

**Vehicle Research and Test Center  
Moving Barrier into Rear of  
2003 Infiniti QX4  
TRC Inc. Test Number: 031021-2**

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**Prepared for:  
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Section 1.0

Purpose and Test Procedure

## Purpose

This 47.3 km/h (30 mph) rear impact test was conducted for the National Highway Traffic Safety Administration (NHTSA)/Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC Inc).

The purpose of this test was to evaluate rear crash protection and occupant response in a rear impact test. The subject vehicle was a 2003 Infiniti QX4.

## Test Procedure

This test was conducted in accordance with VRTC instructions for a moving barrier into a stationary vehicle test. Data was obtained relative to FMVSS 301, "Fuel System Integrity" (February 28, 2003) performance for the modified rear impact mode using 50<sup>th</sup> percentile male anthropomorphic test devices (dummies).

The test vehicle, a 2003 Infiniti QX4, was instrumented with six (6) accelerometers to measure longitudinal, lateral and vertical axis accelerations. The vehicle's door sills, driver's seat, and right rear passengers' seat were instrumented with magnetohydrodynamic (MHD) sensors to measure rotation rate about the lateral axis. The driver's and right rear passenger's seat backs were instrumented with a test device to measure linear displacement. The vehicle was impacted by a FMVSS 301 moving barrier. The moving barrier's specified impact velocity range was 46.5 to 48.1 km/h.

The test vehicle contained two (2) Part 572E 50<sup>th</sup> percentile male Hybrid III dummies. The dummies were positioned in the left front and right rear outboard designated seating positions according to the FMVSS 208 laboratory procedure TP-208-12 Appendix A. The driver dummy and the right rear passenger dummy were both belted. Both dummies' seat belts were instrumented with load cells to measure lap belt and shoulder belt forces and with potentiometers to measure spool out.

Both dummies were instrumented with head, chest, and pelvis accelerometers to measure longitudinal, lateral, and vertical accelerations; chest deflection potentiometers; left and right femur load cells to measure axial forces; and upper and lower neck load cells to measure longitudinal, lateral, and vertical forces moments. The dummies were also instrumented with head and chest rotation rate sensors to measure rotation rate about the lateral axis.

The moving barrier was instrumented with five (5) accelerometers to measure longitudinal, lateral, and vertical axis accelerations.

The 83 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 nine (9) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera.

The rear impact test summary data are presented in Section 2.0. The summary of FMVSS 301 data are presented in Section 3.0. The occupant, camera, and vehicle measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the dummy verification data. Appendix D contains miscellaneous test information.

Section 2.0

Rear Impact Test Summary

## Test Results Summary

This rear impact test was conducted by TRC Inc. on October 21, 2003.

The test vehicle, a 2003 Infiniti QX4, was equipped with a 3.5-liter inline engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 2210.6 kg. The vehicle's fuel system contained 79.9 liters of Stoddard for the test. The vehicle's maximum static crush was 410 mm (measured with the bumper fascia).

The driver's 36 ms Head Injury Criteria (HIC) was 69. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 14.6 g. The driver's maximum chest deflection was 2 mm. The driver's left and right femur maximum axial compression forces were 553 N and 508 N, respectively. The driver's neck injury criteria (NIJ) were: tension-extension 0.12, tension-flexion 0.14, compression-extension 0.00 and compression-flexion 0.07.

The right rear passenger's 36 ms HIC was 25. The right rear passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 19.1 g. The right rear passenger's maximum chest deflection was 0 mm. The right rear passenger's left and right femur maximum axial compression forces were 1165 N and 1201 N, respectively. The right rear passenger's NIJ were: tension-extension 0.35, tension-flexion 0.06, compression-extension 0.35 and compression-flexion 0.17.

A static rollover test was not performed following the impact by decision of the COTR.

## Data Acquisition Explanations

The moving barrier's center of gravity Y-axis acceleration channel, BCGYG1, did not return to zero post-test. The velocity and calculated resultant were also affected.

Table 1 Crash Test Summary

Test type:	Rear impact	
Test date:	10/21/03	
Test time:	15:26	
Ambient temperature:	16° C	
Vehicle:	2003 Infiniti QX4	
Vehicle test weight:	2210.6 kg	
Impact angle: <sup>1</sup>	180°	
Impact velocity: <sup>2</sup>	Primary = 47.3 km/h Secondary = 47.3 km/h	
Maximum static crush:	410 mm	
Dummies:	Driver #202	Passenger #206
Type:	HIII 50 <sup>th</sup> Male (Part 572E)	HIII 50 <sup>th</sup> Male (Part 572E)
Location:	Left front	Right rear
Restraint:	3-point seat belt	3-point seat belt
Number of data channels:	26	26
Number of cameras:		
High-speed	9	
Real-time	1	

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

<sup>2</sup> Speed trap measurement ( $\pm$  .08 km/h accuracy)

Table 2 Test Vehicle Information

Vehicle manufacturer: Nissan Motor Company  
 Make/model: Infiniti/QX4  
 VIN: JNRDR09413W303449  
 Model year: 2003  
 Body style: MPV  
 Color: Silver  
 Engine data:  
     Type: Inline  
     Cylinders: 6  
     Displacement: 3.5 liters

Transmission data:        4   Speed,      \_\_\_ Manual,        X   Automatic,  
                             \_\_\_ FWD,            \_\_\_ RWD,              X   4WD

Date vehicle received: 10/17/2003  
 Odometer reading: 25  
 Dealer's name and address: Vehicle supplied by VRTC

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	Yes	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	N/A		

Certification data from vehicle's label:

Vehicle manufactured by: Nissan Motor Co.  
 Date of manufacture: 08/02  
 VIN: JNRDR09413W303449  
 GVWR: 5300 lbs.  
 GAWR: Front: 2650 lbs.  
        Rear: 2850 lbs.

Table 2 Test Vehicle Information, Cont'd.

Tires on vehicle (mfr., line, size):	Bridgestone, Dueler H/T, P245/65R17		
Tire pressure with maximum capacity vehicle load:			
Front:	300 kPa		
Rear:	300 kPa		
Spare tire (mfr., line, size):	Bridgestone, Dueler H/T, P245/65R17		
Type of seats:	Front:	Bucket	
	Rear:	Split bench	
Type of front seat backs:	Power adjustable		
Maximum width:	1775 mm		
Wheelbase:	2700 mm		

Location of "Recommended Tire Pressure" label:

The label was located on the left B-pillar.

Data from vehicle's "Recommended Tire Pressure" label:

Recommended tire size:	P245/65R17		
Recommended cold tire pressure:	Front:	30 psi	
tire pressure:	Rear:	30 psi	
Seating capacity:	Front:	2	
	Rear:	3	
	Total:	5	
Vehicle capacity weight: <sup>1</sup>	472 kg		

Test vehicle attitude:

Delivered attitude:	LF	820 mm;	RF	820 mm;	LR	825 mm;	RR	825 mm
Fully loaded attitude	LF	816 mm;	RF	815 mm;	LR	774 mm;	RR	768 mm
Pre-test attitude:	LF	766 mm;	RF	771 mm;	LR	797 mm;	RR	802 mm
Post-test attitude:	LF	741 mm;	RF	776 mm;	LR	868 mm;	RR	884 mm

<sup>1</sup> Vehicle capacity weight = gross vehicle weight - unloaded vehicle weight

Table 2 Test Vehicle Information, Cont'd.

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

Right front	514.0 kg	Right rear	433.4 kg
Left front	540.0 kg	Left rear	444.0 kg
Total front weight	1054.0 kg	(54.6% of total vehicle weight)	
Total rear weight	877.5 kg	(45.4% of total vehicle weight)	
Total delivered weight	1931.5 kg		

Calculation of test vehicle's target test weight:

Total Delivered Weight (UDW) =	1931.5 kg
Vehicle Capacity Weight =	472.0 kg
Rated Cargo/Luggage Weight (RCLW <sup>1</sup> ) =	133.0 kg
Weight of 2 Part 572E Dummies @ 76 kg each =	152.0 kg
Target test weight =	2216.5 kg

Weight of test vehicle with required dummies and 126.9 kg of cargo weight:

Right front	602.6 kg	Right rear	481.6 kg
Left front	634.4 kg	Left rear	492.0 kg
Total front weight	1237.0 kg	(56.0% of total vehicle weight)	
Total rear weight	973.6 kg	(44.0% of total vehicle weight)	
Total test weight	2210.6 kg	(0.3% below target test weight)	

Weight of ballast secured in vehicle: 0 kg

Components removed to meet target test weight: Head lights and passenger's side mirror

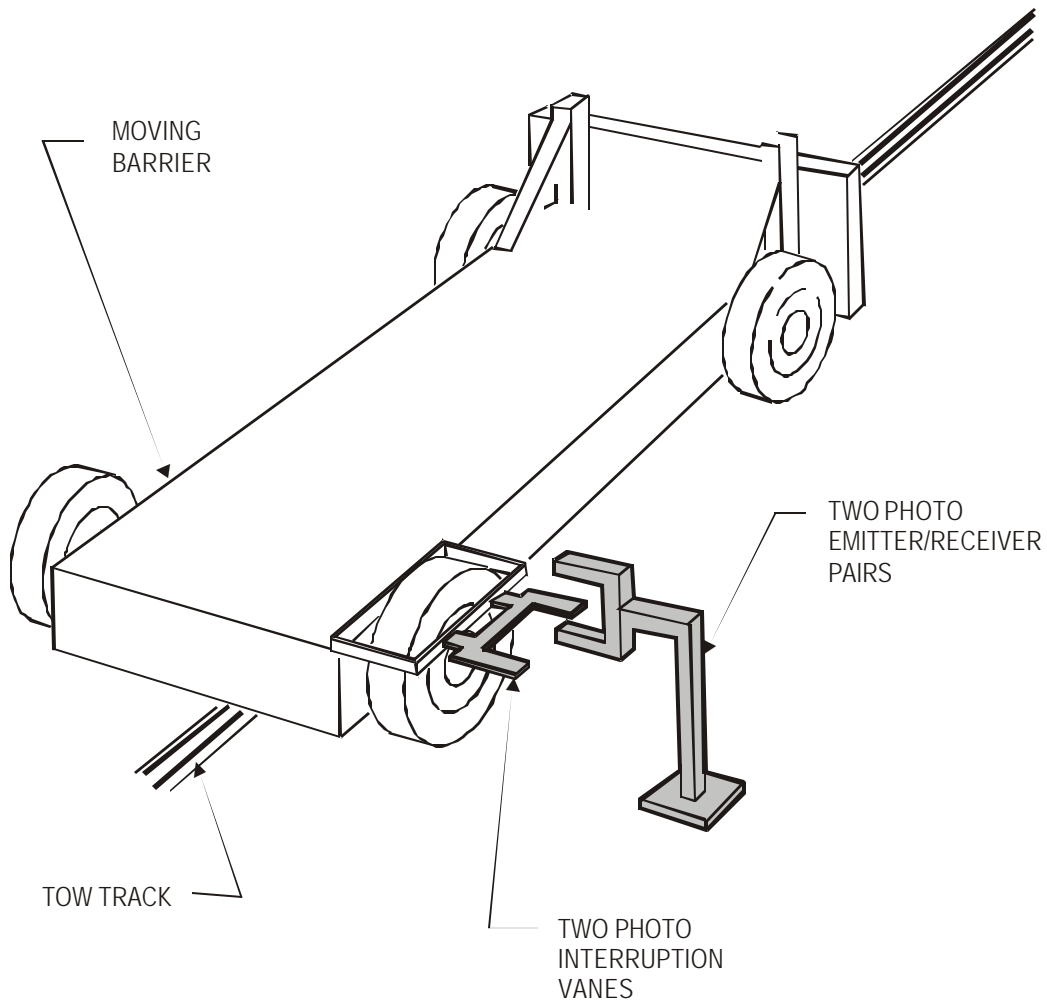
Location of Vehicle's CG: 1188 mm rearward of front wheel centerline.

Fuel System Data

Usable fuel system capacity	79.9 liters (from Owner's Manual)
Actual test volume	79.9 liters

<sup>1</sup> RCLW = Vehicle Capacity Weight – (68 kg x designated seating capacity)

Figure 1 Impact Velocity Measurement System



The final vane clears the final emitter/receiver pair 50 mm before impact.

The vanes have 610 mm spacing.

Figure 2 Vehicle Accelerometer Placement

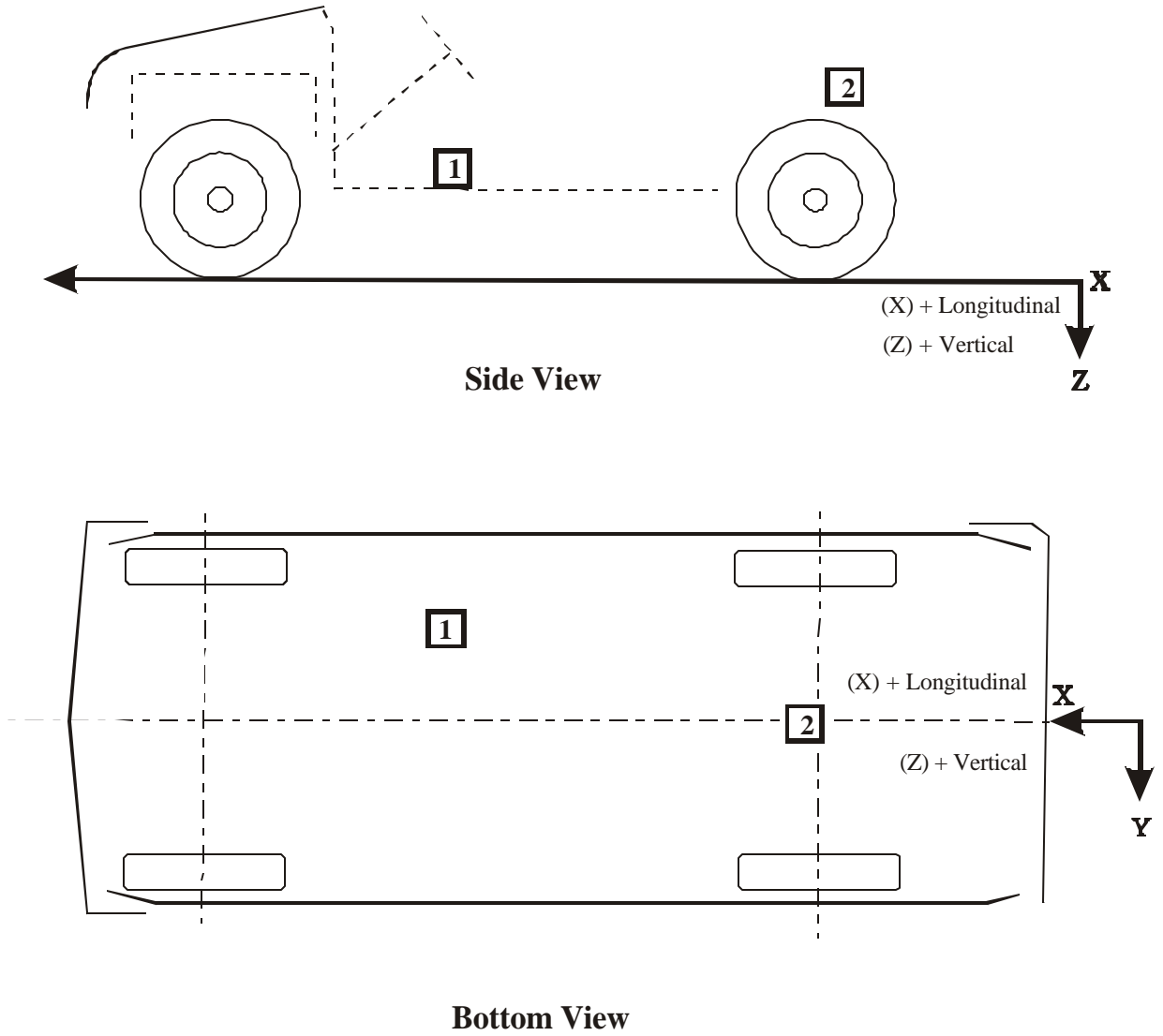


Table 3 Vehicle Accelerometer Locations and Summary

TEST NUMBER: 031021-2

No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 RIGHT FRONT OCCUPANT COMPARTMENT	2220 mm	402 mm	-545 mm				
LONGITUDINAL				16.8 g	@ 27.8 ms	3.8 g	@ 15.8 ms
LATERAL				9.8 g	@ 28.2 ms	5.4 g	@ 61.4 ms
VERTICAL				7.0 g	@ 9.4 ms	14.2 g	@ 28.6 ms
RESULTANT				23.8 g	@ 28.2 ms		
2 REAR FLOORPAN ABOVE AXLE	3826 mm	0 mm	-750 mm				
LONGITUDINAL				16.2 g	@ 19.7 ms	0.1 g	@ 0.0 ms
LATERAL				7.2 g	@ 25.7 ms	6.6 g	@ 71.3 ms
VERTICAL				16.3 g	@ 70.9 ms	29.4 g	@ 20.7 ms
RESULTANT				33.5 g	@ 20.7 ms		

REFERENCE: X: + REARWARD FROM FRONT BUMPER  
 Y: + RIGHTWARD FROM VEHICLE CENTERLINE  
 Z: + DOWNWARD FROM GROUND LEVEL

Table 4 Post-Impact Dummy/Vehicle Data

Visible dummy contact points:

	<u>Driver</u>	<u>Right Rear Passenger</u>
Head	Head restraint	Head restraint, roof
Chest	None	None
Abdomen	None	None
Left knee	None	None
Right knee	None	None

Door opening:

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

Seat back failure:

Left Front Passenger	Reclined
Right Rear Passenger	None

Seat track shift:

Left Front Passenger	None
Right Rear Passenger	N/A

Glazing damage:

Rear window and left and right side  
rear windows shattered

Other notable impact effects:

None

Table 5 Dummy Injury Criteria Data

	<u>Maximum Acceleration<sup>1</sup></u>							
	Head				Chest			
	X	Y	Z	R	X	Y	Z	R
Driver	20.5 g	2.5 g	12.6 g	22.6 g	14.7 g	1.8 g	4.8 g	14.9 g
RR Passenger	12.7 g	-2.4 g	-14.7 g	17.0 g	16.2 g	-1.8 g	-11.6 g	19.5 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	553 N	508 N
RR Passenger	1165 N	1201 N

	<u>Head Injury Criteria<sup>2</sup></u>		
	36 millisecond		
	HIC	Time t <sub>1</sub>	Time t <sub>2</sub>
Driver	69	84.80 ms	120.80 ms
RR Passenger	25	76.80 ms	112.80 ms

	15 millisecond		
	HIC	Time t <sub>1</sub>	Time t <sub>2</sub>
Driver	32	95.44 ms	110.48 ms
RR Passenger	14	88.16 ms	103.20 ms

	<u>Chest Maximum Resultant Acceleration<sup>3</sup></u>		
	Acceleration	Time t <sub>1</sub>	Time t <sub>2</sub>
Driver	14.6 g	73.57 ms	76.53 ms
RR Passenger	19.1 g	39.41 ms	42.37 ms

Table 5 Dummy Injury Criteria Data, Cont'd.

Maximum Chest Deflection

Driver	2 mm
RR Passenger	0 mm

Neck Injury Calculations (Nij)<sup>2</sup>

	NTF	NTE	NCF	NCE
Driver	0.14	0.12	0.07	0.00
RR Passenger	0.06	0.35	0.17	0.35

Upper Neck Axial Force

	Neck Tension	Neck Compression
Driver	766 N	204 N
RR Passenger	466 N	758 N

<sup>1</sup> See Report Sign Convention in Appendix D.

<sup>2</sup> As defined in FMVSS No. 208.

<sup>3</sup> Defined as equal to or exceeding 0.003 sec. duration.

Section 3.0

Summary of FMVSS 301 Data

Table 6 Fuel System Data

Vehicle year/make/ model/body style:	2003/Infiniti/QX4/MPV
Fuel system capacity:	79.9 liters (from owner's manual)
Usable capacity:	79.9 liters
Test volume range:	73.5 liters to 75.1 liters (92% to 94% of usable)
Actual test volume:	79.9 liters
Test fluid type:	Stoddard
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Did electric fuel pump operate with ignition switch "on" and the engine not operating?	No
Details of fuel system:	Fuel tank is located inside of the left frame rail in front of the rear axle, the fuel filler neck runs through the left wheel well, the fuel filler cap is located on the left rear quarter panel, and the fuel lines run along the inside of the right frame rail.

Section 4.0

Vehicle, Occupant, and Camera Measurements

## Dummy Kinematic Summary

### Driver Dummy

Upon impact, the driver dummy translated rearward against the seat back. The seat reclined slightly and the dummy's head contacted the head restraint. The dummy rebounded forward and came to rest seated upright on the driver's seat.

### Right Rear Passenger Dummy

Upon impact, the right rear passenger dummy was forced into the seat back. The seat back reclined and the seat belt slid off of the dummy's shoulder as the dummy moved vertically along the seat. The dummy's pelvis and legs left the seat and the head contacted the head restraint and then the roof of the vehicle. The dummy came to rest seated upright in the seat.

Figure 3 Pre-Test And Post-Test Measurement Points

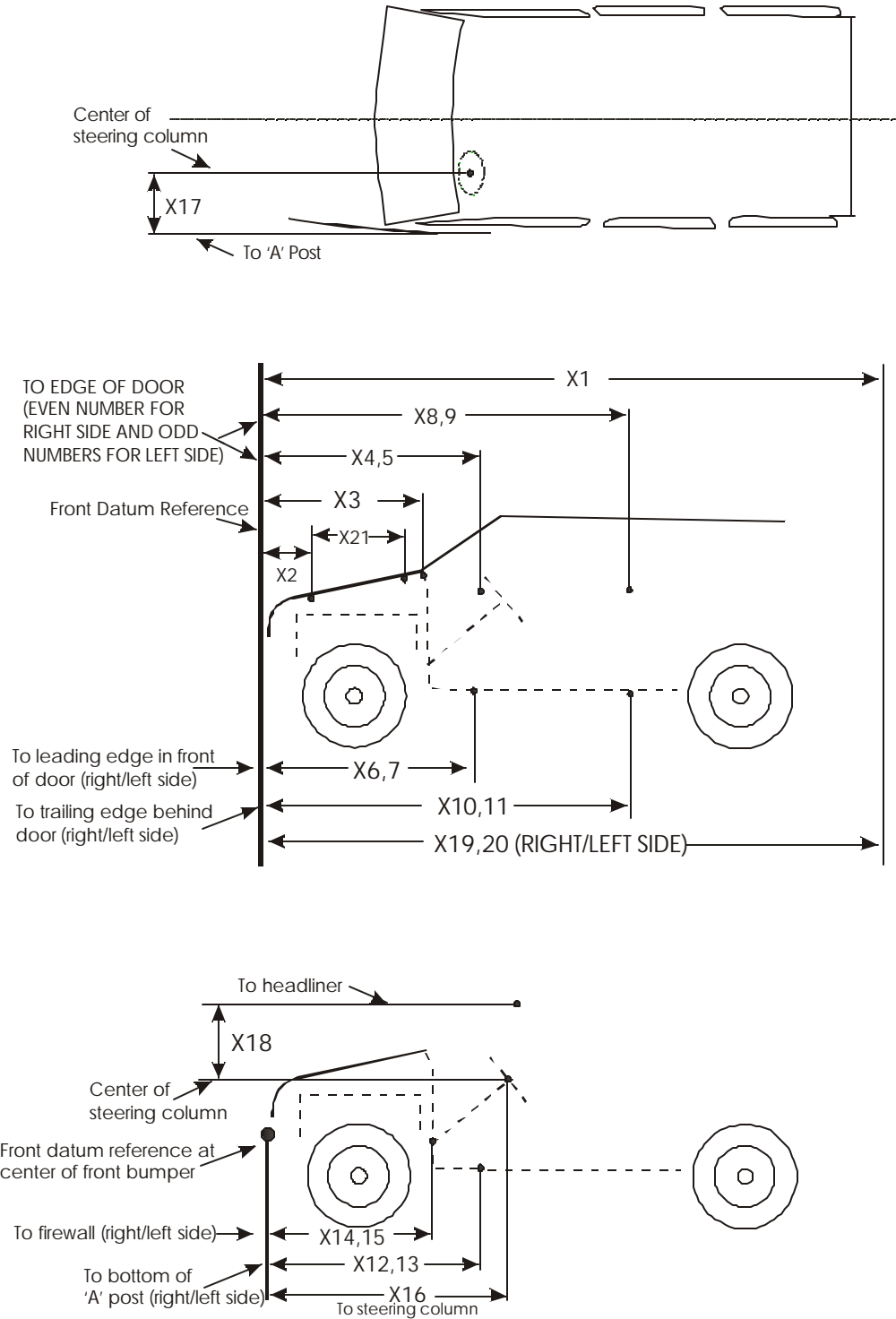


Table 7 Impacted Vehicle Measurements

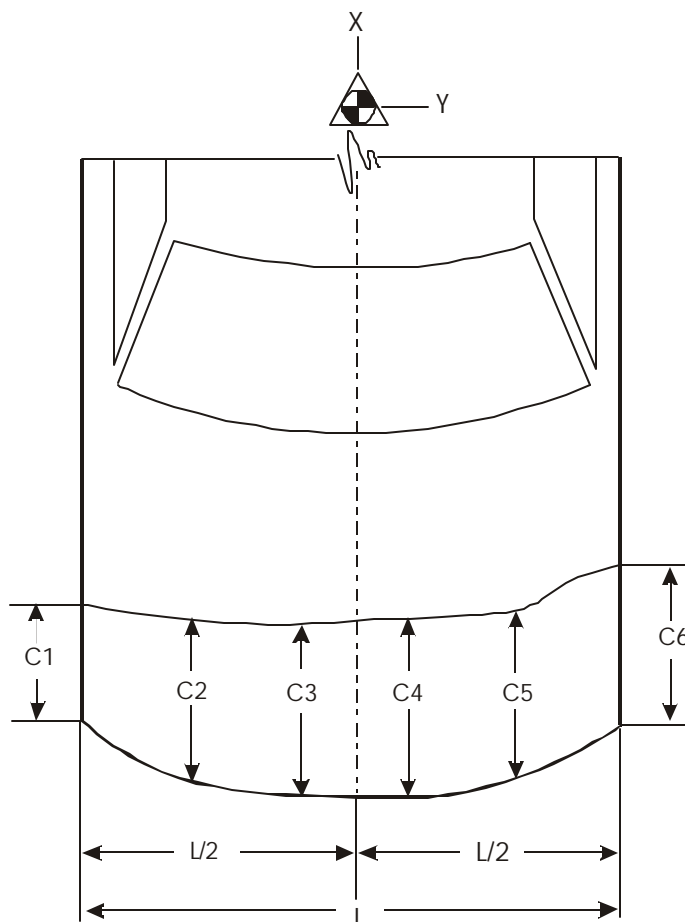
Vehicle Make/Model: 2003 Infiniti QX4

Test Number: 031021-2

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	4901	4502	399
X2	Front Surface of Vehicle to Front of Engine Block	840	840	0
X3	Front Surface of Vehicle to Firewall	1395	1395	0
X4	Front Surface of Vehicle to Upper Leading Edge of Right Door	1440	1448	-8
X5	Front Surface of Vehicle to Upper Leading Edge of Left Door	1645	1645	0
X6	Front Surface of Vehicle to Lower Leading Edge of Right Door	1760	1768	-8
X7	Front Surface of Vehicle to Lower Leading Edge of Left Door	1759	1765	-6
X8	Front Surface of Vehicle to Upper Trailing Edge of Right Door	2726	2730	-4
X9	Front Surface of Vehicle to Upper Trailing Edge of Left Door	2731	2731	0
X10	Front Surface of Vehicle to Lower Trailing Edge of Right Door	2755	2761	-6
X11	Front Surface of Vehicle to Lower Trailing Edge of Left Door	2752	2758	-6
X12	Front Surface of Vehicle to Bottom of " A " Post on Right Side	1680	1680	2
X13	Front Surface of Vehicle to Bottom of " A " Post on Left Side	1680	1680	0
X14	Front Surface of Vehicle to Firewall-Right Side	1420	1420	0
X15	Front Surface of Vehicle to Firewall-Left Side	1423	1423	0
X16	Front Surface of Vehicle to Steering Wheel Center	2148	2120	28
X17	Center of Steering Column to " A " Post	272	270	2
X18	Center of Steering Column to Headliner	416	425	-9
X19	Front Surface of Vehicle to Right Side of Rear Bumper	4825	4473	352
X20	Front Surface of Vehicle to Left Side of Rear Bumper	4827	4513	314
X21	Length of Engine Block	442	442	0

All measurements are in millimeters.

Figure 4 Vehicle Crush



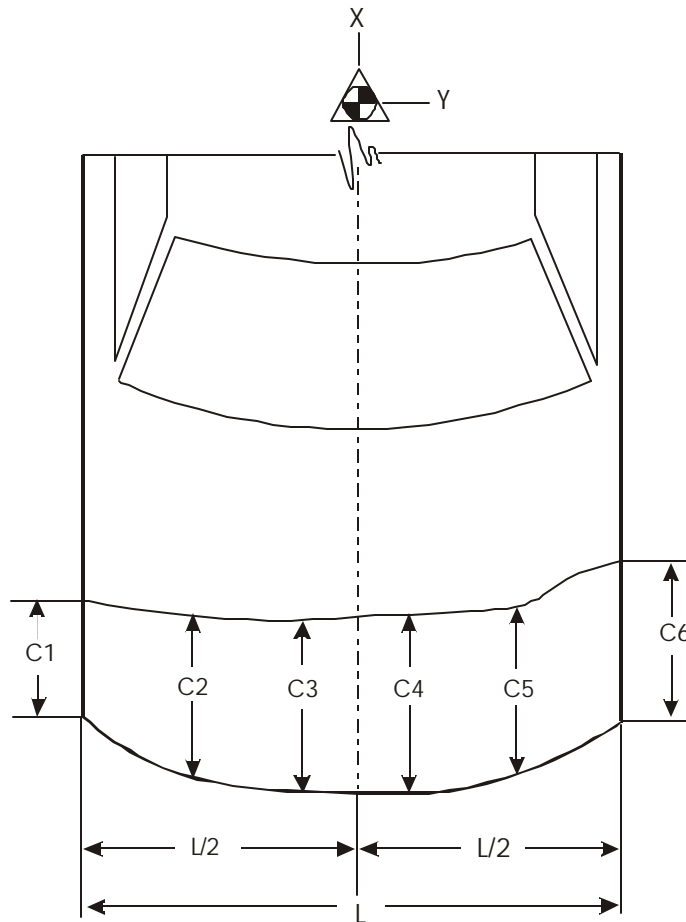
Notes: L is pre-test length of contact surface.  
 C1 through C6 are spaced equally apart.  
 CL is vehicle centerline.

Vehicle: 2003 Infiniti QX4  
 Measured with bumper fascia:

Location	Pre-test	Post-test	Difference
L	1524 mm		
C1	4827 mm	4513 mm	314 mm
C2	4905 mm	4495 mm	410 mm
C3	4902 mm	4501 mm	401 mm
C4	4901 mm	4503 mm	398 mm
C5	4900 mm	4499 mm	401 mm
C6	4825 mm	4473 mm	352 mm
CL	4901 mm	4502 mm	399 mm

<sup>1</sup> The differences for points C1-C6, measured with the bumper fascia, are included in the NHTSA database submission as Damage Profile Distance 1-6.

Figure 4 Vehicle Crush, Cont'd.

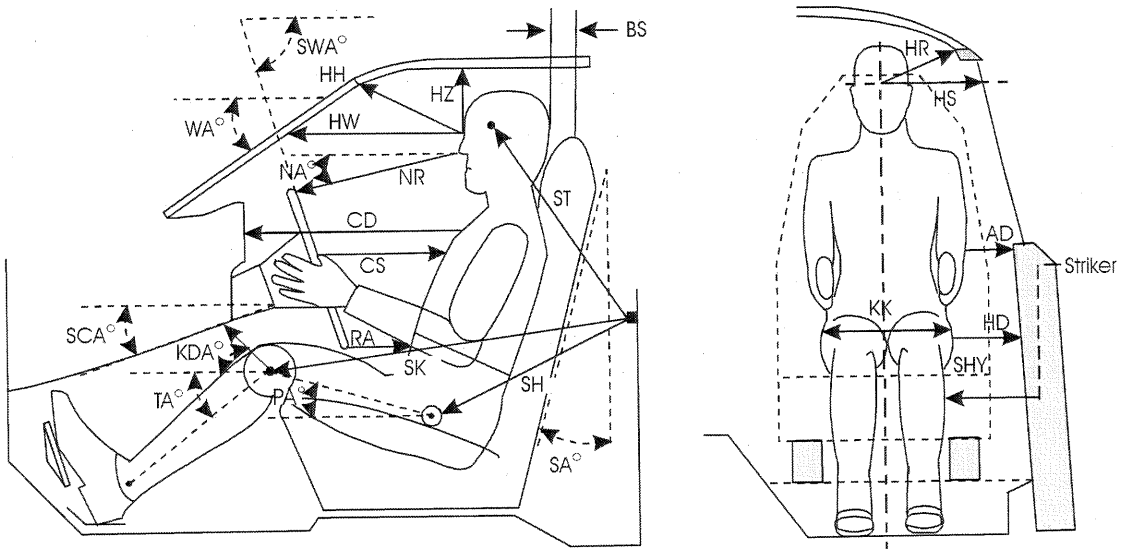


Notes: L is pre-test length of contact surface.  
 C1 through C6 are spaced equally apart.  
 CL is vehicle centerline.

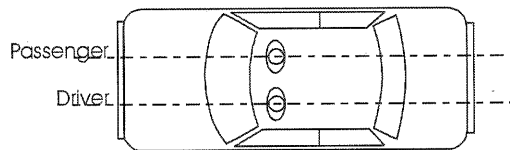
Vehicle: 2003 Infiniti QX4  
 Measured to bumper beam without bumper fascia.

Location	Pre-test	Post-test	Difference
L	1524 mm		
C1	4811 mm	4378 mm	433 mm
C2	4890 mm	4436 mm	454 mm
C3	4900 mm	4453 mm	447 mm
C4	4900 mm	4454 mm	446 mm
C5	4892 mm	4442 mm	450 mm
C6	4815 mm	4389 mm	426 mm
CL	4900 mm	4455 mm	445 mm

Figure 5 Dummy Measurement Locations



VERTICAL LONGITUDINAL PLANE



VERTICAL TRANSVERSE PLANE

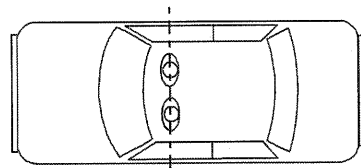


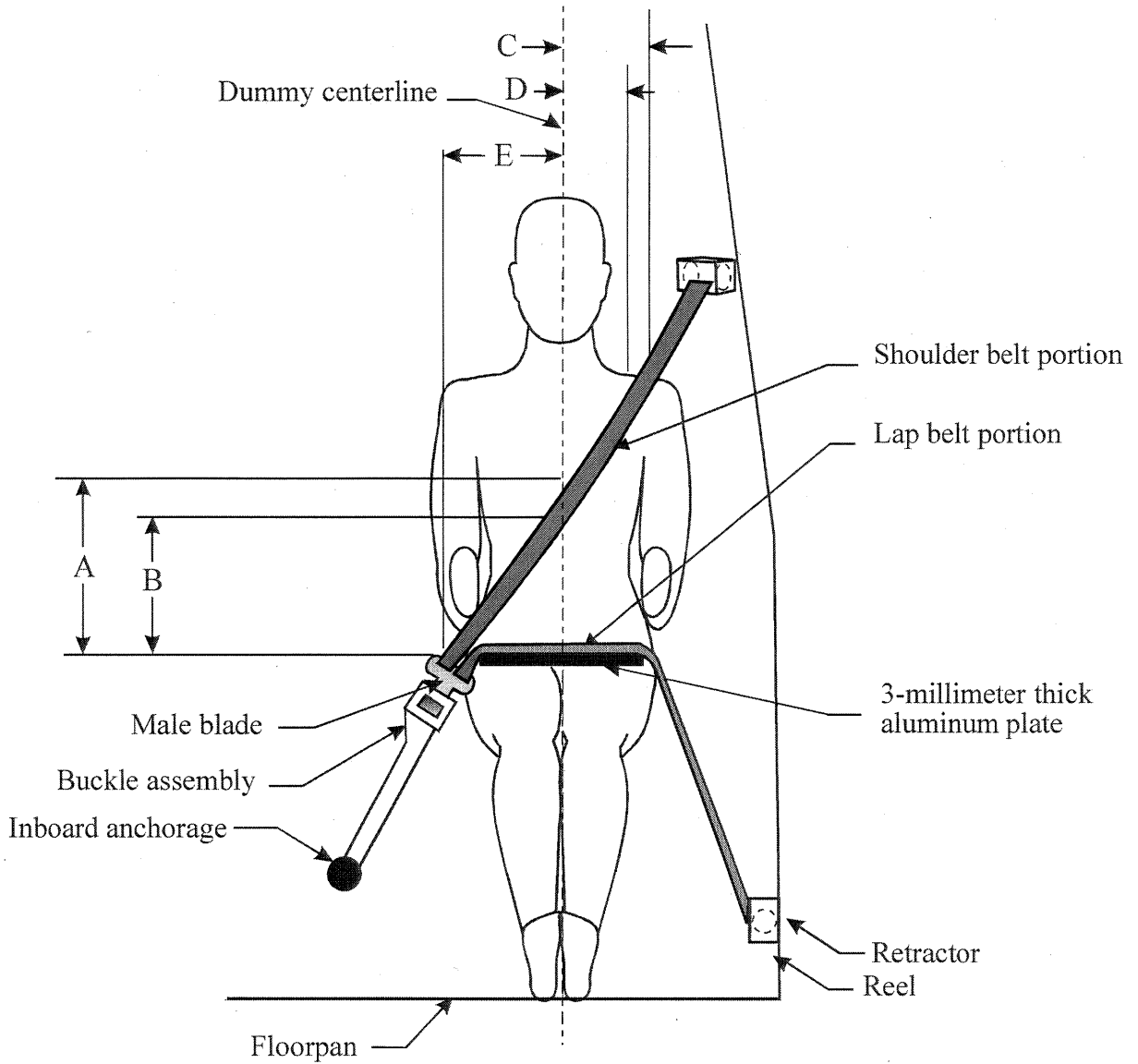
Table 8 Dummy Measurement Data

<u>Designation</u>	<u>Type of Measurement</u>	<u>Driver (Serial #202)</u>	<u>RR Passenger (Serial #206)</u>
WA	Windshield angle	35.4°	35.4°
SWA	Steering wheel angle	25.8°	N/A
SCA	Steering column angle	64.2°	N/A
SA	Seat back angle	26.8°	21.8°
HZ	Head to roof	166 mm	146 mm
HH	Head to header	390 mm	N/A mm
HW	Head to windshield	555 mm	N/A mm
HR	Head to side header	242 mm	248 mm
NR	Nose to rim	391 mm	N/A
NA	Nose to rim angle	18.8°	N/A
CD	Chest to dash	551 mm	N/A
CS	Steering wheel to chest	314 mm	N/A
RA	Rim to abdomen	170 mm	N/A
KDL	Left knee to dash	139 mm	N/A
KDR	Right knee to dash	141 mm	N/A
KDA	Outboard knee to dash angle	21.9°	N/A
PA	Pelvic angle	23.5°	24.8°
TA	Tibia angle	43.1°	48.3°
KK	Knee to knee	288 mm	270 mm
ST	Striker to head	541 mm	430 mm
	Striker to head angle <sup>1</sup>	-85.0°	-73.5°
SK	Striker to knee	640 mm	681 mm
	Striker to knee angle <sup>1</sup>	-5.5°	6.3°
SH	Striker to H-point	263 mm	388 mm
	Striker to H-point angle <sup>1</sup>	14.0°	36.3°
SHY	Striker to H-point (Y dir.)	195 mm	239 mm
HS	Head to side window	340 mm	332 mm
HD	H-point to door	170 mm	164 mm
AD	Arm to door	91 mm	123 mm
BS	Backset	89 mm	83 mm

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

<sup>1</sup> A negative angle indicates that the measurement point was located above the striker.

Figure 6 Seat Belt Measurements



		Driver	Right Rear Passenger
A	PBU, top surface of aluminum plate to belt upper edge	379	350
B	PBL, top surface of aluminum plate to belt lower edge	300	265
C	Dummy centerline to outer edge of belt at chest flesh top	110	115
D	Dummy centerline to inner edge of belt at chest flesh top	50	60
E	TBI, dummy centerline to intersection of upper torso belt and lap belt	260	200

Table 9 Seat Data

PI DATA:

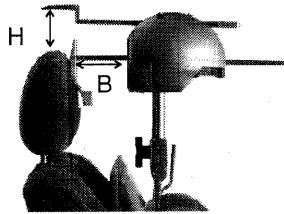
HEAD RESTRAINT	YES	NO		DETAILS
Fixed:	<u>-</u>	<u>X</u>		
Vertical Adjustment:	<u>X</u>	<u>-</u>		
Vertical Locks:	<u>X</u>	<u>-</u>		
Fore-Aft Adjustment:	<u>-</u>	<u>X</u>		
Fore-Aft Locks:	<u>-</u>	<u>X</u>		
SEATBACK RECLINE TYPE	YES	NO		DETAILS
Fixed:	<u>-</u>	<u>X</u>		
Power:	<u>X</u>	<u>-</u>		
Lever (with detents):	<u>-</u>	<u>X</u>		
Lever (infinite):	<u>-</u>	<u>X</u>		
Lever (ratchet):	<u>-</u>	<u>X</u>		
Rotary Knob:	<u>-</u>	<u>X</u>		
Pivot Locks on Both Sides:	<u>X</u>	<u>-</u>		
LUMBAR ADJUSTMENT	YES	NO		DETAILS
Fixed:	<u>-</u>	<u>X</u>		
Adjustable:	<u>X</u>	<u>-</u>		
BOLSTER ADJUSTMENT	YES	NO		DETAILS
Fixed:	<u>X</u>	<u>-</u>		
Adjustable:	<u>-</u>	<u>X</u>		
SEAT CUSHION TYPE	YES	NO		DETAILS
Cushion moves vertically independently of seat back:	<u>-</u>	<u>X</u>		
SEAT CUSHION FORE-AFT	YES	NO		DETAILS
Fixed:	<u>-</u>	<u>X</u>		
Power:	<u>X</u>	<u>-</u>	Travel: <u>230</u> mm	
Manual-Detents:	<u>-</u>	<u>X</u>	First Detent: <u>-</u> Last Detent: <u>-</u> Travel: <u>-</u> mm	
Manual-Infinite:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm	
SEAT CUSHION VERTICAL	YES	NO		DETAILS
Fixed:	<u>-</u>	<u>X</u>		
Power:	<u>-</u>	<u>X</u>		
Manual-Detents:	<u>-</u>	<u>X</u>		
Manual-Infinite:	<u>-</u>	<u>X</u>		
SEAT TEST POSITION				
Seat Cushion Fore-aft:	<u>at mid-track position</u>			
Seat Cushion Vertical:	<u>Non-adjustable</u>			
Seat Back:	<u>25 degree torso angle as set with H-point machine</u>			
Head Restraint:	<u>Adjustable; full up position</u>			

Table 9 Seat Data, Cont'd.

P3 DATA:

HEAD RESTRAINT	YES	NO				DETAILS
Fixed:	-	X				
Vertical Adjustment:	X	-				
Vertical Locks:	X	-				
Fore-Aft Adjustment:	-	X				
Fore-Aft Locks:	-	X				
SEATBACK RECLINE TYPE	YES	NO				DETAILS
Fixed:	-	X				
Power:	-	X				
Lever (with detents):	X	-				
Lever (infinite)	-	X				
Lever (ratchet)	-	X				
Rotary Knob:	-	X				
Pivot locks on Both Sides:	-	X				
LUMBAR ADJUSTMENT	YES	NO				DETAILS
Fixed:	-	X				
Adjustable:	-	X				
BOLSTER ADJUSTMENT	YES	NO				DETAILS
Fixed:	-	X				
Adjustable:	-	X				
SEAT CUSHION TYPE	YES	NO				DETAILS
Cushion moves vertically independently of seat back:	-	X				
SEAT CUSHION FORE-AFT	YES	NO				DETAILS
Fixed:	X	-				
Power:	-	X	Travel:	-	mm	
Manual-Detents:	-	X	First Detent:	-	Last Detent: -	Travel: - mm
Manual-Infinite:	-	X	Travel:	-	mm	
SEAT CUSHION VERTICAL	YES	NO				DETAILS
Fixed:	X	-				
Power:	-	X				
Manual-Detents	-	X				
Manual-Infinite	-	X				
SEAT TEST POSITION						
Seat Cushion Fore-aft:	Non-adjustable					
Seat Cushion Vertical:	Non-adjustable					
Seat Back:	25 degree torso angle with the H-point machine					
Head Restraint:	Adjustable; full-up position					

Table 10 ICBC Measurements



P1 DATA:

ICBC MEASUREMENTS

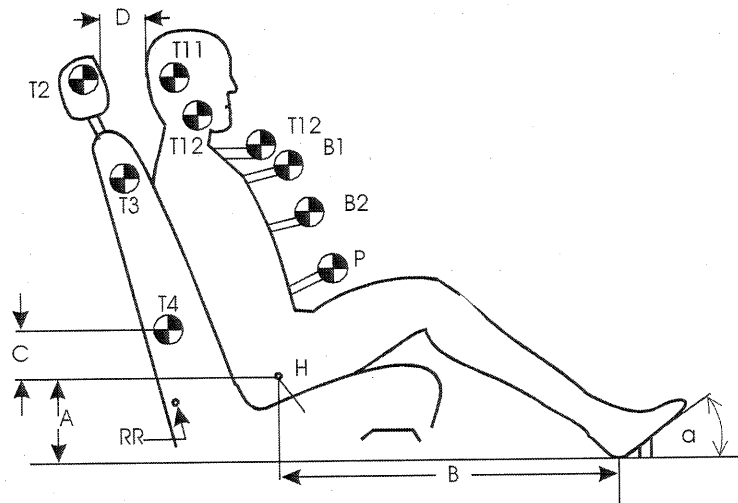
HEAD RESTRAINT POSITION (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line from Pivot (mm)
Adjustable / Fixed:	100	19	25.0	788
Head restraint positioning details:	Full down position			
Adjustable / Fixed:	105	86	25.0	787
Head restraint positioning details:	Full up position			
HEAD RESTRAINT POSITION – CONFIGURED FOR TEST (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line from Pivot (mm)
Adjustable / Fixed:	105	86	25.0	787
Head restraint positioning details:	Full up position			

P3 DATA:

ICBC MEASUREMENTS

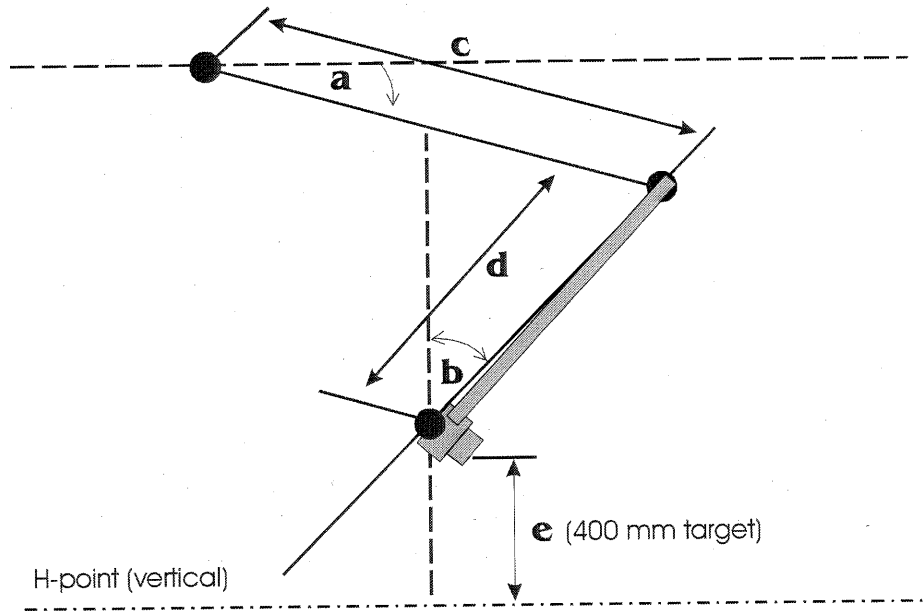
HEAD RESTRAINT POSITION (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line from Pivot (mm)
Adjustable / Fixed:	65	127	25.0	788
Head restraint positioning details:	Full down position			
Adjustable / Fixed:	68	64	25.0	790
Head restraint positioning details:	Full up position			
HEAD RESTRAINT POSITION – CONFIGURED FOR TEST (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line from Pivot (mm)
Adjustable / Fixed:	65	64	25.0	790

Figure 7 Dummy Targeting Information



Parameter	Dummy Position (#)	Vertical Dist. (mm)	Actual Dist. (mm)	Dist. To Side Camera (mm)
Target T2 to T3	1	241	254	940 to T2
Target T3 to T4	1	292	330	813 to T3
Target T4 to Orig. (on center console)	1	45	57	813 to T4 / 762 to Orig.
Target on Arm	1	N/A	N/A	813
Target on Head CG	1	N/A	N/A	965
Centerline of Seat	1	N/A	N/A	1041
Target T2 to T3	3	220	225	N/A
Target T3 to T4	3	290	305	N/A
Target T4 to Orig. (non-moving part)	3	N/A	N/A	N/A
Target on Head Restraint (T2)	3	N/A	N/A	914
Target on Arm	3	N/A	N/A	813
Target on Head CG	3	N/A	N/A	940
Centerline of Seat	3	N/A	N/A	1041
Target on Door Panel	3	N/A	N/A	1397

Figure 8 Rear Impact Measurement Device Measurements



Dimension	Position 1 Left	Position 1 Right	Position 3 Left	Position 3 Right
a (deg. From horiz)#	65.0	64.5	2.5	1.7
b (deg. From vertical)	29.9	29.9	19.6	18.4
c (mm)	140	152	1005	1010
d (mm)	368	368	360	360
e (mm, above H-pt.)	337	337	384	384
f (mm, MHD to rotary pot; Vertical)	356	356	356	356

# - Pos. 1, LEFT string not parallel to long. axis; off by 28.9 deg.

Seat back angle	Position 1, Front		Position 3, Rear	
	Pre (deg)	Post (deg)	Pre (deg)	Post (deg)
Left MHD Bracket (from horizontal)	26.5	36.1	19.8	29.9
Right MHD Bracket (from horizontal)	31.0	28.2	20.5	24.6
Front sill *	1.0	1.3	N/A	N/A
Rear Sill *	N/A	N/A	(-) 15.1	(-) 26.1

\* From horizontal, positive denotes front of sill higher than rear.

Figure 9 Camera Positions

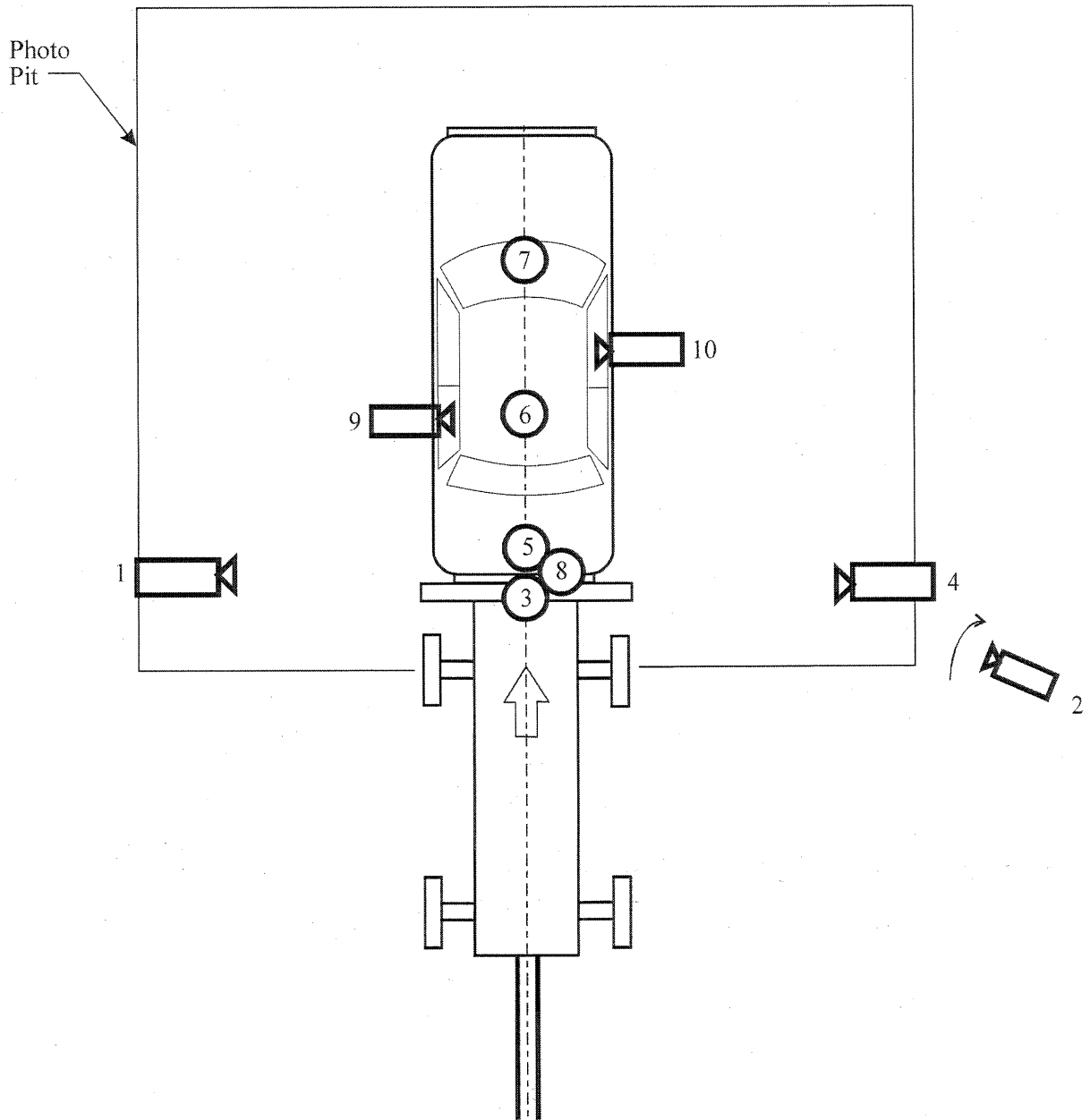


Table 11 Camera Information

Camera Number	Location	Type	Lens (mm)	Speed (frames/s)	Purpose of Camera Data
1	Left wide	Digital HG	27	1000	Vehicle crush
2	Real time panning	Bolex	Zoom	24	Vehicle dynamics
3	Onboard cart	Digital HG	8	1000	Vehicle crush
4	Right wide	Digital HG	50	1000	Vehicle crush
5	Pit rear	Digital HG	50	1000	Vehicle dynamics
6	Pit mid	Digital HG	50	1000	Vehicle dynamics
7	Pit front	Digital HG	50	1000	Vehicle dynamics
8	Overhead	Digital HG	20	1000	Vehicle crush
9	Onboard driver	Digital HG	5.3	1000	Dummy kinematics
10	Onboard rear passenger	Digital HG	5	1000	Dummy kinematics

Appendix A

Photographs



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



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

A-2

031021-2



**Figure A-3 Pre-Test Left Front Three-Quarter View**



**Figure A-4 Post-Test Left Front Three-Quarter View**



**Figure A-5 Pre-Test Left Side View**



**Figure A-6 Post-Test Left Side View**



Figure A-7 Pre-Test Rear View



Figure A-8 Post-Test Rear View



**Figure A-9 Pre-Test Right Rear Three-Quarter View**



**Figure A-10 Post-Test Right Rear Three-Quarter View**



**Figure A-11 Pre-Test Right Side View**



**Figure A-12 Post-Test Right Side View**

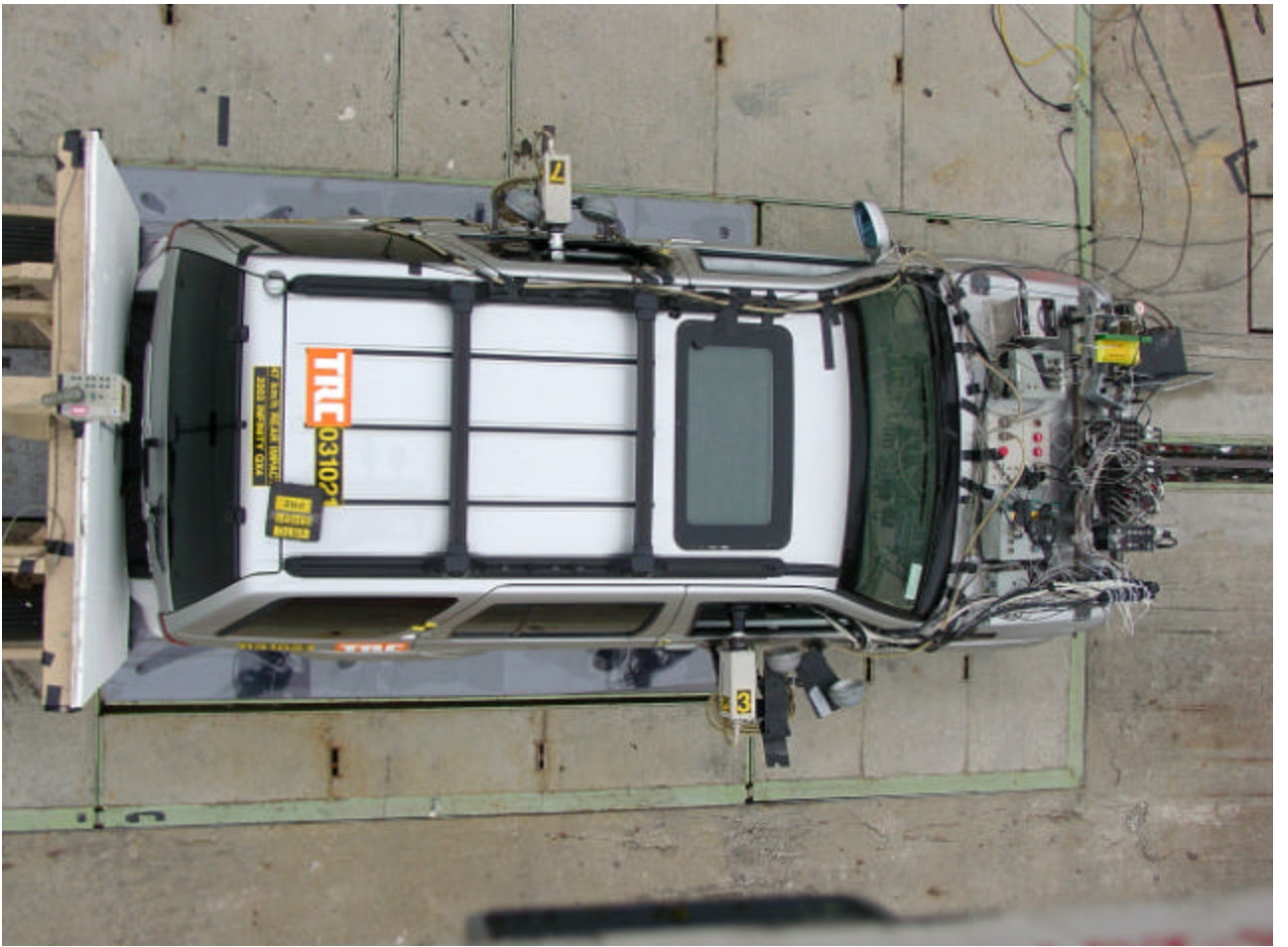


Figure A-13 Pre-Test Overhead - View 1



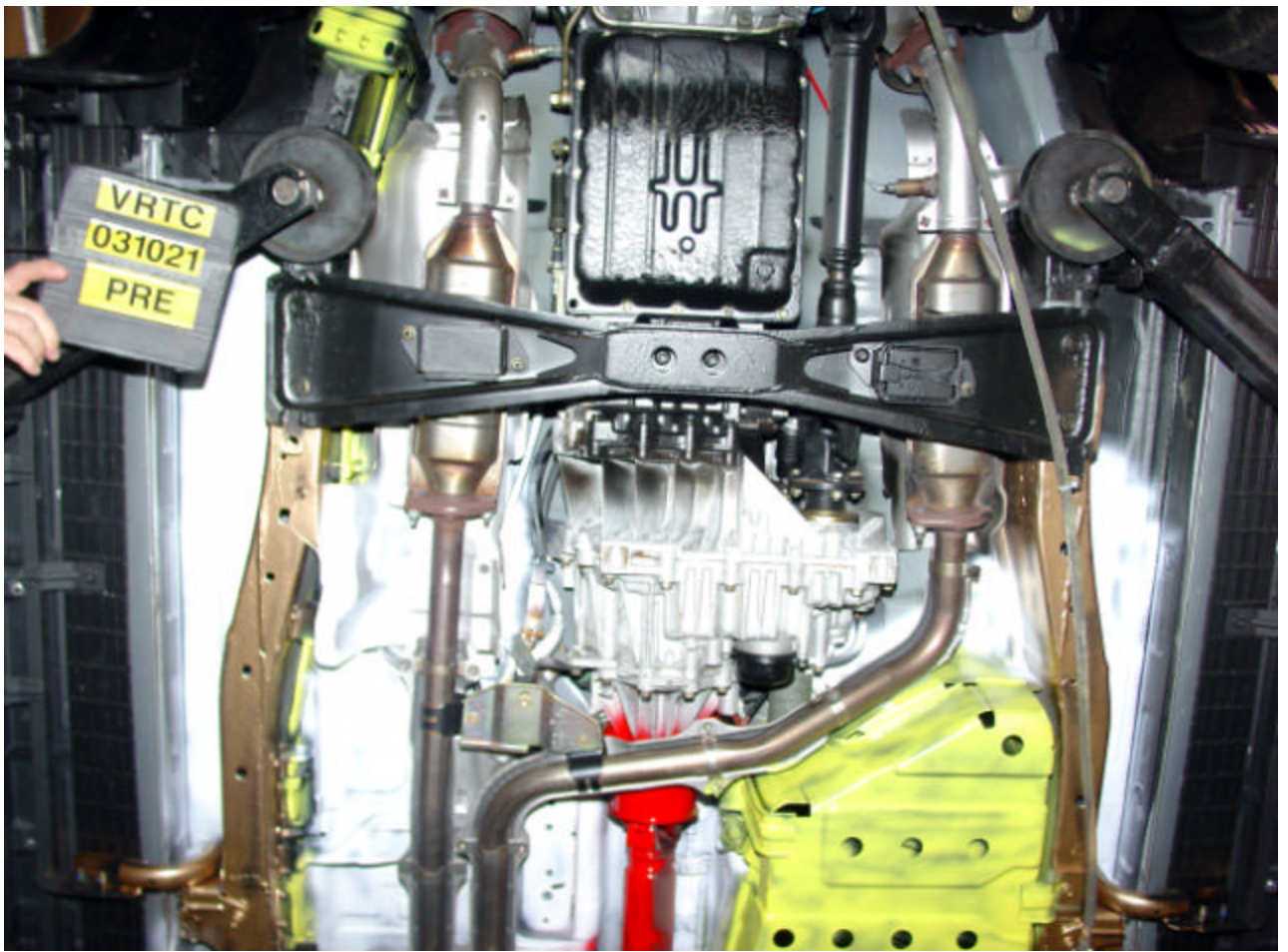
Figure A-14 Pre-Test Overhead - View 2



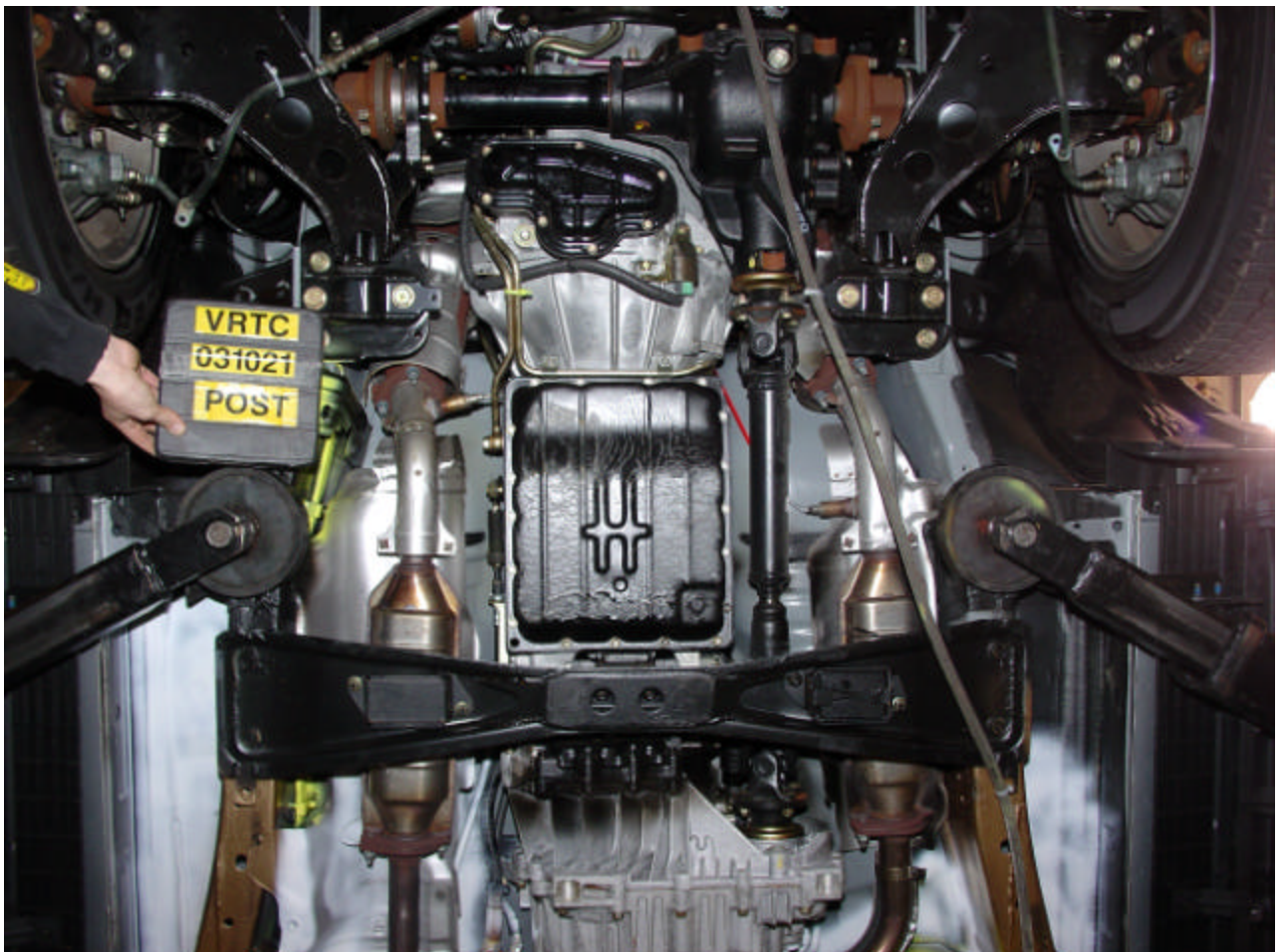
**Figure A-15 Pre-Test Front Underbody View**



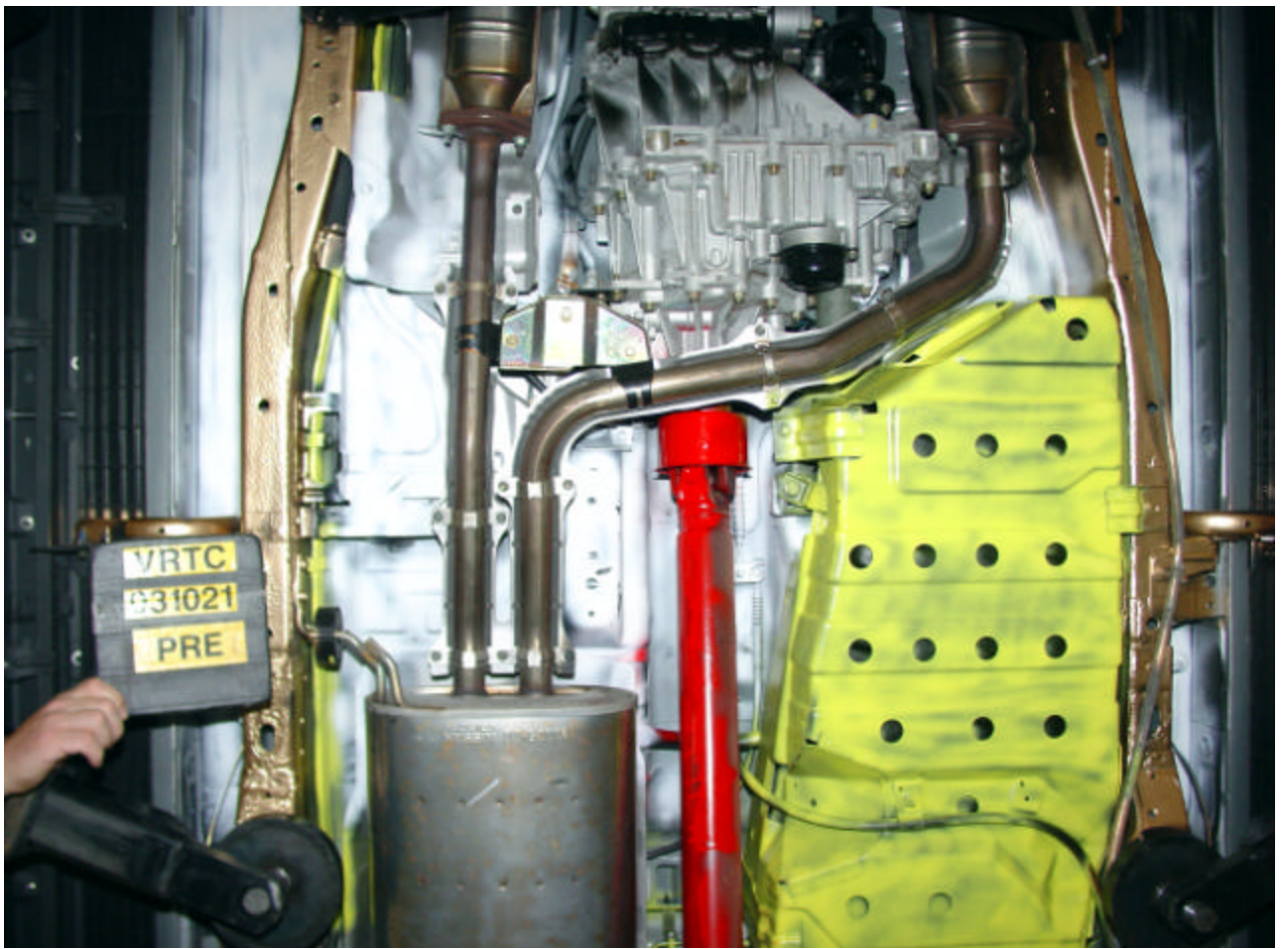
**Figure A-16 Post-Test Front Underbody View**



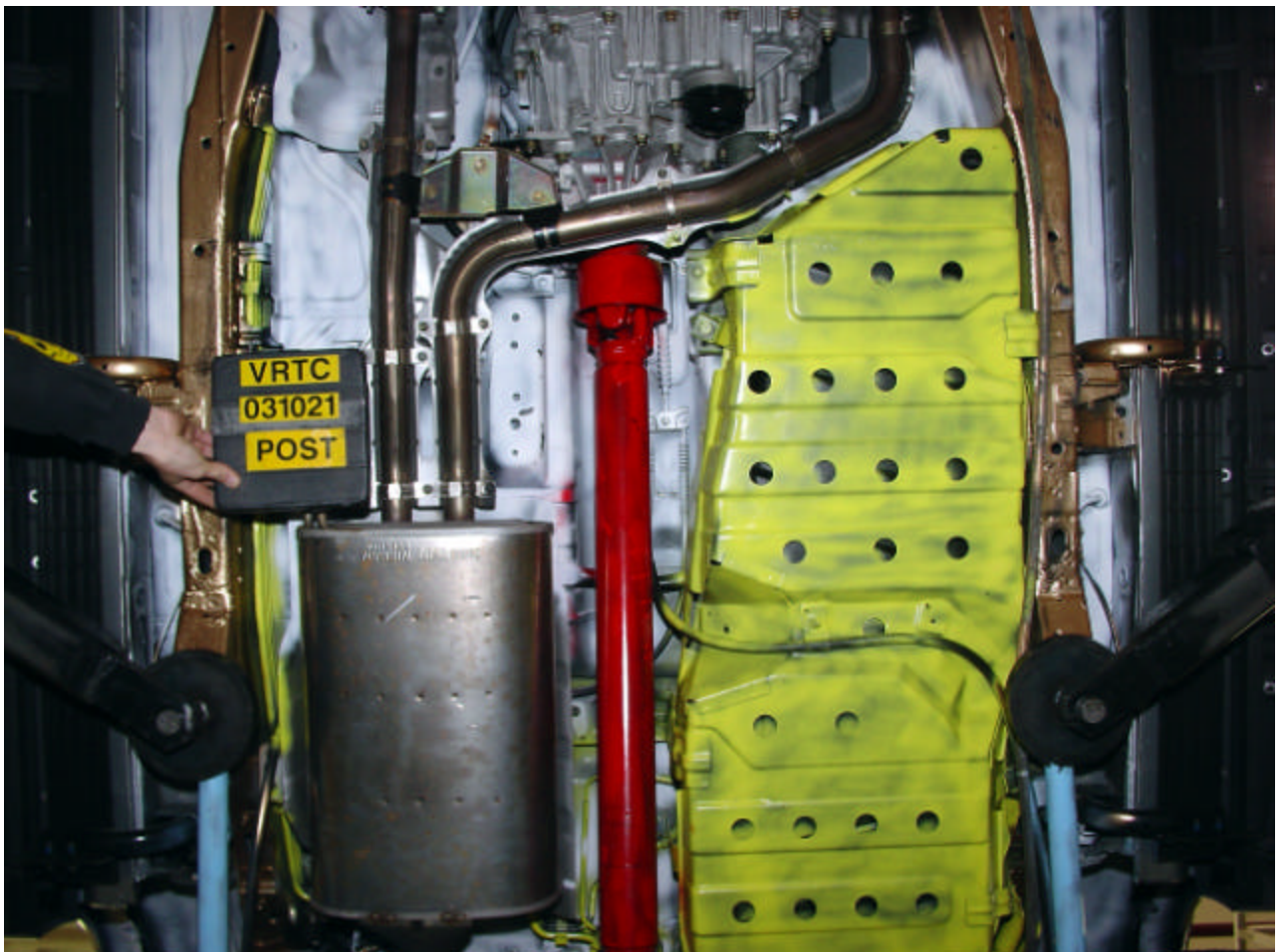
**Figure A-17 Pre-Test Mid Front Underbody View**



**Figure A-18 Post-Test Mid Front Underbody View**



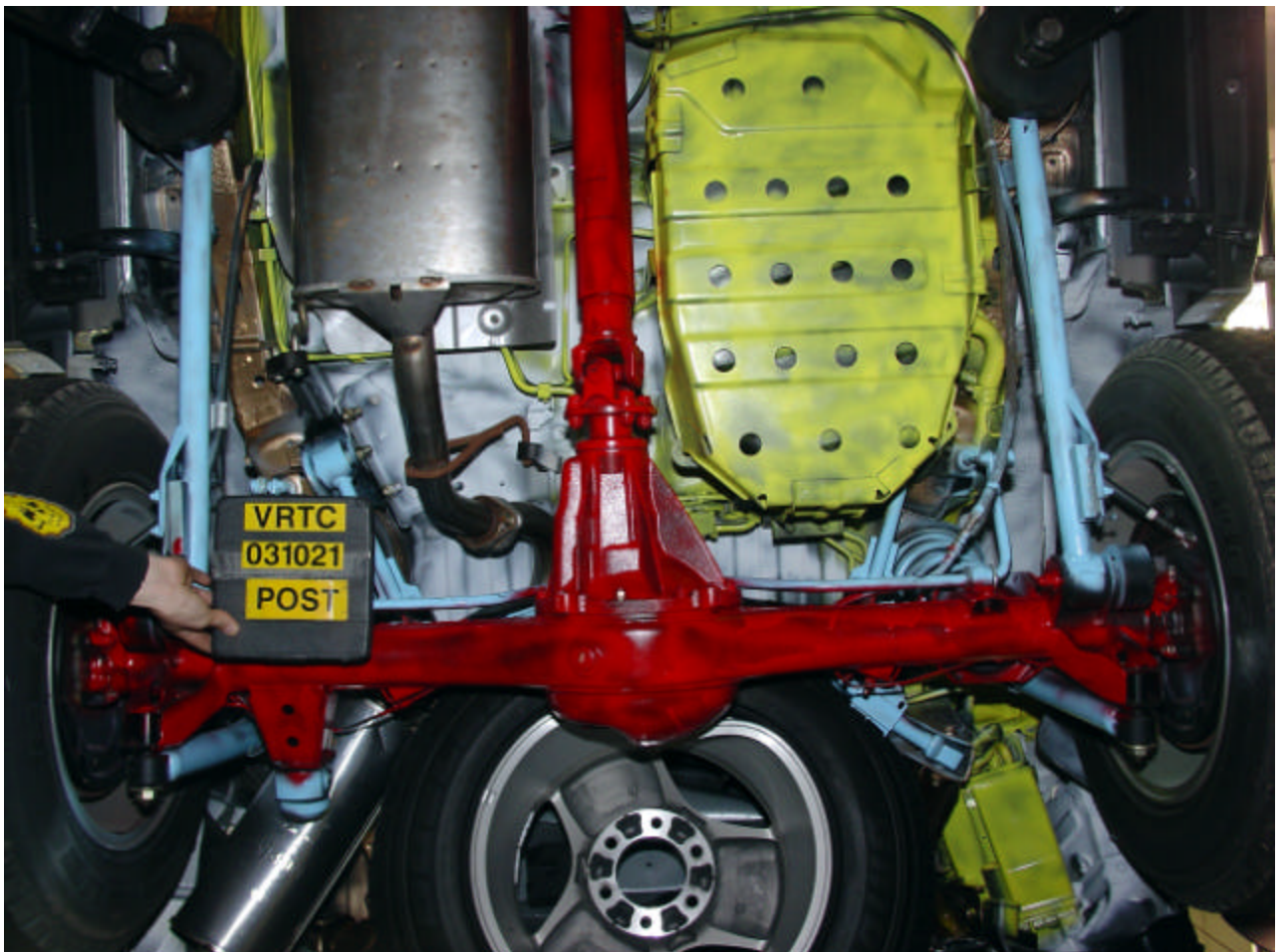
**Figure A-19 Pre-Test Mid Underbody View**



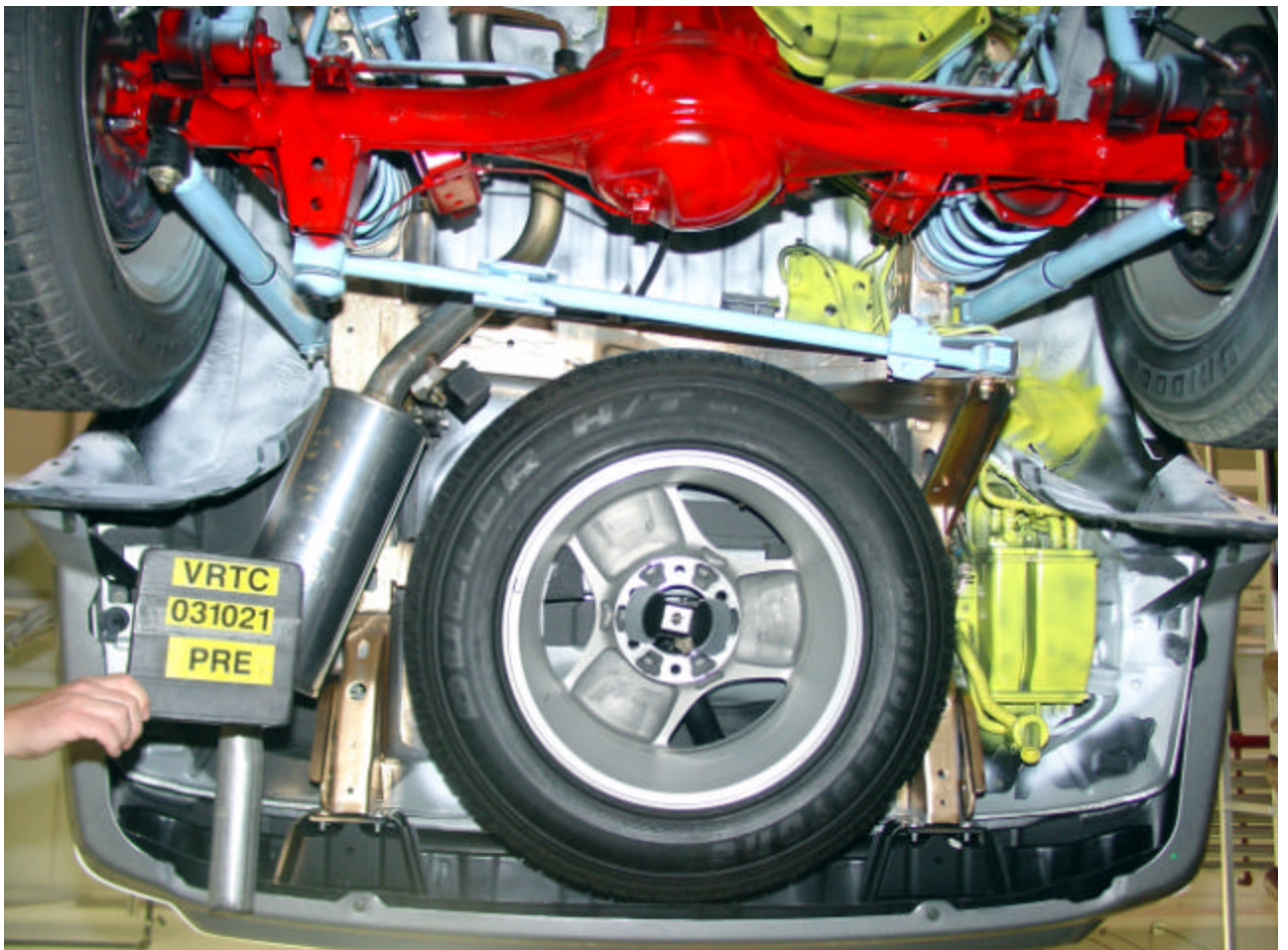
**Figure A-20 Post-Test Mid Underbody View**



**Figure A-21 Pre-Test Mid Rear Underbody View**



**Figure A-22 Post-Test Mid Rear Underbody View**



**Figure A-23 Pre-Test Rear Underbody View**



**Figure A-24 Post-Test Rear Underbody View**



Figure A-25 Pre-Test Fuel Tank View

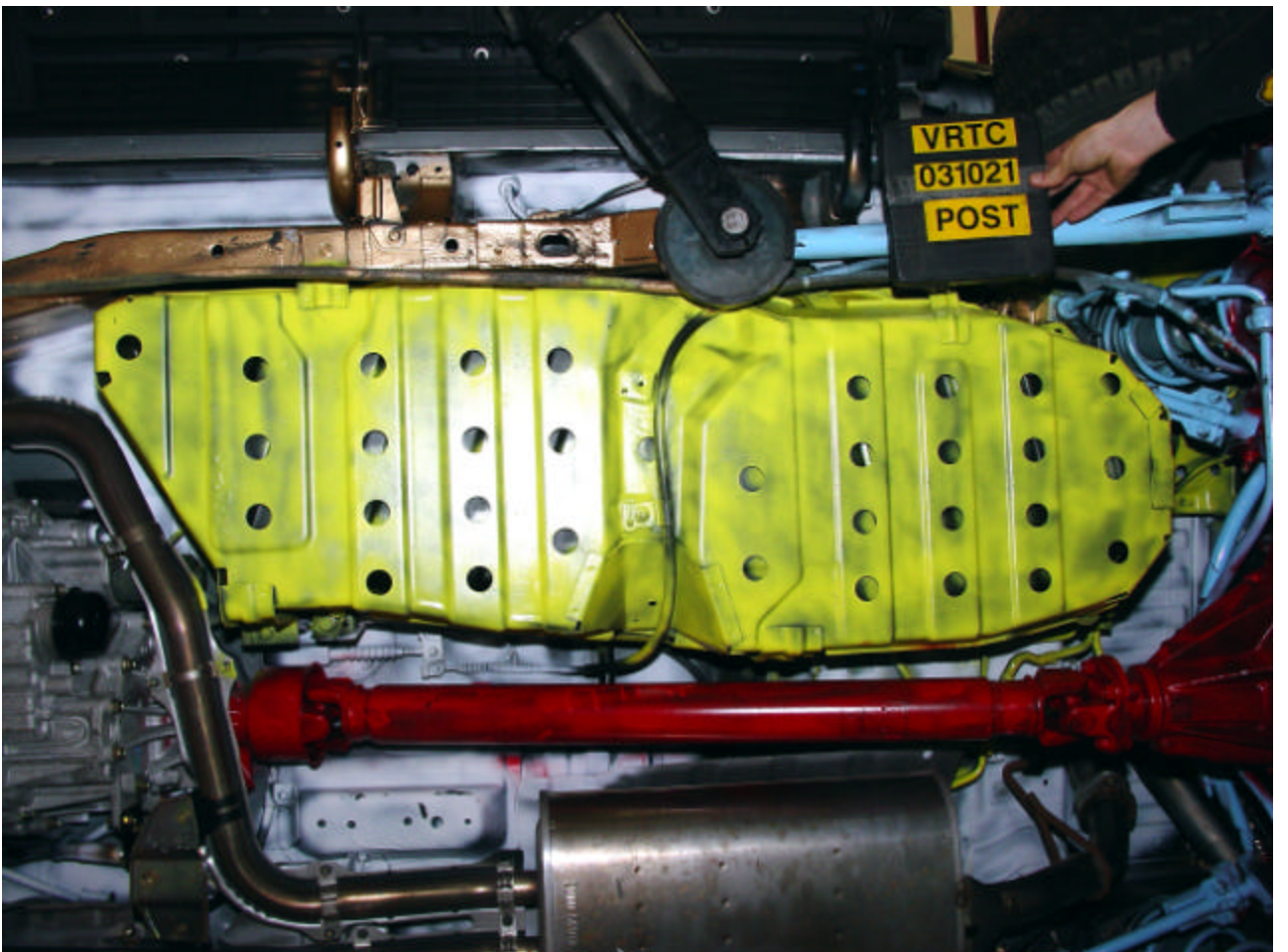


Figure A-26 Post-Test Fuel Tank View

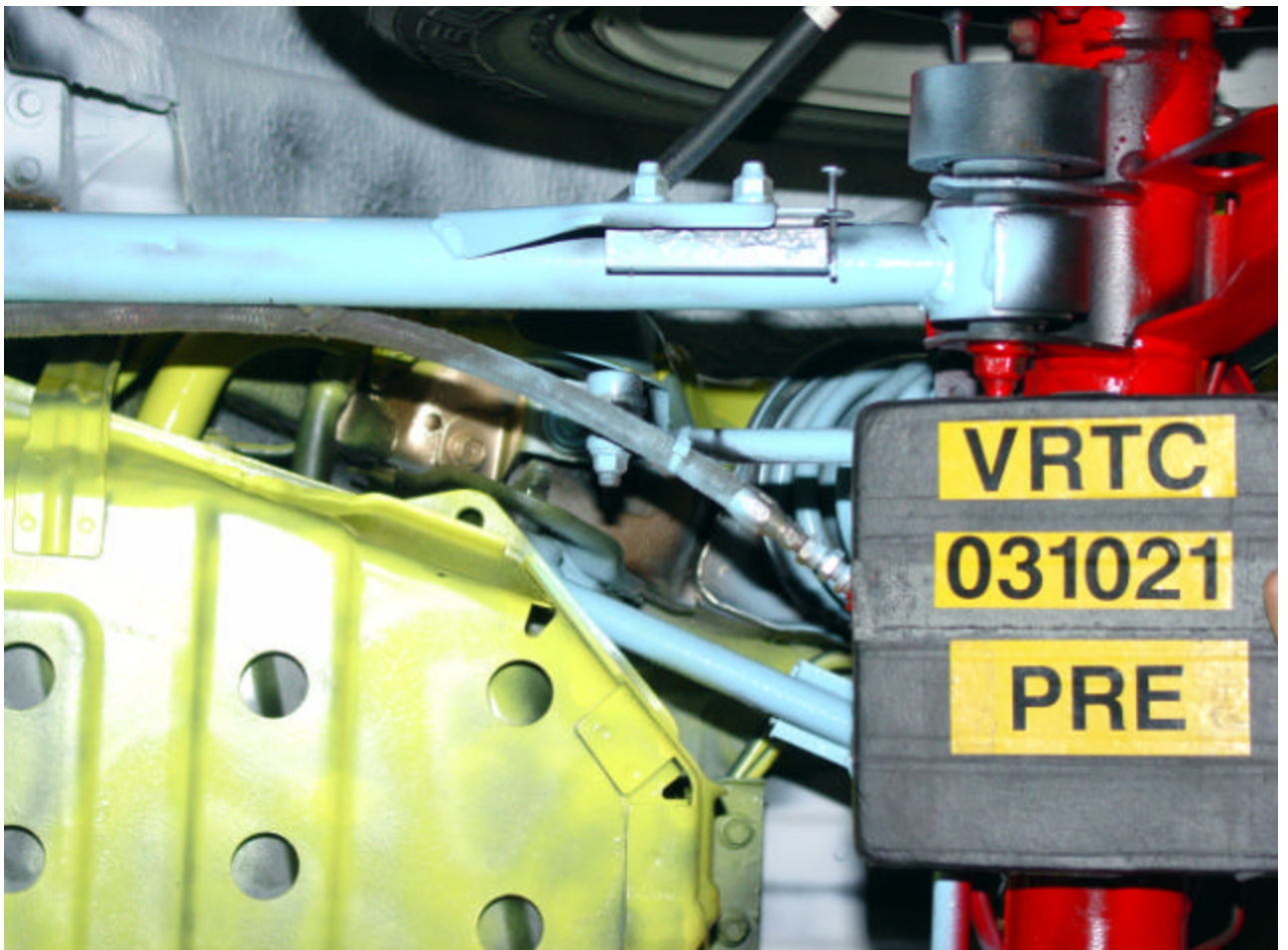


Figure A-27 Pre-Test Fuel Filler Neck View



Figure A-28 Post-Test Fuel Filler Neck View



Figure A-29 Pre-Test Fuel Filler Cap View



Figure A-30 Post-Test Fuel Filler Cap View



Figure A-31 Pre-Test Driver Dummy - View 1



Figure A-32 Post-Test Driver Dummy - View 1



Figure A-33 Pre-Test Driver Dummy - View 2



Figure A-34 Post-Test Driver Dummy - View 2



Figure A-35 Pre-Test Driver Dummy - View 3



Figure A-36 Post-Test Driver Dummy - View 3



Figure A-37 Pre-Test Driver Dummy - View 4



Figure A-38 Post-Test Driver Dummy Overall - View 1



Figure A-39 Post-Test Driver Dummy Overall - View 2



Figure A-40 Post-Test Driver Dummy Overall - View 3



**Figure A-41 Post-Test Driver Dummy Head Contact View**



**Figure A-42 Post-Test Driver Seat View**



Figure A-43 Pre-Test Right Rear Passenger Dummy - View 1



Figure A-44 Post-Test Right Rear Passenger Dummy - View 1



**Figure A-45 Pre-Test Right Rear Passenger Dummy - View 2**

**Intentionally Left Blank**



Figure A-46 Pre-Test Right Rear Passenger Dummy - View 3



Figure A-47 Pre-Test Right Rear Passenger Dummy - View 4



Figure A-48 Post-Test Right Rear Passenger Overall Dummy - View 1



Figure A-49 Post-Test Right Rear Passenger Overall Dummy - View 2



**Figure A-50 Post-Test Right Rear Passenger Dummy Head Contact View**

**Intentionally Left Blank**

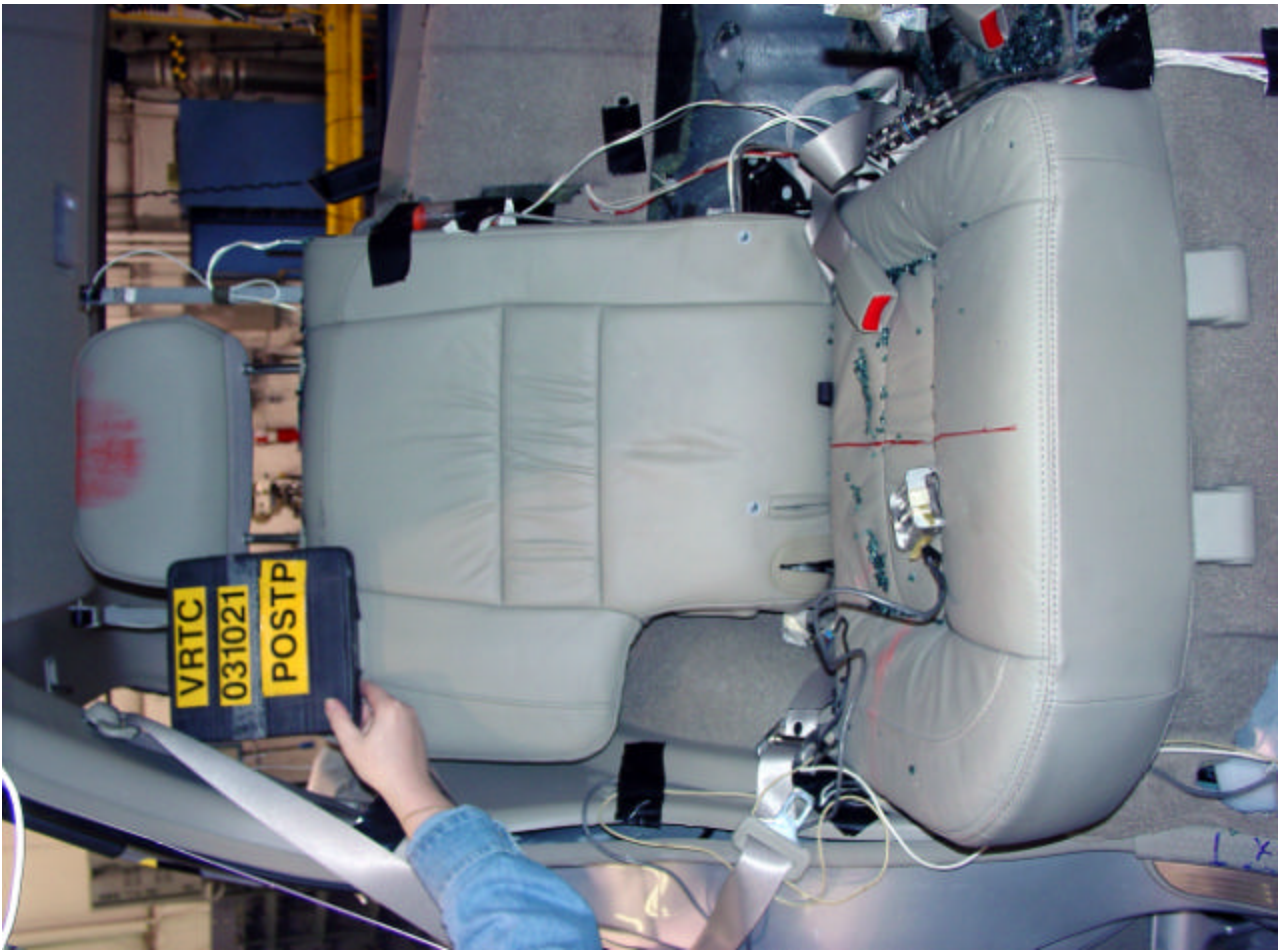
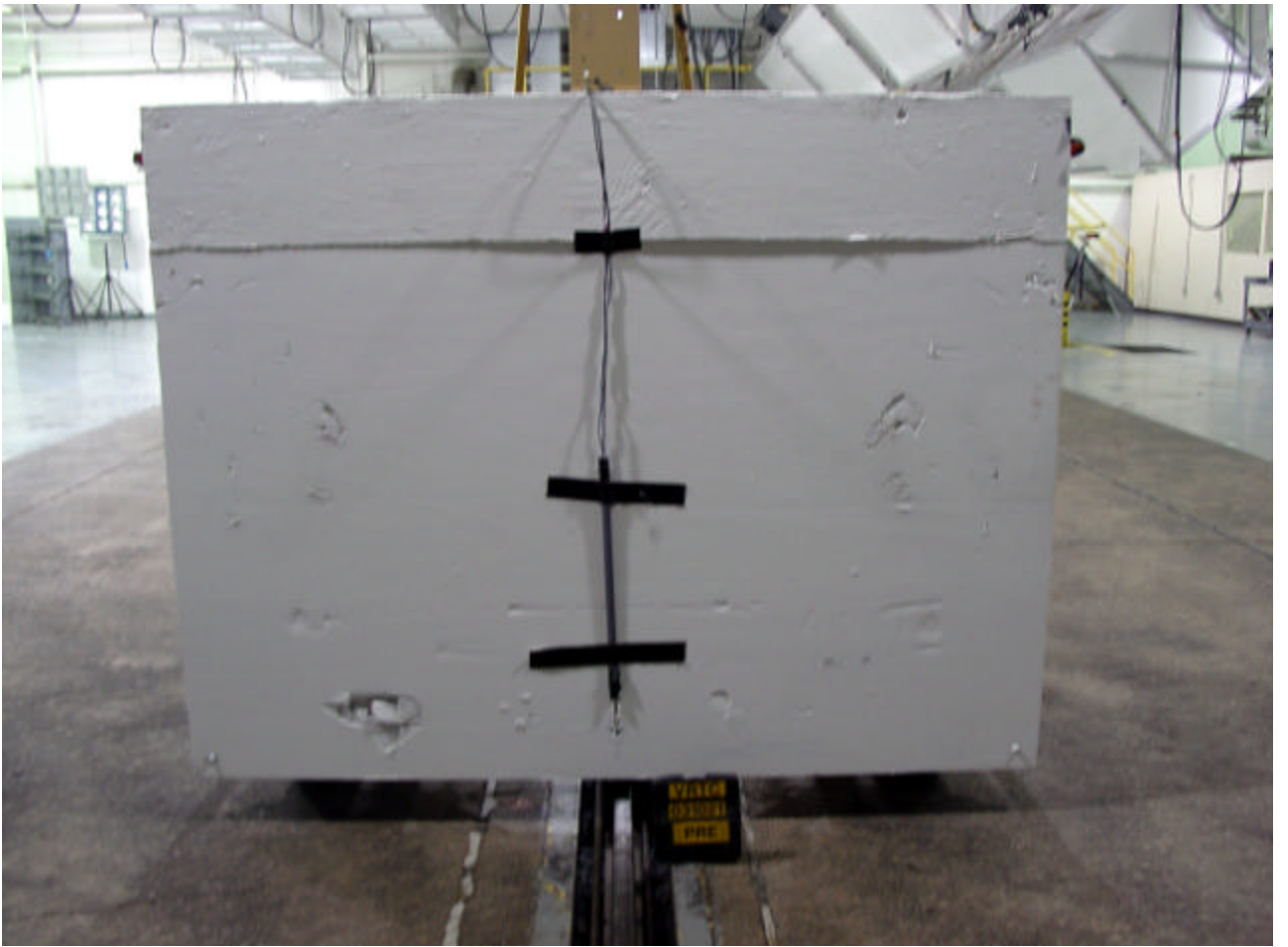


