

REPORT NUMBER: TWG-TRC08-02

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE AIRBAG OUT-OF-POSITION INJURY TESTING**

**CHRYSLER LLC
2008 JEEP LIBERTY SPORT MPV
NHTSA NUMBER: M80309TWG**

**PREPARED BY:
TRANSPORTATION RESEARCH CENTER INC.
10820 STATE ROUTE 347
P. O. BOX B-67
EAST LIBERTY, OH 43319**



Test Date: August 8, 2009

Report Date: August 22, 2008

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVENUE, S.E., ROOM W43-410
WASHINGTON, D.C. 20590**

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNT22-06-R-00029. 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.

Test Performed By: Duey Thomas, Test Technician II

Report Approved By: _____

Michael R. Tonneman, Project Manager
Transportation Research Center Inc.

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

Accepted By: _____

Acceptance Date: _____

1. Report No. TWG-TRC08-02	2. Government Accession No.	3. Recipient's Catalog No.					
4. Title and Subtitle Final Report New Car Assessment Program OOP Testing of a 2008 Jeep Liberty Sport MPV, NHTSA No.: M80309TWG		5. Report Date August 22, 2008					
		6. Performing Organization Code TRC Inc.					
7. Author(s) Michael R. Tonneman, Project Manger Transportation Research Center Inc.		8. Performing Organization Report No. S080808-2					
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. (TRAIS)					
		11. Contract or Grant No. DTNT22-06-R-00029					
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Report August 2008					
		14. Sponsoring Agency Code NVS-111					
15. Supplemental Notes							
16. Abstract This side impact out-of-position test was performed in conjunction with a New Car Assessment Program (NCAP). This test was conducted at The Transportation Research Center Inc. in East Liberty, Ohio, on August 8, 2008.							
Injury Summary							
HIC15	HIC36	Clip (g's)	Chest Displacement (mm)	NIJ NTF	NIJ NTE	NIJ NCF	NIJ NCE
4	4	6.3	0.63	0.00	0.00	0.29	0.43
17. Key Words Side Airbag Out-of-Position New Car Assessment Program (NCAP) 2008 Jeep Liberty Sport NHTSA No.: M80309				18. Distribution Statement <u>Copies of this report are available from:</u> NHTSA Technical Information Services (TIS) 1200 New Jersey Avenue, S.E., Room W43-410 Washington, DC 20590 Telephone No. (202) 366-4946 Attn: Robert Hornicle			
19. Security Classification (of this report) Unclassified		20. Security Classification (of this page) Unclassified		21. Number of Pages 65		22. Price	

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1-1
2	Data Sheets	2-1
	Data Sheet 1 - Test Summary	2-1
	Data Sheet 2 - Vehicle Parameter Data	2-2
	Data Sheet 3 - Dummy Positioning in Vehicle	2-3
	Data Sheet 4 - Dummy Injury Criteria Values	2-4
 <u>Appendix</u>		
A	Photographs	A-1
B	Data Plots	B-1
C	IIII 6YO Calibration Information	C-1
D	Test Equipment Data	D-1

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

The purpose of this test was to obtain data in a static out-of-position side impact. These data constitute part of the general consumer information collected by the New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract No. DTNT22-06-R-00029.

SUMMARY

The effects of a side rail mounted curtain airbag deployment in a 2008 Jeep Liberty Sport with an out-of-position Hybrid III six-year-old were evaluated. The test was performed by Transportation Research Center Inc. on August 8, 2008. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

One (1) high-speed digital camera was used to document the side airbag deployment event. The high-speed camera was placed in the left front occupant compartment in line with the centerline of the dummy. The recorded image rate was 1000 frames per second.

One (1) Part 572N Hybrid III six-year-old child anthropomorphic test device (ATD), was placed in the right front seat situated in the leftward facing position according to dummy placement instructions specified in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as prepared by the Side Airbag Out-of-Position Injury Technical Working Group (TWG).

The child dummy was instrumented with head accelerometers, a lower neck force and moment load cell, and a chest displacement potentiometer.

Seventeen channels of data were recorded using an onboard data acquisition system. Appendix A contains photographs. Appendix B contains dummy response data plots. Appendix C contains the Instrumentation Data Channel Reports.

The child dummy's visible contact points were as follows: The airbag to the back of the head of the dummy.

The six-year-old child dummy was placed on a booster block and seated according to Section 3.3.5.1 of the TWG Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as defined by Lund, et al and the Technical Working Group dated July 2003.

The child dummy's upper neck X- and Z-axis force and X- and Y-axis moment data channels failed to return to zero. This affected the NIJ calculations.

The child dummy's lower neck X-, Y-, and Z-axis force and moment data channels failed to return to zero.

Section 2.0

DATA SHEET NO. 1

TEST SUMMARY

Test Configuration Information

	Test Data	Description
Seating Position:	P2	Right front seating position
Test:	3.3.5.1*	Leftward facing Hybrid III 6-year-old child dummy on booster block
Airbag:	Side Rail	Side curtain airbag
Booster Block	300 mm x 450 mm x 75 mm	Block consisted of Styrofoam DB foam with a density of 28.8 g/L
ATD Type/Serial No.:	030	IIII 6-year-old dummy

* Procedure as defined by Lund, et al and the Technical Working Group dated July 2003.

Number of data channels: 17
Number of cameras: 1 High-speed digital

Visible Dummy Contact Points

Head Contact:	The back (occipital) and top (parietal) of the head by the side curtain
Upper Torso Contact:	None
Lower Torso Contact:	None
Left Knee Contact:	None
Right Knee Contact:	None

DATA SHEET NO. 2**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80309TWG
 Test Date: 08/08/08

TEST VEHICLE INFORMATION AND OPTIONS

Make	Jeep	Anti-Lock Brakes	Yes
Model	Liberty Sport	All Wheel Drive	No
Body Style	MPV	Power Steering	Yes
NHTSA No.	M80309	Driver Front Airbag	Yes
VIN	1J8GN28K48W146985	Driver Side Airbag	No
Color	Bright Silver Metallic	Driver Head Airbag	No
Delivery Date	10/08/2007	Driver Curtain Airbag	Yes
Odometer Reading	28 miles	Passenger Airbag	Yes
Dealer	Nelson Auto Group Inc.	Passenger Side Airbag	No
Transmission	Automatic	Passenger Head Airbag	No
Final Drive	Four wheel drive	Passenger Curtain Airbag	Yes
Number of Cylinders	6	Pre-Tensioners	Yes
Engine Displacement	3.7 L	Load Limiters	Yes
Engine Placement	Longitudinal	Bucket Seats	Yes
Roof Rack	Yes	Air Conditioning	Yes
Sunroof/T-Top	Yes	AM/FM CD	Yes
Tinted Glass	Yes	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes	Other	None

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC	GVWR (kg)	2541
Date of Manufacture	09/07	GAWR Front (kg)	1248
		GAWR Rear (kg)	1452

Measured Parameter	Front	Mid	Rear	Total
Type of Seats	Bucket	N/A	Split Bench	
Number Of Occupants	2	0	3	5
Capacity Wt. (VCW)				430
Cargo Wt. (RCLW) (kg)				90

¹ This vehicle had previously been tested in an NCAP front impact on 10/25/07.

DATA SHEET NO. 3
FRONT SEAT DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80309TWG
 Test Date: 08/08/08

Measurement Description		Value
Total Fore/Aft Travel (mm)		225
Test Distance Rearward of Full Forward (mm)		112
Total Fore/Aft Travel (Detents)		24
Placed in Position #		13
Seat Back Angle	SA°	20°
Side Curtain Airbag Length	SCABL (mm)	1626
Side Curtain Airbag Height	SCABH (mm)	500
Head CG to Door Panel/Window	HD (mm)	145
Head to Seat Back Centerline	HSC (mm)	319
Head to B-Pillar (cg)	HB (mm)	158
Head to Roof, Z (top of the head)	HZ (mm)	130
Head to Header	HHD (mm)	153
Chest to Dash	CD (mm)	580
Chest to Seatback	CS (mm)	205
Right Arm to Seat Back Centerline	RACL (mm)	15
Right Arm to Seat Back Centerline	RACL°	34°
Left Arm to Seat Back Centerline	LACL (mm)	15
Left Arm to Seat Back Centerline	LACL°	34°
Right Arm to Door Panel	RA (mm)	280
Left Arm to Door Panel	LA (mm)	300
Knee to Knee	KK (mm)	110
Toe to Toe	TT (mm)	90
Right Knee to Seat Cushion Centerline	KSCR (mm)	115
Left Knee to Seat Cushion Centerline	KSCL (mm)	115
Right Toe to Seat Cushion Centerline	TSCR (mm)	440
Left Toe to Seat Cushion Centerline	TSCL (mm)	440
Nose to Dash	ND (mm)	610
Nose to Seatback	NS (mm)	280
Nose to Header	NR (mm)	410

DATA SHEET NO. 4

DUMMY INJURY CRITERIA VALUES

Test Vehicle: 2008 Jeep Liberty Sport
 Test Program: NCAP Side Impact

NHTSA No.: M80309TWG
 Test Date: 08/08/08

		Maximum Value			
		Position #2			
Description	Unit	Maximum	Time (ms)	Minimum	Time (ms)
Head X	g	5.8	13.0	8.8	10.7
Head Y	g	23.8	10.8	19.7	11.1
Head Z	g	32.2	10.8	6.4	17.8
Head Resultant	g	40.4	10.8	0.0	19.5
Upper Neck Fx	N	25.9	13.0	159.6	91.0
Upper Neck Fy	N	35.2	33.8	144.4	16.2
Upper Neck Fz	N	6.6	6.8	641.8	86.2
Upper Neck Mx	N-m	15.8	161.6	0.0	10.1
Upper Neck My	N-m	7.2	18.1	10.3	93.2
Upper Neck Mz	N-m	4.9	45.5	1.0	13.6
Lower Neck Fx	N	70.7	18.2	142.1	37.2
Lower Neck Fy	N	20.2	25.1	125.6	186.5
Lower Neck Fz	N	10.0	7.0	645.9	83.0
Lower Neck Mx	N-m	9.2	29.3	4.9	14.2
Lower Neck My	N-m	34.5	88.6	0.3	7.1
Lower Neck Mz	N-m	3.3	47.2	5.4	169.8
Chest X Deflection	mm	0.6	15.0	0.2	47.0

DATA SHEET NO. 4**DUMMY INJURY CRITERIA VALUES (CONTINUED)**Test Vehicle: 2008 Jeep Liberty SportNHTSA No.: M80309TWGTest Program: NCAP Side ImpactTest Date: 08/08/08

Head Injury Criteria (HIC)								
HIC15					HIC36			
HIC	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂		HIC	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position #2 - Left Front	4	10.6	12.2	22.7	4	10.5	46.5	6.86

Position 2 Neck Injury Summary (HIII 6YO - Out of Position)

NIJ	NIJ	Time (ms)
NTF	0.00	7.0
NTE	0.00	6.8
NCF	0.29	16.0
NCE	0.43	94.8

Critical Values

NIJ Intercepts				Peak Limits	
Tension (CVt)	2800 N	Extension (mCVe)	37 N-m	Tension	1490 N
Compression (CVc)	2800 N	Flexion (mCVf)	93 N-m	Compression	-1820 N

APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

<u>FIGURE</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
Figure A-1	Pre-Test Vehicle Left Side View	A-3
Figure A-2	Post-Test Vehicle Left Side View	A-3
Figure A-3	Pre-Test Right Side View	A-4
Figure A-4	Post-Test Right Side View	A-4
Figure A-5	Vehicle Certification Label	A-5
Figure A-6	Vehicle Tire Information Label	A-5
Figure A-7	Pre-Test Right Front Door Panel View	A-6
Figure A-8	Post-Test Right Front Door Panel View	A-6
Figure A-9	Pre-Test Right Rear Door Panel View	A-7
Figure A-10	Post-Test Right Rear Door Panel View	A-7
Figure A-11	Pre-Test Front SID through Windshield View	A-8
Figure A-12	Post-Test Front SID through Windshield View	A-8
Figure A-13	Pre-Test Front SID Side View	A-9
Figure A-14	Post-Test Front SID Side View	A-9
Figure A-15	Pre-Test Front SID Left Side View	A-10
Figure A-16	Post-Test Front SID Left Side View	A-10
Figure A-17	Pre-Test Front SID Rear View	A-11
Figure A-18	Post-Test Front SID Rear View	A-11



Figure A-1 Pre-Test Vehicle Left Side View



Figure A-2 Post-Test Vehicle Left Side View



Figure A-3 Pre-Test Right Side View



Figure A-4 Post-Test Right Side View



Figure A-5 Vehicle Certification Label



Figure A-6 Vehicle Tire Information Label



Figure A-7 Pre-Test Right Front Door Panel View



Figure A-8 Post-Test Right Front Door Panel View



Figure A-9 Pre-Test Right Rear Door Panel View



Figure A-10 Post-Test Right Rear Door Panel View



Figure A-11 Pre-Test Front SID through Windshield View



Figure A-12 Post-Test Front SID through Windshield View



Figure A-13 Pre-Test Front SID Side View



Figure A-14 Post-Test Front SID Side View



Figure A-15 Pre-Test Front SID Left Side View



Figure A-16 Post-Test Front SID Left Side View



Figure A-17 Pre-Test Front SID Rear View



Figure A-18 Post-Test Front SID Rear View

APPENDIX B
DATA PLOTS

Data Plot	LIST OF DATA PLOTS PROVIDED IN THE TEST REPORT	Page
B-1	Head X	B-3
B-2	Head Y	B-4
B-3	Head Z	B-5
B-4	Head Resultant	B-6
B-5	Neck Upper X Force	B-7
B-6	Neck Upper Y Force	B-8
B-7	Neck Upper Z Force	B-9
B-8	Neck Upper Moment About X	B-10
B-9	Neck Upper Moment About Y	B-11
B-10	Neck Upper Moment About Z	B-12
B-11	Neck Lower X Force	B-13
B-12	Neck Lower Y Force	B-14
B-13	Neck Lower Z Force	B-15
B-14	Neck Lower Moment About X	B-16
B-15	Neck Lower Moment About Y	B-17
B-16	Neck Lower Moment About Z	B-18
B-17	Airbag Event Passenger Side	B-19



