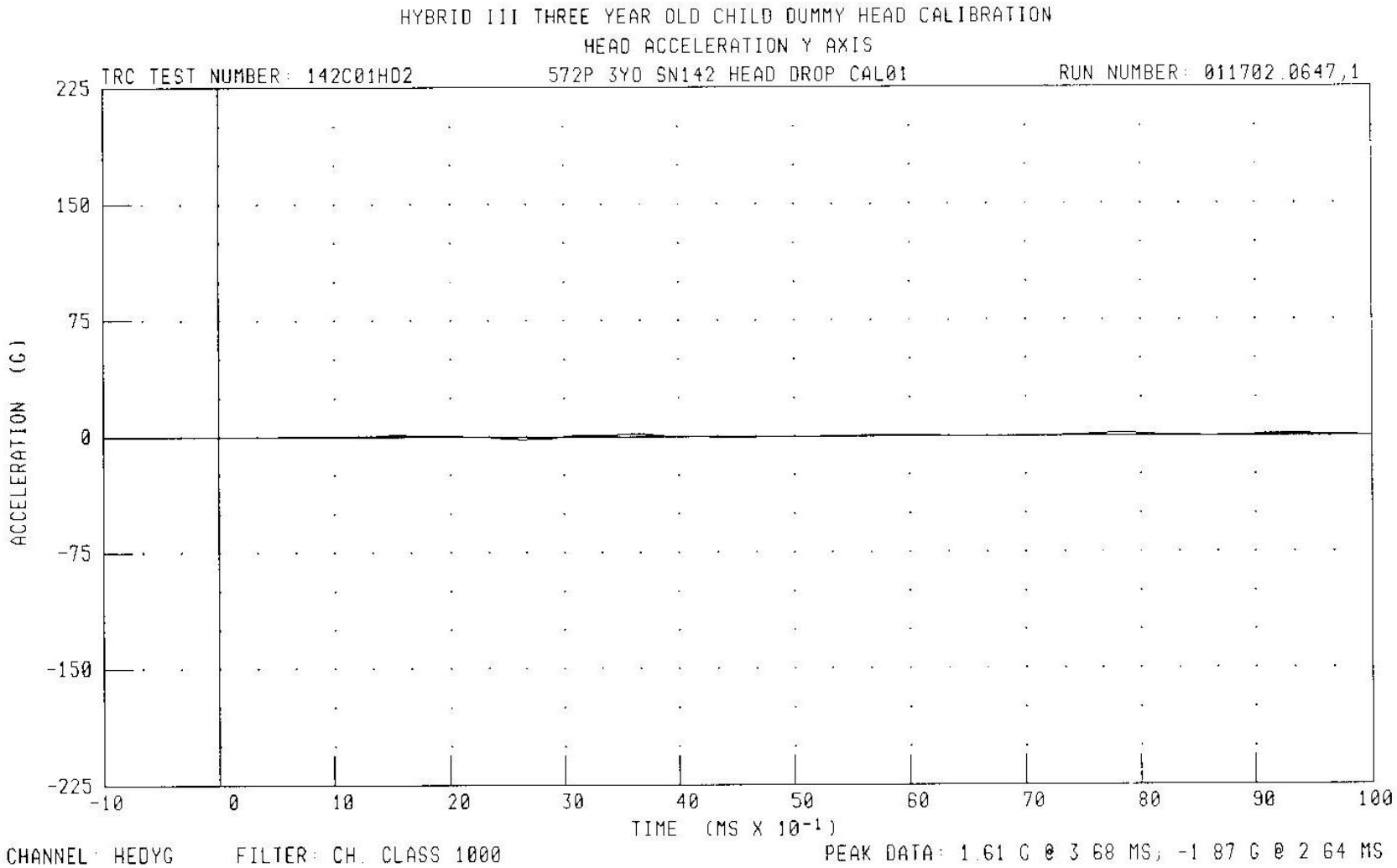
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	16.0 %
PEAK RESULTANT ACCELERATION	250 - 280 G	271.87 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.87 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

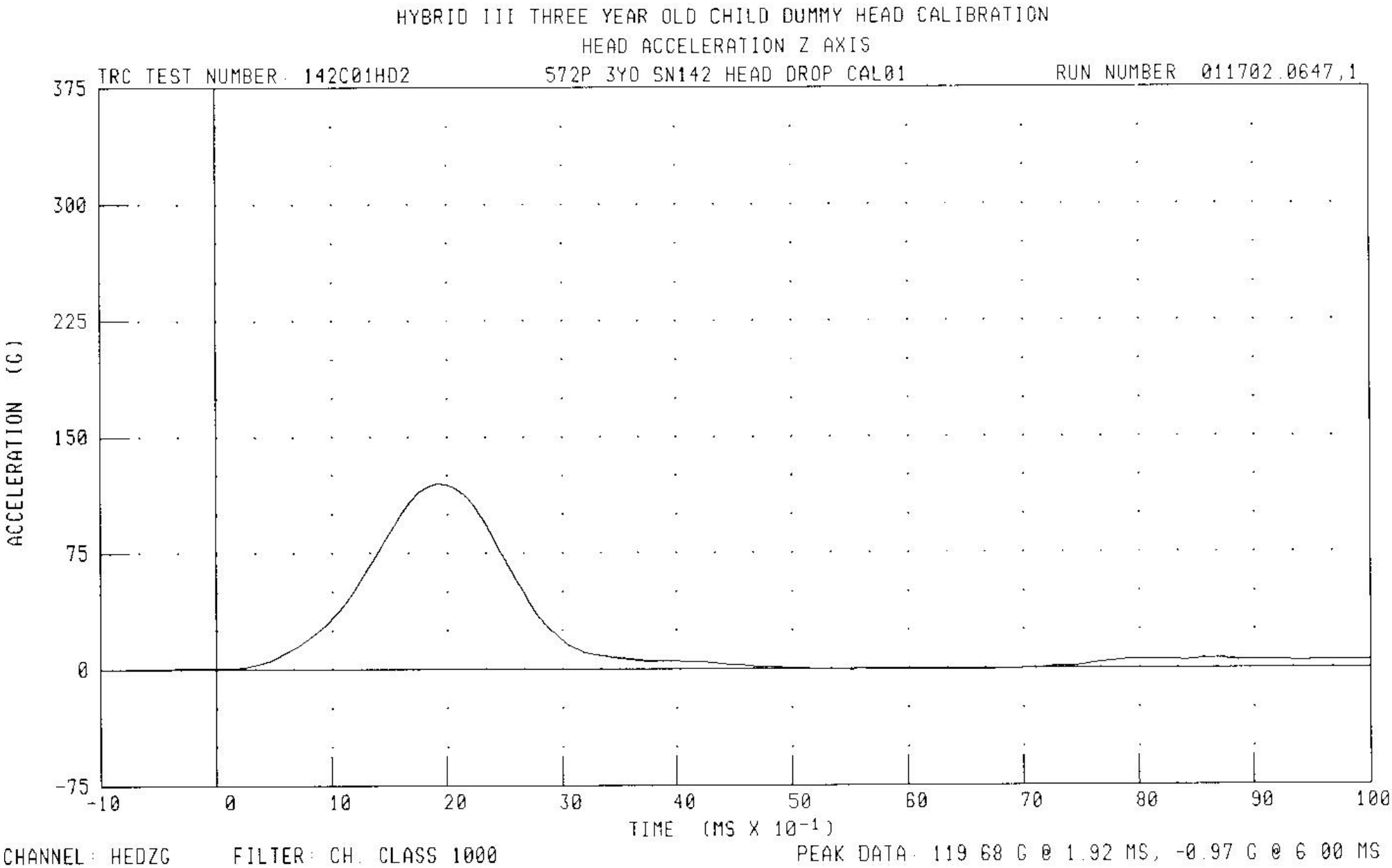
TEST MEETS SPECIFICATIONS

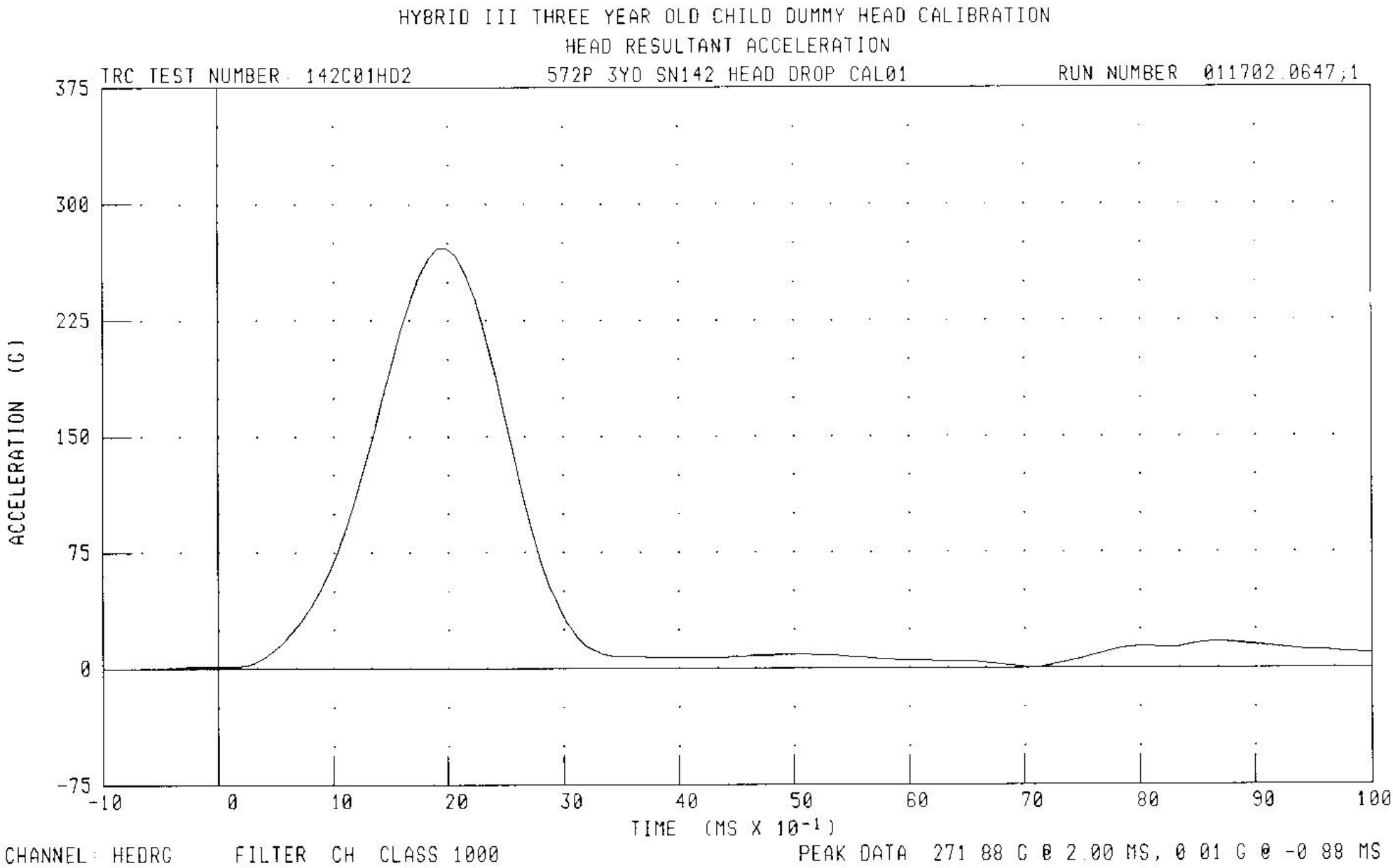
TECHNICIAN 

RUN NUMBER: 011702.0645;1


HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 142C01HD2
572P 3YO SN142 HEAD DROP CAL01
RUN NUMBER: 011702.0647;1
75
0
-75
-150
-225
-300
-375
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH. CLASS 1000
PEAK DATA: 8.62 G @ 5.04 MS; -244.24 G @ 2.00 MS


HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 142C01HD2
572P 3YO SN142 HEAD DROP CAL01
RUN NUMBER: 011702.0647,1
225
150
75
0
-75
-150
-225
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDYG
FILTER: CH. CLASS 1000
PEAK DATA: 1.61 G @ 3.68 MS; -1.87 G @ 2.64 MS


HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 142C01HD2
572P 3YO SN142 HEAD DROP CAL01
RUN NUMBER 011702.0647,1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL: HEDZG
FILTER: CH. CLASS 1000
PEAK DATA: 119.68 G @ 1.92 MS, -0.97 G @ 6.00 MS


HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER 142C01HD2
572P 3YO SN142 HEAD DROP CAL01
RUN NUMBER 011702.0647;1
ACCELERATION (G)
375
300
225
150
75
0
-75
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL HEDRG
FILTER CH CLASS 1000
PEAK DATA 271.88 G @ 2.00 MS, 0.01 G @ -0.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III THREE YEAR OLD 16-JAN-02

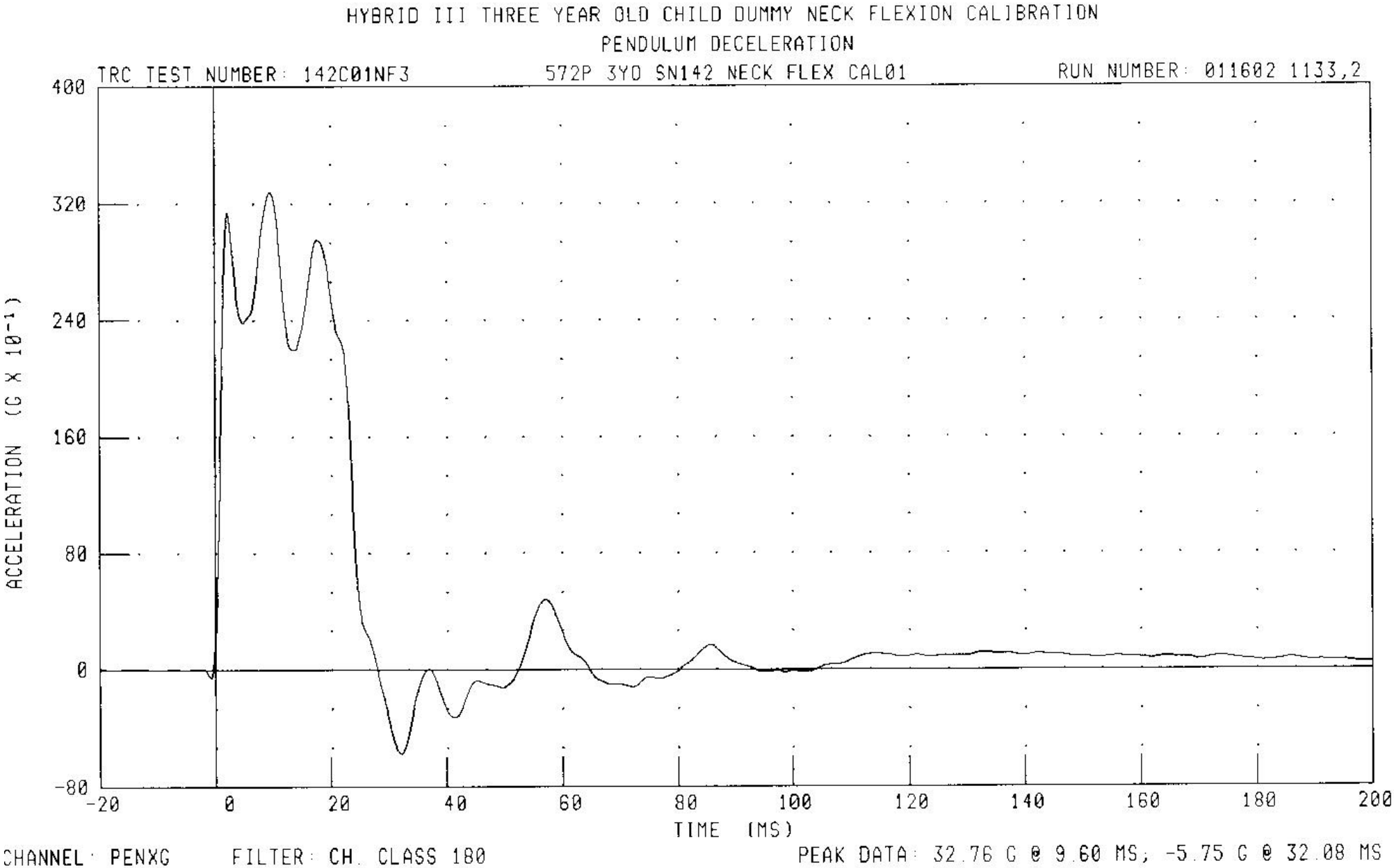
NECK FLEXION TEST

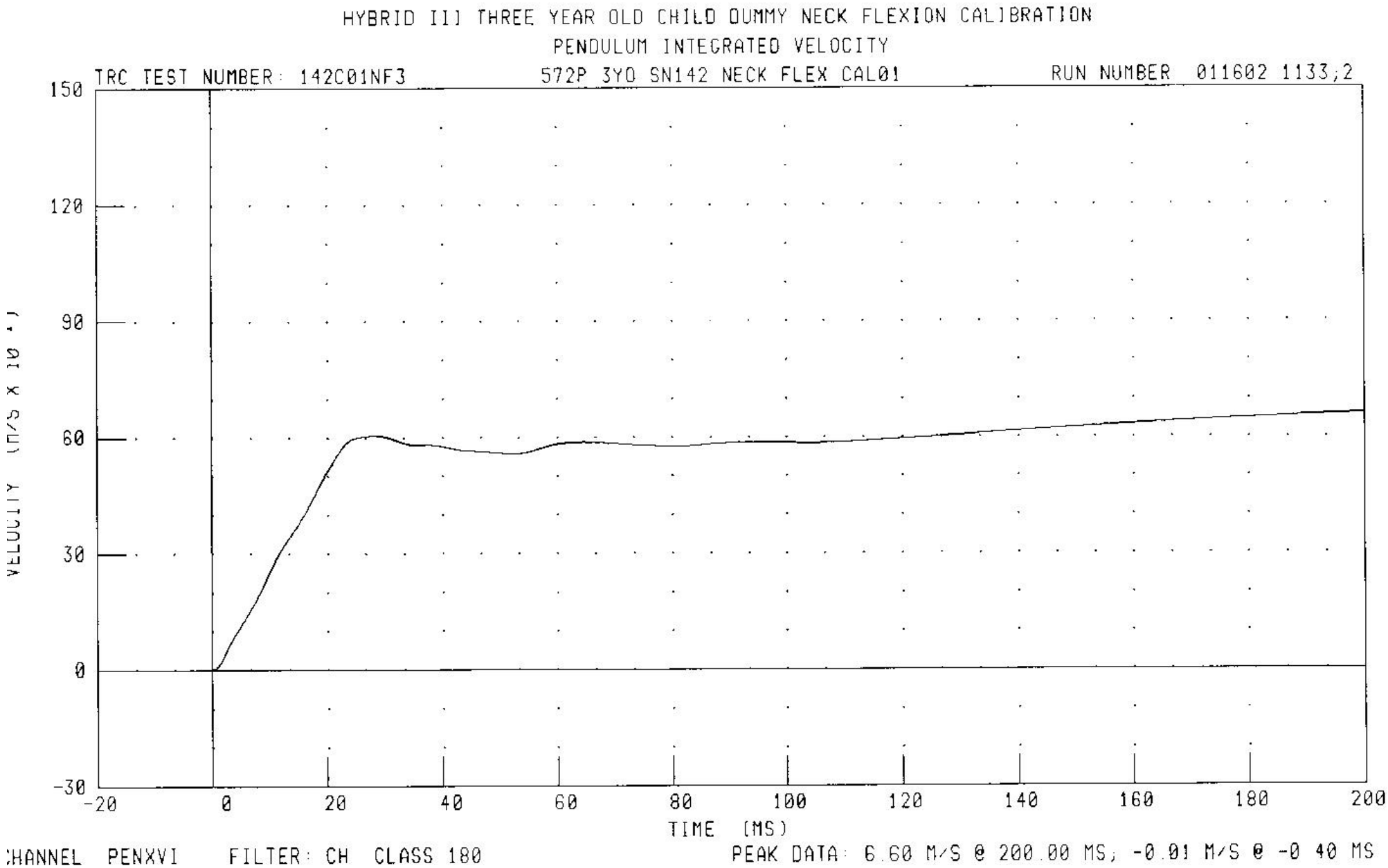
TRC INC. TEST NO: 142C01NF3 572P 3YO SN142 NECK FLEX CAL01