Figure A-51 Post-Test Right Rear Passenger Seat - View 1



Figure A-52 Vehicle Certification and Tire Information Label View



**Figure A-53 Pre-Test Barrier View**



**Figure A-54 Post-Test Barrier View**

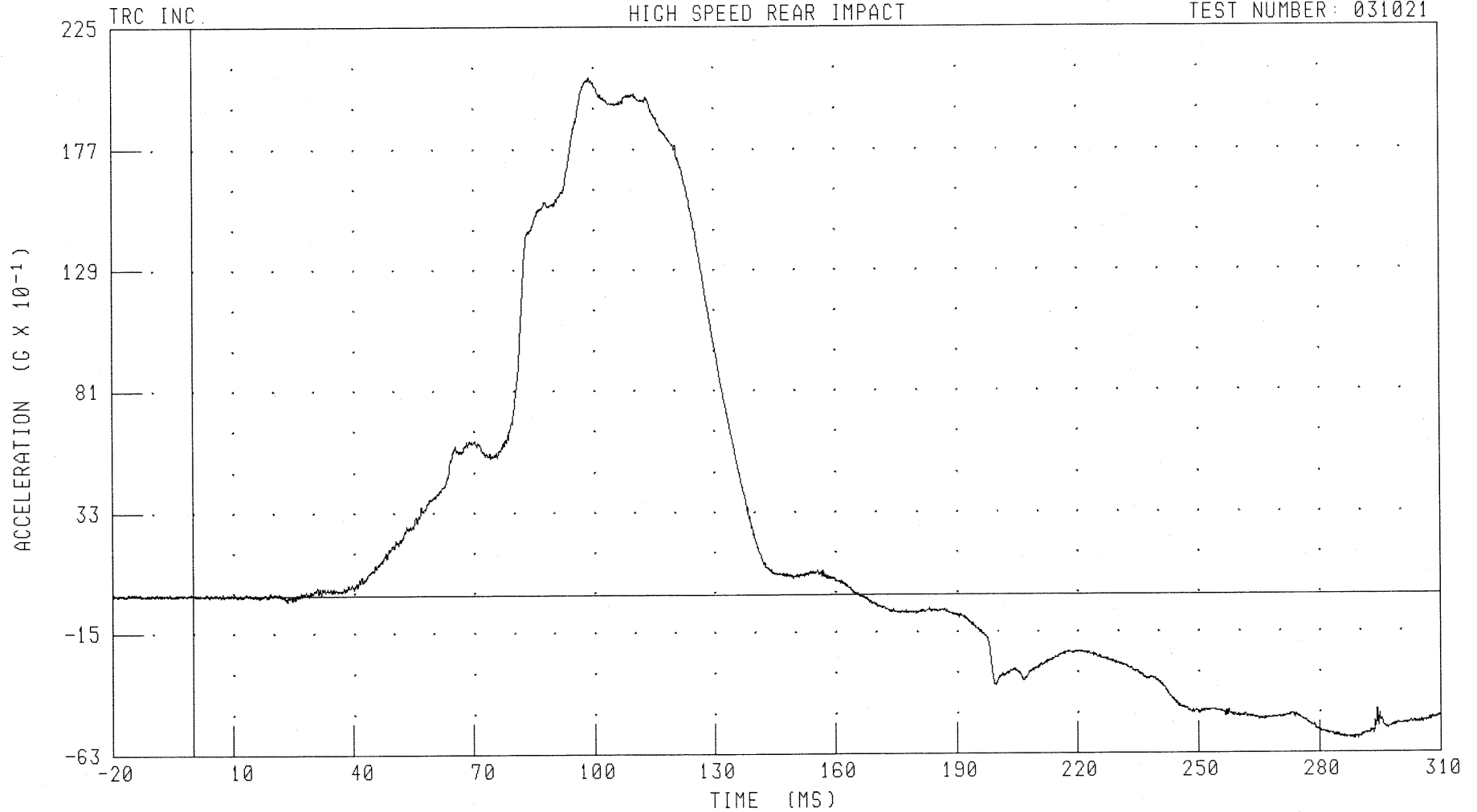
Appendix B

Data Plots

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER HEAD X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 20.53 G @ 99.04 MS; -5.76 G @ 288.64 MS

B-2

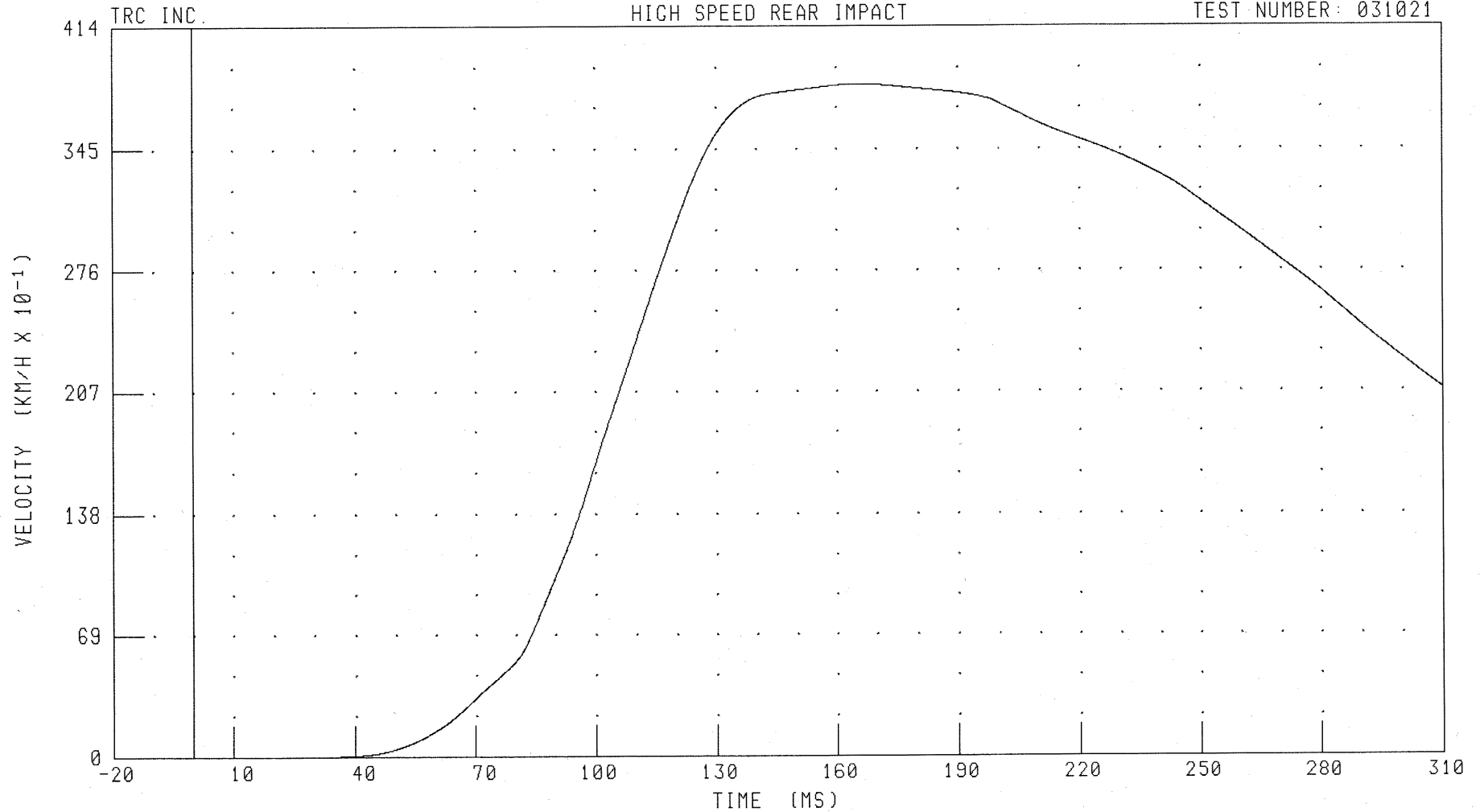
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER HEAD X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDXV1

FILTER: CH. CLASS 180

PEAK DATA: 38.11 KM/H @ 165.84 MS; -0.03 KM/H @ 26.64 MS

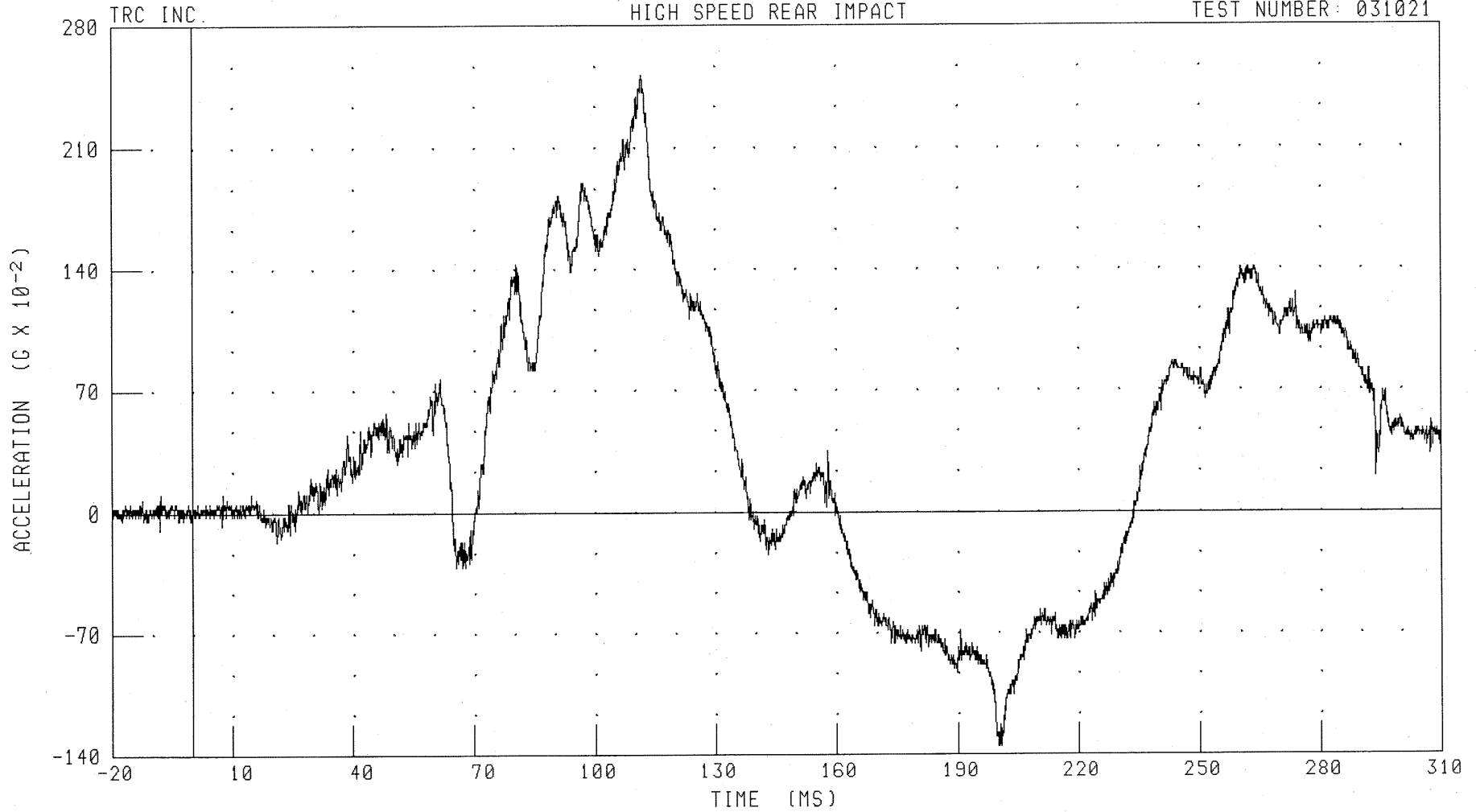
B-3

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER HEAD Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 2.52 G @ 111.68 MS; -1.35 G @ 199.92 MS

B-4

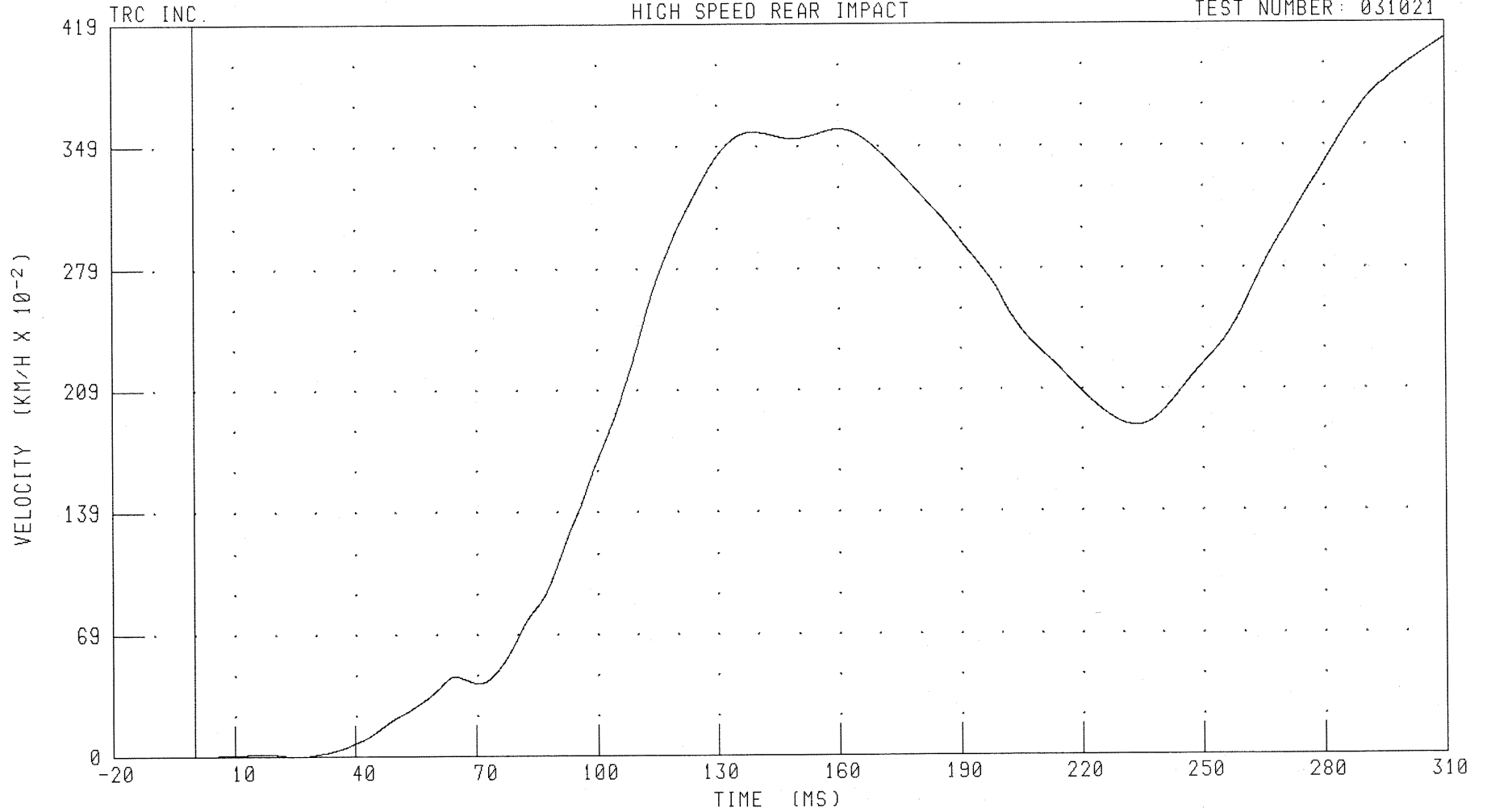
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER HEAD Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYV1

FILTER: CH. CLASS 180

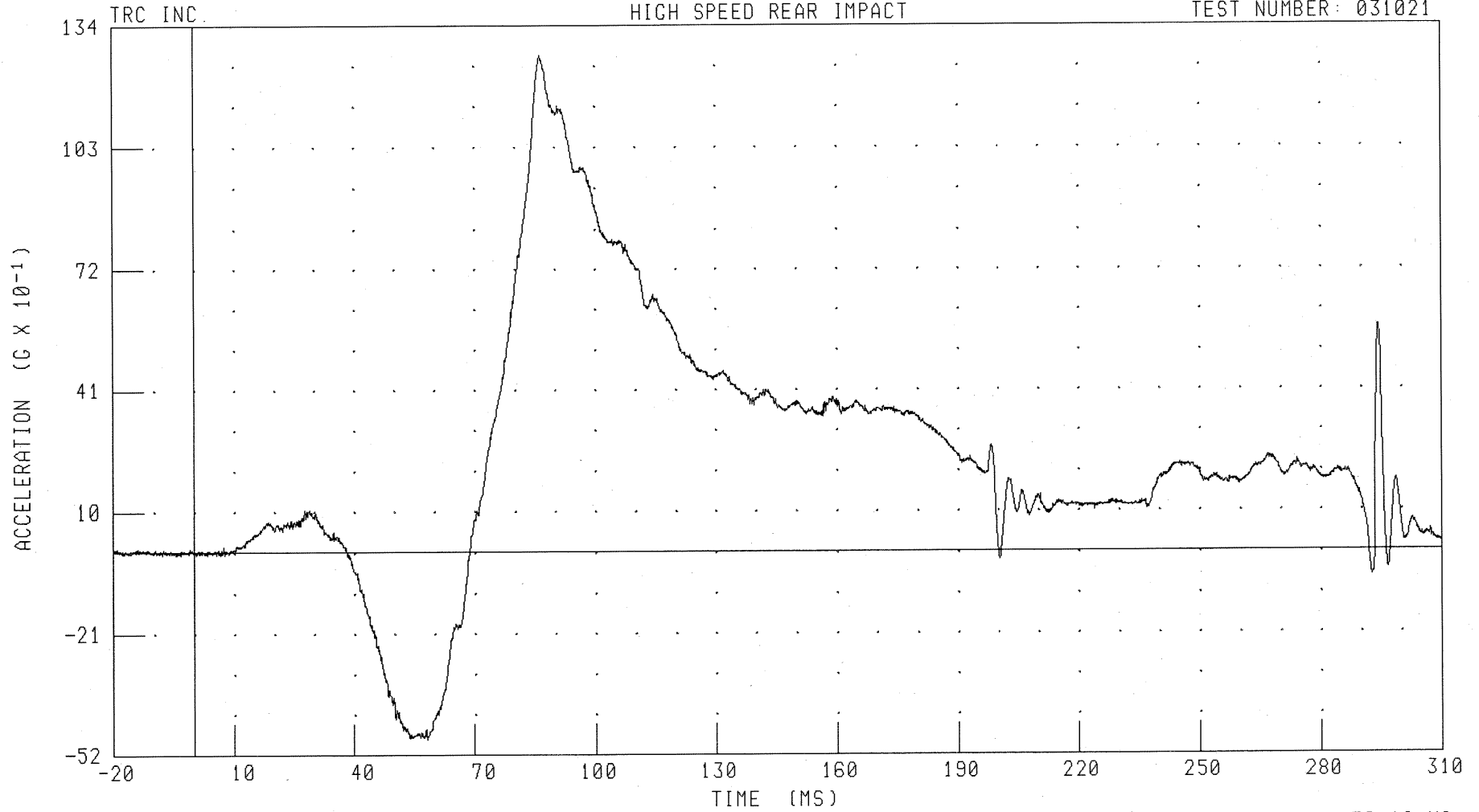
PEAK DATA: 4.11 KM/H @ 310.00 MS; 0.00 KM/H @ 25.84 MS

B-5

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER HEAD Z-AXIS ACCELERATION  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 12.64 G @ 86.40 MS; -4.81 G @ 58.16 MS

B-6

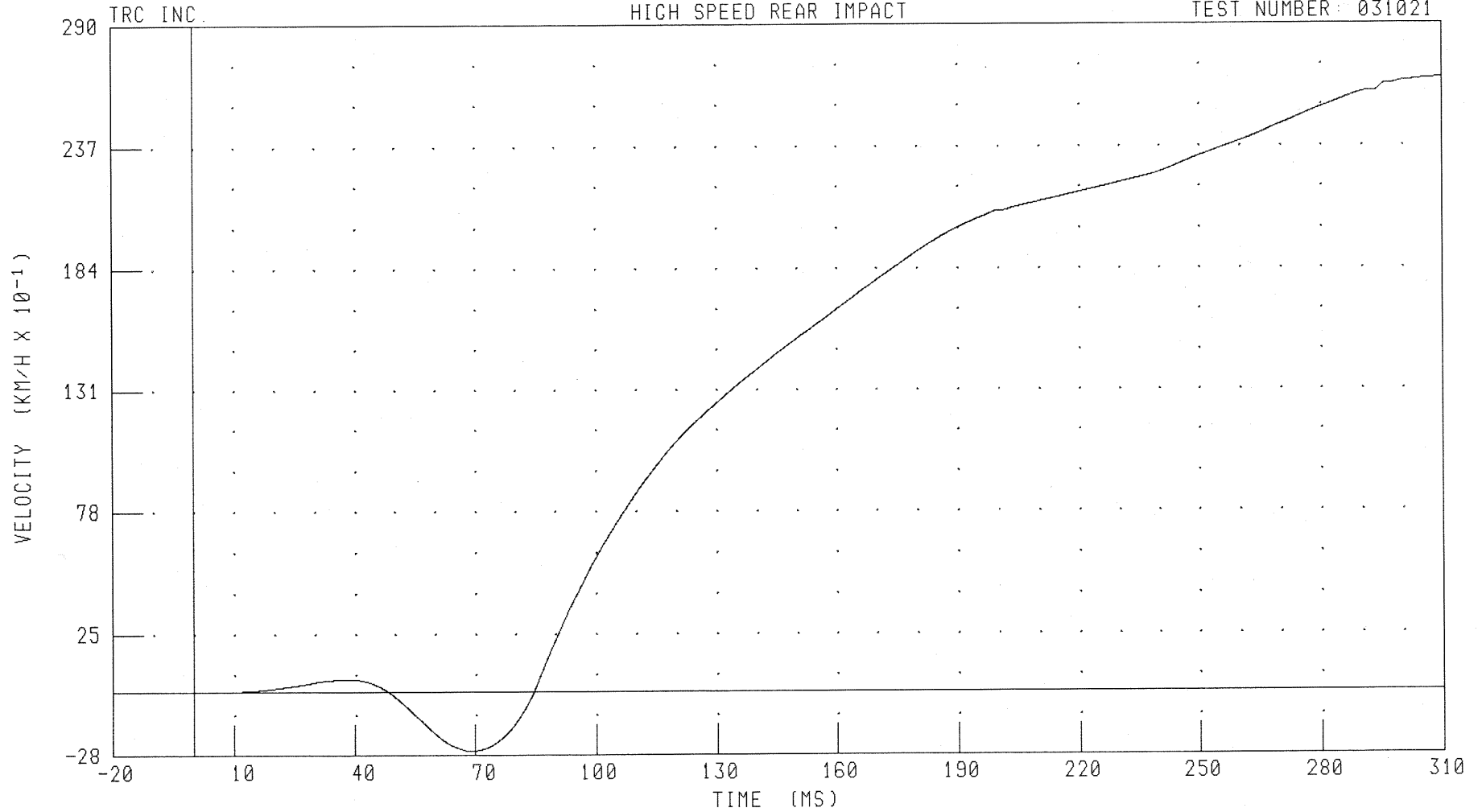
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER HEAD Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDZV1

FILTER: CH. CLASS 180

PEAK DATA: 26.63 KM/H @ 310.00 MS, -2.63 KM/H @ 68.88 MS

B-7

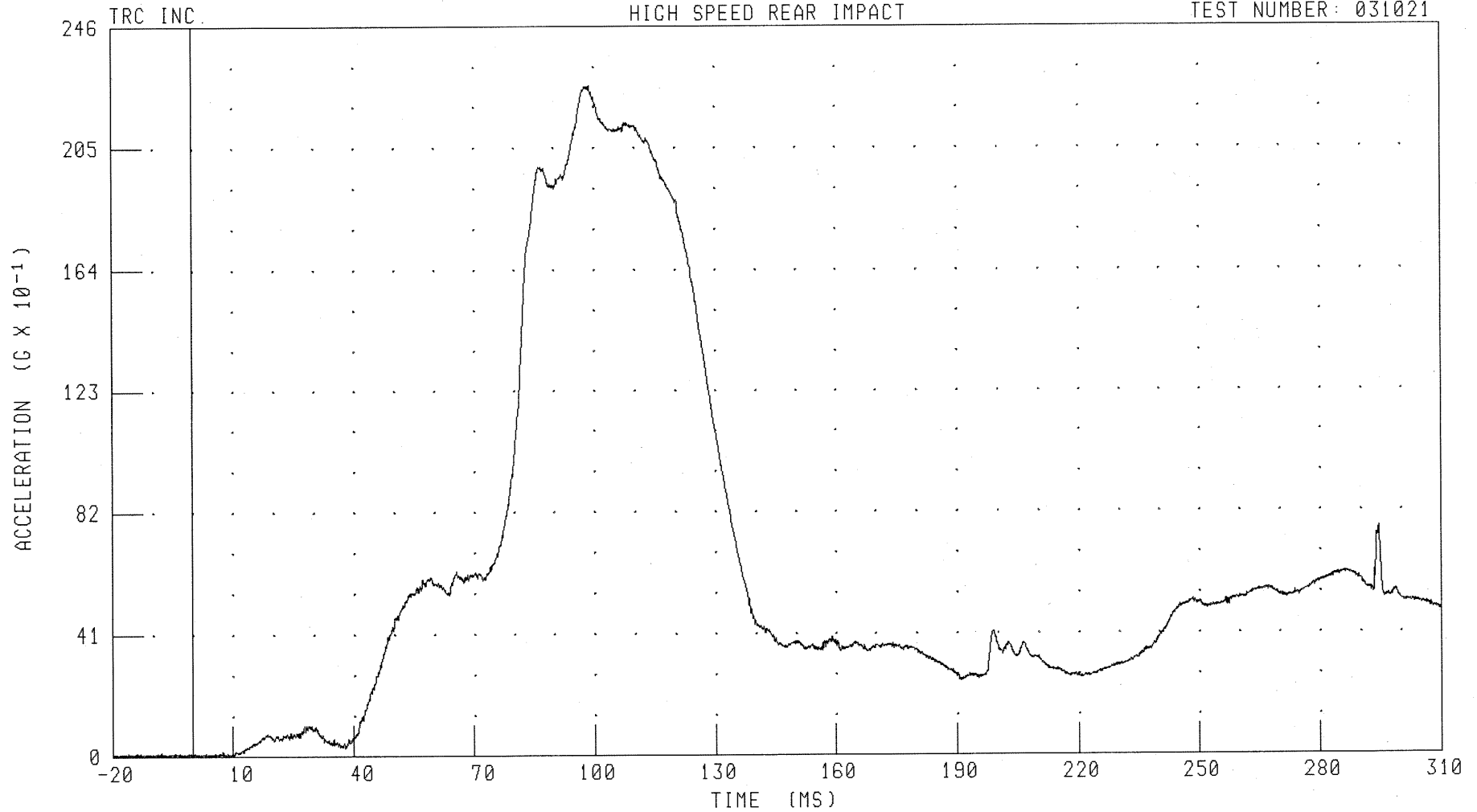
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER HEAD RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDRG1

FILTER: CH. CLASS 1000

PEAK DATA: 22.61 G @ 99.04 MS; 0.01 G @ -18.64 MS

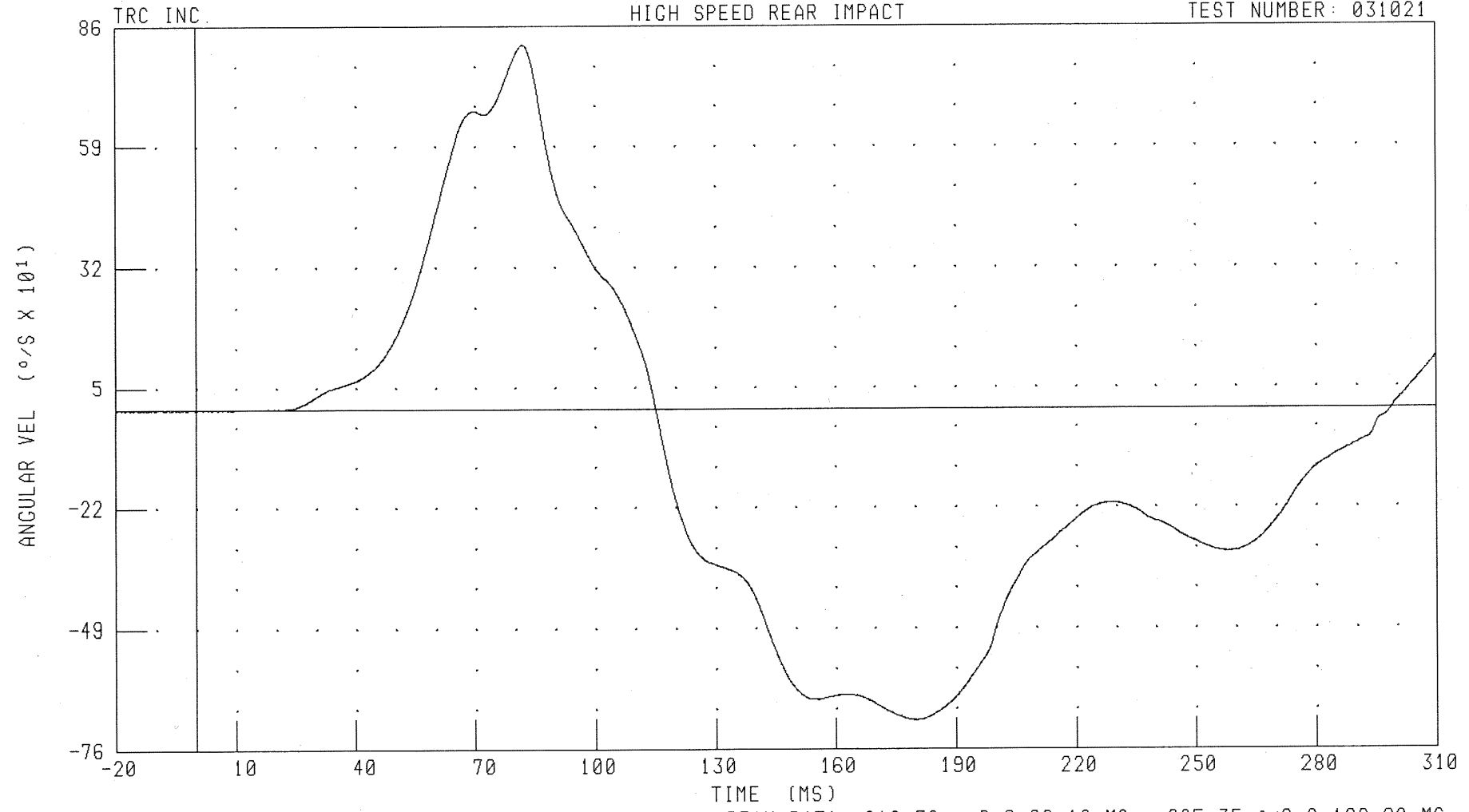
B-8

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER HEAD Y-AXIS ANGULAR VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYV1 FILTER: CH. CLASS 1000

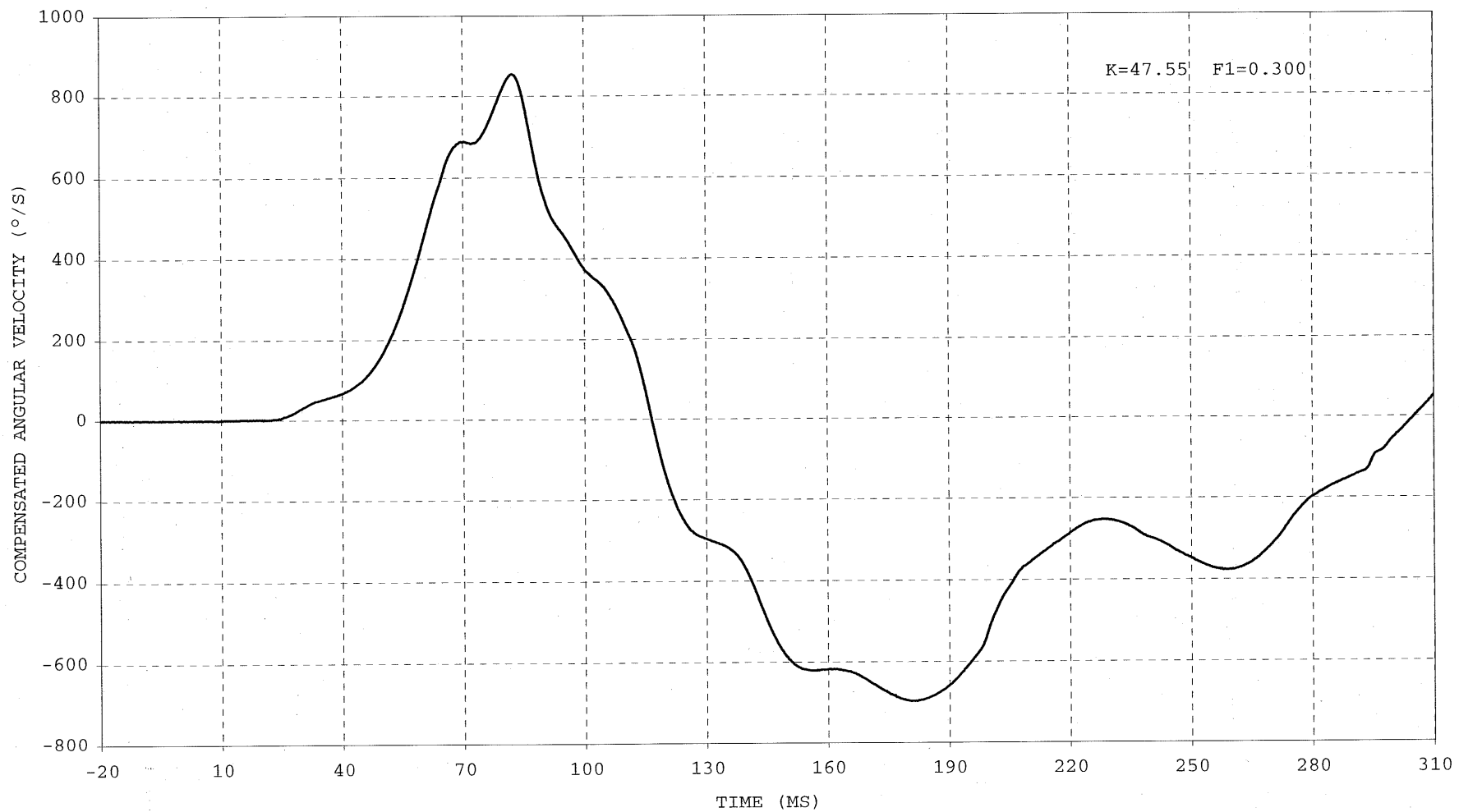
PEAK DATA: 818.50 °/S @ 82.16 MS; -695.35 °/S @ 180.00 MS

B-9

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER HEAD Y-AXIS ANGULAR VELOCITY - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



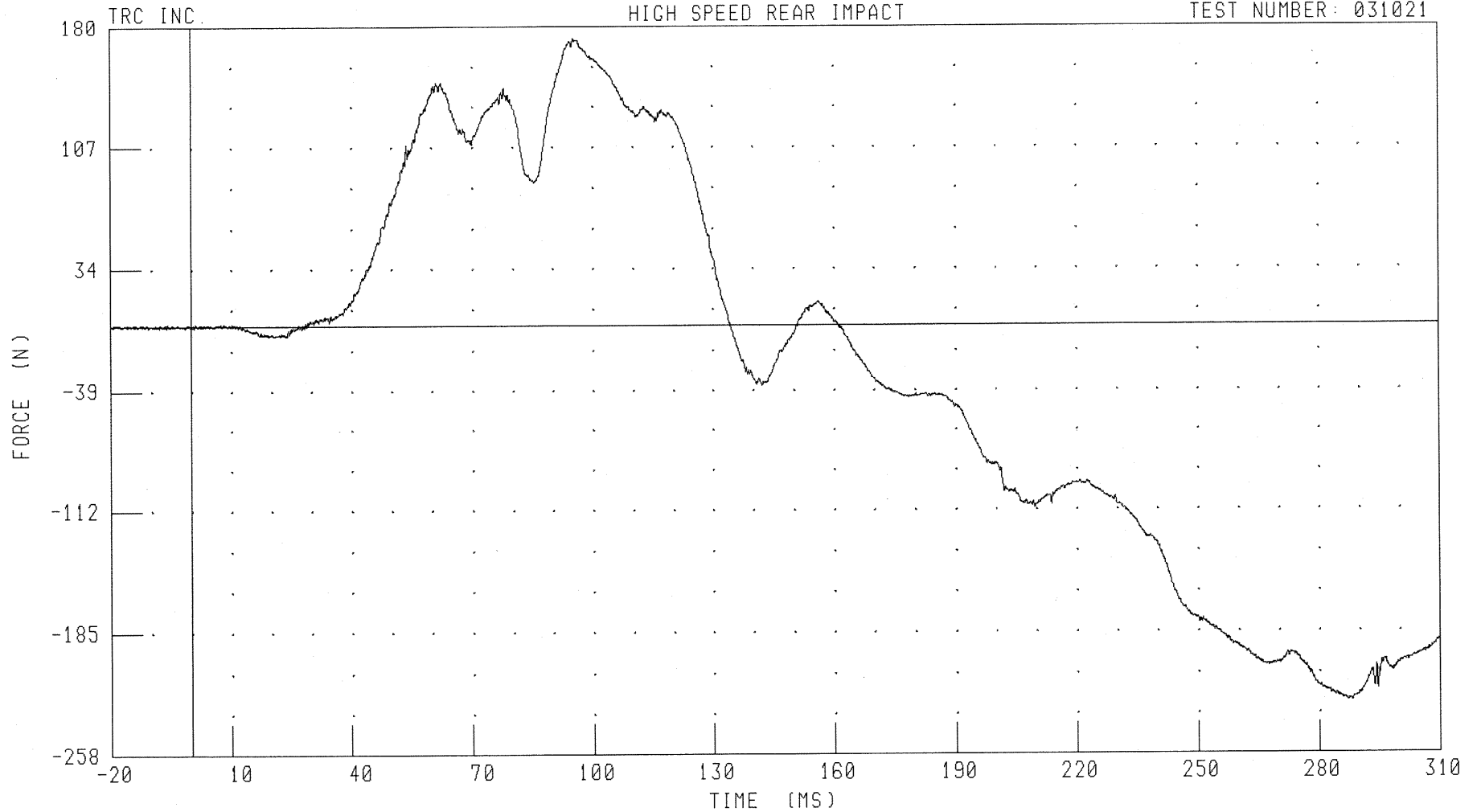
CHANNEL: HEDYV1

B-10

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER UPPER NECK X-AXIS SHEAR FORCE  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

PEAK DATA: 172.60 N @ 95.36 MS; -226.81 N @ 288.24 MS

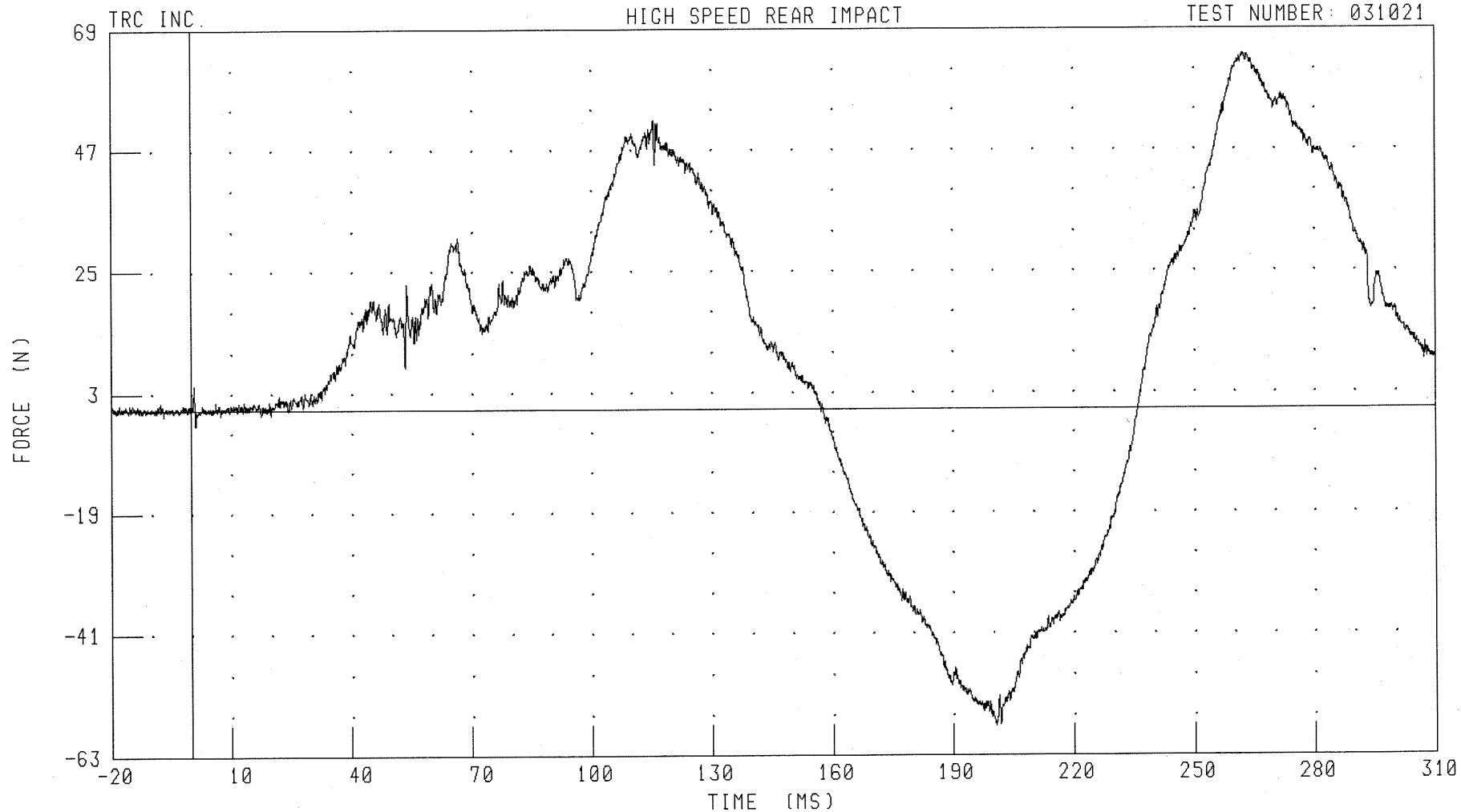
B-11

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER UPPER NECK Y-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

PEAK DATA: 64.41 N @ 262.24 MS; -57.69 N @ 200.72 MS

B-12

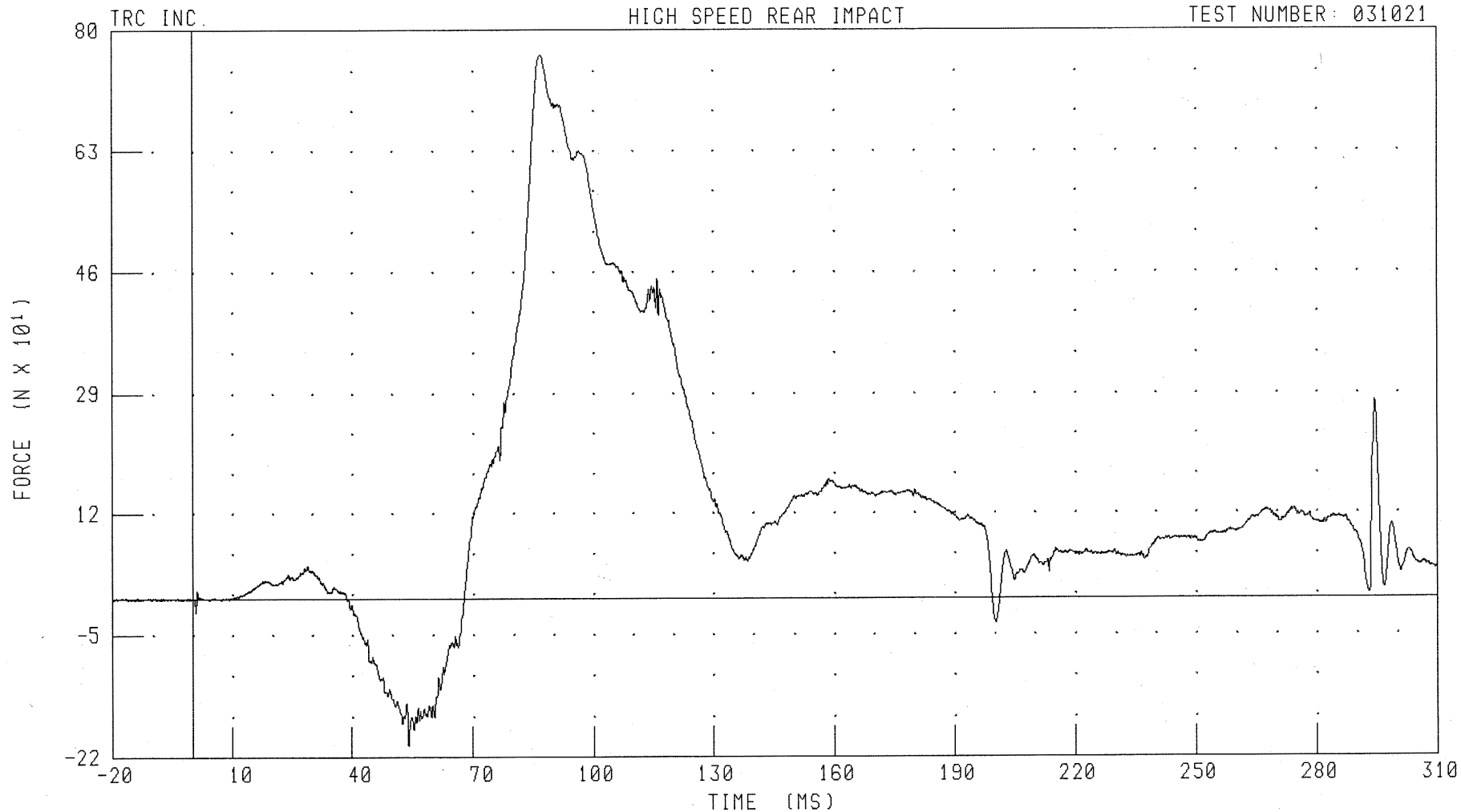
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER UPPER NECK Z-AXIS AXIAL FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKZF1

FILTER: CH. CLASS 1000

PEAK DATA: 766.07 N @ 86.80 MS; -204.19 N @ 54.08 MS

B-13

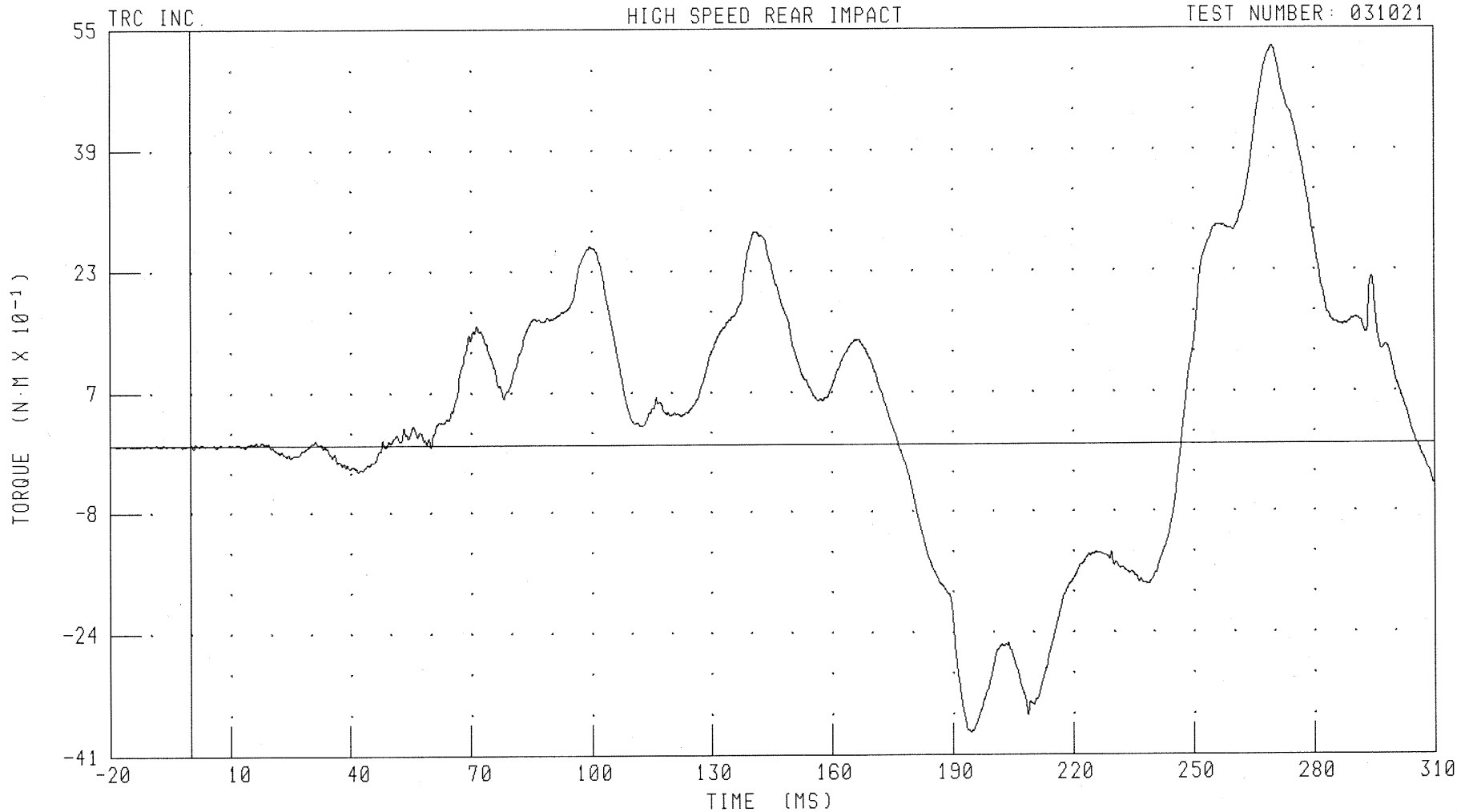
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER UPPER NECK MOMENT ABOUT X AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKXM1 FILTER: CH. CLASS 600

PEAK DATA: 5.26 N.M @ 269.60 MS; -3.80 N.M @ 194.40 MS

B-14

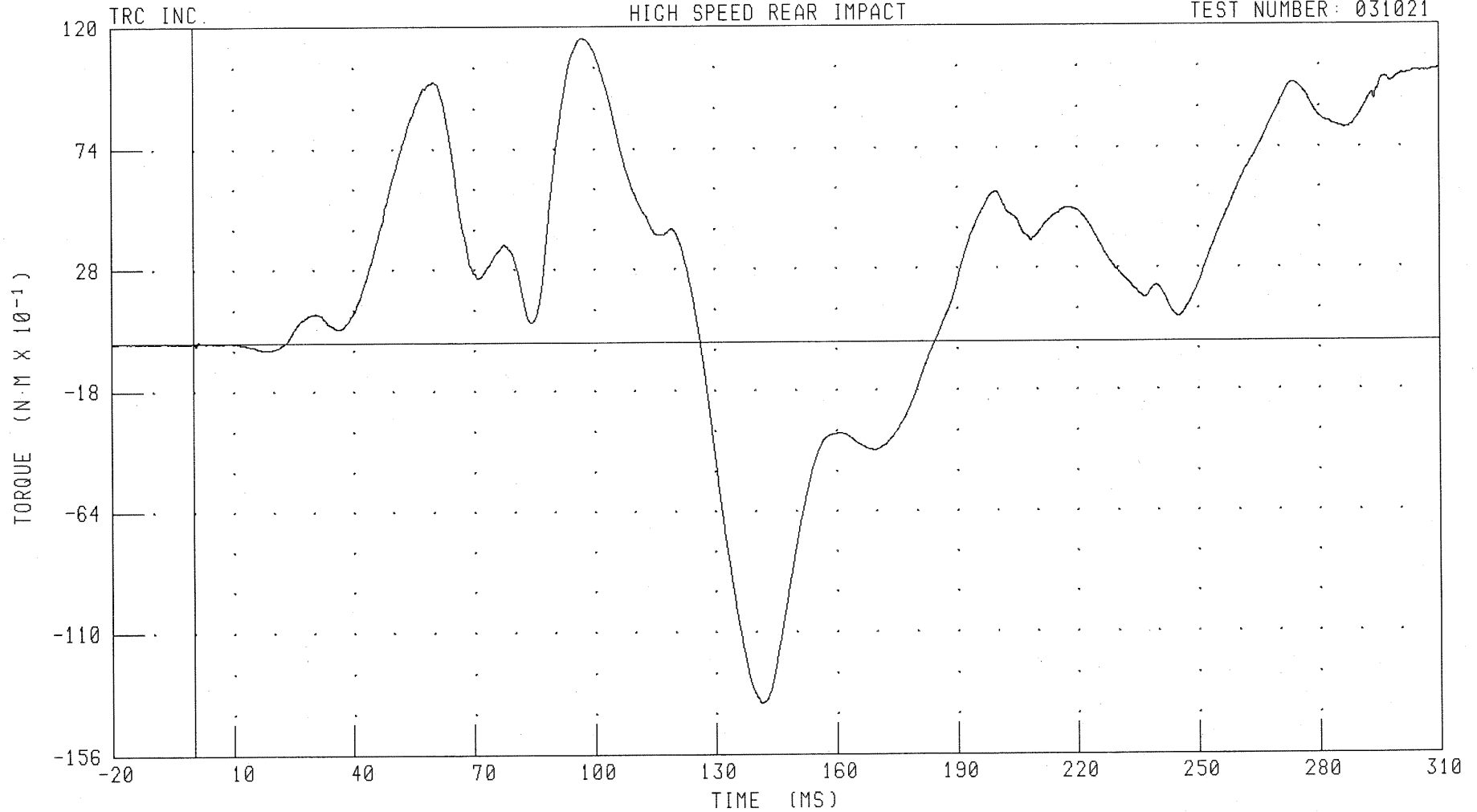
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER UPPER NECK MOMENT ABOUT Y AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKYM1 FILTER: CH. CLASS 600

PEAK DATA: 11.55 N.M @ 96.96 MS; -13.69 N.M @ 141.52 MS

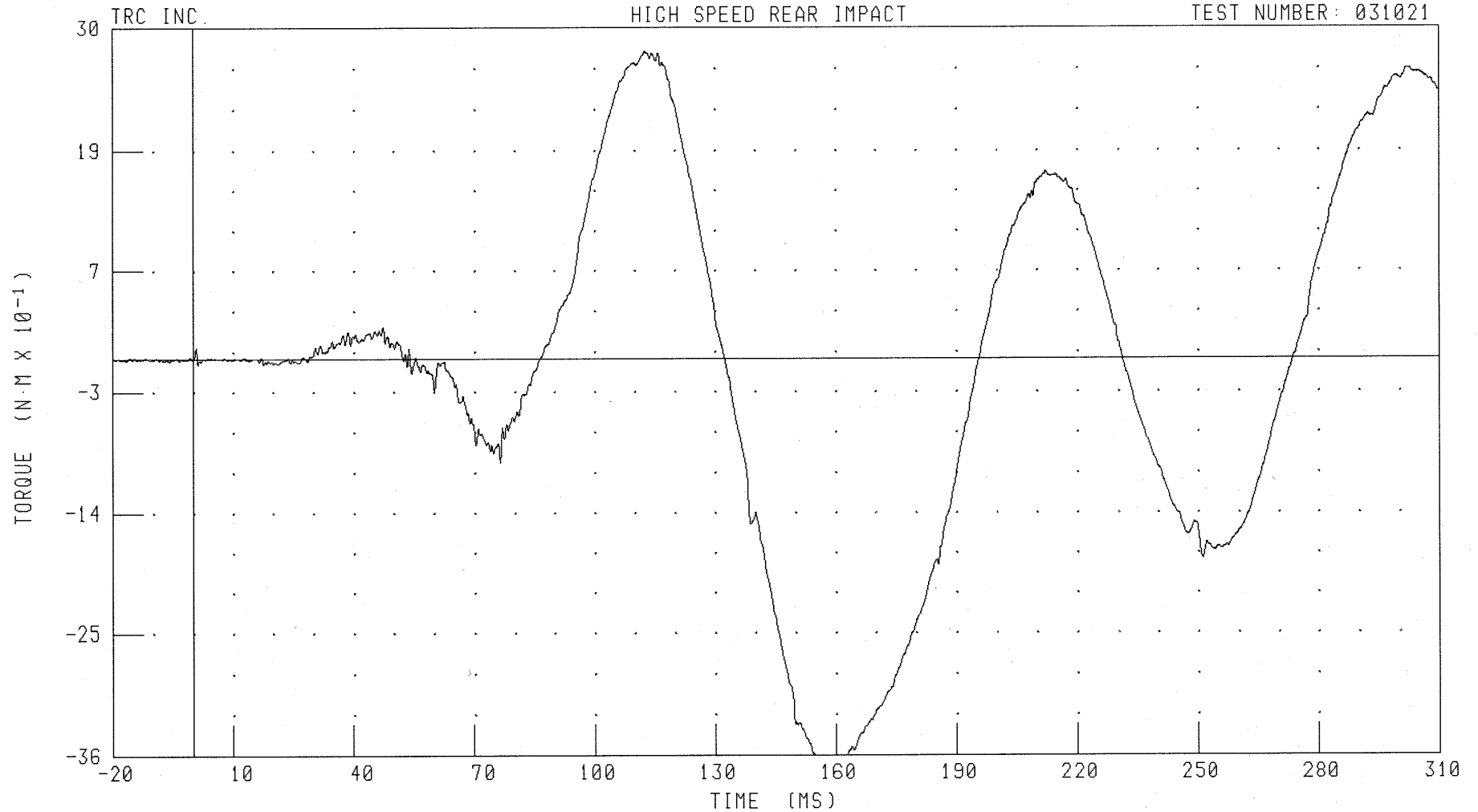
B-15

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER UPPER NECK MOMENT ABOUT Z AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKZM1 FILTER: CH. CLASS 600

PEAK DATA: 2.78 N·M @ 112.72 MS; -3.74 N·M @ 157.28 MS

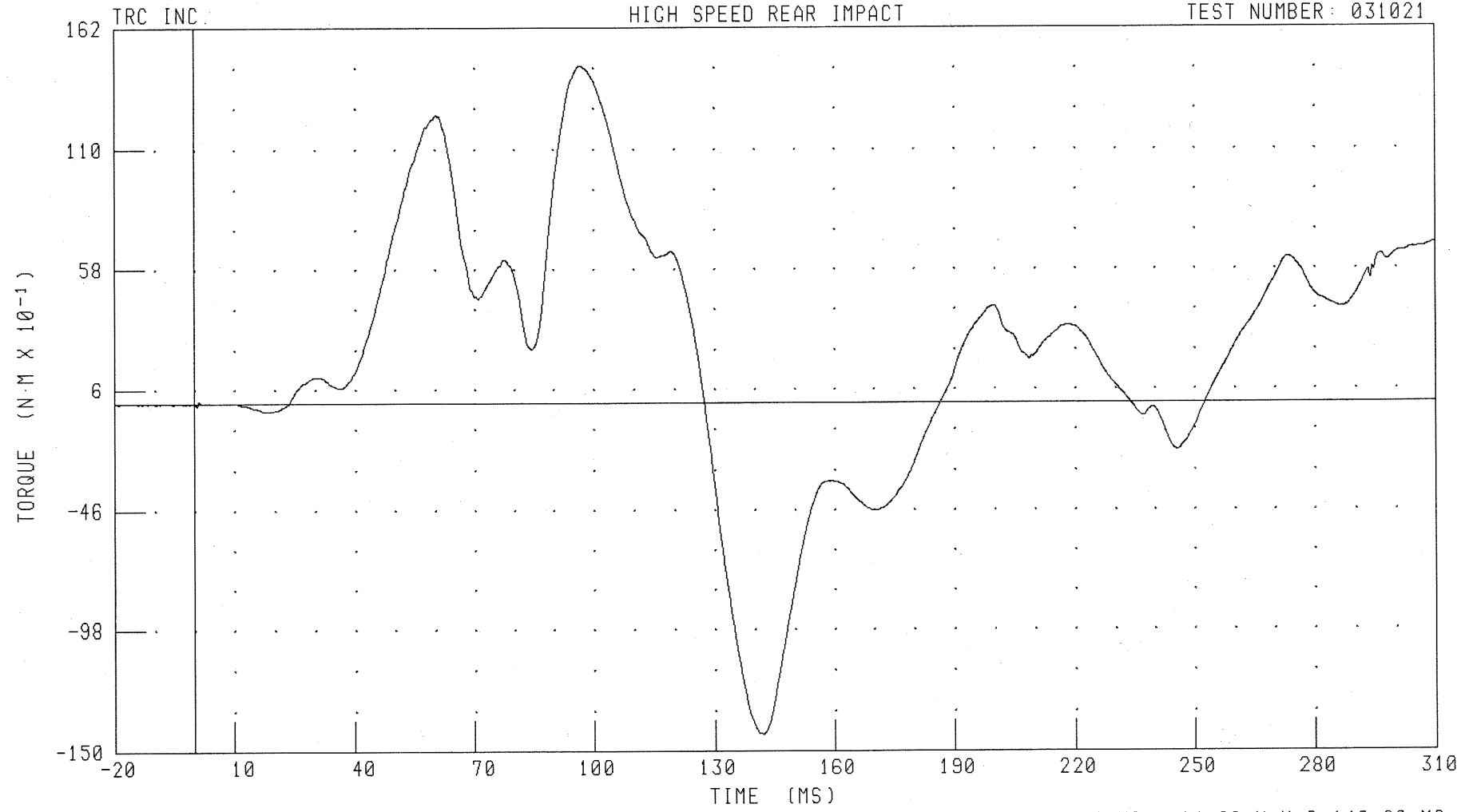
B-16

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKOM1 FILTER: CH. CLASS 600

PEAK DATA: 14.54 N·M @ 96.80 MS; -14.29 N·M @ 142.08 MS

B-17

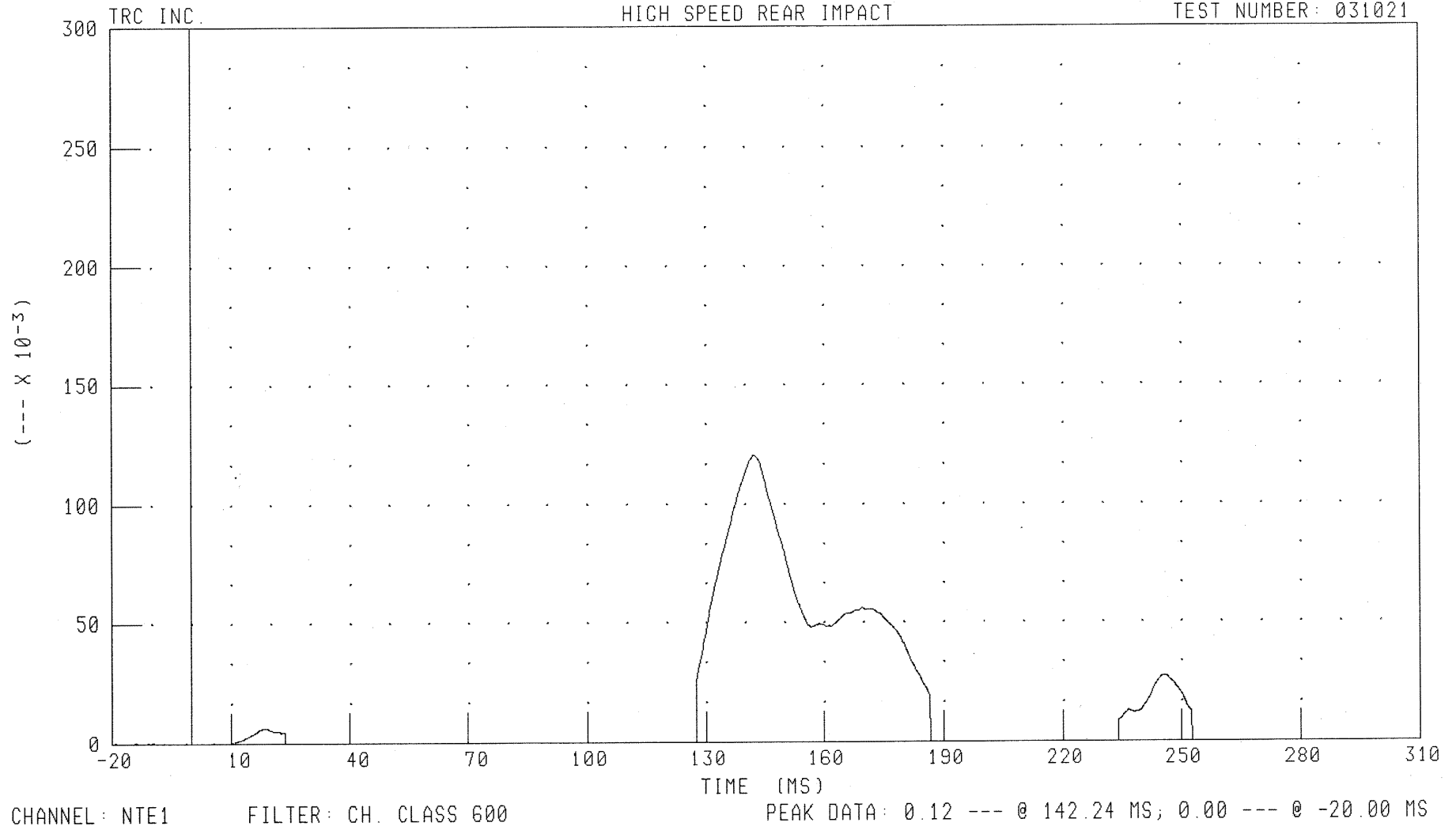
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER NECK TENSION/EXTENSION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-18

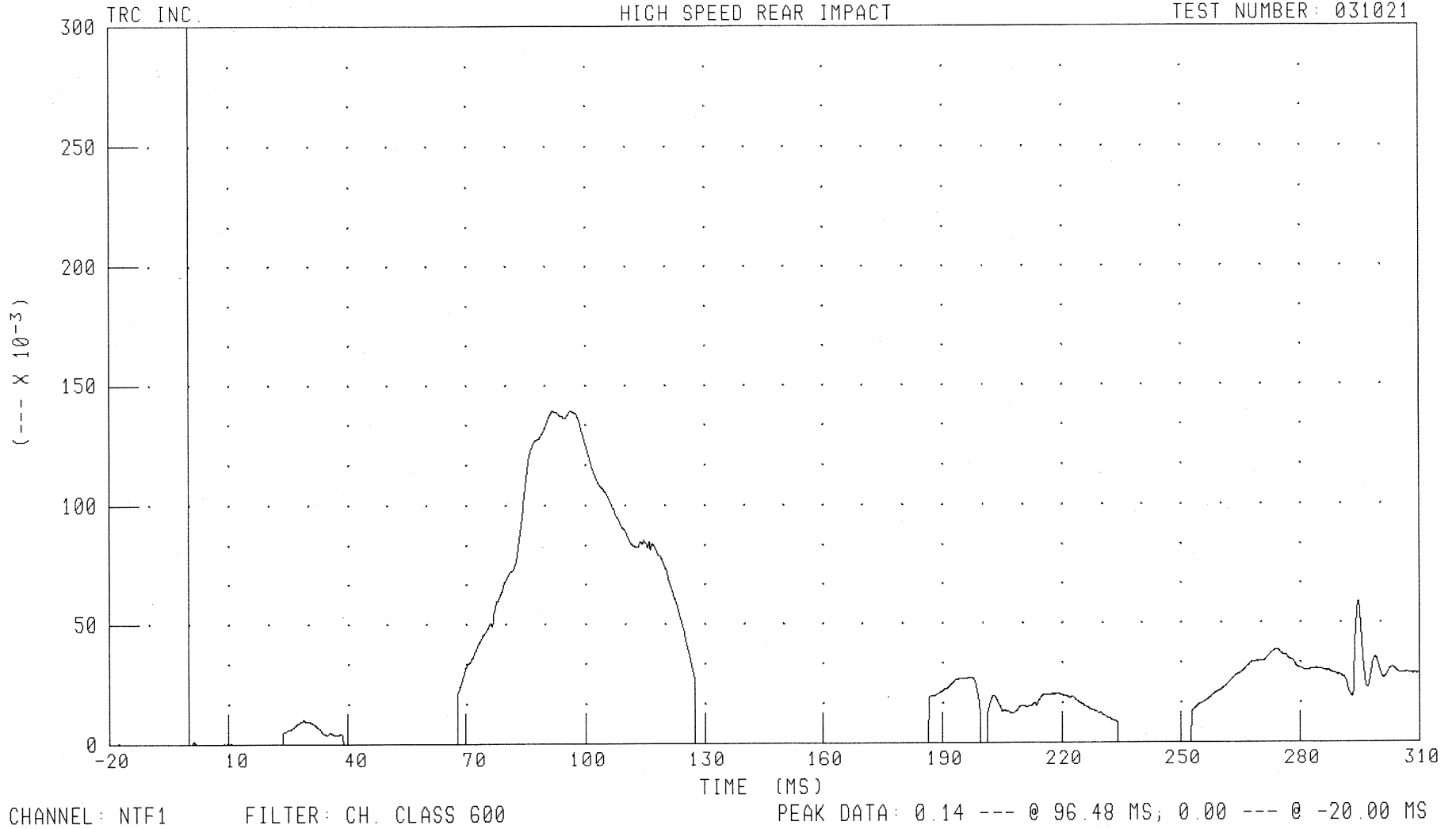
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER NECK TENSION/FLEXION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-19

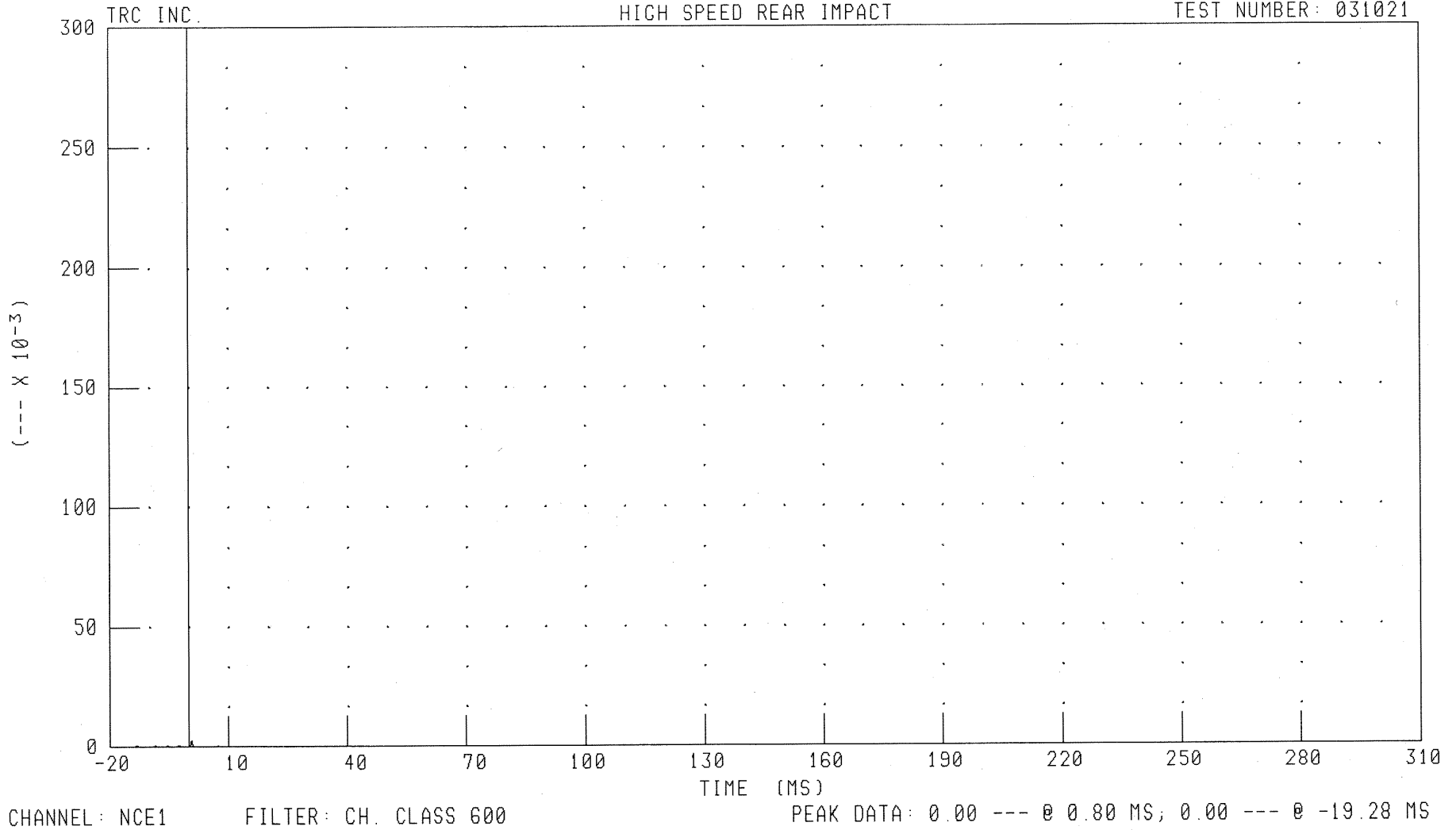
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER NECK COMPRESSION/EXTENSION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-20

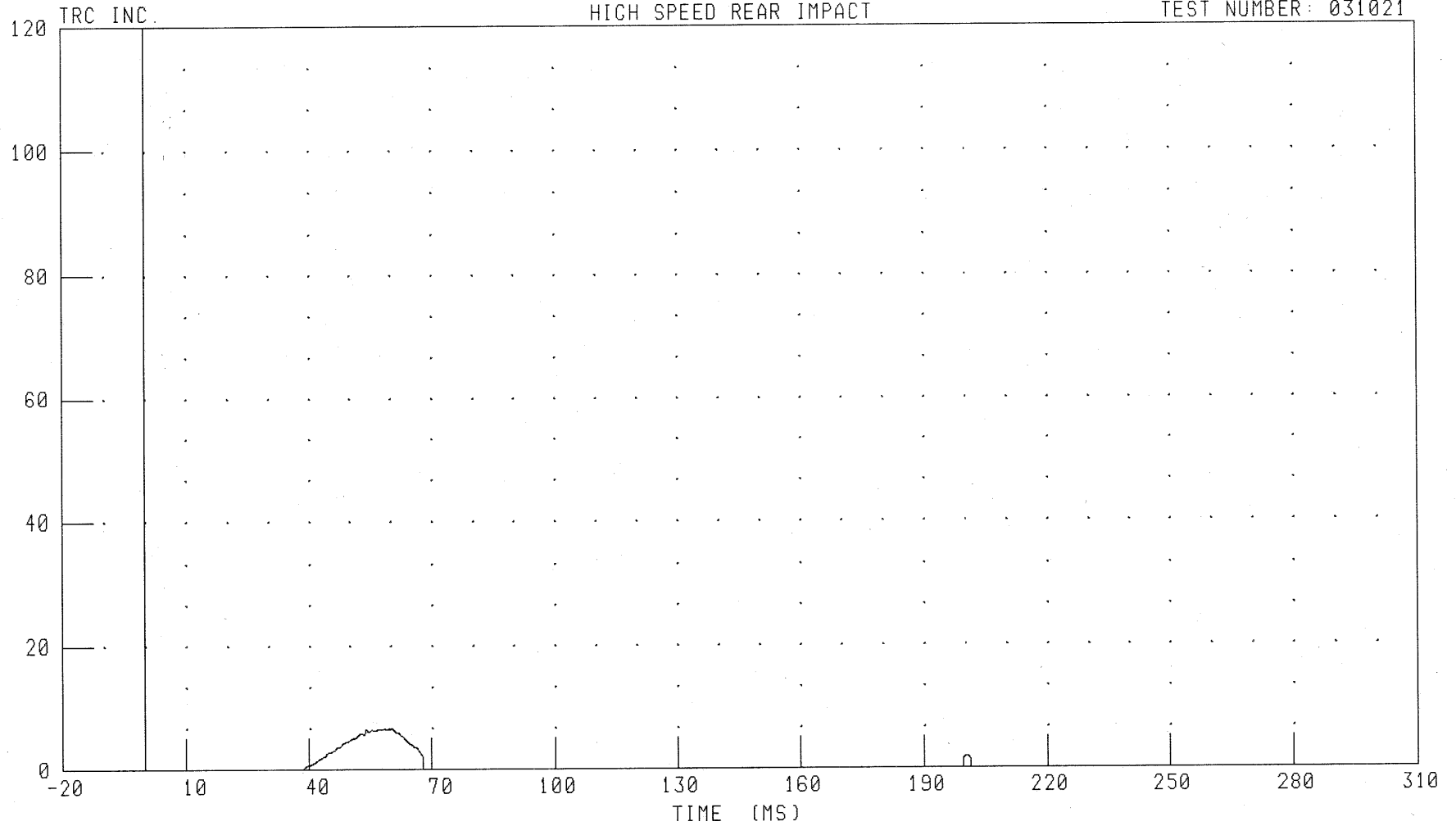
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER NECK COMPRESSION/FLEXION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NCF1

FILTER: CH. CLASS 600

PEAK DATA: 0.07 --- @ 60.32 MS; 0.00 --- @ -20.00 MS

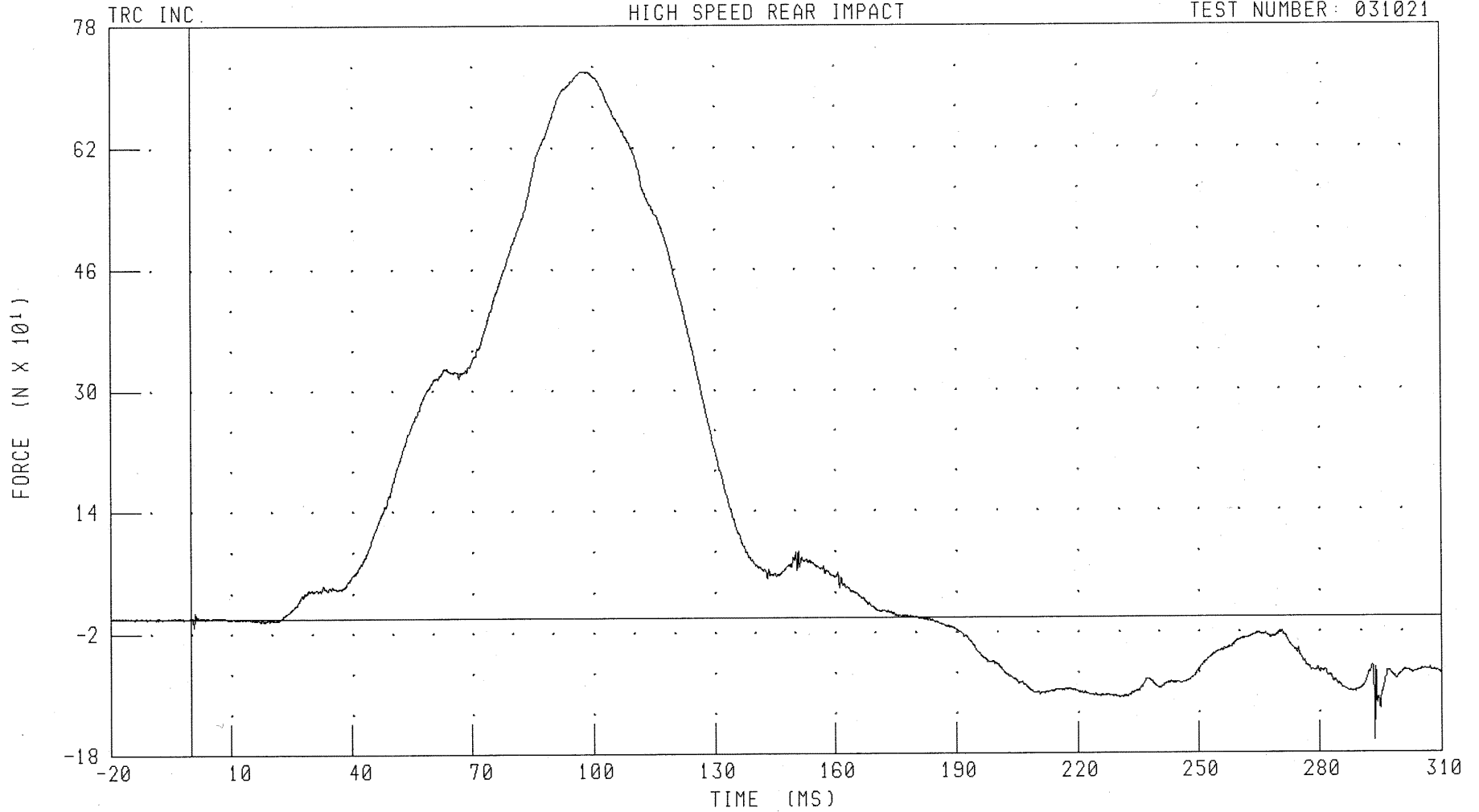
B-21

031021-2

(--- X ---)

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER LOWER NECK X-AXIS SHEAR FORCE  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLXF1

FILTER: CH. CLASS 1000

PEAK DATA: 719.94 N @ 97.36 MS; -164.40 N @ 293.44 MS

B-22

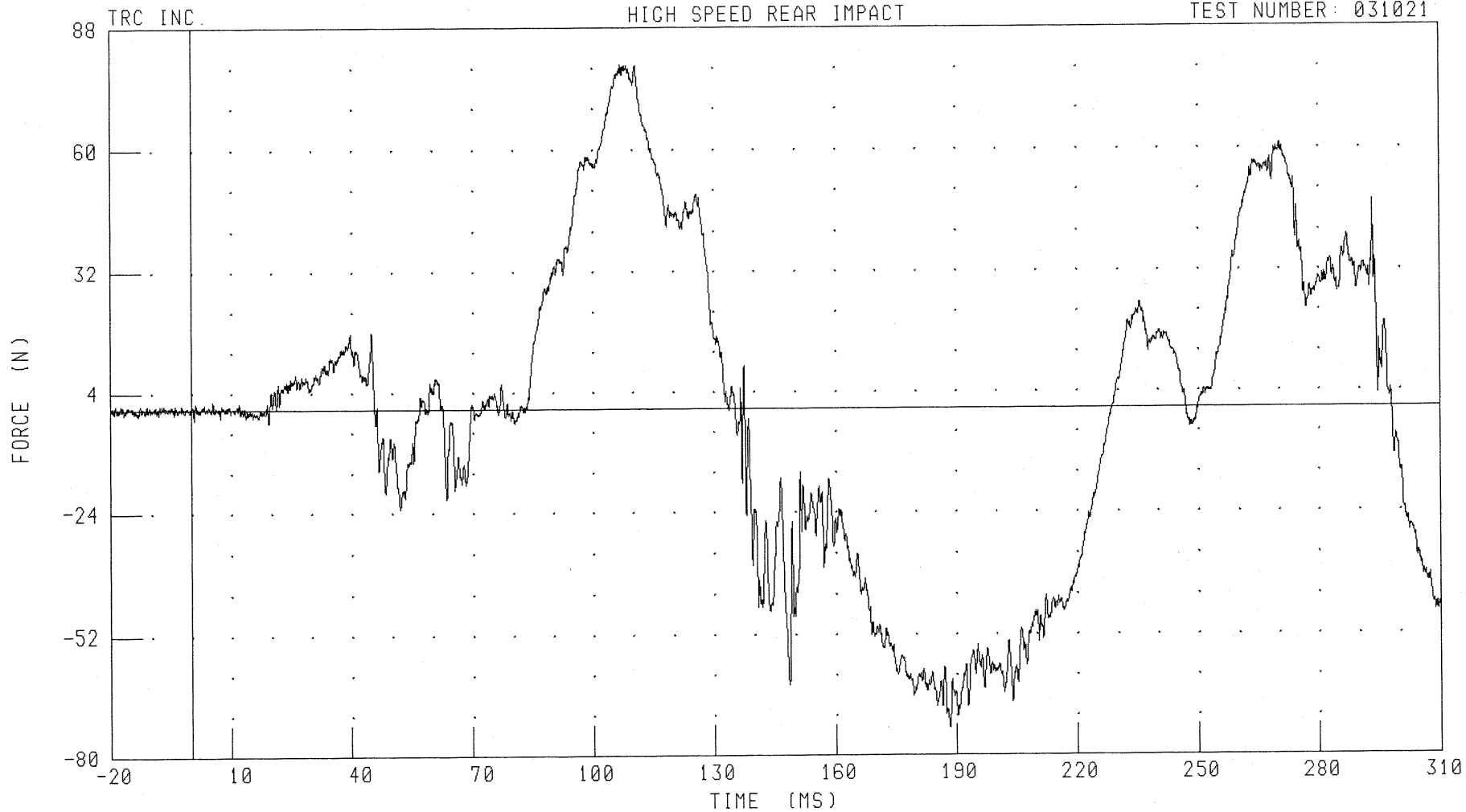
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LOWER NECK Y-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLYF1 FILTER: CH. CLASS 1000

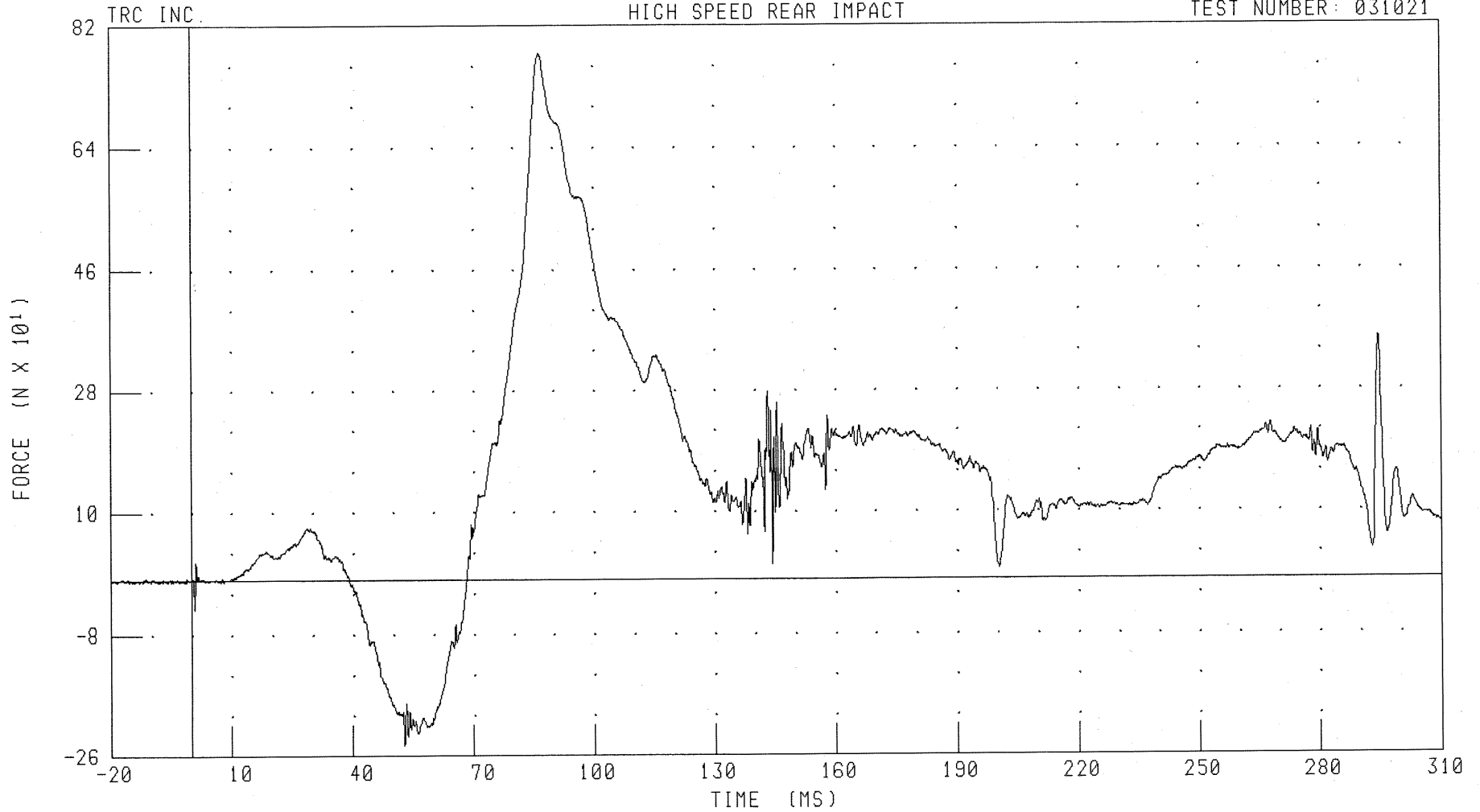
PEAK DATA: 79.49 N @ 107.28 MS; -73.51 N @ 188.40 MS

B-23

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER LOWER NECK Z-AXIS AXIAL FORCE  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLZF1

FILTER: CH. CLASS 1000

PEAK DATA: 778.91 N @ 86.64 MS; -244.43 N @ 52.72 MS

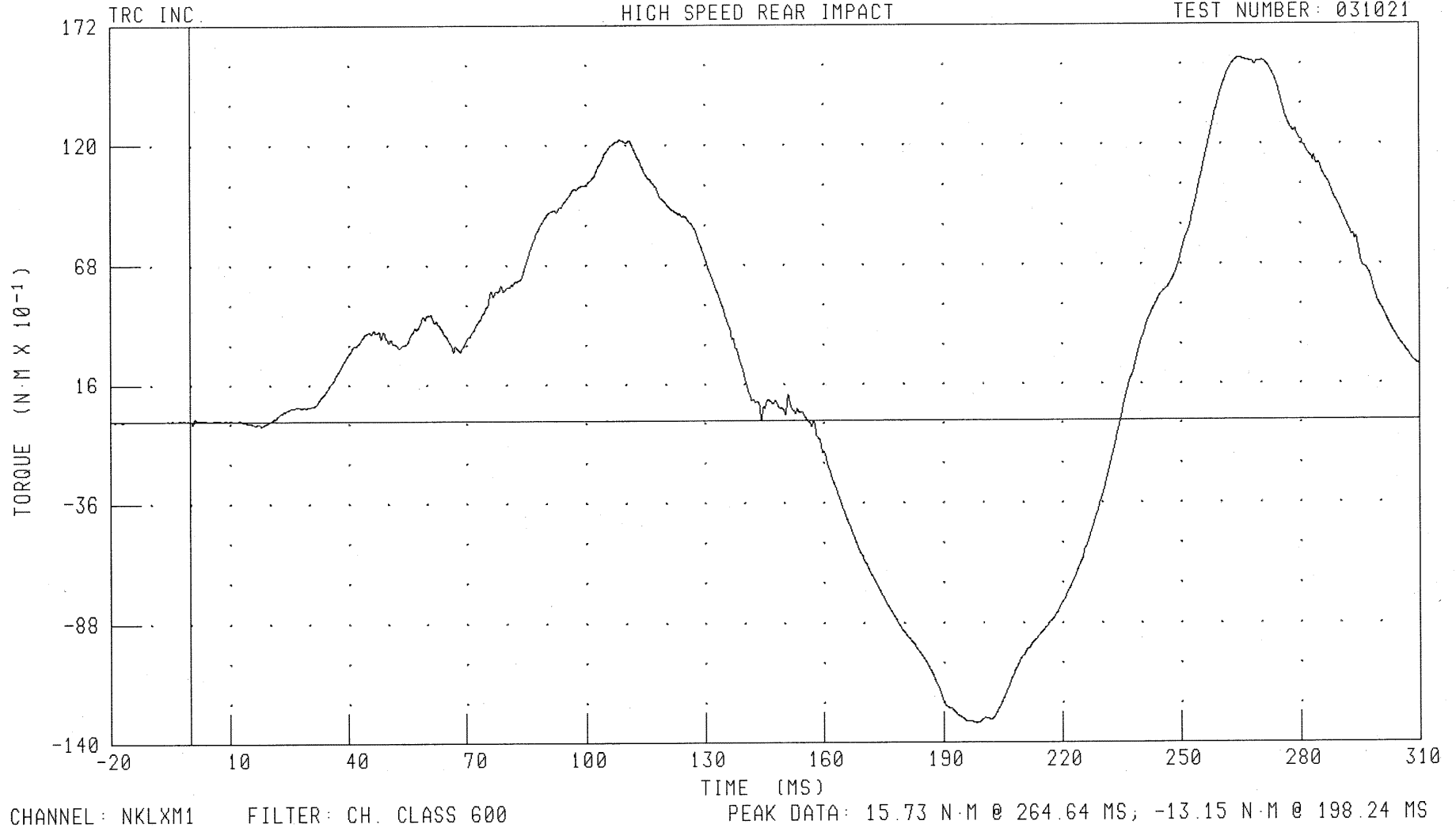
B-24

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER LOWER NECK MOMENT ABOUT X AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLXM1

FILTER: CH. CLASS 600

PEAK DATA: 15.73 N·M @ 264.64 MS; -13.15 N·M @ 198.24 MS

B-25

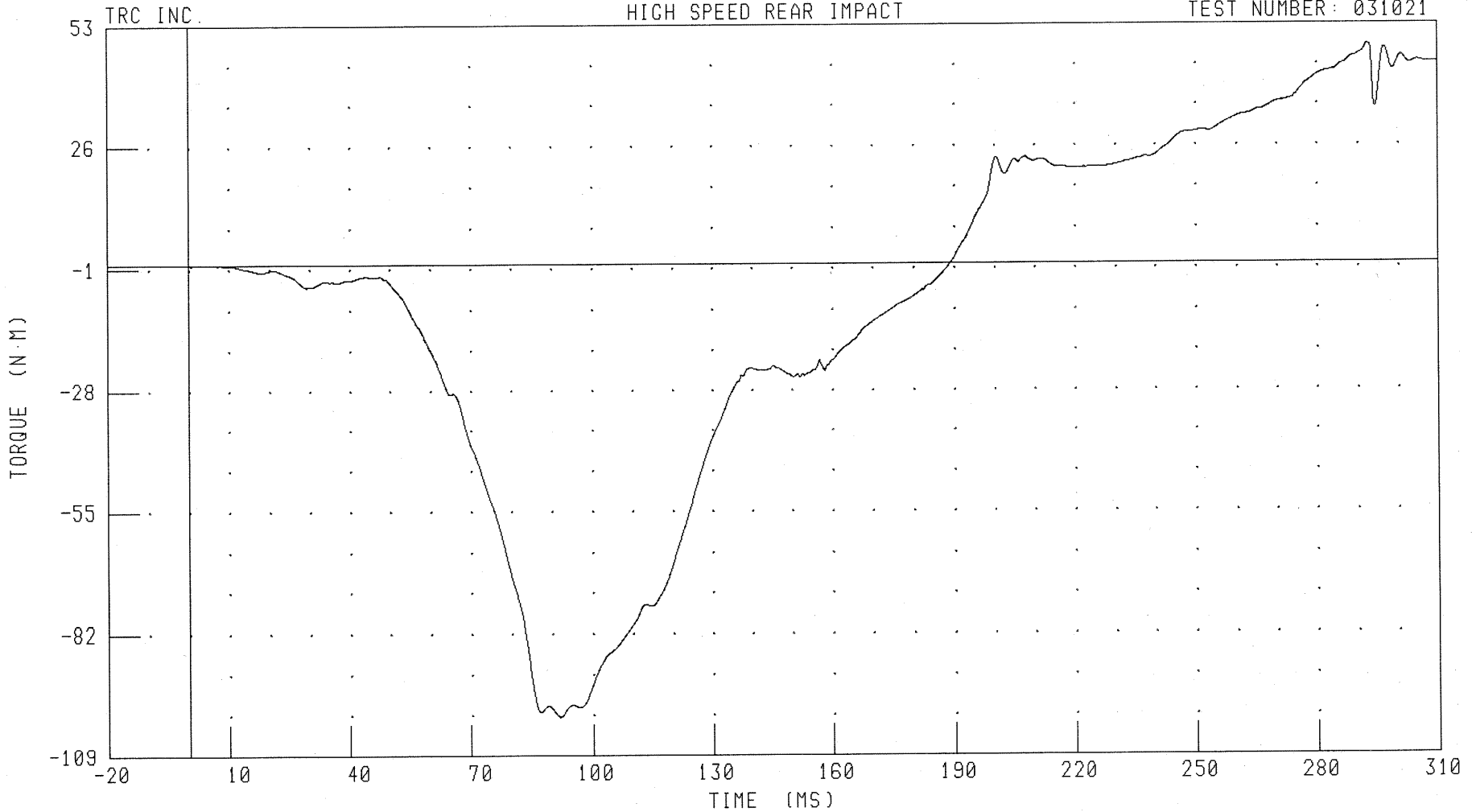
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LOWER NECK MOMENT ABOUT Y AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLYM1

