REPORT NUMBER: SLED-VER-2002-16

CHILD RESTRAINT SYSTEM IN DYNAMIC SLED TEST EVENFLO COZY CARRY V, REARWARD-FACING RECLINED, INFANT COSCO DESIGNER 35, REARWARD-FACING RECLINED, INFANT

TEST NUMBER: 22478

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

April 30, 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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

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		Page No.
1	Purpose and Test Procedure	1
2	P3 Child Restraint Information	2
3	P3 Post-Test Observations	3
4	P3 CRABI 12 Month Old ATD Injury Criteria and Sensor Data	4
5	P4 Child Restraint Information	6
6	P4 Post-Test Observations	7
7	P4 CRABI 12 Month Old ATD Injury Criteria and Sensor Data	8
8	Sled Test Set-Up	10
9	Camera Location	11
10	Photographs	12
11	Data Plots	31
12	Compression – Deflection Resistance Test	73
13	Child Dummy Calibration Data Traces and Tables	83
14	Test Equipment and Instrumentation Calibration	200
15	AVI Files	203

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 April 30, 2002 at a speed of 48.5 kph (30.2 mph). The FMVSS No. 213 sled pulse was used as a crash pulse. The requirements specified in the FMVSS No. 213 were also followed.

The bench seat contained two anthropomorphic test devices (ATD's). Two (2) CRABI 12 month old size ATD's, Serial Number 22 (P3) and 17 (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

On the South (P3) seat the base cracked at the base latches and the carrier separated from base.

SECTION 2

CHILD RESTRAINT INFORMATION

Test No.: 22478S Test Date: April 30, 2002

P3 Seating Position

Child Restraint Type (forward-facing, rearward facing, booster)	Rearward facing, Reclined, Infant
LATCH or NON-LATCH	Non-latch
Child Restraint Manufacturer	Evenflo
Child Restraint Model	Cozy Carry V
Model Number	2731124
Date of Manufacture	1/23/02
Child Restraint Height Limits (mm)	482.6 – 660.4
Child Restraint Weight Limits (kg)	2.3 – 10
Weight of Child Restraint (kg)	5.8
Tether Location	Upper

SECTION 3

POST-TEST OBSERVATIONS

Test No.: 22478S Test Date: April 30, 2002

P3 Seating Position

Child Seat	Evenflo, Cozy Carry V
Belt Fraying	None
Stress Marks	None
Cracks	Base cracked at base latches - Carrier separated from base
Buckle Stress	None
Latch Hooks	None
Seat Back Rotation Angle	Carrier separated from base
Velocity	30.2 mph, 48.5 kph
Acceleration (G's)	24.5

SECTION 4

CRABI 12 MONTH OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22478S Test Date: April 30, 2002

P3 Seating Position

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	18.1	59.6	-4.7	44.9
Head CG	Y	G's	4.2	66.1	-2.5	114.2
Head CG	Z	G's	39.3	59.6	-2.1	150.0
Head CG Resultant	N/A	G's	43.3	59.6		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	23.5	43.3	-1.6	248.4
Chest CG	Y	G's	4.8	39.1	-2.7	62.1
Chest CG	Z	G's	32.4	42.4	-3.4	75.6
Chest CG Resultant	N/A	G's	40.0	43.0		

SEAT BELT SENSOR PEAK VALUES

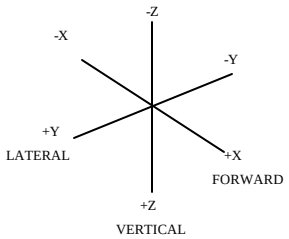
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P3 (South) Rear Passenger			
	HIC	Avg. G's	T^1	T^2
Head CG Primary (36 msec)	194	34.0	37.1	66.0
Head CG Primary (15 msec)	116	36.0	49.5	64.5

CHEST CLIP (3 MSEC)

Location	P3 (South) Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	39.4	41.3	44.3



CRABI 12 MONTH OLD ATD INJURY CRITERIA AND SENSOR DATA…(continued)

Test No.: 22478S Test Date: April 30, 2002

P3 Seating Position

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	45.5	69.3	-10.2	110.2
Pelvis	Y	G's	12.2	40.3	-6.4	63.2
Pelvis	Z	G's	44.0	41.4	-10.8	91.8

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	49.2	134.4	-269.3	45.5
Neck Force	Y	Newtons	32.3	82.3	-94.6	119.2
Neck Force	Z	Newtons	965.6	60.4	-66.8	157.8
Neck Moment	X	Nm	1.4	133.4	-1.5	55.5
Neck Moment	Y	Nm	5.3	149.0	-9.6	45.1
Neck Moment	Z	Nm	0.9	88.8	-1.2	132.3

LOWER NECK PEAK FORCES AND MOMENTS

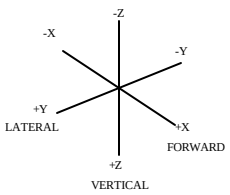
Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	130.5	58.9	-112.1	45.6
Neck Force	Y	Newtons	31.7	82.1	-70.6	43.9
Neck Force	Z	Newtons	1101.8	60.1	-58.2	166.3
Neck Moment	X	Nm	1.9	83.0	-2.6	43.9
Neck Moment	Y	Nm	5.5	167.1	-4.9	58.4
Neck Moment	Z	Nm	1.0	46.7	-0.8	130.4

LUMBAR PEAK FORCES AND MOMENTS

Location	Axis	Units	P3 (South) Rear Passenger			
			Max	Time	Min	Time
Lumbar Force	X	Newtons	35.7	74.5	-122.7	125.7
Lumbar Force	Y	Newtons	21.8	137.2	-38.8	42.2
Lumbar Force	Z	Newtons	313.0	100.2	-127.3	169.8
Lumbar Moment	X	Nm	3.3	122.9	-1.3	71.5
Lumbar Moment	Y	Nm	4.9	124.1	-0.0	50.0
Lumbar Moment	Z	Nm	0.6	100.1	-1.9	123.5

CHEST PEAK DISPLACEMENTS

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



SECTION 5

CHILD RESTRAINT INFORMATION

Test No.: 22478N Test Date: April 30, 2002

P4 Seating Position

Child Restraint Type (forward-facing, rearward facing, booster)	Rearward facing, Reclined, Infant
LATCH or NON-LATCH	Non-latch
Child Restraint Manufacturer	Cosco
Child Restraint Model	Designer 35
Model Number	02-642
Date of Manufacture	1/08/02
Child Restraint Height Limits (mm)	482.6 – 889.0
Child Restraint Weight Limits (kg)	2.3 – 15.9
Weight of Child Restraint (kg)	6.4
Tether Location	Upper

SECTION 6

POST-TEST OBSERVATIONS

Test No.: 22478N Test Date: April 30, 2002

P4 Seating Position

Child Seat	Cosco Designer 35
Belt Fraying	None
Stress Marks	None
Cracks	None
Buckle Stress	None
Latch Hooks	None
Seat Back Rotation Angle	59
Velocity	30.2 mph, 48.5 kph
Acceleration (G's)	24.5

SECTION 7

CRABI 12 MONTH OLD ATD INJURY CRITERIA AND SENSOR DATA

Test No.: 22478N Test Date: April 30, 2002

P4 Seating Position

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	45.6	83.3	-9.9	237.6
Head CG	Y	G's	1.1	137.7	-10.0	81.4
Head CG	Z	G's	35.0	57.2	-28.6	93.4
Head CG Resultant	N/A	G's	48.5	83.8		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	34.5	60.4	-6.8	243.2
Chest CG	Y	G's	2.8	94.2	-5.1	81.1
Chest CG	Z	G's	33.2	38.9	-27.0	86.6
Chest CG Resultant	N/A	G's	45.0	59.4		

SEAT BELT SENSOR PEAK VALUES

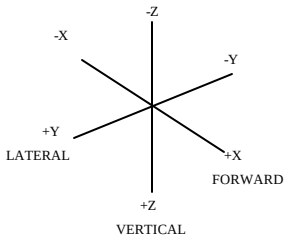
Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Tether Belt	N/A	Newtons	----	----		

HEAD INJURY CRITERIA (HIC)

Location	P4 (North) Rear Passenger			
	HIC	Avg. G's	T^1	T^2
Head CG Primary (36 msec)	314	37.7	54.7	90.7
Head CG Primary (15 msec)	191	43.8	77.7	92.7

CHEST CLIP (3 MSEC)

Location	P4 (North) Rear Passenger		
	Clip	T^1	T^2
Chest CG Primary	43.5	57.9	60.9



CRABI 12 MONTH OLD ATD INJURY CRITERIA AND SENSOR DATA…(continued)

Test No.: 22478N Test Date: April 30, 2002

P4 Seating Position

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	31.8	41.0	-7.1	154.7
Pelvis	Y	G's	3.0	59.6	-5.8	37.6
Pelvis	Z	G's	39.7	37.8	-17.5	84.7

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	126.8	88.4	-259.5	46.0
Neck Force	Y	Newtons	26.5	40.7	-84.9	86.4
Neck Force	Z	Newtons	964.7	46.4	-645.9	96.0
Neck Moment	X	Nm	4.7	89.2	-0.7	107.3
Neck Moment	Y	Nm	17.6	94.5	-9.7	45.8
Neck Moment	Z	Nm	1.0	101.8	-0.5	72.3

LOWER NECK PEAK FORCES AND MOMENTS

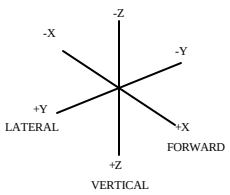
Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	376.8	93.5	-127.4	236.6
Neck Force	Y	Newtons	55.7	42.6	-68.4	82.1
Neck Force	Z	Newtons	1111.3	46.4	-601.9	96.2
Neck Moment	X	Nm	2.6	42.2	-3.3	83.5
Neck Moment	Y	Nm	8.9	227.6	-11.9	93.7
Neck Moment	Z	Nm	0.6	37.9	-0.7	81.9

LUMBAR PEAK FORCES AND MOMENTS

Location	Axis	Units	P4 (North) Rear Passenger			
			Max	Time	Min	Time
Lumbar Force	X	Newtons	0.1	20.5	-185.8	46.5
Lumbar Force	Y	Newtons	49.2	42.6	-14.1	124.0
Lumbar Force	Z	Newtons	380.1	74.6	-109.2	249.1
Lumbar Moment	X	Nm	1.0	36.4	-1.0	227.0
Lumbar Moment	Y	Nm	5.7	50.5	-0.0	40.9
Lumbar Moment	Z	Nm	0.8	64.2	-0.3	131.9

CHEST PEAK DISPLACEMENTS

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



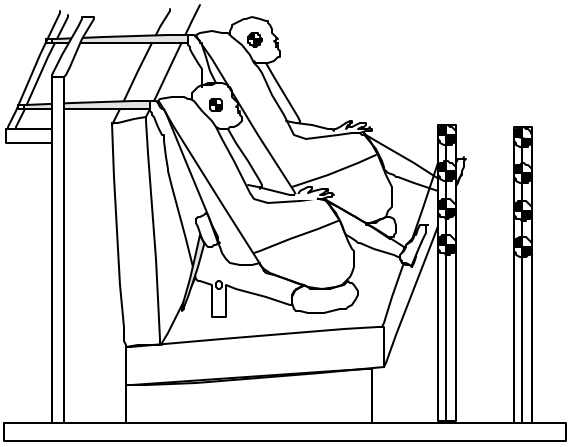
SECTION 8

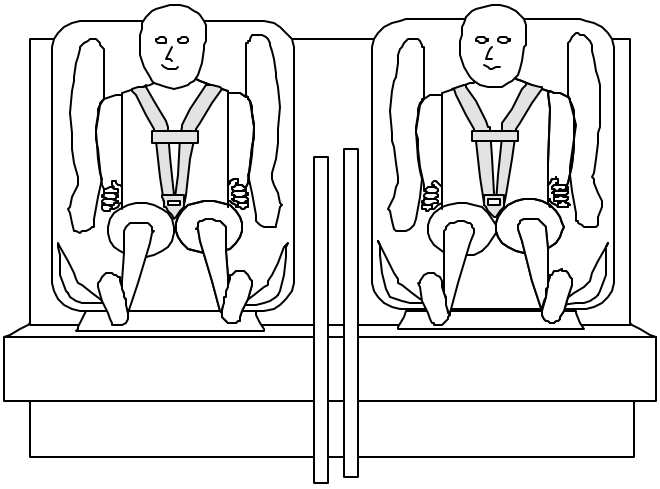
SLED TEST SET-UP

Test No.: 22478 Test Date: April 30, 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



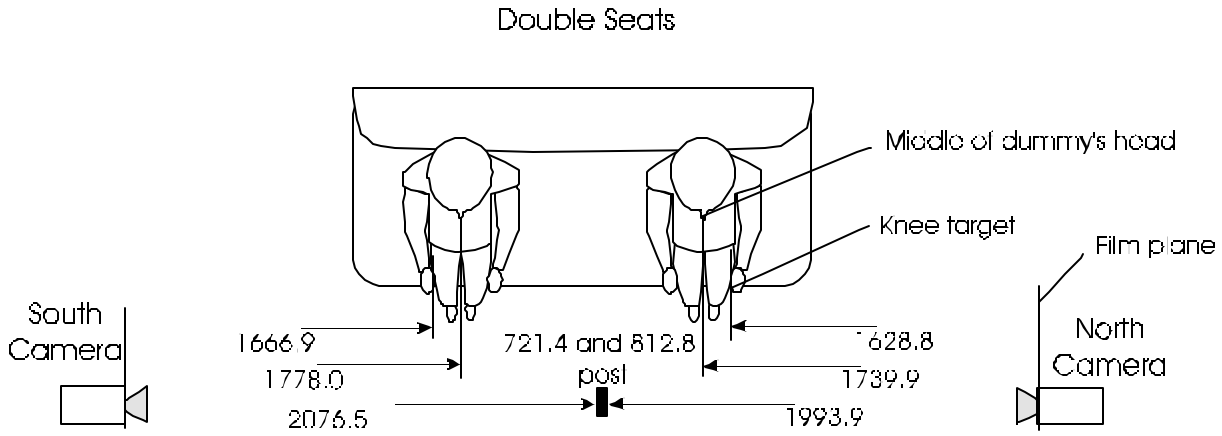


SECTION 9

CAMERA LOCATION

Test No.: 22478 Test Date: April 30, 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

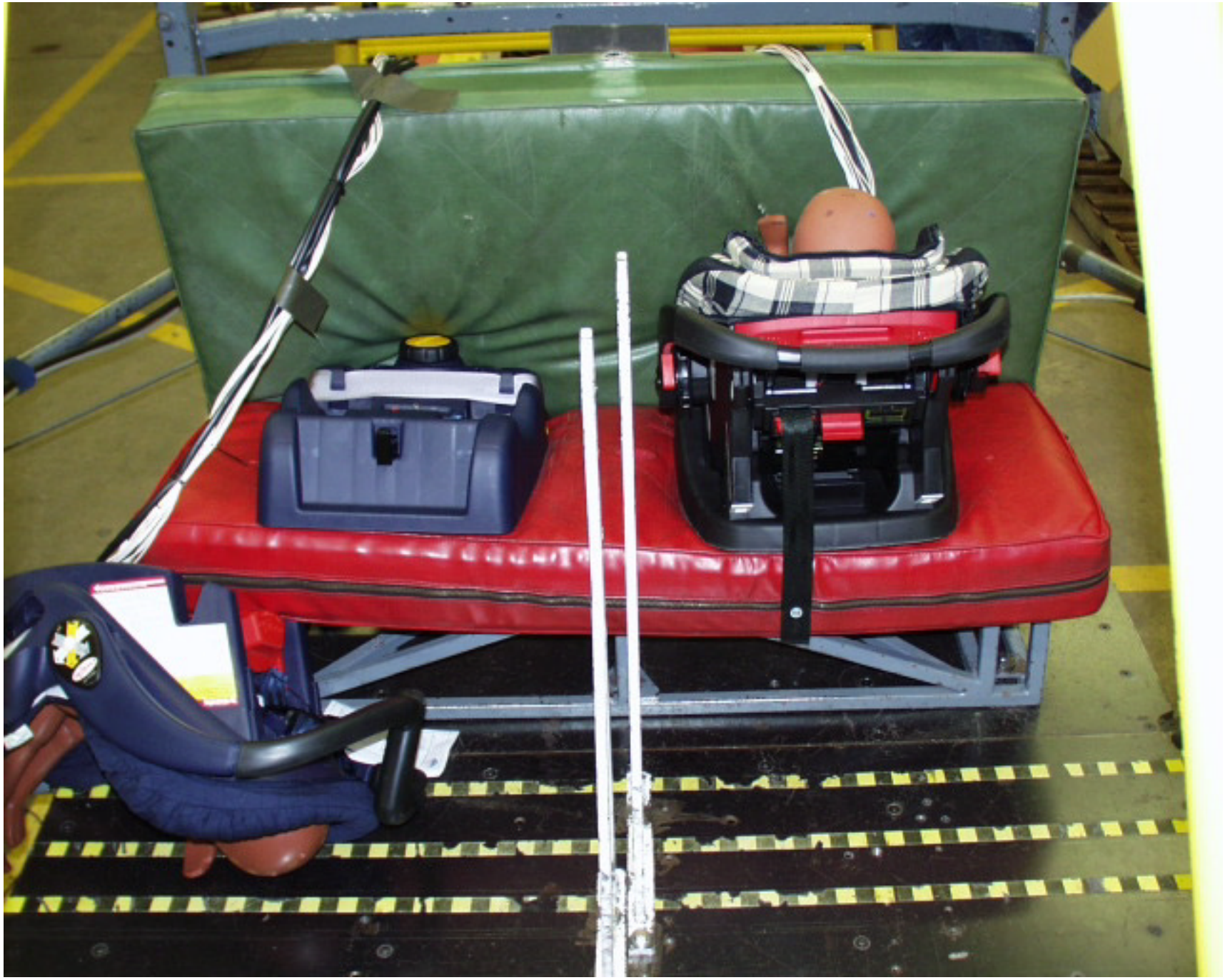
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Photographs	Page No.
Photo 1 – Pre-Test Front View	13
Photo 2 – Post-Test Front View	14
Photo 3 – Pre-Test Rear View	15
Photo 4 – Post-Test Rear View	16
Photo 5 – Pre-Test Left Side View	17
Photo 6 – Post-Test Left Side View	18
Photo 7 – Pre-Test Right Side View	19
Photo 8 – Post-Test Right Side View	20
Photo 9 – Pre-Test Fixture	21
Photo 10 – Post-Test Fixture	22
Photo 11 – Post-Test Front View of P3 Child Seat	23
Photo 12 – Post-Test Rear View of P3 Child Seat	24
Photo 13 – Post-Test Left View of P3 Child Seat	25
Photo 14 – Post-Test Right View of P3 Child Seat	26
Photo 15 – Post-Test Front View of P4 Child Seat	27
Photo 16 – Post-Test Rear View of P4 Child Seat	28
Photo 17 – Post-Test Left View of P4 Child Seat	29
Photo 18 – Post-Test Right View of P4 Child Seat	30



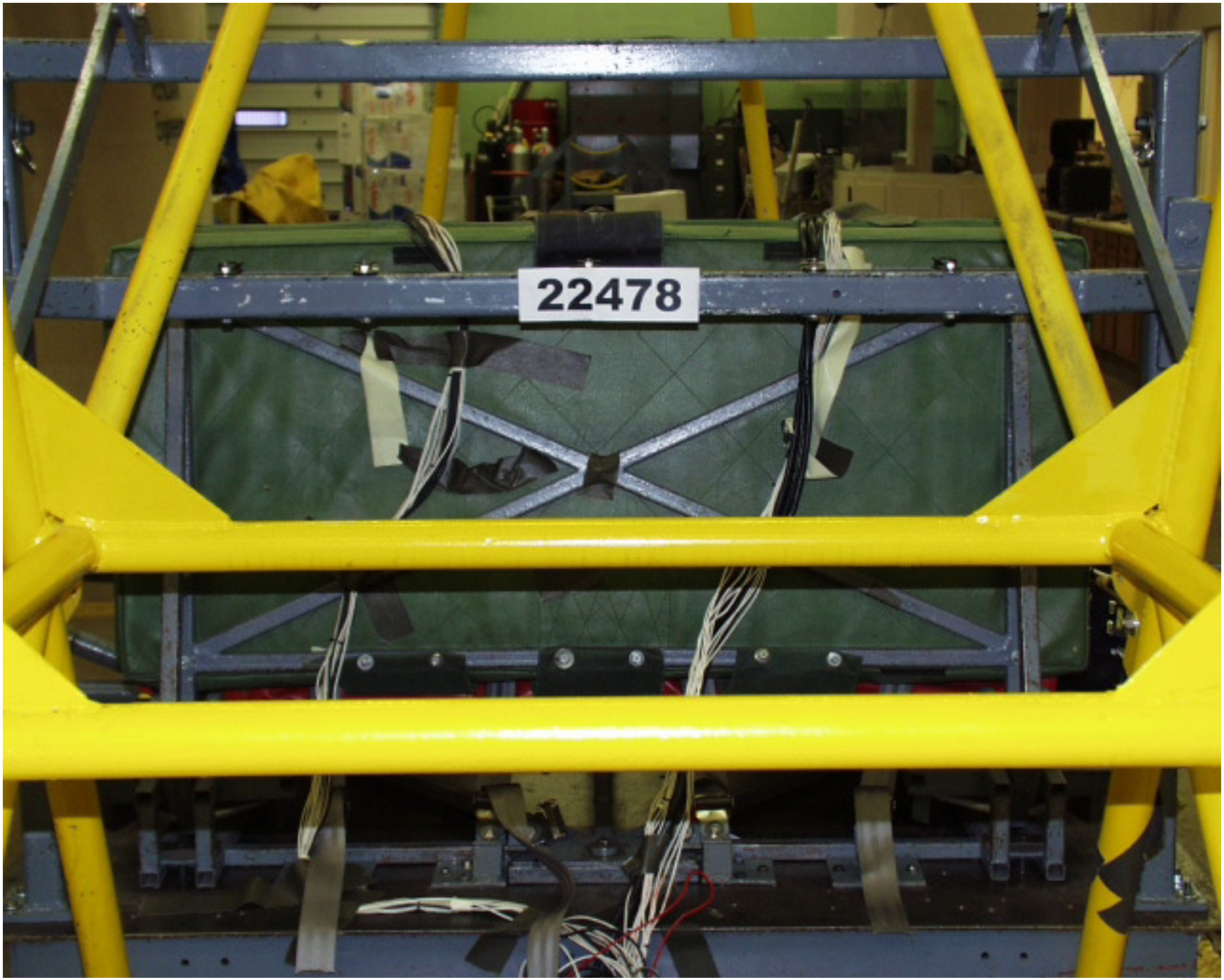
Run #22478 Photo 1 - Pre-Test Front View



Run #22478 Photo 2 - Post-Test Front View



Run #22478 Photo 3 - Pre-Test Rear View



Run #22478 Photo 4 - Post-Test Rear View



Run #22478 Photo 5 - Pre-Test Left Side View



Run #22478 Photo 6 - Post-Test Left Side View



Run #22478 Photo 7 - Pre-Test Right Side View



Run #22478 Photo 8 - Post-Test Right Side View



Run #22478 Photo 9 - Pre-Test Fixture



Run #22478 Photo 10 - Post-Test Fixture



Run #22478 Photo 11 - Post-Test Front View of Child Seat - P3



Run #22478 Photo 12 - Post-Test Rear View of Child Seat - P3



Run #22478 Photo 13 - Post-Test Left View of Child Seat - P3



Run #22478 Photo 14 - Post-Test Right View of Child Seat - P3



Run #22478 Photo 15 - Post-Test Front View of Child Seat - P4



Run #22478 Photo 16 - Post-Test Rear View of Child Seat - P4



Run #22478 Photo 17 - Post-Test Left View of Child Seat - P4



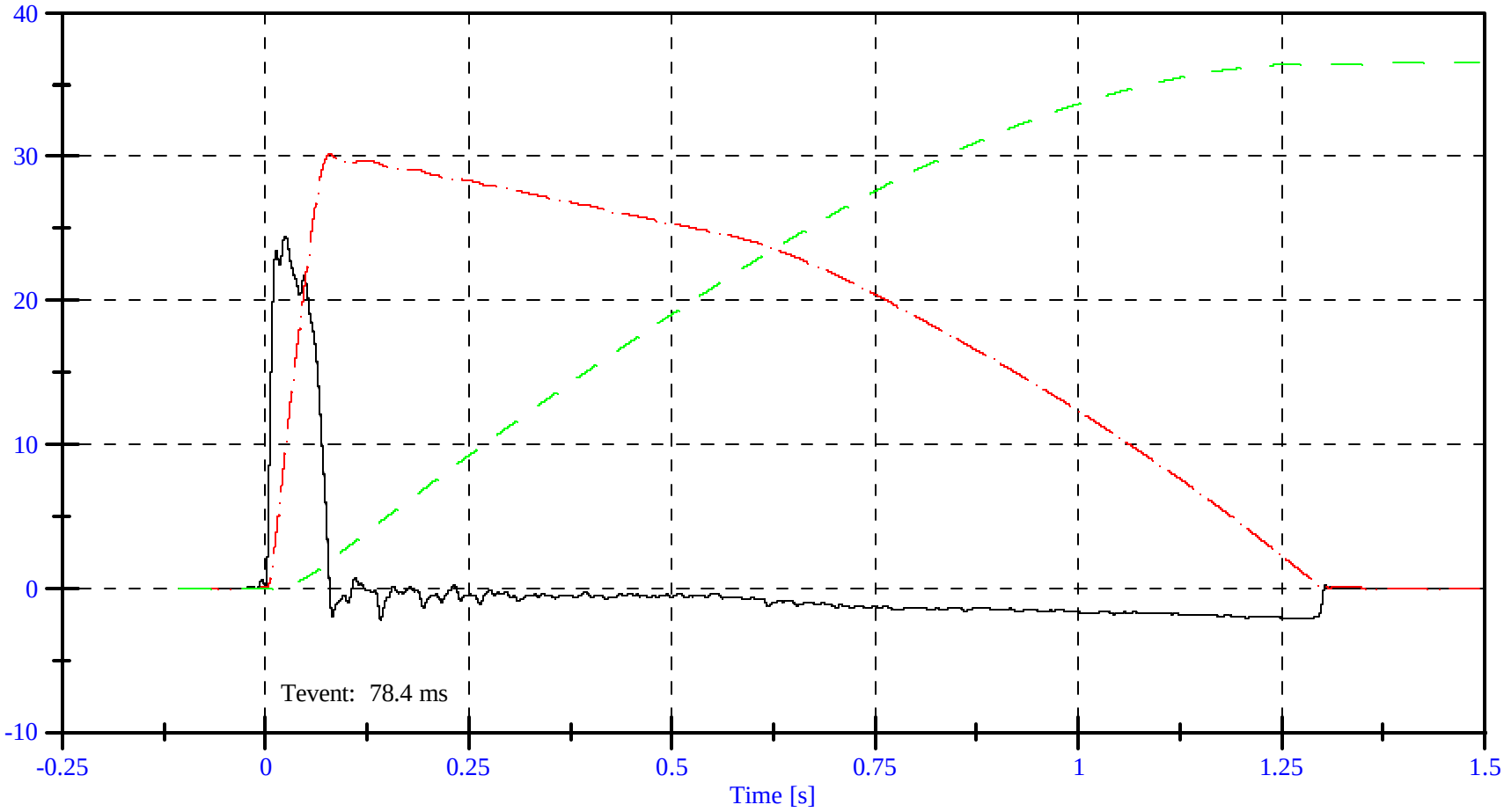
Run #22478 Photo 18 - Post-Test Right View of Child Seat - P4

SECTION 11

DATA PLOTS

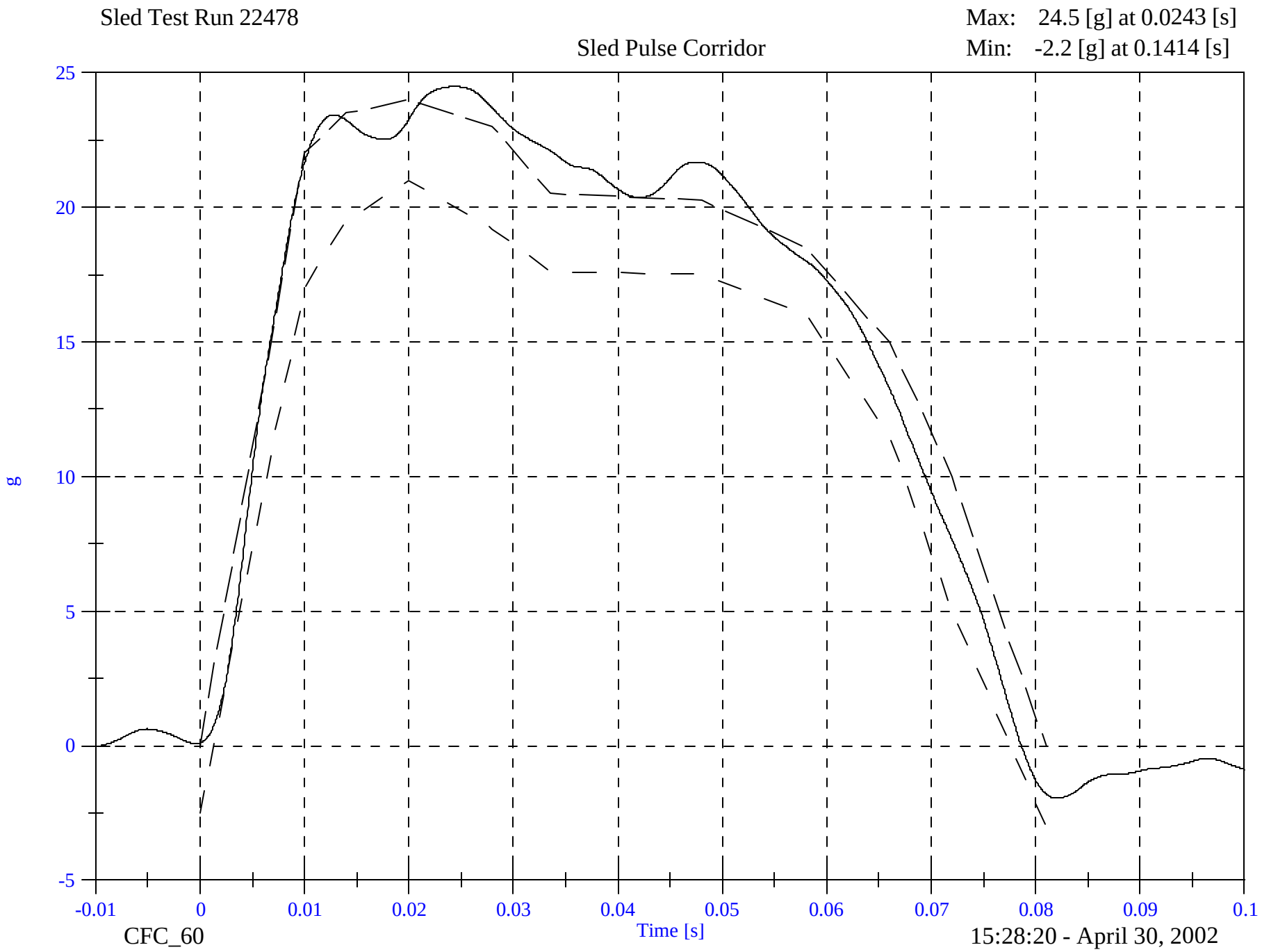
Sled Test Run 22478

April 30, 2002



	Maximum	Time (ms)	Minimum	Time (ms)	Filter Class
Sled Ax (g)	24.5	24.3	-2.2	141.4	CFC_60
Sled Vx (mph)	30.2	78.4	-0.0	-26.1	CFC_180
Sled Dx (ft)	36.5	1469.1	-0.0	-7.3	CFC_180

LEGEND
- Sled Ax
- Sled Vx
- Sled Dx


Sled Test Run 22478
Sled Pulse Corridor
Max: 24.5 [g] at 0.0243 [s]
Min: -2.2 [g] at 0.1414 [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
15:28:20 - April 30, 2002

FACILITY: HYGE SLED DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

CHN	NAME	Unit	Max	msec	Min	msec	Filt	Comment
59	Sled Acceleration	g	24.5	24.3	-2.2	141.4	CFC_60	
60	Sled Acceleration Velocity	kph	48.5	78.4	-0.0	-26.1	CFC_180	
61	Sled Acceleration Displacement	mm	2805.0	249.9	-0.2	-7.3	CFC_180	
62	P3 Head x	g	18.1	59.6	-4.7	44.9	CFC_1000	
63	P3 Head y	g	4.2	66.1	-2.5	114.2	CFC_1000	
64	P3 Head z	g	39.3	59.6	-2.1	150.0	CFC_1000	
65	P3 Head Resultant	g	43.3	59.6	0.0	-17.5	CFC_1000	
66	P3 Upper Neck Fx	N	49.2	134.4	-269.3	45.5	CFC_1000	
67	P3 Upper Neck Fy	N	32.3	82.3	-94.6	119.2	CFC_1000	
68	P3 Upper Neck Fz	N	965.6	60.4	-66.8	157.8	CFC_1000	
69	P3 Upper Neck F Resultant	N	976.9	60.5	0.0	-18.3	CFC_1000	
70	P3 Upper Neck Mx	N-m	1.4	133.3	-1.5	55.5	CFC_600	
71	P3 Upper Neck My	N-m	5.3	149.0	-9.6	45.1	CFC_600	
72	P3 Upper Neck Mz	N-m	0.9	88.8	-1.2	132.3	CFC_600	
73	P3 Upper Neck M Resultant	N-m	9.6	45.1	0.0	-31.9	CFC_600	
74	P3 Lower Neck Fx	N	130.5	58.9	-112.1	45.6	CFC_1000	
75	P3 Lower Neck Fy	N	31.7	82.1	-70.6	43.9	CFC_1000	
76	P3 Lower Neck Fz	N	1101.8	60.1	-58.2	166.3	CFC_1000	
77	P3 Lower Neck F Resultant	N	1109.3	60.0	0.0	-48.6	CFC_1000	
78	P3 Lower Neck Mx	N-m	1.9	83.0	-2.6	43.9	CFC_600	
79	P3 Lower Neck My	N-m	5.5	167.1	-4.9	58.4	CFC_600	
80	P3 Lower Neck Mz	N-m	1.0	46.7	-0.8	130.4	CFC_600	
81	P3 Lower Neck M Resultant	N-m	5.7	166.5	0.0	-33.8	CFC_600	
82	P3 Chest x	g	23.5	43.3	-1.6	248.4	CFC_180	
83	P3 Chest y	g	4.8	39.1	-2.7	62.1	CFC_180	
84	P3 Chest z	g	32.4	42.4	-3.4	75.6	CFC_180	
85	P3 Chest Resultant	g	40.0	43.0	0.0	-33.5	CFC_180	
86	P3 Lumbar Fx	N	35.7	74.5	-122.7	125.7	CFC_1000	
87	P3 Lumbar Fy	N	21.8	137.2	-38.8	42.2	CFC_1000	
88	P3 Lumbar Fz	N	313.0	100.2	-127.3	169.8	CFC_1000	
89	P3 Lumbar F Resultant	N	315.1	100.2	0.0	-36.9	CFC_1000	
90	P3 Lumbar Mx	N-m	3.3	122.9	-1.3	71.5	CFC_1000	
91	P3 Lumbar My	N-m	4.9	124.1	-0.0	-19.8	CFC_1000	

FACILITY: HYGE SLED DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

92	P3 Lumbar Mz	N-m	0.6	100.1	-1.9	123.5	CFC_1000
93	P3 Lumbar M Resultant	N-m	6.1	124.0	0.0	-48.9	CFC_1000
94	P3 Pelvic x	g	45.5	69.3	-10.2	110.1	CFC_1000
95	P3 Pelvic y	g	12.2	40.3	-6.4	63.2	CFC_1000
96	P3 Pelvic z	g	44.0	41.3	-10.8	91.8	CFC_1000
97	P3 Pelvic Resultant	g	55.9	41.6	0.0	-15.1	CFC_1000
98	P3 Head Red z	g	45.2	41.6	-0.2	155.6	CFC_1000
99	P3 Upper Neck Mocy	N-m	5.3	149.0	-8.0	45.1	CFC_600
102	P3 Head x	g	17.6	59.9	-4.3	45.6	CFC_60
103	P3 Head x Velocity	kph	25.5	151.4	-0.0	-19.2	CFC_180
104	P3 Head y	g	2.8	58.4	-1.5	135.6	CFC_60
105	P3 Head y Velocity	kph	2.6	110.5	-0.1	50.3	CFC_180
106	P3 Head z	g	38.8	59.6	-1.8	150.7	CFC_60
107	P3 Head z Velocity	kph	80.1	249.9	-0.0	-44.1	CFC_180
108	P3 Head Red z	g	43.7	41.5	-0.0	-30.4	CFC_60
109	P3 Head Red z Velocity	kph	80.0	249.9	-0.0	-27.8	CFC_180
110	P3 Chest x	g	23.3	41.9	-1.4	204.6	CFC_60
111	P3 Chest x Velocity	kph	39.6	178.2	-0.0	-27.9	CFC_180
112	P3 Chest y	g	4.4	39.0	-1.7	89.6	CFC_60
113	P3 Chest y Velocity	kph	3.9	126.9	-0.0	-50.0	CFC_180
114	P3 Chest z	g	32.6	42.5	-2.9	91.0	CFC_60
115	P3 Chest z Velocity	kph	46.9	249.9	-0.0	-15.1	CFC_180
116	P3 Pelvic x	g	42.9	69.8	-8.9	110.5	CFC_60
117	P3 Pelvic x Velocity	kph	42.3	105.3	-0.0	-15.8	CFC_180
118	P3 Pelvic y	g	11.1	39.5	-4.6	130.2	CFC_60
119	P3 Pelvic y Velocity	kph	6.6	110.4	-0.0	-47.1	CFC_180
120	P3 Pelvic z	g	42.6	41.4	-10.4	90.6	CFC_60
121	P3 Pelvic z Velocity	kph	38.7	70.2	-0.0	-23.7	CFC_180
122	P4 Head x	g	45.6	83.3	-9.9	237.6	CFC_1000
123	P4 Head y	g	1.1	137.6	-10.0	81.4	CFC_1000
124	P4 Head z	g	35.0	57.1	-28.6	93.3	CFC_1000
125	P4 Head Resultant	g	48.5	83.8	0.0	-44.8	CFC_1000
126	P4 Upper Neck Fx	N	126.8	88.4	-259.5	46.0	CFC_1000
127	P4 Upper Neck Fy	N	26.5	40.7	-84.9	86.4	CFC_1000
128	P4 Upper Neck Fz	N	964.7	46.4	-645.9	96.0	CFC_1000

FACILITY: HYGE SLED DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

129	P4 Upper Neck F Resultant	N	999.0	46.4	0.0	-43.4	CFC_1000
130	P4 Upper Neck Mx	N-m	4.7	89.2	-0.7	107.3	CFC_600
131	P4 Upper Neck My	N-m	17.6	94.5	-9.7	45.8	CFC_600
132	P4 Upper Neck Mz	N-m	1.0	101.8	-0.5	72.3	CFC_600
133	P4 Upper Neck M Resultant	N-m	17.9	94.2	0.0	-32.7	CFC_600
134	P4 Lower Neck Fx	N	376.8	93.5	-127.4	236.6	CFC_1000
135	P4 Lower Neck Fy	N	55.7	42.6	-68.4	82.1	CFC_1000
136	P4 Lower Neck Fz	N	1111.3	46.4	-601.9	96.2	CFC_1000
137	P4 Lower Neck F Resultant	N	1113.6	46.4	0.0	-23.9	CFC_1000
138	P4 Lower Neck Mx	N-m	2.6	42.2	-3.3	83.5	CFC_600
139	P4 Lower Neck My	N-m	8.9	227.6	-11.9	93.7	CFC_600
140	P4 Lower Neck Mz	N-m	0.6	37.9	-0.7	81.9	CFC_600
141	P4 Lower Neck M Resultant	N-m	12.0	93.5	0.0	-26.0	CFC_600
142	P4 Chest x	g	34.5	60.4	-6.8	243.2	CFC_180
143	P4 Chest y	g	2.8	94.2	-5.1	81.1	CFC_180
144	P4 Chest z	g	33.2	38.9	-27.0	86.6	CFC_180
145	P4 Chest Resultant	g	45.0	59.4	0.0	-45.8	CFC_180
146	P4 Lumbar Fx	N	0.1	-20.5	-185.8	46.5	CFC_1000
147	P4 Lumbar Fy	N	49.2	42.6	-14.1	123.9	CFC_1000
148	P4 Lumbar Fz	N	380.1	74.6	-109.1	249.1	CFC_1000
149	P4 Lumbar F Resultant	N	410.6	74.5	0.0	-15.4	CFC_1000
150	P4 Lumbar Mx	N-m	1.0	36.4	-1.0	227.0	CFC_1000
151	P4 Lumbar My	N-m	5.7	50.5	-0.0	-40.9	CFC_1000
152	P4 Lumbar Mz	N-m	0.8	64.1	-0.3	131.9	CFC_1000
153	P4 Lumbar M Resultant	N-m	5.7	62.8	0.0	-47.4	CFC_1000
154	P4 Pelvic x	g	31.8	41.0	-7.1	154.7	CFC_1000
155	P4 Pelvic y	g	3.0	59.6	-5.8	37.6	CFC_1000
156	P4 Pelvic z	g	39.7	37.8	-17.5	84.7	CFC_1000
157	P4 Pelvic Resultant	g	48.9	42.8	0.0	-29.0	CFC_1000
158	P4 Head Red z	g	46.1	39.3	-38.3	85.0	CFC_1000
159	P4 Upper Neck Mocy	N-m	17.2	94.6	-8.2	45.7	CFC_600
162	P4 Head x	g	44.4	83.3	-9.8	238.1	CFC_60
163	P4 Head x Velocity	kph	59.1	117.3	-0.0	1.7	CFC_180
164	P4 Head y	g	0.9	137.8	-9.0	80.9	CFC_60
165	P4 Head y Velocity	kph	0.0	32.6	-11.4	242.6	CFC_180

FACILITY: HYGE SLED DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

166	P4 Head z	g	34.5	42.4	-28.0	93.7	CFC_60
167	P4 Head z Velocity	kph	51.9	249.9	-0.0	-49.4	CFC_180
168	P4 Head Red z	g	44.2	39.2	-35.3	85.9	CFC_60
169	P4 Head Red z Velocity	kph	52.6	249.9	-0.0	-40.5	CFC_180
170	P4 Chest x	g	33.6	60.3	-6.8	244.4	CFC_60
171	P4 Chest x Velocity	kph	63.9	117.4	-0.0	-15.2	CFC_180
172	P4 Chest y	g	2.6	94.1	-3.5	81.4	CFC_60
173	P4 Chest y Velocity	kph	1.2	116.9	-0.8	52.7	CFC_180
174	P4 Chest z	g	32.5	39.4	-26.8	86.6	CFC_60
175	P4 Chest z Velocity	kph	40.7	249.9	-0.0	-18.0	CFC_180
176	P4 Pelvic x	g	31.0	83.5	-7.0	152.8	CFC_60
177	P4 Pelvic x Velocity	kph	45.7	119.0	-0.0	-18.3	CFC_180
178	P4 Pelvic y	g	2.3	60.3	-5.1	38.6	CFC_60
179	P4 Pelvic y Velocity	kph	0.1	23.8	-2.2	192.8	CFC_180
180	P4 Pelvic z	g	37.7	39.1	-16.3	86.0	CFC_60
181	P4 Pelvic z Velocity	kph	45.3	77.3	-0.0	-17.5	CFC_180

```
FACILITY: HYGE SLED                          DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

=========================
P3 HIC(FULL): 218.1
    t1: 35.1 msec
    t2: 132.2 msec
    Duration: 97.0 msec
    Average Acceleration: 21.9 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:     49.2 N 134.4 msec
                Min:   -269.3 N  45.5 msec
    Input channel: P3 Upper Neck Fx (6) CFC_1000

P3 UP NECK Fz:  Max:    965.6 N  60.4 msec
                Min:    -66.8 N 157.8 msec
    Input channel: P3 Upper Neck Fz (8) CFC_1000

P3 UP NECK Mocy (1YO Infant OOP)
                Max:      5.3 N-m 149.0 msec
                Min:     -8.0 N-m  45.1 msec
    Input channels: P3 Upper Neck Fx (6) CFC_600
                    P3 Upper Neck My (10) CFC_600
              Docy: 0.0058

P3 UP NECK Nij (1YO Infant OOP)
                Ntf:  0.32 Nij 127.8 msec    CVt: 1460 CVf: 43
                Nte:  1.09 Nij  44.7 msec    CVt: 1460 CVe: 17
                Ncf:  0.16 Nij 149.9 msec    CVc: 1460 CVf: 43
                Nce:  0.00 Nij -20.1 msec    CVc: 1460 CVe: 17
    Input channels: P3 Upper Neck Fz (8) CFC_600
                    P3 Upper Neck Mocy [N-m, CFC_600] (179)

FACILITY: HYGE SLED                          DATE: April 30, 2002
TEST#: 22478
```

```
TITLE: Sled Test Run 22478

P3 CLIP(3 ms): 39.4 g
    t1: 41.3 msec
    t2: 44.3 msec
    Duration: 3.0 msec
P3 CSI: 217.0
    Input channels: P3 Chest x (18) CFC_180
                    P3 Chest y (19) CFC_180
                    P3 Chest z (20) CFC_180

=========================
P3 HIC(36 ms): 194.2
    t1: 37.1 msec
    t2: 66.0 msec
    Duration: 28.9 msec
    Average Acceleration: 34.0 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): 116.2
    t1: 49.5 msec
    t2: 64.5 msec
    Duration: 15.0 msec
    Average Acceleration: 36.0 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: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

P4 HIC(FULL): 505.8
    t1: 35.2 msec
    t2: 99.6 msec
```

```
    Duration: 64.4 msec
    Average Acceleration: 36.1 g
    Input channels: P4 Head x (24) CFC_1000
                    P4 Head y (25) CFC_1000
                    P4 Head z (26) CFC_1000

P4 UP NECK Fx:  Max:    126.8 N  88.4 msec
                Min:   -259.5 N  46.0 msec
    Input channel: P4 Upper Neck Fx (28) CFC_1000

P4 UP NECK Fz:  Max:    964.7 N  46.4 msec
                Min:   -645.9 N  96.0 msec
    Input channel: P4 Upper Neck Fz (30) CFC_1000

P4 UP NECK Mocy (1YO Infant OOP)
                Max:     17.2 N-m  94.6 msec
                Min:     -8.2 N-m  45.7 msec
    Input channels: P4 Upper Neck Fx (28) CFC_600
                    P4 Upper Neck My (32) CFC_600
              Docy: 0.0058

P4 UP NECK Nij (1YO Infant OOP)
                Ntf:  0.20 Nij  77.3 msec    CVt: 1460 CVf: 43
                Nte:  1.14 Nij  46.0 msec    CVt: 1460 CVe: 17
                Ncf:  0.84 Nij  95.4 msec    CVc: 1460 CVf: 43
                Nce:  0.00 Nij -29.7 msec    CVc: 1460 CVe: 17
    Input channels: P4 Upper Neck Fz (30) CFC_600
                    P4 Upper Neck Mocy [N-m, CFC_600] (185)

FACILITY: HYGE SLED                          DATE: April 30, 2002
TEST#: 22478
TITLE: Sled Test Run 22478

P4 CLIP(3 ms): 43.5 g
    t1: 57.9 msec
    t2: 60.9 msec
    Duration: 3.0 msec
P4 CSI: 456.3
    Input channels: P4 Chest x (40) CFC_180
```

```
                    P4 Chest y (41) CFC_180
                    P4 Chest z (42) CFC_180

==========================
P4 HIC(36 ms): 313.5
    t1: 54.7 msec
    t2: 90.7 msec
    Duration: 36.0 msec
    Average Acceleration: 37.7 g
    Input channels: P4 Head x (24) CFC_1000
                    P4 Head y (25) CFC_1000
                    P4 Head z (26) CFC_1000

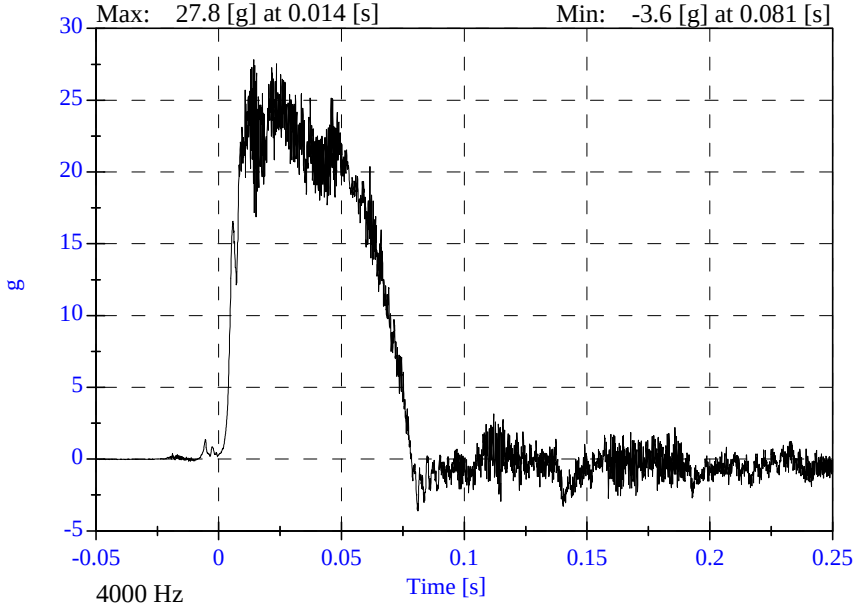
==========================
P4 HIC(15 ms): 190.9
    t1: 77.7 msec
    t2: 92.7 msec
    Duration: 15.0 msec
    Average Acceleration: 43.8 g
    Input channels: P4 Head x (24) CFC_1000
                    P4 Head y (25) CFC_1000
                    P4 Head z (26) CFC_1000

==========================
```

Sled Test Run 22478 - April 30, 2002

Sled Acceleration

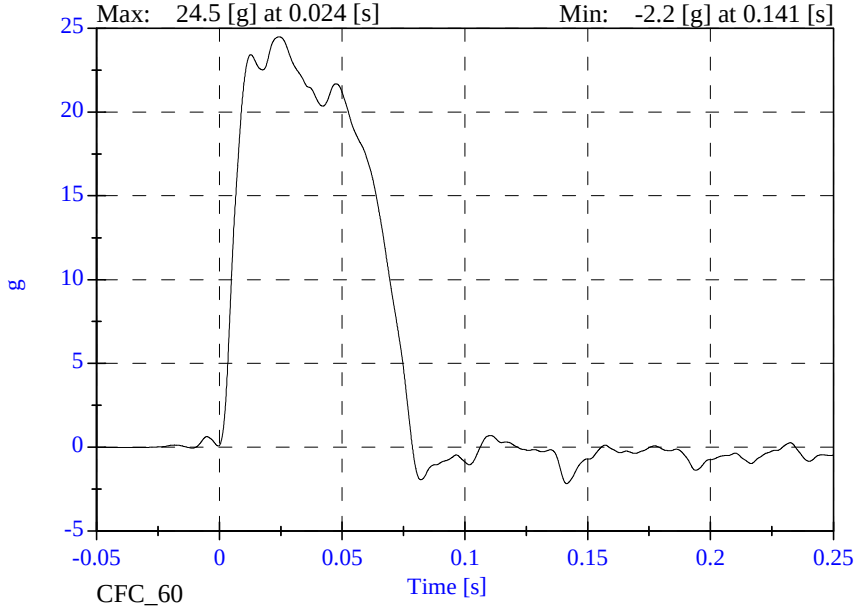
Max: 27.8 [g] at 0.014 [s] Min: -3.6 [g] at 0.081 [s]



4000 Hz

Sled Acceleration

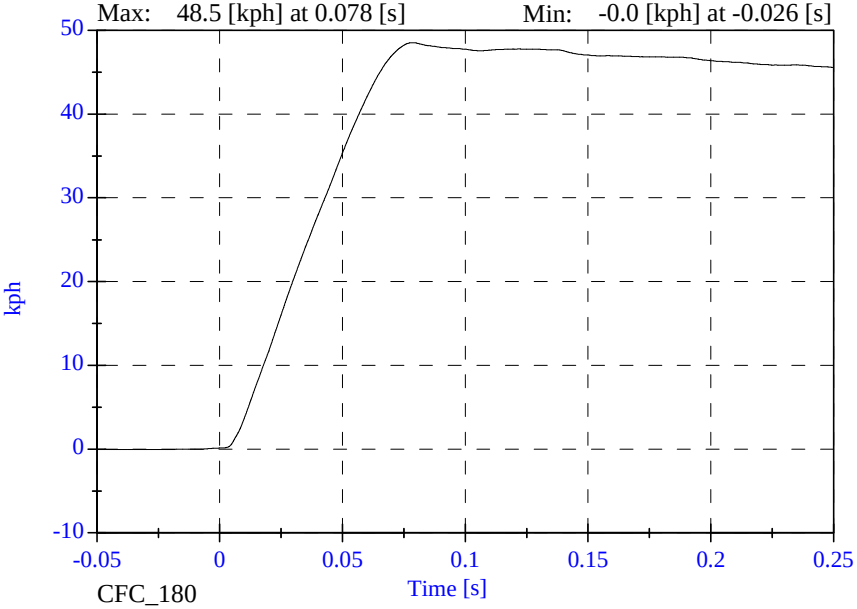
Max: 24.5 [g] at 0.024 [s] Min: -2.2 [g] at 0.141 [s]



CFC_60

Sled Acceleration Velocity

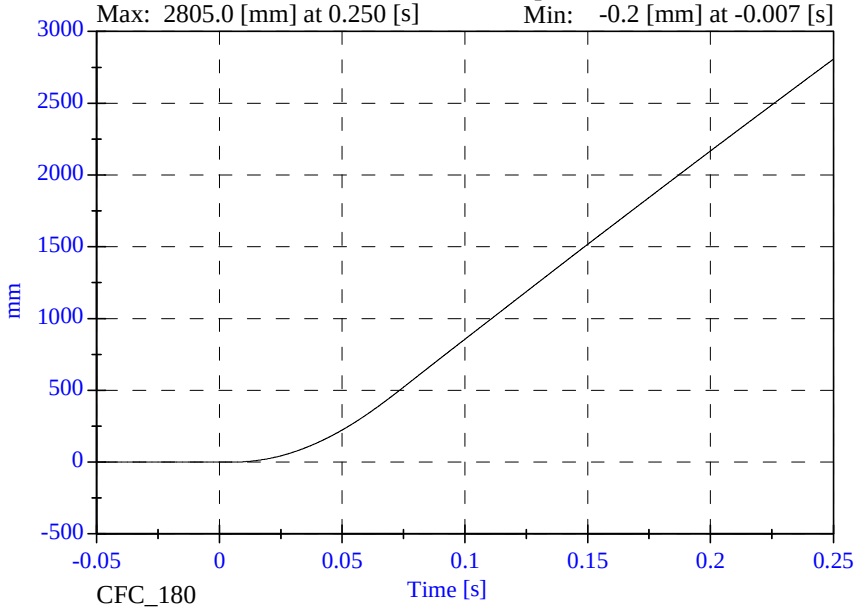
Max: 48.5 [kph] at 0.078 [s] Min: -0.0 [kph] at -0.026 [s]



CFC_180

Sled Acceleration Displacement

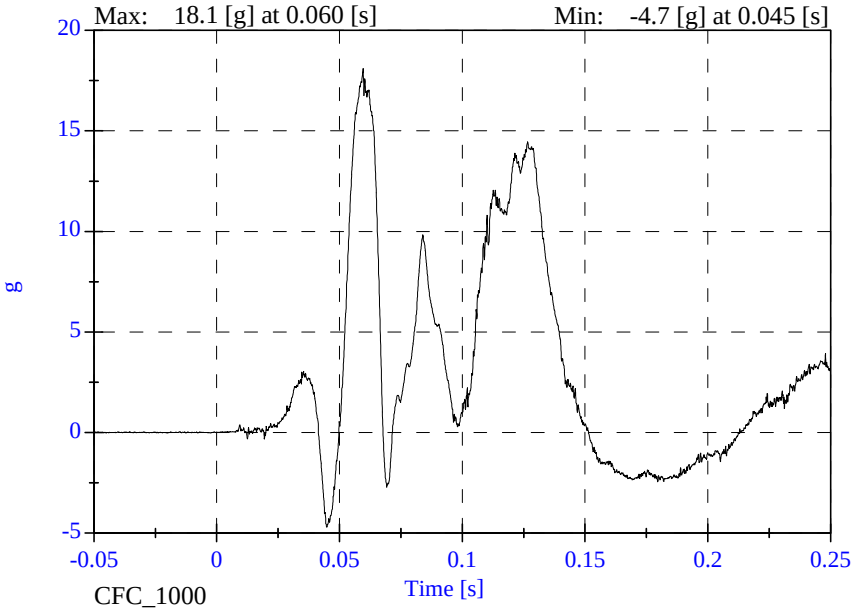
Max: 2805.0 [mm] at 0.250 [s] Min: -0.2 [mm] at -0.007 [s]



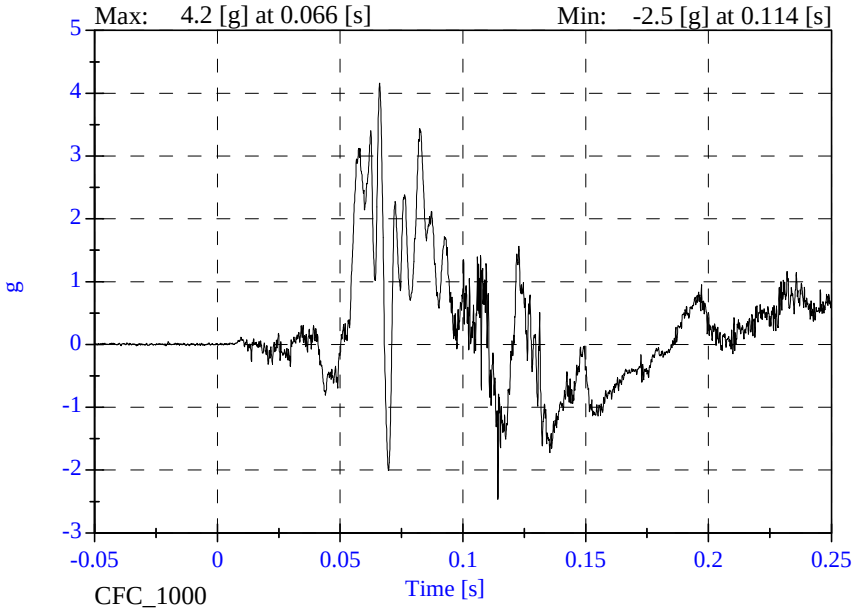
CFC_180

Sled Test Run 22478 - April 30, 2002

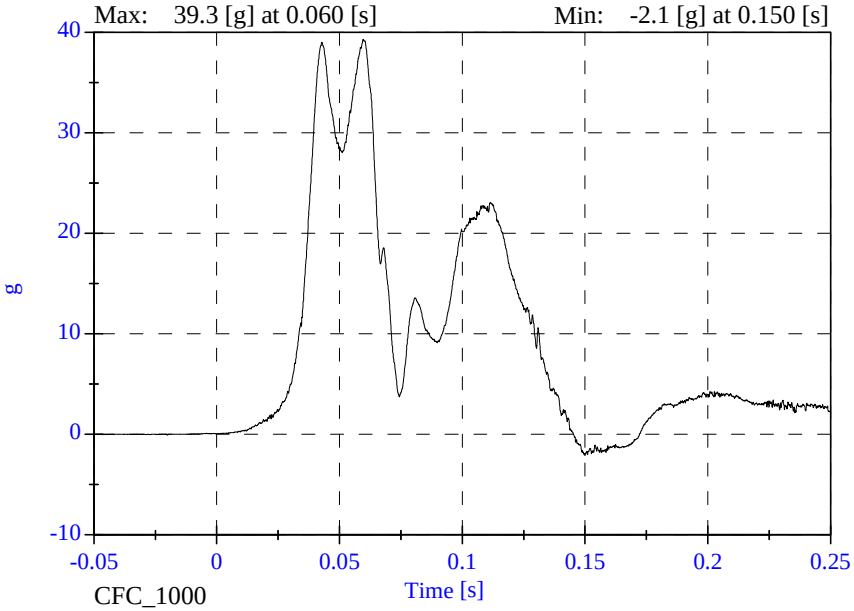
P3 Head x



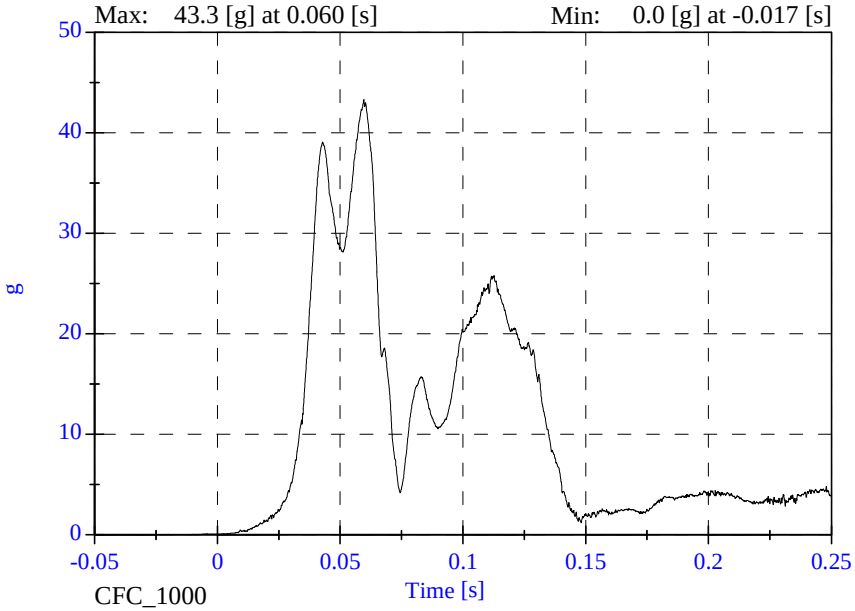
P3 Head y



P3 Head z



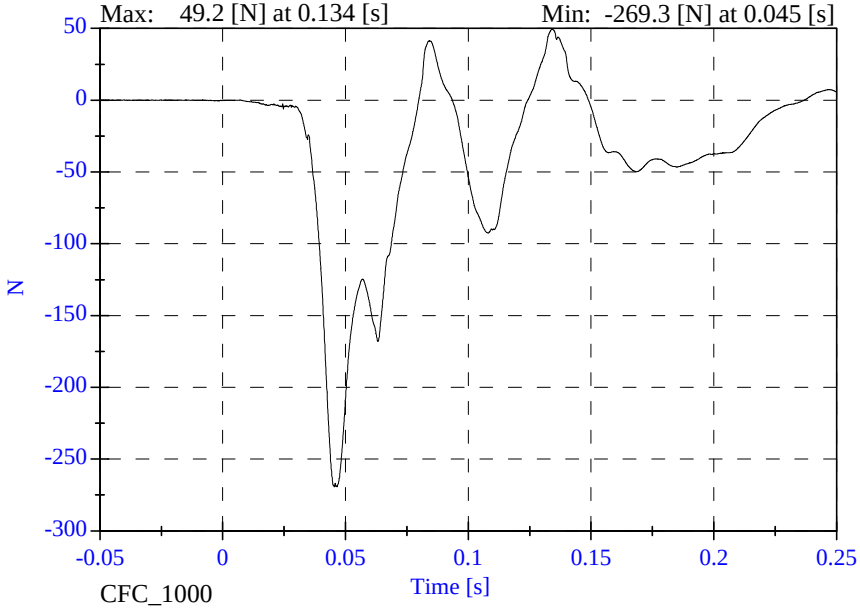
P3 Head Resultant



Sled Test Run 22478 - April 30, 2002

P3 Upper Neck Fx

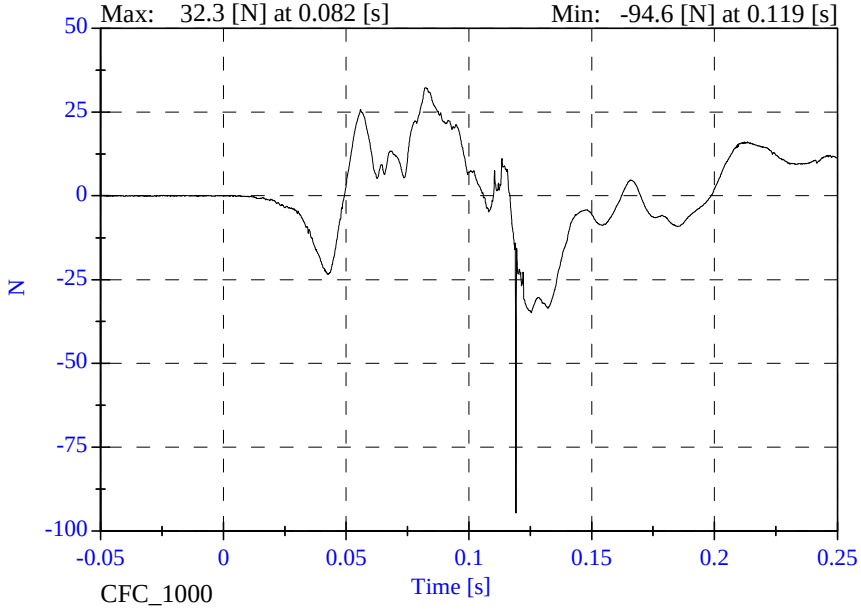
Max: 49.2 [N] at 0.134 [s] Min: -269.3 [N] at 0.045 [s]



CFC_1000

P3 Upper Neck Fy

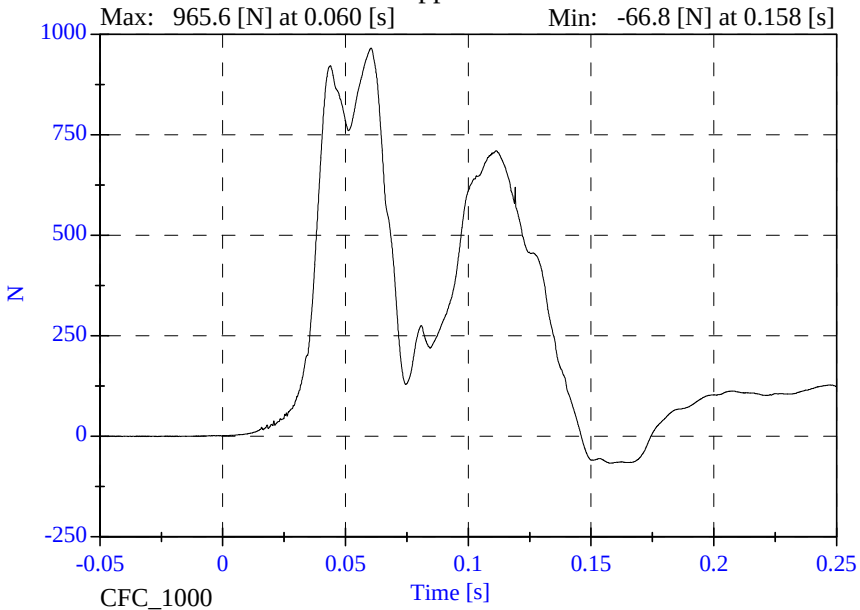
Max: 32.3 [N] at 0.082 [s] Min: -94.6 [N] at 0.119 [s]



CFC_1000

P3 Upper Neck Fz

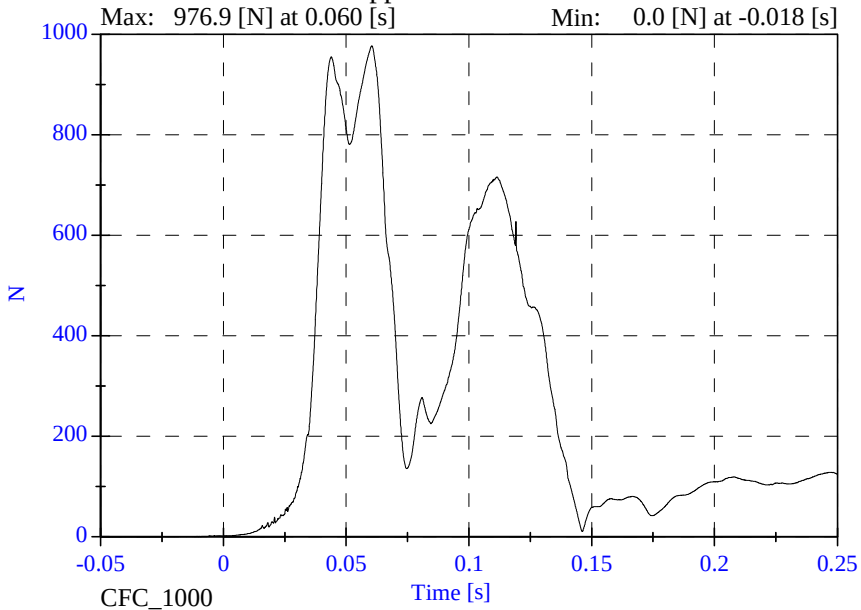
Max: 965.6 [N] at 0.060 [s] Min: -66.8 [N] at 0.158 [s]



CFC_1000

P3 Upper Neck F Resultant

Max: 976.9 [N] at 0.060 [s] Min: 0.0 [N] at -0.018 [s]

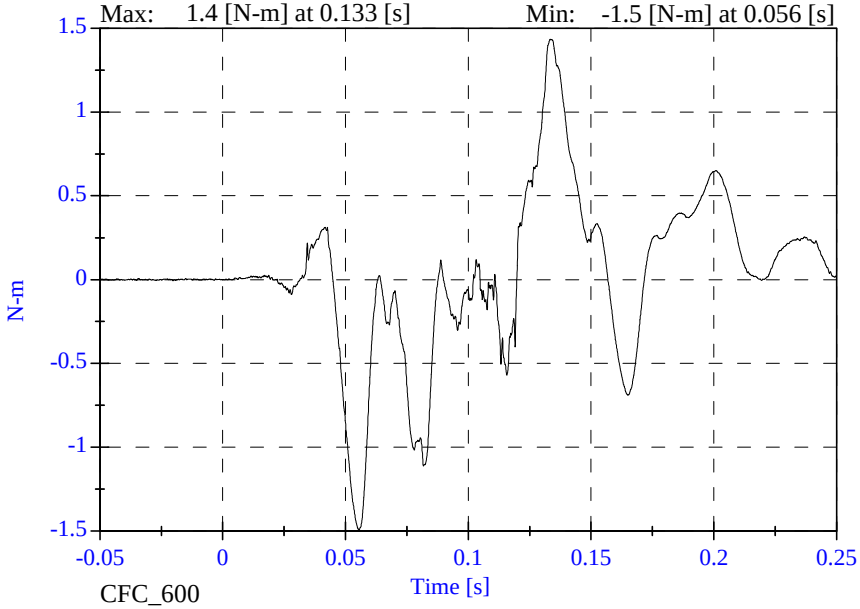


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Upper Neck Mx

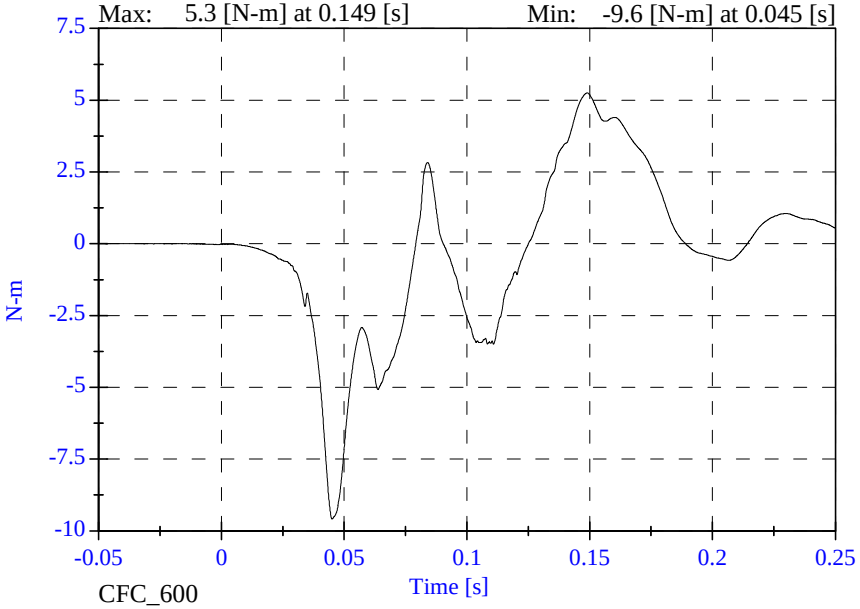
Max: 1.4 [N-m] at 0.133 [s] Min: -1.5 [N-m] at 0.056 [s]



CFC_600

P3 Upper Neck My

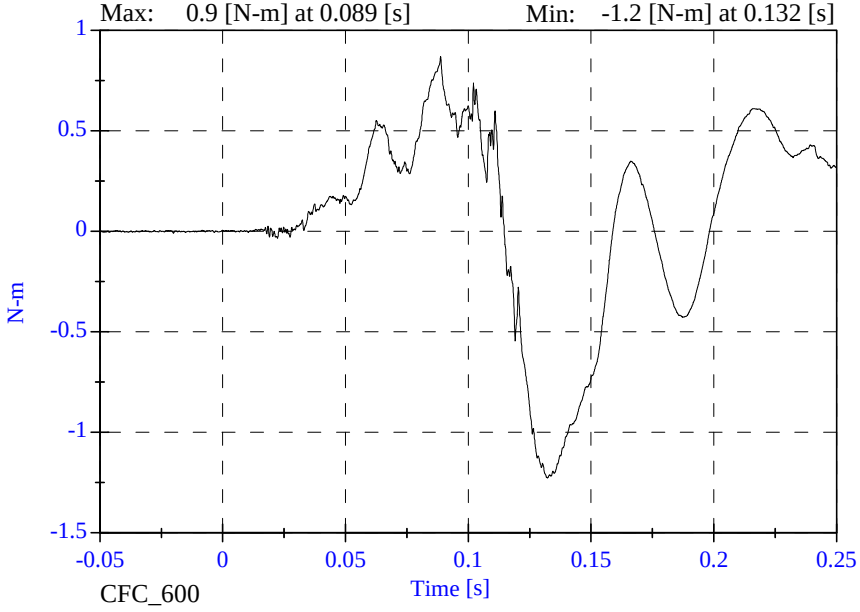
Max: 5.3 [N-m] at 0.149 [s] Min: -9.6 [N-m] at 0.045 [s]



CFC_600

P3 Upper Neck Mz

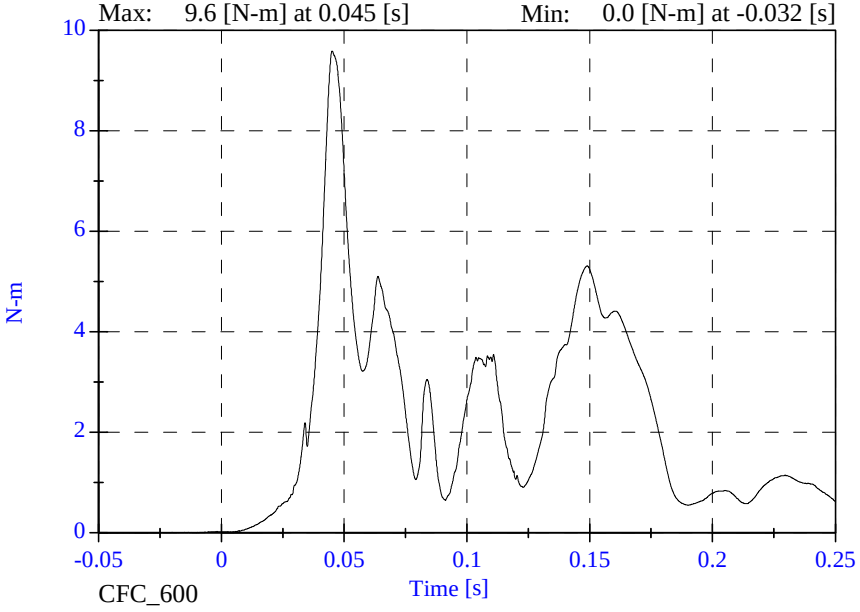
Max: 0.9 [N-m] at 0.089 [s] Min: -1.2 [N-m] at 0.132 [s]



CFC_600

P3 Upper Neck M Resultant

Max: 9.6 [N-m] at 0.045 [s] Min: 0.0 [N-m] at -0.032 [s]

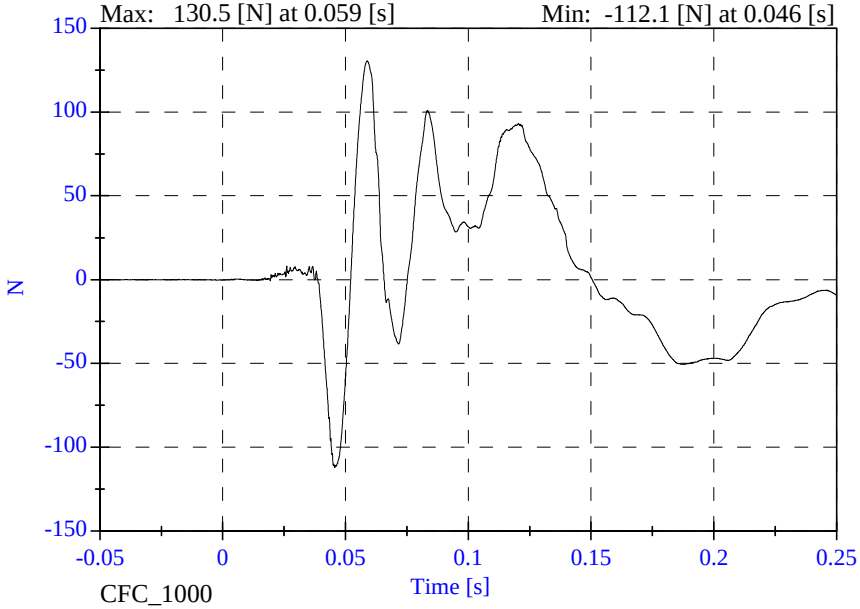


CFC_600

Sled Test Run 22478 - April 30, 2002

P3 Lower Neck Fx

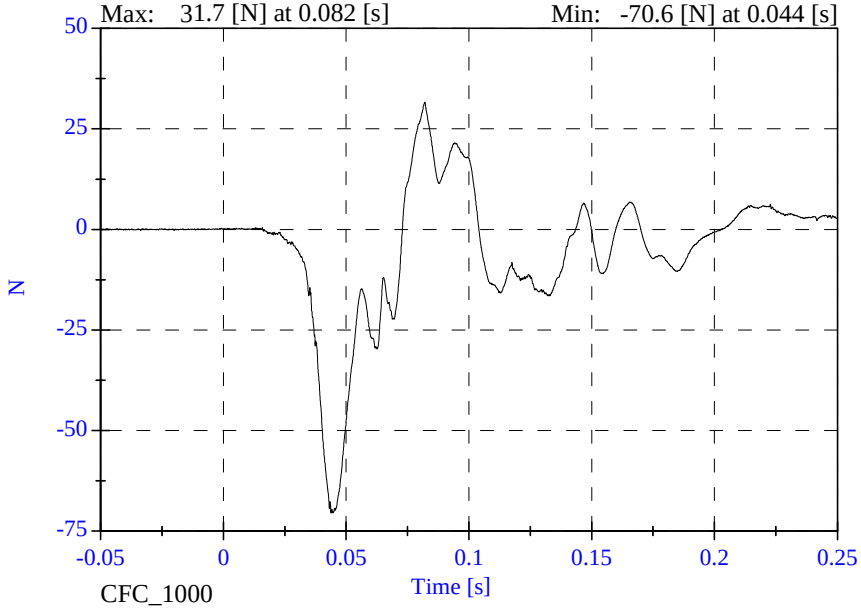
Max: 130.5 [N] at 0.059 [s] Min: -112.1 [N] at 0.046 [s]