TWG Static OOP Procedure 3.3.5.1

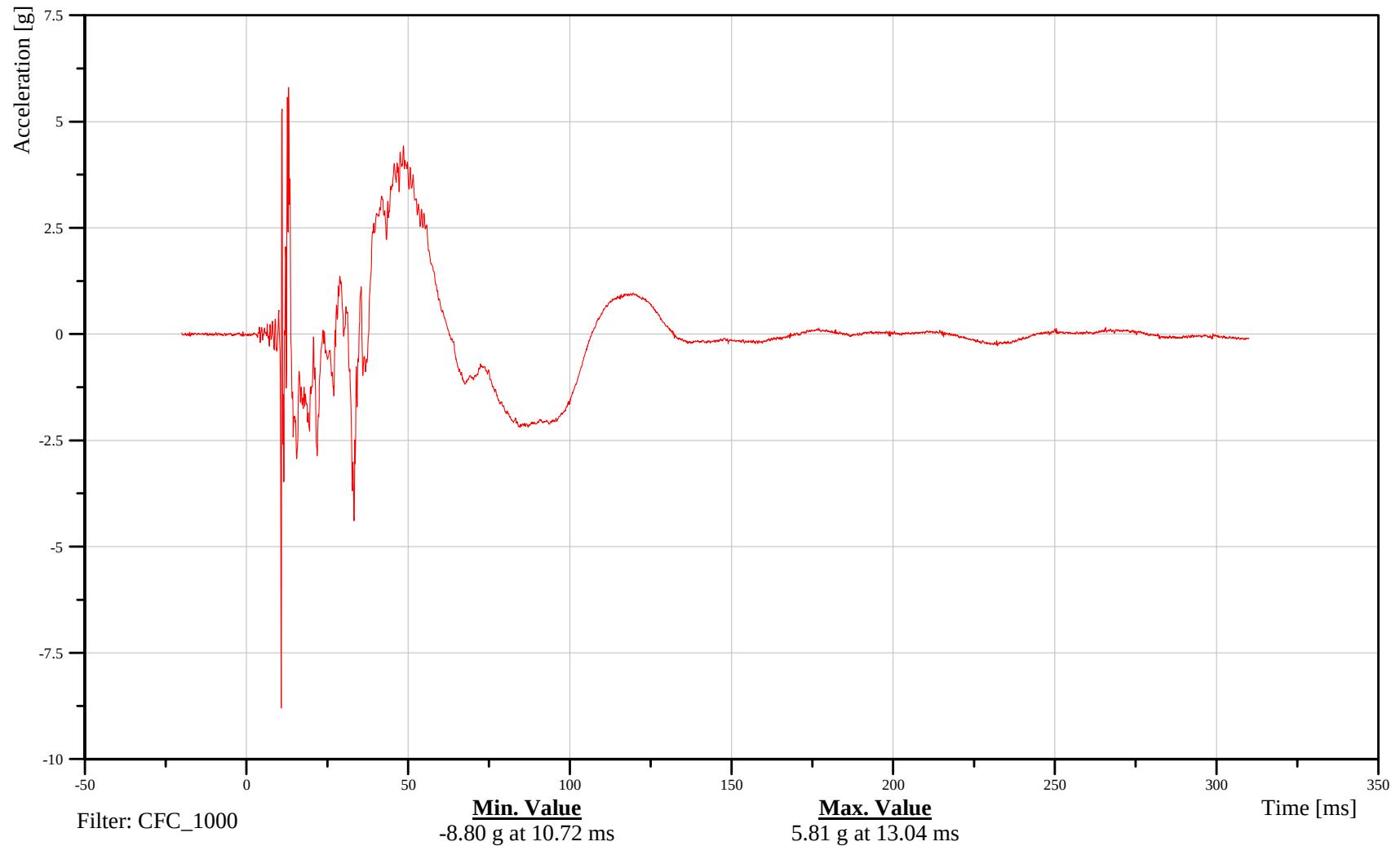
Date: 08/08/2008
Time: 15:21

Head X-Axis Acceleration

Customer: NHTSA
Test Number: M80309

13HEADCG00Y7ACXA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-3

S080808-2



TWG Static OOP Procedure 3.3.5.1

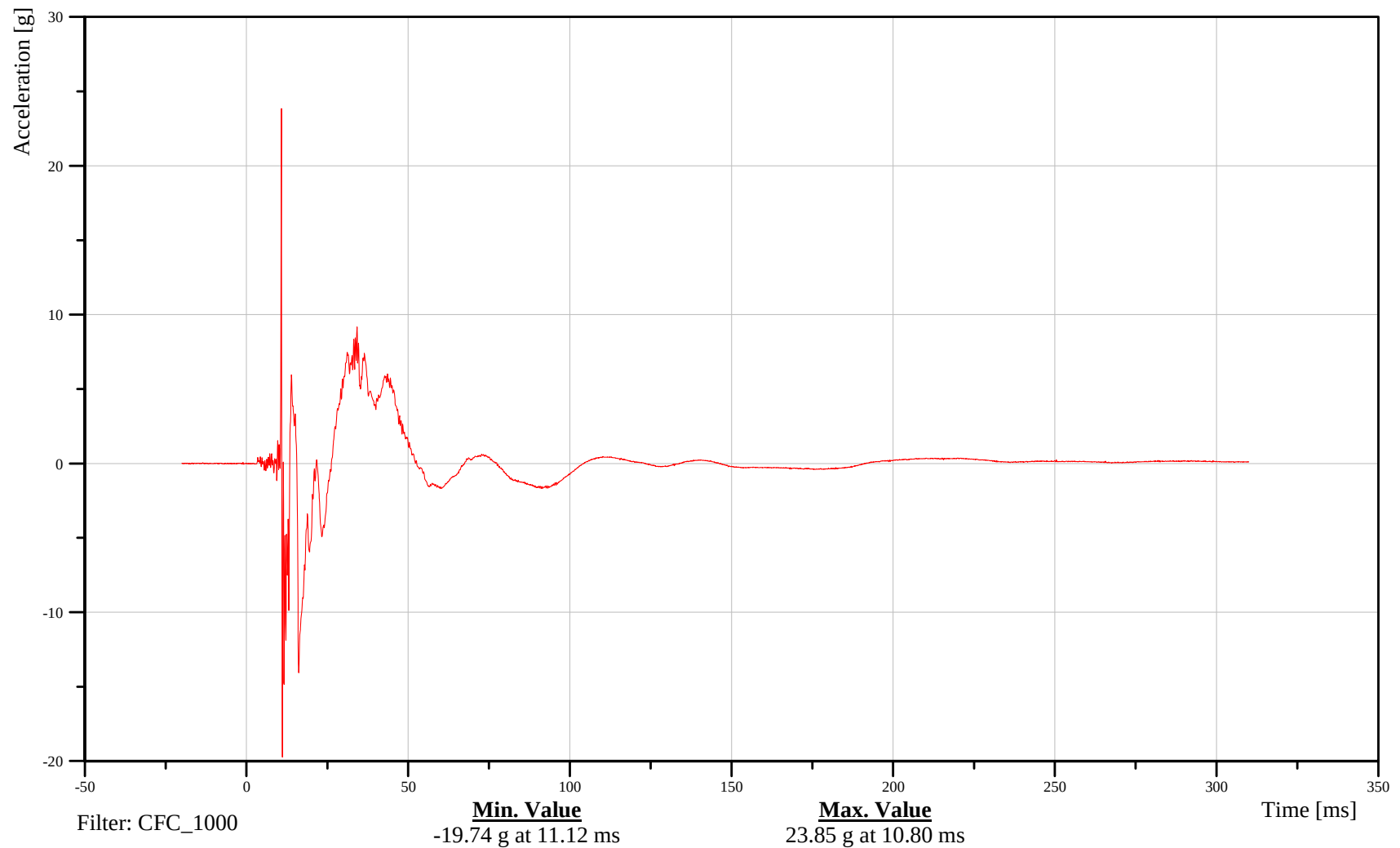
Date: 08/08/2008
Time: 15:21

Head Y-Axis Acceleration

Customer: NHTSA
Test Number: M80309

13HEADCG00Y7ACYA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-4

S080808-2



TWG Static OOP Procedure 3.3.5.1

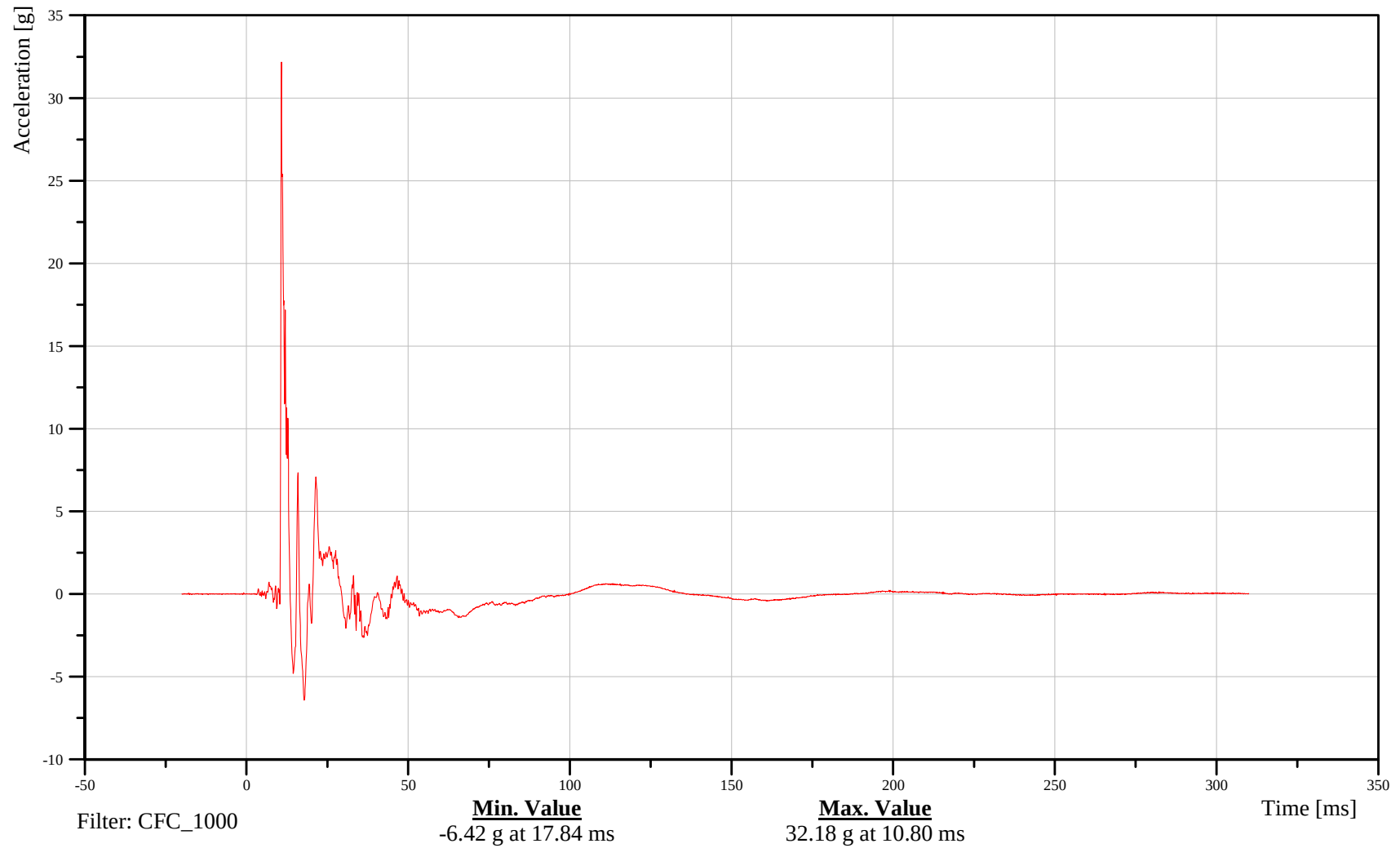
Head Z-Axis Acceleration

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13HEADCG00Y7ACZA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-5

S080808-2



TWG Static OOP Procedure 3.3.5.1

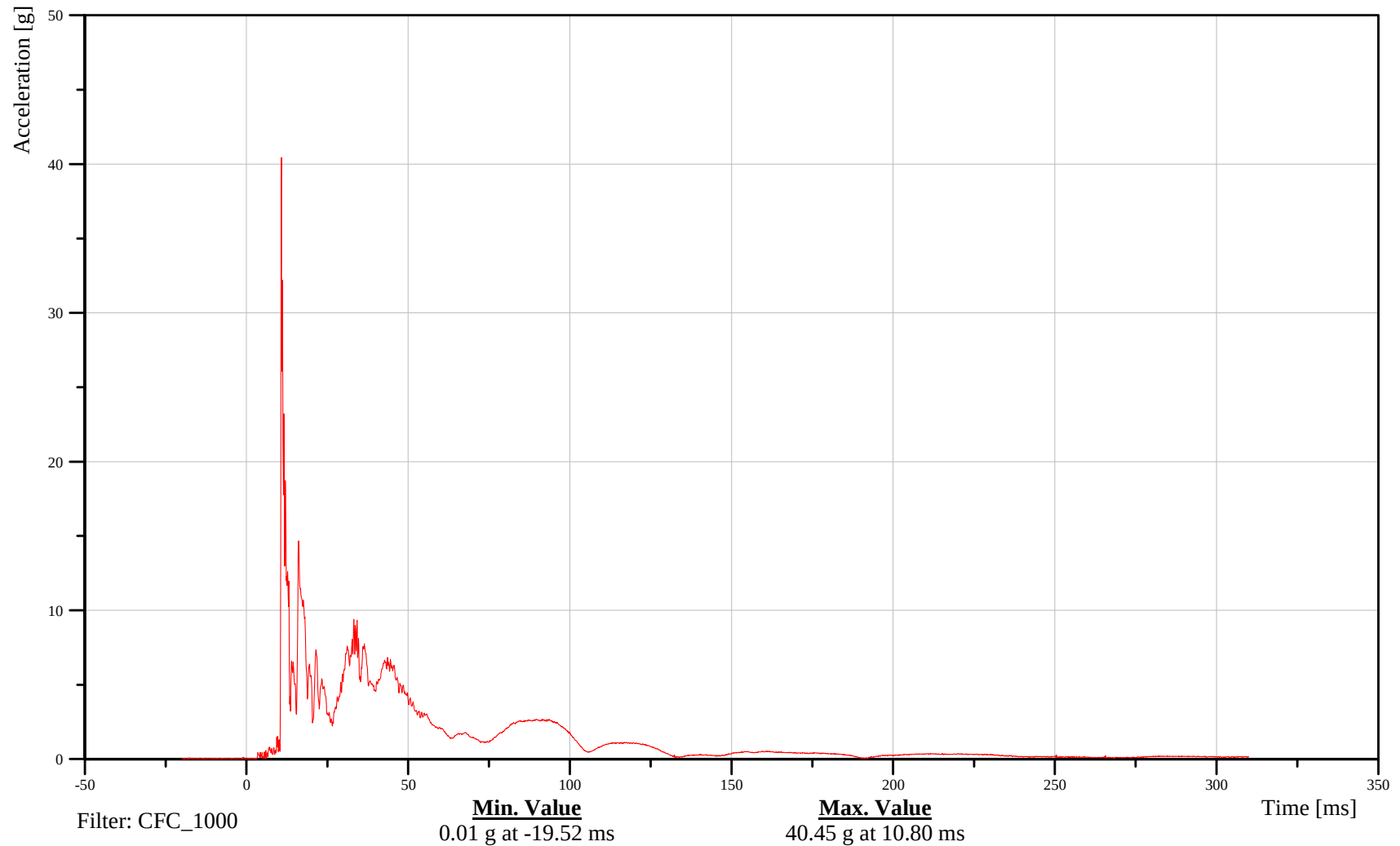
Head Resultant Acceleration

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13HEADCG00Y7ACRA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-6

S080808-2



TWG Static OOP Procedure 3.3.5.1

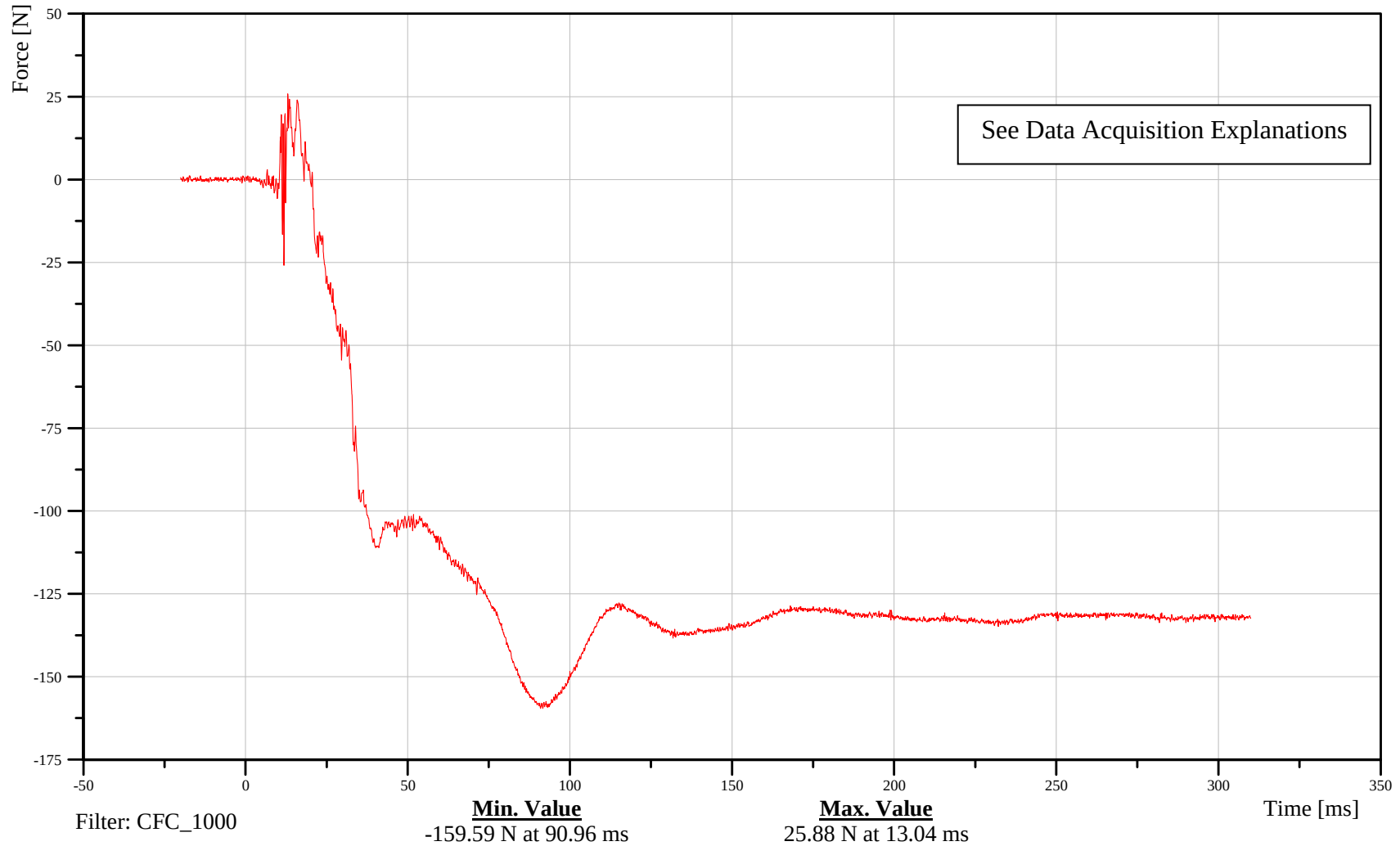
Date: 08/08/2008
Time: 15:21

Neck X-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7FOXA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-7

S080808-2



TWG Static OOP Procedure 3.3.5.1

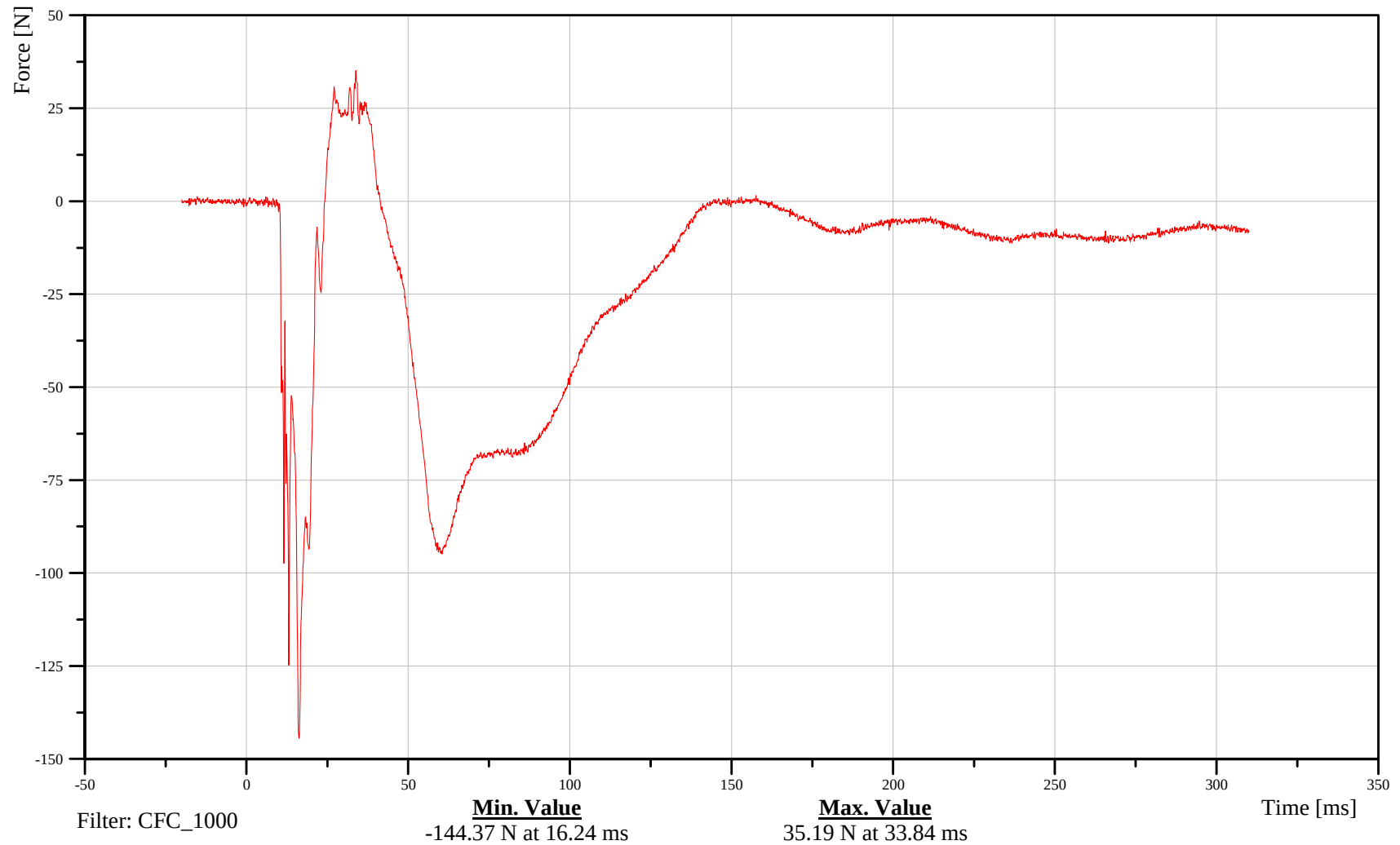
Date: 08/08/2008
Time: 15:21

Neck Y-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7FOYA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-8