FILTER: CH. CLASS 600

PEAK DATA: 48.41 N·M @ 292.64 MS; -100.47 N·M @ 91.92 MS

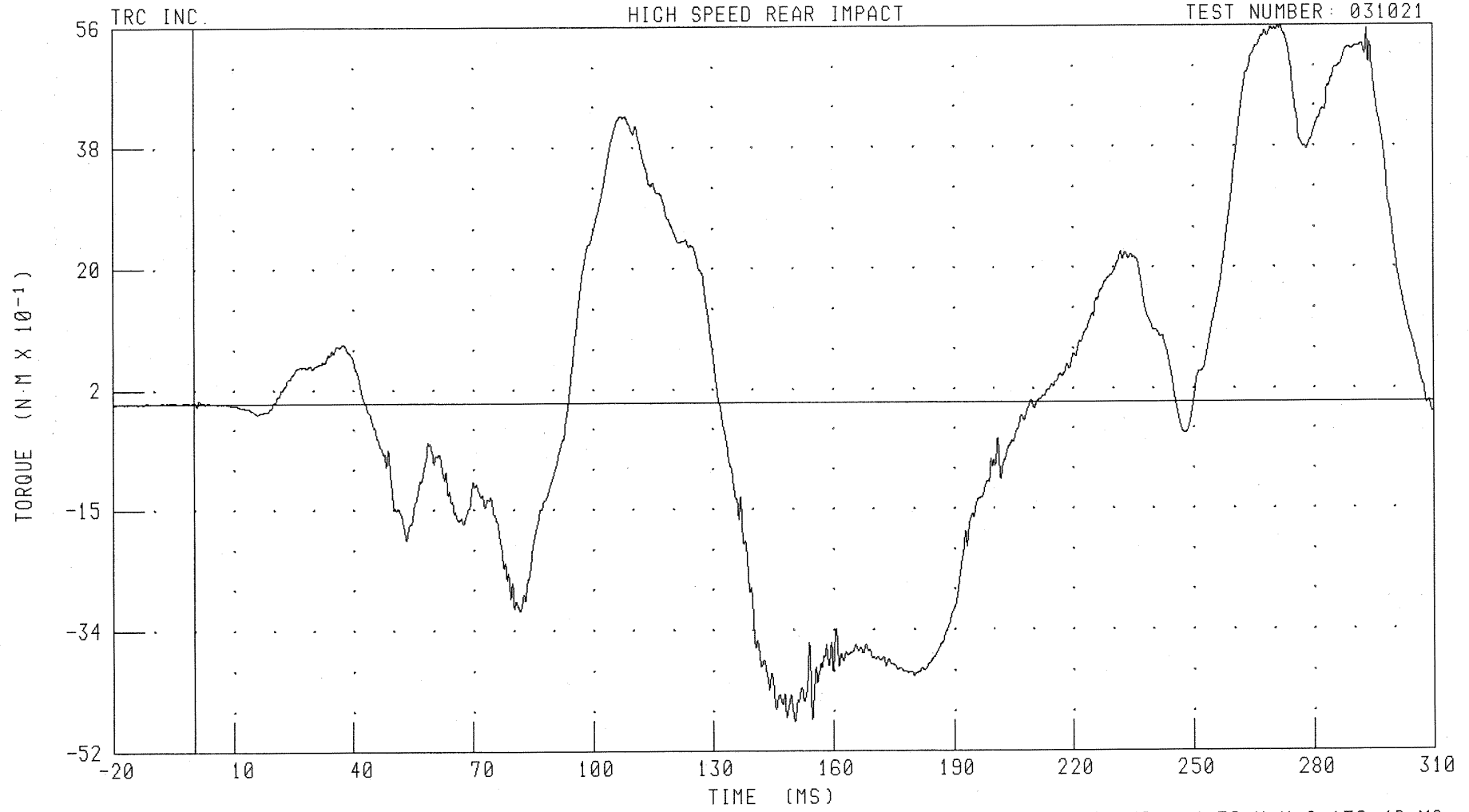
B-26

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER LOWER NECK MOMENT ABOUT Z AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLZM1 FILTER: CH. CLASS 600

PEAK DATA: 5.59 N·M @ 271.84 MS; -4.76 N·M @ 150.48 MS

B-27

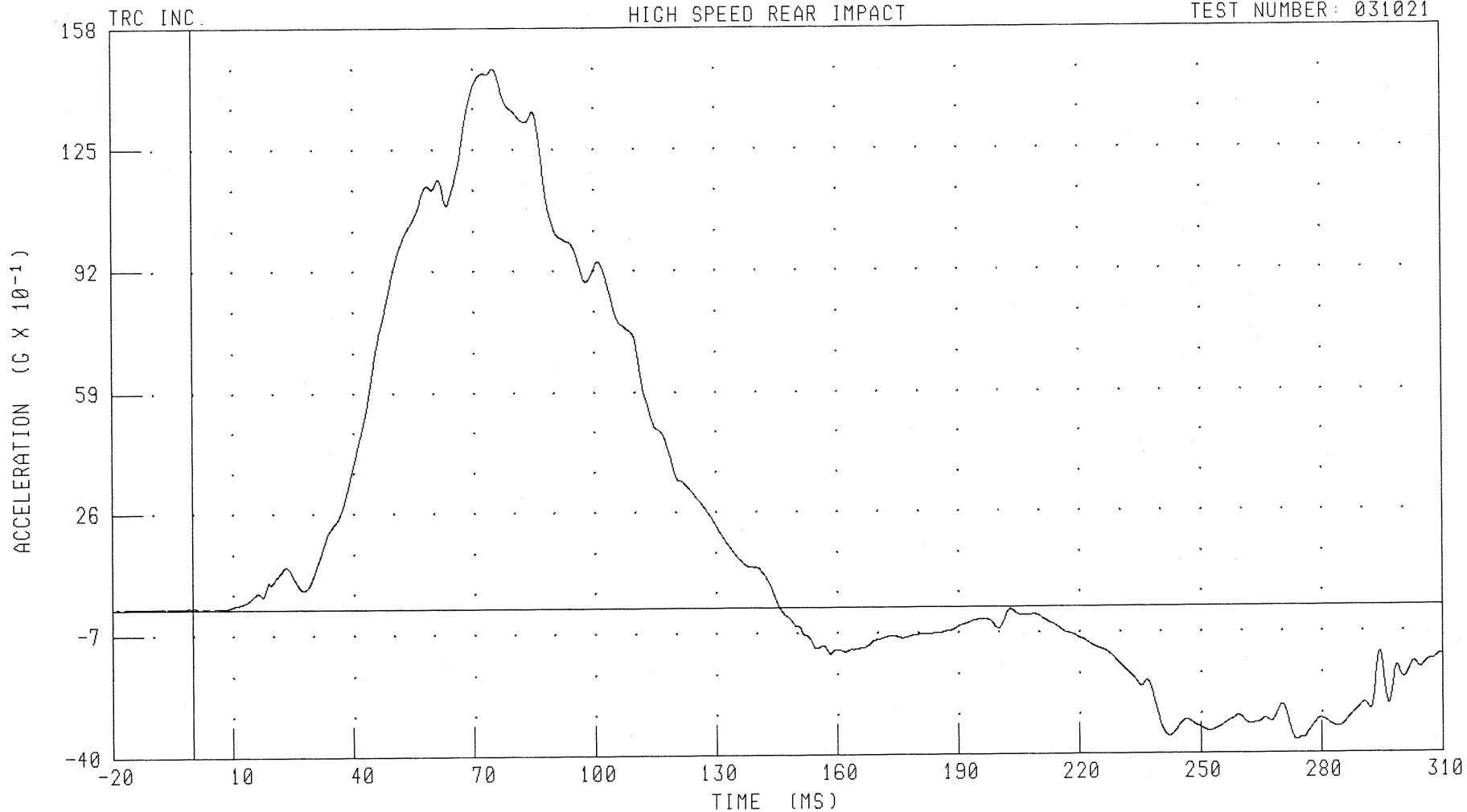
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXC1

FILTER: CH. CLASS 180

PEAK DATA: 14.70 G @ 75.12 MS; -3.65 G @ 273.76 MS

B-28

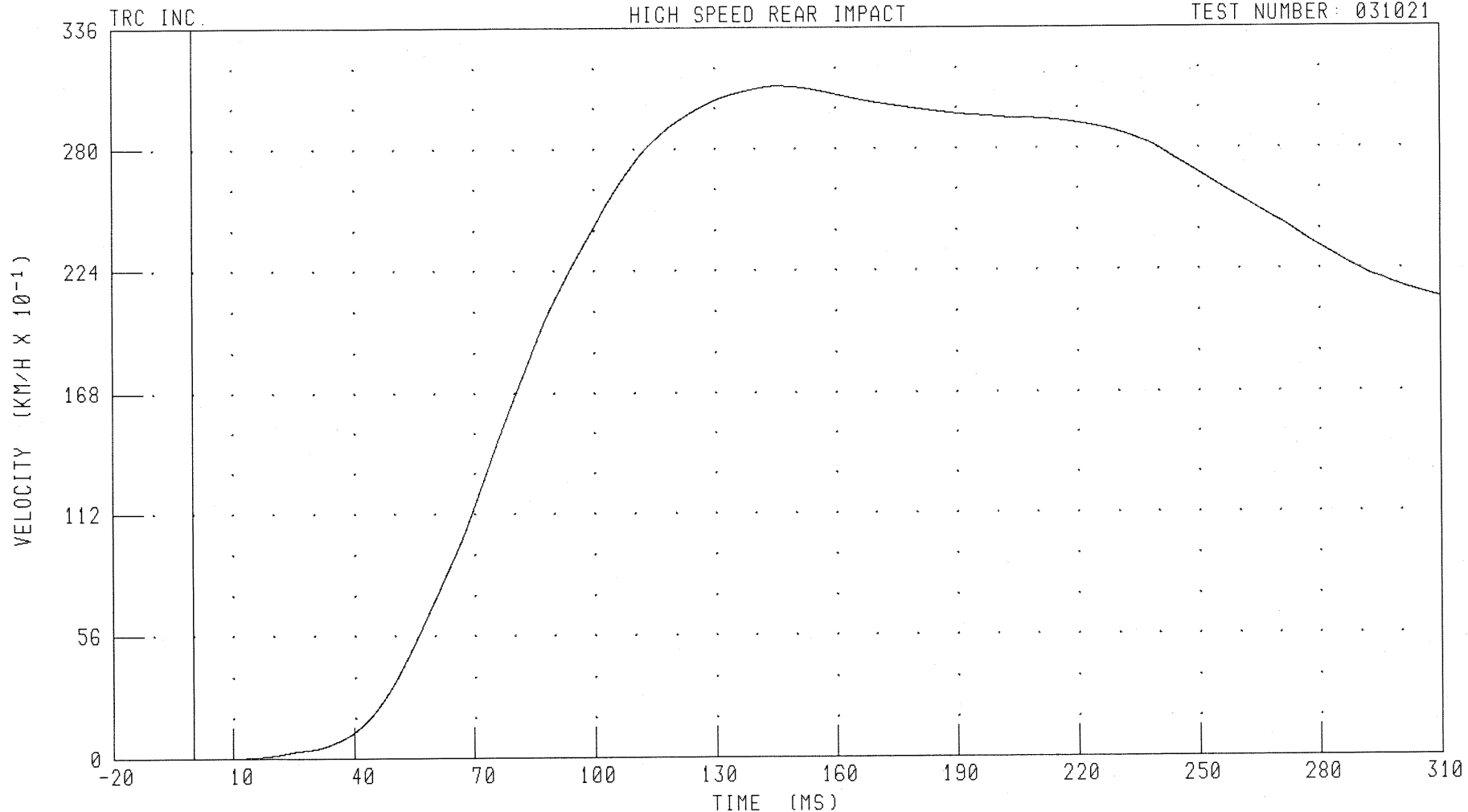
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXV1 FILTER: CH. CLASS 180

PEAK DATA: 30.89 KM/H @ 145.76 MS; 0.00 KM/H @ 0.00 MS

B-29

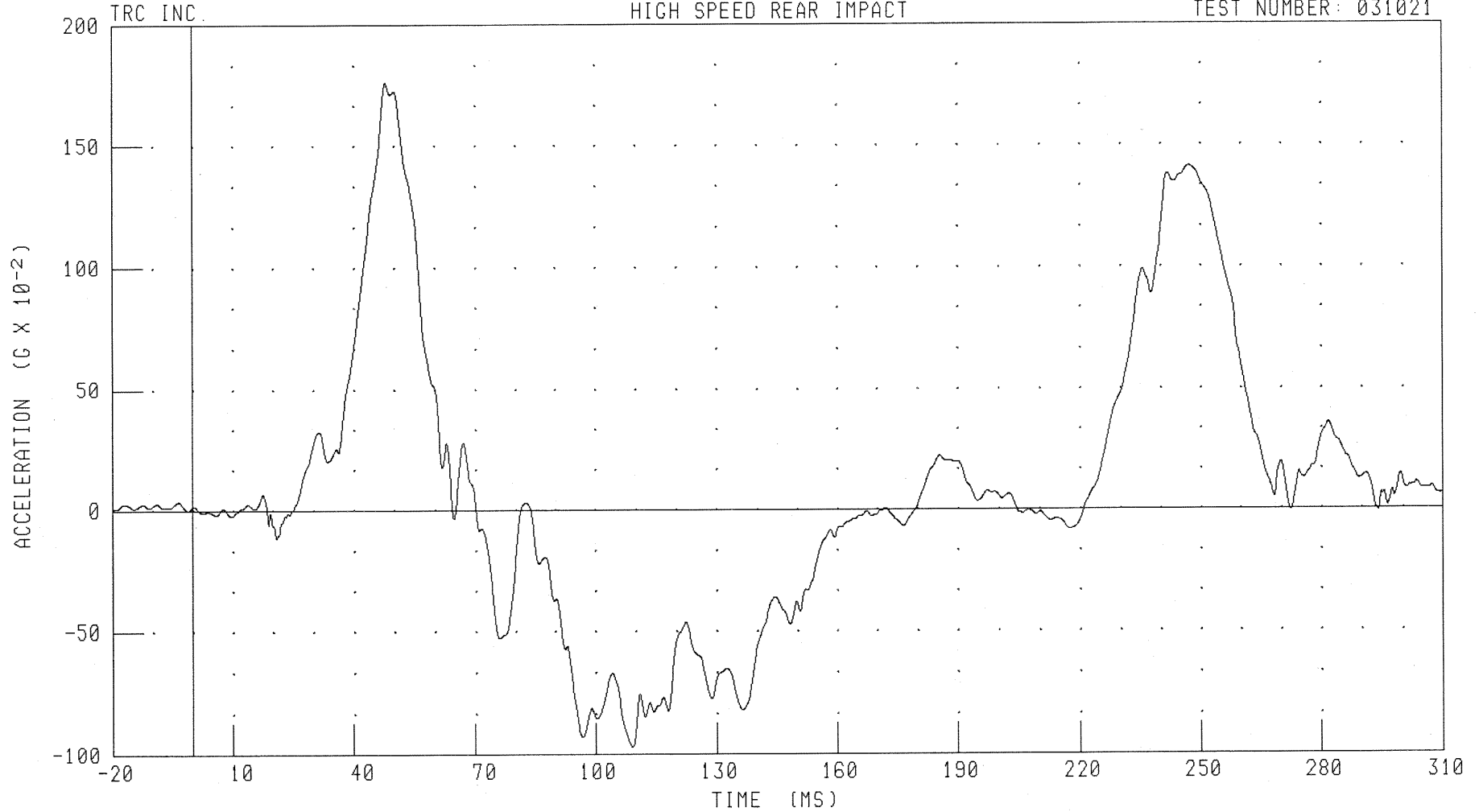
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 1.76 G @ 48.00 MS; -0.97 G @ 109.20 MS

B-30

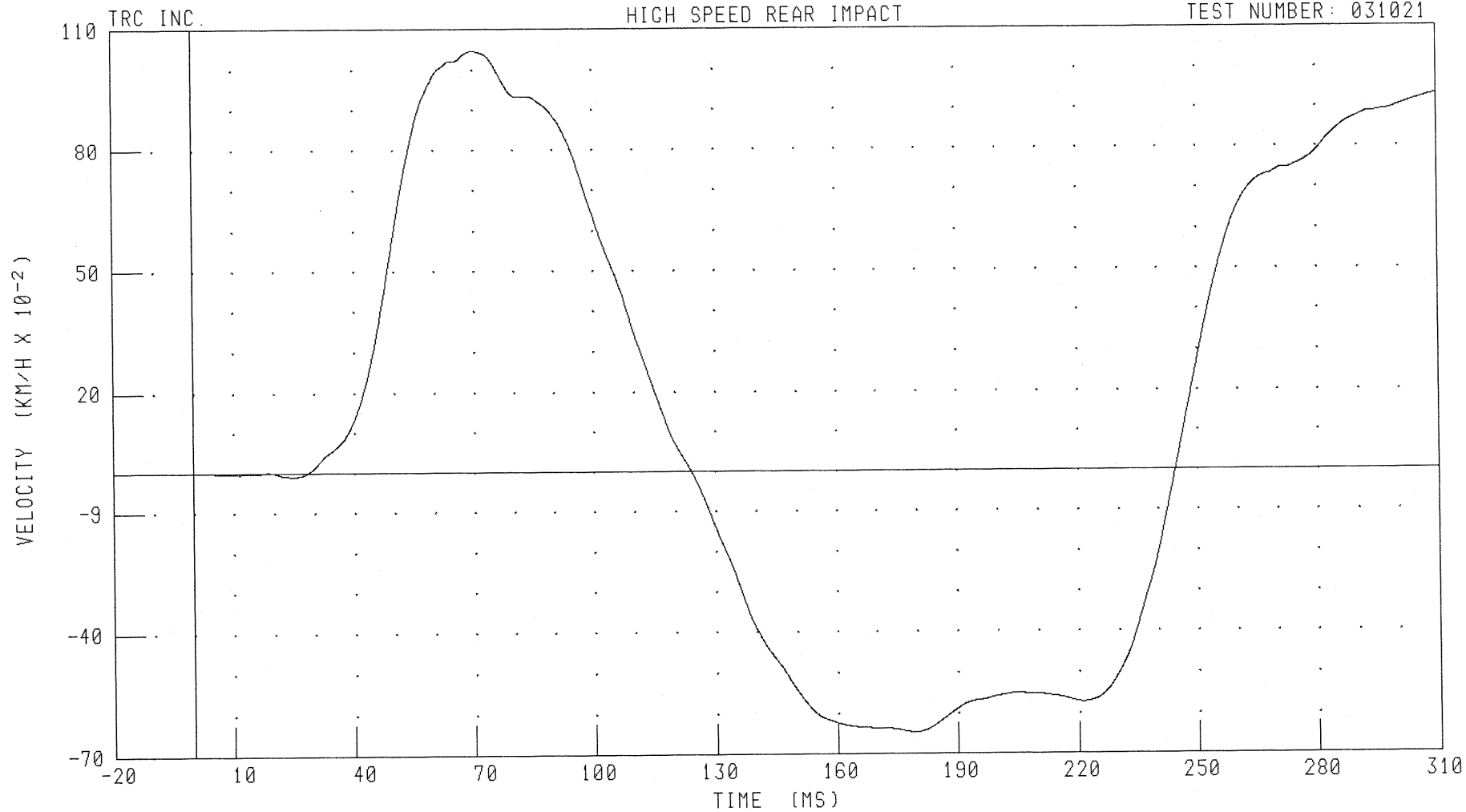
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYV1 FILTER: CH. CLASS 180

PEAK DATA: 1.05 KM/H @ 70.24 MS; -0.65 KM/H @ 179.60 MS

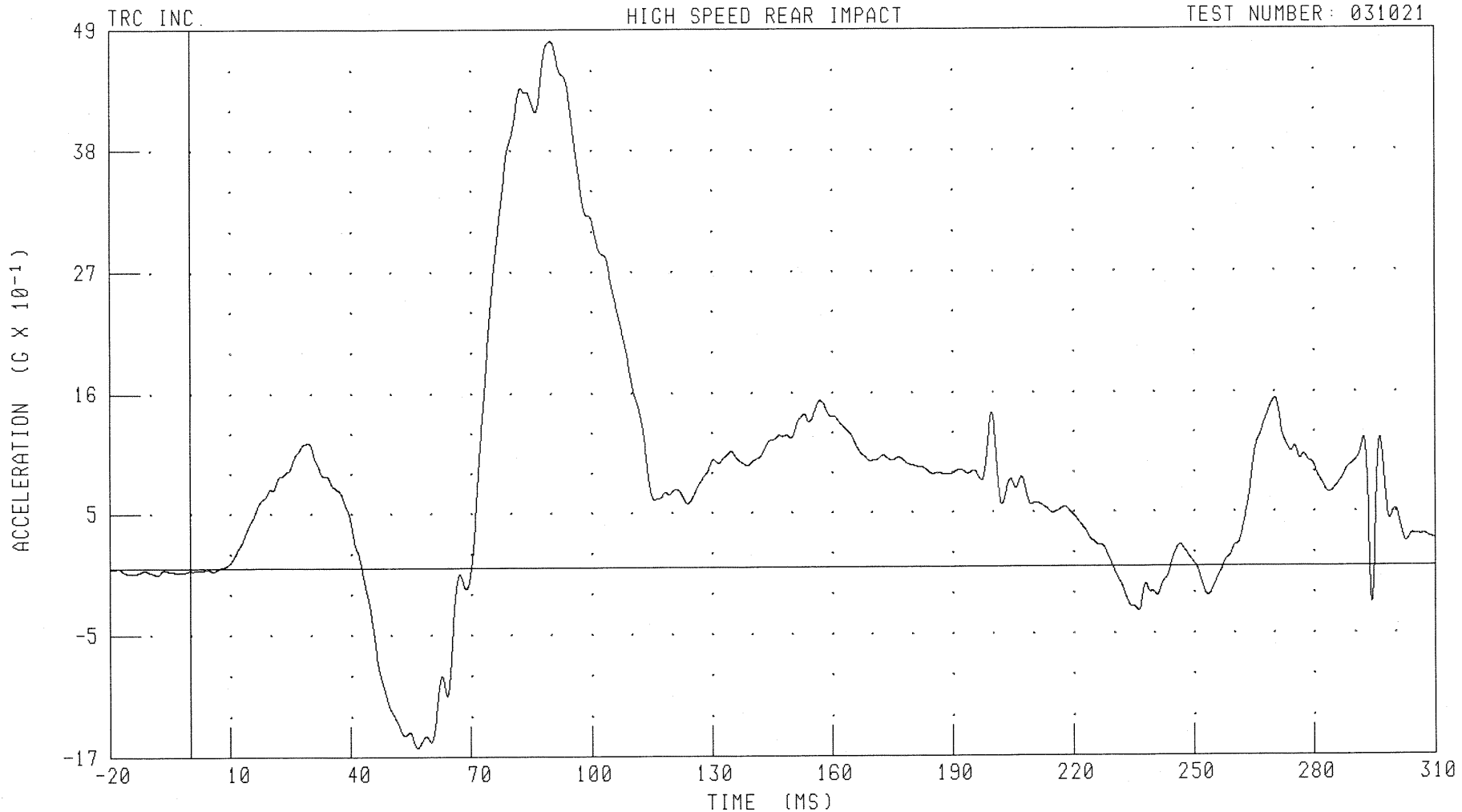
B-31

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER CHEST Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

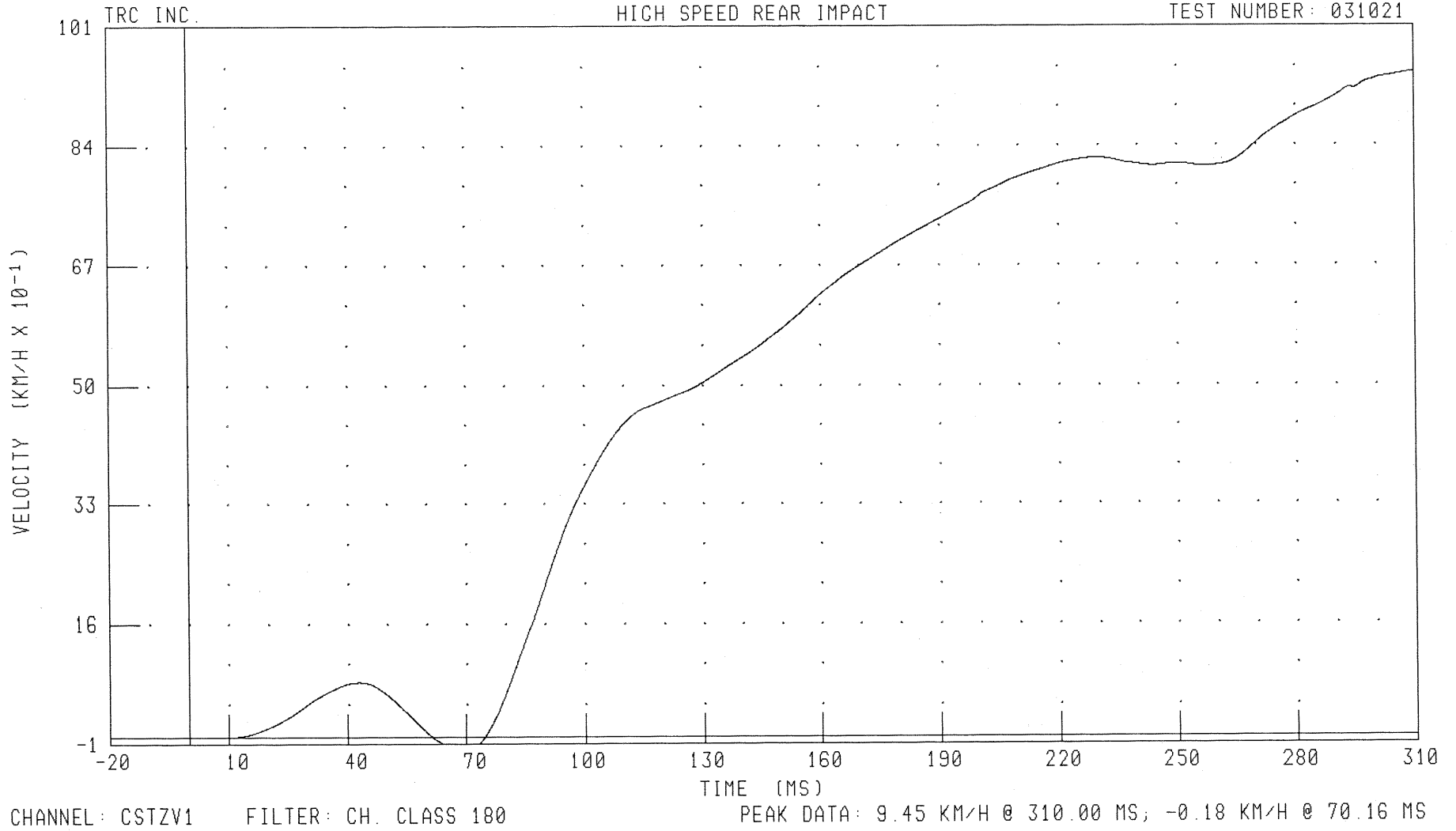
PEAK DATA: 4.80 G @ 90.08 MS; -1.62 G @ 56.56 MS

B-32

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER CHEST Z-AXIS VELOCITY  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-33

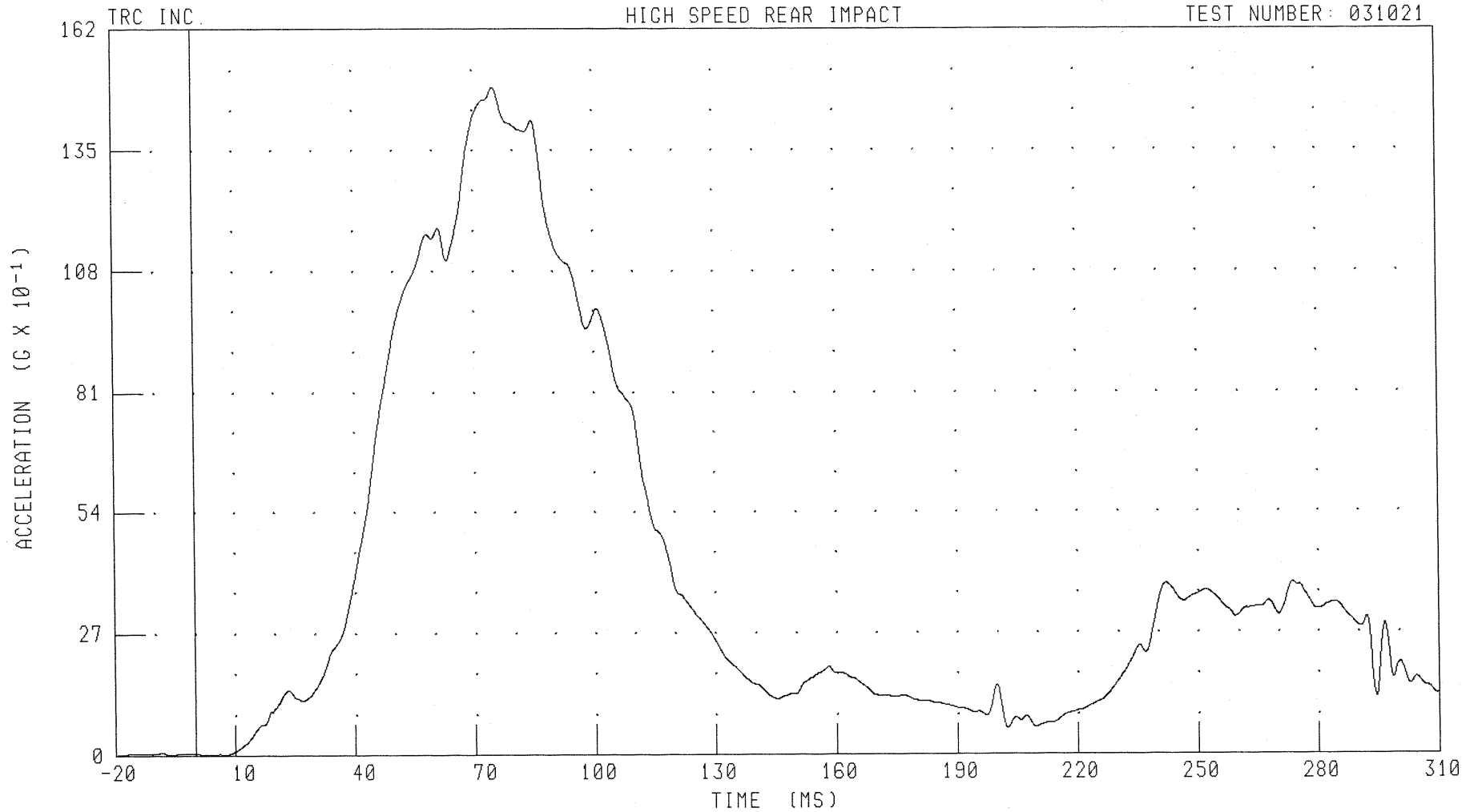
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

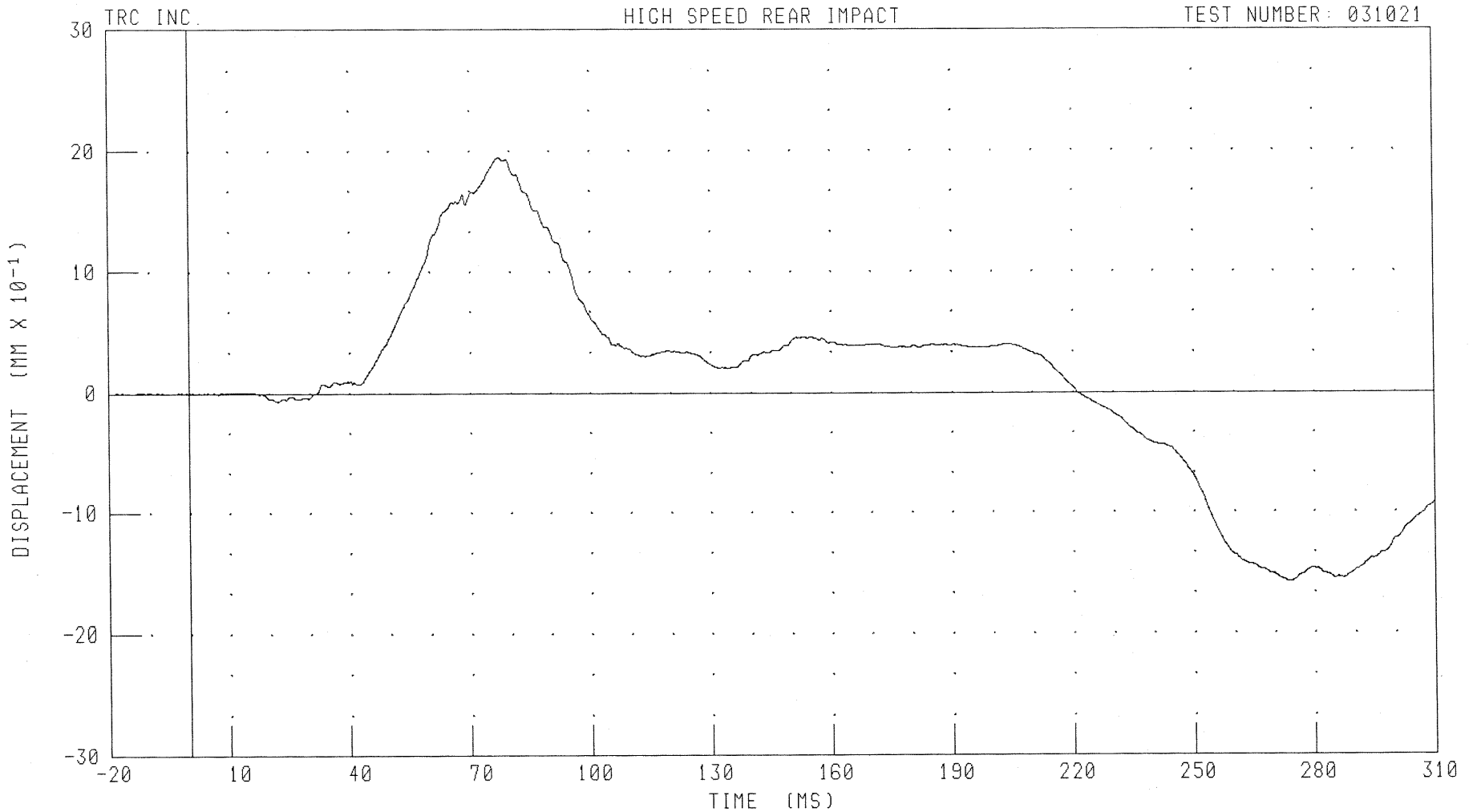
PEAK DATA: 14.91 G @ 75.28 MS; 0.00 G @ -20.00 MS

B-34

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER CHEST X-AXIS DEFLECTION  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXD1 FILTER: CH. CLASS 600

PEAK DATA: 1.94 MM @ 77.60 MS; -1.58 MM @ 273.60 MS

B-35

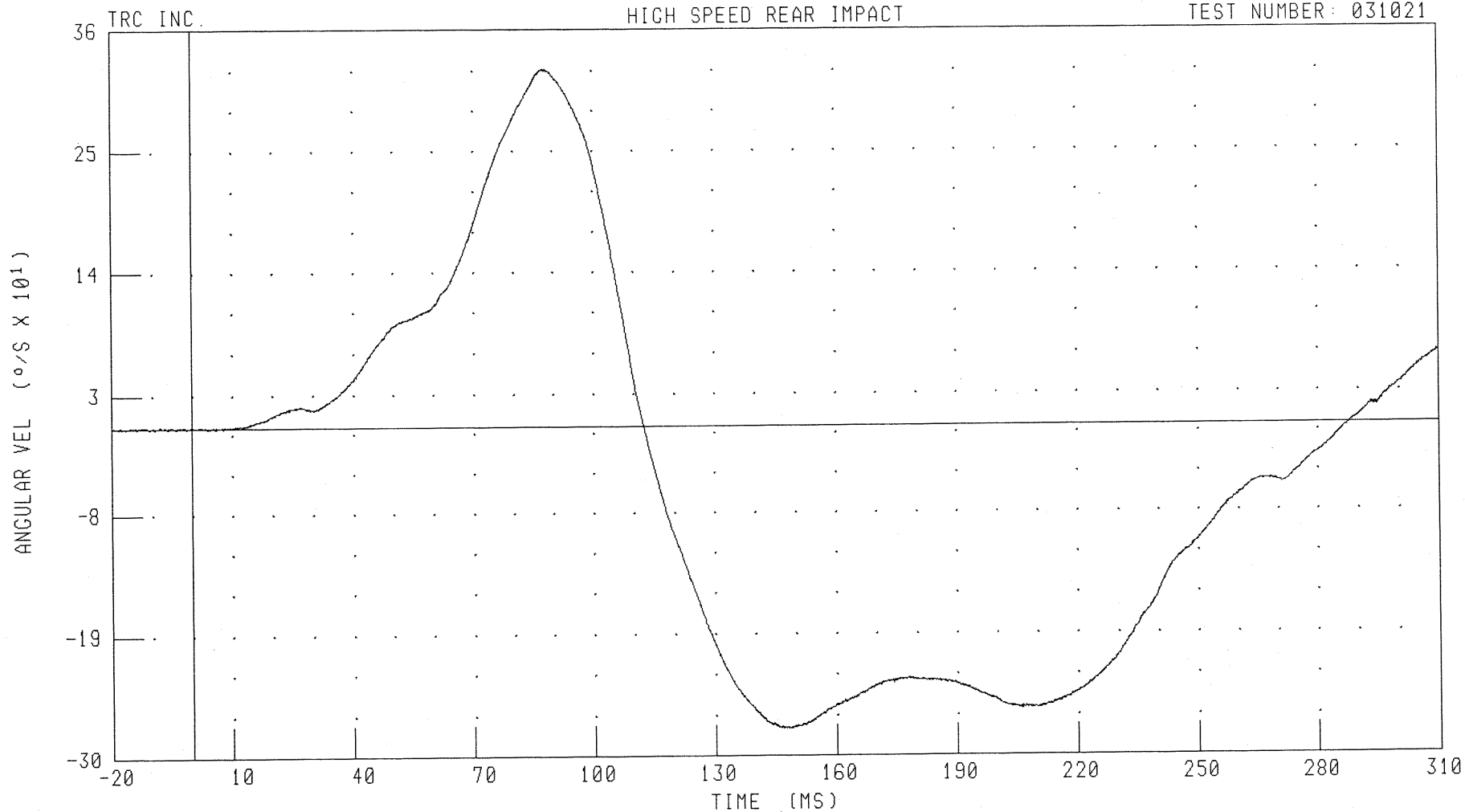
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER CHEST Y-AXIS ANGULAR VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYV1 FILTER: CH. CLASS 1000

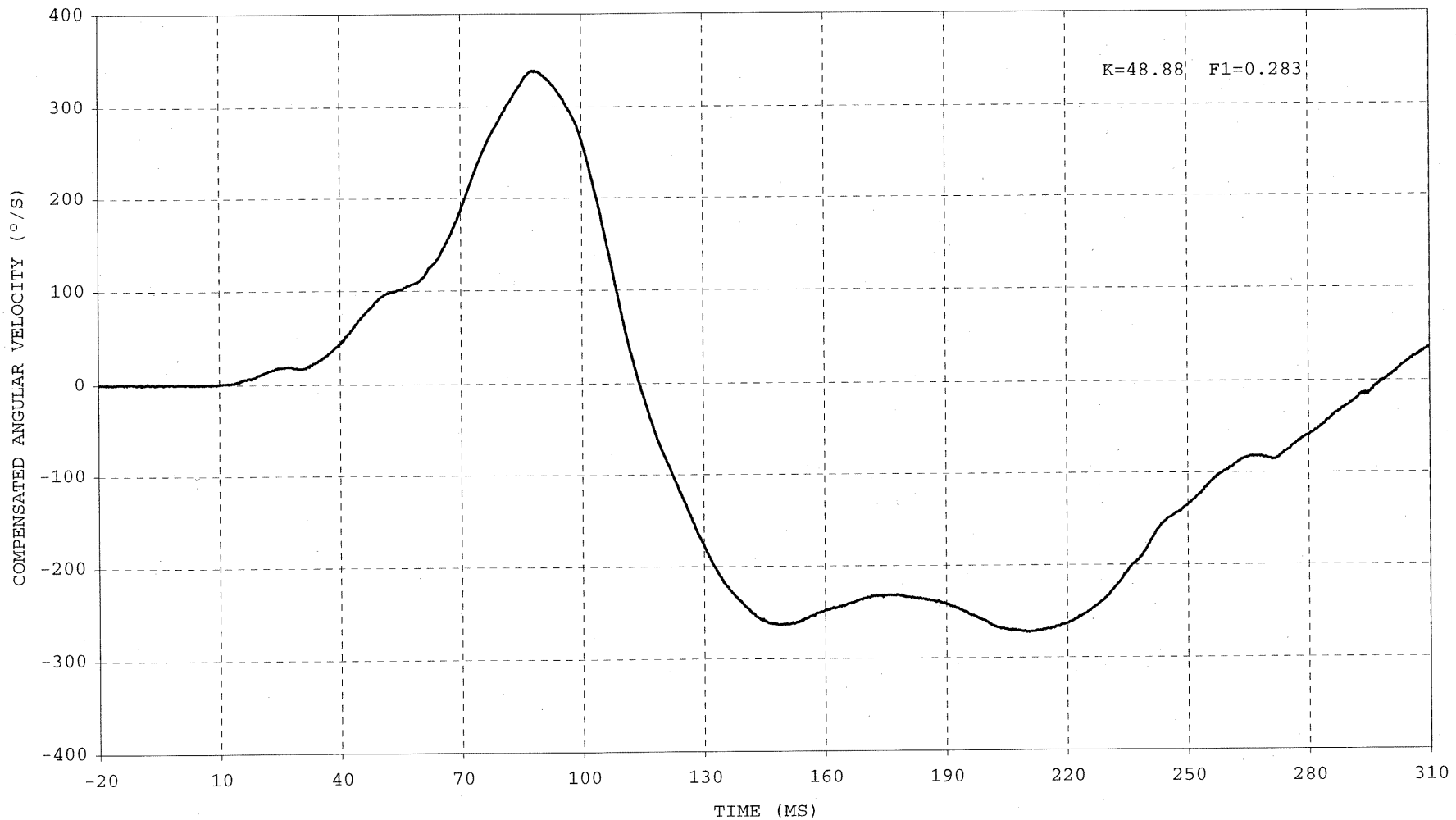
PEAK DATA: 324.72 °/S @ 87.84 MS; -275.15 °/S @ 148.32 MS

B-36

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER CHEST Y-AXIS ANGULAR VELOCITY - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYV1

B-37

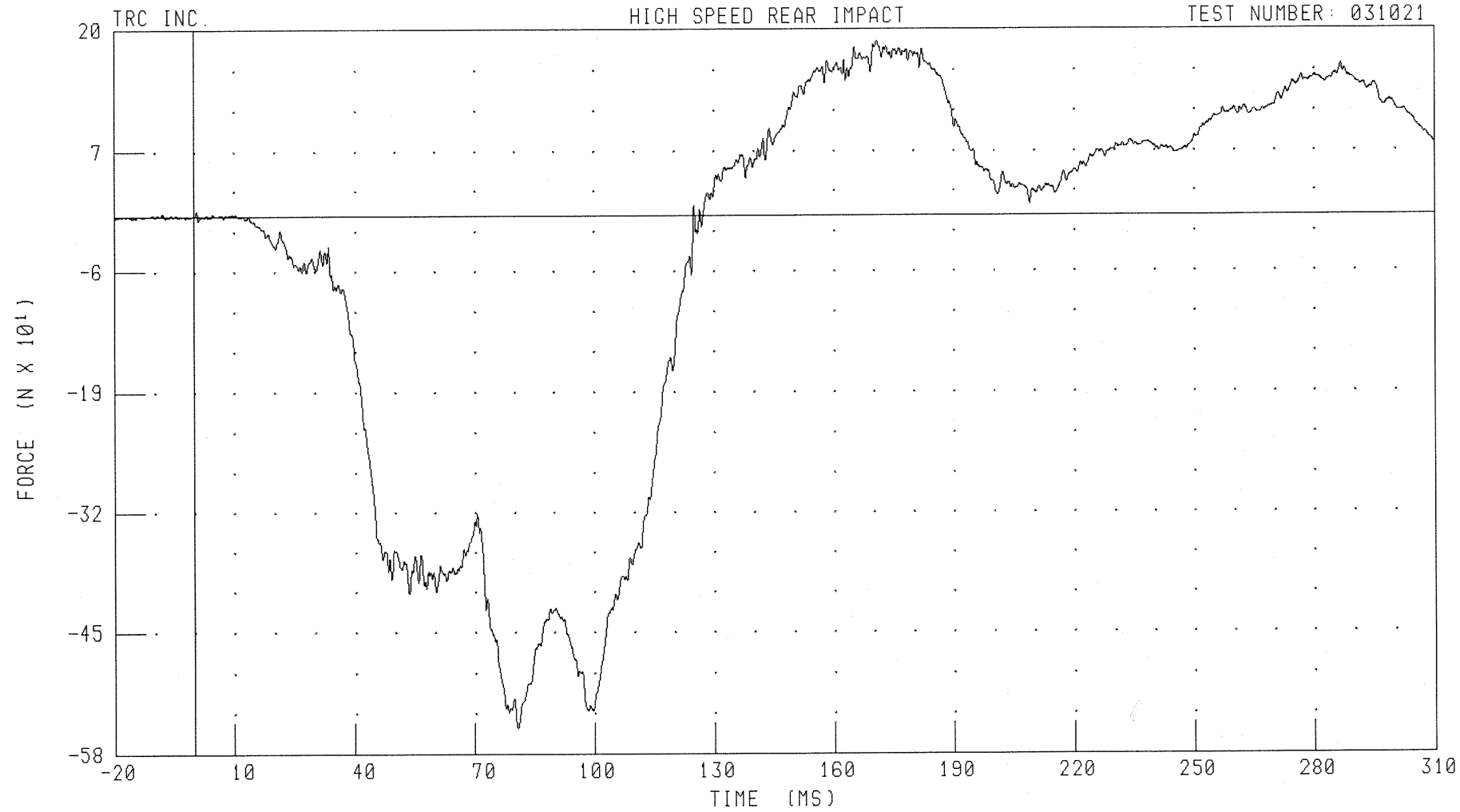
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LEFT FEMUR Z-AXIS FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFMZF1 FILTER: CH. CLASS 600

PEAK DATA: 187.58 N @ 171.04 MS; -553.11 N @ 80.80 MS

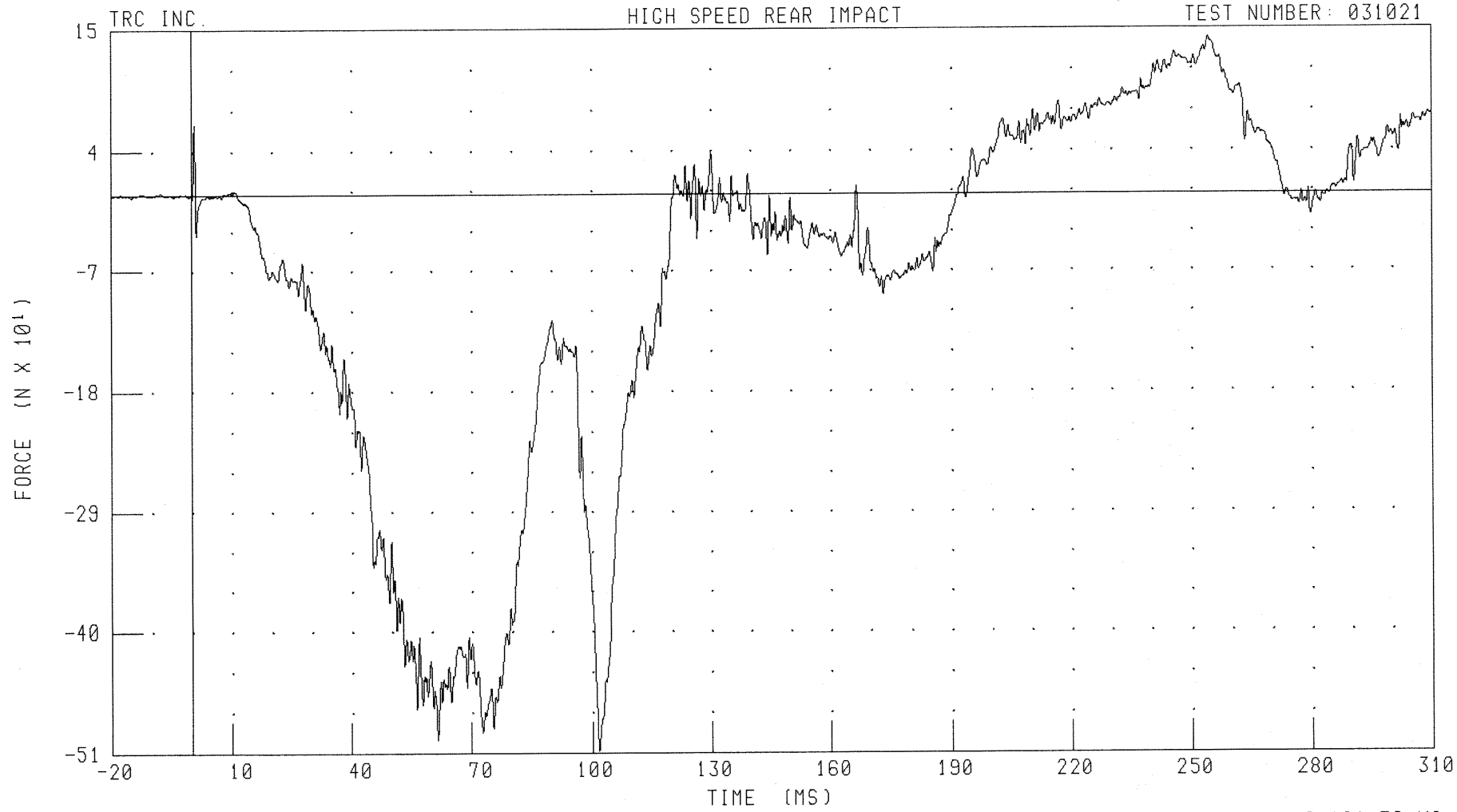
B-38

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER RIGHT FEMUR Z-AXIS FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RFMZFI FILTER: CH. CLASS 600

PEAK DATA: 141.83 N @ 254.24 MS; -507.94 N @ 101.76 MS

B-39

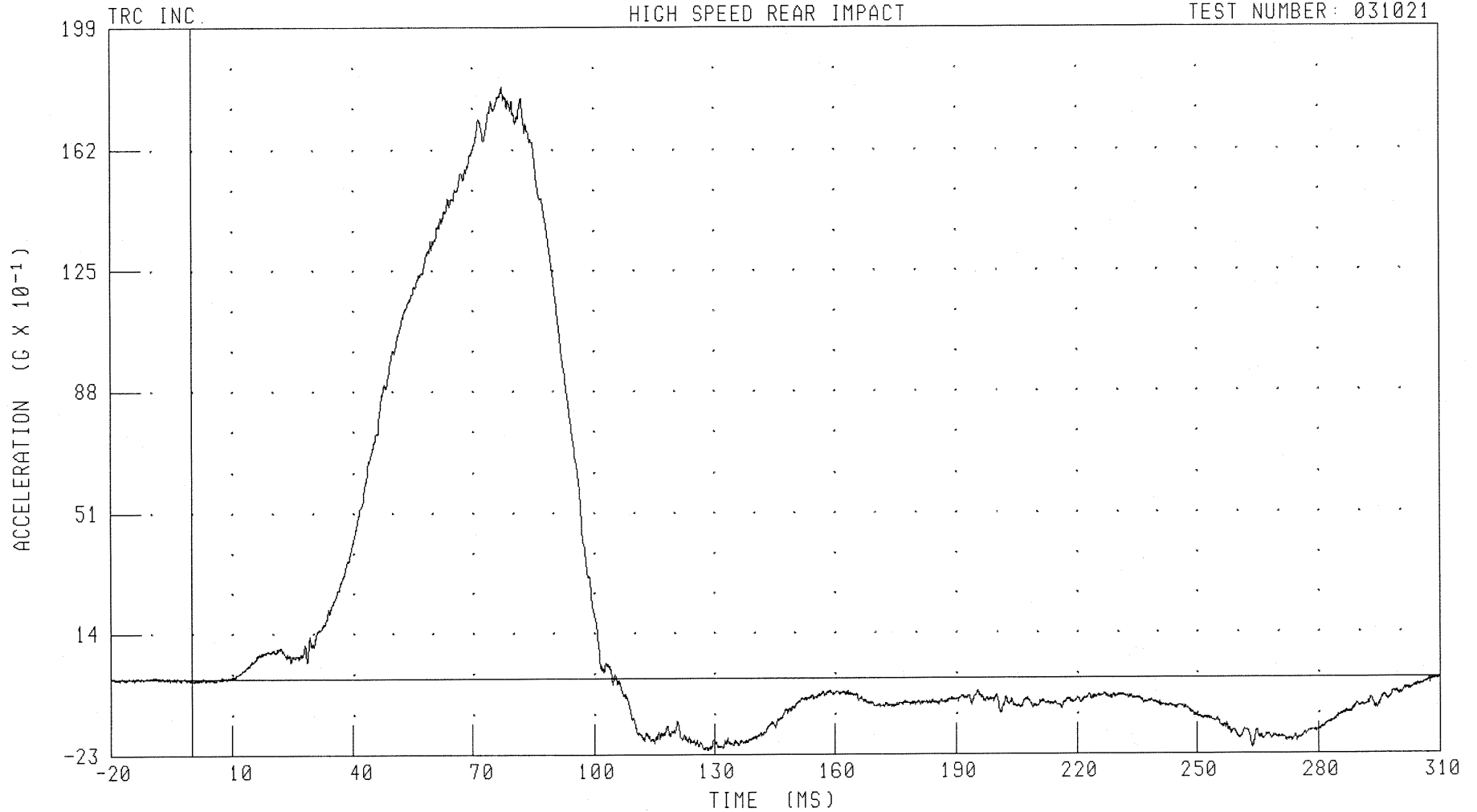
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER PELVIS X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVXG1 FILTER: CH. CLASS 1000

PEAK DATA: 18.10 G @ 77.44 MS; -2.17 G @ 128.40 MS

B-40

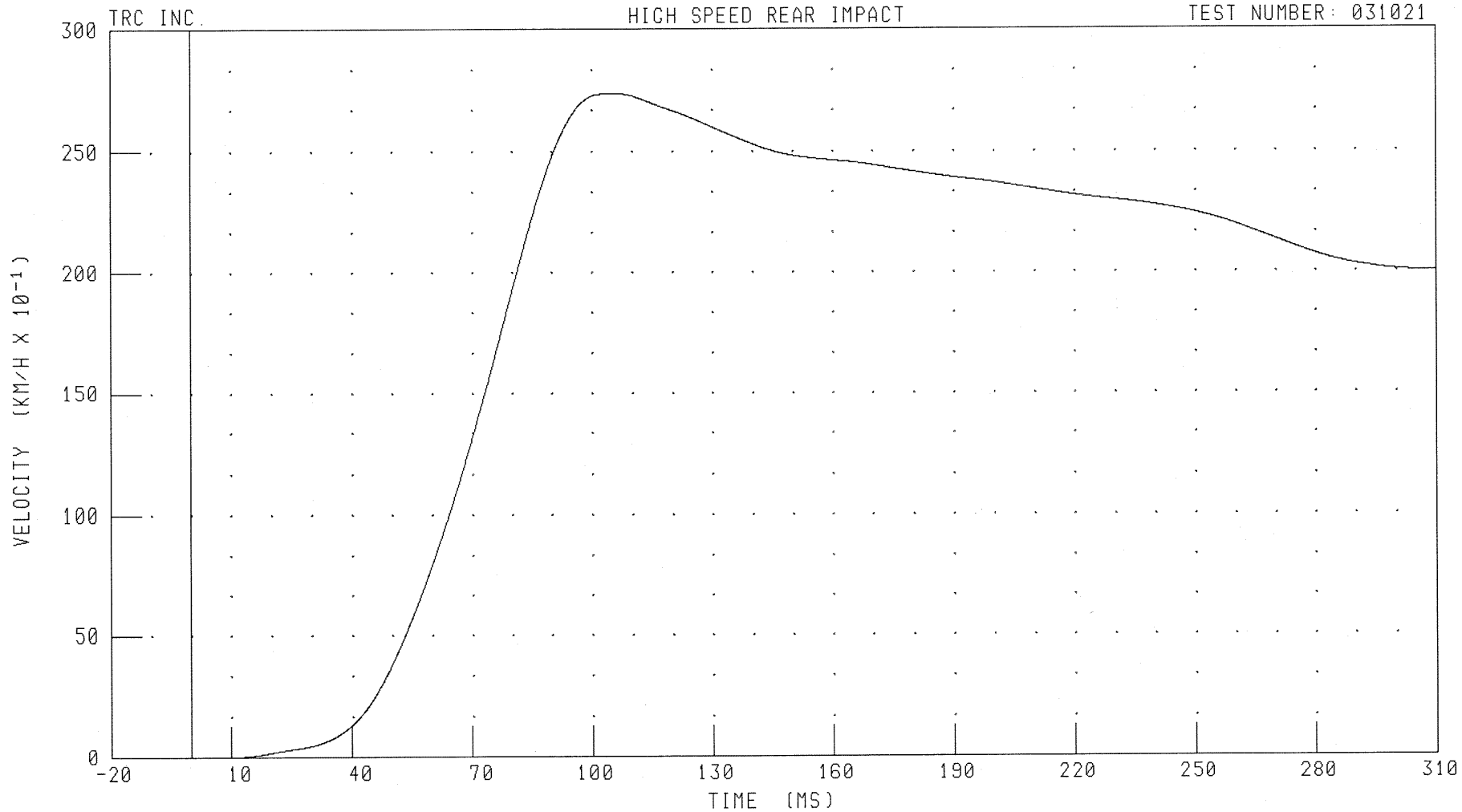
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER PELVIS X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVXV1 FILTER: CH. CLASS 180

PEAK DATA: 27.35 KM/H @ 105.20 MS; 0.00 KM/H @ 6.64 MS

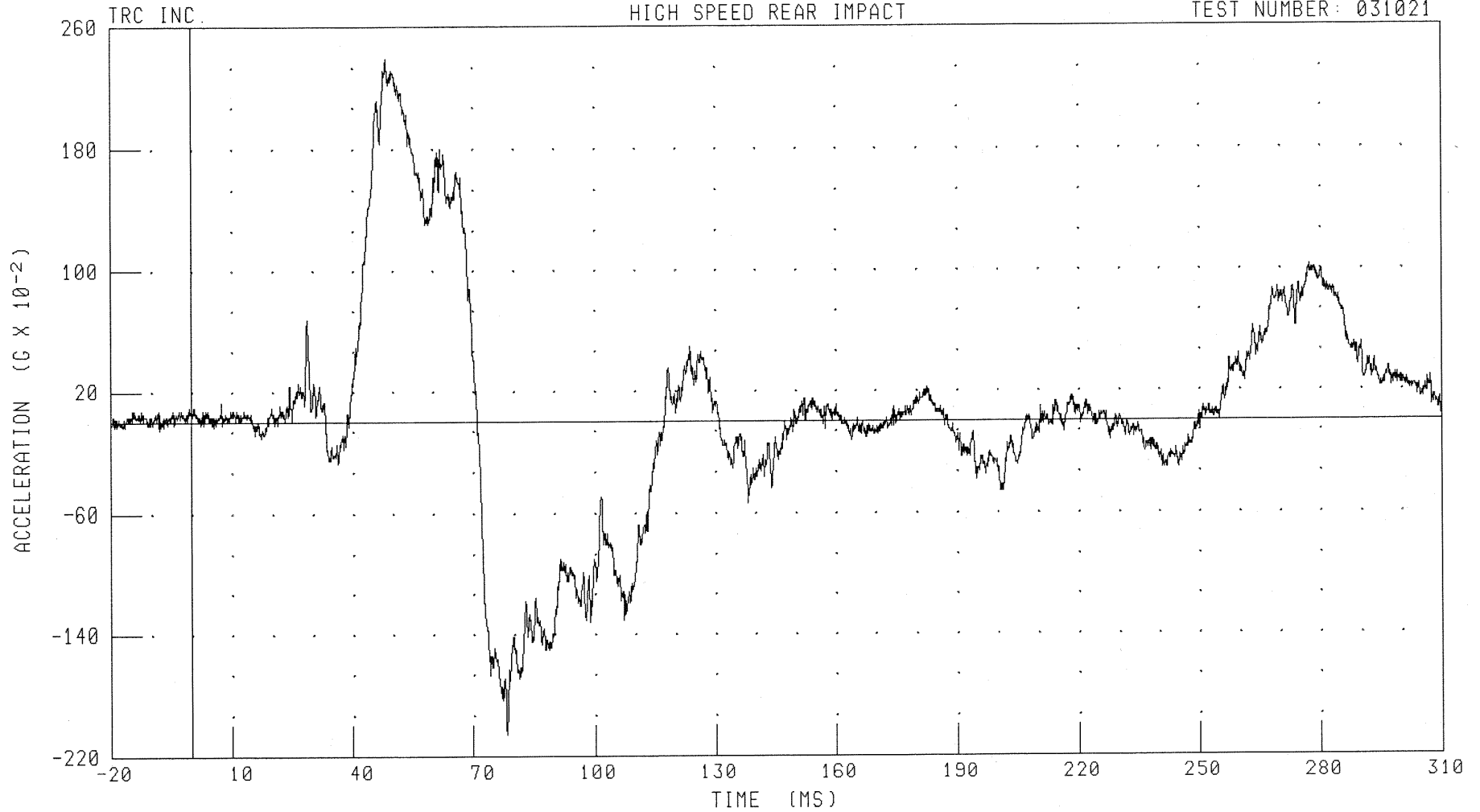
B-41

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER PELVIS Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVYG1

FILTER: CH. CLASS 1000

PEAK DATA: 2.39 G @ 48.48 MS; -2.06 G @ 78.16 MS

B-42

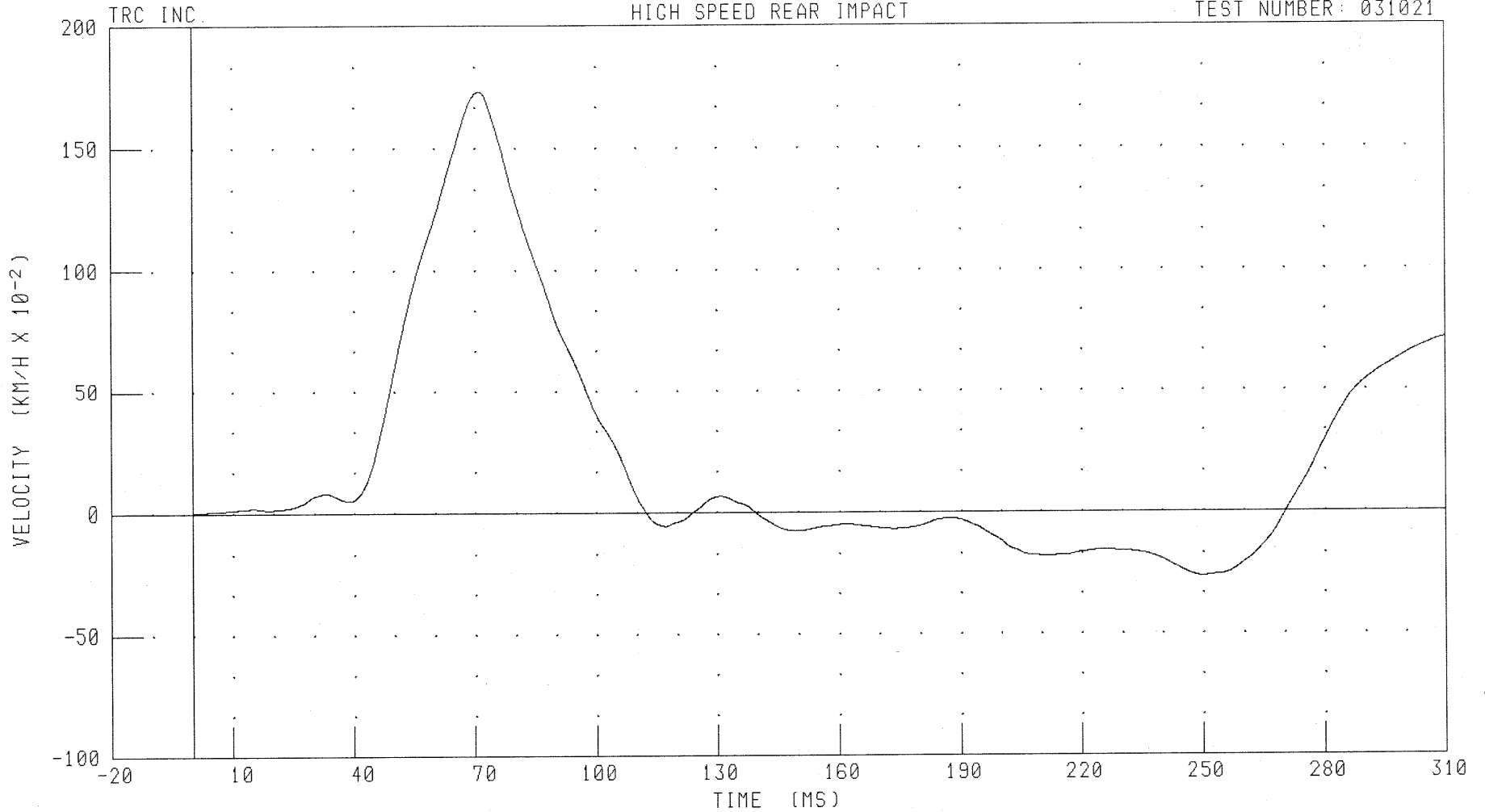
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER PELVIS Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVYV1

FILTER: CH. CLASS 180

PEAK DATA: 1.73 KM/H @ 71.20 MS; -0.26 KM/H @ 250.00 MS

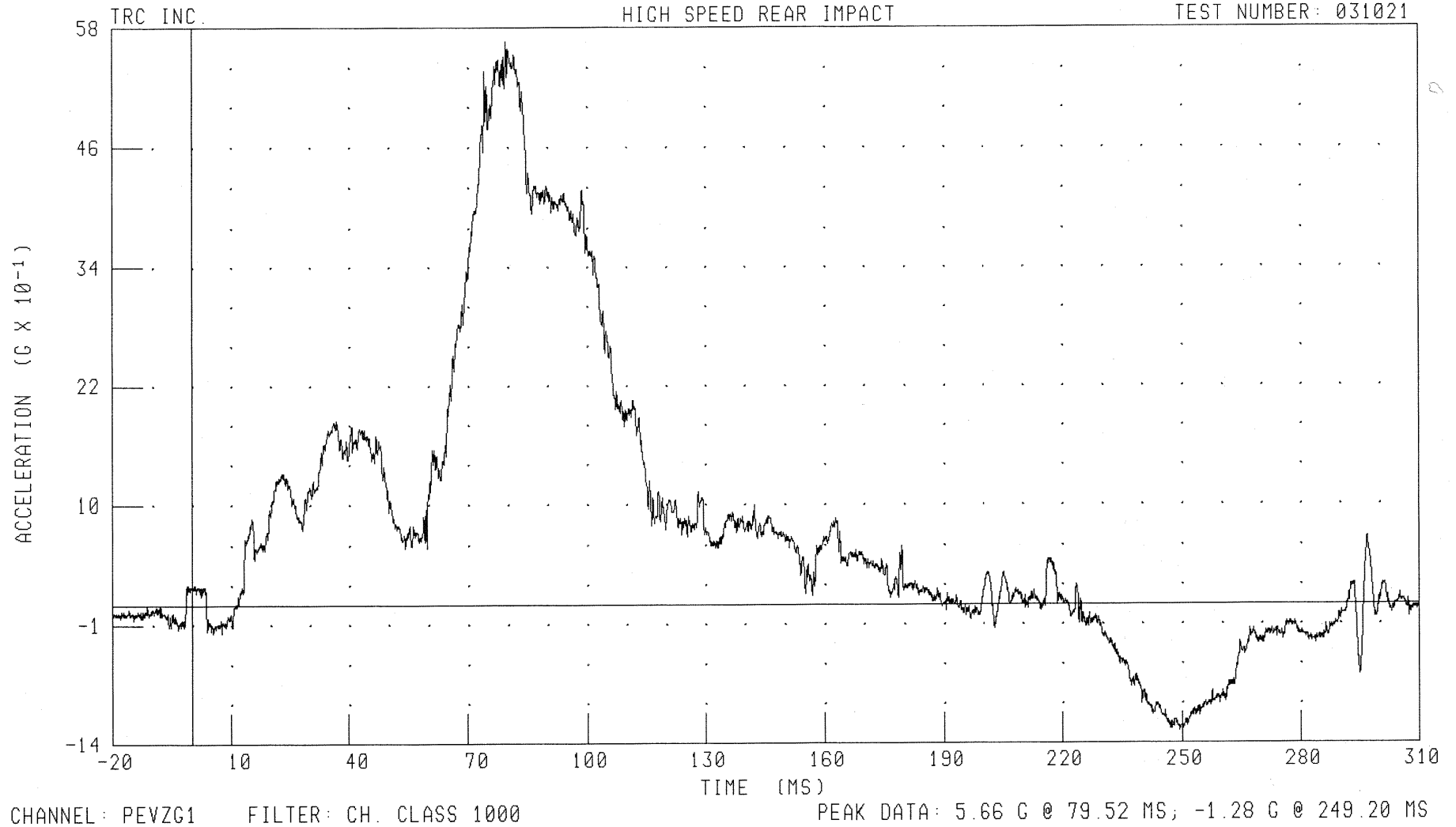
B-43

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER PELVIS Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-44

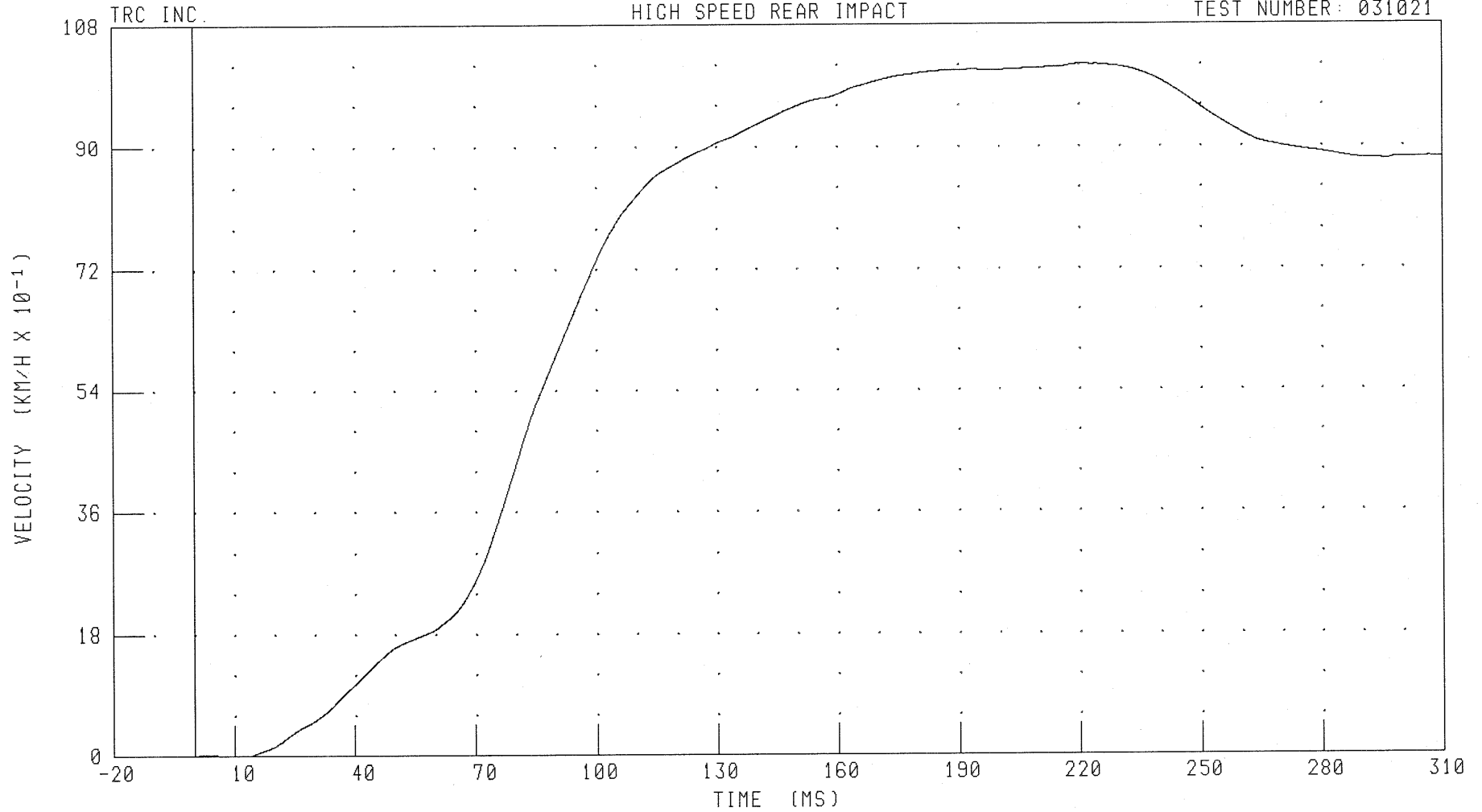
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER PELVIS Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVZV1

FILTER: CH. CLASS 180

PEAK DATA: 10.20 KM/H @ 221.12 MS; -0.03 KM/H @ 11.44 MS

B-45

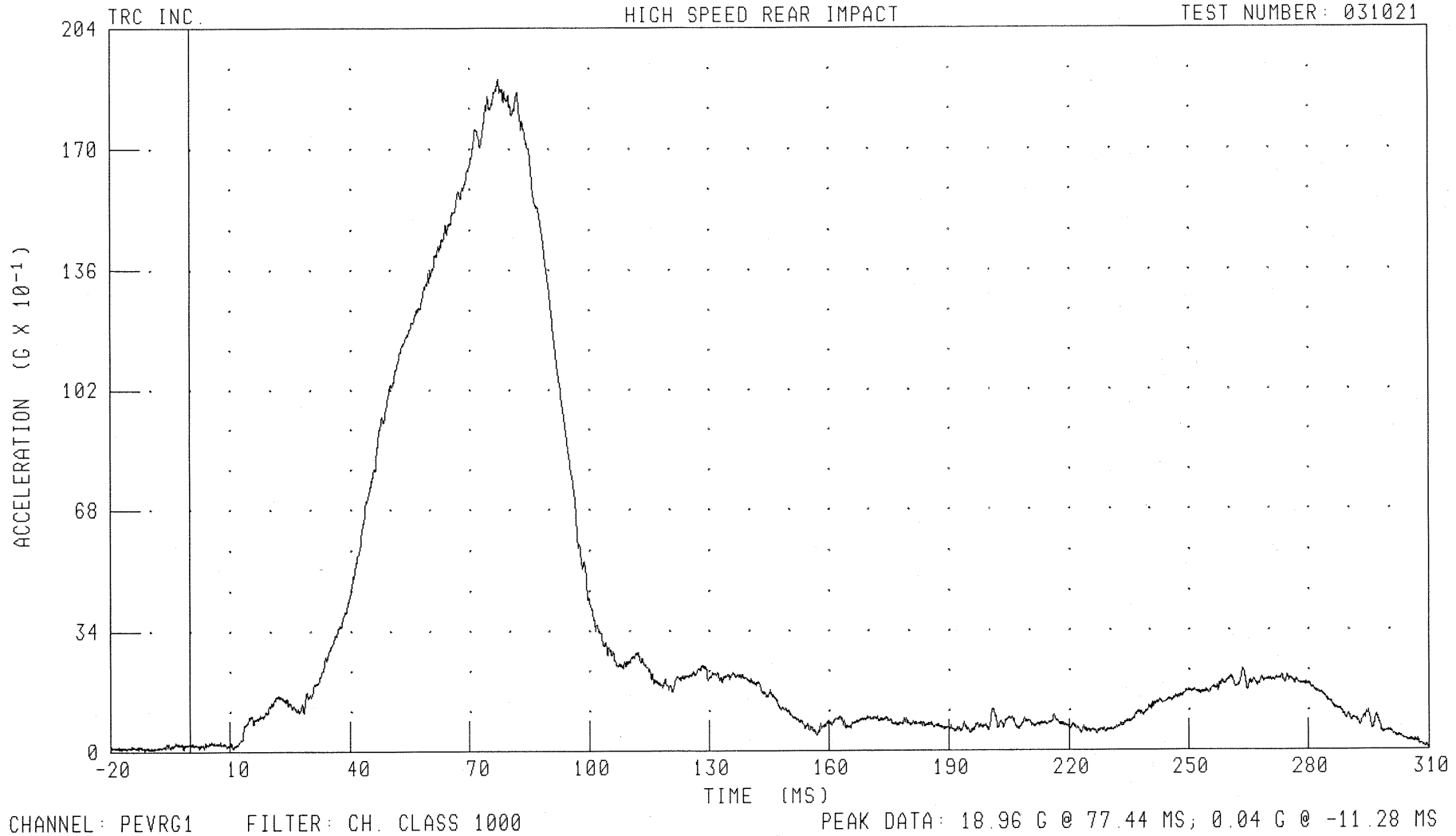
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER PELVIS RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



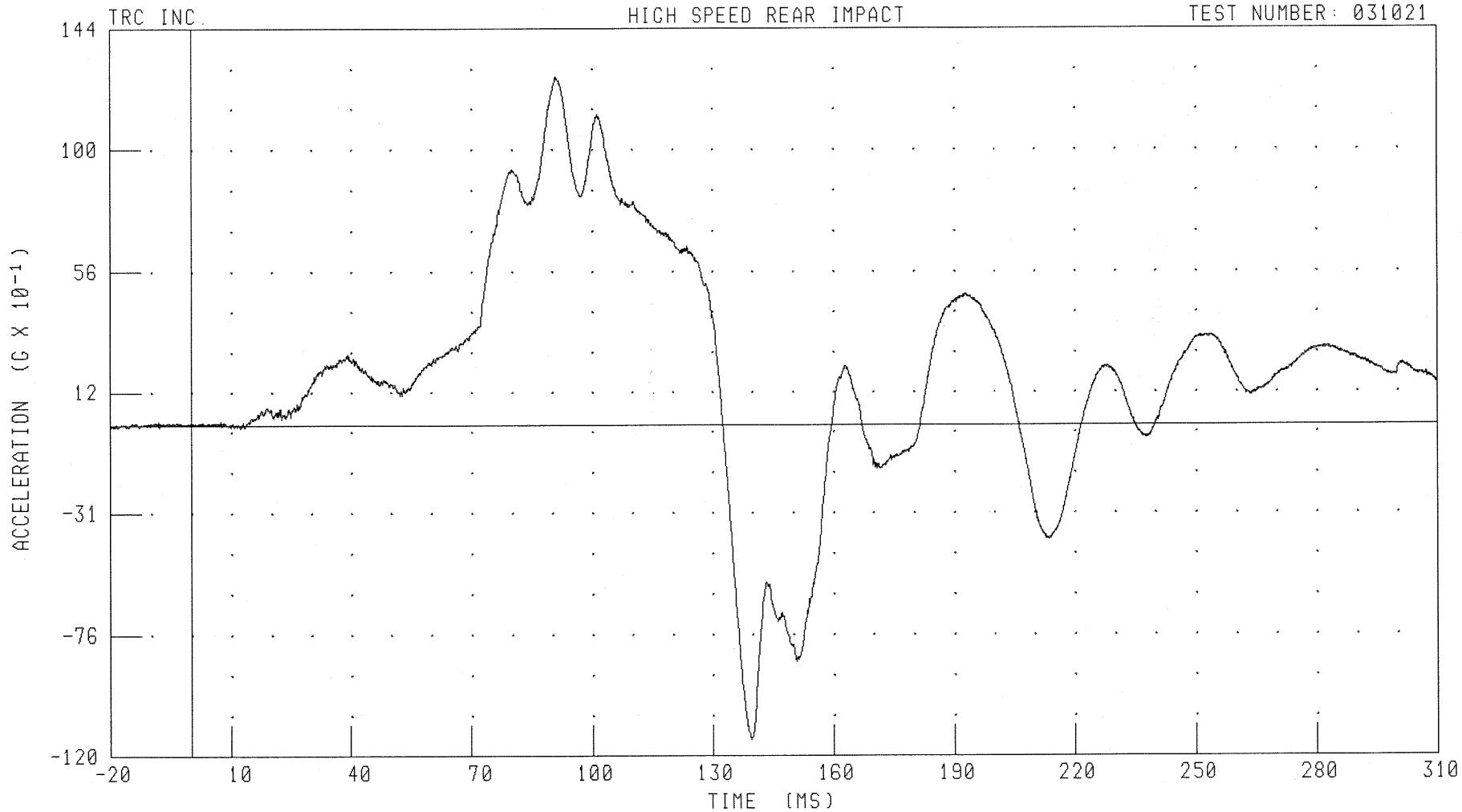
B-46

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDXG3 FILTER: CH. CLASS 1000

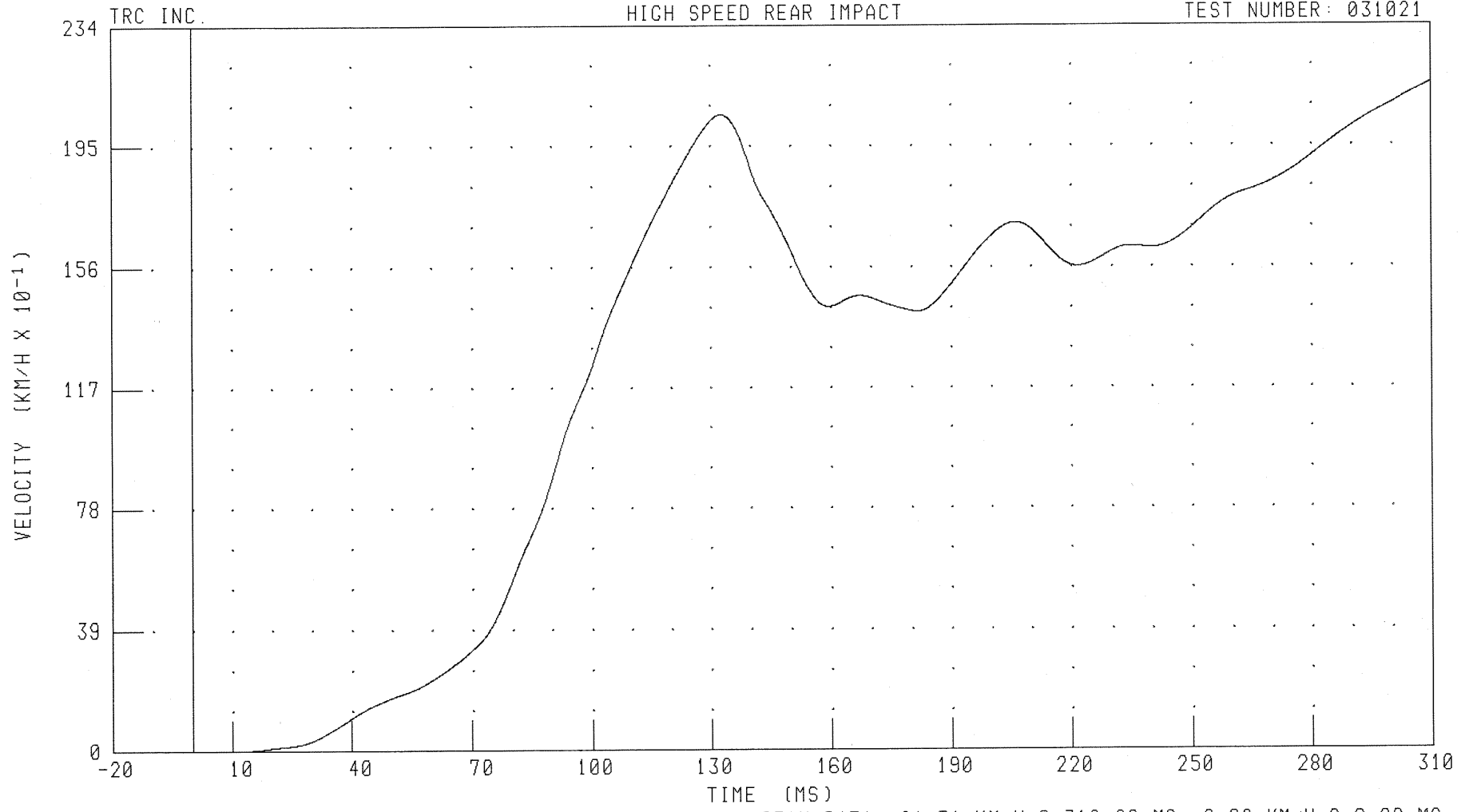
PEAK DATA: 12.66 G @ 91.04 MS; -11.40 G @ 139.68 MS

B-47

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD X-AXIS VELOCITY

TEST NUMBER: 031021



CHANNEL: HEDXV3

FILTER: CH. CLASS 180

PEAK DATA: 21.51 KM/H @ 310.00 MS; 0.00 KM/H @ 0.00 MS

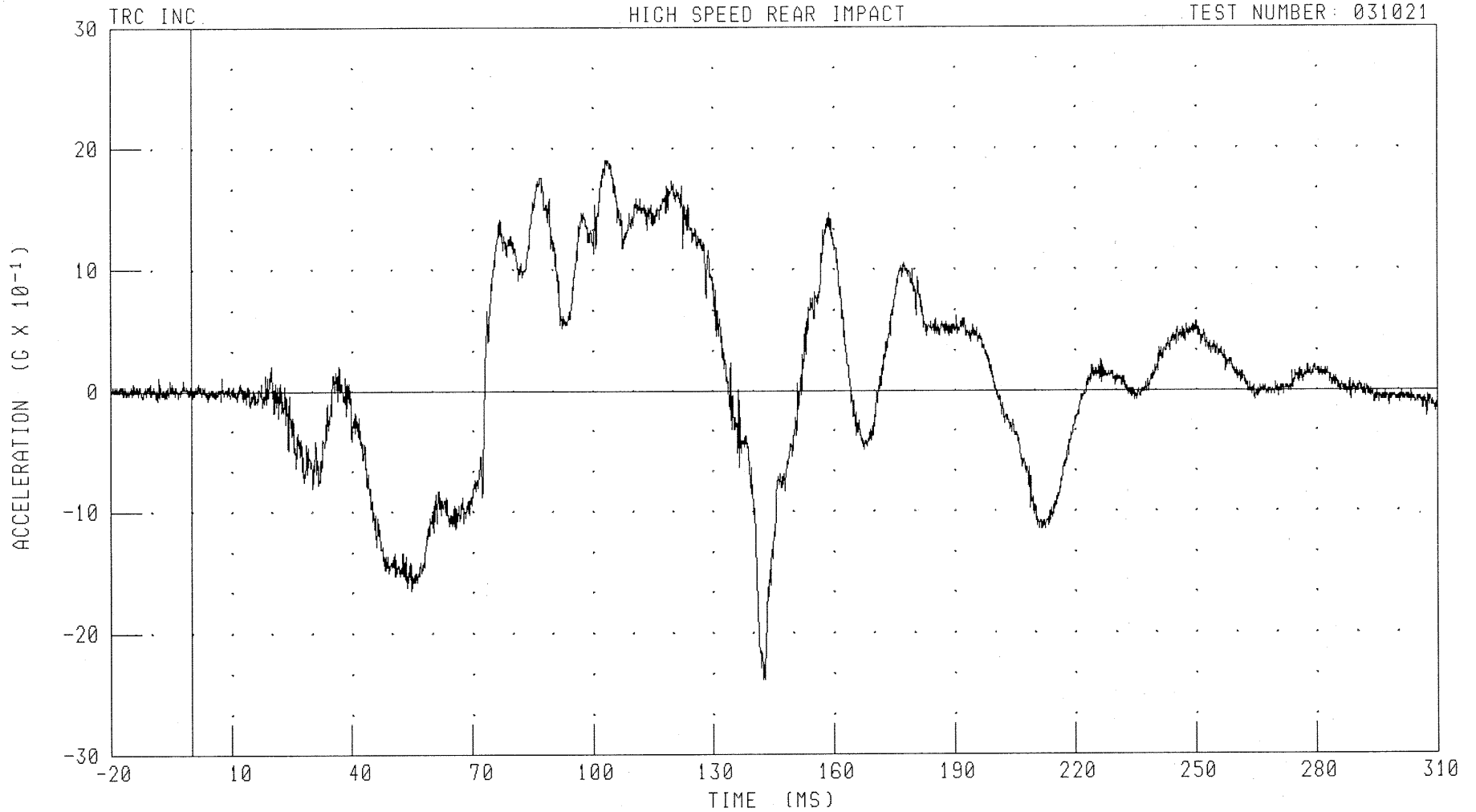
B-48

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYG3

FILTER: CH. CLASS 1000

PEAK DATA: 1.90 G @ 103.28 MS; -2.38 G @ 142.48 MS

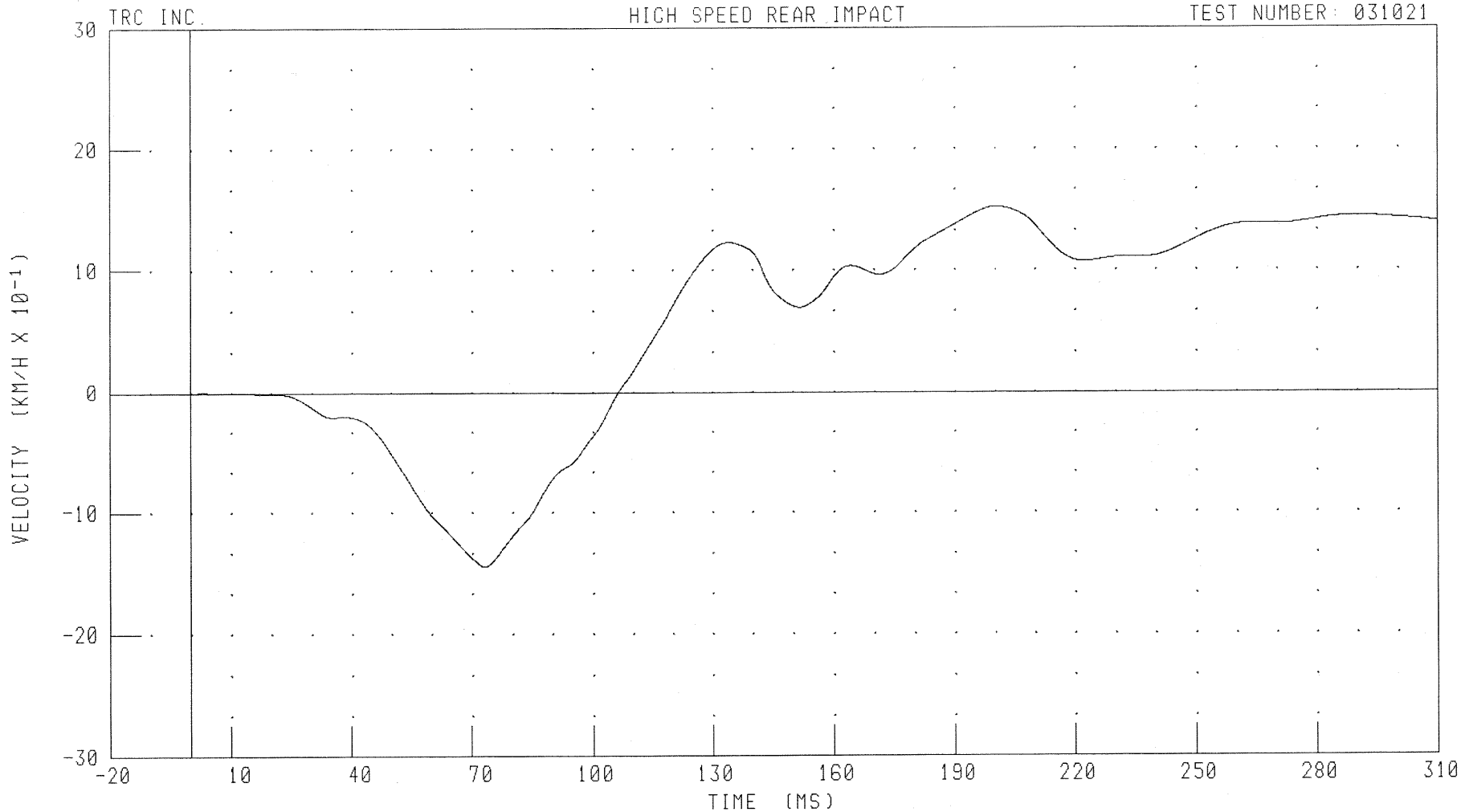
B-49

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYV3

FILTER: CH. CLASS 180

PEAK DATA: 1.52 KM/H @ 200.40 MS; -1.45 KM/H @ 73.20 MS

B-50

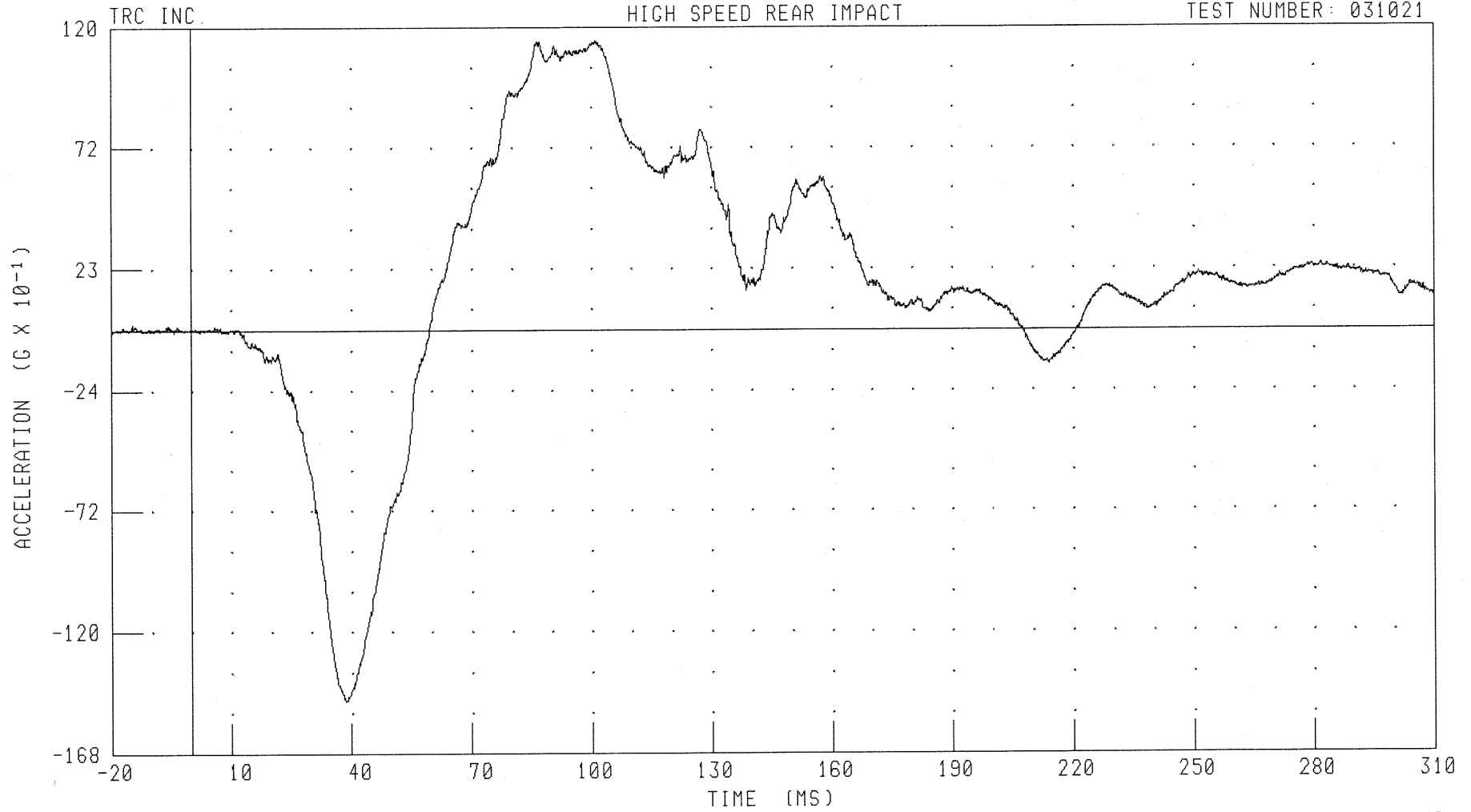
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER HEAD Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDZG3 FILTER: CH. CLASS 1000