CFC_1000

P3 Lower Neck Fy

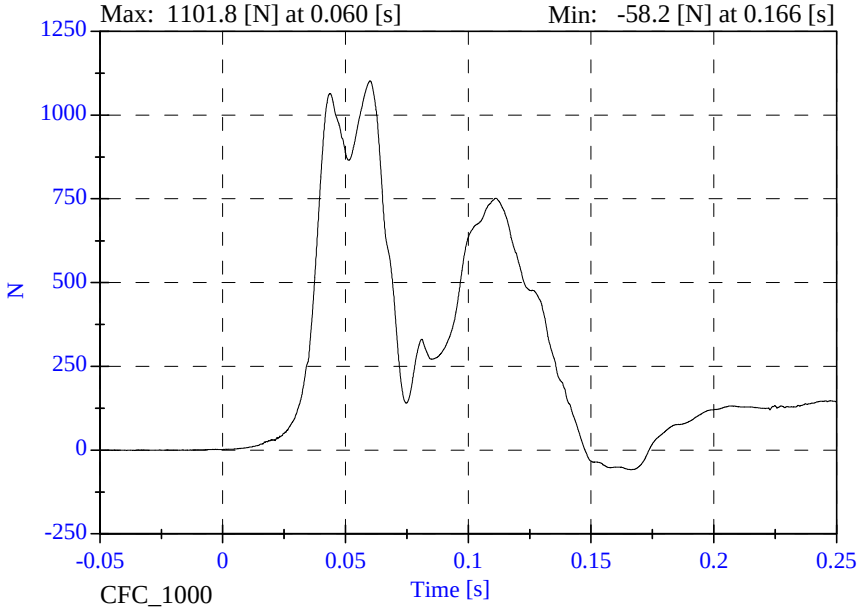
Max: 31.7 [N] at 0.082 [s] Min: -70.6 [N] at 0.044 [s]



CFC_1000

P3 Lower Neck Fz

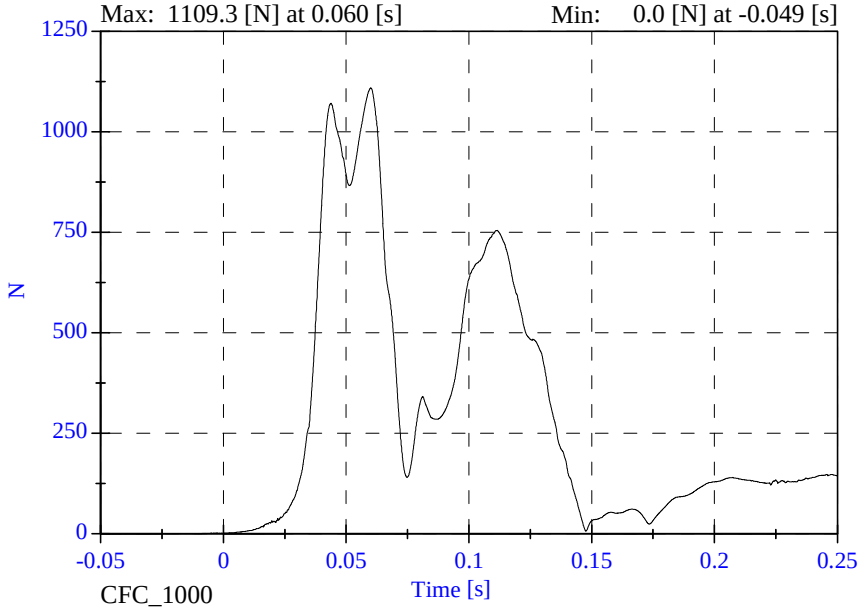
Max: 1101.8 [N] at 0.060 [s] Min: -58.2 [N] at 0.166 [s]



CFC_1000

P3 Lower Neck F Resultant

Max: 1109.3 [N] at 0.060 [s] Min: 0.0 [N] at -0.049 [s]

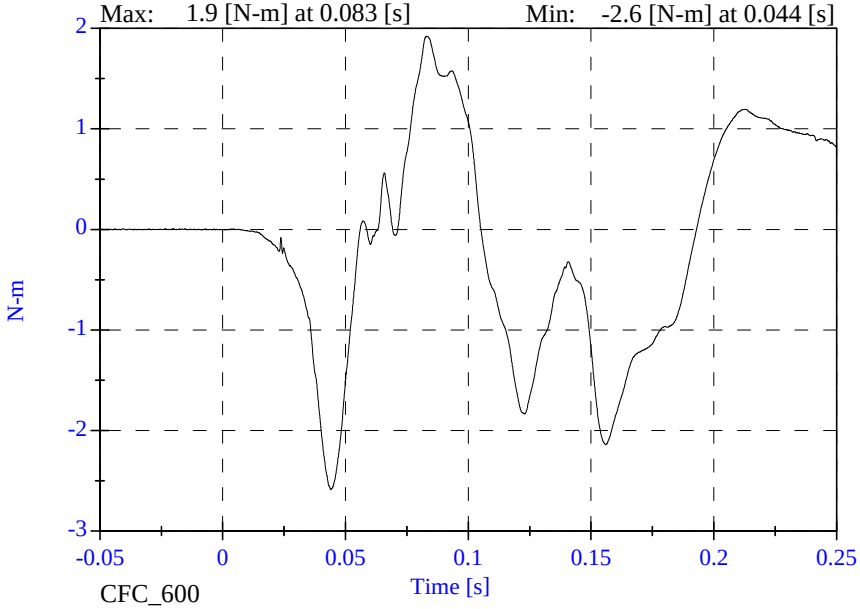


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Lower Neck Mx

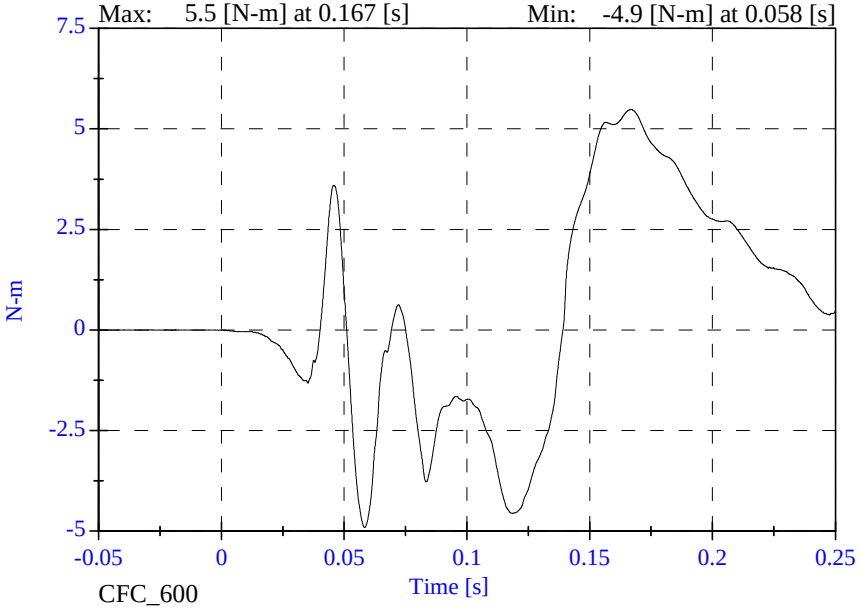
Max: 1.9 [N-m] at 0.083 [s] Min: -2.6 [N-m] at 0.044 [s]



CFC_600

P3 Lower Neck My

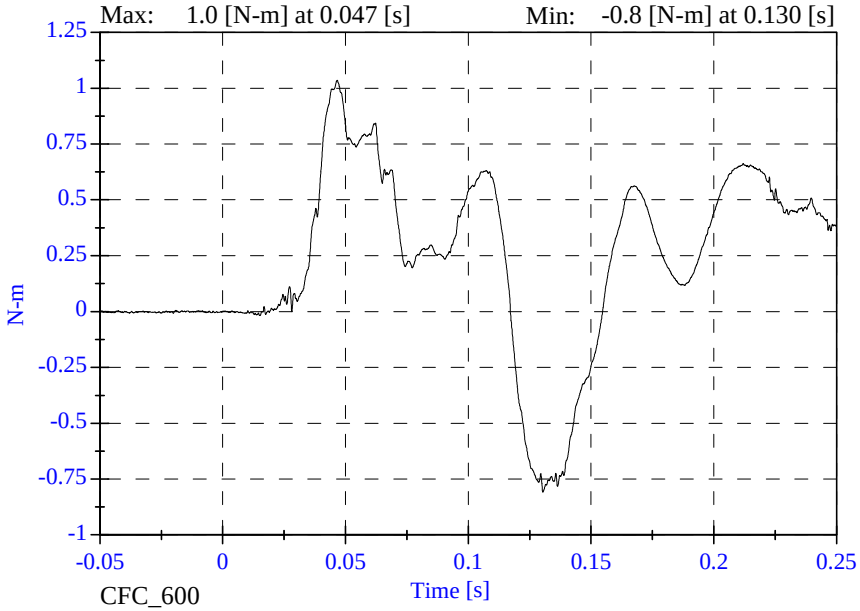
Max: 5.5 [N-m] at 0.167 [s] Min: -4.9 [N-m] at 0.058 [s]



CFC_600

P3 Lower Neck Mz

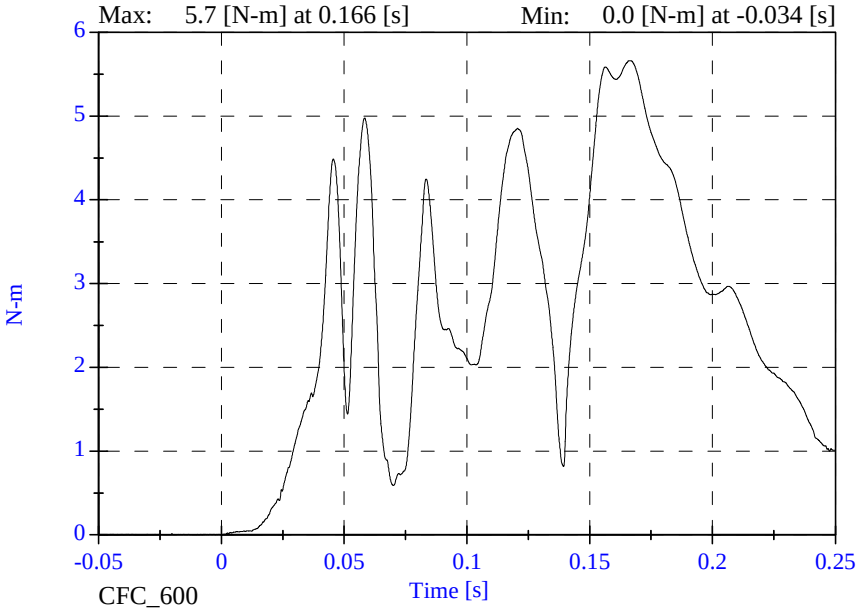
Max: 1.0 [N-m] at 0.047 [s] Min: -0.8 [N-m] at 0.130 [s]



CFC_600

P3 Lower Neck M Resultant

Max: 5.7 [N-m] at 0.166 [s] Min: 0.0 [N-m] at -0.034 [s]

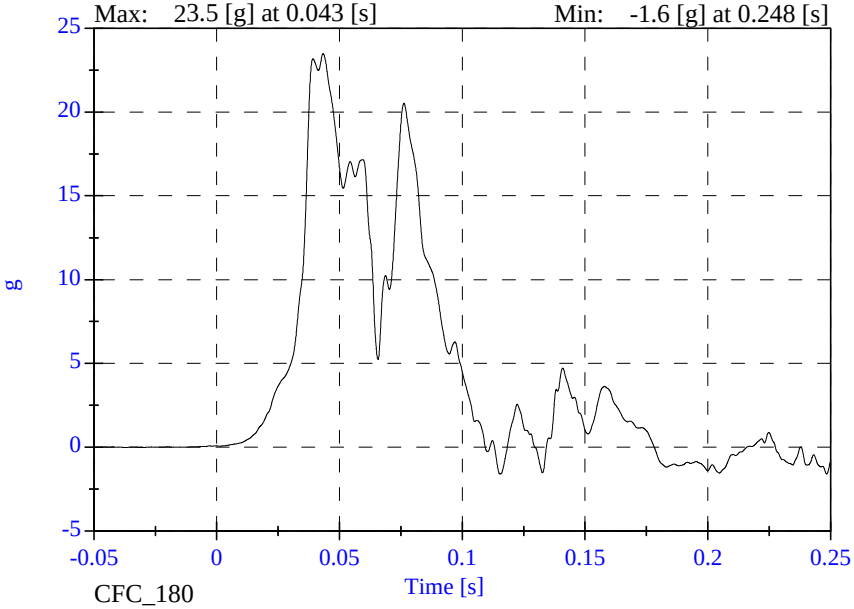


CFC_600

Sled Test Run 22478 - April 30, 2002

P3 Chest x

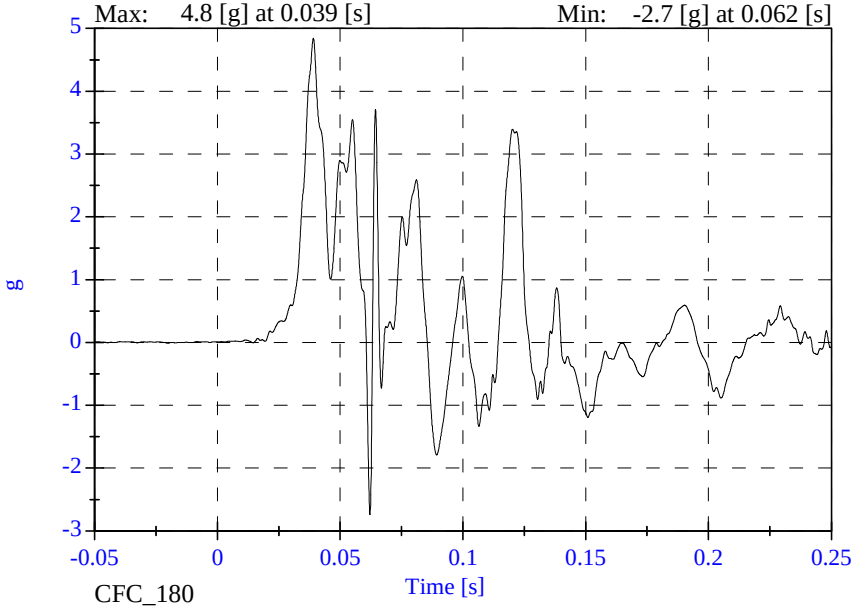
Max: 23.5 [g] at 0.043 [s] Min: -1.6 [g] at 0.248 [s]



CFC_180

P3 Chest y

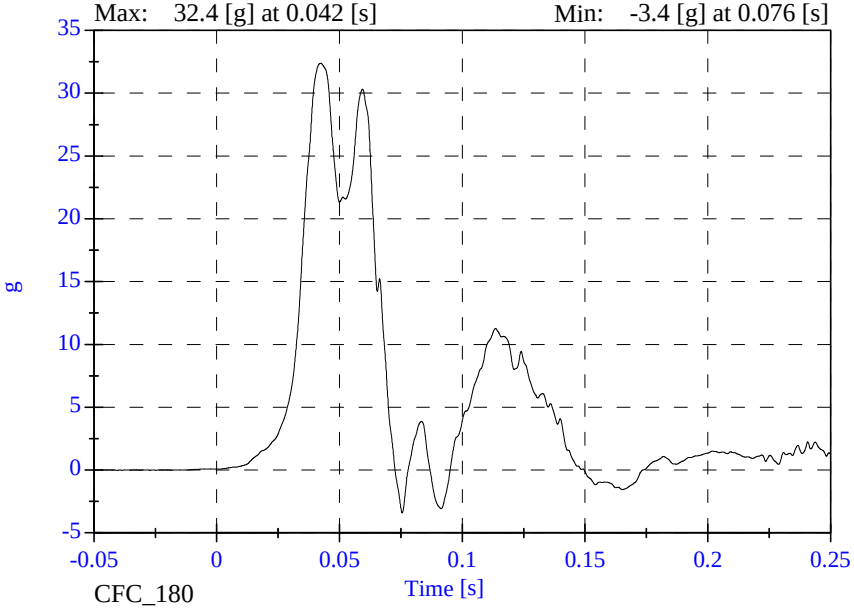
Max: 4.8 [g] at 0.039 [s] Min: -2.7 [g] at 0.062 [s]



CFC_180

P3 Chest z

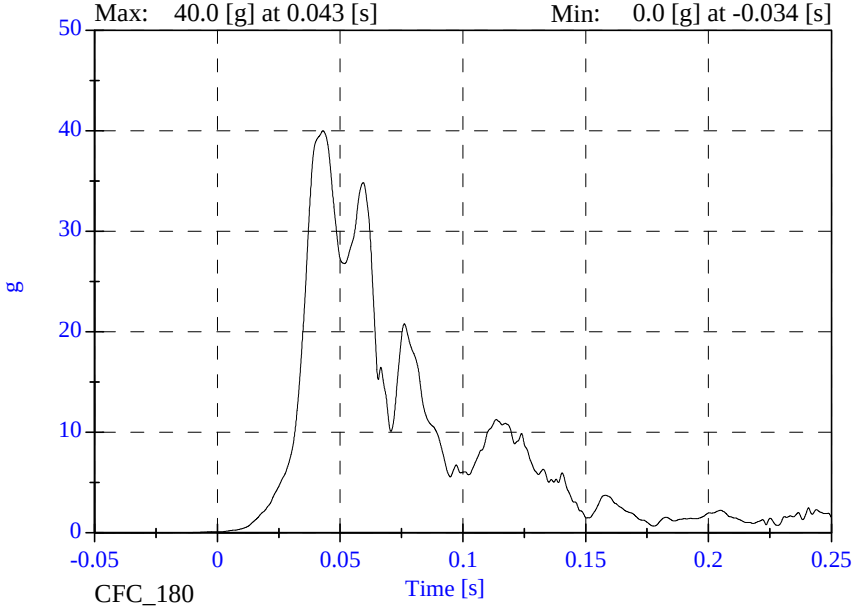
Max: 32.4 [g] at 0.042 [s] Min: -3.4 [g] at 0.076 [s]



CFC_180

P3 Chest Resultant

Max: 40.0 [g] at 0.043 [s] Min: 0.0 [g] at -0.034 [s]

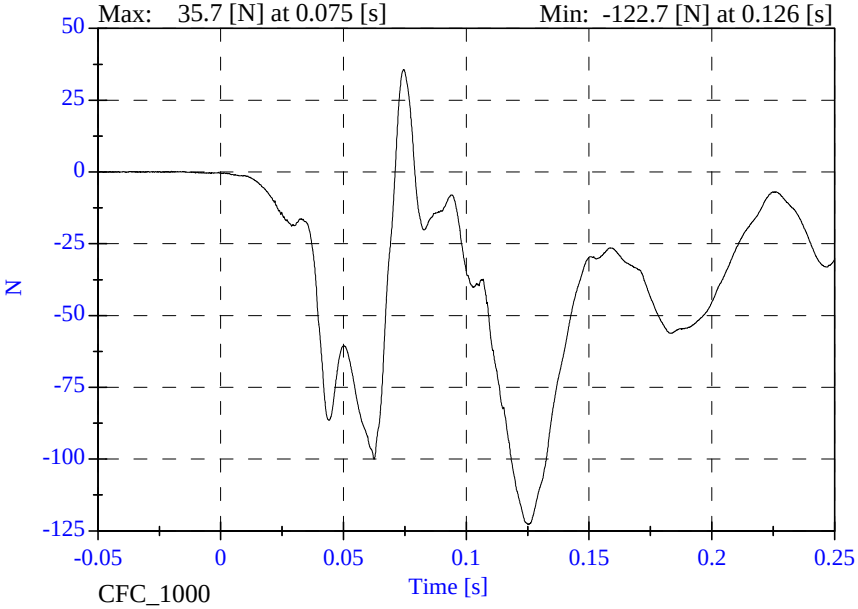


CFC_180

Sled Test Run 22478 - April 30, 2002

P3 Lumbar Fx

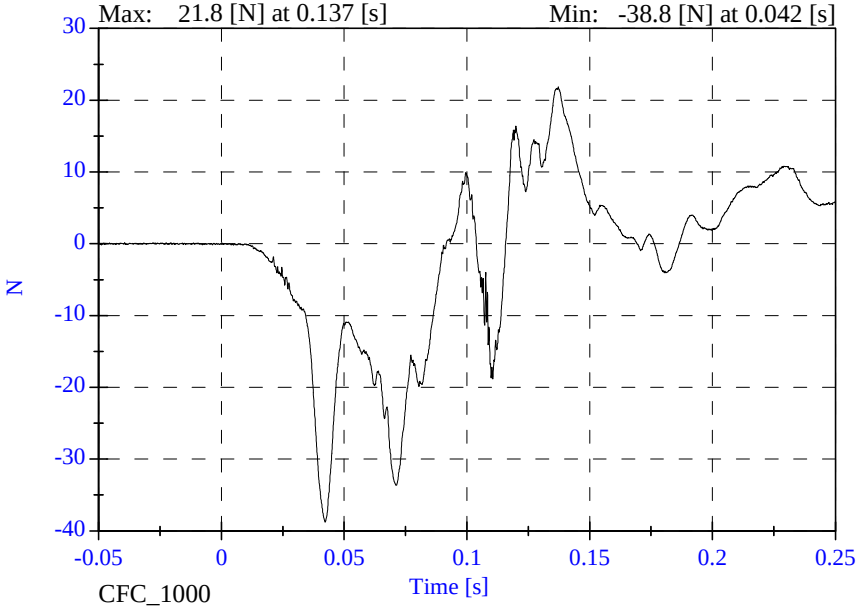
Max: 35.7 [N] at 0.075 [s] Min: -122.7 [N] at 0.126 [s]



CFC_1000

P3 Lumbar Fy

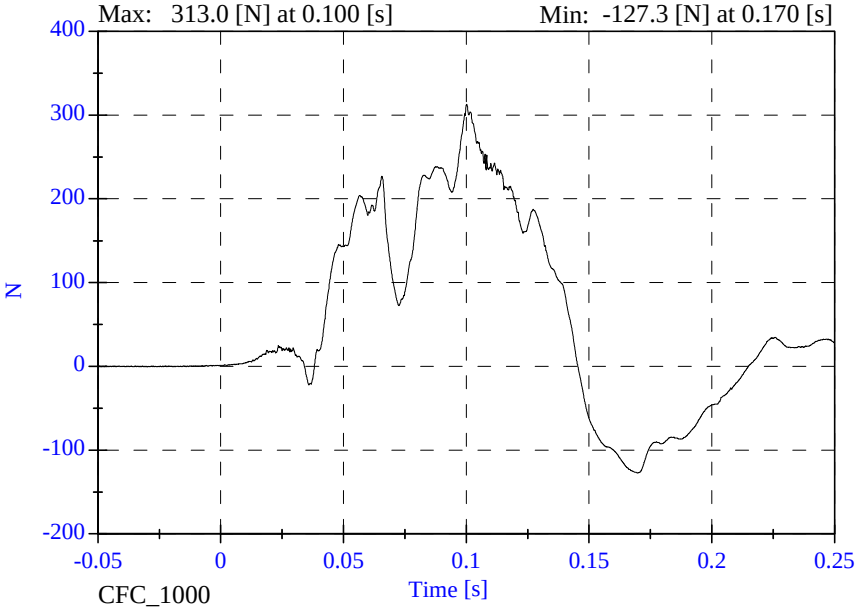
Max: 21.8 [N] at 0.137 [s] Min: -38.8 [N] at 0.042 [s]



CFC_1000

P3 Lumbar Fz

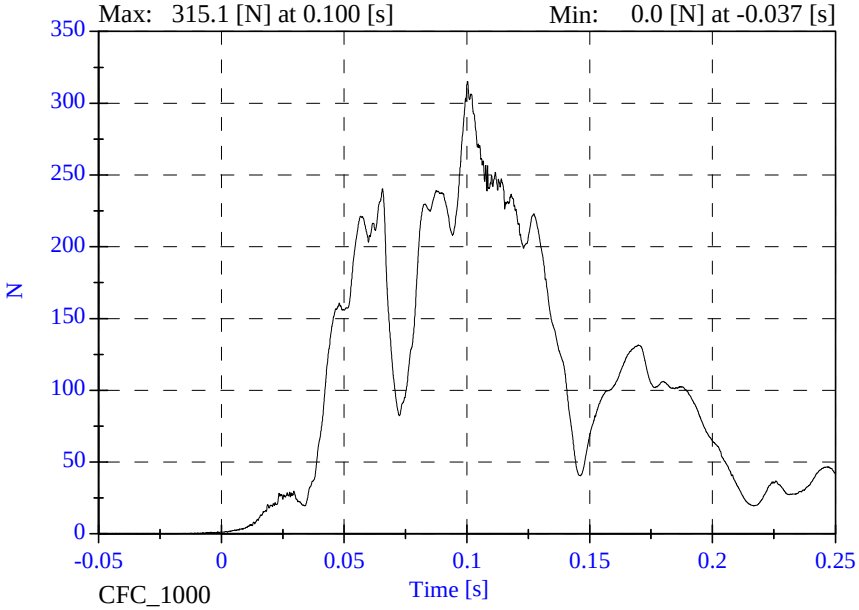
Max: 313.0 [N] at 0.100 [s] Min: -127.3 [N] at 0.170 [s]



CFC_1000

P3 Lumbar F Resultant

Max: 315.1 [N] at 0.100 [s] Min: 0.0 [N] at -0.037 [s]

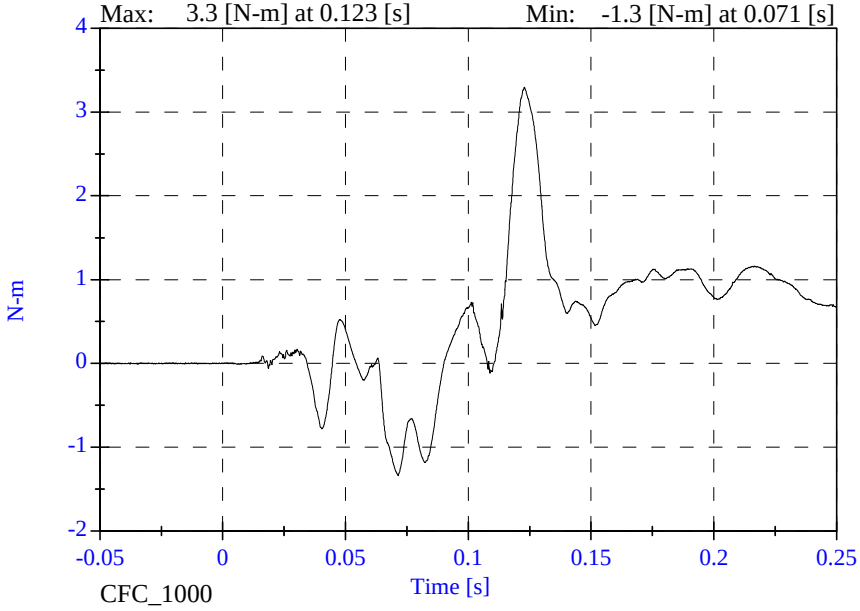


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Lumbar Mx

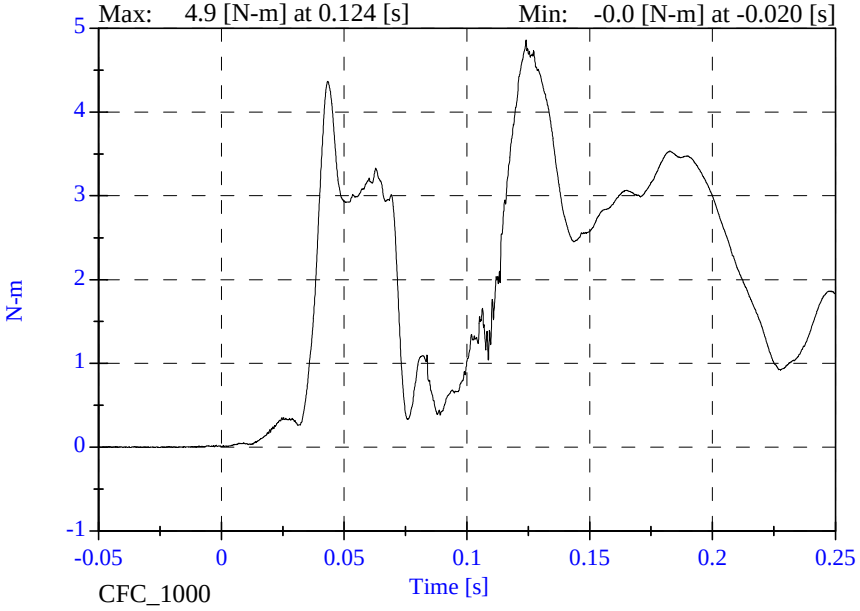
Max: 3.3 [N-m] at 0.123 [s] Min: -1.3 [N-m] at 0.071 [s]



CFC_1000

P3 Lumbar My

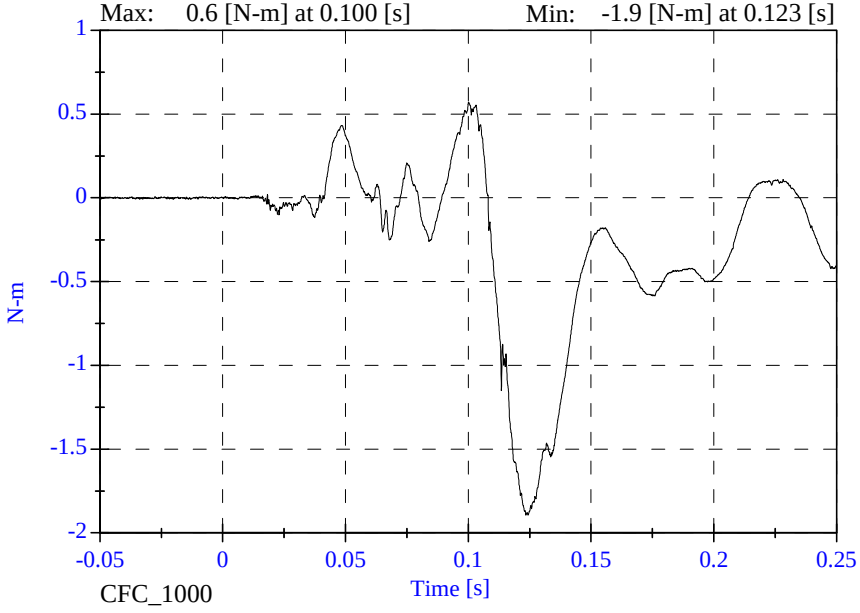
Max: 4.9 [N-m] at 0.124 [s] Min: -0.0 [N-m] at -0.020 [s]



CFC_1000

P3 Lumbar Mz

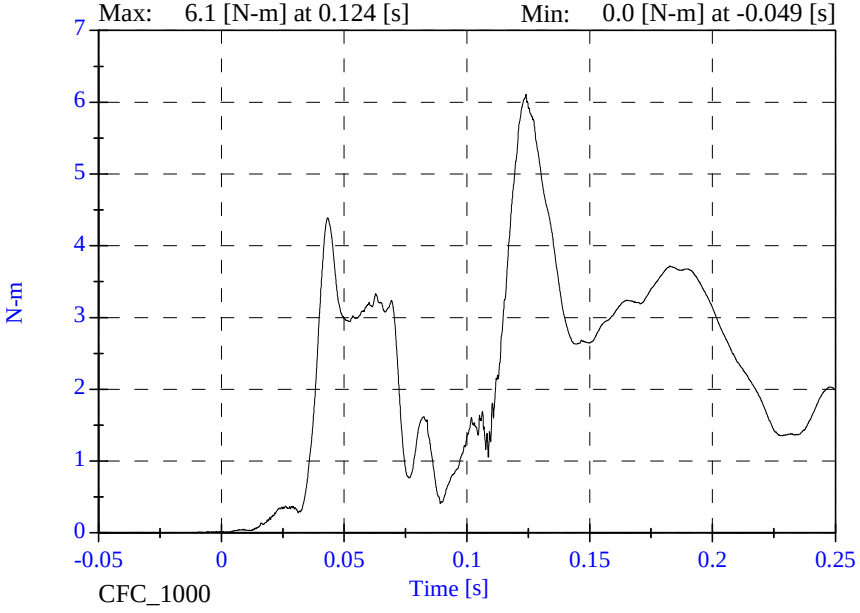
Max: 0.6 [N-m] at 0.100 [s] Min: -1.9 [N-m] at 0.123 [s]



CFC_1000

P3 Lumbar M Resultant

Max: 6.1 [N-m] at 0.124 [s] Min: 0.0 [N-m] at -0.049 [s]

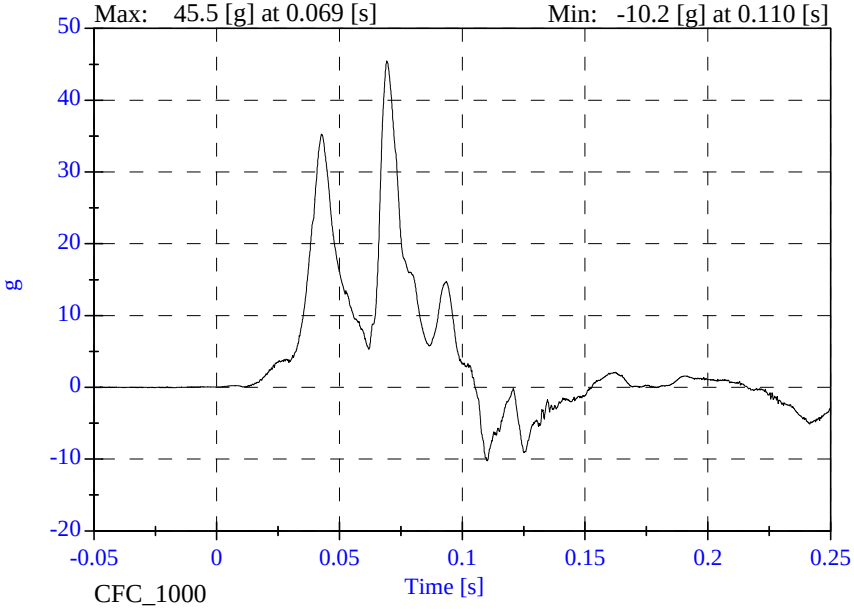


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Pelvic x

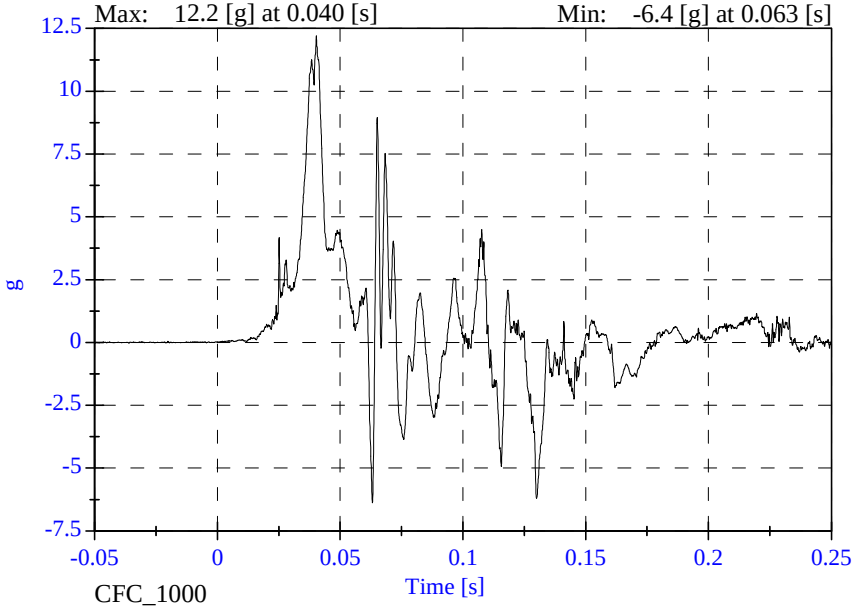
Max: 45.5 [g] at 0.069 [s] Min: -10.2 [g] at 0.110 [s]



CFC_1000

P3 Pelvic y

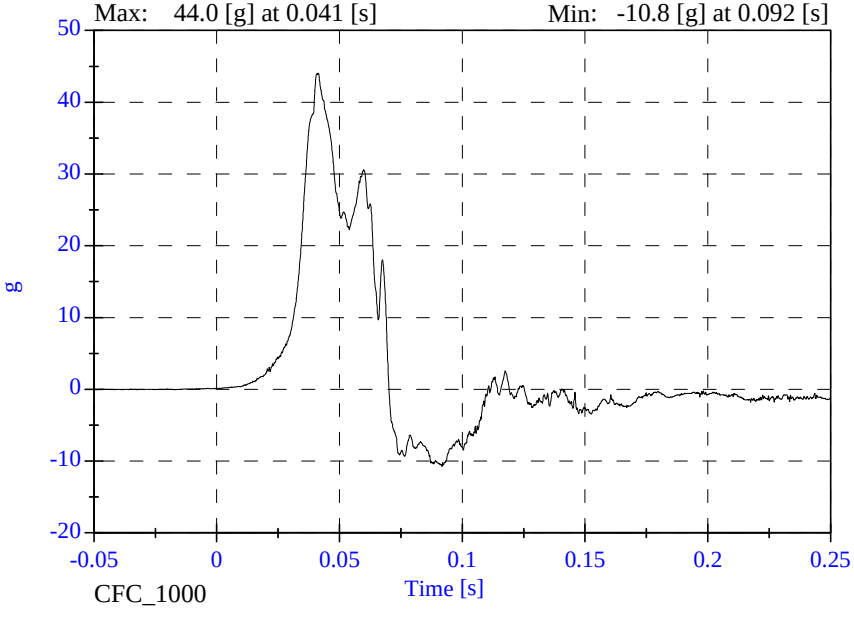
Max: 12.2 [g] at 0.040 [s] Min: -6.4 [g] at 0.063 [s]



CFC_1000

P3 Pelvic z

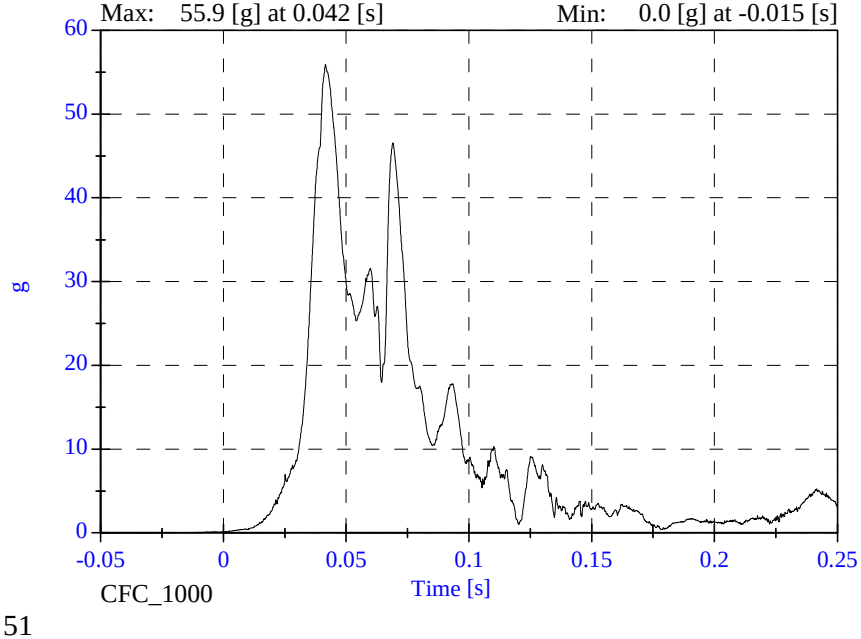
Max: 44.0 [g] at 0.041 [s] Min: -10.8 [g] at 0.092 [s]



CFC_1000

P3 Pelvic Resultant

Max: 55.9 [g] at 0.042 [s] Min: 0.0 [g] at -0.015 [s]

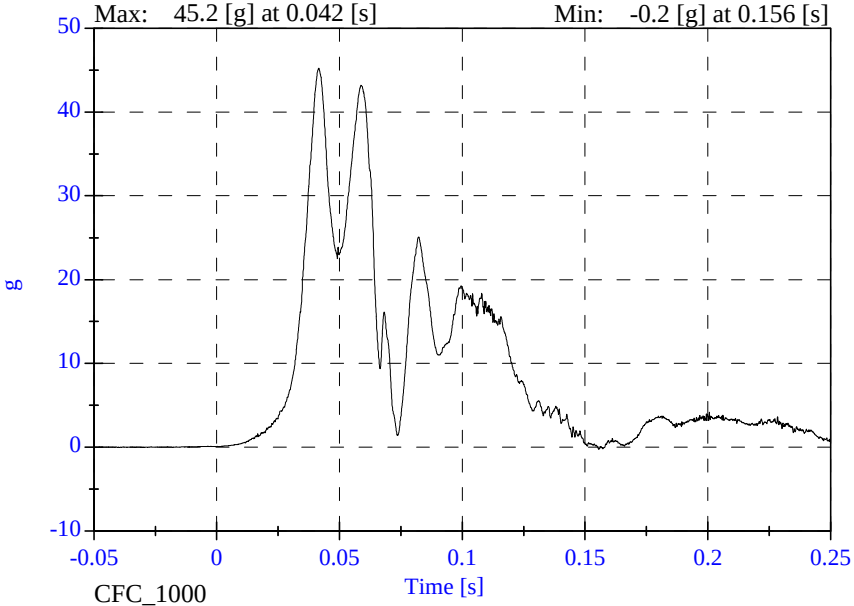


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Head Red z

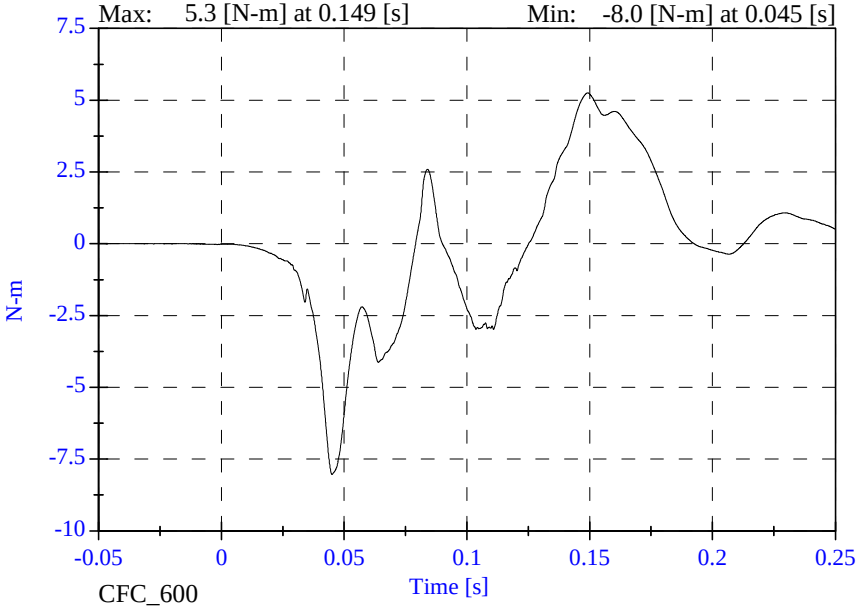
Max: 45.2 [g] at 0.042 [s] Min: -0.2 [g] at 0.156 [s]



CFC_1000

P3 Upper Neck Mocy

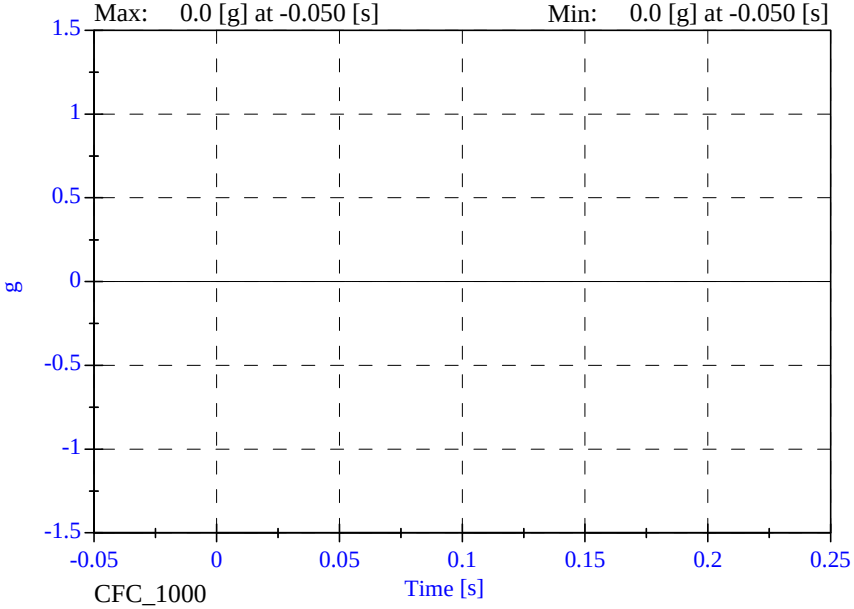
Max: 5.3 [N-m] at 0.149 [s] Min: -8.0 [N-m] at 0.045 [s]



CFC_600

NULL

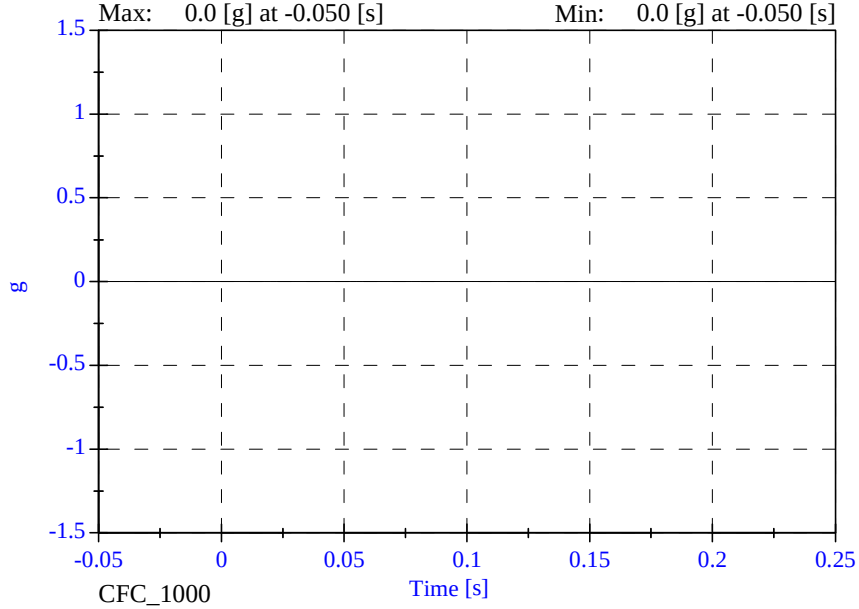
Max: 0.0 [g] at -0.050 [s] Min: 0.0 [g] at -0.050 [s]



CFC_1000

NULL

Max: 0.0 [g] at -0.050 [s] Min: 0.0 [g] at -0.050 [s]

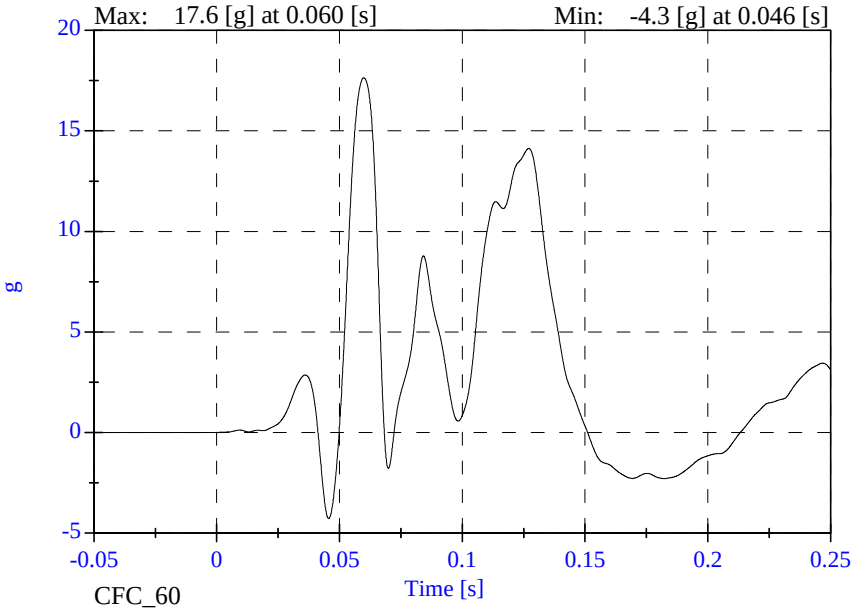


CFC_1000

Sled Test Run 22478 - April 30, 2002

P3 Head x

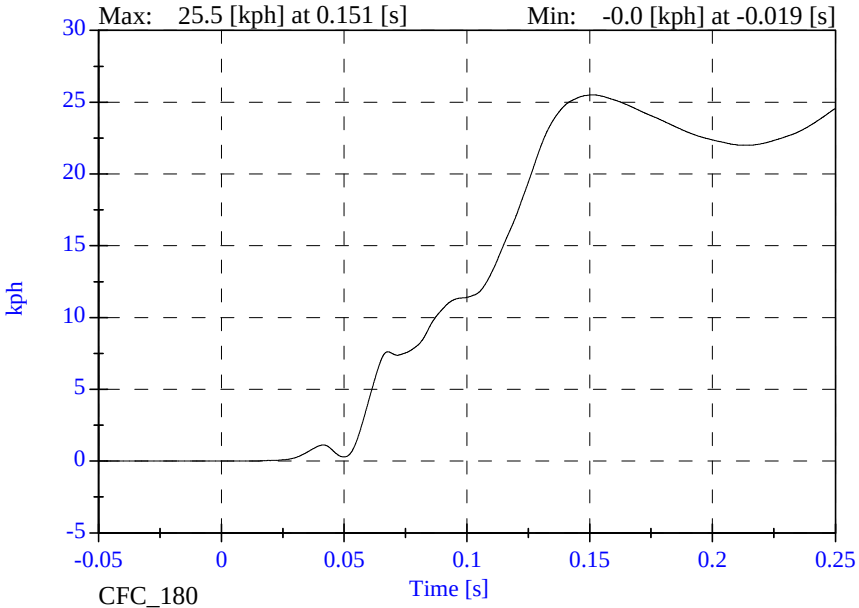
Max: 17.6 [g] at 0.060 [s] Min: -4.3 [g] at 0.046 [s]



CFC_60

P3 Head x Velocity

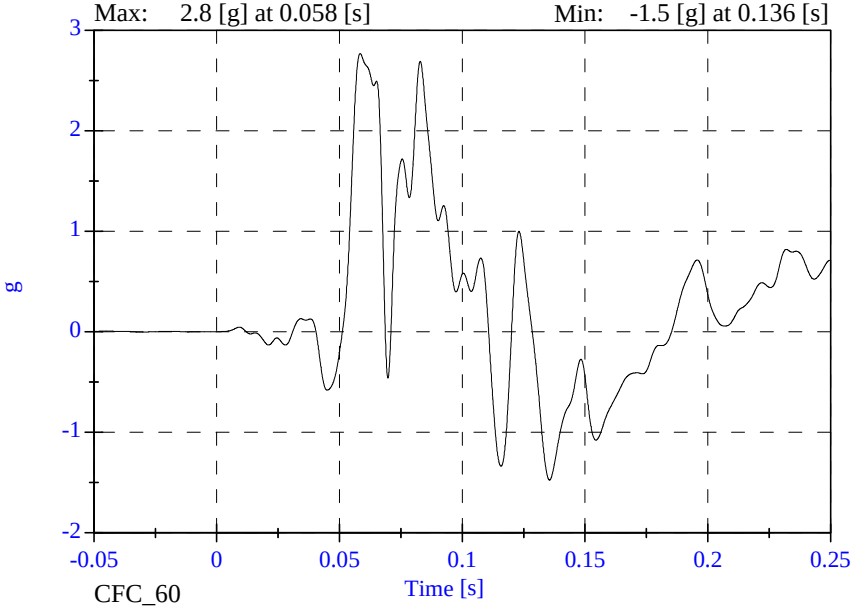
Max: 25.5 [kph] at 0.151 [s] Min: -0.0 [kph] at -0.019 [s]



CFC_180

P3 Head y

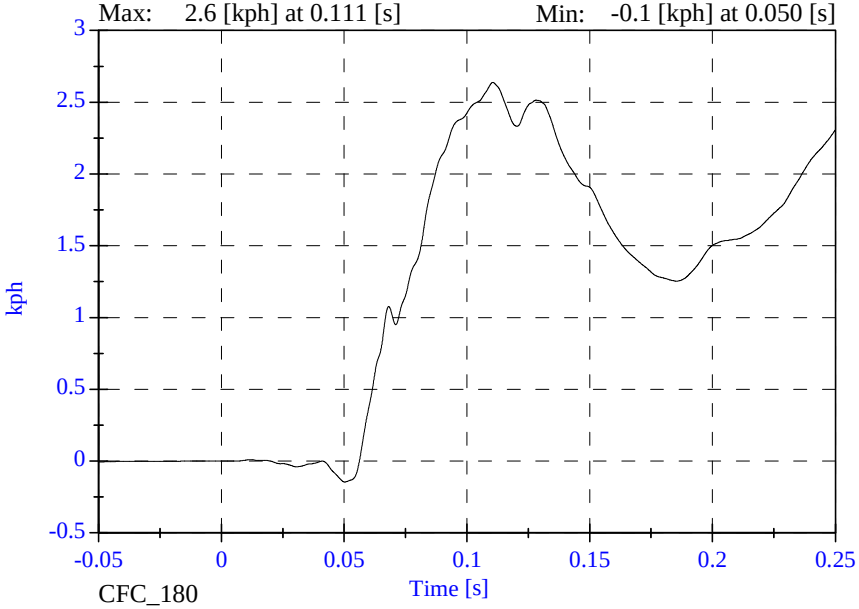
Max: 2.8 [g] at 0.058 [s] Min: -1.5 [g] at 0.136 [s]



CFC_60

P3 Head y Velocity

Max: 2.6 [kph] at 0.111 [s] Min: -0.1 [kph] at 0.050 [s]

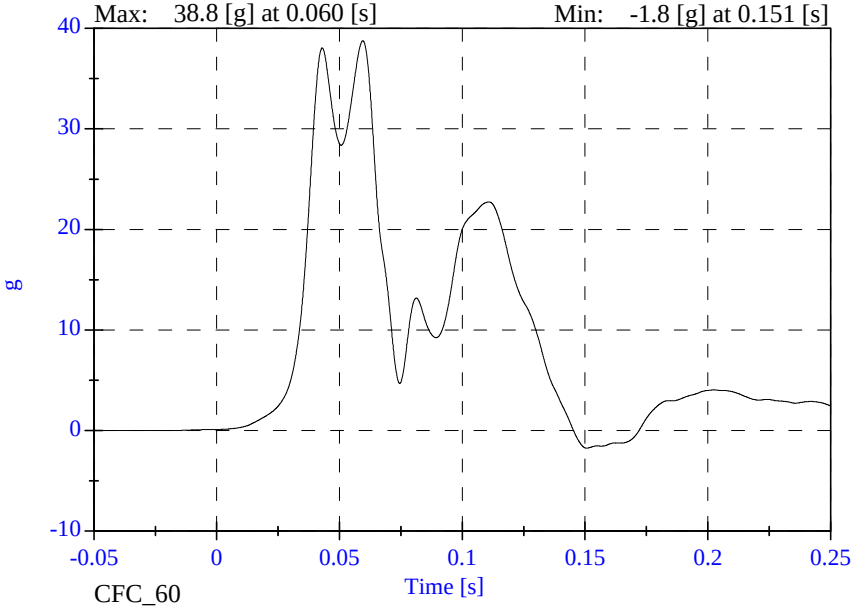


CFC_180

Sled Test Run 22478 - April 30, 2002

P3 Head z

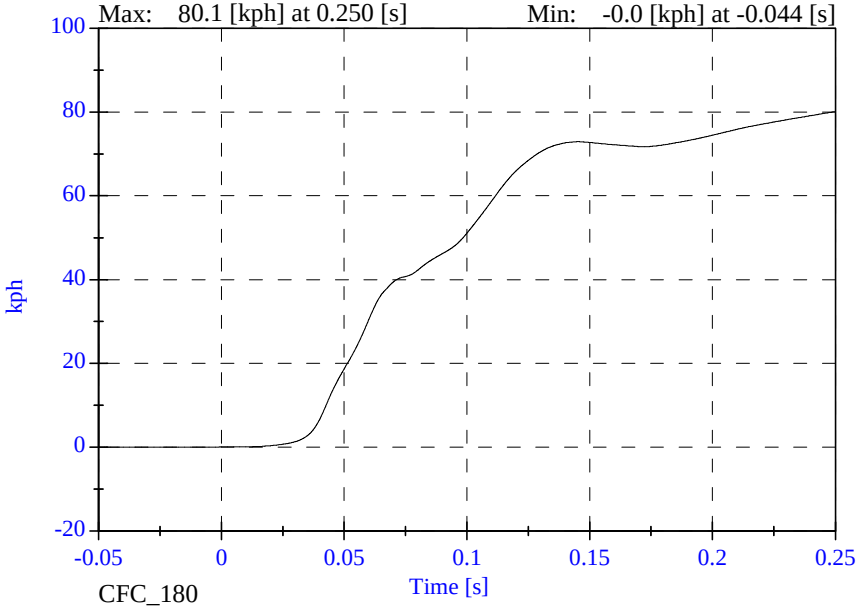
Max: 38.8 [g] at 0.060 [s] Min: -1.8 [g] at 0.151 [s]



CFC_60

P3 Head z Velocity

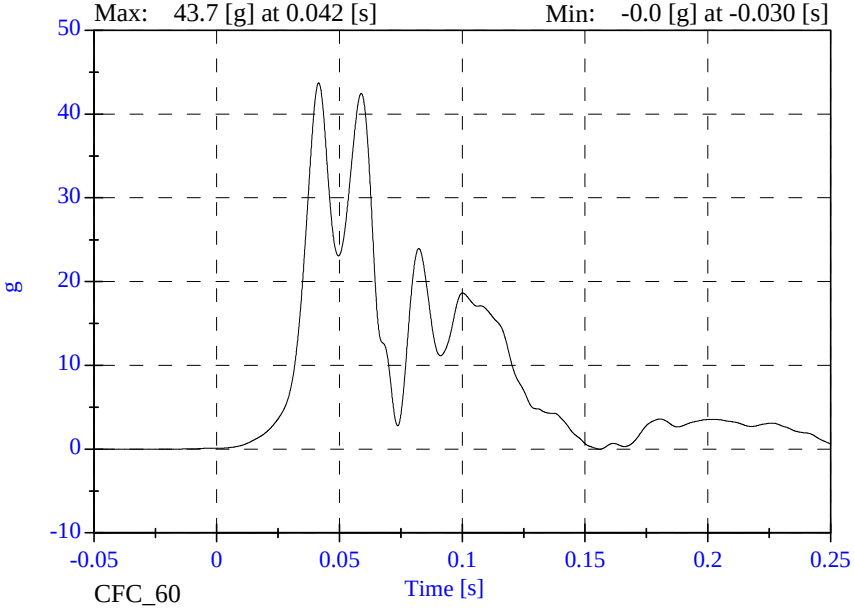
Max: 80.1 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.044 [s]



CFC_180

P3 Head Red z

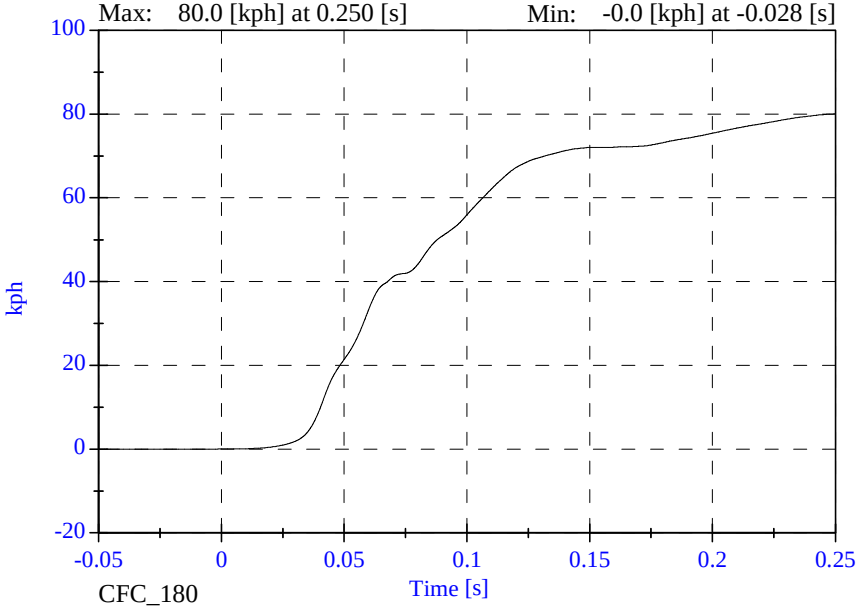
Max: 43.7 [g] at 0.042 [s] Min: -0.0 [g] at -0.030 [s]



CFC_60

P3 Head Red z Velocity

Max: 80.0 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.028 [s]

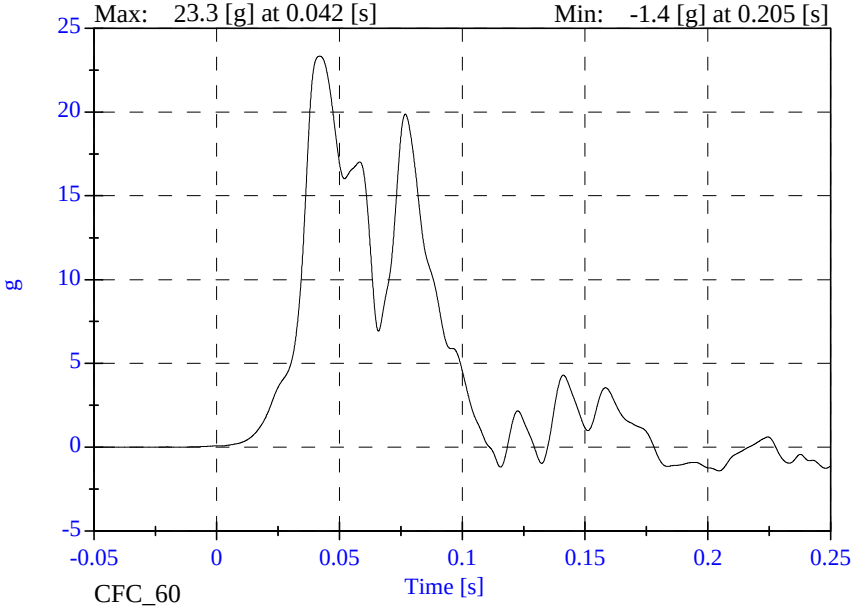


CFC_180

Sled Test Run 22478 - April 30, 2002

P3 Chest x

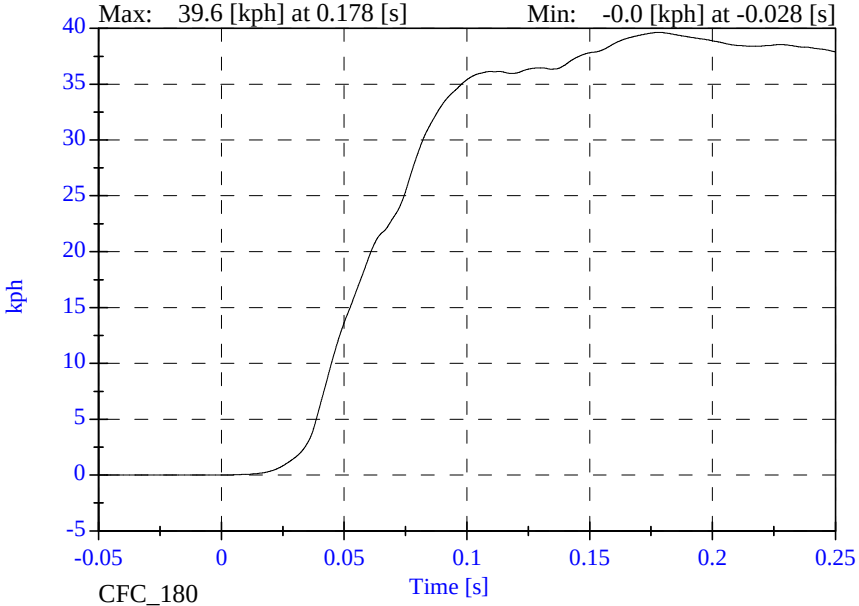
Max: 23.3 [g] at 0.042 [s] Min: -1.4 [g] at 0.205 [s]



CFC_60

P3 Chest x Velocity

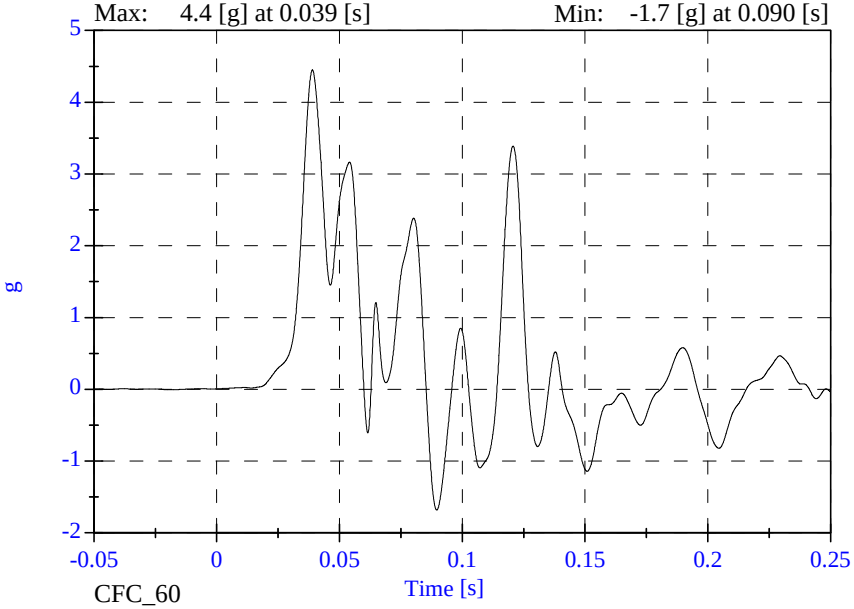
Max: 39.6 [kph] at 0.178 [s] Min: -0.0 [kph] at -0.028 [s]



CFC_180

P3 Chest y

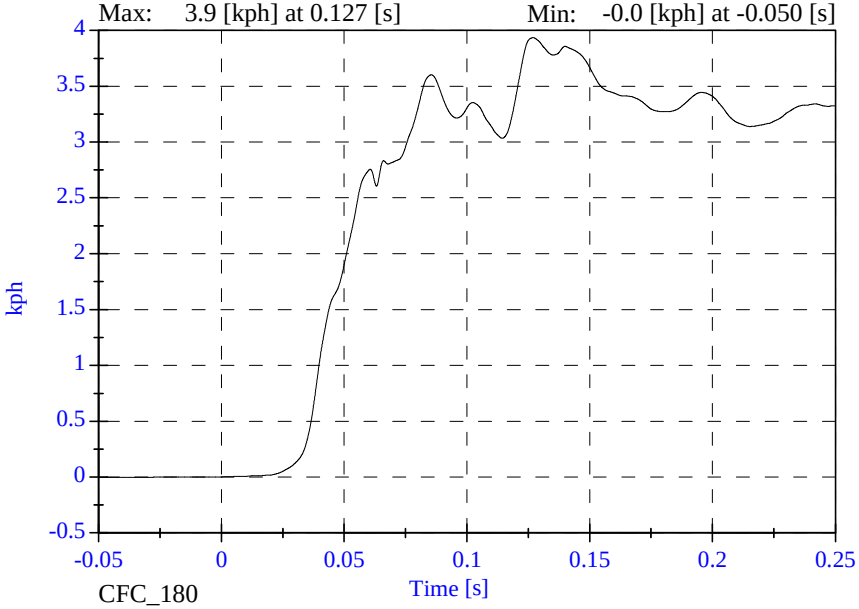
Max: 4.4 [g] at 0.039 [s] Min: -1.7 [g] at 0.090 [s]



CFC_60

P3 Chest y Velocity

Max: 3.9 [kph] at 0.127 [s] Min: -0.0 [kph] at -0.050 [s]

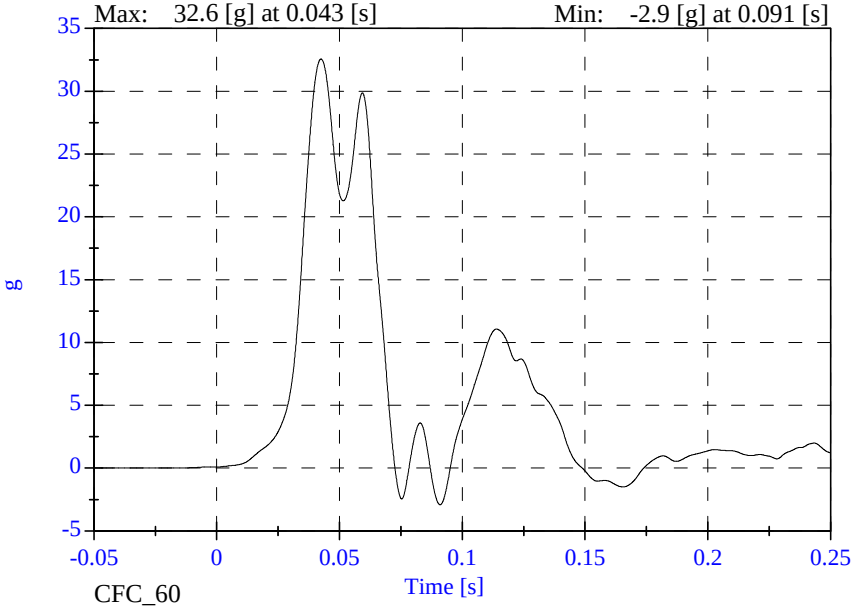


CFC_180

Sled Test Run 22478 - April 30, 2002

P3 Chest z

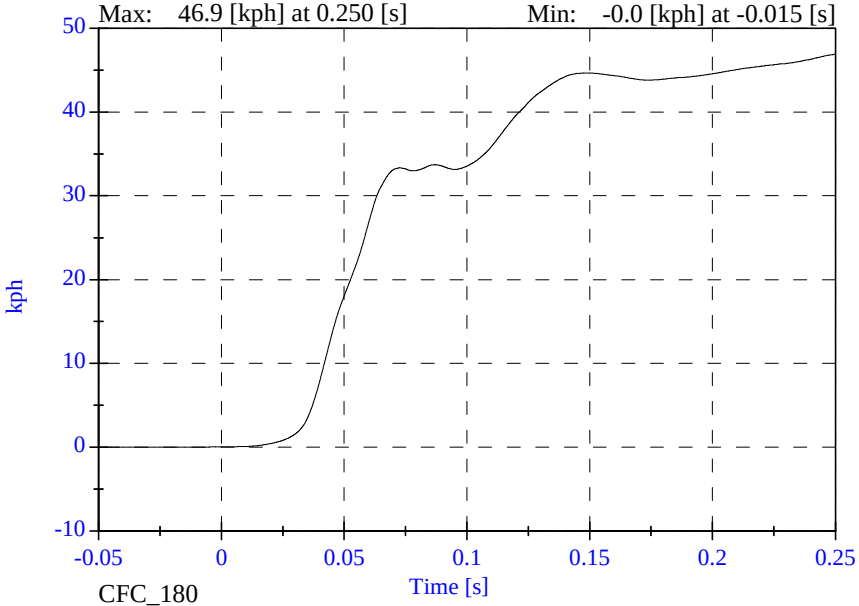
Max: 32.6 [g] at 0.043 [s] Min: -2.9 [g] at 0.091 [s]



CFC_60

P3 Chest z Velocity

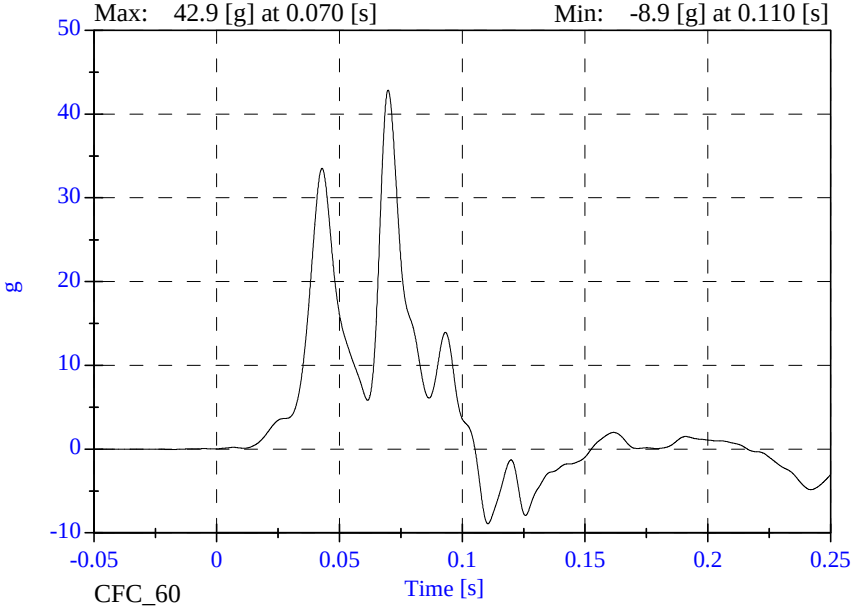
Max: 46.9 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.015 [s]



CFC_180

P3 Pelvic x

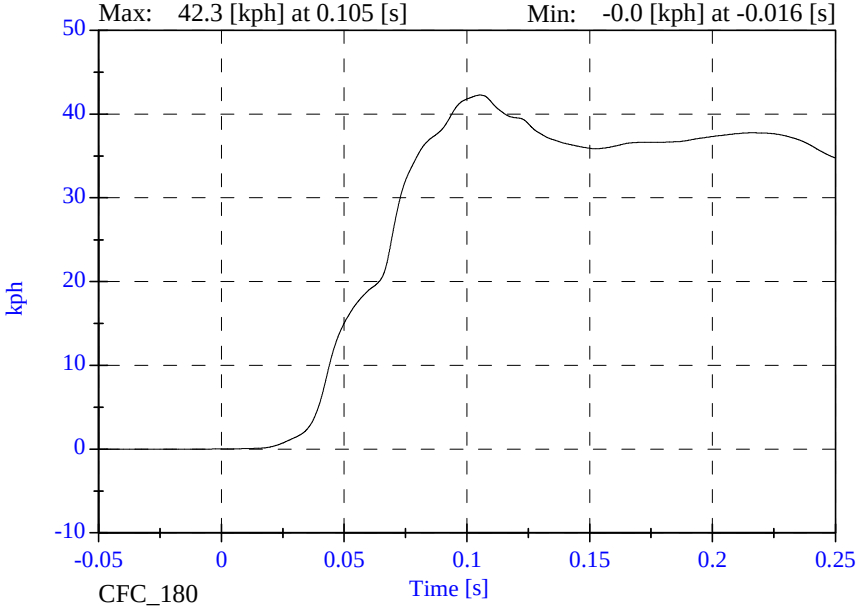
Max: 42.9 [g] at 0.070 [s] Min: -8.9 [g] at 0.110 [s]



CFC_60

P3 Pelvic x Velocity

Max: 42.3 [kph] at 0.105 [s] Min: -0.0 [kph] at -0.016 [s]

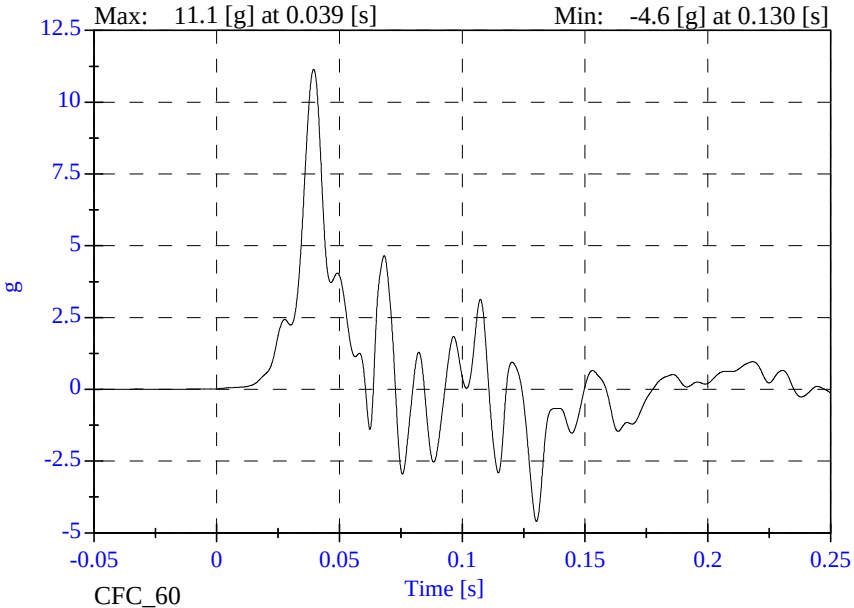


CFC_180

Sled Test Run 22478 - April 30, 2002

P3 Pelvic y

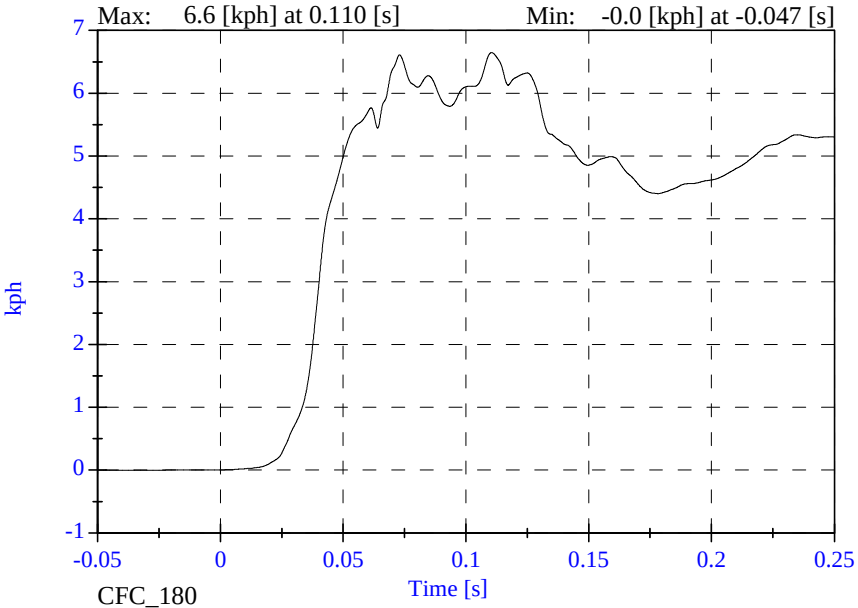
Max: 11.1 [g] at 0.039 [s] Min: -4.6 [g] at 0.130 [s]



CFC_60

P3 Pelvic y Velocity

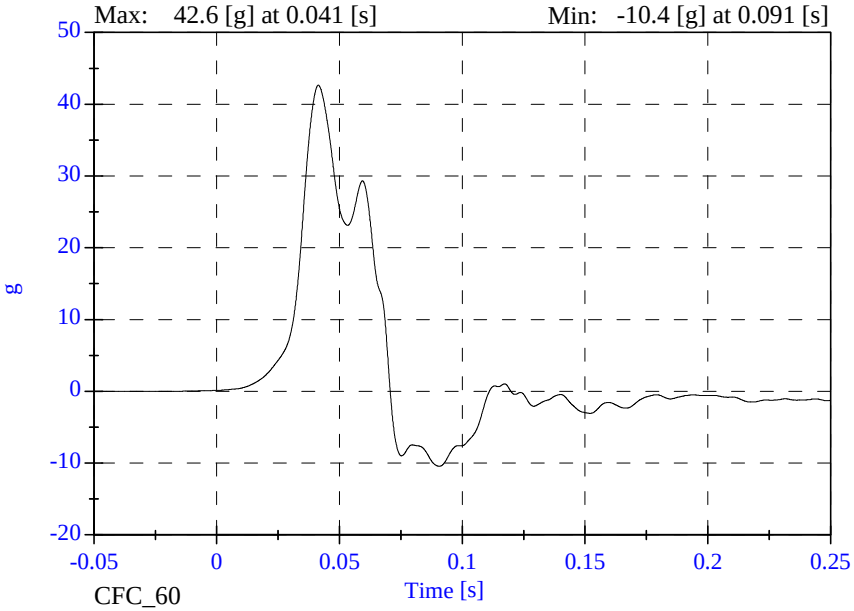
Max: 6.6 [kph] at 0.110 [s] Min: -0.0 [kph] at -0.047 [s]



