REPORT NUMBER: SLED-VER-2002-06

CHILD RESTRAINT SYSTEM IN DYNAMIC SLED TEST CENTURY 1000 STE, FORWARD-FACING UPRIGHT, CONVERTIBLE

CENTURY 1000 STE, FORWARD-FACING UPRIGHT, CONVERTIBLE

TEST NUMBER: 22289

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

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 25, 2002 at a speed of 46.4 kph (28.8 mph). The FMVSS No. 213 sled pulse was used as a crash pulse. The requirements specified in the FMVSS No. 213 were also followed.

The bench seat contained two anthropomorphic test devices (ATD's). Two (2) Hybrid III 3 year old size ATD's, Serial Number 40 (P3) and 142 (P4), were instrumented with head, chest, and pelvic tri-axial accelerometers, and upper and lower neck load cells. The child ATD's were positioned according to the child seat manufacturer's instructions. The data was digitally sampled at 20,000 samples per second and processed per Section IP11 of the Laboratory Test Procedure.

1.3 POST-TEST COMMENTS

None

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 22289S Test Date: March 25, 2002

P3 Seating Position

Child Restraint Type (forward-facing, rearward facing, booster)	Forward facing, Upright, Convertible
LATCH or NON-LATCH	Non-Latch with tether
Child Restraint Manufacturer	Century
Child Restraint Model	1000 STE
Model Number	44161
Date of Manufacture	01/14/2002
Child Restraint Height Limits (mm)	Up to 1016
Child Restraint Weight Limits (kg)	Rearward-facing Birth – 10 Forward-facing 9 - 18
Weight of Child Restraint (kg)	4.8
Tether Location	Upper

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 22289S Test Date: March 25, 2002

P3 Seating Position

Child Seat	Century 1000STE
Belt Fraying	None
Stress Marks	None
Cracks	None
Buckle Stress	None
Latch Hooks	None
Max. Head Excursion (mm)	650.2
Max. Knee Excursion (mm)	673.1
Velocity	28.8 mph, 46.4 kph
Acceleration (G's)	23.1

SECTION 4

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22289S Test Date: March 25, 2002

P3 Seating Position

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	18.6	210.1	-53.9	88.7
Head CG	Y	G's	24.8	88.6	-20.3	91.8
Head CG	Z	G's	51.2	75.9	0.0	15.3
Head CG Resultant	N/A	G's	66.6	88.7		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	5.7	181.9	-32.5	55.9
Chest CG	Y	G's	3.1	94.2	-3.8	91.6
Chest CG	Z	G's	5.4	211.6	-28.3	58.3
Chest CG Resultant	N/A	G's	42.3	56.8		

SEAT BELT SENSOR PEAK VALUES

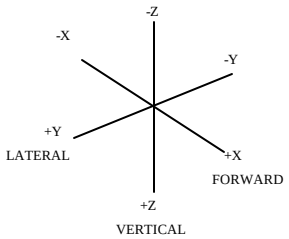
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P3 (South) Rear Passenger			
	HIC	Avg. G's	T^1	T^2
Head CG Primary (36 msec)	518	46.3	60.0	95.6
Head CG Primary (15 msec)	281	51.2	67.7	82.7

CHEST CLIP (3 MSEC)

Location	P3 (South) Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	41.6	55.6	58.6



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

Test No.: 22289S Test Date: March 25, 2002

P3 Seating Position

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	24.0	126.4	-40.5	56.2
Pelvis	Y	G's	2.8	64.1	-5.4	72.7
Pelvis	Z	G's	10.6	127.2	-40.5	56.6

UPPER NECK PEAK FORCES AND MOMENTS

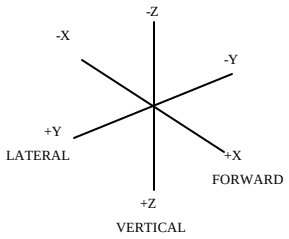
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	84.5	189.3	-769.9	88.0
Neck Force	Y	Newtons	23.4	202.8	-35.0	89.1
Neck Force	Z	Newtons	1421.3	80.0	-1.0	15.2
Neck Moment	X	Nm	1.5	200.0	-5.6	90.7
Neck Moment	Y	Nm	10.9	79.1	-10.4	47.6
Neck Moment	Z	Nm	1.8	90.8	-0.8	116.6

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	186.4	200.4	-1184.0	84.3
Neck Force	Y	Newtons	322.6	69.6	-19.7	183.5
Neck Force	Z	Newtons	670.9	73.3	-175.4	95.6
Neck Moment	X	Nm	6.8	66.6	-4.9	91.9
Neck Moment	Y	Nm	126.2	87.5	-10.8	200.2
Neck Moment	Z	Nm	0.9	218.1	-4.2	90.0

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			-21.7	95.1



SECTION 5

CHILD RESTRAINT INFORMATION

Test No.: 22289N Test Date: March 25, 2002

P4 Seating Position

Child Restraint Type (forward-facing, rearward facing, booster)	Forward facing, Upright, Convertible
LATCH or NON-LATCH	Non-Latch with tether
Child Restraint Manufacturer	Century
Child Restraint Model	1000 STE
Model Number	44161
Date of Manufacture	01/14/2002
Child Restraint Height Limits (mm)	Up to 1016
Child Restraint Weight Limits (kg)	Rearward-facing Birth – 10 Forward-facing 9 - 18
Weight of Child Restraint (kg)	4.8
Tether Location	Upper

SECTION 6

POST-TEST OBSERVATIONS

Test No.: 22289N Test Date: March 25, 2002

P4 Seating Position

Child Seat	Century 1000STE
Belt Fraying	None
Stress Marks	None
Cracks	None
Buckle Stress	None
Latch Hooks	None
Max. Head Excursion (mm)	653.8
Max. Knee Excursion (mm)	673.1
Velocity	28.8 mph, 46.4 kph
Acceleration (G's)	23.1

SECTION 7

HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22289N Test Date: March 25, 2002

P4 Seating Position

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	25.1	200.9	-53.6	88.9
Head CG	Y	G's	25.4	88.7	-12.8	95.4
Head CG	Z	G's	56.6	77.1	0.0	1.5
Head CG Resultant	N/A	G's	68.5	88.7		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	6.7	175.7	-35.3	54.9
Chest CG	Y	G's	7.4	43.2	-3.2	196.2
Chest CG	Z	G's	8.5	202.8	-25.6	58.3
Chest CG Resultant	N/A	G's	43.2	55.4		

SEAT BELT SENSOR PEAK VALUES

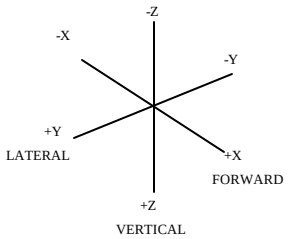
Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P4 (North) Rear Passenger			
	HIC	Avg. G's	T^1	T^2
Head CG Primary (36 msec)	627	49.7	62.1	98.1
Head CG Primary (15 msec)	363	56.7	70.0	85.0

CHEST CLIP (3 MSEC)

Location	P4 (North) Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	42.8	53.8	59.2



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

Test No.: 22289N Test Date: March 25, 2002

P4 Seating Position

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	10.9	115.4	-24.0	57.4
Pelvis	Y	G's	3.5	209.2	-6.6	69.0
Pelvis	Z	G's	9.5	115.7	-37.7	58.4

UPPER NECK PEAK FORCES AND MOMENTS

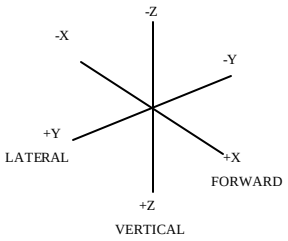
Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	58.4	185.0	-795.7	95.0
Neck Force	Y	Newtons	50.4	96.8	-20.7	89.3
Neck Force	Z	Newtons	1491.1	77.1	-43.0	221.2
Neck Moment	X	Nm	3.8	197.6	-4.5	106.3
Neck Moment	Y	Nm	16.3	91.1	-8.8	47.0
Neck Moment	Z	Nm	3.3	140.7	-2.8	101.0

LOWER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	258.7	192.6	-1237.6	79.9
Neck Force	Y	Newtons	43.2	48.3	-46.4	102.5
Neck Force	Z	Newtons	972.0	74.3	-218.2	97.5
Neck Moment	X	Nm	6.0	74.3	-5.7	94.3
Neck Moment	Y	Nm	120.4	94.2	-15.8	193.1
Neck Moment	Z	Nm	2.7	72.6	-5.6	104.4

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			-16.4	96.4



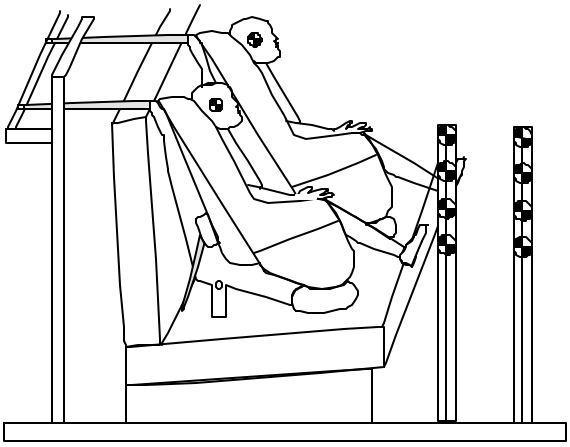
SECTION 8

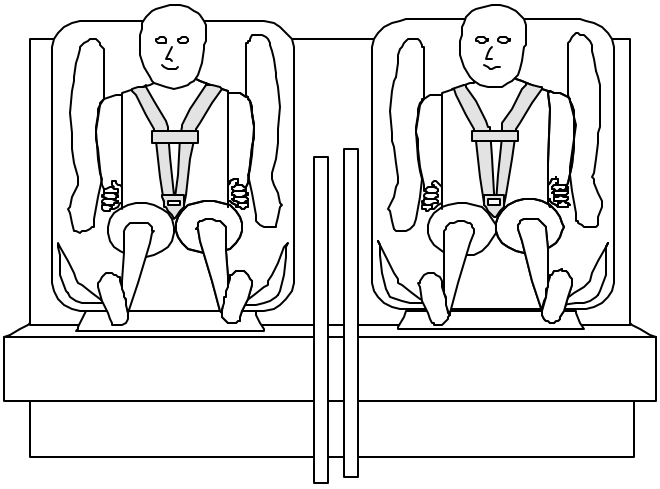
SLED TEST SET-UP

Test No.: 22289 Test Date: March 25, 2002

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

Pre-test Infant and Car Seat Positions



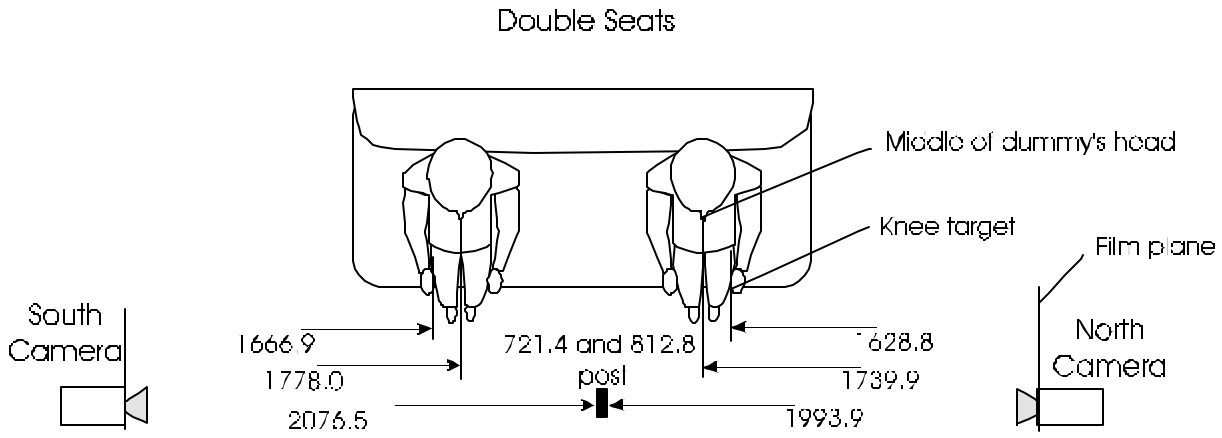


SECTION 9

CAMERA LOCATION

Test No.: 22289 Test Date: March 25, 2002

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



SECTION 10

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Run #22289 Photo 1 - Pre-Test Right 3/4 View

Run #22289 Photo 2 - Post-Test Right 3/4 View

Run #22289 Photo 3 - Pre-Test Right Side View

Run #22289 Photo 4 - Post-Test Right Side View

Run #22289 Photo 5 - Pre-Test Left 3/4 View

Run #22289 Photo 6 - Post-Test Left 3/4 View

Run #22289 Photo 7 - Pre-Test Left Side View

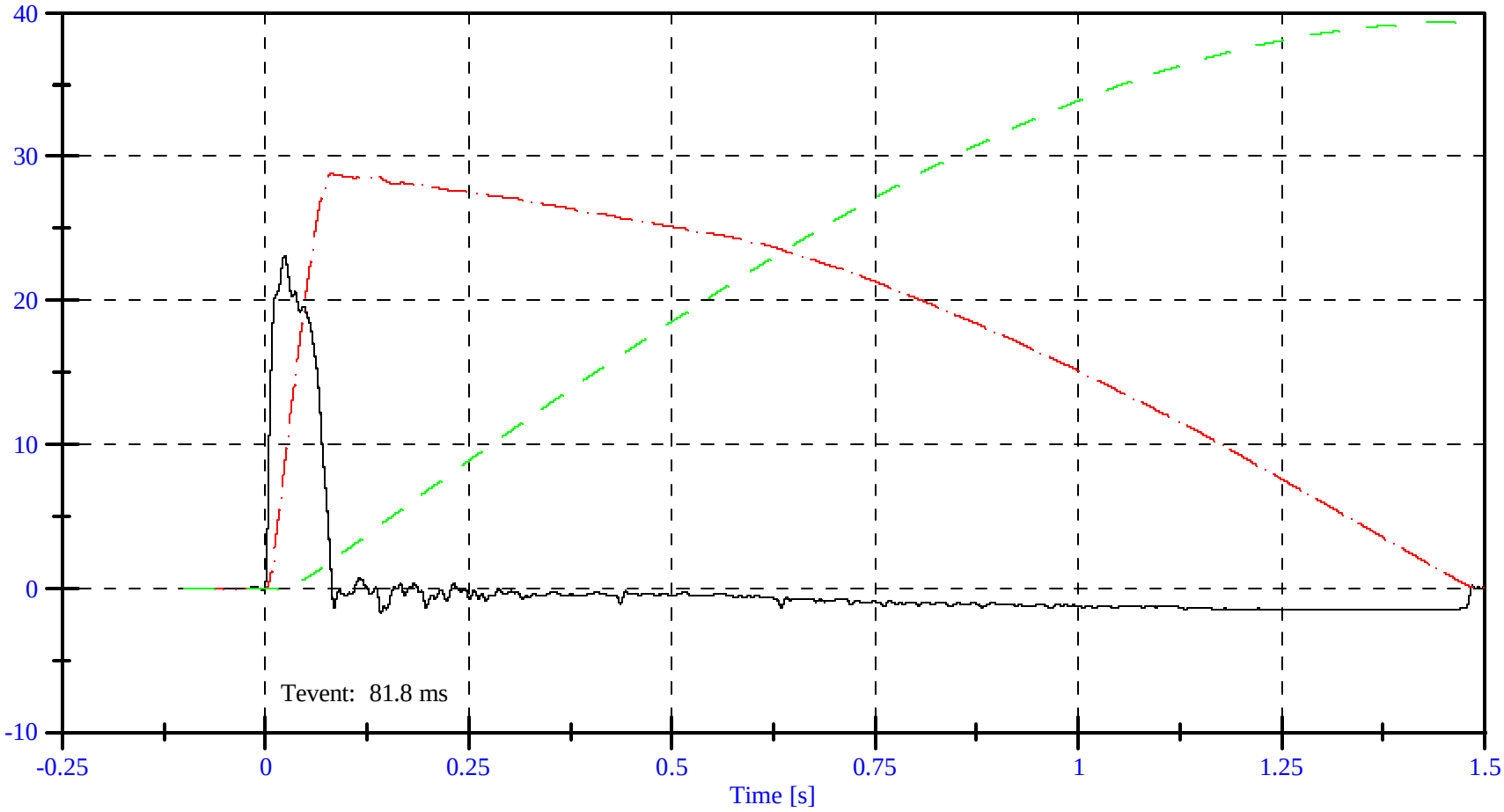
Run #22289 Photo 8 - Post-Test Left Side View

SECTION 11

DATA PLOTS

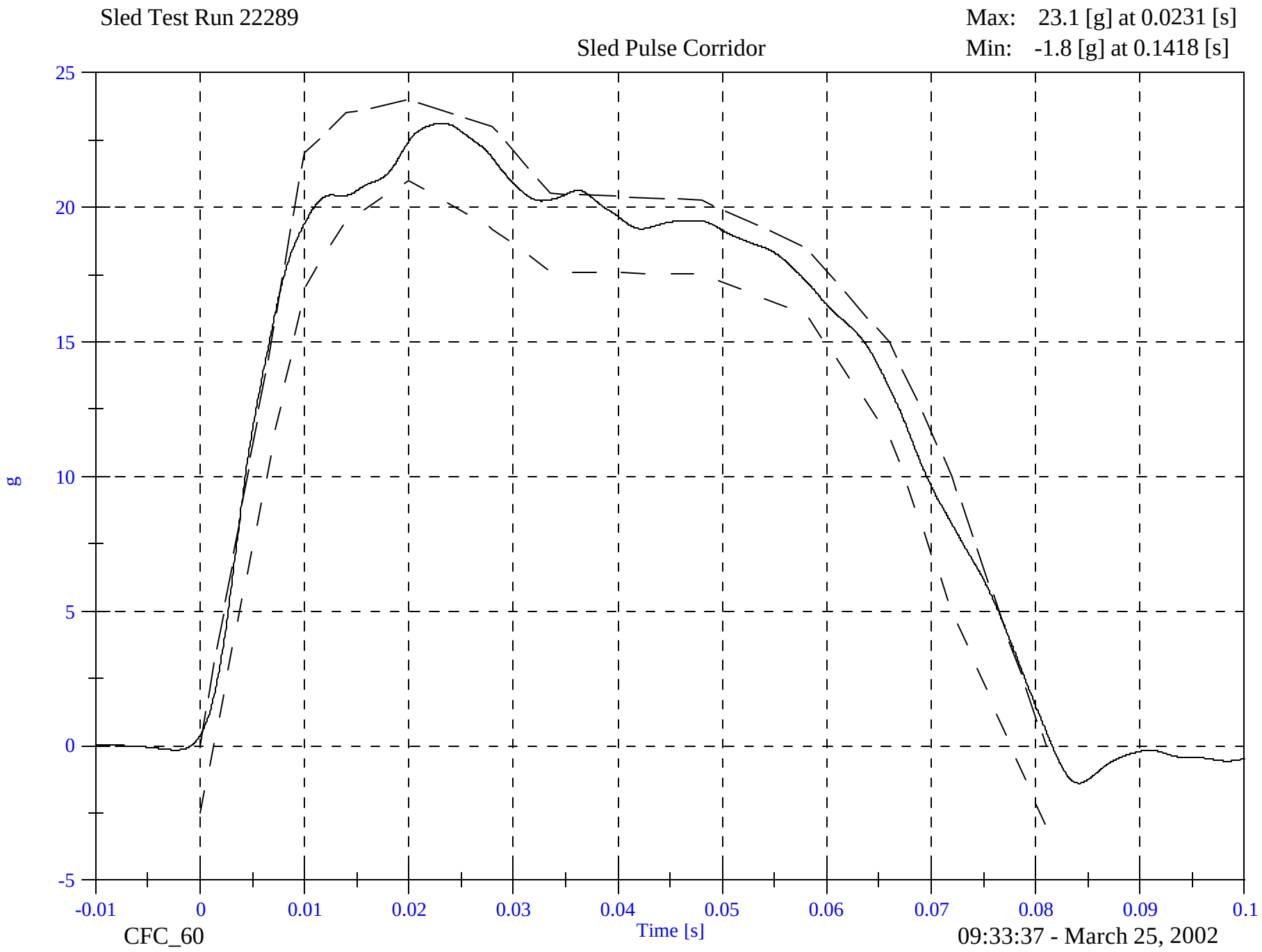
Sled Test Run 22289

March 25, 2002



	Maximum	Time (ms)	Minimum	Time (ms)	Filter Class
Sled Ax (g)	23.1	23.1	-1.8	141.8	CFC_60
Sled Vx (mph)	28.8	81.8	-0.0	-21.4	CFC_180
Sled Dx (ft)	39.4	1499.9	-0.0	-10.0	CFC_180

LEGEND
- Sled Ax
- Sled Vx
- Sled Dx


Sled Test Run 22289
Sled Pulse Corridor
Max: 23.1 [g] at 0.0231 [s]
Min: -1.8 [g] at 0.1418 [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
09:33:37 - March 25, 2002

FACILITY: HYGE SLED DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
49	Sled Acceleration	g	23.1	23.1	-1.8	141.8	CFC_60	
50	Sled Acceleration Velocity	kph	46.4	81.8	-0.0	-21.4	CFC_180	
51	Sled Acceleration Displacement	mm	2697.7	250.0	-0.0	-10.0	CFC_180	
52	P3 Head x	g	18.6	210.1	-53.9	88.7	CFC_1000	
53	P3 Head y	g	24.8	88.6	-20.3	91.8	CFC_1000	
54	P3 Head z	g	51.2	75.9	-0.0	-15.3	CFC_1000	
55	P3 Head Resultant	g	66.6	88.7	0.0	1.9	CFC_1000	
56	P3 Upper Neck Fx	N	84.5	189.3	-769.9	88.0	CFC_1000	
57	P3 Upper Neck Fy	N	23.4	202.9	-35.0	89.1	CFC_1000	
58	P3 Upper Neck Fz	N	1421.3	80.0	-1.0	-15.2	CFC_1000	
59	P3 Upper Neck F Resultant	N	1541.8	84.4	0.0	0.8	CFC_1000	
60	P3 Upper Neck Mx	N-m	1.5	200.0	-5.6	90.7	CFC_600	
61	P3 Upper Neck My	N-m	10.9	79.1	-10.4	47.6	CFC_600	
62	P3 Upper Neck Mz	N-m	1.8	90.8	-0.8	116.6	CFC_600	
63	P3 Upper Neck M Resultant	N-m	10.9	79.1	0.0	-26.0	CFC_600	
64	P3 Lower Neck Fx	N	186.4	200.4	-1184.0	84.3	CFC_1000	
65	P3 Lower Neck Fy	N	322.6	69.6	-19.7	183.5	CFC_1000	
66	P3 Lower Neck Fz	N	670.9	73.3	-175.4	95.6	CFC_1000	
67	P3 Lower Neck F Resultant	N	1300.1	79.9	0.0	-3.1	CFC_1000	
68	P3 Lower Neck Mx	N-m	6.8	66.6	-4.9	91.9	CFC_600	
69	P3 Lower Neck My	N-m	126.2	87.5	-10.8	200.2	CFC_600	
70	P3 Lower Neck Mz	N-m	0.9	218.1	-4.2	90.0	CFC_600	
71	P3 Lower Neck M Resultant	N-m	126.2	87.5	0.0	-17.2	CFC_600	
72	P3 Chest x	g	5.7	181.9	-32.5	55.9	CFC_180	
73	P3 Chest y	g	3.1	94.2	-3.8	91.6	CFC_180	
74	P3 Chest z	g	5.4	211.6	-28.3	58.3	CFC_180	
75	P3 Chest Resultant	g	42.3	56.8	0.0	-7.9	CFC_180	
76	P3 Pelvic x	g	24.0	126.4	-40.5	56.2	CFC_1000	
77	P3 Pelvic y	g	2.8	64.1	-5.4	72.7	CFC_1000	
78	P3 Pelvic z	g	10.6	127.2	-40.5	56.6	CFC_1000	
79	P3 Pelvic Resultant	g	57.2	56.6	0.0	-15.3	CFC_1000	
80	P3 Head Red z	g	69.8	79.4	-9.8	48.0	CFC_1000	
81	P3 Chest Compression	mm	0.1	18.8	-21.7	95.1	CFC_600	
82	P3 Upper Neck Mocy	N-m	10.9	79.1	-10.4	47.6	CFC_600	

FACILITY: HYGE SLED DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
84	P3 Head x	g	18.5	210.2	-44.9	89.5	CFC_60	
85	P3 Head x Velocity	kph	0.0	-5.1	-60.0	172.5	CFC_180	
86	P3 Head y	g	10.1	88.3	-9.2	92.4	CFC_60	
87	P3 Head y Velocity	kph	1.4	90.2	-0.5	190.0	CFC_180	
88	P3 Head z	g	50.3	75.3	-0.0	-32.9	CFC_60	
89	P3 Head z Velocity	kph	90.8	250.0	-0.0	1.2	CFC_180	
90	P3 Head Red z	g	64.5	78.9	-9.1	48.0	CFC_60	
91	P3 Head Red z Velocity	kph	90.8	201.6	-2.8	55.3	CFC_180	
92	P3 Chest x	g	5.3	181.9	-32.1	55.5	CFC_60	
93	P3 Chest x Velocity	kph	0.0	-47.0	-54.9	118.1	CFC_180	
94	P3 Chest y	g	2.7	59.6	-1.3	125.6	CFC_60	
95	P3 Chest y Velocity	kph	1.2	73.9	-0.1	46.9	CFC_180	
96	P3 Chest z	g	5.4	211.4	-28.3	59.1	CFC_60	
97	P3 Chest z Velocity	kph	0.2	35.5	-24.5	119.5	CFC_180	
98	P3 Pelvic x	g	22.4	126.9	-40.0	56.6	CFC_60	
99	P3 Pelvic x Velocity	kph	0.0	-23.3	-44.9	102.5	CFC_180	
100	P3 Pelvic y	g	2.1	63.4	-4.4	72.2	CFC_60	
101	P3 Pelvic y Velocity	kph	0.5	210.3	-0.8	102.8	CFC_180	
102	P3 Pelvic z	g	10.2	126.7	-39.9	57.6	CFC_60	
103	P3 Pelvic z Velocity	kph	0.0	-41.9	-44.3	116.2	CFC_180	
104	P4 Head x	g	25.1	200.9	-53.6	88.9	CFC_1000	
105	P4 Head y	g	25.4	88.7	-12.8	95.4	CFC_1000	
106	P4 Head z	g	56.6	77.1	-0.0	1.6	CFC_1000	
107	P4 Head Red z	g	72.8	88.6	-14.9	47.3	CFC_1000	
108	P4 Upper Neck Fx	N	58.4	185.0	-795.7	95.0	CFC_1000	
109	P4 Upper Neck Fy	N	50.4	96.8	-20.7	89.3	CFC_1000	
110	P4 Upper Neck Fz	N	1491.1	77.1	-43.0	221.2	CFC_1000	
111	P4 Upper Neck F Resultant	N	1581.4	77.8	0.0	-9.8	CFC_1000	
112	P4 Upper Neck Mx	N-m	3.8	197.6	-4.5	106.3	CFC_600	
113	P4 Upper Neck My	N-m	16.3	91.1	-8.8	47.0	CFC_600	
114	P4 Upper Neck Mz	N-m	3.3	140.7	-2.8	101.0	CFC_600	
115	P4 Upper Neck M Resultant	N-m	16.9	91.5	0.0	-36.9	CFC_600	
116	P4 Lower Neck Fx	N	258.7	192.6	-1237.6	79.9	CFC_1000	

FACILITY: HYGE SLED DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
117	P4 Lower Neck Fy	N	43.2	48.3	-46.4	102.5	CFC_1000	
118	P4 Lower Neck Fz	N	972.0	74.3	-218.2	97.5	CFC_1000	
119	P4 Lower Neck F Resultant	N	1514.3	78.2	0.0	-34.7	CFC_1000	
120	P4 Lower Neck Mx	N-m	6.0	74.3	-5.7	94.4	CFC_600	
121	P4 Lower Neck My	N-m	120.4	94.2	-15.8	193.1	CFC_600	
122	P4 Lower Neck Mz	N-m	2.7	72.6	-5.6	104.4	CFC_600	
123	P4 Lower Neck M Resultant	N-m	120.5	94.2	0.0	-16.7	CFC_600	
124	P4 Chest x	g	6.7	175.7	-35.3	54.9	CFC_180	
125	P4 Chest y	g	7.4	43.2	-3.2	196.2	CFC_180	
126	P4 Chest z	g	8.5	202.8	-25.6	58.3	CFC_180	
127	P4 Chest Resultant	g	43.2	55.4	0.0	-45.9	CFC_180	
128	P4 Pelvic x	g	10.9	115.5	-24.0	57.5	CFC_1000	
129	P4 Pelvic y	g	3.5	209.2	-6.6	69.0	CFC_1000	
130	P4 Pelvic z	g	9.5	115.7	-37.7	58.4	CFC_1000	
131	P4 Pelvic Resultant	g	44.8	57.5	0.0	-33.4	CFC_1000	
132	P4 Head Resultant	g	68.5	88.7	0.0	-48.6	CFC_1000	
133	P4 Chest Compression	mm	0.1	249.5	-16.4	96.4	CFC_600	
134	P4 Upper Neck Mocy	N-m	16.3	91.1	-8.8	47.0	CFC_600	
136	P4 Head x	g	24.5	200.6	-41.3	89.5	CFC_60	
137	P4 Head x Velocity	kph	0.0	-21.2	-63.8	169.4	CFC_180	
138	P4 Head y	g	10.6	88.6	-8.9	95.4	CFC_60	
139	P4 Head y Velocity	kph	1.6	90.4	-3.2	250.0	CFC_180	
140	P4 Head z	g	56.2	77.5	-0.0	0.5	CFC_60	
141	P4 Head z Velocity	kph	104.1	250.0	-0.0	5.1	CFC_180	
142	P4 Head Red z	g	62.0	88.9	-14.2	47.6	CFC_60	
143	P4 Head Red z Velocity	kph	104.9	250.0	-4.4	55.9	CFC_180	
144	P4 Chest x	g	6.0	175.6	-35.1	55.6	CFC_60	
145	P4 Chest x Velocity	kph	0.0	-48.7	-58.7	116.1	CFC_180	
146	P4 Chest y	g	7.1	43.1	-2.7	196.5	CFC_60	
147	P4 Chest y Velocity	kph	4.1	66.2	-0.0	-47.8	CFC_180	
148	P4 Chest z	g	8.3	202.7	-25.3	57.8	CFC_60	
149	P4 Chest z Velocity	kph	0.6	37.7	-20.5	137.8	CFC_180	
150	P4 Pelvic x	g	9.8	115.5	-23.3	57.2	CFC_60	
151	P4 Pelvic x Velocity	kph	0.0	-12.5	-26.8	101.6	CFC_180	

FACILITY: HYGE SLED DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
152	P4 Pelvic y	g	3.3	209.6	-6.4	68.6	CFC_60	
153	P4 Pelvic y Velocity	kph	2.0	49.6	-5.6	115.9	CFC_180	
154	P4 Pelvic z	g	8.9	201.8	-37.2	58.5	CFC_60	
155	P4 Pelvic z Velocity	kph	0.0	-11.3	-38.6	88.7	CFC_180	

```
FACILITY: HYGE SLED                              DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

=========================
P3 HIC(FULL): 517.7
    t1: 60.0 msec
    t2: 95.6 msec
    Duration: 35.6 msec
    Average Acceleration: 46.3 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:     84.5 N 189.3 msec
                Min:   -769.9 N  88.0 msec
    Input channel: P3 Upper Neck Fx (6) CFC_1000

P3 UP NECK Fz:  Max:   1421.3 N  80.0 msec
                Min:     -1.0 N -15.2 msec
    Input channel: P3 Upper Neck Fz (8) CFC_1000

P3 UP NECK Mocy (3YO Child OOP)
                Max:     10.9 N-m  79.1 msec
                Min:    -10.4 N-m  47.6 msec
    Input channels: P3 Upper Neck Fx (6) CFC_600
                    P3 Upper Neck My (10) CFC_600
              Docy: 0

P3 UP NECK Nij (3YO Child OOP)
                Ntf:  0.82 Nij  79.6 msec    CVt: 2120 CVf: 68
                Nte:  0.51 Nij  68.0 msec    CVt: 2120 CVe: 27
                Ncf:  0.00 Nij -10.8 msec    CVc: 2120 CVf: 68
                Nce:  0.00 Nij -26.3 msec    CVc: 2120 CVe: 27
    Input channels: P3 Upper Neck Fz (8) CFC_600
                    P3 Upper Neck Mocy [N-m, CFC_600] (155)
```

```
FACILITY: HYGE SLED                                DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

=========================
P3 CLIP(3 ms): 41.6 g
    t1: 55.6 msec
    t2: 58.6 msec
    Duration: 3.0 msec
P3 CSI: 278.3
    Input channels: P3 Chest x (18) CFC_180
                    P3 Chest y (19) CFC_180
                    P3 Chest z (20) CFC_180

P3 CHEST DISP:  Max:      0.1 mm  18.8 msec
                Min:    -21.7 mm  95.1 msec
    Input channel: P3 Chest Compression (21) CFC_600

=========================
P3 HIC(36 ms): 517.7
    t1: 60.0 msec
    t2: 95.6 msec
    Duration: 35.6 msec
    Average Acceleration: 46.3 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): 280.9
    t1: 67.7 msec
    t2: 82.7 msec
    Duration: 15.0 msec
    Average Acceleration: 51.2 g
    Input channels: P3 Head x (2) CFC_1000
                    P3 Head y (3) CFC_1000
                    P3 Head z (4) CFC_1000
```

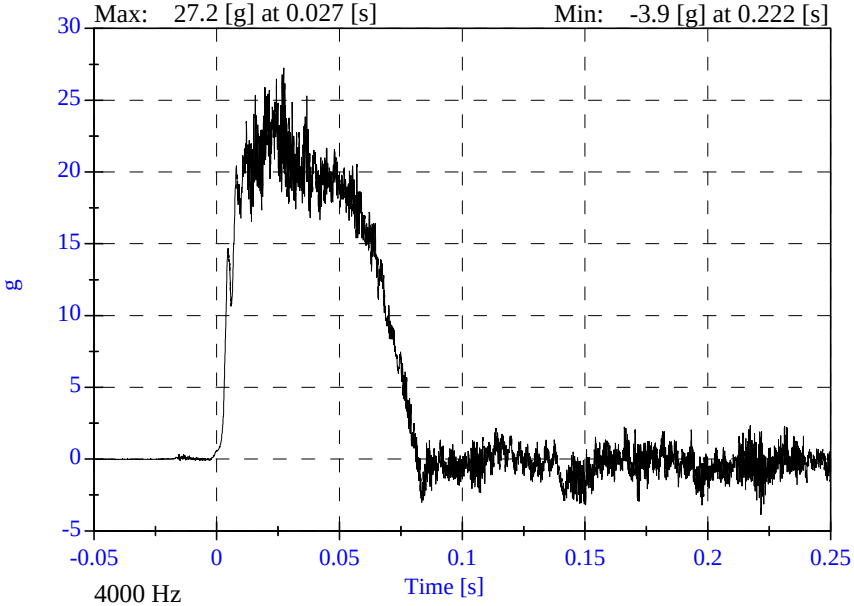
```
FACILITY: HYGE SLED                              DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

=========================
P4 HIC(FULL): 629.7
    t1: 60.8 msec
    t2: 99.2 msec
    Duration: 38.4 msec
    Average Acceleration: 48.5 g
    Input channels: P4 Head x (25) CFC_1000
                    P4 Head y (26) CFC_1000
                    P4 Head z (27) CFC_1000

P4 UP NECK Fx:  Max:     58.4 N 185.0 msec
                Min:   -795.7 N  95.0 msec
    Input channel: P4 Upper Neck Fx (29) CFC_1000

P4 UP NECK Fz:  Max:   1491.1 N  77.1 msec
                Min:    -43.0 N 221.2 msec
    Input channel: P4 Upper Neck Fz (31) CFC_1000

P4 UP NECK Mocy (3YO Child OOP)
                Max:     16.3 N-m  91.1 msec
                Min:     -8.8 N-m  47.0 msec
    Input channels: P4 Upper Neck Fx (29) CFC_600
                    P4 Upper Neck My (33) CFC_600
              Docy: 0

P4 UP NECK Nij (3YO Child OOP)
                Ntf:  0.74 Nij  90.6 msec    CVt: 2120 CVf: 68
                Nte:  0.75 Nij  74.8 msec    CVt: 2120 CVe: 27
                Ncf:  0.00 Nij -44.8 msec    CVc: 2120 CVf: 68
                Nce:  0.21 Nij 220.2 msec    CVc: 2120 CVe: 27
    Input channels: P4 Upper Neck Fz (31) CFC_600
                    P4 Upper Neck Mocy [N-m, CFC_600] (161)
```

```
FACILITY: HYGE SLED                                DATE: March 25, 2002
TEST#: 22289
TITLE: Sled Test Run 22289

=========================
P4 CLIP(3 ms): 42.8 g
    t1: 53.8 msec
    t2: 59.2 msec
    Duration: 5.4 msec
P4 CSI: 337.3
    Input channels: P4 Chest x (41) CFC_180
                    P4 Chest y (42) CFC_180
                    P4 Chest z (43) CFC_180

P4 CHEST DISP:  Max:      0.1 mm 249.5 msec
                Min:    -16.4 mm  96.4 msec
    Input channel: P4 Chest Compression (44) CFC_600

=========================
P4 HIC(36 ms): 627.1
    t1: 62.1 msec
    t2: 98.1 msec
    Duration: 36.0 msec
    Average Acceleration: 49.7 g
    Input channels: P4 Head x (25) CFC_1000
                    P4 Head y (26) CFC_1000
                    P4 Head z (27) CFC_1000

=========================
P4 HIC(15 ms): 363.3
    t1: 70.0 msec
    t2: 85.0 msec
    Duration: 15.0 msec
    Average Acceleration: 56.7 g
    Input channels: P4 Head x (25) CFC_1000
                    P4 Head y (26) CFC_1000
                    P4 Head z (27) CFC_1000
```

Sled Test Run 22289 - March 25, 2002

Sled Acceleration

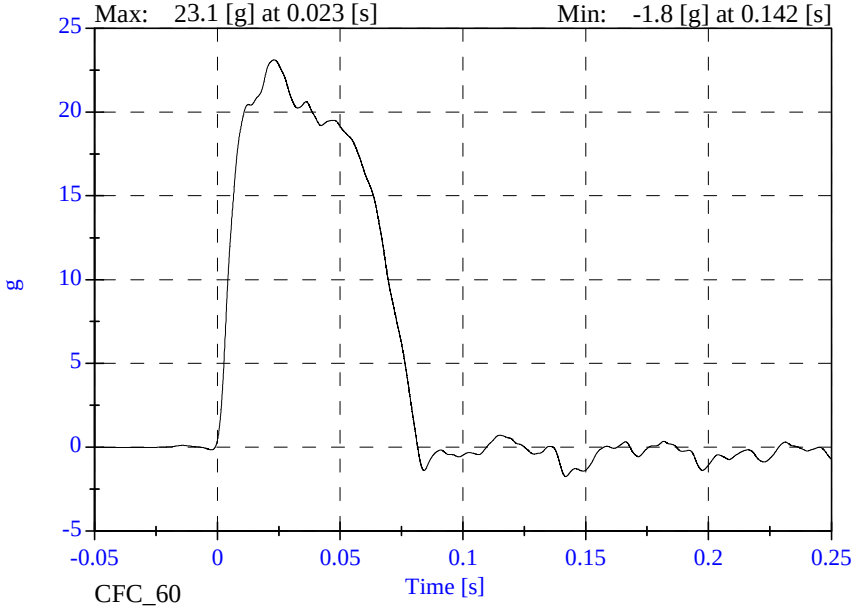
Max: 27.2 [g] at 0.027 [s] Min: -3.9 [g] at 0.222 [s]



4000 Hz

Sled Acceleration

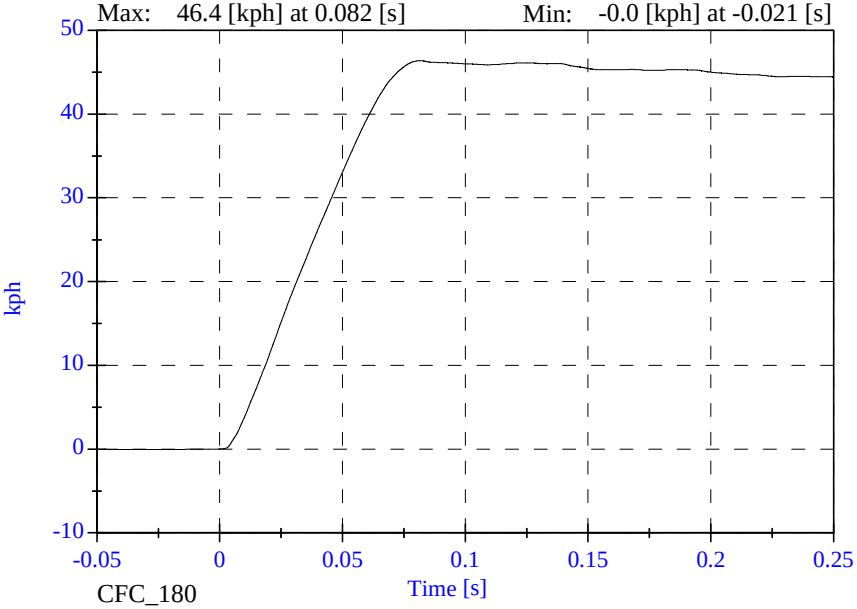
Max: 23.1 [g] at 0.023 [s] Min: -1.8 [g] at 0.142 [s]



CFC_60

Sled Acceleration Velocity

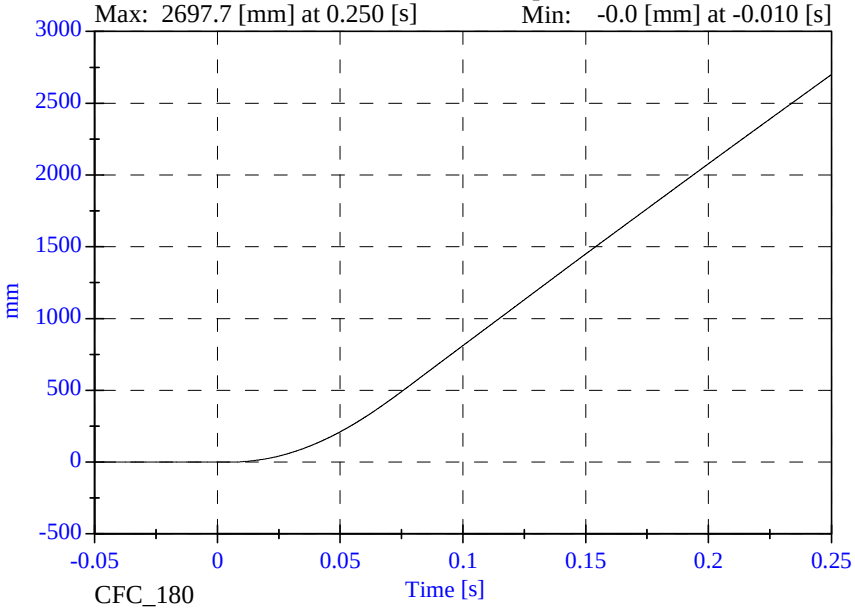
Max: 46.4 [kph] at 0.082 [s] Min: -0.0 [kph] at -0.021 [s]



CFC_180

Sled Acceleration Displacement

Max: 2697.7 [mm] at 0.250 [s] Min: -0.0 [mm] at -0.010 [s]

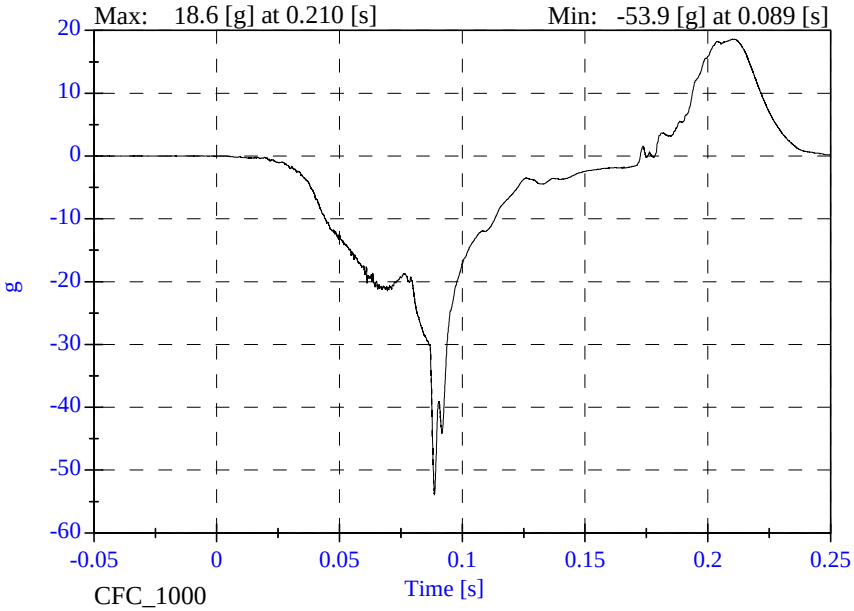


CFC_180

Sled Test Run 22289 - March 25, 2002

P3 Head x

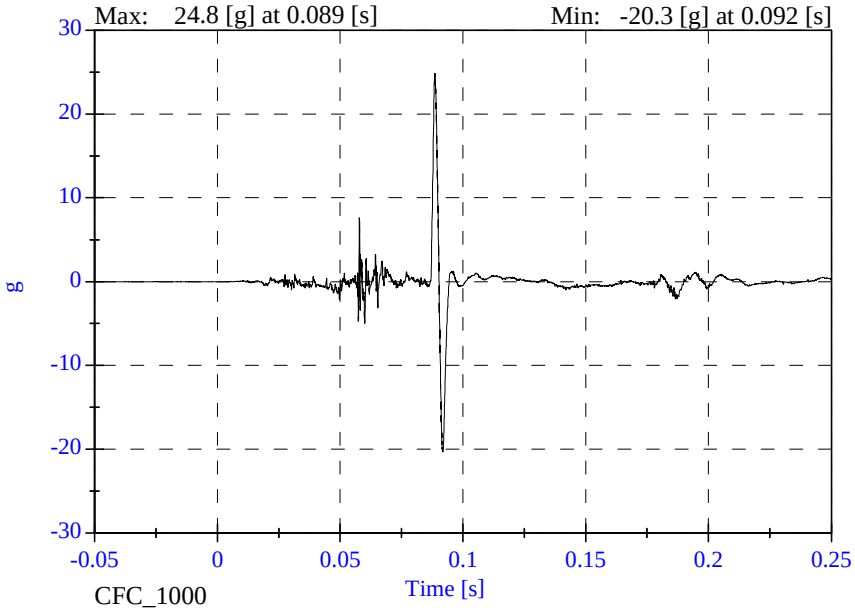
Max: 18.6 [g] at 0.210 [s] Min: -53.9 [g] at 0.089 [s]



CFC_1000

P3 Head y

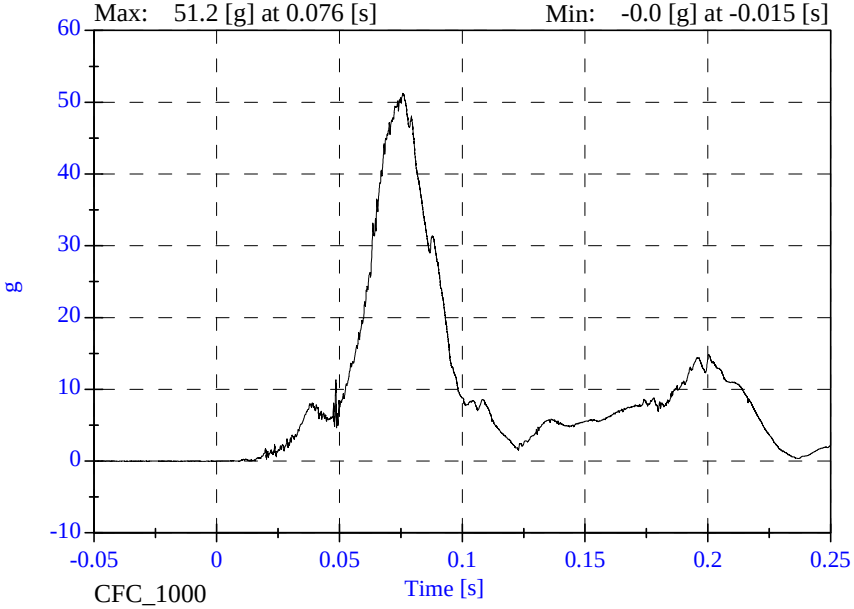
Max: 24.8 [g] at 0.089 [s] Min: -20.3 [g] at 0.092 [s]



CFC_1000

P3 Head z

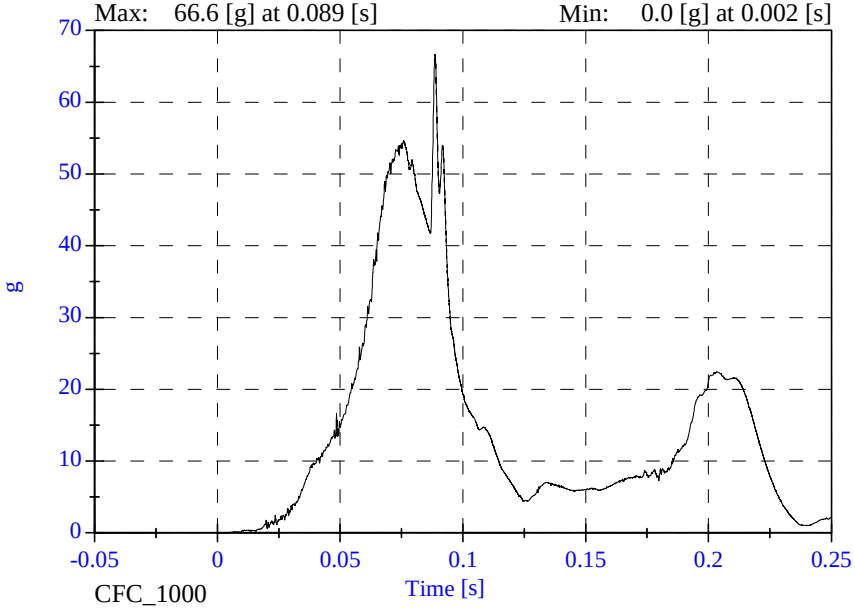
Max: 51.2 [g] at 0.076 [s] Min: -0.0 [g] at -0.015 [s]



CFC_1000

P3 Head Resultant

Max: 66.6 [g] at 0.089 [s] Min: 0.0 [g] at 0.002 [s]

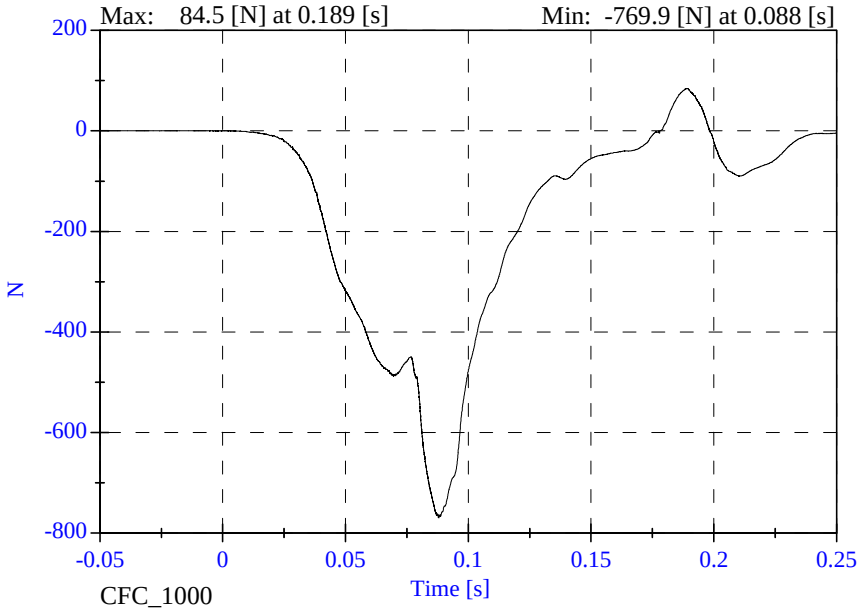


CFC_1000

Sled Test Run 22289 - March 25, 2002

P3 Upper Neck Fx

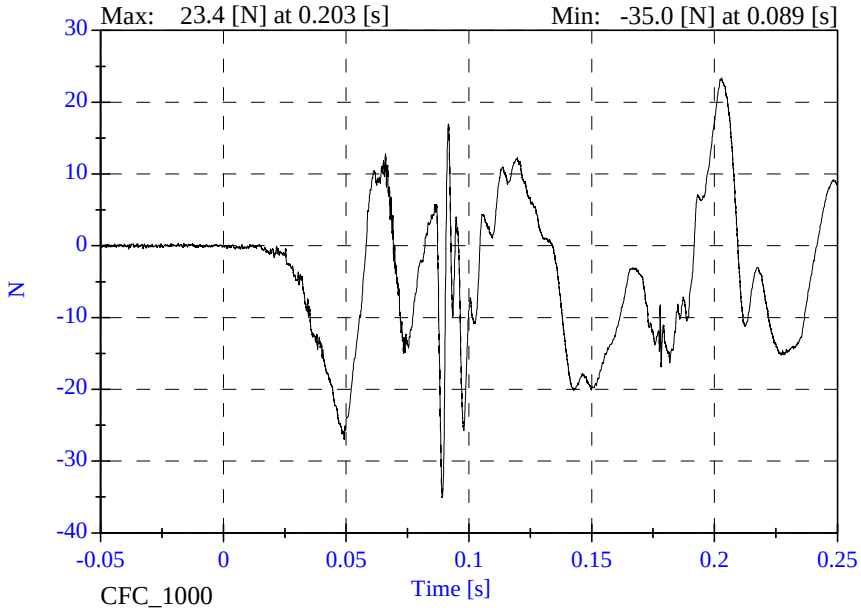
Max: 84.5 [N] at 0.189 [s] Min: -769.9 [N] at 0.088 [s]



CFC_1000

P3 Upper Neck Fy

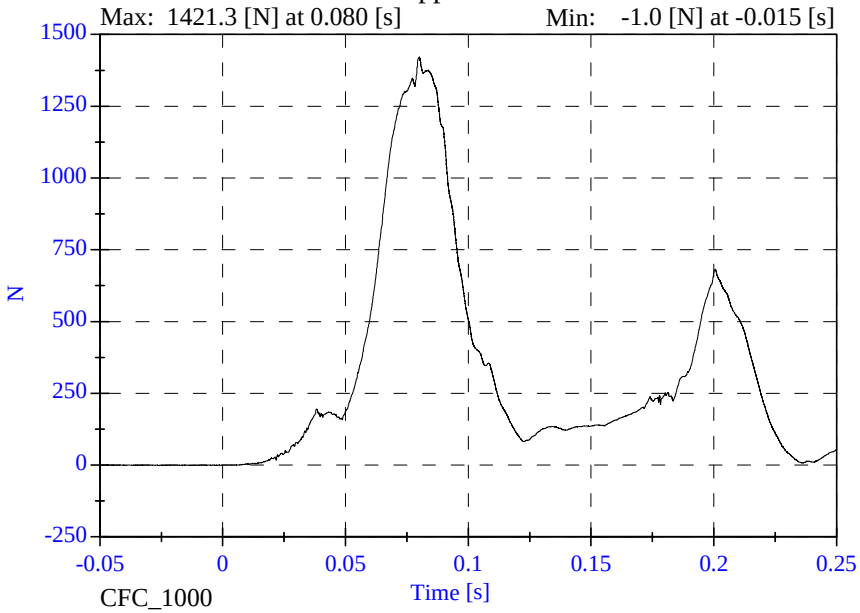
Max: 23.4 [N] at 0.203 [s] Min: -35.0 [N] at 0.089 [s]



CFC_1000

P3 Upper Neck Fz

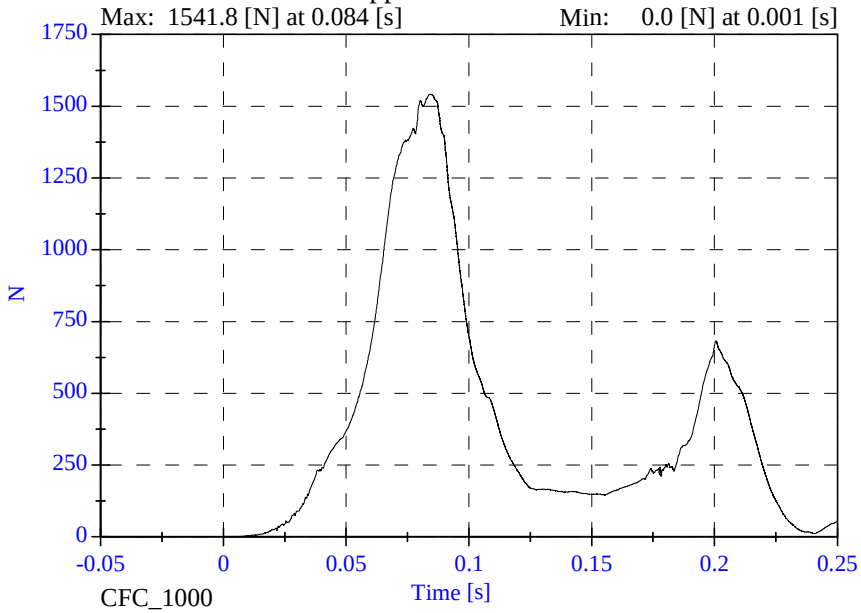
Max: 1421.3 [N] at 0.080 [s] Min: -1.0 [N] at -0.015 [s]



CFC_1000

P3 Upper Neck F Resultant

Max: 1541.8 [N] at 0.084 [s] Min: 0.0 [N] at 0.001 [s]

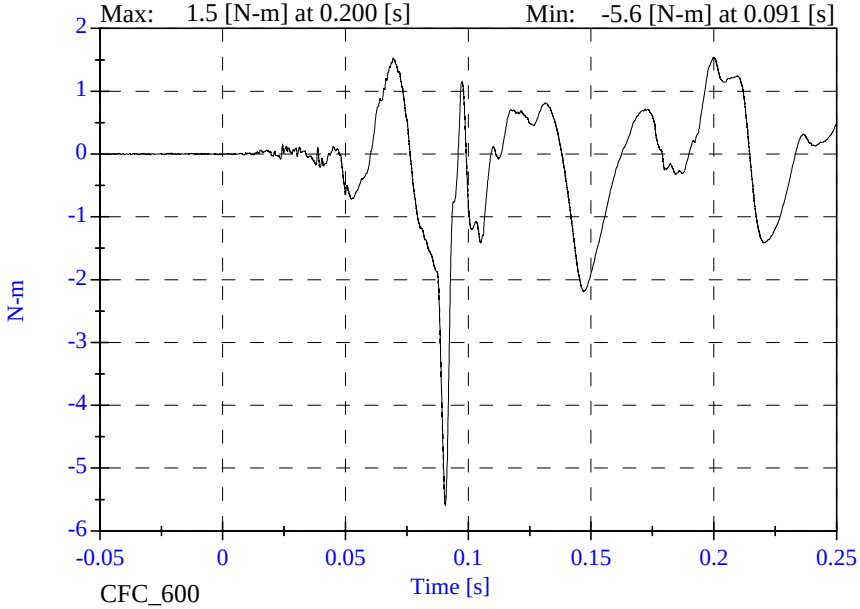


CFC_1000

Sled Test Run 22289 - March 25, 2002

P3 Upper Neck Mx

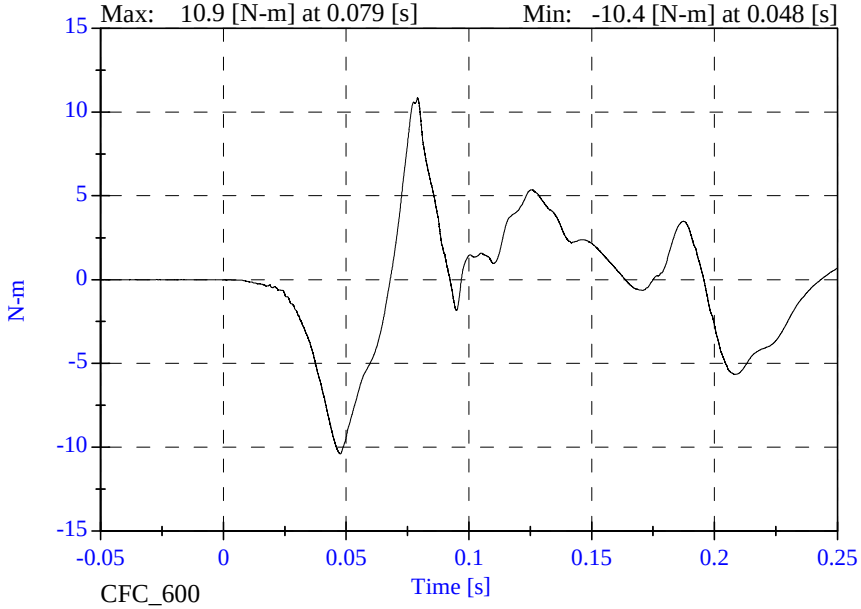
Max: 1.5 [N-m] at 0.200 [s] Min: -5.6 [N-m] at 0.091 [s]



CFC_600

P3 Upper Neck My

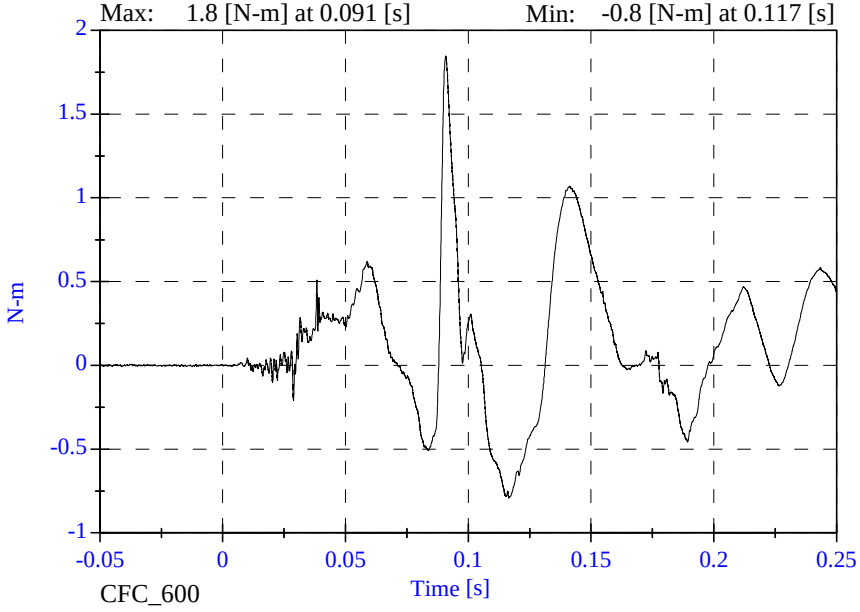
Max: 10.9 [N-m] at 0.079 [s] Min: -10.4 [N-m] at 0.048 [s]