PEAK DATA: 11.48 G @ 101.12 MS; -14.72 G @ 38.64 MS

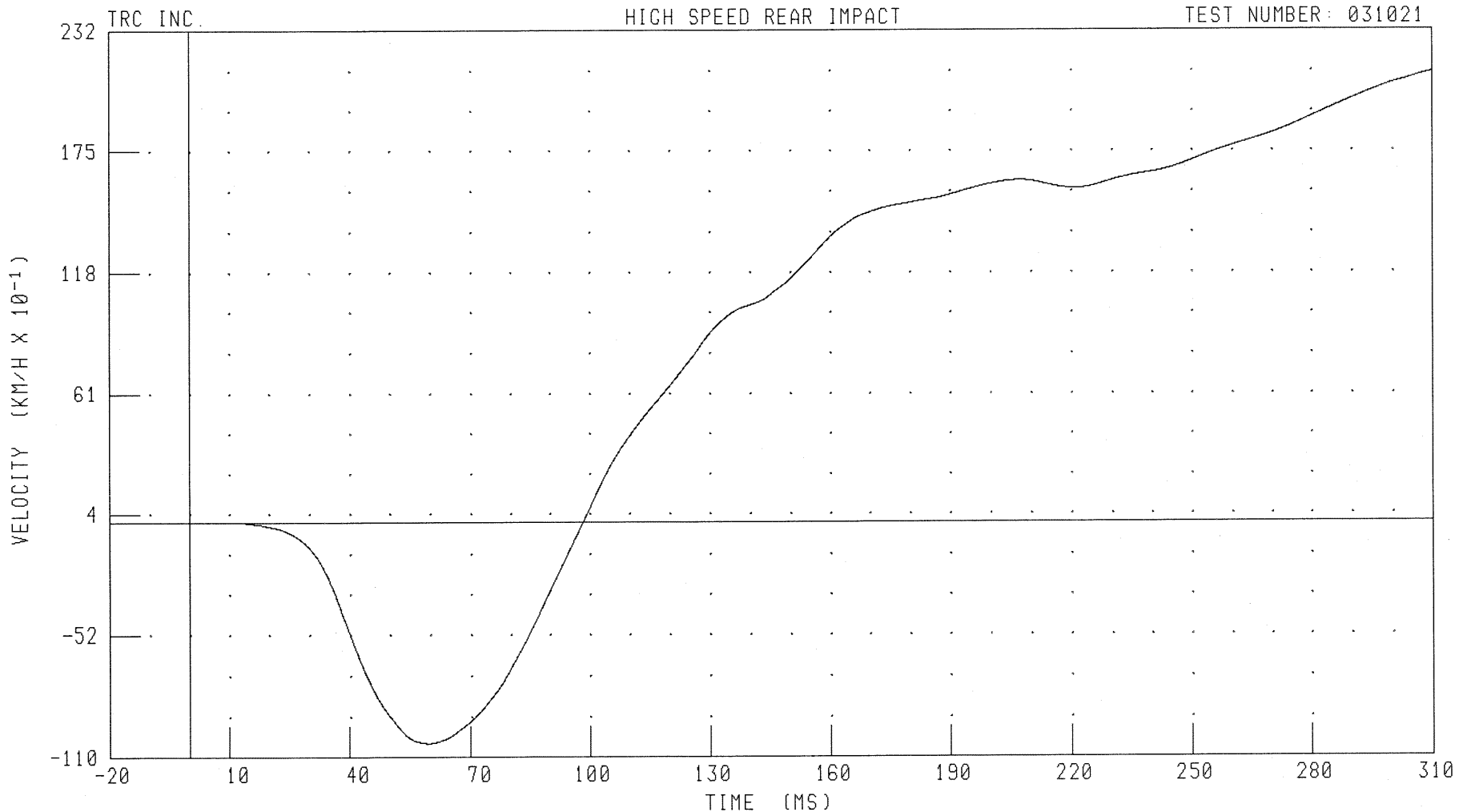
B-51

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDZV3

FILTER: CH. CLASS 100

TIME (MS)

PEAK DATA: 21.24 KM/H @ 310.00 MS; -10.36 KM/H @ 59.60 MS

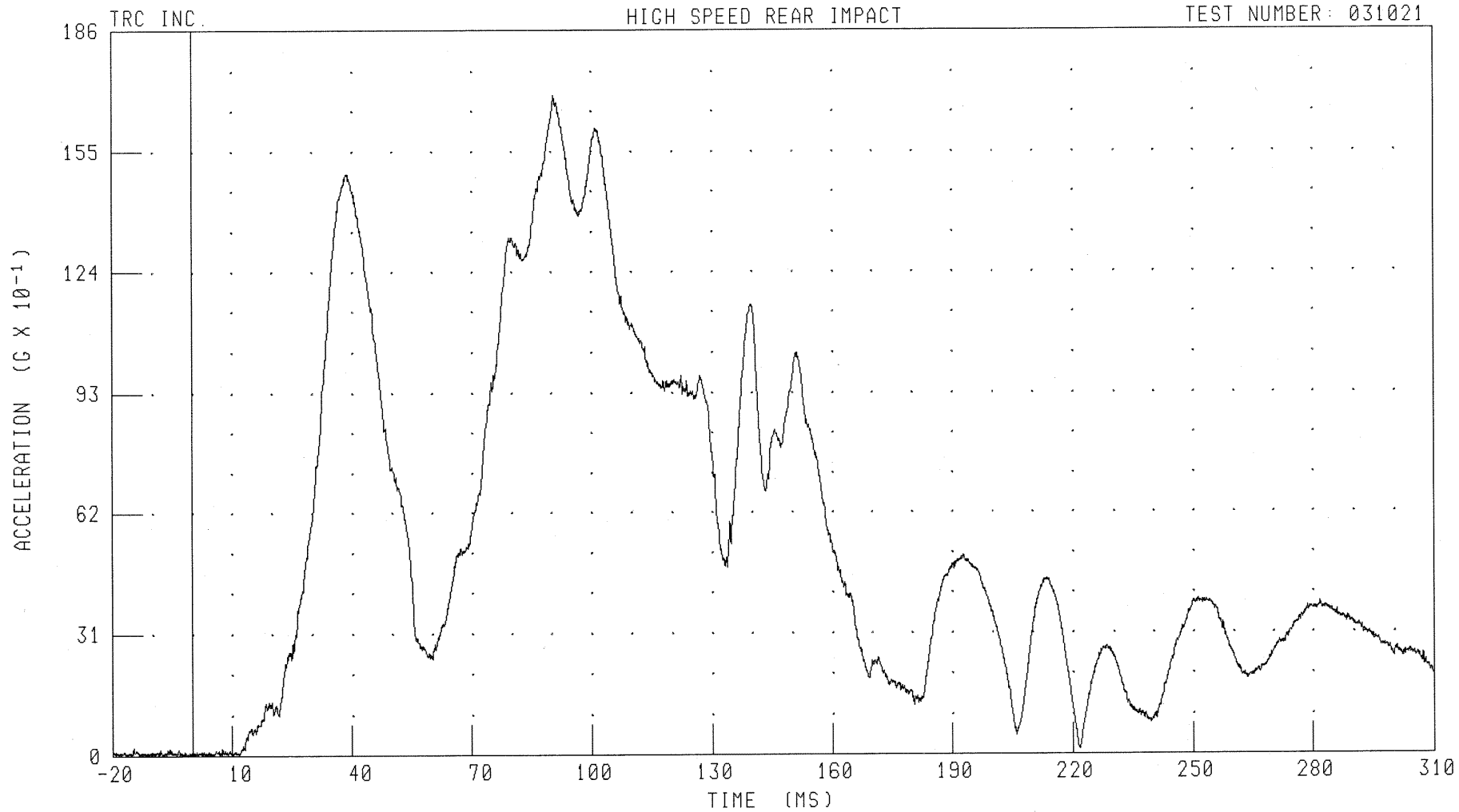
B-52

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDRG3 FILTER: CH. CLASS 1000

PEAK DATA: 16.96 G @ 90.80 MS; 0.02 G @ -10.48 MS

B-53

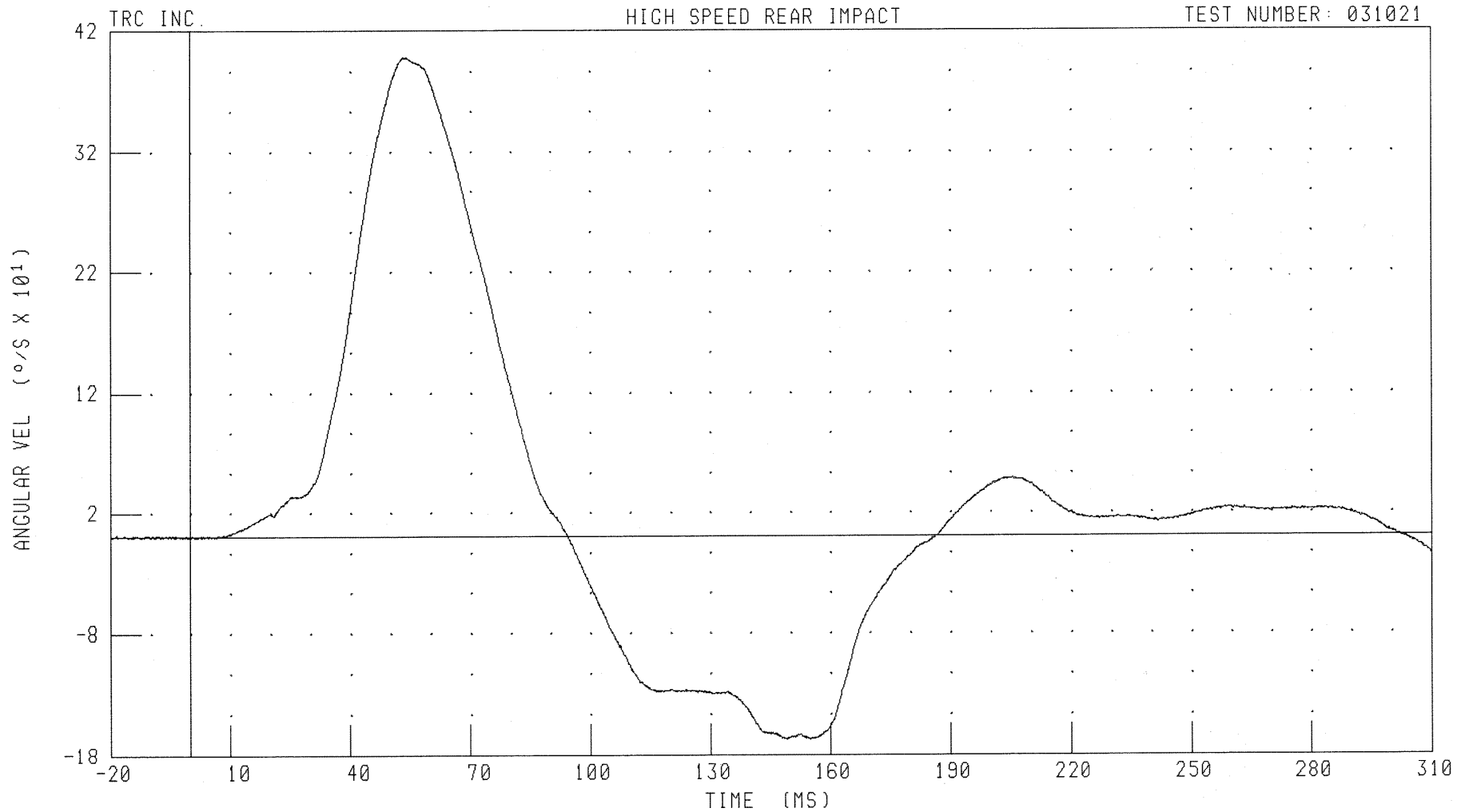
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER HEAD Y-AXIS ANGULAR VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: HEDYV3 FILTER: CH. CLASS 1000

TIME (MS)

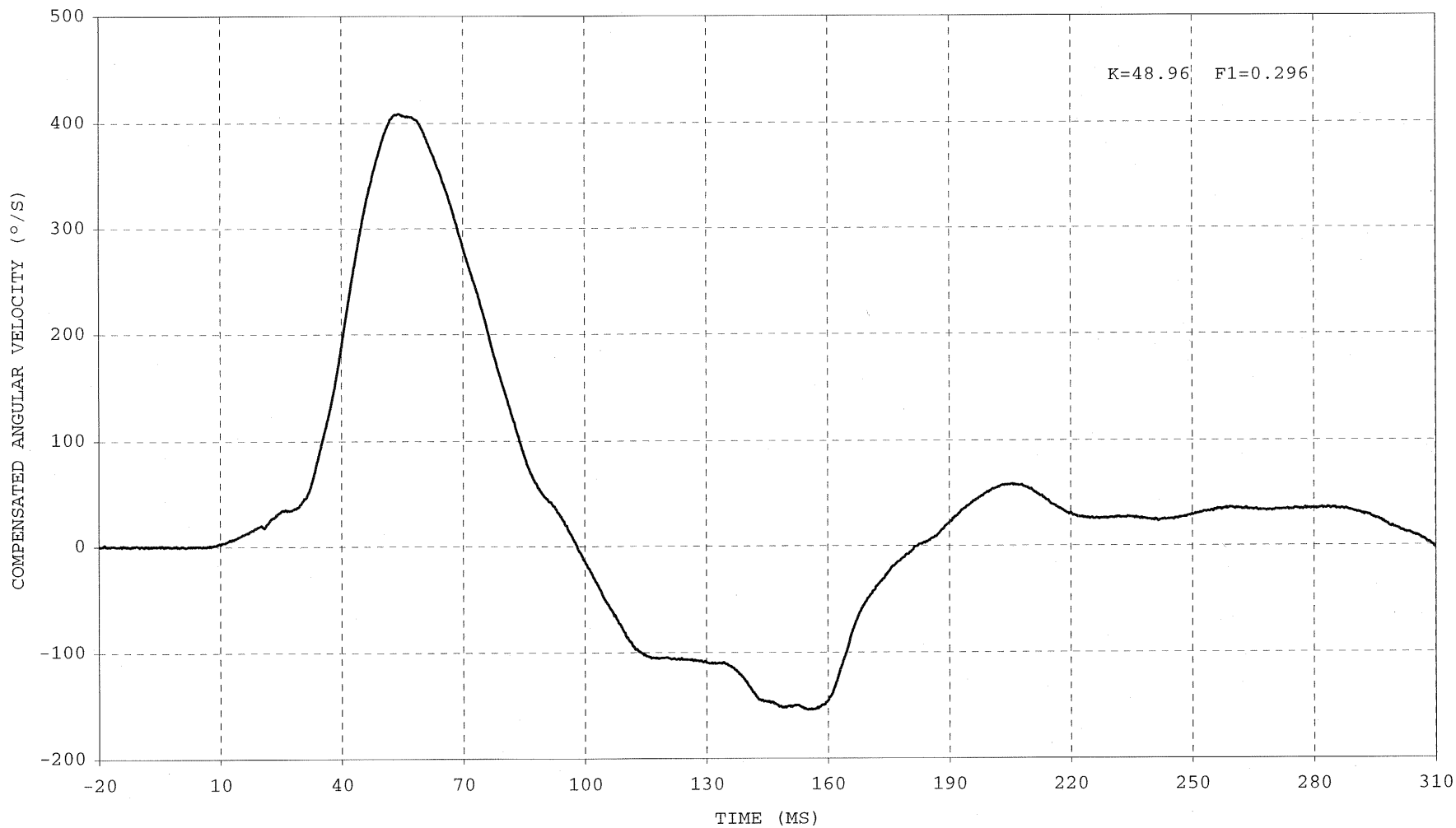
PEAK DATA: 398.08 °/S @ 54.00 MS; -166.98 °/S @ 149.04 MS

B-54

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER HEAD Y-AXIS ANGULAR VELOCITY - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



K=48.96 F1=0.296

CHANNEL: HEDYV3

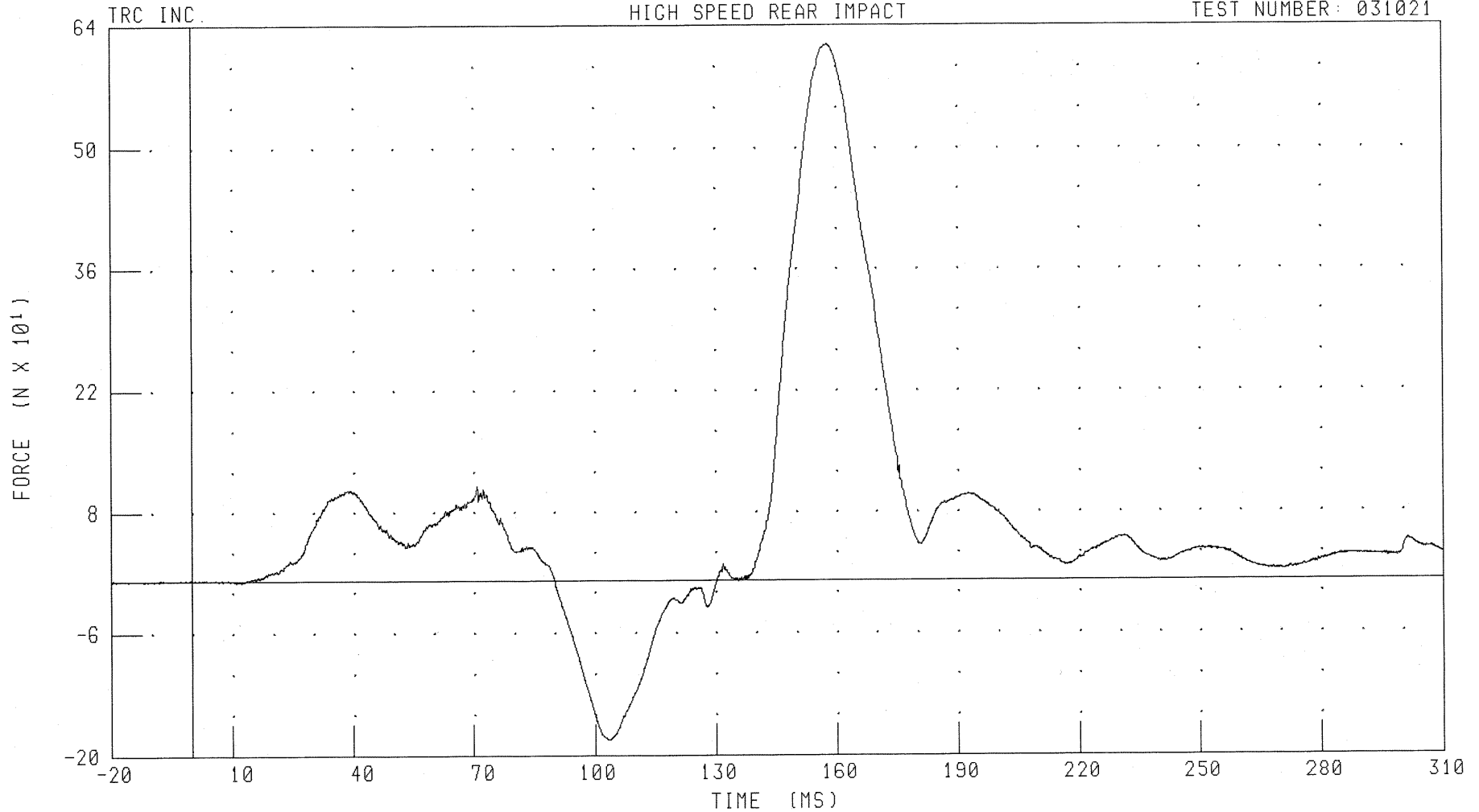
B-55

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK X-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKXF3 FILTER: CH. CLASS 1000

PEAK DATA: 618.48 N @ 158.08 MS; -182.35 N @ 103.60 MS

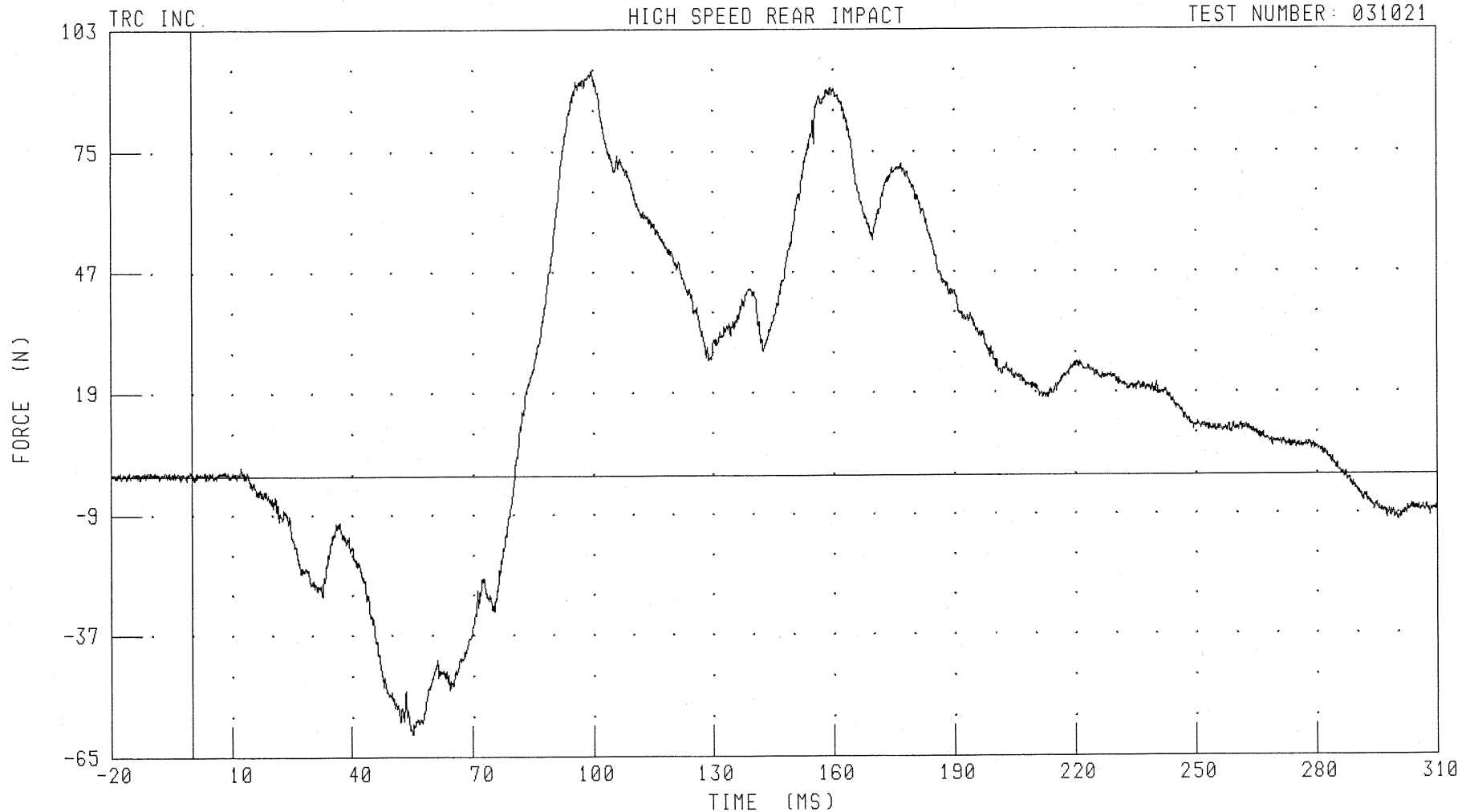
B-56

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK Y-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKYF3 FILTER: CH. CLASS 1000

PEAK DATA: 93.36 N @ 99.68 MS; -59.70 N @ 55.20 MS

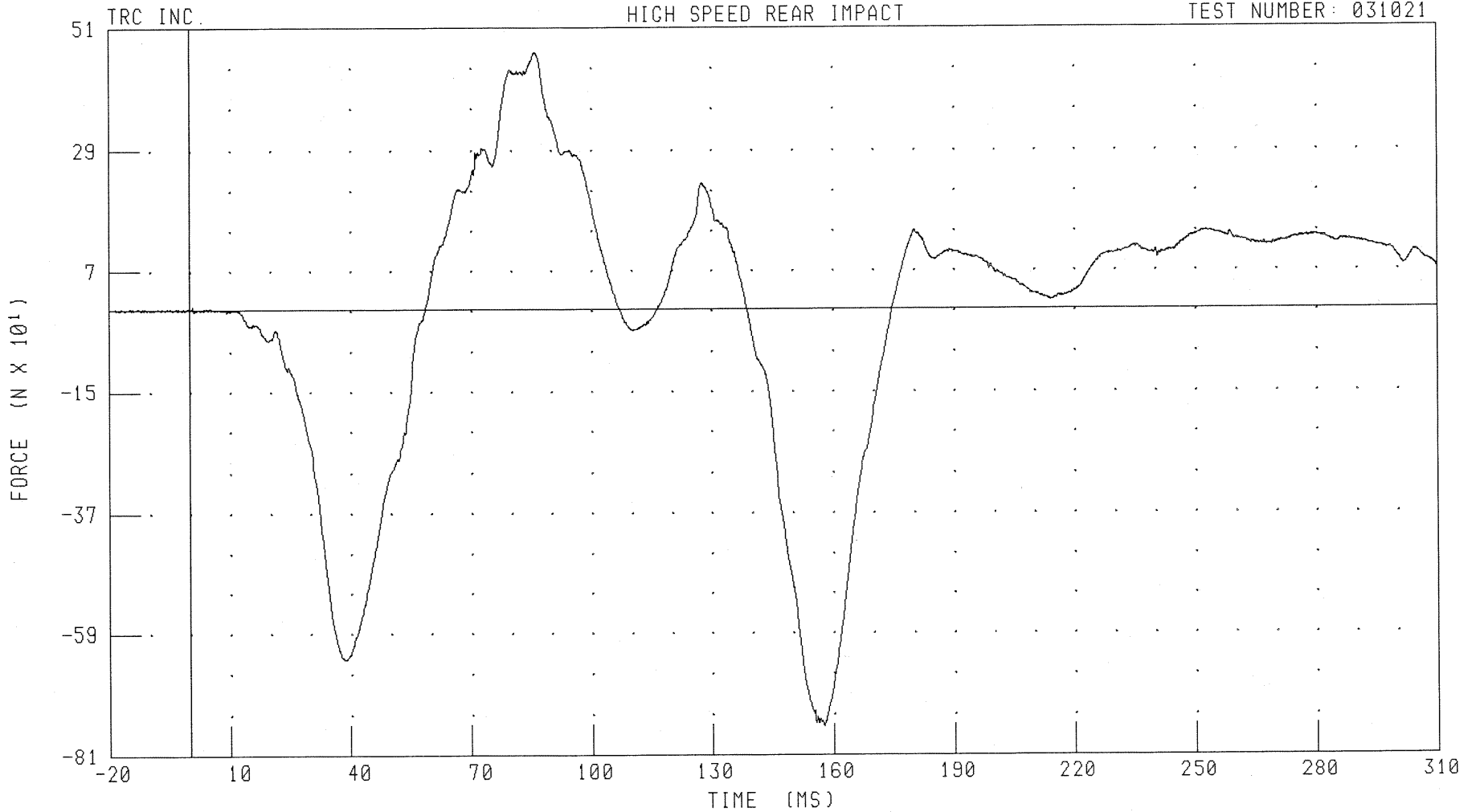
B-57

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK Z-AXIS AXIAL FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKZF3

FILTER: CH. CLASS 1000

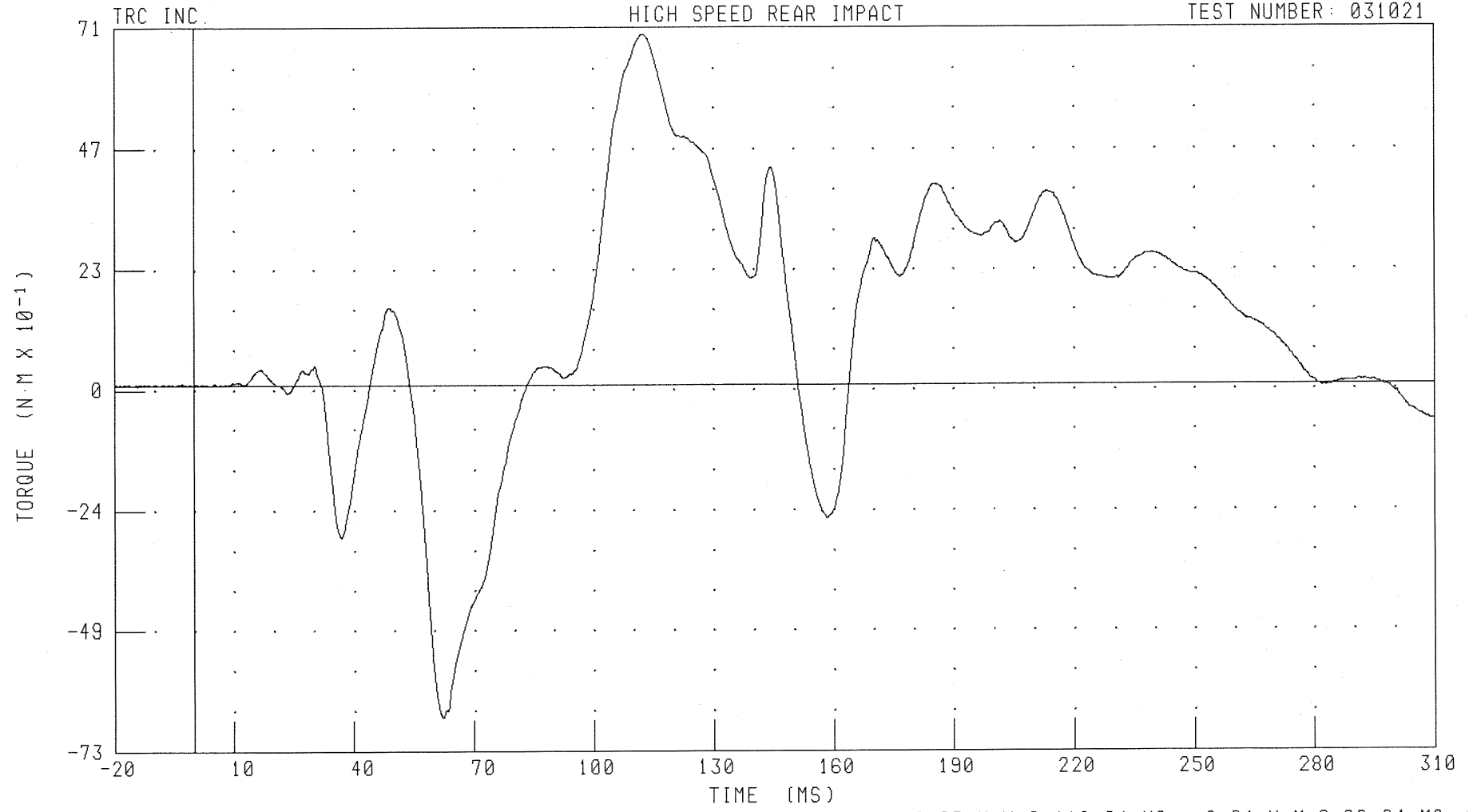
PEAK DATA: 466.38 N @ 85.84 MS; -757.75 N @ 157.68 MS

B-58

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 031021



CHANNEL: NEKXM3 FILTER: CH. CLASS 600

PEAK DATA: 6.97 N·M @ 112.64 MS; -6.64 N·M @ 62.24 MS

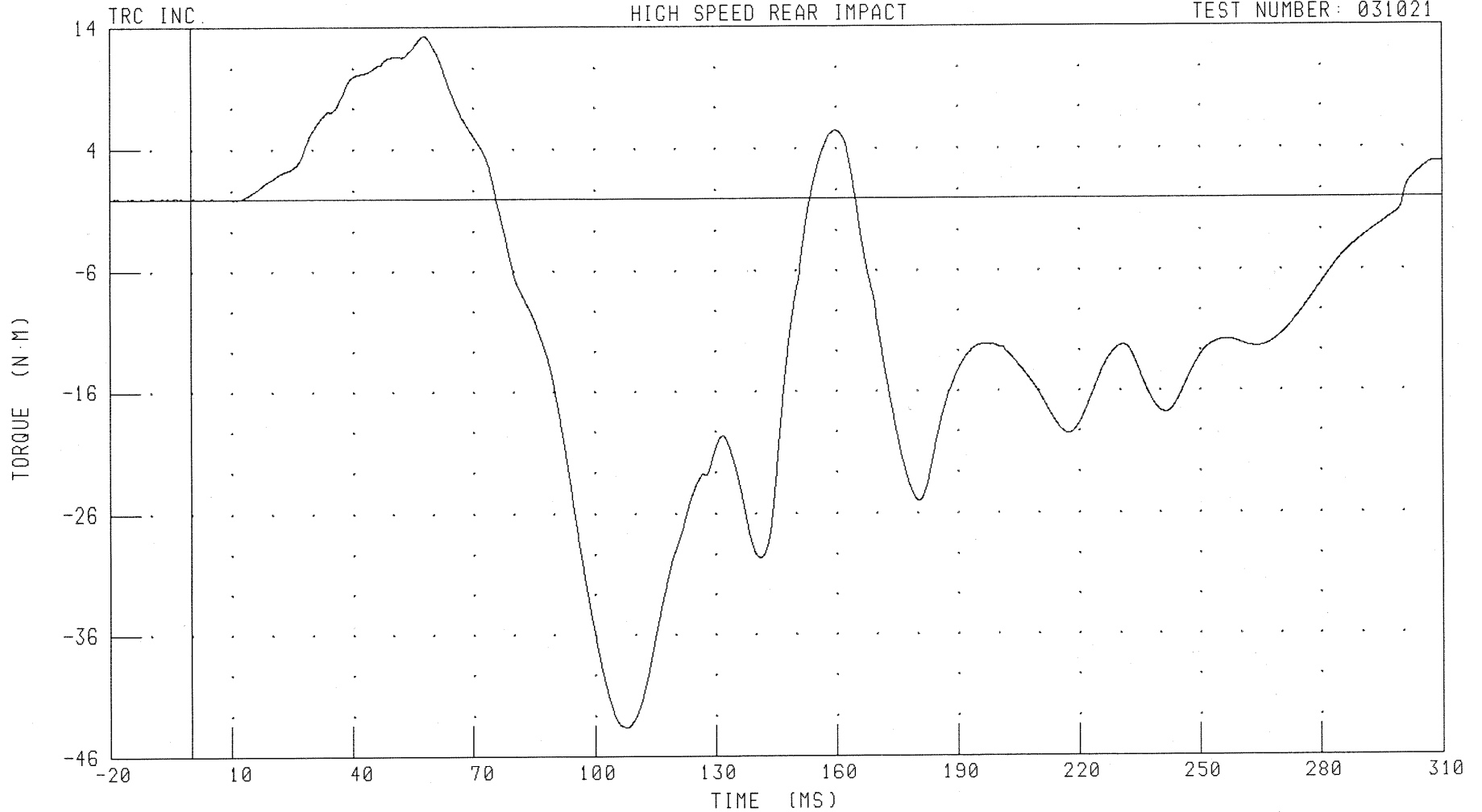
B-59

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK MOMENT ABOUT Y AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKYM3 FILTER: CH. CLASS 600

PEAK DATA: 13.29 N·M @ 58.08 MS; -43.64 N·M @ 107.84 MS

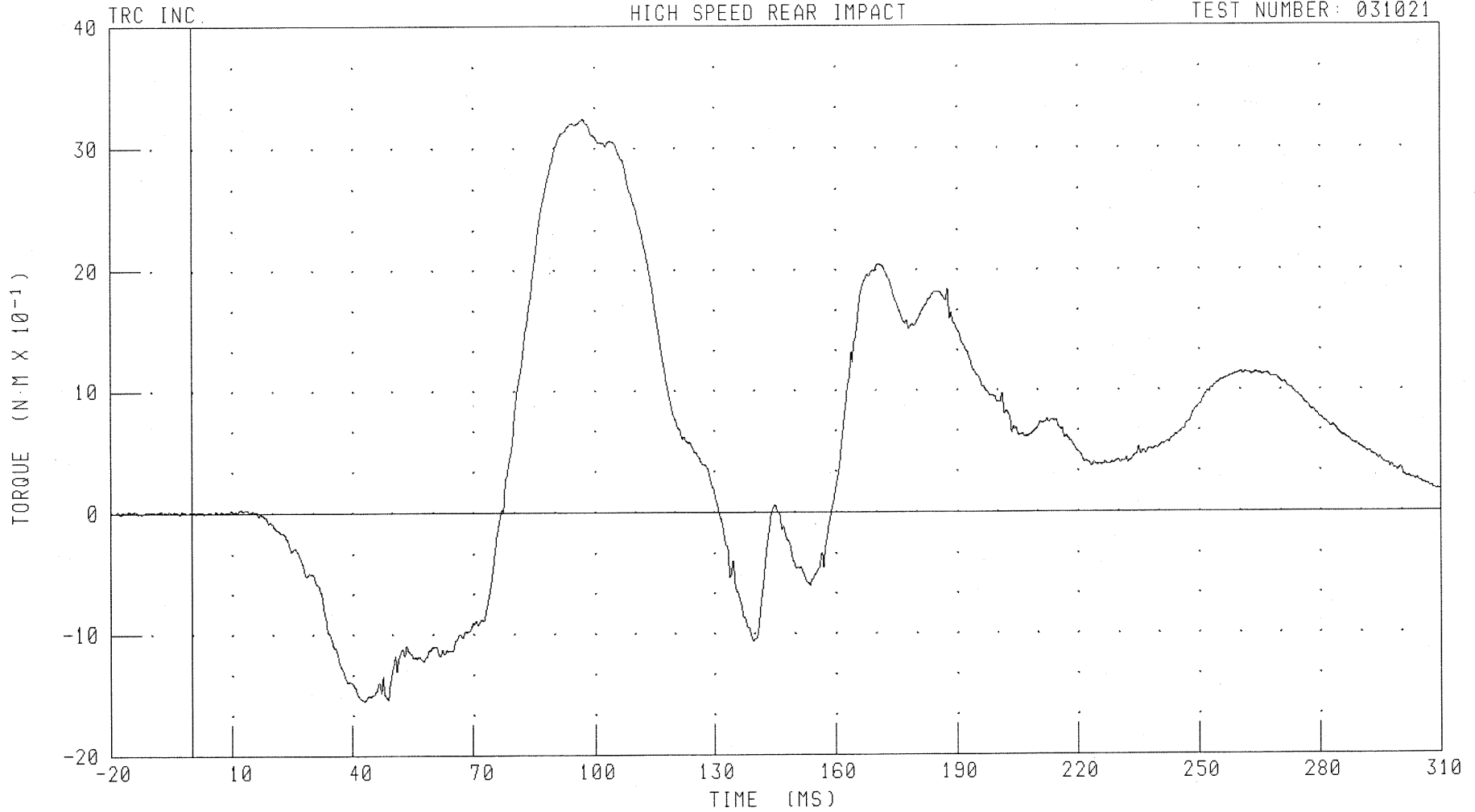
B-60

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER UPPER NECK MOMENT ABOUT Z AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKZM3 FILTER: CH. CLASS 600

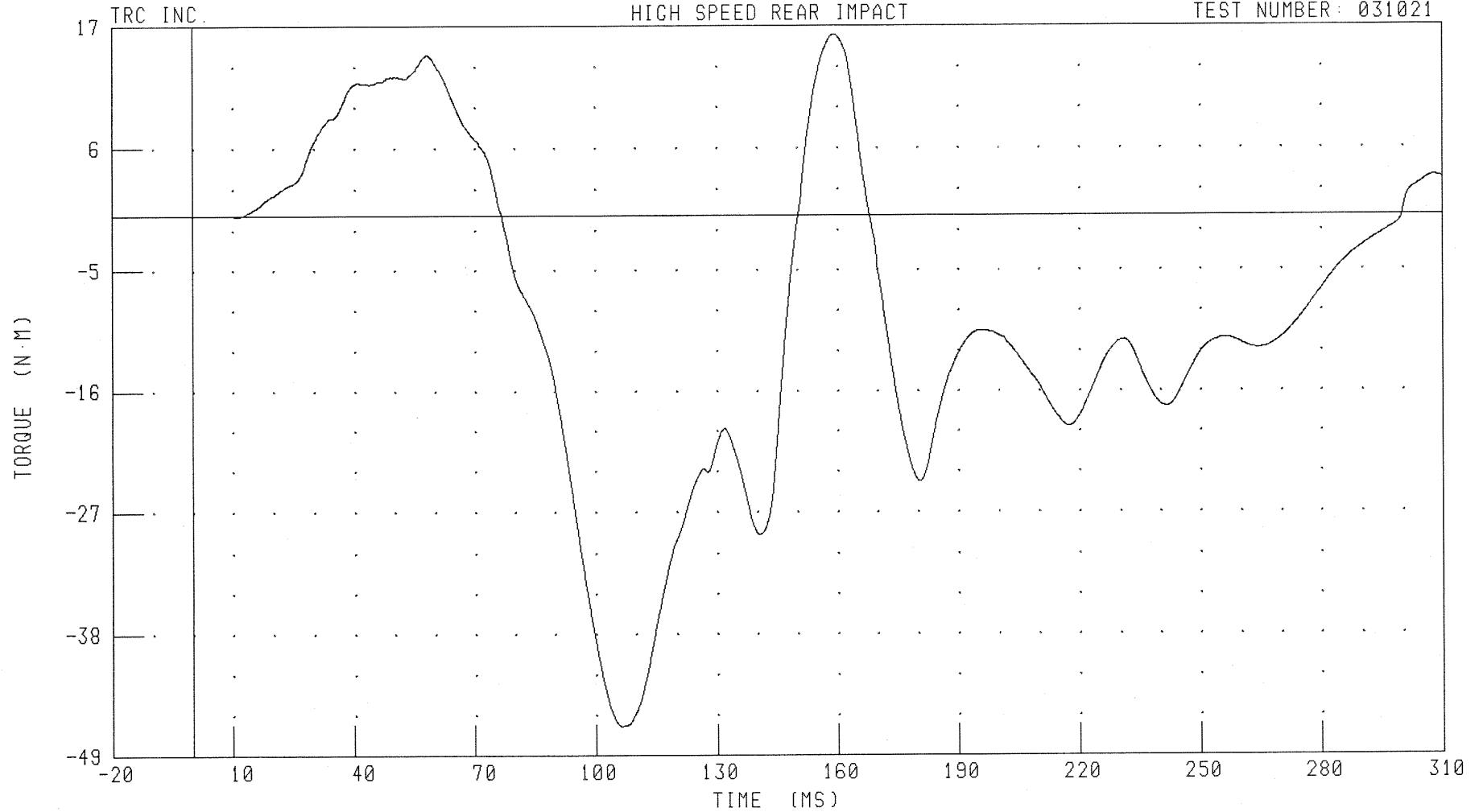
PEAK DATA: 3.24 N·M @ 97.20 MS; -1.56 N·M @ 43.04 MS

B-61

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NEKOM3 FILTER: CH. CLASS 600

PEAK DATA: 16.19 N·M @ 159.60 MS; -46.37 N·M @ 106.56 MS

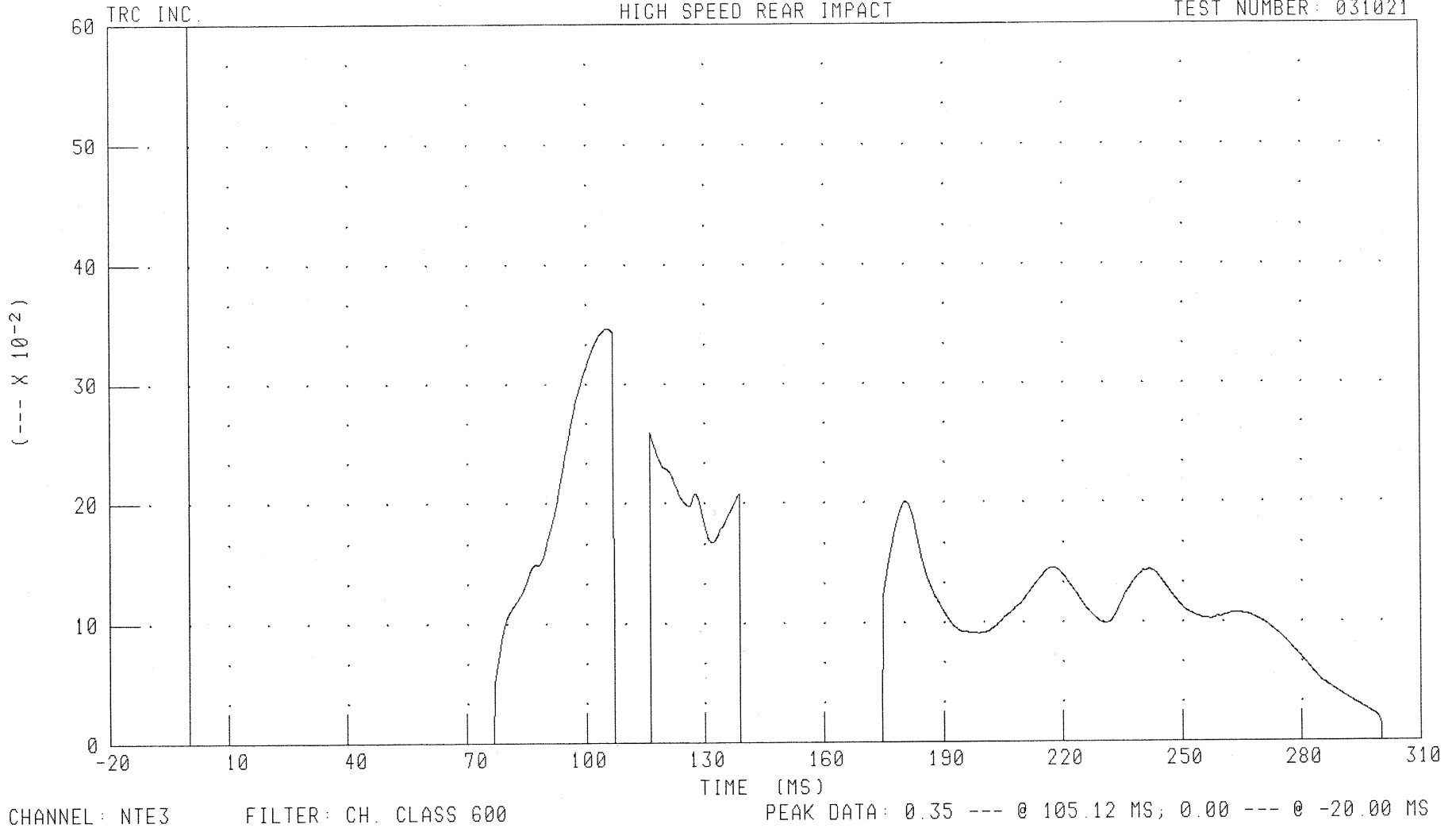
B-62

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER NECK TENSION/EXTENSION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



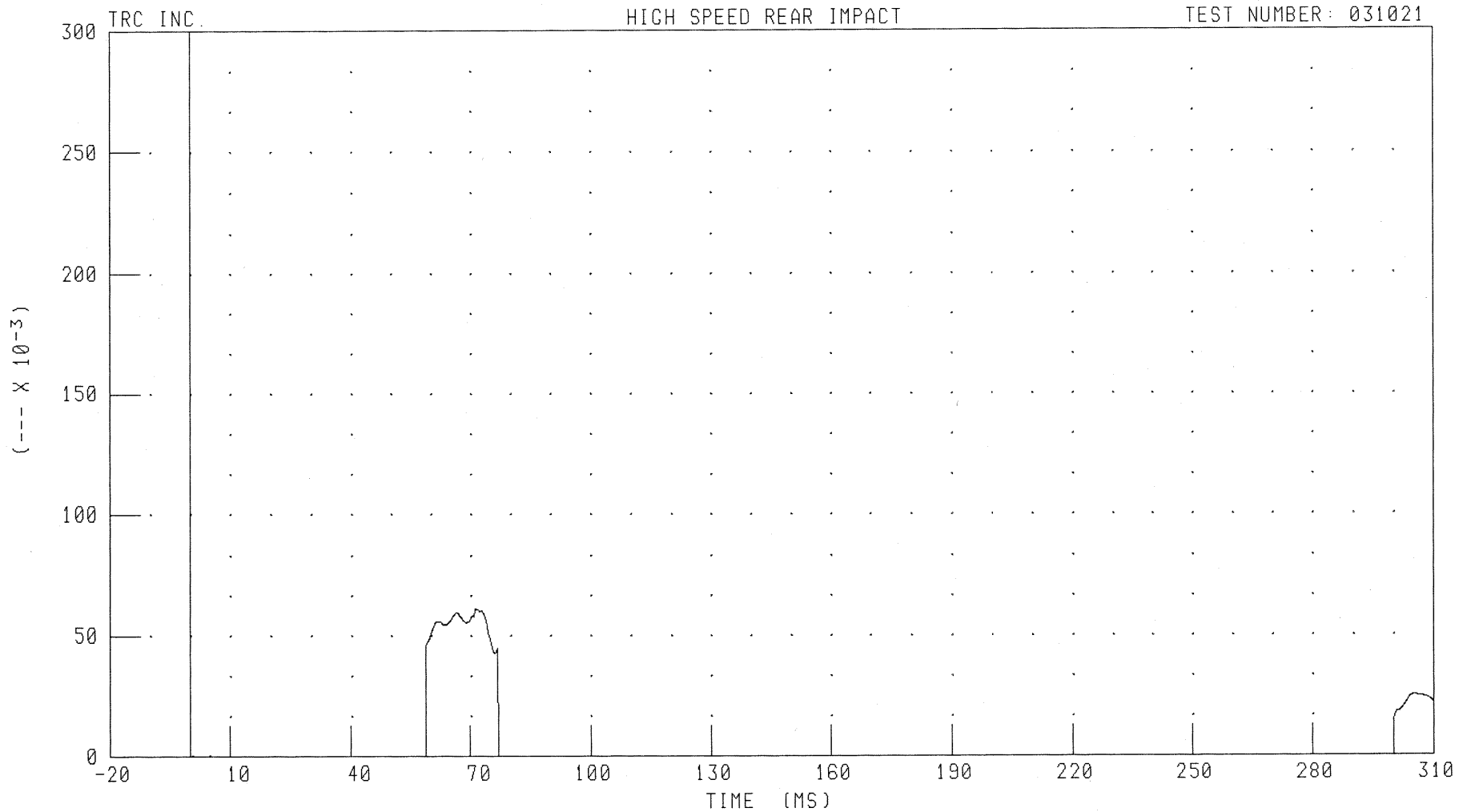
B-63

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER NECK TENSION/FLEXION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NTF3

FILTER: CH. CLASS 600

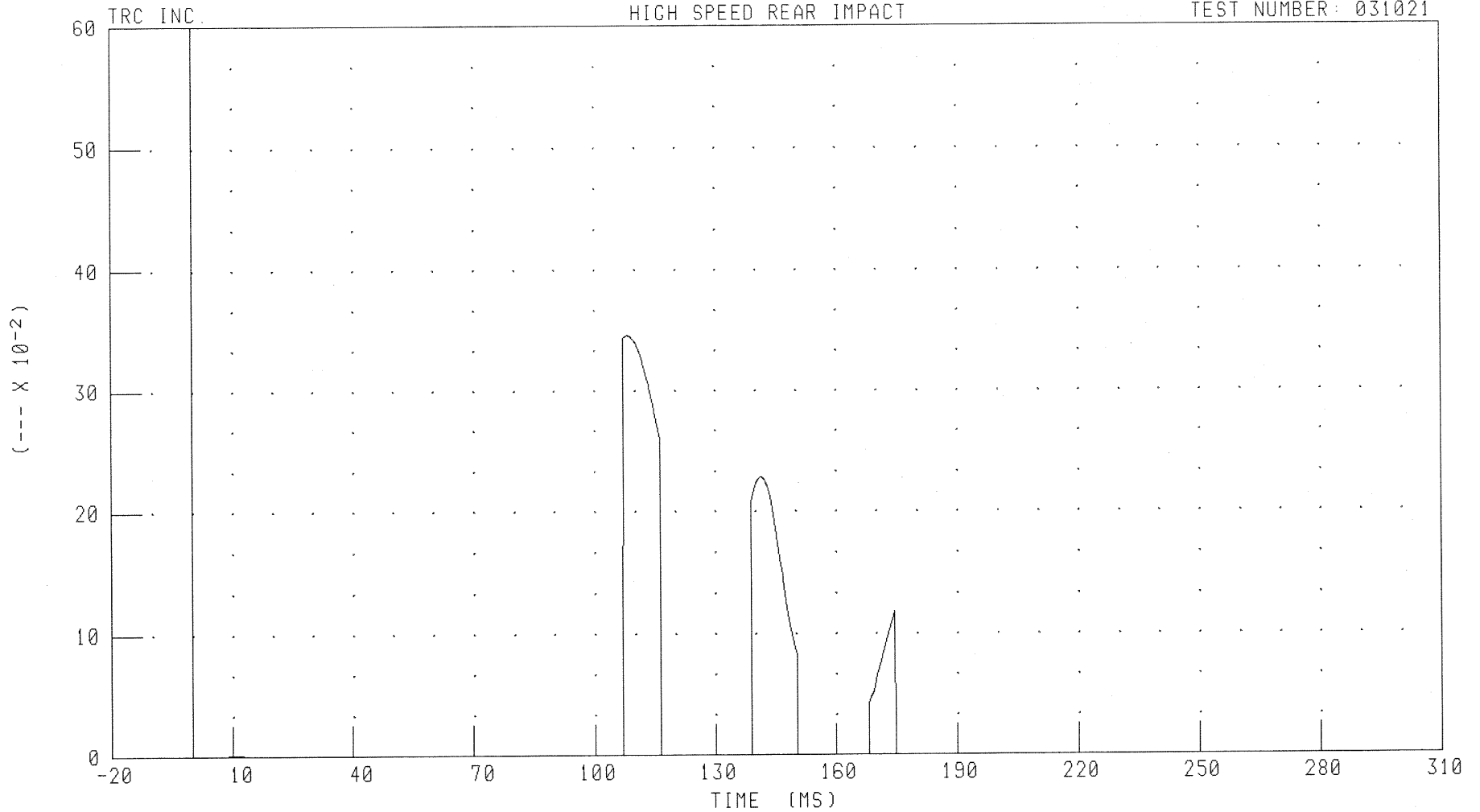
PEAK DATA: 0.06 --- @ 71.36 MS; 0.00 --- @ -19.68 MS

B-64

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER NECK COMPRESSION/EXTENSION

TEST NUMBER: 031021



CHANNEL: NCE3

FILTER: CH. CLASS 600

PEAK DATA: 0.35 --- @ 108.32 MS; 0.00 --- @ -20.00 MS

B-65

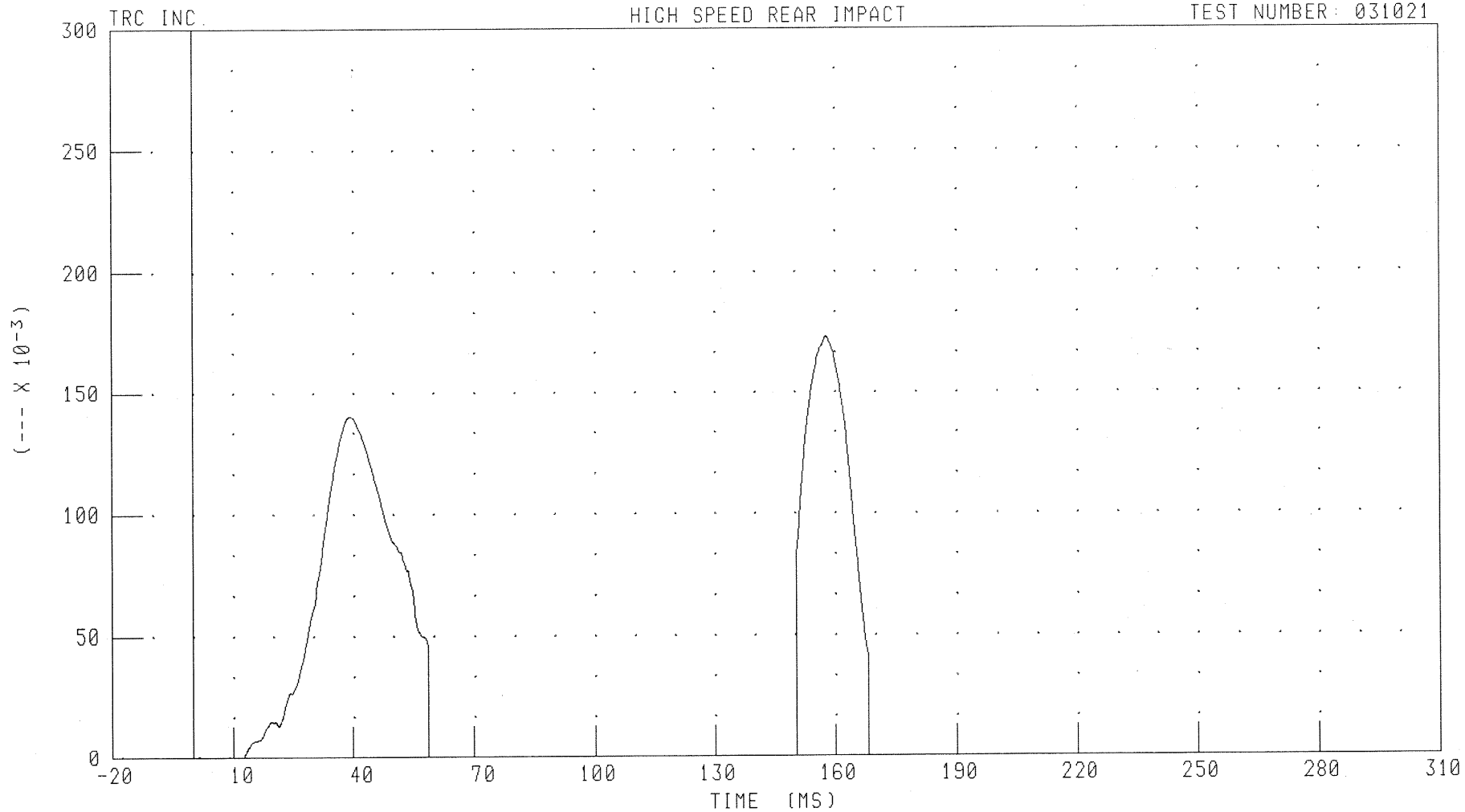
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER NECK COMPRESSION/FLEXION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NCF3

FILTER: CH. CLASS 600

PEAK DATA: 0.17 --- @ 157.84 MS; 0.00 --- @ -20.00 MS

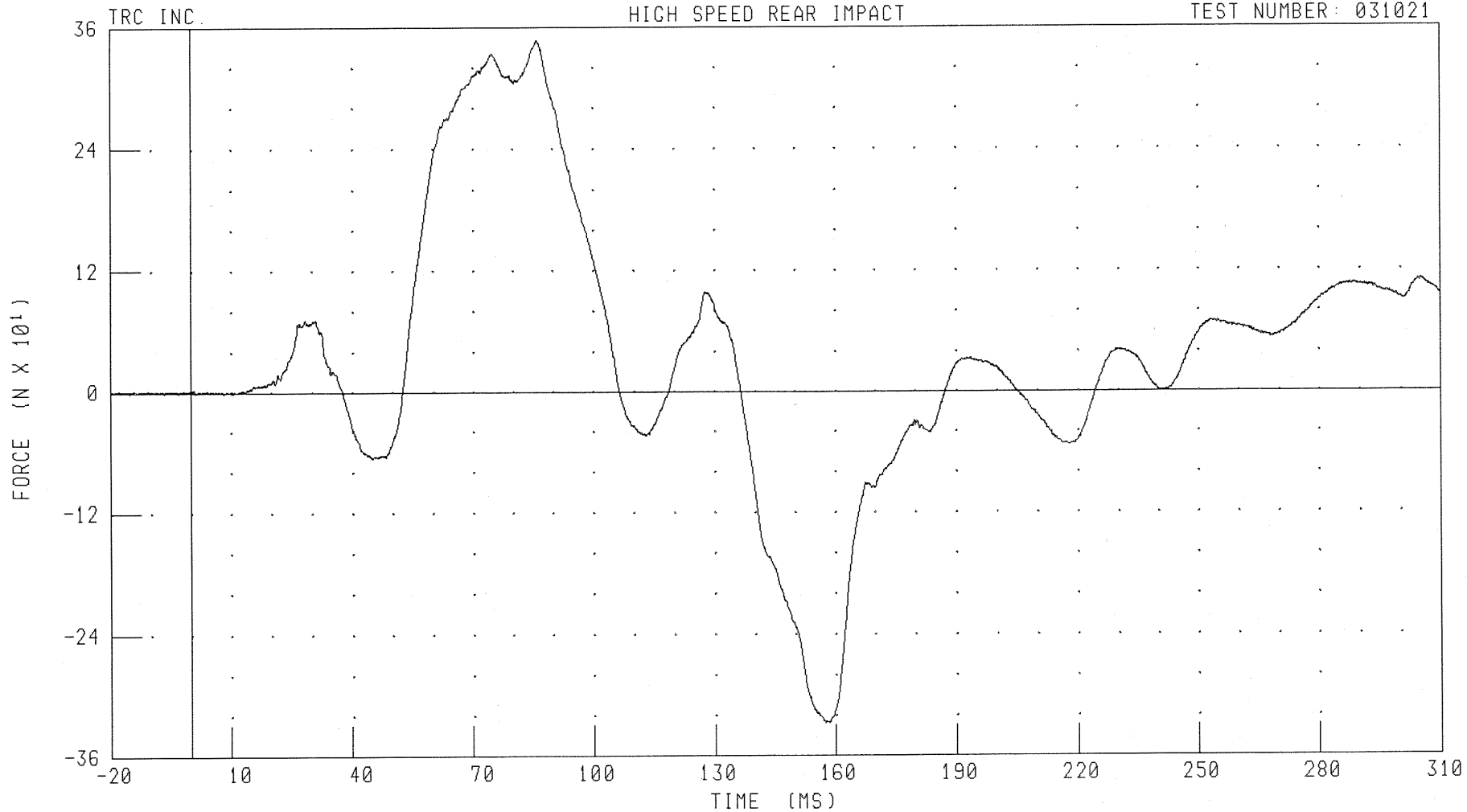
B-66

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK X-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLXF3 FILTER: CH. CLASS 1000

PEAK DATA: 346.79 N @ 86.32 MS; -327.62 N @ 158.56 MS

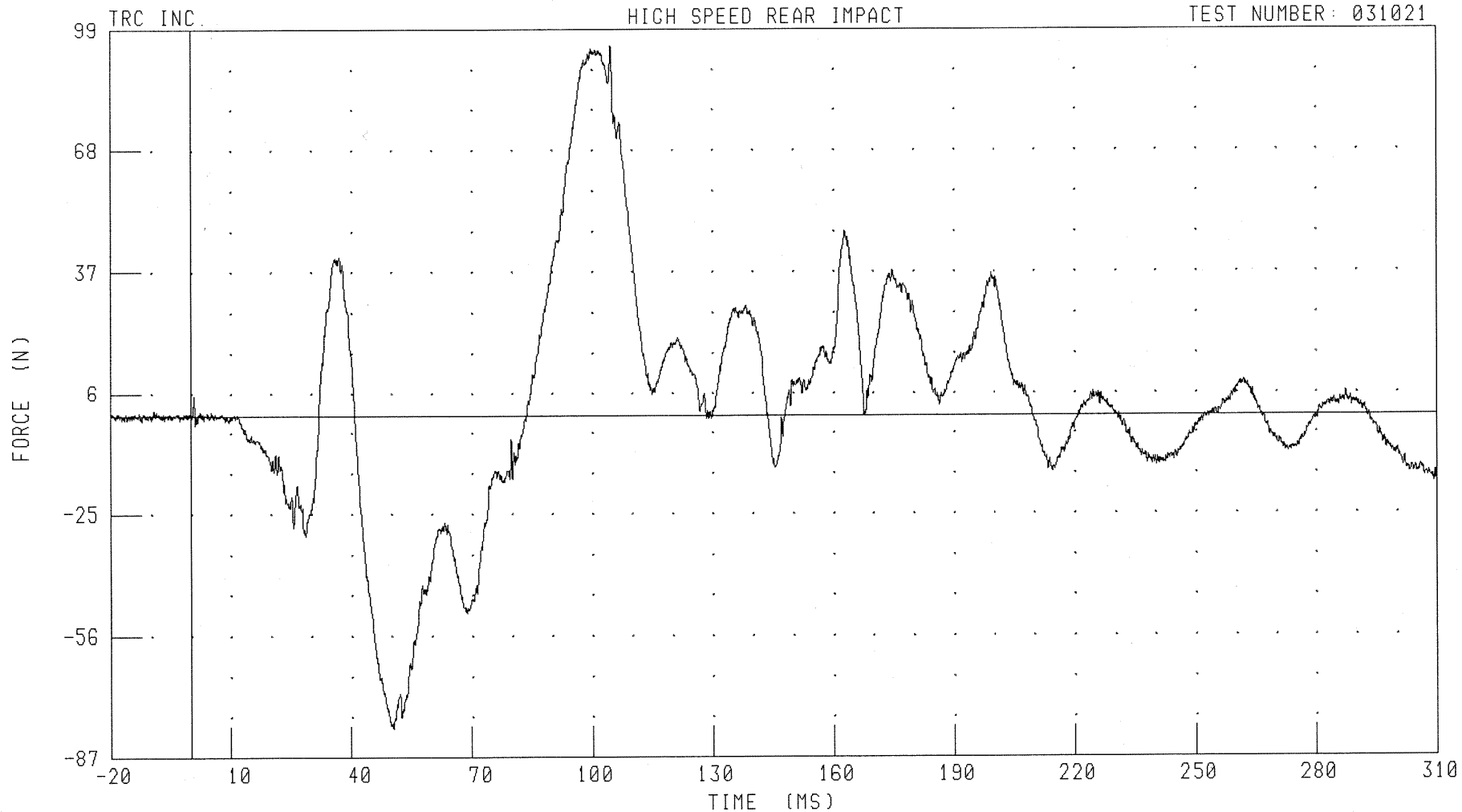
B-67

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK Y-AXIS SHEAR FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLYF3 FILTER: CH. CLASS 1000

PEAK DATA: 94.83 N @ 104.72 MS; -79.70 N @ 50.48 MS

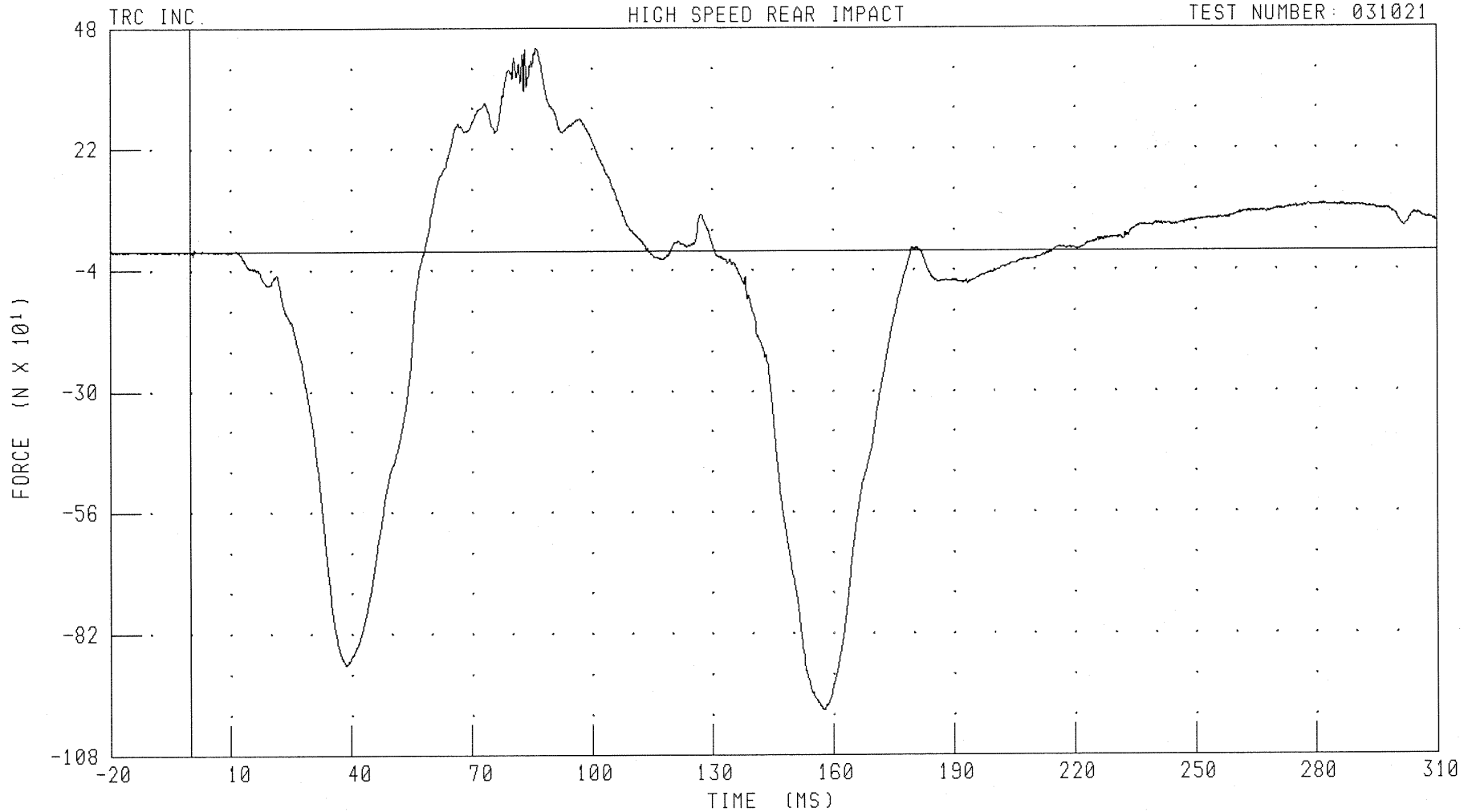
B-68

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK Z-AXIS AXIAL FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLZF3

FILTER: CH. CLASS 1000

PEAK DATA: 437.35 N @ 86.08 MS; -983.59 N @ 157.84 MS

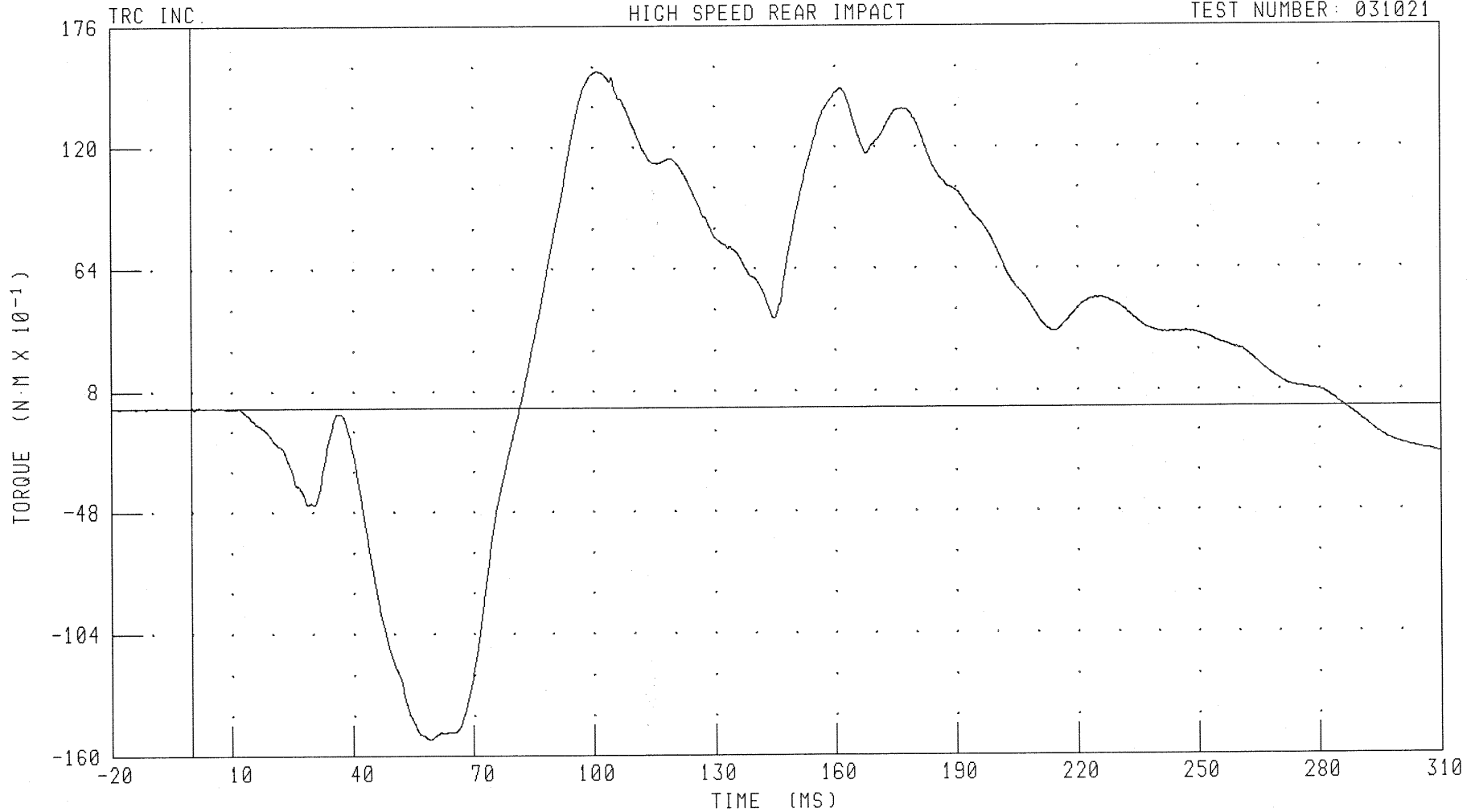
B-69

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK MOMENT ABOUT X AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLXM3

FILTER: CH. CLASS 600

PEAK DATA: 15.52 N·M @ 101.44 MS; -15.24 N·M @ 58.96 MS

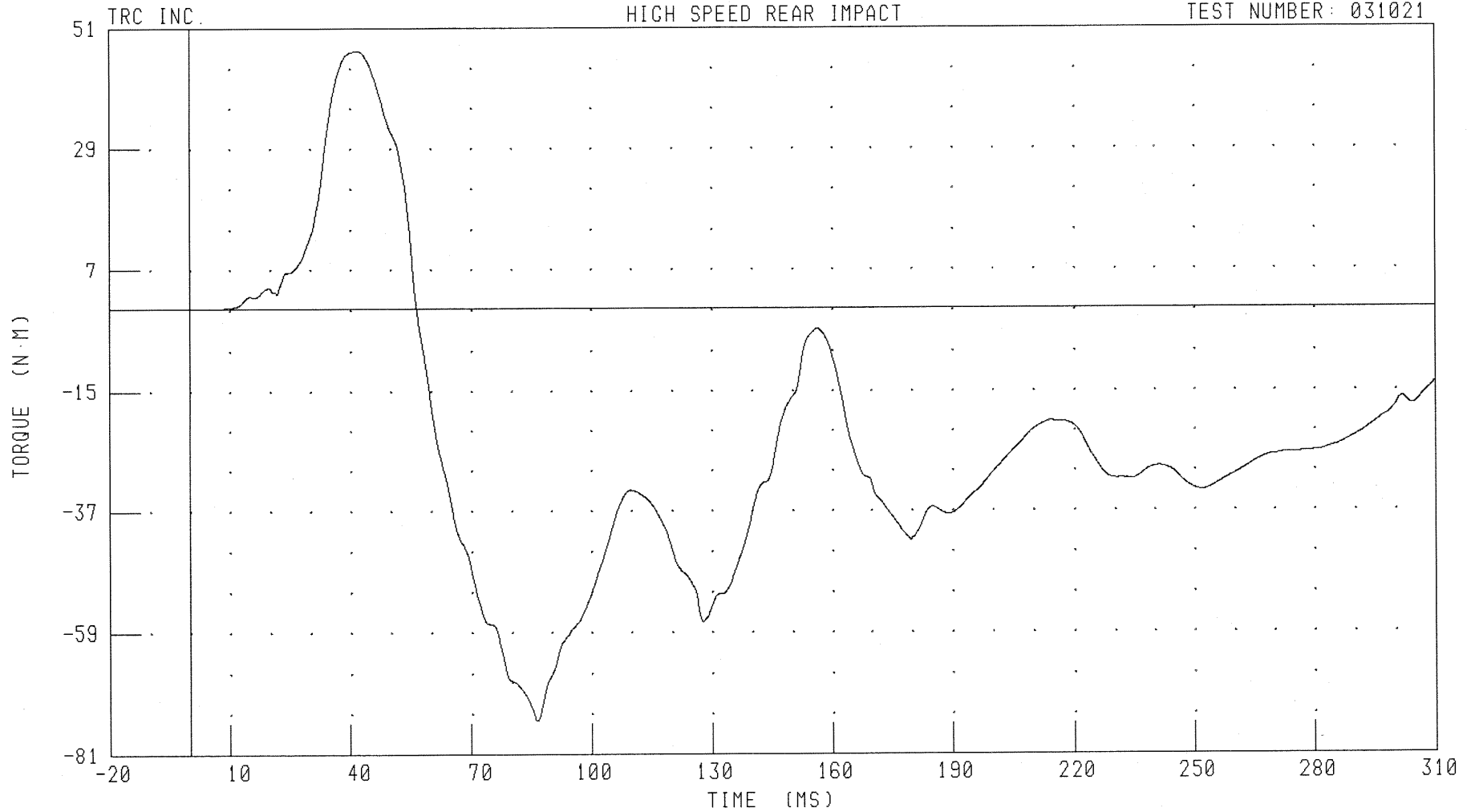
B-70

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK MOMENT ABOUT Y AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLYM3 FILTER: CH. CLASS 600

PEAK DATA: 46.78 N·M @ 42.16 MS; -74.92 N·M @ 86.32 MS

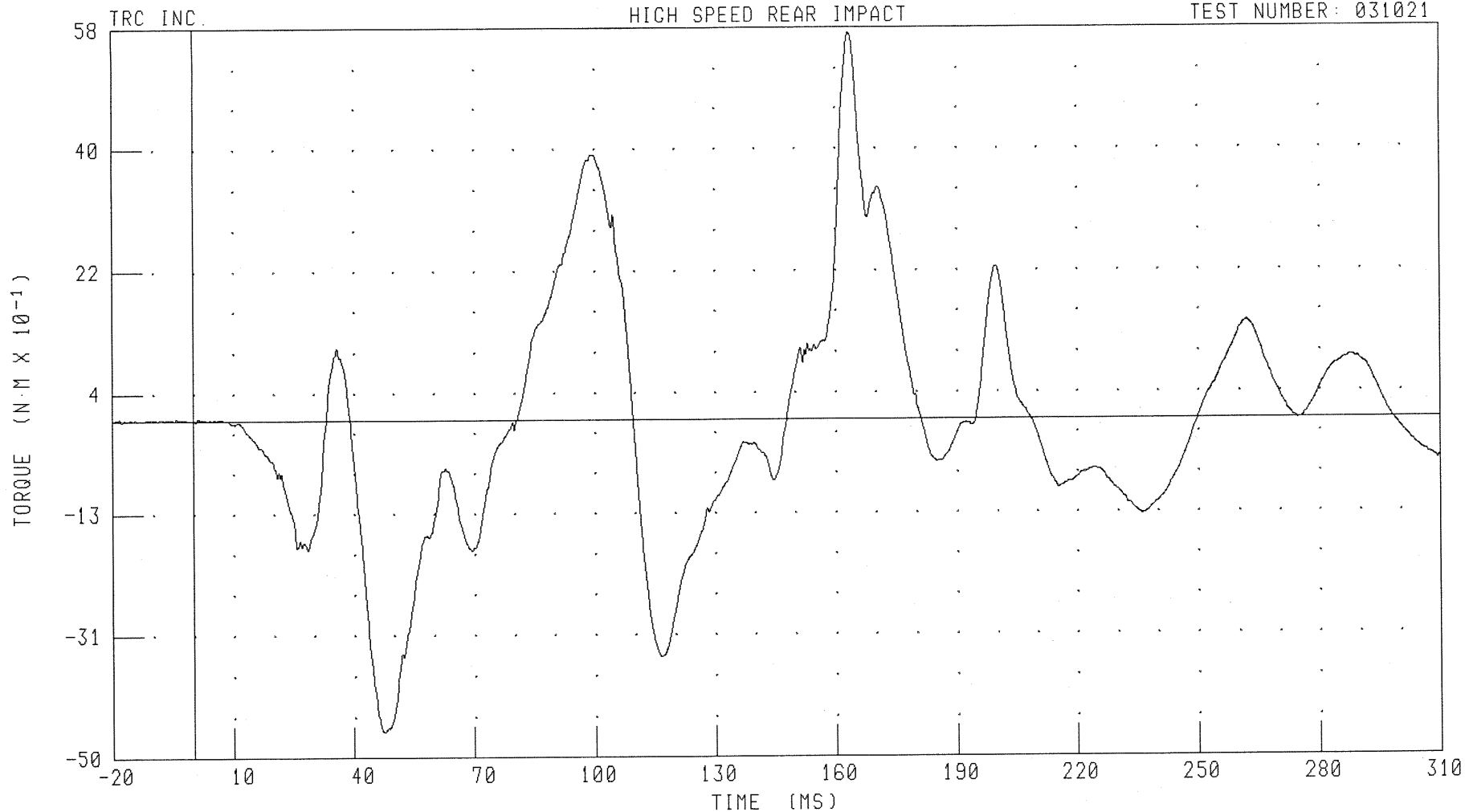
B-71

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LOWER NECK MOMENT ABOUT Z AXIS

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: NKLZM3 FILTER: CH. CLASS 600

PEAK DATA: 5.73 N·M @ 163.52 MS; -4.62 N·M @ 47.68 MS

B-72

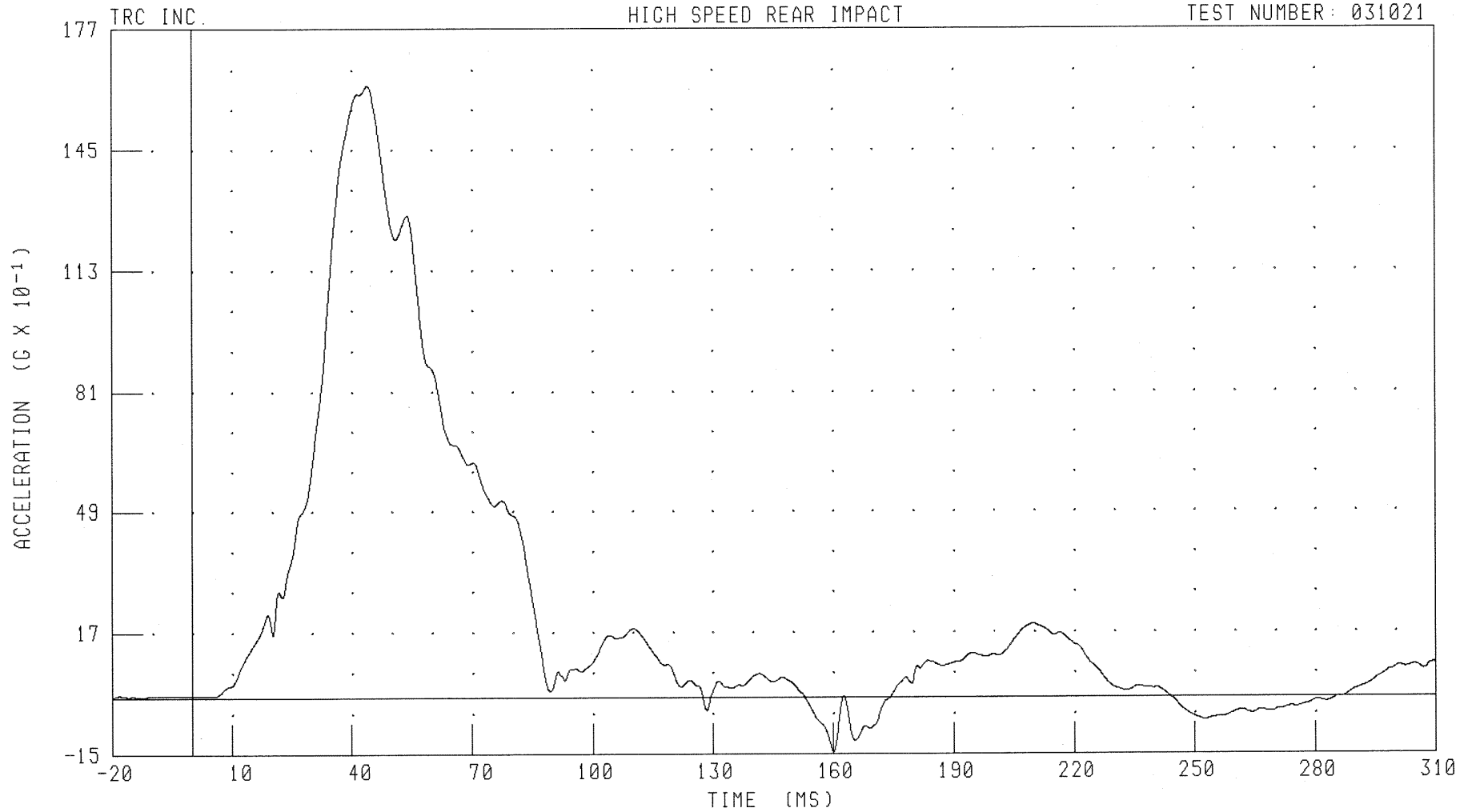
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER CHEST X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXG3

FILTER: CH. CLASS 180

PEAK DATA: 16.21 G @ 44.08 MS; -1.44 G @ 160.16 MS

B-73

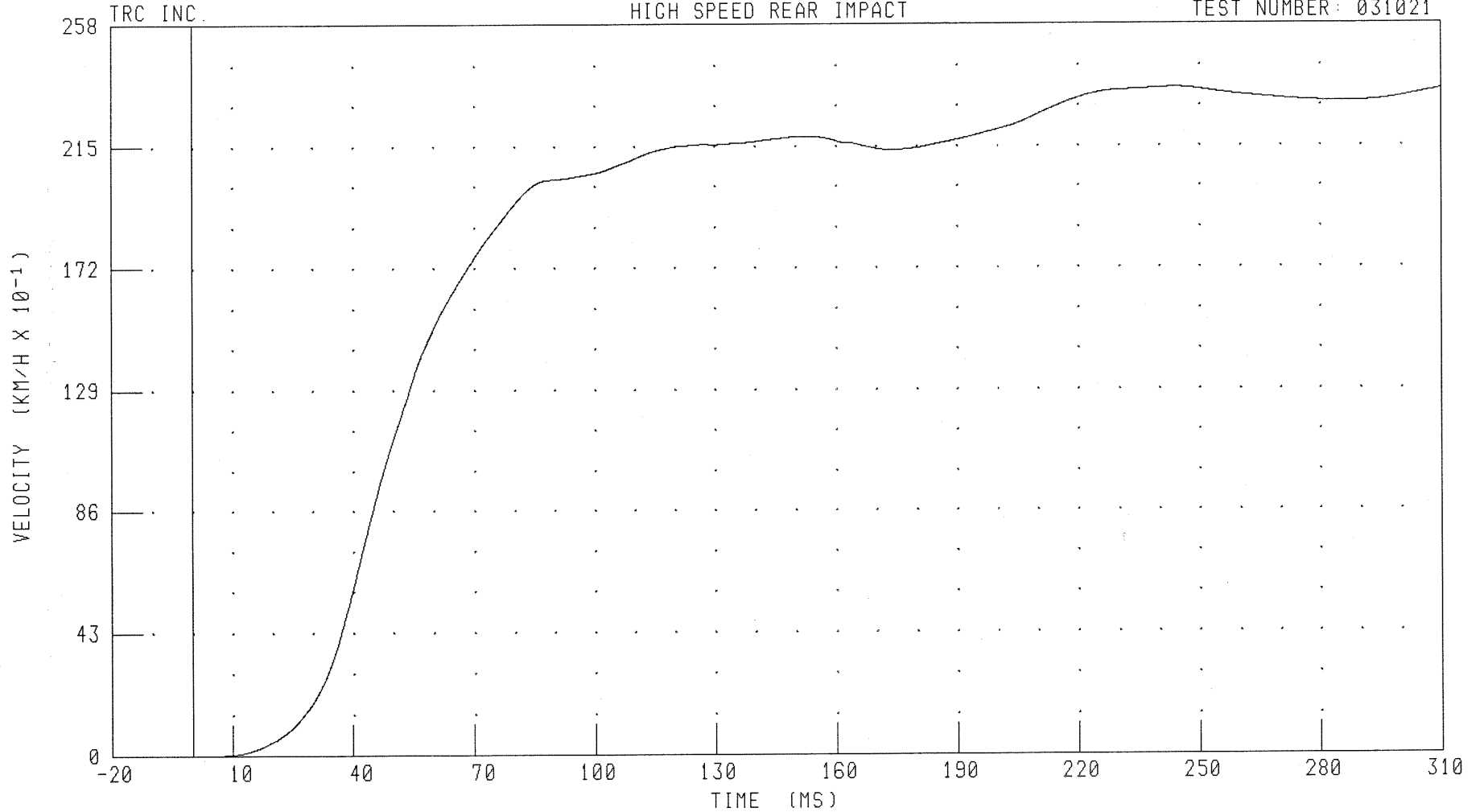
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER CHEST X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXV3 FILTER: CH. CLASS 180