S080808-2



TWG Static OOP Procedure 3.3.5.1

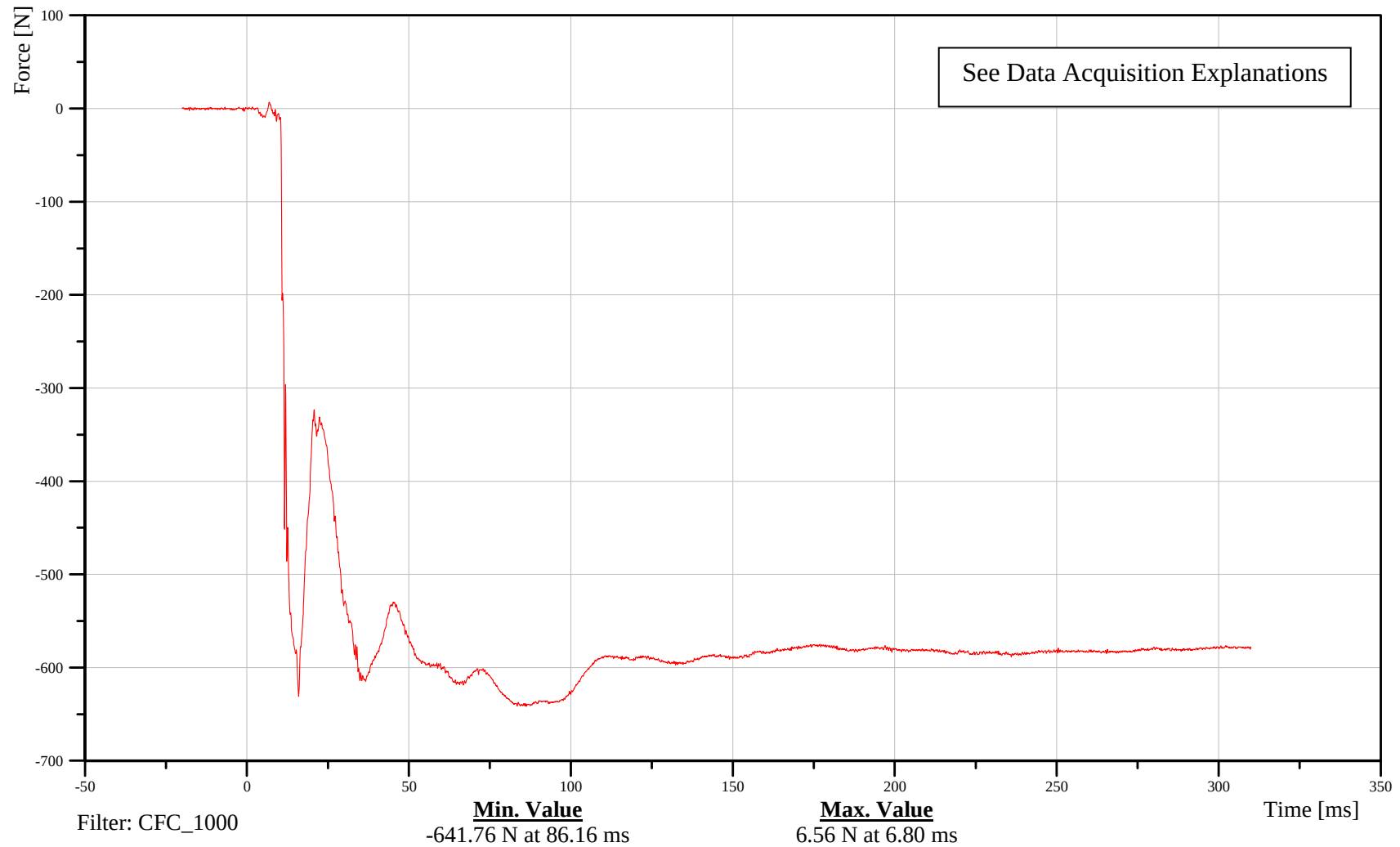
Date: 08/08/2008
Time: 15:21

Neck Z-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7FOZA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-9

S080808-2



TWG Static OOP Procedure 3.3.5.1

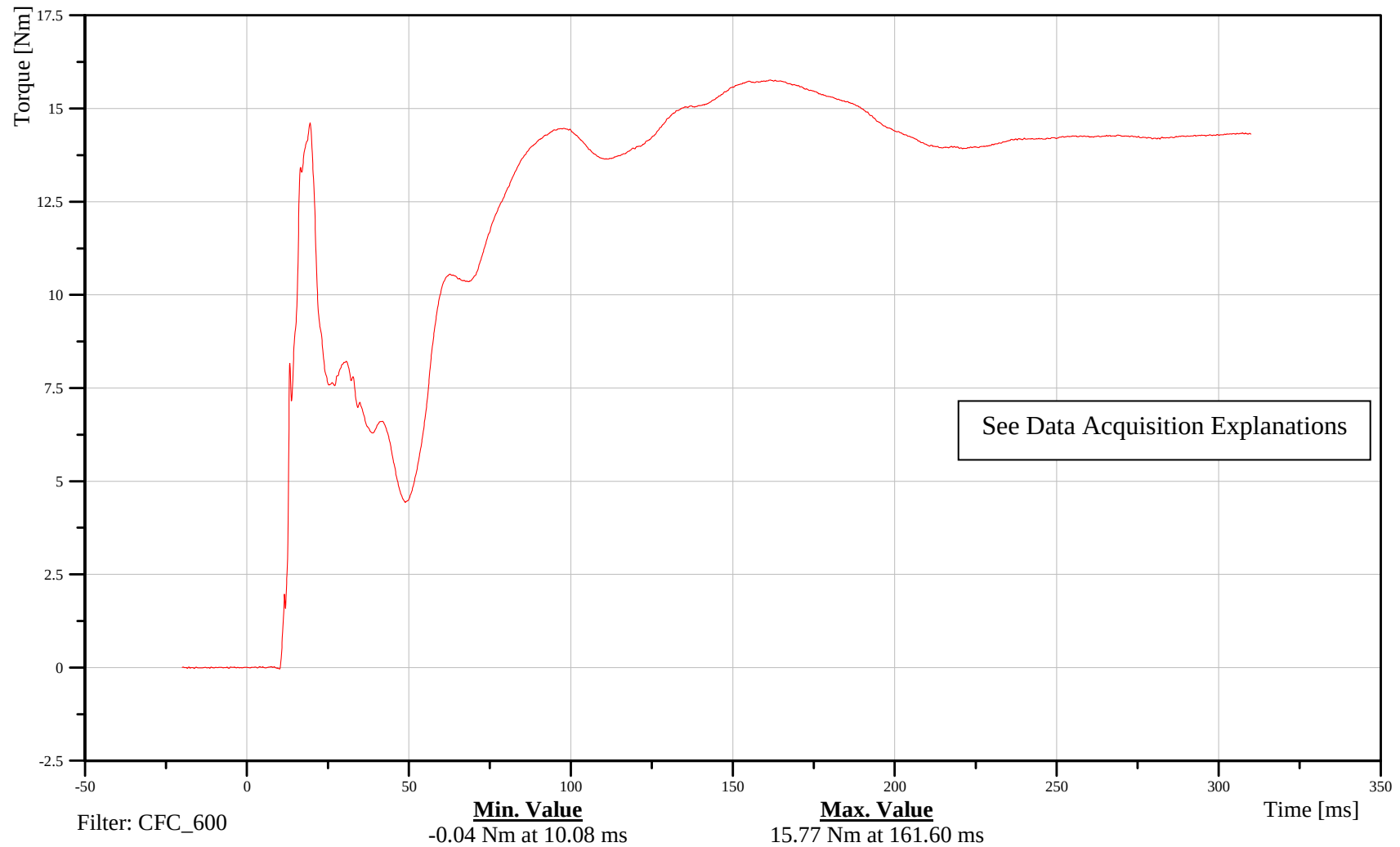
Neck Moment About X Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7MOXB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-10

S080808-2



TWG Static OOP Procedure 3.3.5.1

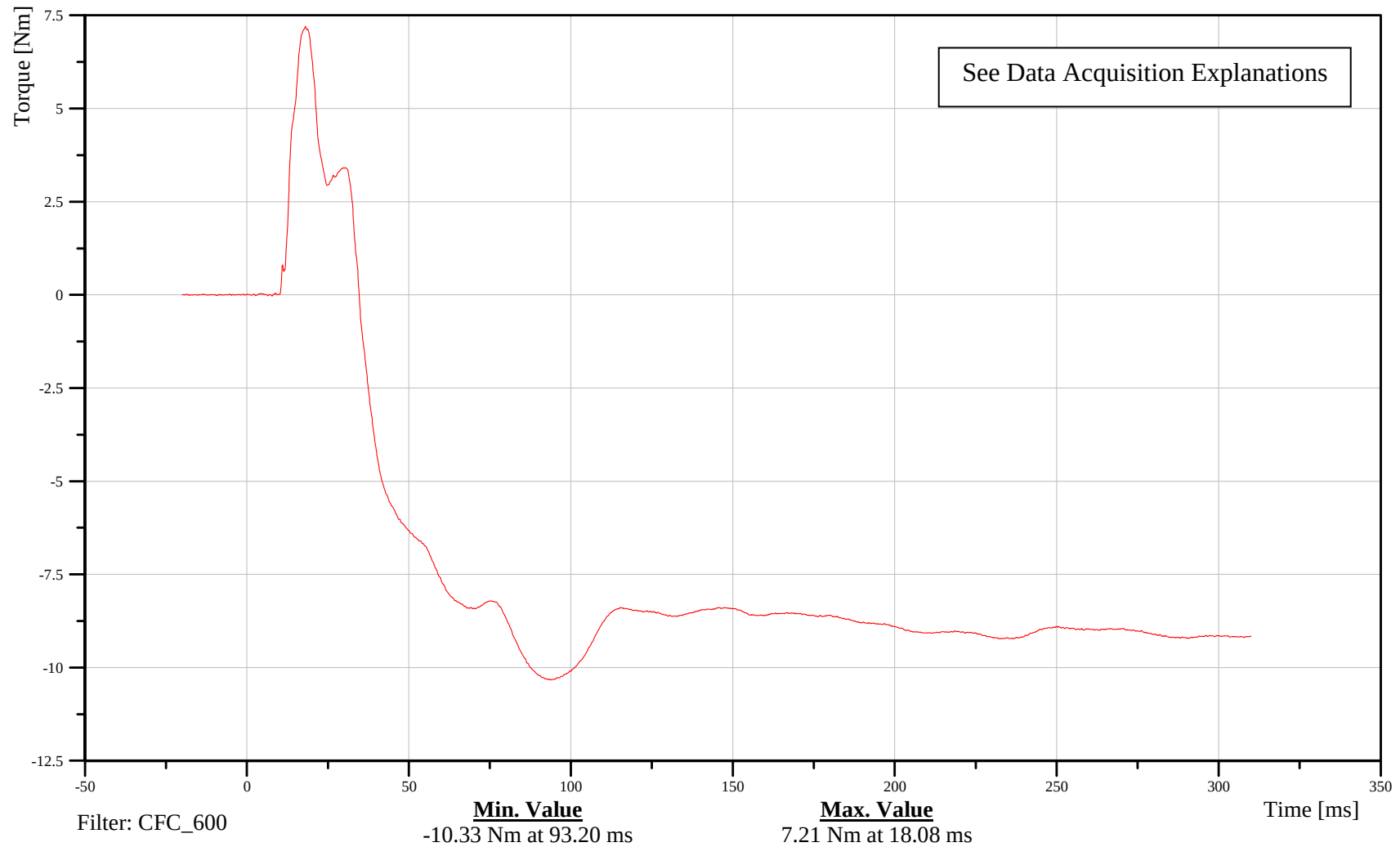
Neck Moment About Y Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7MOYB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-11

S080808-2



TWG Static OOP Procedure 3.3.5.1

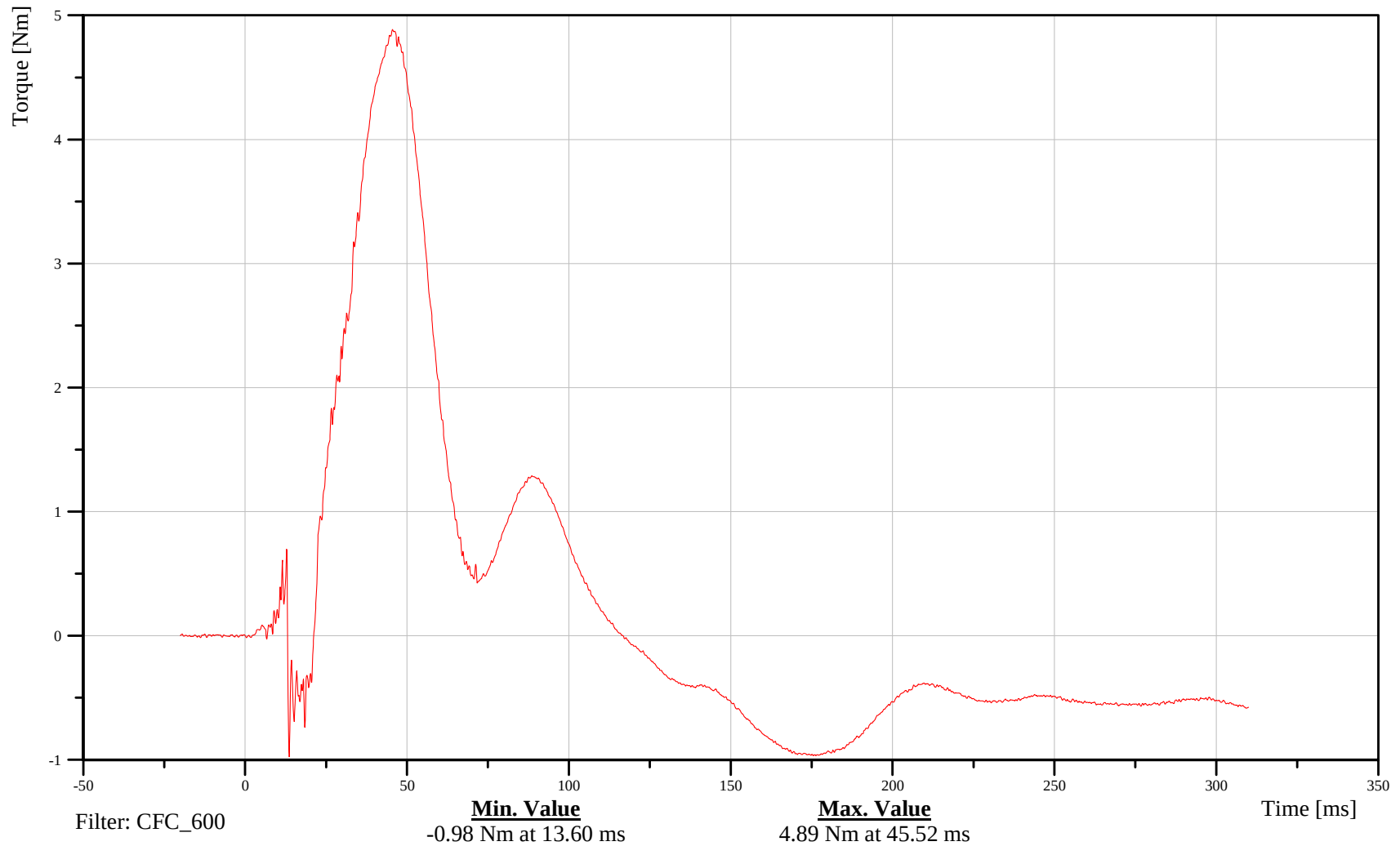
Neck Moment About Z Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKUP00Y7MOZB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-12