CFC_600

P3 Upper Neck Mz

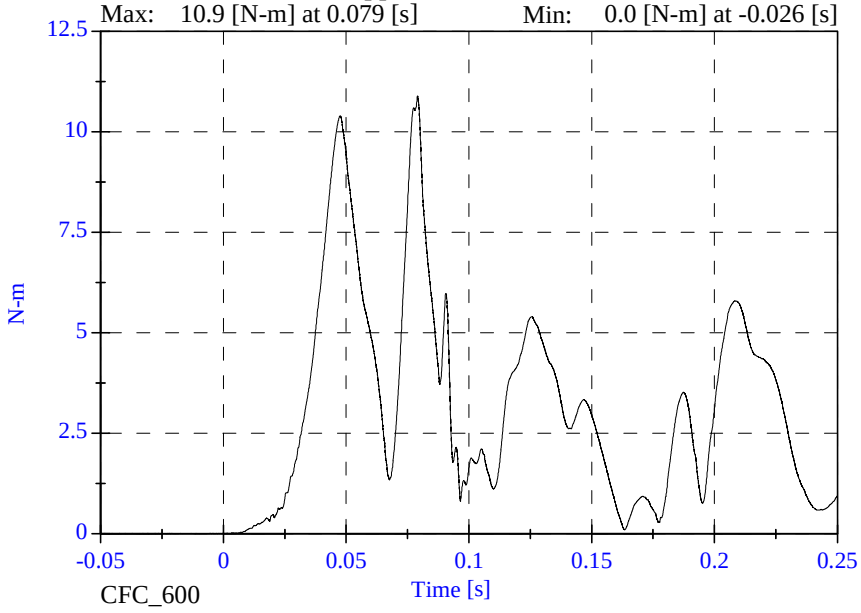
Max: 1.8 [N-m] at 0.091 [s] Min: -0.8 [N-m] at 0.117 [s]



CFC_600

P3 Upper Neck M Resultant

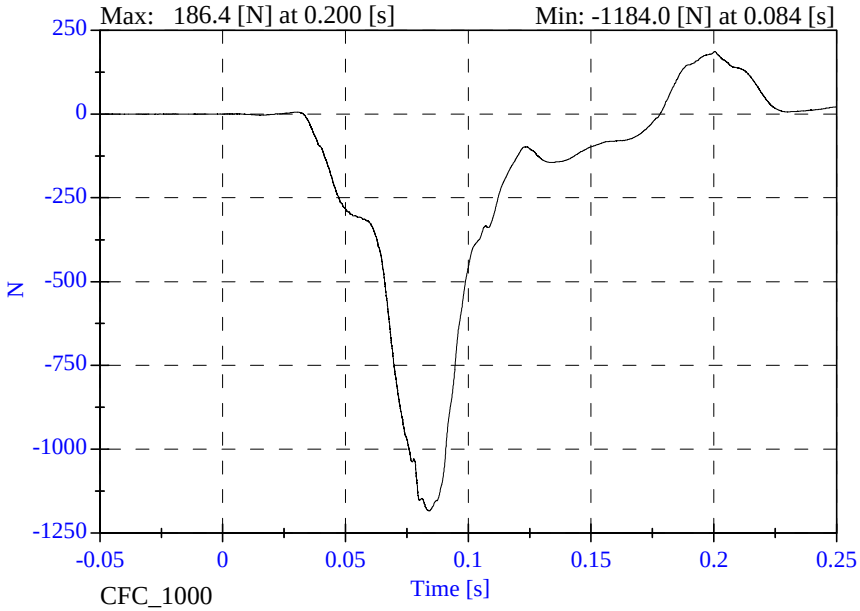
Max: 10.9 [N-m] at 0.079 [s] Min: 0.0 [N-m] at -0.026 [s]



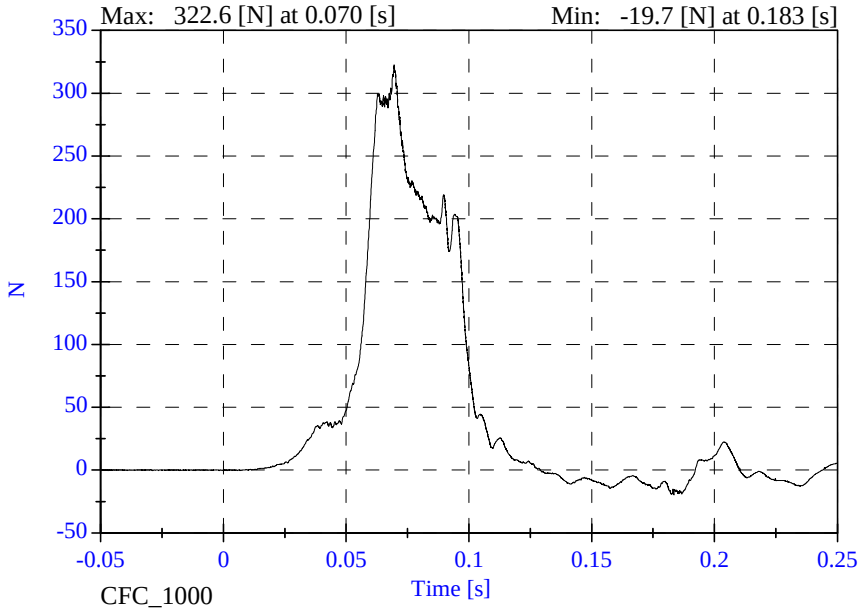
CFC_600

Sled Test Run 22289 - March 25, 2002

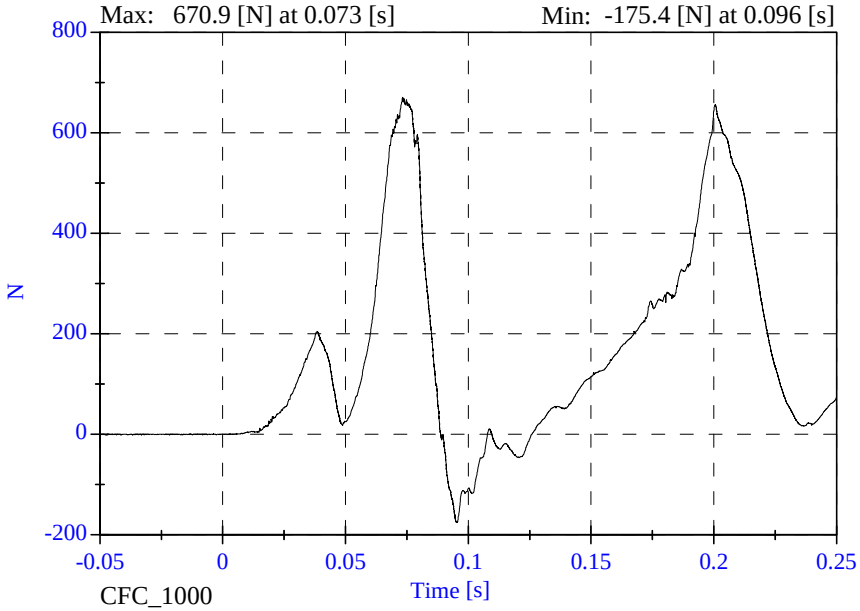
P3 Lower Neck Fx



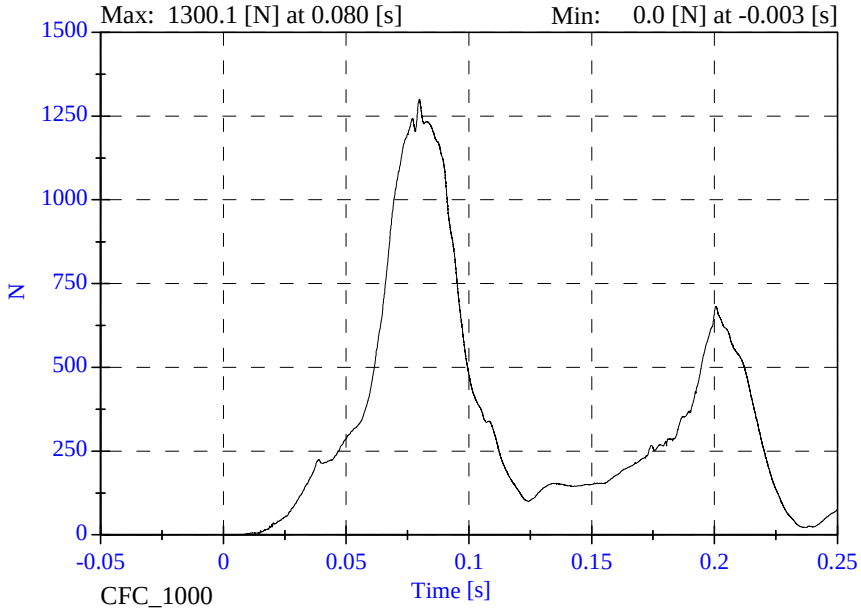
P3 Lower Neck Fy



P3 Lower Neck Fz



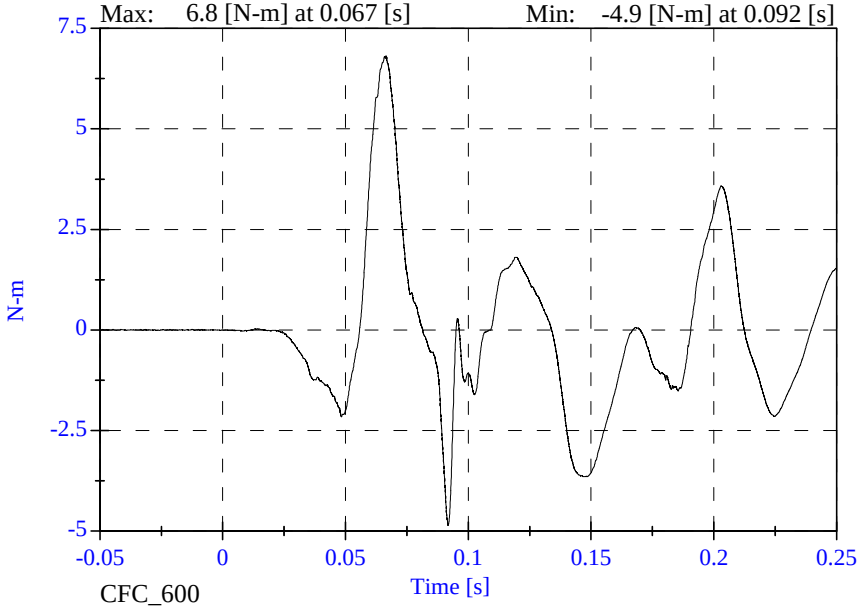
P3 Lower Neck F Resultant



Sled Test Run 22289 - March 25, 2002

P3 Lower Neck Mx

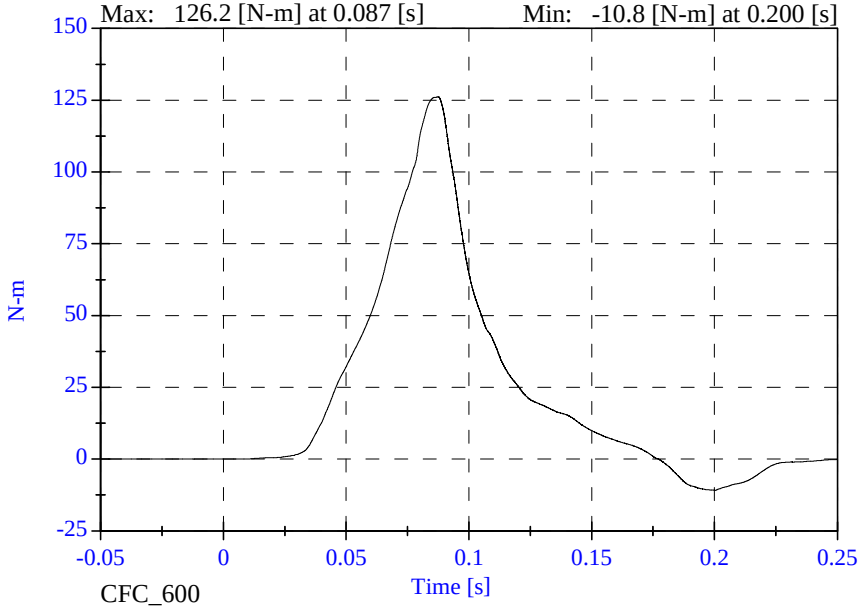
Max: 6.8 [N-m] at 0.067 [s] Min: -4.9 [N-m] at 0.092 [s]



CFC_600

P3 Lower Neck My

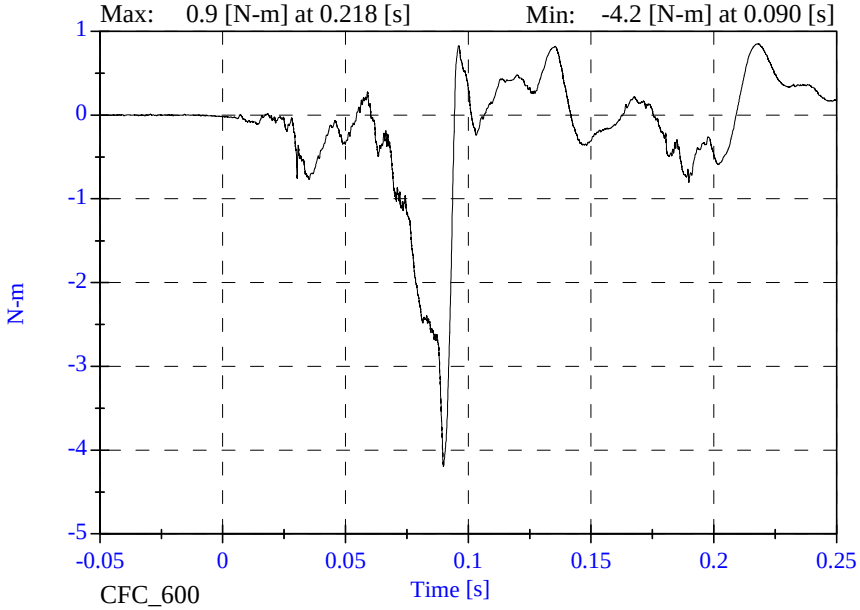
Max: 126.2 [N-m] at 0.087 [s] Min: -10.8 [N-m] at 0.200 [s]



CFC_600

P3 Lower Neck Mz

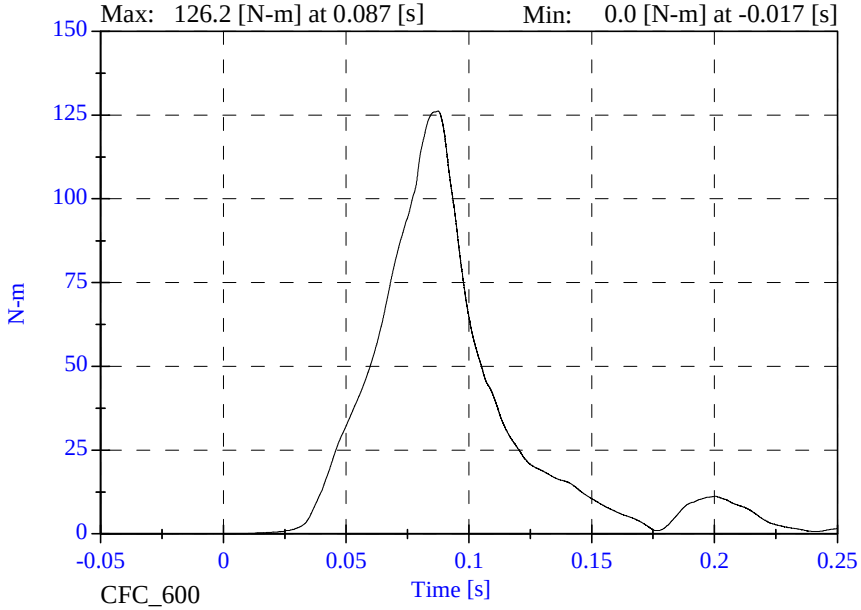
Max: 0.9 [N-m] at 0.218 [s] Min: -4.2 [N-m] at 0.090 [s]



CFC_600

P3 Lower Neck M Resultant

Max: 126.2 [N-m] at 0.087 [s] Min: 0.0 [N-m] at -0.017 [s]

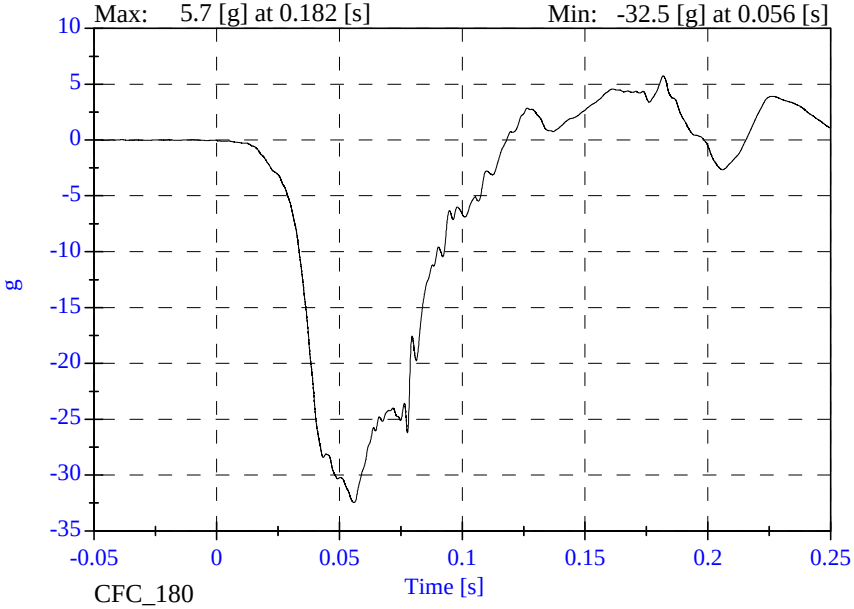


CFC_600

Sled Test Run 22289 - March 25, 2002

P3 Chest x

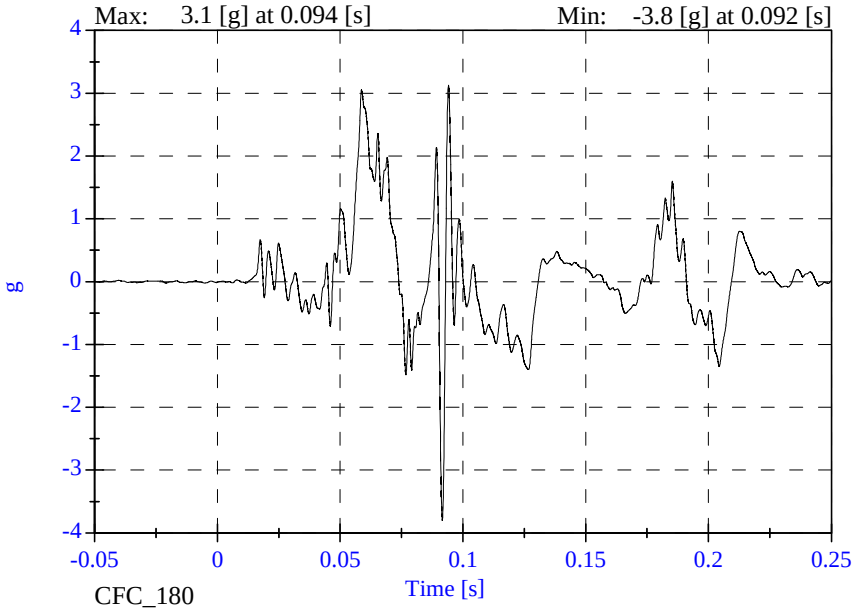
Max: 5.7 [g] at 0.182 [s] Min: -32.5 [g] at 0.056 [s]



CFC_180

P3 Chest y

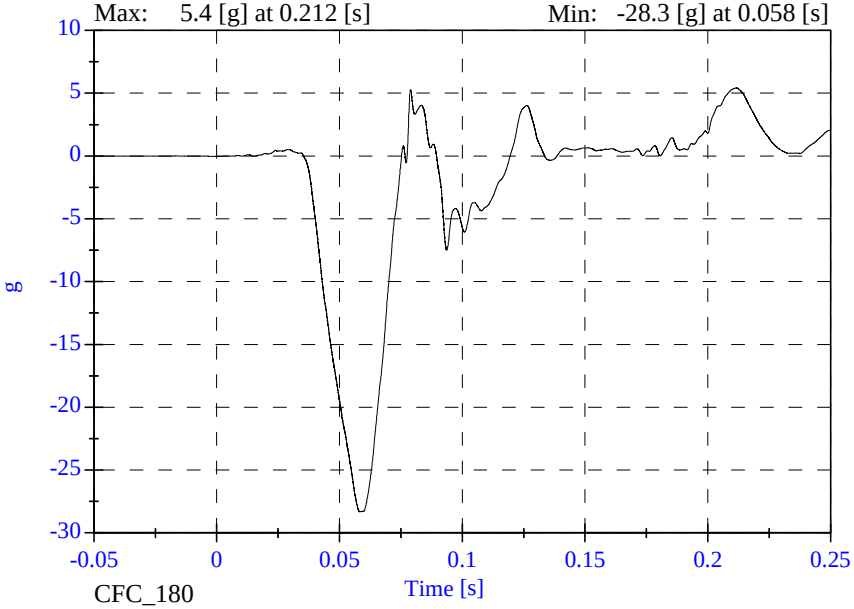
Max: 3.1 [g] at 0.094 [s] Min: -3.8 [g] at 0.092 [s]



CFC_180

P3 Chest z

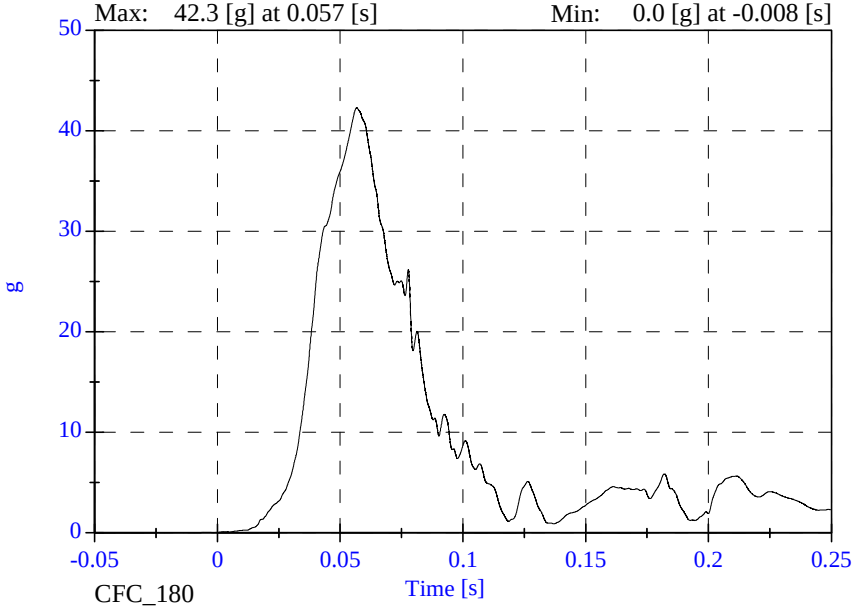
Max: 5.4 [g] at 0.212 [s] Min: -28.3 [g] at 0.058 [s]



CFC_180

P3 Chest Resultant

Max: 42.3 [g] at 0.057 [s] Min: 0.0 [g] at -0.008 [s]

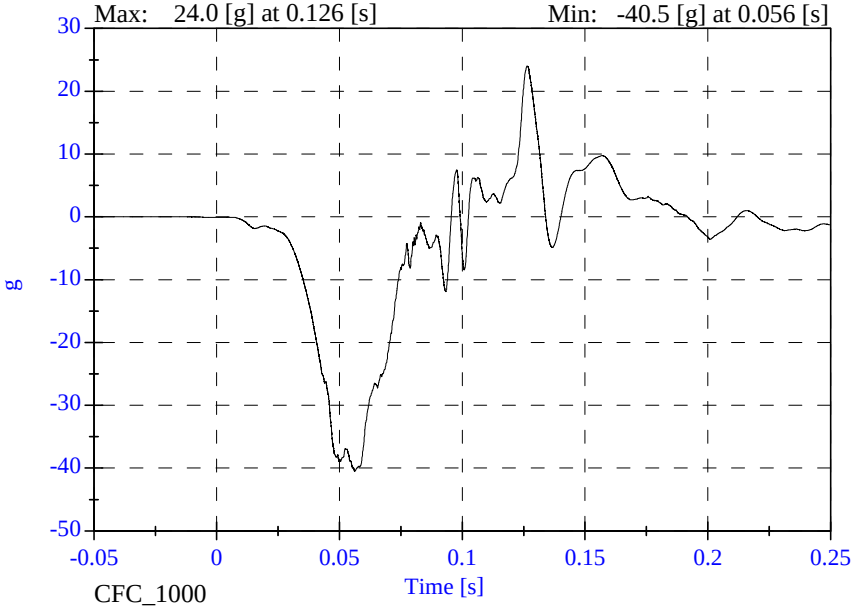


CFC_180

Sled Test Run 22289 - March 25, 2002

P3 Pelvic x

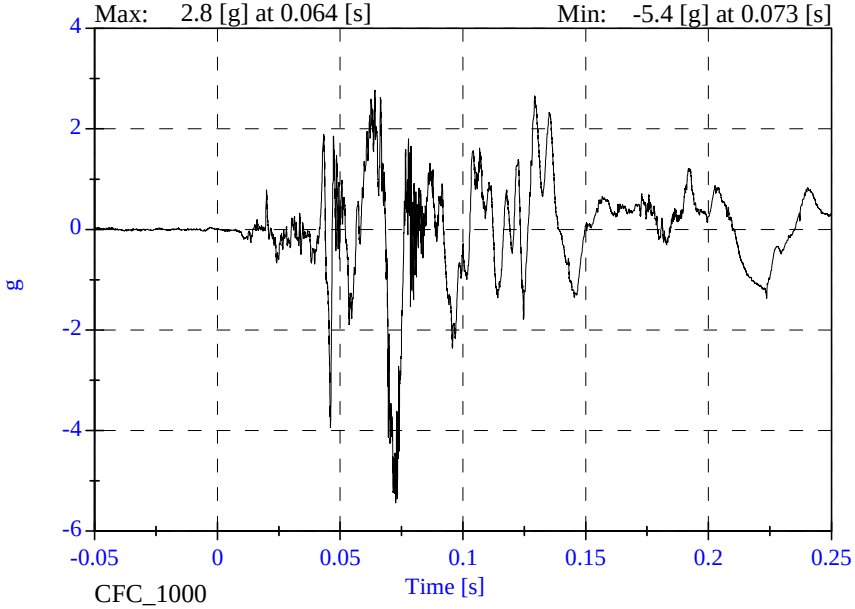
Max: 24.0 [g] at 0.126 [s] Min: -40.5 [g] at 0.056 [s]



CFC_1000

P3 Pelvic y

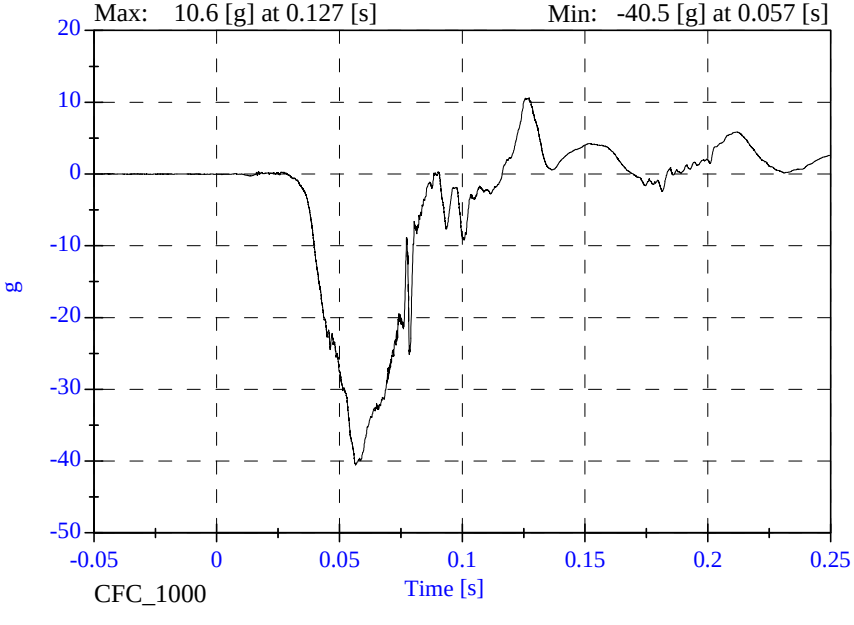
Max: 2.8 [g] at 0.064 [s] Min: -5.4 [g] at 0.073 [s]



CFC_1000

P3 Pelvic z

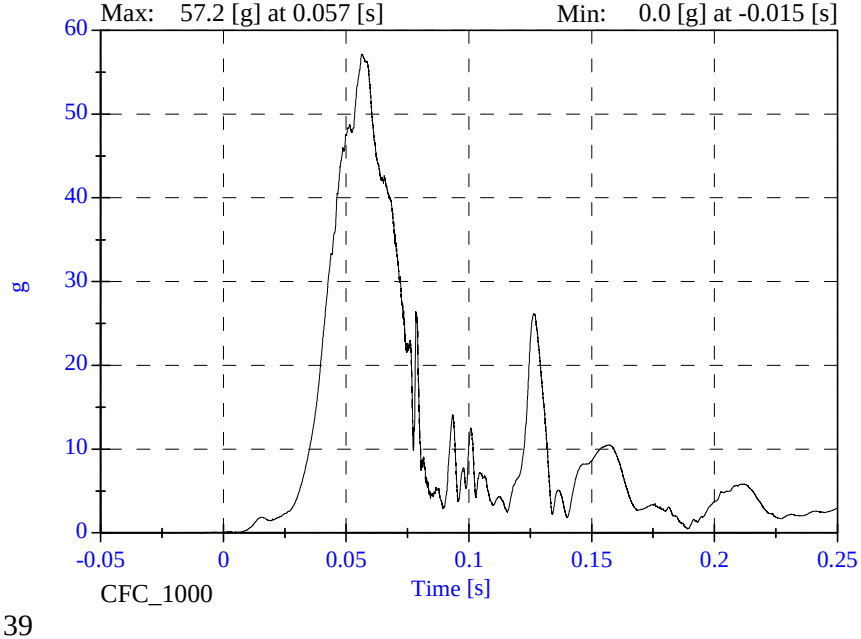
Max: 10.6 [g] at 0.127 [s] Min: -40.5 [g] at 0.057 [s]



CFC_1000

P3 Pelvic Resultant

Max: 57.2 [g] at 0.057 [s] Min: 0.0 [g] at -0.015 [s]

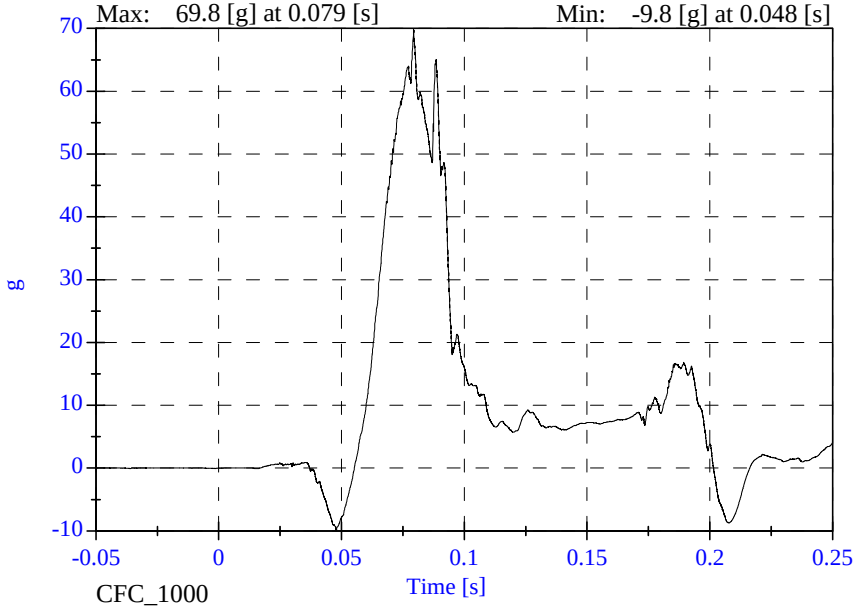


CFC_1000

Sled Test Run 22289 - March 25, 2002

P3 Head Red z

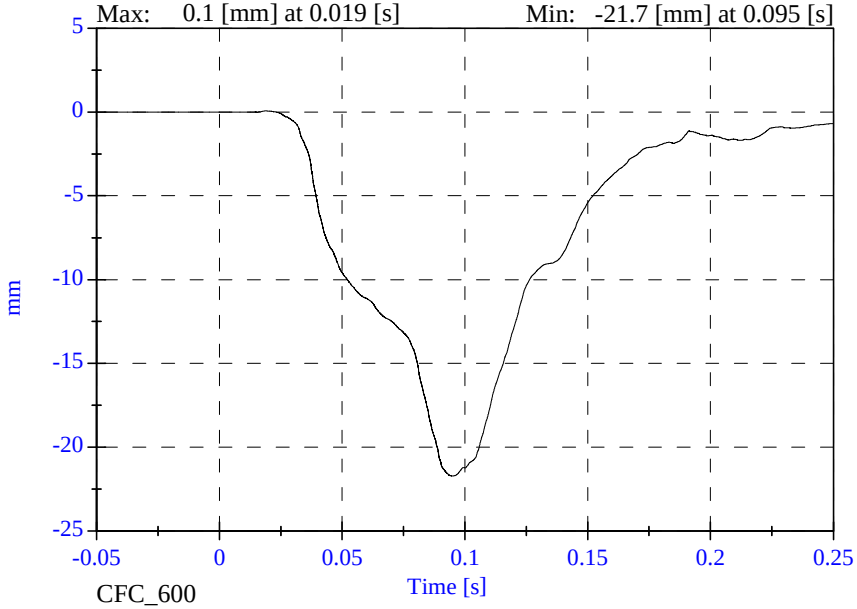
Max: 69.8 [g] at 0.079 [s] Min: -9.8 [g] at 0.048 [s]



CFC_1000

P3 Chest Compression

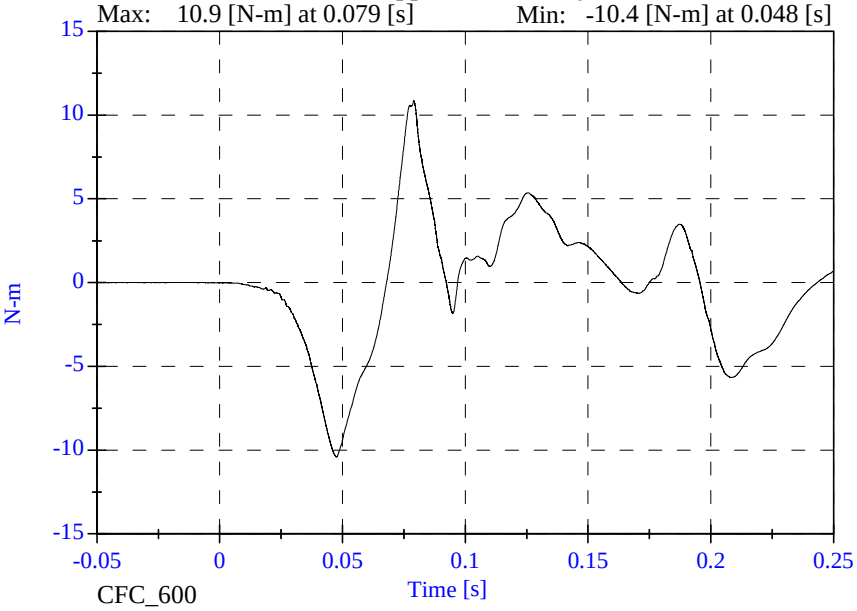
Max: 0.1 [mm] at 0.019 [s] Min: -21.7 [mm] at 0.095 [s]



CFC_600

P3 Upper Neck Mocy

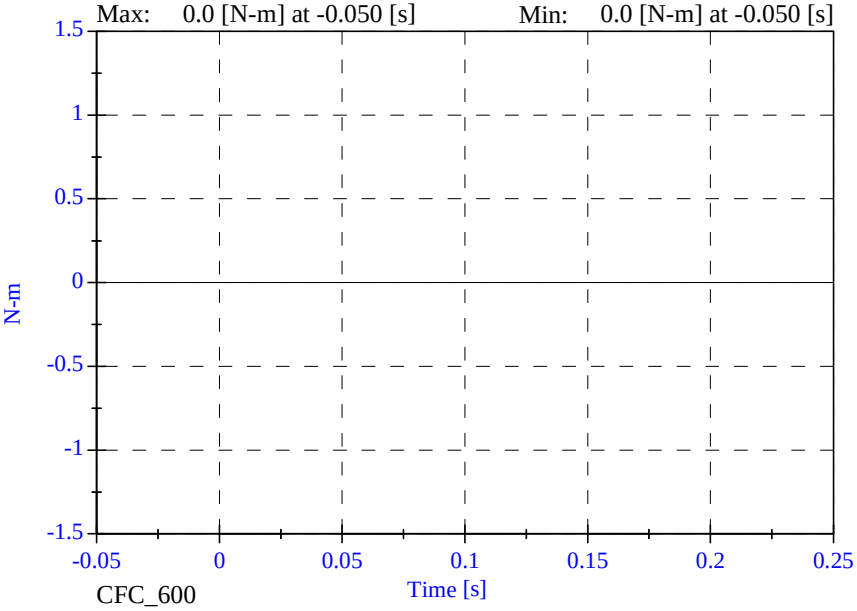
Max: 10.9 [N-m] at 0.079 [s] Min: -10.4 [N-m] at 0.048 [s]



CFC_600

NULL

Max: 0.0 [N-m] at -0.050 [s] Min: 0.0 [N-m] at -0.050 [s]

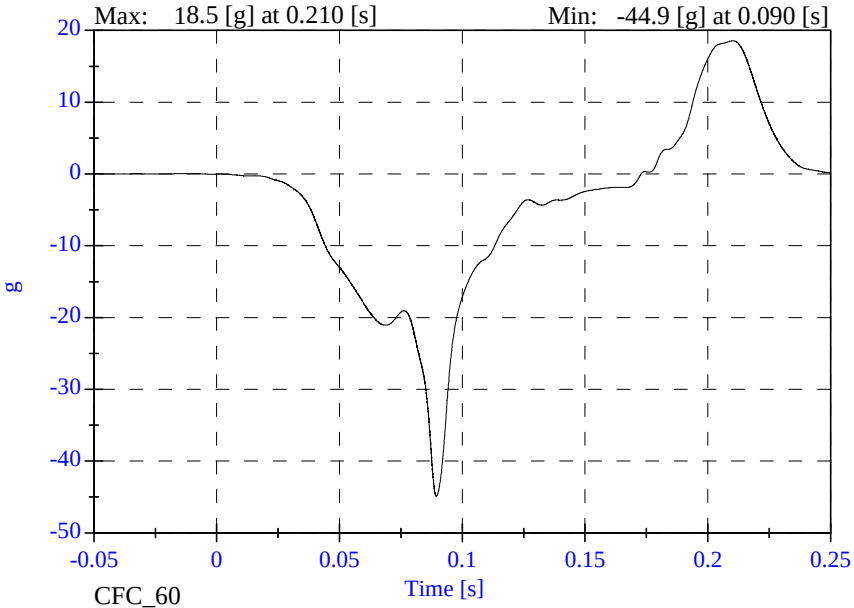


CFC_600

Sled Test Run 22289 - March 25, 2002

P3 Head x

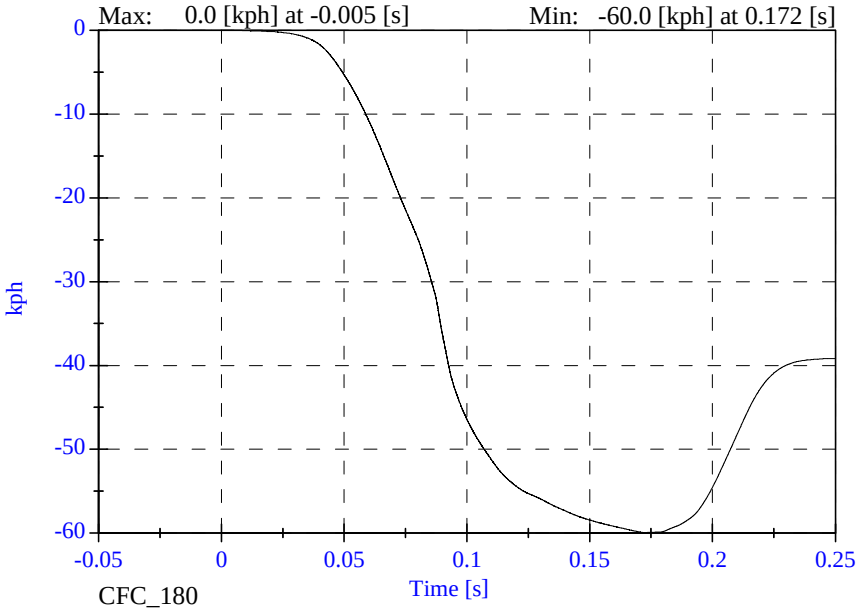
Max: 18.5 [g] at 0.210 [s] Min: -44.9 [g] at 0.090 [s]



CFC_60

P3 Head x Velocity

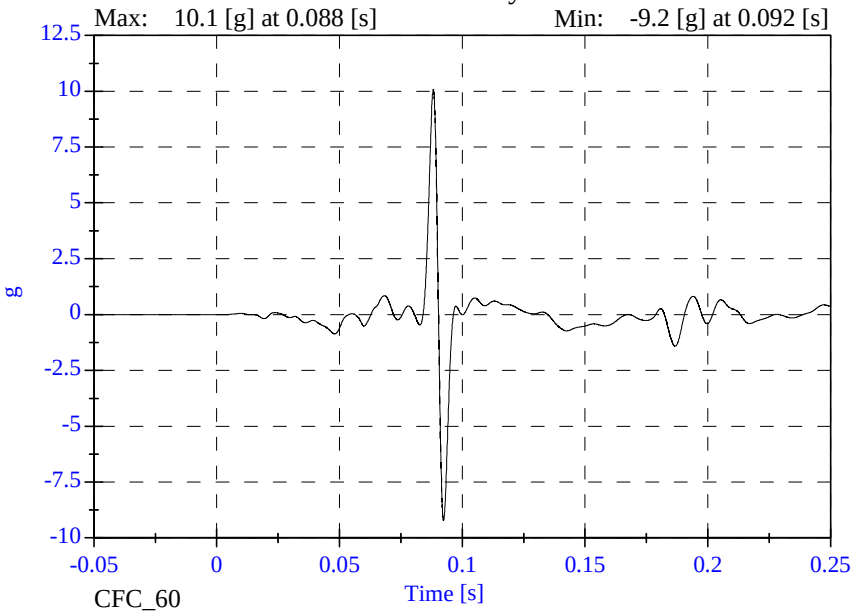
Max: 0.0 [kph] at -0.005 [s] Min: -60.0 [kph] at 0.172 [s]



CFC_180

P3 Head y

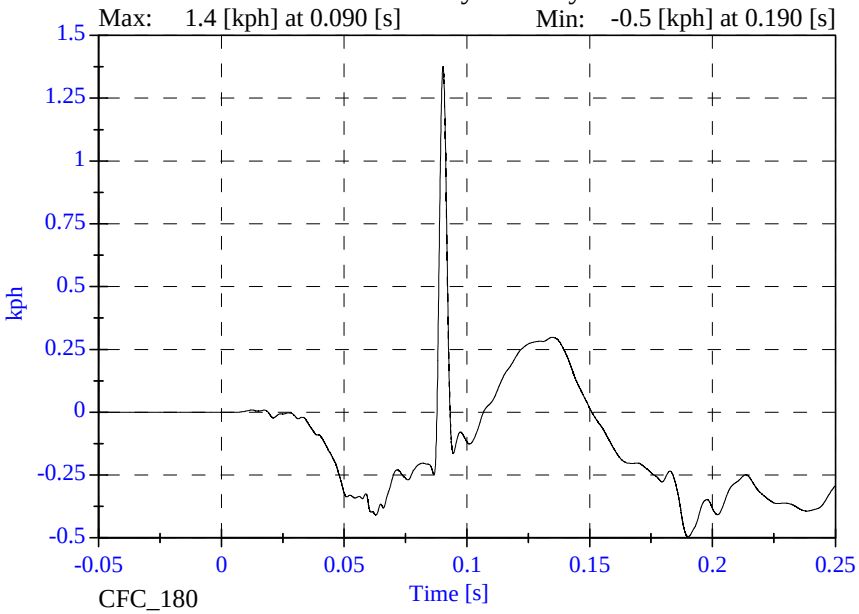
Max: 10.1 [g] at 0.088 [s] Min: -9.2 [g] at 0.092 [s]



CFC_60

P3 Head y Velocity

Max: 1.4 [kph] at 0.090 [s] Min: -0.5 [kph] at 0.190 [s]

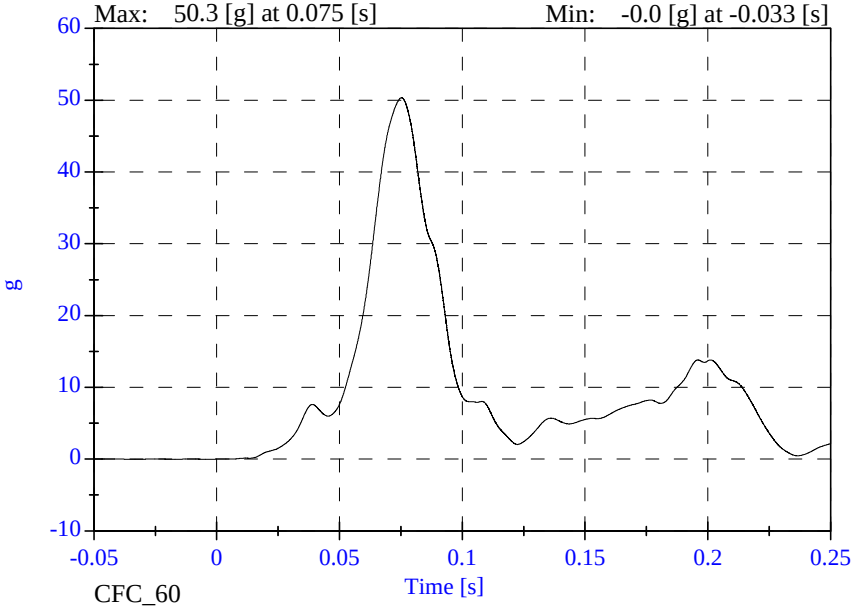


CFC_180

Sled Test Run 22289 - March 25, 2002

P3 Head z

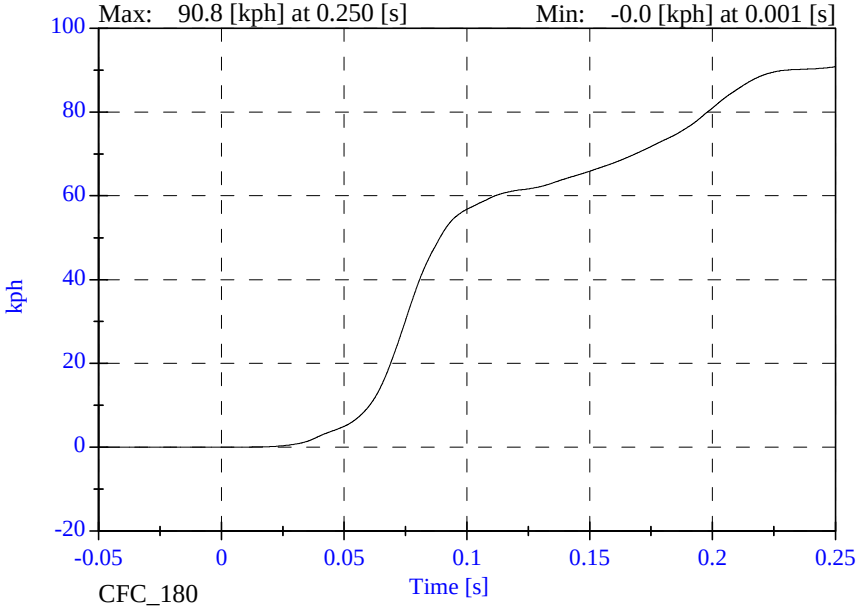
Max: 50.3 [g] at 0.075 [s] Min: -0.0 [g] at -0.033 [s]



CFC_60

P3 Head z Velocity

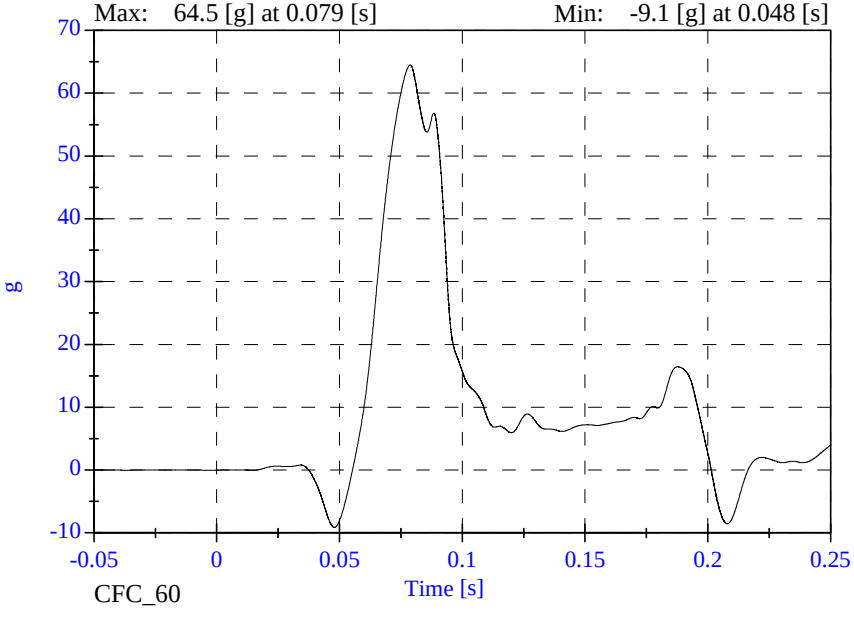
Max: 90.8 [kph] at 0.250 [s] Min: -0.0 [kph] at 0.001 [s]



CFC_180

P3 Head Red z

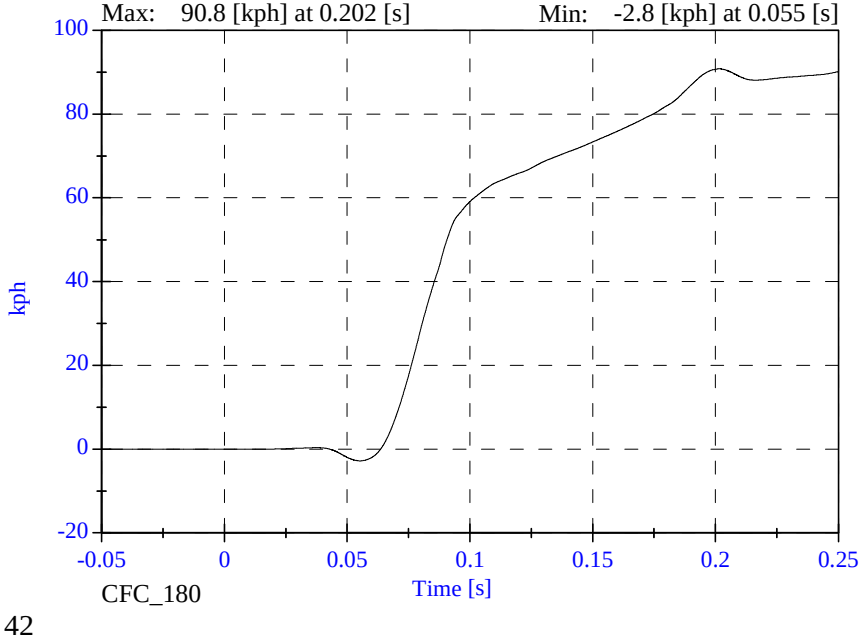
Max: 64.5 [g] at 0.079 [s] Min: -9.1 [g] at 0.048 [s]



CFC_60

P3 Head Red z Velocity

Max: 90.8 [kph] at 0.202 [s] Min: -2.8 [kph] at 0.055 [s]

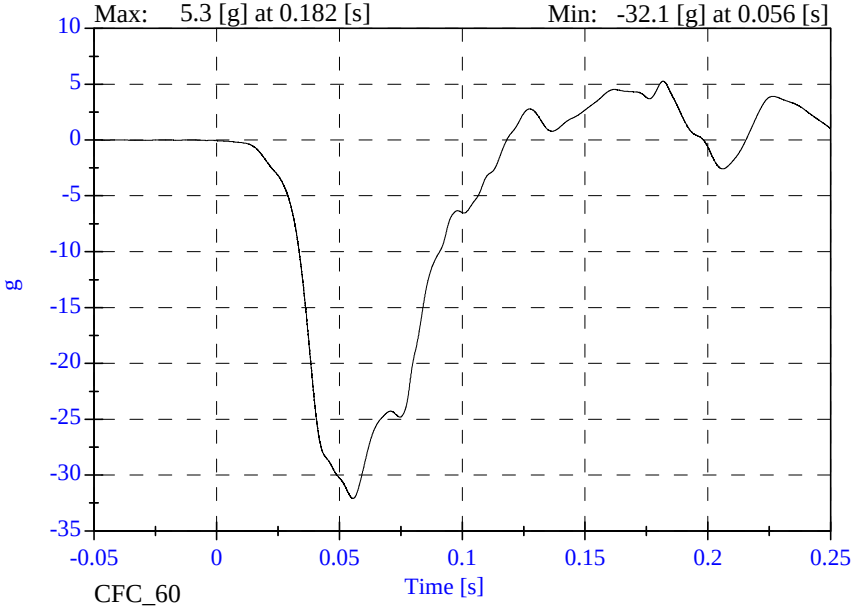


CFC_180

Sled Test Run 22289 - March 25, 2002

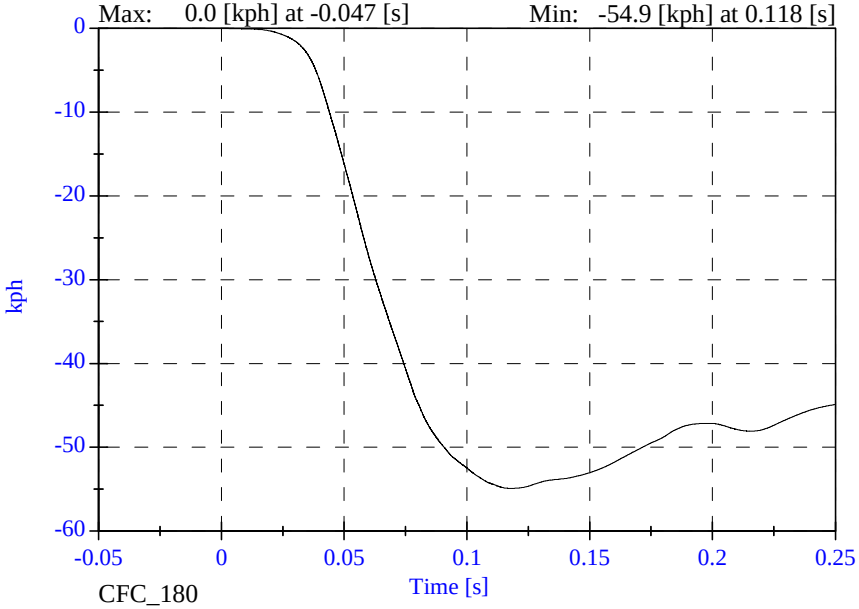
P3 Chest x

Max: 5.3 [g] at 0.182 [s] Min: -32.1 [g] at 0.056 [s]



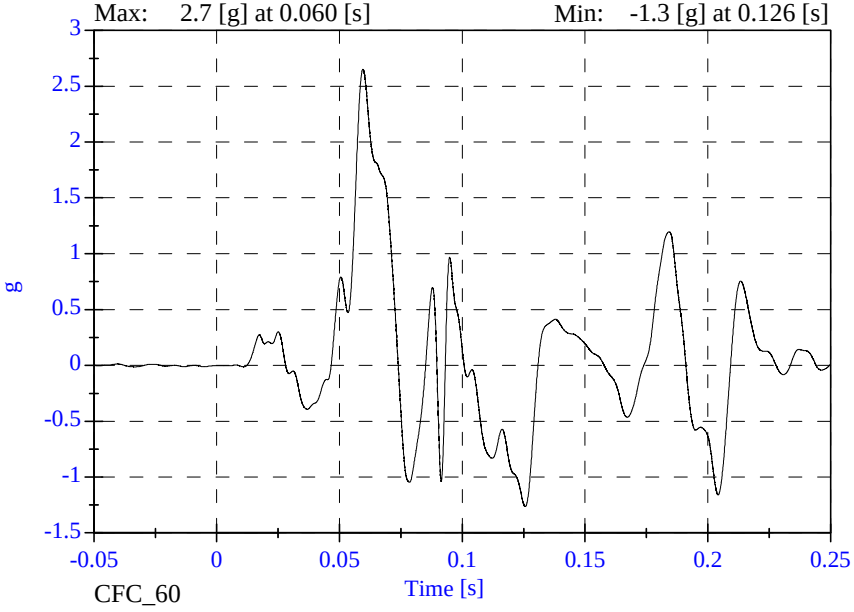
P3 Chest x Velocity

Max: 0.0 [kph] at -0.047 [s] Min: -54.9 [kph] at 0.118 [s]



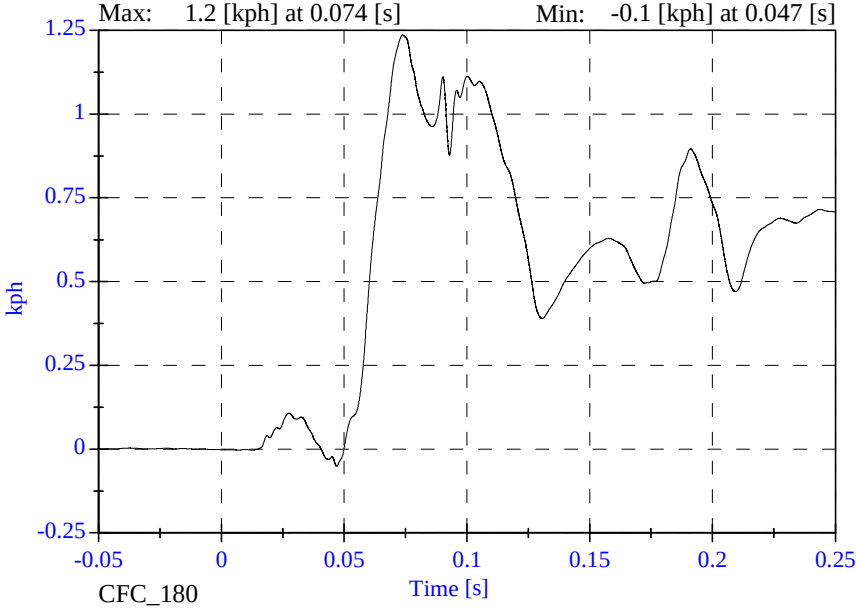
P3 Chest y

Max: 2.7 [g] at 0.060 [s] Min: -1.3 [g] at 0.126 [s]



P3 Chest y Velocity

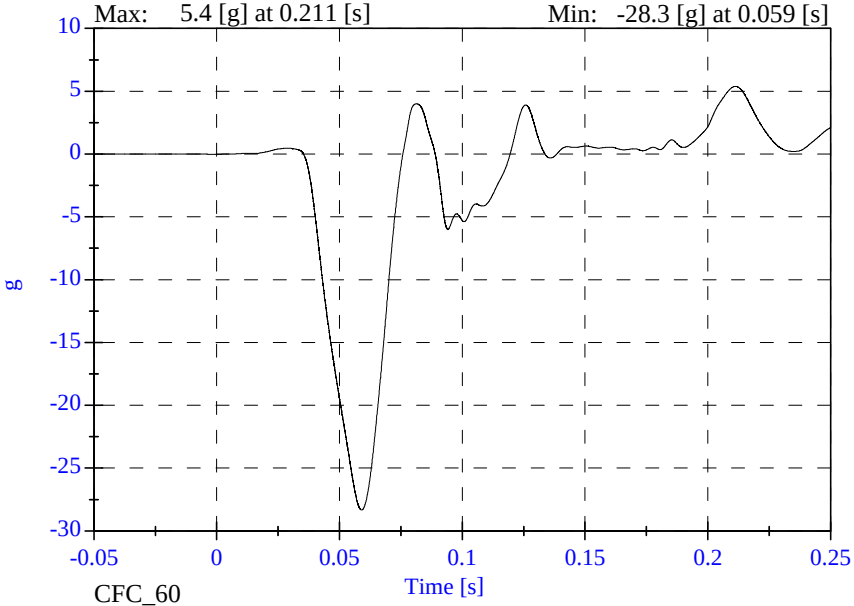
Max: 1.2 [kph] at 0.074 [s] Min: -0.1 [kph] at 0.047 [s]



Sled Test Run 22289 - March 25, 2002

P3 Chest z

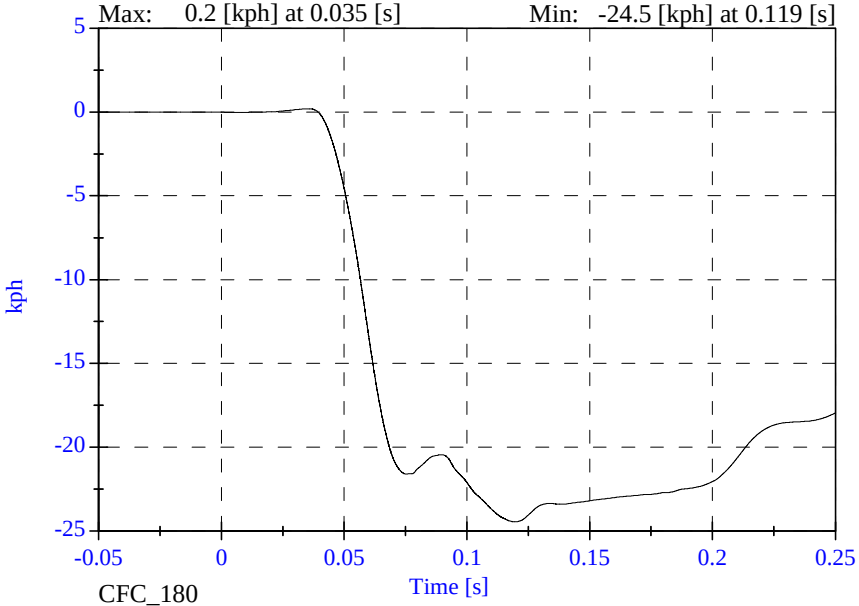
Max: 5.4 [g] at 0.211 [s] Min: -28.3 [g] at 0.059 [s]