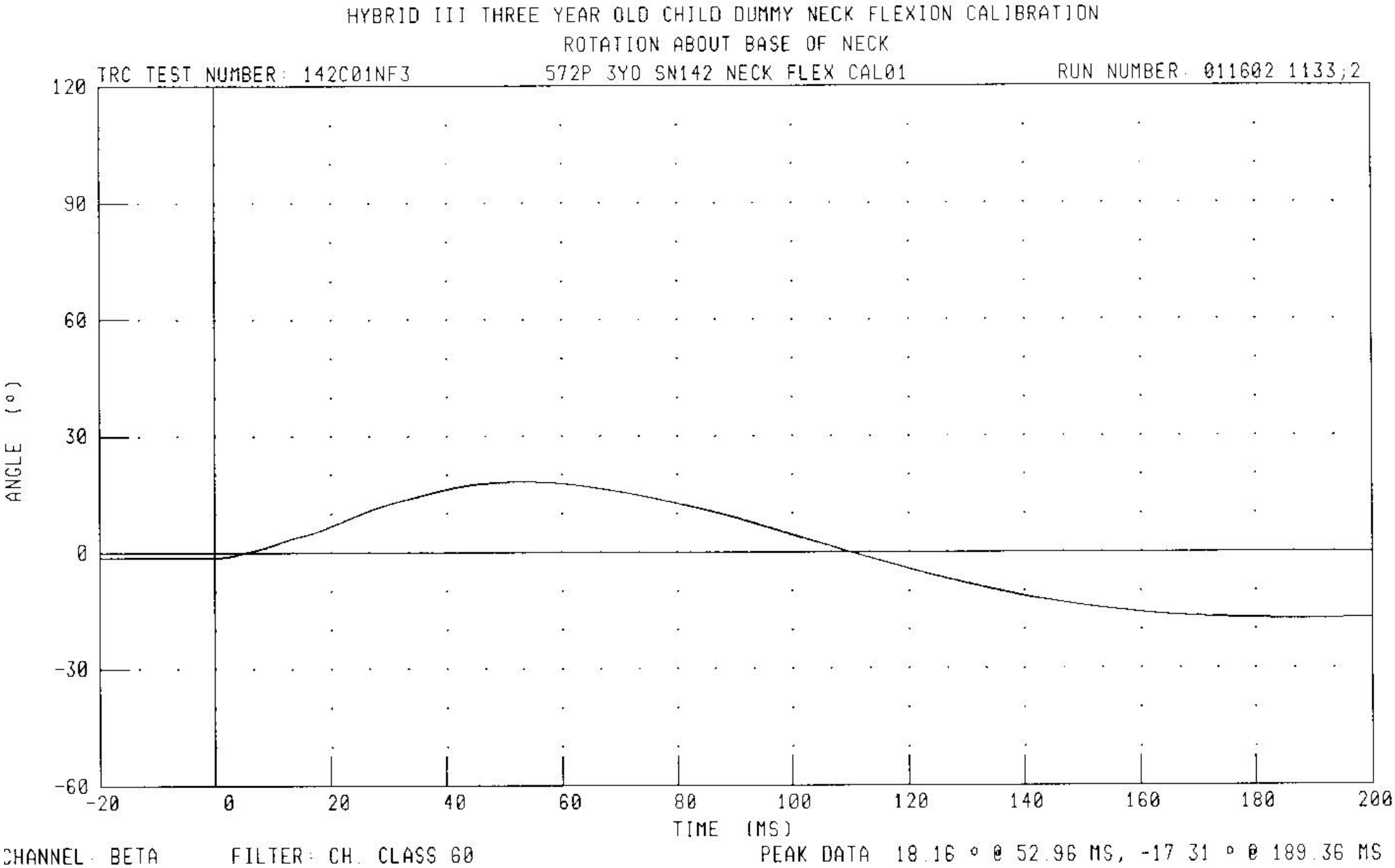
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	16.0 %
IMPACT VELOCITY		5.40 - 5.60 M/S	5.56 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.0 - 2.7 M/S	2.51 M/S
	15 MS	3.0 - 4.0 M/S	3.76 M/S
	20 MS	4.0 - 5.1 M/S	5.10 M/S
PEAK D-PLANE ROTATION		70 - 82 DEG.	73.26 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		42 - 53 NM	45.58 NM
POSITIVE MOMENT DECAY TIME TO 10 NM LEVEL		60 - 80 MS	68.72 MS

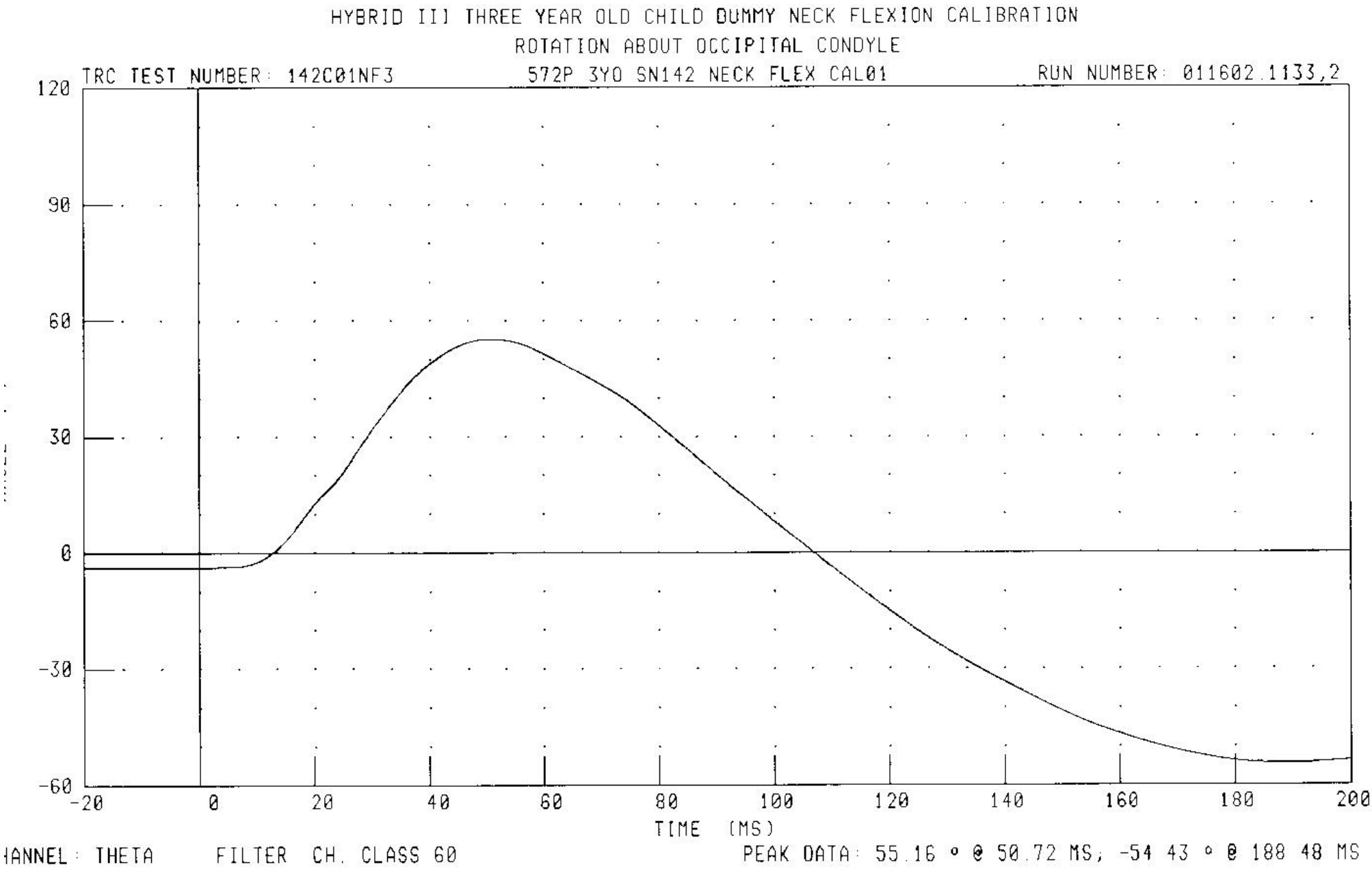
TEST MEETS SPECIFICATIONS

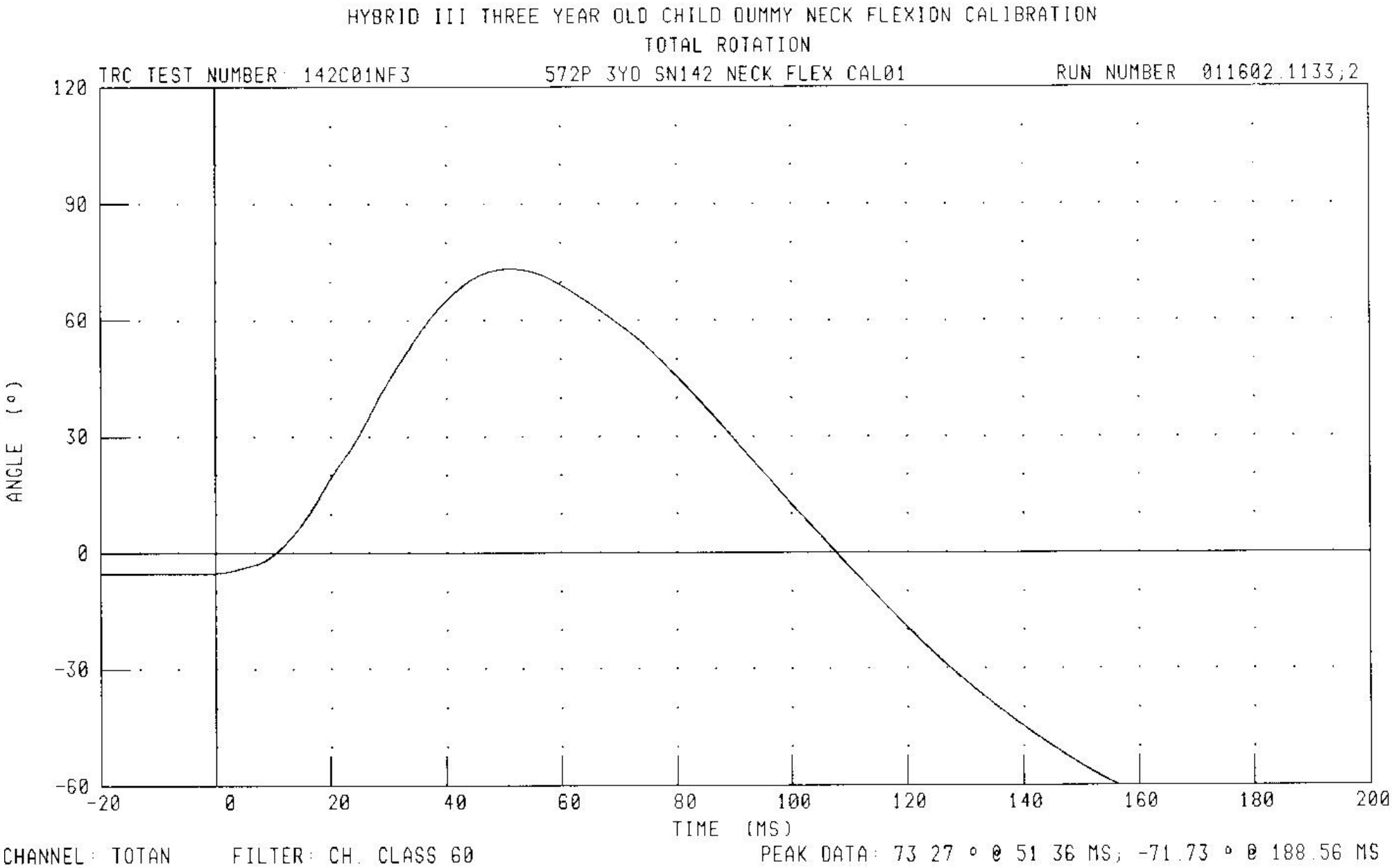
TECHNICIAN _____ RUN NUMBER: 011602.1112;2