PEAK DATA: 23.57 KM/H @ 243.84 MS; 0.00 KM/H @ 0.00 MS

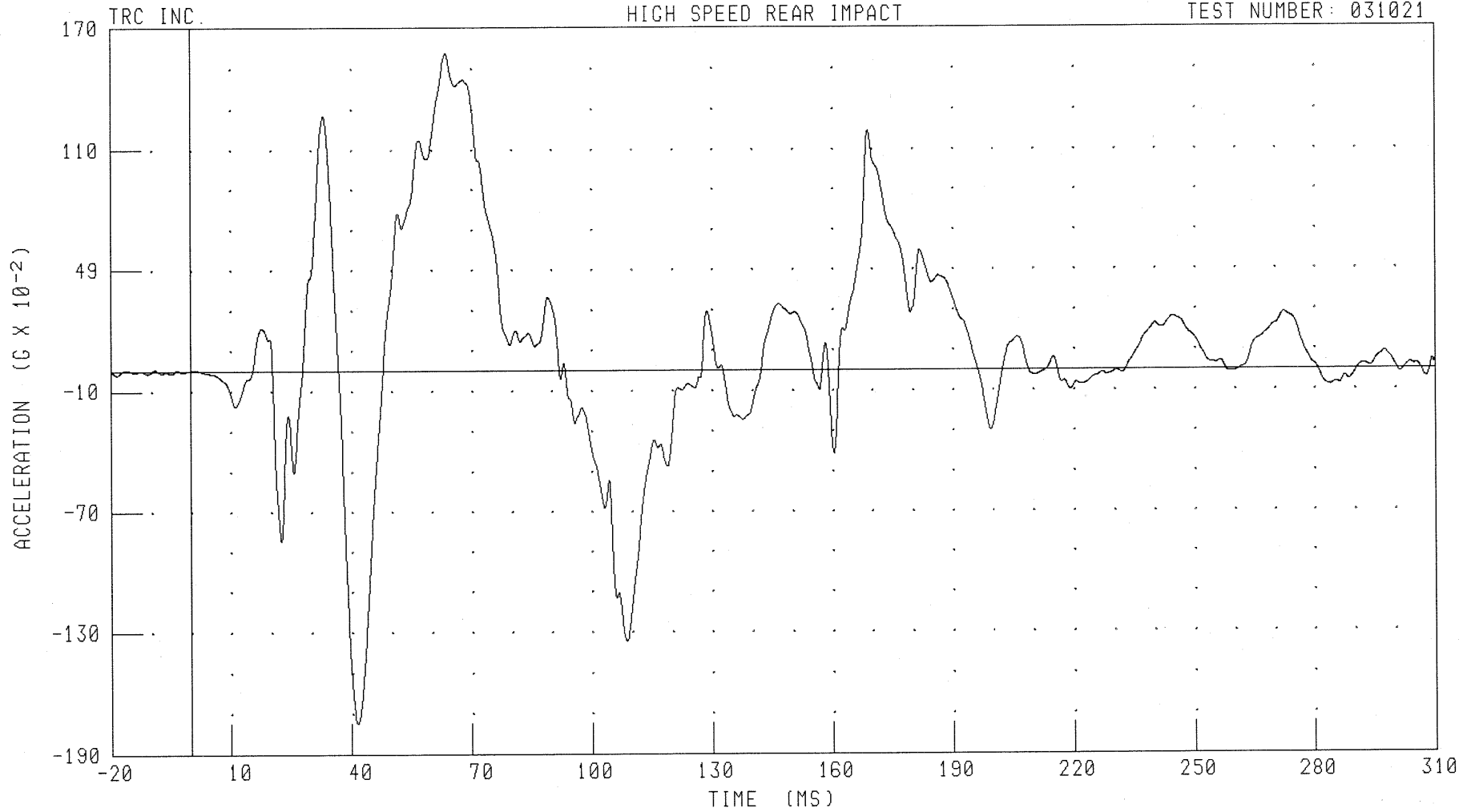
B-74

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYG3 FILTER: CH. CLASS 180

PEAK DATA: 1.57 G @ 63.60 MS; -1.75 G @ 41.52 MS

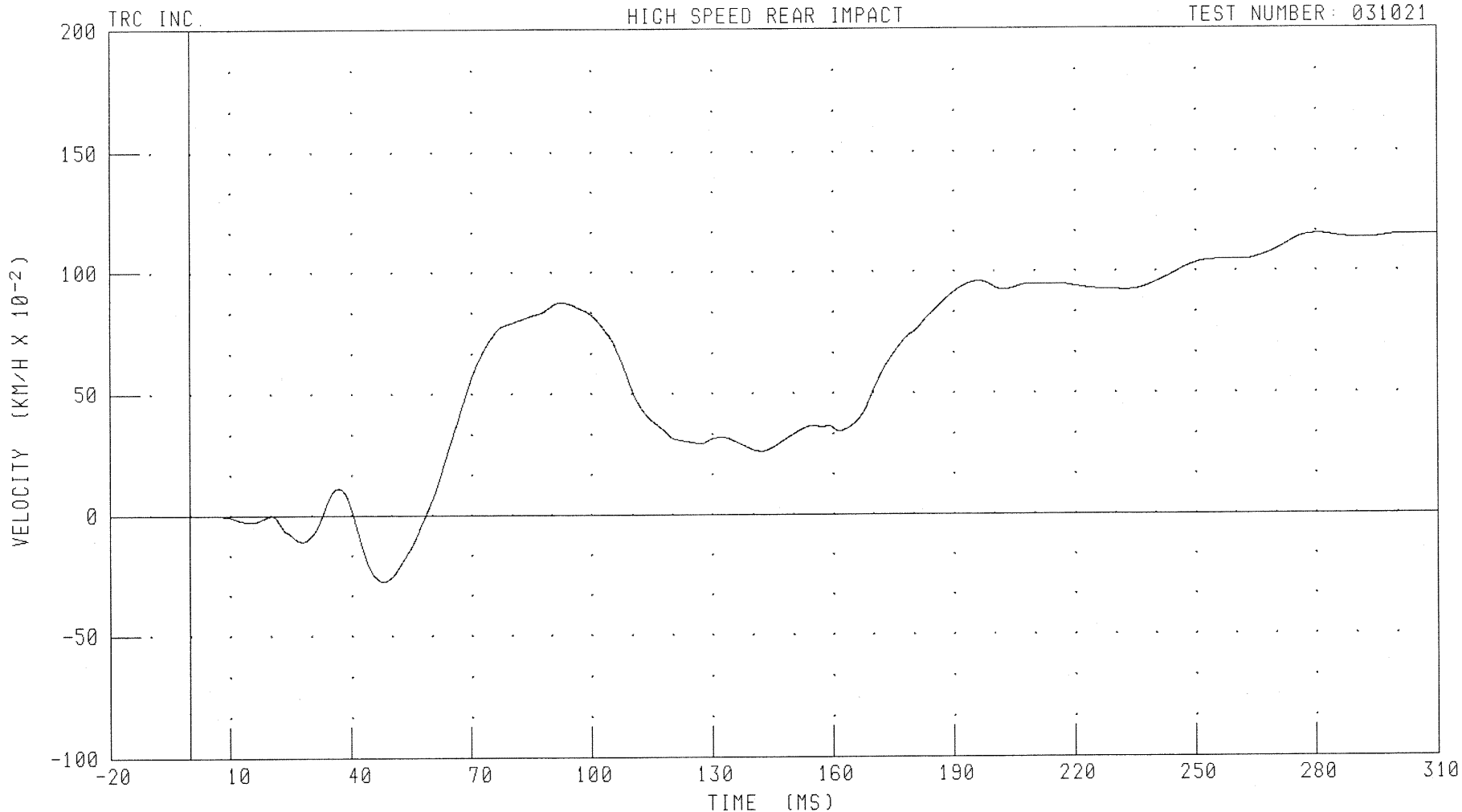
B-75

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYV3 FILTER: CH. CLASS 180

PEAK DATA: 1.15 KM/H @ 280.96 MS; -0.28 KM/H @ 47.92 MS

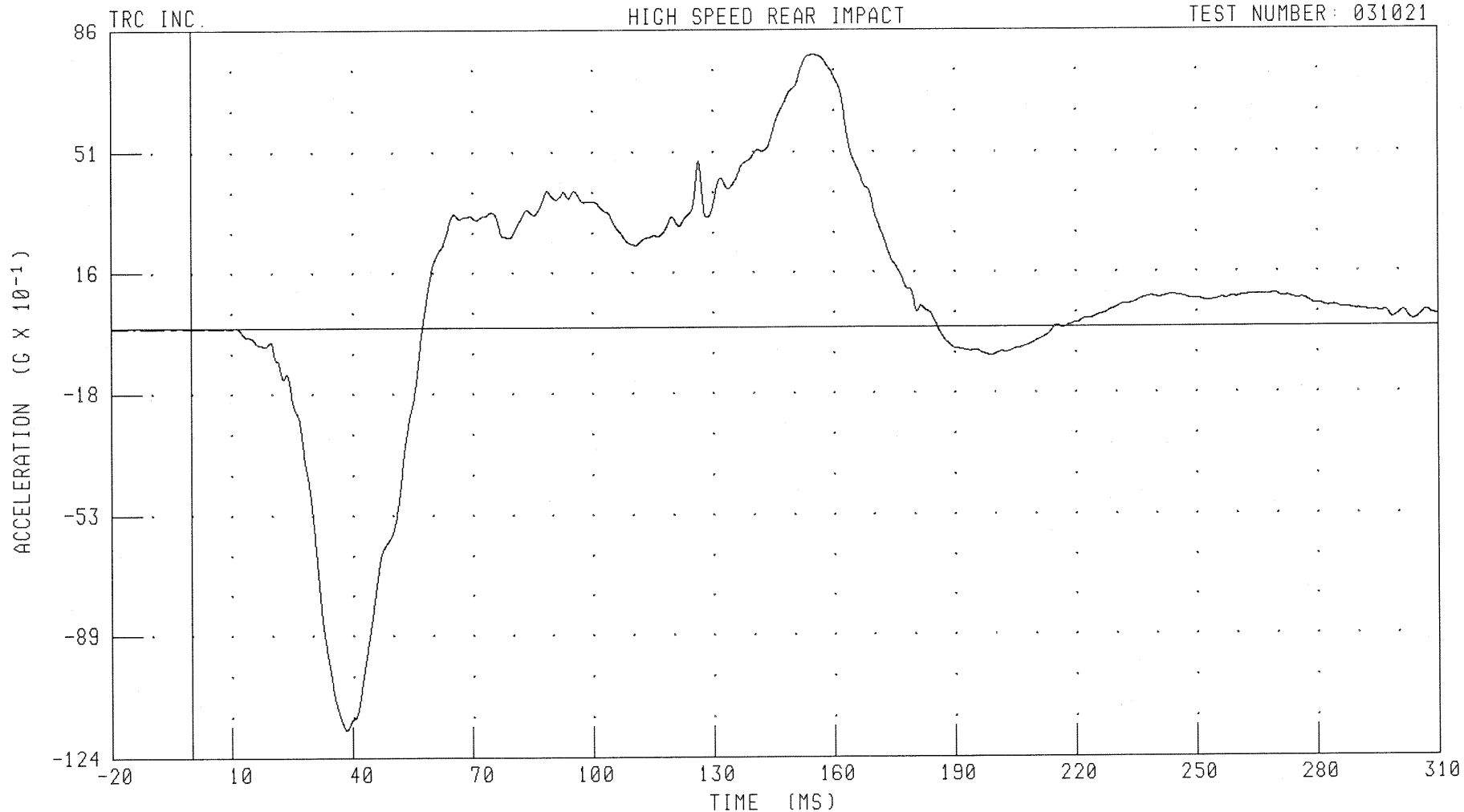
B-76

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTZG3

FILTER: CH. CLASS 180

PEAK DATA: 7.87 G @ 155.04 MS; -11.60 G @ 38.40 MS

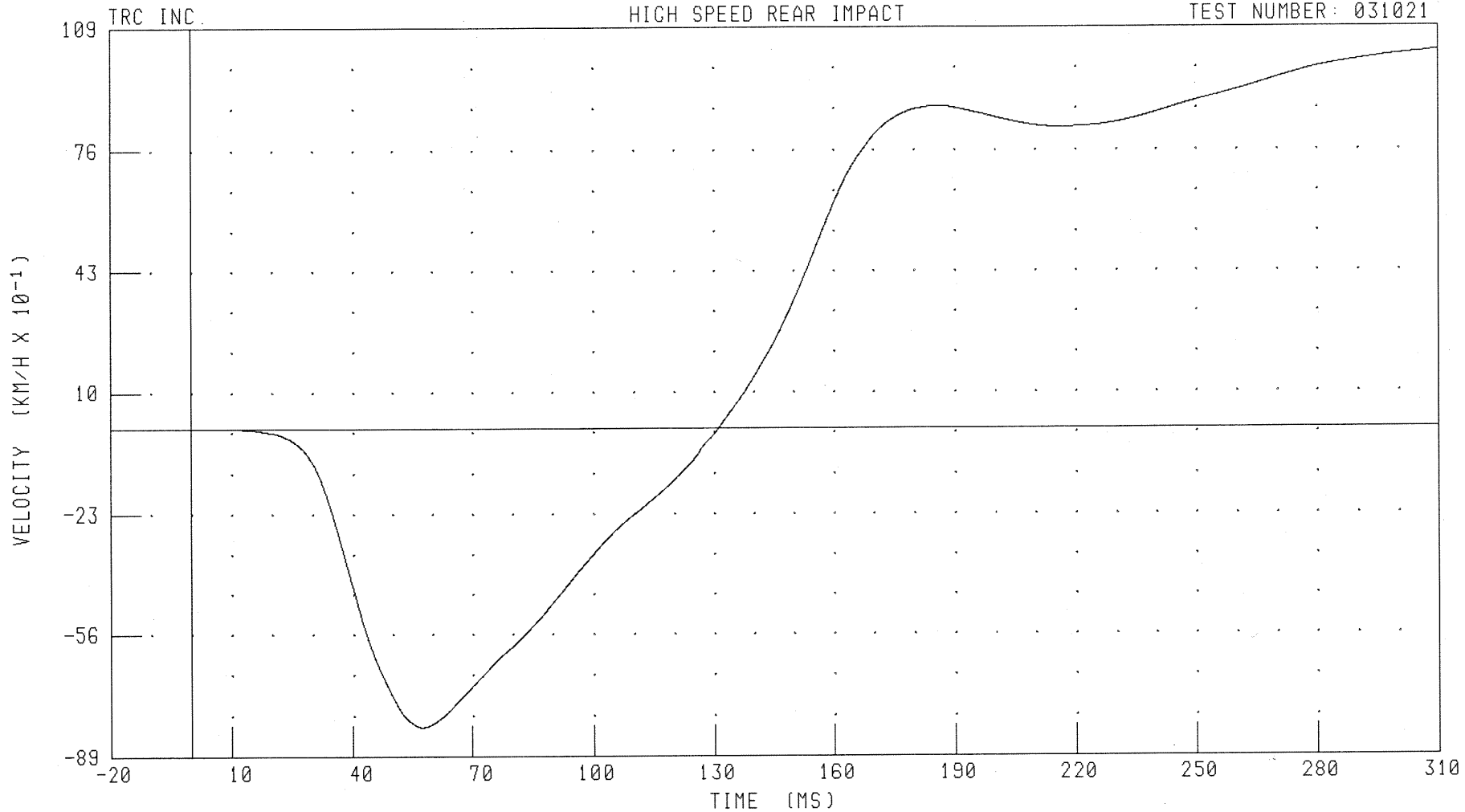
B-77

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTZV3

FILTER: CH. CLASS 180

PEAK DATA: 10.27 KM/H @ 310.00 MS; -8.11 KM/H @ 57.44 MS

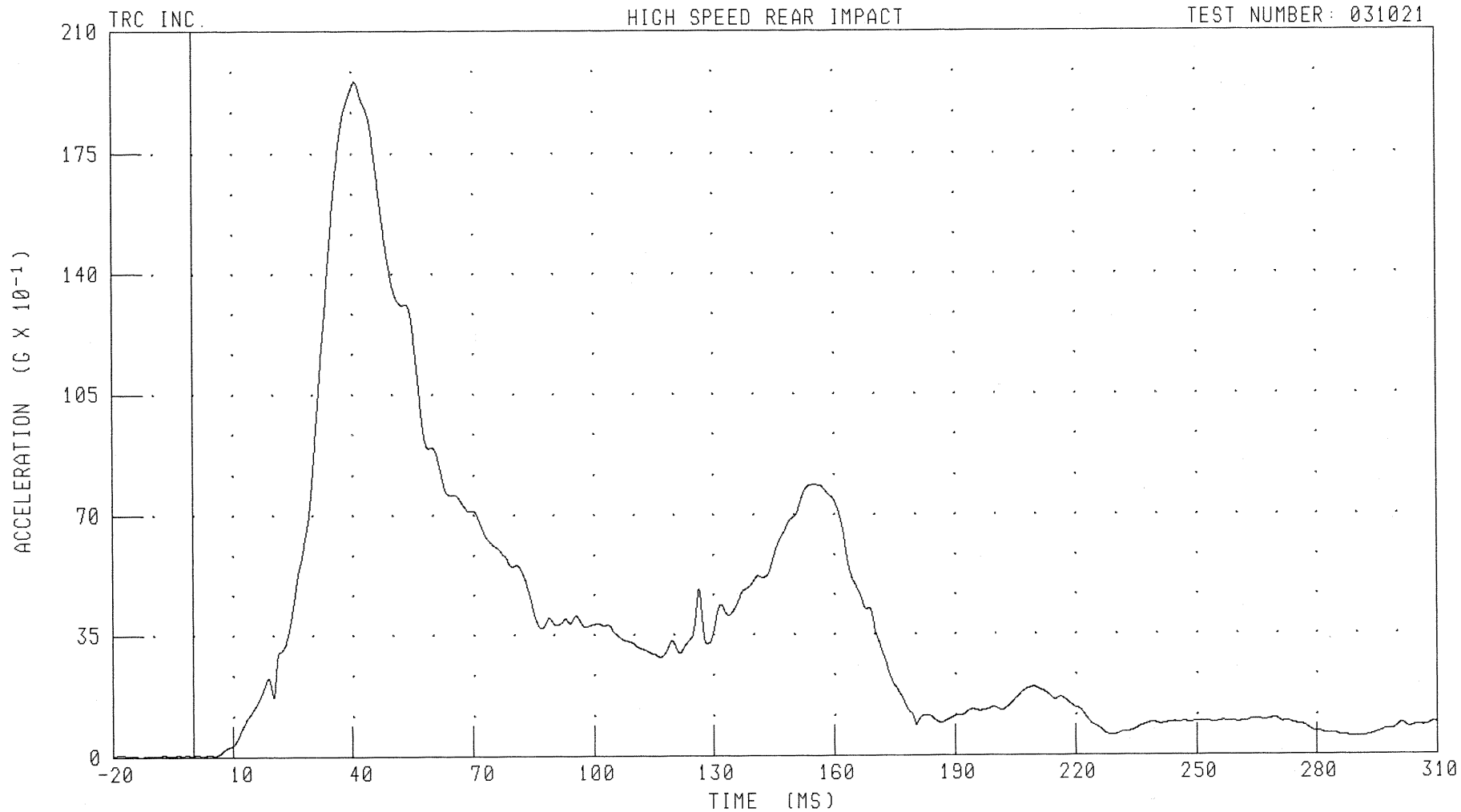
B-78

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTRG3 FILTER: CH. CLASS 180

PEAK DATA: 19.54 G @ 41.04 MS; 0.00 G @ -20.00 MS

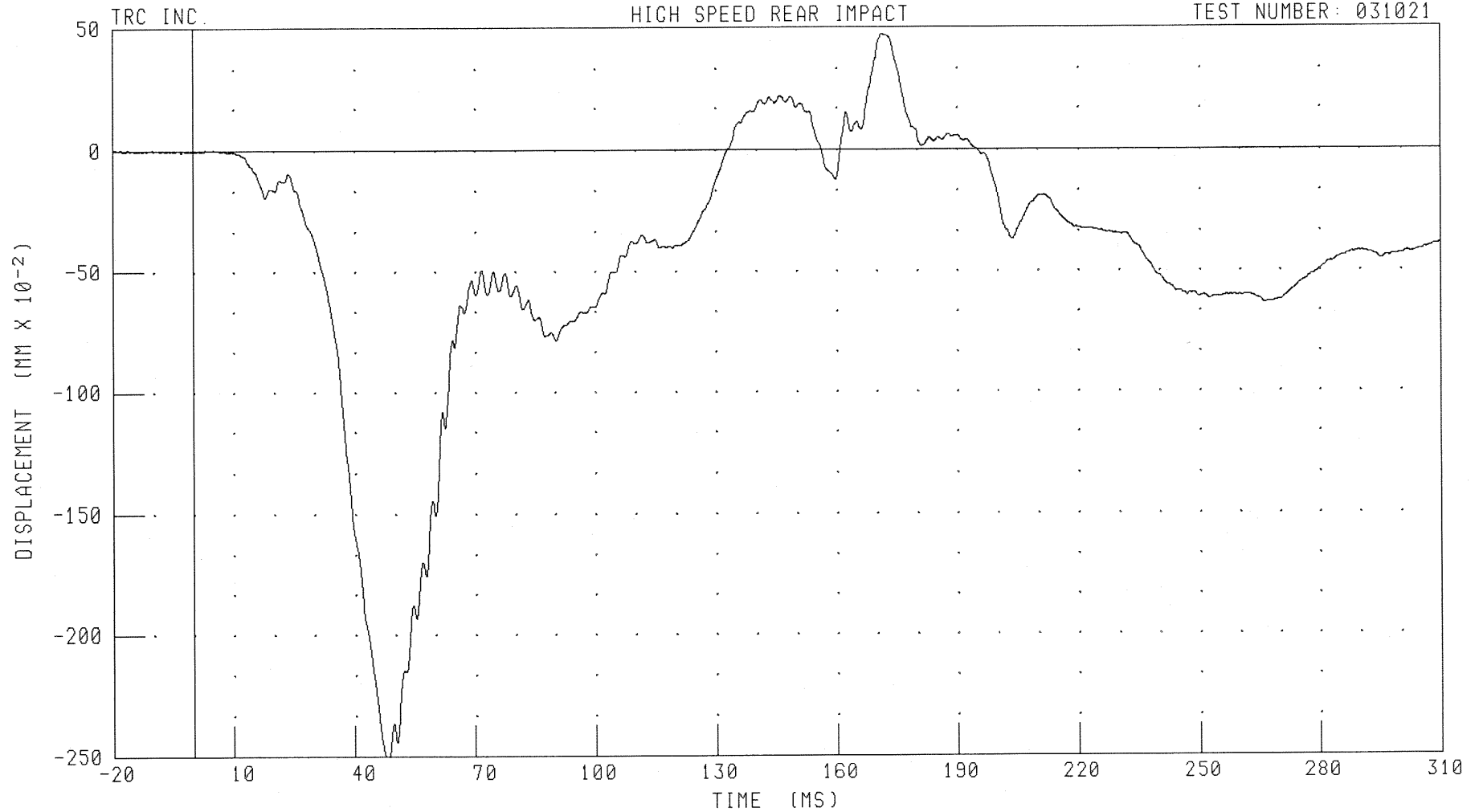
B-79

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST X-AXIS DEFLECTION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTXD3

FILTER: CH. CLASS 600

PEAK DATA: 0.47 MM @ 171.28 MS; -2.52 MM @ 48.00 MS

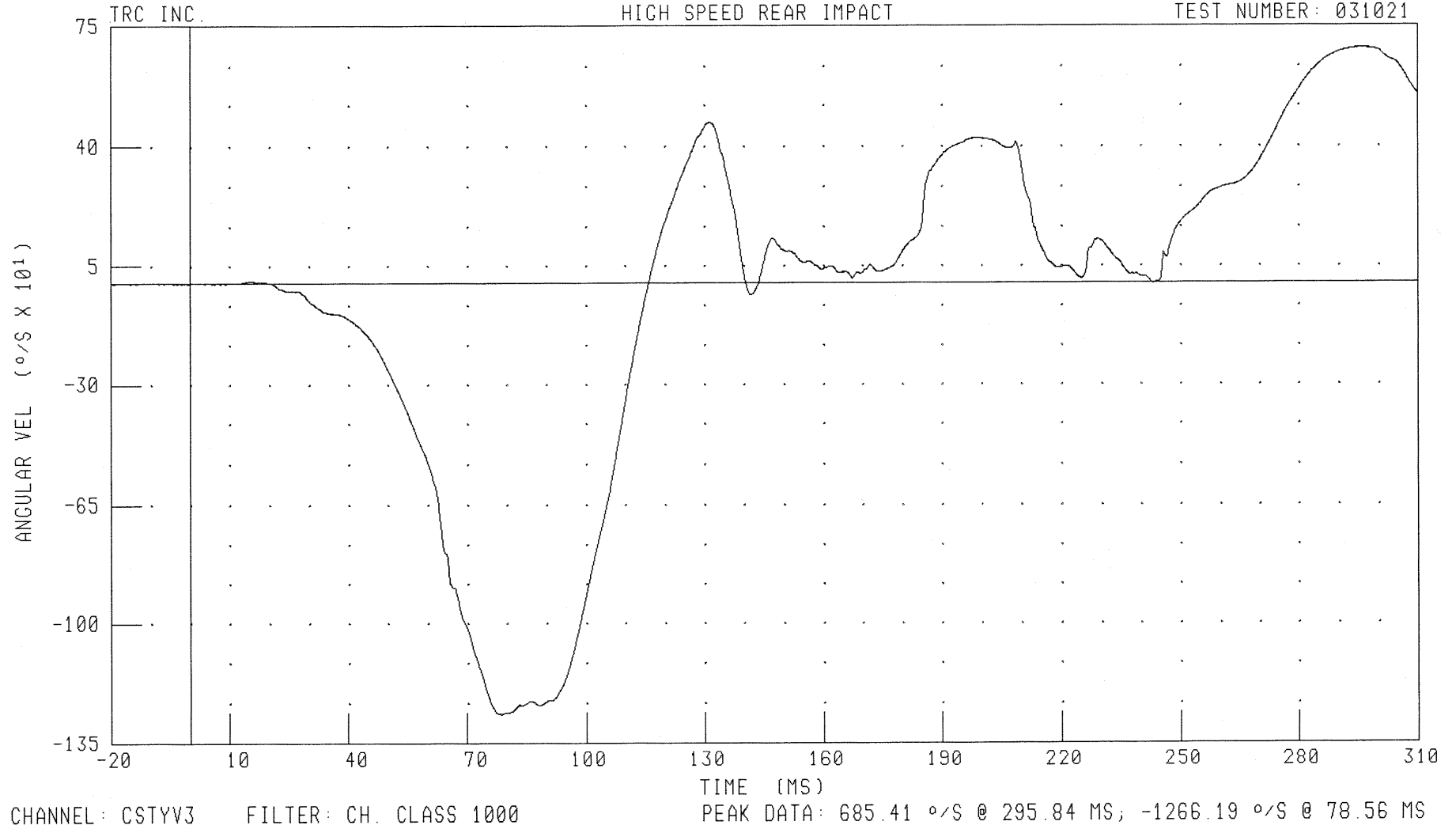
B-80

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Y-AXIS ANGULAR VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021

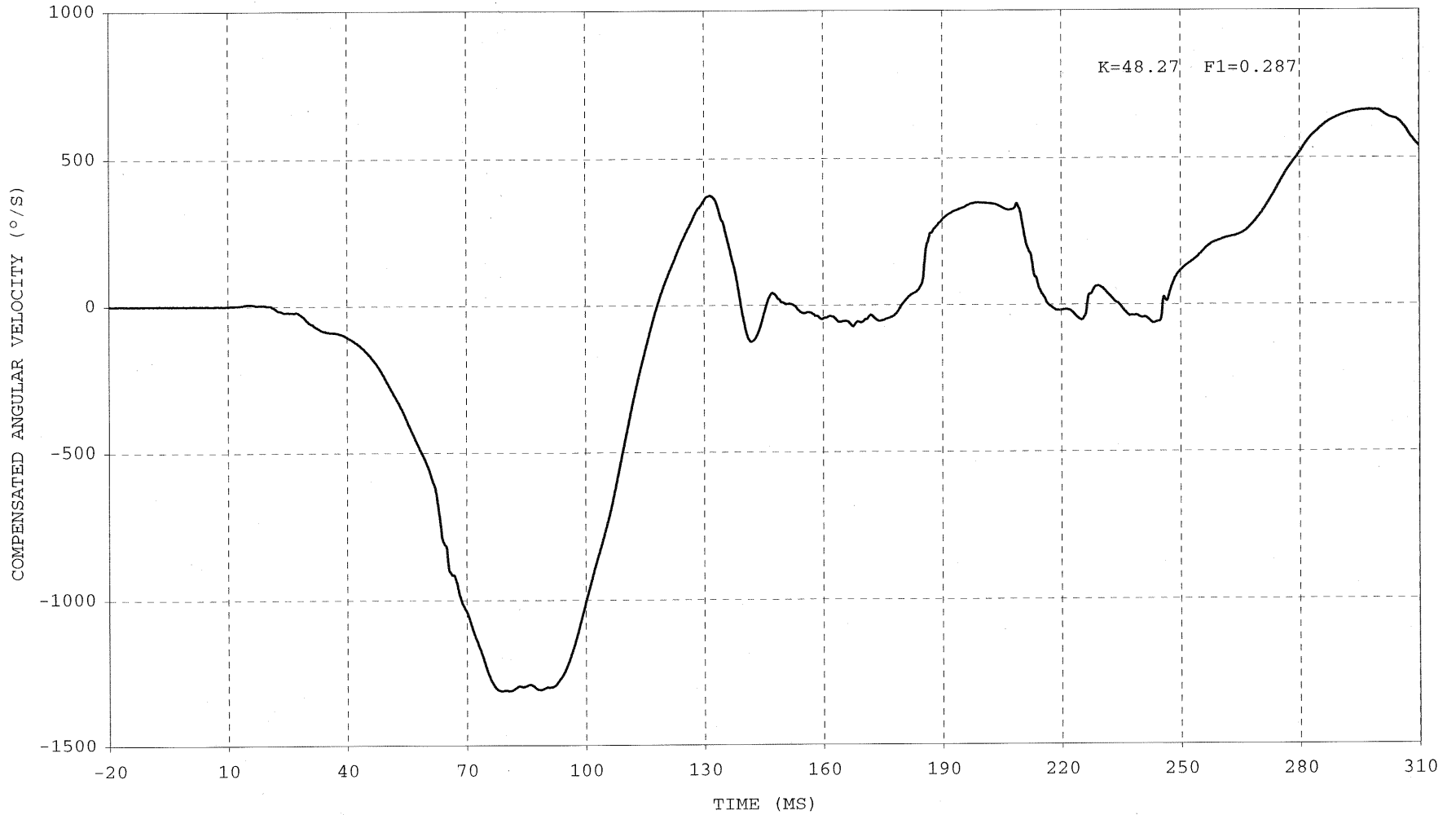


B-81

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER CHEST Y-AXIS ANGULAR VELOCITY - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: CSTYV3

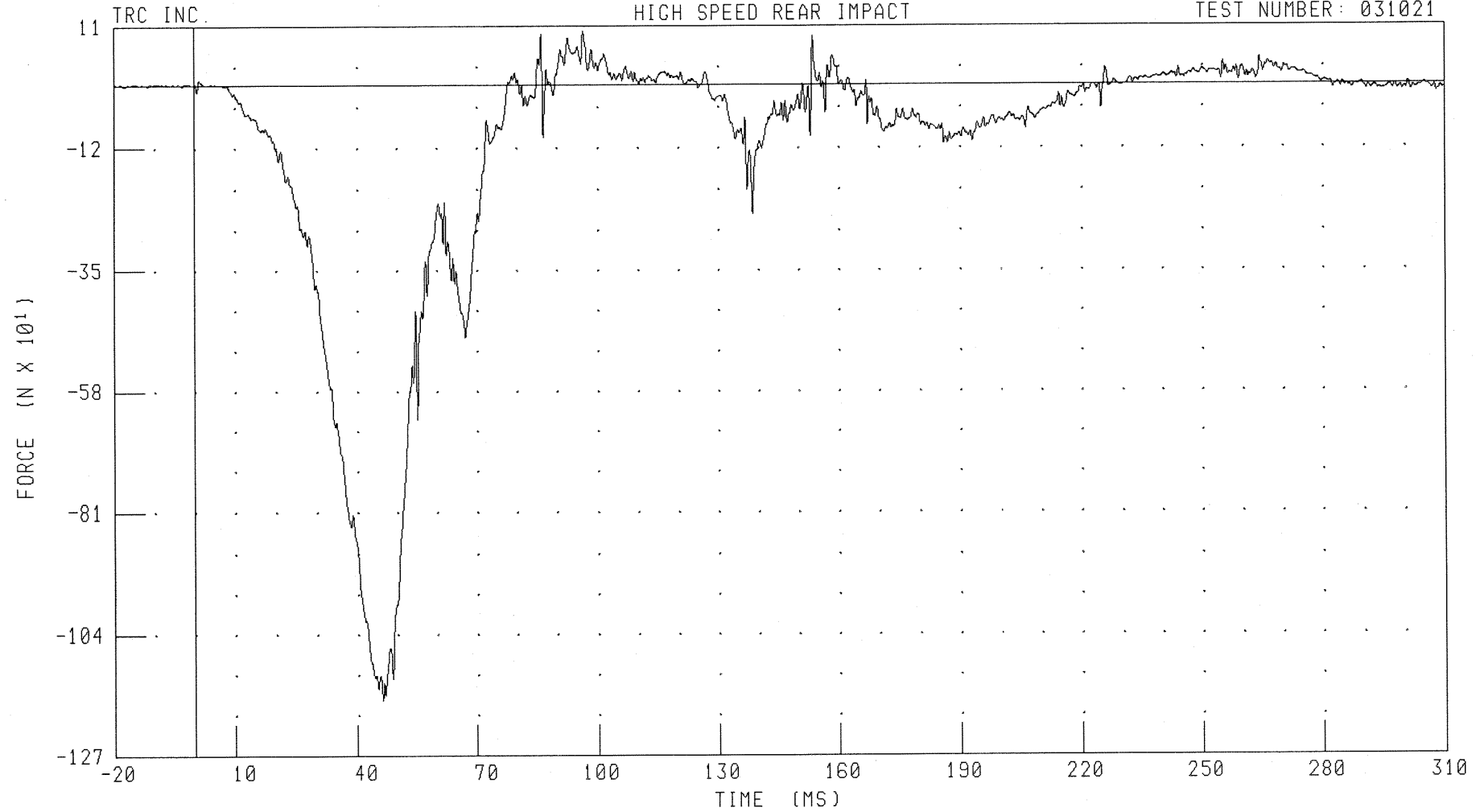
B-82

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LEFT FEMUR Z-AXIS FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFMZF3 FILTER: CH. CLASS 600

PEAK DATA: 101.54 N @ 96.56 MS; -1164.90 N @ 46.24 MS

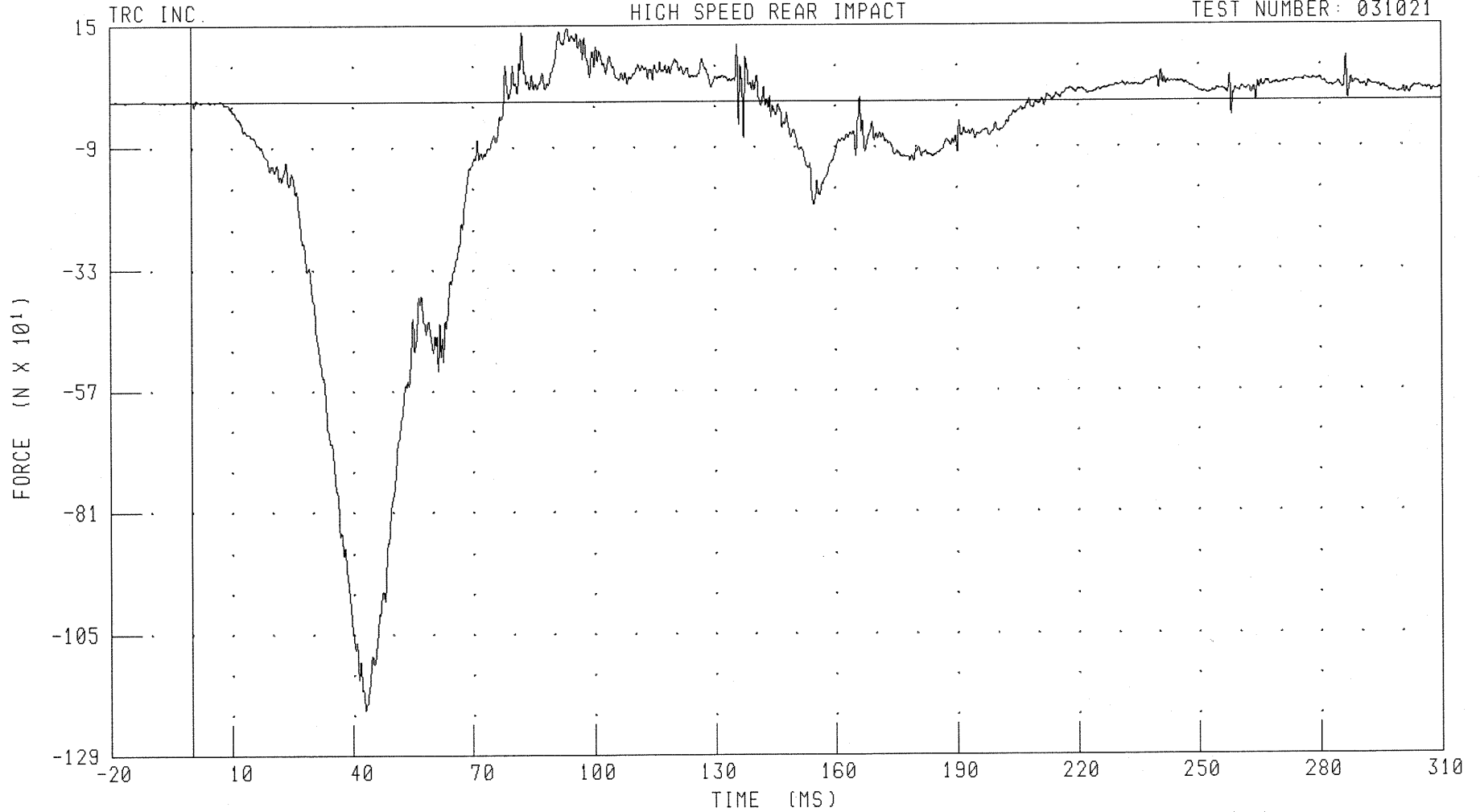
B-83

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER RIGHT FEMUR Z-AXIS FORCE

TEST NUMBER: 031021



CHANNEL: RFMZ3

FILTER: CH. CLASS 600

PEAK DATA: 144.59 N @ 93.52 MS; -1200.73 N @ 43.04 MS

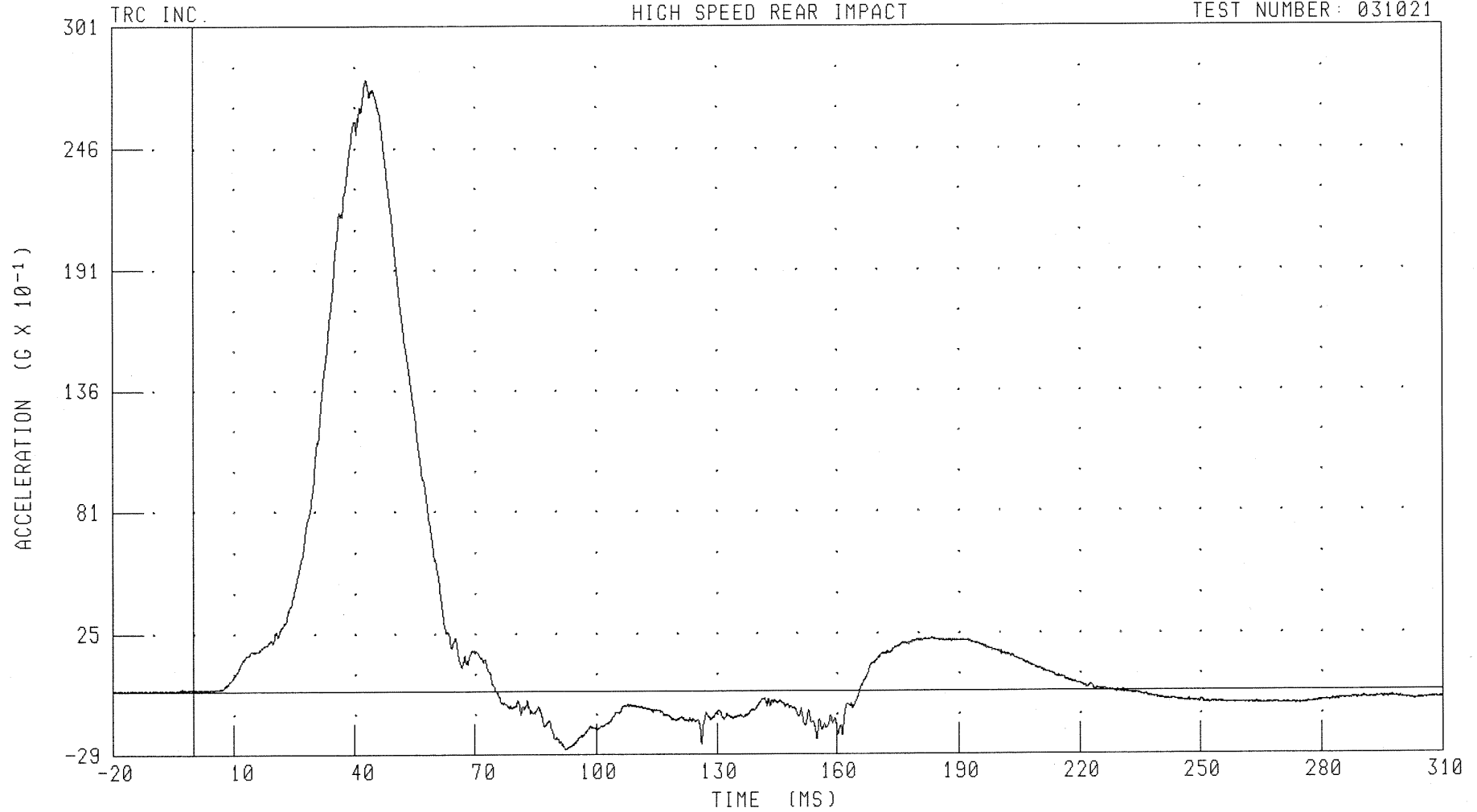
B-84

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER PELVIS X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVXG3 FILTER: CH. CLASS 1000

PEAK DATA: 27.69 G @ 42.96 MS; -2.69 G @ 92.32 MS

B-85

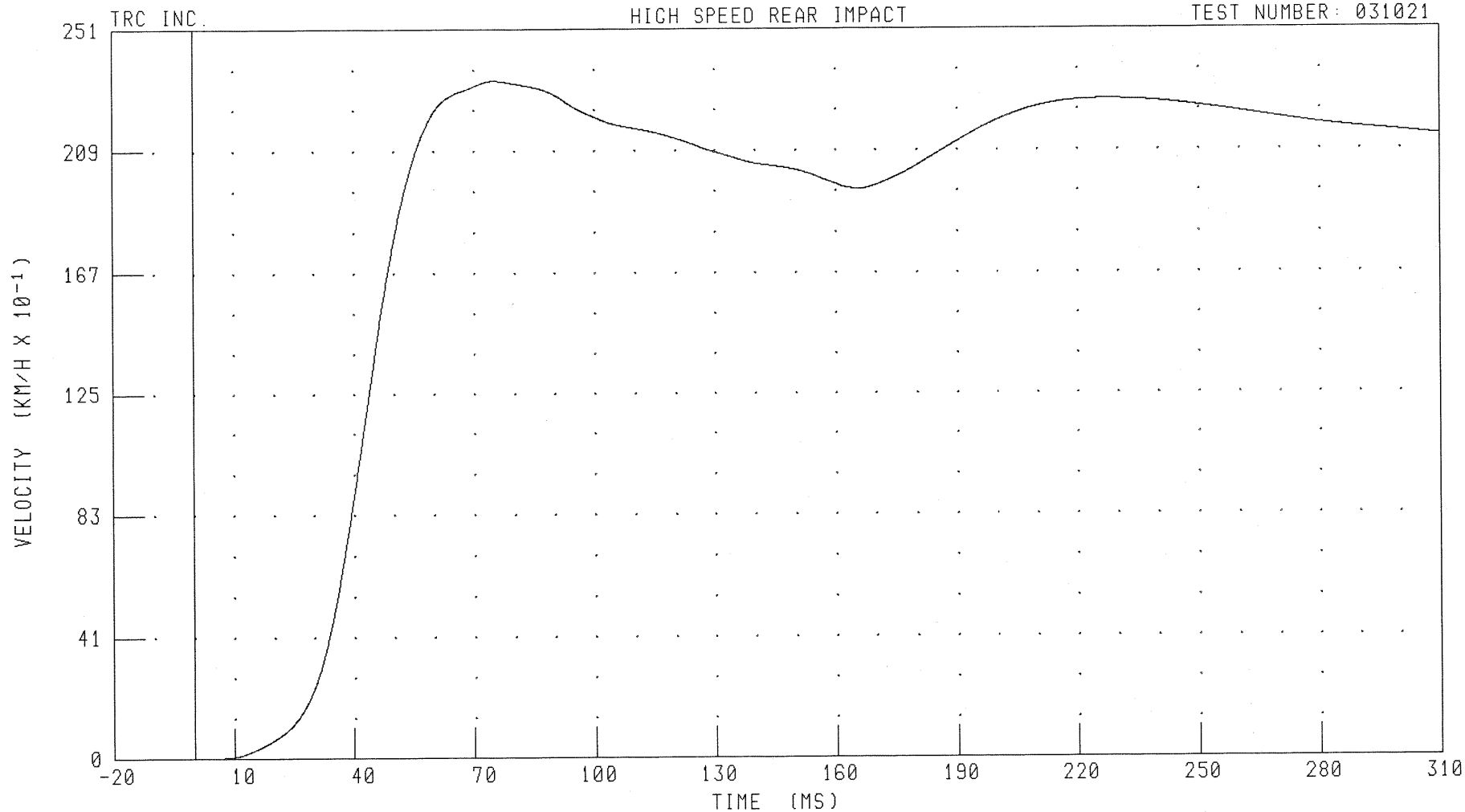
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER PELVIS X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVXV3

FILTER: CH. CLASS 180

PEAK DATA: 23.42 KM/H @ 75.20 MS; 0.00 KM/H @ 0.00 MS

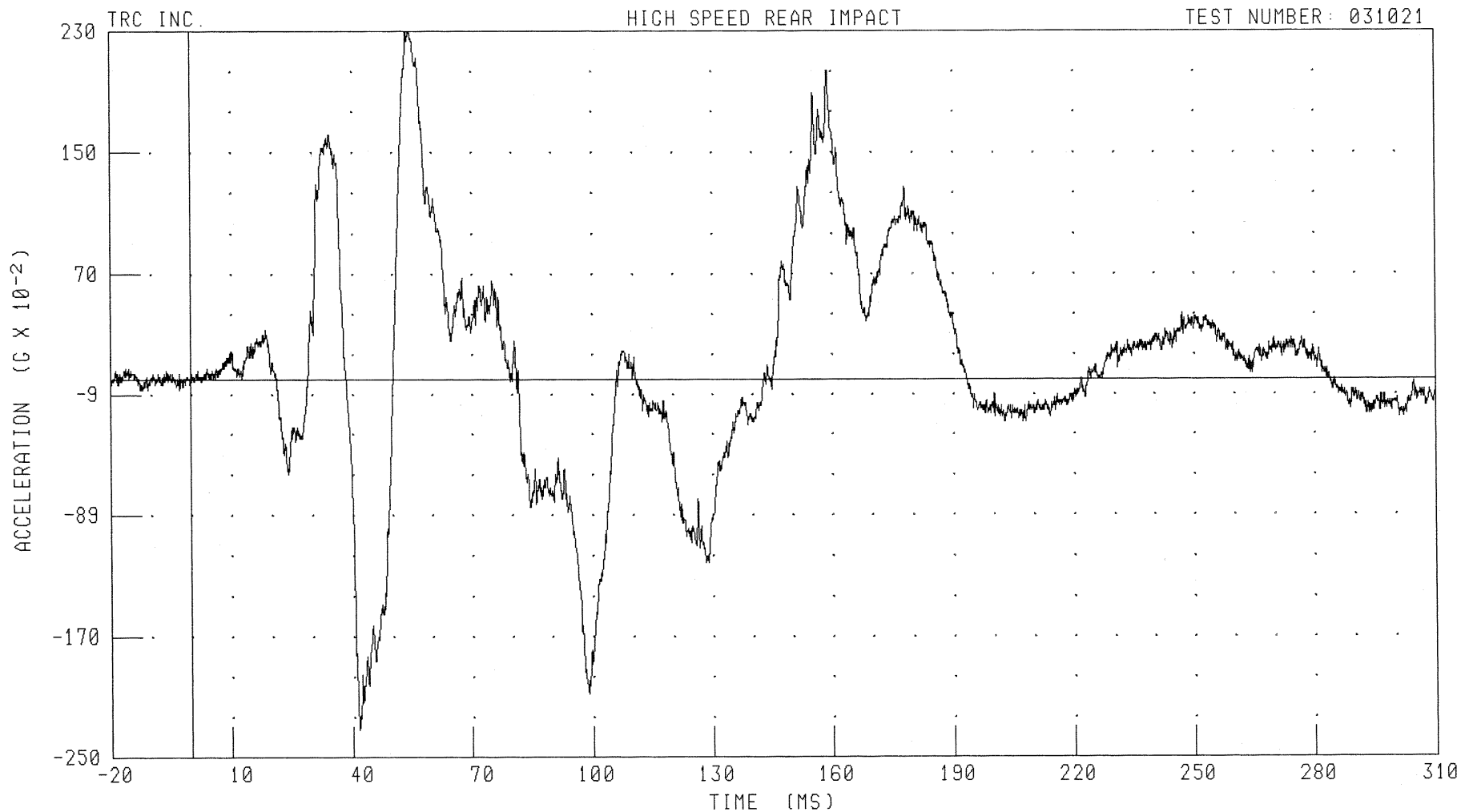
B-86

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER PELVIS Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVYG3

FILTER: CH. CLASS 1000

PEAK DATA: 2.32 G @ 53.68 MS; -2.32 G @ 41.52 MS

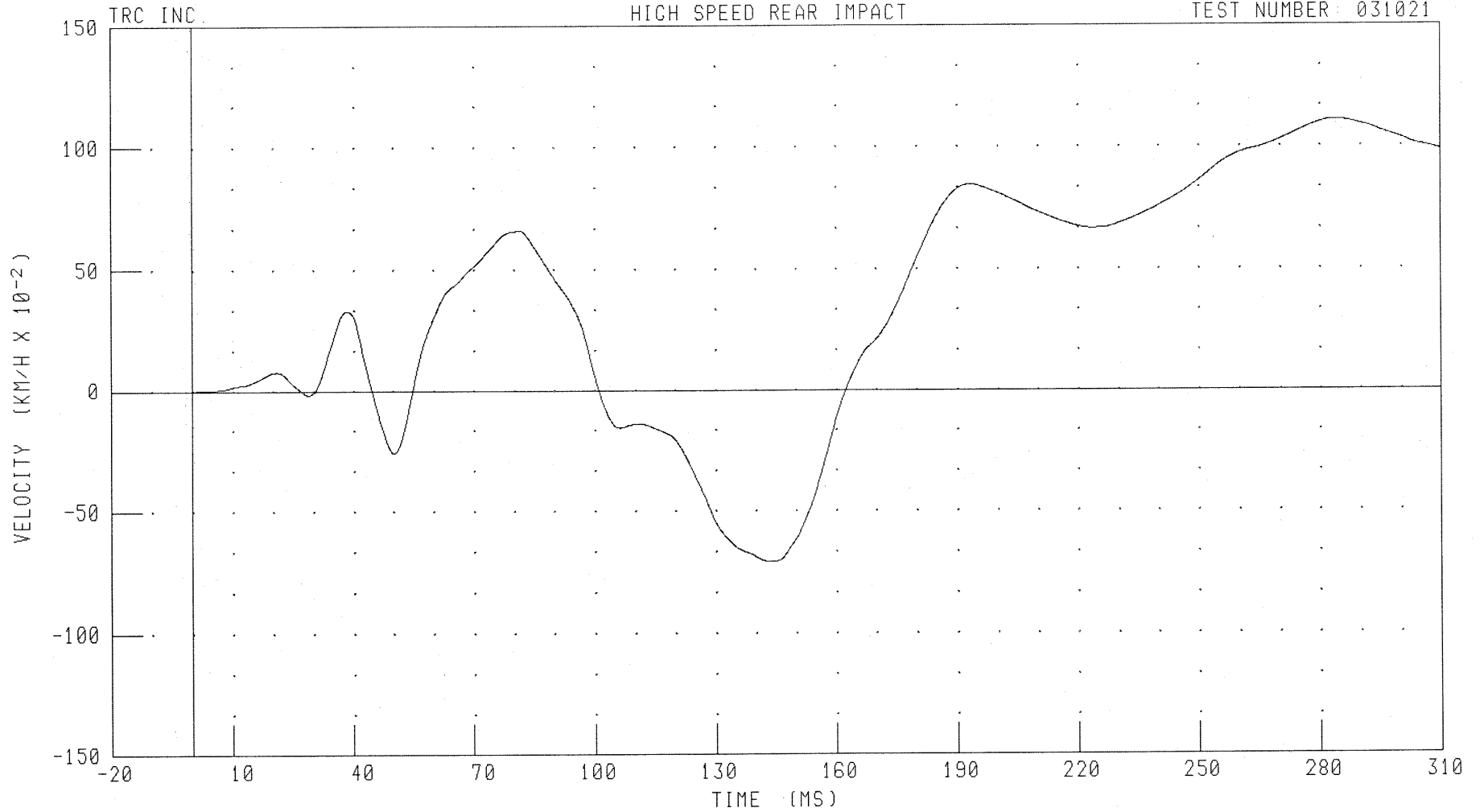
B-87

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER PELVIS Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVYV3

FILTER: CH. CLASS 180

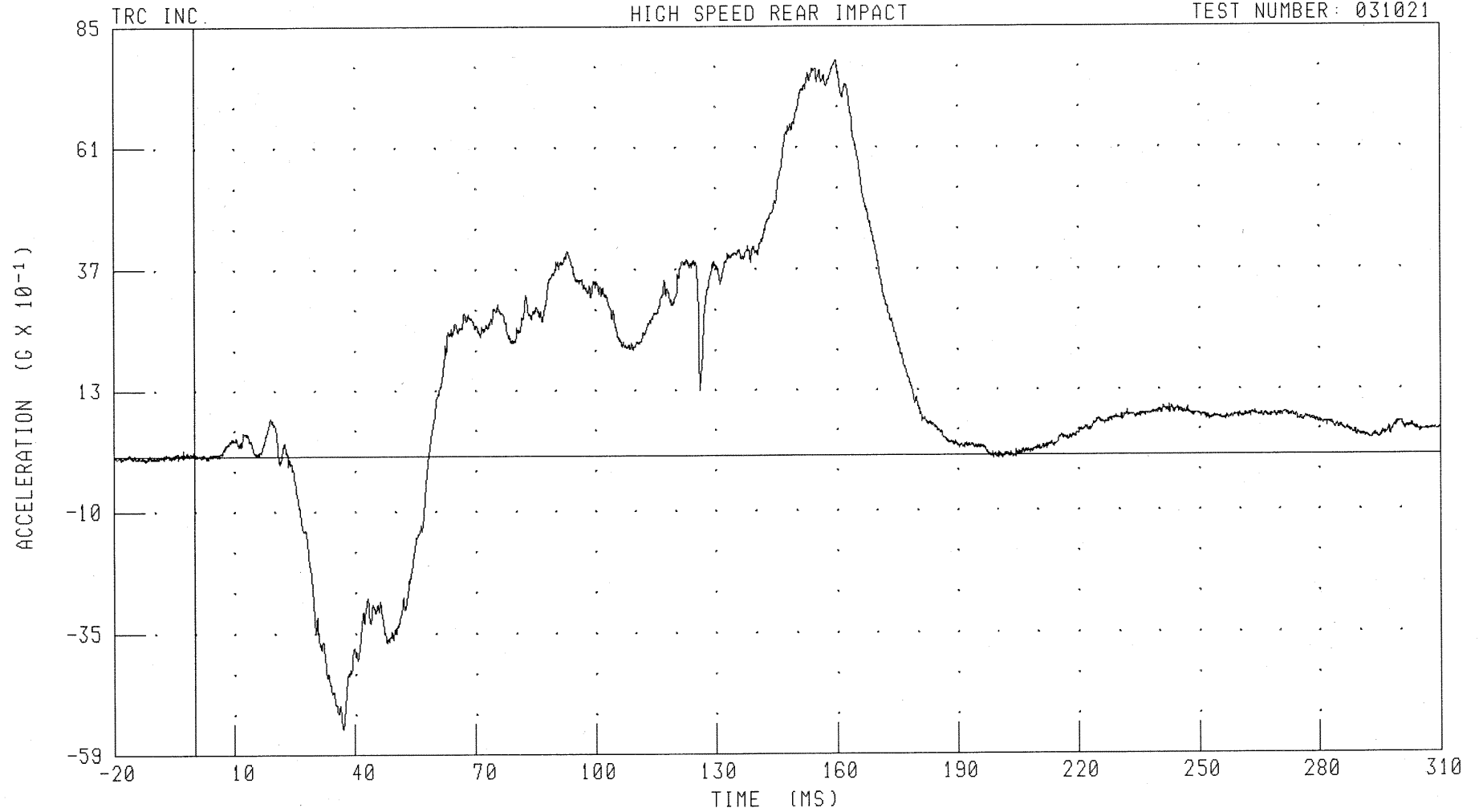
PEAK DATA: 1.11 KM/H @ 283.92 MS; -0.71 KM/H @ 143.20 MS

B-88

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 031021



CHANNEL: PEVZG3 FILTER: CH. CLASS 1000

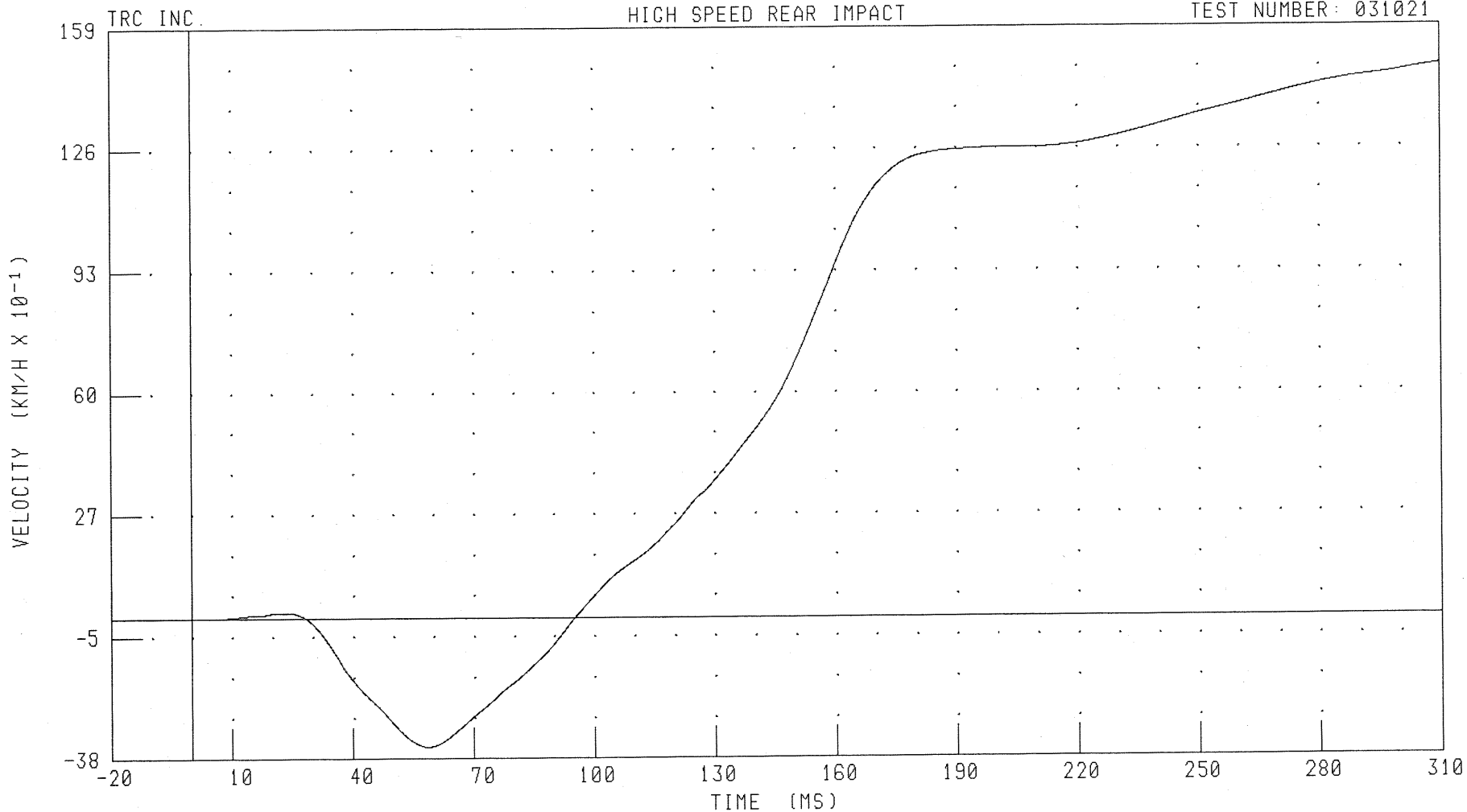
B-89

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER PELVIS Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVZV3

FILTER: CH. CLASS 180

PEAK DATA: 14.94 KM/H @ 310.00 MS; -3.49 KM/H @ 58.48 MS

B-90

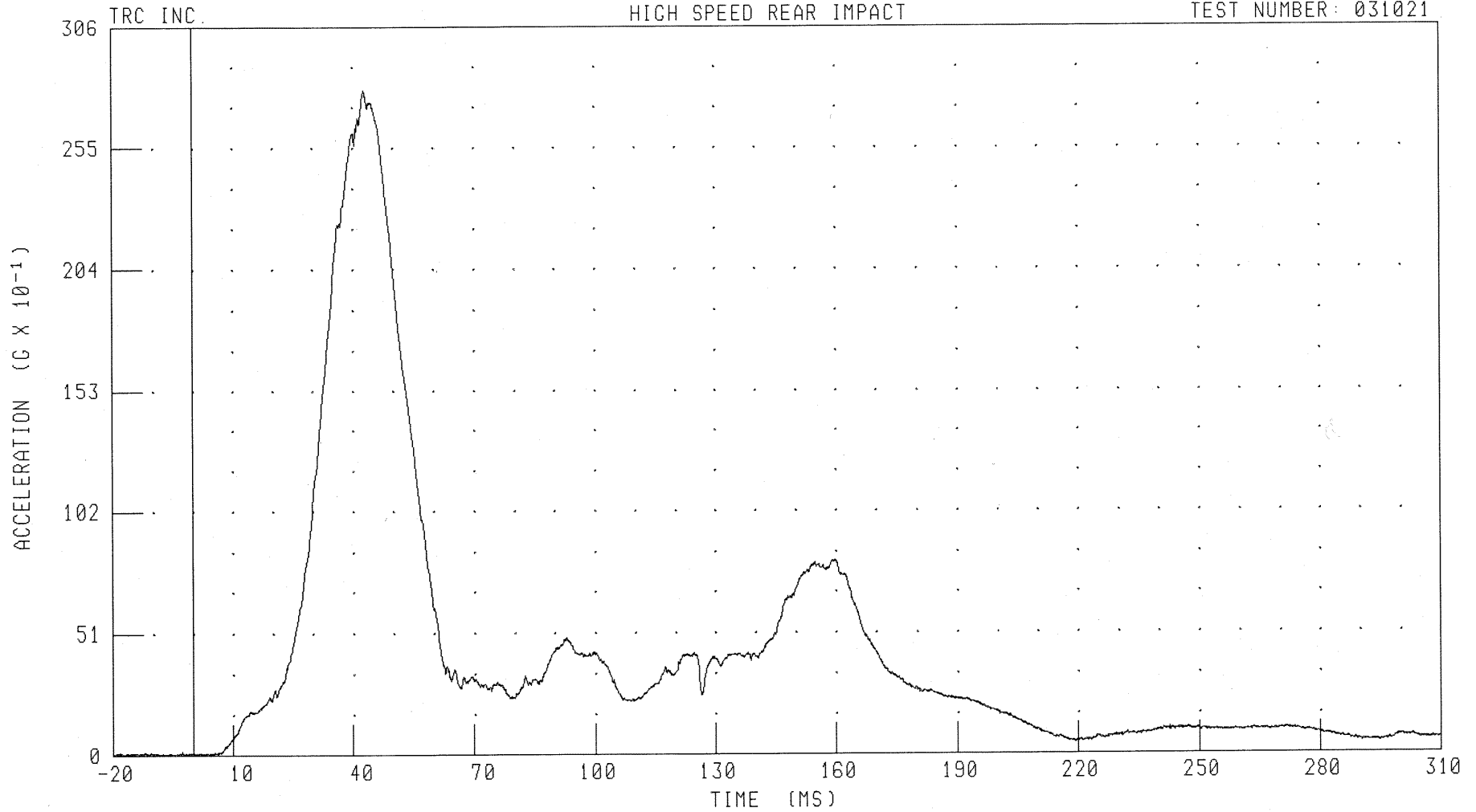
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER PELVIS RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: PEVRG3 FILTER: CH. CLASS 1000

PEAK DATA: 27.91 G @ 42.96 MS; 0.01 G @ -17.04 MS

B-91

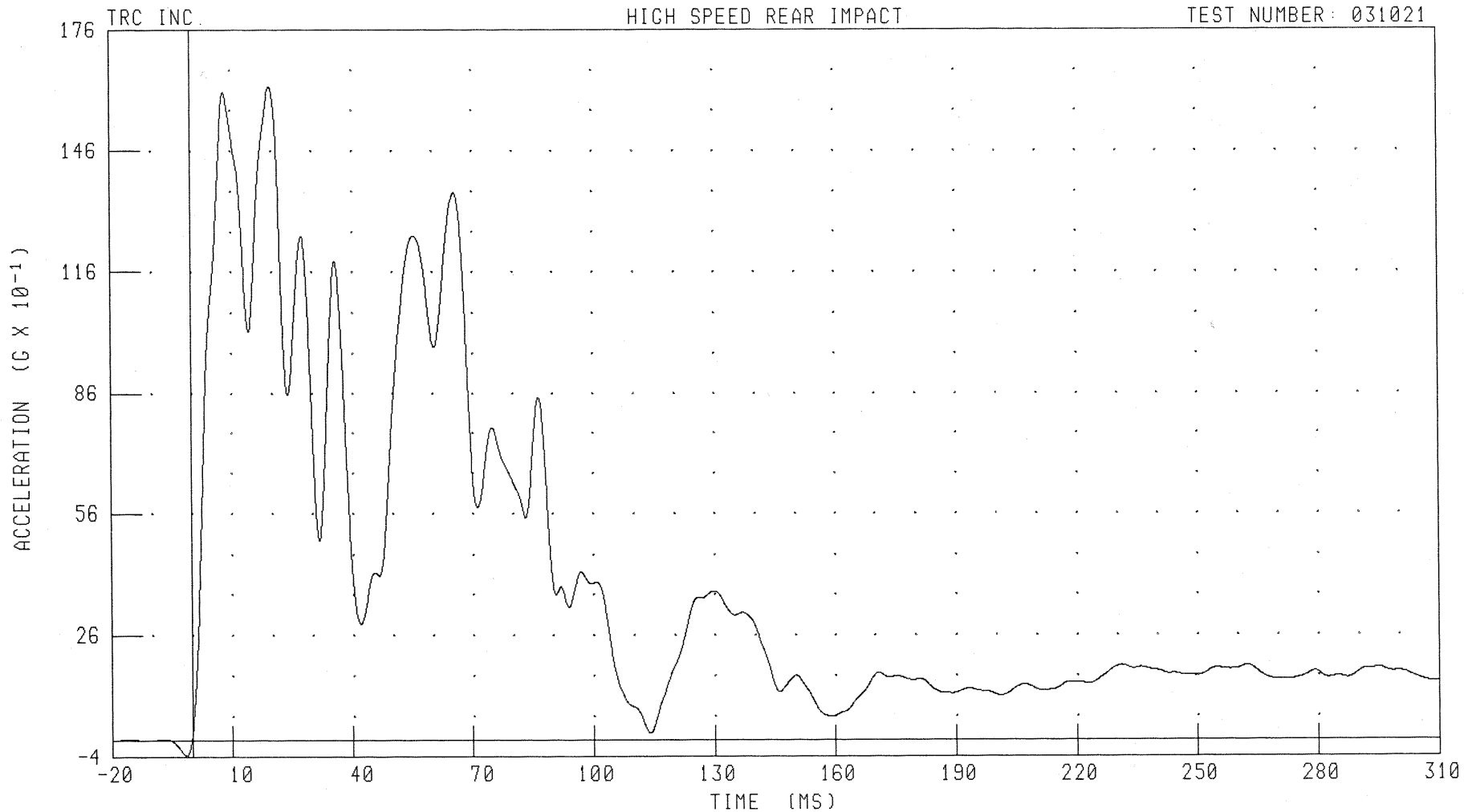
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

REAR FLOORPAN ABOVE AXLE X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKXG1

FILTER: CH. CLASS 60

PEAK DATA: 16.19 G @ 19.68 MS; -0.37 G @ -1.60 MS

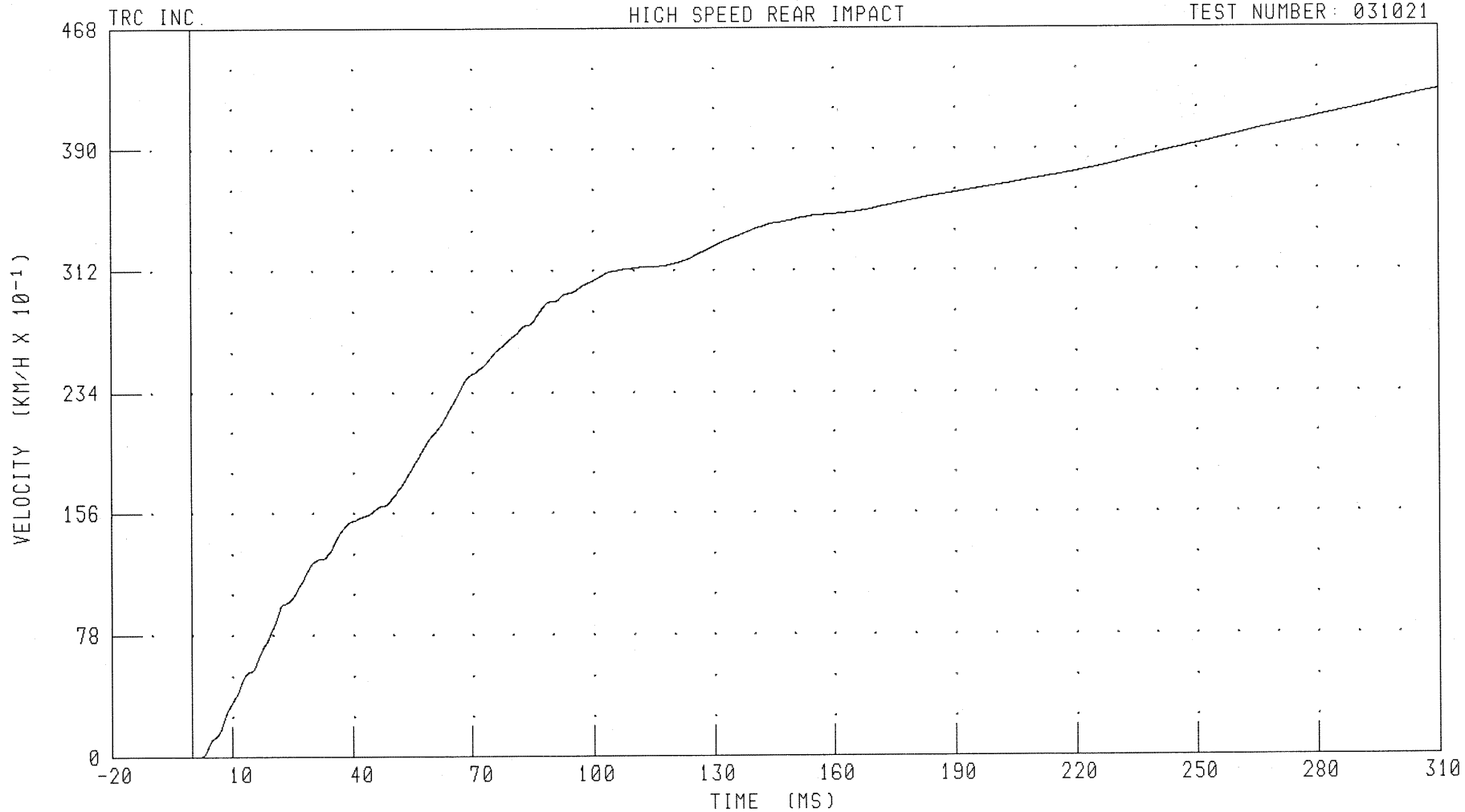
B-92

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKXV1

FILTER: CH. CLASS 180

PEAK DATA: 42.73 KM/H @ 310.00 MS; -0.01 KM/H @ 1.92 MS

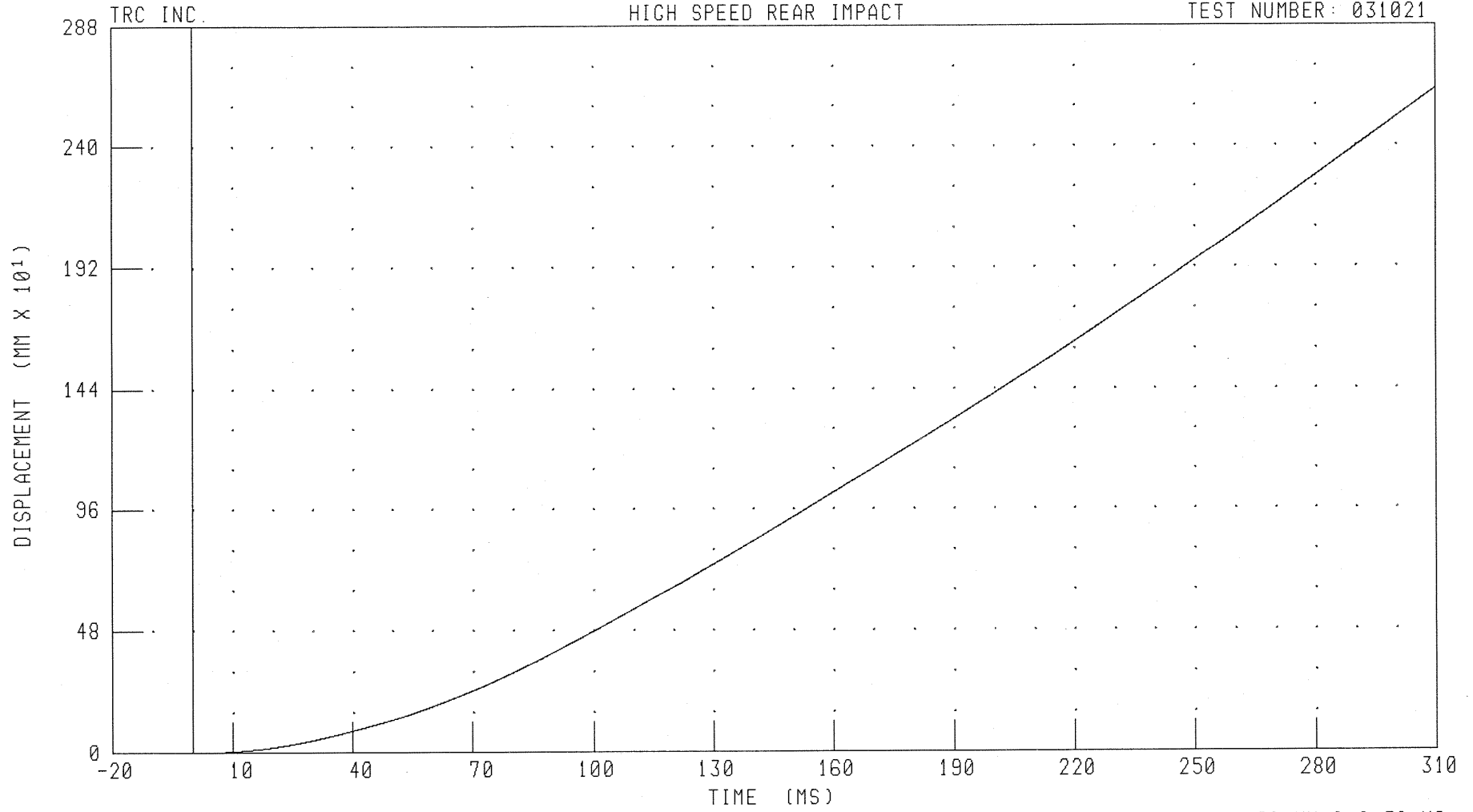
B-93

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE X-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKXD1

FILTER: CH. CLASS 180

PEAK DATA: 2628.05 MM @ 310.00 MS; 0.00 MM @ 2.32 MS

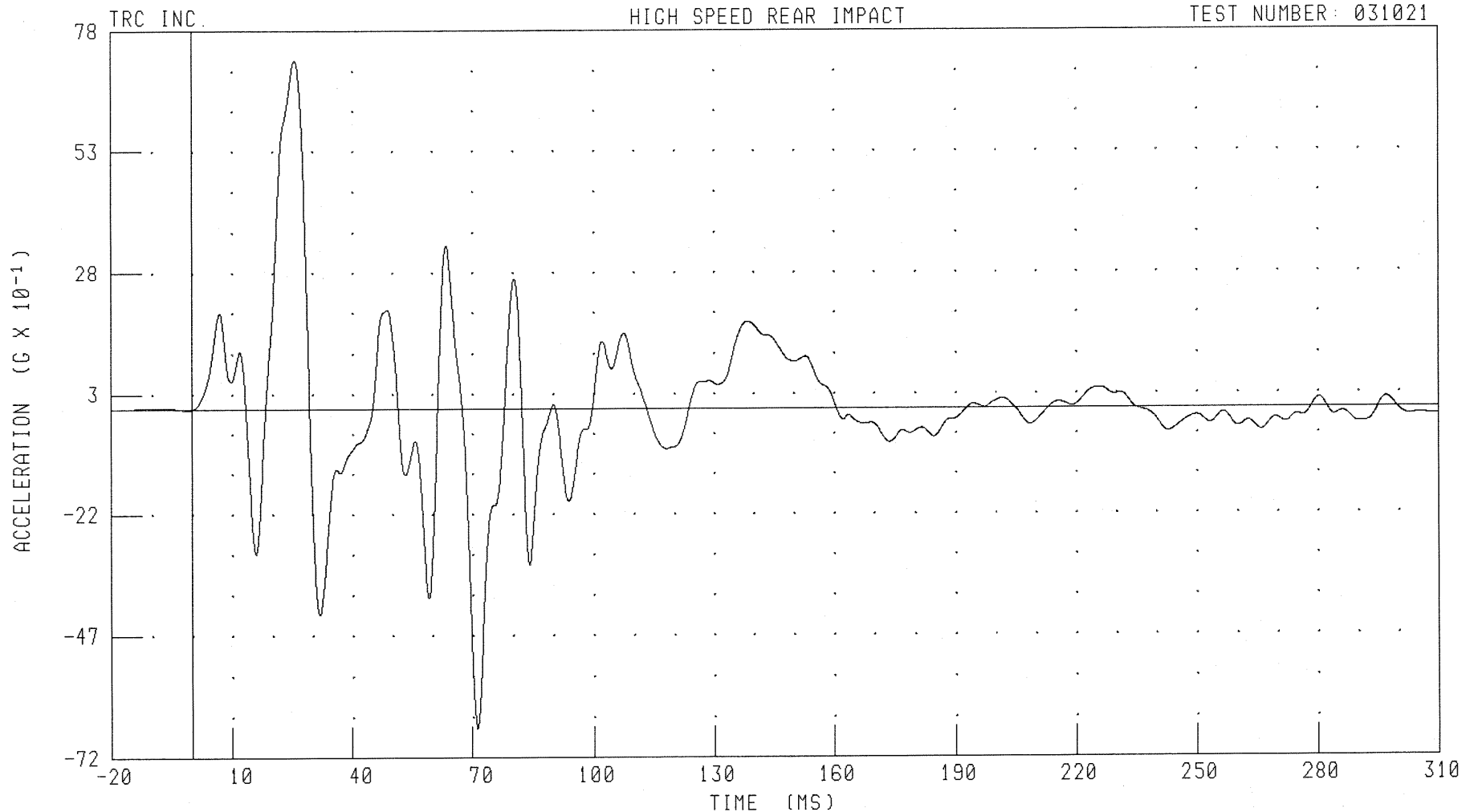
B-94

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKYG1

FILTER: CH. CLASS 60

PEAK DATA: 7.19 G @ 25.68 MS; -6.60 G @ 71.28 MS

B-95

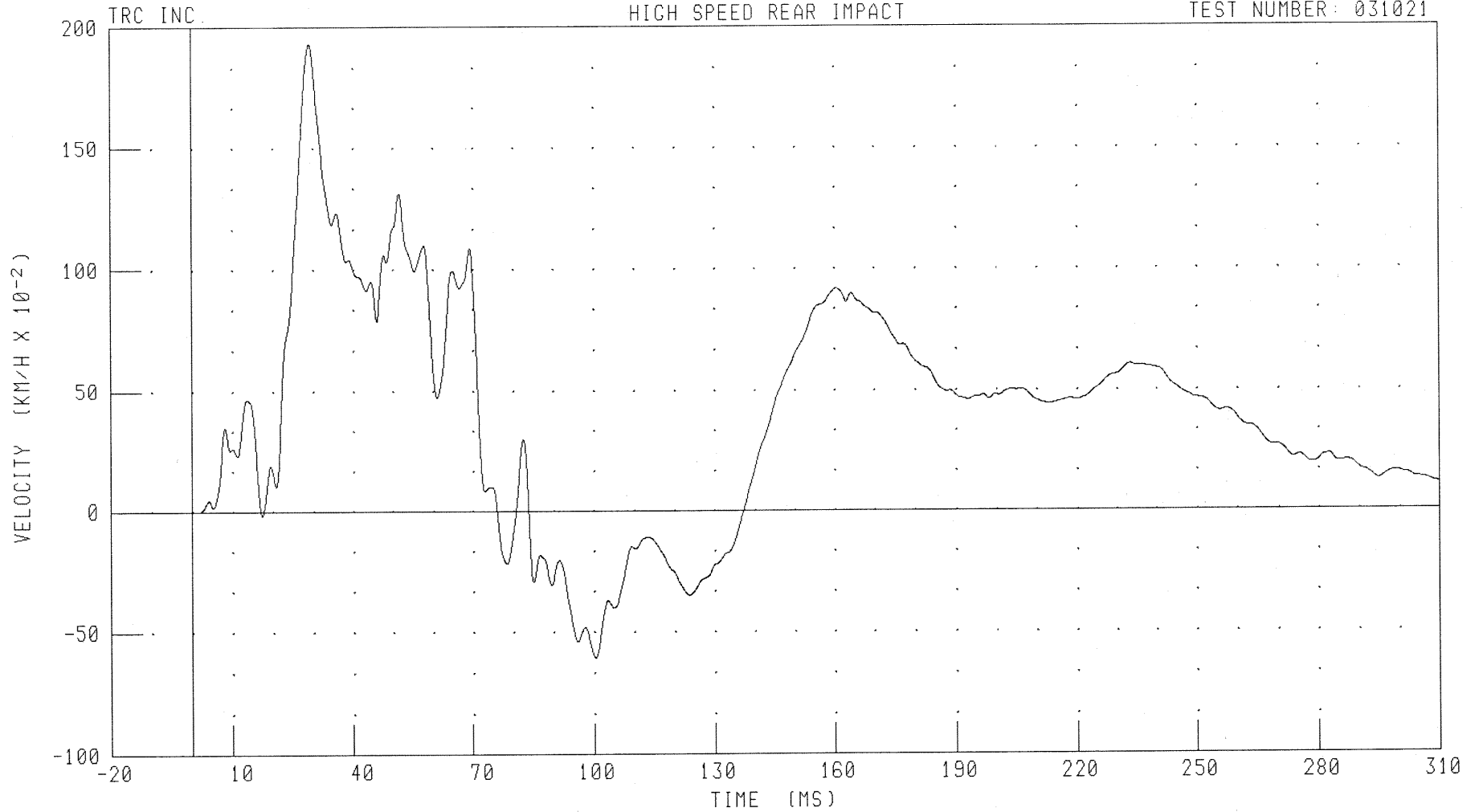
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

REAR FLOORPAN ABOVE AXLE Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKYV1 FILTER: CH. CLASS 180

PEAK DATA: 1.93 KM/H @ 29.28 MS; -0.61 KM/H @ 100.48 MS

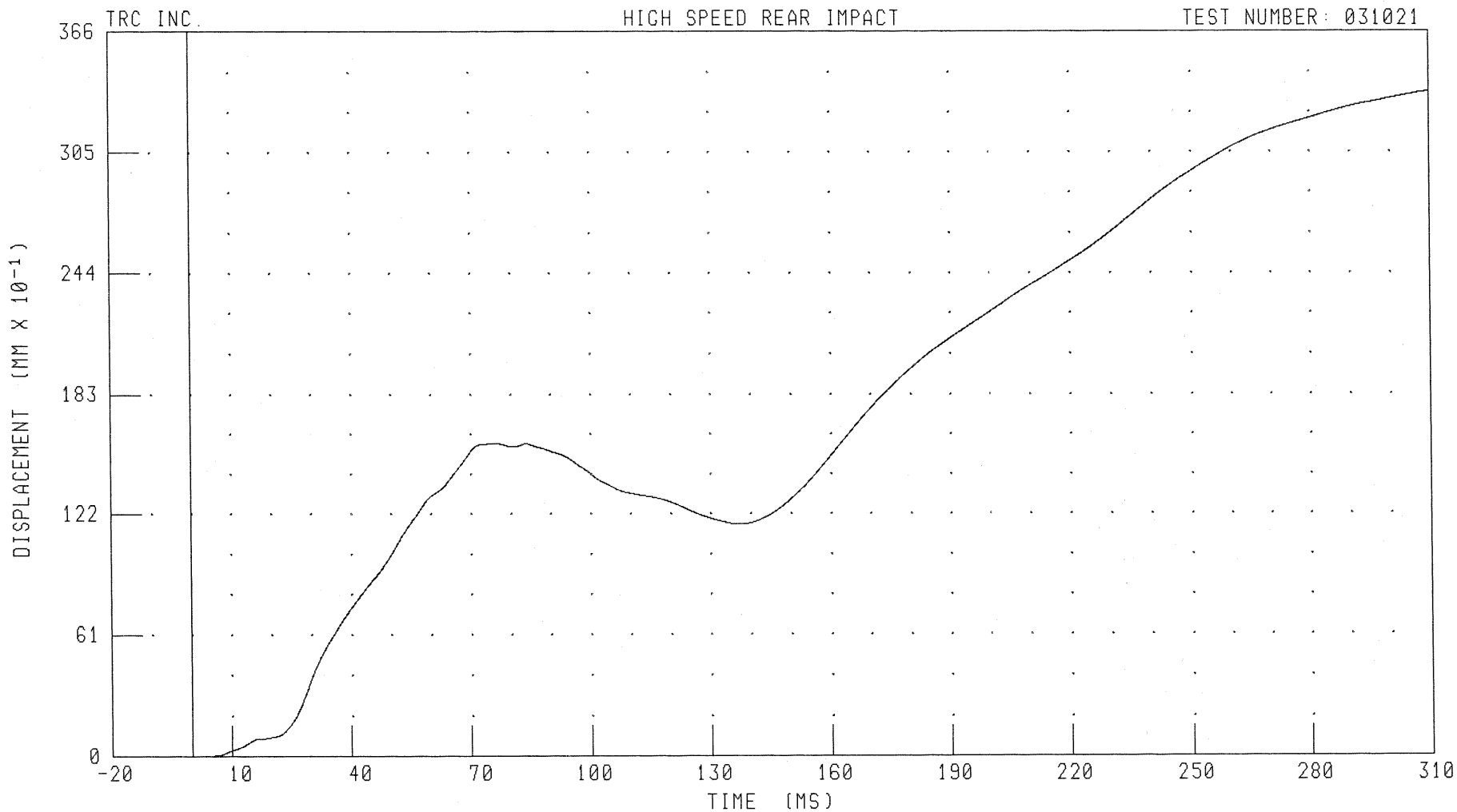
B-96

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE Y-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKYD1 FILTER: CH. CLASS 180

PEAK DATA: 33.58 MM @ 310.00 MS; 0.00 MM @ 2.16 MS

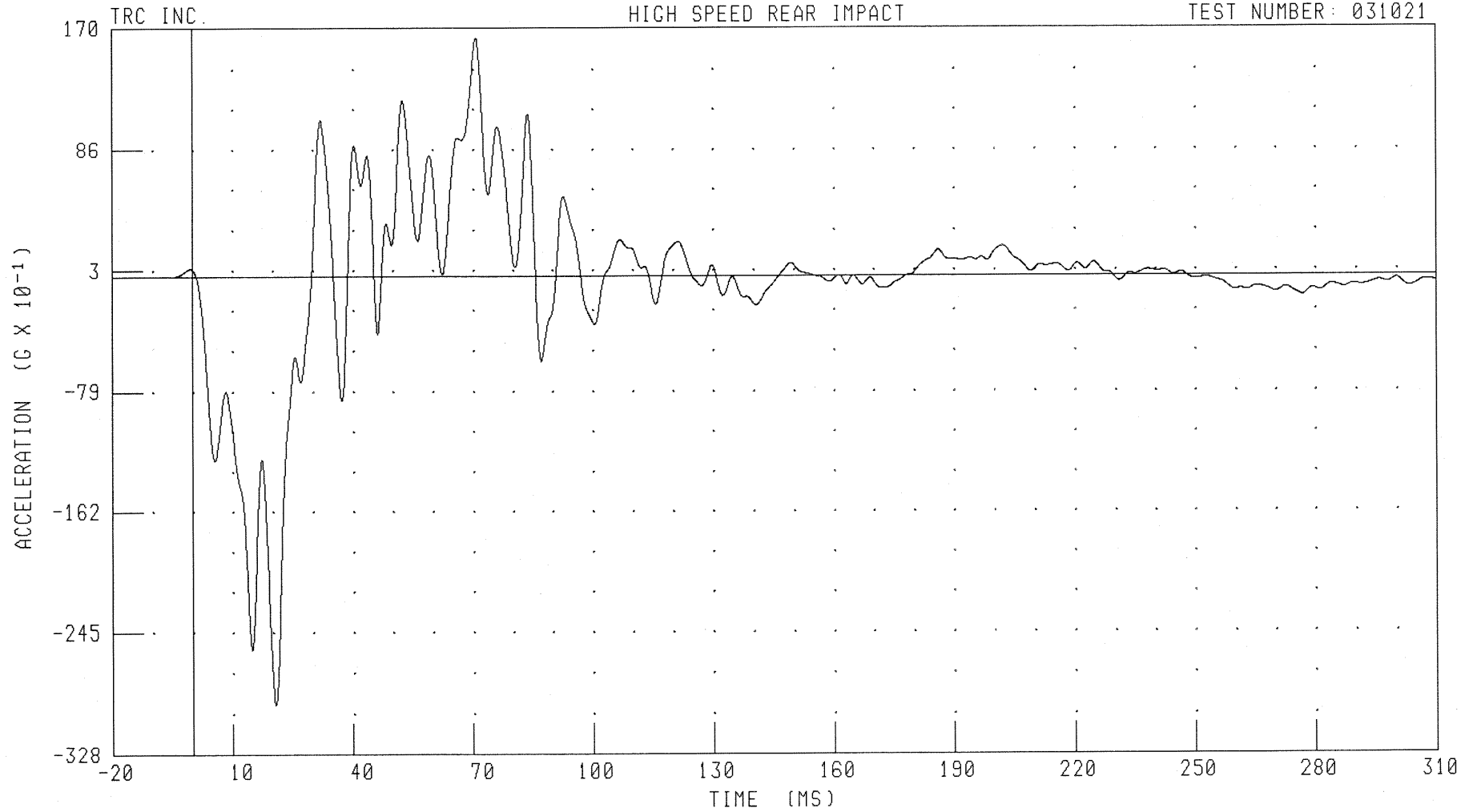
B-97

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKZG1 FILTER: CH. CLASS 60

PEAK DATA: 16.30 G @ 70.88 MS; -29.41 G @ 20.72 MS

B-98

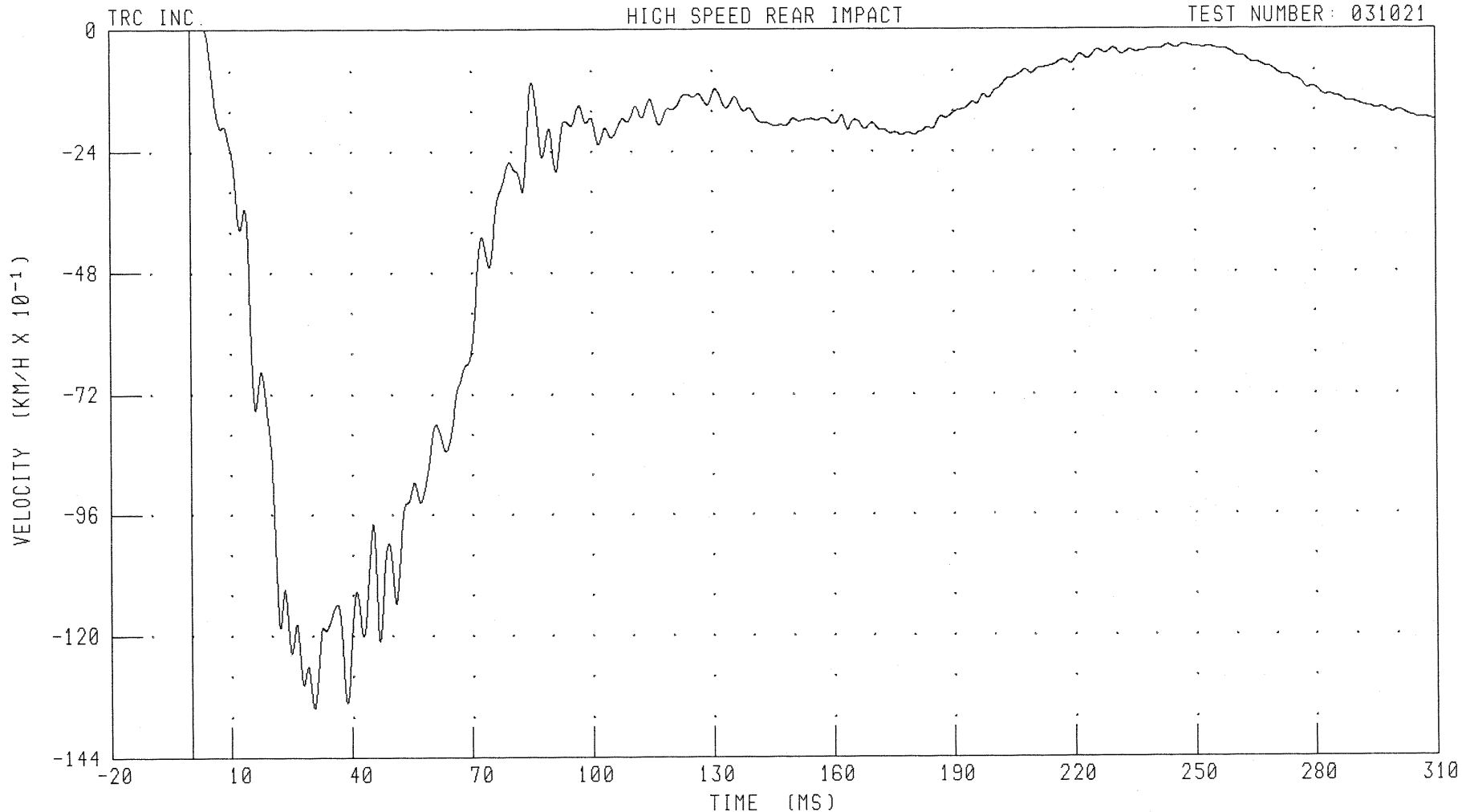
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

REAR FLOORPAN ABOVE AXLE Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKZV1 FILTER: CH. CLASS 180

PEAK DATA: 0.02 KM/H @ 3.20 MS; -13.43 KM/H @ 30.56 MS

B-99

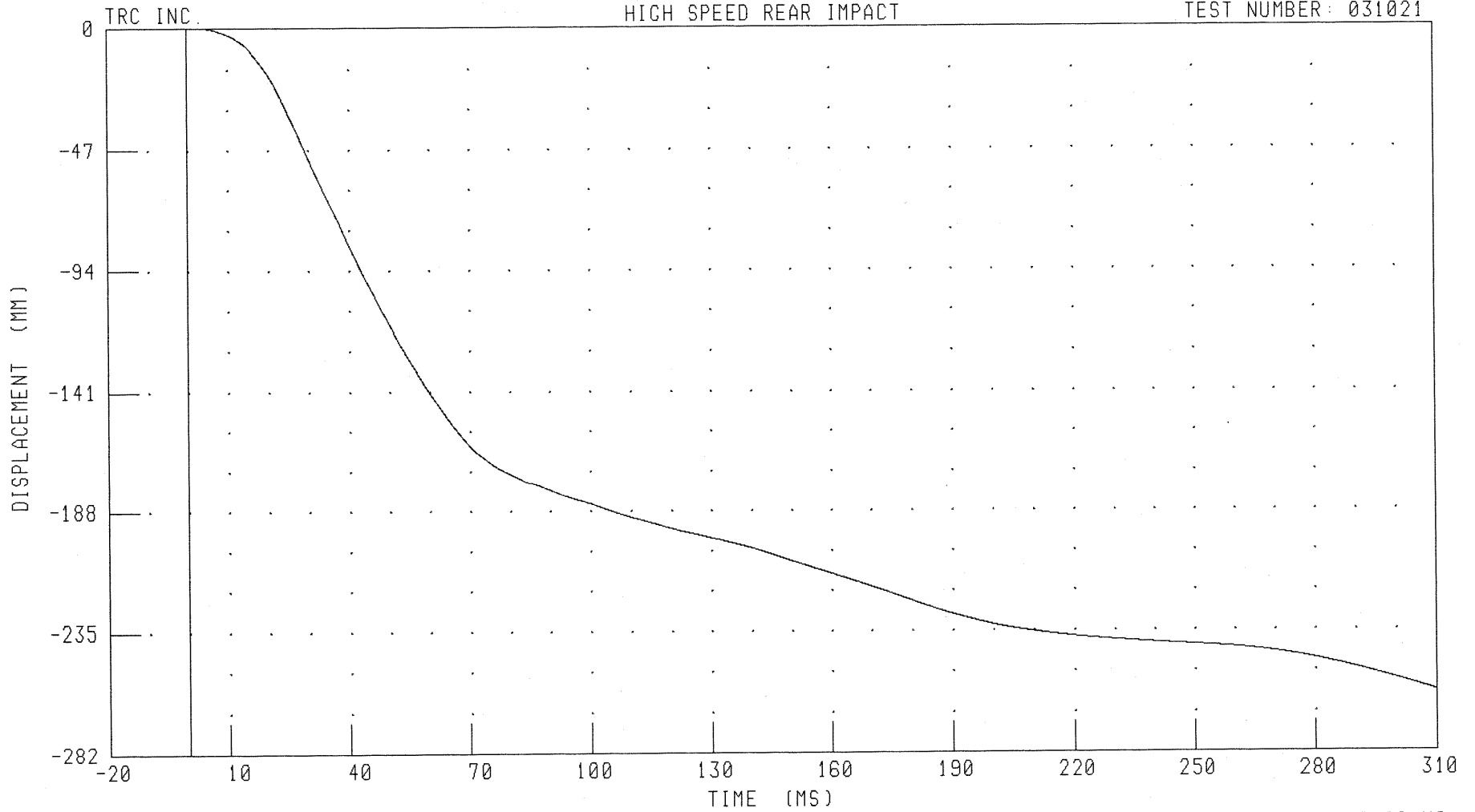
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

REAR FLOORPAN ABOVE AXLE Z-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKZD1 FILTER: CH. CLASS 180

PEAK DATA: 0.01 MM @ 3.68 MS; -258.78 MM @ 310.00 MS

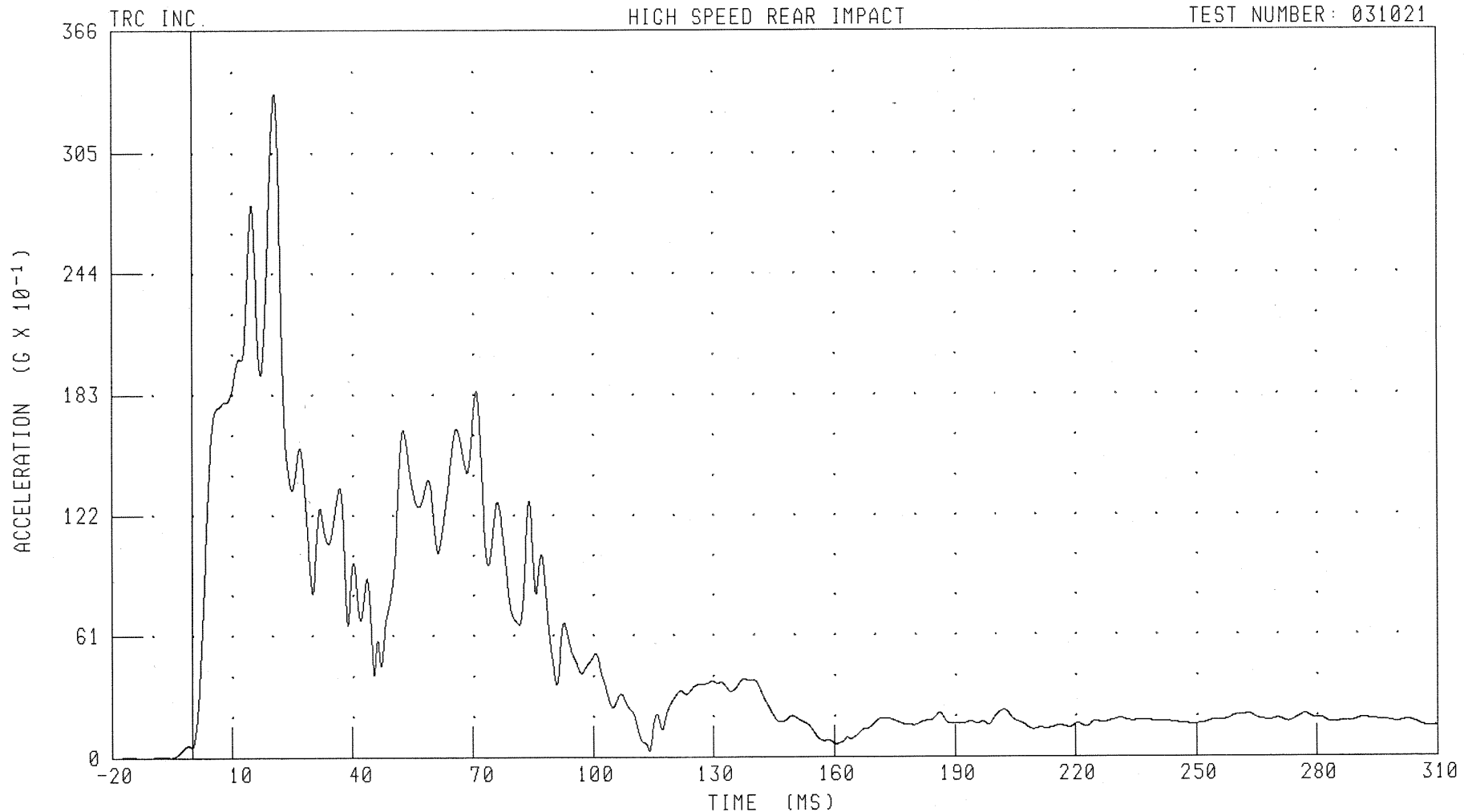
B-100

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RDKRG1

FILTER: CH. CLASS 60

PEAK DATA: 33.48 G @ 20.72 MS; 0.01 G @ -20.00 MS

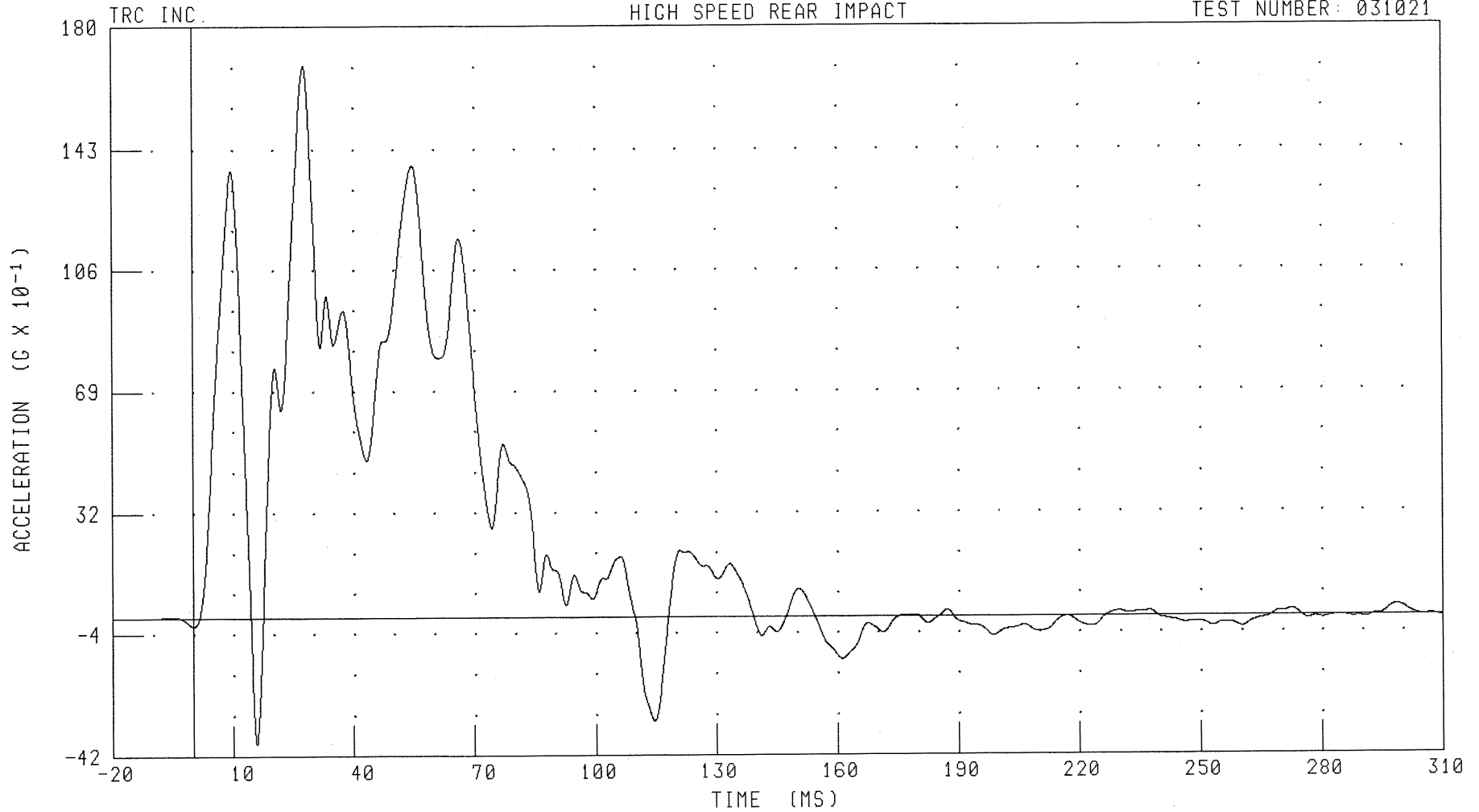
B-101

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTXG1

FILTER: CH. CLASS 60

PEAK DATA: 16.81 G @ 27.84 MS; -3.84 G @ 15.76 MS

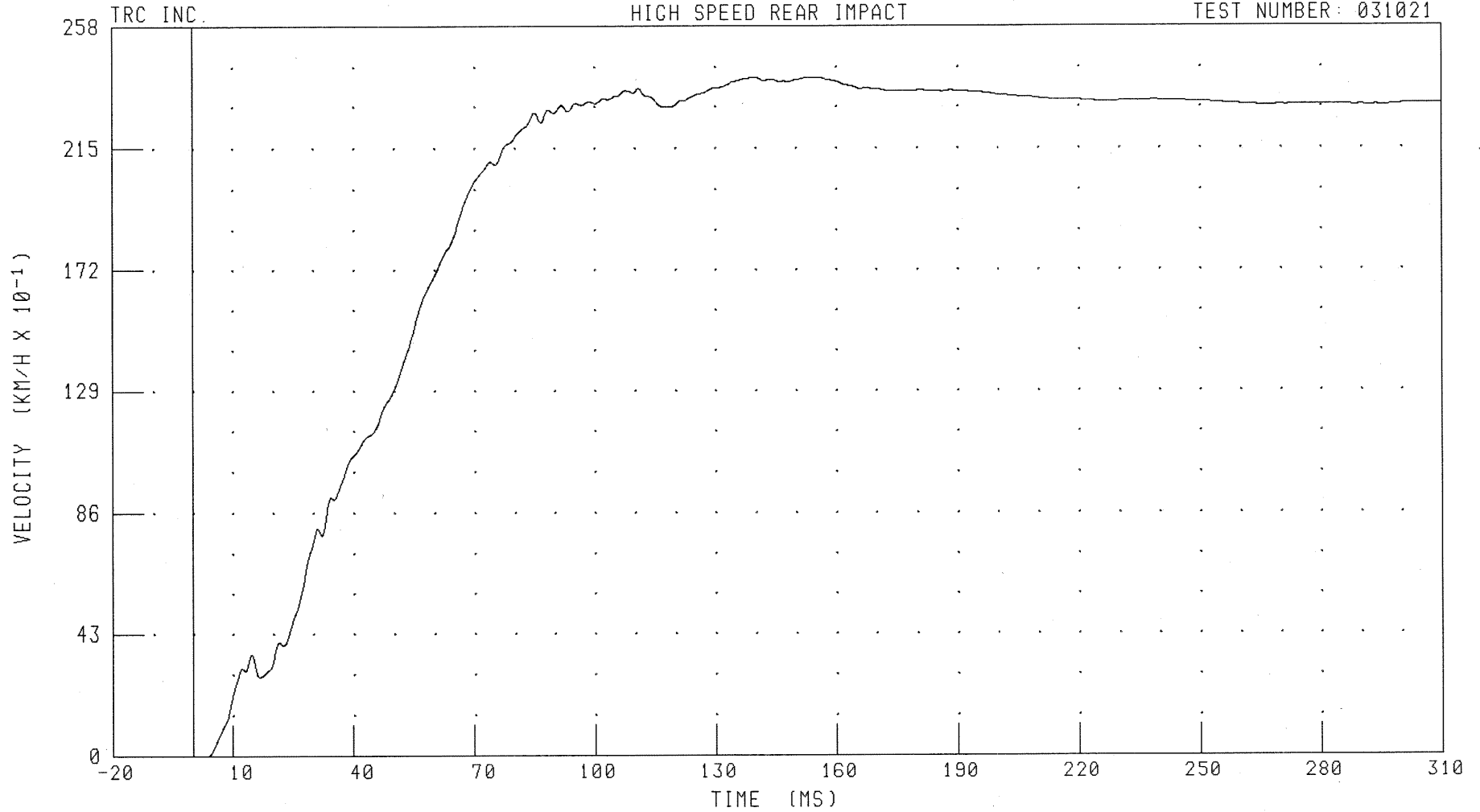
B-102

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTXV1

FILTER: CH. CLASS 180

PEAK DATA: 23.99 KM/H @ 155.68 MS; 0.00 KM/H @ 3.20 MS

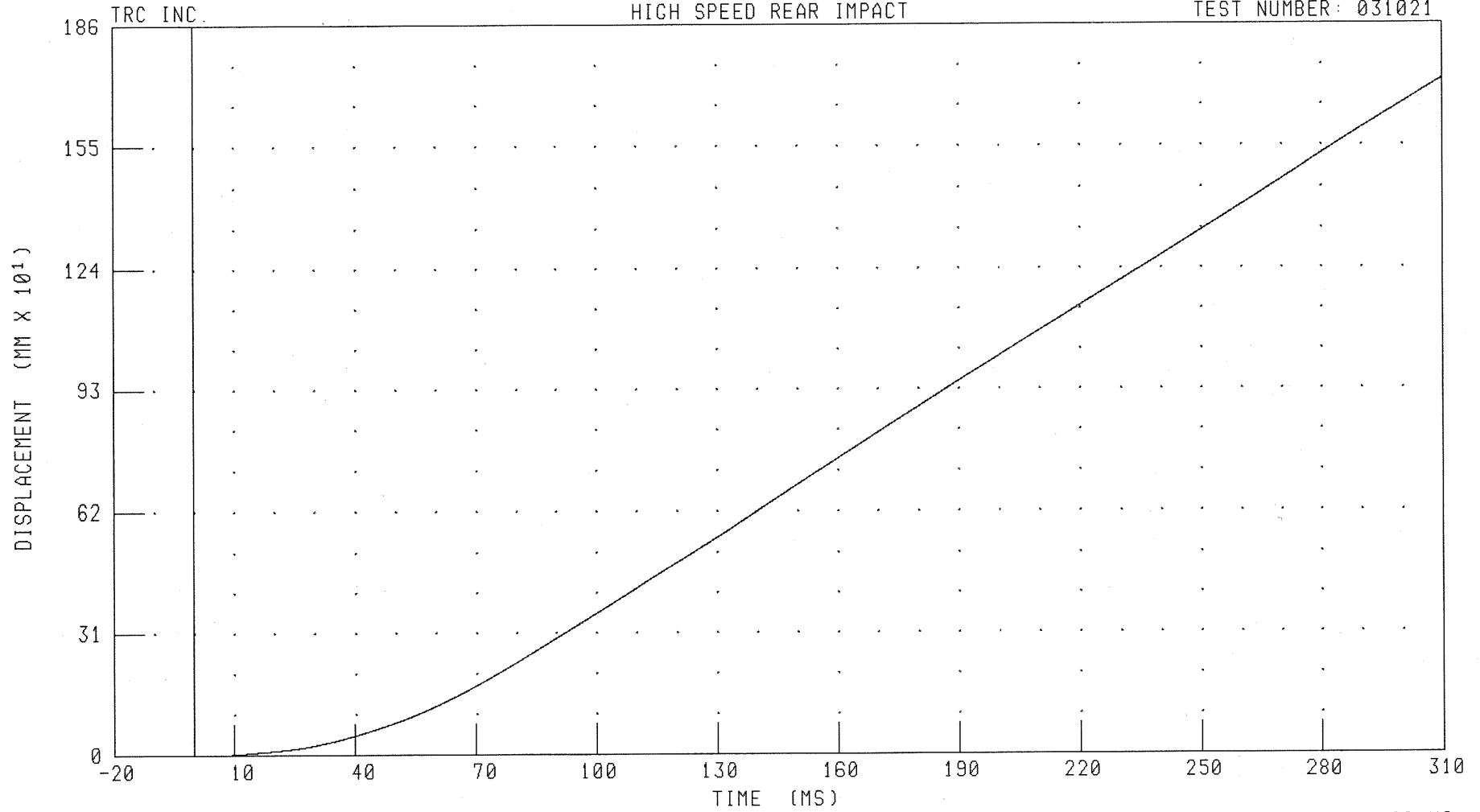
B-103

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT X-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTXD1