S080808-2



TWG Static OOP Procedure 3.3.5.1

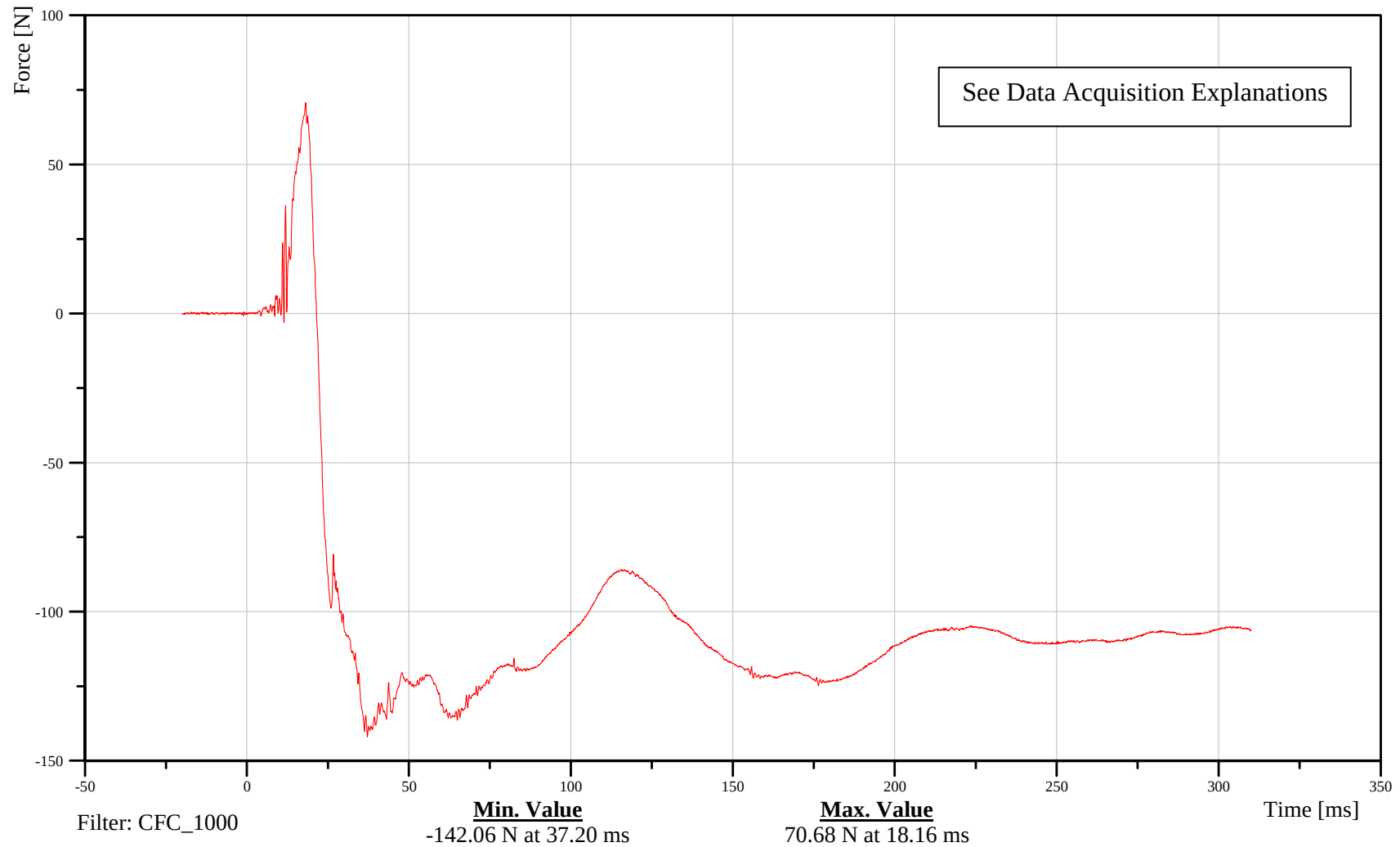
Date: 08/08/2008
Time: 15:21

Neck Lower X-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7FOXA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-13

S080808-2



TWG Static OOP Procedure 3.3.5.1

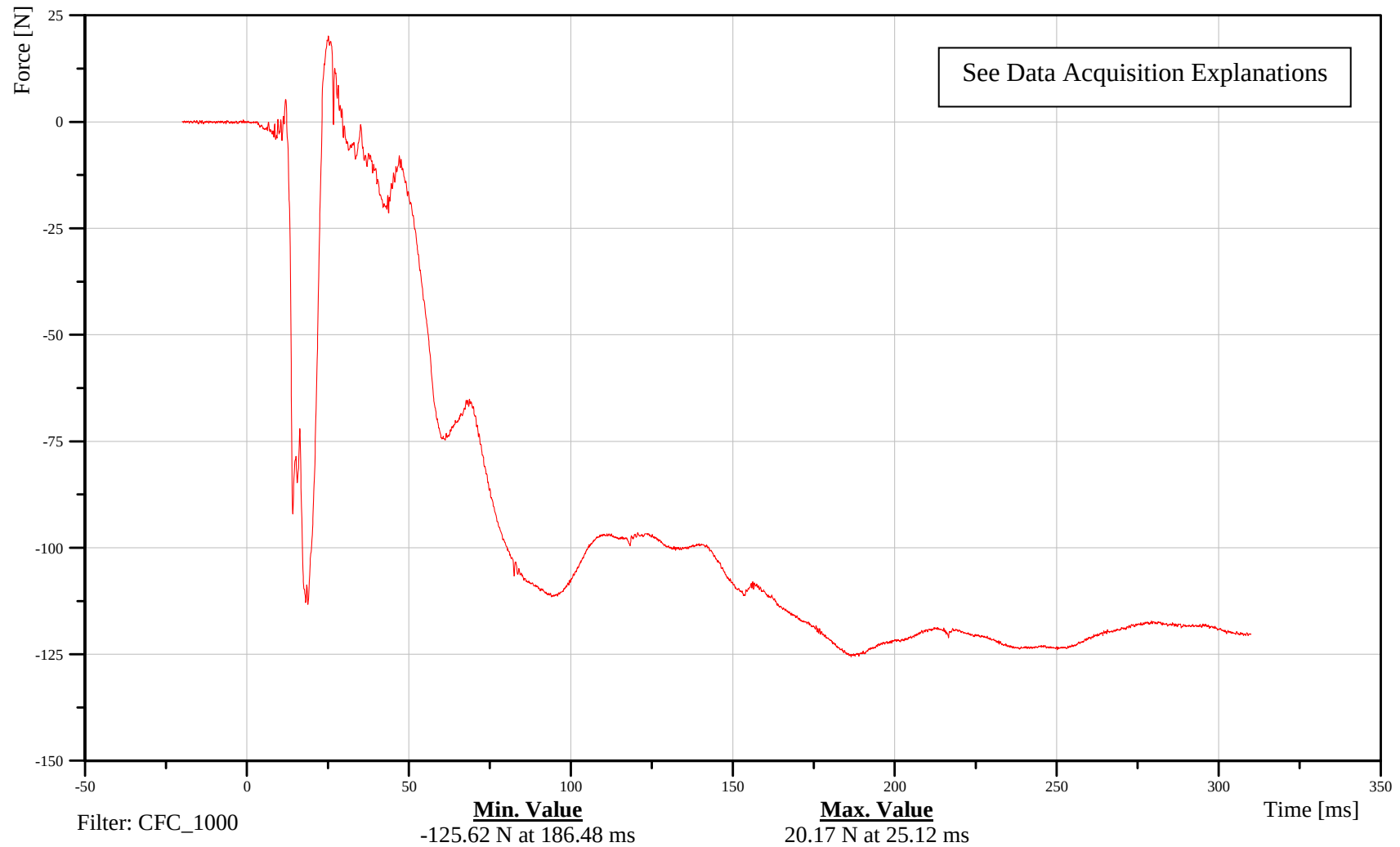
Date: 08/08/2008
Time: 15:21

Neck Lower Y-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7FOYA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-14

S080808-2



TWG Static OOP Procedure 3.3.5.1

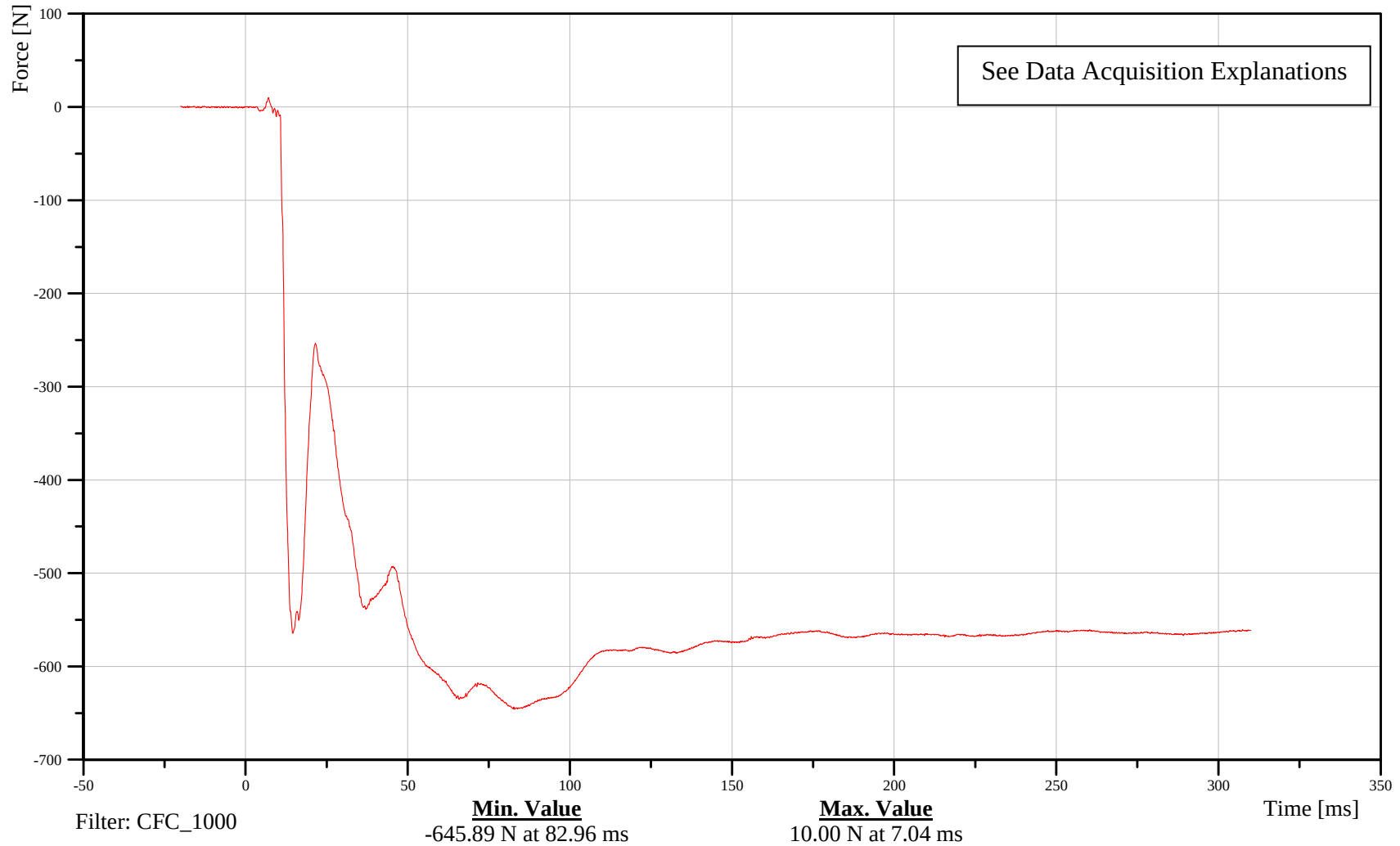
Date: 08/08/2008
Time: 15:21

Neck Lower Z-Axis Force

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7FOZA

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-15

S080808-2



TWG Static OOP Procedure 3.3.5.1

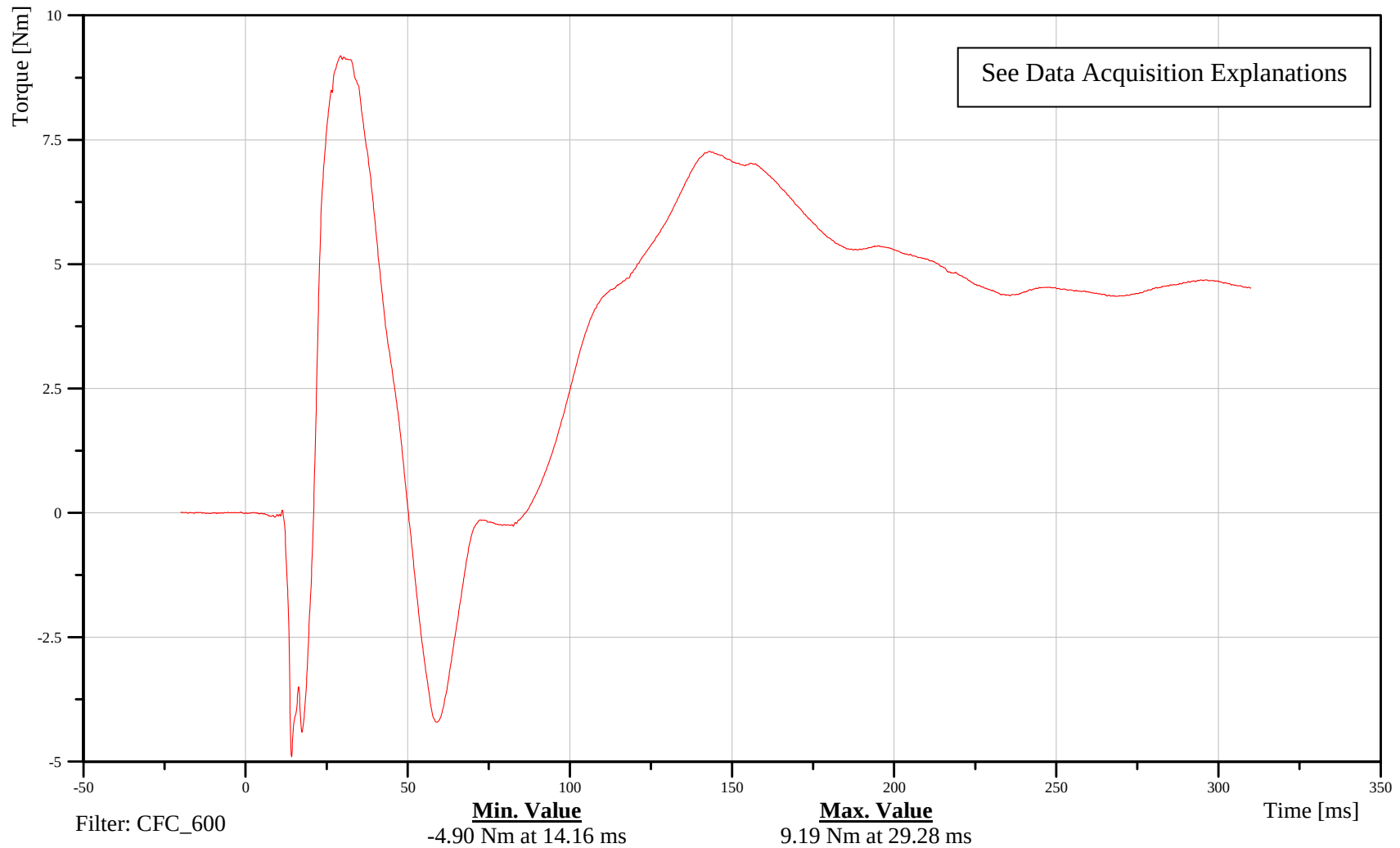
Neck Lower Moment About X Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7MOXB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-16

S080808-2



TWG Static OOP Procedure 3.3.5.1

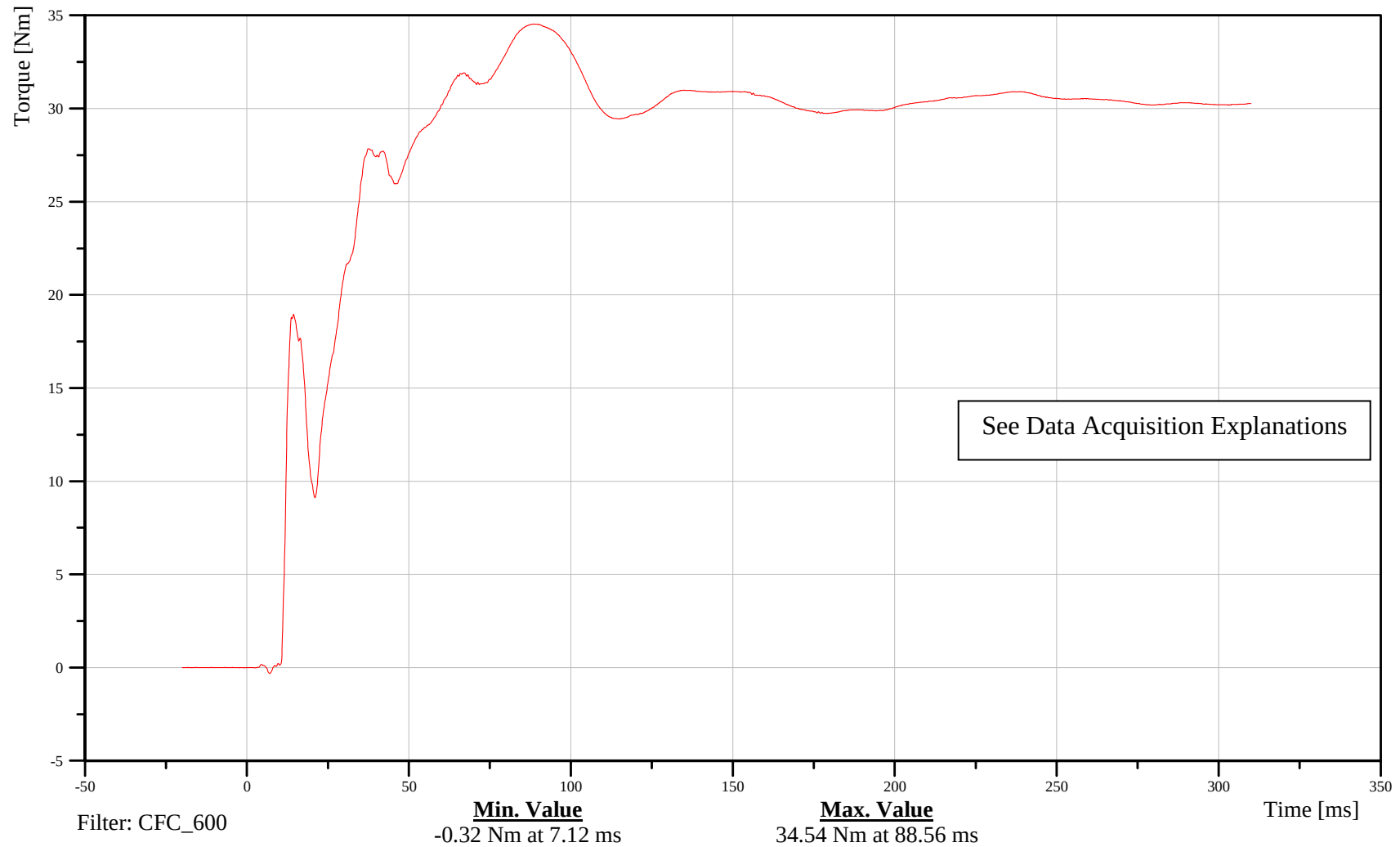
Neck Lower Moment About Y Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7MOYB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-17