CFC_60

P3 Chest z Velocity

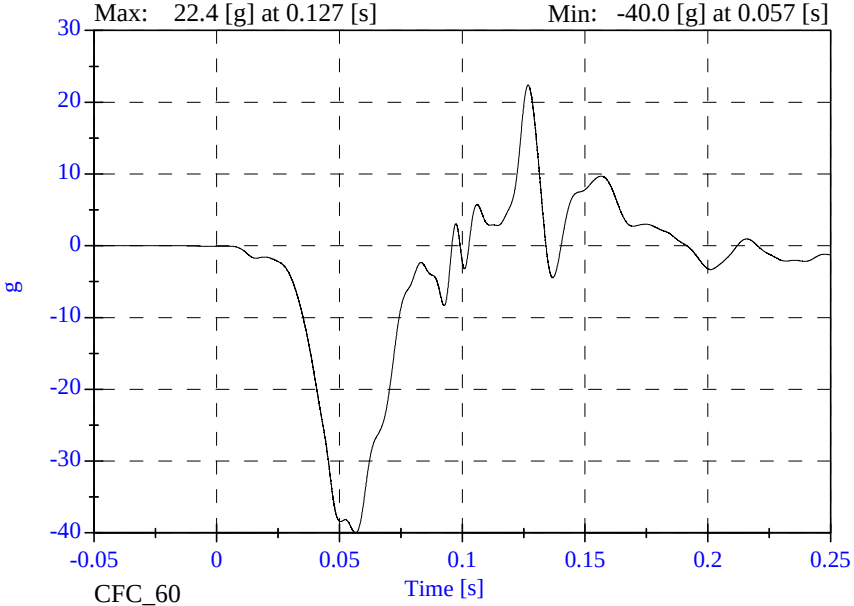
Max: 0.2 [kph] at 0.035 [s] Min: -24.5 [kph] at 0.119 [s]



CFC_180

P3 Pelvic x

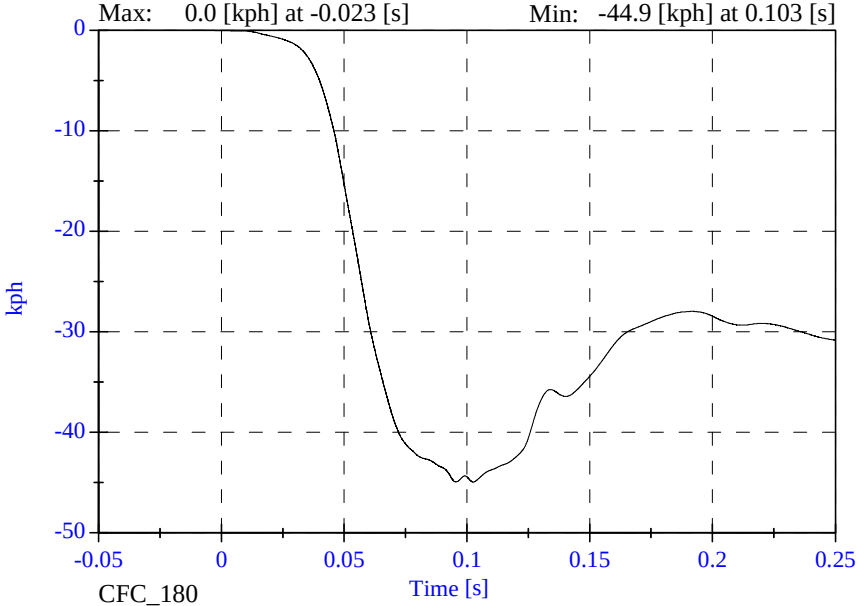
Max: 22.4 [g] at 0.127 [s] Min: -40.0 [g] at 0.057 [s]



CFC_60

P3 Pelvic x Velocity

Max: 0.0 [kph] at -0.023 [s] Min: -44.9 [kph] at 0.103 [s]

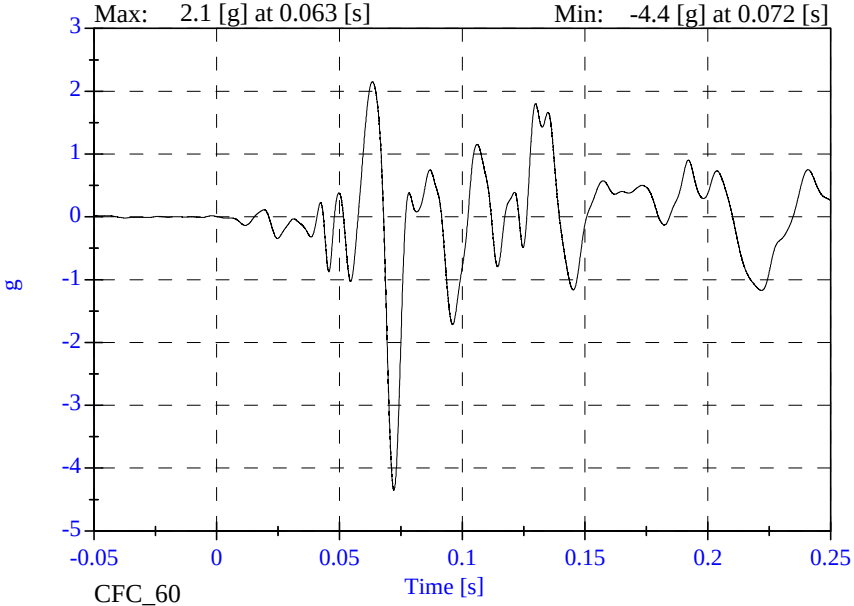


CFC_180

Sled Test Run 22289 - March 25, 2002

P3 Pelvic y

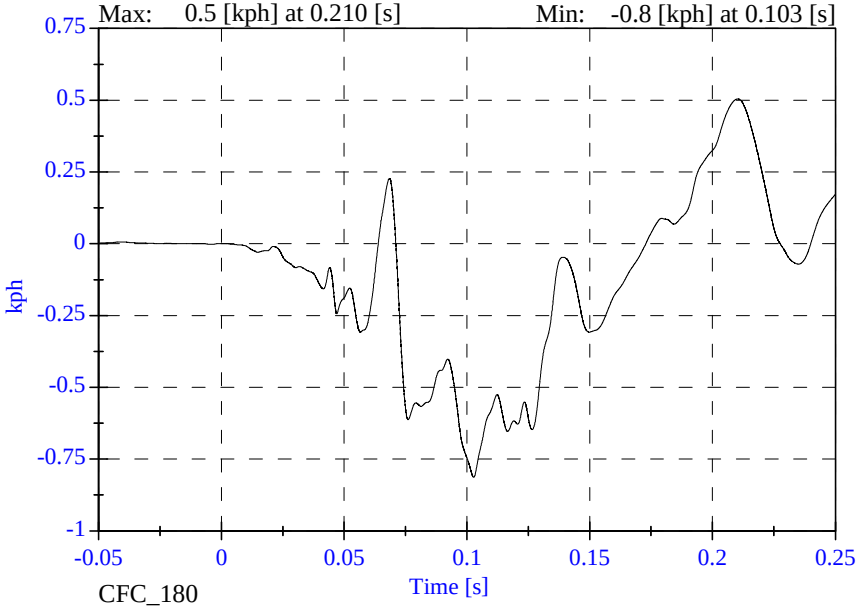
Max: 2.1 [g] at 0.063 [s] Min: -4.4 [g] at 0.072 [s]



CFC_60

P3 Pelvic y Velocity

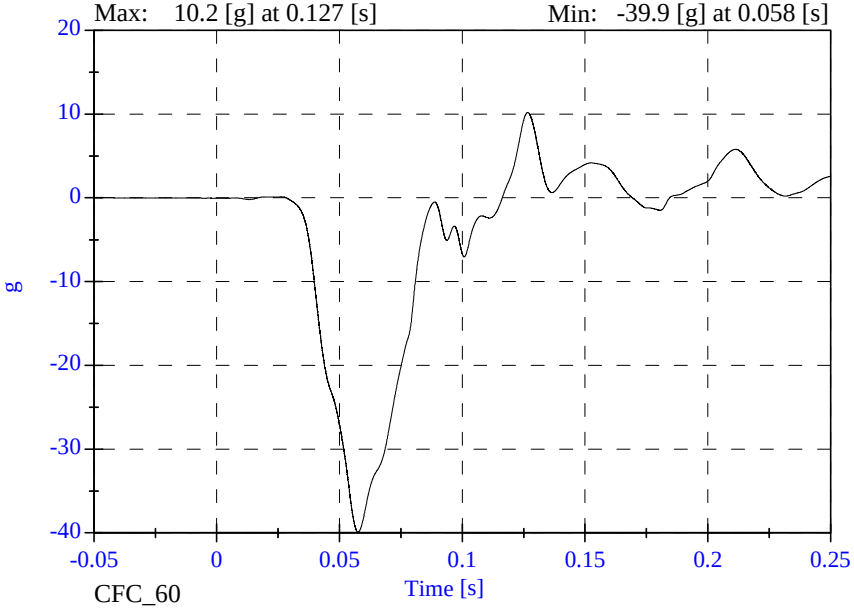
Max: 0.5 [kph] at 0.210 [s] Min: -0.8 [kph] at 0.103 [s]



CFC_180

P3 Pelvic z

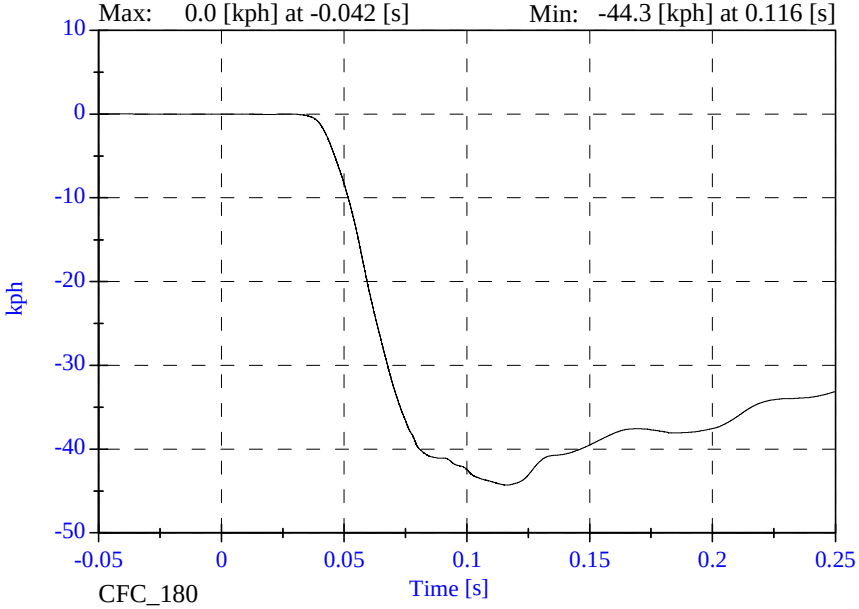
Max: 10.2 [g] at 0.127 [s] Min: -39.9 [g] at 0.058 [s]



CFC_60

P3 Pelvic z Velocity

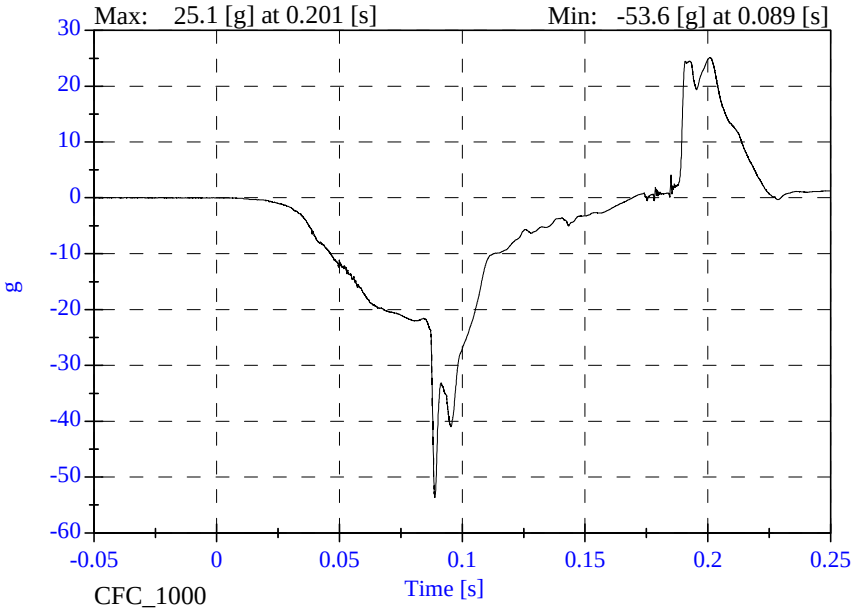
Max: 0.0 [kph] at -0.042 [s] Min: -44.3 [kph] at 0.116 [s]



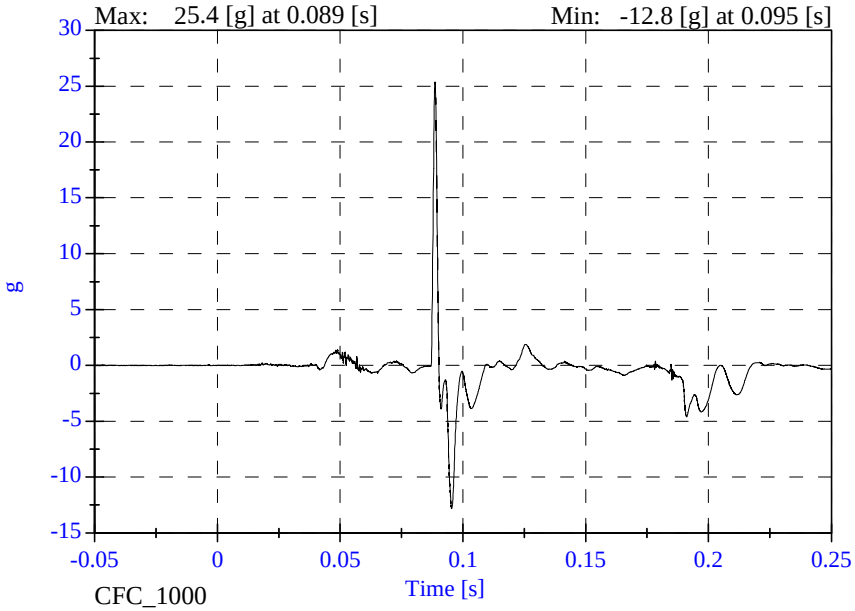
CFC_180

Sled Test Run 22289 - March 25, 2002

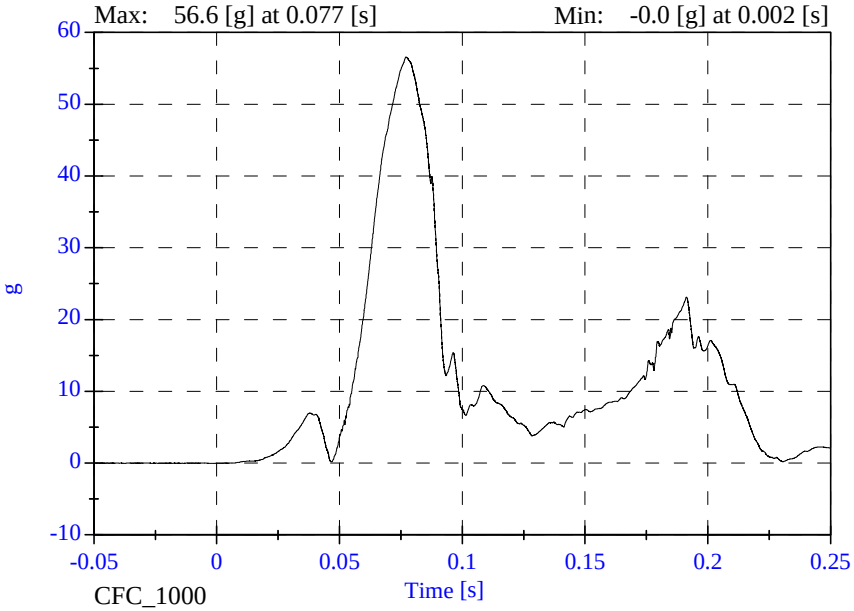
P4 Head x



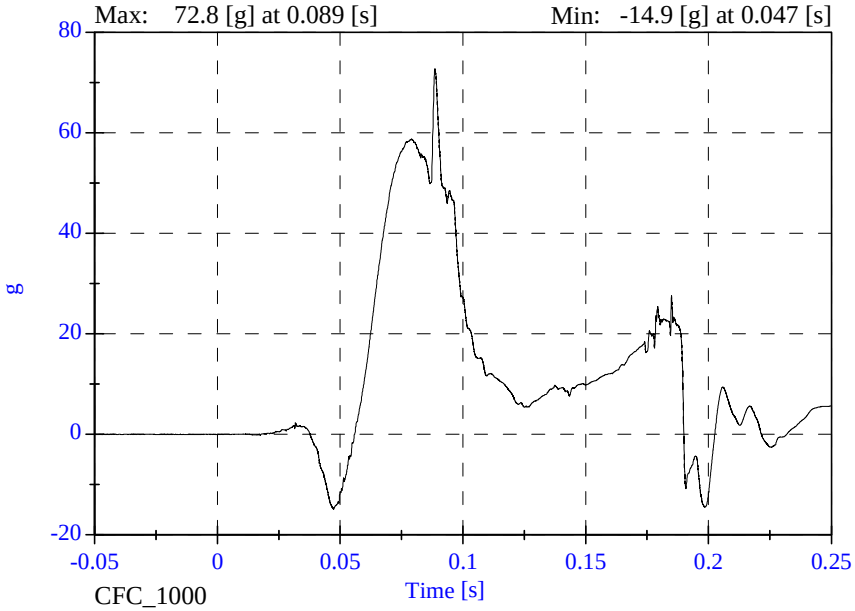
P4 Head y



P4 Head z



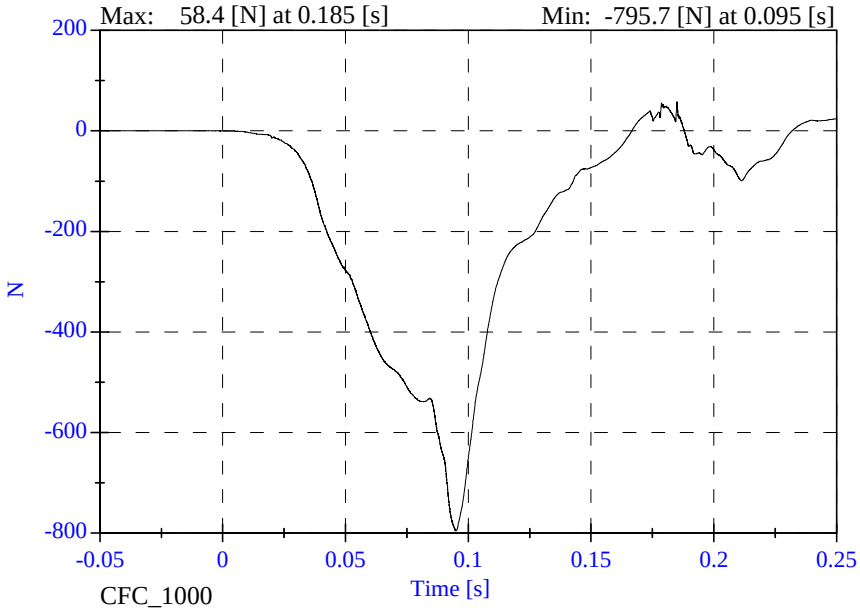
P4 Head Red z



Sled Test Run 22289 - March 25, 2002

P4 Upper Neck Fx

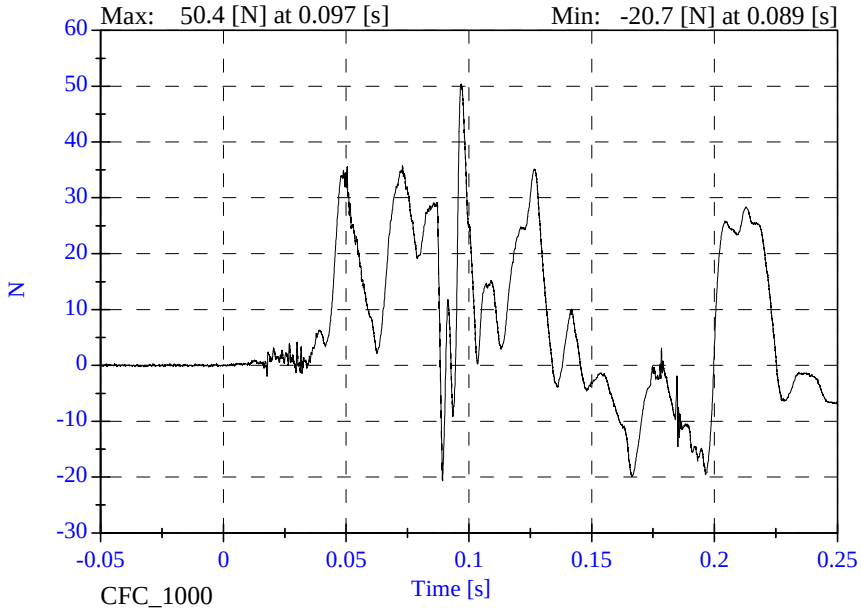
Max: 58.4 [N] at 0.185 [s] Min: -795.7 [N] at 0.095 [s]



CFC_1000

P4 Upper Neck Fy

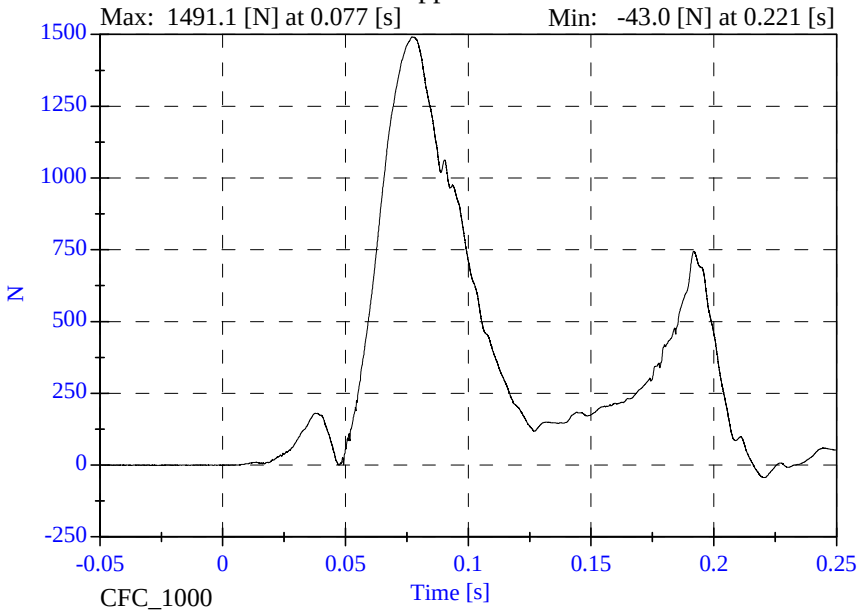
Max: 50.4 [N] at 0.097 [s] Min: -20.7 [N] at 0.089 [s]



CFC_1000

P4 Upper Neck Fz

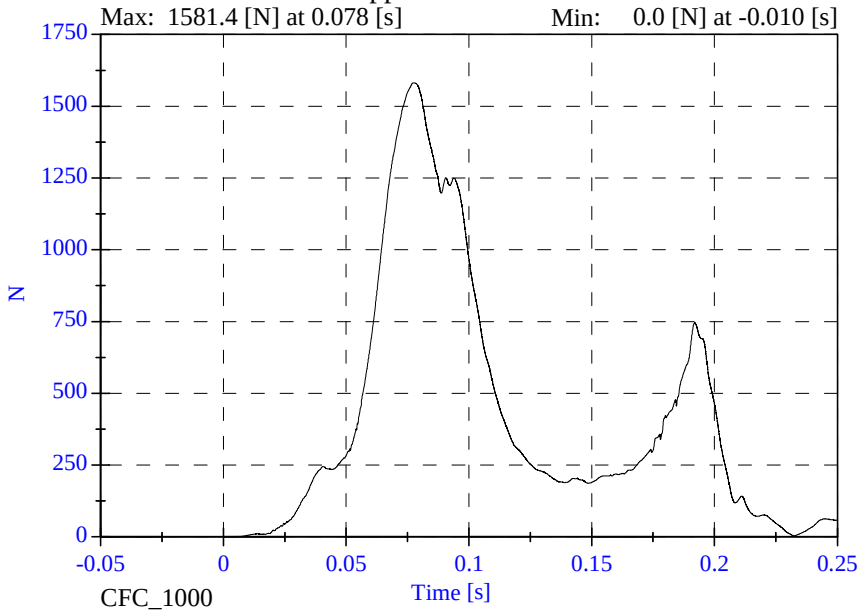
Max: 1491.1 [N] at 0.077 [s] Min: -43.0 [N] at 0.221 [s]



CFC_1000

P4 Upper Neck F Resultant

Max: 1581.4 [N] at 0.078 [s] Min: 0.0 [N] at -0.010 [s]

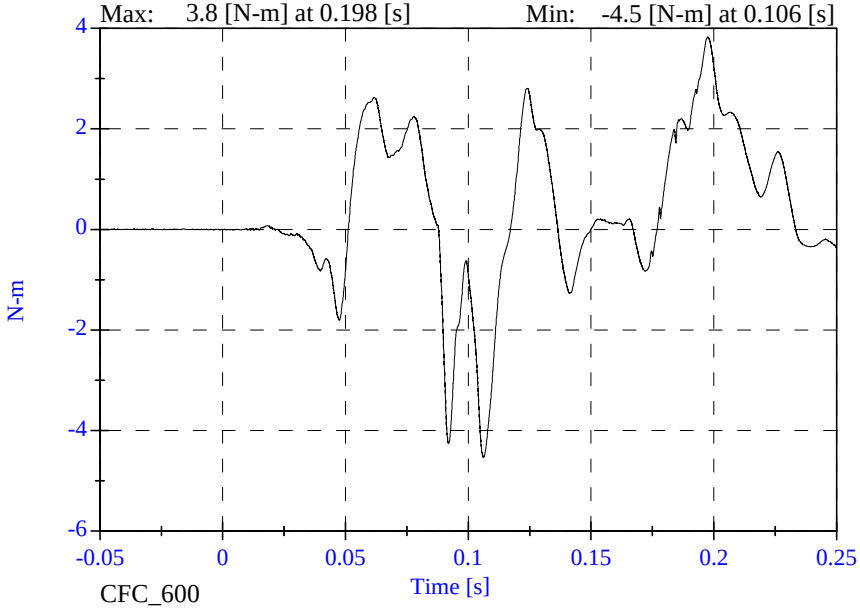


CFC_1000

Sled Test Run 22289 - March 25, 2002

P4 Upper Neck Mx

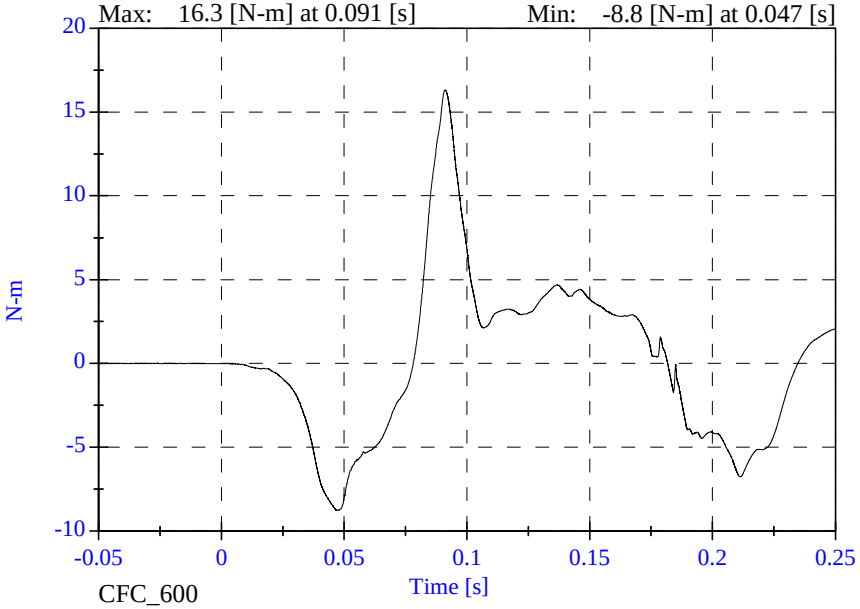
Max: 3.8 [N-m] at 0.198 [s] Min: -4.5 [N-m] at 0.106 [s]



CFC_600

P4 Upper Neck My

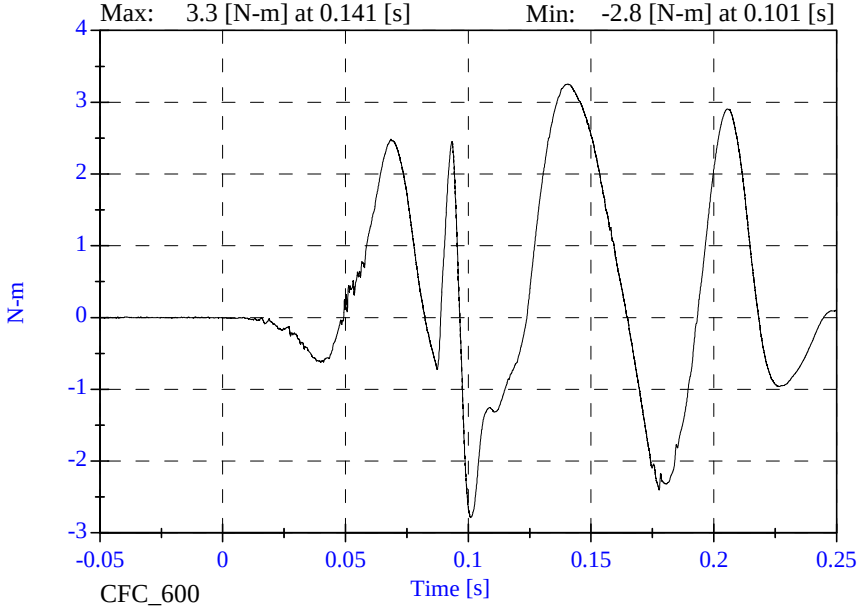
Max: 16.3 [N-m] at 0.091 [s] Min: -8.8 [N-m] at 0.047 [s]



CFC_600

P4 Upper Neck Mz

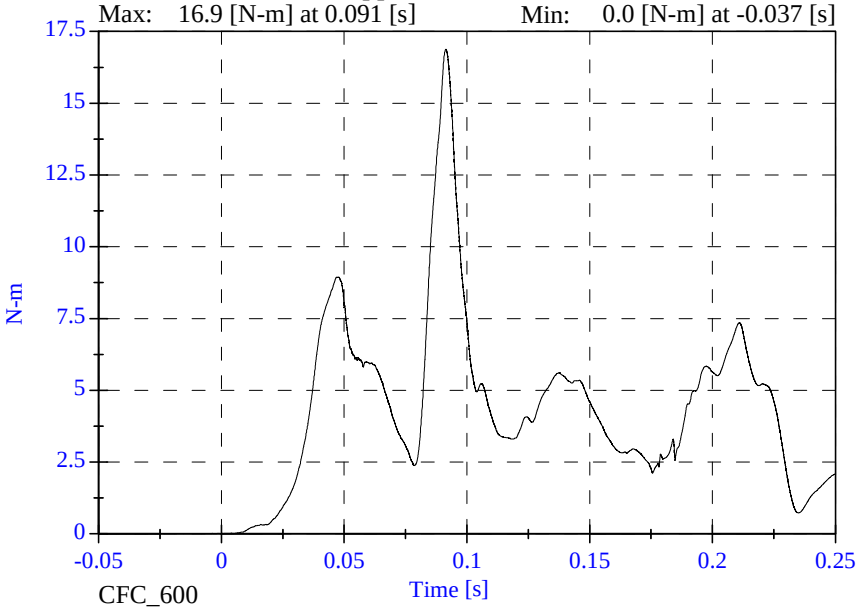
Max: 3.3 [N-m] at 0.141 [s] Min: -2.8 [N-m] at 0.101 [s]



CFC_600

P4 Upper Neck M Resultant

Max: 16.9 [N-m] at 0.091 [s] Min: 0.0 [N-m] at -0.037 [s]

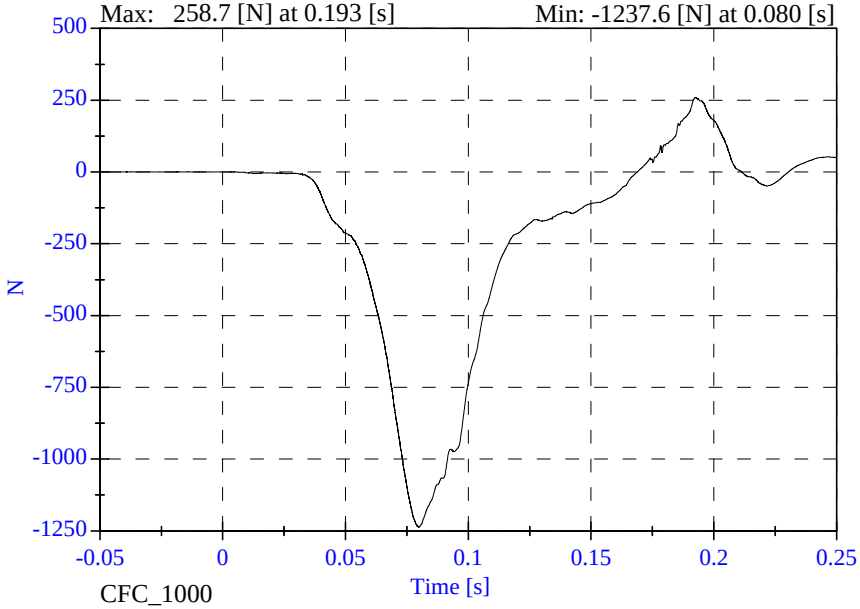


CFC_600

Sled Test Run 22289 - March 25, 2002

P4 Lower Neck Fx

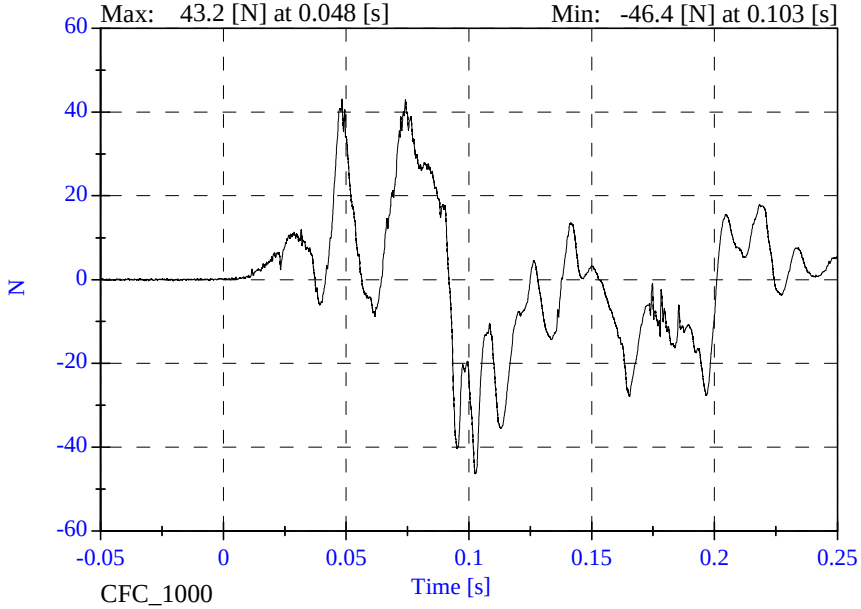
Max: 258.7 [N] at 0.193 [s] Min: -1237.6 [N] at 0.080 [s]



CFC_1000

P4 Lower Neck Fy

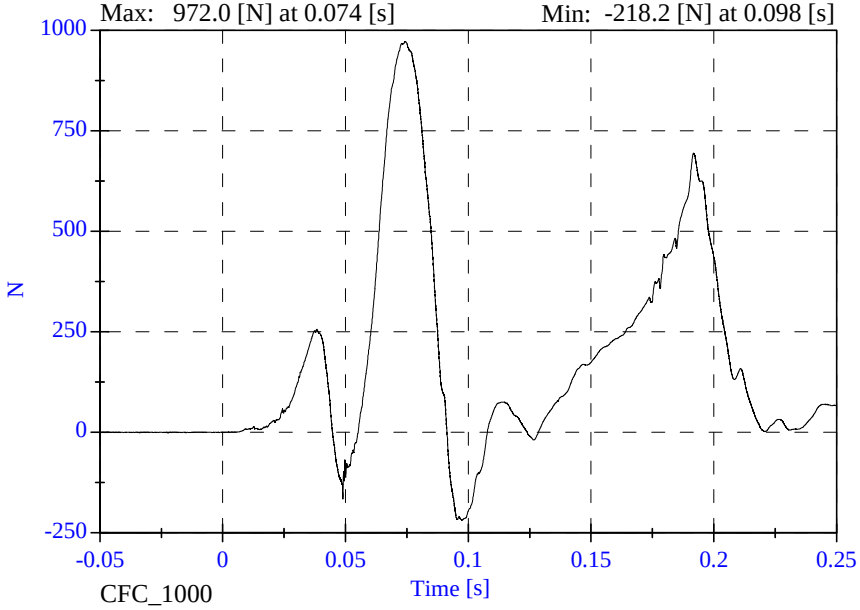
Max: 43.2 [N] at 0.048 [s] Min: -46.4 [N] at 0.103 [s]



CFC_1000

P4 Lower Neck Fz

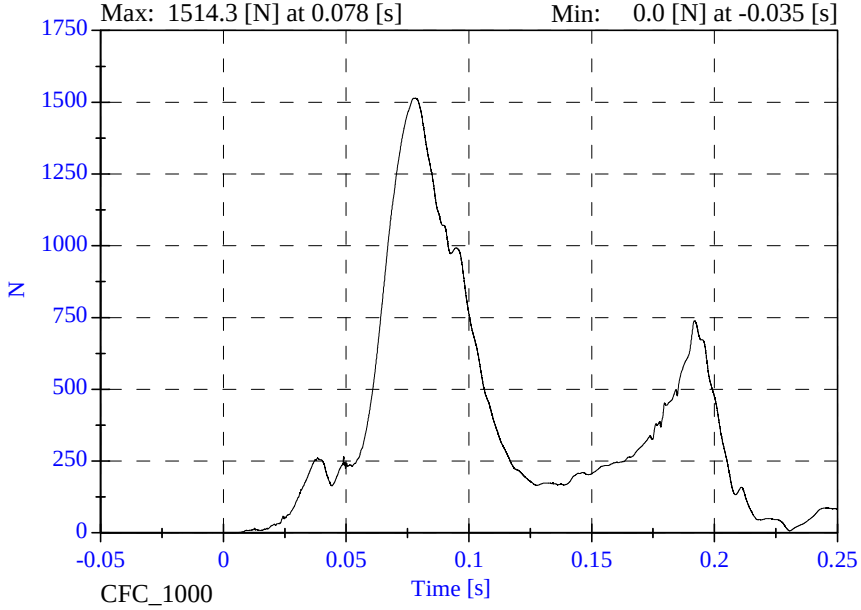
Max: 972.0 [N] at 0.074 [s] Min: -218.2 [N] at 0.098 [s]



CFC_1000

P4 Lower Neck F Resultant

Max: 1514.3 [N] at 0.078 [s] Min: 0.0 [N] at -0.035 [s]

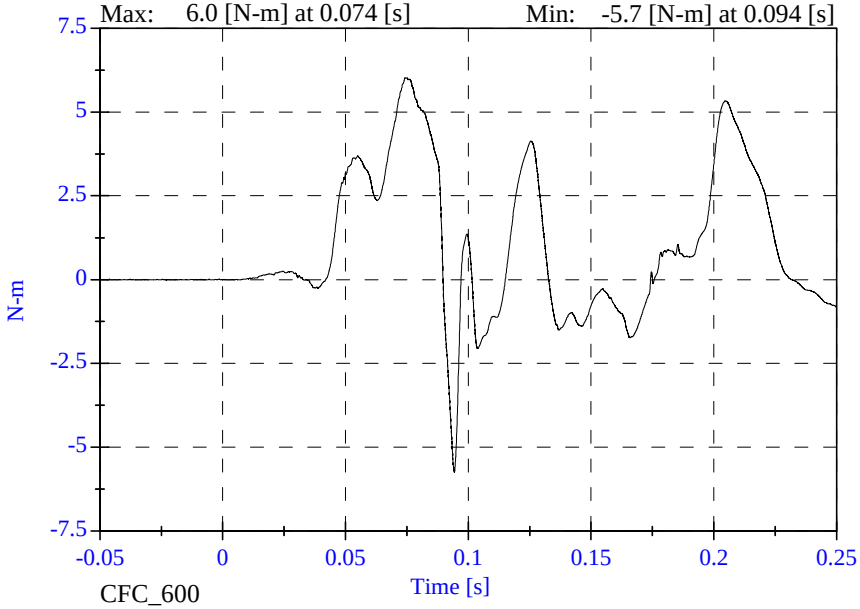


CFC_1000

Sled Test Run 22289 - March 25, 2002

P4 Lower Neck Mx

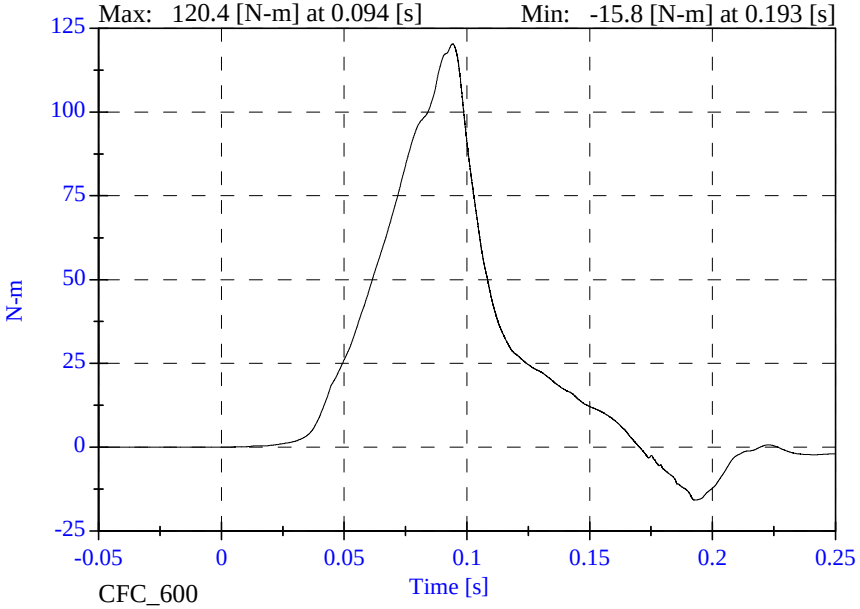
Max: 6.0 [N-m] at 0.074 [s] Min: -5.7 [N-m] at 0.094 [s]



CFC_600

P4 Lower Neck My

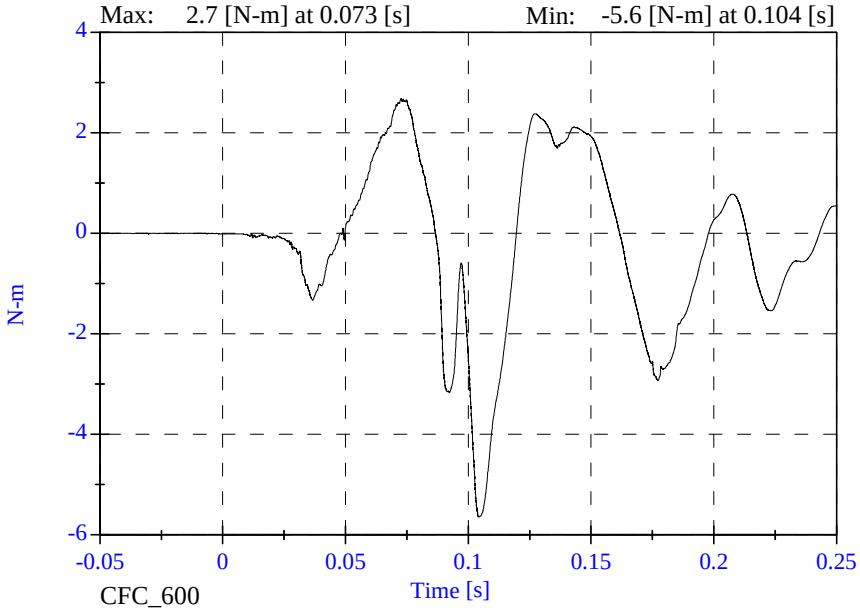
Max: 120.4 [N-m] at 0.094 [s] Min: -15.8 [N-m] at 0.193 [s]



CFC_600

P4 Lower Neck Mz

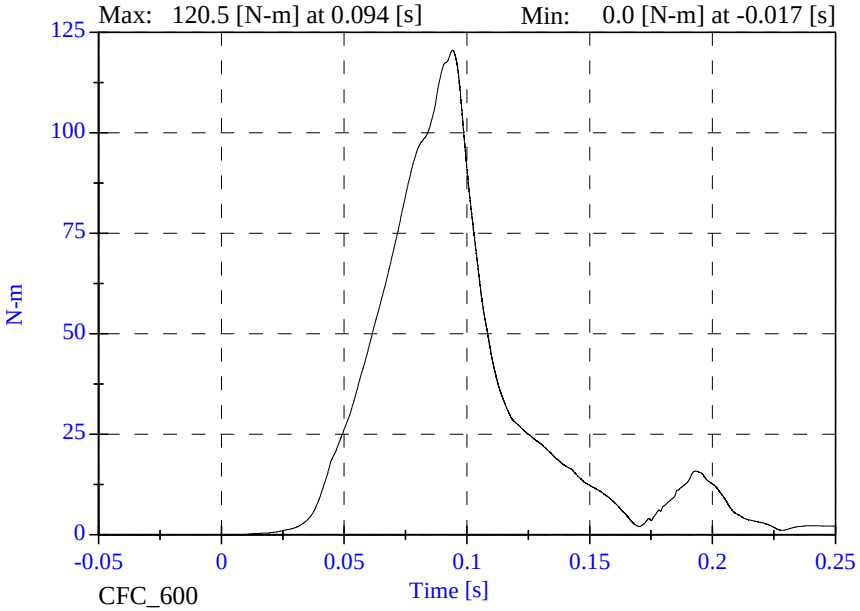
Max: 2.7 [N-m] at 0.073 [s] Min: -5.6 [N-m] at 0.104 [s]



CFC_600

P4 Lower Neck M Resultant

Max: 120.5 [N-m] at 0.094 [s] Min: 0.0 [N-m] at -0.017 [s]

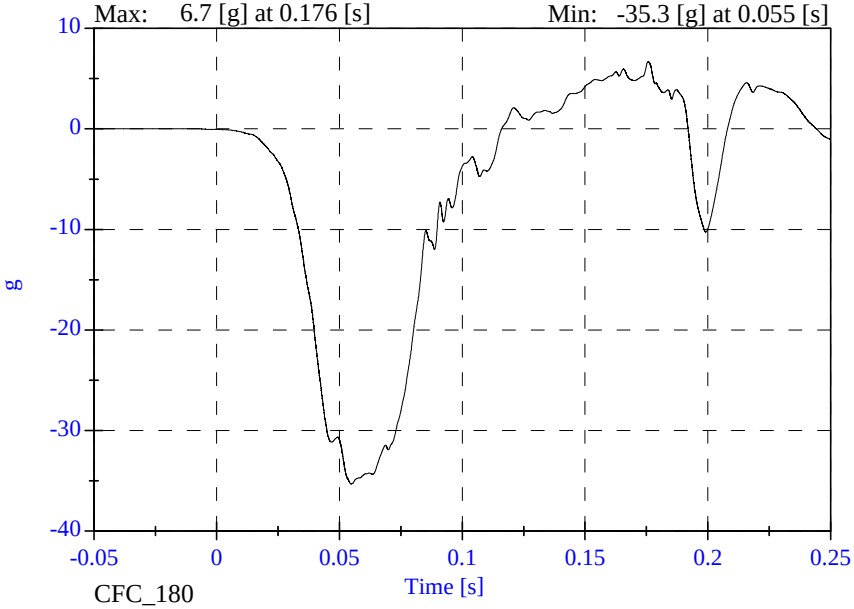


CFC_600

Sled Test Run 22289 - March 25, 2002

P4 Chest x

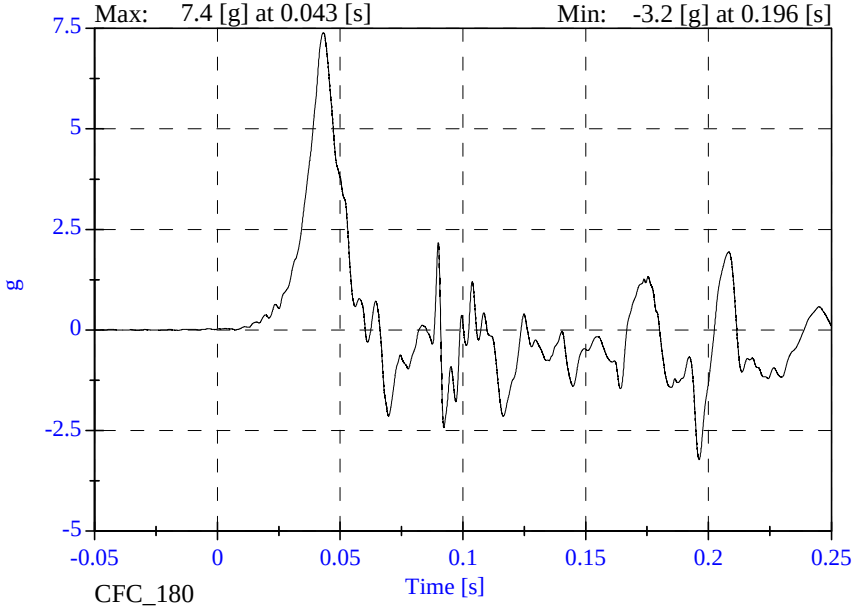
Max: 6.7 [g] at 0.176 [s] Min: -35.3 [g] at 0.055 [s]



CFC_180

P4 Chest y

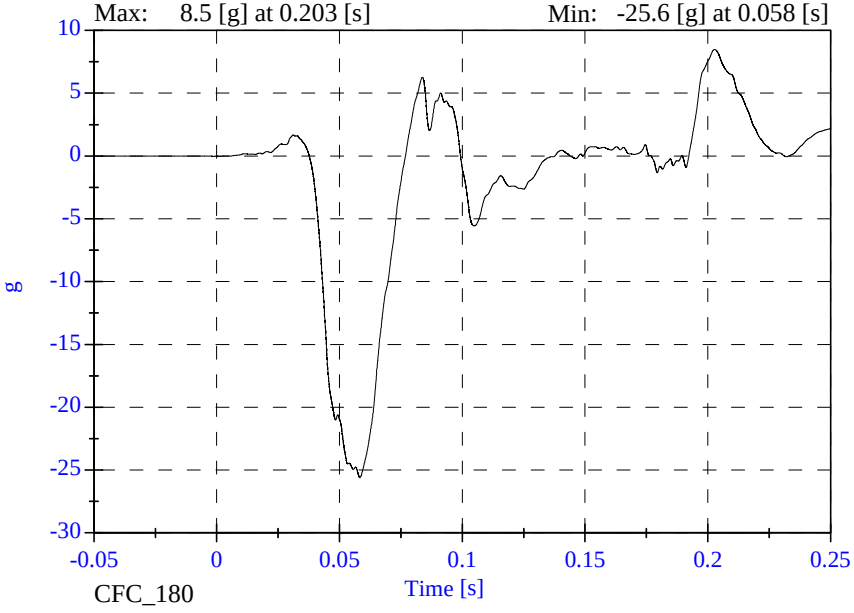
Max: 7.4 [g] at 0.043 [s] Min: -3.2 [g] at 0.196 [s]



CFC_180

P4 Chest z

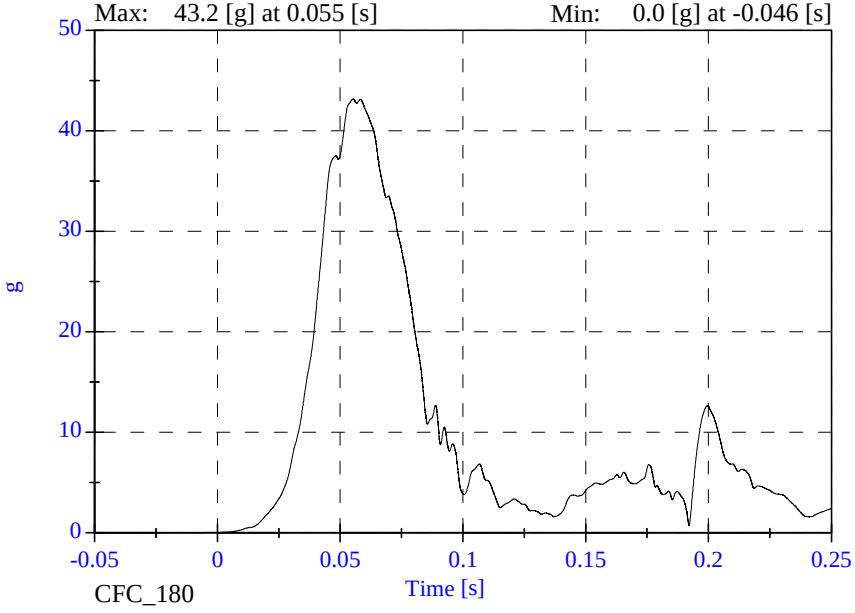
Max: 8.5 [g] at 0.203 [s] Min: -25.6 [g] at 0.058 [s]



CFC_180

P4 Chest Resultant

Max: 43.2 [g] at 0.055 [s] Min: 0.0 [g] at -0.046 [s]

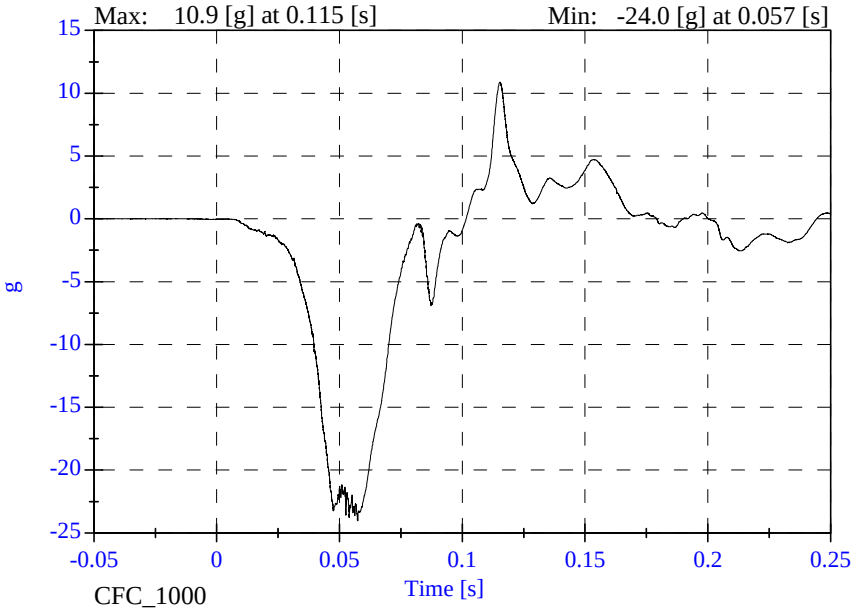


CFC_180

Sled Test Run 22289 - March 25, 2002

P4 Pelvic x

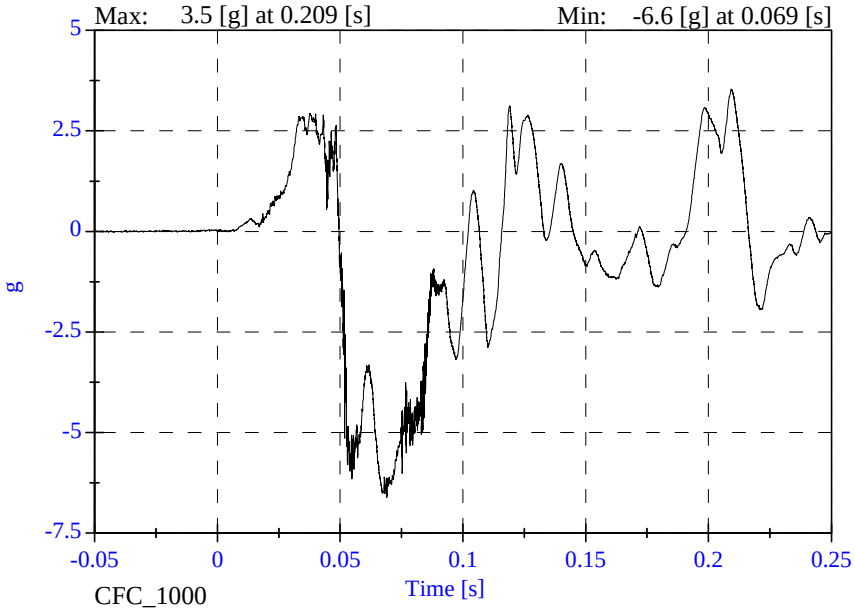
Max: 10.9 [g] at 0.115 [s] Min: -24.0 [g] at 0.057 [s]



CFC_1000

P4 Pelvic y

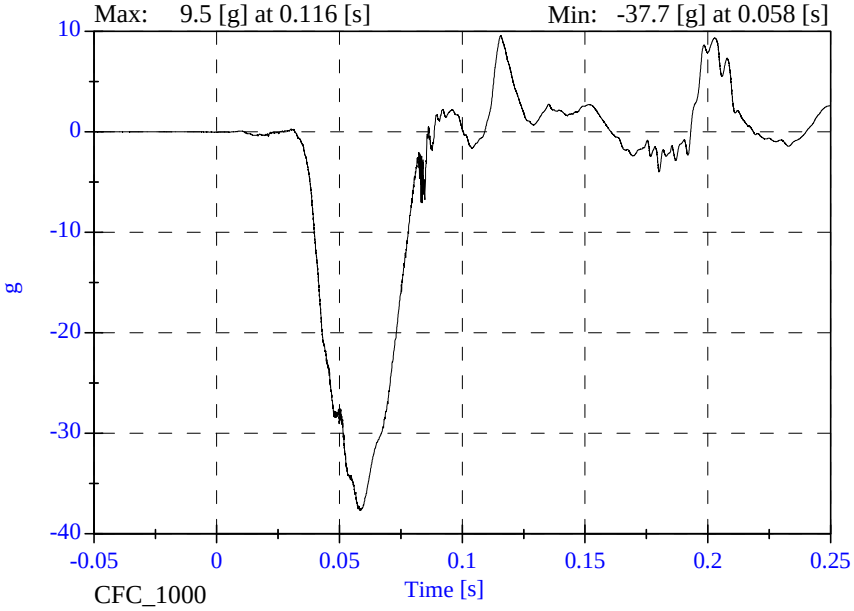
Max: 3.5 [g] at 0.209 [s] Min: -6.6 [g] at 0.069 [s]



CFC_1000

P4 Pelvic z

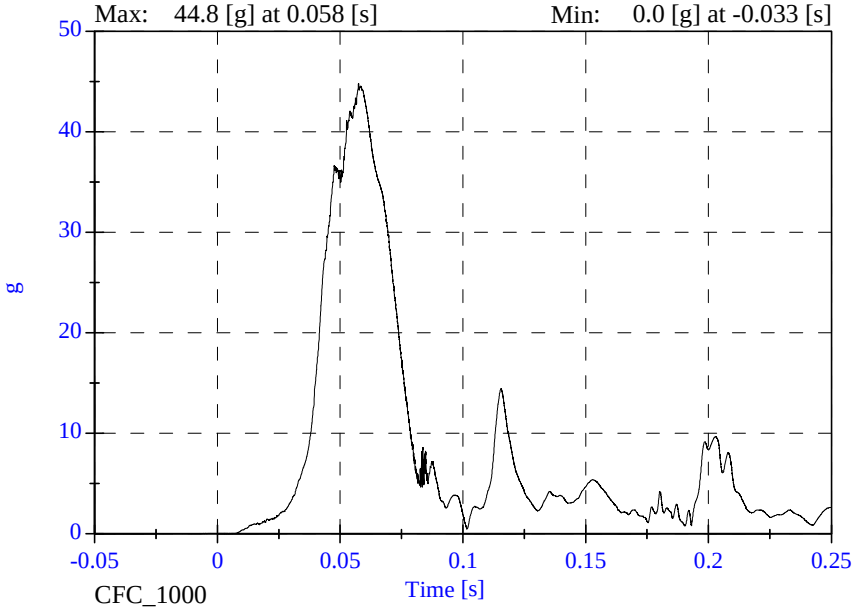
Max: 9.5 [g] at 0.116 [s] Min: -37.7 [g] at 0.058 [s]



CFC_1000

P4 Pelvic Resultant

Max: 44.8 [g] at 0.058 [s] Min: 0.0 [g] at -0.033 [s]