FILTER: CH. CLASS 180

PEAK DATA: 1719.51 MM @ 310.00 MS; 0.00 MM @ 0.00 MS

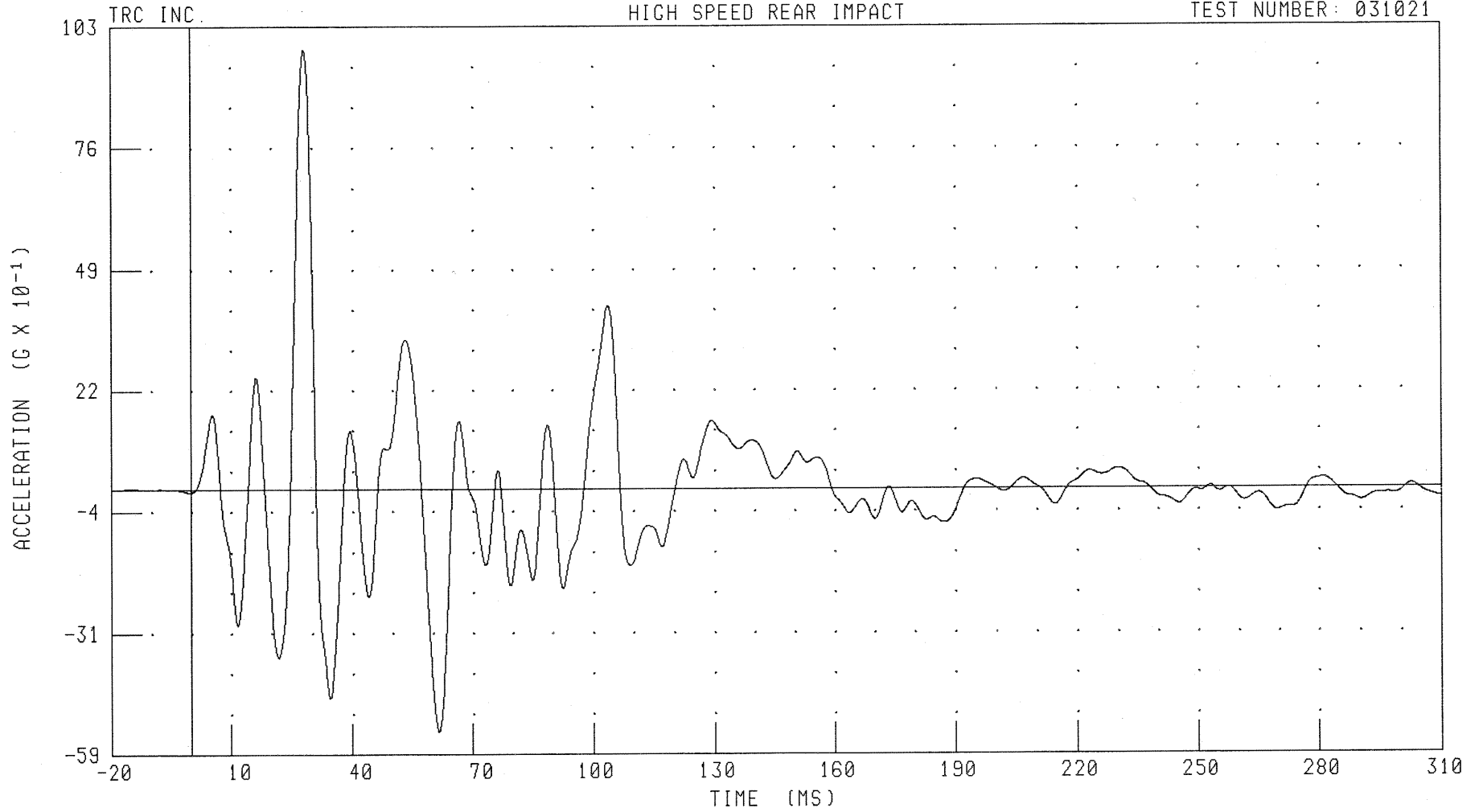
B-104

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Y-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTYG1

FILTER: CH. CLASS 60

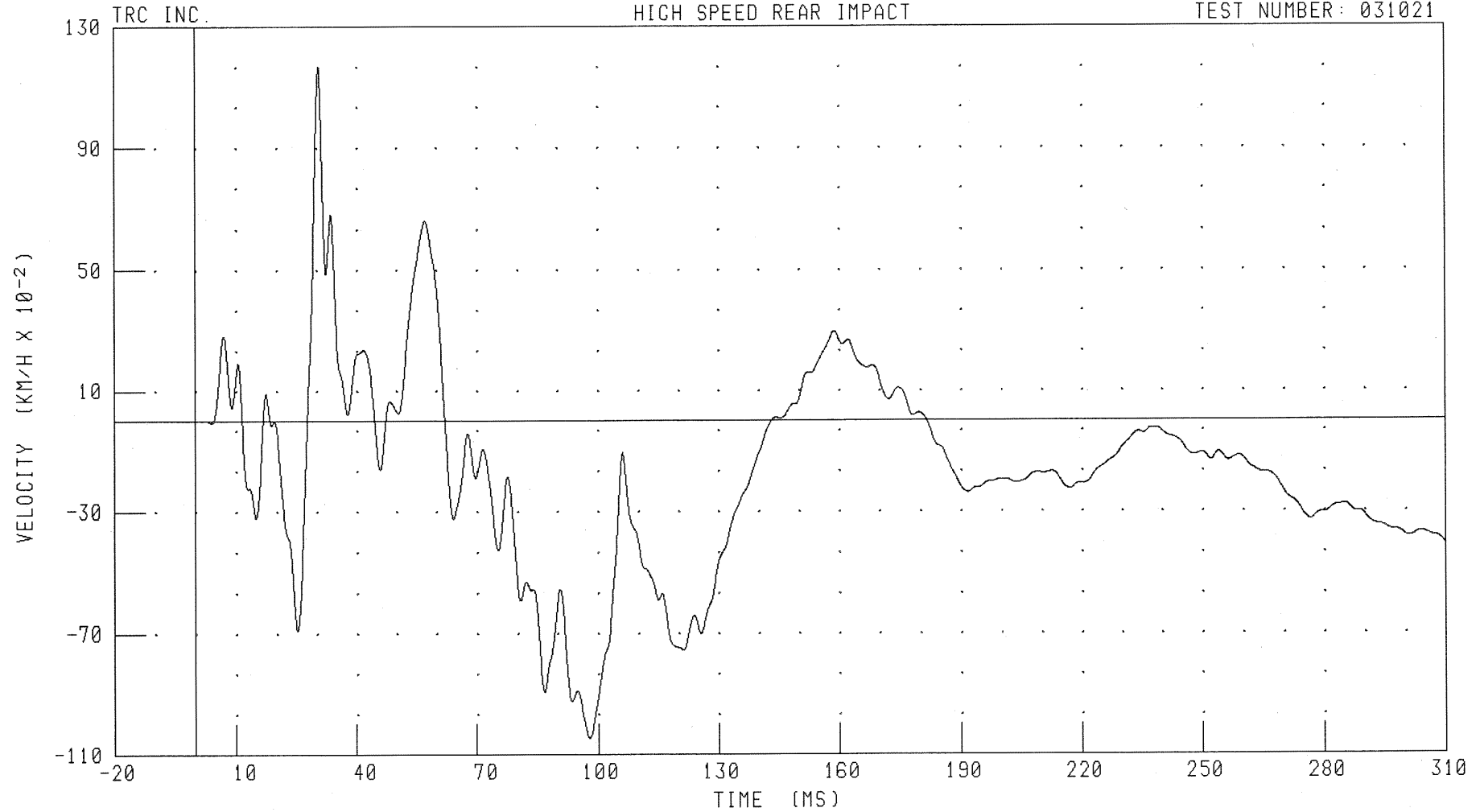
PEAK DATA: 9.79 G @ 28.16 MS; -5.40 G @ 61.44 MS

B-105

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Y-AXIS VELOCITY

TEST NUMBER: 031021



CHANNEL: LFTYV1 FILTER: CH. CLASS 180

PEAK DATA: 1.17 KM/H @ 30.56 MS; -1.05 KM/H @ 97.92 MS

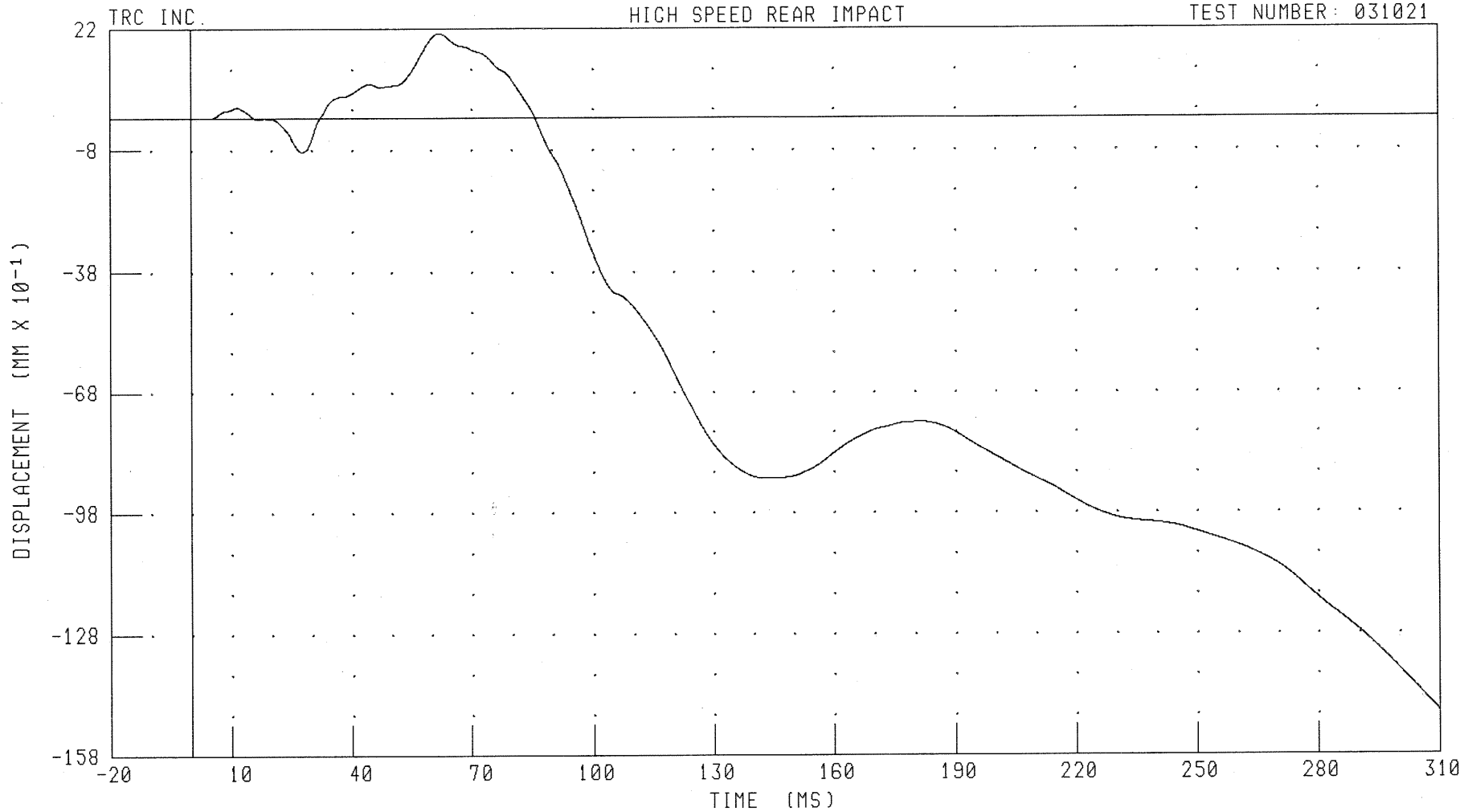
B-106

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Y-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTYD1

FILTER: CH. CLASS 180

PEAK DATA: 2.08 MM @ 62.16 MS; -14.75 MM @ 310.00 MS

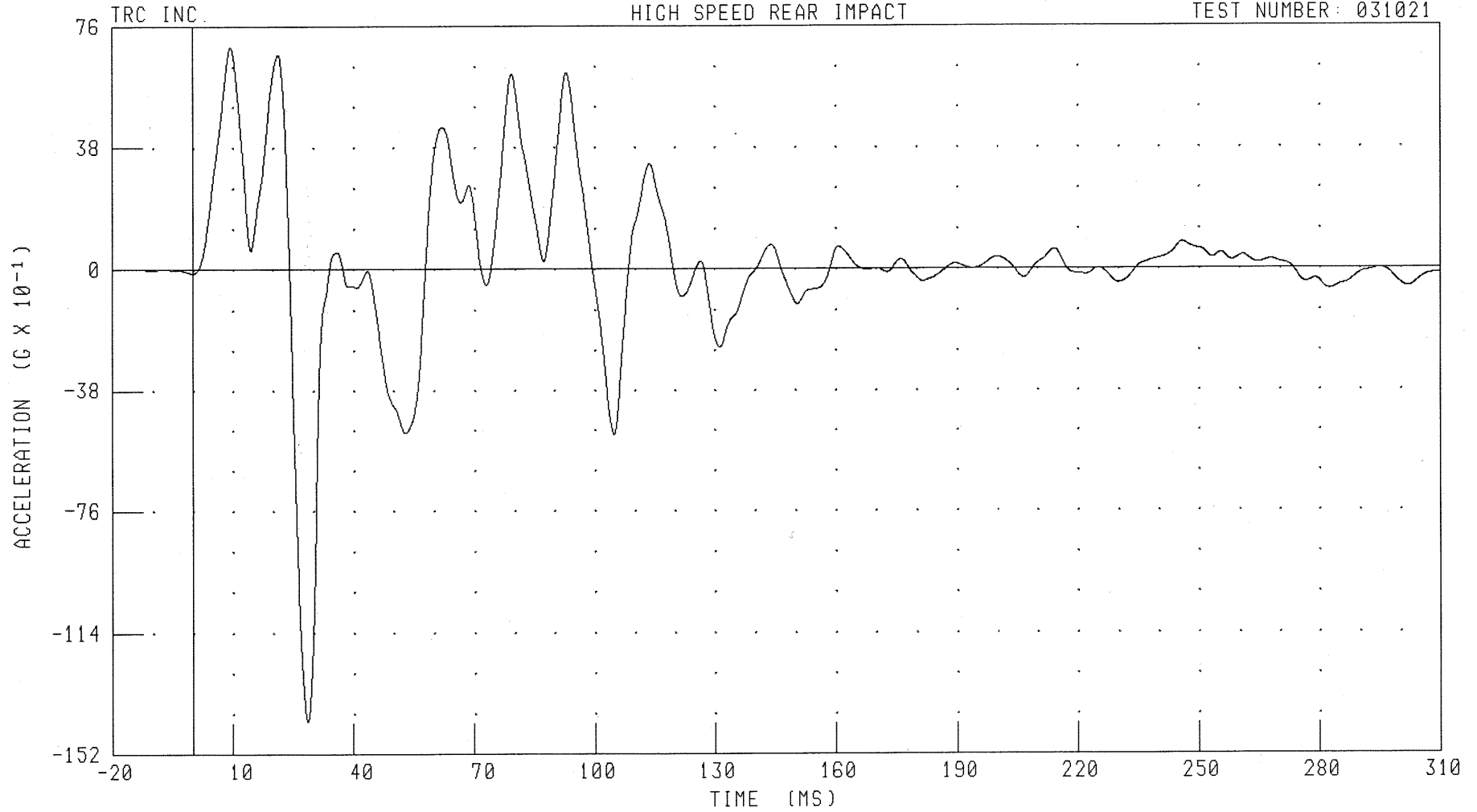
B-107

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTZG1 FILTER: CH. CLASS 60

PEAK DATA: 6.95 G @ 9.44 MS; -14.17 G @ 28.56 MS

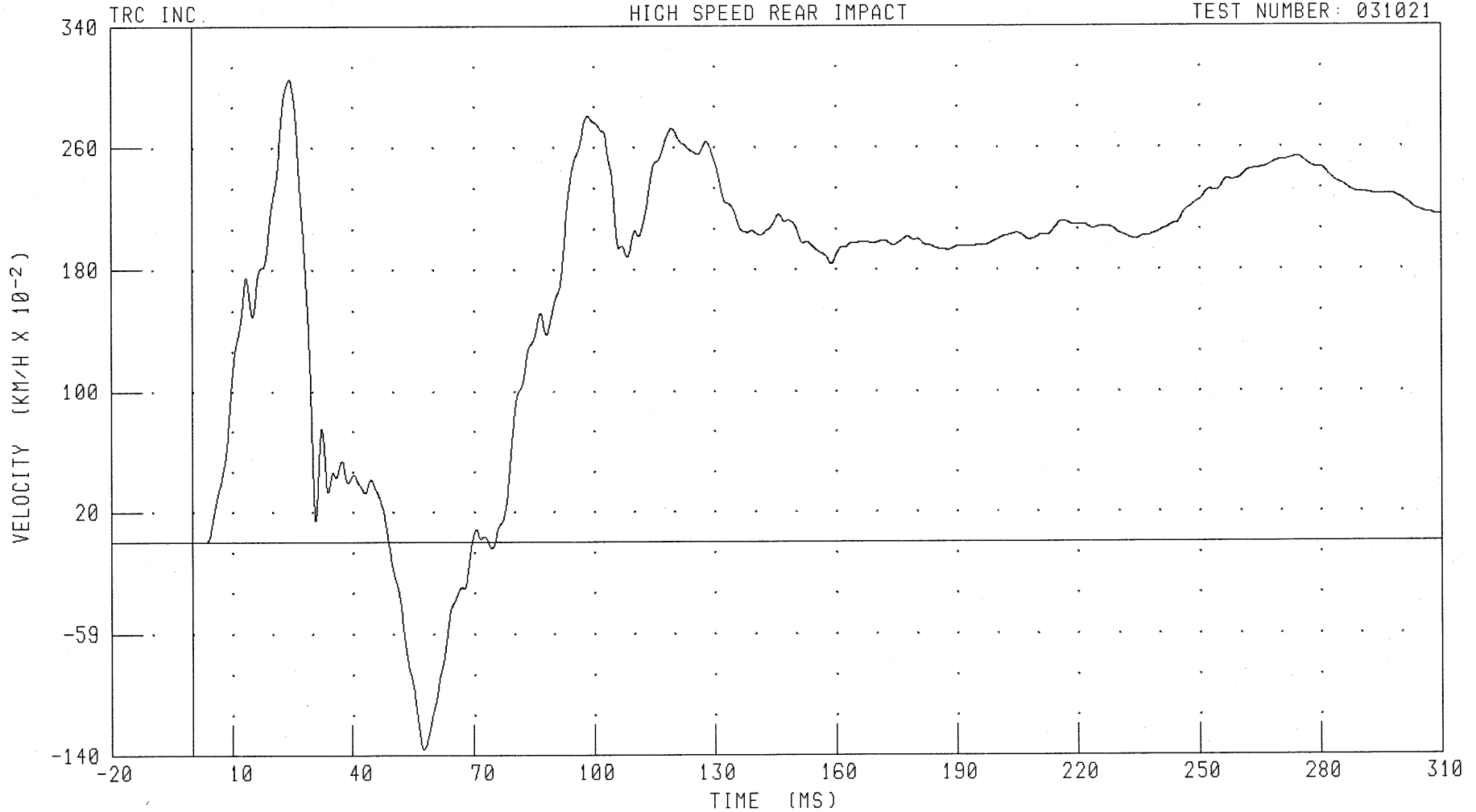
B-108

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTZV1

FILTER: CH. CLASS 180

PEAK DATA: 3.05 KM/H @ 24.40 MS; -1.36 KM/H @ 57.60 MS

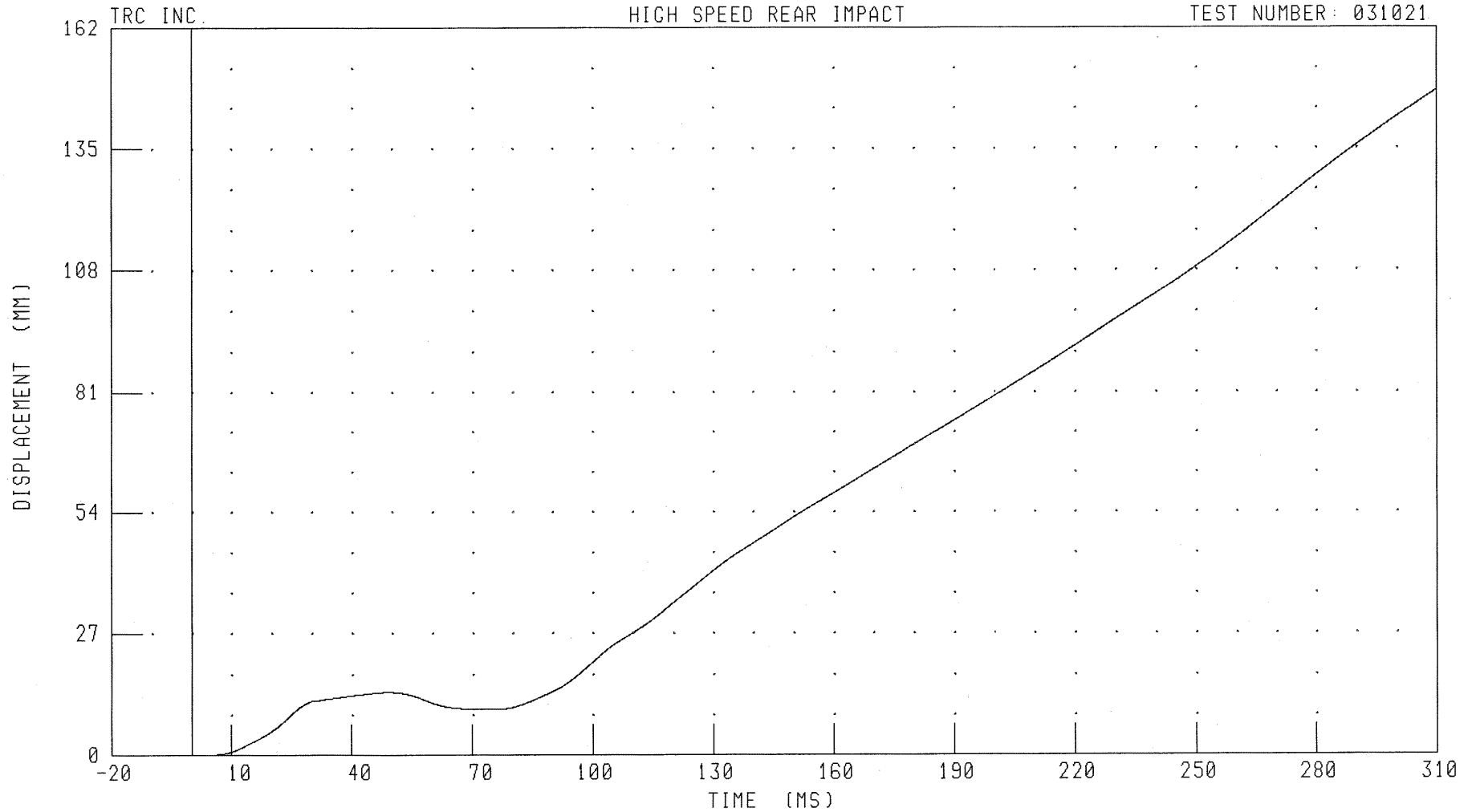
B-109

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT Z-AXIS DISPLACEMENT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTZD1

FILTER: CH. CLASS 180

PEAK DATA: 148.03 MM @ 310.00 MS; 0.00 MM @ 0.00 MS

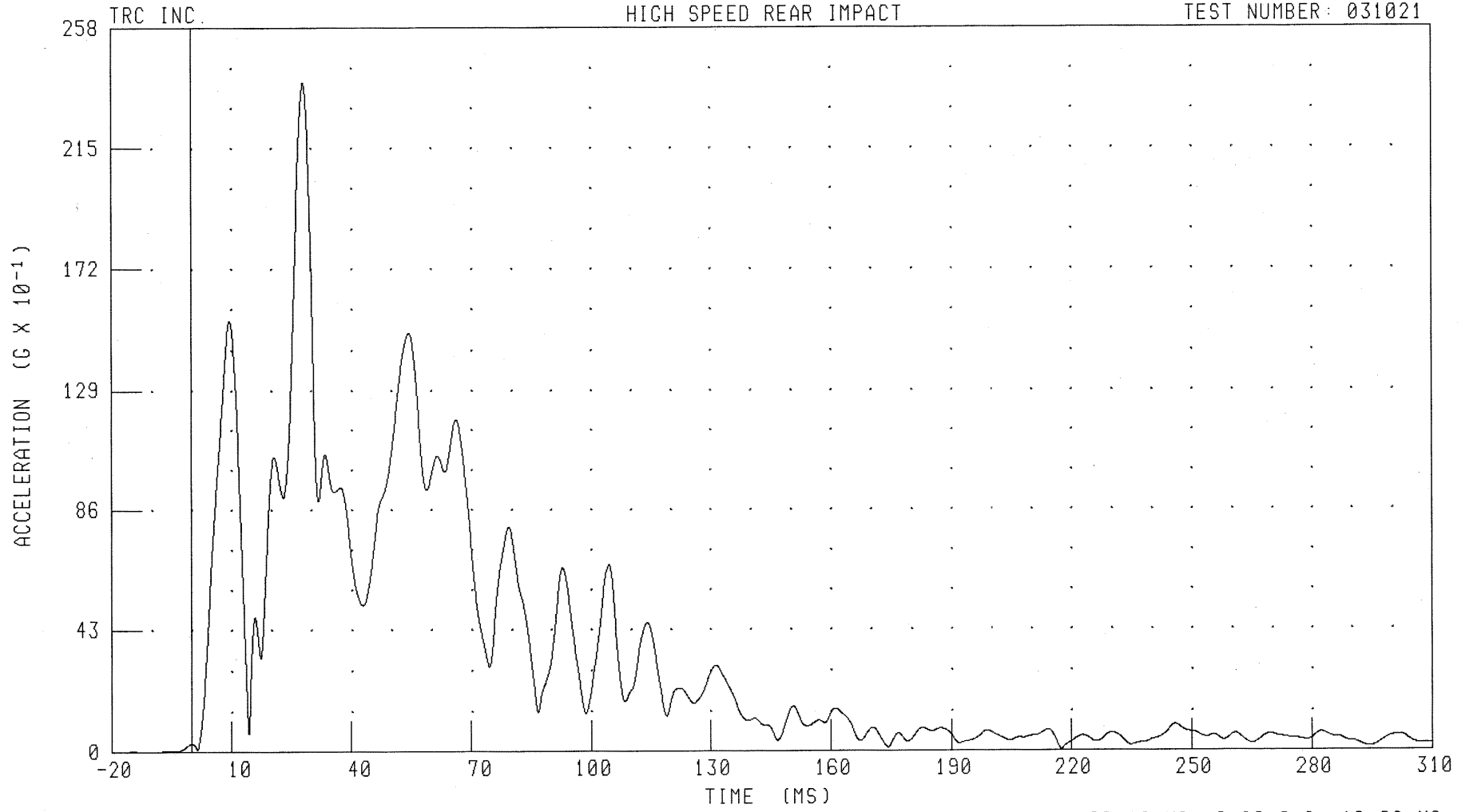
B-110

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
LEFT FRONT OCCUPANT COMPARTMENT RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LFTRG1

FILTER: CH. CLASS 60

PEAK DATA: 23.84 G @ 28.16 MS; 0.00 G @ -18.96 MS

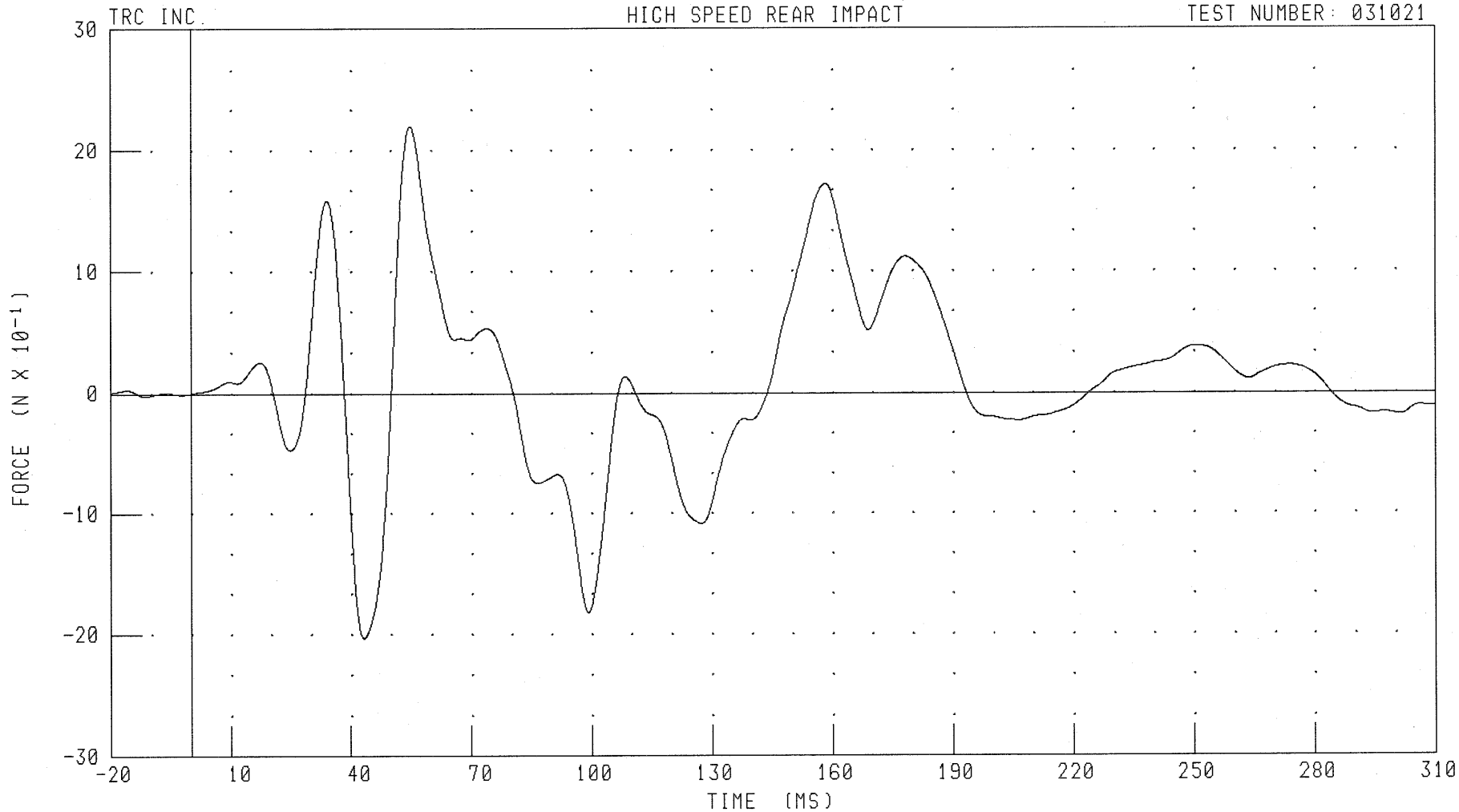
B-111

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LAP BELT FORCE  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LBOF1

FILTER: CH. CLASS 60

PEAK DATA: 2.20 N @ 54.80 MS; -2.03 N @ 43.36 MS

B-112

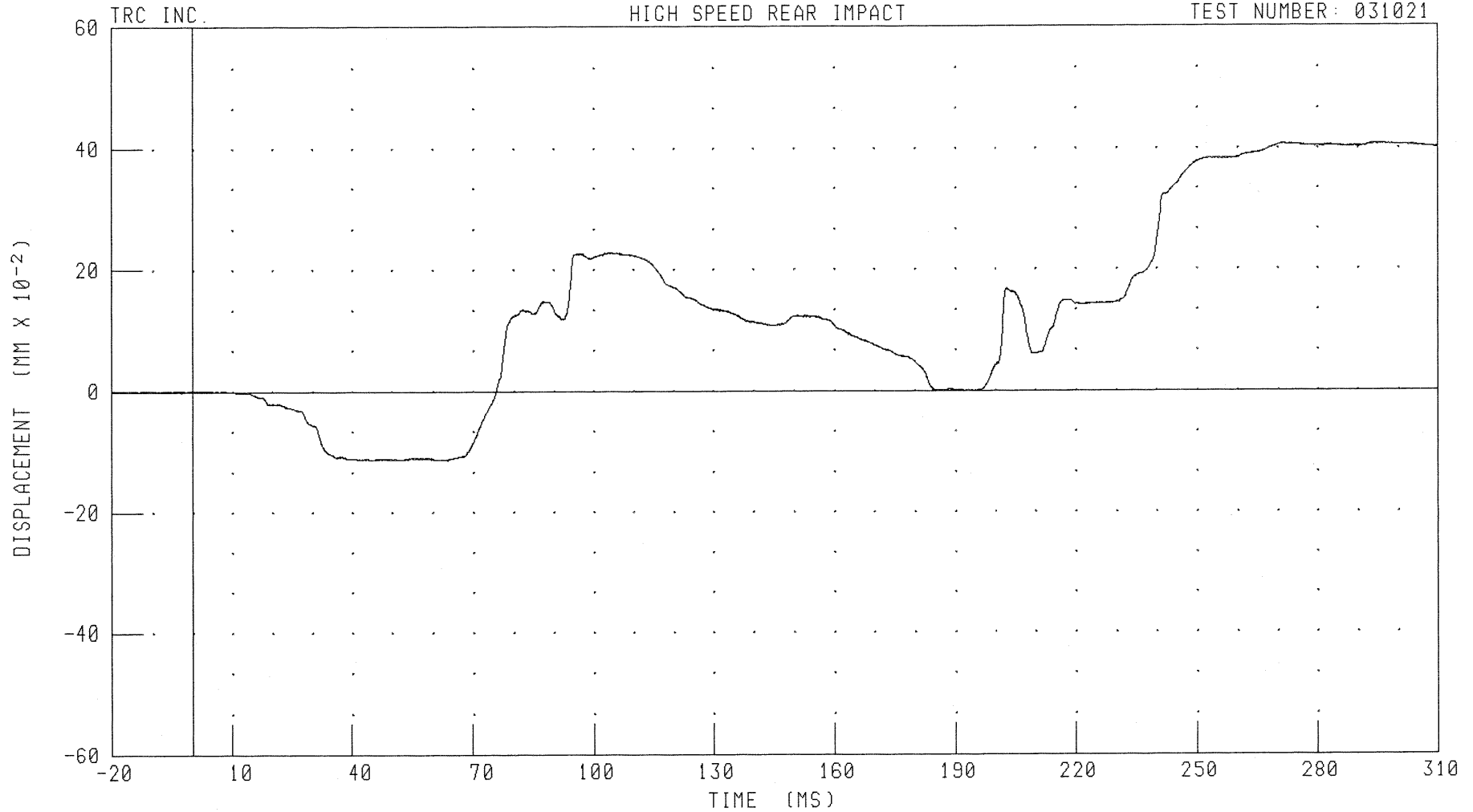
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER BELT SPOOL OUT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SPOOL1 FILTER: CH. CLASS 1000

PEAK DATA: 0.41 MM @ 295.44 MS; -0.11 MM @ 63.68 MS

B-113

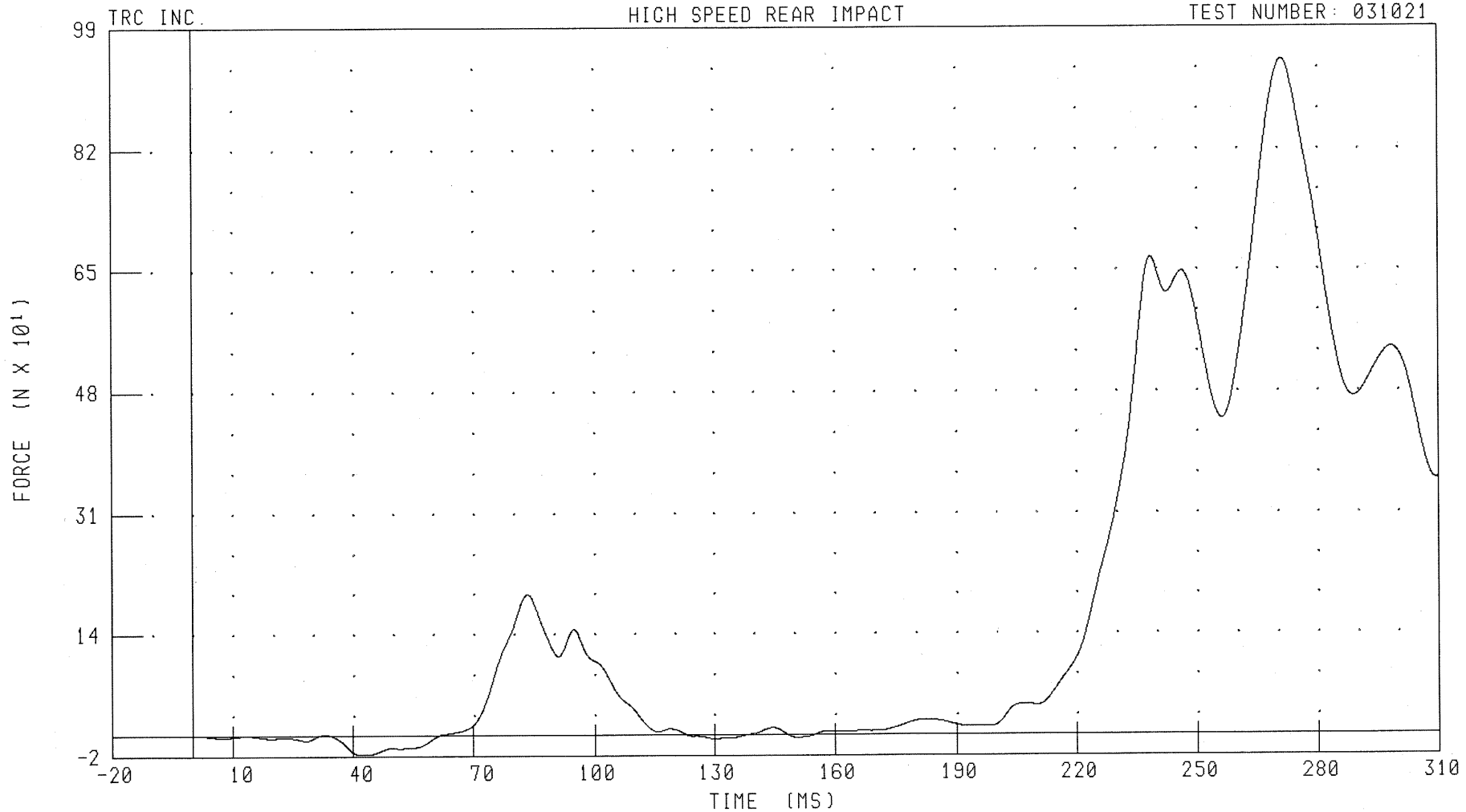
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER SHOULDER BELT FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SHBF1

FILTER: CH. CLASS 60

PEAK DATA: 945.81 N @ 271.20 MS; -26.65 N @ 41.76 MS

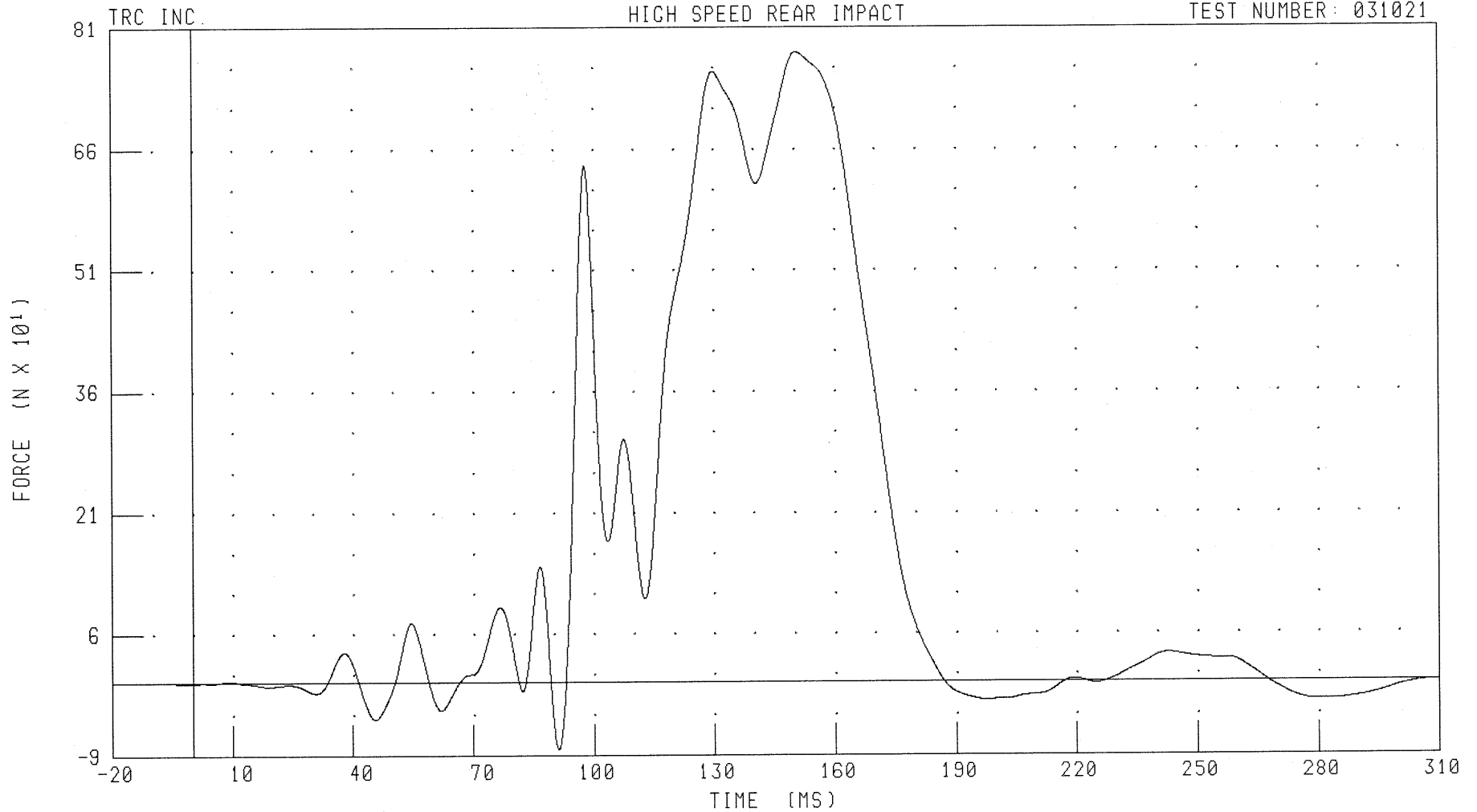
B-114

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LAP BELT FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LBOF3

FILTER: CH. CLASS 60

PEAK DATA: 778.59 N @ 150.72 MS; -82.47 N @ 91.12 MS

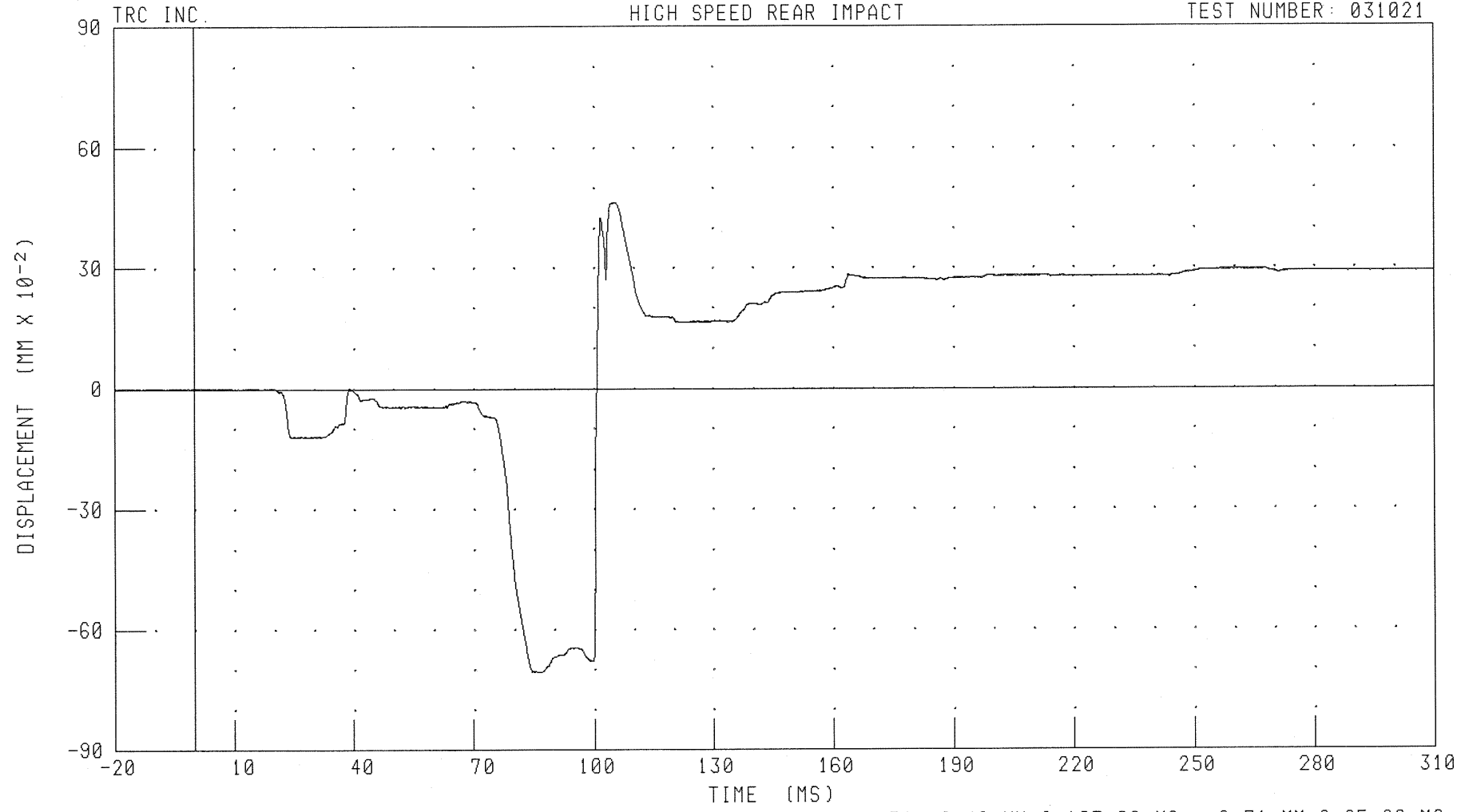
B-115

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER BELT SPOOL OUT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SPOOL3 FILTER: CH. CLASS 1000

PEAK DATA: 0.46 MM @ 105.28 MS; -0.71 MM @ 85.60 MS

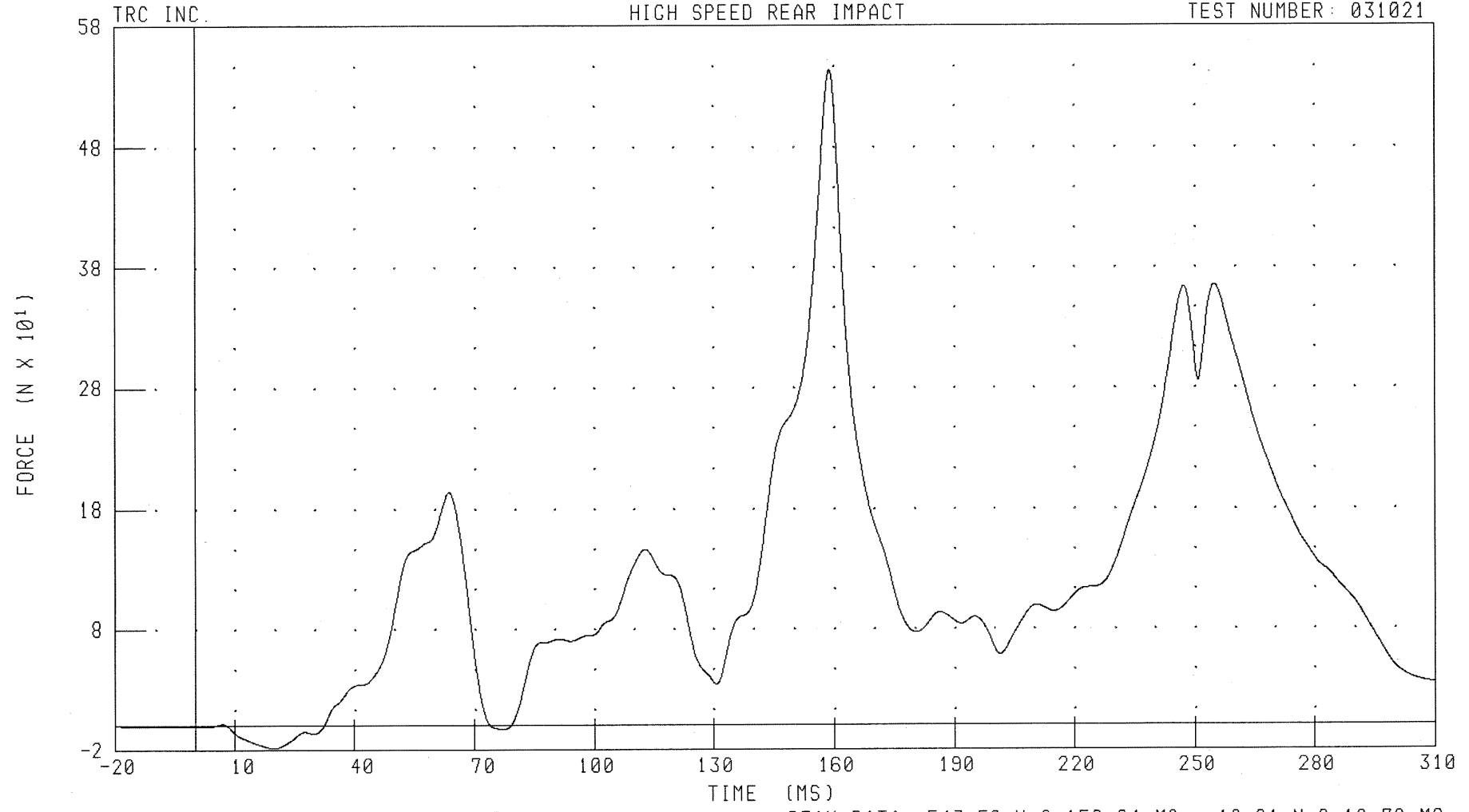
B-116

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER SHOULDER BELT FORCE

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SHBF3

FILTER: CH. CLASS 60

PEAK DATA: 543.58 N @ 159.04 MS; -18.81 N @ 19.76 MS

B-117

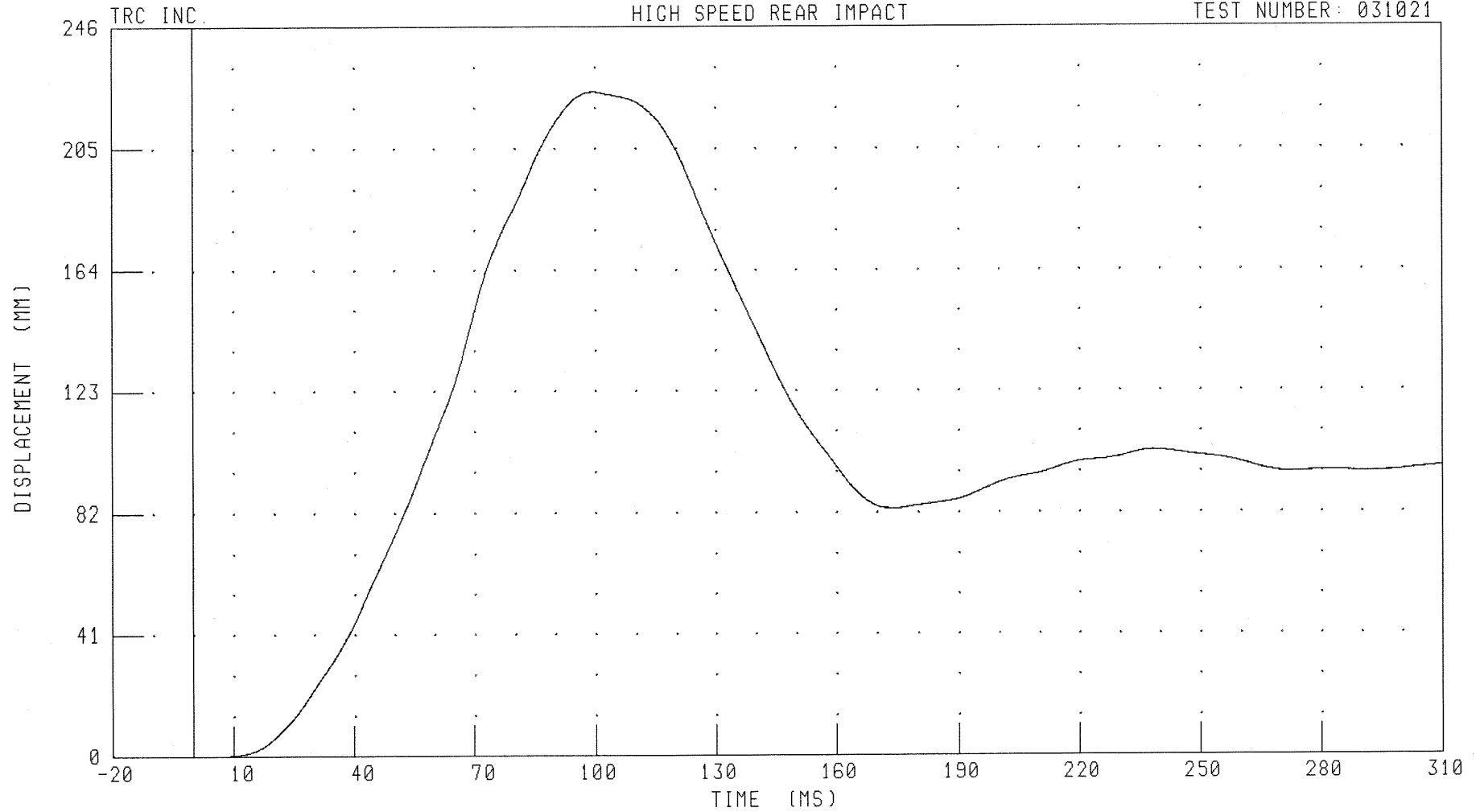
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LEFT SEAT BACK SPOOL

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SPOL1L

FILTER: CH. CLASS 1000

PEAK DATA: 224.14 MM @ 99.28 MS; -0.09 MM @ -19.60 MS

B-118

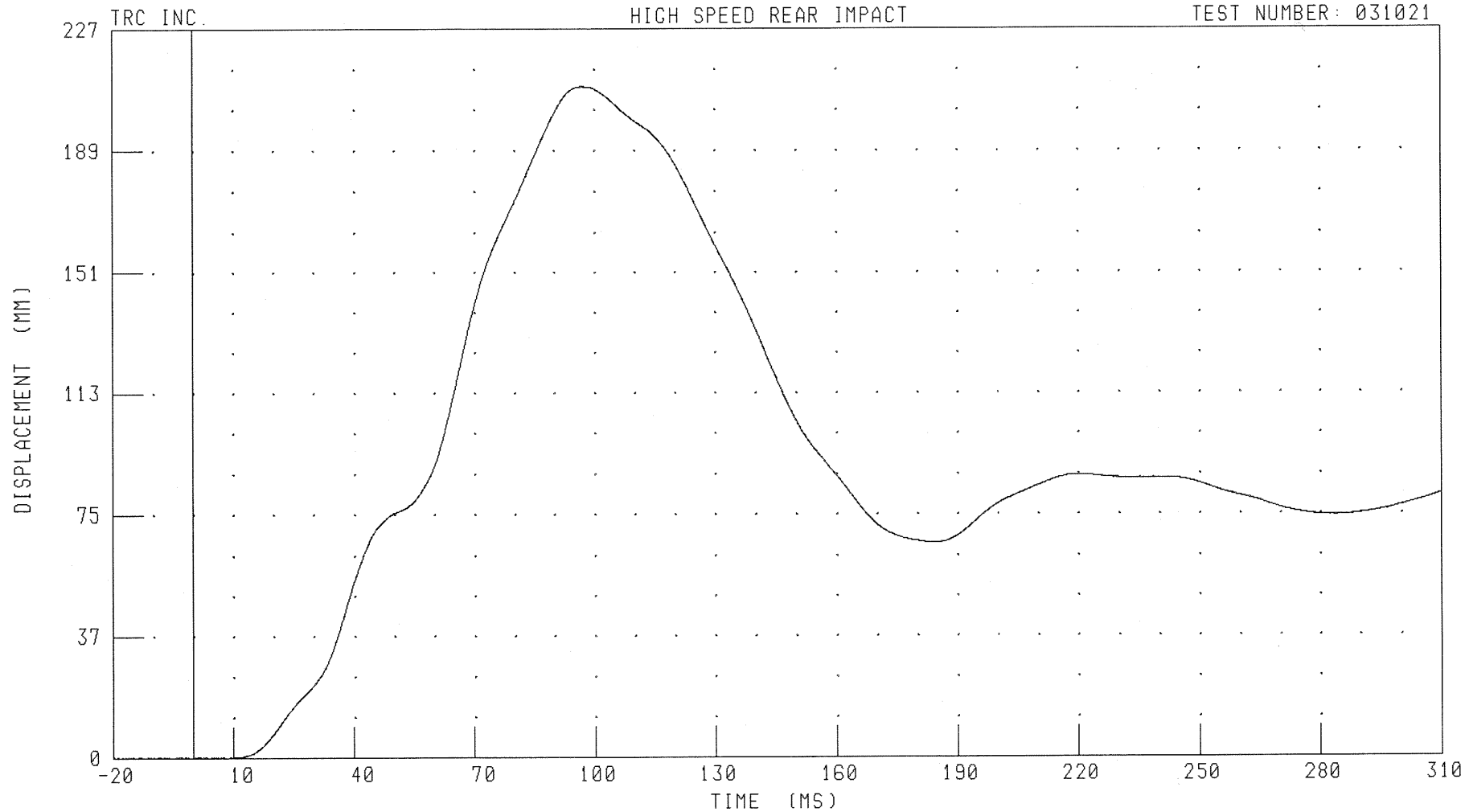
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER RIGHT SEAT BACK SPOOL

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SPOL1R FILTER: CH. CLASS 1000

PEAK DATA: 209.90 MM @ 96.64 MS; -0.13 MM @ -19.68 MS

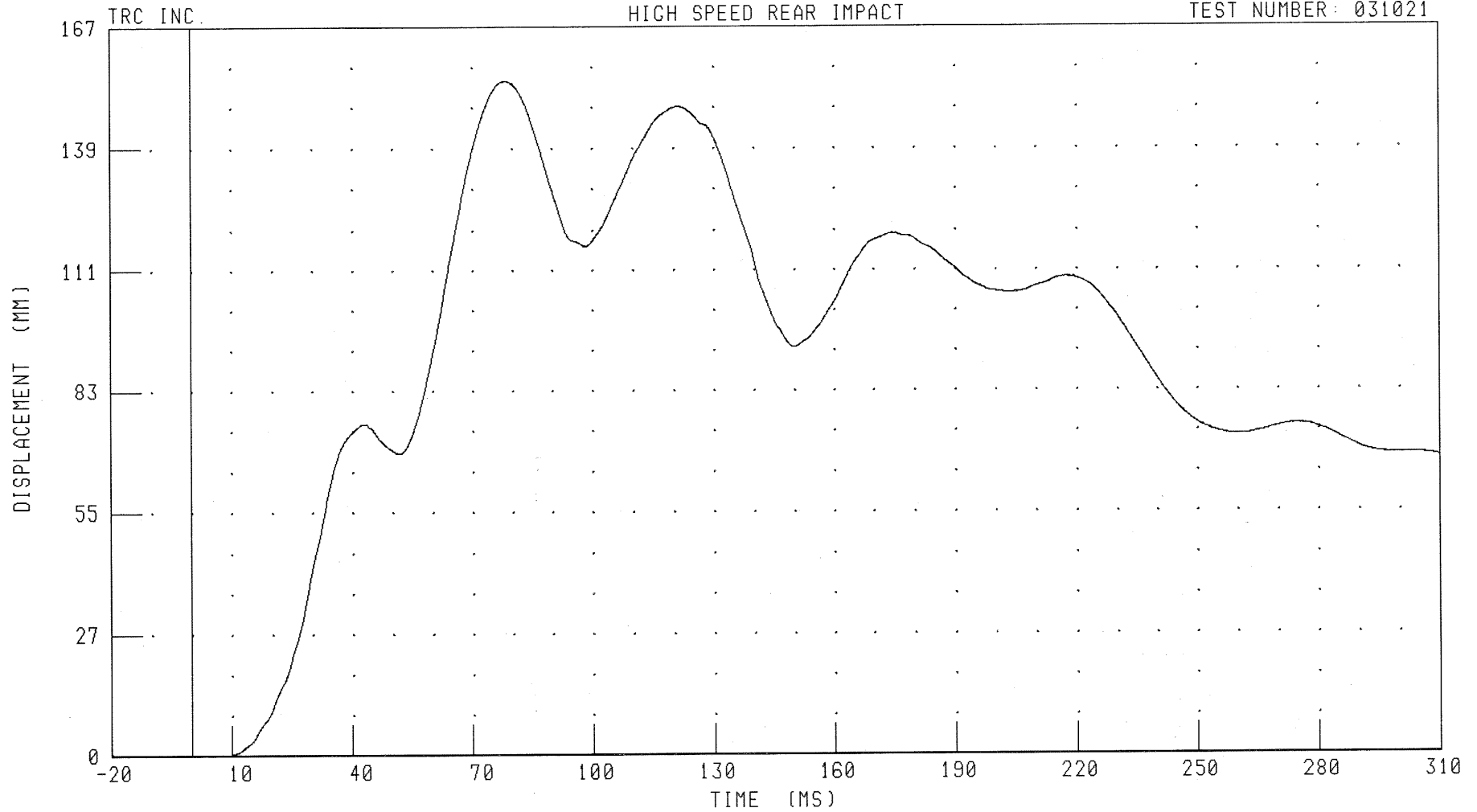
B-119

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LEFT SEAT BACK SPOOL

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: SPOL3L

FILTER: CH. CLASS 1000

PEAK DATA: 155.28 MM @ 78.32 MS; -0.26 MM @ 7.76 MS

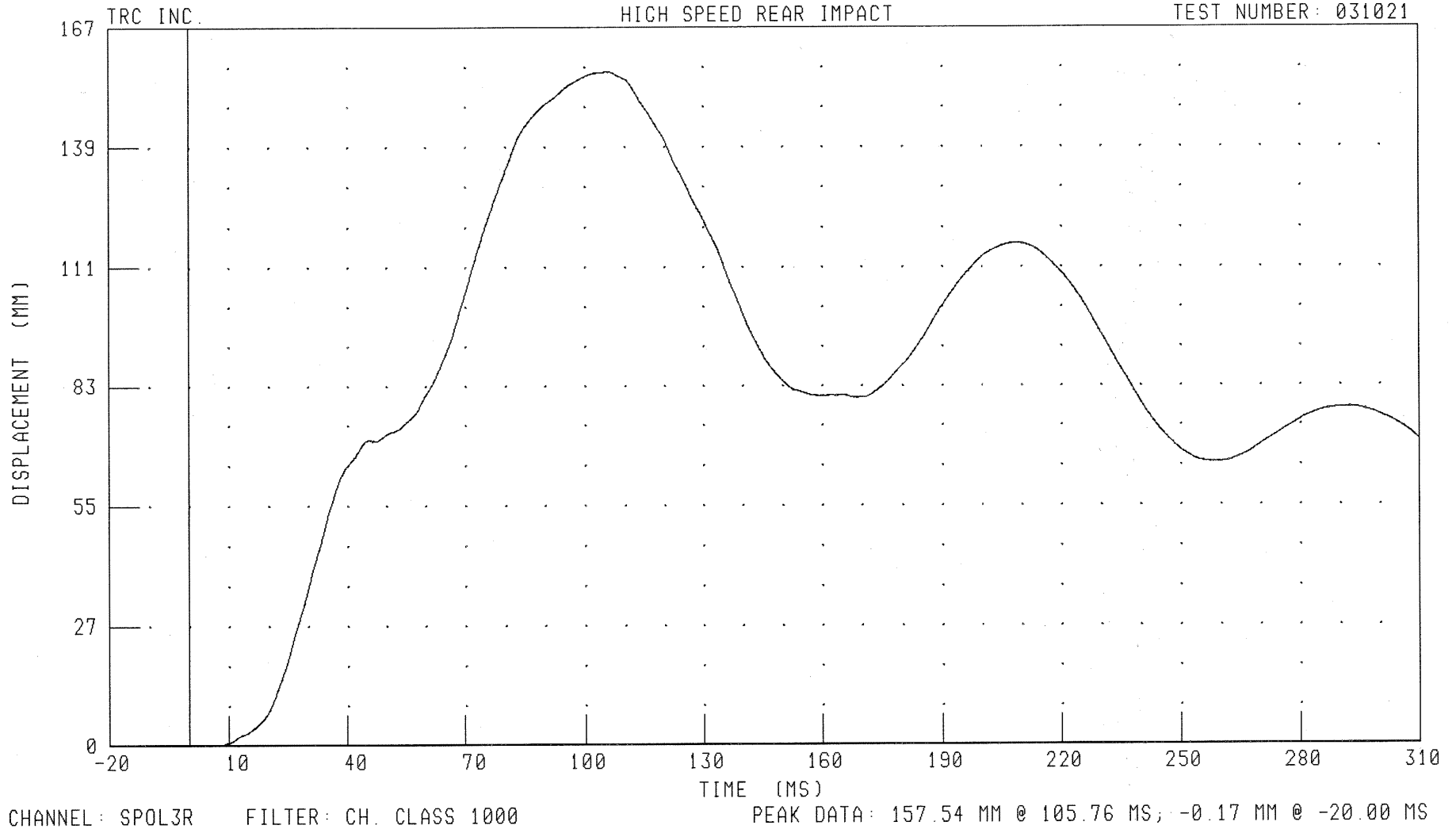
B-120

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER RIGHT SEAT BACK SPOOL

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



B-121

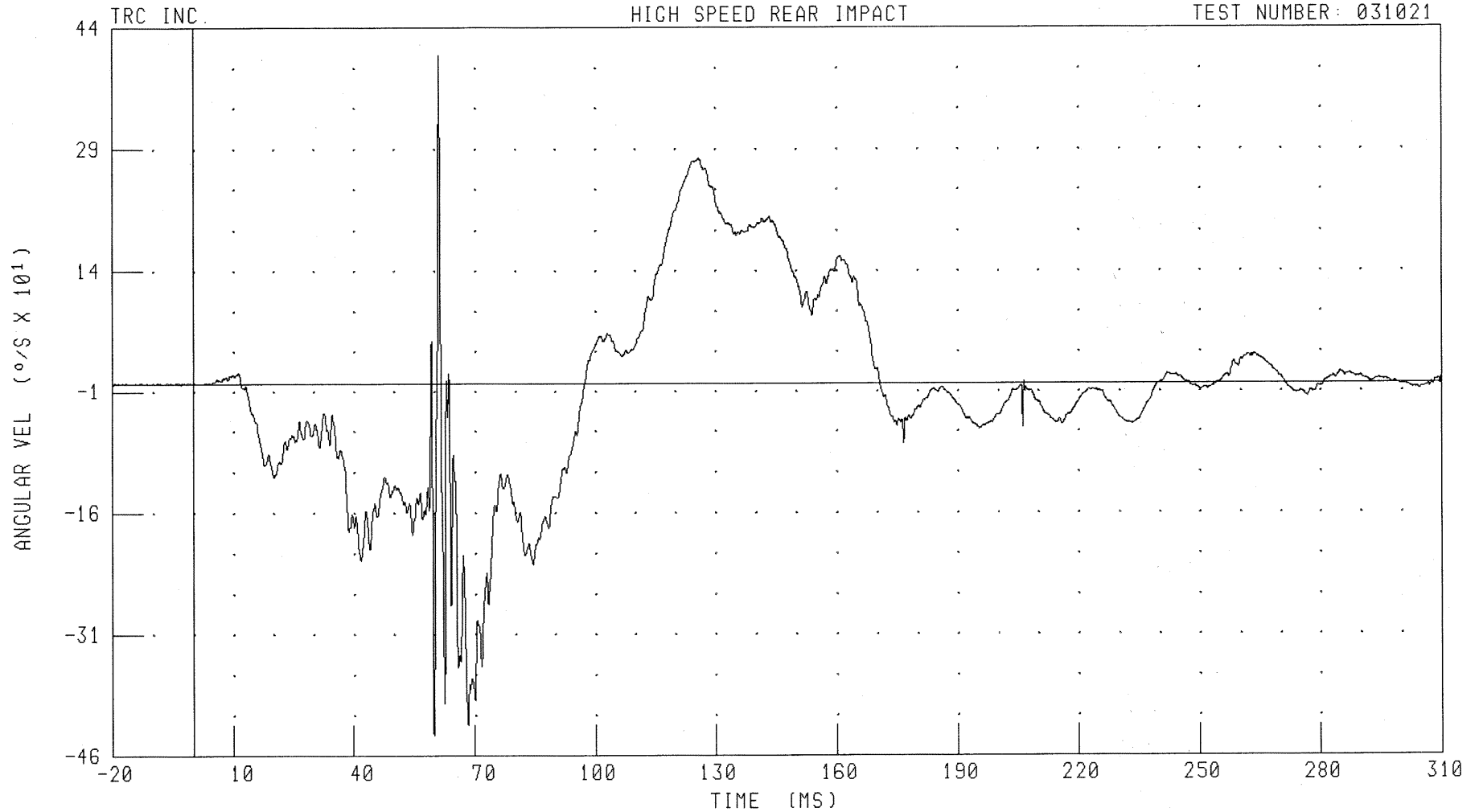
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LEFT SEAT ROTARY POT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LRPOT1

FILTER: CH. CLASS 1000

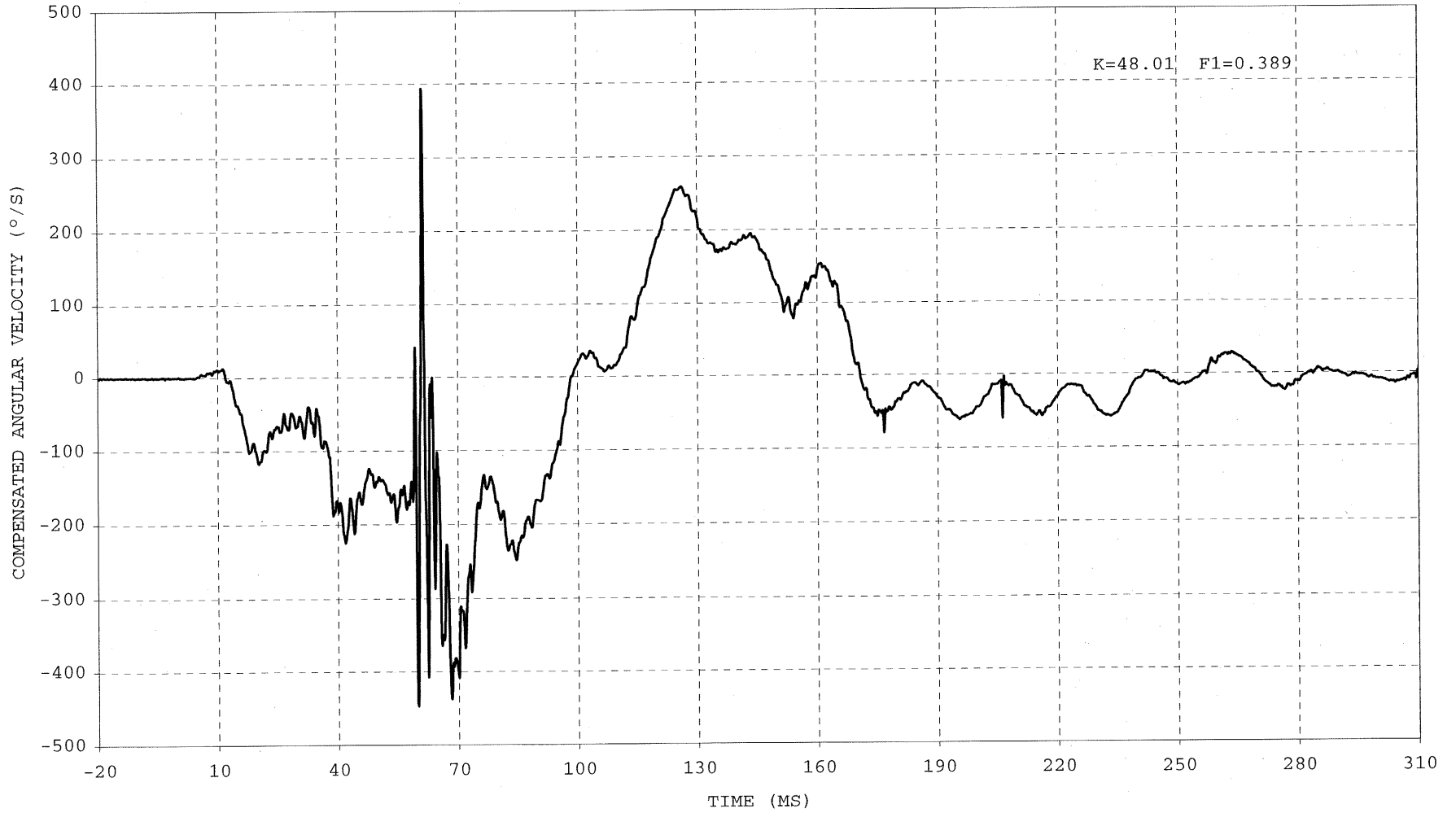
PEAK DATA: 405.89 °/S @ 61.20 MS; -434.62 °/S @ 59.92 MS

B-122

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER LEFT SEAT ROTARY POT - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



K=48.01 F1=0.389

CHANNEL: LRPOT1

B-123

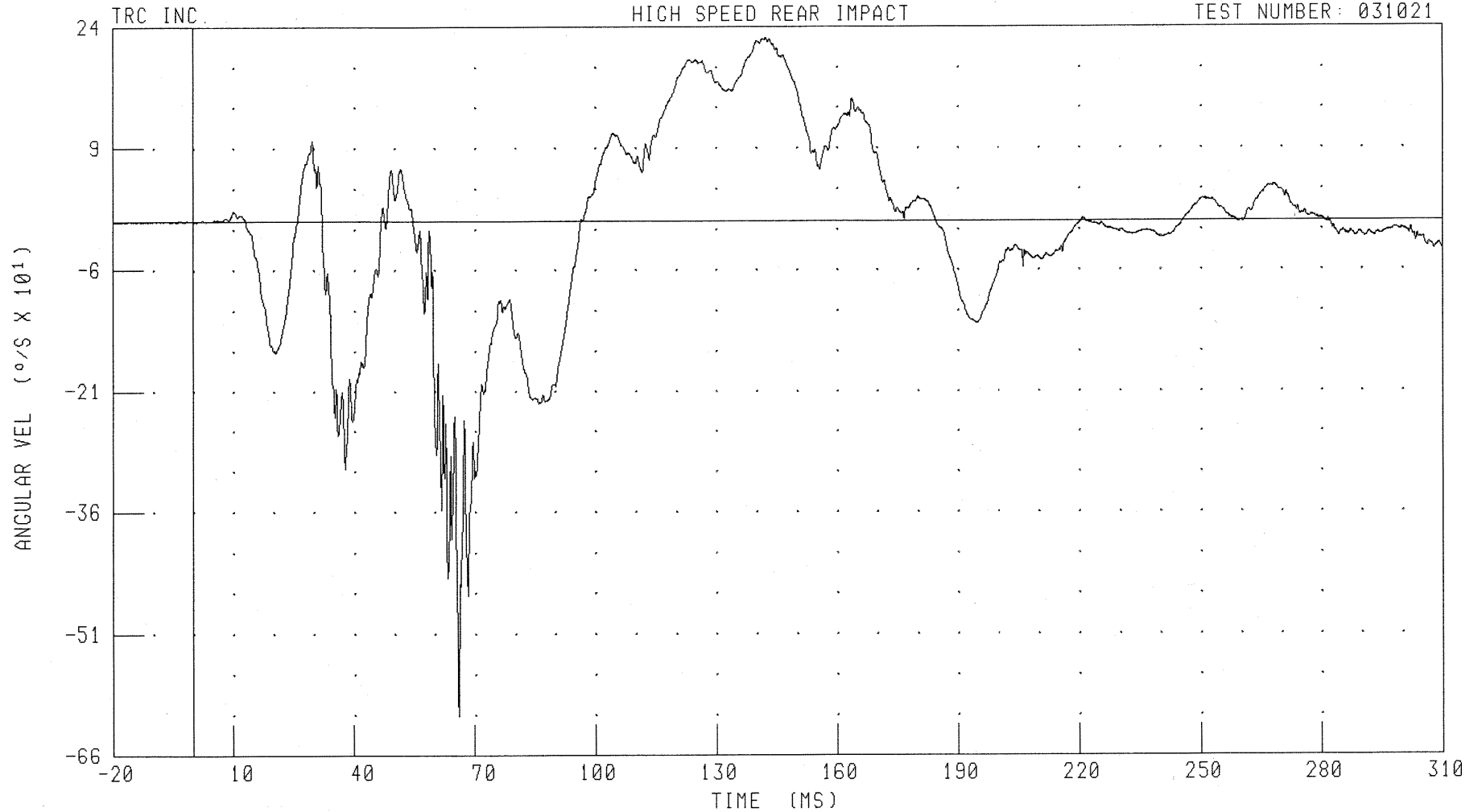
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER RIGHT SEAT ROTARY POT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RRPOT1 FILTER: CH. CLASS 1000

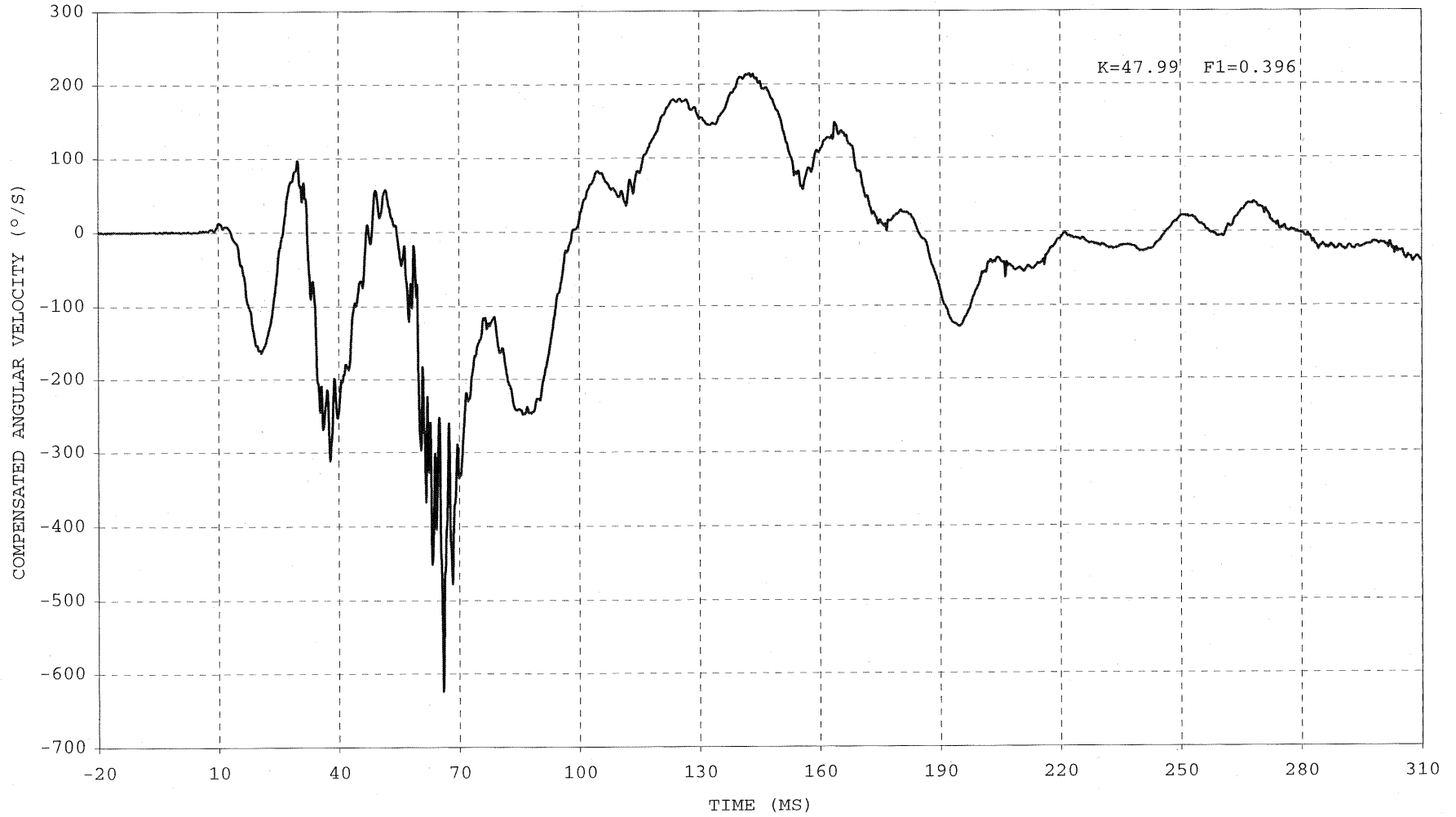
PEAK DATA: 226.30 °/S @ 142.40 MS; -611.79 °/S @ 66.00 MS

B-124

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER RIGHT SEAT ROTARY POT - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RRPOT1

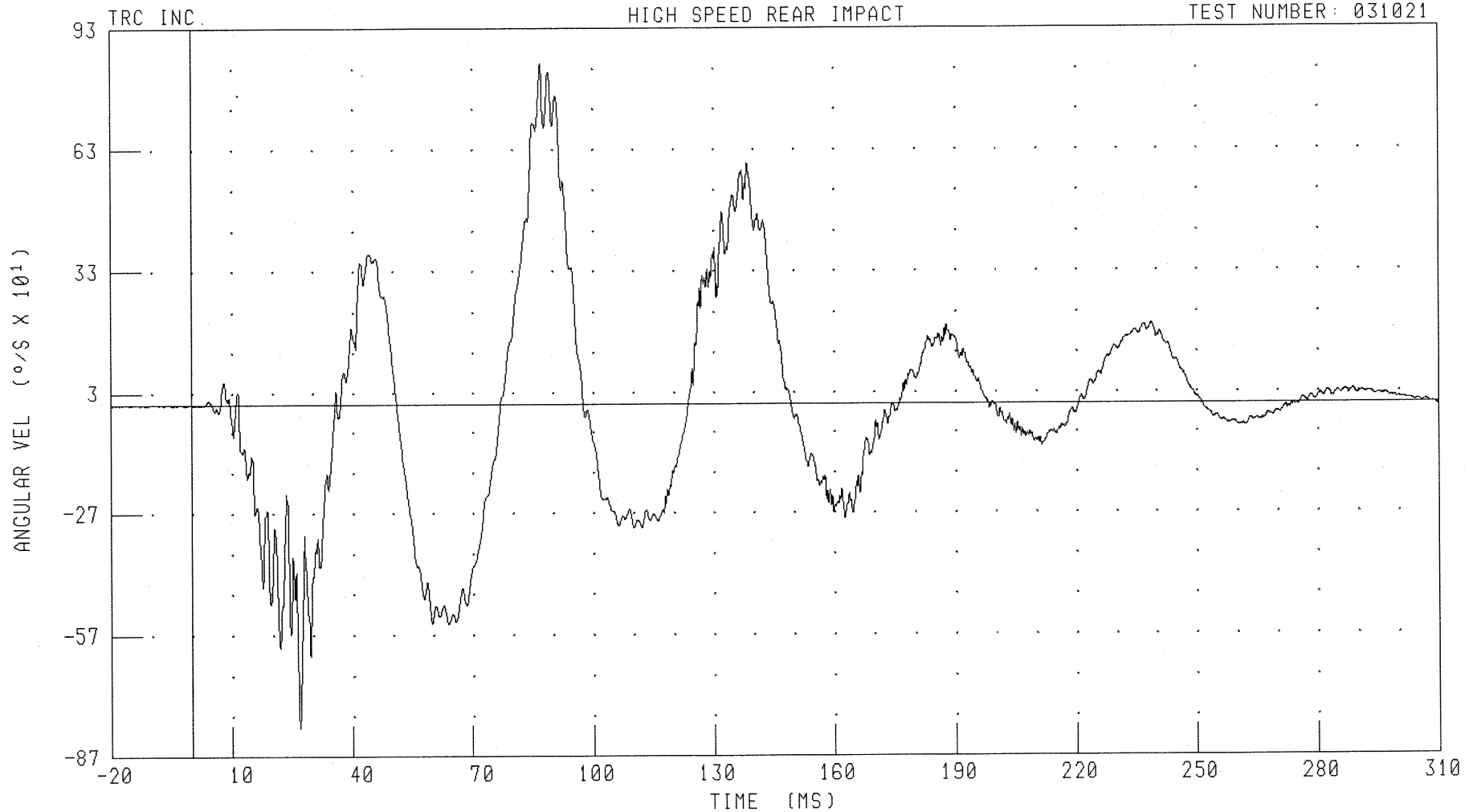
B-125

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LEFT SEAT ROTARY POT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LRPOT3

FILTER: CH. CLASS 1000

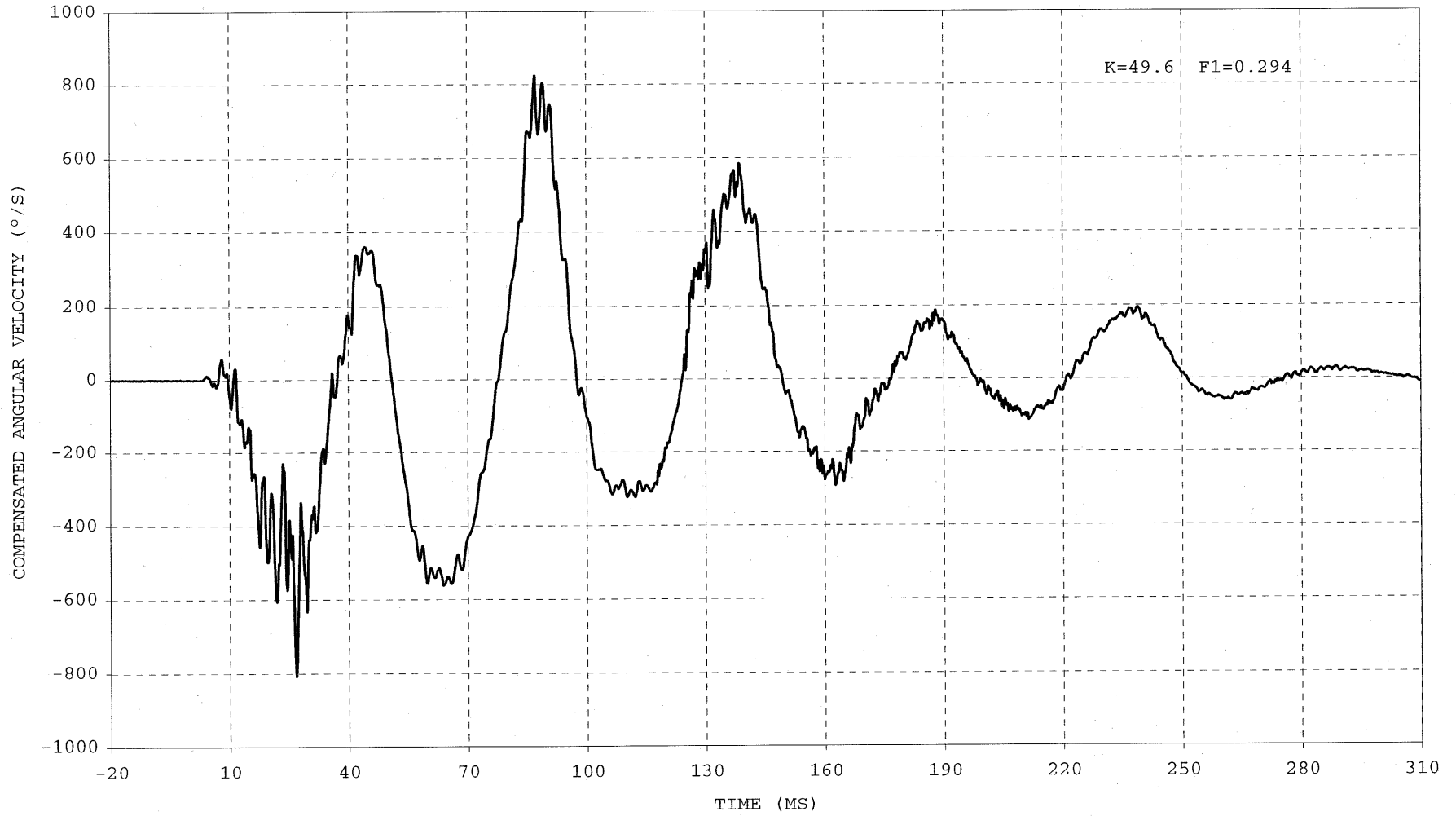
PEAK DATA: 845.35 °/S @ 87.12 MS; -798.89 °/S @ 26.72 MS

B-126

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LEFT SEAT ROTARY POT - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LRPOT3