S080808-2



TWG Static OOP Procedure 3.3.5.1

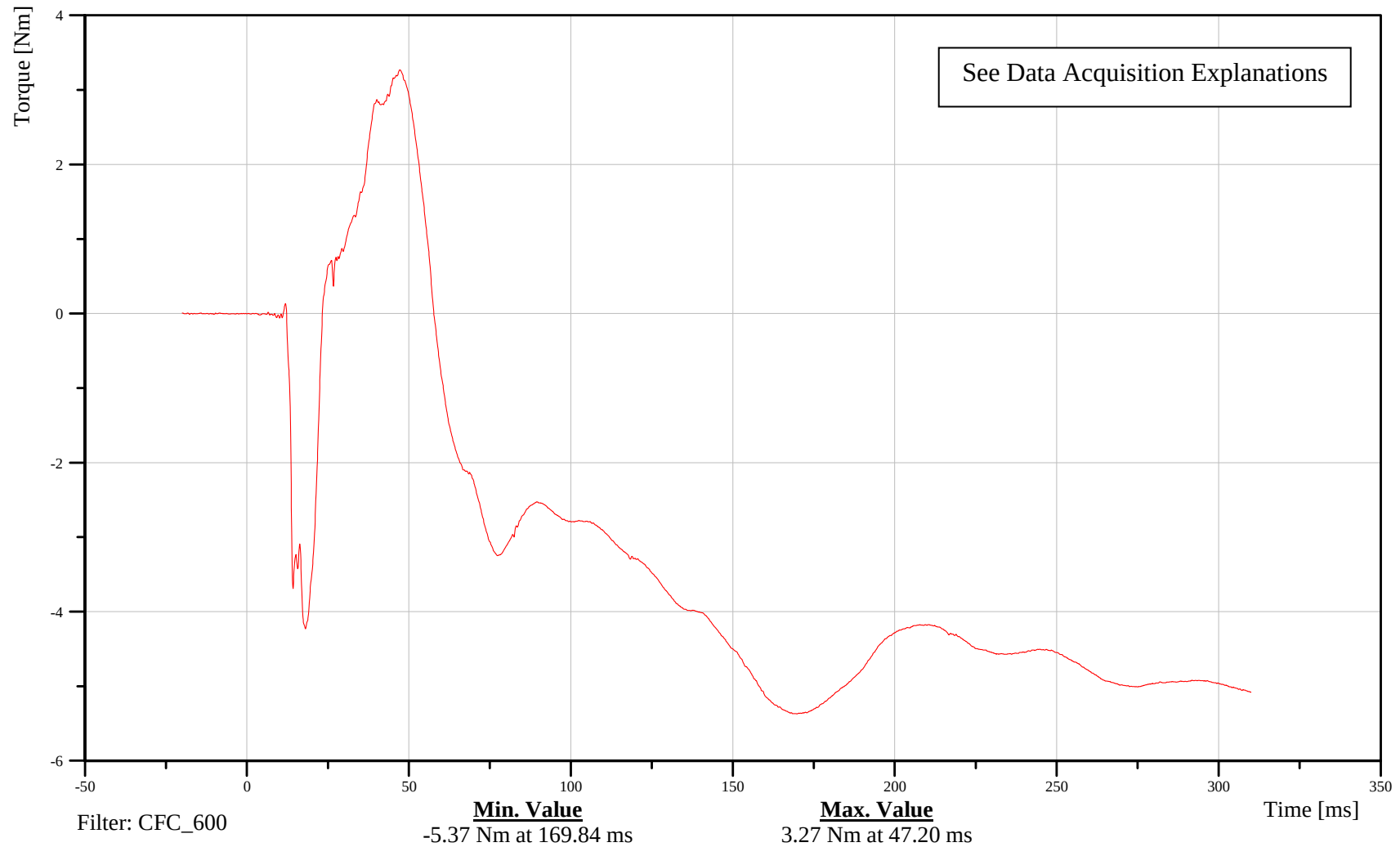
Neck Lower Moment About Z Axis

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13NECKLO00Y7MOZB

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-18

S080808-2



TWG Static OOP Procedure 3.3.5.1

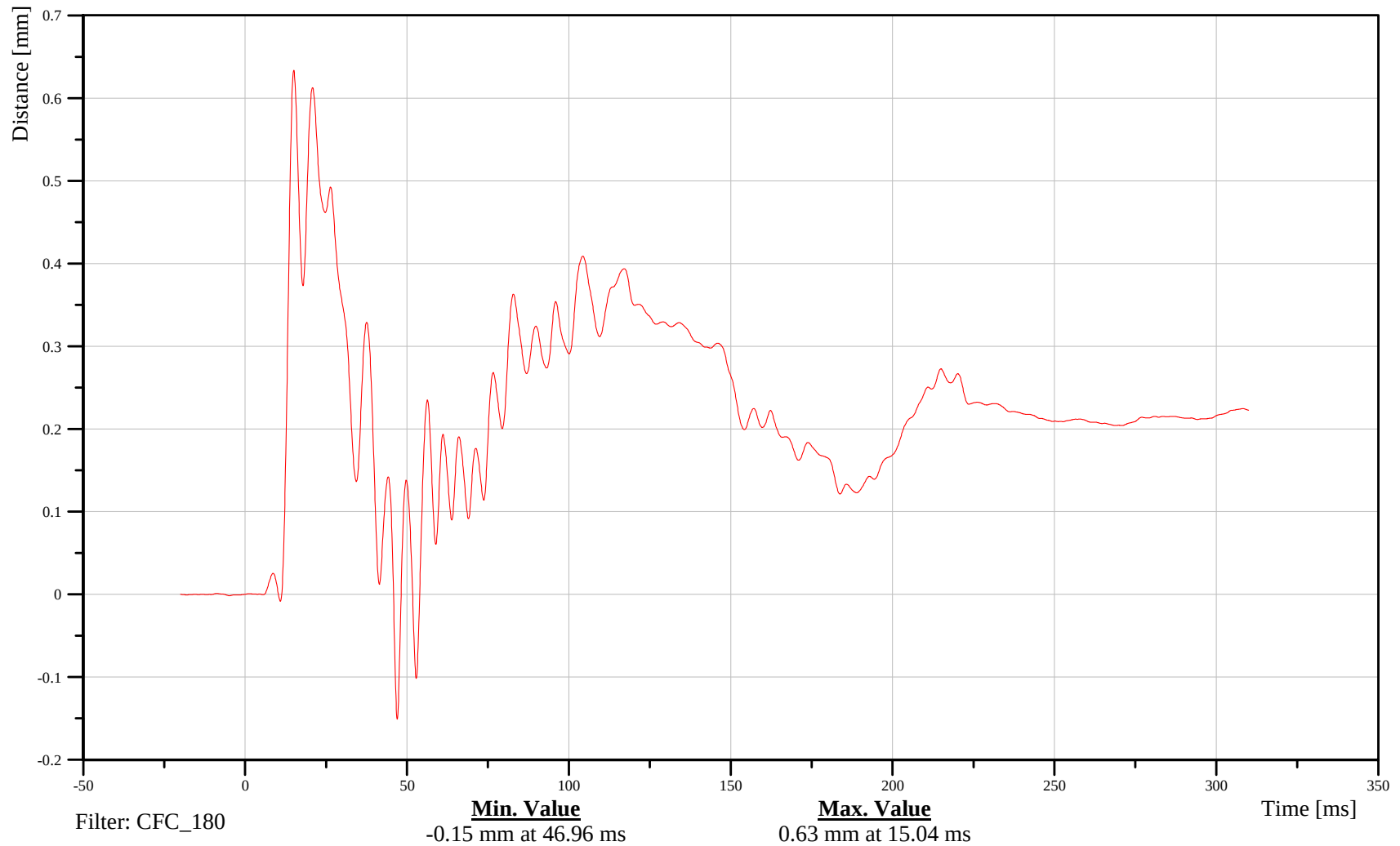
Chest X-Axis Deflection

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13CHST0000Y7DSXC

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-19

S080808-2



TWG Static OOP Procedure 3.3.5.1

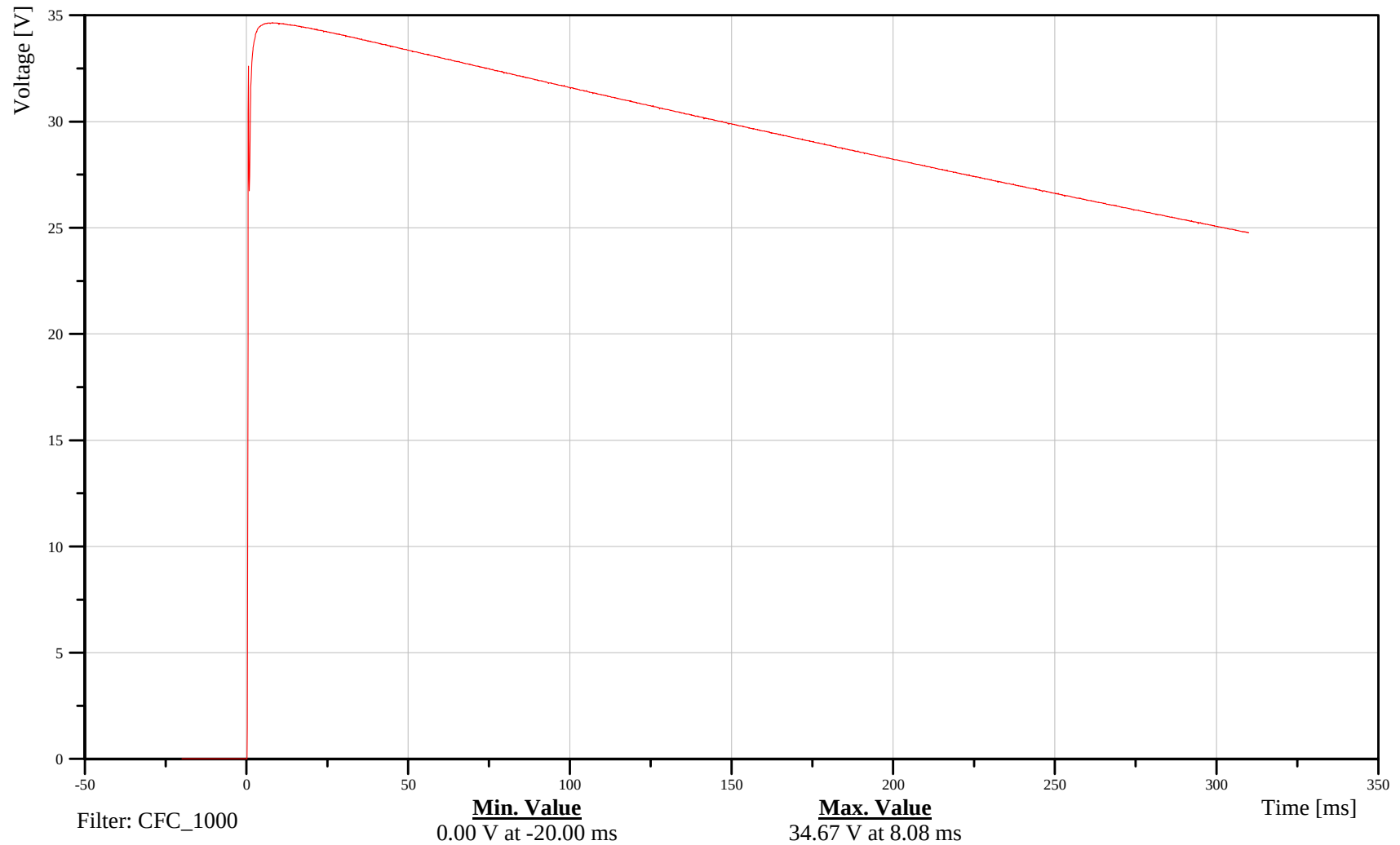
Airbag Event Passenger Side

Date: 08/08/2008
Time: 15:21

Customer: NHTSA
Test Number: M80309

13AIRB010000VO0A

TRC Inc. Test Lab: SLED
Test Number: S080808-2



B-20

S080808-2

APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

Hybrid III 6YO: 030

Transportation Research Center Inc.
572N HIII 6 Year Old Dummy
External Dimensions
Serial No. 030 Calibration No. 19

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	622.3 - 647.7	632	Yes
B	Shoulder Pivot Height	348.0 - 363.2	351	Yes
C	Hip Pivot Height	63.5 - 73.7	68	Yes
D	Hip Pivot from Backline	88.9 - 99.1	93	Yes
E	Shoulder Pivot from Backline	53.3 - 63.5	61	Yes
F	Thigh Clearance	88.9 - 104.1	93	Yes
G	Back of Elbow to Wrist Pivot	182.9 - 198.1	190	Yes
H	Head Back to Backline	17.8 - 22.8	22	Yes
I	Shoulder to Elbow Length	215.9 - 231.1	220	Yes
J	Elbow Rest Height	157.4 - 177.8	161	Yes
K	Buttock to Knee Length	370.8 - 391.2	380	Yes
L	Popliteal Height	269.2 - 289.6	275	Yes
M	Knee to Floor Height	307.4 - 322.6	315	Yes
N	Buttock Popliteal Height	320.0 - 340.4	325	Yes
O	Chest Depth without Jacket	129.6 - 144.8	140	Yes
P	Foot Length	170.2 - 185.4	171	Yes
Q	Stature (Q=A-C-D+R+M)	1099.9 - 1181.1	1132	Yes
R	Buttock to Knee Pivot Length	342.9 - 363.2	345	Yes
S	Head Breadth	137.1 - 147.3	139	Yes
T	Head Depth	167.6 - 177.8	173	Yes
U	Hip Breadth	208.3 - 223.5	218	Yes
V	Shoulder Breadth	259.1 - 274.3	270	Yes
W	Foot Breadth	62.3 - 77.5	65	Yes
X	Head Circumference	510.5 - 530.9	512	Yes
Y	Chest Circumference with Jacket	596.9 - 622.3	615	Yes
Z	Waist Circumference	558.8 - 584.2	573	Yes
AA	Reference Location for Chest Circumference	325.1 - 335.3	330	Yes
BB	Reference Location for Waist Circumference	153.7 - 163.9	155	Yes

Technician

Approved

Charles W. Hale

Ron Stence

Transportation Research Center Inc.

Front Head Drop

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Peak Head Resultant Acceleration	245 - 300 g	280.8 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-3.7 g	Yes
Is Acceleration Curve Unimodal	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner

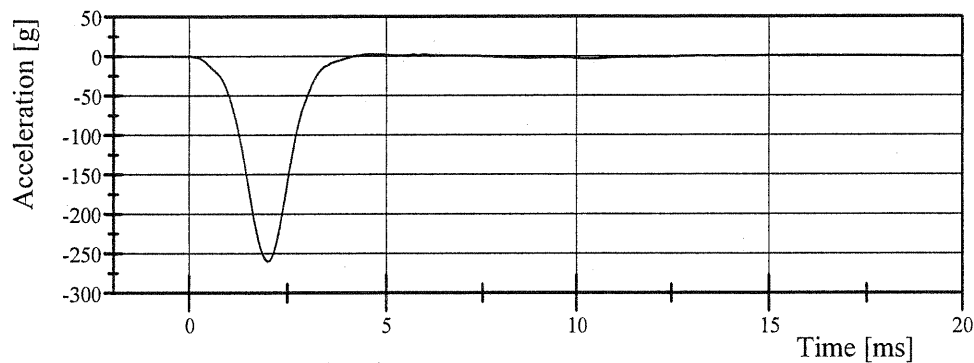
Transportation Research Center Inc.

Front Head Drop

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008

Head X-Axis Acceleration

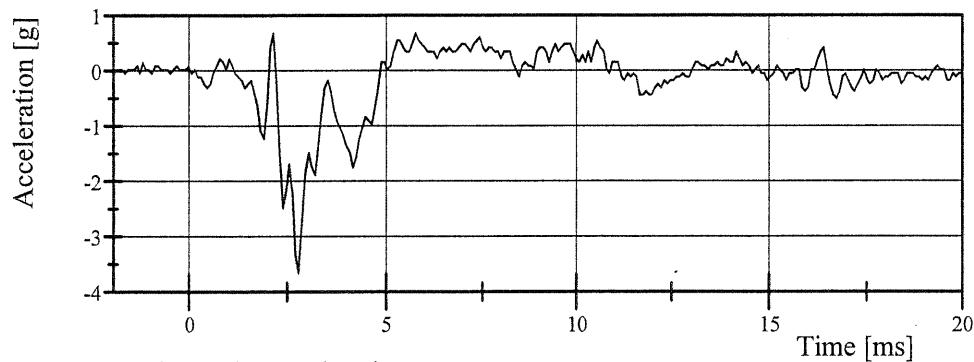


Filter Class: CFC_1000

Max: 2.6 g at 4.6 ms

Min: -260.2 g at 2.0 ms

Head Y-Axis Acceleration

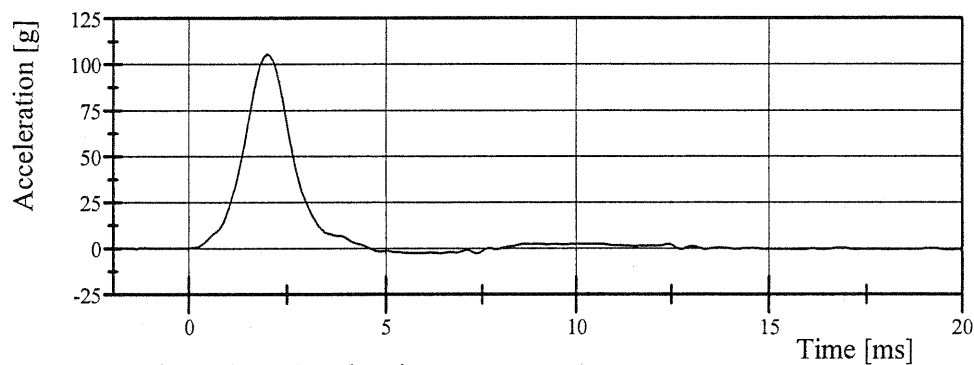


Filter Class: CFC_1000

Max: 0.7 g at 2.2 ms

Min: -3.7 g at 2.8 ms

Head Z-Axis Acceleration

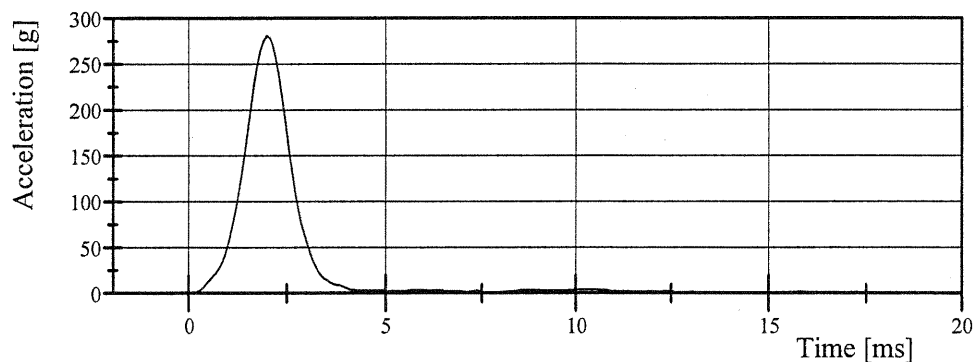


Filter Class: CFC_1000

Max: 105.5 g at 2.0 ms

Min: -2.8 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000

Max: 280.8 g at 2.0 ms

Min: 0.0 g at -2.0 ms

Transportation Research Center Inc.