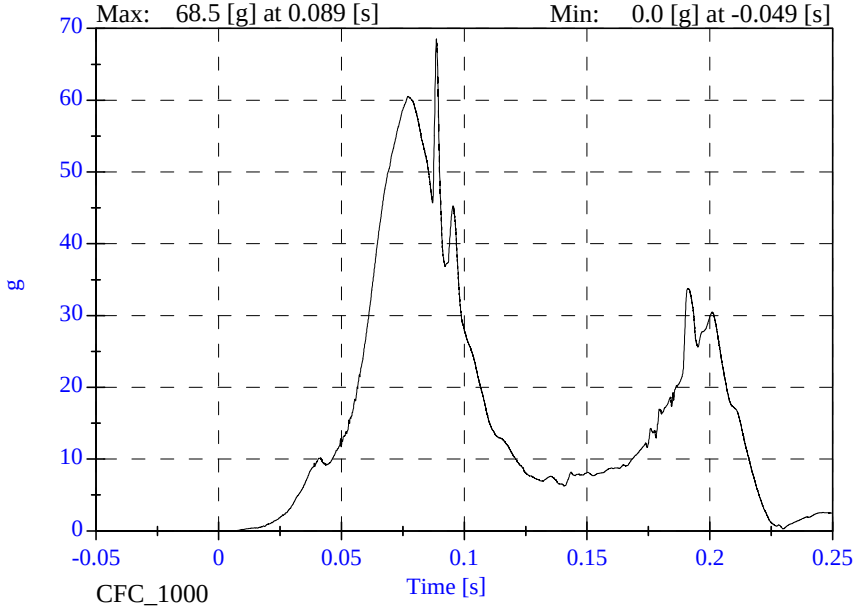


CFC_1000

Sled Test Run 22289 - March 25, 2002

P4 Head Resultant

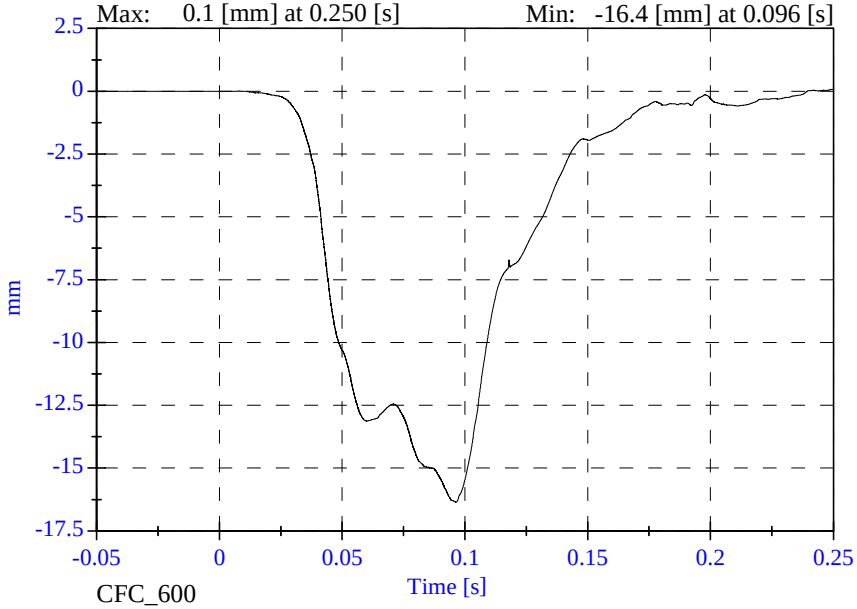
Max: 68.5 [g] at 0.089 [s] Min: 0.0 [g] at -0.049 [s]



CFC_1000

P4 Chest Compression

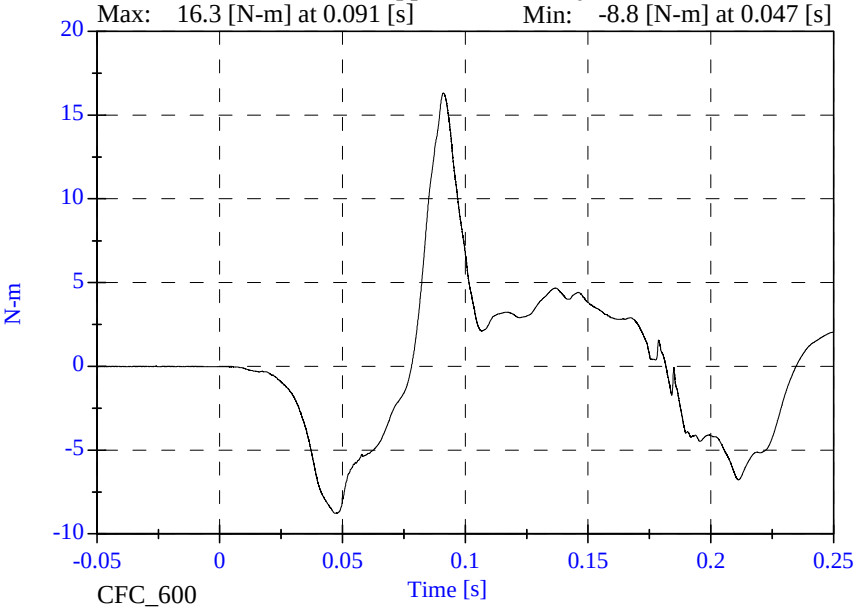
Max: 0.1 [mm] at 0.250 [s] Min: -16.4 [mm] at 0.096 [s]



CFC_600

P4 Upper Neck Mocy

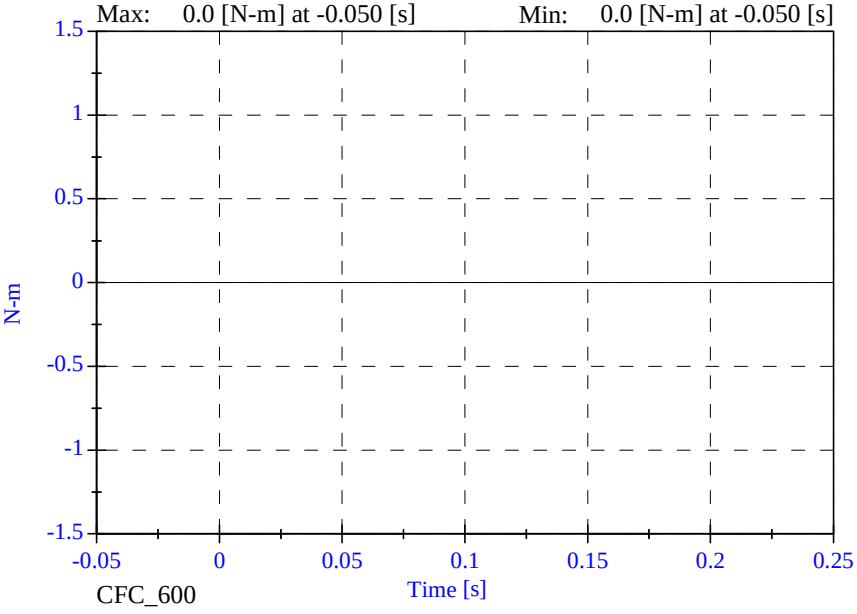
Max: 16.3 [N-m] at 0.091 [s] Min: -8.8 [N-m] at 0.047 [s]



CFC_600

NULL

Max: 0.0 [N-m] at -0.050 [s] Min: 0.0 [N-m] at -0.050 [s]

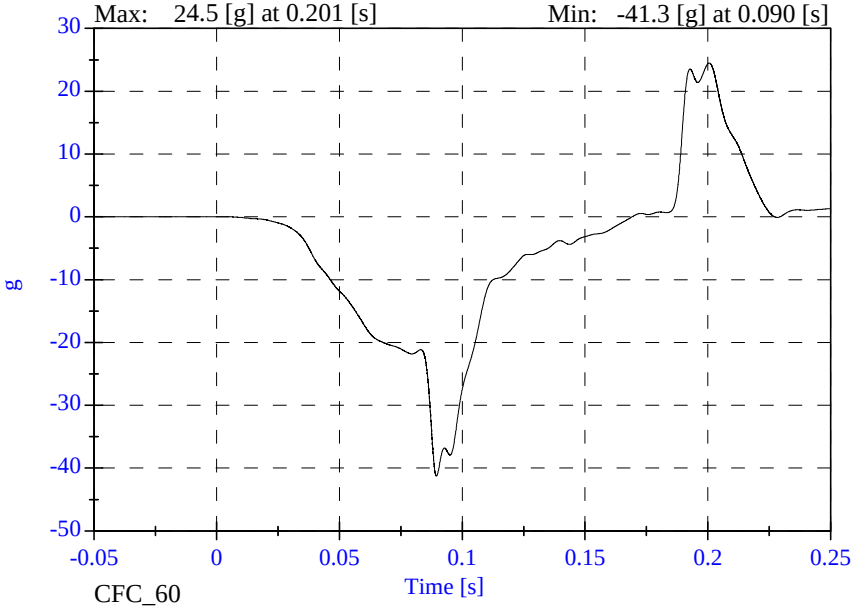


CFC_600

Sled Test Run 22289 - March 25, 2002

P4 Head x

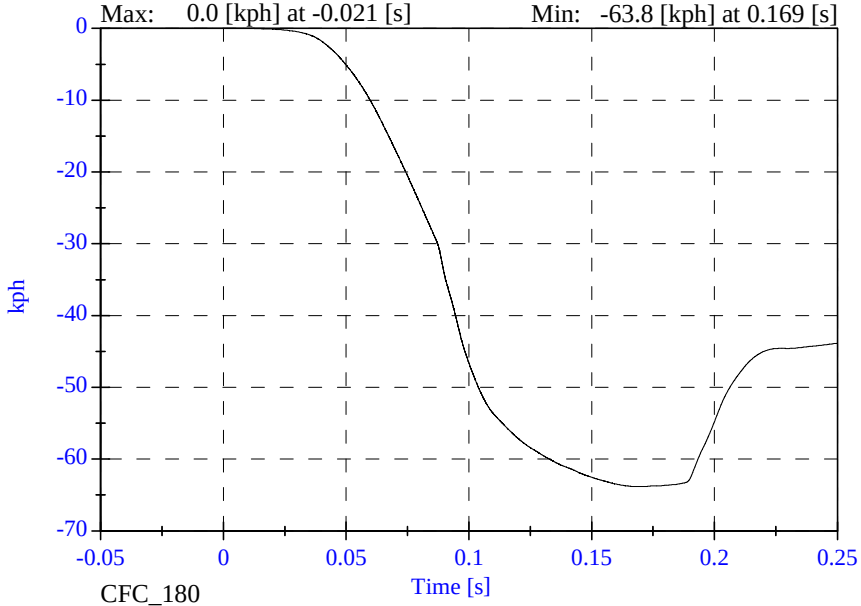
Max: 24.5 [g] at 0.201 [s] Min: -41.3 [g] at 0.090 [s]



CFC_60

P4 Head x Velocity

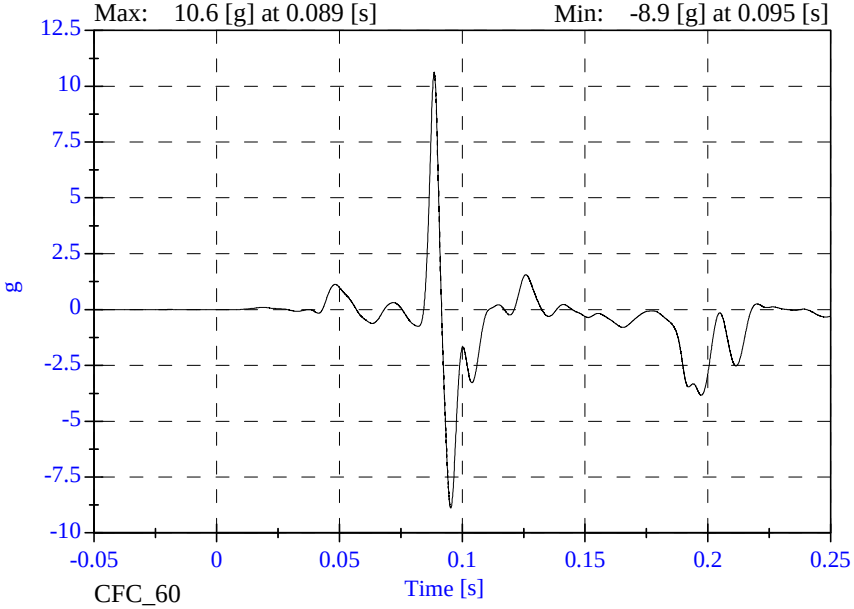
Max: 0.0 [kph] at -0.021 [s] Min: -63.8 [kph] at 0.169 [s]



CFC_180

P4 Head y

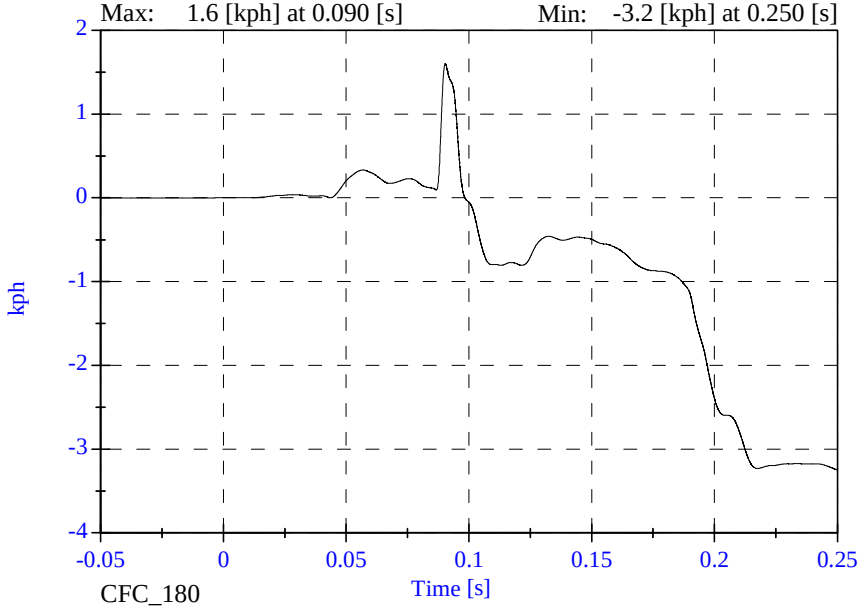
Max: 10.6 [g] at 0.089 [s] Min: -8.9 [g] at 0.095 [s]



CFC_60

P4 Head y Velocity

Max: 1.6 [kph] at 0.090 [s] Min: -3.2 [kph] at 0.250 [s]

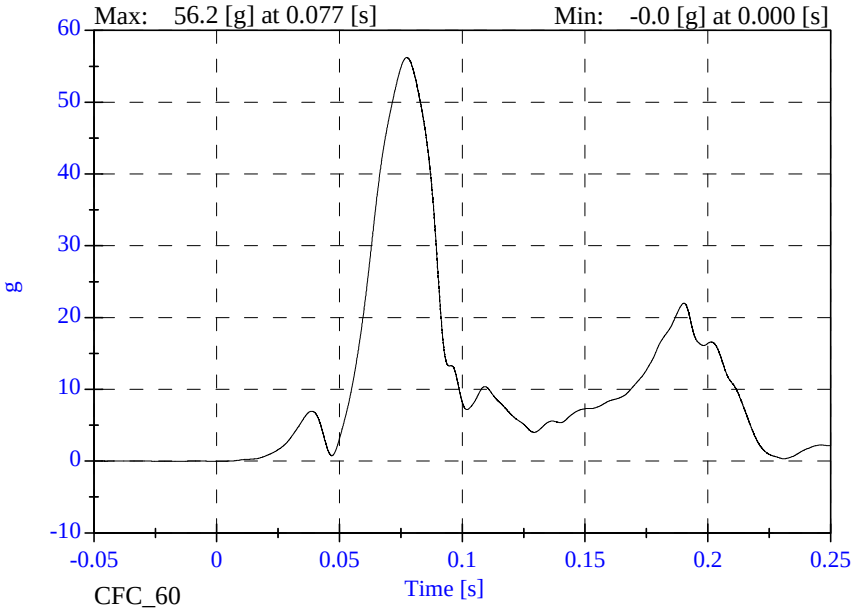


CFC_180

Sled Test Run 22289 - March 25, 2002

P4 Head z

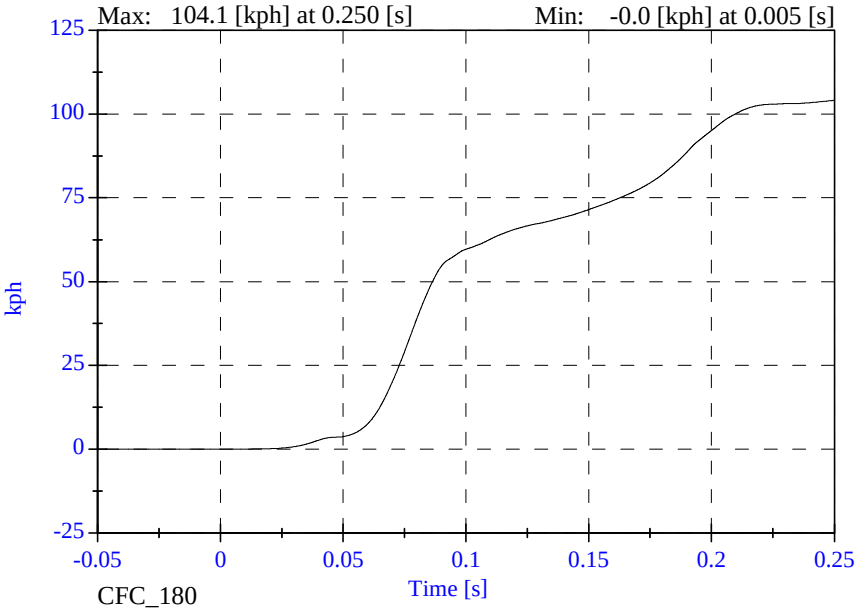
Max: 56.2 [g] at 0.077 [s] Min: -0.0 [g] at 0.000 [s]



CFC_60

P4 Head z Velocity

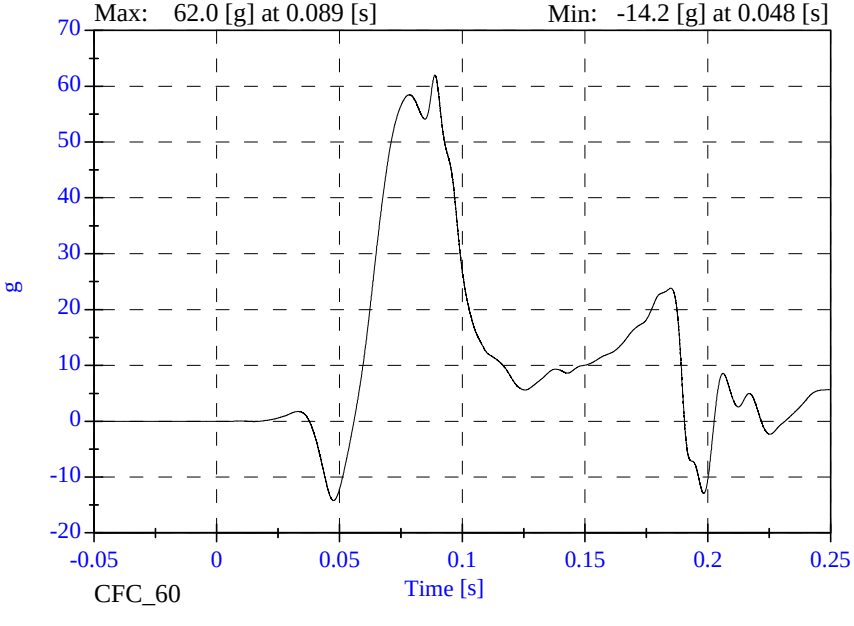
Max: 104.1 [kph] at 0.250 [s] Min: -0.0 [kph] at 0.005 [s]



CFC_180

P4 Head Red z

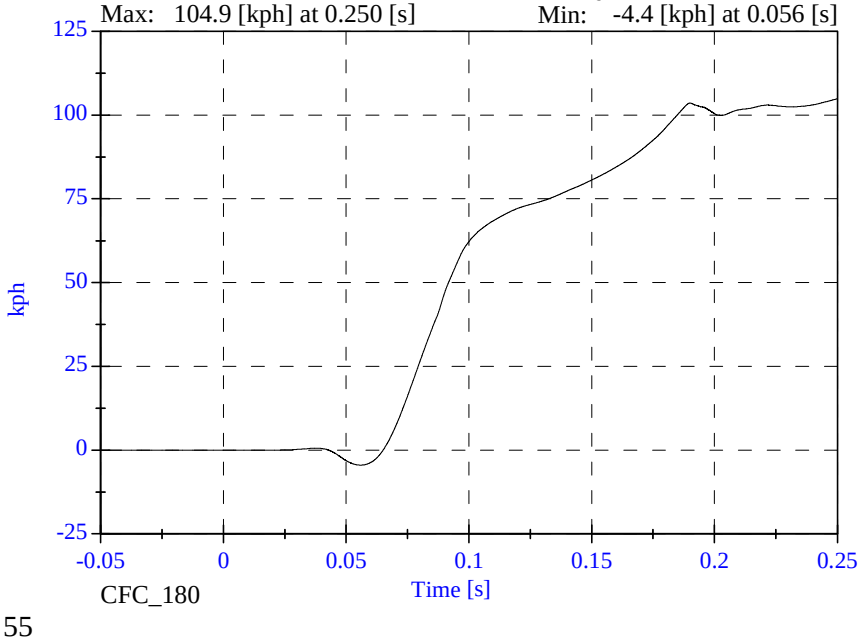
Max: 62.0 [g] at 0.089 [s] Min: -14.2 [g] at 0.048 [s]



CFC_60

P4 Head Red z Velocity

Max: 104.9 [kph] at 0.250 [s] Min: -4.4 [kph] at 0.056 [s]

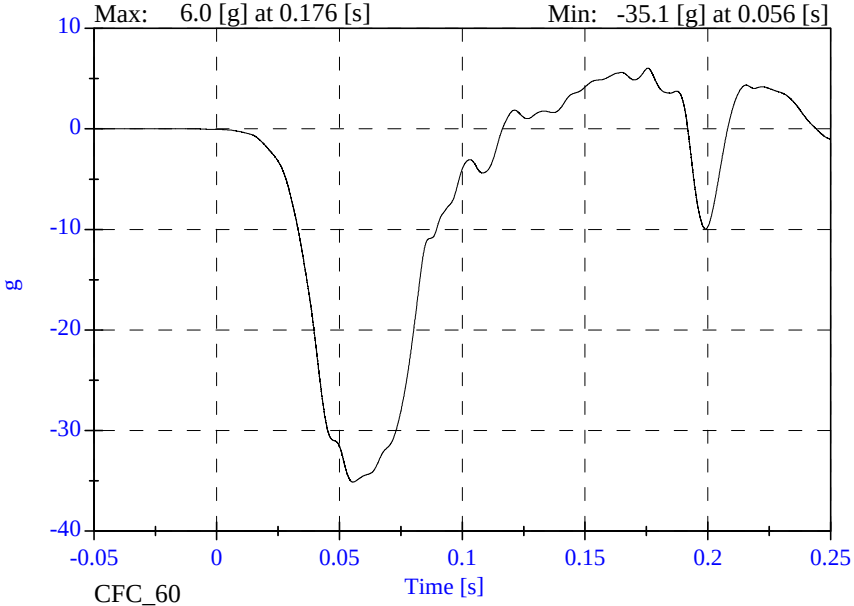


CFC_180

Sled Test Run 22289 - March 25, 2002

P4 Chest x

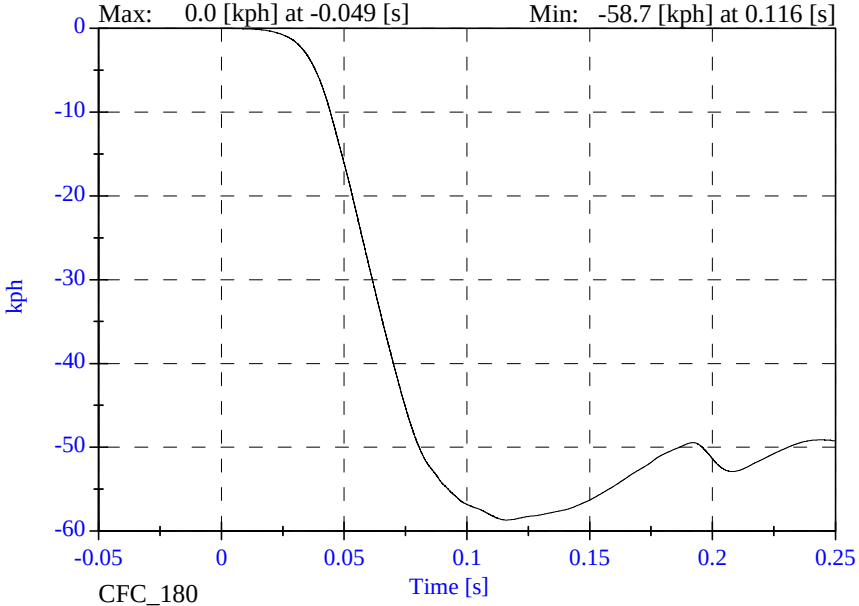
Max: 6.0 [g] at 0.176 [s] Min: -35.1 [g] at 0.056 [s]



CFC_60

P4 Chest x Velocity

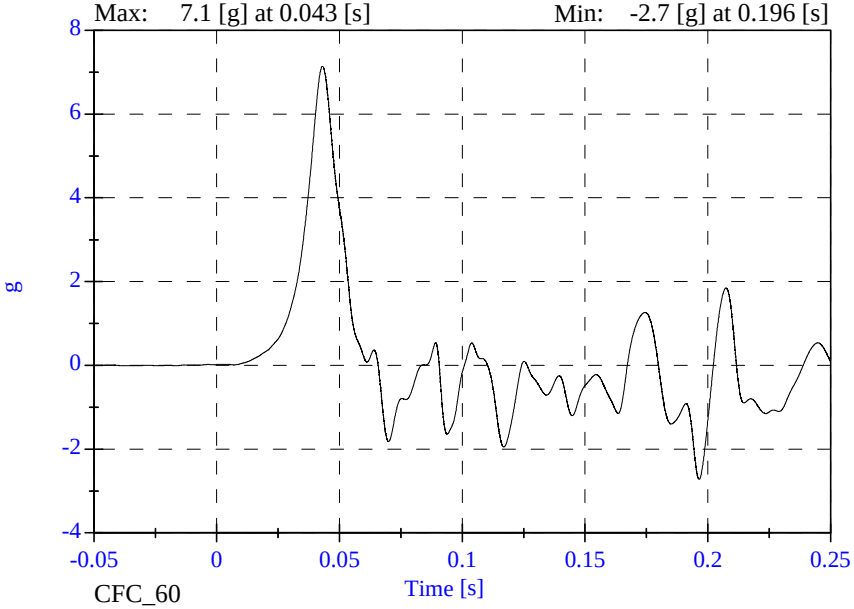
Max: 0.0 [kph] at -0.049 [s] Min: -58.7 [kph] at 0.116 [s]



CFC_180

P4 Chest y

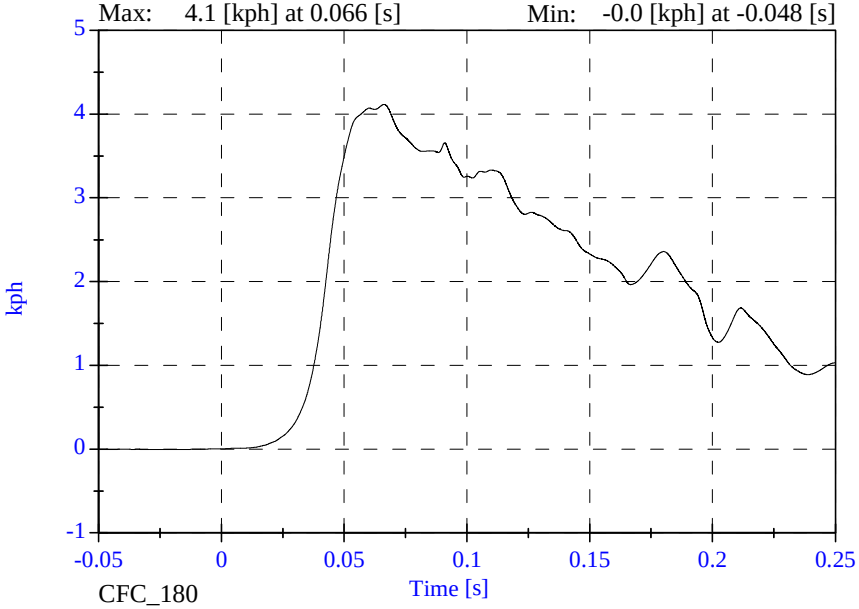
Max: 7.1 [g] at 0.043 [s] Min: -2.7 [g] at 0.196 [s]



CFC_60

P4 Chest y Velocity

Max: 4.1 [kph] at 0.066 [s] Min: -0.0 [kph] at -0.048 [s]

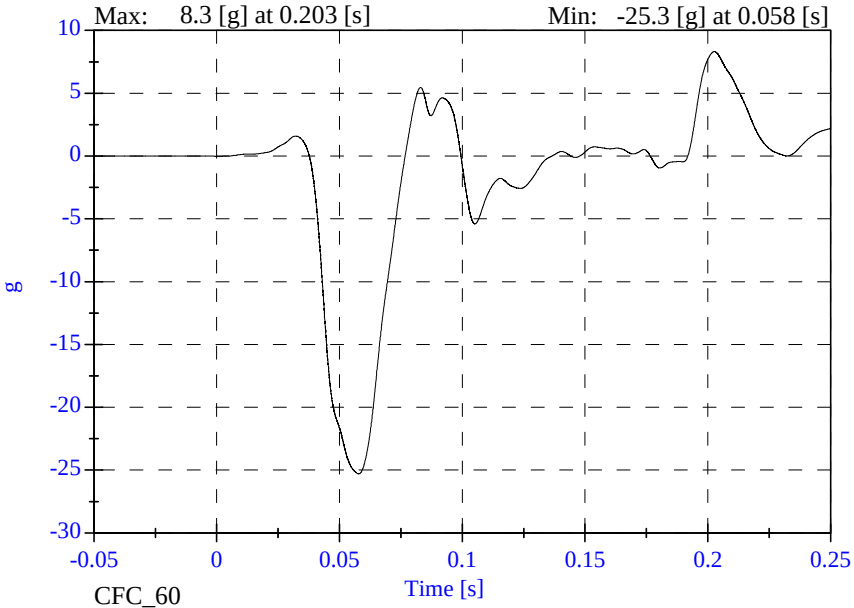


CFC_180

Sled Test Run 22289 - March 25, 2002

P4 Chest z

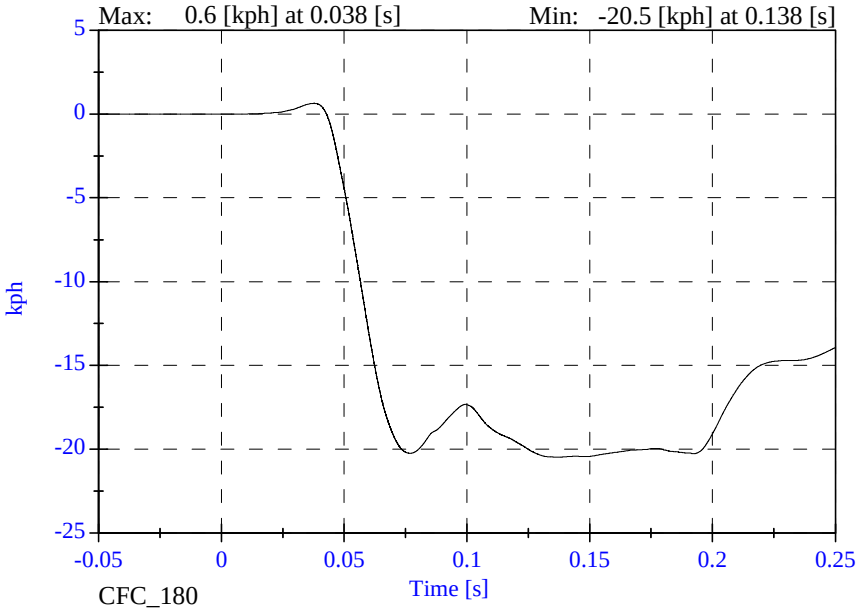
Max: 8.3 [g] at 0.203 [s] Min: -25.3 [g] at 0.058 [s]



CFC_60

P4 Chest z Velocity

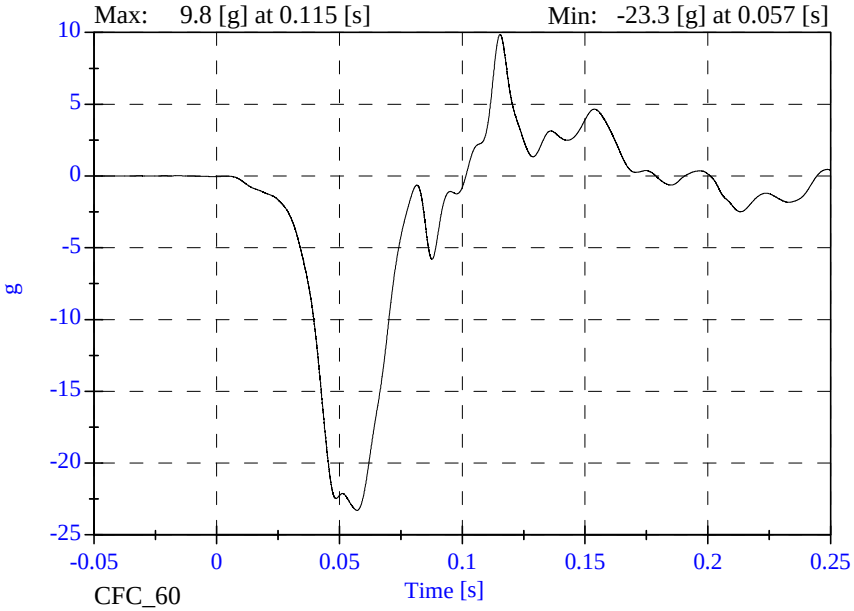
Max: 0.6 [kph] at 0.038 [s] Min: -20.5 [kph] at 0.138 [s]



CFC_180

P4 Pelvic x

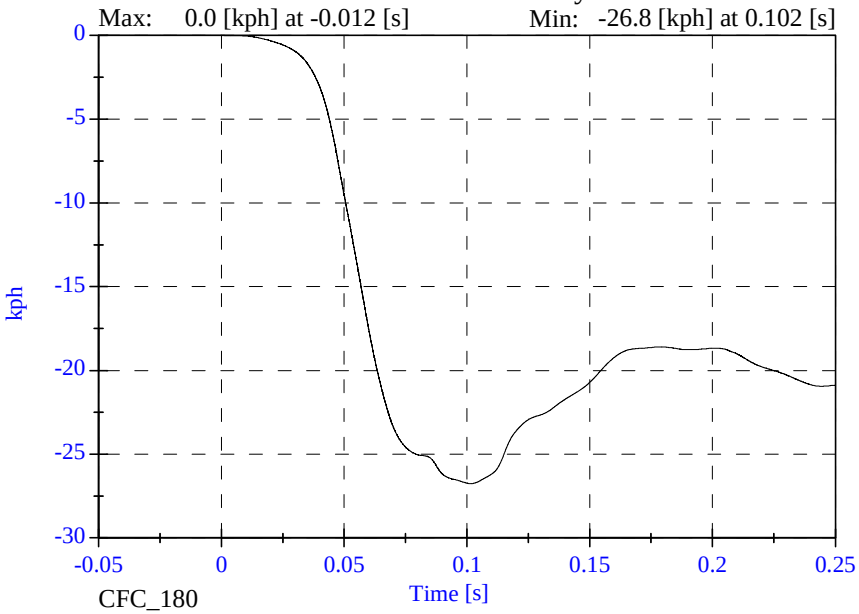
Max: 9.8 [g] at 0.115 [s] Min: -23.3 [g] at 0.057 [s]



CFC_60

P4 Pelvic x Velocity

Max: 0.0 [kph] at -0.012 [s] Min: -26.8 [kph] at 0.102 [s]

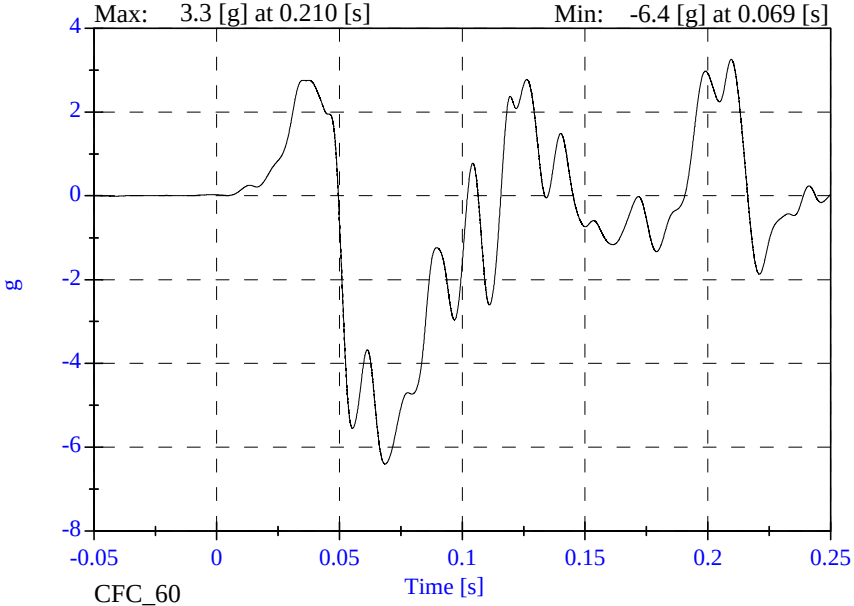


CFC_180

Sled Test Run 22289 - March 25, 2002

P4 Pelvic y

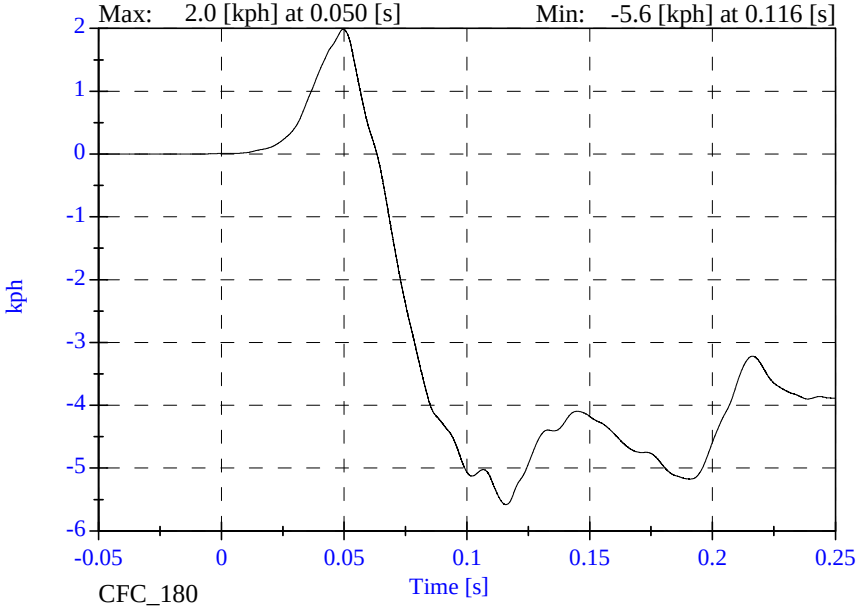
Max: 3.3 [g] at 0.210 [s] Min: -6.4 [g] at 0.069 [s]



CFC_60

P4 Pelvic y Velocity

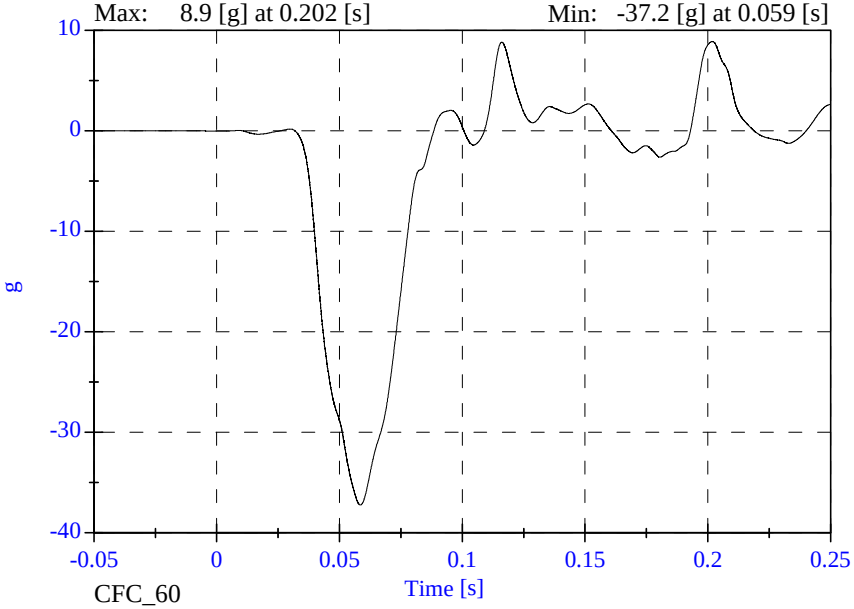
Max: 2.0 [kph] at 0.050 [s] Min: -5.6 [kph] at 0.116 [s]



CFC_180

P4 Pelvic z

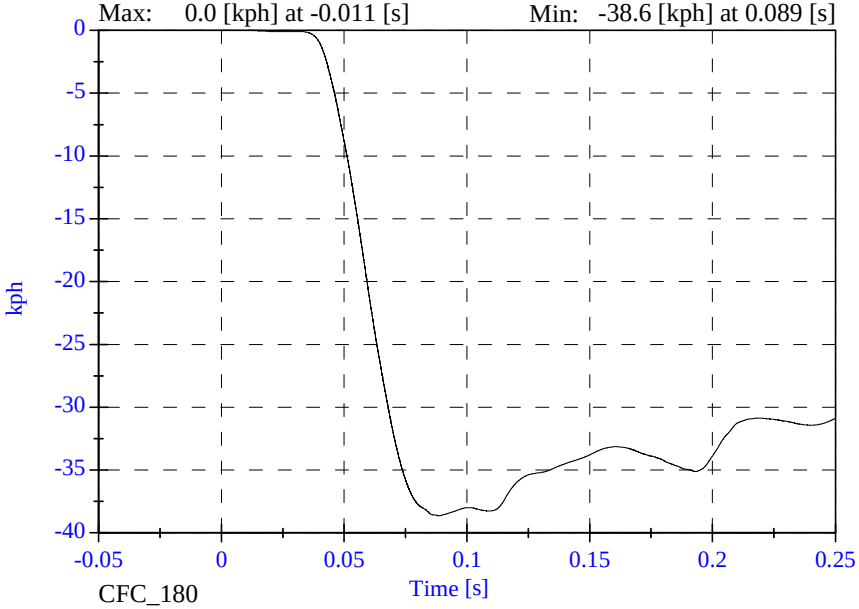
Max: 8.9 [g] at 0.202 [s] Min: -37.2 [g] at 0.059 [s]



CFC_60

P4 Pelvic z Velocity

Max: 0.0 [kph] at -0.011 [s] Min: -38.6 [kph] at 0.089 [s]



CFC_180

SECTION 12

COMPRESSION – DEFLECTION RESISTANCE TEST

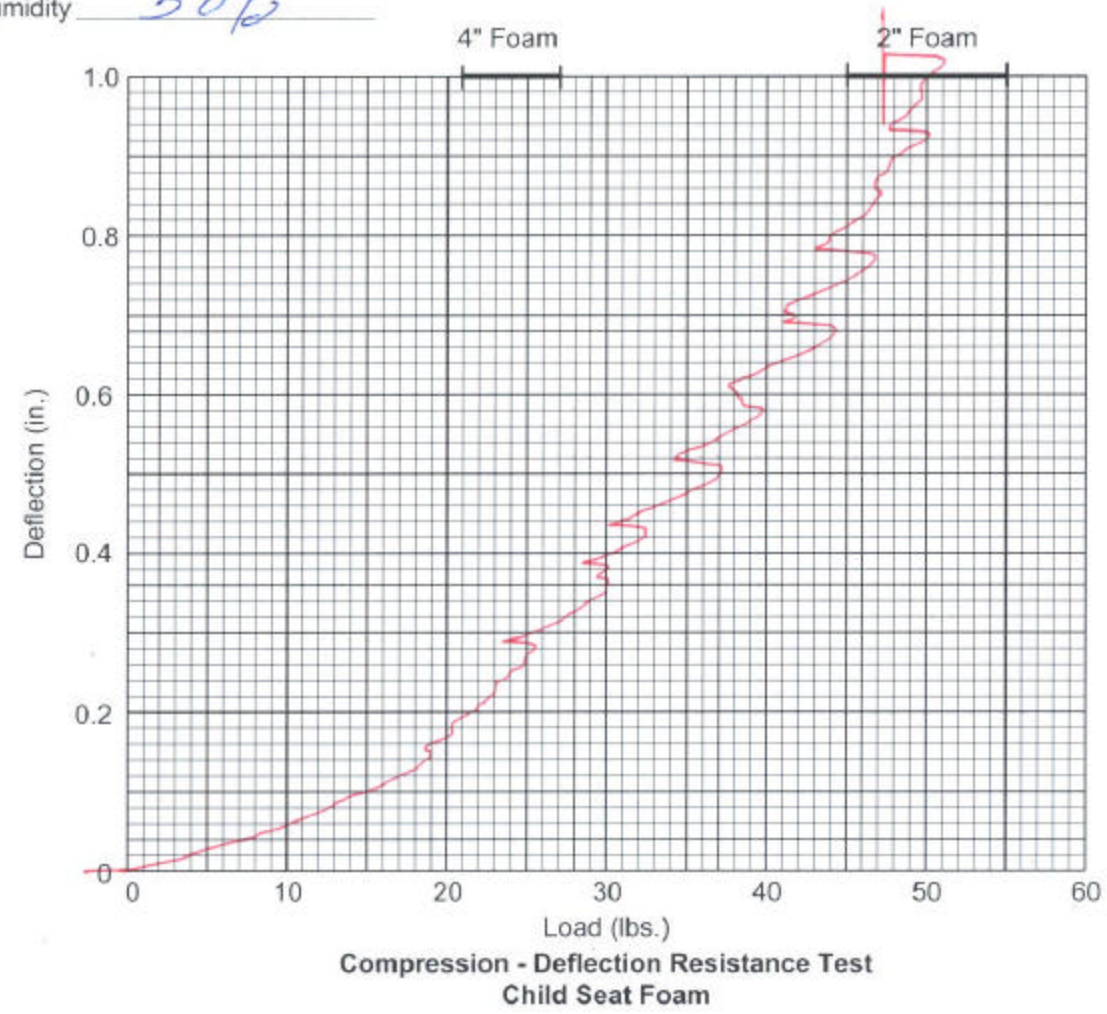
Date 3/25/02

Performed By SD

Temp. 70°

Humidity 50%

Foam No. 2.20" 2"x24" #1



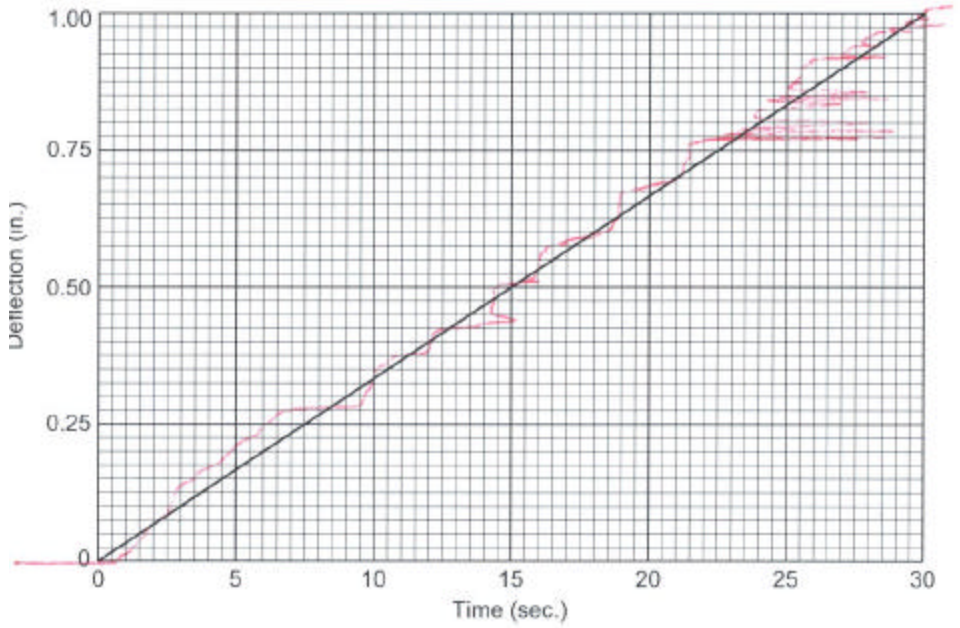
Compression - Deflection Resistance Test
Child Seat Foam

Date 3/25/02

Temp 70°

Humidity 50%

Foam No. 2'X 20"2"X 24'H'



Compression - Deflection Resistance Test Child Seat Foam

001-R01

FN. ..2-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 2"X20"2"X24" #1

Date	Peak Load	Pass/Fail
3/25/02	44.25 LBS	PASS

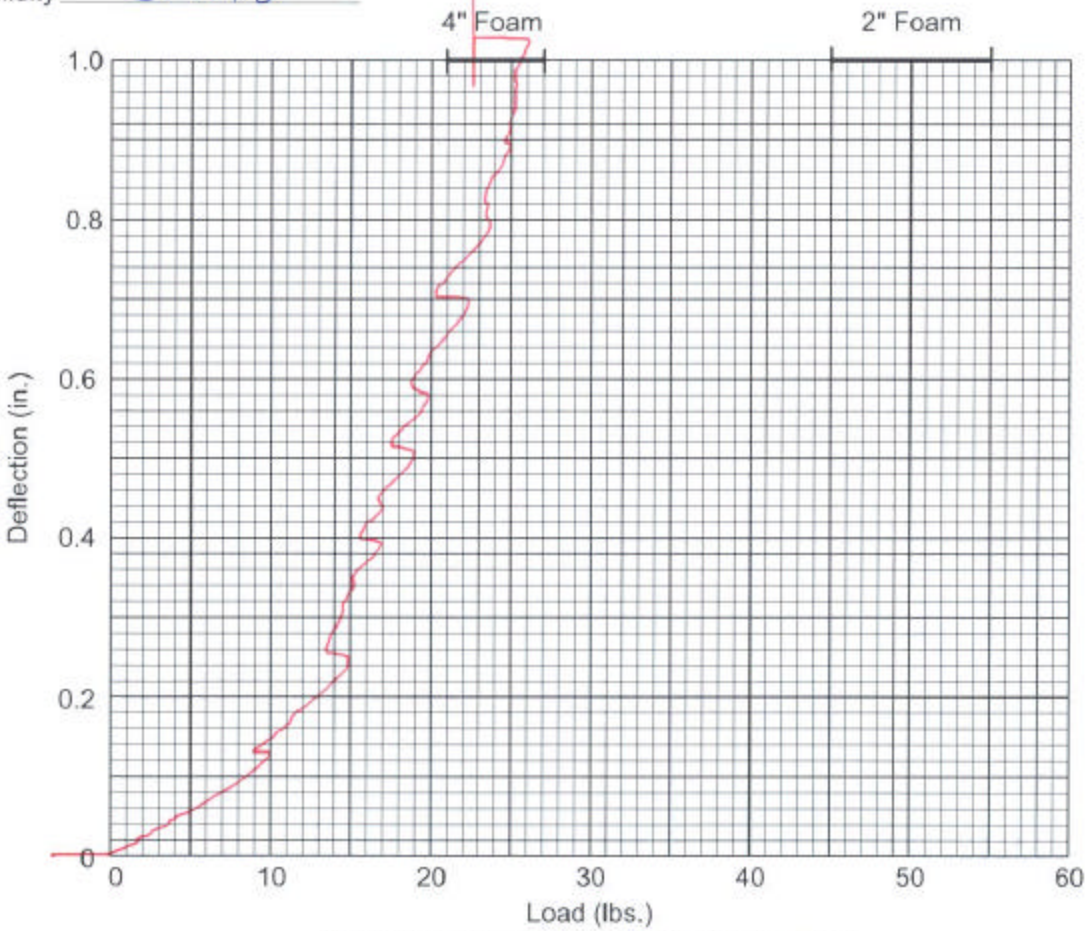
Date 3/25/02

Performed By SD

Temp. 70°

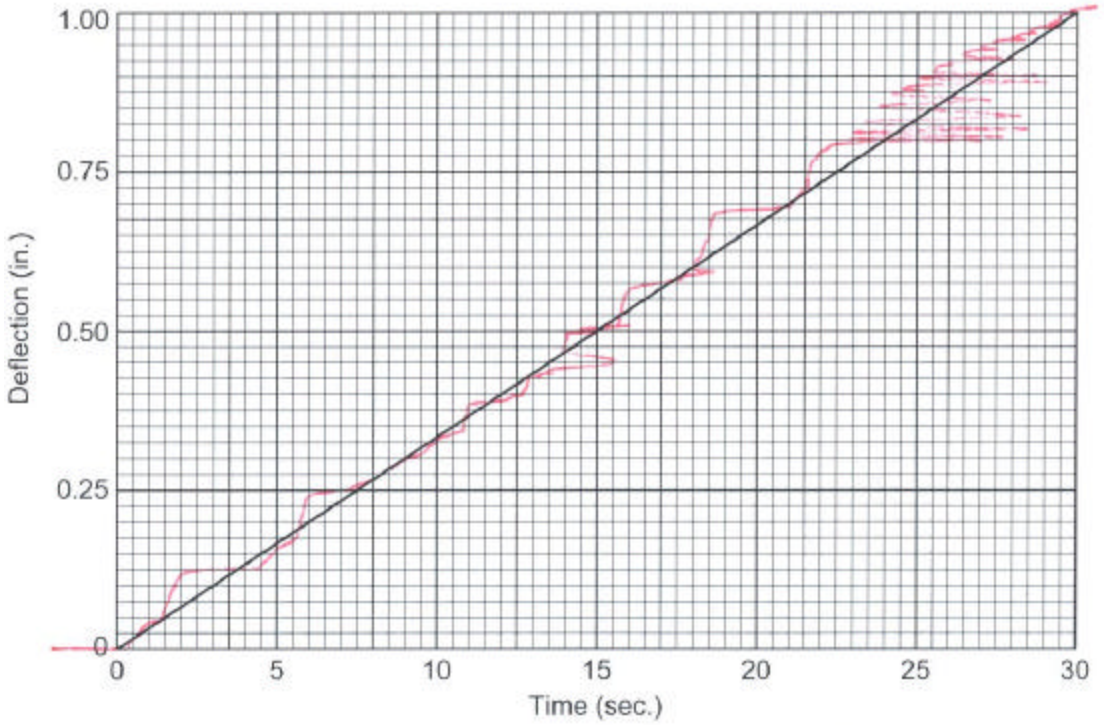
Humidity 50%

Foam No. 4,'20"H(



Compression - Deflection Resistance Test
Child Seat Foam

Date 3/25/02
Temp 70°
Humidity 50%
Foam No. 4'X20"H



Compression - Deflection Resistance Test Child Seat Foam

FM-22-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 4"X20"H1

Date	Peak Load	Pass/Fail
3/25/02	225 LBS	PASS

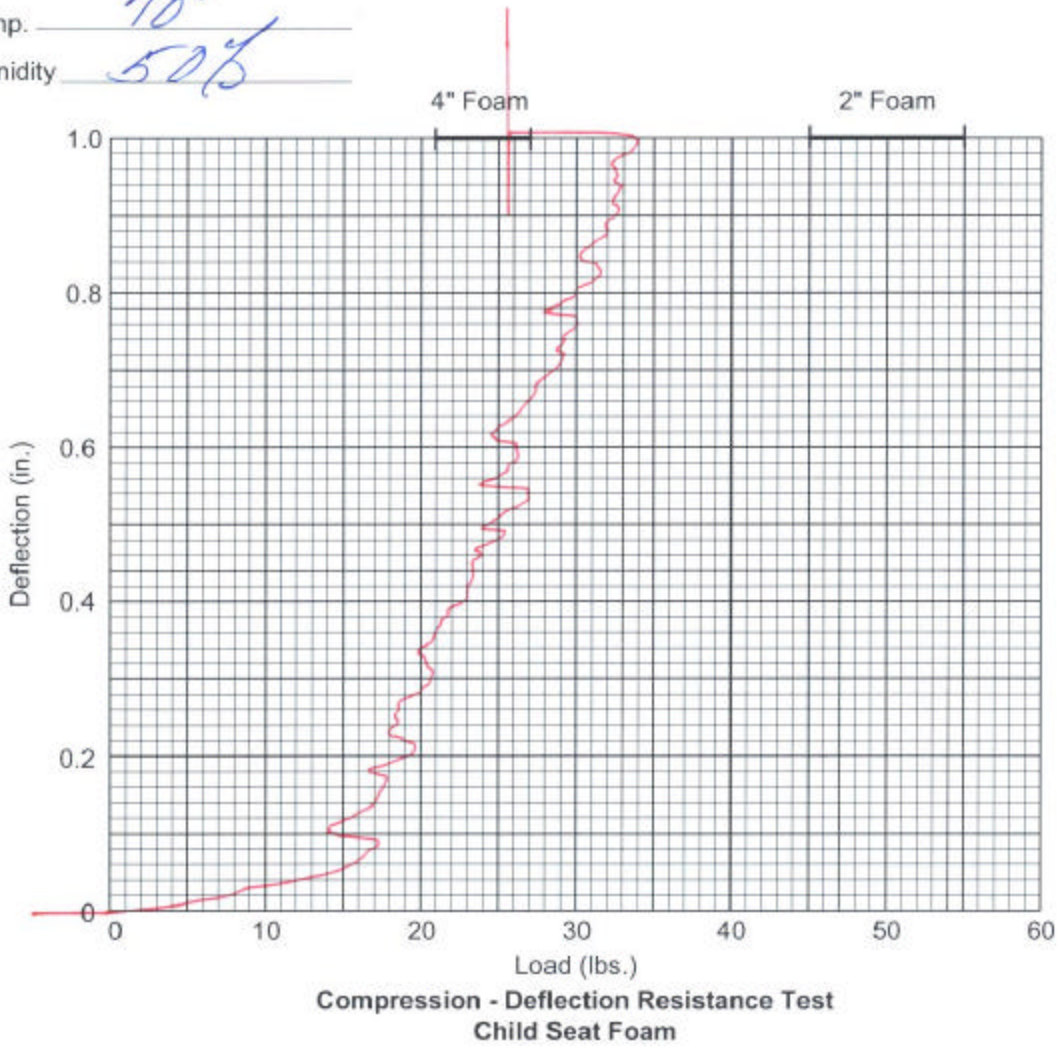
Date 3/25/02

Foam No. 4"x24"#1

Performed By SD

Temp. 70°

Humidity 50%



Compression - Deflection Resistance Test
Child Seat Foam

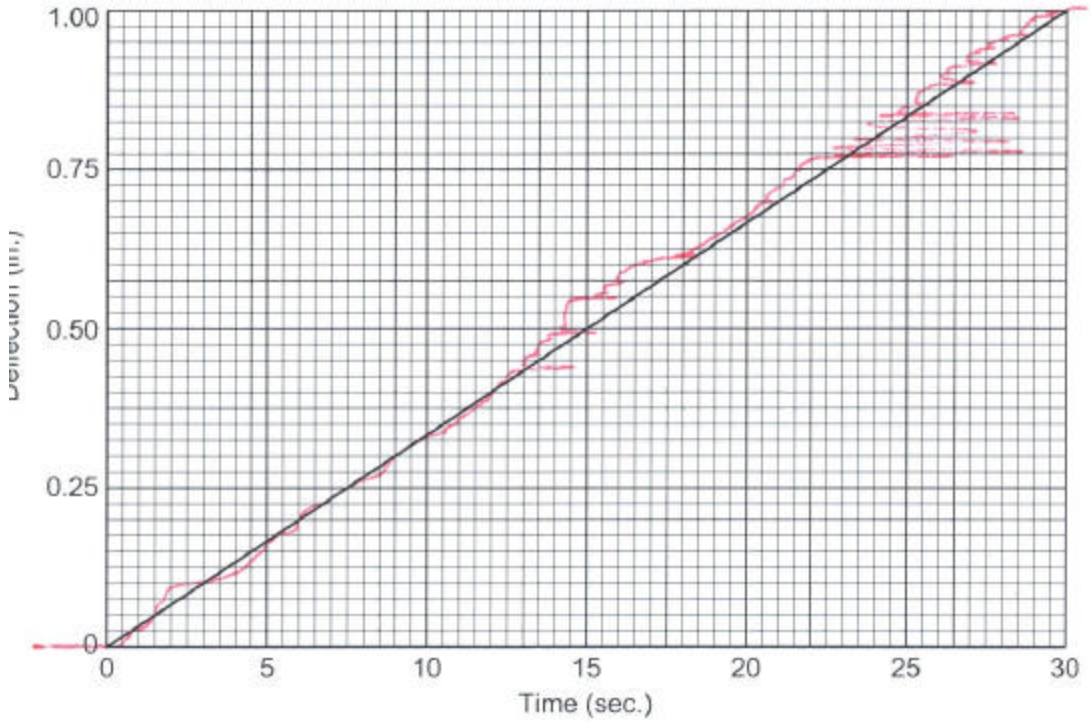
FM-052-CERT-002-R01

Date 3/25/02

Temp 70°

Humidity 50%

Foam No. 4"X24"H/I



Compression - Deflection Resistance Test Child Seat Foam

FM. .2-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 4" X 24" H/

Date	Peak Load	Pass/Fail
3/25/02	25.5 LBS	PASS

SECTION 13

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

Calibration No.	C2624017	Date	Jan 7, 2002 Due Jan 7, 2003
Model No.	3303	Serial No.	210
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	22.2 / 25.9
Customer	VRTC	Last Calibrated	Nov 28, 2000
Description	Child Neck	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 J. Kovalchuk

Robert A. Denton, Inc. Authorized Representative 01/07/02 15:58:43

File UCALRPT FPC

Page 1 of 1

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

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	Applied Load	FX 1000.0 lbf	FY 1000.0 lbf	FZ 1500.0 lbf	MX 1500.0 in-lbf	MY 1500.0 in-lbf	MZ 1000.0 in-lbf
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	Applied Load	FX 1000.0 lbf	FY 1000.0 lbf	FZ 1500.0 lbf	MX 1500.0 in-lbf	MY 1500.0 in-lbf	MZ 1000.0 in-lbf
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

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*

Axis	Input Impedance	Output Impedance	
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**

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 ±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

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 Used[3]

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%	

CLF014

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 1-15-02

~~Lower~~

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

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 J. Kovalchuk GS

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/07/02 15:32:46

Page 1 of 1

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

Automated Load Cell Calibration System

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

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)

Bridge	Applied Load	FX 1000.0 lbf	FY 1000.0 lbf	FZ 1500.0 lbf	MX 1500.0 in-lbf	MY 1500.0 in-lbf	MZ 1000.0 in-lbf
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 *

Bridge	Applied Load	FX 1000.0 lbf	FY 1000.0 lbf	FZ 1500.0 lbf	MX 1500.0 in-lbf	MY 1500.0 in-lbf	MZ 1000.0 in-lbf
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

Calibration Number	C2624016	This Calibration	15:21:49	Jan 07, 2002
Model Number	3303	Calibration Due		Jan 07, 2003
Serial Number	86	Last Calibrated		Nov 25, 1998
Description	Child Neck	Temp (°C) / Hum (%)		22.4 / 18.3
Customer	VRTC	Customer Tag		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 ±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).