CFC_180

P3 Pelvic z

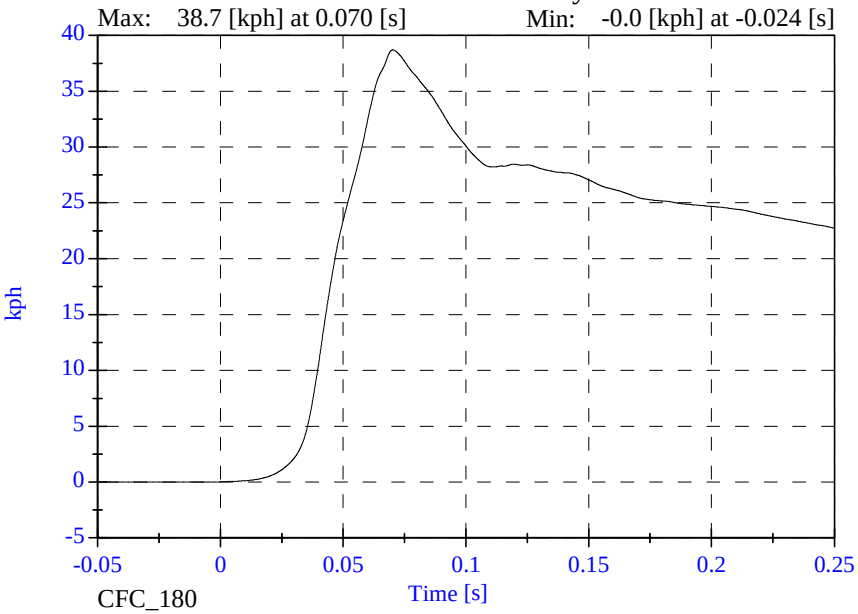
Max: 42.6 [g] at 0.041 [s] Min: -10.4 [g] at 0.091 [s]



CFC_60

P3 Pelvic z Velocity

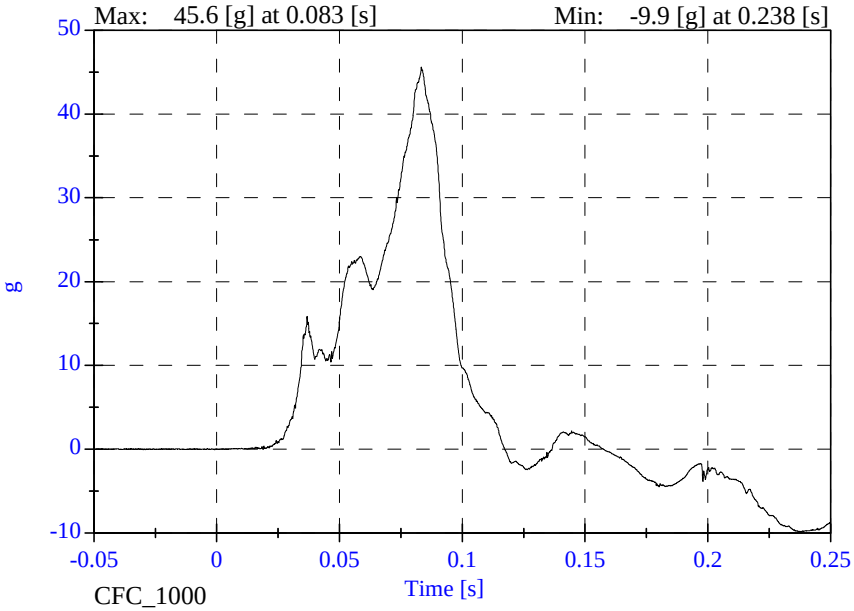
Max: 38.7 [kph] at 0.070 [s] Min: -0.0 [kph] at -0.024 [s]



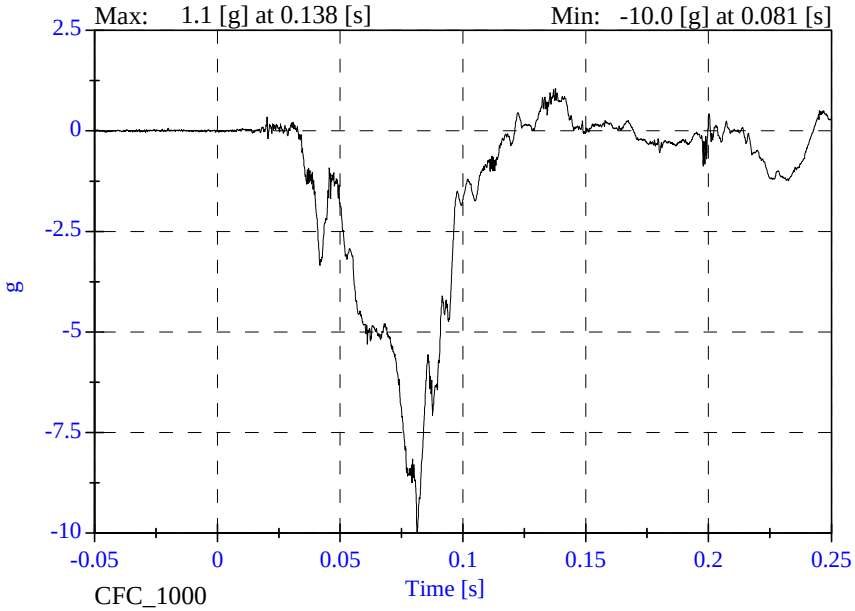
CFC_180

Sled Test Run 22478 - April 30, 2002

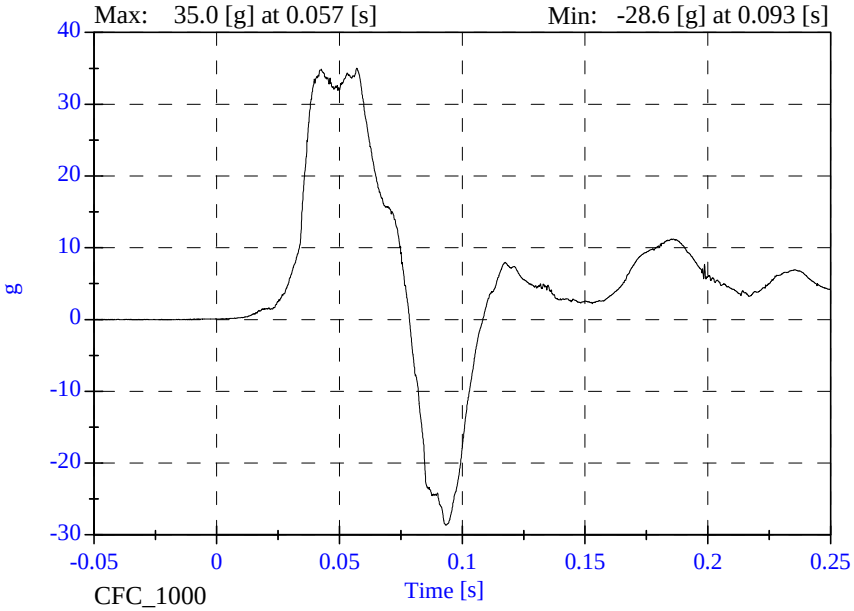
P4 Head x



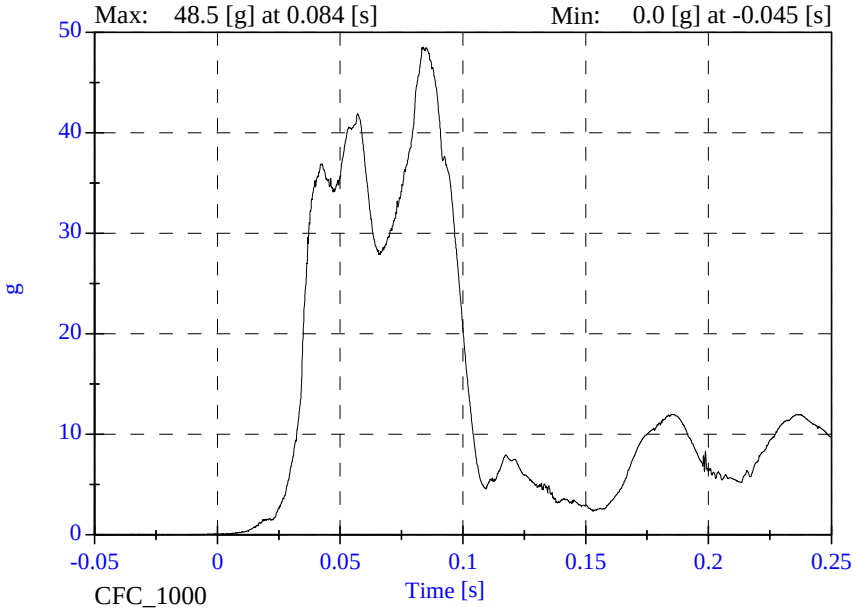
P4 Head y



P4 Head z

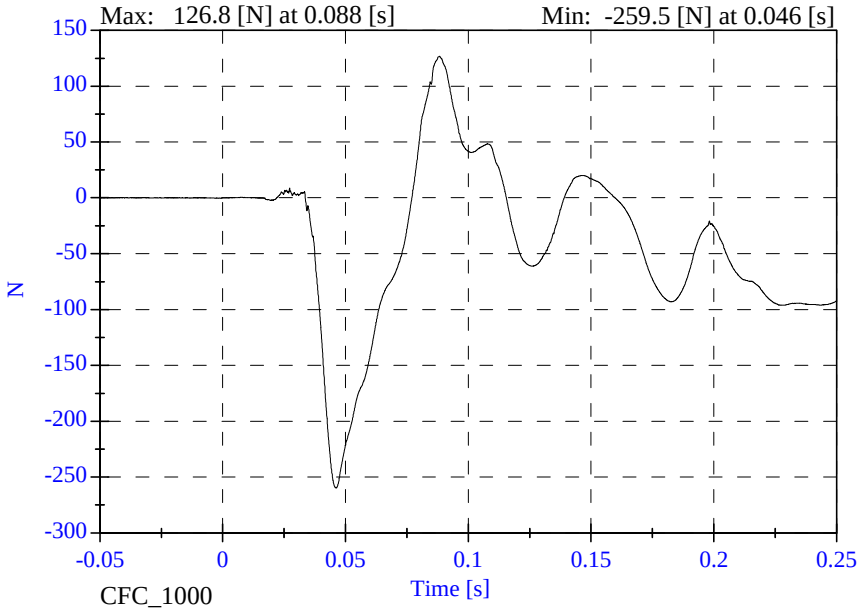


P4 Head Resultant

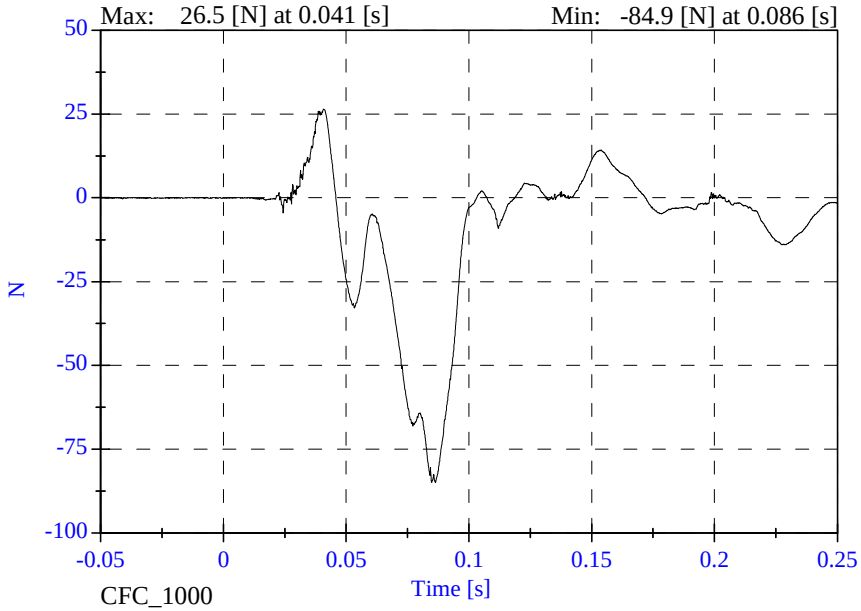


Sled Test Run 22478 - April 30, 2002

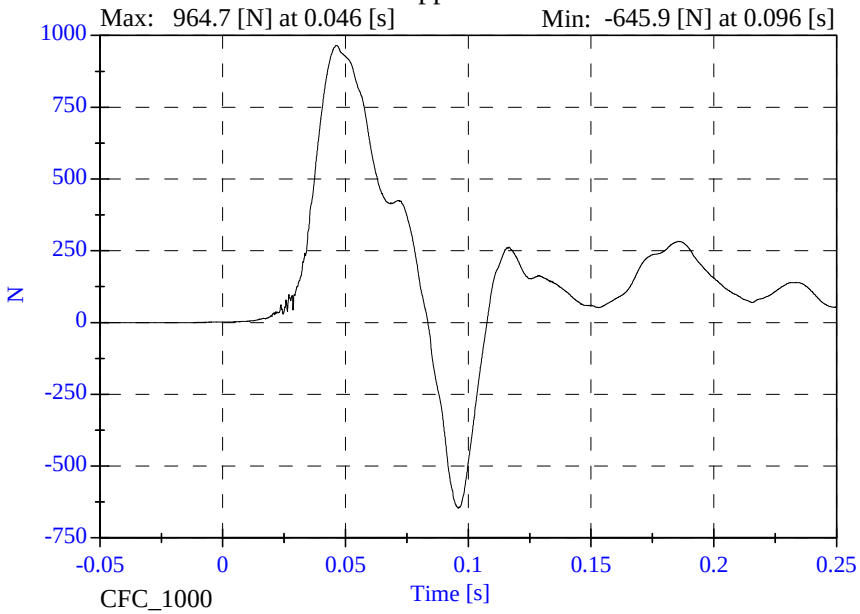
P4 Upper Neck Fx



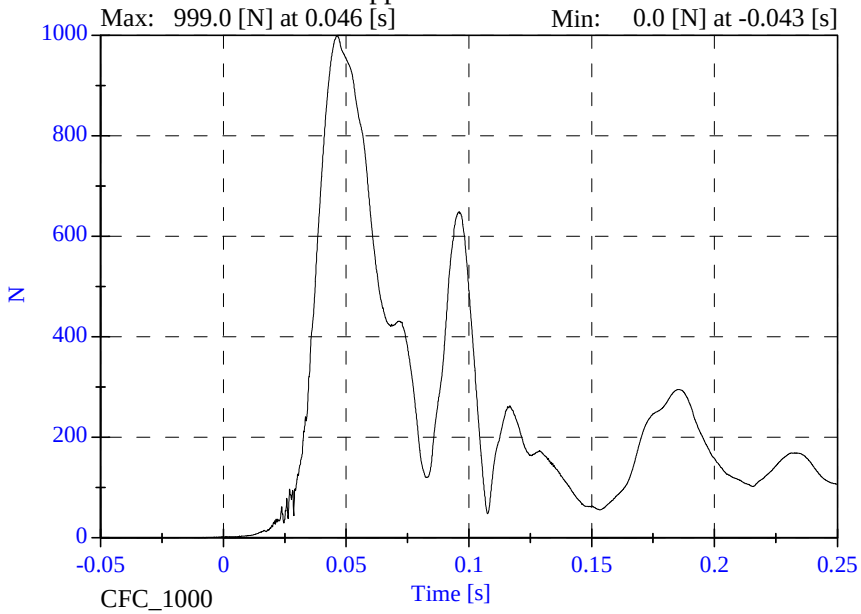
P4 Upper Neck Fy



P4 Upper Neck Fz



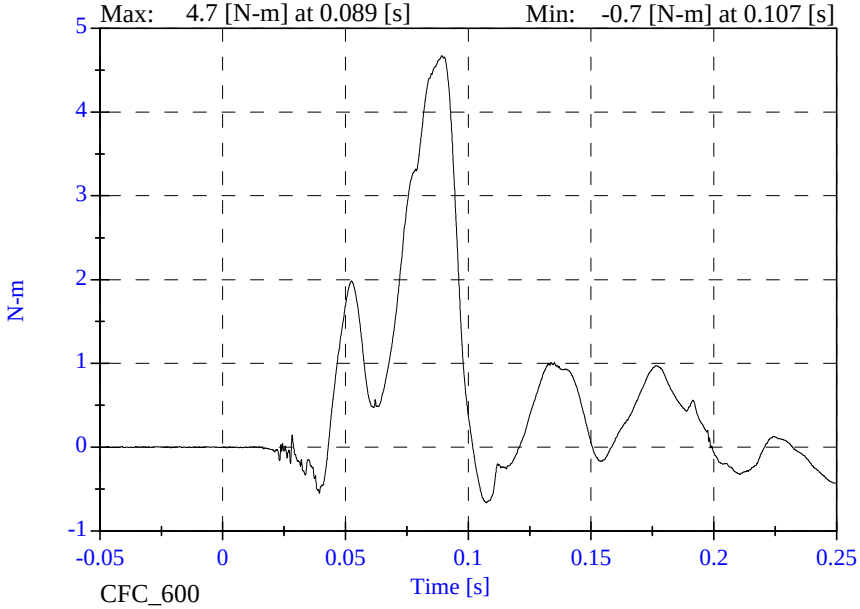
P4 Upper Neck F Resultant



Sled Test Run 22478 - April 30, 2002

P4 Upper Neck Mx

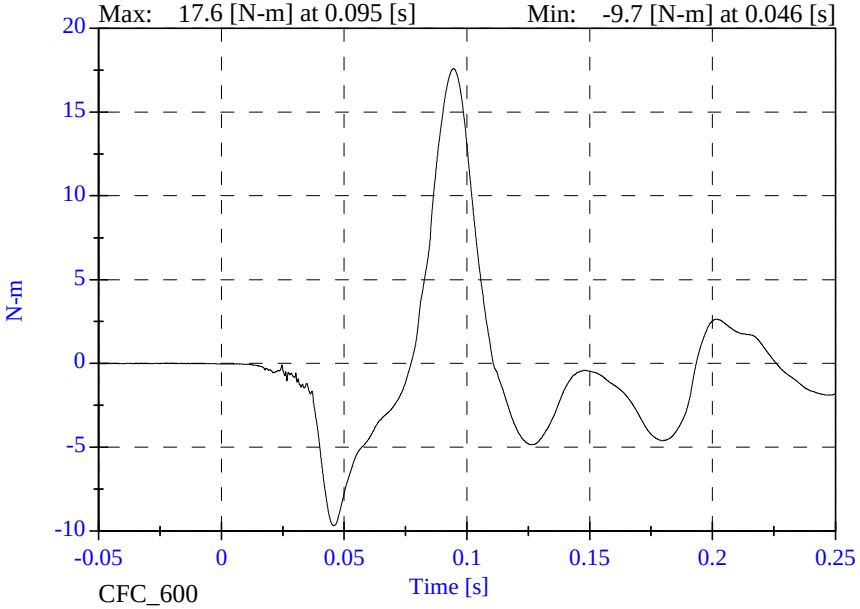
Max: 4.7 [N-m] at 0.089 [s] Min: -0.7 [N-m] at 0.107 [s]



CFC_600

P4 Upper Neck My

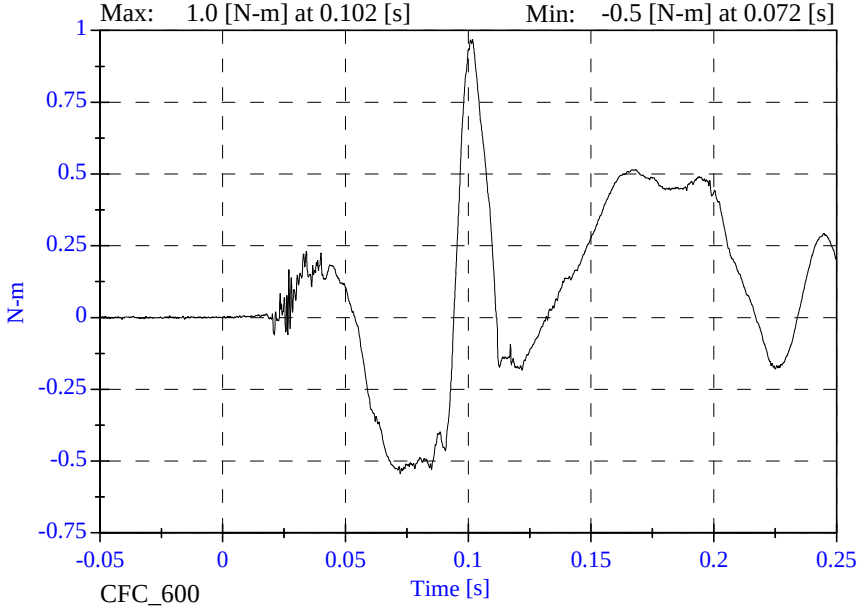
Max: 17.6 [N-m] at 0.095 [s] Min: -9.7 [N-m] at 0.046 [s]



CFC_600

P4 Upper Neck Mz

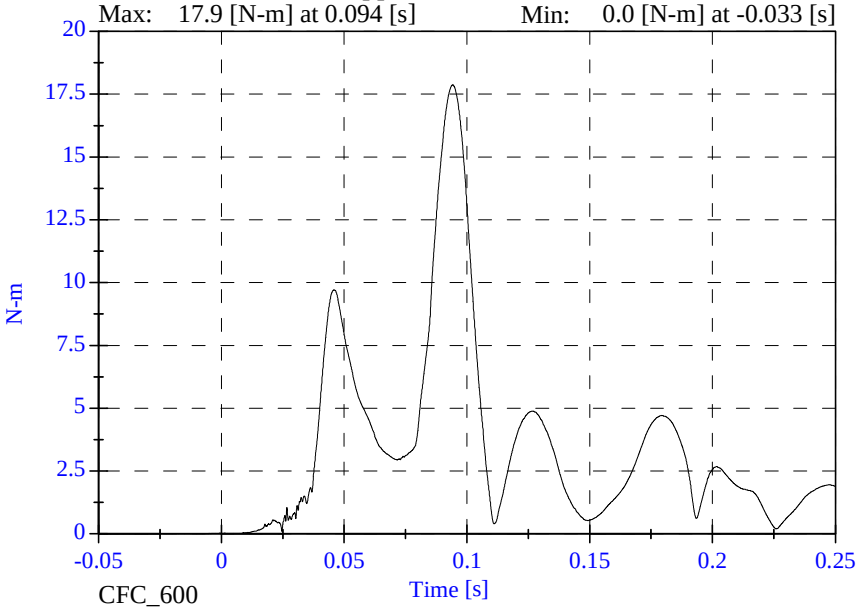
Max: 1.0 [N-m] at 0.102 [s] Min: -0.5 [N-m] at 0.072 [s]



CFC_600

P4 Upper Neck M Resultant

Max: 17.9 [N-m] at 0.094 [s] Min: 0.0 [N-m] at -0.033 [s]

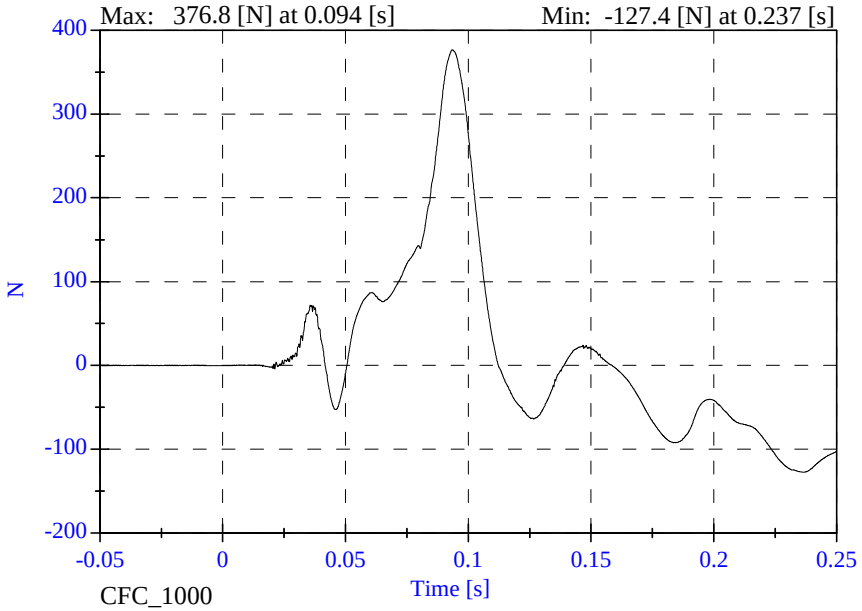


CFC_600

Sled Test Run 22478 - April 30, 2002

P4 Lower Neck Fx

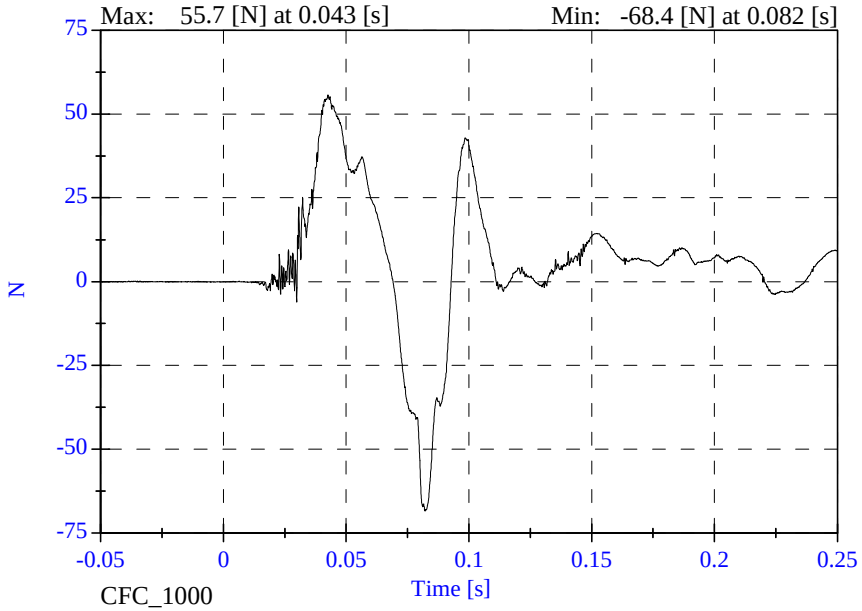
Max: 376.8 [N] at 0.094 [s] Min: -127.4 [N] at 0.237 [s]



CFC_1000

P4 Lower Neck Fy

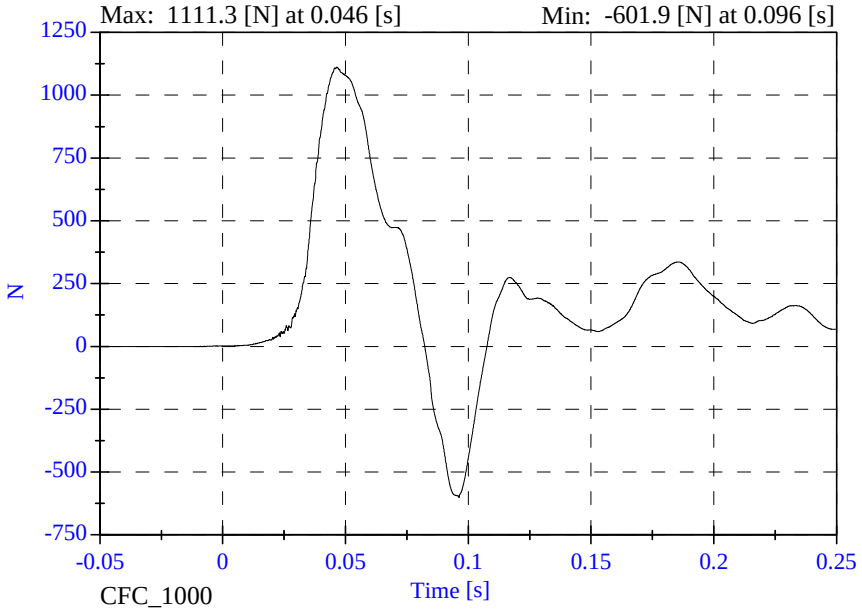
Max: 55.7 [N] at 0.043 [s] Min: -68.4 [N] at 0.082 [s]



CFC_1000

P4 Lower Neck Fz

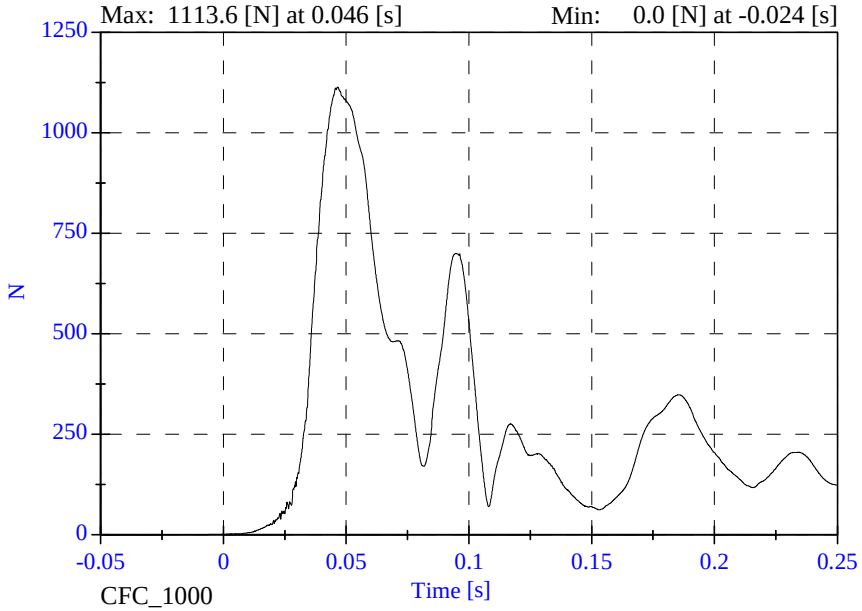
Max: 1111.3 [N] at 0.046 [s] Min: -601.9 [N] at 0.096 [s]



CFC_1000

P4 Lower Neck F Resultant

Max: 1113.6 [N] at 0.046 [s] Min: 0.0 [N] at -0.024 [s]

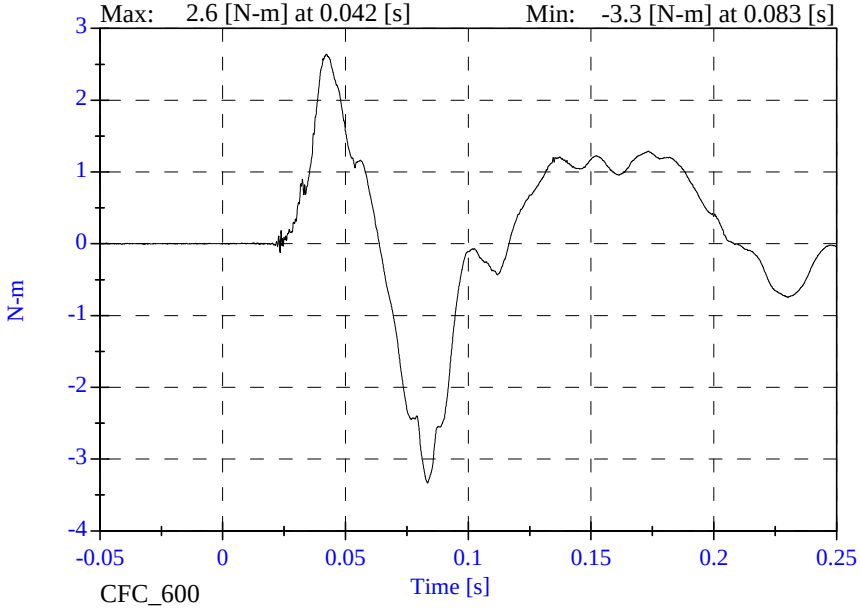


CFC_1000

Sled Test Run 22478 - April 30, 2002

P4 Lower Neck Mx

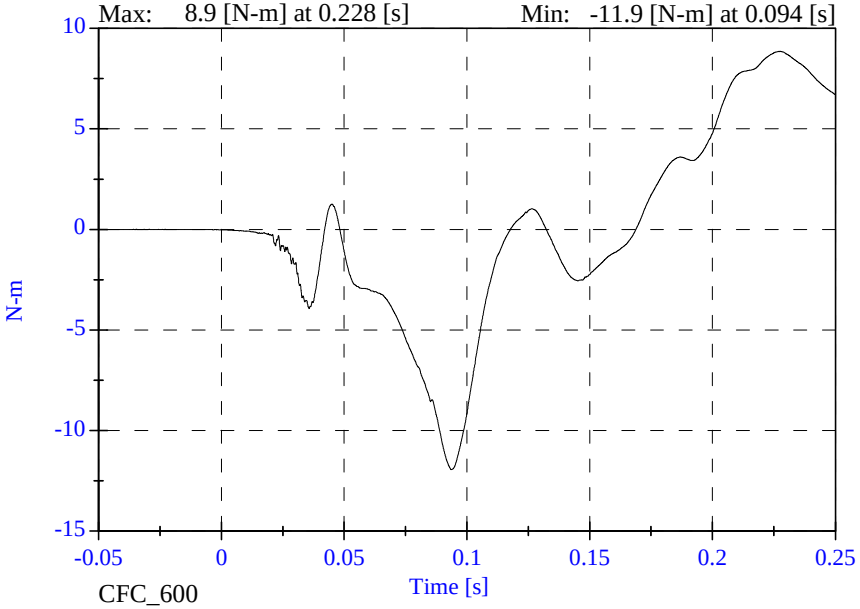
Max: 2.6 [N-m] at 0.042 [s] Min: -3.3 [N-m] at 0.083 [s]



CFC_600

P4 Lower Neck My

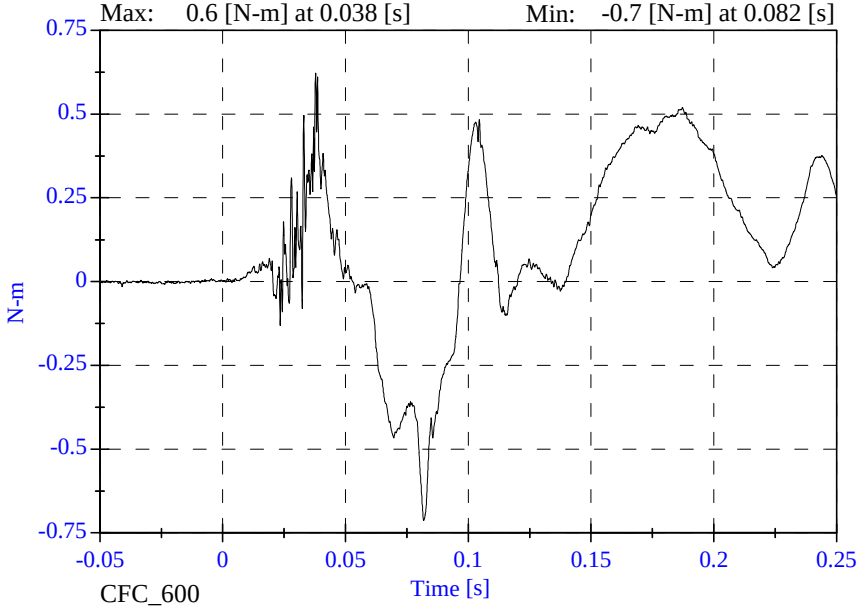
Max: 8.9 [N-m] at 0.228 [s] Min: -11.9 [N-m] at 0.094 [s]



CFC_600

P4 Lower Neck Mz

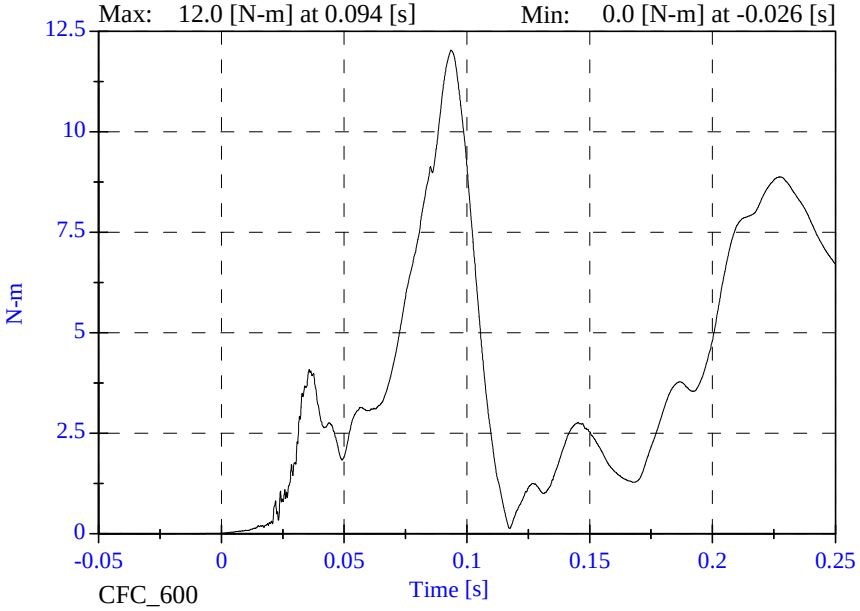
Max: 0.6 [N-m] at 0.038 [s] Min: -0.7 [N-m] at 0.082 [s]



CFC_600

P4 Lower Neck M Resultant

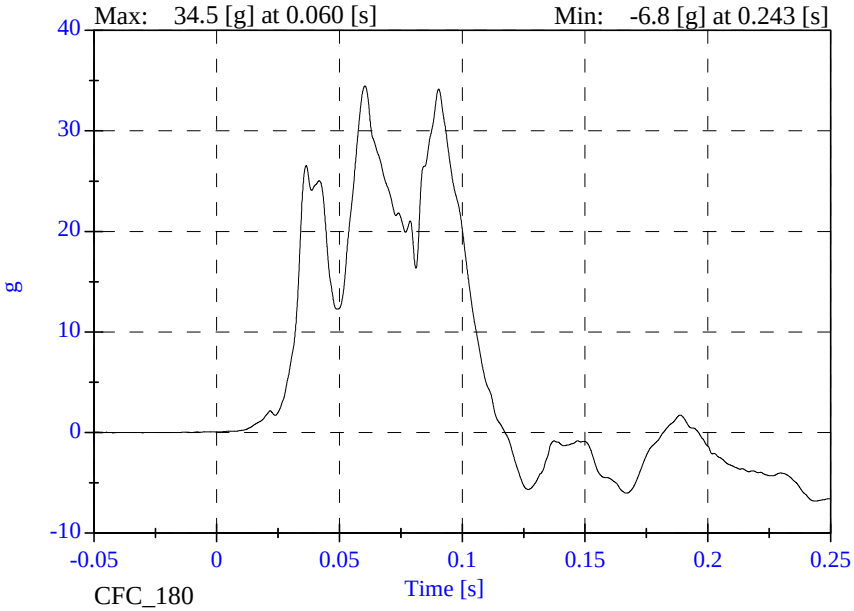
Max: 12.0 [N-m] at 0.094 [s] Min: 0.0 [N-m] at -0.026 [s]



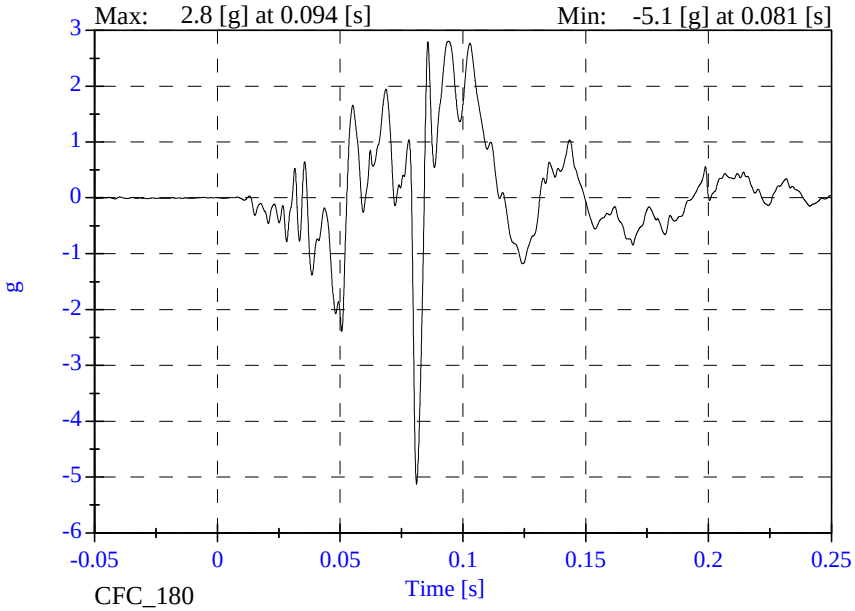
CFC_600

Sled Test Run 22478 - April 30, 2002

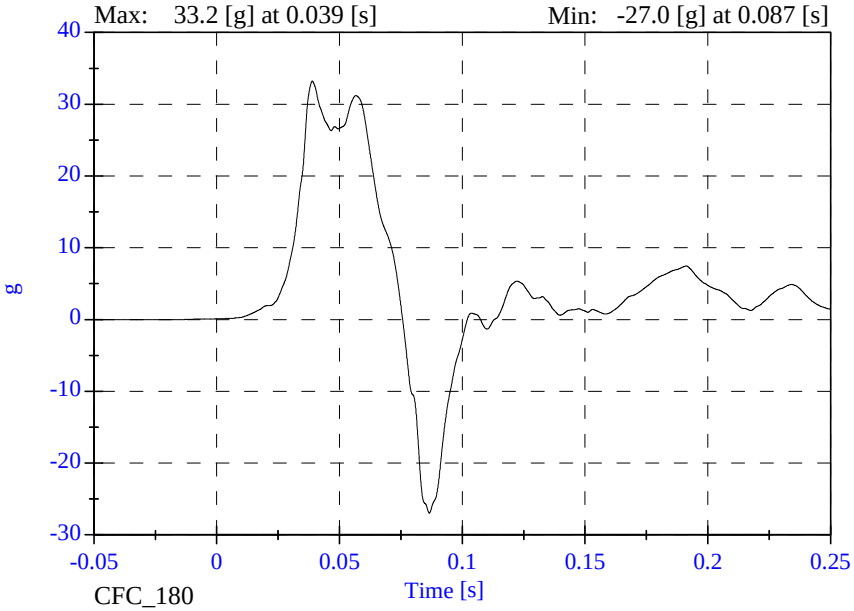
P4 Chest x



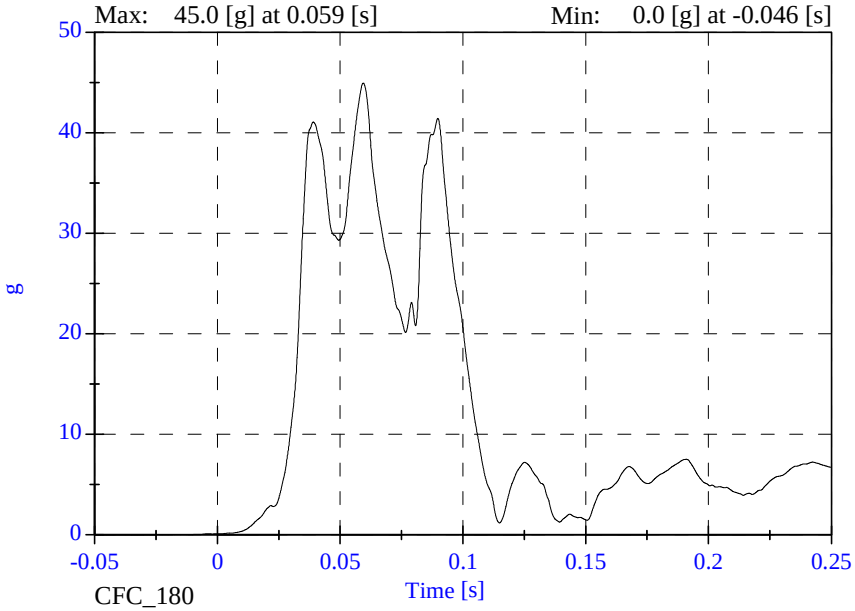
P4 Chest y



P4 Chest z

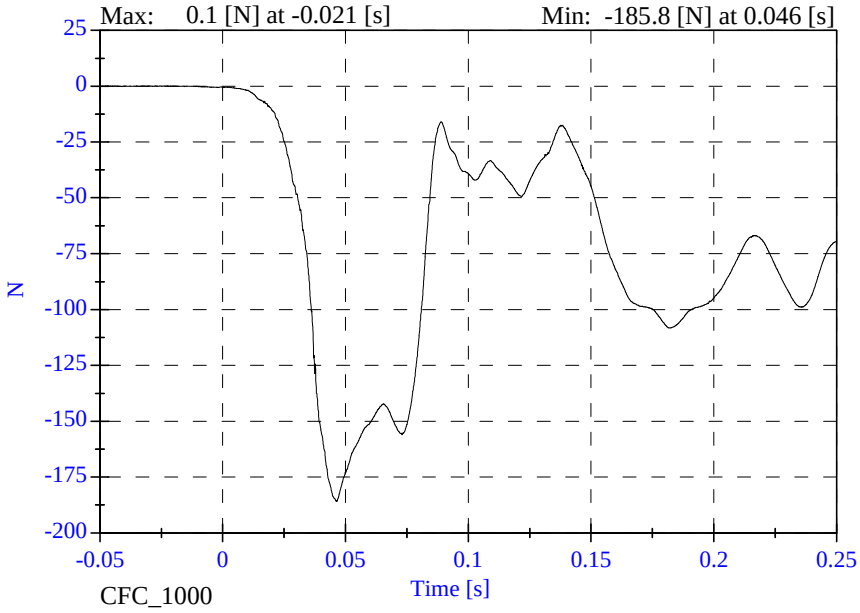


P4 Chest Resultant

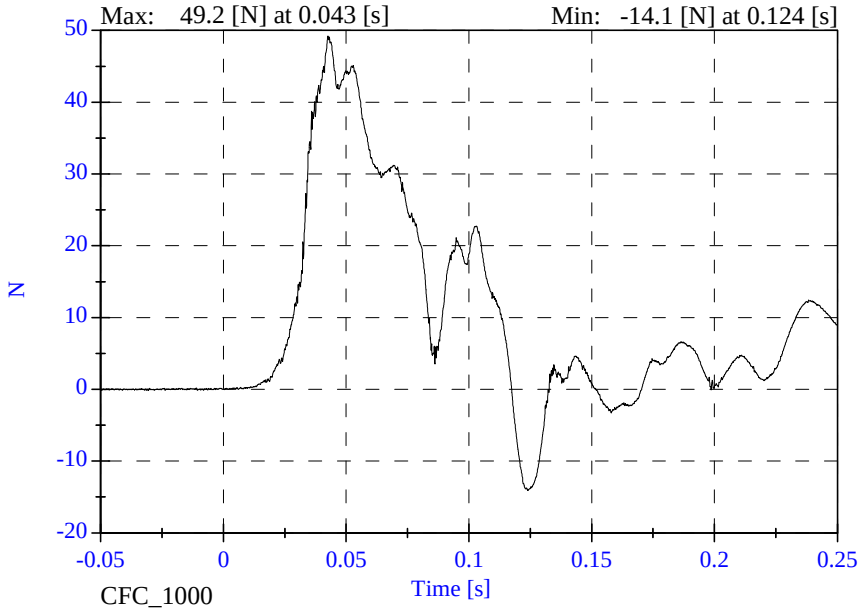


Sled Test Run 22478 - April 30, 2002

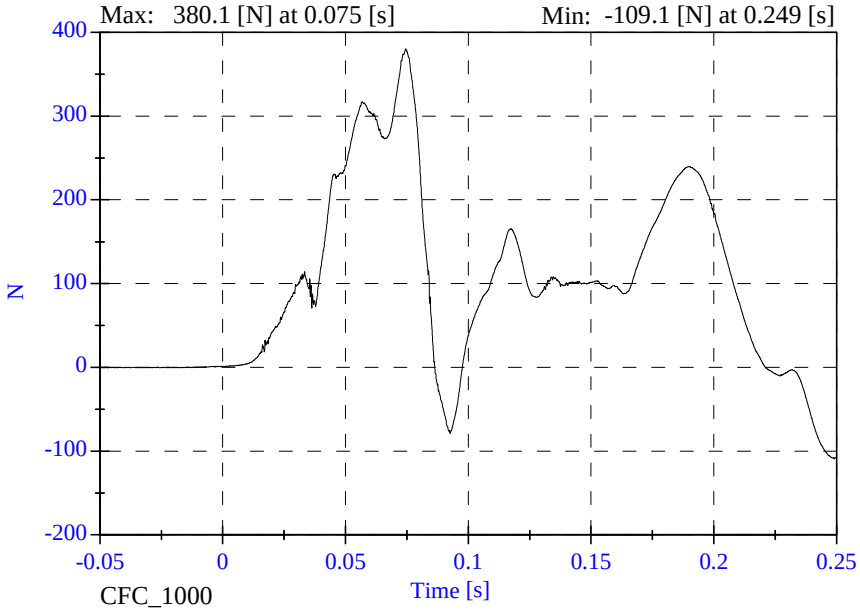
P4 Lumbar Fx



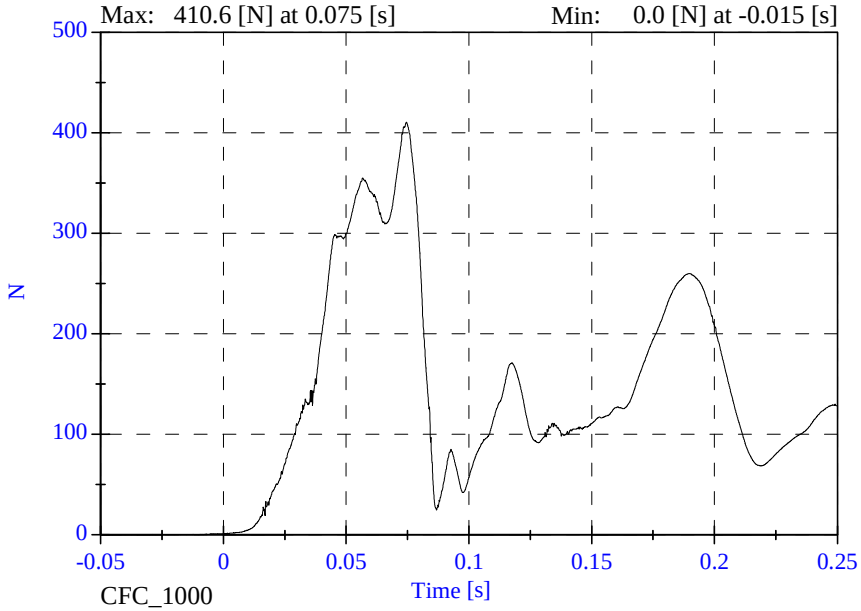
P4 Lumbar Fy



P4 Lumbar Fz



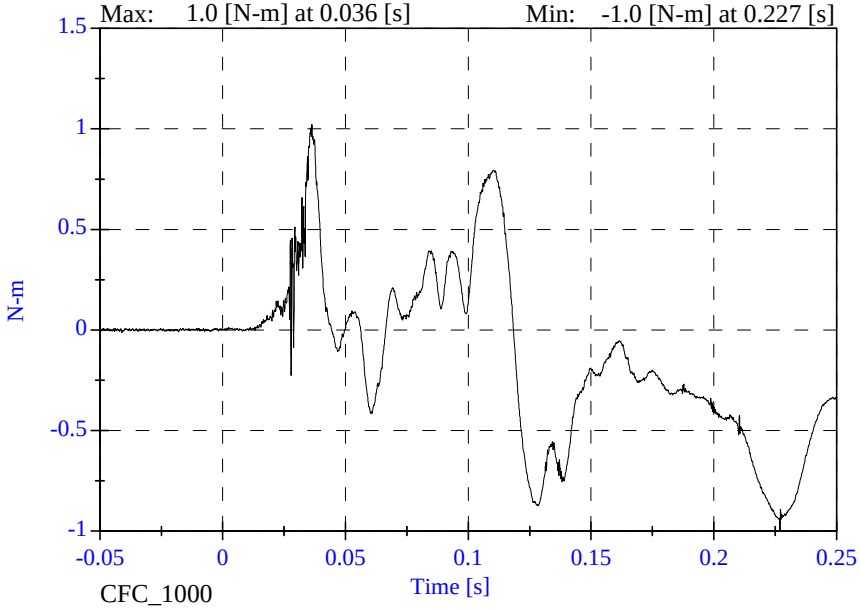
P4 Lumbar F Resultant



Sled Test Run 22478 - April 30, 2002

P4 Lumbar Mx

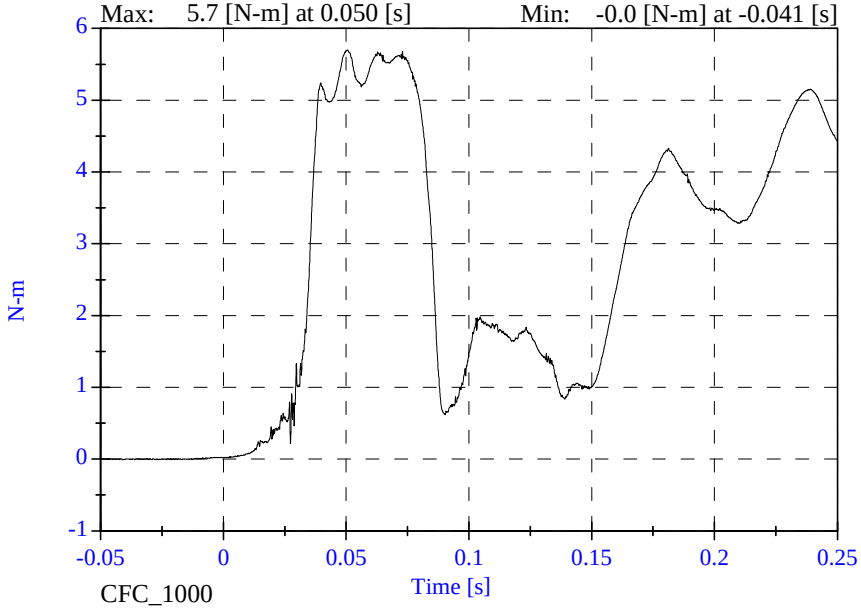
Max: 1.0 [N-m] at 0.036 [s] Min: -1.0 [N-m] at 0.227 [s]



CFC_1000

P4 Lumbar My

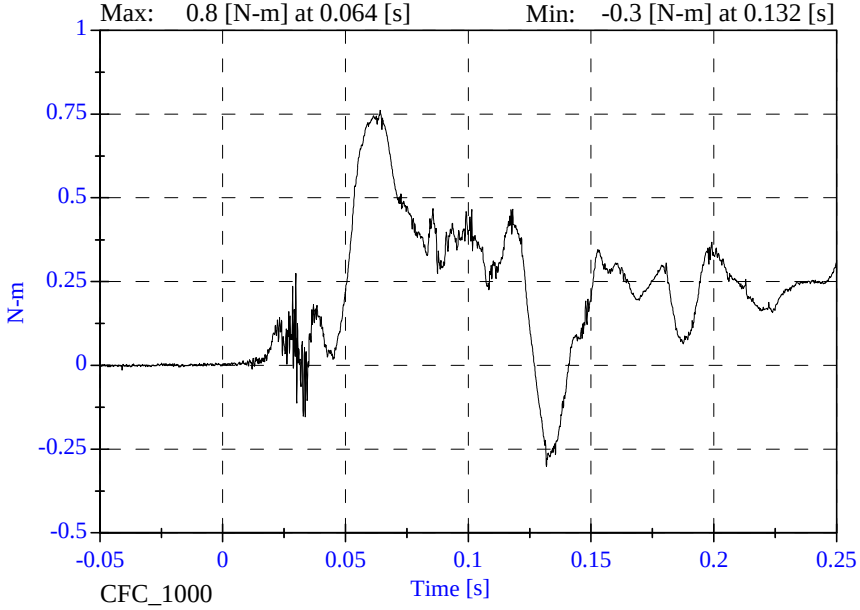
Max: 5.7 [N-m] at 0.050 [s] Min: -0.0 [N-m] at -0.041 [s]



CFC_1000

P4 Lumbar Mz

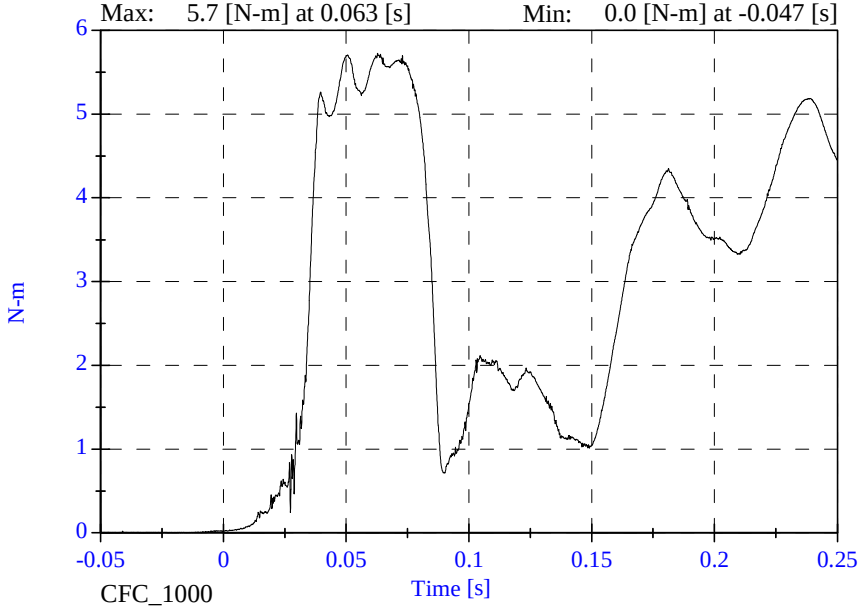
Max: 0.8 [N-m] at 0.064 [s] Min: -0.3 [N-m] at 0.132 [s]



CFC_1000

P4 Lumbar M Resultant

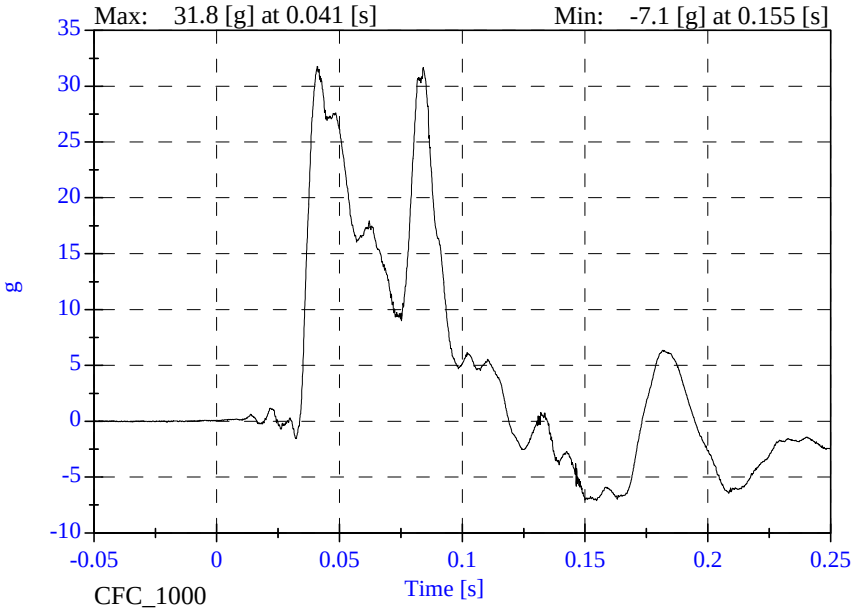
Max: 5.7 [N-m] at 0.063 [s] Min: 0.0 [N-m] at -0.047 [s]



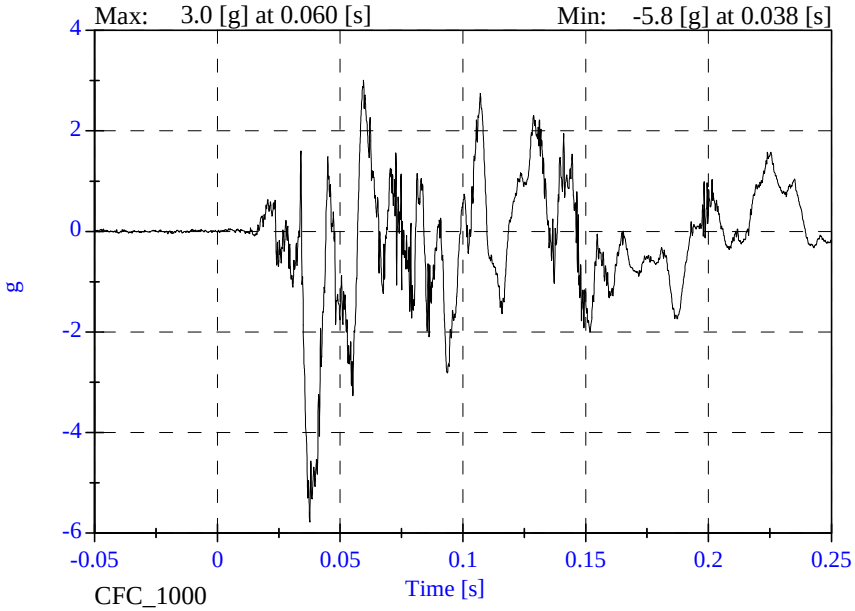
CFC_1000

Sled Test Run 22478 - April 30, 2002

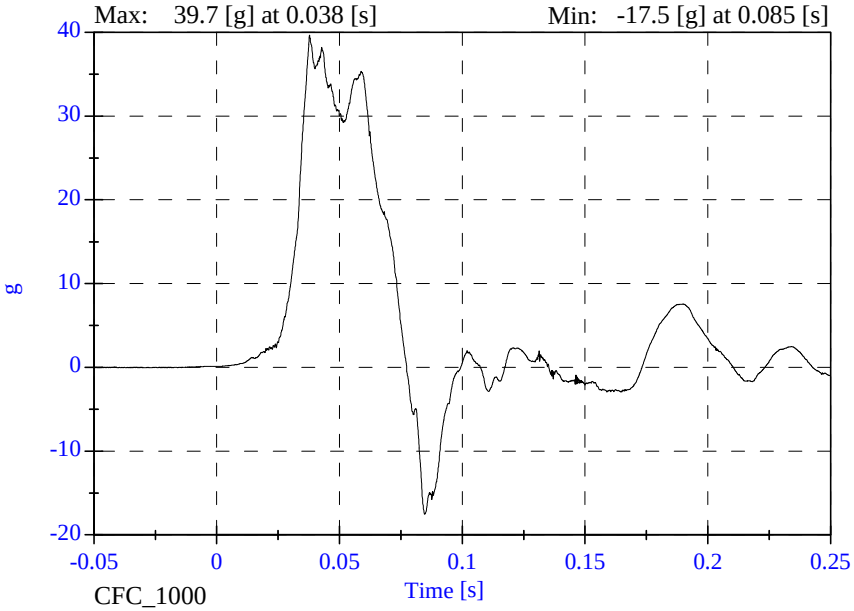
P4 Pelvic x



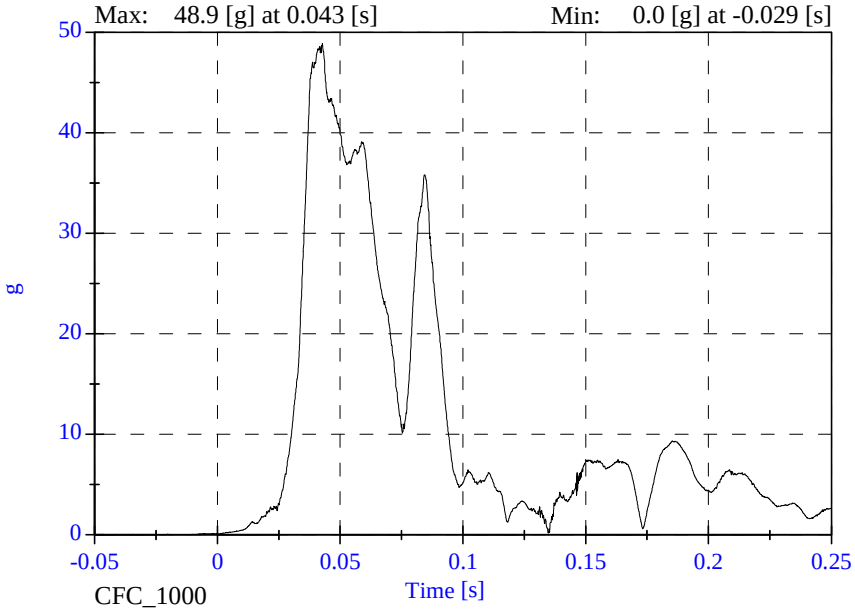
P4 Pelvic y



P4 Pelvic z



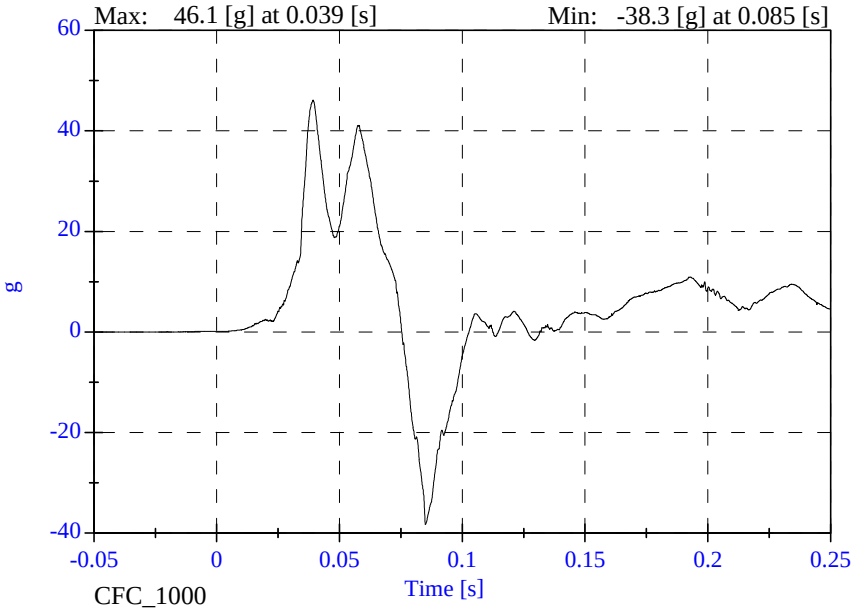
P4 Pelvic Resultant



Sled Test Run 22478 - April 30, 2002

P4 Head Red z

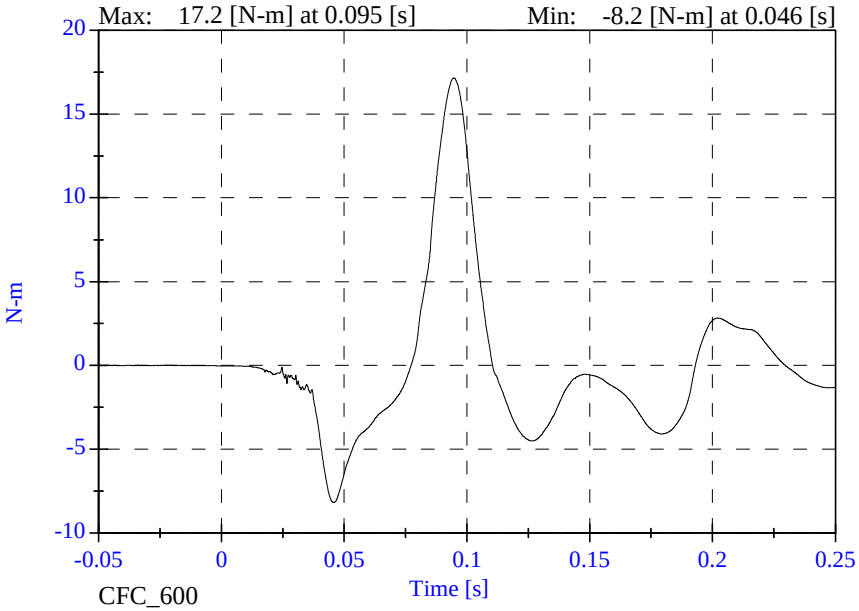
Max: 46.1 [g] at 0.039 [s] Min: -38.3 [g] at 0.085 [s]



CFC_1000

P4 Upper Neck Mocy

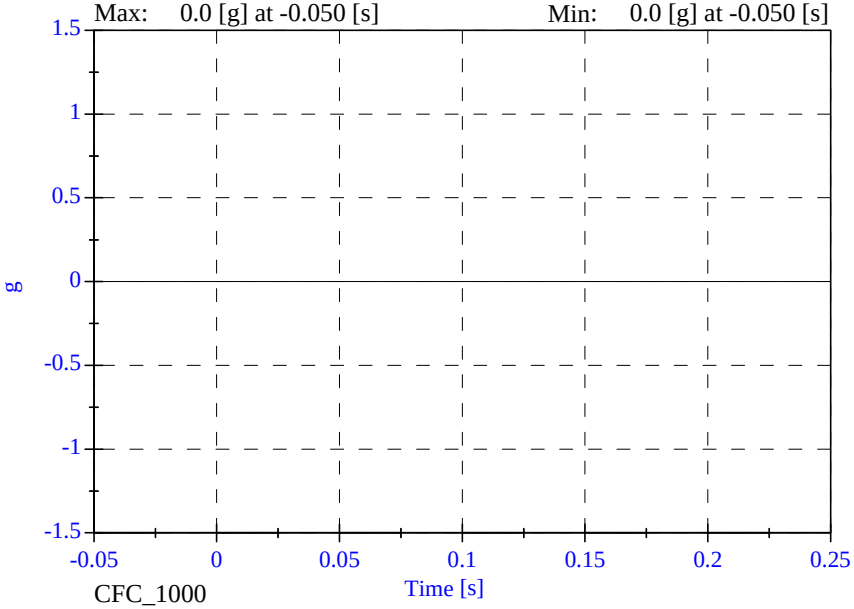
Max: 17.2 [N-m] at 0.095 [s] Min: -8.2 [N-m] at 0.046 [s]



CFC_600

NULL

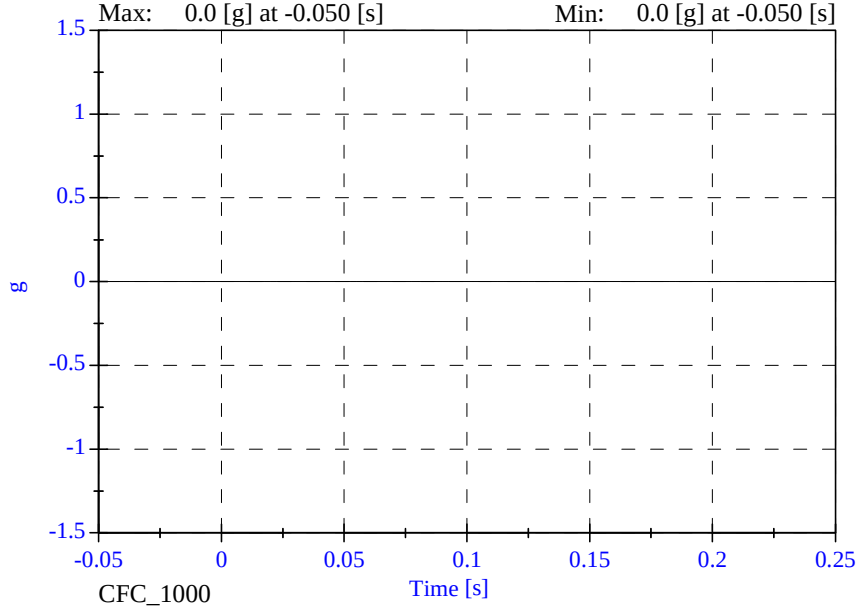
Max: 0.0 [g] at -0.050 [s] Min: 0.0 [g] at -0.050 [s]



CFC_1000

NULL

Max: 0.0 [g] at -0.050 [s] Min: 0.0 [g] at -0.050 [s]

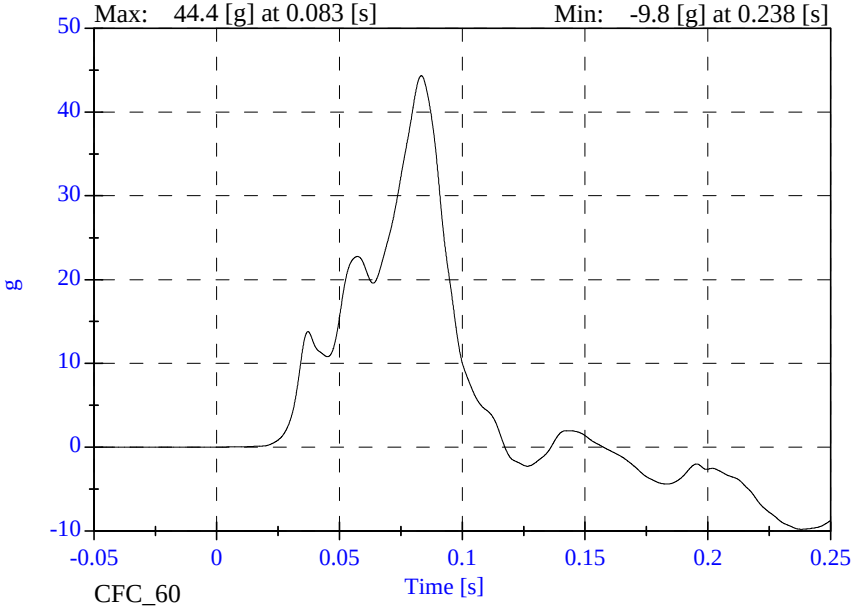


CFC_1000

Sled Test Run 22478 - April 30, 2002

P4 Head x

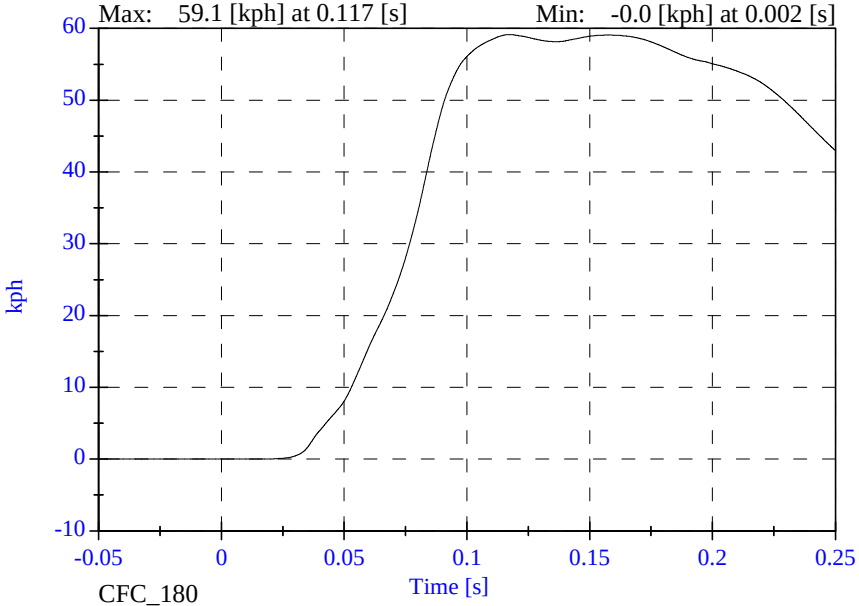
Max: 44.4 [g] at 0.083 [s] Min: -9.8 [g] at 0.238 [s]



CFC_60

P4 Head x Velocity

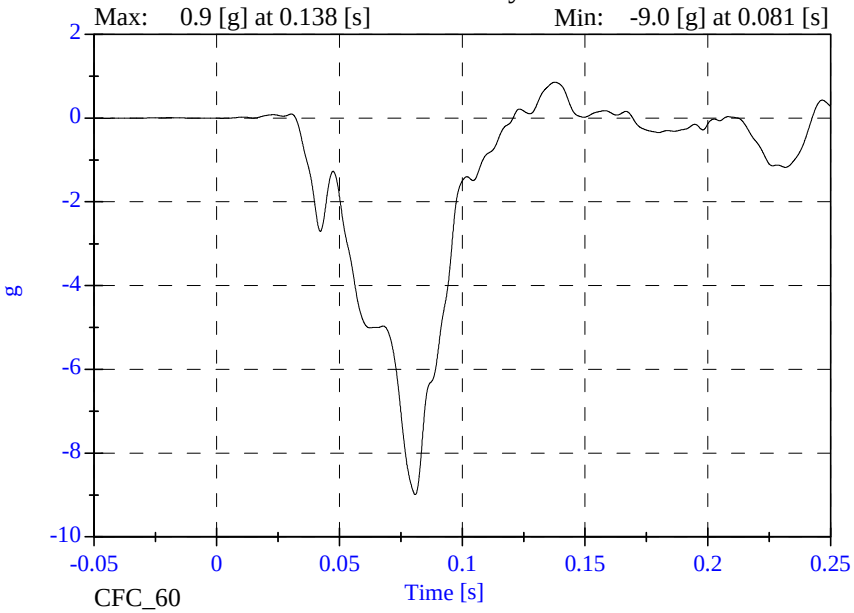
Max: 59.1 [kph] at 0.117 [s] Min: -0.0 [kph] at 0.002 [s]



CFC_180

P4 Head y

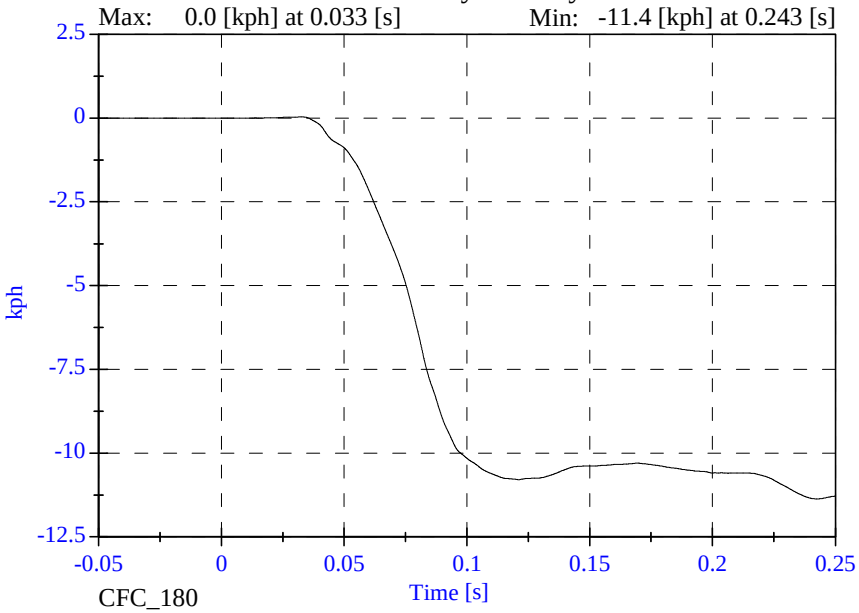
Max: 0.9 [g] at 0.138 [s] Min: -9.0 [g] at 0.081 [s]



CFC_60

P4 Head y Velocity

Max: 0.0 [kph] at 0.033 [s] Min: -11.4 [kph] at 0.243 [s]