Neck Flexion

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Impact Velocity	4.83 - 5.07 m/s	4.977 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.2) - (-1.6) m/s	-1.52 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-2.4) - (-3.4) m/s	-2.97 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-3.8) - (-5.0) m/s	-4.33 m/s	Yes
Total Head D-Plane Rotation	(-74) - (-92) °	-81.8 °	Yes
Peak Neck Occipital Condyles Moment Between -74° and -92° Rotation	27 - 33 Nm	30.6 Nm	Yes
Neck Occipital Condyles Moment Decay to 5 Nm	103 - 123 ms	113.8 ms	Yes

Test meets specifications.

Comments:

Technician



Approved



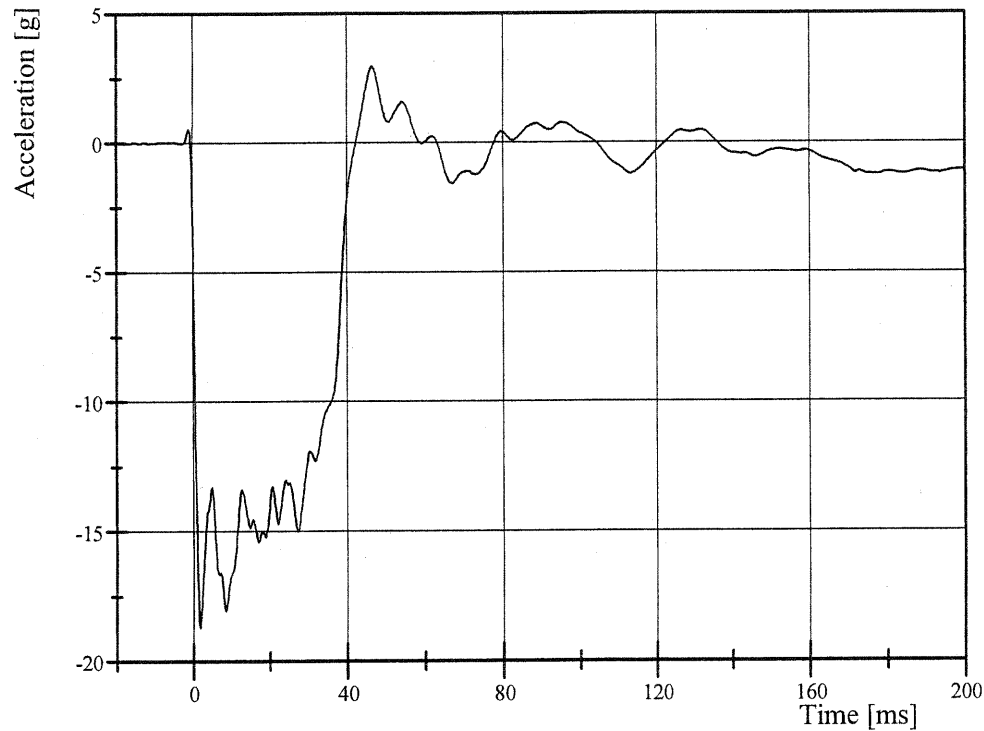
Transportation Research Center Inc.

Neck Flexion

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Pendulum Acceleration

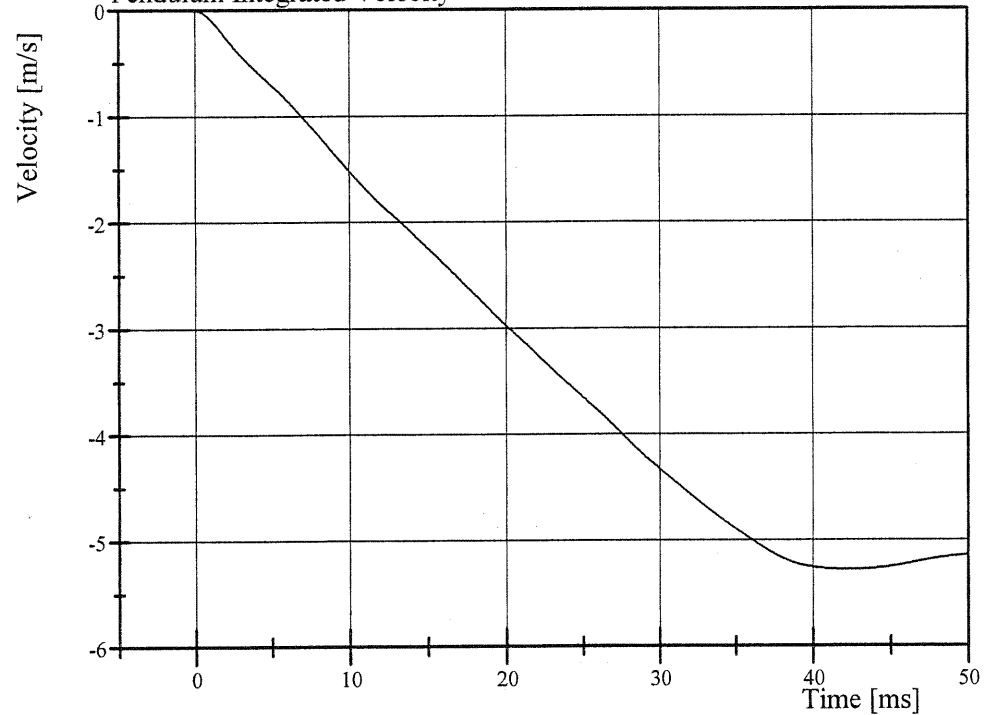


Filter Class: CFC_180

Max: 3.0 g at 46.6 ms

Min: -18.7 g at 1.8 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -5.3 m/s at 42.4 ms

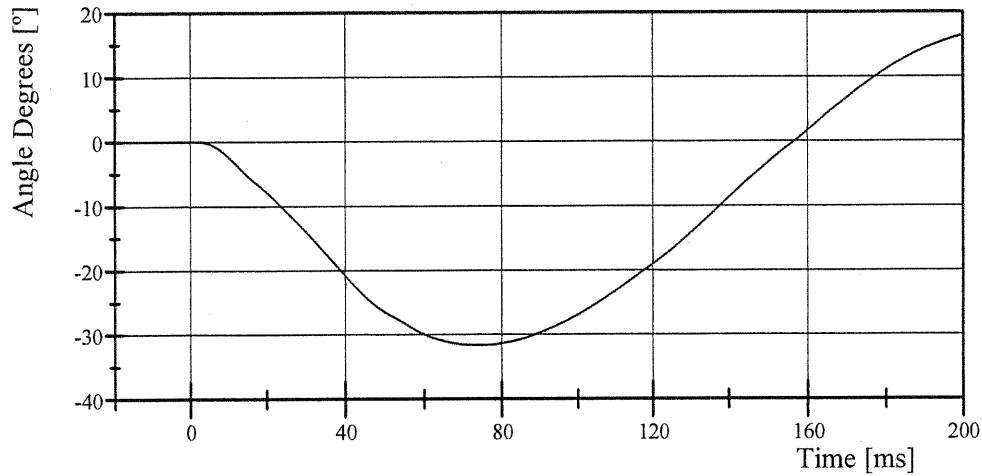
Transportation Research Center Inc.

Neck Flexion

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Pot Rotation at the Base of Neck

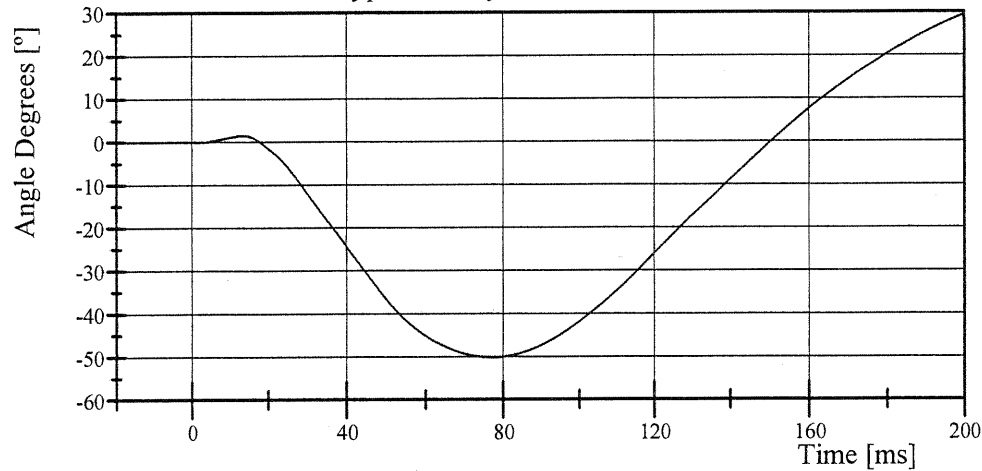


Filter Class: CFC_60

Max: 16.4 ° at 200.0 ms

Min: -31.6 ° at 74.7 ms

Head Rotation at Occypital Condyles

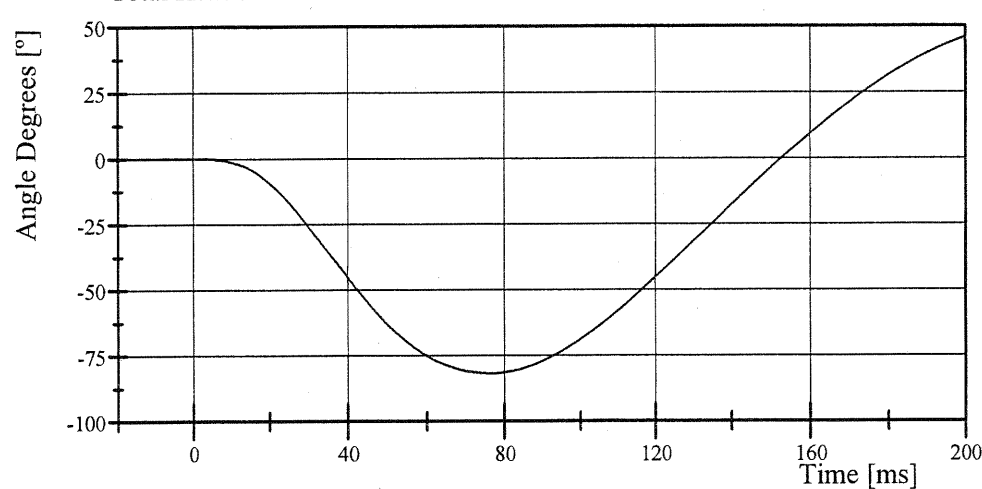


Filter Class: CFC_60

Max: 29.4 ° at 200.0 ms

Min: -50.2 ° at 77.4 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 45.8 ° at 200.0 ms

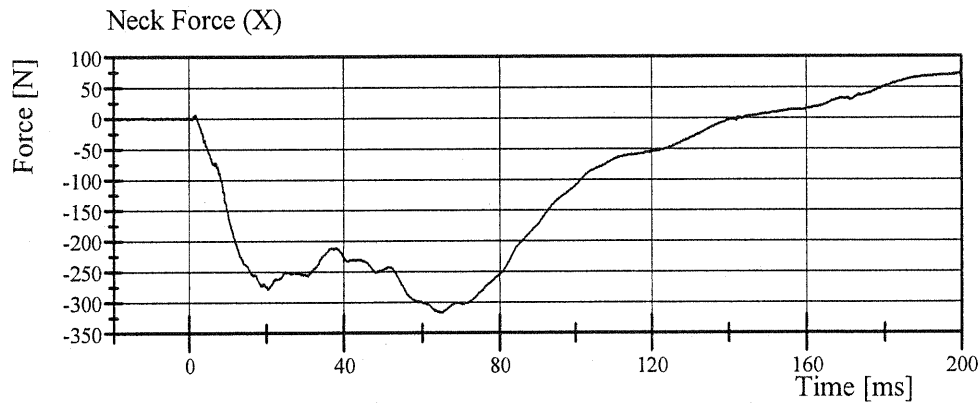
Min: -81.8 ° at 76.6 ms

Transportation Research Center Inc.

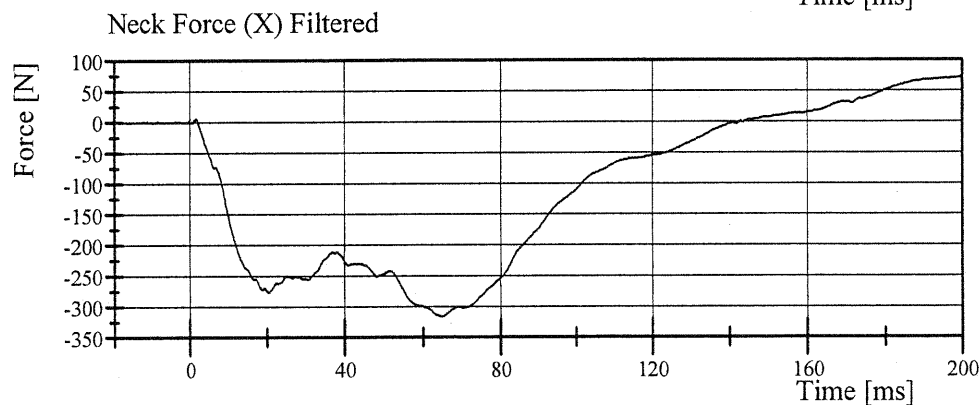
Neck Flexion

HIII 6YO Serial No. 030 Certification No. 19-1

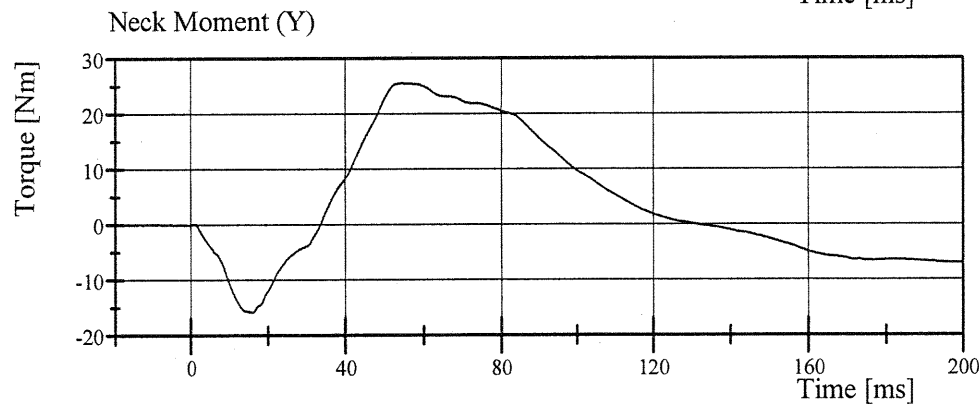
Test Date: 8/1/2008



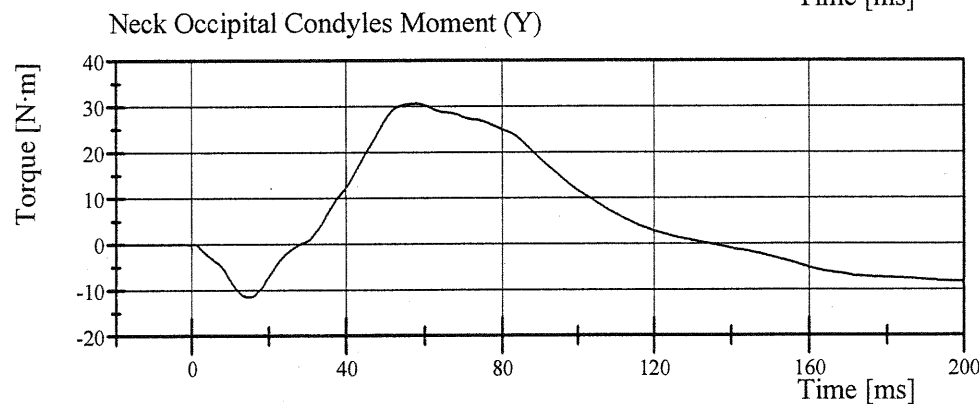
Filter Class: CFC_1000
Max: 72.3 N at 199.8 ms
Min: -316.7 N at 65.0 ms



Filter Class: CFC_600
Max: 72.0 N at 200.0 ms
Min: -316.6 N at 65.0 ms



Filter Class: CFC_600
Max: 25.5 Nm at 54.2 ms
Min: -15.8 Nm at 16.0 ms



Filter Class: CFC_600
Max: 30.7 N·m at 58.0 ms
Min: -11.4 N·m at 15.3 ms

Transportation Research Center Inc.

Neck Extension

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Impact Velocity	4.18 - 4.42 m/s	4.265 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.0) - (-1.4) m/s	-1.32 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-2.2) - (-3.0) m/s	-2.58 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-3.2) - (-4.2) m/s	-3.77 m/s	Yes
Total Head D-Plane Rotation	85 - 103 °	95.1 °	Yes
Peak Neck Occipital Condyles Moment Between 85° and 103° Rotation	(-19) - (-24) Nm	-21.3 Nm	Yes
Neck Occipital Condyles Moment Decay to 5 Nm	123 - 147 ms	133.0 ms	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bah

Approved

Ron Stoner

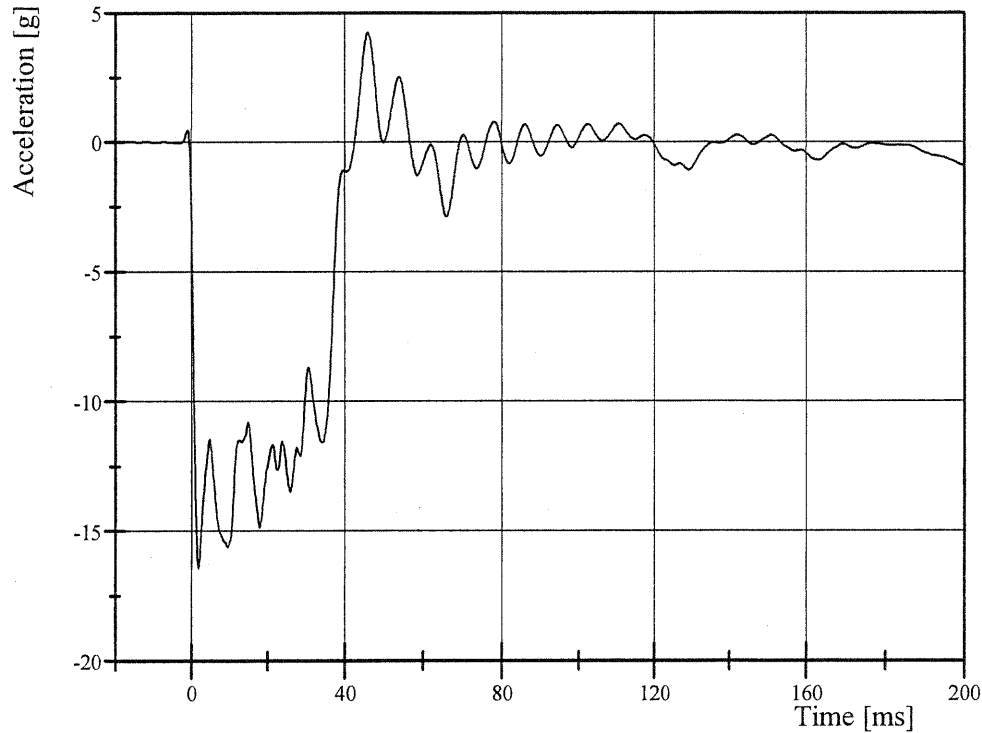
Transportation Research Center Inc.