File: MEASRPT.DFM
Technician: J. Kovalchuk

1/7/02 4:46 PM

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

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 Used[3]

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%	

CLF014

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	Elect. Developement Cce-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: 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

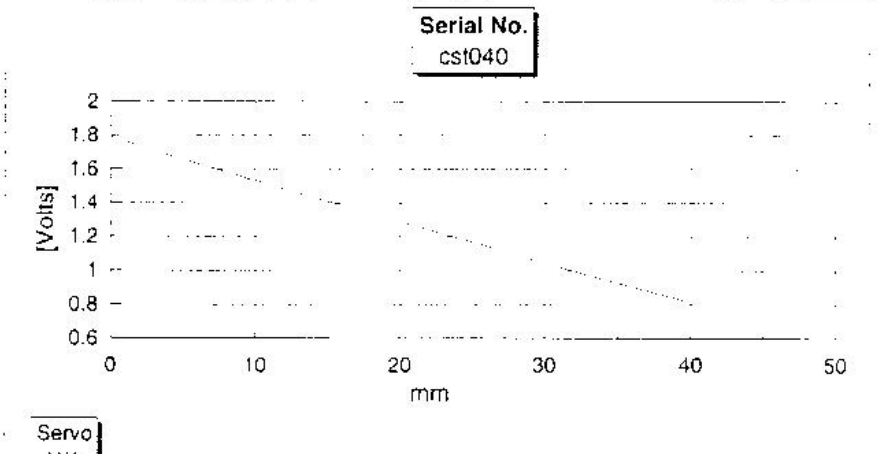
TECHNICIAN: _____ Date: 1/4/2002

Dustin Walborn

ENGINEER UNITS mm	Y-axis READING [Volts]	NON-LINEARITY [%]	%FULL SCALE ERROR
0	1.788	ERR	1.01%
5	1.6569	0.41%	0.05%
10	1.5299	-1.93%	-0.49%
15	1.40818	-1.27%	-0.48%
20	1.2871	-0.80%	-0.41%
25	1.1667	-0.41%	-0.27%
30	1.044	-0.47%	-0.37%
35	0.9277	0.24%	0.19%
40	0.81175	0.81%	0.79%

Regression Output:

Constant		1.778195
Std Err of Y Est		0.005857
R Squared		0.99973
No. of Observations		9
Degrees of Freedom		7
X Coefficient(s)	-0.02435	
Std Err of Coef.	0.000151	



040 H III 3Y0
head 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

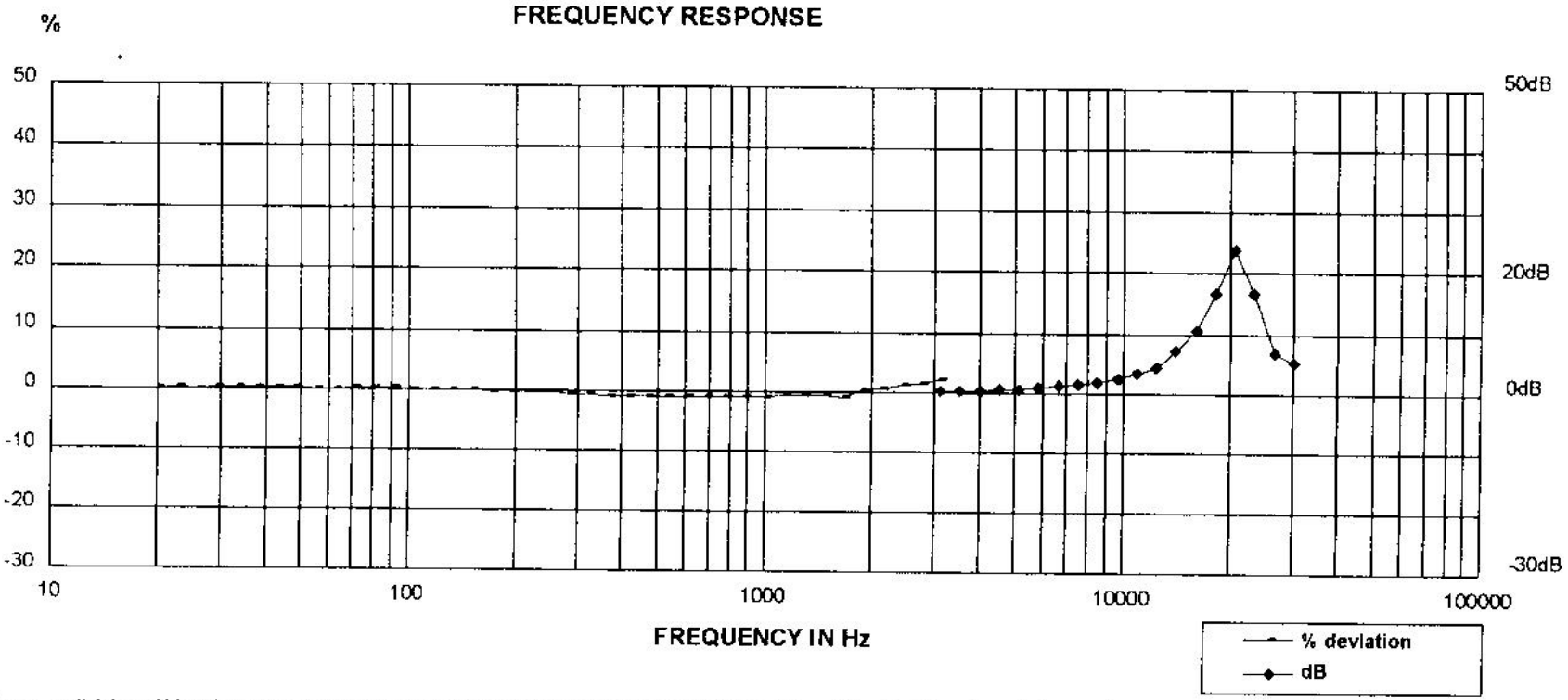
ZMO (mV): -32.34
Resonance Frequency (Hz): 20180

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).

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

040 HIII 3Y0
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

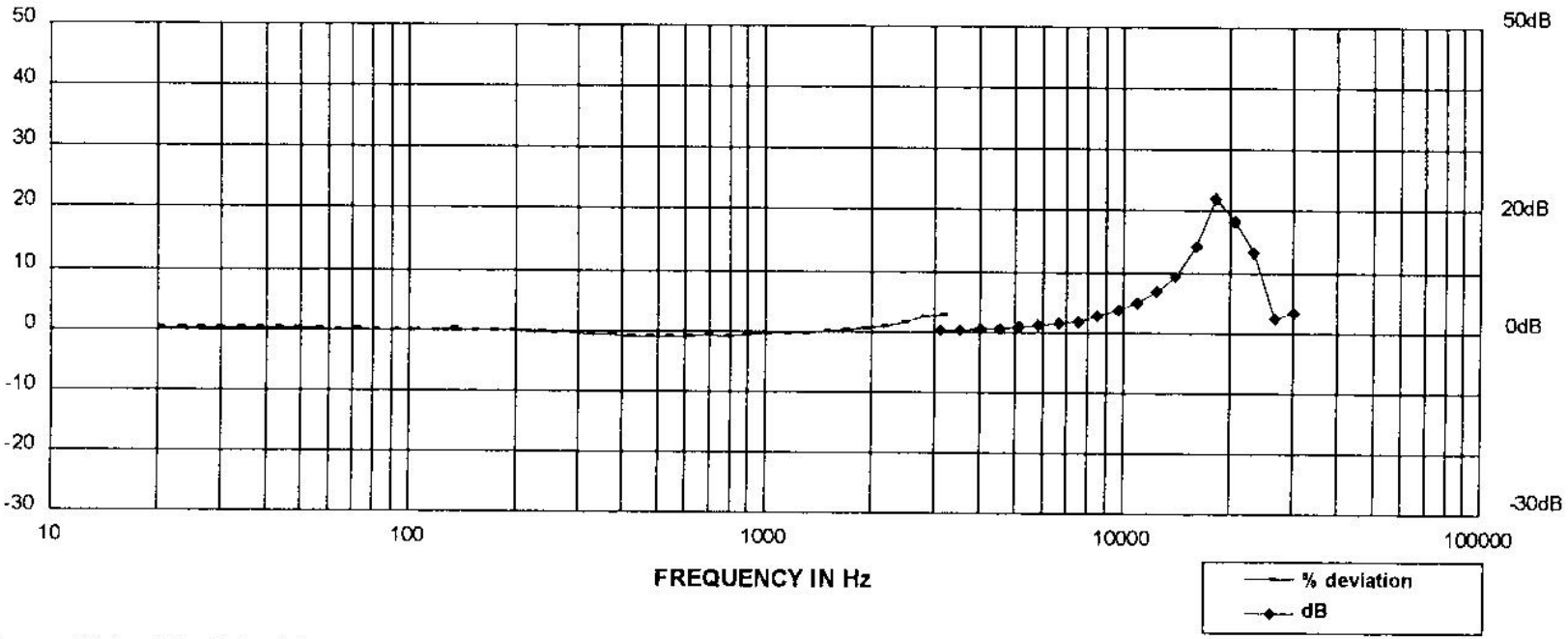
0.2577 mV/g @ 100 Hz, 10g pk

Last Sens: 2.649E-1, Change: -2.7
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

FREQUENCY RESPONSE



Endevco, a division of Meggitt, located at 30700 Rancho Vlejo 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)

nsole 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

EDxxx Rev x_eg

) HIII 5%O

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

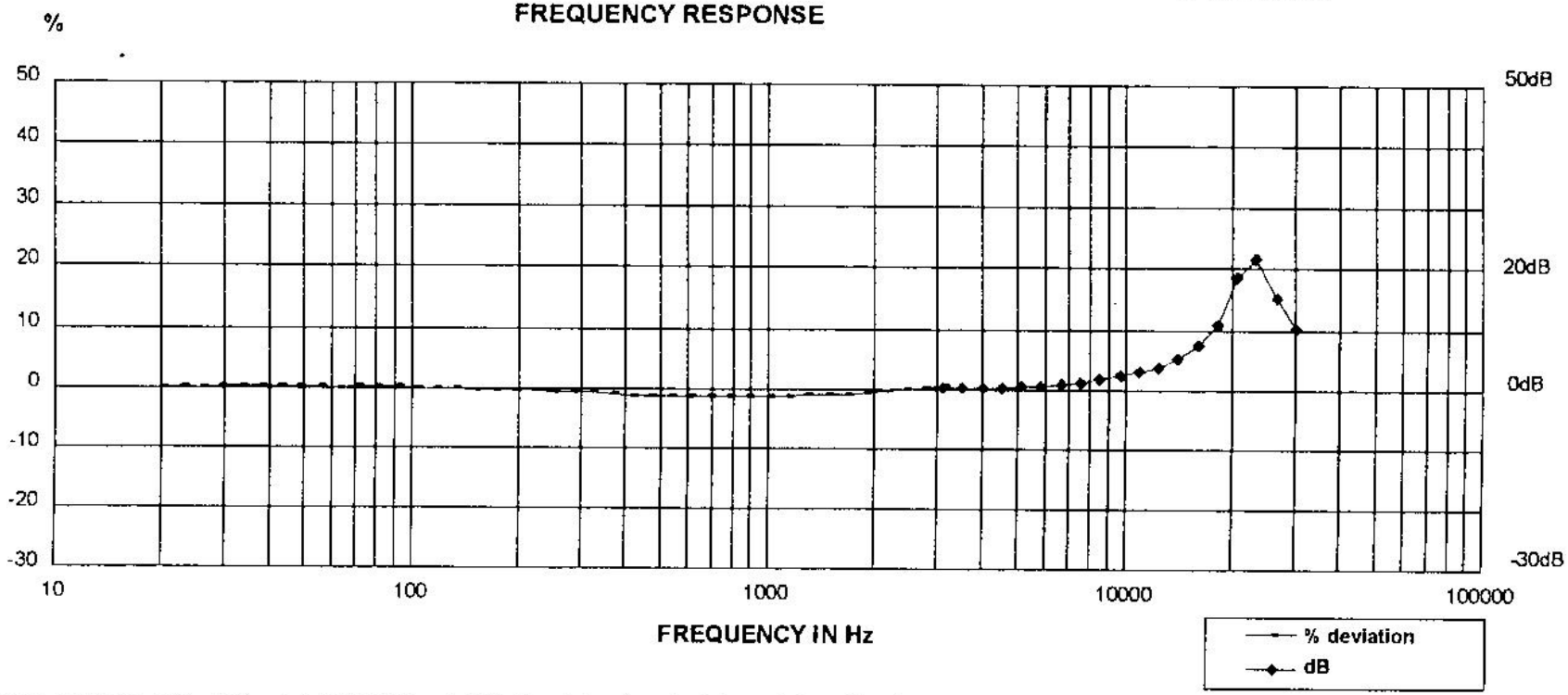
0.2796 mV/g @ 100 Hz, 10g pk

Last Sens: 2.793E-1, Change: 0.11
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

540 H III 3YC

Head Red Z up

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

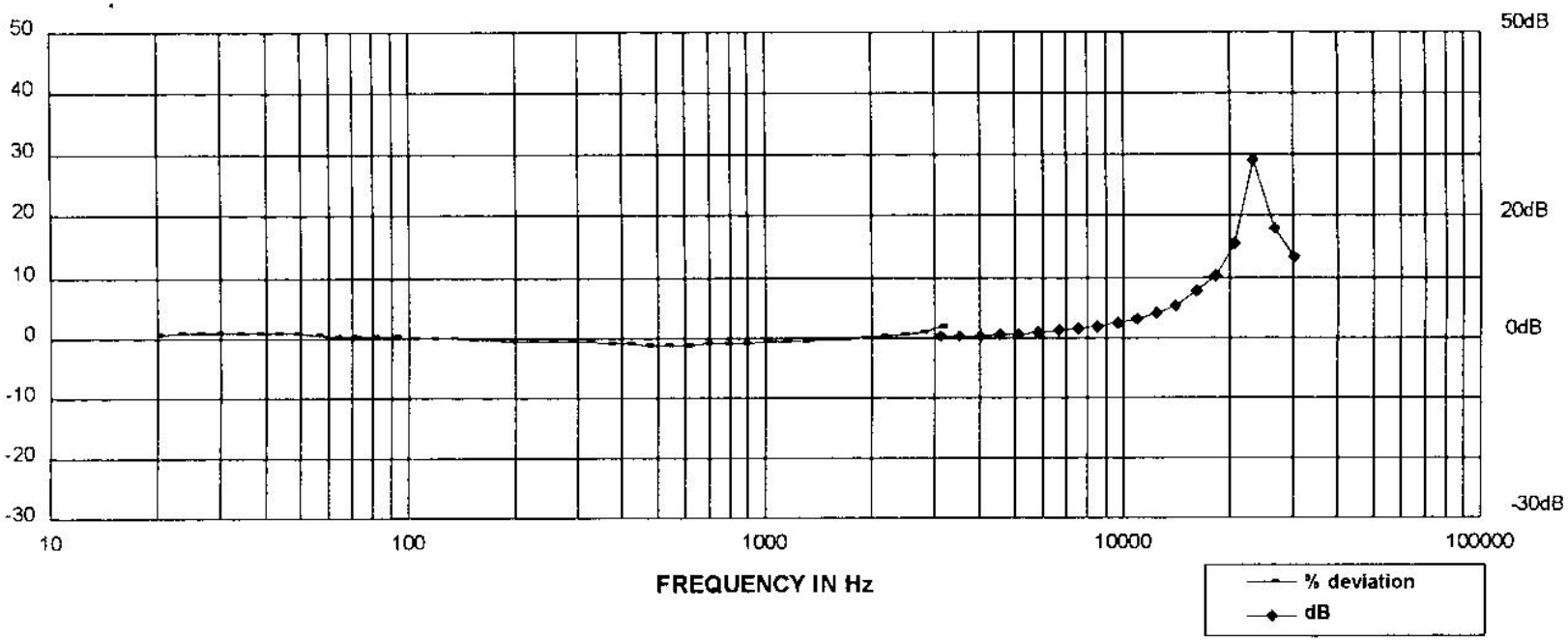
0.2339 mV/g @ 100 Hz, 10g pk

Last Sens: 2.337E-1, Change: 0.12
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x .sg

#040 H III 3Y0
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

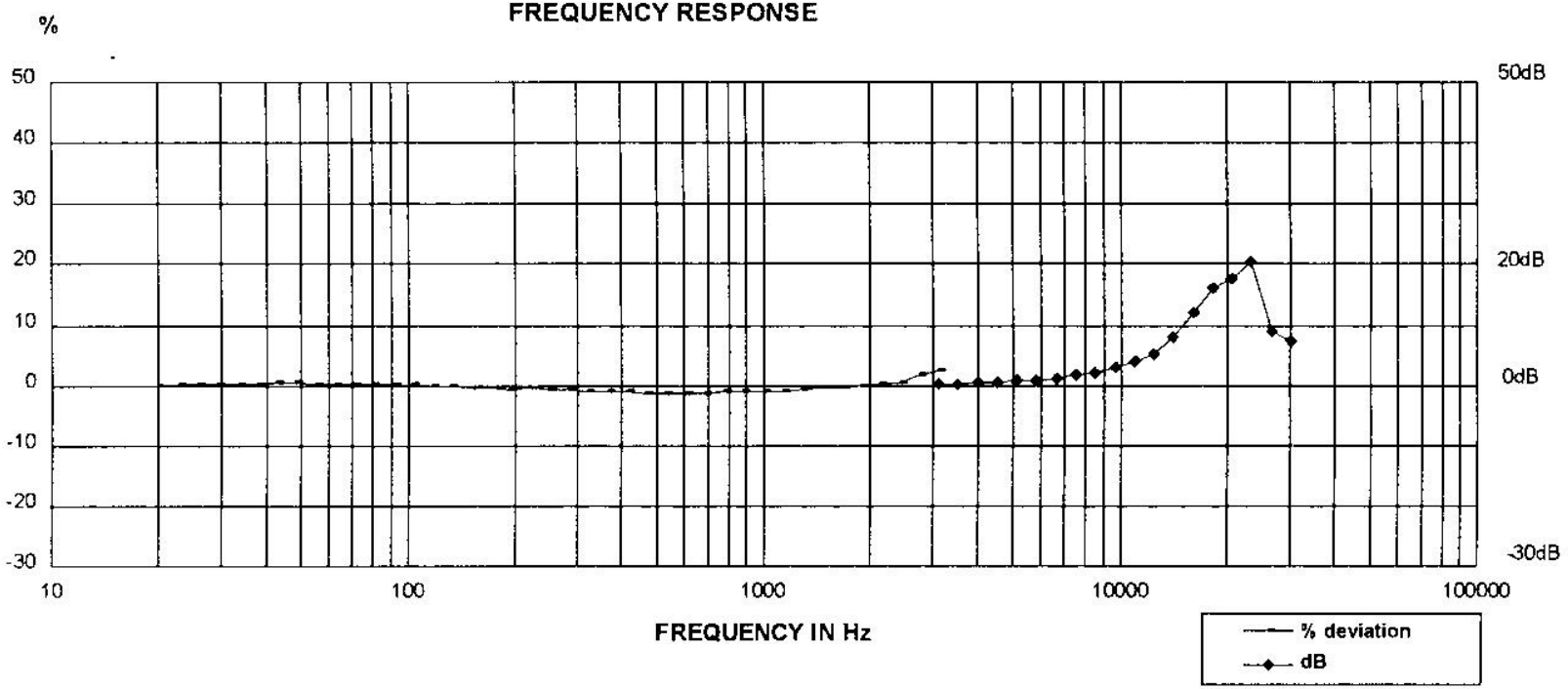
0.2308 mV/g @ 100 Hz, 10g pk

Last Sens: 2.228E-1, Change: 3.61
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x .eg

>40 HIII 3Y0
chest 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

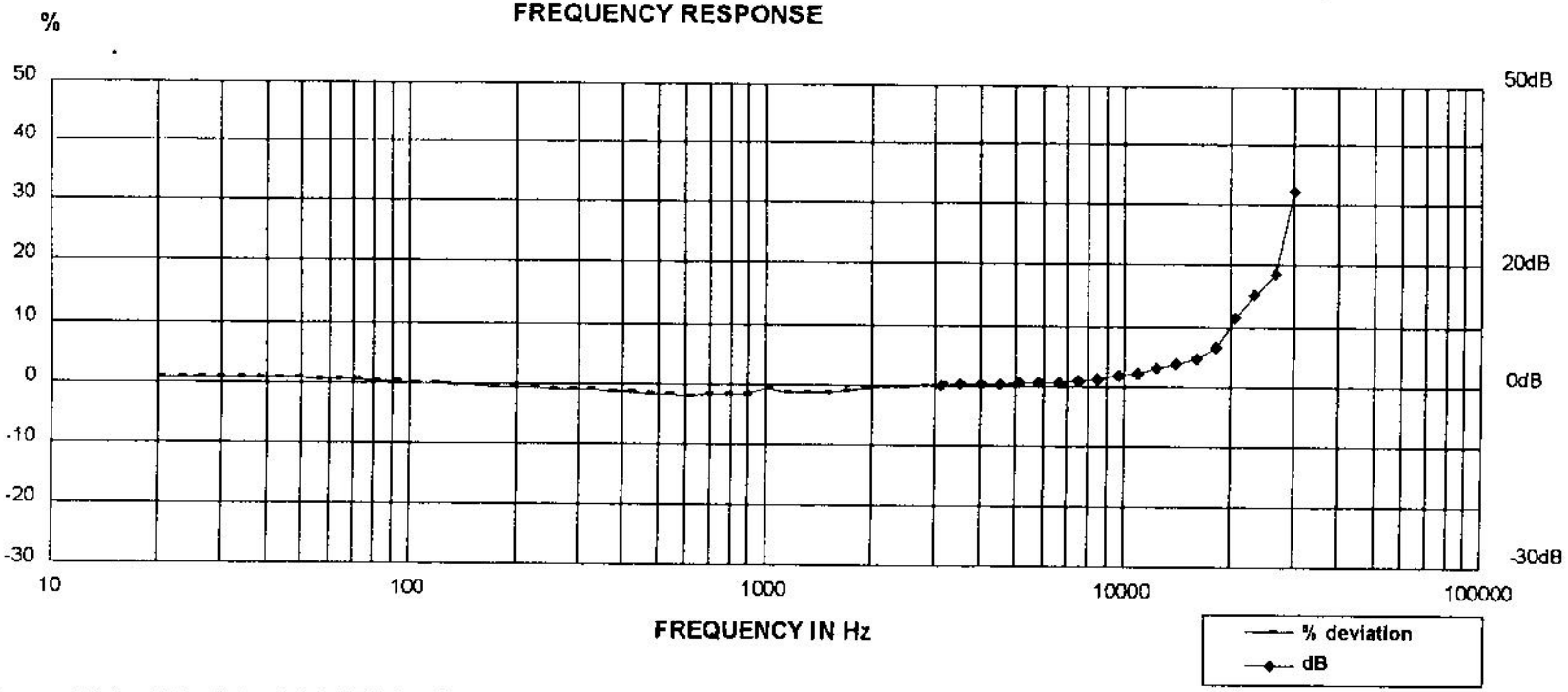
0.213 mV/g @ 100 Hz, 10g pk

Last Sens: 2.130E-1, Change: -0.02
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x_eg

040 HIII 3YO
^chest z up

Calibration Certificate

Customer: VRTC
19950311-0130

Document number: 5877

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BQE0-2000BF
Serial Number: 99H12-F08

Input Resistance (ohms): 967.13

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

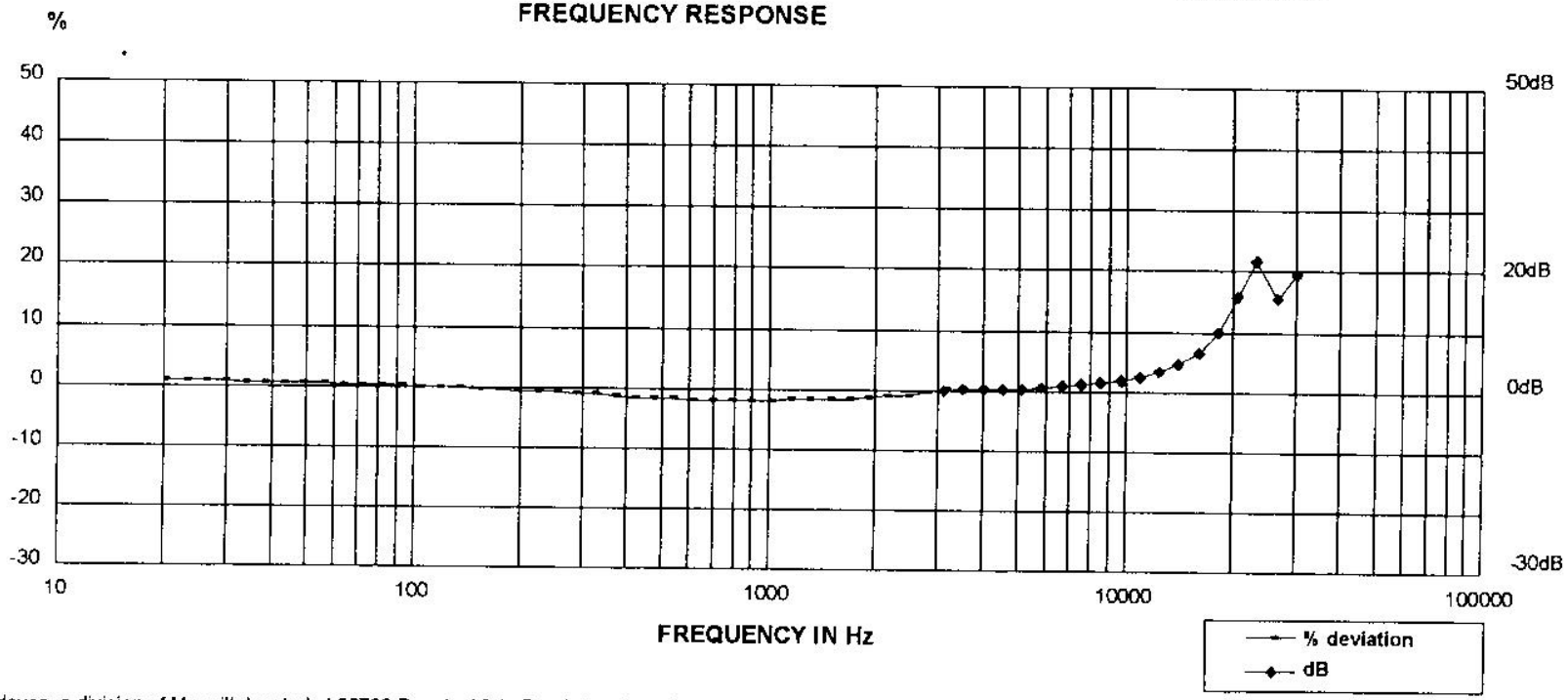
0.1765 mV/g @ 100 Hz, 10g pk

Last Sens: 1.776E-1, Change: -0.6
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x_eg

10 HIII 3Y0

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

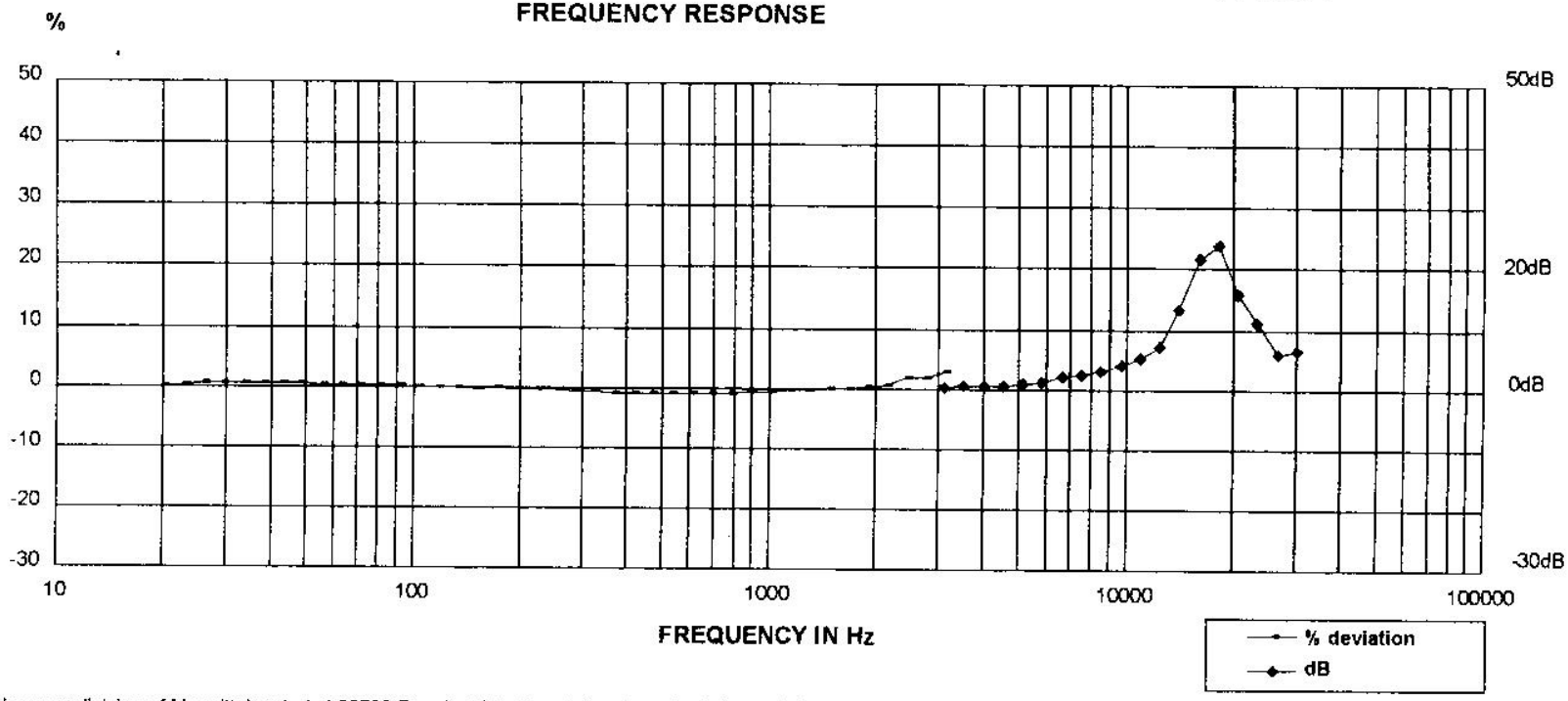
0.3455 mV/g @ 100 Hz, 10g pk

Last Sens: 3.416E-1, Change: 1.16
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x_eg

√

040 HIII 5Y0

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

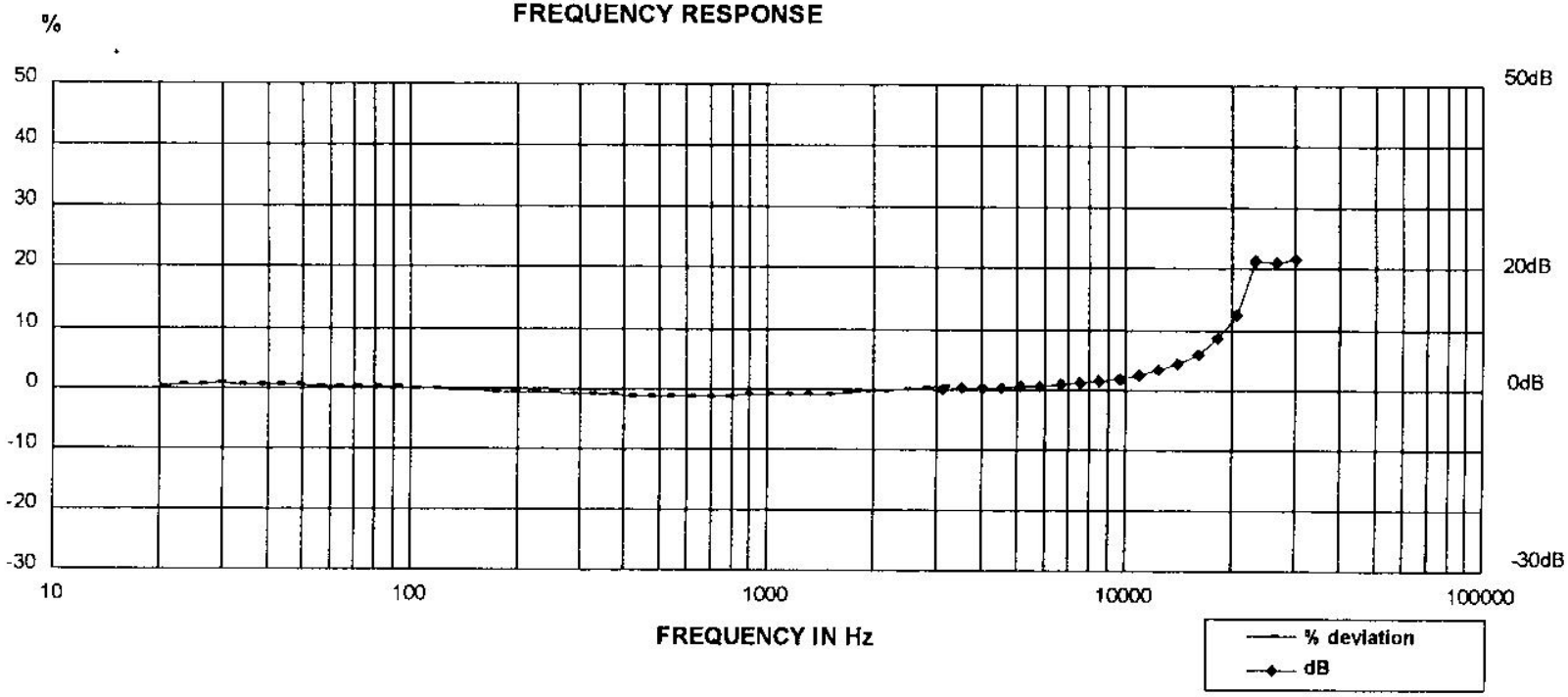
0.2445 mV/g @ 100 Hz, 10g pk

Last Sens: 2.427E-1, Change: 0.71
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x_eg

Pelvis Z up

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

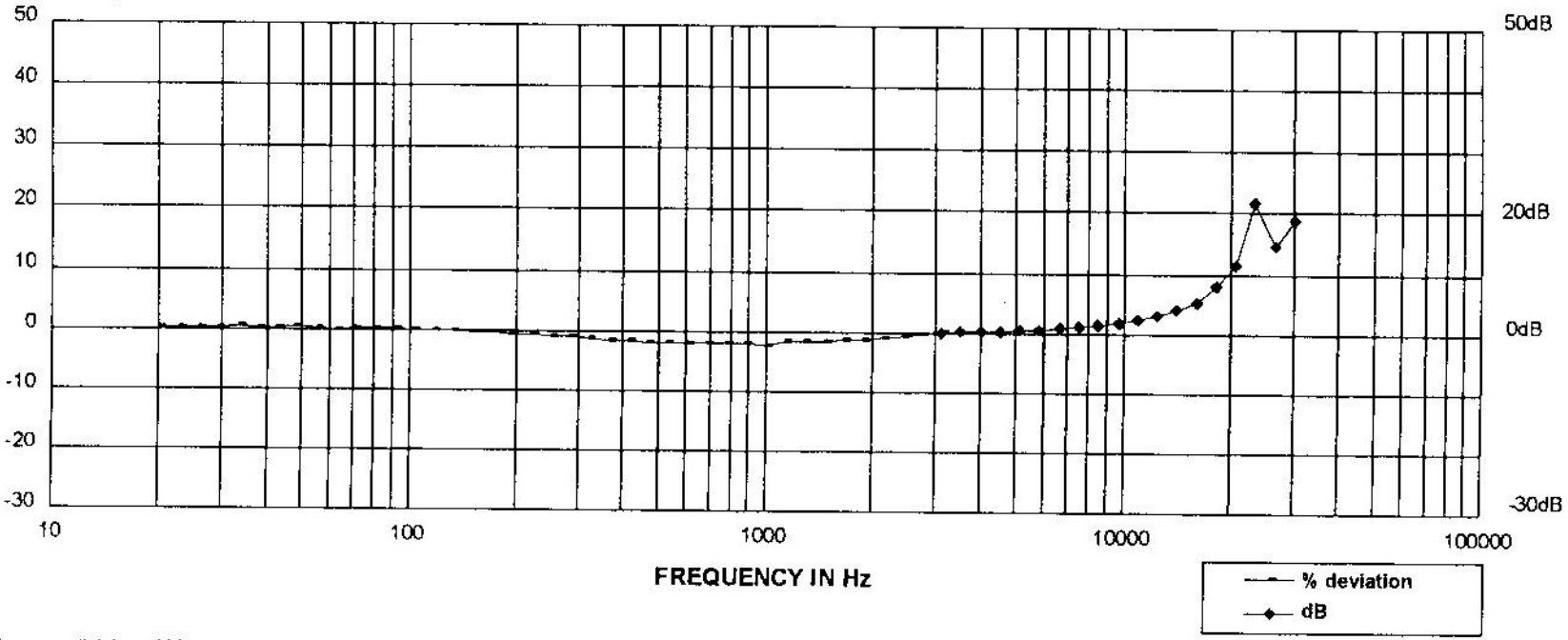
0.2266 mV/g @ 100 Hz, 10g pk

Last Sens: 2.268E-1, Change: -0.06
Next cal date: 12/27/2002

Notes:

Excitation: 10.0 V

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: 12/27/2001

Endevco
Transportation Research Center

EDxxx Rev x_eg

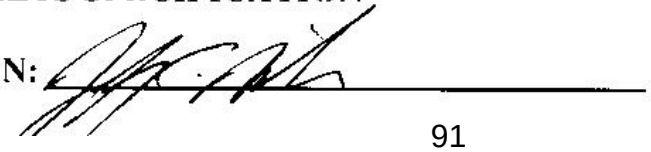
TRANSPORTATION RESEARCH CENTER INC.
HYBRID III THREE-YEAR-OLD EXTERNAL DIMENSIONS
SN: 040 MFG: Denton

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

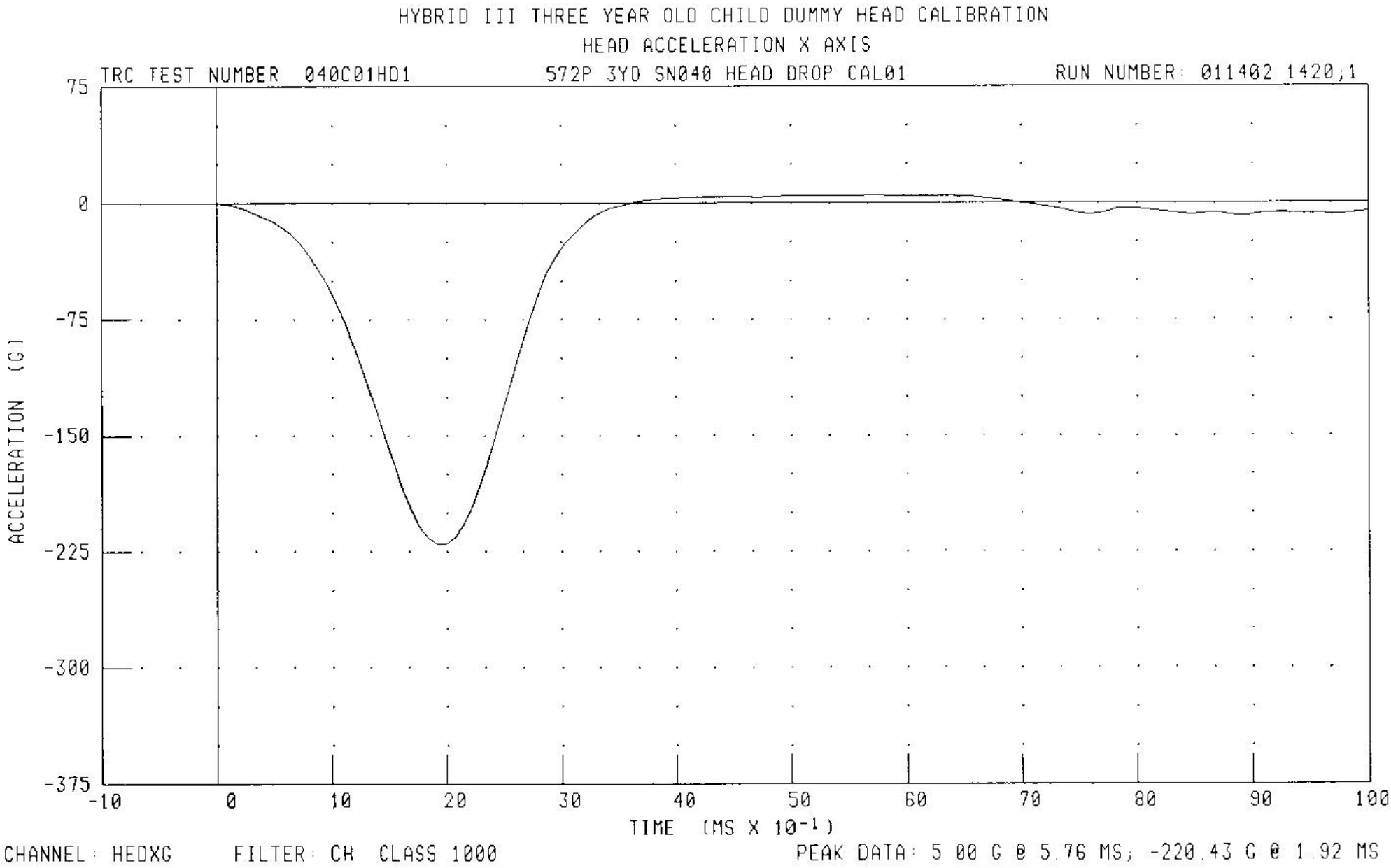
HYBRID III THREE YEAR OLD 14-JAN-02

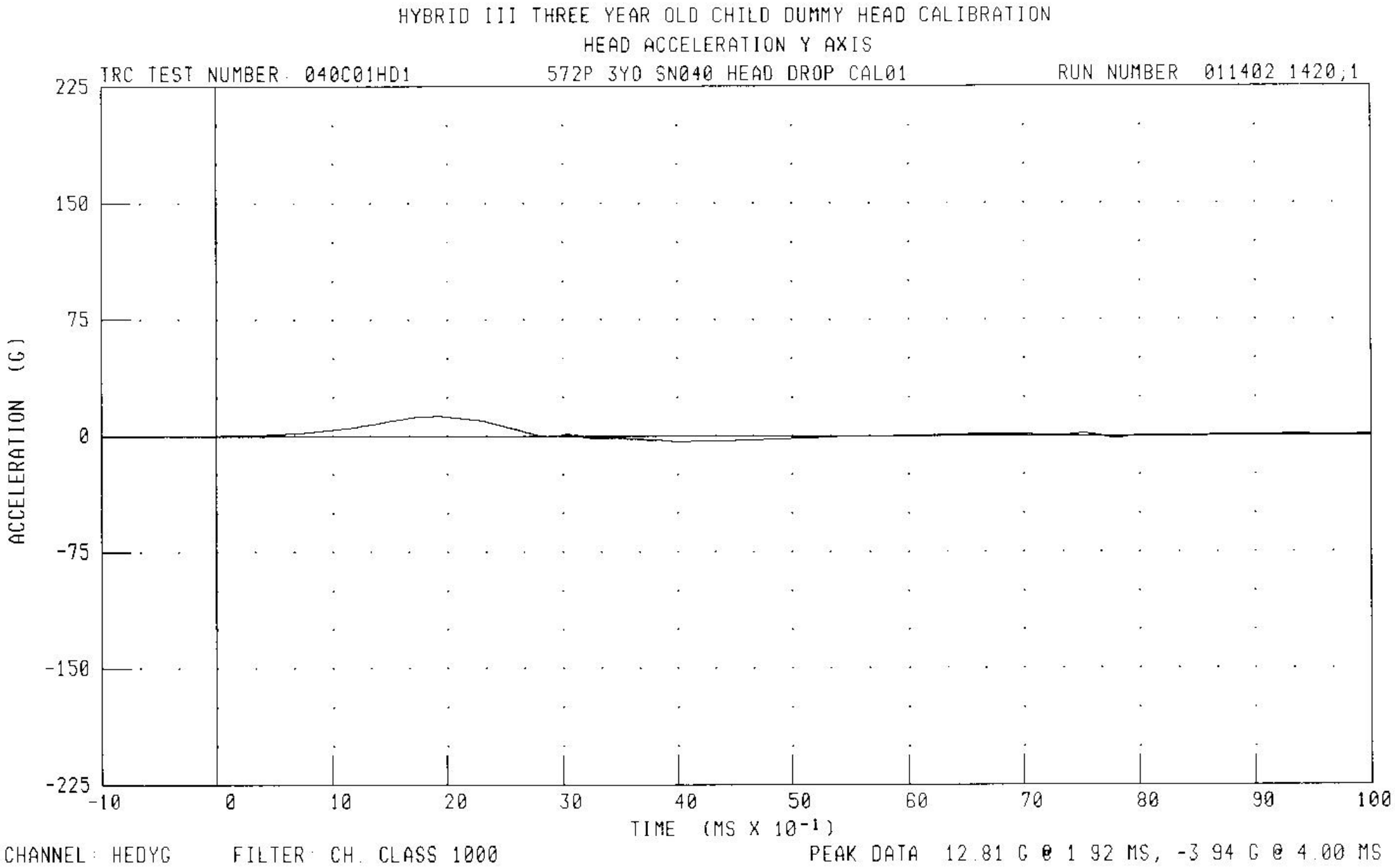
TRC INC. TEST NO: 040C01HD1 572P 3YO SN040 HEAD DROP CAL01

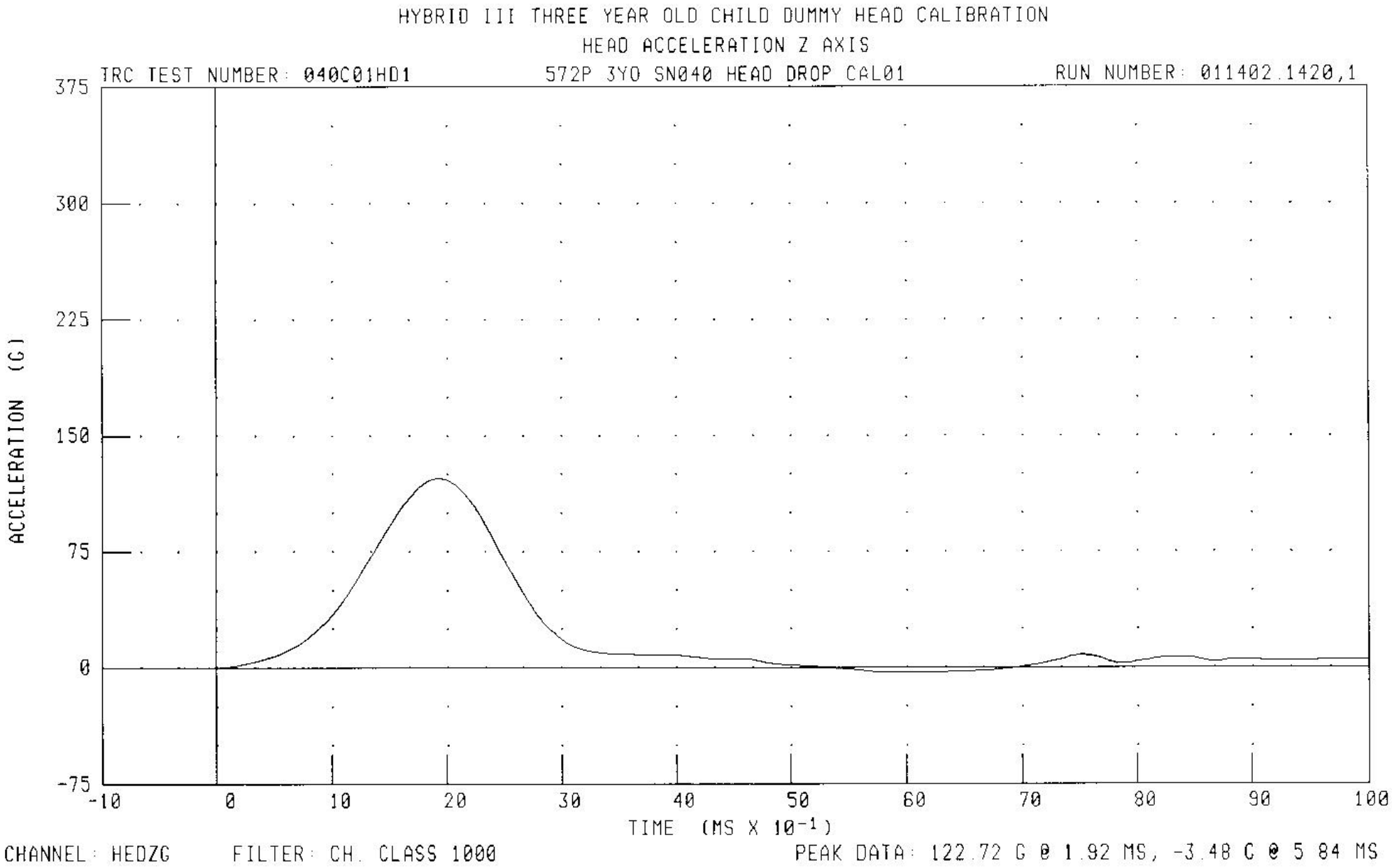
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	20.6 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PEAK RESULTANT ACCELERATION	250 - 280 G	252.61 G
PEAK LATERAL ACCELERATION	15 G MAX	12.80 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

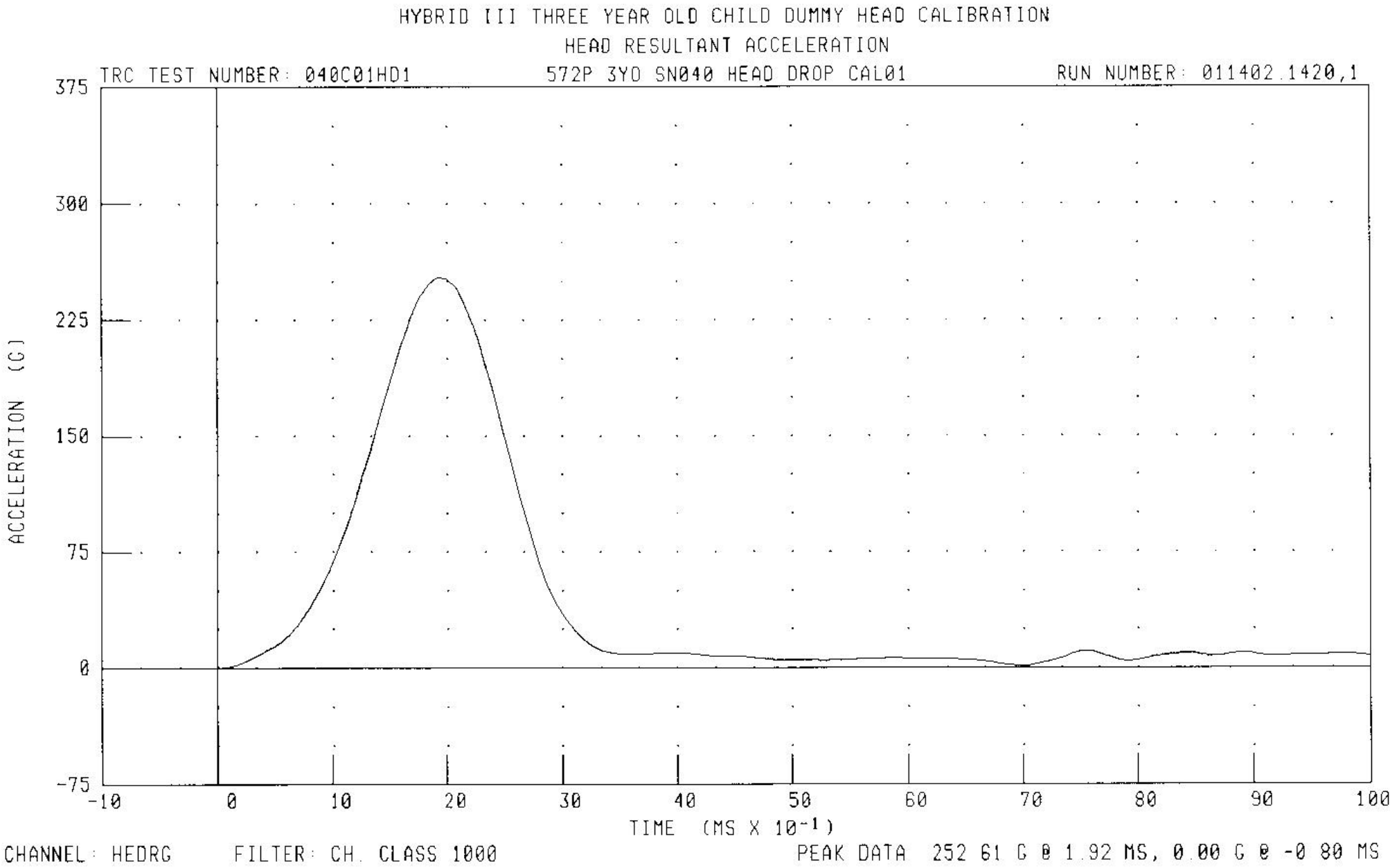
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 011402.1417;1


HYBRID III THREE YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER 040C01HD1
572P 3YO SN040 HEAD DROP CAL01
RUN NUMBER: 011402 1420;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: 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
TRC TEST NUMBER 040C01HD1
572P 3YO SN040 HEAD DROP CAL01
RUN NUMBER 011402 1420,1
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 12.81 G @ 1 92 MS, -3 94 G @ 4.00 MS


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
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: 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
TRC TEST NUMBER: 040C01HD1
572P 3YO SN040 HEAD DROP CAL01
RUN NUMBER: 011402.1420,1
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 252.61 G @ 1.92 MS, 0.00 G @ -0.80 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III THREE YEAR OLD 17-JAN-02

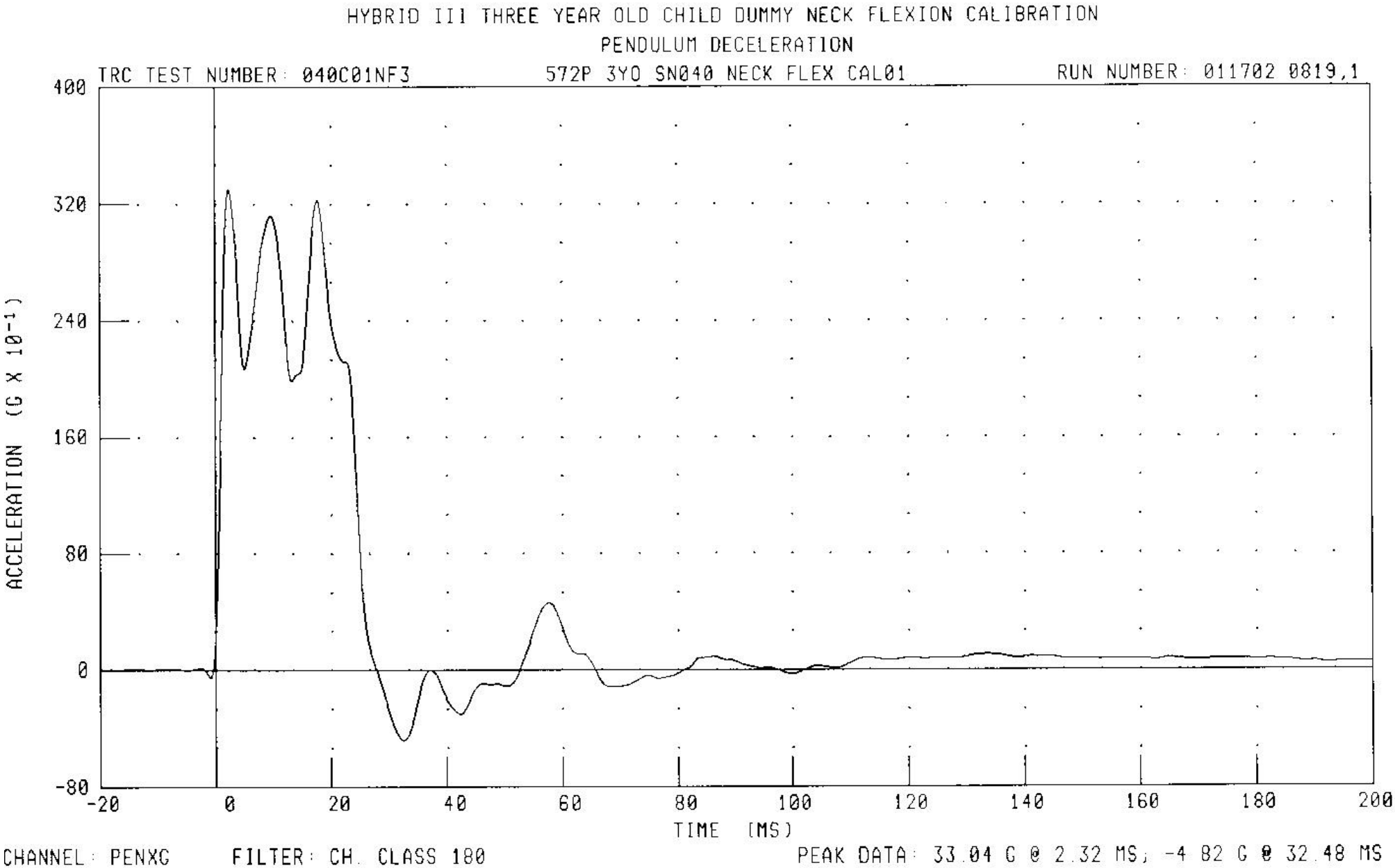
NECK FLEXION TEST

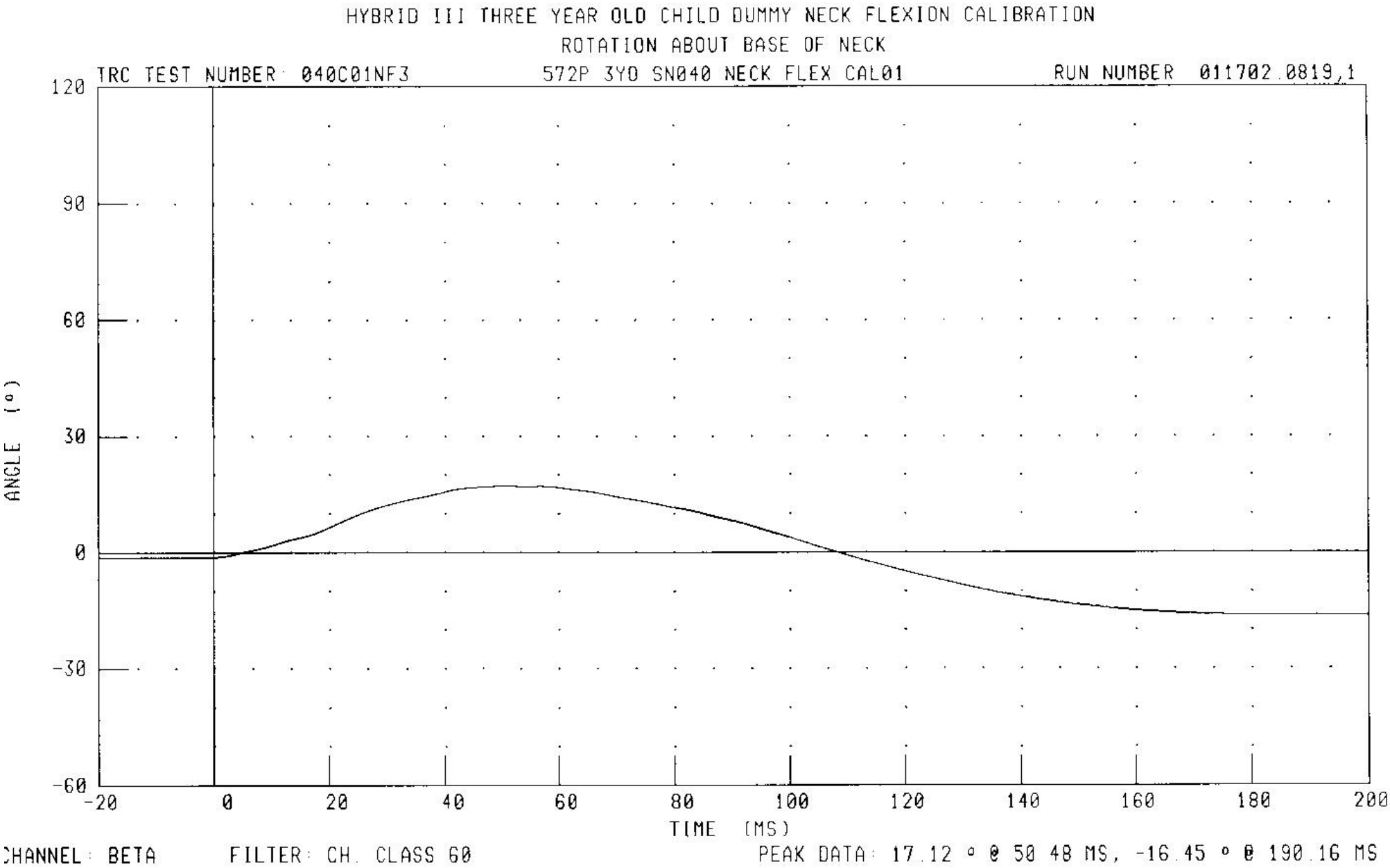
TRC INC. TEST NO: 040C01NF3 572P 3YO SN040 NECK FLEX CAL01

