

**Frontal Barrier Impact Test**

**Saturn Corporation  
2002 Saturn Vue MPV  
NHTSA Number: R21305  
TRC Inc. Test Number: 030214**

**Prepared By:  
Transportation Research Center Inc.  
10820 State Route 347  
East Liberty, OH 43319**



**Final Report**

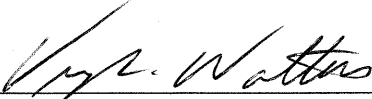
**February - May 2003**

**Prepared For:  
U. S. Department of Transportation  
Volpe National Transportation Systems Center  
55 Broadway, Kendall Square  
Cambridge, MA 02142**

This publication is distributed by the U. S. Department of Transportation, Volpe National Transportation Systems Center, 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 Volpe National Transportation Systems Center. 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: Michael S. Postle, Engineering Technician

Report Approved By:

  
\_\_\_\_\_  
Date 5/30/03  
Virginia L. Watters, Project Manager  
Transportation Research Center Inc.

FINAL REPORT ACCEPTANCE BY COTR:

\_\_\_\_\_  
Date \_\_\_\_\_  
Contracting Officer's Technical Representative (COTR),  
USDOT, Volpe National Transportation Systems Center

1. Report No. <b>DTS-TRC-03-006</b>	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle <b>Final Report of a Frontal Barrier Impact Test of a 2002 Saturn Vue MPV, NHTSA No. R21305</b>		5. Report Date <b>May 29, 2003</b>	
		6. Performing Organization Code <b>TRC Inc.</b>	
7. Author(s) <b>Virginia L. Watters, Project Manager</b>		8. Performing Organization Report No. <b>030214</b>	
9. Performing Organization Name and Address <b>Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319-0367</b>		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. <b>DTRS57-98-D-00042</b>	
12. Sponsoring Agency Name and Address <b>U. S. Department of Transportation Volpe National Transportation Systems Center 55 Broadway, Kendall Square Cambridge, MA 02142</b>		13. Type of Report and Period Covered <b>Final Report February - May 2003</b>	
		14. Sponsoring Agency Code <b>DTS-85</b>	
15. Supplemental Notes			
16. Abstract  <p>A 48.0 km/h flat frontal rigid barrier impact test was conducted on a 2002 Saturn Vue MPV, NHTSA No. R21305, at Transportation Research Center Inc. on February 14, 2003. This test was conducted in accordance with Volpe Task Order No. 2, for the evaluation of vehicle and occupant responses, except that the airbags did not fire (see Data Acquisition Explanations). The barrier impact velocity was 48.0 km/h. The vehicle's maximum static crush was 571 millimeters. The ambient temperature was 21° C.</p> <p>The driver's 15 millisecond Head Injury Criteria (HIC) was 1013 (see Data Acquisition Explanations). The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 63.8 g. The driver's maximum chest deflection was 65 millimeters. The driver's left and right femur maximum axial compressive forces were 6597 N and 4936 N, respectively.</p> <p>The passenger's 15 millisecond HIC was 2826. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.2 g. The passenger's maximum chest deflection was 24 millimeters. The passenger's left and right femur maximum axial compressive forces were 10374 N and 8812 N, respectively.</p>			
17. Key Words <b>Frontal Barrier Impact Test</b>		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. NHTSA Technical Reference Division 400 Seventh Street, S. W., Room 5108 Washington, DC 20590	
19. Security Classif. (of this report) <b>Unclassified</b>	20. Security Classif. (of this page) <b>Unclassified</b>	21. Number of Pages <b>410</b>	22. Price

## Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
1.0	Purpose and Test Procedure	1-1
2.0	Full Frontal Barrier Test Summary	2-1
3.0	Summary of FMVSS 208 Data	3-1
4.0	Occupant, Camera and Vehicle Information	4-1
Appendix A	Photographs	A-1
Appendix B	Dummy, Vehicle, and Barrier Data Plots	B-1
Appendix C	Dummy Configuration and Performance Verification Data	C-1
Appendix D	Test Equipment and Instrumentation Calibration Information	D-1

## List of Tables

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Crash Test Summary	2-6
2	General Test and Vehicle Parameter Data	2-7
3	Post-Impact Data	2-10
4	Vehicle Accelerometer Locations and Data Summary	2-13
5	Dummy Injury Criteria Data	3-2
6	Post-Impact Dummy/Vehicle Data	3-4
7	Dummy Measurement Data for Front Seat Occupants	4-4
8	Impacted Vehicle Measurements	4-9
9	Test Vehicle Frontal Profile Data	4-11
10	Intrusion of Upper Instrument Panel	4-13
11	Fuel System Data	4-14
12	Camera Information	4-17

## List of Figures

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Impact Velocity Measurement System	2-11
2	Vehicle Accelerometer Placement	2-12
3	Dummy Measurement Locations for Front Seat Occupants	4-3
4	Pre-Test and Post-Test Measurement Points	4-8
5	Vehicle Crush	4-10
6	Toeboard Measurements	4-12
7	Camera Positions	4-15
8	Vehicle Reference Photo Target Locations	4-19
9	Load Cell Barrier Locations on Fixed Barrier	4-20

Section 1.0

Purpose and Test Procedure

## Purpose

This 48 km/h frontal barrier impact test was conducted for the Volpe National Transportation Systems Center (Volpe) by Transportation Research Center Inc. (TRC Inc.).

The purpose of this testing was to evaluate and compare vehicle and occupant responses in frontal rigid barrier crash tests conducted using model year 2002 and 2003 vehicles in support of the FMVSS 208 Implementation plan (May 12, 2000 interim rule). Pairs of matching vehicles will be tested and evaluated with the 50<sup>th</sup> and 95<sup>th</sup> percentile dummies seated in alternate front seating positions. For this test, the subject vehicle was a 2002 Saturn Vue MPV with a Hybrid III 50th percentile driver dummy and a Hybrid III 95th percentile passenger dummy. The test intention was for the dummies to be unbelted and restrained with airbags only; however, the airbags did not deploy. (See Data Acquisition Explanations)

The barrier wall was equipped with a load cell barrier.

## Test Procedure

This test was conducted in accordance with VNTSC's instructions for a full frontal car to rigid load cell barrier test, except that the airbags did not deploy as intended.<sup>1</sup> Data was obtained relative to FMVSS 208, "Occupant Crash Protection" performance.

The test vehicle, a 2002 Saturn Vue MPV, was instrumented with ten (10) accelerometers to measure longitudinal axis accelerations and three (3) accelerometers to measure vertical axis accelerations. Inductive pickups were installed to monitor the driver's and passenger's airbag signals. The vehicle impacted a rigid load cell barrier instrumented with thirty-six (36) load cells to measure longitudinal forces. The vehicle's specified impact velocity range was 47.2 to 48.8 km/h.

The test vehicle contained one (1) Part 572E 50<sup>th</sup> percentile adult male Hybrid III anthropomorphic test device (dummy) in the driver's position and one (1) large male 95<sup>th</sup> percentile Hybrid III dummy in the passenger's position. The 50th percentile dummy was positioned in the front outboard designated seating position according to NHTSA Laboratory Test Procedure TP-208-11. The 95<sup>th</sup> percentile dummy was positioned according to instructions provided by Volpe. The instructions are outlined in Appendix D. The driver and passenger dummies were both unbelted and unrestrained because the vehicle's single stage airbags did not deploy.<sup>1</sup>

Both dummies were instrumented with an array of twelve (12) accelerometers in the head, and six (6) accelerometers in the chest, oriented to measure longitudinal, lateral, and vertical accelerations. The dummies were also instrumented with 6-channel upper and lower neck moment and force load cells, left and right femur load cells to measure axial forces, and chest deflection potentiometers. Both dummies were also instrumented upper and lower tibia load cells to measure forces and moments, and knee displacement potentiometers. The driver dummy was equipped with THOR-LX legs, which included longitudinal and lateral tibia accelerometers, three (3) foot accelerometers on each foot to measure accelerations in three (3)

<sup>1</sup> See Data Acquisition Explanations

axes and three (3) rotary potentiometers at each ankle to measure foot rotations about three (3) axes.

The 175 data channels were digitally sampled and recorded at 12,500 samples per second and processed per SAE J211 March 1995.

The crash event was recorded by one (1) real-time panning motion picture camera and eleven (11) high-speed motion picture cameras. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera.

The frontal load cell barrier crash test summary data are presented in Section 2.0. The FMVSS 208 summary data are presented in Section 3.0. The occupant, camera, and vehicle measurements are presented in Section 4.0. Appendix A contains the still photographs. Appendix B contains the dummy, vehicle and barrier data plots. Appendix C contains the dummy verification data. Appendix D contains miscellaneous test information.

Section 2.0

Full Frontal Barrier Test Summary

## Test Results Summary

This full frontal rigid load cell barrier crash test was conducted by TRC Inc. on February 14, 2003.

The test vehicle, a 2002 Saturn Vue MPV, NHTSA Number R21305, was equipped with a 3-liter Transverse engine, automatic transmission, power steering, power brakes and dual stage front airbags. The vehicle's test weight was 1836.2 kg. The vehicle's impact speed was 48.0 km/h. The vehicle sustained 571 mm of static crush during the impact (measured at the level of the bumper bottom).

The driver's 36 millisecond Head Injury Criteria (HIC) was 1397<sup>1</sup>. The driver's 15 millisecond HIC was 1013<sup>1</sup>. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 63.8 g. The driver's maximum chest deflection was 65 mm. The driver's left and right femur maximum axial compressive forces were 6597 N and 4936 N, respectively. The driver dummy's neck injury calculations were as follows: NTF, 0.72; NTE, 1.12; NCF, 0.10; NCE, 0.47. The driver's upper neck maximum tension force was 4994 N and maximum compression force was 2056 N.

The right front passenger's 36 millisecond HIC was 3000. The passenger's 15 millisecond HIC was 2826. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.2 g<sup>1</sup>. The passenger's maximum chest deflection was 24 mm. The passenger's left and right femur maximum axial compressive forces were 10374 N and 8812 N, respectively. The right front passenger's neck injury calculations were as follows: NTF, 0.05; NTE, 1.32; NCF, 0.08; NCE, 0.57. The right front passenger's upper neck maximum tension force was 7100 N and maximum compression force was 2239 N.

<sup>1</sup> See Data Acquisition Explanations

## Data Acquisition Explanations

The driver and passenger airbags did not receive a fire signal and failed to deploy for this test. After investigation by manufacturer's representatives, it appears that the failure was due to low voltage of the vehicle battery and failure of the backup battery system. This created the unintentional test situation of unrestrained dummies in the crash.

A number of dummy accelerometers used in this test exhibited anomalous data. Post-test investigation uncovered faulty wiring at the connector. All accelerometers cited below as having an anomaly had the connectors reworked or cleaned as necessary to correct the problem.

The driver's head Y-axis acceleration data channel, HEDYG1, recorded no valid data. This affected the driver's head resultant acceleration, HEDRG1, and original Head Injury Criteria (HIC) calculations. The driver's 36 and 15 ms HICs presented in this report were computed with a special redundant acceleration, HEDRK1, calculation using the primary X-axis acceleration channel, HEDXG1, and the redundant Y- and Z-axis acceleration channels, HEDYR1 and HEDZR1.

The driver's head Z-axis acceleration data channel, HEDZG1, recorded data spikes at approximately 36, 56, and 73 ms. This affected the driver's head resultant acceleration, HEDRG1, and original HIC calculations. The driver's 36 and 15 ms HICs presented in this report were computed with a special redundant acceleration, HEDRK1, calculation using the primary X-axis acceleration channel, HEDXG1, and the redundant Y- and Z-axis acceleration channels, HEDYR1 and HEDZR1.

The driver's redundant head X-axis acceleration data channel, HEDXR1, recorded data spikes at approximately 58 and 63 ms. This affected the driver's redundant head resultant acceleration, HEDRR1. This channel was not included in the HIC calculation.

The driver's left head X-axis acceleration data channel, HD1XG1, recorded data spikes at approximately 15, 55, and 63 ms.

The driver's left head Z-axis acceleration data channel, HD1ZG1, recorded large data spikes at approximately 16 and 33 ms and small intermittent spikes throughout the test.

The driver's front head Y-axis acceleration data channel, HD2YG1, recorded no valid data between approximately 40 and 93 ms.

The driver's top head Y-axis acceleration data channel, HD3YG1, recorded several large data spikes and no valid data between approximately 13 and 72 ms.

The driver's redundant X-axis chest acceleration data channel, CSTXR1, recorded a large data spike at approximately 63 ms and questionable data throughout the event. This affected the redundant resultant calculation. (The driver's primary chest acceleration data channels were used to calculate the driver's 3 millisecond duration chest acceleration presented in this report.)

The passenger's redundant head Y-axis acceleration data channel, HEDYR2, exceeded full-scale with multiple spikes and recorded no valid data throughout the test. This affected the redundant resultant calculation.

The passenger's top head X-axis acceleration channel, HD3XG2, recorded a data spike at approximately 102 ms.

The passenger's lower neck moment about the Y-axis data channel, NKLYM2, exceeded full scale between approximately 94 and 113 ms and exceeded full scale a second time between approximately 133 and 150 ms.

The passenger's X-axis chest acceleration channel, CSTXG2, recorded no valid data throughout the test. This affected the resultant acceleration and the original maximum resultant acceleration with three millisecond minimum duration calculations. The passenger's redundant chest X-, Y-, and Z-axis acceleration channels were used to calculate the maximum resultant acceleration with three millisecond minimum duration for the report.

The passenger's left knee displacement channel, KNLXD2, exceeded full scale at approximately 62 ms and recorded no valid data afterwards due to a broken wire.

The passenger's upper right tibia moment about the Y-axis channel, TBRYM2, exceeded full scale between approximately 95 and 101 ms. This affected the calculated upper right tibia index.

The passenger's lower right Z-axis tibia force channel, ANRZF2, exceed full scale between approximately 94 and 107 ms. This affected the original calculated lower right tibia index. The passenger's lower right tibia index presented in this report was calculated using the upper right tibia Z-axis force with the lower right X- and Y-axis moments.

Table 1 Crash Test Summary

Test mode:	Flat frontal load cell barrier		
Test date:	02/14/03		
Test time:	1207		
Ambient temperature:	21° C		
Vehicle year/make/ model/body style:	2002/Saturn/Vue/MPV		
Vehicle test weight:	1836.2 kg		
Impact angle <sup>1</sup> :	0°		
Impact velocity <sup>2</sup> :	48.0 km/h		
Maximum static crush <sup>3</sup> :	571 mm		
Average rebound:	643 mm		
Number of data channels:	175		
Number of cameras:	High-speed	14	Real-time 1
<u>Dummies:</u>	<u>Driver #090</u>		<u>Passenger #083</u>
Type:	Part 572E (HIII-50) w/ THOR-LX legs		Large Male (HIII-95) w/ Denton legs
Location:	Left front		Right front
Restraint:	None <sup>4</sup>		None <sup>4</sup>
<u>Seat track position for test:</u>			
Driver:	Middle; notch 13 of 25		
Passenger:	Full rear		
<u>Seat back position for test:</u>			
Driver:	4.6°; measured at the headrest support posts.		
Passenger:	4.7°; measured at the headrest support posts.		
<u>Head restraint position for test:</u>			
Driver:	Full up		
Passenger:	Full up		
Steering column position:	Middle of the geometric range of steering column adjustment.		
<u>Large male H-point position relative to position established by SAE J826 H-point machine:</u>			
Large male H-point:	139 mm rearward, 3 mm above the HIII-50 target established by the J826 H-point machine		

<sup>1</sup> With respect to tow track centerline.

<sup>2</sup> Speed trap measurement (± .08 km/h accuracy)

<sup>3</sup> Maximum static crush was measured at the level of the bottom of the front bumper.

<sup>4</sup> See Data Acquisition Explanations

Table 2 General Test and Vehicle Parameter Data

Vehicle year/make/  
model/body style: 2002/Saturn/Vue/MPV

VIN: 5GZCZ63B42S806531

Model year: 2002

Body style: MPV

Color: Black Silver

Engine data:

    Cylinders: 6

    Displacement 3.0 liters

    Cylinder placement: V

    Engine placement: Transverse

Transmission data: 5 speed, \_\_\_ manual, X automatic, \_\_\_ overdrive

    Final drive: \_\_\_ FWD, \_\_\_ RWD, X 4WD

Date vehicle received: 10/02/2002

Odometer reading: 543

Dealer's name Saturn of Florence  
and address: 5969 Continental Circle  
Florence, KY 41042

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	Yes
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Other	None	Power door locks	Yes

Certification data from vehicle's label:

Vehicle manufactured by: Saturn Corporation

Date of manufacture: 01/02

VIN: 5GZCZ63B42S806531

GVWR: 4422 lbs. (2006 kg)

GAWR: Front: 2328 lbs. (1056 kg)

        Rear: 2094 lbs. (0956 kg)

Table 2 General Test and Vehicle Parameter Data, Cont'd.

Tires on vehicle (mfr., line, size): Bridgestone, Dueller H/T, P235/65R16  
 Load index and speed symbol: 101S  
 Treadwear grade: 360  
 Traction grade: B  
 Temperature grade: B

Tire pressure with maximum capacity vehicle load:  
 Front: 35 psi (240 kPa)  
 Rear: 35 psi (240 kPa)

Spare tire (mfr., line, size): Firestone, Tempa - Spare, T155/90R16 110M

Type of seats:  
 Front Bucket  
 Rear Split bench

Maximum width: 1768 mm  
 Wheelbase: 2705 mm

Location of “Recommended Tire Pressure” label:

The label was located on the driver door.

Data from vehicle’s “Recommended Tire Pressure” label”:

Recommended tire size: P235/65R16  
 Recommended cold tire pressure:  
 Front: 30 psi (210 kPa)  
 Rear: 30 psi (210 kPa)

Vehicle Capacity Data (from belt count or calculation; not on label):

Number of Occupants (Designated seating capacity):

Front	2
Rear	3
Total	5

Vehicle capacity weight: 378 kg

Rated cargo/luggage weight<sup>1</sup> 38 kg

Test vehicle attitude:

Delivered attitude:	LF	820 mm;	RF	820 mm;	LR	832 mm;	RR	838 mm
Fully loaded attitude:	LF	798 mm;	RF	797 mm;	LR	805 mm;	RR	810 mm
Pre-test attitude:	LF	791 mm;	RF	789 mm;	LR	806 mm;	RR	804 mm
Post-test attitude:	LF	812 mm;	RF	815 mm;	LR	810 mm;	RR	790 mm

<sup>1</sup> RCLW = Vehicle capacity weight - (68 kg \* designated seating capacity).

Table 2 General Test and Vehicle Parameter Data Cont'd

Weight of test vehicle as received (with maximum fluids)=UDW:

Right front	467.5 kg	Right rear	329.5 kg
Left front	476.5 kg	Left rear	354.5 kg
Total front weight	944.0 kg	(58.0 % of total vehicle weight)	
Total rear weight	684.0 kg	(42.0 % of total vehicle weight)	
Total delivered weight	1628.0 kg		

Calculation of test vehicle's target test weight:

Total Delivered Weight (UDW) =	1628.0 kg
Rated Cargo/Luggage Weight (RCLW) =	38.0 kg
Weight of 1 Part 572E Dummy @ 76 kg	
And 1 Large Male Dummy @ 102 kg =	178.0 kg
Target test weight =	1844.0 kg

Weight of test vehicle with required dummies and 30.2 kg of cargo weight:

Right front	511.4 kg	Right rear	403.2 kg
Left front	522.0 kg	Left rear	399.6 kg
Total front weight	1033.4 kg	(56.3% of total vehicle weight)	
Total rear weight	802.8 kg	(43.7% of total vehicle weight)	
Total test weight	1836.2 kg	(0.4% below target test weight)	

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: Deck lid, rear seatbelts, rear door panels and glass, rear fascia, rear bumper beam, rubber trim around rear doors and rear hatch, muffler.

Location of Vehicle's CG: 1182 mm rearward of front wheel centerline

Table 3 Post-Impact Data

Test number: 030214  
Test date: 02/14/03  
Test time: 1207  
Test type: Frontal load cell barrier  
Impact angle: 0°  
Ambient temperature  
at impact area: 21° C  
Required impact velocity range: 47.2 to 48.8 km/h

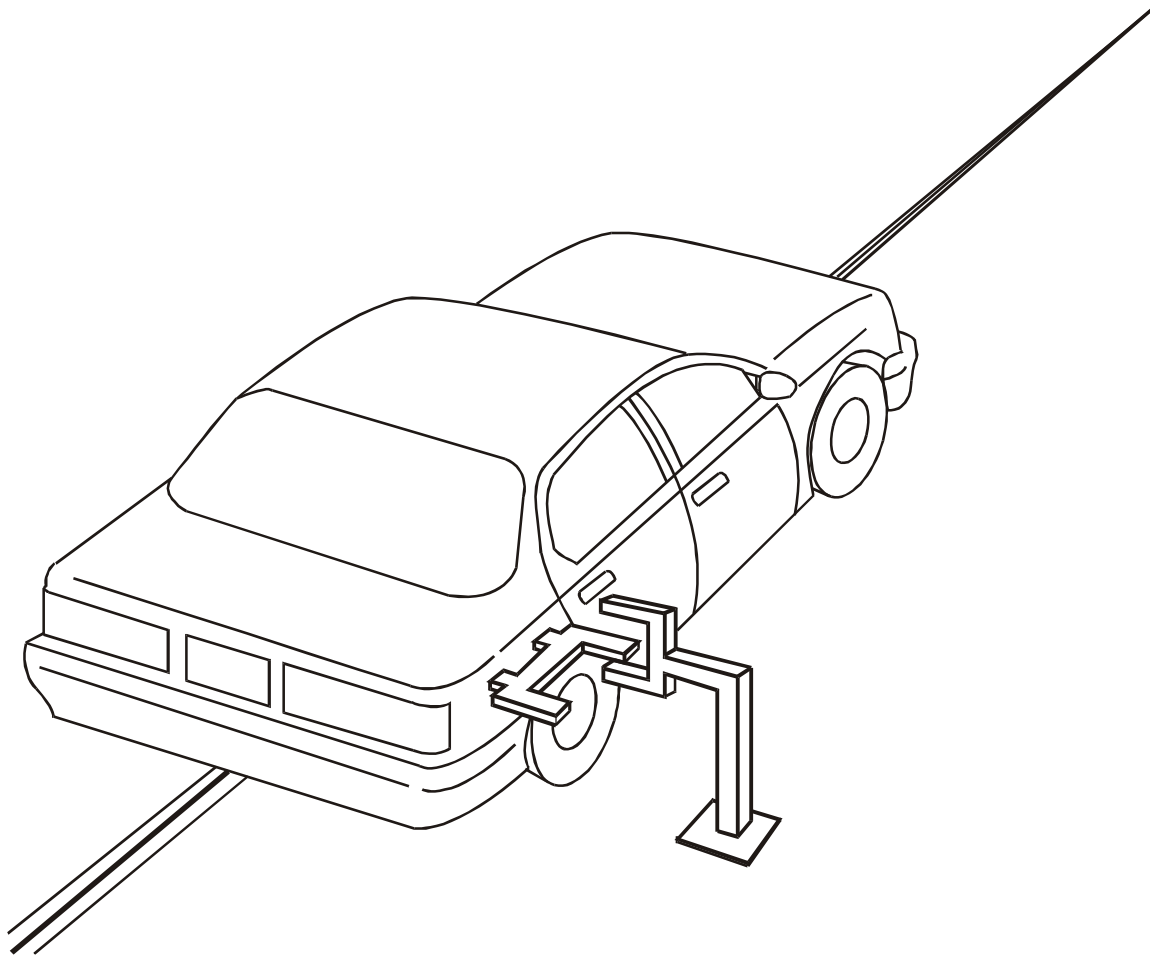
Barrier impact velocity:

Primary: 48.0 km/h  
Secondary: 48.0 km/h  
Distance from vehicle to barrier:  
Entering velocity trap: 356 mm  
Exiting velocity trap: 51 mm

Vehicle rebound from flat rigid barrier:

Distance from test vehicle to barrier impact point:  
Post-test: L 715 mm; C 625 mm; R 590 mm  
Average rebound: 643 mm

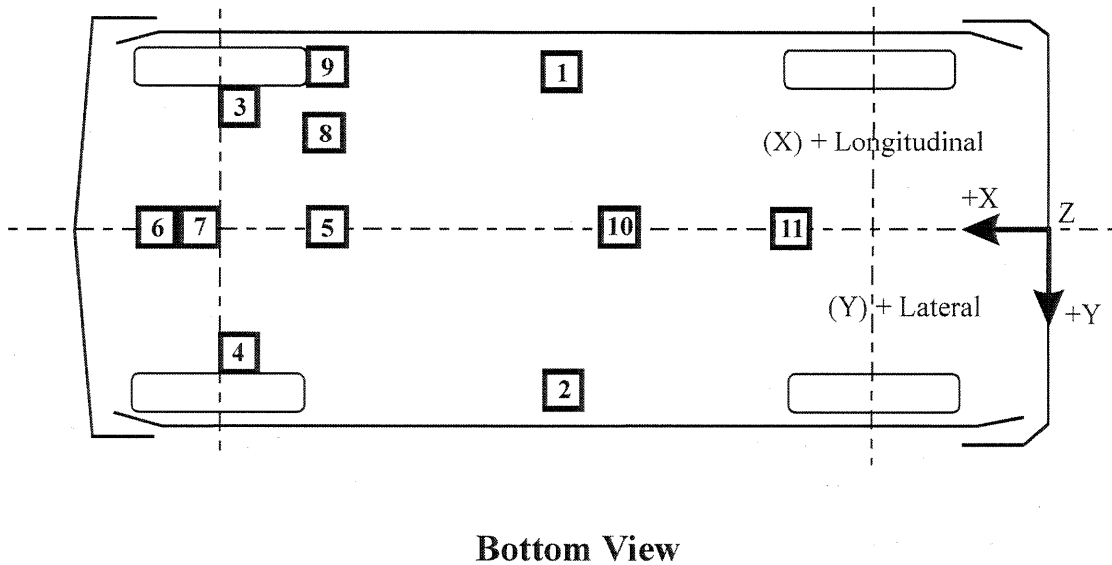
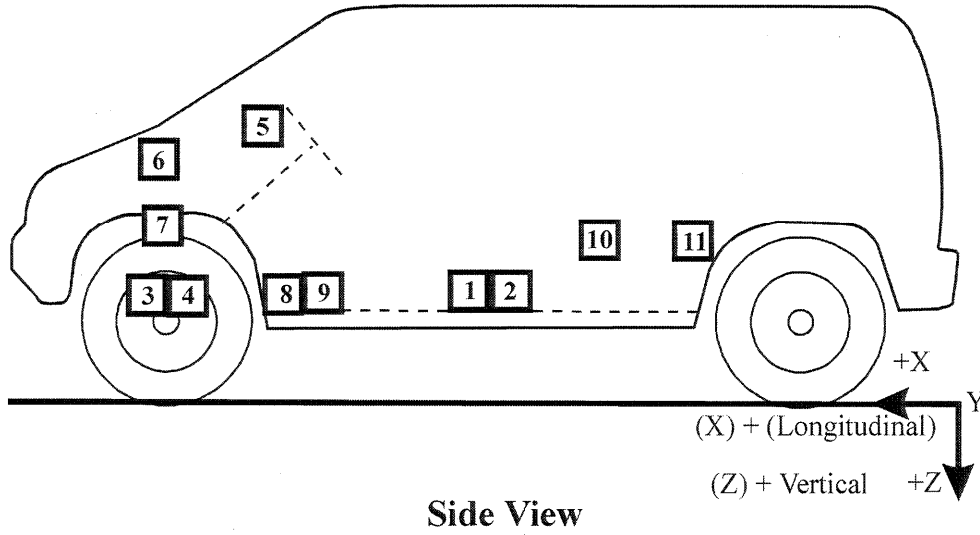
Figure 1 Impact Velocity Measurement System



The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

Figure 2 Vehicle Accelerometer Placement



**Reference:**

- X: + Forward from rear bumper
- Y: + Rightward from vehicle centerline
- Z: + Downward from ground level

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 030214  
No. LOCATION

		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	1650 mm	-545 mm	-395 mm			
	POST	1674 mm	-545 mm	-404 mm	1.6 g	@ 183.0 ms	33.8 g @ 51.0 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	1650 mm	546 mm	-407 mm			
	POST	1679 mm	546 mm	-398 mm	2.1 g	@ 121.8 ms	41.7 g @ 49.7 ms
3 FRONT BRAKE CALIPER LEFT LONGITUDINAL	PRE	4064 mm	-686 mm	-387 mm			
	POST	4068 mm	-676 mm	-384 mm	16.9 g	@ 83.7 ms	62.2 g @ 55.1 ms
4 FRONT BRAKE CALIPER RIGHT LONGITUDINAL	PRE	4064 mm	686 mm	-388 mm			
	POST	4093 mm	736 mm	-385 mm	26.4 g	@ 82.6 ms	47.3 g @ 56.6 ms
5 DASH PANEL CENTER  LONGITUDINAL	PRE	2955 mm	0 mm	-1119 mm			
	POST	2953 mm	0 mm	-1150 mm	78.5 g	@ 114.6 ms	53.2 g @ 92.5 ms
6 ENGINE TOP  LONGITUDINAL	PRE	3912 mm	0 mm	-886 mm			
	POST	3716 mm	0 mm	-859 mm	57.2 g	@ 56.9 ms	123.5 g @ 39.1 ms

Table 4 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 030214 No. LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
7 ENGINE BOTTOM  LONGITUDINAL	PRE	4150 mm	19 mm	-181 mm				
	POST	4031 mm	83 mm	-185 mm	15.6 g	@ 61.2 ms	70.6 g	@ 37.6 ms
8 TOEPAN NEXT TO ACCELERATOR LONGITUDINAL VERTICAL	PRE	3050 mm	-161 mm	-353 mm				
	POST	3133 mm	-195 mm	-349 mm	1.4 g	@ 125.2 ms	33.4 g	@ 50.1 ms
9 TOEPAN NEXT TO FOOTREST LONGITUDINAL VERTICAL	PRE	3000 mm	-451 mm	-356 mm				
	POST	3094 mm	-514 mm	-365 mm	0.9 g	@ 125.2 ms	35.6 g	@ 50.2 ms
10 REAR DECK  VERTICAL	PRE	1071 mm	0 mm	-547 mm				
	POST	1088 mm	0 mm	-487 mm	26.0 g	@ 76.2 ms	12.0 g	@ 87.8 ms
11 REAR COMPARTMENT CENTER LONGITUDINAL	PRE	330 mm	0 mm	-608 mm				
	POST	334 mm	0 mm	-617 mm	2.1 g	@ 105.0 ms	31.7 g	@ 49.6 ms

REFERENCE: X: + FORWARD FROM REAR BUMPER  
 Y: + RIGHTWARD FROM VEHICLE CENTERLINE  
 Z: + DOWNWARD FROM GROUND LEVEL

Section 3.0

Summary of FMVSS 208 Data

Table 5 Dummy Injury Criteria Data

VOLPE TO002		
Injury Criteria and Performance Limits		
Parameter	Driver	
	H3-50 w/THOR-LX Limit	H3-50 w/THOR-LX Test Value
HIC (15 ms) <sup>1</sup>	700	1013
NIJ (Compression Flexion)	1.0	0.10
NIJ (Compression Extension)	1.0	0.47
NIJ (Tension Flexion)	1.0	0.72
NIJ (Tension Extension)	1.0	1.12
Peak Upper Neck Tension (N)	4170	4994
Peak Upper Neck Compression (N)	4000	2056
3 ms Chest Acceleration (g)	60	63.8
Chest Deflection (mm)	63	65
Left Femur Compression Load (N)	9040	6597
Right Femur Compression Load (N)	9040	4936
Left Tibia to Femur Displacement (mm)	15	12
Right Tibia to Femur Displacement (mm)	15	6
Left Upper Tibia Index	0.91*	0.59
Right Upper Tibia Index	0.91*	0.82
Left Lower Tibia Index	0.91*	0.46
Right Lower Tibia Index	0.91*	1.00
Left Upper Tibia Compression FZ (N)	5600	2032
Right Upper Tibia Compression FZ (N)	5600	5241
Left Lower Tibia Compression FZ (N)	5200	2788
Right Lower Tibia Compression FZ (N)	5200	6901
Left Foot XL Rotation (degrees)	35	18
Right Foot XL Rotation (degrees)	35	7
Left Foot YL Rotation (degrees)	35	21
Right Foot YL Rotation (degrees)	35	36

\* Revised Tibia Index

<sup>1</sup> See Data Acquisition Explanations

Table 5 Dummy Injury Criteria Data, Cont'd.

VOLPE TO002		
Injury Criteria and Performance Limits		
	Passenger	
Parameter	H3-95 w/Denton Limit	H3-95 w/Denton Test Value
HIC (15 ms)	700	2826
NIJ (Compression Flexion)	1.0	0.08
NIJ (Compression Extension)	1.0	0.57
NIJ (Tension Flexion)	1.0	0.05
NIJ (Tension Extension)	1.0	1.32
Peak Upper Neck Tension (N)	5030	7100
Peak Upper Neck Compression (N)	4830	2239
3 ms Chest Acceleration (g) <sup>1</sup>	55	48.2
Chest Deflection (mm)	70	24
Left Femur Compression Load (N)	12,700	10374
Right Femur Compression Load (N)	12,700	8812
Left Tibia to Femur Displacement (mm) <sup>1</sup>	17	----
Right Tibia to Femur Displacement (mm)	17	0
Left Upper Tibia Index	1.0	0.63
Right Upper Tibia Index <sup>1,2</sup>	1.0	----
Left Lower Tibia Index	1.0	0.68
Right Lower Tibia Index <sup>1</sup>	1.0	1.19
Left Upper Tibia Compression FZ (N)	9840	5385
Right Upper Tibia Compression FZ (N)	9840	10010
Left Lower Tibia Compression FZ (N)	9840	6189
Right Lower Tibia Compression FZ (N) <sup>1</sup>	9840	----
Left Foot XL Rotation (degrees)	N/A	N/A
Right Foot XL Rotation (degrees)	N/A	N/A
Left Foot YL Rotation (degrees)	N/A	N/A
Right Foot YL Rotation (degrees)	N/A	N/A

<sup>1</sup> See Data Acquisition Explanations

<sup>2</sup> Right upper tibia index calculated on the available, clipped, data exceeded 1.2.

Table 6 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	<u>Driver</u>	<u>Passenger</u>
Head	Sun visor, windshield, dash, upper steering wheel rim, header	Sun visor, windshield, dash
Chest	Steering wheel rim	Dash panel
Abdomen	Lower steering wheel rim	
Left knee	Knee Bolster	Glove Box
Right knee	Knee Bolster	Glove Box

Door opening:

	<u>Left</u>	<u>Right</u>
Front	Easy	Easy
Rear	Easy	Easy

Seat movement:

	<u>Seat back failure</u>	<u>Seat shift</u>
Left Front	None	None
Right Front	None	None
Left Rear		
Right Rear		

Glazing damage:

Windshield shattered.

Other notable impact effects:

Air bags did not deploy.<sup>1</sup> Pelvis of each dummy contacted upper seat back on rebound

<sup>1</sup> See Data Acquisition Explanations

Section 4.0

Occupant, Camera, and Vehicle Information

## Dummy Kinematic Summary

### Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's torso contacted the steering wheel and then the head and neck rotated forward into the steering wheel and dash panel. The dummy rebounded reward and upward with the back of the head contacting the windshield, the header, and the sun visor. The pelvis hit mid-way up the driver's seat back during the rebound. The dummy came to rest tilted forward with the head resting on the steering wheel and the pelvis against the seat back.

### Right Front Passenger Dummy

Upon impact, the passenger dummy translated forward on the seat impacting both knees into the glove box. The dummy's head impacted the windshield and sun visor, which rotated the head and neck reward while the upper torso contacted the dash panel. The head then rotated forward onto the top of the dash. The dummy rebounded with the head rotating forward and the pelvis rising vertically and translating reward into the seat head restraint. The dummy came to rest with its pelvis against the upper passenger seat back and the head touching the glove box with the torso nearly horizontal.

Figure 3 Dummy Measurement Locations for Front Seat Occupants

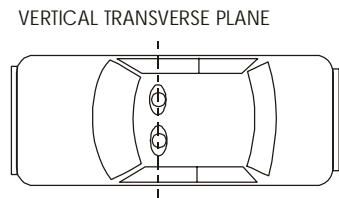
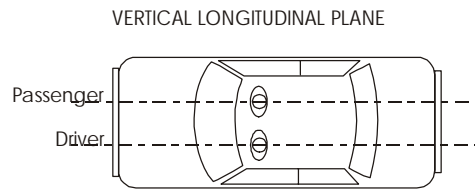
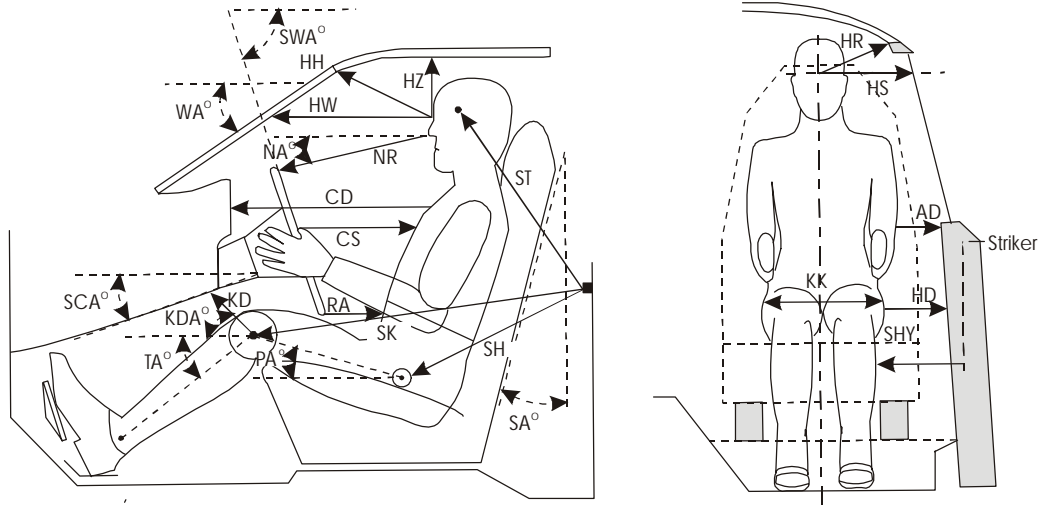


Table 7 Dummy Measurement Data For Front Seat Occupants

<u>Designation</u>	<u>Type of Measurement</u>	<u>Driver (Serial # 090)</u>	<u>Passenger (Serial # 083)</u>
WA	Windshield angle	32.1°	32.1°
SWA	Steering wheel angle	24.0°	N/A
SCA	Steering column angle	66.0°	N/A
SA <sup>1</sup>	Seat back angle	4.6°	4.7°
HZ	Head to roof	235 mm	165 mm
HH	Head to header	413 mm	496 mm
HW	Head to windshield	693 mm	733 mm
HR	Head to side header	245 mm	175 mm
NR	Nose to rim	408 mm	N/A
NA	Nose to rim angle	6.6°	N/A
CD	Chest to dash	543 mm	713 mm
CS	Steering wheel to chest	328 mm	N/A
RA	Rim to abdomen	202 mm	N/A
KDL	Left knee to dash	150 mm	235 mm
KDR	Right knee to dash	150 mm	260 mm
KDA	Outboard knee to dash angle	53.0°	72.6°
PA	Pelvic angle	24.0°	20.2°
TA	Tibia angle	46.4°	51.8°
KK	Knee to knee	345 mm	310 mm
ST <sup>2</sup>	Striker to head	532 mm	600 mm
	Striker to head angle	-81.2°	-85.5°
SK <sup>2</sup>	Striker to knee	585 mm	475 mm
	Striker to knee angle	-0.7°	-7.2°
SH <sup>2</sup>	Striker to H-point	230 mm	85 mm
	Striker to H-point angle	25.5°	30.9°
SHY	Striker to H-point (Y dir.)	225 mm	210 mm
HS	Head to side window	342 mm	335 mm
HD	H-point to door	144 mm	118 mm
AD <sup>3</sup>	Arm to door	93 mm	25 mm

The seat back angle (SA°) is measured relative to vertical, all other angles are measured relative to horizontal.

<sup>1</sup> Measured at the headrest support posts.

<sup>2</sup> A negative angle indicates the measurement point was above the striker.

<sup>3</sup> Passenger measurement was to the vehicle B-pillar.

## Descriptions of Dummy Measurements

When a level is to be used, it is to ensure that the line containing the two points described is either parallel or perpendicular to the ground. If a measurement to be made is less than 10 inches ignore the directions to use a level and approximate a level measurement. Also, when a measurement is to be taken to or from the center of a bolt on the dummy, take the measurement from the center of the bolt hole if the bolt is recessed.

### **The following measurements are to be made within a vertical longitudinal plane.**

- \* HH Head to Header, taken from the point where the dummy's nose meets his forehead (between his eyes) to the furthest point forward on the header.
- \* HW Head to Windshield, taken from the point where the dummy's nose meets his forehead (between his eyes) to a point on the windshield. Use a level.
- HZ Head to Roof, taken from the point where the dummy's nose meets his forehead (between his eyes) to the point on the roof directly above it. Use a level.
- \* CS Steering Wheel to Chest, taken from the center of the steering wheel hub to the dummy's chest. Use a level.
- \* CD Chest to Dash, place a tape measure on the tip of the dummy's chin and rotate five inches of it downward toward the dummy to the point of contact on the transverse center of the dummy's chest. Then measure from this point to the closest point on the dashboard either between the upper part of the steering wheel between the hub and the rim, or measure to the dashboard placing the tape measure above the rim, whichever is a shorter measurement. See diagram.
- RA Steering Wheel Rim to Abdomen, taken from the bottommost point of the steering wheel rim horizontally rearward to the dummy. Use a level.
- NR Nose to Rim, taken from the tip of the dummy's nose to the closest point on the top of the steering wheel rim. Also indicate the angle this line makes with respect to the horizontal (NA).
- \*<sup>1</sup> KDL, KDR Left and Right Knees to Dashboard, taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the dashboard. Also reference the angle of this measurement with respect to the horizontal for the outboard knee (KDA). See diagram.

\* Measurement used in Data Tape Reference Guide

<sup>1</sup> Only outboard measurement is referenced in Data Tape Reference Guide

## Descriptions of Dummy Measurements, Cont'd.

SH, SK, ST Striker to Hip, Knee, and Head, these measurements are to be taken in the X-Z plane measured from the forward most center point on the striker to the center of the H-point, outer knee bolt, and head target. When taking this measurement a firm device that can be rigidly connected to the striker should be used. Use a level. The angles of these measurements with respect to the horizontal should also be recorded. The measurement in the Y (transverse) direction from the striker to the H-point should also be taken (SHY). See diagram.

### **The following measurements are to be made within a vertical transverse plane.**

- HS Head to Side Window, taken from the point where the dummy's nose meets his forehead (between his eyes) to the outside of the side window. In order to make this measurement, roll the window down to the exact height which allows a level measurement. Use a level. See diagram.
- \* AD Arm to Door, taken from the outer surface of the elbow pivot bolt on a Hybrid II dummy to the first point it hits on the door. In the case of a Hybrid III dummy, measure from the bolt on the outer biceps. When a SID is used make the measurement from the center of the bottom of the arm segment where it meets the dummy's torso.
- \* HD H-point to Door, taken from the H-point on the dummy to the closest point on the door. Use a level.
- \* HR Head to Side Header, measure the shortest distance from the point where the dummy's nose meets his forehead (between his eyes) to the side edge of the header just above the window frame, directly adjacent to the dummy.
- SHY Striker to H-point, taken from a rod rigidly connected to the forward most center point on the striker to the H-point. Use a level. See diagram.
- KK Knee to Knee, for Hybrid II dummies measure the distance between knee pivot bolt head outer surfaces. For Hybrid III dummies measure the distance between the outboard knee clevis flange surfaces. (This measurement may not be exactly transverse.)

### **Angles**

- SA Seat Back Angle, find this angle using the instructions provided by the manufacturer. If the manufacturer doesn't provide clear instructions contact the COTR.

\* Measurement used in Data Tape Reference Guide

Descriptions of Dummy Measurements, Cont'd.

- PA Pelvic or Femur Angle, taken by inserting the pelvic angle gauge into the H-point gauging hole on the SID or the Hybrid III dummies and taking this angle with respect to the horizontal. Measure the angle of the line connecting the H-point hole and the outer knee pivot bolt hole on a Hybrid II dummy with respect to the horizontal, to find the femur angle.
- SWA Steering Wheel Angle, find this by placing a straight edge against the steering wheel rim along the longitudinal plane. Then measure the acute angle of the straight edge with respect to the horizontal.
- SCA Steering Column Angle, measured with respect to the horizontal by placing an inclinometer on the center of the underside of the steering column.
- NA Measure the angle made when taking the measurement NR with respect to the horizontal.
- KDA Knee to Dash Angle, the angle that the measurement KD is taken at with respect to the horizontal. Only get this angle for the outboard knee. See diagram.
- WA Windshield Angle, place an inclinometer along the transverse center of the windshield exterior (measurement is made with respect to horizontal).
- TA Tibia Angle, use a straight edge to connect the dummy's knee and ankle bolts. Then place an inclinometer on the straight edge and measure the angle with respect to the horizontal.

Figure 4 Pre-Test And Post-Test Measurement Points

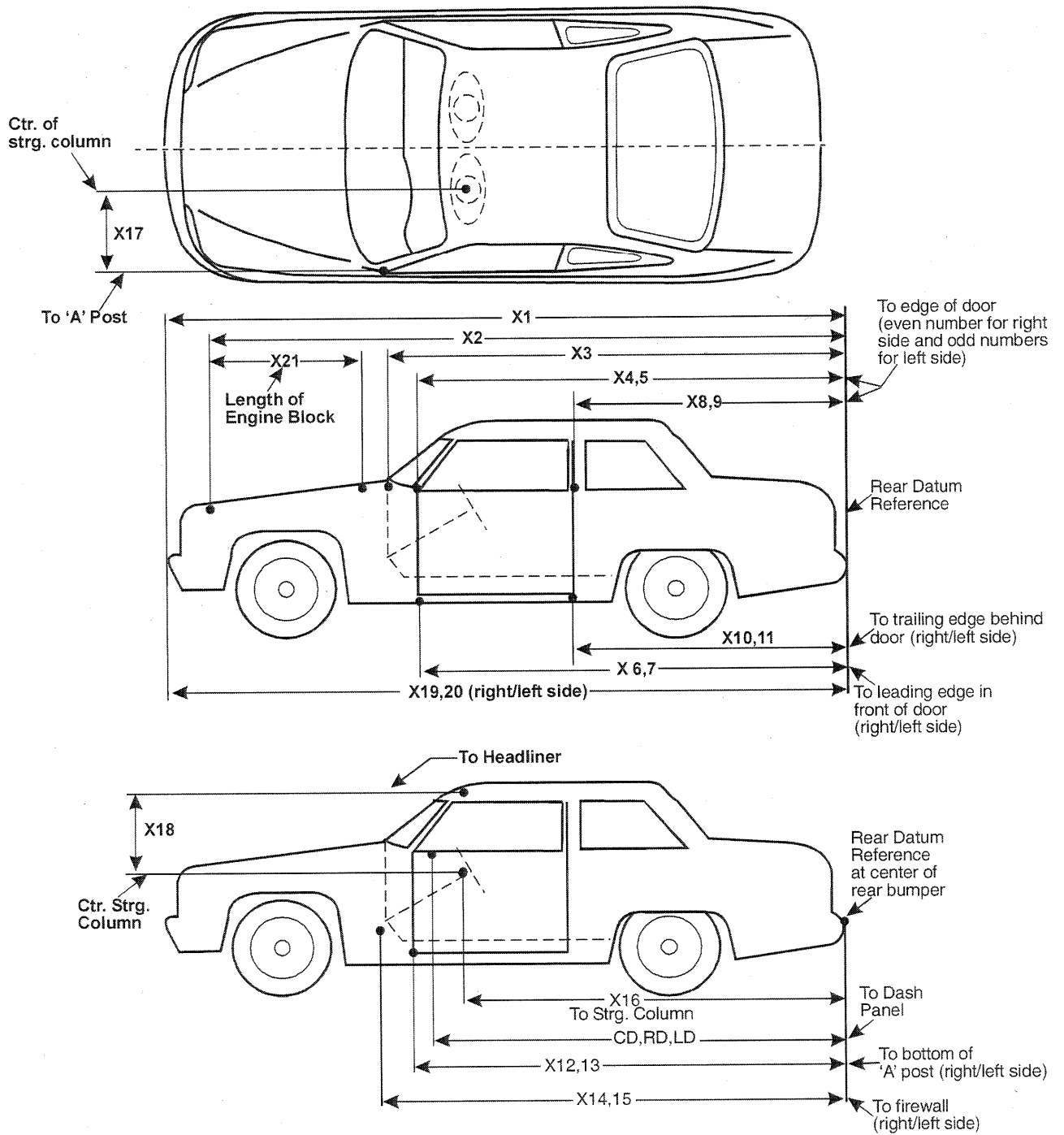


Table 8 Impacted Vehicle Measurements

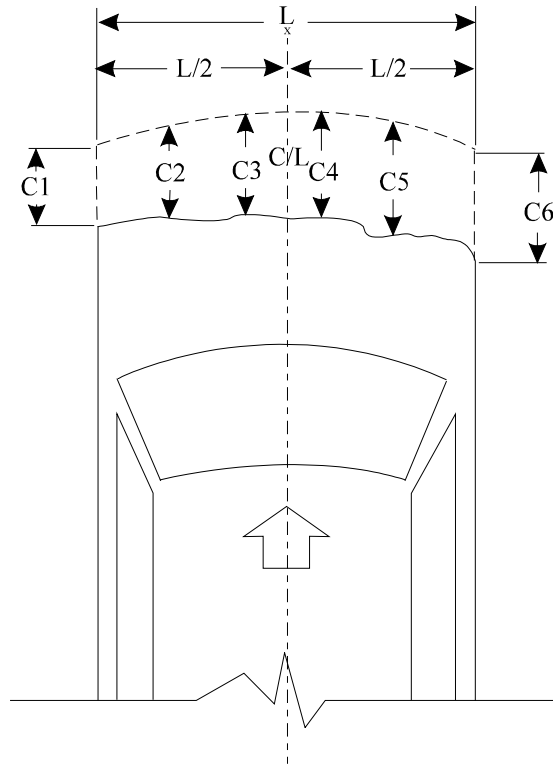
Test number: 030214

Vehicle year/make/model/body style: 2002/Saturn/Vue/MPV

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	4590	4103	487
X2	Rear Surface of Vehicle to Front of Engine Block	4050	3661	389
X3	Rear Surface of Vehicle to Firewall	3598	3453	145
X4	Rear Surface of Veh. to Upper Leading Edge of Right Door	3045	2904	141
X5	Rear Surface of Veh. to Upper Leading Edge of Left Door	3043	2898	145
X6	Rear Surface of Veh. to Lower Leading Edge of Right Door	3050	2889	161
X7	Rear Surface of Veh. to Lower Leading Edge of Left Door	3034	2885	149
X8	Rear Surface of Veh. to Upper Trailing Edge of Right Door	2058	1917	141
X9	Rear Surface of Veh. to Upper Trailing Edge of Left Door	2062	1917	145
X10	Rear Surface of Veh. to Lower Trailing Edge of Right Door	2094	1943	151
X11	Rear Surface of Veh. to Lower Trailing Edge of Left Door	2093	1947	146
X12	Rear Surface of Veh. to Bottom of " A " Post on Right Side	3047	2912	135
X13	Rear Surface of Veh. to Bottom of " A " Post on Left Side	3046	2905	141
X14	Rear Surface of Vehicle to Firewall--Right Side	3525	3382	143
X15	Rear Surface of Vehicle to Firewall --Left Side	3520	3370	150
X16	Rear Surface of Vehicle to Steering Wheel Center	2661	2558	103
X17	Center of Steering Column to " A " Post	300	309	-11
X18	Center of Steering Column to Headliner	470	498	-30
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4420	4107	313
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4400	4118	282
X21	Length of Engine Block	500	499	1
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2915	2778	137
CD	Rear Surface of Vehicle to Center of Dash Panel	2880	2722	158
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2900	2762	138

All distance measurements are in millimeters.

Figure 5 Vehicle Crush



Notes: L is pre-test length of contact surface.  
 C1 through C6 are spaced equally apart.  
 CL is vehicle centerline.

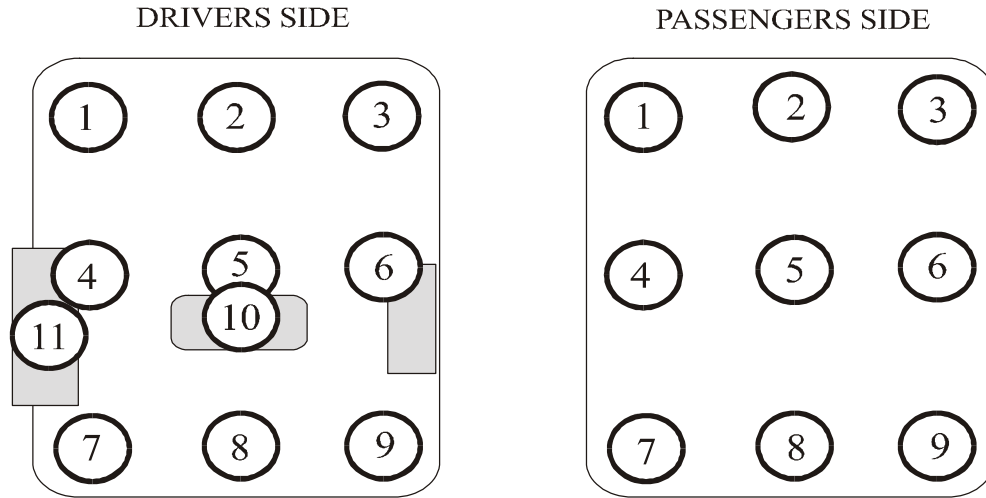
Vehicle: 2002 Saturn Vue MPV

Location	Pre-test	Post-test	Difference
L	1524 mm		
C1	4400 mm	4118 mm	282 mm
C2	4530 mm	3985 mm	545 mm
C3	4590 mm	4066 mm	524 mm
C4	4591 mm	4132 mm	459 mm
C5	4540 mm	4156 mm	384 mm
C6	4420 mm	4107 mm	313 mm
CL	4590 mm	4103 mm	487 mm

<sup>1</sup> The difference for point C1, measured with the bumper fascia, is included in the NHTSA database submission as Damage Profile Distance 1.



Figure 6 Toeboard Measurements



<b>Driver Toe Pan</b>			
<b>Pre-Test</b>			
Index	Xmm	Ymm	Zmm
1	2988	478	-239
2	2987	329	-240
3	3006	178	-244
4	2928	479	-287
5	2923	329	-291
6	2940	171	-312
7	2842	477	-347
8	2838	329	-349
9	2870	177	-358
10	2860	332	-128
11	2903	582	-216

<b>Driver Toe Pan</b>			
<b>Post-Test</b>			
Xmm	Ymm	Zmm	
2981	474	-242	
2984	325	-253	
3002	171	-262	
2925	472	-296	
2921	321	-305	
2939	164	-329	
2840	473	-358	
2835	325	-364	
2872	171	-372	
2854	331	-128	
2906	567	-218	

<b>Difference</b>			
Xmm	Ymm	Zmm	
7	5	3	
3	5	12	
5	7	19	
3	7	8	
3	8	14	
1	7	18	
1	4	11	
3	4	15	
-2	5	14	
6	1	0	
-3	15	2	

<b>Passenger Toe Pan</b>			
<b>Pre-Test</b>			
Index	Xmm	Ymm	Zmm
1	2997	-228	-231
2	3000	-394	-225
3	2990	-565	-214
4	2921	-223	-291
5	2920	-398	-283
6	2922	-568	-294
7	2840	-217	-345
8	2841	-400	-338
9	2838	-568	-347

<b>Passenger Toe Pan</b>			
<b>Post-Test</b>			
Xmm	Ymm	Zmm	
2997	-231	-258	
2992	-398	-249	
2989	-565	-233	
2921	-227	-318	
2920	-401	-310	
2919	-572	-314	
2839	-222	-371	
2838	-404	-363	
2835	-572	-367	

<b>Difference</b>			
Xmm	Ymm	Zmm	
0	3	28	
8	4	24	
1	0	19	
0	3	27	
0	3	27	
2	4	20	
0	4	26	
2	5	26	
3	4	20	

Reference: +X forward from rear bumper; +Y rightward from vehicle centerline; +Z downward from vehicle reference point

Table 10 Intrusion of Upper Instrument Panel

**Driver Instrument Panel - Lower**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
Left	2607	521	104				2607	521	104
Right	2608	219	100				2608	219	100

**Driver Knees**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
Left	2562	515	177				2562	515	177
Right	2578	227	144				2578	227	144

**Passenger Knees**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
Left	2583	-210	156	2603	-202	155	-20	-8	1
Right	2594	-508	154	2599	-500	148	-5	-8	6

**Steering Column**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	2377	371	329	2427	393	278	-50	-23	51

**Driver Front Outboard Seat Attachment Bolt**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	2261	594	-225	2260	590	-234	1	4	9

**Passenger Front Outboard Seat Attachment Bolt**

Pre-Test				Post-Test			Difference		
Index	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm	Xmm	Ymm	Zmm
1	2260	-588	-221	2260	-594	-241	1	6	20

Knee intrusions are points measured pre and post, which are located just above where the four knees would be expected to contact the instrument panel.

+X: Forward from rear reference point at rear striker

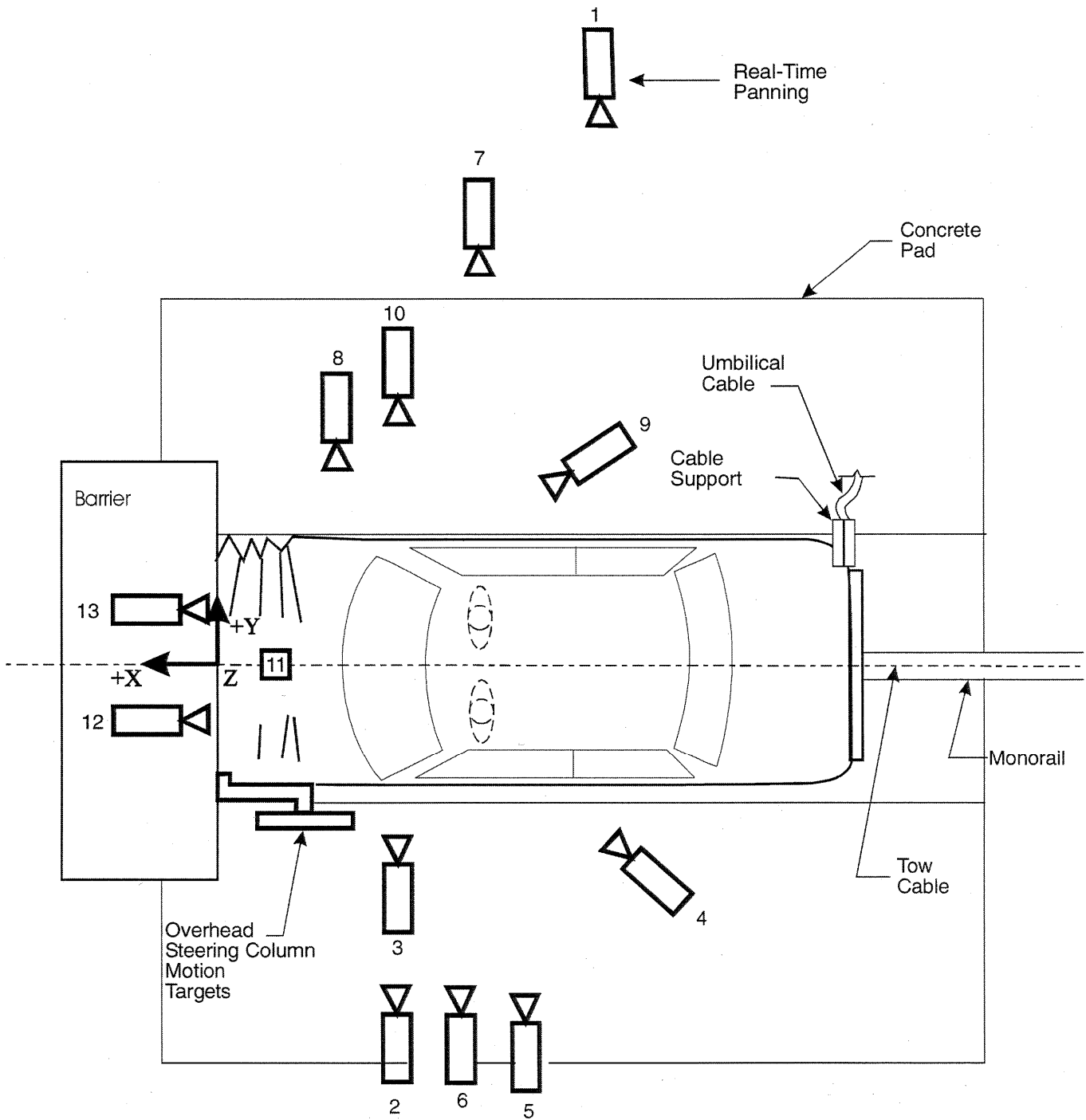
+Y: Rightward from centerline

+Z: Downward from vehicle reference point

Table 11 Fuel System Data

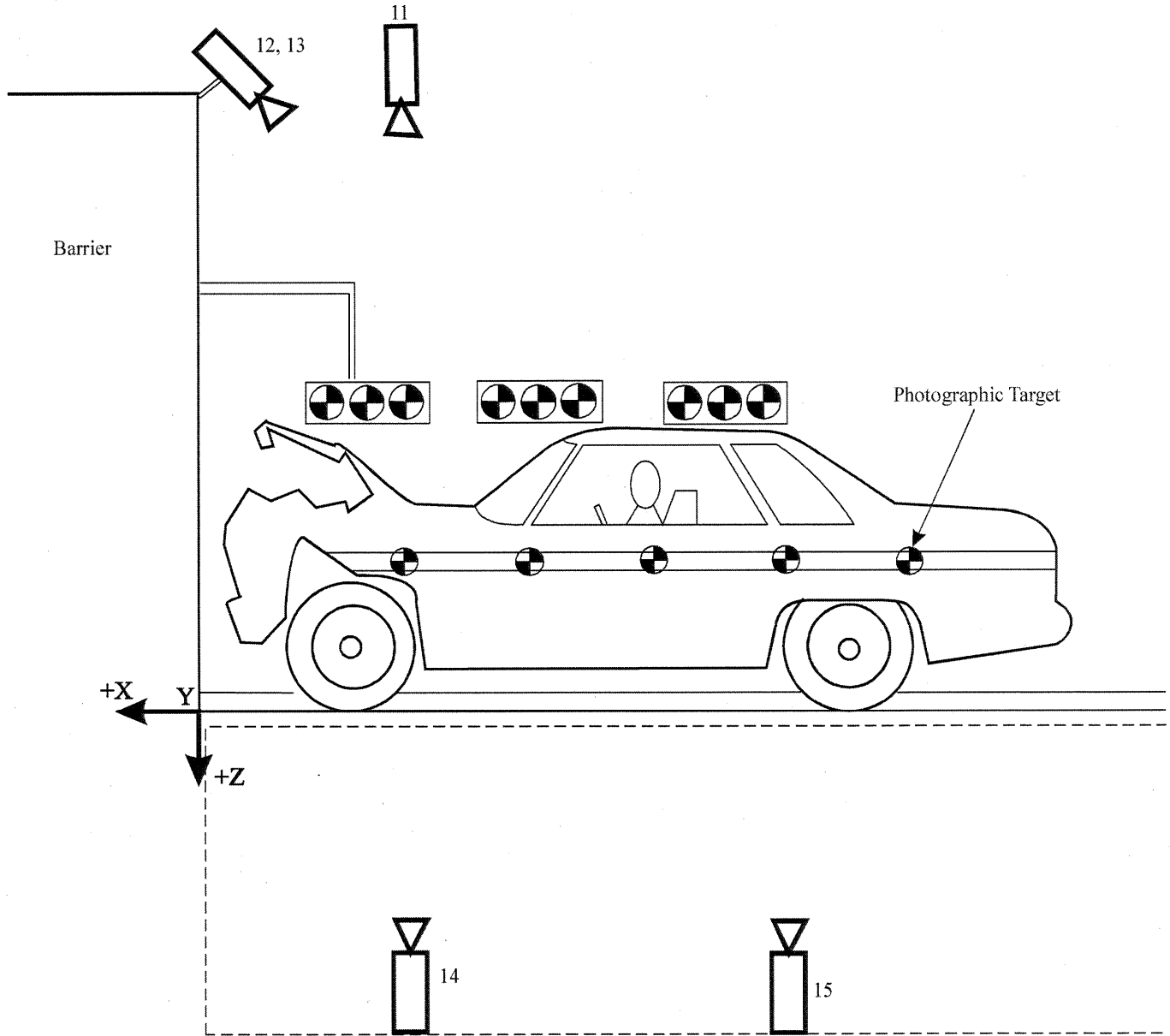
Usable fuel system capacity:	59.4 liters (from owner's manual)
Test volume range:	52.2 - 51.1 liters (92-94% of usable)
Actual test volume:	55.5 liters (94% of usable)
Test fluid type:	Stoddard
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Type of fuel pump:	Electric
Did electric fuel pump operate with ignition switch "on" and the engine not operating.	No
Details of fuel system:	Fuel tank under vehicle second row seat area. Filler neck top of tank right rear quarter panel. Filler cap at the end of filler neck. Fuel lines at the top of tank inside left frame rail.

Figure 7 Camera Positions



- +X = Film plane forward of barrier face
- +Y = Film plane to right of monorail centerline
- +Z = Film plane below ground level
- +Angle = Film plane angled upward from horizontal plane

Figure 7 Camera Positions, Cont'd.



- +X = Film plane forward of barrier face
- +Y = Film plane to right of monorail centerline
- +Z = Film plane below ground level
- +Angle = Film plane angled upward from horizontal plane

Table 12 Camera Information

No.	View	Type	Lens	Film Speed	Camera Positions <sup>1</sup>			Angle <sup>2</sup>	Film Plane to Head Target
					X	Y	Z		
1	Real-time panning	Bolex	Zoom	24 frames/s	N/A	N/A	N/A	N/A	N/A
2	Left side overall	Photosonic	13 mm	N/A <sup>3</sup>	-1174 mm	-5055 mm	-1053 mm	-1.4	N/A
3	Left tight dummy	Photosonic	25 mm	985 frames/s	-1402 mm	-6053 mm	-1430 mm	-4.7	N/A
4	Left angled on dummy	Photosonic	25 mm	940 frames/s	-4777 mm	-3500 mm	-2150 mm	-13.3	N/A
5	Left steering column upper	Photosonic	13 mm	1010 frames/s	-1692 mm	-5062 mm	-2440 mm	-16.9	N/A
6	Left steering column lower	Photosonic	13 mm	1022 frames/s	-1692 mm	-5062 mm	-1630 mm	-3.5	N/A
7	Right side overall	Photosonic	13 mm	1015 frames/s	-2142 mm	7820 mm	-1100 mm	-2.3	N/A
8	Right tight dummy	Photosonic	25 mm	977 frames/s	-1382 mm	6680 mm	-1000 mm	1.1	N/A
9	Right angled on dummy	Photosonic	25 mm	1012 frames/s	-5152 mm	3250 mm	-2050 mm	-13	N/A
10	Right side passenger	Photosonic	25 mm	1022 frames/s	-2292 mm	7640 mm	-950 mm	-1.9	N/A
11	Overhead	Photosonic	17 mm	1030 frames/s	-869 mm	0 mm	-5652 mm	-88.9	N/A
12	Barrier driver	Photosonic	17 mm	1005 frames/s	0 mm	-350 mm	-2620 mm	-48.5	N/A
13	Barrier passenger	Photosonic	17 mm	1007 frames/s	0 mm	350 mm	-2620 mm	-51.6	N/A
14	Pit front	Photosonic	17 mm	1025 frames/s	-380 mm	0 mm	554 mm	89.9	N/A
15	Pit rear	Photosonic	13 mm	1000 frames/s	-2820 mm	0 mm	850 mm	86.9	N/A

<sup>1</sup> +X = Film plane forward of barrier face

+Y = Film plane to right of monorail centerline

+Z = Film plane below ground level

<sup>2</sup> +Angle = Film plane angled upward from horizontal plane

<sup>3</sup> No LEDs

## Description Of Timing Marks On TRC Inc. High-Speed Film

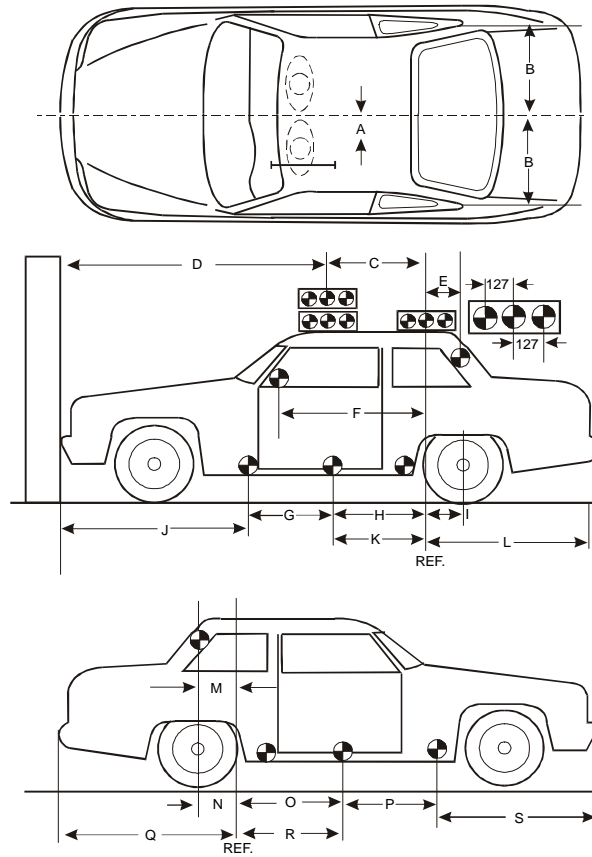
All TRC Inc. high-speed cameras are equipped with red LEDs which put timing marks on the right edge of the film. TRC Inc. uses a single timing generator to generate the timing for all cameras. This allows the timing marks to be common to all cameras. The timing marks can be used to measure camera speed (frames per second) or to locate a point in time before or after the time-zero event.

The timing marks appear on the film as small red marks on the right edge of the film. Round marks are left by the Photosonic and Stalex cameras while horizontal bars are left by the Hycam, Locam, and Fastax II cameras.

The timing generator puts out a pulse for every millisecond plus it generates additional pulses for hundredths and tenths of seconds. To explain this further, we can use an example of a camera running at 1000 frames per second.

1. Every frame will have **one** LED appear in it. This indicates a *millisecond* pulse.
2. Every ten frames will have **two** LEDs appear in it. These indicate a *millisecond* pulse plus a *hundredth of a second* pulse.
3. Every one hundred frames will have **three** LEDs appear in it. These indicate a *millisecond* pulse, a *hundredth of a second* pulse, and a *tenth of a second* pulse.

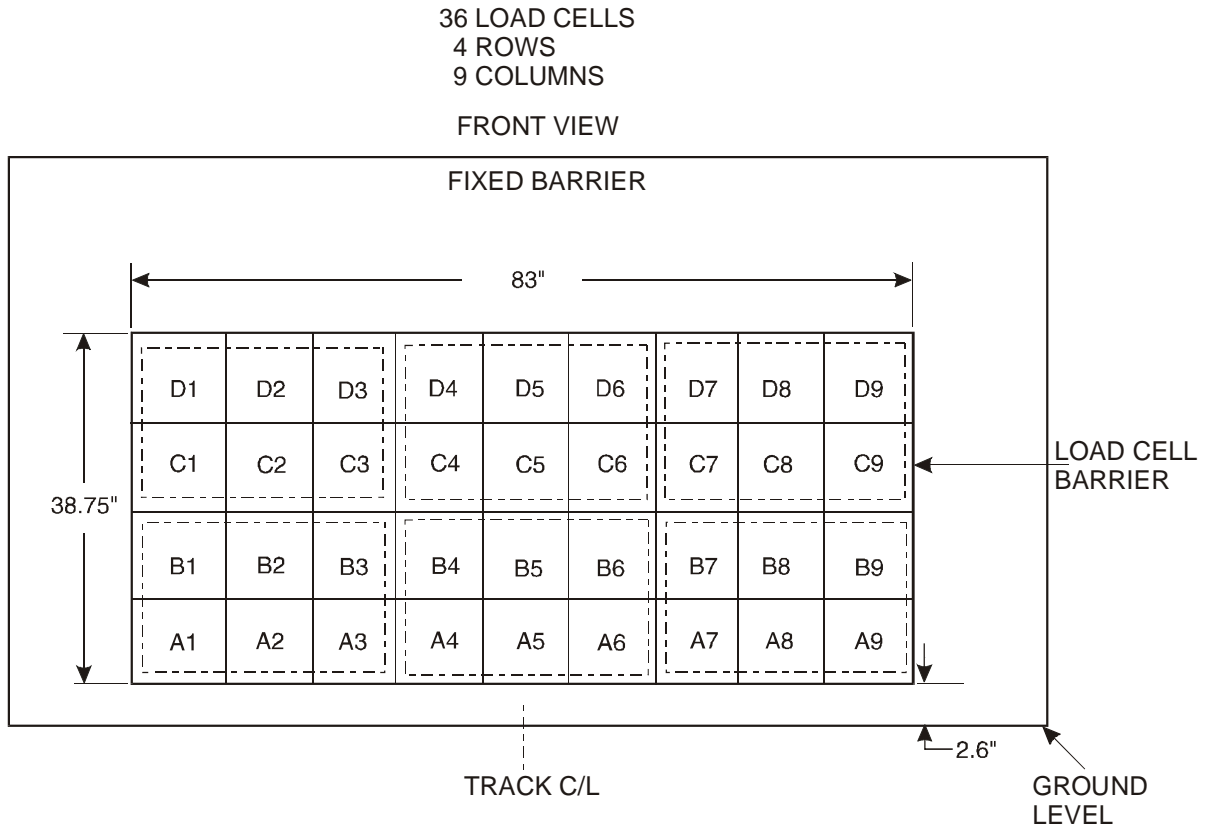
Figure 8 Vehicle Reference Photo Target Locations



Measurement	Pre-Test
A	360 mm
B	692 mm
C	610 mm
D	1579 mm
E	-170 mm
F	1822 mm
G	842 mm
H	875 mm
I	437 mm
J	1435 mm
K	1315 mm
L	998 mm
M	-106 mm
N	355 mm
O	852 mm
P	860 mm
Q	1085 mm
R	1209 mm
S	1436 mm

Additional targeting:  
 Inch tape along the top and sides of the vehicle has targets placed at 300 mm intervals except the first side target is placed 600 mm from front of front bumper.

Figure 9 Load Cell Locations on Fixed Barrier



- Group 1: A1 thru B3
- Group 2: A4 thru B6
- Group 3: A7 thru B9
- Group 4: C1 thru D3
- Group 5: C4 thru D6
- Group 6: C7 thru D9

The following data is presented as data plots at the end of Appendix B:

- 1) Data from 36 individual load cells
- 2) Total of 36 individual load cells
- 3) Data from 6 groupings shown above (6 cells/groups)

Appendix A

Photographs



**Figure A- 1 Pre-Test Front View**



**Figure A- 2 Post-Test Front View**



Figure A- 3 Pre-Test Left Front View



Figure A- 4 Post-Test Left Front View



Figure A- 5 Pre-Test Left Side View



Figure A- 6 Post-Test Left Side View



**Figure A- 7 Pre-Test Left Rear View**



**Figure A- 8 Post-Test Left Rear View**



Figure A- 9 Pre-Test Right Rear View



Figure A- 10 Post-Test Right Rear View



Figure A- 11 Pre-Test Right Side View



Figure A- 12 Post-Test Right Side View



Figure A- 13 Pre-Test Right Front View



Figure A- 14 Post-Test Right Front View



Figure A- 15 Pre-Test Overhead Overall View

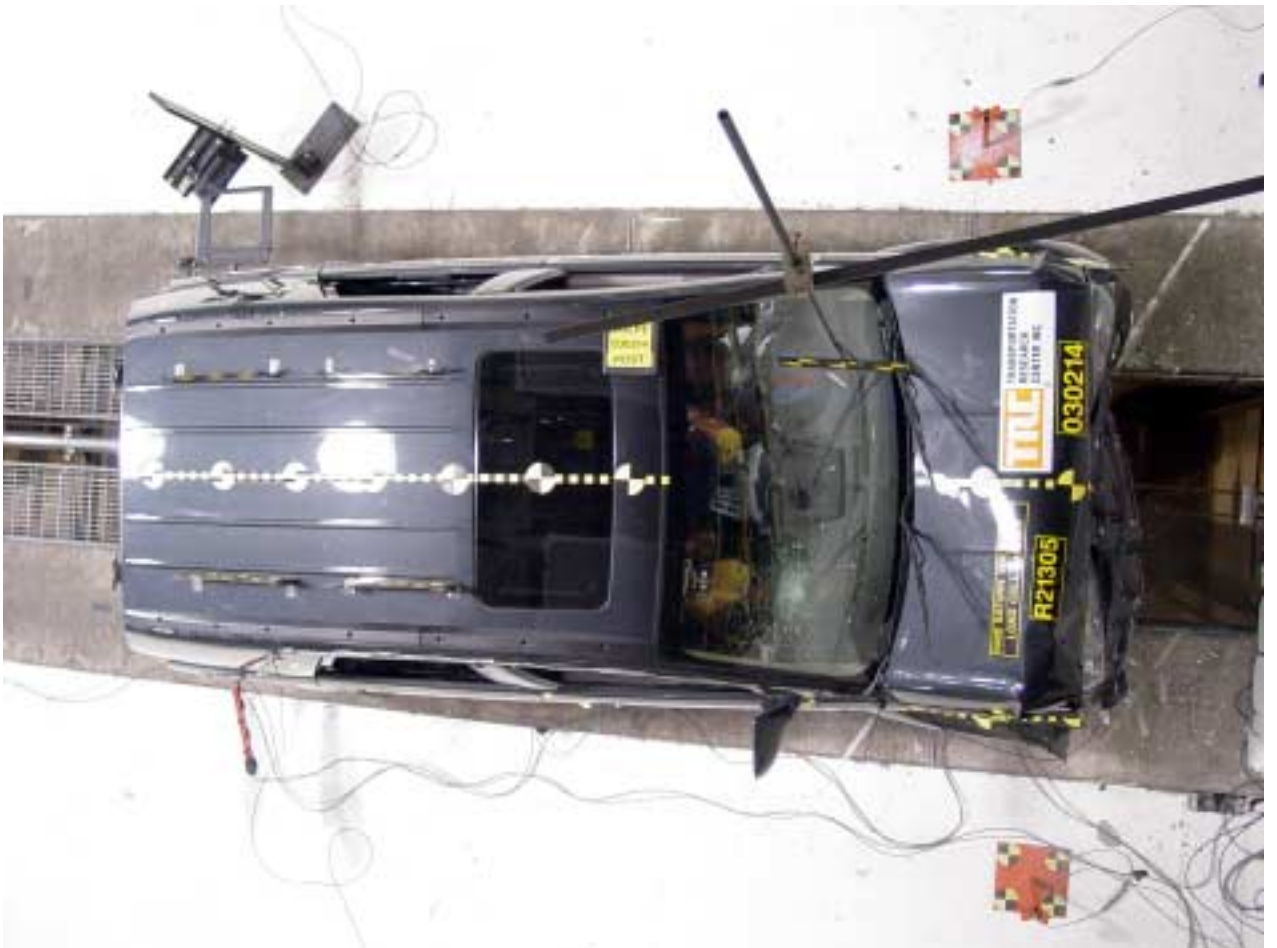


Figure A- 16 Post-Test Overhead Overall View



Figure A- 17 Pre-Test Front Underbody View



Figure A- 18 Post-Test Front Underbody View



Figure A- 19 Pre-Test Front Mid Underbody View



Figure A- 20 Post-Test Front Mid Underbody View



Figure A- 21 Pre-Test Mid Underbody View



Figure A- 22 Post-Test Mid Underbody View



Figure A- 23 Pre-Test Rear Mid Underbody View

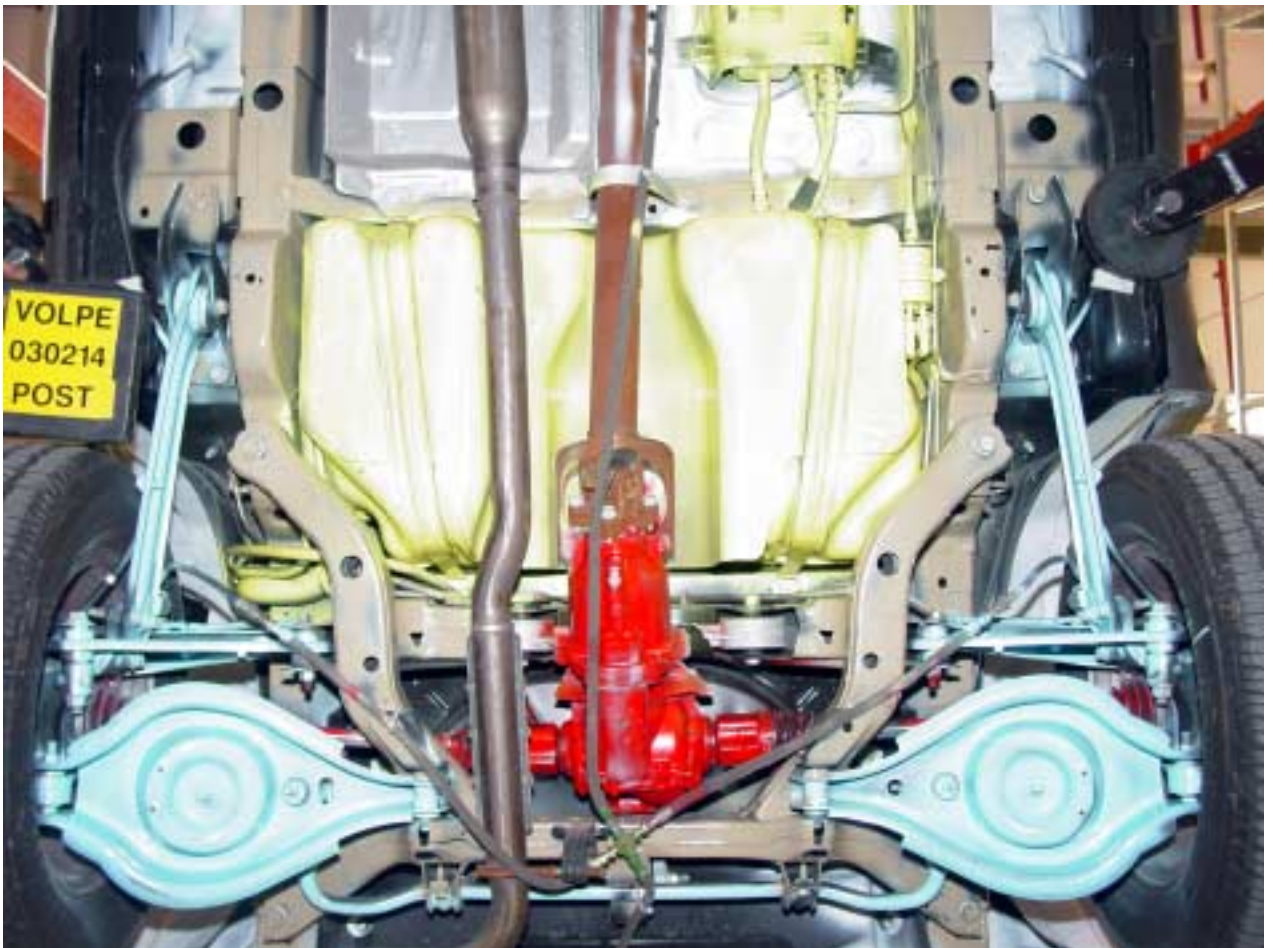


Figure A- 24 Post-Test Rear Mid Underbody View

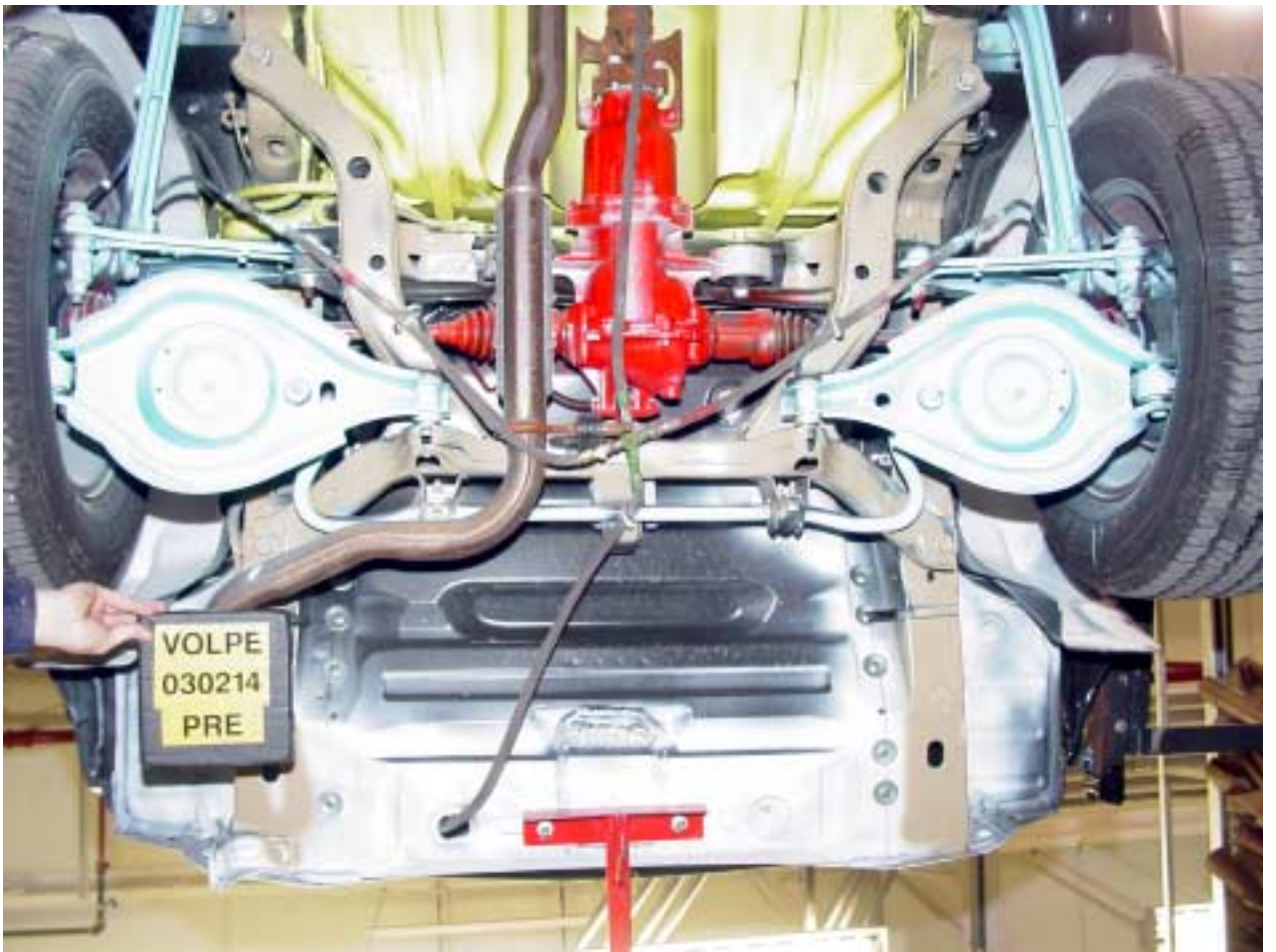


Figure A- 25 Pre-Test Rear Underbody View

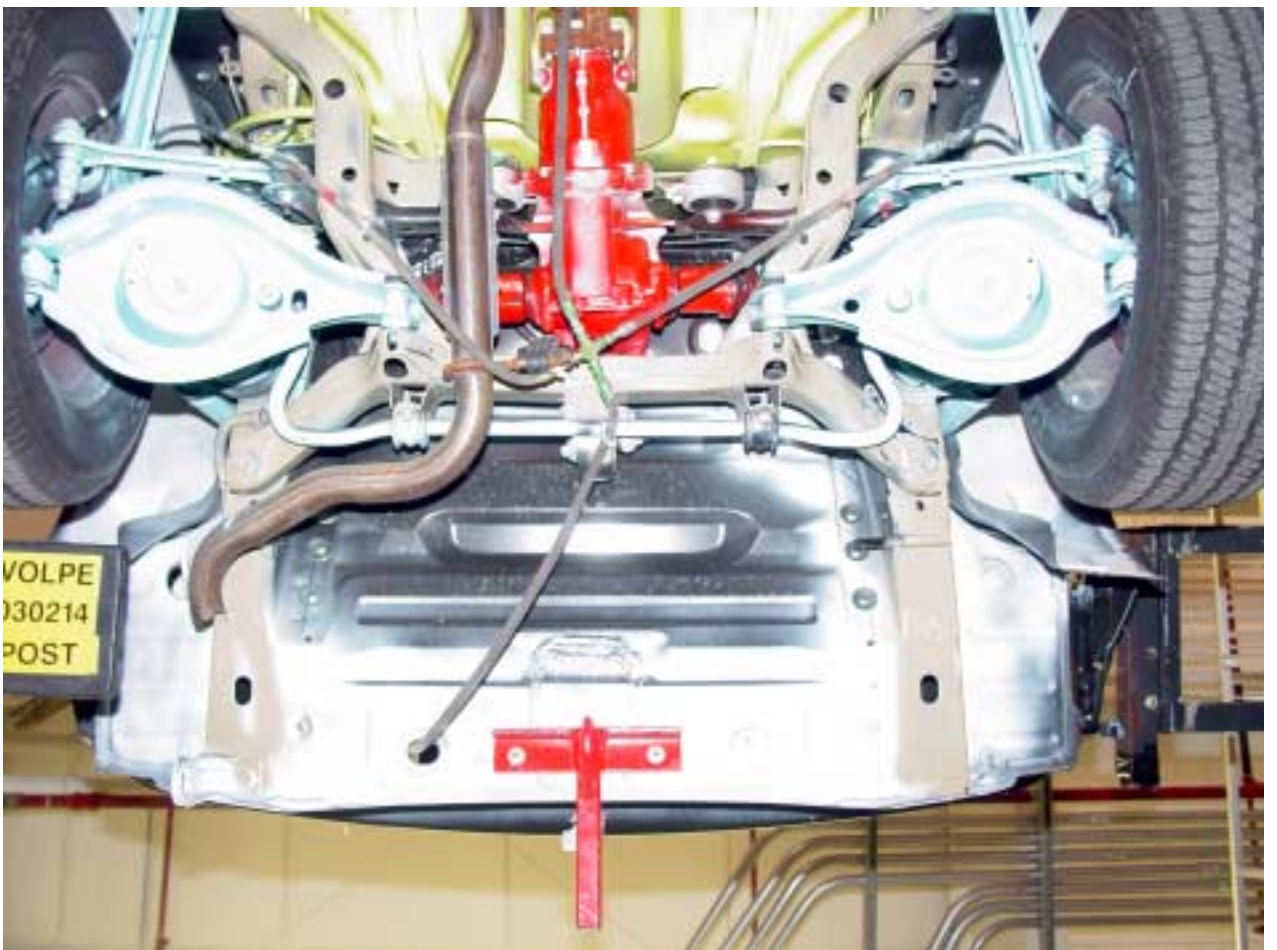


Figure A- 26 Post-Test Rear Underbody View



Figure A- 27 Pre-Test Fuel Cap View



Figure A- 28 Post-Test Fuel Cap View

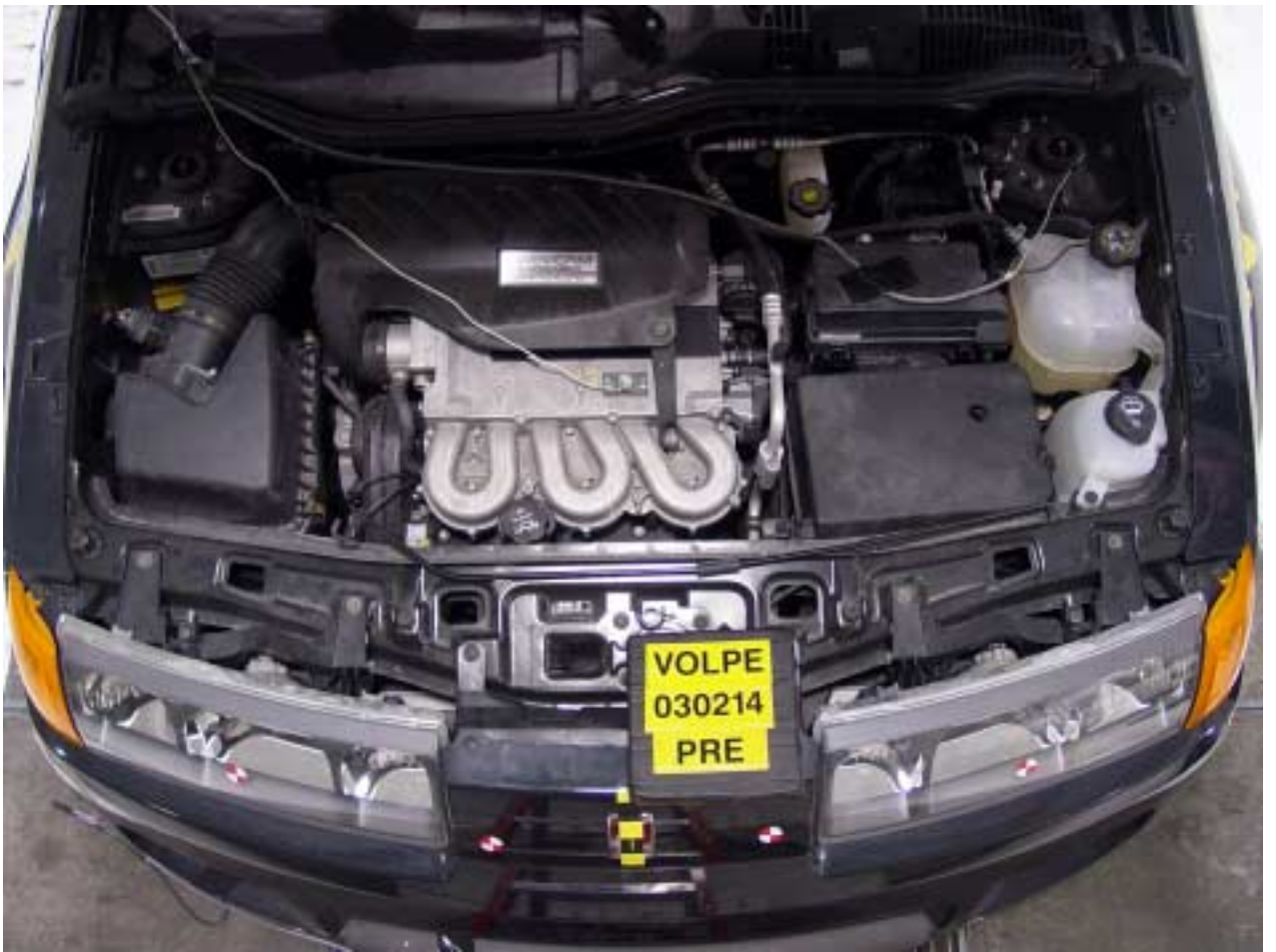


Figure A- 29 Pre-Test Engine Compartment View



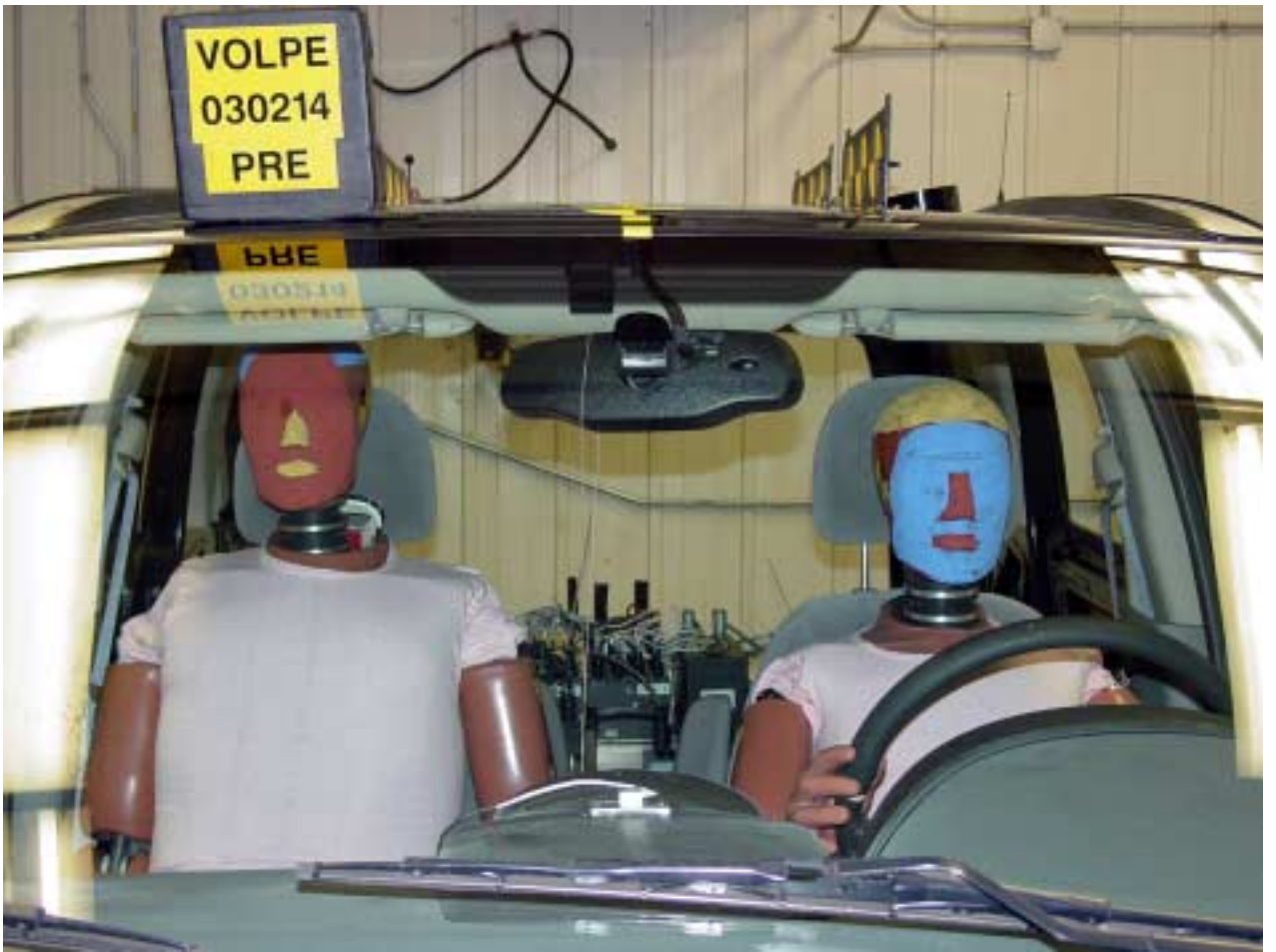
Figure A- 30 Post-Test Engine Compartment View



Figure A- 31 Pre-Test Windshield View



Figure A- 32 Post-Test Windshield View



**Figure A- 33 Pre-Test Driver and Passenger Dummies Front View**

**Intentionally Left Blank**



Figure A- 34 Pre-Test Driver Dummy Position - View 1



Figure A- 35 Post-Test Driver Dummy Position - View 1



Figure A- 36 Pre-Test Driver Dummy Position - View 2



Figure A- 37 Post-Test Driver Dummy Position - View 2



Figure A- 38 Pre-Test Driver Dummy & Vehicle Interior - View 1



Figure A- 39 Post-Test Driver Dummy & Vehicle Interior - View 1



Figure A- 40 Pre-Test Driver Dummy & Vehicle Interior - View 2



Figure A- 41 Post-Test Driver Dummy & Vehicle Interior - View 2



Figure A- 42 Pre-Test Driver Dummy Seat Position View



Figure A- 43 Post-Test Driver Dummy Seat Position View



Figure A- 44 Pre-Test Driver Dummy Leg Position View



Figure A- 45 Post-Test Driver Dummy Leg Position View



Figure A- 46 Pre-Test Driver Dummy Abdomen View



Figure A- 47 Post-Test Driver Dummy Abdomen View



Figure A- 48 Pre-Test Passenger Dummy Position - View 1



Figure A- 49 Post-Test Passenger Dummy Position - View 1



Figure A- 50 Pre-Test Passenger Dummy Position - View 2



Figure A- 51 Post-Test Passenger Dummy Position - View 2



Figure A- 52 Pre-Test Passenger Dummy & Vehicle Interior - View 1



Figure A- 53 Post-Test Passenger Dummy & Vehicle Interior - View 1



Figure A- 54 Pre-Test Passenger Dummy & Vehicle Interior - View 2



Figure A- 55 Post-Test Passenger Dummy & Vehicle Interior - View 2

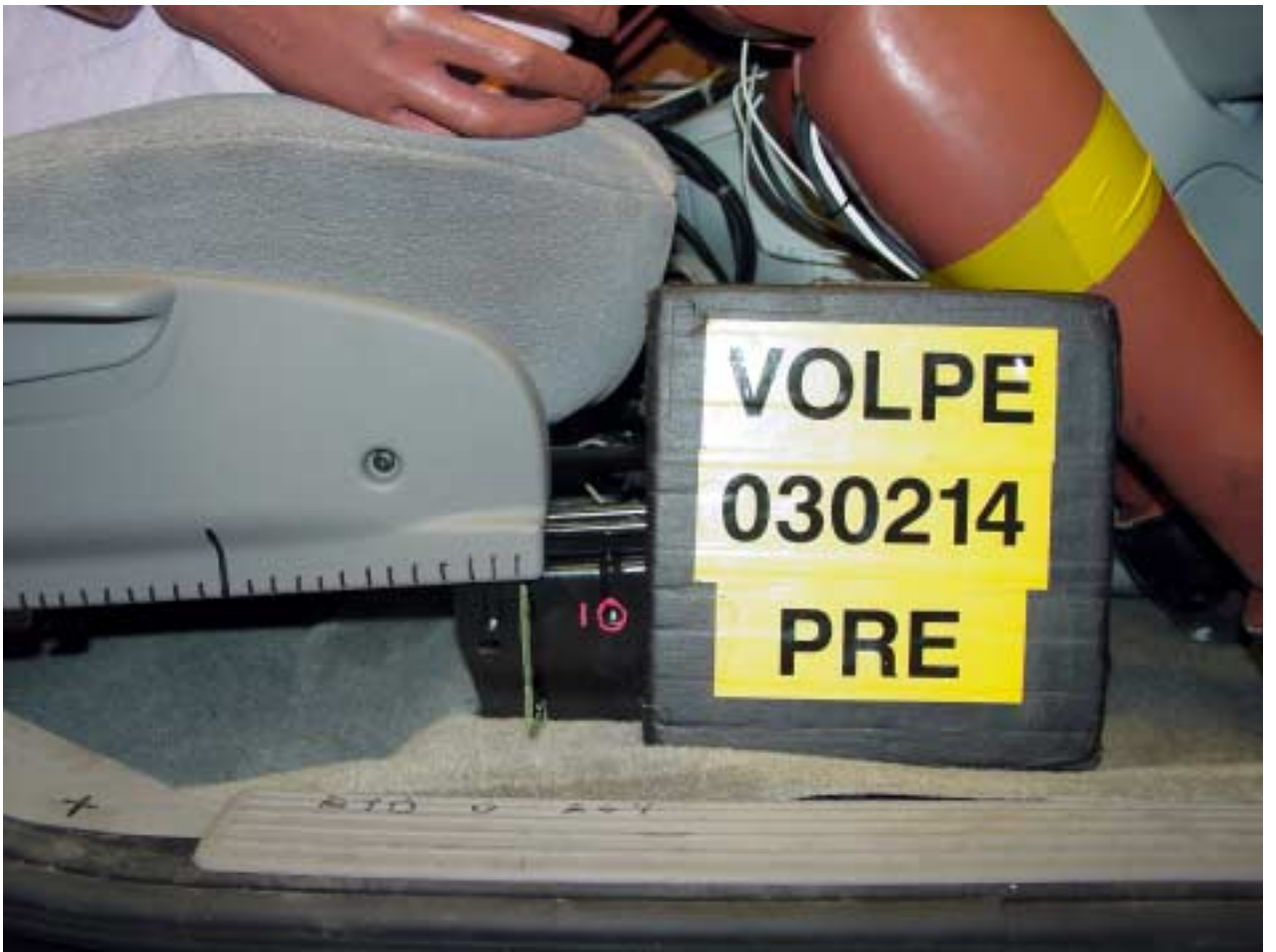


Figure A- 56 Pre-Test Passenger Dummy Seat Position View



Figure A- 57 Post-Test Passenger Dummy Seat Position View



Figure A- 58 Pre-Test Passenger Dummy Leg Position - View 1



Figure A- 59 Post-Test Passenger Dummy Leg Position - View 1



Figure A- 60 Post-Test Passenger Dummy Leg Position - View 2

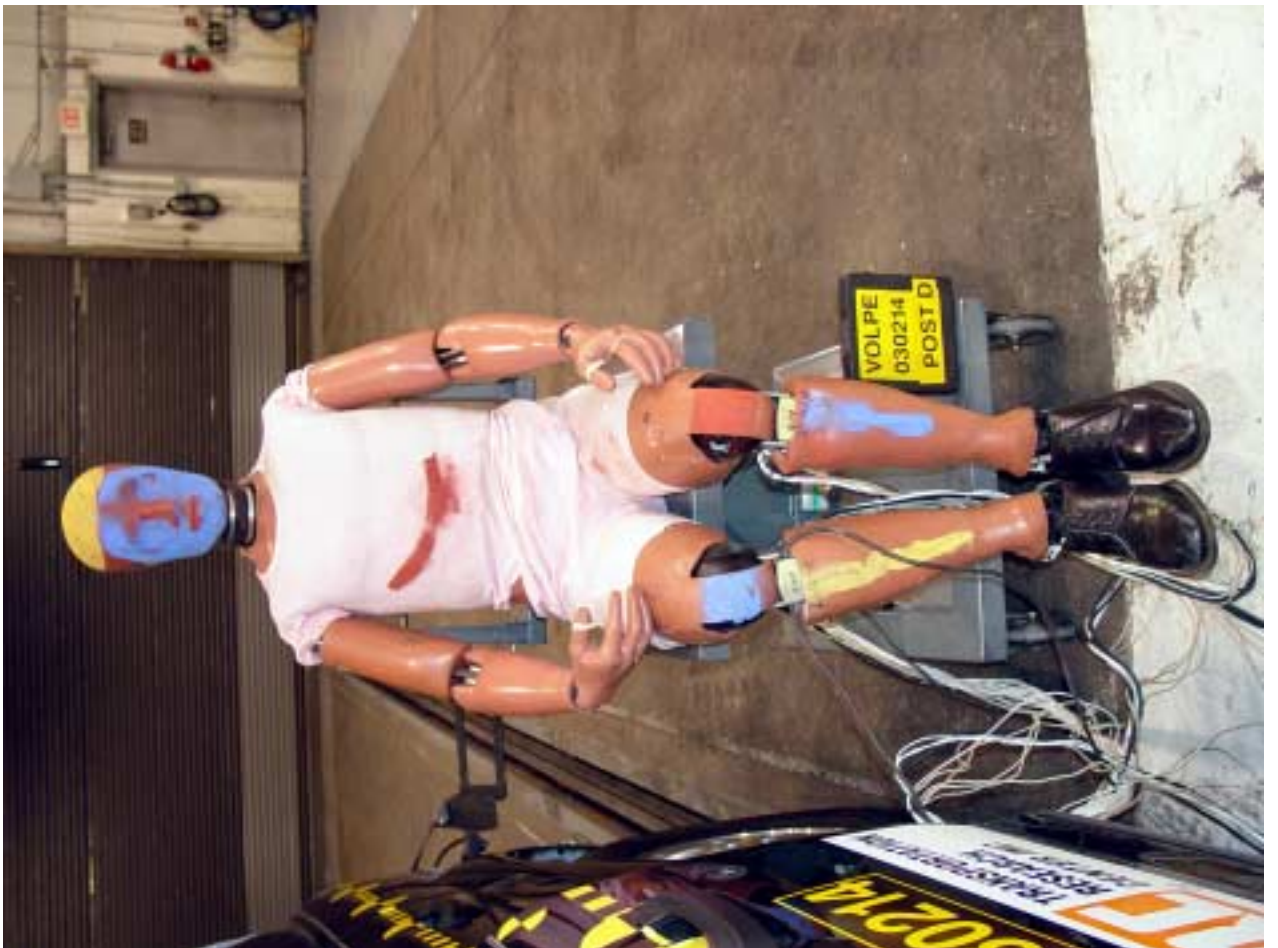


Figure A- 61 Post-Test Driver Dummy Overall View



Figure A- 62 Post-Test Driver Dummy Head Contact - View 1



Figure A- 63 Post-Test Driver Dummy Head Contact - View 2



Figure A- 64 Post-Test Driver Dummy Head Contact - View 3



Figure A- 65 Post-Test Driver Dummy Head Contact - View 4



Figure A- 66 Post-Test Driver Dummy Head Contact - View 5



Figure A- 67 Post-Test Driver Dummy Abdomen Contact View

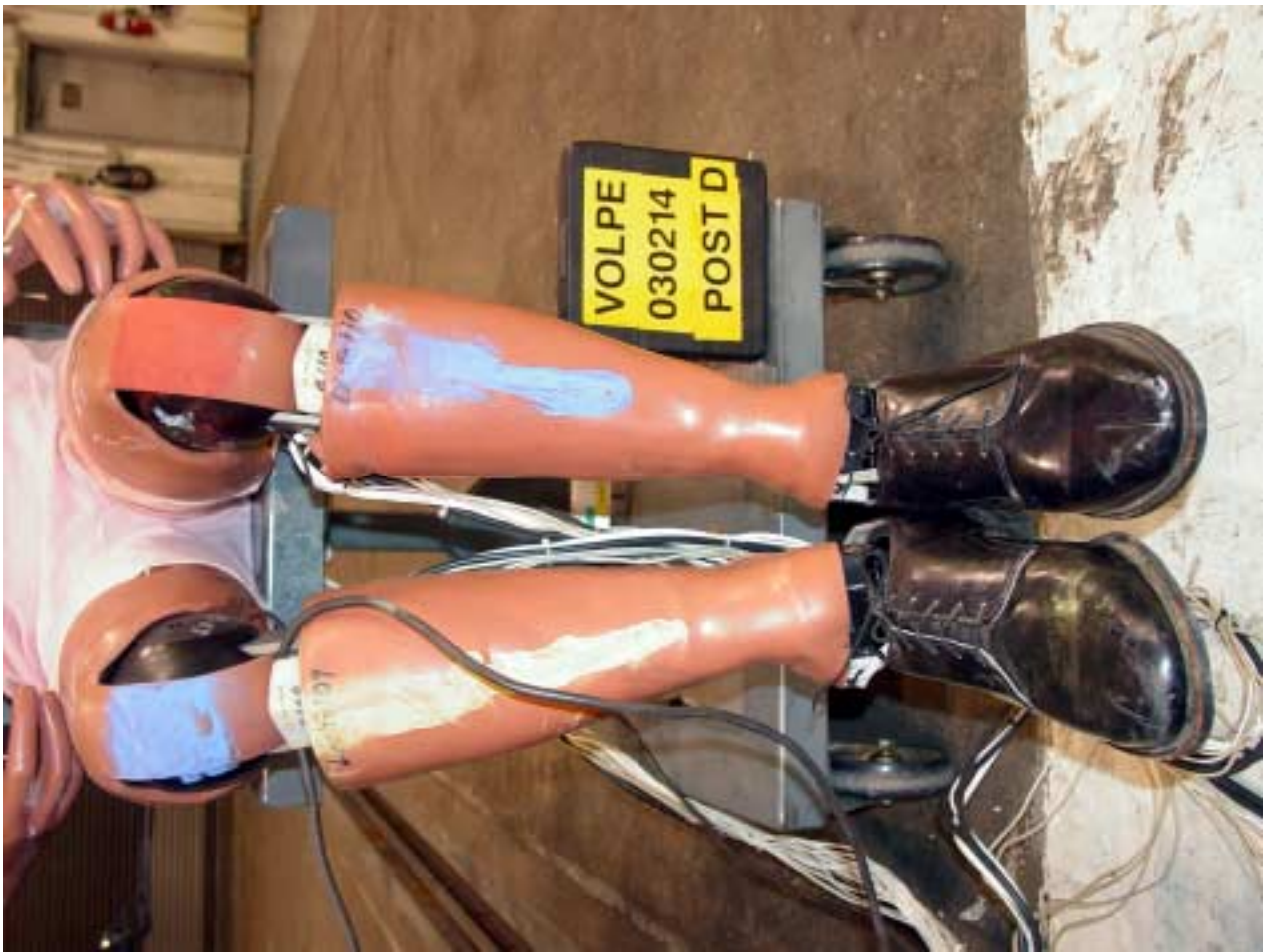


Figure A- 68 Post-Test Driver Dummy Knee Contact - View 1



Figure A- 69 Post-Test Driver Dummy Knee Contact - View 2



**Figure A- 70 Post-Test Passenger Dummy Overall View**

**Intentionally Left Blank**



Figure A- 71 Post-Test Passenger Dummy Head Contact - View 1



Figure A- 72 Post-Test Passenger Dummy Head Contact - View 2



Figure A-73 Post-Test Passenger Dummy Head Contact - View 3



Figure A-74 Post-Test Passenger Dummy Head Contact - View 4



Figure A- 75 Post-Test Passenger Dummy Knee Contact - View 1



Figure A- 76 Post-Test Passenger Dummy Knee Contact - View 2



Figure A- 77 Pre-Test Barrier View

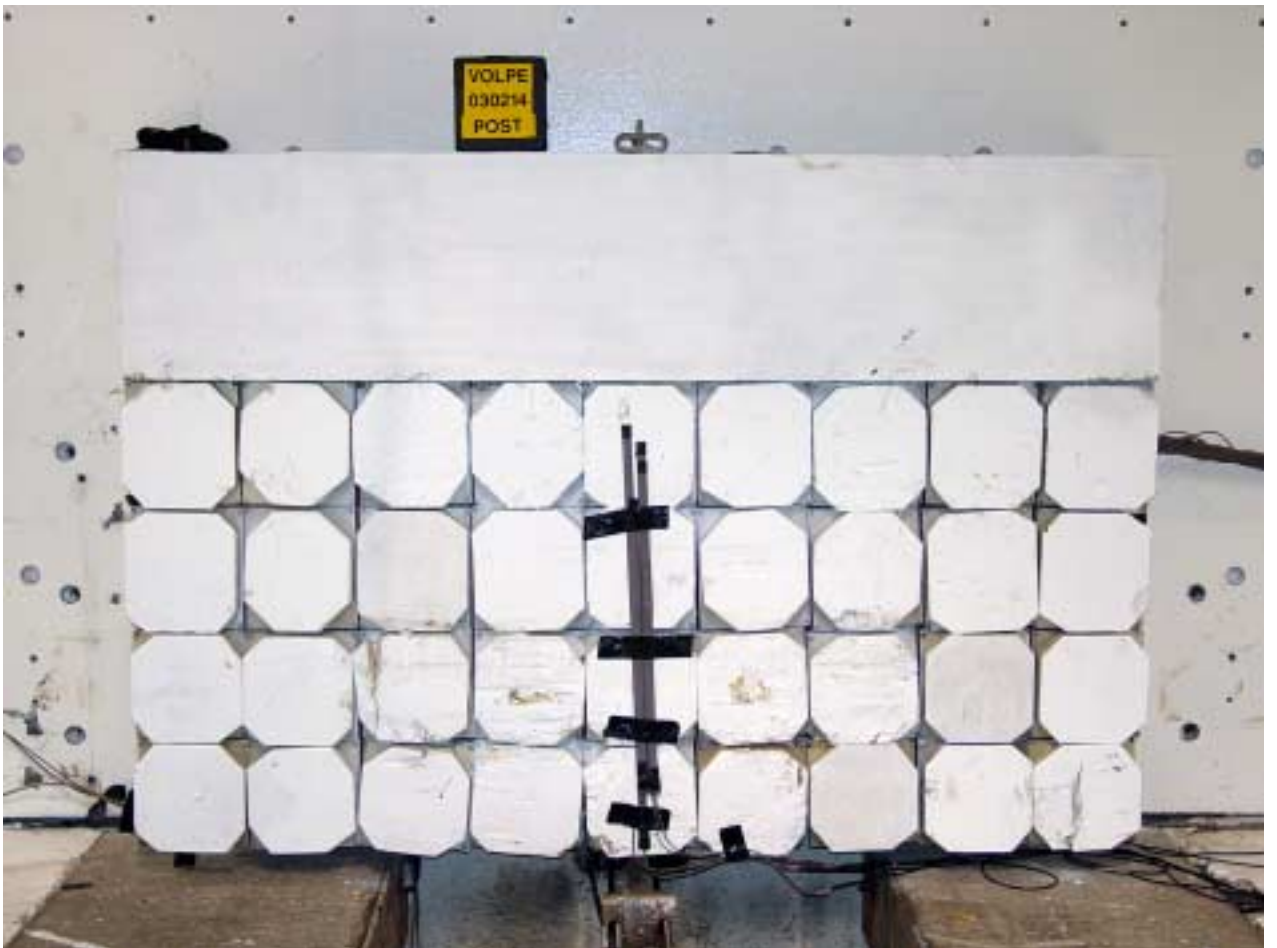


Figure A- 78 Post-Test Barrier View



Figure A- 79 Pre-Test Vehicle Certification Label View



Figure A-80 Impact Event

Appendix B

Data Plots

Table of Data Plots  
Curve Number Corresponds to NHTSA Database Sequence

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
1	Driver Head X-Axis Acceleration	B-9
2	Driver Head Y-Axis Acceleration	B-10
3	Driver Head Z-Axis Acceleration	B-11
--- <sup>1</sup>	Driver Head Resultant Acceleration	B-12
4	Driver Head X-Axis Acceleration Redundant	B-13
5	Driver Head Y-Axis Acceleration Redundant	B-14
6	Driver Head Z-Axis Acceleration Redundant	B-15
--- <sup>1</sup>	Driver Head Resultant Acceleration Redundant	B-16
--- <sup>1</sup>	Driver Head Resultant Acceleration using Primary X-Axis and Redundant Y- and Z-Axis	B-17
7	Driver Head X-Axis (LT) Acceleration	B-18
8	Driver Head Z-Axis (LT) Acceleration	B-19
9	Driver Head Y-Axis (FT) Acceleration	B-20
10	Driver Head Z-Axis (FT) Acceleration	B-21
11	Driver Head X-Axis (TP) Acceleration	B-22
12	Driver Head Y-Axis (TP) Acceleration	B-23
13	Driver Neck X-Axis Shear Force	B-24
14	Driver Neck Y-Axis Shear Force	B-25
15	Driver Neck Z-Axis Axial Force	B-26
16	Driver Neck Moment About X Axis	B-27
17	Driver Neck Moment About Y Axis	B-28
18	Driver Neck Moment About Z Axis	B-29
--- <sup>1</sup>	Driver Neck Occipital Moment About Y Axis	B-30
--- <sup>1</sup>	Driver Neck Tension/Extension	B-31
--- <sup>1</sup>	Driver Neck Tension/Flexion	B-32
--- <sup>1</sup>	Driver Neck Compression/Extension	B-33
--- <sup>1</sup>	Driver Neck Compression/Flexion	B-34
19	Driver Neck Lower X-Axis Shear Force	B-35
20	Driver Neck Lower Y-Axis Shear Force	B-36
21	Driver Neck Lower Z-Axis Axial Force	B-37
22	Driver Neck Lower Moment About X Axis	B-38
23	Driver Neck Lower Moment About Y Axis	B-39
24	Driver Neck Lower Moment About Z Axis	B-40

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
25	Driver Chest X-Axis Acceleration	B-41
26	Driver Chest Y-Axis Acceleration	B-42
27	Driver Chest Z-Axis Acceleration	B-43
--- <sup>1</sup>	Driver Chest Resultant Acceleration	B-44
28	Driver Chest X-Axis Acceleration Redundant	B-45
29	Driver Chest Y-Axis Acceleration Redundant	B-46
30	Driver Chest Z-Axis Acceleration Redundant	B-47
--- <sup>1</sup>	Driver Chest Resultant Acceleration Redundant	B-48
31	Driver Chest Deflection	B-49
32	Driver Left Femur Force	B-50
33	Driver Right Femur Force	B-51
34	Driver Left Knee Displacement	B-52
35	Driver Left Upper Tibia X-Axis Force	B-53
36	Driver Left Upper Tibia Z-Axis Force	B-54
37	Driver Left Upper Tibia Moment About X Axis	B-55
38	Driver Left Upper Tibia Moment About Y Axis	B-56
39	Driver Left Upper Tibia X-Axis Acceleration	B-57
40	Driver Left Upper Tibia Y-Axis Acceleration	B-58
41	Driver Left Lower Tibia X-Axis Force	B-59
42	Driver Left Lower Tibia Y-Axis Force	B-60
43	Driver Left Lower Tibia Z-Axis Force	B-61
44	Driver Left Lower Tibia Moment About X-Axis	B-62
45	Driver Left Lower Tibia Moment About Y-Axis	B-63
46	Driver Left Foot X-Axis Displacement	B-64
47	Driver Left Foot Y-Axis Displacement	B-65
48	Driver Left Foot Z-Axis Displacement	B-66
49	Driver Left Foot X-Axis Acceleration	B-67
50	Driver Left Foot Y-Axis Acceleration	B-68
51	Driver Left Foot Z-Axis Acceleration	B-69
--- <sup>1</sup>	Driver Left Foot Resultant Acceleration	B-70
52	Driver Right Knee Displacement	B-71
53	Driver Right Upper Tibia X-Axis Force	B-72
54	Driver Right Upper Tibia Z-Axis Force	B-73

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
55	Driver Right Upper Tibia Moment About X-Axis	B-74
56	Driver Right Upper Tibia Moment About Y-Axis	B-75
57	Driver Right Upper Tibia X-Axis Acceleration	B-76
58	Driver Right Upper Tibia Y-Axis Acceleration	B-77
59	Driver Right Lower Tibia X-Axis Force	B-78
60	Driver Right Lower Tibia Y-Axis Force	B-79
61	Driver Right Lower Tibia Z-Axis Force	B-80
62	Driver Right Lower Tibia Moment About X-Axis	B-81
63	Driver Right Lower Tibia Moment About Y-Axis	B-82
64	Driver Right Foot X-Axis Displacement	B-83
65	Driver Right Foot Y-Axis Displacement	B-84
66	Driver Right Foot Z-Axis Displacement	B-85
67	Driver Right Foot X-Axis Acceleration	B-86
68	Driver Right Foot Y-Axis Acceleration	B-87
69	Driver Right Foot Z-Axis Acceleration	B-88
--- <sup>1</sup>	Driver Right Foot Resultant Acceleration	B-89
70	Passenger Head X-Axis Acceleration	B-90
71	Passenger Head Y-Axis Acceleration	B-91
72	Passenger Head Z-Axis Acceleration	B-92
--- <sup>1</sup>	Passenger Head Resultant Acceleration	B-93
73	Passenger Head X-Axis Acceleration Redundant	B-94
74	Passenger Head Y-Axis Acceleration Redundant	B-95
75	Passenger Head Z-Axis Acceleration Redundant	B-96
--- <sup>1</sup>	Passenger Head Resultant Acceleration Redundant	B-97
76	Passenger Head X-Axis (LT) Acceleration	B-98
77	Passenger Head Z-Axis (LT) Acceleration	B-99
78	Passenger Head Y-Axis (FT) Acceleration	B-100
79	Passenger Head Z-Axis (FT) Acceleration	B-101
80	Passenger Head X-Axis (TP) Acceleration	B-102
81	Passenger Head Y-Axis (TP) Acceleration	B-103
82	Passenger Neck X-Axis Shear Force	B-104
83	Passenger Neck Y-Axis Shear Force	B-105
84	Passenger Neck Z-Axis Axial Force	B-106

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
85	Passenger Neck Moment About X Axis	B-107
86	Passenger Neck Moment About Y Axis	B-108
87	Passenger Neck Moment About Z Axis	B-109
--- <sup>1</sup>	Passenger Neck Occipital Condyle Moment About Y Axis	B-110
--- <sup>1</sup>	Right Front Passenger Neck Tension/Extension	B-111
--- <sup>1</sup>	Right Front Passenger Neck Tension/Flexion	B-112
--- <sup>1</sup>	Right Front Passenger Neck Compression/Extension	B-113
--- <sup>1</sup>	Right Front Passenger Neck Compression/Flexion	B-114
88	Passenger Neck Lower X-Axis Shear Force	B-115
89	Passenger Neck Lower Y-Axis Shear Force	B-116
90	Passenger Neck Lower Z-Axis Axial Force	B-117
91	Passenger Neck Lower Moment About X Axis	B-118
92	Passenger Neck Lower Moment About Y Axis	B-119
93	Passenger Neck Lower Moment About Z Axis	B-120
94	Passenger Chest X-Axis Acceleration	B-121
95	Passenger Chest Y-Axis Acceleration	B-122
96	Passenger Chest Z-Axis Acceleration	B-123
--- <sup>1</sup>	Passenger Chest Resultant Acceleration	B-124
97	Passenger Chest X-Axis Acceleration Redundant	B-125
98	Passenger Chest Y-Axis Acceleration Redundant	B-126
99	Passenger Chest Z-Axis Acceleration Redundant	B-127
--- <sup>1</sup>	Passenger Chest Resultant Acceleration Redundant	B-128
100	Passenger Chest Deflection	B-129
101	Passenger Left Femur Force	B-130
102	Passenger Right Femur Force	B-131
103	Passenger Left Knee Displacement	B-132
104	Passenger Left Upper Tibia X-Axis Force	B-133
105	Passenger Left Upper Tibia Y-Axis Force	B-134
106	Passenger Left Upper Tibia Z-Axis Force	B-135
107	Passenger Left Upper Tibia Moment About X Axis	B-136
108	Passenger Left Upper Tibia Moment About Y Axis	B-137
109	Passenger Left Lower Tibia X-Axis Force	B-138
110	Passenger Left Lower Tibia Y-Axis Force	B-139

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
111	Passenger Left Lower Tibia Z-Axis Force	B-140
112	Passenger Left Lower Tibia Moment About X Axis	B-141
113	Passenger Left Lower Tibia Moment About Y Axis	B-142
114	Passenger Right Knee Displacement	B-143
115	Passenger Right Upper Tibia X-Axis Force	B-144
116	Passenger Right Upper Tibia Y-Axis Force	B-145
117	Passenger Right Upper Tibia Z-Axis Force	B-146
118	Passenger Right Upper Tibia Moment About X Axis	B-147
119	Passenger Right Upper Tibia Moment About Y Axis	B-148
120	Passenger Right Lower Tibia X-Axis Force	B-149
121	Passenger Right Lower Tibia Y-Axis Force	B-150
122	Passenger Right Lower Tibia Z-Axis Force	B-151
123	Passenger Right Lower Tibia Moment About X Axis	B-152
124	Passenger Right Lower Tibia Moment About Y Axis	B-153
125	Left Rear Seat Crossmember X-Axis Acceleration	B-154
126	Right Rear Seat Crossmember X-Axis Acceleration	B-155
127	Front Brake Caliper Left X-Axis Acceleration	B-156
128	Front Brake Caliper Right X-Axis Acceleration	B-157
129	Dash Panel Center X-Axis Acceleration	B-158
130	Engine Top X-Axis Acceleration	B-159
131	Engine Bottom X-Axis Acceleration	B-160
132	Toepan Next to Accelerator X-Axis Acceleration	B-161
133	Toepan Next to Accelerator Z-Axis Acceleration	B-162
134	Toepan Next to Footrest X-Axis Acceleration	B-163
135	Toepan Next to Footrest Z-Axis Acceleration	B-164
136	Rear Deck Z-Axis Acceleration	B-165
137	Rear Compartment Center X-Axis Acceleration	B-166
138	Driver Airbag Event	B-167
139	Passenger Airbag Event	B-168
140	Load Cell Barrier Position A1 Force	B-169
141	Load Cell Barrier Position A2 Force	B-170
142	Load Cell Barrier Position A3 Force	B-171
143	Load Cell Barrier Position A4 Force	B-172

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
144	Load Cell Barrier Position A5 Force	B-173
145	Load Cell Barrier Position A6 Force	B-174
146	Load Cell Barrier Position A7 Force	B-175
147	Load Cell Barrier Position A8 Force	B-176
148	Load Cell Barrier Position A9 Force	B-177
149	Load Cell Barrier Position B1 Force	B-178
150	Load Cell Barrier Position B2 Force	B-179
151	Load Cell Barrier Position B3 Force	B-180
152	Load Cell Barrier Position B4 Force	B-181
153	Load Cell Barrier Position B5 Force	B-182
154	Load Cell Barrier Position B6 Force	B-183
155	Load Cell Barrier Position B7 Force	B-184
156	Load Cell Barrier Position B8 Force	B-185
157	Load Cell Barrier Position B9 Force	B-186
158	Load Cell Barrier Position C1 Force	B-187
159	Load Cell Barrier Position C2 Force	B-188
160	Load Cell Barrier Position C3 Force	B-189
161	Load Cell Barrier Position C4 Force	B-190
162	Load Cell Barrier Position C5 Force	B-191
163	Load Cell Barrier Position C6 Force	B-192
164	Load Cell Barrier Position C7 Force	B-193
165	Load Cell Barrier Position C8 Force	B-194
166	Load Cell Barrier Position C9 Force	B-195
167	Load Cell Barrier Position D1 Force	B-196
168	Load Cell Barrier Position D2 Force	B-197
169	Load Cell Barrier Position D3 Force	B-198
170	Load Cell Barrier Position D4 Force	B-199
171	Load Cell Barrier Position D5 Force	B-200
172	Load Cell Barrier Position D6 Force	B-201
173	Load Cell Barrier Position D7 Force	B-202
174	Load Cell Barrier Position D8 Force	B-203
175	Load Cell Barrier Position D9 Force	B-204
--- <sup>1</sup>	Load Cell Barrier Group #1 Force Total	B-205

Table of Data Plots Cont'd.

<u>Curve No.</u>	<u>Data Plot Title</u>	<u>Page</u>
--- <sup>1</sup>	Load Cell Barrier Group #2 Force Total	B-206
--- <sup>1</sup>	Load Cell Barrier Group #3 Force Total	B-207
--- <sup>1</sup>	Load Cell Barrier Group #4 Force Total	B-208
--- <sup>1</sup>	Load Cell Barrier Group #5 Force Total	B-209
--- <sup>1</sup>	Load Cell Barrier Group #6 Force Total	B-210
--- <sup>1</sup>	Total Load Cell Barrier Force	B-211

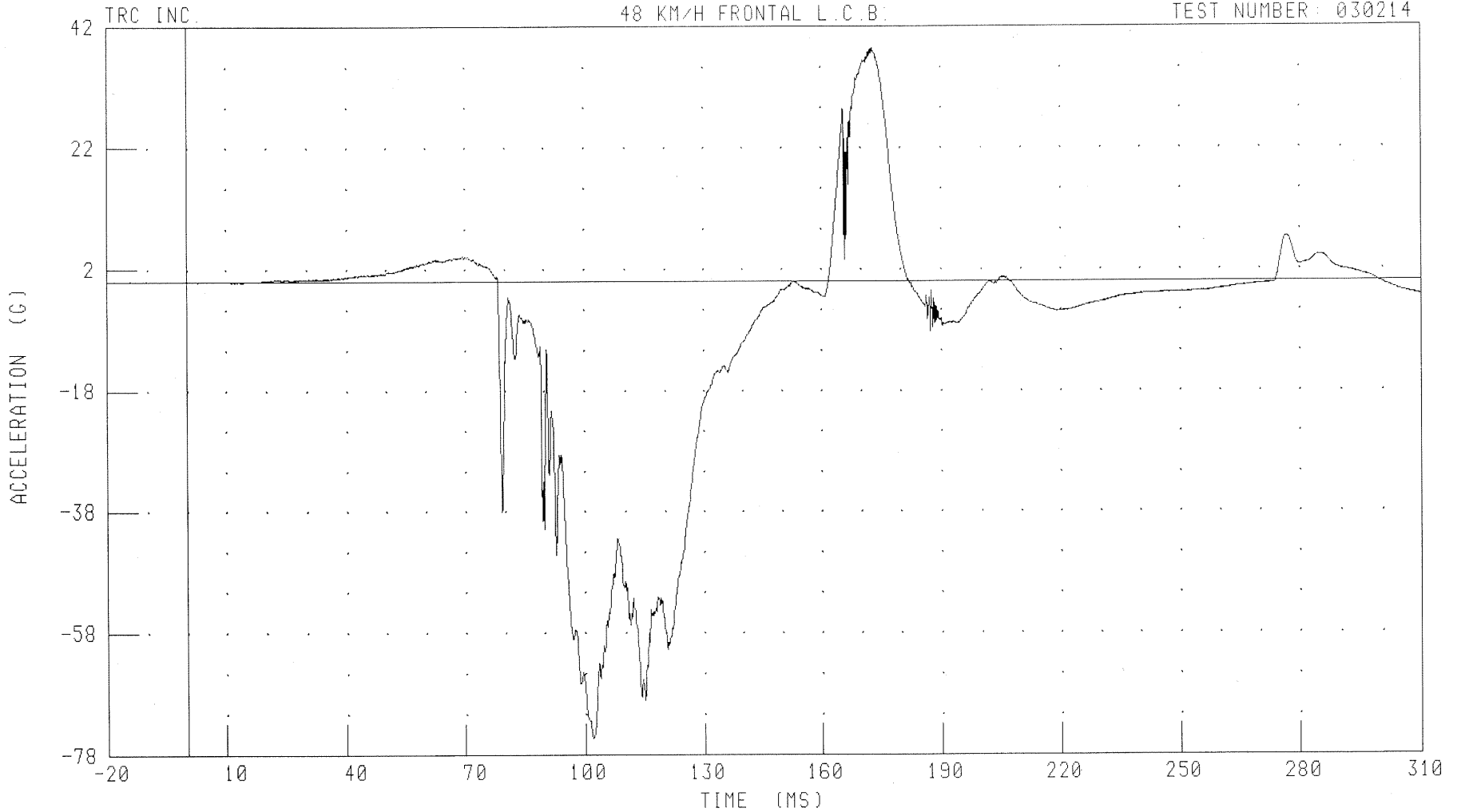
<sup>1</sup> Curve is not included in NHTSA database.