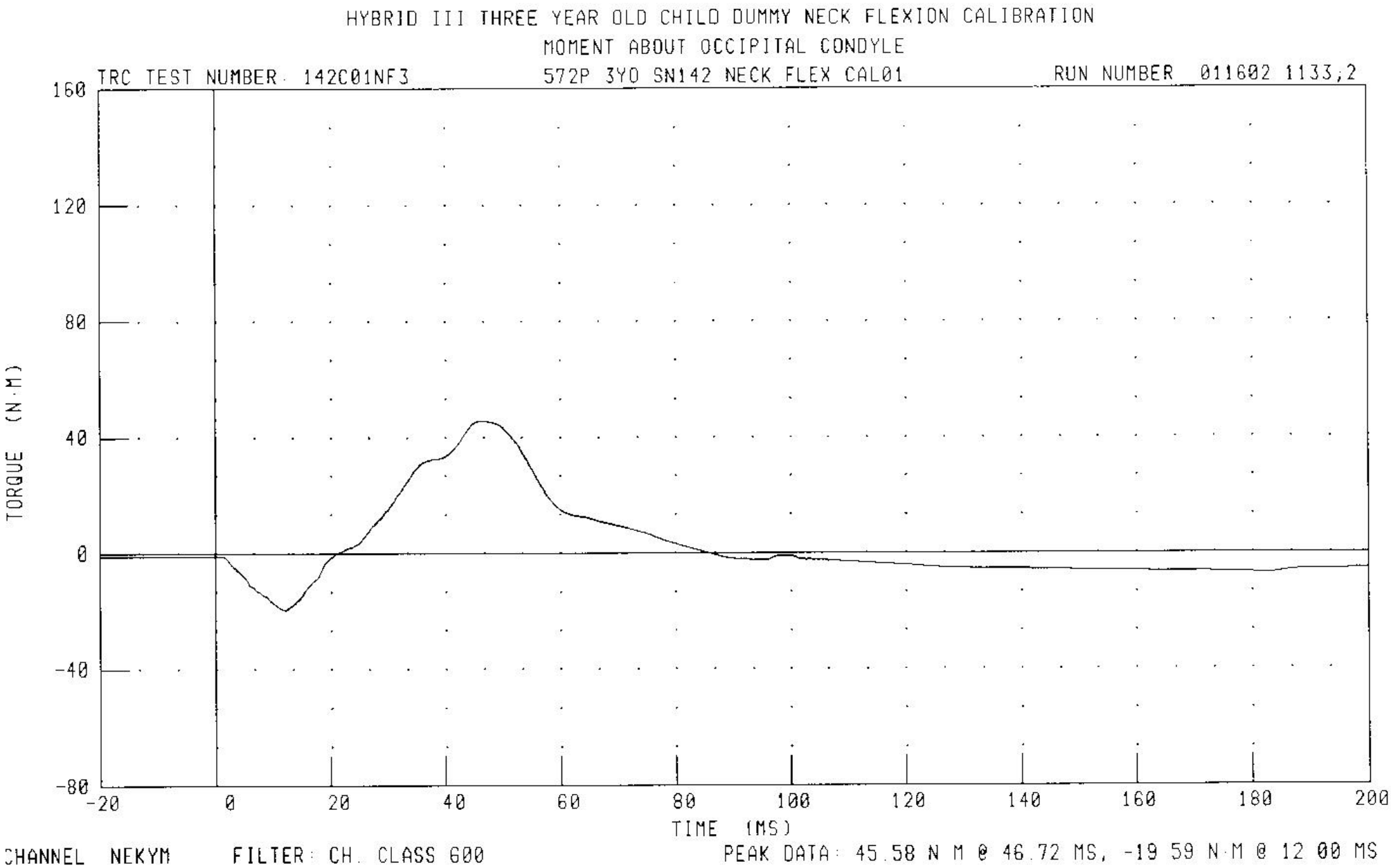

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER: 011602 1133,2
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 32.76 G @ 9.60 MS; -5.75 G @ 32.08 MS

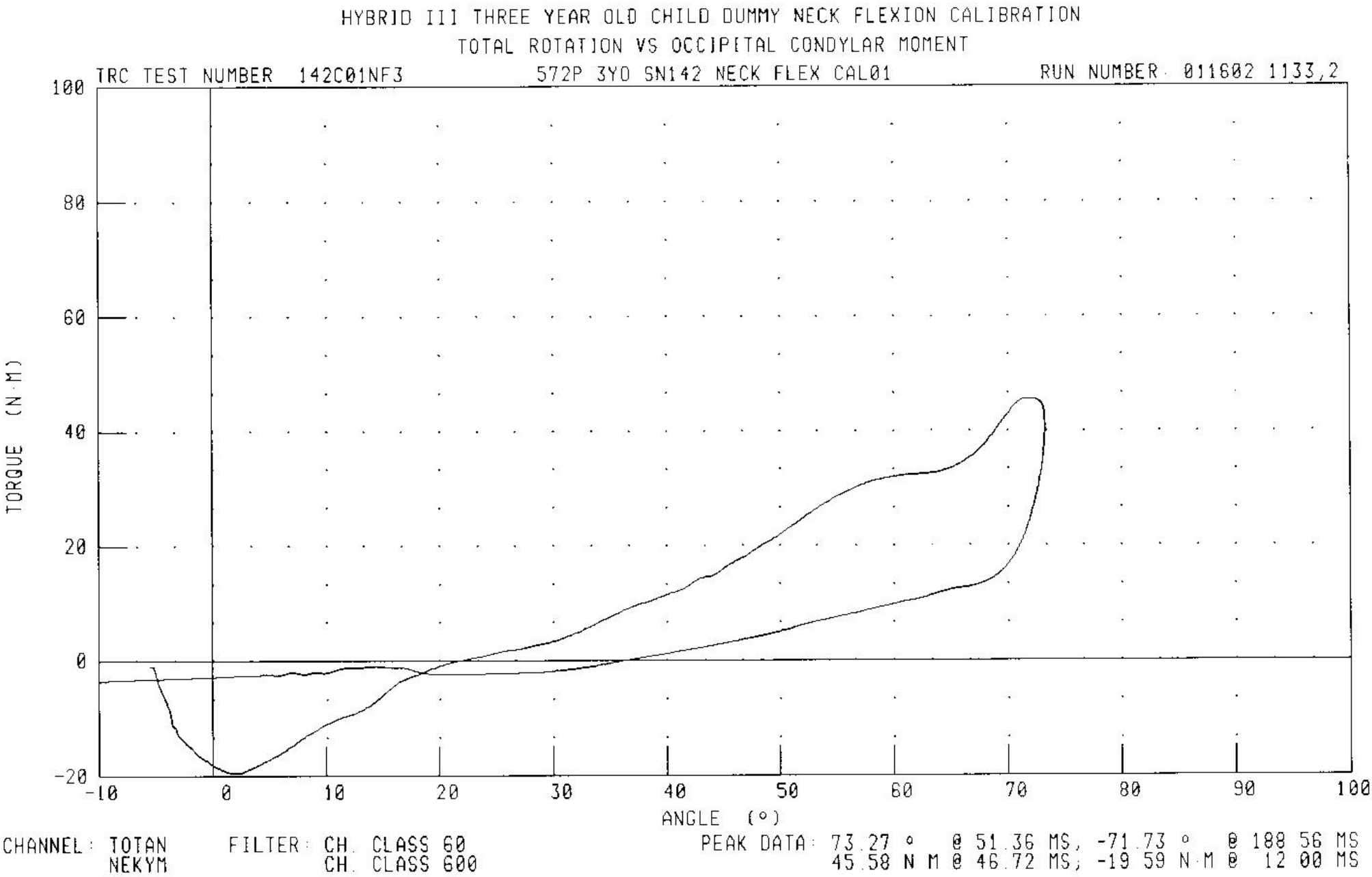

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM INTEGRATED VELOCITY
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER 011602 1133;2
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXVI
FILTER: CH CLASS 180
PEAK DATA: 6.60 M/S @ 200.00 MS; -0.01 M/S @ -0.40 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER: 011602 1133;2
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA 18.16 ° @ 52.96 MS, -17.31 ° @ 189.36 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER: 011602.1133,2
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
HANNEL: THETA
FILTER CH. CLASS 60
PEAK DATA: 55.16 ° @ 50.72 MS, -54 43 ° @ 188 48 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER 011602.1133;2
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 73.27 ° @ 51.36 MS; -71.73 ° @ 188.56 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER 011602 1133,2
160
120
80
40
0
-40
-80
TORQUE (N·M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKYM
FILTER: CH. CLASS 600
PEAK DATA: 45.58 N M @ 46.72 MS, -19 59 N·M @ 12 00 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER 011602 1133,2
TORQUE (N·M)
100
80
60
40
20
0
-20
-10
0
10
20
30
40
50
60
70
80
90
100
ANGLE (°)
CHANNEL: TOTAN
NEKYM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 73.27 ° @ 51.36 MS, -71.73 ° @ 188 56 MS
45.58 N M @ 46.72 MS; -19 59 N·M @ 12 00 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III THREE YEAR OLD 17-JAN-02