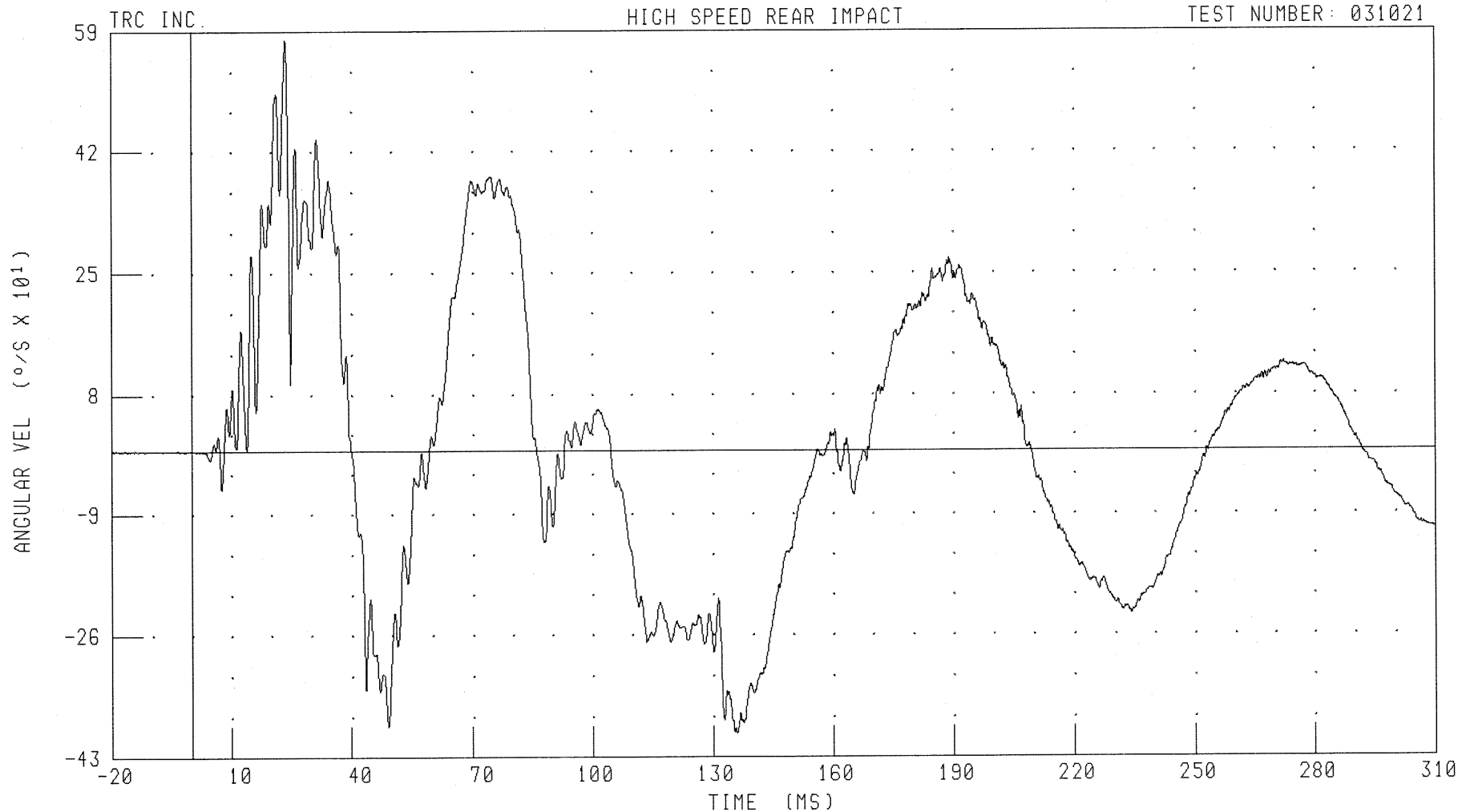
B-127

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER RIGHT SEAT ROTARY POT

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: RRPOT3 FILTER: CH. CLASS 1000

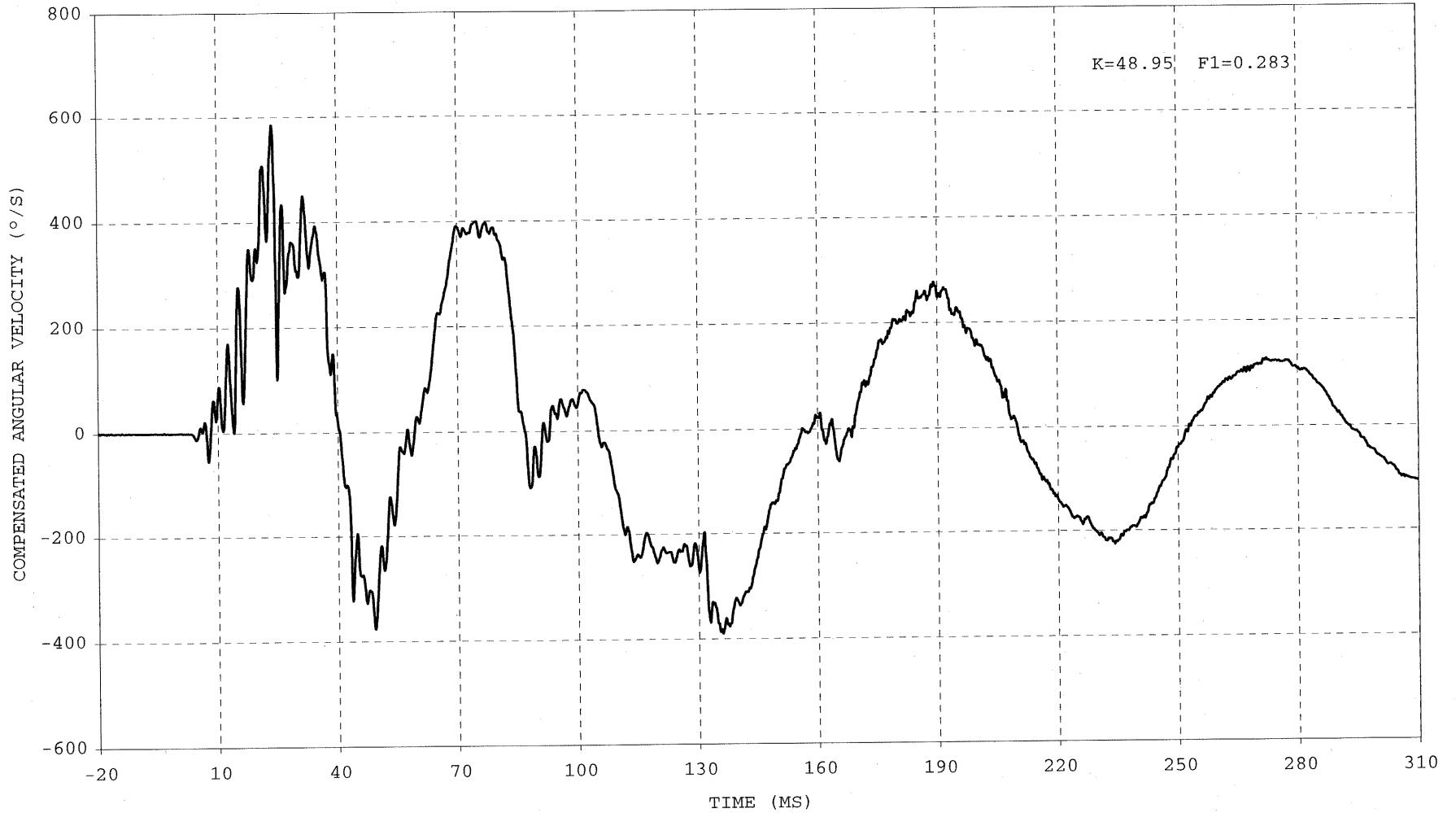
PEAK DATA: 578.12 °/S @ 23.76 MS; -397.66 °/S @ 136.00 MS

B-128

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER RIGHT SEAT ROTARY POT - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



K=48.95 F1=0.283

CHANNEL: RRPOT3

B-129

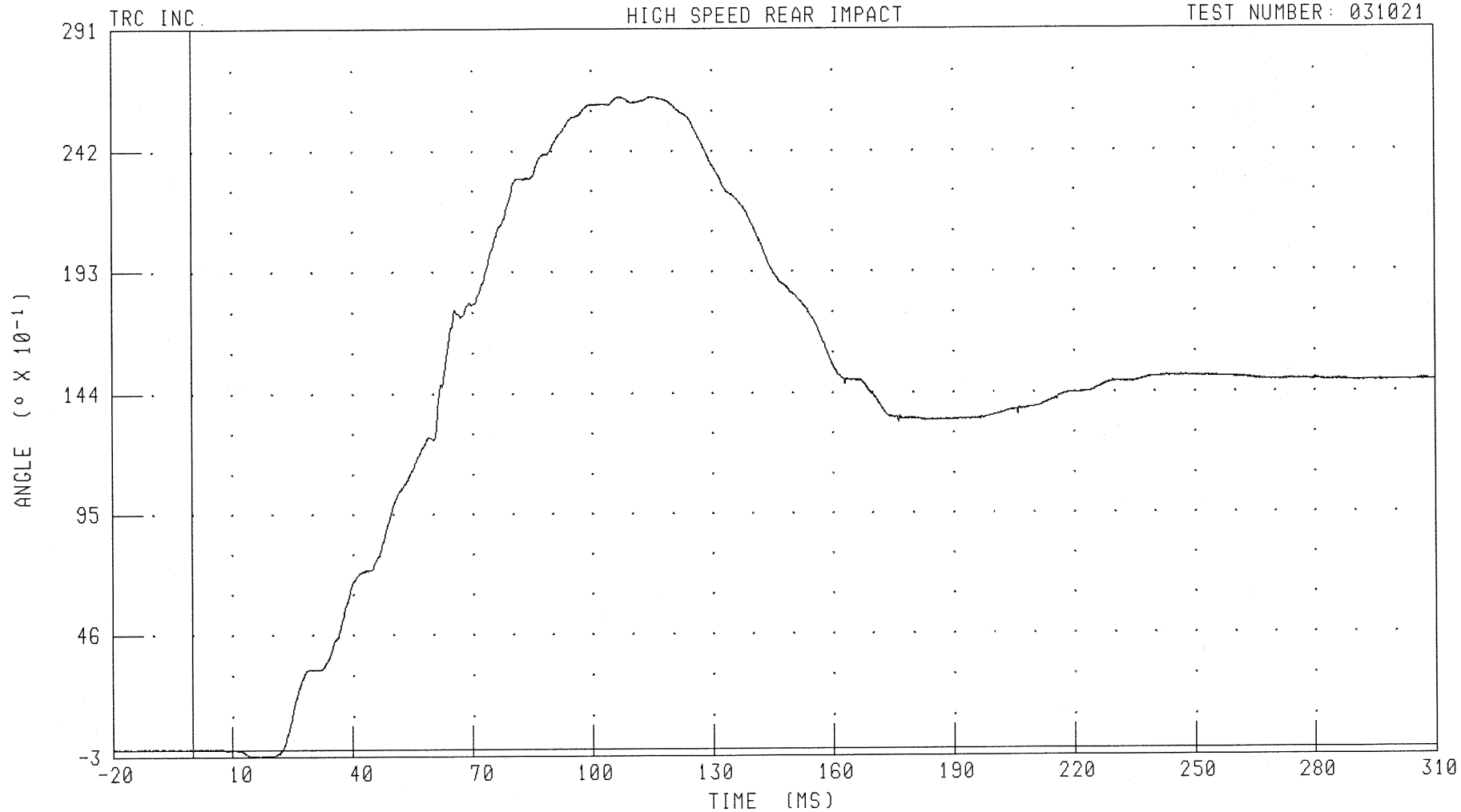
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER LEFT SEAT BACK ROTATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: GYRO1 FILTER: CH. CLASS 1000

PEAK DATA: 26.43 ° @ 107.04 MS; -0.31 ° @ 16.00 MS

B-130

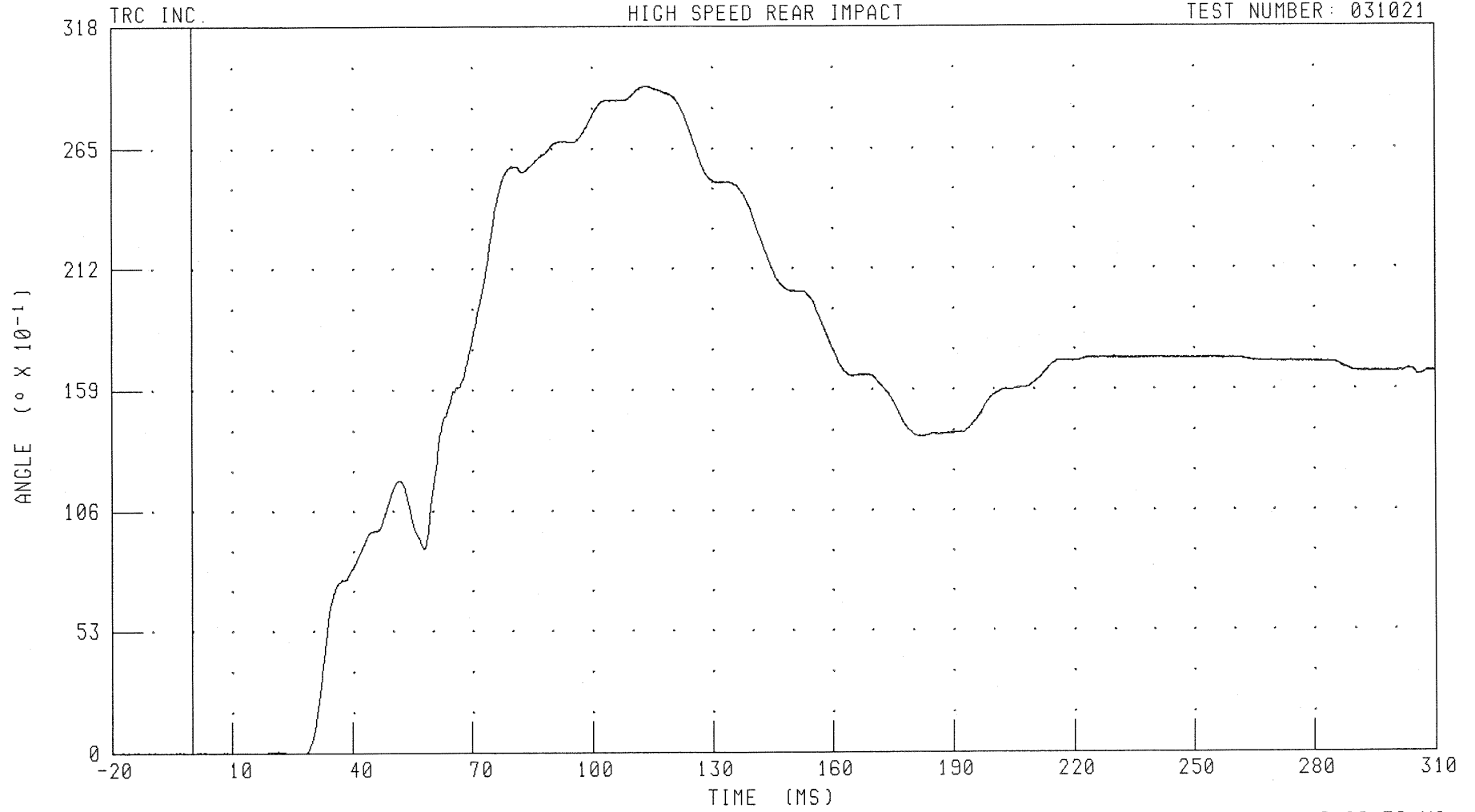
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

DRIVER RIGHT SEAT BACK ROTATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: GYRO2 FILTER: CH. CLASS 1000

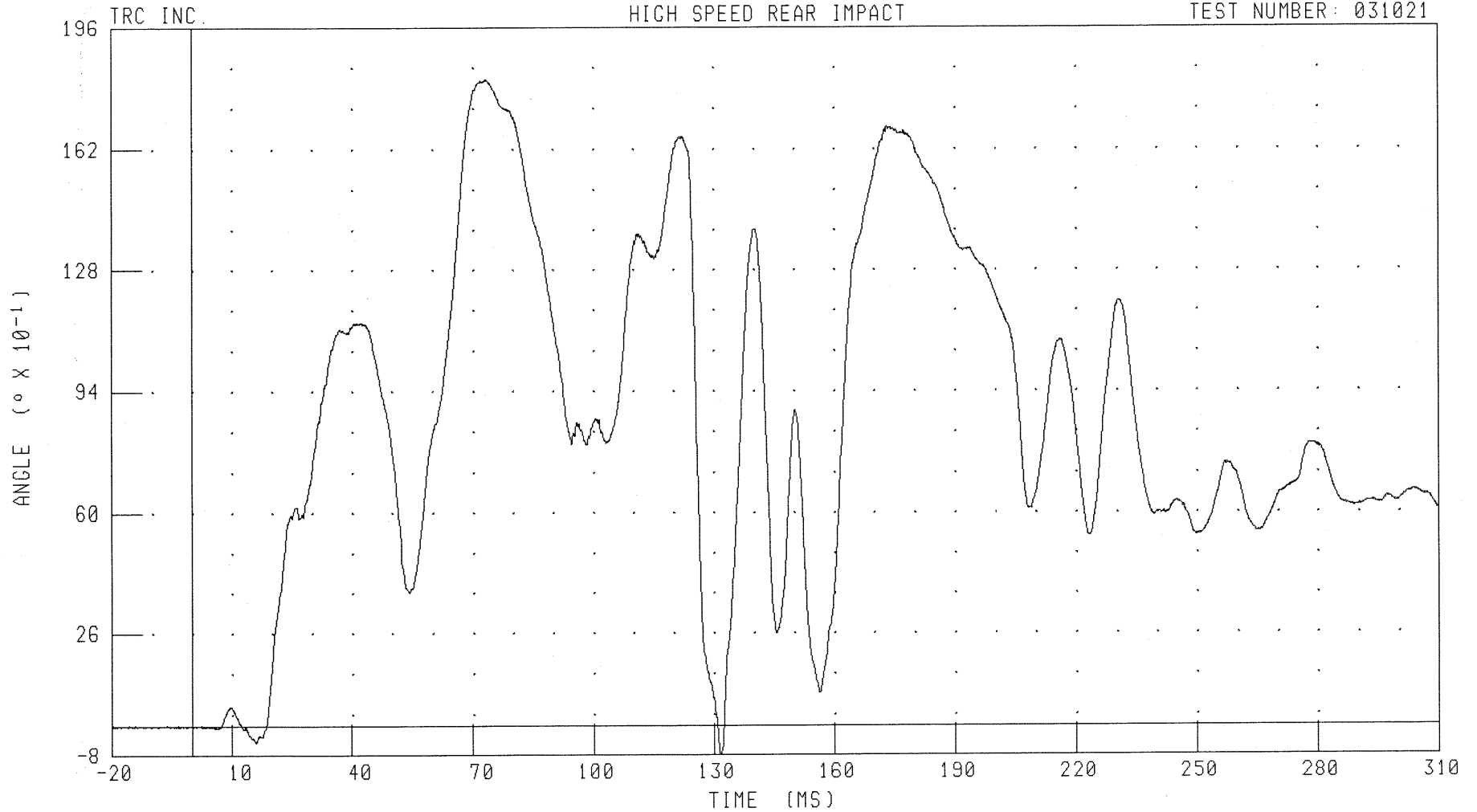
PEAK DATA: 29.23 ° @ 113.36 MS; -0.09 ° @ 26.72 MS

B-131

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER LEFT SEAT BACK ROTATION

TEST NUMBER: 031021



CHANNEL: GYRO3 FILTER: CH. CLASS 1000

PEAK DATA: 18.14 ° @ 73.20 MS; -0.80 ° @ 131.52 MS

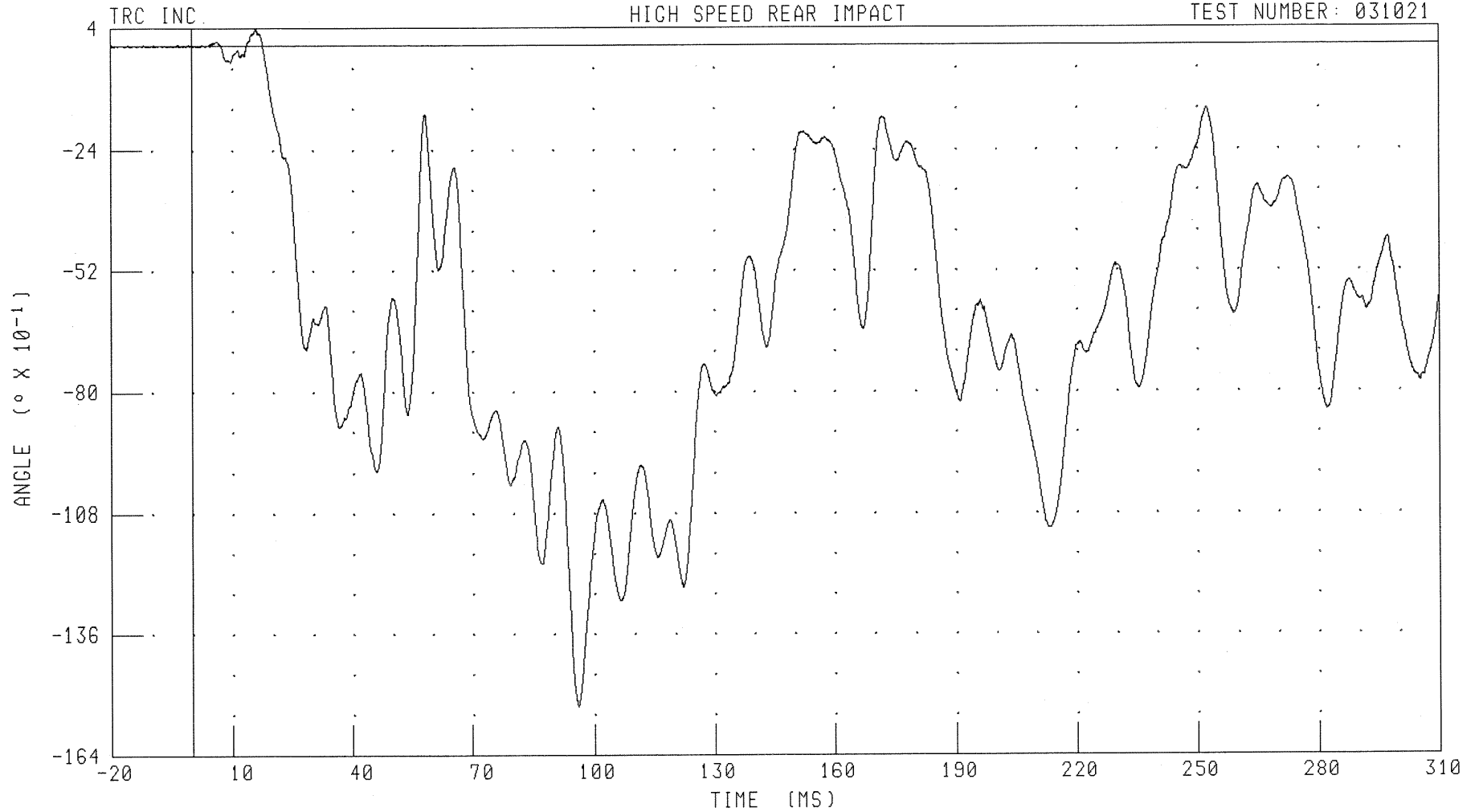
B-132

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER RIGHT SEAT BACK ROTATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: GYRO4 FILTER: CH. CLASS 1000

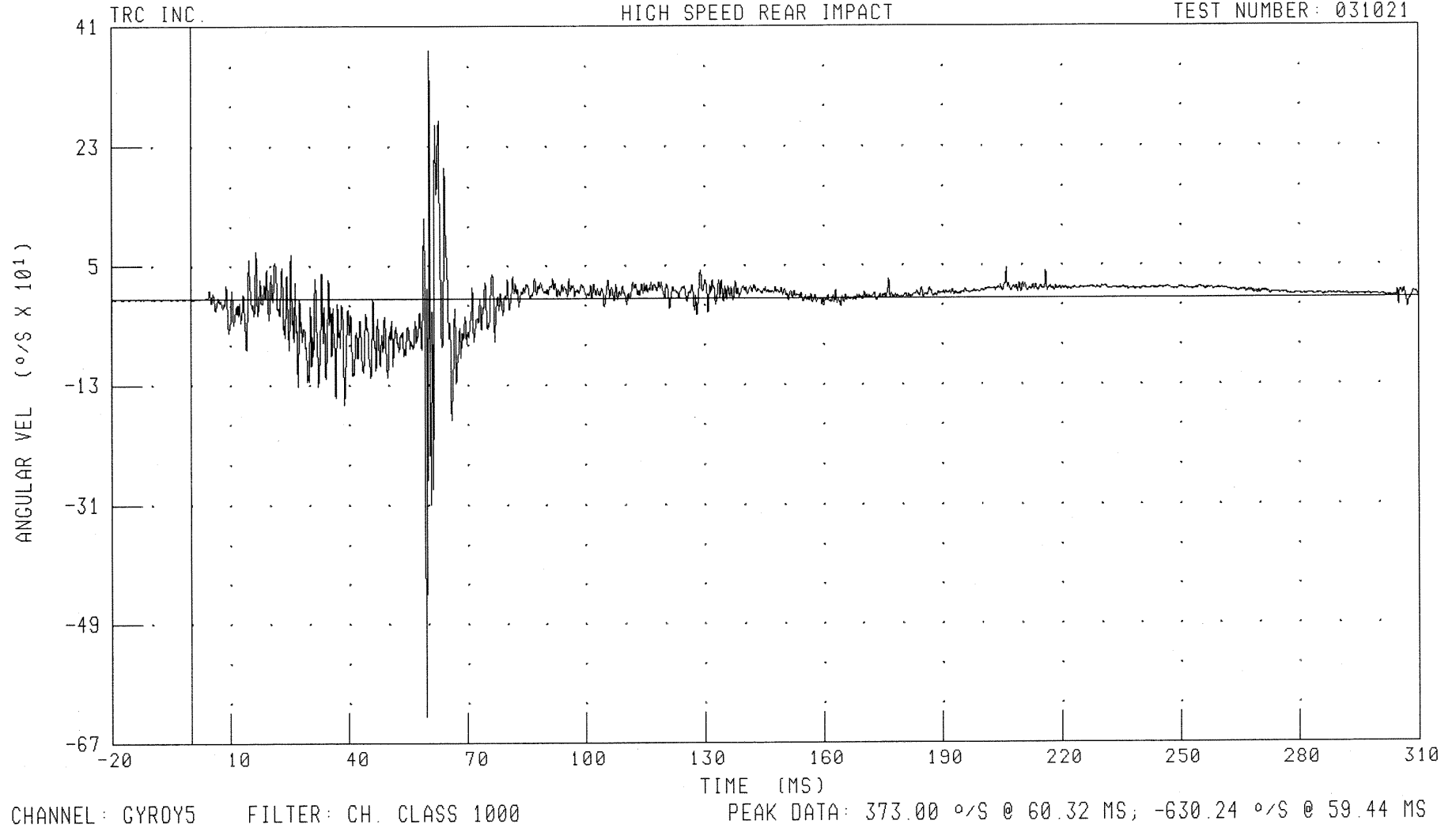
PEAK DATA: 0.37 ° @ 15.76 MS; -152.8 ° @ 95.92 MS

B-133

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER DOOR SILL ROTATION  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: GYROYS

FILTER: CH. CLASS 1000

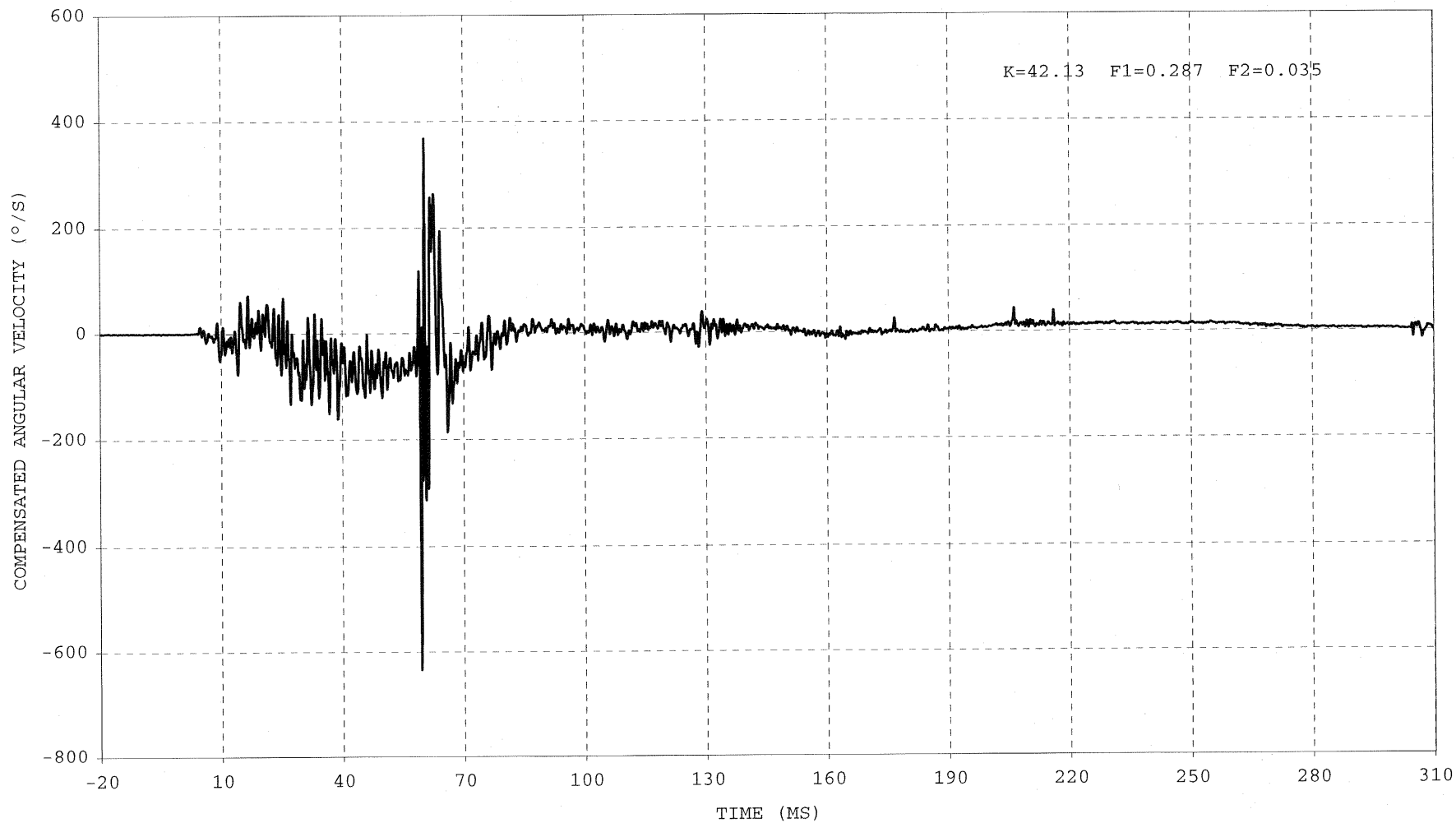
PEAK DATA: 373.00 °/S @ 60.32 MS; -630.24 °/S @ 59.44 MS

B-134

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
DRIVER DOOR SILL ROTATION - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: GYRO5

B-135

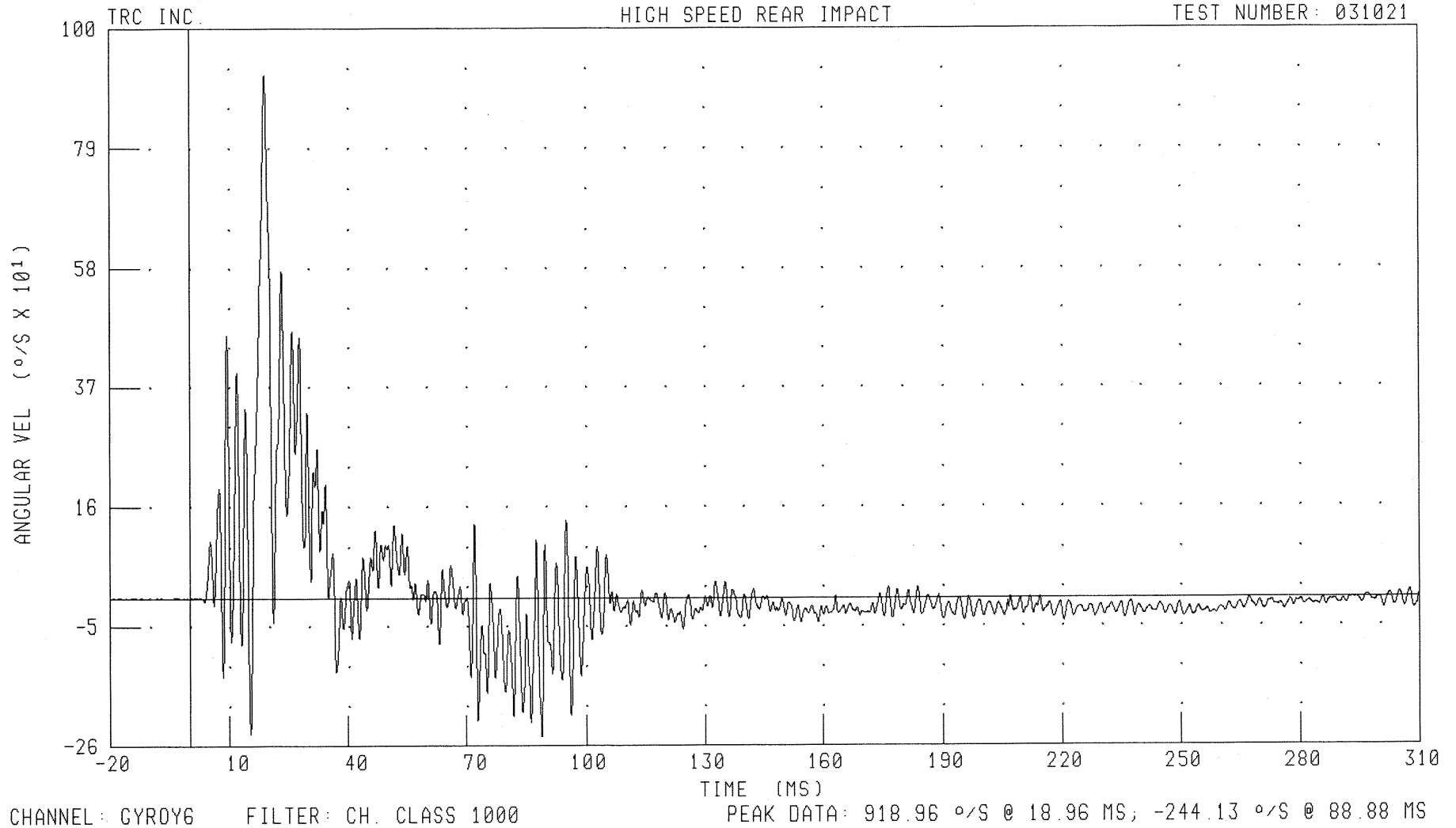
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

RIGHT REAR PASSENGER DOOR SILL ROTATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021

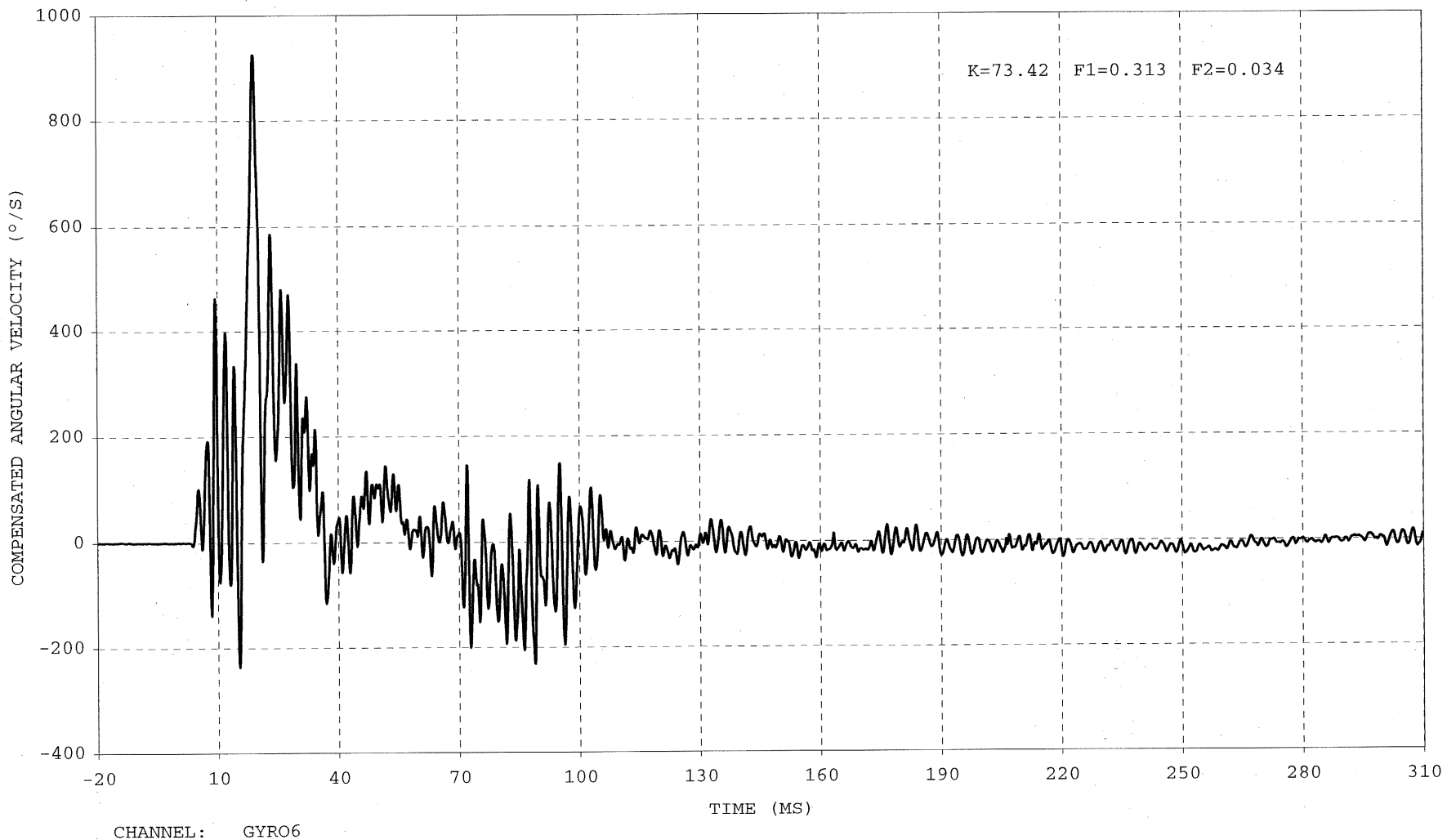


B-136

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
RIGHT REAR PASSENGER DOOR SILL ROTATION - COMPENSATED DATA  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



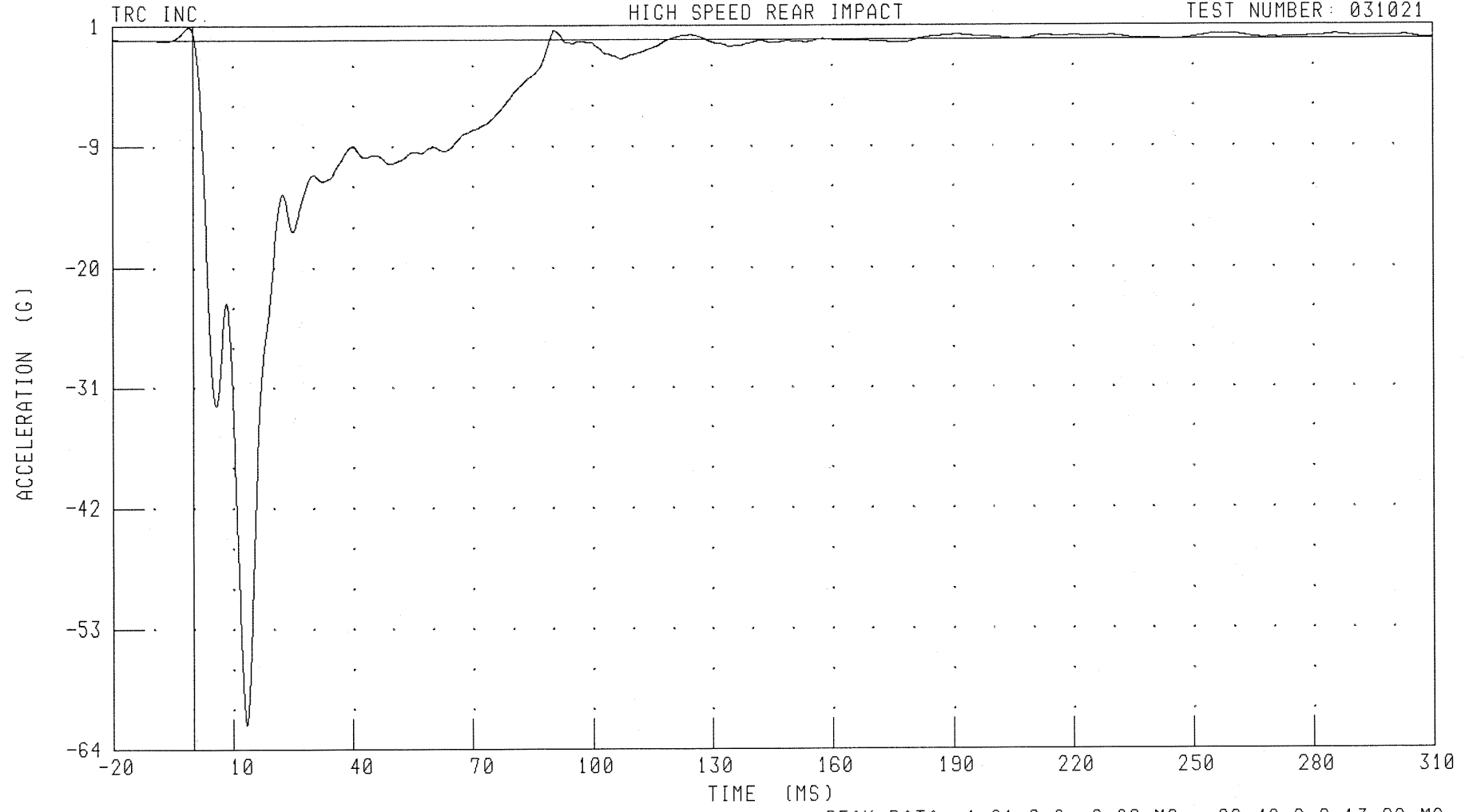
B-137

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGXG1 FILTER: CH. CLASS 60

PEAK DATA: 1.21 G @ -0.96 MS; -62.46 G @ 13.28 MS

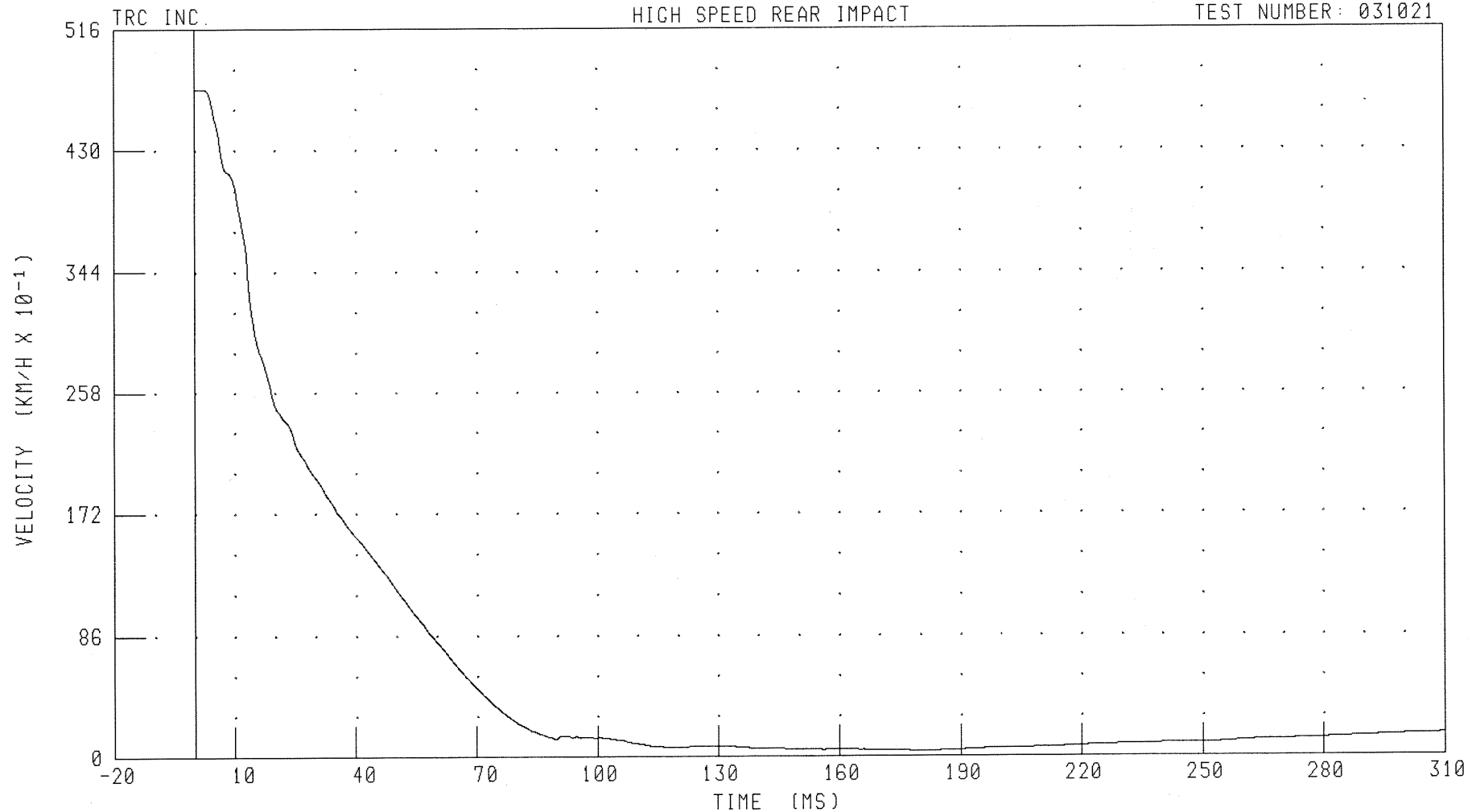
B-138

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER CENTER OF GRAVITY X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGXV1

FILTER: CH. CLASS 180

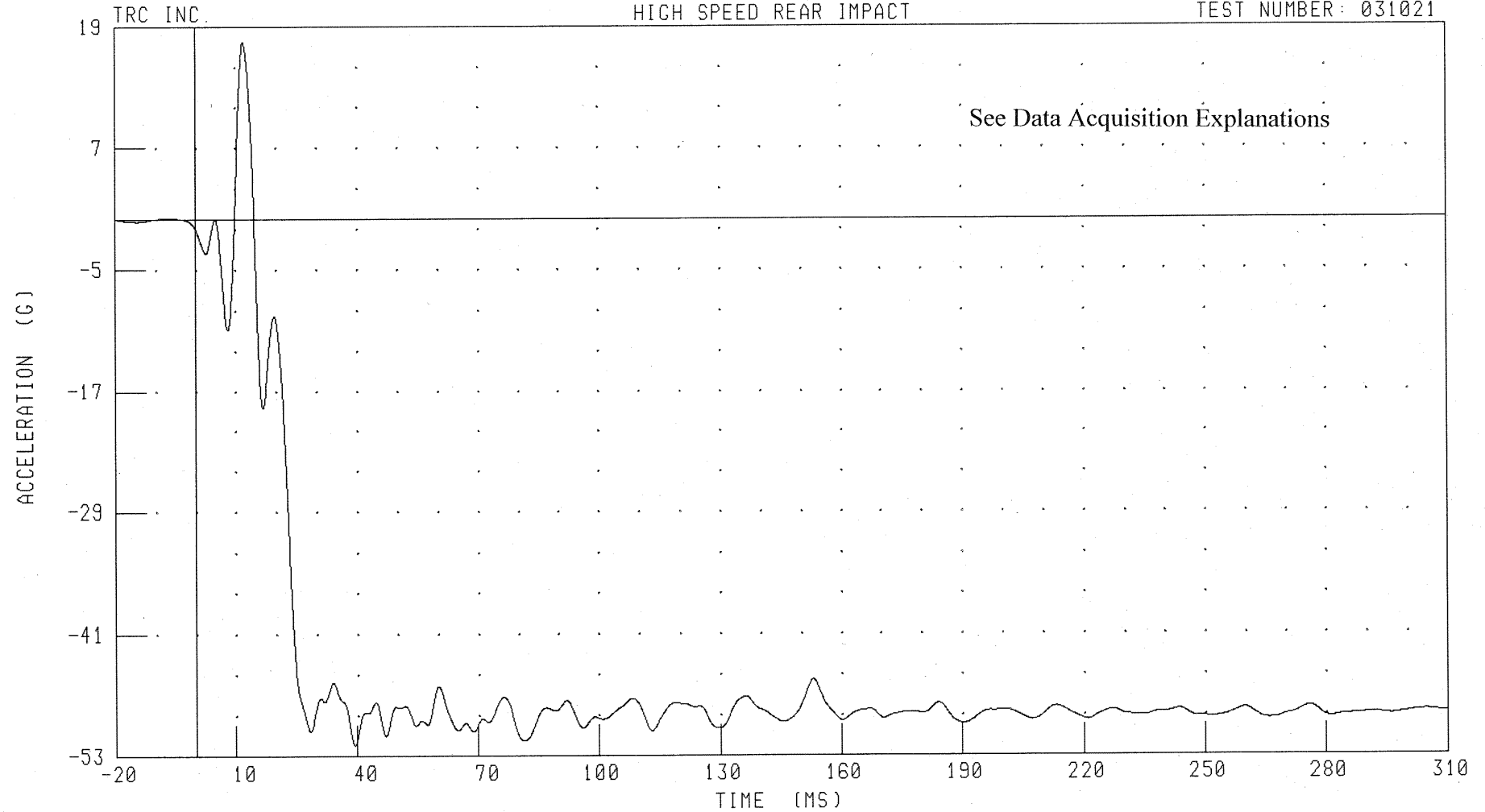
PEAK DATA: 47.30 KM/H @ 2.32 MS; 0.36 KM/H @ 180.96 MS

B-139

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION  
HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGYG1

FILTER: CH. CLASS 60

PEAK DATA: 17.53 G @ 12.08 MS; -52.00 G @ 39.36 MS

B-140

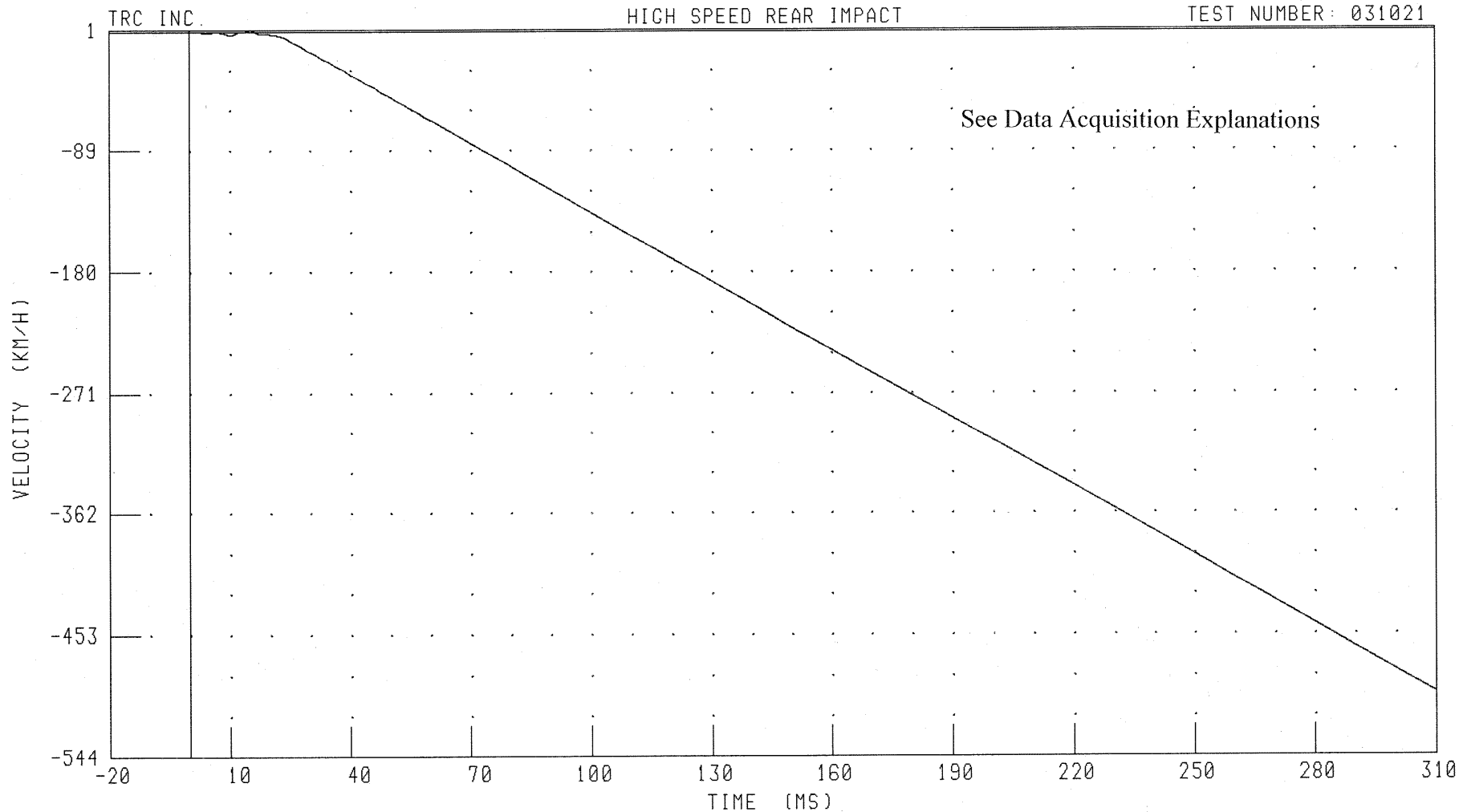
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

MOVING BARRIER CENTER OF GRAVITY Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGYV1

FILTER: CH. CLASS 180

TIME (MS)

PEAK DATA: 1.41 KM/H @ 15.20 MS; -497.54 KM/H @ 310.00 MS

B-141

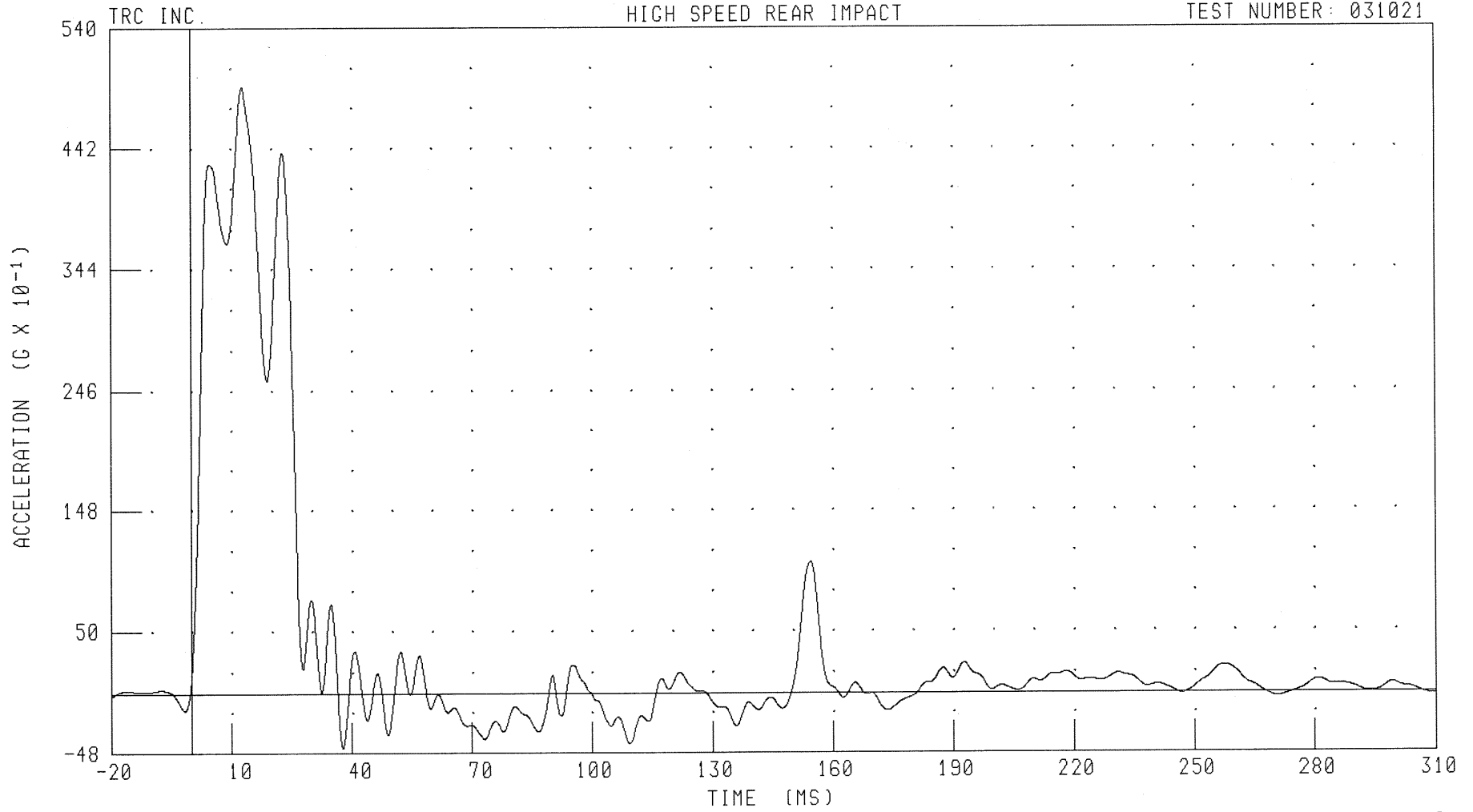
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

MOVING BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGZG1

FILTER: CH. CLASS 60

PEAK DATA: 49.21 G @ 12.80 MS; -4.43 G @ 37.68 MS

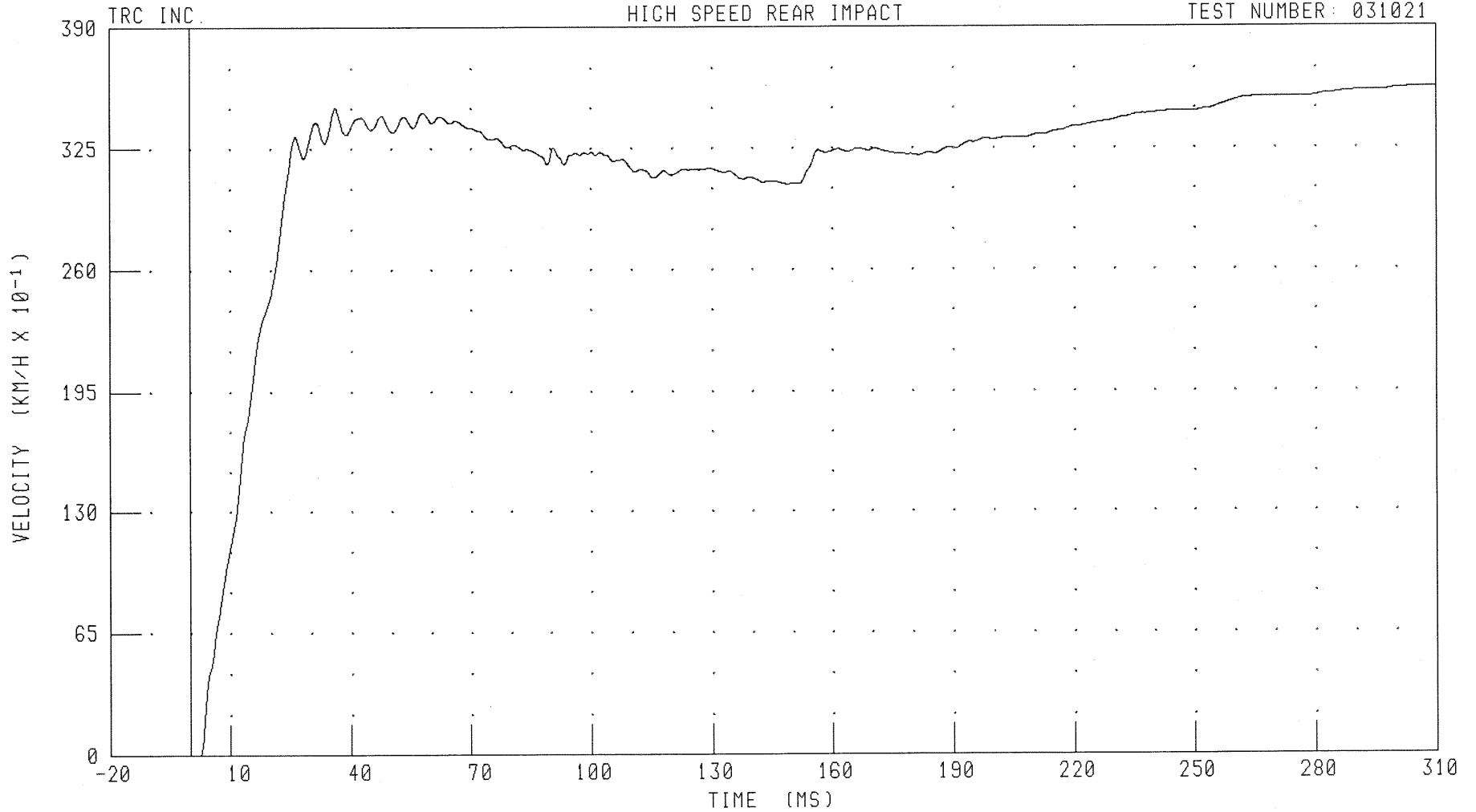
B-142

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER CENTER OF GRAVITY Z-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGZV1 FILTER: CH. CLASS 180

PEAK DATA: 35.78 KM/H @ 305.44 MS; -0.08 KM/H @ 2.08 MS

B-143

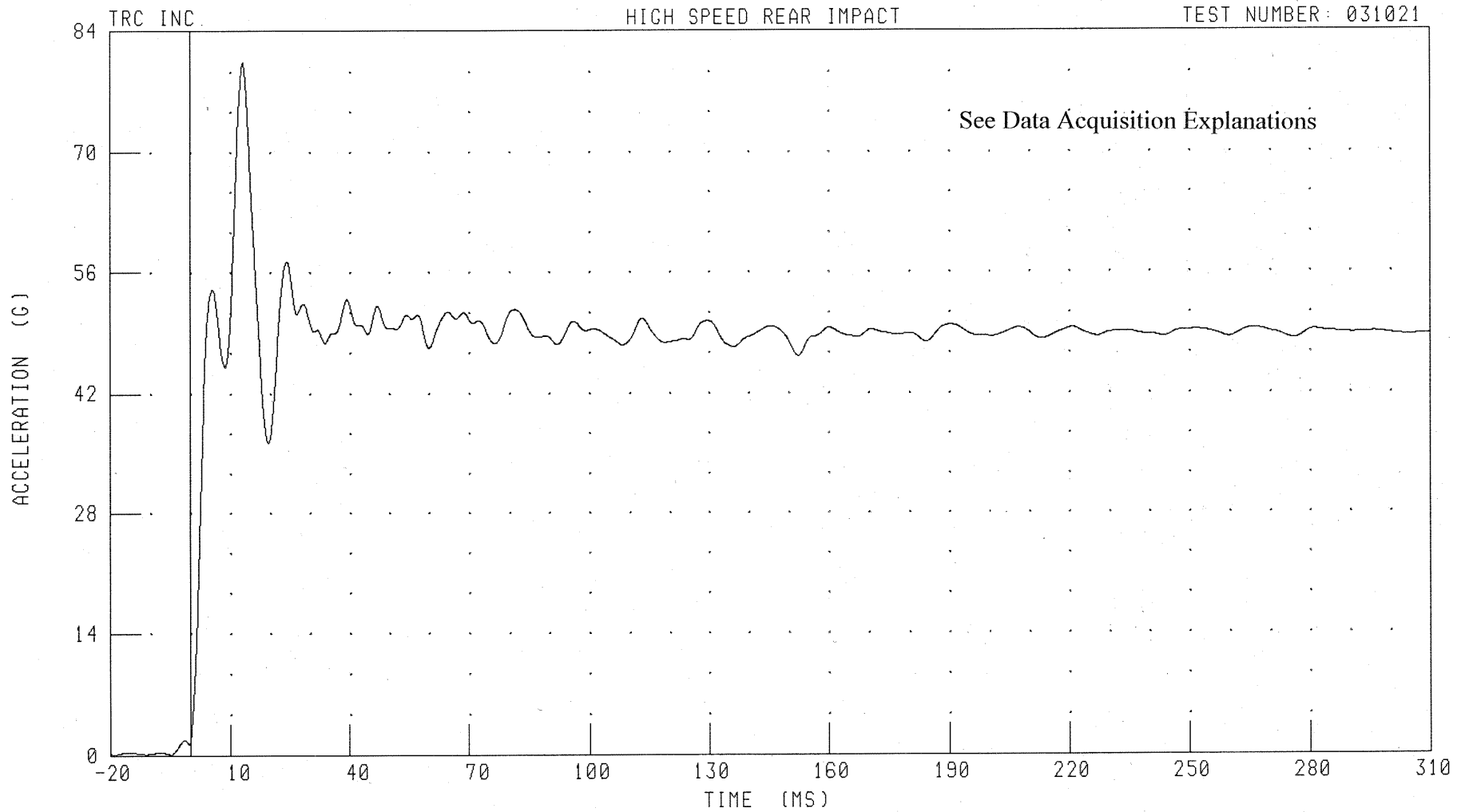
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

MOVING BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: BCGRG1

FILTER: CH. CLASS 60

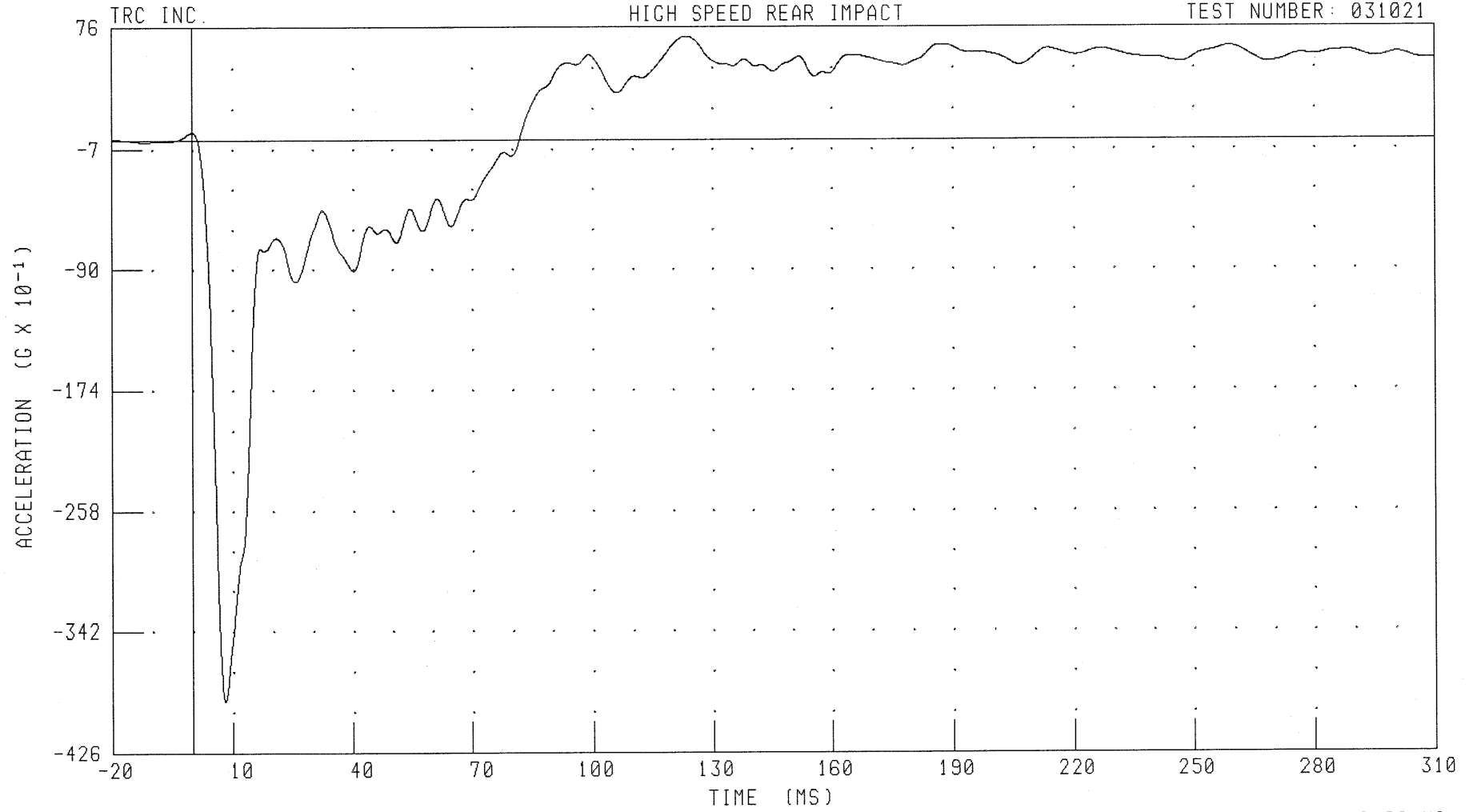
PEAK DATA: 80.45 G @ 13.12 MS; 0.08 G @ -19.12 MS

B-144

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER LEFT REAR X-AXIS ACCELERATION

TEST NUMBER: 031021



CHANNEL: LRRXG1 FILTER: CH. CLASS 60

PEAK DATA: 7.04 G @ 123.44 MS; -39.15 G @ 8.08 MS

B-145

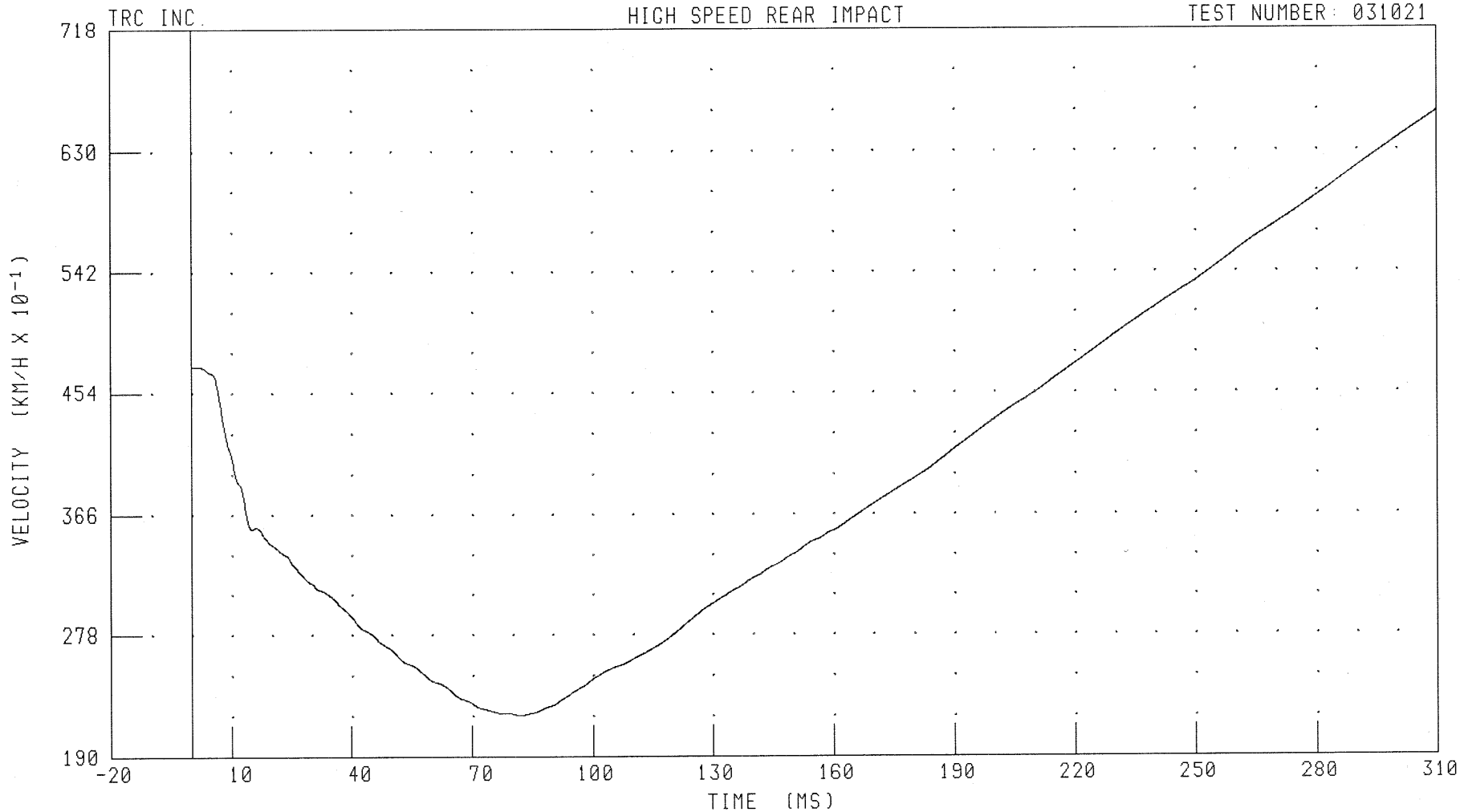
031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4

MOVING BARRIER LEFT REAR X-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LRRXV1

FILTER: CH. CLASS 180

TIME (MS)

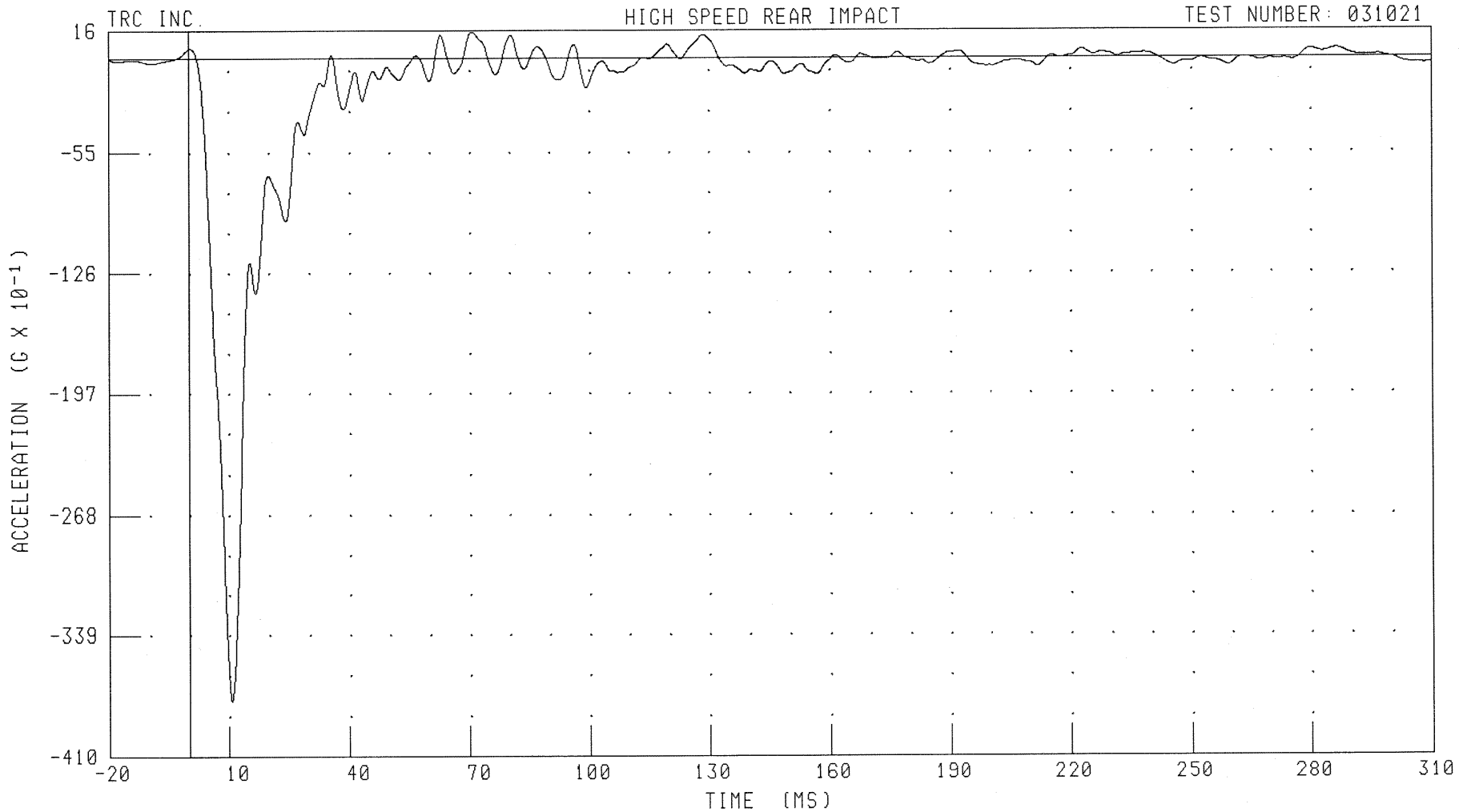
PEAK DATA: 65.79 KM/H @ 310.00 MS; 21.96 KM/H @ 81.84 MS

B-146

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER LEFT REAR Y-AXIS ACCELERATION

TEST NUMBER: 031021



CHANNEL: LRRYG1

FILTER: CH. CLASS 60

PEAK DATA: 1.52 G @ 70.72 MS; -37.73 G @ 10.64 MS

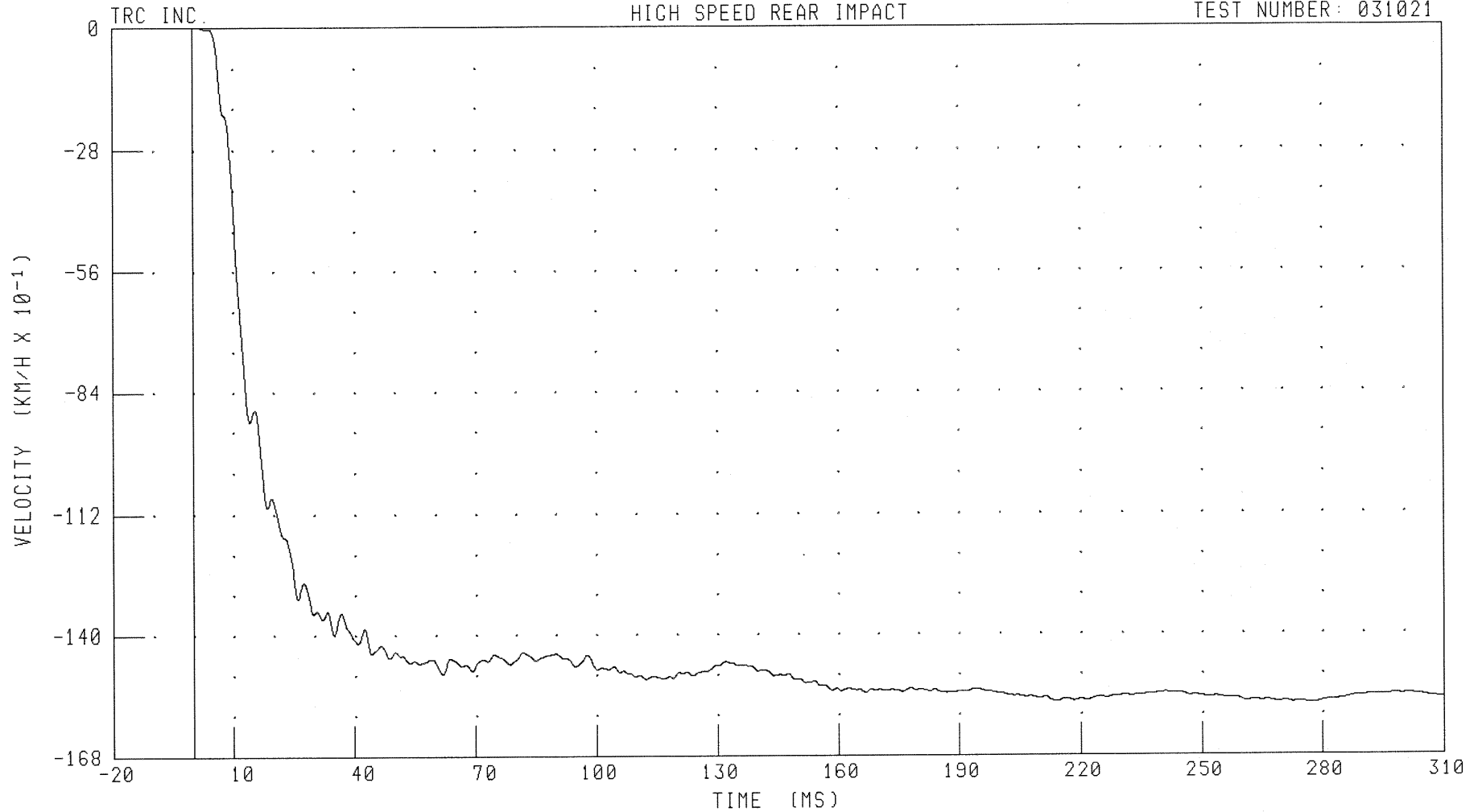
B-147

031021-2

47.3 KPH REAR IMPACT (MOVING BARRIER) INTO 2003 INFINITI QX4  
MOVING BARRIER LEFT REAR Y-AXIS VELOCITY

HIGH SPEED REAR IMPACT

TEST NUMBER: 031021



CHANNEL: LRRYV1 FILTER: CH. CLASS 180

PEAK DATA: 0.01 KM/H @ 0.96 MS; -15.63 KM/H @ 277.84 MS

B-148

031021-2

Appendix C

Dummy Certification Data

Pre-Test Calibration

Driver Dummy S/N 202

Dummy	202v	Type	IIII 50th	Descriptio	VRTC - 202v HYBRID III 50TH ICAL'd 6-23-03 (DKS 10-13-03)J211					
Chsnam	Location	Model	Name	Manufacturer	Sens./mV/V/	Fullscal	Caldat	Pos Output	Flip	
HEDXG	Head Accel X	EGE-73BQ-200	98H13-F16	Entran	0.01801 g	2000	8/28/2003	Rwd	1	
HEDYG	Head Accel Y	EGE-73B6Q-20	02A16-A09	Entran	0.02046 g	2000	8/28/2003	Rgt	0	
HEDZG	Head Accel Z	EGE-73B6Q-20	00L13-F11	Entran	0.02068 g	2000	8/28/2003	Up	1	
HD1XG	Head (LT) Accel X	EGE-73B6Q-20	00L20-A23	Entran	0.01891 g	2000	8/28/2003	Fwd	0	
HD1ZG	Head (LT) Accel Z	EGE-73B6Q-20	00L13-F25	Entran	0.02097 g	2000	8/28/2003	Up	1	
HD2YG	Head (FT) Accel Y	EGE-73B6Q-20	B02A18-N21	Entran	0.02461 g	2000	8/28/2003	Lft	1	
HD2ZG	Head (FT) Accel Z	EGE-73B6Q-20	00L13-F27	Entran	0.01939 g	2000	8/28/2003	Up	1	
HD3XG	Head (TP) Accel X	EGE-73B6Q-20	B02A18-N23	Entran	0.02021 g	2000	8/28/2003	Fwd	0	
HD3YG	Head (TP) Accel Y	EGE-73B6Q-20	00L13-F05	Entran	0.02383 g	2000	8/28/2003	Lft	1	
HEDYV	Head Angular Vel Y	VRTC2	ARS-06	ARS-06-0033	ATA SENSORS	0.08298429 %s	11500	6/23/2003	Chn to Strnm (CCW)	1
NEKXF	Neck Force X	1716A	1716A-0853-FX	Denton	0.000190808 N	8896.4	9/30/2003	Hd Fd,Cst Rr	1	
NEKYF	Neck Force Y	1716A	1716A-0853-FY	Denton	0.000181658 N	8896.4	9/30/2003	Hd Lt,Cst Rt	0	
NEKZF	Neck Force Z	1716A	1716A-0853-FZ	Denton	0.000095619 N	13344.6	9/30/2003	Hd Up,Cst Dn	0	
NEKXM	Neck Moment X	1716A	1716A-0853-MX	Denton	0.005890619 N	282.5	9/30/2003	Rt Ear to Rt Shld	1	
NEKYM	Neck Moment Y	1716A	1716A-0853-MY	Denton	0.005901947 N	282.5	9/30/2003	Chn to Strnm	0	
NEKZM	Neck Moment Z	1716A	1716A-0853-MZ	Denton	0.008317876 N	282.5	9/30/2003	Chn to Lt Shld	0	
NKLXF	Lwr Neck Force X	1794A	1794A-0121-FX	Denton	0.000141304 N	13344.6	9/18/2003	Hd Fd,Cst Rr	1	
NKLYF	Lwr Neck Force Y	1794A	1794A-0121-FY	Denton	0.000139805 N	13344.6	9/18/2003	Hd Lt,Cst Rt	0	
NKLZF	Lwr Neck Force Z	1794A	1794A-0121-FZ	Denton	0.000062038 N	13344.6	9/18/2003	Hd Up,Cst Dn	0	
NKLXM	Lwr Neck Moment X	1794A	1794A-0121-MX	Denton	0.003806195 N	452	9/18/2003	Rt Ear to Rt Shld	1	
NKLYM	Lwr Neck Moment Y	1794A	1794A-0121-MY	Denton	0.003701549 N	452	9/18/2003	Chn to Strnm	0	
NKLZM	Lwr Neck Moment Z	1794A	1794A-0121-MZ	Denton	0.009113274 N	452	9/18/2003	Chn to Lt Shld	0	
CSTXG	Chest Accel X	EGE-73BQ-200	98H13-F15	Entran	0.01871 g	2000	8/28/2003	Fwd	0	
CSTYG	Chest Accel Y	EGE-73B6Q-20	02A16-A20	Entran	0.0225 g	2000	9/3/2003	Lft	1	
CSTZG	Chest Accel Z	EGE-73B6Q-20	01L26-F06	Entran	0.01948 g	2000	9/3/2003	Up	1	
CSTYV	Chest Angular Vel Y	VRTC12	ARS-06	ARS-06-0035	ATA SENSORS	0.08530541 %s	11500	6/23/2003	Strnm Away Frm Legs	0

Tuesday, October 21, 202v  
2003

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031021-2

Chsnam	Location	Model	Name	Manufacturer	Sens./mV/V/	Fullscal	Caldat	Pos Output	Flip
CSTXD	Chest Deflection X	14CB1-2847	14CB1-2847-0137	Servo	1.1502 m	100	10/3/2003	Strnm Away Frm Spn	0
PEVXG	Pelvis Accel X	EGE-73B6Q-20	B02A25-N02	Entran	0.01992 g	2000	8/28/2003	Rr	1
PEVYG	Pelvis Accel Y	EGE-73B6Q-20	00L13-F26	Entran	0.0218 g	2000	8/27/2003	Lft	1
PEVZG	Pelvis Accel Z	EGE-73B6Q-20	02A18-N16	Entran	0.01964 g	2000	8/28/2003	Up	1
LFMZF	Left Femur Force Z 002	2430	2430-96662	GSE	0.00006555 N	13344	10/3/2003	Knee Fd,Pel Rr	0
RFMZF	Right Femur Force Z 001	2430	2430-96661	GSE	0.000066254 N	13344	10/3/2003	Knee Fd,Pel Rrxt	0

C-4

031021-2

**Transportation Research Center  
Inc.**

# **ATD Calibration Report**

for

**VRTC**

**HIII 50<sup>th</sup> Serial No. 202  
Calibration No. 19**



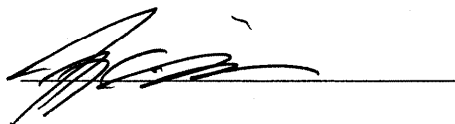
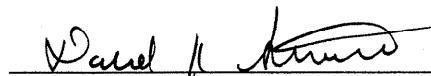
Transportation Research Center Inc.  
P.O. Box B-67  
10820 St. Rt. 347  
East Liberty, OH 43319-0367

**Transportation Research Center Inc.**  
**572E HIII 50th Male Dummy**  
**External Dimensions**  
**Serial No. 202 Calibration No. 19**

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	879	Yes
B	Shoulder Pivot Height	505.5 - 520.7	514	Yes
C	H-Point Height	83.8 - 88.9	85	Yes
D	H-Point From Seatback	134.6 - 139.7	136	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	89	Yes
F	Thigh Clearance	139.7 - 154.9	154	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	Yes
H	Skull Cap To Backline	40.6 - 45.7	43	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	337	Yes
J	Elbow Rest Height	190.5 - 210.8	196	Yes
K	Buttock Knee Length	579.1 - 604.5	594	Yes
L	Popliteal Height	429.3 - 454.7	438	Yes
M	Knee Pivot Height	485.1 - 500.4	490	Yes
N	Buttock Popliteal Length	452.1 - 477.5	460	Yes
O	Chest Depth	213.4 - 228.6	220	Yes
P	Foot Length	251.5 - 266.7	263	Yes
V	Shoulder Breadth	421.6 - 436.9	432	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	991	Yes
Z	Waist Circumference	835.7 - 866.1	847	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Technician

Approved

# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

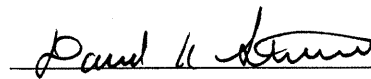
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Peak Resultant Acceleration	225 - 275 g	243.4 g	Yes
Peak Lateral Acceleration	15 g Max	-5.4 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

## Comments:

Technician



Approved



10.15.2003 13:42:21 614



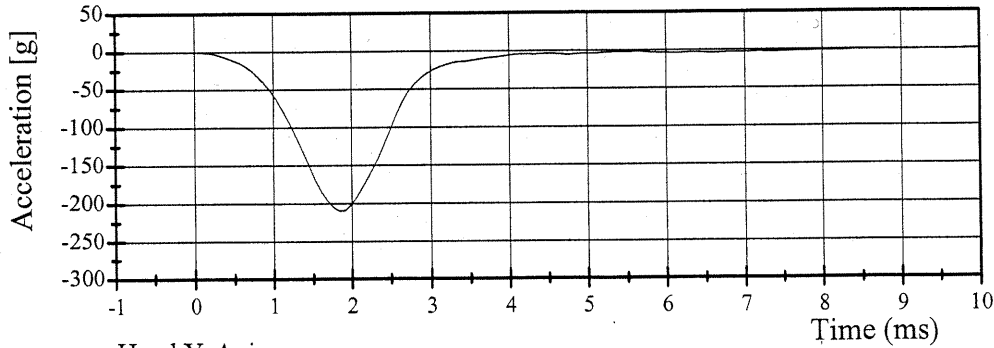
# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

Head X-Axis

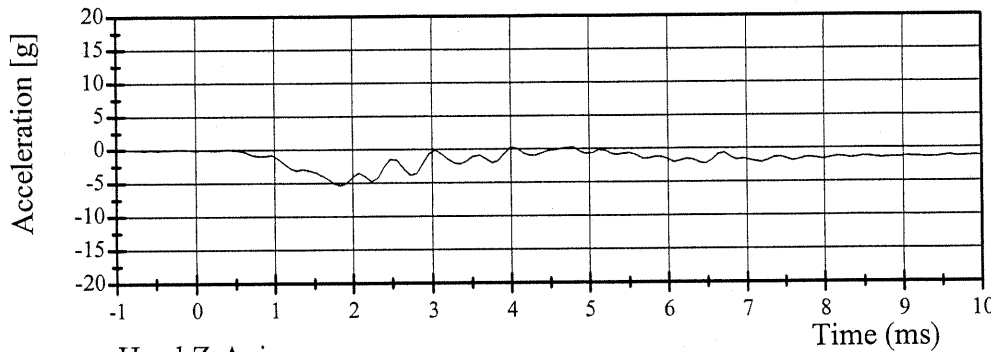


Filter Class: 1000

Max: -0.5 g at 10.0 ms

Min: -209.7 g at 1.8 ms

Head Y-Axis

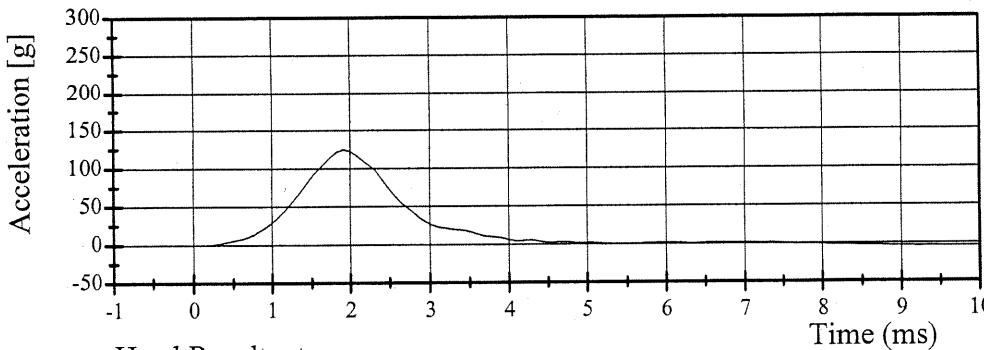


Filter Class: 1000

Max: 0.3 g at 4.0 ms

Min: -5.4 g at 1.8 ms

Head Z-Axis

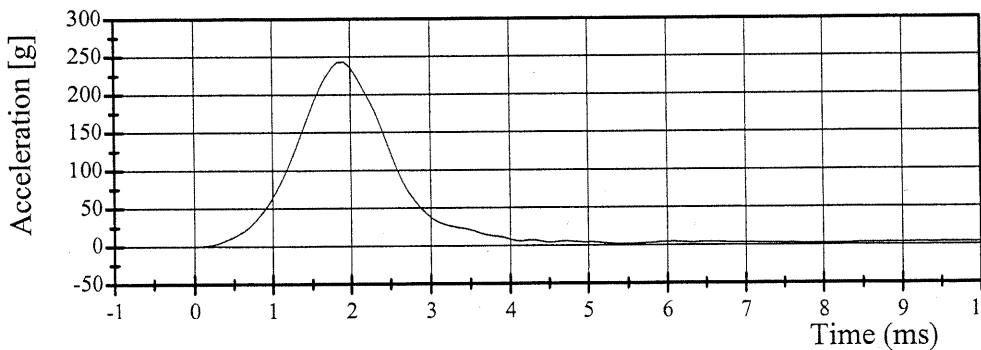


Filter Class: 1000

Max: 124.9 g at 1.9 ms

Min: -3.8 g at 9.6 ms

Head Resultant



Filter Class: 1000

Max: 243.4 g at 1.9 ms

Min: 0.0 g at 2.4 ms

10.15.2003 13:42:22 614



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

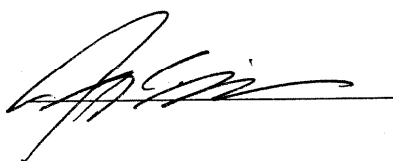
HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

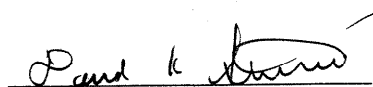
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impact Velocity	6.89 - 7.13 m/s	7.01 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	24.55 g	Yes
20 ms	17.60 - 22.60 g	21.56 g	Yes
30 ms	12.50 - 18.50 g	16.53 g	Yes
Max Pendulum Deceleration	29.00 g	25.92 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	16.46 g	Yes
Deceleration-Time Curve Decay Time To 5g	34 - 42 ms	36.96 ms	Yes
D Plane Rotation			
Max	64 - 78 °	66.60 °	Yes
Time	57 - 64 ms	58.64 ms	Yes
Moment About Occipital Condyle			
Max	88.1 - 108.5 N·m	99.51 N·m	Yes
Time	47 - 58 ms	49.76 ms	Yes
Rotation Angle-Time Curve Decay Time To Zero	113 - 128 ms	118.24 ms	Yes
Positive Moment-Time Curve Decay Time To Zero	97 - 107 ms	99.36 ms	Yes

## Comments:

Technician



Approved



10.16.2003 10:28:14 502



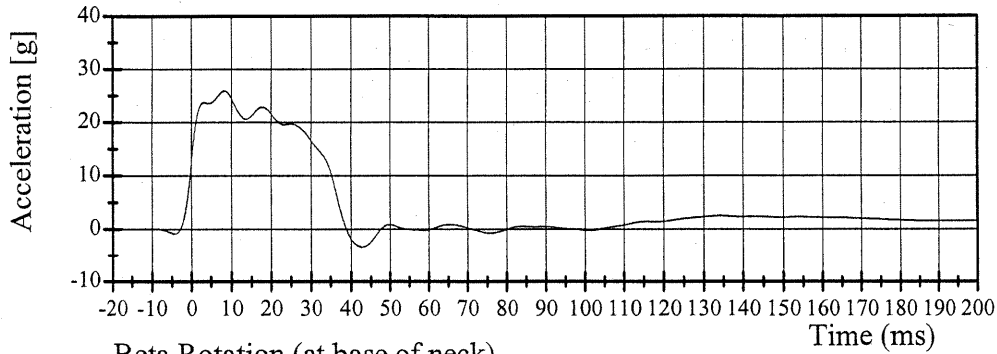
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