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER HEAD X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDXC1 FILTER: CH. CLASS 1000

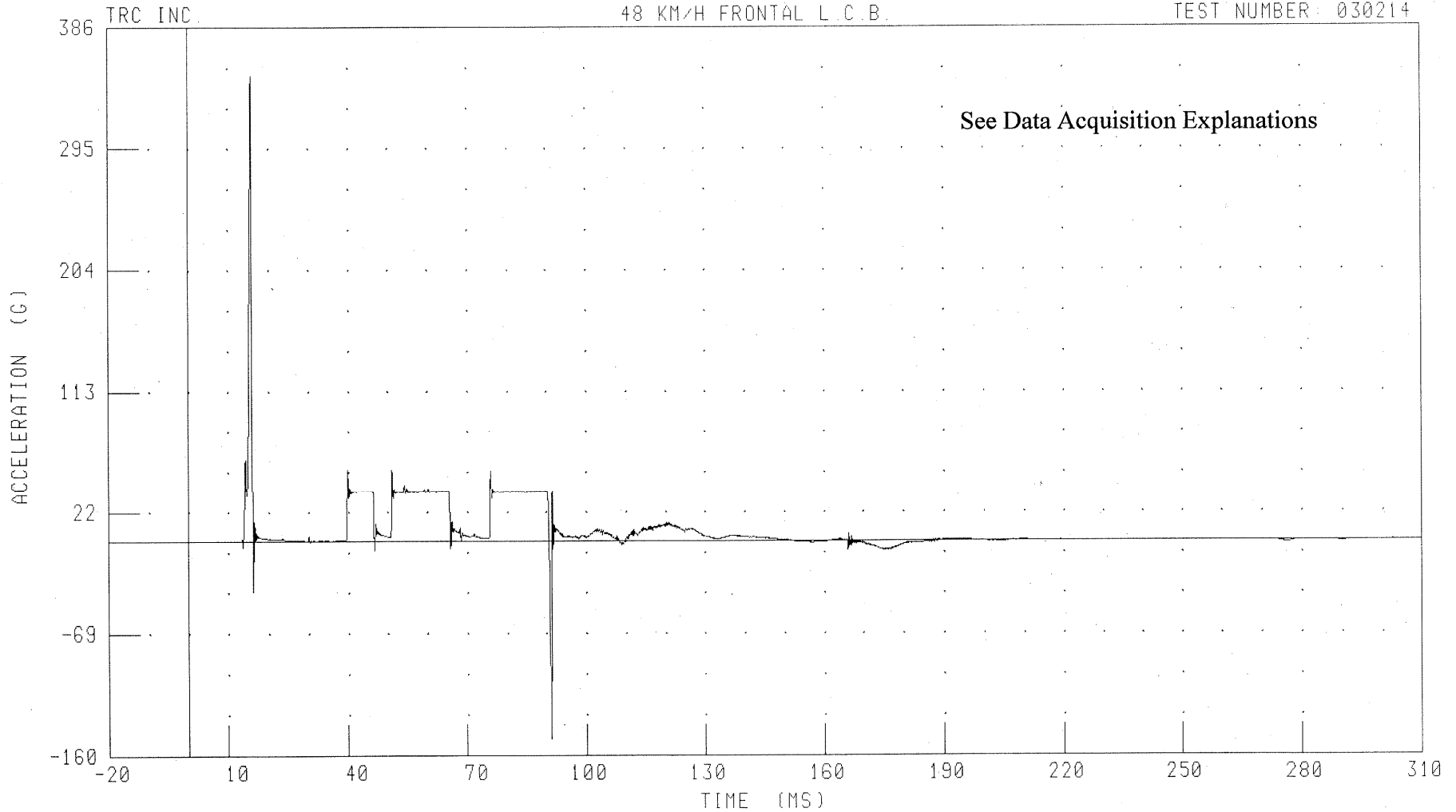
PEAK DATA: 38.43 G @ 173.20 MS; -75.33 G @ 101.92 MS

B-9

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Y-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-10

030214

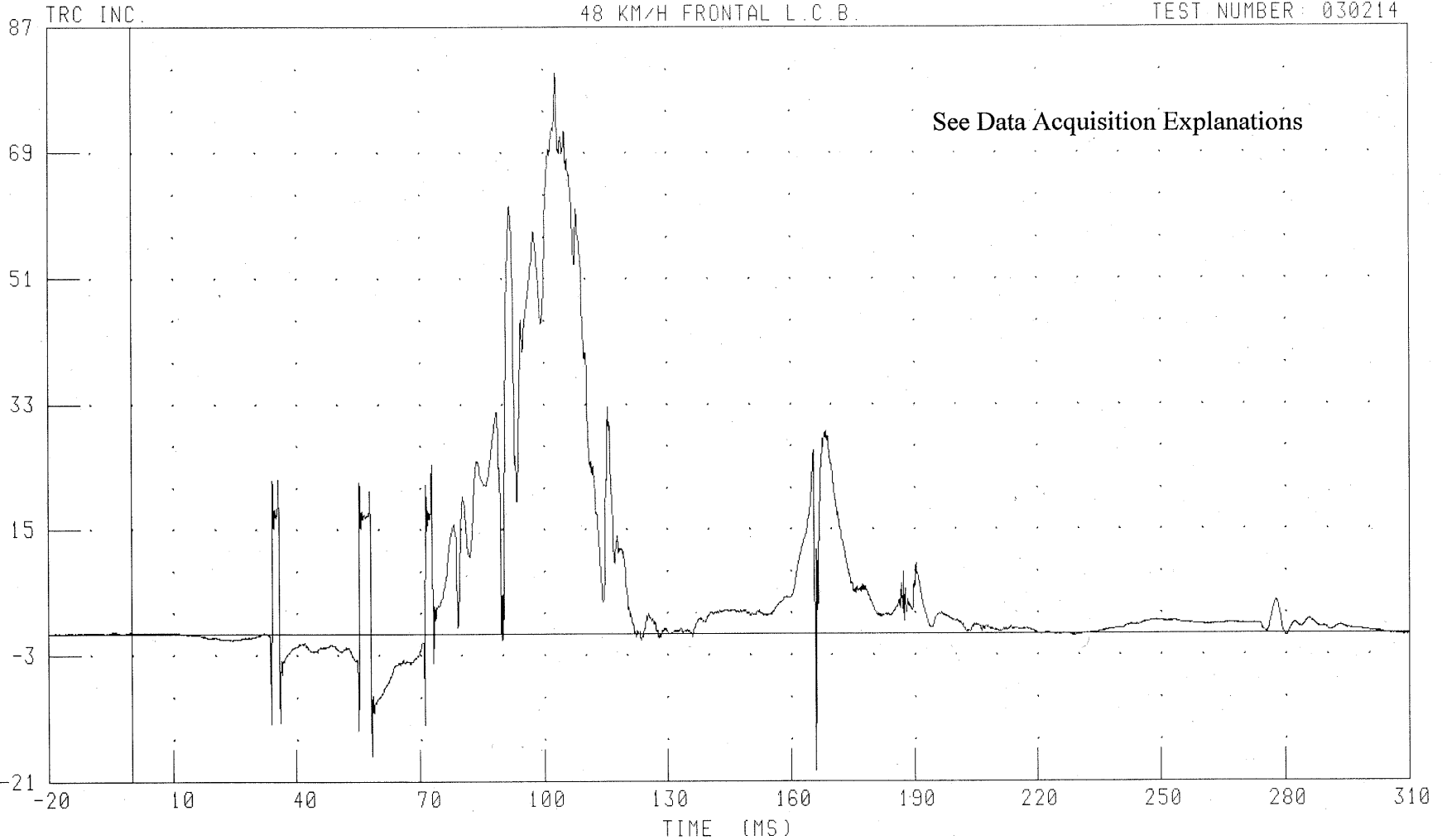
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 349.74 G @ 15.92 MS; -148.09 G @ 91.20 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

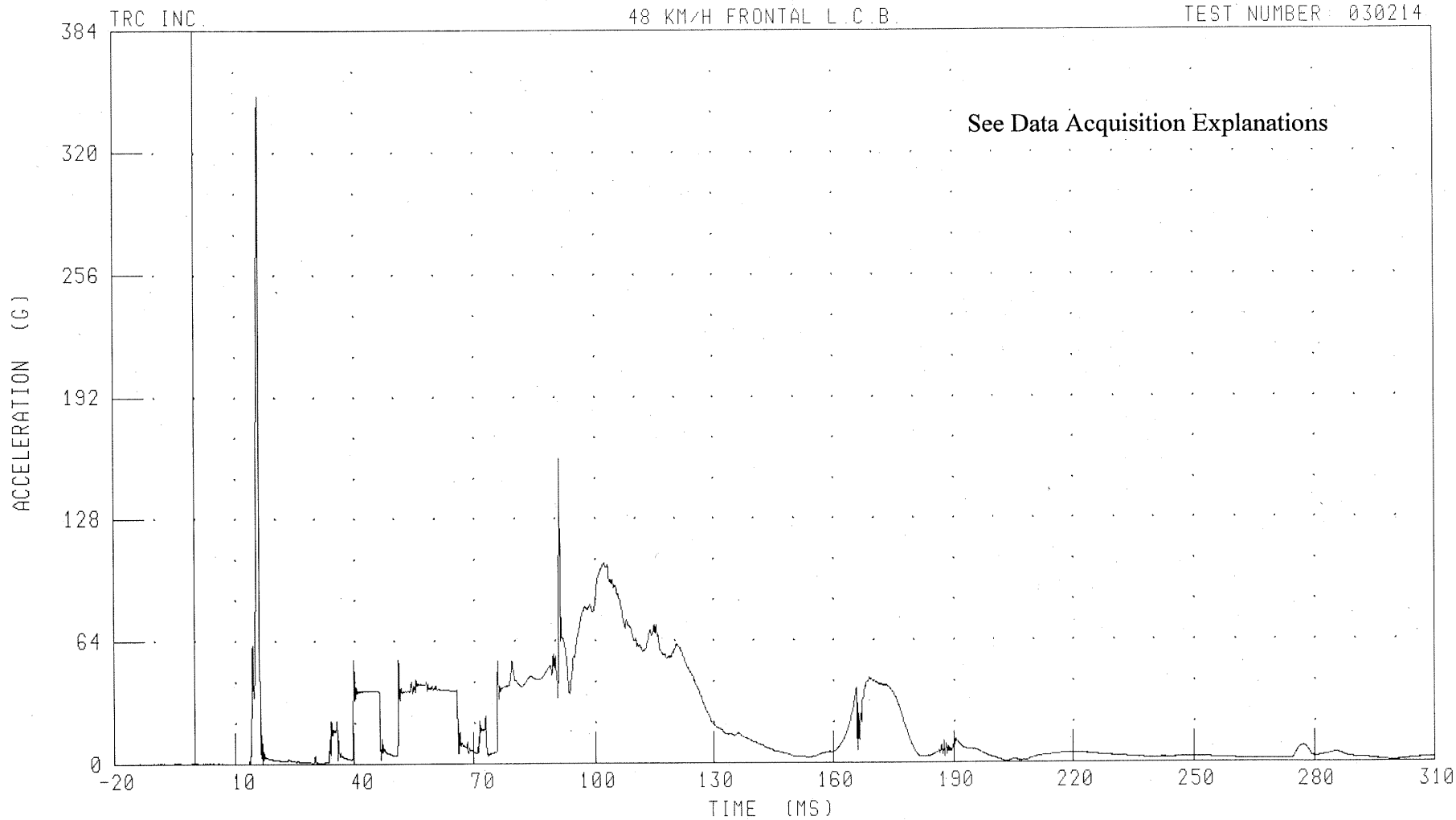
PEAK DATA: 80.42 G @ 103.28 MS; -19.45 G @ 166.16 MS

B-11

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD RESULTANT ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-12

030214

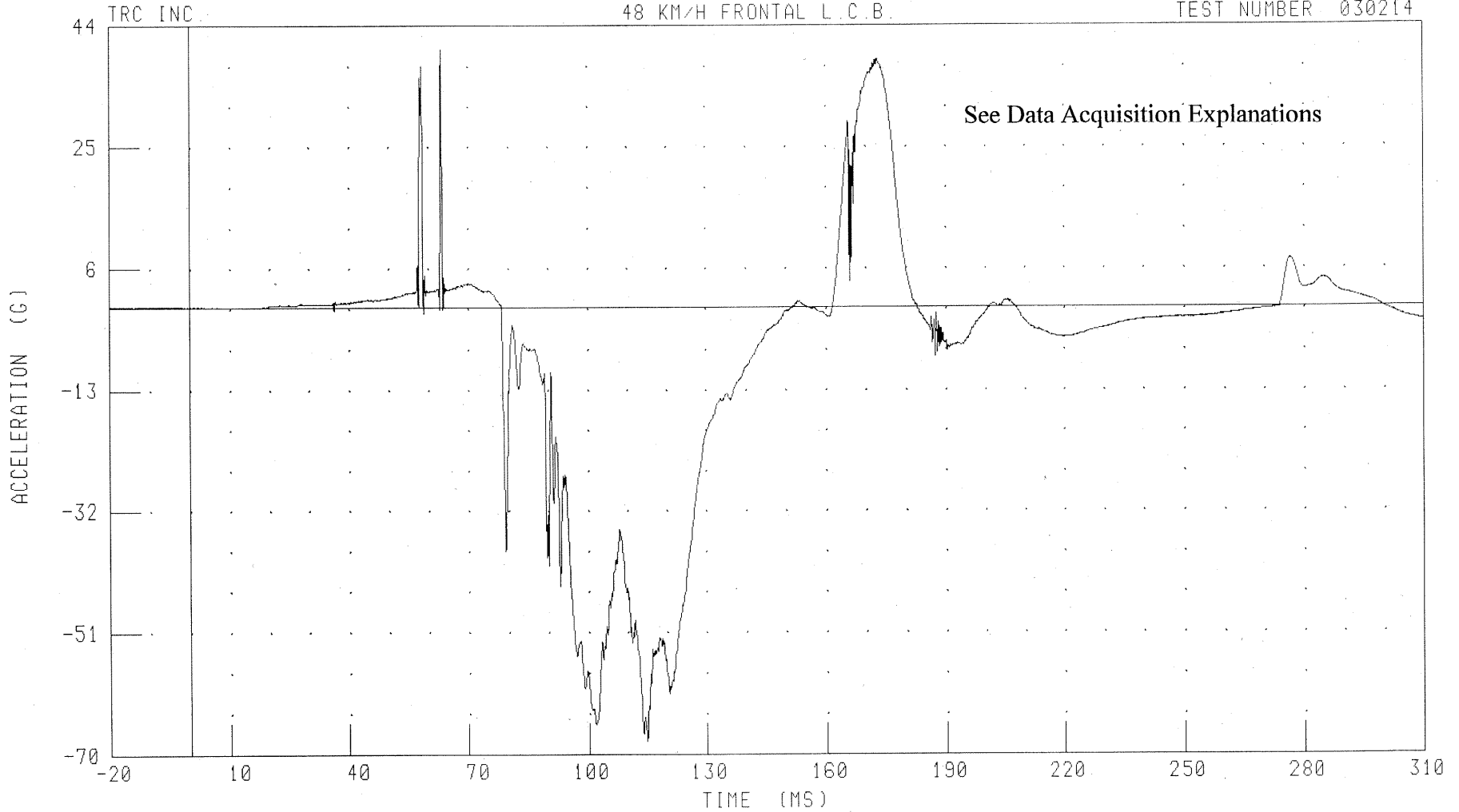
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

PEAK DATA: 349.74 G @ 15.92 MS; 0.07 G @ 12.56 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD X-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER 030214



CHANNEL: HEDXR1 FILTER: CH. CLASS 1000

PEAK DATA: 40.30 G @ 63.44 MS; -67.96 G @ 114.80 MS

B-13

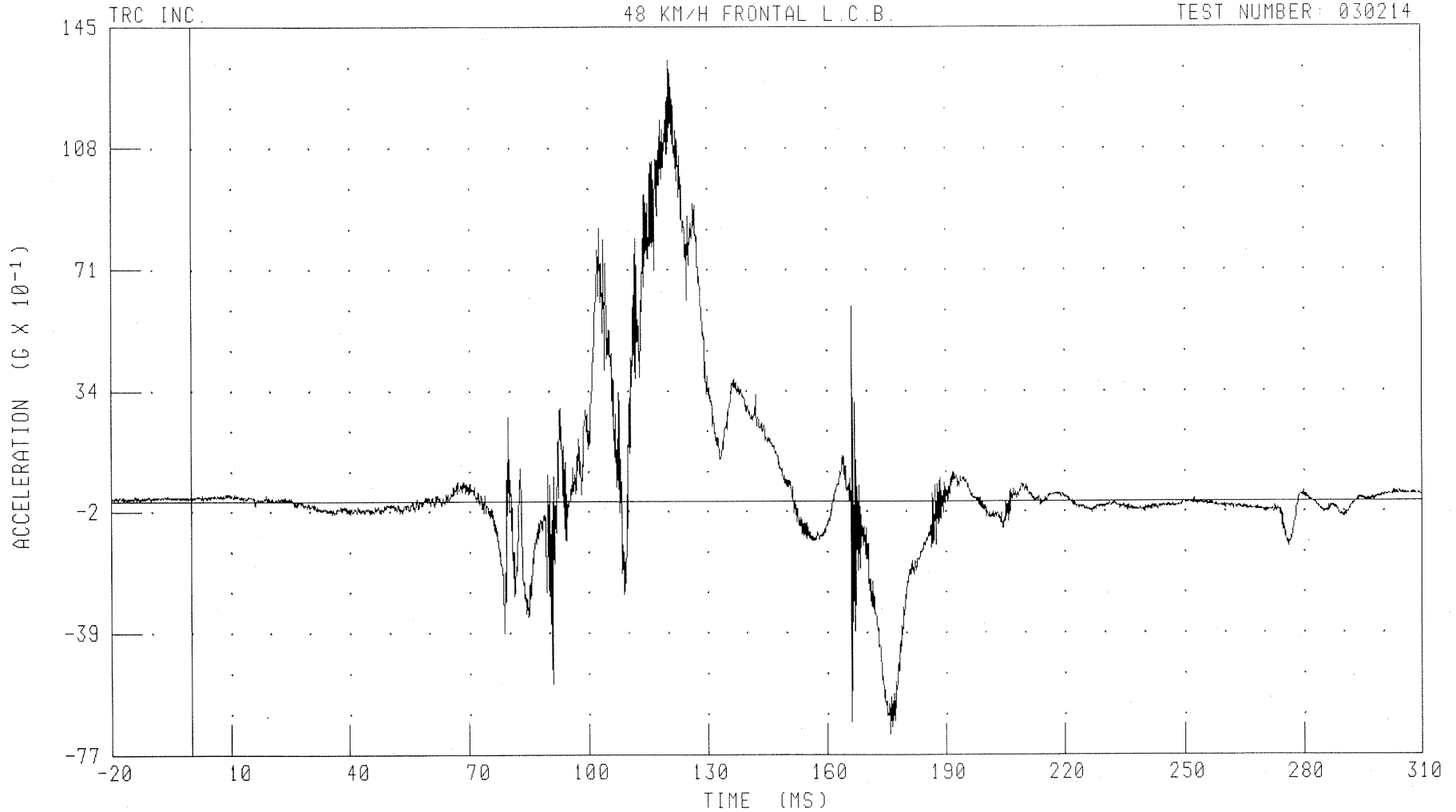
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER HEAD Y-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDYR1 FILTER: CH. CLASS 1000

PEAK DATA: 13.50 G @ 120.48 MS; -7.08 G @ 175.84 MS

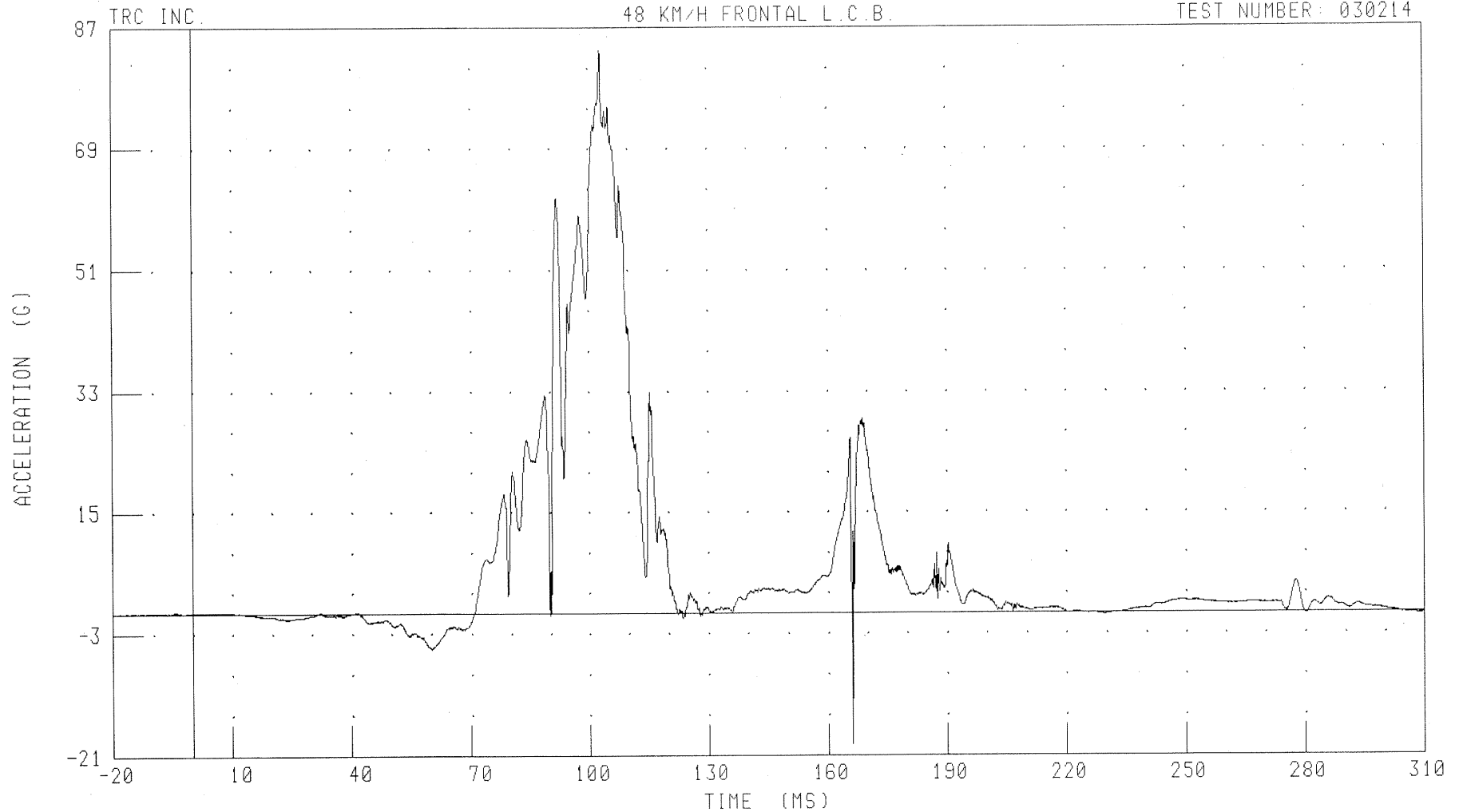
B-14

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Z-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDZR1 FILTER: CH. CLASS 1000

PEAK DATA: 83.72 G @ 103.28 MS; -19.35 G @ 166.16 MS

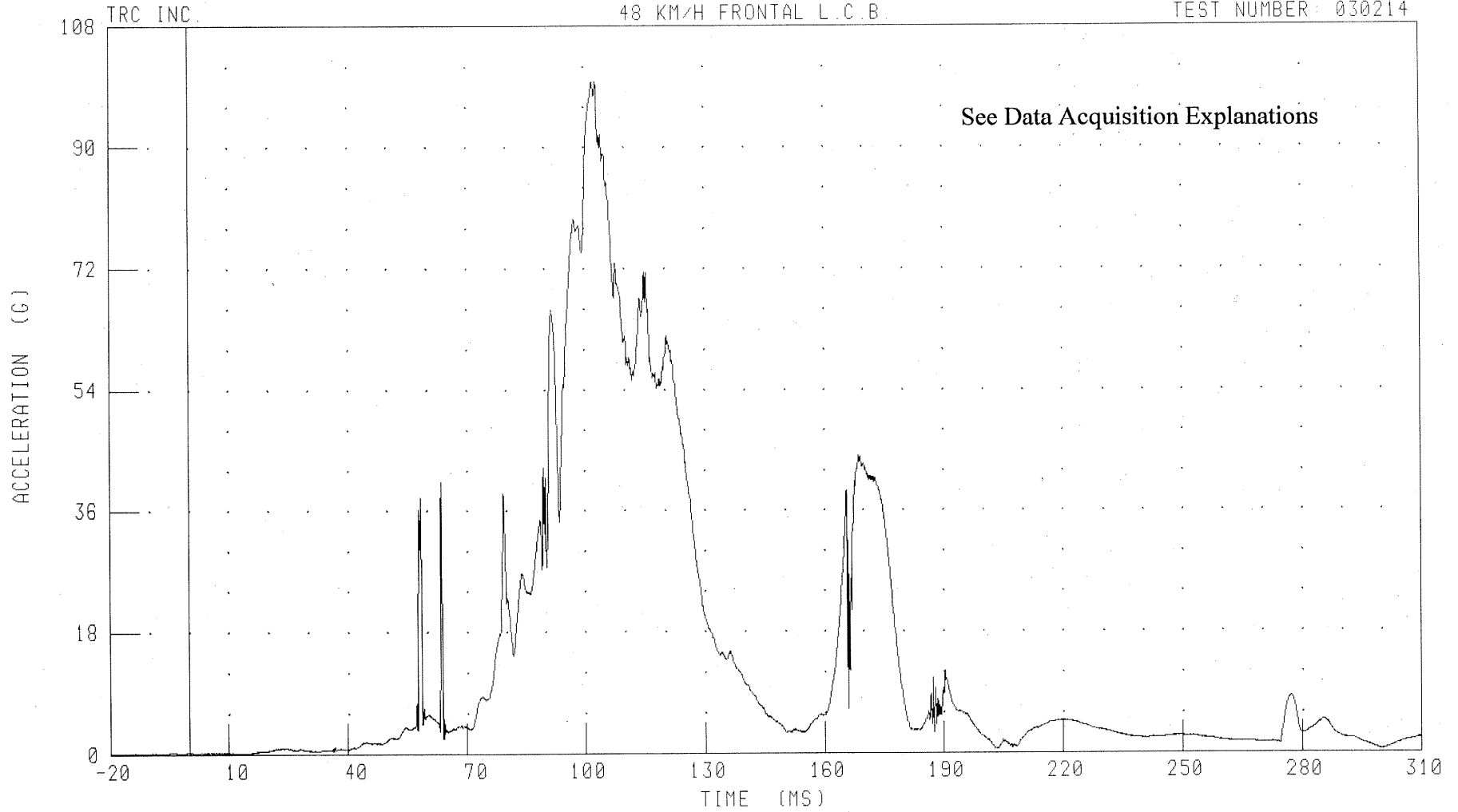
B-15

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD RESULTANT ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



See Data Acquisition Explanations

CHANNEL: HEDRR1 FILTER: CH. CLASS 1000

PEAK DATA: 99.85 G @ 103.28 MS; 0.06 G @ 13.20 MS

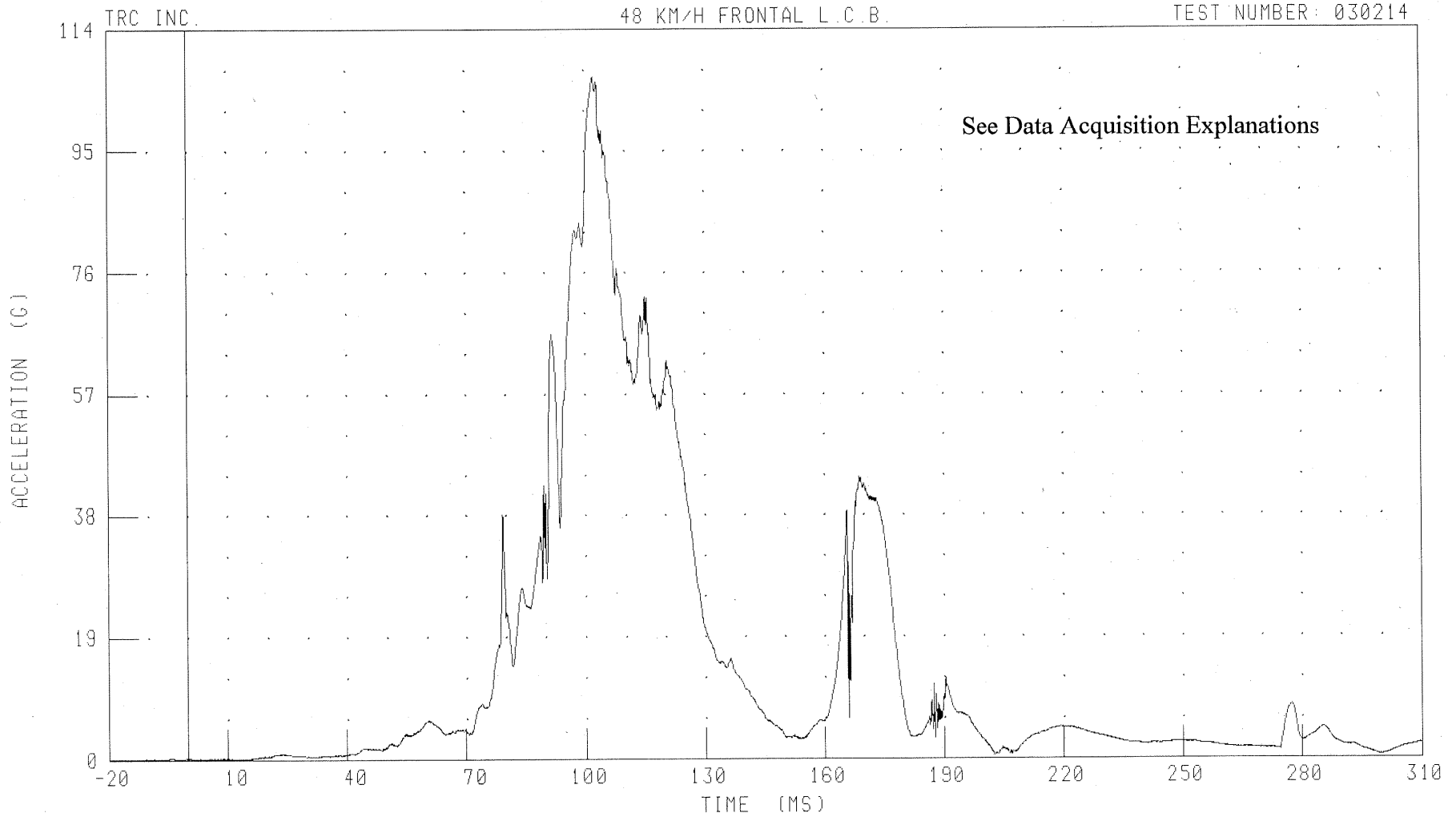
B-16

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD RESULTANT ACCELERATION USING PRIMARY X-AXIS AND REDUNDANT Y- AND Z-AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



See Data Acquisition Explanations

CHANNEL: HEDRK1 FILTER: CH. CLASS 1000

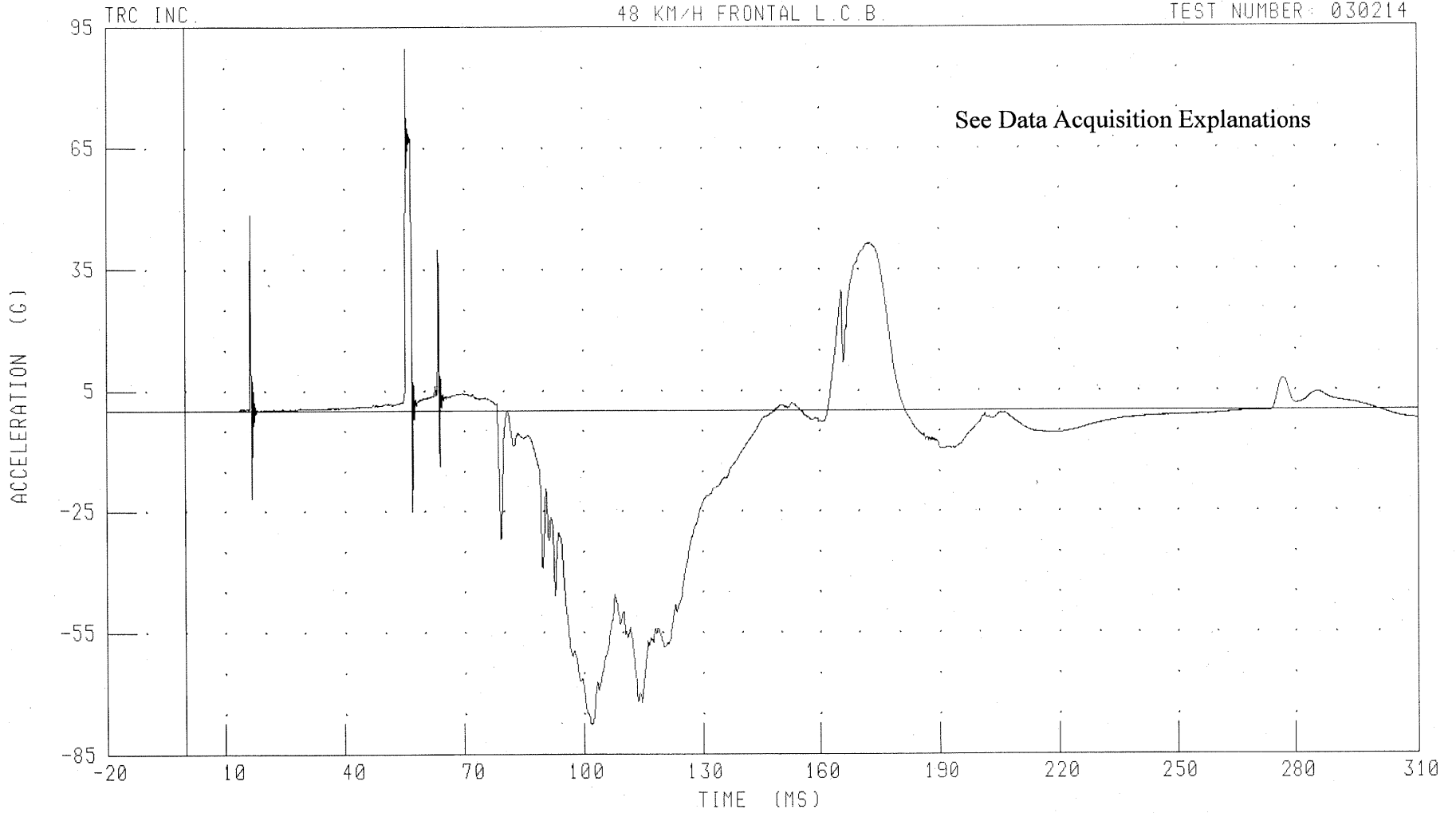
PEAK DATA: 106.63 G @ 102.32 MS; 40.07 G @ 167.20 MS

B-17

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD X-AXIS (LT) ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD1XG1 FILTER: CH. CLASS 1000

PEAK DATA: 89.85 G @ 55.44 MS; -77.63 G @ 102.24 MS

B-18

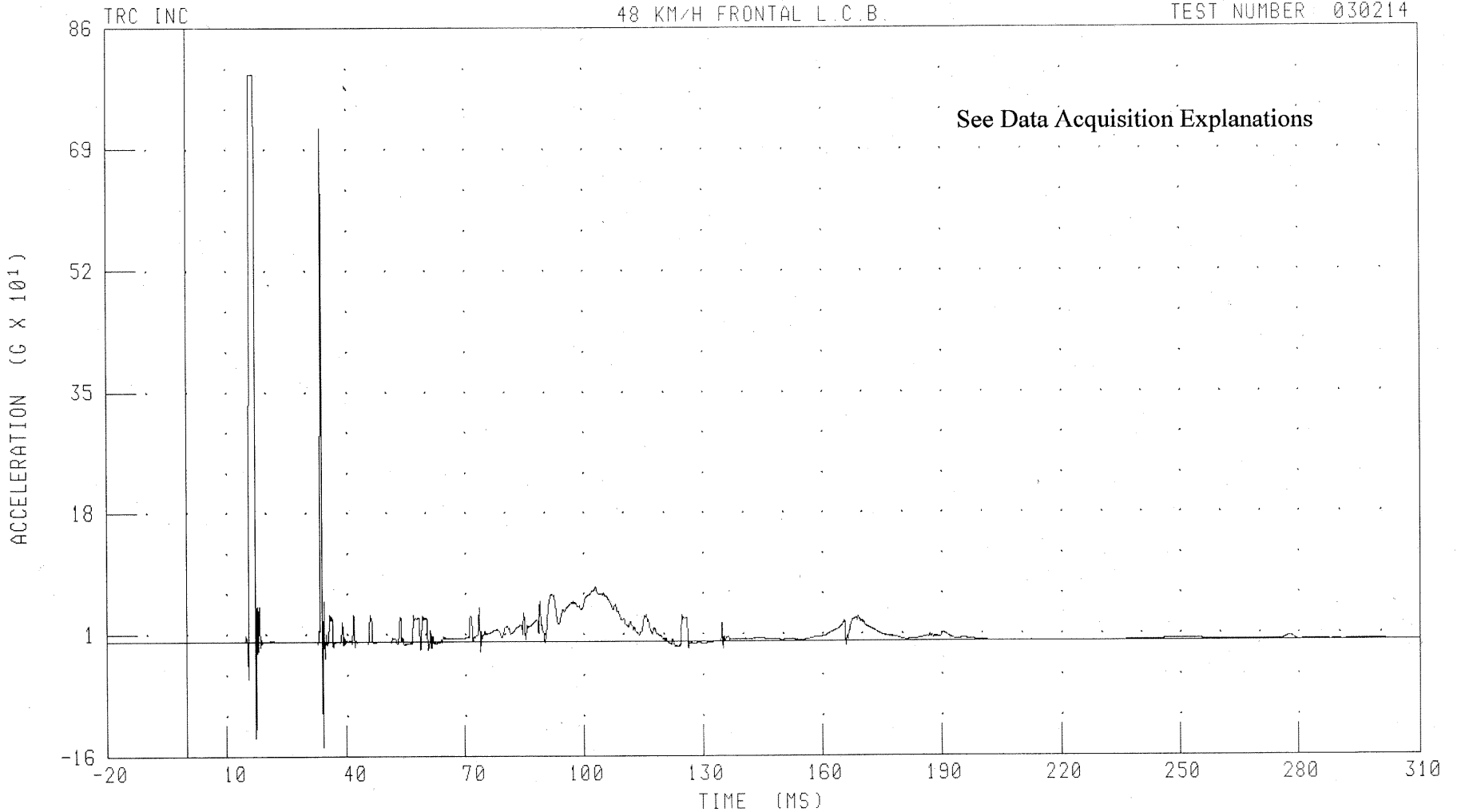
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER HEAD Z-AXIS (LT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER 030214



CHANNEL: HD1ZG1

FILTER: CH. CLASS 1000

PEAK DATA: 795.11 G @ 16.00 MS; -147.56 G @ 34.24 MS

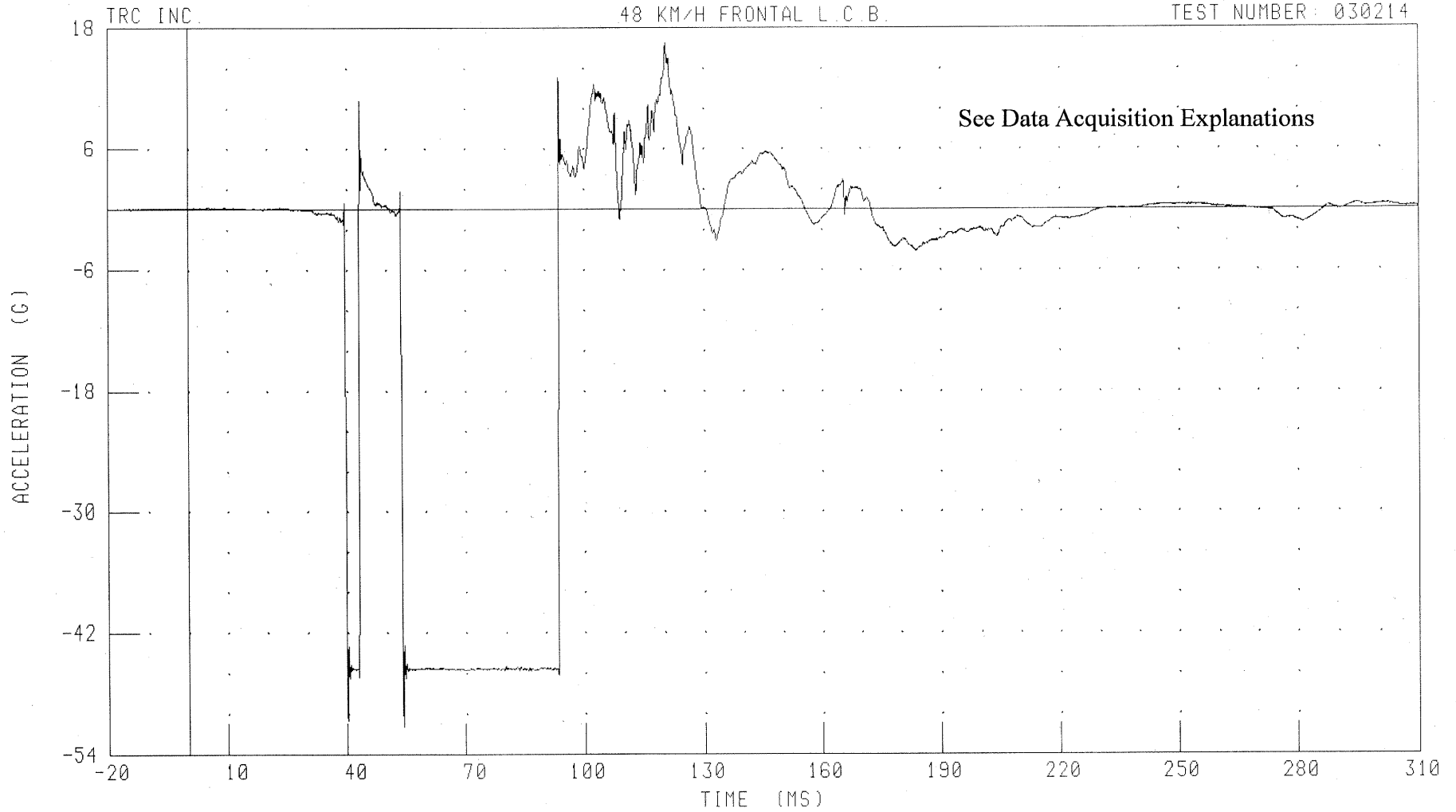
B-19

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Y-AXIS (FT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD2YG1

FILTER: CH. CLASS 1000

PEAK DATA: 16.47 G @ 120.56 MS; -51.22 G @ 54.32 MS

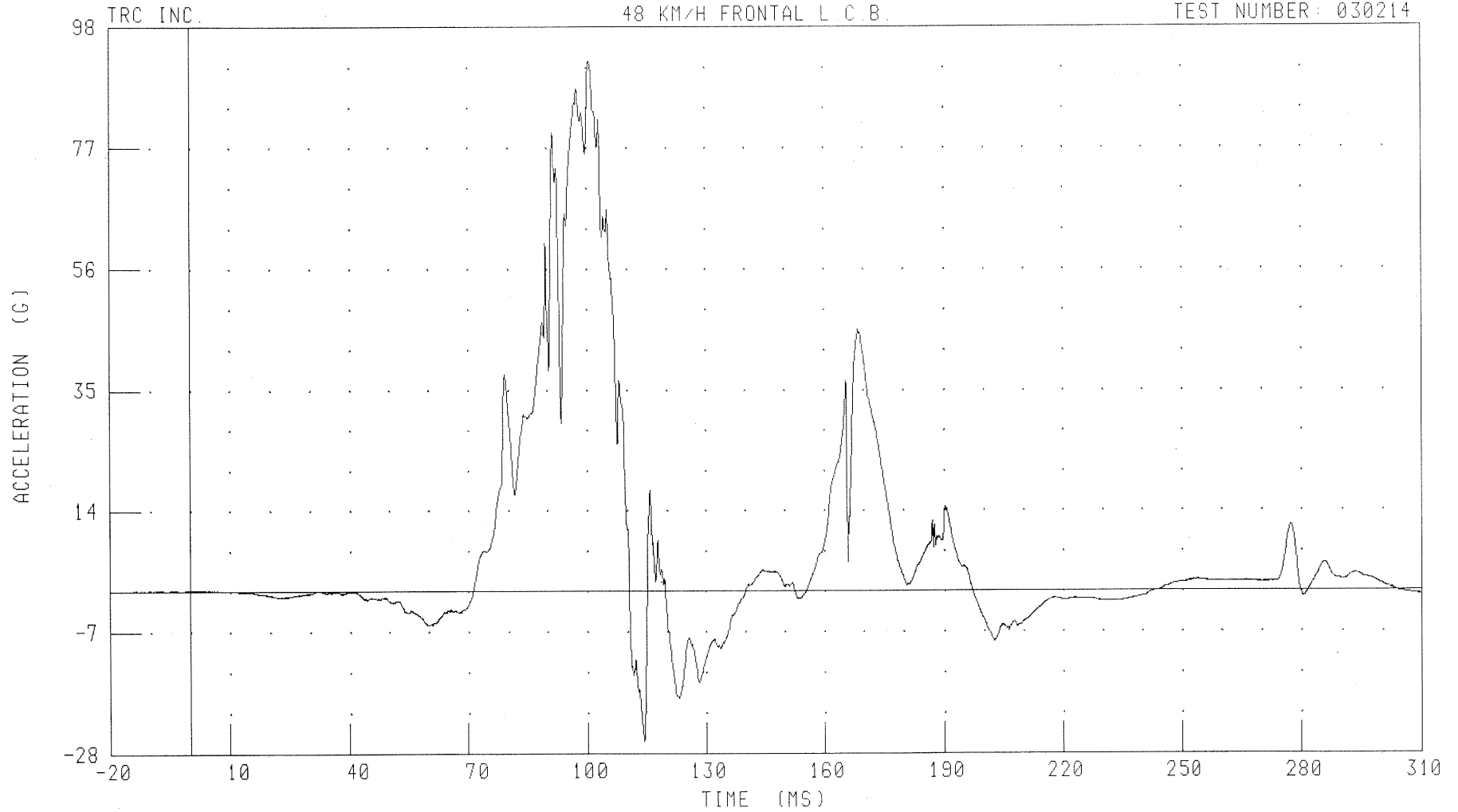
B-20

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Z-AXIS (FT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD2ZG1 FILTER: CH. CLASS 1000

PEAK DATA: 92.17 G @ 100.80 MS; -25.94 G @ 114.16 MS

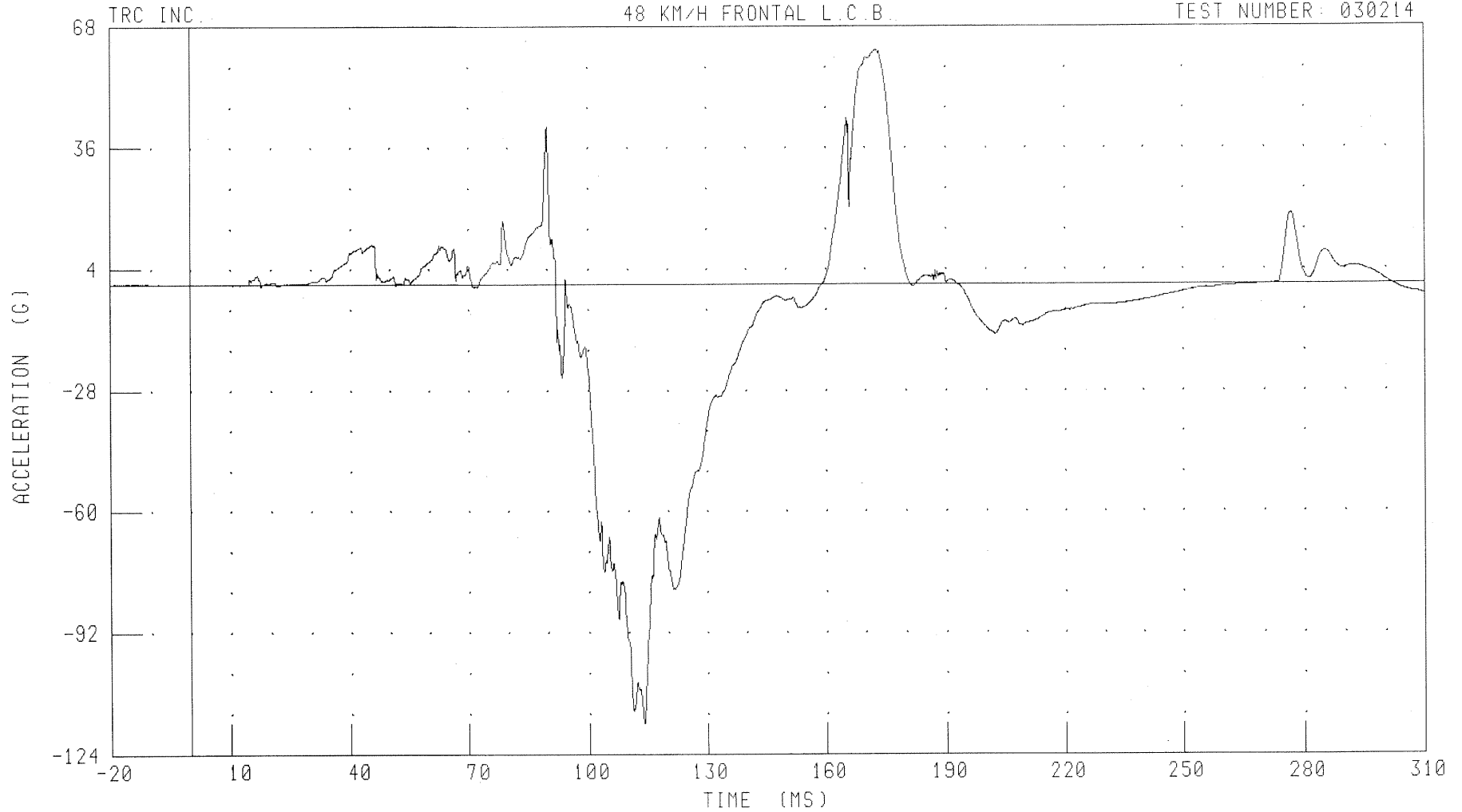
B-21

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD X-AXIS (TP) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD3XG1 FILTER: CH. CLASS 1000

PEAK DATA: 61.92 G @ 173.04 MS, -115.98 G @ 113.92 MS

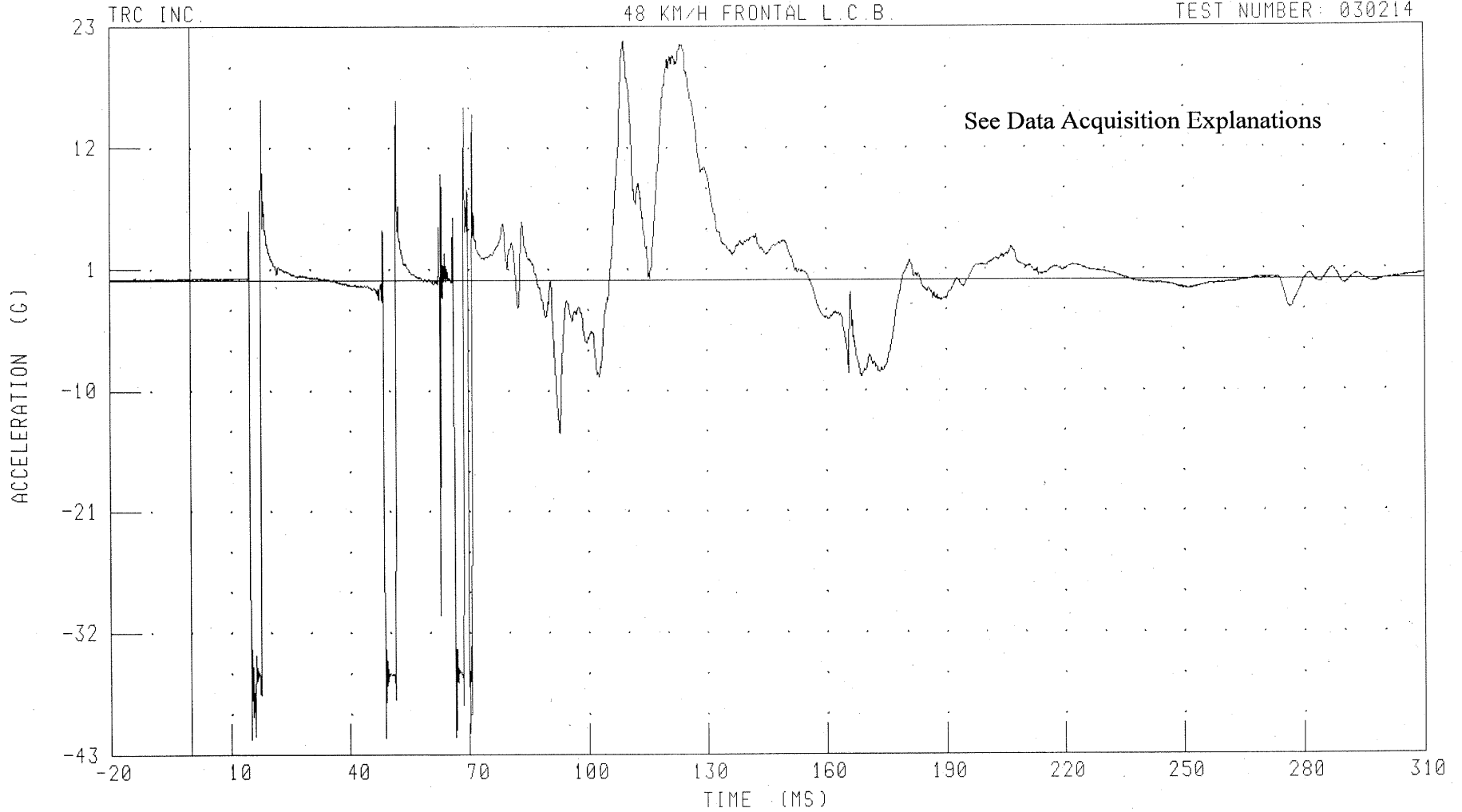
B-22

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER HEAD Y-AXIS (TP) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD3YG1 FILTER: CH. CLASS 1000

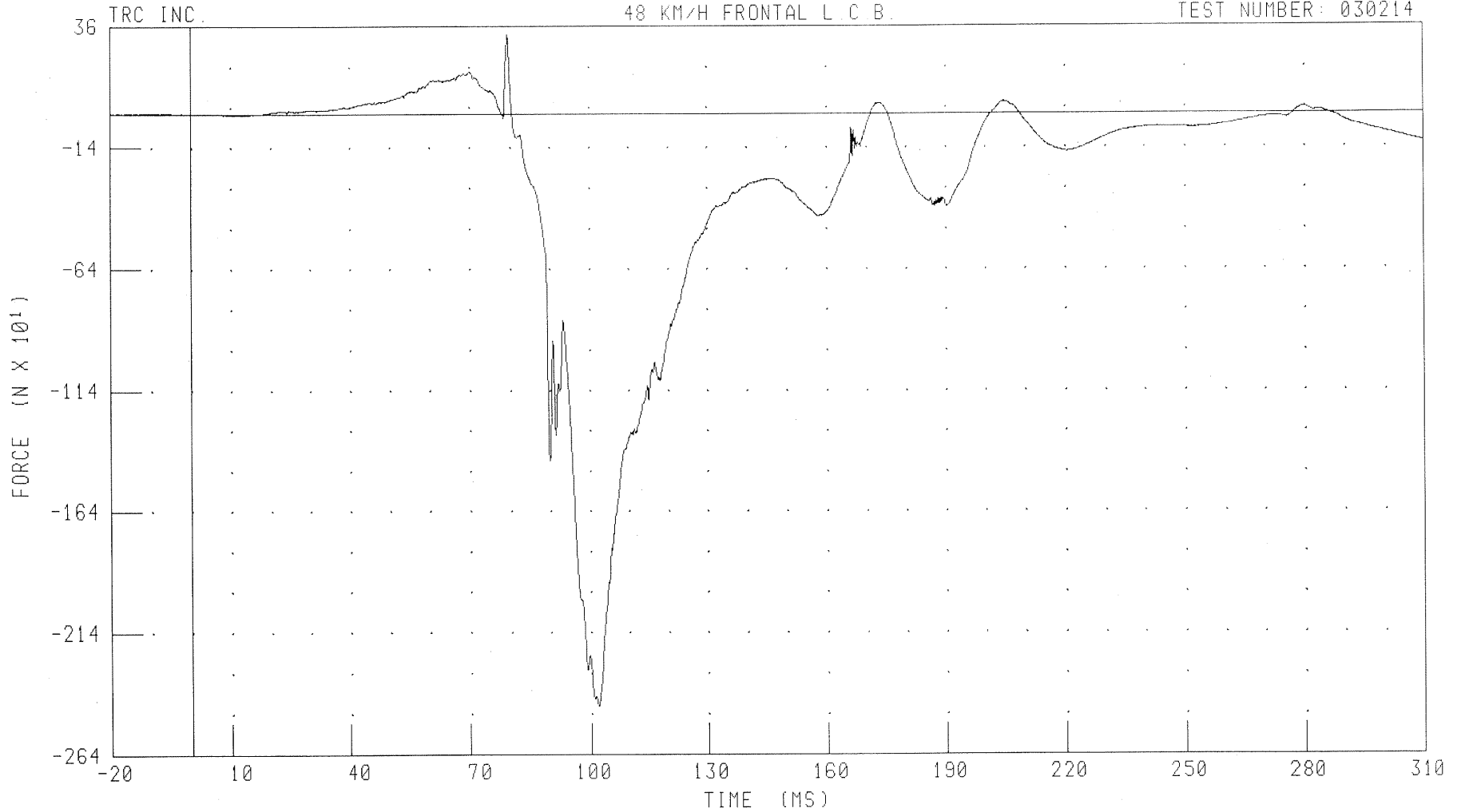
PEAK DATA: 21.68 G @ 109.12 MS; -41.61 G @ 15.04 MS

B-23

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK X-AXIS SHEAR FORCE  
48 KM/H FRONTAL L C B.

TEST NUMBER: 030214



CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

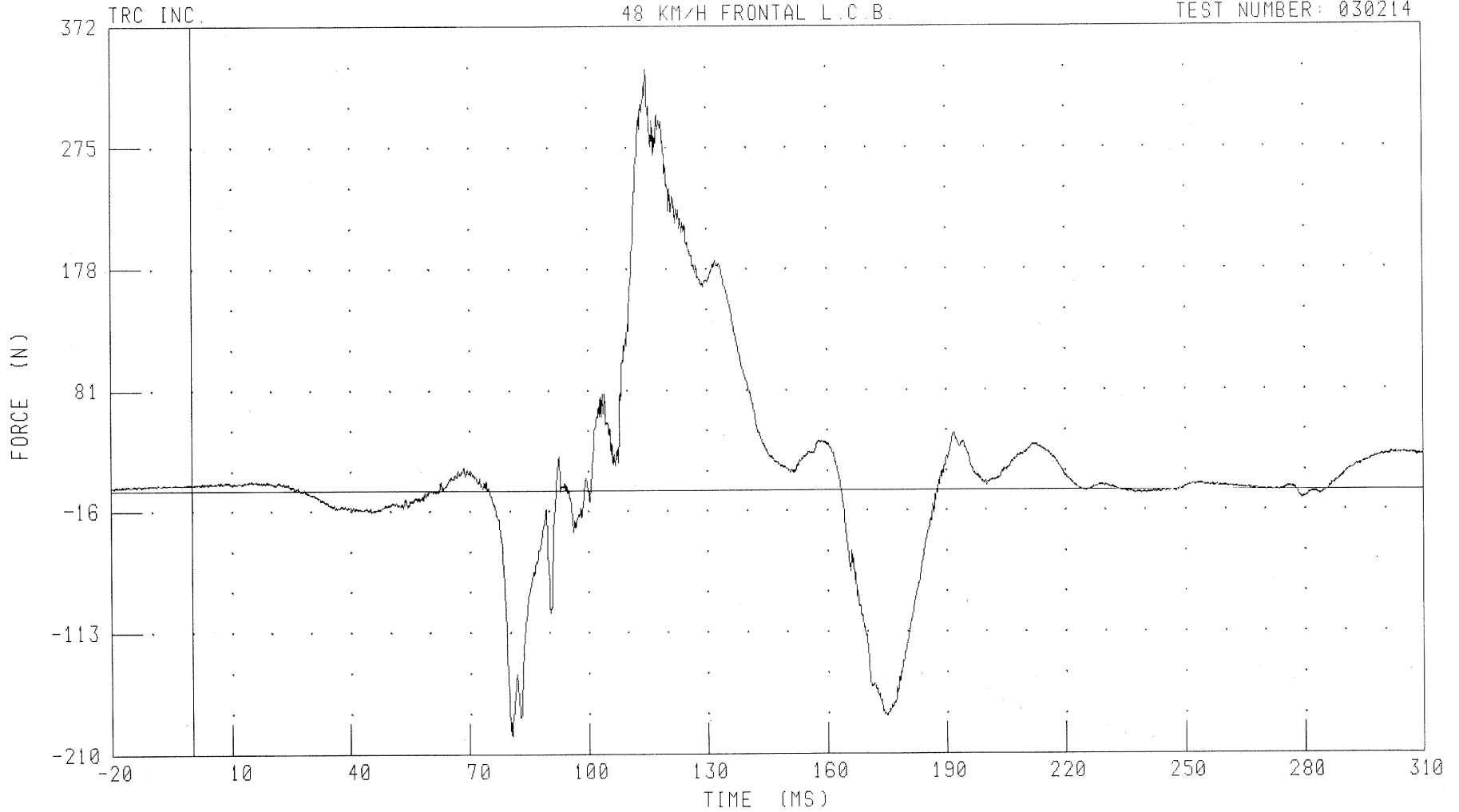
PEAK DATA: 328.07 N @ 79.52 MS; -2441.14 N @ 102.00 MS

B-24

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK Y-AXIS SHEAR FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

PEAK DATA: 338.11 N @ 115.12 MS; -195.41 N @ 80.48 MS

B-25

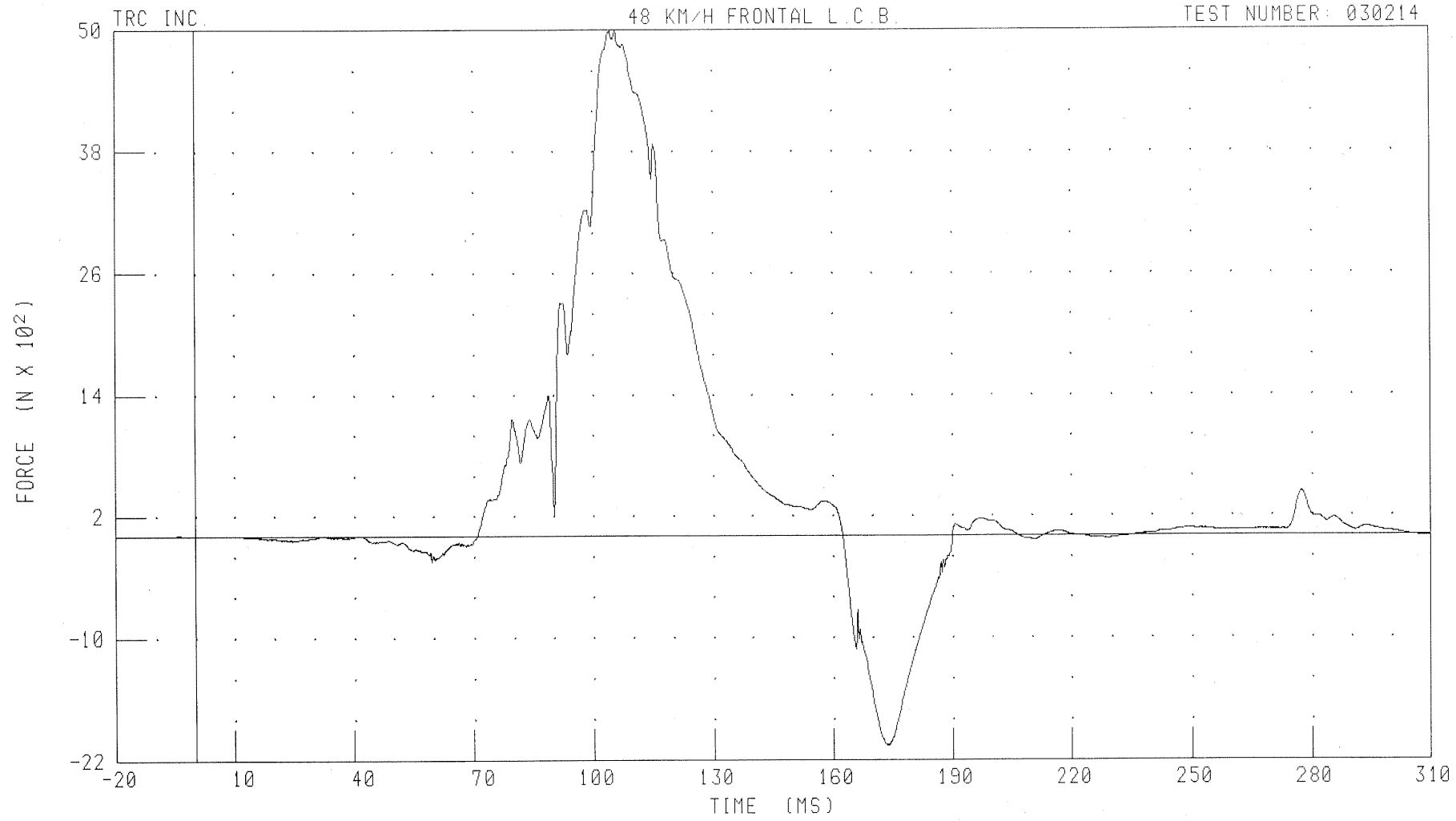
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK Z-AXIS AXIAL FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

PEAK DATA: 4993.68 N @ 104.64 MS; -2055.87 N @ 173.60 MS

B-26

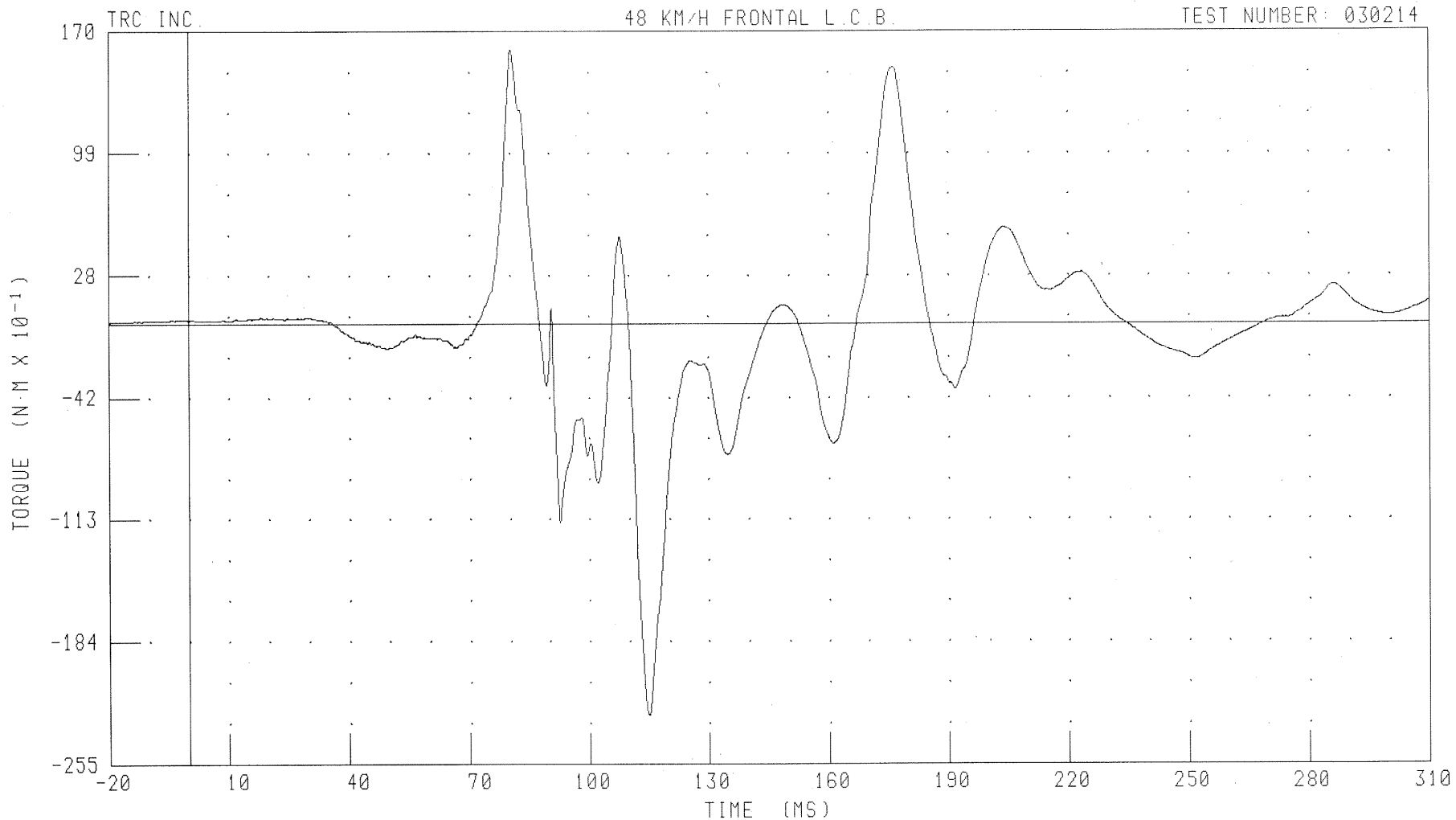
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKXM1 FILTER: CH: CLASS 600

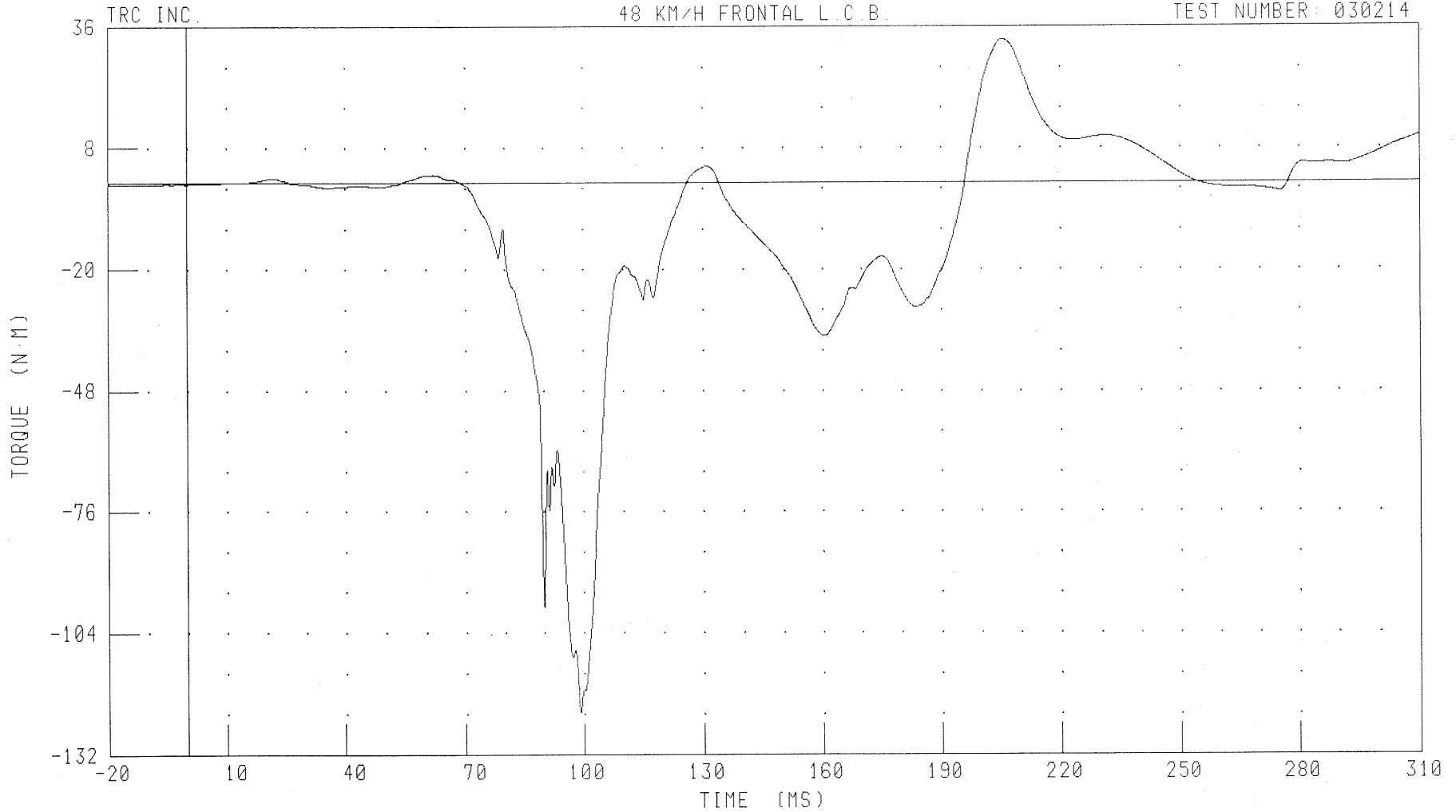
PEAK DATA: 15.96 N·M @ 80.40 MS; -22.79 N·M @ 115.04 MS

B-27

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK MOMENT ABOUT Y AXIS  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKYM1 FILTER: CH. CLASS 600

PEAK DATA: 33.07 N.M @ 205.76 MS, -122.20 N.M @ 99.28 MS

B-28

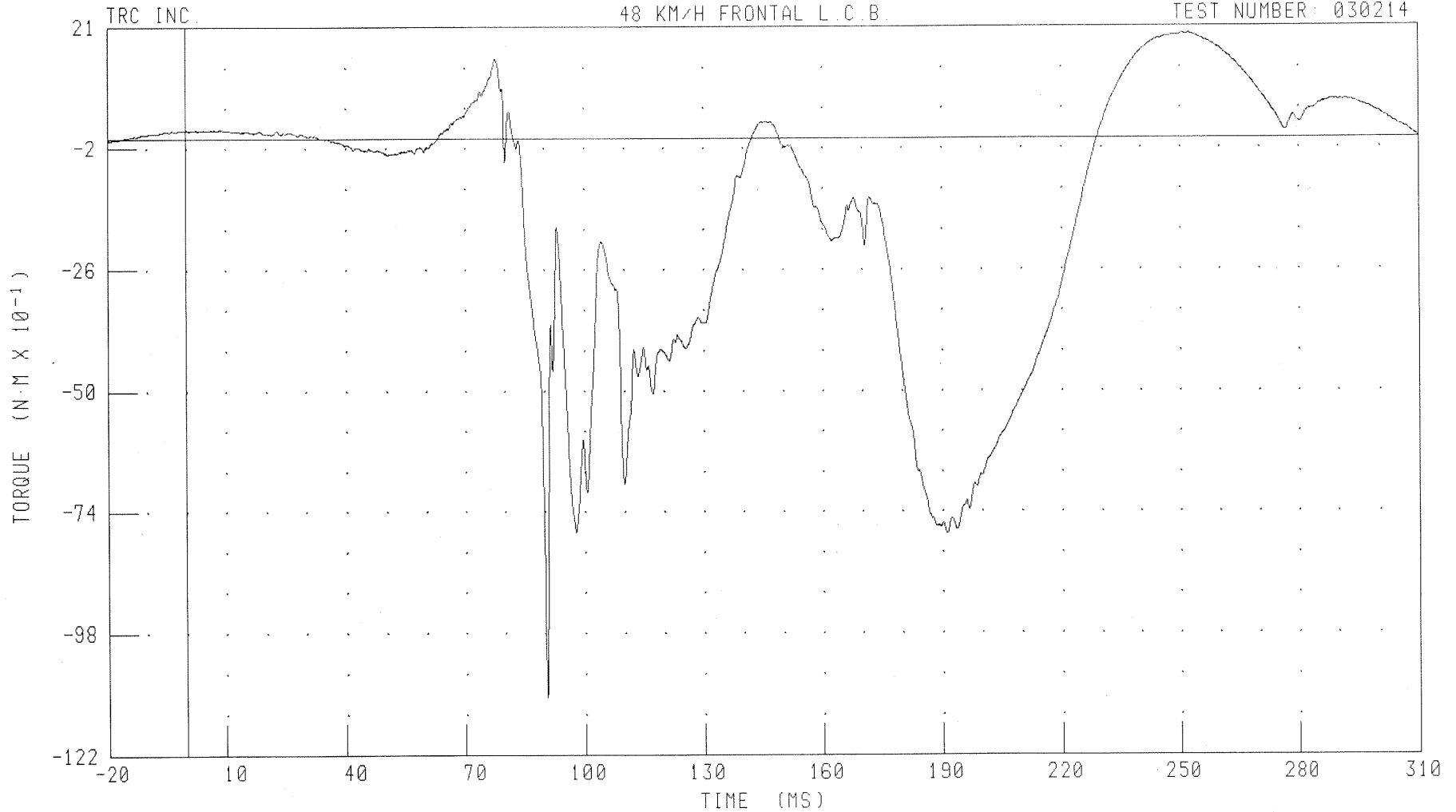
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK MOMENT ABOUT Z AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-29

030214

CHANNEL: NEKZM1

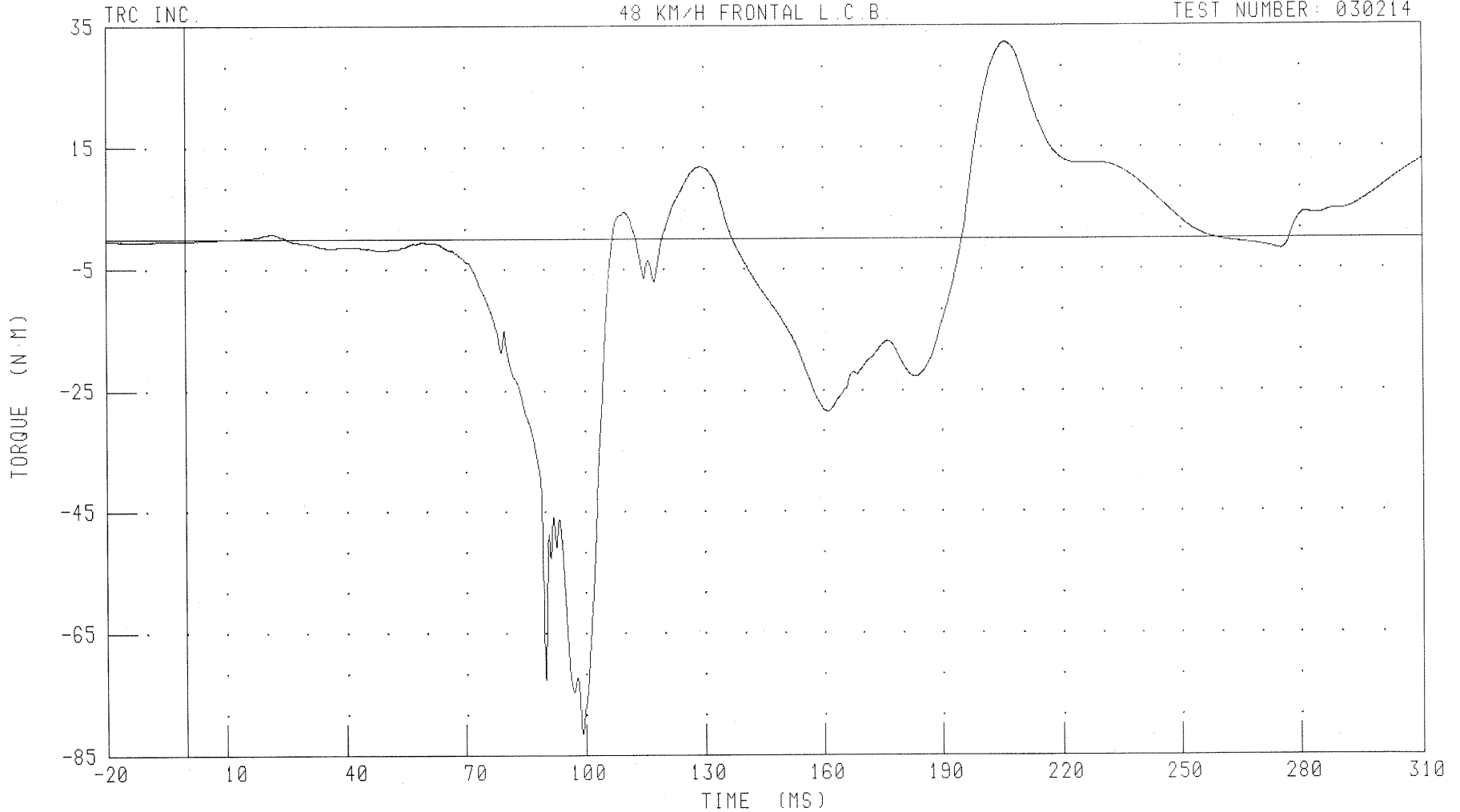
FILTER: CH. CLASS 600

PEAK DATA: 2.07 N·M @ 252.56 MS; -11.07 N·M @ 90.56 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKOM1 FILTER: CH. CLASS 600

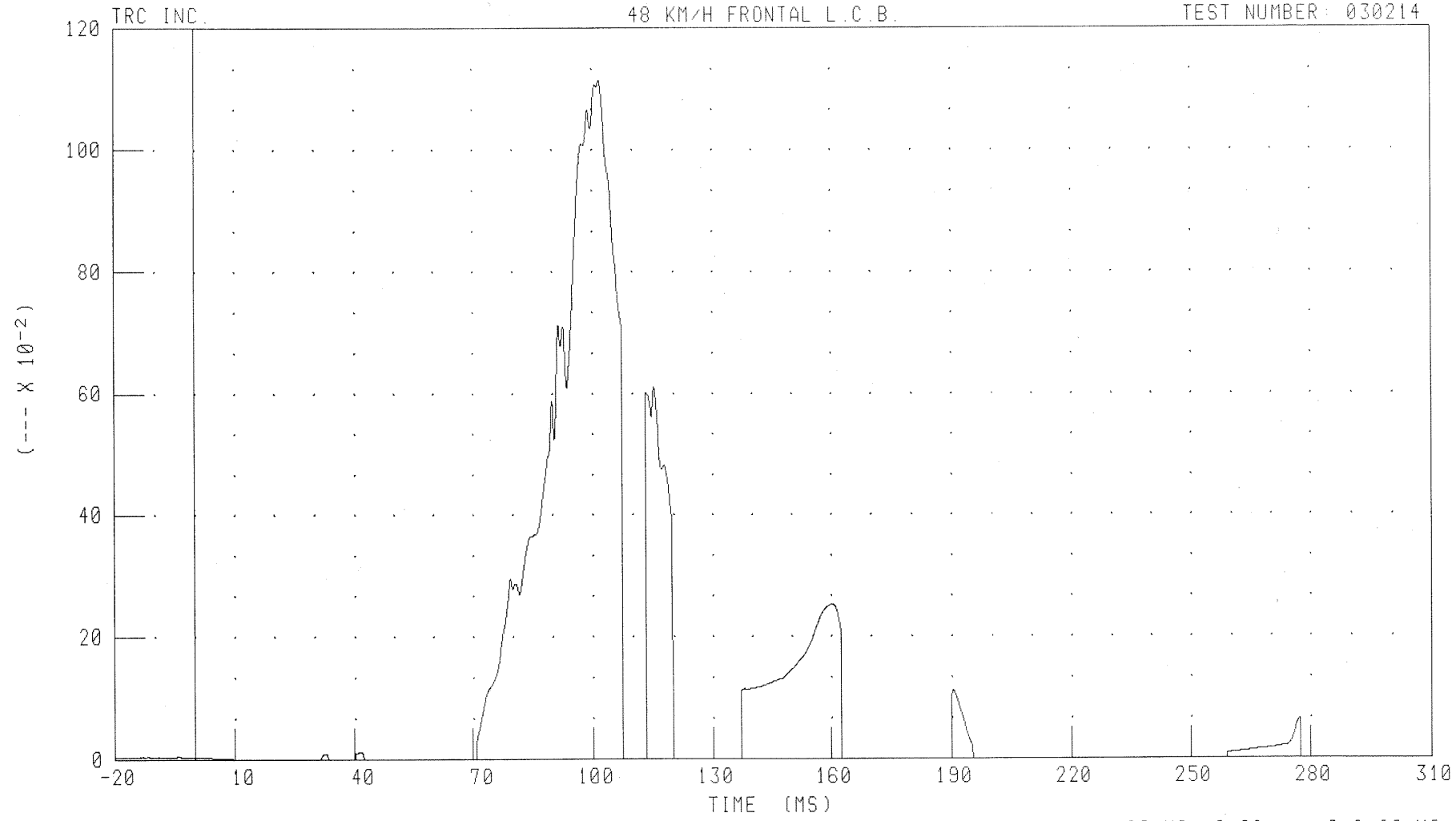
PEAK DATA: 32.27 N·M @ 205.92 MS; -81.50 N·M @ 99.20 MS

B-30

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK TENSION/EXTENSION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-31

030214

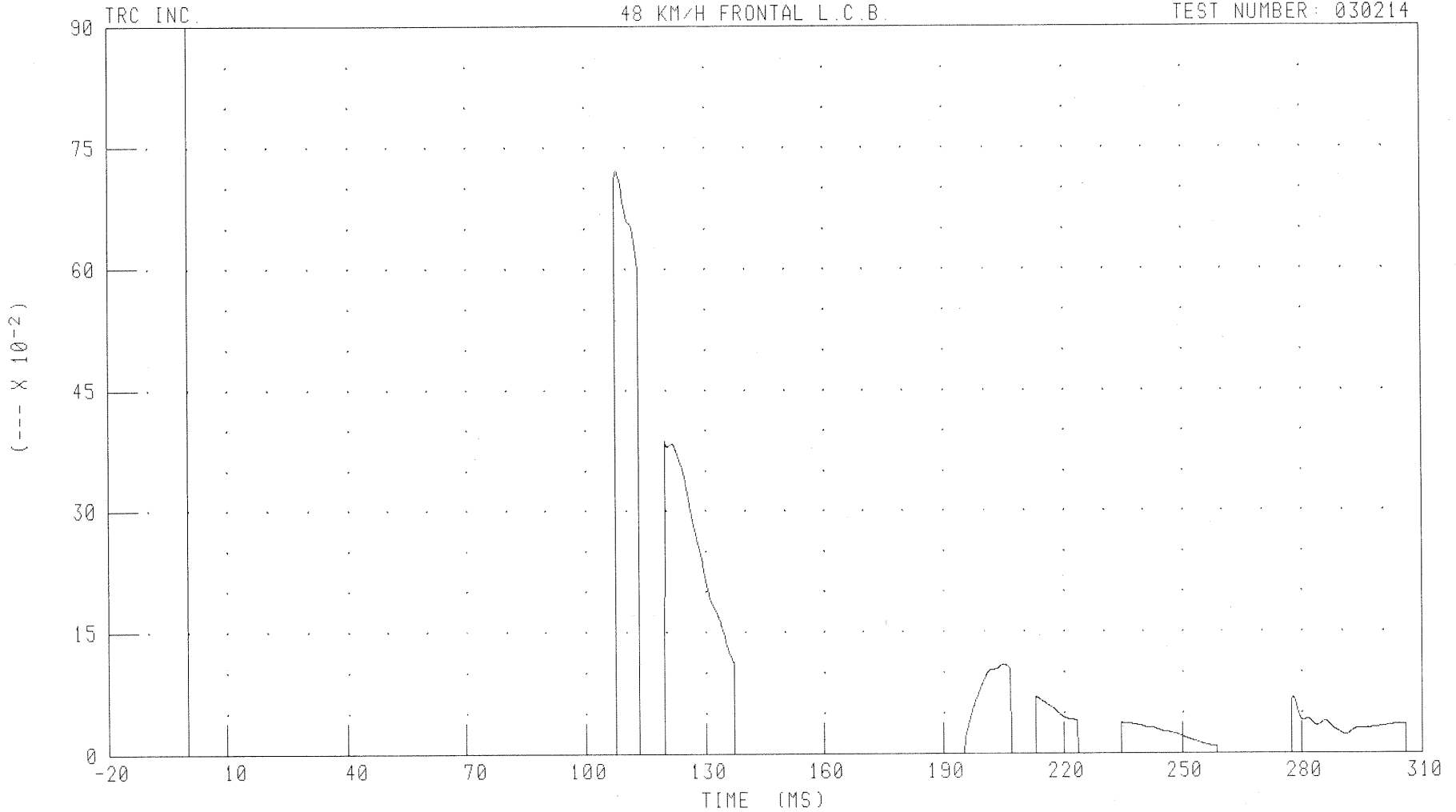
CHANNEL: NTE1

FILTER: CH. CLASS 600

PEAK DATA: 1.11 --- @ 102.00 MS; 0.00 --- @ 9.92 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK TENSION/FLEXION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NTF1

FILTER: CH. CLASS 600

PEAK DATA: 0.72 --- @ 108.00 MS; 0.00 --- @ -20.00 MS

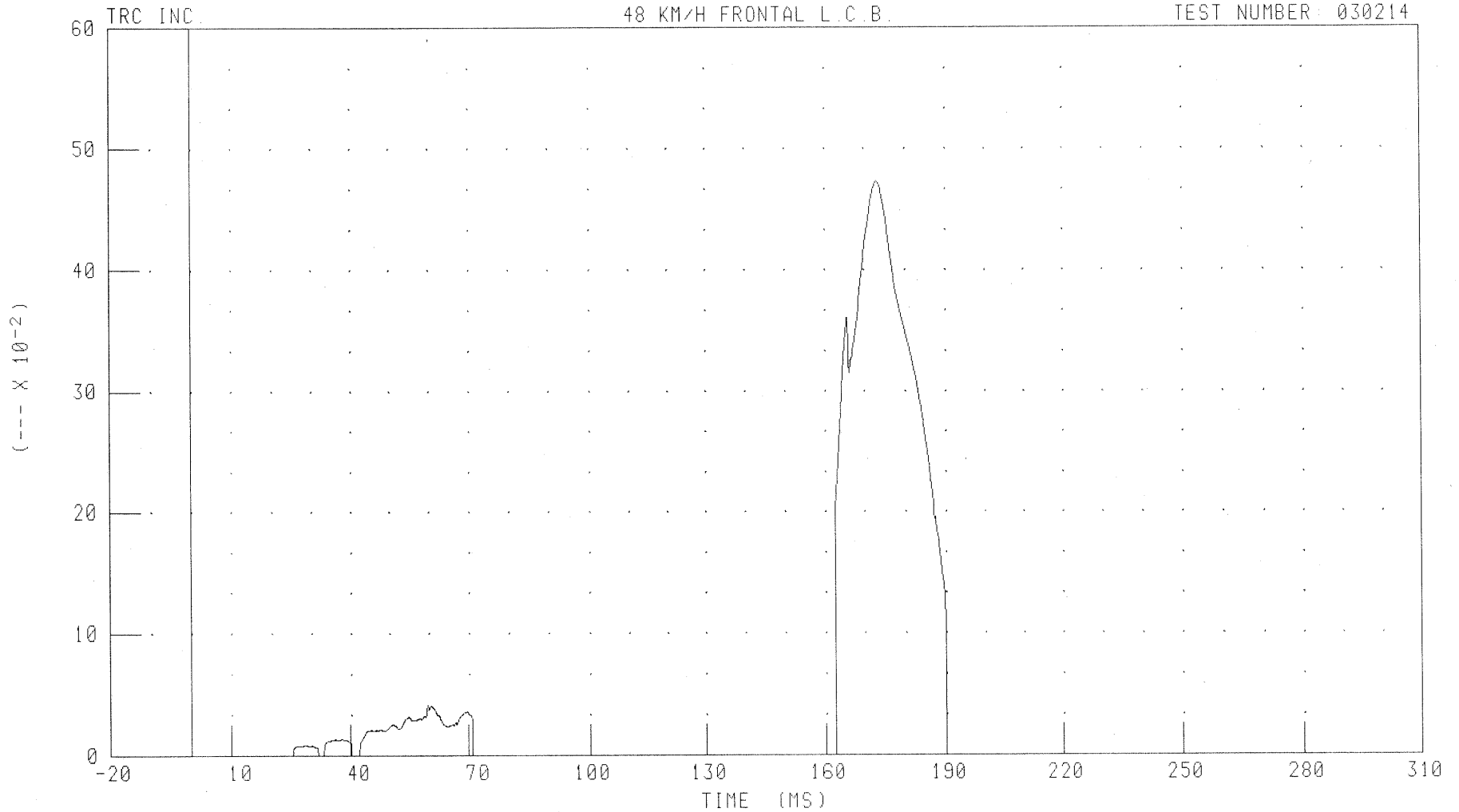
B-32

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK COMPRESSION/EXTENSION

48 KM/H FRONTAL L C B.

TEST NUMBER: 030214



B-33

030214

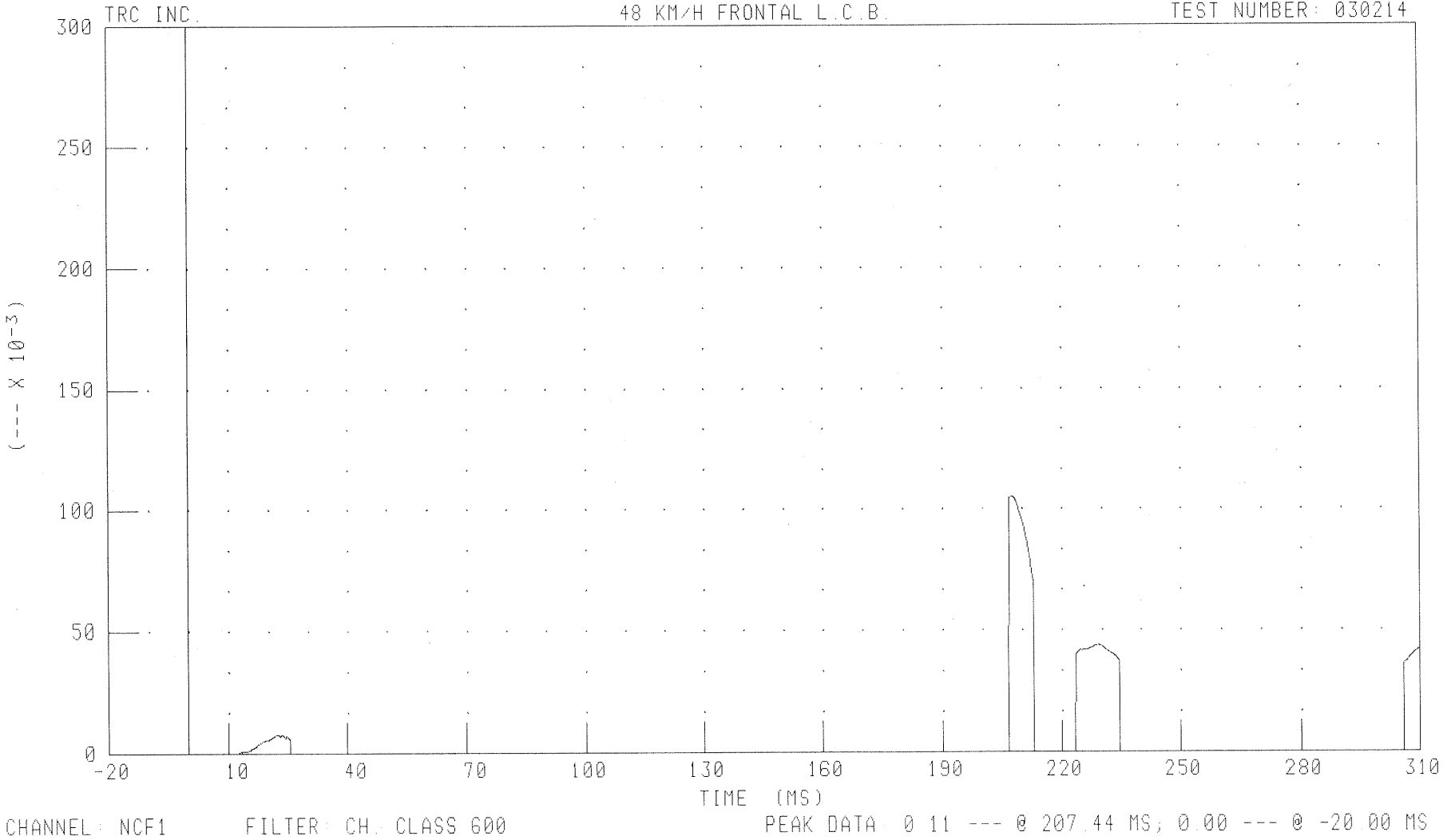
CHANNEL: NCE1

FILTER: CH. CLASS 600

PEAK DATA: 0.47 --- @ 173.28 MS; 0.00 --- @ -20.00 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK COMPRESSION/FLEXION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-34

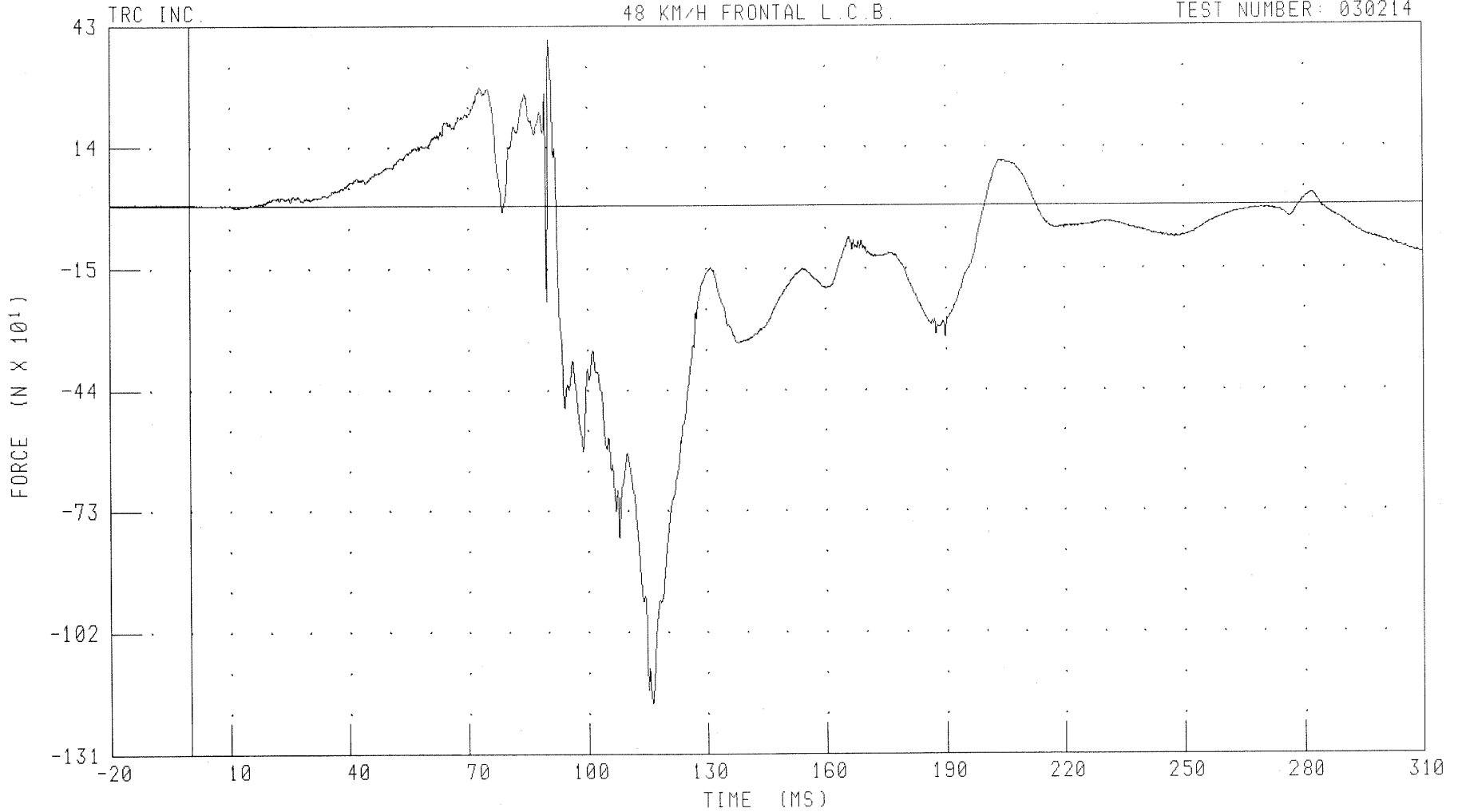
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK LOWER X-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-35

030214

CHANNEL: NKLXF1

FILTER: CH. CLASS 1000

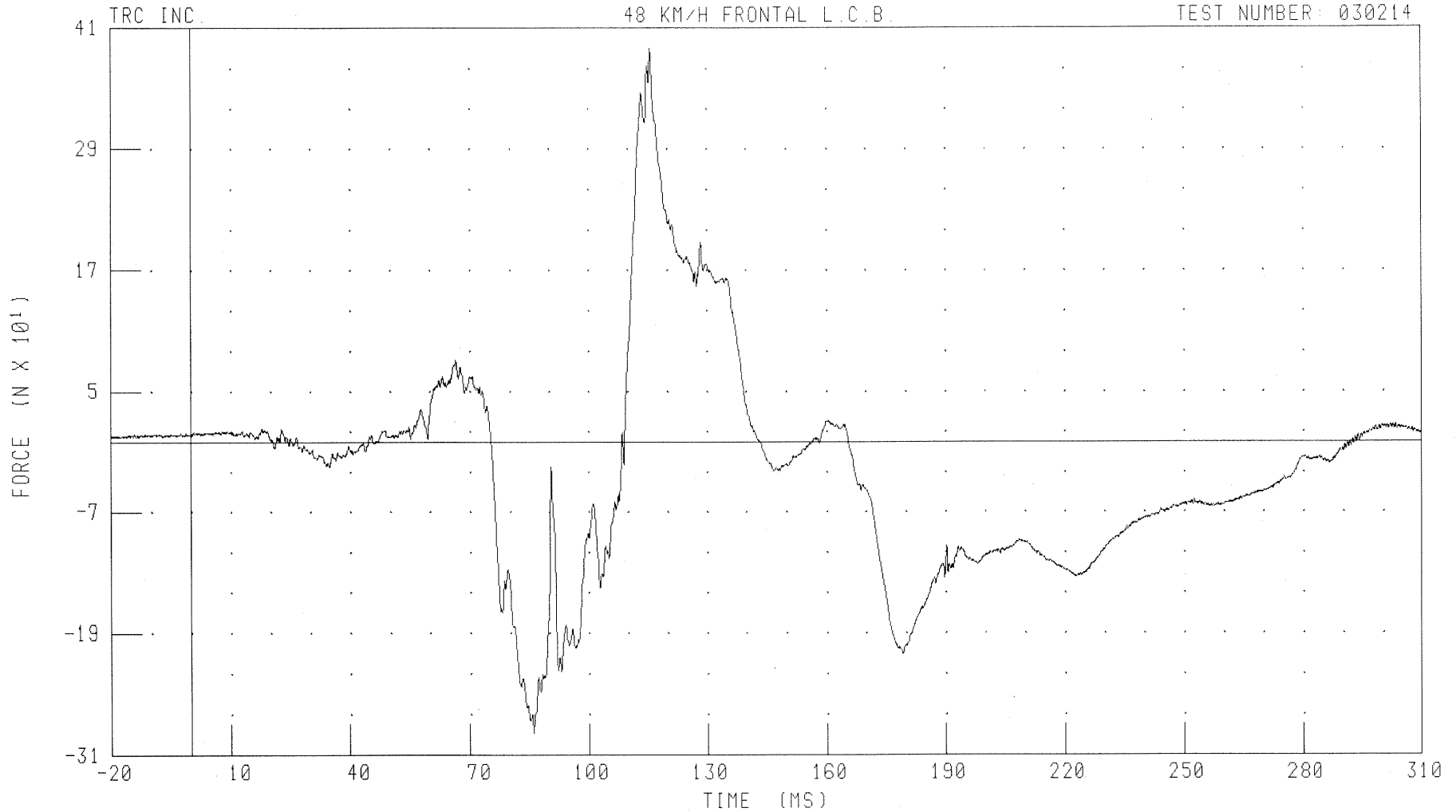
PEAK DATA: 399.67 N @ 90.48 MS; -1188.79 N @ 116.16 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK LOWER Y-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLYF1 FILTER: CH. CLASS 1000

PEAK DATA: 389.78 N @ 115.92 MS; -288.84 N @ 85.84 MS

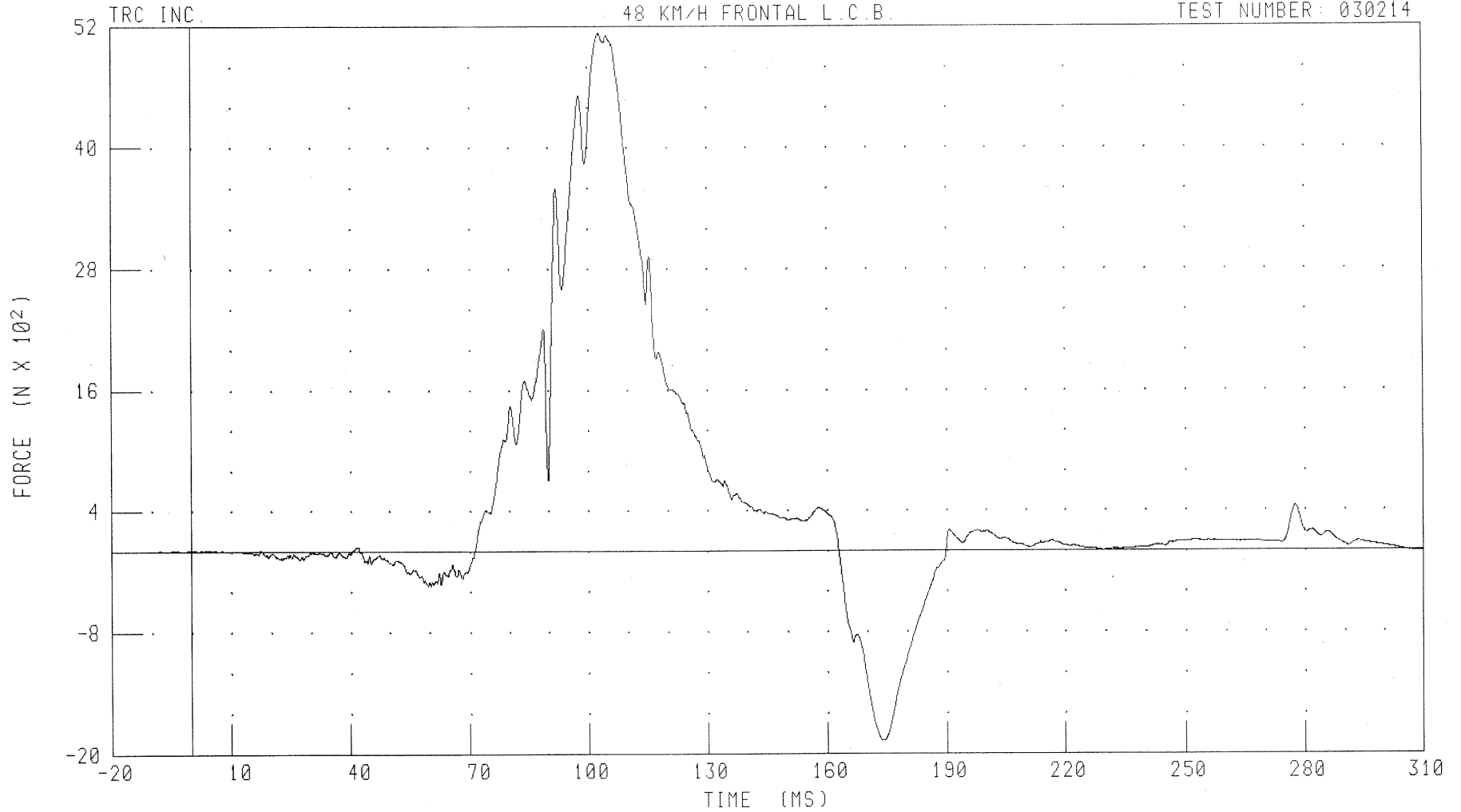
B-36

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK LOWER Z-AXIS AXIAL FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLZF1 FILTER: CH: CLASS 1000

PEAK DATA: 5137.02 N @ 103.04 MS; -1873.07 N @ 174.16 MS

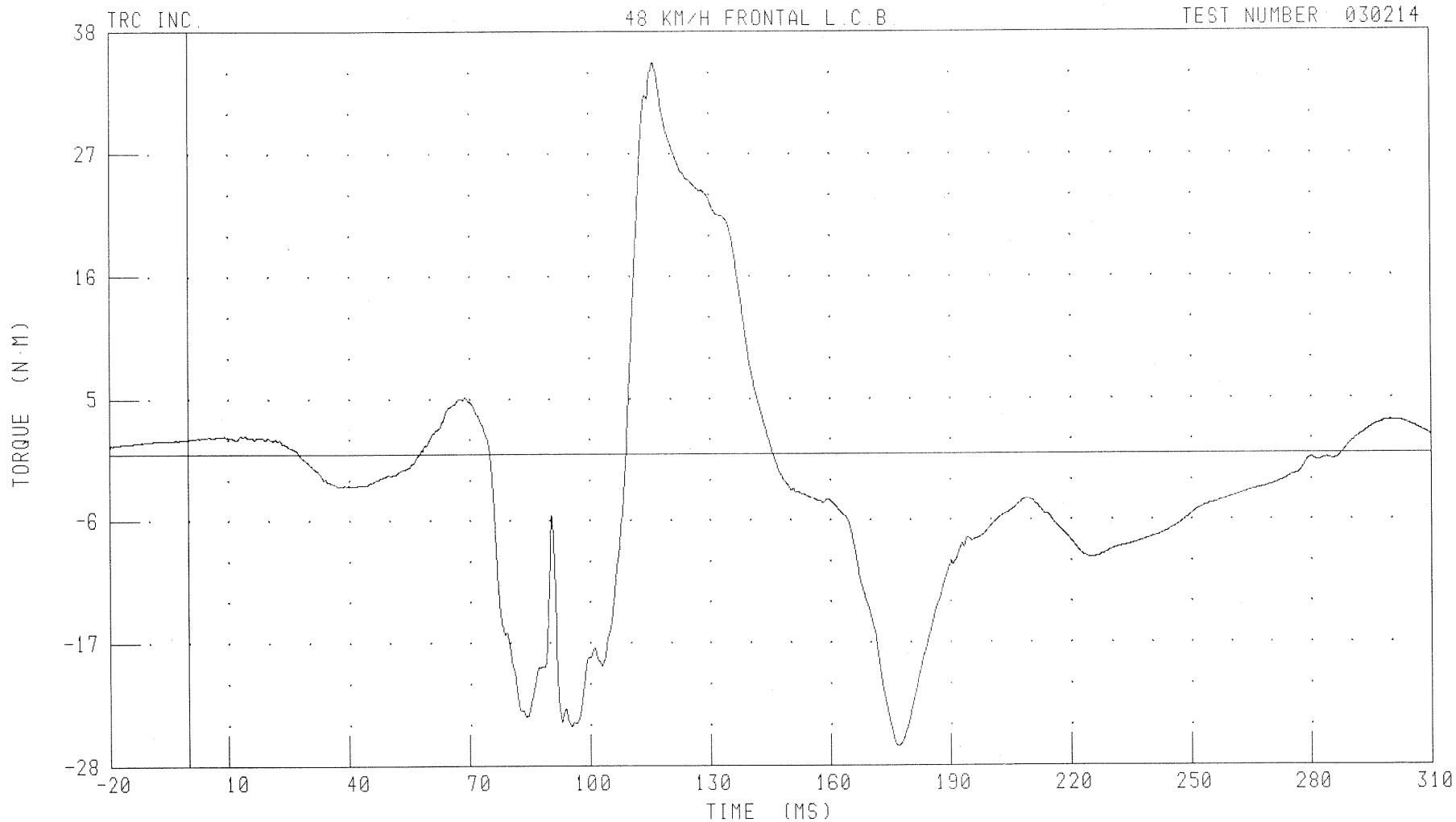
B-37

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK LOWER MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLXM1 FILTER: CH. CLASS 600

PEAK DATA: 35.26 N.M @ 116.00 MS; -26.25 N.M @ 176.96 MS

B-38

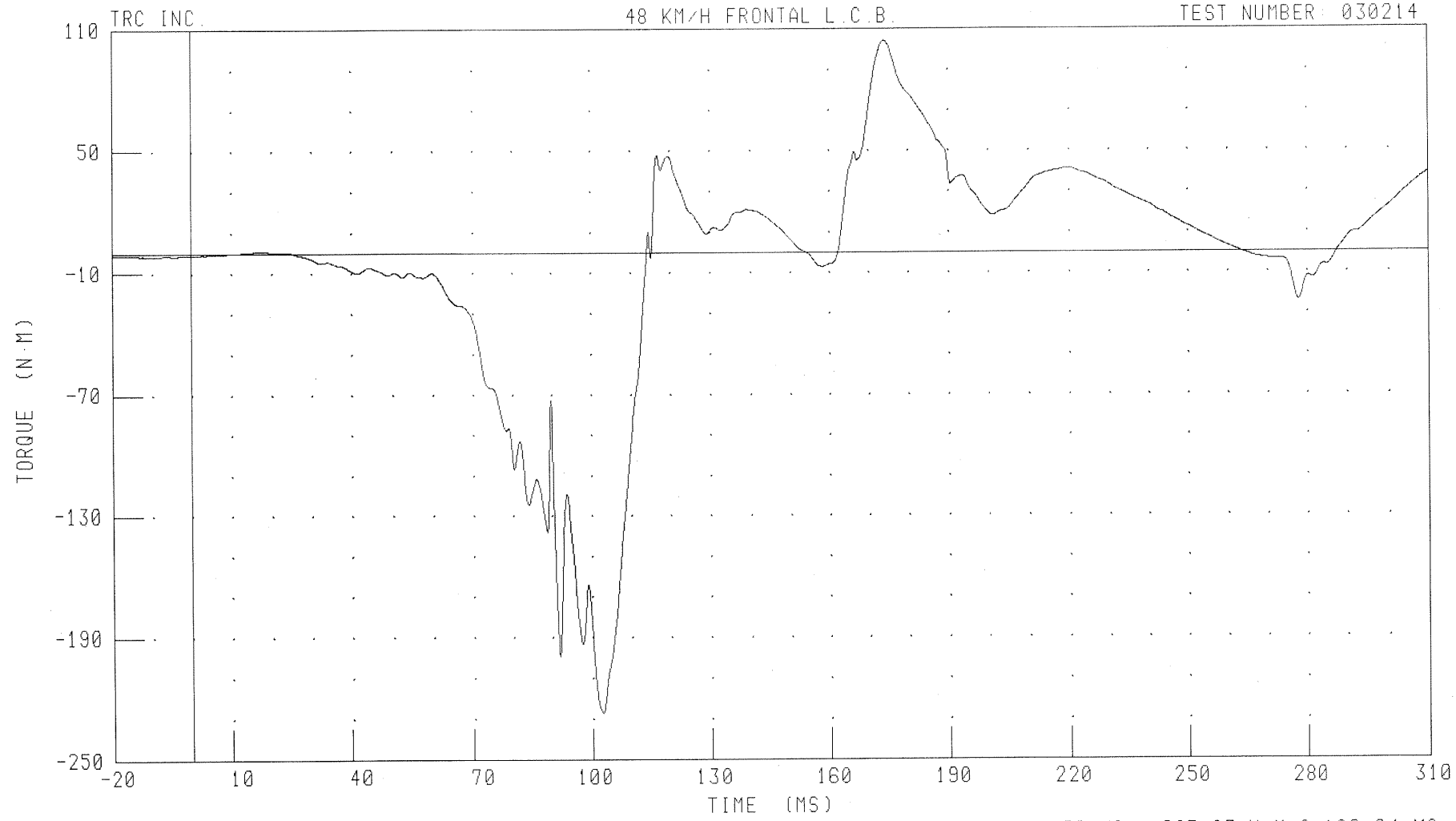
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER NECK LOWER MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-39

030214

CHANNEL: NKLYM1

FILTER: CH. CLASS 600

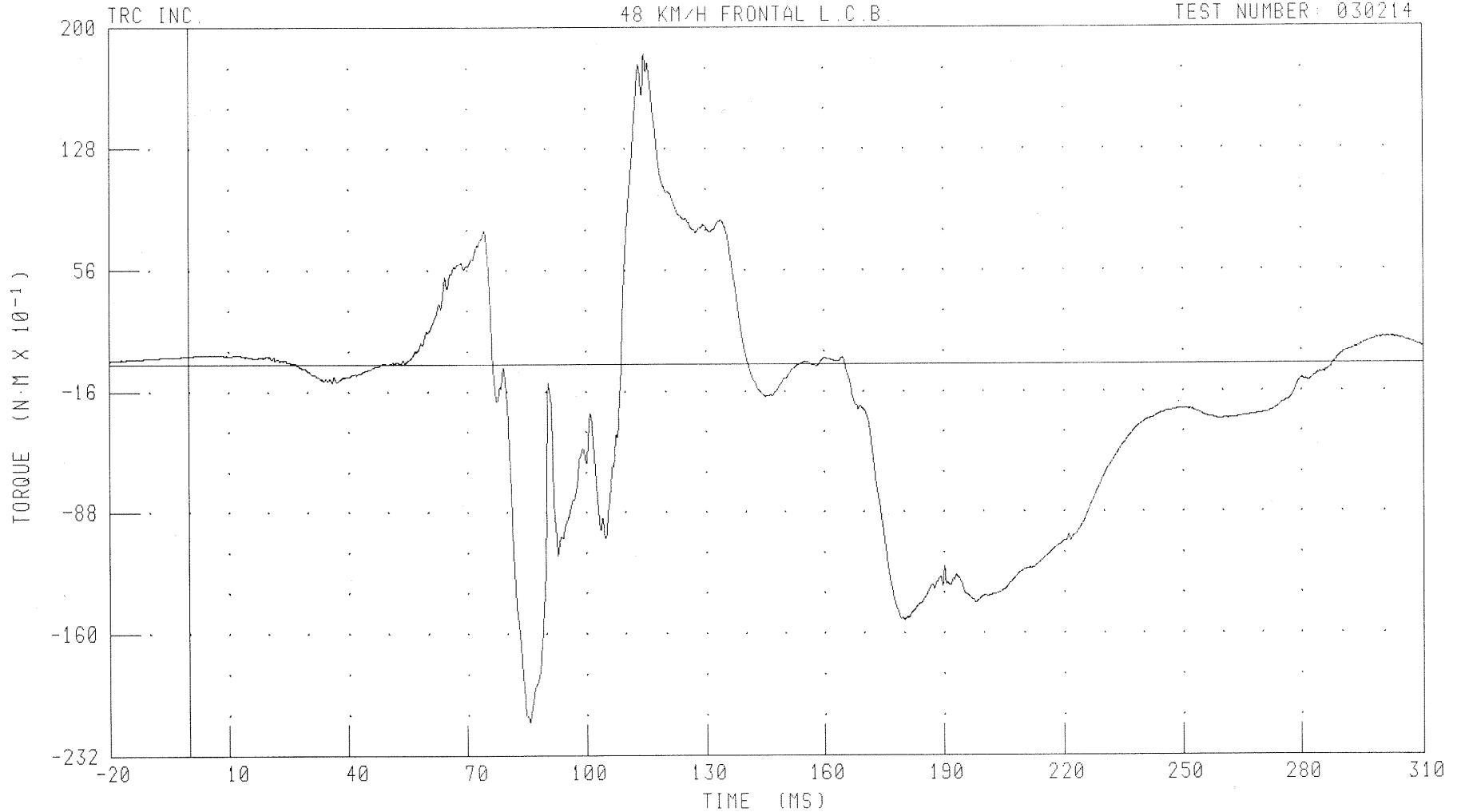
TIME (MS)

PEAK DATA: 104.28 N.M @ 174.32 MS; -227.03 N.M @ 102.64 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER NECK LOWER MOMENT ABOUT Z AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLZM1 FILTER: CH. CLASS 600

PEAK DATA: 18.43 N·M @ 115.12 MS; -21.27 N·M @ 85.84 MS

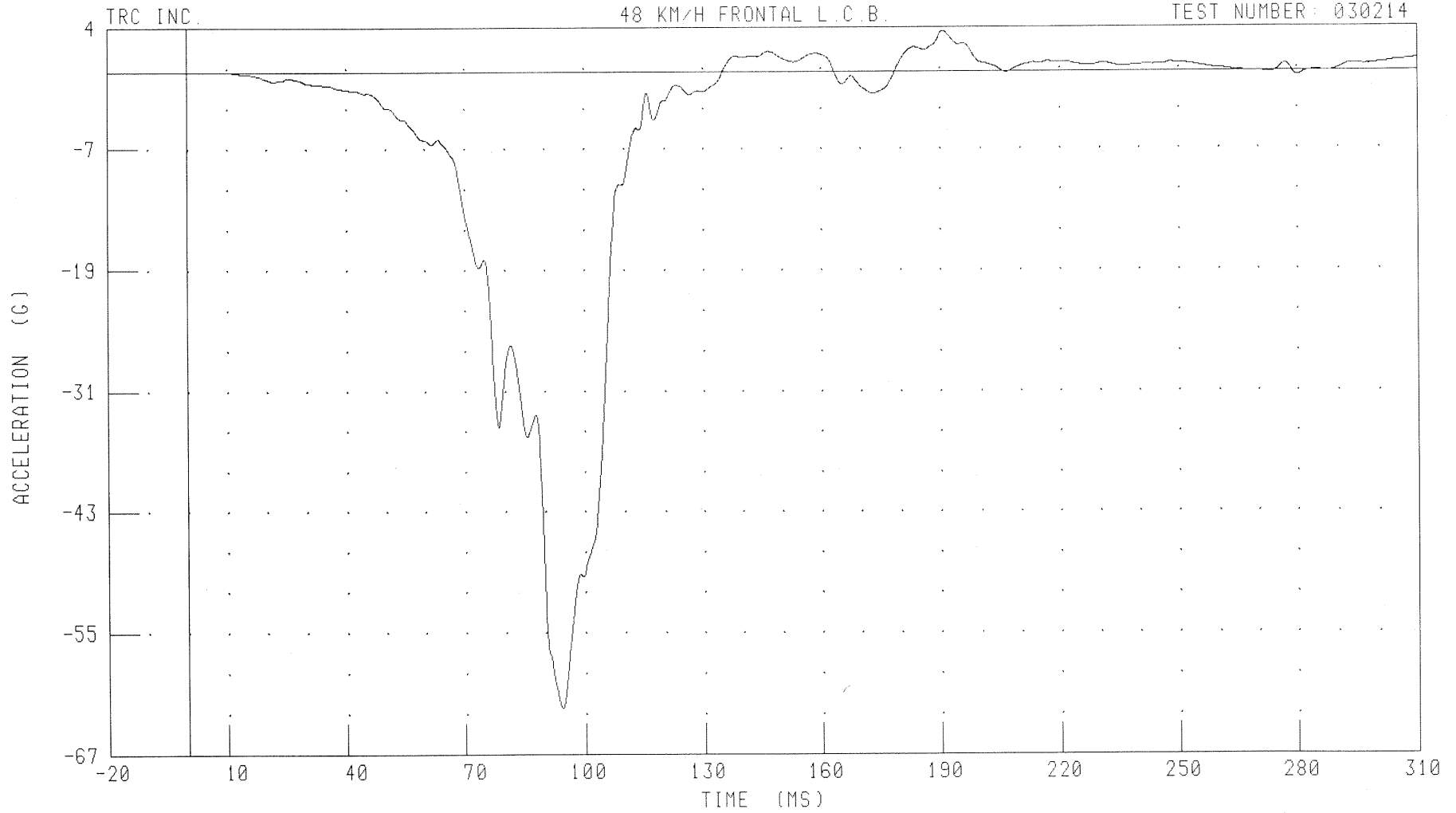
B-40

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST X-AXIS ACCELERATION.

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-41

030214

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

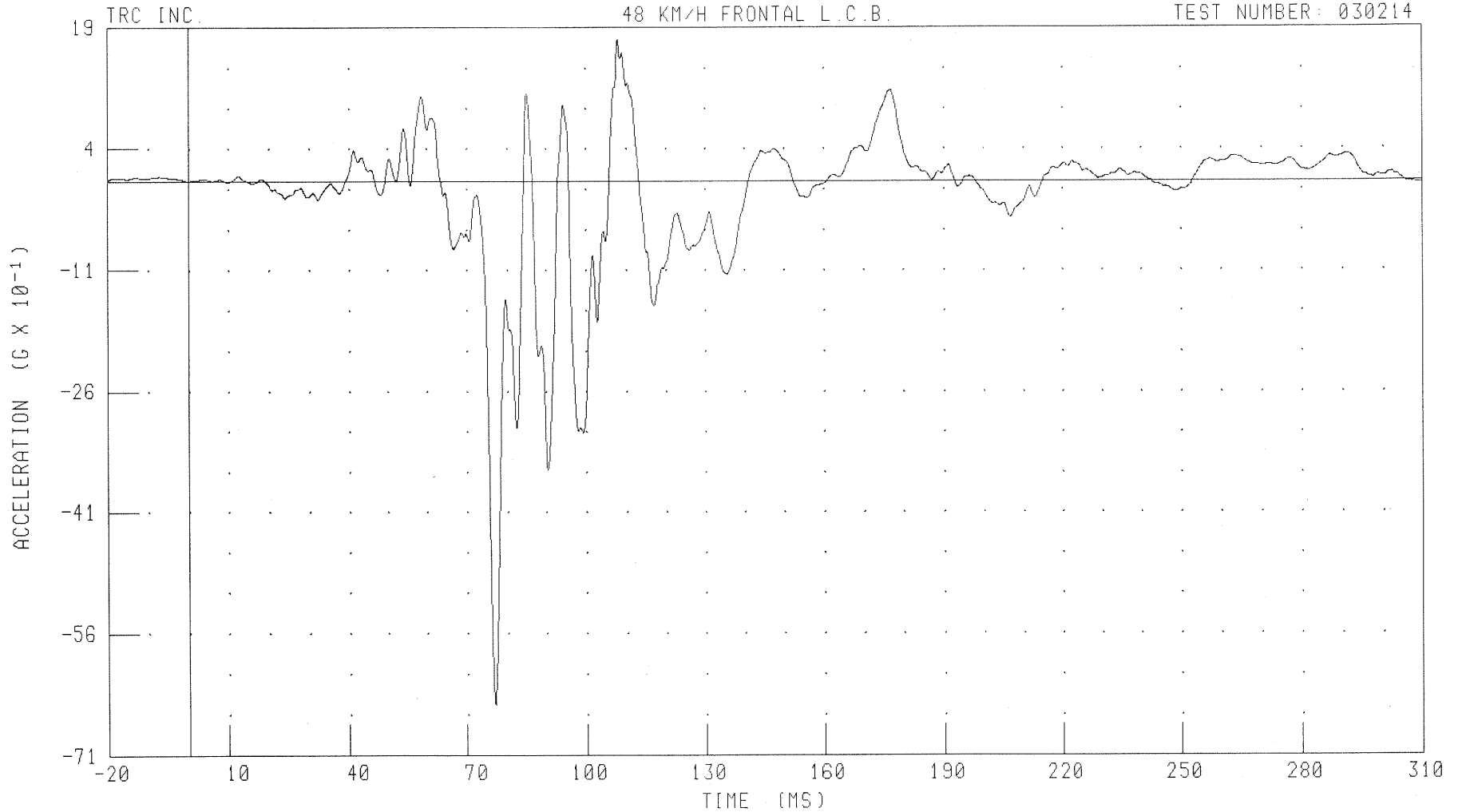
PEAK DATA: 3.95 G @ 191.04 MS; -63.14 G @ 94.08 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER CHEST Y-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-42

030214

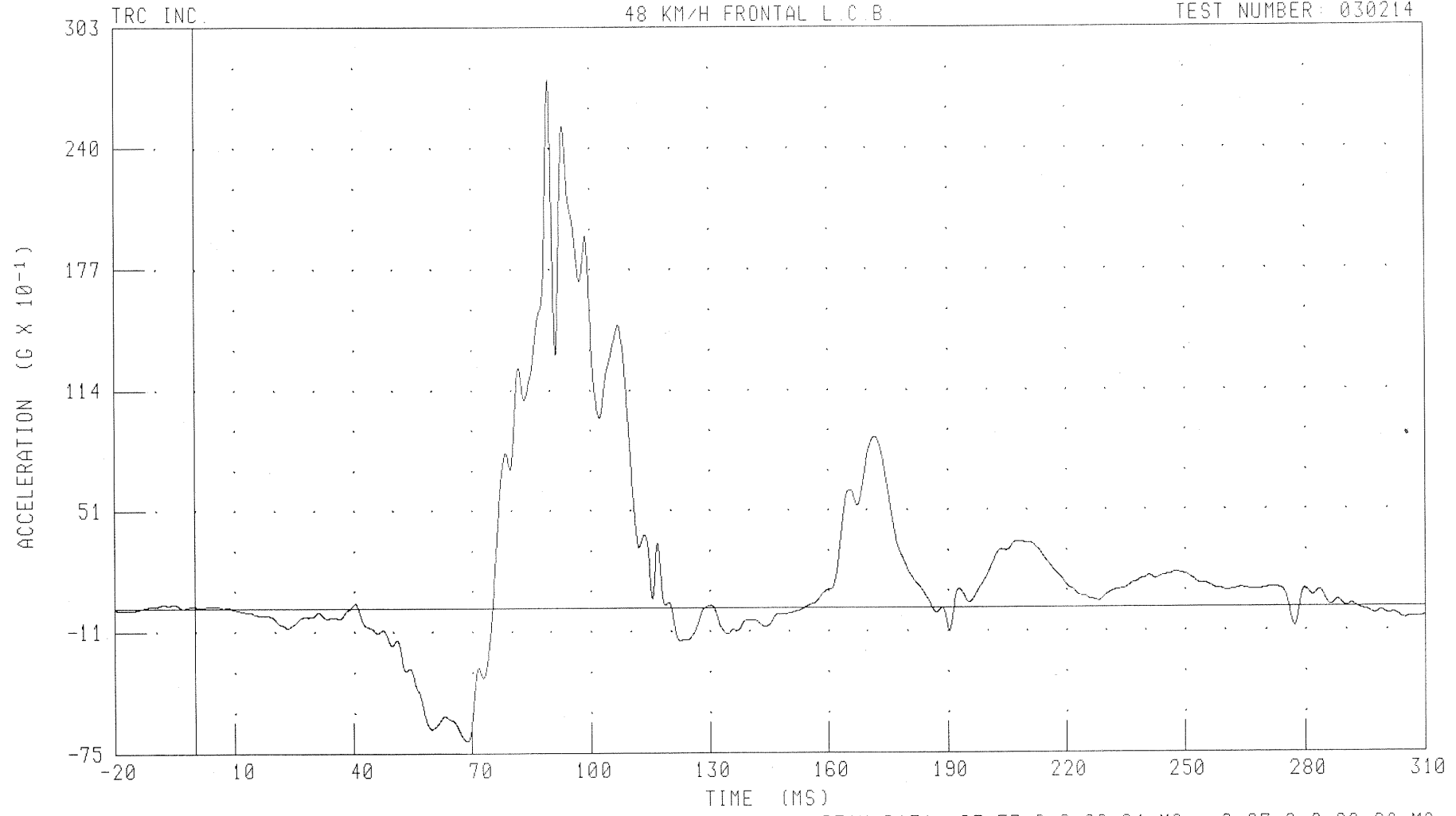
CHANNEL: CSTYG1

FILTER: CH. CLASS 180

PEAK DATA: 1.75 G @ 108.16 MS; -6.48 G @ 76.88 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST Z-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

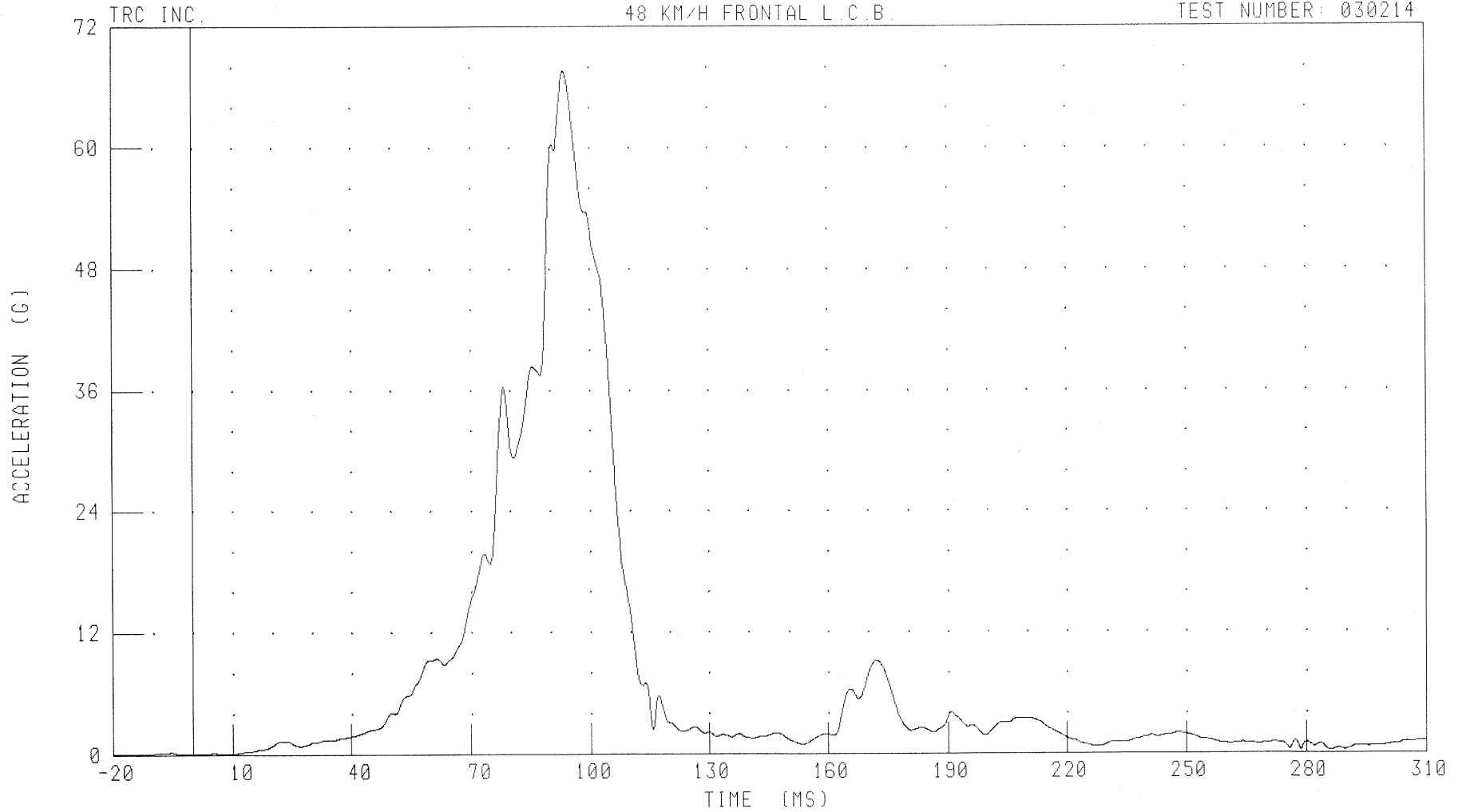
PEAK DATA: 27.57 G @ 89.84 MS; -6.87 G @ 68.80 MS

B-43

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST RESULTANT ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTRG1

FILTER: CH. CLASS 180

PEAK DATA: 67.64 G @ 93.68 MS; 0.01 G @ -20.00 MS

B-44

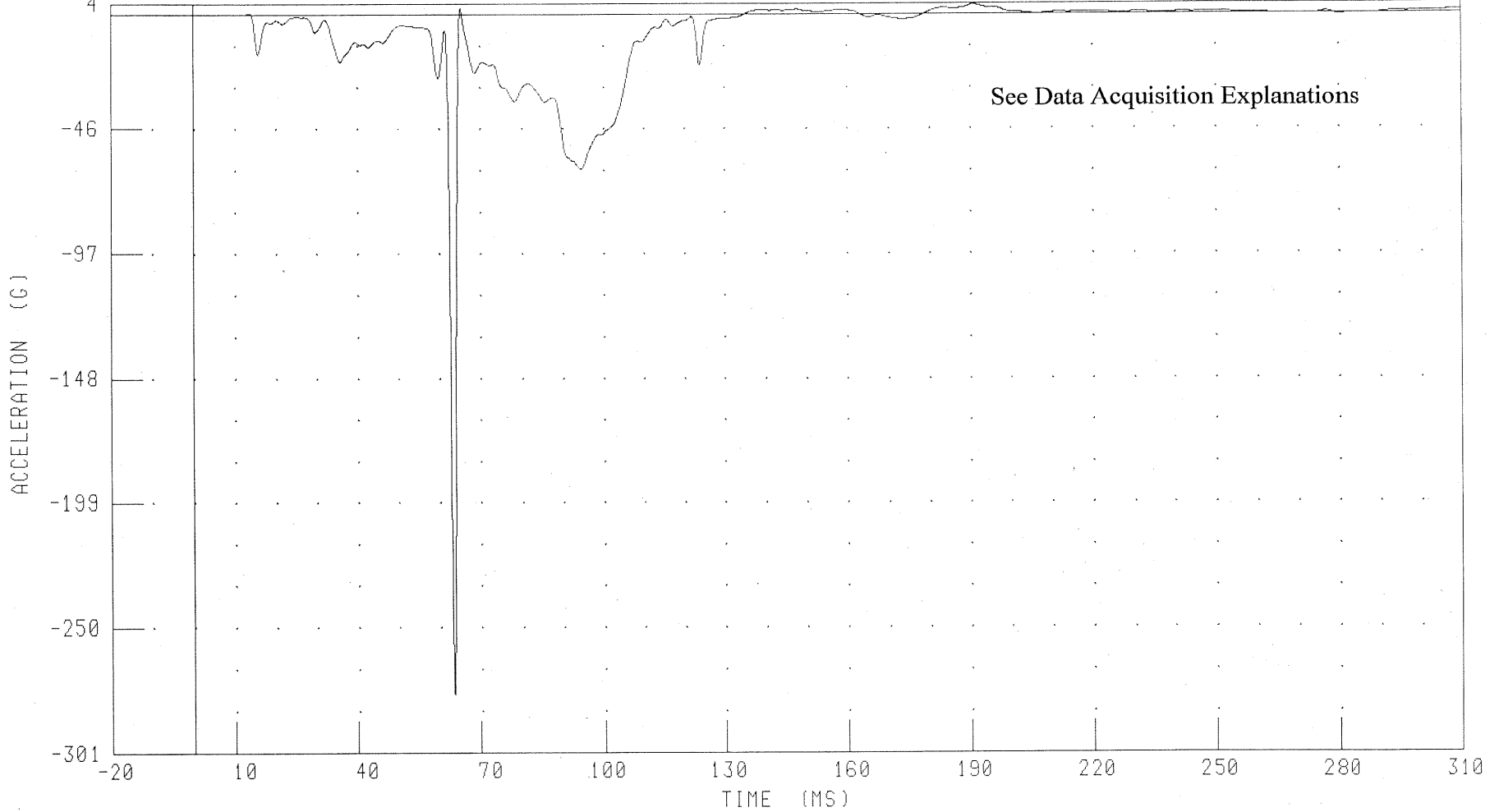
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST X-AXIS ACCELERATION REDUNDANT

TRC INC.

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-45

030214

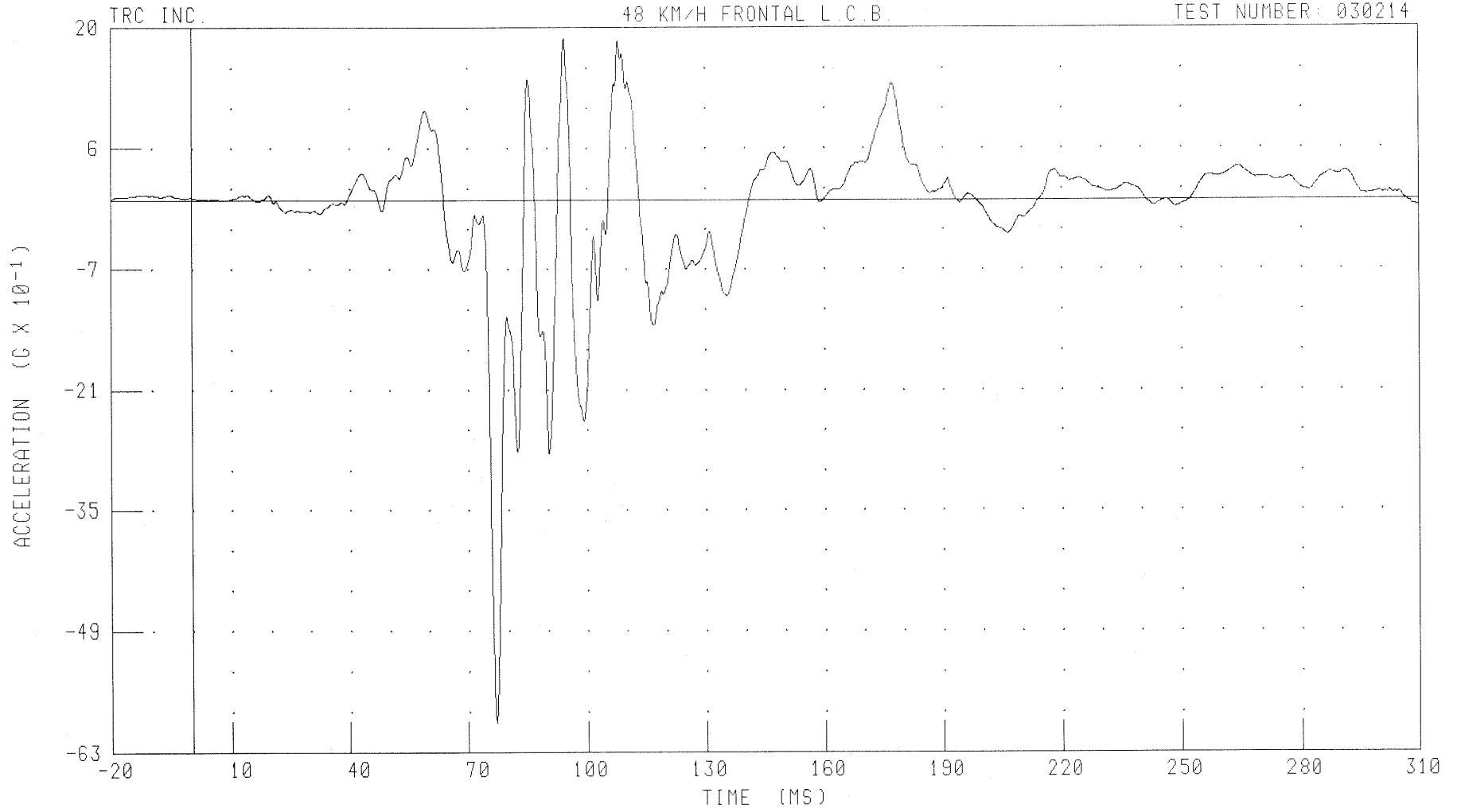
CHANNEL: CSTXR1 FILTER: CH. CLASS 180

PEAK DATA: 3.74 G @ 191.04 MS; -278.24 G @ 63.44 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST Y-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTYR1

FILTER: CH. CLASS 180

PEAK DATA: 1.87 G @ 94.40 MS; -6.06 G @ 76.96 MS

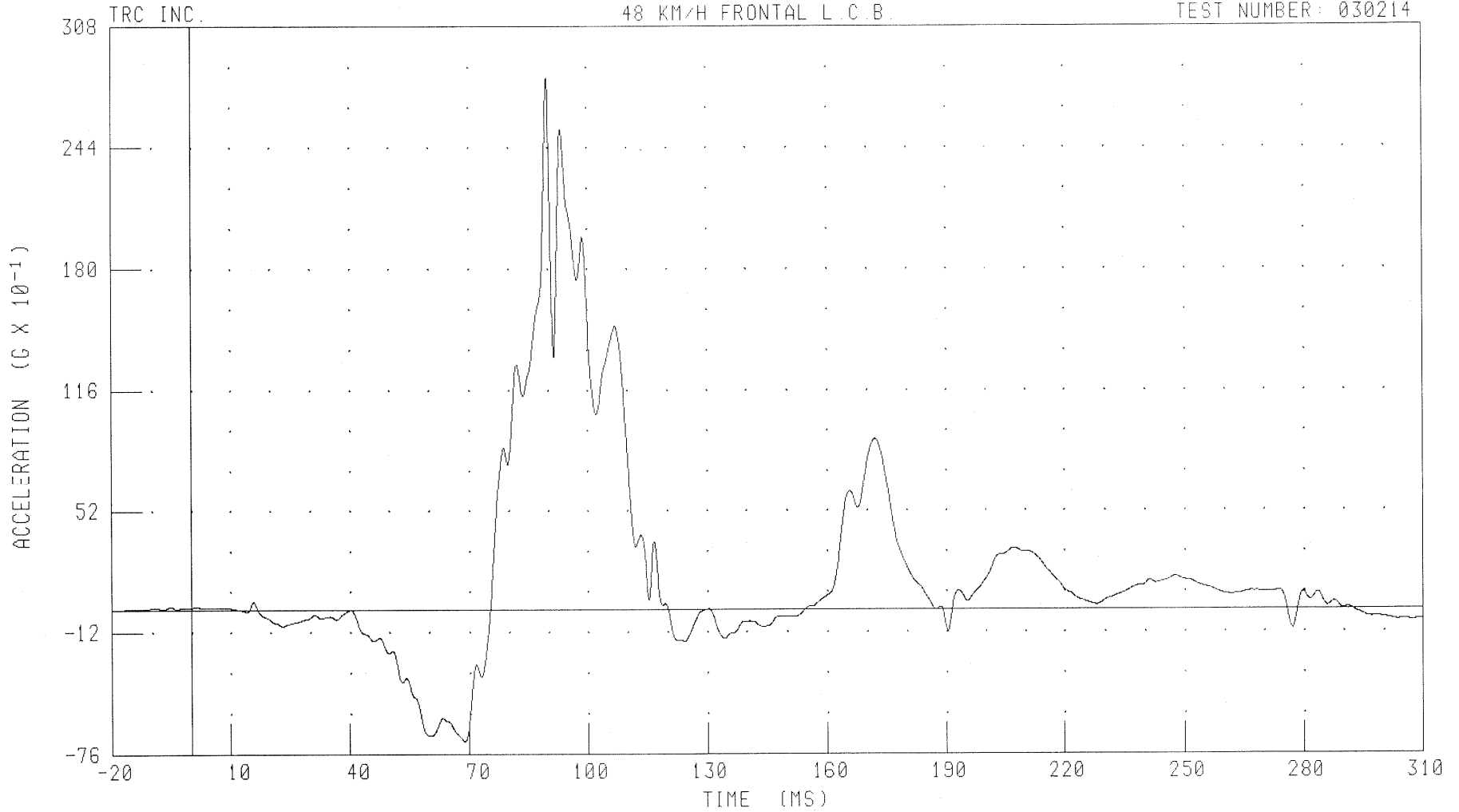
B-46

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST Z-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTZR1 FILTER: CH. CLASS 180

PEAK DATA: 28.10 G @ 89.84 MS; -6.93 G @ 68.80 MS

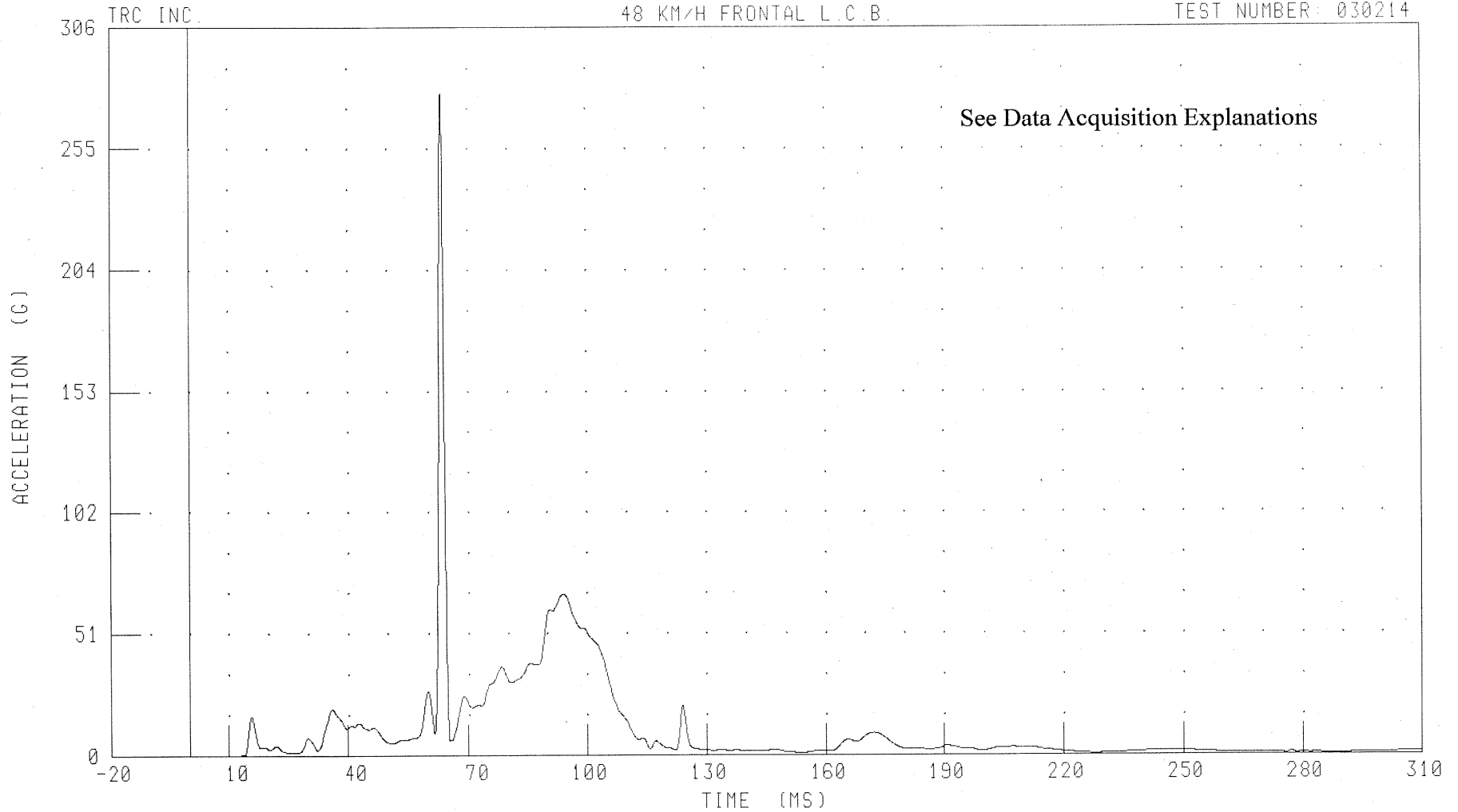
B-47

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST RESULTANT ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTRR1 FILTER: CH. CLASS 180

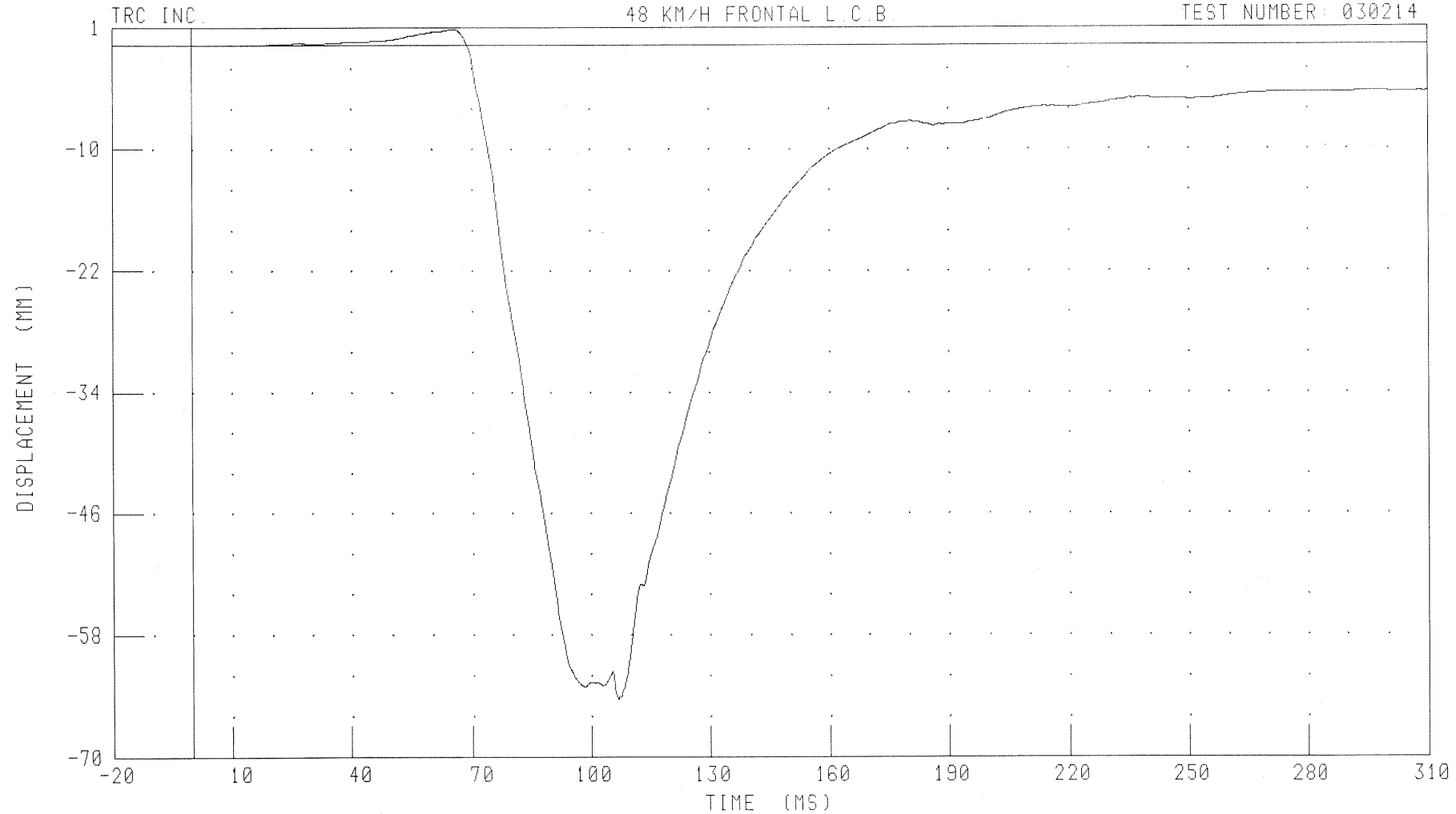
PEAK DATA: 278.30 G @ 63.44 MS, 0.00 G @ -20.00 MS

B-48

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER CHEST DEFLECTION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTXD1

FILTER: CH. CLASS 600

PEAK DATA: 1.55 MM @ 65.60 MS; -64.64 MM @ 106.80 MS

B-49

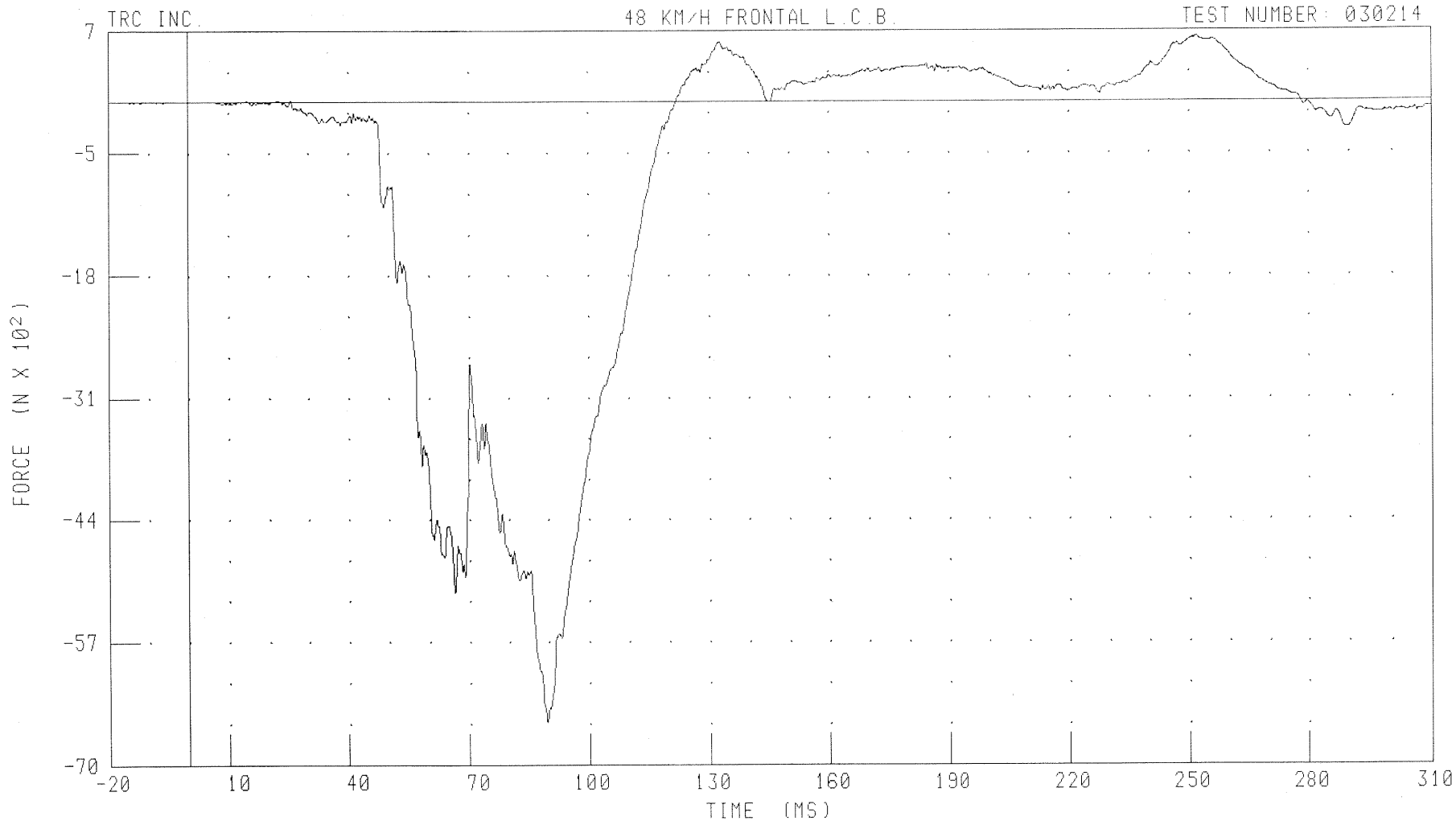
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER LEFT FEMUR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LFMZF1 FILTER: CH. CLASS 600

PEAK DATA: 688.13 N @ 252.08 MS; -6596.82 N @ 89.60 MS

B-50

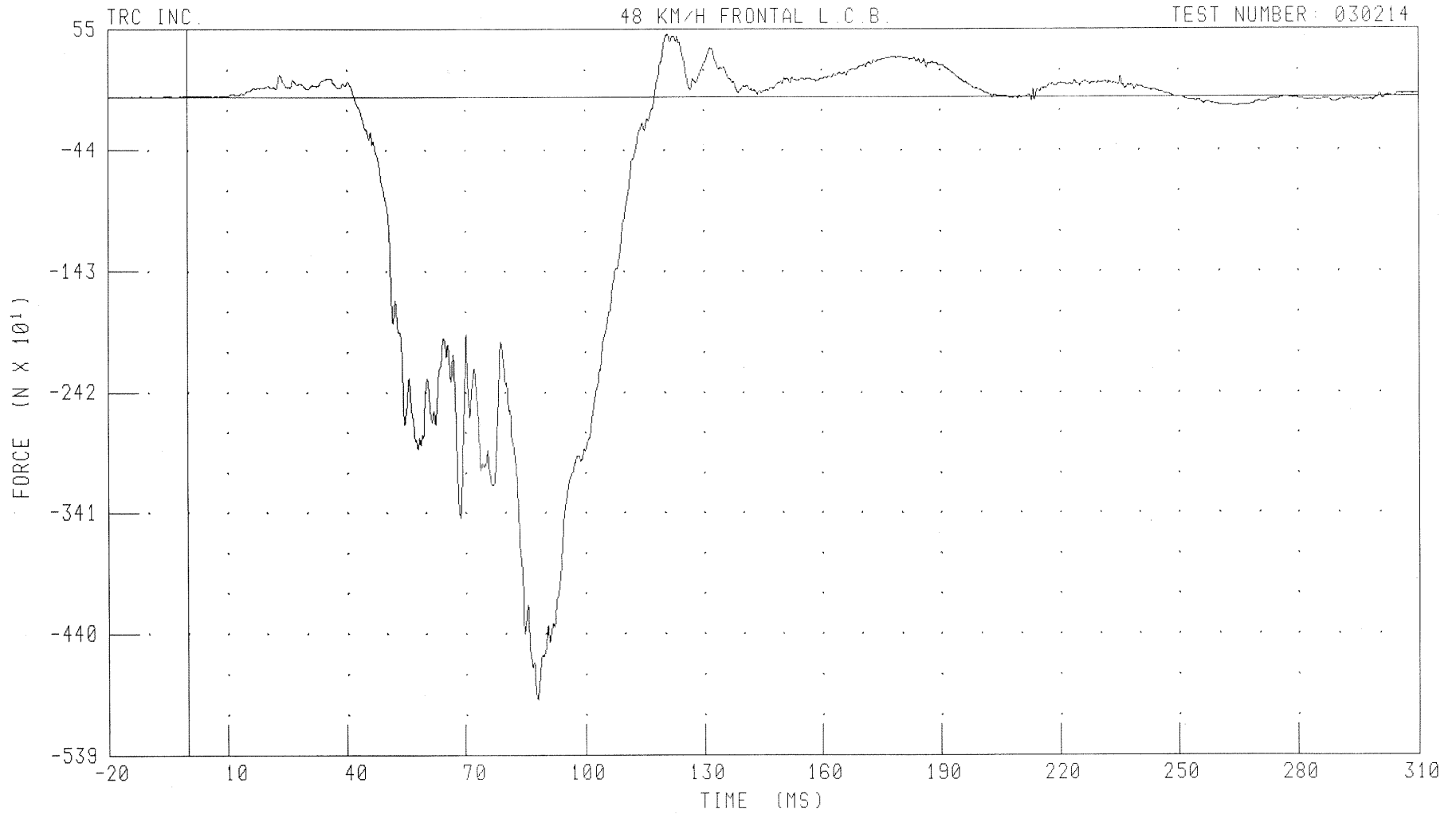
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER RIGHT FEMUR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-51

030214

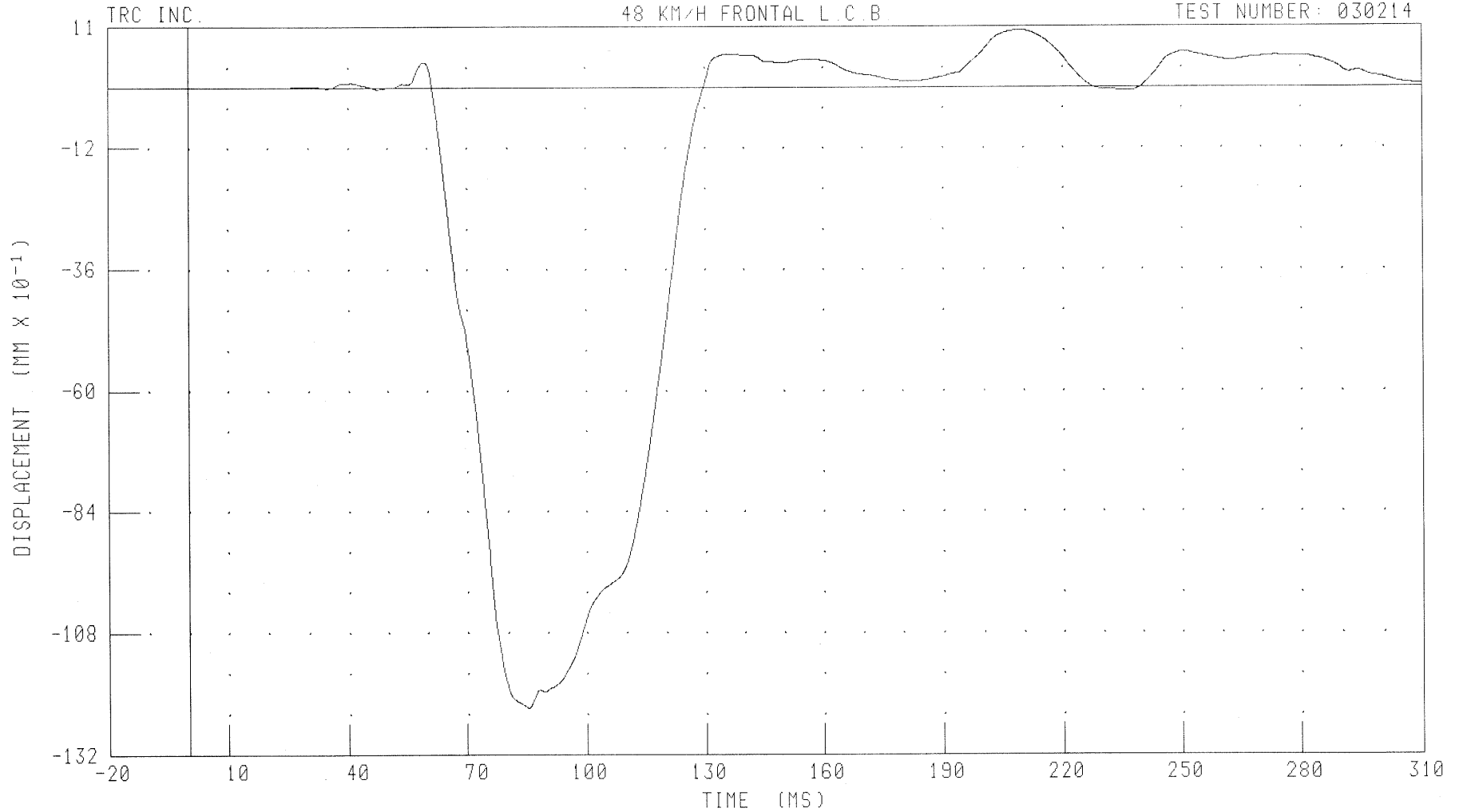
CHANNEL: RFMZ F1

FILTER: CH. CLASS 600

PEAK DATA: 508.67 N @ 121.12 MS; -4936.27 N @ 88.08 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT KNEE DISPLACEMENT  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: KNLXD1 FILTER: CH. CLASS 180

PEAK DATA: 1.12 MM @ 209.36 MS; -12.28 MM @ 85.20 MS

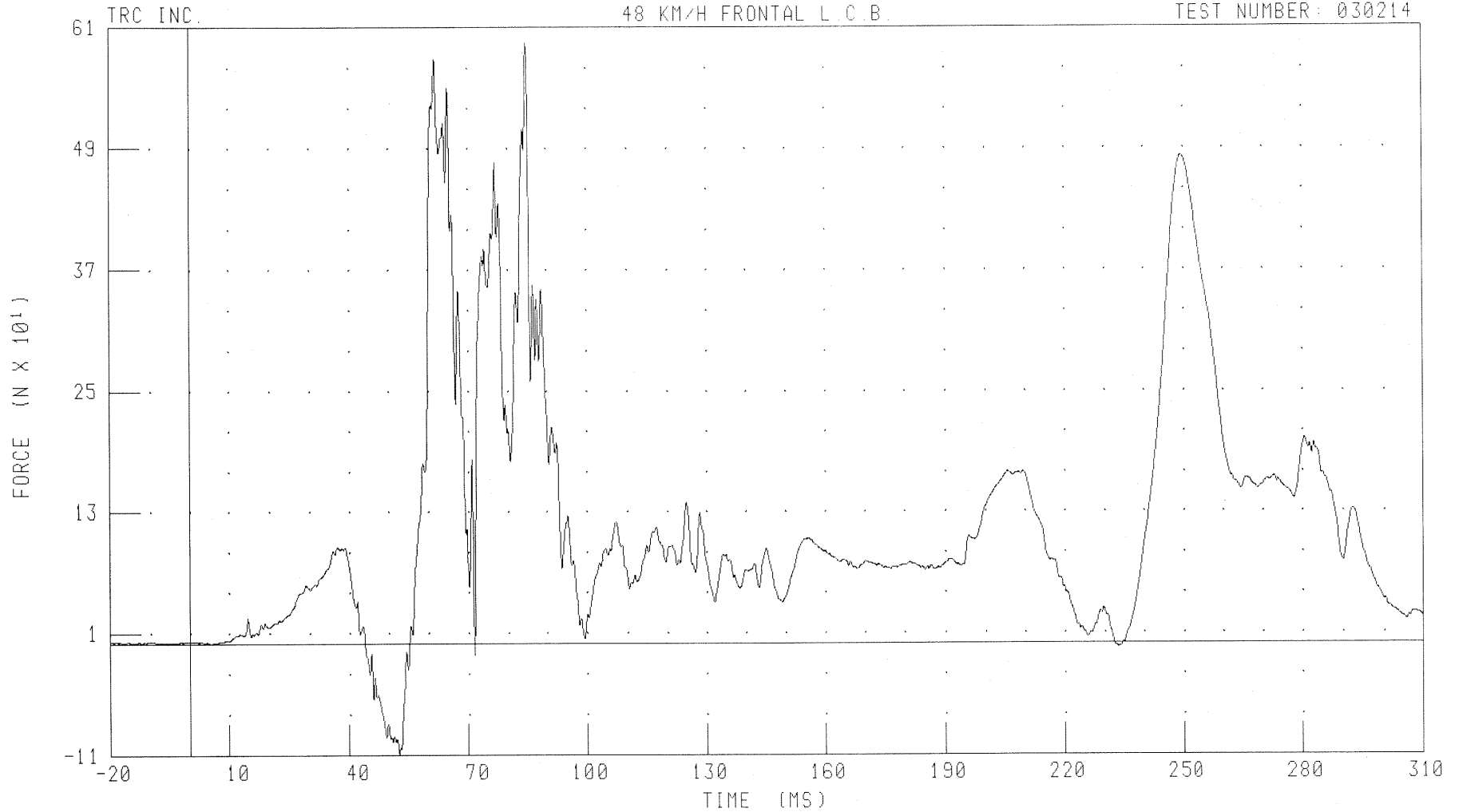
B-52

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT UPPER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L C B.