Neck Extension

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Pendulum Acceleration

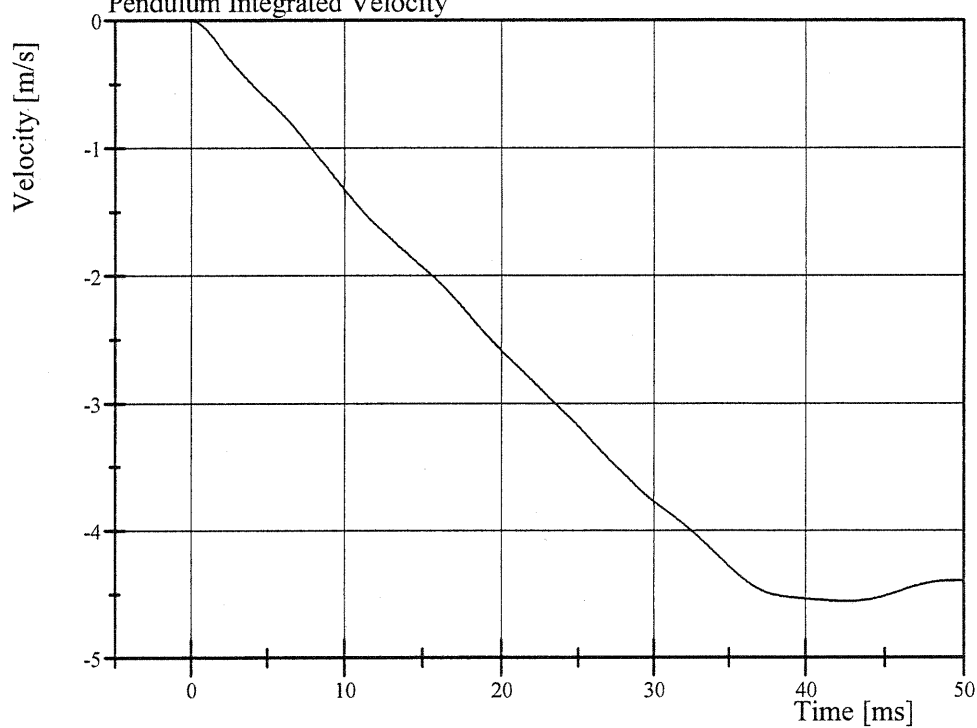


Filter Class: CFC_180

Max: 4.2 g at 45.9 ms

Min: -16.4 g at 1.9 ms

Pendulum Integrated Velocity



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -4.6 m/s at 42.6 ms

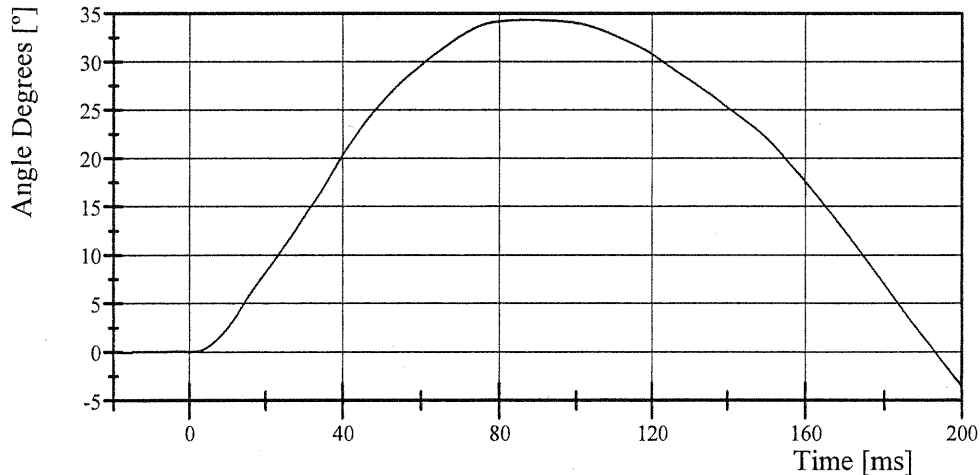
Transportation Research Center Inc.

Neck Extension

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 8/1/2008

Pot Rotation at the Base of Neck

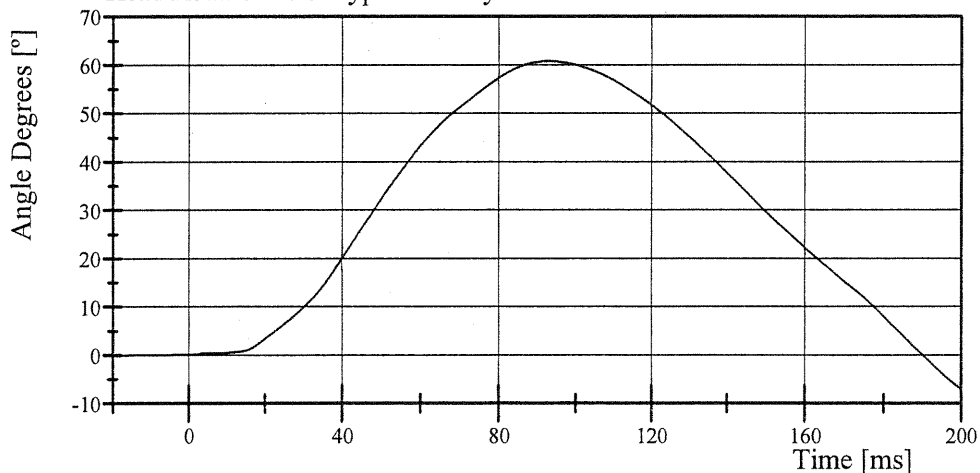


Filter Class: CFC_60

Max: 34.3 ° at 87.6 ms

Min: -3.5 ° at 200.0 ms

Head Rotation at Occypital Condyles

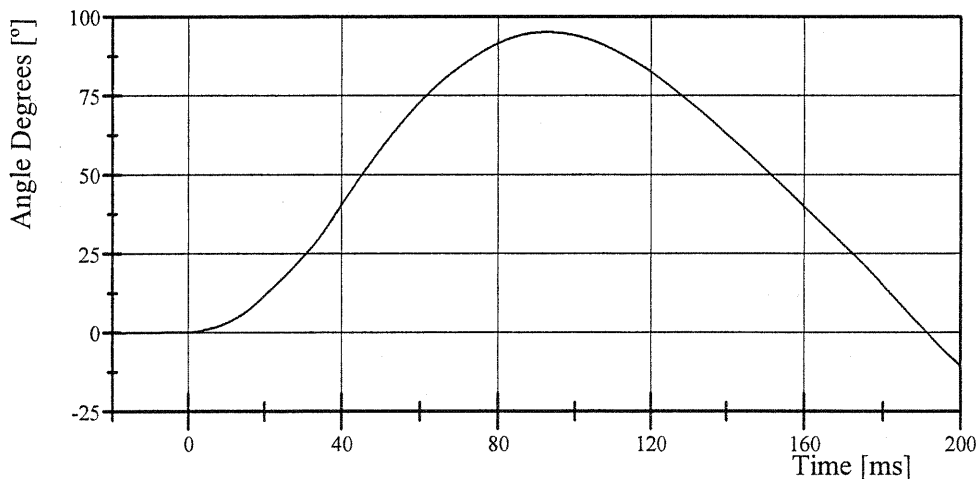


Filter Class: CFC_60

Max: 60.8 ° at 93.1 ms

Min: -7.0 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60

Max: 95.1 ° at 92.6 ms

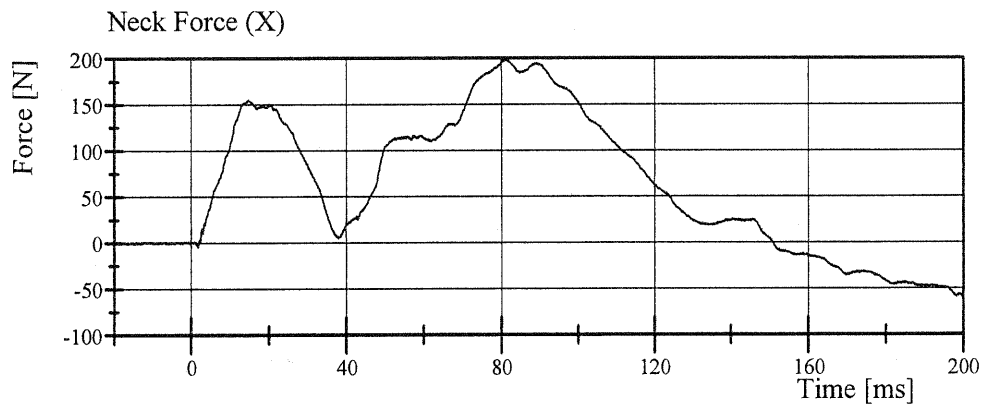
Min: -10.5 ° at 200.0 ms

Transportation Research Center Inc.

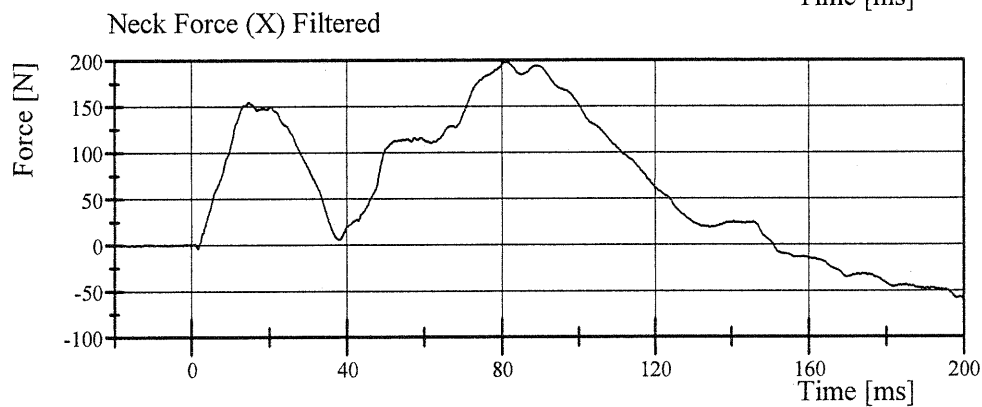
Neck Extension

HIII 6YO Serial No. 030 Certification No. 19-1

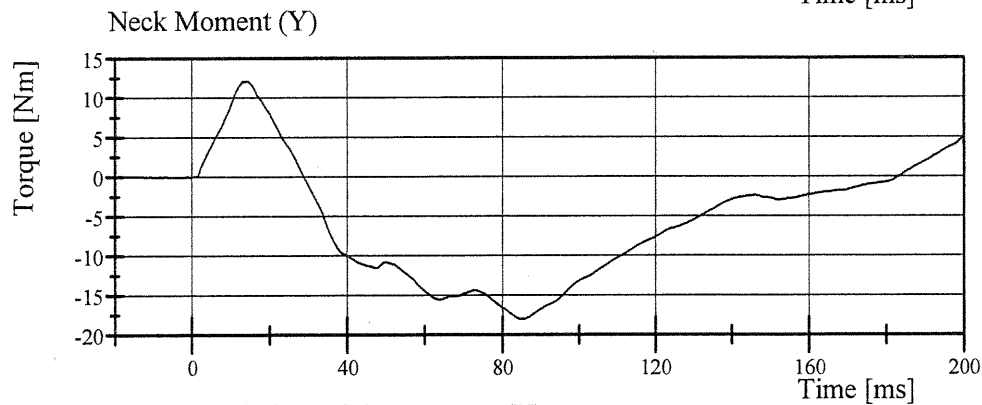
Test Date: 8/1/2008



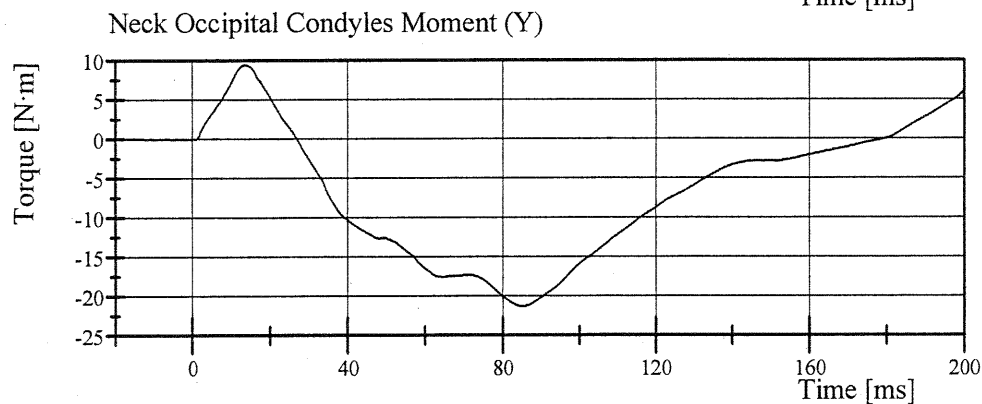
Filter Class: CFC_1000
Max: 198.1 N at 80.7 ms
Min: -58.5 N at 198.1 ms



Filter Class: CFC_600
Max: 197.7 N at 81.3 ms
Min: -58.5 N at 200.0 ms



Filter Class: CFC_600
Max: 12.1 Nm at 14.3 ms
Min: -18.0 Nm at 85.1 ms



Filter Class: CFC_600
Max: 9.4 N·m at 13.6 ms
Min: -21.3 N·m at 85.2 ms

Transportation Research Center Inc.

Front Thorax

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.624 m/s	Yes
Probe Force Peak Between 38.0 mm and 46.0 mm Chest Deflection	(-1,150) - (-1,380) N	-1,214.0 N	Yes
Probe Force Peak Between 12.5 mm and 38.0 mm Chest Deflection	>= (-1,500) N	-1,255.3 N	Yes
Maximum Chest Compression	(-38) - (-46) mm	-42.1 mm	Yes
Internal Hysteresis	65 - 85 %	79.2 %	Yes

Test meets specifications.

Comments:

Technician

Paul Baranek

Approved

Ron Stover

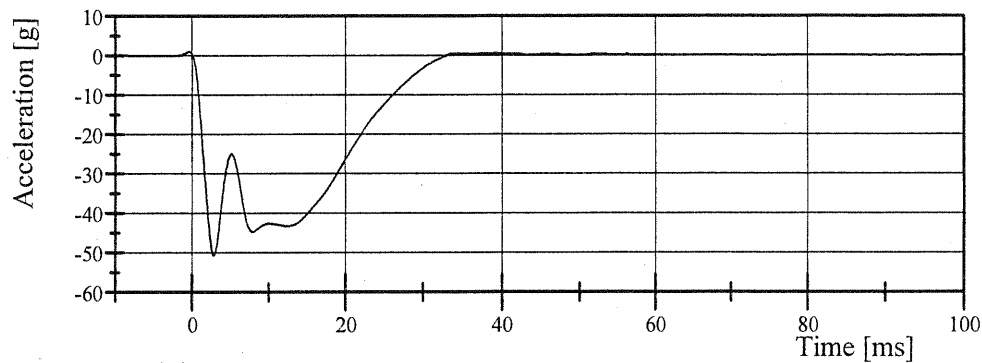
Transportation Research Center Inc.

Front Thorax

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008

Pendulum Acceleration

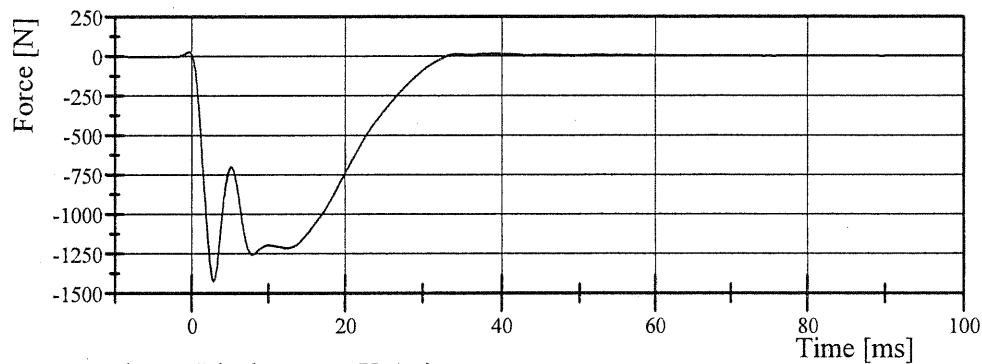


Filter Class: CFC_180

Max: 0.9 g at -0.3 ms

Min: -50.8 g at 2.9 ms

Pendulum Force

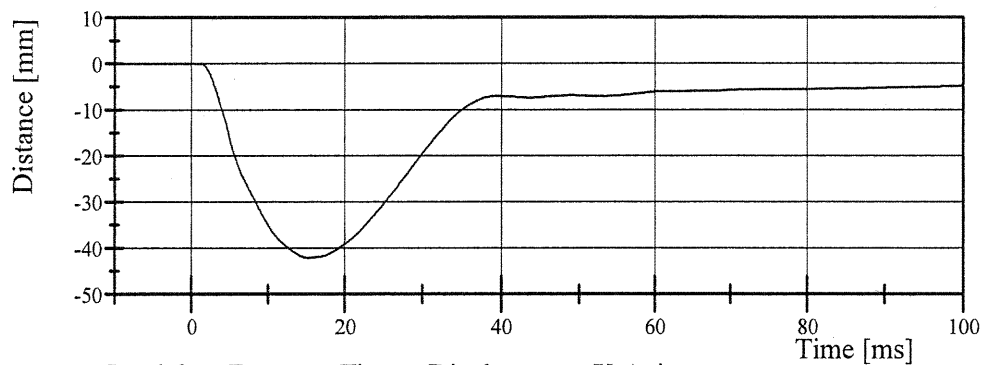


Filter Class: CFC_180

Max: 26.0 N at -0.3 ms

Min: -1,424.2 N at 2.9 ms

Thorax Displacement X-Axis

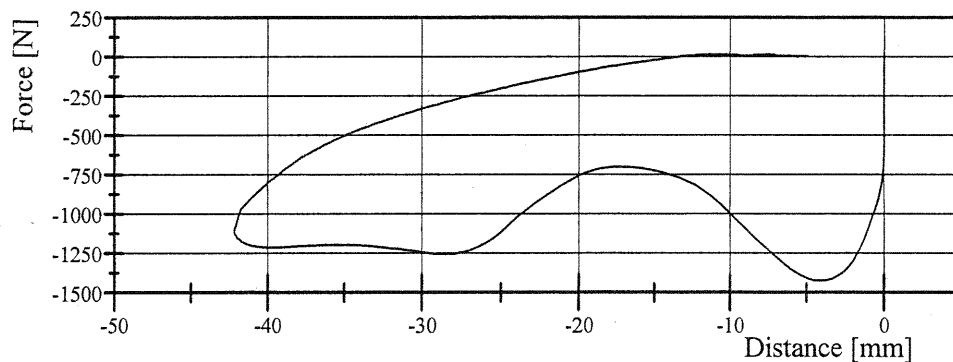


Filter Class: CFC_600

Max: 0.0 mm at 1.3 ms

Min: -42.1 mm at 15.4 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180

Max: 26.0 N at -0.0 mm

Min: -1,424.2 N at -4.1 mm

Transportation Research Center Inc.