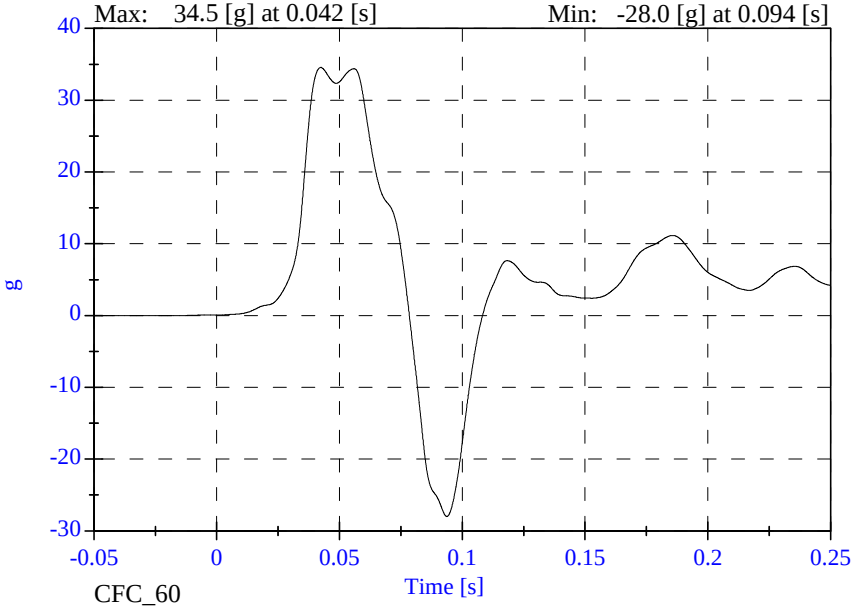


CFC_180

Sled Test Run 22478 - April 30, 2002

P4 Head z

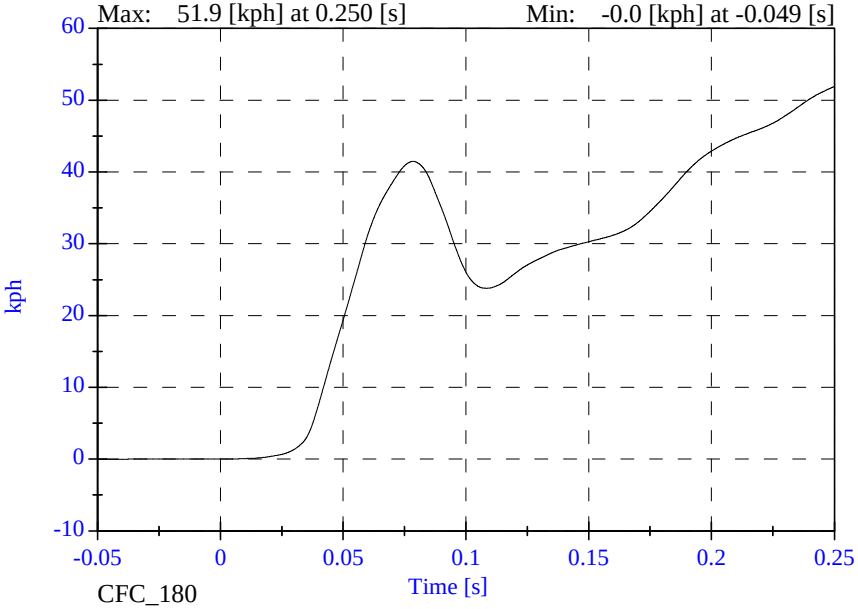
Max: 34.5 [g] at 0.042 [s] Min: -28.0 [g] at 0.094 [s]



CFC_60

P4 Head z Velocity

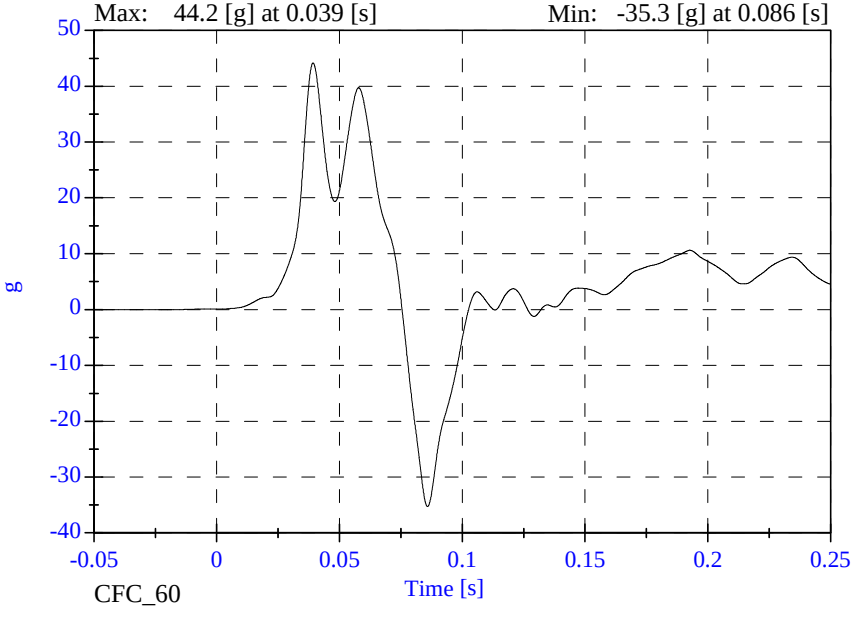
Max: 51.9 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.049 [s]



CFC_180

P4 Head Red z

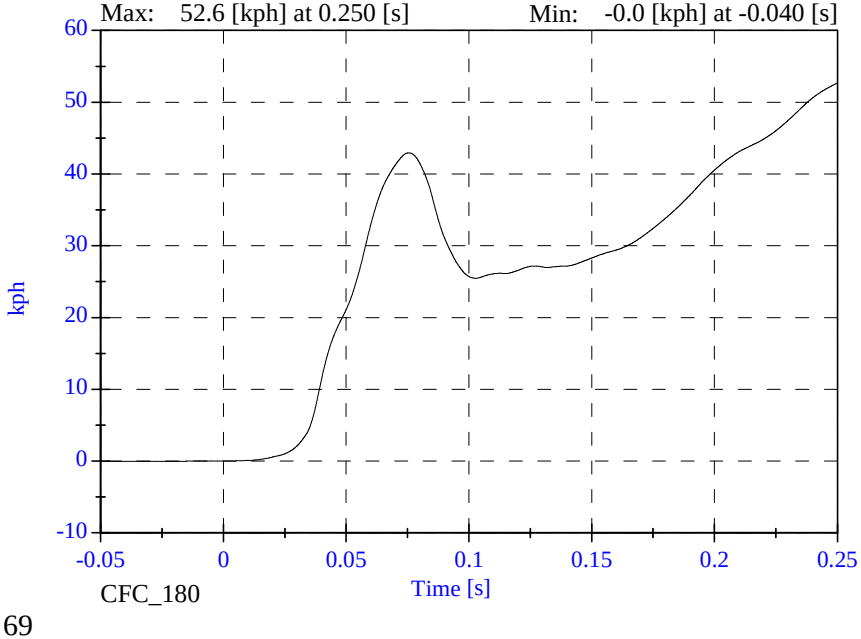
Max: 44.2 [g] at 0.039 [s] Min: -35.3 [g] at 0.086 [s]



CFC_60

P4 Head Red z Velocity

Max: 52.6 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.040 [s]

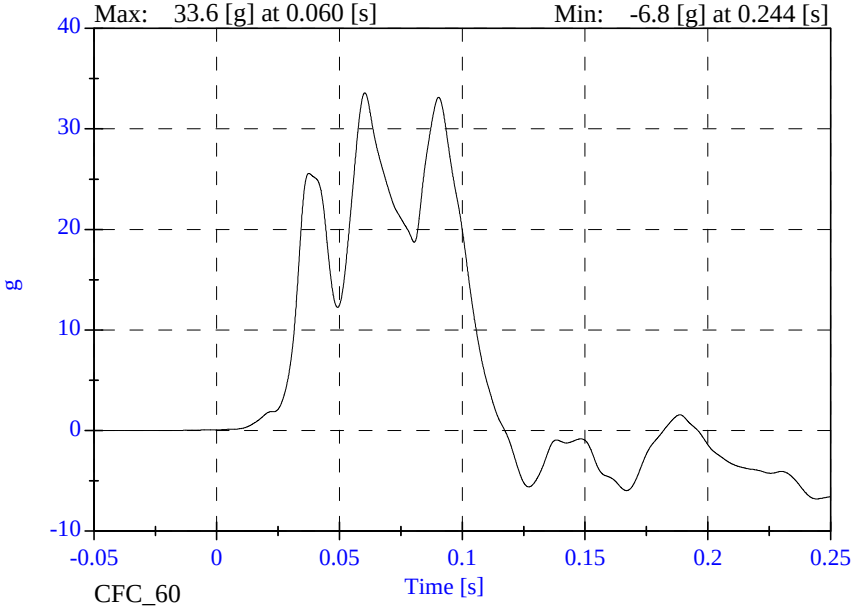


CFC_180

Sled Test Run 22478 - April 30, 2002

P4 Chest x

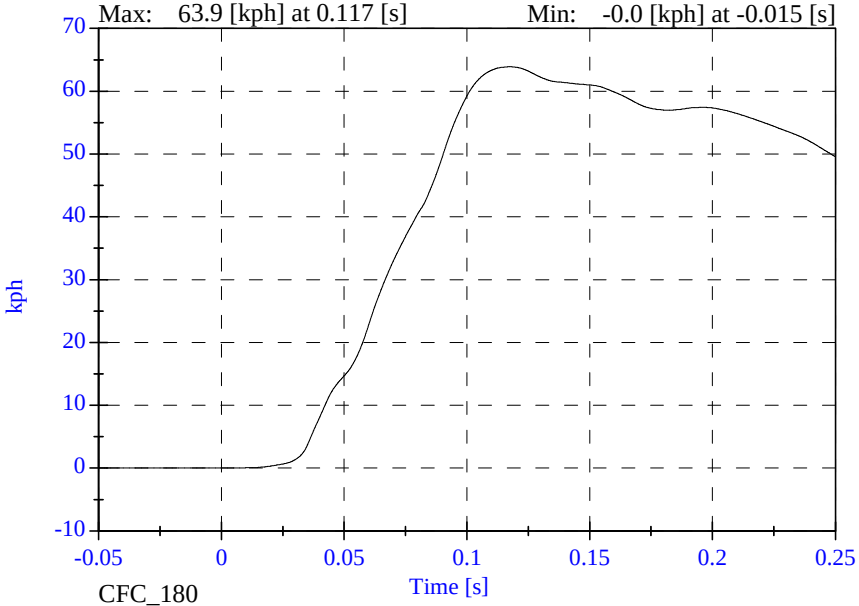
Max: 33.6 [g] at 0.060 [s] Min: -6.8 [g] at 0.244 [s]



CFC_60

P4 Chest x Velocity

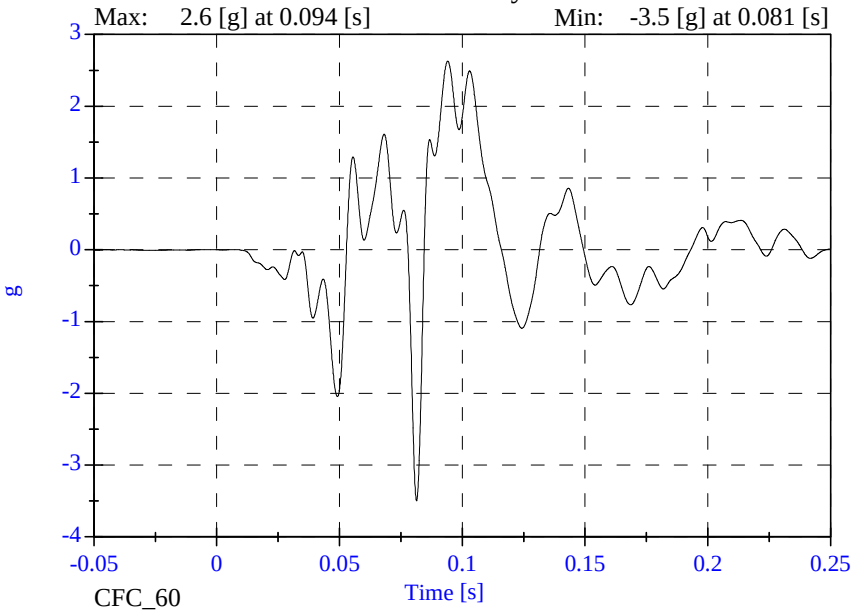
Max: 63.9 [kph] at 0.117 [s] Min: -0.0 [kph] at -0.015 [s]



CFC_180

P4 Chest y

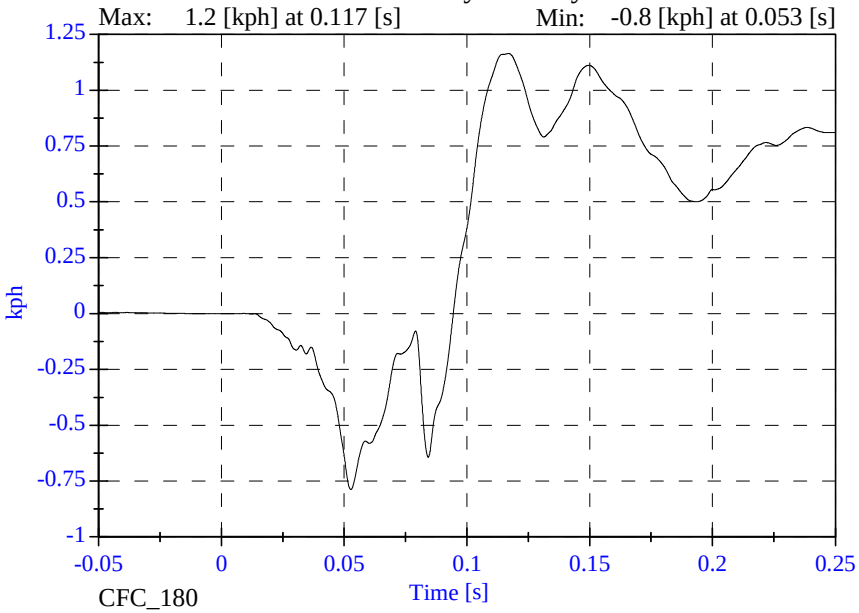
Max: 2.6 [g] at 0.094 [s] Min: -3.5 [g] at 0.081 [s]



CFC_60

P4 Chest y Velocity

Max: 1.2 [kph] at 0.117 [s] Min: -0.8 [kph] at 0.053 [s]

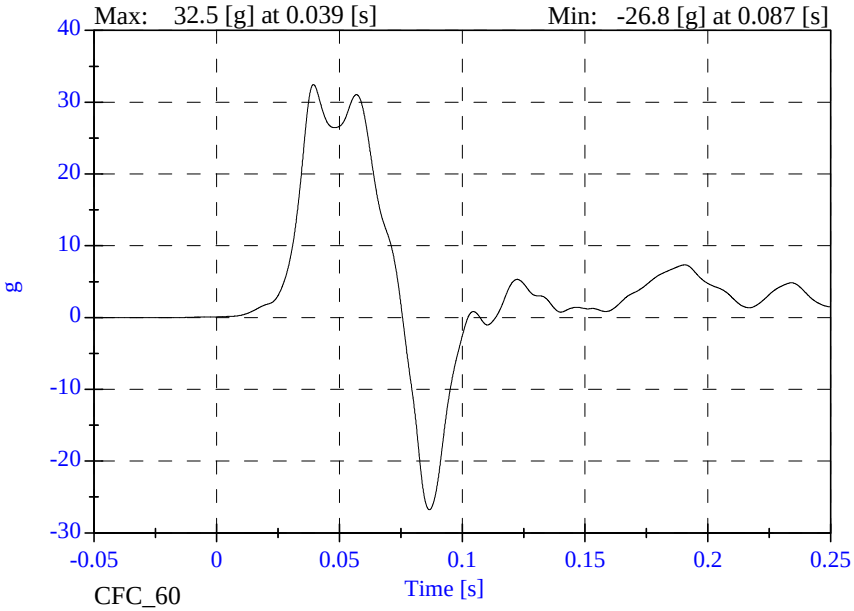


CFC_180

Sled Test Run 22478 - April 30, 2002

P4 Chest z

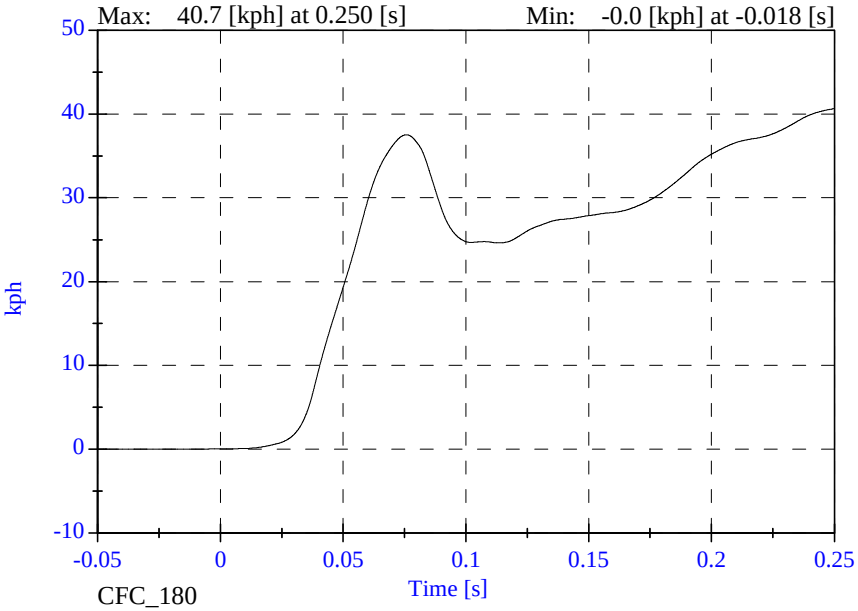
Max: 32.5 [g] at 0.039 [s] Min: -26.8 [g] at 0.087 [s]



CFC_60

P4 Chest z Velocity

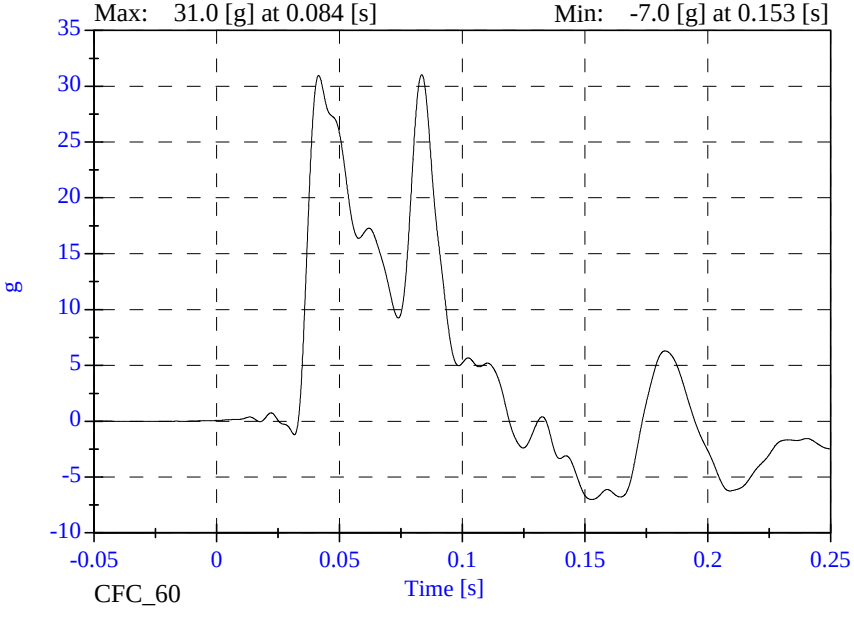
Max: 40.7 [kph] at 0.250 [s] Min: -0.0 [kph] at -0.018 [s]



CFC_180

P4 Pelvic x

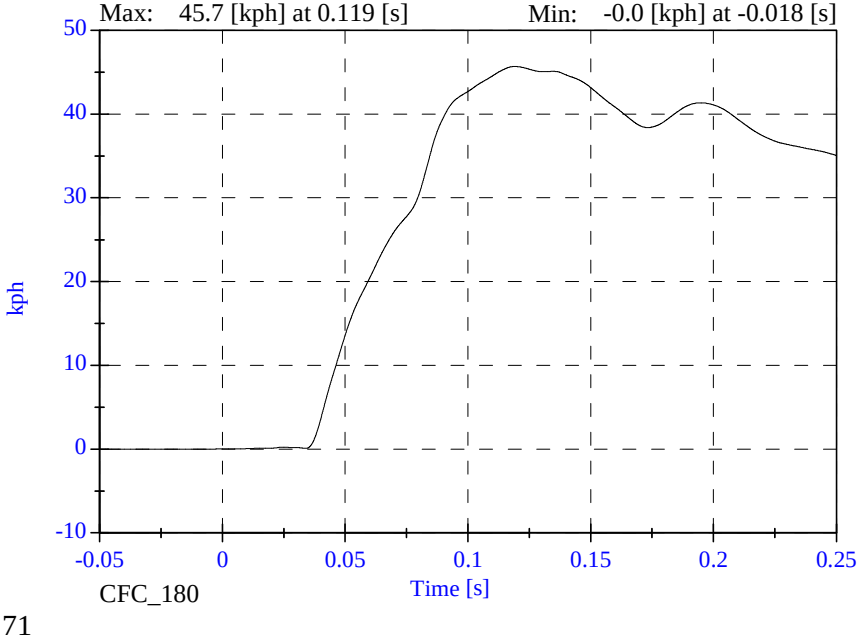
Max: 31.0 [g] at 0.084 [s] Min: -7.0 [g] at 0.153 [s]



CFC_60

P4 Pelvic x Velocity

Max: 45.7 [kph] at 0.119 [s] Min: -0.0 [kph] at -0.018 [s]

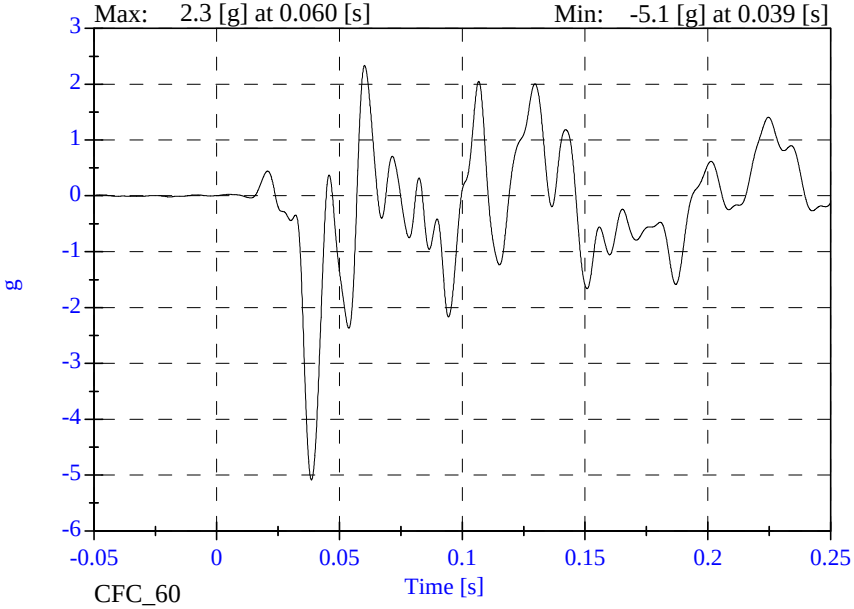


CFC_180

Sled Test Run 22478 - April 30, 2002

P4 Pelvic y

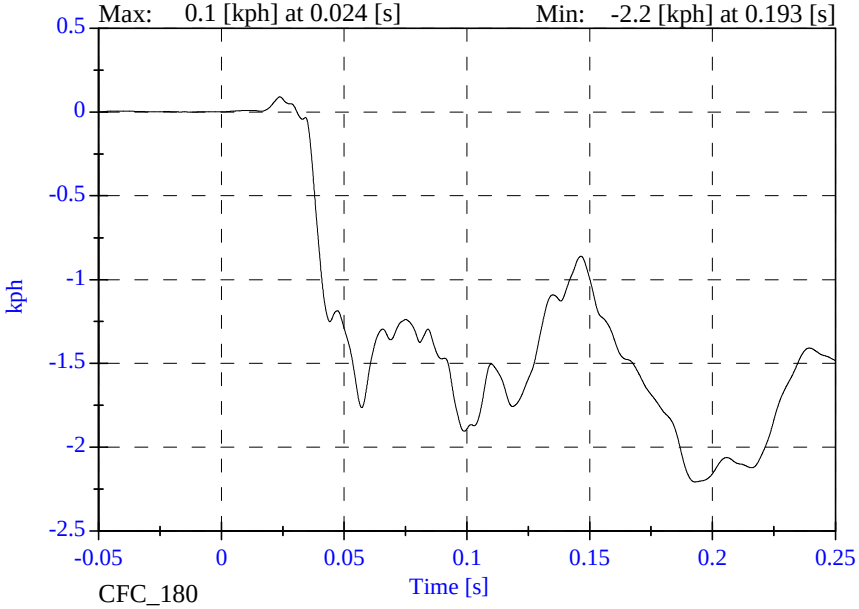
Max: 2.3 [g] at 0.060 [s] Min: -5.1 [g] at 0.039 [s]



CFC_60

P4 Pelvic y Velocity

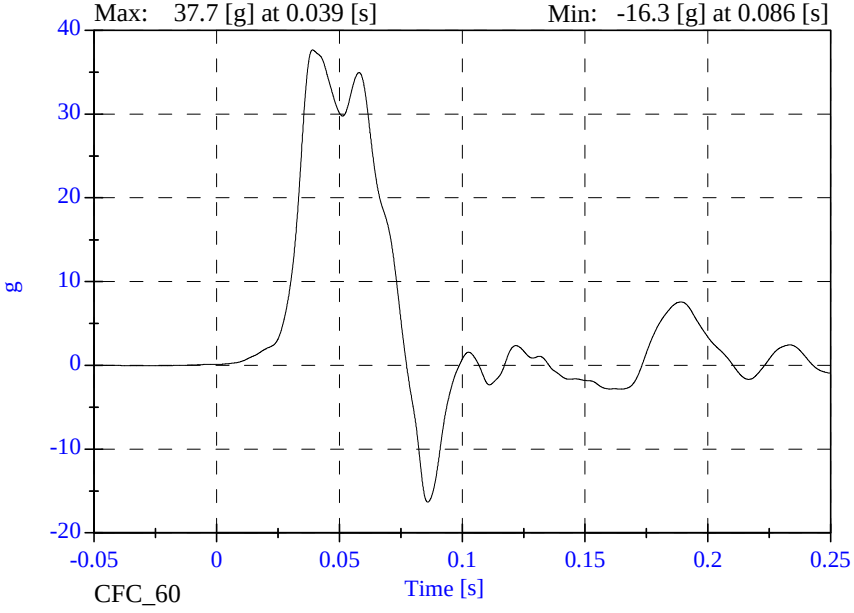
Max: 0.1 [kph] at 0.024 [s] Min: -2.2 [kph] at 0.193 [s]



CFC_180

P4 Pelvic z

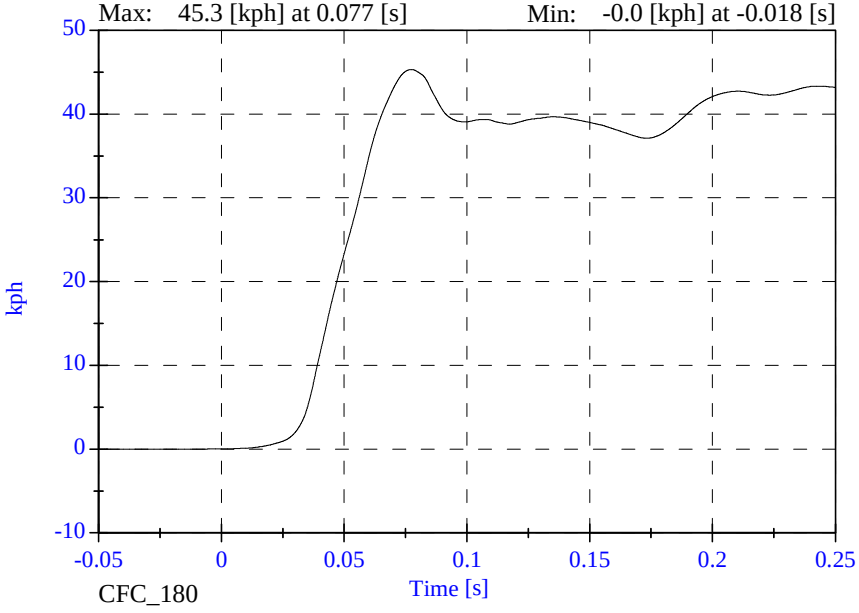
Max: 37.7 [g] at 0.039 [s] Min: -16.3 [g] at 0.086 [s]



CFC_60

P4 Pelvic z Velocity

Max: 45.3 [kph] at 0.077 [s] Min: -0.0 [kph] at -0.018 [s]



CFC_180

SECTION 12

COMPRESSION – DEFLECTION RESISTANCE TEST

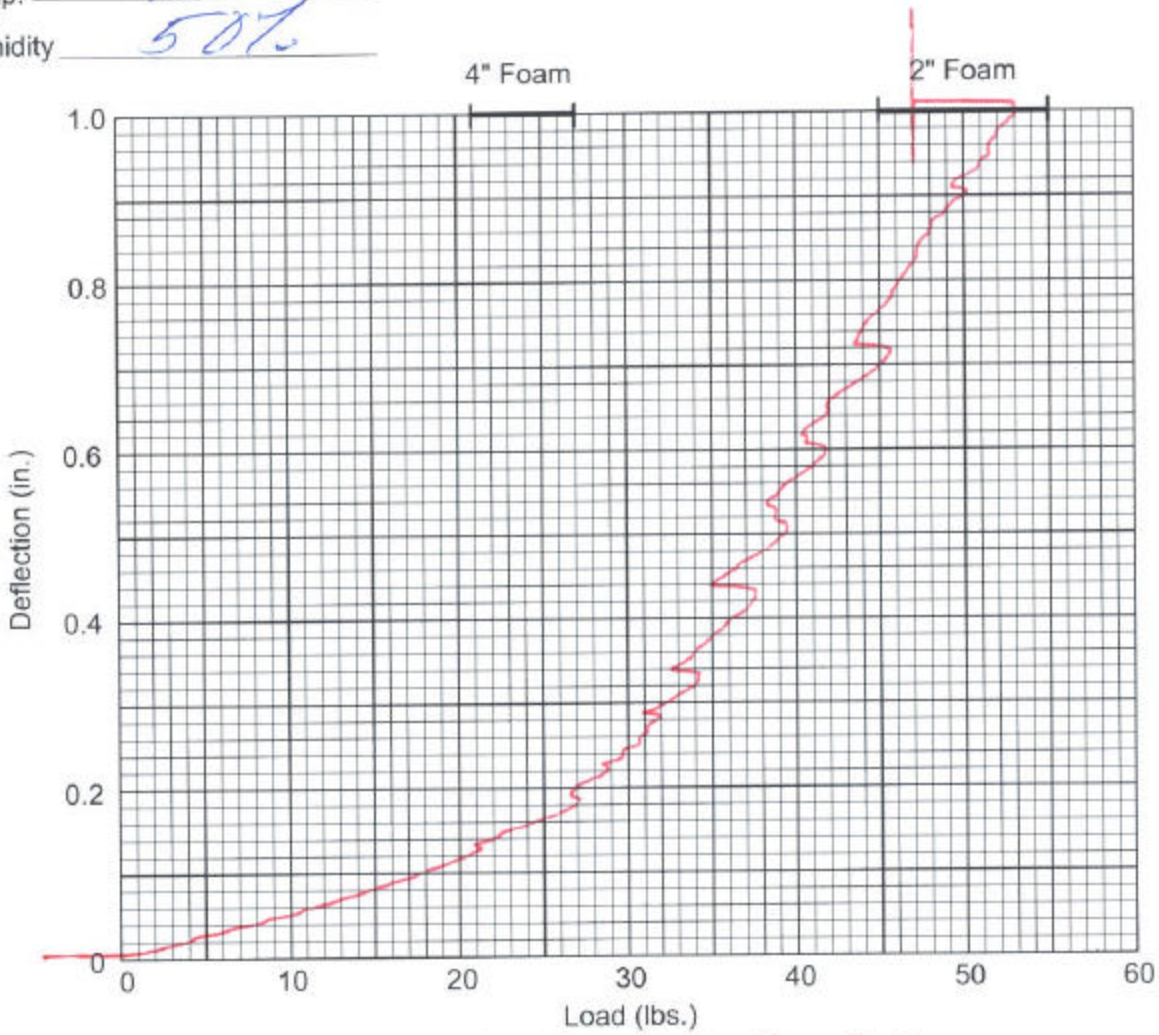
Date 4/30/02

Performed By SD

Temp. 70°

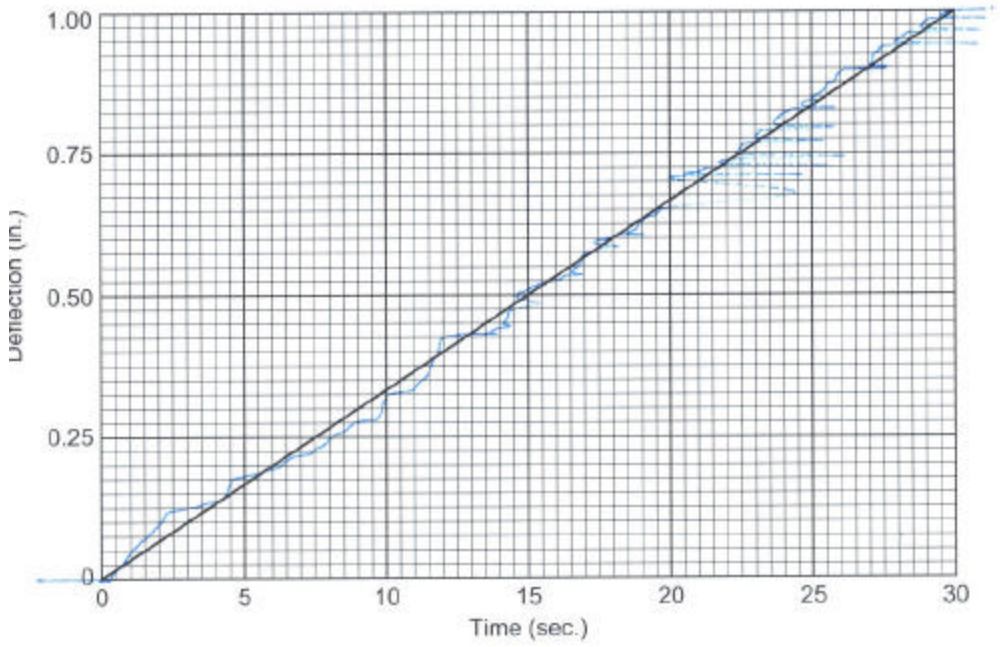
Humidity 50%

Foam No. 2.120 "2"x24"H



Compression - Deflection Resistance Test
Child Seat Foam

Date 4/30/02
Temp 70°
Humidity 50%
Foam No. 2"X20" 2"X24" HR



Compression - Deflection Resistance Test Child Seat Foam

001-R01

PC32

FM-02-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 2" x 20" 2" x 24" #2

Date	Peak Load	Pass/Fail
4/30/02	47 LBS	

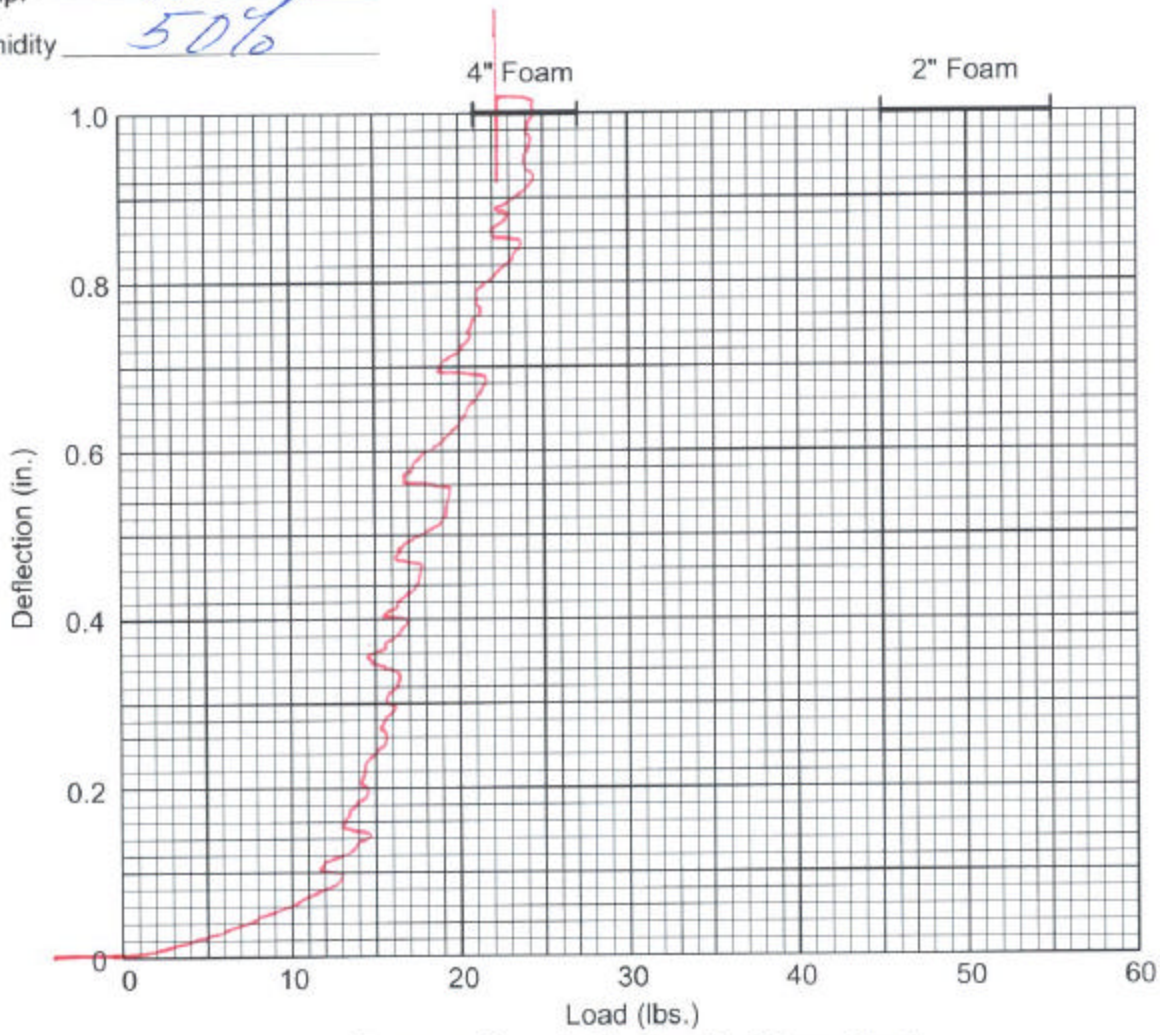
Date 4/30/02

Performed By SD

Temp. 70°

Humidity 50%

Foam No. 4"X20"HZ



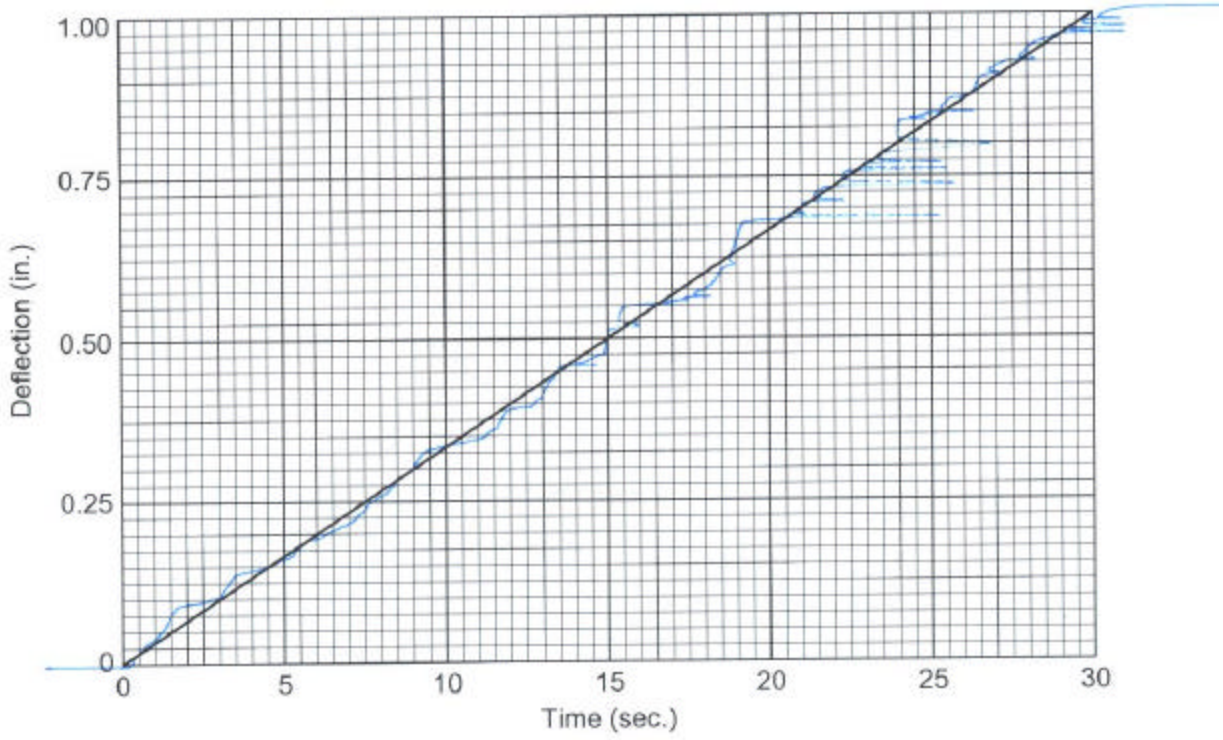
Compression - Deflection Resistance Test
Child Seat Foam

Date 4/3/02

Temp 70°

Humidity 50%

Foam No. 4" X 20' HR



Compression - Deflection Resistance Test Child Seat Foam

IT-001-R01

FM-[illegible]-SFUL-001-R00

SEAT FOAM USAGE LOG

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

Date	Peak Load	Pass/Fail
9/30/02	22.25 LBS	PASS

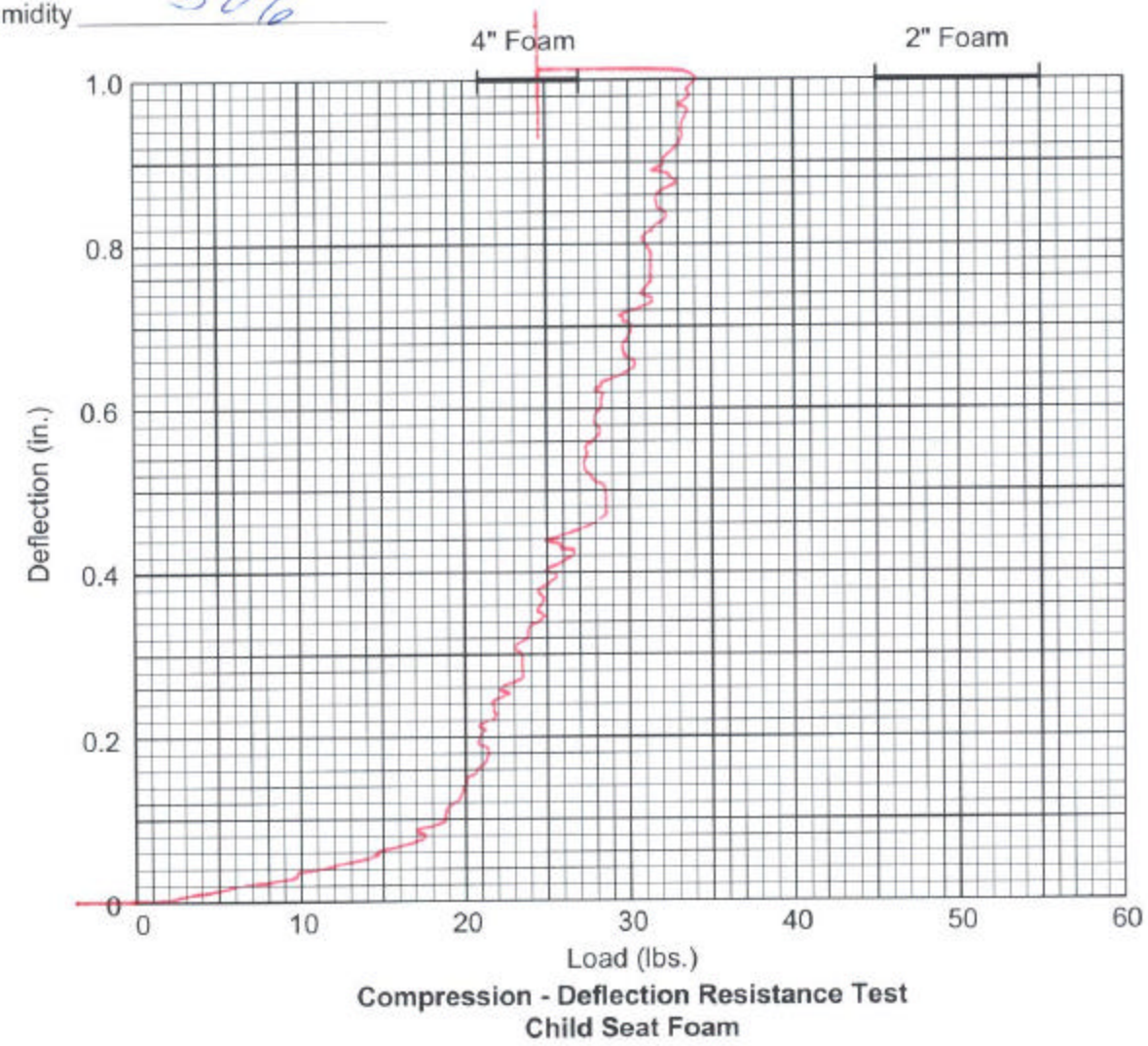
Date 4/30/02

Performed By SD

Temp. 70°

Humidity 50%

Foam No. 4"X24"HZ



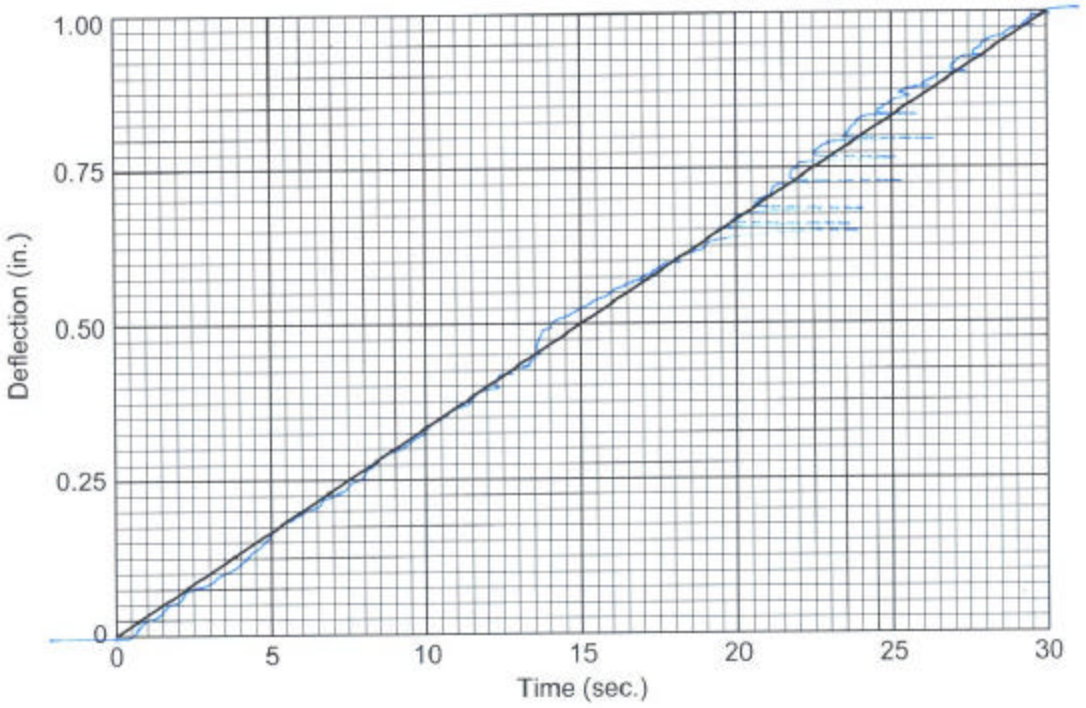
Compression - Deflection Resistance Test
Child Seat Foam

Date 4/30/02

Temp 70°

Humidity 50%

Foam No. 1"X24"H2



Compression - Deflection Resistance Test Child Seat Foam

FM-[illegible]-SFUL-001-R00

SEAT FOAM USAGE LOG

Foam I.D. Number 4"x24"HZ

Date	Peak Load	Pass/Fail
4/30/02	24.7 LBS	

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

Crab: #022

Upper Neck

Calibration Report
Uni-Directional Calibration

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

Calibration No.	C2624000	Date Jan 7, 2002 Due	Jan 7, 2003
Model No.	IF-954	Serial No.	128
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	21.5 / 23.5
Customer	VRTC	Last Calibrated	Jan 7, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	0.0027 mV/V	0.08 % FS	0.14 % FS	-0.9660 mV/V	0.00 % FS
FY	200.0 lbf	0.0002 mV/V	0.06 % FS	0.13 % FS	0.9619 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0384 mV/V	0.02 % FS	0.03 % FS	-0.7631 mV/V	0.00 % FS
MX	500.0 in-lbf	0.0306 mV/V	0.09 % FS	0.63 % FS	-1.3446 mV/V	0.00 % FS
MY	500.0 in-lbf	-0.0214 mV/V	0.17 % FS	0.78 % FS	1.3175 mV/V	0.00 % FS
MZ	300.0 in-lbf	-0.0182 mV/V	0.18 % FS	0.26 % FS	1.4495 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	-153.2 lbf	350.0 Ohms
FY	120.0 K Ohms	154.1 lbf	350.0 Ohms
FZ	300.0 K Ohms	-383.4 lbf	700.0 Ohms
MX	80.0 K Ohms	-412.3 in-lbf	350.0 Ohms
MY	80.0 K Ohms	420.9 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	227.2 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by J. Kovalchuk GS

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/07/02 08:48:33

Creating the Standard in Safety Measurement Since 1974

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	C2624000	This Calibration	08:36:53	Jan 7, 2002
Model Number	IF-954	Calibration Due		Jan 7, 2003
Serial Number	128	Last Calibrated		Jan 7, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.5 / 23.5
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	200.0 lbf	-0.9660	-0.0048300	0.08	0.14	0.00
FY	200.0 lbf	0.9619	0.0048093	0.06	0.13	0.00
FZ	500.0 lbf	-0.7631	-0.0015262	0.02	0.03	0.00
MX	500.0 in-lbf	-1.3446	-0.0026893	0.09	0.63	1.00
MY	500.0 in-lbf	1.3175	0.0026350	0.17	0.78	1.00
MZ	300.0 in-lbf	1.4495	0.0048318	0.18	0.26	1.50

Bridge Unbalance

FX Axis	0.0027 mV/V
FY Axis	0.0002 mV/V
FZ Axis	-0.0384 mV/V
MX Axis	0.0306 mV/V
MY Axis	-0.0214 mV/V
MZ Axis	-0.0182 mV/V

Linearization

Force (	FX	)	=	0.1	+	-207.0	*	Output (mV/V)
Force (	FY	)	=	0.1	+	207.8	*	Output (mV/V)
Force (	FZ	)	=	0.1	+	-655.1	*	Output (mV/V)
Force (	MX	)	=	0.2	+	-371.8	*	Output (mV/V)
Force (	MY	)	=	0.3	+	379.7	*	Output (mV/V)
Force (	MZ	)	=	0.3	+	206.8	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	C2624000	This Calibration	08:36:53	Jan 7, 2002
Model Number	IF-954	Calibration Due		Jan 7, 2003
Serial Number	128	Last Calibrated		Jan 7, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.5 / 23.5
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	-0.9660	0.0046	0.0050	0.0040	-0.0090	-0.0107
FY	200.0 lbf	0.0055	0.9619	0.0025	-0.0167	0.0011	-0.0131
FZ	500.0 lbf	0.0003	0.0011	-0.7631	0.0094	-0.0057	0.0046
MX	500.0 in-lbf	0.0047	0.0087	-0.7561	-1.3446	0.0033	0.0158
MY	500.0 in-lbf	0.0081	0.0008	-0.7649	0.0141	1.3175	0.0125
MZ	300.0 in-lbf	0.0155	0.9678	0.0205	-0.0080	-0.0039	1.4495

% FS Crosstalk *

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	0.00%	0.48%	-0.66%	-0.30%	-0.68%	-0.74%
FY	200.0 lbf	-0.57%	0.00%	-0.33%	1.24%	0.08%	-0.90%
FZ	500.0 lbf	-0.03%	0.11%	0.00%	-0.70%	-0.43%	0.32%
MX	500.0 in-lbf	-0.49%	0.90%	0.91%	0.00%	0.25%	1.09%
MY	500.0 in-lbf	-0.83%	0.08%	0.24%	-1.05%	0.00%	0.86%
MZ	300.0 in-lbf	-1.60%	0.62%	-2.69%	0.59%	-0.30%	0.00%

* Percentage crosstalk for force channels applying moments are corrected for the applied force.

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System
Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	C2624000	This Calibration	08:36:53	Jan 07, 2002
Model Number	IF-954	Calibration Due		Jan 07, 2003
Serial Number	128	Last Calibrated		Jan 07, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		22.3 / 16.4
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	355.95	355.83	Ohms
Channel 2 FY	356.19	356.20	Ohms
Channel 3 FZ	704.22	704.28	Ohms
Channel 4 MX	355.81	355.68	Ohms
Channel 5 MY	356.06	356.04	Ohms
Channel 6 MZ	705.02	705.21	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. C2624000
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 FTSS
Serial Number 128

Model Number IF-954

As Received Condition

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

Received Notes

As Shipped Condition

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

As Shipped Notes

Action Taken

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

Action Notes

Calibration Standards Used[3]

Standard ID	Report No	Due Date
500-02	SNH607172L:99600599	7/24/02

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%	

[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

This report applies only to the item identified herein. This report shall not be reproduced except in full, without the written approval of Robert A. Denton, Inc.

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

Crab: #022

Lower Neck

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	C2622006	Date Jan 5, 2002 Due	Jan 5, 2003
Model No.	IF-954	Serial No.	130
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	22.4 / 22.9
Customer	VRTC	Last Calibrated	Jan 5, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	0.0038 mV/V	0.06 % FS	0.11 % FS	-1.0123 mV/V	0.00 % FS
FY	200.0 lbf	0.0093 mV/V	0.05 % FS	0.15 % FS	1.0204 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0258 mV/V	0.02 % FS	0.05 % FS	-0.7734 mV/V	0.00 % FS
MX	500.0 in-lbf	0.0166 mV/V	0.11 % FS	0.55 % FS	-1.3524 mV/V	0.00 % FS
MY	500.0 in-lbf	-0.0204 mV/V	0.11 % FS	0.41 % FS	1.3478 mV/V	0.00 % FS
MZ	300.0 in-lbf	0.0175 mV/V	0.17 % FS	0.20 % FS	1.4719 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	-146.0 lbf	350.0 Ohms
FY	120.0 K Ohms	145.1 lbf	350.0 Ohms
FZ	300.0 K Ohms	-377.5 lbf	700.0 Ohms
MX	80.0 K Ohms	-408.9 in-lbf	350.0 Ohms
MY	80.0 K Ohms	410.7 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	223.6 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by J. Kovalchuk GS

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/05/02 13:14:32

Page 1 of 1

Creating the Standard in Safety Measurement Since 1974

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	C2622006	This Calibration	13:01:35	Jan 5, 2002
Model Number	IF-954	Calibration Due		Jan 5, 2003
Serial Number	130	Last Calibrated		Jan 5, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.4 / 22.9
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	200.0 lbf	-1.0123	-0.0050613	0.06	0.11	0.00
FY	200.0 lbf	1.0204	0.0051022	0.05	0.15	0.00
FZ	500.0 lbf	-0.7734	-0.0015469	0.02	0.05	0.00
MX	500.0 in-lbf	-1.3524	-0.0027048	0.11	0.55	1.00
MY	500.0 in-lbf	1.3478	0.0026956	0.11	0.41	1.00
MZ	300.0 in-lbf	1.4719	0.0049063	0.17	0.20	1.50

Bridge Unbalance

FX Axis	0.0038 mV/V
FY Axis	0.0093 mV/V
FZ Axis	-0.0258 mV/V
MX Axis	0.0166 mV/V
MY Axis	-0.0204 mV/V
MZ Axis	0.0175 mV/V

Linearization

Force (	FX	)	=	0.1	+	-197.5	*	Output (mV/V)
Force (	FY	)	=	0.1	+	196.0	*	Output (mV/V)
Force (	FZ	)	=	0.0	+	-646.4	*	Output (mV/V)
Force (	MX	)	=	0.3	+	-369.6	*	Output (mV/V)
Force (	MY	)	=	0.3	+	370.9	*	Output (mV/V)
Force (	MZ	)	=	0.2	+	203.6	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	C2622006	This Calibration	13:01:35	Jan 5, 2002
Model Number	IF-954	Calibration Due		Jan 5, 2003
Serial Number	130	Last Calibrated		Jan 5, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.4 / 22.9
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	-1.0123	0.0052	0.0017	-0.0045	-0.0036	-0.0148
FY	200.0 lbf	0.0063	1.0204	0.0013	-0.0056	0.0003	-0.0066
FZ	500.0 lbf	0.0005	0.0002	-0.7734	0.0173	-0.0083	-0.0103
MX	500.0 in-lbf	0.0019	0.0084	-0.7668	-1.3524	-0.0069	-0.0204
MY	500.0 in-lbf	0.0087	0.0052	-0.7656	0.0064	1.3478	0.0062
MZ	300.0 in-lbf	0.0180	1.0321	0.0112	-0.0046	-0.0101	1.4719

% FS Crosstalk *

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	0.00%	0.51%	-0.22%	0.34%	-0.27%	-1.01%
FY	200.0 lbf	-0.62%	0.00%	-0.16%	0.41%	0.02%	-0.45%
FZ	500.0 lbf	-0.05%	0.02%	0.00%	-1.28%	-0.61%	-0.70%
MX	500.0 in-lbf	-0.19%	0.82%	0.86%	0.00%	-0.52%	-1.38%
MY	500.0 in-lbf	-0.86%	0.51%	1.01%	-0.47%	0.00%	0.42%
MZ	300.0 in-lbf	-1.78%	1.15%	-1.45%	0.34%	-0.75%	0.00%

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System

Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	C2622006	This Calibration	13:01:35	Jan 05, 2002
Model Number	IF-954	Calibration Due		Jan 05, 2003
Serial Number	130	Last Calibrated		Jan 05, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		23.1 / 16.9
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	355.69	355.54	Ohms
Channel 2 FY	355.86	355.83	Ohms
Channel 3 FZ	703.89	703.95	Ohms
Channel 4 MX	355.64	355.63	Ohms
Channel 5 MY	355.79	355.65	Ohms
Channel 6 MZ	704.91	705.08	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. C2622006
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 FTSS
Serial Number 130
Model Number IF-954

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

As Shipped Notes

Action Notes

Calibration Standards Used[3]

Standard ID	Report No	Due Date
500-02	SNH607172L:99600599	7/24/02

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%	

[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

This report applies only to the item identified herein. This report shall not be reproduced except in full, without the written approval of Robert A. Denton, Inc.

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

Crabi #022

Lumbar

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	C2622007	Date Jan 5, 2002 Due	Jan 5, 2003
Model No.	IF-954	Serial No.	140
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	22.5 / 23.6
Customer	VRTC	Last Calibrated	Jan 5, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	-0.0142 mV/V	0.04 % FS	0.11 % FS	-0.9791 mV/V	0.00 % FS
FY	200.0 lbf	-0.0071 mV/V	0.05 % FS	0.12 % FS	0.9768 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0289 mV/V	0.05 % FS	0.02 % FS	-0.7693 mV/V	0.00 % FS
MX	500.0 in-lbf	0.0096 mV/V	0.07 % FS	0.66 % FS	-1.3571 mV/V	0.00 % FS
MY	500.0 in-lbf	-0.0092 mV/V	0.06 % FS	0.53 % FS	1.3462 mV/V	0.00 % FS
MZ	300.0 in-lbf	0.0077 mV/V	0.15 % FS	0.21 % FS	1.4779 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	-151.1 lbf	350.0 Ohms
FY	120.0 K Ohms	151.7 lbf	350.0 Ohms
FZ	300.0 K Ohms	-380.2 lbf	700.0 Ohms
MX	80.0 K Ohms	-408.5 in-lbf	350.0 Ohms
MY	80.0 K Ohms	411.7 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	223.0 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by J. Kovalchuk GS

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/05/02 13:35:09

Page 1 of 1

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	C2622007	This Calibration	13:23:28	Jan 5, 2002
Model Number	IF-954	Calibration Due		Jan 5, 2003
Serial Number	140	Last Calibrated		Jan 5, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.5 / 23.6
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	200.0 lbf	-0.9791	-0.0048954	0.04	0.11	0.00
FY	200.0 lbf	0.9768	0.0048840	0.05	0.12	0.00
FZ	500.0 lbf	-0.7693	-0.0015387	0.05	0.02	0.00
MX	500.0 in-lbf	-1.3571	-0.0027143	0.07	0.66	1.00
MY	500.0 in-lbf	1.3462	0.0026924	0.06	0.53	1.00
MZ	300.0 in-lbf	1.4779	0.0049262	0.15	0.21	1.50

Bridge Unbalance

FX Axis	-0.0142 mV/V
FY Axis	-0.0071 mV/V
FZ Axis	-0.0289 mV/V
MX Axis	0.0096 mV/V
MY Axis	-0.0092 mV/V
MZ Axis	0.0077 mV/V

Linearization

Force (	FX	)	=	0.0	+	-204.3	*	Output (mV/V)
Force (	FY	)	=	0.0	+	204.7	*	Output (mV/V)
Force (	FZ	)	=	0.1	+	-649.7	*	Output (mV/V)
Force (	MX	)	=	-0.2	+	-368.5	*	Output (mV/V)
Force (	MY	)	=	0.0	+	371.3	*	Output (mV/V)
Force (	MZ	)	=	0.2	+	202.9	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	C2622007	This Calibration	13:23:28	Jan 5, 2002
Model Number	IF-954	Calibration Due		Jan 5, 2003
Serial Number	140	Last Calibrated		Jan 5, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.5 / 23.6
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	-0.9791	0.0038	-0.0014	0.0064	0.0073	-0.0068
FY	200.0 lbf	0.0011	0.9768	0.0011	0.0024	0.0001	-0.0058
FZ	500.0 lbf	0.0035	-0.0033	-0.7693	0.0086	0.0019	0.0016
MX	500.0 in-lbf	0.0030	-0.0057	-0.7682	-1.3571	0.0054	0.0079
MY	500.0 in-lbf	0.0019	0.0003	-0.7660	0.0162	1.3462	0.0047
MZ	300.0 in-lbf	-0.0036	0.9923	-0.0011	0.0064	0.0069	1.4779

% FS Crosstalk *

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	0.00%	0.39%	0.18%	-0.47%	0.54%	-0.46%
FY	200.0 lbf	-0.11%	0.00%	-0.14%	-0.18%	0.01%	-0.39%
FZ	500.0 lbf	-0.35%	-0.34%	0.00%	-0.64%	0.14%	0.11%
MX	500.0 in-lbf	-0.31%	-0.58%	0.15%	0.00%	0.40%	0.53%
MY	500.0 in-lbf	-0.19%	0.03%	0.43%	-1.19%	0.00%	0.32%
MZ	300.0 in-lbf	0.37%	1.59%	0.14%	-0.47%	0.51%	0.00%

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System

Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	C2622007	This Calibration	13:23:28	Jan 05, 2002
Model Number	IF-954	Calibration Due		Jan 05, 2003
Serial Number	140	Last Calibrated		Jan 05, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		21.6 / 19
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	356.27	356.35	Ohms
Channel 2 FY	356.31	356.27	Ohms
Channel 3 FZ	703.89	704.07	Ohms
Channel 4 MX	356.08	355.88	Ohms
Channel 5 MY	356.12	356.07	Ohms
Channel 6 MZ	705.59	705.68	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. C2622007
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 FTSS
Serial Number 140
Model Number IF-954

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

As Shipped Notes

Action Notes

Calibration Standards Used[3]

Standard ID	Report No	Due Date
500-02	SNH607172L:99600599	7/24/02

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%	

[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

This report applies only to the item identified herein. This report shall not be reproduced except in full, without the written approval of Robert A. Denton, Inc.

Crash #022
Head X - Fwd

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5945

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P16336

Input Resistance (ohms): 560
Output Resistance (ohms): 564.56
ZMO (mV): 12.466
Resonance Frequency (Hz): 27538

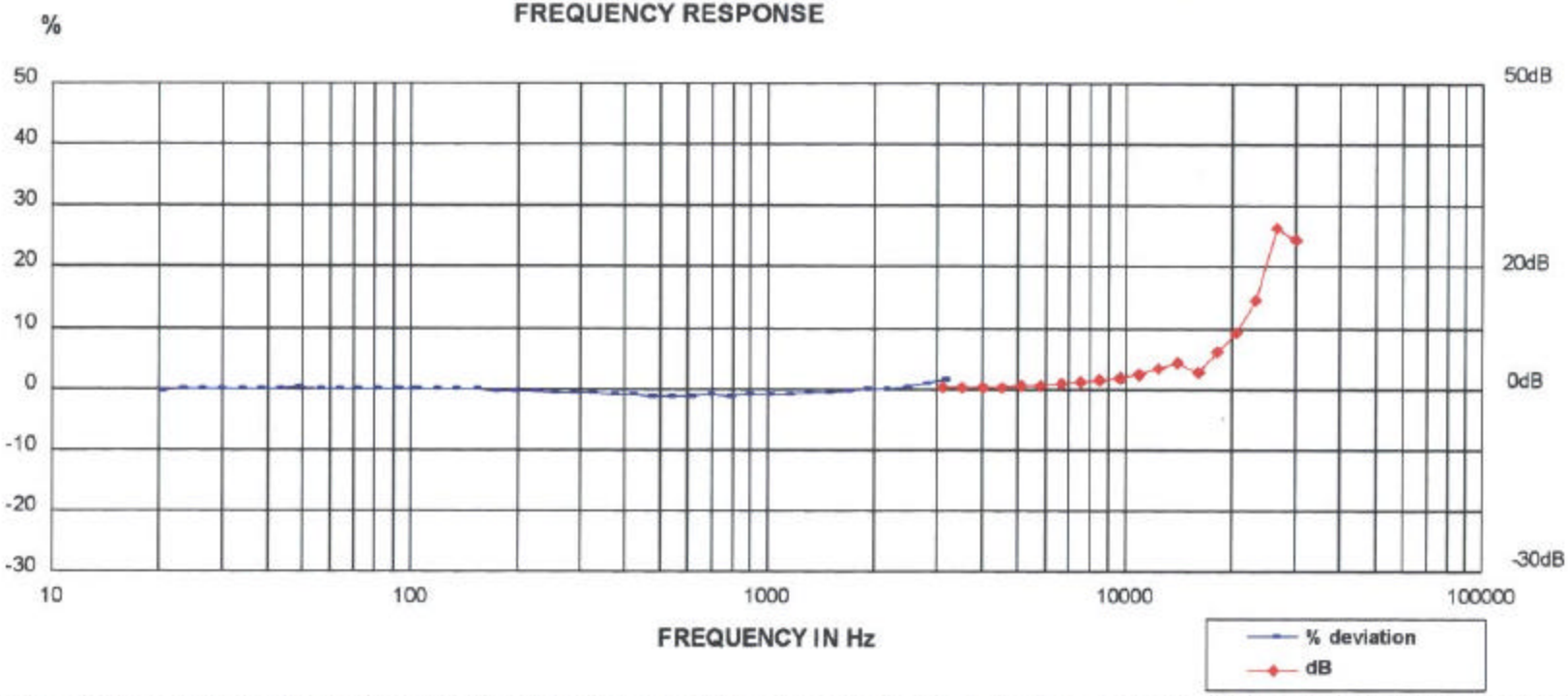
0.1396 mV/g @ 100 Hz, 10g pk

Last Sens: 1.374E-1, Change: 1.61
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crab: #022

Head Y - Left

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5954

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P14936

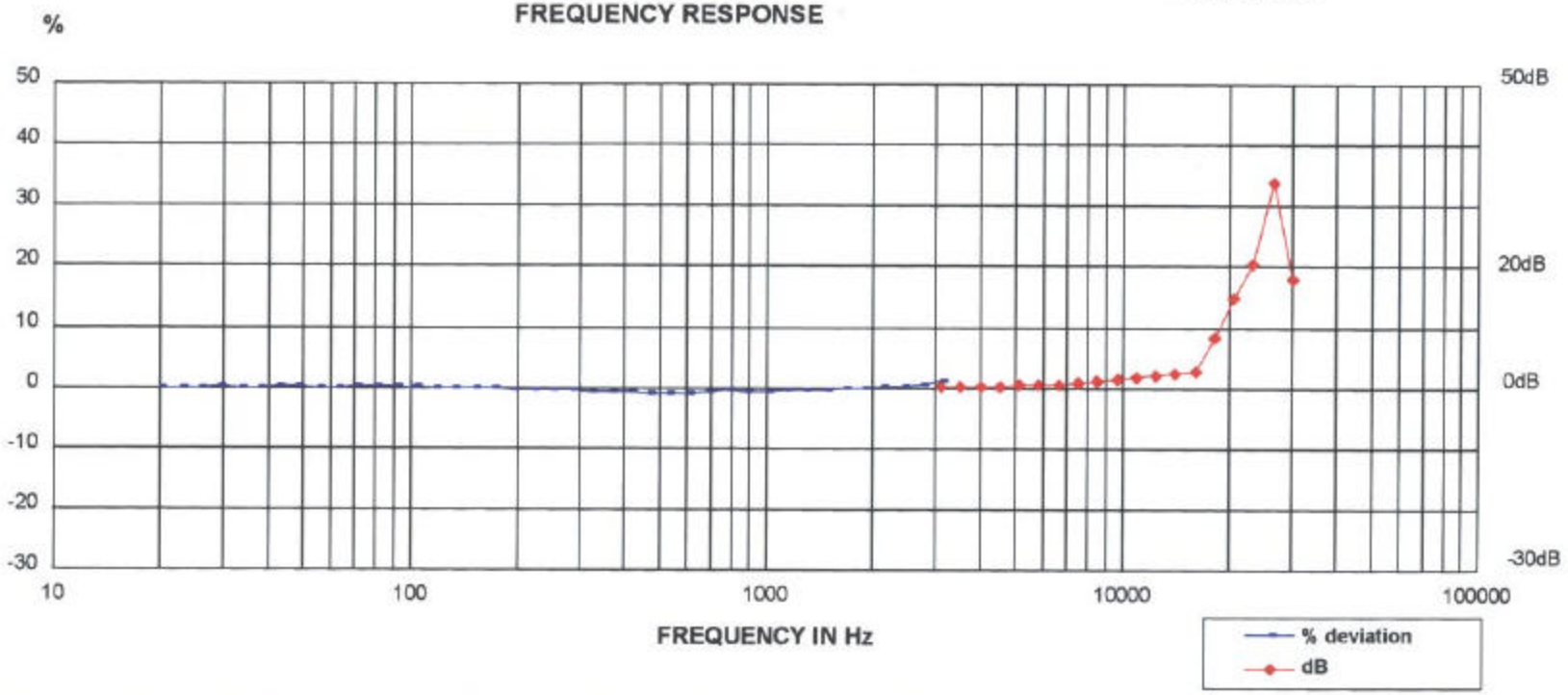
Input Resistance (ohms): 549.34
Output Resistance (ohms): 543.73
ZMO (mV): -15.66
Resonance Frequency (Hz): 24859

0.1424 mV/g @ 100 Hz, 10g pk

Last Sens: 1.403E-1, Change: 1.55
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crabi #022
Head Z - Down

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5944

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P17837

Input Resistance (ohms): 495.69
Output Resistance (ohms): 495.52
ZMO (mV): -2.451
Resonance Frequency (Hz): 25288

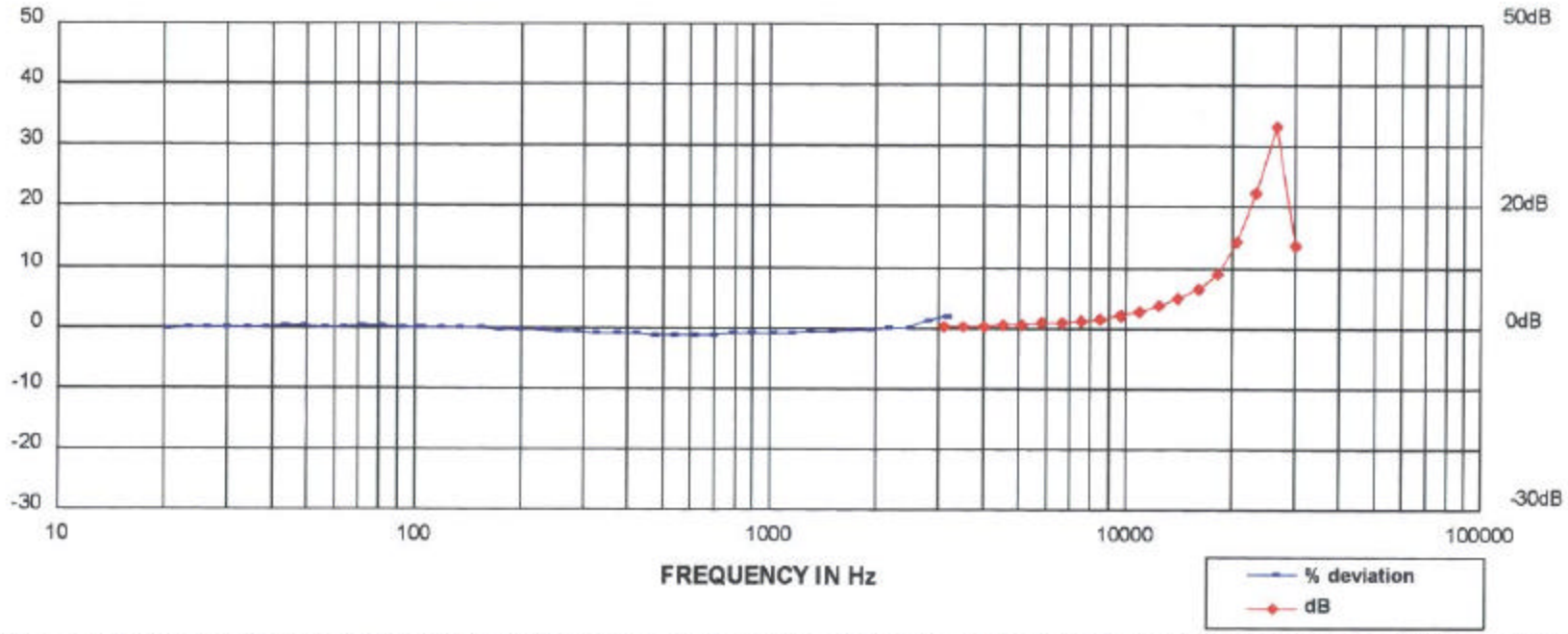
0.1405 mV/g @ 100 Hz, 10g pk

Last Sens: 1.382E-1, Change: 1.66
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crab: #022

Head Rod 2-uD

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5956

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P14914

Input Resistance (ohms): 647.93
Output Resistance (ohms): 704.58
ZMO (mV): -21.79
Resonance Frequency (Hz): 28129

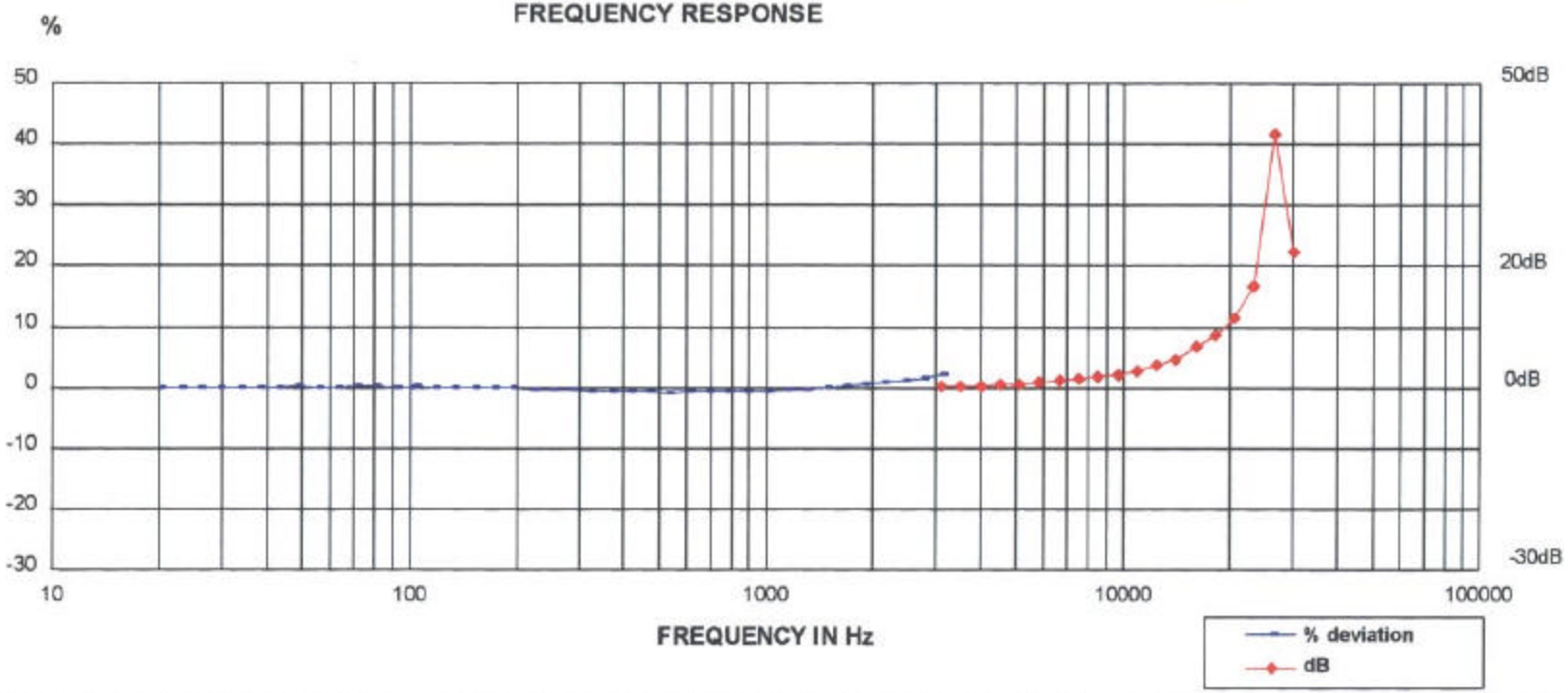
0.2565 mV/g @ 100 Hz, 10g pk

Last Sens: 2.530E-1, Change: 1.40
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crabi #022
Chest X - Fwd

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5963

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BQE0-2000BF
Serial Number: 99108-F26