TEST NUMBER: 030214



CHANNEL: TBLXF1 FILTER: CH. CLASS 600

PEAK DATA: 595.44 N @ 84.96 MS; -108.74 N @ 52.56 MS

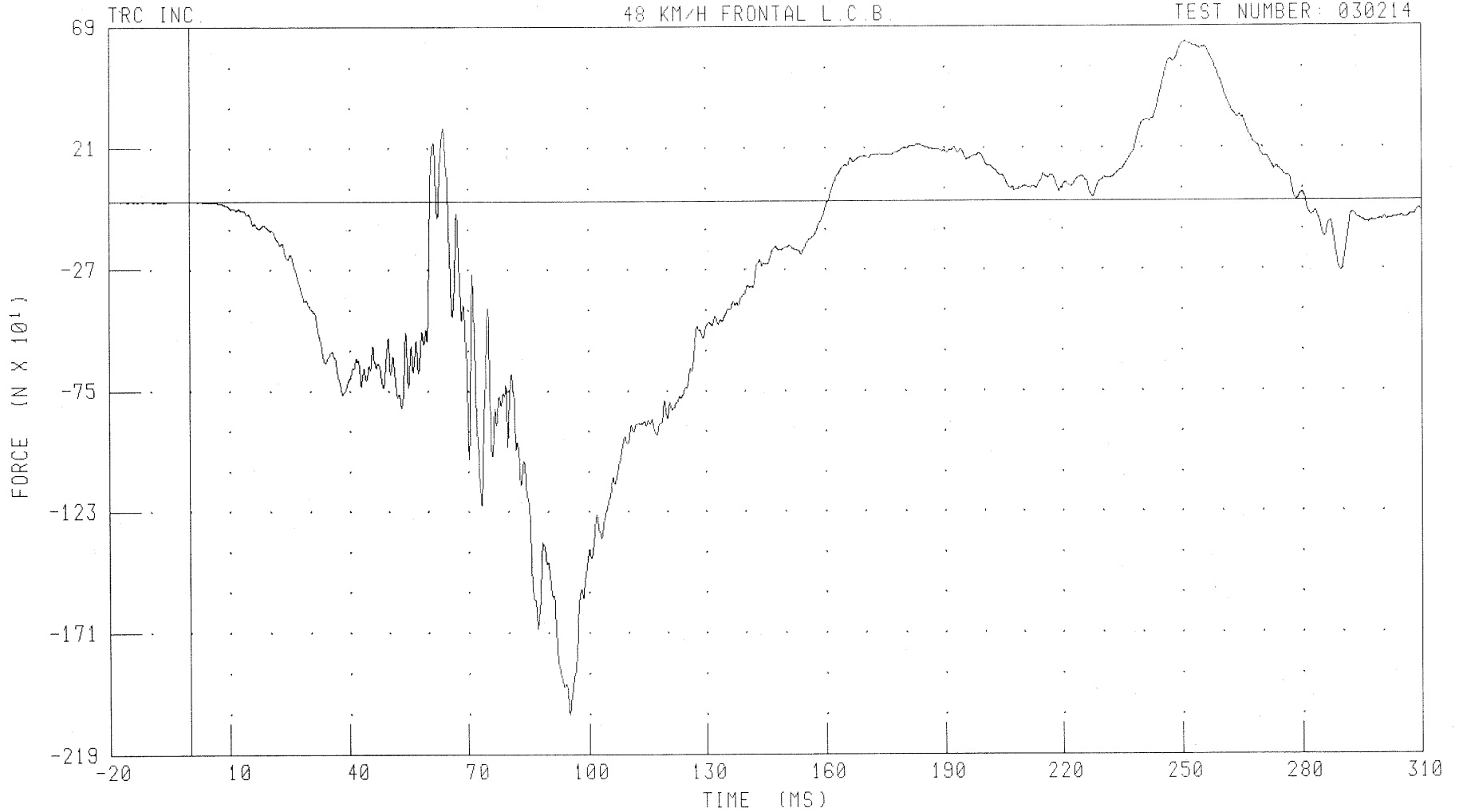
B-53

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT UPPER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLZF1

FILTER: CH. CLASS 600

PEAK DATA: 628.59 N @ 251.20 MS; -2031.66 N @ 95.28 MS

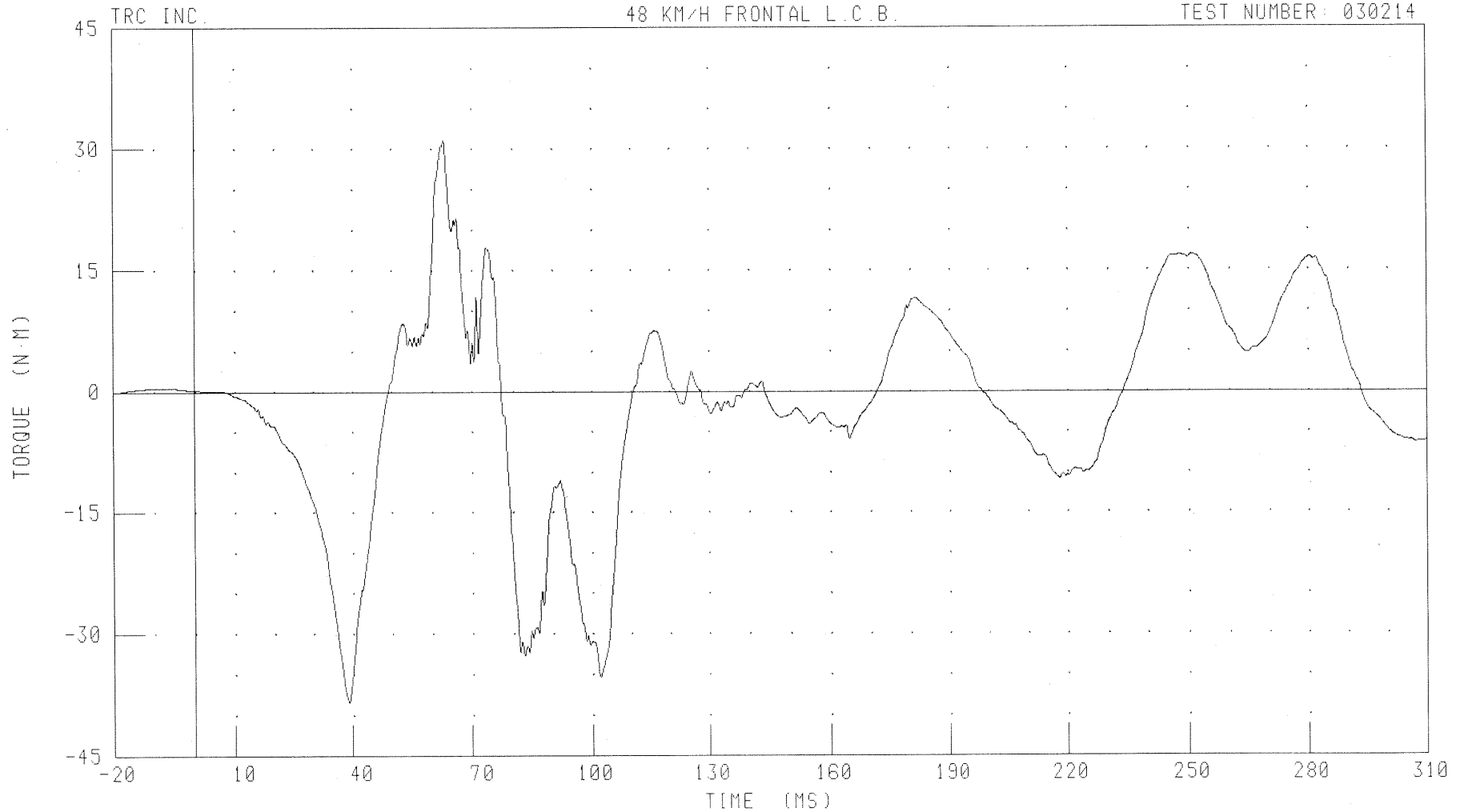
B-54

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT UPPER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLXM1 FILTER: CH. CLASS 600

PEAK DATA: 31.02 N·M @ 63.12 MS; -38.40 N·M @ 39.04 MS

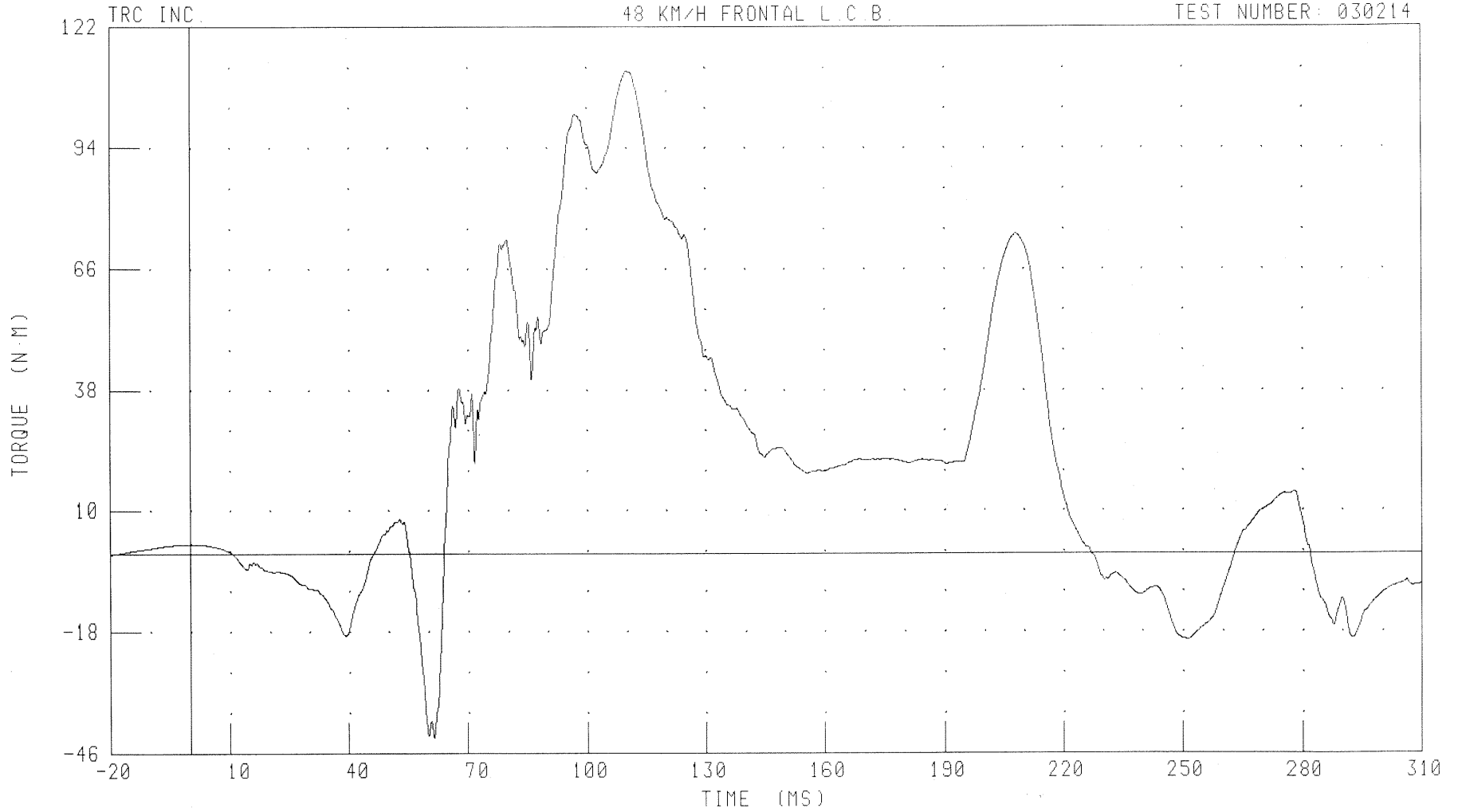
B-55

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLYM1

FILTER: CH. CLASS 600

PEAK DATA: 111.96 N·M @ 110.16 MS; -42.52 N·M @ 61.44 MS

B-56

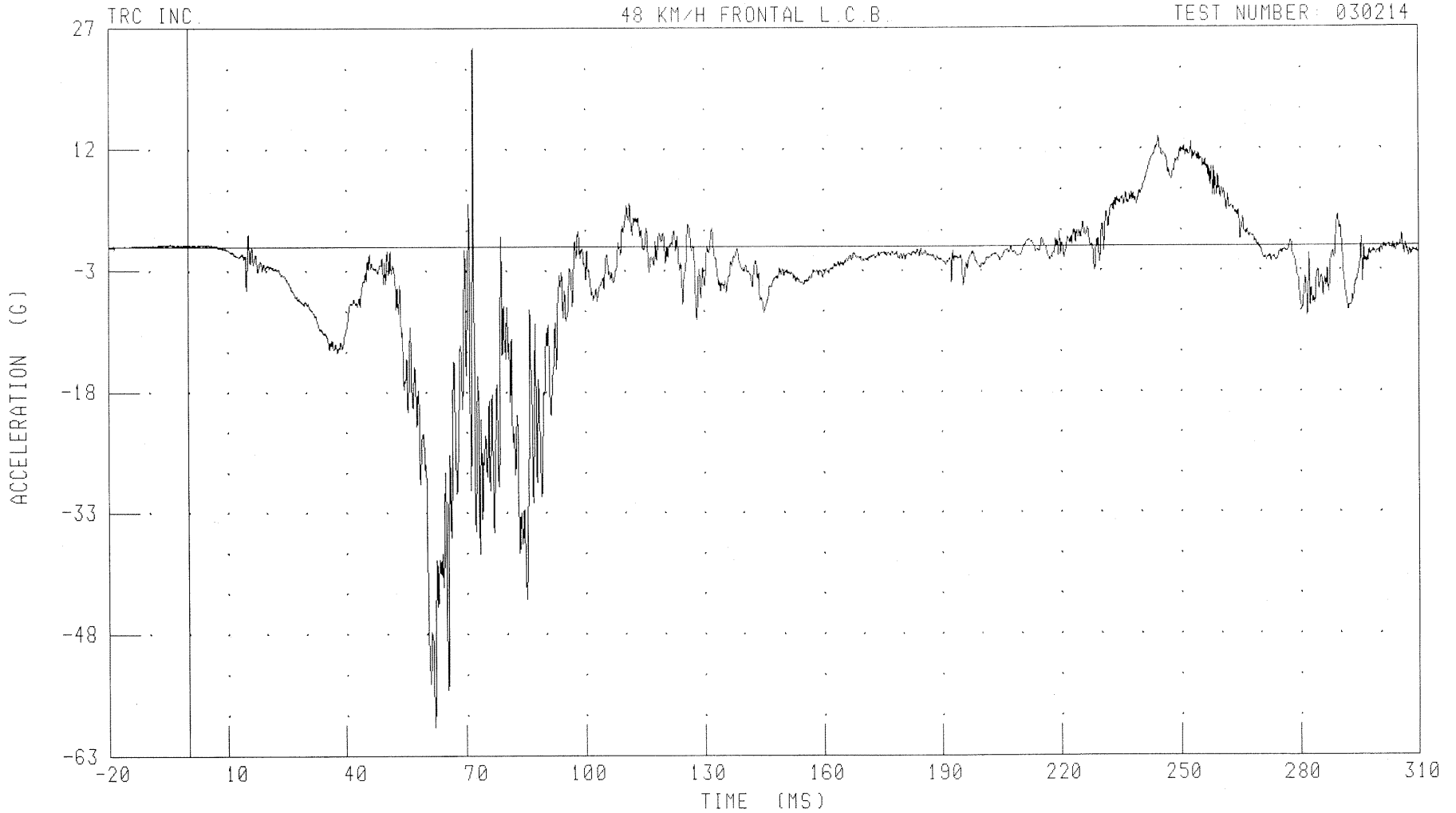
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER LEFT TIBIA X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLXG1 FILTER: CH. CLASS 1000

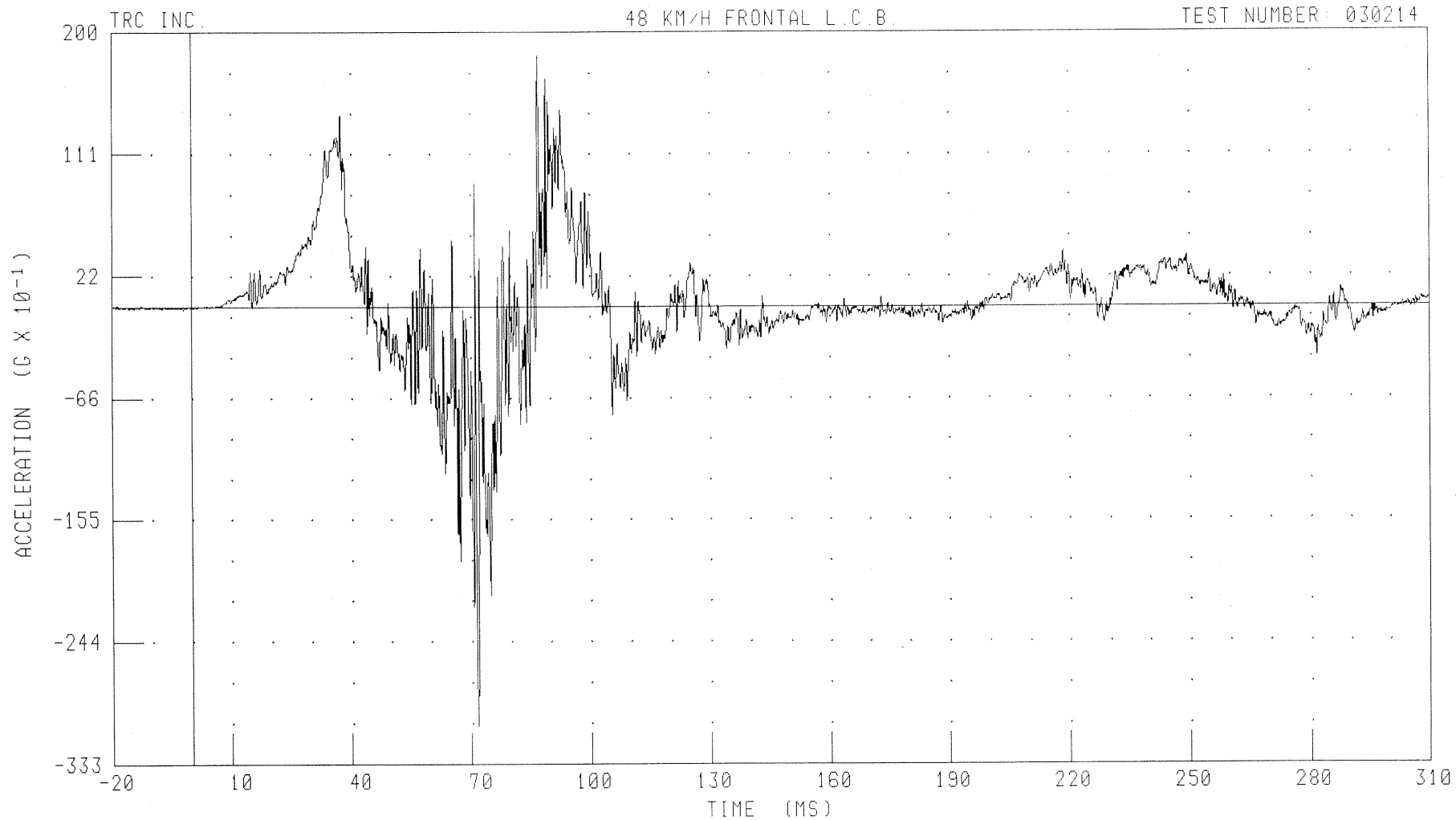
PEAK DATA: 24.58 G @ 71.84 MS; -59.40 G @ 62.08 MS

B-57

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT TIBIA Y-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLYG1 FILTER: CH. CLASS 1000

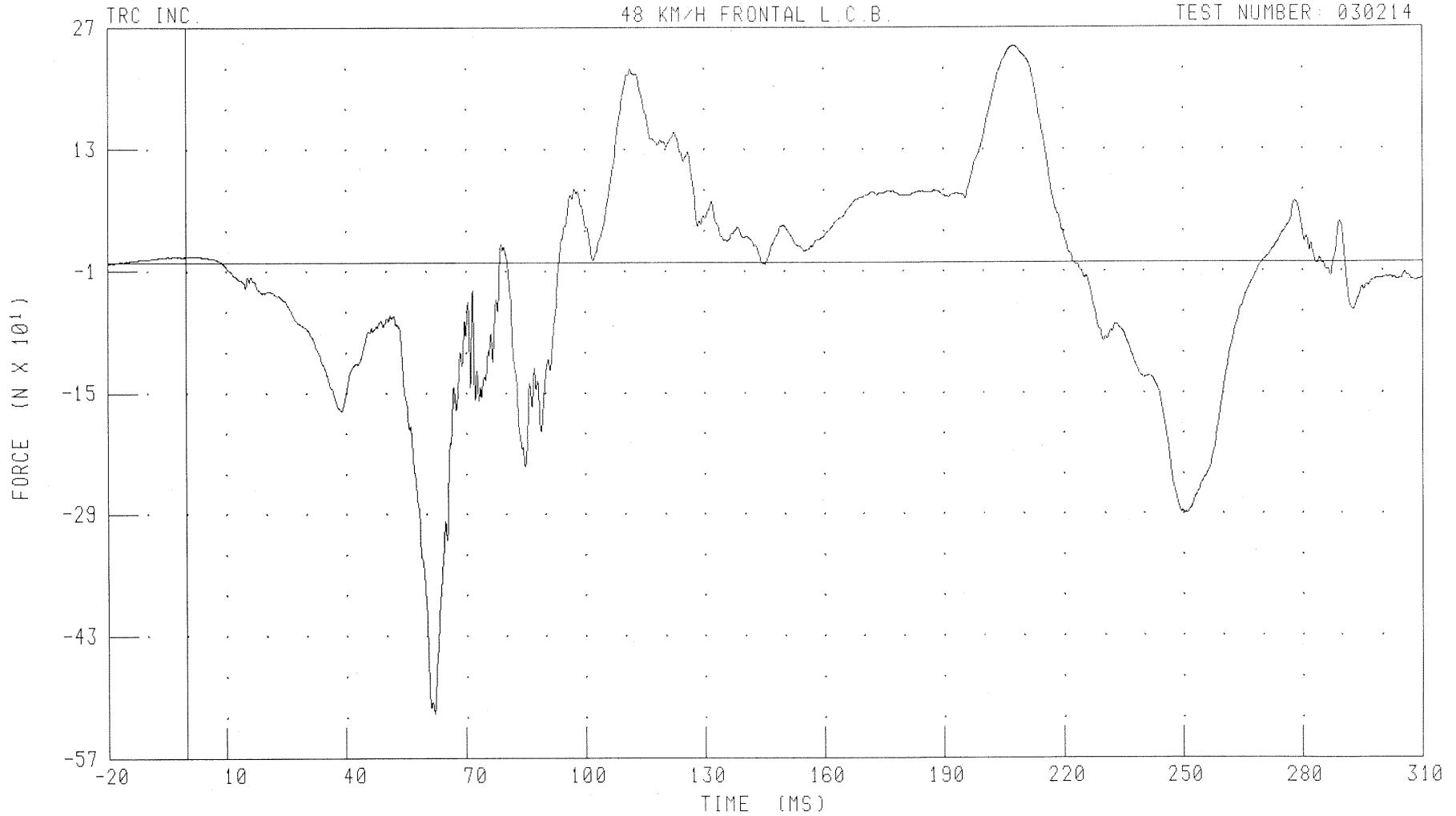
PEAK DATA: 18.28 G @ 87.12 MS; -30.62 G @ 71.68 MS

B-58

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT LOWER TIBIA X-AXIS FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLXF1 FILTER: CH. CLASS 600

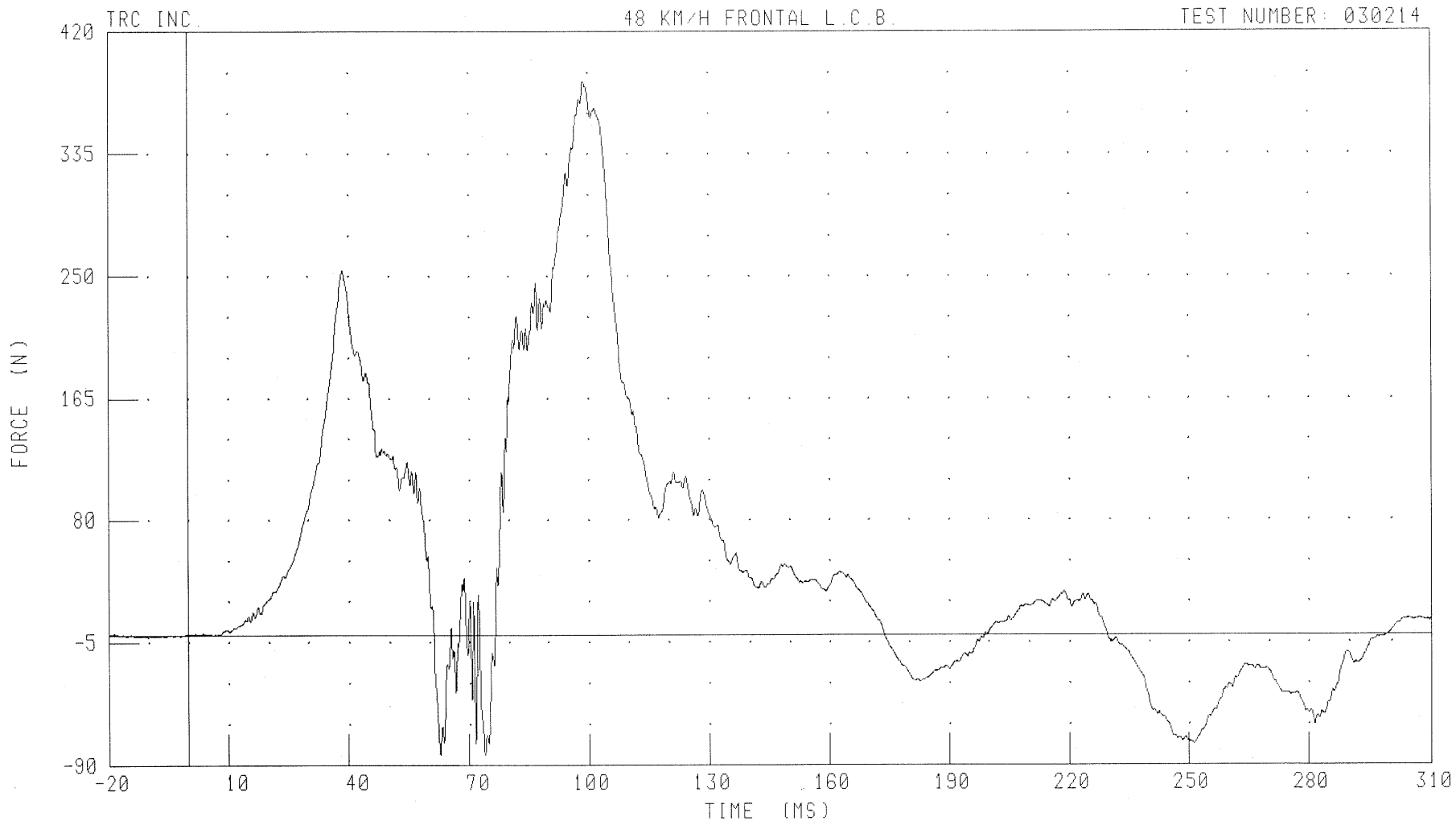
PEAK DATA: 249.35 N @ 207.76 MS; -519.35 N @ 62.00 MS

B-59

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT LOWER TIBIA Y-AXIS FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLYF1

FILTER: CH. CLASS 600

PEAK DATA: 385.48 N @ 99.12 MS; -82.70 N @ 73.92 MS

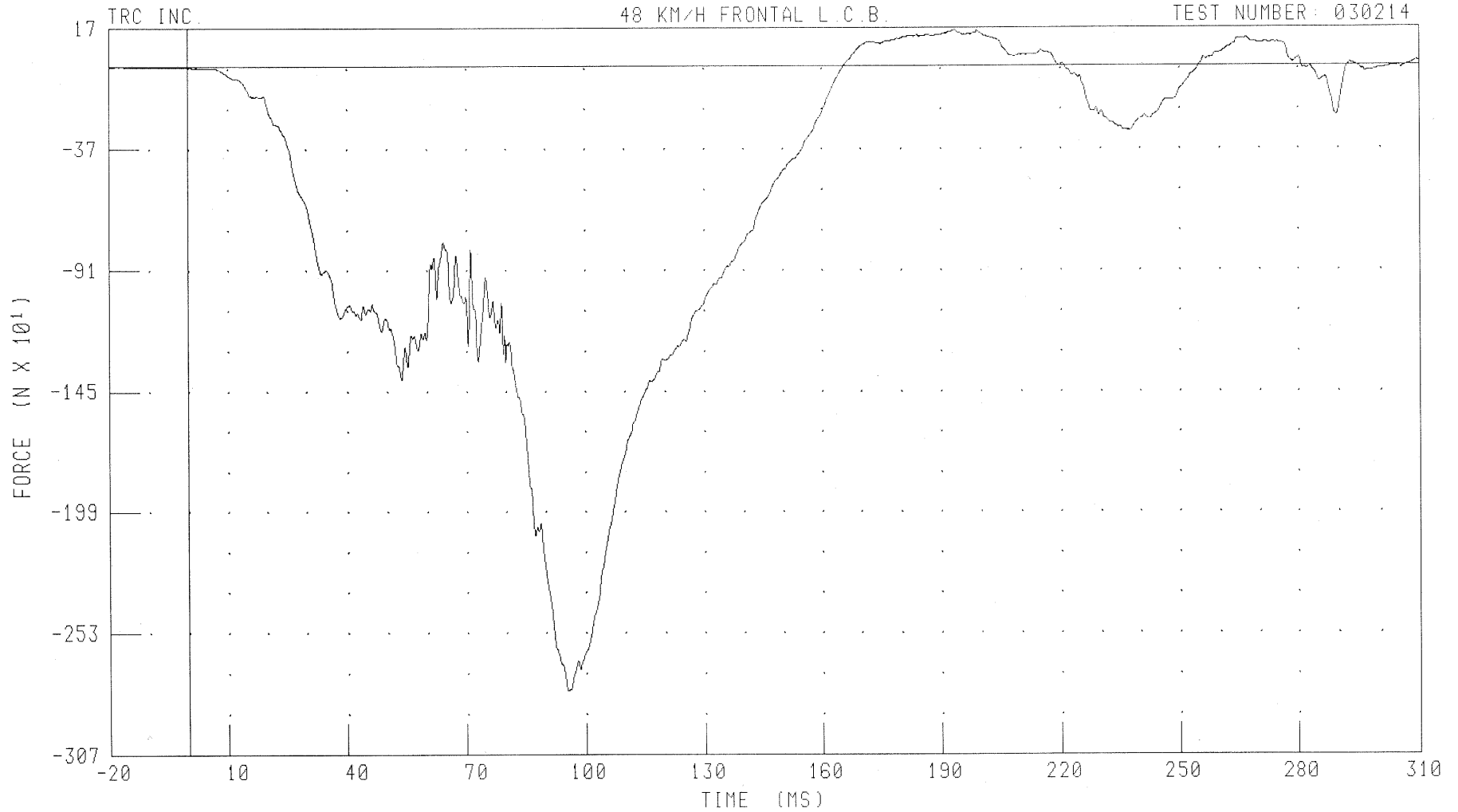
B-60

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT LOWER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-61

030214

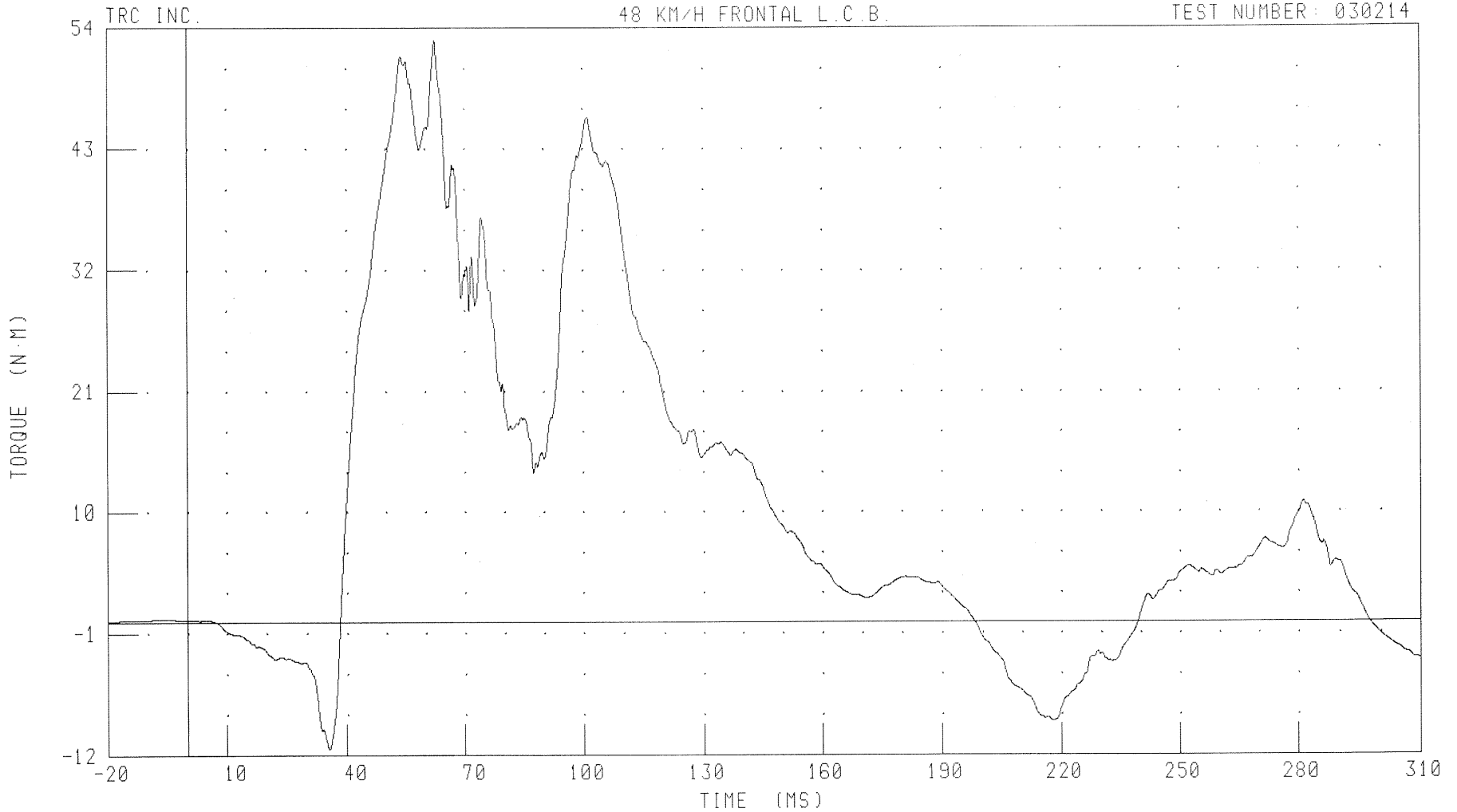
CHANNEL: ANLZF1 FILTER: CH. CLASS 600

PEAK DATA: 160.49 N @ 193.84 MS; -2788.09 N @ 95.52 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT LOWER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLXM1 FILTER: CH. CLASS 600

PEAK DATA: 52.86 N.M @ 62.56 MS; -11.45 N.M @ 35.60 MS

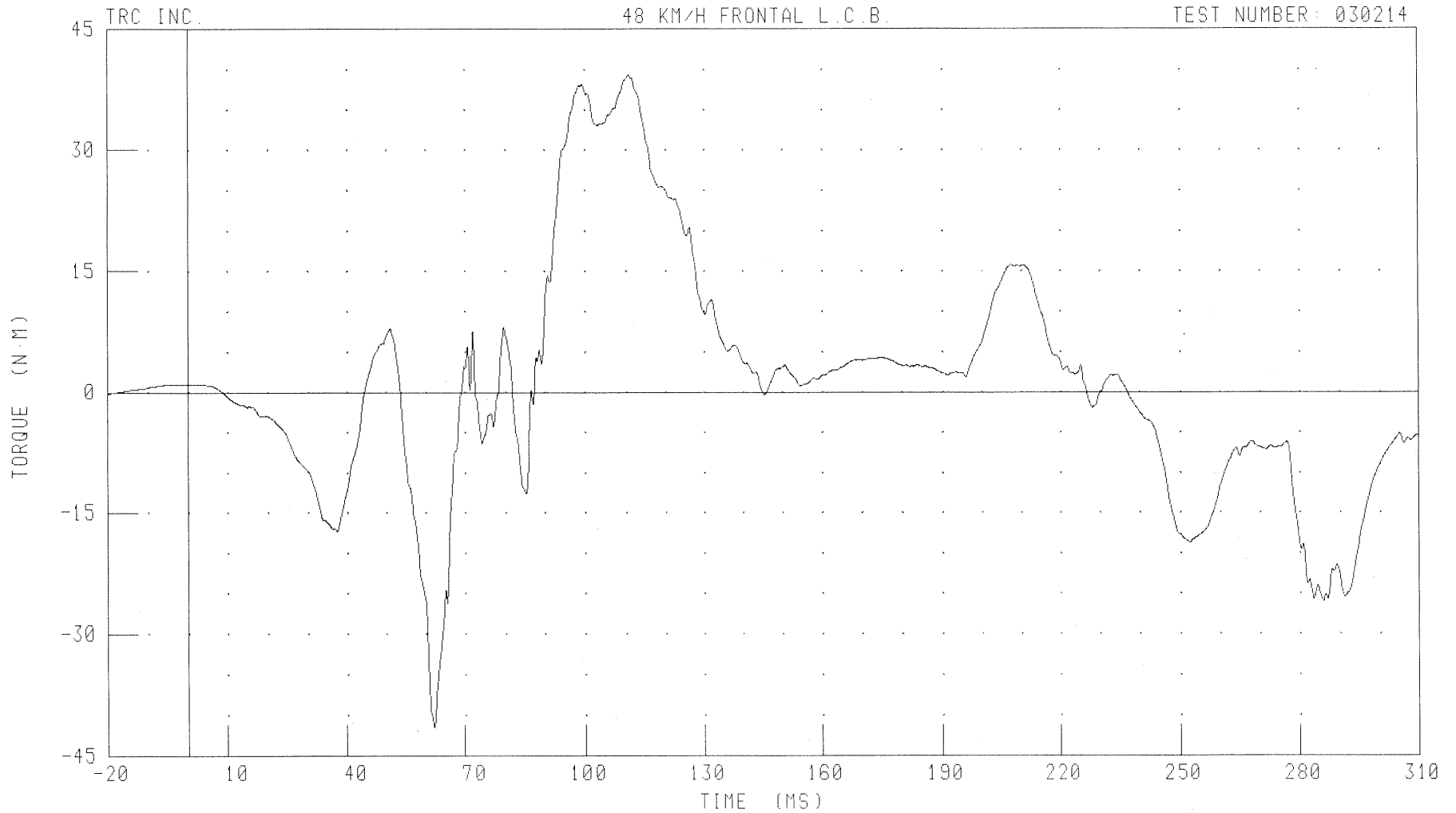
B-62

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLYM1 FILTER: CH. CLASS 600

PEAK DATA: 39.31 N·M @ 110.80 MS, -41.55 N·M @ 62.16 MS

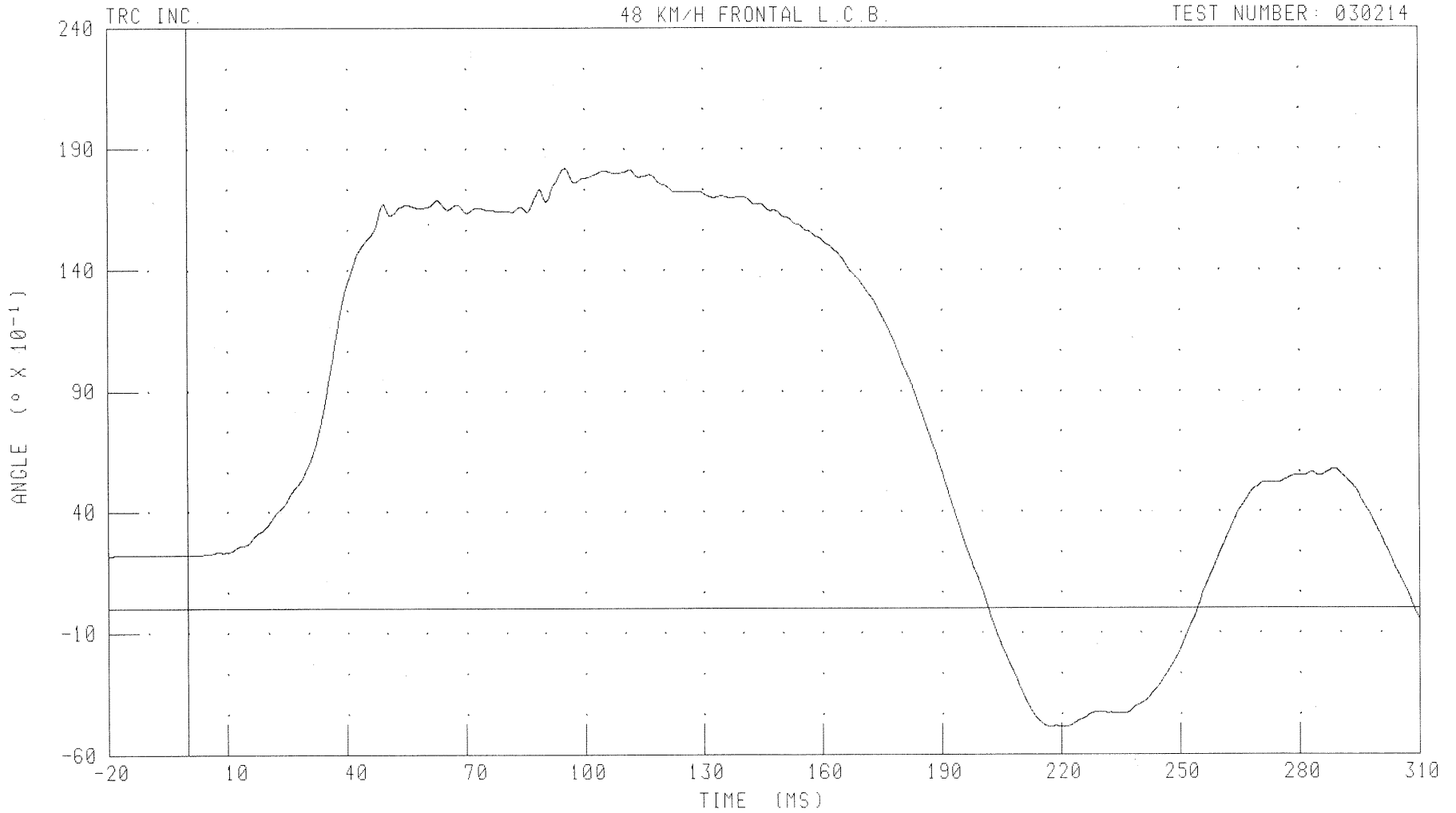
B-63

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT TO ANKLE X-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-64

030214

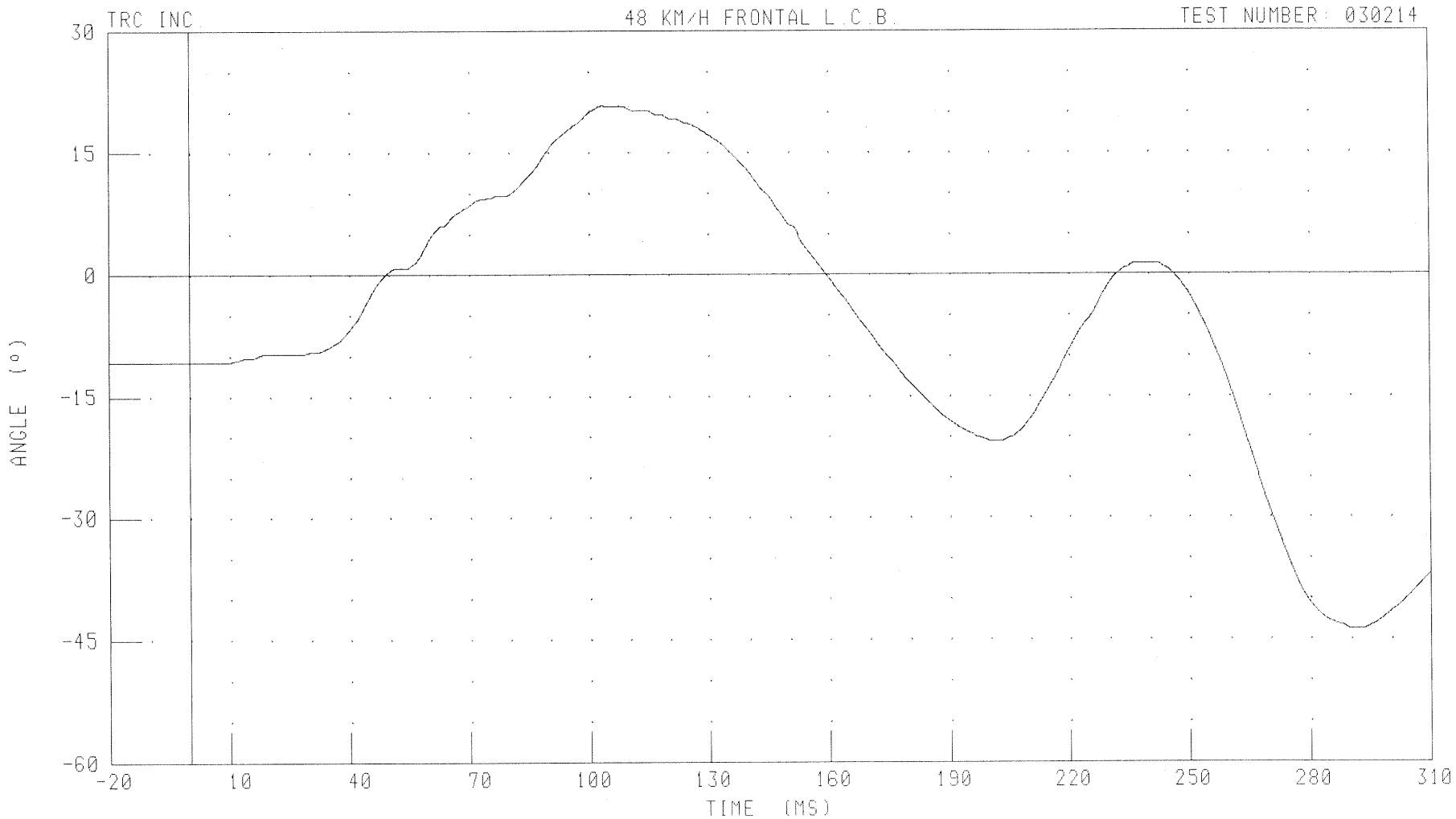
CHANNEL: FTLXD1 FILTER: CH. CLASS 180

PEAK DATA: 18.19 ° @ 95.36 MS; -4.85 ° @ 221.04 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT TO ANKLE Y-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTLYD1

FILTER: CH. CLASS 180

PEAK DATA: 20.83 ° @ 103.52 MS; -43.75 ° @ 290.08 MS

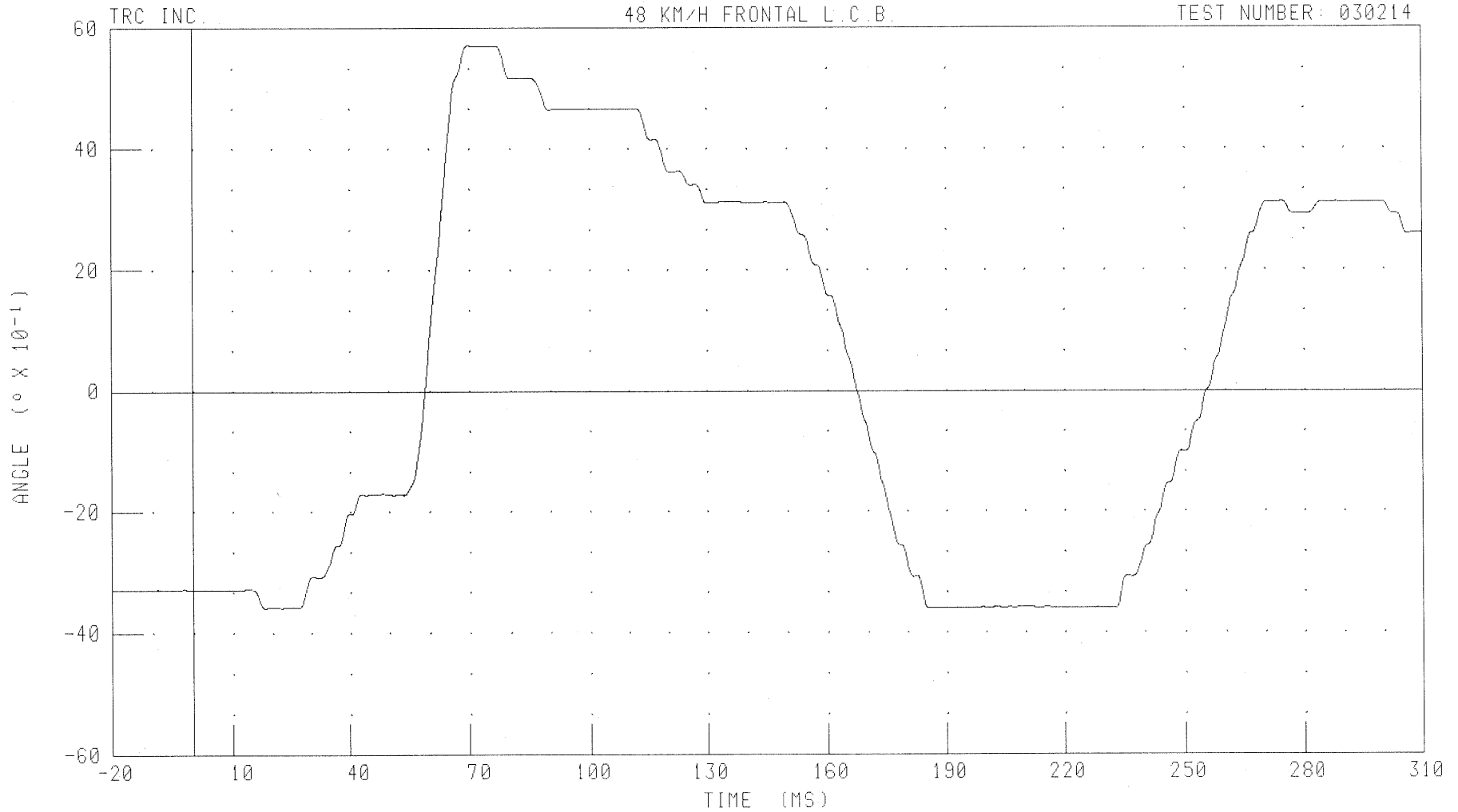
B-65

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT TO ANKLE Z-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTLZD1

FILTER: CH. CLASS 180

PEAK DATA: 5.71 ° @ 70.00 MS; -3.61 ° @ 185.44 MS

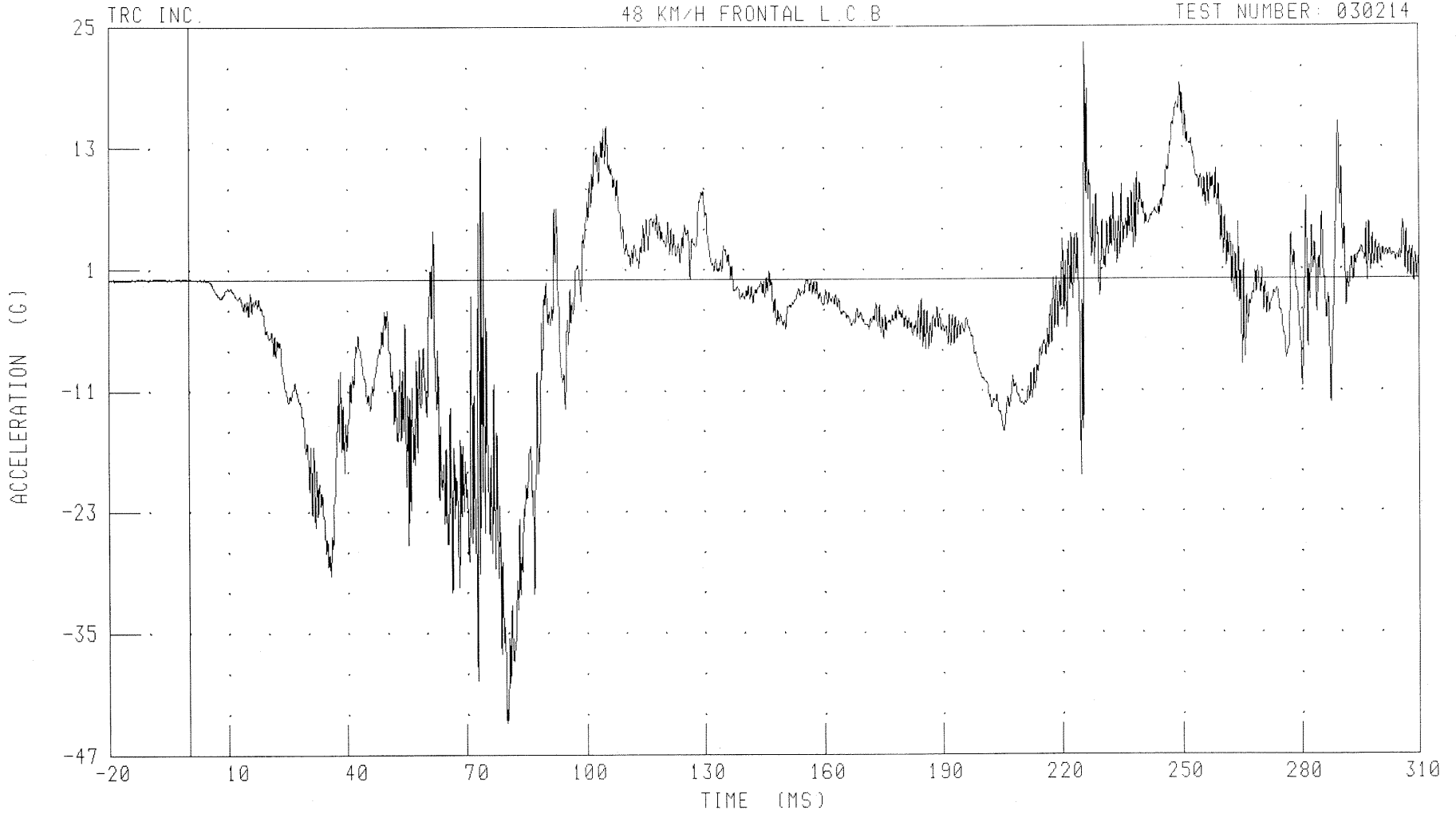
B-66

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT X-AXIS ACCELERATION

48 KM/H FRONTAL L.C B

TEST NUMBER: 030214



CHANNEL: FTLXG1 FILTER: CH. CLASS 1000

PEAK DATA: 23.37 G @ 225.92 MS; -43.86 G @ 79.68 MS

B-67

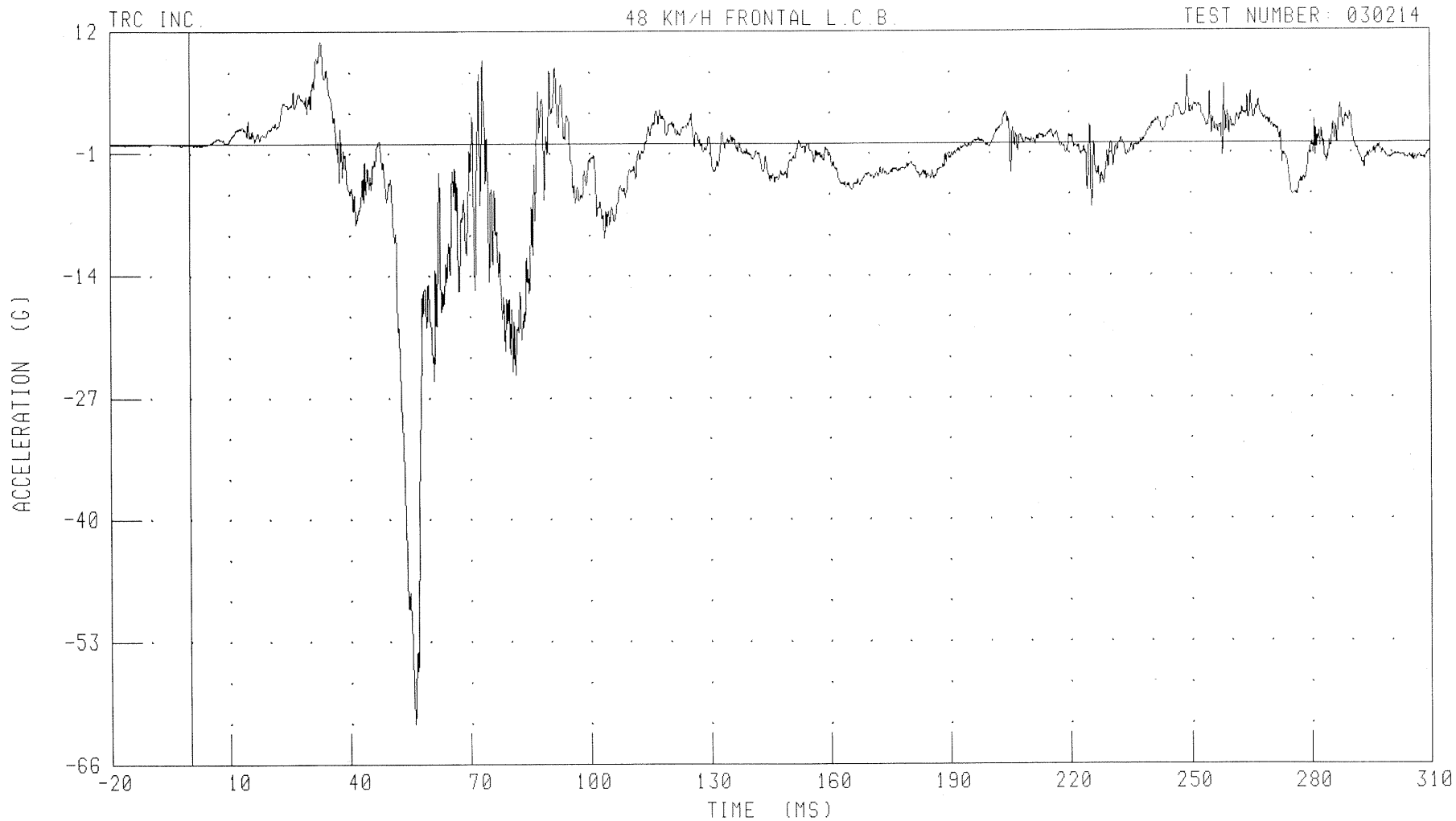
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER LEFT FOOT Y-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTLYG1 FILTER: CH. CLASS 1000

PEAK DATA: 10.94 G @ 33.04 MS; -61.68 G @ 56.16 MS

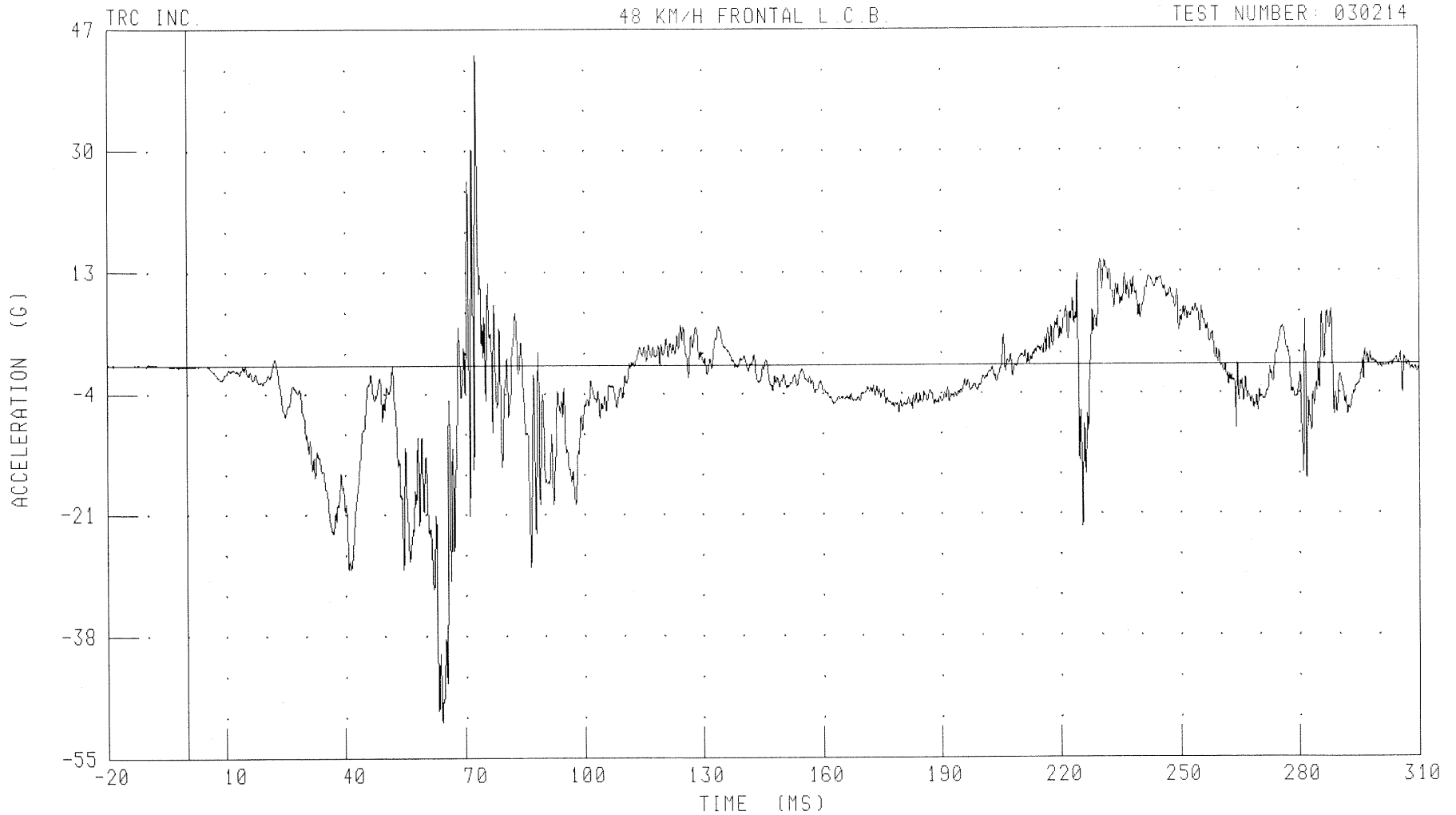
B-68

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTLZG1 FILTER: CH. CLASS 1000

PEAK DATA: 43.46 G @ 72.80 MS; -49.99 G @ 63.92 MS

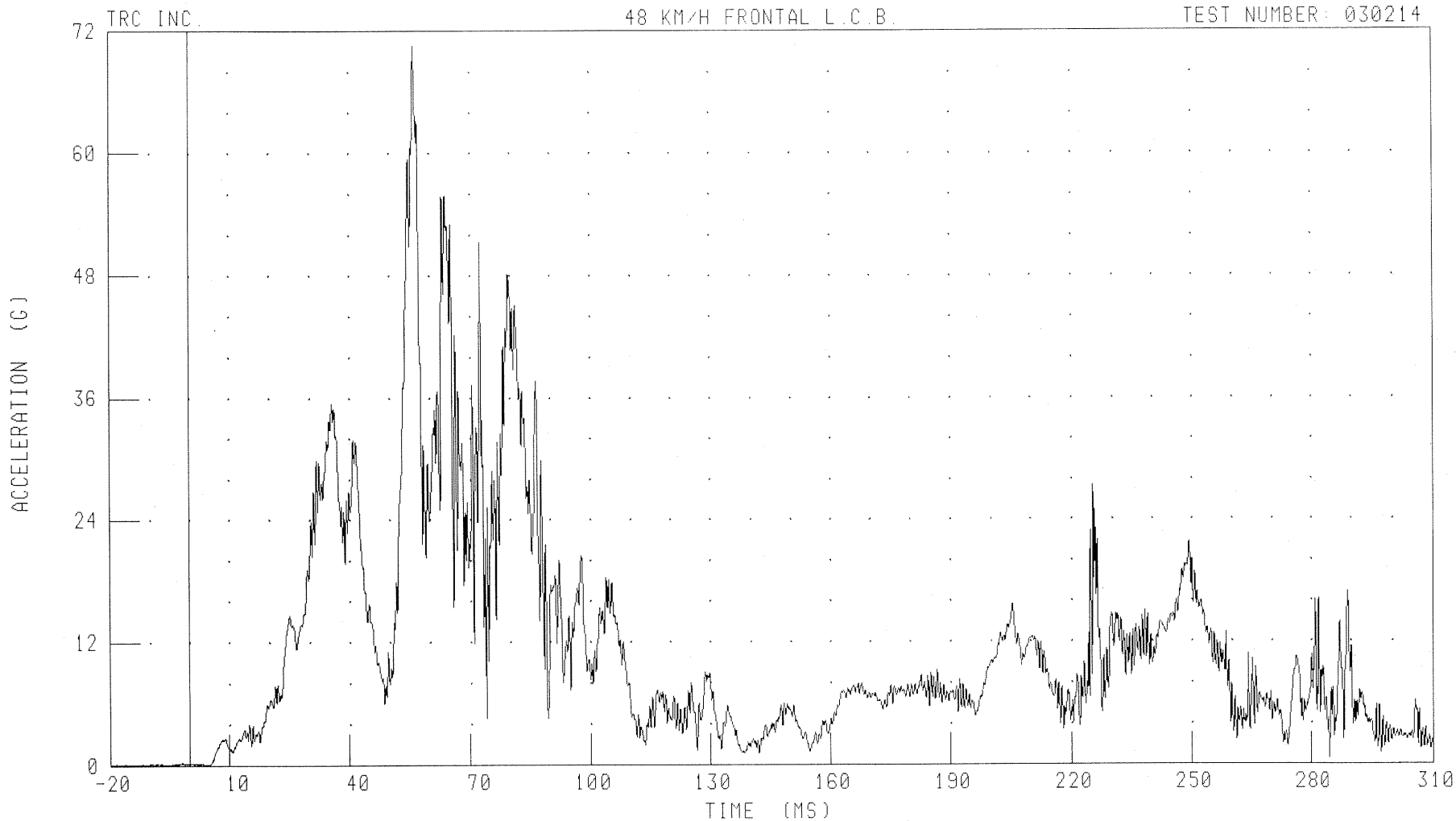
B-69

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER LEFT FOOT RESULTANT ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTLRG1 FILTER: CH. CLASS 1000

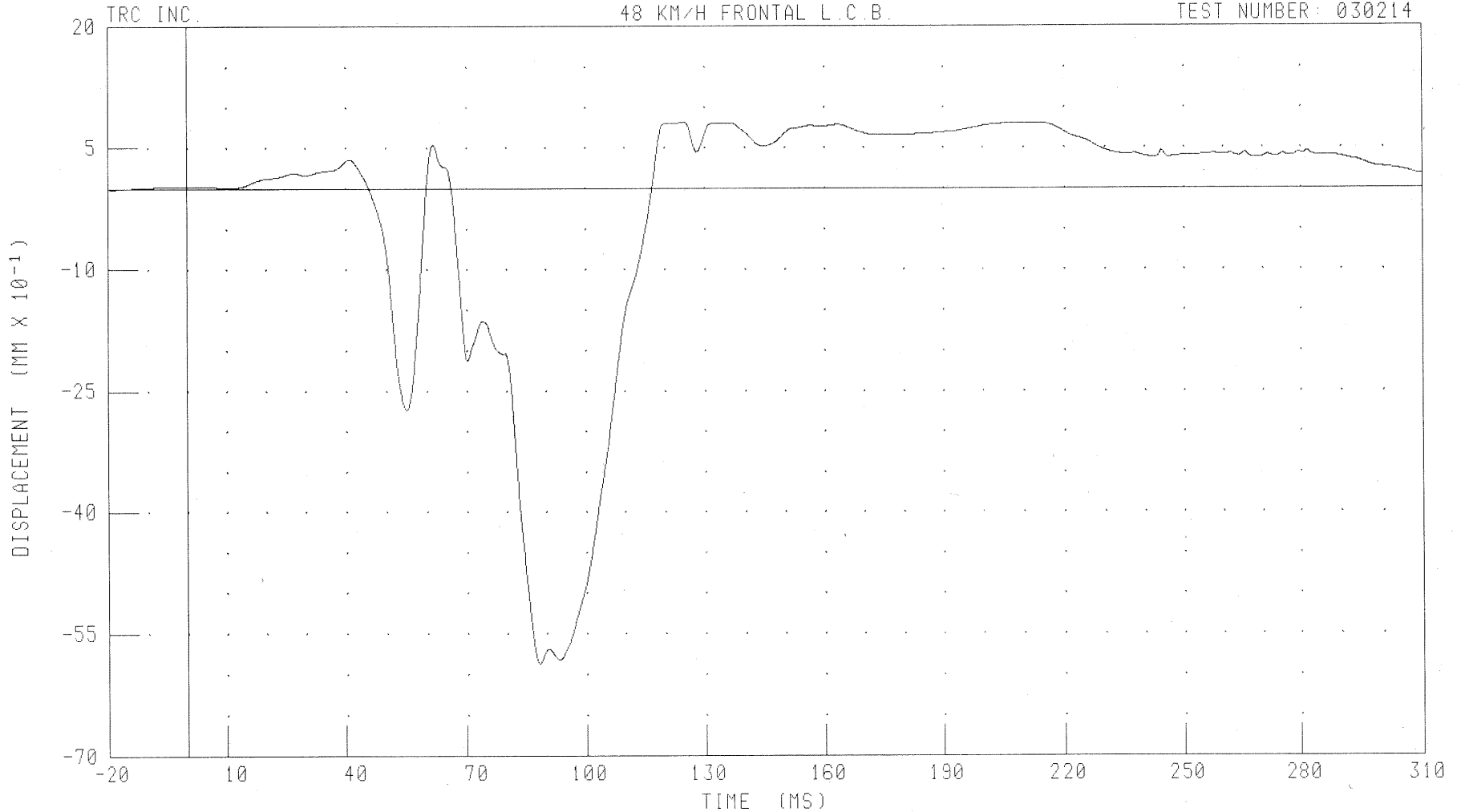
PEAK DATA: 70.59 G @ 56.16 MS; 0.00 G @ -4.96 MS

B-70

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT KNEE DISPLACEMENT  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: KNRXD1

FILTER: CH. CLASS 180

PEAK DATA: 0.81 MM @ 125.12 MS, -5.87 MM @ 88.32 MS

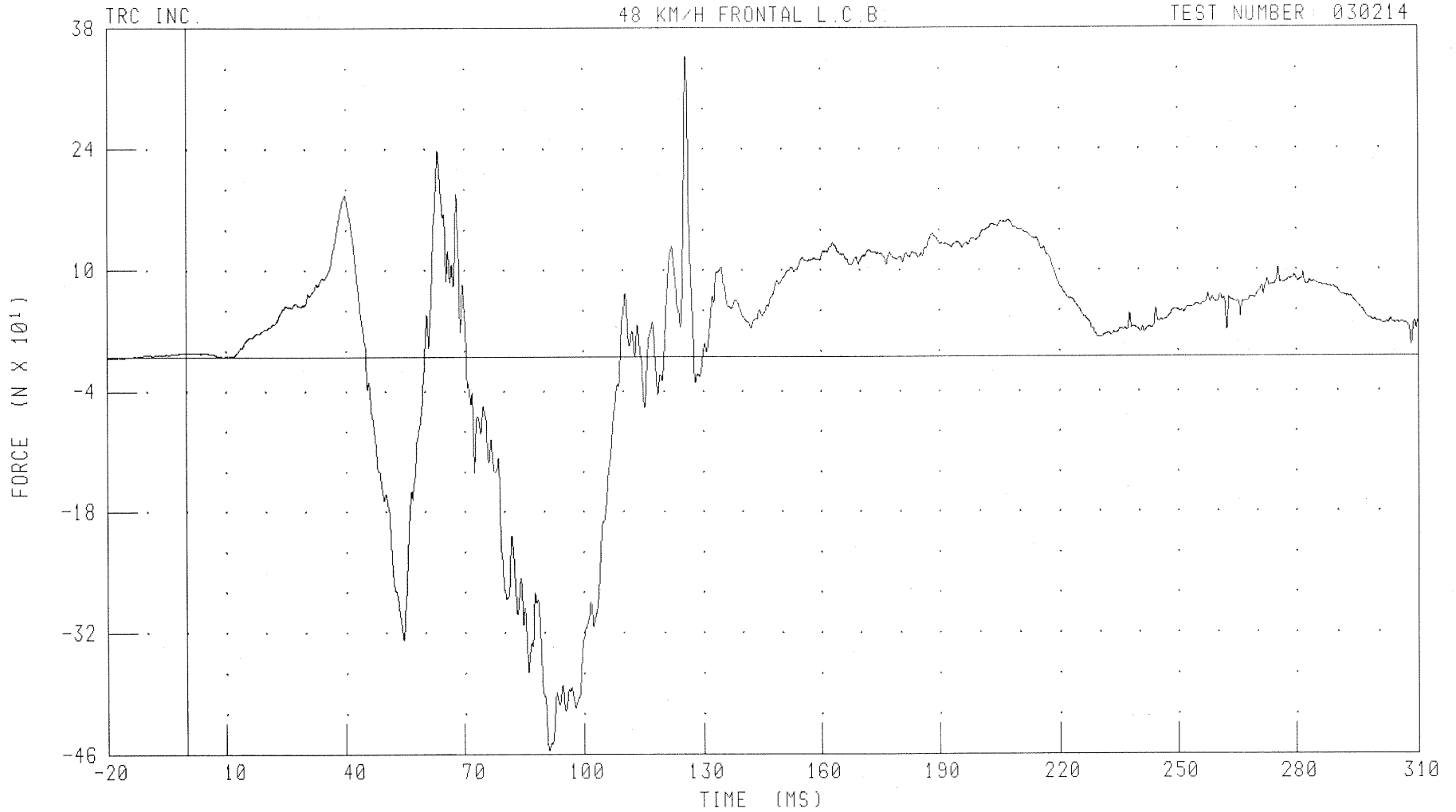
B-71

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT UPPER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRXF1 FILTER: CH. CLASS 600

PEAK DATA: 347.42 N @ 125.92 MS; -455.14 N @ 91.04 MS

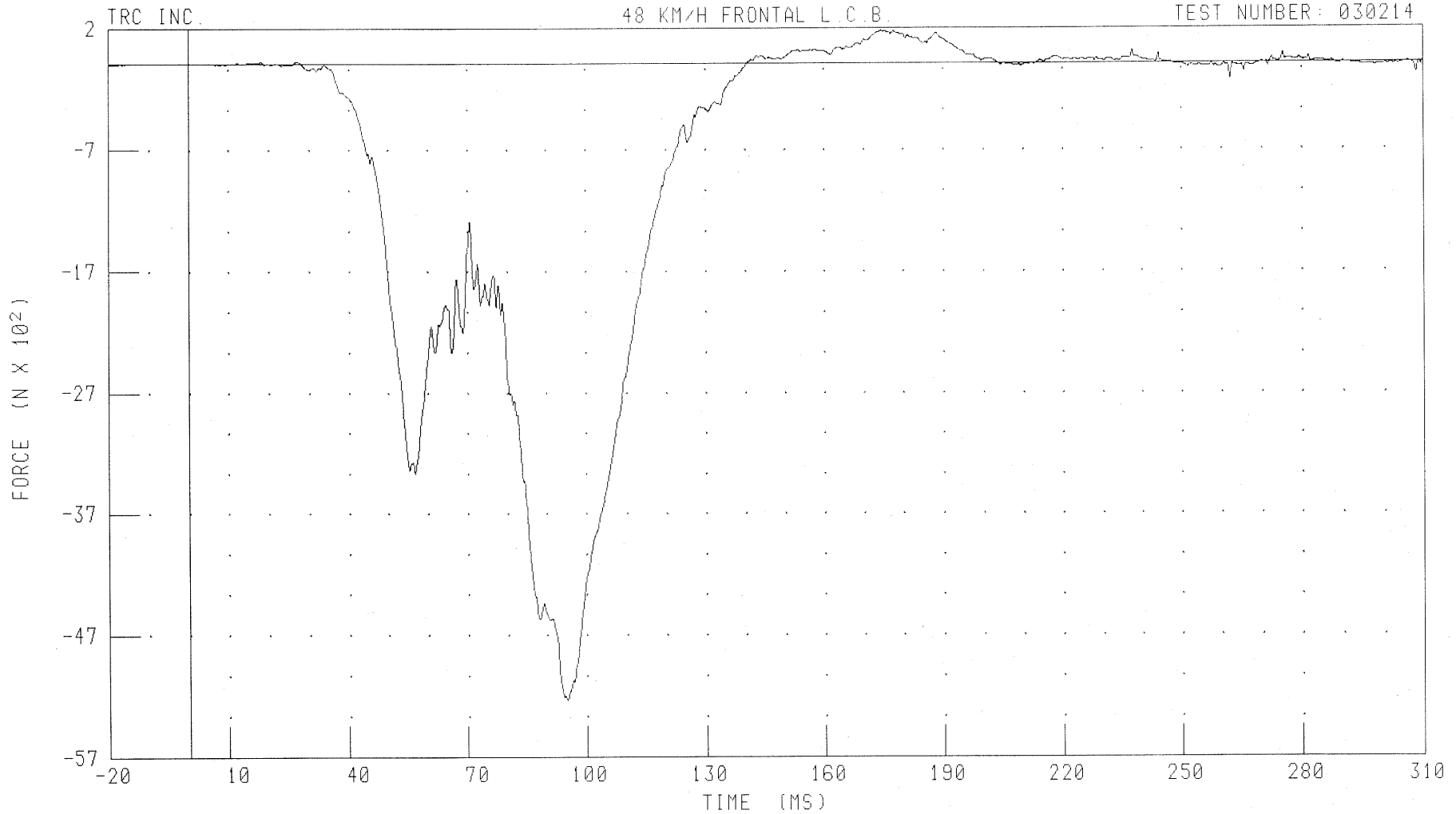
B-72

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT UPPER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRZF1 FILTER: CH. CLASS 600

PEAK DATA: 271.41 N @ 174.72 MS; -5241.19 N @ 95.20 MS

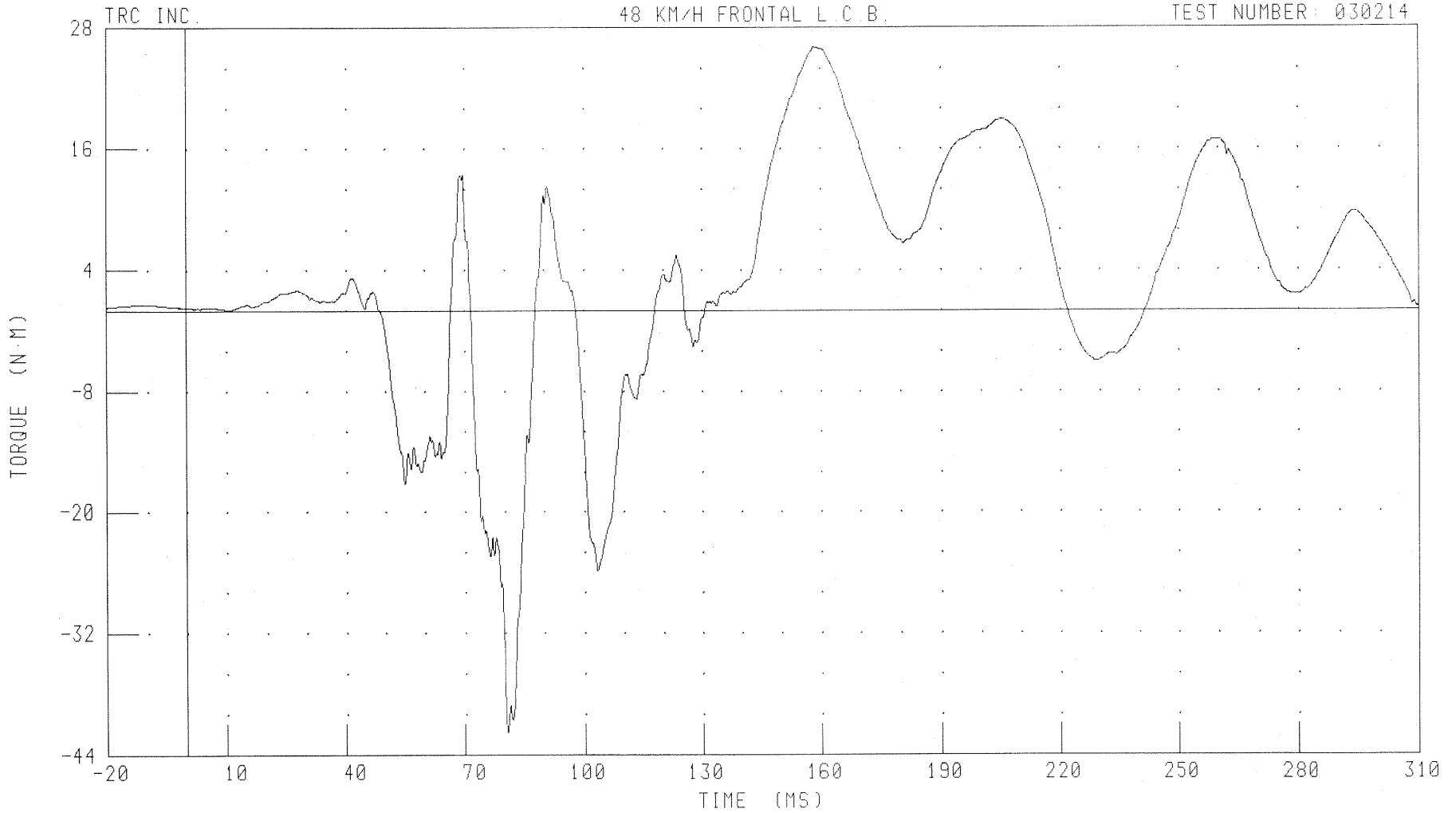
B-73

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L C B.

TEST NUMBER: 030214



CHANNEL: TBRXM1 FILTER: CH. CLASS 600

PEAK DATA: 26.08 N.M @ 158.56 MS, -41.82 N.M @ 80.64 MS

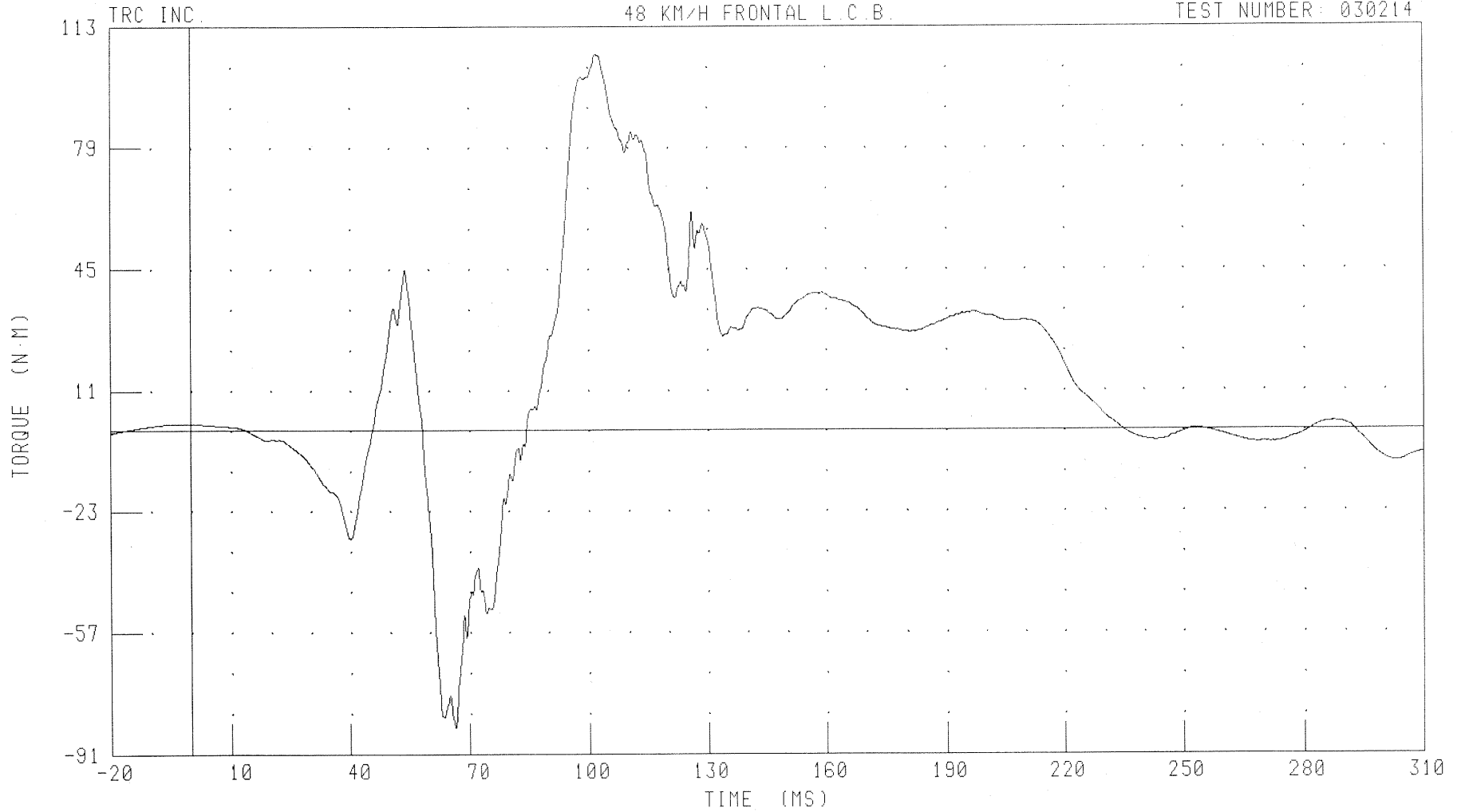
B-74

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRYM1

FILTER: CH. CLASS 600

TIME (MS)

PEAK DATA: 105.30 N-M @ 102.16 MS; -83.56 N-M @ 66.40 MS

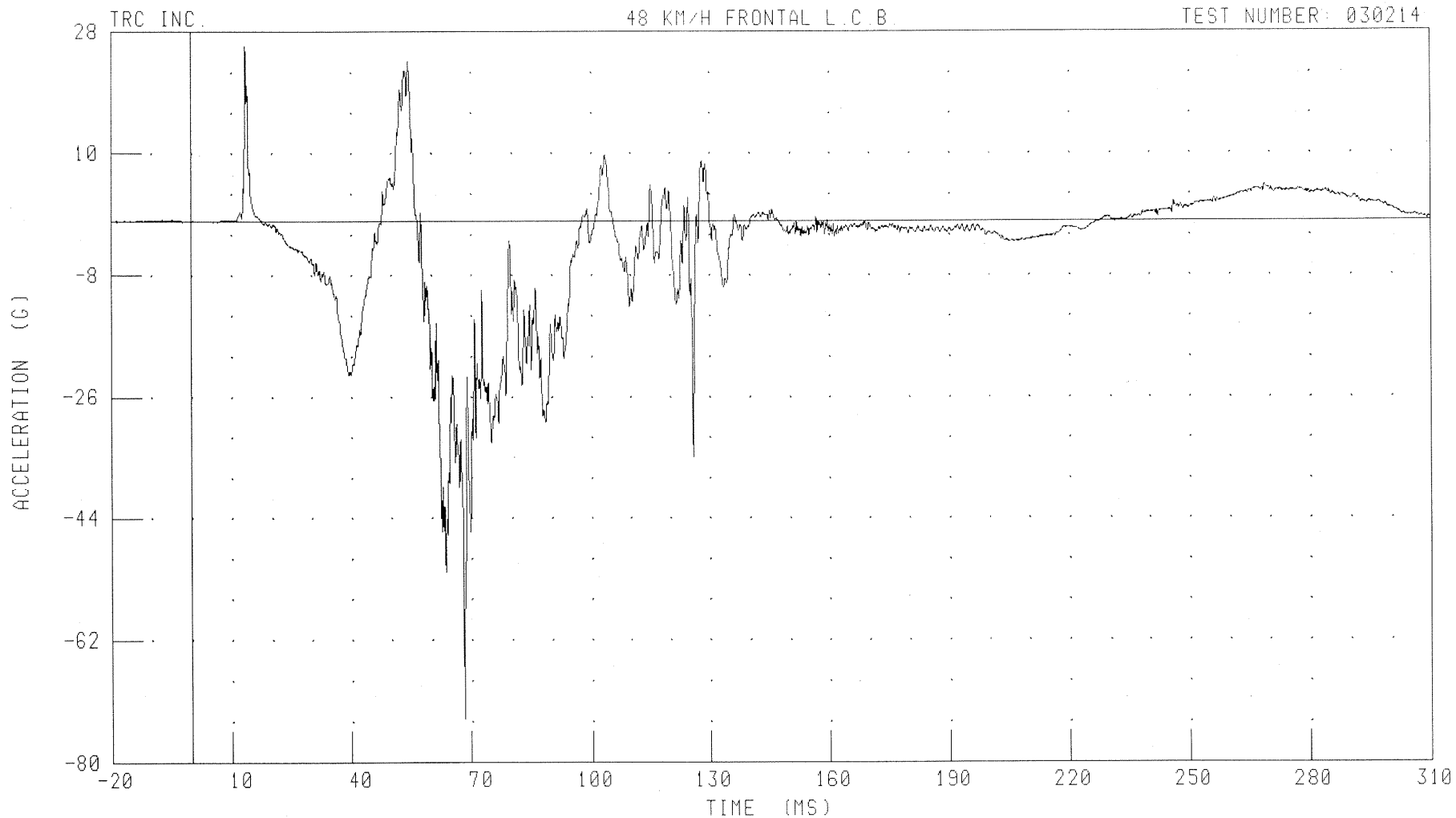
B-75

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT TIBIA X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRXG1 FILTER: CH. CLASS 1000

PEAK DATA: 25.87 G @ 13.60 MS; -73.65 G @ 68.32 MS

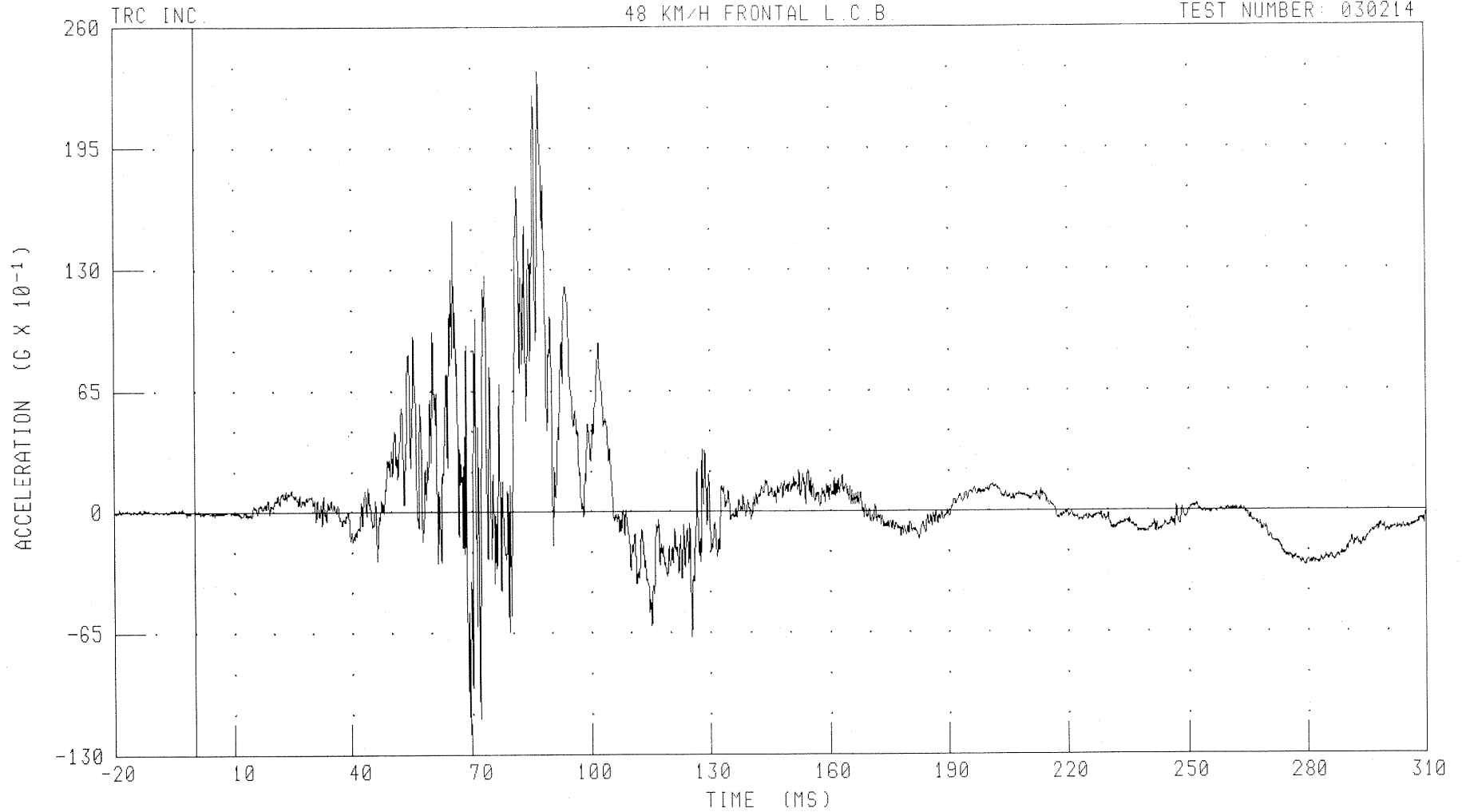
B-76

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT TIBIA Y-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRYG1

FILTER: CH. CLASS 1000

PEAK DATA: 23.64 G @ 86.96 MS; -11.90 G @ 69.52 MS

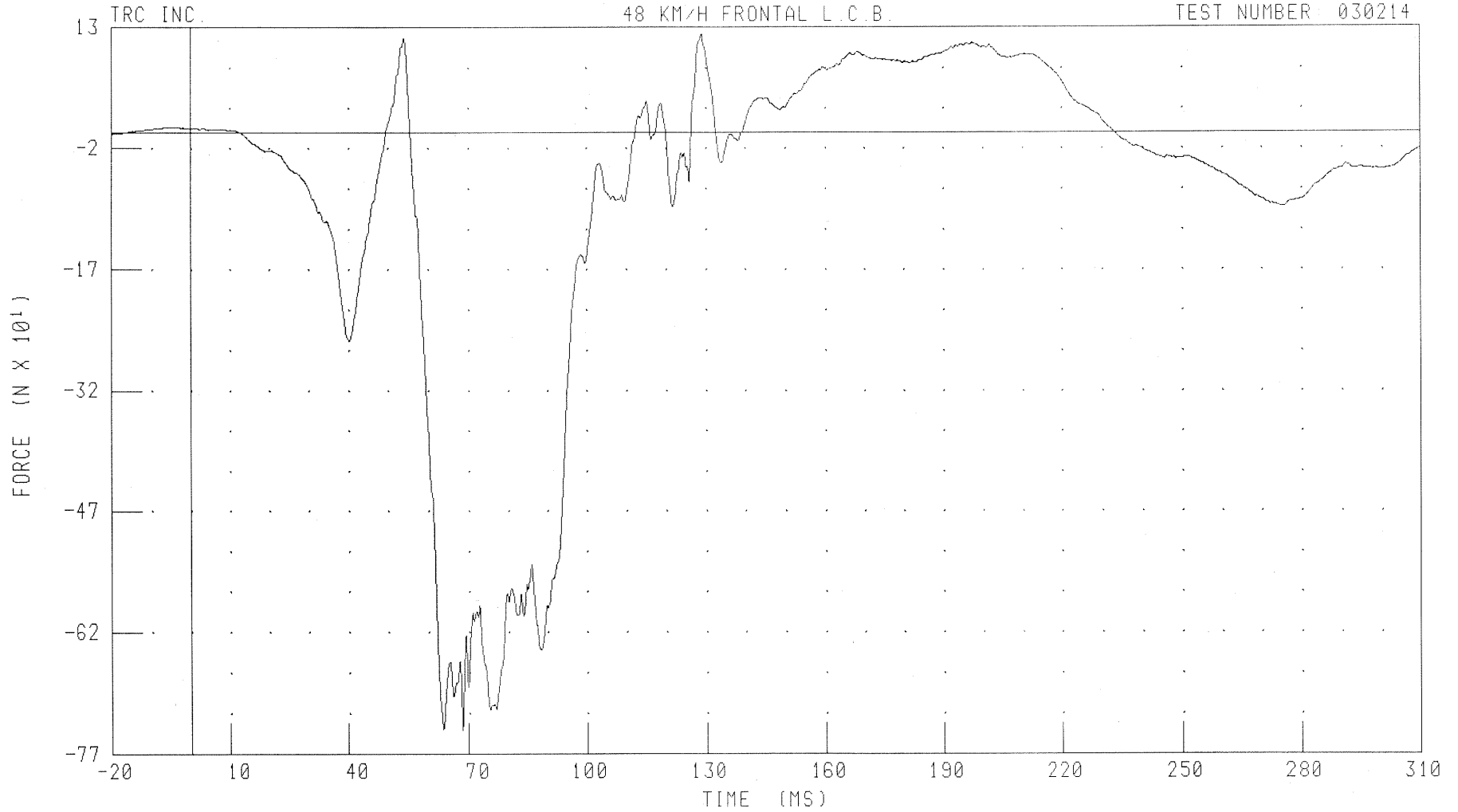
B-77

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT LOWER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER 030214



CHANNEL: ANRXF1

FILTER: CH. CLASS 600

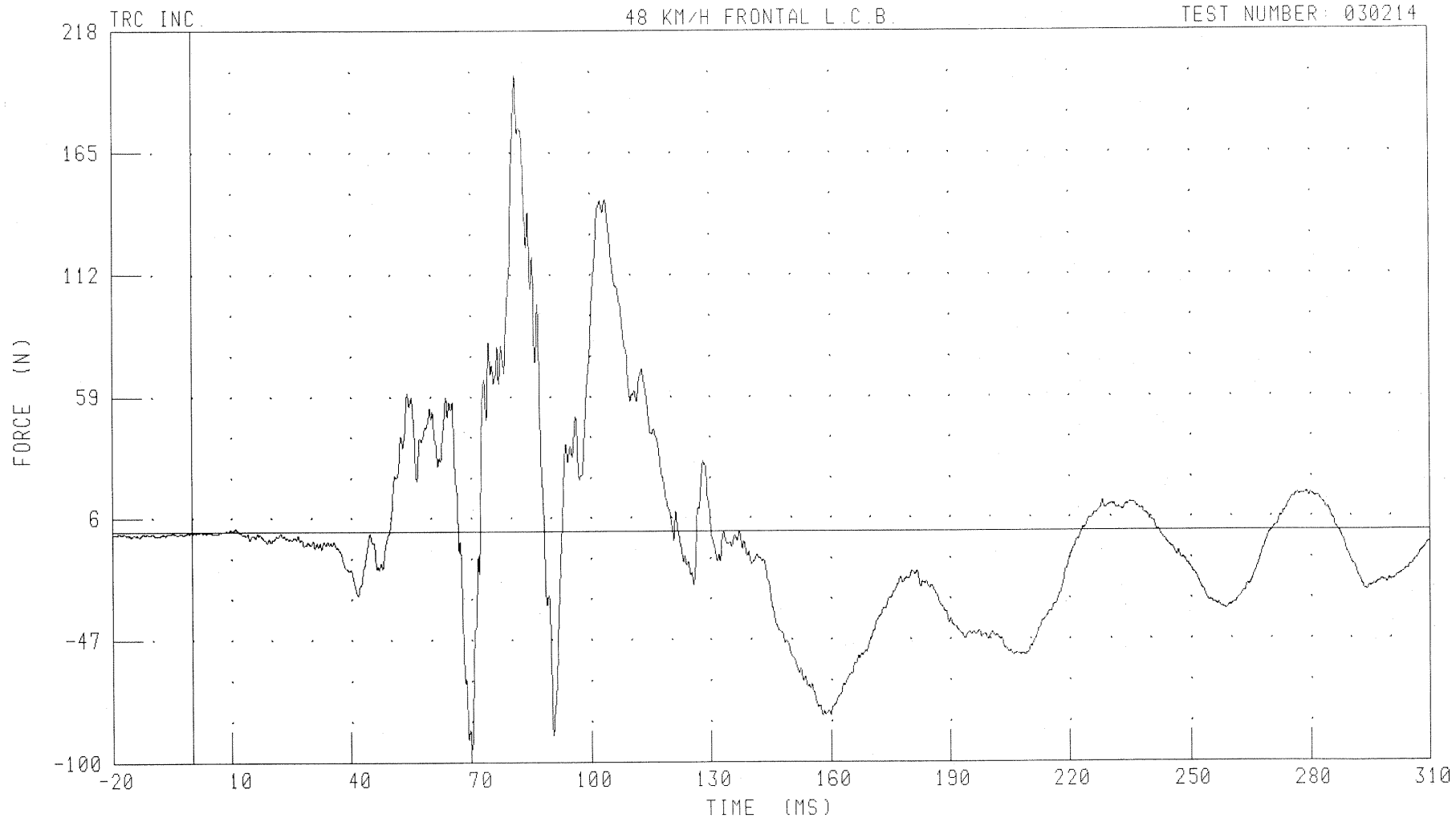
PEAK DATA: 121.87 N @ 129.12 MS; -741.23 N @ 68.40 MS

B-78

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT LOWER TIBIA Y-AXIS FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRYF1

FILTER: CH. CLASS 600

PEAK DATA: 198.71 N @ 81.36 MS; -94.08 N @ 70.16 MS

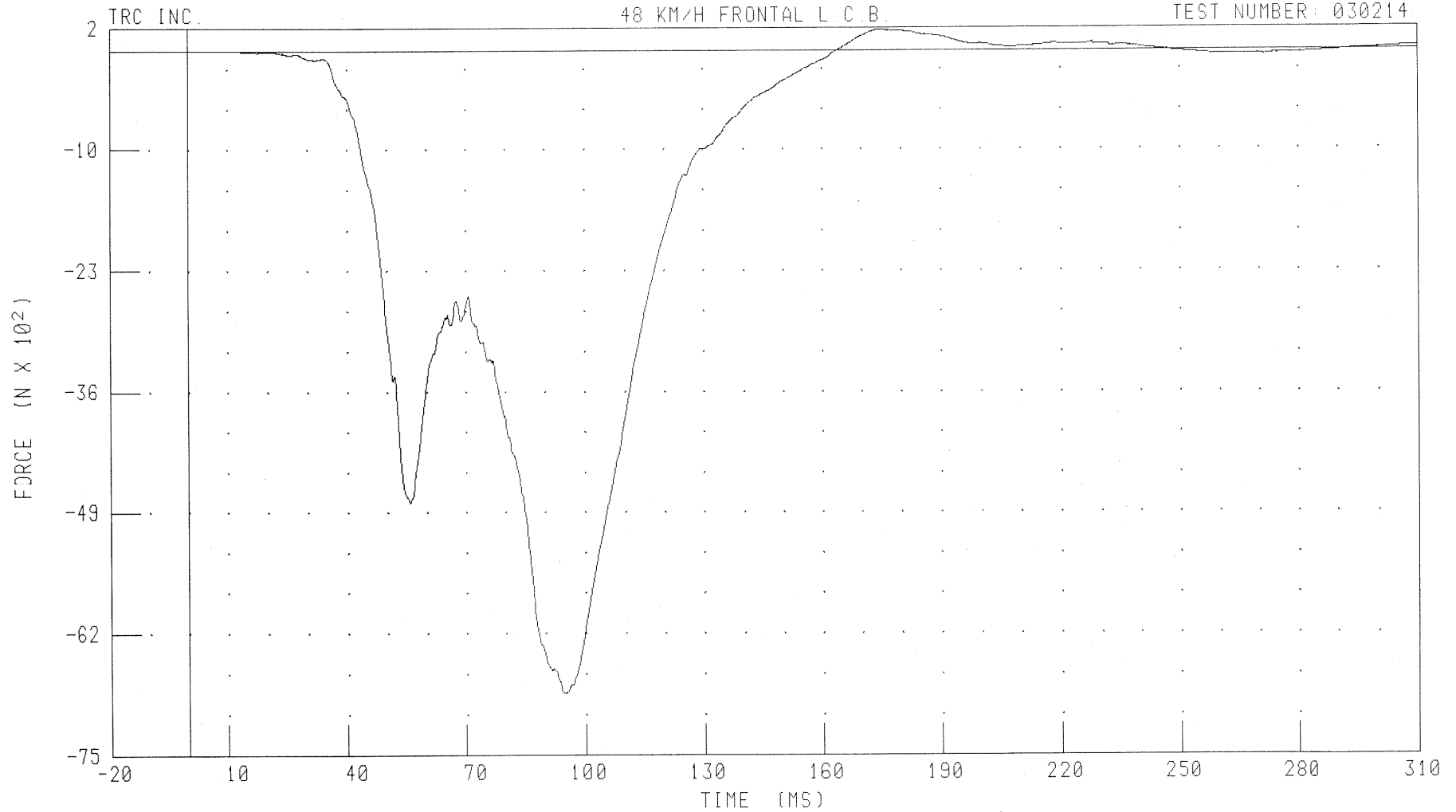
B-79

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRZF1 FILTER: CH. CLASS 600

PEAK DATA: 220.39 N @ 174.80 MS; -6901.34 N @ 94.56 MS

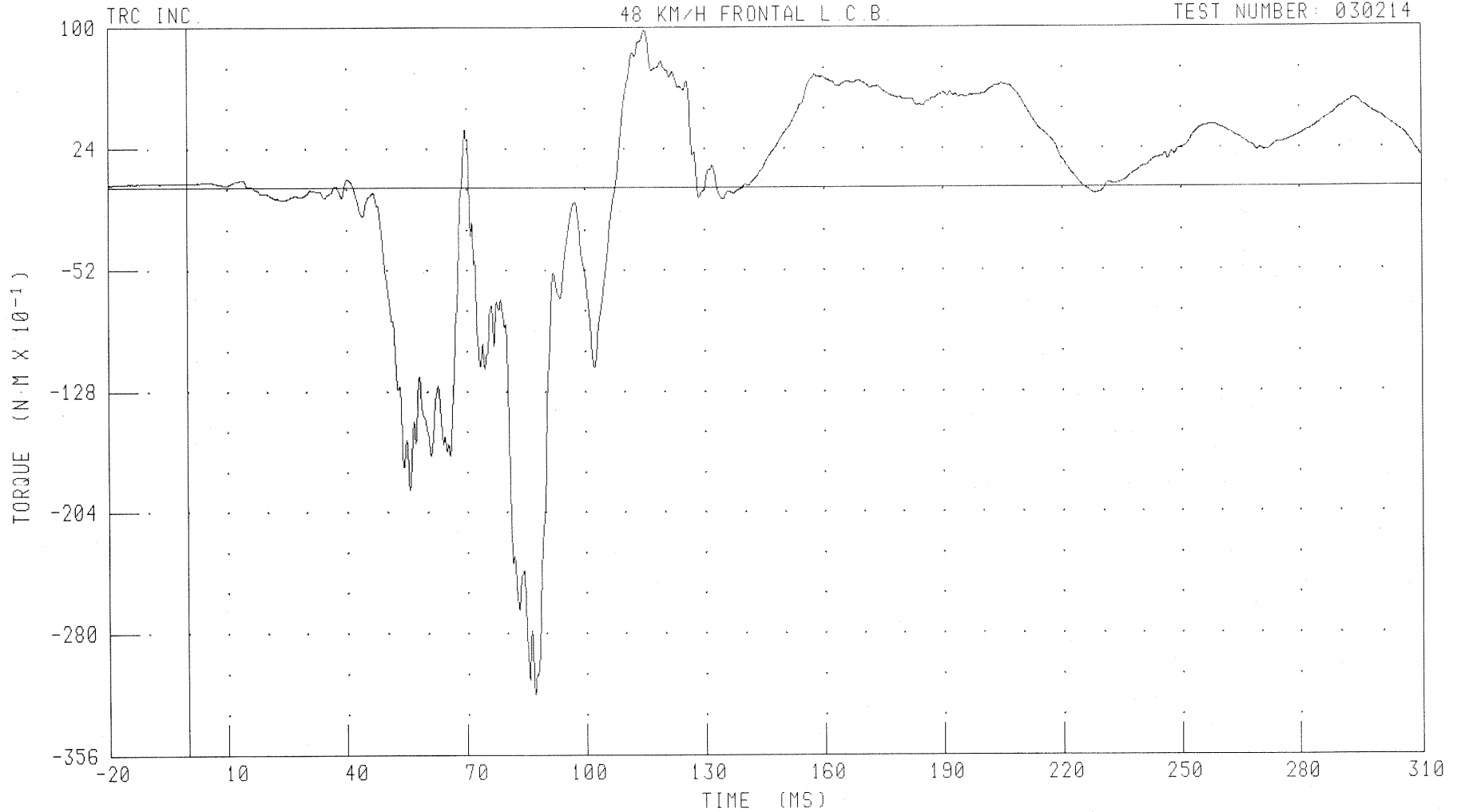
B-80

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT LOWER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRXM1

FILTER: CH. CLASS 600

PEAK DATA: 9.85 N·M @ 115.52 MS; -31.82 N·M @ 87.12 MS

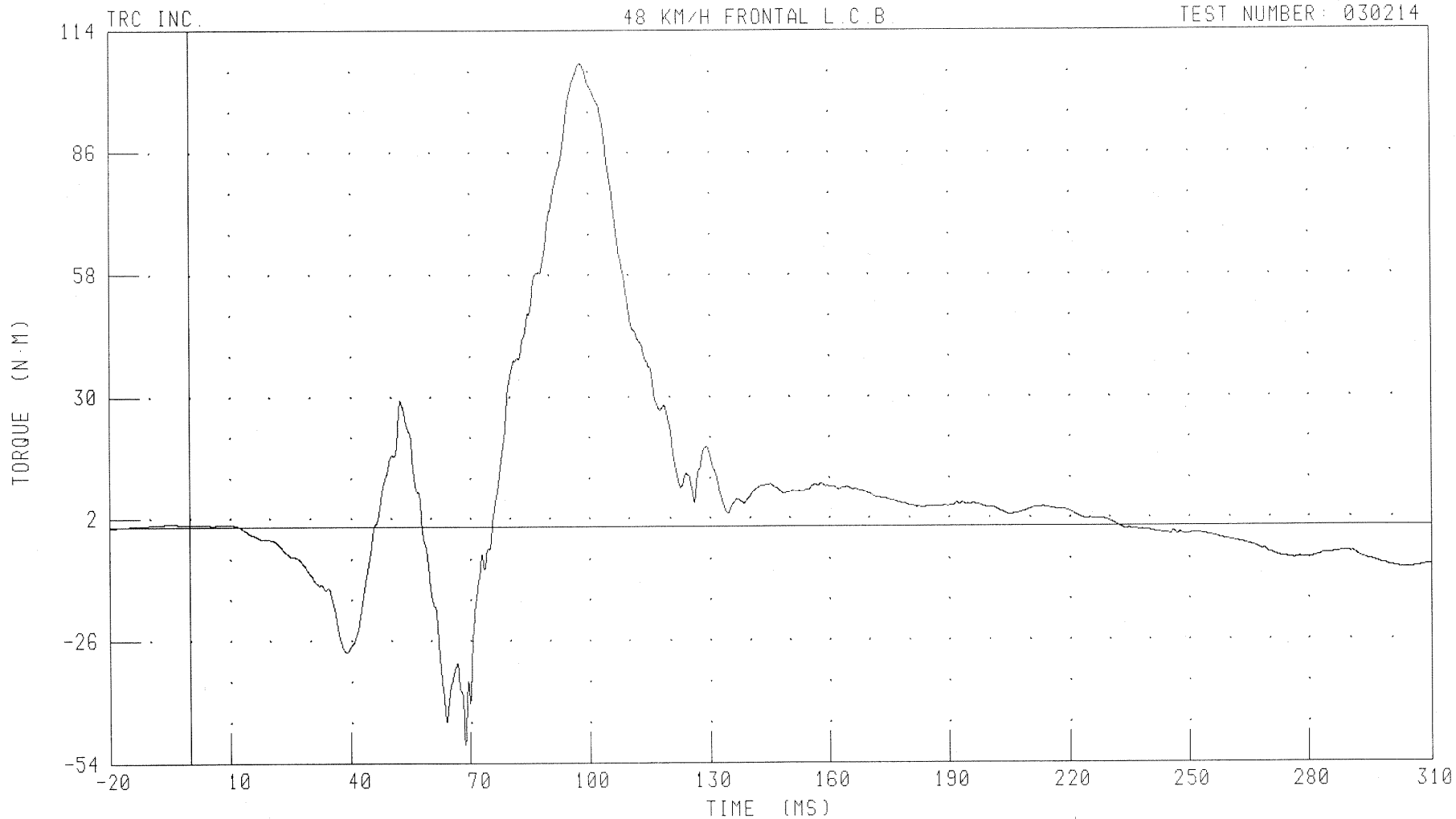
B-81

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B

TEST NUMBER: 030214



CHANNEL: ANRYM1 FILTER: CH. CLASS 600

PEAK DATA: 106.41 N·M @ 98.16 MS; -49.80 N·M @ 68.64 MS

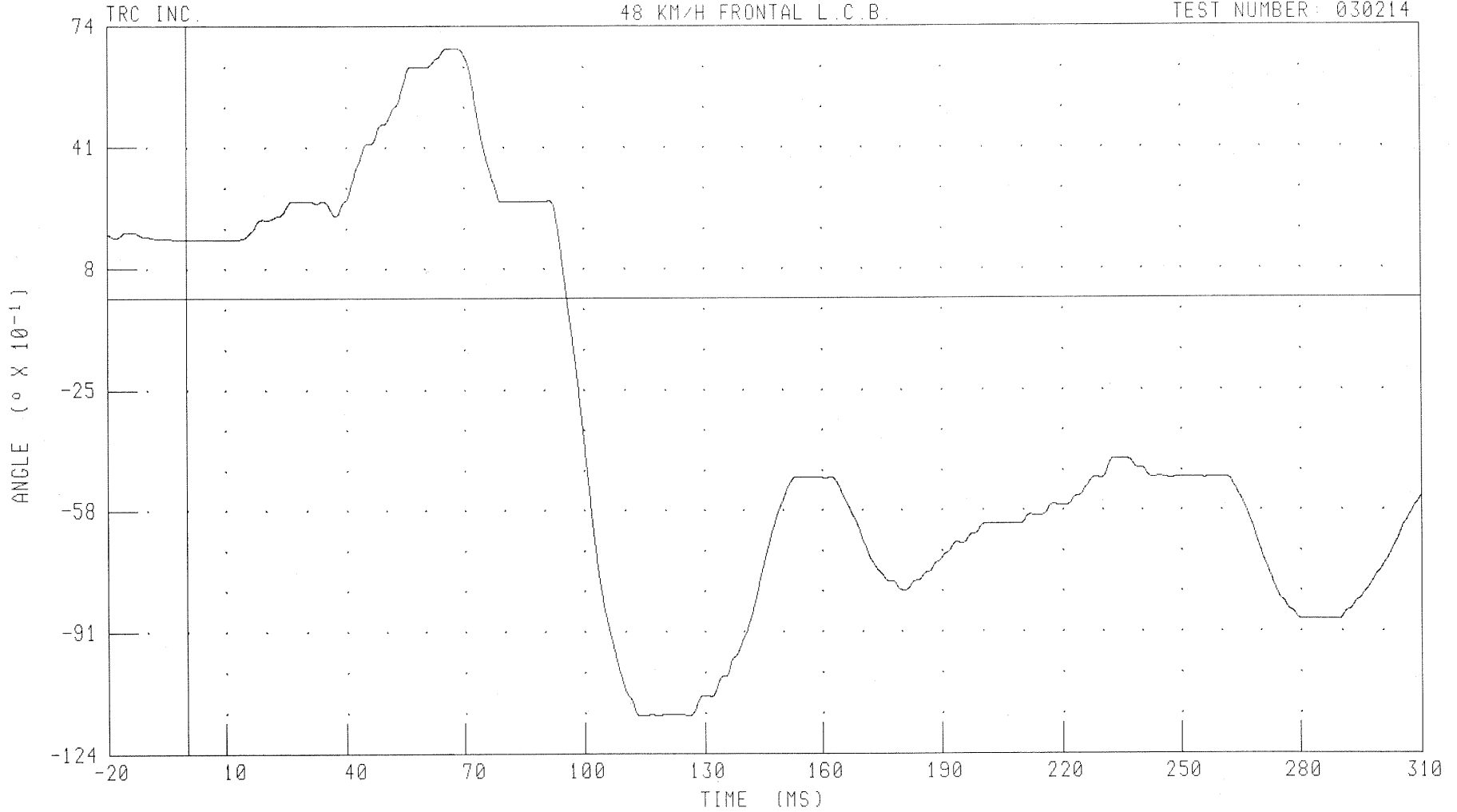
B-82

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H.  
DRIVER RIGHT FOOT TO ANKLE X-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRXD1

FILTER: CH. CLASS 180

PEAK DATA: 6.79 ° @ 65.92 MS; -11.37 ° @ 113.60 MS

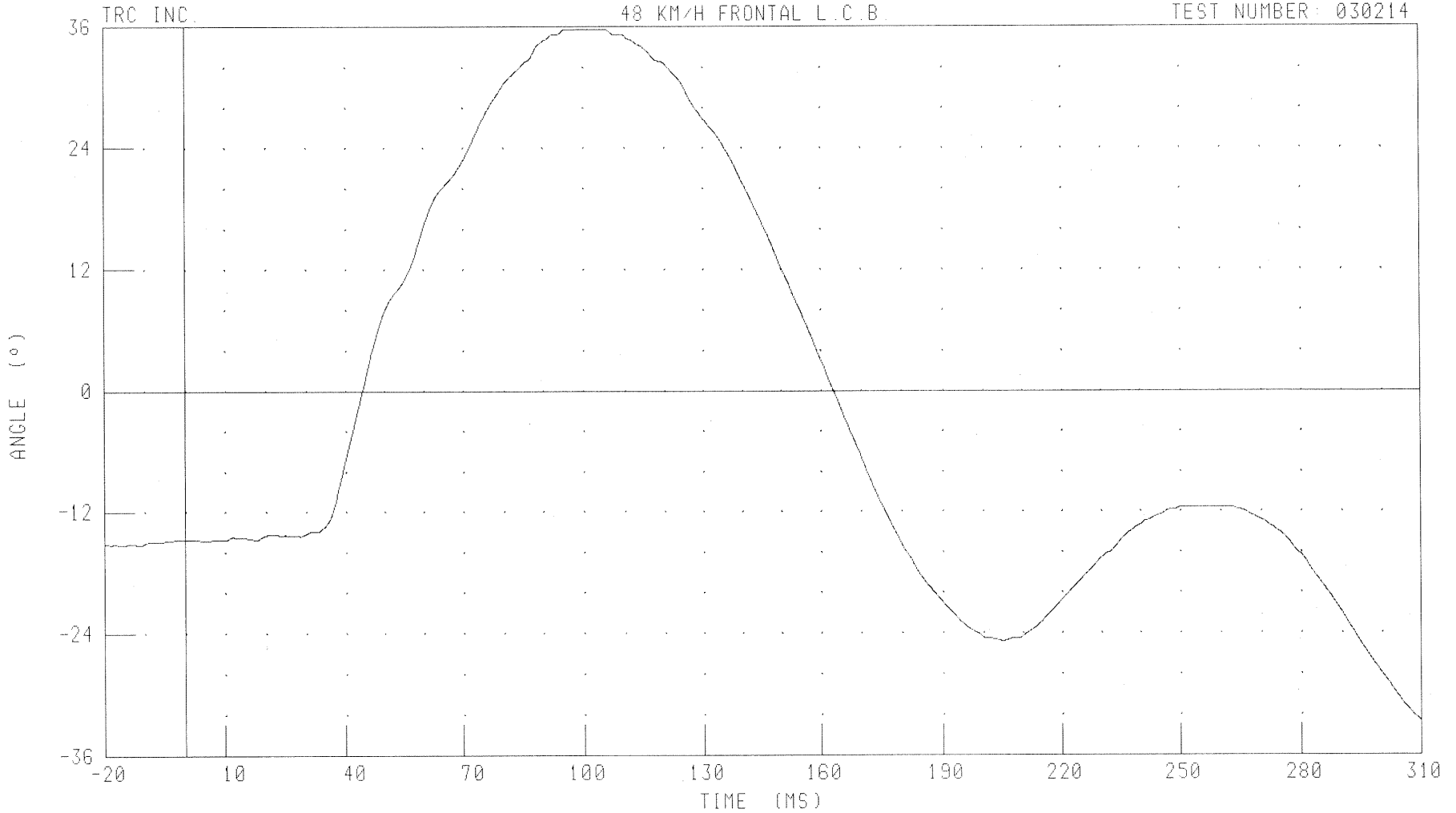
B-83

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT FOOT TO ANKLE Y-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRYD1 FILTER: CH CLASS 180

PEAK DATA: 35.76 ° @ 96.24 MS; -32.72 ° @ 310.00 MS

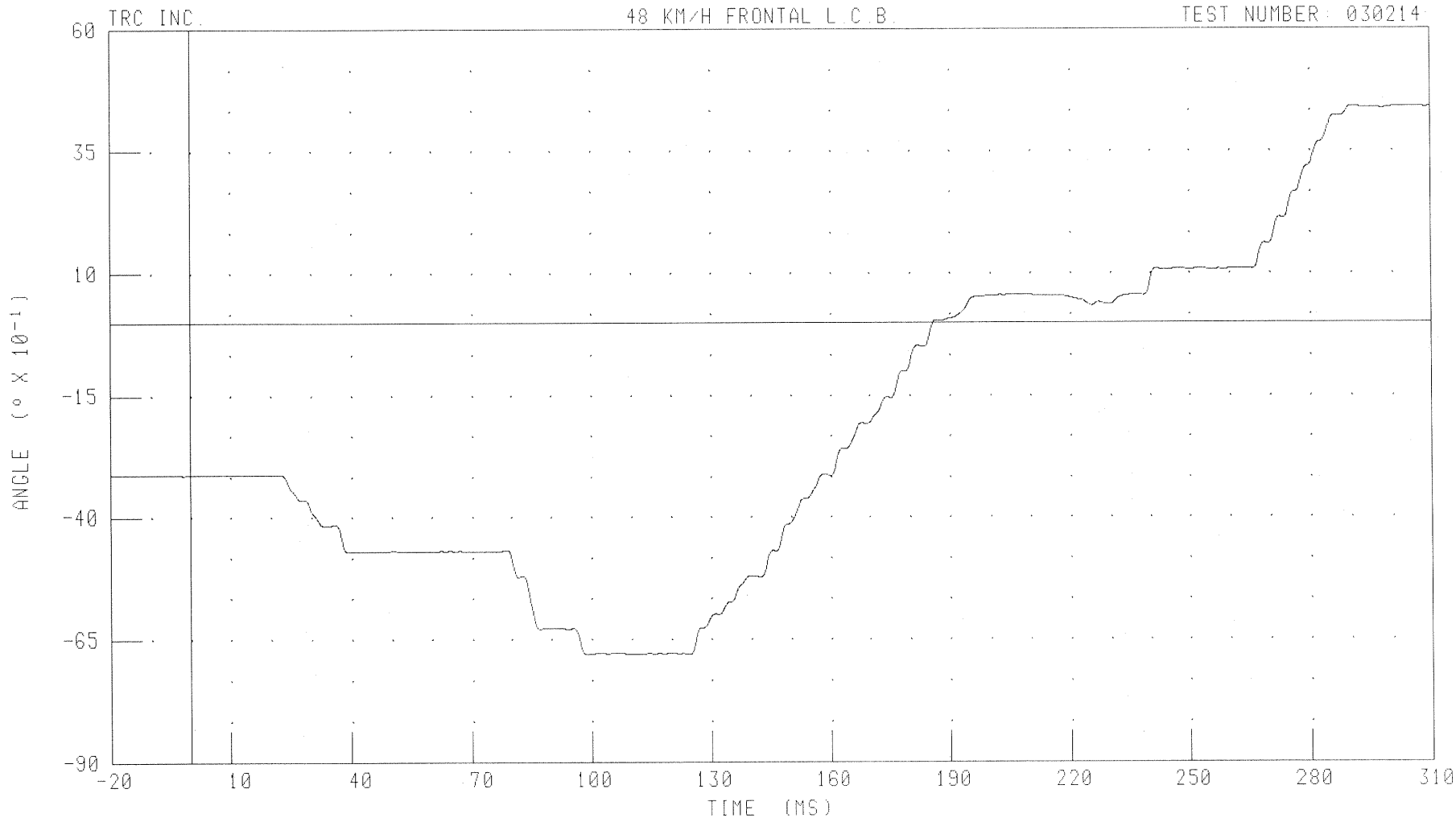
B-84

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT FOOT TO ANKLE Z-AXIS DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRZD1 FILTER: CH. CLASS 100

PEAK DATA: 4.42  $^{\circ}$  @ 290.32 MS; -6.81  $^{\circ}$  @ 124.72 MS

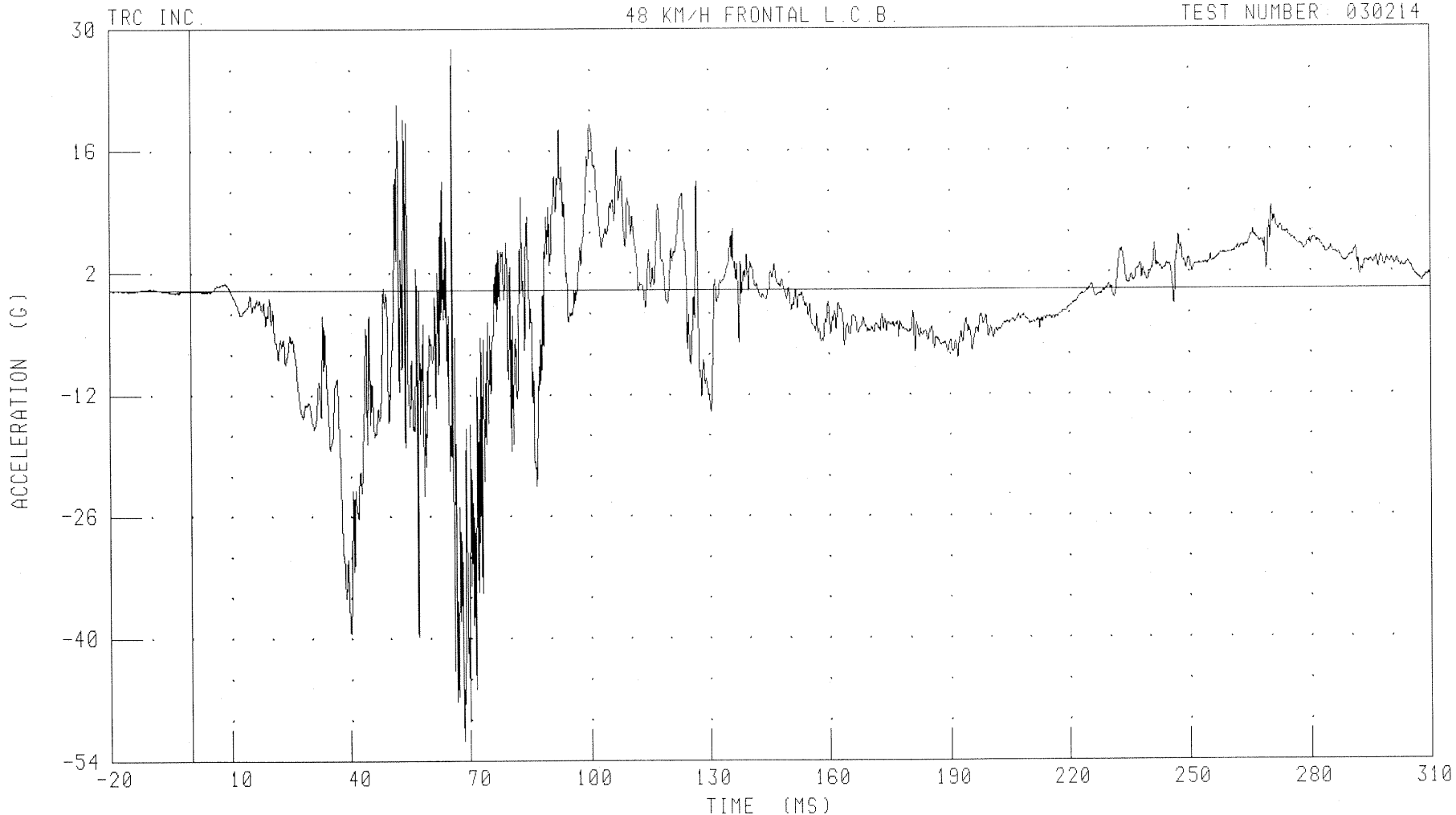
B-85

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT FOOT X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRXG1 FILTER: CH. CLASS 1000

PEAK DATA: 27.73 G @ 65.76 MS, -51.79 G @ 68.24 MS

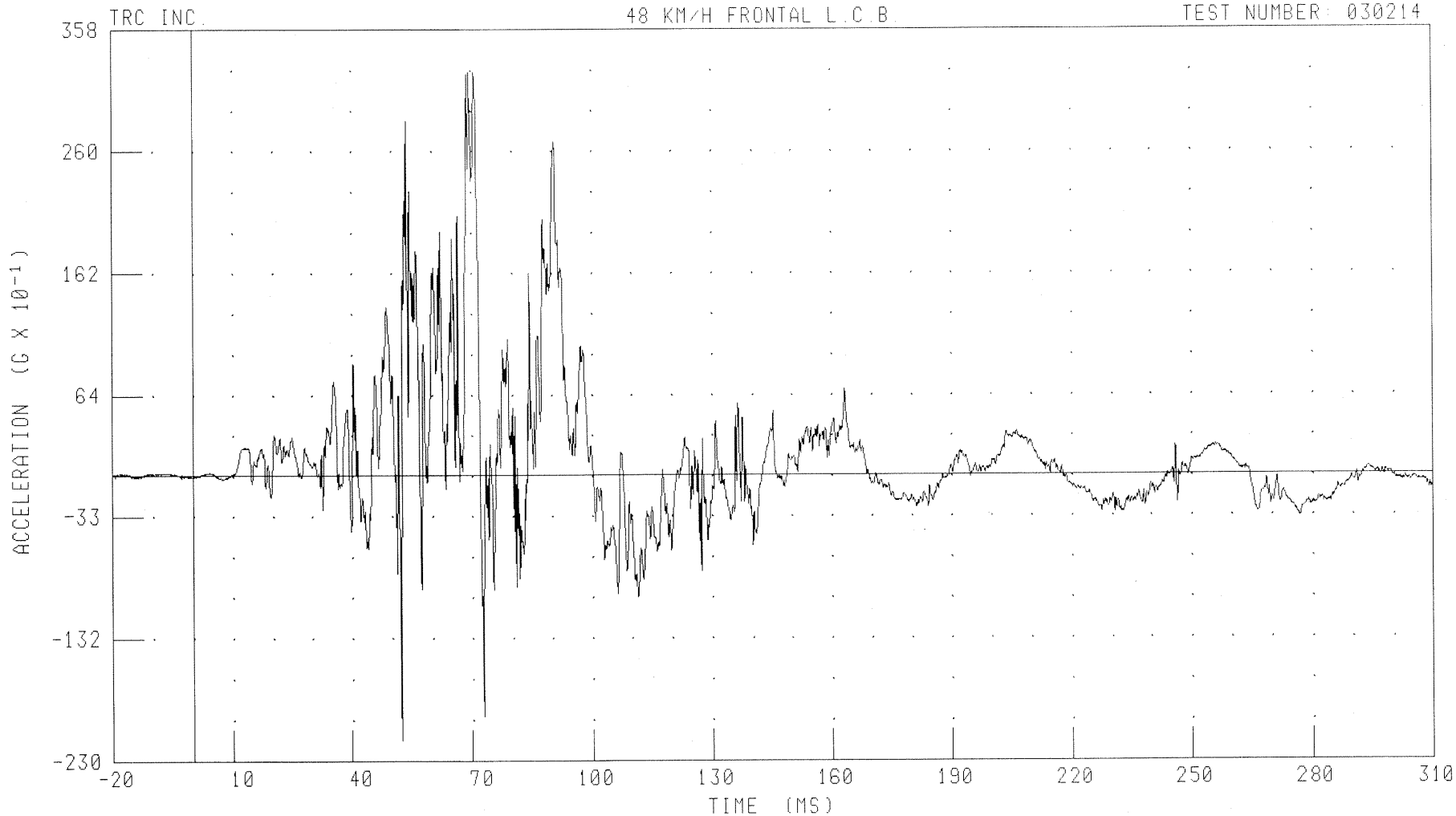
B-86

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT FOOT Y-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRYG1

FILTER: CH. CLASS 1000

PEAK DATA: 32.42 G @ 69.60 MS; -21.36 G @ 52.32 MS

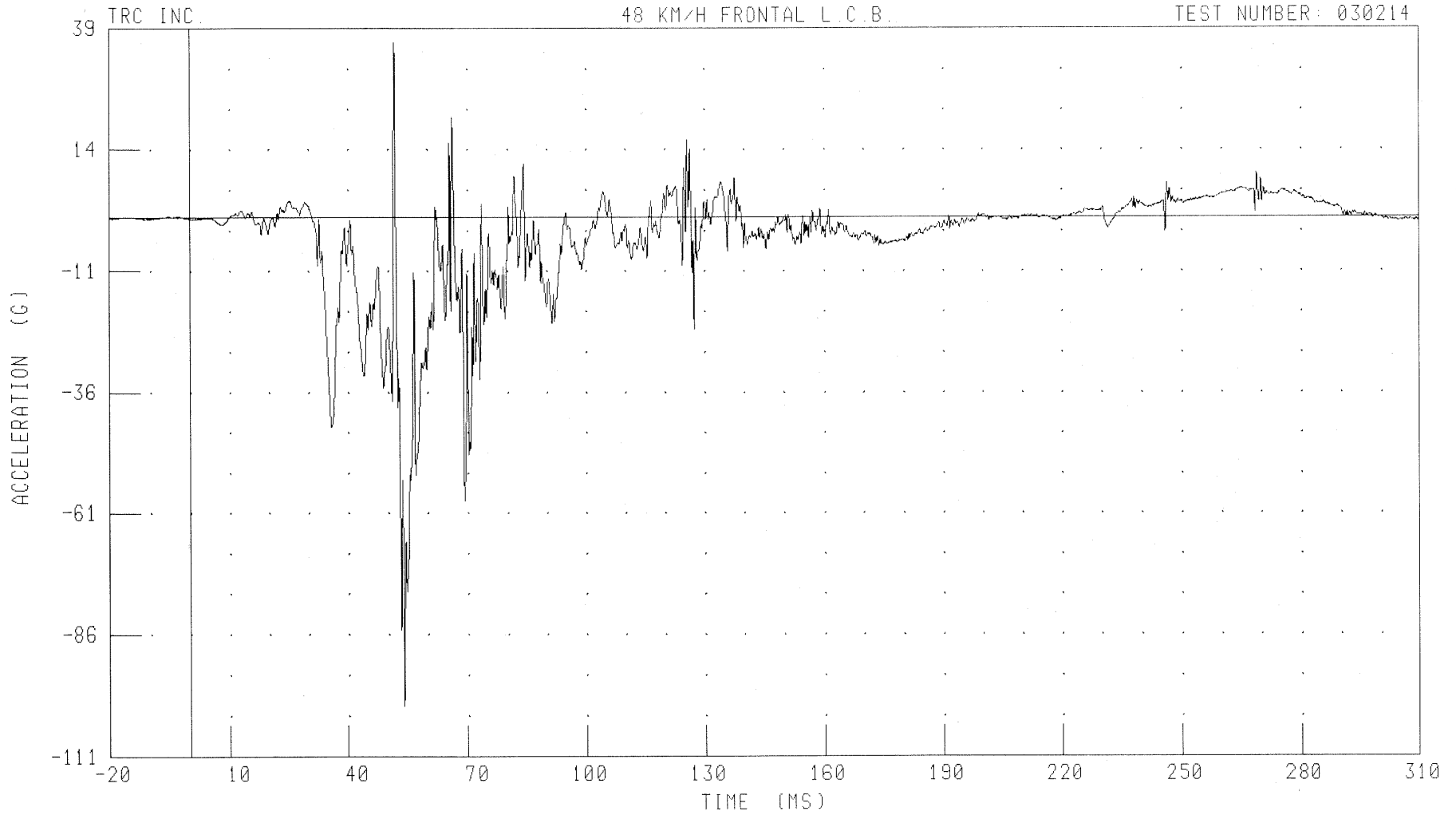
B-87

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER RIGHT FOOT Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTRZG1 FILTER: CH. CLASS 1000

PEAK DATA: 36.16 G @ 51.68 MS; -100.63 G @ 54.00 MS

B-88

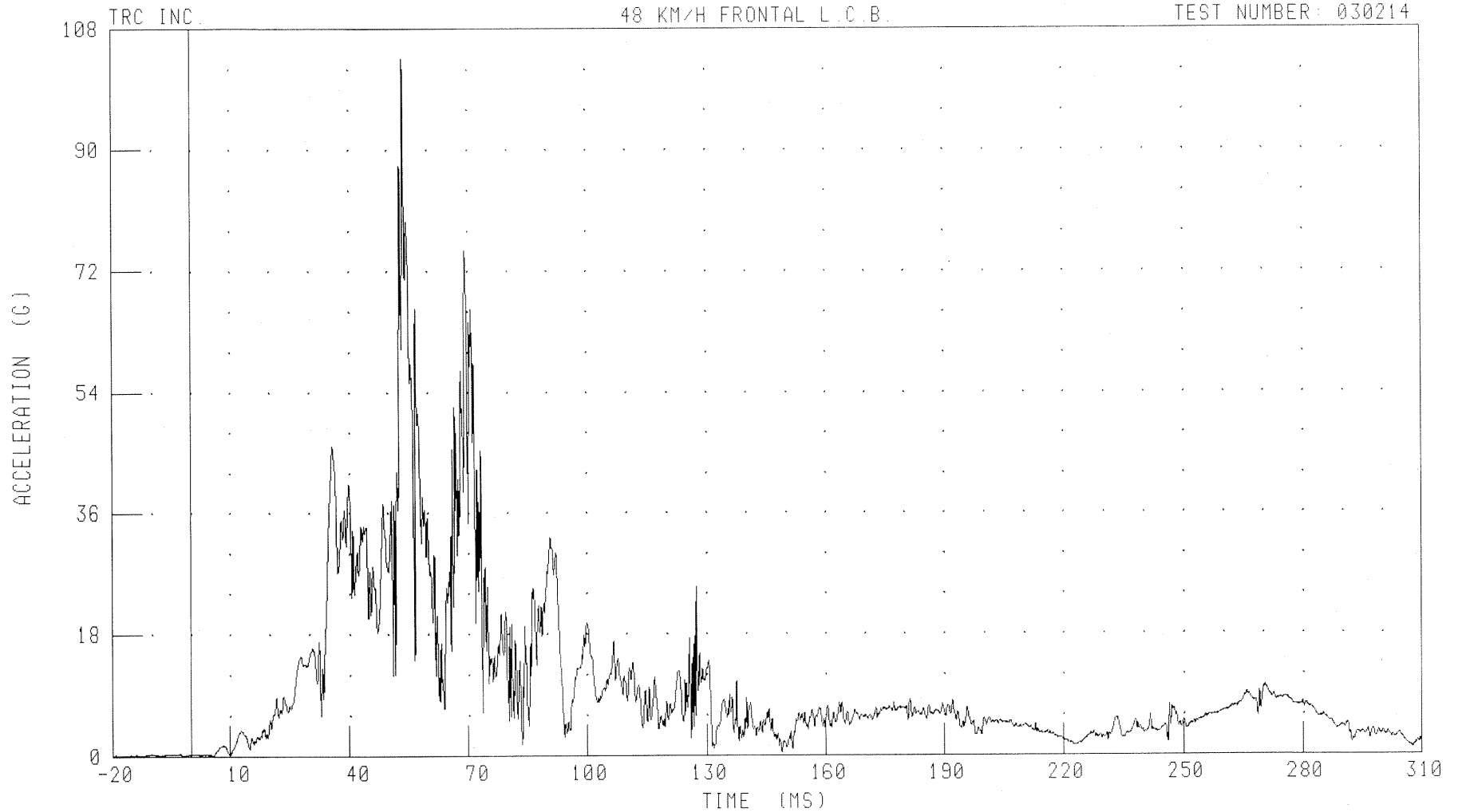
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

DRIVER RIGHT FOOT RESULTANT ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: FTTRG1 FILTER: CH. CLASS 1000

PEAK DATA: 103.62 G @ 54.00 MS; 0.05 G @ -17.68 MS

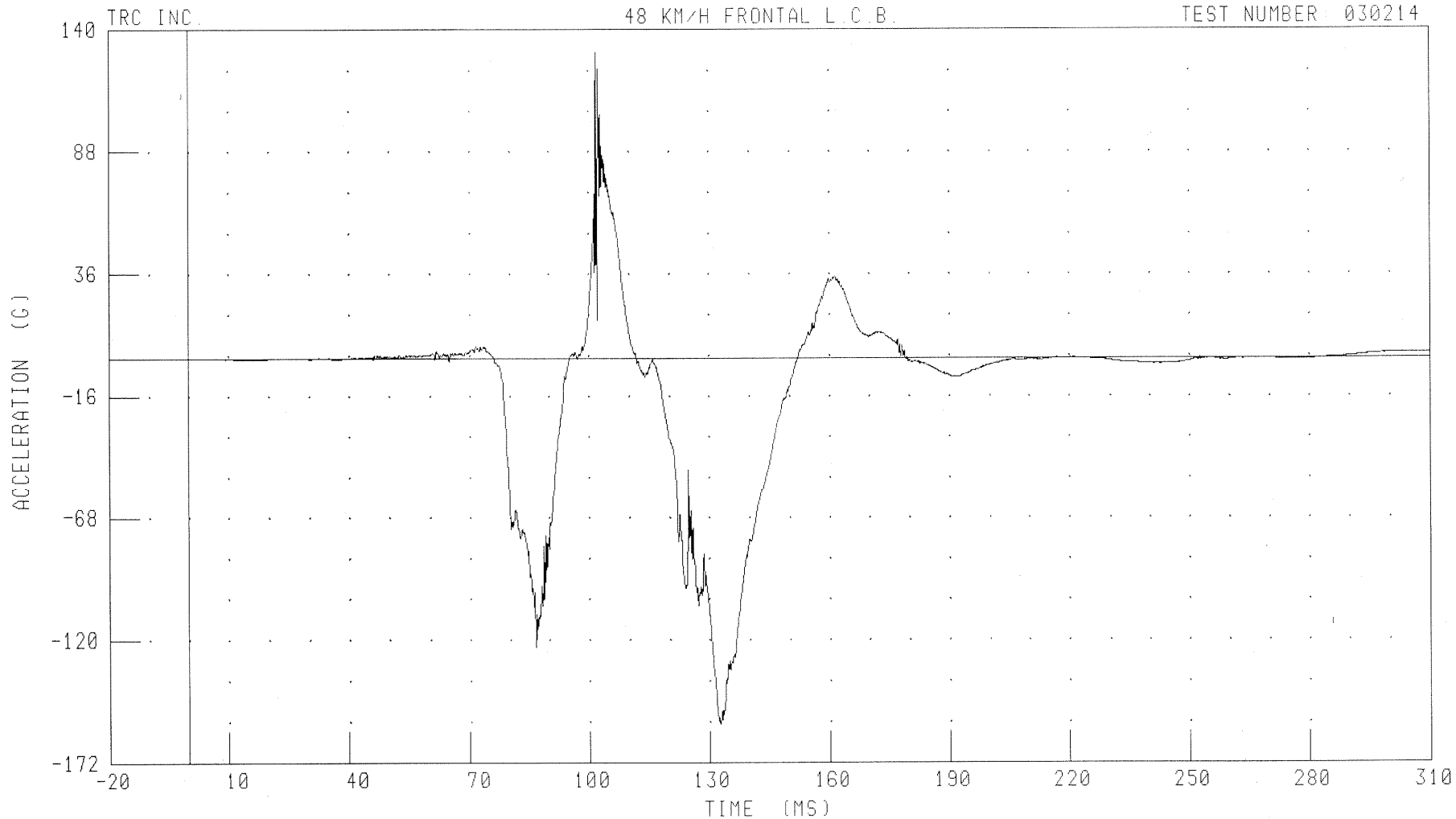
B-89

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

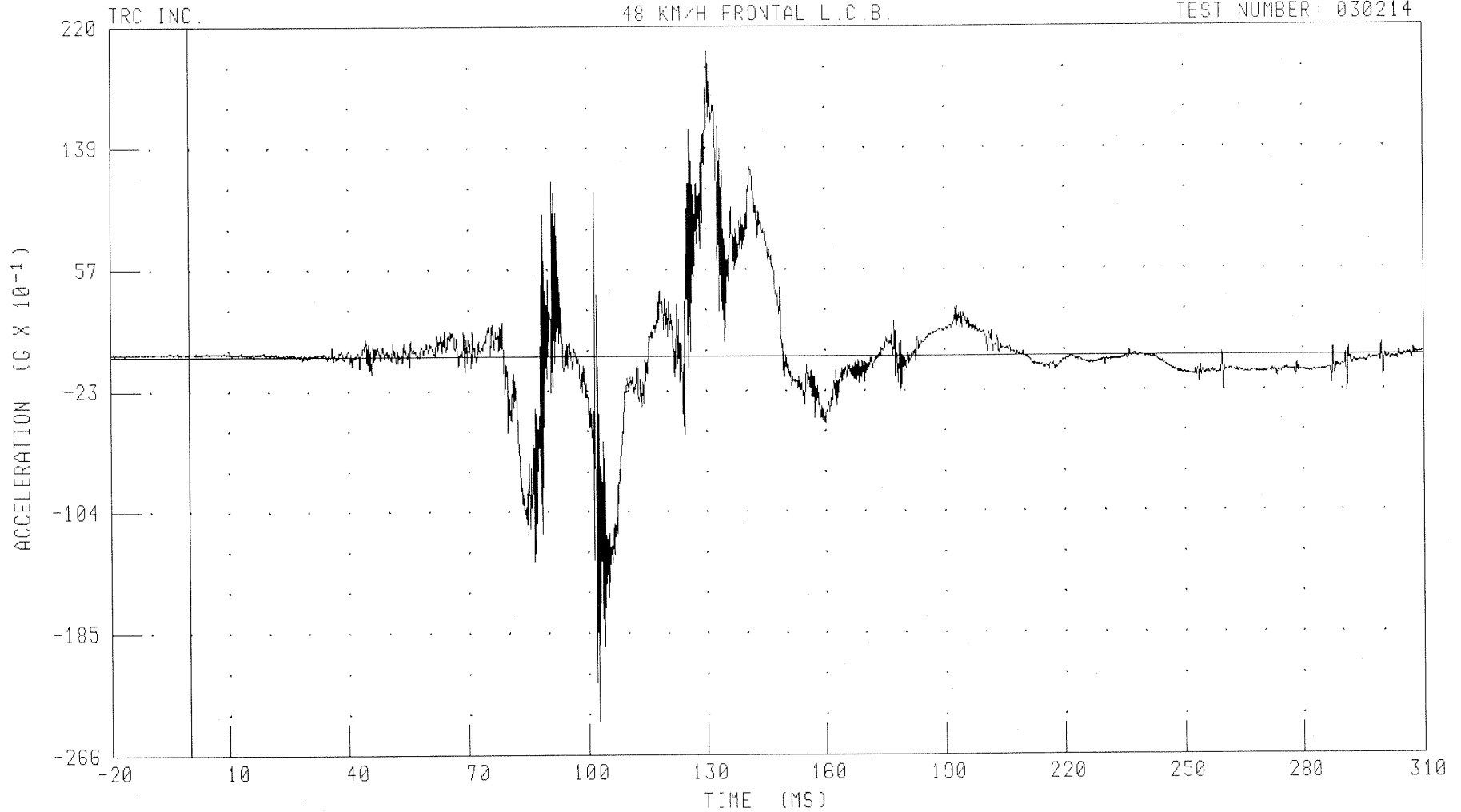
PEAK DATA: 130.35 G @ 102.08 MS; -155.59 G @ 132.88 MS

B-90

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Y-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 20.38 G @ 130.64 MS; -24.33 G @ 102.72 MS

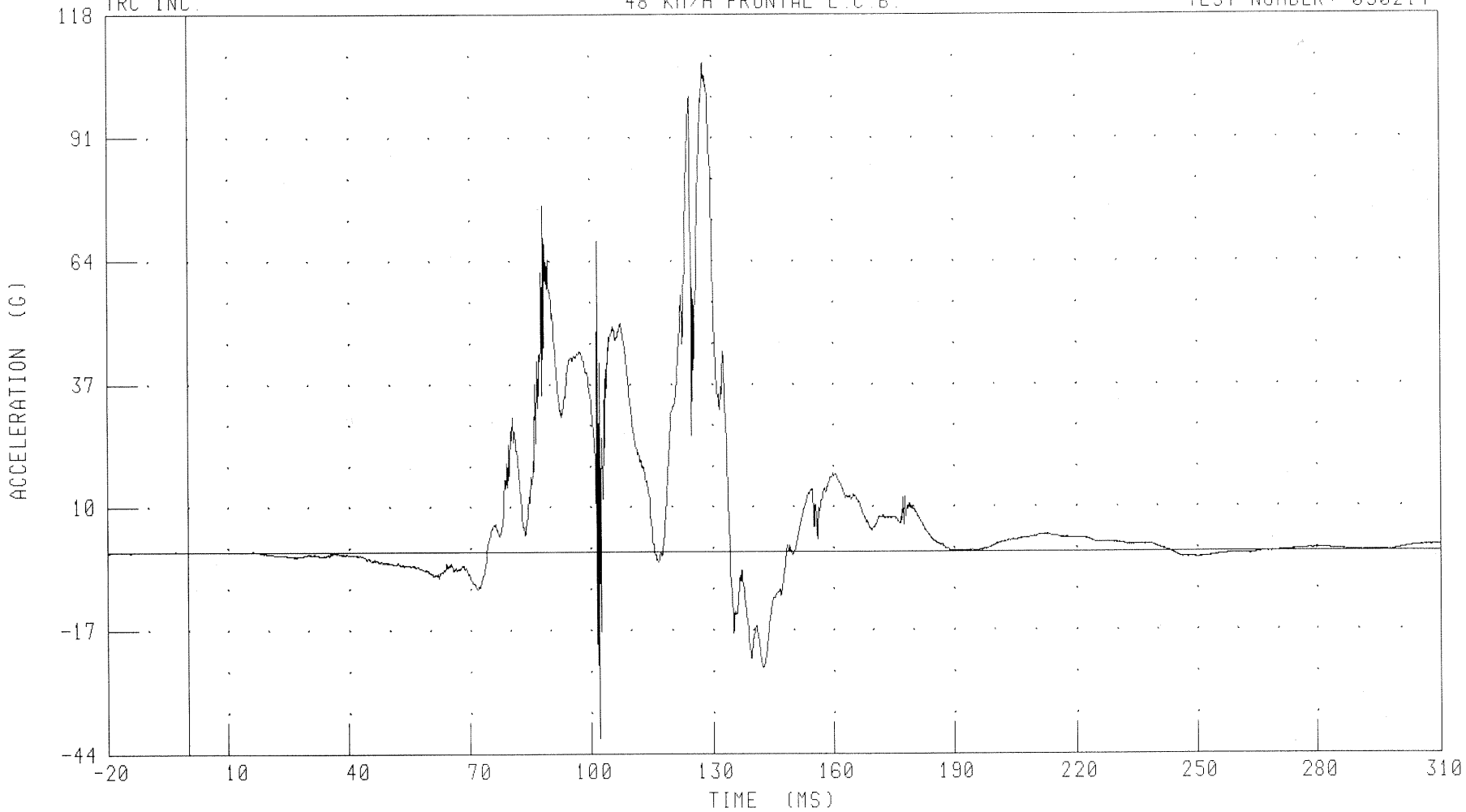
B-91

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 107.59 G @ 128.00 MS; -40.67 G @ 102.08 MS

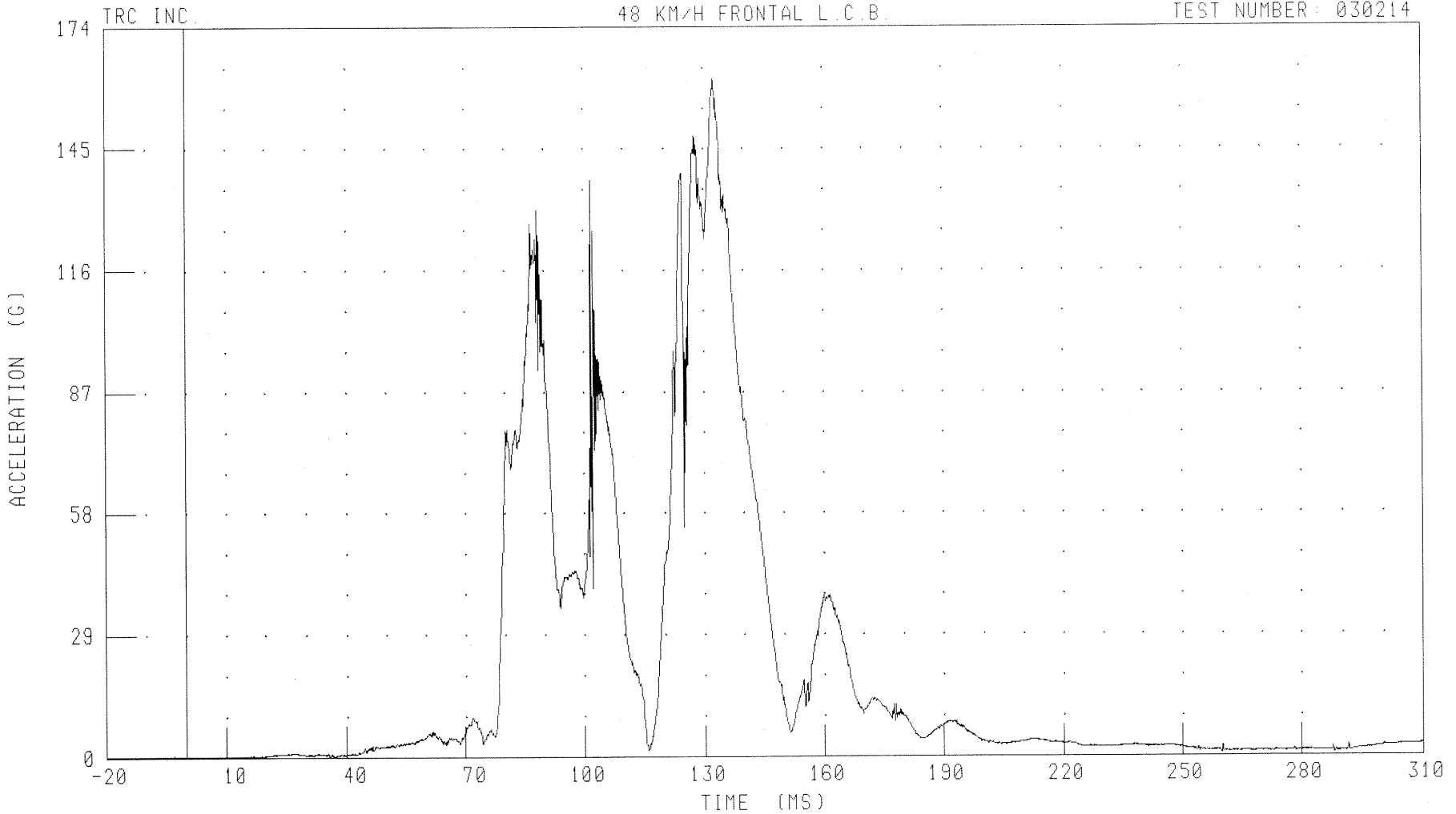
B-92

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD RESULTANT ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

PEAK DATA: 161.68 G @ 132.72 MS; 0.12 G @ 35.76 MS

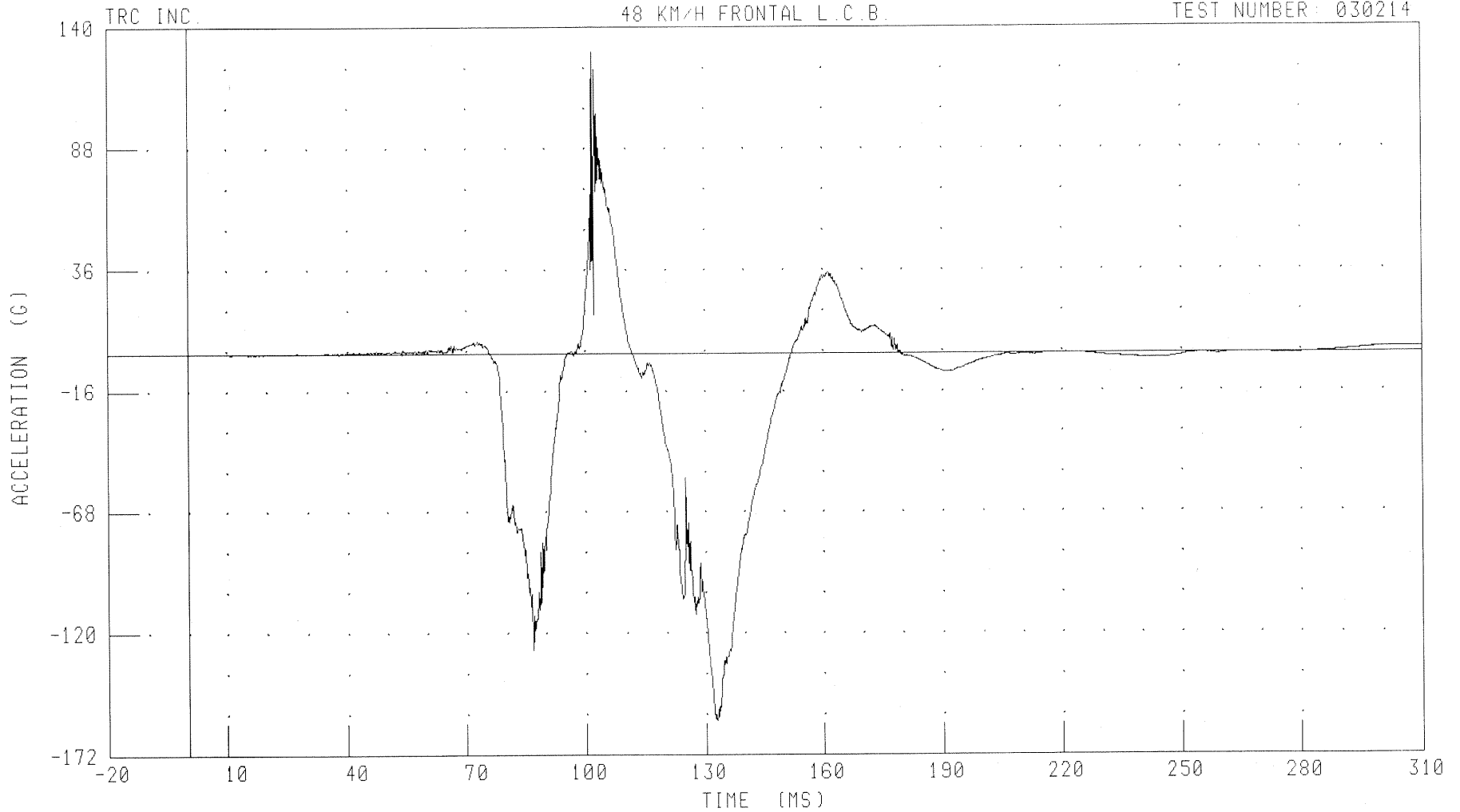
B-93

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD X-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDXR2 FILTER: CH. CLASS 1000

PEAK DATA: 129.47 G @ 102.08 MS; -157.74 G @ 132.96 MS

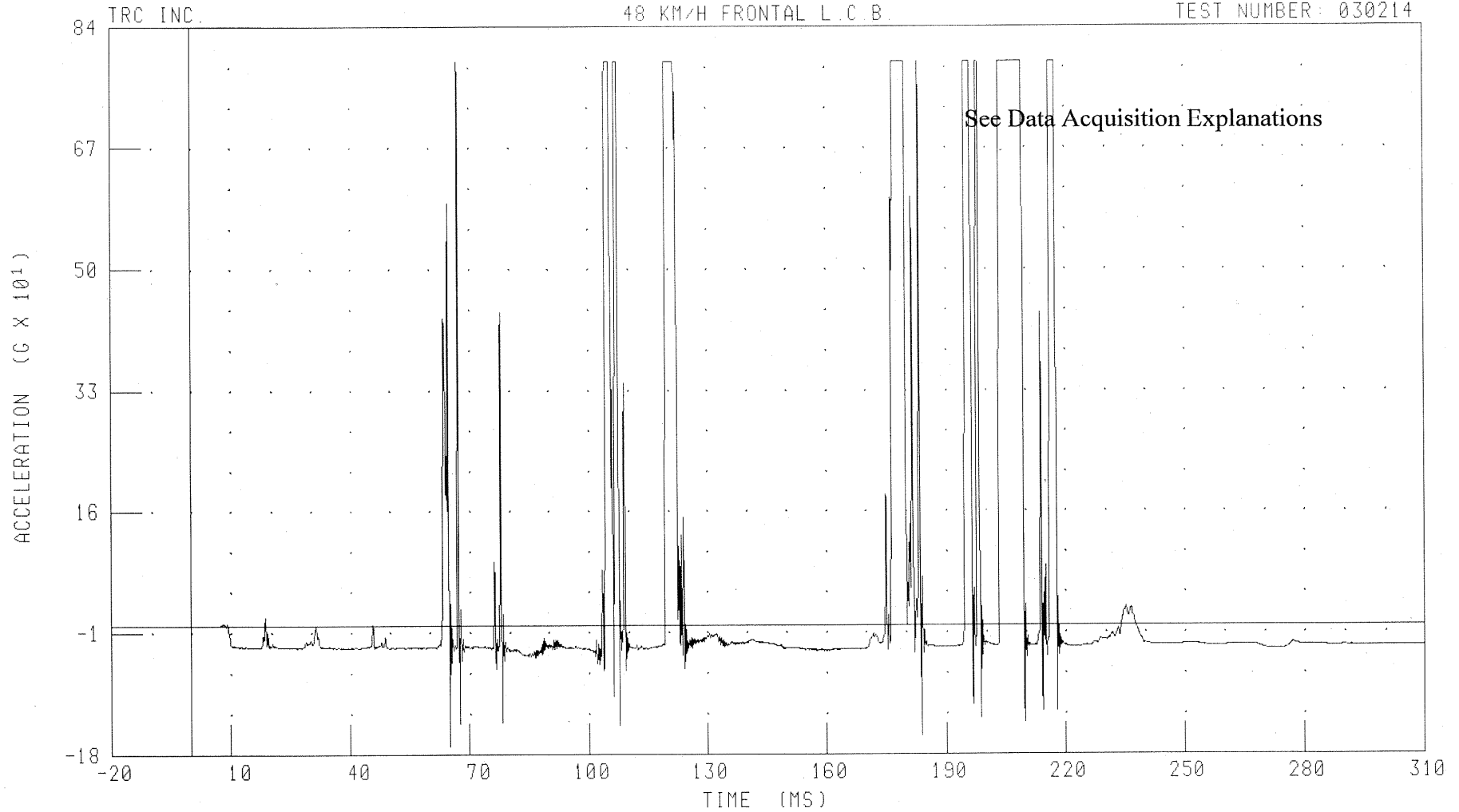
B-94

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Y-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDYR2 FILTER: CH. CLASS 1000