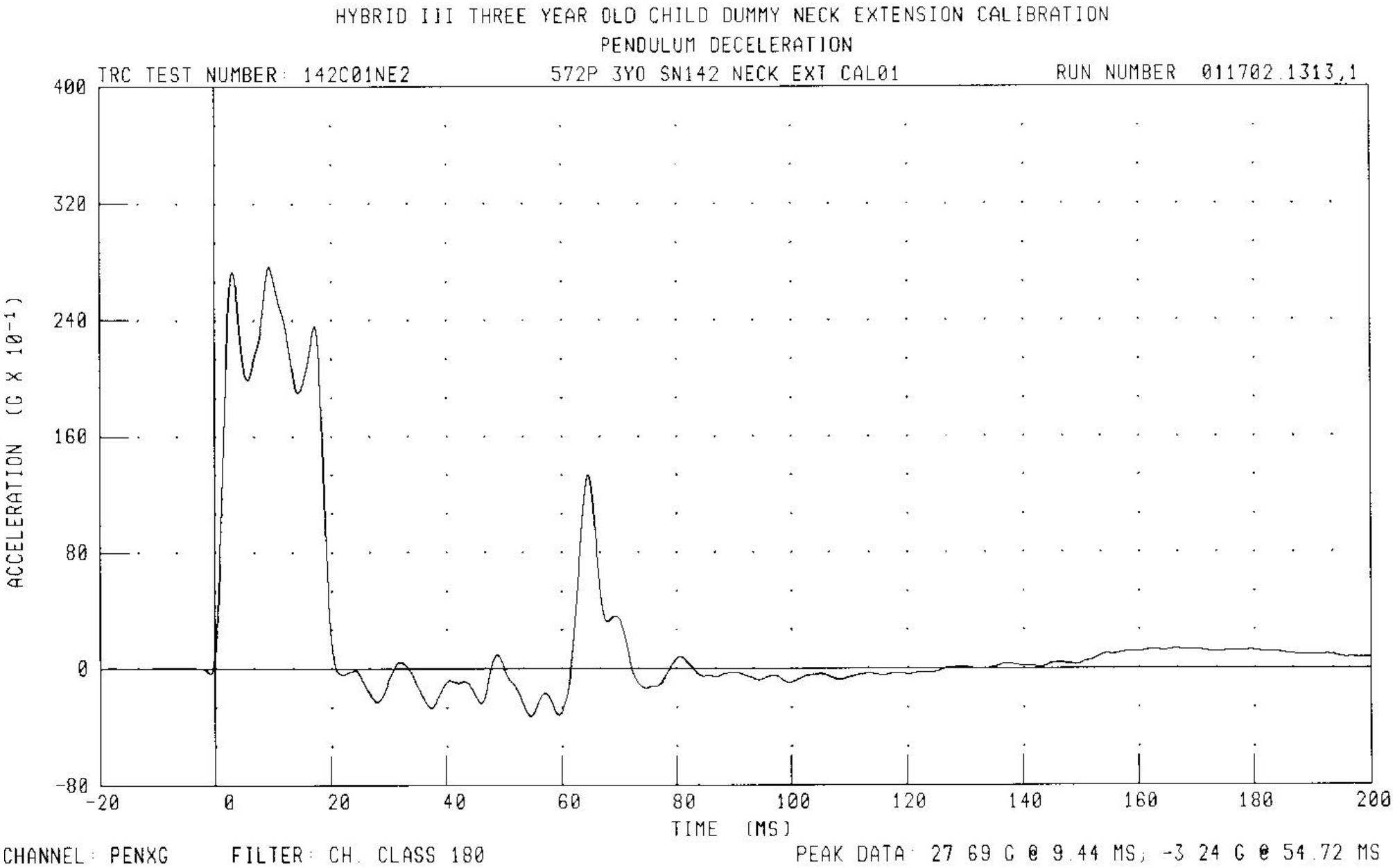
NECK EXTENSION TEST

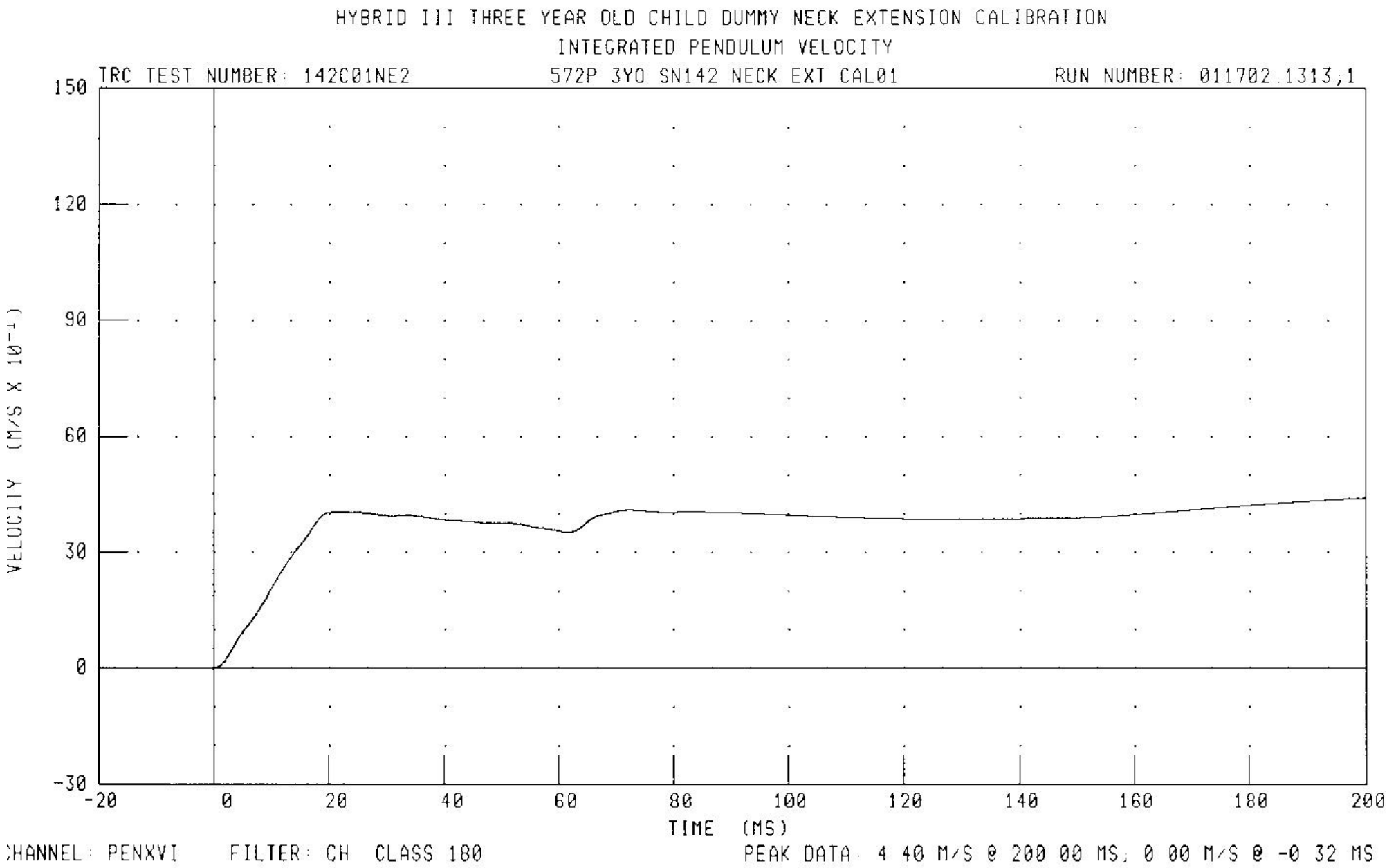
TRC INC. TEST NO: 142C01NE2 572P 3YO SN142 NECK EXT CAL01

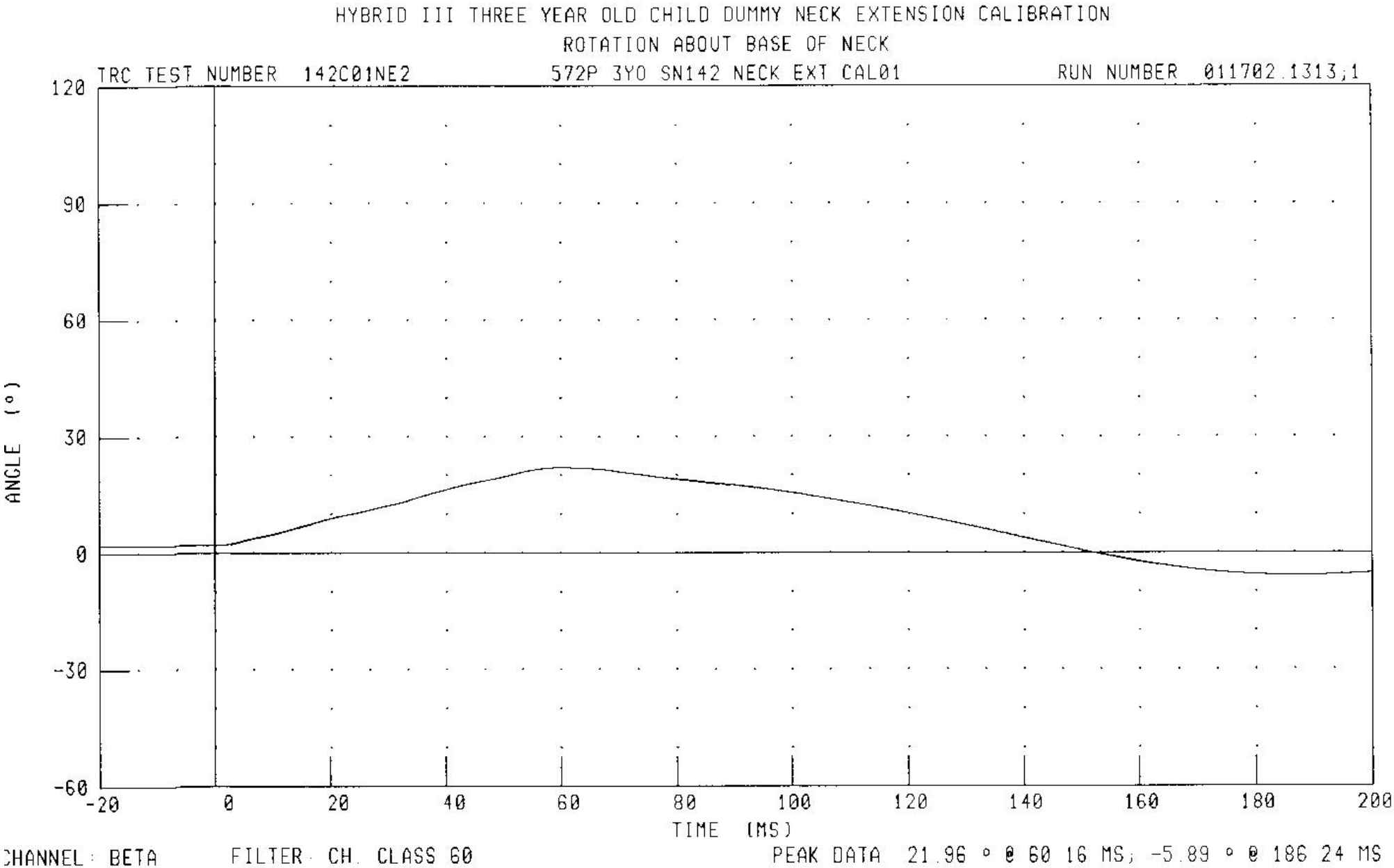
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	15.0 %
IMPACT VELOCITY		3.55 - 3.75 M/S	3.68 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	1.0 - 1.4 M/S	1.12 M/S
	10 MS	1.9 - 2.5 M/S	2.06 M/S
	14 MS	2.8 - 3.5 M/S	2.98 M/S
PEAK D-PLANE ROTATION		83 - 93 DEG.	89.11 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		-43.7 / -53.3 NM	-49.45 NM
NEGATIVE MOMENT DECAY TIME TO -10 NM LEVEL		60 - 80 MS	66.72 MS