Input Resistance (ohms): 1058

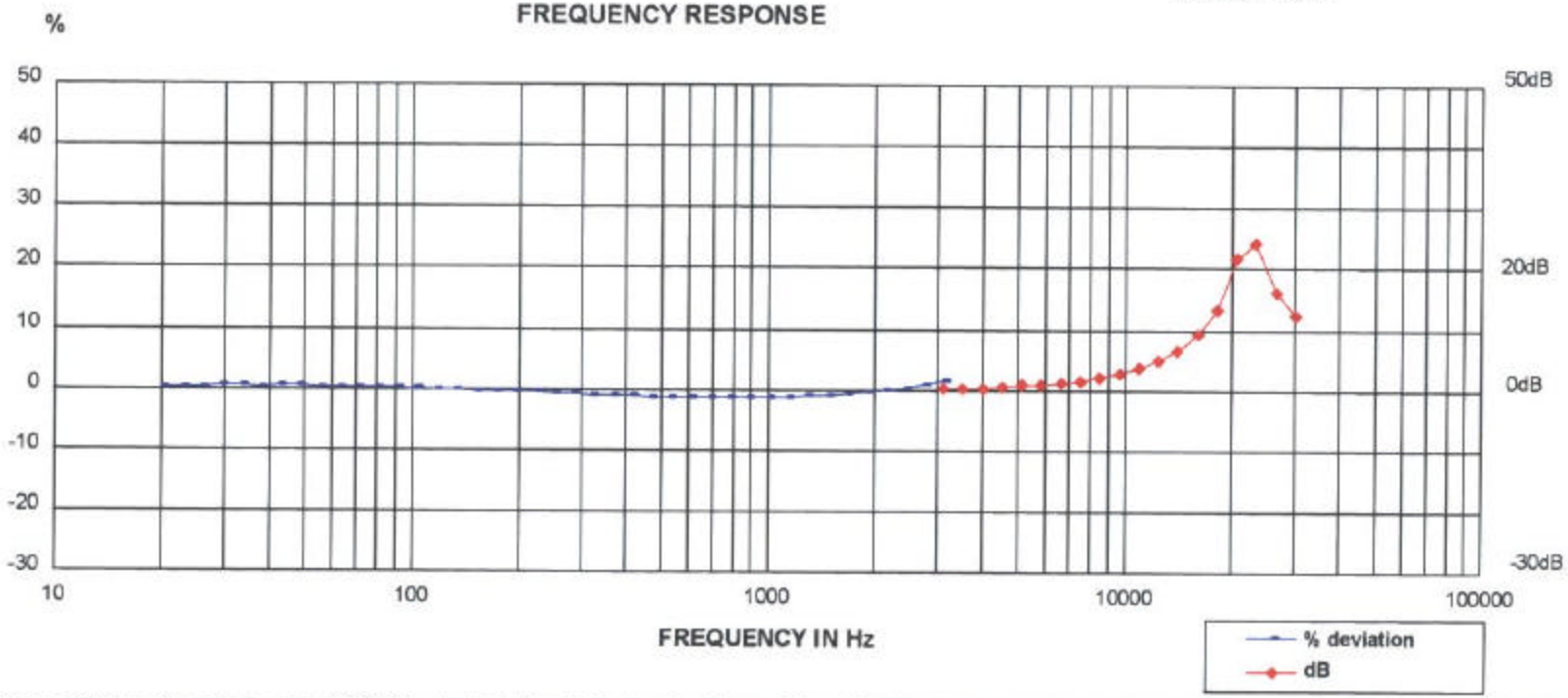
ZMO (mV): 6.5106
Resonance Frequency (Hz): 21987

0.2386 mV/g @ 100 Hz, 10g pk

Last Sens: 2.365E-1, Change: 0.92
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

rab: #022

~~Chest~~ Chest Y - Right

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5926

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99102-F09

Input Resistance (ohms): 955.72

ZMO (mV): -6.362
Resonance Frequency (Hz): 22338

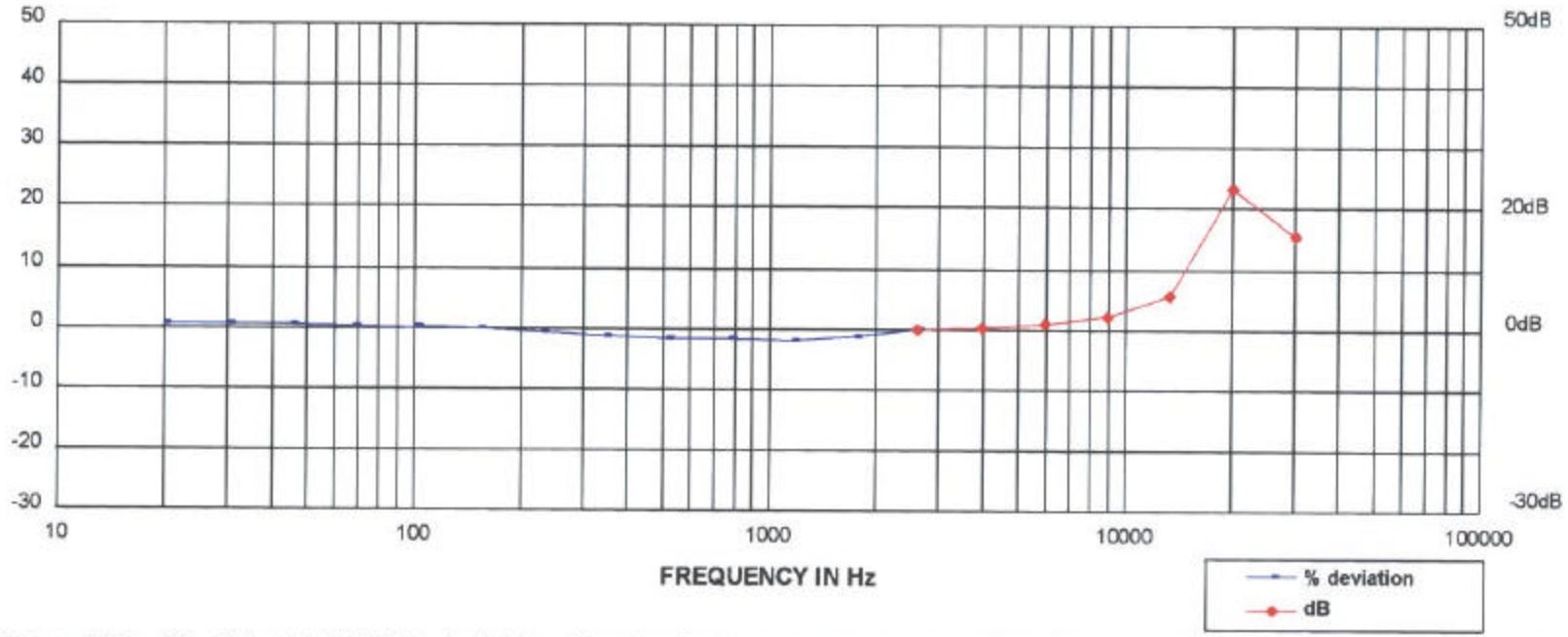
0.1998 mV/g @ 100 Hz, 10g pk

Last Sens: 1.994E-1, Change: 0.17
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 IM66357. 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

This certificate shall not be reproduced, except in full, without the written approval of Endevco

rabi #022
Chest z-axis

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5925

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99H30-Z08

Input Resistance (ohms): 936.16

ZMO (mV): -15.25
Resonance Frequency (Hz): 17348

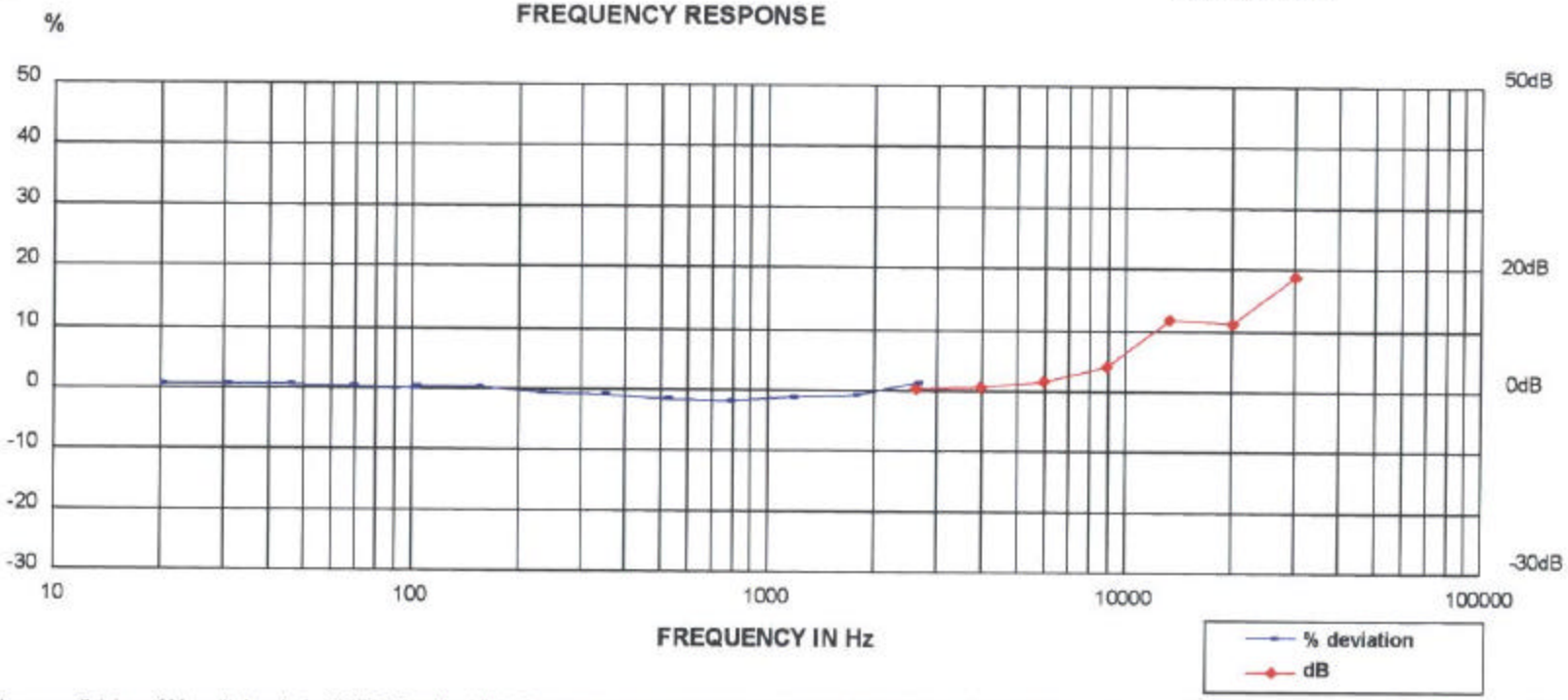
0.1876 mV/g @ 100 Hz, 10g pk

Last Sens: 1.867E-1, Change: 0.50
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

This certificate shall not be reproduced, except in full, without the written approval of Endevco

Crabi #022

Pelvis X - Rear

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5935

Description: VRTC - Full Bridge Accelemeter
Manufacturer: ENTRAN
Model Number: EGE-73BQ-2000BF
Serial Number: 01G19-F01

Input Resistance (ohms): 482.42
Output Resistance (ohms): 483.2
ZMO (mV): 5.6894
Resonance Frequency (Hz): 28240

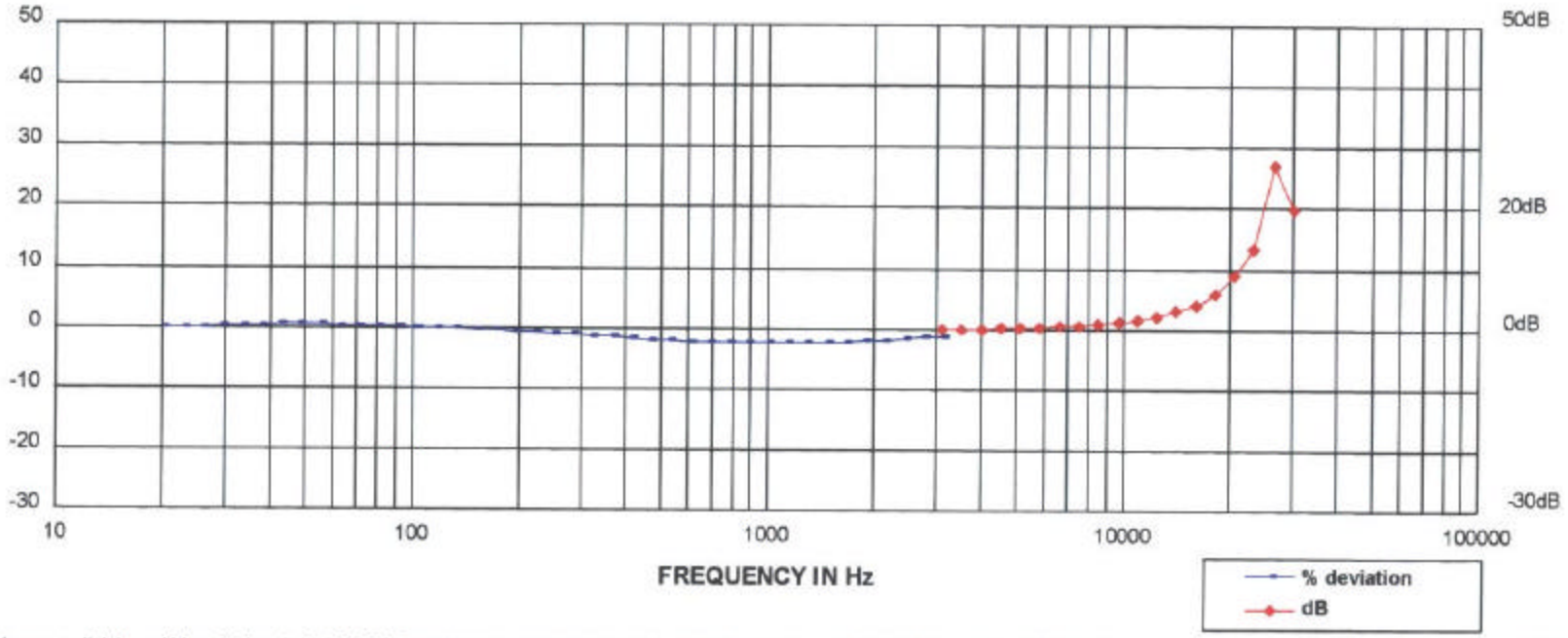
0.1995 mV/g @ 100 Hz, 10g pk

Last Sens: 1.993E-1, Change: 0.1
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).

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

This certificate shall not be reproduced, except in full, without the written approval of Endevco

Crab: #022

Pelvis Y - Left

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5928

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99H30-Z05

Input Resistance (ohms): 963.7

ZMO (mV): 2.5145
Resonance Frequency (Hz): 25087

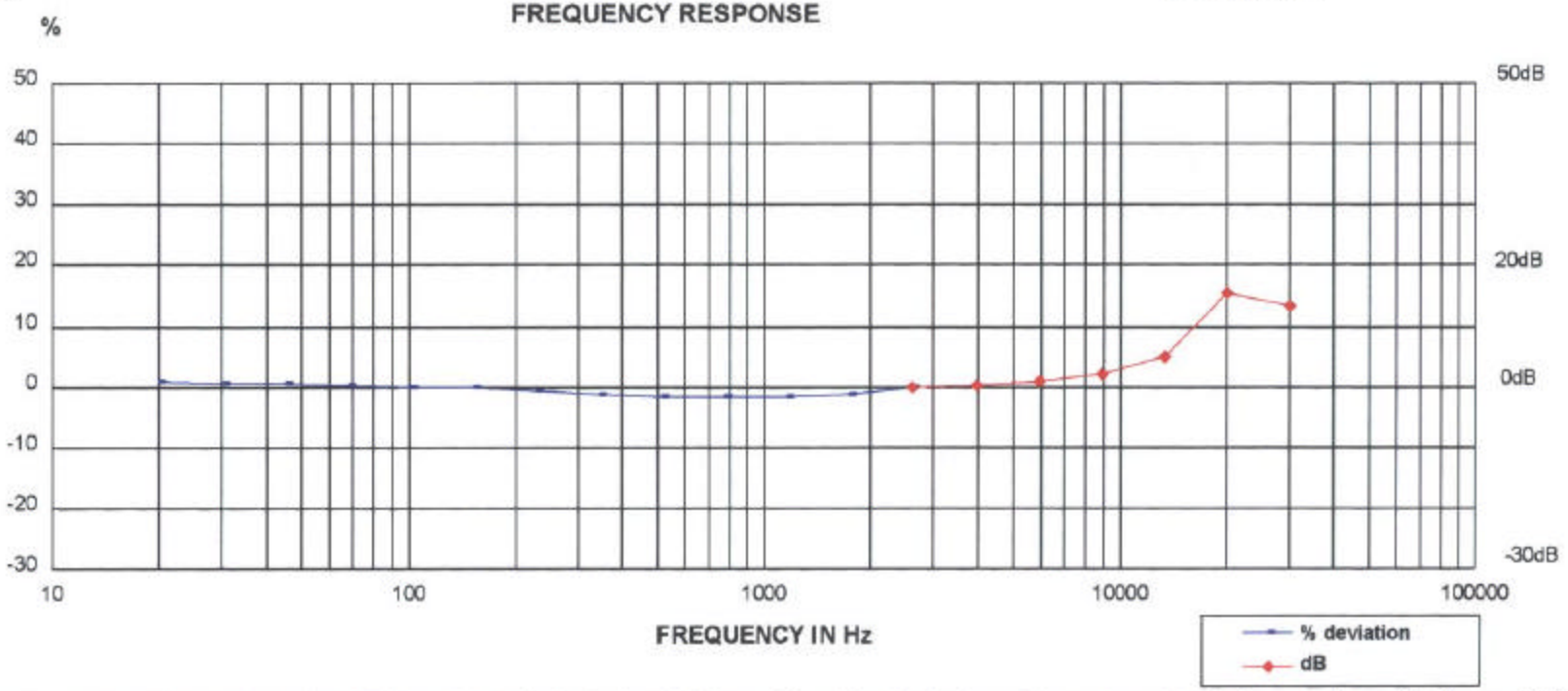
0.1916 mV/g @ 100 Hz, 10g pk

Last Sens: 1.914E-1, Change: 0.09
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

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Irabi #022

Delvis Z-uP

Calibration Certificate

Customer: VRTC
20010620-0270

Document number: 5931

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BE0Q-2000BF
Serial Number: 99H30-Z03

Input Resistance (ohms): 983.01

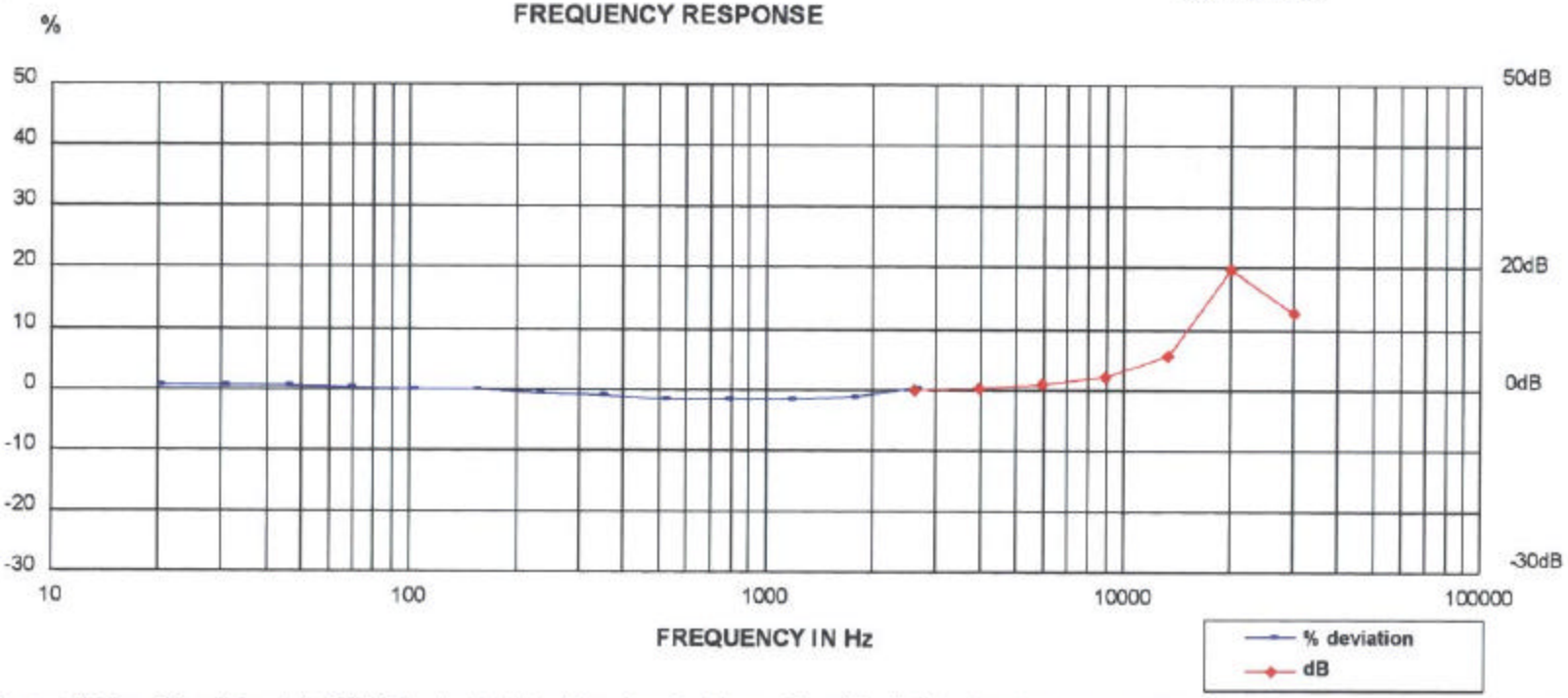
ZMO (mV): -12.97
Resonance Frequency (Hz): 25550

0.1974 mV/g @ 100 Hz, 10g pk

Last Sens: 1.972E-1, Change: 0.09
Next cal date: 7/9/2002

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: 1/9/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

TRANSPORTATION RESEARCH CENTER INC.

FRONTAL HEAD DROP TEST

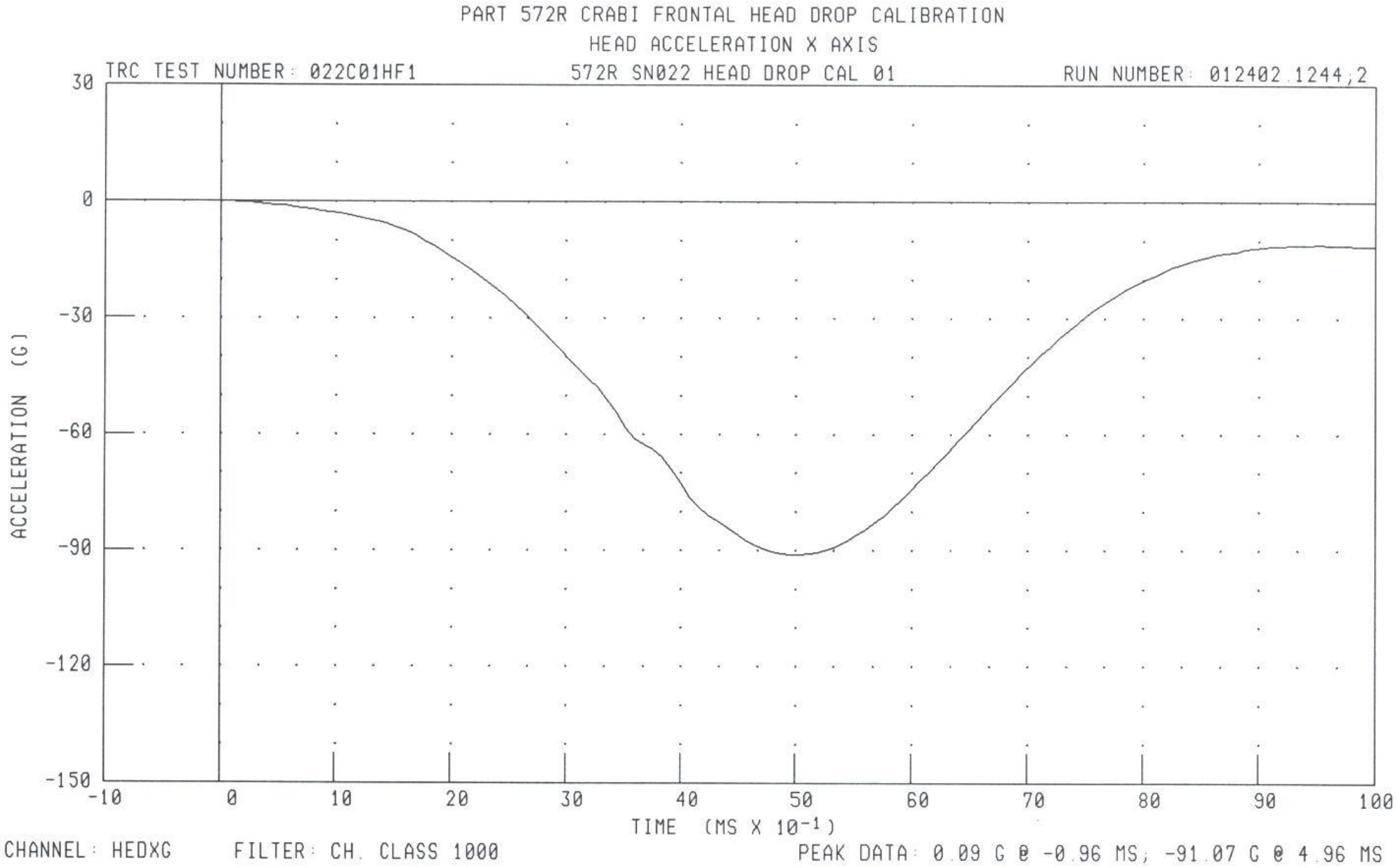
CRABI 12-MONTH 24-JAN-02

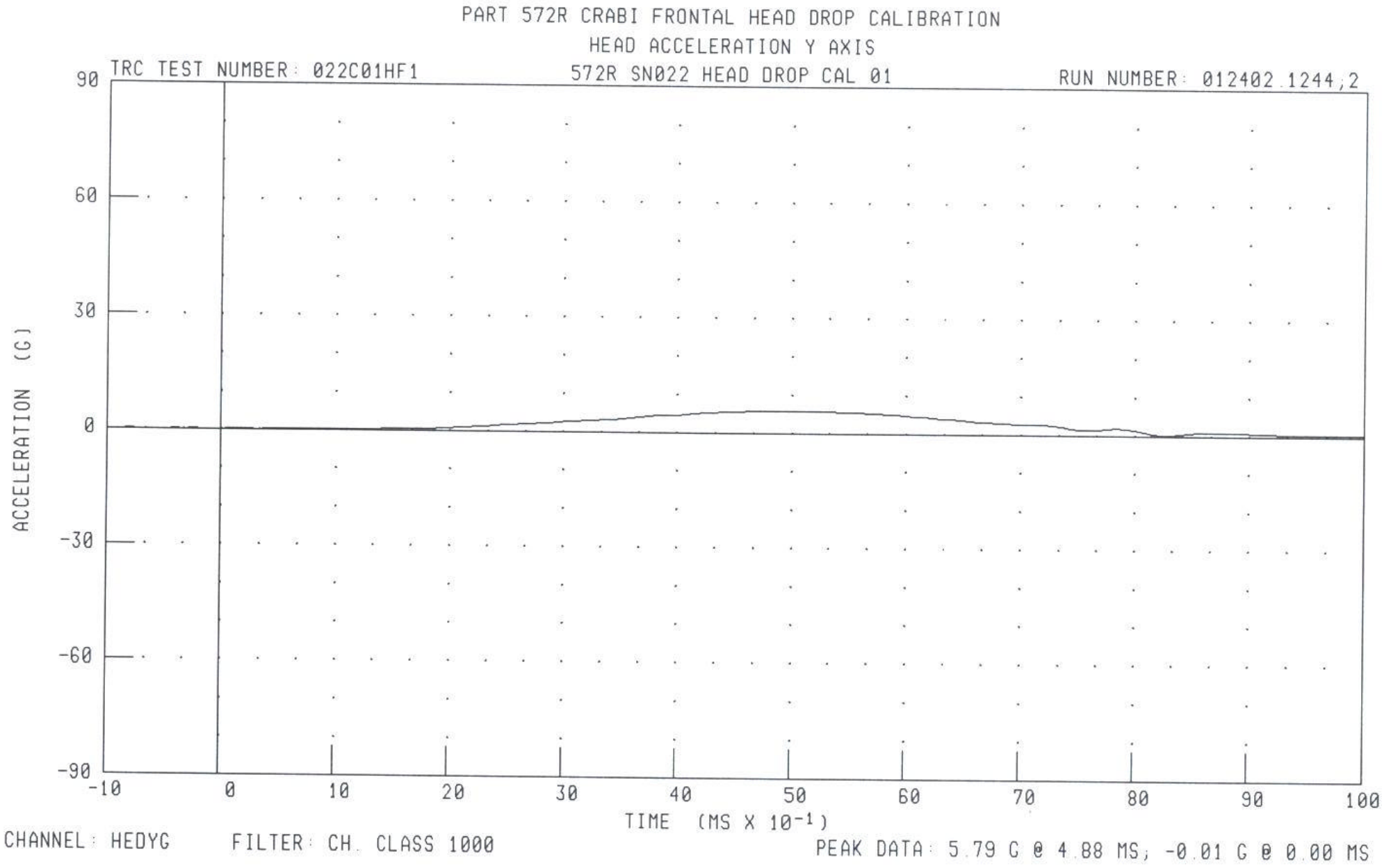
TRC INC. TEST NO: 022C01HF1 572R SN022 HEAD DROP CAL 01

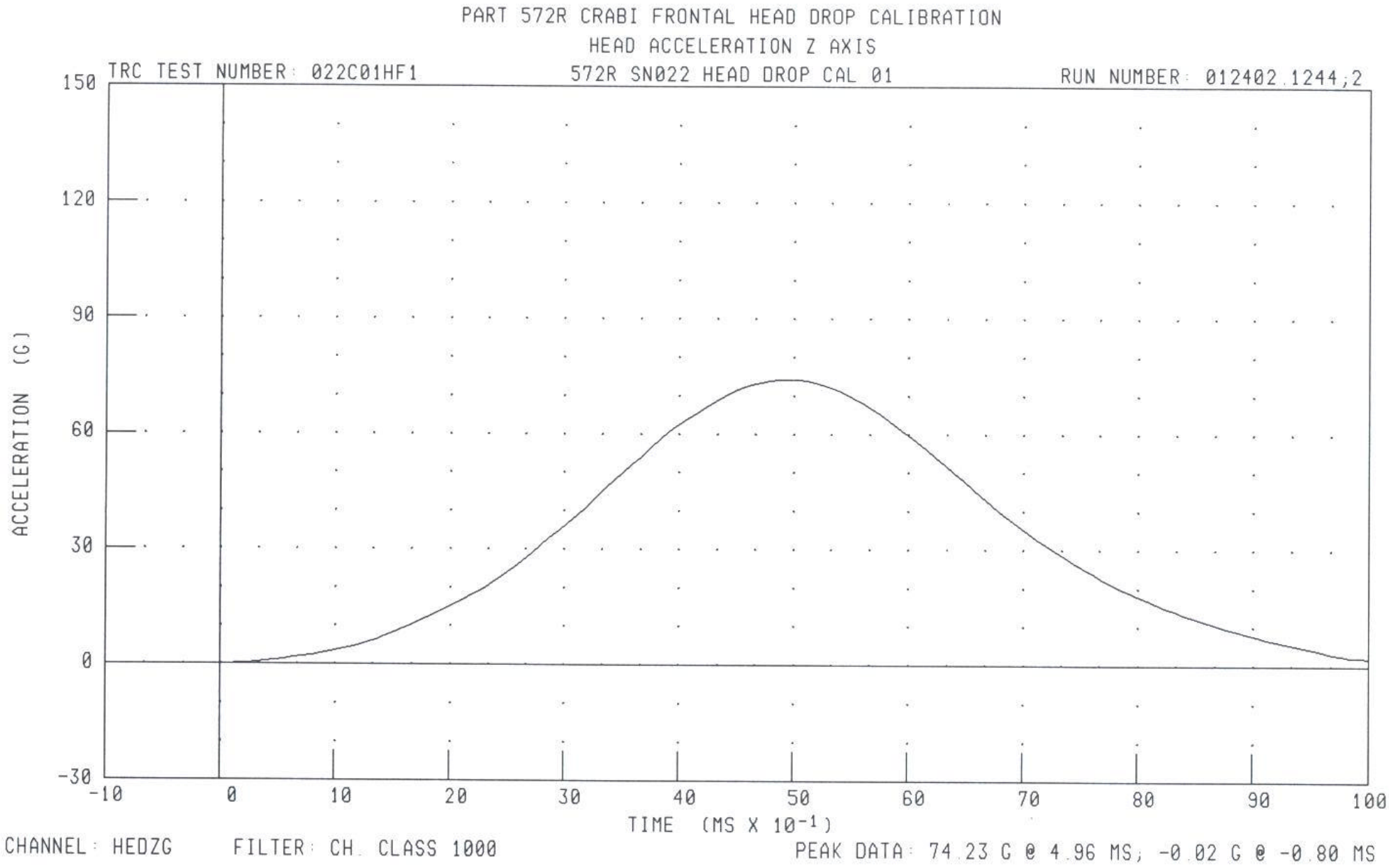
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	45.0 %
PEAK RESULTANT ACCELERATION	100 - 120 G	117.62 G
PEAK LATERAL ACCELERATION	15 G MAX	5.78 G
IS ACCELERATION CURVE UNIMODAL? (<= 17%)	YES	YES (10.6%)

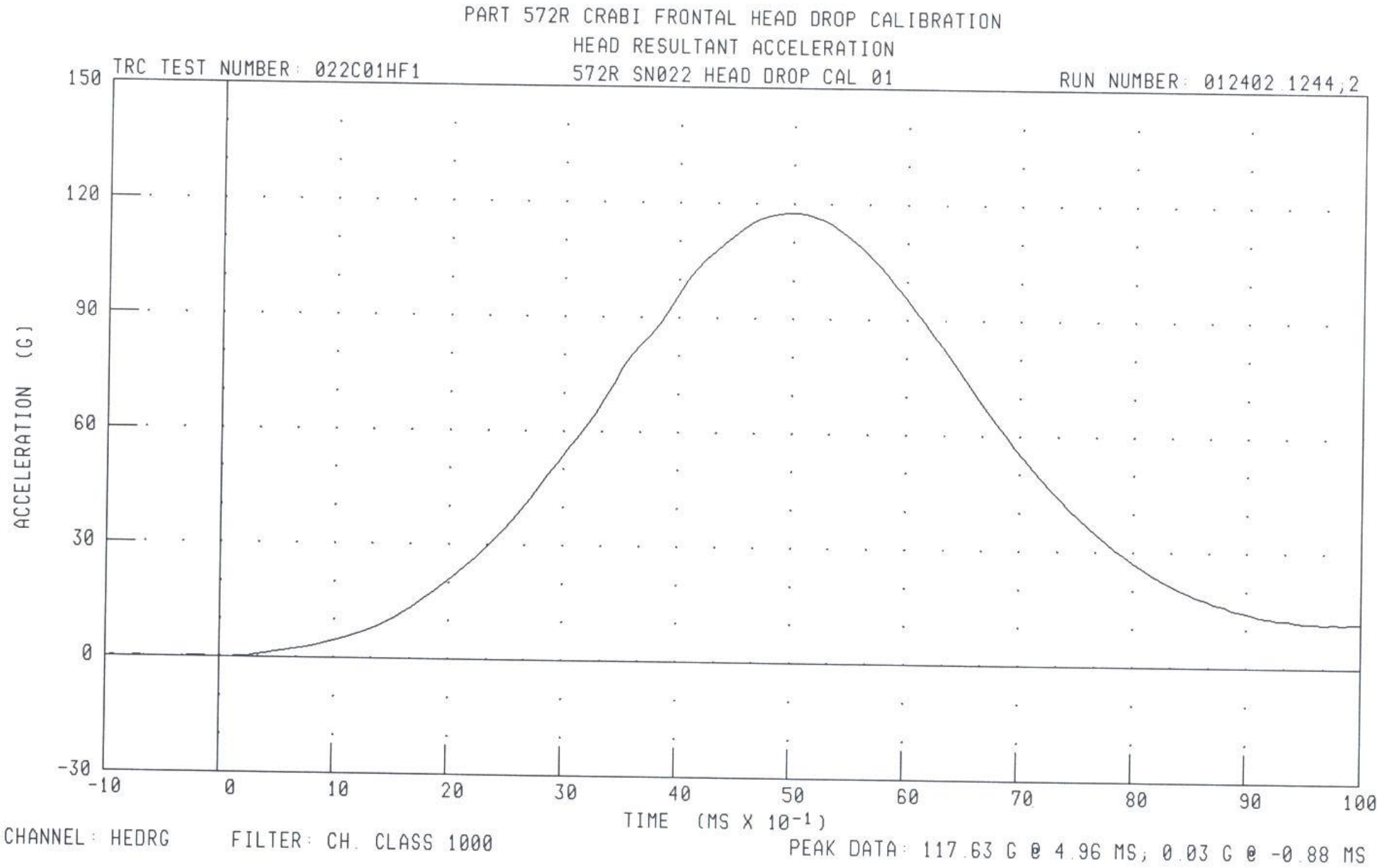
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 012402.1243;2


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 022C01HF1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012402.1244;2
30
0
-30
-60
-90
-120
-150
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: 0.09 G @ -0.96 MS; -91.07 G @ 4.96 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 022C01HF1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012402.1244;2
90
60
30
0
-30
-60
-90
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: 5.79 G @ 4.88 MS; -0.01 G @ 0.00 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 022C01HF1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012402.1244;2
150
120
90
60
30
0
-30
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: 74.23 G @ 4.96 MS; -0.02 G @ -0.80 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 022C01HF1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012402.1244;2
150
120
90
60
30
0
-30
ACCELERATION (G)
-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: 117.63 G @ 4.96 MS; 0.03 G @ -0.88 MS

TRANSPORTATION RESEARCH CENTER INC.

REAR HEAD DROP TEST

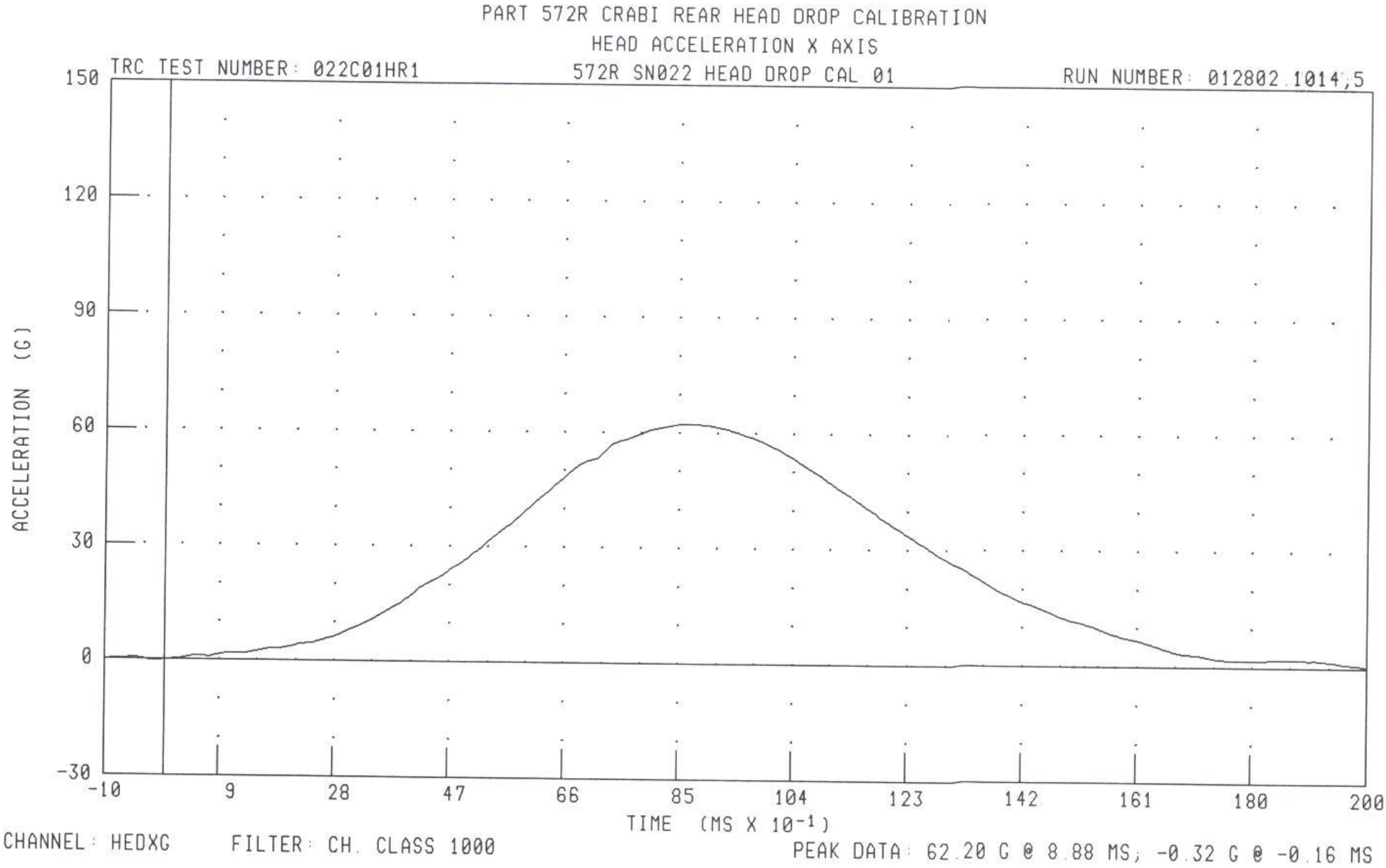
CRABI 12-MONTH 24-JAN-02

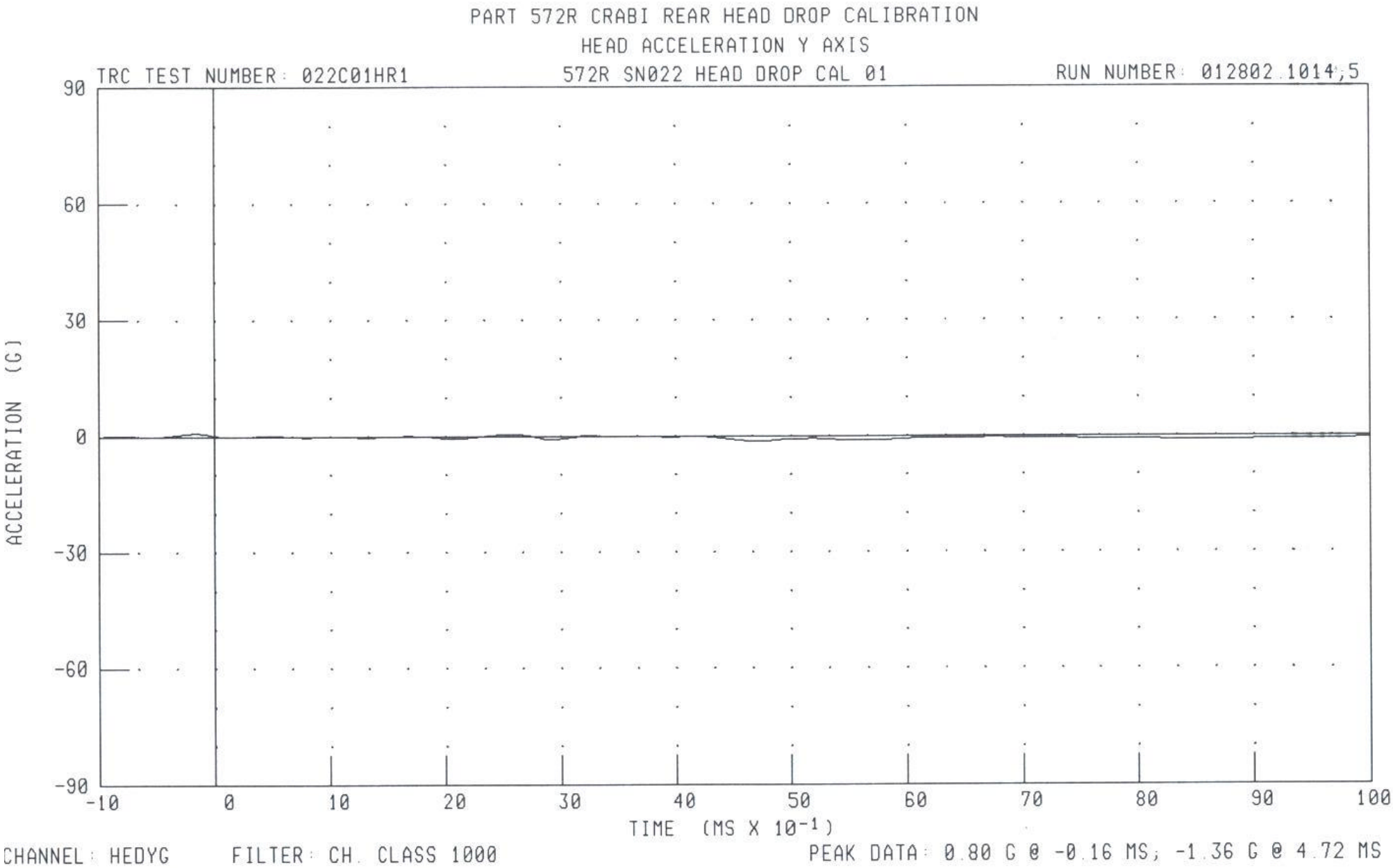
TRC INC. TEST NO: 022C01HR1 572R SN022 HEAD DROP CAL 01

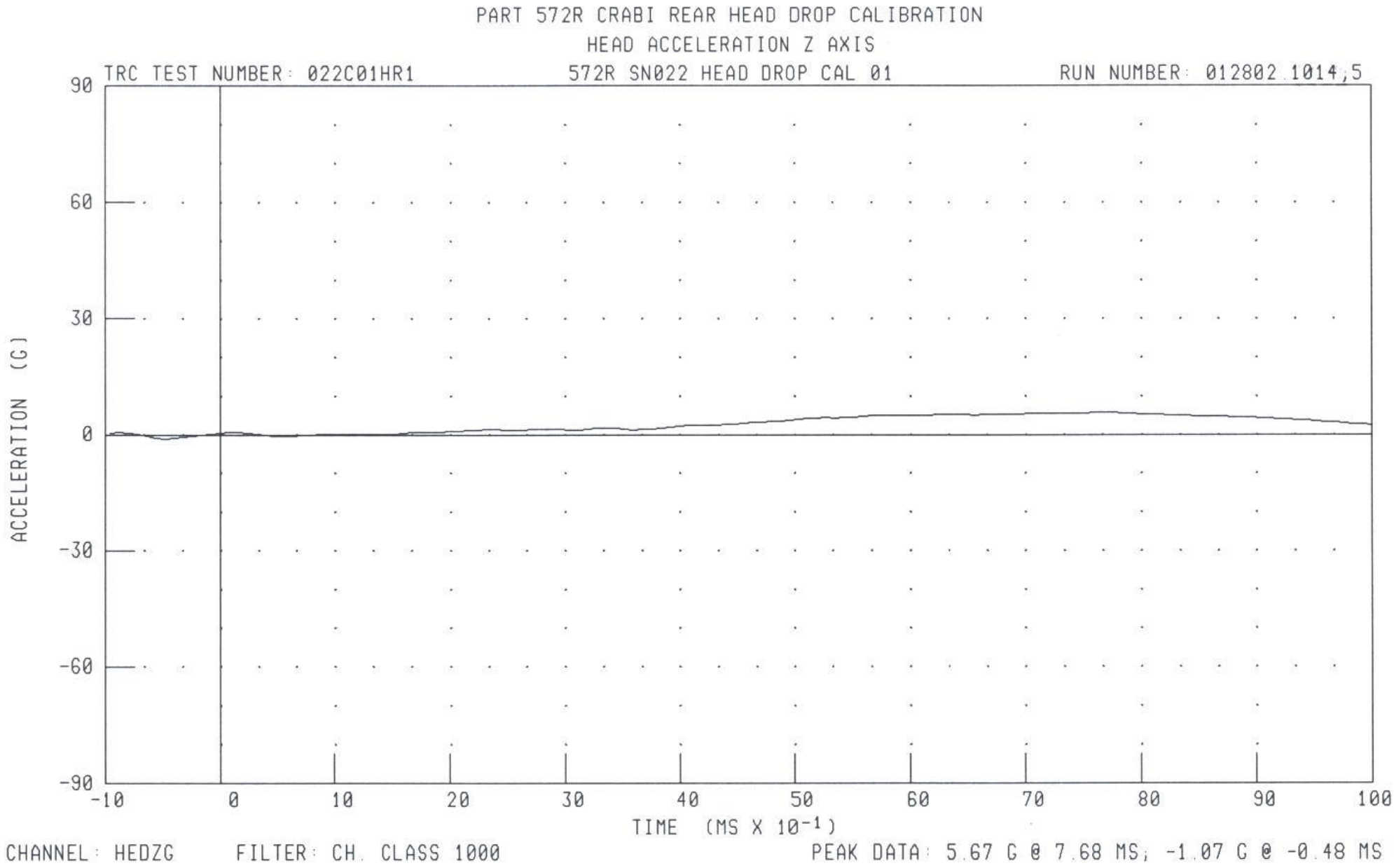
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	55 - 71 G	62.36 G
PEAK LATERAL ACCELERATION	15 G MAX	2.07 G
IS ACCELERATION CURVE UNIMODAL? (<=17%)	YES	YES (9.7%)

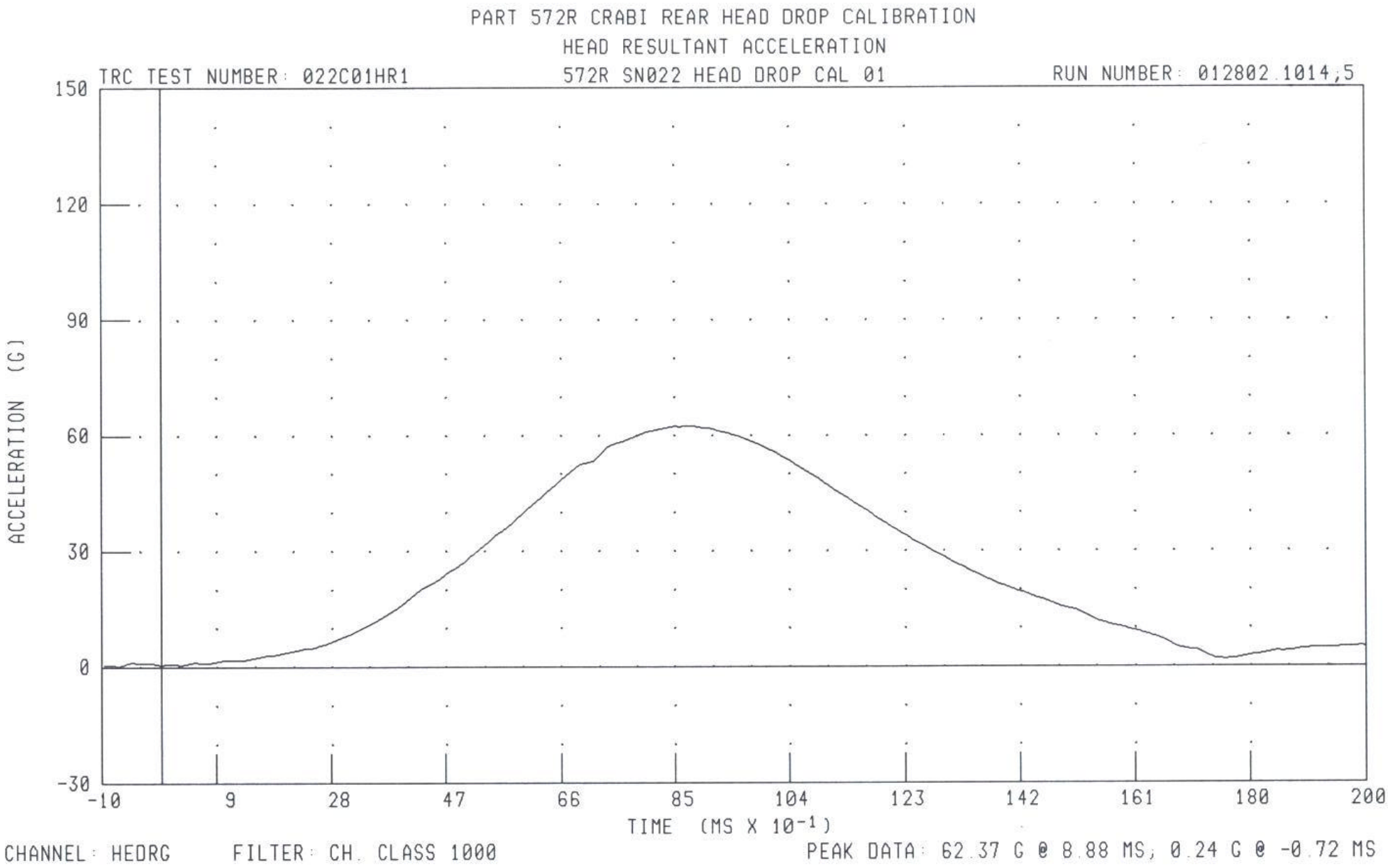
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 012402.1449;5


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 022C01HR1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012802.1014;5
150
120
90
60
30
0
-30
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH. CLASS 1000
PEAK DATA: 62.20 G @ 8.88 MS; -0.32 G @ -0.16 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 022C01HR1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012802.1014;5
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-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: 0.80 G @ -0.16 MS; -1.36 G @ 4.72 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 022C01HR1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012802.1014,5
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-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: 5.67 G @ 7.68 MS; -1.07 G @ -0.48 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 022C01HR1
572R SN022 HEAD DROP CAL 01
RUN NUMBER: 012802.1014;5
150
120
90
60
30
0
-30
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 62.37 G @ 8.88 MS; 0.24 G @ -0.72 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST

CRABI 12-MONTH 25-JAN-02

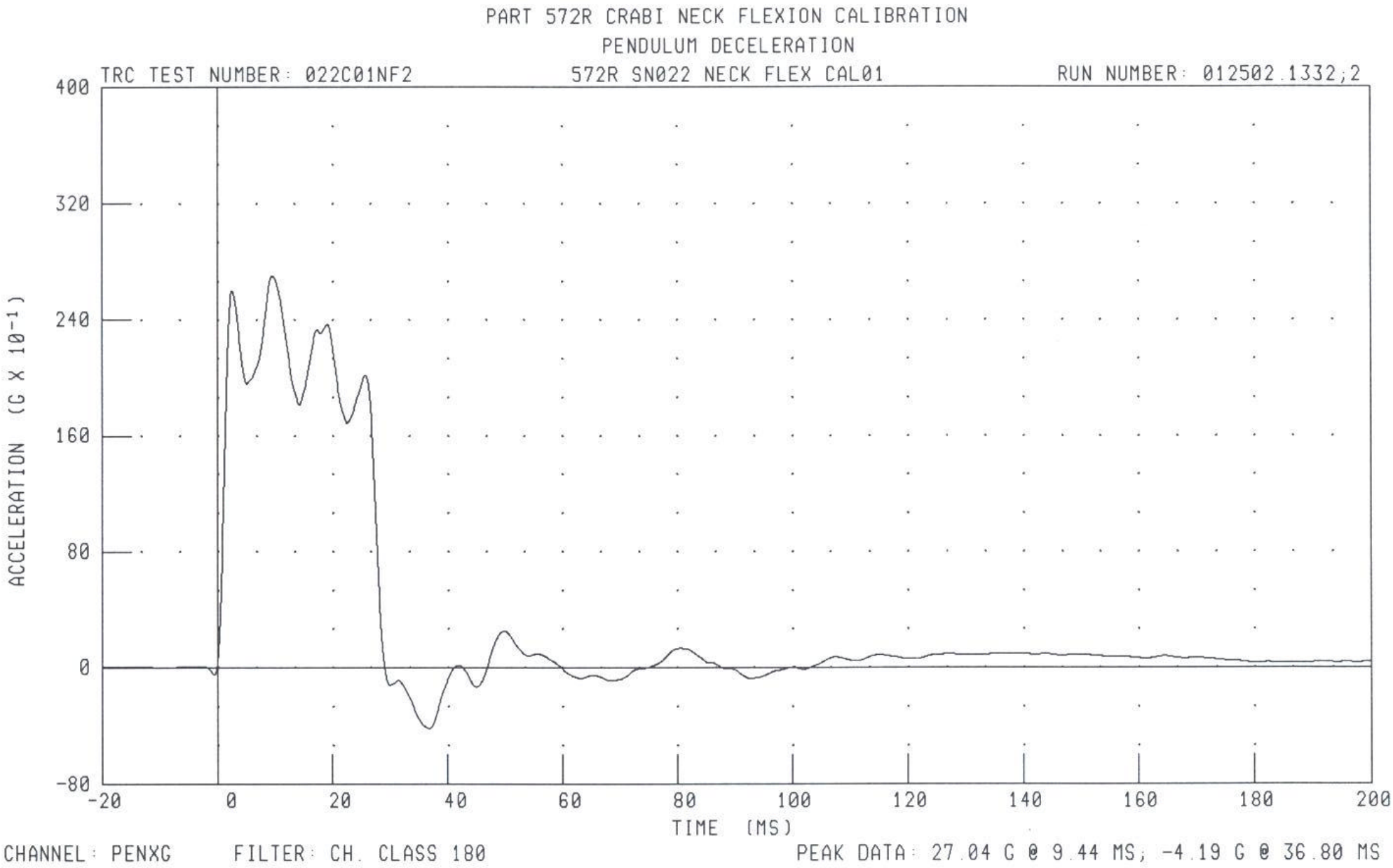
TRC INC. TEST NO: 022C01NF2 572R SN022 NECK FLEX CAL01

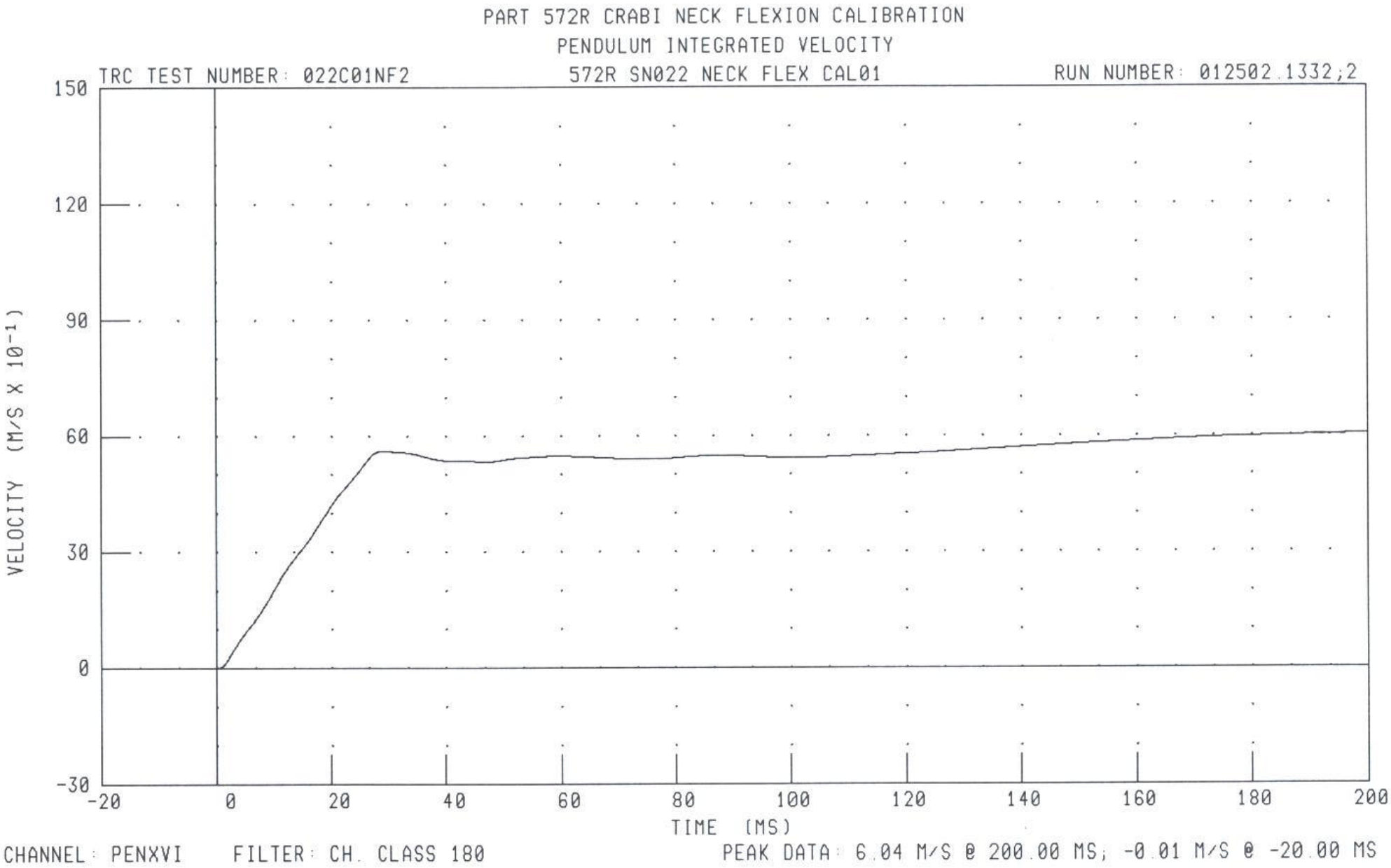
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	24.0 %
IMPACT VELOCITY		5.1 - 5.3 M/S	5.25 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	1.6 - 2.3 G	2.03 M/S
	20 MS	3.4 - 4.2 M/S	4.18 M/S
	25 MS	4.3 - 5.2 M/S	5.10 M/S
PEAK D-PLANE ROTATION		75 - 86 DEG.	76.94 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		39 - 45 NM	40.64 NM
POSITIVE MOMENT DECAY TIME TO 5 NM LEVEL		60 - 80 MS	69.92 MS

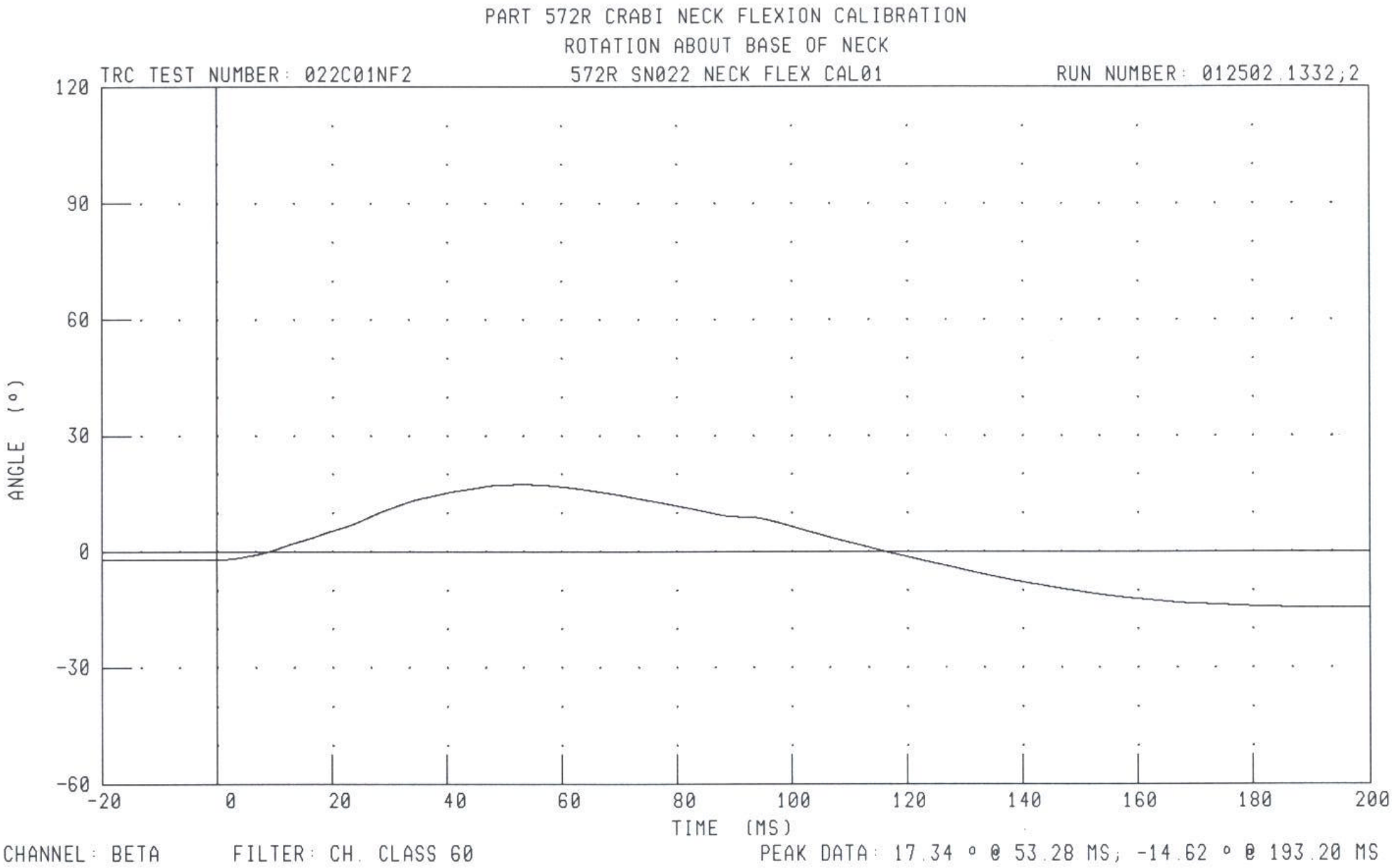
TEST MEETS SPECIFICATIONS

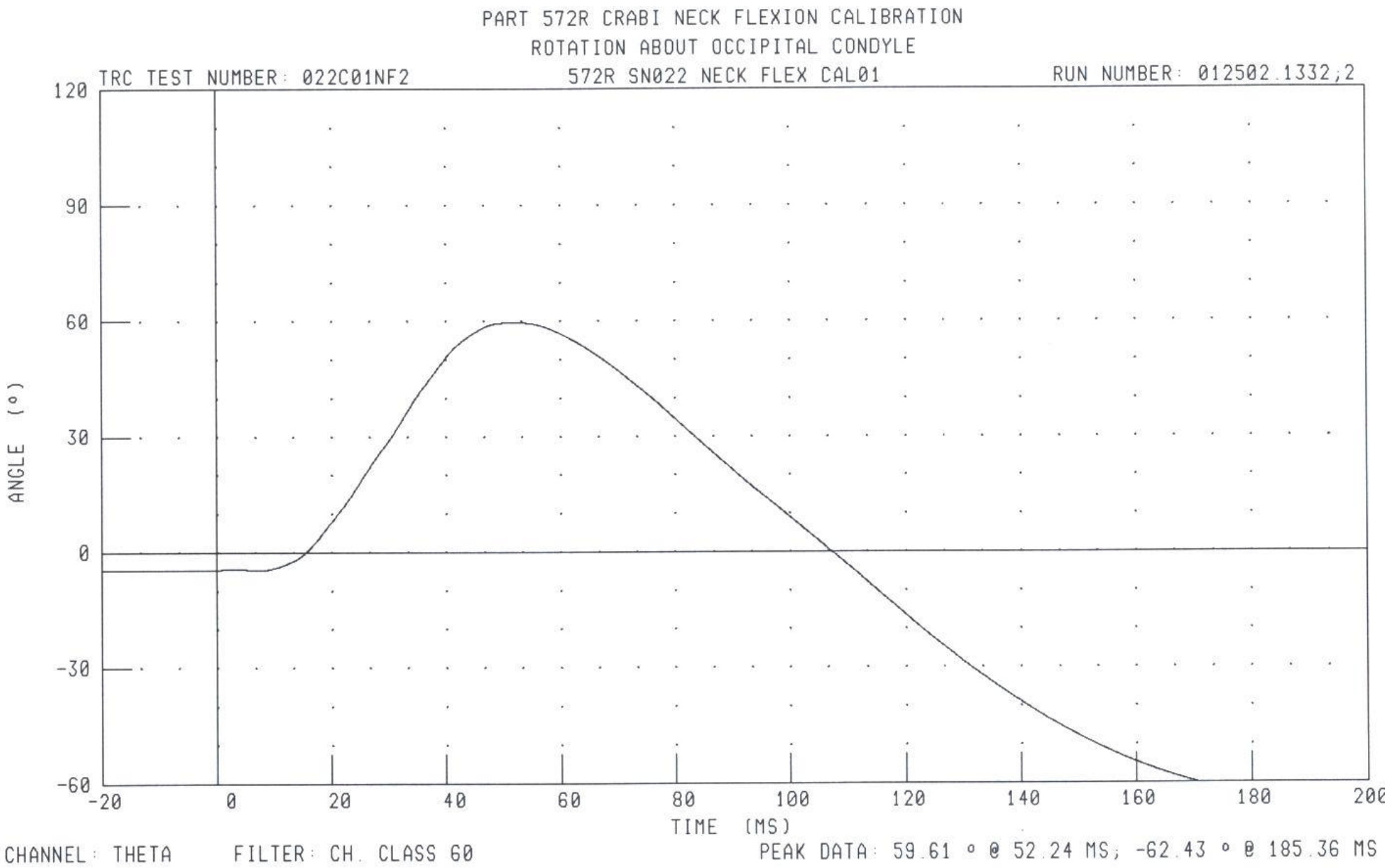
TECHNICIAN 

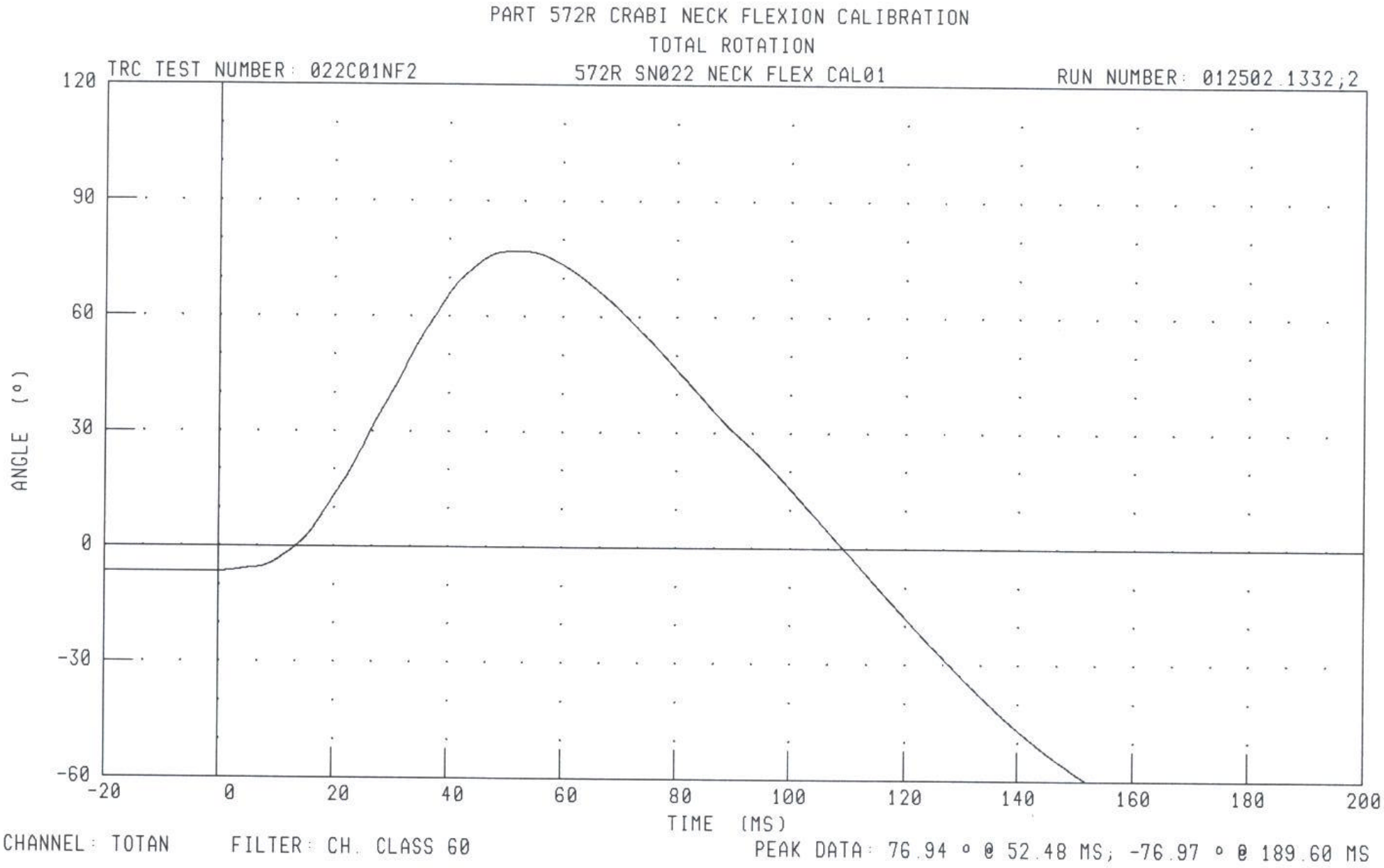
RUN NUMBER: 012502.0928;1

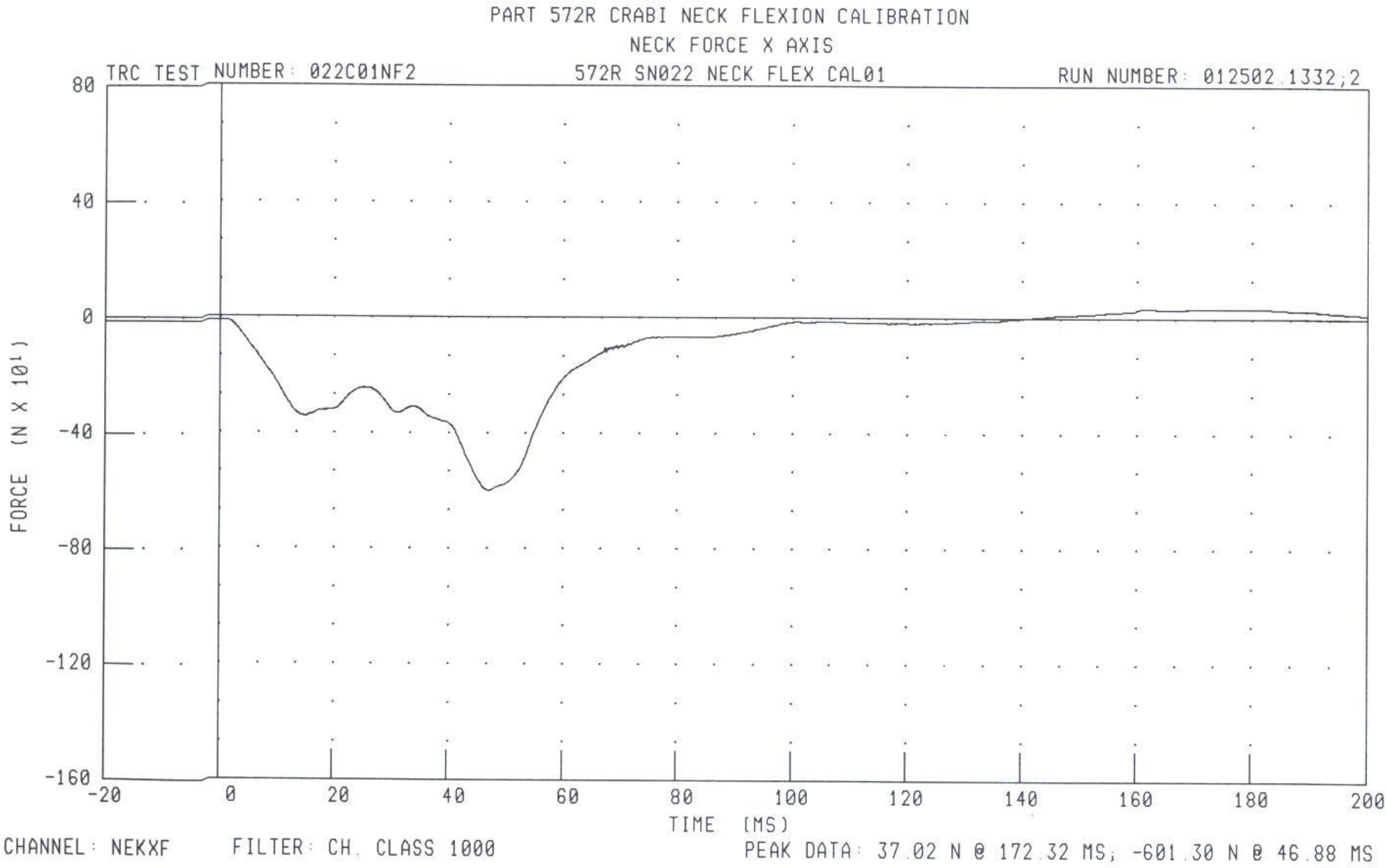

PART 572R CRABI NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
400
320
240
160
80
0
-80
ACCELERATION (G X 10-1)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 27.04 G @ 9.44 MS; -4.19 G @ 36.80 MS

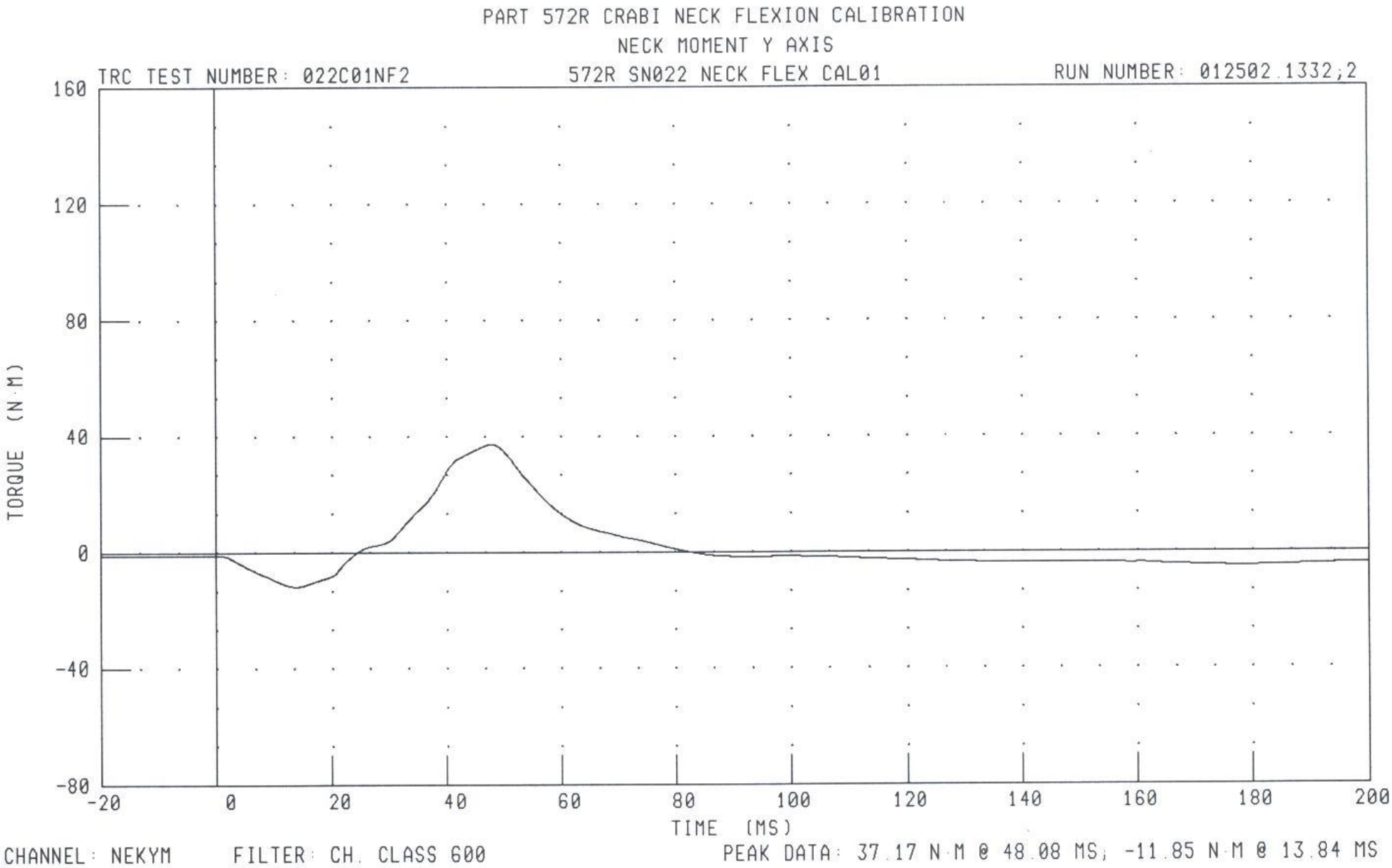

PART 572R CRABI NECK FLEXION CALIBRATION
PENDULUM INTEGRATED VELOCITY
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
VELOCITY (M/S X 10⁻¹)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH. CLASS 180
PEAK DATA: 6.04 M/S @ 200.00 MS; -0.01 M/S @ -20.00 MS