PEAK DATA: 790.83 G @ 67.12 MS; -168.50 G @ 65.04 MS

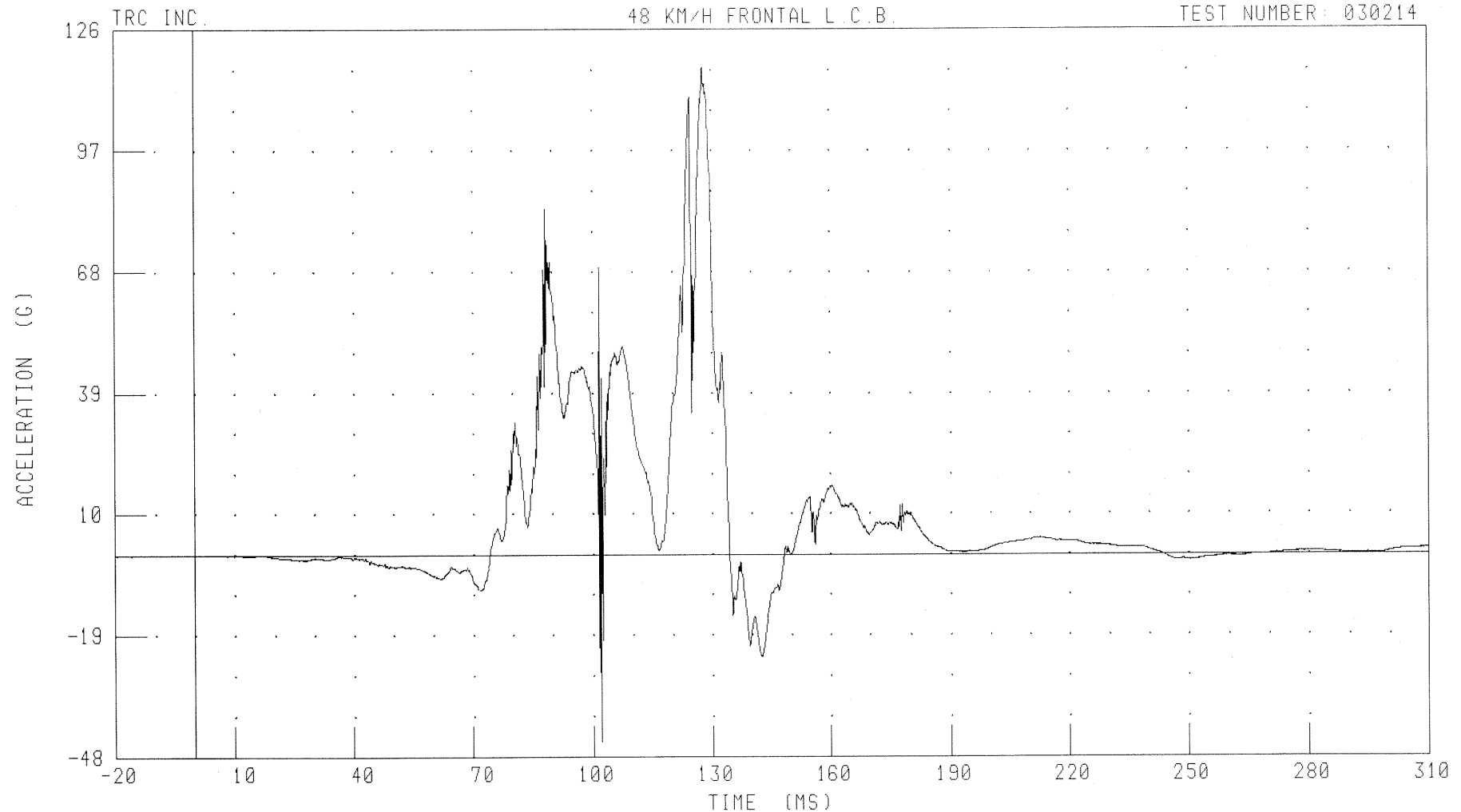
B-95

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Z-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDZR2 FILTER: CH. CLASS 1000

PEAK DATA: 116.90 G @ 128.00 MS; -44.23 G @ 102.08 MS

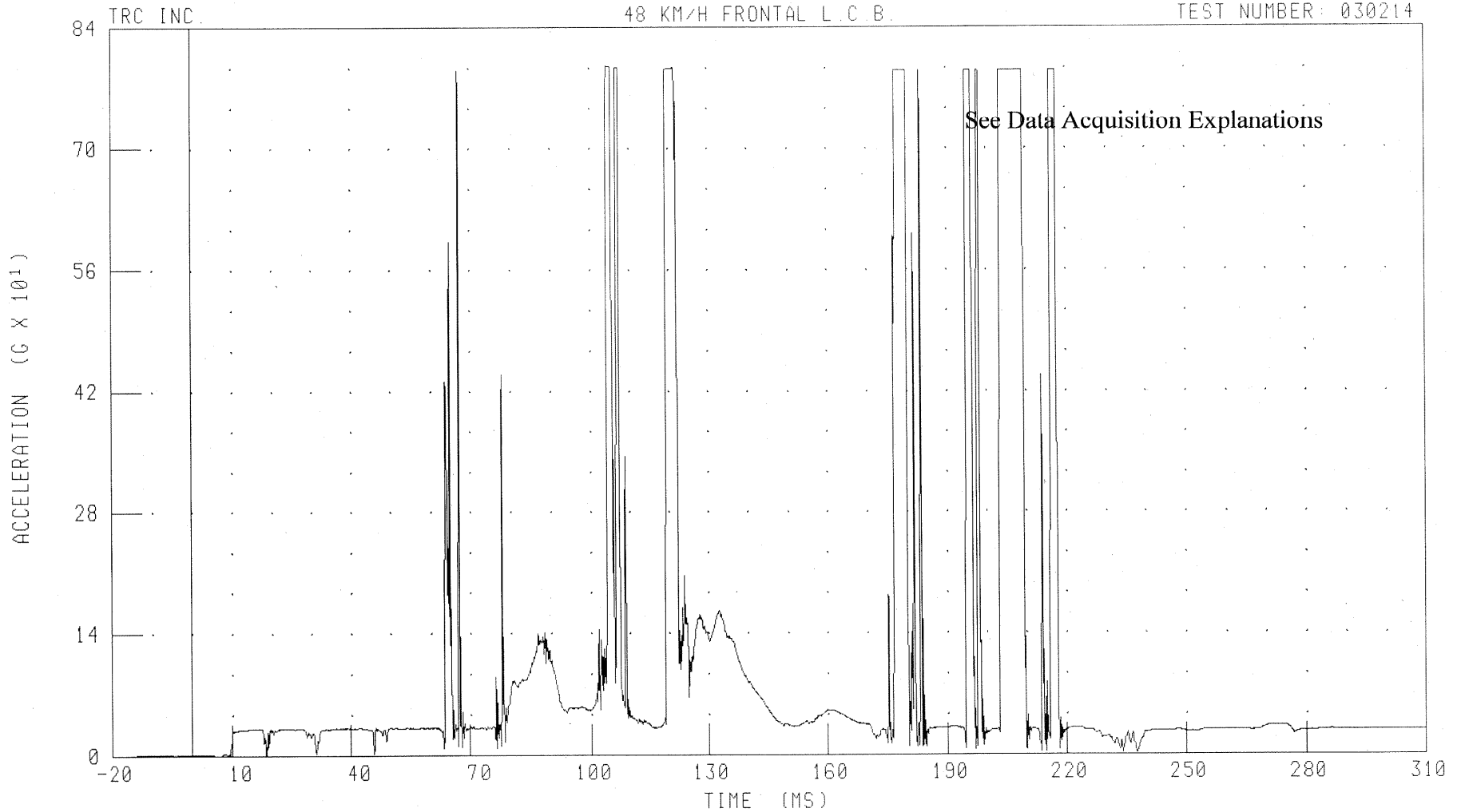
B-96

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD RESULTANT ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HEDRR2 FILTER: CH. CLASS 1000

PEAK DATA: 796.02 G @ 104.48 MS; 0.04 G @ 6.64 MS

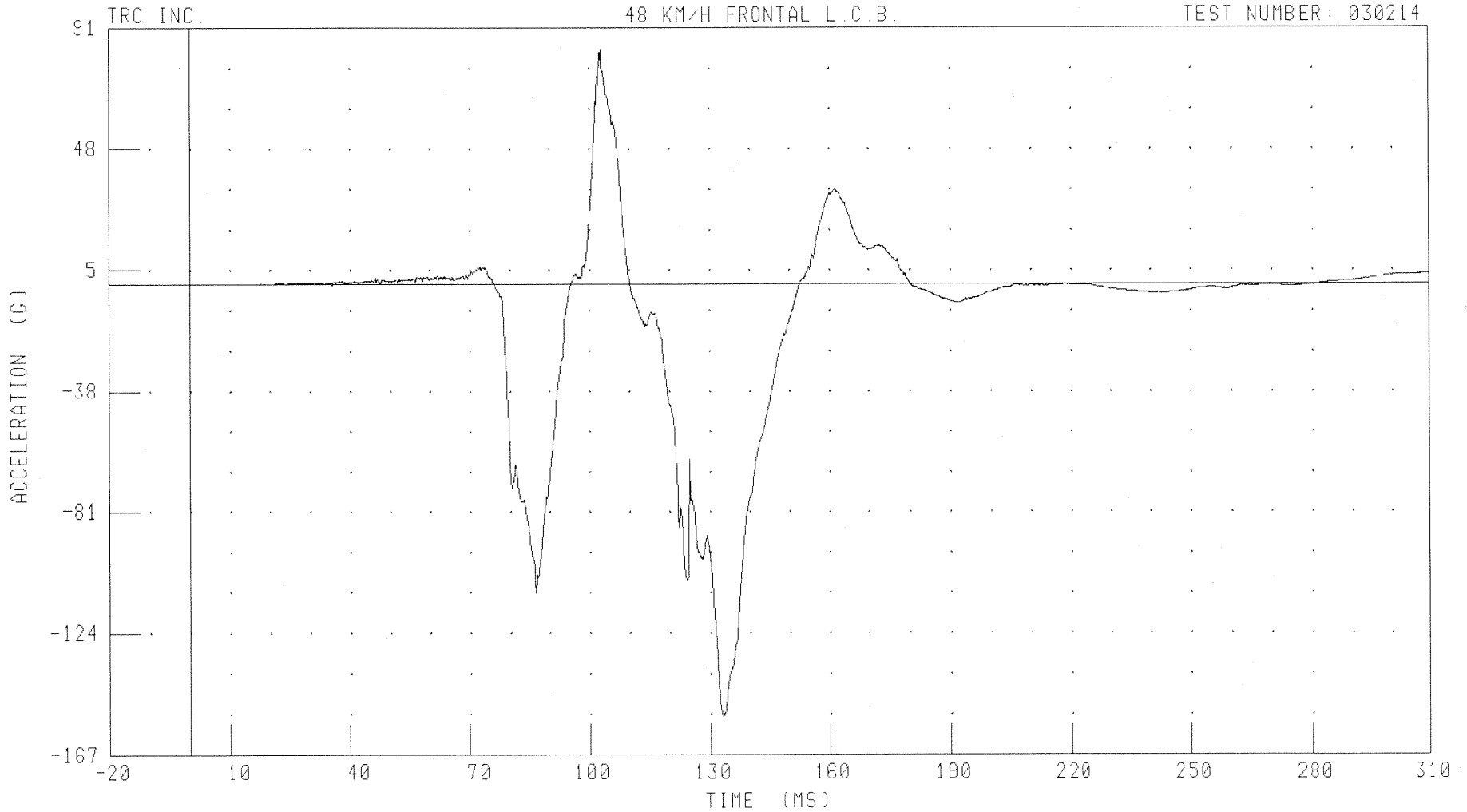
B-97

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD X-AXIS (LT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD1XG2

FILTER: CH. CLASS 1000

PEAK DATA: 83.47 G @ 103.04 MS; -153.60 G @ 133.20 MS

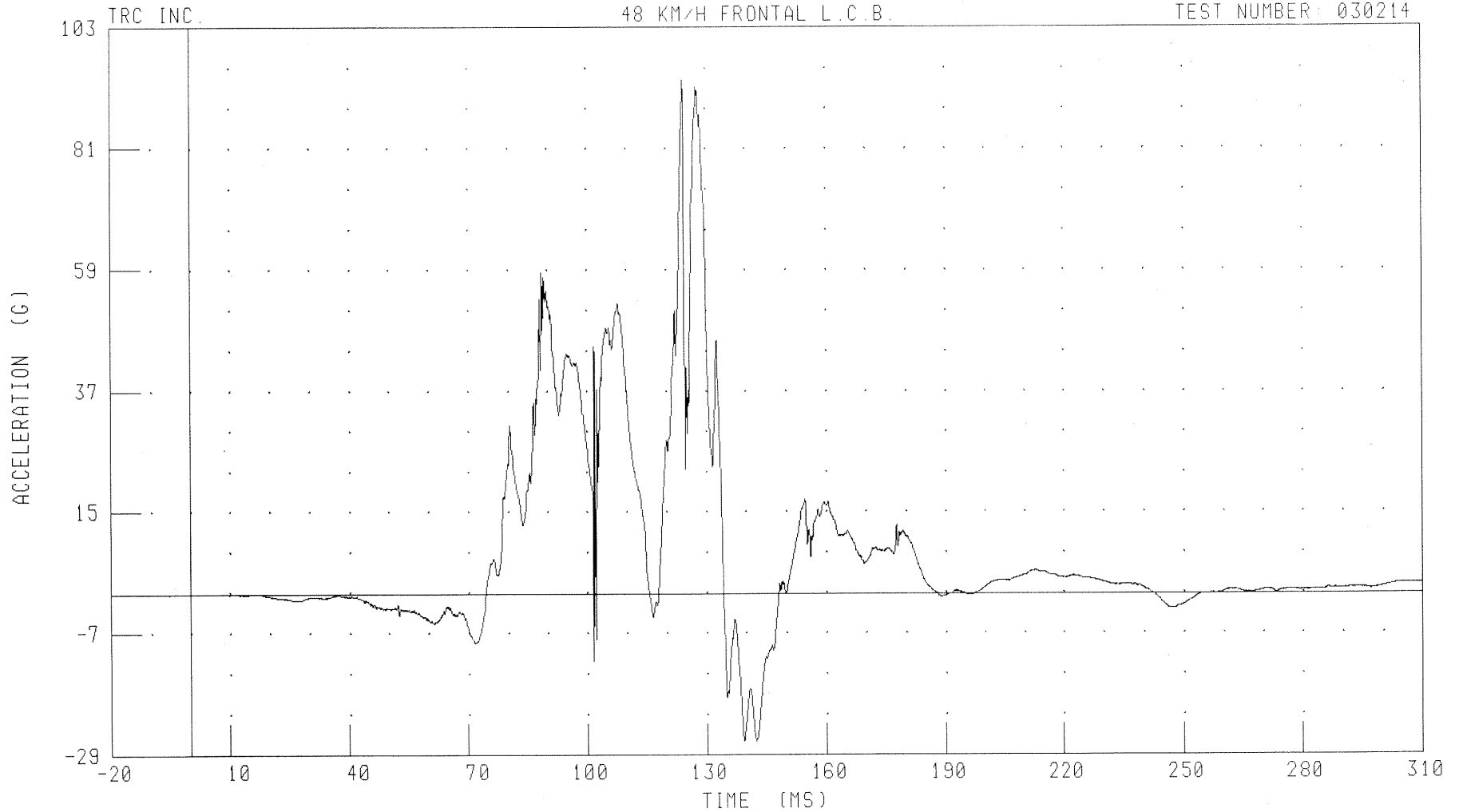
B-98

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Z-AXIS (LT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD1ZG2

FILTER: CH. CLASS 1000

PEAK DATA: 93.51 G @ 124.56 MS; -26.67 G @ 139.44 MS

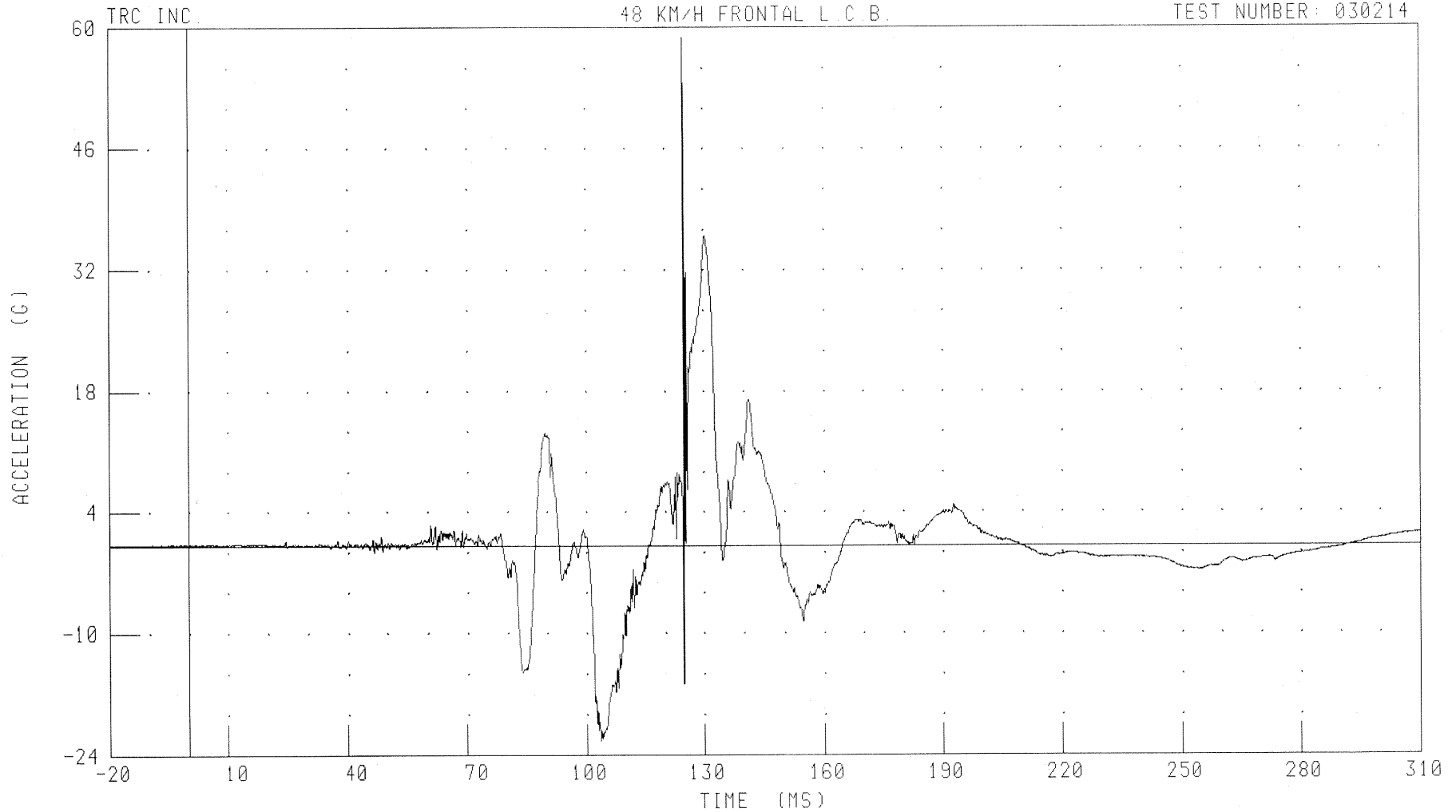
B-99

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Y-AXIS (FT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD2YG2 FILTER: CH. CLASS 1000

PEAK DATA: 58.79 G @ 125.12 MS; -22.35 G @ 103.76 MS

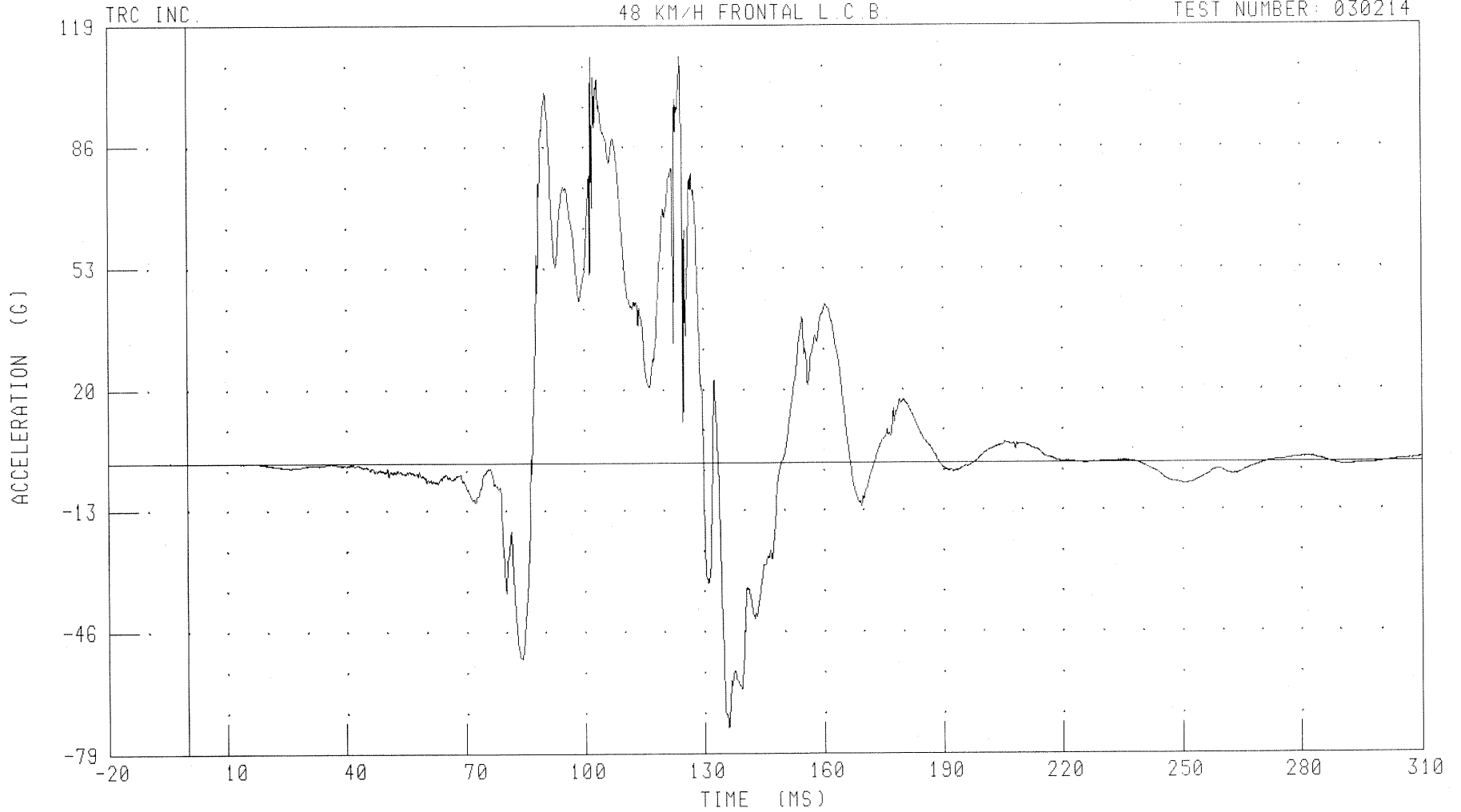
B-100

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD Z-AXIS (FT) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD2ZG2 FILTER: CH. CLASS 1000

PEAK DATA: 110.76 G @ 102.08 MS, -72.14 G @ 136.00 MS

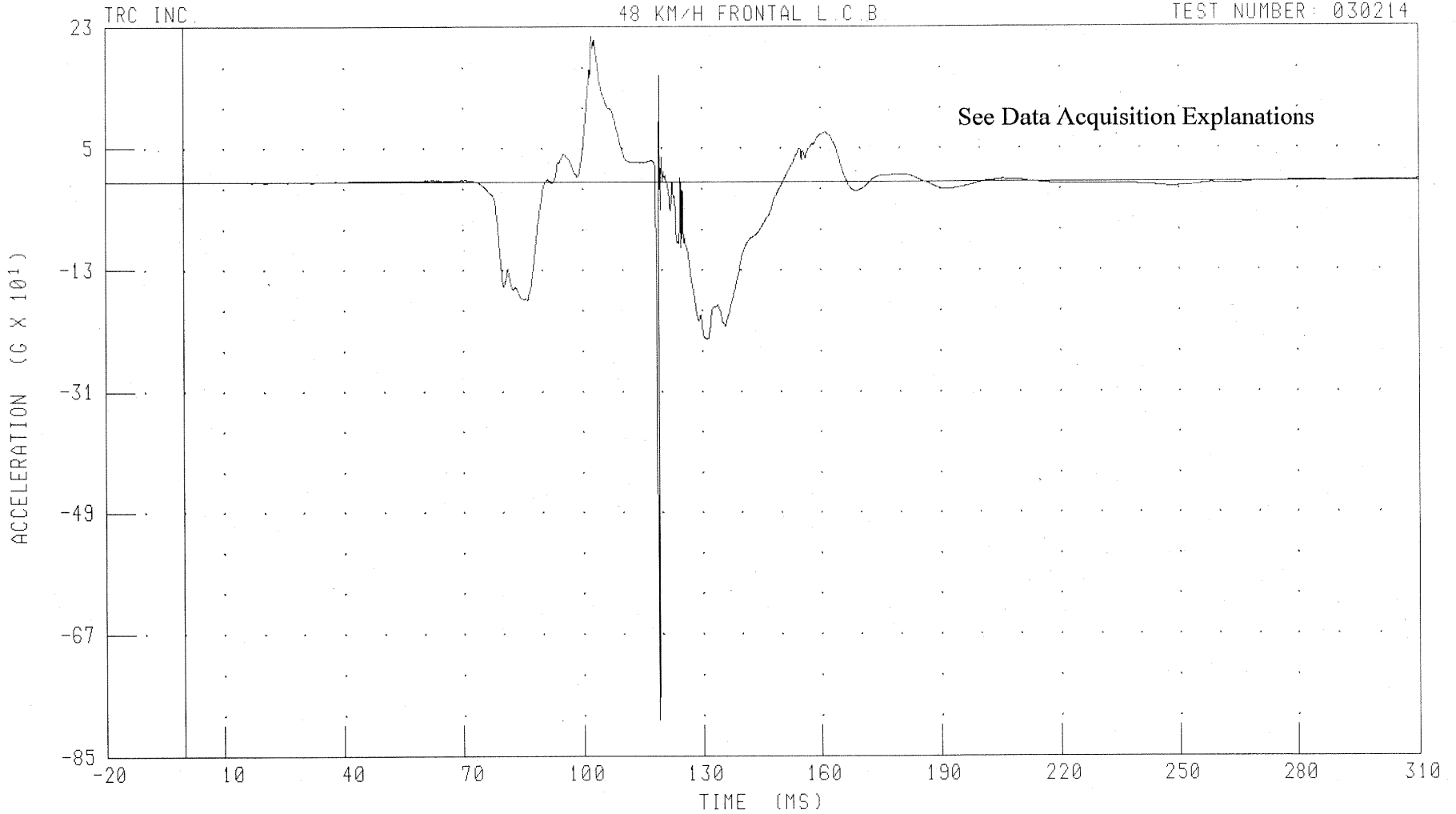
B-101

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER HEAD X-AXIS (TP) ACCELERATION

48 KM/H FRONTAL L.C.B

TEST NUMBER: 030214



CHANNEL: HD3XG2 FILTER: CH. CLASS 1000

PEAK DATA: 216.78 G @ 102.40 MS; -797.50 G @ 119.12 MS

B-102

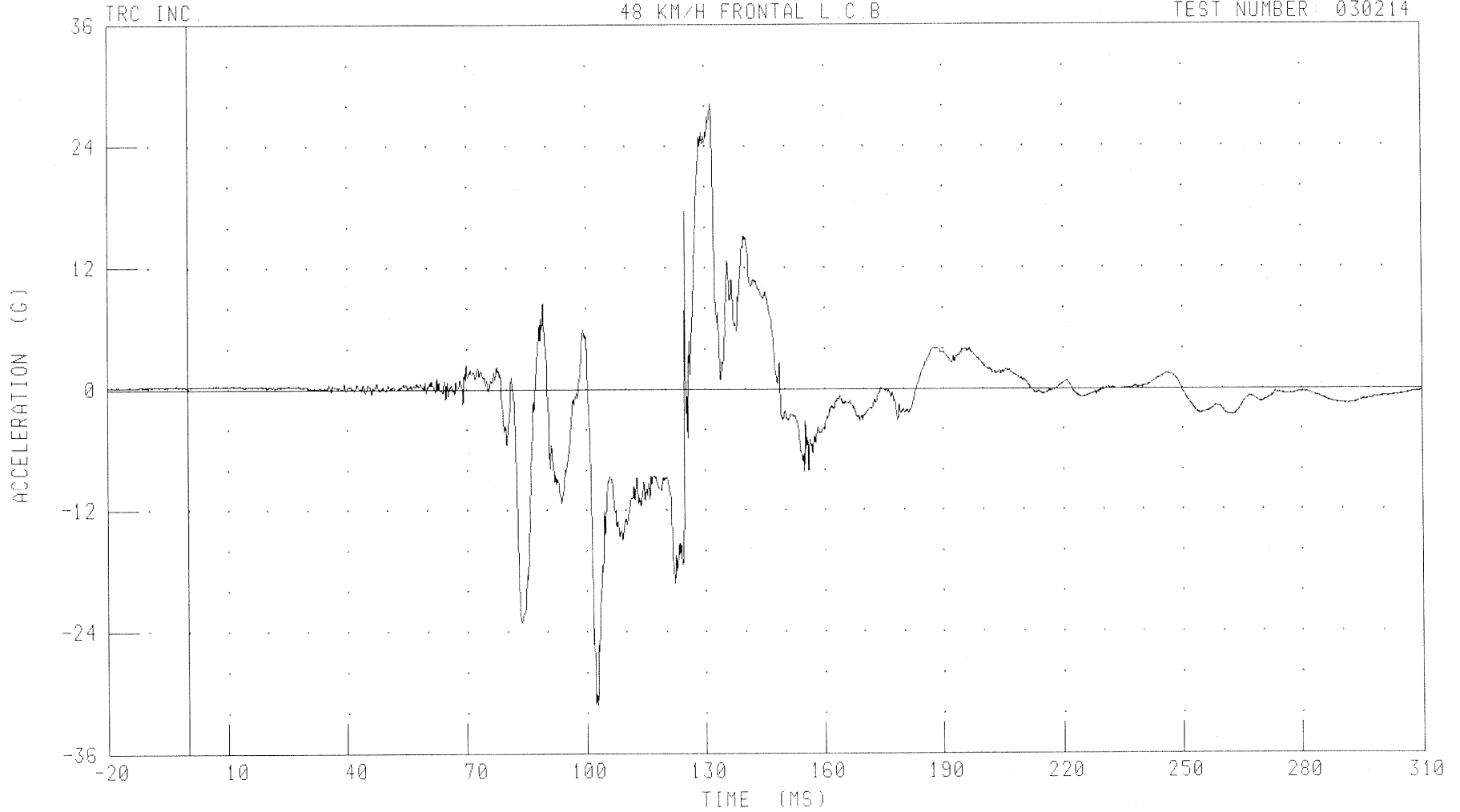
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER HEAD Y-AXIS (TP) ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: HD3YG2

FILTER: CH. CLASS 1000

PEAK DATA: 28.17 G @ 131.60 MS, -31.25 G @ 102.96 MS

B-103

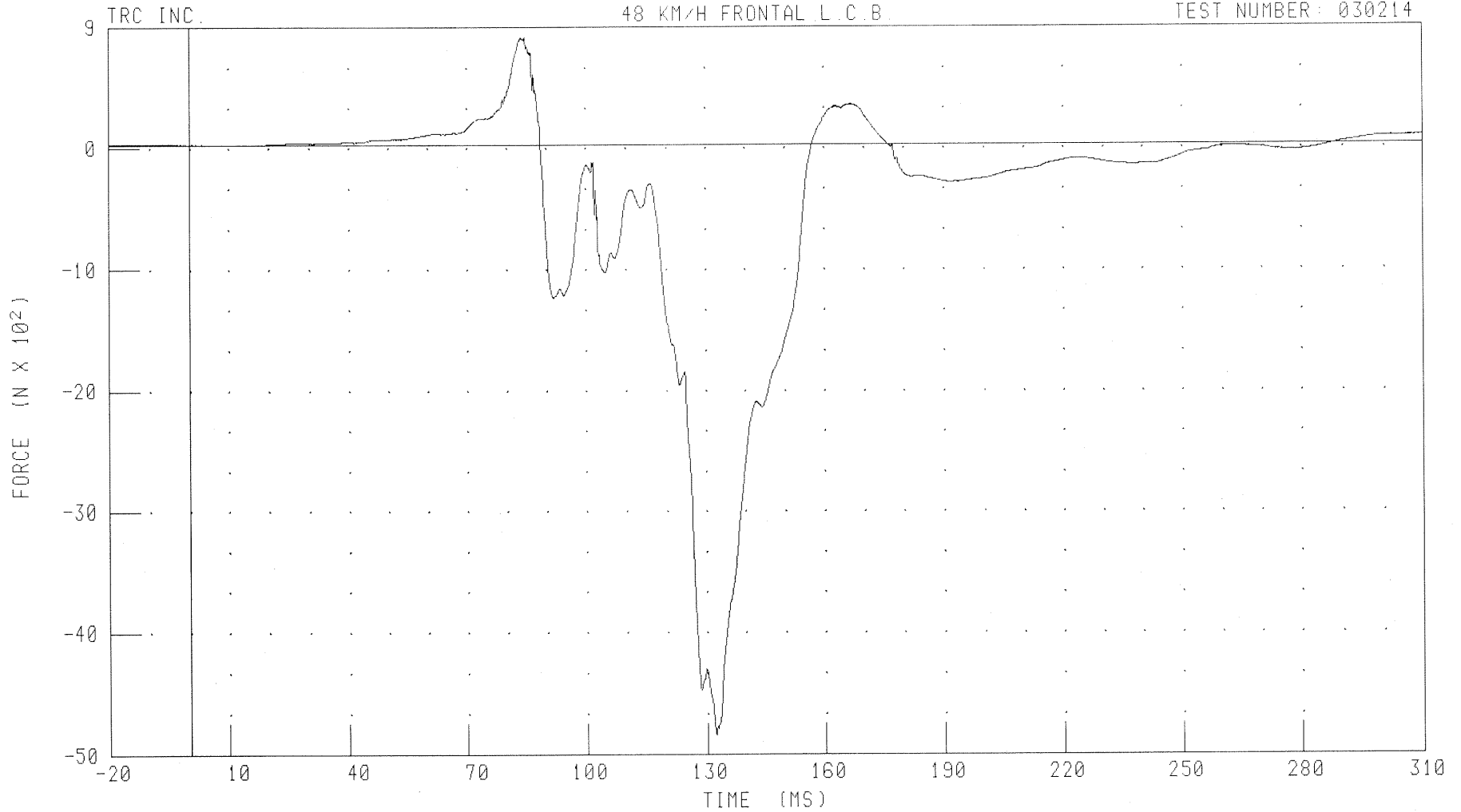
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER NECK X-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

PEAK DATA: 889.18 N @ 84.80 MS; -4872.39 N @ 132.32 MS

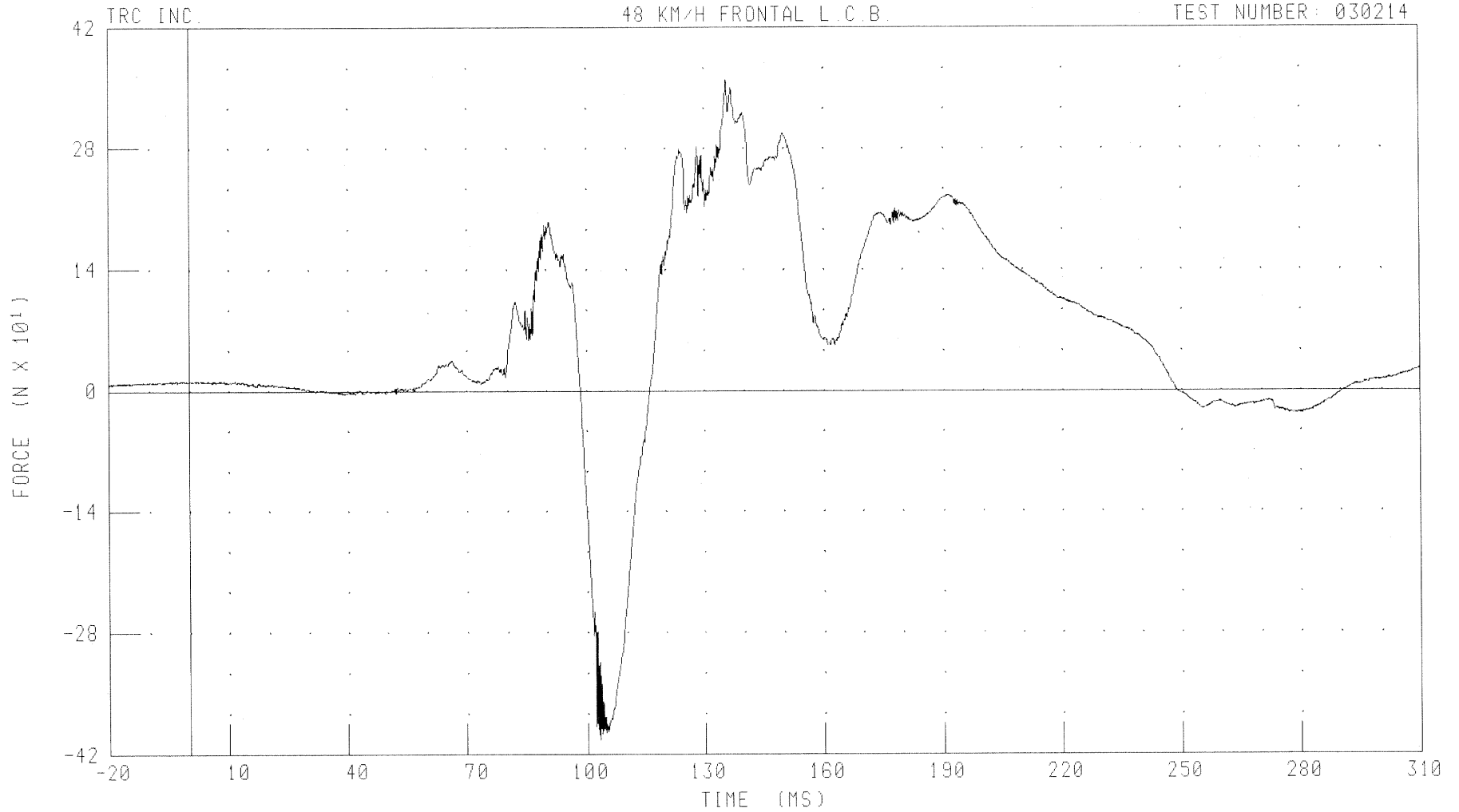
B-104

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK Y-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

PEAK DATA: 360.30 N @ 135.76 MS, -403.24 N @ 103.28 MS

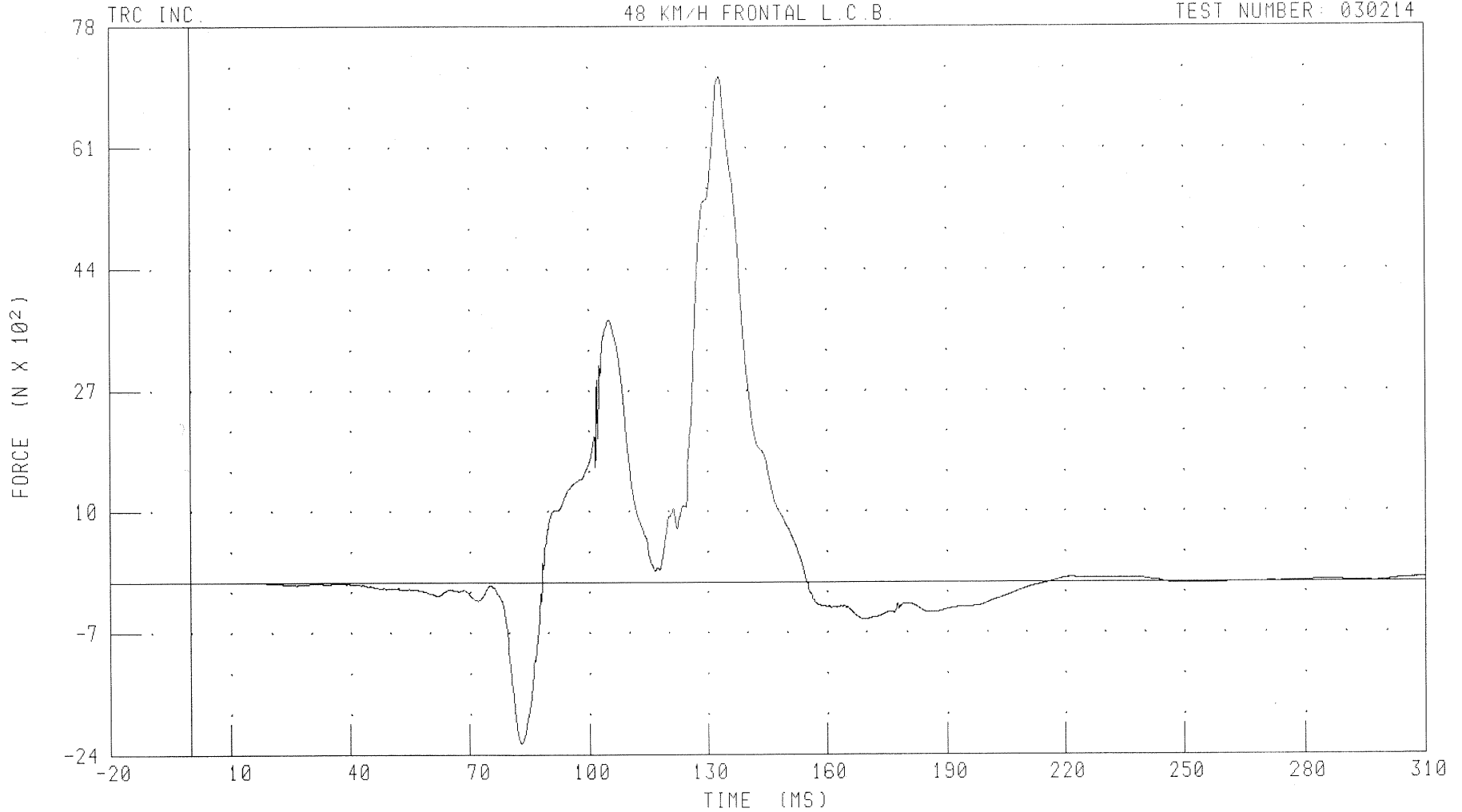
B-105

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK Z-AXIS AXIAL FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

PEAK DATA: 7100.42 N @ 133.20 MS; -2238.56 N @ 83.12 MS

B-106

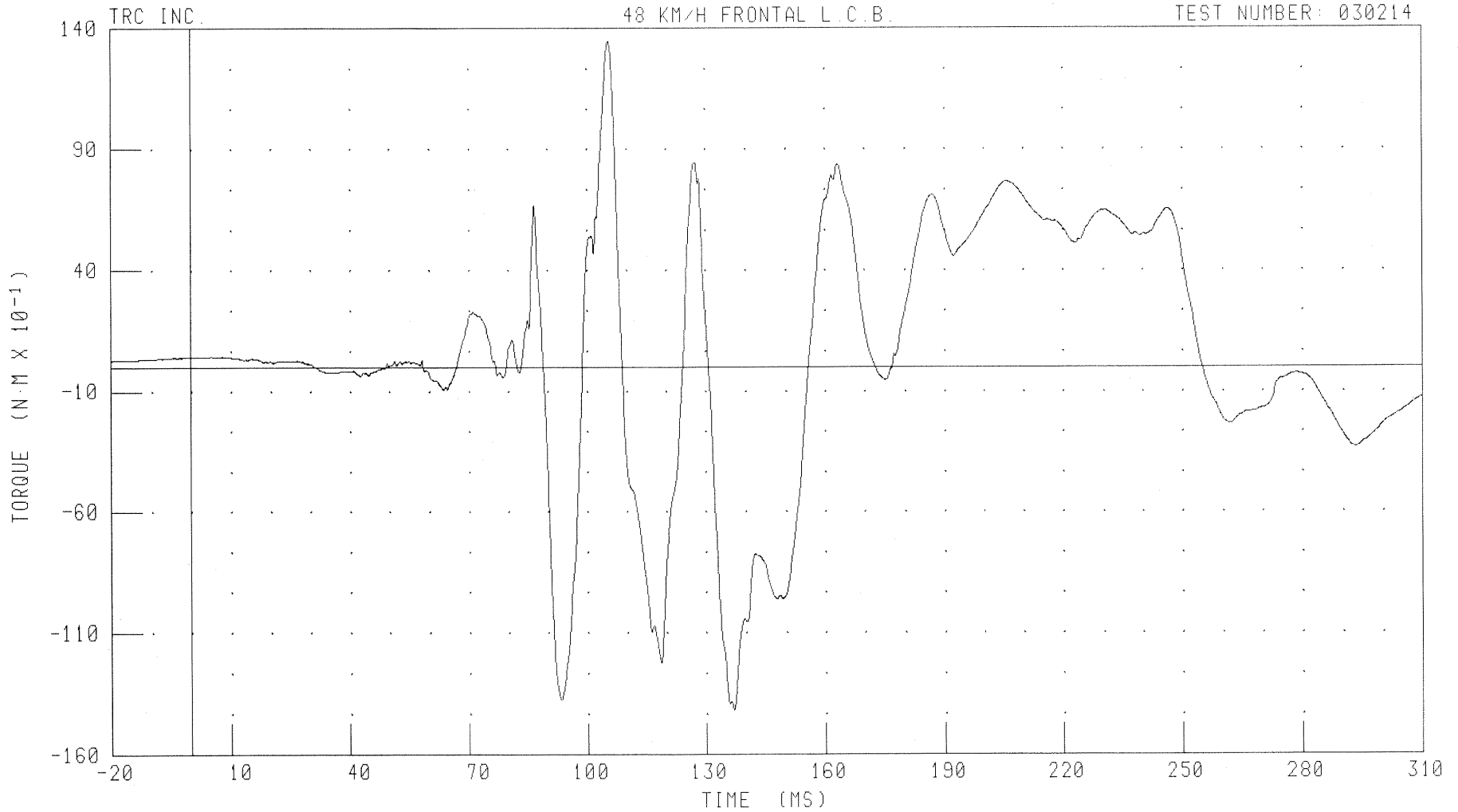
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER NECK MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKXM2

FILTER: CH. CLASS 600

PEAK DATA: 13.47 N·M @ 105.52 MS; -14.19 N·M @ 137.04 MS

B-107

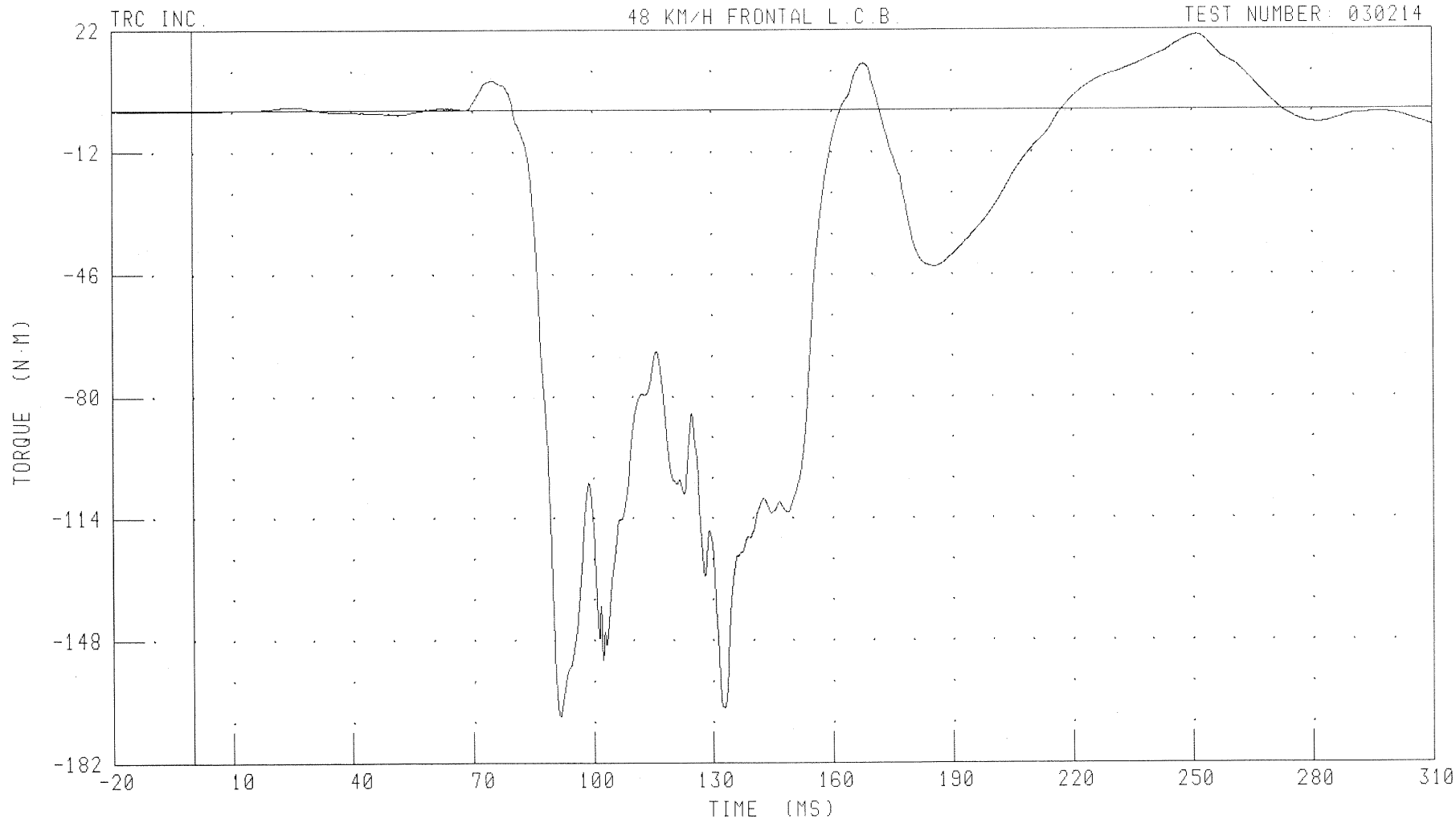
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER NECK MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKYM2 FILTER: CH. CLASS 600

PEAK DATA: 20.49 N.M @ 251.44 MS; -169.08 N.M @ 91.44 MS

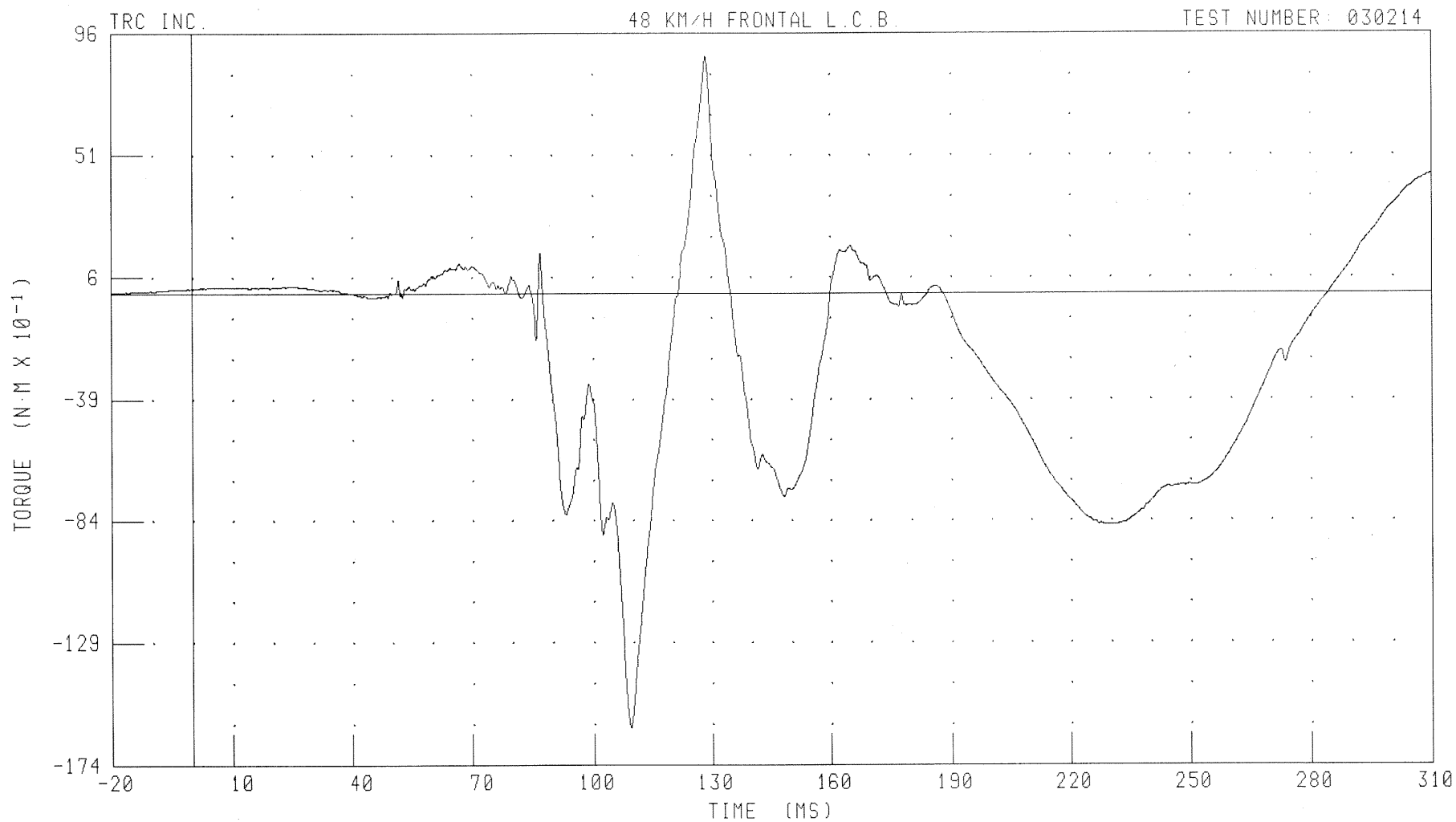
B-108

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK MOMENT ABOUT Z AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKZM2 FILTER: CH. CLASS 600

PEAK DATA: 8.76 N·M @ 128.64 MS; -16.03 N·M @ 109.36 MS

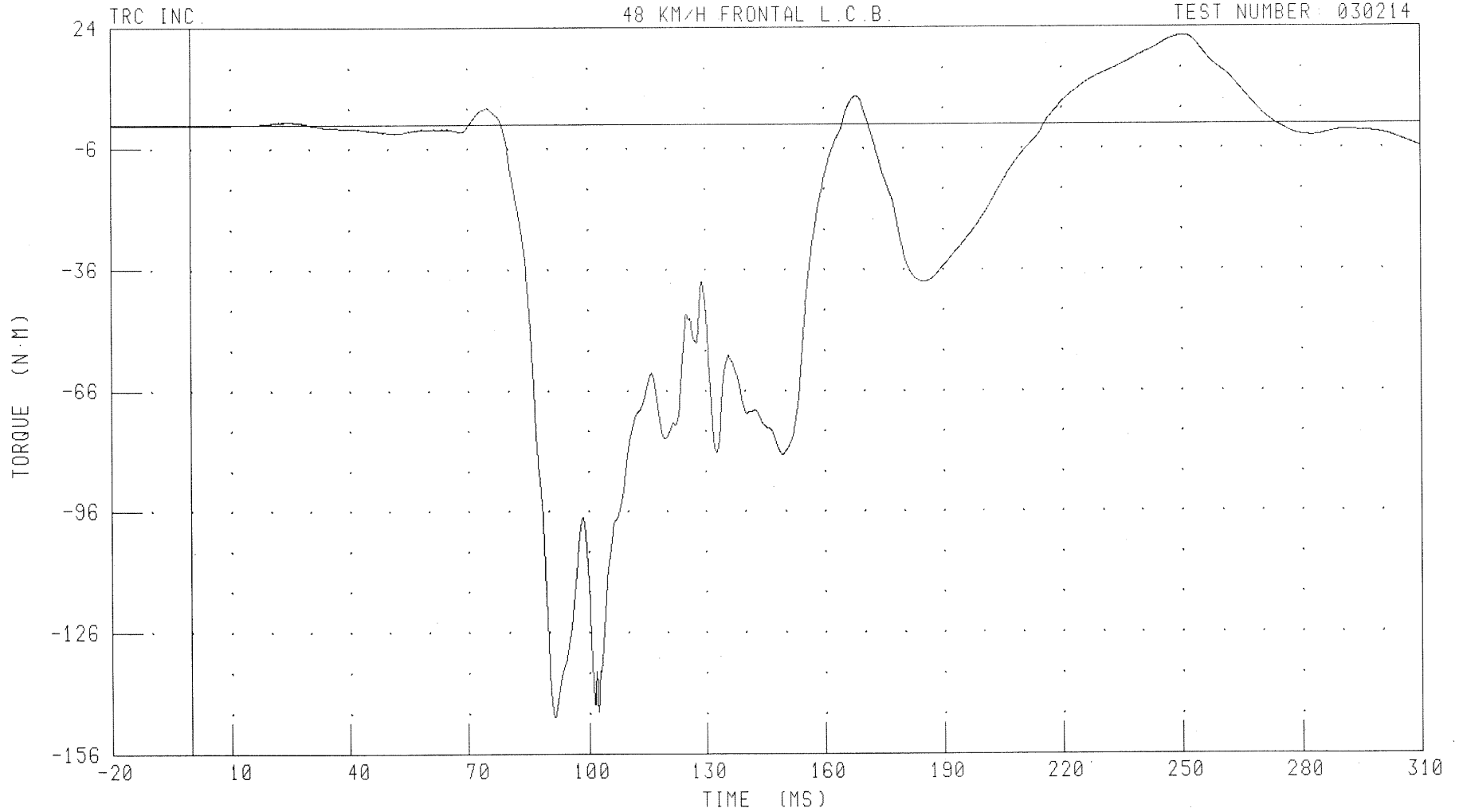
B-109

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NEKOM2 FILTER: CH. CLASS 600

PEAK DATA: 21.87 N.M @ 251.04 MS; -146.89 N.M @ 91.36 MS

B-110

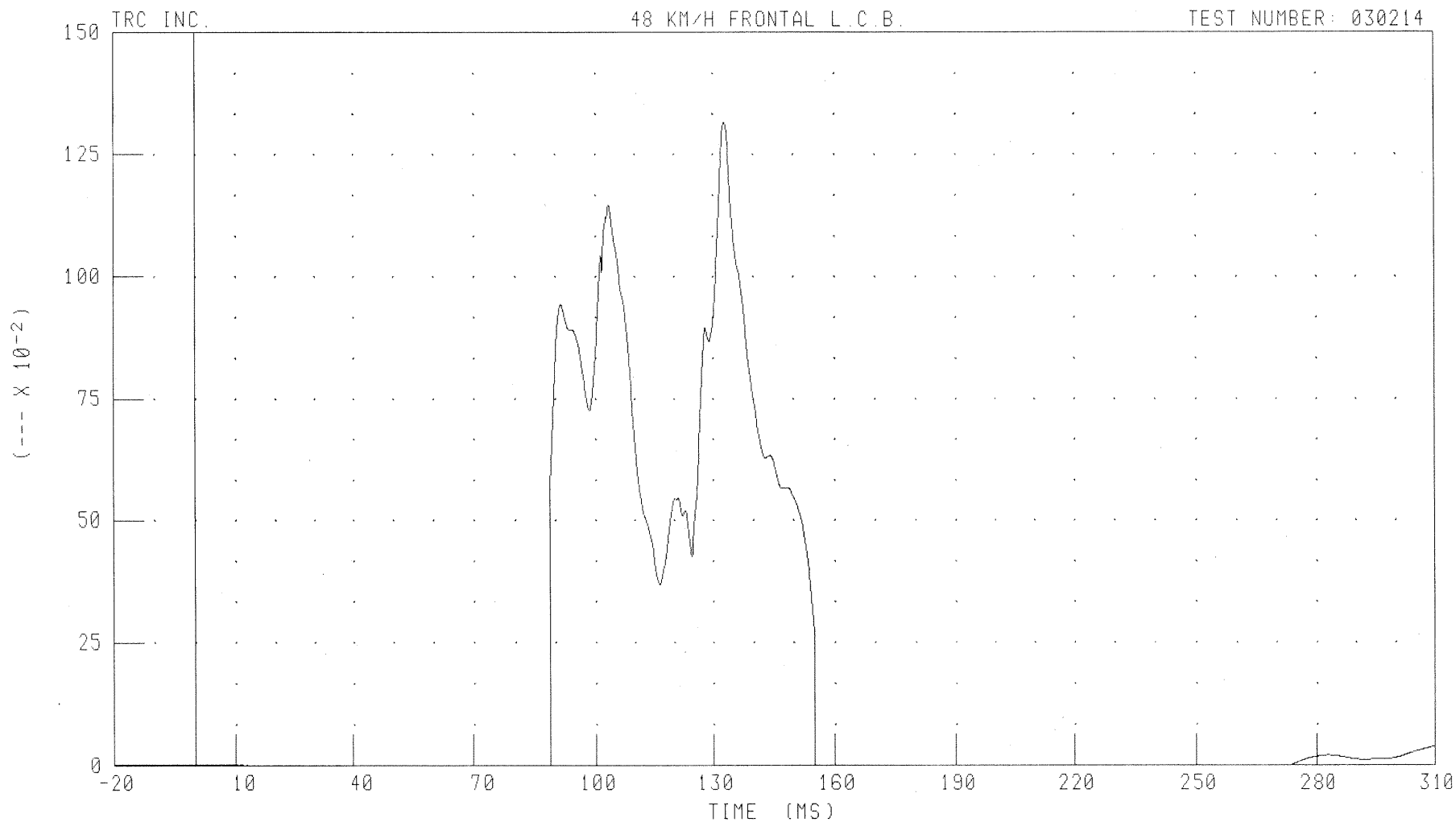
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

RIGHT FRONT PASSENGER NECK TENSION/EXTENSION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NTE2

FILTER: CH. CLASS 600

PEAK DATA: 1.32 --- @ 133.04 MS; 0.00 --- @ 10.56 MS

B-111

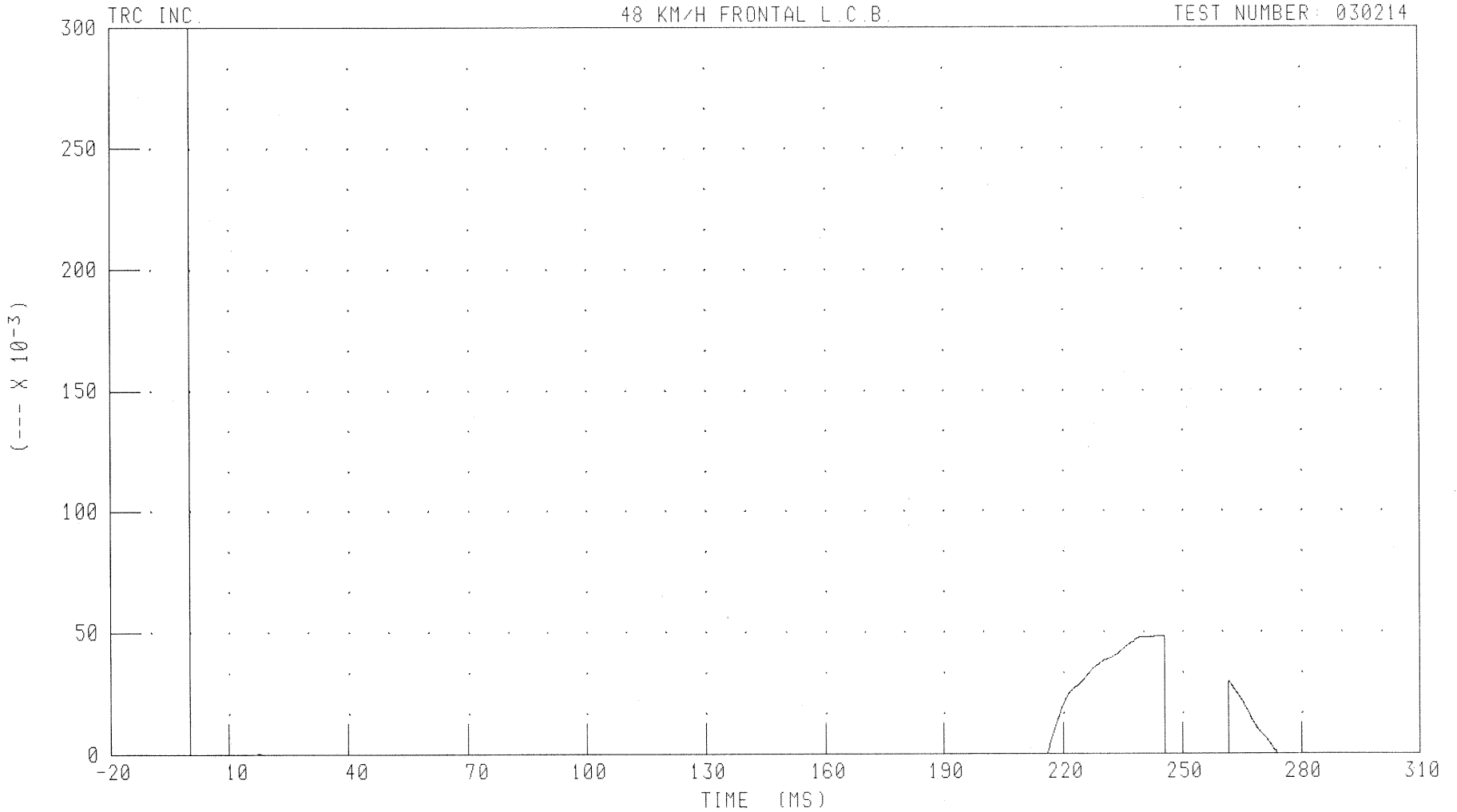
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

RIGHT FRONT PASSENGER NECK TENSION/FLEXION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NTF2

FILTER: CH. CLASS 600

PEAK DATA: 0.05 --- @ 243.60 MS; 0.00 --- @ -20.00 MS

B-112

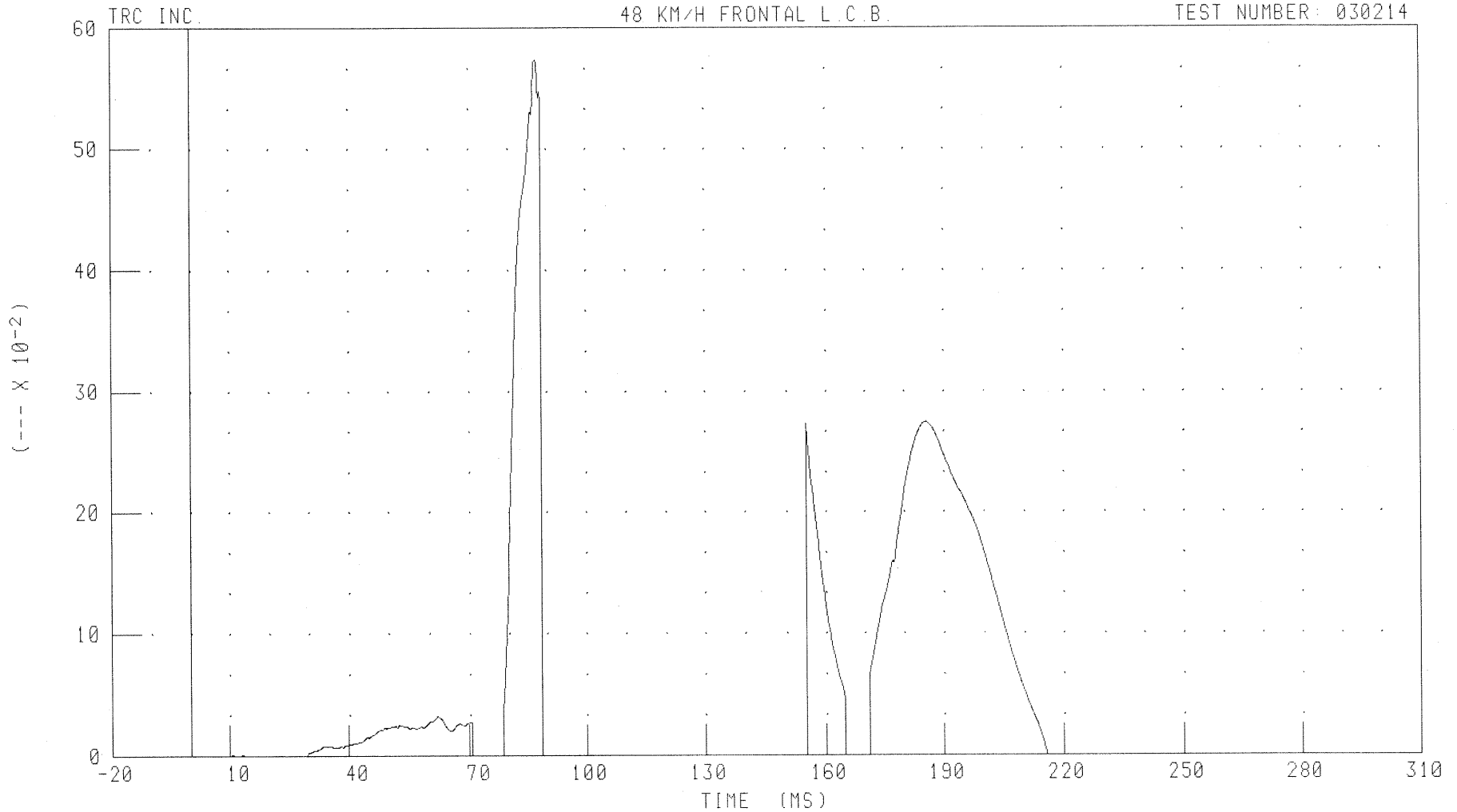
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

RIGHT FRONT PASSENGER NECK COMPRESSION/EXTENSION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NCE2

FILTER: CH. CLASS 600

PEAK DATA: 0.57 --- @ 87.44 MS, 0.00 --- @ -20.00 MS

B-113

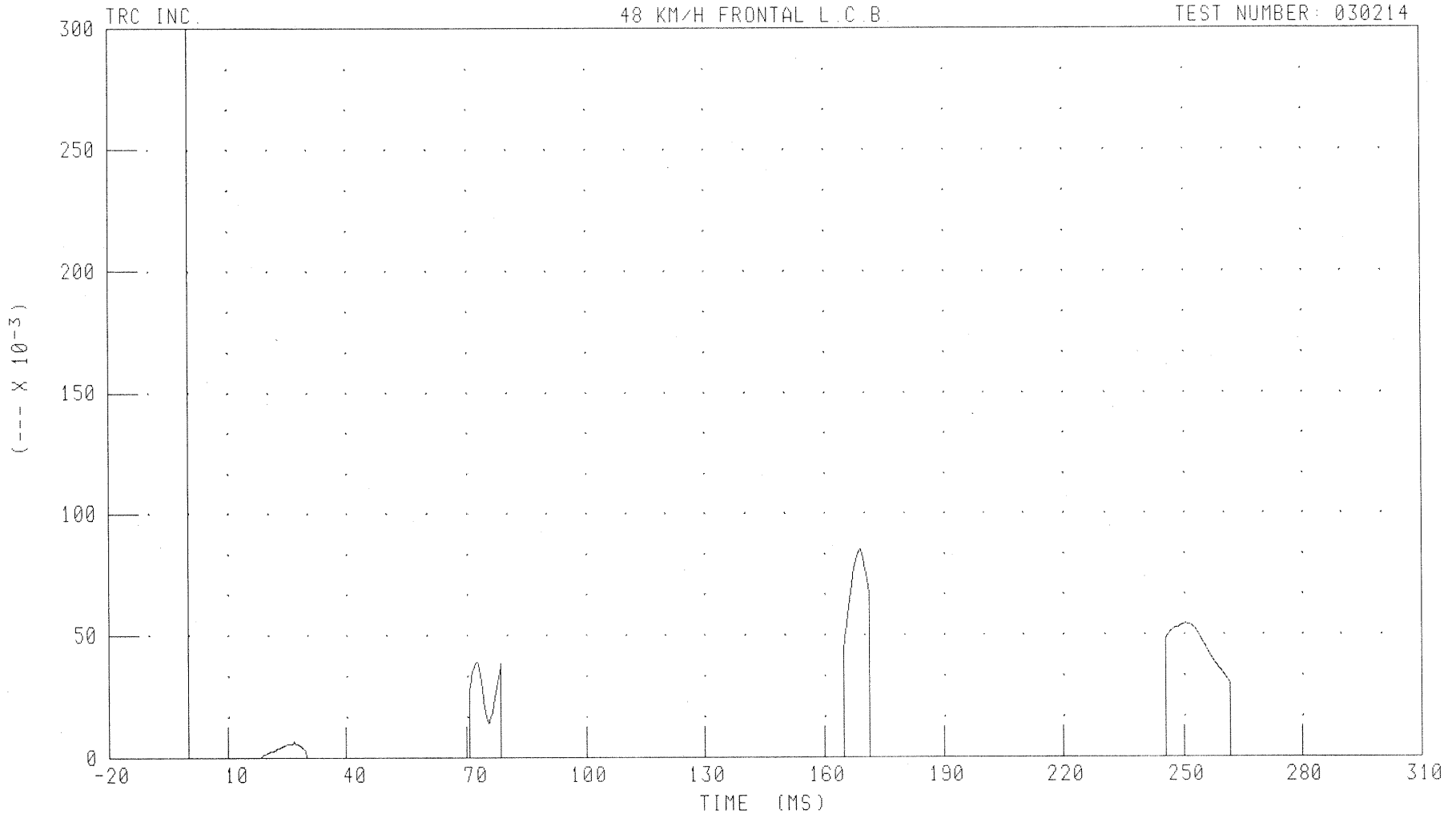
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

RIGHT FRONT PASSENGER NECK COMPRESSION/FLEXION

48 KM/H FRONTAL L.C.B

TEST NUMBER: 030214



CHANNEL: NCF2

FILTER: CH. CLASS 600

PEAK DATA: 0.08 --- @ 169.04 MS; 0.00 --- @ -20.00 MS

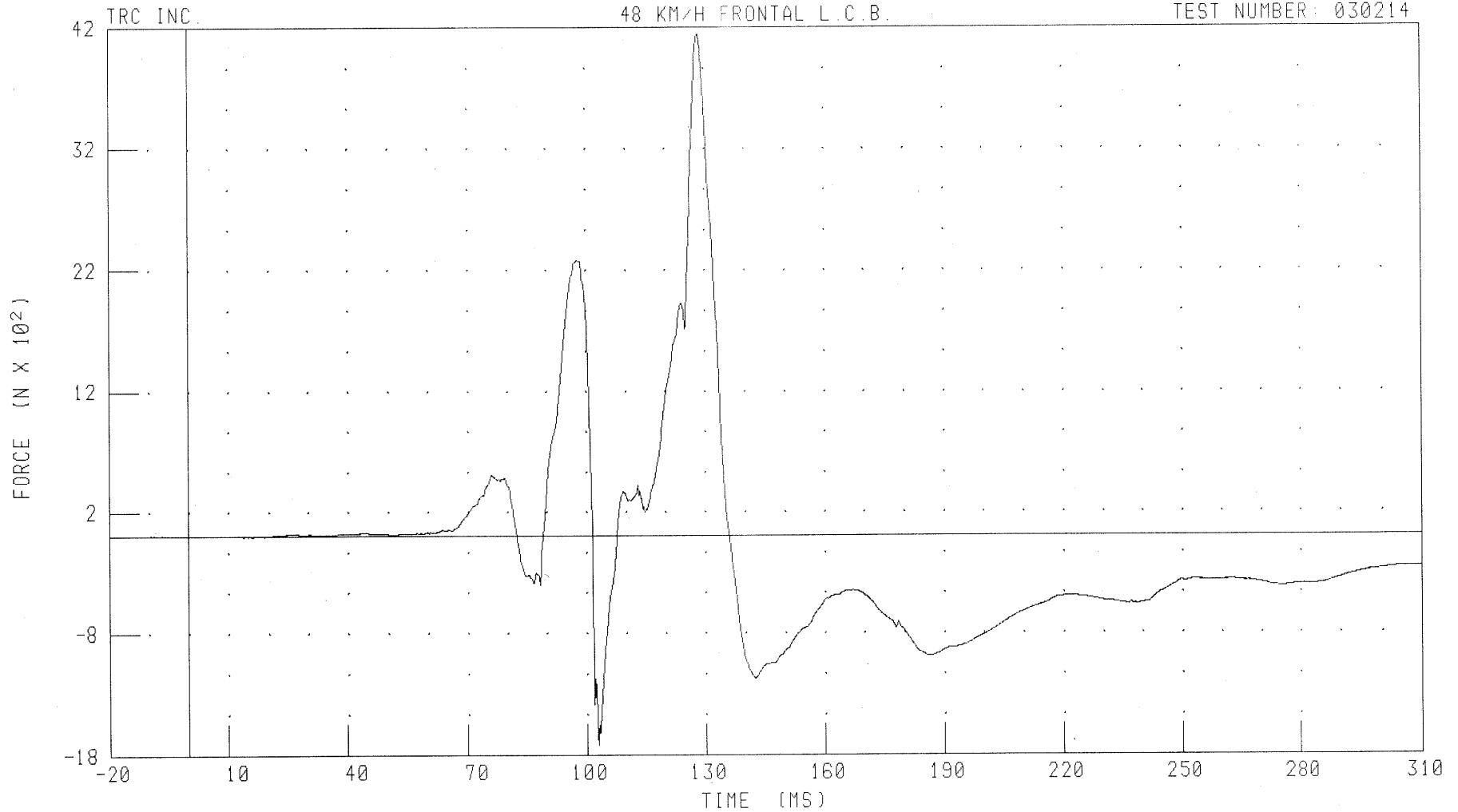
B-114

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK LOWER X-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLXF2 FILTER: CH. CLASS 1000

PEAK DATA: 4142.93 N @ 128.64 MS; -1715.84 N @ 102.80 MS

B-115

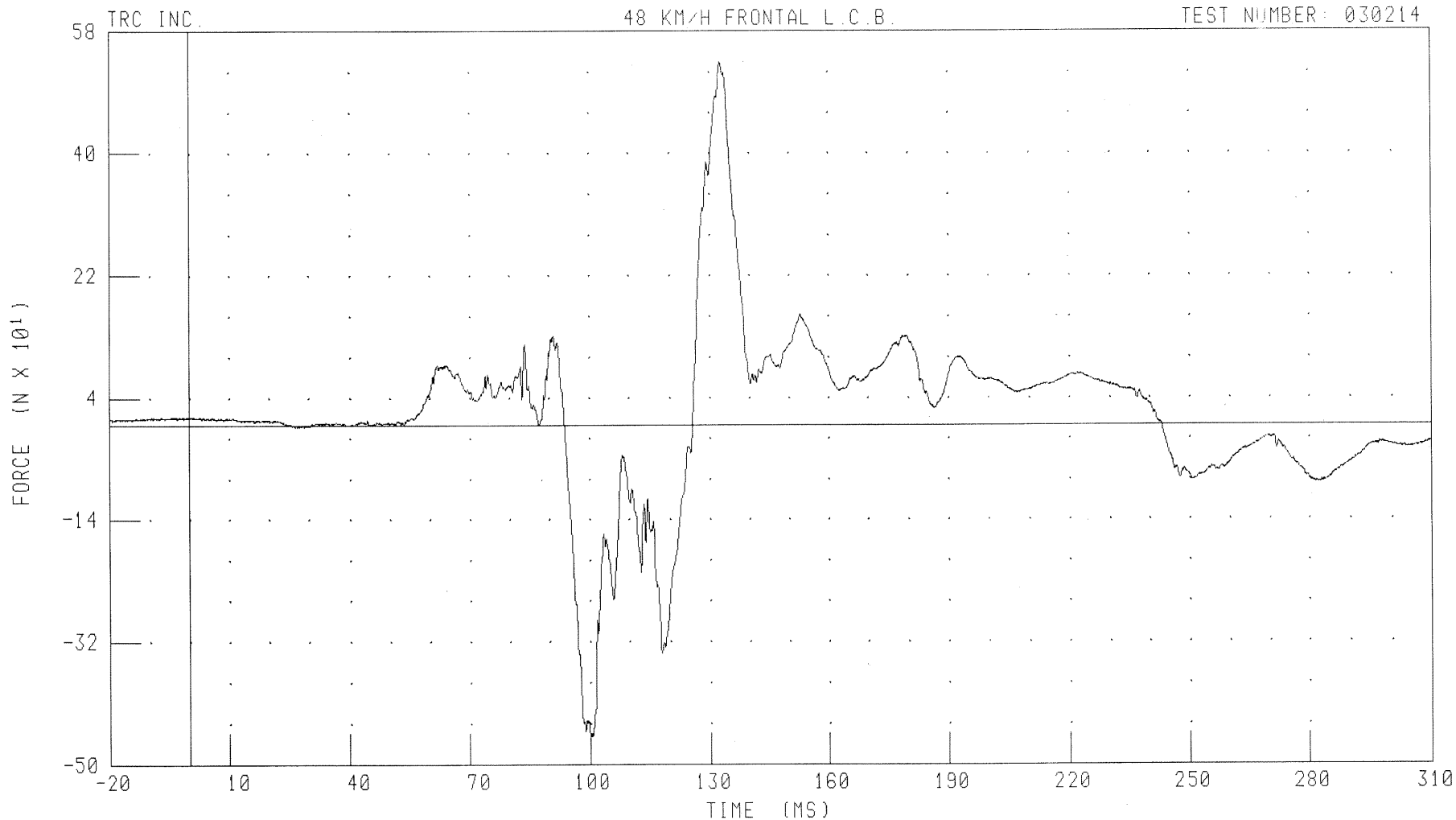
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER NECK LOWER Y-AXIS SHEAR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLYF2 FILTER: CH. CLASS 1000

PEAK DATA: 534.59 N @ 132.96 MS; -461.60 N @ 100.16 MS

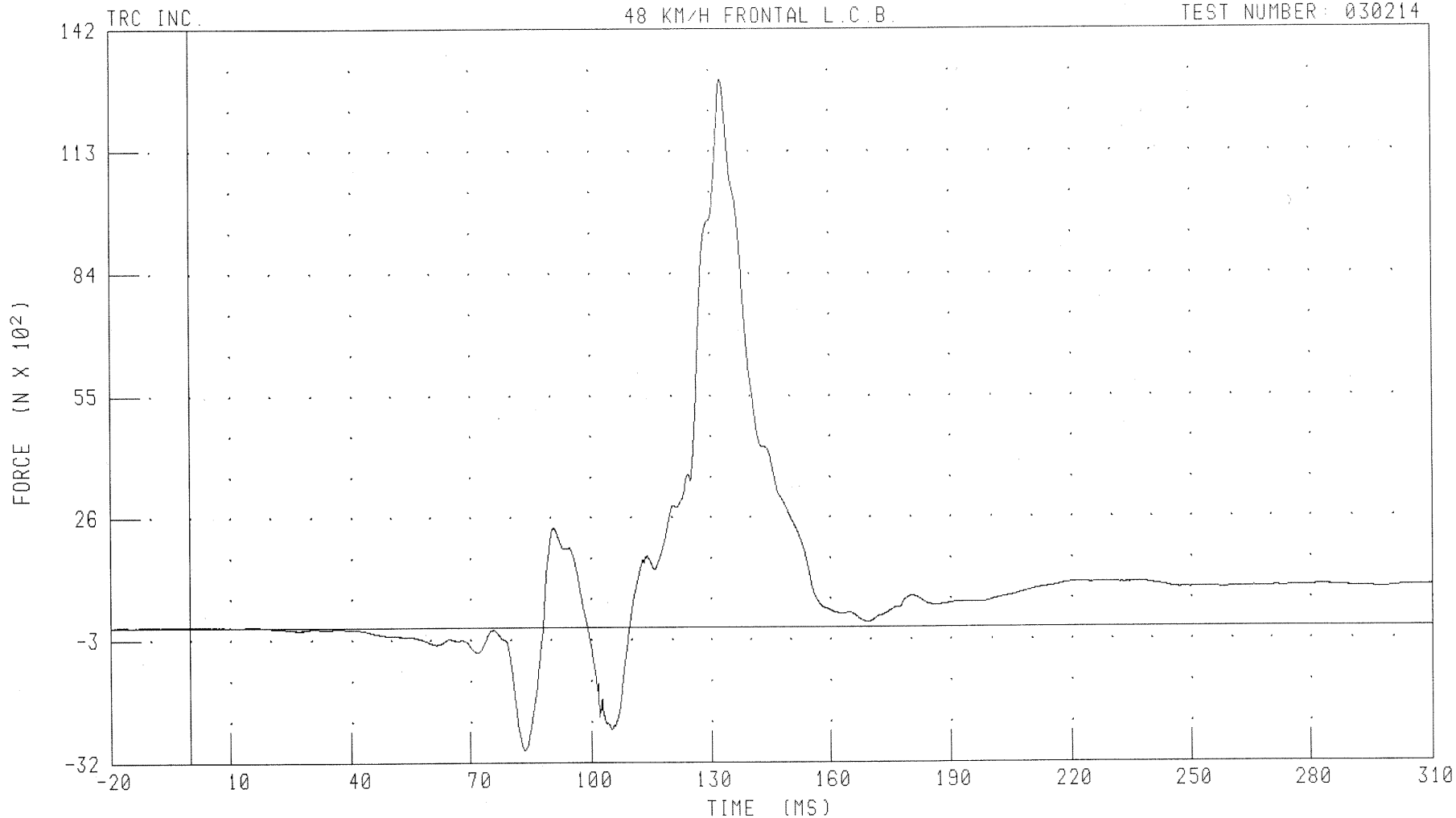
B-116

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK LOWER Z-AXIS AXIAL FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLZF2 FILTER: CH. CLASS 1000

PEAK DATA: 13012.10 N @ 133.04 MS; -2910.85 N @ 83.52 MS

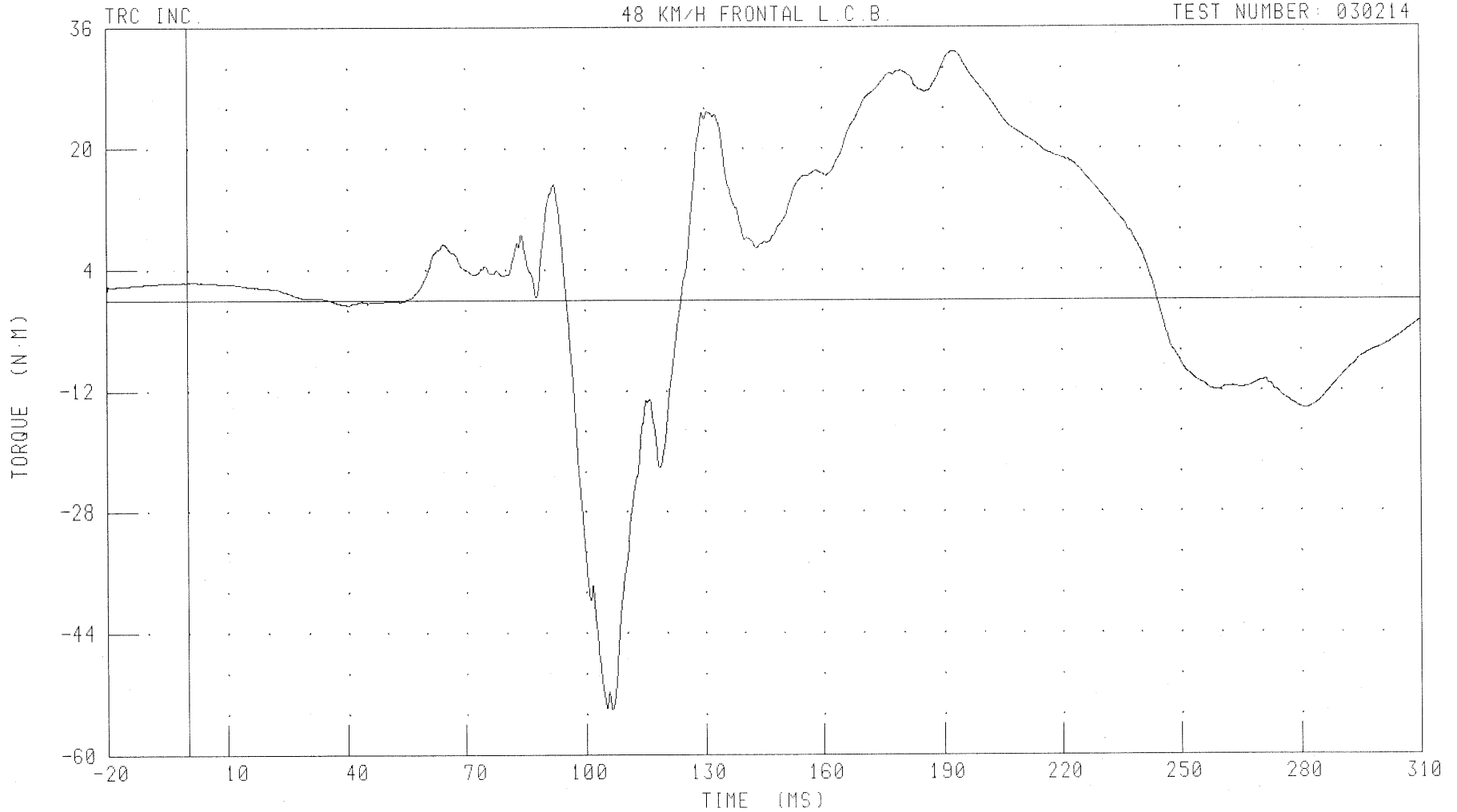
B-117

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK LOWER MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLXM2 FILTER: CH. CLASS 600

PEAK DATA: 32.84 N·M @ 192.64 MS; -54.09 N·M @ 106.48 MS

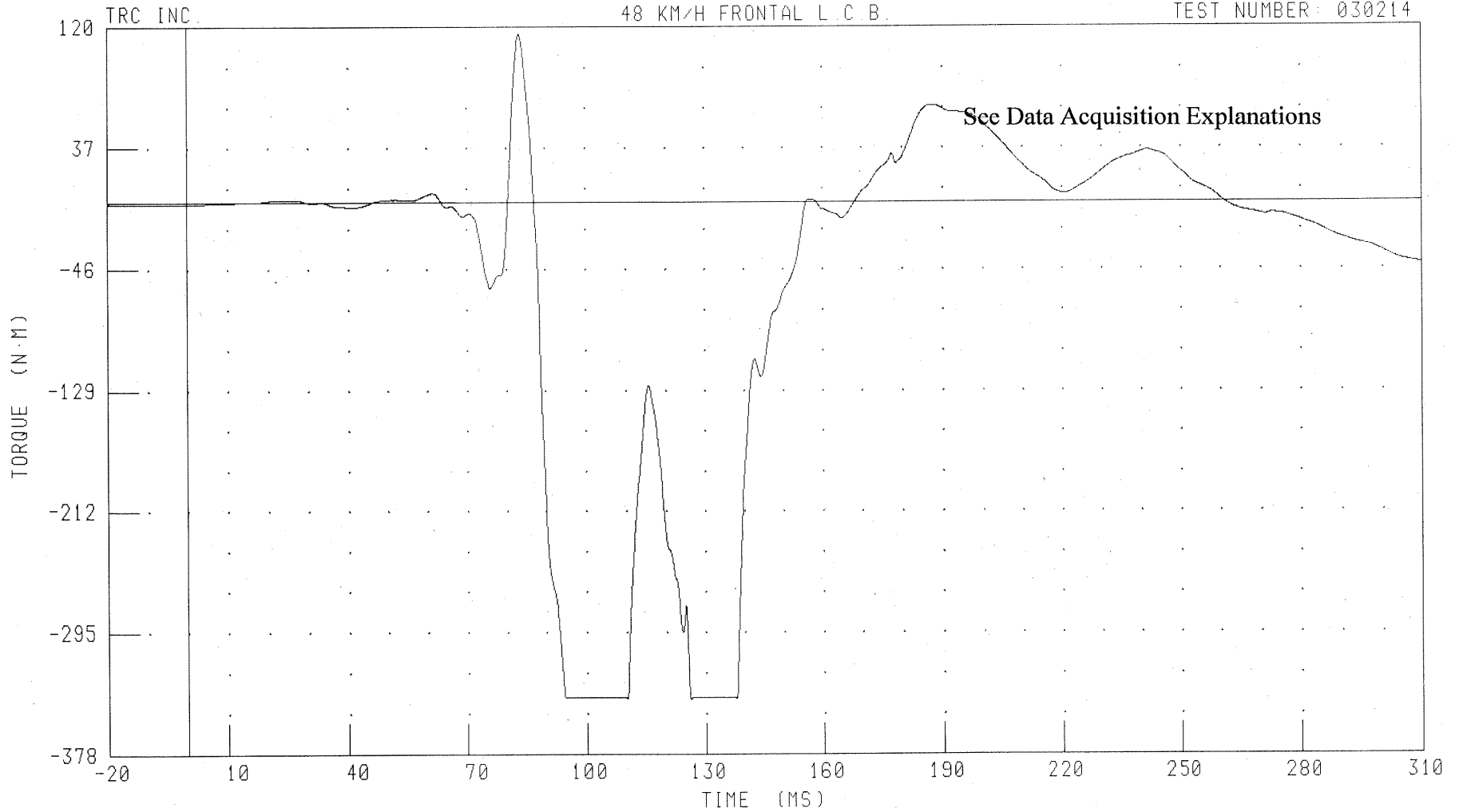
B-118

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK LOWER MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLYM2 FILTER: CH. CLASS 600

PEAK DATA: 115.01 N·M @ 83.68 MS; -340.50 N·M @ 126.16 MS

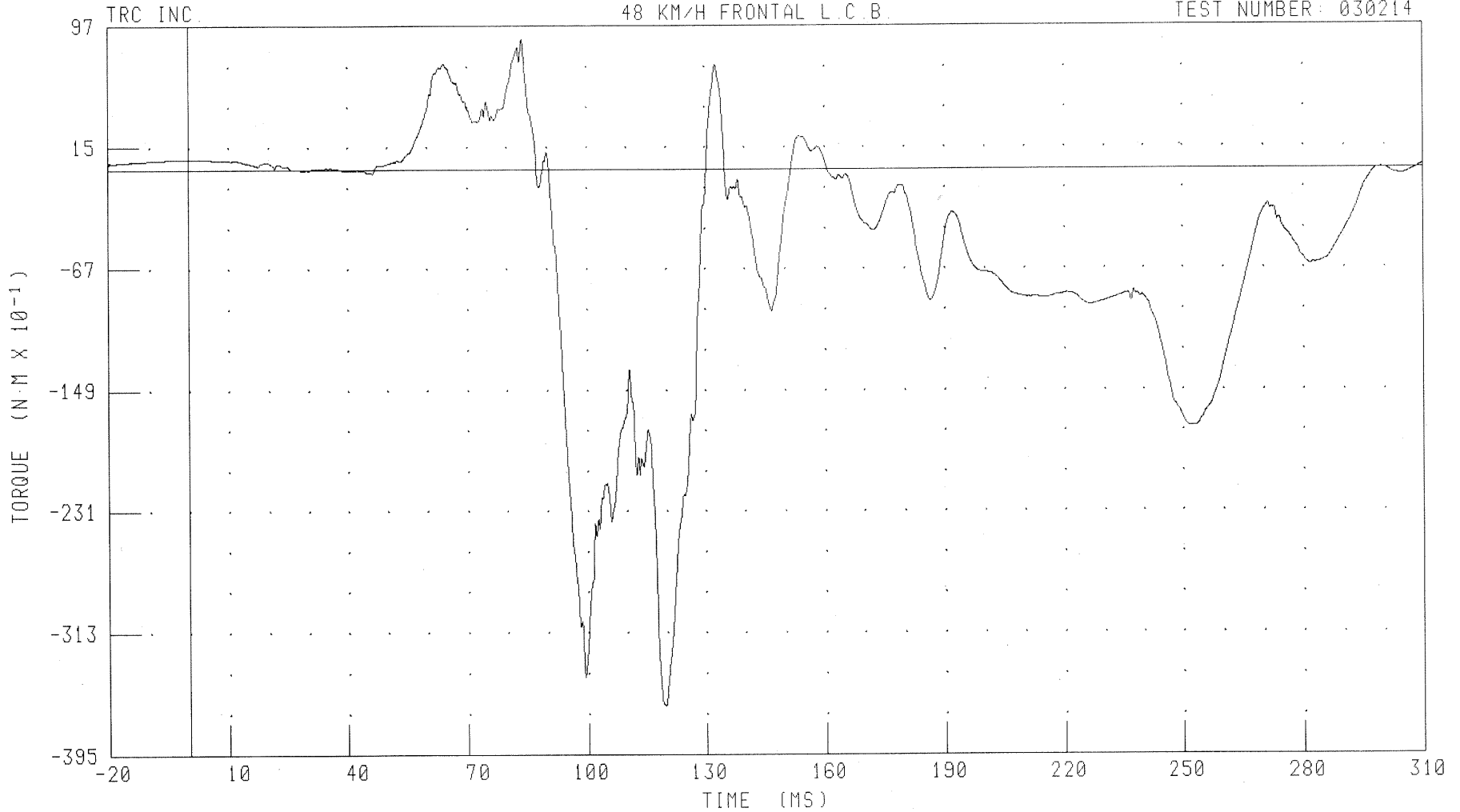
B-119

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER NECK LOWER MOMENT ABOUT Z AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: NKLZM2 FILTER: CH. CLASS 600

PEAK DATA: 8.84 N·M @ 84.00 MS; -36.23 N·M @ 119.68 MS

B-120

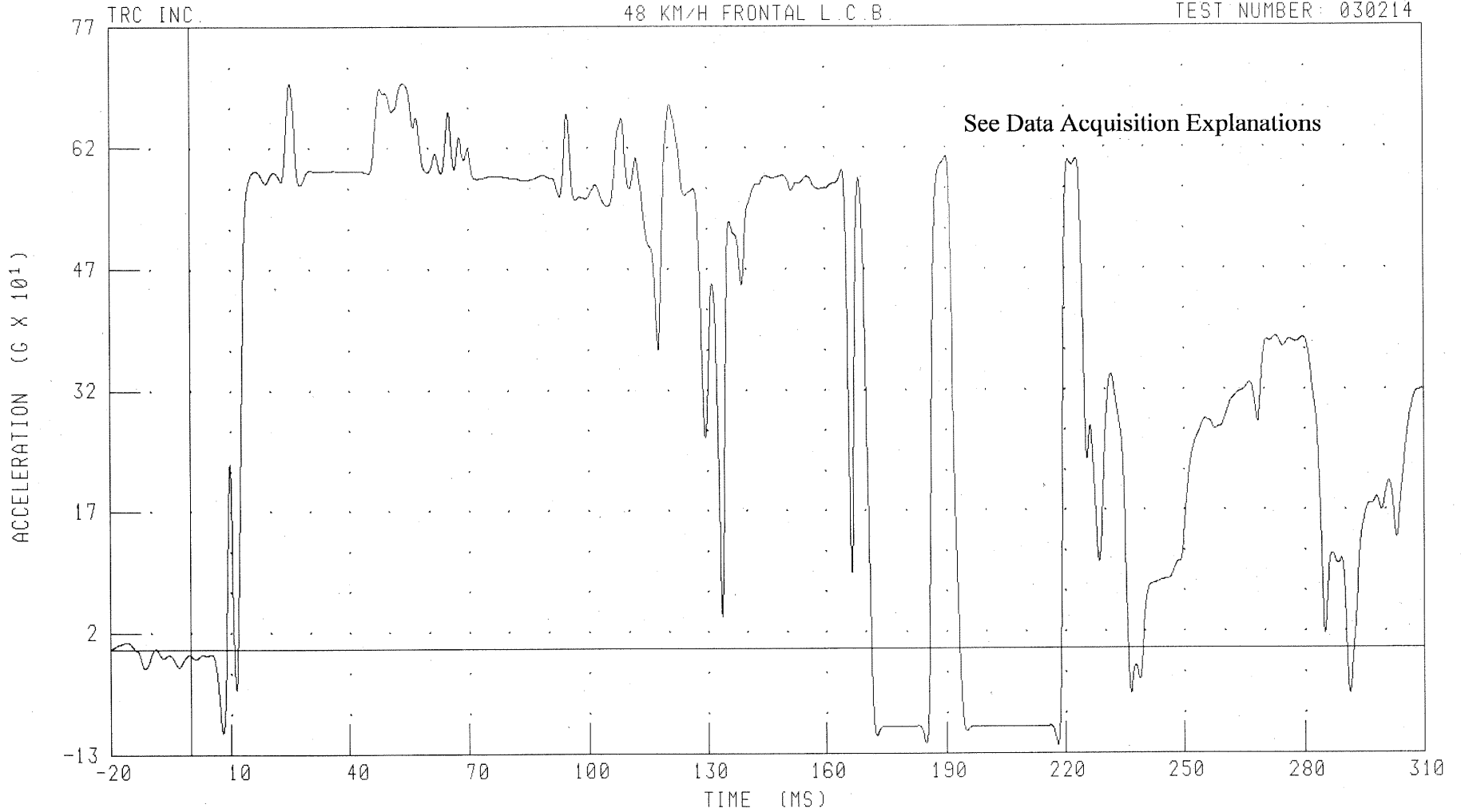
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER CHEST X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTXG2 FILTER: CH. CLASS 180

PEAK DATA: 700.80 G @ 53.92 MS; -119.95 G @ 218.08 MS

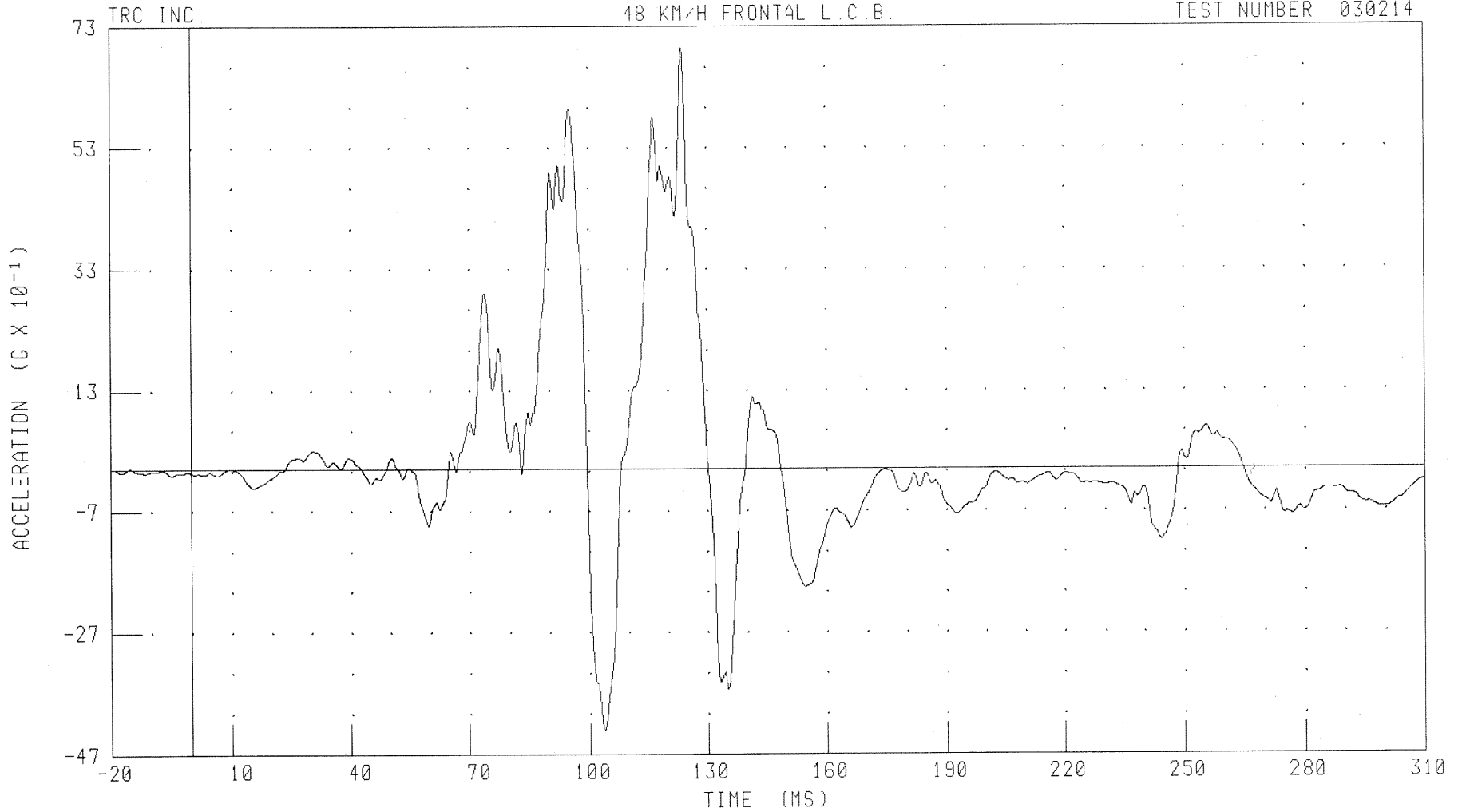
B-121

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST Y-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTYG2

FILTER: CH. CLASS 180

PEAK DATA: 6.95 G @ 124.00 MS; -4.30 G @ 103.68 MS

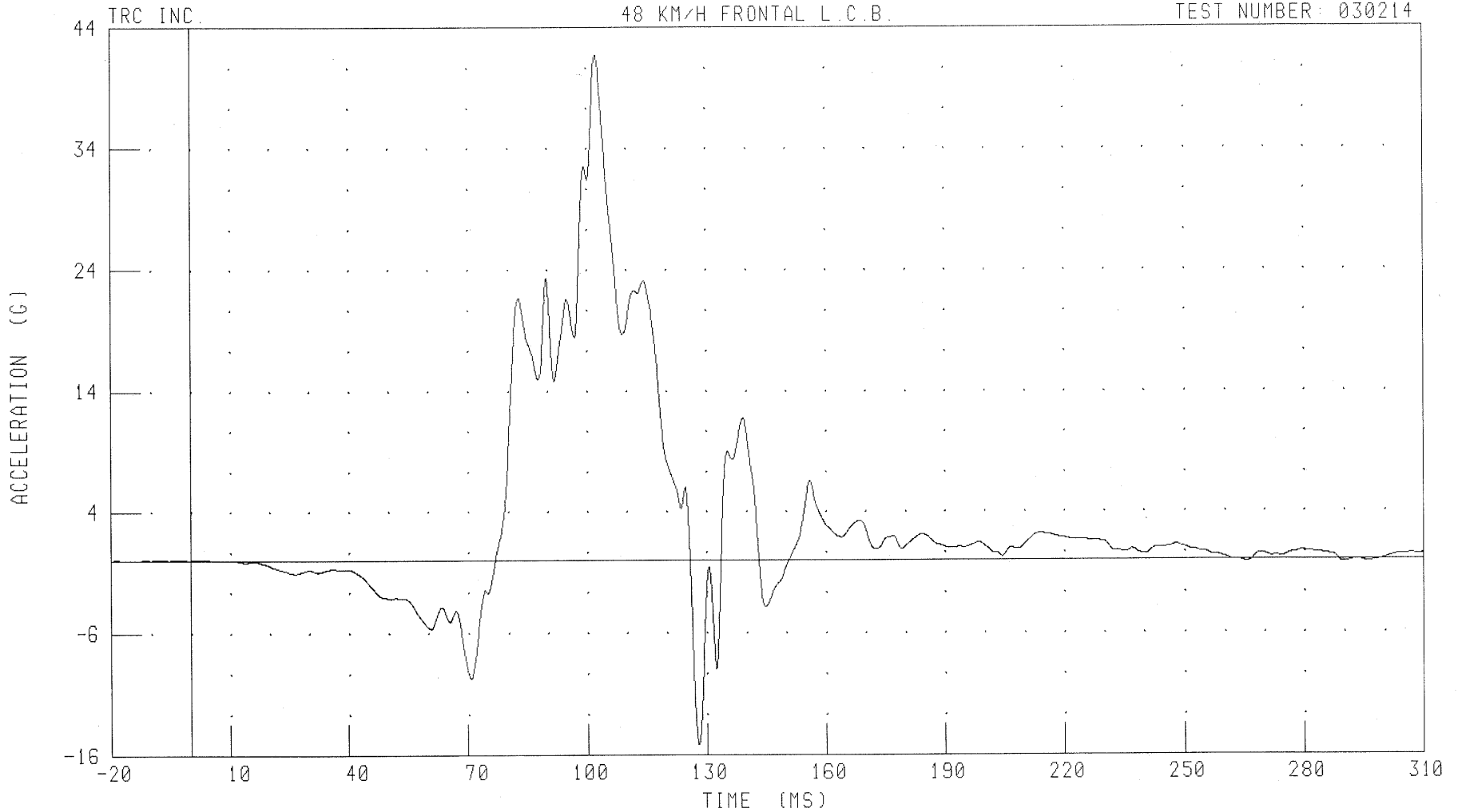
B-122

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTZG2

FILTER: CH. CLASS 180

PEAK DATA: 41.75 G @ 102.48 MS; -15.20 G @ 128.00 MS

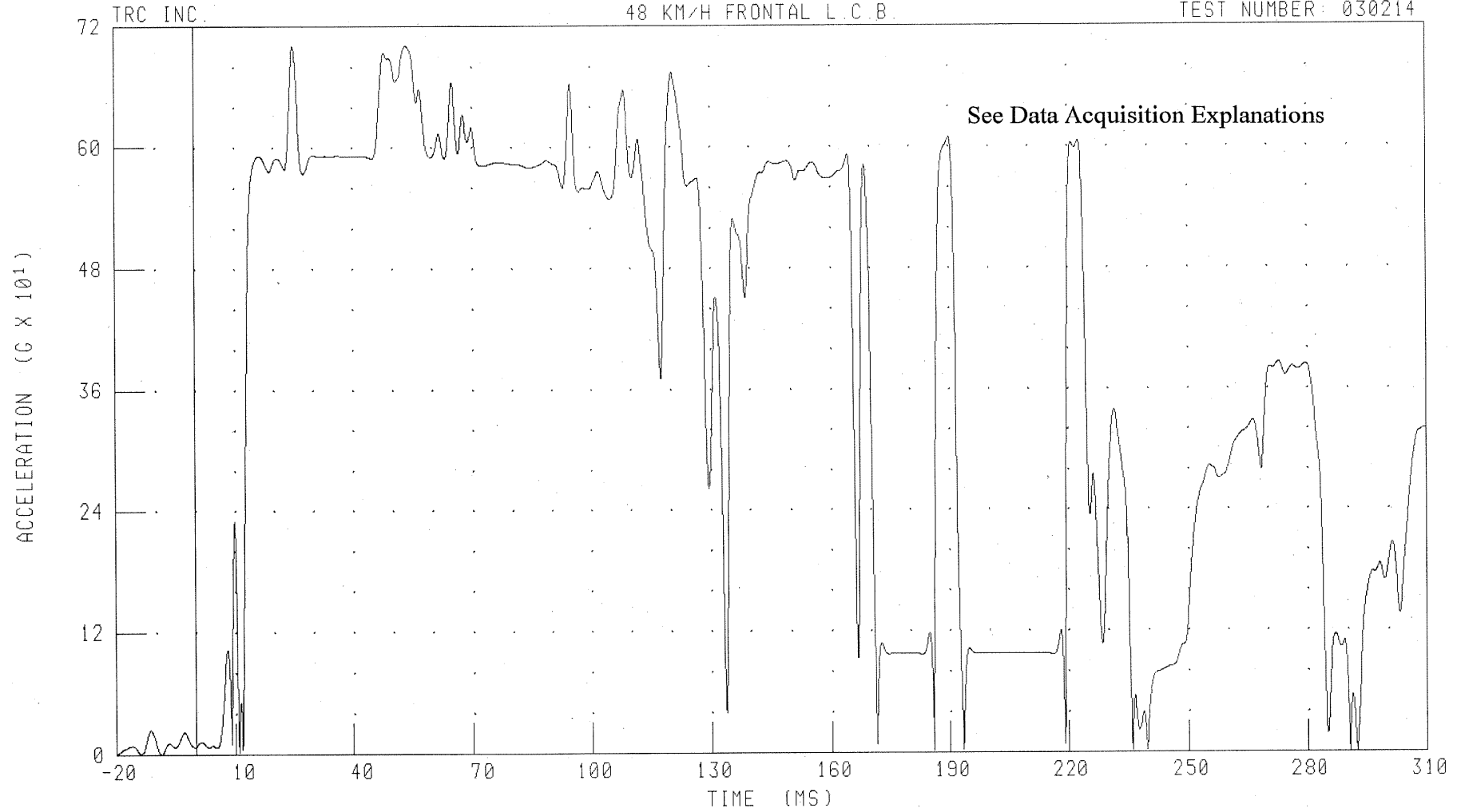
B-123

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST RESULTANT ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTRG2 FILTER: CH. CLASS 180

PEAK DATA: 700.81 G @ 53.92 MS; 0.10 G @ -8.56 MS

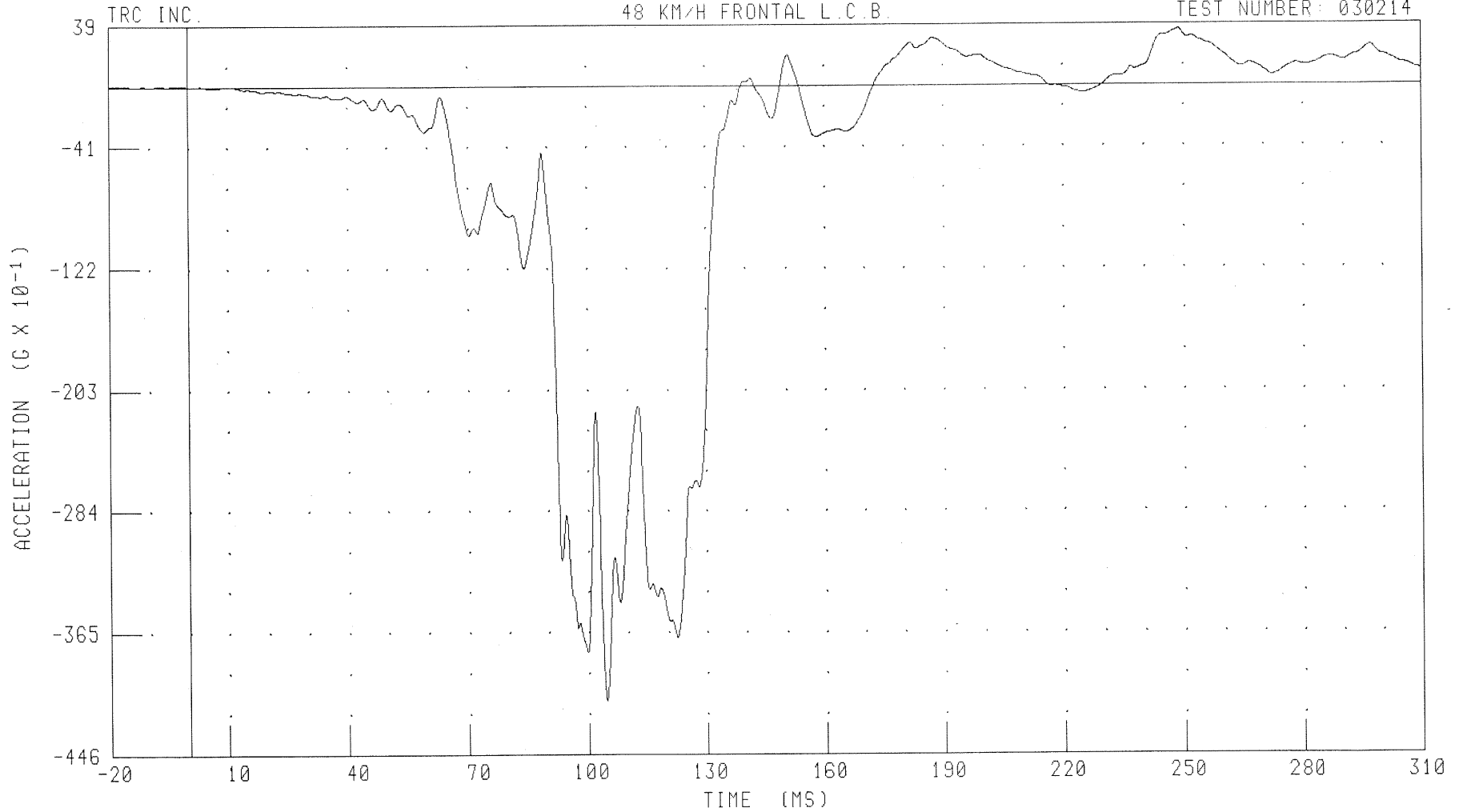
B-124

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST X-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-125

030214

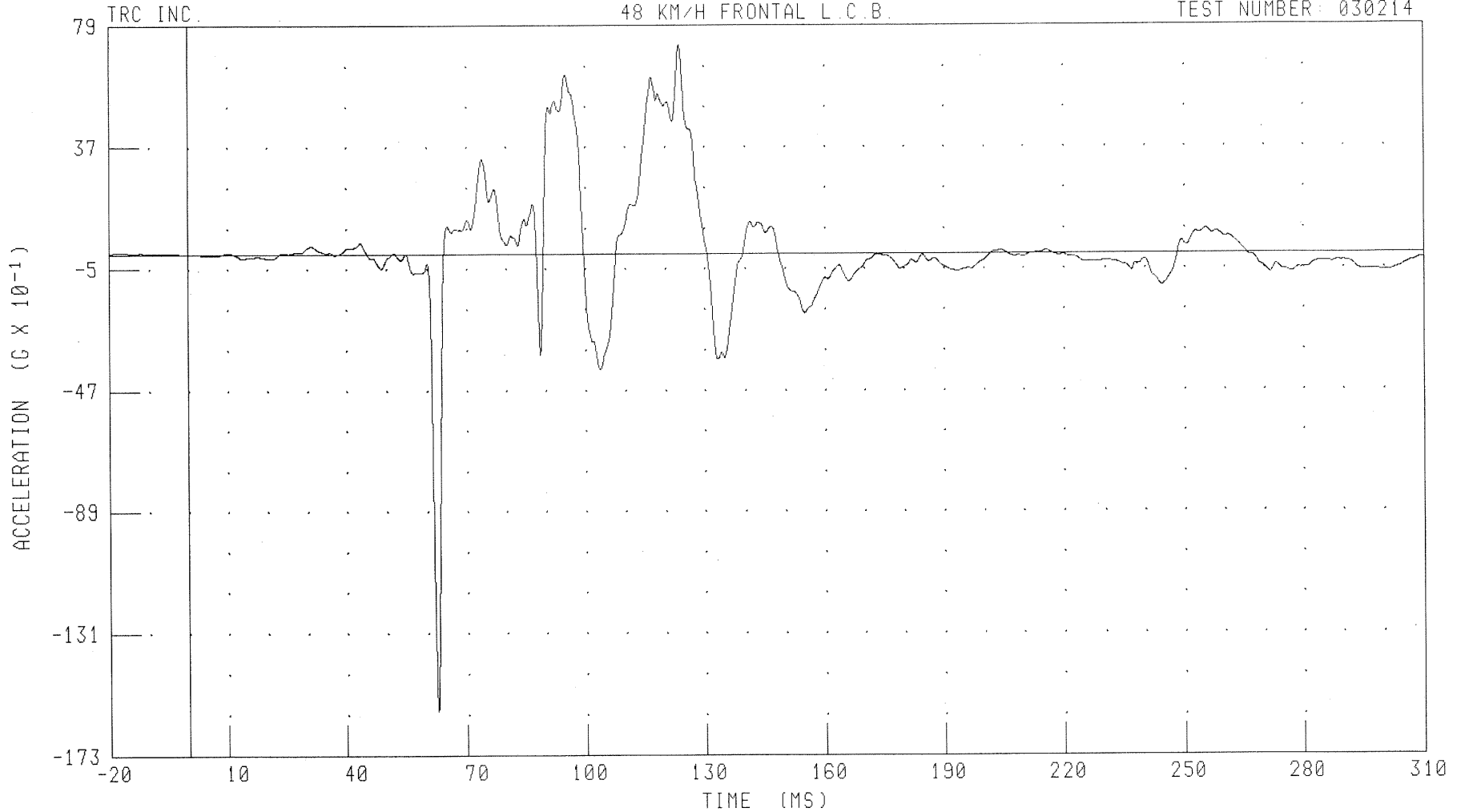
CHANNEL: CSTXR2 FILTER: CH. CLASS 180

PEAK DATA: 3.65 G @ 248.96 MS; -41.05 G @ 104.64 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST Y-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTYR2

FILTER: CH. CLASS 180

PEAK DATA: 7.22 G @ 123.92 MS; -15.78 G @ 62.56 MS

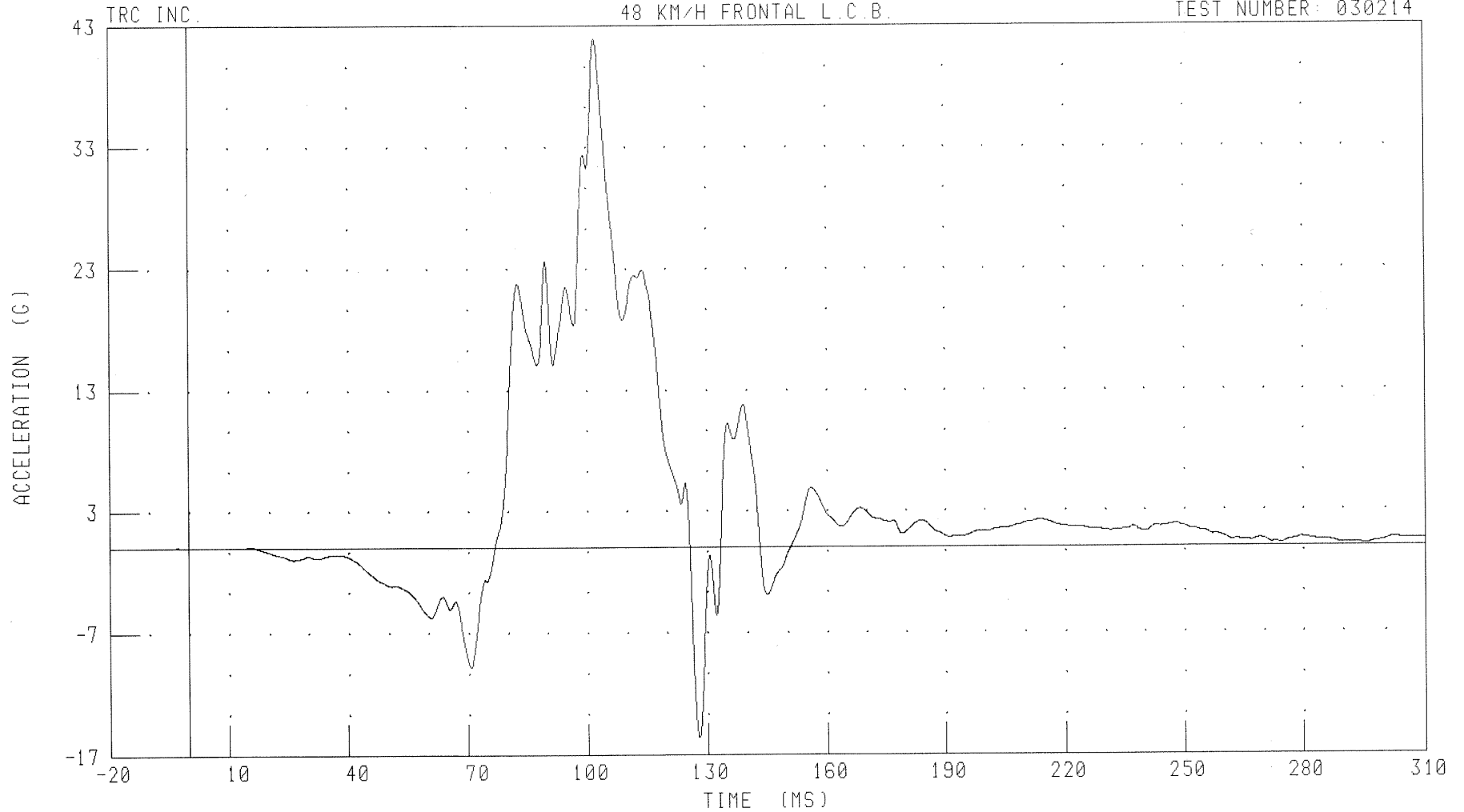
B-126

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST Z-AXIS ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTZR2

FILTER: CH. CLASS 180

PEAK DATA: 41.94 G @ 102.40 MS; -15.59 G @ 128.00 MS

B-127

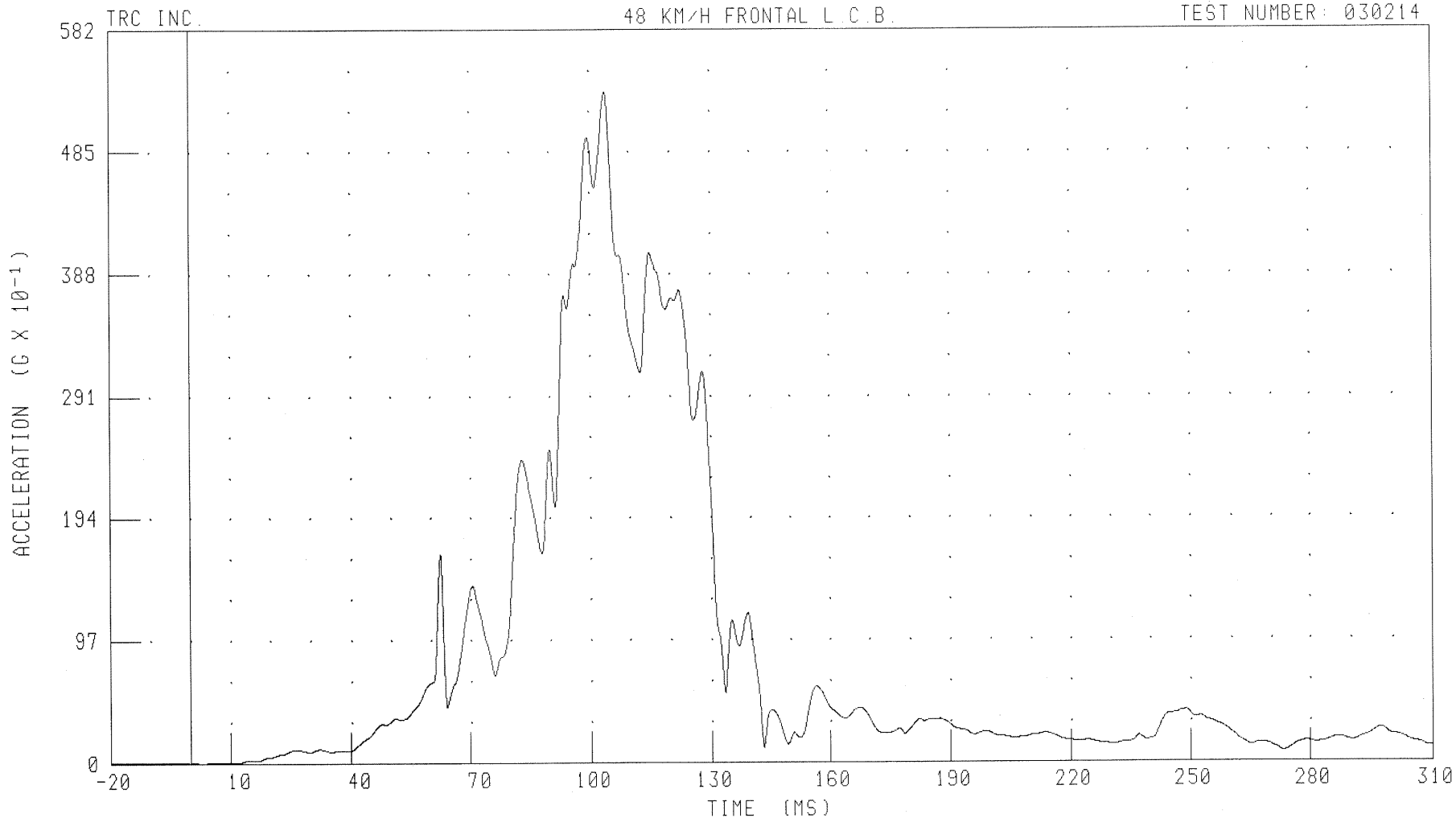
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER CHEST RESULTANT ACCELERATION REDUNDANT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTRR2

FILTER: CH. CLASS 180

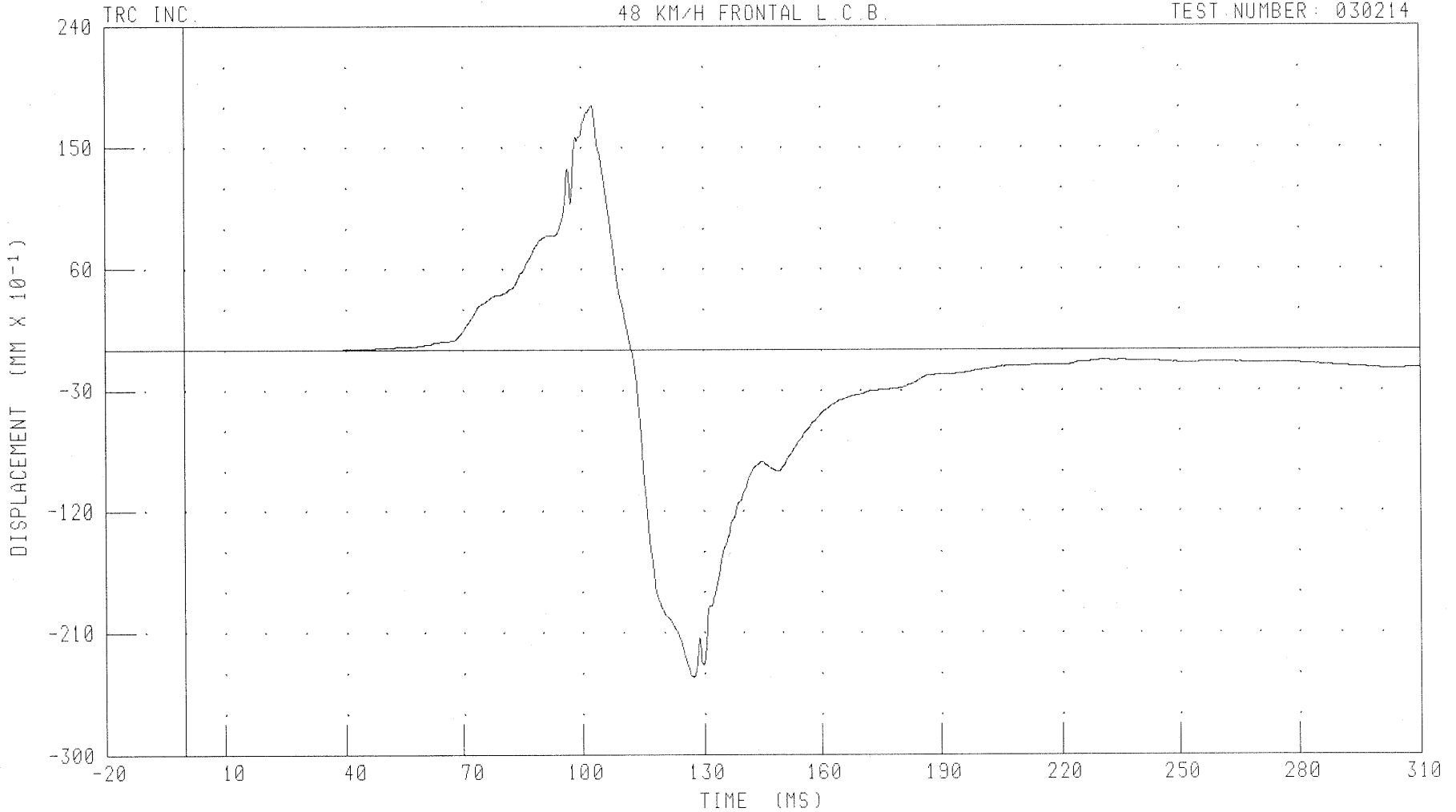
PEAK DATA: 53.29 G @ 104.32 MS; 0.01 G @ -20.00 MS

B-128

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER CHEST DEFLECTION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: CSTXD2

FILTER: CH. CLASS 600

PEAK DATA: 18.15 MM @ 102.72 MS; -24.26 MM @ 127.36 MS

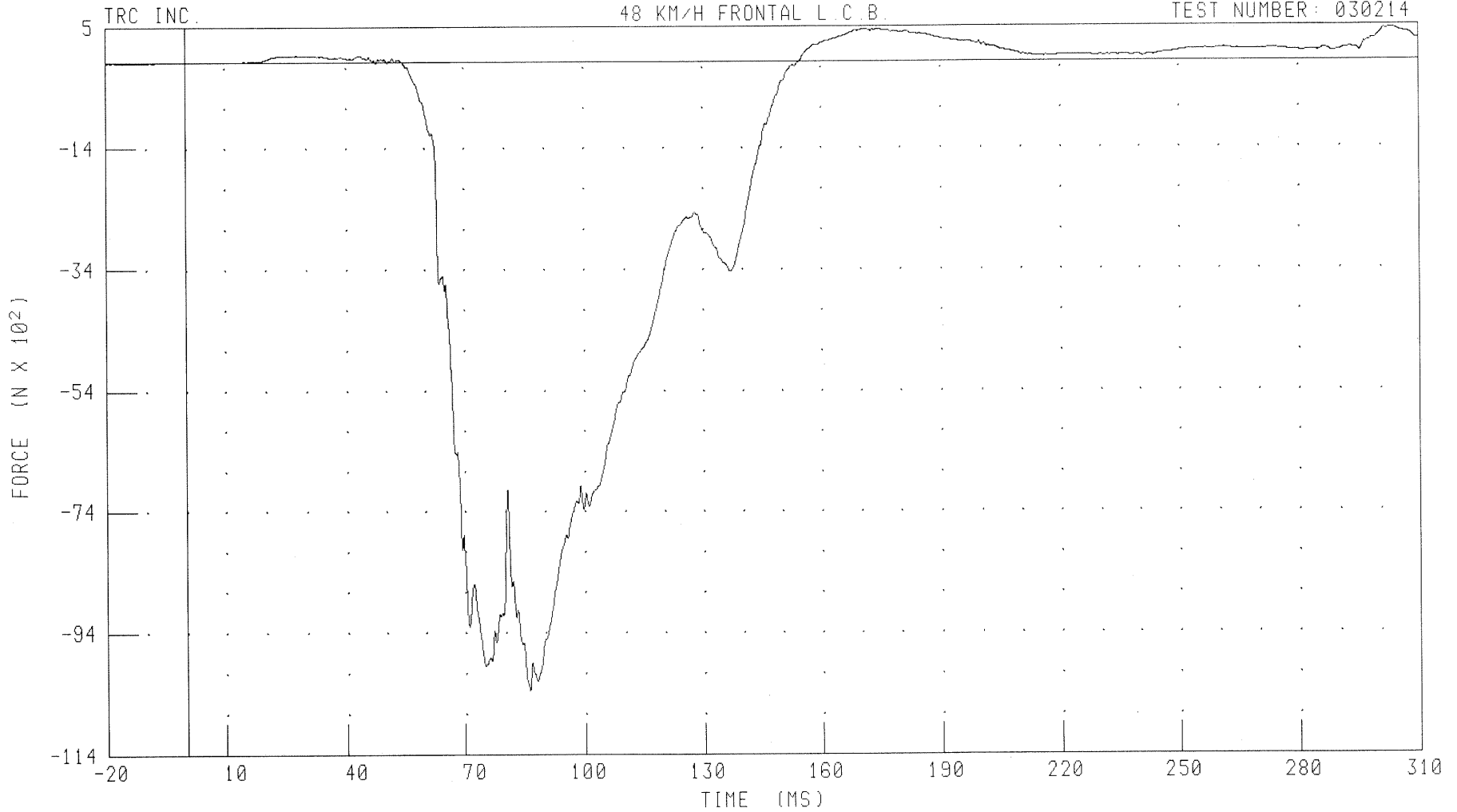
B-129

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT FEMUR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LFMZF2 FILTER: CH. CLASS 600

PEAK DATA: 535.61 N @ 173.28 MS; -10374.27 N @ 86.00 MS

B-130

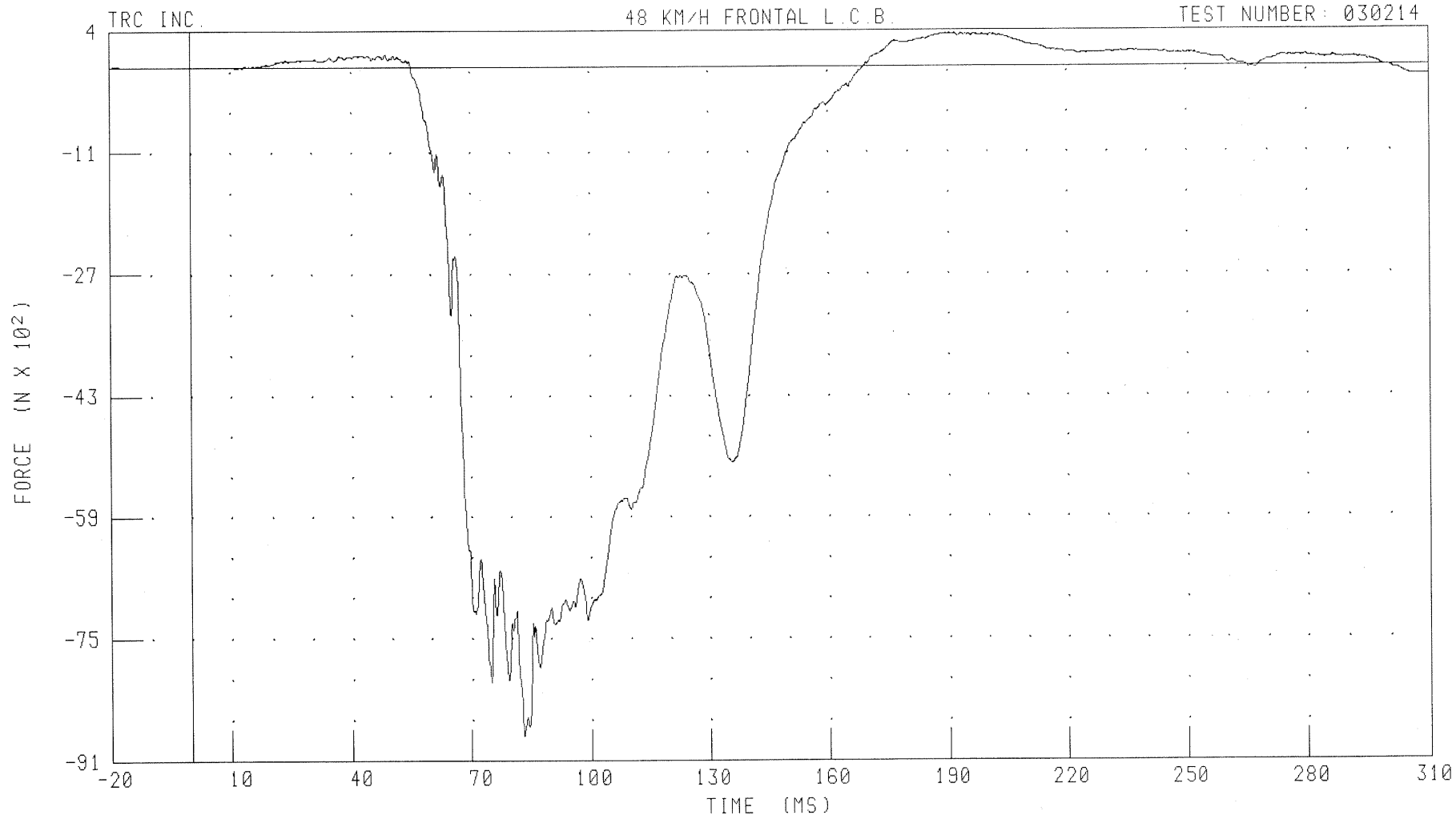
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER RIGHT FEMUR FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: RFMZ F2 FILTER: CH. CLASS 600

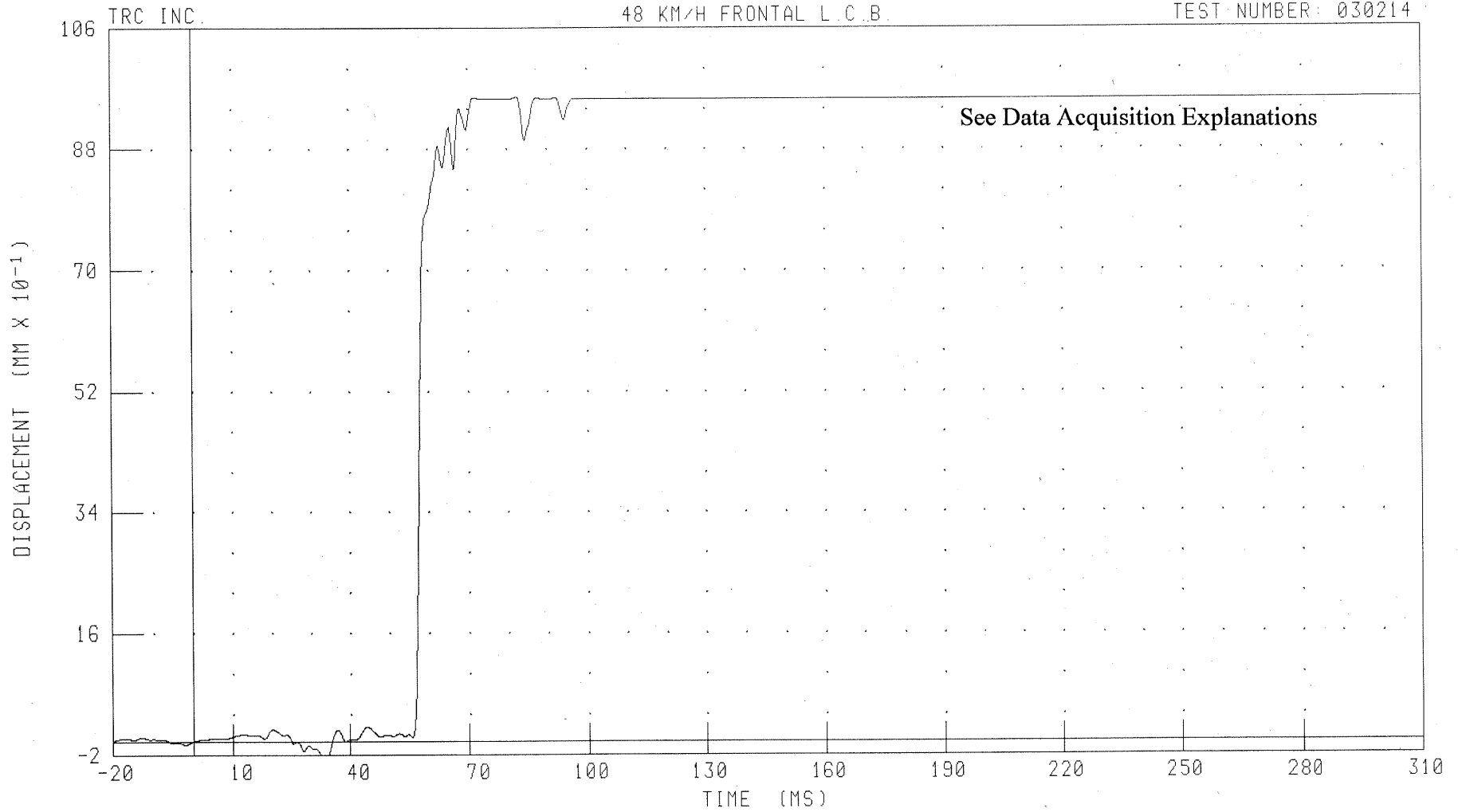
PEAK DATA: 428.91 N @ 192.00 MS; -8812.03 N @ 83.20 MS

B-131

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT KNEE DISPLACEMENT  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: KNLXD2 FILTER: CH. CLASS 100

PEAK DATA: 9.58 MM @ 82.56 MS; -0.27 MM @ 33.68 MS

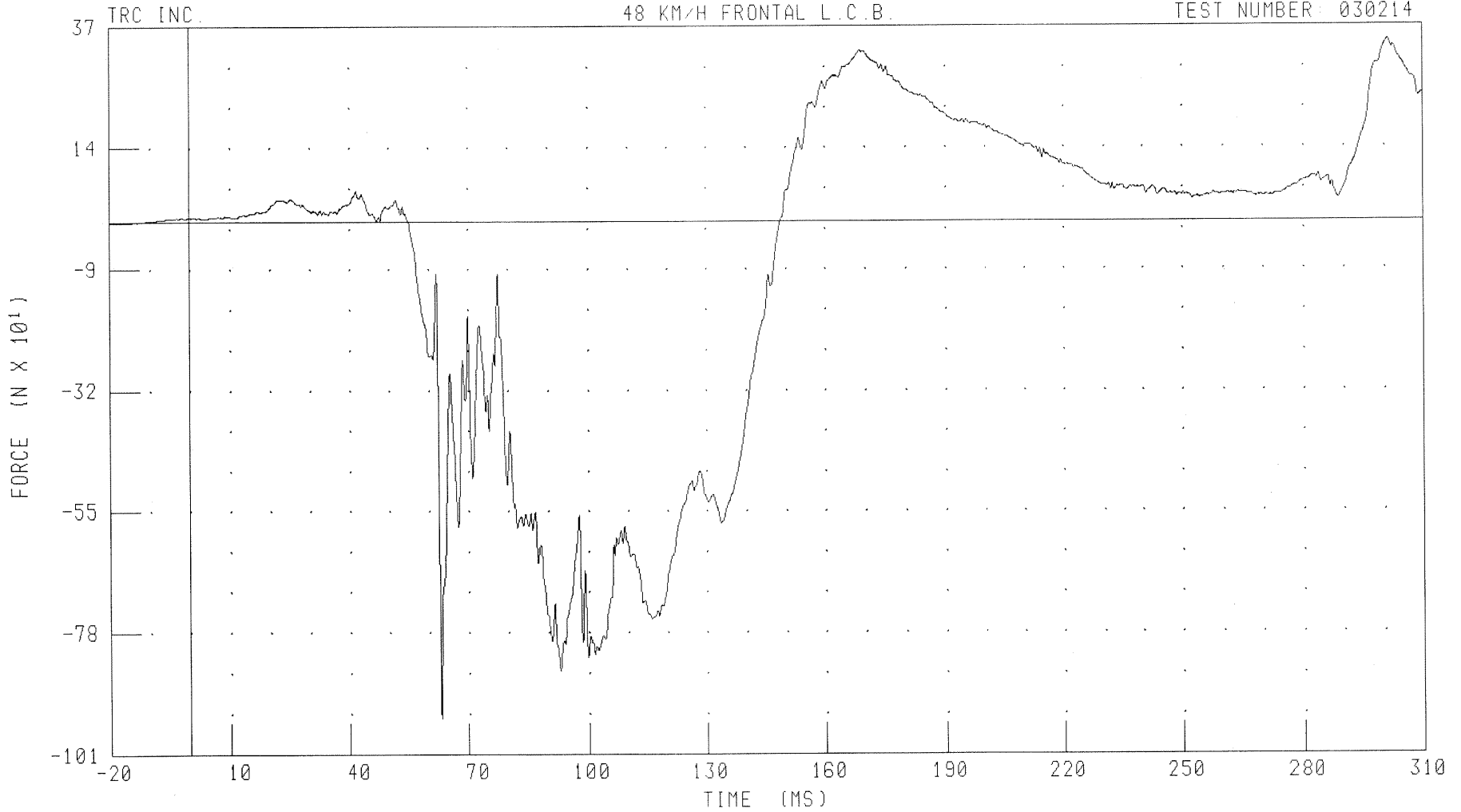
B-132

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT UPPER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLXF2 FILTER: CH. CLASS 600

PEAK DATA: 343.86 N @ 301.28 MS; -942.80 N @ 62.96 MS

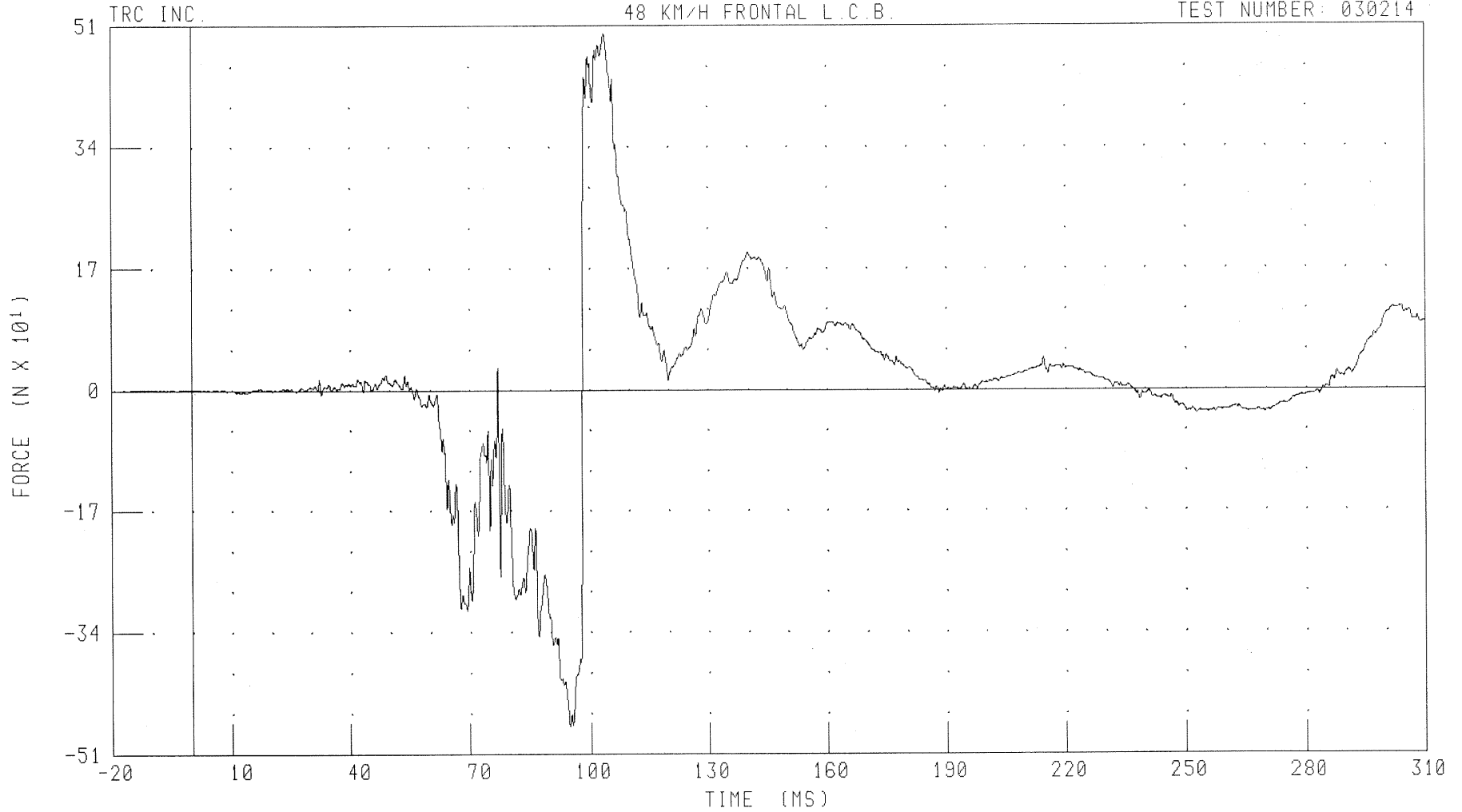
B-133

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT UPPER TIBIA Y-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLYF2 FILTER: CH. CLASS 600

PEAK DATA: 499.01 N @ 104.00 MS; -470.84 N @ 94.80 MS

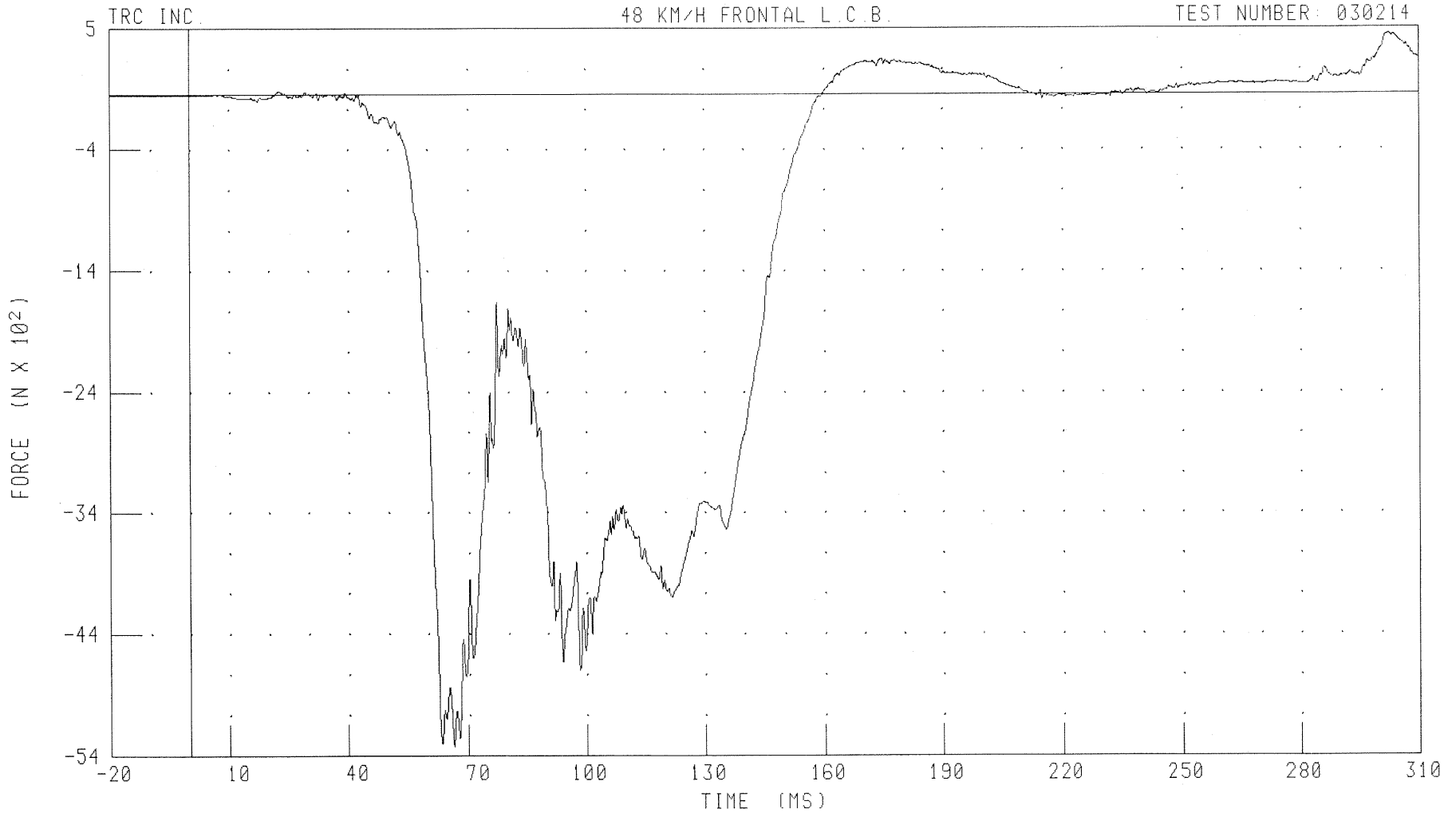
B-134

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT UPPER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLZF2

FILTER: CH. CLASS 600

PEAK DATA: 494.38 N @ 302.08 MS; -5385.41 N @ 66.24 MS

B-135

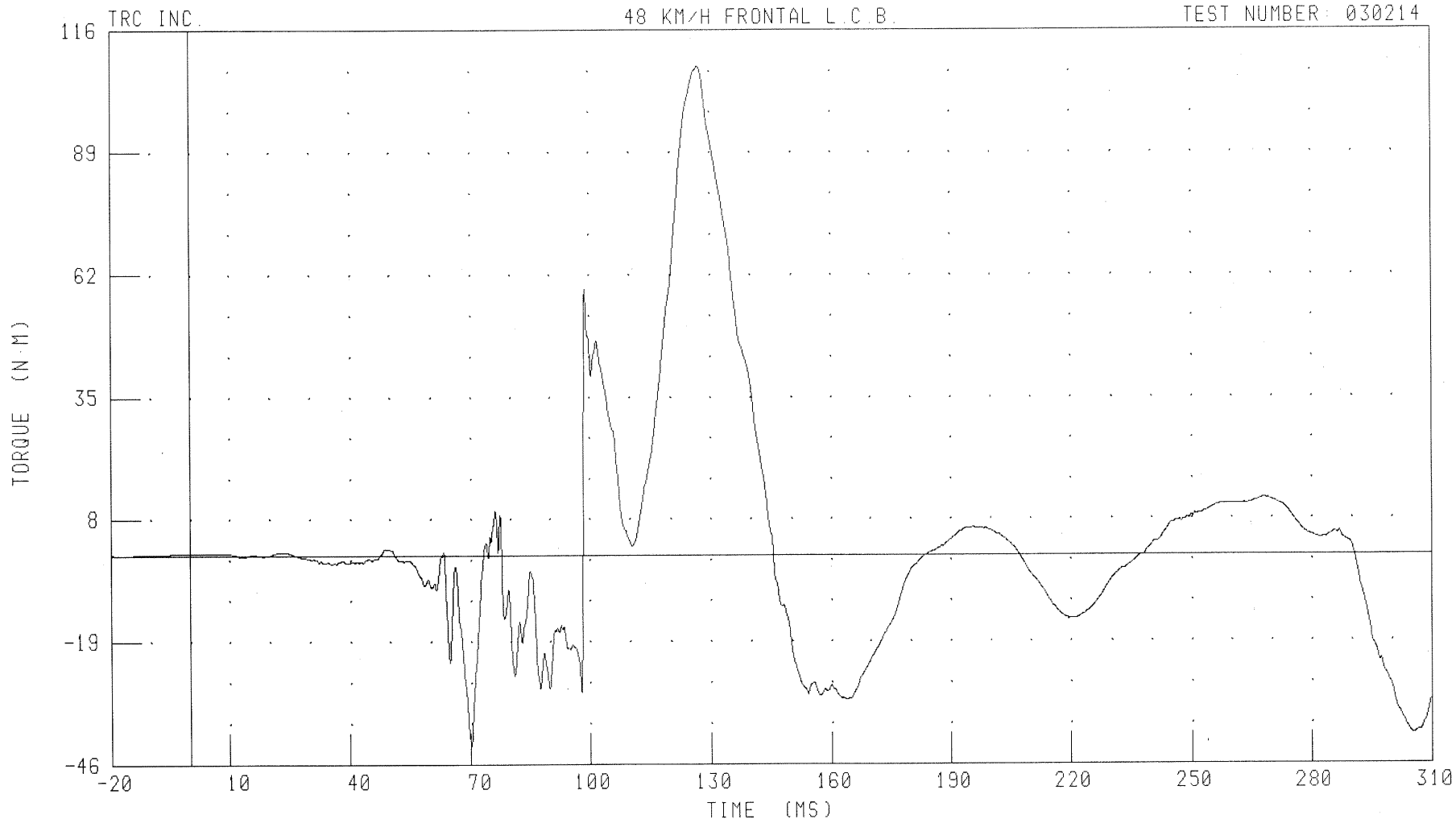
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLXM2 FILTER: CH. CLASS 600