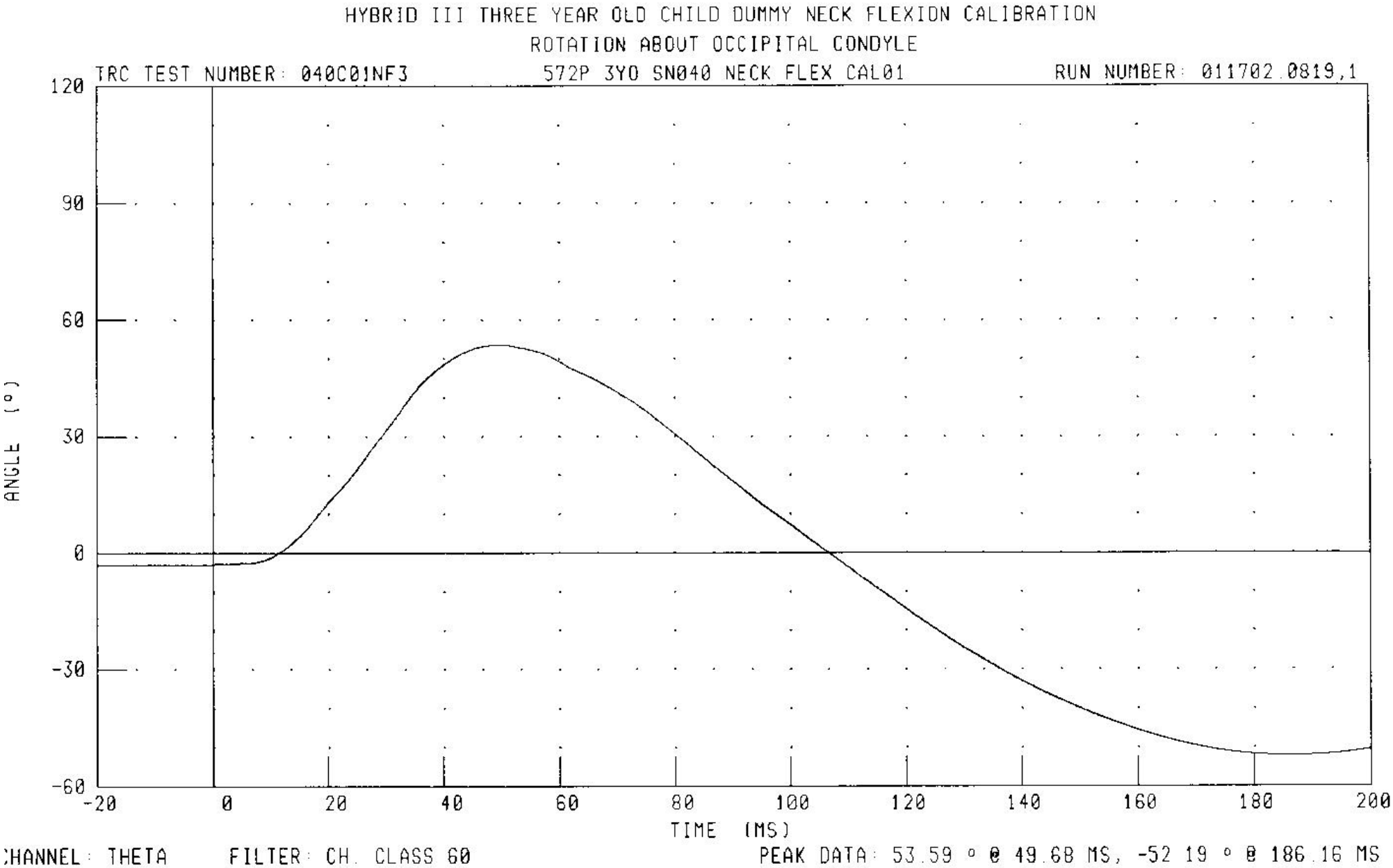
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	18.0 %
IMPACT VELOCITY		5.40 - 5.60 M/S	5.60 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.0 - 2.7 M/S	2.48 M/S
	15 MS	3.0 - 4.0 M/S	3.67 M/S
	20 MS	4.0 - 5.1 M/S	5.02 M/S
PEAK D-PLANE ROTATION		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

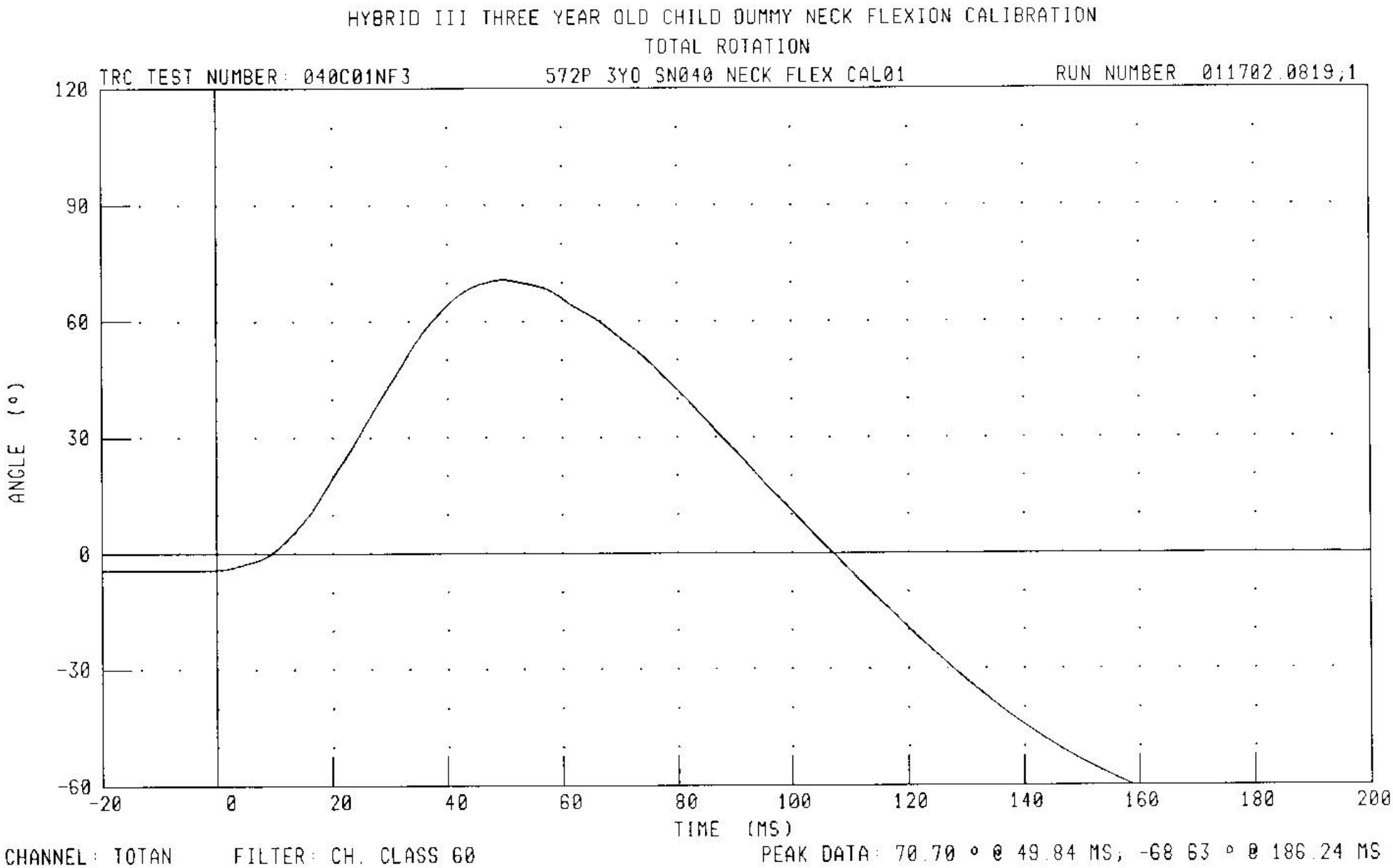
TEST MEETS SPECIFICATIONS

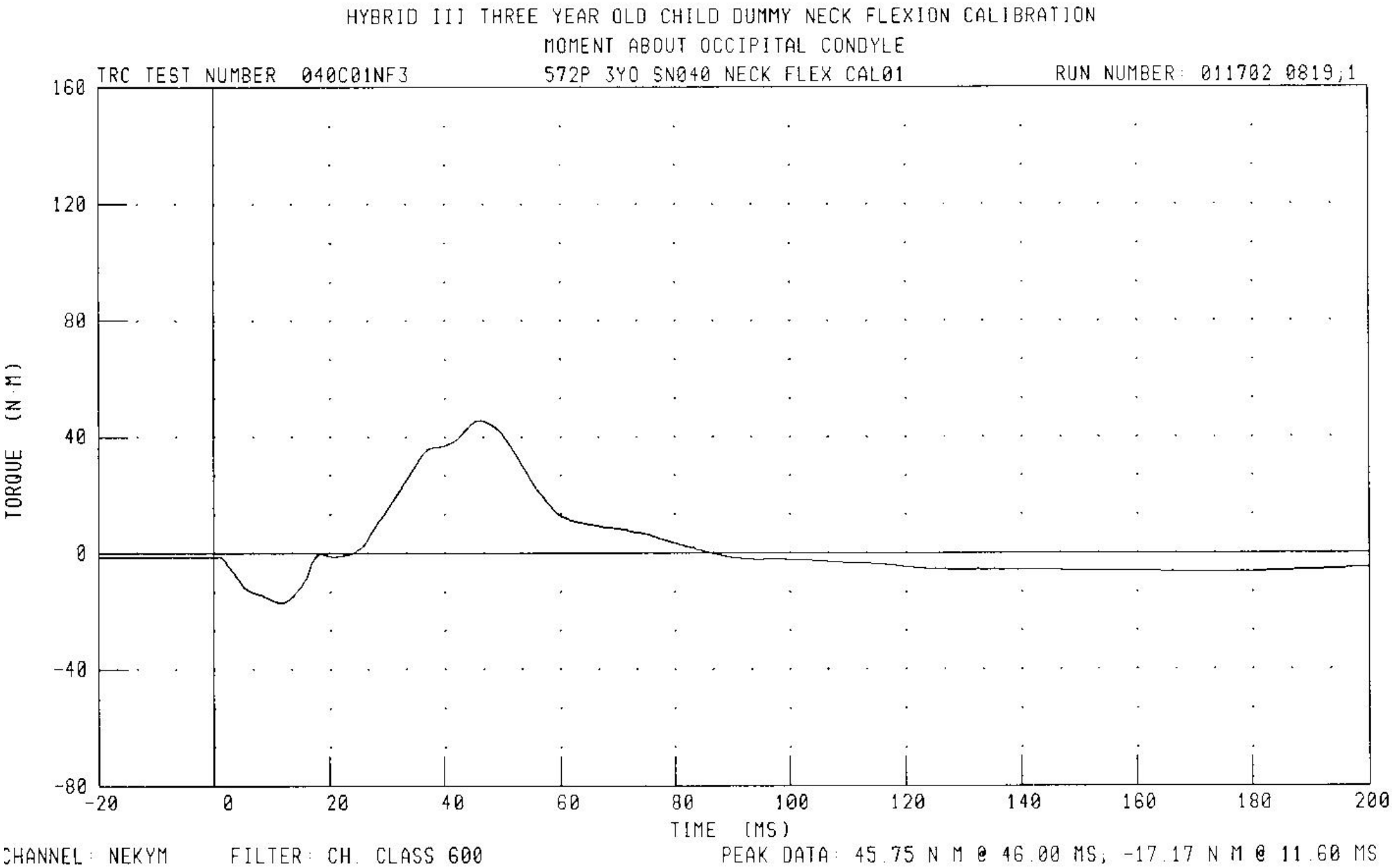
TECHNICIAN _____ RUN NUMBER: 011702.0817;1

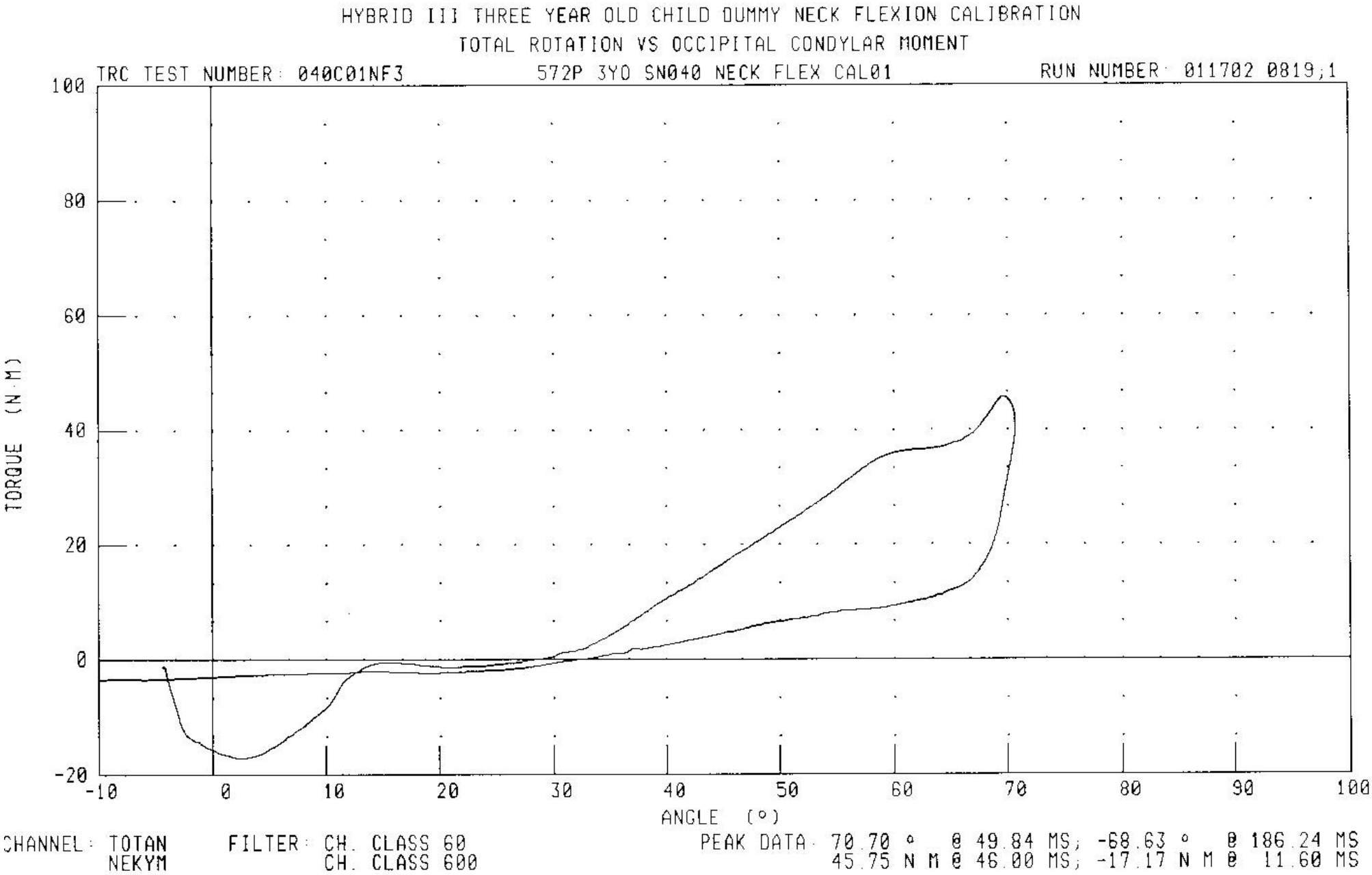

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 040C01NF3
572P 3YO SN040 NECK FLEX CAL01
RUN NUMBER: 011702 0819,1
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 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
TRC TEST NUMBER: 040C01NF3
572P 3YO SN040 NECK FLEX CAL01
RUN NUMBER 011702.0819,1
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: 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
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
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
TRC TEST NUMBER: 040C01NF3
572P 3YO SN040 NECK FLEX CAL01
RUN NUMBER 011702.0819;1
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: 70.70 ° @ 49.84 MS, -68.63 ° @ 186.24 MS


HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 040C01NF3
572P 3YO SN040 NECK FLEX CAL01
RUN NUMBER: 011702 0819;1
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: 45.75 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 3YO SN040 NECK FLEX CAL01
RUN NUMBER: 011702 0819;1
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: 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

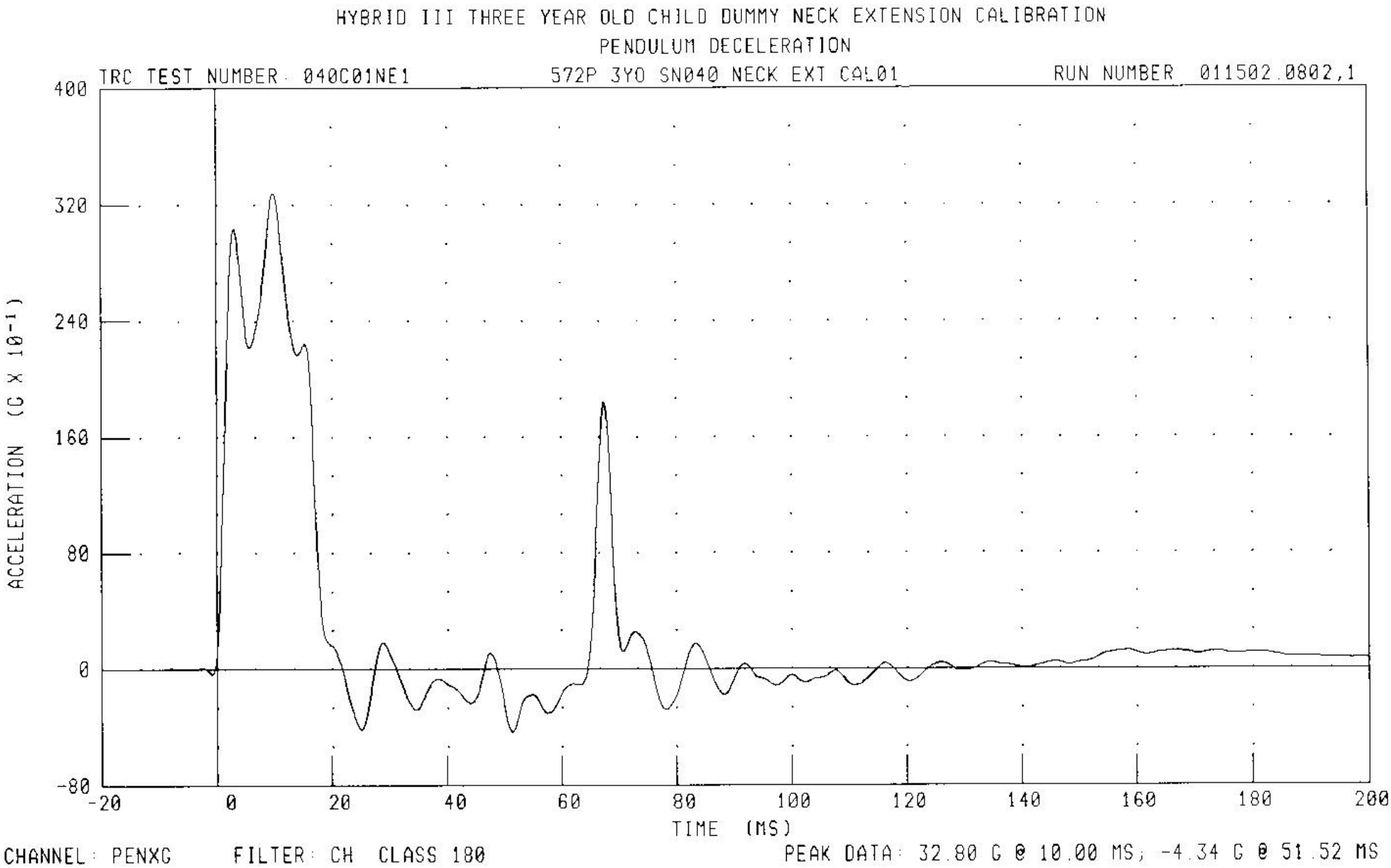
NECK EXTENSION TEST

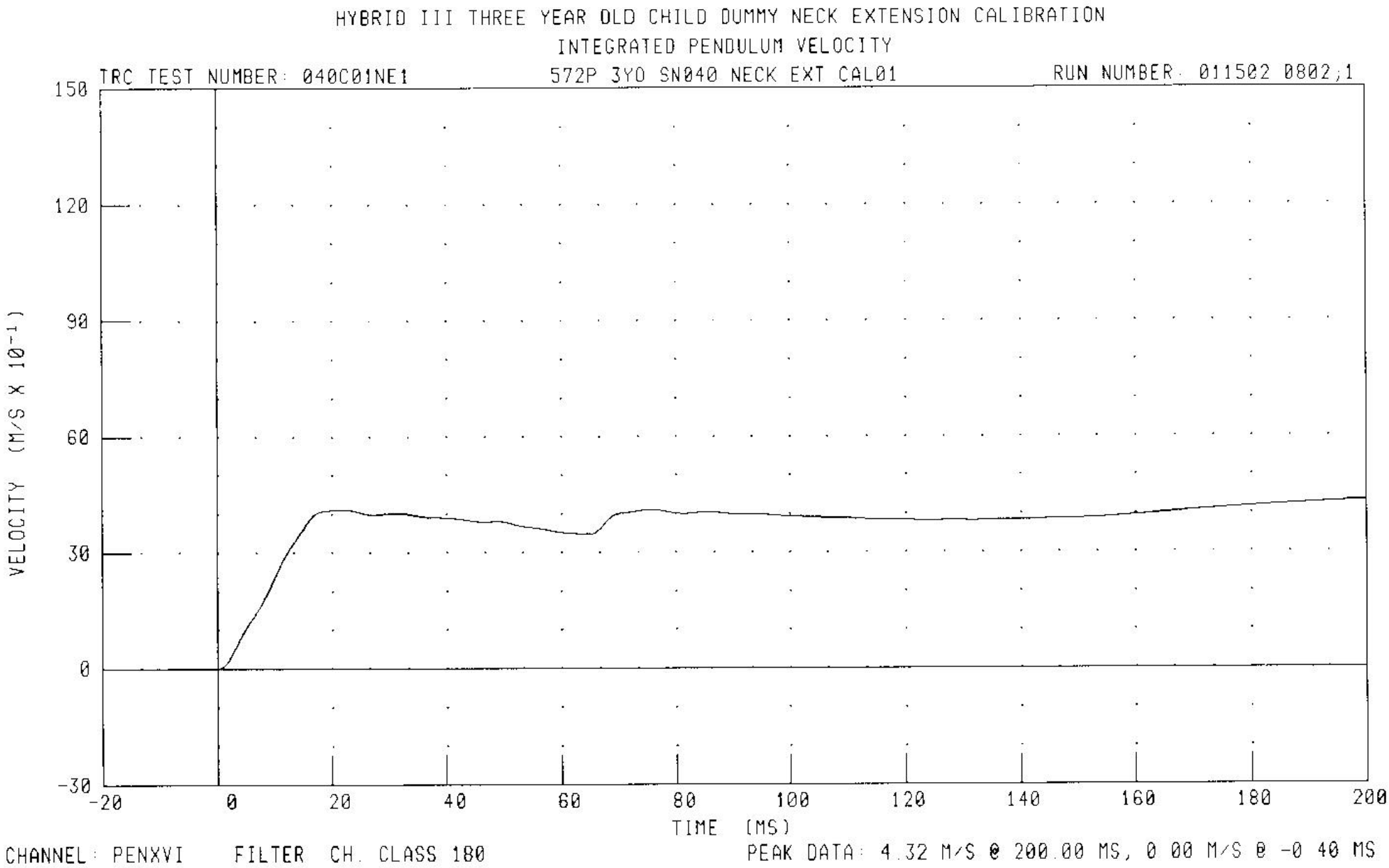
TRC INC. TEST NO: 040C01NE1 572P 3YO SN040 NECK EXT CAL01

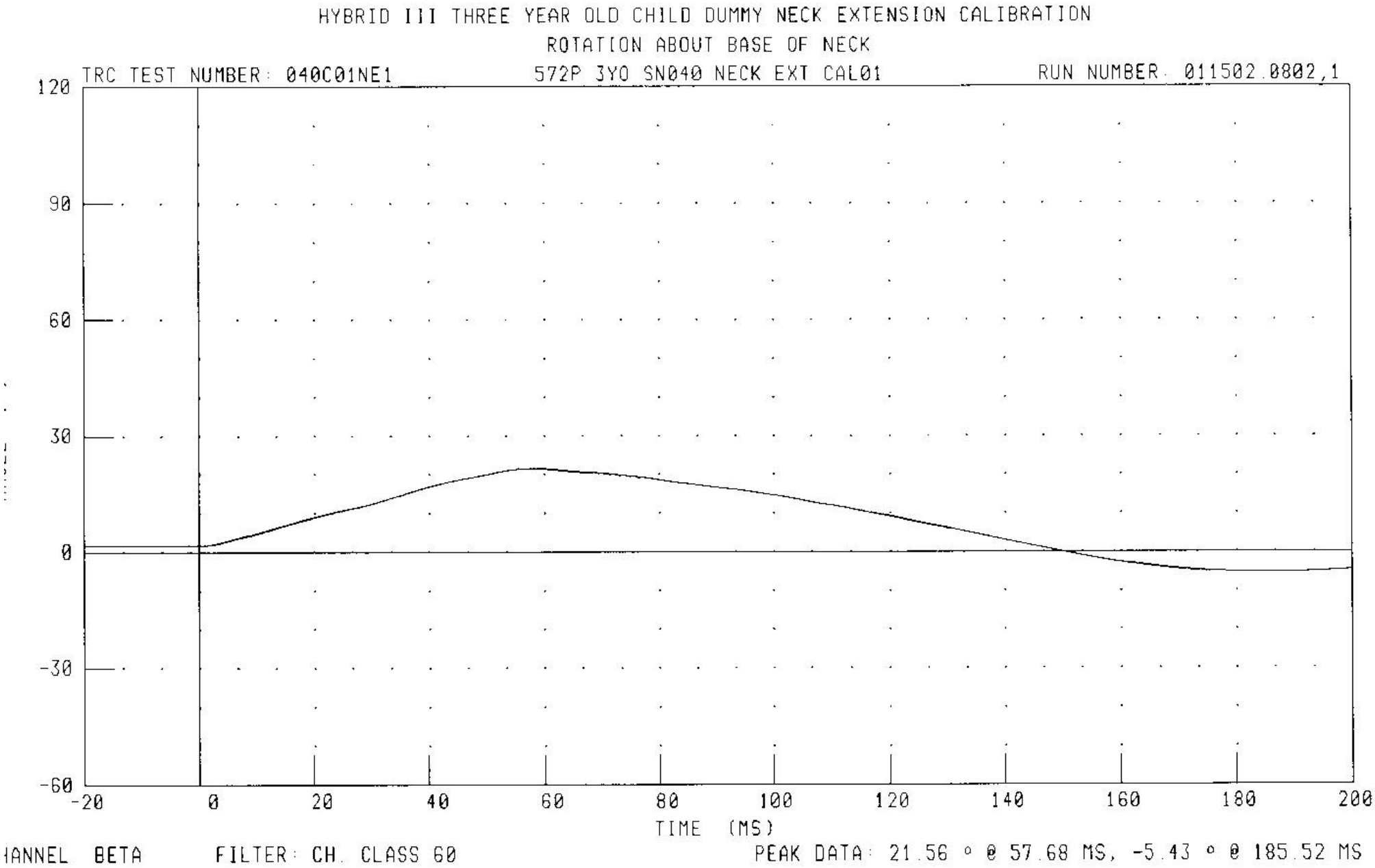
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	22.0 %
IMPACT VELOCITY		3.55 - 3.75 M/S	3.70 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	1.0 - 1.4 M/S	1.26 M/S
	10 MS	1.9 - 2.5 M/S	2.32 M/S
	30 MS	2.8 - 3.5 M/S	3.37 M/S
PEAK D-PLANE ROTATION		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

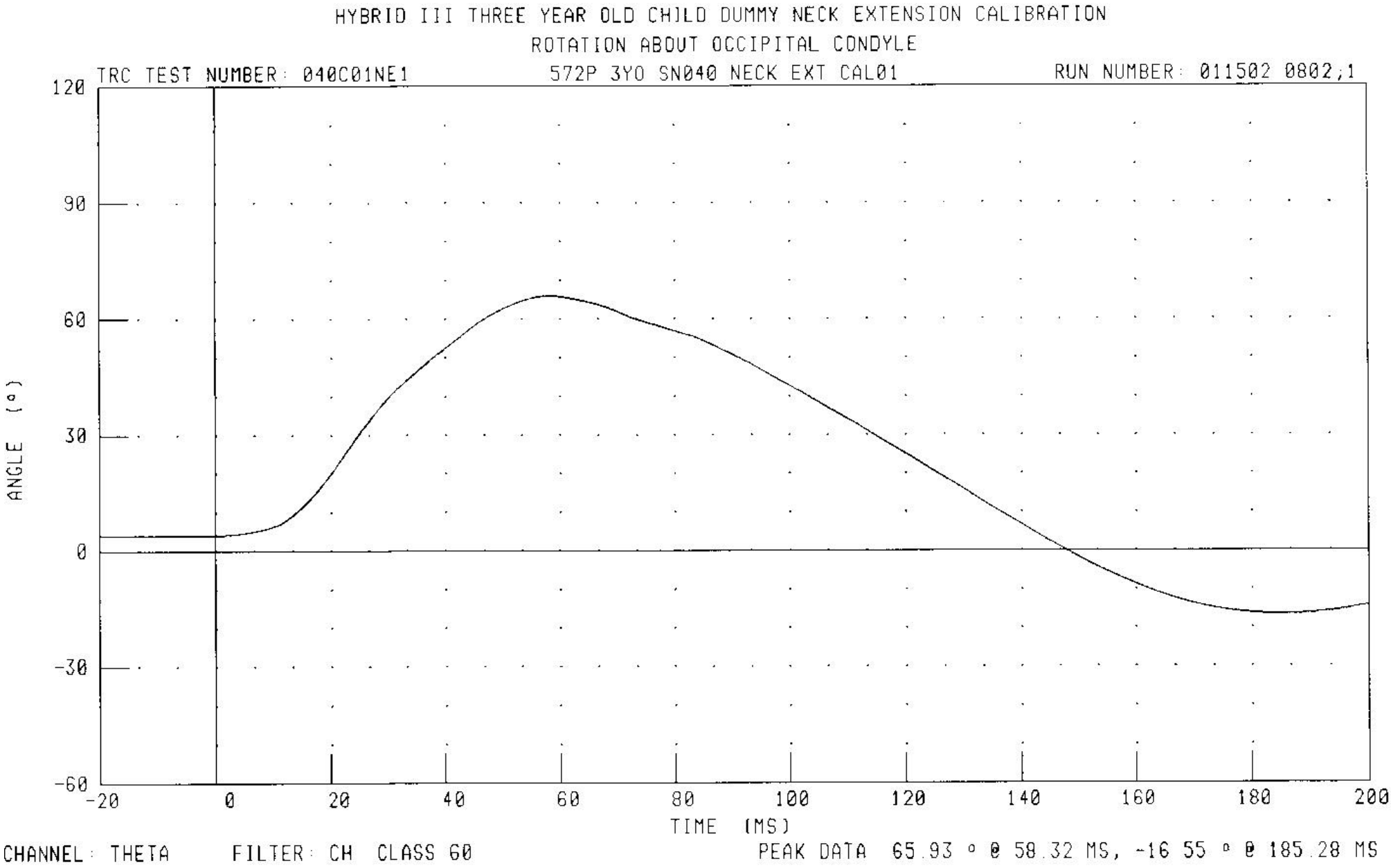
TEST MEETS SPECIFICATIONS

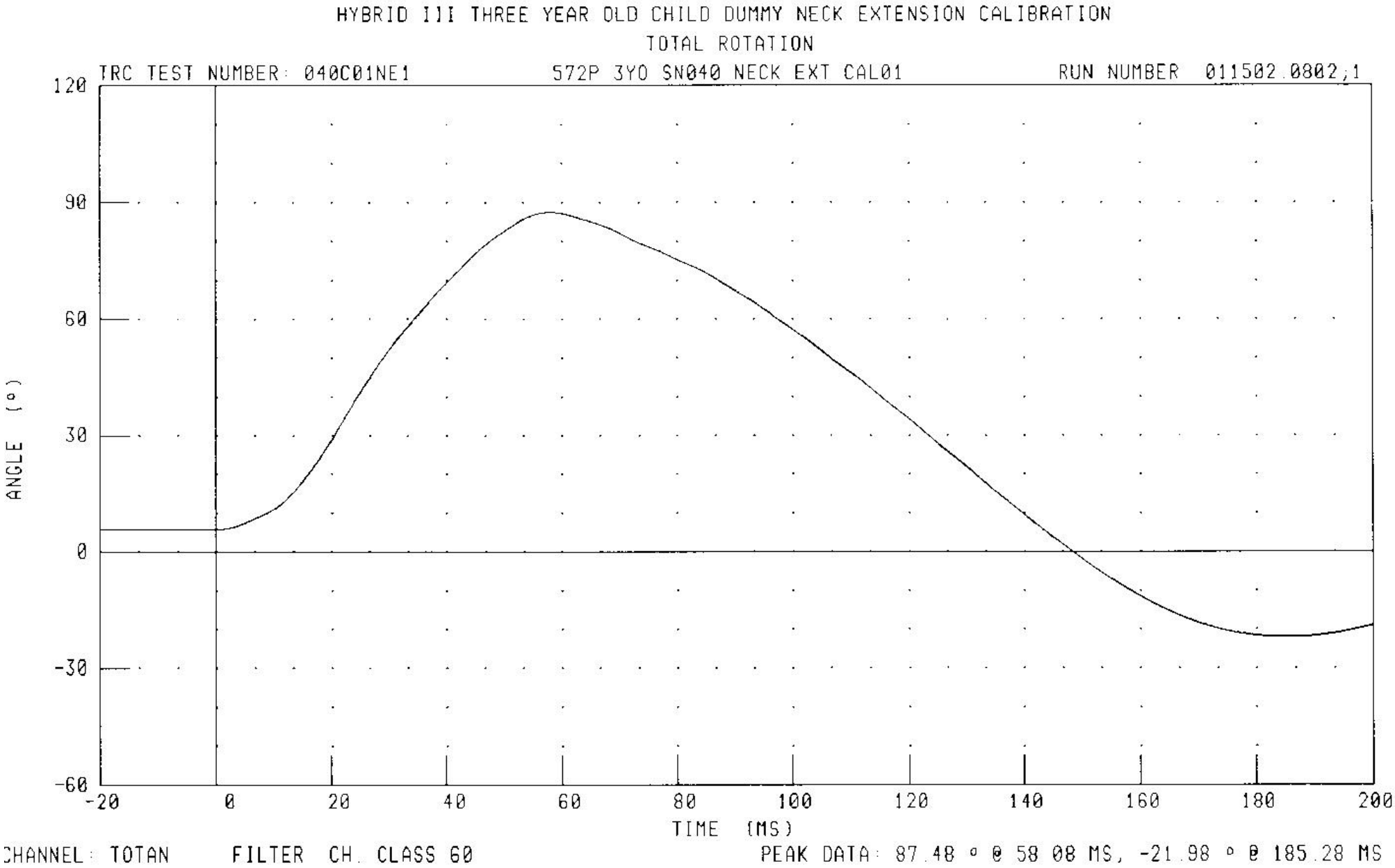
TECHNICIAN _____ RUN NUMBER: 011502.0758;1

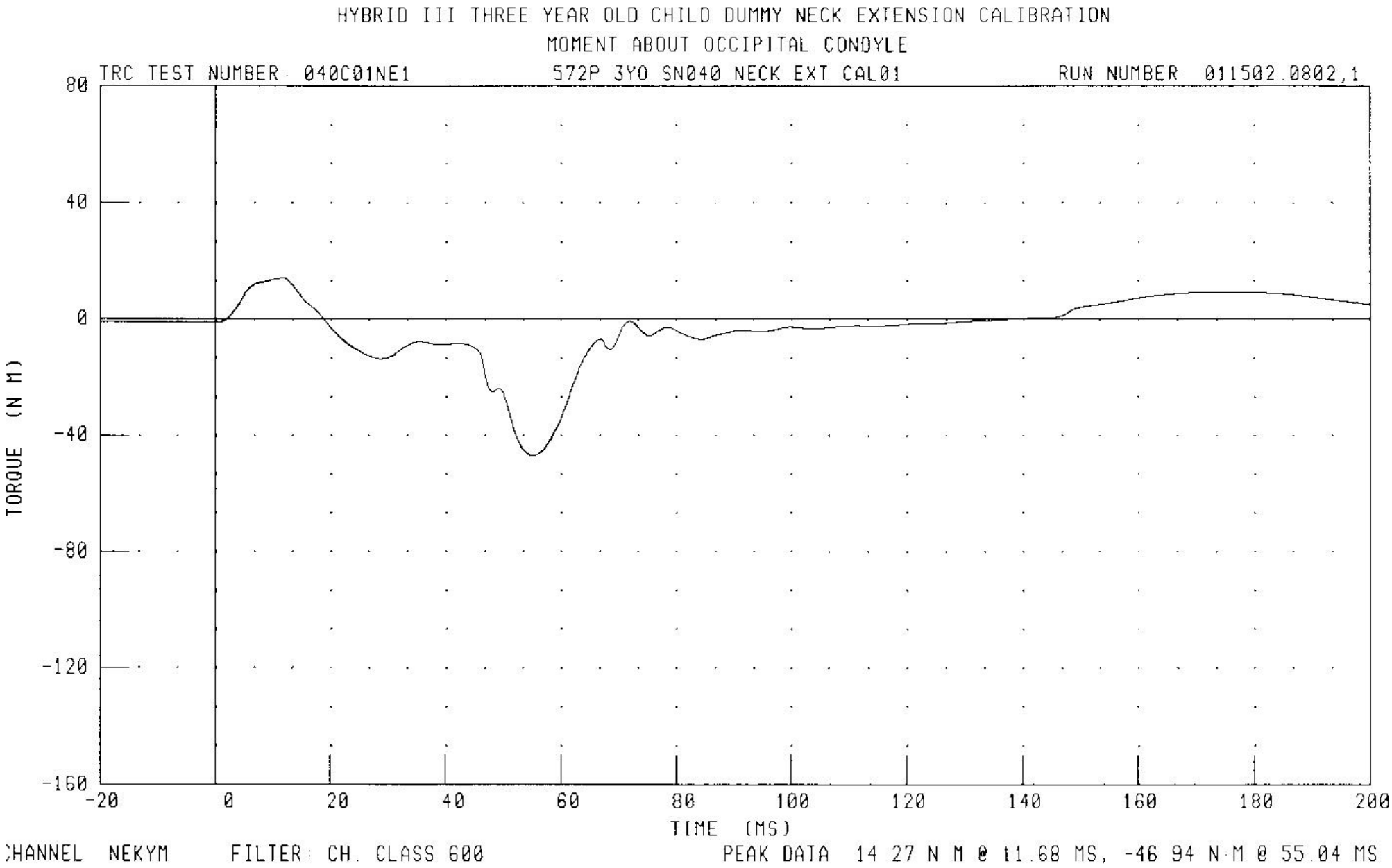

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 040C01NE1
572P 3YO SN040 NECK EXT CAL01
RUN NUMBER 011502.0802,1
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH CLASS 180
PEAK DATA: 32.80 G @ 10.00 MS; -4.34 G @ 51.52 MS

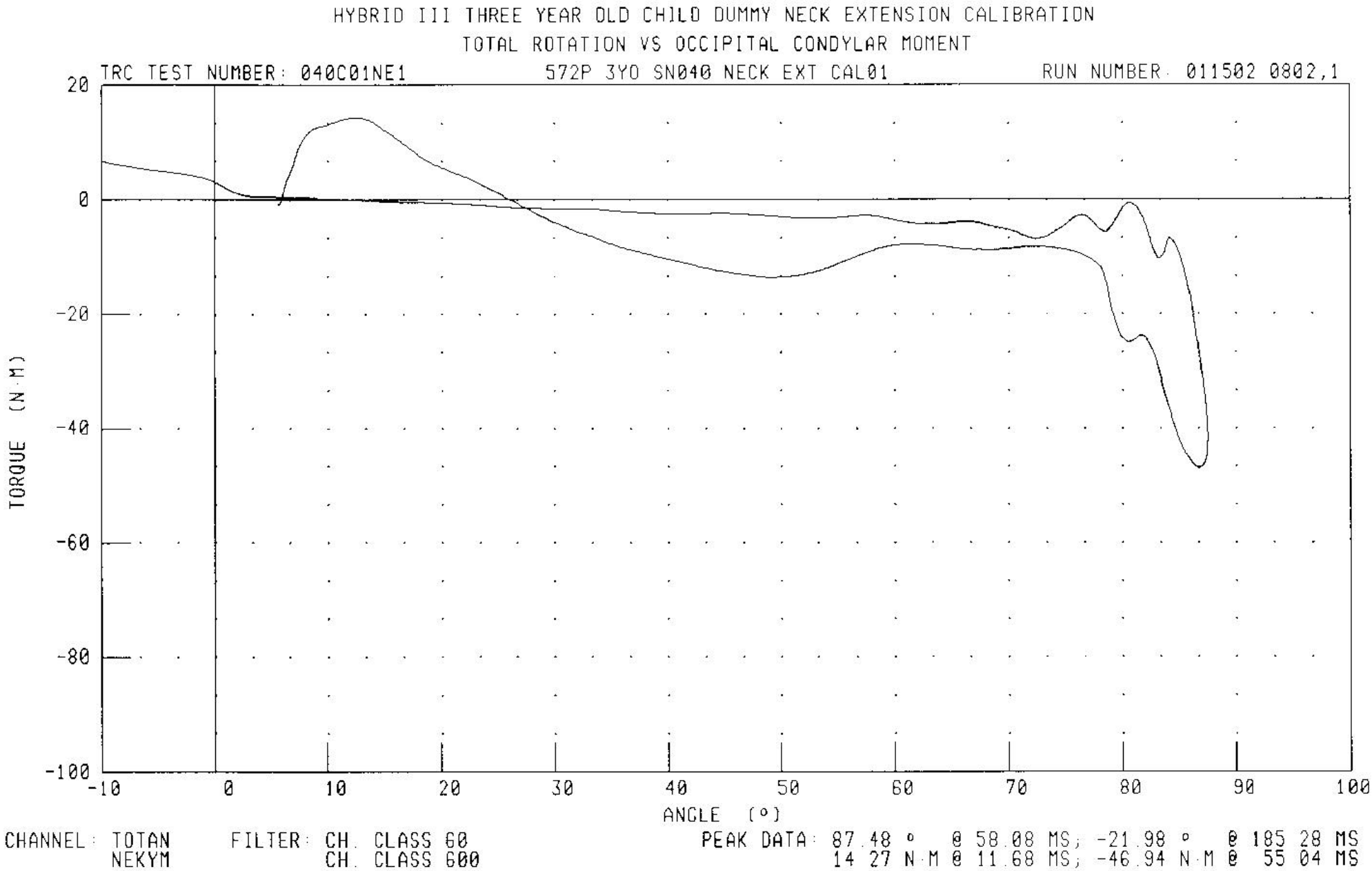

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
INTEGRATED PENDULUM VELOCITY
TRC TEST NUMBER: 040C01NE1
572P 3YO SN040 NECK EXT CAL01
RUN NUMBER: 011502 0802;1
VELOCITY (M/S X 10⁻¹)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER CH. CLASS 180
PEAK DATA: 4.32 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
TRC TEST NUMBER: 040C01NE1
572P 3YO SN040 NECK EXT CAL01
RUN NUMBER: 011502.0802,1
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
HANNEL BETA
FILTER: CH. CLASS 60
PEAK DATA: 21.56 ° @ 57.68 MS, -5.43 ° @ 185.52 MS


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
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
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
TRC TEST NUMBER: 040C01NE1
572P 3YO SN040 NECK EXT CAL01
RUN NUMBER 011502.0802;1
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: 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 3YO SN040 NECK EXT CAL01
RUN NUMBER 011502.0802,1
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 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
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: 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

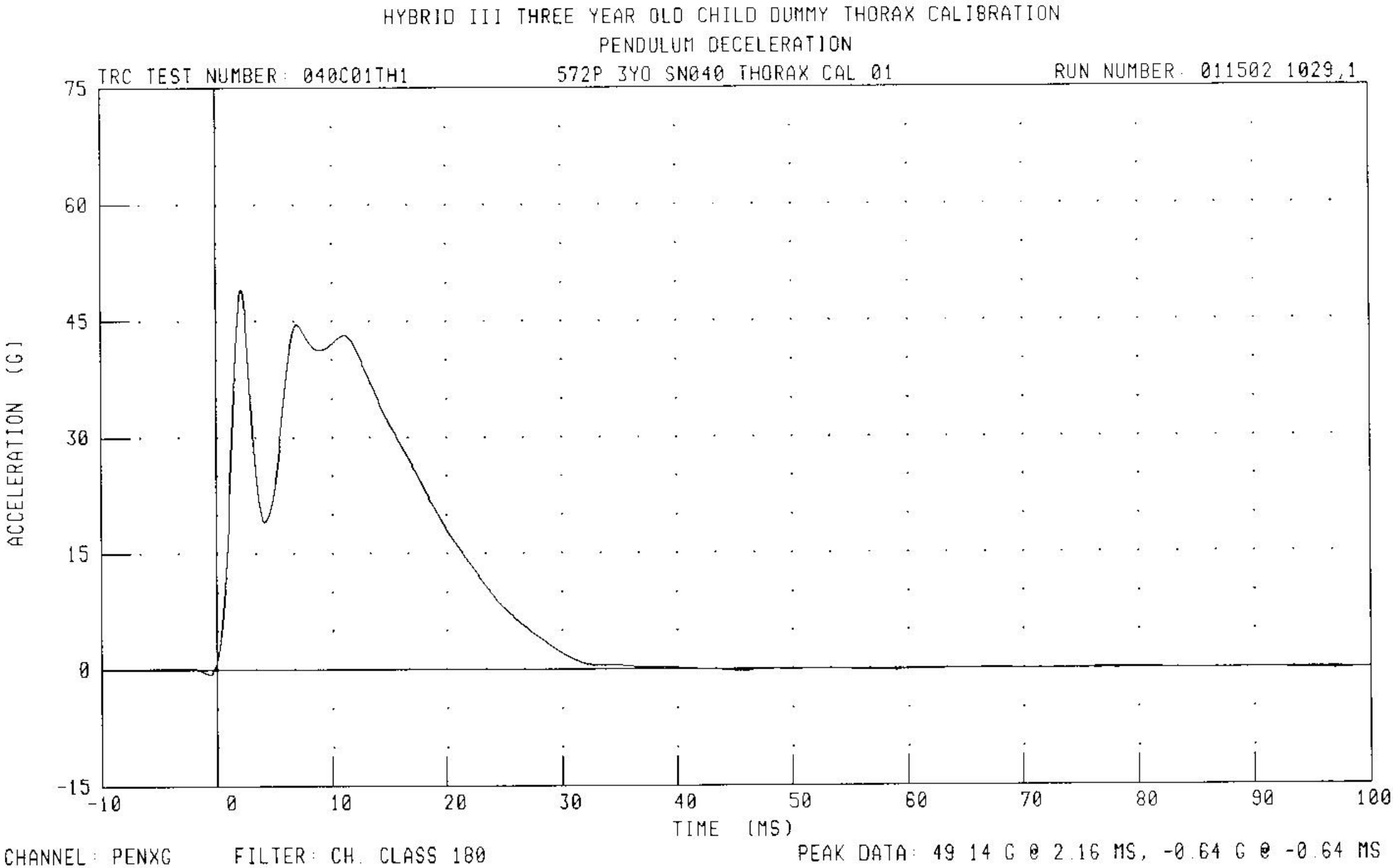
HYBRID III THREE YEAR OLD 15-JAN-02

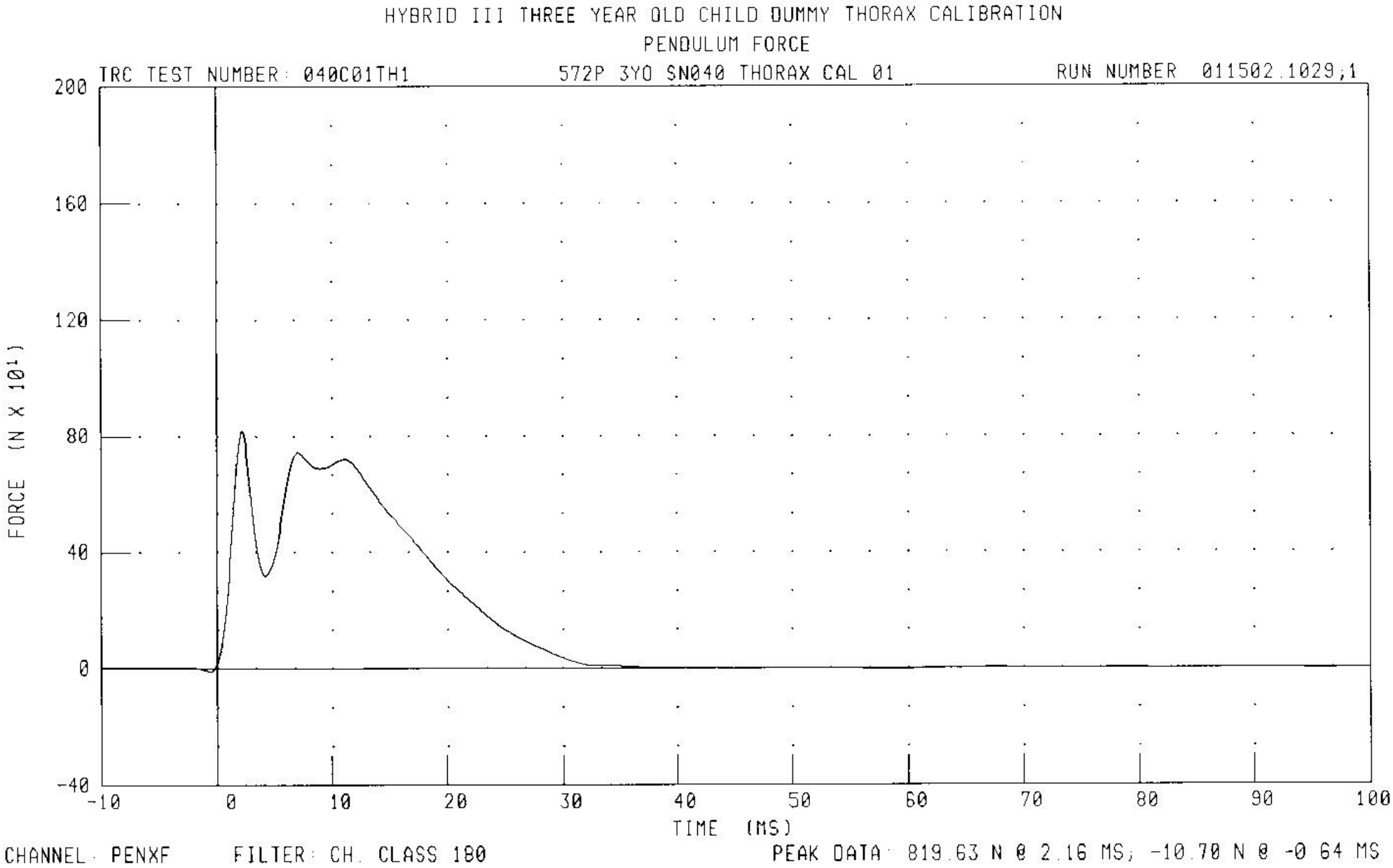
TRC INC. TEST NO: 040C01TH1 572P 3YO SN040 THORAX CAL 01

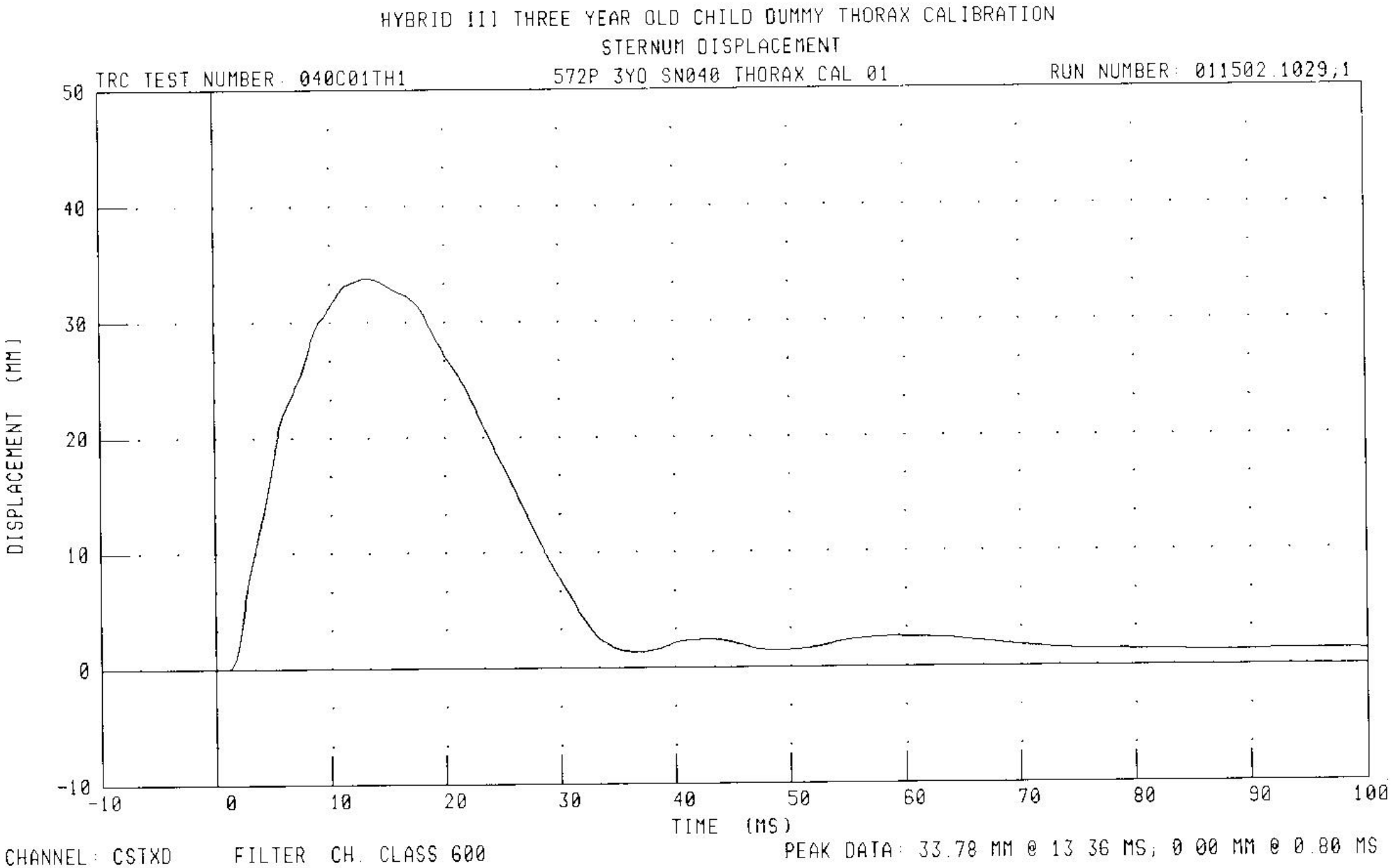
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	21.0 %
PENDULUM VELOCITY	5.90 - 6.10 M/S	5.97 M/S
MAXIMUM DEFLECTION	32 - 38 MM	33.7 MM
MAXIMUM FORCE DURING DEFLECTION INTERVAL	680 - 810 N	720. N
INTERNAL HYSTERESIS	65% -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

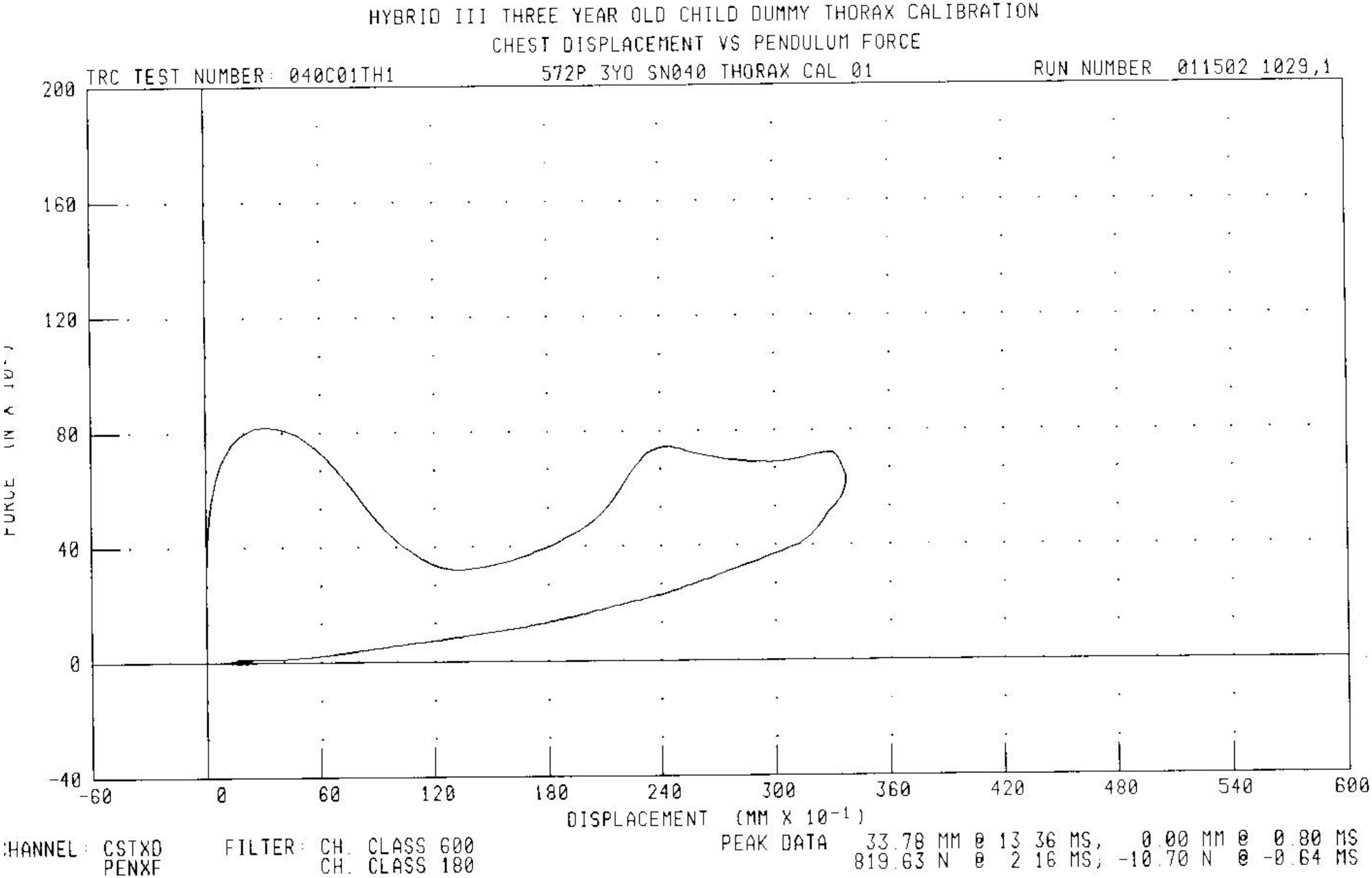
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 011502.1022;1


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 040C01TH1
572P 3YO SN040 THORAX CAL 01
RUN NUMBER: 011502 1029.1
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: 49.14 G @ 2.16 MS, -0.64 G @ -0.64 MS


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM FORCE
TRC TEST NUMBER: 040C01TH1
572P 3YO SN040 THORAX CAL 01
RUN NUMBER 011502.1029;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: 819.63 N @ 2.16 MS; -10.70 N @ -0.64 MS


HYBRID III THREE YEAR OLD CHILD DUMMY THORAX CALIBRATION
STERNUM DISPLACEMENT
TRC TEST NUMBER: 040C01TH1
572P 3YO SN040 THORAX CAL 01
RUN NUMBER: 011502.1029,1
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: 33.78 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
200
160
120
80
40
0
-40
-60
0
60
120
180
240
300
360
420
480
540
600
DISPLACEMENT (MM X 10⁻¹)
CHANNEL: 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 UNSUPPORRTED 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 INTIAL ANGLE	4 DEG.