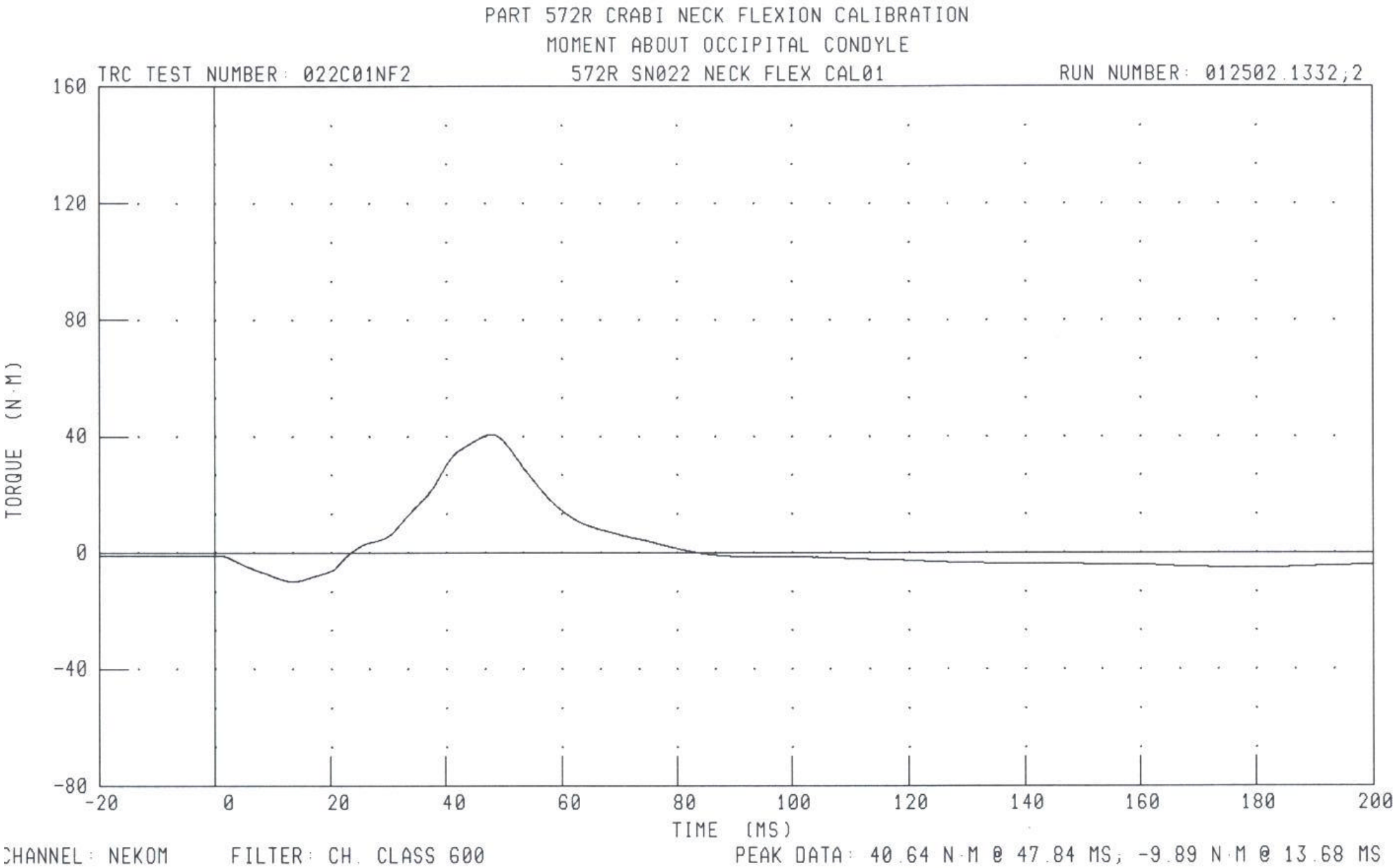

PART 572R CRABI NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 17.34 ° @ 53.28 MS; -14.62 ° @ 193.20 MS

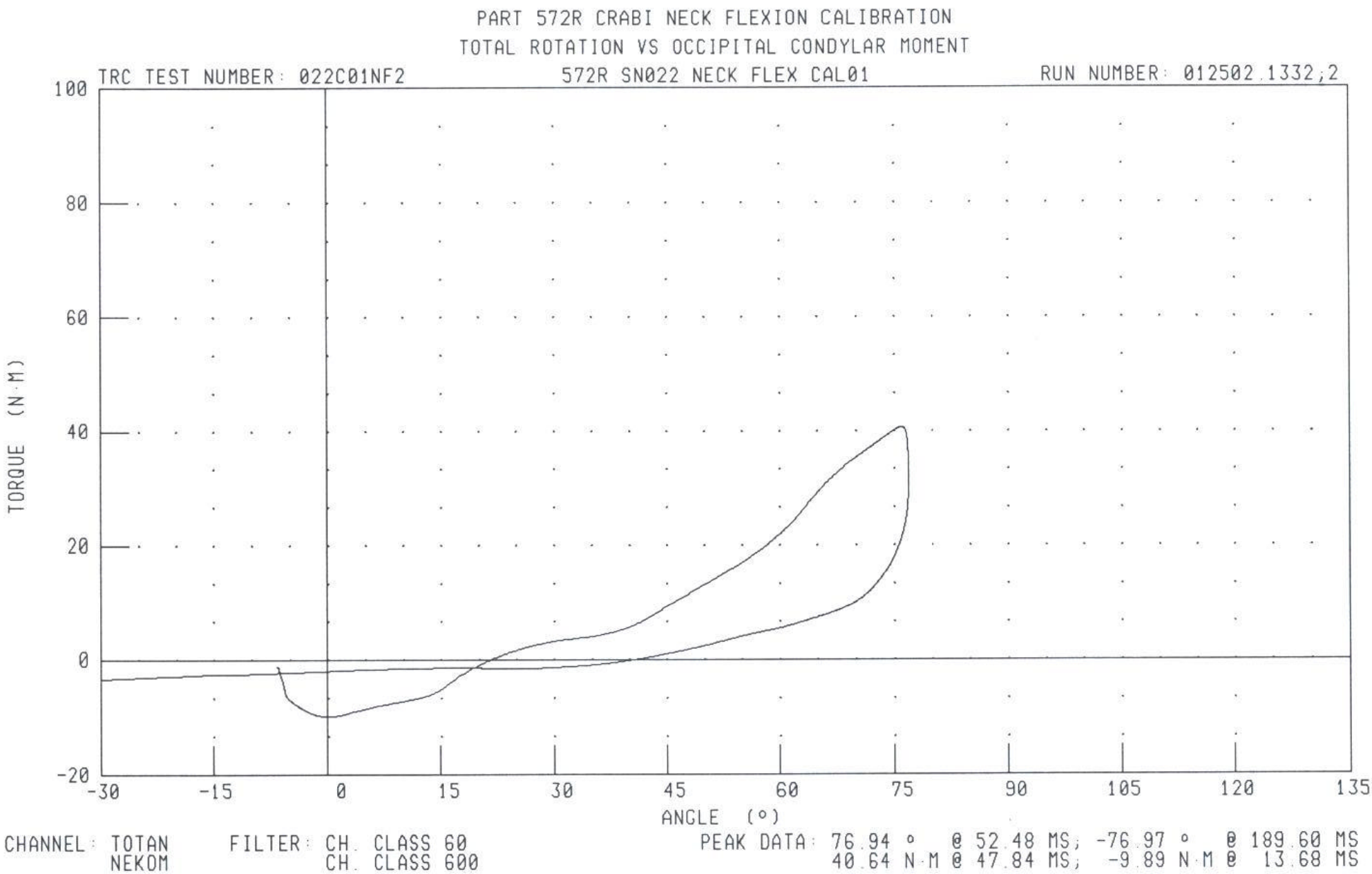

PART 572R CRABI NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 59.61 ° @ 52.24 MS; -62.43 ° @ 185.36 MS


PART 572R CRABI NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;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: 76.94 ° @ 52.48 MS; -76.97 ° @ 189.60 MS


PART 572R CRABI NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 1000
PEAK DATA: 37.02 N @ 172.32 MS; -601.30 N @ 46.88 MS


PART 572R CRABI NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;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: 37.17 N·M @ 48.08 MS; -11.85 N·M @ 13.84 MS


PART 572R CRABI NECK FLEXION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;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: NEKOM
FILTER: CH. CLASS 600
PEAK DATA: 40.64 N.M @ 47.84 MS; -9.89 N.M @ 13.68 MS


PART 572R CRABI NECK FLEXION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER: 022C01NF2
572R SN022 NECK FLEX CAL01
RUN NUMBER: 012502.1332;2
TORQUE (N.M)
100
80
60
40
20
0
-20
-30
-15
0
15
30
45
60
75
90
105
120
135
ANGLE (°)
CHANNEL: TOTAN
NEKOM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 76.94 ° @ 52.48 MS; -76.97 ° @ 189.60 MS
40.64 N.M @ 47.84 MS; -9.89 N.M @ 13.68 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST

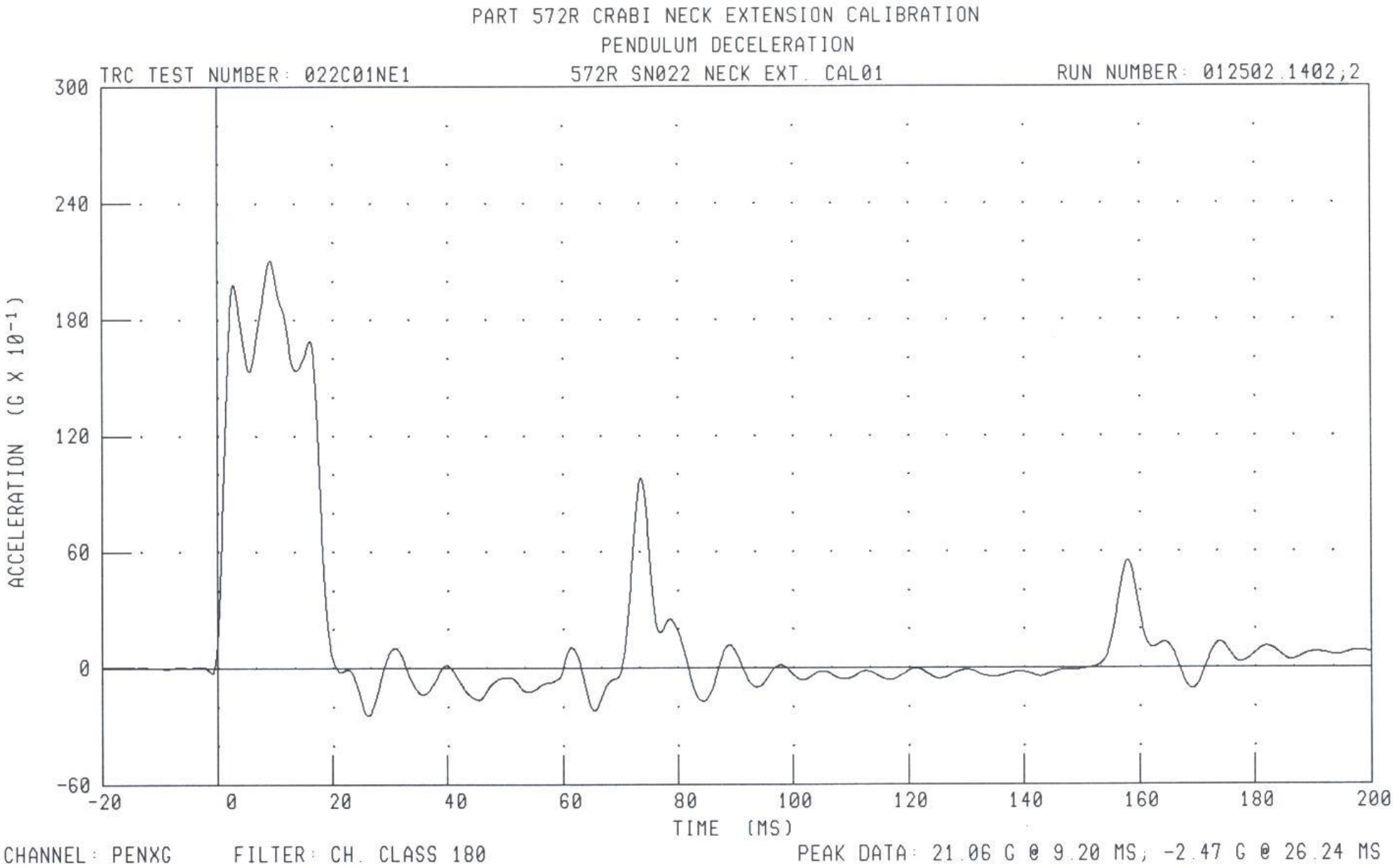
CRABI 12-MONTH 25-JAN-02

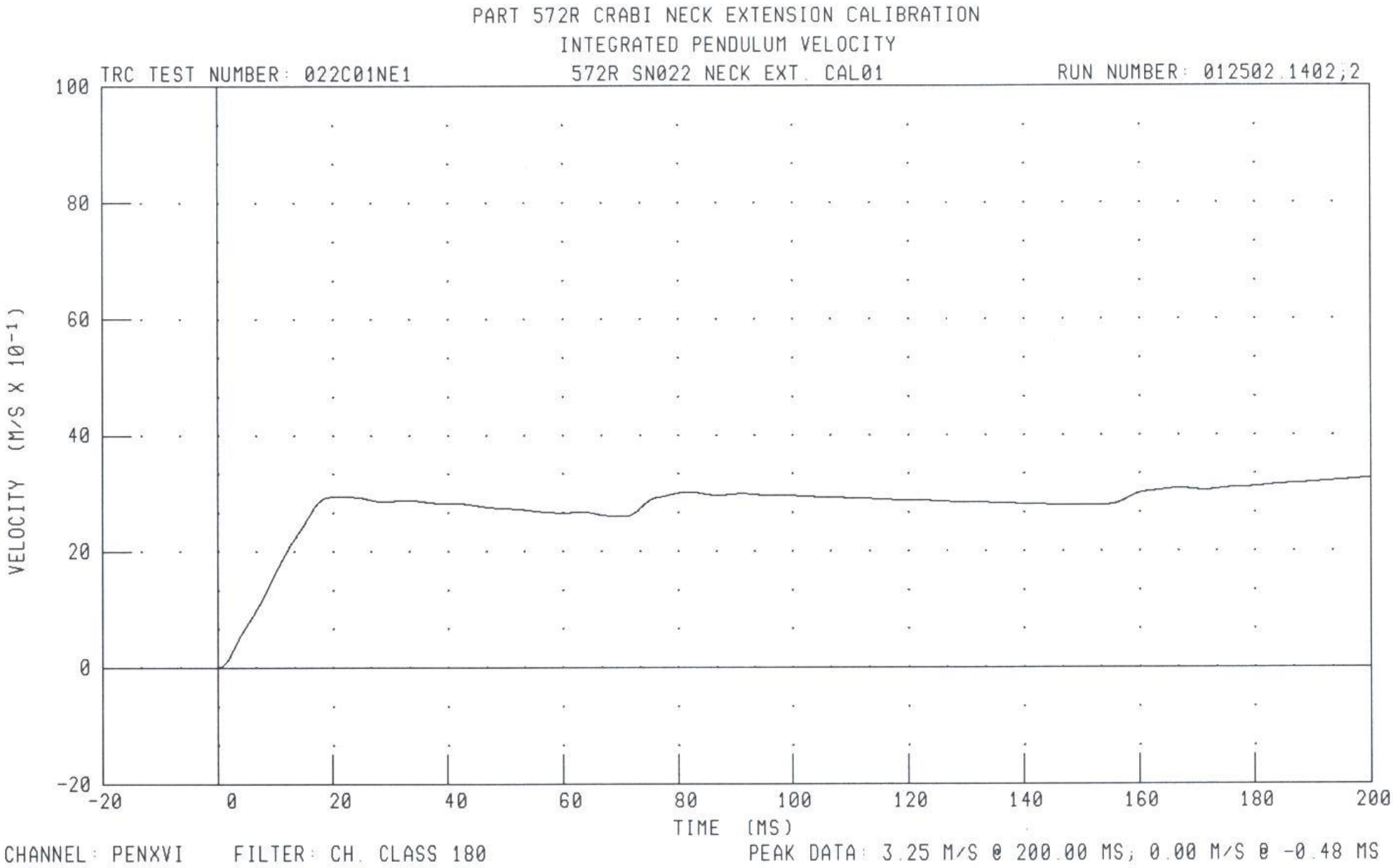
TRC INC. TEST NO: 022C01NE1 572R SN022 NECK EXT. CAL01

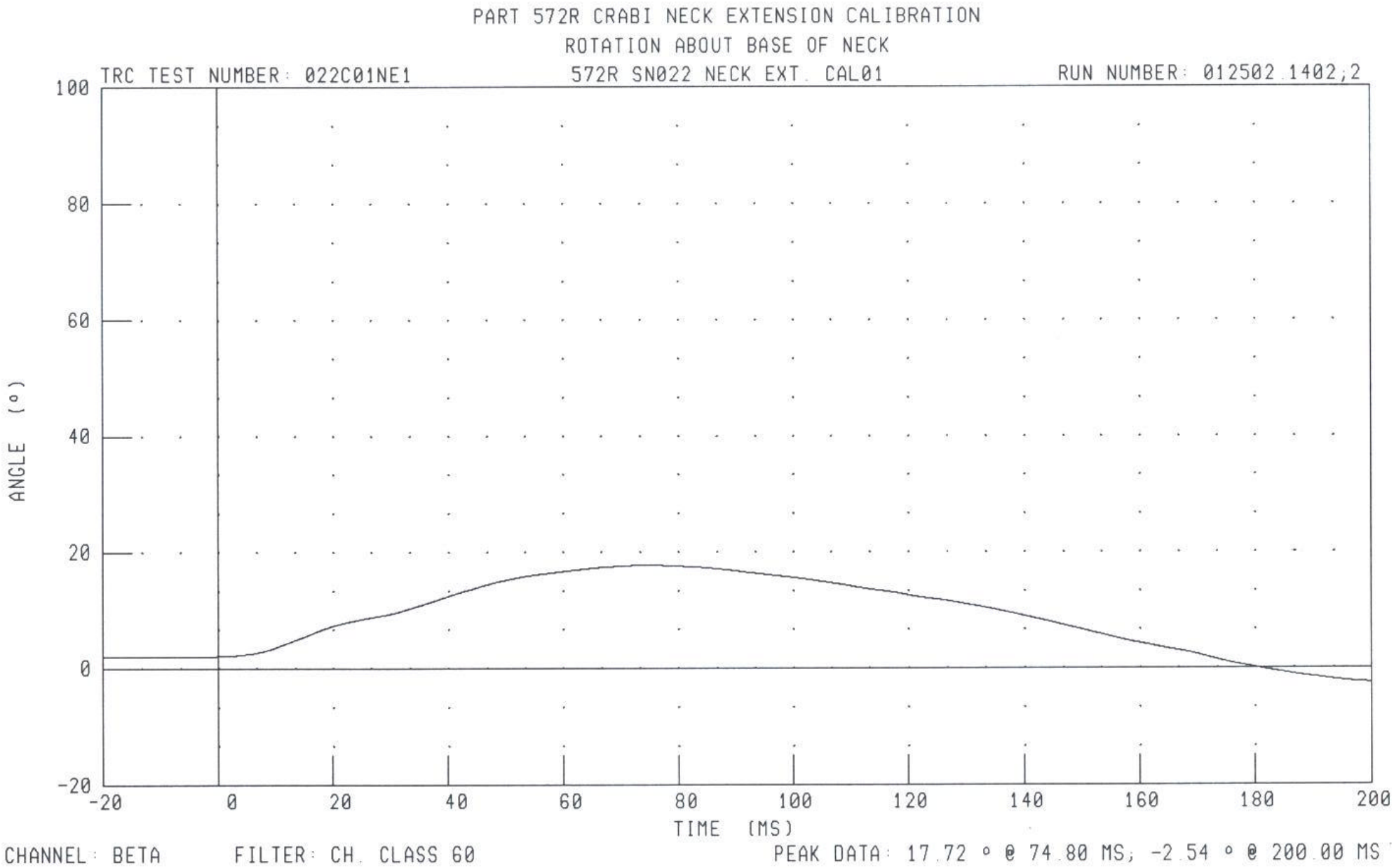
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	32.0 %
IMPACT VELOCITY		2.4 - 2.6 M/S	2.59 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	0.8 - 1.2 M/S	0.87 M/S
	10 MS	1.5 - 2.1 M/S	1.60 M/S
	20 MS	2.2 - 2.9 M/S	2.29 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	84.93 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		-12 / -23 NM	-18.06 NM
POSITIVE MOMENT DECAY TIME TO -5 NM LEVEL		76 - 90 MS	82.24 MS

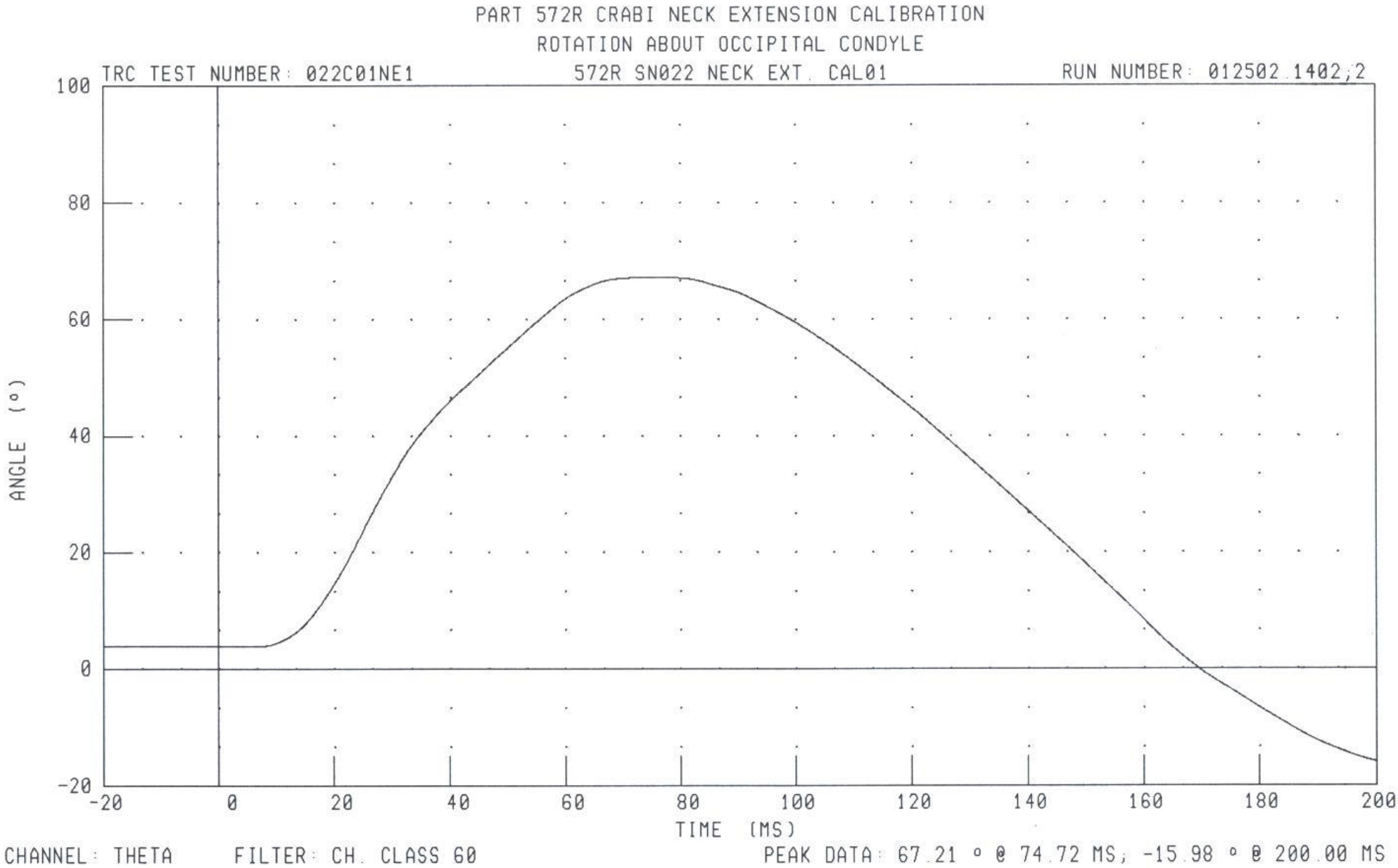
TEST MEETS SPECIFICATIONS

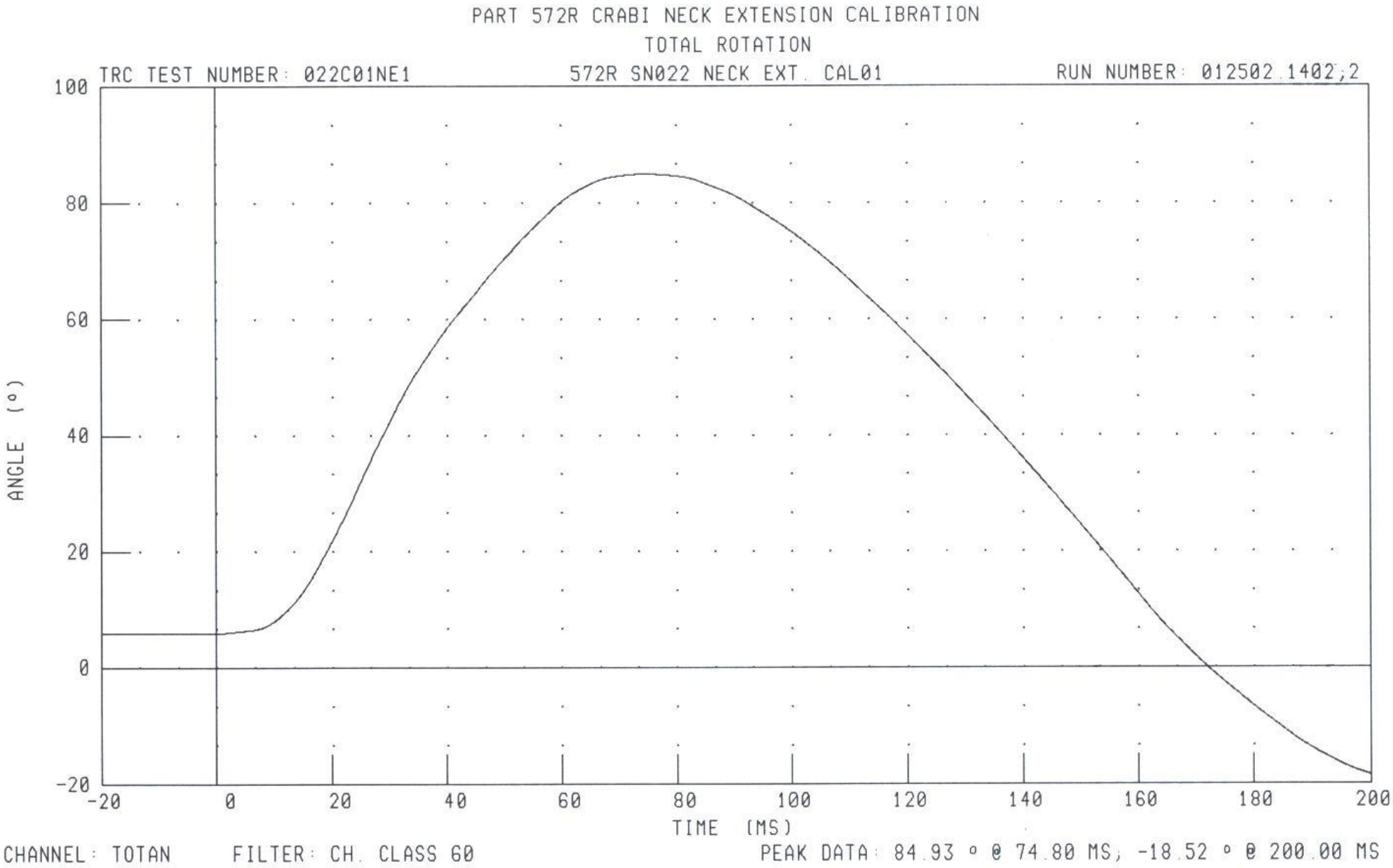
TECHNICIAN _____ RUN NUMBER: 012502.1359;2

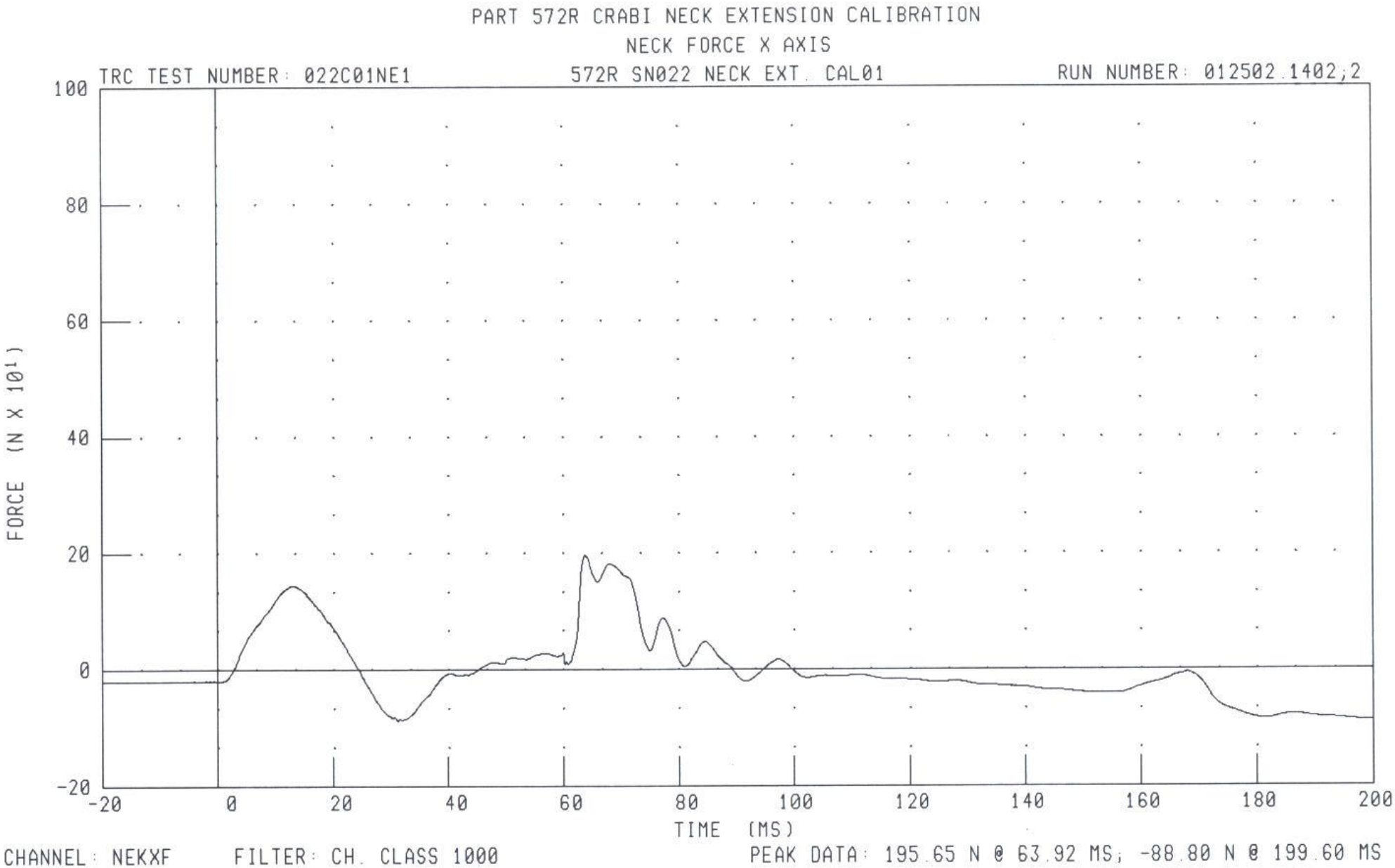

PART 572R CRABI NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
ACCELERATION (G X 10⁻¹)
300
240
180
120
60
0
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 21.06 G @ 9.20 MS; -2.47 G @ 26.24 MS

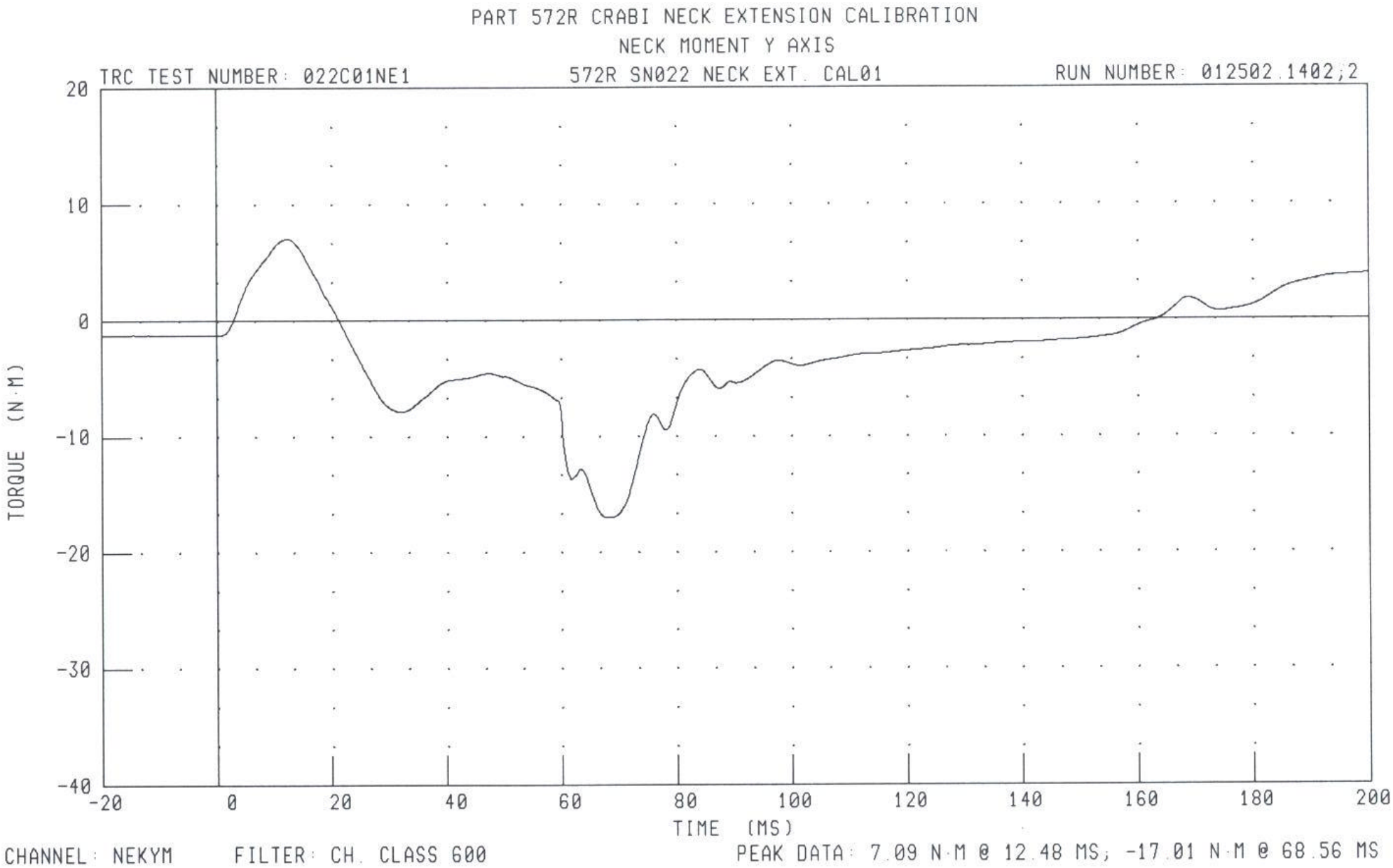

PART 572R CRABI NECK EXTENSION CALIBRATION
INTEGRATED PENDULUM VELOCITY
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
VELOCITY (M/S X 10-1)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH. CLASS 180
PEAK DATA: 3.25 M/S @ 200.00 MS; 0.00 M/S @ -0.48 MS

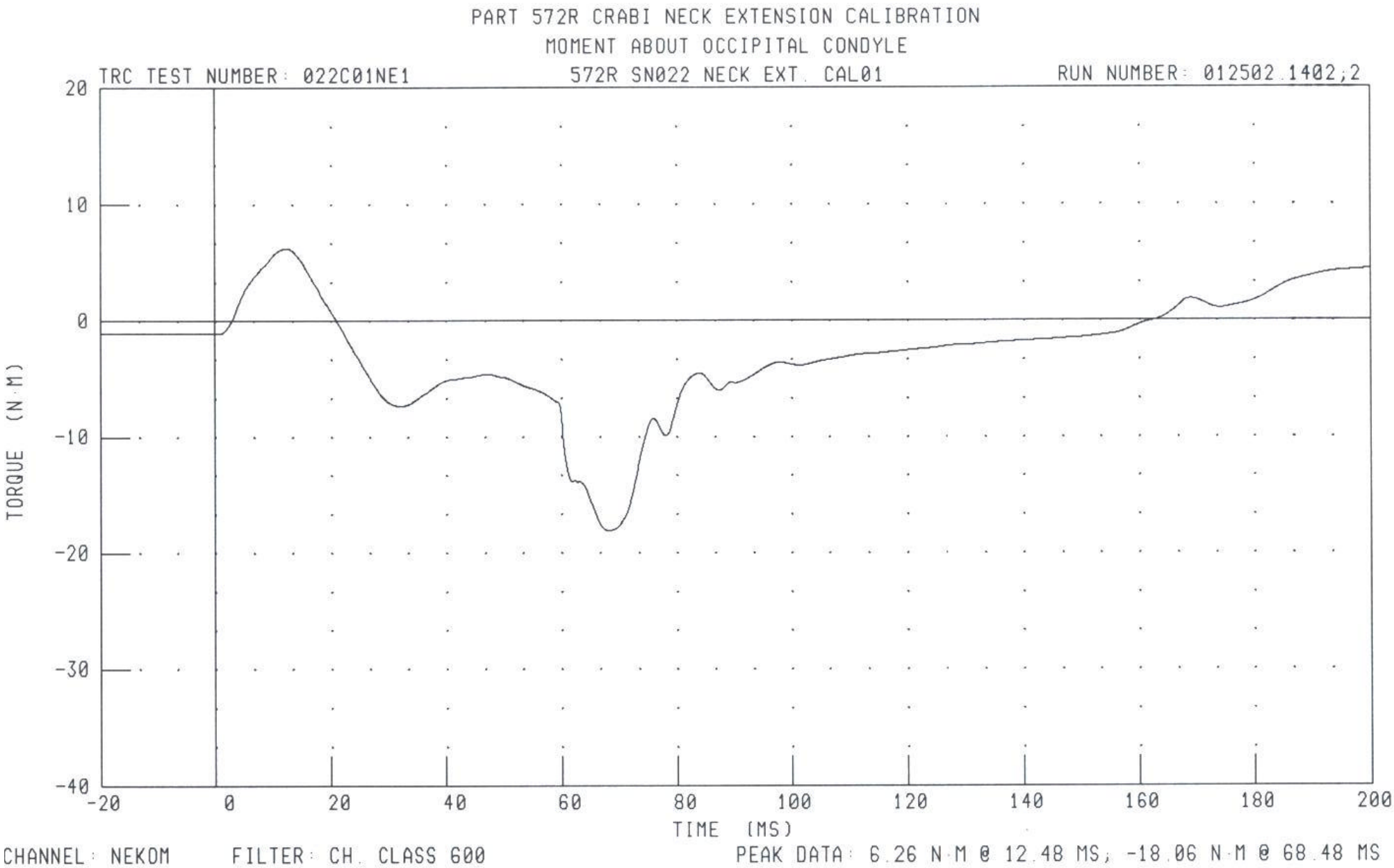

PART 572R CRABI NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 17.72 ° @ 74.80 MS; -2.54 ° @ 200.00 MS

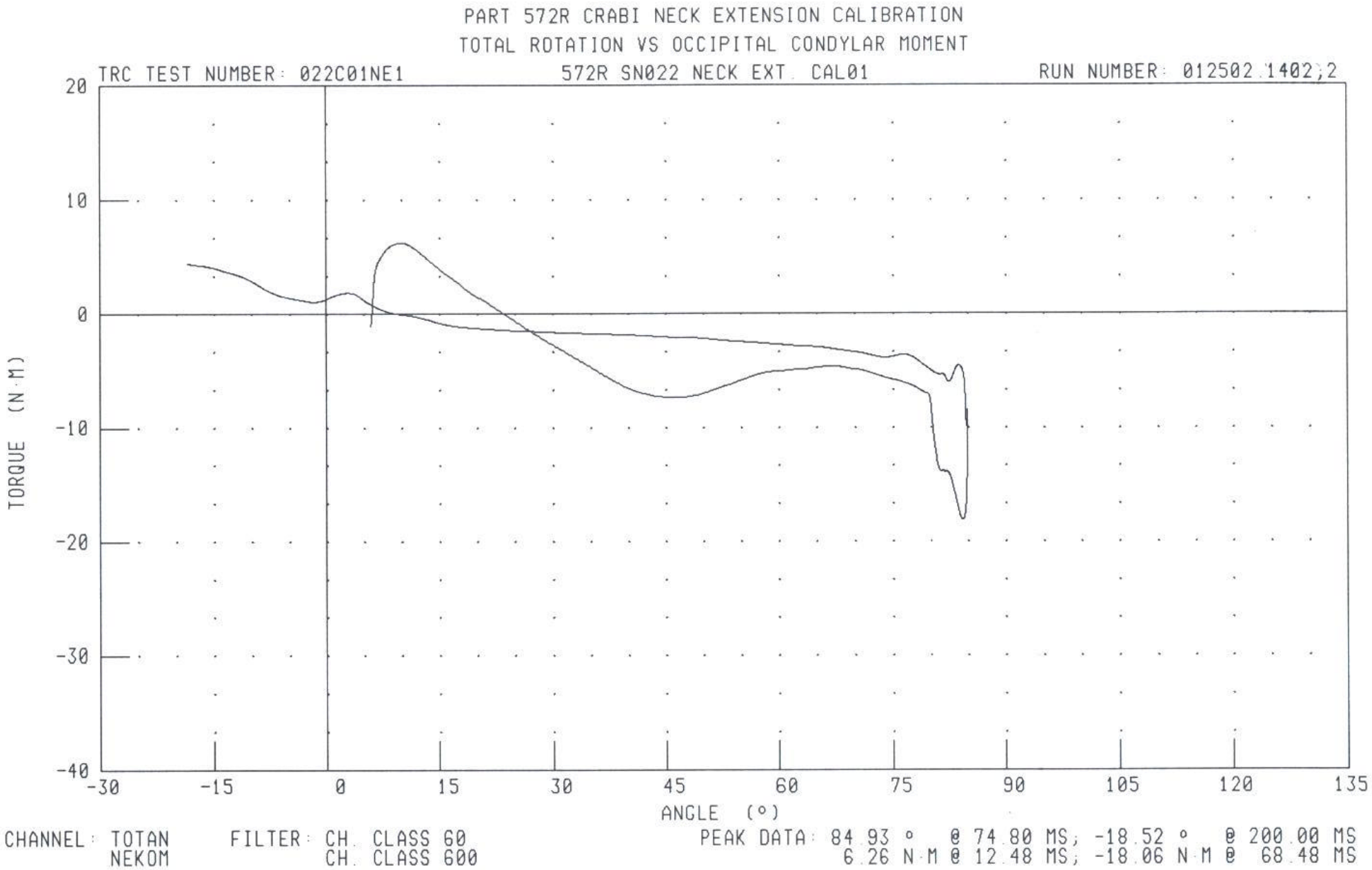

PART 572R CRABI NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 67.21 ° @ 74.72 MS; -15.98 ° @ 200.00 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 84.93 ° @ 74.80 MS; -18.52 ° @ 200.00 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
FORCE (N X 10¹)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 1000
PEAK DATA: 195.65 N @ 63.92 MS; -88.80 N @ 199.60 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
20
10
0
-10
-20
-30
-40
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: 7.09 N·M @ 12.48 MS, -17.01 N·M @ 68.56 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
TORQUE (N-M)
20
10
0
-10
-20
-30
-40
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKOM
FILTER: CH. CLASS 600
PEAK DATA: 6.26 N-M @ 12.48 MS; -18.06 N-M @ 68.48 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER: 022C01NE1
572R SN022 NECK EXT. CAL01
RUN NUMBER: 012502.1402;2
TORQUE (N-M)
20
10
0
-10
-20
-30
-40
-30
-15
0
15
30
45
60
75
90
105
120
135
ANGLE (°)
CHANNEL: TOTAN
NEKOM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 84.93 ° @ 74.80 MS; -18.52 ° @ 200.00 MS
6.26 N-M @ 12.48 MS; -18.06 N-M @ 68.48 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

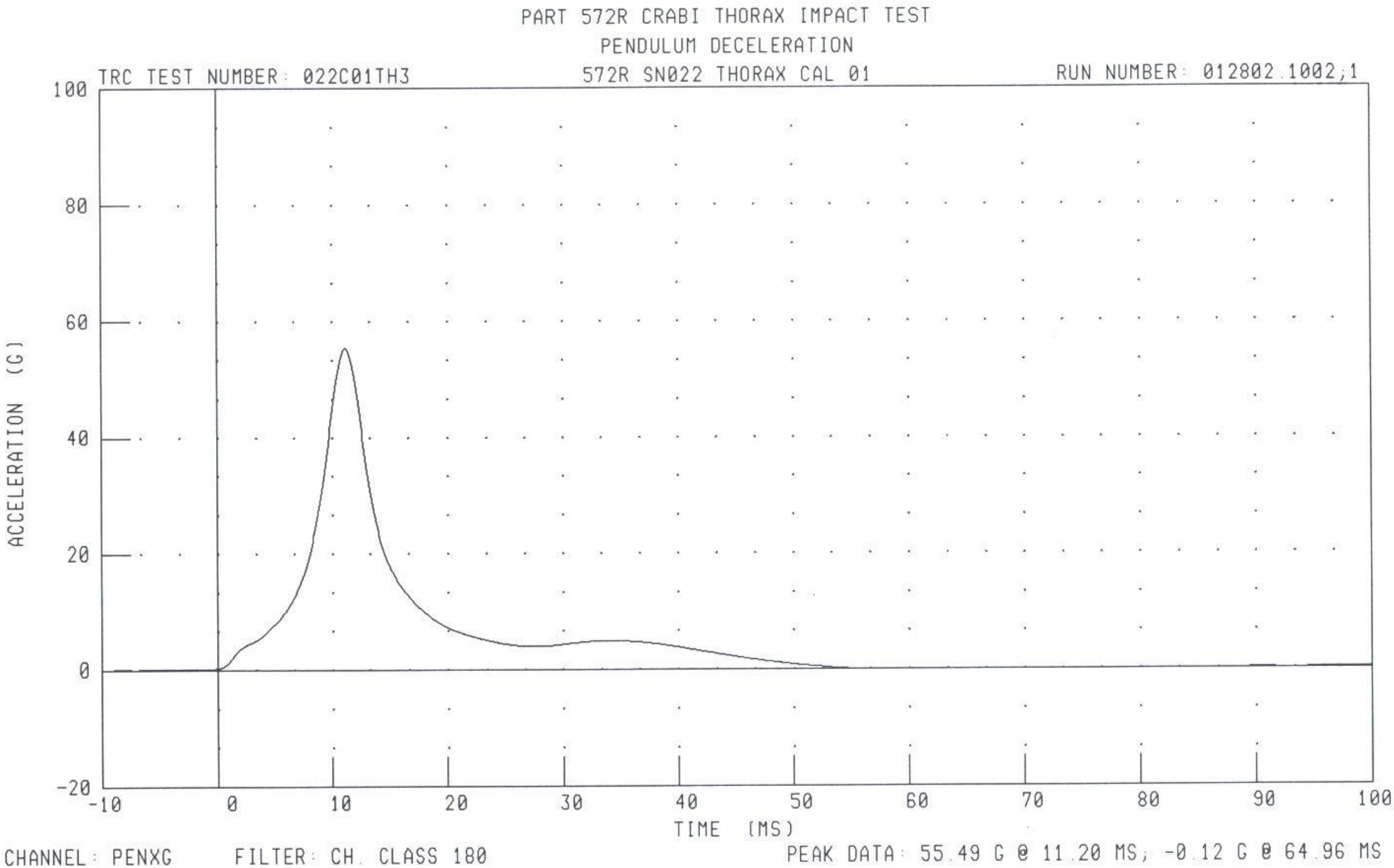
CRABI 12-MONTH 28-JAN-02

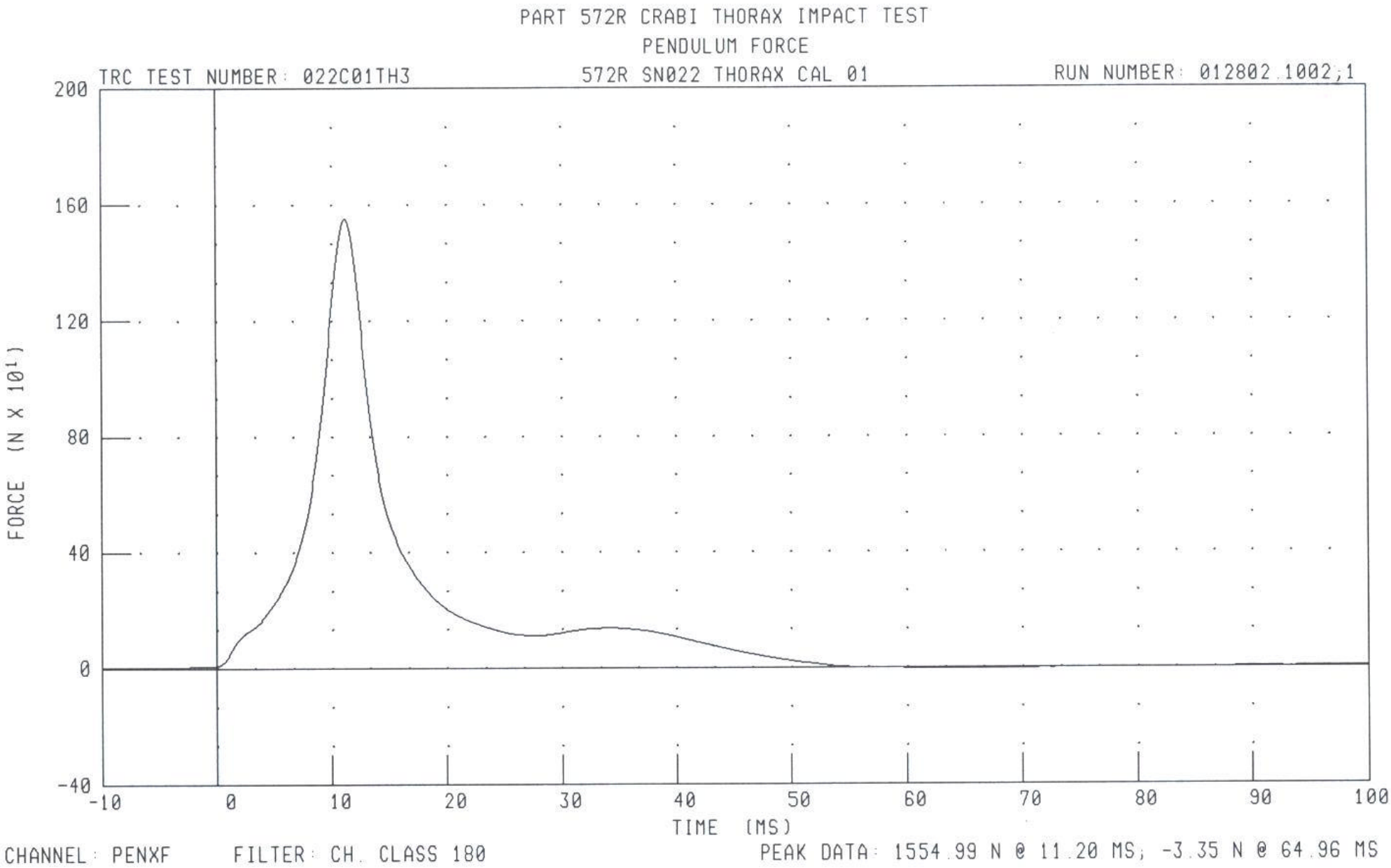
TRC INC. TEST NO: 022C01TH3 572R SN022 THORAX CAL 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	41.0 %
PENDULUM VELOCITY	4.90 - 5.10 M/S	4.93 M/S
MAXIMUM RESISTIVE FORCE	1514 - 1796 N	1554. N

TEST MEETS SPECIFICATIONS

TECHNICIAN Rick A. Waldeck RUN NUMBER: 012802.1001;1


PART 572R CRABI THORAX IMPACT TEST
PENDULUM DECELERATION
TRC TEST NUMBER: 022C01TH3
572R SN022 THORAX CAL 01
RUN NUMBER: 012802.1002;1
ACCELERATION (G)
100
80
60
40
20
0
-20
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 55.49 G @ 11.20 MS; -0.12 G @ 64.96 MS


PART 572R CRABI THORAX IMPACT TEST
PENDULUM FORCE
TRC TEST NUMBER: 022C01TH3
572R SN022 THORAX CAL 01
RUN NUMBER: 012802.1002;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: 1554.99 N @ 11.20 MS; -3.35 N @ 64.96 MS

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

Crabi #017

Lower Neck

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	C2632002	Date Jan 15, 2002 Due	Jan 15, 2003
Model No.	2554A	Serial No.	280
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	21.6 / 33.5
Customer	VRTC	Last Calibrated	Jan 15, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	0.0028 mV/V	0.02 % FS	0.07 % FS	1.9757 mV/V	0.00 % FS
FY	200.0 lbf	-0.0019 mV/V	0.04 % FS	0.05 % FS	1.9803 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0132 mV/V	0.04 % FS	0.04 % FS	-0.8590 mV/V	0.00 % FS
MX	500.0 in-lbf	-0.0079 mV/V	0.16 % FS	0.38 % FS	1.2889 mV/V	0.00 % FS
MY	500.0 in-lbf	-0.0228 mV/V	0.29 % FS	0.25 % FS	1.3061 mV/V	0.00 % FS
MZ	300.0 in-lbf	-0.0091 mV/V	0.06 % FS	0.65 % FS	1.4120 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	147.2 lbf	700.0 Ohms
FY	120.0 K Ohms	147.1 lbf	700.0 Ohms
FZ	300.0 K Ohms	-340.6 lbf	700.0 Ohms
MX	80.0 K Ohms	429.1 in-lbf	350.0 Ohms
MY	80.0 K Ohms	424.6 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	231.1 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by _____

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/15/02 10:38:23

Creating the Standard in Safety Measurement Since 1974

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	C2632002	This Calibration	10:27:27	Jan 15, 2002
Model Number	2554A	Calibration Due		Jan 15, 2003
Serial Number	280	Last Calibrated		Jan 15, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.6 / 33.5
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	200.0	lbf	1.9757	0.0098785	0.02	0.07	0.00
FY	200.0	lbf	1.9803	0.0099016	0.04	0.05	0.00
FZ	500.0	lbf	-0.8590	-0.0017181	0.04	0.04	0.00
MX	500.0	in-lbf	1.2889	0.0025778	0.16	0.38	1.00
MY	500.0	in-lbf	1.3061	0.0026123	0.29	0.25	1.00
MZ	300.0	in-lbf	1.4120	0.0047068	0.06	0.65	1.50

Bridge Unbalance

FX Axis	0.0028 mV/V
FY Axis	-0.0019 mV/V
FZ Axis	-0.0132 mV/V
MX Axis	-0.0079 mV/V
MY Axis	-0.0228 mV/V
MZ Axis	-0.0091 mV/V

Linearization

Force (	FX	)	=	0.0	+	101.2	*	Output (mV/V)
Force (	FY	)	=	0.0	+	101.0	*	Output (mV/V)
Force (	FZ	)	=	0.1	+	-582.0	*	Output (mV/V)
Force (	MX	)	=	-0.4	+	387.9	*	Output (mV/V)
Force (	MY	)	=	-0.4	+	382.5	*	Output (mV/V)
Force (	MZ	)	=	0.1	+	212.4	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	C2632002	This Calibration	10:27:27	Jan 15, 2002
Model Number	2554A	Calibration Due		Jan 15, 2003
Serial Number	280	Last Calibrated		Jan 15, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.6 / 33.5
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	1.9757	-0.0109	-0.0027	0.0012	-0.0102	-0.0019
FY	200.0 lbf	0.0168	1.9803	-0.0092	0.0073	-0.0017	-0.0111
FZ	500.0 lbf	0.0049	-0.0005	-0.8590	-0.0065	0.0035	0.0130
MX	500.0 in-lbf	0.0039	0.0098	-0.8568	1.2889	0.0067	0.0276
MY	500.0 in-lbf	0.0077	0.0141	-0.8521	-0.0064	1.3061	-0.0139
MZ	300.0 in-lbf	0.0169	1.9700	-0.0103	0.0040	-0.0083	1.4120

% FS Crosstalk *

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	0.00%	-0.55%	0.31%	0.09%	-0.78%	-0.13%
FY	200.0 lbf	0.85%	0.00%	1.07%	0.56%	-0.13%	-0.78%
FZ	500.0 lbf	0.25%	-0.02%	0.00%	-0.51%	0.27%	0.92%
MX	500.0 in-lbf	0.20%	0.49%	0.26%	0.00%	0.51%	1.96%
MY	500.0 in-lbf	0.39%	0.71%	0.81%	-0.50%	0.00%	-0.98%
MZ	300.0 in-lbf	0.86%	0.52%	1.20%	0.31%	-0.64%	0.00%

* Percentage crosstalk for force channels applying moments are corrected for the applied force.

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System

Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	C2632002	This Calibration	10:27:27	Jan 15, 2002
Model Number	2554A	Calibration Due		Jan 15, 2003
Serial Number	280	Last Calibrated		Jan 15, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		22.2 / 25.3
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	701.48	701.44	Ohms
Channel 2 FY	701.01	701.02	Ohms
Channel 3 FZ	702.73	702.60	Ohms
Channel 4 MX	355.54	355.49	Ohms
Channel 5 MY	355.69	355.77	Ohms
Channel 6 MZ	700.60	700.49	Ohms

Bridge High Short Measurement**

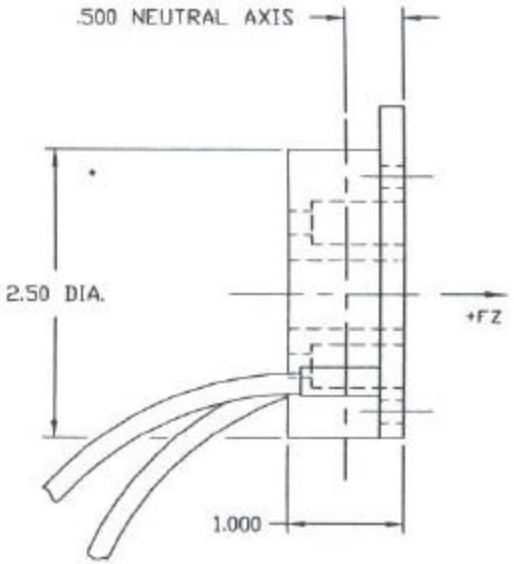
Axis	Bridge to Transducer Body	
Channel 1 FX	>= 5.00	G Ohms (10^9 Ohms)
Channel 2 FY	>= 5.00	G Ohms (10^9 Ohms)
Channel 3 FZ	>= 5.00	G Ohms (10^9 Ohms)
Channel 4 MX	>= 5.00	G Ohms (10^9 Ohms)
Channel 5 MY	>= 5.00	G Ohms (10^9 Ohms)
Channel 6 MZ	>= 5.00	G Ohms (10^9 Ohms)

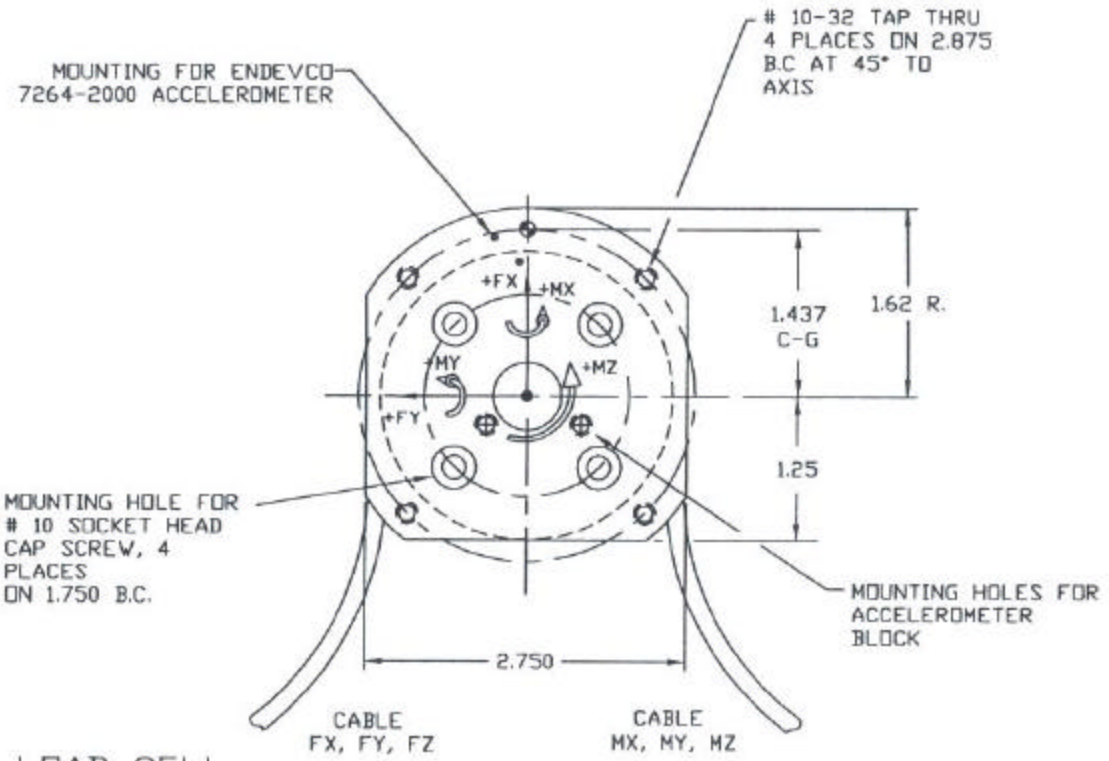
Measurement Equipment	Serial Number	Measurement Accuracy
Keithley Model 7001 Switch System	0698562	N/A
Keithley Model 2000 Multimeter	0643818	±0.045 Ohms/Year @ 23°C ±5°C
Keithley Model 6517A Electrometer/High Resistance Meter	0695446	±(11.25 x 10^6) + 10^5 Ohms/Year @ 18°C-28°C

* 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).





INFANT DUMMY 6-CHANNEL LOAD CELL

AXIS	CAPACITY	OUTPUT @ CAPACITY	MODEL 2554 BRIDGE RESISTANCE	MODEL 2554A BRIDGE RESISTANCE
FX	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FY	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FZ	500 LBS.	.8 mV/V NOMINAL	480 OHMS	700 OHMS
MX	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MY	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MZ	300 LB.-IN.	1.3 mV/V NOMINAL	700 OHMS	700 OHMS

NONLINEARITY < 1% OF FULL SCALE
CROSSTALK < 5% OF FULL SCALE
WEIGHT - 0.30 LBS. NOMINAL (C)

NOTE:
THIS LOAD CELL IS UTILIZED IN THE UPPER NECK, LOWER NECK AND LUMBAR SPINE OF THE INFANT DUMMY. FX AND MX POLARITY WILL CHANGE BASED ON MOUNTING LOCATION.

SYM	REVISION	DATE
C	WAS .40 LBS.	4/99
B	WAS DRG. B-2554	4/99
A	ADD WEIGHT SPEC	12/98

INFANT DUMMY LOAD CELL

SCALE: FULL
DATE: 10/18/91
DRAWN BY: C.R. MORGAN
MODEL: 2554

UNLESS OTHERWISE SPECIFIED
TWO PLACE DECIMALS ± .010
THREE PLACE DECIMALS ± .005
ANGLES ± 0° 30'
SURFACE FINISH 125
REMOVE ALL BURRS & SHARP EDGES
DIMENSION LIMITS HELD AFTER PLATING

ROBERT A. DENTON, INC.
ROCHESTER HILLS, MICHIGAN

DRAWING NUMBER: B-2554-D

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

Crabi #017

283

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	C2633005	Date Jan 16, 2002 Due	Jan 16, 2003
Model No.	2554A	Serial No.	283
Technician	J. Kovalchuk	Temp (C) / Hum. (%)	22.6 / 26.9
Customer	VRTC	Last Calibrated	Jan 16, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	0.0003 mV/V	0.04 % FS	0.04 % FS	1.9630 mV/V	0.00 % FS
FY	200.0 lbf	0.0028 mV/V	0.05 % FS	0.06 % FS	1.9697 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0159 mV/V	0.02 % FS	0.05 % FS	-0.8627 mV/V	0.00 % FS
MX	500.0 in-lbf	0.0008 mV/V	0.11 % FS	0.20 % FS	1.3043 mV/V	0.00 % FS
MY	500.0 in-lbf	0.0074 mV/V	0.18 % FS	0.41 % FS	1.2928 mV/V	0.00 % FS
MZ	300.0 in-lbf	0.0109 mV/V	0.14 % FS	0.19 % FS	1.3871 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	149.0 lbf	700.0 Ohms
FY	120.0 K Ohms	148.4 lbf	700.0 Ohms
FZ	300.0 K Ohms	-339.1 lbf	700.0 Ohms
MX	80.0 K Ohms	425.8 in-lbf	350.0 Ohms
MY	80.0 K Ohms	429.1 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	237.5 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by

Robert A. Denton, Inc. Authorized Representative

File UCALRPT.FPC 01/16/02 13:32:50

Page 1 of 1

Creating the Standard in Safety Measurement Since 1974

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	C2633005	This Calibration	13:20:36	Jan 16, 2002
Model Number	2554A	Calibration Due		Jan 16, 2003
Serial Number	283	Last Calibrated		Jan 16, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.6 / 26.9
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	200.0 lbf	1.9630	0.0098149	0.04	0.04	0.00
FY	200.0 lbf	1.9697	0.0098486	0.05	0.06	0.00
FZ	500.0 lbf	-0.8627	-0.0017255	0.02	0.05	0.00
MX	500.0 in-lbf	1.3043	0.0026086	0.11	0.20	1.00
MY	500.0 in-lbf	1.2928	0.0025857	0.18	0.41	1.00
MZ	300.0 in-lbf	1.3871	0.0046236	0.14	0.19	1.50

Bridge Unbalance

FX Axis	0.0003 mV/V
FY Axis	0.0028 mV/V
FZ Axis	-0.0159 mV/V
MX Axis	0.0008 mV/V
MY Axis	0.0074 mV/V
MZ Axis	0.0109 mV/V

Linearization

Force (	FX	)	=	0.0	+	101.9	*	Output (mV/V)
Force (	FY	)	=	0.0	+	101.5	*	Output (mV/V)
Force (	FZ	)	=	0.0	+	-579.5	*	Output (mV/V)
Force (	MX	)	=	0.3	+	383.2	*	Output (mV/V)
Force (	MY	)	=	-0.6	+	386.9	*	Output (mV/V)
Force (	MZ	)	=	-0.0	+	216.2	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	C2633005	This Calibration	13:20:36	Jan 16, 2002
Model Number	2554A	Calibration Due		Jan 16, 2003
Serial Number	283	Last Calibrated		Jan 16, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		22.6 / 26.9
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX	FY	FZ	MX	MY	MZ
		200.0 lbf	200.0 lbf	500.0 lbf	500.0 in-lbf	500.0 in-lbf	300.0 in-lbf
FX	200.0 lbf	1.9630	-0.0050	0.0000	-0.0009	-0.0014	0.0047
FY	200.0 lbf	-0.0003	1.9697	-0.0032	0.0114	-0.0019	0.0030
FZ	500.0 lbf	-0.0068	0.0024	-0.8627	0.0212	-0.0025	0.0096
MX	500.0 in-lbf	-0.0111	-0.0008	-0.8541	1.3043	-0.0011	0.0153
MY	500.0 in-lbf	-0.0050	0.0079	-0.8641	0.0137	1.2928	-0.0066
MZ	300.0 in-lbf	0.0095	1.9624	-0.0117	0.0077	-0.0097	1.3871

% FS Crosstalk *

Bridge	Applied Load	FX	FY	FZ	MX	MY	MZ
		200.0 lbf	200.0 lbf	500.0 lbf	500.0 in-lbf	500.0 in-lbf	300.0 in-lbf
FX	200.0 lbf	0.00%	-0.26%	0.00%	-0.07%	-0.11%	0.34%
FY	200.0 lbf	-0.02%	0.00%	0.37%	0.88%	-0.15%	0.22%
FZ	500.0 lbf	-0.35%	0.12%	0.00%	1.62%	-0.20%	0.70%
MX	500.0 in-lbf	-0.56%	-0.04%	1.00%	0.00%	-0.09%	1.10%
MY	500.0 in-lbf	-0.26%	0.40%	0.16%	1.05%	0.00%	-0.48%
MZ	300.0 in-lbf	0.48%	0.37%	1.35%	0.59%	-0.75%	0.00%

* Percentage crosstalk for force channels applying moments are corrected for the applied force.

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System

Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	C2633005	This Calibration	13:20:36	Jan 16, 2002
Model Number	2554A	Calibration Due		Jan 16, 2003
Serial Number	283	Last Calibrated		Jan 16, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		22.3 / 21.2
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	704.05	704.06	Ohms
Channel 2 FY	703.54	703.42	Ohms
Channel 3 FZ	703.44	703.21	Ohms
Channel 4 MX	356.11	356.22	Ohms
Channel 5 MY	356.34	356.38	Ohms
Channel 6 MZ	705.28	705.23	Ohms

Bridge High Short Measurement**

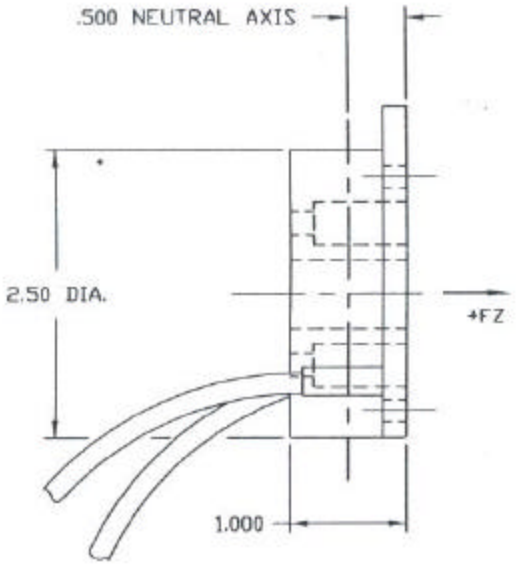
Axis	Bridge to Transducer Body	
Channel 1 FX	>= 5.00	G Ohms (10^9 Ohms)
Channel 2 FY	>= 5.00	G Ohms (10^9 Ohms)
Channel 3 FZ	>= 5.00	G Ohms (10^9 Ohms)
Channel 4 MX	>= 5.00	G Ohms (10^9 Ohms)
Channel 5 MY	>= 5.00	G Ohms (10^9 Ohms)
Channel 6 MZ	>= 5.00	G Ohms (10^9 Ohms)

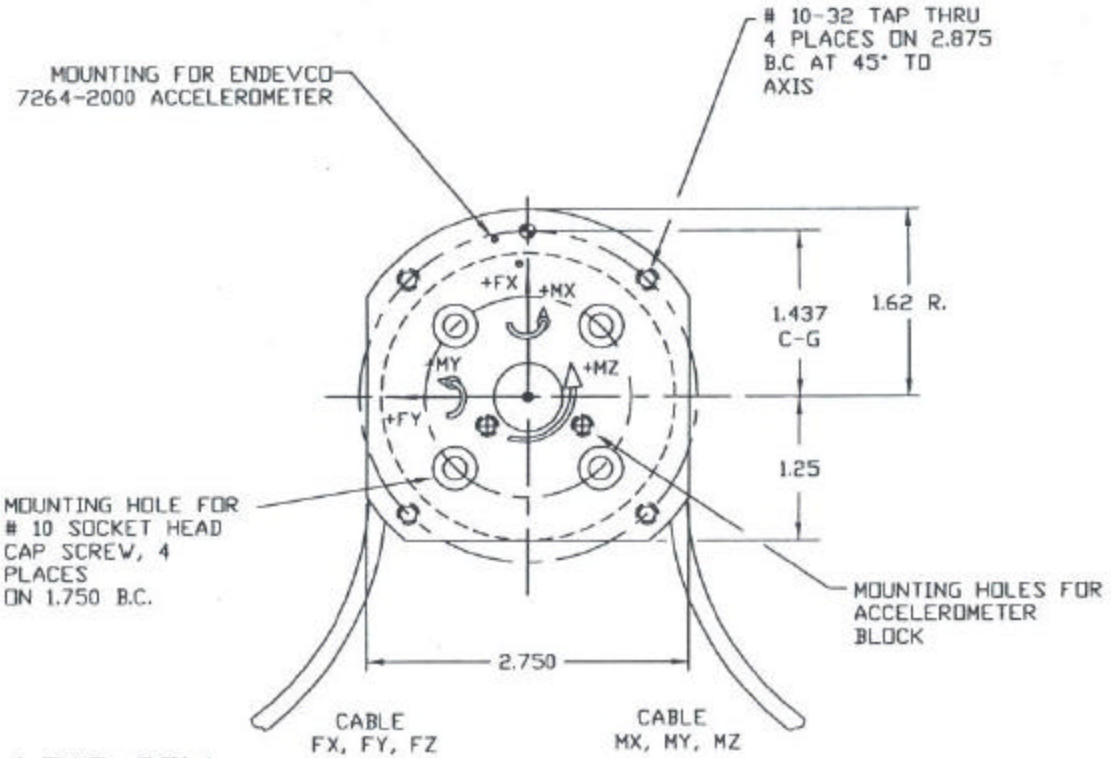
Measurement Equipment	Serial Number	Measurement Accuracy
Keithley Model 7001 Switch System	0698562	N/A
Keithley Model 2000 Multimeter	0643818	±0.045 Ohms/Year @ 23°C ±5°C
Keithley Model 6517A Electrometer/High Resistance Meter	0695446	±(11.25 x 10^6) + 10^5 Ohms/Year @ 18°C-28°C

* 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).





INFANT DUMMY 6-CHANNEL LOAD CELL

AXIS	CAPACITY	OUTPUT @ CAPACITY	MODEL 2554 BRIDGE RESISTANCE	MODEL 2554A BRIDGE RESISTANCE
FX	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FY	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FZ	500 LBS.	.8 mV/V NOMINAL	480 OHMS	700 OHMS
MX	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MY	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MZ	300 LB.-IN.	1.3 mV/V NOMINAL	700 OHMS	700 OHMS

NONLINEARITY < 1% OF FULL SCALE
CROSSTALK < 5% OF FULL SCALE
WEIGHT - 0.30 LBS. NOMINAL (C)

NOTE:
THIS LOAD CELL IS UTILIZED IN THE UPPER NECK, LOWER NECK AND LUMBAR SPINE OF THE INFANT DUMMY. FX AND MX POLARITY WILL CHANGE BASED ON MOUNTING LOCATION.

SYM	REVISION	DATE
C	WAS .40 LBS.	4/99
B	WAS DRG. B-2554	4/99
A	ADD WEIGHT SPEC	12/98

INFANT DUMMY LOAD CELL

SCALE: FULL | DRAWN BY: C.R. MORGAN
DATE: 10/18/91 | MODEL: 2554

UNLESS OTHERWISE SPECIFIED
TWO PLACE DECIMALS ± .010
THREE PLACE DECIMALS ± .005
ANGLES ± 0° 30'
SURFACE FINISH 125
REMOVE ALL BURRS & SHARP EDGES
DIMENSION LIMITS HELD AFTER PLATING

ROBERT A. DENTON, INC.
ROCHESTER HILLS, MICHIGAN

DRAWING NUMBER: B-2554-D

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

Crab: #017

Upper Neck

Calibration Report

Uni-Directional Calibration

Automated Load Cell Calibration System

Copyright (c) 1987-2000 Robert A. Denton, Inc.

Calibration No.	A2631002	Date Jan 14, 2002 Due	Jan 14, 2003
Model No.	2554A	Serial No.	277
Technician	B. Biermacher	Temp (C) / Hum. (%)	21.9 / 28.1
Customer	VRTC	Last Calibrated	Jan 14, 2002
Description	Infant Neck	Customer Tag Number	N/A

Voltage Calibration

Bridge	Capacity	Zero Offset	Nonlinearity	Hysteresis	Output @ Capacity	% Change
FX	200.0 lbf	0.0096 mV/V	0.14 % FS	0.06 % FS	1.9565 mV/V	0.00 % FS
FY	200.0 lbf	-0.0035 mV/V	0.08 % FS	0.11 % FS	1.9620 mV/V	0.00 % FS
FZ	500.0 lbf	-0.0230 mV/V	0.20 % FS	0.06 % FS	-0.8538 mV/V	0.00 % FS
MX	500.0 in-lbf	0.0022 mV/V	0.33 % FS	0.55 % FS	1.3113 mV/V	0.00 % FS
MY	500.0 in-lbf	0.0112 mV/V	0.08 % FS	0.92 % FS	1.2882 mV/V	0.00 % FS
MZ	300.0 in-lbf	0.0879 mV/V	0.22 % FS	0.91 % FS	1.3871 mV/V	0.00 % FS

Shunt

Bridge	Shunt Value	Equivalent Load	Bridge Resistance (nom)
FX	120.0 K Ohms	148.8 lbf	700.0 Ohms
FY	120.0 K Ohms	148.3 lbf	700.0 Ohms
FZ	300.0 K Ohms	-342.6 lbf	700.0 Ohms
MX	80.0 K Ohms	422.6 in-lbf	350.0 Ohms
MY	80.0 K Ohms	429.7 in-lbf	350.0 Ohms
MZ	160.0 K Ohms	236.4 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
Revere	363-B10-500-20P1	H607172L	Jul 24, 2002

Calibrated by _____ GS

Robert A. Denton, Inc. Authorized Representative

File: UCALRPT.FPC 01/14/02 09:50:06

CALIBRATION REPORT

Uni-Directional Calibration
Loading Sequence Summary

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

Calibration Number	A2631002	This Calibration	09:35:00	Jan 14, 2002
Model Number	2554A	Calibration Due		Jan 14, 2003
Serial Number	277	Last Calibrated		Jan 14, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.9 / 28.1
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	200.0 lbf	1.9565	0.0097824	0.14	0.06	0.00
FY	200.0 lbf	1.9620	0.0098102	0.08	0.11	0.00
FZ	500.0 lbf	-0.8538	-0.0017076	0.20	0.06	0.00
MX	500.0 in-lbf	1.3113	0.0026226	0.33	0.55	1.00
MY	500.0 in-lbf	1.2882	0.0025763	0.08	0.92	1.00
MZ	300.0 in-lbf	1.3871	0.0046238	0.22	0.91	1.50

Bridge Unbalance

FX Axis	0.0096 mV/V
FY Axis	-0.0035 mV/V
FZ Axis	-0.0230 mV/V
MX Axis	0.0022 mV/V
MY Axis	0.0112 mV/V
MZ Axis	0.0879 mV/V

Linearization

Force (	FX	)	=	0.2	+	102.2	*	Output (mV/V)
Force (	FY	)	=	0.1	+	101.9	*	Output (mV/V)
Force (	FZ	)	=	-0.2	+	-585.2	*	Output (mV/V)
Force (	MX	)	=	0.8	+	381.1	*	Output (mV/V)
Force (	MY	)	=	0.2	+	387.8	*	Output (mV/V)
Force (	MZ	)	=	0.4	+	216.1	*	Output (mV/V)

CALIBRATION REPORT

Uni-Directional Calibration
Crosstalk Summary

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

Calibration Number	A2631002	This Calibration	09:35:00	Jan 14, 2002
Model Number	2554A	Calibration Due		Jan 14, 2003
Serial Number	277	Last Calibrated		Jan 14, 2002
Description	Infant Neck	Temp (C) / Hum. (%)		21.9 / 28.1
Customer	VRTC	Customer Tag Number		N/A

Raw Crosstalk Data (mV/V)

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	1.9565	-0.0100	0.0041	-0.0062	-0.0079	0.0006
FY	200.0 lbf	-0.0124	1.9620	0.0006	0.0080	0.0029	0.0154
FZ	500.0 lbf	0.0019	-0.0033	-0.8538	0.0201	-0.0120	0.0175
MX	500.0 in-lbf	0.0014	0.0057	-0.8450	1.3113	-0.0070	0.0041
MY	500.0 in-lbf	-0.0068	0.0019	-0.8513	0.0088	1.2882	-0.0150
MZ	300.0 in-lbf	-0.0084	1.9641	0.0099	-0.0046	0.0067	1.3871

% FS Crosstalk *

Bridge	Applied Load	FX 200.0 lbf	FY 200.0 lbf	FZ 500.0 lbf	MX 500.0 in-lbf	MY 500.0 in-lbf	MZ 300.0 in-lbf
FX	200.0 lbf	0.00%	-0.51%	-0.48%	-0.47%	-0.61%	0.05%
FY	200.0 lbf	-0.63%	0.00%	-0.07%	0.61%	0.22%	1.11%
FZ	500.0 lbf	0.10%	-0.17%	0.00%	1.53%	-0.93%	1.26%
MX	500.0 in-lbf	0.07%	0.29%	1.02%	0.00%	-0.54%	0.30%
MY	500.0 in-lbf	-0.35%	0.10%	0.29%	0.67%	0.00%	-1.08%
MZ	300.0 in-lbf	-0.43%	0.10%	-1.16%	-0.35%	0.52%	0.00%

Measurement Report

Load Cell Bridge Impedance Measurement Summary

Automated Load Cell Impedance Measurement System
Copyright © 1998 Robert A. Denton, Inc.