PEAK DATA: 108.06 N·M @ 127.28 MS, -41.99 N·M @ 70.08 MS

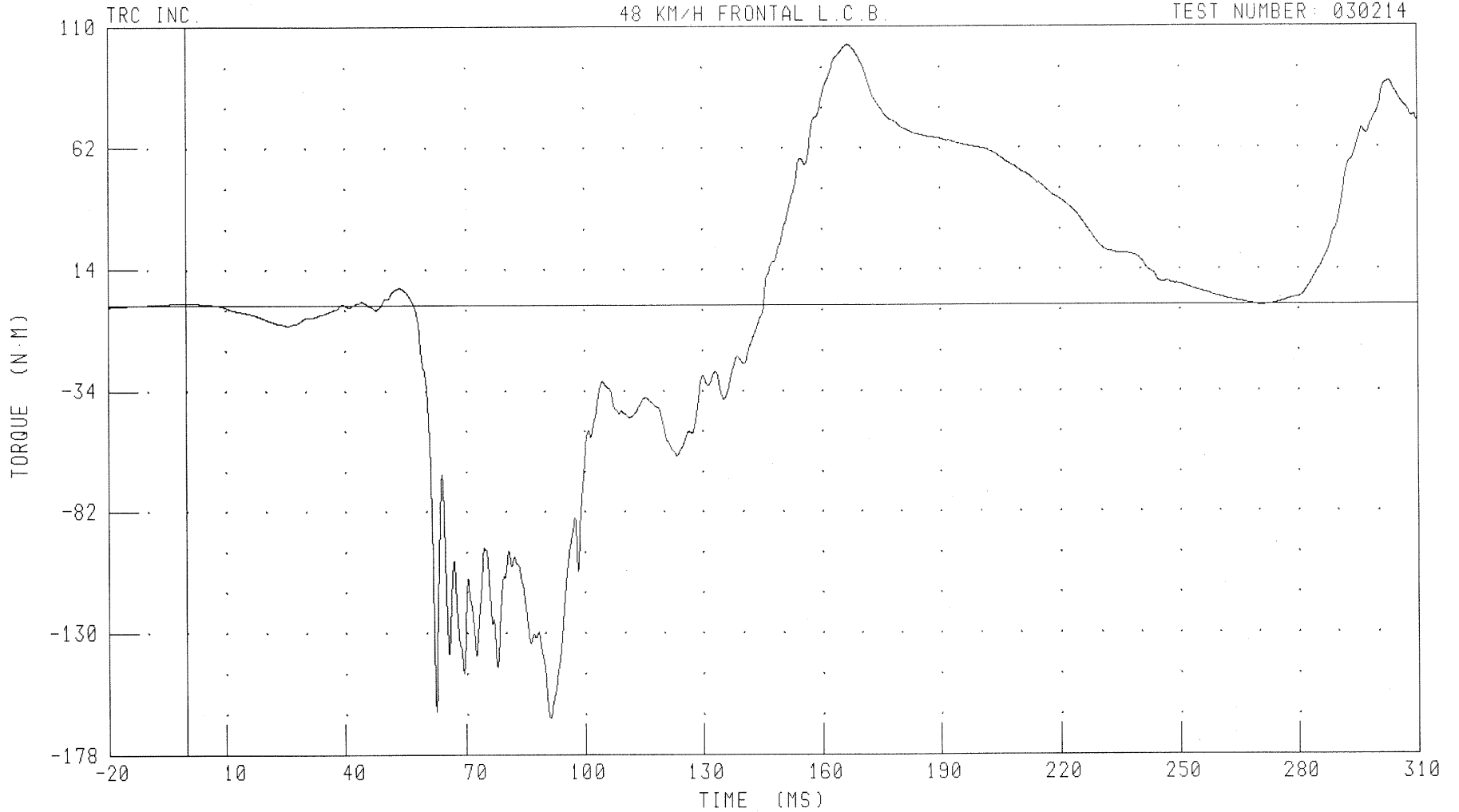
B-136

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBLYM2 FILTER: CH. CLASS 600

PEAK DATA: 103.00 N·M @ 166.88 MS; -163.57 N·M @ 91.28 MS

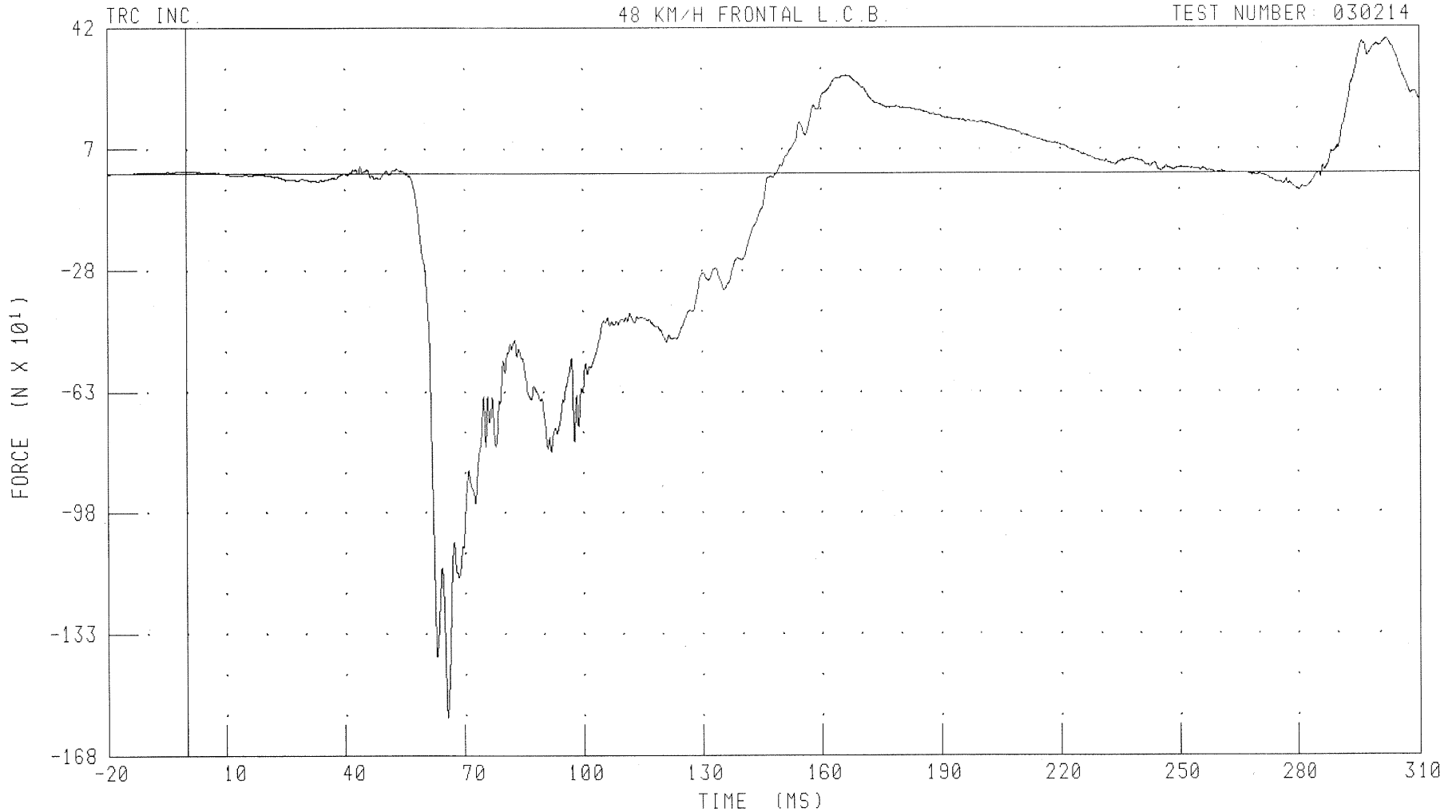
B-137

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT LOWER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-138

030214

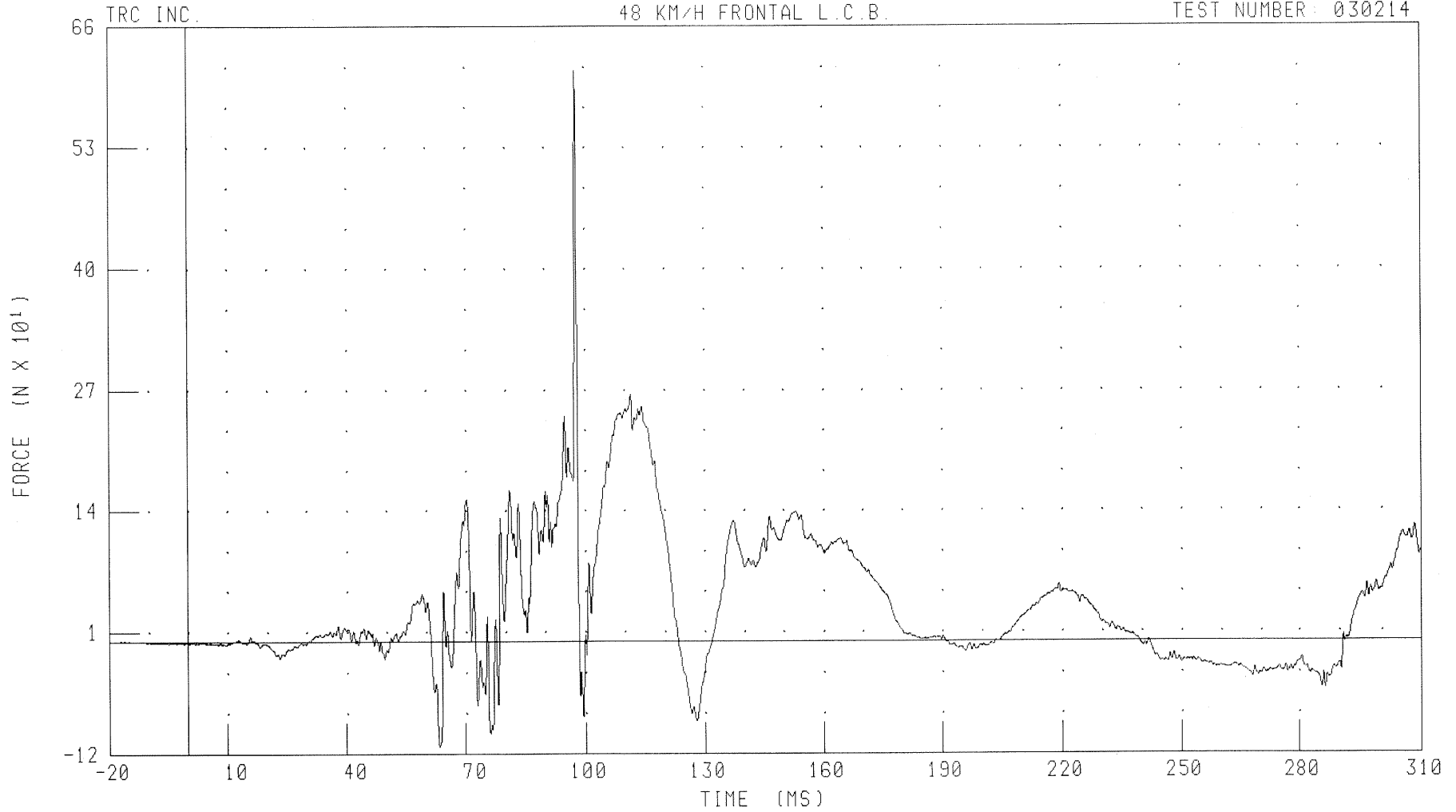
CHANNEL: ANLXF2 FILTER: CH. CLASS 600

PEAK DATA: 385.57 N @ 301.84 MS; -1570.26 N @ 65.52 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT LOWER TIBIA Y-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLYF2 FILTER: CH. CLASS 600

PEAK DATA: 612.85 N @ 97.92 MS; -112.28 N @ 63.28 MS

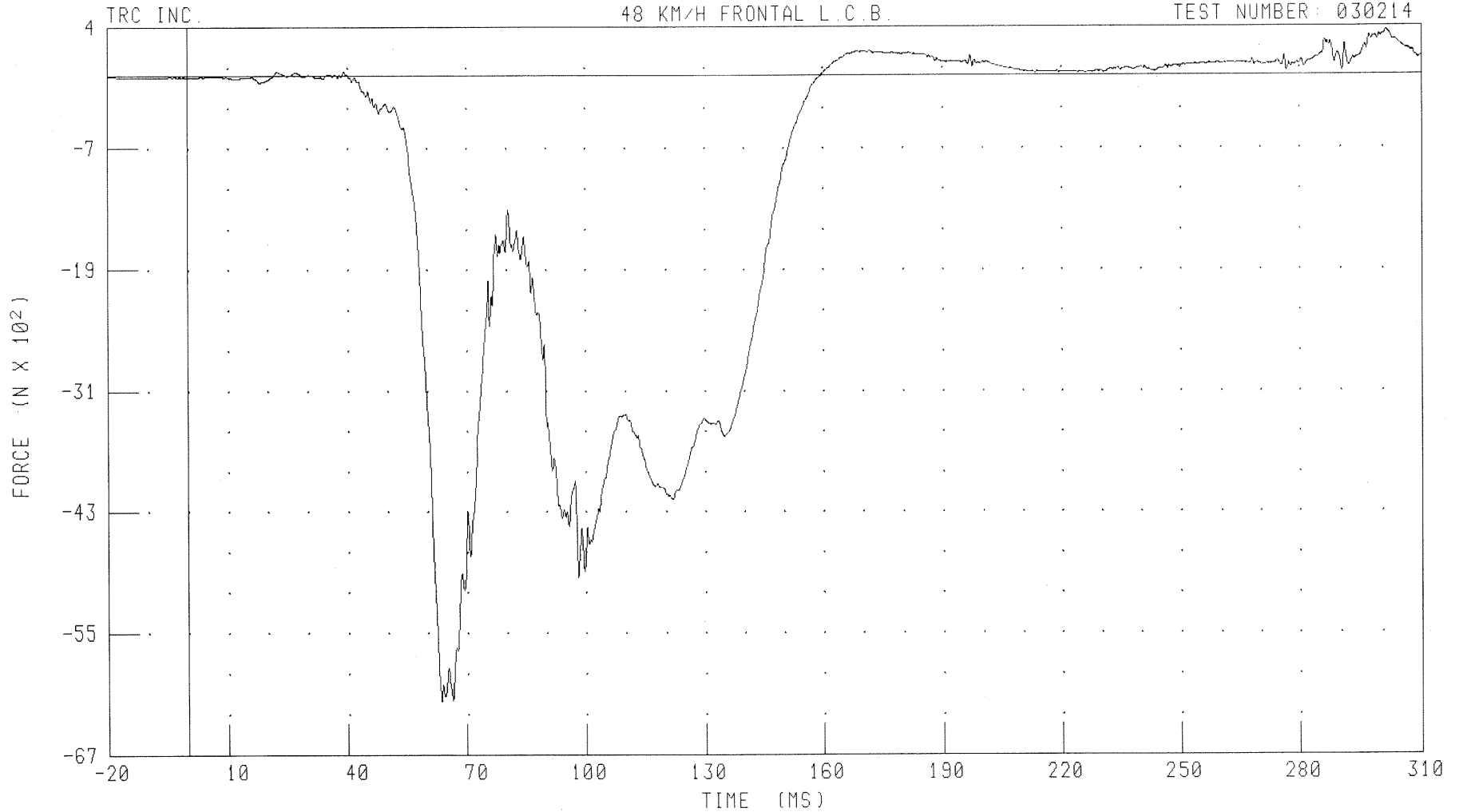
B-139

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLZF2 FILTER: CH. CLASS 600

PEAK DATA: 440.22 N @ 301.04 MS; -6189.36 N @ 63.36 MS

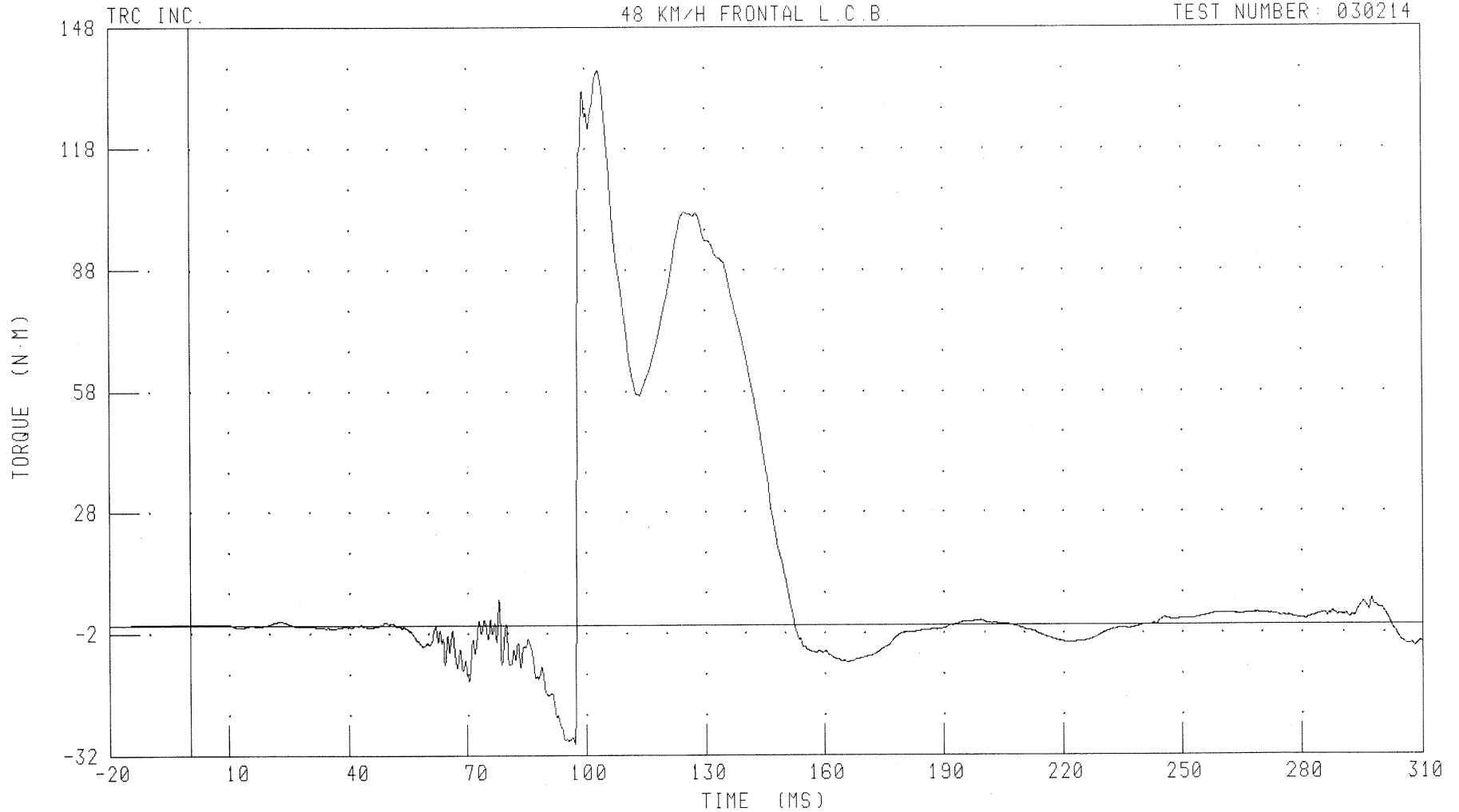
B-140

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT LOWER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLXM2 FILTER: CH. CLASS 600

PEAK DATA: 137.35 N·M @ 103.52 MS, -29.12 N·M @ 97.28 MS

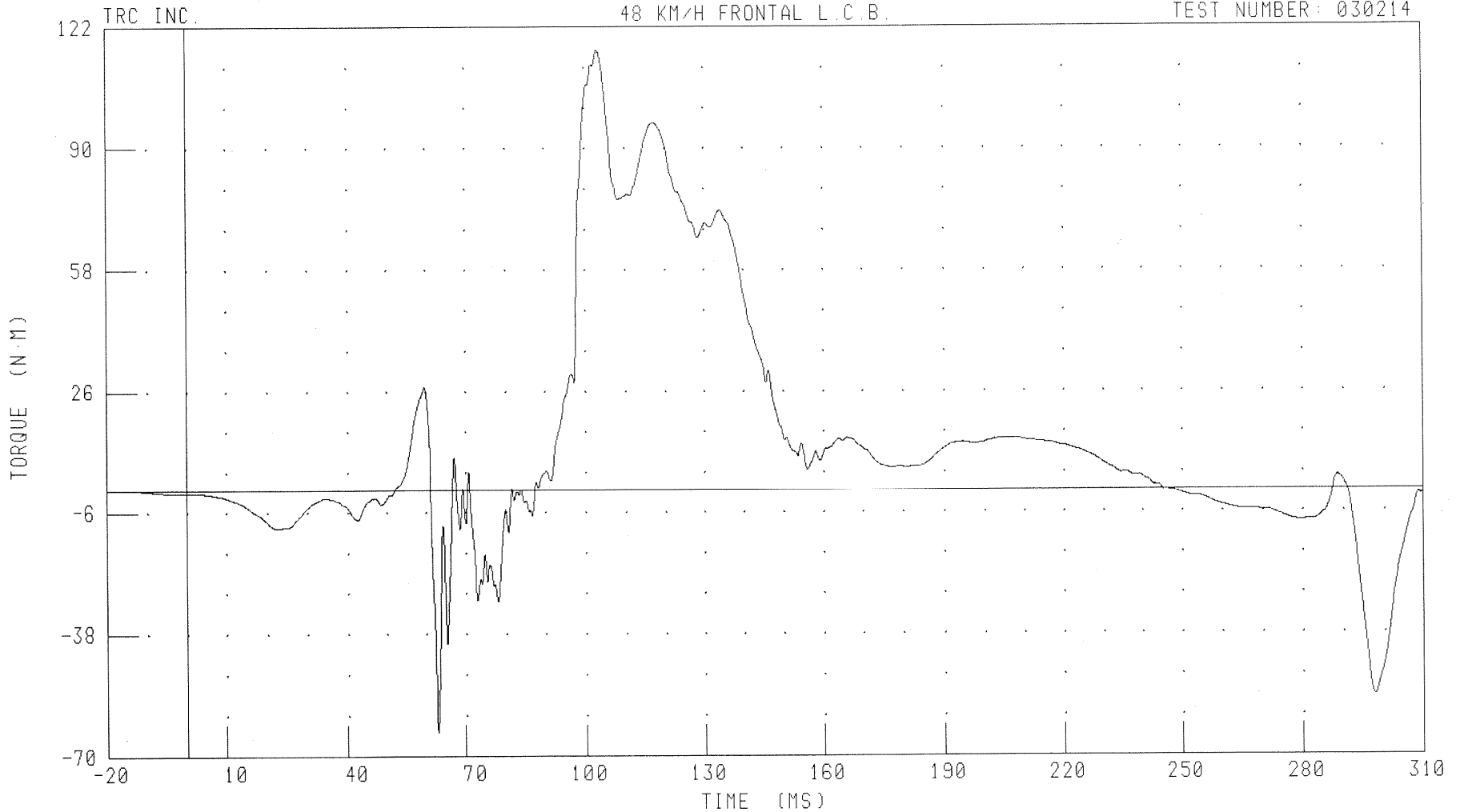
B-141

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANLYM2 FILTER: CH. CLASS 600

PEAK DATA: 115.83 N·M @ 103.36 MS; -63.90 N·M @ 63.04 MS

B-142

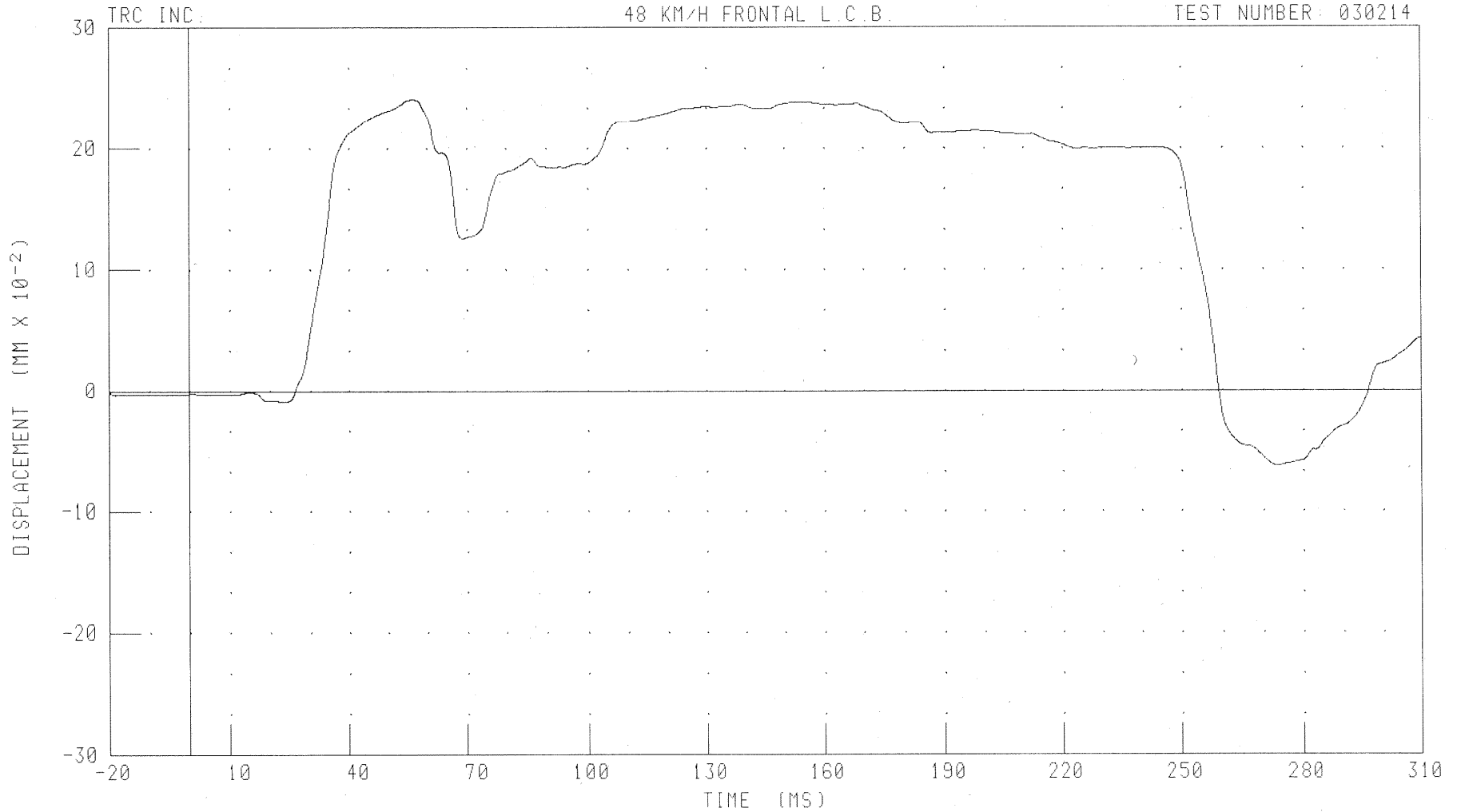
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER RIGHT KNEE DISPLACEMENT

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: KNRXD2

FILTER: CH. CLASS 180

PEAK DATA: 0.24 MM @ 56.56 MS; -0.06 MM @ 274.00 MS

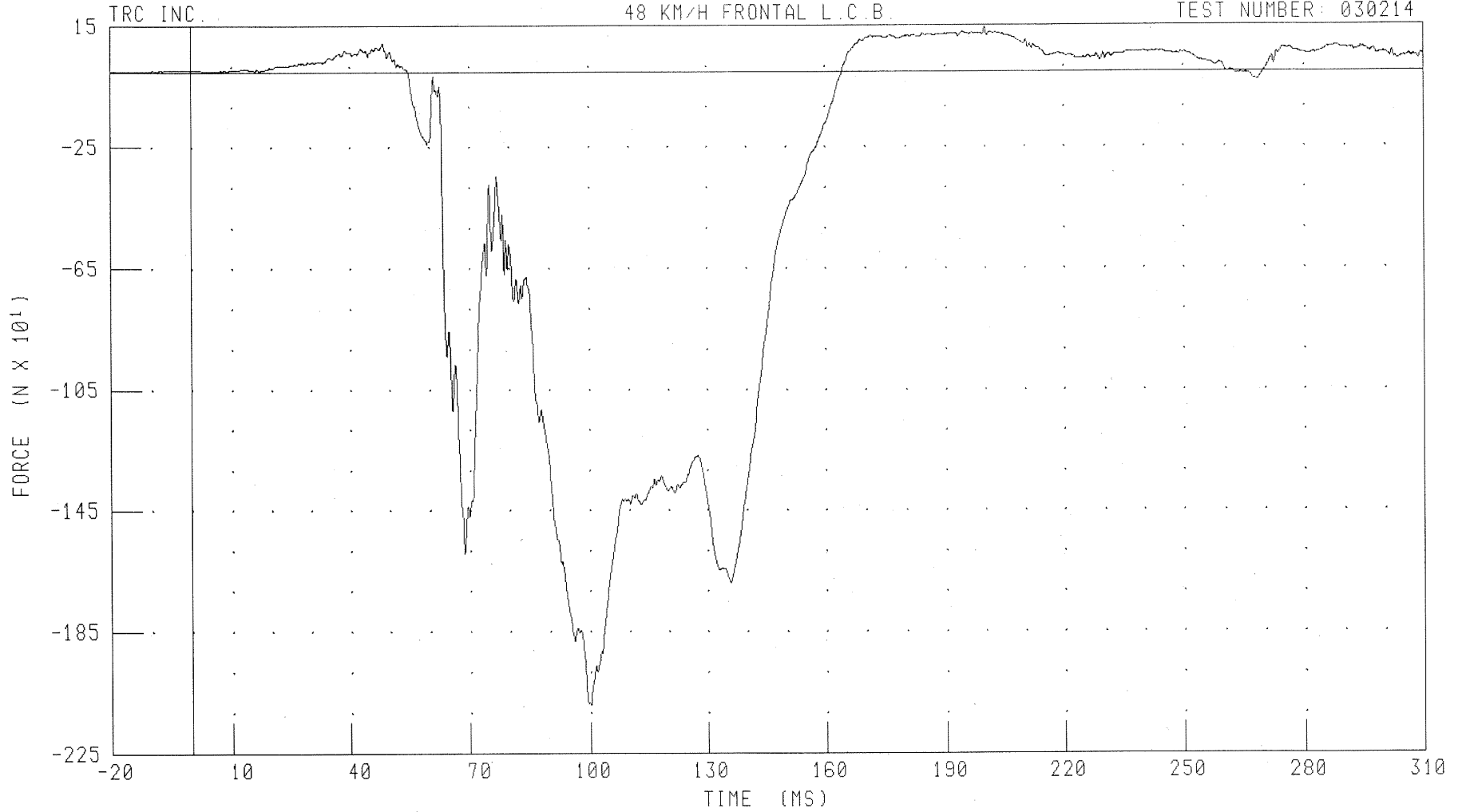
B-143

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT UPPER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRXF2 FILTER: CH. CLASS 600

PEAK DATA: 143.73 N @ 200.24 MS; -2091.82 N @ 100.16 MS

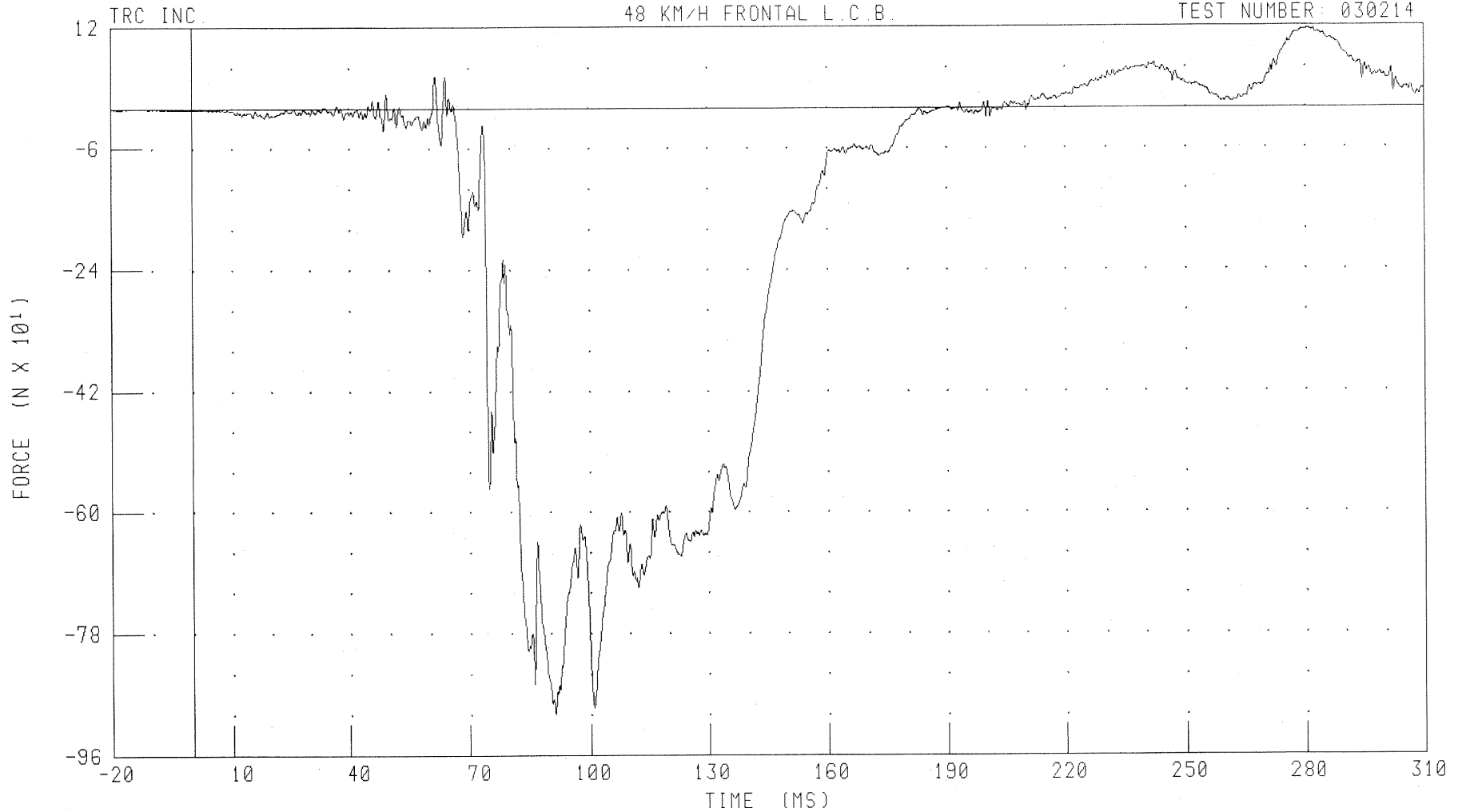
B-144

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT UPPER TIBIA Y-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRYF2

FILTER: CH. CLASS 600

PEAK DATA: 115.85 N @ 280.88 MS; -899.11 N @ 91.12 MS

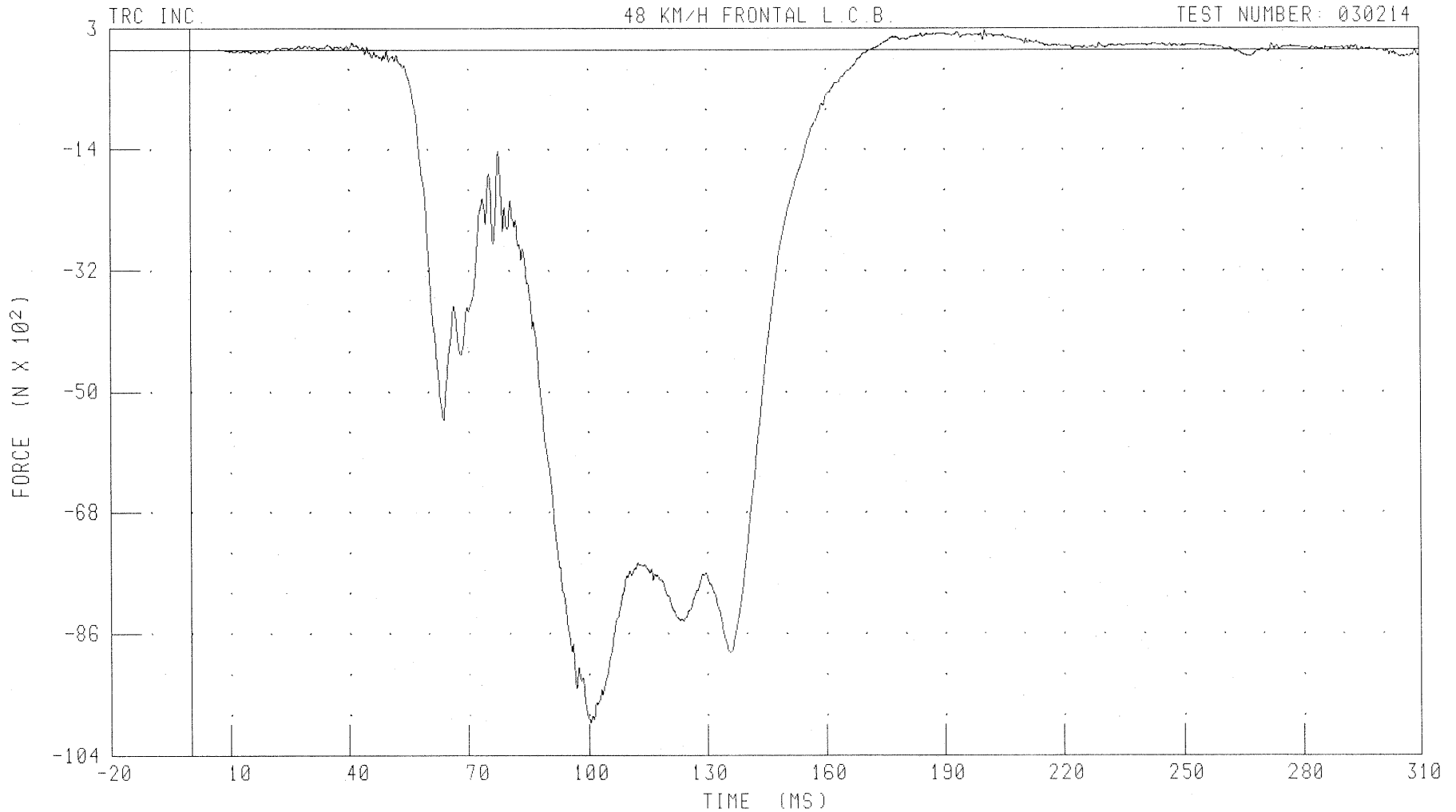
B-145

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT UPPER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRZF2 FILTER: CH. CLASS 600

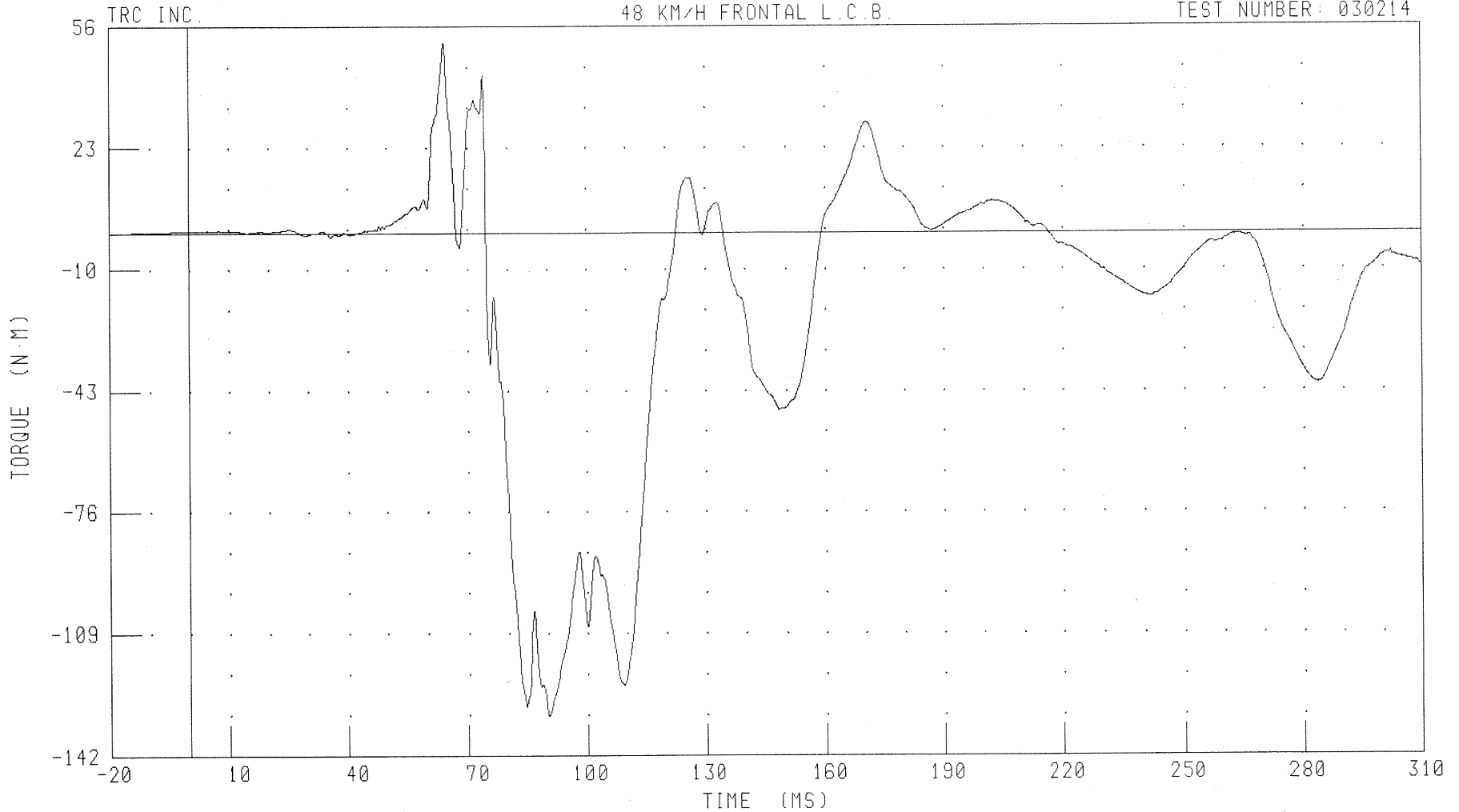
PEAK DATA: 289.84 N @ 200.64 MS, -10009.57 N @ 100.56 MS

B-146

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRXM2 FILTER: CH. CLASS 600

PEAK DATA: 51.60 N·M @ 64.40 MS, -131.44 N·M @ 90.16 MS

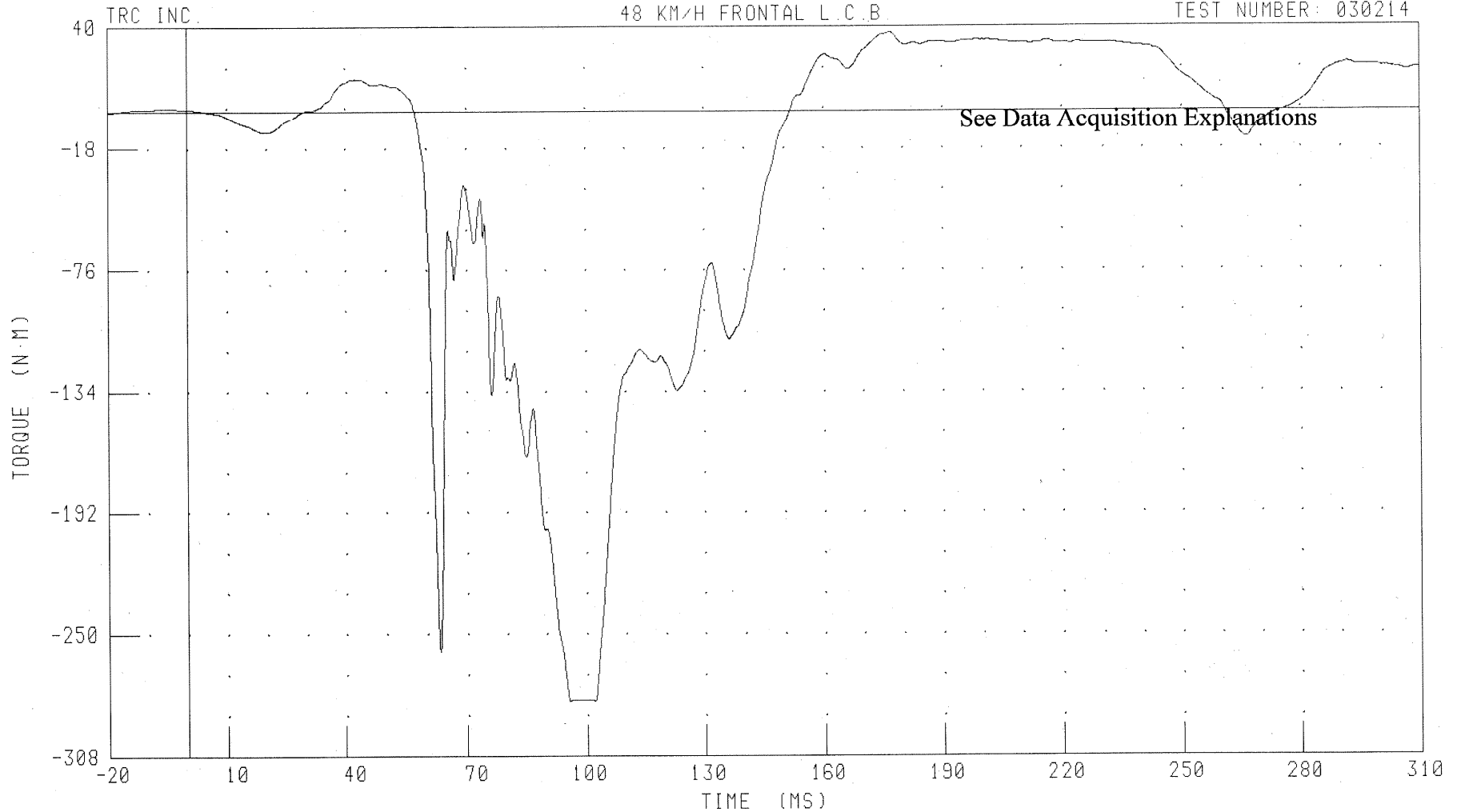
B-147

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TBRYM2 FILTER: CH. CLASS 600

PEAK DATA: 37.10 N·M @ 177.20 MS; -281.97 N·M @ 102.16 MS

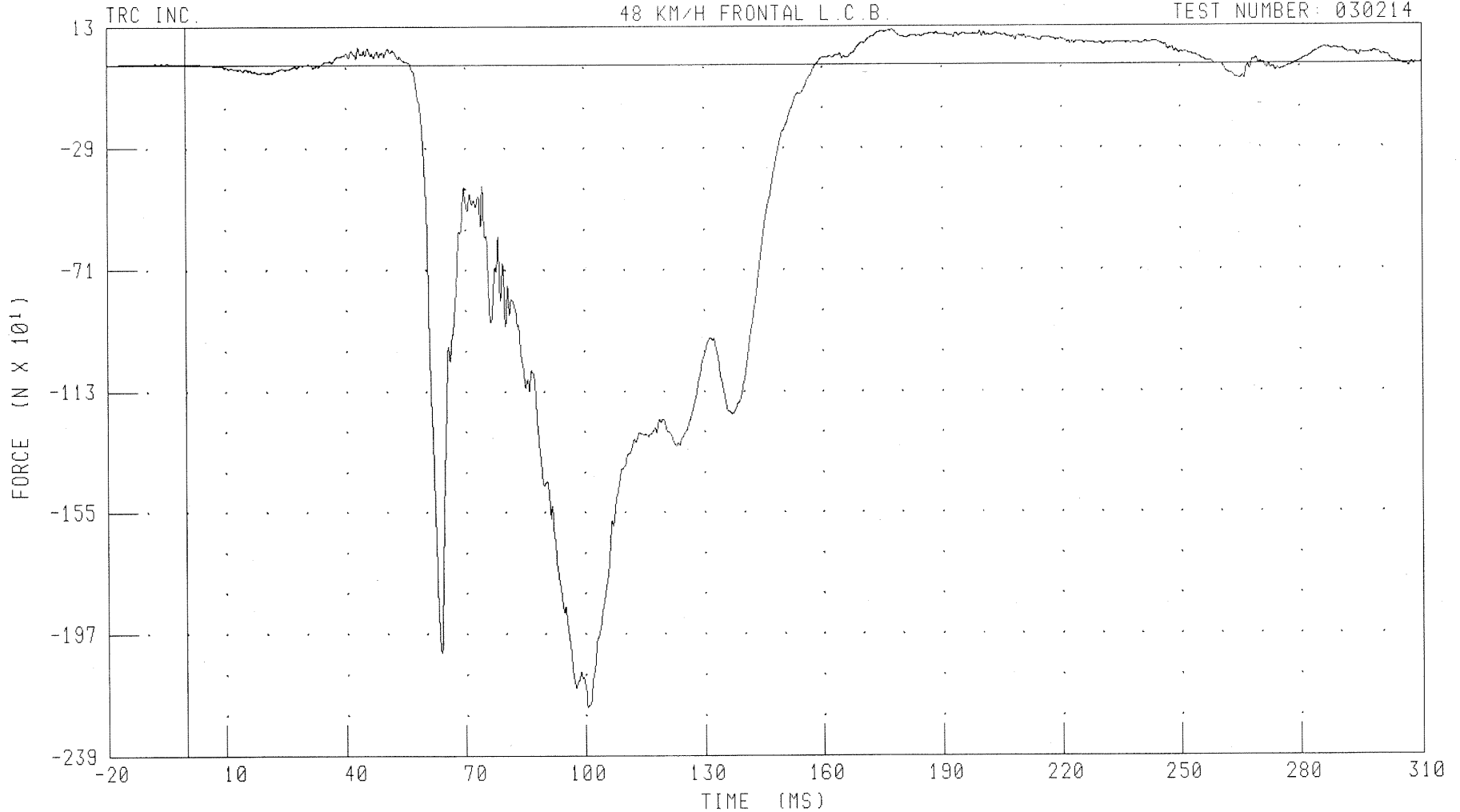
B-148

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRXF2 FILTER: CH. CLASS 600

PEAK DATA: 119.10 N @ 177.84 MS; -224.24 N @ 100.64 MS

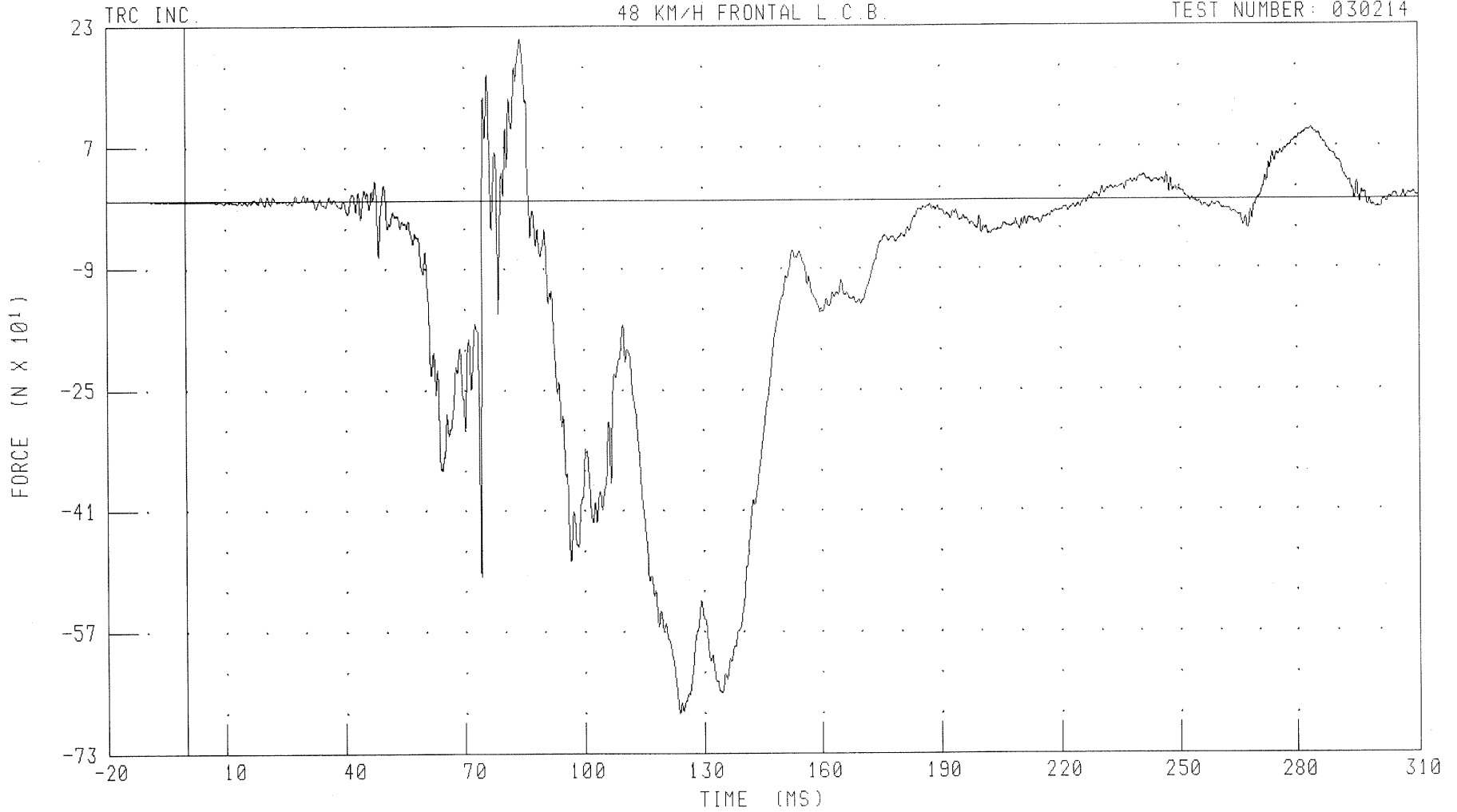
B-149

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT LOWER TIBIA Y-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRYF2

FILTER: CH. CLASS 600

PEAK DATA: 214.73 N @ 84.24 MS; -677.34 N @ 124.08 MS

B-150

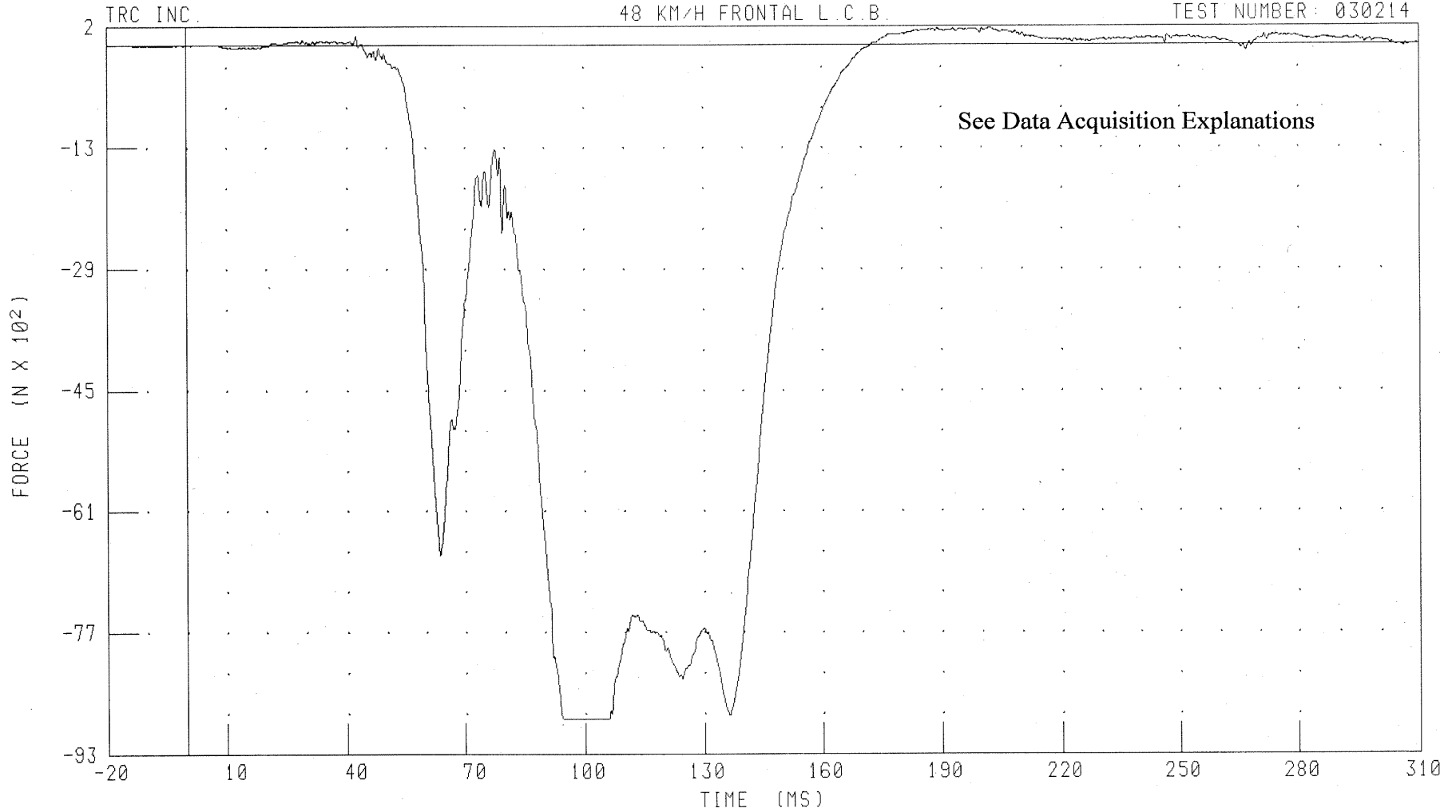
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-151

030214

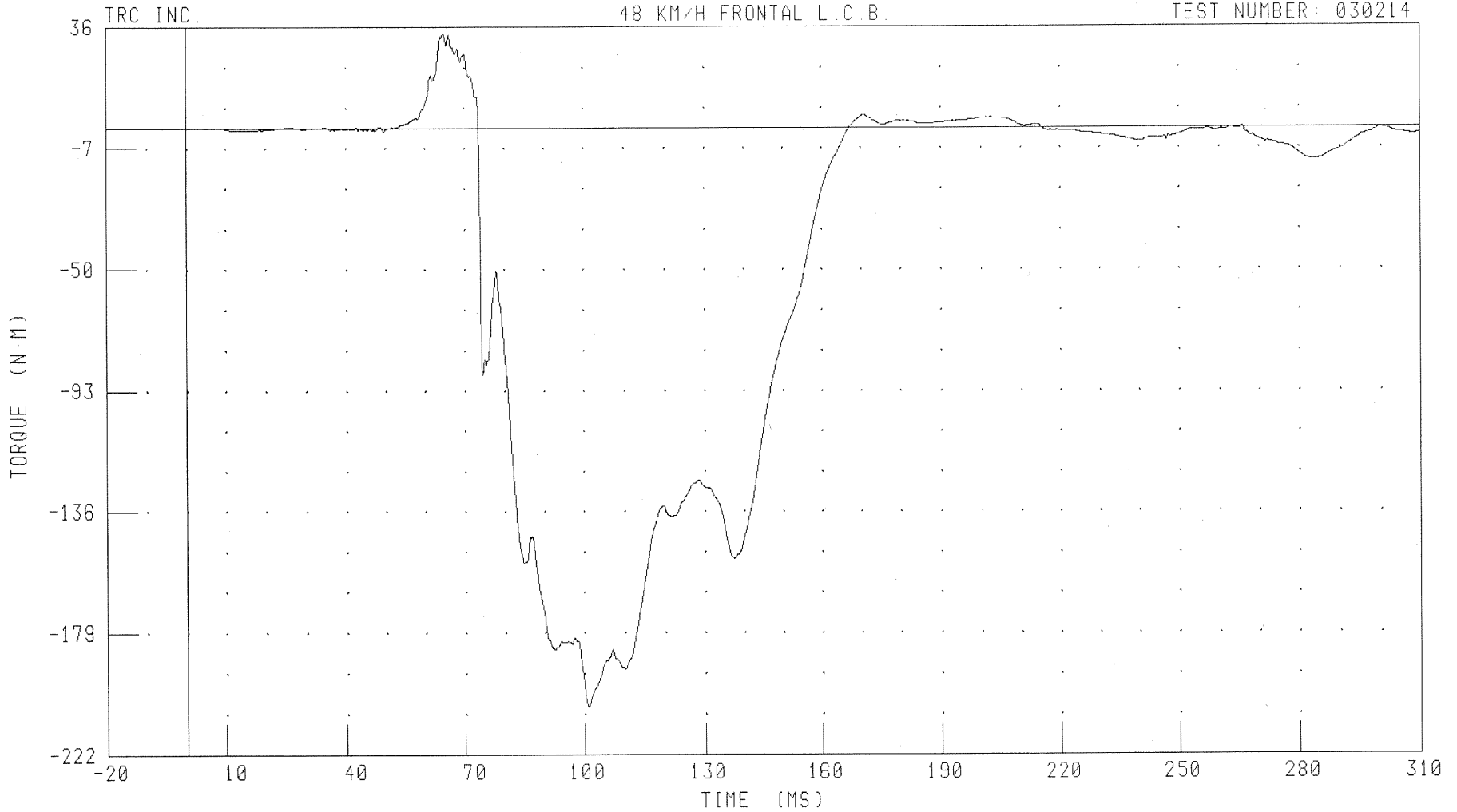
CHANNEL: ANRZF2 FILTER: CH. CLASS 600

PEAK DATA: 220.76 N @ 202.48 MS; -8907.25 N @ 94.64 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT X AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRXM2

FILTER: CH. CLASS 600

TIME (MS)

PEAK DATA: 33.54 N.M @ 64.88 MS; -205.18 N.M @ 101.20 MS

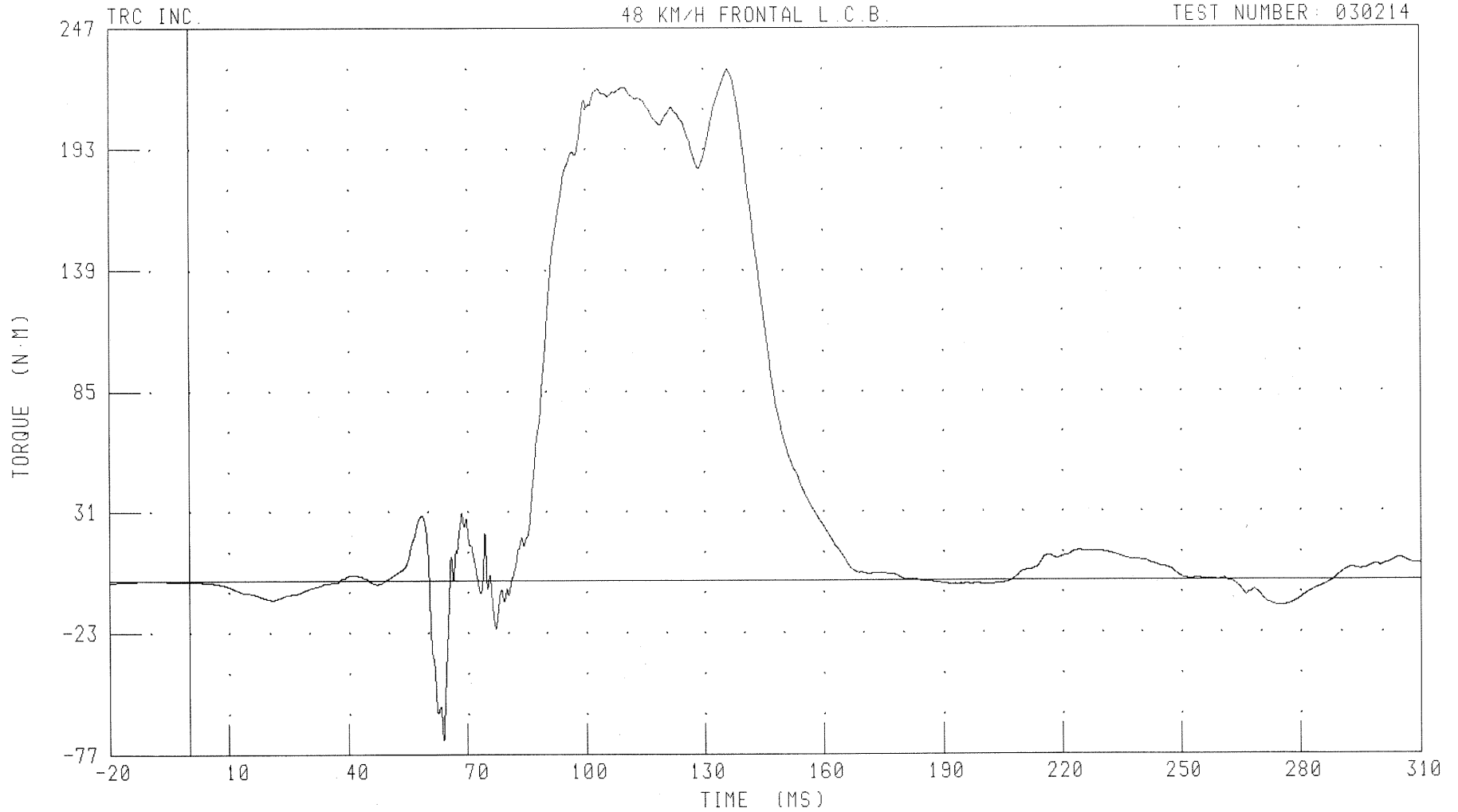
B-152

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ANRYM2 FILTER: CH. CLASS 600

PEAK DATA: 228.67 N·M @ 136.24 MS; -70.86 N·M @ 63.84 MS

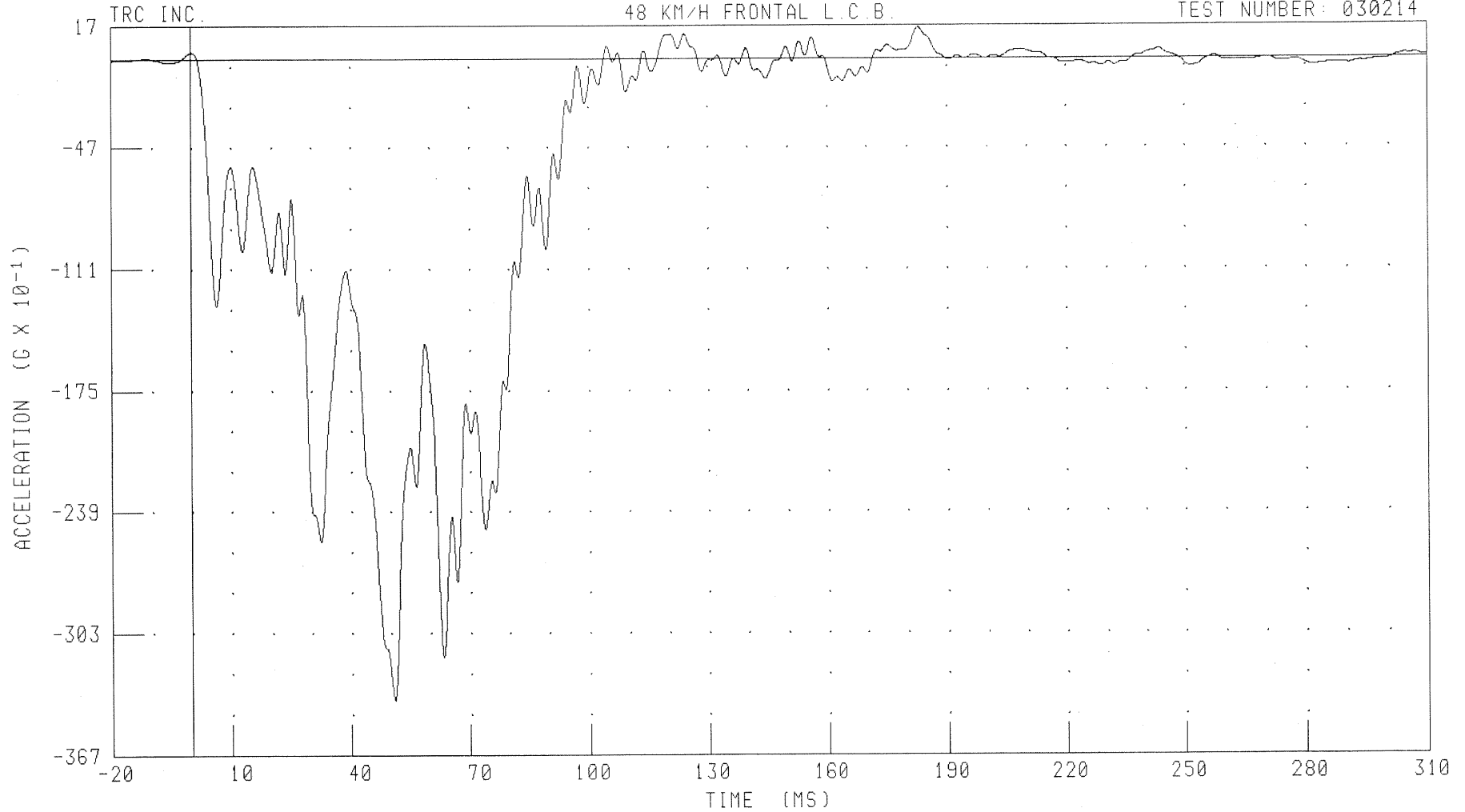
B-153

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LEFT REAR SEAT CROSSMEMBER X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LRSXG1 FILTER: CH. CLASS 60

PEAK DATA: 1.59 G @ 182.96 MS; -33.82 G @ 50.96 MS

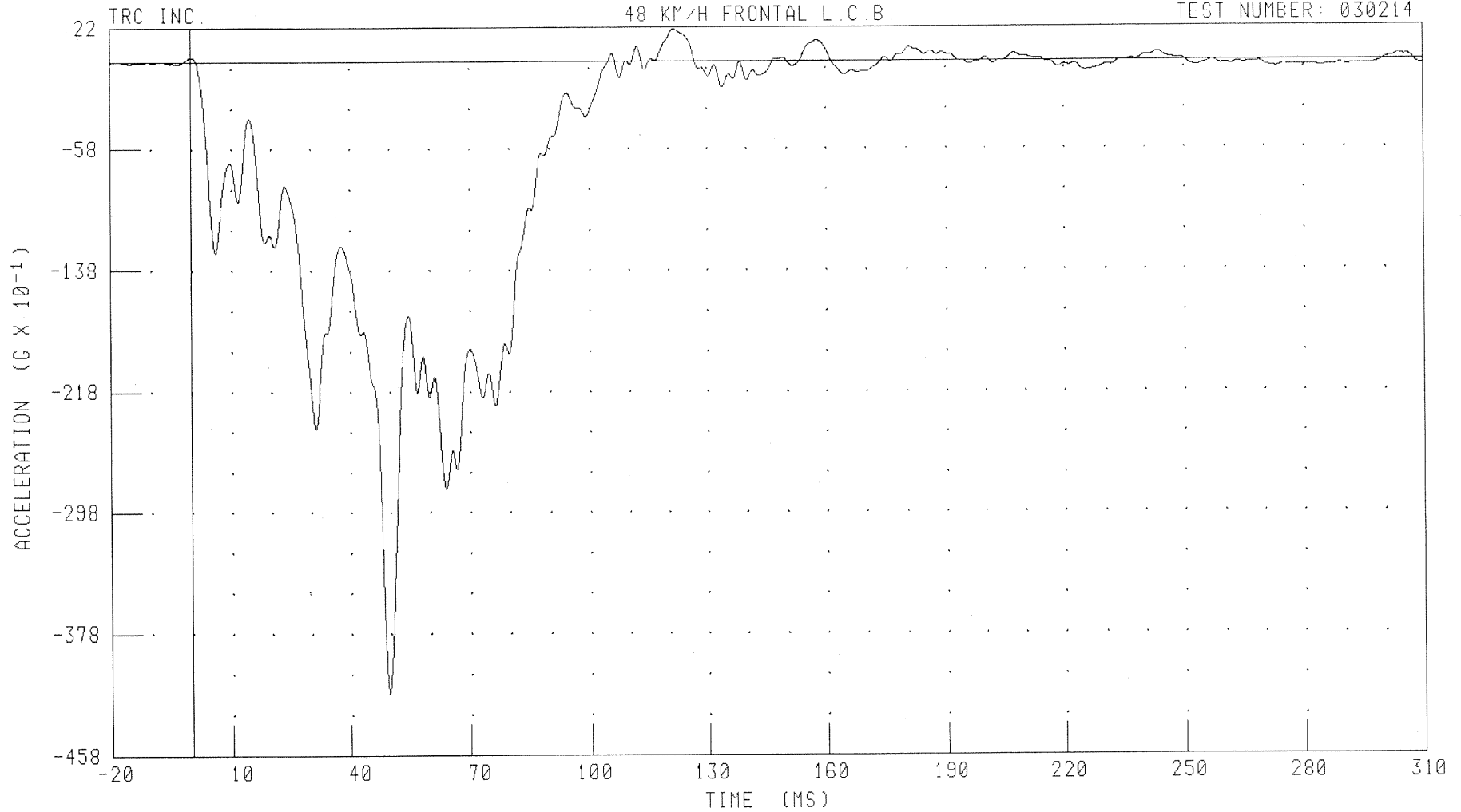
B-154

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
RIGHT REAR SEAT CROSSMEMBER X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: RRSXG1 FILTER: CH. CLASS 60

PEAK DATA: 2.08 G @ 121.76 MS; -41.73 G @ 49.68 MS

B-155

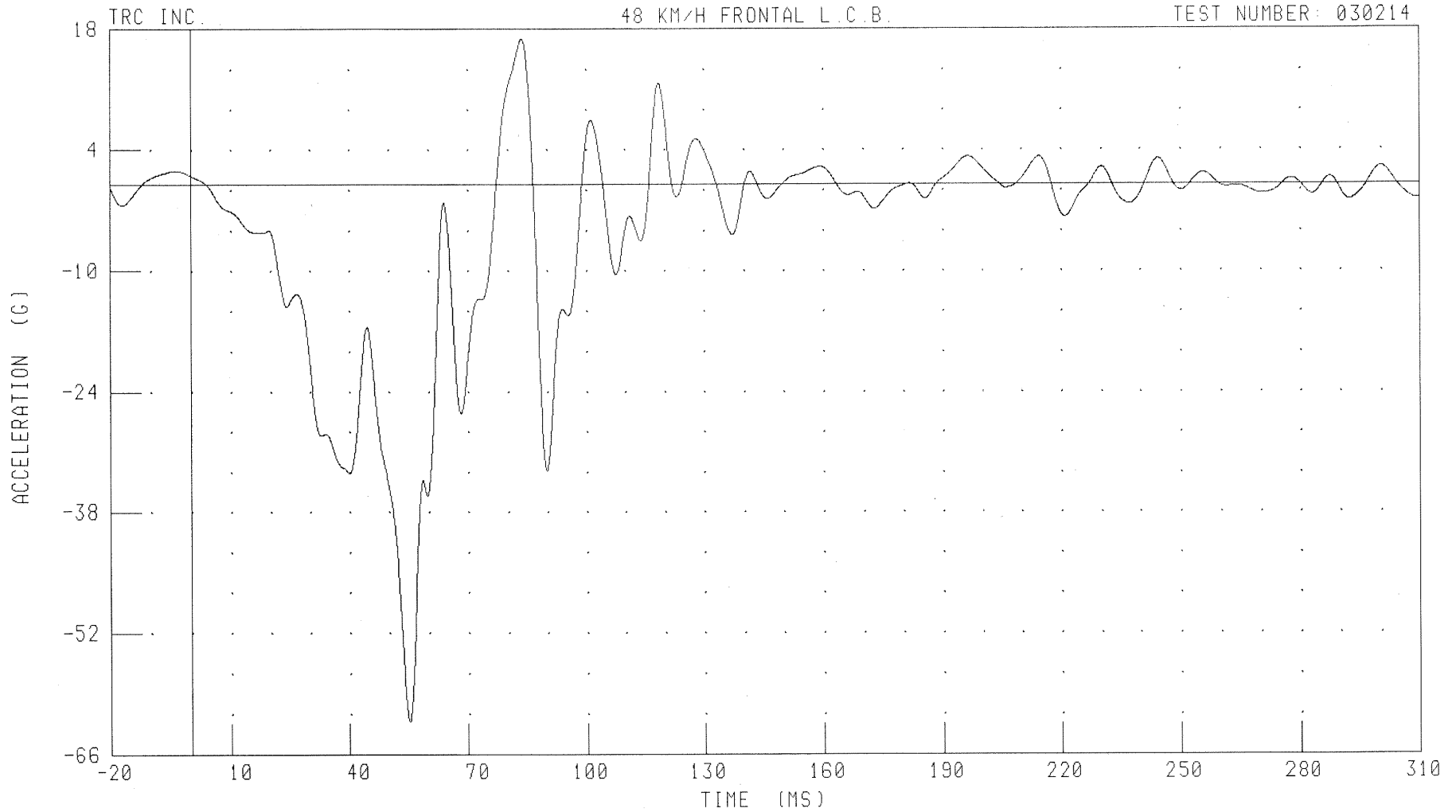
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

FRONT BRAKE CALIPER LEFT X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BCLXG1

FILTER: CH. CLASS 60

PEAK DATA: 16.87 G @ 83.68 MS; -62.23 G @ 55.12 MS

B-156

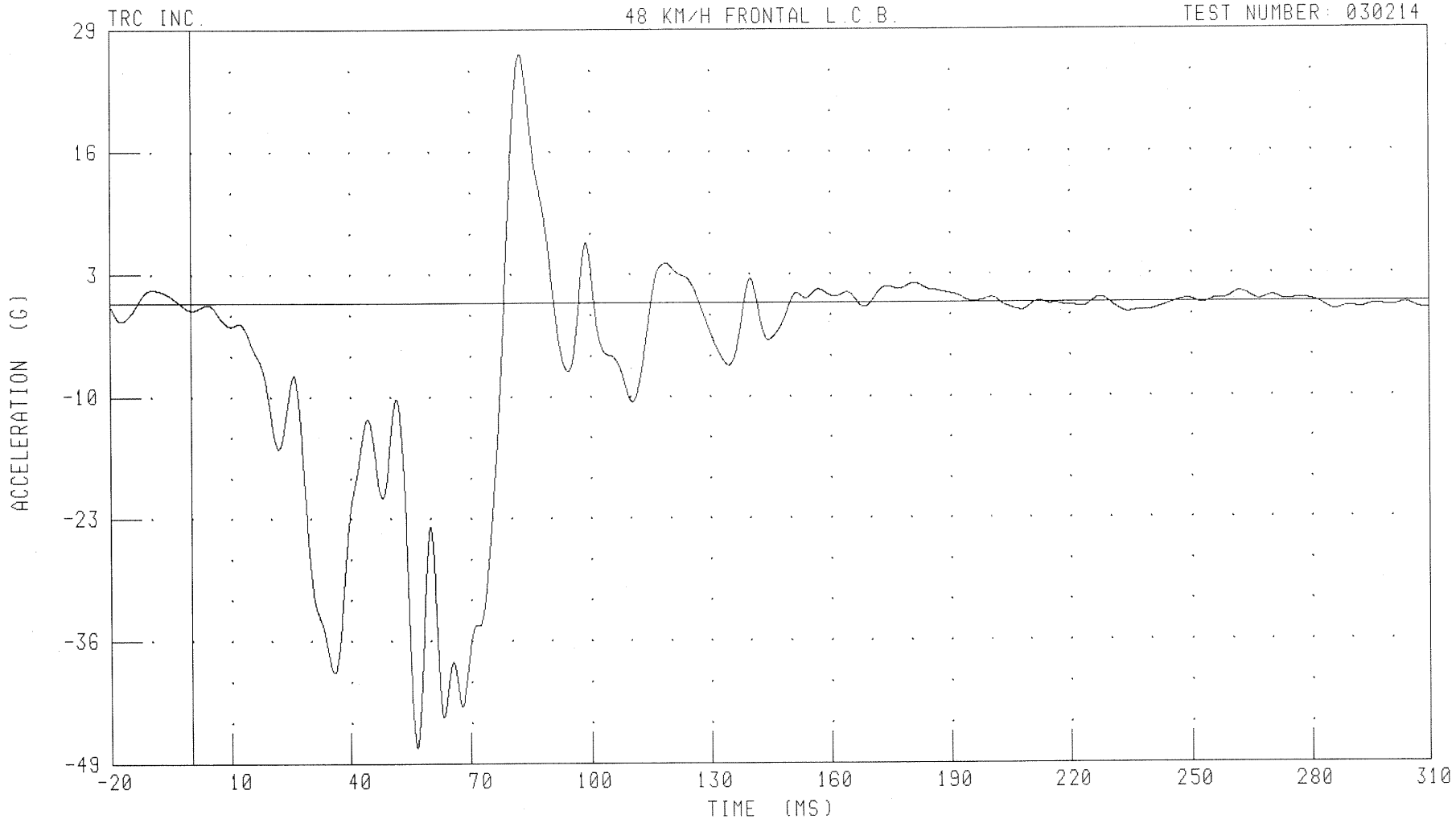
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

FRONT BRAKE CALIPER RIGHT X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BCRXG1

FILTER: CH. CLASS 60

PEAK DATA: 26.41 G @ 82.56 MS; -47.32 G @ 56.64 MS

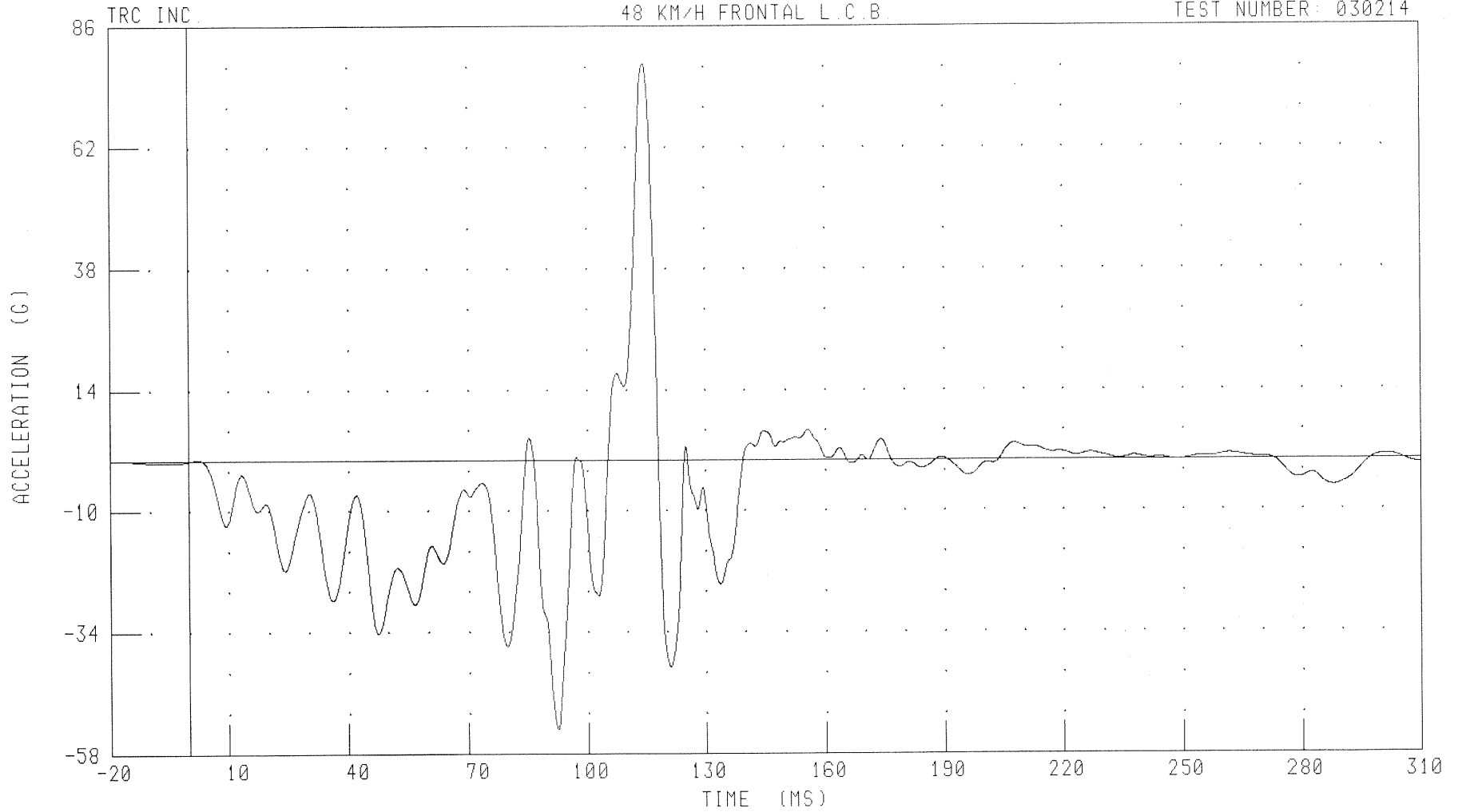
B-157

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DASH PANEL CENTER X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B

TEST NUMBER: 030214



CHANNEL: DPCXG1 FILTER: CH. CLASS 60

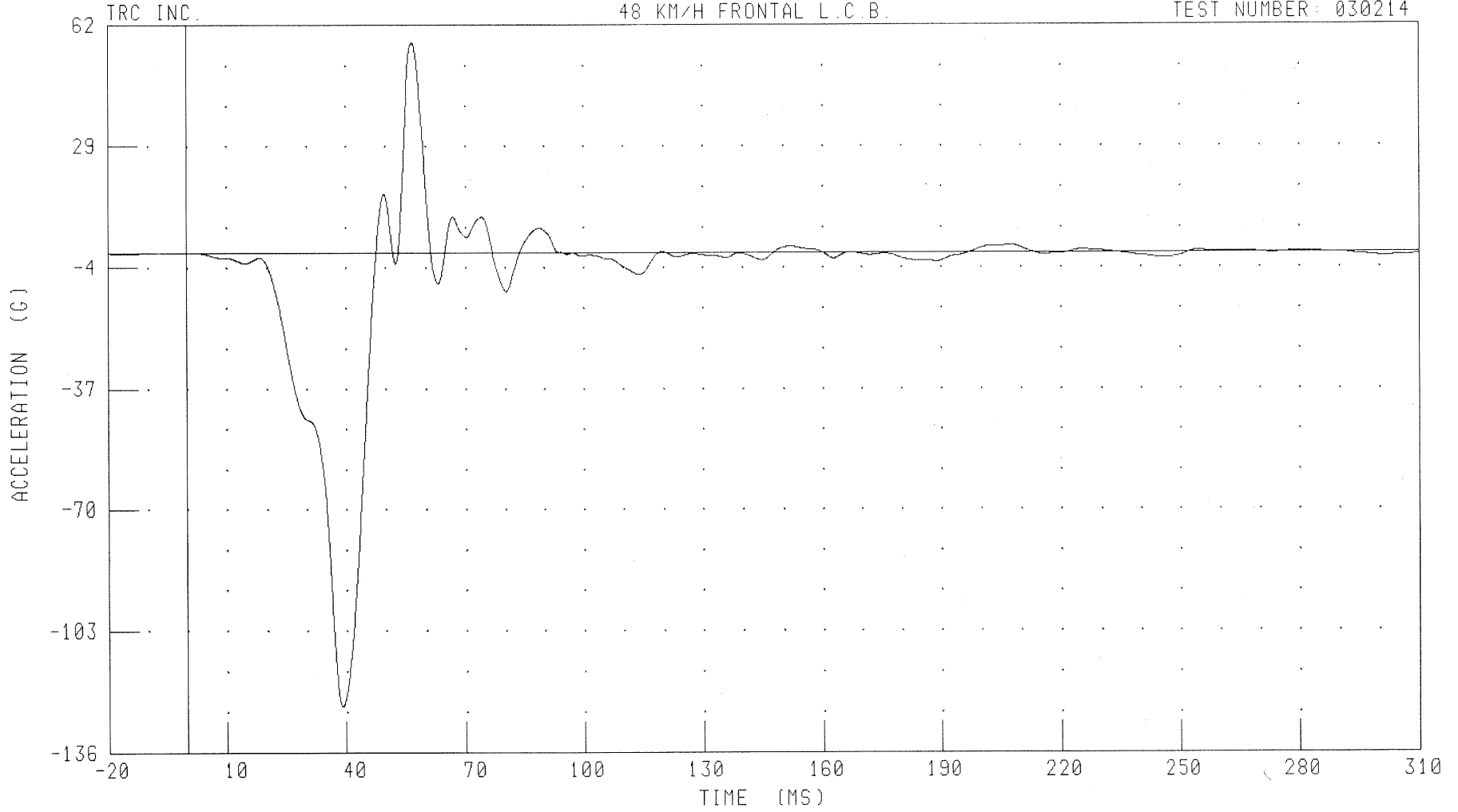
PEAK DATA: 78.53 G @ 114.64 MS; -53.24 G @ 92.48 MS

B-158

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
ENGINE TOP X-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ENGXC1

FILTER: CH. CLASS 60

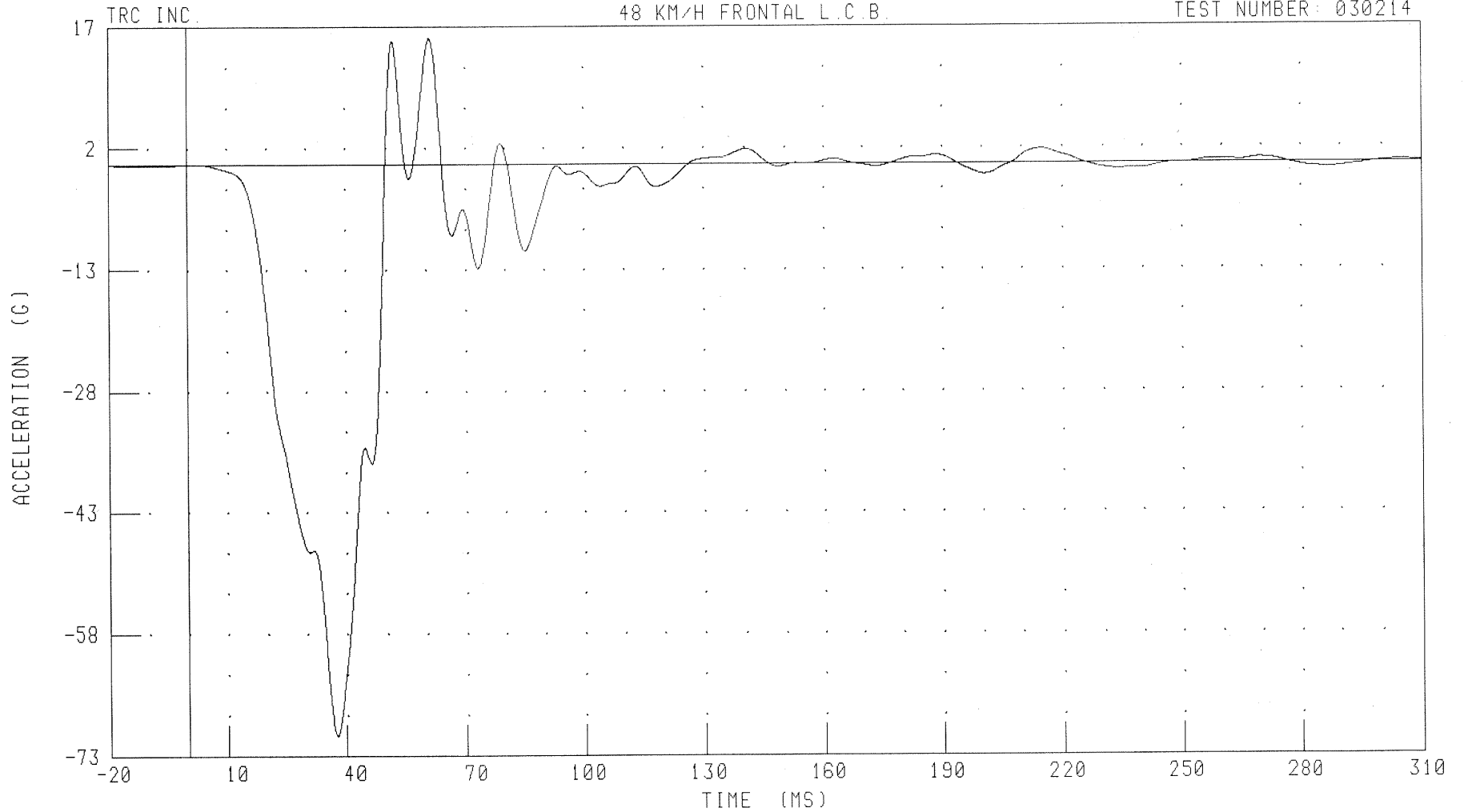
PEAK DATA: 57.21 G @ 56.88 MS; -123.54 G @ 39.12 MS

B-159

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
ENGINE BOTTOM X-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: ENGXG2

FILTER: CH. CLASS 60

PEAK DATA: 15.63 G @ 61.20 MS; -70.56 G @ 37.60 MS

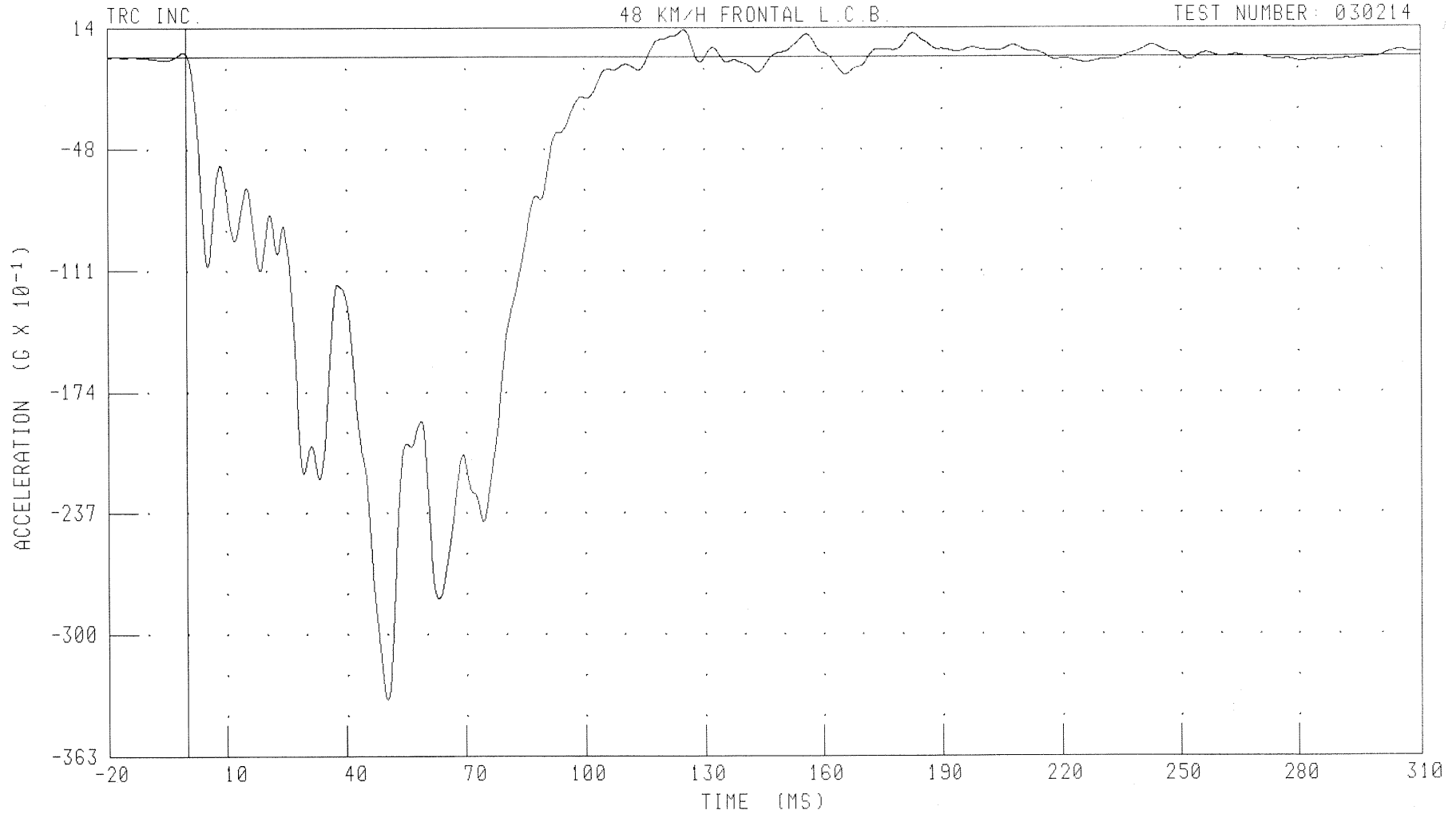
B-160

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
TOEPAN NEXT TO ACCELERATOR X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TPAXG1

FILTER: CH. CLASS 60

PEAK DATA: 1.41 G @ 125.20 MS; -33.36 G @ 50.08 MS

B-161

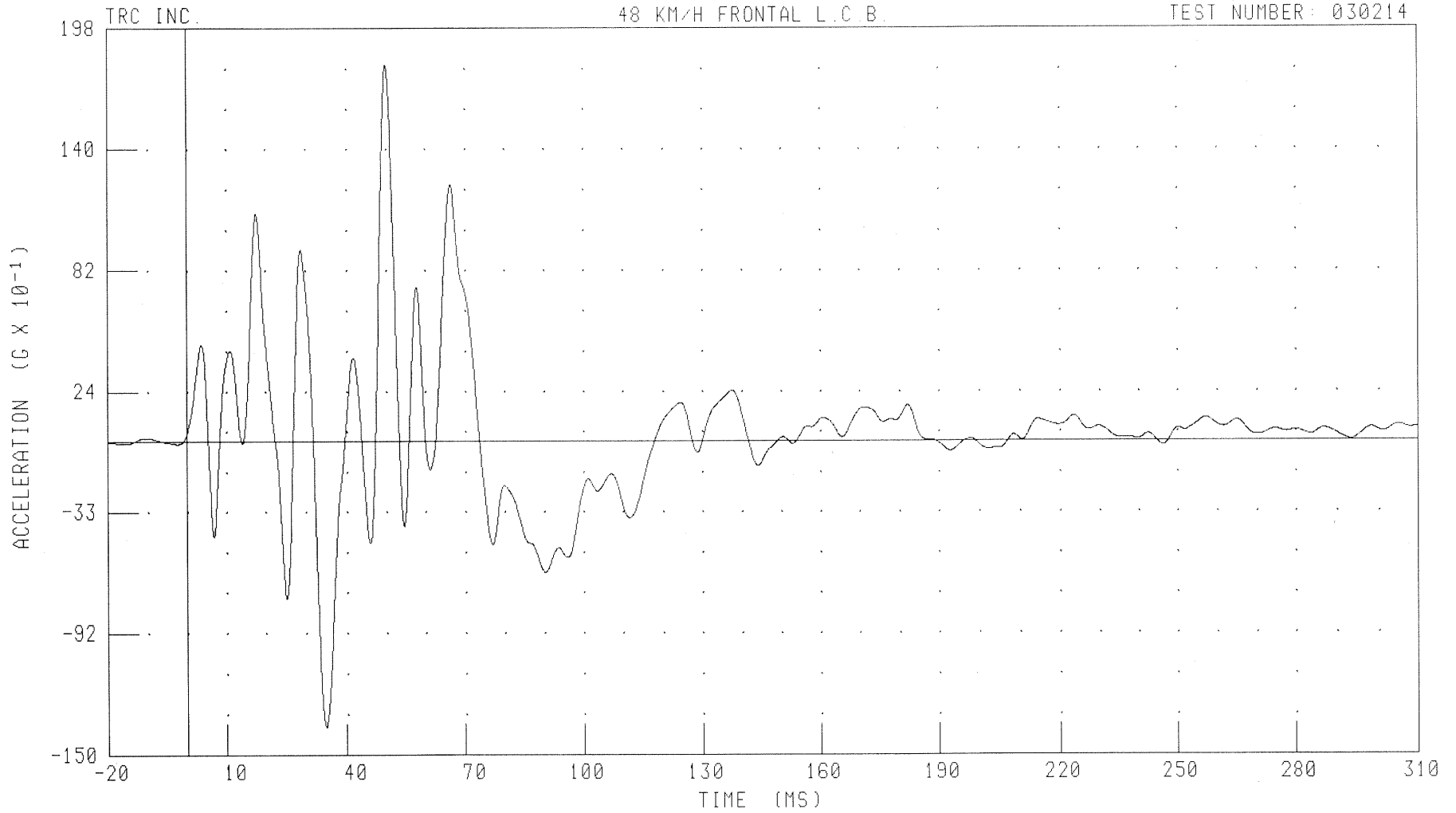
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

TOEPAN NEXT TO ACCELERATOR Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TPAZG1

FILTER: CH. CLASS 60

PEAK DATA: 18.06 G @ 50.00 MS; -13.67 G @ 34.88 MS

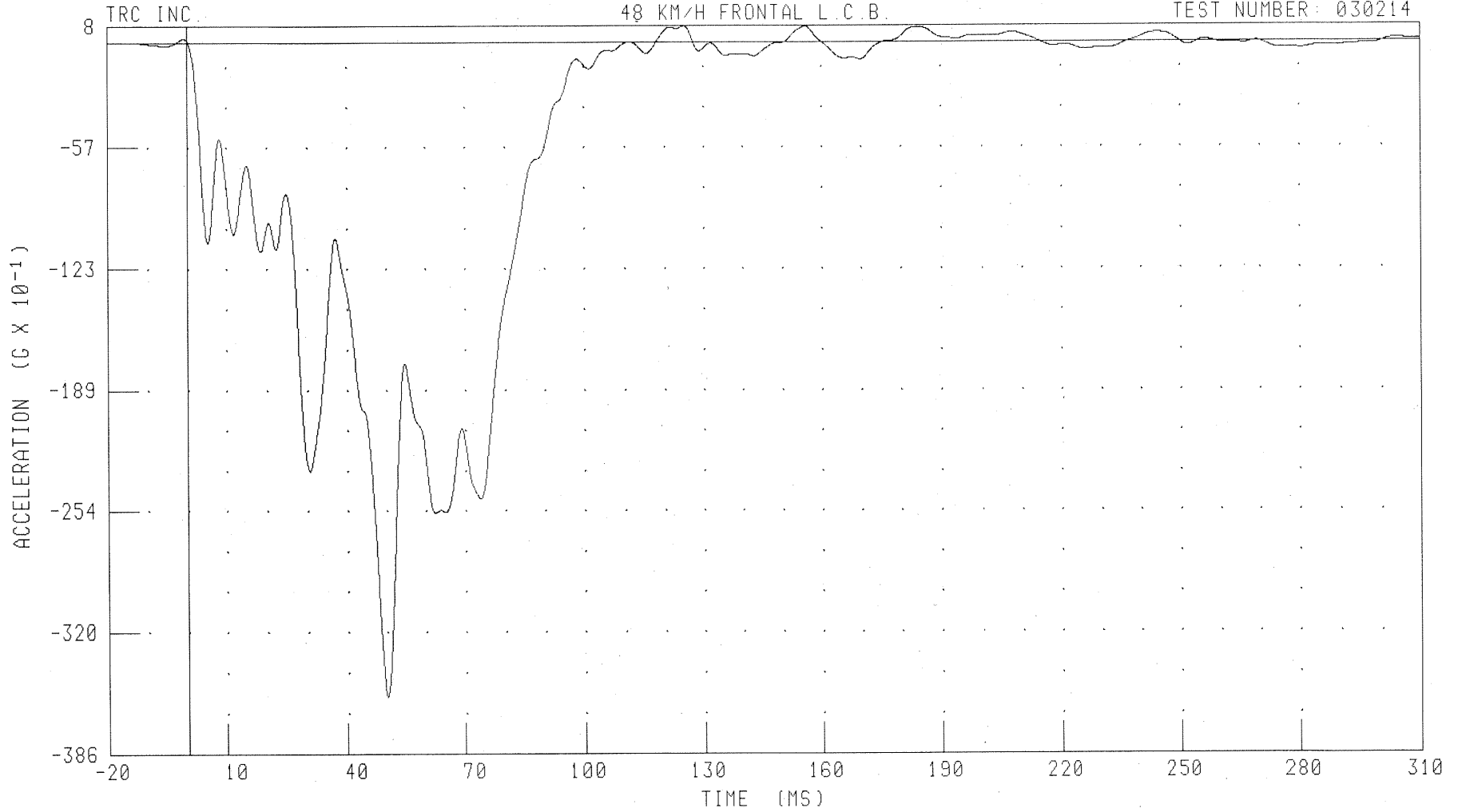
B-162

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
TOEPAN NEXT TO FOOTREST X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-163

030214

CHANNEL: TPFXG1

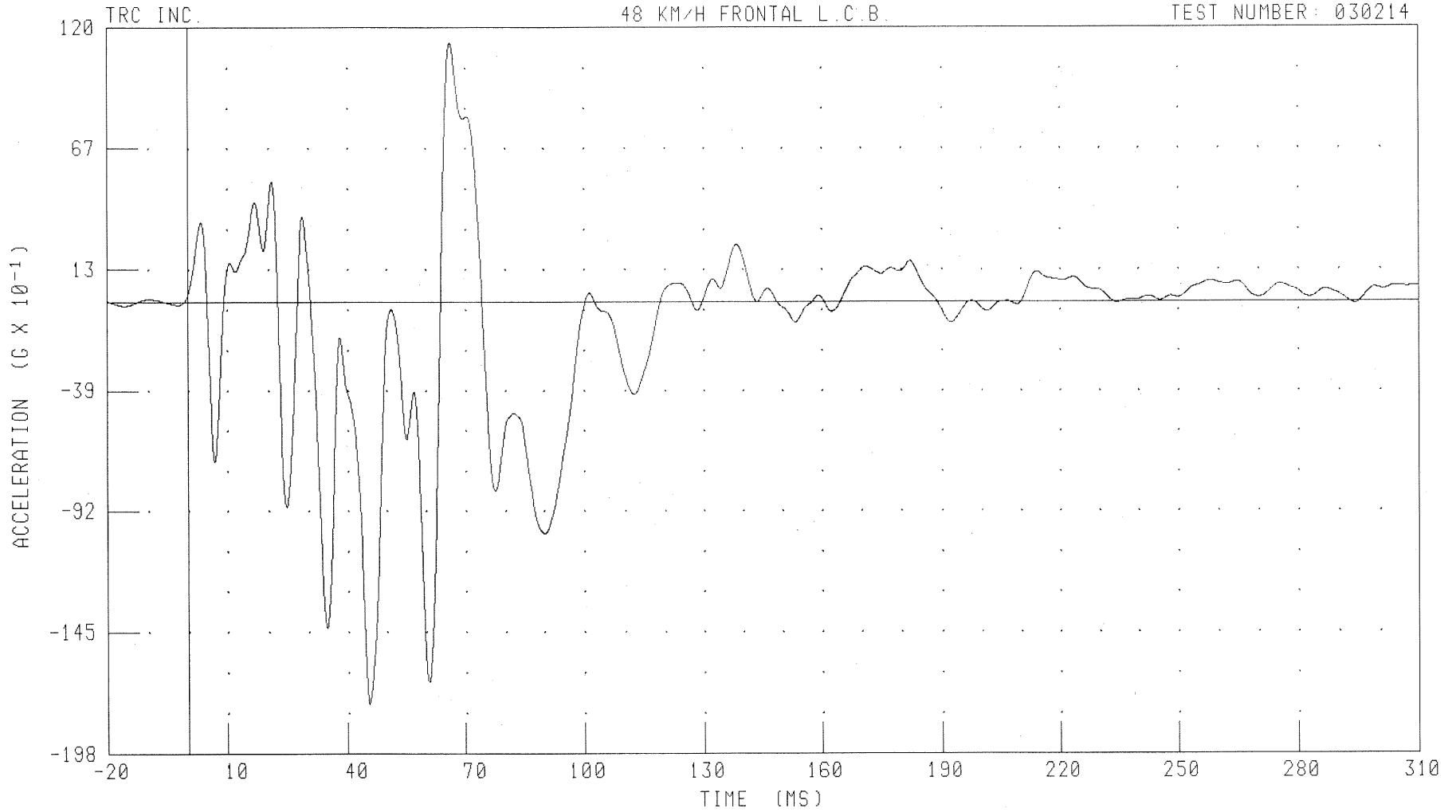
FILTER: CH. CLASS 60

PEAK DATA: 0.89 G @ 125.20 MS; -35.61 G @ 50.16 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
TOEPAN NEXT TO FOOTREST Z-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: TPFZG1

FILTER: CH. CLASS 60

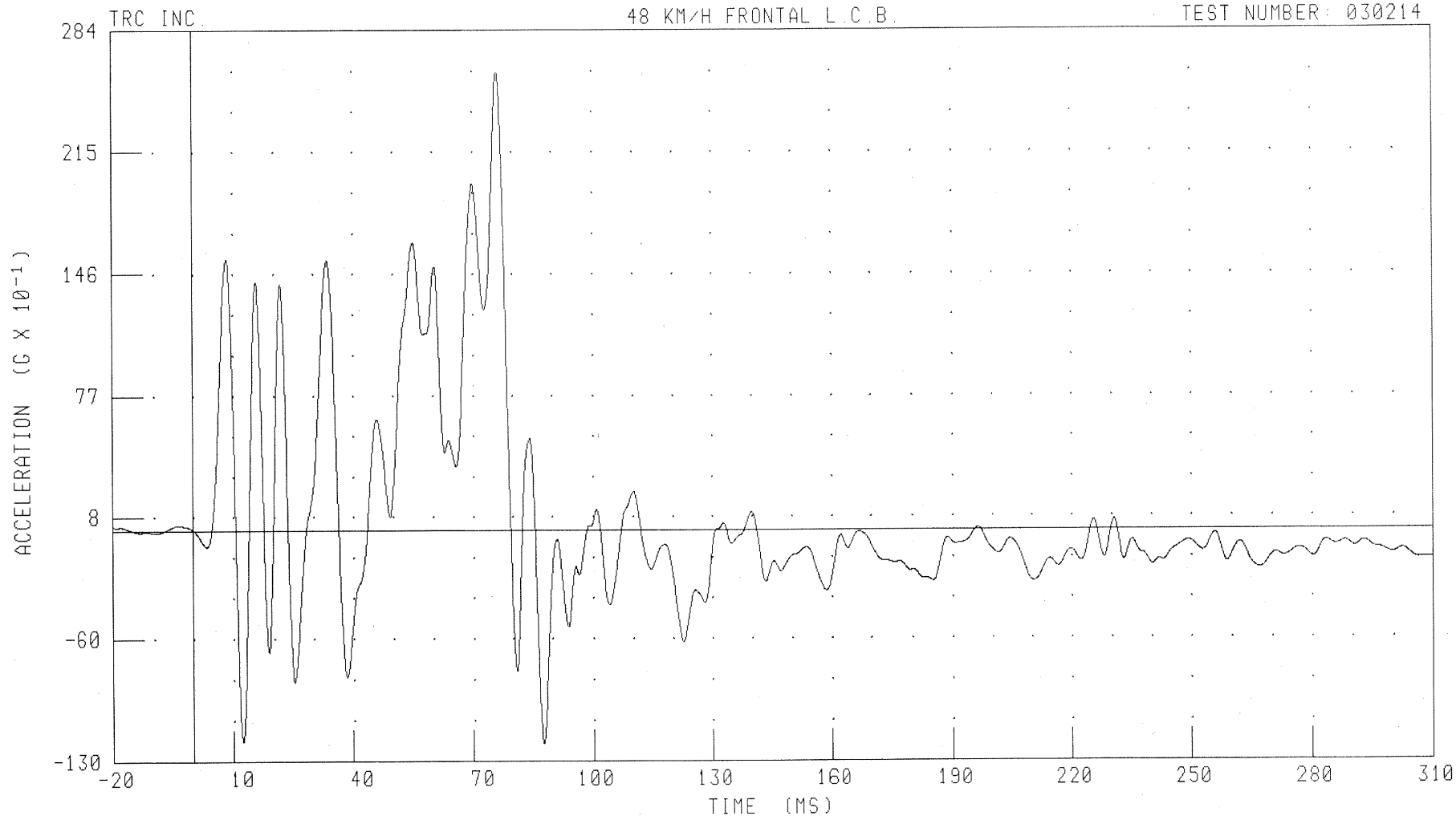
PEAK DATA: 11.33 G @ 66.32 MS; -17.64 G @ 45.52 MS

B-164

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
REAR DECK Z-AXIS ACCELERATION  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: RDKZG1

FILTER: CH. CLASS 60

PEAK DATA: 26.04 G @ 76.24 MS; -12.02 G @ 87.76 MS

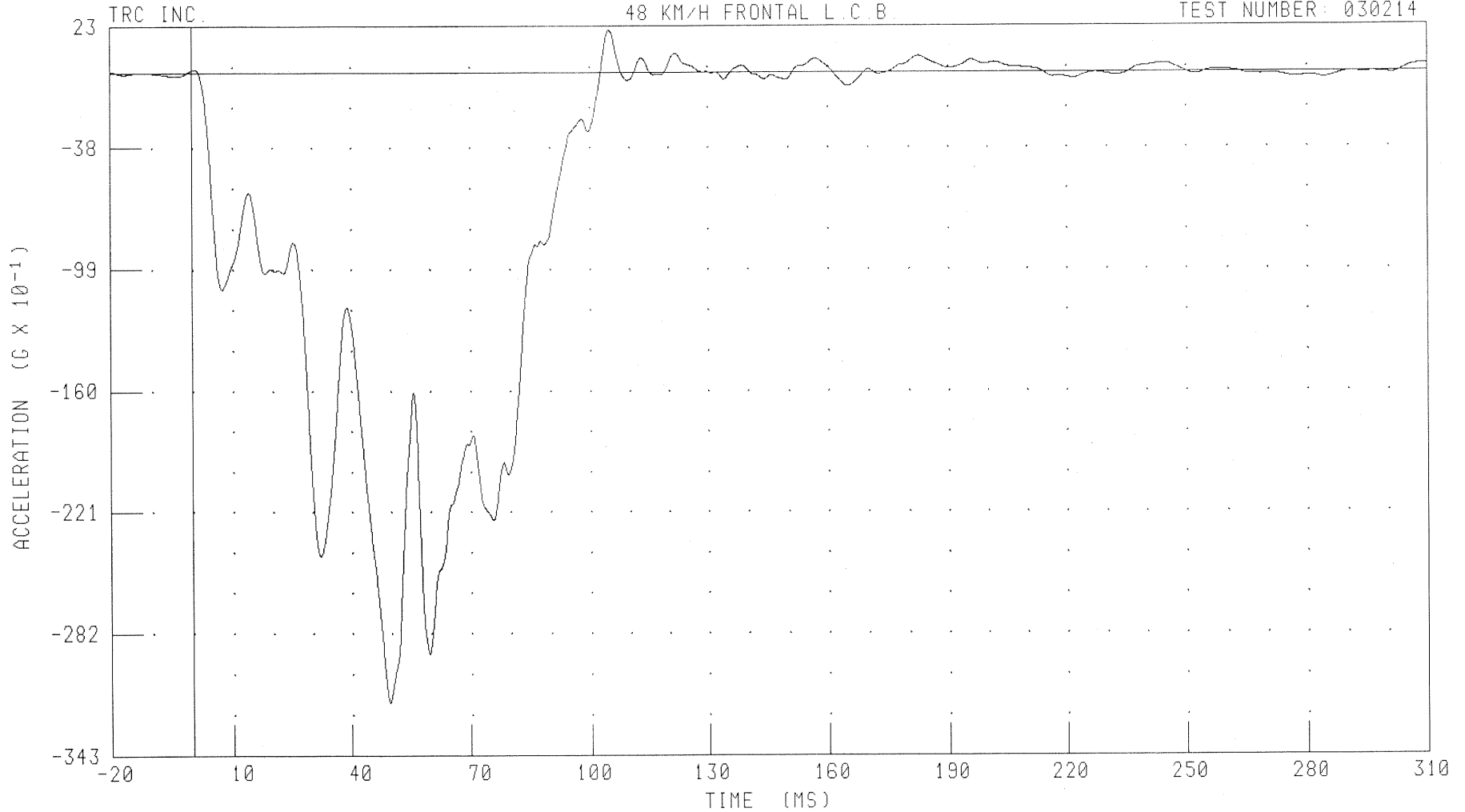
B-165

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
REAR COMPARTMENT CENTER X-AXIS ACCELERATION

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: RDCXG1

FILTER: CH. CLASS 60

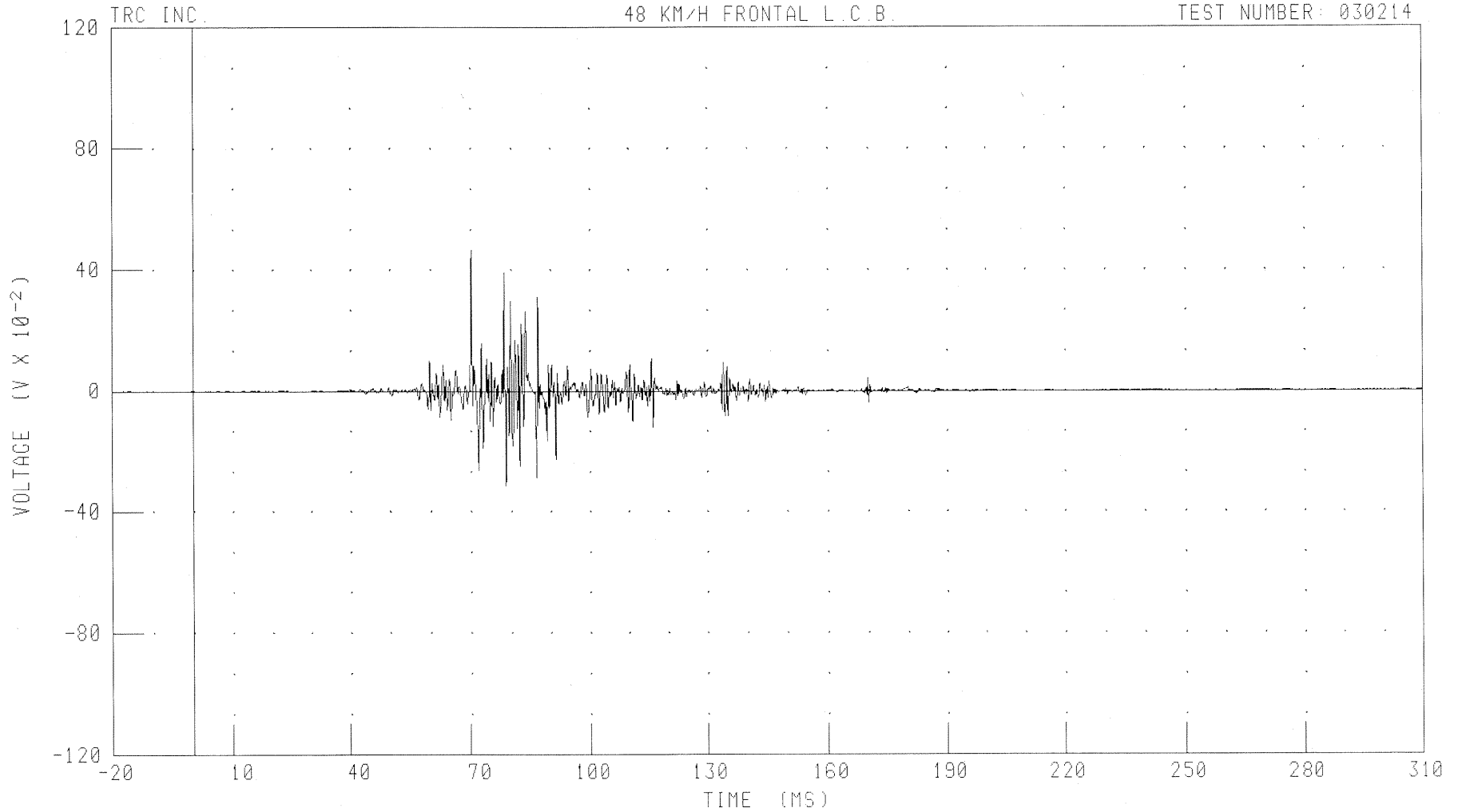
PEAK DATA: 2.09 G @ 105.04 MS; -31.67 G @ 49.60 MS

B-166

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
DRIVER AIRBAG EVENT  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: DABET1 FILTER: CH. CLASS 1000

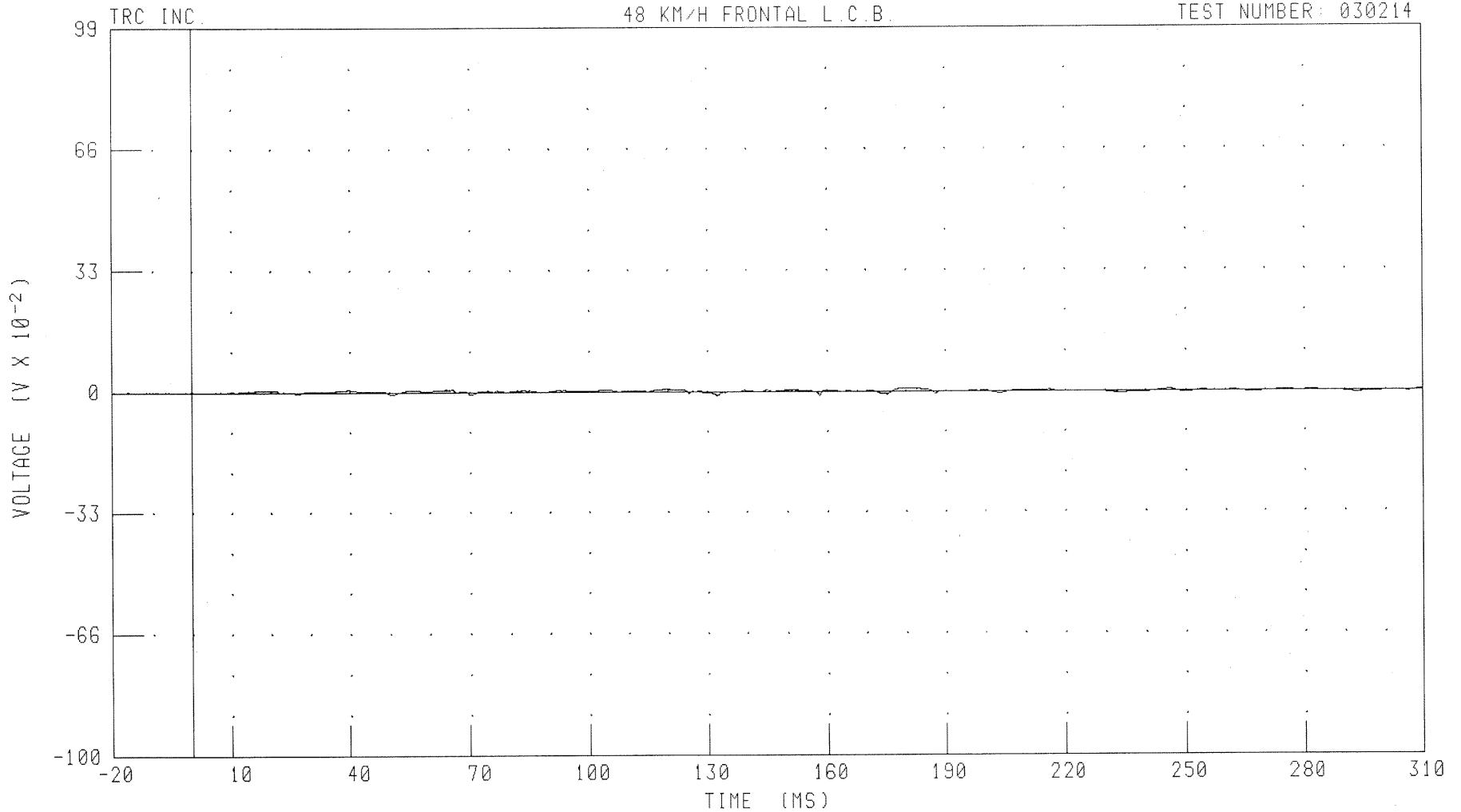
PEAK DATA: 0.47 V @ 70.32 MS; -0.31 V @ 78.88 MS

B-167

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
PASSENGER AIRBAG EVENT  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: PABET1 FILTER: CH. CLASS 1000

PEAK DATA: 0.01 V @ 180.24 MS; -0.01 V @ 158.24 MS

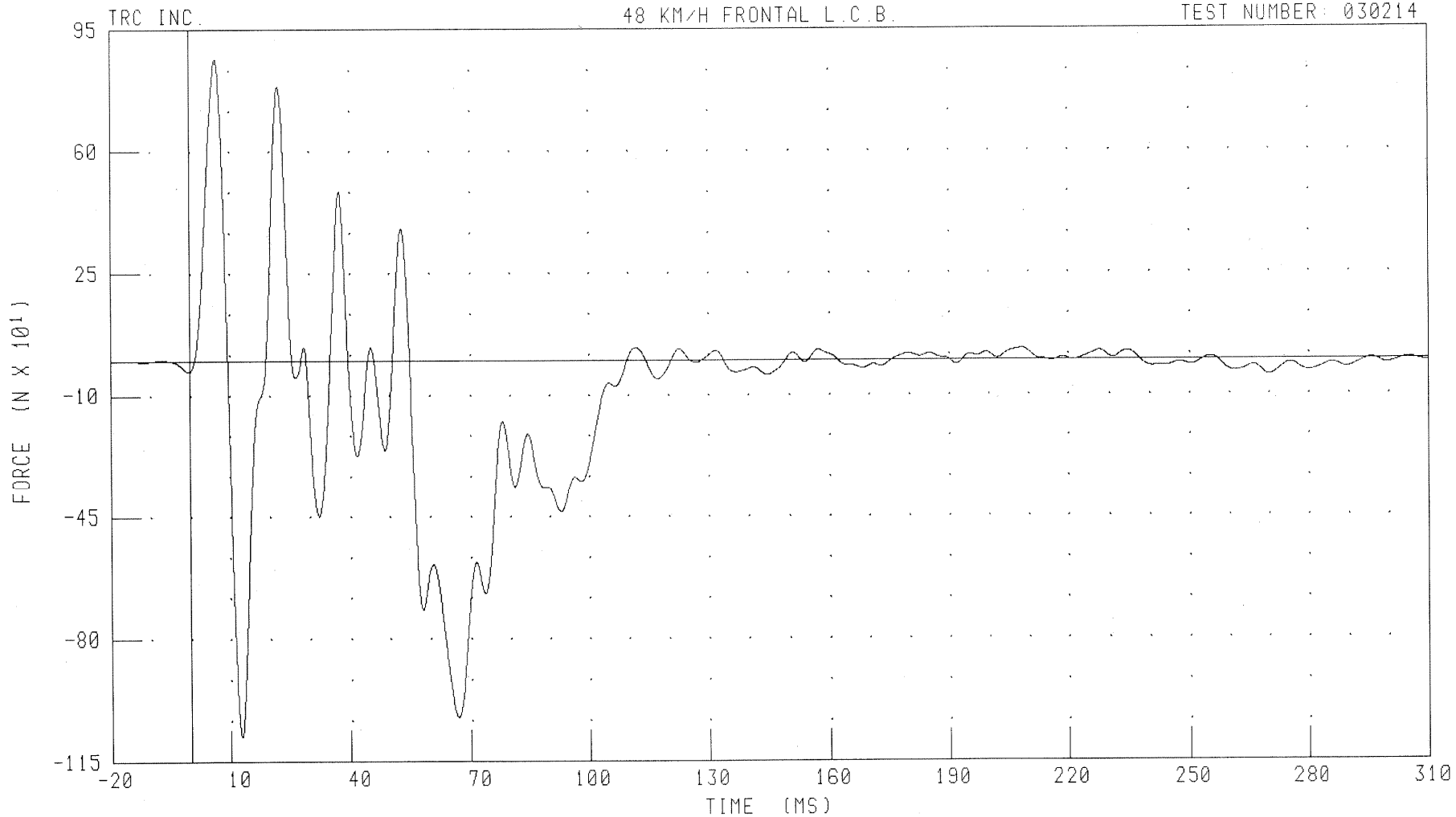
B-168

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A1 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BA1F

FILTER: CH. CLASS 60

PEAK DATA: 865.84 N @ 6.64 MS; -1079.59 N @ 12.80 MS

B-169

030214

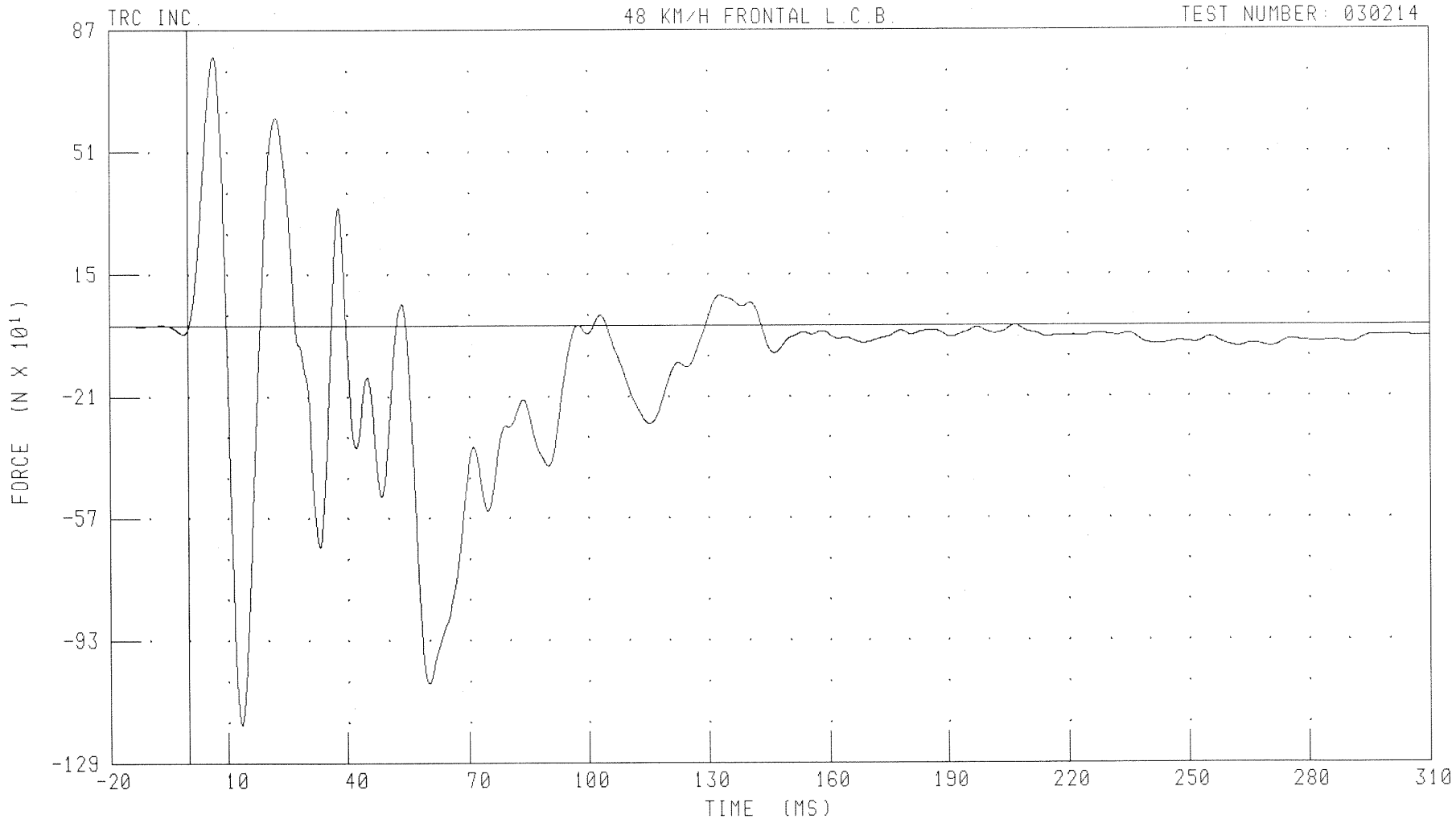
2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION A2 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214

B-170



CHANNEL: BA2F

FILTER: CH. CLASS 60

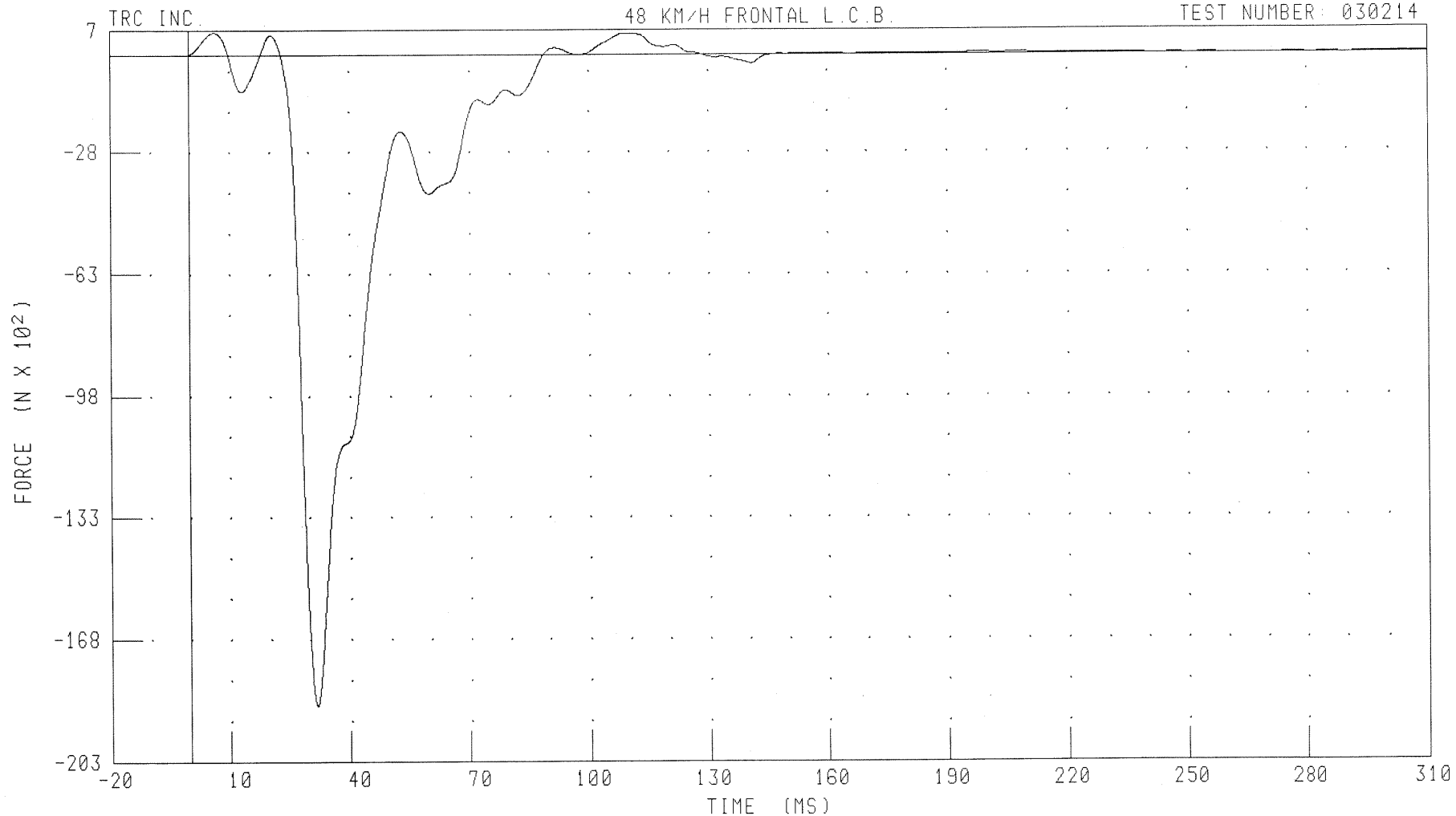
PEAK DATA: 791.92 N @ 6.64 MS; -1178.79 N @ 13.36 MS

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A3 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BA3F

FILTER: CH. CLASS 60

PEAK DATA: 639.59 N @ 6.32 MS; -18700.58 N @ 31.84 MS

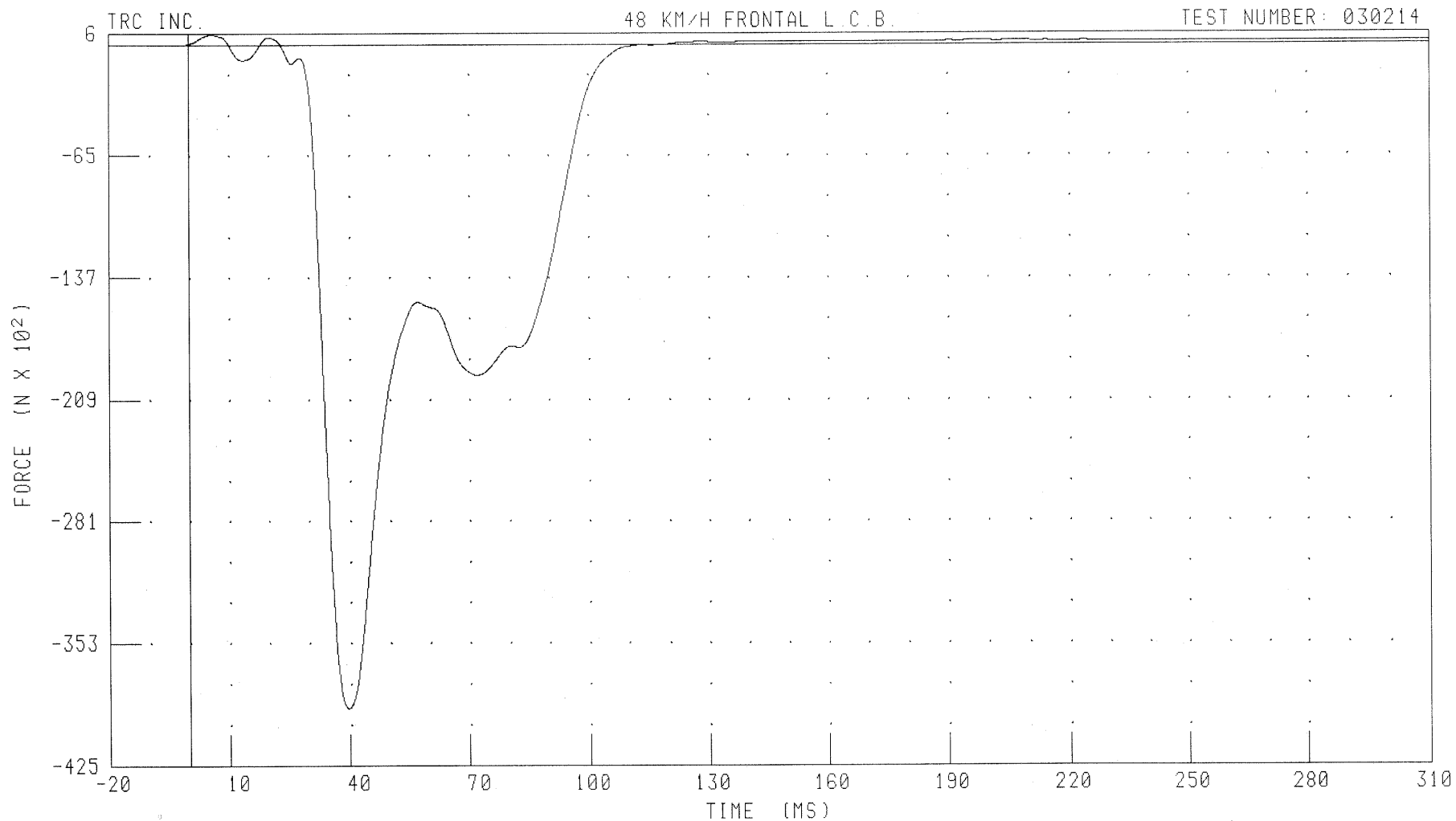
B-171

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A4 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BA4F

FILTER: CH. CLASS 60

PEAK DATA: 575.16 N @ 5.76 MS; -39204.47 N @ 39.60 MS

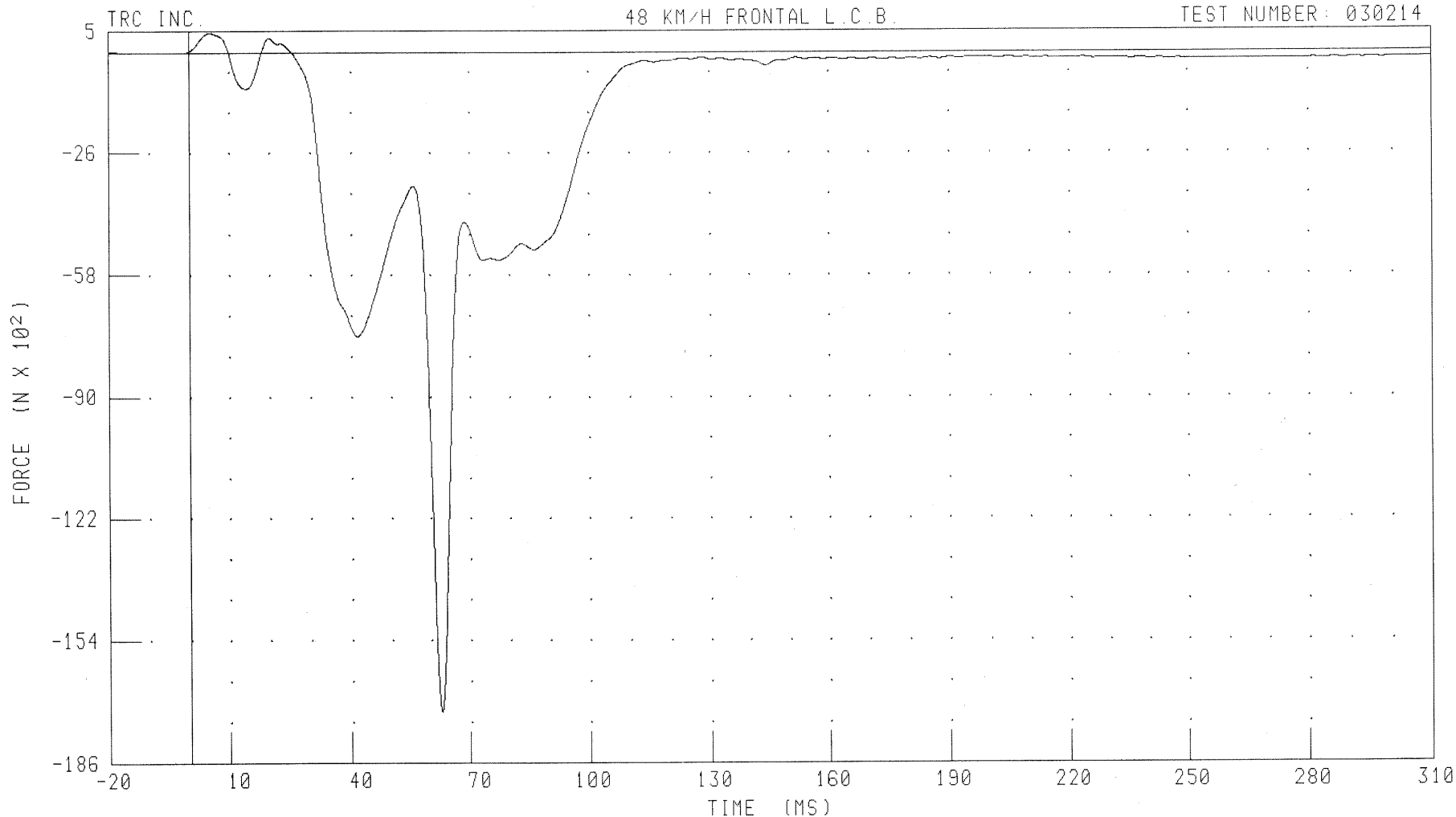
B-172

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A5 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-173

030214

CHANNEL: BA5F

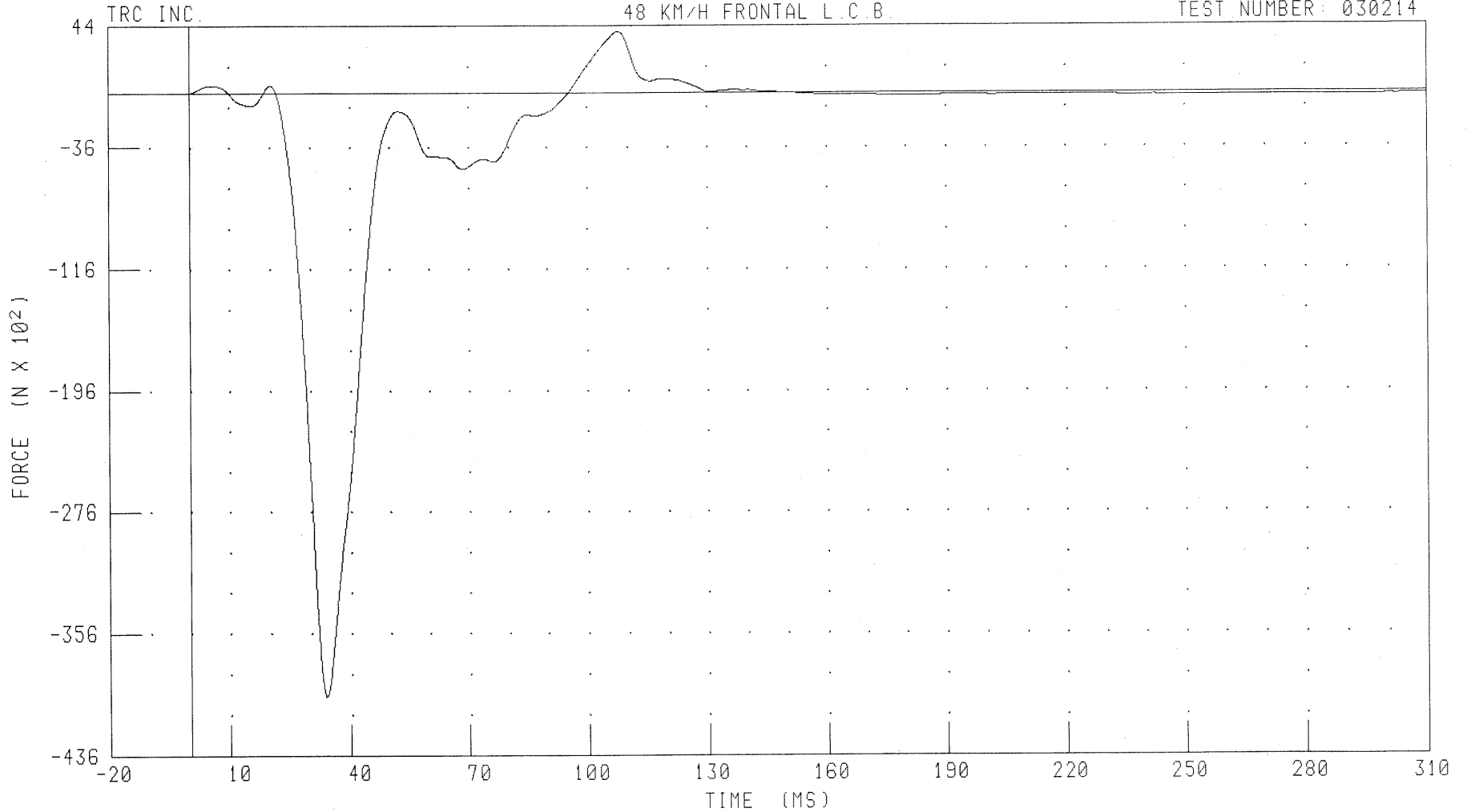
FILTER: CH. CLASS 60

PEAK DATA: 502.27 N @ 5.20 MS; -17336.51 N @ 62.72 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A6 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BA6F

FILTER: CH. CLASS 60

PEAK DATA: 4014.56 N @ 107.92 MS; -39742.63 N @ 33.84 MS

B-174

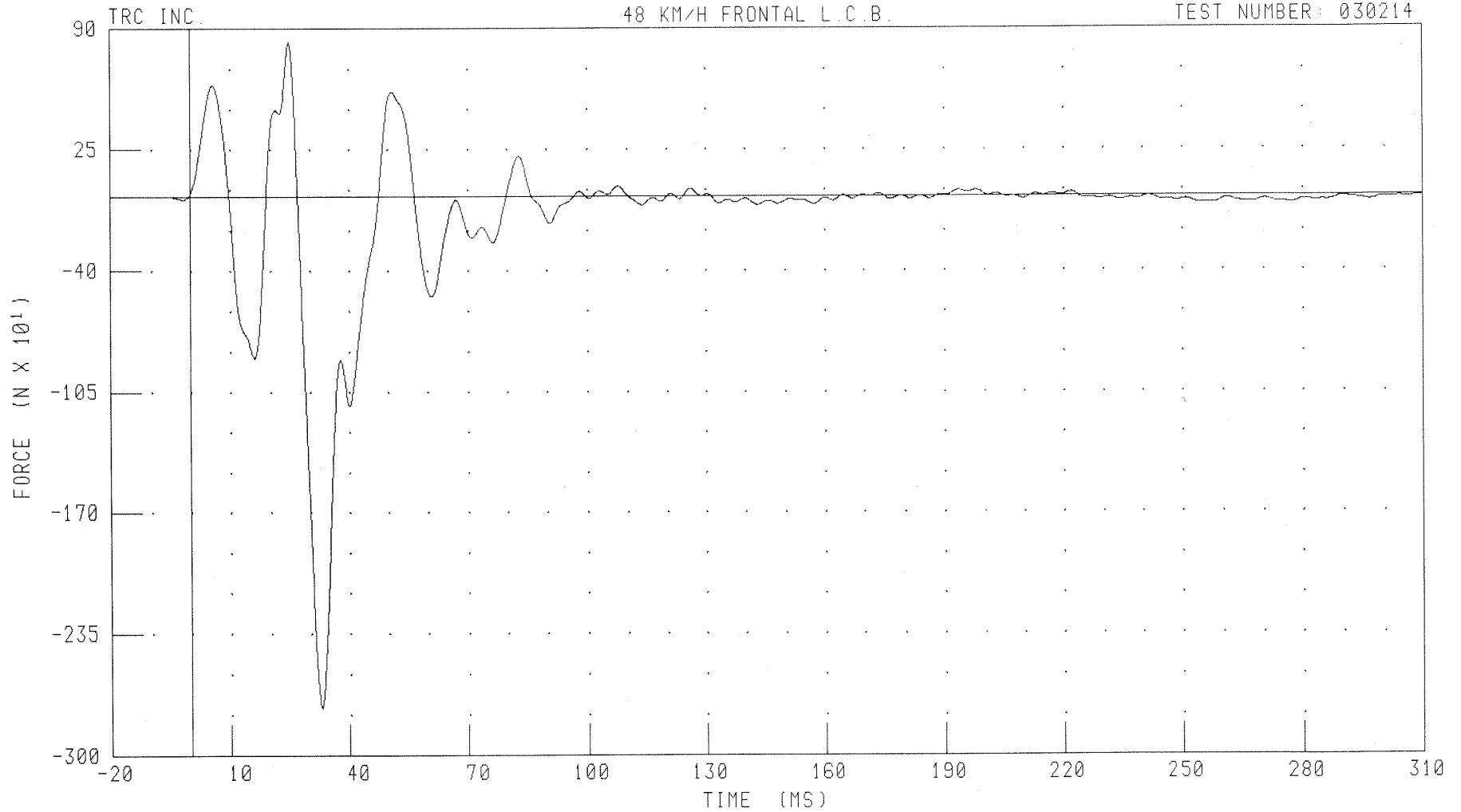
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION A7 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-175

030214

CHANNEL: BA7F

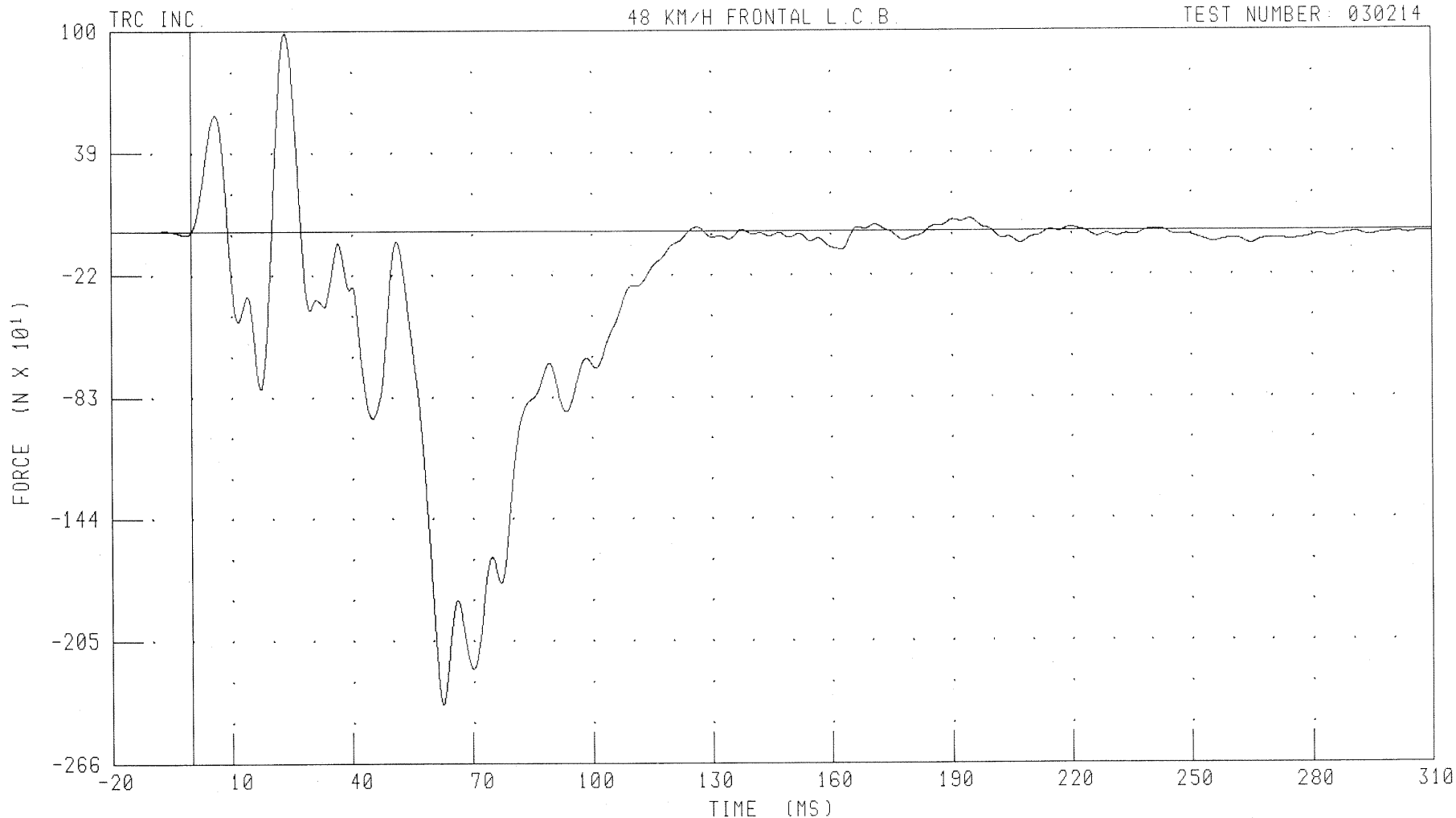
FILTER: CH. CLASS 60

PEAK DATA: 827.08 N @ 24.88 MS; -2745.27 N @ 32.72 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A8 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-176

030214

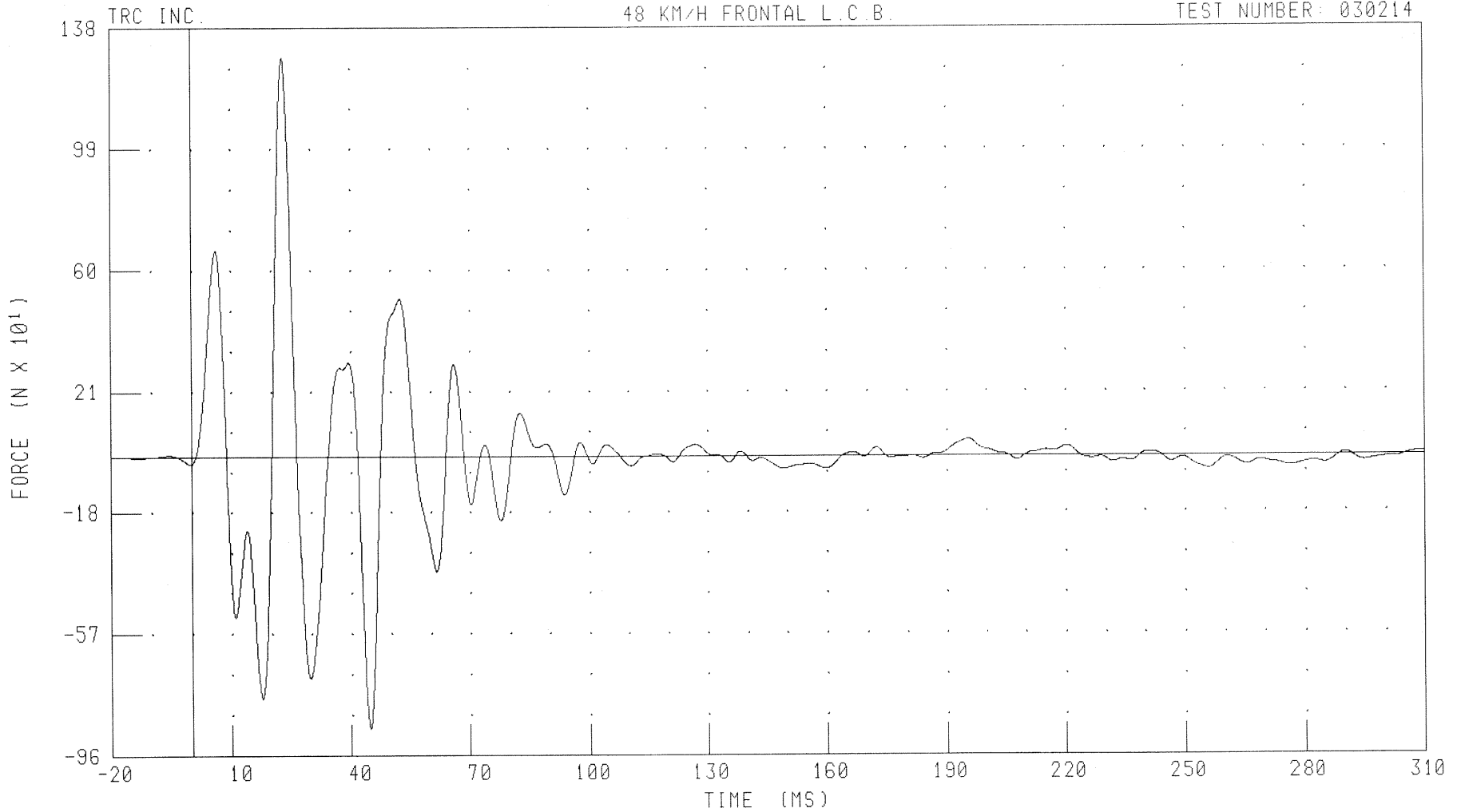
CHANNEL: BA8F

FILTER: CH. CLASS 60

PEAK DATA: 990.57 N @ 23.36 MS; -2367.32 N @ 62.40 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION A9 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BA9F

FILTER: CH. CLASS 60

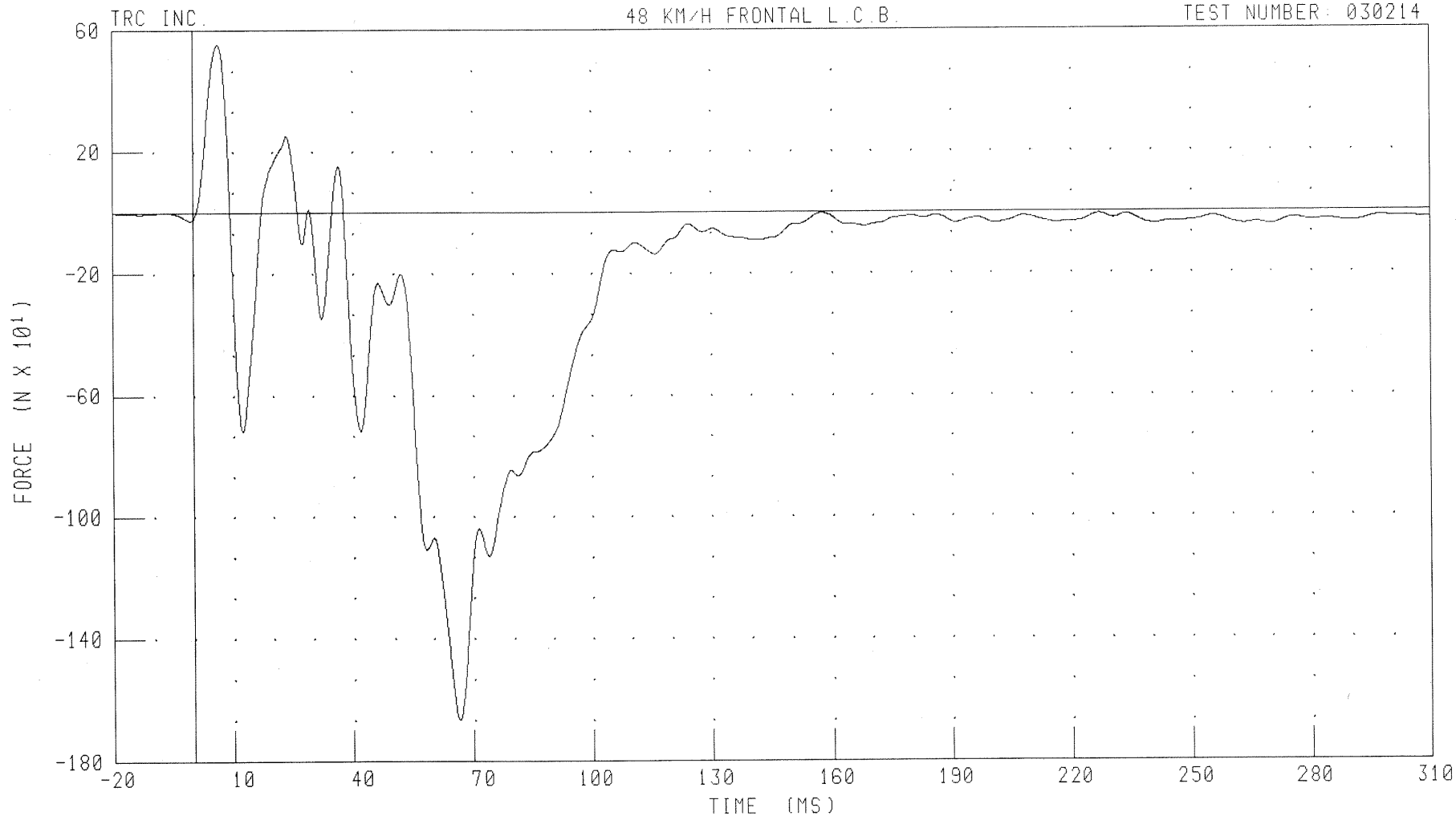
PEAK DATA: 1284.49 N @ 23.12 MS; -874.30 N @ 44.80 MS

B-177

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B1 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BB1F

FILTER: CH. CLASS 60

PEAK DATA: 554.23 N @ 6.24 MS; -1664.84 N @ 66.40 MS

B-178

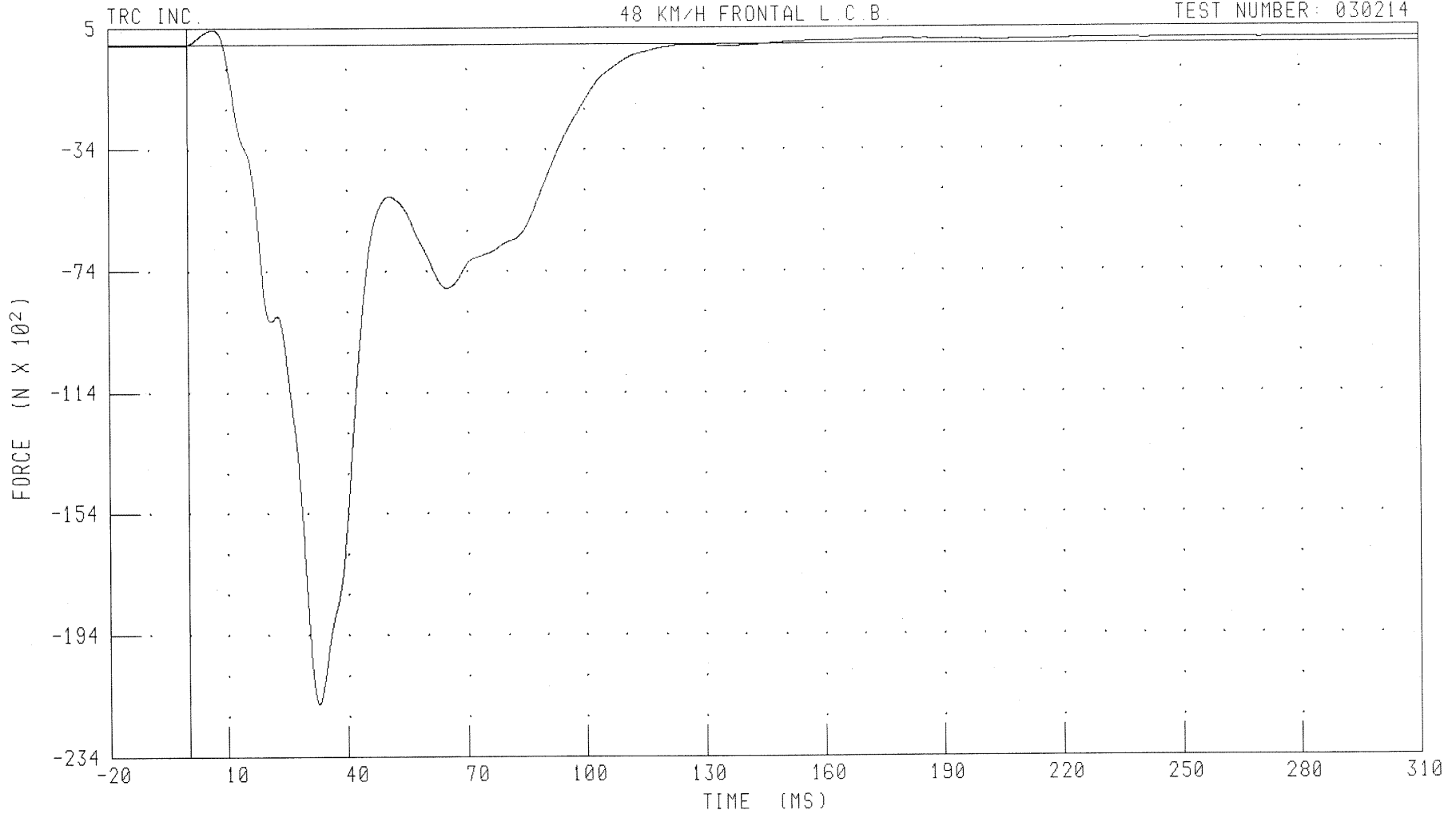
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION B2 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BB2F

FILTER: CH. CLASS 60

PEAK DATA: 502.40 N @ 6.64 MS; -21715.74 N @ 32.72 MS

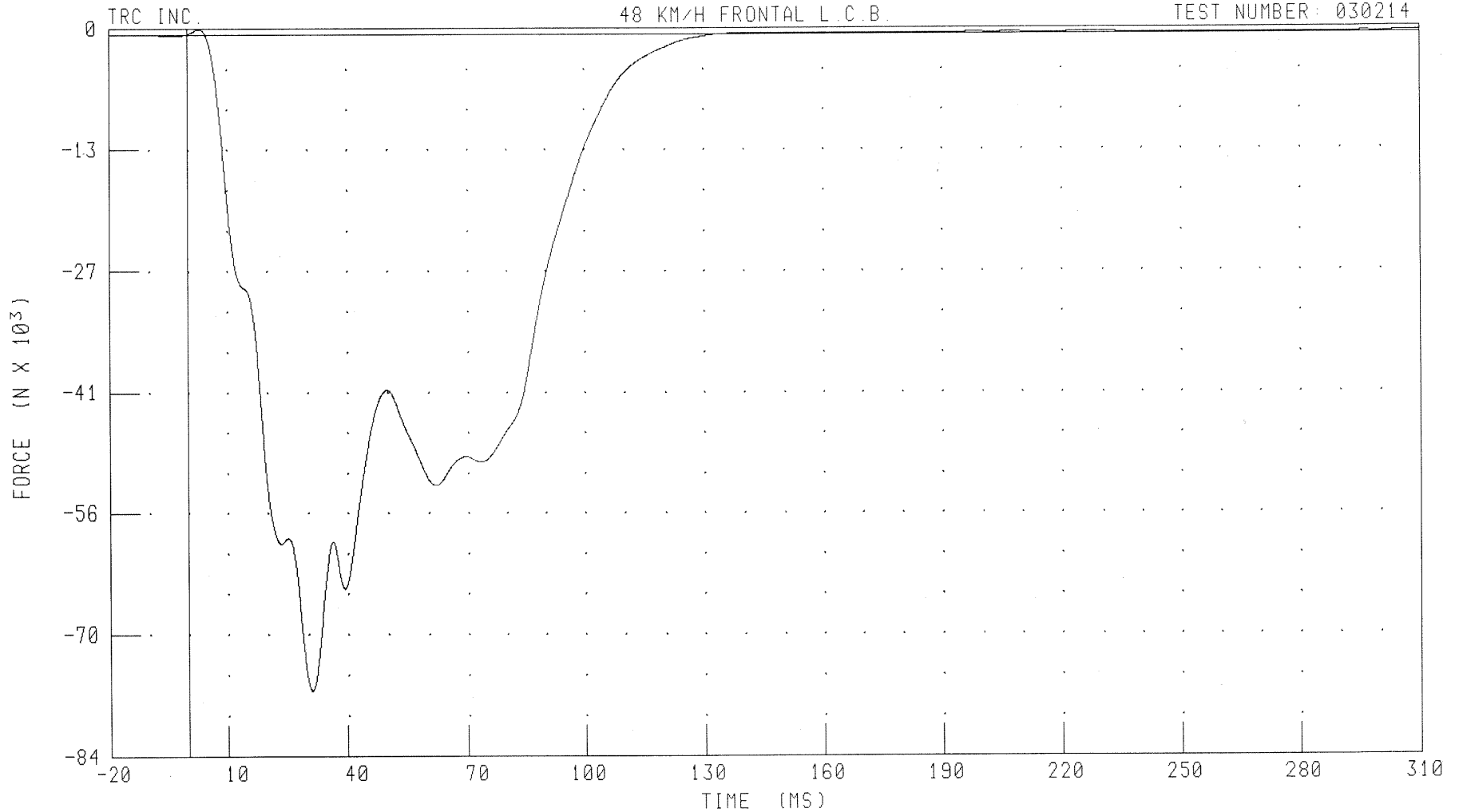
B-179

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B3 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BB3F

FILTER: CH. CLASS 60

PEAK DATA: 680.21 N @ 3.04 MS; -76859.73 N @ 30.96 MS

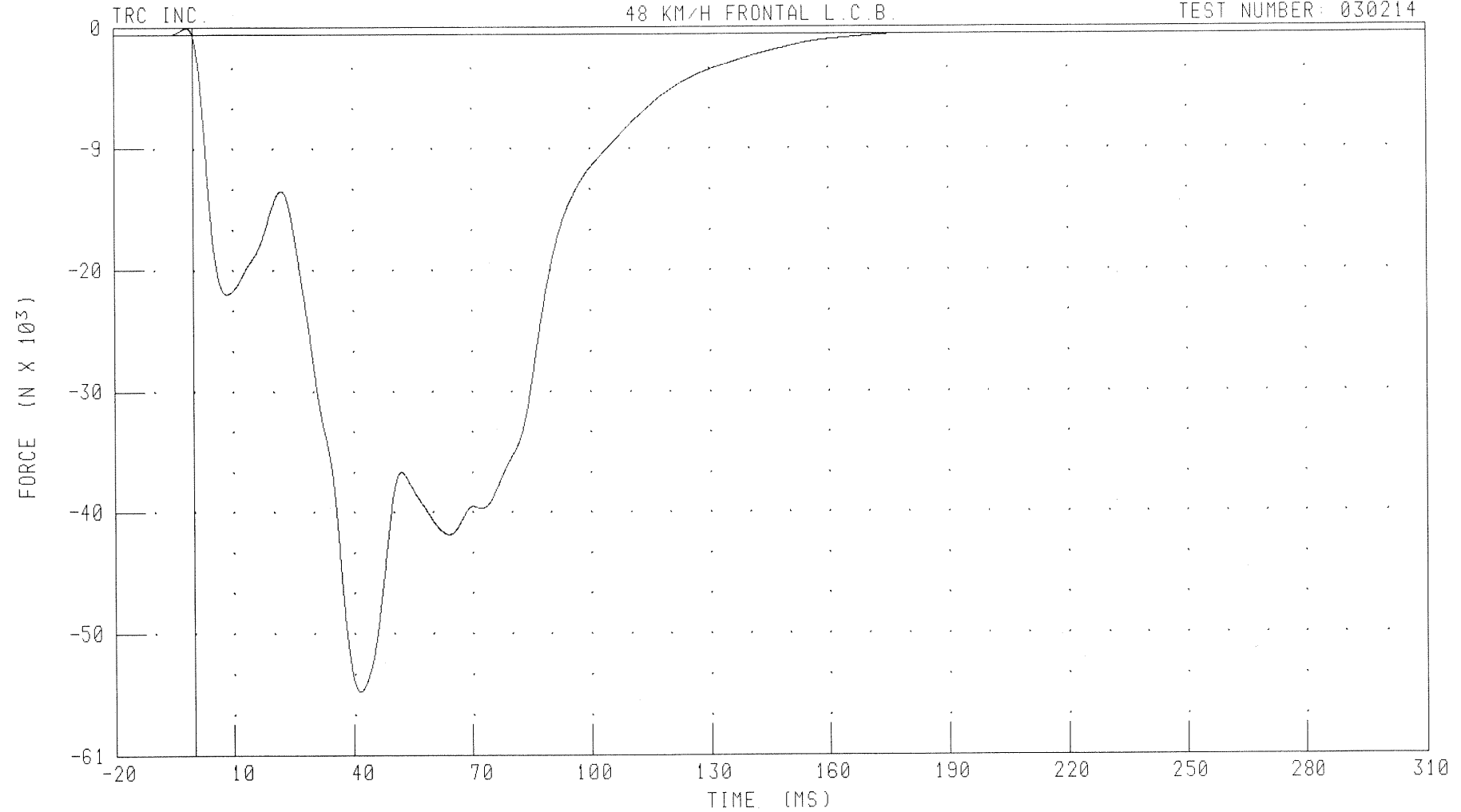
B-180

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B4 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



TRC INC.