TEST MEETS SPECIFICATIONS

TECHNICIAN 

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

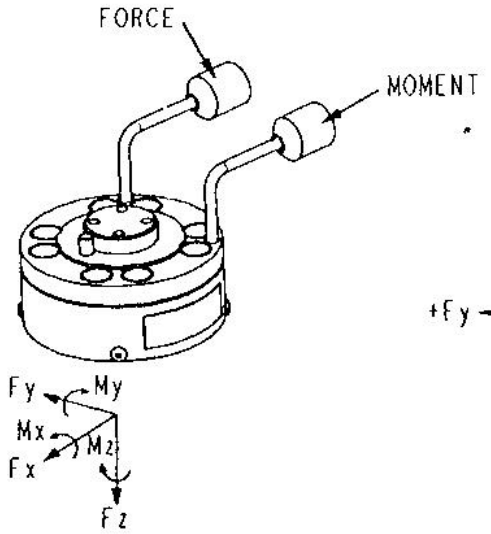
	Direction	Load lb/in-lb	FX %Full Scale	FY %Full Scale	FZ %Full Scale	MX %Full Scale	MY %Full Scale	MZ %Full Scale
FX	Positive	1000	0.00	-1.25	1.27	0.38	1.97	0.30
FY	Positive	1000	1.23	0.00	0.63	-2.49	-0.19	-0.58
FZ	Negative	-1500	0.09	-0.34	0.00	-0.46	-0.24	-0.01
MX	Positive	1500	-0.23	0.60	-2.05	0.00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

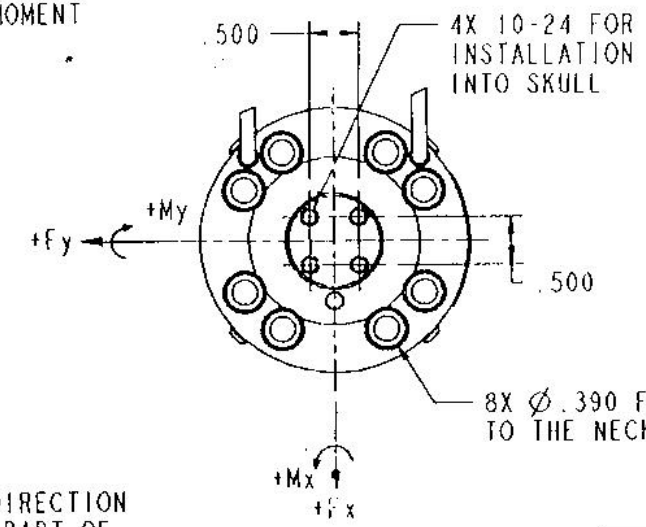
Shunt Calibration

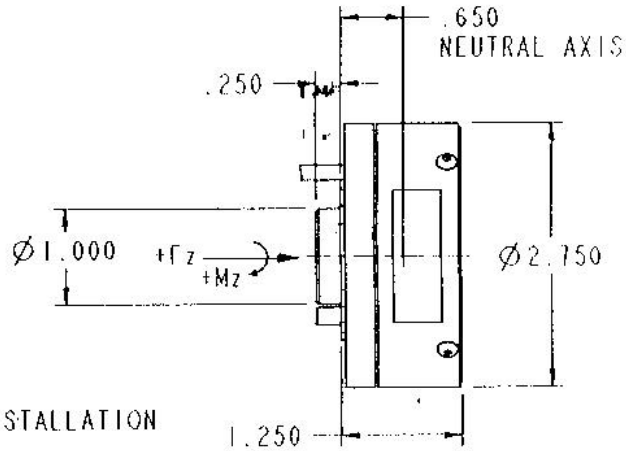
	Loading	Shunt (Ohms)	+Ex to +Sig	+Ex to -Sig	-Ex to +Sig	-Ex to -Sig	Units	Bridge (Ohms)
FX	Positive	60000	555.6	-555.9	-554.9	555.6	LBF	350
	Positive	80000	417.4	-417.7	-416.6	417.0	LBF	350
	Positive	100000	334.0	-334.4	-333.4	333.9	LBF	350
FY	Positive	60000	549.8	-549.9	-549.5	549.4	LBF	350
	Positive	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

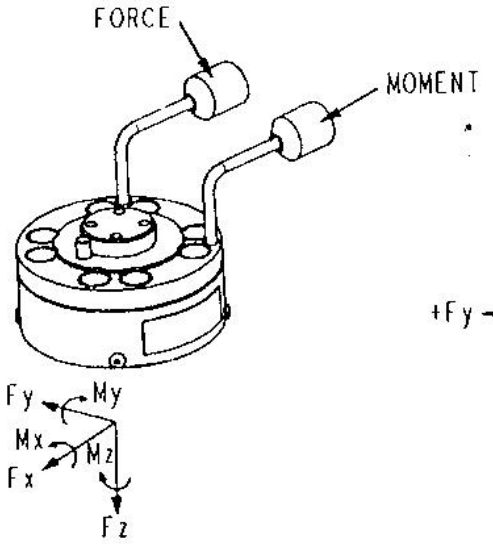
	Direction	Load N/N-M	FX %Full Scale	FY %Full Scale	FZ %Full Scale	MX %Full Scale	MY %Full Scale	MZ %Full Scale
FX	Positive	4450	0.00	0.12	1.09	0.63	2.46	3.00
FY	Positive	4450	-0.35	0.00	-1.45	-2.99	-1.34	2.24
FZ	Negative	-6670	0.12	0.13	0.00	0.12	-0.42	0.14
MX	Positive	170	-0.05	0.20	-0.80	0.00	1.14	-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

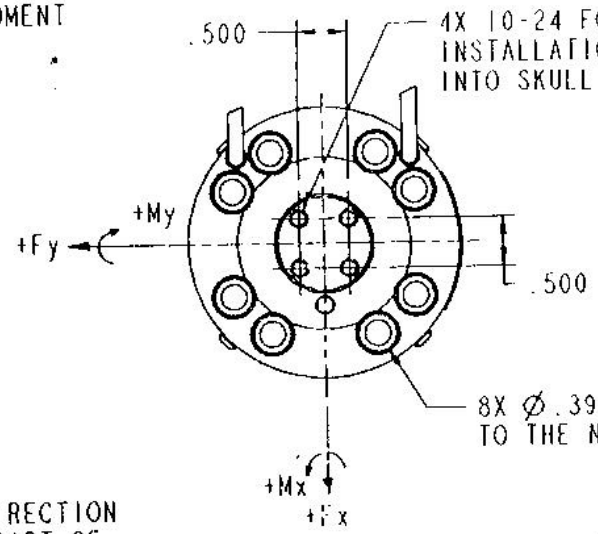
Shunt Calibration

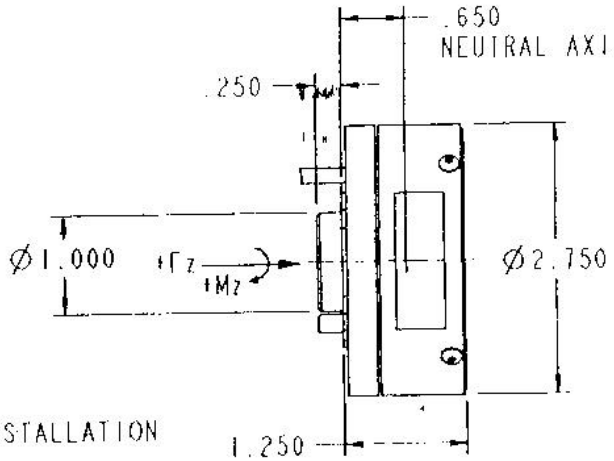
	Loading	Shunt (Ohms)	+Ex to +Sig	+Ex to -Sig	-Ex to +Sig	-Ex to -Sig	Units	Bridge (Ohms)
FX	Positive	60000	2407.4	-2406.9	-2406.5	2405.2	N	350
	Positive	80000	1808.2	-1808.2	-1804.6	1806.4	N	350
	Positive	100000	1447.0	-1447.5	-1444.8	1446.1	N	350
FY	Positive	60000	2424.3	-2419.8	-2420.7	2418.9	N	350
	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

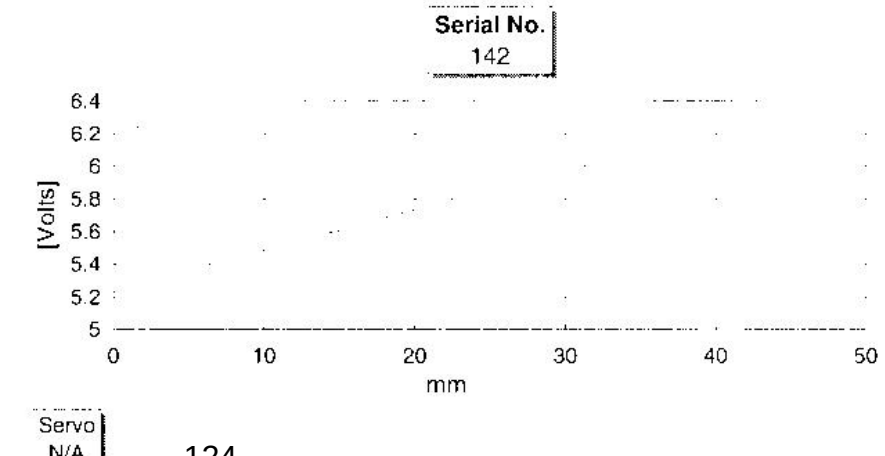
TECHNICIAN: _____ Date: 1/14/2002

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

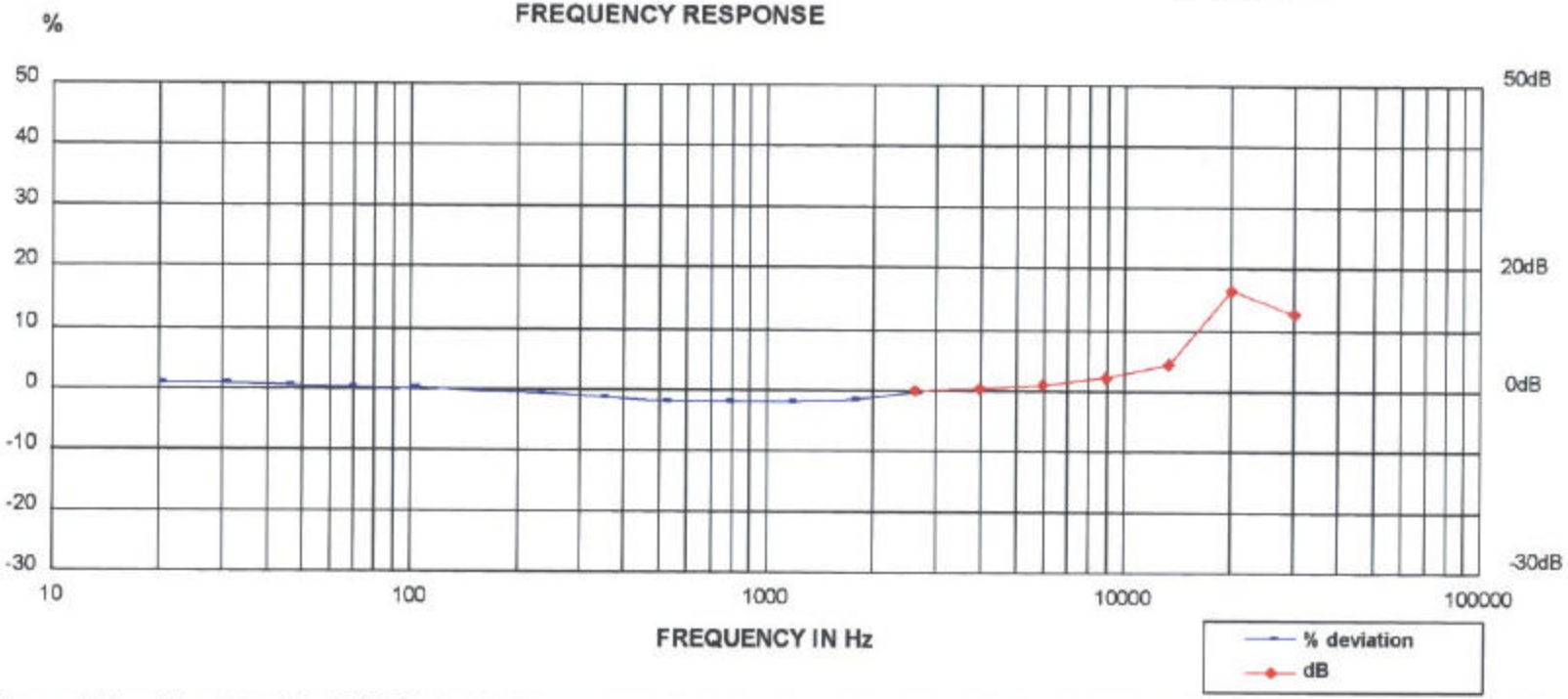
0.1987 mV/g @ 100 Hz, 10g pk

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

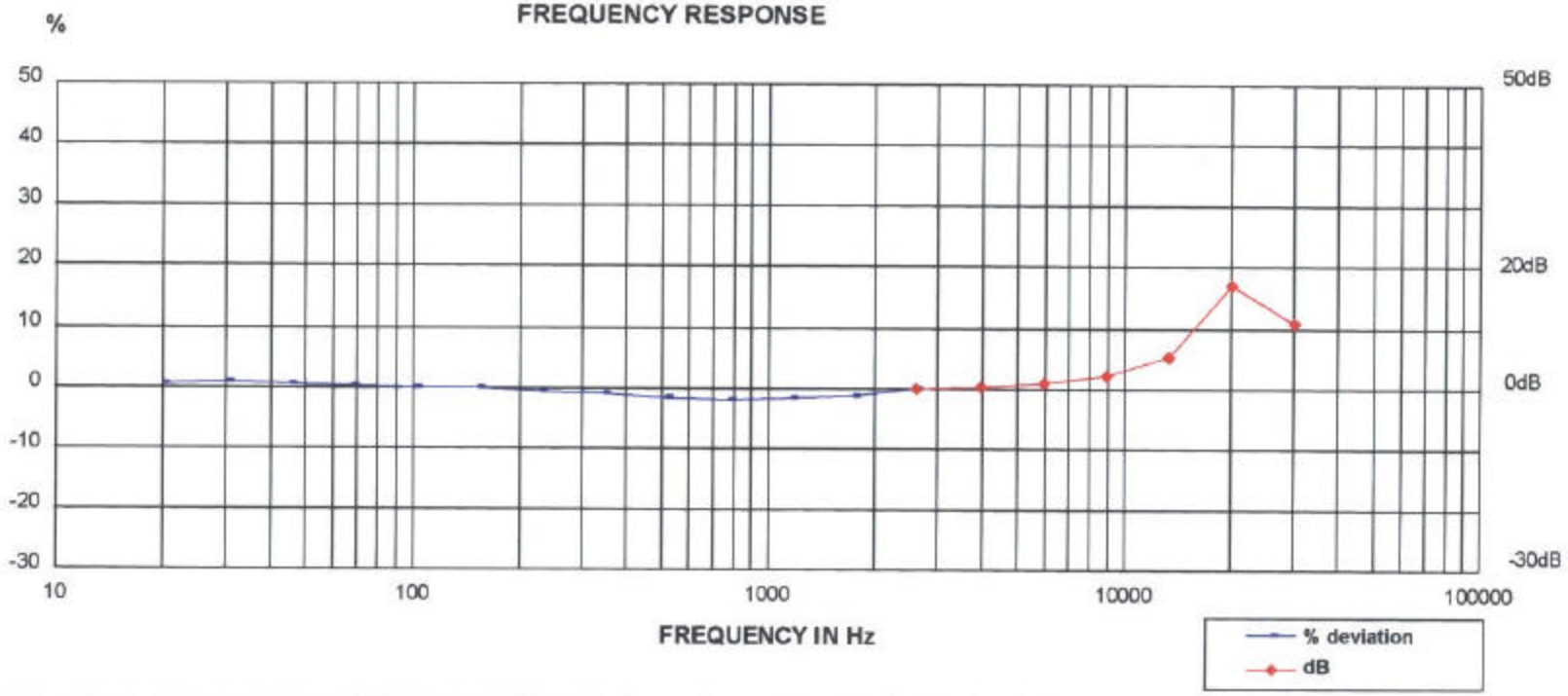
0.1839 mV/g @ 100 Hz, 10g pk

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

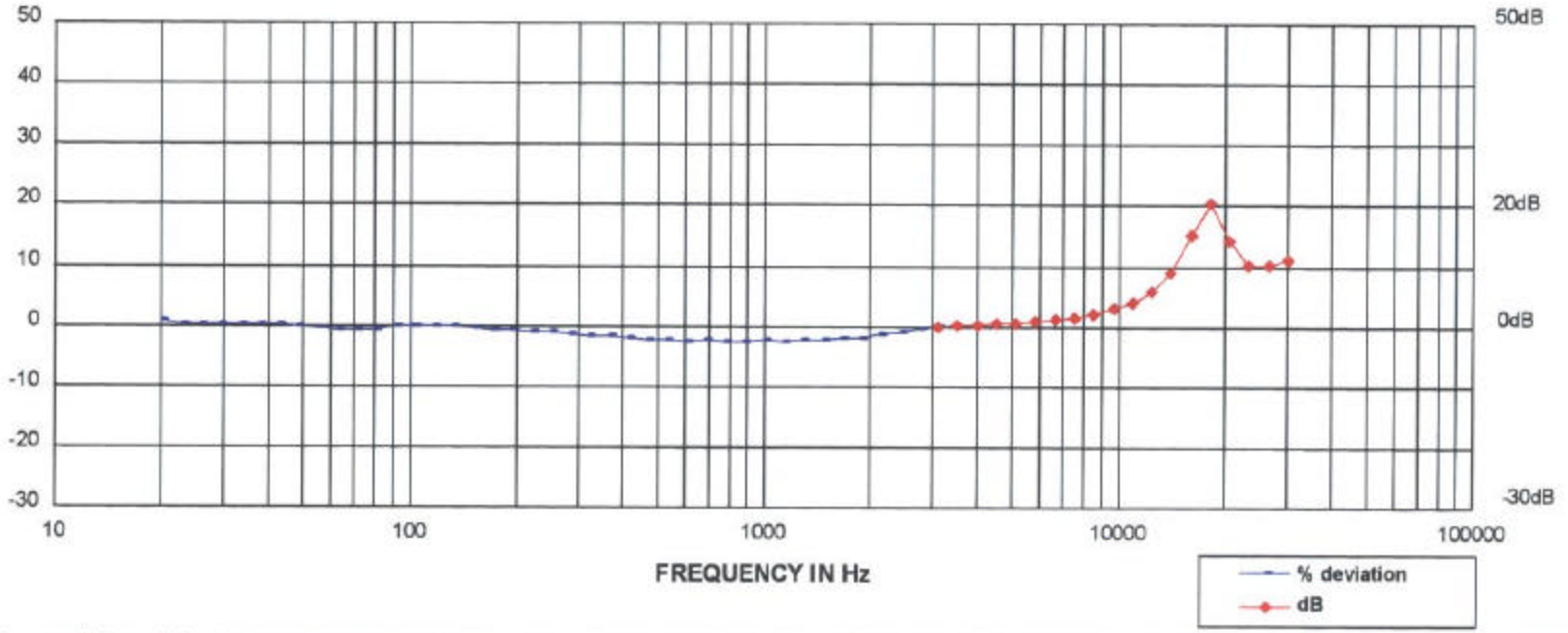
0.2506 mV/g @ 100 Hz, 10g pk

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 2 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

0.1861 mV/g @ 100 Hz, 10g pk

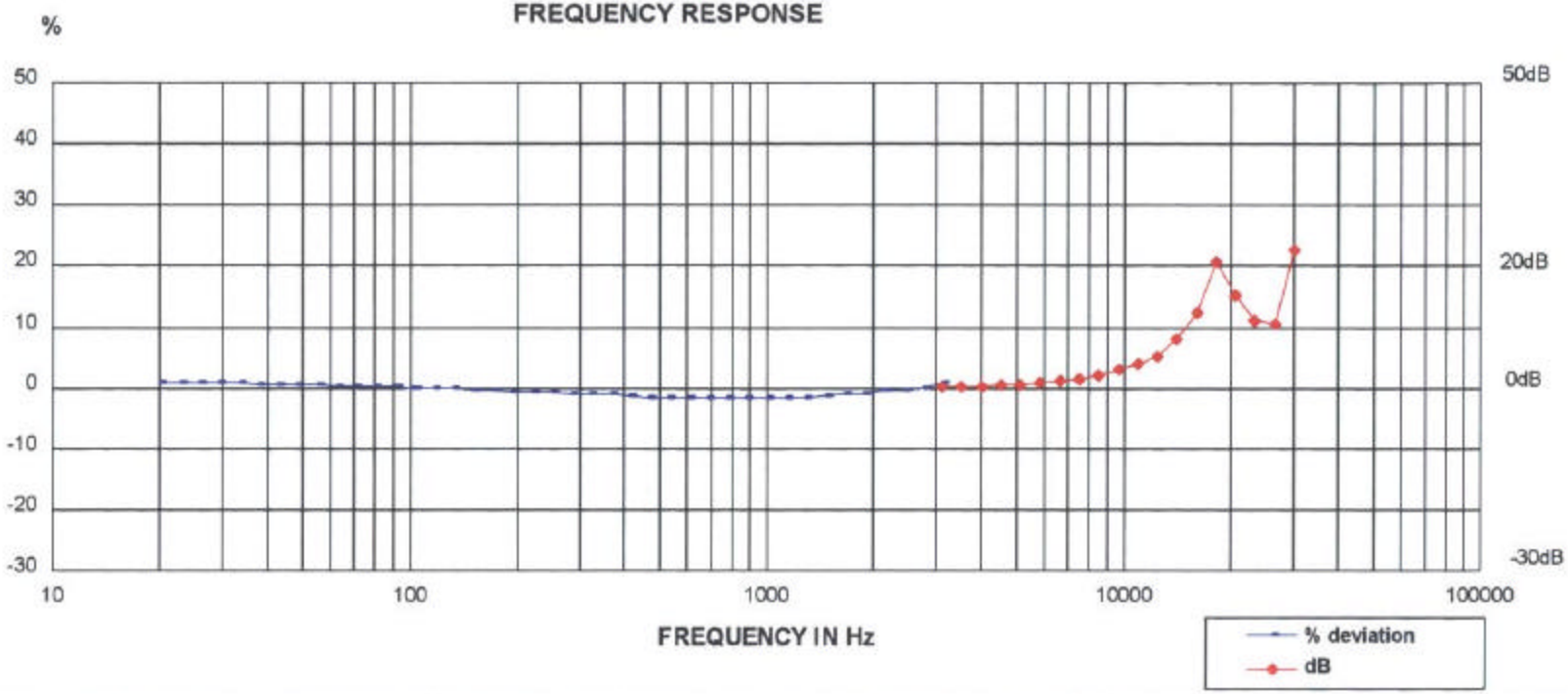
Input Resistance (ohms): 501.49
Output Resistance (ohms): 500.5
ZMO (mV): 14.539
Resonance Frequency (Hz): 19536

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

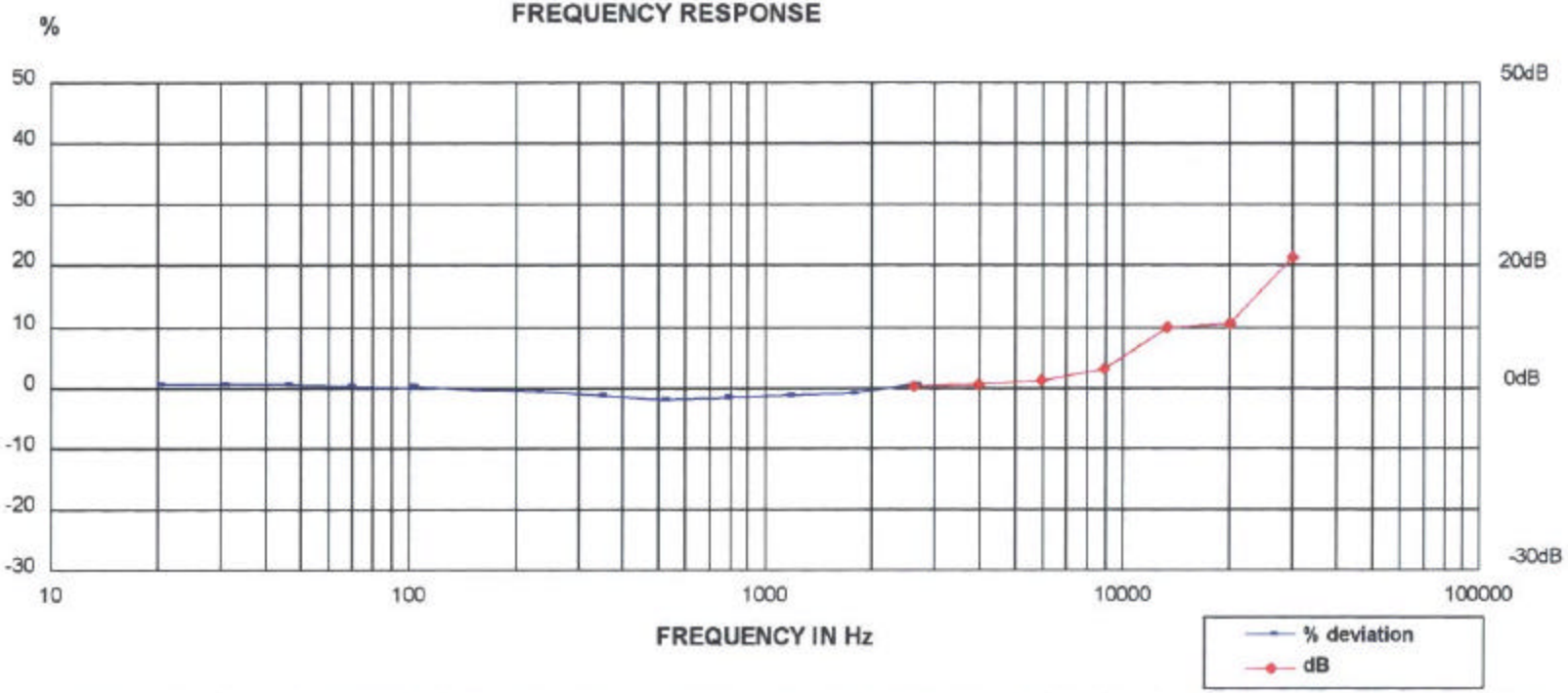
0.2054 mV/g @ 100 Hz, 10g pk

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).

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

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

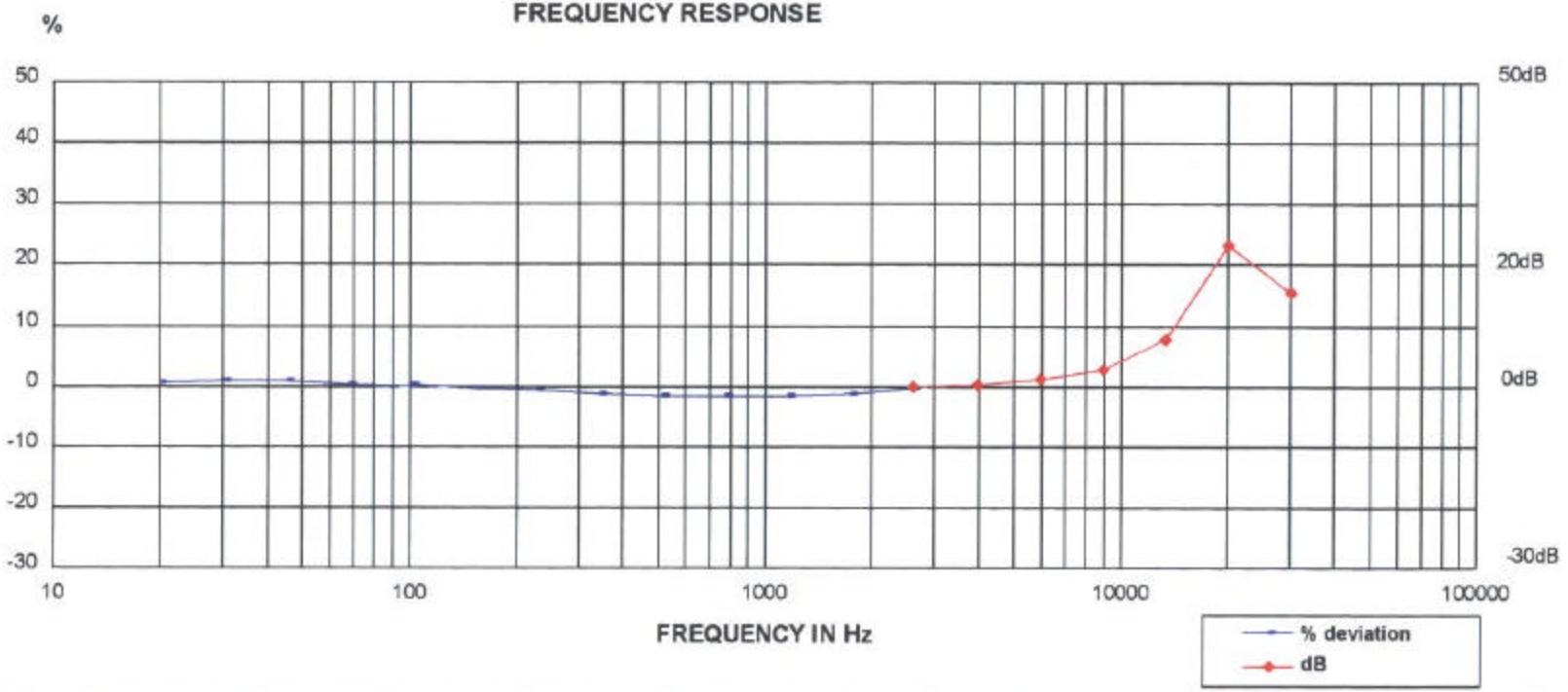
0.2226 mV/g @ 100 Hz, 10g pk

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 uP

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

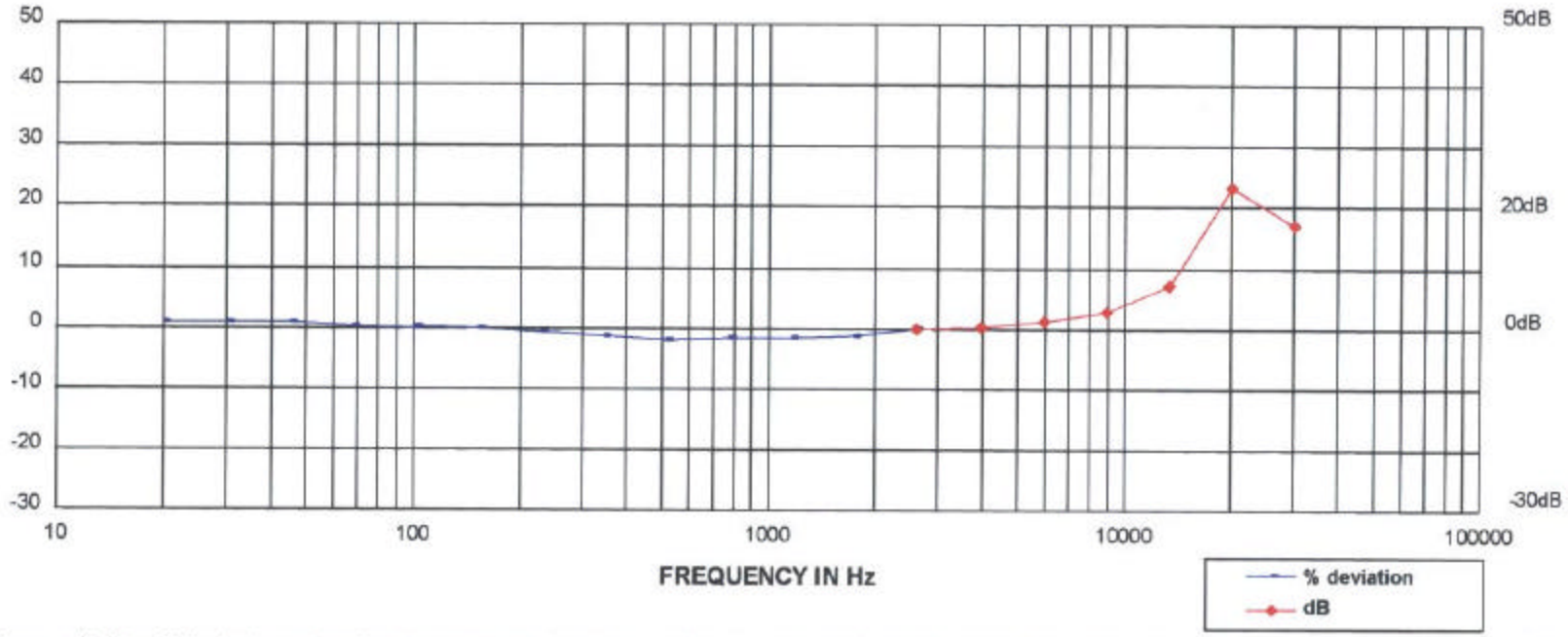
0.2347 mV/g @ 100 Hz, 10g pk

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

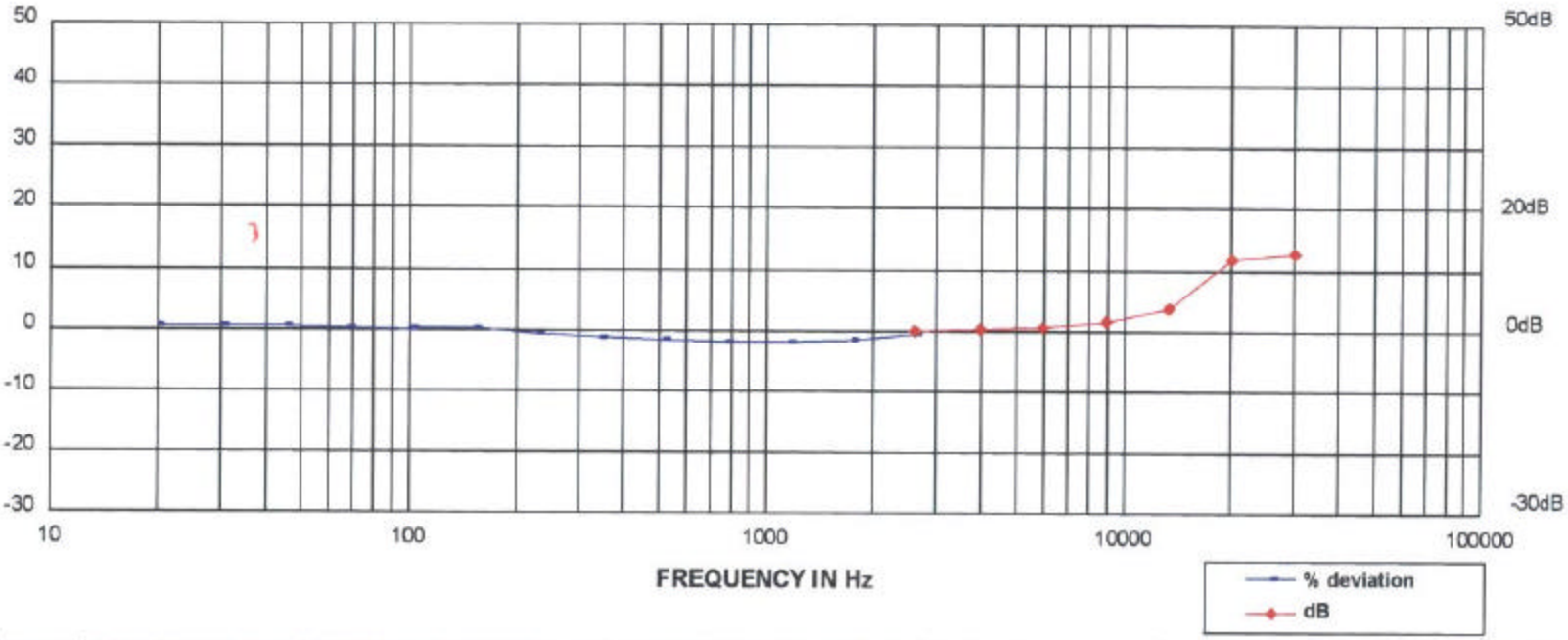
0.1859 mV/g @ 100 Hz, 10g pk

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

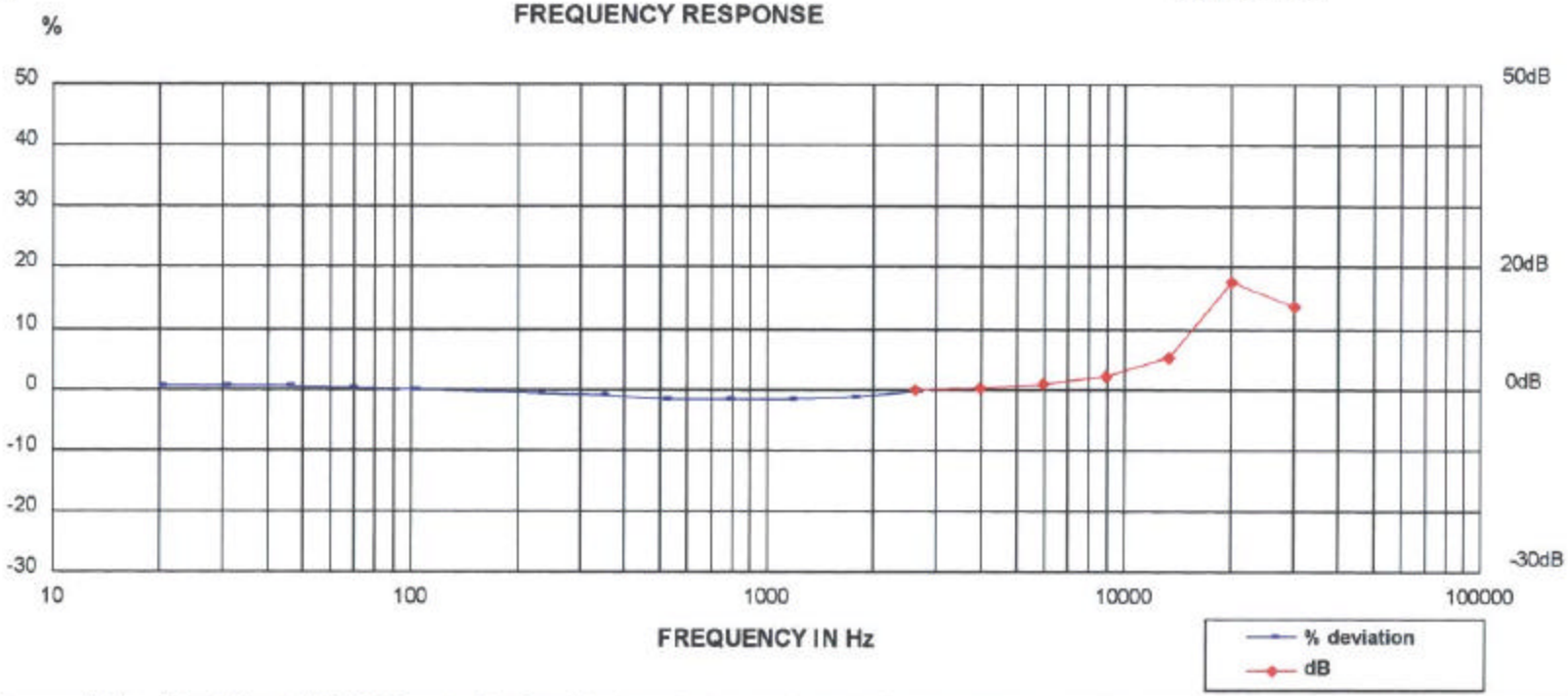
0.1854 mV/g @ 100 Hz, 10g pk

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 3YO

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

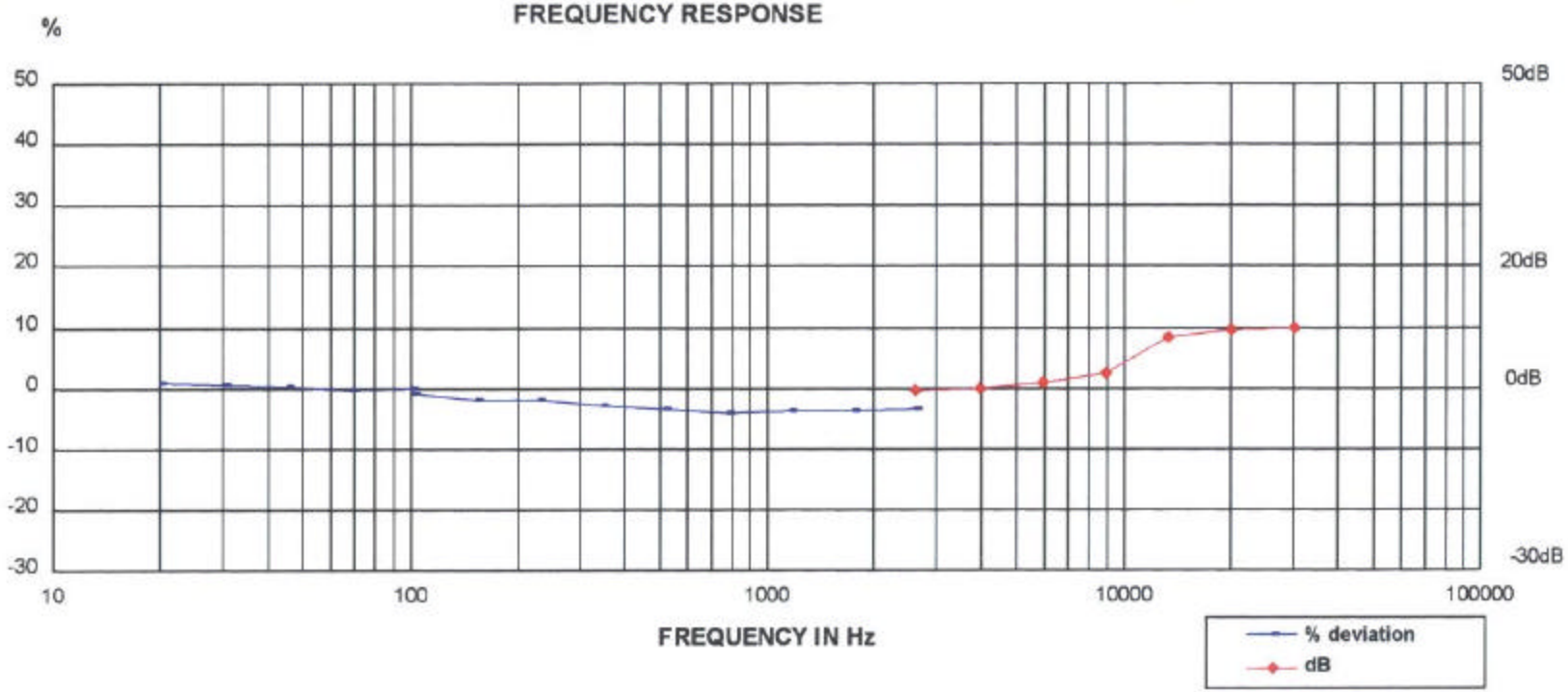
0.2320 mV/g @ 100 Hz, 10g pk

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).

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

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

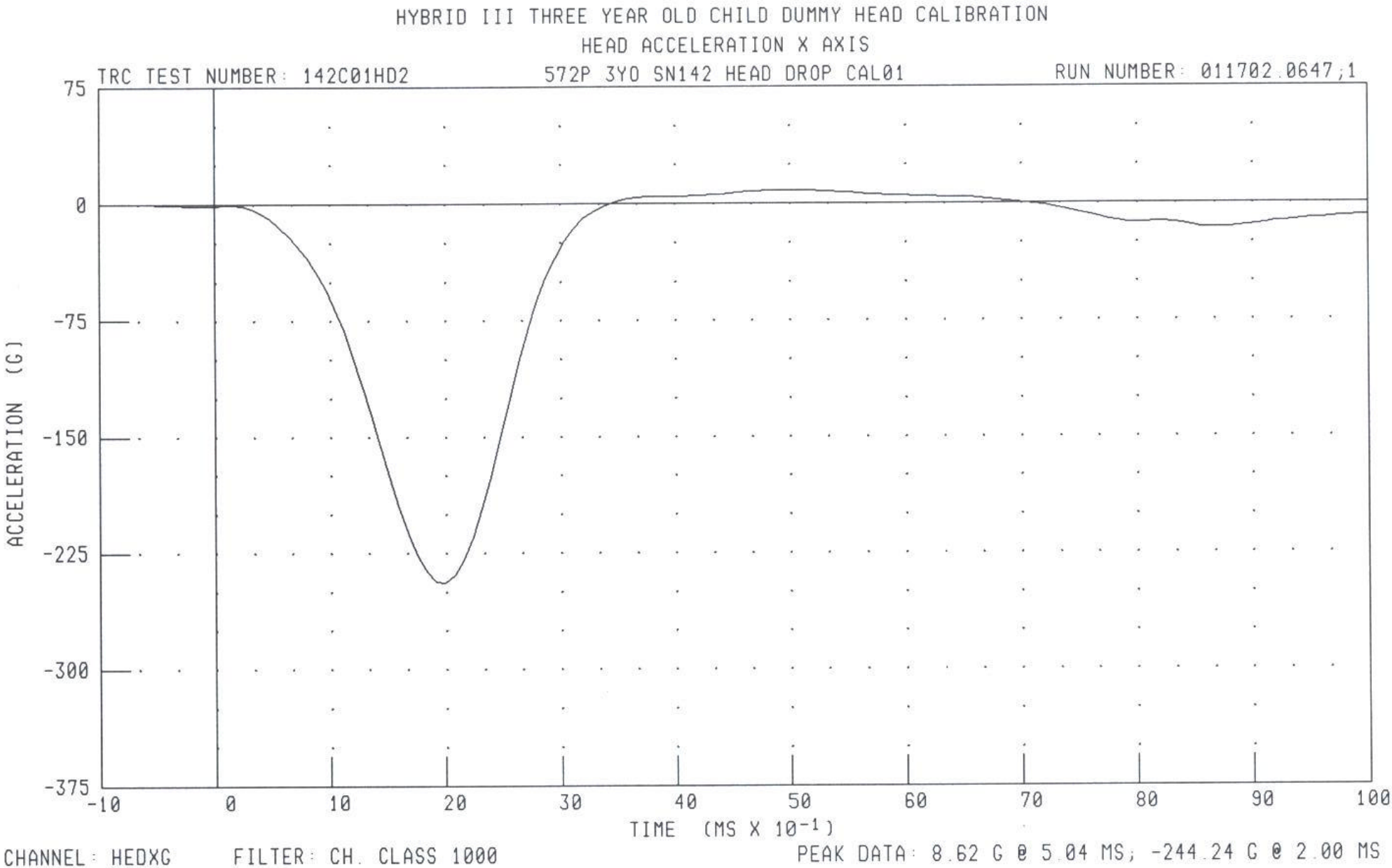
HYBRID III THREE YEAR OLD 17-JAN-02

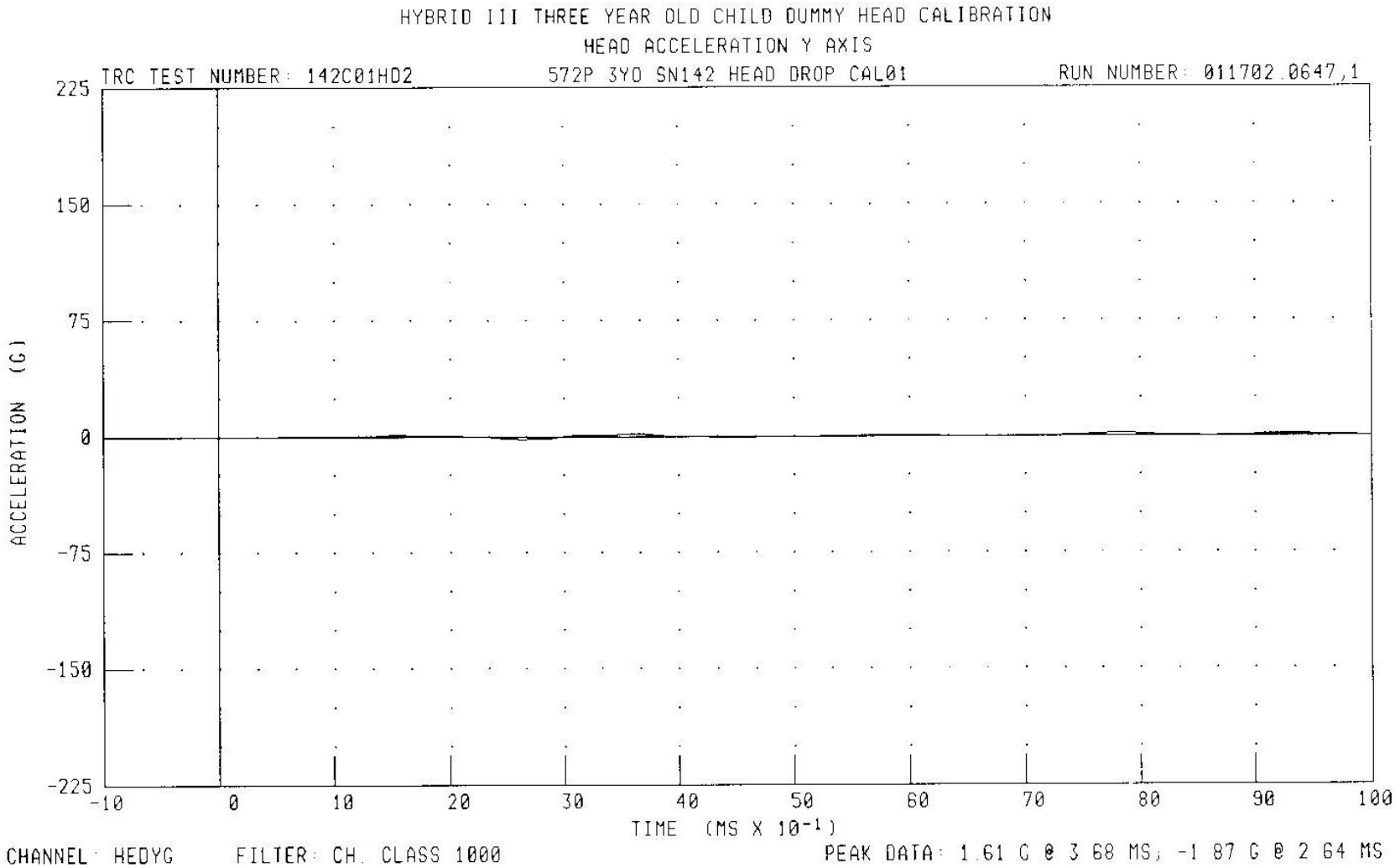
TRC INC. TEST NO: 142C01HD2 572P 3YO SN142 HEAD DROP CAL01

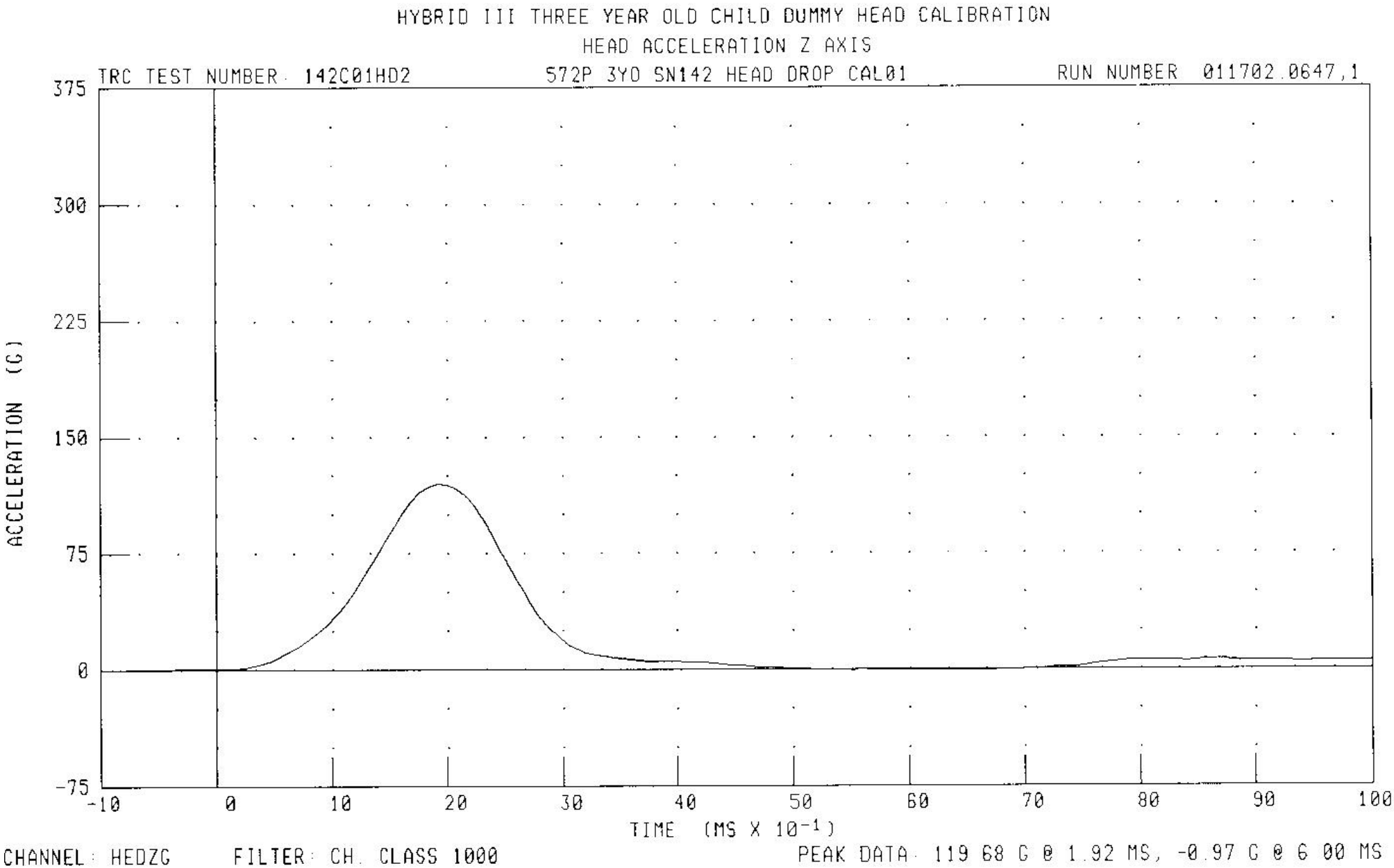
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	16.0 %
PEAK RESULTANT ACCELERATION	250 - 280 G	271.87 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.87 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

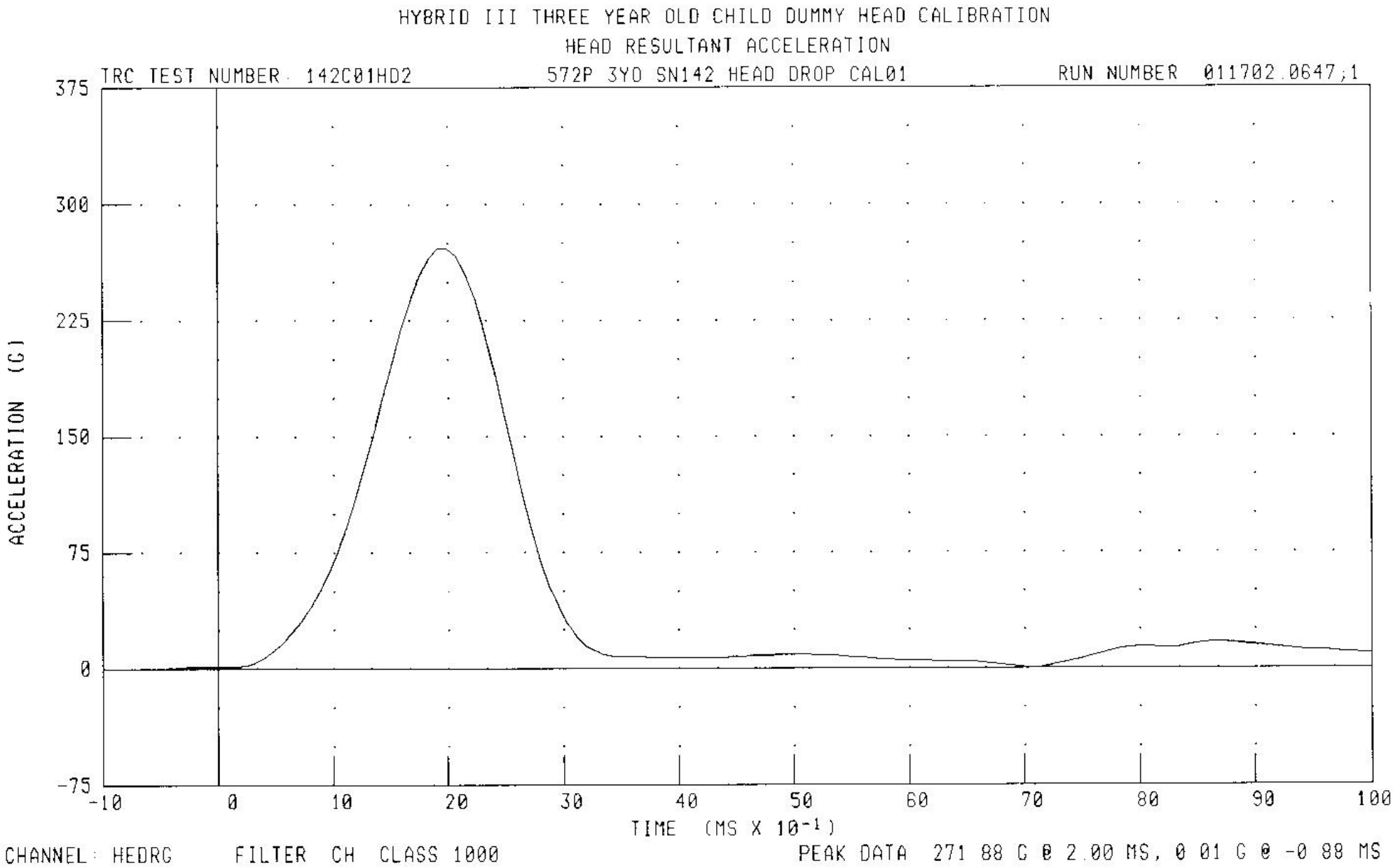
TEST MEETS SPECIFICATIONS

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

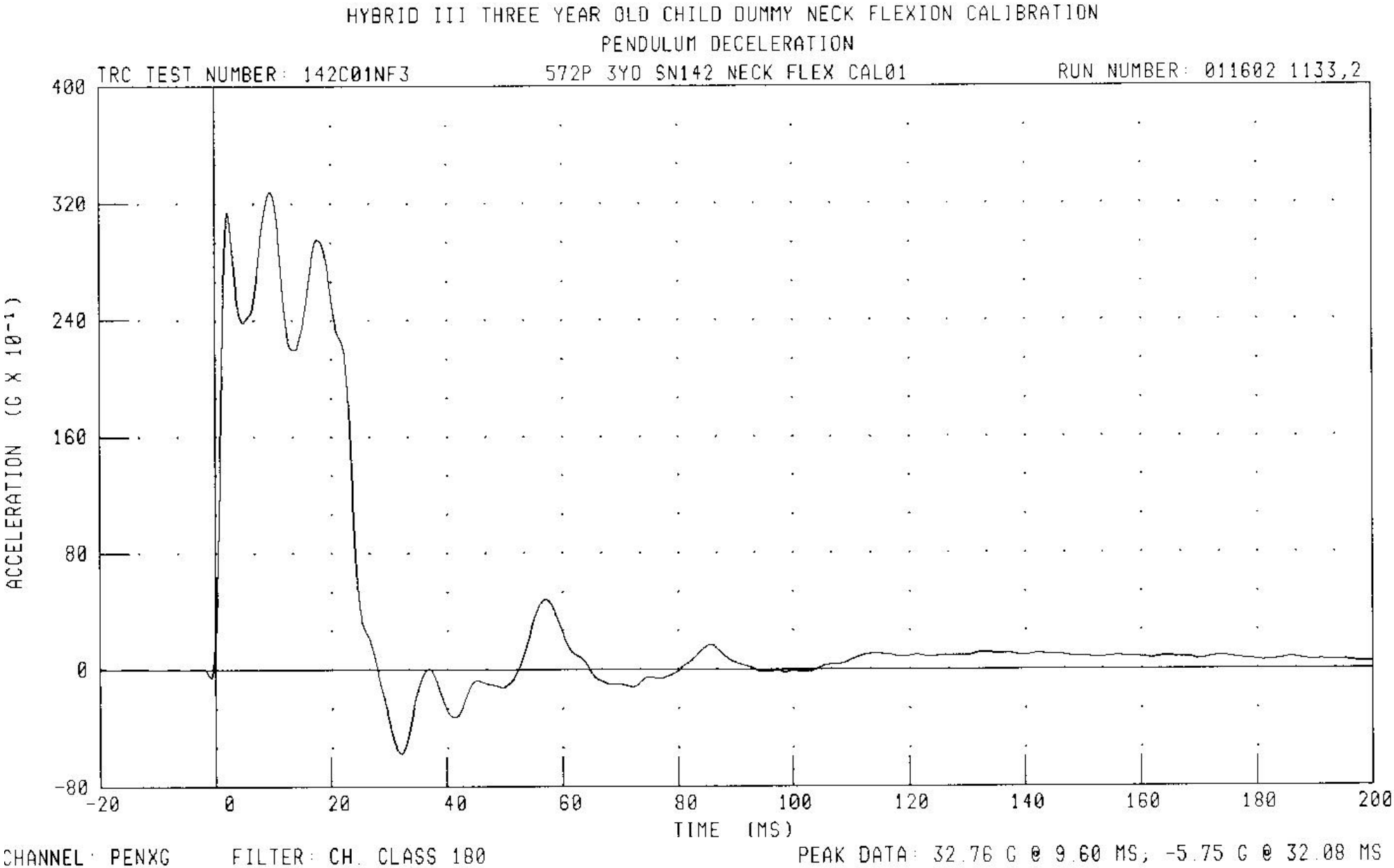
NECK FLEXION TEST

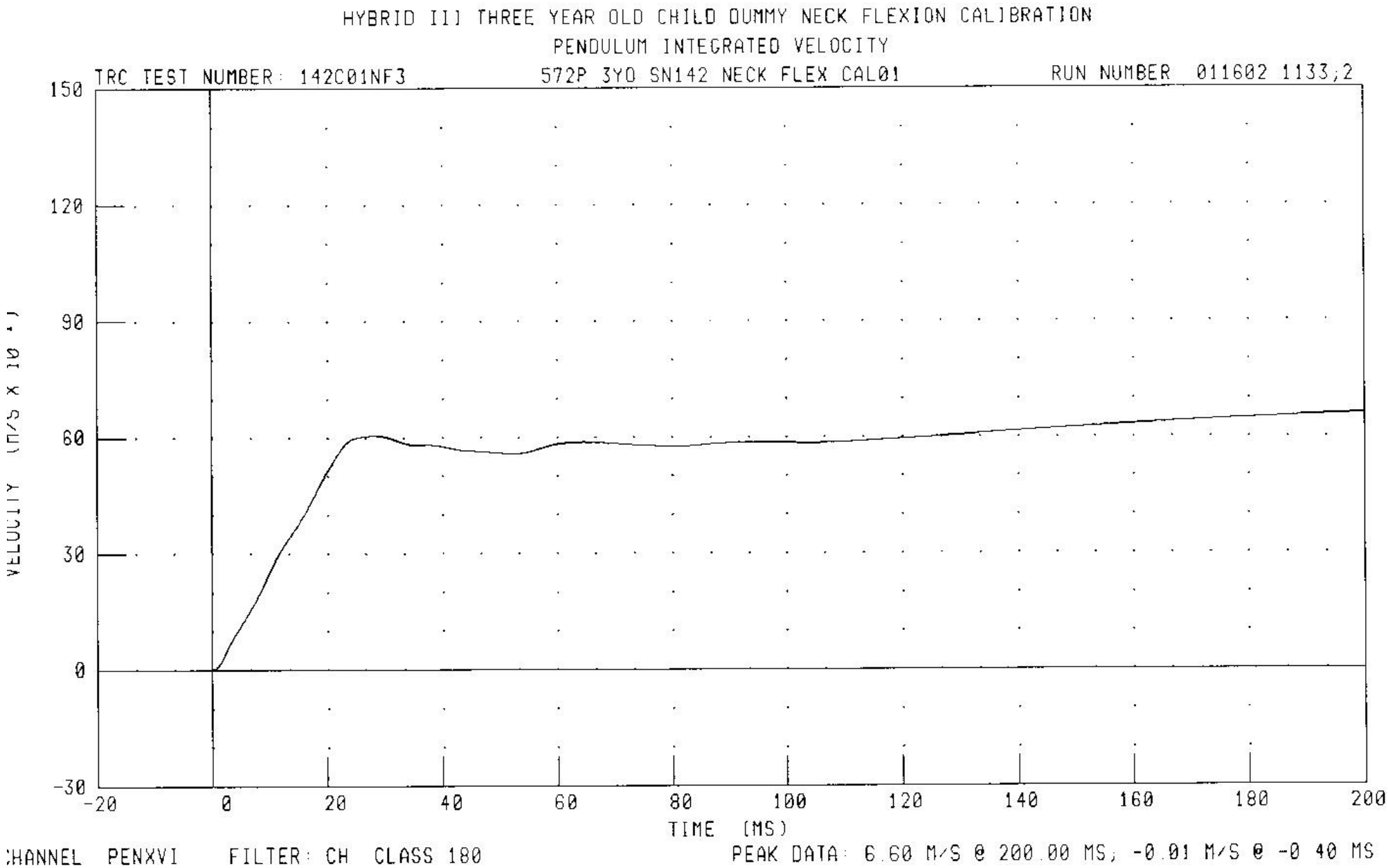
TRC INC. TEST NO: 142C01NF3 572P 3YO SN142 NECK FLEX CAL01