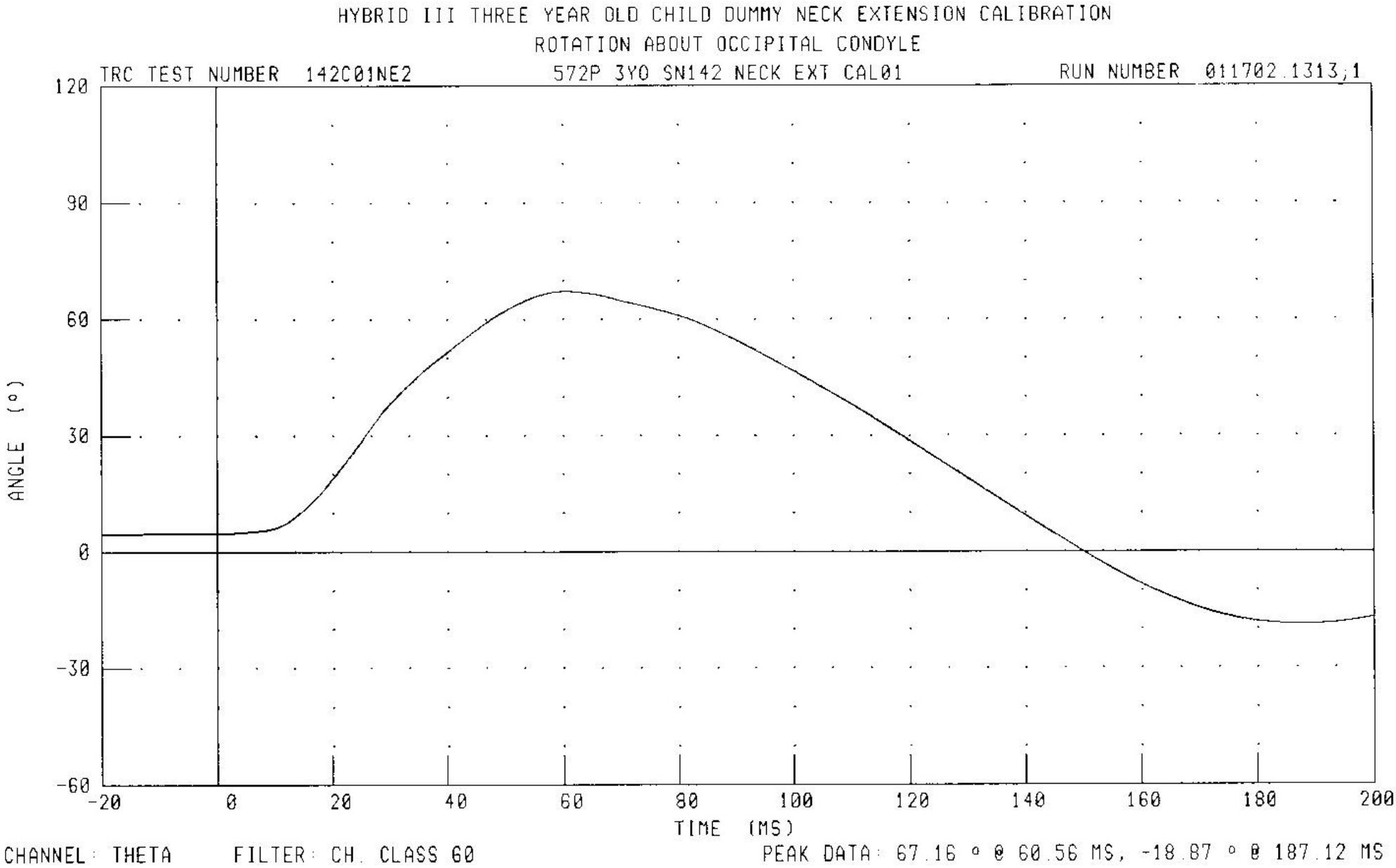
TEST MEETS SPECIFICATIONS

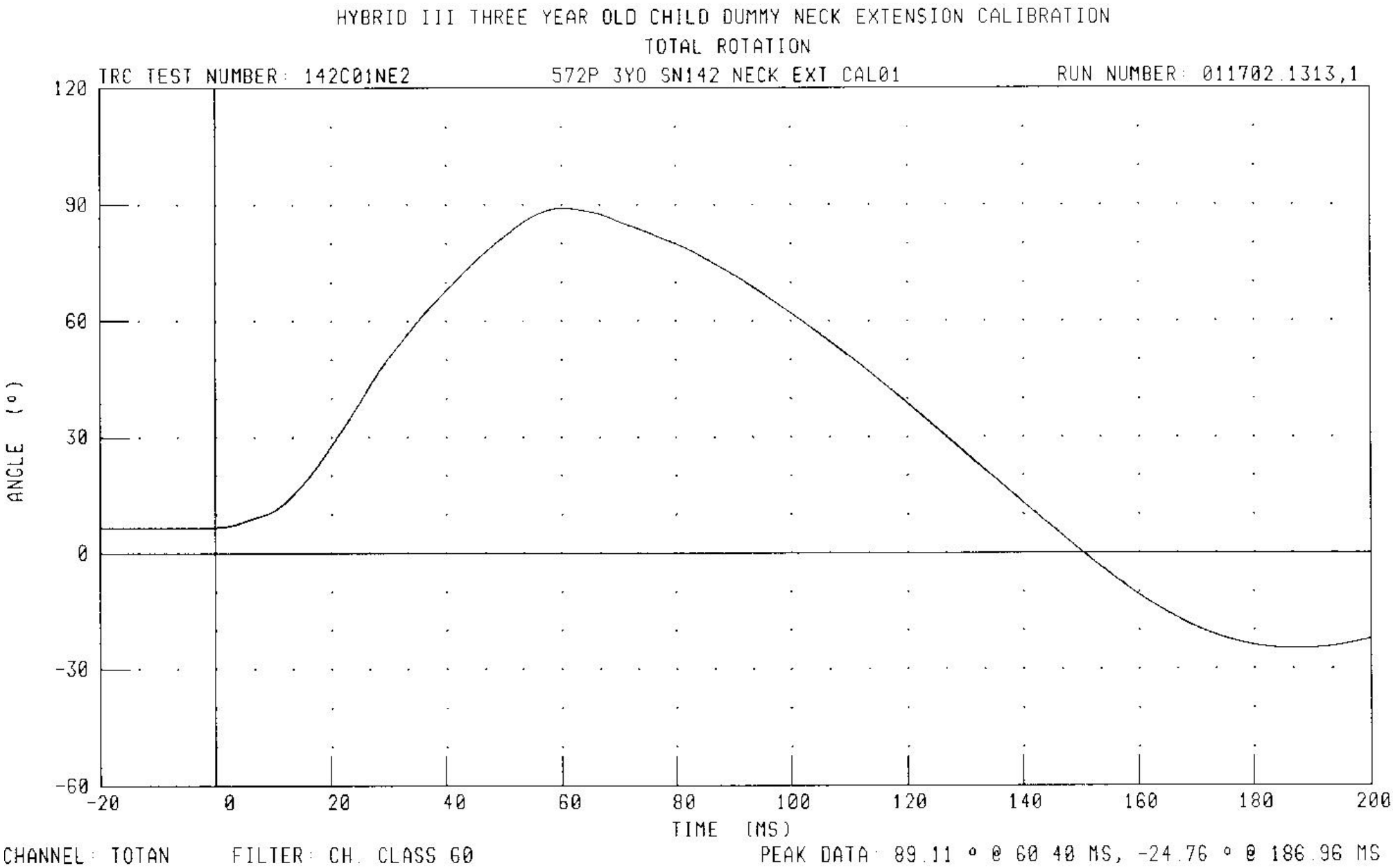
TECHNICIAN _____ RUN NUMBER: 011702.1251;1

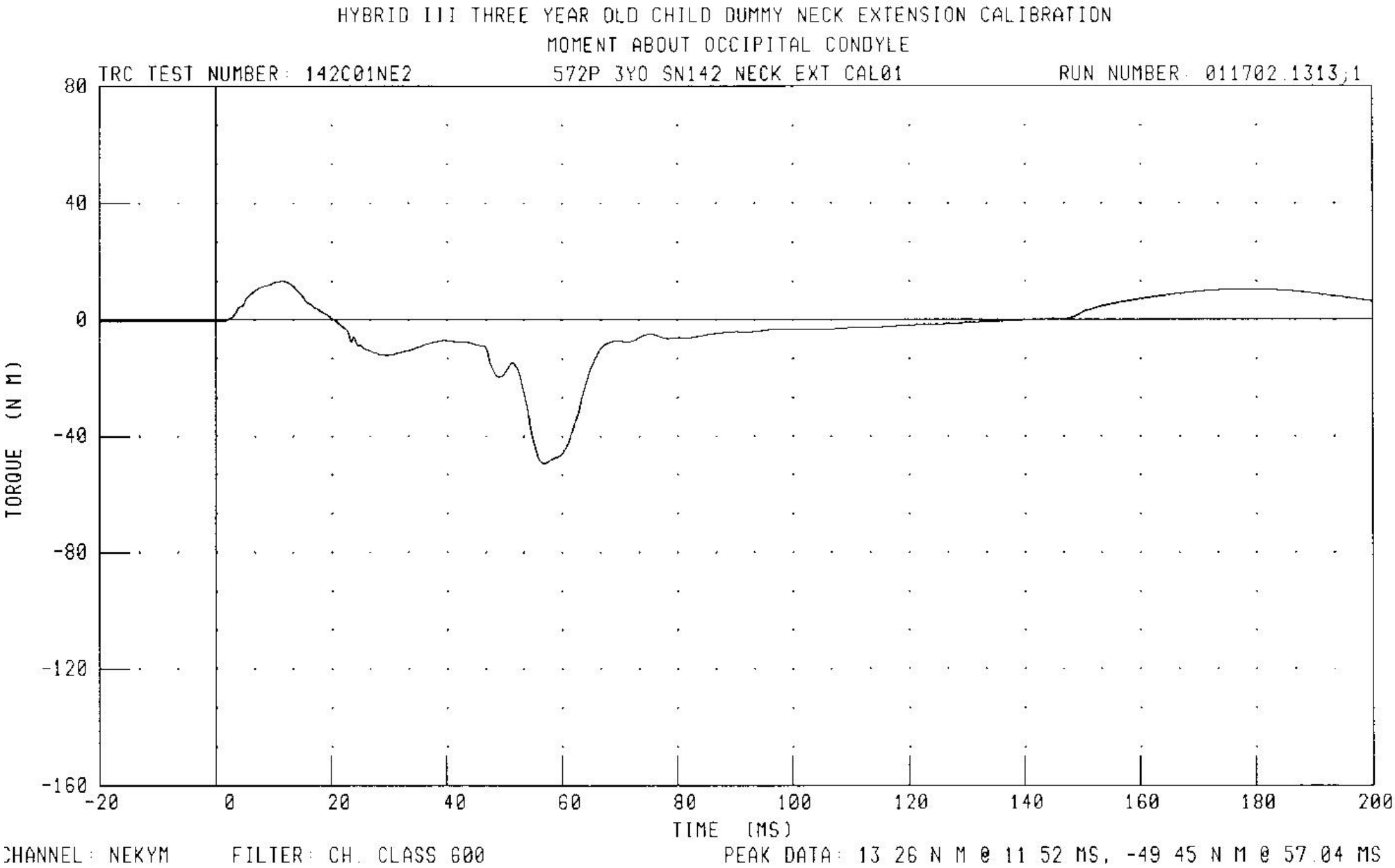

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER 011702.1313,1
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 27 69 G @ 9.44 MS; -3 24 G @ 54.72 MS