B-181

030214

CHANNEL: BB4F

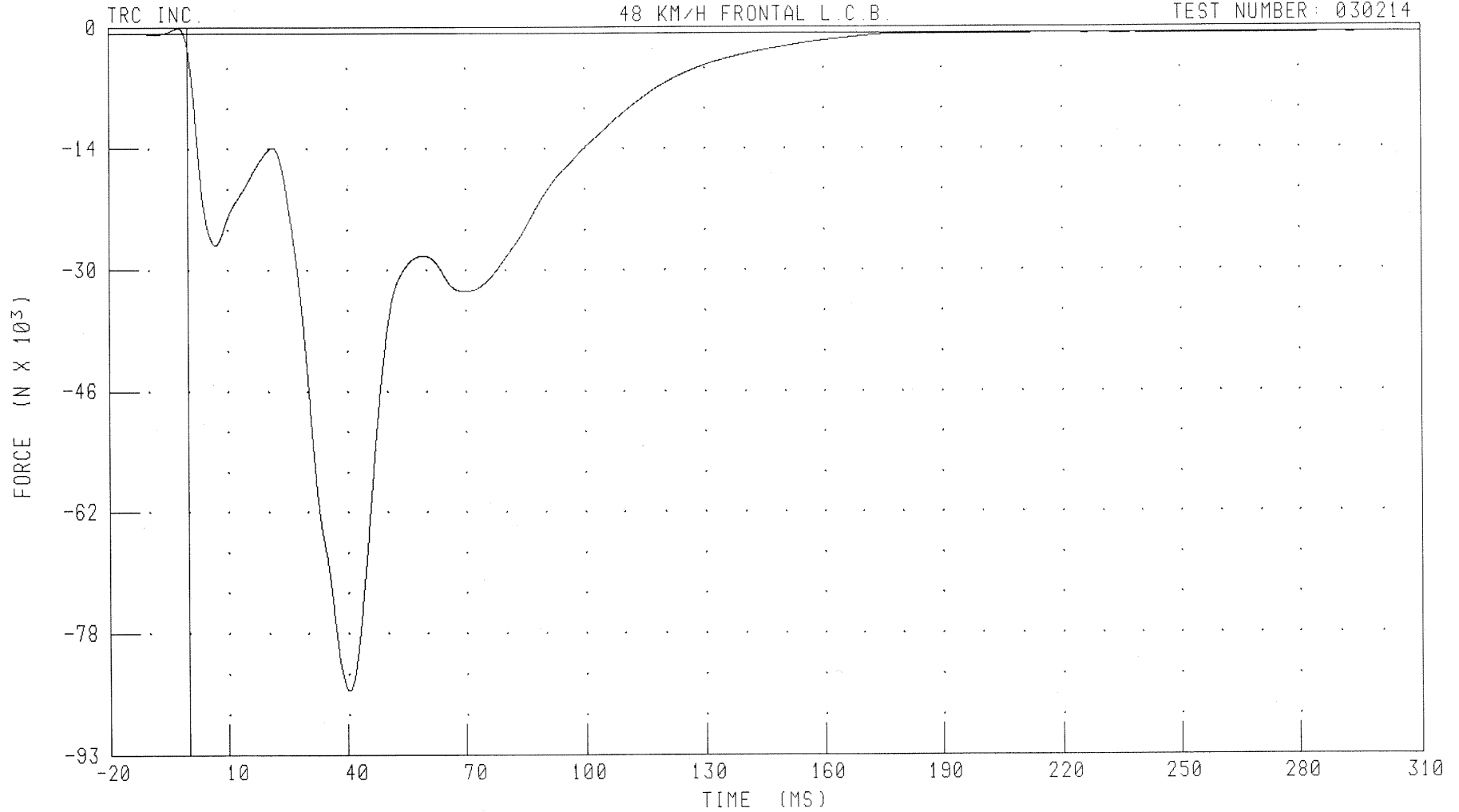
FILTER: CH. CLASS 60

PEAK DATA: 543.07 N @ -1.52 MS; -55850.52 N @ 41.52 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B5 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



TRC INC.

B-182

030214

CHANNEL: BB5F

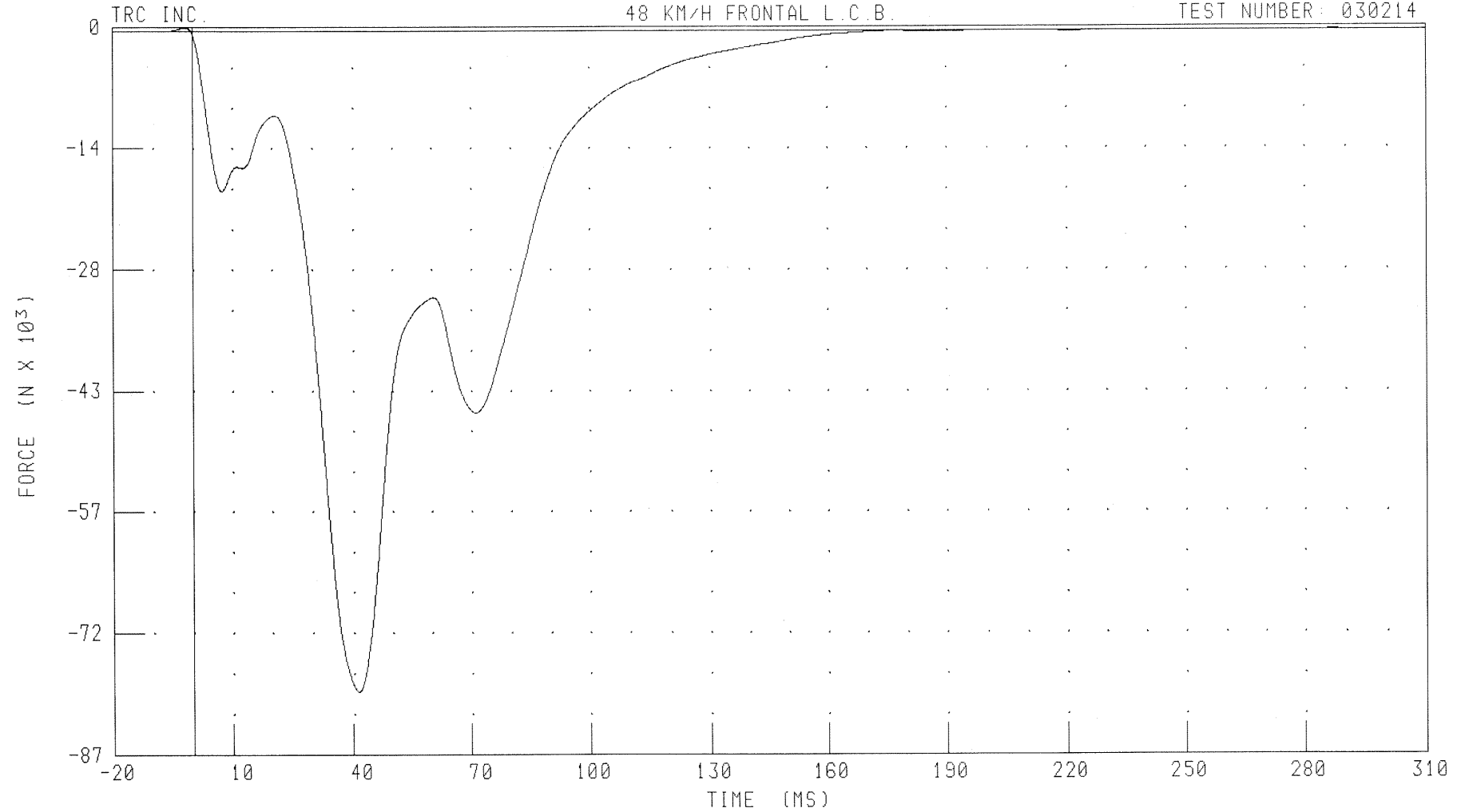
FILTER: CH. CLASS 60

PEAK DATA: 753.59 N @ -2.32 MS; -85625.60 N @ 40.40 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B6 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



TRC INC.

B-183

030214

CHANNEL: BB6F

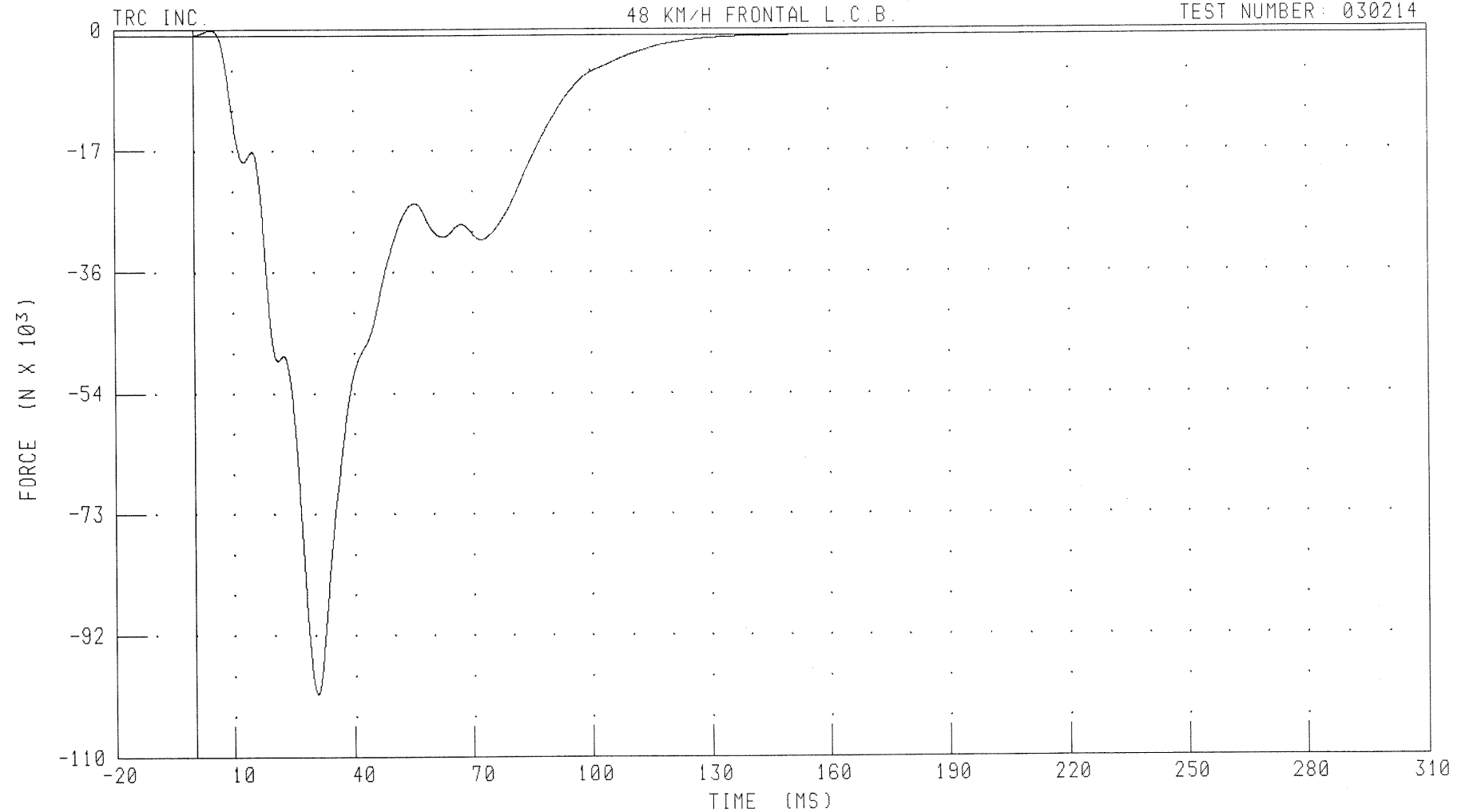
FILTER: CH. CLASS 60

PEAK DATA: 410.08 N @ -1.84 MS; -79623.34 N @ 41.36 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B7 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-184

030214

CHANNEL: BB7F

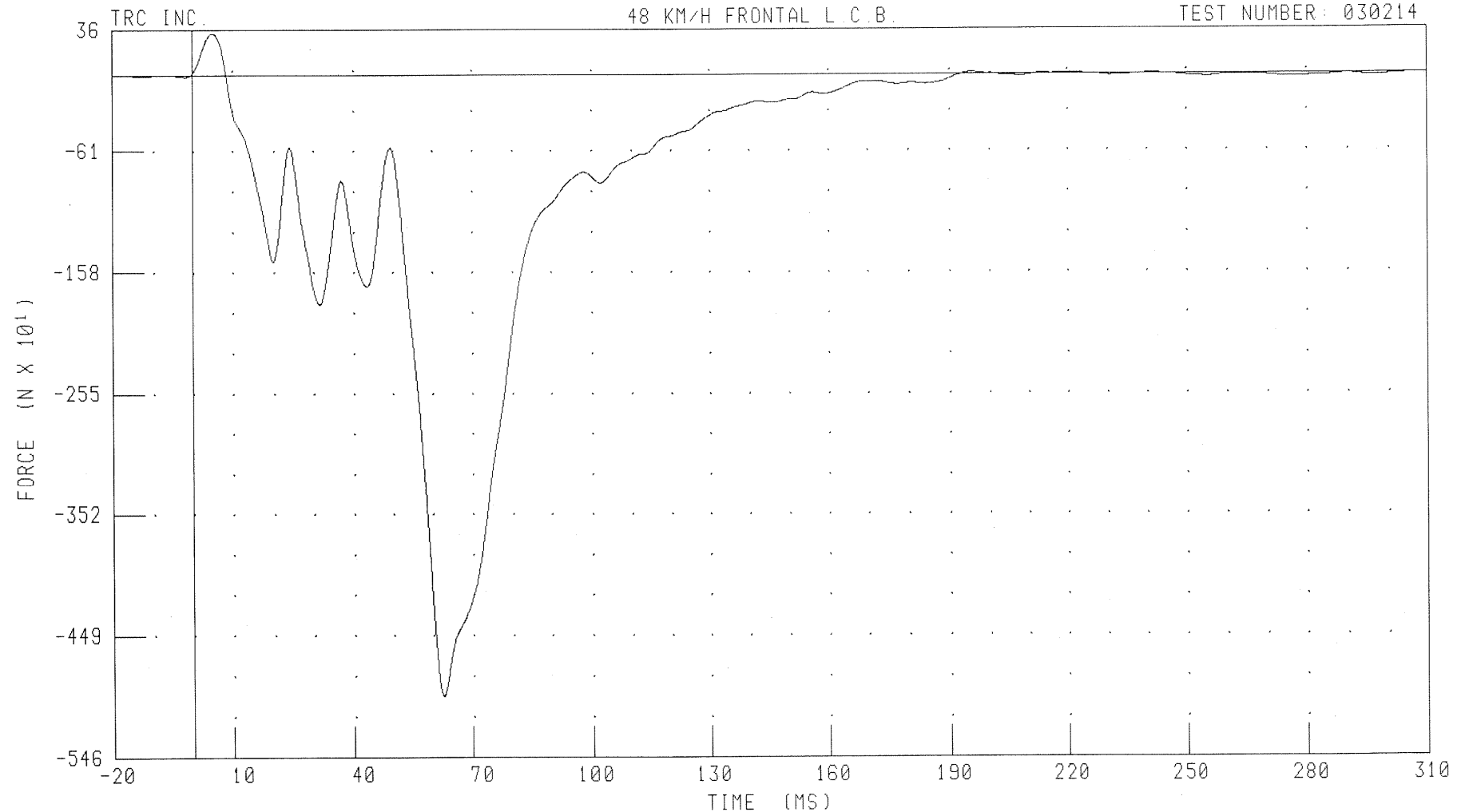
FILTER: CH. CLASS 60

PEAK DATA: 794.66 N @ 4.56 MS; -101120.84 N @ 30.72 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B8 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-185

030214

CHANNEL: BB8F

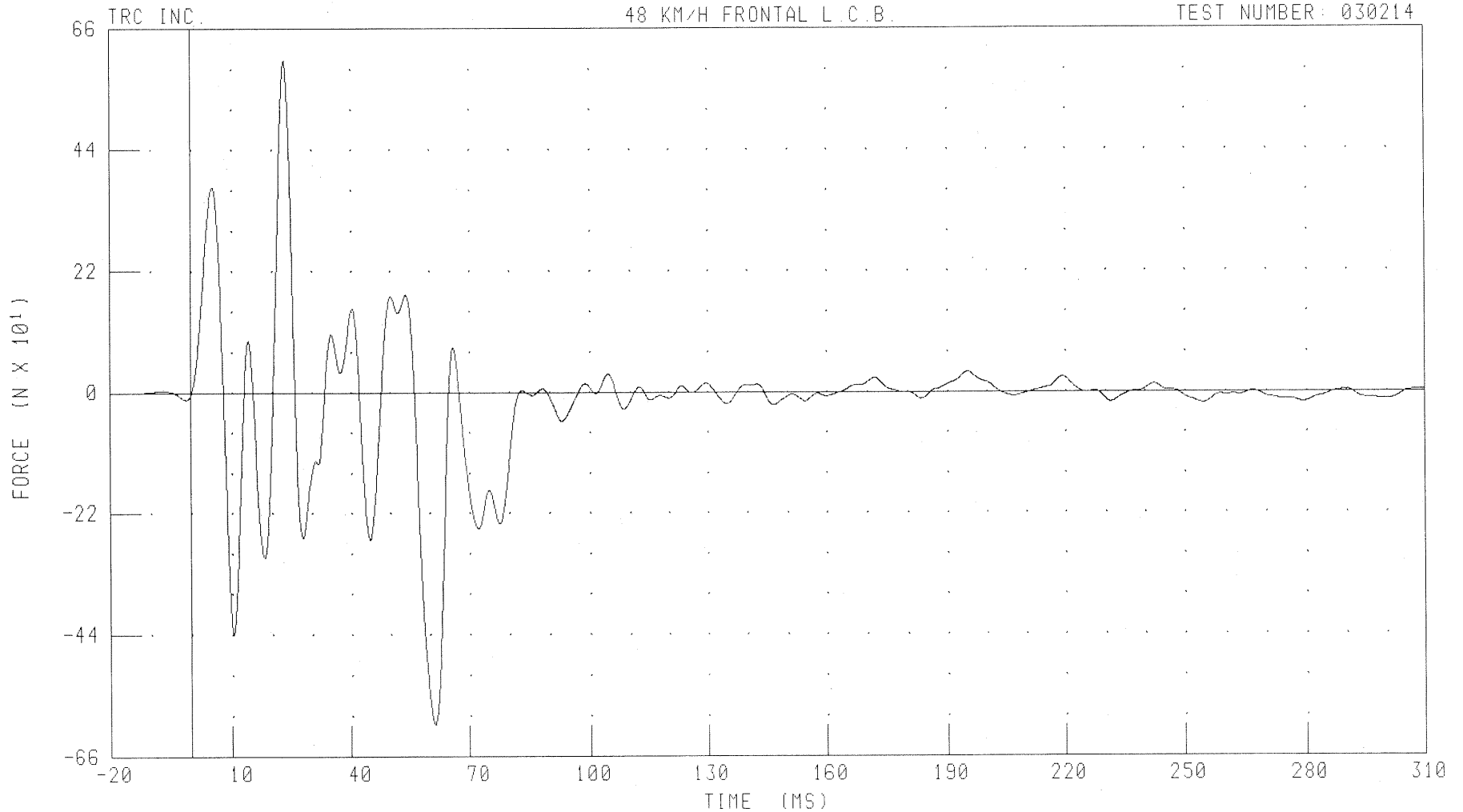
FILTER: CH. CLASS 60

PEAK DATA: 332.11 N @ 4.96 MS; -4974.96 N @ 62.56 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION B9 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BB9F

FILTER: CH. CLASS 60

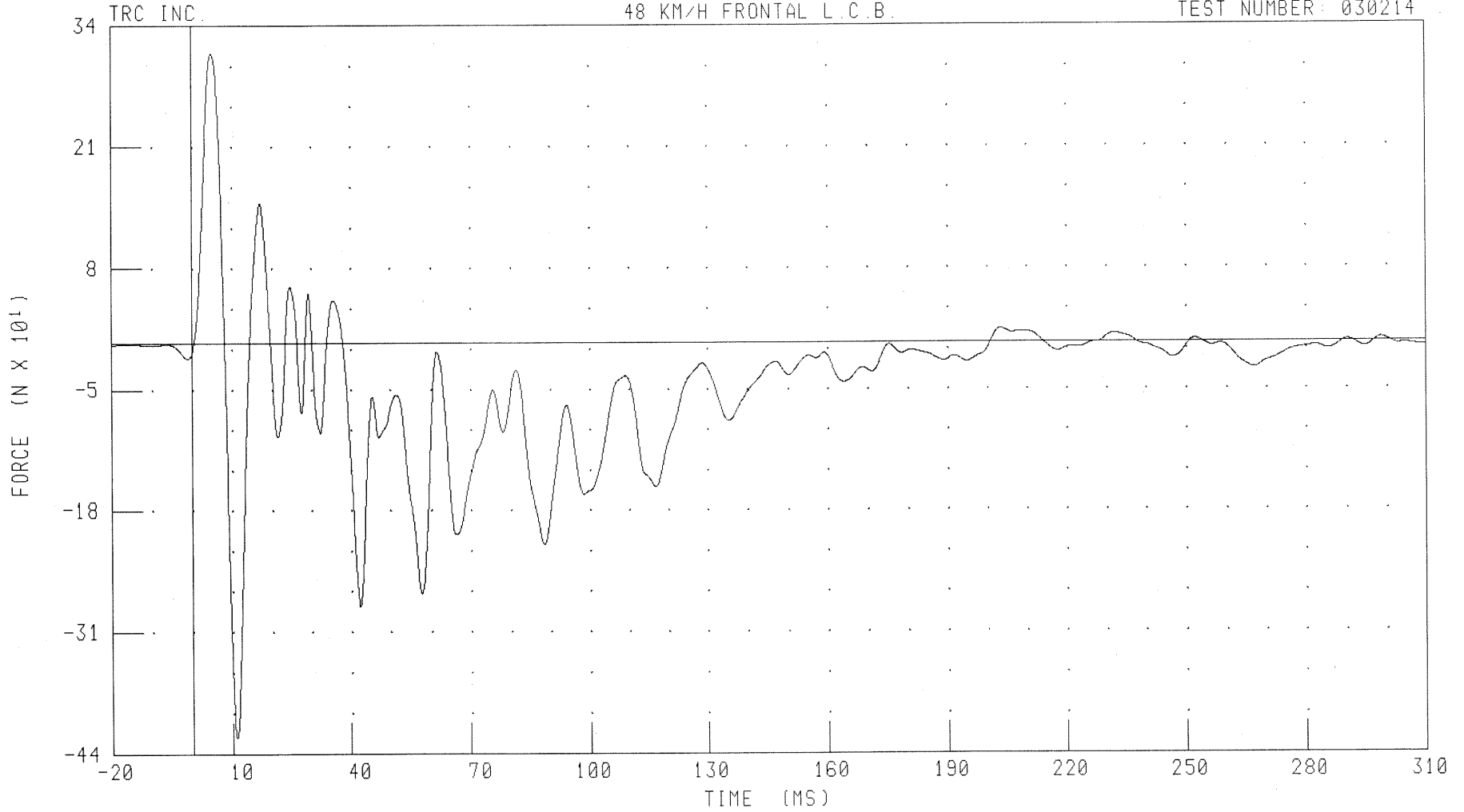
PEAK DATA: 601.96 N @ 23.28 MS; -603.27 N @ 61.28 MS

B-186

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C1 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC1F

FILTER: CH. CLASS 60

PEAK DATA: 310.13 N @ 4.96 MS; -422.80 N @ 10.96 MS

B-187

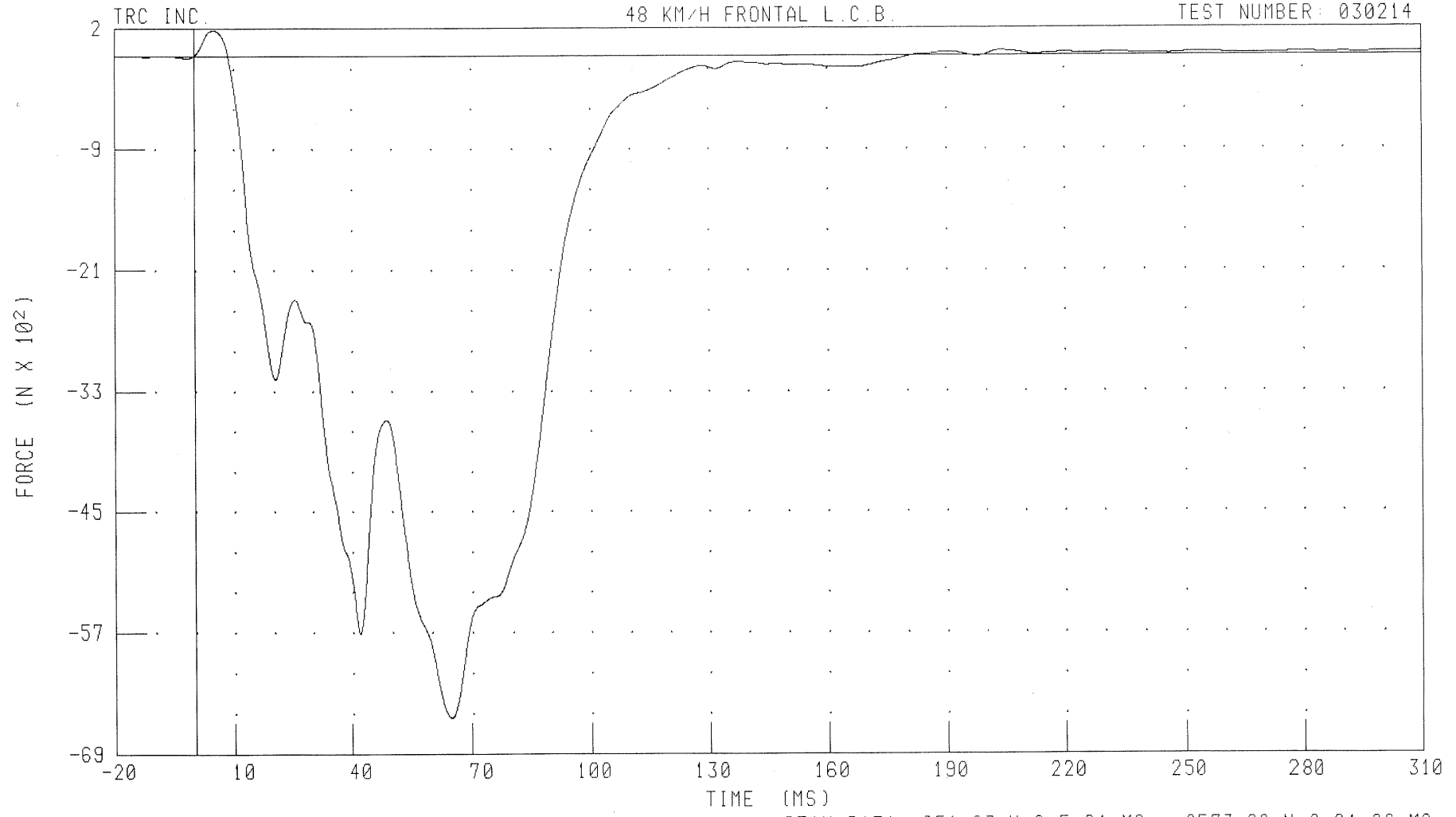
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION C2 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-188

030214

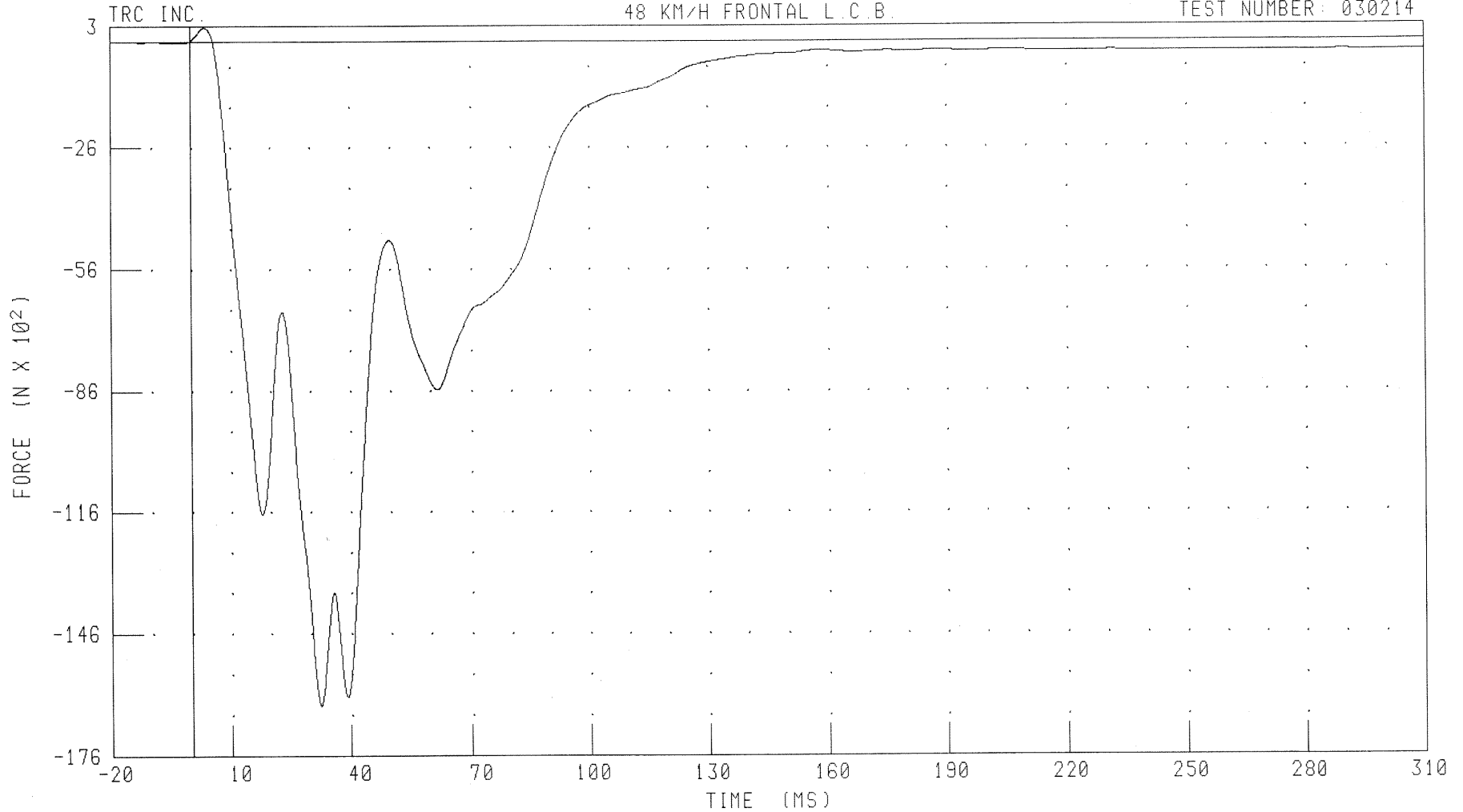
CHANNEL: BC2F

FILTER: CH. CLASS 60

PEAK DATA: 251.23 N @ 5.04 MS; -6573.29 N @ 64.80 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C3 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC3F

FILTER: CH. CLASS 60

PEAK DATA: 349.24 N @ 3.52 MS; -16395.36 N @ 32.48 MS

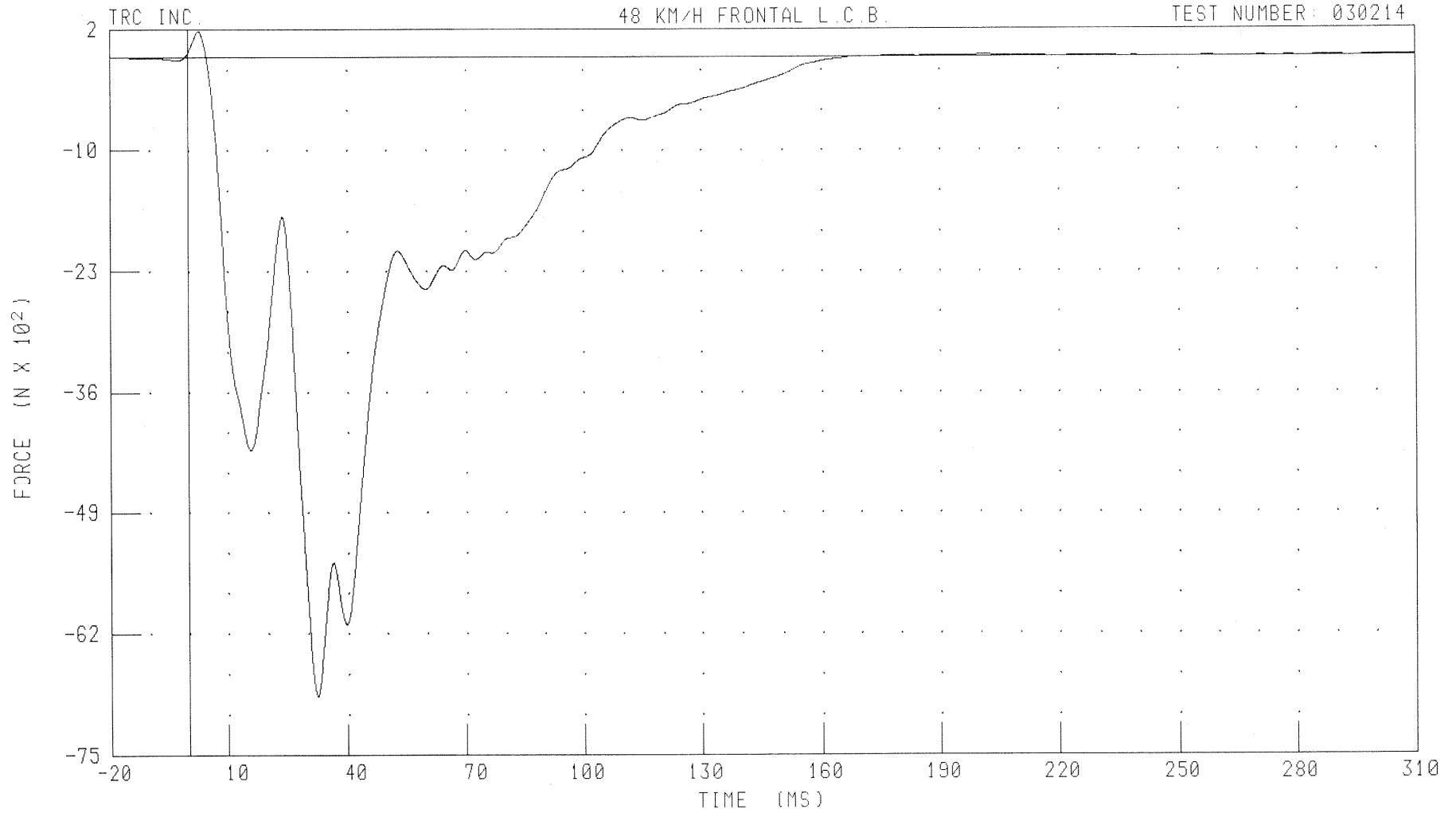
B-189

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C4 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC4F

FILTER: CH. CLASS 60

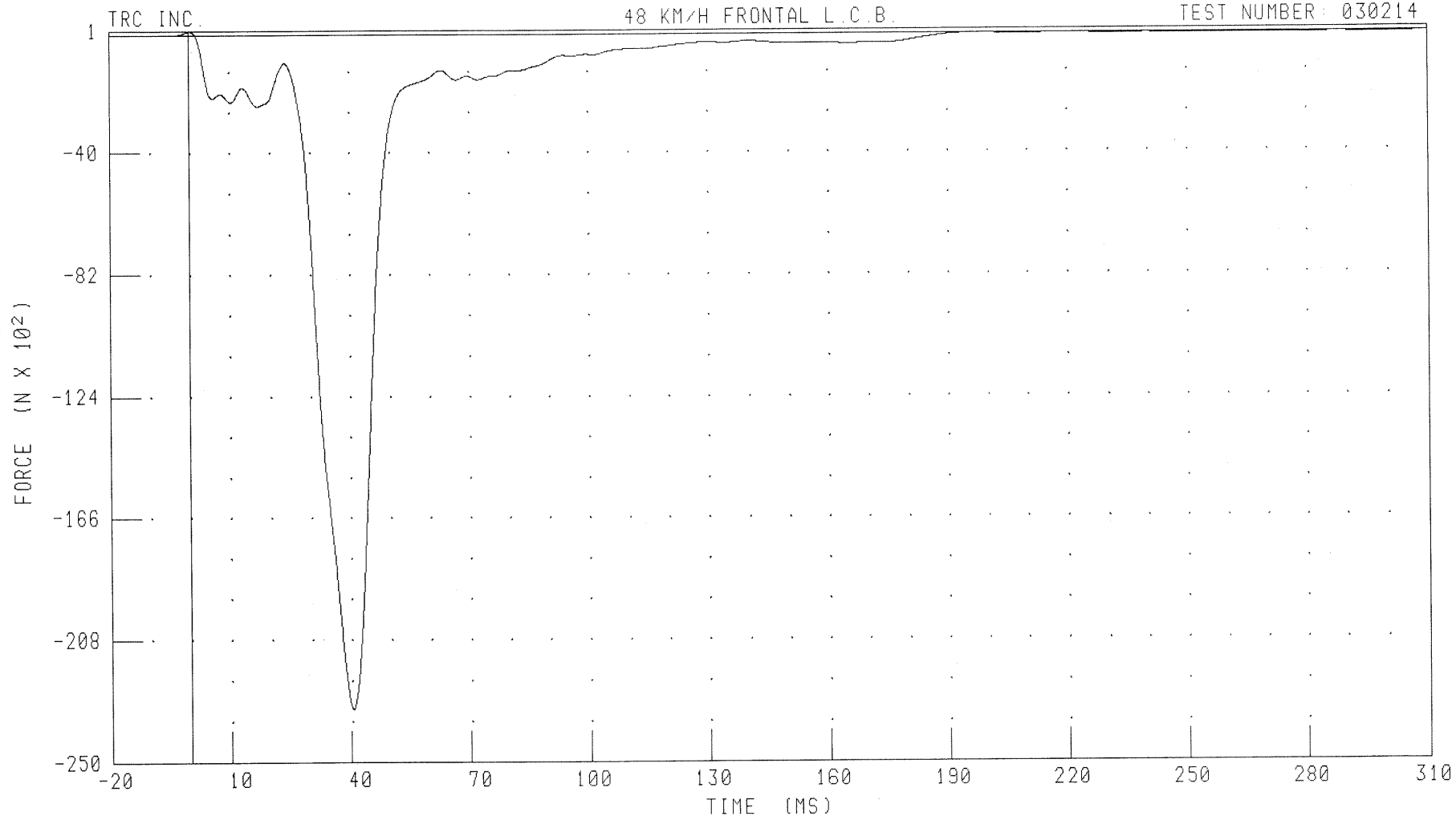
PEAK DATA: 271.20 N @ 2.72 MS; -6882.96 N @ 32.40 MS

B-190

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C5 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC5F

FILTER: CH. CLASS 60

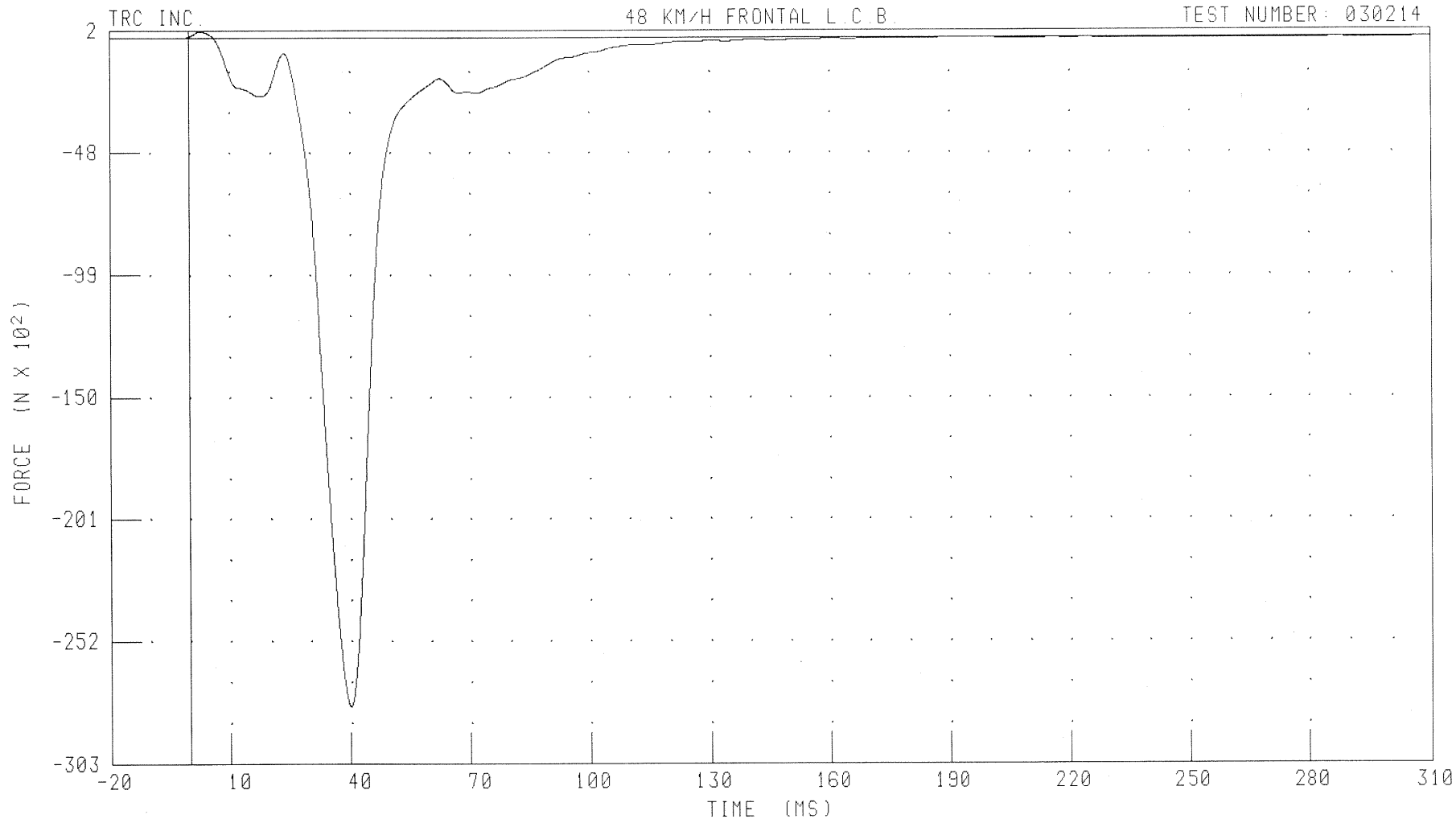
PEAK DATA: 122.11 N @ 0.32 MS; -23245.21 N @ 40.48 MS

B-191

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C6 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC6F

FILTER: CH. CLASS 60

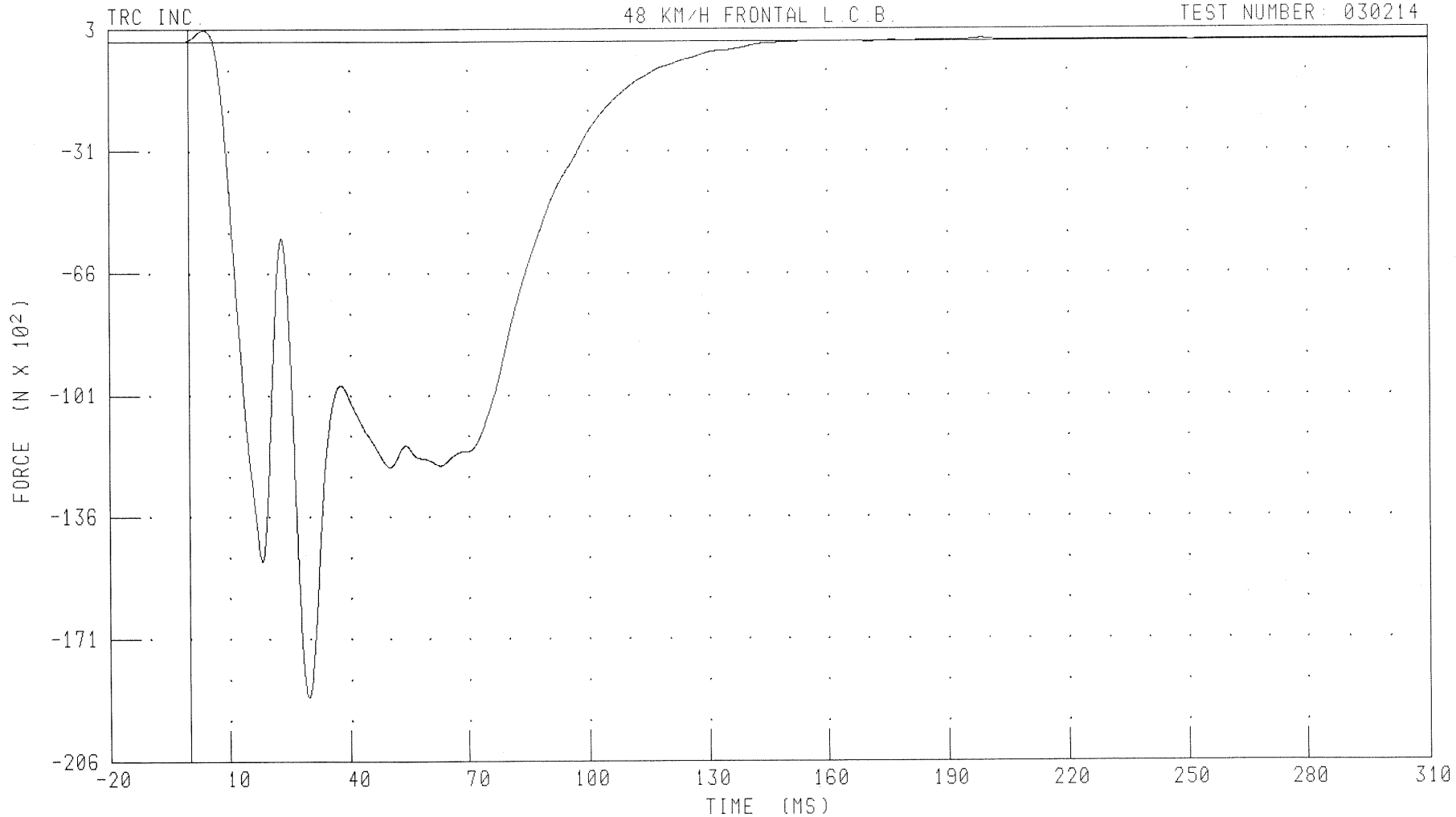
PEAK DATA: 248.44 N @ 2.96 MS; -27943.93 N @ 40.00 MS

B-192

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C7 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-193

030214

CHANNEL: BC7F

FILTER: CH. CLASS 60

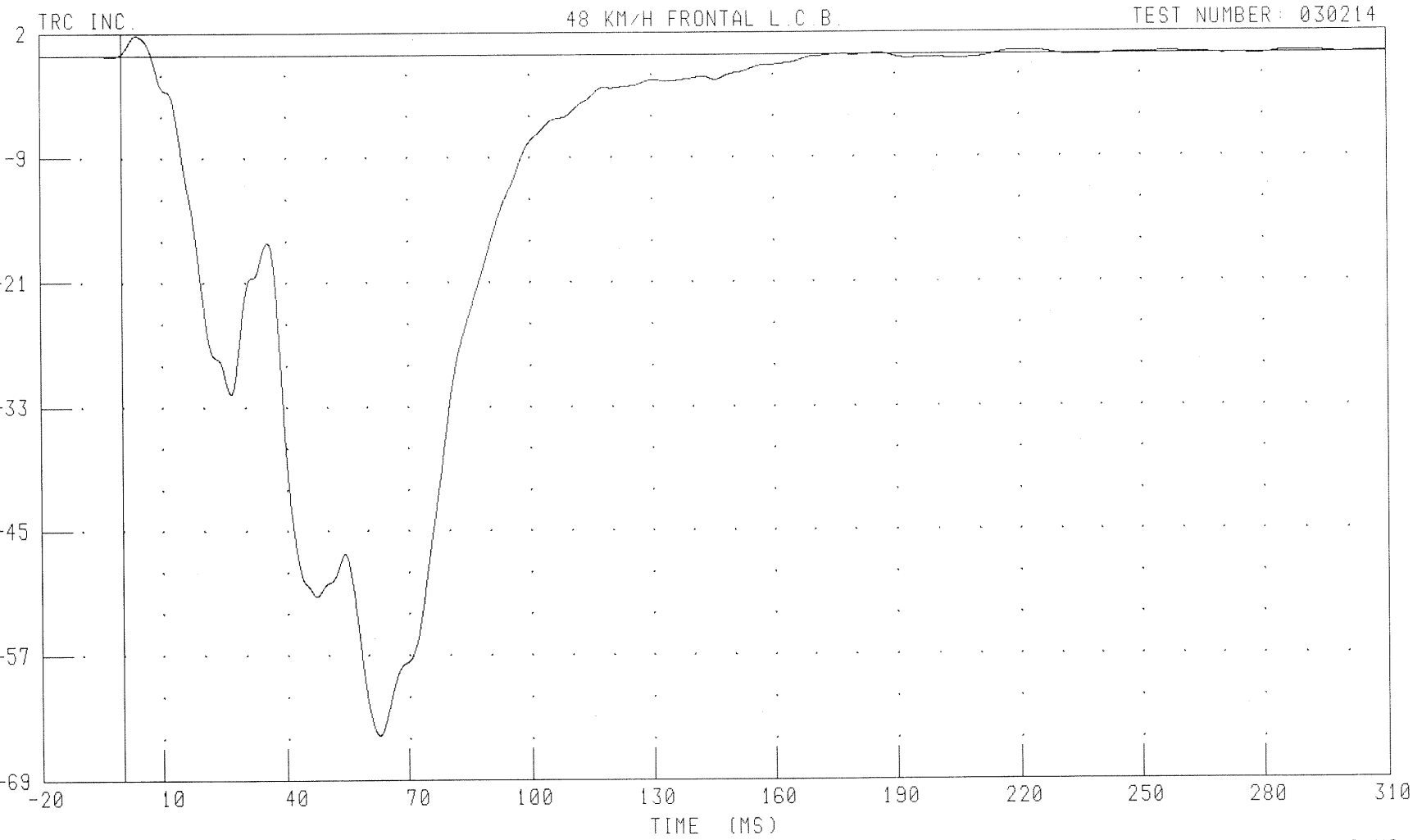
PEAK DATA: 316.37 N @ 3.76 MS; -18830.53 N @ 29.84 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION C8 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BC8F

FILTER: CH. CLASS 60

PEAK DATA: 194.38 N @ 3.68 MS; -6564.97 N @ 62.72 MS

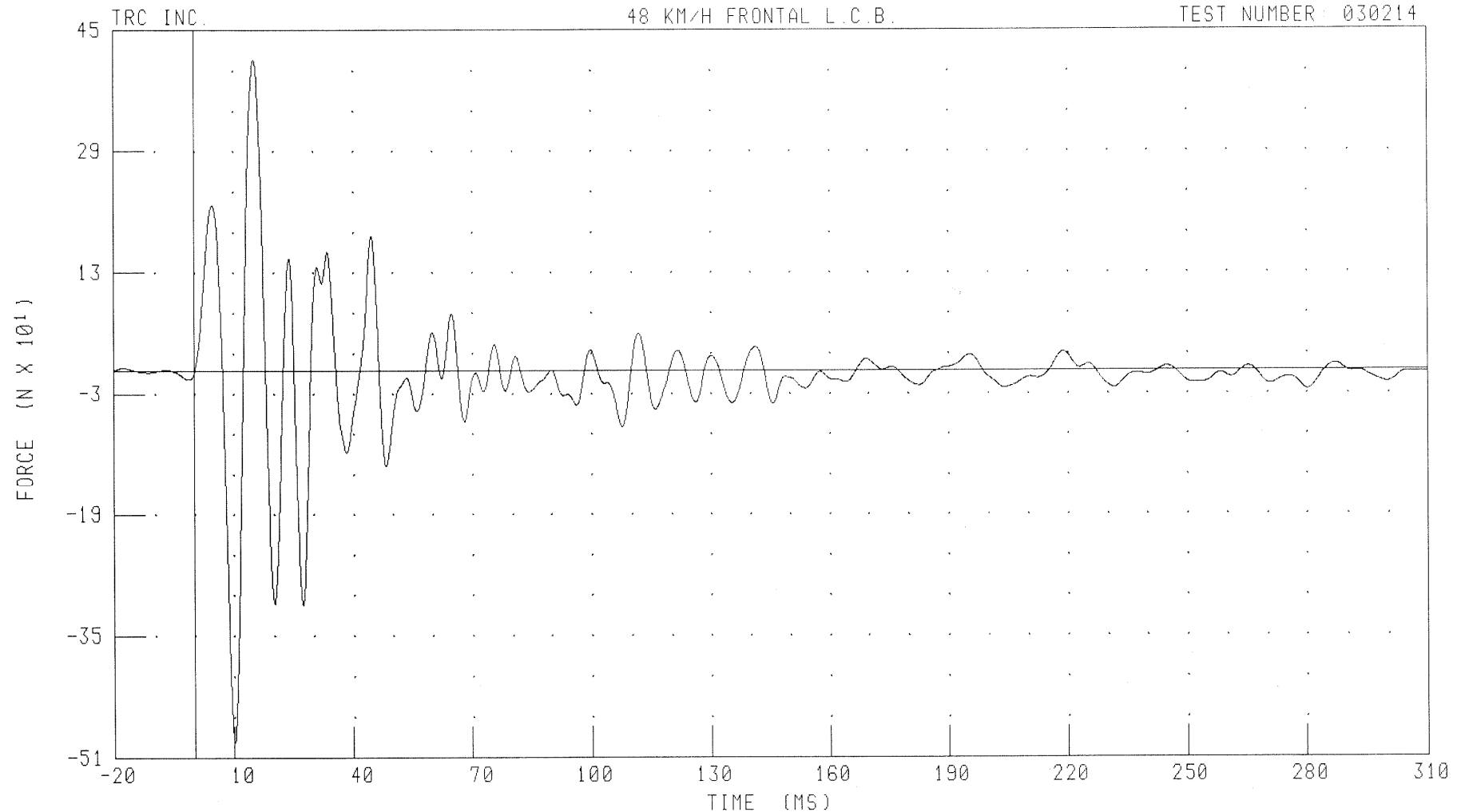
B-194

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION C9 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-195

030214

CHANNEL: BC9F

FILTER: CH. CLASS 60

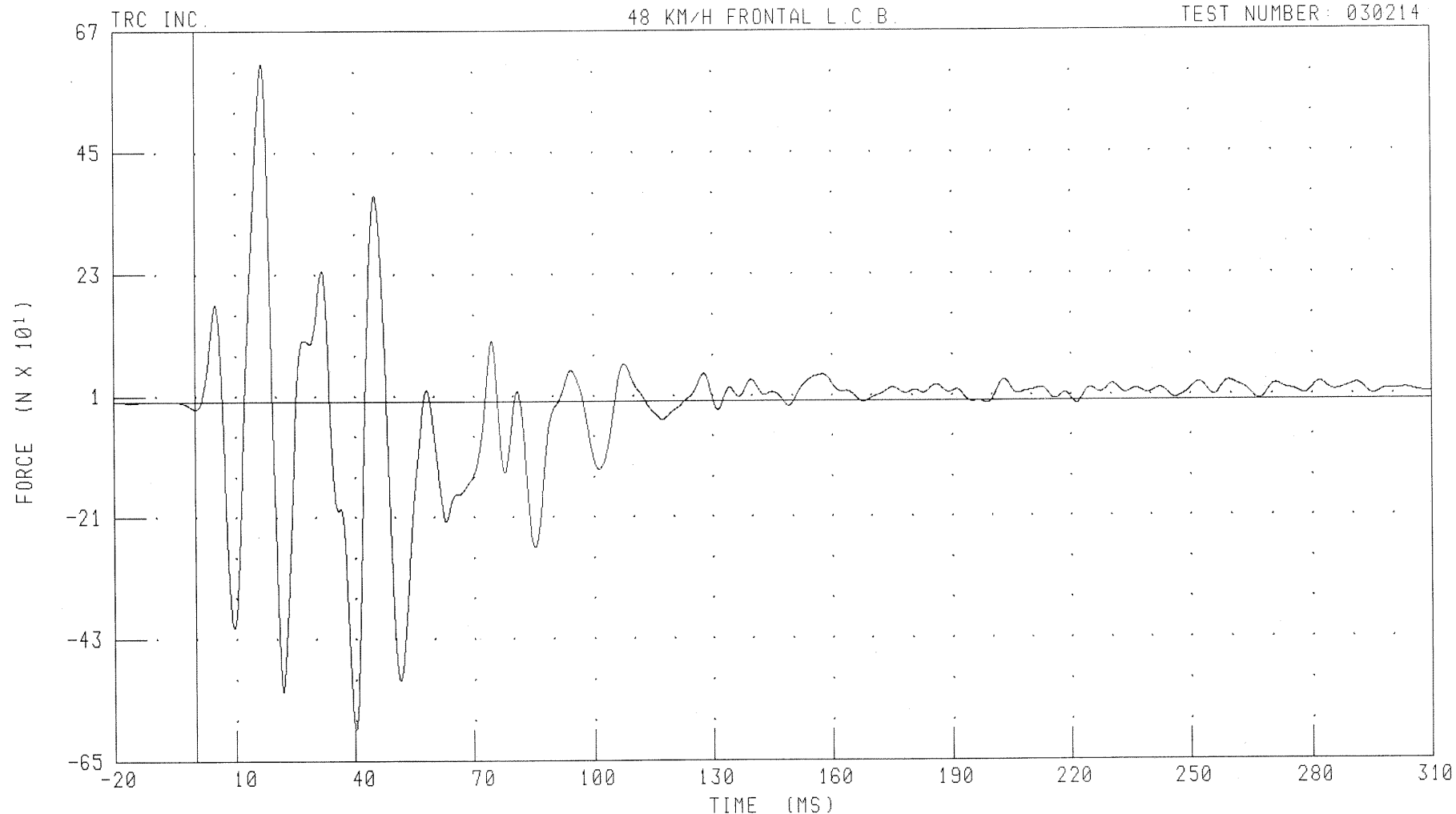
PEAK DATA: 410.77 N @ 15.28 MS; -490.46 N @ 10.16 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION D1 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD1F

FILTER: CH. CLASS 60

PEAK DATA: 610.81 N @ 16.72 MS; -593.05 N @ 40.16 MS

B-196

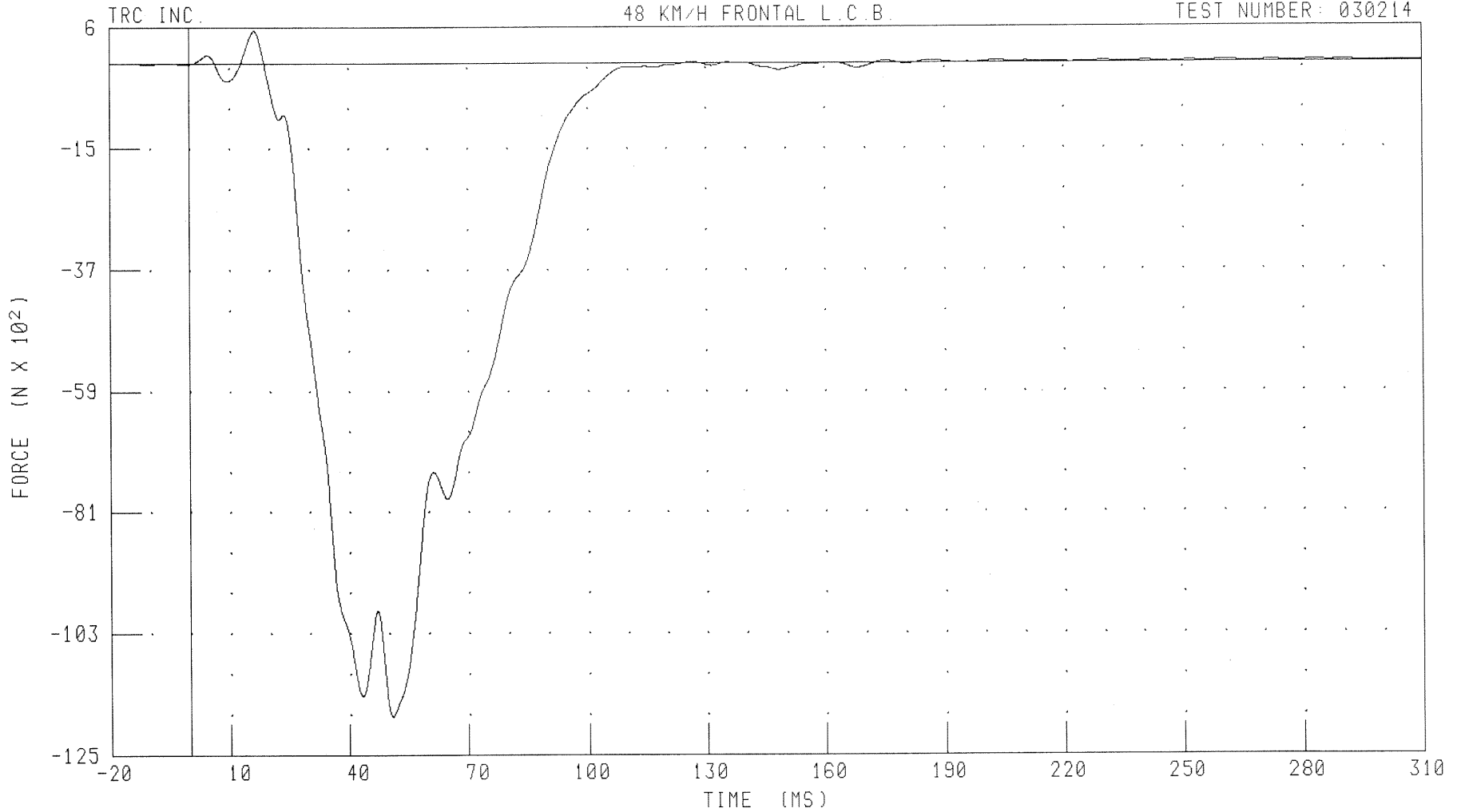
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION D2 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD2F

FILTER: CH. CLASS 60

PEAK DATA: 591.50 N @ 16.32 MS; -11856.30 N @ 50.88 MS

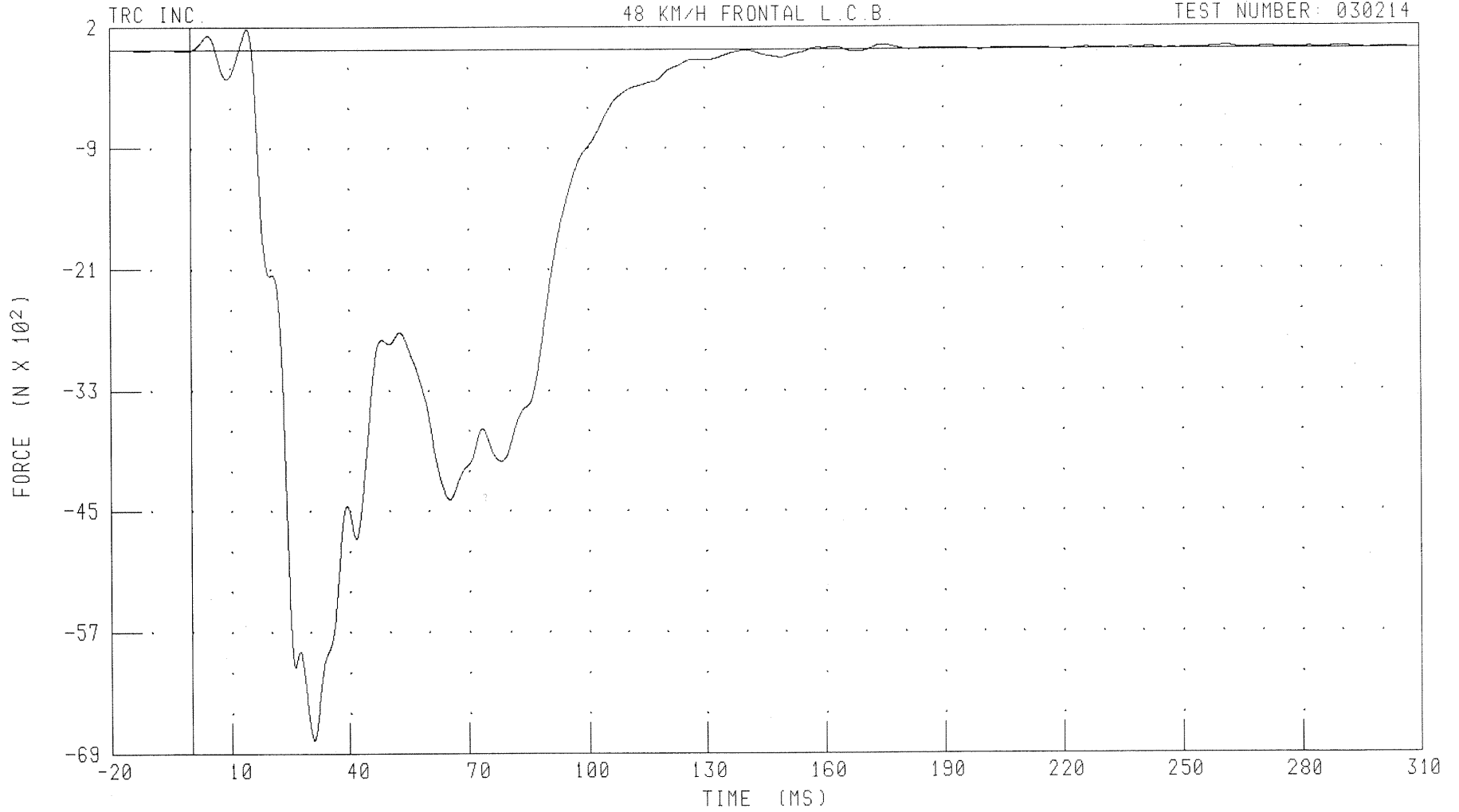
B-197

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION D3 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD3F

FILTER: CH. CLASS 60

PEAK DATA: 204.09 N @ 14.24 MS; -6846.40 N @ 30.96 MS

B-198

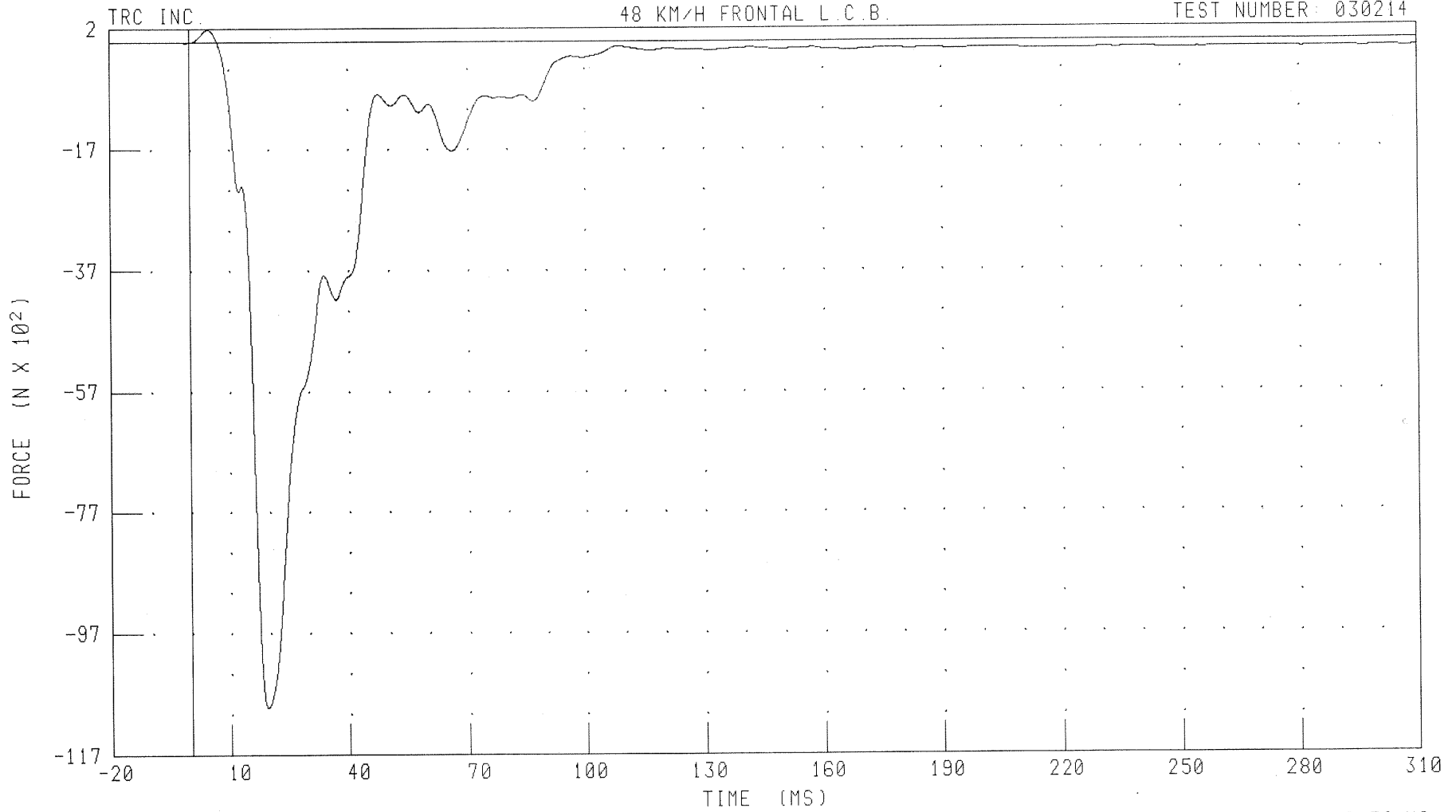
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION D4 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD4F

FILTER: CH. CLASS 60

PEAK DATA: 196.06 N @ 4.72 MS; -11014.09 N @ 19.36 MS

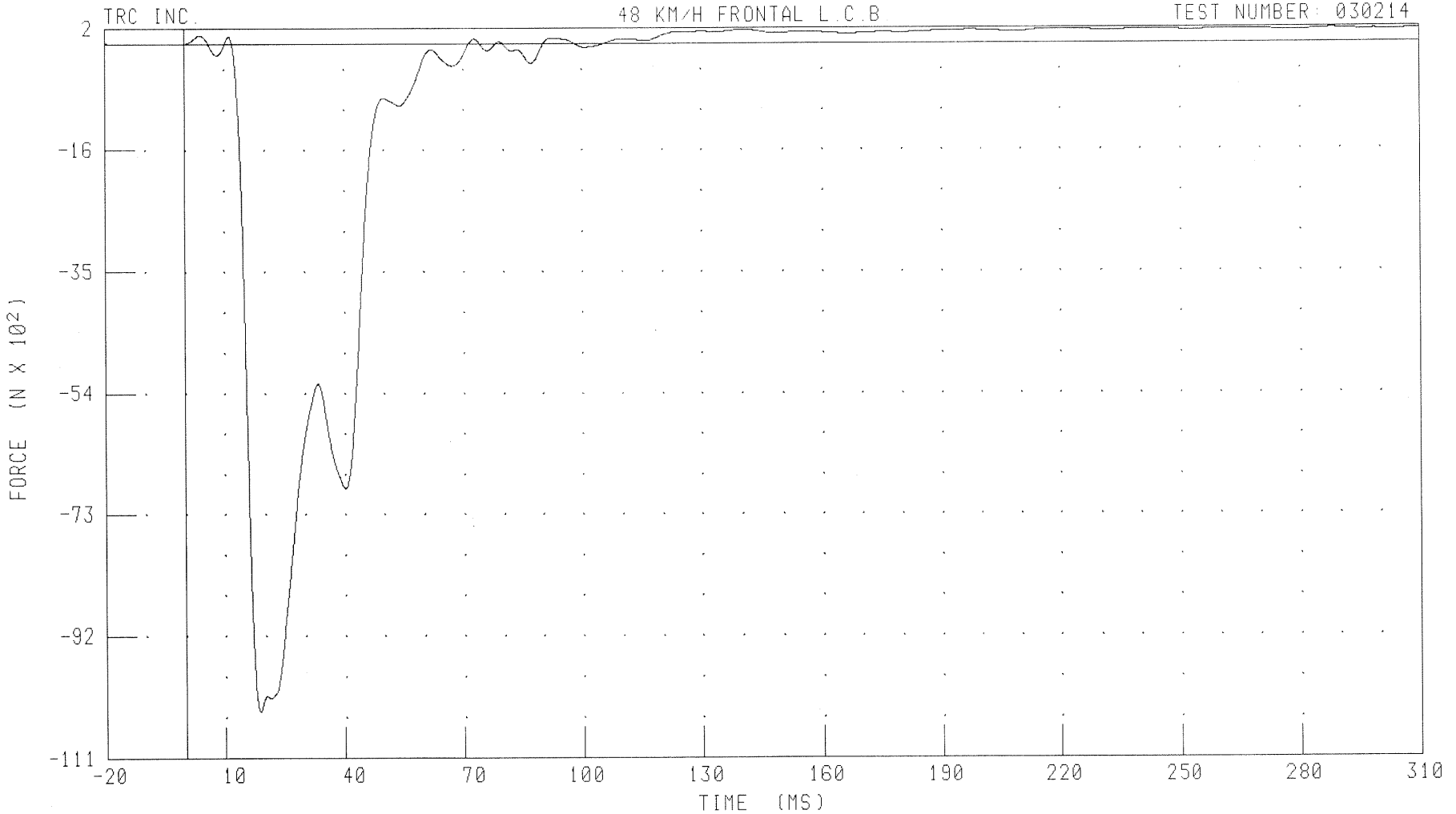
B-199

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION D5 FORCE

48 KM/H FRONTAL L.C.B

TEST NUMBER: 030214



CHANNEL: BD5F

FILTER: CH. CLASS 60

PEAK DATA: 210.82 N @ 288.16 MS; -10452.20 N @ 18.64 MS

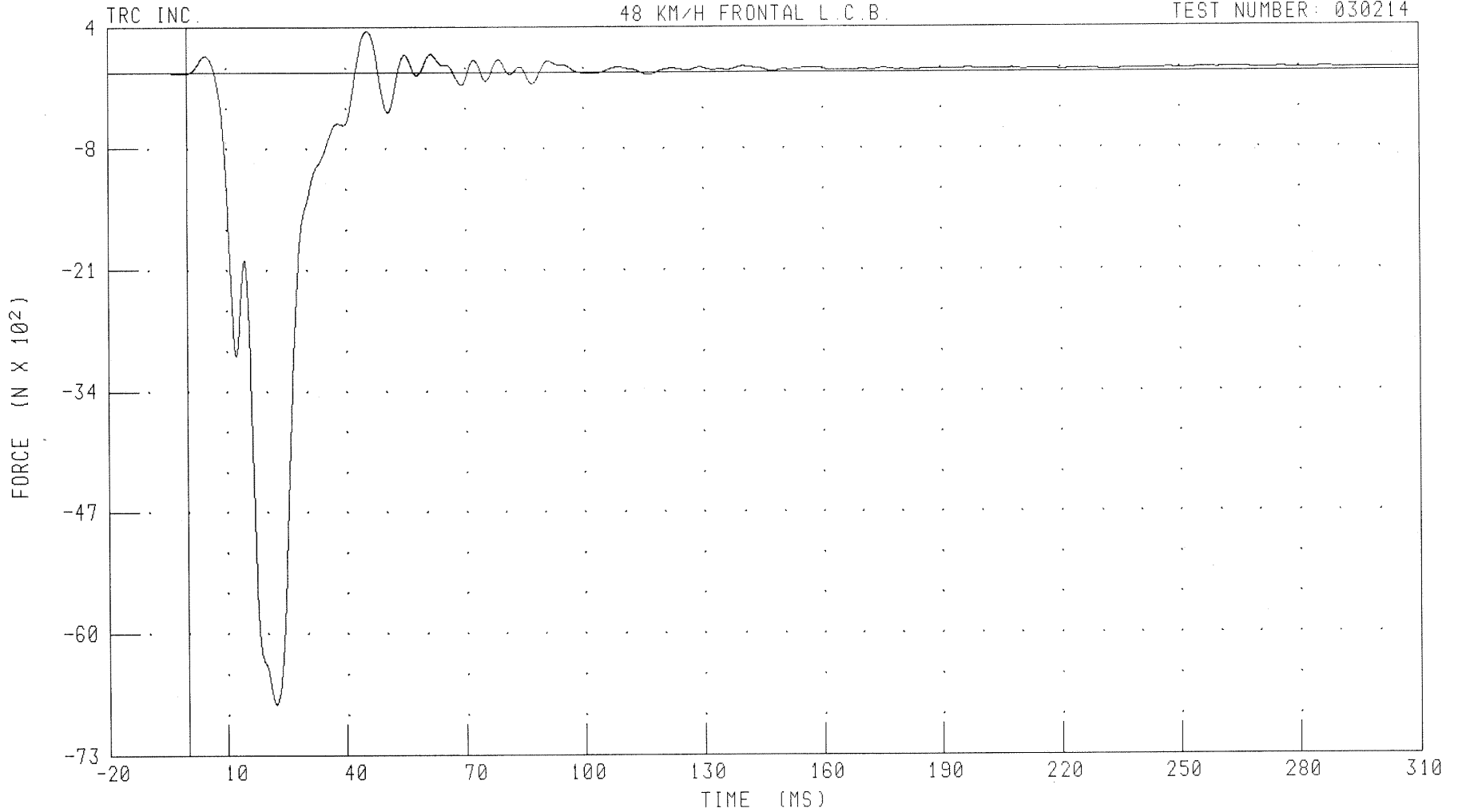
B-200

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION D6 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD6F

FILTER: CH. CLASS 60

PEAK DATA: 439.08 N @ 45.52 MS; -6776.55 N @ 22.08 MS

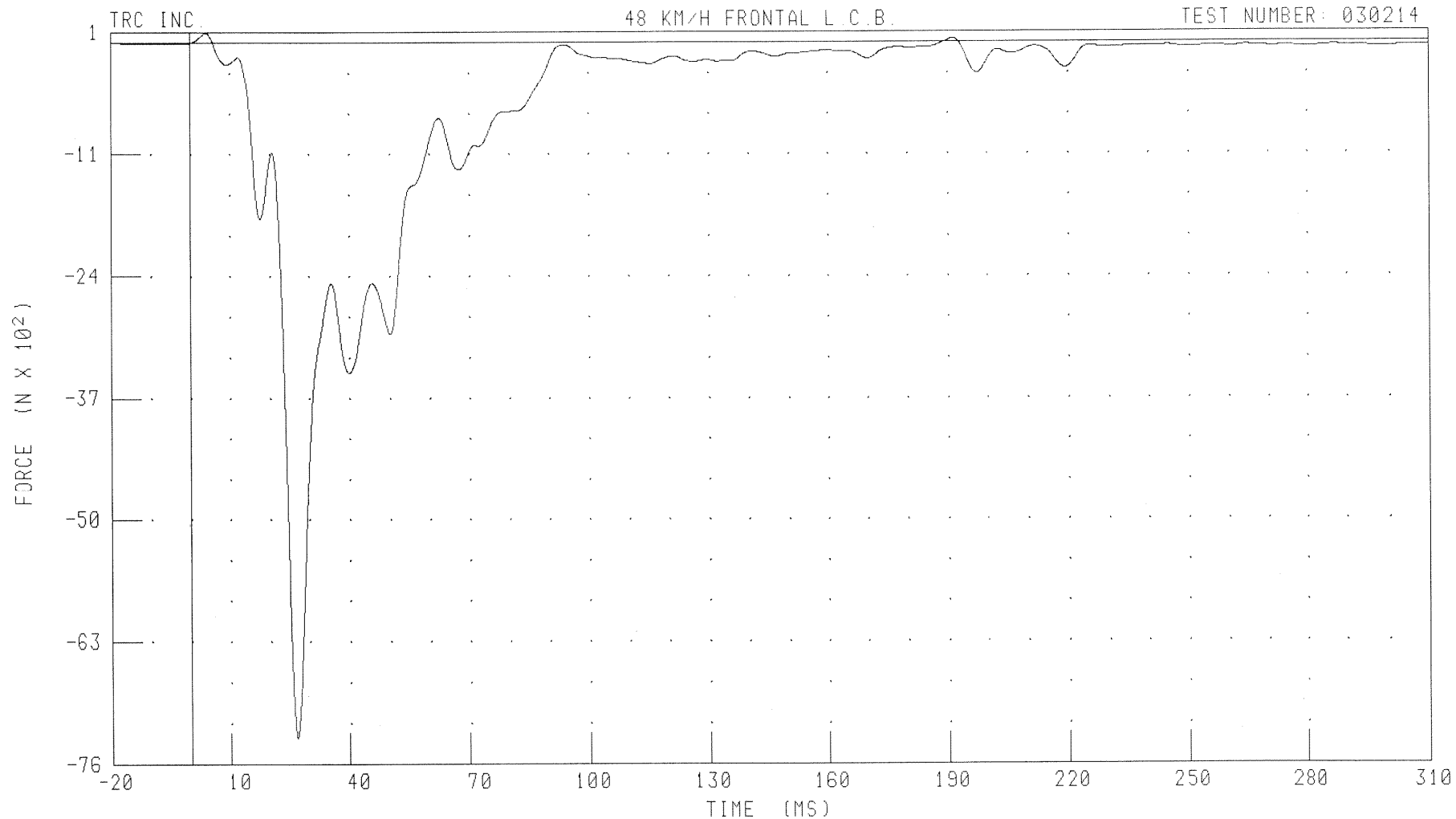
B-201

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION D7 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD7F

FILTER: CH. CLASS 60

PEAK DATA: 106.12 N @ 4.08 MS; -7417.67 N @ 26.72 MS

B-202

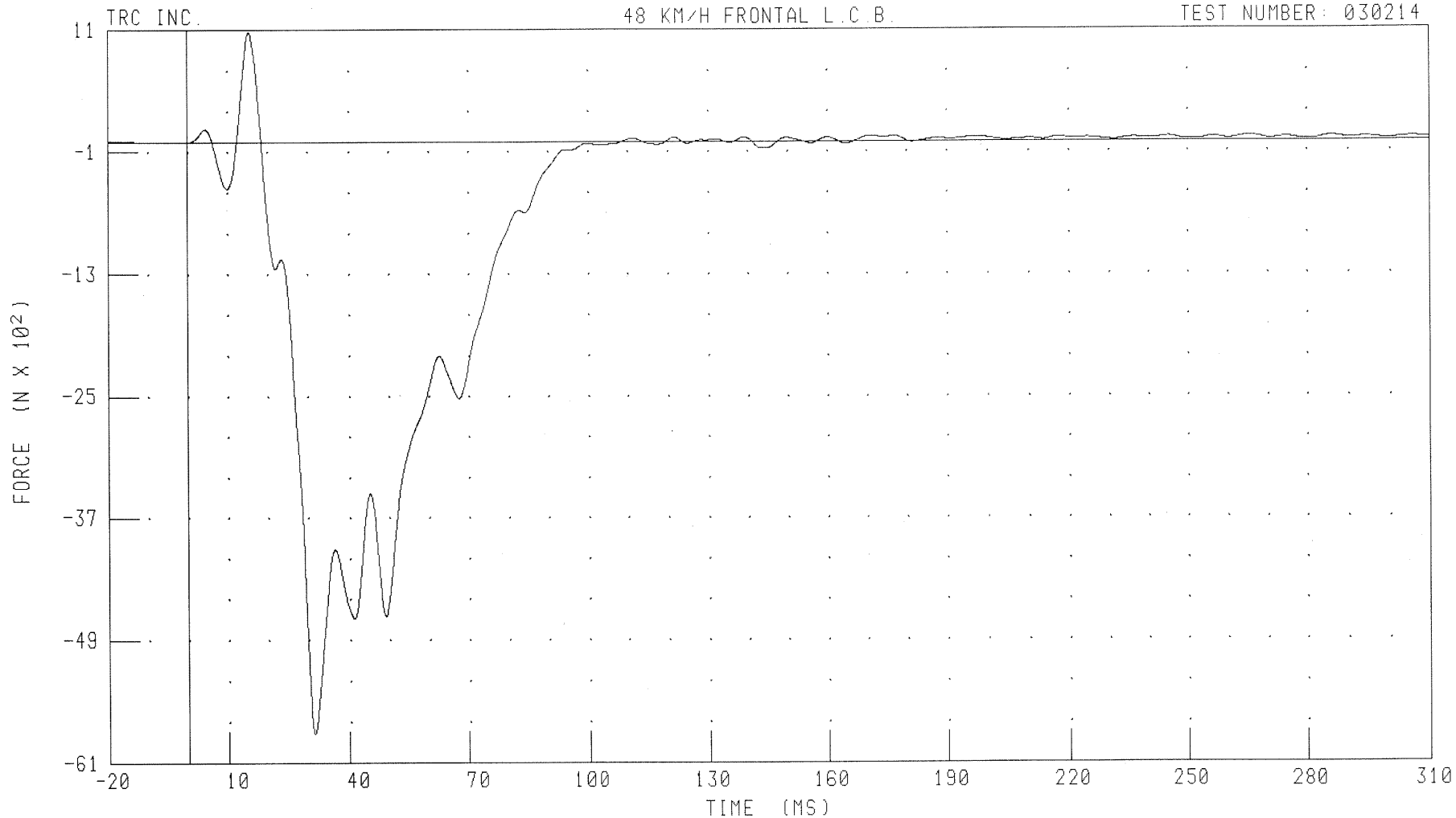
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER POSITION D8 FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD8F

FILTER: CH. CLASS 60

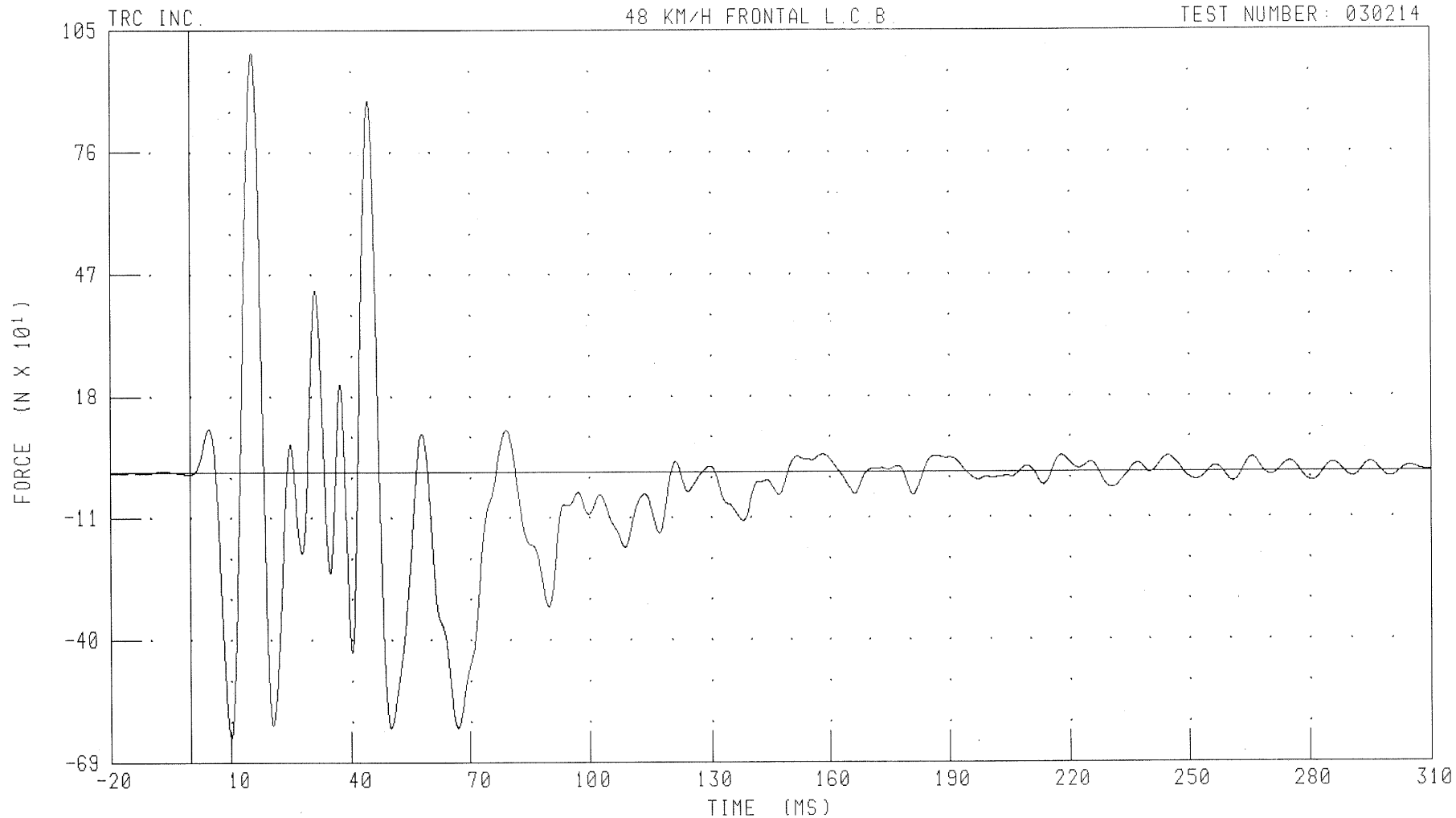
PEAK DATA: 1077.64 N @ 15.60 MS; -5818.31 N @ 31.52 MS

B-203

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER POSITION D9 FORCE  
48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: BD9F

FILTER: CH. CLASS 60

PEAK DATA: 996.78 N @ 15.76 MS; -631.76 N @ 10.00 MS

B-204

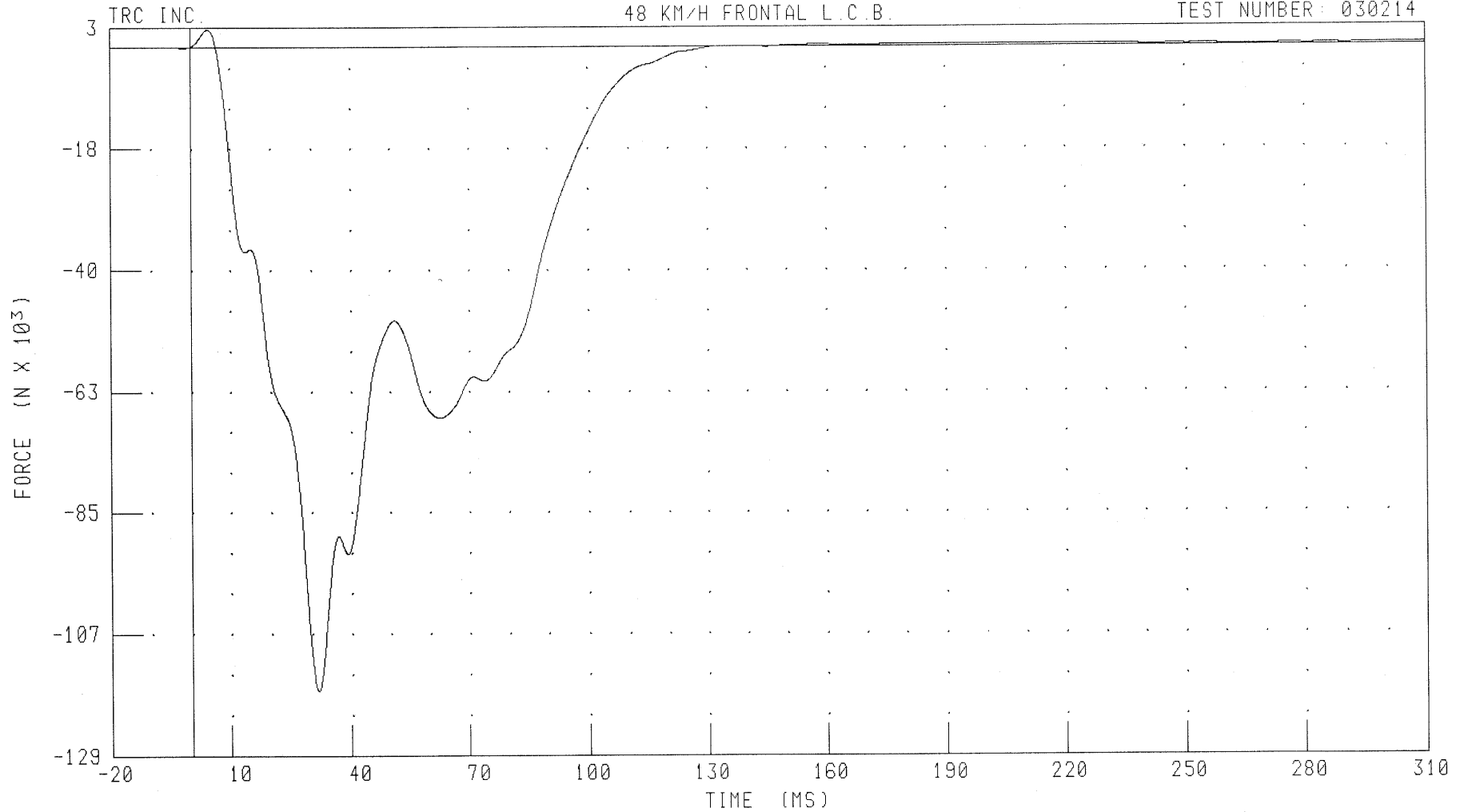
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER GROUP # 1 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



B-205

030214

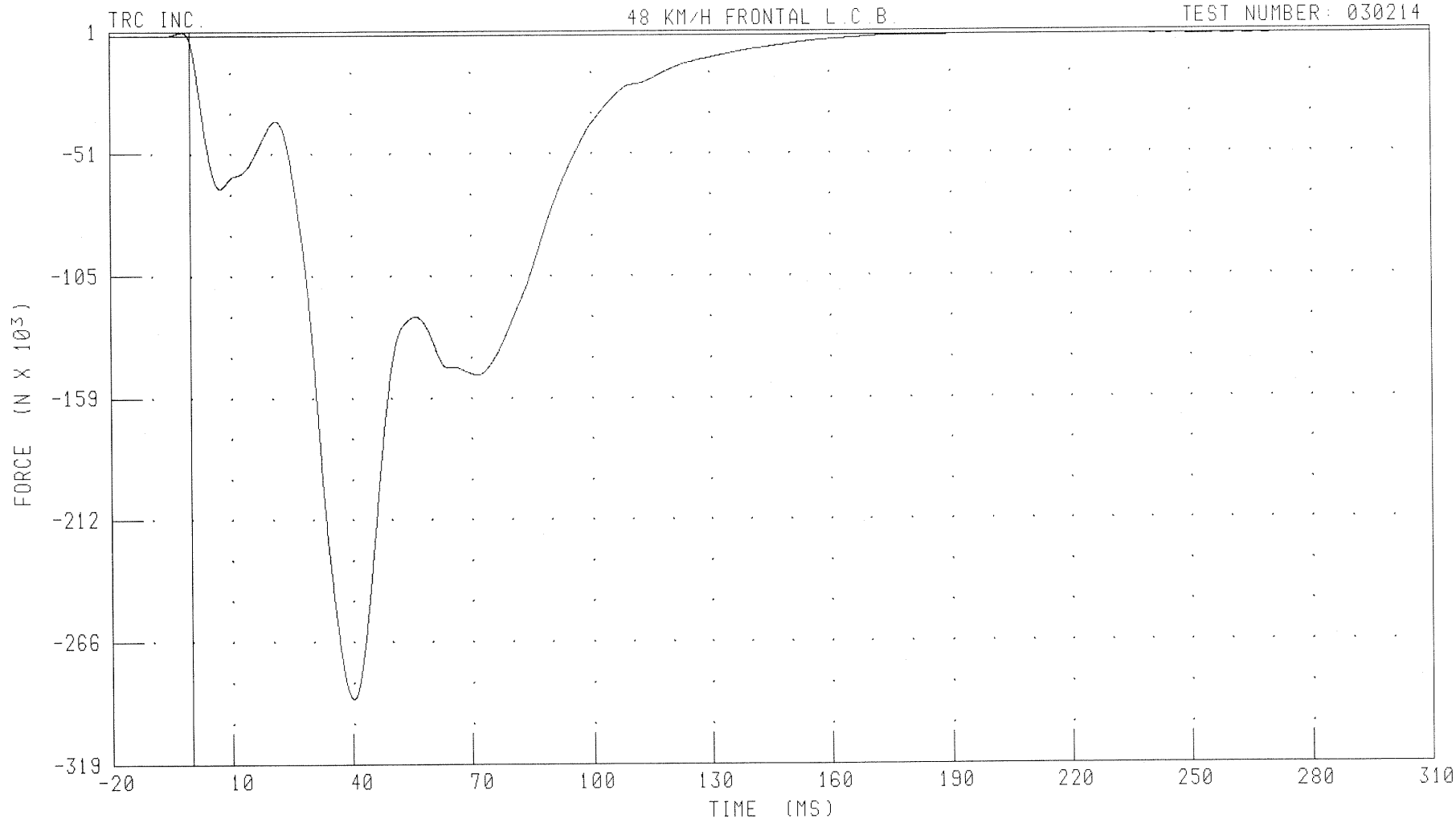
CHANNEL: LCBG1F FILTER: CH. CLASS 60

PEAK DATA: 3210.28 N @ 4.56 MS; -117901.30 N @ 31.68 MS

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER GROUP # 2 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBG2F FILTER: CH. CLASS 60

PEAK DATA: 1601.24 N @ -2.00 MS; -291256.22 N @ 40.16 MS

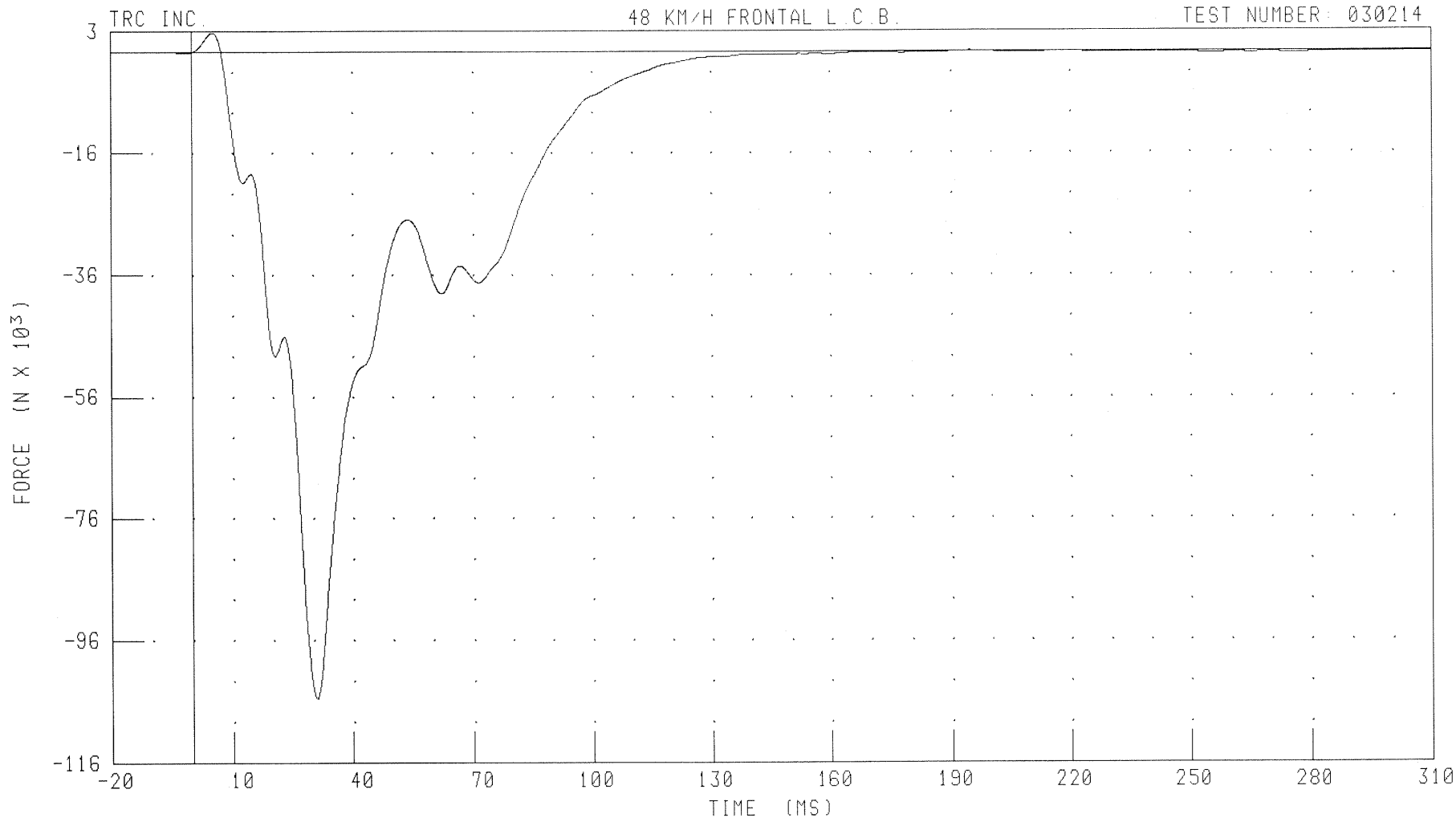
B-206

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER GROUP # 3 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBG3F FILTER: CH. CLASS 60

PEAK DATA: 3132.26 N @ 5.20 MS; -106146.47 N @ 30.80 MS

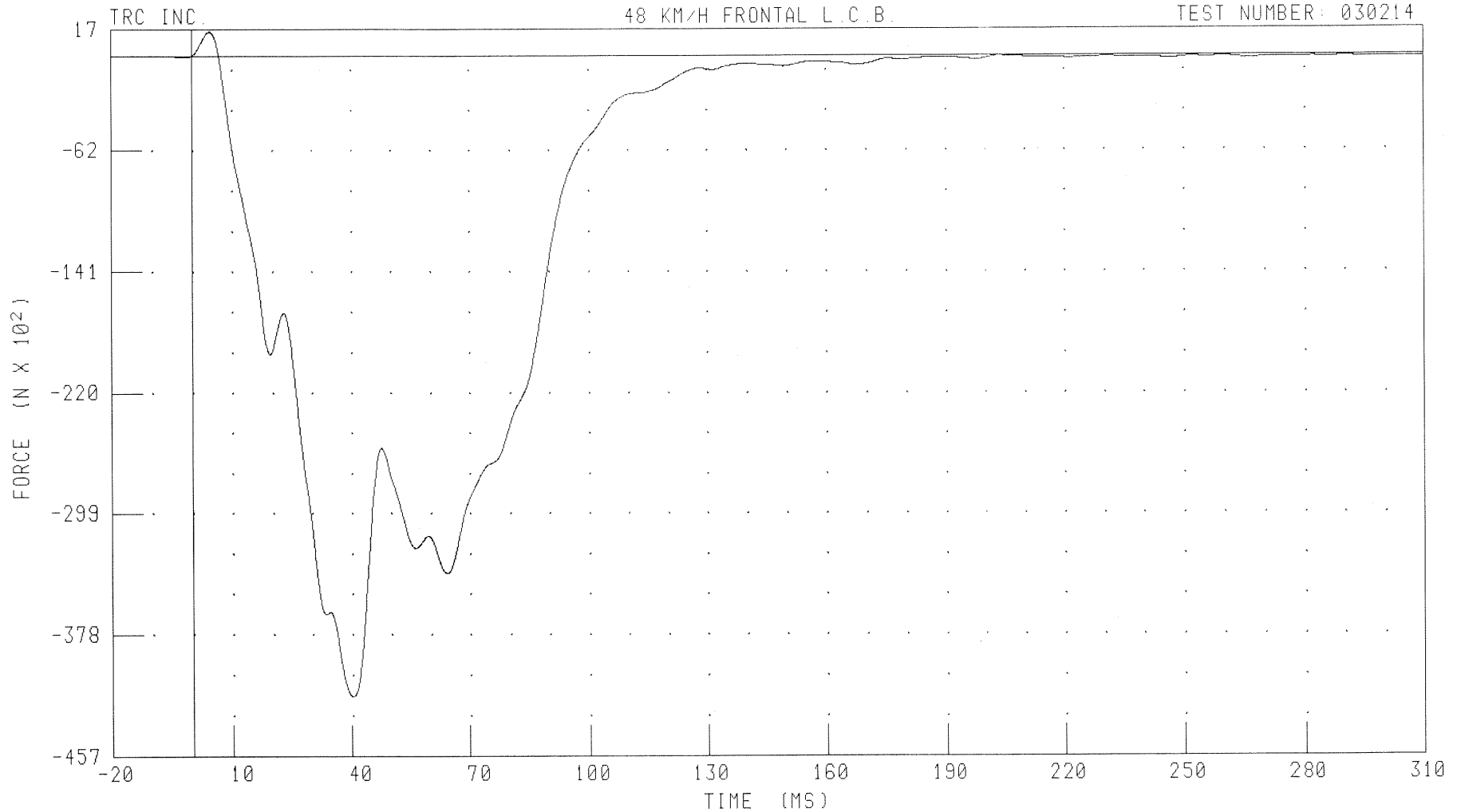
B-207

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER GROUP # 4 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBG4F FILTER: CH. CLASS 60

PEAK DATA: 1550.81 N @ 4.40 MS; -4182.24 N @ 40.24 MS

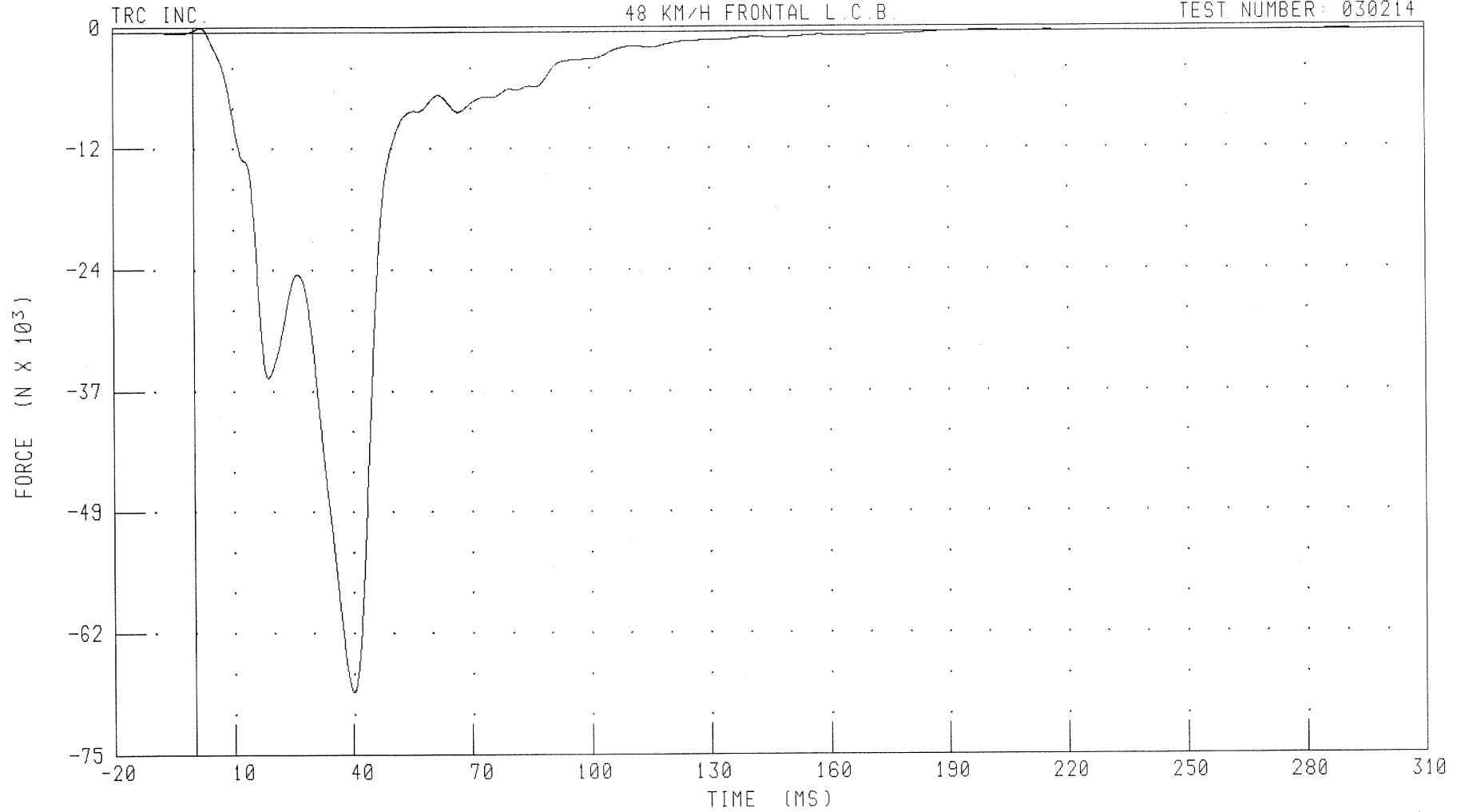
B-208

030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H  
LOAD CELL BARRIER GROUP # 5 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBG5F FILTER: CH. CLASS 60

PEAK DATA: 455.03 N @ 1.92 MS; -68607.43 N @ 40.16 MS

B-209

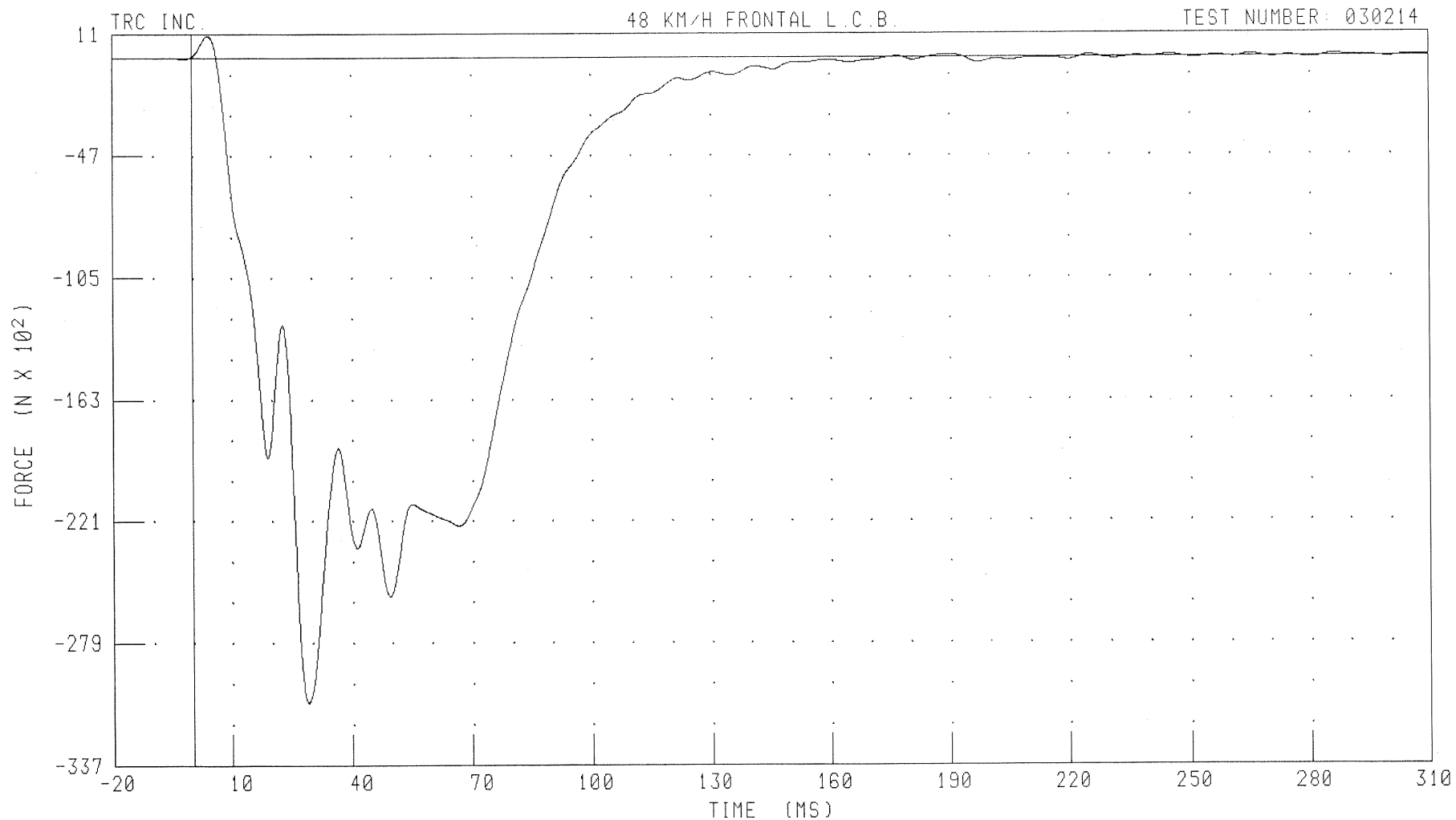
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

LOAD CELL BARRIER GROUP # 6 FORCE TOTAL

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBG6F

FILTER: CH. CLASS 60

PEAK DATA: 1029.44 N @ 4.24 MS; -30740.51 N @ 29.04 MS

B-210

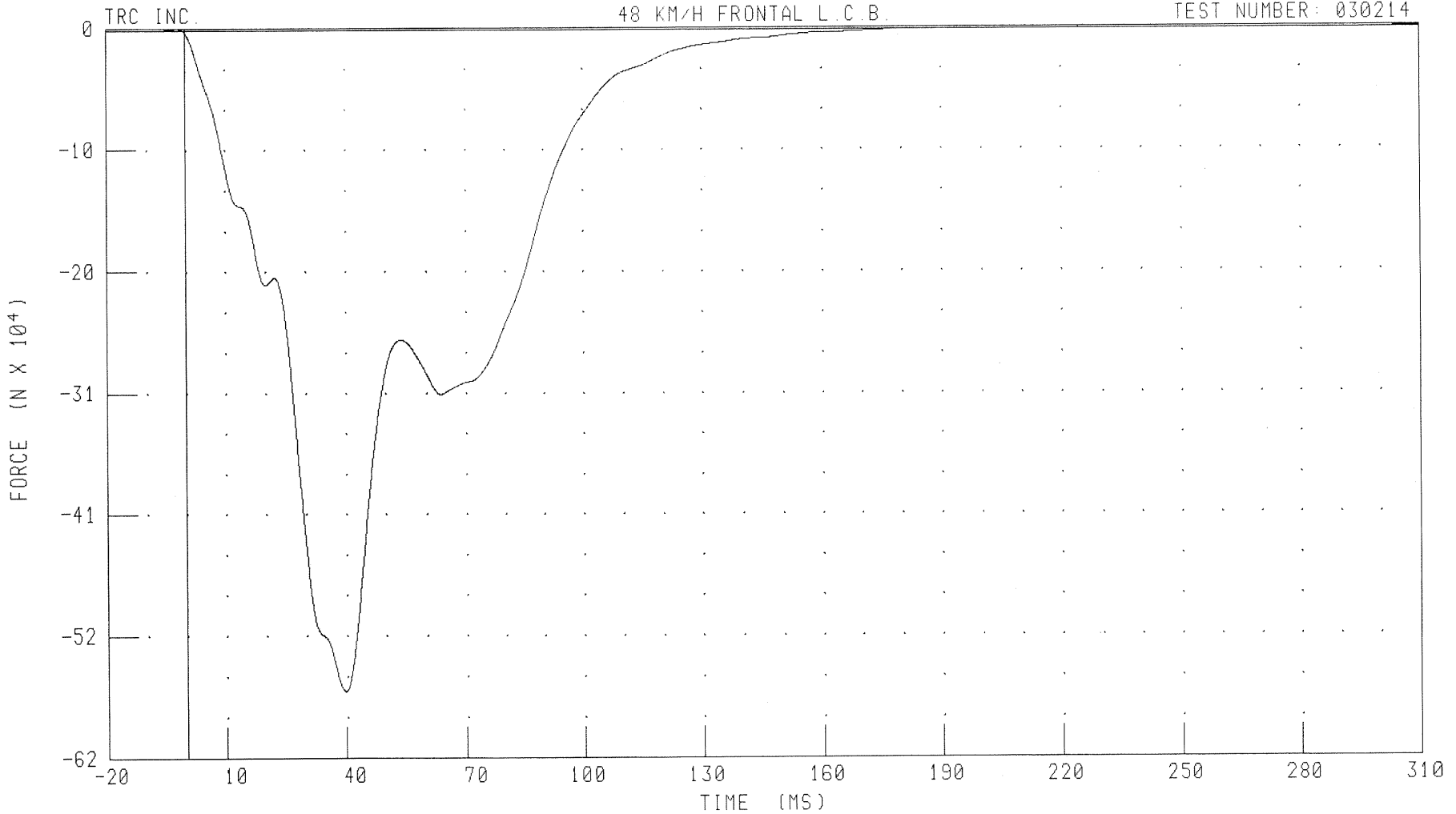
030214

2002 SATURN VUE INTO FRONTAL LOAD CELL BARRIER AT 48 KM/H

TOTAL LOAD CELL BARRIER FORCE

48 KM/H FRONTAL L.C.B.

TEST NUMBER: 030214



CHANNEL: LCBGT

FILTER: CH. CLASS 60

PEAK DATA: 1114.72 N @ -2.08 MS; -571151.19 N @ 39.76 MS

B-211

030214

## Appendix C

### Dummy Configuration and Performance Verification Data

THOR Leg Configuration Information

Driver Dummy S/N: 090

Program Summary of THOR-Lx Leg Uses with Dummy S/N: 090

Date	Activity	THOR Leg Uses		Notes	Injury Criteria Exceeded
		Left LX-110	Right LX-109		
9/9/02	Calibration	yes	yes	Initial calibration	
2/14/03	Test	1	1	2002 Saturn Vue - Driver	Right lower tibia index, right lower compression, right foot YL rotation
2/20/03	Test	2	2	2002 Ford Windstar - Driver	Right foot XL rotation
2/28/03	Test	3	3	2002 Ford Windstar - Passenger	None
3/10/03	Calibration	yes	yes	Note #1	
3/18/03	Test	1	1	2003 Toyota Carolla - Driver	Right foot XL rotation
4/4/03	Test	2	2	2003 Toyota Carolla - Passenger	Right upper tibia index
4/15/03	Calibration	no	yes	Note #2	
5/5/03	Test	3	1	2002 Honda Civic - Driver	None
5/20/03	Calibration	yes	no	Note #3	
5/29/03	Test	1	2	2002 Honda Civic - Passenger	Left upper tibia index
6/6/03	Calibration	yes	no	Note #4	
6/23/03	Test	1	3	2002 Saturn Vue - Passenger	Left and right foot YL rotation
8/5/03	Test	2	4	2002 Saturn Vue - Driver; Note #5	Left foot YL rotation
Sept, 2003	Calibration	yes	yes	Note #6	

C-3

- #1 Scheduled calibration after three uses - Right and left legs  
(2) Rubber eversion bumpers were replaced based on visual inspection prior to performing a calibration.  
Right leg failed the Dynamic Heel Foot Impact Test during calibration. The Tibia Compliant bushing was replaced and the leg passed the second test. Data from both the failing and passing test are included in the dummy calibration documentation.
- #2 Injury calibration - Right leg only  
Replaced (2) Inversion/Eversion bumpers, Dorsi Plantar stop, Tibia Compliant bushing, and foot skin.  
These components were replaced prior to the final calibration data presented in the report.
- #3 Scheduled calibration after three uses - Left leg only  
Replaced (2) Inversion/Eversion bumpers, Dorsi Plantar stop, Tibia Compliant bushing, and foot flesh.  
These components were replaced prior to the final calibration data presented in the report.
- #4 Injury calibration - Left leg only  
Replaced (2) Inversion/Eversion bumpers, Ankle Rubber Torque Cylinder, Dorsi Plantar soft stop, (2) Ankle Z-rotation stops, Ankle bolt sleeve, and (2) Rotary X,Y potentiometers.  
These components were replaced prior to the final calibration data presented in the report.
- #5 Fourth use of right leg without calibration approved prior to test by COTR.
- #6 Final post-program calibration - Right and left legs

030214

Pre-test Dummy Configuration and Performance Verification Data

Driver Dummy S/N: 090

**Transportation Research Center Inc.**  
**572E HIII 50th Dummy**  
**External Dimensions**  
**Serial No. 090 Calibration No. 35**

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	878.8 - 889.0 mm	882 mm	Yes
Shoulder Pivot Height	B	505.5 - 520.7 mm	514 mm	Yes
H-Point Height	C	83.8 - 88.9 mm	86 mm	Yes
H-Point From Seatback	D	134.6 - 139.7 mm	138 mm	Yes
Shoulder Pivot From Backline	E	83.8 - 94.0 mm	86 mm	Yes
Thigh Clearance	F	139.7 - 154.9 mm	147 mm	Yes
Back Of Elbow To Wrist Pivot	G	289.6 - 304.8 mm	295 mm	Yes
Skull Cap To Backline	H	40.6 - 45.7 mm	43 mm	Yes
Shoulder-Elbow Length	I	330.2 - 345.4 mm	335 mm	Yes
Elbow Rest Height	J	190.5 - 210.8 mm	194 mm	Yes
Buttock Knee Length	K	579.1 - 604.5 mm	591 mm	Yes
Popliteal Height	L	429.3 - 454.7 mm	436 mm	Yes
Knee Pivot Height	M	485.1 - 500.4 mm	492 mm	Yes
Buttock Popliteal Length	N	452.1 - 477.5 mm	461 mm	Yes
Chest Depth	O	213.4 - 228.6 mm	225 mm	Yes
Foot Length	P	251.5 - 266.7 mm	254 mm	Yes
Shoulder Breadth	V	421.6 - 436.9 mm	429 mm	Yes
Foot Breadth	W	91.4 - 106.7 mm	103 mm	Yes
Chest Circumference	Y	970.3 - 1000.8 mm	982 mm	Yes
Waist Circumference	Z	835.7 - 866.1 mm	849 mm	Yes
Location For Chest Circumference	AA	429.3 - 434.3 mm	432 mm	Yes
Location For Waist Circumference	BB	226.1 - 231.1 mm	229 mm	Yes

Technician



Approved




# Transportation Research Center Inc.

572E Head Drop Test

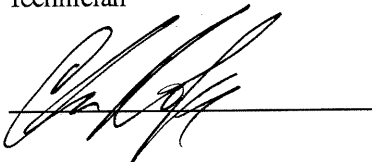
HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/07/2003

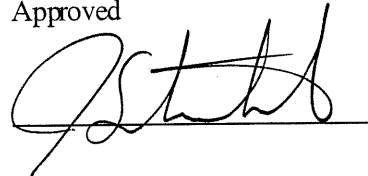
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Peak Resultant Acceleration	225 - 275 g	233.7 g	Yes
Peak Lateral Acceleration	15 g Max	9.0 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

## Comments:

Technician



Approved



02.07.2003 11:03:41 612

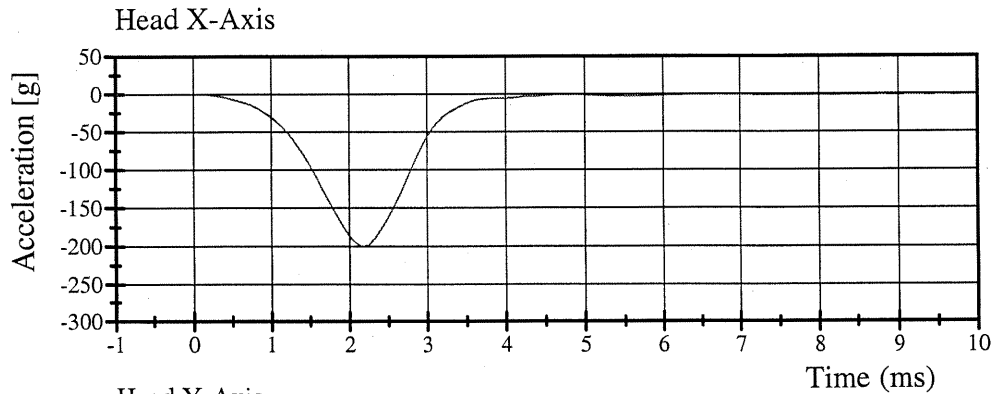


# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

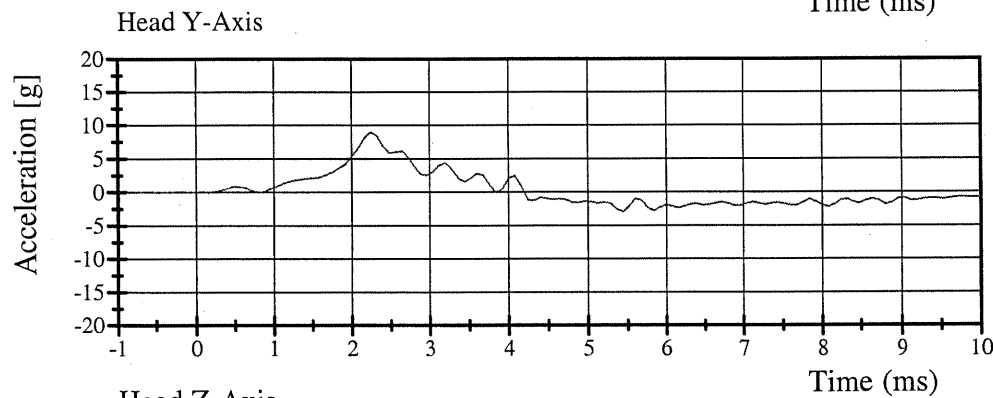
Test Date 02/07/2003



Filter Class: 1000

Max: -0.1 g at 0.0 ms

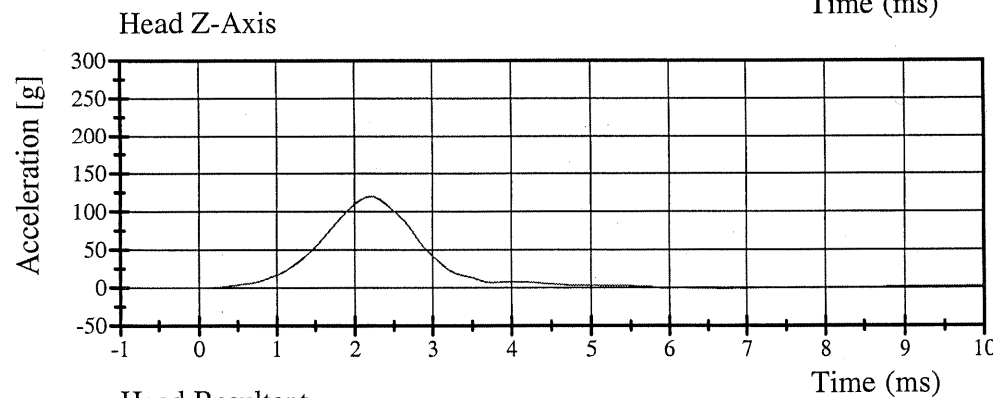
Min: -200.5 g at 2.2 ms



Filter Class: 1000

Max: 9.0 g at 2.2 ms

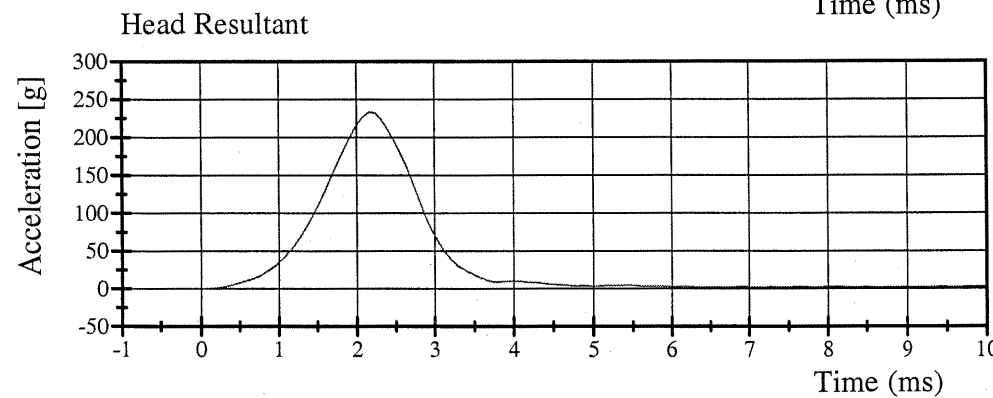
Min: -2.9 g at 5.4 ms



Filter Class: 1000

Max: 120.1 g at 2.2 ms

Min: -1.3 g at 6.7 ms



Filter Class: 1000

Max: 233.7 g at 2.2 ms

Min: 0.0 g at 1.1 ms

02.07.2003 11:03:42 612



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

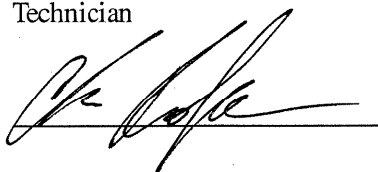
HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/12/2003

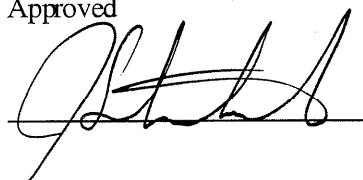
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Impact Velocity	6.89 - 7.13 m/s	6.97 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	23.13 g	Yes
20 ms	17.60 - 22.60 g	21.17 g	Yes
30 ms	12.50 - 18.50 g	16.39 g	Yes
Max Pendulum Deceleration	29.00 g	23.75 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	16.30 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	34 - 42 ms	38.00 ms	Yes
D Plane Rotation			
Max	64 - 78 °	70.67 °	Yes
Time	57 - 64 ms	60.40 ms	Yes
Moment About Occipital Condyle			
Max	88.2 - 108.4 N·m	92.13 N·m	Yes
Time	47 - 58 ms	52.72 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	113 - 128 ms	120.96 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	97 - 107 ms	100.56 ms	Yes

## Comments:

Technician



Approved



02.12.2003 12:28:23 502



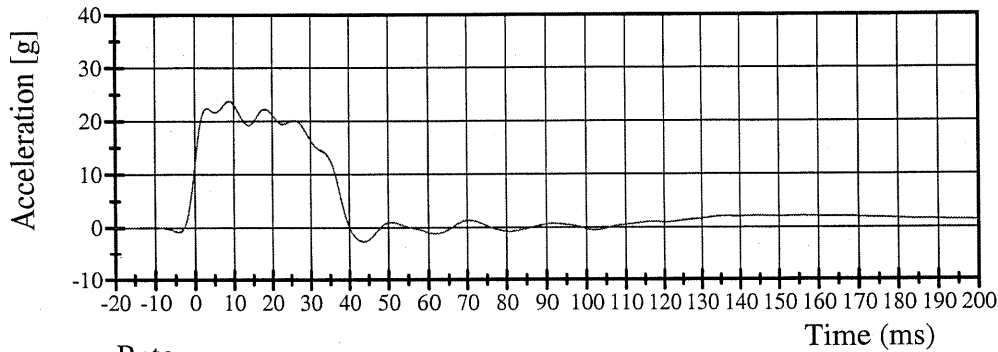
# Transportation Research Center Inc.

572E Neck Flexion Test

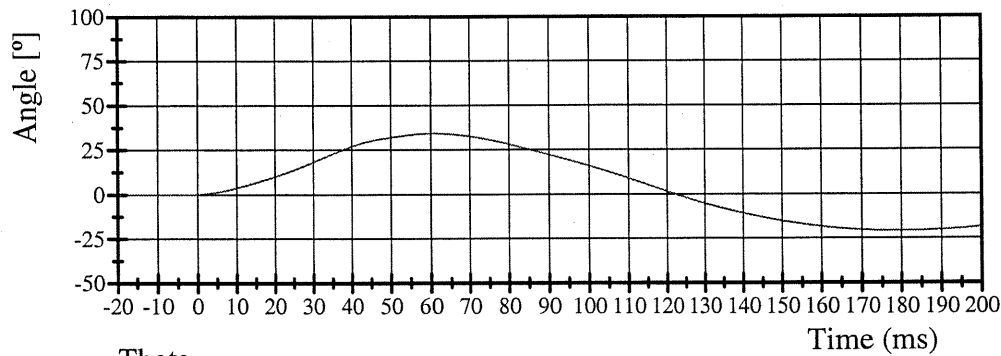
HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/12/2003

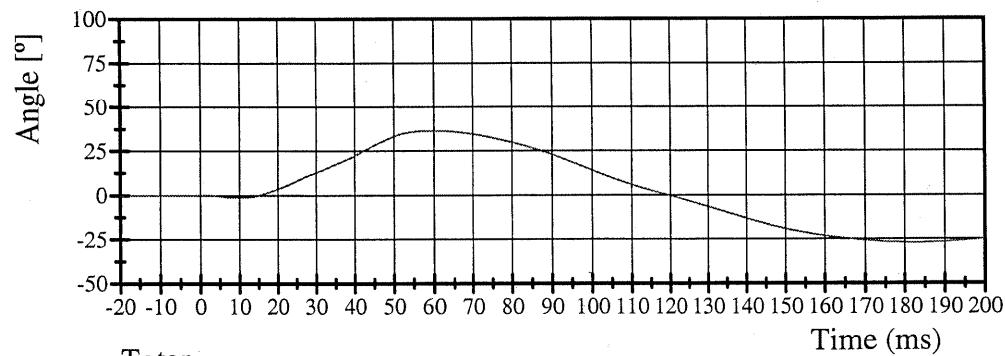
### Pendulum Deceleration



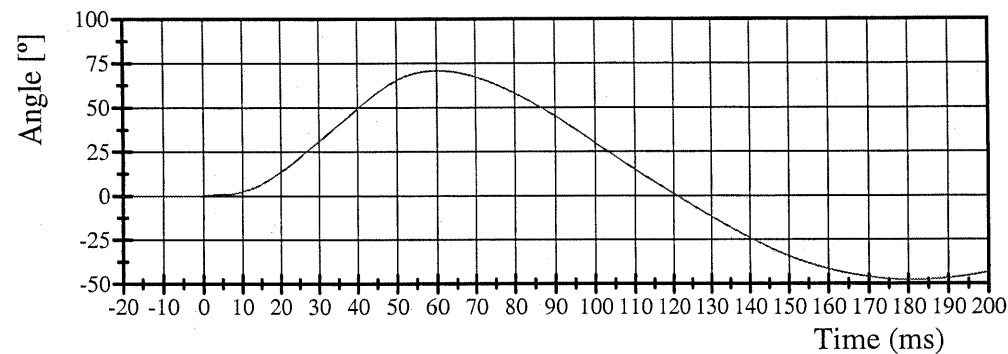
### Beta



### Theta



### Totan



02.12.2003 12:28:25 502



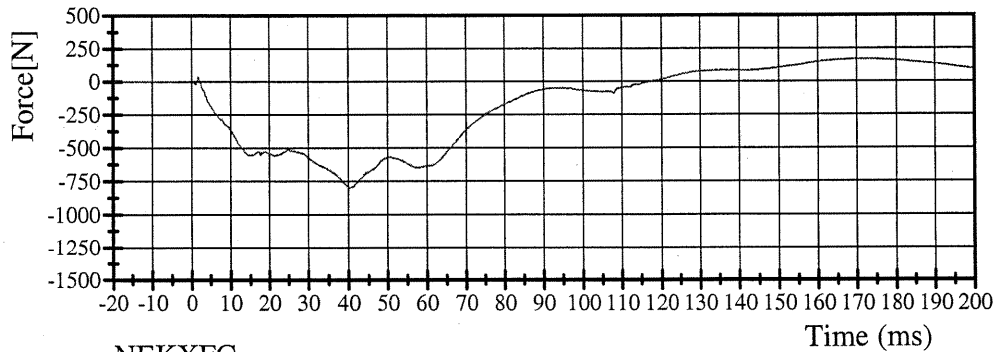
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/12/2003

NEKXF

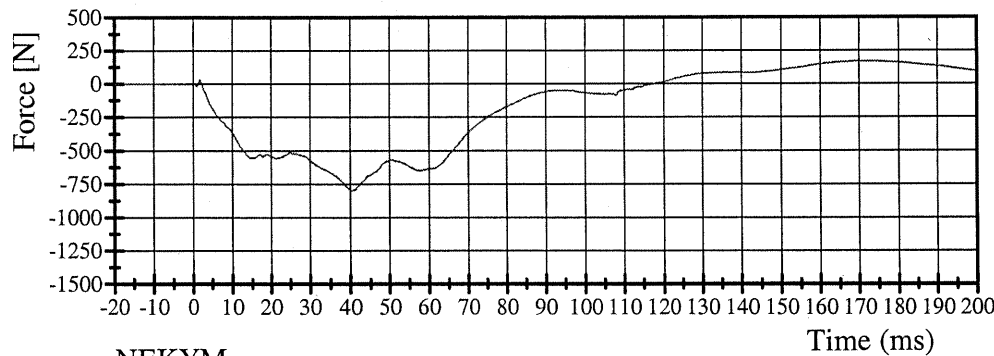


Filter Class: 1000

Max: 166.3 N at 173.1 ms

Min: -798.9 N at 40.3 ms

NEKXFC

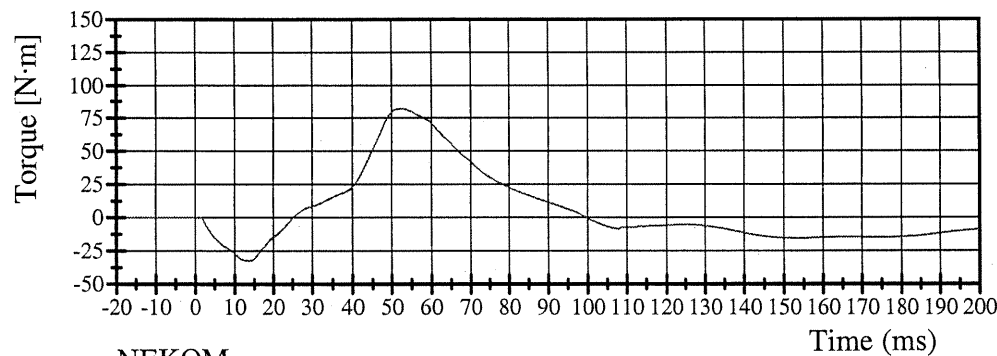


Filter Class: 600

Max: 165.9 N at 173.4 ms

Min: -798.1 N at 40.3 ms

NEKYM

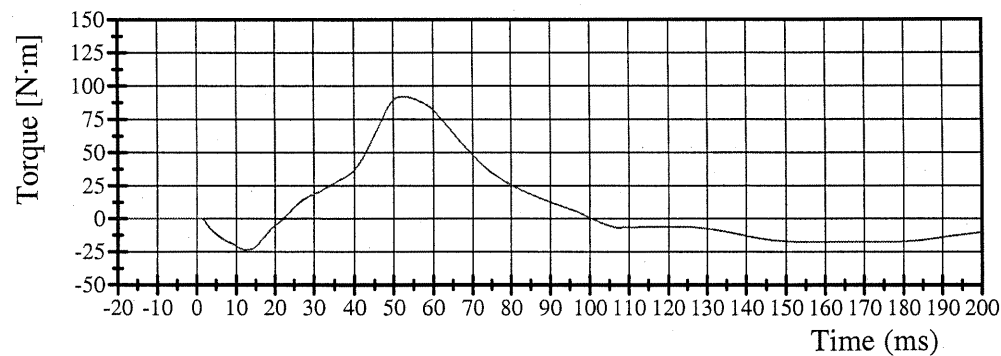


Filter Class: 600

Max: 81.8 N·m at 52.6 ms

Min: -32.5 N·m at 13.7 ms

NEKOM



Filter Class: 600

Max: 92.1 N·m at 52.7 ms

Min: -23.5 N·m at 12.3 ms

# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/12/2003

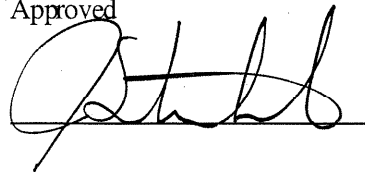
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.05 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	18.95 g	Yes
20 ms	14.00 - 19.00 g	16.84 g	Yes
30 ms	11.00 - 16.00 g	13.16 g	Yes
Max Pendulum Deceleration	22.00 g	19.70 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	13.10 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	41.44 ms	Yes
D Plane Rotation			
Max	81 - 106 °	92.94 °	Yes
Time	72 - 82 ms	79.36 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-64.16 N·m	Yes
Time	65 - 79 ms	74.72 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	164.72 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	140.16 ms	Yes

## Comments:

Technician



Approved



02.12.2003 13:04:10 575



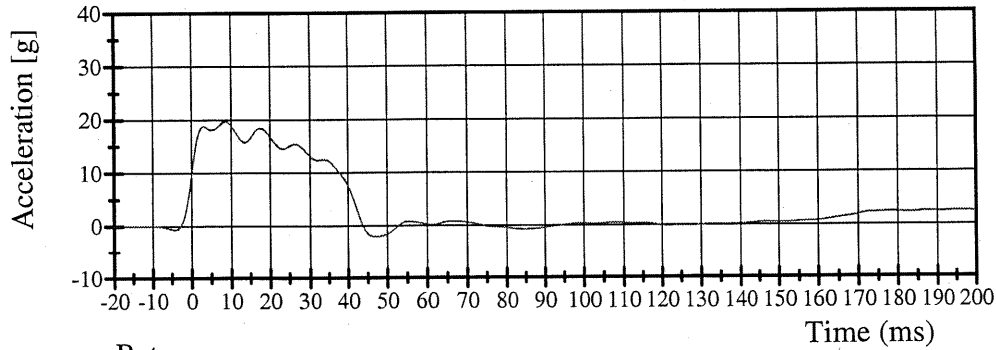
# Transportation Research Center Inc.