Calibration Number	A2631002	This Calibration	09:35:00	Jan 14, 2002
Model Number	2554A	Calibration Due		Jan 14, 2003
Serial Number	277	Last Calibrated		Jan 14, 2002
Description	Infant Neck	Temp (°C) / Hum (%)		22.5 / 21.4
Customer	VRTC	Customer Tag		N/A

Bridge Impedance Measurements*

Axis	Input Impedance	Output Impedance	
Channel 1 FX	701.06	701.02	Ohms
Channel 2 FY	700.81	700.81	Ohms
Channel 3 FZ	702.23	702.09	Ohms
Channel 4 MX	356.01	355.96	Ohms
Channel 5 MY	355.46	355.49	Ohms
Channel 6 MZ	701.17	701.08	Ohms

Bridge High Short Measurement**

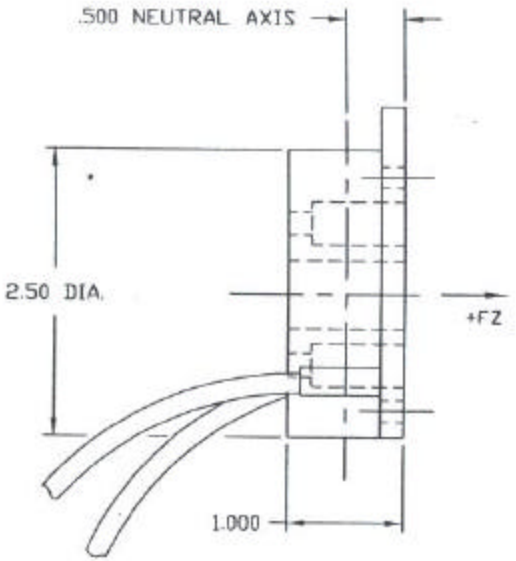
Axis	Bridge to Transducer Body	
Channel 1 FX	>= 5.00	G Ohms (10^9 Ohms)
Channel 2 FY	>= 5.00	G Ohms (10^9 Ohms)
Channel 3 FZ	>= 5.00	G Ohms (10^9 Ohms)
Channel 4 MX	>= 5.00	G Ohms (10^9 Ohms)
Channel 5 MY	>= 5.00	G Ohms (10^9 Ohms)
Channel 6 MZ	>= 5.00	G Ohms (10^9 Ohms)

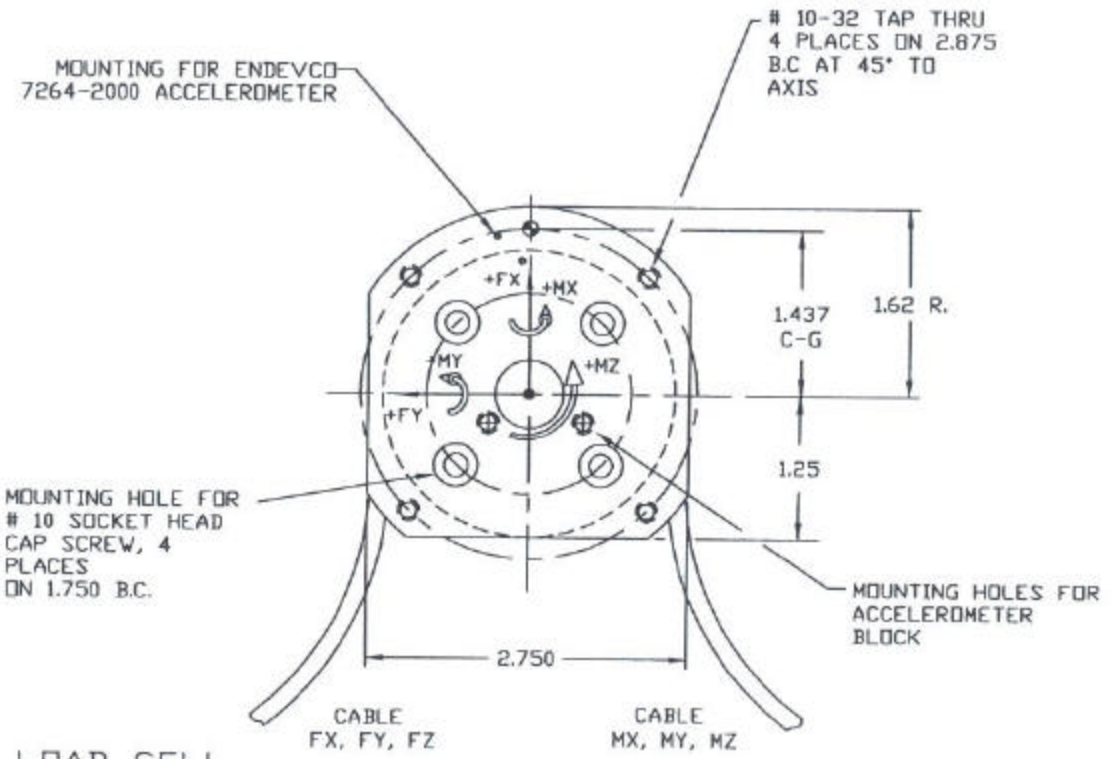
Measurement Equipment	Serial Number	Measurement Accuracy
Keithley Model 7001 Switch System	0698562	N/A
Keithley Model 2000 Multimeter	0643818	±0.045 Ohms/Year @ 23°C ±5°C
Keithley Model 6517A Electrometer/High Resistance Meter	0695446	±(11.25 x 10^6) + 10^5 Ohms/Year @ 18°C-28°C

* 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).





INFANT DUMMY 6-CHANNEL LOAD CELL

AXIS	CAPACITY	OUTPUT @ CAPACITY	MODEL 2554 BRIDGE RESISTANCE	MODEL 2554A BRIDGE RESISTANCE
FX	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FY	200 LBS.	1.8 mV/V NOMINAL	700 OHMS	700 OHMS
FZ	500 LBS.	.8 mV/V NOMINAL	480 OHMS	700 OHMS
MX	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MY	500 LB.-IN.	1.3 mV/V NOMINAL	350 OHMS	350 OHMS
MZ	300 LB.-IN.	1.3 mV/V NOMINAL	700 OHMS	700 OHMS

NONLINEARITY < 1% OF FULL SCALE
CROSSTALK < 5% OF FULL SCALE
WEIGHT - 0.30 LBS. NOMINAL (C)

NOTE:
THIS LOAD CELL IS UTILIZED IN THE UPPER NECK, LOWER NECK AND LUMBAR SPINE OF THE INFANT DUMMY. FX AND MX POLARITY WILL CHANGE BASED ON MOUNTING LOCATION.

SYM	REVISION	DATE
C	WAS .40 LBS.	4/99
B	WAS DRG. B-2554	4/99
A	ADD WEIGHT SPEC	12/98

INFANT DUMMY LOAD CELL

SCALE: FULL
DATE: 10/18/91
DRAWN BY: C.R. MORGAN
MODEL: 2554

UNLESS OTHERWISE SPECIFIED
TWO PLACE DECIMALS ± .010
THREE PLACE DECIMALS ± .005
ANGLES ± 0° 30'
SURFACE FINISH 125
REMOVE ALL BURRS & SHARP EDGES
DIMENSION LIMITS HELD AFTER PLATING

ROBERT A. DENTON, INC.
ROCHESTER HILLS, MICHIGAN

DRAWING NUMBER: B-2554-D

rab: #017
Head X - Forward

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5955

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P16194

Input Resistance (ohms): 522.73
Output Resistance (ohms): 522.69
ZMO (mV): 7.8787
Resonance Frequency (Hz): 27825

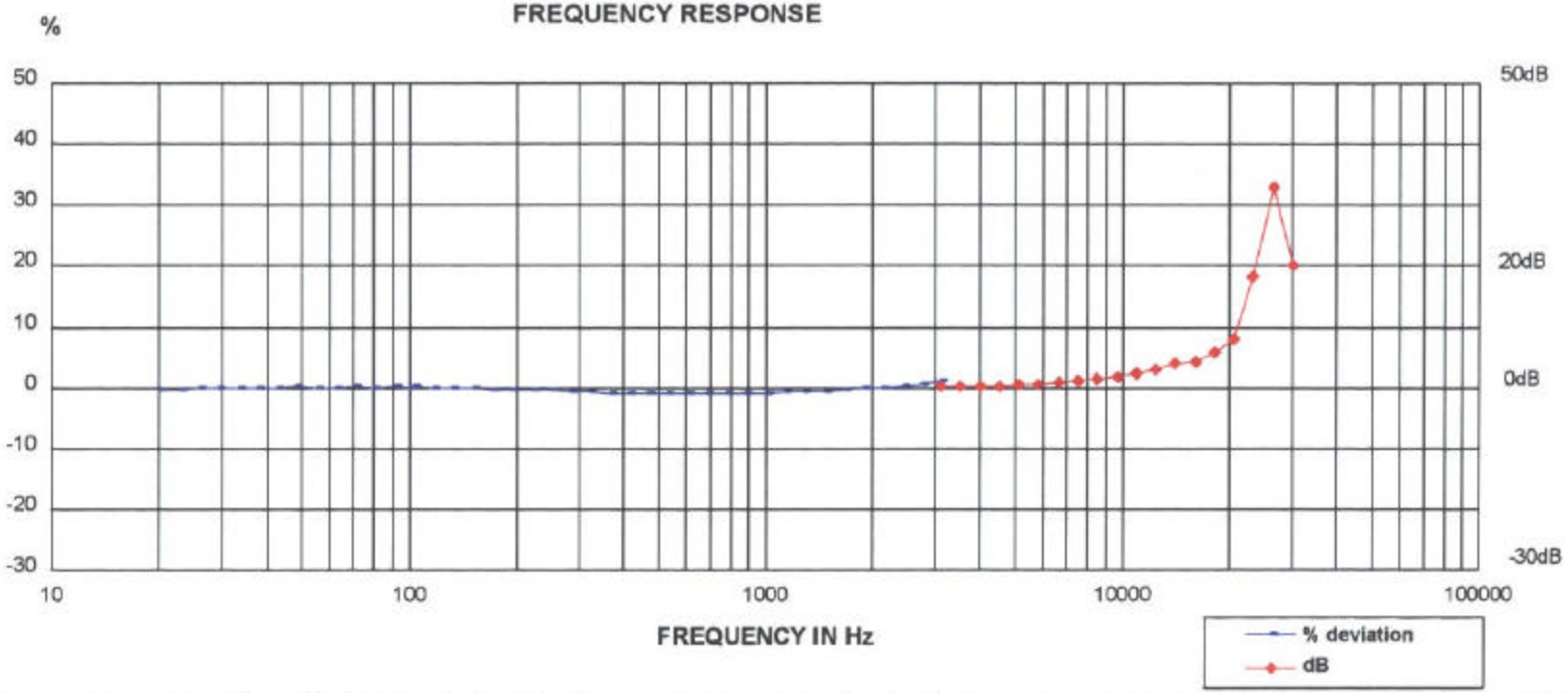
0.1395 mV/g @ 100 Hz, 10g pk

Last Sens: 1.371E-1, Change: 1.75
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crabi #017
Head Y - Left

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5938

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P16428

Input Resistance (ohms): 485.21
Output Resistance (ohms): 485.33
ZMO (mV): -5.984
Resonance Frequency (Hz): 28084

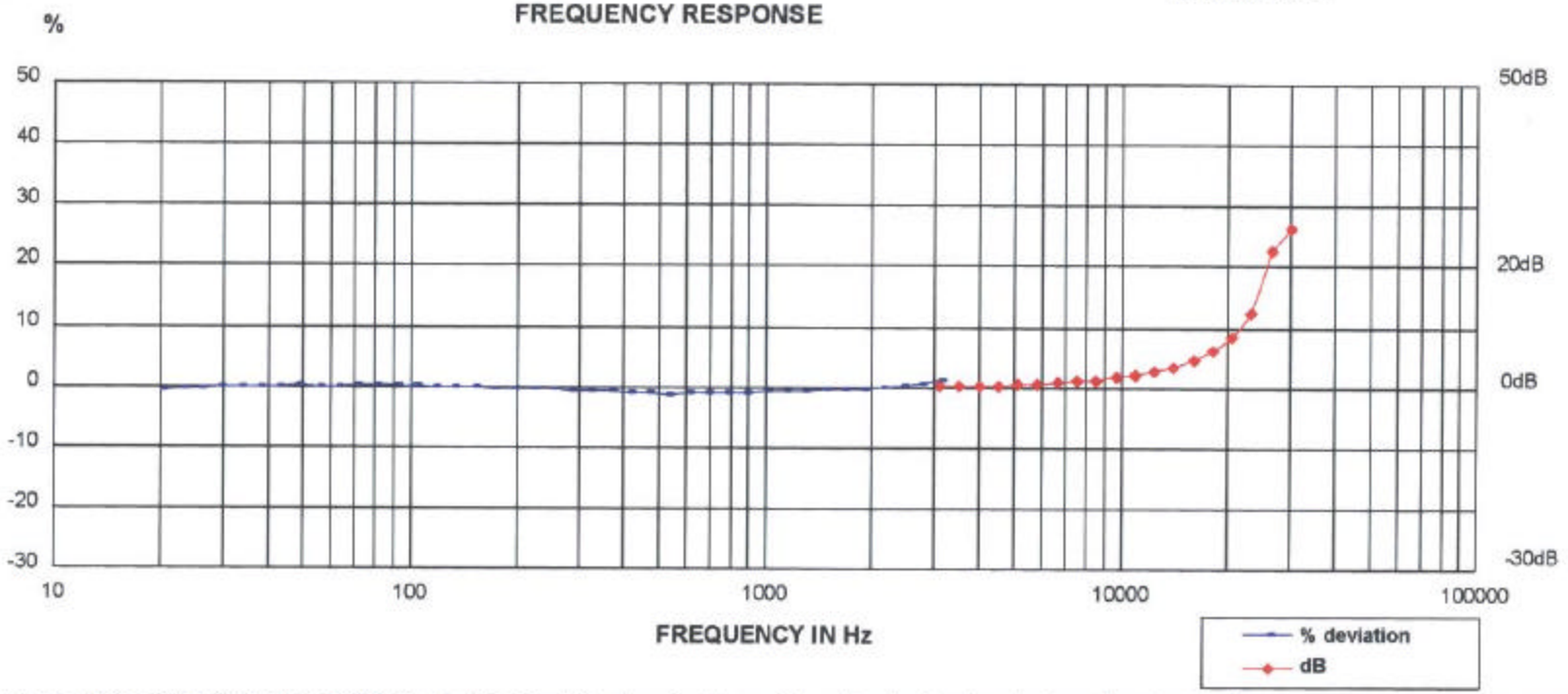
0.1483 mV/g @ 100 Hz, 10g pk

Last Sens: 1.459E-1, Change: 1.64
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

rabi #017

Head Z - Down

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5946

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P16517

Input Resistance (ohms): 537.25
Output Resistance (ohms): 539.22
ZMO (mV): -9.835
Resonance Frequency (Hz): 28314

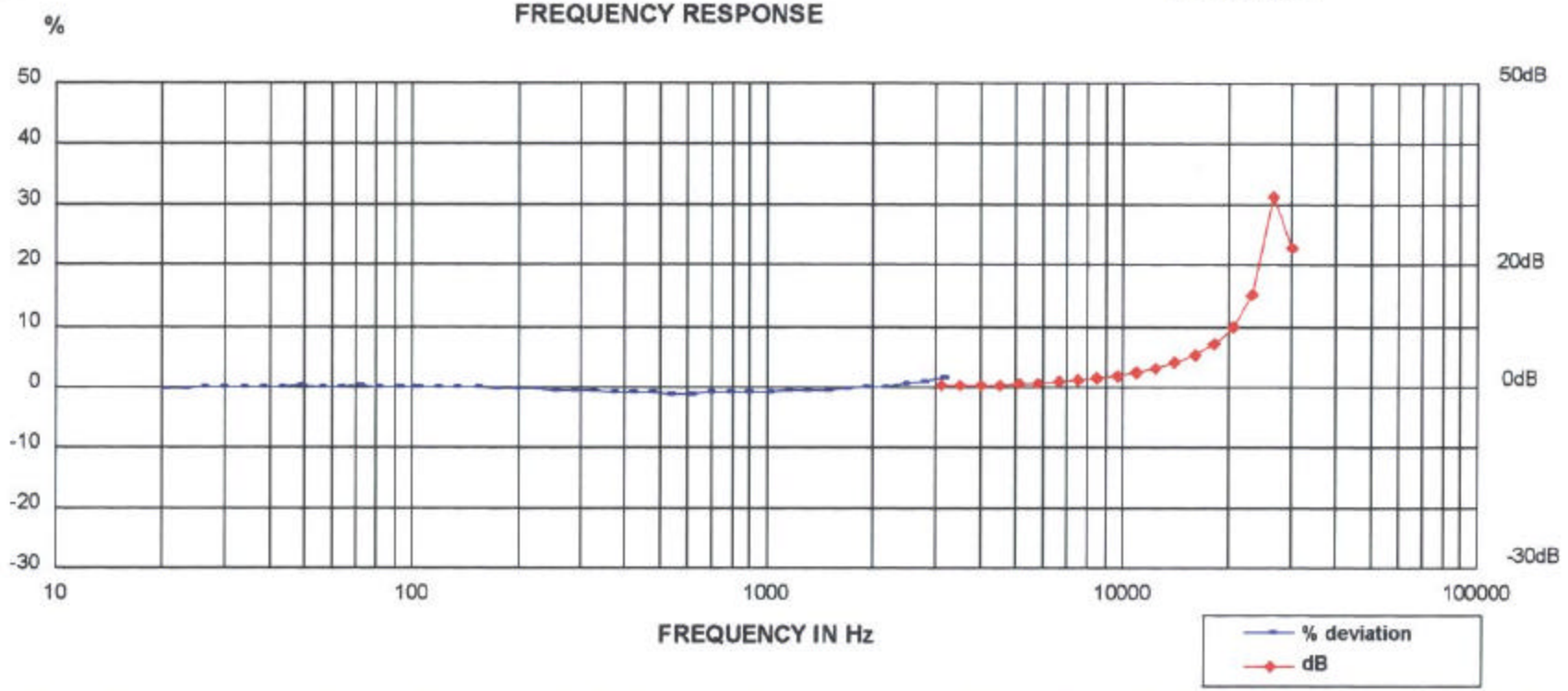
0.1496 mV/g @ 100 Hz, 10g pk

Last Sens: 1.473E-1, Change: 1.6
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

Crabi #017
Chest X - Fwd

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5959

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: J27467

Input Resistance (ohms): 2364.8

ZMO (mV): -12.94
Resonance Frequency (Hz): 27885

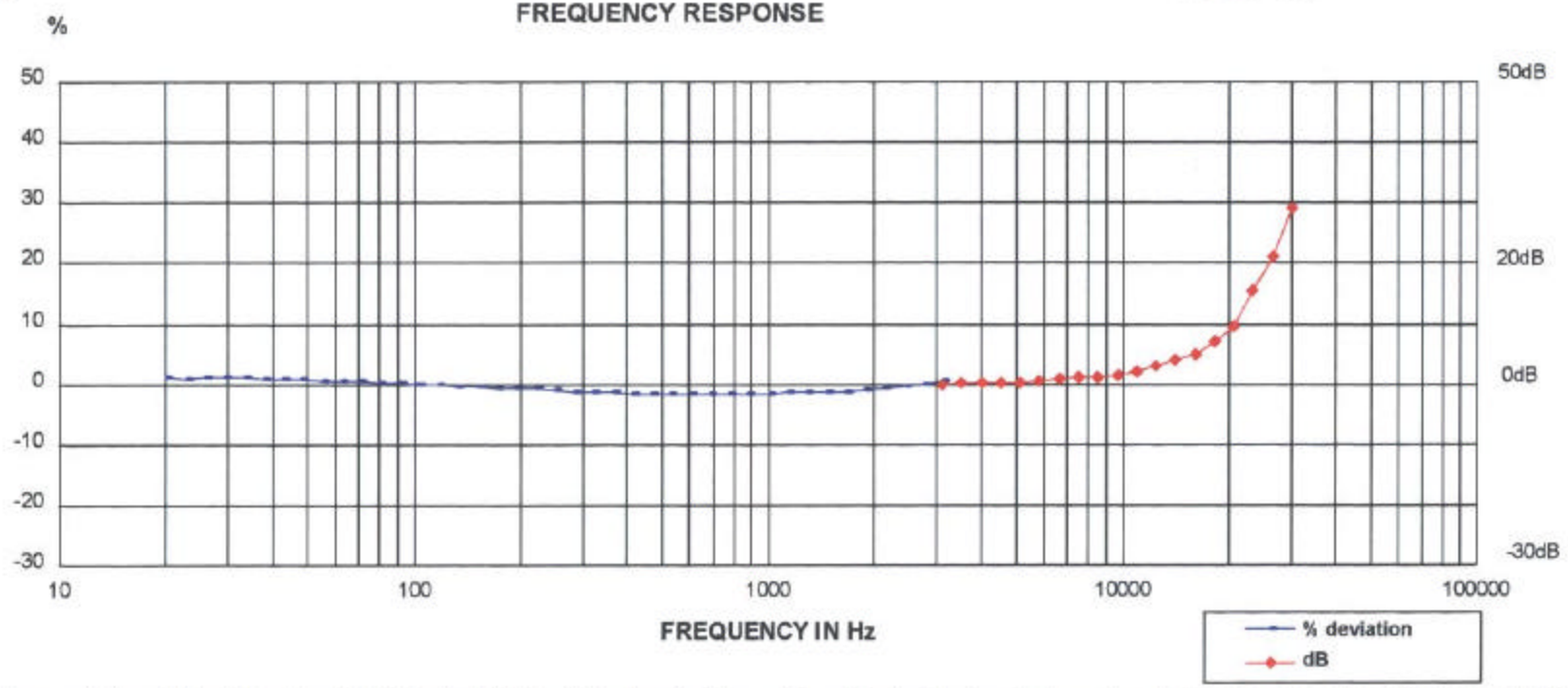
0.2241 mV/g @ 100 Hz, 10g pk

Last Sens: 2.237E-1, Change: 0.18
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crabi #017
Chest Y - Right

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5958

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: AJ4Y5

Input Resistance (ohms): 2487.6

ZMO (mV): -8.321
Resonance Frequency (Hz): 23473

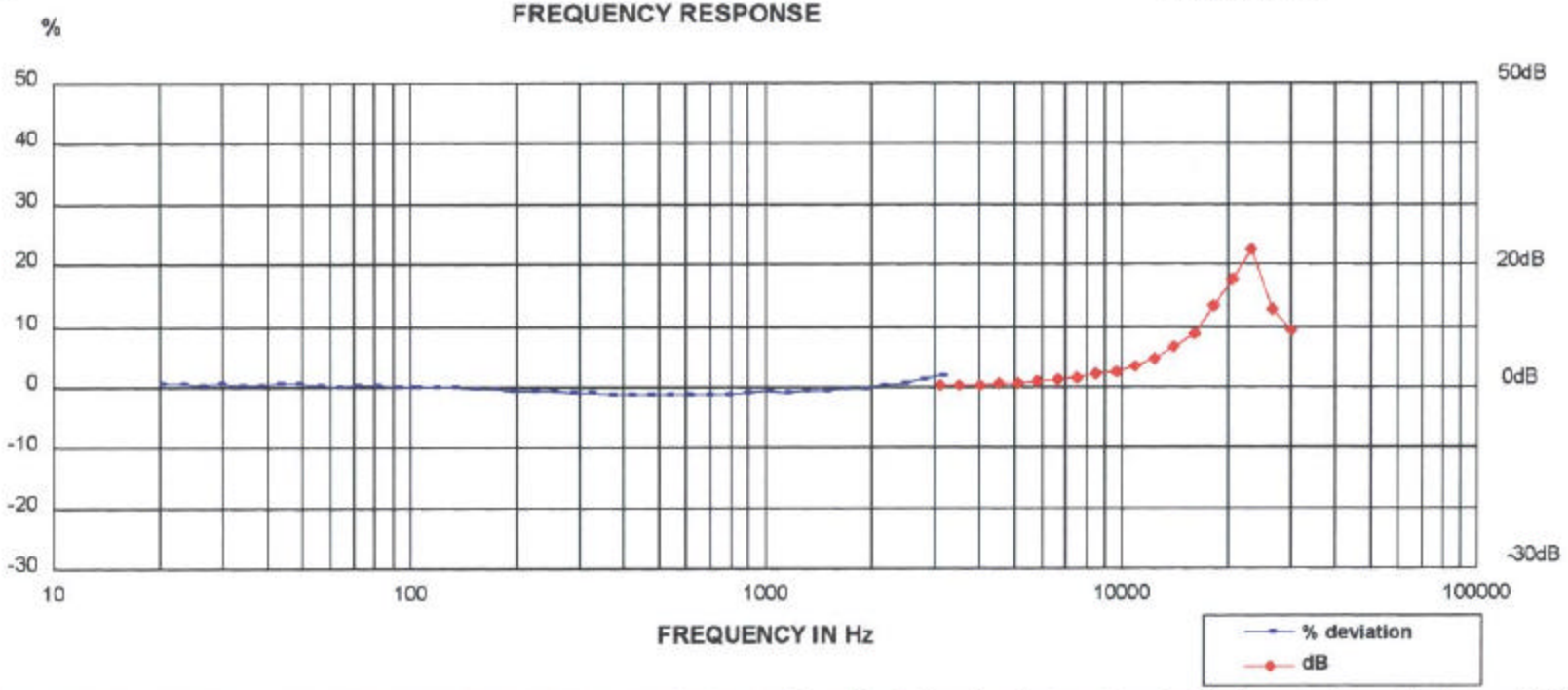
0.2655 mV/g @ 100 Hz, 10g pk

Last Sens: 2.645E-1, Change: 0.39
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crabi #017
Chest z-up

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5941

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P17559

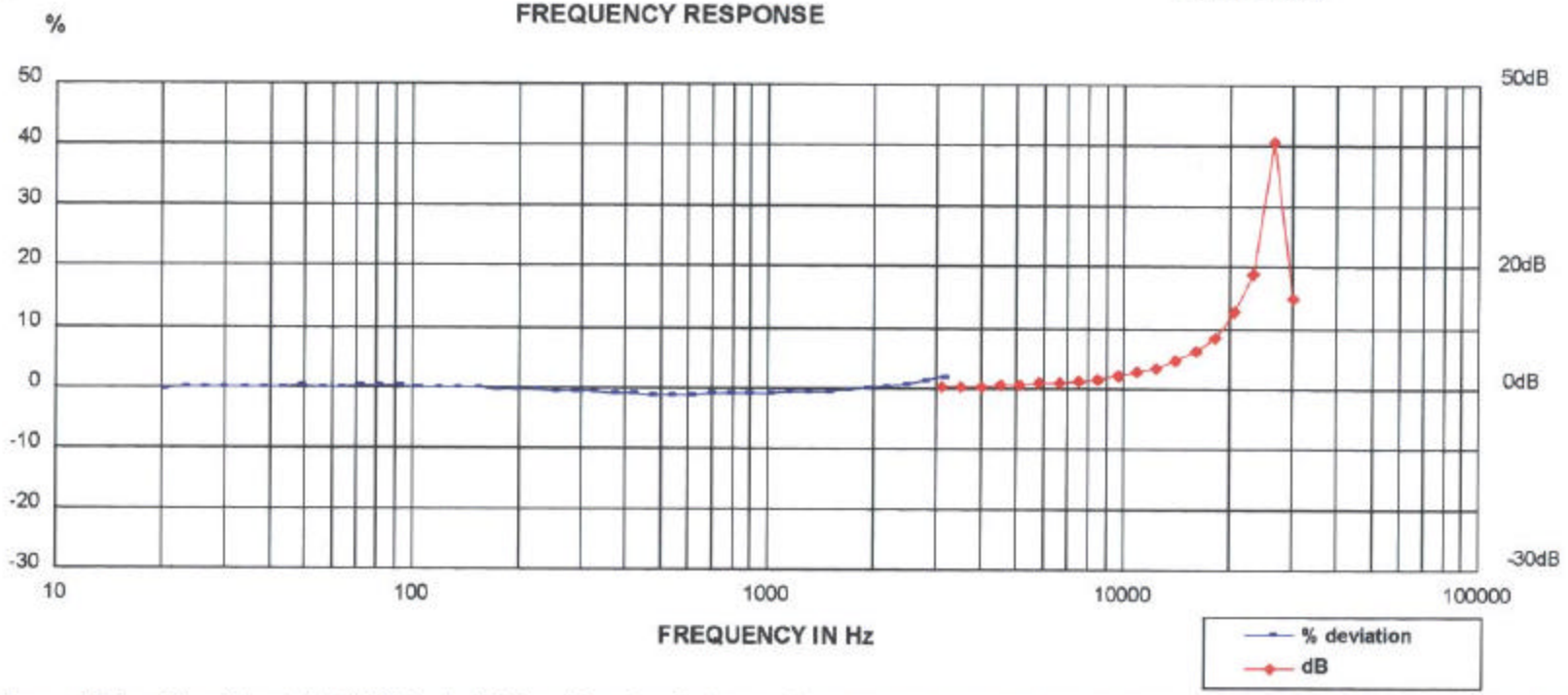
Input Resistance (ohms): 491.89
Output Resistance (ohms): 491.09
ZMO (mV): -3.179
Resonance Frequency (Hz): 27054

0.14 mV/g @ 100 Hz, 10g pk

Last Sens: 1.378E-1, Change: 1.62
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco

Crabi #017
Pelvis X - Rear

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5942

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P15856

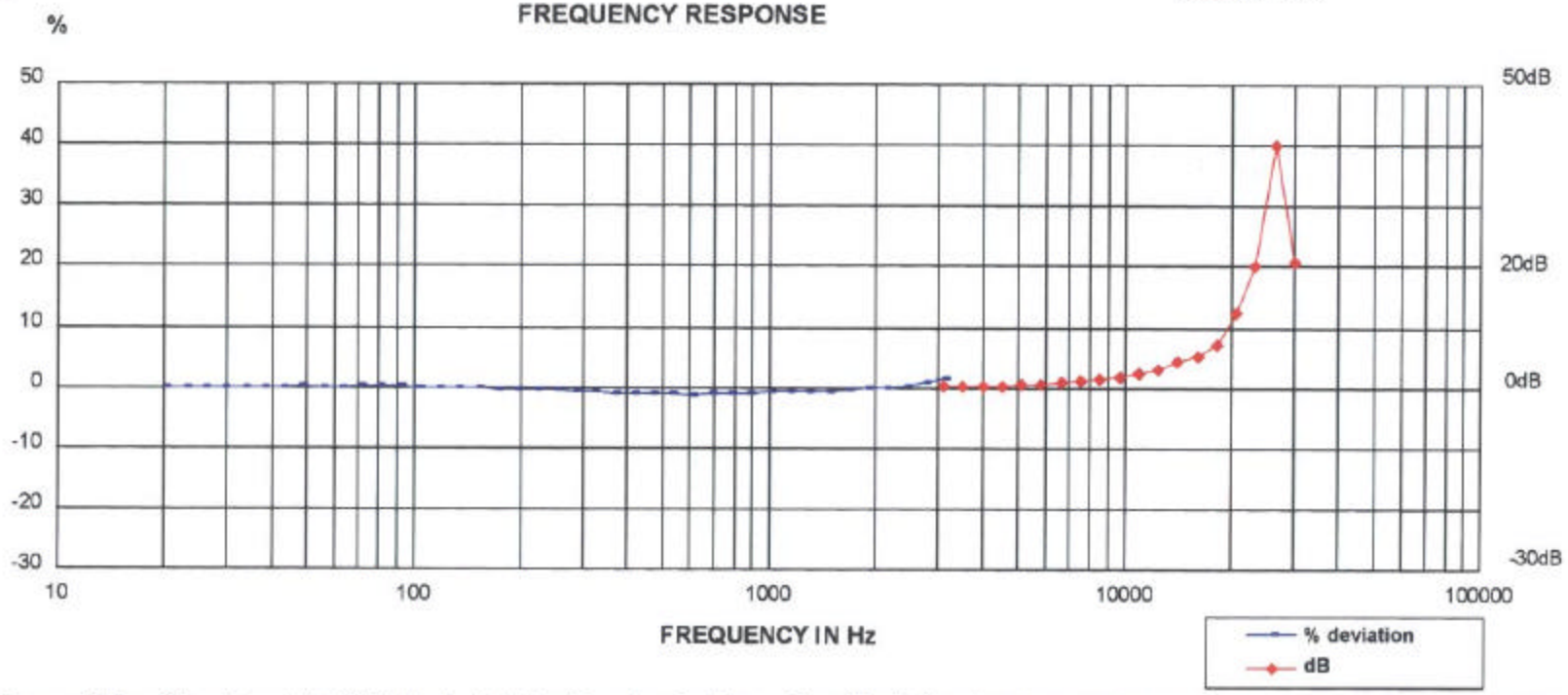
Input Resistance (ohms): 543.75
Output Resistance (ohms): 546.30
ZMO (mV): 10.56
Resonance Frequency (Hz): 27530

0.1461 mV/g @ 100 Hz, 10g pk

Last Sens: 1.439E-1, Change: 1.56
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crab: #017
Pelvis Y - Left

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5957

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264-2KM5T
Serial Number: J27496

Input Resistance (ohms): 2694.9

ZMO (mV): 7.2351
Resonance Frequency (Hz): 25622

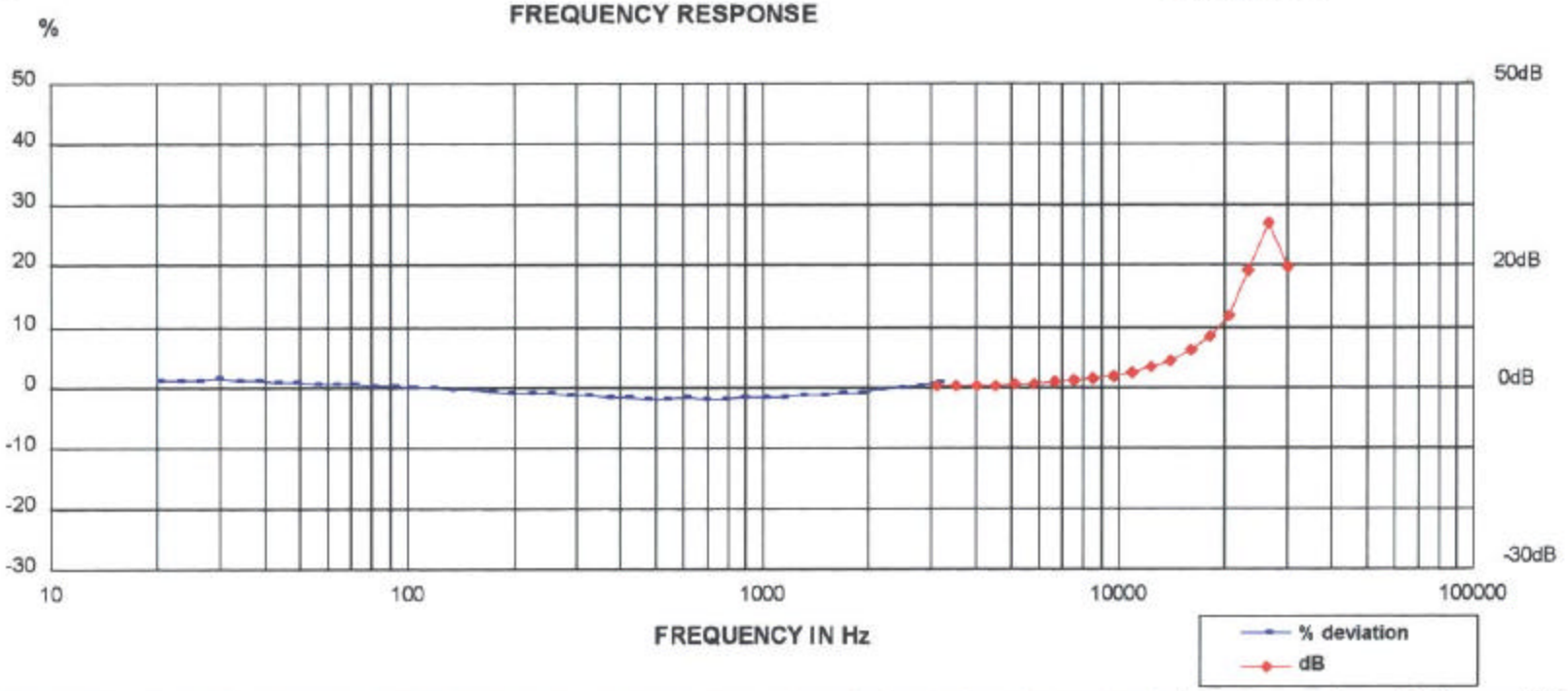
0.2795 mV/g @ 100 Hz, 10g pk

Last Sens: 2.795E-1, Change: 0.007
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

Crash #017
Pelvis z-up

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5952

Description: VRTC - Accelerometer
Manufacturer: ENDEVCO
Model Number: 7264C-2KLC-2-240
Serial Number: P15638

Input Resistance (ohms): 527.62
Output Resistance (ohms): 527.76
ZMO (mV): -0.423
Resonance Frequency (Hz): 28532

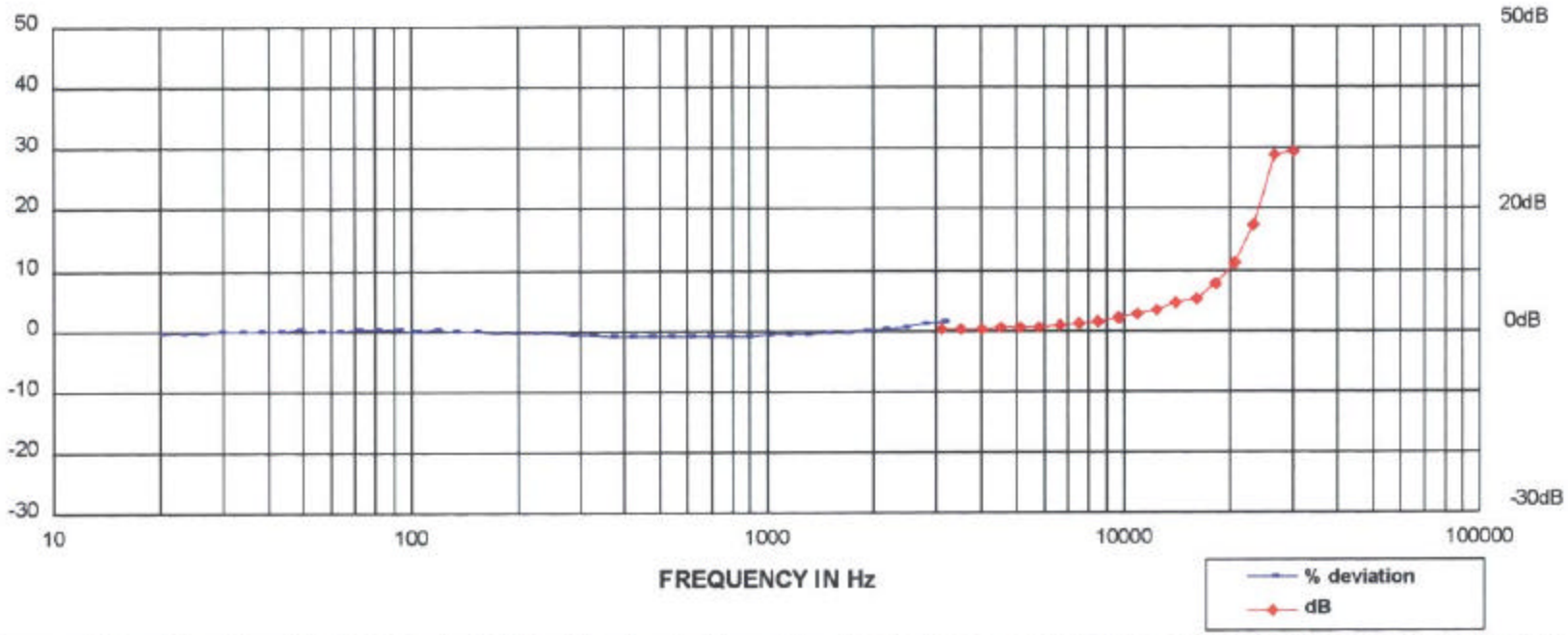
0.141 mV/g @ 100 Hz, 10g pk

Last Sens: 1.410E-1, Change: -0.04
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco

2b. #017
Head Red Z-up

Calibration Certificate

Customer: VRTC
20010620-0250

Document number: 5964

Description: VRTC - Accelerometer
Manufacturer: ENTRAN
Model Number: EGE-73BQE0-2000BF
Serial Number: 99H30-Z07

Input Resistance (ohms): 973.91

ZMO (mV): 15.817
Resonance Frequency (Hz): 19489

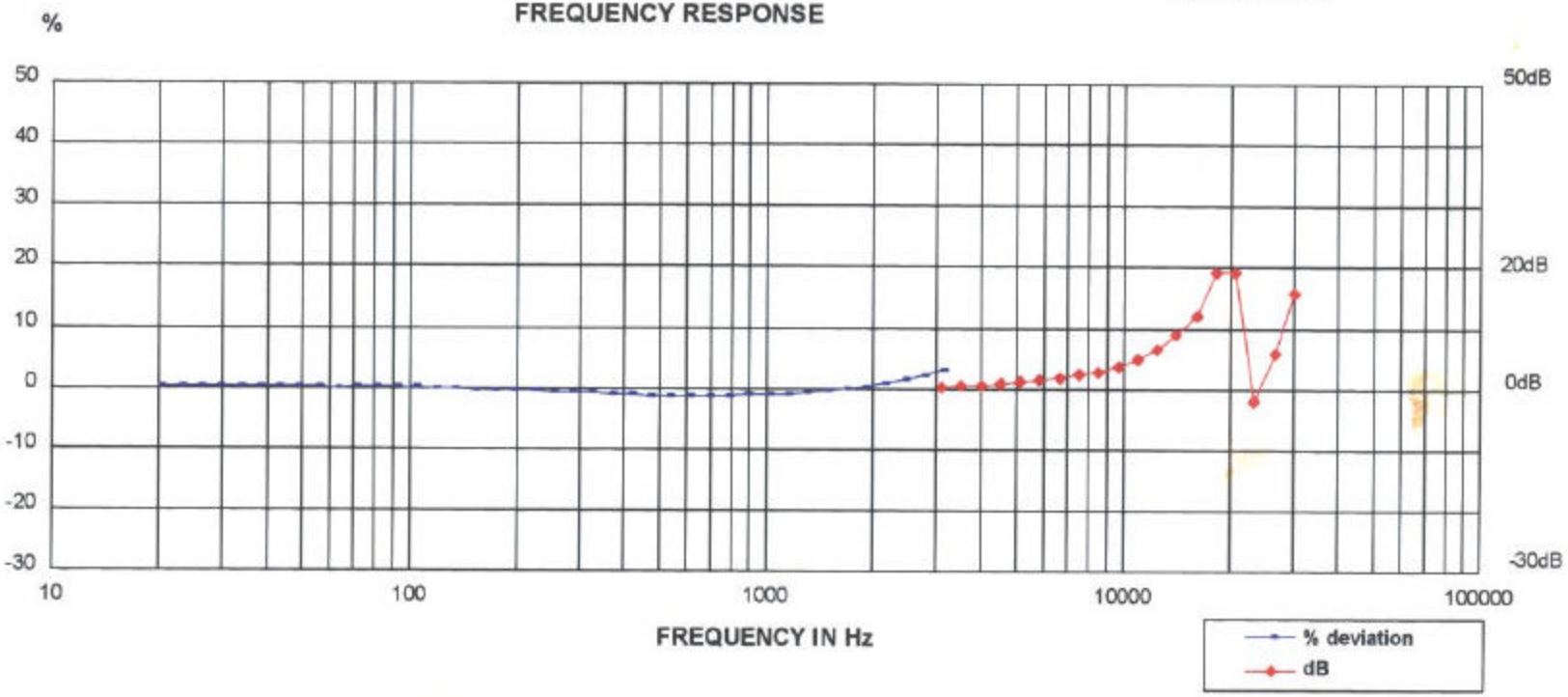
0.1994 mV/g @ 100 Hz, 10g pk

Last Sens: 1.959E-1, Change: 1.82
Next cal date: 1/14/2003

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: 1/14/2002

Endevco
Transportation Research Center

EDxxx Rev x_eg

This certificate shall not be reproduced, except in full, without the written approval of Endevco.

TRANSPORTATION RESEARCH CENTER INC.

FRONTAL HEAD DROP TEST

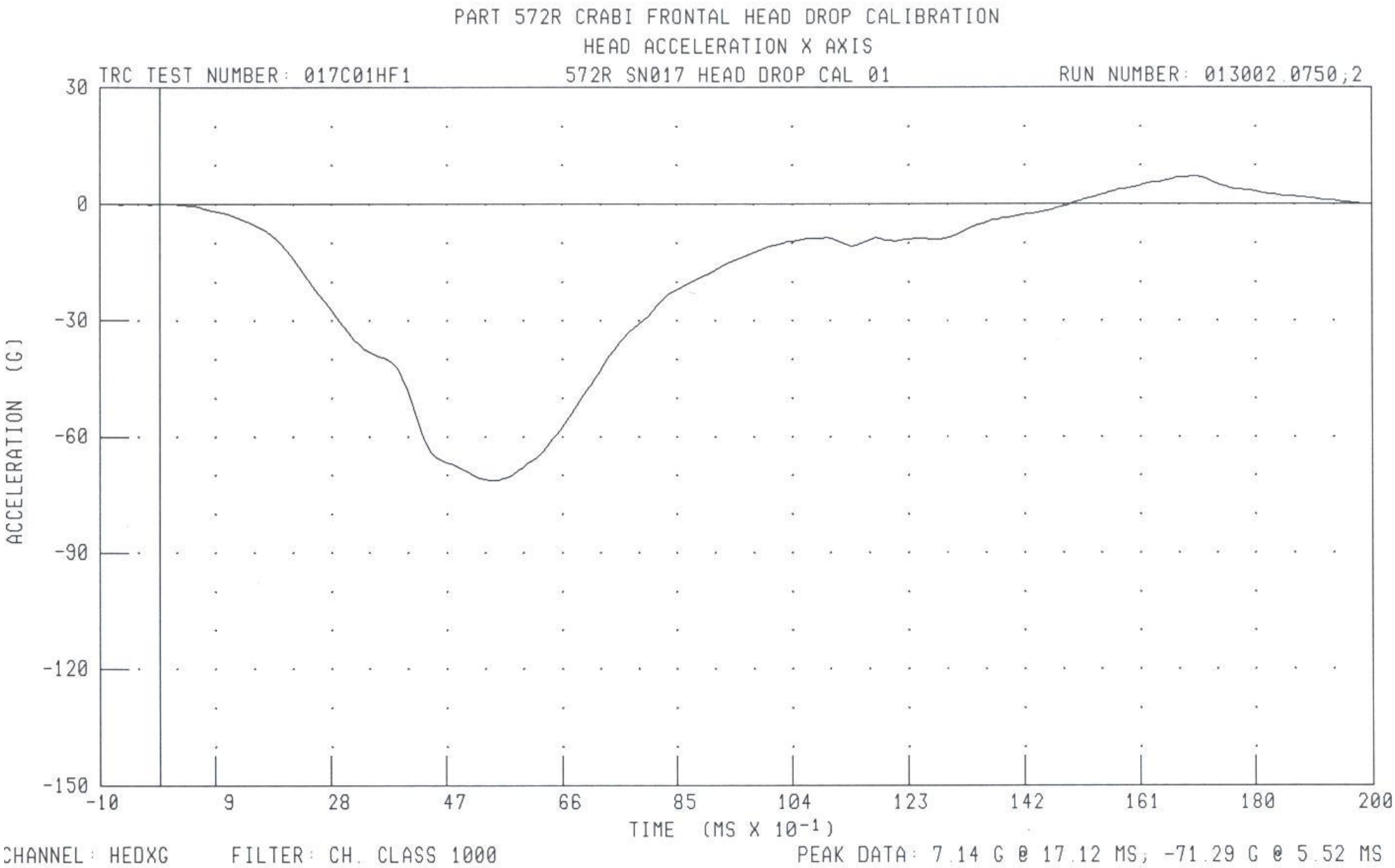
CRABI 12-MONTH 30-JAN-02

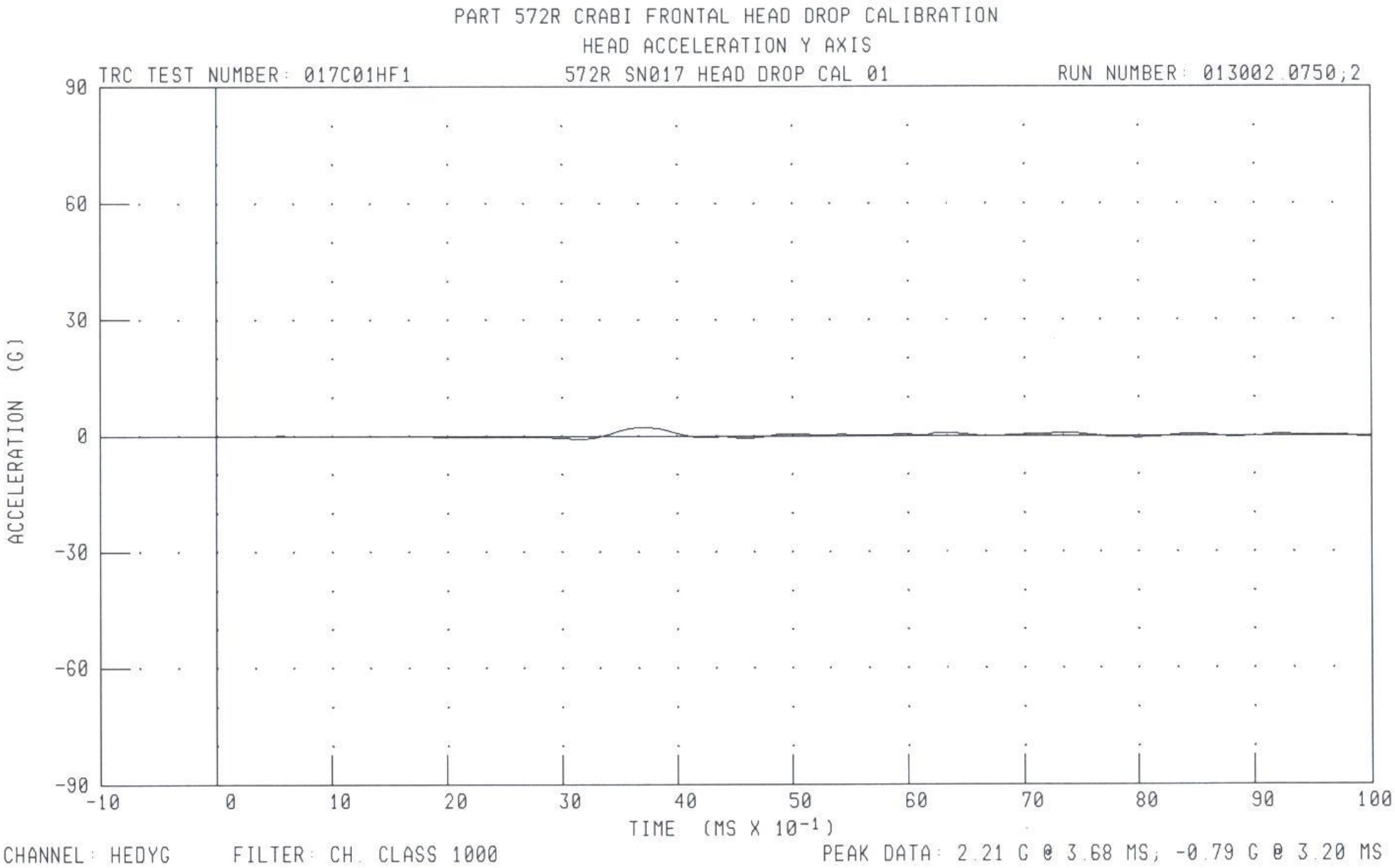
TRC INC. TEST NO: 017C01HF1 572R SN017 HEAD DROP CAL 01

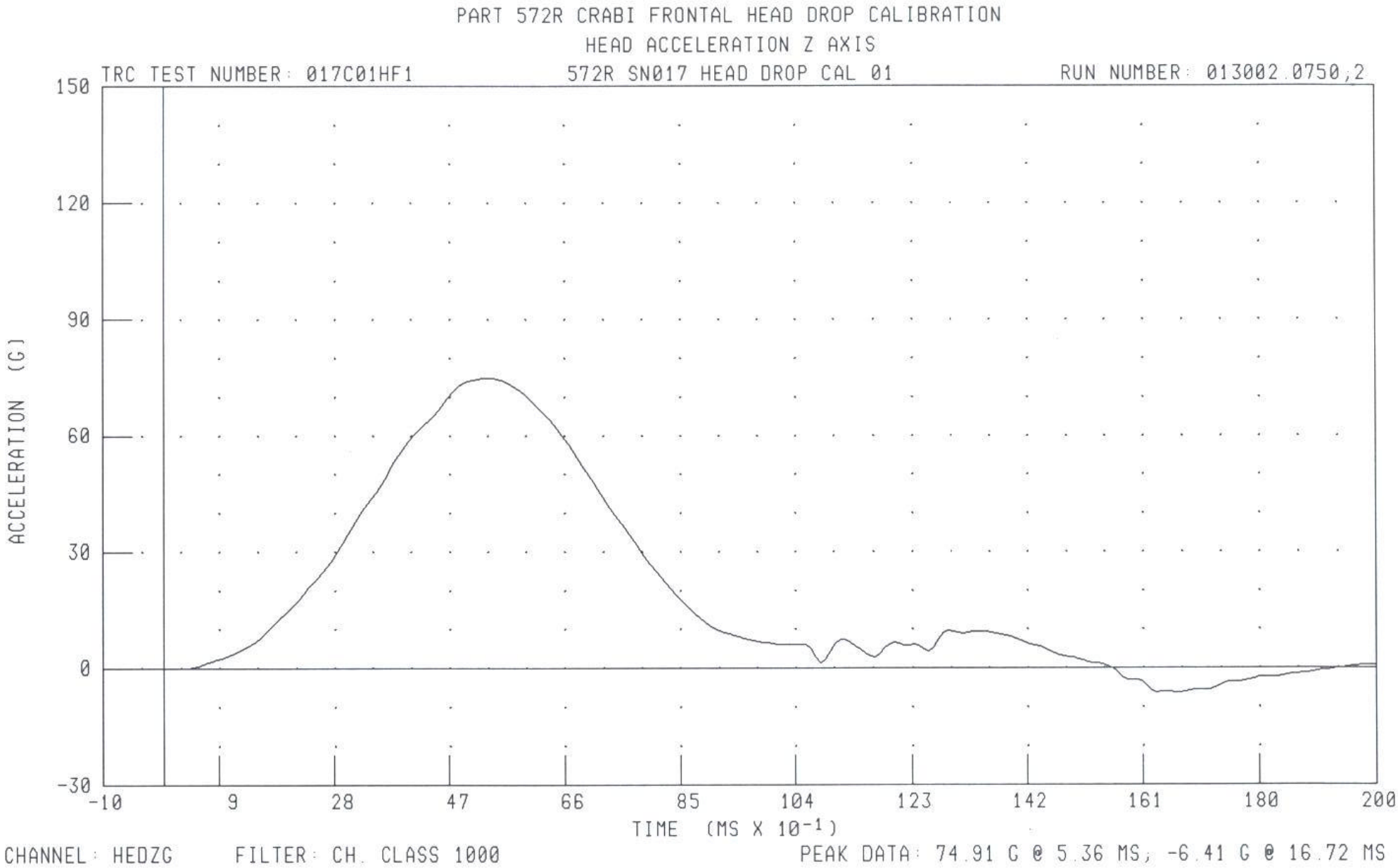
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PEAK RESULTANT ACCELERATION	100 - 120 G	103.35 G
PEAK LATERAL ACCELERATION	15 G MAX	2.21 G
IS ACCELERATION CURVE UNIMODAL? (=< 17%)	YES	YES (9%)

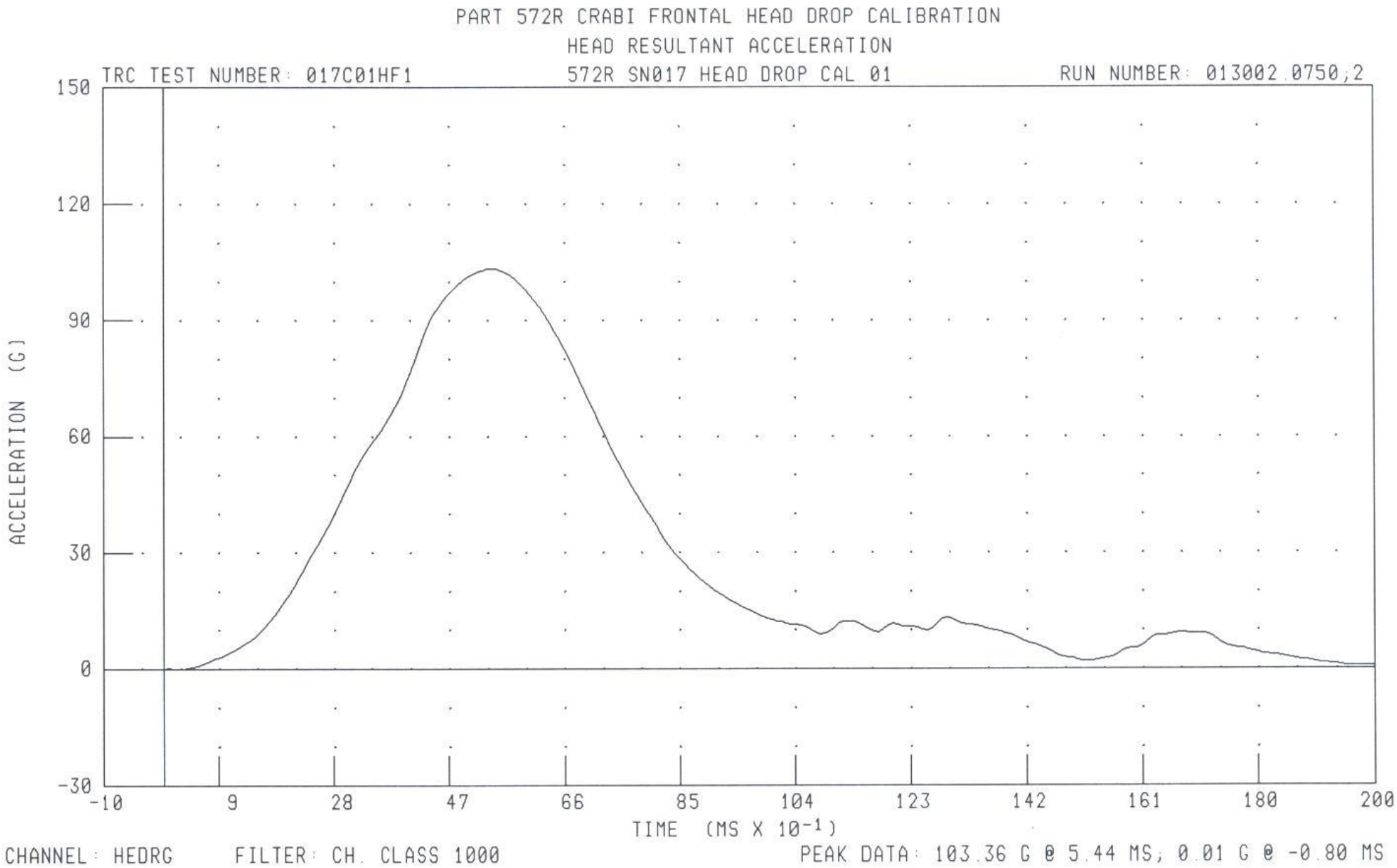
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 013002.0749;2


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 017C01HF1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0750;2
30
0
-30
-60
-90
-120
-150
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH. CLASS 1000
PEAK DATA: 7.14 G @ 17.12 MS; -71.29 G @ 5.52 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 017C01HF1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0750;2
90
60
30
0
-30
-60
-90
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: 2.21 G @ 3.68 MS; -0.79 G @ 3.20 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 017C01HF1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0750,2
150
120
90
60
30
0
-30
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDZG
FILTER: CH. CLASS 1000
PEAK DATA: 74.91 G @ 5.36 MS; -6.41 G @ 16.72 MS


PART 572R CRABI FRONTAL HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 017C01HF1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0750;2
ACCELERATION (G)
150
120
90
60
30
0
-30
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 103.36 G @ 5.44 MS; 0.01 G @ -0.80 MS

TRANSPORTATION RESEARCH CENTER INC.

REAR HEAD DROP TEST

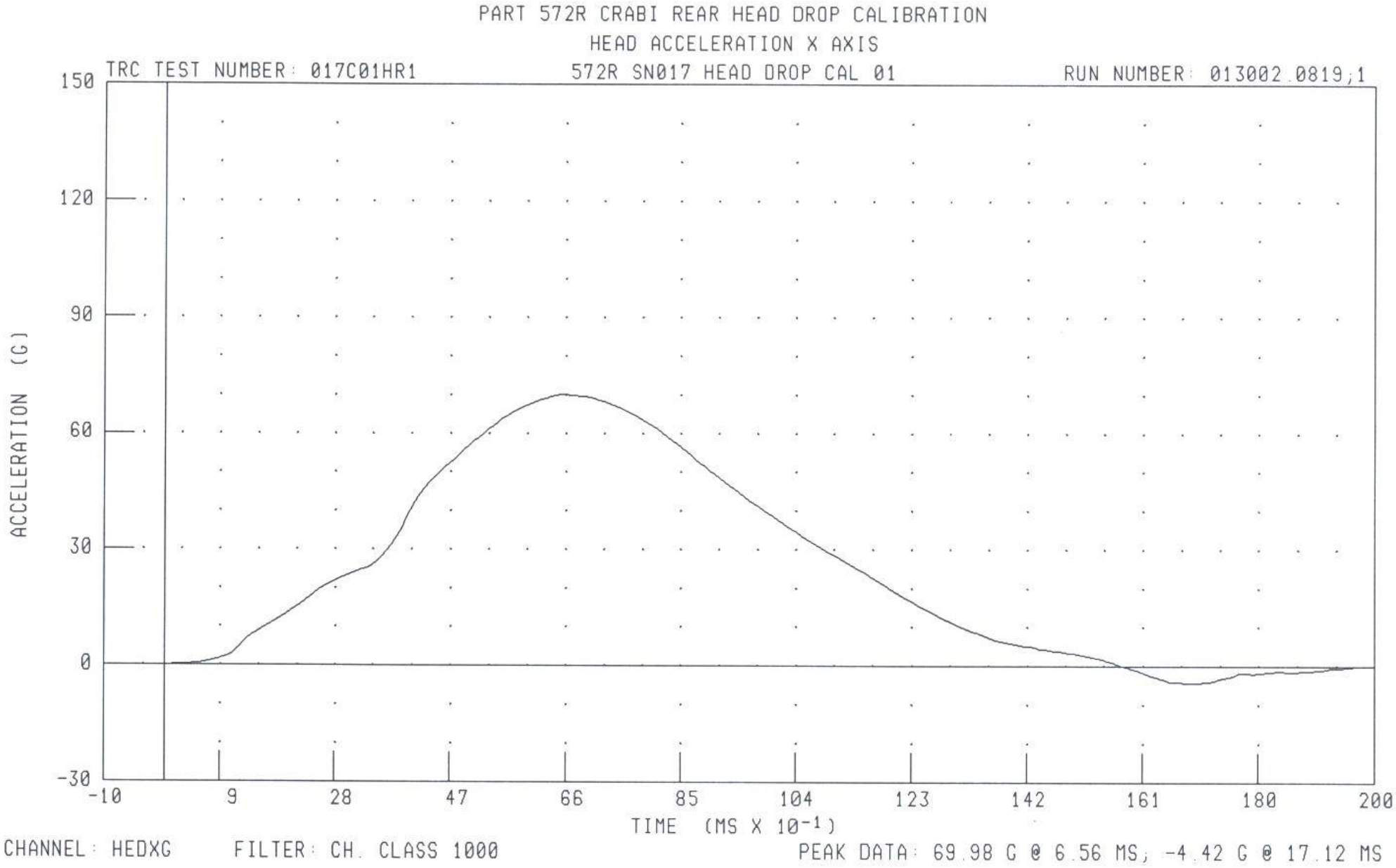
CRABI 12-MONTH 30-JAN-02

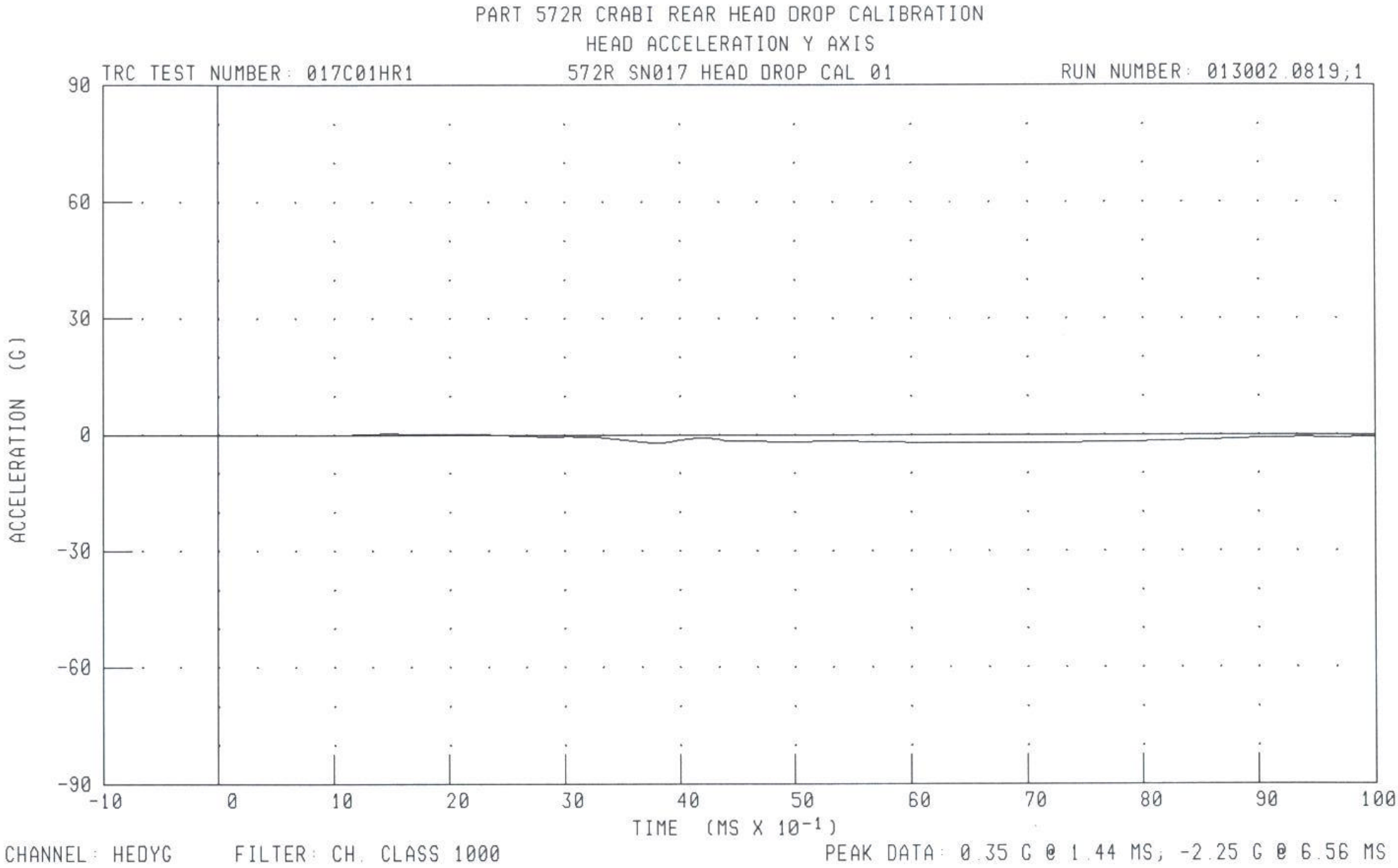
TRC INC. TEST NO: 017C01HR1 572R SN017 HEAD DROP CAL 01

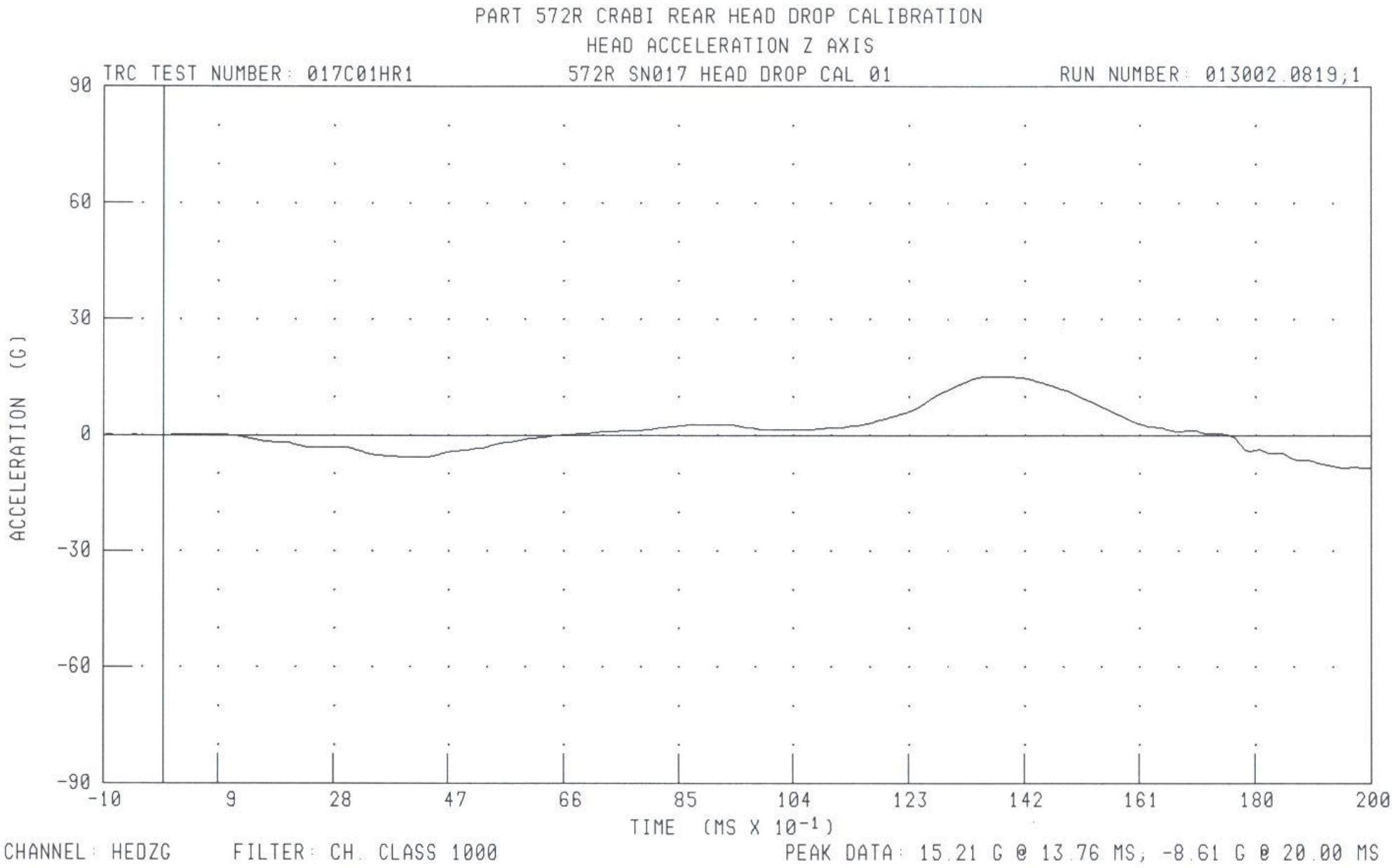
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	51.0 %
PEAK RESULTANT ACCELERATION	55 - 71 G	70.01 G
PEAK LATERAL ACCELERATION	15 G MAX	-2.24 G
IS ACCELERATION CURVE UNIMODAL? (<= 17%)	YES	YES (12%)

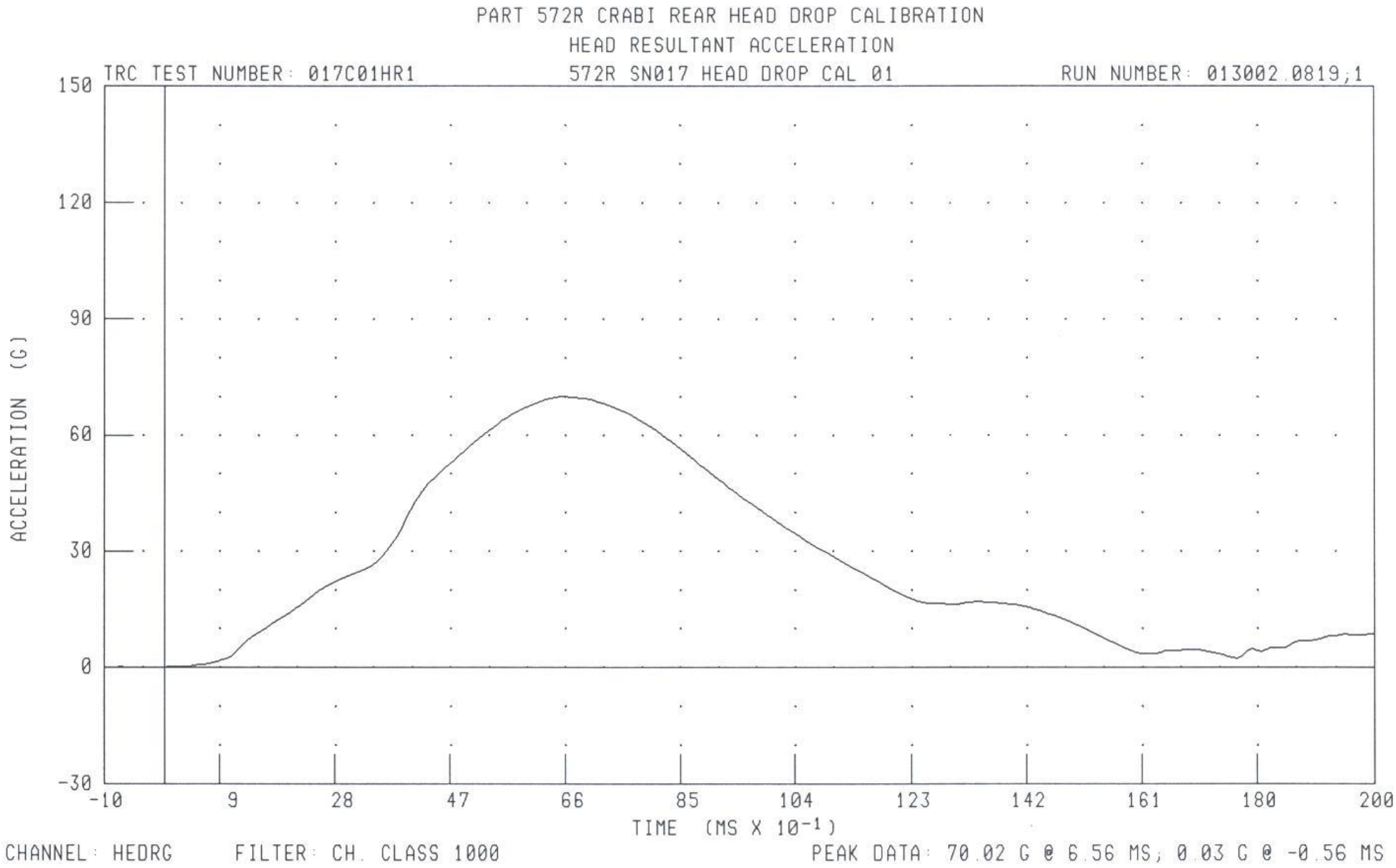
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 013002.0813;1


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 017C01HR1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0819;1
150
120
90
60
30
0
-30
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDXG
FILTER: CH. CLASS 1000
PEAK DATA: 69.98 G @ 6.56 MS; -4.42 G @ 17.12 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 017C01HR1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0819,1
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-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: 0.35 G @ 1.44 MS; -2.25 G @ 6.56 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 017C01HR1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0819;1
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10-1)
CHANNEL: HEDZC
FILTER: CH. CLASS 1000
PEAK DATA: 15.21 G @ 13.76 MS, -8.61 G @ 20.00 MS


PART 572R CRABI REAR HEAD DROP CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 017C01HR1
572R SN017 HEAD DROP CAL 01
RUN NUMBER: 013002.0819;1
150
120
90
60
30
0
-30
ACCELERATION (G)
-10
9
28
47
66
85
104
123
142
161
180
200
TIME (MS X 10⁻¹)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 70.02 G @ 6.56 MS; 0.03 G @ -0.56 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST

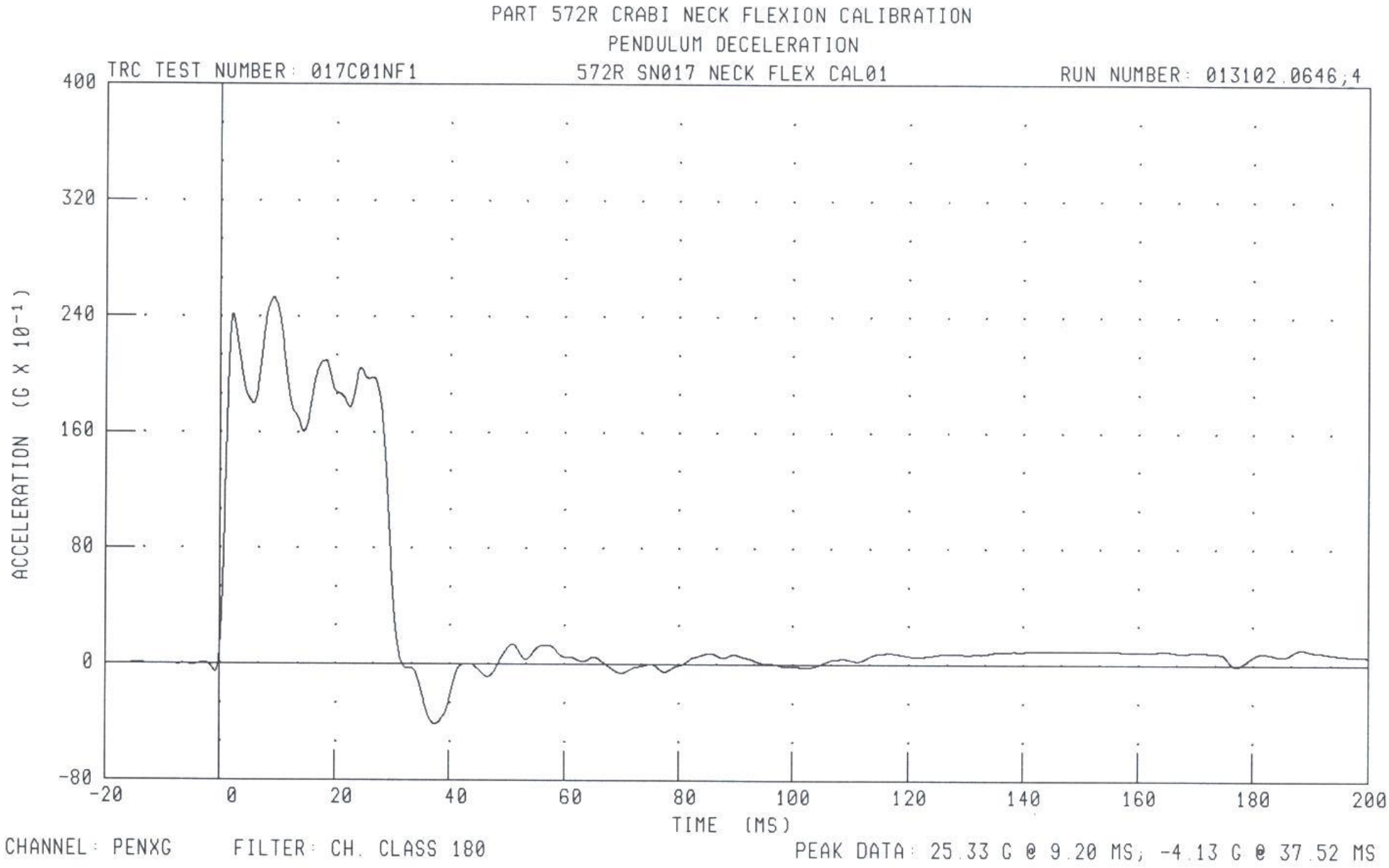
CRABI 12-MONTH 30-JAN-02

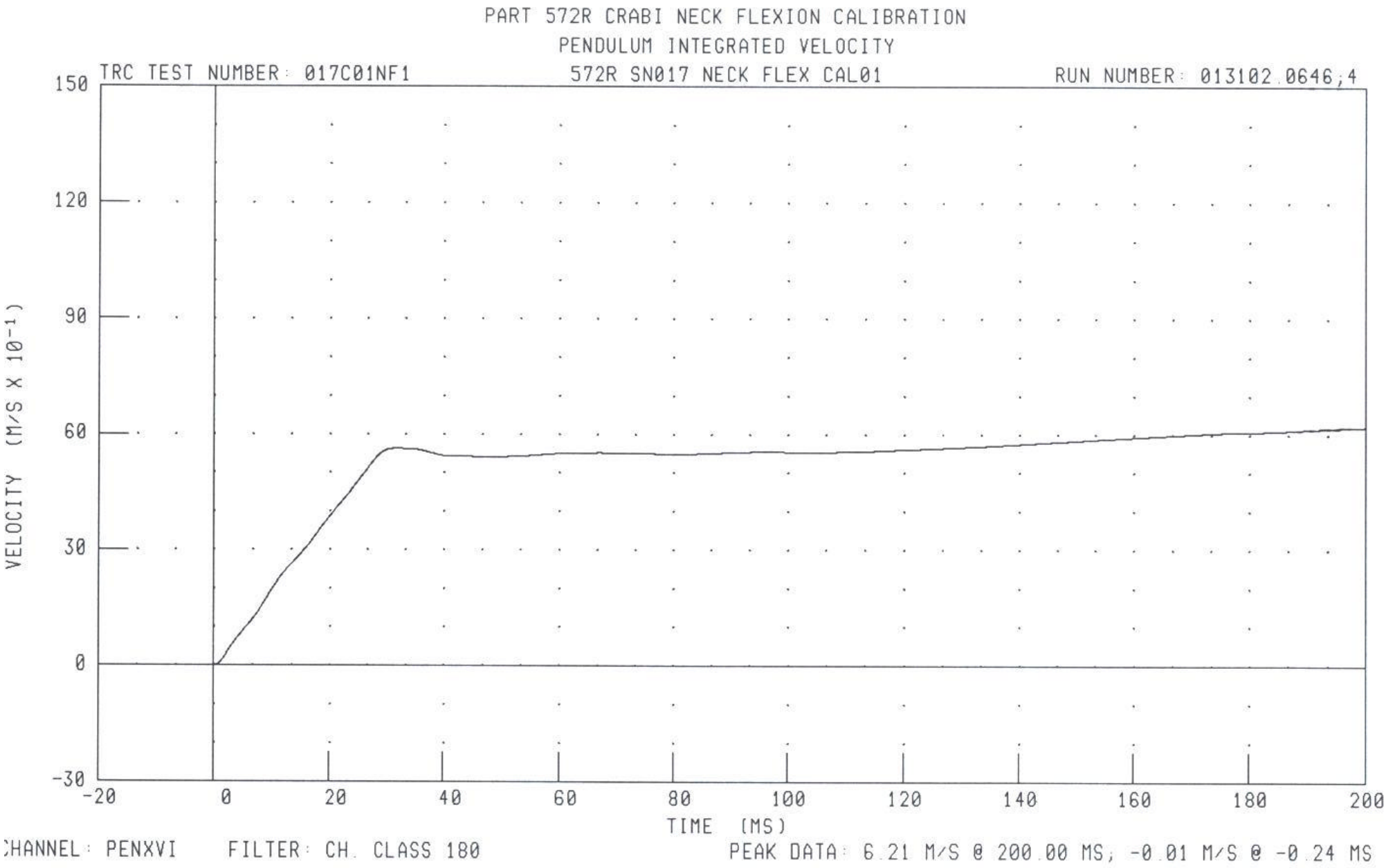
TRC INC. TEST NO: 017C01NF1 572R SN017 NECK FLEX CAL01

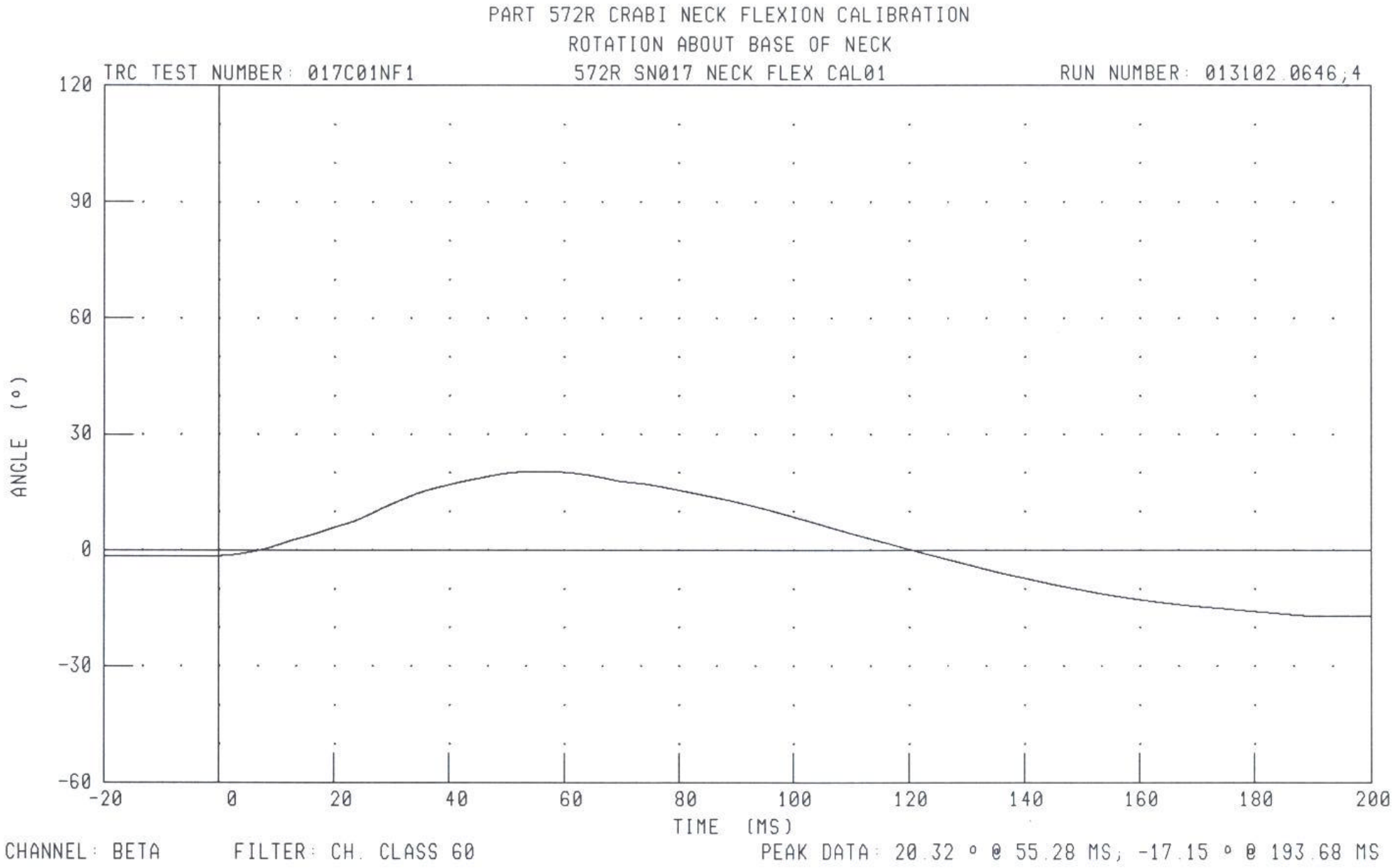
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	30.0 %
IMPACT VELOCITY		5.1 - 5.3 M/S	5.25 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	1.6 - 2.3 G	1.95 M/S
	20 MS	3.4 - 4.2 M/S	3.84 M/S
	25 MS	4.3 - 5.2 M/S	4.78 M/S
PEAK D-PLANE ROTATION		75 - 86 DEG.	79.59 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		36 - 45 NM	38.57 NM
POSITIVE MOMENT DECAY TIME TO 5 NM LEVEL		60 - 80 MS	75.20 MS

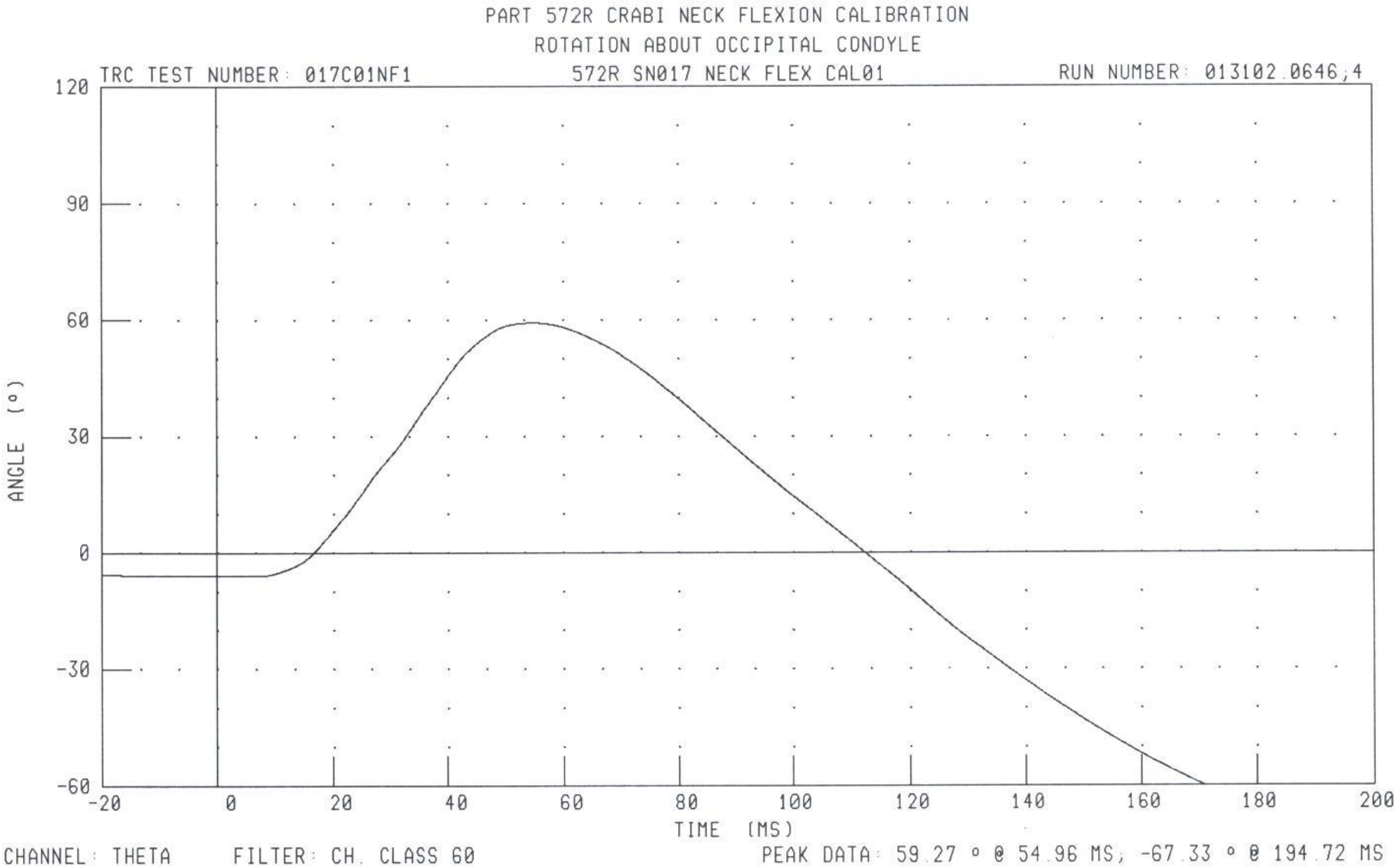
TEST MEETS SPECIFICATIONS

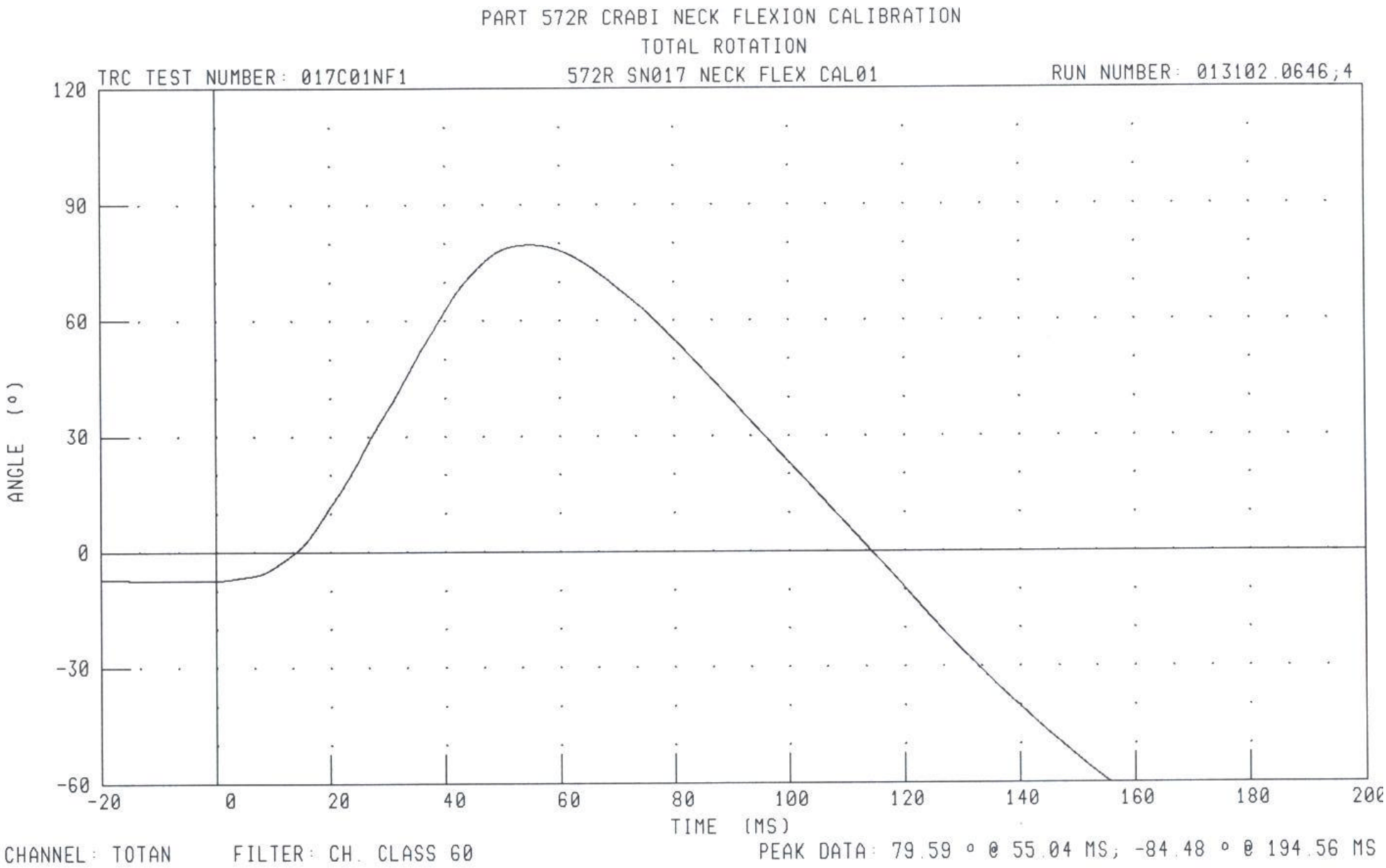
TECHNICIAN _____ RUN NUMBER: 013102.0644;4

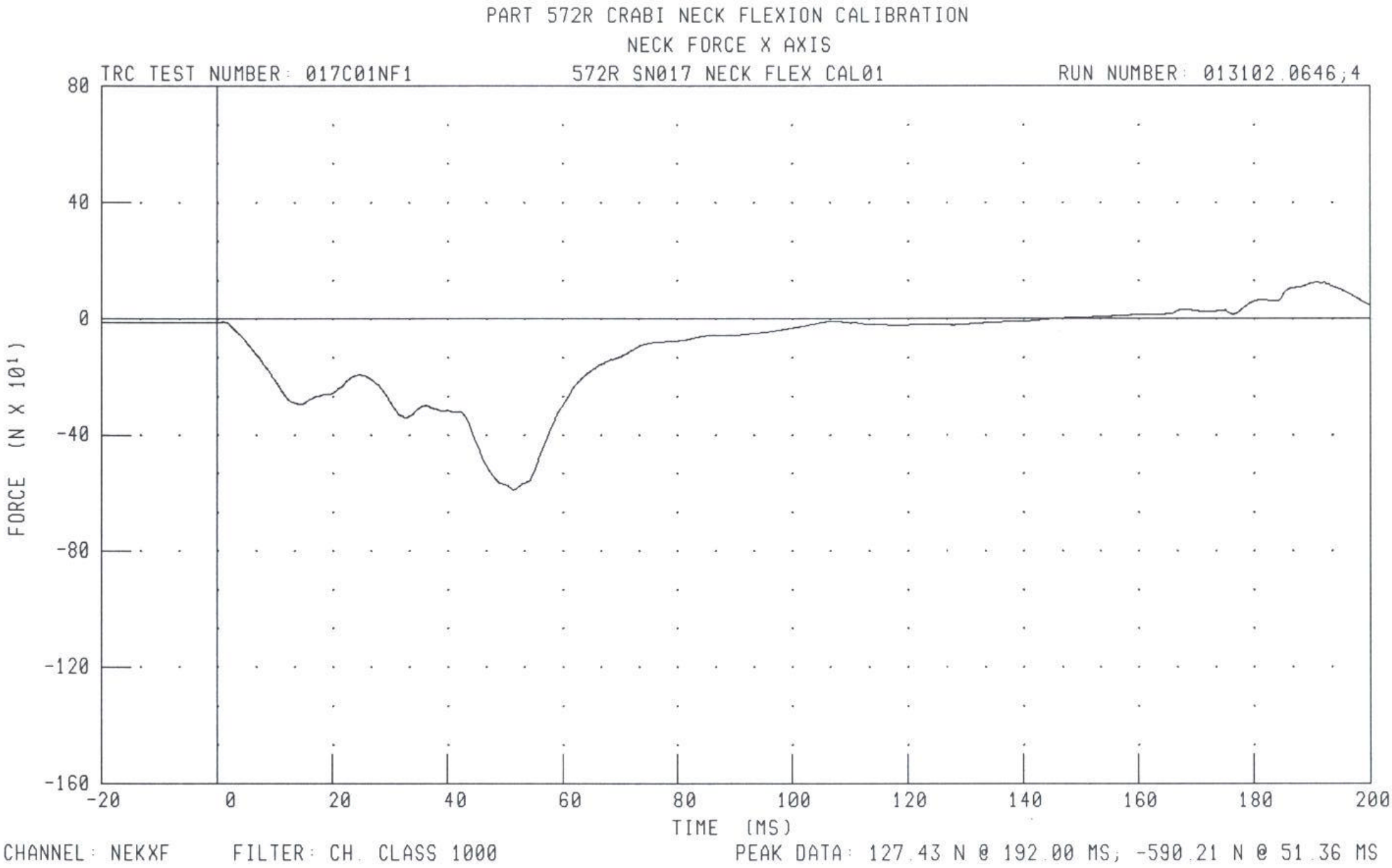

PART 572R CRABI NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
ACCELERATION (G X 10-1)
400
320
240
160
80
0
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 25.33 G @ 9.20 MS; -4.13 G @ 37.52 MS

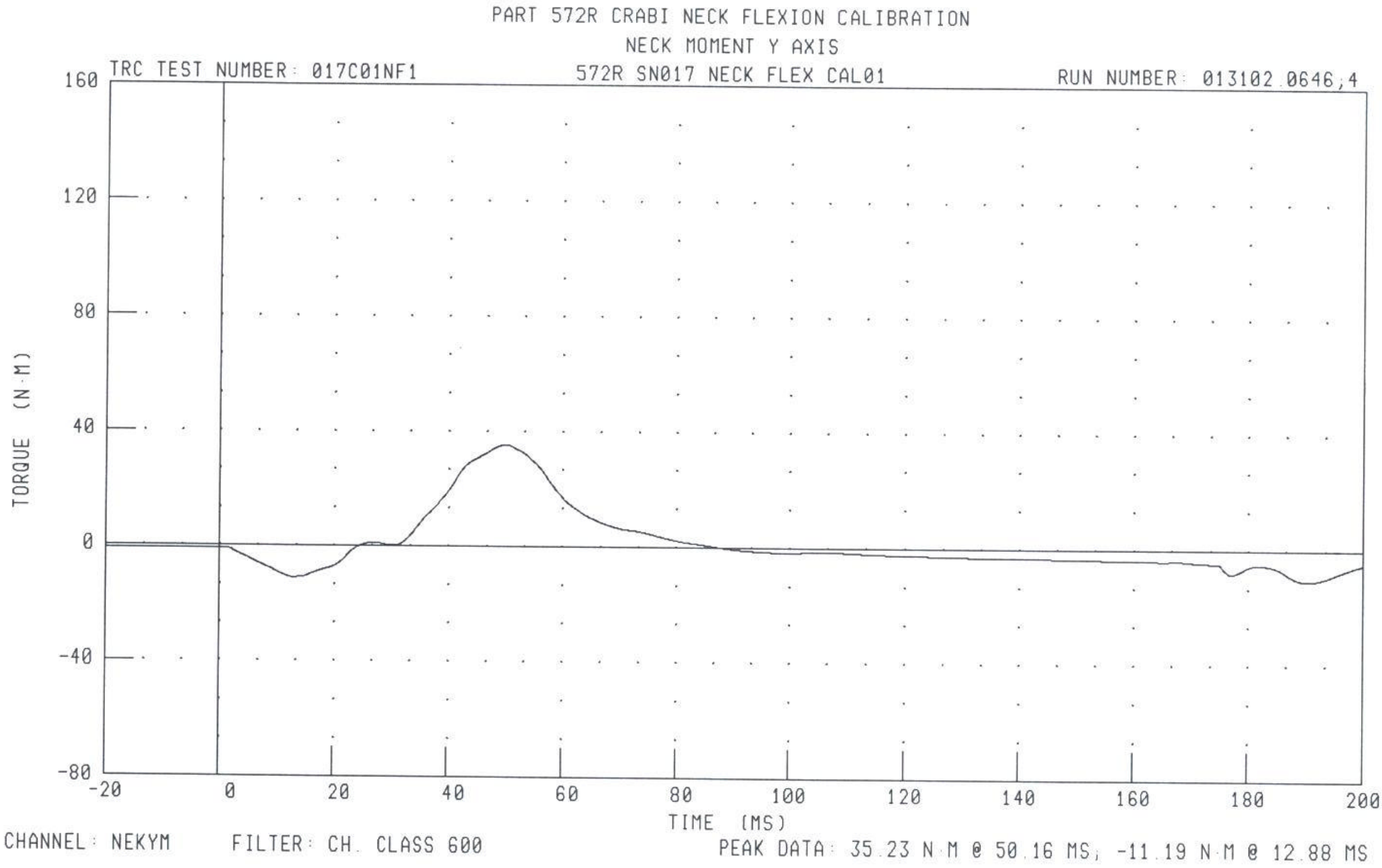

PART 572R CRABI NECK FLEXION CALIBRATION
PENDULUM INTEGRATED VELOCITY
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
VELOCITY (M/S X 10-1)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH. CLASS 180
PEAK DATA: 6.21 M/S @ 200.00 MS; -0.01 M/S @ -0.24 MS

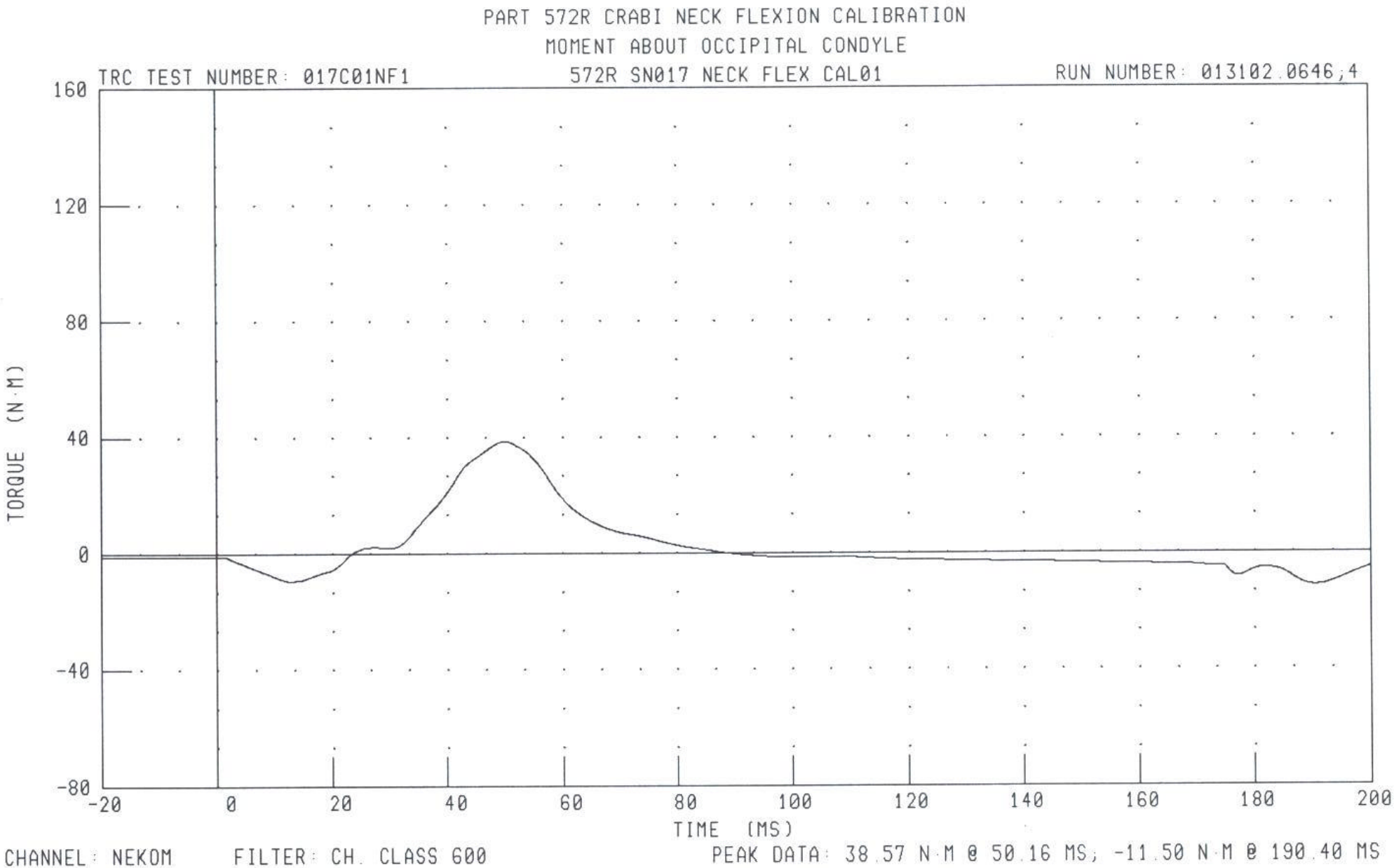

PART 572R CRABI NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 20.32 ° @ 55.28 MS; -17.15 ° @ 193.68 MS

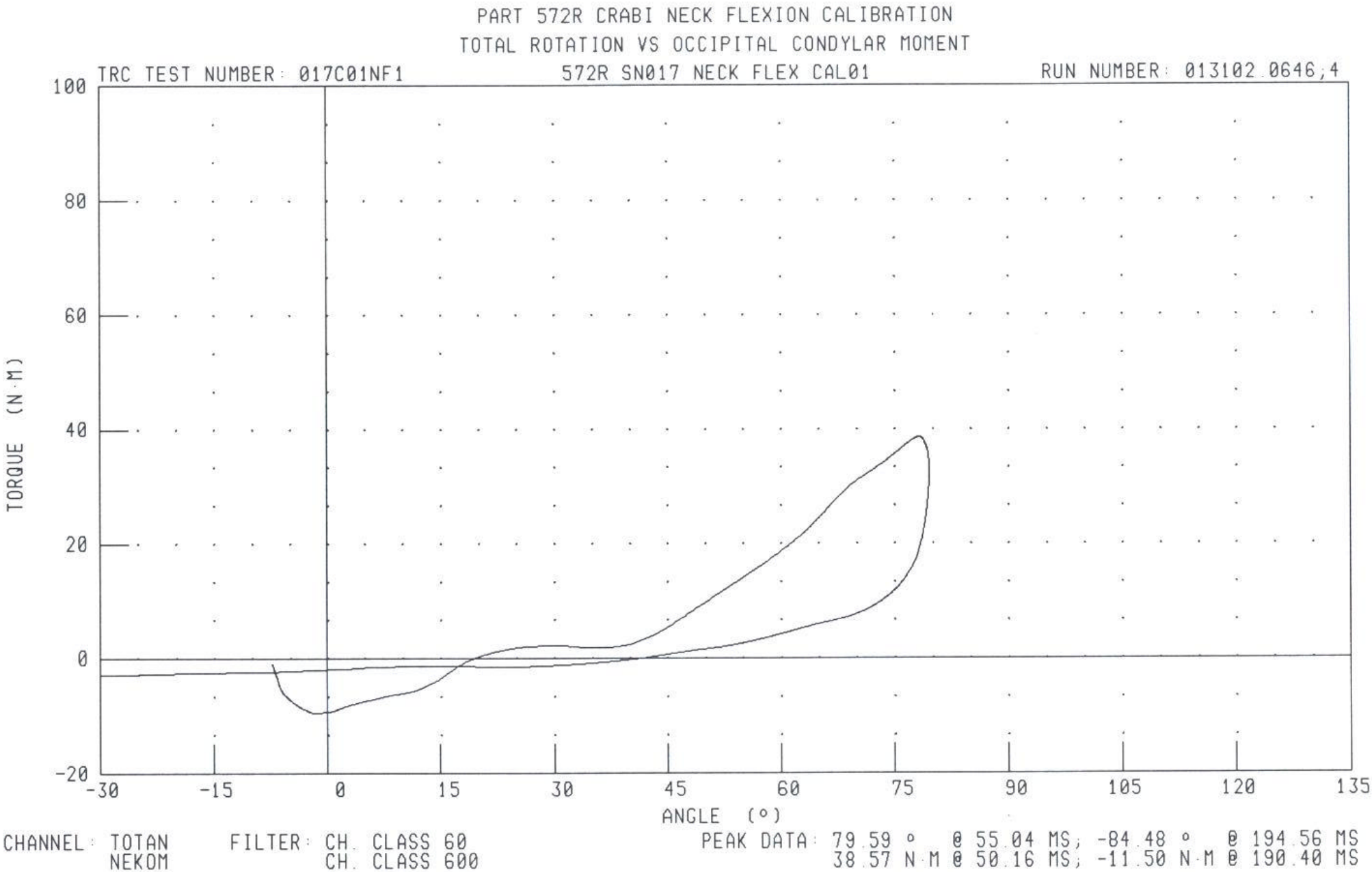

PART 572R CRABI NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 59.27 ° @ 54.96 MS; -67.33 ° @ 194.72 MS


PART 572R CRABI NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
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: 79.59 ° @ 55.04 MS; -84.48 ° @ 194.56 MS


PART 572R CRABI NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 1000
PEAK DATA: 127.43 N @ 192.00 MS; -590.21 N @ 51.36 MS


PART 572R CRABI NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
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: 35.23 N-M @ 50.16 MS; -11.19 N-M @ 12.88 MS


PART 572R CRABI NECK FLEXION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646,4
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: NEKOM
FILTER: CH. CLASS 600
PEAK DATA: 38.57 N-M @ 50.16 MS; -11.50 N-M @ 190.40 MS


PART 572R CRABI NECK FLEXION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER: 017C01NF1
572R SN017 NECK FLEX CAL01
RUN NUMBER: 013102.0646;4
TORQUE (N·M)
100
80
60
40
20
0
-20
-30
-15
0
15
30
45
60
75
90
105
120
135
ANGLE (°)
CHANNEL: TOTAN
NEKOM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 79.59 ° @ 55.04 MS; -84.48 ° @ 194.56 MS
38.57 N·M @ 50.16 MS; -11.50 N·M @ 190.40 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST

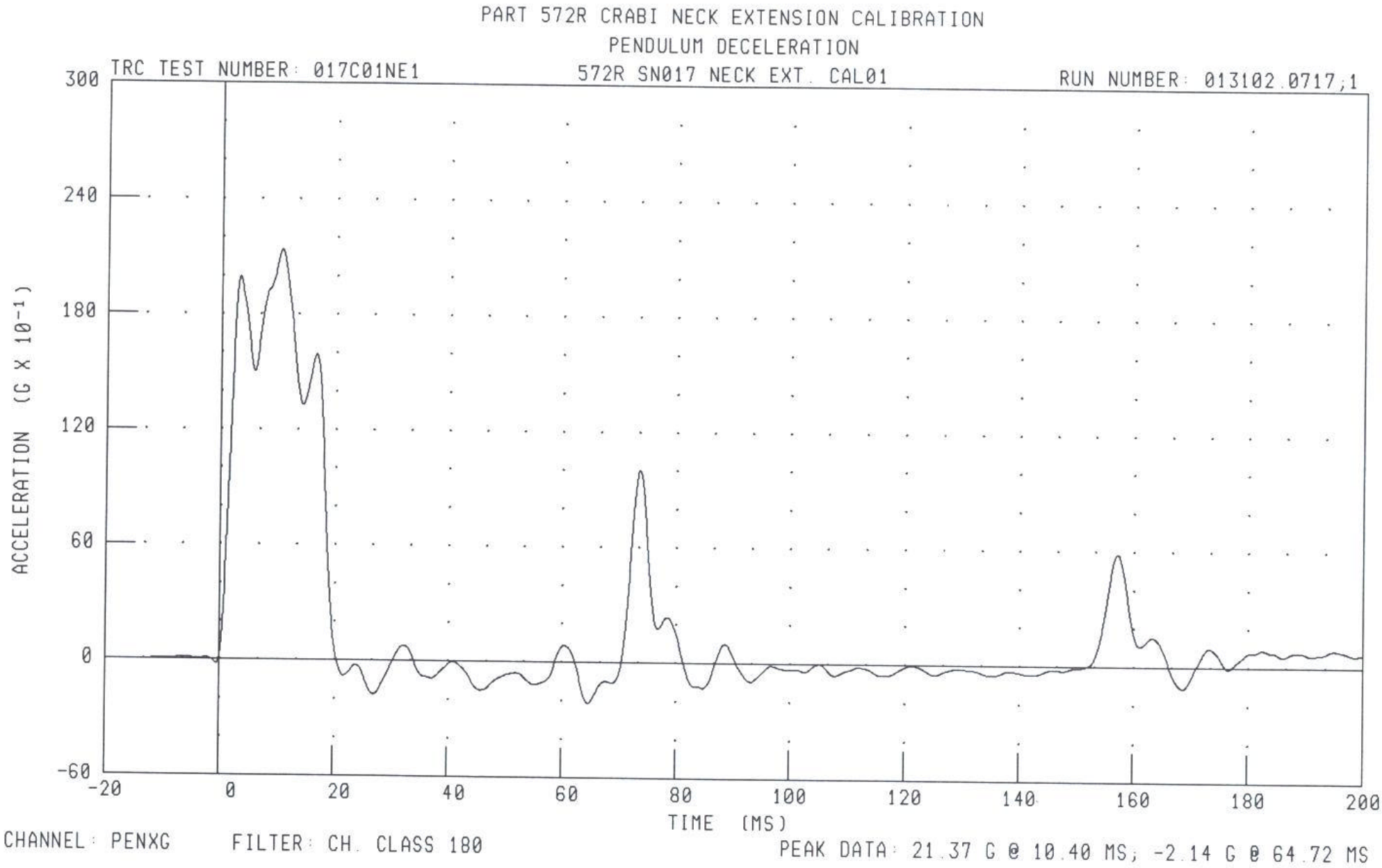
CRABI 12-MONTH 31-JAN-02

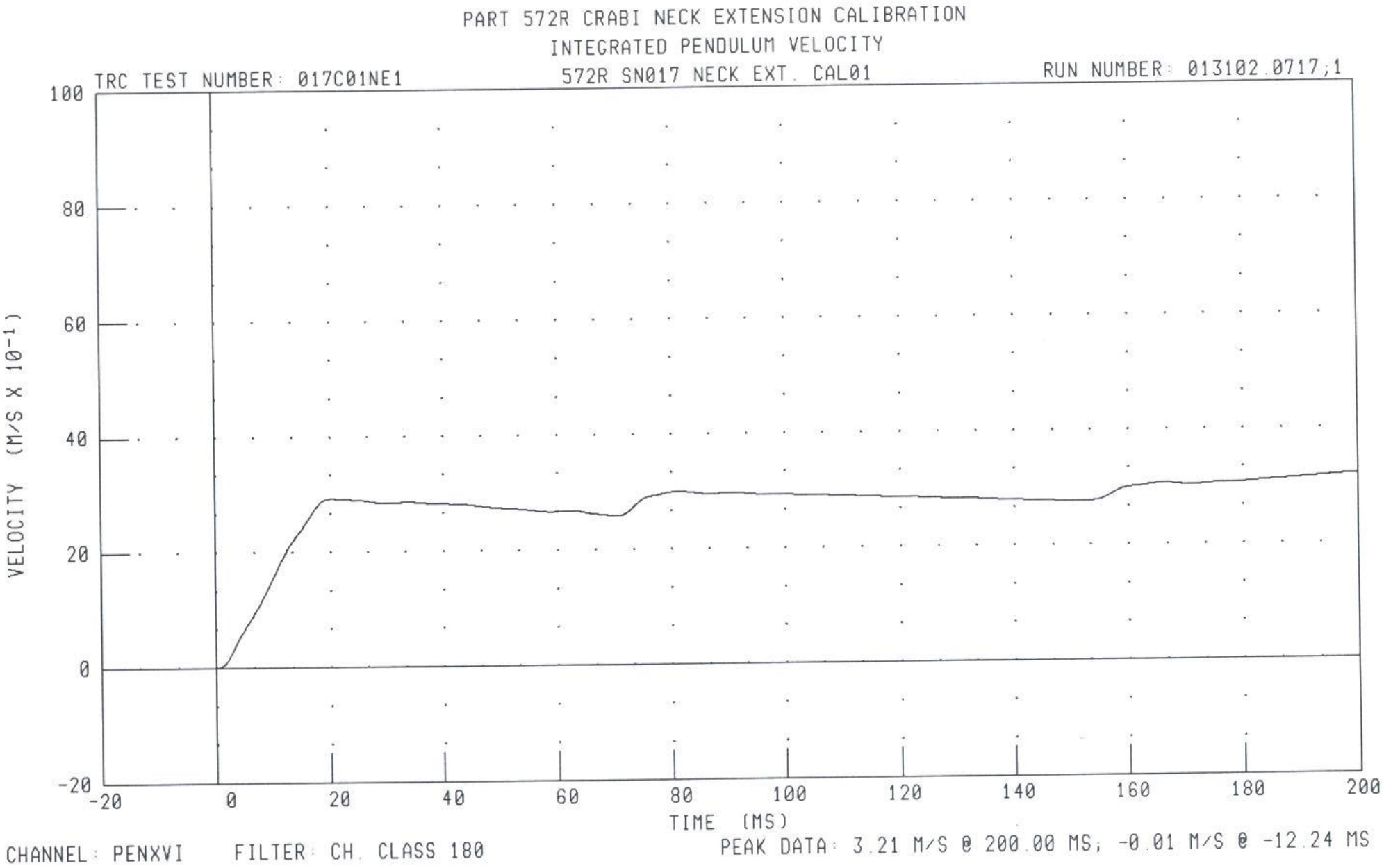
TRC INC. TEST NO: 017C01NE1 572R SN017 NECK EXT. CAL01

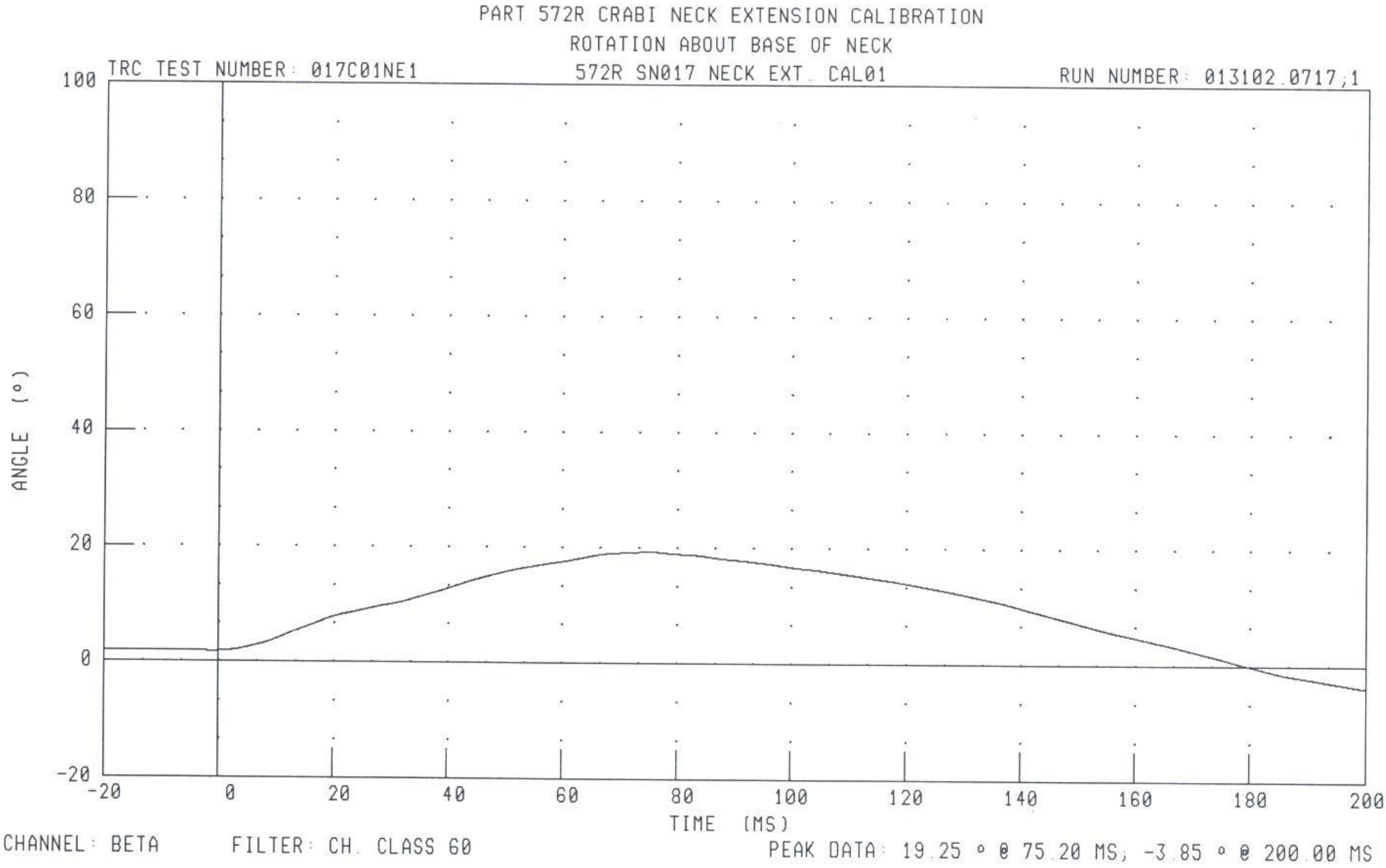
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	30.0 %
IMPACT VELOCITY		2.4 - 2.6 M/S	2.59 M/S
INTEGRATED PENDULUM VELOCITY	6 MS	0.8 - 1.2 G	0.82 M/S
	10 MS	1.5 - 2.1 M/S	1.53 M/S
	14 MS	2.2 - 2.9 M/S	2.25 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	87.35 DEG.
PEAK MOMENT DURING ROTATION ITNERVAL		-12 / -23 NM	-19.77 NM
POSITIVE MOMENT DECAY TIME TO -5 NM LEVEL		76 - 90 MS	82.40 MS

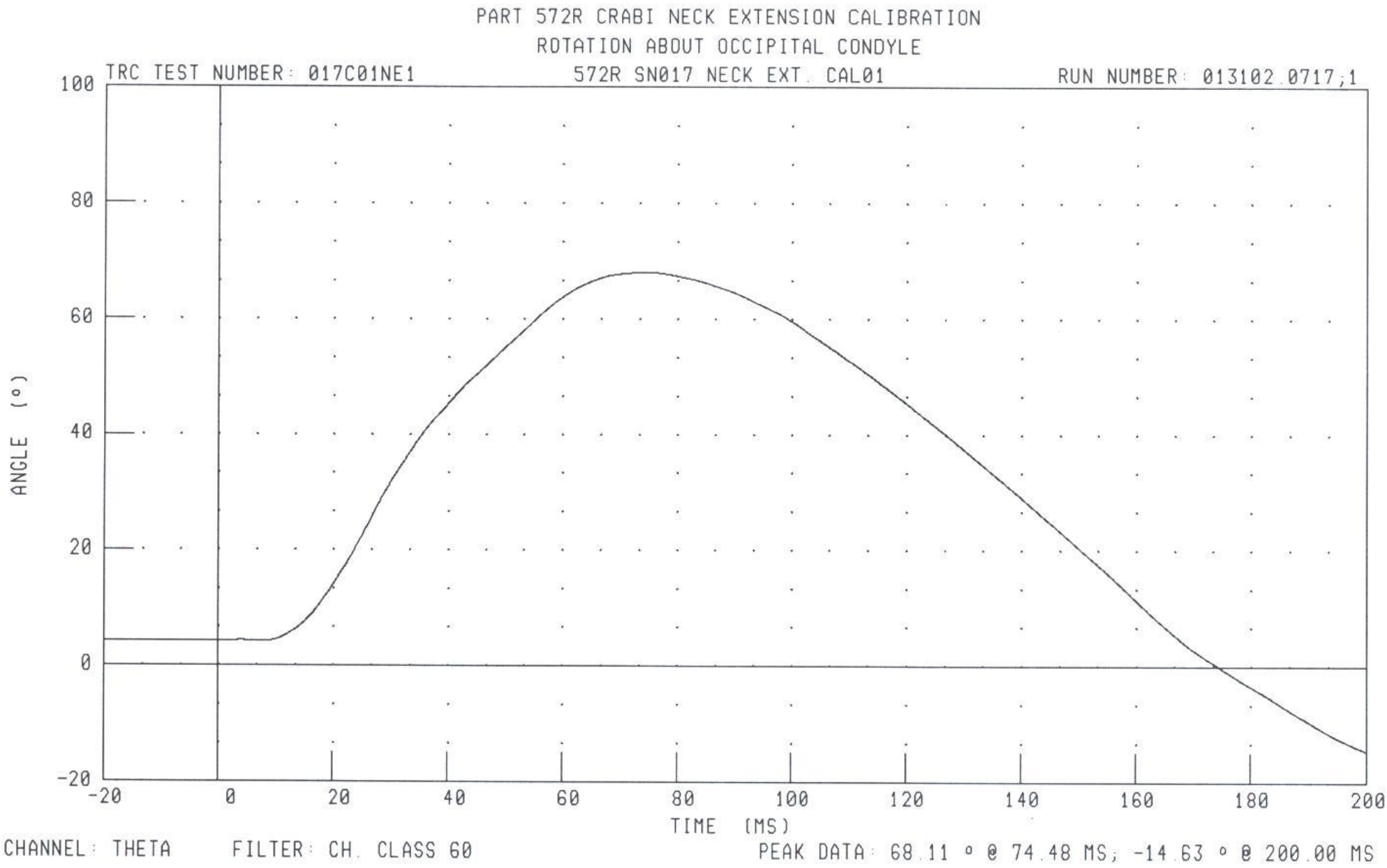
TEST MEETS SPECIFICATIONS

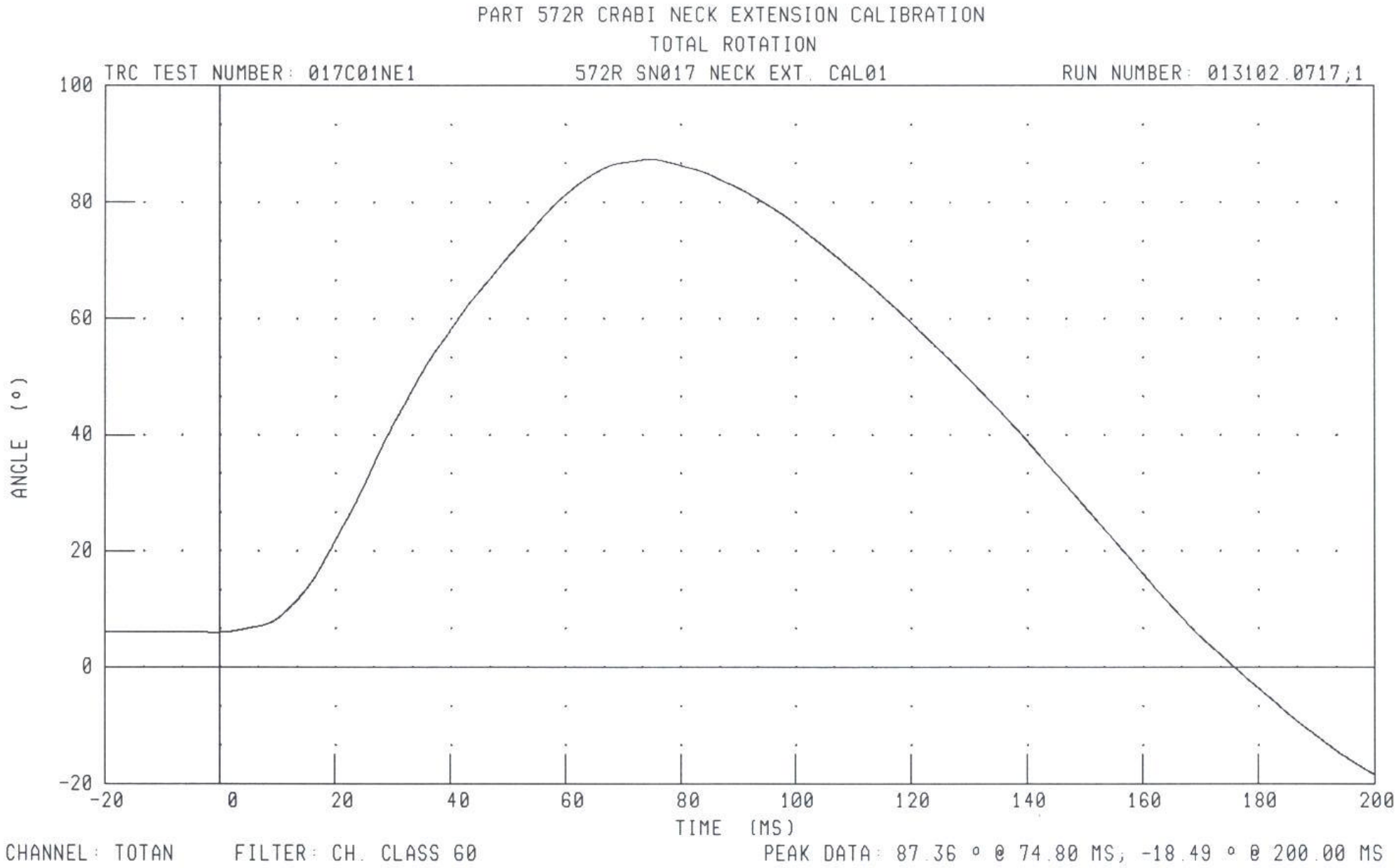
TECHNICIAN _____ RUN NUMBER: 013102.0714;1

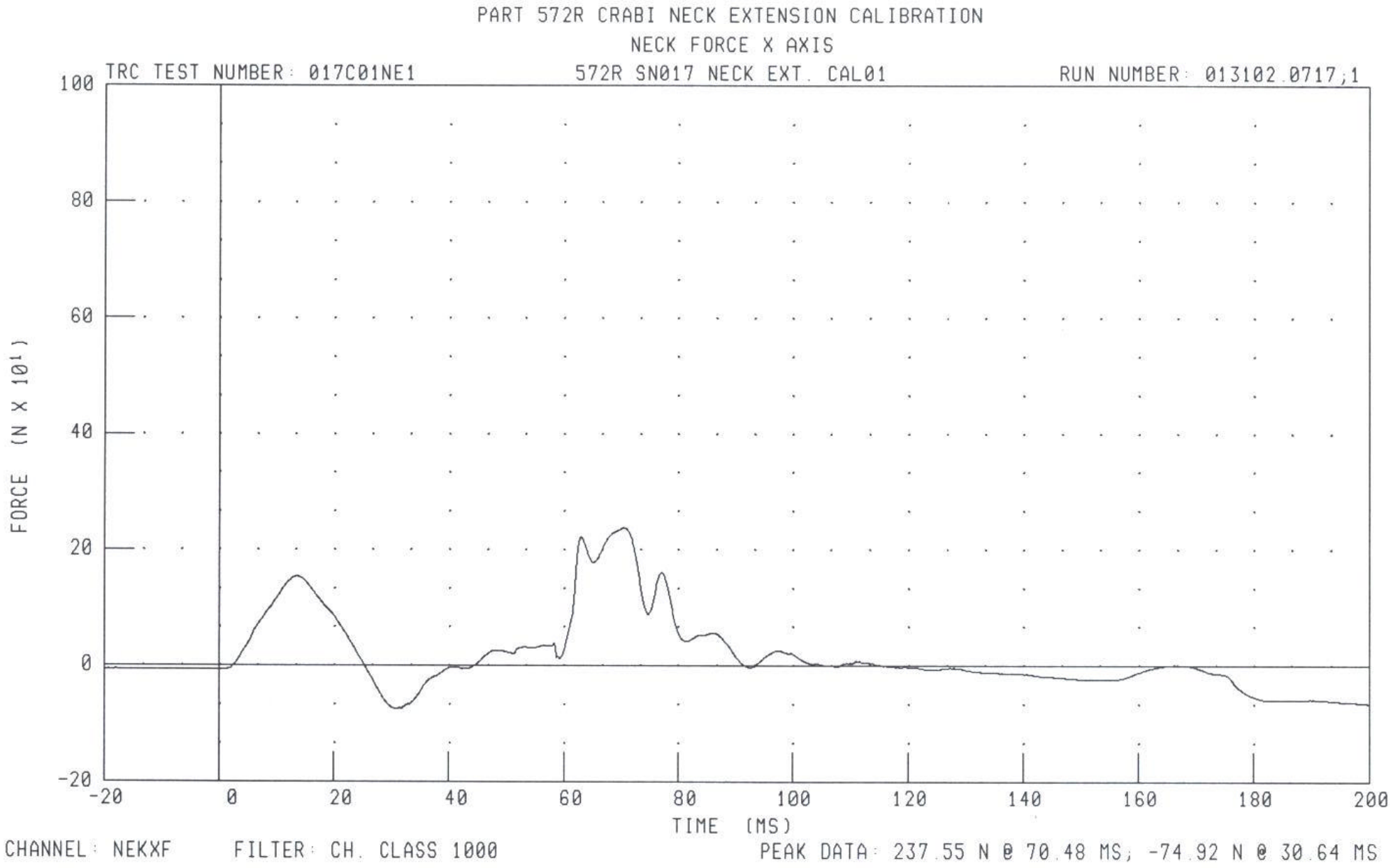

PART 572R CRABI NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
ACCELERATION (G X 10-1)
300
240
180
120
60
0
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 21.37 G @ 10.40 MS; -2.14 G @ 64.72 MS

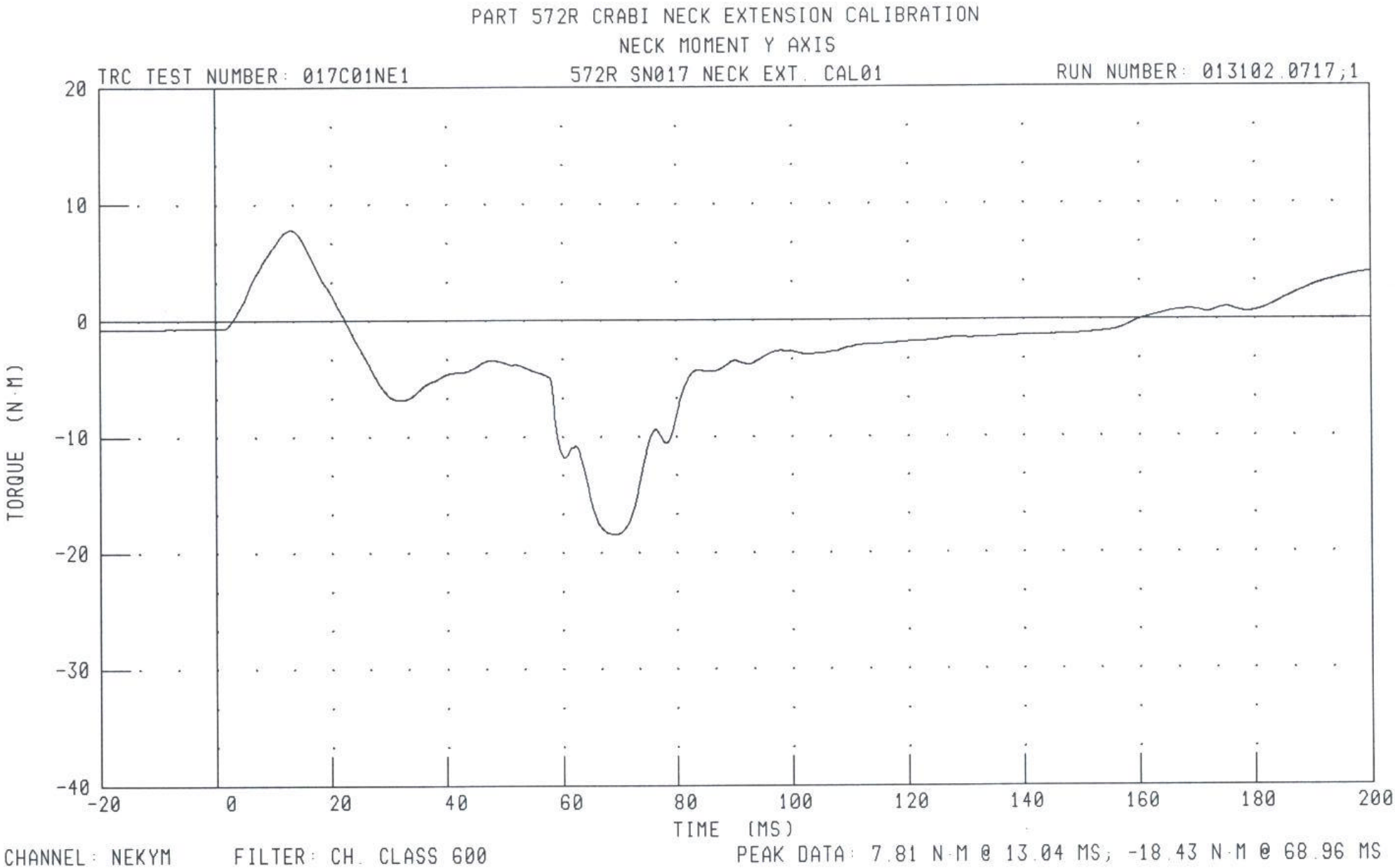

PART 572R CRABI NECK EXTENSION CALIBRATION
INTEGRATED PENDULUM VELOCITY
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
VELOCITY (M/S X 10-1)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: PENXVI
FILTER: CH. CLASS 180
PEAK DATA: 3.21 M/S @ 200.00 MS; -0.01 M/S @ -12.24 MS

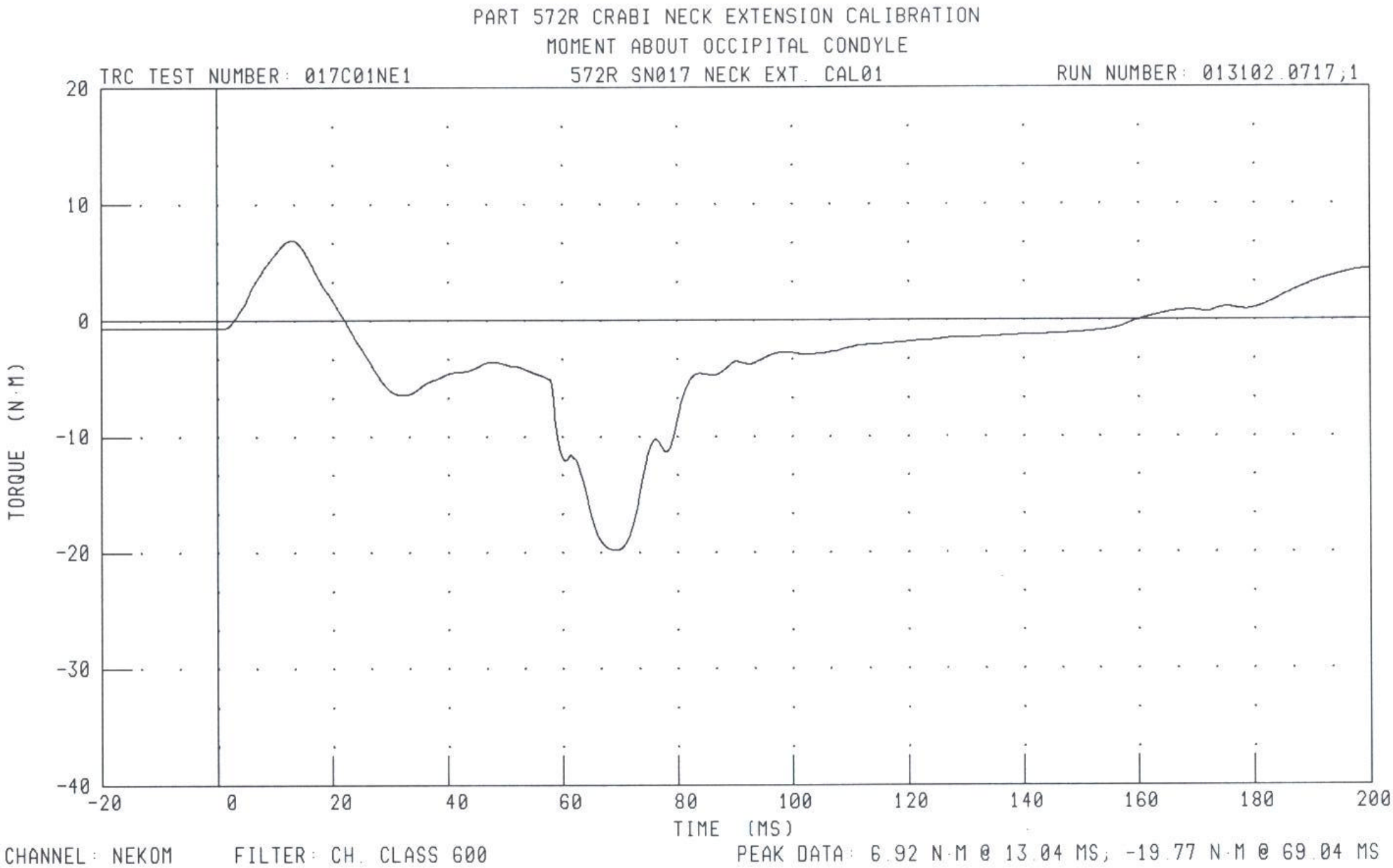

PART 572R CRABI NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 19.25 ° @ 75.20 MS; -3.85 ° @ 200.00 MS

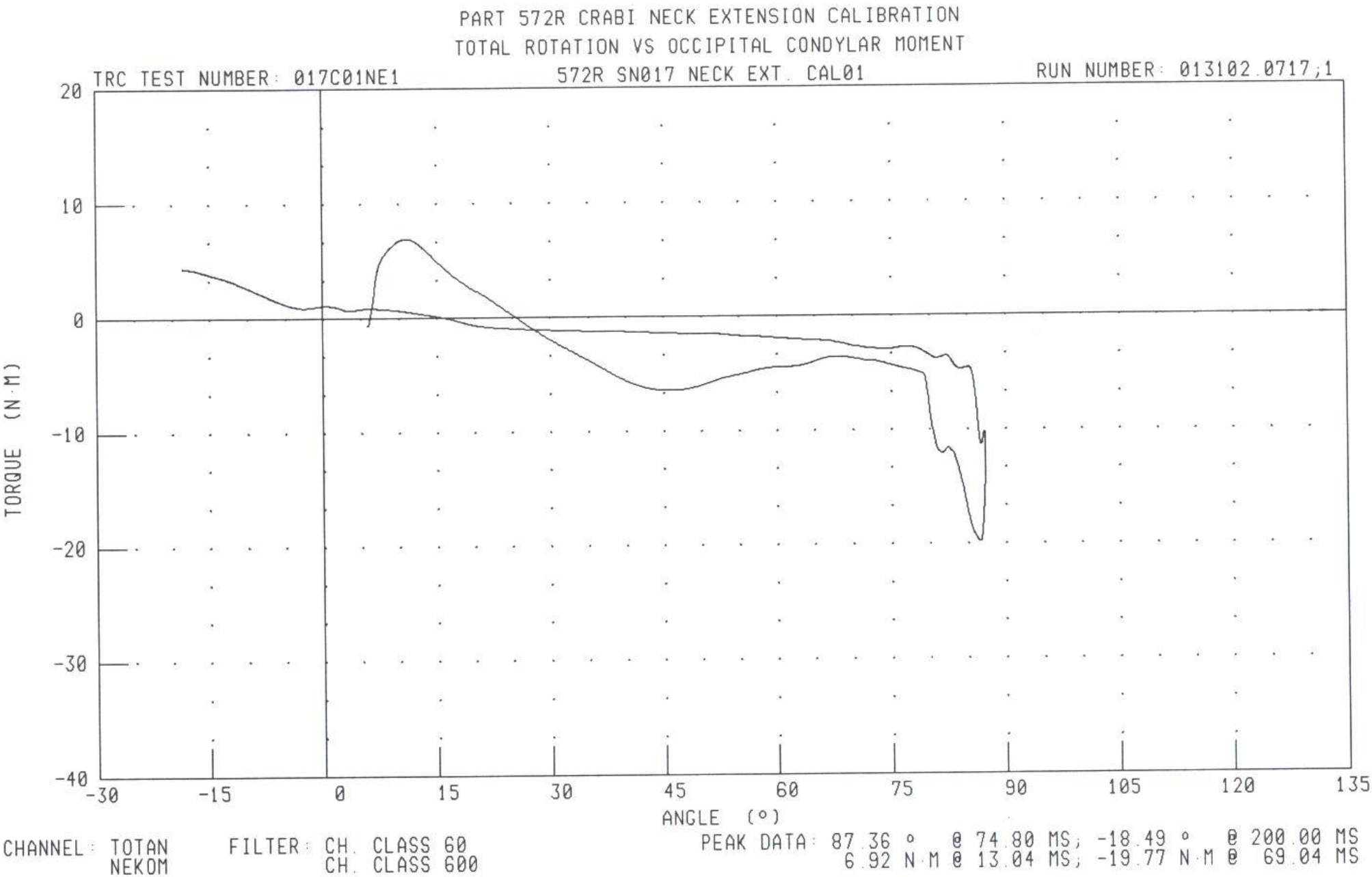

PART 572R CRABI NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 68.11 ° @ 74.48 MS; -14.63 ° @ 200.00 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
ANGLE (°)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: TOTAN
FILTER: CH. CLASS 60
PEAK DATA: 87.36 ° @ 74.80 MS; -18.49 ° @ 200.00 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
FORCE (N X 10¹)
100
80
60
40
20
0
-20
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXF
FILTER: CH. CLASS 1000
PEAK DATA: 237.55 N @ 70.48 MS; -74.92 N @ 30.64 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
TORQUE (N-M)
20
10
0
-10
-20
-30
-40
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKYM
FILTER: CH. CLASS 600
PEAK DATA: 7.81 N-M @ 13.04 MS; -18.43 N-M @ 68.96 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
TORQUE (N-M)
20
10
0
-10
-20
-30
-40
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKOM
FILTER: CH. CLASS 600
PEAK DATA: 6.92 N-M @ 13.04 MS; -19.77 N-M @ 69.04 MS


PART 572R CRABI NECK EXTENSION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT
TRC TEST NUMBER: 017C01NE1
572R SN017 NECK EXT. CAL01
RUN NUMBER: 013102.0717;1
TORQUE (N-M)
20
10
0
-10
-20
-30
-40
-30
-15
0
15
30
45
60
75
90
105
120
135
ANGLE (°)
CHANNEL: TOTAN
NEKOM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 87.36 ° @ 74.80 MS; -18.49 ° @ 200.00 MS
6.92 N-M @ 13.04 MS; -19.77 N-M @ 69.04 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

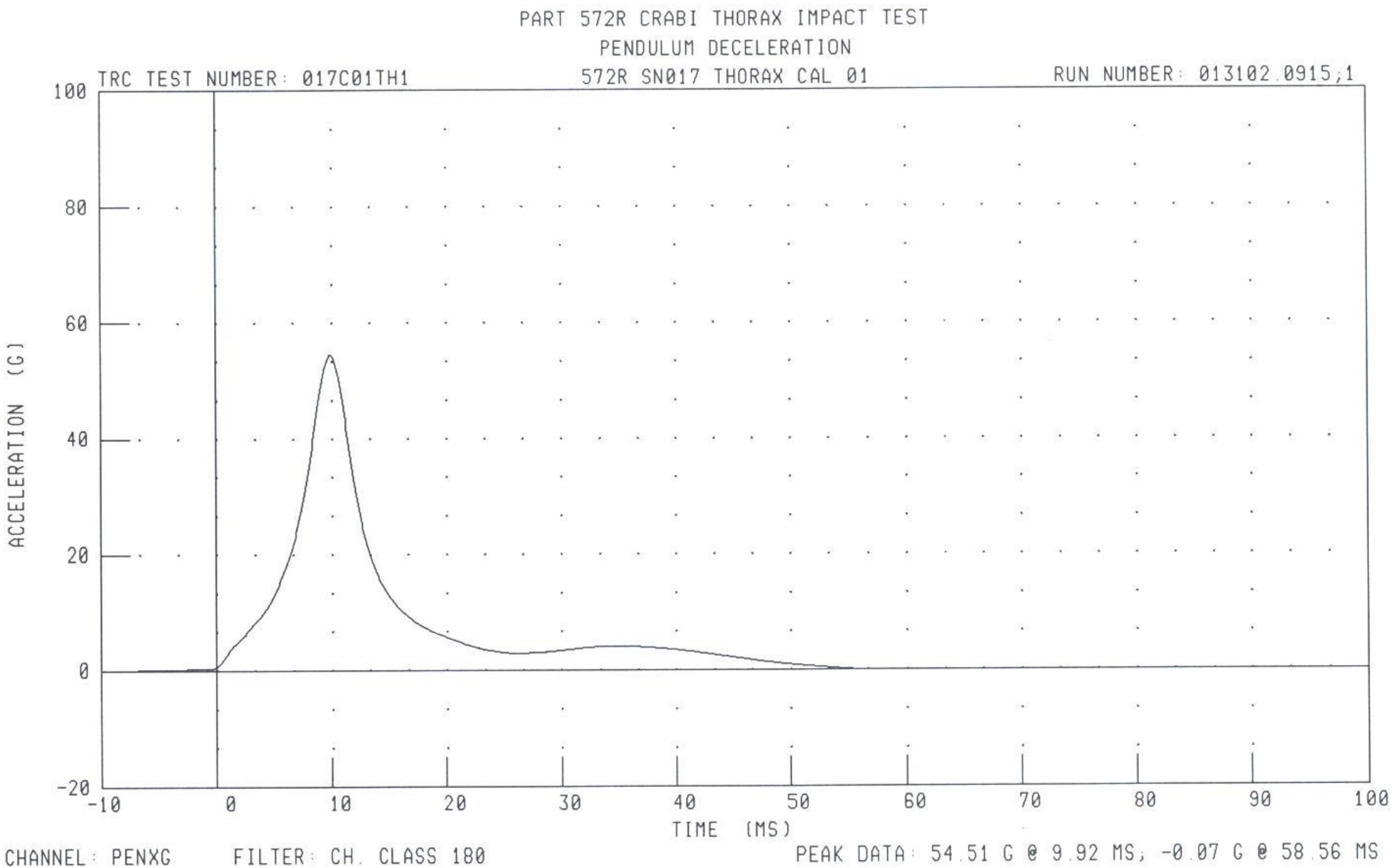
CRABI 12 -MONTH 31-JAN-02

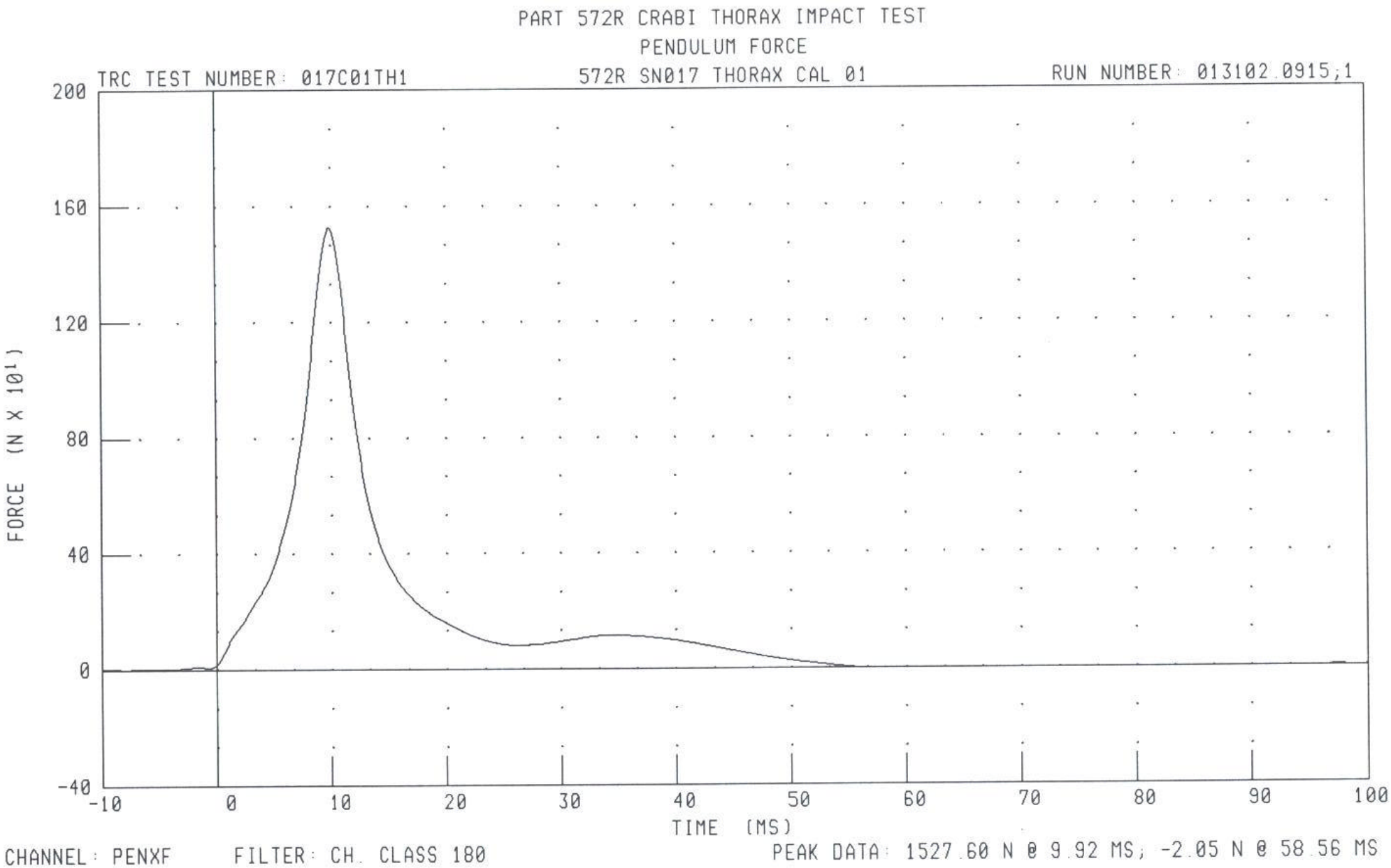
TRC INC. TEST NO: 017C01TH1 572R SN017 THORAX CAL 01

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	4.90 - 5.10 M/S	4.91 M/S
MAXIMUM RESISTIVE FORCE	1514 - 1796 N	1527. N

TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 013102.0913;1


PART 572R CRABI THORAX IMPACT TEST
PENDULUM DECELERATION
TRC TEST NUMBER: 017C01TH1
572R SN017 THORAX CAL 01
RUN NUMBER: 013102.0915;1
ACCELERATION (G)
100
80
60
40
20
0
-20
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH. CLASS 180
PEAK DATA: 54.51 G @ 9.92 MS, -0.07 G @ 58.56 MS


PART 572R CRABI THORAX IMPACT TEST
PENDULUM FORCE
TRC TEST NUMBER: 017C01TH1
572R SN017 THORAX CAL 01
RUN NUMBER: 013102.0915;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: 1527.60 N @ 9.92 MS; -2.05 N @ 58.56 MS

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