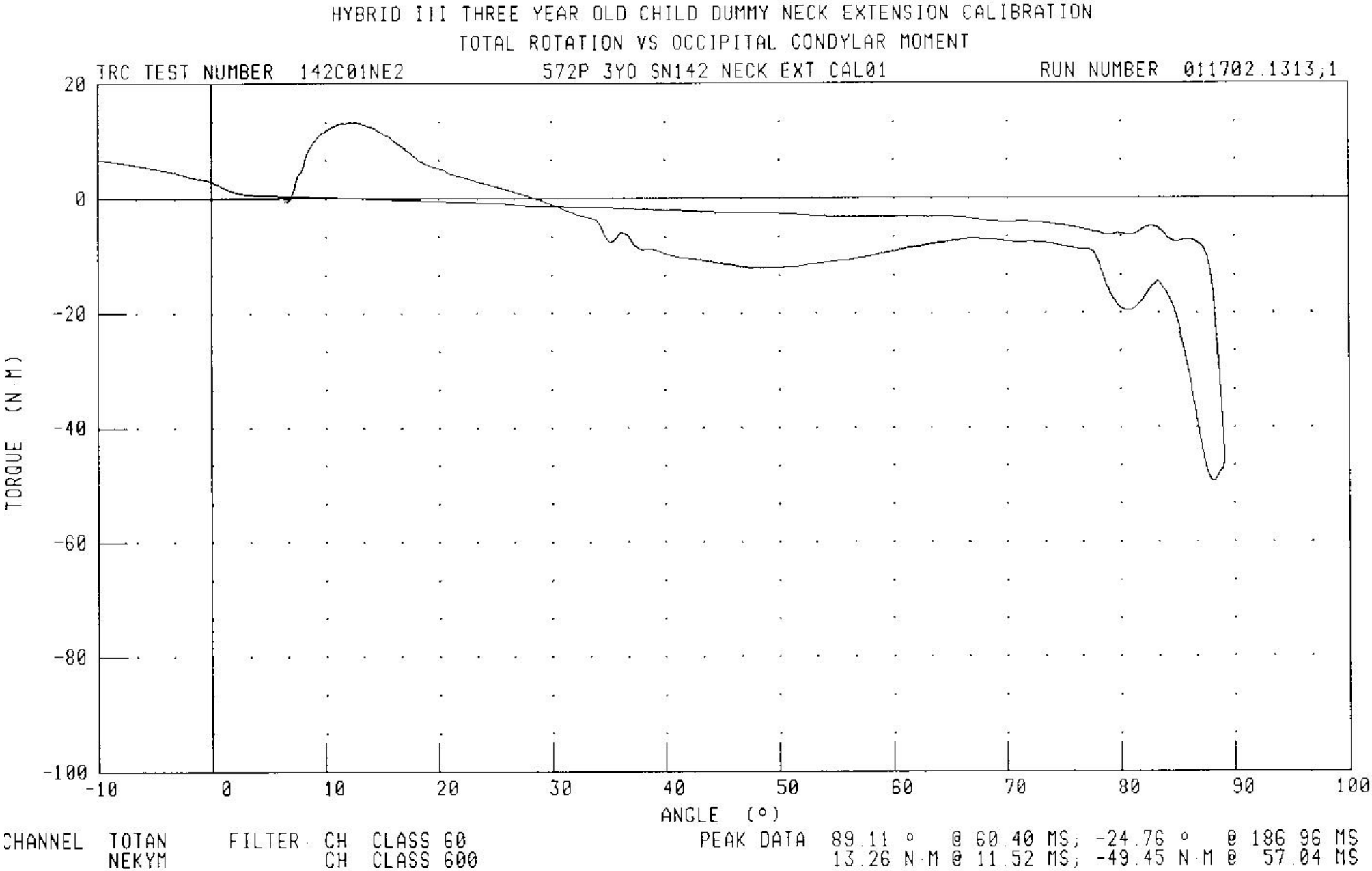

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
INTEGRATED PENDULUM VELOCITY
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER: 011702.1313;1
VELOCITY (M/S X 10⁻¹)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH CLASS 180
PEAK DATA: 4 40 M/S @ 200 00 MS; 0 00 M/S @ -0 32 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER 011702.1313;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA 21.96 ° @ 60 16 MS; -5.89 ° @ 186 24 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER 011702.1313;1
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 67.16 ° @ 60.56 MS, -18.87 ° @ 187.12 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER: 011702.1313,1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 89.11 ° @ 60.40 MS, -24.76 ° @ 186.96 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER: 011702.1313;1
80
40
0
-40
-80
-120
-160
TORQUE (N M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKYM
FILTER: CH. CLASS 600
PEAK DATA: 13.26 N M @ 11.52 MS, -49.45 N M @ 57.04 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER 011702.1313;1
TORQUE (N-M)
20
0
-20
-40
-60
-80
-100
-10
0
10
20
30
40
50
60
70
80
90
100
ANGLE (°)
CHANNEL TOTAN
NEKYM
FILTER CH CLASS 60
CH CLASS 600
PEAK DATA 89.11 ° @ 60.40 MS; -24.76 ° @ 186.96 MS
13.26 N-M @ 11.52 MS; -49.45 N-M @ 57.04 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III THREE YEAR OLD 17-JAN-02

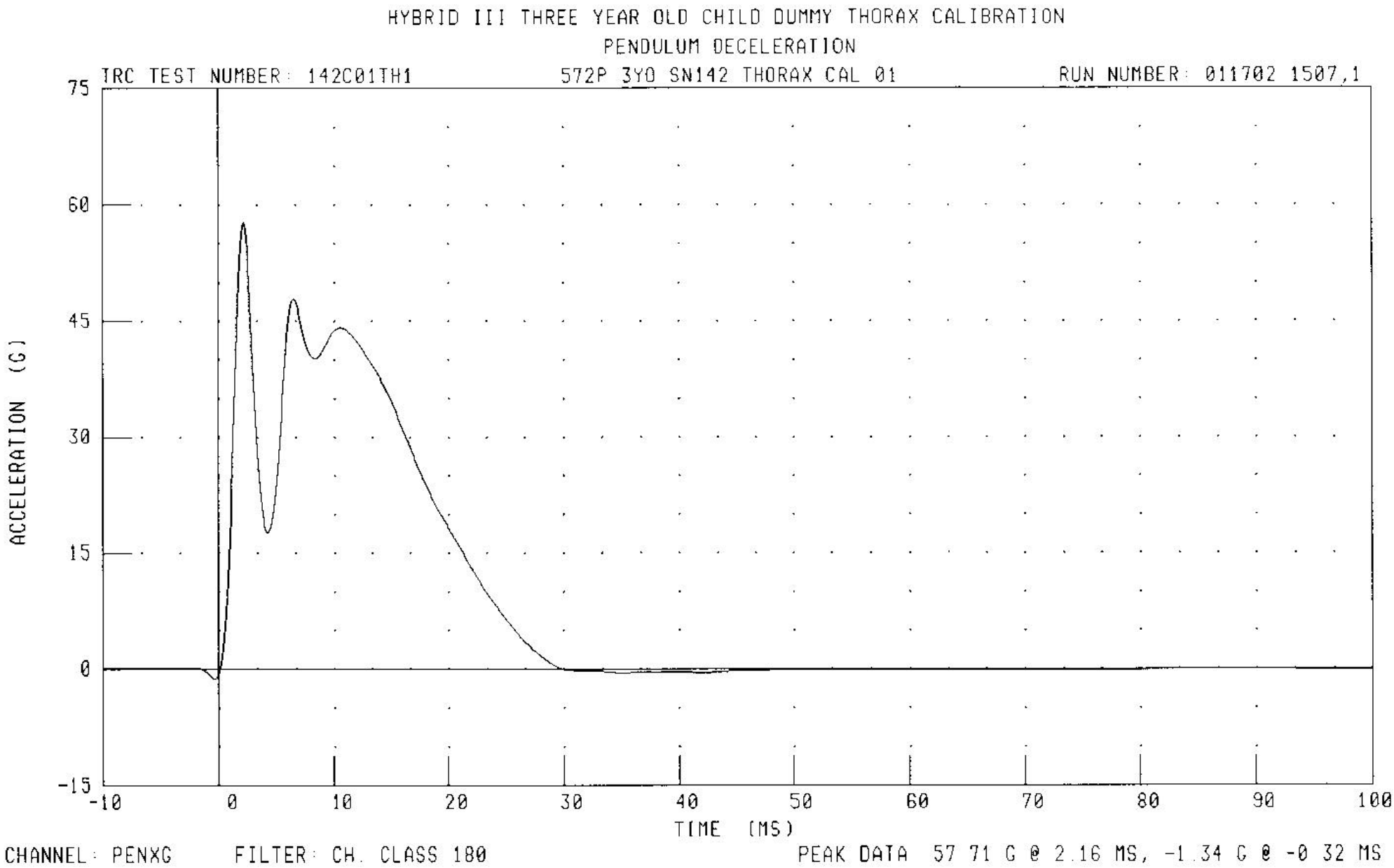
TRC INC. TEST NO: 142C01TH1 572P 3YO SN142 THORAX CAL 01

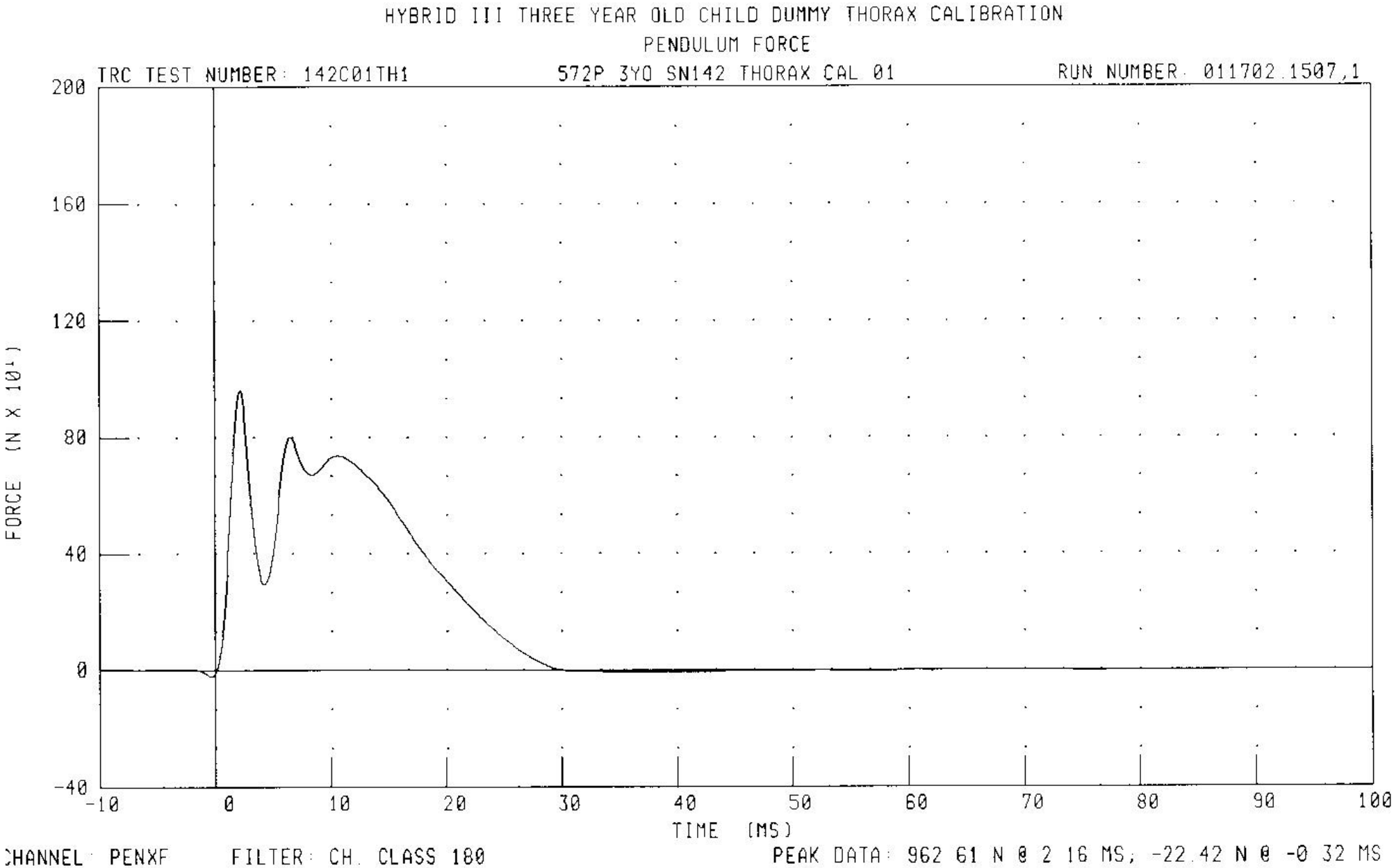
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	14.0 %
PENDULUM VELOCITY	5.90 - 6.10 M/S	5.99 M/S
MAXIMUM DEFLECTION	32 - 38 MM	33.2 MM
MAXIMUM FORCE DURING DEFLECTION INTERVAL	680 - 910 N	735. N
INTERNAL HYSTERESIS	65% - 85%	72.3%
MAXIMUM FORCE BEWTWEEN 12.5 & 32 MM OF DEFLECTION	<= 910. N	799. N