572E NeckExtension Test

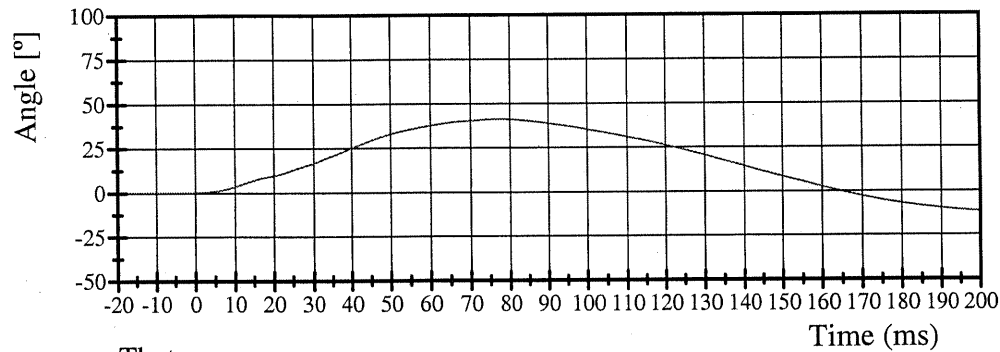
HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/12/2003

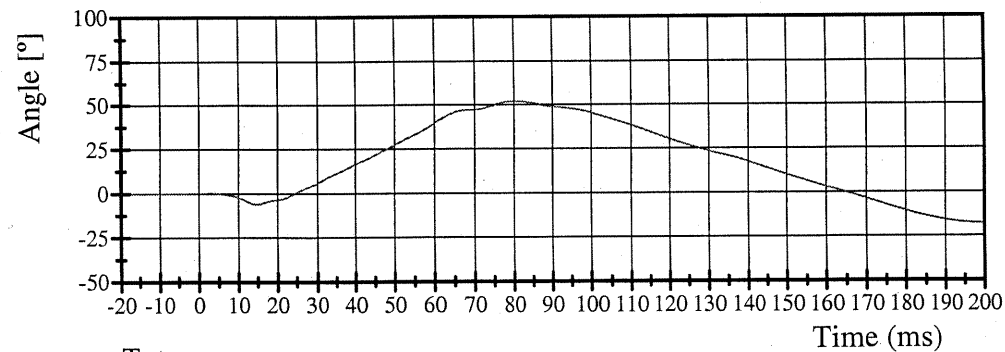
### Pendulum Deceleration



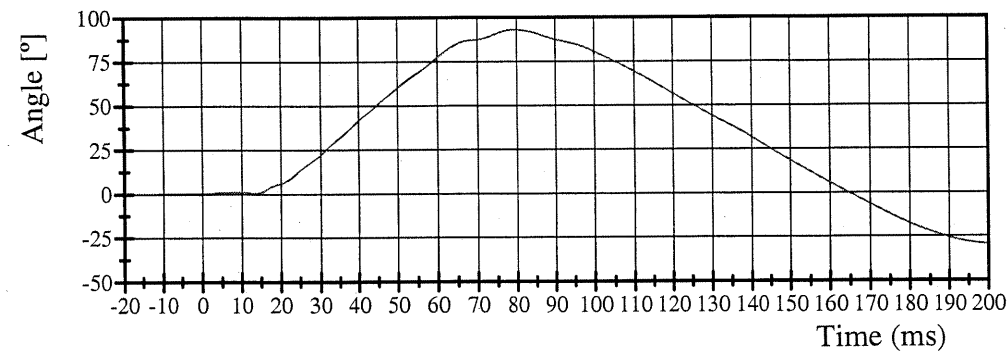
### Beta



### Theta



### Totan



02.12.2003 13:04:12 575

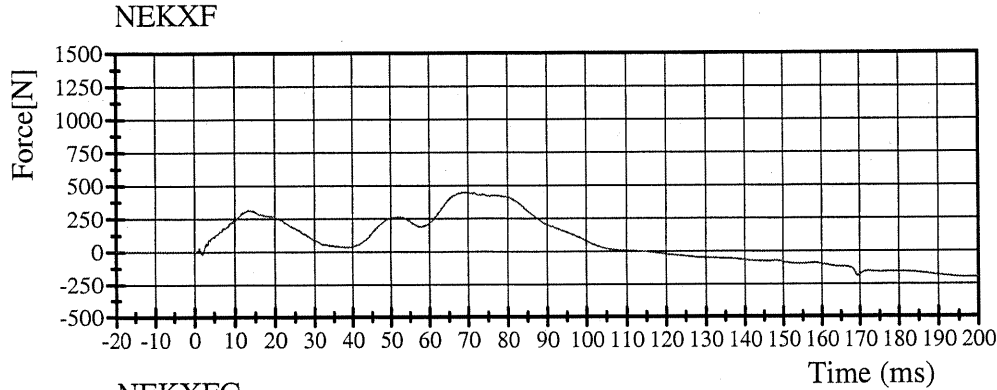


# Transportation Research Center Inc.

572E NeckExtension Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

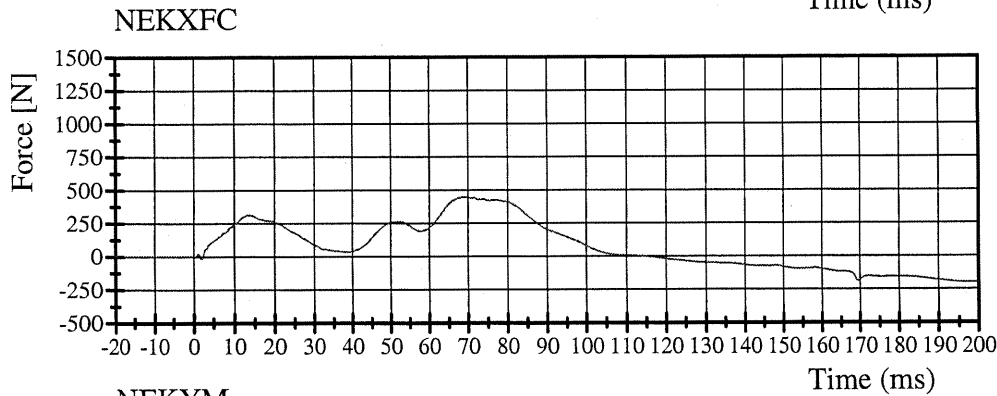
Test Date 02/12/2003



Filter Class: 1000

Max: 447.4 N at 69.8 ms

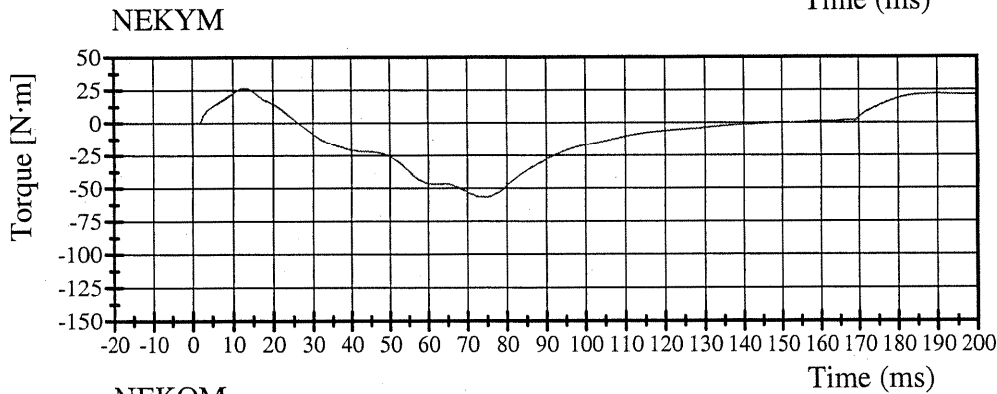
Min: -200.8 N at 198.6 ms



Filter Class: 600

Max: 447.1 N at 69.7 ms

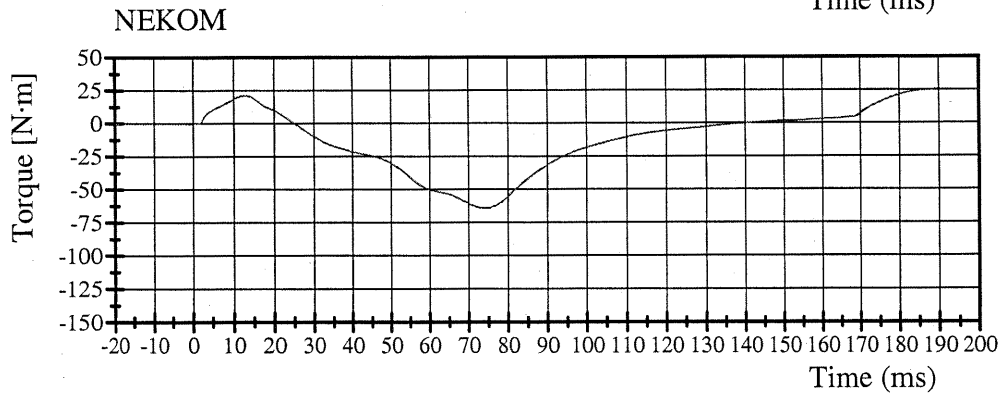
Min: -200.3 N at 198.6 ms



Filter Class: 600

Max: 26.7 N·m at 13.0 ms

Min: -56.7 N·m at 74.8 ms



Filter Class: 600

Max: 25.2 N·m at 191.6 ms

Min: -64.2 N·m at 74.7 ms

02.12.2003 13:04:13 575



# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/13/2003

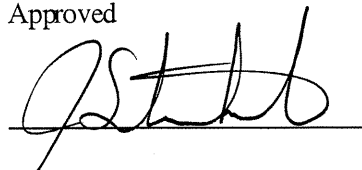
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.68 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-67.9 mm	Yes
Maximum Resistive Force	5159 - 5894 N	5845 N	Yes
Internal Hysteresis	69 - 85 %	72 %	Yes

## Comments:

Technician



Approved



02.13.2003 13:50:26 970

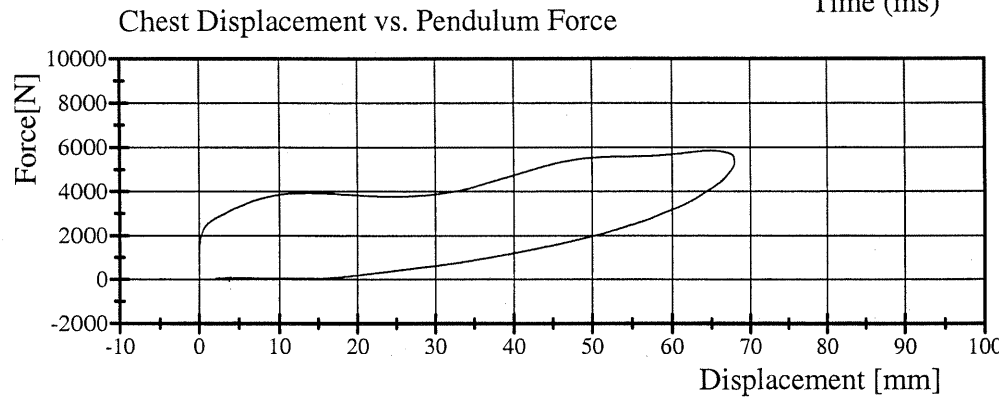
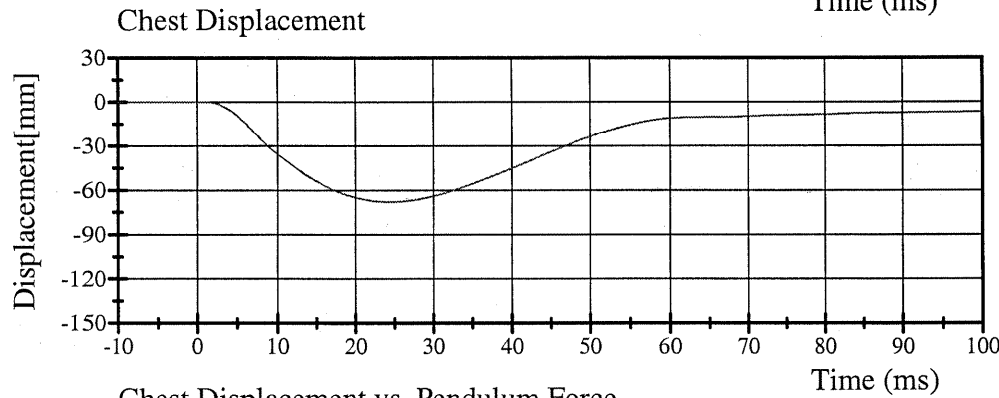
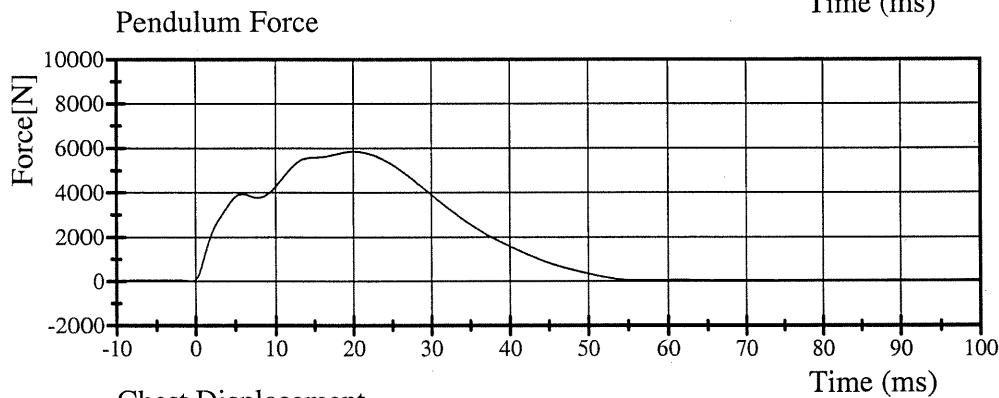
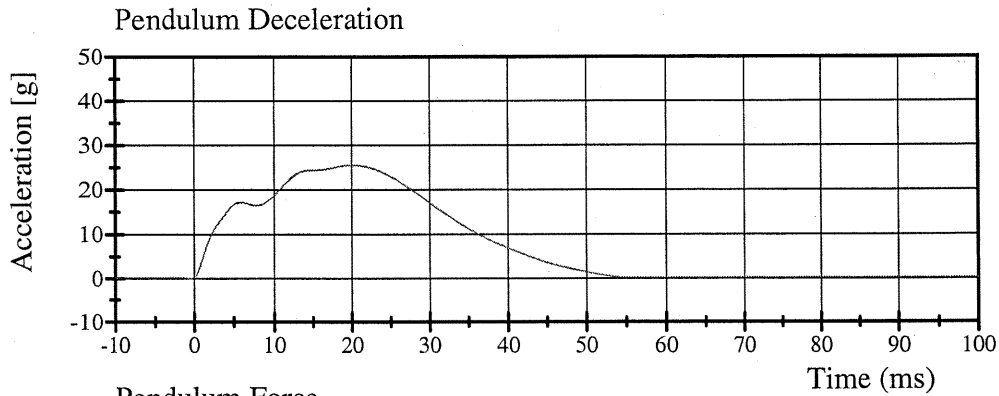


# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/13/2003



# Transportation Research Center Inc

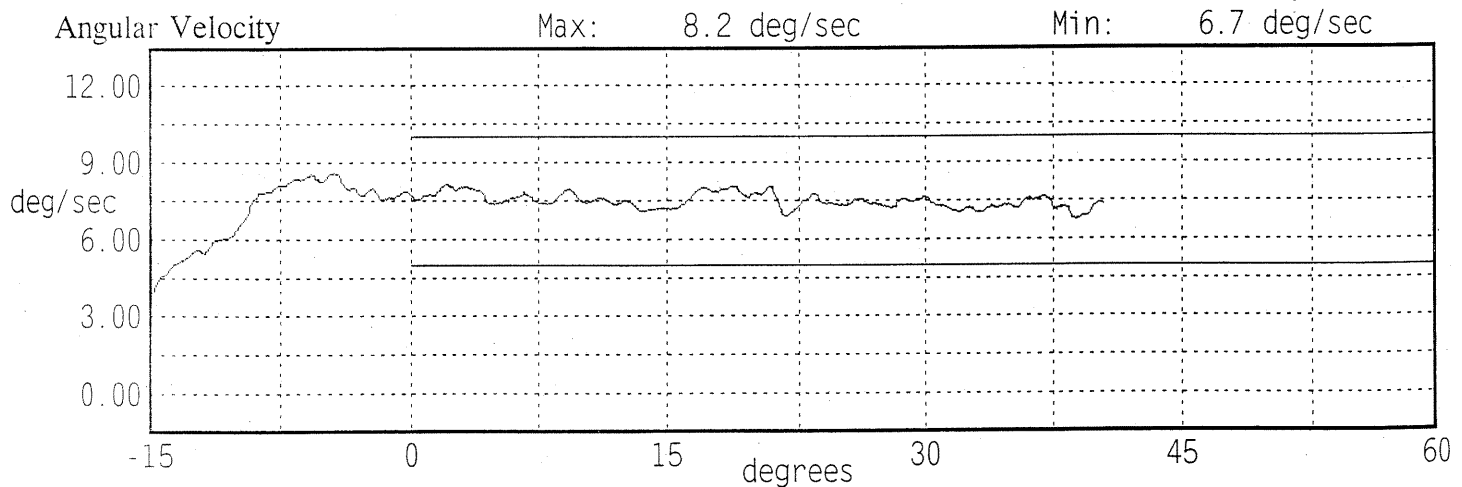
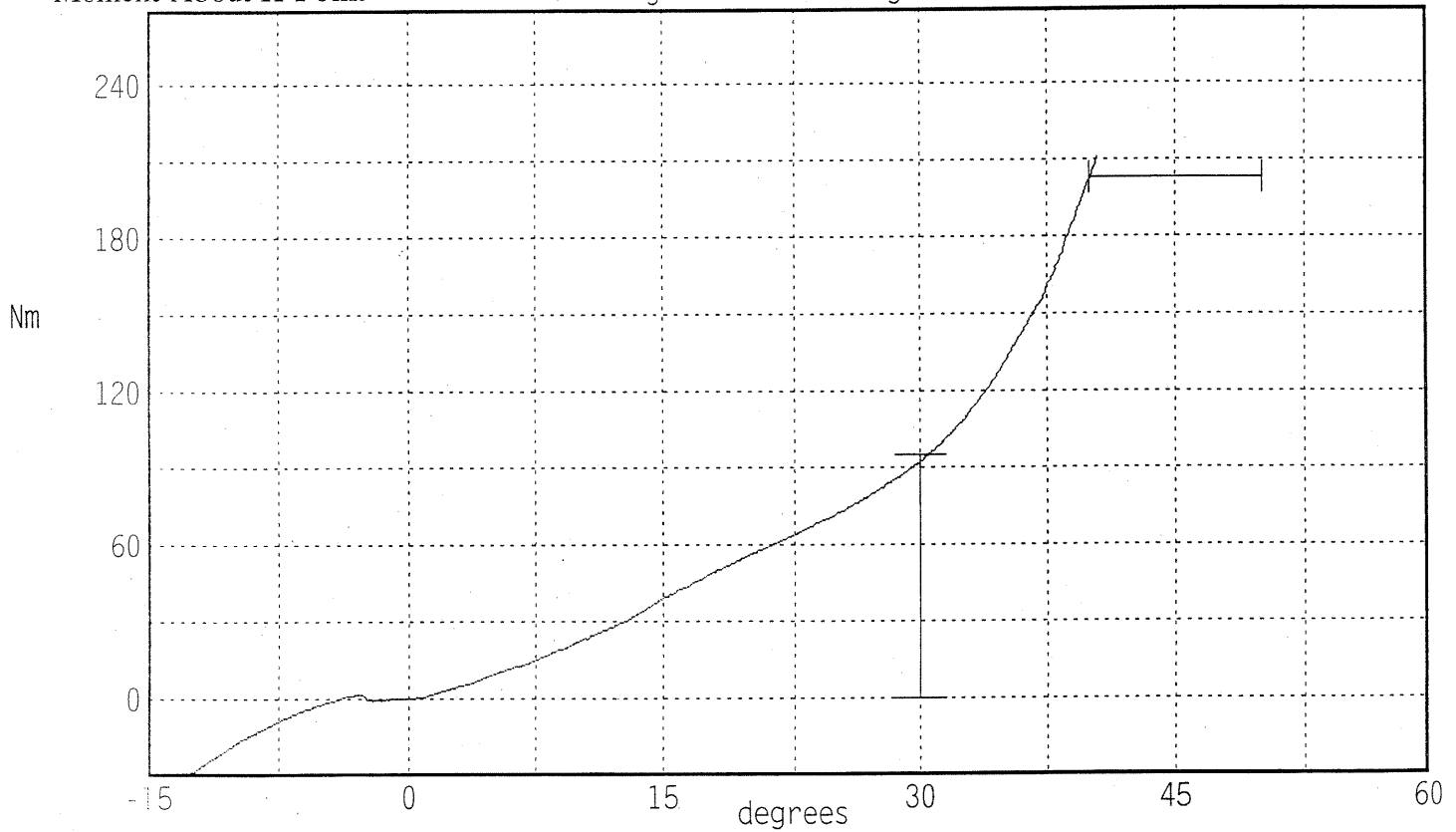
Hybrid III Hip Range of Motion

Serial Number: 090R  
 Test Number: 090C35  
 Comments:

Date: 02/06/2003  
 Time: 08:13

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.7 °C	Pass
Humidity	10 - 70	20 %	Pass
Moment at 30 deg	<= 94.9	92.4 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.1 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Moment About H-Point  
 Peak Moment: 211.2 Nm at 40.4 deg  
 Peak Angle: 40.4 deg at 211.2 Nm



# Transportation Research Center Inc

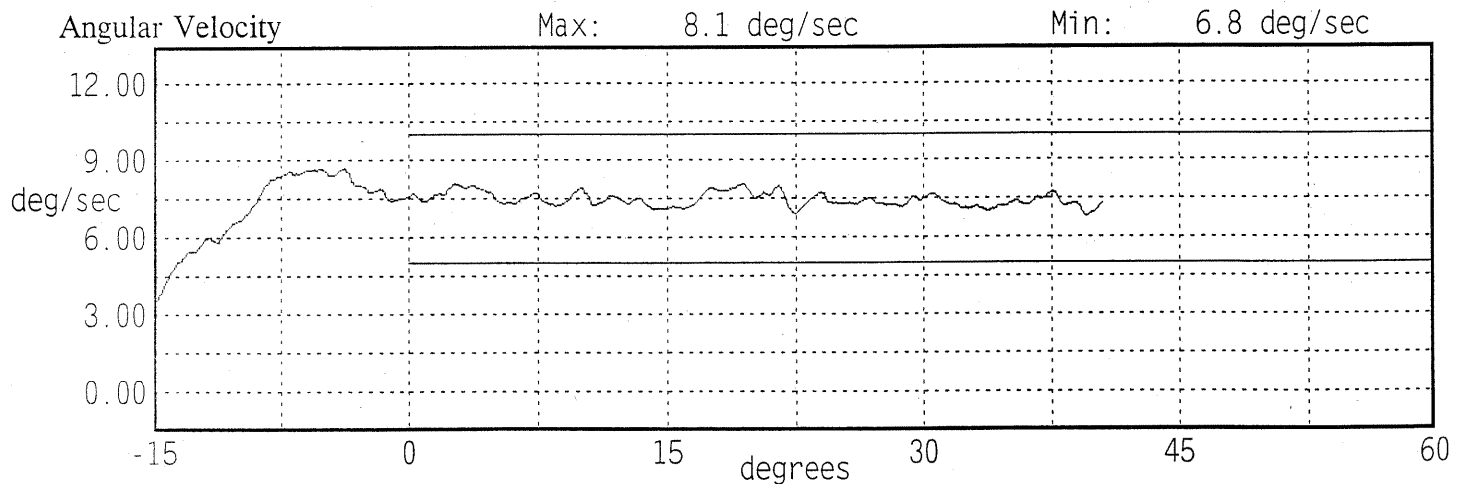
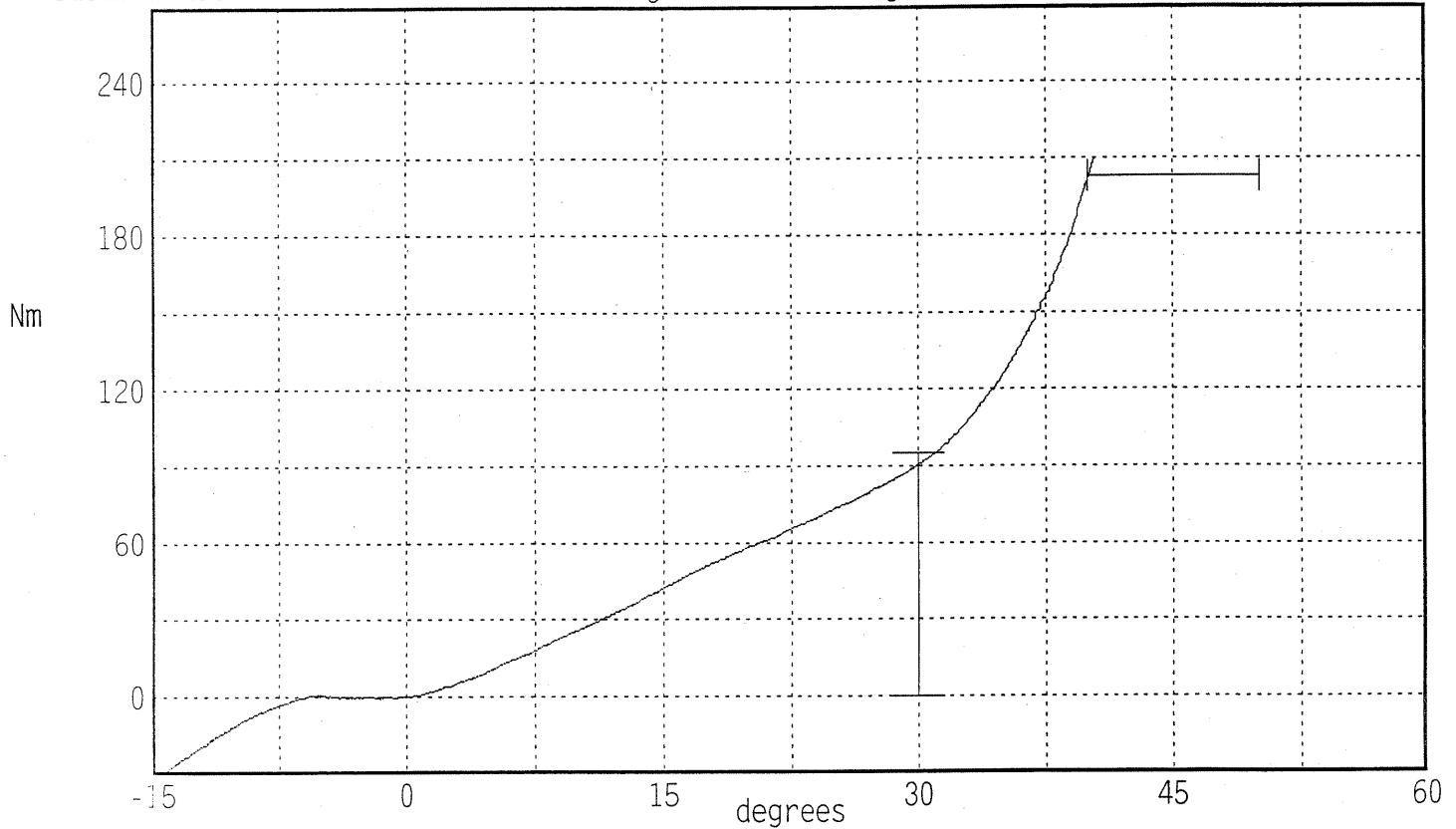
Hybrid III Hip Range of Motion

Serial Number: 090L  
Test Number: 090C35  
Comments:

Date: 02/06/2003  
Time: 07:50

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.7 °C	Pass
Humidity	10 - 70	14 %	Pass
Moment at 30 deg	<= 94.9	90.8 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.1 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Moment About H-Point  
Peak Moment: 210.2 Nm at 40.4 deg  
Peak Angle: 40.4 deg at 210.2 Nm



# Transportation Research Center Inc.

572E Left Knee Slider Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/07/2003

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Force At 10 mm Displacement	-1259 - (-1721) N	-1575 N	Yes
Force At 18 mm Displacement	-2268 - (-3096) N	-3075 N	Yes

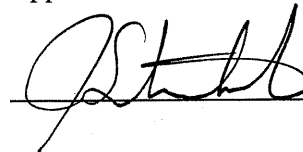
## Comments:

Technician



---

Approved



---

02.07.2003 12:13:16 1814

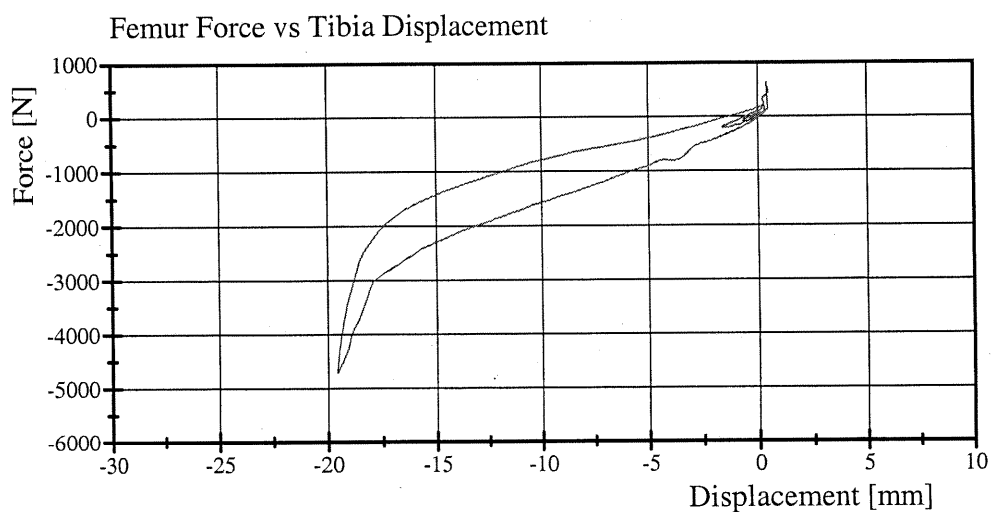
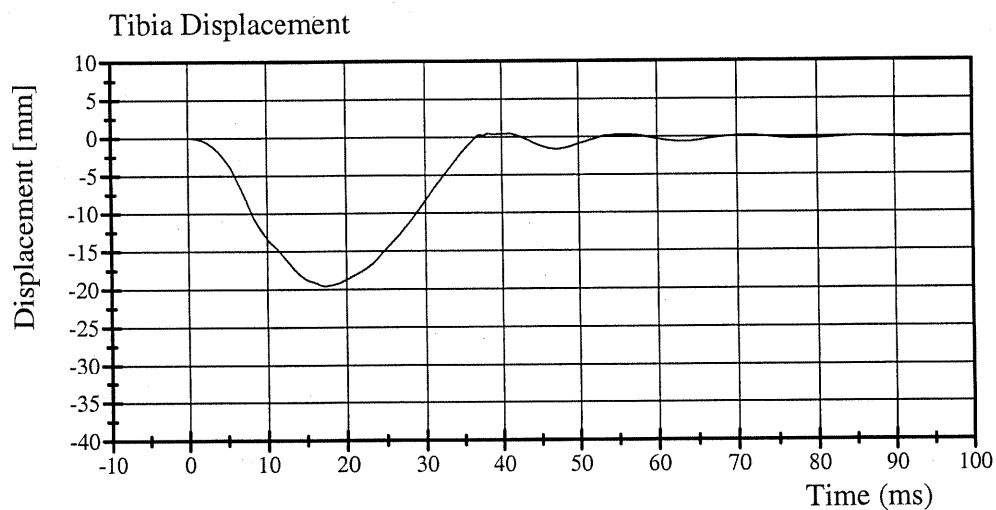
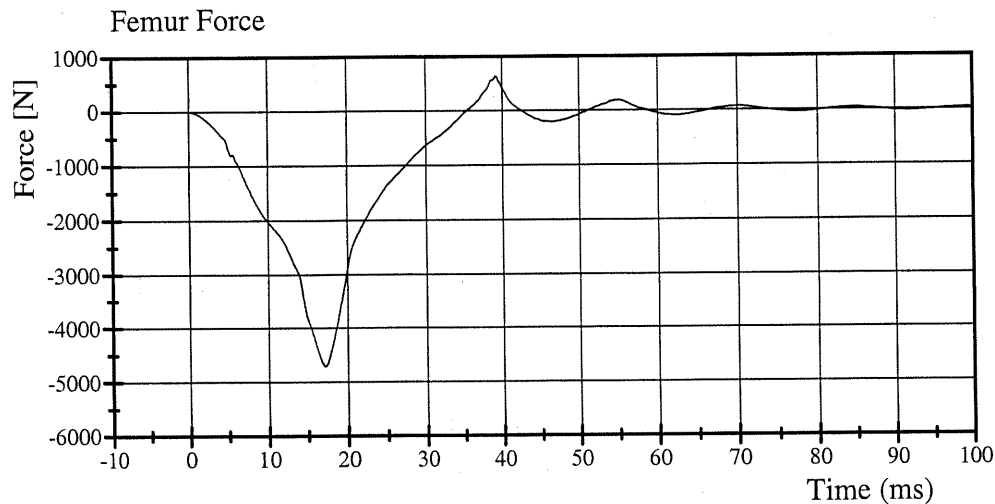


# Transportation Research Center Inc.

572E Left Knee Slider Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/07/2003



02.07.2003 12:13:21 1814



# Transportation Research Center Inc.

572E Right Knee Slider Test

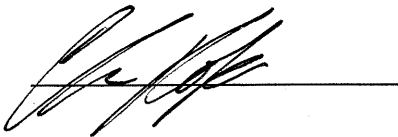
HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/07/2003

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Force At 10 mm Displacement	-1259 - (-1721) N	-1512 N	Yes
Force At 18 mm Displacement	-2268 - (-3096) N	-3081 N	Yes

## Comments:

Technician



Approved



02.07.2003 11:01:55 1804

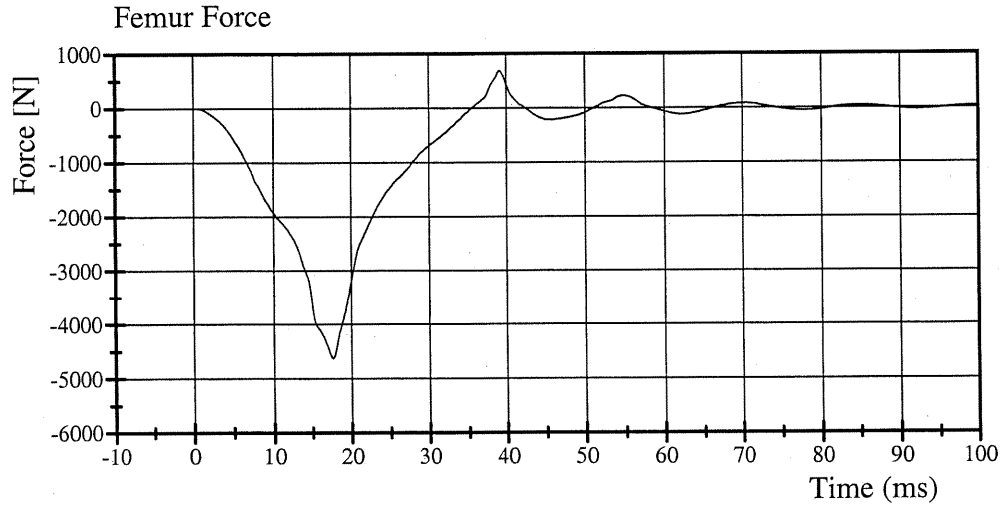


# Transportation Research Center Inc.

572E Right Knee Slider Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

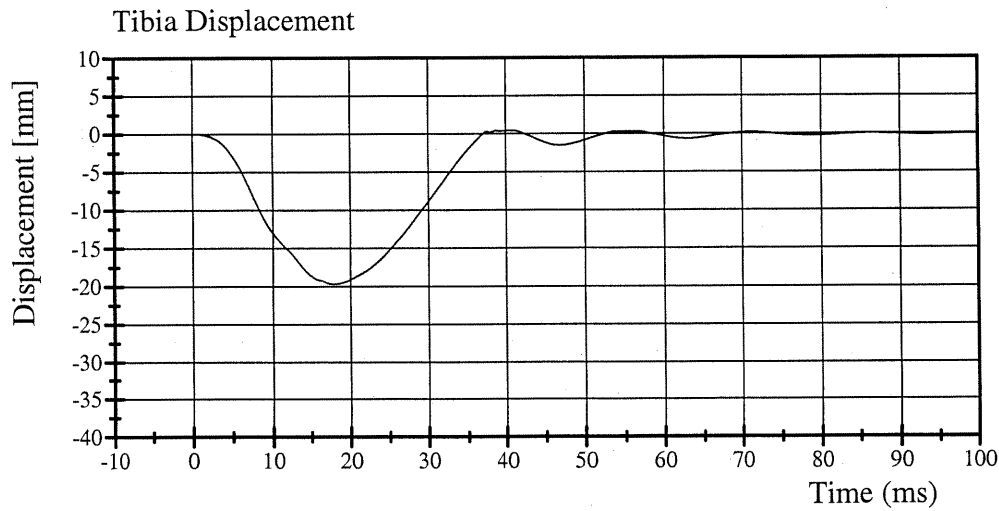
Test Date 02/07/2003



Filter Class: 600

Max: 683.3 N at 39.1 ms

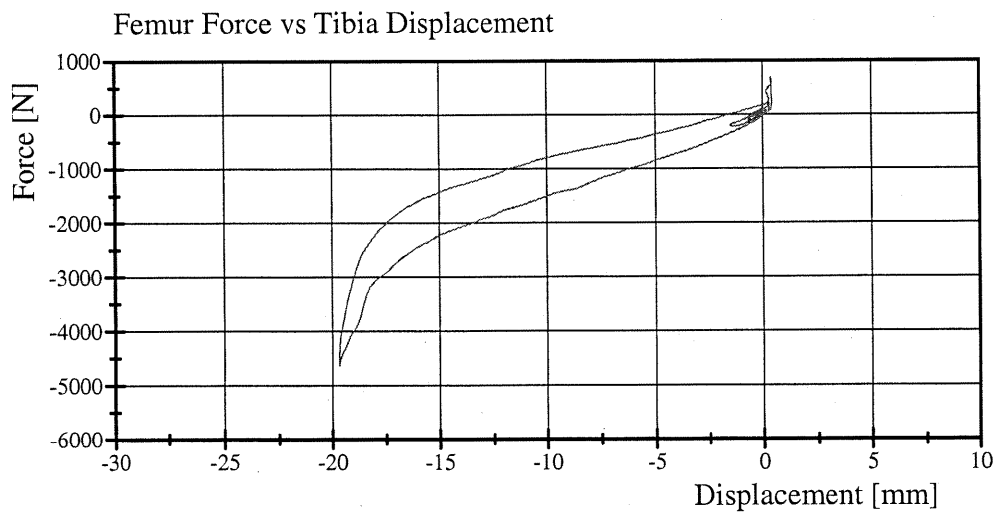
Min: -4627.0 N at 17.6 ms



Filter Class: 600

Max: 0.4 mm at 40.6 ms

Min: -19.7 mm at 17.9 ms



02.07.2003 11:01:57 1804



# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/06/2003

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	19 %	Yes
Pendulum Velocity	2.08 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4716 - 5782 N	5373 N	Yes

## Comments:

Technician



Approved



02.06.2003 08:07:35 2165



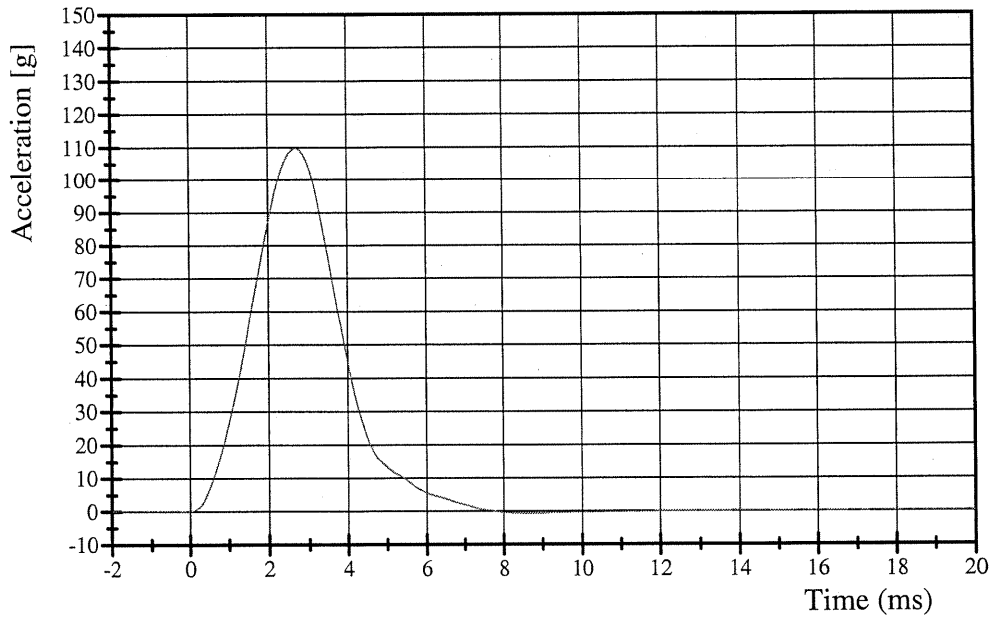
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/06/2003

### Pendulum Deceleration

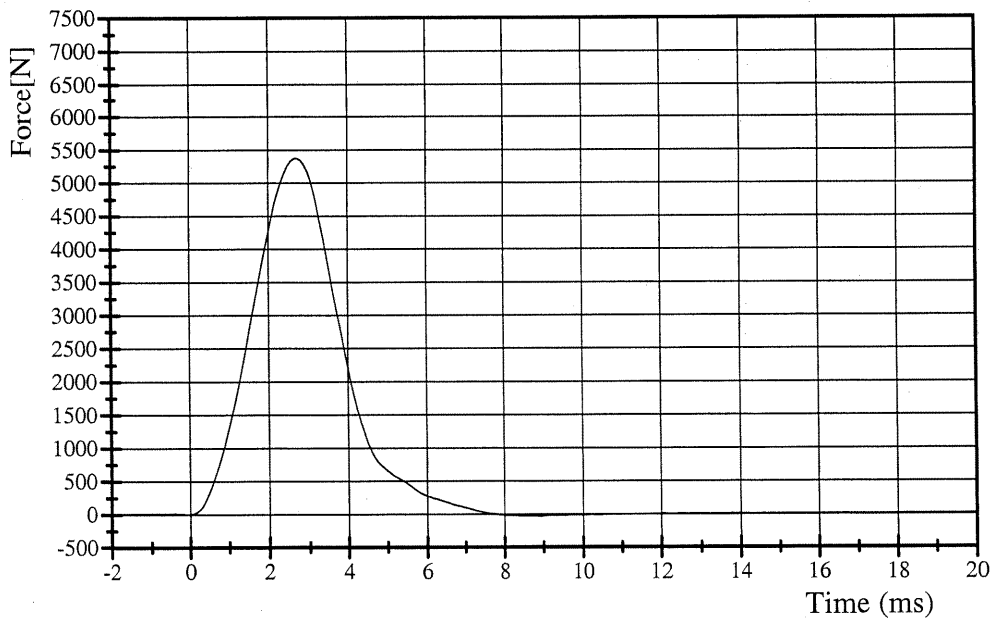


Filter Class: 600

Max: 109.8 g at 2.7 ms

Min: -0.7 g at 9.0 ms

### Pendulum Force



Filter Class: 600

Max: 5373.0 N at 2.7 ms

Min: -33.7 N at 9.0 ms



# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/06/2003

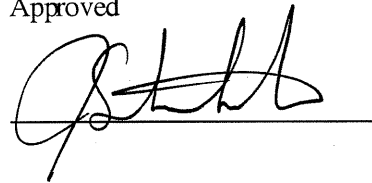
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	20 %	Yes
Pendulum Velocity	2.08 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4716 - 5782 N	5114 N	Yes

## Comments:

Technician



Approved



02.06.2003 08:13:36 2166



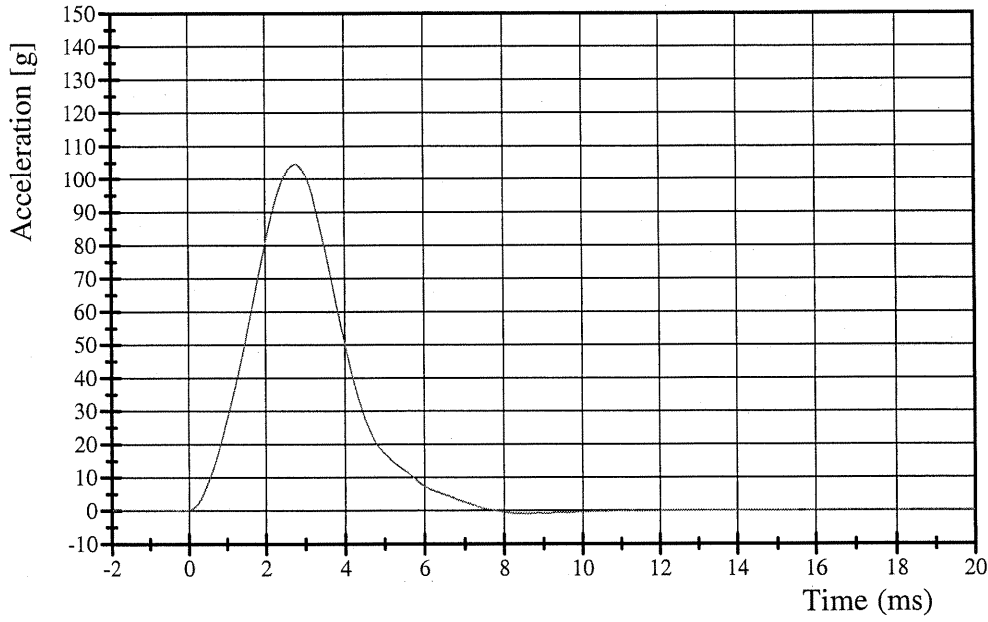
# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 090 Calibration No. 35 - 1

Test Date 02/06/2003

### Pendulum Deceleration

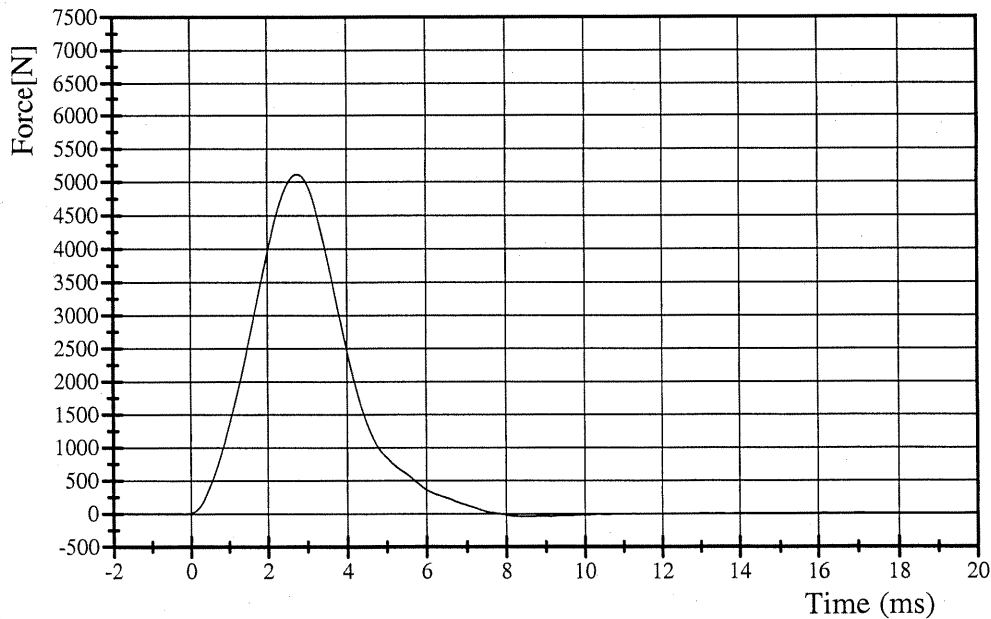


Filter Class: 600

Max: 104.5 g at 2.8 ms

Min: -0.9 g at 8.6 ms

### Pendulum Force



Filter Class: 600

Max: 5114.2 N at 2.8 ms

Min: -44.7 N at 8.6 ms



# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885

Fax (301) 432-6199

## Thor-LX Test Report

### Dynamic Heel of Foot Impact Test

Engineer	P. Pope Y. Wang	Test Date	September 10, 2002
Customer	VRTC	Temp (C)/Hum.(%)	23/62
Description	Left Lower Extremities	Serial No.	LX-110

#### Testing Summary

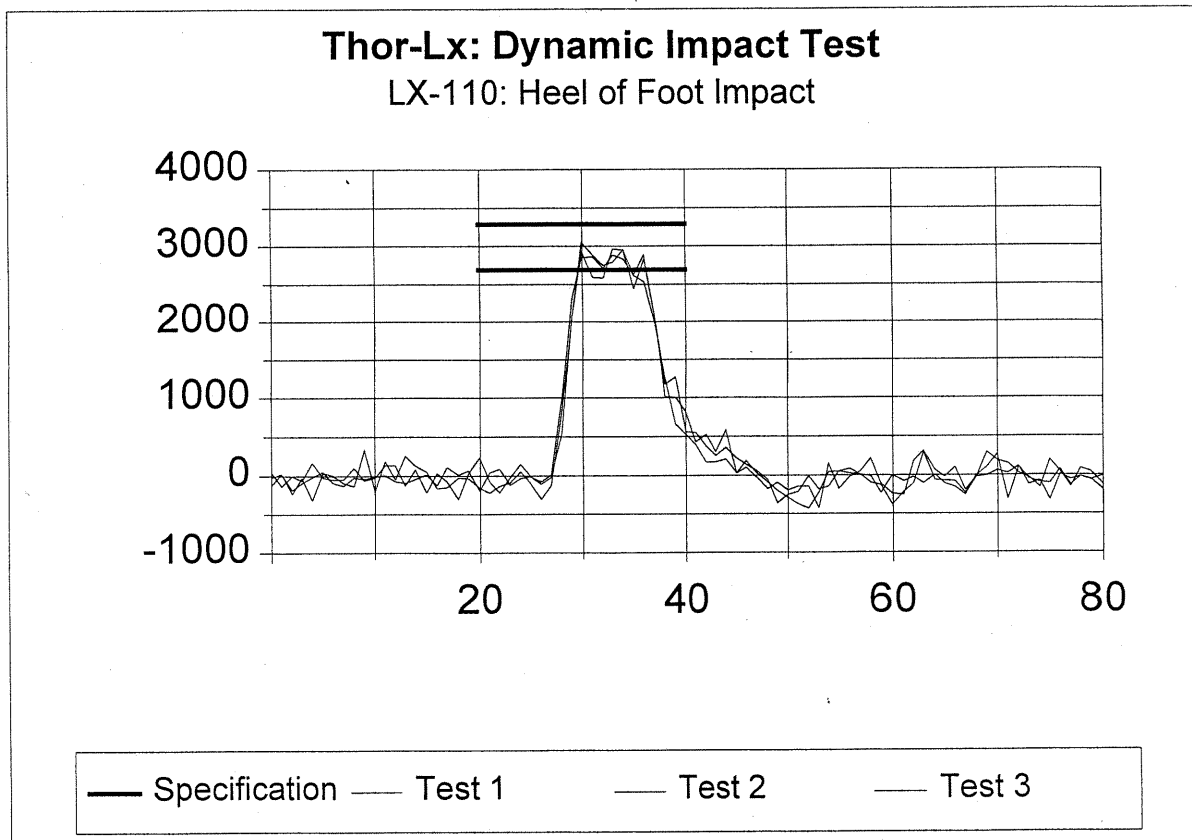
Impact Speed	4.0 m/s	Scan Rate	10000 scans/sec
Impact Effective Mass	5.0 kg	Filter	CFC 600
Impactor	NHTSA Dynamic Impactor (TLX-9000-013)		

#### Response

Peak Lower Tibia Compressive Force* (N)	Specification (N)	Within Reference
2970	2694 - 3292	Yes

\*Average Value

#### Test Plot



Tested by: *Patrick Pope*

Date: *9-19-02*

Analyzed by: *Y. Wang*

Date: *9/17/02*

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885

Fax (301) 432-6199

## Thor-LX Test Report

### Dynamic Ball of Foot Impact Test (page 1)

**Engineer** P. Pope  
Y. Wang  
**Customer** VRTC  
**Description** Left Lower Extremities

**Test Date** September 18, 2002  
**Temp (C)/Hum.(%)** 23/61  
**Serial No.** LX-110

#### Testing Summary

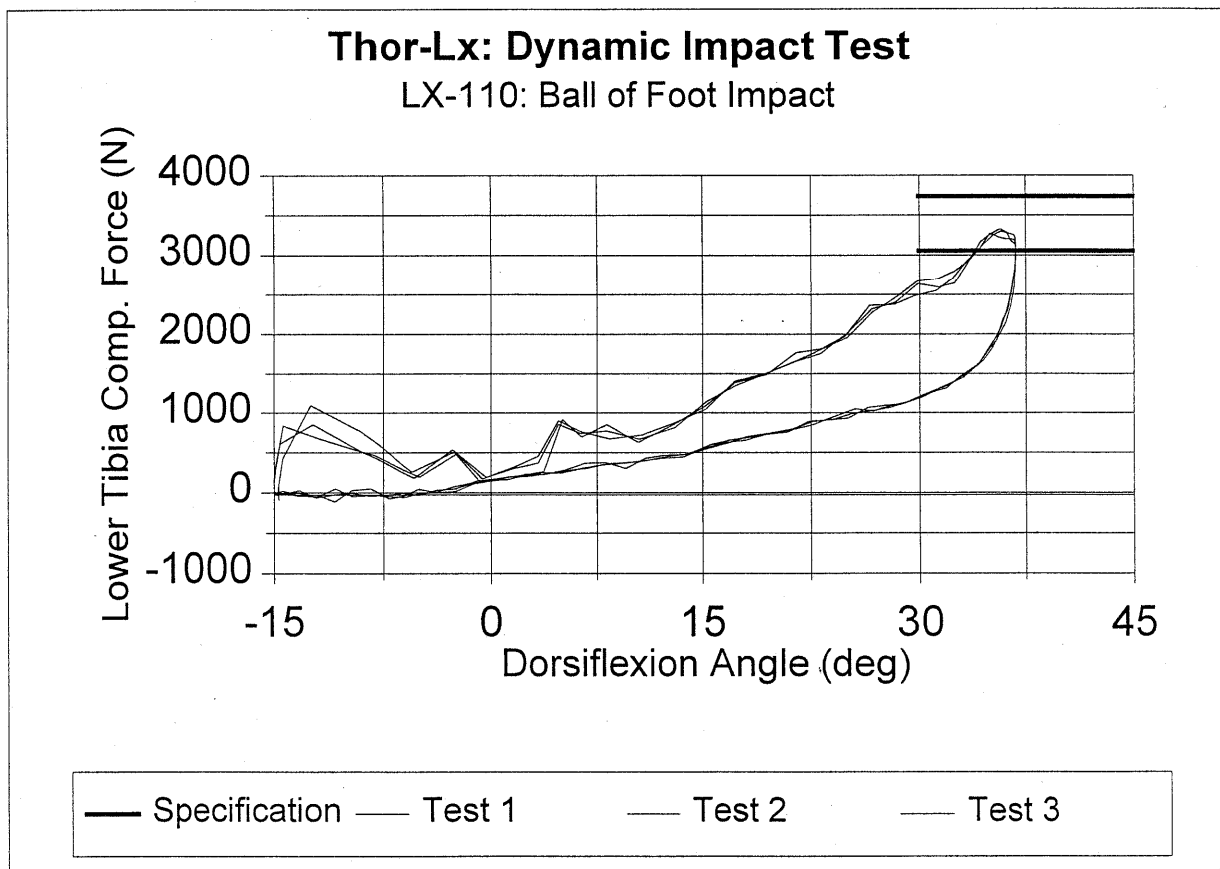
Impact Speed	5.0 m/s	Scan Rate	10000 scans/sec
Impact Effective Mass	5.0 kg	Filter	CFC 600
Impactor	NHTSA Dynamic Impactor (TLX-9000-013)		

#### Response

Peak Lower Tibia Compressive Force* (N)	Specification (N)	Within Reference
3302	3058 - 3738	Yes

\*Average Value

#### Test Plot



Tested by: Patrick Pope  
Analyzed by: Y. Wang

Date: 9-19-02  
Date: 9/19/02

### Thor-LX Test Report

#### Dynamic Ball of Foot Impact Test (page 2)

**Engineer** P. Pope  
 Y. Wang  
**Customer** VRTC  
**Description** Left Lower Extremities

**Test Date** September 18, 2002  
**Temp (C)/Hum.(%)** 23/61  
**Serial No.** LX-110

#### Testing Summary

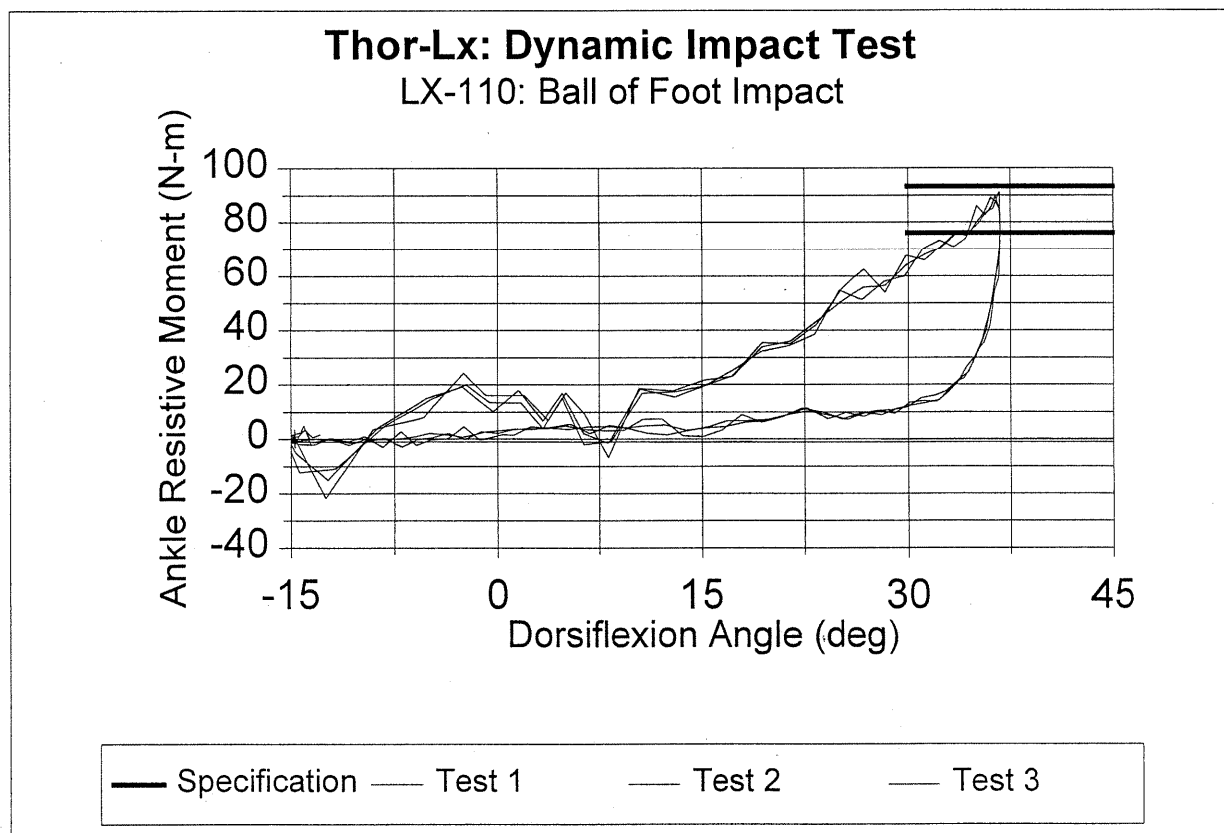
**Impact Speed** 5.0 m/s **Scan Rate** 10000 scans/sec  
**Impact Effective Mass** 5.0 kg **Filter** CFC 600  
**Impactor** NHTSA Dynamic Impactor (TLX-9000-013)

#### Response

Peak Ankle Resistive Moment* (N-m)	Specification (N-m)	Within Reference
90.0	76.2 - 93.2	Yes

\*Average Value

#### Test Plot



Tested by:

Patrick Pope

Date:

9-19-02

Analyzed by:

Y. Wang

Date:

9/19/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885 Fax (301) 432-6199

## Thor-Lx Test Report

### Inversion Quasi-Static Test

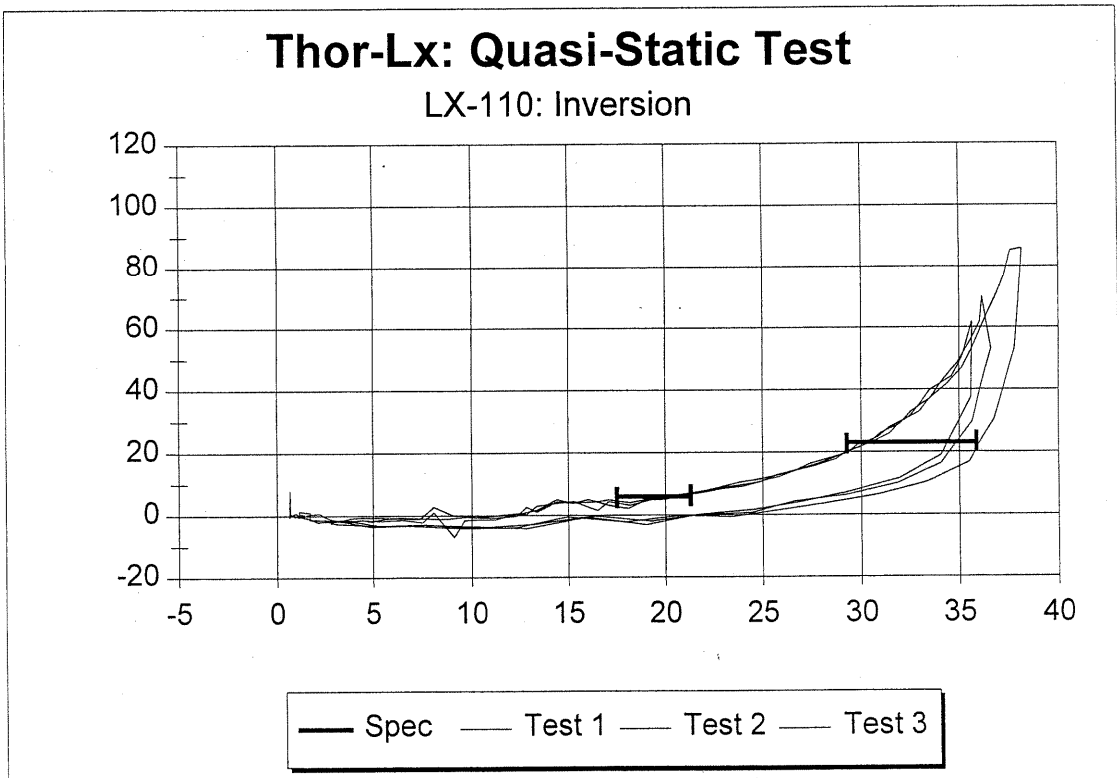
<b>Engineer</b>	P. Pope Y. Wang	<b>Test Date</b>	September 17, 2002
<b>Customer</b>	VRTC	<b>Temp. (C)/Hum.(%)</b>	23/61
<b>Description</b>	Left Lower Extremity	<b>Serial No.</b>	LX-110

### Testing Summary (Design Reference)

Ankle Moment (Nm)	Inversion Angle (Degree)	Reference Specification (Degree)	Within Reference?
6	20.5	17.5 - 21.3	Yes
23	30.4	29.3 - 35.9	Yes

\*Average Value

### Result Plot



Tested by: *Patrick Pope*

Date: 9-19-02

Analyzed by: *Wang*

Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885 Fax (301) 432-6199

## Thor-Lx Test Report

### Eversion Quasi-Static Test

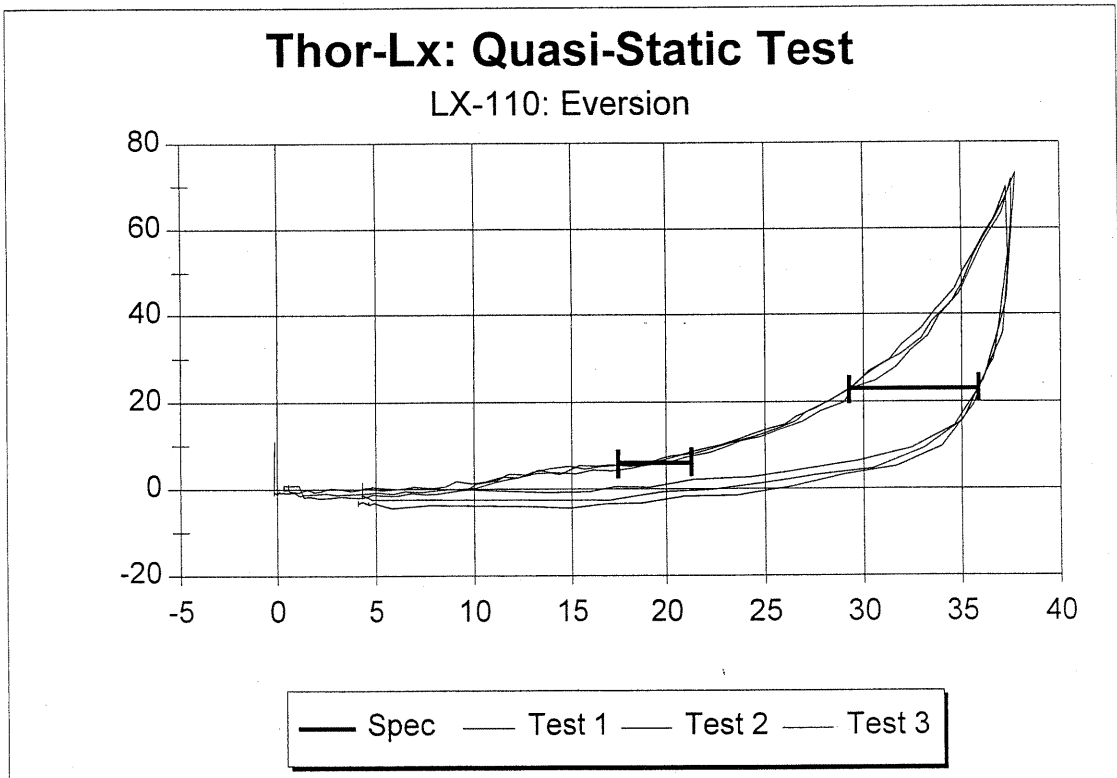
<b>Engineer</b>	P. Pope Y. Wang	<b>Test Date</b>	September 17, 2002
<b>Customer</b>	VRTC	<b>Temp. (C)/Hum.(%)</b>	23/62
<b>Description</b>	Left Lower Extremity	<b>Serial No.</b>	LX-110

### Testing Summary (Design Reference)

Ankle Moment (Nm)	Eversion Angle (Degree)	Reference Specification (Degree)	Within Reference?
6	19.3	17.5 - 21.3	Yes
23	29.4	29.3 - 35.9	Yes

\*Average Value

### Result Plot



Tested by: Patrick Pope

Date: 9-19-02

Analyzed by: [Signature]

Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713  
Tel (301) 432-5885 Fax (301) 432-6199

## Thor-LX Test Report

### Dynamic Heel of Foot Impact Test

Engineer P. Pope  
Y. Wang  
Customer VRTC  
Description Right Lower Extremities

Test Date September 9, 2002  
Temp (C)/Hum.(%) 23/61  
Serial No. LX-109

### Testing Summary

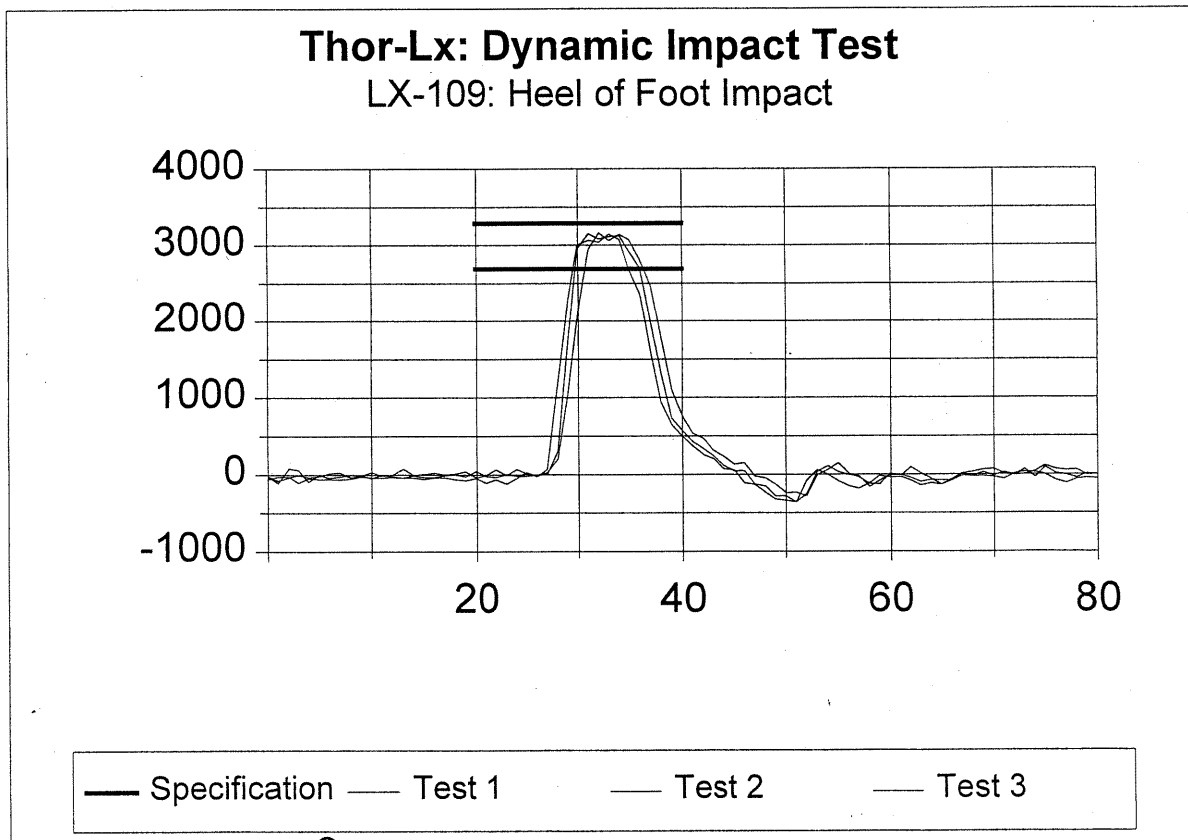
Impact Speed 4.0 m/s Scan Rate 10000 scans/sec  
Impact Effective Mass 5.0 kg Filter CFC 600  
Impactor NHTSA Dynamic Impactor (TLX-9000-013)

### Response

Peak Lower Tibia Compressive Force* (N)	Specification (N)	Within Reference
3156	2694 - 3292	Yes

\*Average Value

### Test Plot



Tested by: Patrick Pope

Date: 9-19-02

Analyzed by: [Signature]

Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885

Fax (301) 432-6199

## Thor-LX Test Report

### Dynamic Ball of Foot Impact Test (page 1)

Engineer P. Pope  
Y. Wang  
Customer VRTC  
Description Right Lower Extremities

Test Date September 9, 2002  
Temp (C)/Hum.(%) 23/61  
Serial No. LX-109

#### Testing Summary

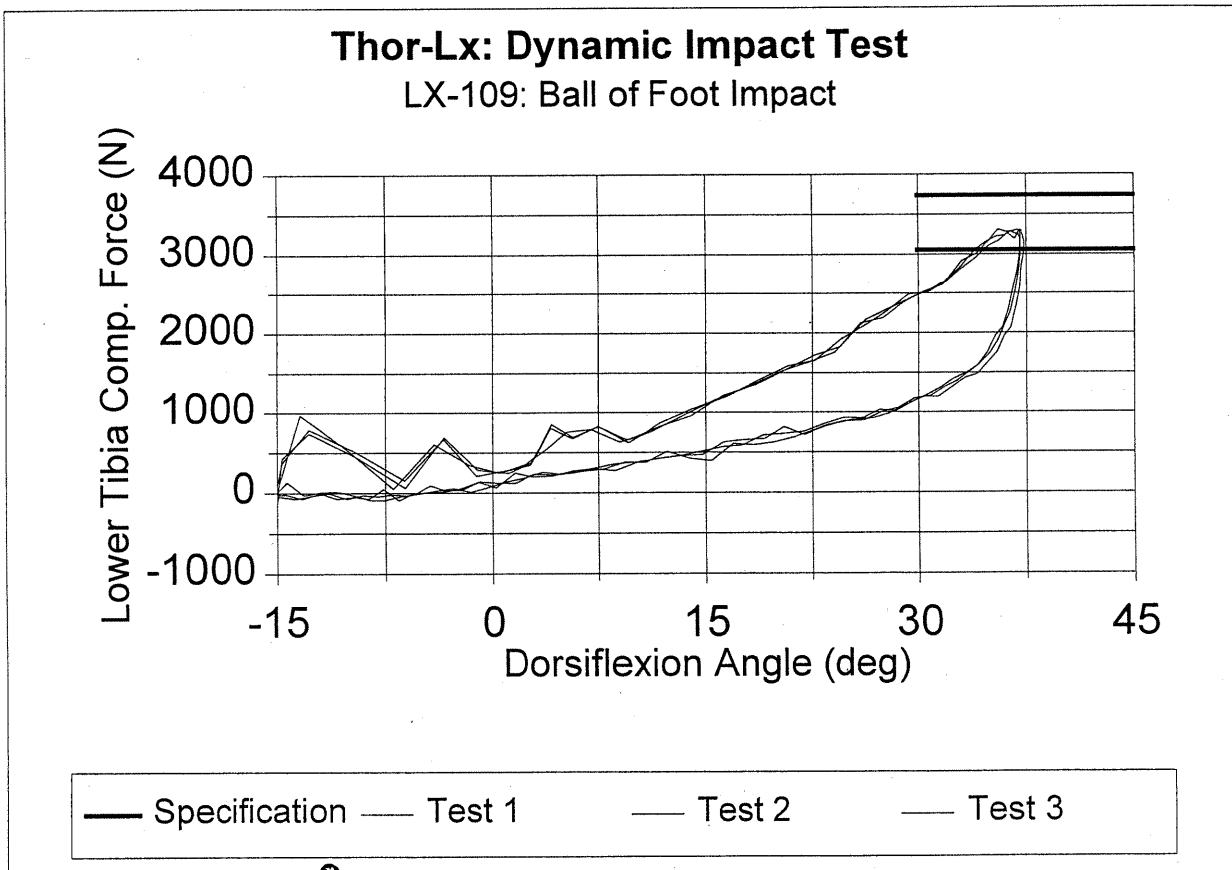
Impact Speed 5.0 m/s Scan Rate 10000 scans/sec  
Impact Effective Mass 5.0 kg Filter CFC 600  
Impactor NHTSA Dynamic Impactor (TLX-9000-013)

#### Response

Peak Lower Tibia Compressive Force* (N)	Specification (N)	Within Reference
3303	3058 - 3738	Yes

\*Average Value

#### Test Plot



Tested by: Patrick Pope  
Analyzed by: [Signature]

Date: 9-19-02  
Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885

Fax (301) 432-6199

## Thor-LX Test Report

### Dynamic Ball of Foot Impact Test (page 2)

Engineer P. Pope  
 Y. Wang  
 Customer VRTC  
 Description Right Lower Extremities

Test Date September 9, 2002  
 Temp (C)/Hum.(%) 23/61  
 Serial No. LX-109

#### Testing Summary

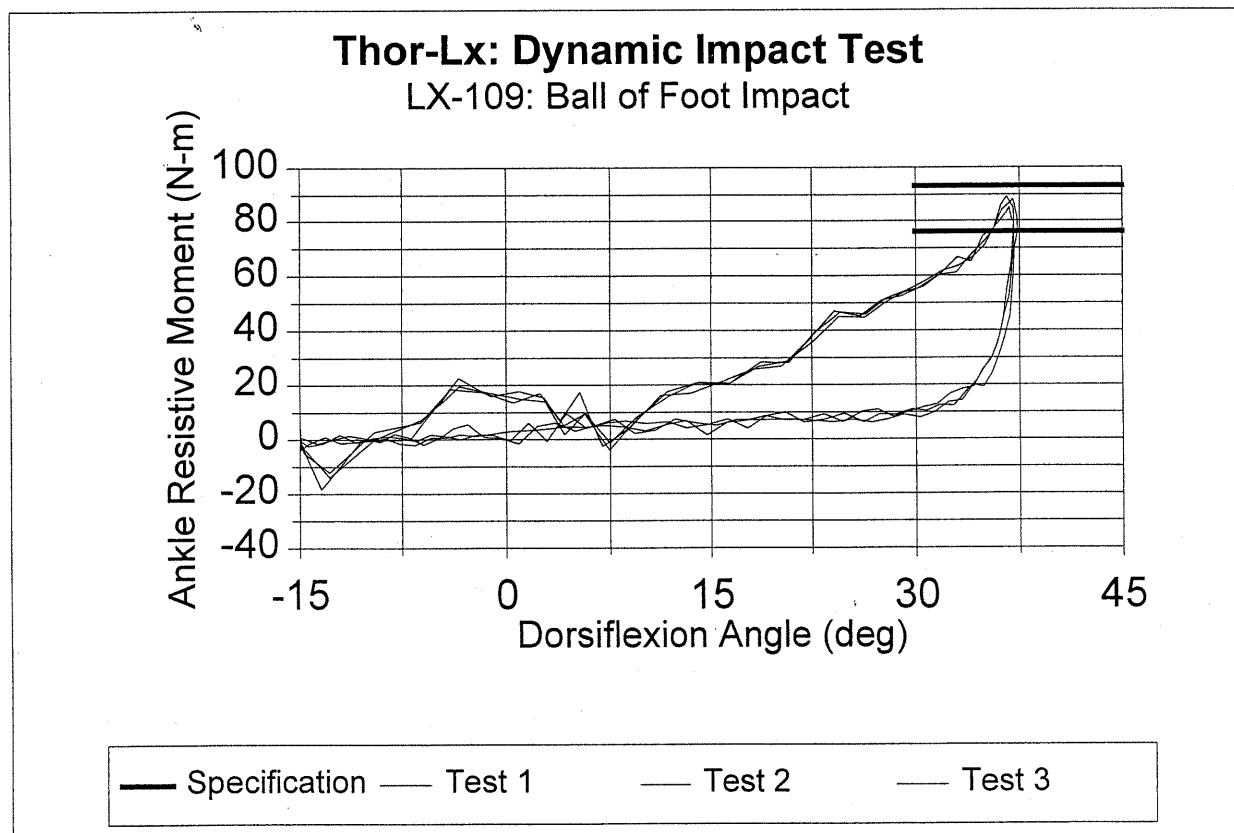
Impact Speed	5.0 m/s	Scan Rate	10000 scans/sec
Impact Effective Mass	5.0 kg	Filter	CFC 600
Impactor	NHTSA Dynamic Impactor (TLX-9000-013)		

#### Response

Peak Ankle Resistive Moment* (N-m)	Specification (N-m)	Within Reference
87.6	76.2 - 93.2	Yes

\*Average Value

#### Test Plot



Tested by: Patrick Pope  
 Analyzed by: [Signature]

Date: 9-19-02  
 Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885 Fax (301) 432-6199

## Thor-Lx Test Report

### Inversion Quasi-Static Test

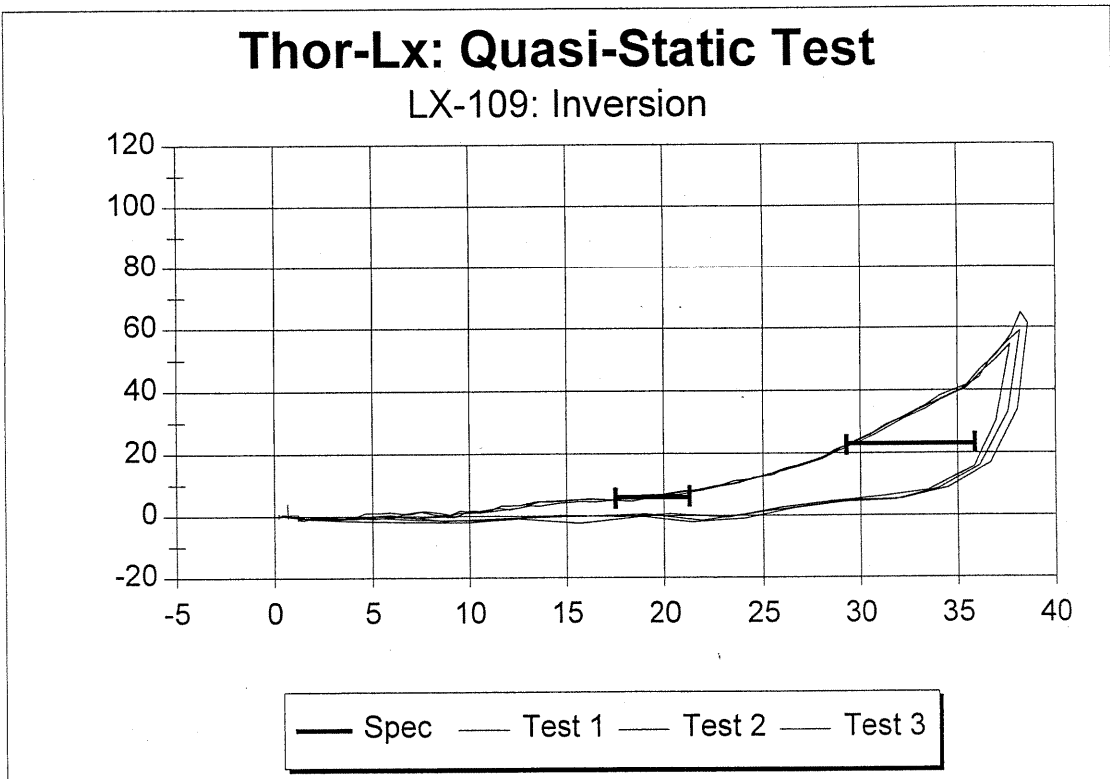
<b>Engineer</b>	P. Pope Y. Wang	<b>Test Date</b>	September 16, 2002
<b>Customer</b>	VRTC	<b>Temp. (C)/Hum.(%)</b>	23/62
<b>Description</b>	Right Lower Extremity	<b>Serial No.</b>	LX-109

### Testing Summary (Design Reference)

Ankle Moment (Nm)	Inversion Angle (Degree)	Reference Specification (Degree)	Within Reference?
6	18.7	17.5 - 21.3	Yes
23	29.6	29.3 - 35.9	Yes

\*Average Value

### Result Plot



Tested by: Patrick Pope

Analyzed by: [Signature]

Date: 9-19-02

Date: 9/17/02

# GESAC, INC

DESIGN | MANUFACTURE | TEST | SOFTWARE DEVELOPMENT | ERGONOMICS

125 Orchard Drive, Boonsboro, MD 21713

Tel (301) 432-5885 Fax (301) 432-6199

## Thor-Lx Test Report

### Eversion Quasi-Static Test

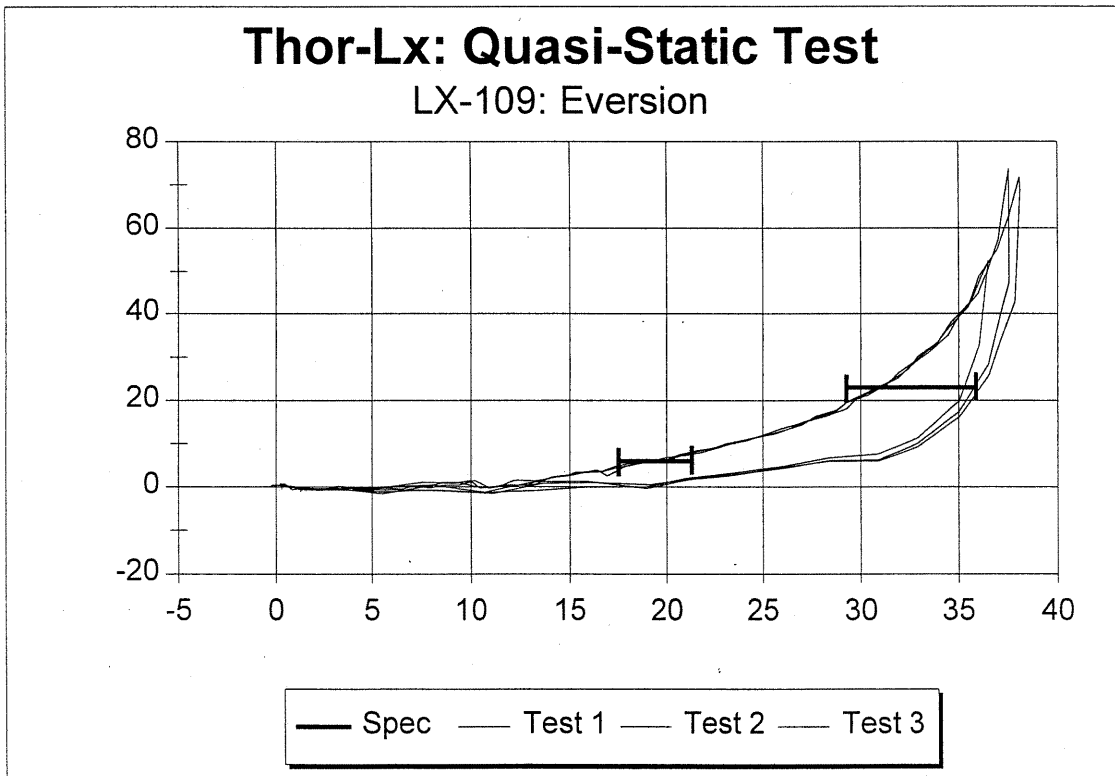
<b>Engineer</b>	P. Pope Y. Wang	<b>Test Date</b>	September 12, 2002
<b>Customer</b>	VRTC	<b>Temp. (C)/Hum.(%)</b>	23/62
<b>Description</b>	Right Lower Extremity	<b>Serial No.</b>	LX-109

### Testing Summary (Design Reference)

Ankle Moment (Nm)	Eversion Angle (Degree)	Reference Specification (Degree)	Within Reference?
6	19.3	17.5 - 21.3	Yes
23	31.0	29.3 - 35.9	Yes

\*Average Value

### Result Plot



Tested by: *Patrick Pope*

Date: 9-19-02

Analyzed by: *Michael S.*

Date: 9/17/02

Post-test Dummy Configuration and Performance Verification Data

Driver Dummy S/N: 090

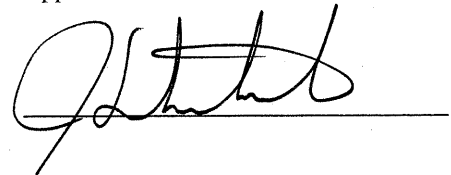
**Transportation Research Center Inc.**  
**572E HIII 50th Dummy**  
**External Dimensions**  
**Serial No. 090 Calibration No. 36**

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	878.8 - 889.0 mm	883 mm	Yes
Shoulder Pivot Height	B	505.5 - 520.7 mm	513 mm	Yes
H-Point Height	C	83.8 - 88.9 mm	87 mm	Yes
H-Point From Seatback	D	134.6 - 139.7 mm	138 mm	Yes
Shoulder Pivot From Backline	E	83.8 - 94.0 mm	84 mm	Yes
Thigh Clearance	F	139.7 - 154.9 mm	149 mm	Yes
Back Of Elbow To Wrist Pivot	G	289.6 - 304.8 mm	293 mm	Yes
Skull Cap To Backline	H	40.6 - 45.7 mm	43 mm	Yes
Shoulder-Elbow Length	I	330.2 - 345.4 mm	336 mm	Yes
Elbow Rest Height	J	190.5 - 210.8 mm	191 mm	Yes
Buttock Knee Length	K	579.1 - 604.5 mm	590 mm	Yes
Popliteal Height	L	429.3 - 454.7 mm	435 mm	Yes
Knee Pivot Height	M	485.1 - 500.4 mm	492 mm	Yes
Buttock Popliteal Length	N	452.1 - 477.5 mm	463 mm	Yes
Chest Depth	O	213.4 - 228.6 mm	227 mm	Yes
Foot Length	P	251.5 - 266.7 mm	254 mm	Yes
Shoulder Breadth	V	421.6 - 436.9 mm	431 mm	Yes
Foot Breadth	W	91.4 - 106.7 mm	102 mm	Yes
Chest Circumference	Y	970.3 - 1000.8 mm	983 mm	Yes
Waist Circumference	Z	835.7 - 866.1 mm	850 mm	Yes
Location For Chest Circumference	AA	429.3 - 434.3 mm	433 mm	Yes
Location For Waist Circumference	BB	226.1 - 231.1 mm	230 mm	Yes

Technician



Approved




# Transportation Research Center Inc.

572E Head Drop Test

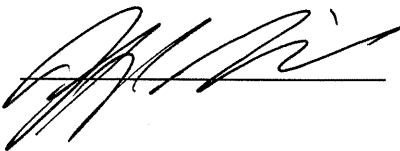
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

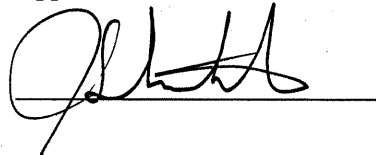
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Peak Resultant Acceleration	225 - 275 g	233.2 g	Yes
Peak Lateral Acceleration	15 g Max	8.9 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

## Comments:

Technician



Approved



02.18.2003 16:03:06 600

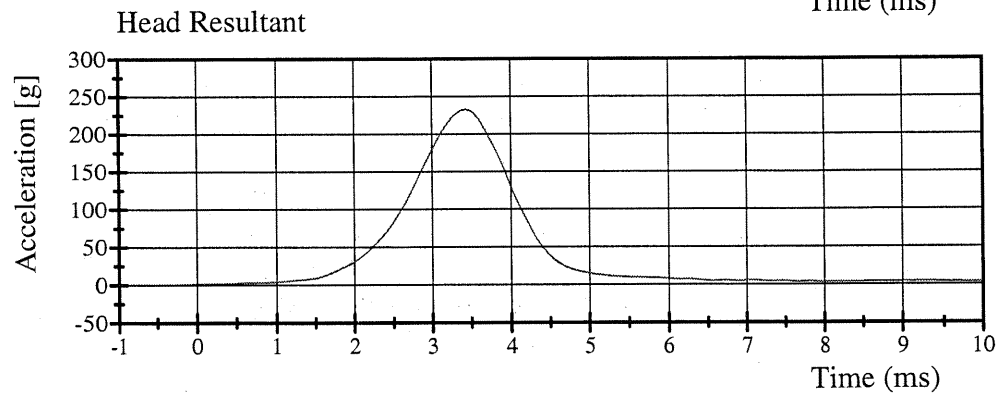
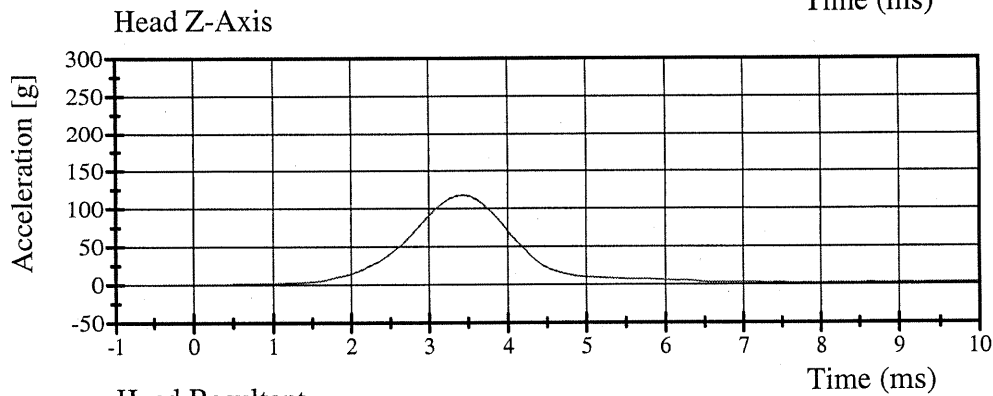
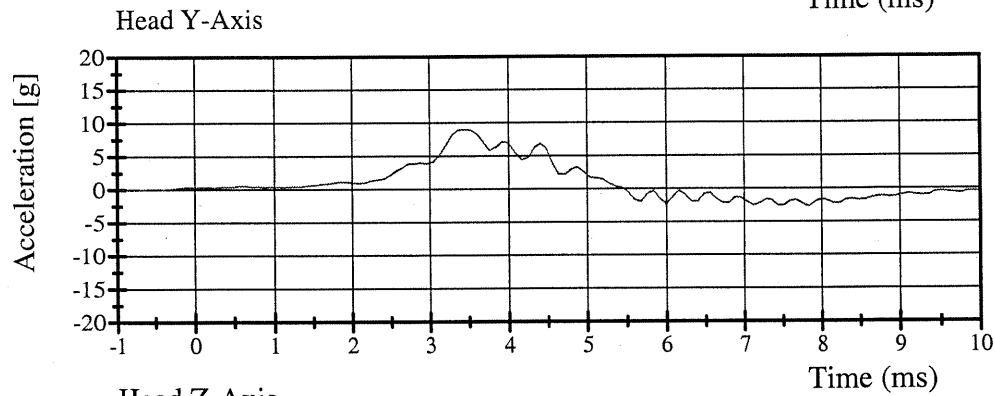
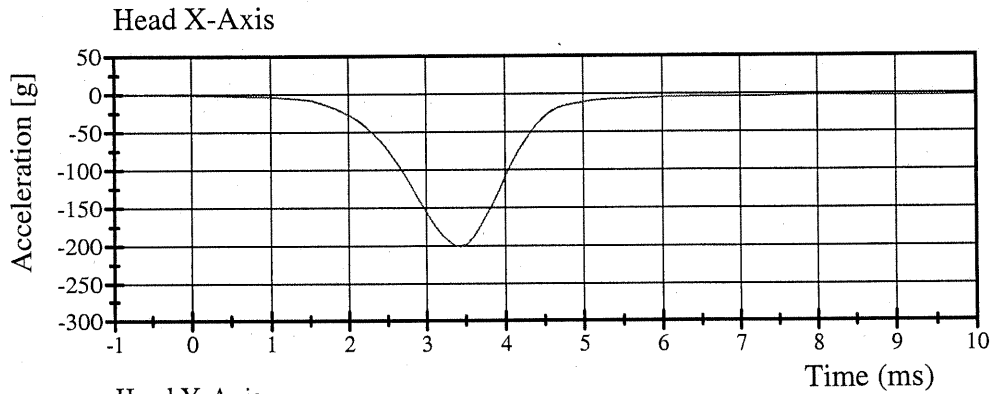


# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003



02.18.2003 16:03:08 600



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

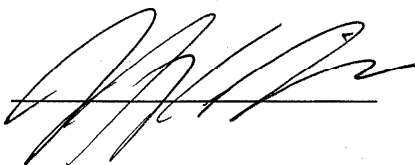
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

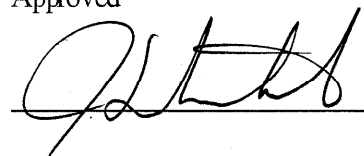
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	29 %	Yes
Impact Velocity	6.89 - 7.13 m/s	7.01 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	24.76 g	Yes
20 ms	17.60 - 22.60 g	21.43 g	Yes
30 ms	12.50 - 18.50 g	17.87 g	Yes
Max Pendulum Deceleration	29.00 g	25.30 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	17.83 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	34 - 42 ms	36.56 ms	Yes
D Plane Rotation			
Max	64 - 78 °	74.43 °	Yes
Time	57 - 64 ms	59.44 ms	Yes
Moment About Occipital Condyle			
Max	88.2 - 108.4 N·m	95.94 N·m	Yes
Time	47 - 58 ms	51.04 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	113 - 128 ms	118.72 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	97 - 107 ms	99.36 ms	Yes

## Comments:

Technician



Approved



02.18.2003 17:39:45 491



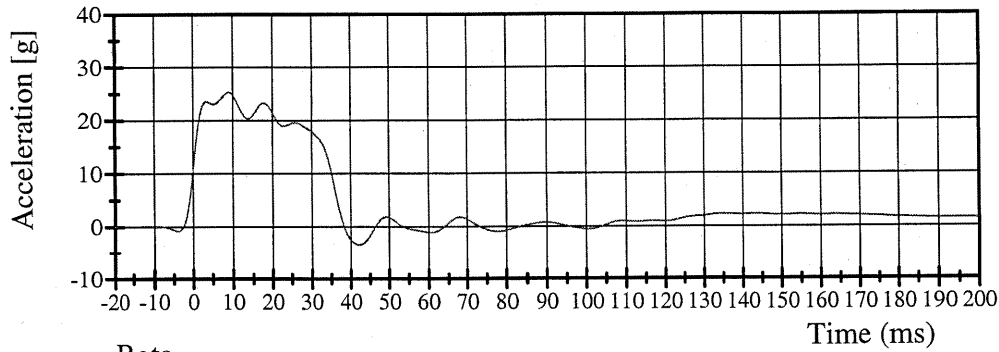
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

Pendulum Deceleration

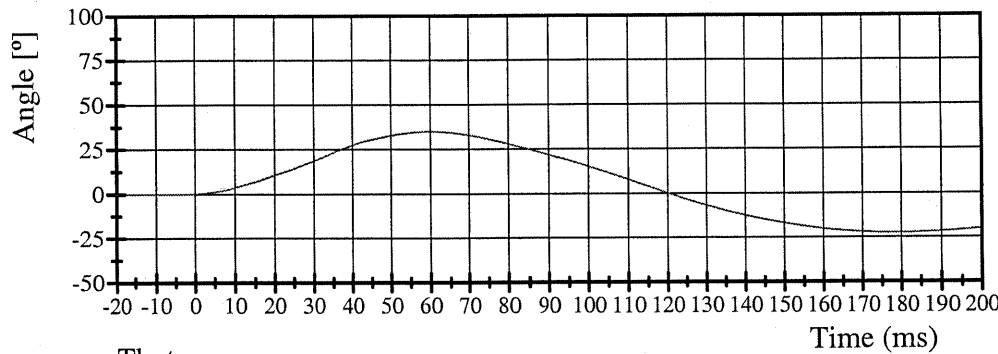


Filter Class: 60

Max: 25.3 g at 9.0 ms

Min: -3.4 g at 42.2 ms

Beta

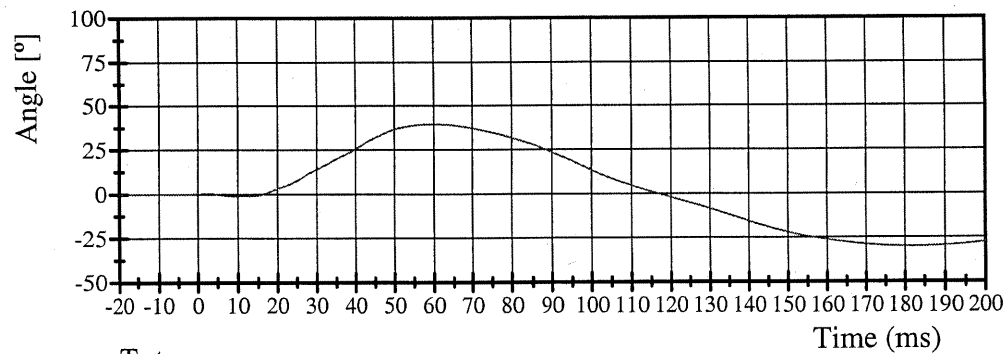


Filter Class: 60

Max: 35.0 ° at 59.8 ms

Min: -22.4 ° at 178.6 ms

Theta

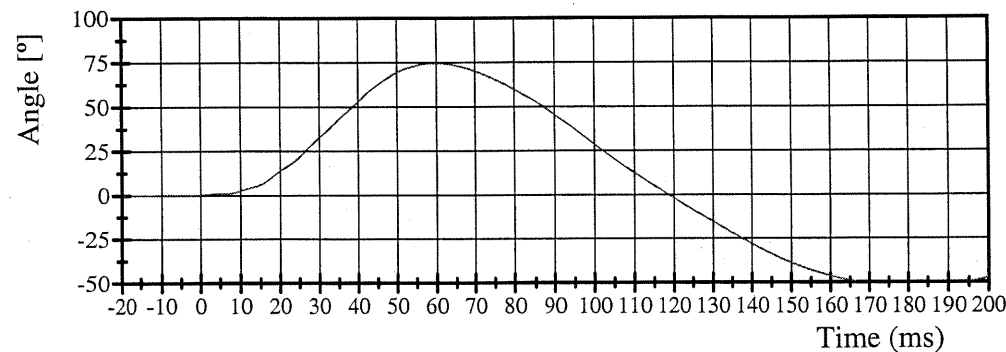


Filter Class: 60

Max: 39.4 ° at 59.1 ms

Min: -30.1 ° at 181.9 ms

Totan



Filter Class: 60

Max: 74.4 ° at 59.4 ms

Min: -52.4 ° at 180.7 ms

02.18.2003 17:39:47 491

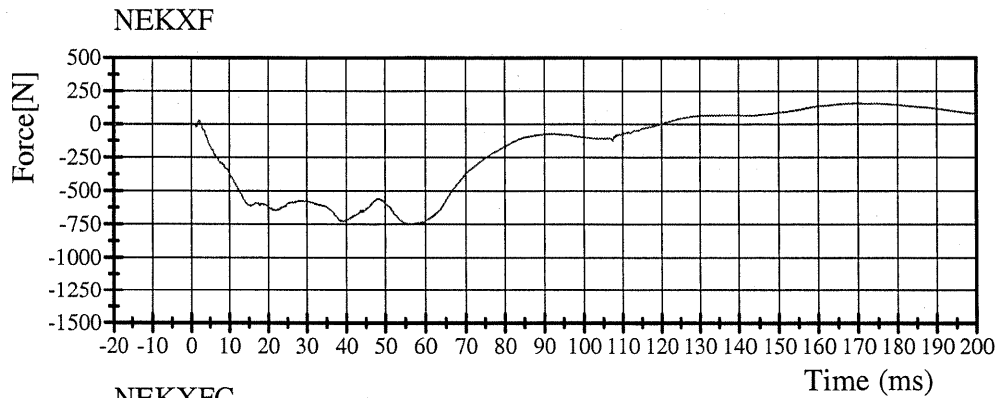


# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

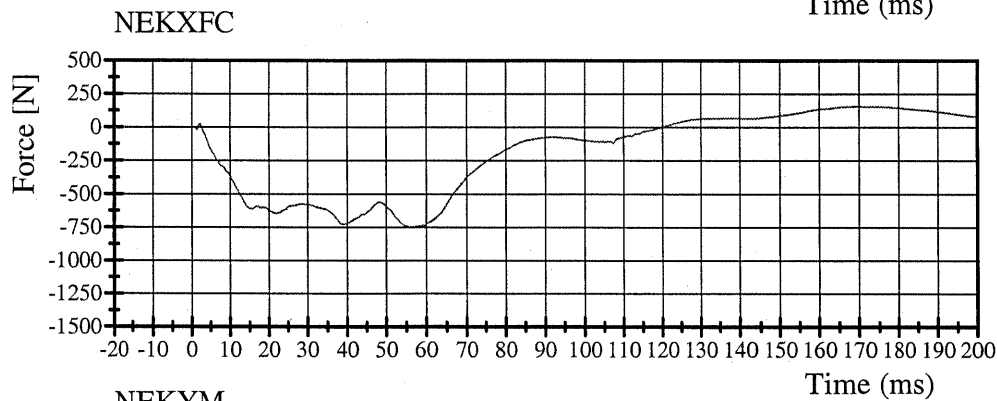
Test Date 02/18/2003



Filter Class: 1000

Max: 156.9 N at 169.1 ms

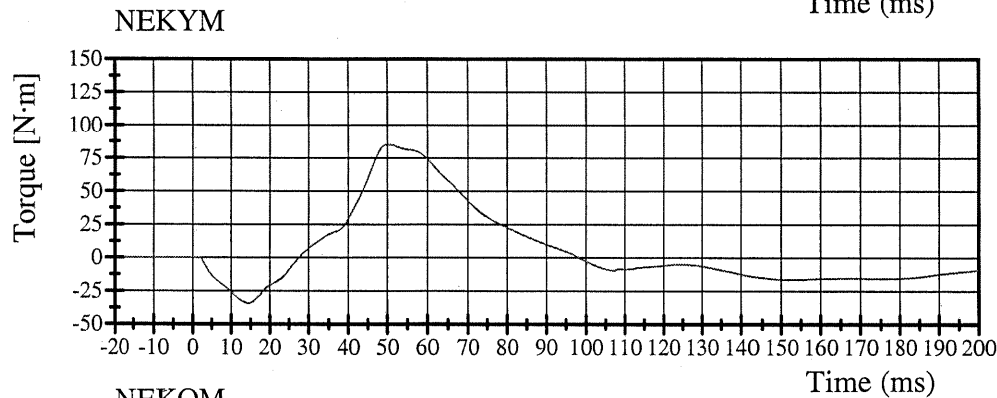
Min: -748.5 N at 56.6 ms



Filter Class: 600

Max: 156.6 N at 169.8 ms

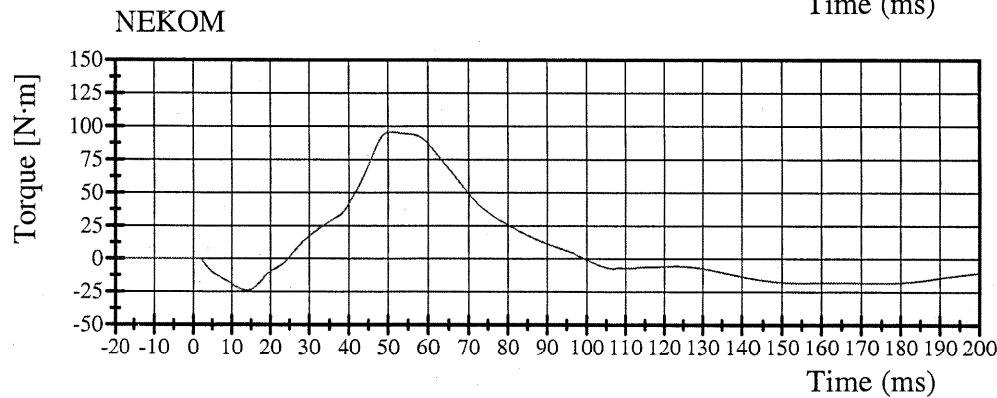
Min: -747.9 N at 56.5 ms



Filter Class: 600

Max: 85.1 N·m at 50.2 ms

Min: -34.4 N·m at 14.3 ms



Filter Class: 600

Max: 95.9 N·m at 51.0 ms

Min: -24.1 N·m at 13.9 ms

02.18.2003 17:39:48 491



# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

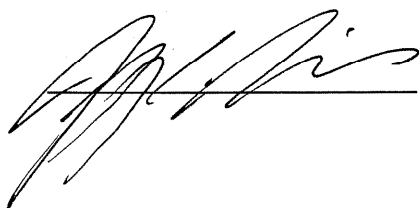
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

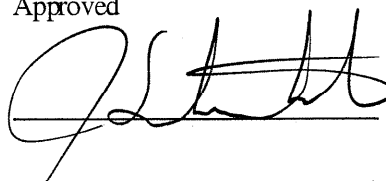
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	29 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.05 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	17.23 g	Yes
20 ms	14.00 - 19.00 g	15.47 g	Yes
30 ms	11.00 - 16.00 g	13.29 g	Yes
Max Pendulum Deceleration	22.00 g	17.91 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	13.26 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	45.76 ms	Yes
D Plane Rotation			
Max	81 - 106 °	95.27 °	Yes
Time	72 - 82 ms	80.48 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-63.17 N·m	Yes
Time	65 - 79 ms	76.48 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	165.92 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	142.32 ms	Yes

## Comments:

Technician



Approved



02.18.2003 18:09:34 568



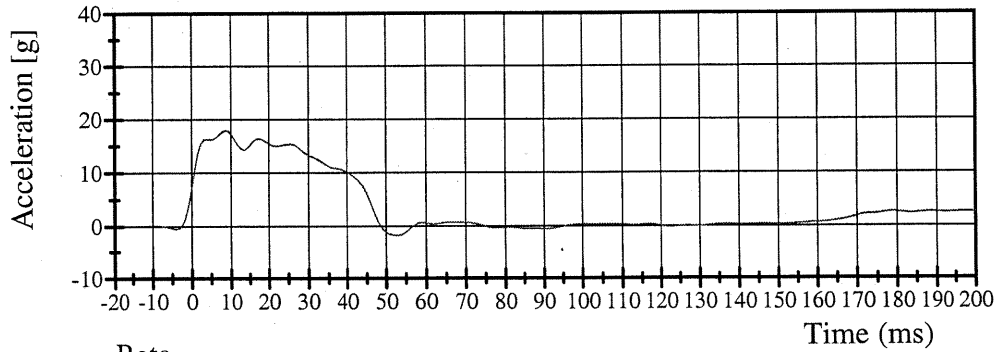
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

### Pendulum Deceleration

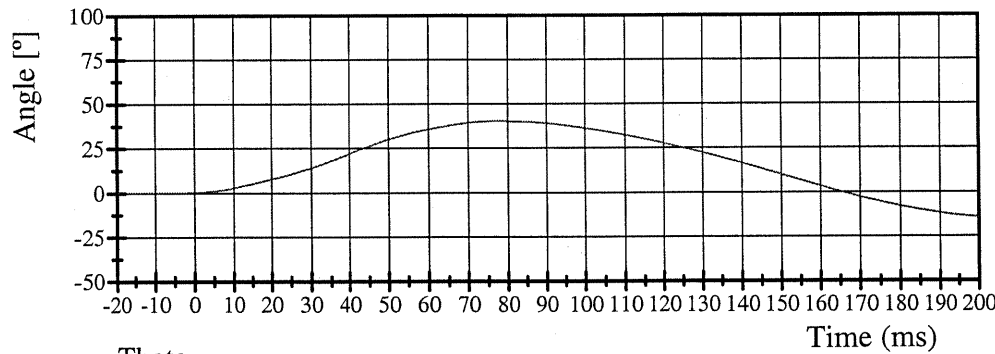


Filter Class: 60

Max: 17.9 g at 8.6 ms

Min: -1.7 g at 52.7 ms

### Beta

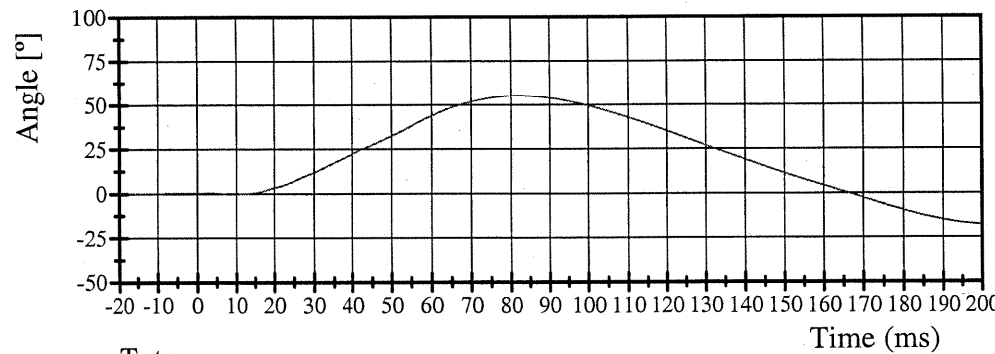


Filter Class: 60

Max: 40.3 ° at 77.5 ms

Min: -15.0 ° at 210.0 ms

### Theta

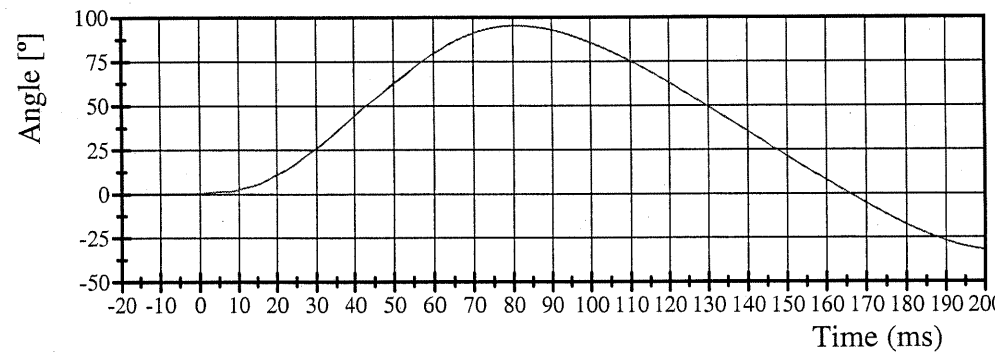


Filter Class: 60

Max: 55.2 ° at 81.8 ms

Min: -18.8 ° at 209.8 ms

### Totan



Filter Class: 60

Max: 95.3 ° at 80.5 ms

Min: -33.8 ° at 209.9 ms

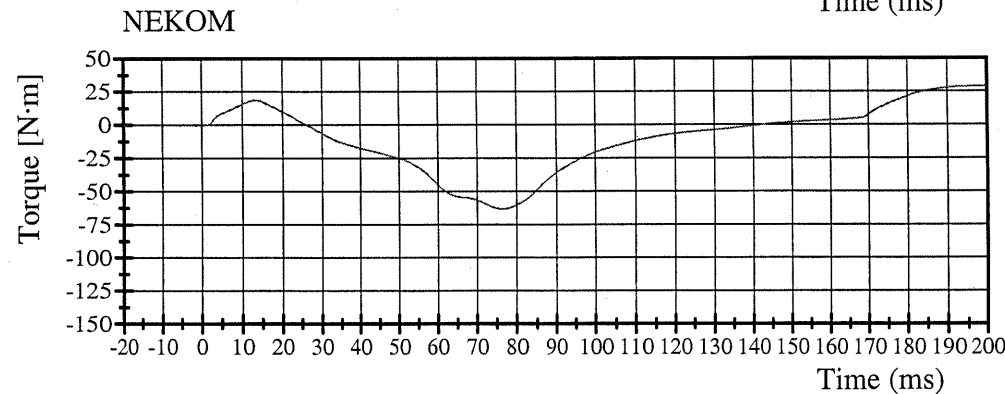
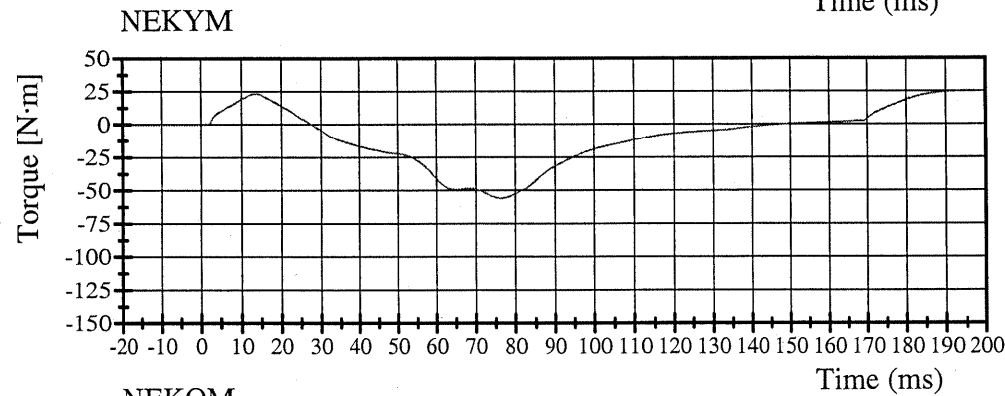
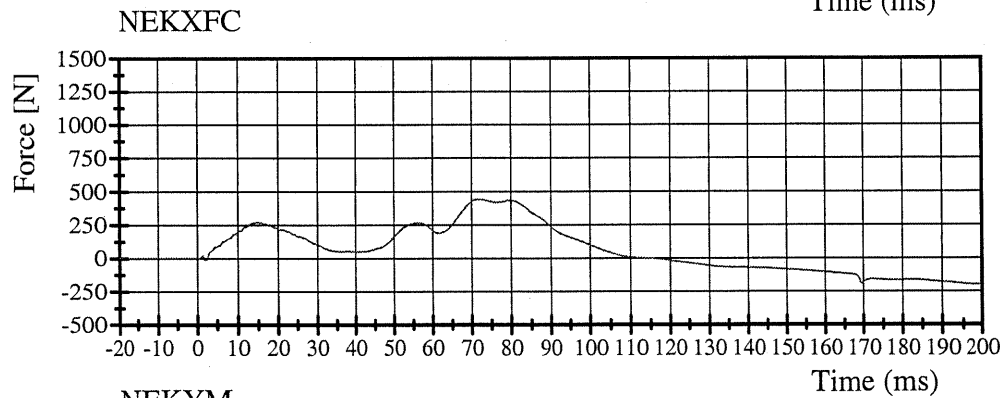
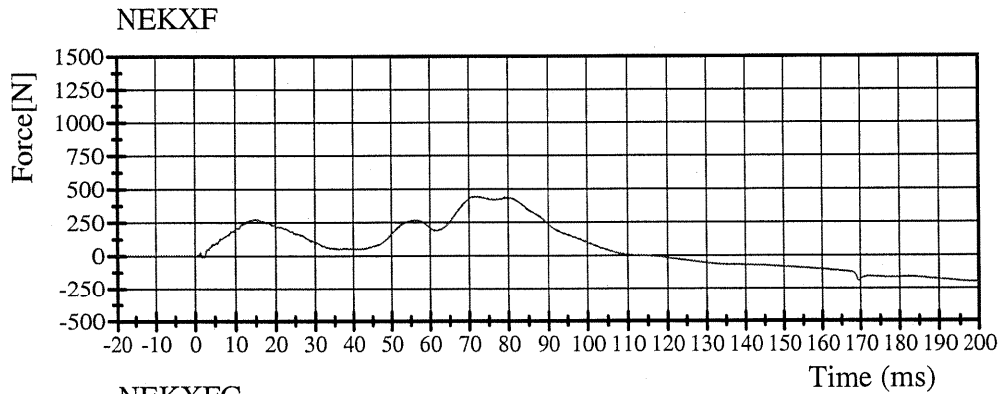


# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003



# Transportation Research Center Inc.

572E Thorax Test

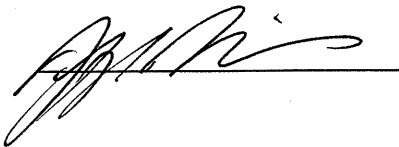
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/19/2003

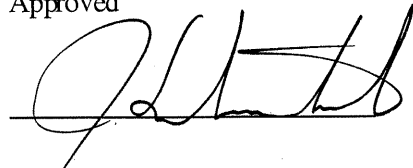
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.66 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-70.0 mm	Yes
Maximum Resistive Force	5160 - 5894 N	5649 N	Yes
Internal Hysteresis	69 - 85 %	71 %	Yes

## Comments:

Technician



Approved



02.20.2003 09:17:34 958

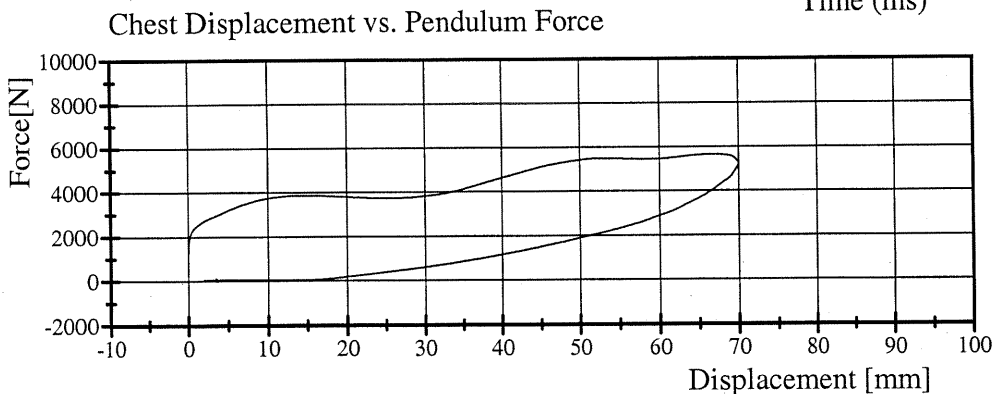
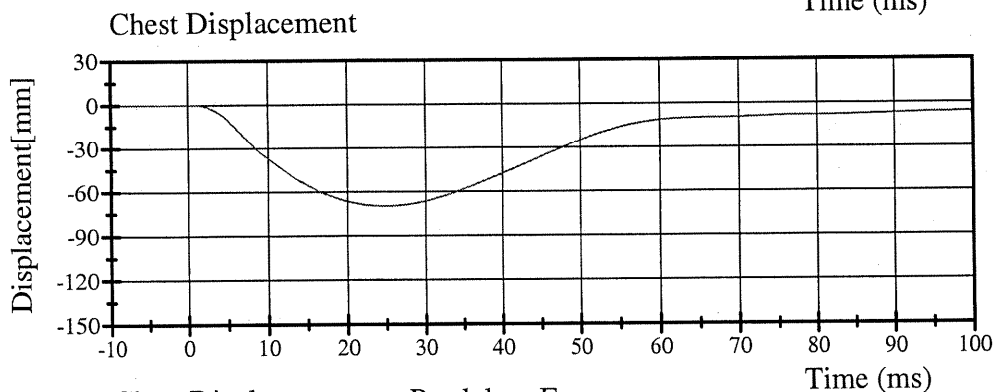
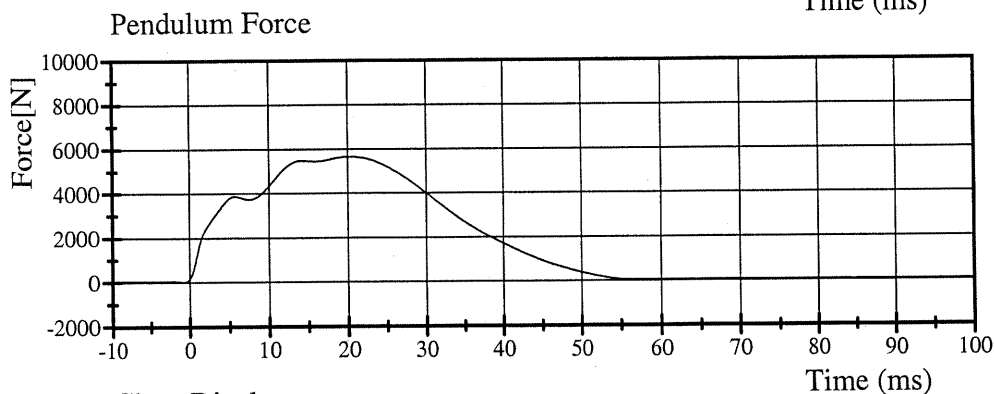
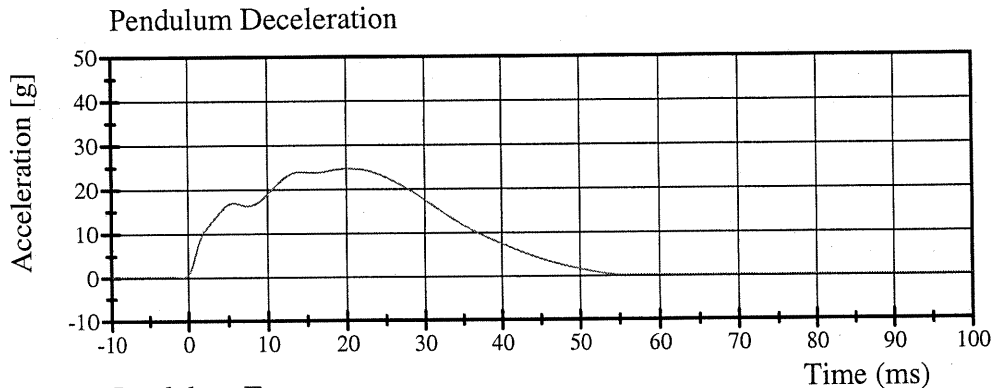


# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/19/2003



02.20.2003 09:17:36 958



# Transportation Research Center Inc

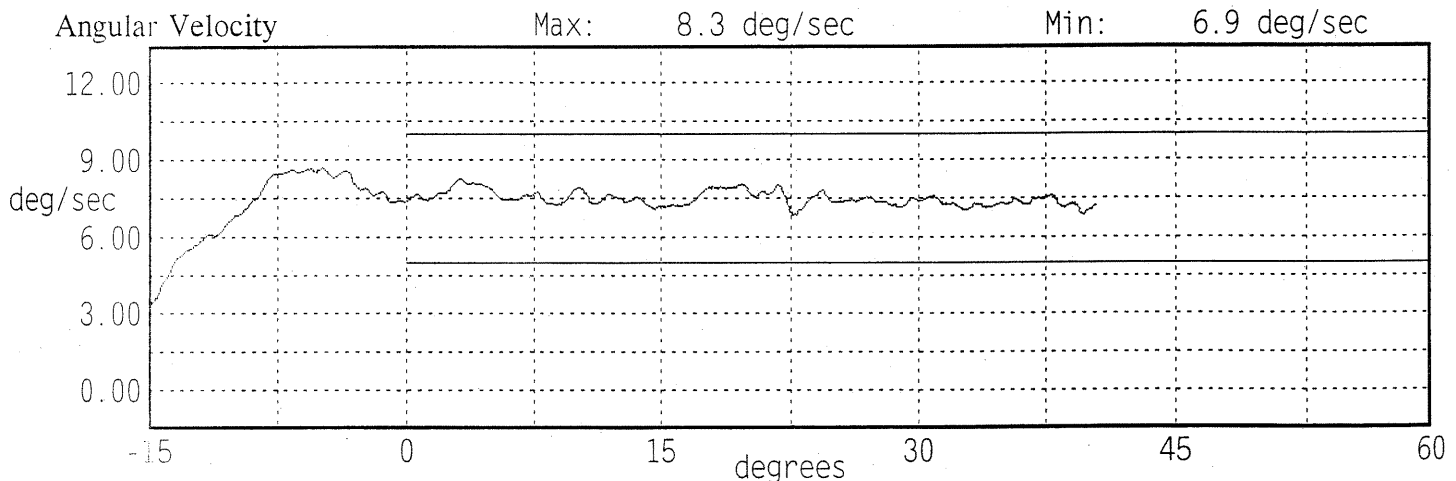
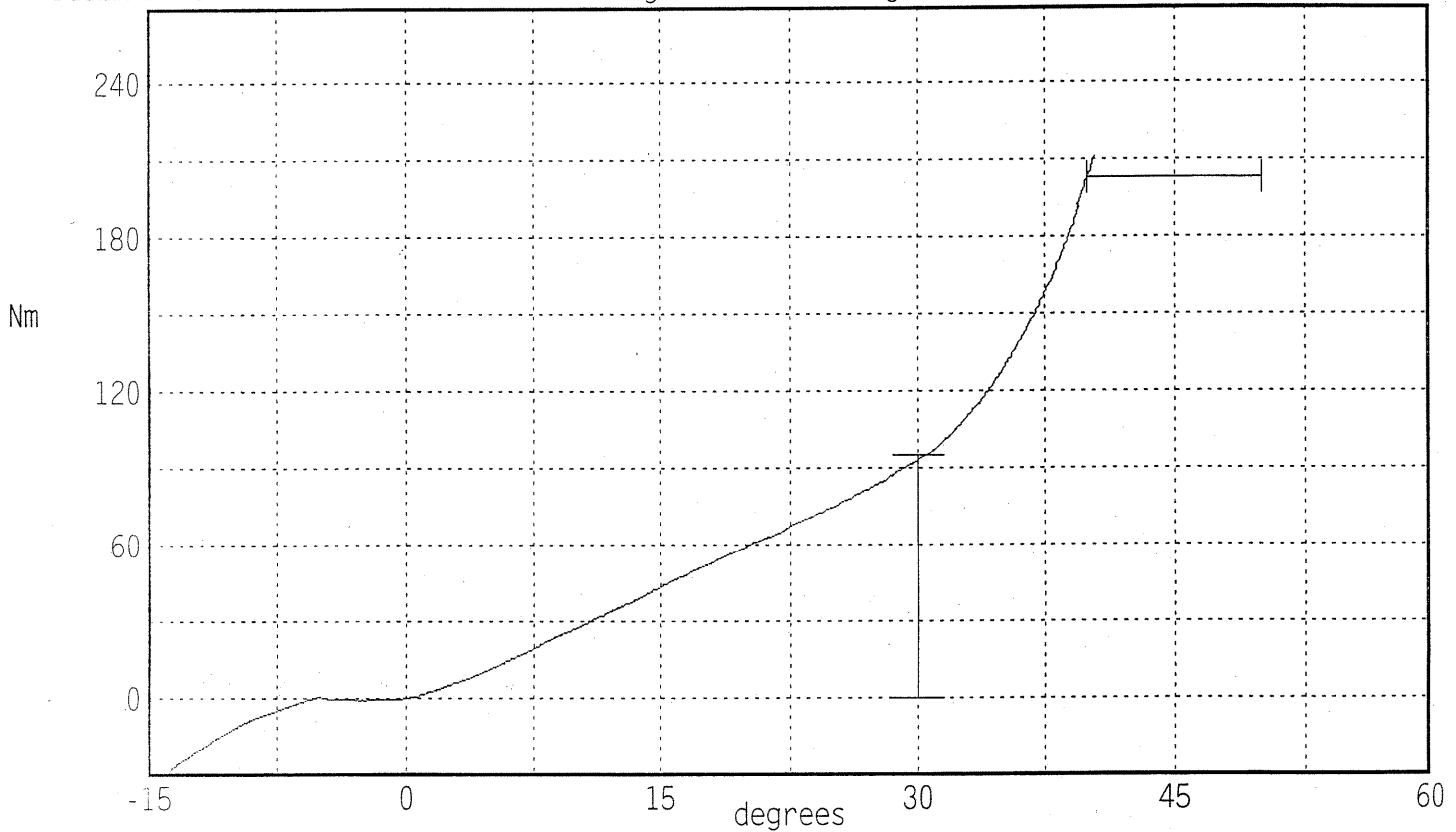
Hybrid III Hip Range of Motion

Serial Number: 090L  
 Test Number: 090C36  
 Comments:

Date: 02/18/2003  
 Time: 18:06

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	31 %	Pass
Moment at 30 deg	<= 94.9	93.4 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.1 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Moment About H-Point  
 Peak Moment: 211.2 Nm at 40.4 deg  
 Peak Angle: 40.4 deg at 211.2 Nm



# Transportation Research Center Inc

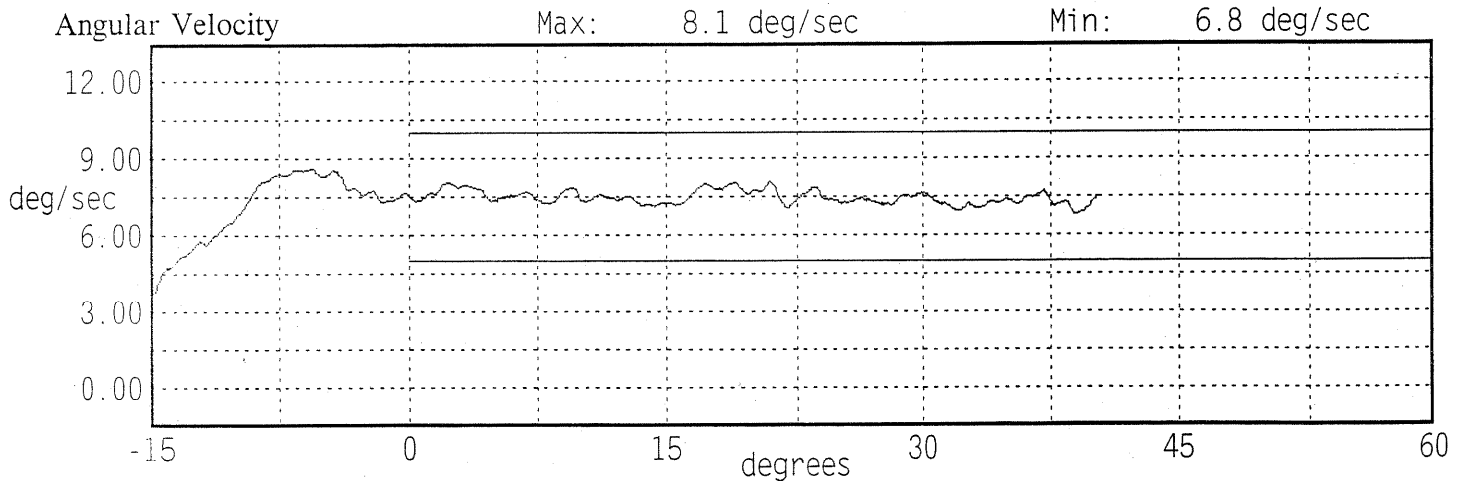
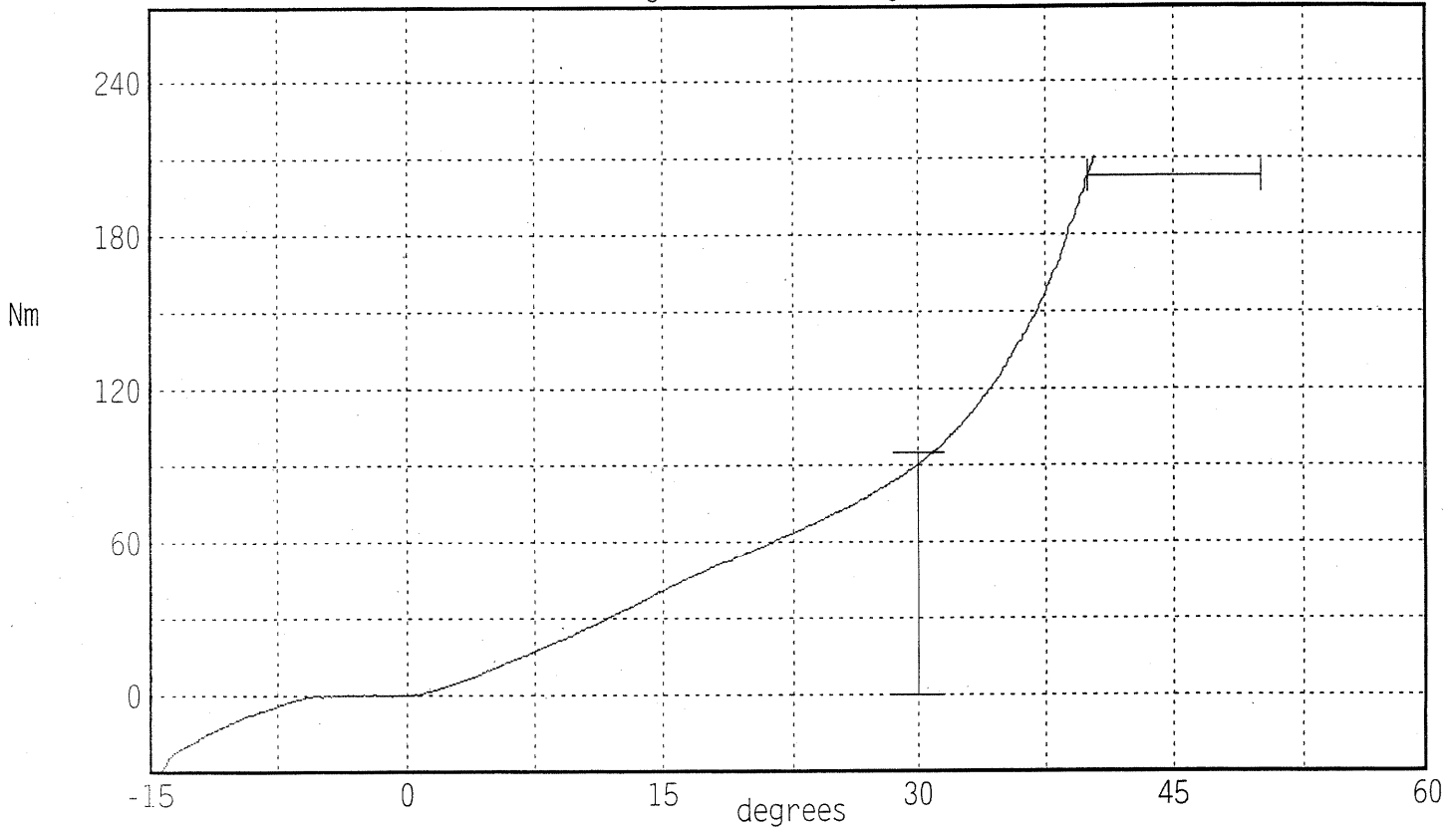
Hybrid III Hip Range of Motion

Serial Number: 090R  
Test Number: 090C36  
Comments:

Date: 02/18/2003  
Time: 17:08

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	31 %	Pass
Moment at 30 deg	<= 94.9	90.1 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.1 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Moment About H-Point  
Peak Moment: 210.3 Nm at 40.4 deg  
Peak Angle: 40.4 deg at 210.3 Nm



# Transportation Research Center Inc.

572E Left Knee Slider Test

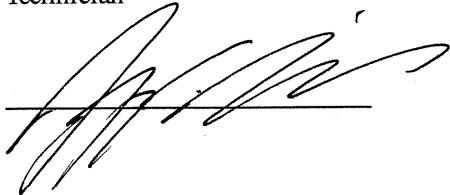
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

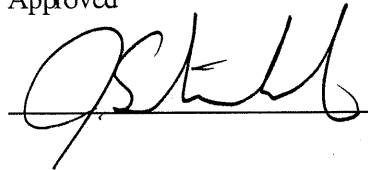
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Force At 10 mm Displacement	-1259 - (-1721) N	-1494 N	Yes
Force At 18 mm Displacement	-2268 - (-3096) N	-2871 N	Yes

## Comments:

Technician



Approved



02.18.2003 10:46:32 1811

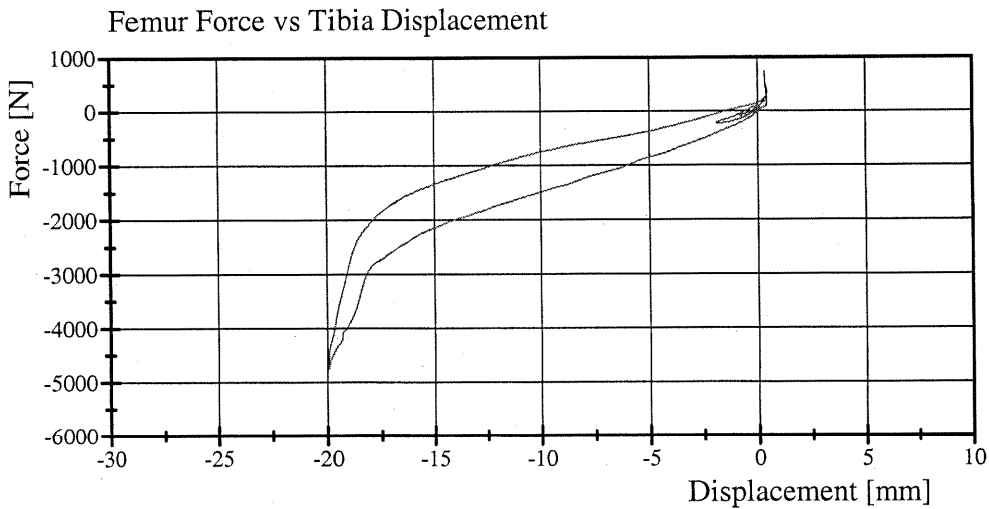
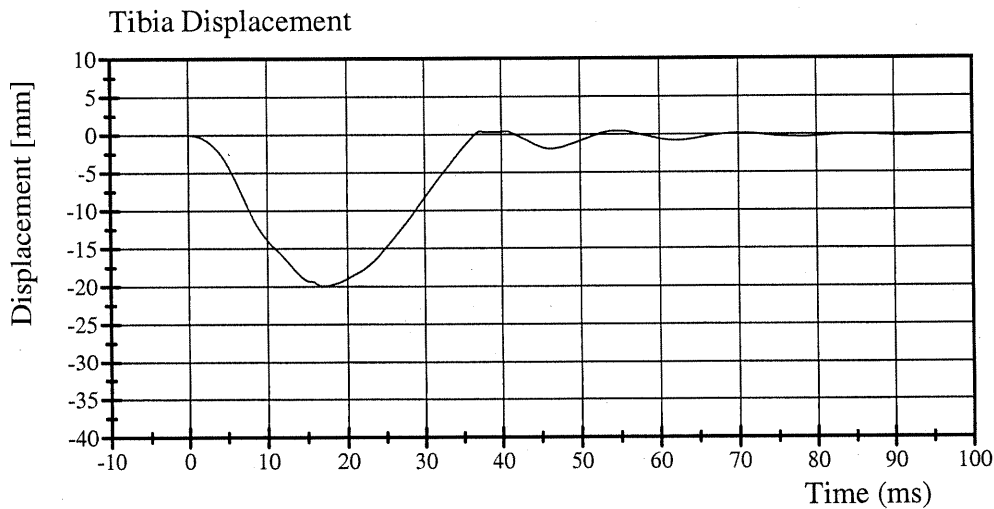
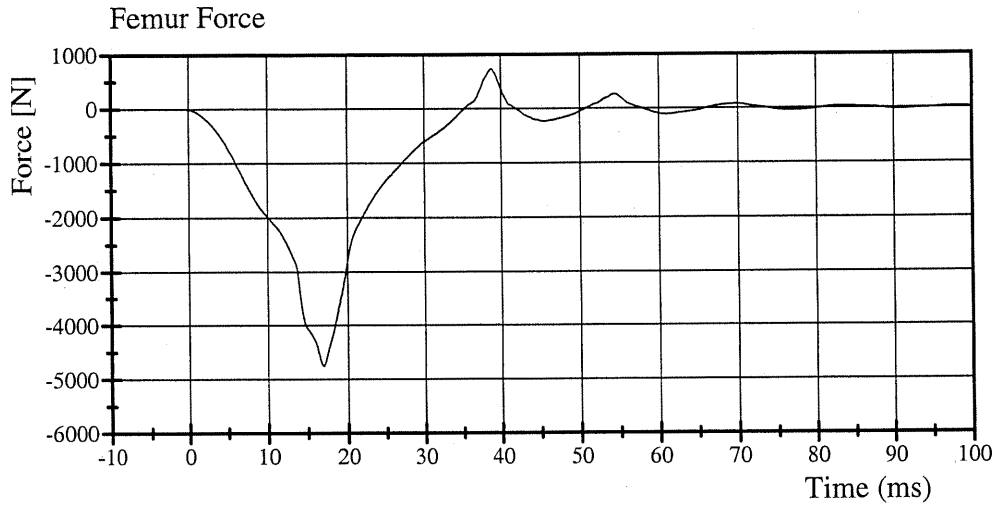


# Transportation Research Center Inc.

572E Left Knee Slider Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003



02.18.2003 10:46:34 1811



# Transportation Research Center Inc.

572E Right Knee Slider Test

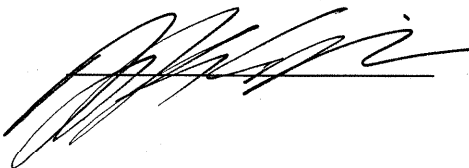
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

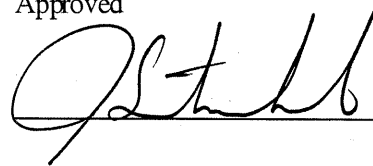
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Force At 10 mm Displacement	-1259 - (-1721) N	-1494 N	Yes
Force At 18 mm Displacement	-2268 - (-3096) N	-3067 N	Yes

## Comments:

Technician



Approved



02.18.2003 11:11:17 1806

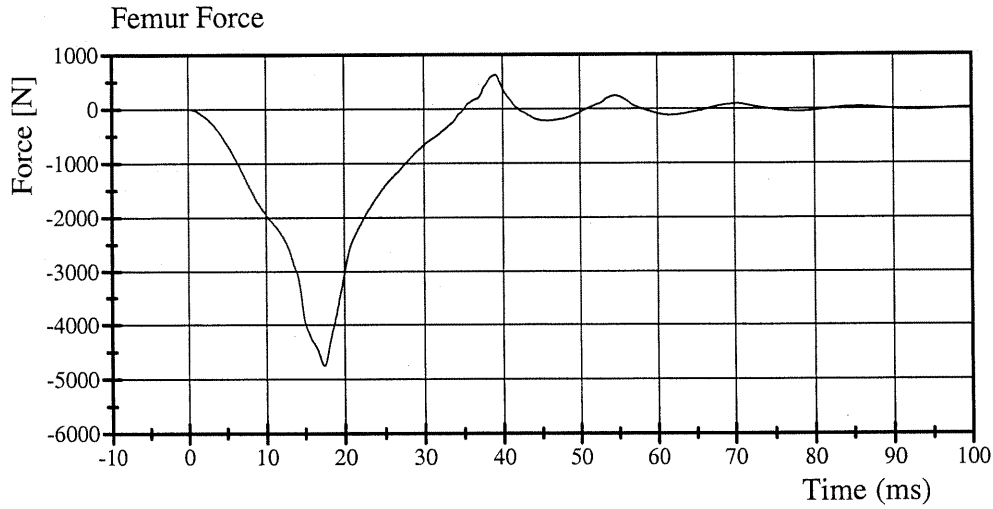


# Transportation Research Center Inc.

572E Right Knee Slider Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

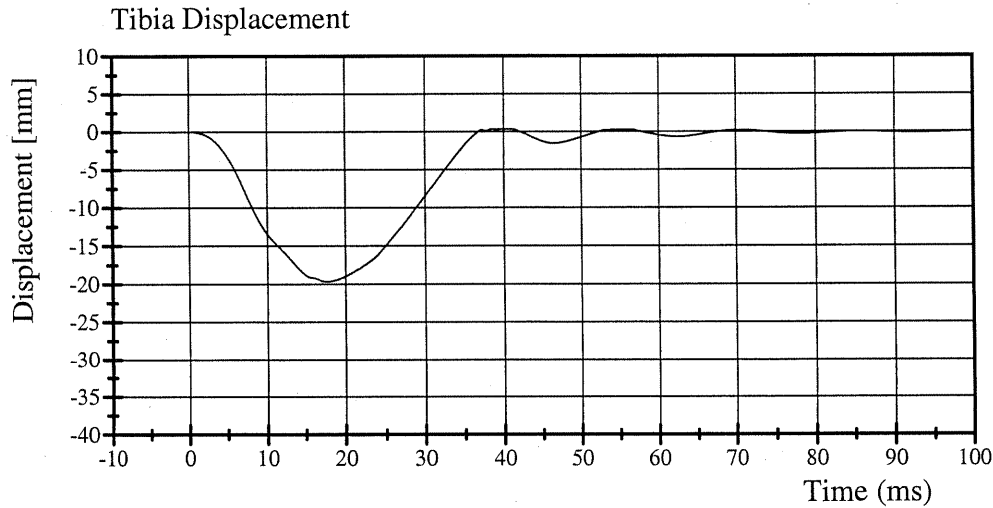
Test Date 02/18/2003



Filter Class: 600

Max: 628.9 N at 39.0 ms

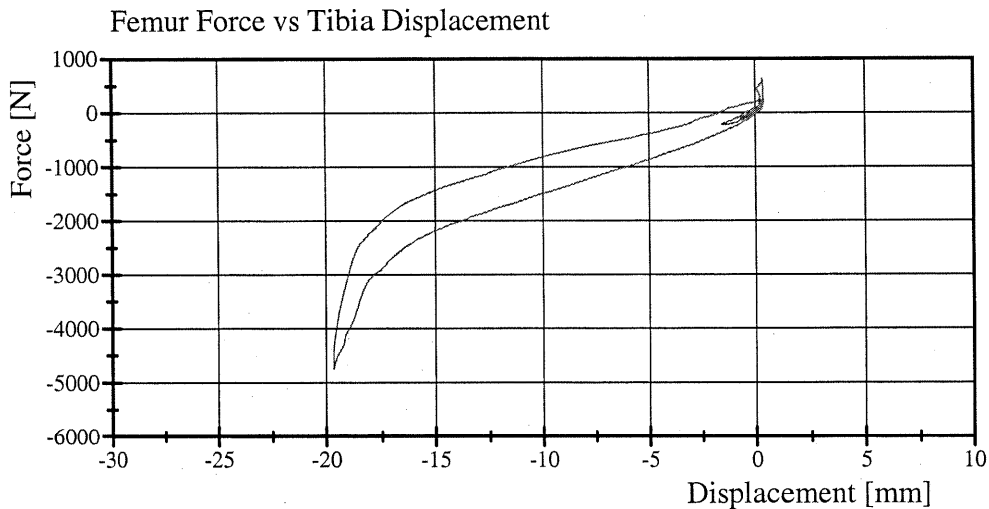
Min: -4753.2 N at 17.4 ms



Filter Class: 600

Max: 0.4 mm at 40.6 ms

Min: -19.7 mm at 17.8 ms



02.18.2003 11:11:20 1806



# Transportation Research Center Inc.

572E Left Knee Test

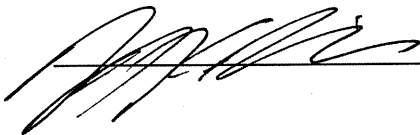
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

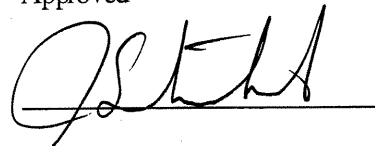
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.08 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4716 - 5782 N	5274 N	Yes

## Comments:

Technician



Approved



02.18.2003 13:38:44 2341



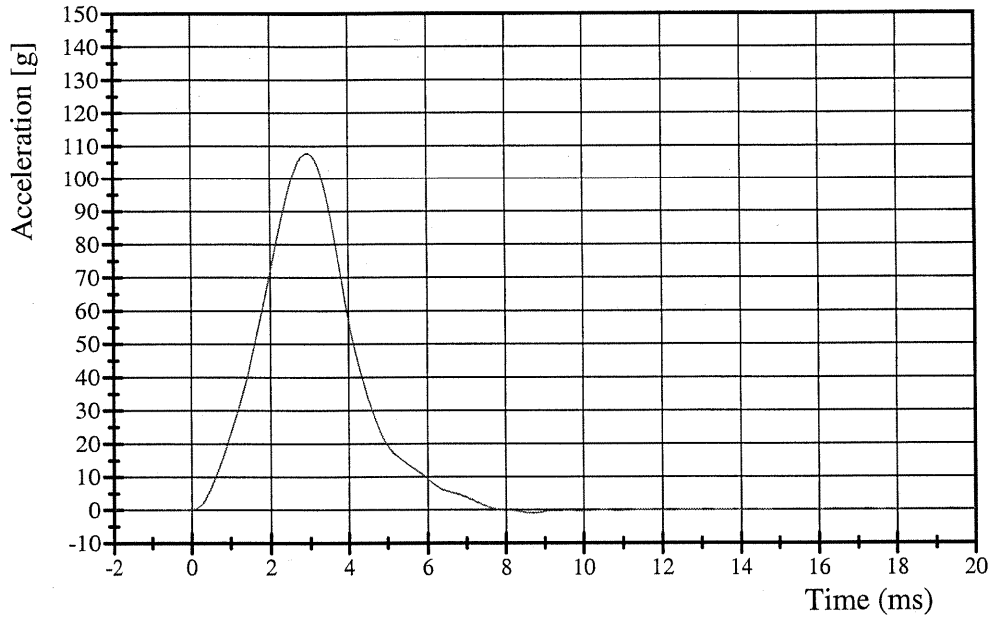
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

### Pendulum Deceleration

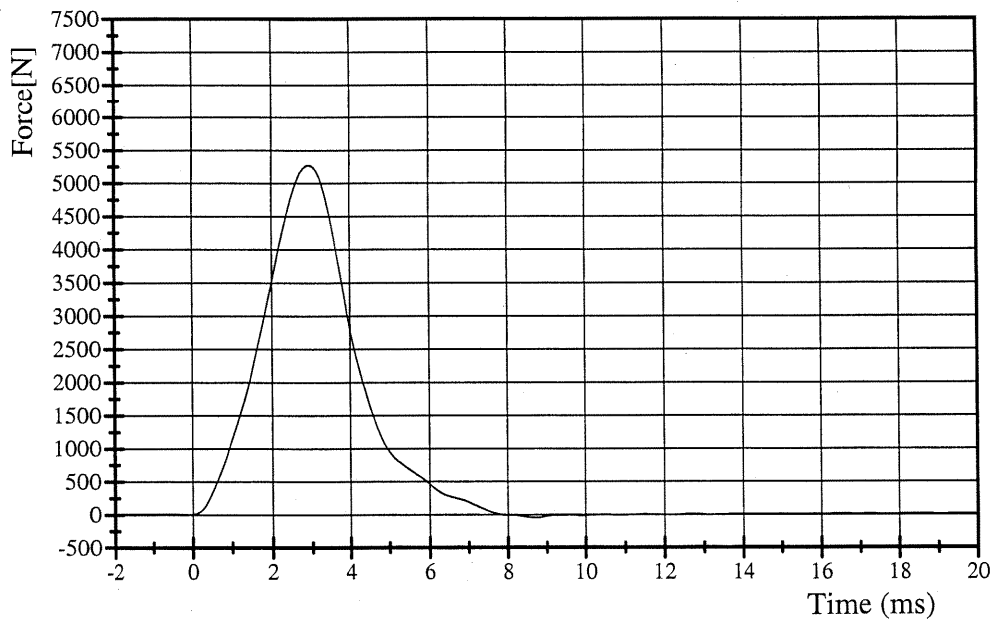


Filter Class: 600

Max: 107.8 g at 3.0 ms

Min: -1.0 g at 8.7 ms

### Pendulum Force



Filter Class: 600

Max: 5274.1 N at 3.0 ms

Min: -48.6 N at 8.7 ms

02.18.2003 13:38:45 2341



# Transportation Research Center Inc.

572E Right Knee Test

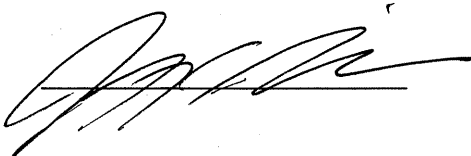
HIII 50th Male Serial No. 090 Calibration No. 36 - 1

Test Date 02/18/2003

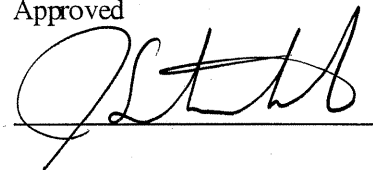
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.08 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4716 - 5782 N	5517 N	Yes

## Comments:

Technician



Approved



02.18.2003 13:23:01 2340

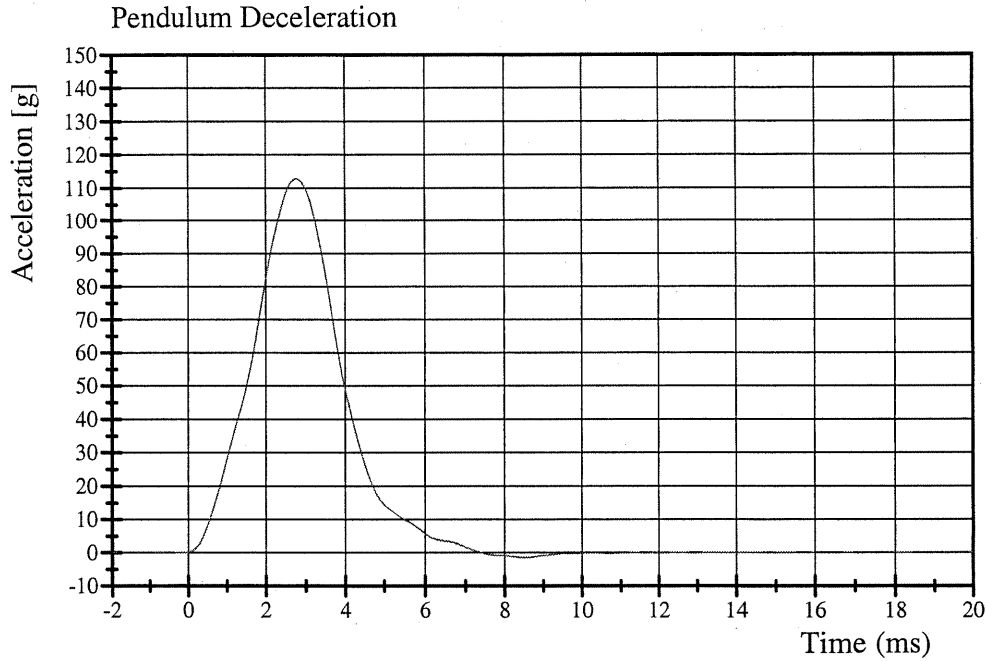


# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 090 Calibration No. 36 - 1

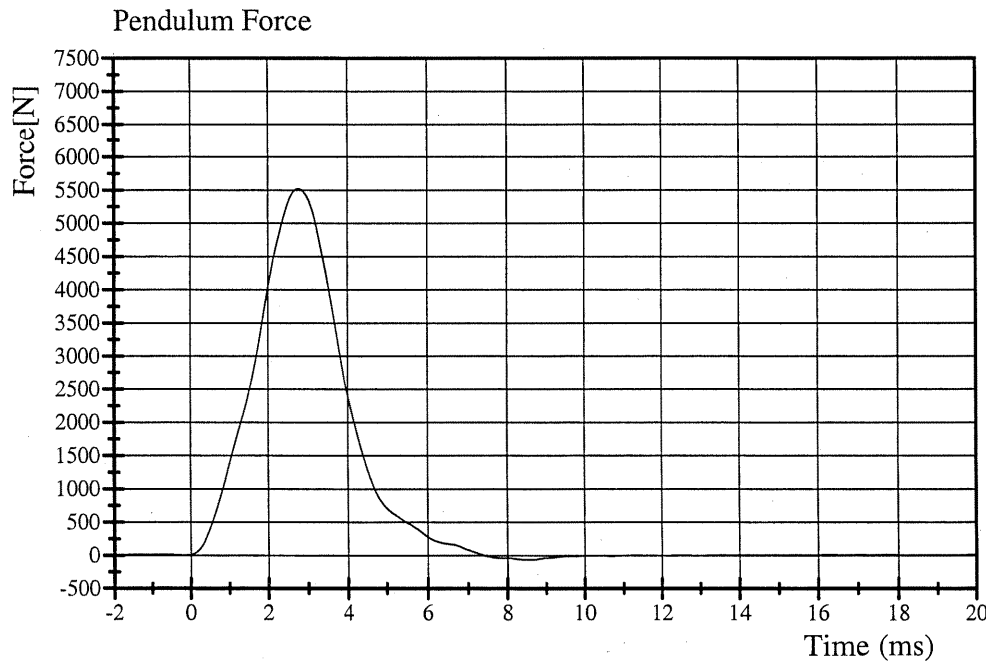
Test Date 02/18/2003



Filter Class: 600

Max: 112.7 g at 2.8 ms

Min: -1.4 g at 8.6 ms



Filter Class: 600

Max: 5516.8 N at 2.8 ms

Min: -67.4 N at 8.6 ms

02.18.2003 13:23:03 2340



Pre-test Dummy Configuration and Performance Verification Data

Passenger Dummy S/N: 083

**Transportation Research Center Inc.**

**III 95th Dummy**

**External Dimensions**

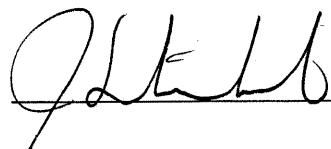
**Serial No. 083 Calibration No. 07**

<b>Test Parameter</b>	<b>Dimension</b>	<b>Specification</b>	<b>Results</b>	<b>Pass</b>
Total Sitting Height	A	927.1 - 942.3 mm	936 mm	Yes
Shoulder Pivot Height	B	541.0 - 556.2 mm	551 mm	Yes
H-Point Height	C	101.6 - 111.8 mm	105 mm	Yes
H-Point From Seatback	D	137.1 - 147.3 mm	140 mm	Yes
Shoulder Pivot From Backline	E	109.3 - 119.3 mm	115 mm	Yes
Thigh Clearance	F	160.0 - 175.2 mm	168 mm	Yes
Back Of Elbow To Wrist Pivot	G	307.4 - 317.4 mm	311 mm	Yes
Skull Cap To Backline	H	86.4 - 91.4 mm	88 mm	Yes
Shoulder-Elbow Length	I	348.0 - 363.2 mm	354 mm	Yes
Elbow Rest Height	J	208.3 - 223.5 mm	215 mm	Yes
Buttock Knee Length	K	624.8 - 650.2 mm	634 mm	Yes
Popliteal Height	L	457.2 - 482.6 mm	469 mm	Yes
Knee Pivot Height	M	520.7 - 546.1 mm	531 mm	Yes
Buttock Popliteal Length	N	490.2 - 515.6 mm	499 mm	Yes
Chest Depth	O	284.5 - 299.7 mm	292 mm	Yes
Foot Length	P	251.5 - 266.7 mm	258 mm	Yes
Buttock to Knee Pivot Length	R	556.3 - 581.7 mm	576 mm	Yes
Head Breadth	S	148.9 - 160.0 mm	155 mm	Yes
Head Depth	T	190.5 - 200.7 mm	194 mm	Yes
Hip Breadth	U	396.3 - 411.5 mm	408 mm	Yes
Shoulder Breadth	V	467.4 - 482.6 mm	475 mm	Yes
Foot Breadth	W	91.5 - 106.7 mm	96 mm	Yes
Head Circumference	X	566.4 - 576.6 mm	571 mm	Yes
Chest Circumference	Y	1120.2 - 1150.6 mm	1130 mm	Yes
Waist Circumference	Z	988.1 - 1018.5 mm	999 mm	Yes
Location For Chest Circumference	AA	502.9 - 513.1 mm	508 mm	Yes
Location For Waist Circumference	BB	274.3 - 284.5 mm	279 mm	Yes

Technician



Approved




# Transportation Research Center Inc.

Head Drop Test


HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/07/2003

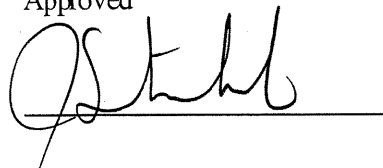
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Peak Resultant Acceleration	220 - 265 g	254.0 g	Yes
Peak Lateral Acceleration	15 g Max	6.3 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

## Comments:

Technician



Approved



02.07.2003 09:08:04 611

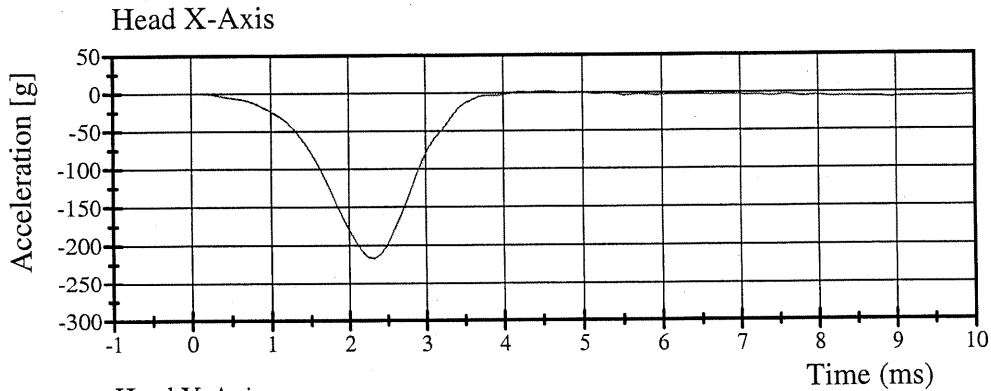


# Transportation Research Center Inc.

## Head Drop Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

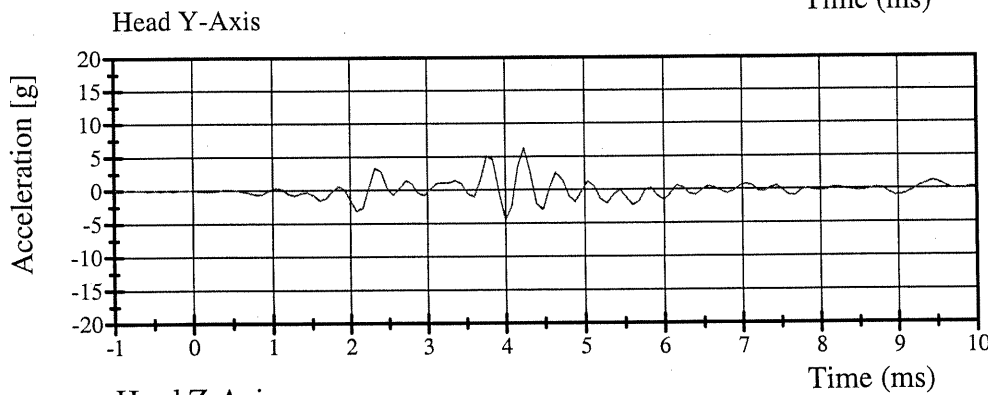
Test Date 02/07/2003



Filter Class: 1000

Max: 2.1 g at 4.6 ms

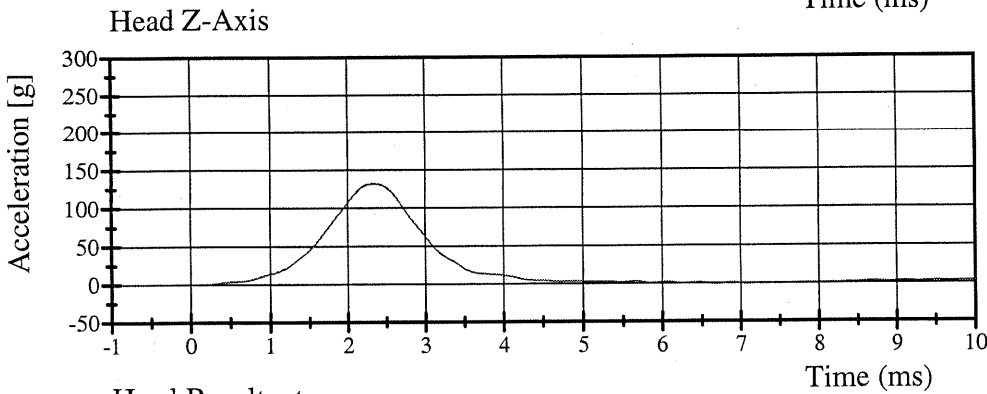
Min: -217.0 g at 2.3 ms



Filter Class: 1000

Max: 6.3 g at 4.2 ms

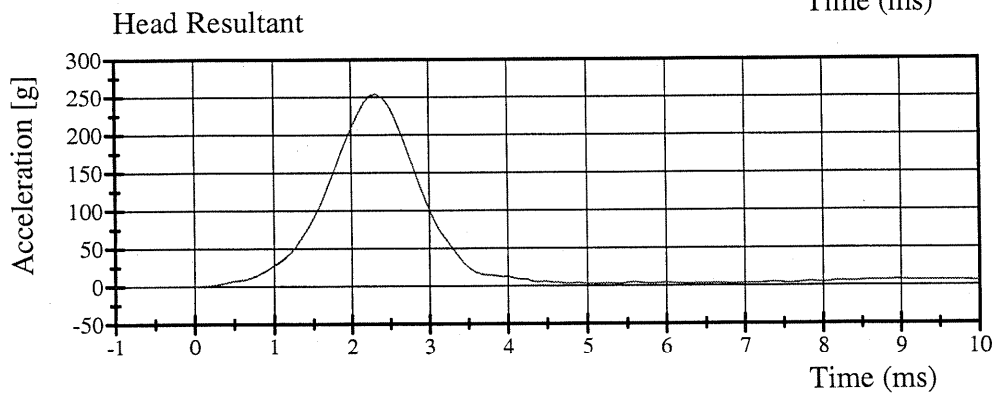
Min: -4.5 g at 4.0 ms



Filter Class: 1000

Max: 132.1 g at 2.3 ms

Min: -0.8 g at 7.1 ms



Filter Class: 1000

Max: 254.0 g at 2.3 ms

Min: 0.0 g at 2.3 ms

02.07.2003 09:08:07 611



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III LARGE MALE

13-FEB-03

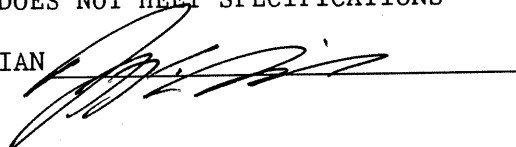
NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 083C7NF12 LG. MALE SN083 NECK FLEX CAL07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	31.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	6.93 M/S
INTEGRATED PENDULUM VELOCITY	10 MS   2.2 - 2.7 M/S	2.20 M/S
	20 MS   4.0 - 5.0 M/S	4.40 M/S
	30 MS   5.7 - 6.9 M/S	6.31 M/S
PEAK D-PLANE ROTATION	61 - 75 DEG.	63.61 DEG.
ROTATION ANGLE DECAY TIME FROM PEAK TO ZERO	50 - 60 MS	59.68 MS
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	110 - 130 NM	102.42 NM *
POSITIVE MOMENT DECAY TIME FROM PEAK TO ZERO	40 - 50 MS	49.20 MS
TIME OF PEAK ROTATION AFTER PEAK MOMENT	1 - 11 MS	6.64 MS

\* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 021303.1327;2

Neck performance compared to SAE User's Manual for the Hybrid III Large Male Test Dummy, September 1998, draft.