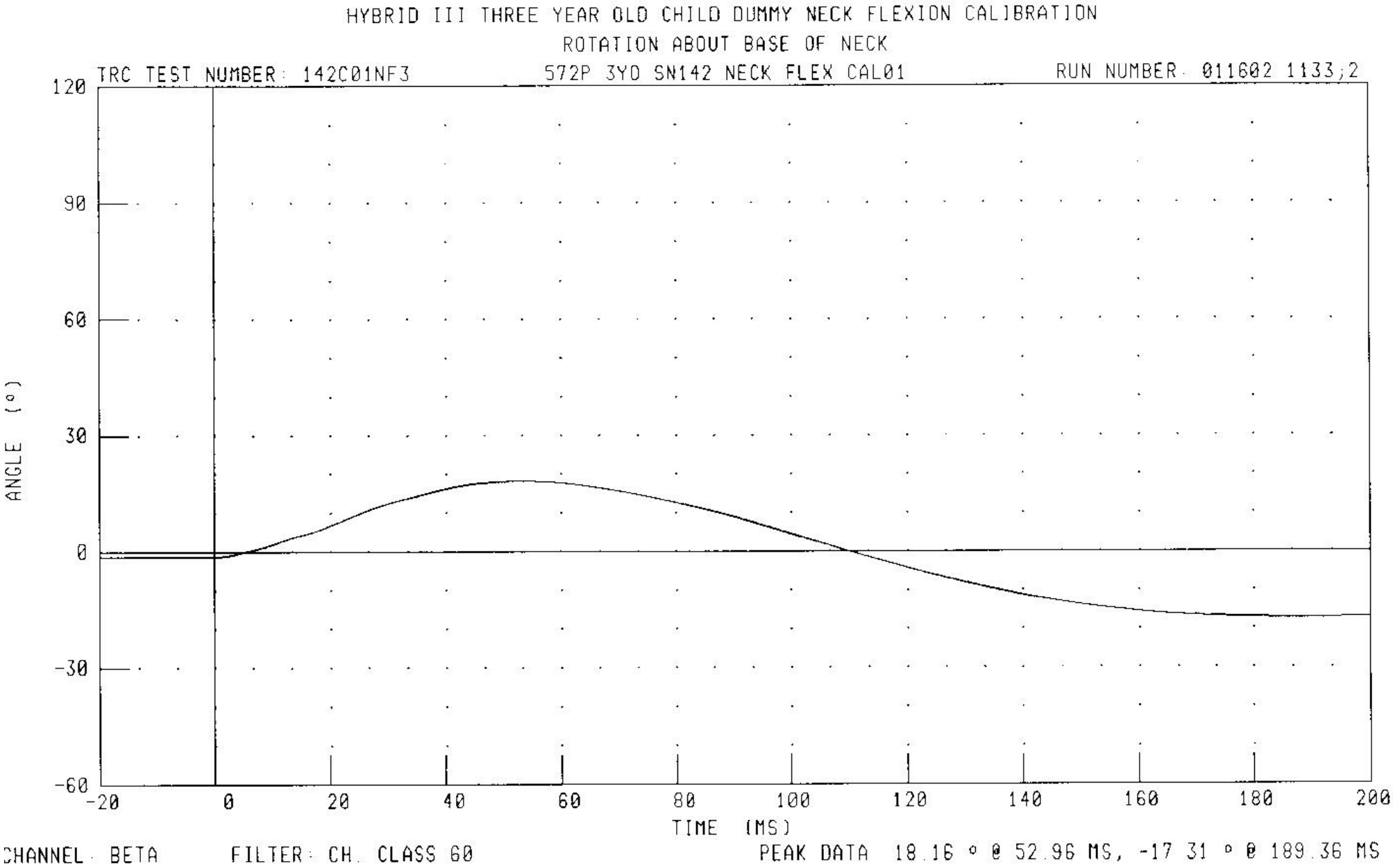
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	16.0 %
IMPACT VELOCITY		5.40 - 5.60 M/S	5.56 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.0 - 2.7 M/S	2.51 M/S
	15 MS	3.0 - 4.0 M/S	3.76 M/S
	20 MS	4.0 - 5.1 M/S	5.10 M/S
PEAK D-PLANE ROTATION		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

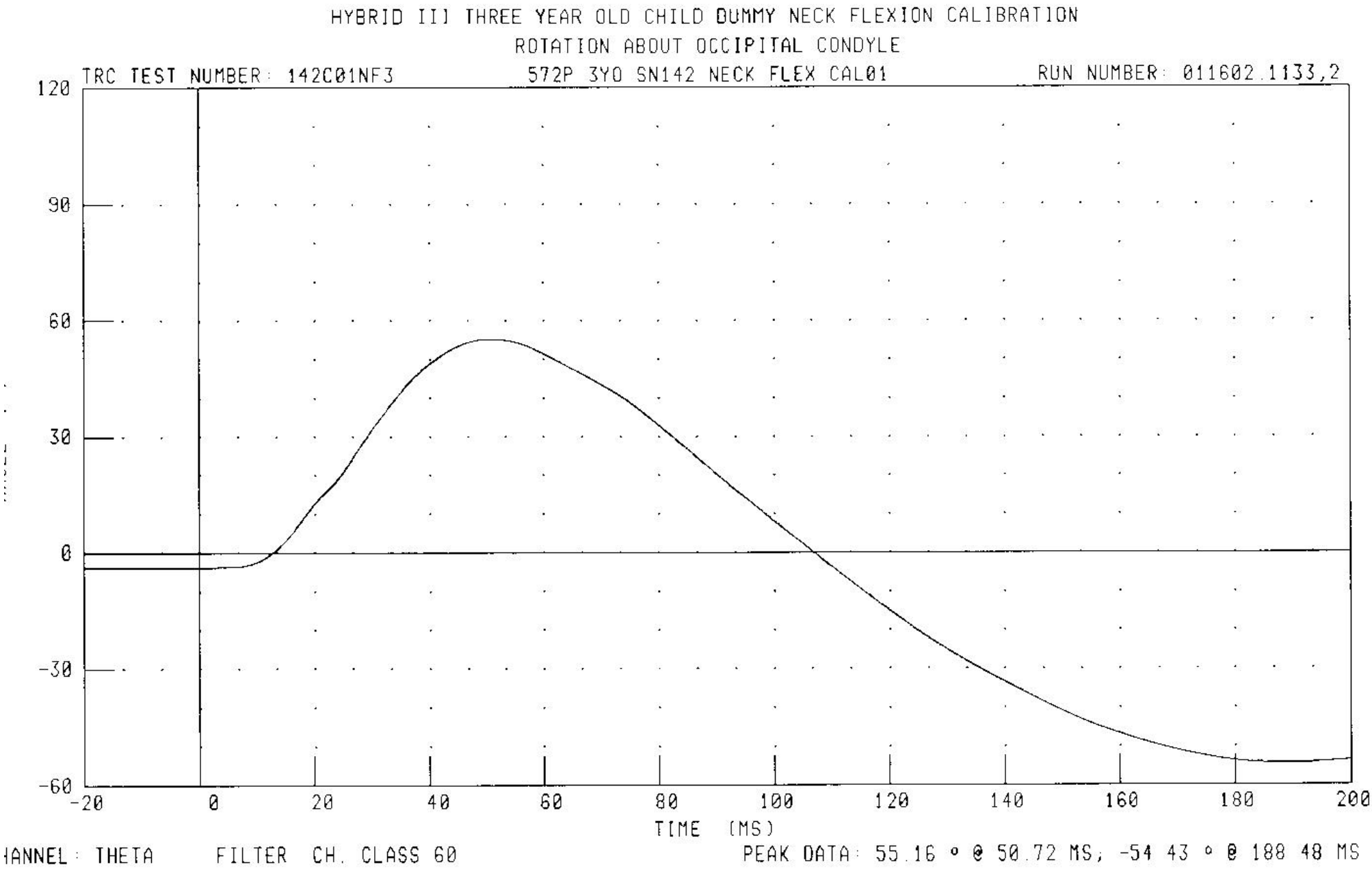
TEST MEETS SPECIFICATIONS

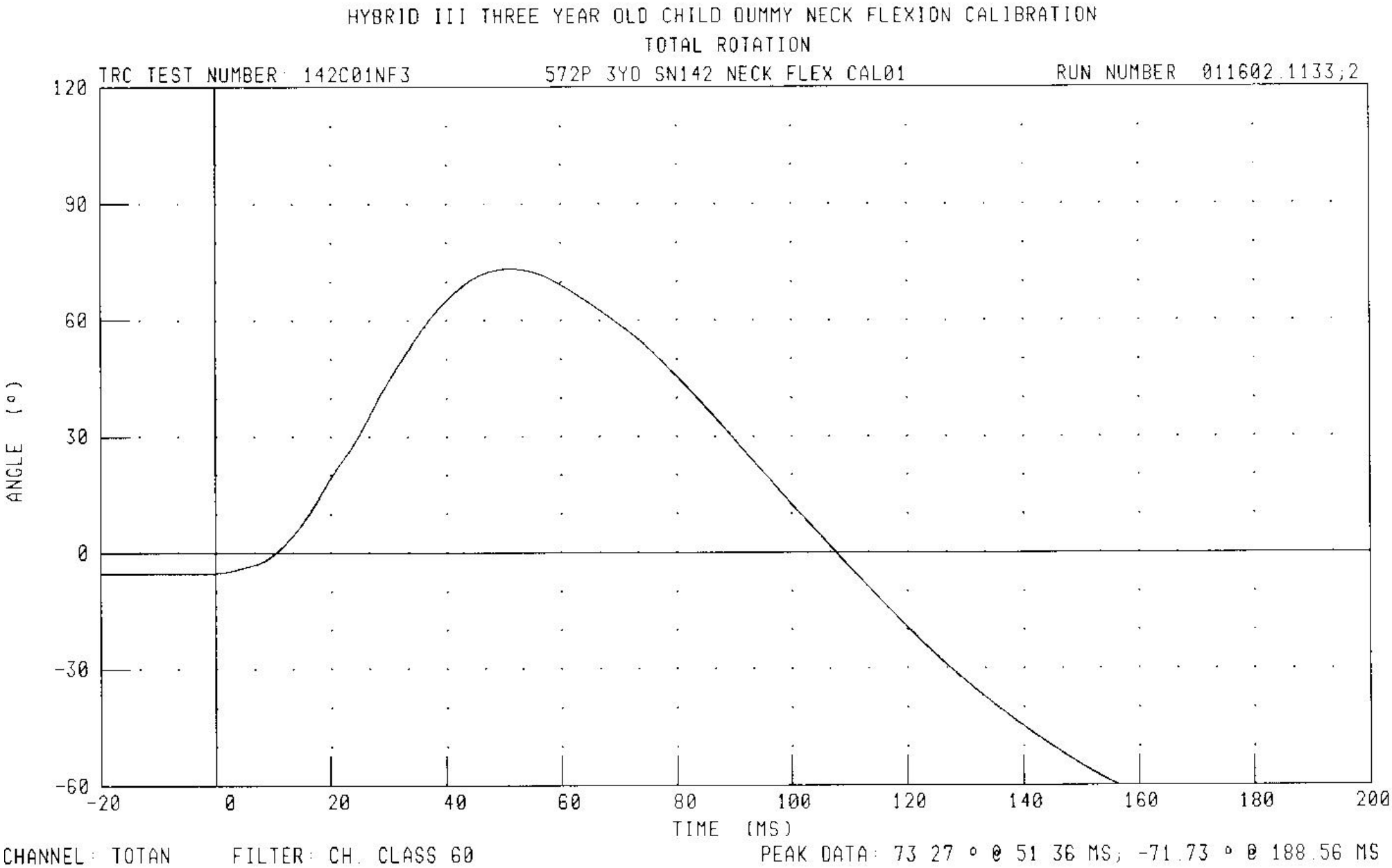
TECHNICIAN _____ RUN NUMBER: 011602.1112;2

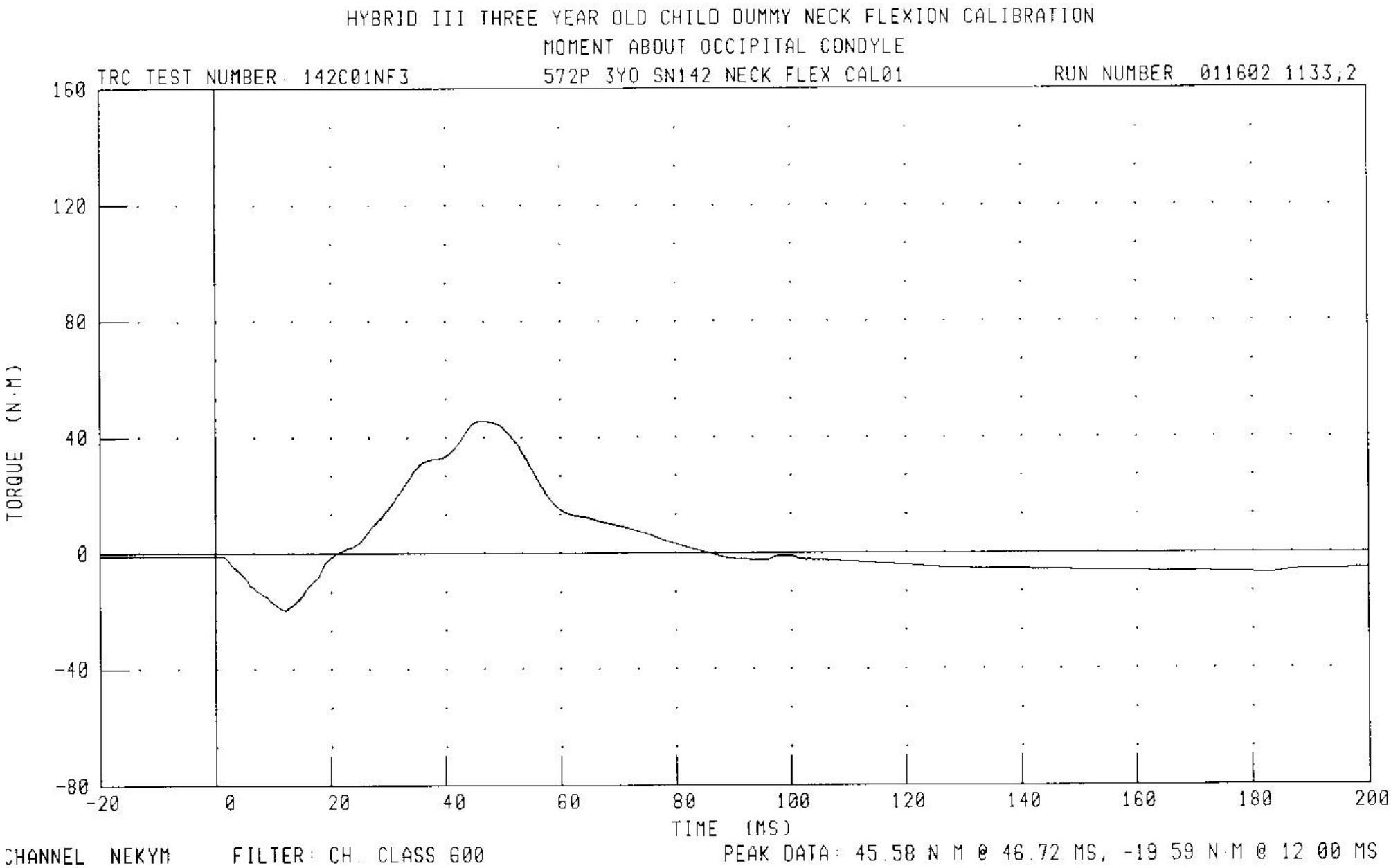

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER: 011602 1133,2
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS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

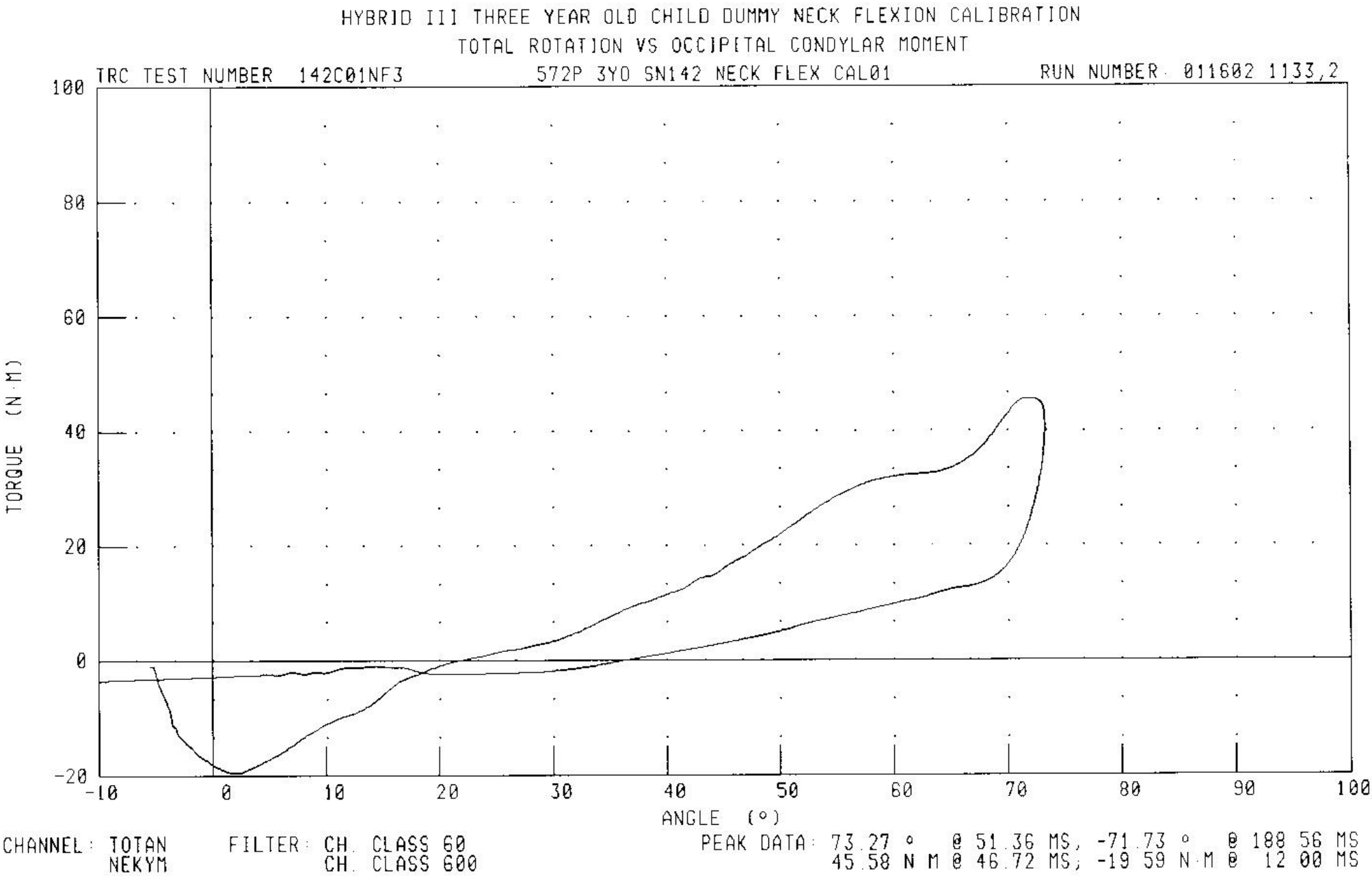

HYBRID III THREE YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM INTEGRATED VELOCITY
TRC TEST NUMBER: 142C01NF3
572P 3YO SN142 NECK FLEX CAL01
RUN NUMBER 011602 1133;2
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXVI
FILTER: CH CLASS 180
PEAK DATA: 6.60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

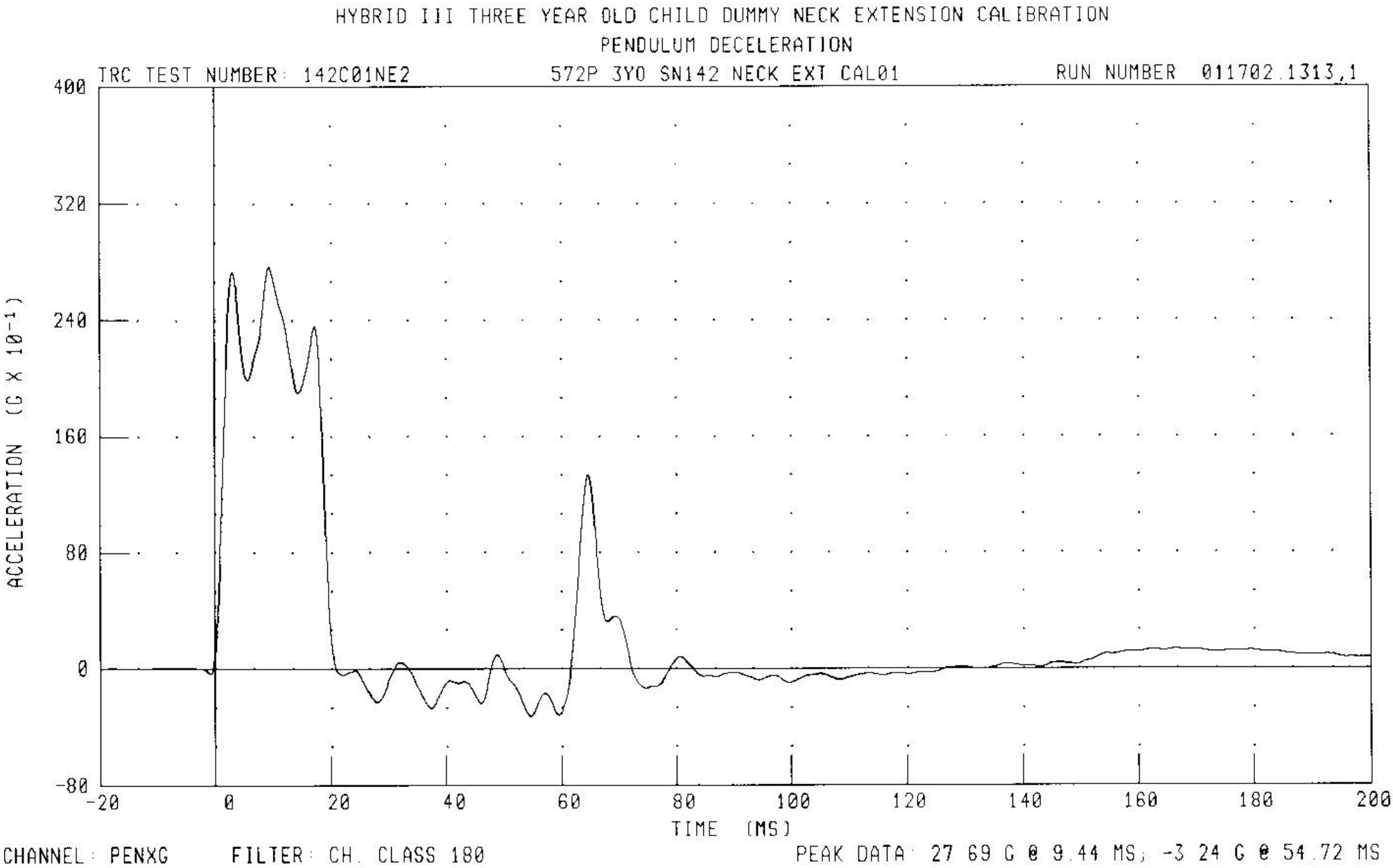
NECK EXTENSION TEST

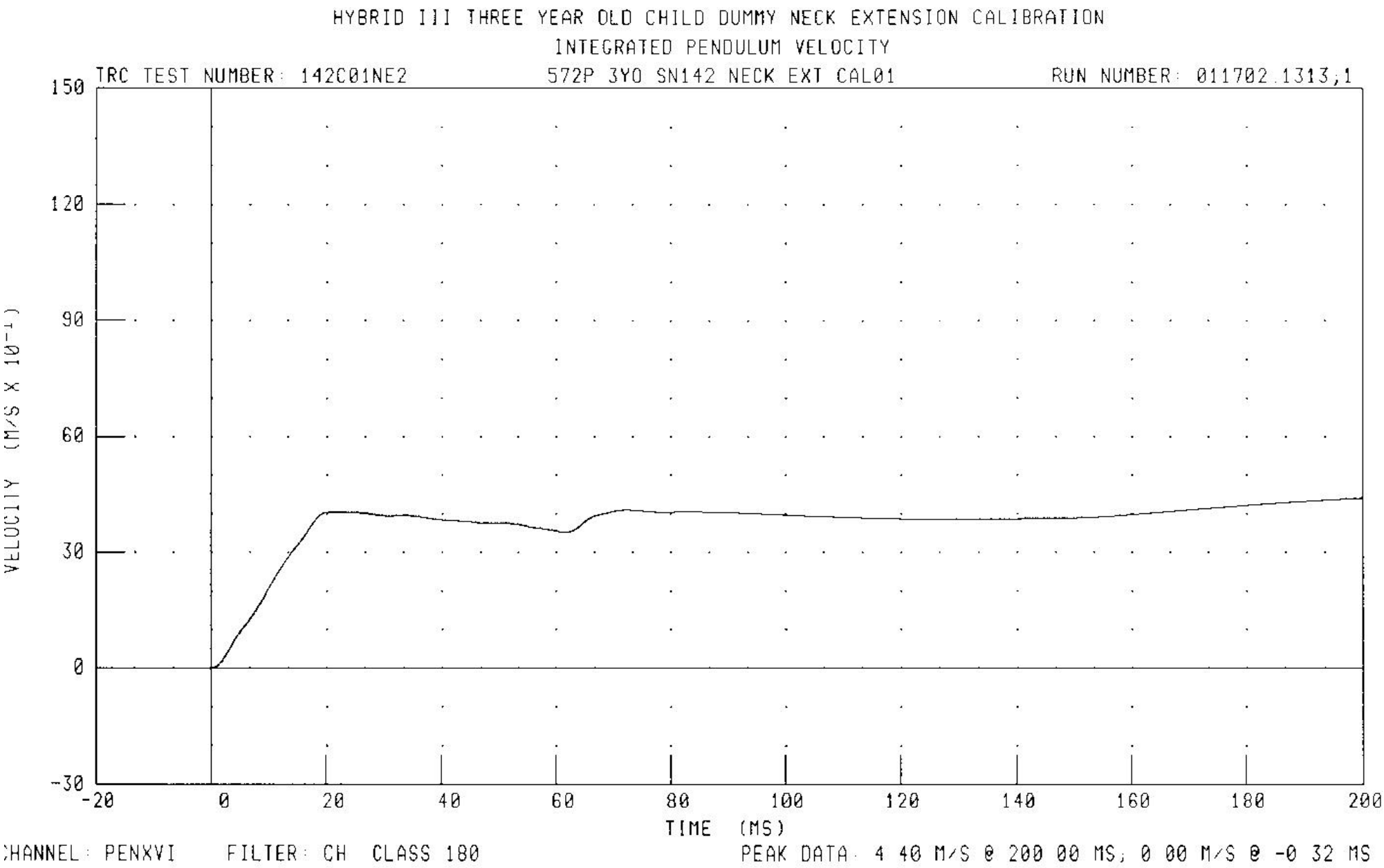
TRC INC. TEST NO: 142C01NE2 572P 3YO SN142 NECK EXT CAL01

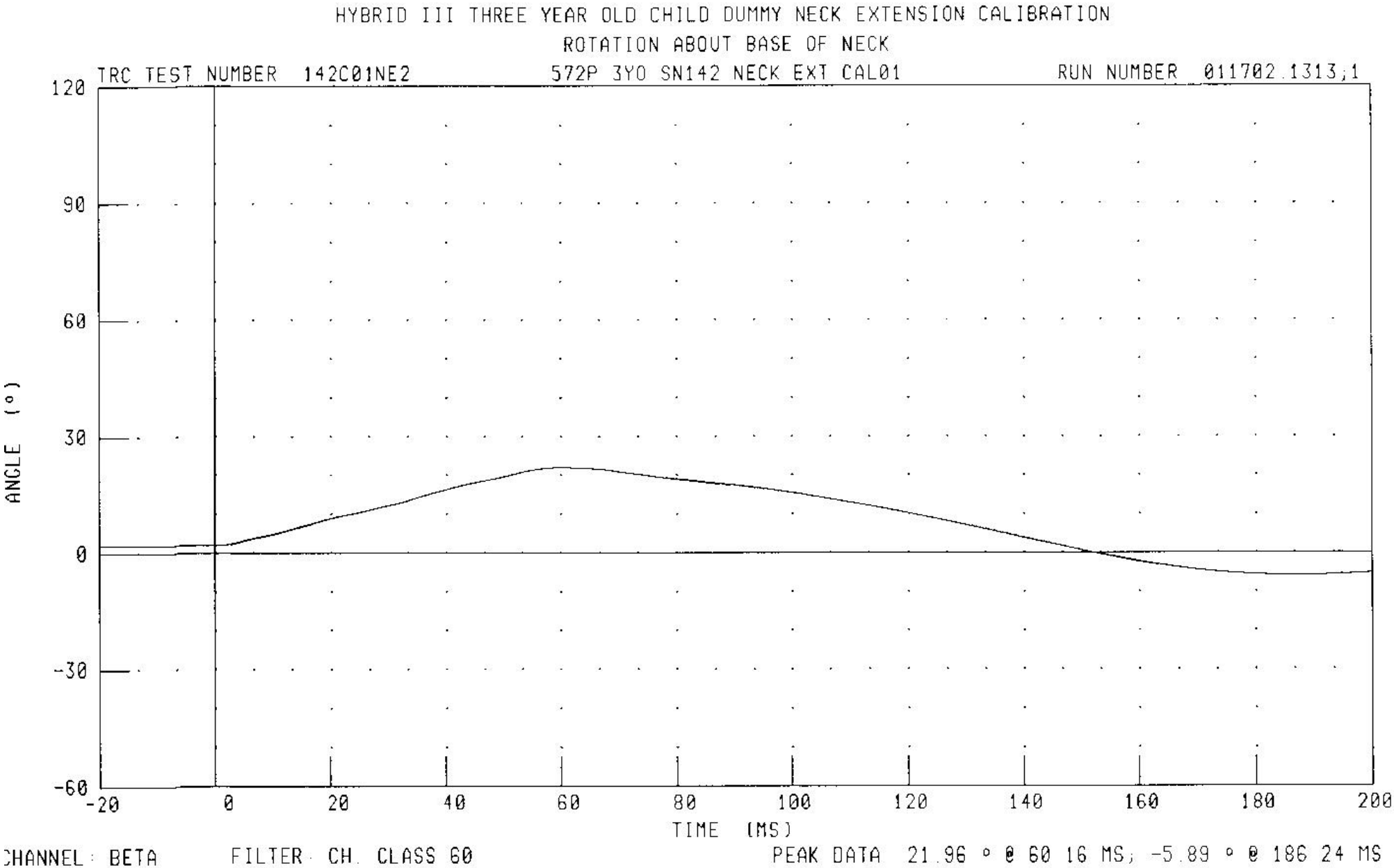
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	15.0 %
IMPACT VELOCITY		3.55 - 3.75 M/S	3.68 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	1.0 - 1.4 M/S	1.12 M/S
	10 MS	1.9 - 2.5 M/S	2.06 M/S
	14 MS	2.8 - 3.5 M/S	2.98 M/S
PEAK D-PLANE ROTATION		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

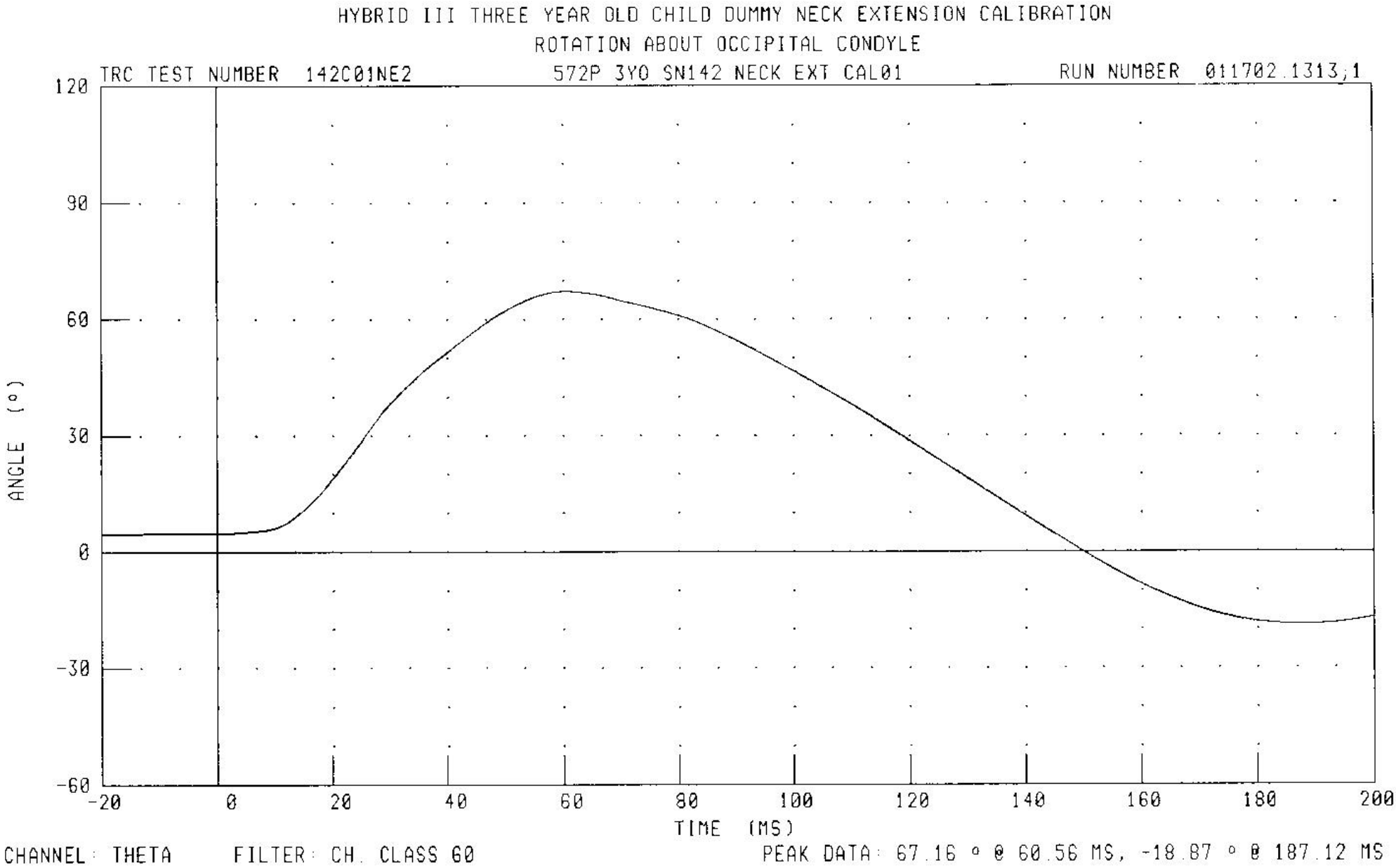
TEST MEETS SPECIFICATIONS

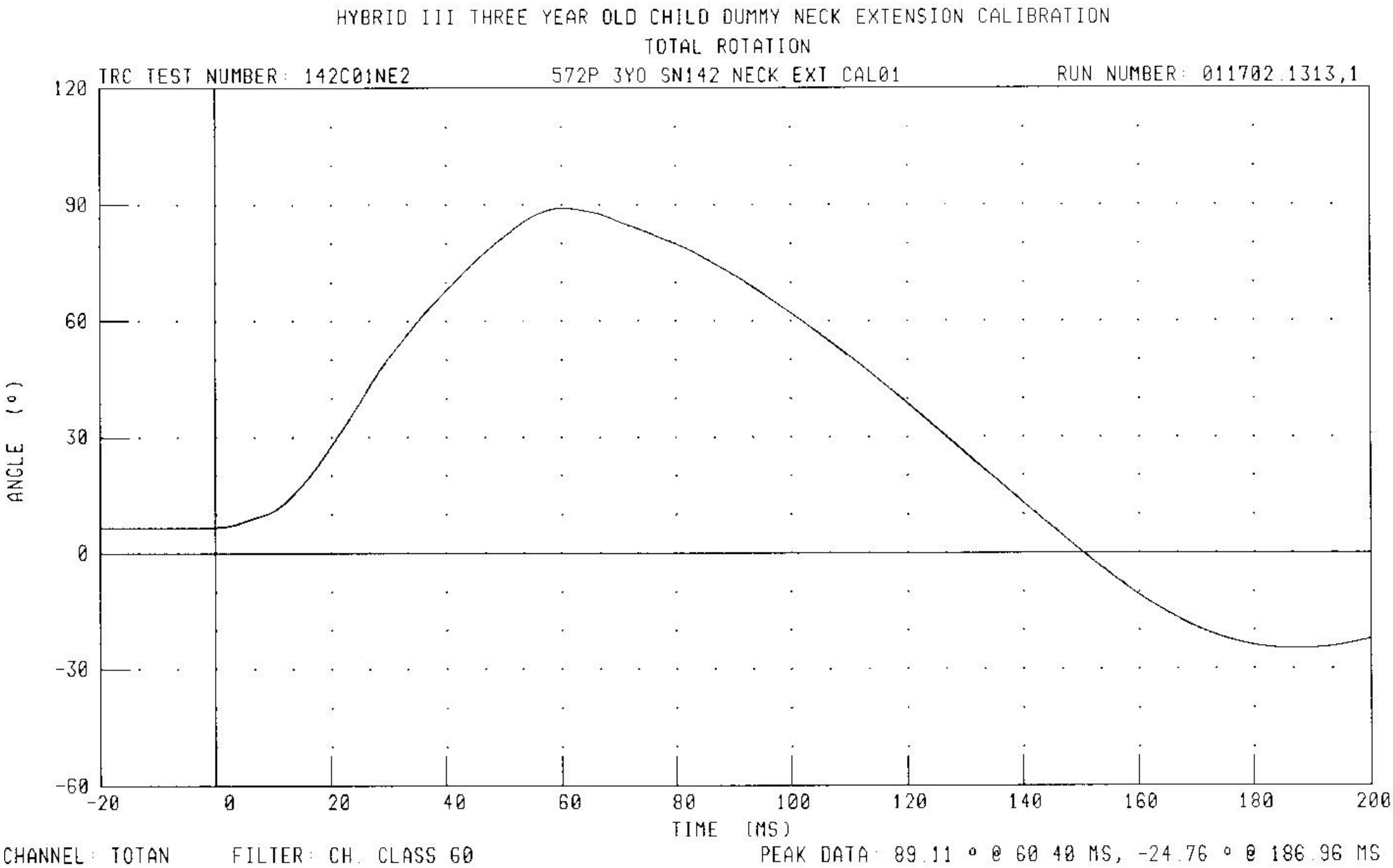
TECHNICIAN _____ RUN NUMBER: 011702.1251;1

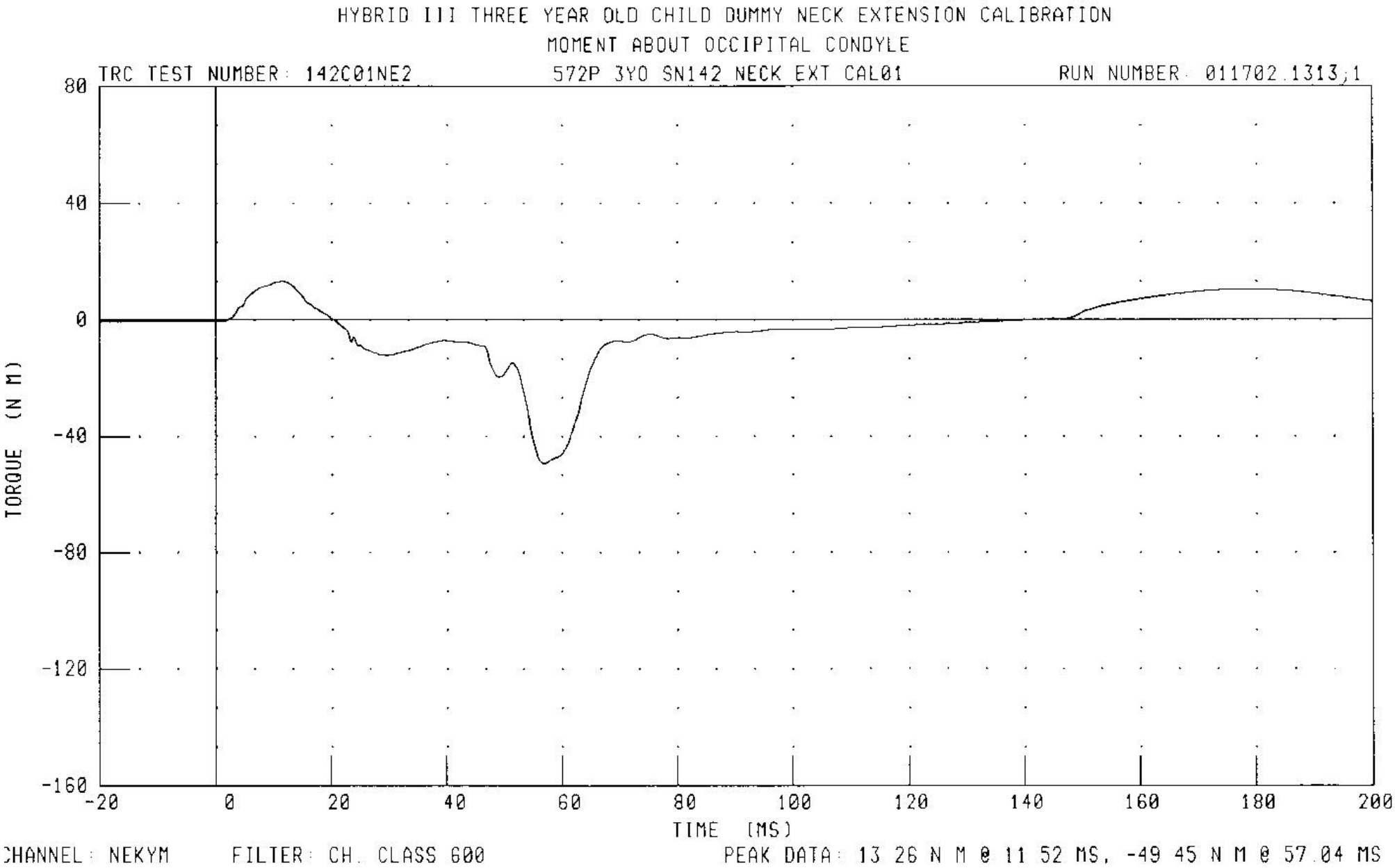

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER 011702.1313,1
ACCELERATION (G X 10⁻¹)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS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

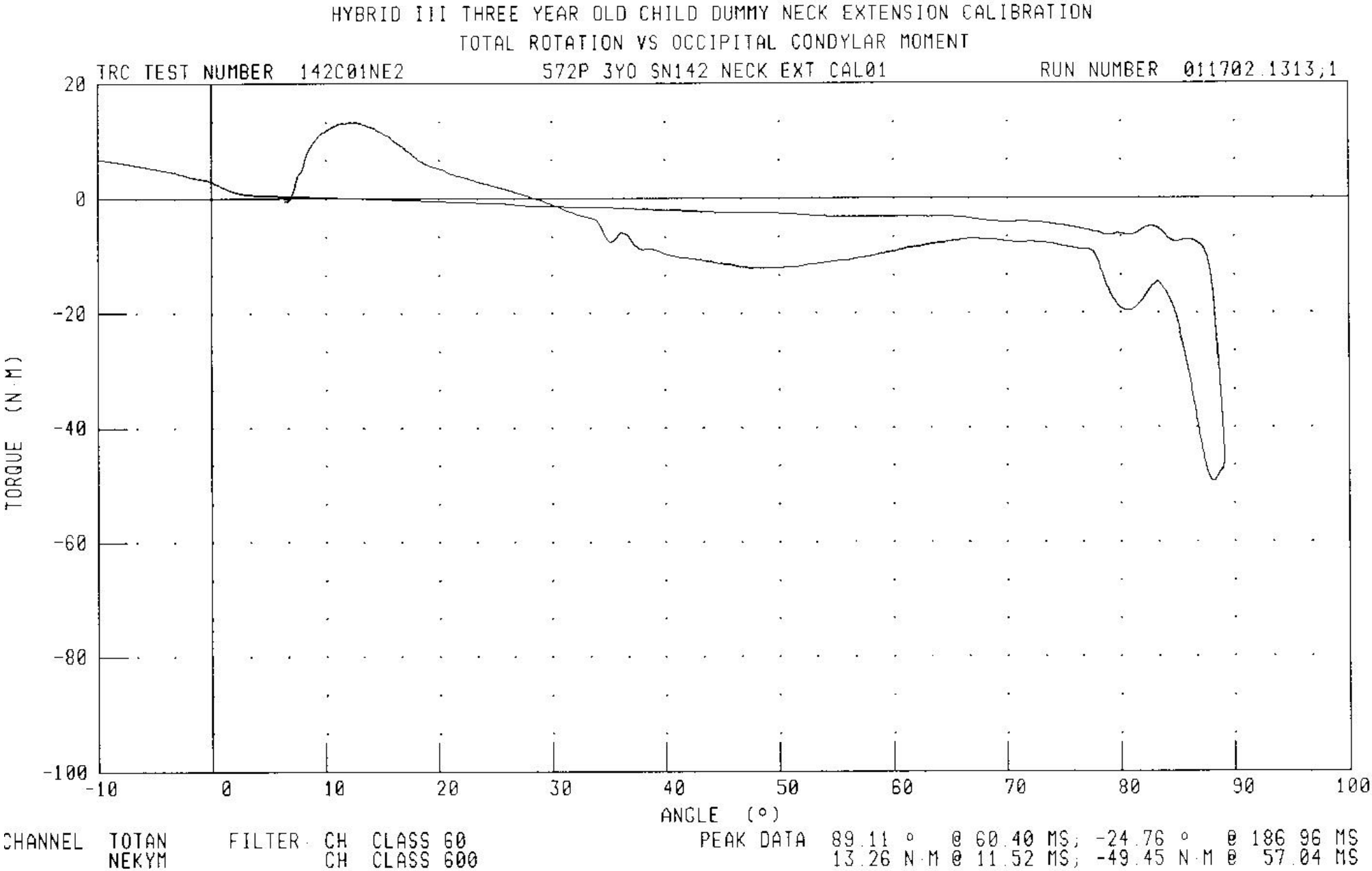

HYBRID III THREE YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
INTEGRATED PENDULUM VELOCITY
TRC TEST NUMBER: 142C01NE2
572P 3YO SN142 NECK EXT CAL01
RUN NUMBER: 011702.1313;1
VELOCITY (M/S X 10⁻¹)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH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

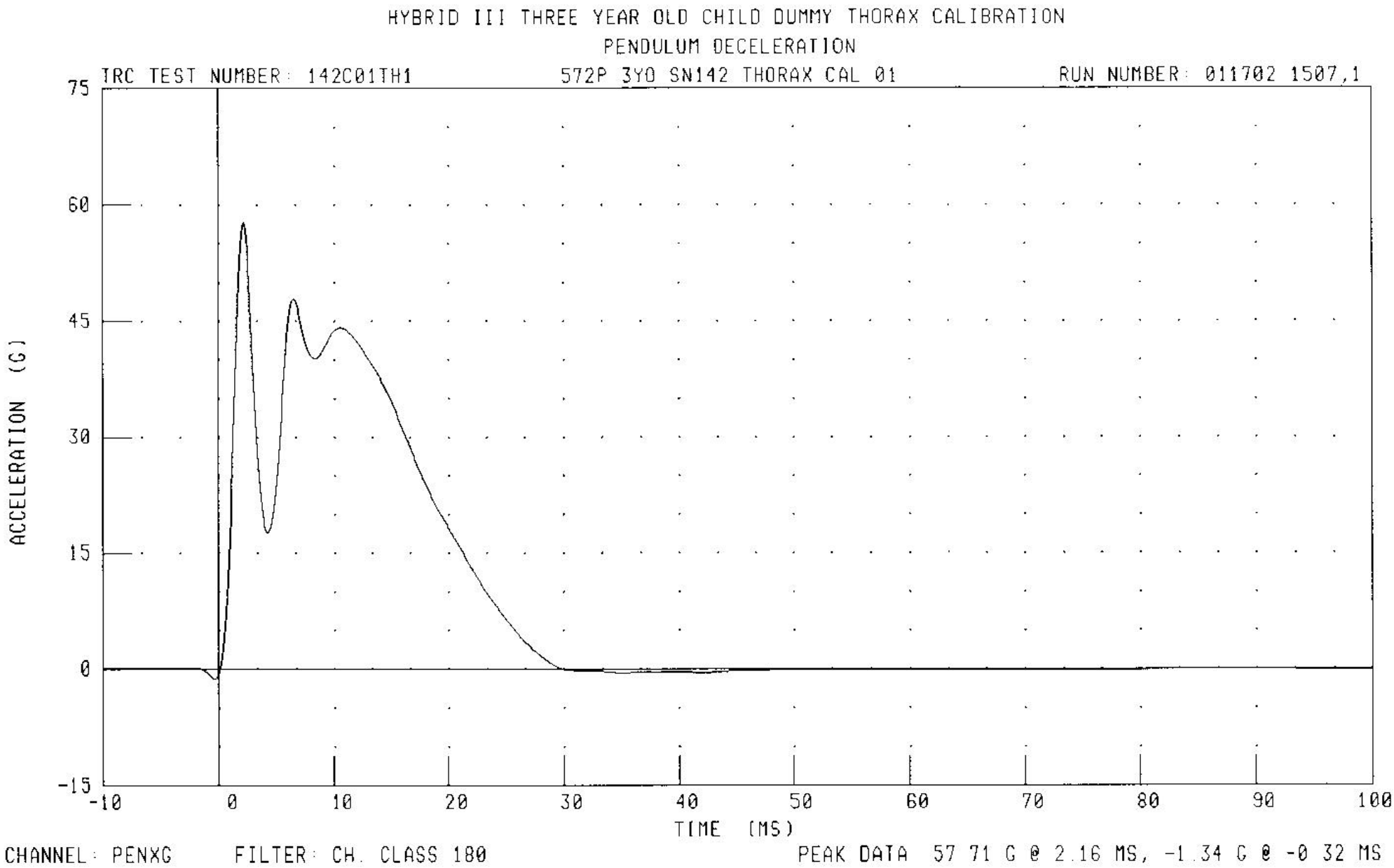
TRC INC. TEST NO: 142C01TH1 572P 3YO SN142 THORAX CAL 01

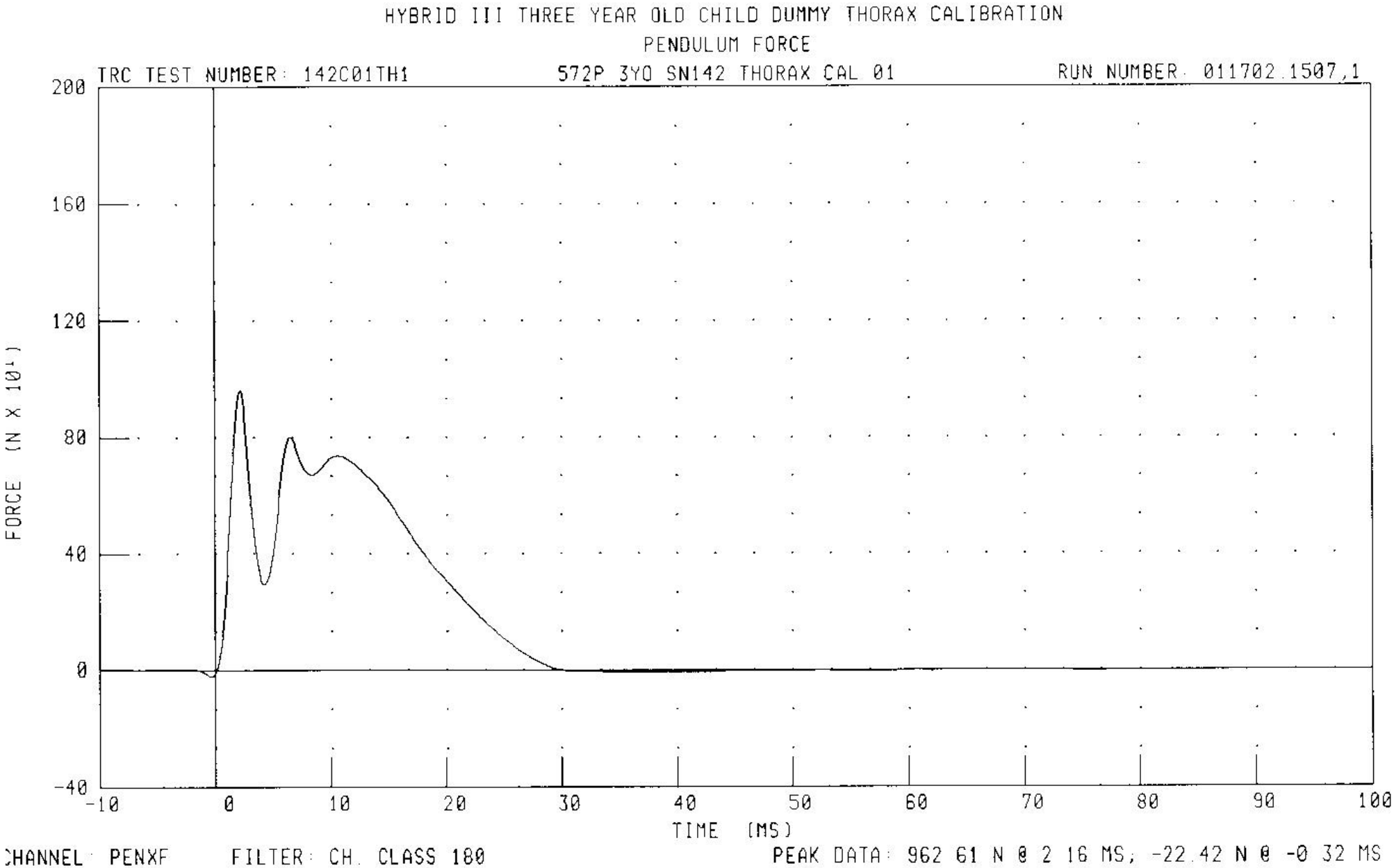
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	14.0 %
PENDULUM VELOCITY	5.90 - 6.10 M/S	5.99 M/S
MAXIMUM DEFLECTION	32 - 38 MM	33.2 MM
MAXIMUM FORCE DURING DEFLECTION INTERVAL	680 - 910 N	735. N
INTERNAL HYSTERESIS	65% -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

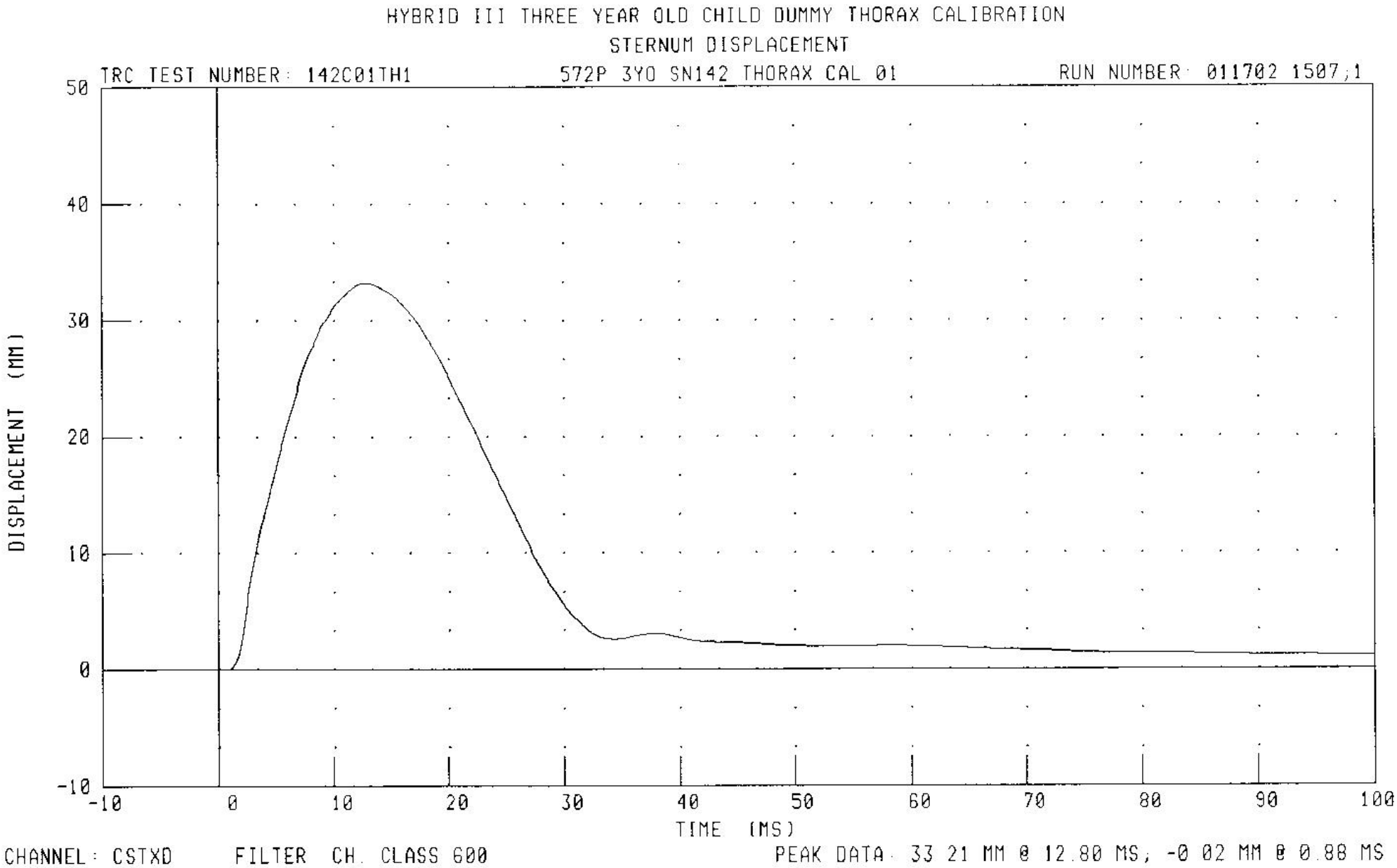
TEST MEETS SPECIFICATIONS

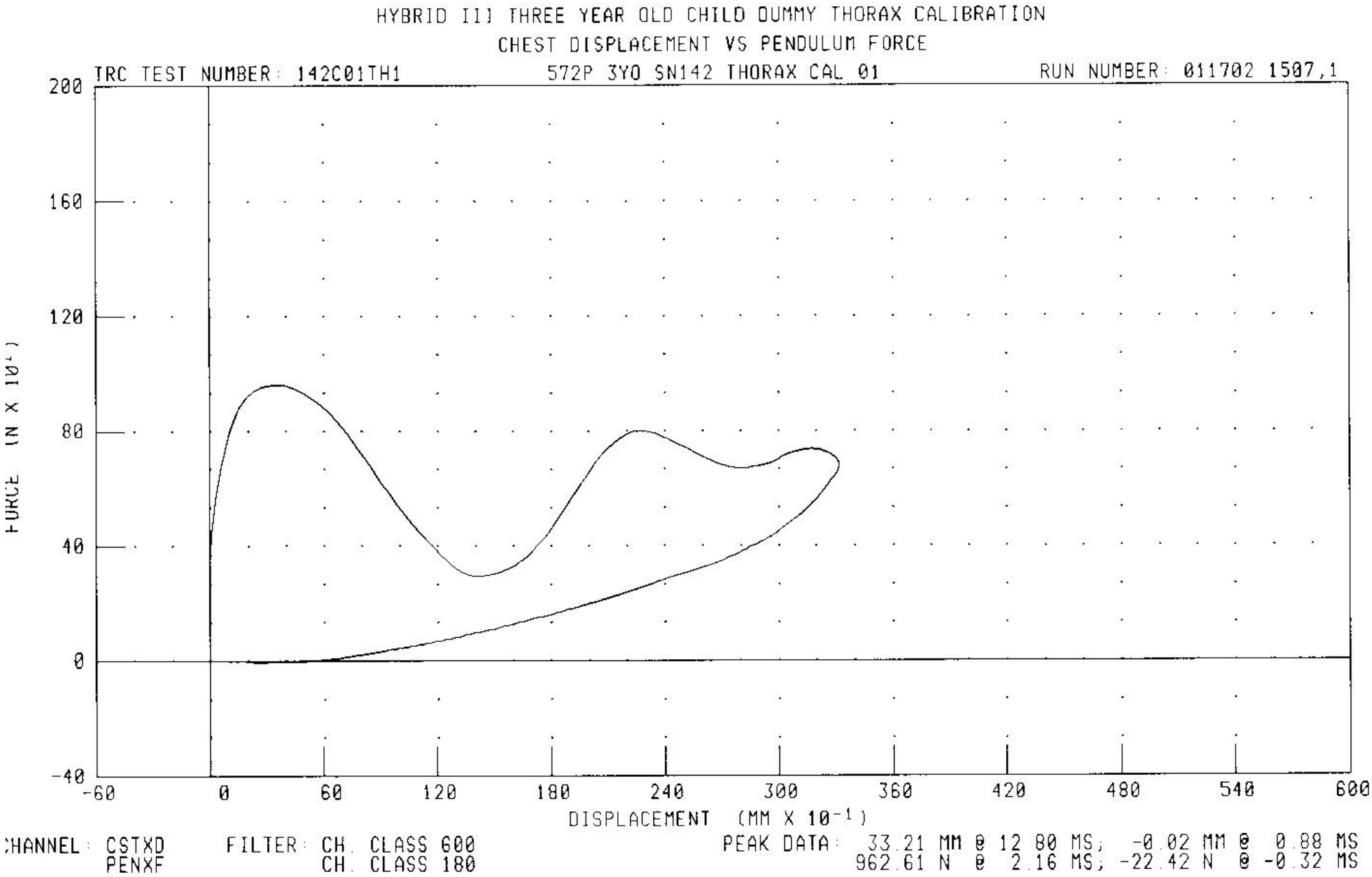
TECHNICIAN

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
FORCE (N X 10¹)
200
160
120
80
40
0
-40
-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
200
160
120
80
40
0
-40
-60
0
60
120
180
240
300
360
420
480
540
600
DISPLACEMENT (MM X 10-1)
CHANNEL: CSTXD
PENXF
FILTER: CH. CLASS 600
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

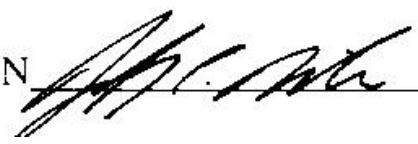
HYBRID III THREE-YEAR-OLD

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 14

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 15

AVI FILES

AVI FILES (continuted)