Left Knee Femur Response Test

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.110 m/s	Yes
Peak Femur Force	(-2,000) - (-3,000) N	-2,253.2 N	Yes

Test meets specifications.

Comments:

Technician

Charles W. Bell

Approved

Ron Stoner

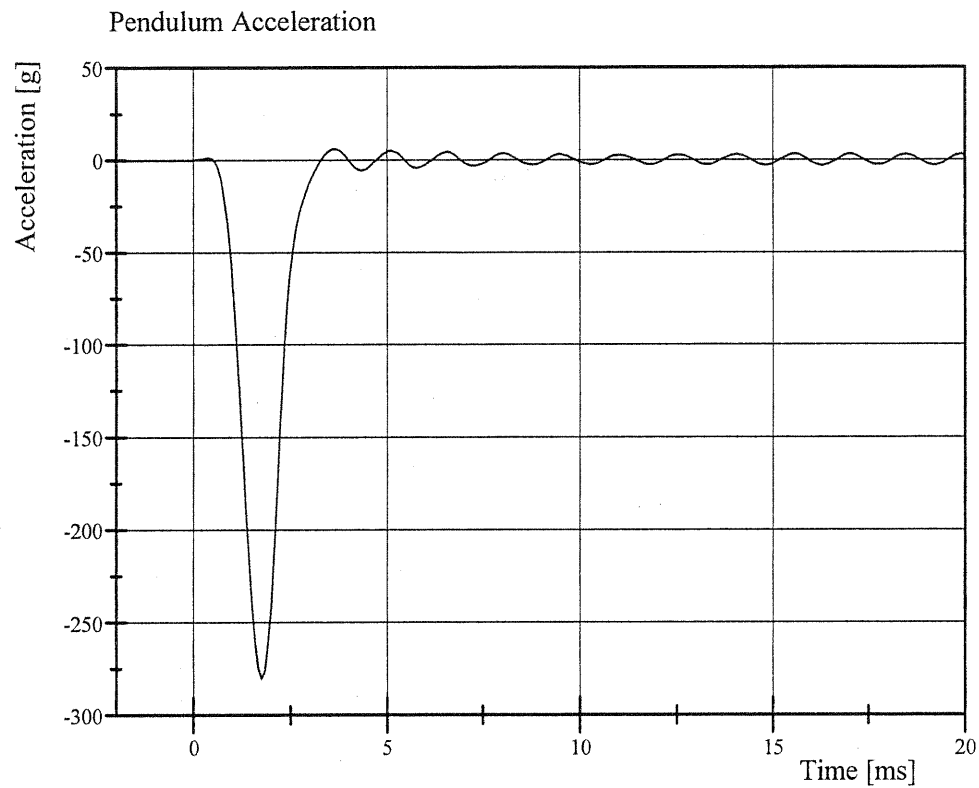


Transportation Research Center Inc.

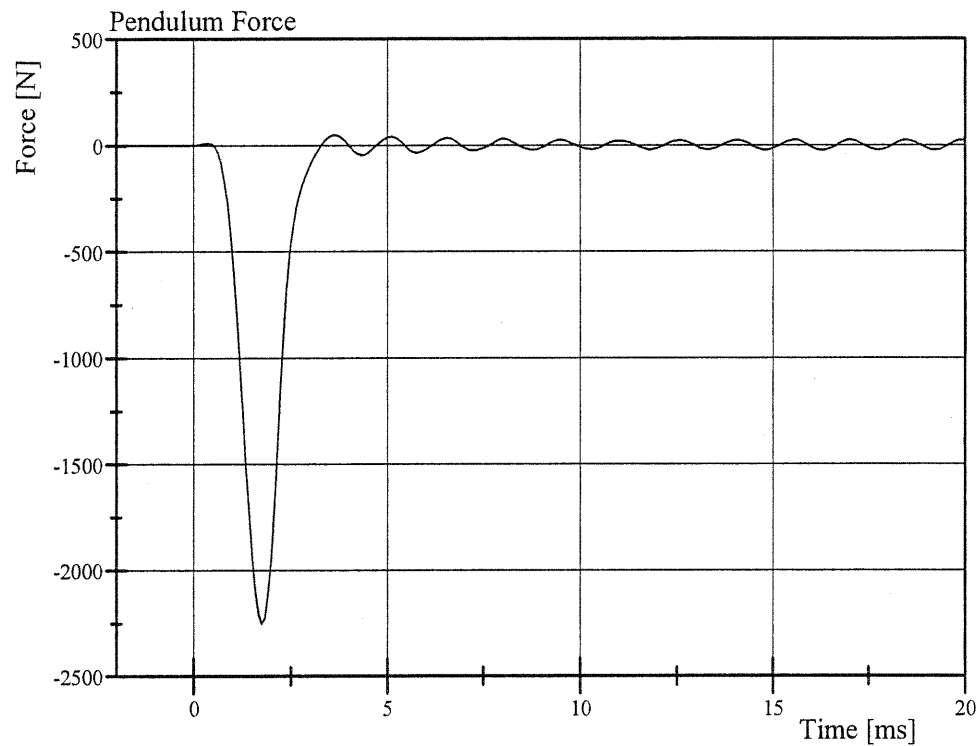
Left Knee Femur Response Test

HIII 6YO Serial No. 030 Certification No. 19-1

Test Date: 7/31/2008



Filter Class: CFC_600
Max: 5.9 g at 3.6 ms
Min: -280.2 g at 1.8 ms



Filter Class: CFC_600
Max: 47.7 N at 3.6 ms
Min: -2,253.2 N at 1.8 ms

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 6YO Serial No. 030 Certification No. 19-2
Test Date: 7/31/2008

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.113 m/s	Yes
Peak Femur Force	(-2,000) - (-3,000) N	-2,241.7 N	Yes

Test meets specifications.

Comments:

Technician

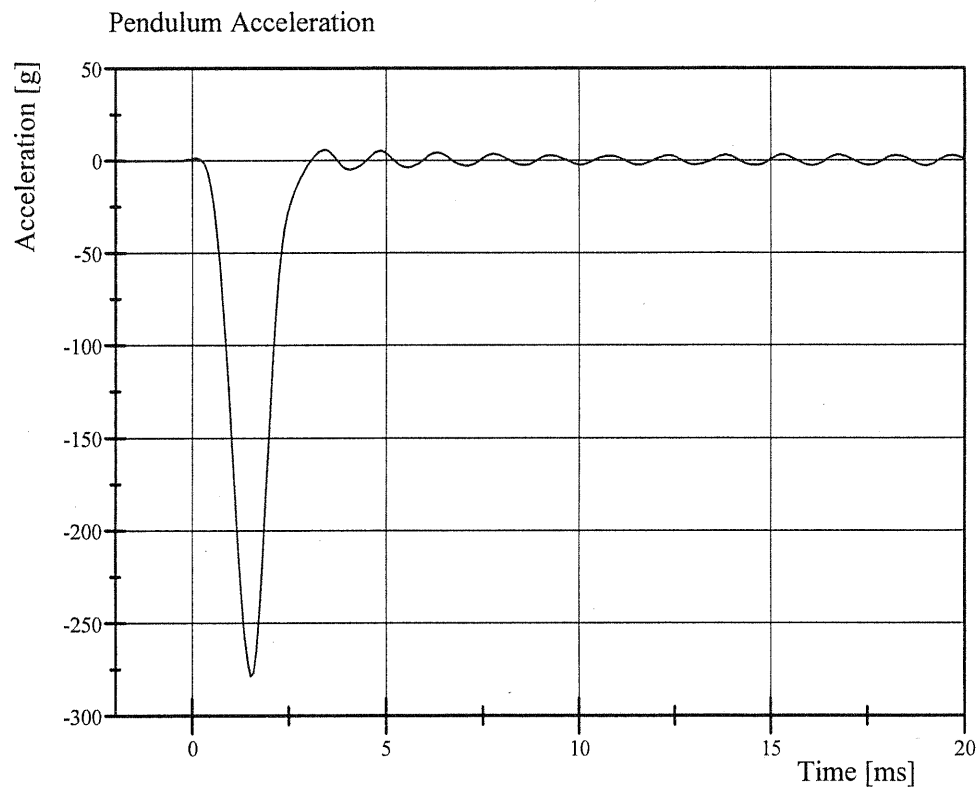
Charles W. Bell

Approved

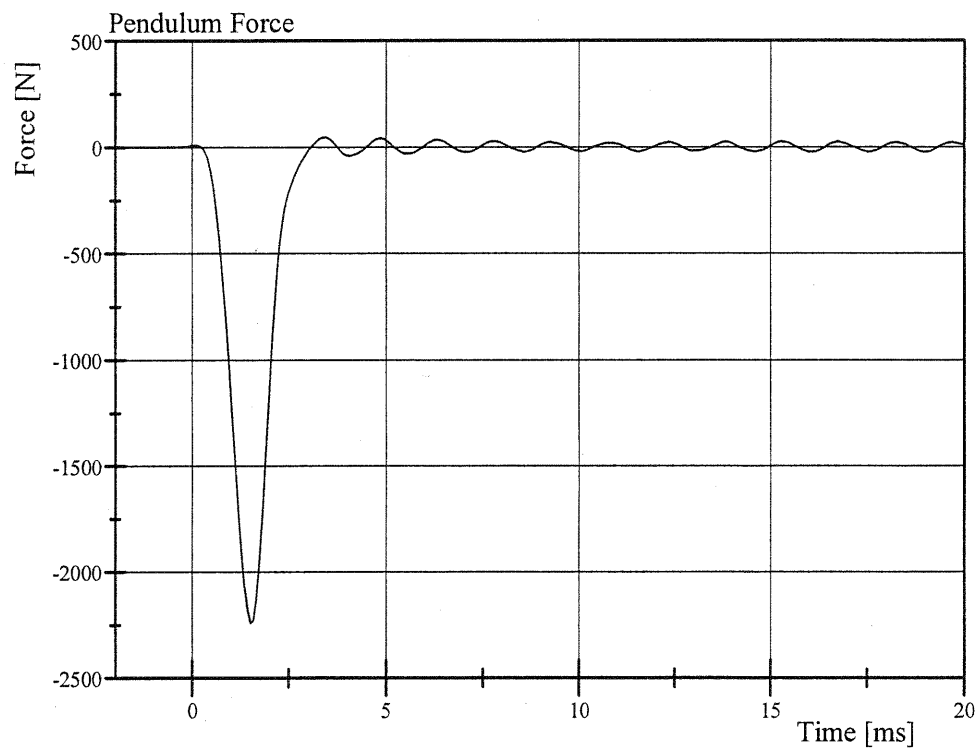
Ron Stoner

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 6YO Serial No. 030 Certification No. 19-2
Test Date: 7/31/2008



Filter Class: CFC_600
Max: 5.8 g at 3.4 ms
Min: -278.8 g at 1.5 ms



Filter Class: CFC_600
Max: 46.6 N at 3.4 ms
Min: -2,241.7 N at 1.5 ms

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III 6 Year Old

CAL DATE: 01-Aug-08

TRC, INC. TEST NO: TOFL-02 572N SN 030 TORSO FLEX CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 – 22.2° C	21.7 ° C
RELATIVE HUMIDITY	10 – 70 %	51 %
INITIAL ANGLE OF UNSUPPORTTED DUMMY	$\leq 22^{\circ}$ REFERENCED TO VERTICAL	17.7 °
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	147 - 200 N	188.8 N
DIFFERENCE BETWEEN RETURN ANGLE & INTIAL ANGLE	$\pm 8^{\circ}$ OF INTIAL ANGLE	5.0 °
RATE	0.5° - 1.5°/sec	1.04 °/sec

TEST MEETS SPECIFICATIONS

TECHNICIAN Charles W. Beil

APPENDIX D
TEST EQUIPMENT DATA

Channel Report Test Number S080808-2

Ref	Transducer ID	ISO Signal Identifier	Description	FScale	Units	Polarity	Assembly
1	Trig D1	10ZERO000000VO0A	Event	1	Logic	Bipolar	
3	P51266	13HEADCG00Y7ACXA	Head Accel X	400	g	Bipolar	3-030 HIII 6 YO VRTC.001
4	P51986	13HEADCG00Y7ACYA	Head Accel Y	400	g	Bipolar	3-030 HIII 6 YO VRTC.002
5	P58844	13HEADCG00Y7ACZA	Head Accel Z	400	g	-Bipolar	3-030 HIII 6 YO VRTC.003
6	1716A-851-FX	13NECKUP00Y7FOXA	Neck Force X	8896.4	N	-Bipolar	3-030 HIII 6 YO VRTC.004
7	1716A-851-FY	13NECKUP00Y7FOYA	Neck Force Y	8896.4	N	Bipolar	3-030 HIII 6 YO VRTC.005
8	1716A-851-FZ	13NECKUP00Y7FOZA	Neck Force Z	13344.6	N	Bipolar	3-030 HIII 6 YO VRTC.006
9	1716A-851-MX	13NECKUP00Y7MOXA	Neck Moment X	282.462	Nm	-Bipolar	3-030 HIII 6 YO VRTC.007
10	1716A-851-MY	13NECKUP00Y7MOYA	Neck Moment Y	282.462	Nm	Bipolar	3-030 HIII 6 YO VRTC.008
11	1716A-851-MZ	13NECKUP00Y7MOZA	Neck Moment Z	282.462	Nm	Bipolar	3-030 HIII 6 YO VRTC.009
12	2430-179-FX	13NECKLO00Y7FOXA	Lower Neck Force X	4448	N	-Bipolar	3-030 HIII 6 YO VRTC.010
13	2430-179-FY	13NECKLO00Y7FOYA	Lower Neck Force Y	4448	N	Bipolar	3-030 HIII 6 YO VRTC.011
14	2430-179-FZ	13NECKLO00Y7FOZA	Lower Neck Force Z	7117	N	Bipolar	3-030 HIII 6 YO VRTC.012
15	2430-179-MX	13NECKLO00Y7MOXA	Lower Neck Moment X	226	Nm	-Bipolar	3-030 HIII 6 YO VRTC.013
16	2430-179-MY	13NECKLO00Y7MOYA	Lower Neck Moment Y	226	Nm	Bipolar	3-030 HIII 6 YO VRTC.014
17	2430-179-MZ	13NECKLO00Y7MOZA	Lower Neck Moment Z	141	Nm	Bipolar	3-030 HIII 6 YO VRTC.015
18	08C1-3179-CST030	13CHST0000Y7DSXA	Chest Deflection X	54	mm	Bipolar	3-030 HIII 6 YO VRTC.019
	ABT squib volts	13AIRB010000VO0A	Airbag Event Passenger Side	50	V	Bipolar	

D-2

S080808-2

Command File Test Number S080808-2

Channel	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
1	13HEADCG00Y7ACXA	Head X-Axis Acceleration	1000	+	yes	400
2	13HEADCG00Y7ACYA	Head Y-Axis Acceleration	1000	+	yes	400
3	13HEADCG00Y7ACZA	Head Z-Axis Acceleration	1000	+	yes	400
3A	13HEADCG00Y7ACRA	Head Resultant Acceleration	1000			
4	13NECKUP00Y7FOXA	Neck X-Axis Force	1000	+	yes	8896.4
5	13NECKUP00Y7FOYA	Neck Y-Axis Force	1000	+	yes	8896.4
6	13NECKUP00Y7FOZA	Neck Z-Axis Force	1000	+	yes	13344.6
7	13NECKUP00Y7MOXA	Neck Moment About X Axis	600	+	yes	282.462
8	13NECKUP00Y7MOYA	Neck Moment About Y Axis	600	+	yes	282.462
9	13NECKUP00Y7MOZA	Neck Moment About Z Axis	600	+	yes	282.462
10	13NECKLO00Y7FOXA	Neck Lower X-Axis Force	1000	+	yes	4448
11	13NECKLO00Y7FOYA	Neck Lower Y-Axis Force	1000	+	yes	4448
12	13NECKLO00Y7FOZA	Neck Lower Z-Axis Force	1000	+	yes	7117
13	13NECKLO00Y7MOXA	Neck Lower Moment About X Axis	600	+	yes	226
14	13NECKLO00Y7MOYA	Neck Lower Moment About Y Axis	600	+	yes	226
15	13NECKLO00Y7MOZA	Neck Lower Moment About Z Axis	600	+	yes	141
16	13CHST0000Y7DSXA	Chest X-Axis Deflection	180	+	yes	54
17	13AIRB010000VO0A	Airbag Event Passenger Side	1000	+	no	50

D-3

S080808-2