# Transportation Research Center Inc.

Neck Flexion Test - 6 Channel Transducer

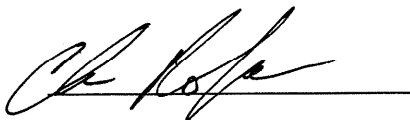
HIII 95th Male Serial No. 083 Calibration No. 07 - 12

Test Date 02/13/2003

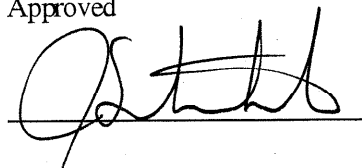
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Impact Velocity	6.89 - 7.13 m/s	6.95 m/s	Yes
Integrated Pendulum Velocity			
10 ms	2.20 - 2.70 m/s	2.21 m/s	Yes
20 ms	4.00 - 5.00 m/s	4.42 m/s	Yes
30 ms	5.70 - 6.90 m/s	6.33 m/s	Yes
Peak D Plane Rotation	61 - 75 °	63.6 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	110.0 - 130.0 N·m	101.62 N·m	No
Positive Moment Decay Time To 10 N·m	77 - 97 ms	90.64 ms	Yes

## Comments:

Technician



Approved



02.14.2003 07:35:31 490

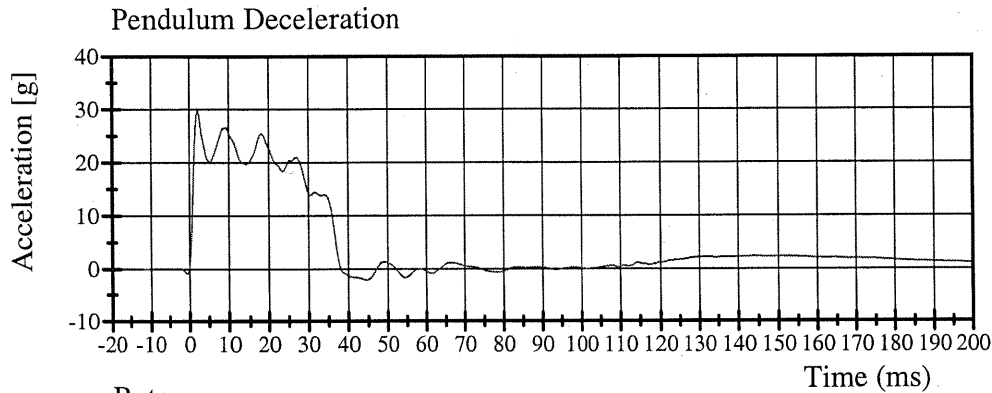


# Transportation Research Center Inc.

Neck Flexion Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 12

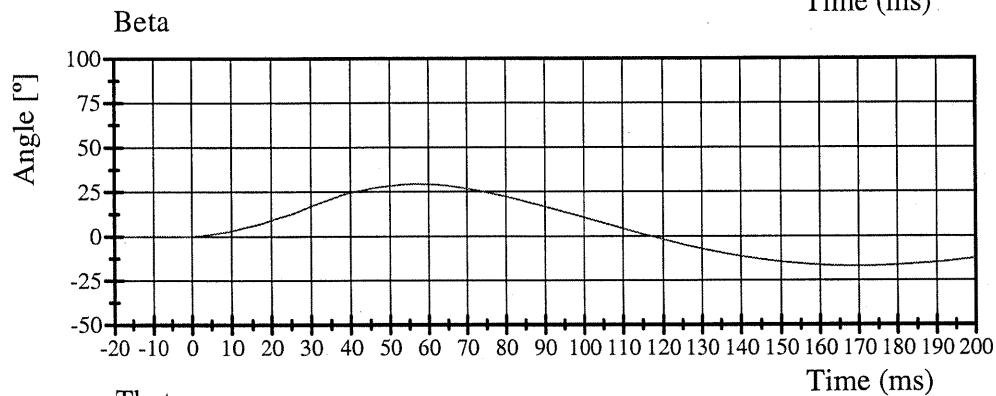
Test Date 02/13/2003



Filter Class: 180

Max: 29.7 g at 2.1 ms

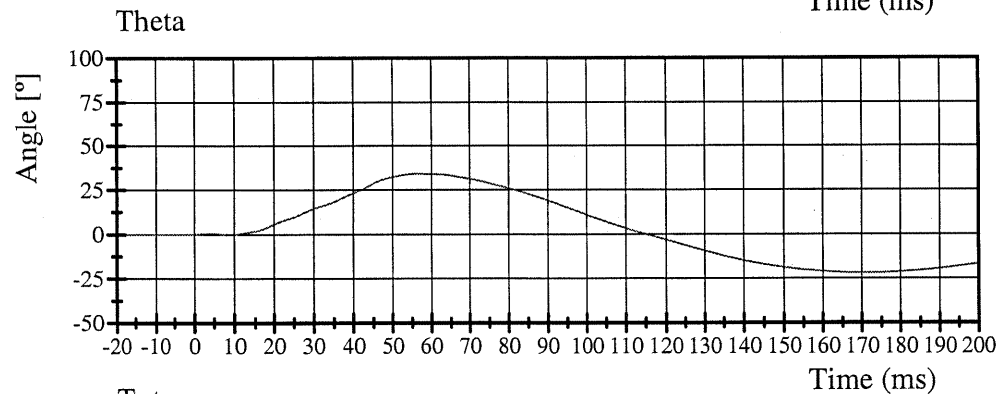
Min: -2.1 g at 44.8 ms



Filter Class: 60

Max: 29.4 ° at 56.6 ms

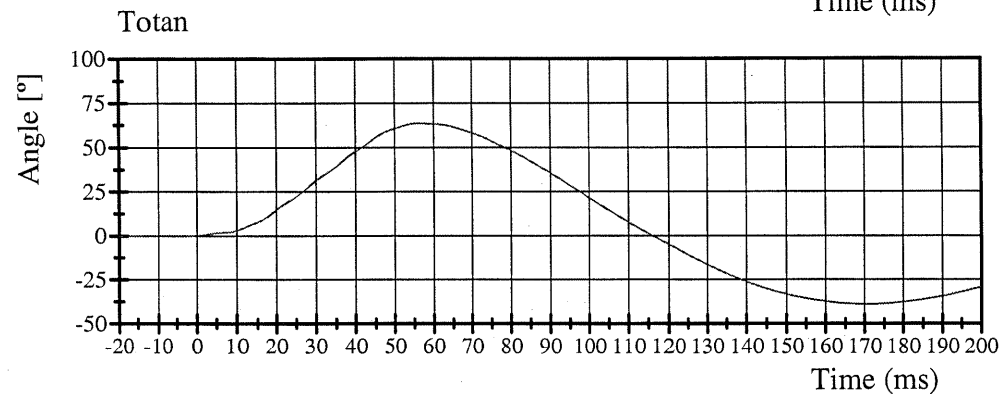
Min: -17.0 ° at 170.3 ms



Filter Class: 60

Max: 34.2 ° at 56.4 ms

Min: -21.8 ° at 171.5 ms



Filter Class: 60

Max: 63.6 ° at 56.4 ms

Min: -38.8 ° at 171.0 ms

02.14.2003 07:35:32 490

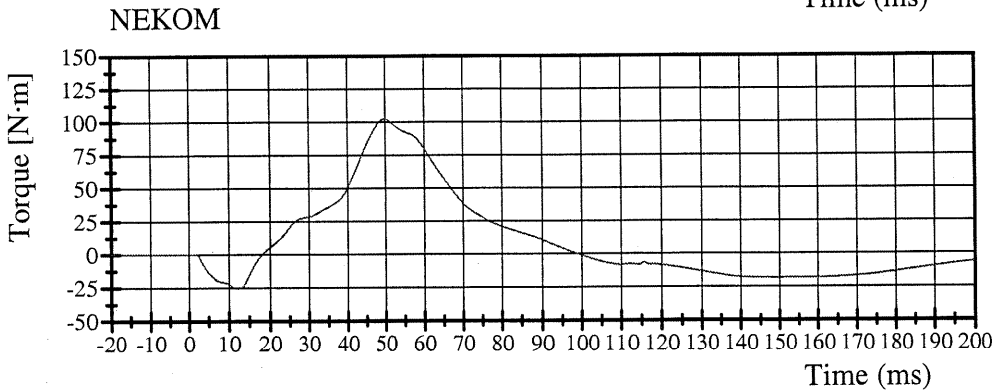
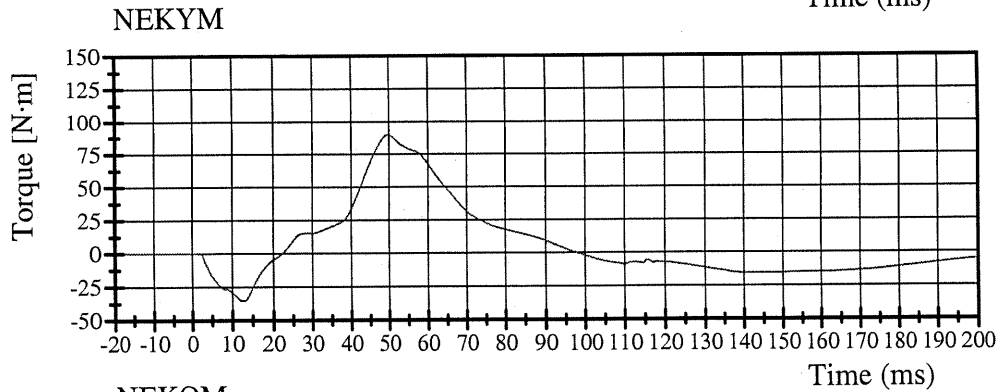
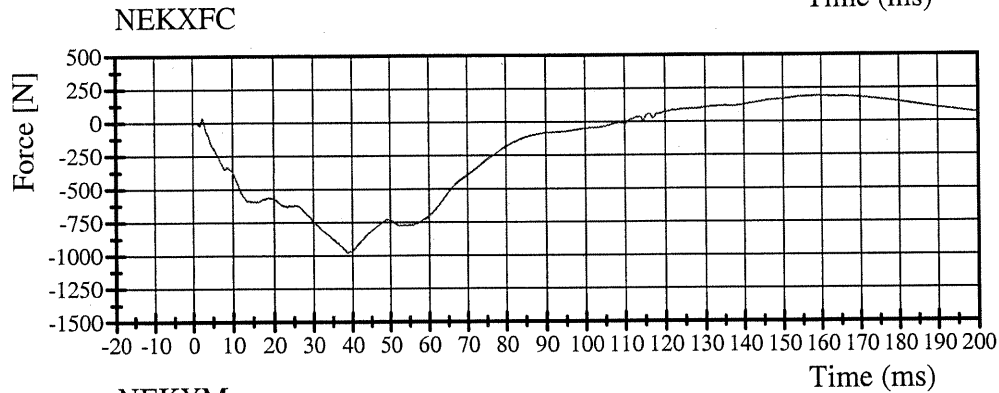
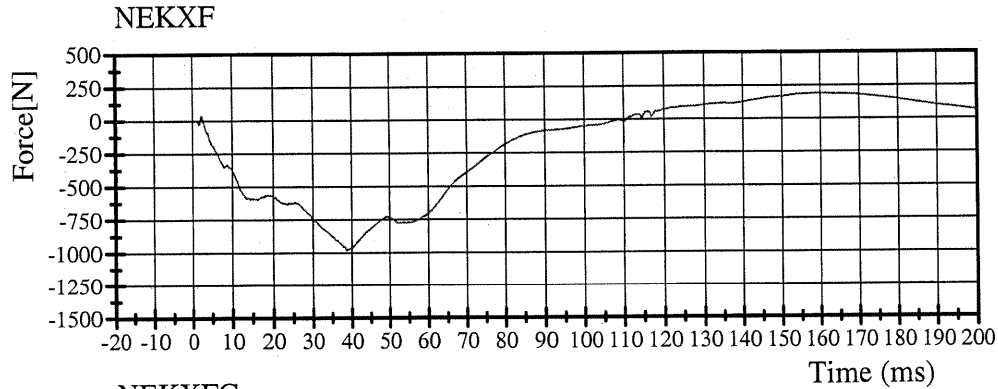


# Transportation Research Center Inc.

## Neck Flexion Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 12

Test Date 02/13/2003



02.14.2003 07:35:34 490



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III LARGE MALE

13-FEB-03

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 083C07NE1 L.MALE SN083 NECK EXT CAL07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	31.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS   1.8 - 2.2 M/S	1.94 M/S
	20 MS   3.4 - 4.2 M/S	3.80 M/S
	30 MS   4.8 - 5.8 M/S	5.41 M/S
PEAK D-PLANE ROTATION	81 - 98 DEG.	87.87 DEG.
ROTATION ANGLE DECAY TIME FROM PEAK TO ZERO	75 - 90 MS	82.16 MS
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	-87 / -69 NM	-63.30 NM *
NEGATIVE MOMENT DECAY TIME FROM PEAK TO ZERO	53 - 66 MS	64.40 MS
TIME OF PEAK ROTATION AFTER PEAK MOMENT	0 - 10 MS	5.20 MS

\* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 021303.1453;2

Neck performance compared to SAE User's Manual for the Hybrid III Large Male Test Dummy, September 1998, draft.

# Transportation Research Center Inc.

Neck Extension Test - 6 Channel Transducer

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/13/2003

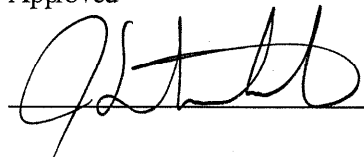
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.05 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.80 - 2.20 m/s	1.94 m/s	Yes
20 ms	3.40 - 4.20 m/s	3.80 m/s	Yes
30 ms	4.80 - 5.80 m/s	5.42 m/s	Yes
Peak D Plane Rotation	81 - 98 °	88.0 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	-84.0 - (-66.0) N·m	-63.36 N·m	No
Positive Moment Decay Time To -10 N·m	100 - 120 ms	109.60 ms	Yes

## Comments:

Technician



Approved



02.14.2003 07:23:44 581



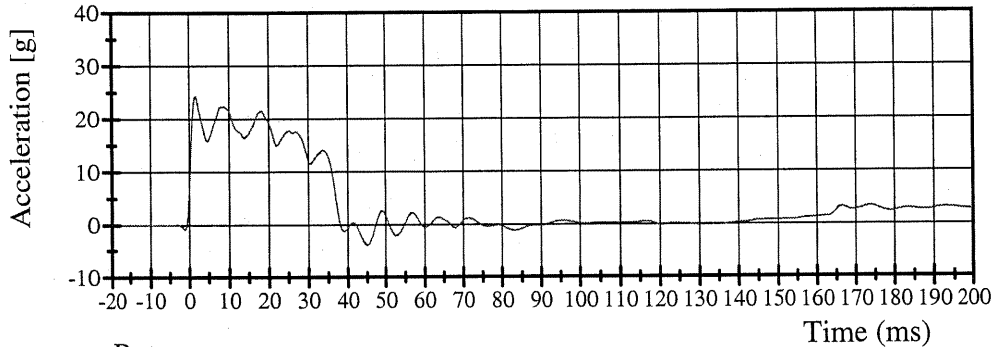
# Transportation Research Center Inc.

Neck Extension Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/13/2003

### Pendulum Deceleration

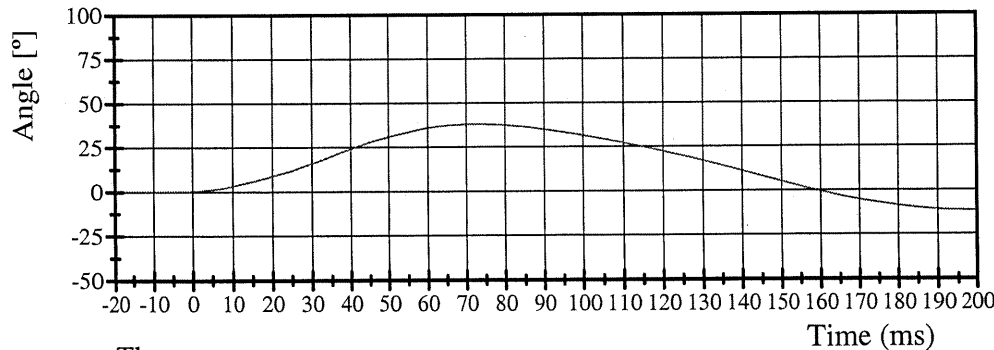


Filter Class: 180

Max: 24.3 g at 1.6 ms

Min: -4.0 g at 45.0 ms

### Beta

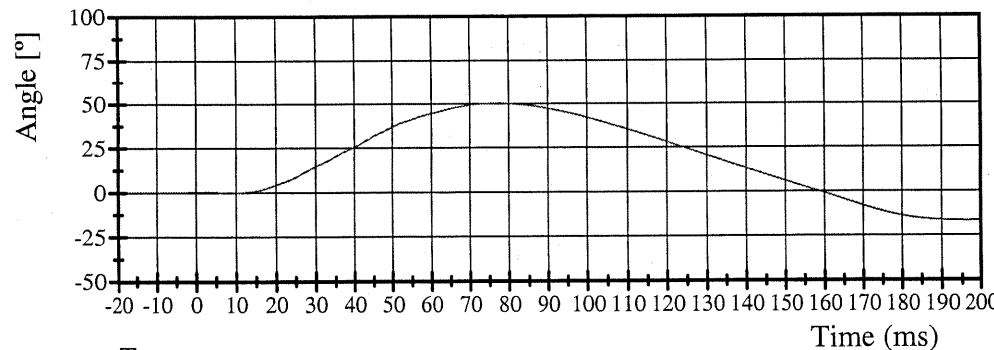


Filter Class: 60

Max: 37.9 ° at 72.2 ms

Min: -11.7 ° at 198.3 ms

### Theta

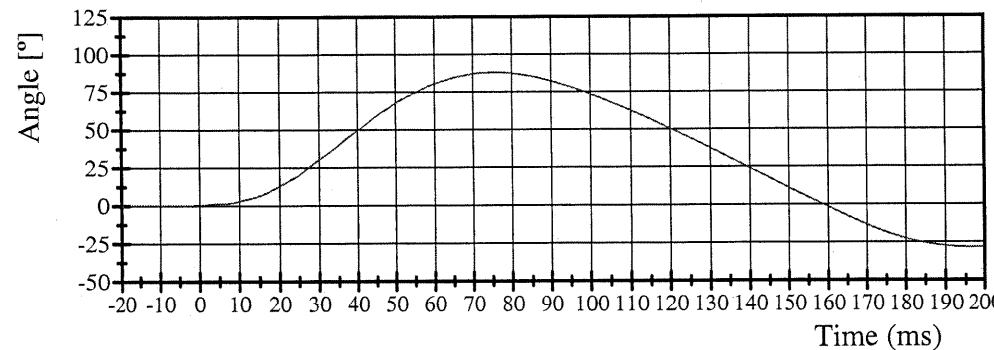


Filter Class: 60

Max: 50.2 ° at 77.4 ms

Min: -16.7 ° at 196.5 ms

### Totan



Filter Class: 60

Max: 88.0 ° at 76.5 ms

Min: -28.3 ° at 197.6 ms

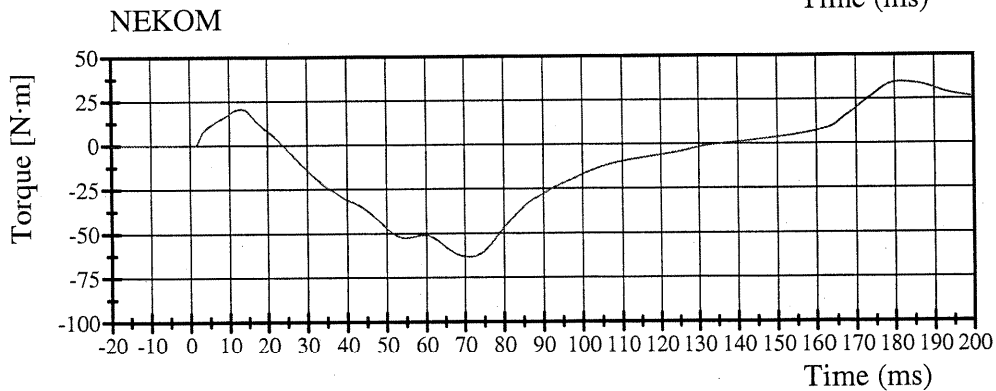
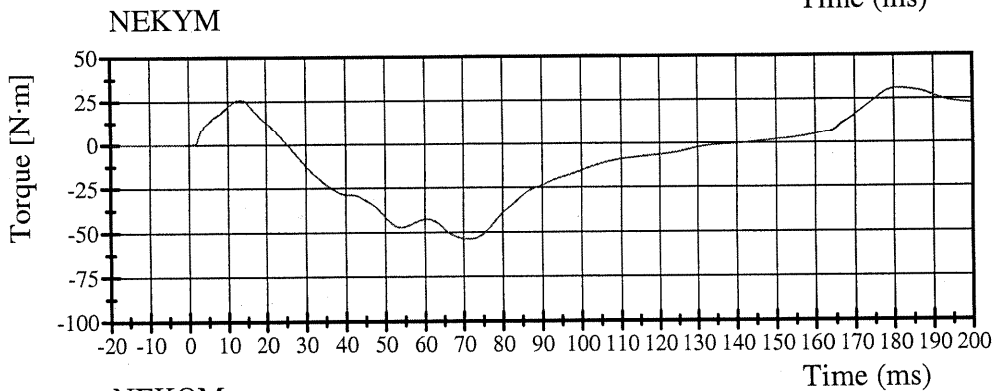
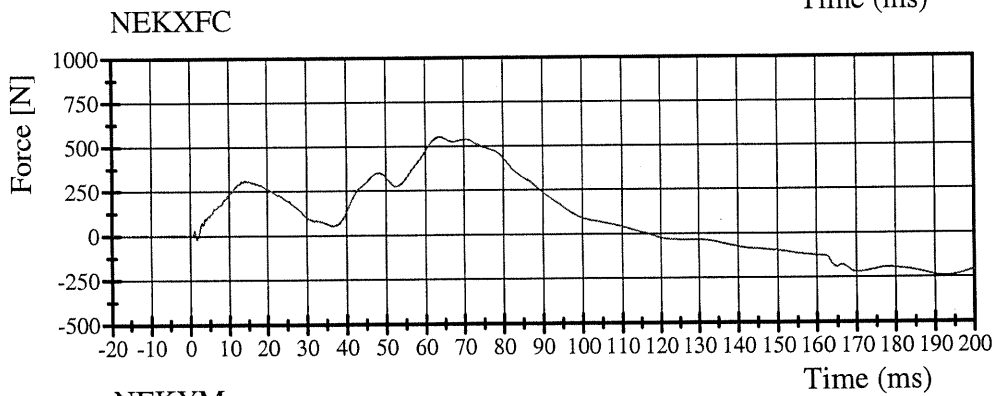
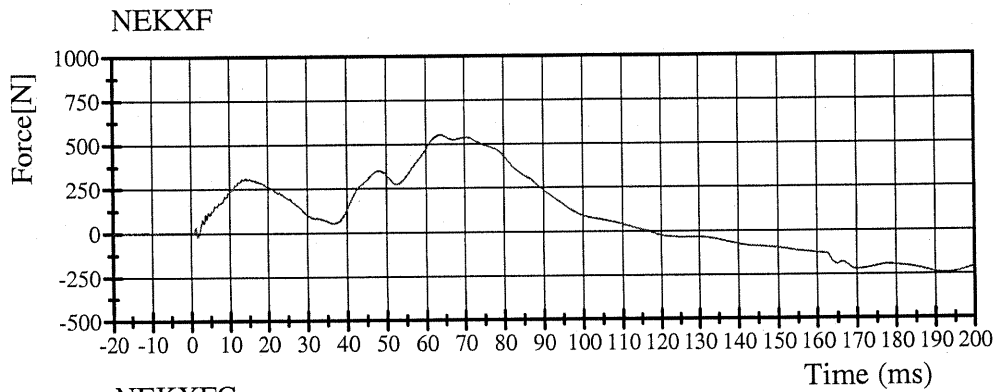


# Transportation Research Center Inc.

Neck Extension Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/13/2003



02.14.2003 07:23:46 581



# Transportation Research Center Inc.

Thorax Test


HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/13/2003

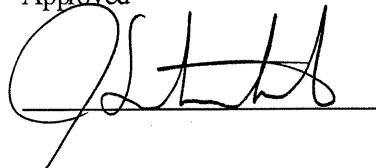
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.71 m/s	Yes
Maximum Chest Deflection	-76.0 - (-66.0) mm	-70.5 mm	Yes
Maximum Resistive Force	4700 - 6000 N	5727 N	Yes
Internal Hysteresis	69 - 85 %	74 %	Yes

## Comments:

Technician



Approved



02.13.2003 12:23:13 971



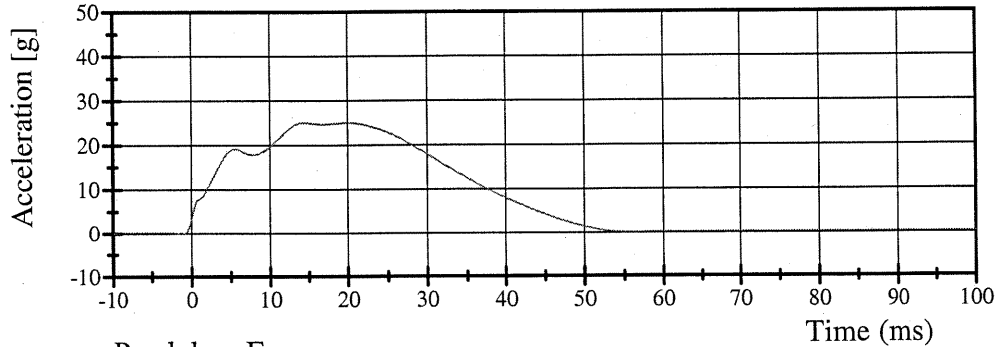
# Transportation Research Center Inc.

Thorax Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/13/2003

### Pendulum Deceleration

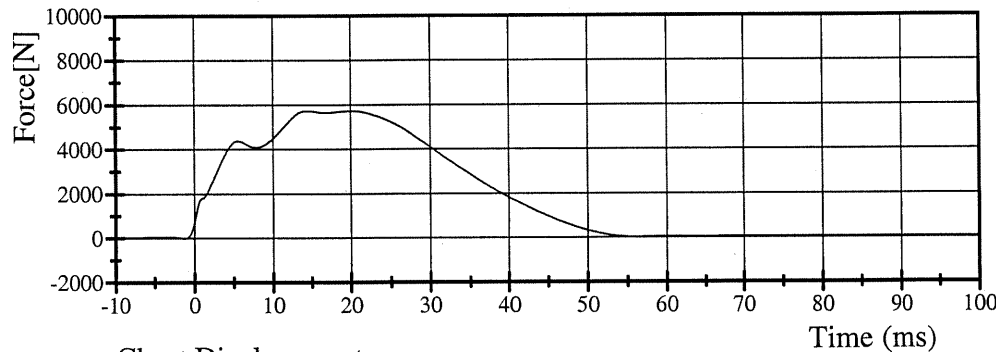


Filter Class: 180

Max: 25.0 g at 14.4 ms

Min: -0.1 g at -1.2 ms

### Pendulum Force

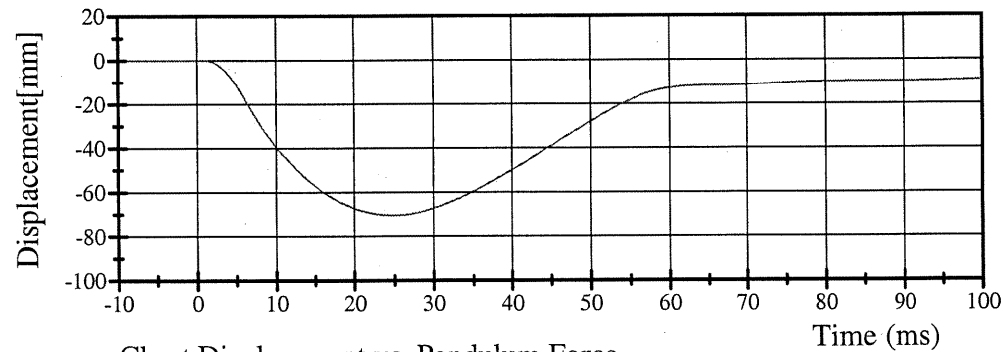


Filter Class: 180

Max: 5726.9 N at 14.4 ms

Min: -14.9 N at -1.2 ms

### Chest Displacement

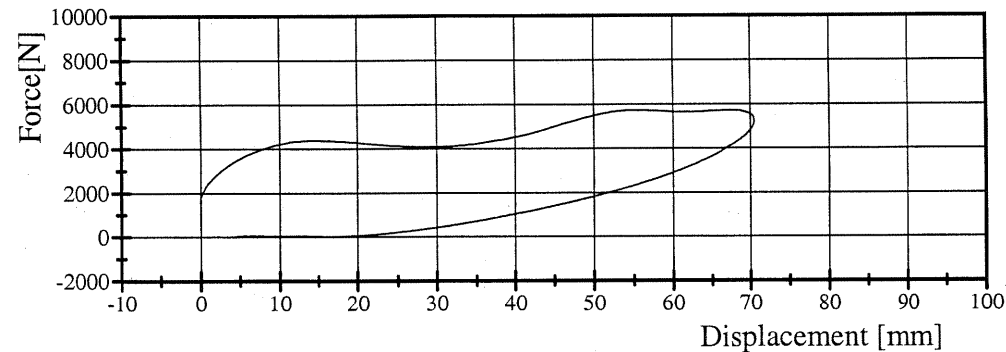


Filter Class: 180

Max: 0.0 mm at 0.6 ms

Min: -70.5 mm at 25.0 ms

### Chest Displacement vs. Pendulum Force



02.13.2003 12:23:15 971



# Transportation Research Center Inc.

Left Knee Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/06/2003

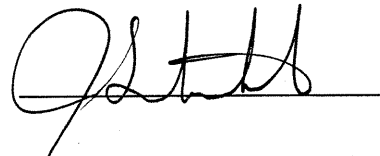
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	21 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4900 - 6000 N	5741 N	Yes

Comments:

Technician



Approved



02.06.2003 08:20:50 2101



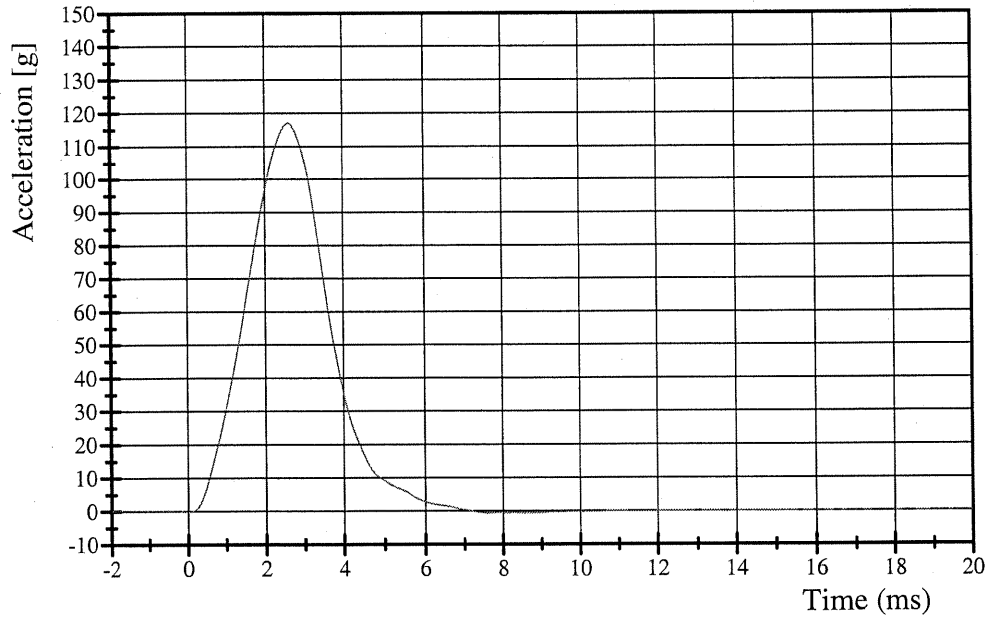
# Transportation Research Center Inc.

Left Knee Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/06/2003

### Pendulum Deceleration

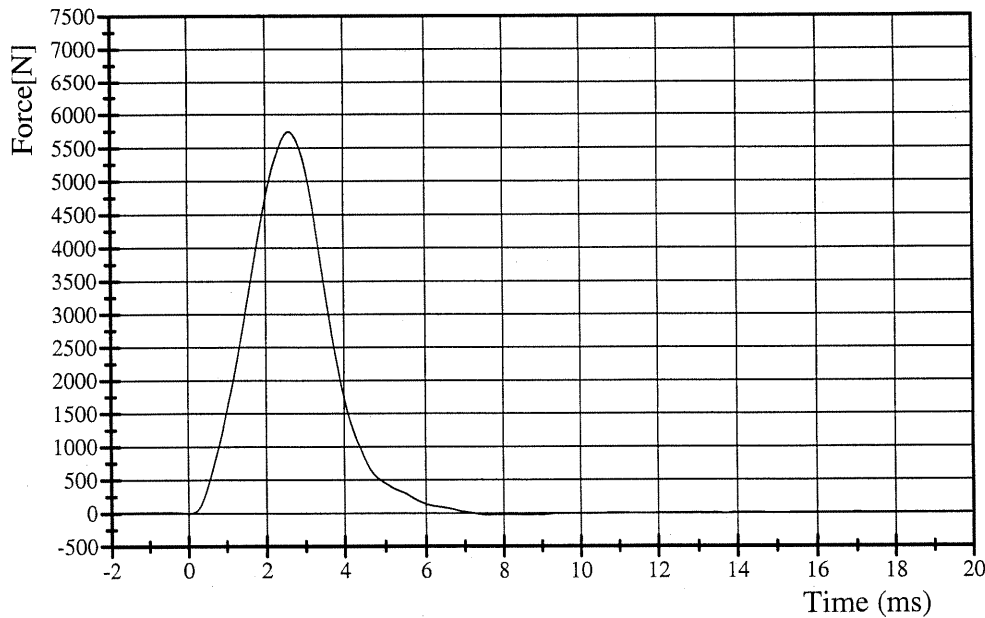


Filter Class: 600

Max: 117.1 g at 2.6 ms

Min: -0.6 g at 7.6 ms

### Pendulum Force



Filter Class: 600

Max: 5740.7 N at 2.6 ms

Min: -28.4 N at 7.6 ms



# Transportation Research Center Inc.

Right Knee Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/06/2003

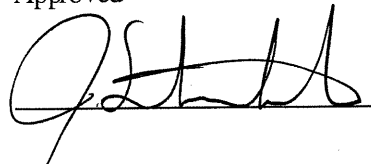
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	21 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4900 - 6000 N	5430 N	Yes

Comments:

Technician



Approved



02.06.2003 08:17:20 2109

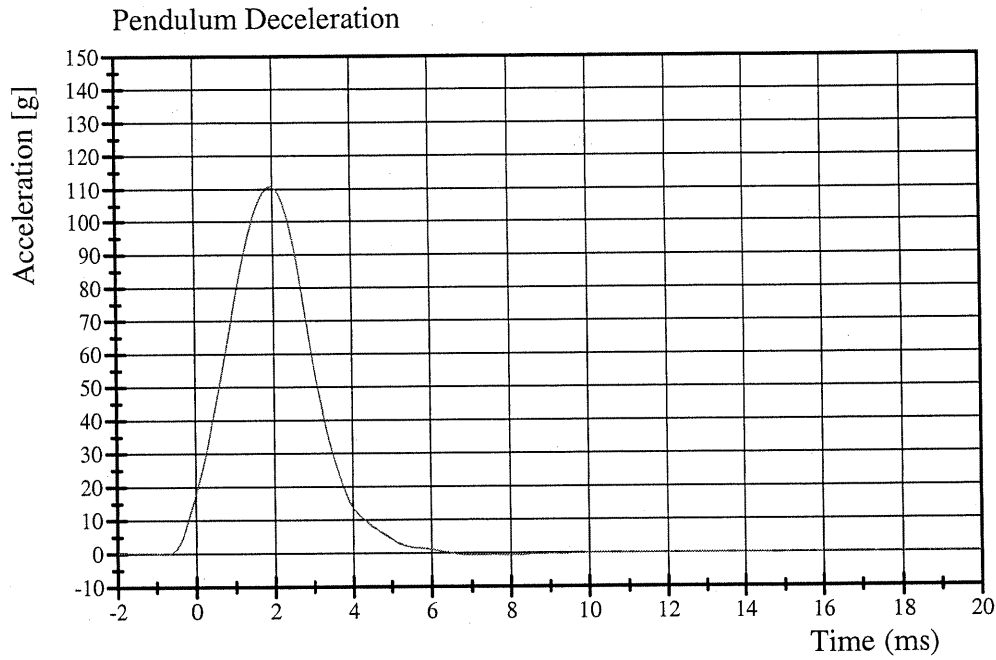


# Transportation Research Center Inc.

Right Knee Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

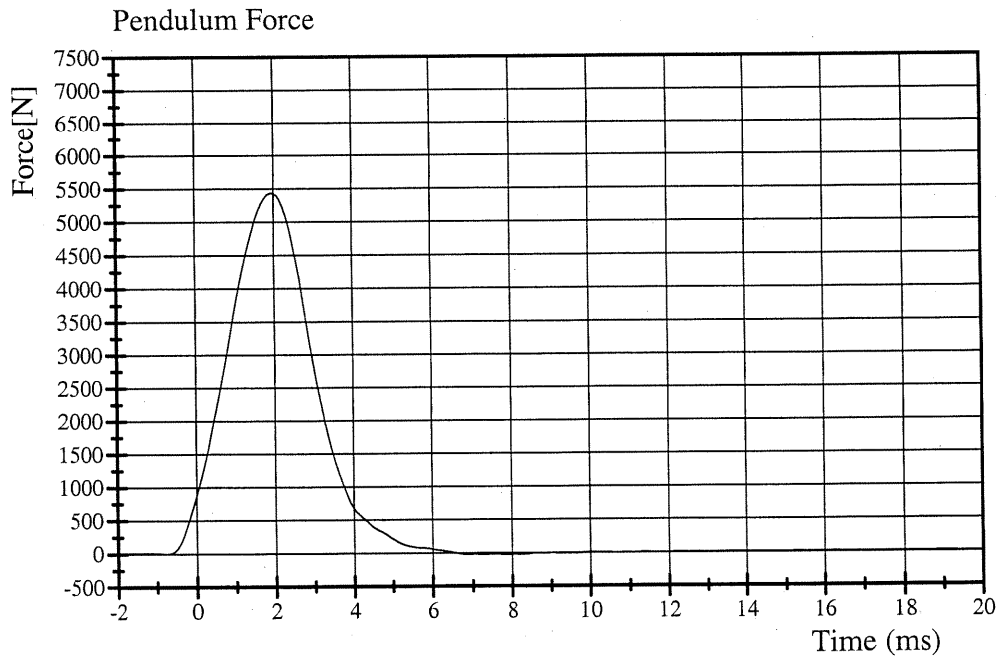
Test Date 02/06/2003



Filter Class: 600

Max: 110.7 g at 1.9 ms

Min: -0.6 g at 7.8 ms



Filter Class: 600

Max: 5430.1 N at 1.9 ms

Min: -29.4 N at 7.8 ms

02.06.2003 08:17:22 2109



# Transportation Research Center Inc.

Left Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 3

Test Date 02/13/2003

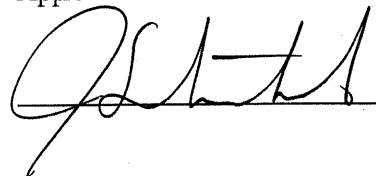
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.77 m/s	Yes
Knee Displacement	-18.3 - (-15.0) mm	-18.0 mm	Yes

Comments:

Technician



Approved



02.18.2003 07:50:51 1739

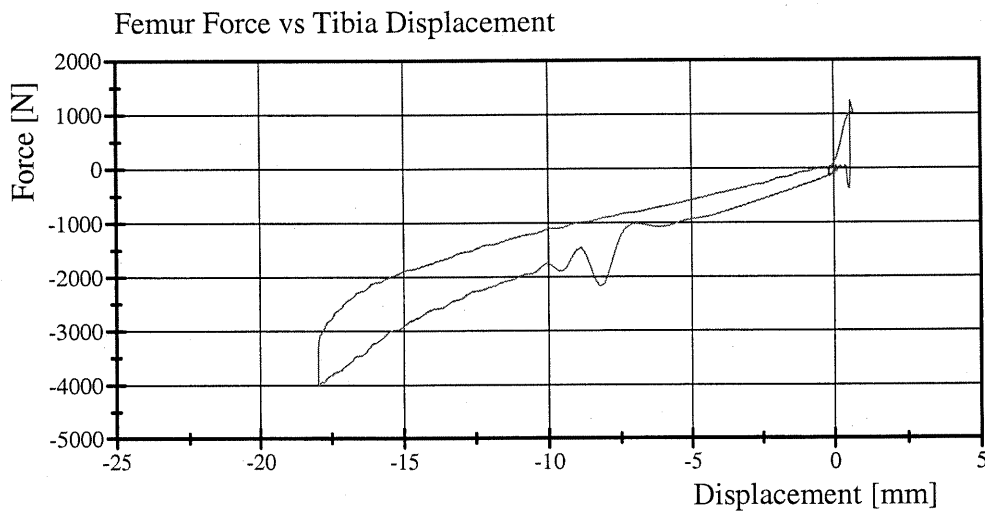
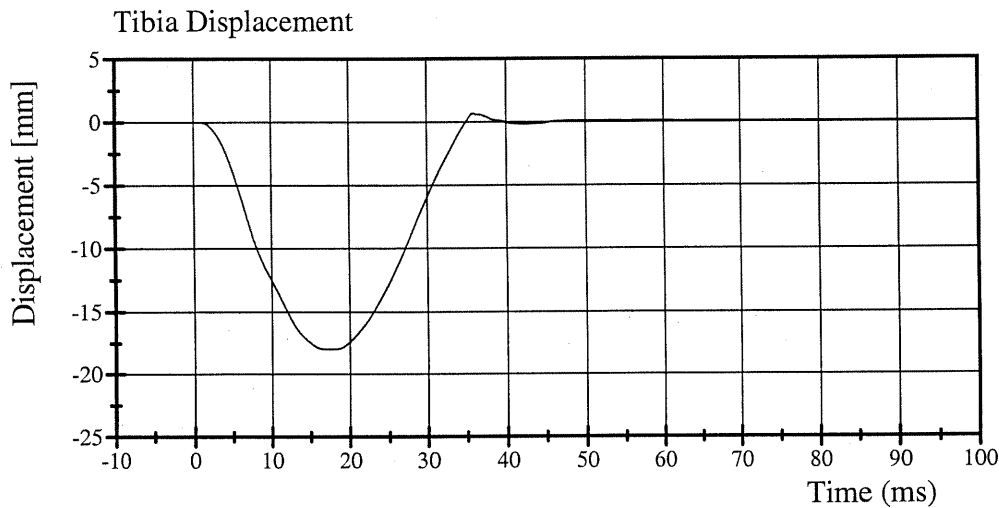
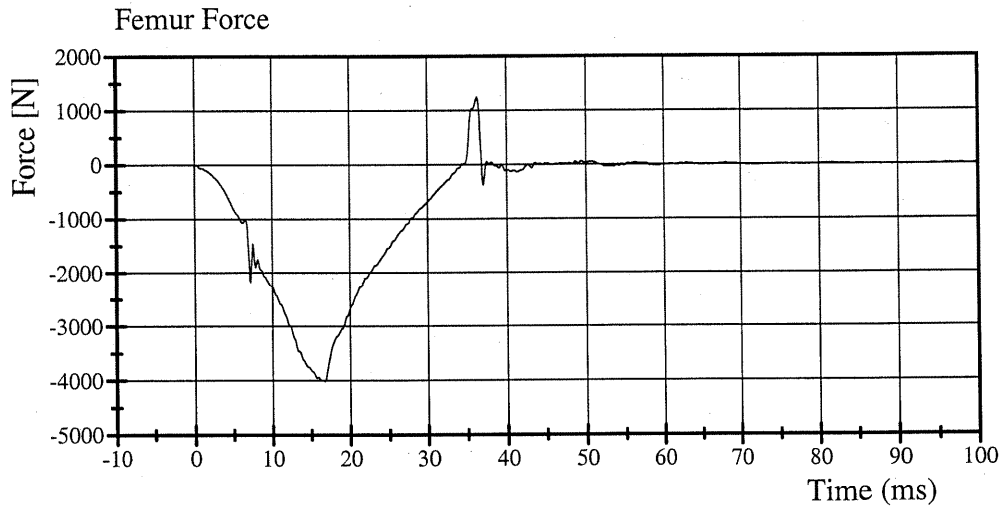


# Transportation Research Center Inc.

Left Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 3

Test Date 02/13/2003



02.18.2003 07:50:53 1739



# Transportation Research Center Inc.

Right Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

Test Date 02/12/2003

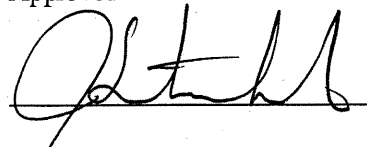
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.71 m/s	Yes
Knee Displacement	-18.3 - (-15.0) mm	-15.0 mm	Yes

Comments:

Technician



Approved



02.18.2003 07:51:54 1755

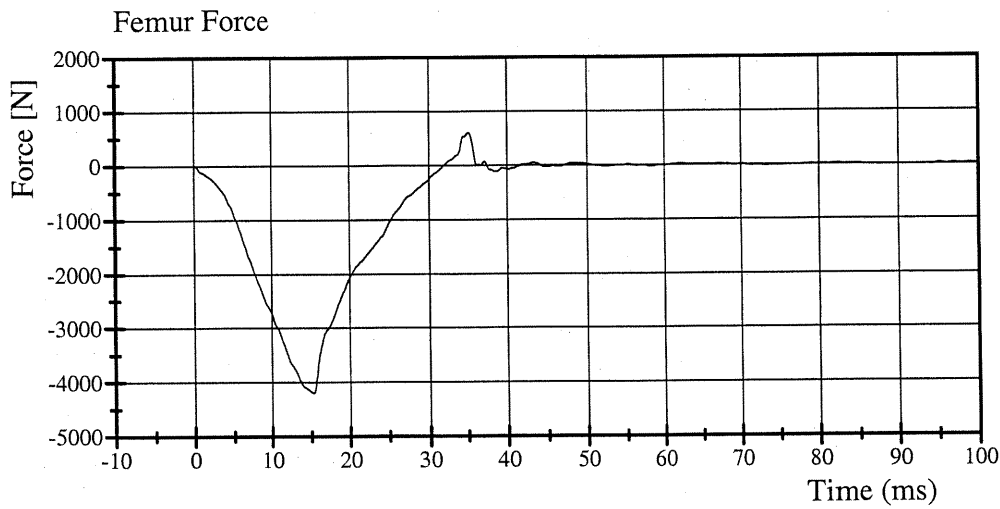


# Transportation Research Center Inc.

Right Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 07 - 1

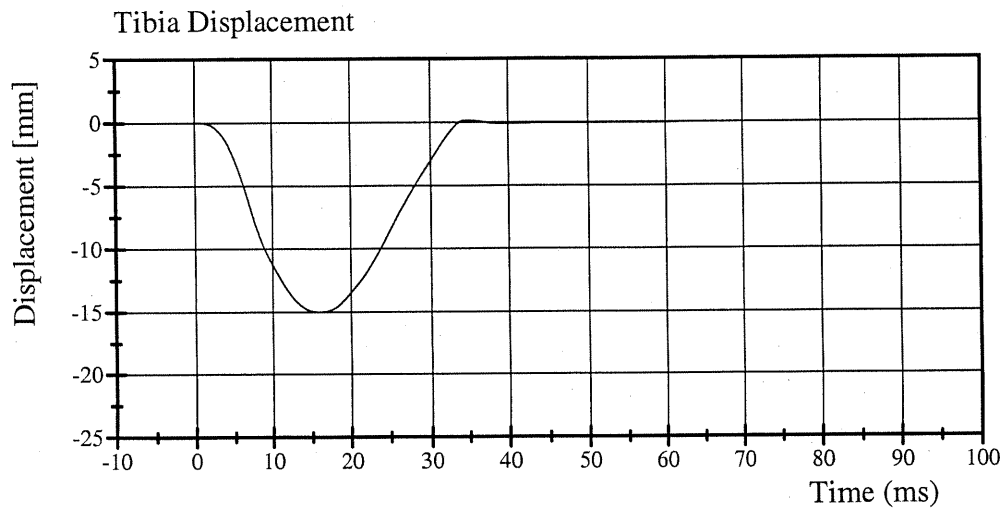
Test Date 02/12/2003



Filter Class: 600

Max: 603.1 N at 35.2 ms

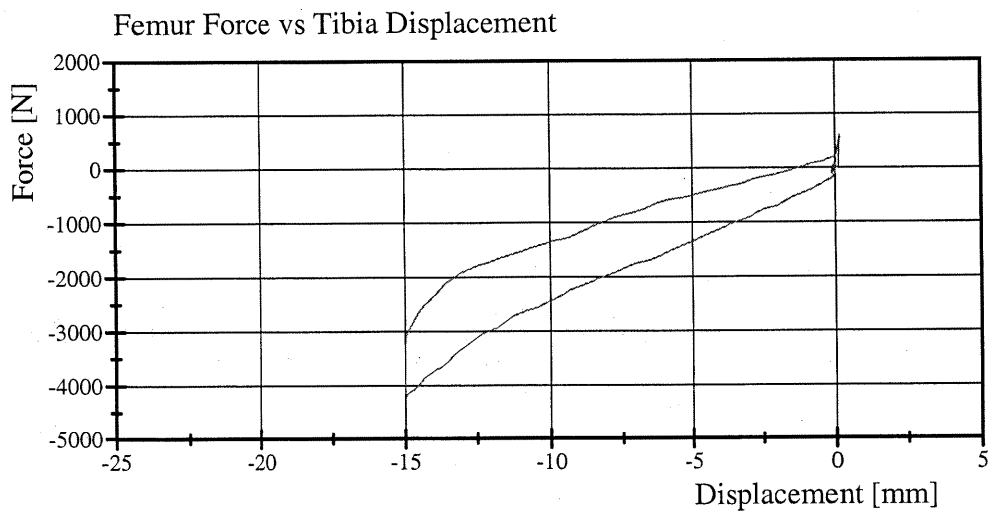
Min: -4204.4 N at 15.3 ms



Filter Class: 180

Max: 0.1 mm at 34.9 ms

Min: -15.0 mm at 16.0 ms



02.18.2003 07:51:55 1755



Post-test Dummy Configuration and Performance Verification Data

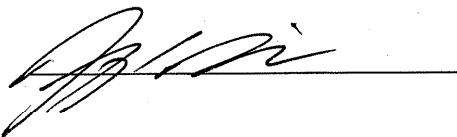
Passenger Dummy S/N: 083

**Transportation Research Center Inc.**  
**HIII 95th Dummy**  
**External Dimensions**  
**Serial No. 083 Calibration No. 08**

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	927.1 - 942.3 mm	937 mm	Yes
Shoulder Pivot Height	B	541.0 - 556.2 mm	550 mm	Yes
H-Point Height	C	101.6 - 111.8 mm	106 mm	Yes
H-Point From Seatback	D	137.1 - 147.3 mm	141 mm	Yes
Shoulder Pivot From Backline	E	109.3 - 119.3 mm	113 mm	Yes
Thigh Clearance	F	160.0 - 175.2 mm	167 mm	Yes
Back Of Elbow To Wrist Pivot	G	307.4 - 317.4 mm	309 mm	Yes
Skull Cap To Backline	H	86.4 - 91.4 mm	87 mm	Yes
Shoulder-Elbow Length	I	348.0 - 363.2 mm	355 mm	Yes
Elbow Rest Height	J	208.3 - 223.5 mm	216 mm	Yes
Buttock Knee Length	K	624.8 - 650.2 mm	636 mm	Yes
Popliteal Height	L	457.2 - 482.6 mm	471 mm	Yes
Knee Pivot Height	M	520.7 - 546.1 mm	530 mm	Yes
Buttock Popliteal Length	N	490.2 - 515.6 mm	500 mm	Yes
Chest Depth	O	284.5 - 299.7 mm	293 mm	Yes
Foot Length	P	251.5 - 266.7 mm	259 mm	Yes
Buttock to Knee Pivot Length	R	556.3 - 581.7 mm	577 mm	Yes
Head Breadth	S	148.9 - 160.0 mm	155 mm	Yes
Head Depth	T	190.5 - 200.7 mm	192 mm	Yes
Hip Breadth	U	396.3 - 411.5 mm	407 mm	Yes
Shoulder Breadth	V	467.4 - 482.6 mm	477 mm	Yes
Foot Breadth	W	91.5 - 106.7 mm	95 mm	Yes
Head Circumference	X	566.4 - 576.6 mm	569 mm	Yes
Chest Circumference	Y	1120.2 - 1150.6 mm	1131 mm	Yes
Waist Circumference	Z	988.1 - 1018.5 mm	1000 mm	Yes
Location For Chest Circumference	AA	502.9 - 513.1 mm	508 mm	Yes
Location For Waist Circumference	BB	274.3 - 284.5 mm	279 mm	Yes

Technician

Approved





# Transportation Research Center Inc.

Head Drop Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

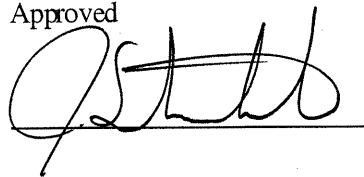
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Peak Resultant Acceleration	220 - 265 g	261.8 g	Yes
Peak Lateral Acceleration	15 g Max	9.5 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

## Comments:

Technician



Approved



02.20.2003 08:15:26 611

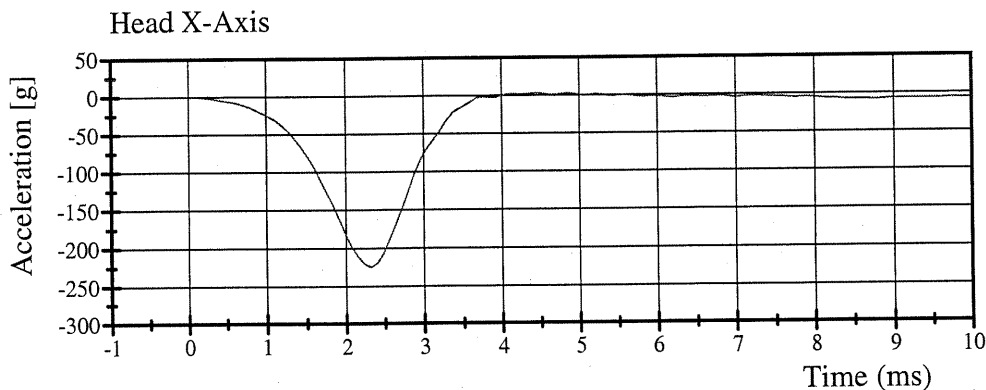


# Transportation Research Center Inc.

## Head Drop Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

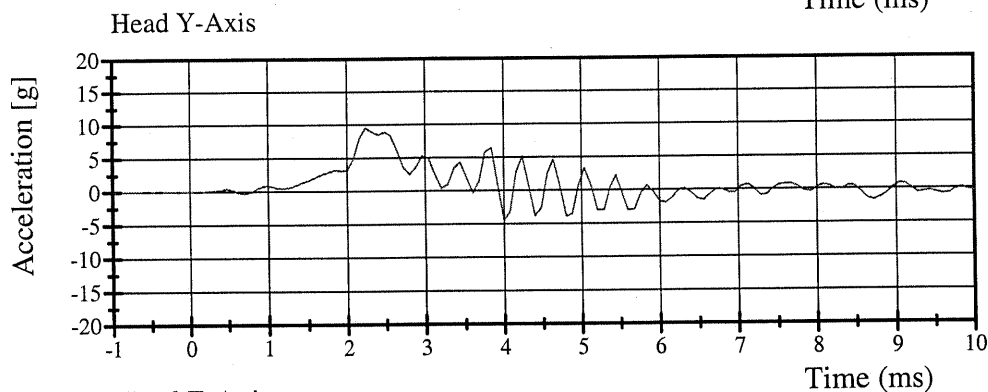
Test Date 02/18/2003



Filter Class: 1000

Max: 3.1 g at 4.5 ms

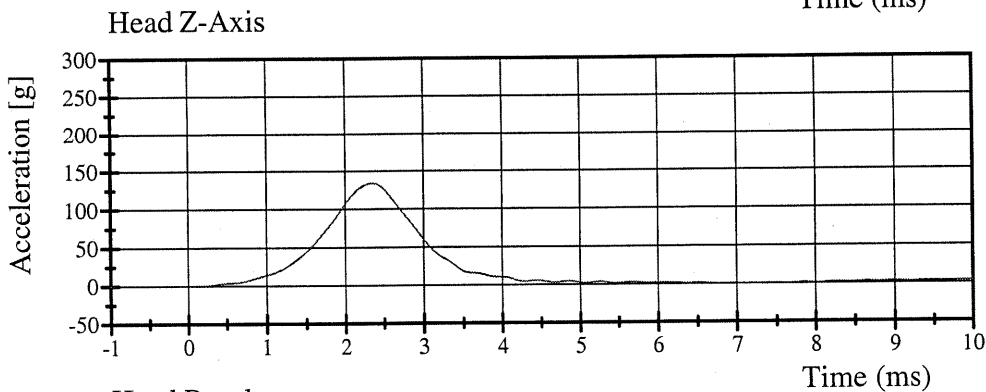
Min: -224.7 g at 2.3 ms



Filter Class: 1000

Max: 9.5 g at 2.2 ms

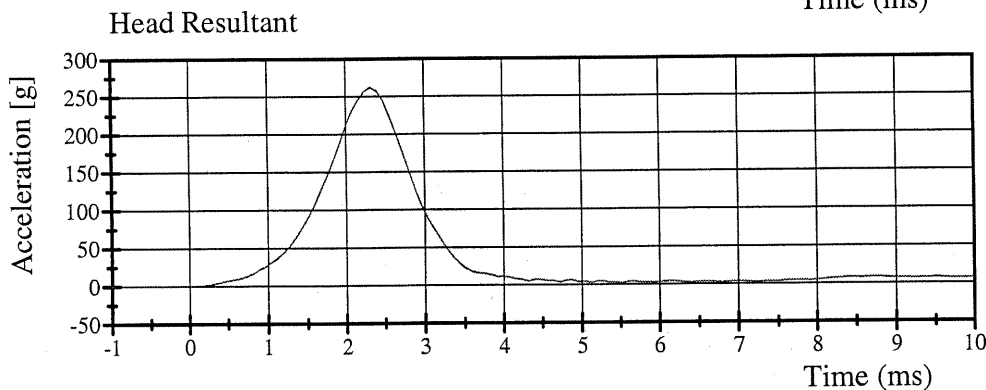
Min: -4.5 g at 4.0 ms



Filter Class: 1000

Max: 134.2 g at 2.3 ms

Min: -0.1 g at 7.6 ms



Filter Class: 1000

Max: 261.8 g at 2.3 ms

Min: 0.0 g at 0.3 ms

02.20.2003 08:15:28 611



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III LARGE MALE

18-FEB-03

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 083C08NF1 LG. MALE SN083 NECK FLEX CAL08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	31.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	6.99 M/S
INTEGRATED PENDULUM VELOCITY	10 MS   2.2 - 2.7 M/S	2.34 M/S
	20 MS   4.0 - 5.0 M/S	4.48 M/S
	30 MS   5.7 - 6.9 M/S	6.45 M/S
PEAK D-PLANE ROTATION	61 - 75 DEG.	63.69 DEG.
ROTATION ANGLE DECAY TIME FROM PEAK TO ZERO	50 - 60 MS	59.36 MS
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	110 - 130 NM	97.19 NM *
POSITIVE MOMENT DECAY TIME FROM PEAK TO ZERO	40 - 50 MS	52.08 MS *
TIME OF PEAK ROTATION AFTER PEAK MOMENT	1 - 11 MS	9.36 MS

\* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 021803.1213;1

Neck performance compared to SAE User's Manual for the Hybrid III Large Male Test Dummy, September 1998, draft.

# Transportation Research Center Inc.

Neck Flexion Test - 6 Channel Transducer

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

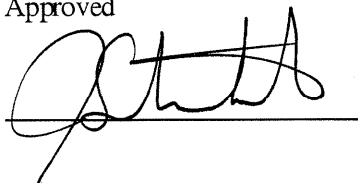
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Impact Velocity	6.89 - 7.13 m/s	6.95 m/s	Yes
Integrated Pendulum Velocity			
10 ms	2.20 - 2.70 m/s	2.35 m/s	Yes
20 ms	4.00 - 5.00 m/s	4.49 m/s	Yes
30 ms	5.70 - 6.90 m/s	6.46 m/s	Yes
Peak D Plane Rotation	61 - 75 °	63.7 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	110.0 - 130.0 N·m	94.36 N·m	No
Positive Moment Decay Time To 10 N·m	77 - 97 ms	90.72 ms	Yes

## Comments:

Technician



Approved



02.18.2003 12:00:41 493



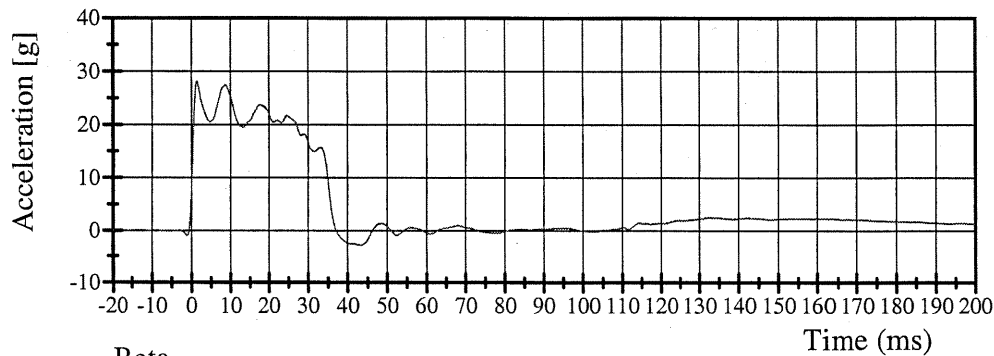
# Transportation Research Center Inc.

Neck Flexion Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

### Pendulum Deceleration

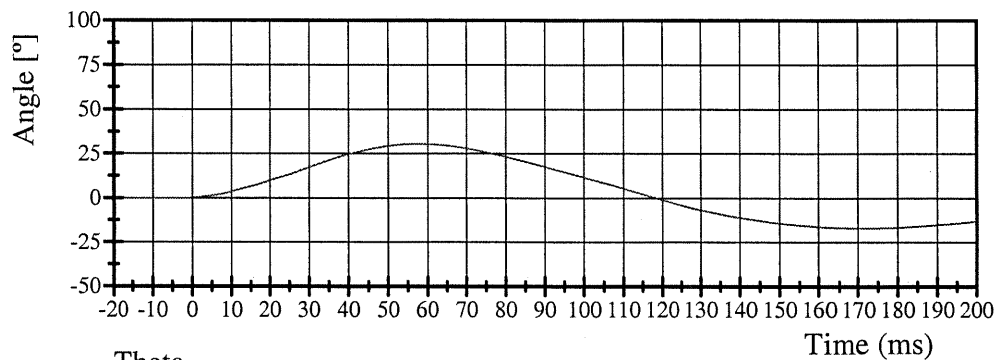


Filter Class: 180

Max: 28.1 g at 1.4 ms

Min: -2.7 g at 43.2 ms

### Beta

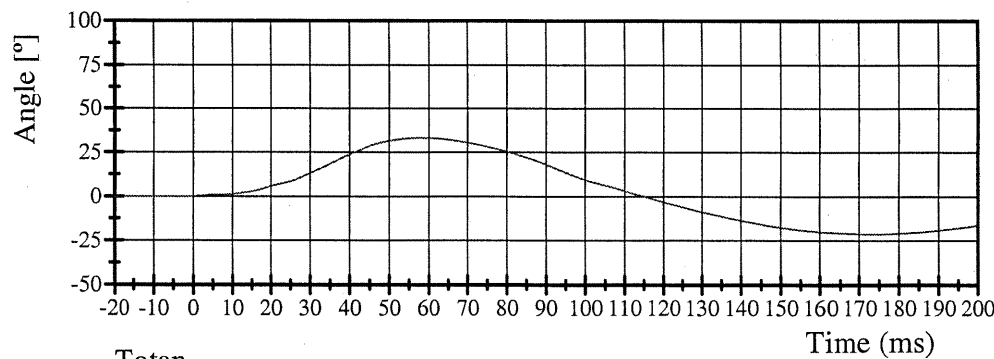


Filter Class: 60

Max: 30.5 ° at 57.2 ms

Min: -17.0 ° at 171.0 ms

### Theta

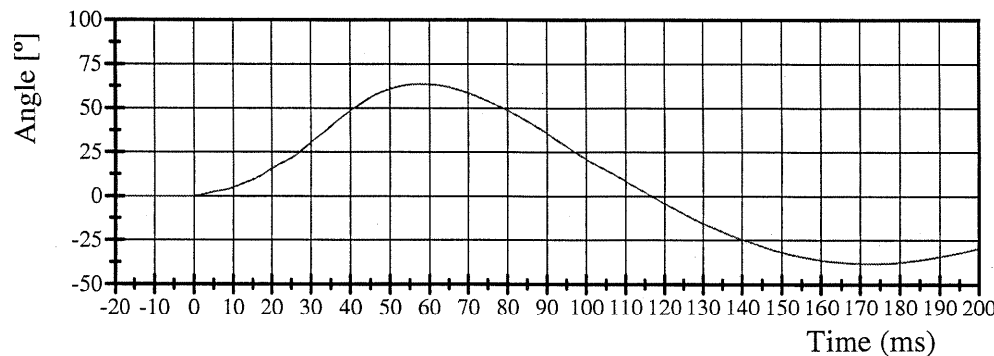


Filter Class: 60

Max: 33.2 ° at 57.6 ms

Min: -21.2 ° at 173.5 ms

### Totan



Filter Class: 60

Max: 63.7 ° at 57.4 ms

Min: -38.2 ° at 172.2 ms

02.18.2003 12:00:43 493

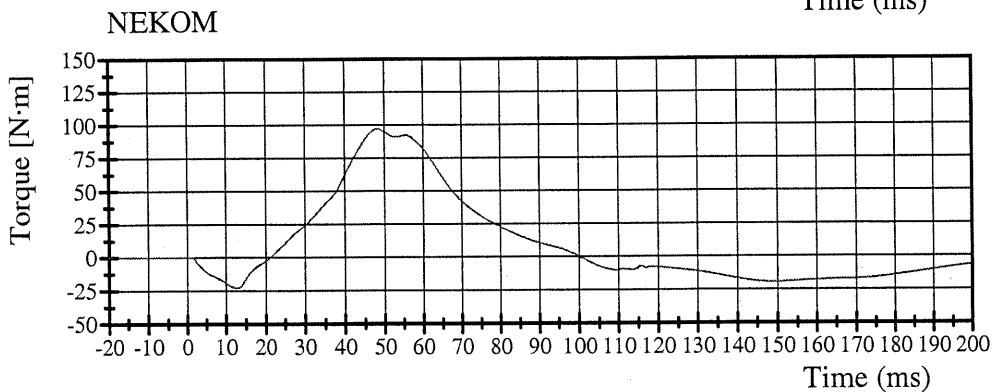
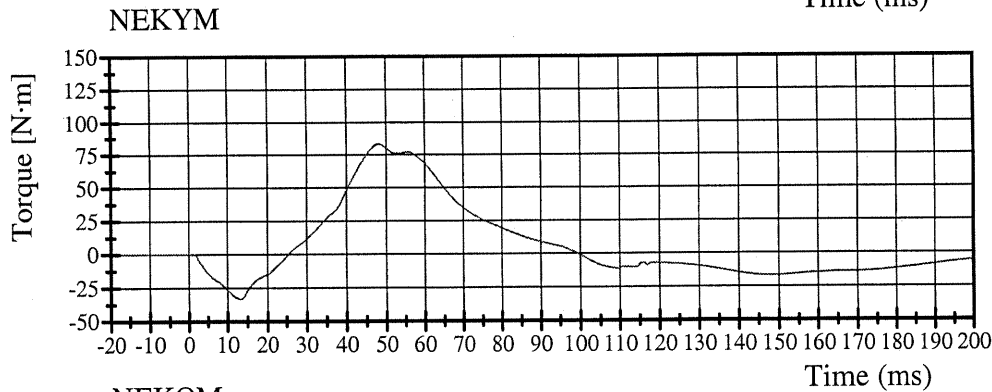
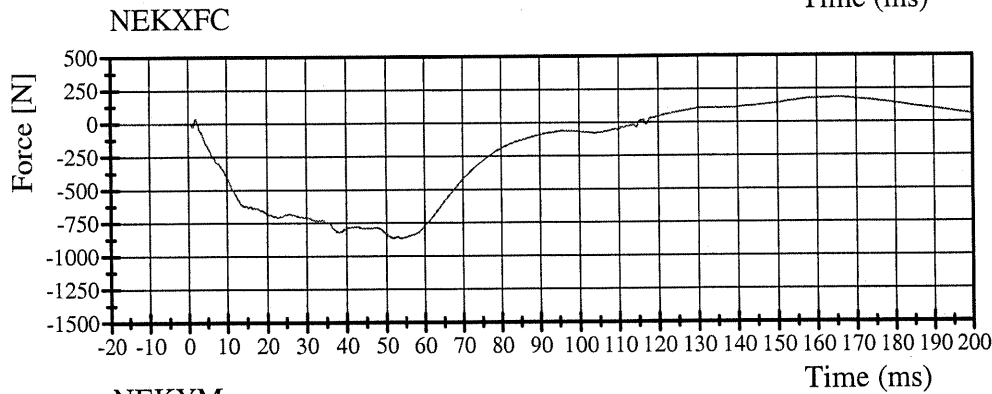
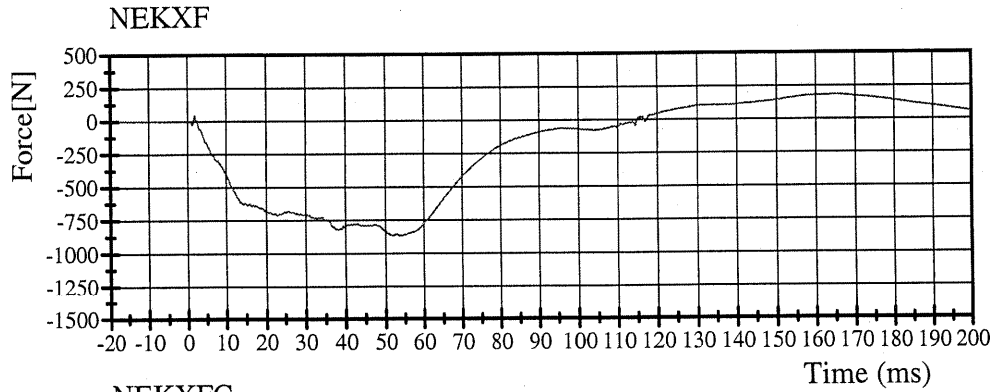


# Transportation Research Center Inc.

Neck Flexion Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003



02.18.2003 12:00:45 493



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III LARGE MALE

18-FEB-03

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 083C08NE1 L.MALE SN083 NECK EXT CAL08

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	32.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS   1.8 - 2.2 M/S	1.92 M/S
	20 MS   3.4 - 4.2 M/S	3.74 M/S
	30 MS   4.8 - 5.8 M/S	5.45 M/S
PEAK D-PLANE ROTATION	81 - 98 DEG.	88.84 DEG.
ROTATION ANGLE DECAY TIME FROM PEAK TO ZERO	75 - 90 MS	89.36 MS
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	-87 / -69 NM	-61.60 NM *
NEGATIVE MOMENT DECAY TIME FROM PEAK TO ZERO	53 - 66 MS	66.00 MS
TIME OF PEAK ROTATION AFTER PEAK MOMENT	0 - 10 MS	4.56 MS

\* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 021803.1252;1

Neck performance compared to SAE User's Manual for the Hybrid III Large Male Test Dummy, September 1998, draft.

# Transportation Research Center Inc.

Neck Extension Test - 6 Channel Transducer

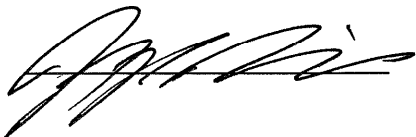
HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

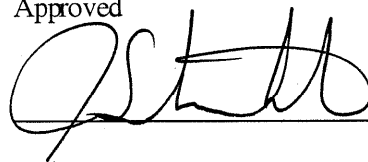
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.05 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.80 - 2.20 m/s	1.94 m/s	Yes
20 ms	3.40 - 4.20 m/s	3.76 m/s	Yes
30 ms	4.80 - 5.80 m/s	5.47 m/s	Yes
Peak D Plane Rotation	81 - 98 °	88.9 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	-84.0 - (-66.0) N·m	-61.67 N·m	No
Positive Moment Decay Time To -10 N·m	100 - 120 ms	110.96 ms	Yes

## Comments:

Technician



Approved



02.18.2003 12:31:23 572



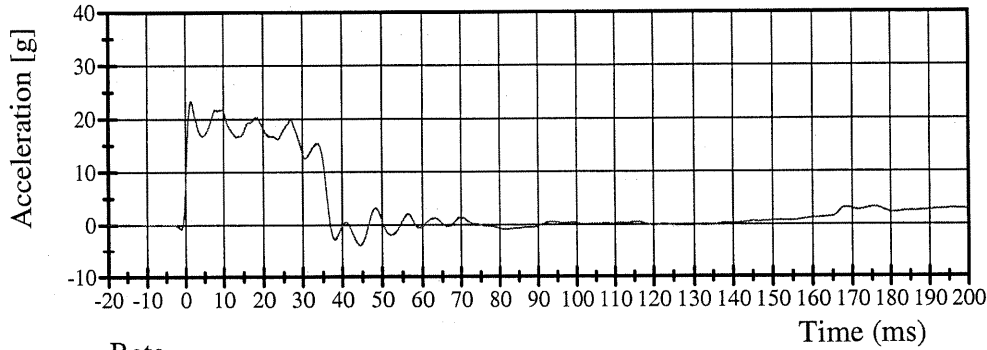
# Transportation Research Center Inc.

Neck Extension Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

Pendulum Deceleration

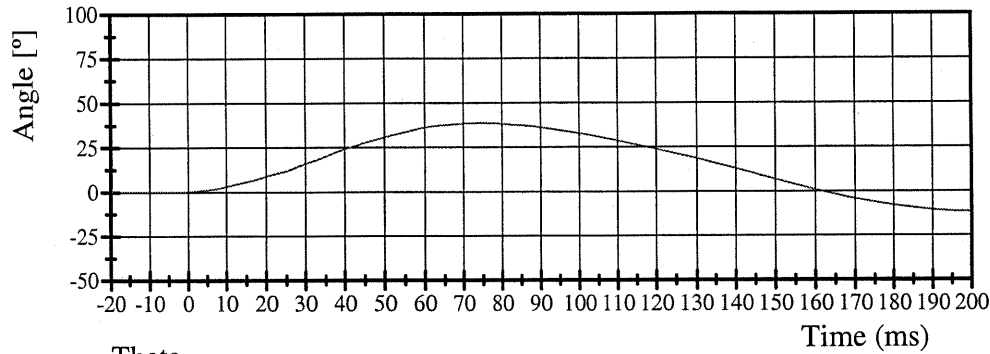


Filter Class: 180

Max: 23.3 g at 1.4 ms

Min: -3.9 g at 44.4 ms

Beta

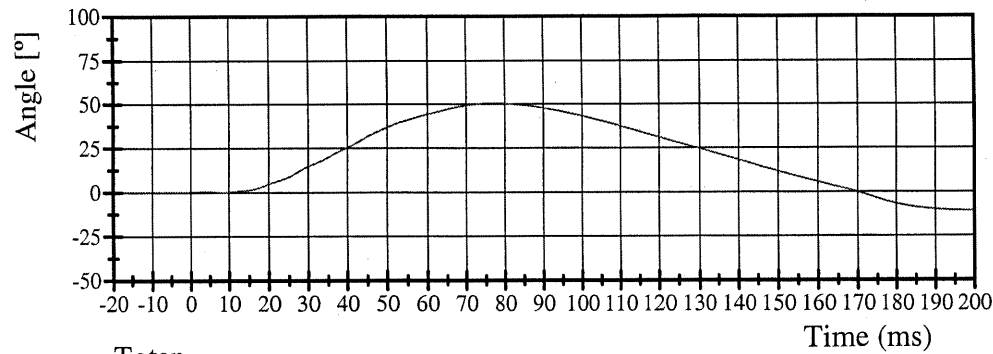


Filter Class: 60

Max: 38.6 ° at 74.6 ms

Min: -11.7 ° at 201.3 ms

Theta

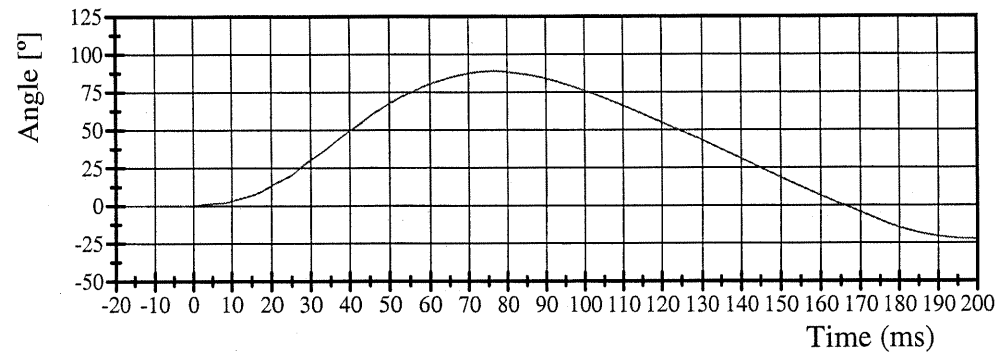


Filter Class: 60

Max: 50.3 ° at 77.7 ms

Min: -10.7 ° at 199.8 ms

Totan



Filter Class: 60

Max: 88.9 ° at 76.5 ms

Min: -22.4 ° at 200.6 ms

02.18.2003 12:31:25 572



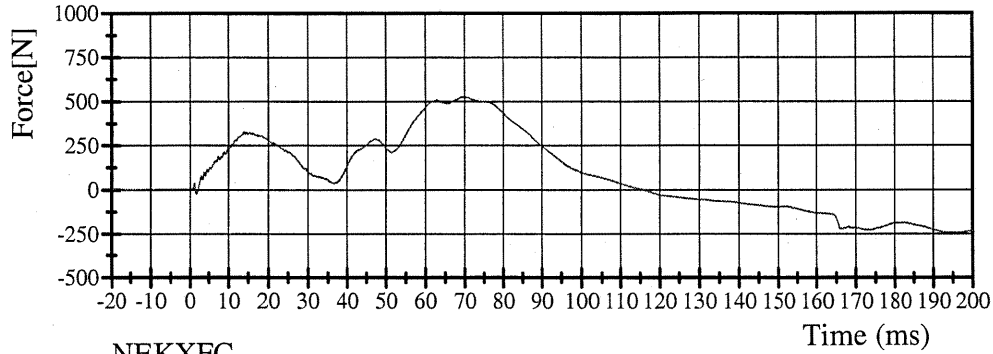
# Transportation Research Center Inc.

Neck Extension Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

NEKXF

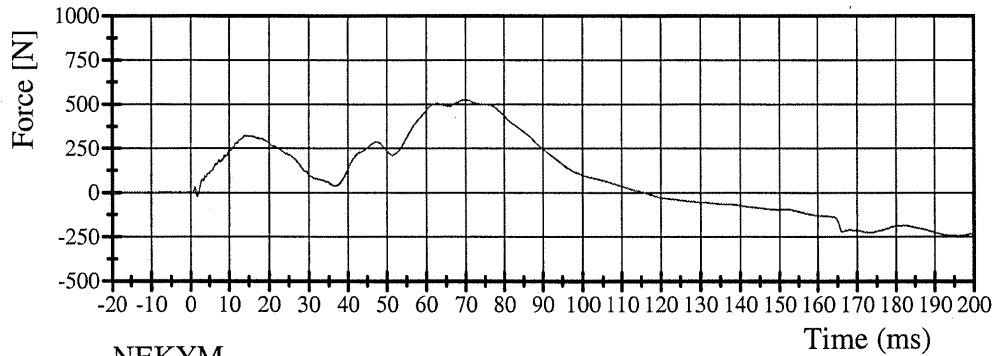


Filter Class: 1000

Max: 525.5 N at 70.2 ms

Min: -243.4 N at 196.2 ms

NEKXFC

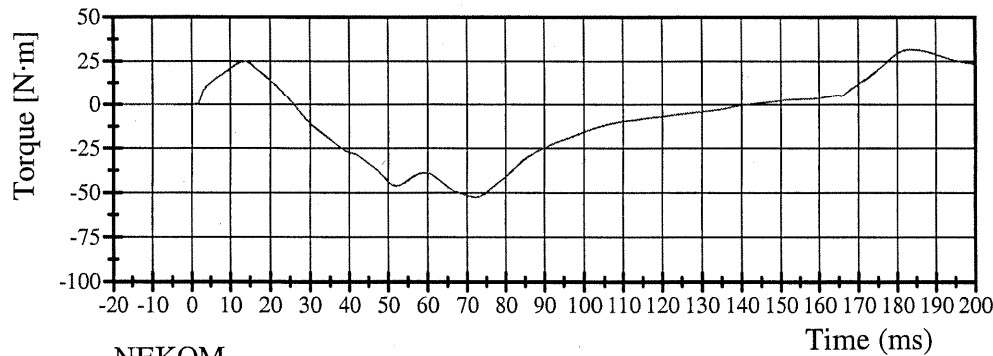


Filter Class: 600

Max: 525.1 N at 70.2 ms

Min: -243.1 N at 196.0 ms

NEKYM

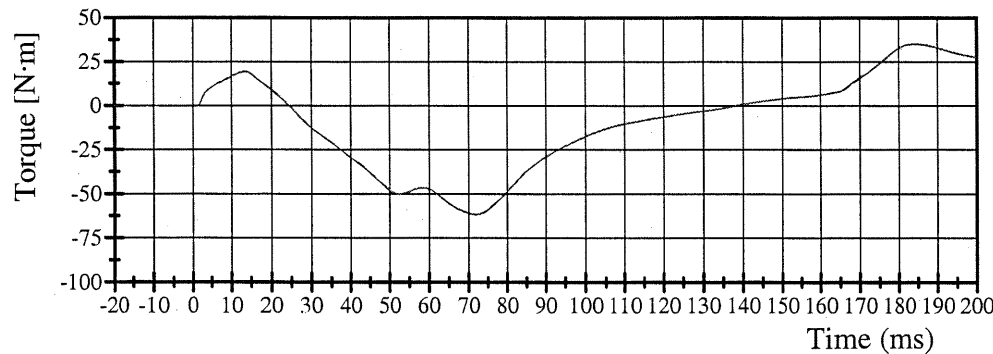


Filter Class: 600

Max: 31.7 N·m at 184.1 ms

Min: -52.6 N·m at 72.2 ms

NEKOM



Filter Class: 600

Max: 35.1 N·m at 184.2 ms

Min: -61.7 N·m at 71.9 ms



# Transportation Research Center Inc.

Thorax Test

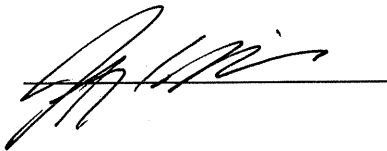
HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

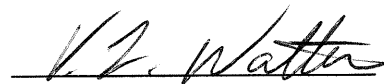
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.68 m/s	Yes
Maximum Chest Deflection	-76.0 - (-66.0) mm	-70.9 mm	Yes
Maximum Resistive Force	4700 - 6000 N	5689 N	Yes
Internal Hysteresis	69 - 85 %	72 %	Yes

Comments:

Technician



Approved



02.20.2003 15:14:44 958



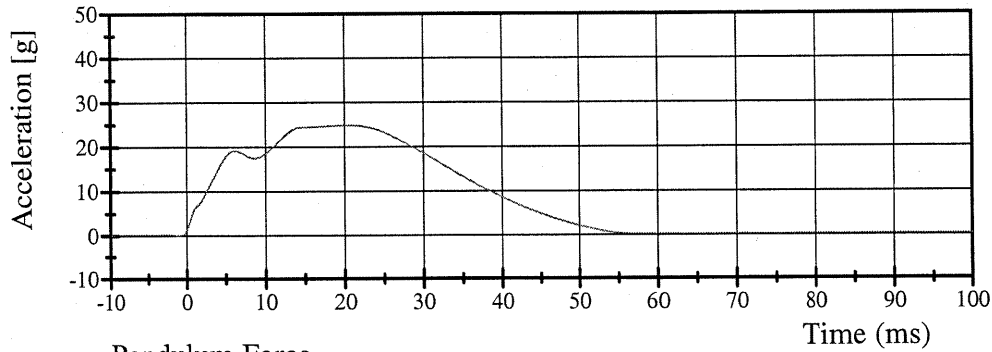
# Transportation Research Center Inc.

Thorax Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

### Pendulum Deceleration

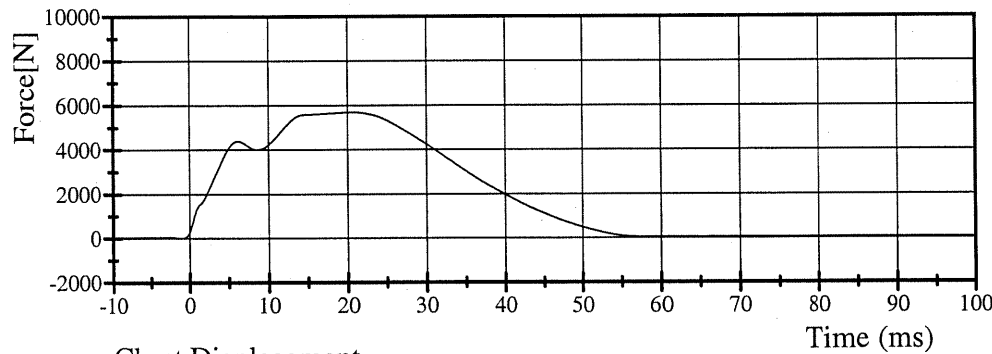


Filter Class: 180

Max: 24.8 g at 20.4 ms

Min: -0.0 g at -75.0 ms

### Pendulum Force

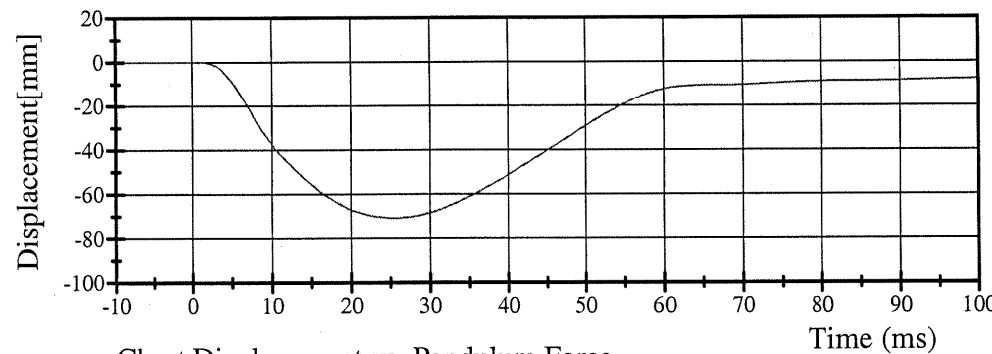


Filter Class: 180

Max: 5688.9 N at 20.4 ms

Min: -7.0 N at -75.0 ms

### Chest Displacement

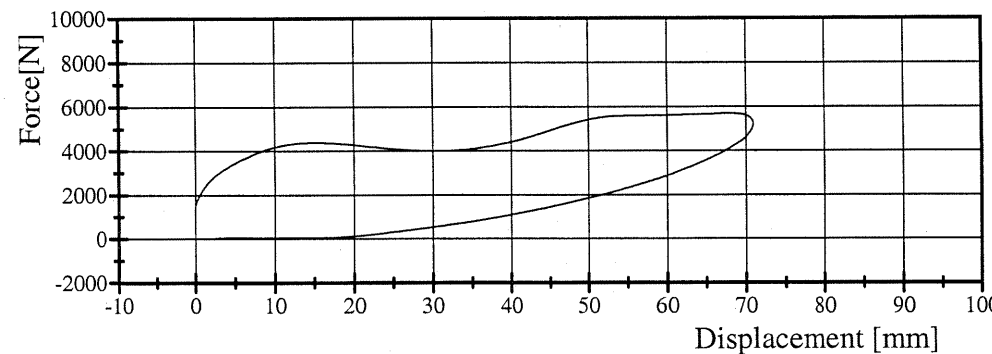


Filter Class: 180

Max: 0.0 mm at 0.8 ms

Min: -70.9 mm at 25.5 ms

### Chest Displacement vs. Pendulum Force



02.20.2003 15:14:45 958



# Transportation Research Center Inc.

Left Knee Slider Test

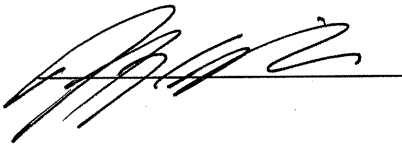
HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

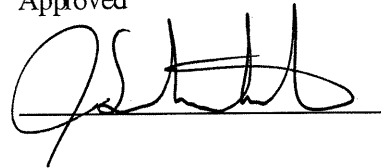
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Knee Displacement	-18.3 - (-15.0) mm	-17.8 mm	Yes

## Comments:

Technician



Approved



02.20.2003 08:11:48 1782

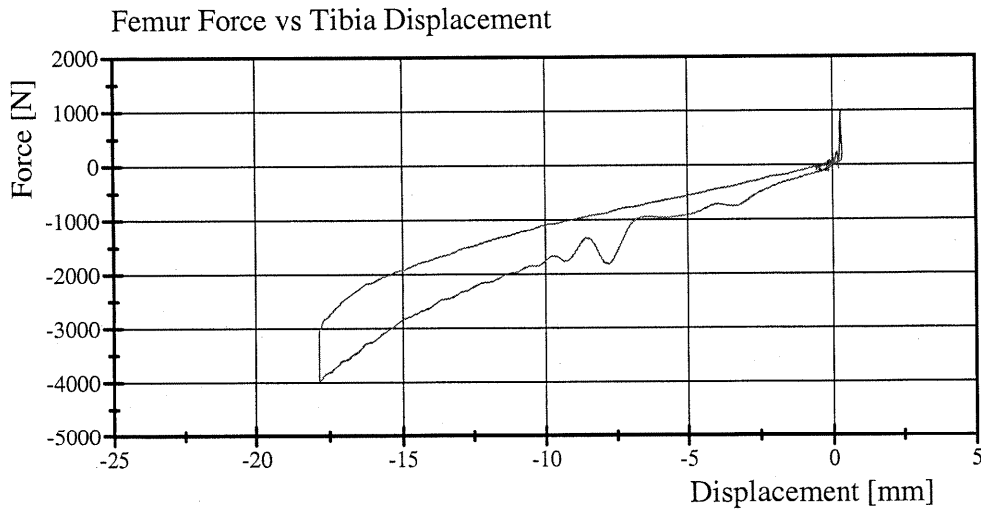
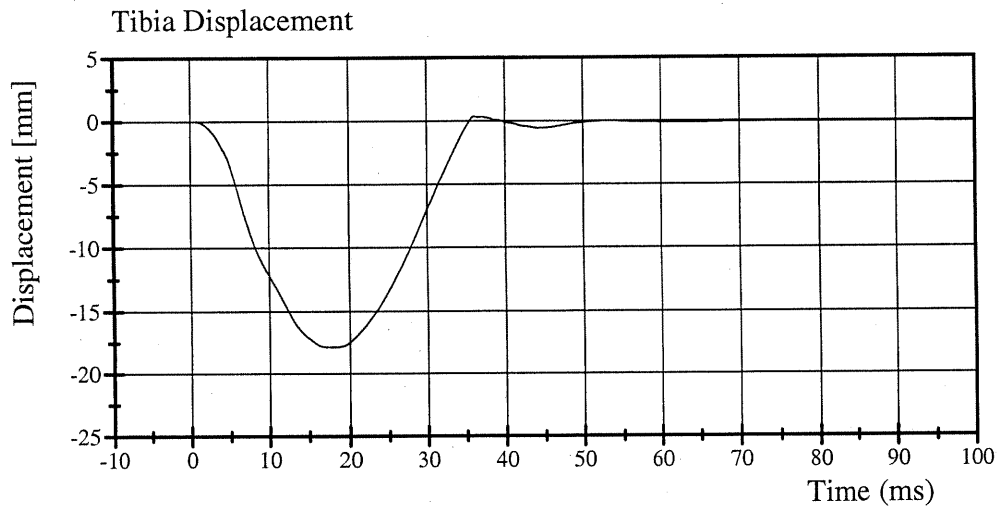
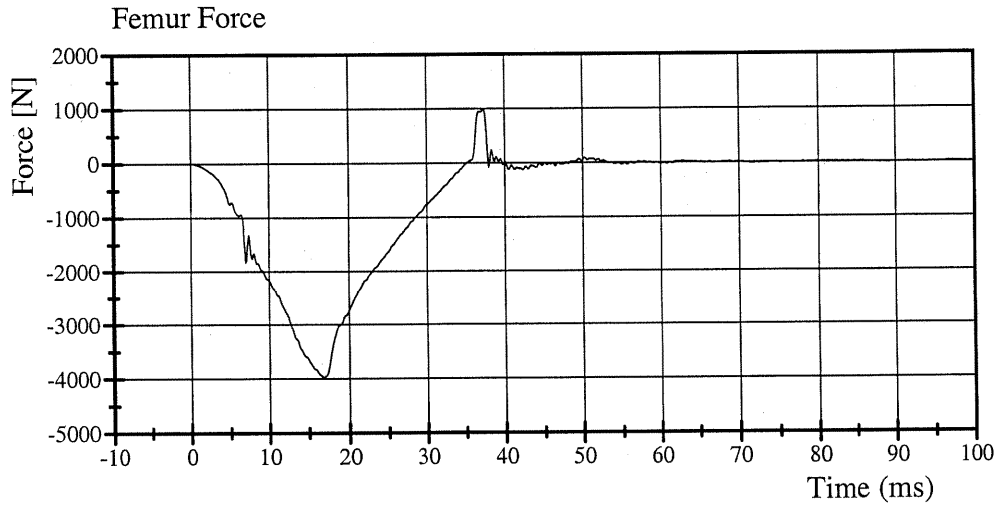


# Transportation Research Center Inc.

Left Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003



02.20.2003 08:11:51 1782



# Transportation Research Center Inc.

Right Knee Slider Test

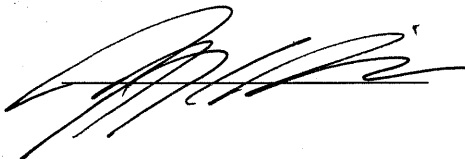
HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

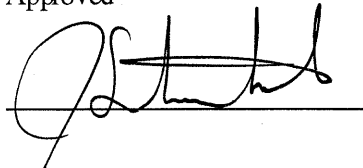
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.70 - 2.80 m/s	2.74 m/s	Yes
Knee Displacement	-18.3 - (-15.0) mm	-15.3 mm	Yes

Comments:

Technician



Approved



02.18.2003 07:46:30 1783

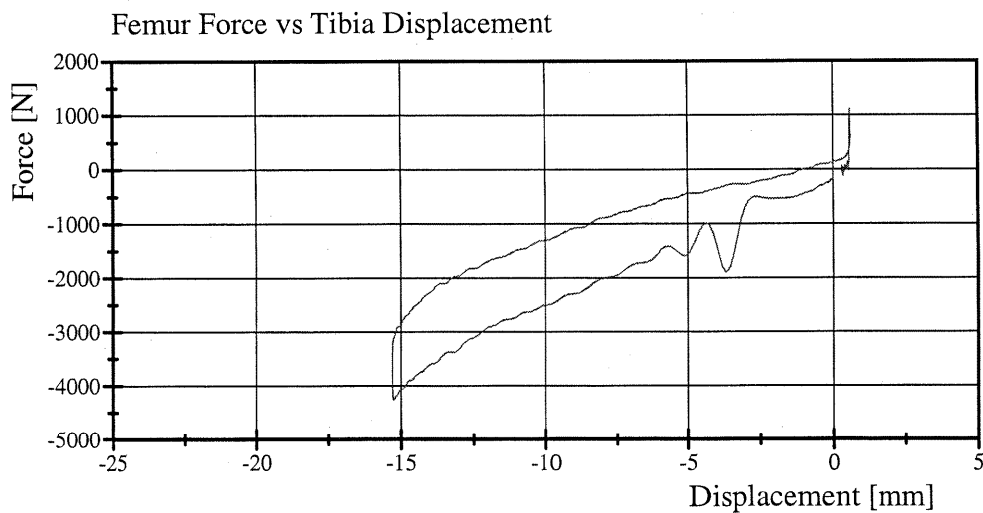
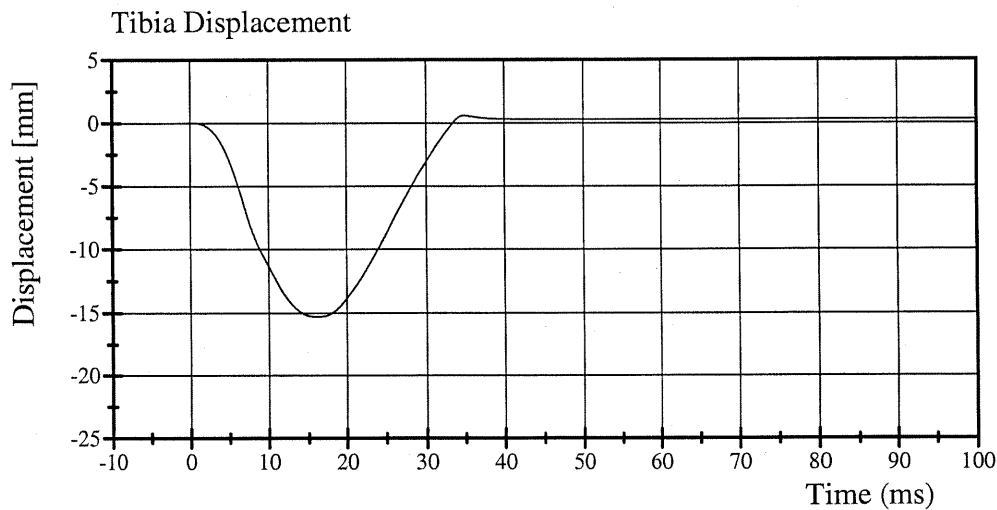
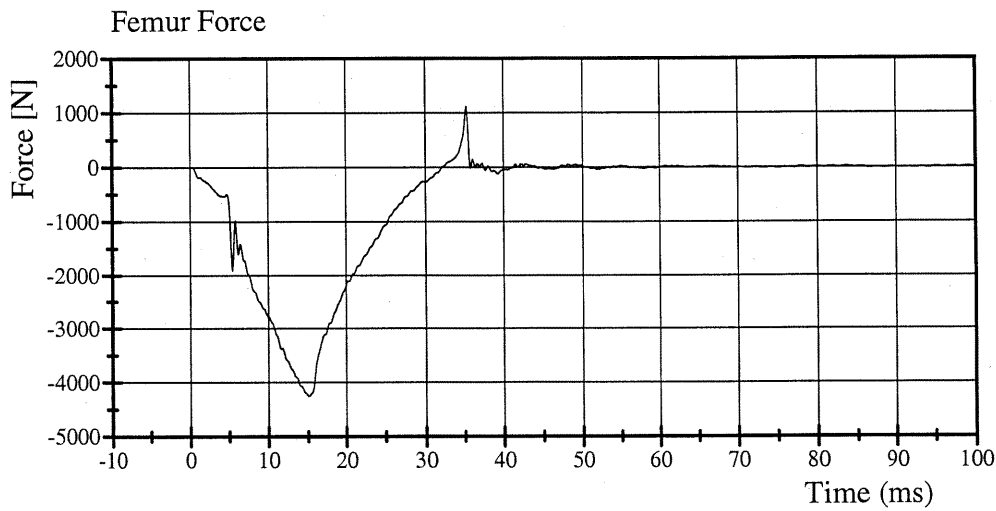


# Transportation Research Center Inc.

Right Knee Slider Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003



02.18.2003 07:46:31 1783



# Transportation Research Center Inc.

Left Knee Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

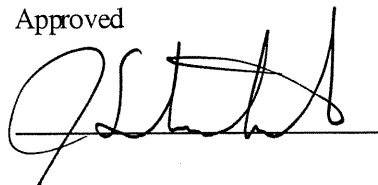
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.07 m/s	Yes
Maximum Pendulum Force	4900 - 6000 N	5778 N	Yes

## Comments:

Technician



Approved



02.18.2003 13:02:27 2301



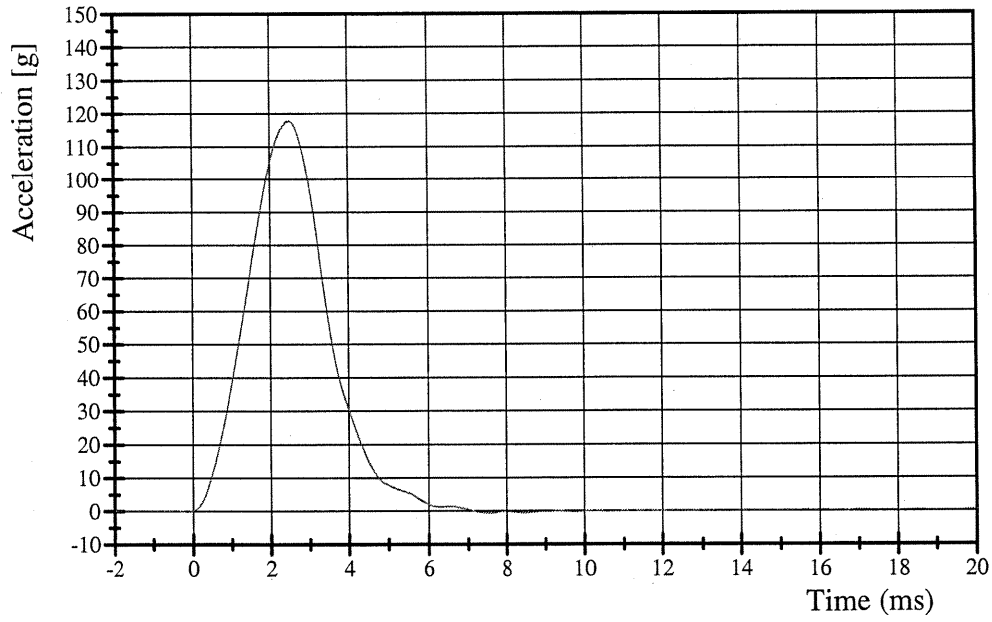
# Transportation Research Center Inc.

Left Knee Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

### Pendulum Deceleration

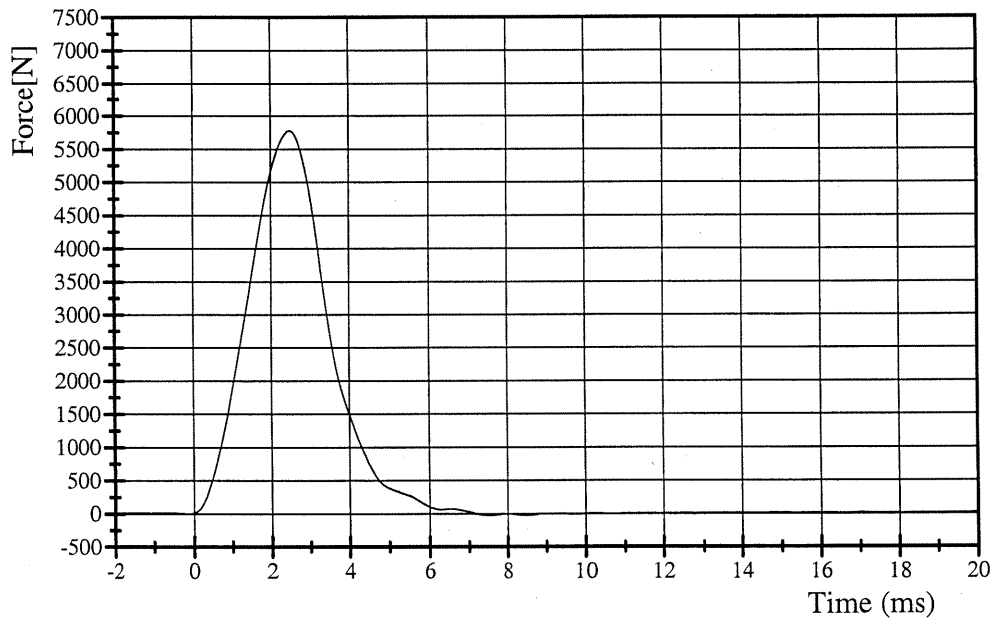


Filter Class: 600

Max: 117.8 g at 2.5 ms

Min: -0.6 g at 7.5 ms

### Pendulum Force



Filter Class: 600

Max: 5778.2 N at 2.5 ms

Min: -29.9 N at 7.5 ms



# Transportation Research Center Inc.

Right Knee Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

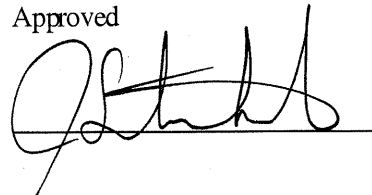
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4900 - 6000 N	5640 N	Yes

## Comments:

Technician



Approved



02.18.2003 13:13:02 2277



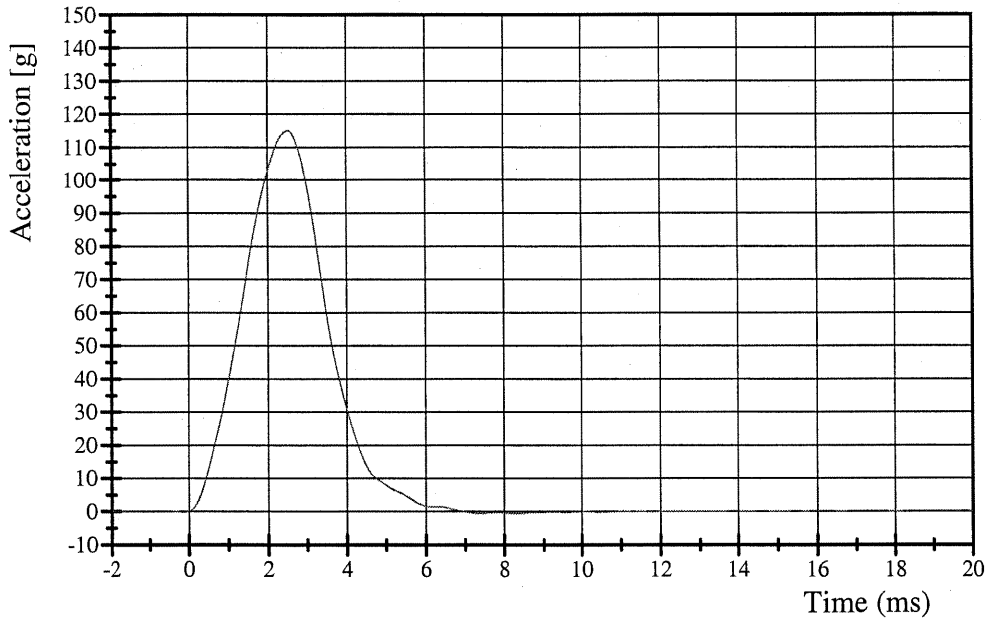
# Transportation Research Center Inc.

Right Knee Test

HIII 95th Male Serial No. 083 Calibration No. 08 - 1

Test Date 02/18/2003

Pendulum Deceleration

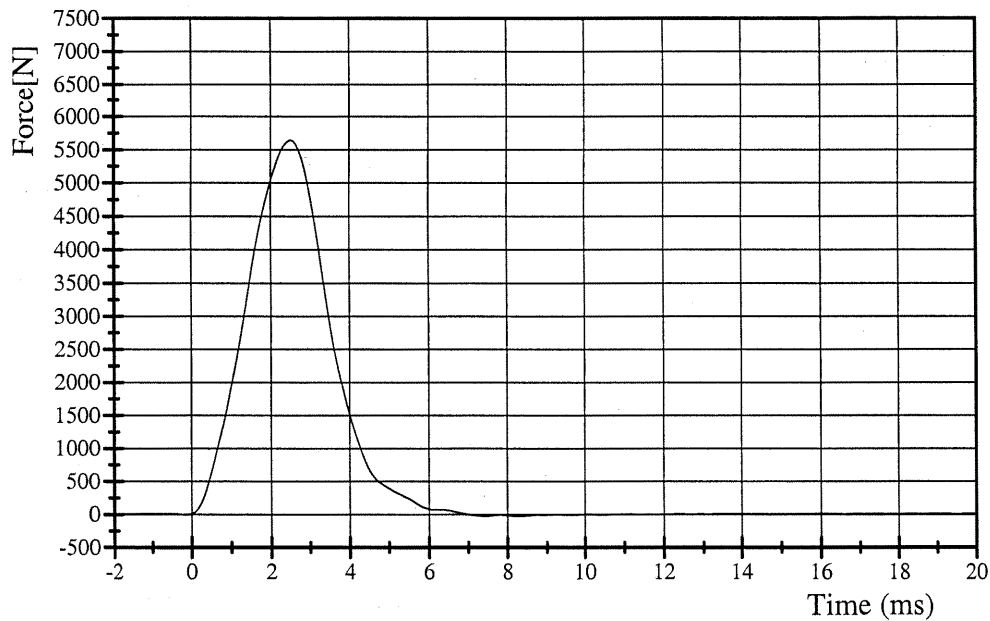


Filter Class: 600

Max: 115.0 g at 2.5 ms

Min: -0.6 g at 8.3 ms

Pendulum Force



Filter Class: 600

Max: 5640.4 N at 2.5 ms

Min: -30.5 N at 8.3 ms

02.18.2003 13:13:03 2277



Type: HIII 50th S/N: 090 Mfg.: Alderson Test Date: 2/14/03  
 Proj./Seg. No.: 20020480-1001 Test Eng. G. Watters

ITEM	PRE-USE
<b>HEAD:</b>	
Head Ballast Condition	X
Accel. Mount Bolts and Cables	X
Skull Cap Bolts	X
Accel. Cable Exit (left or right)	X
<b>NECK:</b>	
* Bracket at specified setting, Serration Alignment, Bolt	N/A
* Condyle Pin, Set Screws	X
* Rubber Condition	X
* Neck Cable Torque (50 <sup>th</sup> 9.6 – 14.4 in-lb / 5 <sup>th</sup> 12 in-lb / 6YO 1.8 – 2.2 in-lb)	X
* Nodding Blocks Condition and Position	X
<b>ARMS AND HANDS:</b>	
Clavicle and Shoulder Bumpers Condition	X
Range of Motion Stops: Elbow, Top and Rear Shoulder	X
<b>THORAX:</b>	
Front and Rear Rib Bolts, Rib Ends Position, Rib Spacing	X
Chest Pot Arm, Ball Movement, Set Screws	X
Sternum Bolts and Sternum Bumpers Condition	X
Jacket Condition	X
Abdominal Insert Condition	X
Rib Damping Material and Stiffeners Condition	X
Rib Minimum Depth (Use Chest Depth Gage)	X
Accel. Mount Bolts	X
Lumbar Spine Rubber Condition, Spine Angle, (4) Attachment Bolts	X
<b>PELVIS:</b>	
Iliac Crest Bone	X
Flesh Condition	X
Accel. Mount Bolt	X
Lumbar Block Bolts	X
<b>LEGS AND FEET:</b>	
* Femur Load Cell Bolts (30 ft/lbs)	X
Knee Joint Function and Range of Motion	X
Knee Skins, Inserts and Castings Condition	X
Knee Slider Zero Position	X
Ankle Range of Motion, Bumper Condition	X
Foot Condition	X
<b>OTHER:</b>	
Cleanliness / Skin Condition & Position	X
Target Position	X
Clothes Blue	X
Shoes	X
One G Joint Adjustments	X

\* Items to be checked during calibration.

Inspection Completed By: J. Clarridge

Date: 2/13/03

Type: HIII 95th S/N: 083 Mfg.: First Technology Test Date: 2/14/03  
 Proj./Seg. No.: 200204801-1001 Test Eng. G. Watters

ITEM	PRE-USE
<b>HEAD:</b>	
Head Ballast Condition	X
Accel. Mount Bolts and Cables	X
Skull Cap Bolts	X
Accel. Cable Exit (left or right)	X
<b>NECK:</b>	
* Bracket at specified setting, Serration Alignment, Bolt	N/A
* Condyle Pin, Set Screws	X
* Rubber Condition	X
* Neck Cable Torque (50 <sup>th</sup> 9.6 – 14.4 in-lb / 5 <sup>th</sup> 12 in-lb / 6YO 1.8 – 2.2 in-lb)	X
* Nodding Blocks Condition and Position	X
<b>ARMS AND HANDS:</b>	
Clavicle and Shoulder Bumpers Condition	X
Range of Motion Stops: Elbow, Top and Rear Shoulder	X
<b>THORAX:</b>	
Front and Rear Rib Bolts, Rib Ends Position, Rib Spacing	X
Chest Pot Arm, Ball Movement, Set Screws	X
Sternum Bolts and Sternum Bumpers Condition	X
Jacket Condition	X
Abdominal Insert Condition	X
Rib Damping Material and Stiffeners Condition	X
Rib Minimum Depth (Use Chest Depth Gage)	X
Accel. Mount Bolts	X
Lumbar Spine Rubber Condition, Spine Angle, (4) Attachment Bolts	X
<b>PELVIS:</b>	
Iliac Crest Bone	X
Flesh Condition	X
Accel. Mount Bolt	X
Lumbar Block Bolts	X
<b>LEGS AND FEET:</b>	
* Femur Load Cell Bolts (30 ft/lbs)	X
Knee Joint Function and Range of Motion	X
Knee Skins, Inserts and Castings Condition	X
Knee Slider Zero Position	X
Ankle Range of Motion, Bumper Condition	X
Foot Condition	X
<b>OTHER:</b>	
Cleanliness / Skin Condition & Position	X
Target Position	X
Clothes Pink	X
Shoes	X
One G Joint Adjustments	X

\* Items to be checked during calibration.

Inspection Completed By: J. Clarridge

Date: 2/13/03

**Transportation Research Center Inc.**

Hybrid III Dummy Post-Use Inspection

Type: HIII 50th S/N: 090 Mfg.: Alderson Test Date: 02/14/03  
Proj./Seg. No.: 20020480-1001 Test Eng. Ginny Watters

ITEM	POST-USE
<b>HEAD:</b>	
Head Skin Condition	X
<b>NECK:</b>	
Rubber Condition	X
<b>ARMS AND HANDS:</b>	
Skin Condition	X
<b>THORAX:</b>	
Jacket Condition	X
Rib Damping Material and Stiffeners Condition	X
Chest Pot Arm and Ball Movement	X
Spine Condition	X
Sternum Assembly Condition	X
<b>PELVIS:</b>	
Flesh Condition	X
Iliac Crest Bone	X
Range of Motion Bumpers and Leg Cavity	X
<b>LEGS AND FEET:</b>	
Knee Skins, Inserts, and Castings Condition	X
Leg Skin Condition and Position	X
Foot Condition	X

NOTES: No damage to report.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Inspection Completed By: J. Clarridge Date: 02/18/03

**Transportation Research Center Inc.**

Hybrid III Dummy Post-Use Inspection

Type: HIII 95th S/N: 083 Mfg.: First Technology Test Date: 02/14/03  
 Proj./Seg. No.: 20020480-1001 Test Eng. Ginny Watters

ITEM	POST-USE
<b>HEAD:</b>	
Head Skin Condition	X
<b>NECK:</b>	
Rubber Condition	X
<b>ARMS AND HANDS:</b>	
Skin Condition	X
<b>THORAX:</b>	
Jacket Condition	X
Rib Damping Material and Stiffeners Condition	X
Chest Pot Arm and Ball Movement	X
Spine Condition	X
Sternum Assembly Condition	X
<b>PELVIS:</b>	
Flesh Condition	X
Iliac Crest Bone	X
Range of Motion Bumpers and Leg Cavity	X
<b>LEGS AND FEET:</b>	
Knee Skins, Inserts, and Castings Condition	X
Leg Skin Condition and Position	X
Foot Condition	X

NOTES: No damage to report.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Inspection Completed By: J. Clarridge Date: 02/18/03

Appendix D

Test Equipment and Instrumentation Calibration Information

### Large Male (HIII-95) Dummy Positioning

The seat track was placed in full rearward position.

The seat back angle was set as specified for the vehicle, the same angle used for the 50<sup>th</sup> percentile dummy.

If the vehicle was equipped with an adjustable steering column, it was set at its highest position when the large male was seated in the driver's position.

If the vehicle was equipped with adjustable seat belt D-rings, the large male's seating position's D-ring was placed in its highest position.

If the seat was equipped with an adjustable lumbar support, it was placed in its lowest position.

If the seat was vertically adjustable, it was placed in its lowest position.

The dummy was placed in the seat similar to a 50<sup>th</sup> percentile dummy with its legs parallel, its pelvis angle between 20 and 25 degrees and its head level.

The H-point location of the 95<sup>th</sup> percentile dummy (with the seat in the full rearward position) was recorded relative to the 50<sup>th</sup> percentile target H-point established by the SAE J826 H-point machine (with the seat in the mid position).

Sign Convention  
SAE J211 MAR95

Accelerometers:    +X: Forward  
                          +Y: Rightward  
                          +Z: Downward

Potentiometers:    +Chest longitudinal deflection: Outward  
                          +Chest lateral deflection:       Rightward  
                          +Seat belt displacement:        Outward  
                          +Seat belt extension:            Elongation  
                          +Knee slider displacement:    Distance between femur and tibia  
  increased (in relation to a seated  
  dummy)

Rotation potentiometers:

                          +About the X-axis:       Left foot-eversion  
  Right foot-inversion  
                          +About the Y-axis:       Left/right foot-dorsiflexion  
                          +About the Z-axis:       Left foot-internal  
  Right foot-external

Load cells:        +Femur force:        Tension  
                          +Seat belt force:    Tension  
                          +Barrier force:      Tension

Neck load cells:    +X force:        Head pushed rearward  
                          +Y force:        Head pushed leftward  
                          +Z force:        Head pulled upward (tension on neck)  
                          +X moment:       Left ear rotating toward left shoulder  
                          +Y moment:       Chin rotating toward chest  
                          +Z moment:       Chin rotating toward left shoulder

Tibia load cells:    +X force:        Ankle forward, knee rearward  
                          +Y force:        Ankle rightward, knee leftward  
                          +Z force:        Tension  
                          +X moment:       Bottom of tibia moving leftward  
                          +Y moment:       Bottom of tibia moving rearward

Frequency Response Classes  
SAE J211 MAR95

<u>Typical Test Measurements</u>	<u>Channel Class</u>
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	600
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Head form Accelerations	1000

The direction column on the following sheets describes the transducer output as mounted and wired in the test location. The polarity column indicates whether a polarity change occurred during data acquisition to conform to J211 MAR95. See Report Sign Convention sheet for description of data output as presented in the report: occasionally channels have been adjusted in post-acquisition processing to conform to J211 MAR95.

Dummy 090v Type HYBRID III 50TH Description VOLPE - 090v HYBRID III 50TH w/THOR LEGS ICAL'd 9-19-02 (DKS 2-10-03)J211

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
HEDXG	Head Accel X	EGE-73B6Q-20	02I02I05-F14	Entran	0.0221 g	2000	1/24/03	Fwd	0
HEDYG	Head Accel Y	EGE-73B6Q-20	02I02I10-N20	Entran	0.02529 g	2000	1/24/03	Lft	1
HEDZG	Head Accel Z	EGE-73B6Q-20	02I02I10-N28	Entran	0.02092 g	2000	1/24/03	Up	1
HEDXR	Head Accel Red X	EGE-73B6Q-20	02I02I10-N18	Entran	0.02256 g	2000	1/24/03	Rwd	1
HEDYR	Head Accel Red Y	EGE-73B6Q-20	02I02I05-F02	Entran	0.0204 g	2000	1/24/03	Rgt	0
HEDZR	Head Accel Red Z	EGE-73B6Q-20	02I02I16-A20	Entran	0.02307 g	2000	1/24/03	Up	1
HD1XG	Head (LT) Accel X	EGE-73B6Q-20	02I02I05-F18	Entran	0.02155 g	2000	1/24/03	Fwd	0
HD1ZG	Head (LT) Accel Z	EGE-73B6Q-20	02I02I05-F15	Entran	0.023 g	2000	1/24/03	Up	1
HD2YG	Head (FT) Accel Y	EGE-73B6Q-20	02I02I05-F13	Entran	0.02196 g	2000	1/24/03	Lft	1
HD2ZG	Head (FT) Accel Z	EGE-73B6Q-20	02I02I05-F05	Entran	0.02083 g	2000	1/24/03	Up	1
HD3XG	Head (TP) Accel X	EGE-73B6Q-20	02I02I10-N21	Entran	0.02027 g	2000	1/24/03	Fwd	0
HD3YG	Head (TP) Accel Y	EGE-73B6Q-20	02I02I05-F12	Entran	0.02148 g	2000	1/24/03	Lft	1
NEKXF	Neck Force X	1716	1716-0499-FX	Denton	0.000190515 N	8896.4	10/3/02	Hd Fd,Cst Rr	1
NEKYF	Neck Force Y	1716	1716-0499-FY	Denton	0.000187548 N	8896.4	10/3/02	Hd Lt,Cst Rt	0
NEKZF	Neck Force Z	1716	1716-0499-FZ	Denton	0.000088118 N	13344.6	10/3/02	Hd Up,Cst Dn	0
NEKXM	Neck Moment X	1716	1716-0499-MX	Denton	0.00592 N-m	282.5	10/3/02	Rt Ear to Rt Shld	1
NEKYM	Neck Moment Y	1716	1716-0499-MY	Denton	0.005854513 N-m	282.5	10/3/02	Chn to Strnm	0
NEKZM	Neck Moment Z	1716	1716-0499-MZ	Denton	0.008227611 N-m	282.5	10/3/02	Chn to Lt Shld	0
NKLXF	Neck Lower Force X	1794A	1794A-0121-FX	Denton	0.000140895 N	13344.6	10/26/02	Hd Fd,Cst Rr	1
NKLYF	Neck Lower Force Y	1794A	1794A-0121-FY	Denton	0.000139487 N	13344.6	10/26/02	Hd Lt,Cst Rt	0
NKLZF	Neck Lower Force Z	1794A	1794A-0121-FZ	Denton	6.22799E-05 N	13344.6	10/26/02	Hd Up,Cst Dn	0
NKLXM	Neck Lower Moment X	1794A	1794A-0121-MX	Denton	0.00382831 N-m	452	10/26/02	Rt Ear to Rt Shld	1
NKLYM	Neck Lower Moment Y	1794A	1794A-0121-MY	Denton	0.003734956 N-m	452	10/26/02	Chn to Strnm	0
NKLZM	Neck Lower Moment Z	1794A	1794A-0121-MZ	Denton	0.00694115 N-m	452	10/26/02	Chn to Lt Shld	0
CSTXG	Chest Accel X	7264-2KM5T	J14688	Endevco	0.04085 g	2000	1/21/03	Fwd	0
CSTYG	Chest Accel Y	7264-2000LC	AAKA1	Endevco	0.03038 g	2000	1/21/03	Lft	1

D-6

030214

Monday, February 10, 200 090v

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
CSTZG	Chest Accel Z	7264-2000LC	ADAL2	Endevco	0.01949 g	2000	1/21/03	Up	1
CSTXR	Chest Accel Red X	7264-2000TZ	J36744	Endevco	0.02302 g	2000	1/21/03	Rwd	1
CSTYR	Chest Accel Red Y	7264-2KM5T	J14660	Endevco	0.03241 g	2000	1/21/03	Lft	1
CSTZR	Chest Accel Red Z	7264-2KM5T	J14666	Endevco	0.03284 g	2000	1/21/03	Up	1
CSTXD	Chest Deflection X #1	14CB1-2897	83672-14	Servo	1.13936 mm	100	1/31/03	Stn Fr Spn	0
LFMZF	Left Femur Force Z #3	2430	2430-631	GSE	0.000071013 N	13344	10/7/02	Kne Fd,Pel Rr	0
RFMZF	Right Femur Force Z #6	2430	2430-741	GSE	0.000067656 N	13344	10/7/02	Kne Fd,Pel Rr	0
KNLXD	Left Knee Displacement	150-0121VR	150-0121VR-3892L	SpaceAge	23.22389 mm	40	1/28/03	Tib Rr,Hld Fem	1
TBLXF	Left Upper Tibia Force X	4509J	4509J-90-FX	Denton	0.000167356 N	11120	12/27/02	Tib Fd,Knee Rr	0
TBLYF	Left Upper Tibia Force Y	4509J	4509J-90-FY	Denton	0.00016795 N	11120	12/27/02	Tib Rt,Knee Lt	0
TBLZF	Left Upper Tibia Force Z	4509J	4509J-90-FZ	Denton	9.30665E-05 N	11120	12/27/02	Tib Dn,Knee Up	0
TBLXM	Left Upper Tibia Moment X	4509J	4509J-90-MX	Denton	0.007199291 N·m	395.4	12/27/02	Tib Lt,Hld Knee	0
TBLYM	Left Upper Tibia Moment Y	4509J	4509J-90-MY	Denton	0.007209155 N·m	395.4	12/27/02	Tib Fd,Clevis Rr	0
TBLXG	Left Tibia Accel X	7264-2000T	EJ59J	Endevco	0.02219 g	2000	1/21/03	Fwd	0
TBLYG	Left Tibia Accel Y	7264-2KM5T	AJ507	Endevco	0.02795 g	2000	1/22/03	Rt	0
ANLXF	Left Lower Tibia Force X	4929J	4929J-121-FX	Denton	0.000173138 N	11120.5	12/30/02	Ank Fd,Knee Rr	0
ANLYF	Left Lower Tibia Force Y	4929J	4929J-121-FY	Denton	0.000174541 N	11120.5	12/30/02	Ank Rt,Knee Lt	0
ANLZF	Left Lower Tibia Force Z	4929J	4929J-121-FZ	Denton	9.55306E-05 N	11120.5	12/30/02	Ank Dn,Knee Up	0
ANLXM	Left Lower Tibia Moment X	4929J	4929J-121-MX	Denton	0.0075 N·m	395.4	12/30/02	Ank Lt,Hld Knee	0
ANLYM	Left Lower Tibia Moment Y	4929J	4929J-121-MY	Denton	0.0074678 N·m	395.4	12/30/02	Ank Fd,Hld Knee	0
FTLXD	Left Foot Disp. X 103X	PD210-4B	PD210-4B-AK-0257	Contelec	3.1295 °	318	9/19/02	Eversion	0
FTLYD	Left Foot Disp. Y 103Y	PD210-4B	PD210-4B-AK-0258	Contelec	3.1743 °	318	9/19/02	Dorsiflexion	0
FTLZD	Left Foot Disp. Z 103Z	PD210-4B	PD210-4B-AK-0259	Contelec	3.1385 °	318	9/19/02	External Rotation	1
FTLXG	Left Foot Accel X	7264-2000T	EY99J	Endevco	0.03649 g	2000	1/22/03	Fwd	0
FTLYG	Left Foot Accel Y	7264-2KM5T	J17988	Endevco	0.03383 g	2000	1/22/03	Rt	0
FTLZG	Left Foot Accel Z	7264-2KM5T	FG97J	Endevco	0.02917 g	2000	1/21/03	Dn	0
KNRXD	Right Knee Displacement	150-0121VL	150-0121VL-3726R	SpaceAge	23.77294 mm	40	1/28/03	Tib Rr,Hld Fem	1
TBRXF	Right Upper Tibia Force X	4509J	4509J-89-FX	Denton	0.000169811 N	11120	12/27/02	Tib Fd,Knee Rr	0

D-7

030214

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
TBRYF	Right Upper Tibia Force Y	4509J	4509J-89-FY	Denton	0.000169604 N	11120	12/27/02	Tib Rt,Knee Lt	0
TBRZF	Right Upper Tibia Force Z	4509J	4509J-89-FZ	Denton	9.31835E-05 N	11120	12/27/02	Tib Dn,Knee Up	0
TBRXM	Right Upper Tibia Moment X	4509J	4509J-89-MX	Denton	0.00717551 N·m	395.4	12/27/02	Tib Lt,Hld Knee	0
TBRYM	Right Upper Tibia Moment Y	4509J	4509J-89-MY	Denton	0.0072028 N·m	395.4	12/27/02	Tib Fd,Clevis Rr	0
TBRXG	Right Tibia Accel X	7264-2000TZ	J35770	Endevco	0.02453 g	2000	1/22/03	Fwd	0
TBRYG	Right Tibia Accel Y	7264-2000LC	AAKC6	Endevco	0.02755 g	2000	1/22/03	Rt	0
ANRXF	Right Lower Tibia Force X	4929J	4929J-120-FX	Denton	0.000171115 N	11120.5	12/27/02	Ank Fd,Knee Rr	0
ANRYF	Right Lower Tibia Force Y	4929J	4929J-120-FY	Denton	0.000172239 N	11120.5	12/27/02	Ank Rt,Knee Lt	0
ANRZF	Right Lower Tibia Force Z	4929J	4929J-120-FZ	Denton	9.54317E-05 N	11120.5	12/27/02	Ank Dn,Knee Up	0
ANRXM	Right Lower Tibia Moment X	4929J	4929J-120-MX	Denton	0.007373798 N·m	395.4	12/27/02	Ank Lt,Hld Knee	0
ANRYM	Right Lower Tibia Moment Y	4929J	4929J-120-MY	Denton	0.00748002 N·m	395.4	12/27/02	Ank Fd,Hld Knee	0
FTRXD	Right Foot Disp. X 108X	PD210-4B	PD210-4B-AK-0254	Contelec	3.2138 °	318	9/19/02	Eversion	1
FTRYD	Right Foot Disp. Y 108Y	PD210-4B	PD210-4B-AK-0255	Contelec	3.1317 °	318	9/19/02	Dorsiflexion	0
FTRZD	Right Foot Disp. Z 108Z	PD210-4B	PD210-4B-AK-0256	Contelec	3.1719 °	318	9/19/02	Internal Rotation	1
FTRXG	Right Foot Accel X	7264-2KM5T	AGAC4	Endevco	0.02409 g	2000	1/21/03	Fwd	0
FTRYG	Right Foot Accel Y	7264-2KM5T	AJ452	Endevco	0.025 g	2000	1/22/03	Rt	0
FTRZG	Right Foot Accel Z	7264-2KM5T	CC24H	Endevco	0.03443 g	2000	1/21/03	Dn	0

D-8

030214

Dummy 083v Type HYBRID III 95TH Description VOLPE - 083v HYBRID III 95TH w/THOR LEGS ICAL'd 9-25-02 (DKS 2-5-03)J211

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
HEDXG	Head Accel X	7264-2000LC	AGN47	Endevco	0.01996 g	2000	1/22/03	Fwd	0
HEDYG	Head Accel Y	7264-2KM5T	J27457	Endevco	0.02785 g	2000	1/22/03	Lft	1
HEDZG	Head Accel Z	7264-2000LC	AAKE2	Endevco	0.02542 g	2000	1/22/03	Up	1
HEDXR	Head Accel Red X	7264-2KM5T	J27523	Endevco	0.02142 g	2000	1/22/03	Fwd	0
HEDYR	Head Accel Red Y	7264-2KM5T	J27466	Endevco	0.02277 g	2000	1/22/03	Lft	1
HEDZR	Head Accel Red Z	7264-2000LC	ACCP9	Endevco	0.02456 g	2000	1/22/03	Up	1
HD1XG	Head (LT) Accel X	7264-2KM5T	J29006	Endevco	0.02499 g	2000	1/22/03	Fwd	0
HD1ZG	Head (LT) Accel Z	7264-2000LC	AGAG0	Endevco	0.02074 g	2000	1/22/03	Up	1
HD2YG	Head (FT) Accel Y	7264-2KM5T	J29023	Endevco	0.02864 g	2000	1/22/03	Lft	1
HD2ZG	Head (FT) Accel Z	7264-2KM5T	J27470	Endevco	0.02263 g	2000	1/22/03	Up	1
HD3XG	Head (TP) Accel X	7264-2000LC	AAJY4	Endevco	0.02677 g	2000	1/22/03	Fwd	0
HD3YG	Head (TP) Accel Y	7264-2000LC	AAKB3	Endevco	0.02557 g	2000	1/22/03	Lft	1
NEKXF	Neck Force X	1716A	1716A-810-FX	Denton	0.000191403 N	8896.4	9/25/02	Hd Fd,Cst Rr	1
NEKYF	Neck Force Y	1716A	1716A-810-FY	Denton	0.000188054 N	8896.4	9/25/02	Hd Lt,Cst Rt	0
NEKZF	Neck Force Z	1716A	1716A-810-FZ	Denton	0.000144789 N	13344.6	9/25/02	Hd Up,Cst Dn	0
NEKXM	Neck Moment X	1716A	1716A-810-MX	Denton	0.005941593 N·m	282.5	9/25/02	Rt Ear to Rt Shld	1
NEKYM	Neck Moment Y	1716A	1716A-810-MY	Denton	0.006023363 N·m	282.5	9/25/02	Chn to Strnm	0
NEKZM	Neck Moment Z	1716A	1716A-810-MZ	Denton	0.008315044 N·m	282.5	9/25/02	Chn to Lt Shld	0
NKLXF	Neck Lower Force X	1794A	1794A-215-FX	Denton	0.000139689 N	13344.6	10/24/02	Hd Fd,Cst Rr	1
NKLYF	Neck Lower Force Y	1794A	1794A-215-FY	Denton	0.000137396 N	13344.6	10/24/02	Hd Lt,Cst Rt	0
NKLZF	Neck Lower Force Z	1794A	1794A-215-FZ	Denton	6.91516E-05 N	13344.6	10/24/02	Hd Up,Cst Dn	0
NKLXM	Neck Lower Moment X	1794A	1794A-215-MX	Denton	0.003843362 N·m	452	10/24/02	Rt Ear to Rt Shld	1
NKLYM	Neck Lower Moment Y	1794A	1794A-215-MY	Denton	0.003790487 N·m	452	10/24/02	Chn to Strnm	0
NKLZM	Neck Lower Moment Z	1794A	1794A-215-MZ	Denton	0.006869912 N·m	452	10/24/02	Chn to Lt Shld	0
CSTXG	Chest Accel X	7264-2KM5T	J19873	Endevco	0.02473 g	2000	1/22/03	Fwd	0
CSTYG	Chest Accel Y	7264-2000LC	AAKA2	Endevco	0.02722 g	2000	1/22/03	Lft	1

D-9

030214

D-10

030214

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
CSTZG	Chest Accel Z	7264-2000LC	AF973	Endevco	0.02643 g	2000	1/22/03	Up	1
CSTXR	Chest Accel Red X	7264-2000LC	AGT82	Endevco	0.01993 g	2000	1/22/03	Rwd	1
CSTYR	Chest Accel Red Y	7264-2KM5T	J23772	Endevco	0.02746 g	2000	1/22/03	Lft	1
CSTZR	Chest Accel Red Z	7264-2000LC	AF9Y5	Endevco	0.02433 g	2000	1/22/03	Up	1
CSTXD	Chest Deflection X	14CB1-2897	14CB1-2897-9230	Servo	1.28526 mm	100	1/29/03	Stn Fr Spn	0
LFMZ	Left Femur Force Z	2430	2430-726	GSE	0.000069245 N	13344	9/25/02	Kne Fd,Pel Rr	0
RFMZ	Right Femur Force Z	2430	2430-729	GSE	0.000069964 N	13344	9/25/02	Kne Fd,Pel Rr	0
KNLXD	Left Knee Displacement	08TC1-2702	08TC1-2702-0831	Servo	41.05857 mm	25.4	1/29/03	Tib Rr,Hld Fem	1
KNLLF	Left Knee-Left Force	2372	2372-146-LEFT	Denton	0.000225383 N	8896.4	9/25/02	Knee Up,Clev Dn	0
KNLMF	Left Knee-Right Force	2372	2372-146-RIGHT	Denton	0.000225473 N	8896.4	9/25/02	Knee Up,Clev Dn	0
TBLXF	Left Upper Tibia Force X	3643	3643-92-FX	Denton	0.000177059 N	11120.6	9/25/02	Tib Rr,Knee Fd	1
TBLYF	Left Upper Tibia Force Y	3643	3643-92-FY	Denton	0.000176708 N	11120.6	9/25/02	Tib Rt,Knee Lt	0
TBLZF	Left Upper Tibia Force Z	3643	3643-92-FZ	Denton	0.000097468 N	11120.6	9/25/02	Tib Dn,Knee Up	0
TBLXM	Left Upper Tibia Moment X	3643	3643-92-MX	Denton	0.00755134 N-m	395.4	9/25/02	Ank Rt,Hld Knee	1
TBLYM	Left Upper Tibia Moment Y	3643	3643-92-MY	Denton	0.007606727 N-m	395.4	9/25/02	Ank Fd,Bot Clev Rr	0
ANLXF	Left Lower Tibia Force X	3644	3644-92-FX	Denton	0.000174145 N	11120.6	9/25/02	Ank Rr,Knee Fd	1
ANLYF	Left Lower Tibia Force Y	3644	3644-92-FY	Denton	0.000173165 N	11120.6	9/25/02	Ank Rt,Knee Lft	0
ANLZF	Left Lower Tibia Force Z	3644	3644-92-FZ	Denton	0.000096092 N	11120.6	9/25/02	Ank Dn,Tib Up	0
ANLXM	Left Lower Tibia Moment X	3644	3644-92-MX	Denton	0.007537178 N-m	395.4	9/25/02	Ank Rt,Hld Knee	1
ANLYM	Left Lower Tibia Moment Y	3644	3644-92-MY	Denton	0.007441325 N-m	395.4	9/25/02	Ank Fd,Hld Knee	0
KNRXD	Right Knee Displacement	08TC1-2702	08TC1-2702-273r	Servo	39.29857 mm	25.4	1/29/03	Tib Rr,Hld Fem	1
KNRMF	Right Knee-Left Force	2372	2372-148-LEFT	Denton	0.000226451 N	8896.4	9/25/02	Knee Up,Clev Dn	0
KNRLF	Right Knee-Right Force	2372	2372-148-RIGHT	Denton	0.000226226 N	8896.4	9/25/02	Knee Up,Clev Dn	0
TBRXF	Right Upper Tibia Force X	3643	3643-94-FX	Denton	0.000173552 N	11120.6	9/25/02	Tib Rr,Knee Fd	1
TBRYF	Right Upper Tibia Force Y	3643	3643-94-FY	Denton	0.000173237 N	11120.6	9/25/02	Tib Rt,Knee Lt	0
TBRZF	Right Upper Tibia Force Z	3643	3643-94-FZ	Denton	0.00095795 N	11120.6	9/25/02	Tib Dn,Knee Up	0
TBRXM	Right Upper Tibia Moment X	3643	3643-94-MX	Denton	0.007383156 N-m	395.4	9/25/02	Ank Rt,Hld Knee	1
TBRYM	Right Upper Tibia Moment Y	3643	3643-94-MY	Denton	0.00744436 N-m	395.4	9/25/02	Ank Fd,Bot Clev Rr	0

Chsname	Location	Model	Name	Manufacturer	Sens./mV/V/U	Fullscale	Caldate	Pos Output	Flip
ANRXF	Right Lower Tibia Force X	3644	3644-94-FX	Denton	0.000176546 N	11120.6	9/25/02	Ank Rr,Knee Fd	1
ANRYF	Right Lower Tibia Force Y	3644	3644-94-FY	Denton	0.000175458 N	11120.6	9/25/02	Ank Rt,Knee Lft	0
ANRZF	Right Lower Tibia Force Z	3644	3644-94-FZ	Denton	0.000097 N	11120.6	9/25/02	Ank Dn,Tib Up	0
ANRXM	Right Lower Tibia Moment X	3644	3644-94-MX	Denton	0.007690187 N·m	395.4	9/25/02	Ank Rt,Hld Knee	1
ANRYM	Right Lower Tibia Moment Y	3644	3644-94-MY	Denton	0.007623672 N·m	395.4	9/25/02	Ank Fd,Hld Knee	0

D-11

030214

2002 SATURN VUE FMVSS 208 / 030214

D-12

030214