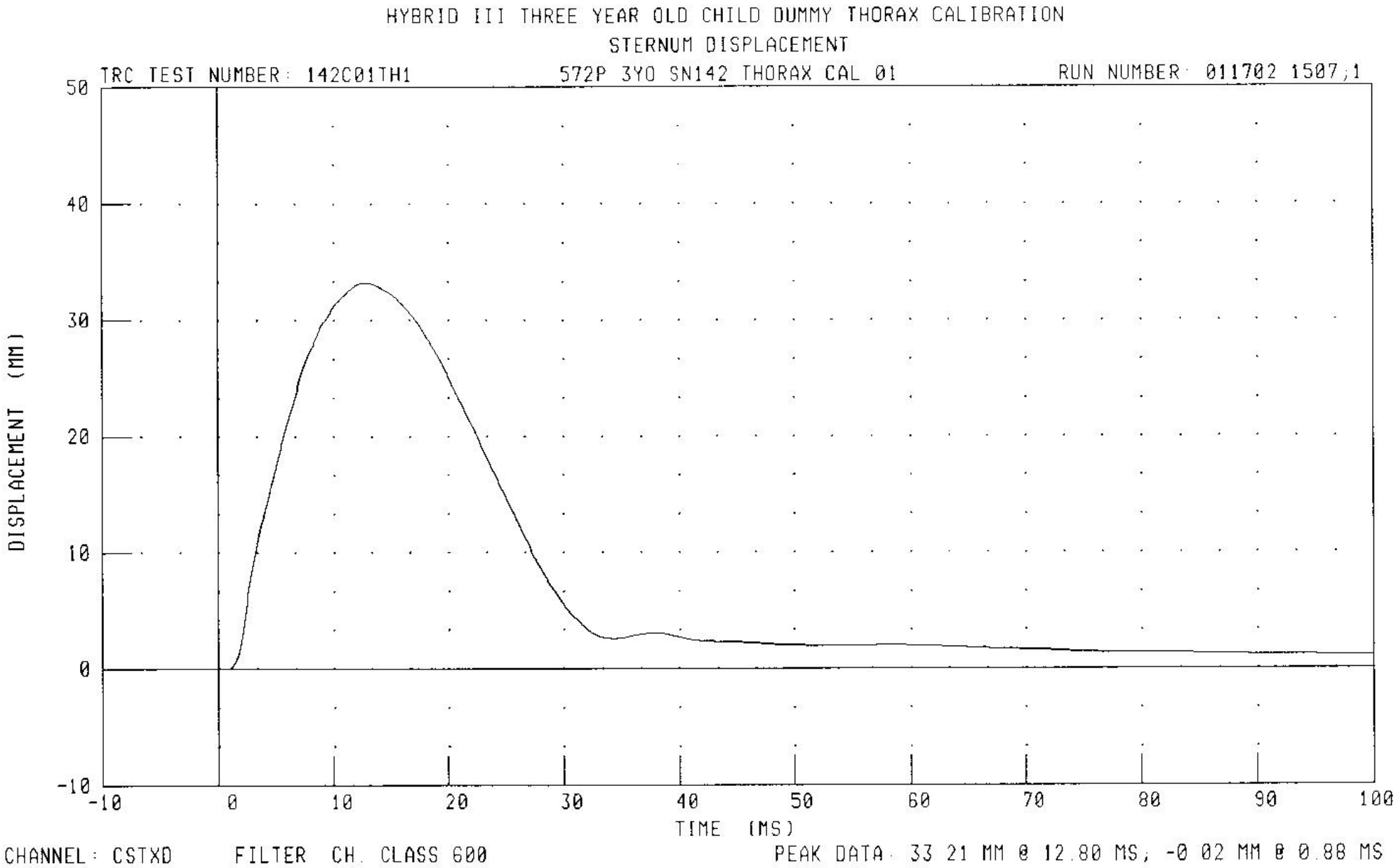
TEST MEETS SPECIFICATIONS

TECHNICIAN

RUN NUMBER: 011702.1504;1


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C01TH1
572P 3YO SN142 THORAX CAL 01
RUN NUMBER: 011702 1507,1
ACCELERATION (G)
75
60
45
30
15
0
-15
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA 57 71 G @ 2.16 MS, -1.34 G @ -0 32 MS

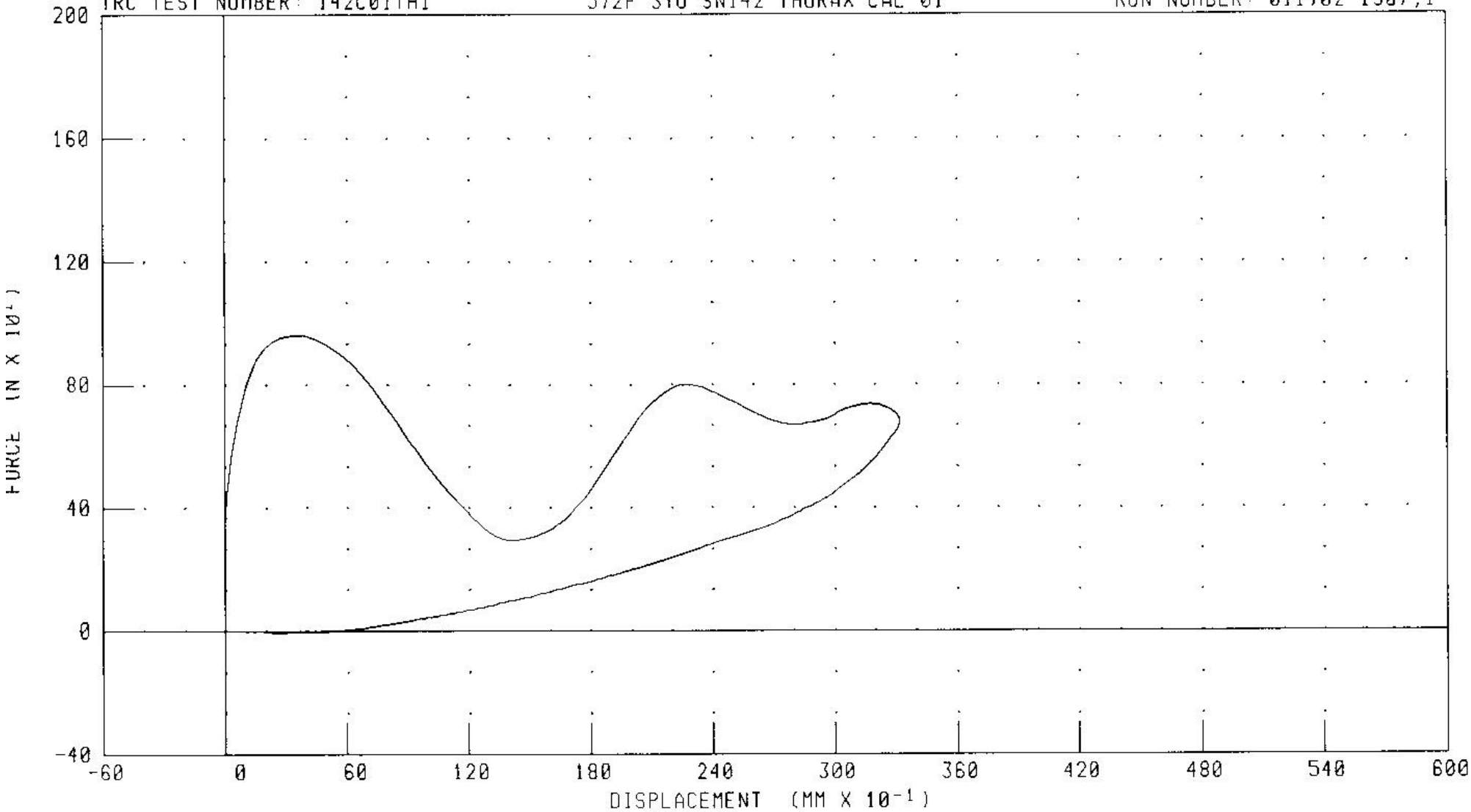

HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM FORCE
TRC TEST NUMBER: 142C01TH1
572P 3YO SN142 THORAX CAL 01
RUN NUMBER: 011702.1507,1
200
160
120
80
40
0
-40
FORCE (N X 10¹)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXF
FILTER: CH. CLASS 180
PEAK DATA: 962.61 N @ 2.16 MS; -22.42 N @ -0.32 MS


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
STERNUM DISPLACEMENT
TRC TEST NUMBER: 142C01TH1
572P 3YO SN142 THORAX CAL 01
RUN NUMBER: 011702 1507;1
DISPLACEMENT (MM)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: CSTXD
FILTER CH. CLASS 600
PEAK DATA: 33.21 MM @ 12.80 MS; -0.02 MM @ 0.88 MS

HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION

CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 142C01TH1 572P 3YO SN142 THORAX CAL 01 RUN NUMBER: 011702 1507,1



CHANNEL: CSTXD FILTER: CH. CLASS 600

PENXF CH. CLASS 180

PEAK DATA: 33.21 MM @ 12.80 MS; -0.02 MM @ 0.88 MS

962.61 N @ 2.16 MS; -22.42 N @ -0.32 MS

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

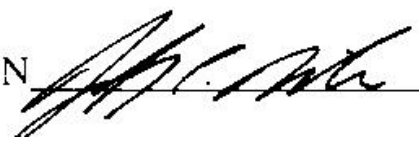
HYBRID III THREE-YEAR-OLD

CAL DATE: 15-Jan-02

TRC, INC. **TEST NO: 142C01TF1** **572 P SN142 TORSO FLEX CAL 01**

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 – 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 – 70 %	23 %
INITIAL ANGLE OF UNSUPPORRTED DUMMY	<= 15 DEG. REFERENCED TO VERTICAL	1 DEG.
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	130 – 180 N	169 N
RETURN ANGLE	+/- 10 DEG OF INTIAL ANGLE	3 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 (continuted)