### Pendulum Deceleration

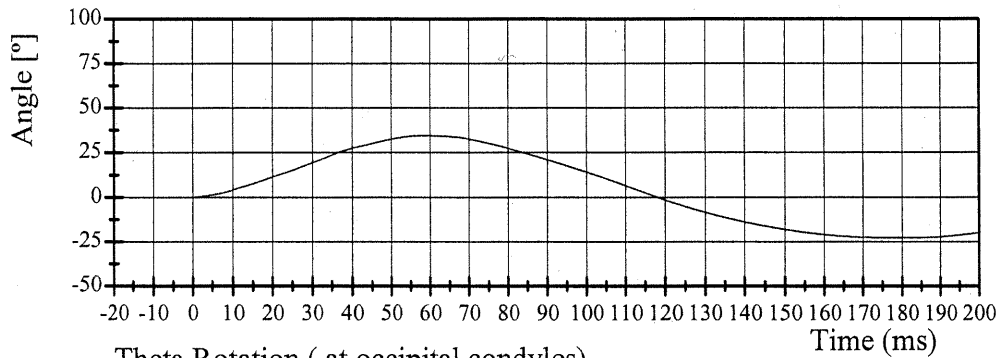


Filter Class: 60

Max: 25.9 g at 8.2 ms

Min: -3.3 g at 42.8 ms

### Beta Rotation (at base of neck)

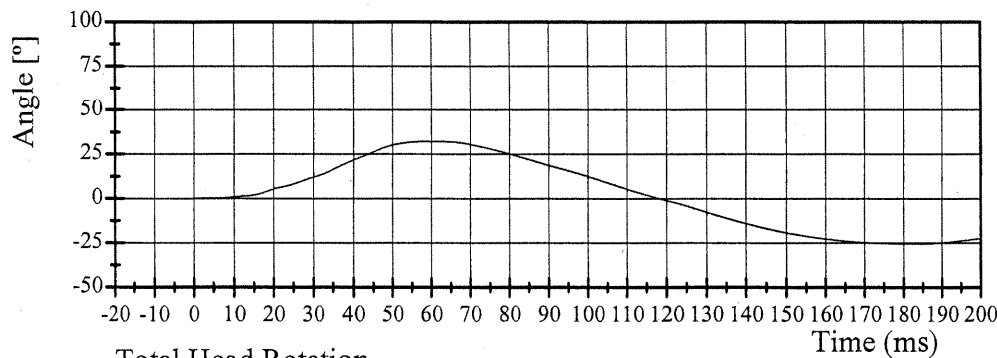


Filter Class: 60

Max: 34.5 ° at 58.8 ms

Min: -22.6 ° at 176.3 ms

### Theta Rotation (at occipital condyles)

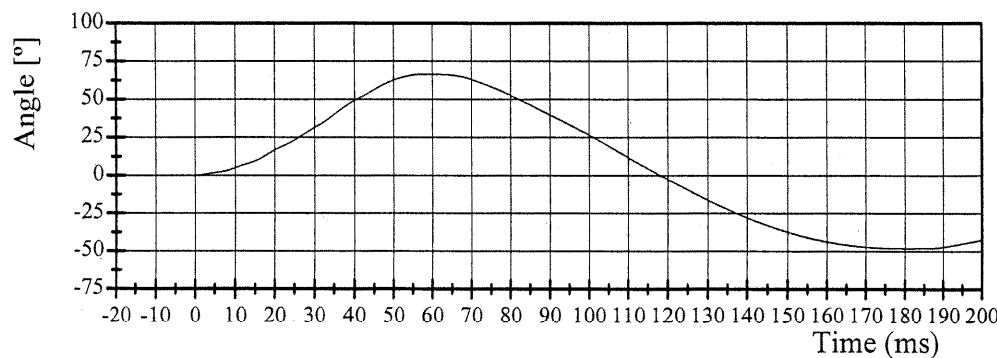


Filter Class: 60

Max: 32.1 ° at 58.2 ms

Min: -25.4 ° at 182.0 ms

### Total Head Rotation



Filter Class: 60

Max: 66.6 ° at 58.6 ms

Min: -48.0 ° at 180.6 ms

10.16.2003 10:28:15 502



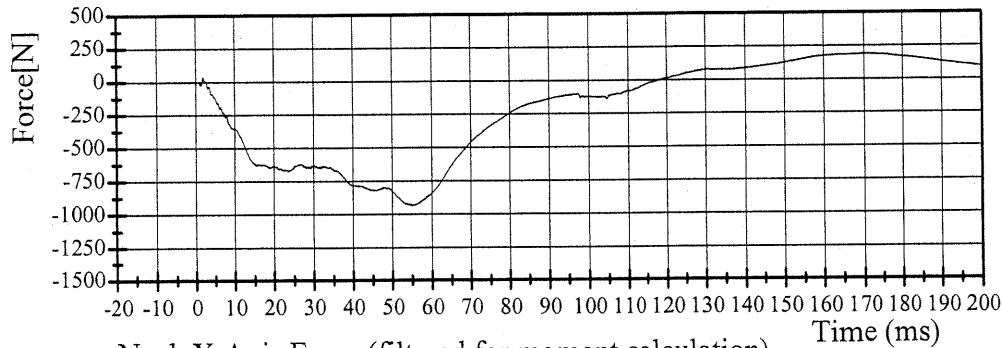
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

Neck X-Axis Force

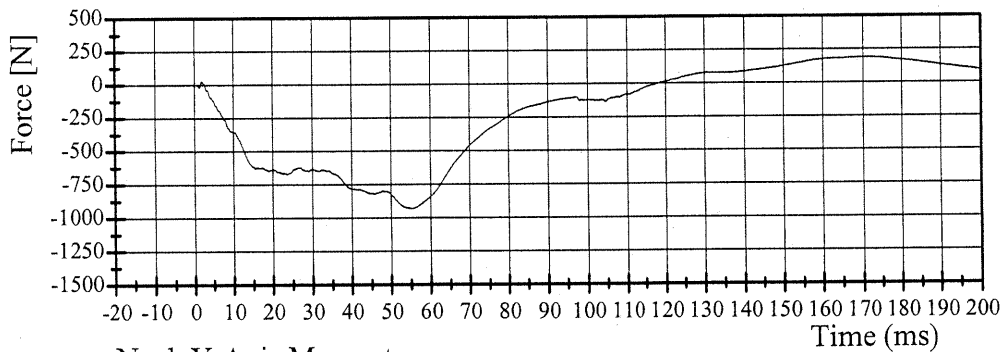


Filter Class: 1000

Max: 189.1 N at 169.8 ms

Min: -931.5 N at 55.0 ms

Neck X-Axis Force (filtered for moment calculation)

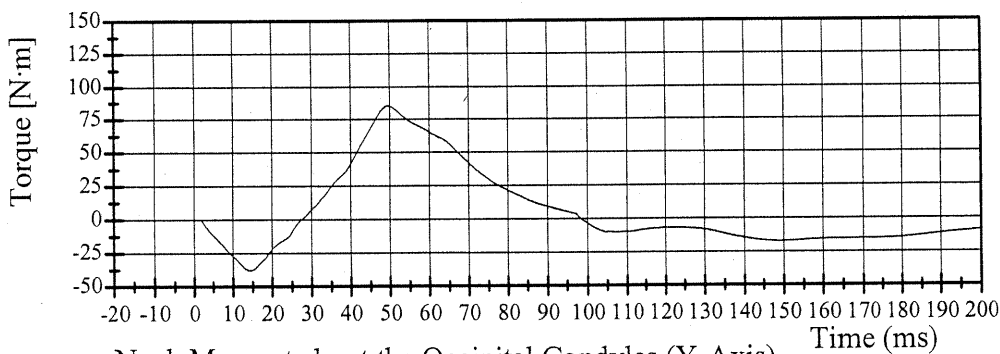


Filter Class: 600

Max: 189.1 N at 170.1 ms

Min: -931.4 N at 55.1 ms

Neck Y-Axis Moment

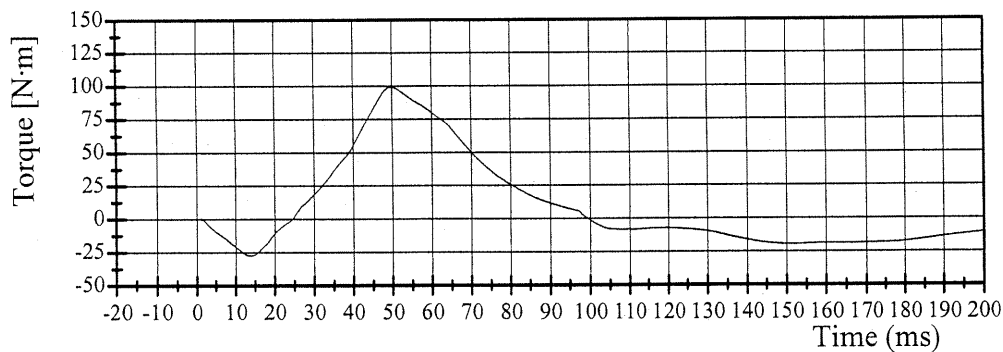


Filter Class: 600

Max: 85.1 N·m at 49.5 ms

Min: -38.0 N·m at 14.2 ms

Neck Moment about the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 99.5 N·m at 49.8 ms

Min: -27.5 N·m at 13.8 ms

# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003


Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.02 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	18.80 g	Yes
20 ms	14.00 - 19.00 g	16.13 g	Yes
30 ms	11.00 - 16.00 g	13.57 g	Yes
Max Pendulum Deceleration	22.00 g	19.26 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	13.51 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	43.28 ms	Yes
D Plane Rotation			
Max	81 - 106 °	90.36 °	Yes
Time	72 - 82 ms	81.68 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-62.99 N·m	Yes
Time	65 - 79 ms	75.44 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	161.36 ms	Yes
Negative Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	146.96 ms	Yes

## Comments:

Technician



Approved



10.16.2003 10:58:22 575



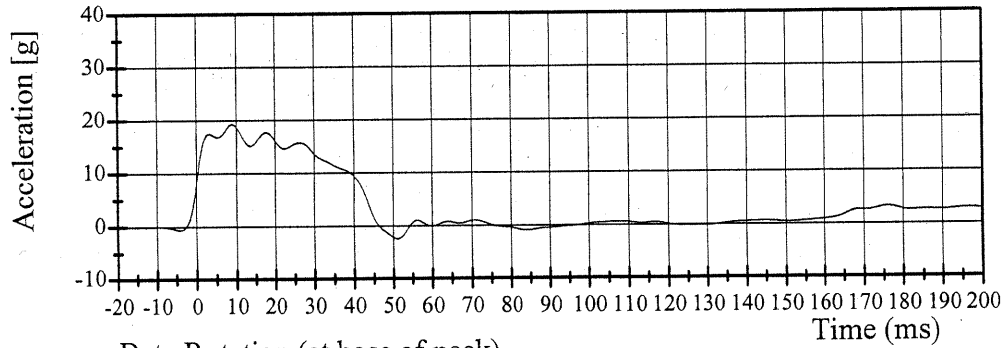
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

### Pendulum Deceleration

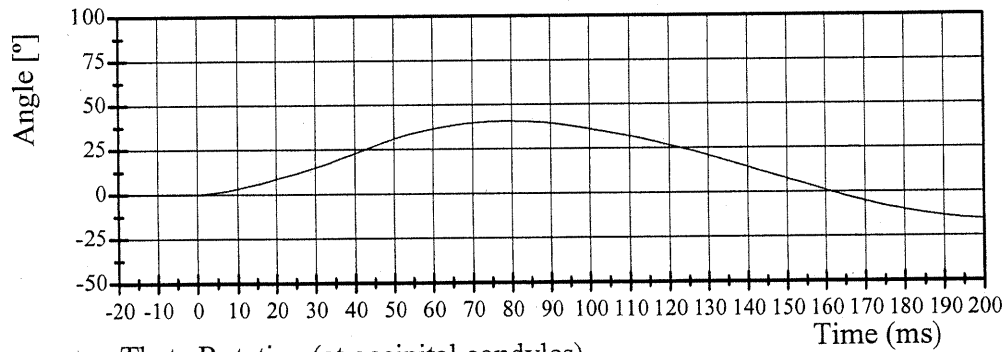


Filter Class: 60

Max: 19.3 g at 9.0 ms

Min: -2.4 g at 51.0 ms

### Beta Rotation (at base of neck)



Filter Class: 60

Max: 40.6 ° at 78.9 ms

Min: -15.9 ° at 205.2 ms

### Theta Rotation (at occipital condyles)

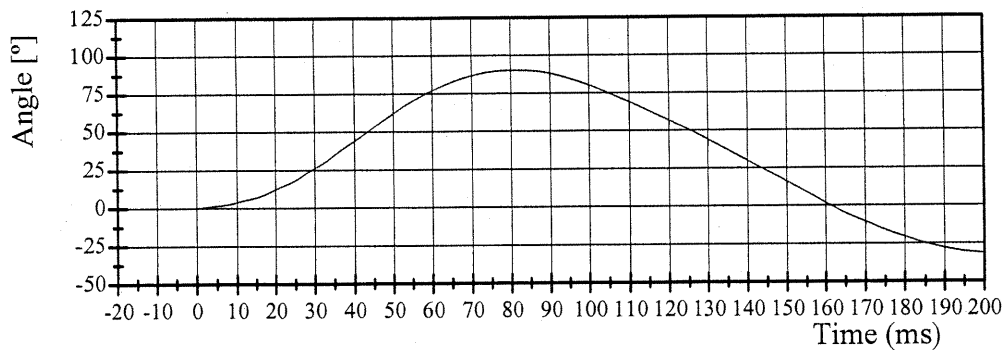


Filter Class: 60

Max: 49.9 ° at 82.7 ms

Min: -15.8 ° at 203.0 ms

### Total Head Rotation



Filter Class: 60

Max: 90.4 ° at 81.7 ms

Min: -31.8 ° at 204.4 ms

10.16.2003 10:58:23 575



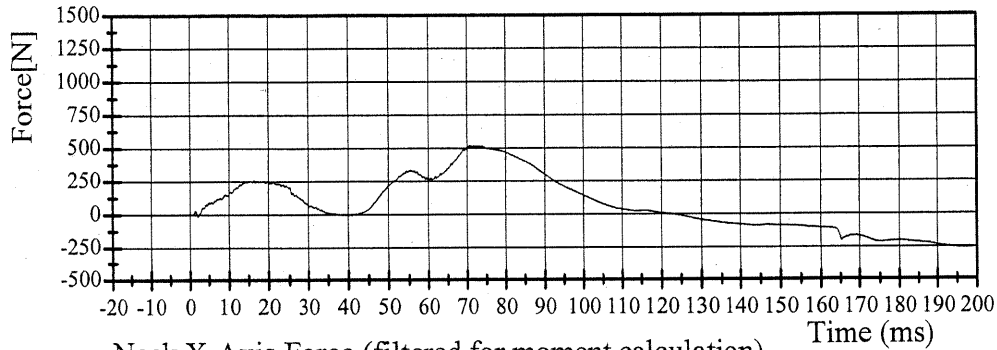
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

Neck X-Axis Force

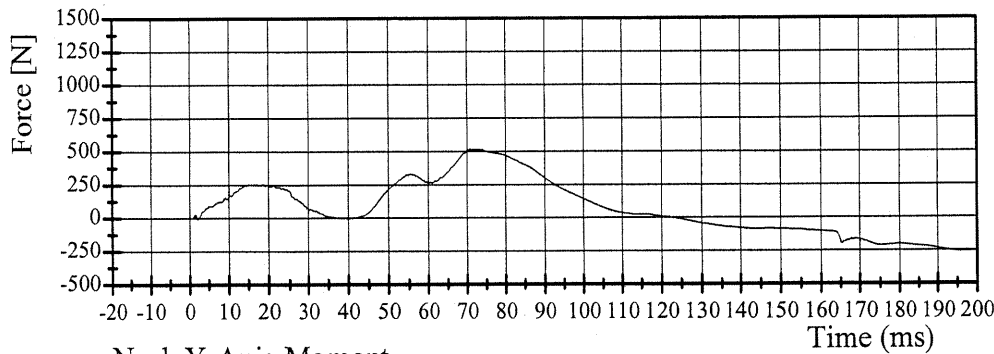


Filter Class: 1000

Max: 519.2 N at 70.7 ms

Min: -259.5 N at 196.4 ms

Neck X-Axis Force (filtered for moment calculation)

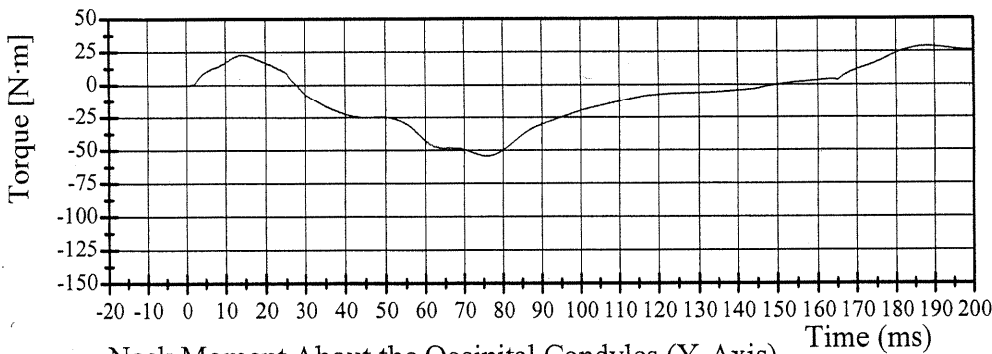


Filter Class: 600

Max: 515.1 N at 70.7 ms

Min: -259.2 N at 196.6 ms

Neck Y-Axis Moment

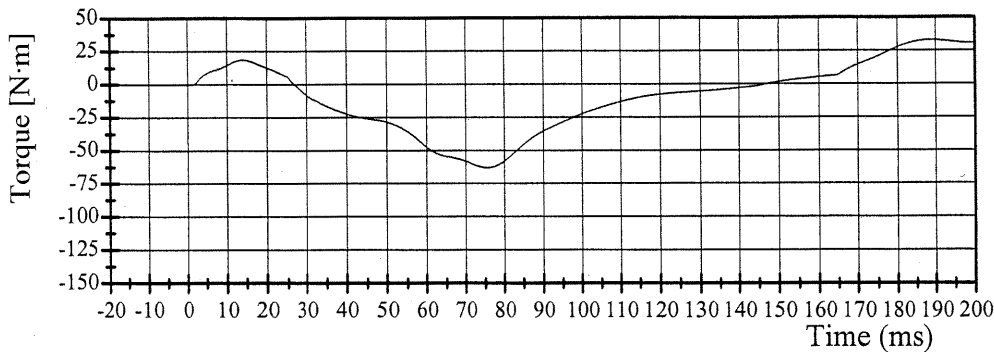


Filter Class: 600

Max: 28.9 N·m at 188.2 ms

Min: -54.2 N·m at 75.7 ms

Neck Moment About the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 32.9 N·m at 188.9 ms

Min: -63.0 N·m at 75.4 ms

# Transportation Research Center Inc.

572E Thorax Test

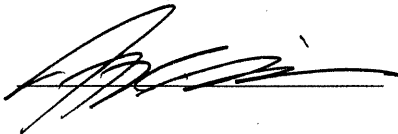
HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

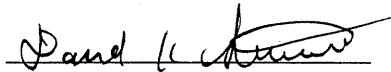
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.61 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-67.2 mm	Yes
Maximum Resistive Force	5160 - 5894 N	5834 N	Yes
Internal Hysteresis	69 - 85 %	71 %	Yes

## Comments:

Technician



Approved



10.16.2003 13:11:58 966



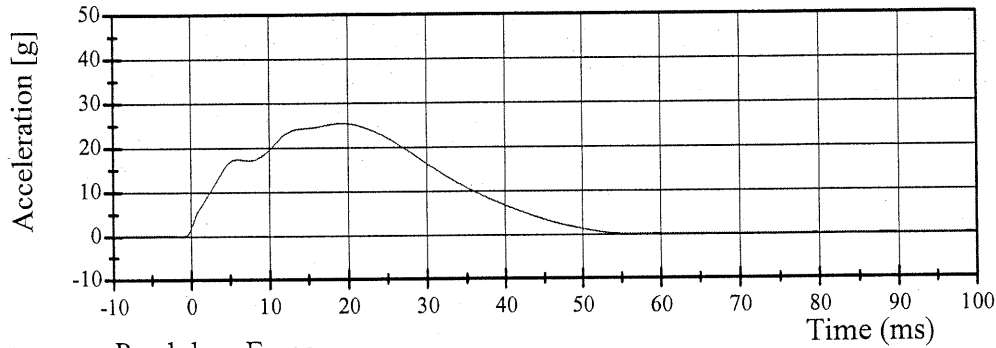
# Transportation Research Center Inc.

572E Thorax Test

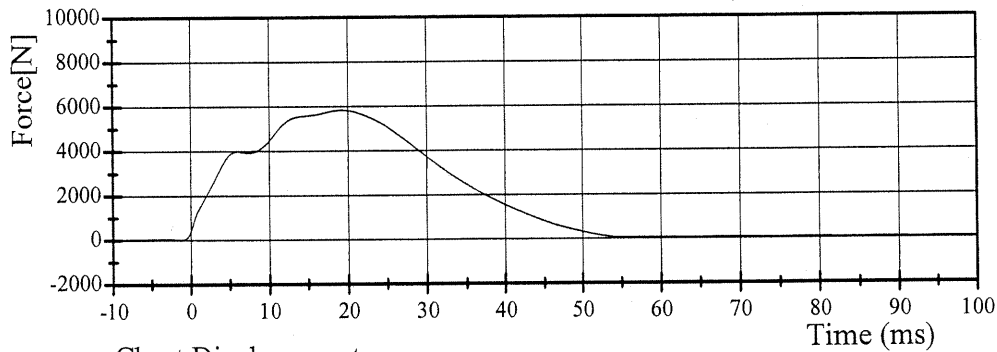
HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/16/2003

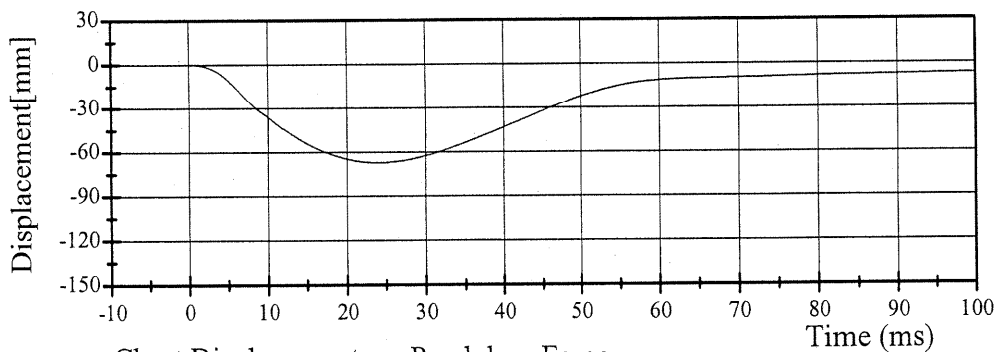
Pendulum Deceleration



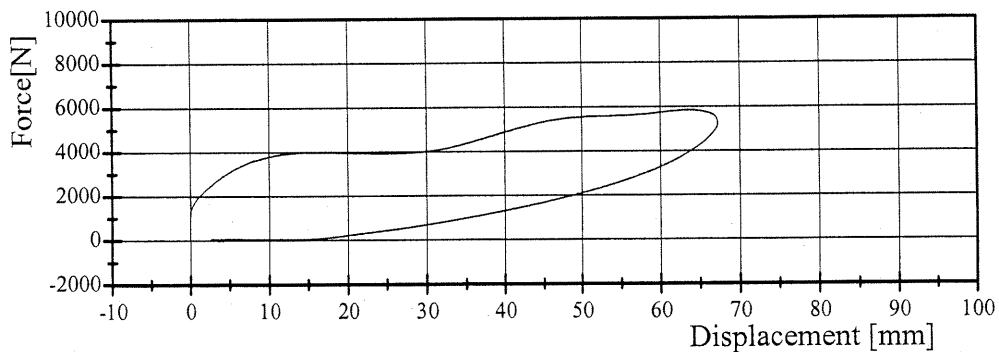
Pendulum Force



Chest Displacement



Chest Displacement vs. Pendulum Force



10.16.2003 13:11:59 966



# Transportation Research Center Inc

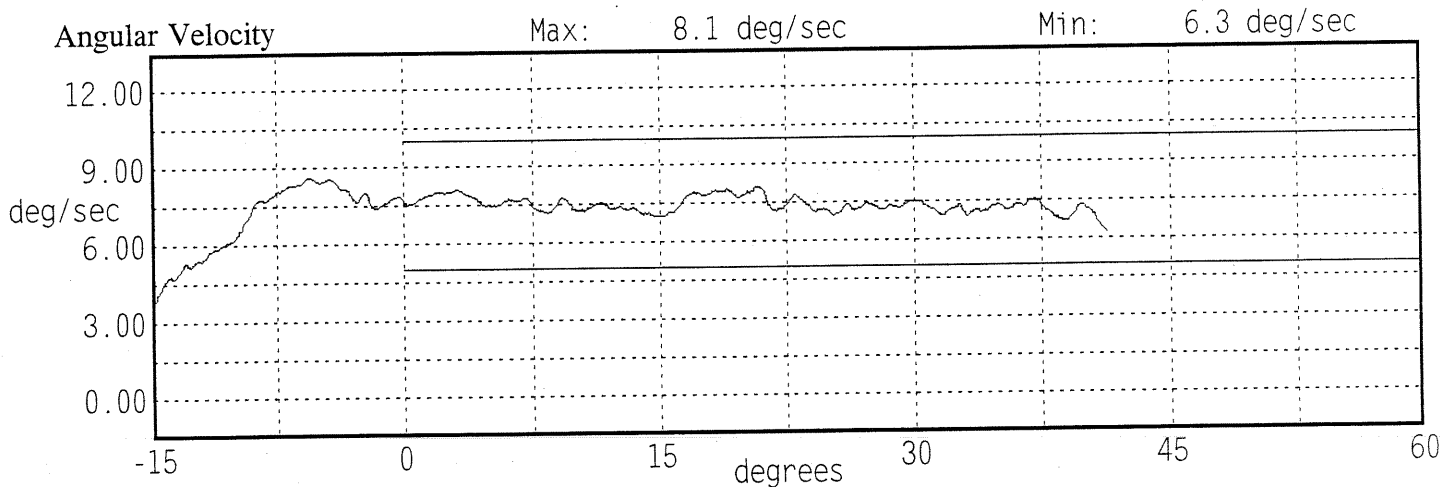
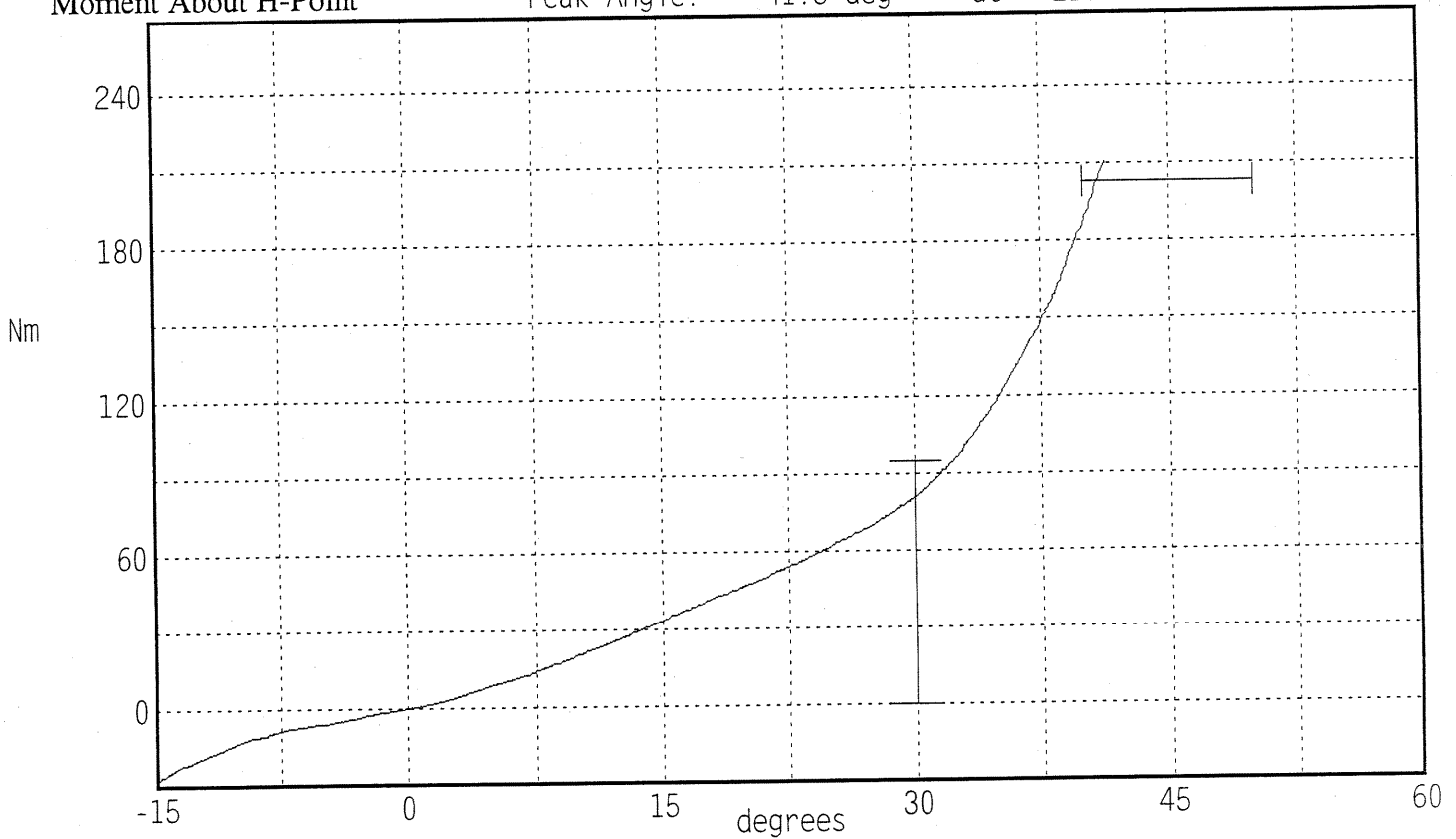
Hybrid III Hip Range of Motion

Serial Number: 202L  
Test Number: 202C19  
Comments:

Date: 10/15/2003  
Time: 13:01

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	34 %	Pass
Moment at 30 deg	<= 94.9	80.9 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.9 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Moment About H-Point  
Peak Moment: 210.5 Nm at 41.3 deg  
Peak Angle: 41.3 deg at 210.5 Nm



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 202R  
Test Number: 202C19

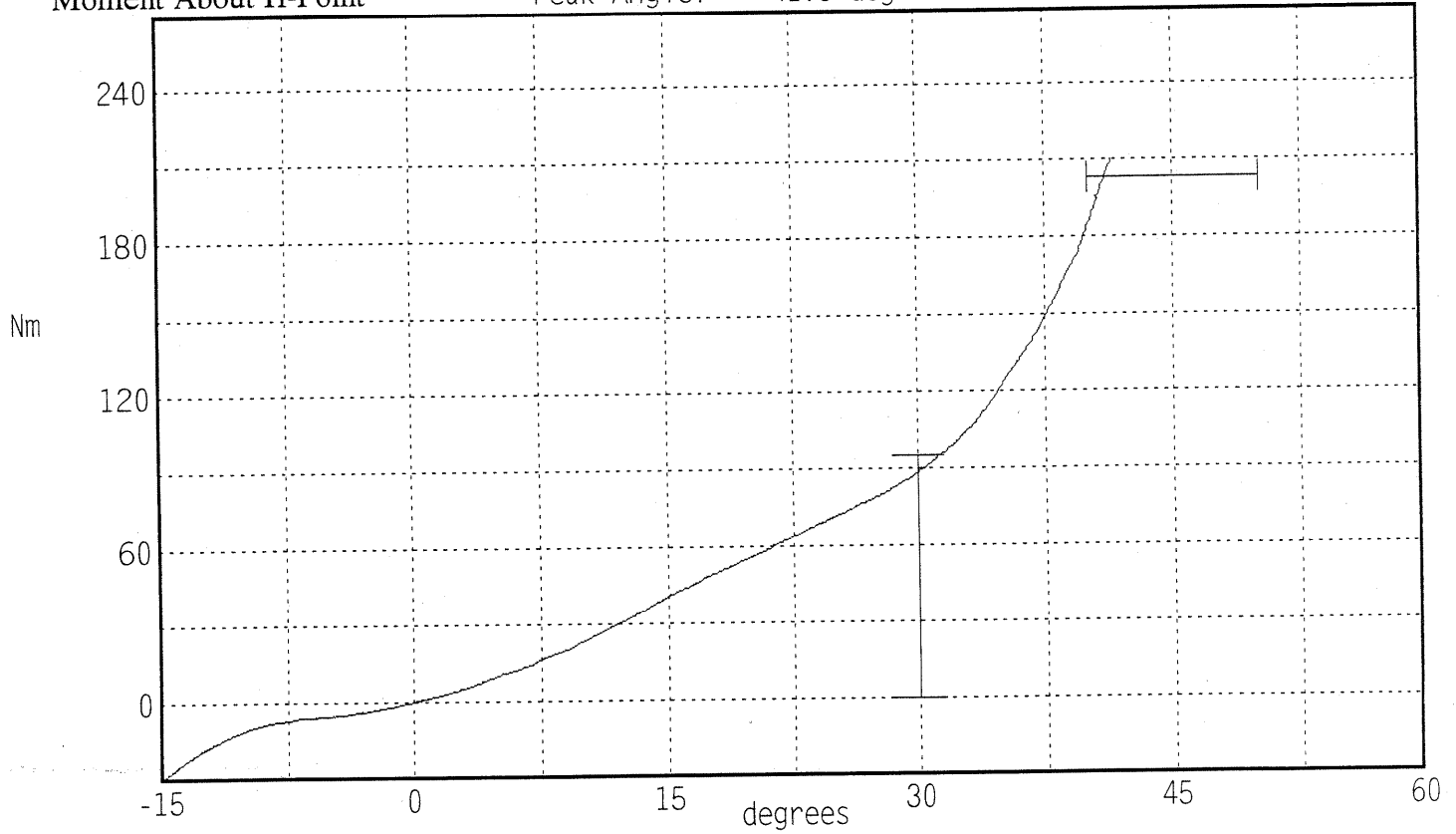
Date: 10/15/2003  
Time: 12:52

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	34 %	Pass
Moment at 30 deg	<= 94.9	88.3 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	41.0 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Peak Moment: 210.0 Nm at 41.3 deg  
Peak Angle: 41.3 deg at 210.0 Nm

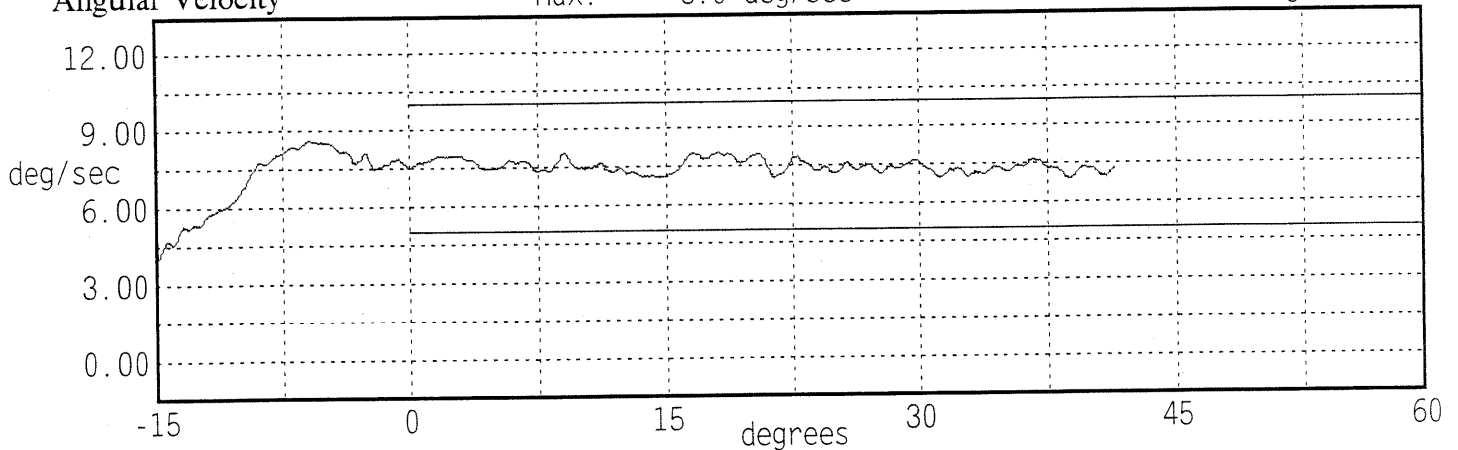
Moment About H-Point



Angular Velocity

Max: 8.0 deg/sec

Min: 6.9 deg/sec



# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

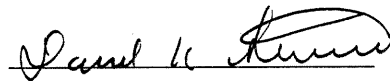
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.13 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5692 N	Yes

## Comments:

Technician



Approved



10.15.2003 14:26:50 2106



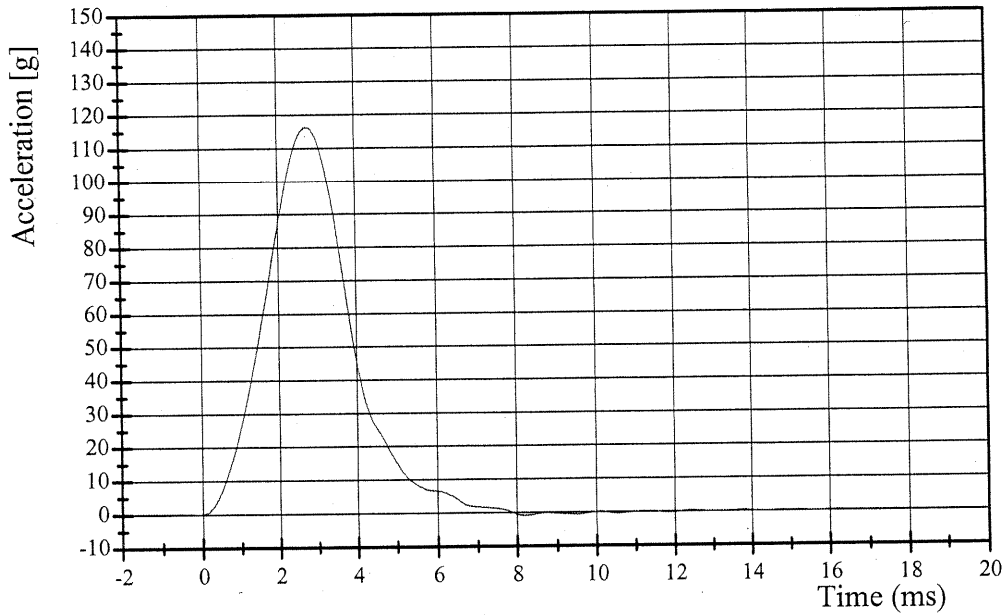
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

### Pendulum Deceleration

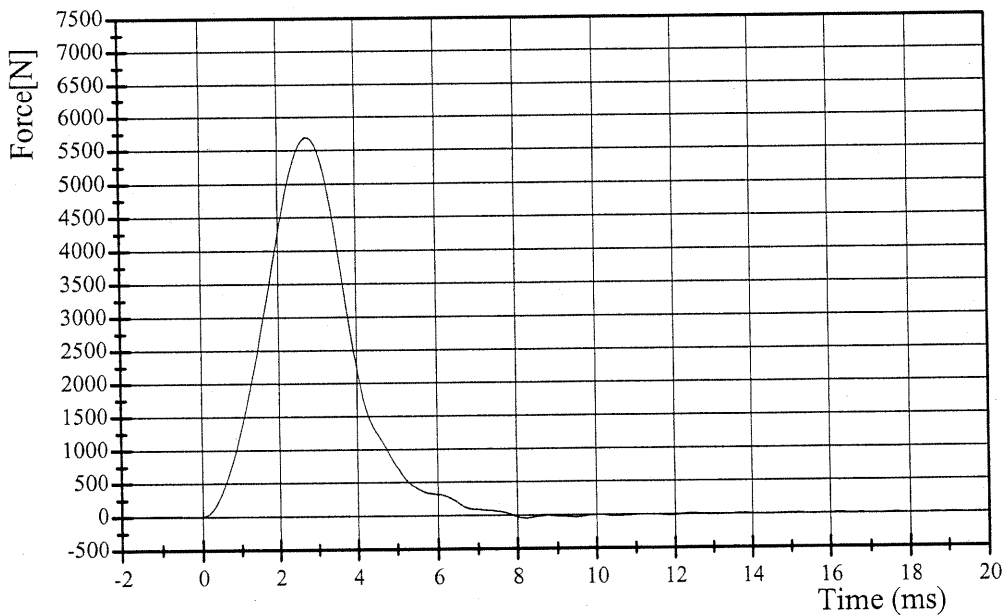


Filter Class: 600

Max: 116.3 g at 2.8 ms

Min: -0.9 g at 8.2 ms

### Pendulum Force



Filter Class: 600

Max: 5692.4 N at 2.8 ms

Min: -42.9 N at 8.2 ms



# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

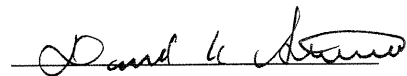
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.09 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5374 N	Yes

## Comments:

Technician



Approved



10.15.2003 14:29:34 2130



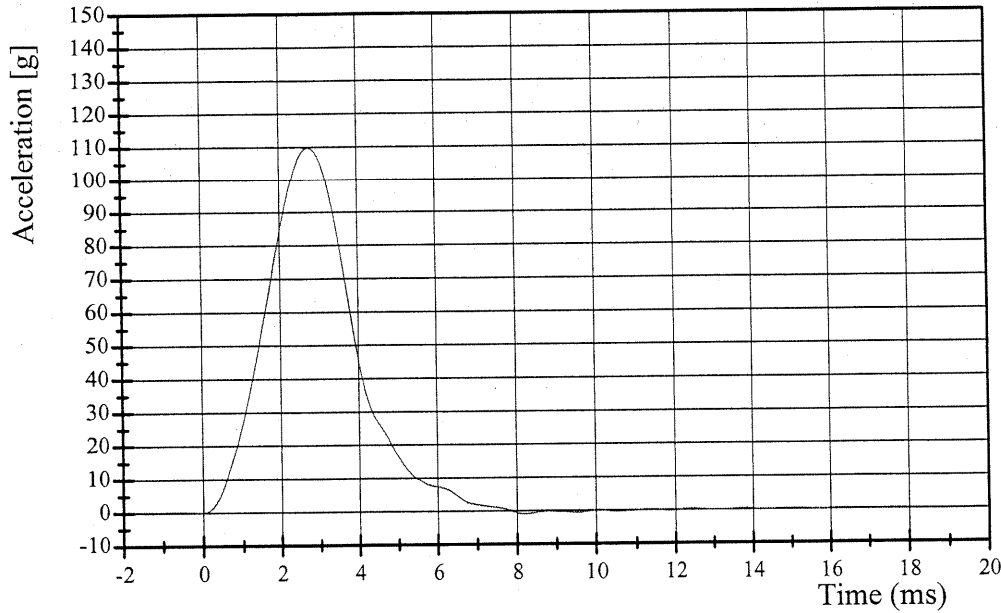
# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 202 Calibration No. 19 - 1

Test Date 10/15/2003

### Pendulum Deceleration

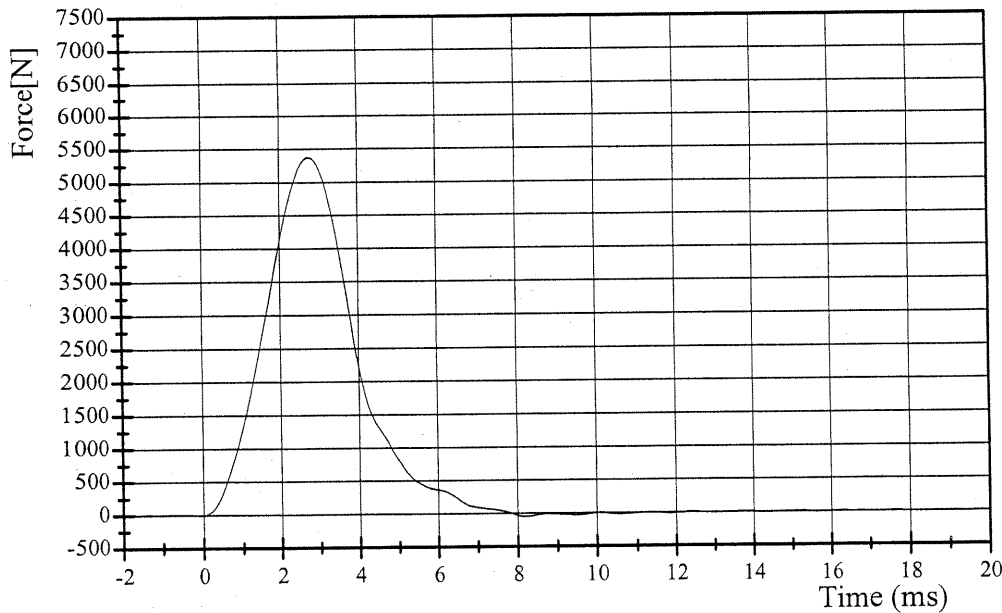


Filter Class: 600

Max: 109.8 g at 2.7 ms

Min: -1.0 g at 8.2 ms

### Pendulum Force



Filter Class: 600

Max: 5373.7 N at 2.7 ms

Min: -48.6 N at 8.2 ms



Pre-Test Calibration

Right Rear Passenger Dummy S/N 206

Dummy	206v	Type	HIH 50th	Descriptio	VRTC - 206v HYBRID III 50TH.ICAL'd 6-23-03 (DKS 10-06-03)J211					
Chsnam	Location	Model	Name	Manufacturer	Sens./mV/V/	Fullscal	Caldat	Pos Output	Flip	
HEDXG	Head Accel X	EGE-73BQ-200	98H14-K06	Entran	0.02095 g	2000	9/23/2003	Rwd	1	
HEDYG	Head Accel Y	EGE-73BQ-200	98H14-K10	Entran	0.01792 g	2000	9/23/2003	Rgt	0	
HEDZG	Head Accel Z	EGE-73BQ-200	98H10-F17	Entran	0.01957 g	2000	9/23/2003	Up	1	
HEDYV	Head Angular Vel Y S230	ARS-06	ARS-06-0031	ATA SENSORS	0.085445026 %s	11500	6/23/2003	Chn to Strnm (CCW)	1	
NEKXF	Neck Force X	IF-205	IF-205-157-FX	FTSS	0.000188905 N	8896	9/23/2003	Hd Fd,Cst Rr	1	
NEKYF	Neck Force Y	IF-205	IF-205-157-FY	FTSS	0.000179598 N	8896	9/23/2003	Hd Lt,Cst Rt	0	
NEKZF	Neck Force Z	IF-205	IF-205-157-FZ	FTSS	0.000094537 N	13344	9/23/2003	Hd Up,Cst Dn	0	
NEKXM	Neck Moment X	IF-205	IF-205-157-MX	FTSS	0.005990442 N	282.5	9/23/2003	Rt Ear to Rt Shld	1	
NEKYM	Neck Moment Y	IF-205	IF-205-157-MY	FTSS	0.005922124 N	282.5	9/23/2003	Chn to Strnm	0	
NEKZM	Neck Moment Z	IF-205	IF-205-157-MZ	FTSS	0.008483186 N	282.5	9/23/2003	Chn to Lt Shld	0	
NKLXF	Lwr Neck Force X	1794A	1794A-216-FX	Denton	0.000140367 N	13344.6	9/23/2003	Hd Fd,Cst Rr	1	
NKLYF	Lwr Neck Force Y	1794A	1794A-216-FY	Denton	0.000138052 N	13344.6	9/23/2003	Hd Lt,Cst Rt	0	
NKLZF	Lwr Neck Force Z	1794A	1794A-216-FZ	Denton	0.000069816 N	13344.6	9/23/2003	Hd Up,Cst Dn	0	
NKLXM	Lwr Neck Moment X	1794A	1794A-216-MX	Denton	0.003860398 N	452	9/23/2003	Rt Ear to Rt Shld	1	
NKLYM	Lwr Neck Moment Y	1794A	1794A-216-MY	Denton	0.003745133 N	452	9/23/2003	Chn to Strnm	0	
NKLZM	Lwr Neck Moment Z	1794A	1794A-216-MZ	Denton	0.009237611 N	452	9/23/2003	Chn to Lt Shld	0	
CSTXG	Chest Accel X	EGE-73BQ-200	98H10-F07	Entran	0.02123 g	2000	9/23/2003	Fwd	0	
CSTYG	Chest Accel Y	EGE-73B6Q-20	01J02-F05	Entran	0.02168 g	2000	9/23/2003	Lft	1	
CSTZG	Chest Accel Z	EGE-73B6Q-20	01J02-F10	Entran	0.02104 g	2000	9/23/2003	Up	1	
CSTYV	Chest Angular Vel Y SJ3	ARS-06	ARS-06-0027	ATA SENSORS	0.085026178 %s	11500	6/23/2003	Strnm Away Frm Legs	0	
CSTXD	Chest Deflection X	14CB1-2847	14CB1-2847-206	Servo	1.1361 m	100	10/1/2003	Strnm Away Frm Spn	0	
PEVXG	Pelvis Accel X	EGE-73B6Q-20	03E03D30-N19	Entran	0.02297 g	2000	9/23/2003	Rr	1	
PEVYG	Pelvis Accel Y	EGE-73BQ-200	98H10-F10	Entran	0.01834 g	2000	9/2/2003	Lft	1	
PEVZG	Pelvis Accel Z	EGE-73B6Q-20	01J02-F03	Entran	0.02038 g	2000	9/23/2003	Up	1	
LFMZP	Left Femur Force Z 2017	2430	2430-717	GSE	0.000067956 N	13344	9/26/2003	Knee Fd,Pel Rr	0	
RFMZP	Right Femur Force Z 2018	2430	2430-744	GSE	0.000070976 N	13344	9/26/2003	Knee Fd,Pel Rr	0	

Tuesday, October 21, 2003

C-24

031021-2

**Transportation Research Center  
Inc.**

# **ATD Calibration Report**

for

**VRTC**

**HIII 50<sup>th</sup> Serial No. 206  
Calibration No. 17**



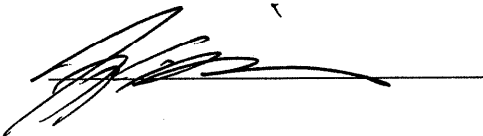
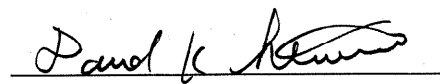
Transportation Research Center Inc.  
P.O. Box B-67  
10820 St. Rt. 347  
East Liberty, OH 43319-0367

**Transportation Research Center Inc.**  
**572E HIII 50th Male Dummy**  
**External Dimensions**  
**Serial No. 206 Calibration No. 17**

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	880	Yes
B	Shoulder Pivot Height	505.5 - 520.7	509	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	89	Yes
F	Thigh Clearance	139.7 - 154.9	148	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	291	Yes
H	Skull Cap To Backline	40.6 - 45.7	43	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	334	Yes
J	Elbow Rest Height	190.5 - 210.8	199	Yes
K	Buttock Knee Length	579.1 - 604.5	590	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	498	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	221	Yes
P	Foot Length	251.5 - 266.7	252	Yes
V	Shoulder Breadth	421.6 - 436.9	431	Yes
W	Foot Breadth	91.4 - 106.7	102	Yes
Y	Chest Circumference	970.3 - 1000.8	991	Yes
Z	Waist Circumference	835.7 - 866.1	857	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Technician

Approved

# Transportation Research Center Inc.

572E Head Drop Test

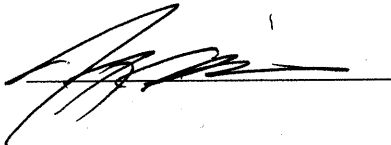
HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

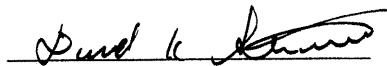
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Peak Resultant Acceleration	225 - 275 g	272.9 g	Yes
Peak Lateral Acceleration	15 g Max	12.8 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

## Comments:

Technician



Approved



10.14.2003 14:49:44 614



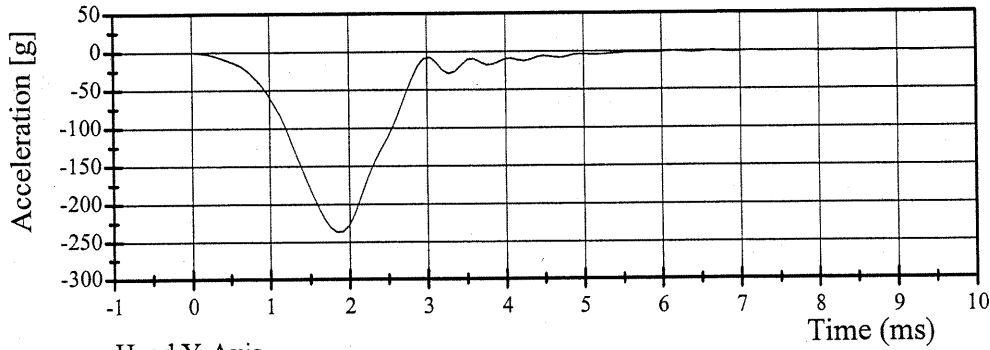
# Transportation Research Center Inc.

572E Head Drop Test

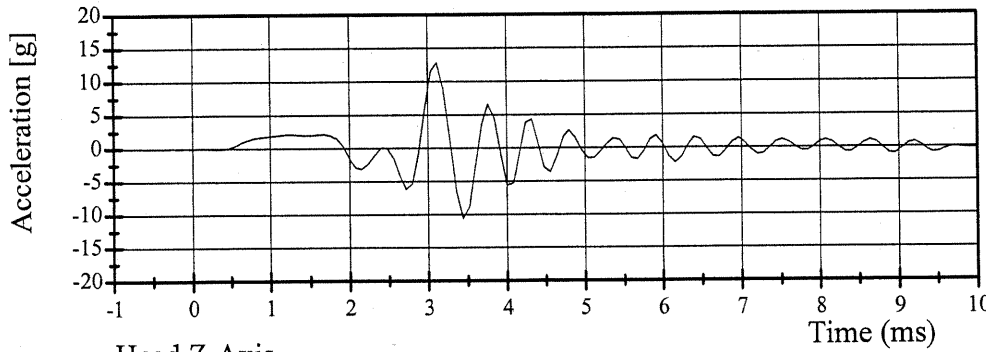
HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

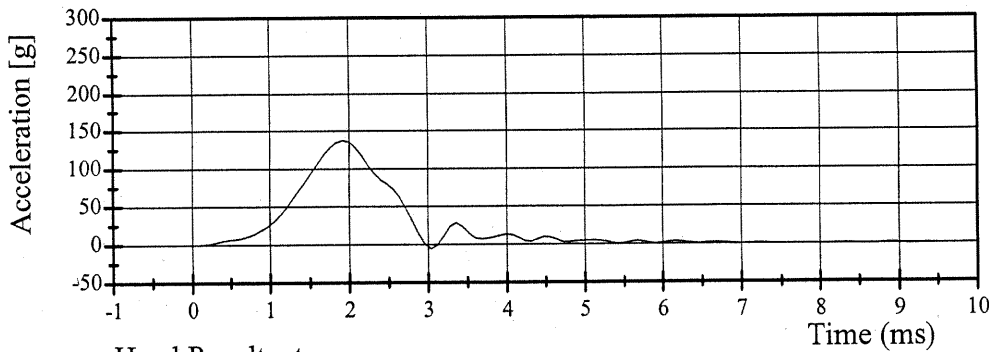
Head X-Axis



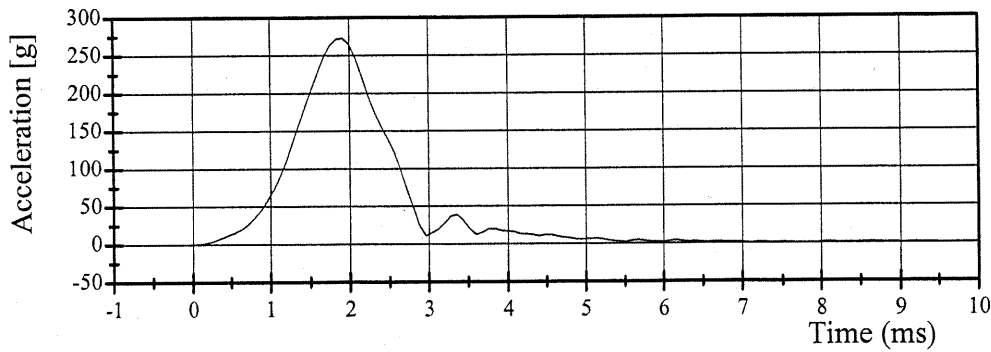
Head Y-Axis



Head Z-Axis



Head Resultant



10.14.2003 14:49:45 614



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

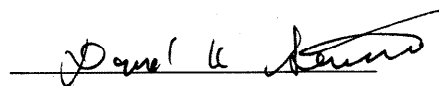
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Impact Velocity	6.89 - 7.13 m/s	7.01 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	25.92 g	Yes
20 ms	17.60 - 22.60 g	22.56 g	Yes
30 ms	12.50 - 18.50 g	17.82 g	Yes
Max Pendulum Deceleration	29.00 g	27.25 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	17.75 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	34 - 42 ms	34.80 ms	Yes
D Plane Rotation			
Max	64 - 78 °	73.67 °	Yes
Time	57 - 64 ms	58.96 ms	Yes
Moment About Occipital Condyle			
Max	88.1 - 108.5 N·m	96.72 N·m	Yes
Time	47 - 58 ms	47.68 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	113 - 128 ms	115.92 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	97 - 107 ms	100.48 ms	Yes

## Comments:

Technician



Approved



10.14.2003 17:24:56 501



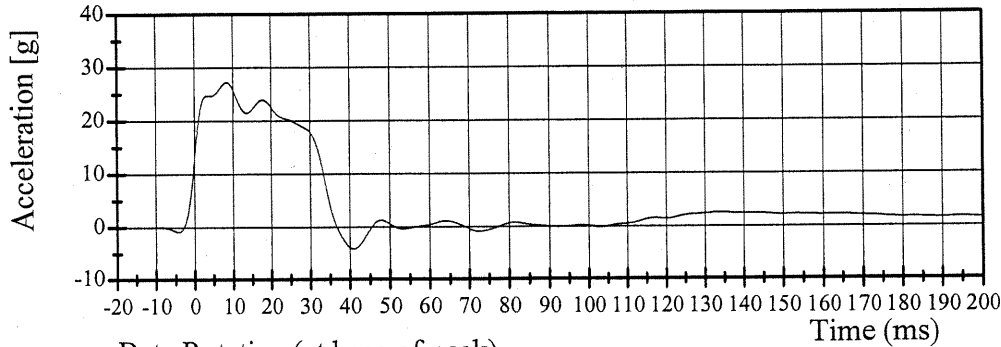
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

Pendulum Deceleration

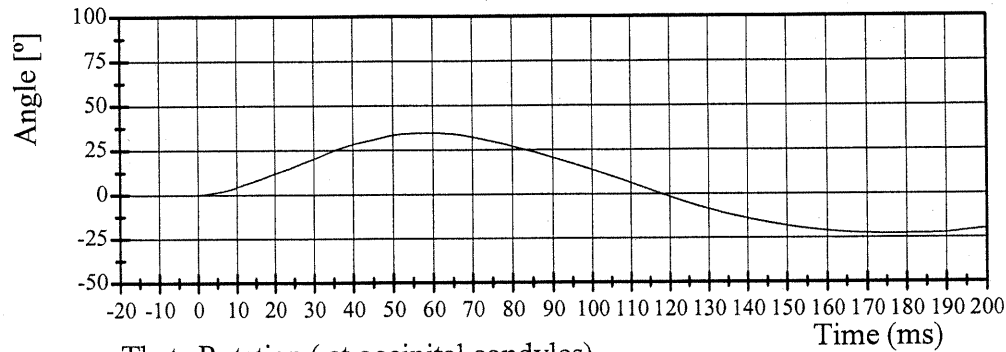


Filter Class: 60

Max: 27.3 g at 8.4 ms

Min: -4.1 g at 41.0 ms

Beta Rotation (at base of neck)

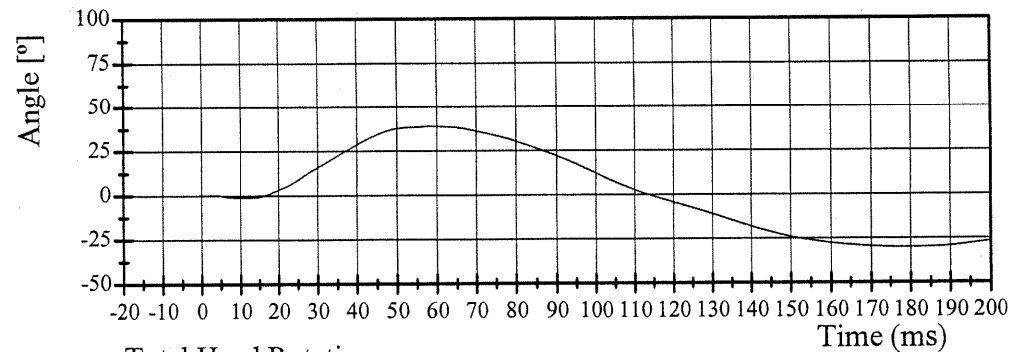


Filter Class: 60

Max: 34.7 ° at 59.0 ms

Min: -22.7 ° at 175.6 ms

Theta Rotation (at occipital condyles)

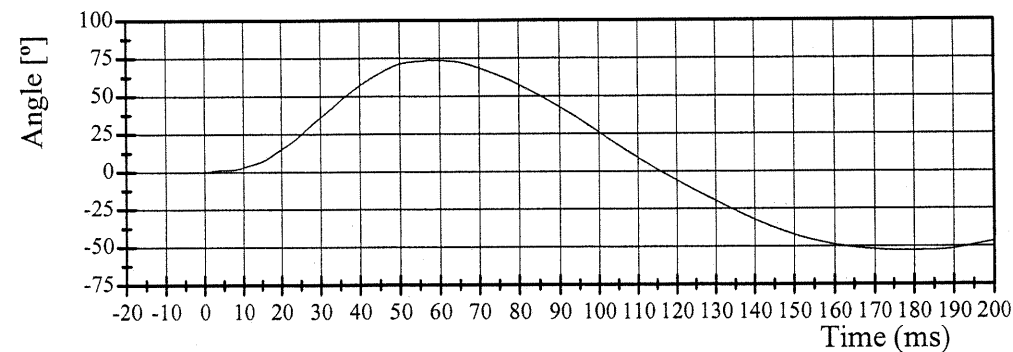


Filter Class: 60

Max: 39.0 ° at 58.9 ms

Min: -30.0 ° at 179.1 ms

Total Head Rotation



Filter Class: 60

Max: 73.7 ° at 59.0 ms

Min: -52.7 ° at 177.9 ms

10.14.2003 17:24:57 501



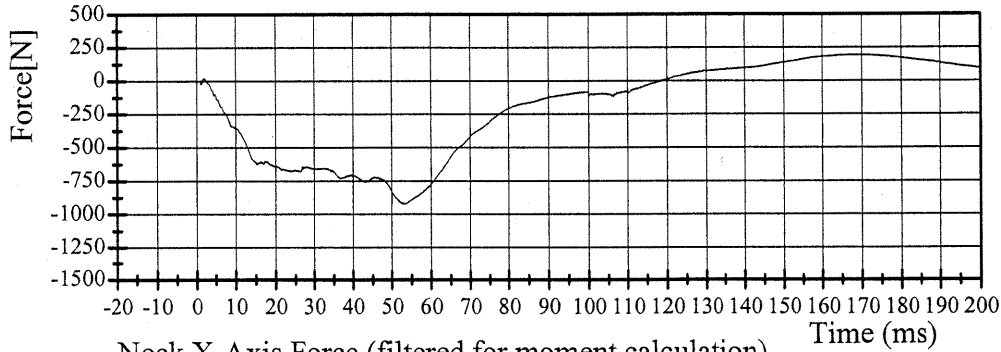
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

Neck X-Axis Force

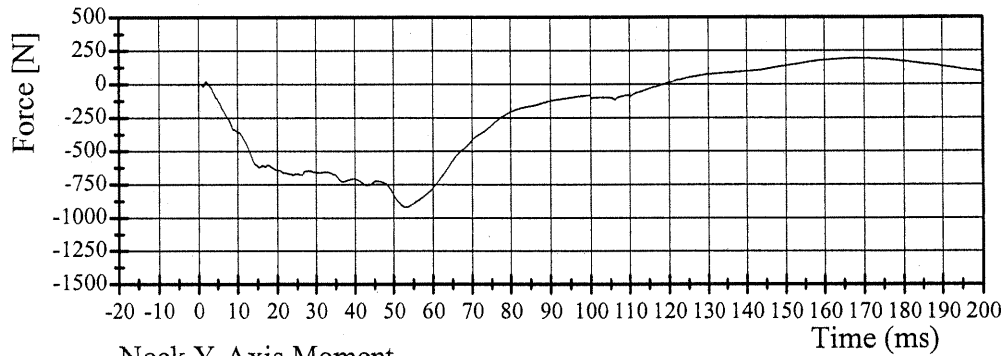


Filter Class: 1000

Max: 193.5 N at 169.6 ms

Min: -919.4 N at 53.3 ms

Neck X-Axis Force (filtered for moment calculation)

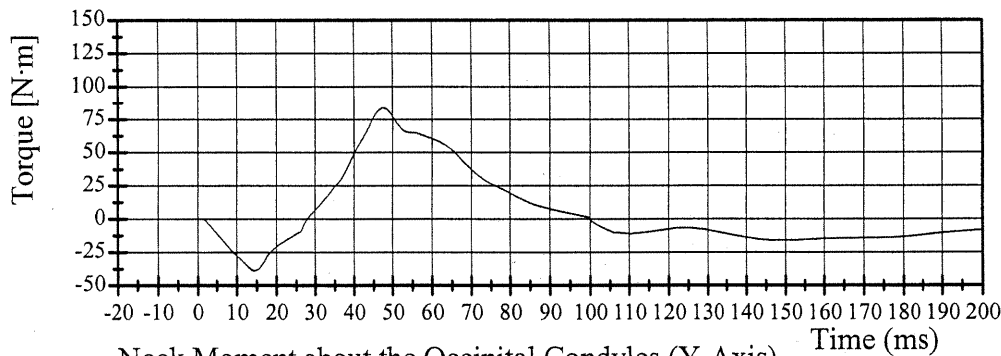


Filter Class: 600

Max: 193.3 N at 169.6 ms

Min: -919.3 N at 53.3 ms

Neck Y-Axis Moment

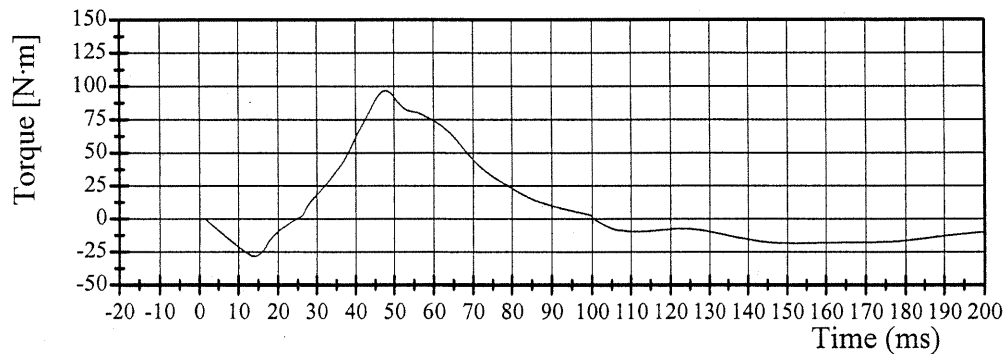


Filter Class: 600

Max: 83.7 N·m at 47.5 ms

Min: -38.8 N·m at 14.3 ms

Neck Moment about the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 96.7 N·m at 47.7 ms

Min: -28.3 N·m at 14.1 ms

10.14.2003 17:24:58 501



# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

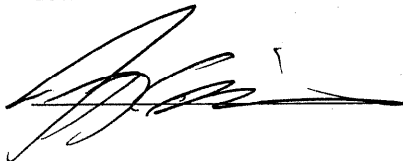
HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

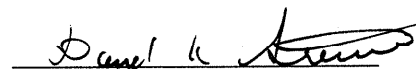
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Impact Velocity	5.95 - 6.19 m/s	6.02 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	18.69 g	Yes
20 ms	14.00 - 19.00 g	16.71 g	Yes
30 ms	11.00 - 16.00 g	14.01 g	Yes
Max Pendulum Deceleration	22.00 g	19.79 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	13.97 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	40.56 ms	Yes
D Plane Rotation			
Max	81 - 106 °	98.51 °	Yes
Time	72 - 82 ms	79.52 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-68.83 N·m	Yes
Time	65 - 79 ms	73.04 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	158.40 ms	Yes
Negative Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	146.64 ms	Yes

## Comments:

Technician



Approved



10.14.2003 17:57:08 579



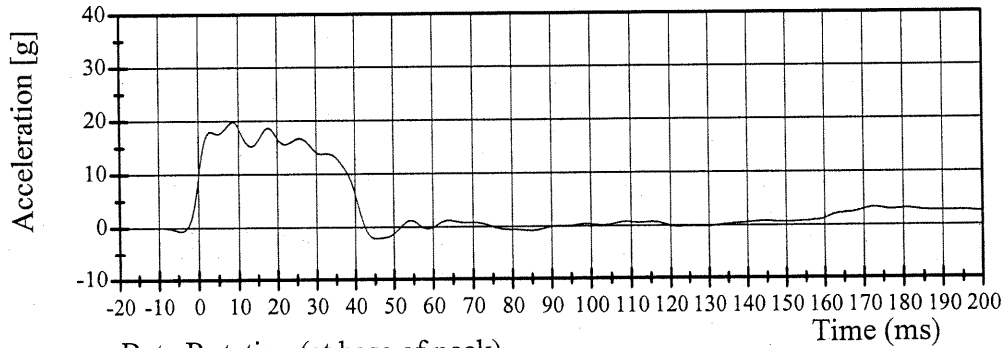
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

### Pendulum Deceleration

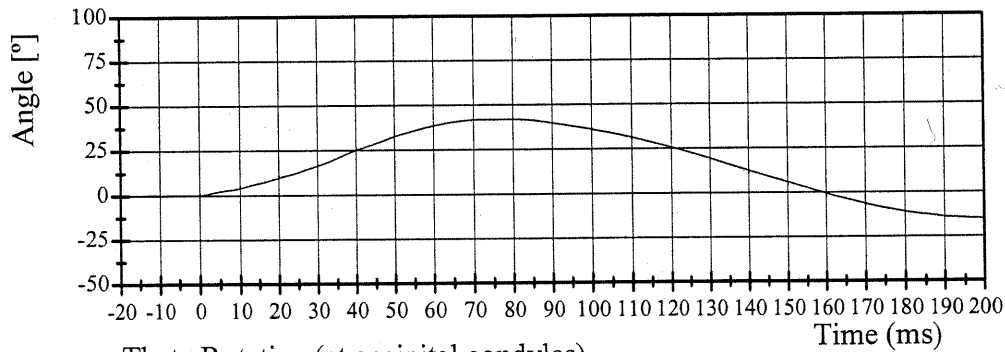


Filter Class: 60

Max: 19.8 g at 8.5 ms

Min: -2.1 g at 45.4 ms

### Beta Rotation (at base of neck)

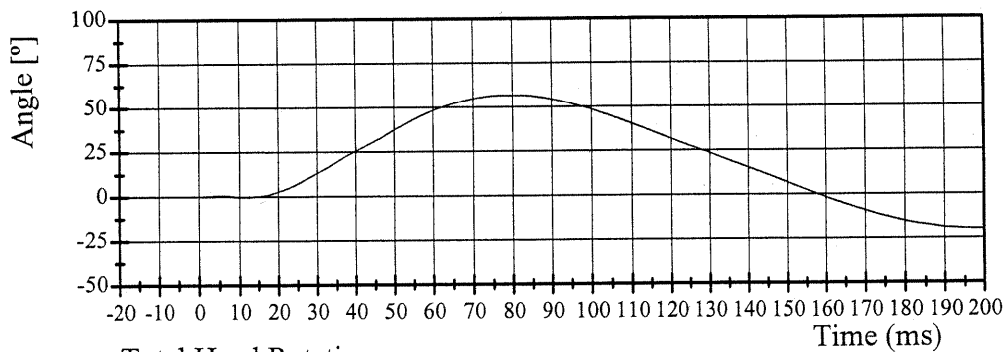


Filter Class: 60

Max: 41.9 ° at 74.6 ms

Min: -15.0 ° at 201.5 ms

### Theta Rotation (at occipital condyles)

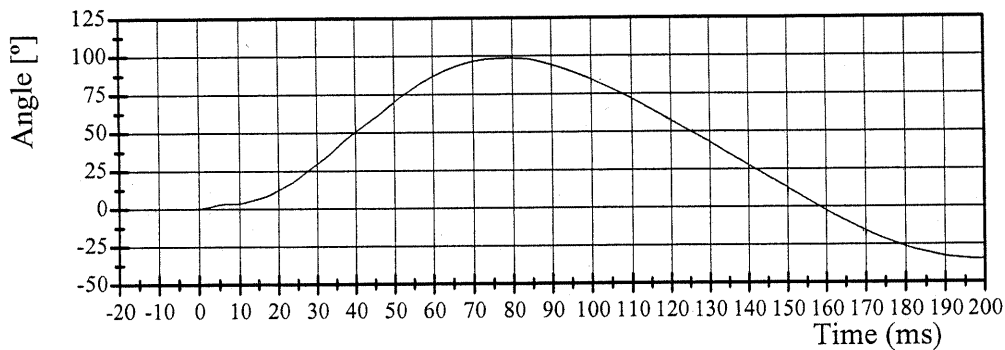


Filter Class: 60

Max: 56.6 ° at 80.4 ms

Min: -20.0 ° at 200.3 ms

### Total Head Rotation



Filter Class: 60

Max: 98.5 ° at 79.5 ms

Min: -35.0 ° at 200.7 ms

10.14.2003 17:57:09 579



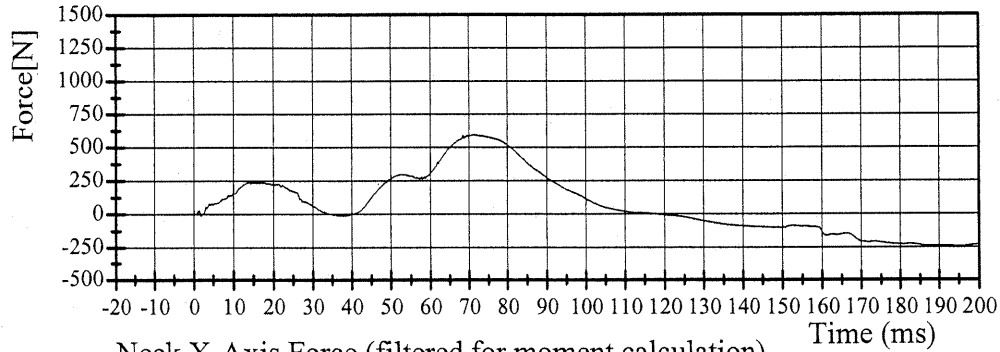
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

Neck X-Axis Force

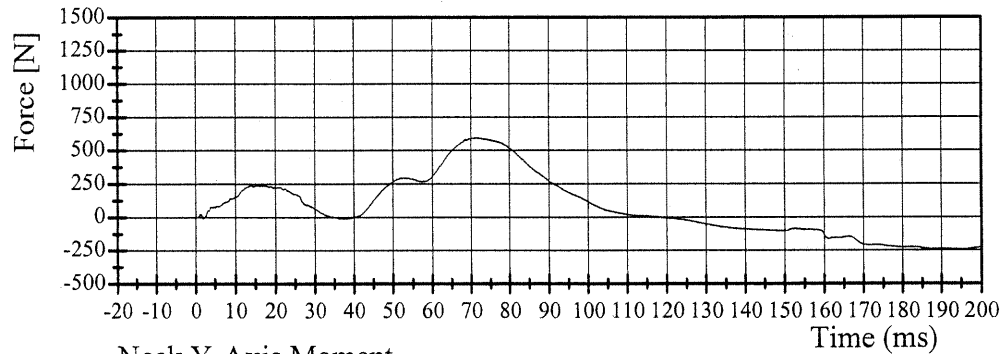


Filter Class: 1000

Max: 594.2 N at 71.4 ms

Min: -242.7 N at 195.0 ms

Neck X-Axis Force (filtered for moment calculation)

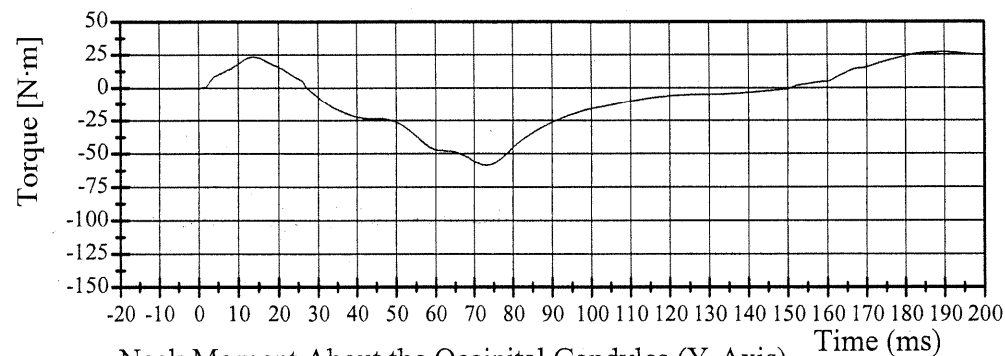


Filter Class: 600

Max: 593.5 N at 71.4 ms

Min: -242.4 N at 195.0 ms

Neck Y-Axis Moment

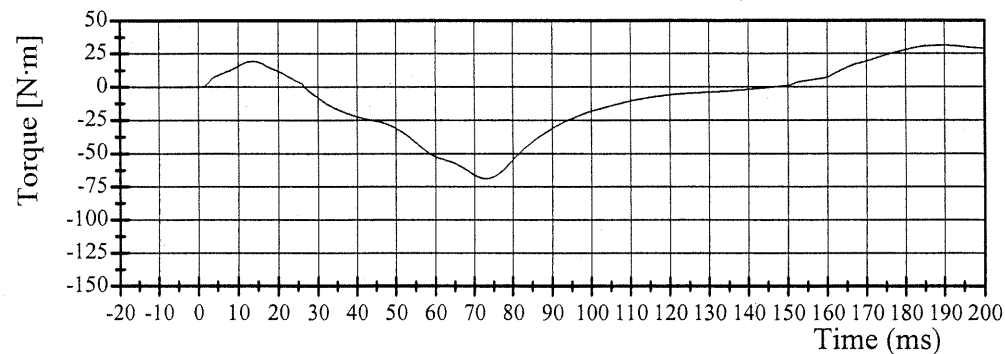


Filter Class: 600

Max: 27.2 N·m at 189.8 ms

Min: -58.5 N·m at 73.1 ms

Neck Moment About the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 31.3 N·m at 189.8 ms

Min: -68.8 N·m at 73.0 ms



# Transportation Research Center Inc.

572E Thorax Test

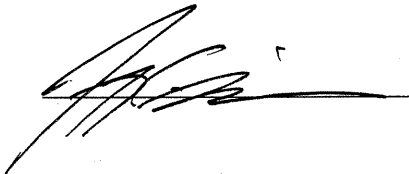
HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/15/2003

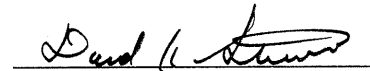
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.65 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-68.9 mm	Yes
Maximum Resistive Force	5160 - 5894 N	5810 N	Yes
Internal Hysteresis	69 - 85 %	70 %	Yes

## Comments:

Technician



Approved



10.15.2003 13:29:07 959



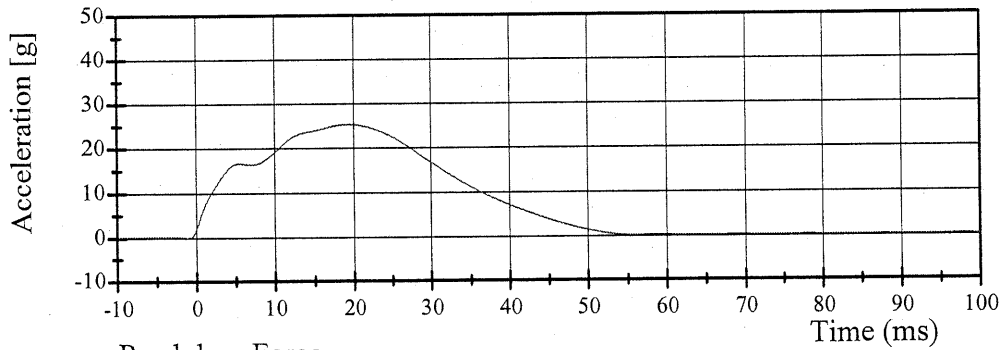
# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/15/2003

### Pendulum Deceleration

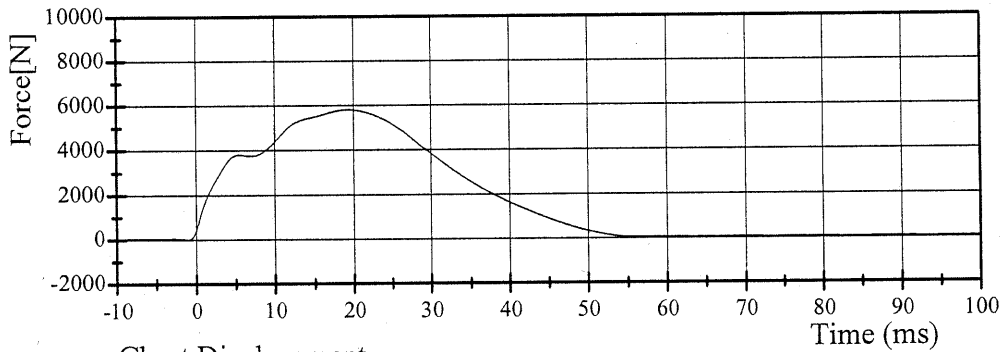


Filter Class: 180

Max: 25.4 g at 19.4 ms

Min: -0.0 g at -73.2 ms

### Pendulum Force

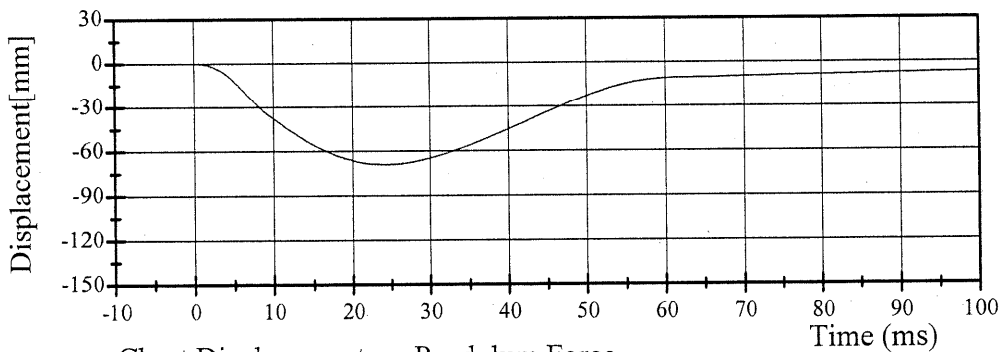


Filter Class: 180

Max: 5809.7 N at 19.4 ms

Min: -8.2 N at -73.2 ms

### Chest Displacement

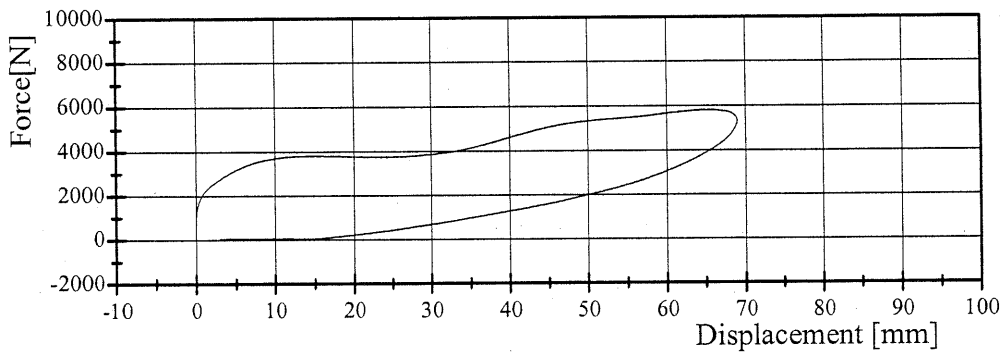


Filter Class: 180

Max: 0.0 mm at -0.1 ms

Min: -68.9 mm at 24.2 ms

### Chest Displacement vs. Pendulum Force



10.15.2003 13:29:08 959



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 206L  
Test Number: 206C17

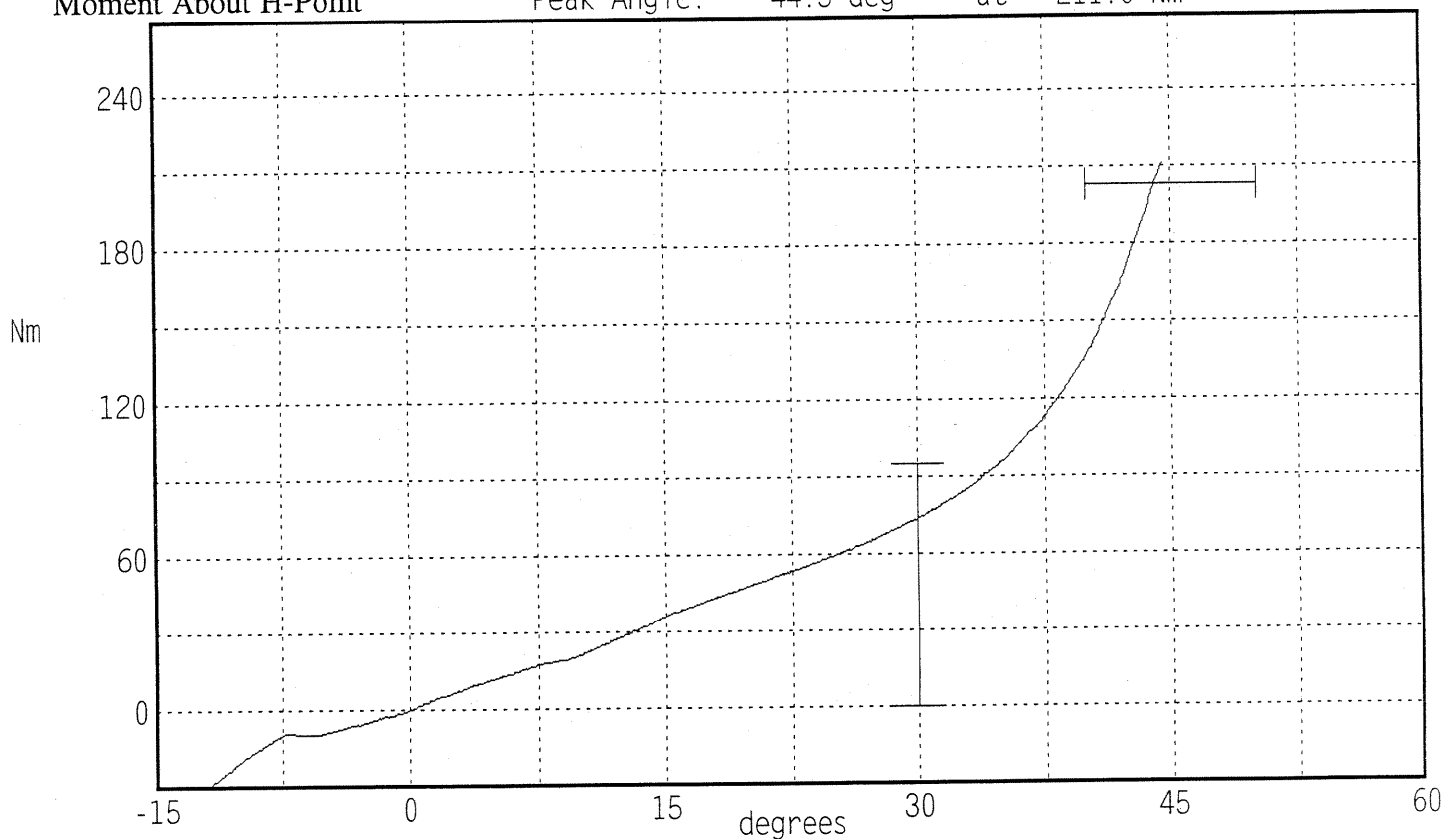
Date: 10/14/2003  
Time: 17:44

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	54 %	Pass
Moment at 30 deg	<= 94.9	73.3 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	44.1 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

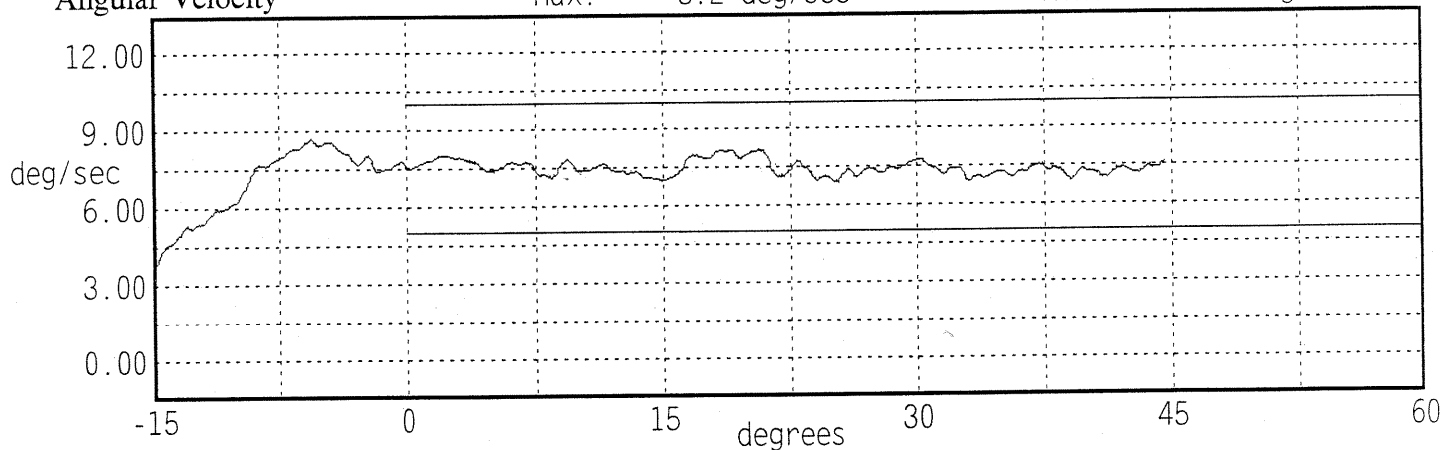
Peak Moment: 211.0 Nm at 44.5 deg  
Peak Angle: 44.5 deg at 211.0 Nm

Moment About H-Point



Angular Velocity

Max: 8.2 deg/sec Min: 6.9 deg/sec



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 206R  
Test Number: 206C17

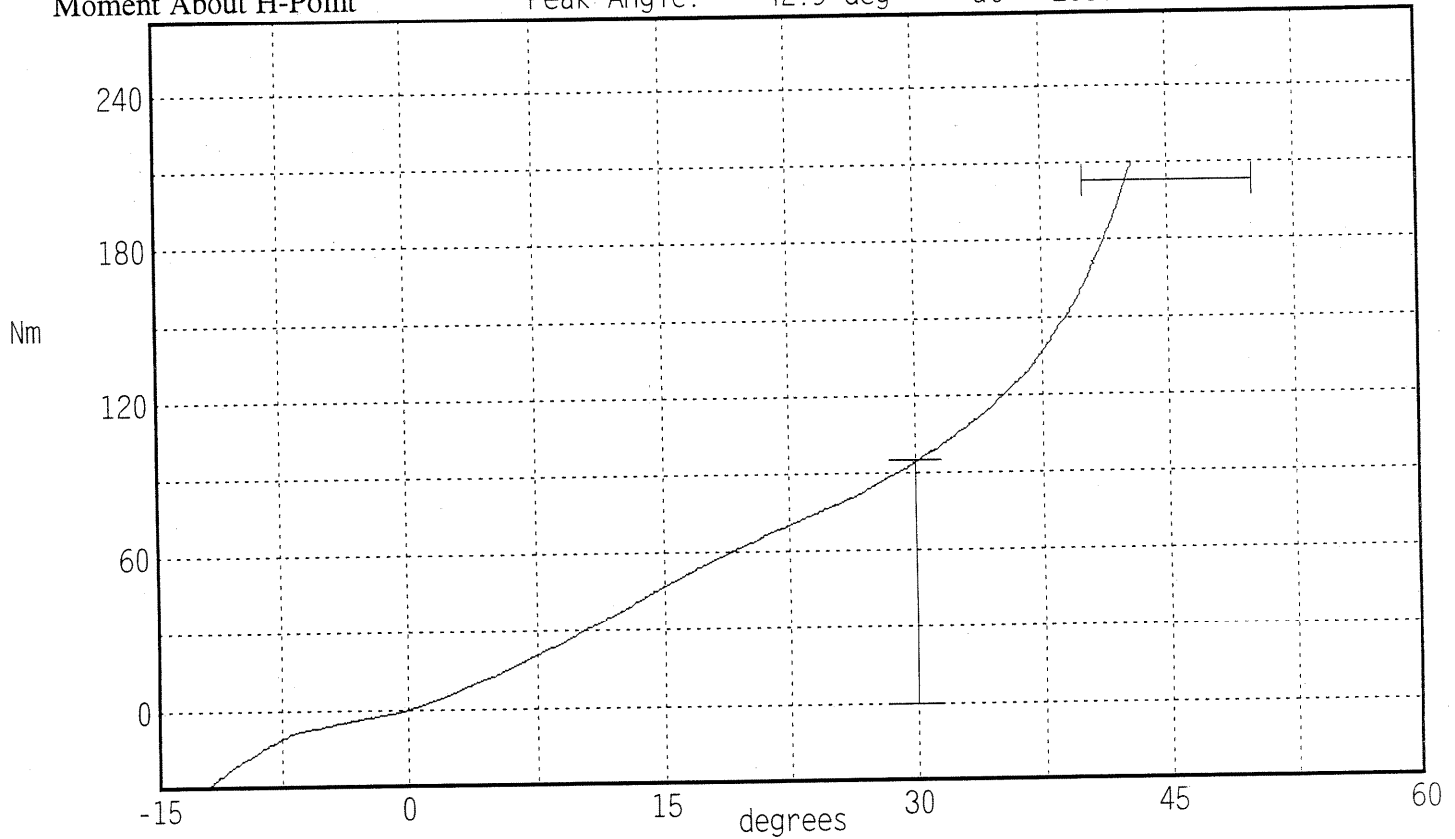
Date: 10/14/2003  
Time: 17:37

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	54 %	Pass
Moment at 30 deg	<= 94.9	94.4 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	42.6 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Peak Moment: 210.0 Nm at 42.9 deg  
Peak Angle: 42.9 deg at 208.5 Nm

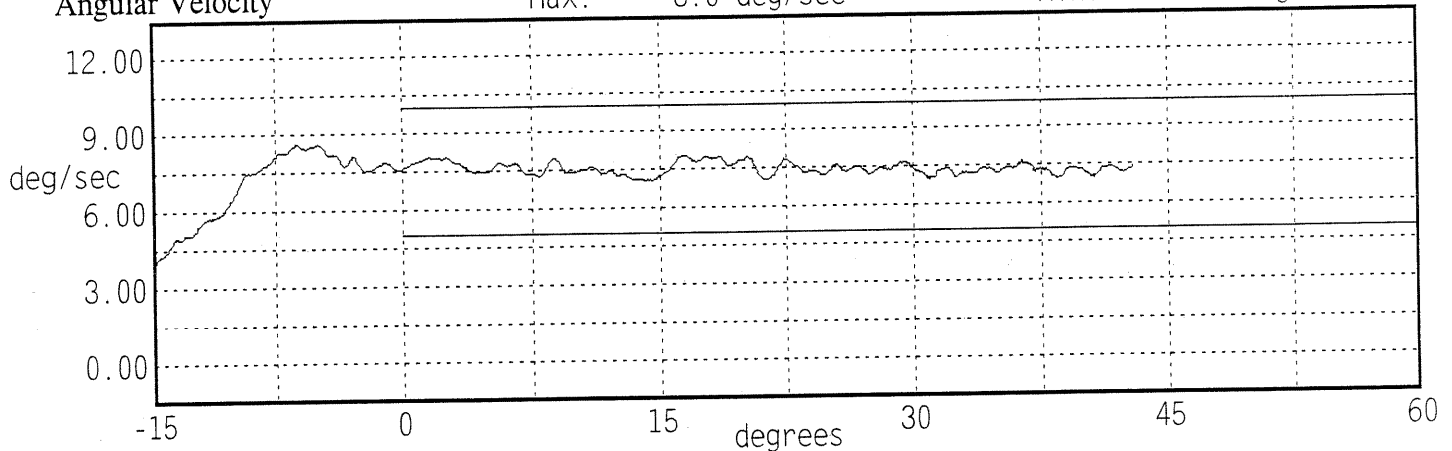
Moment About H-Point



Angular Velocity

Max: 8.0 deg/sec

Min: 7.0 deg/sec



# Transportation Research Center Inc.

572E Left Knee Test

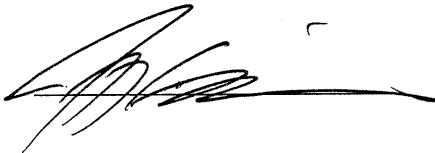
HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

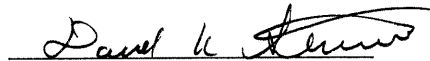
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5107 N	Yes

## Comments:

Technician



Approved



10.14.2003 15:29:36 2093



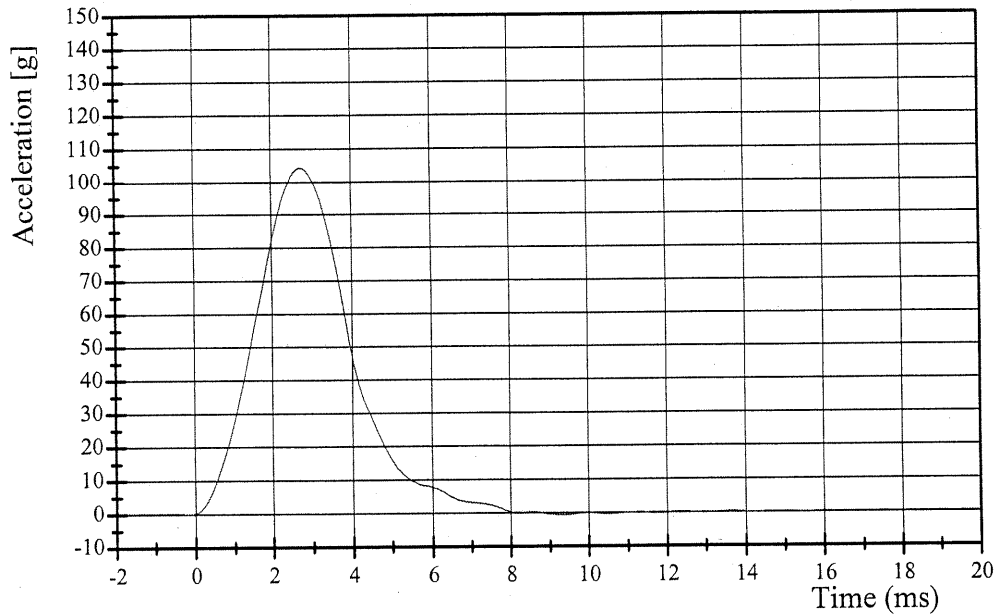
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

### Pendulum Deceleration

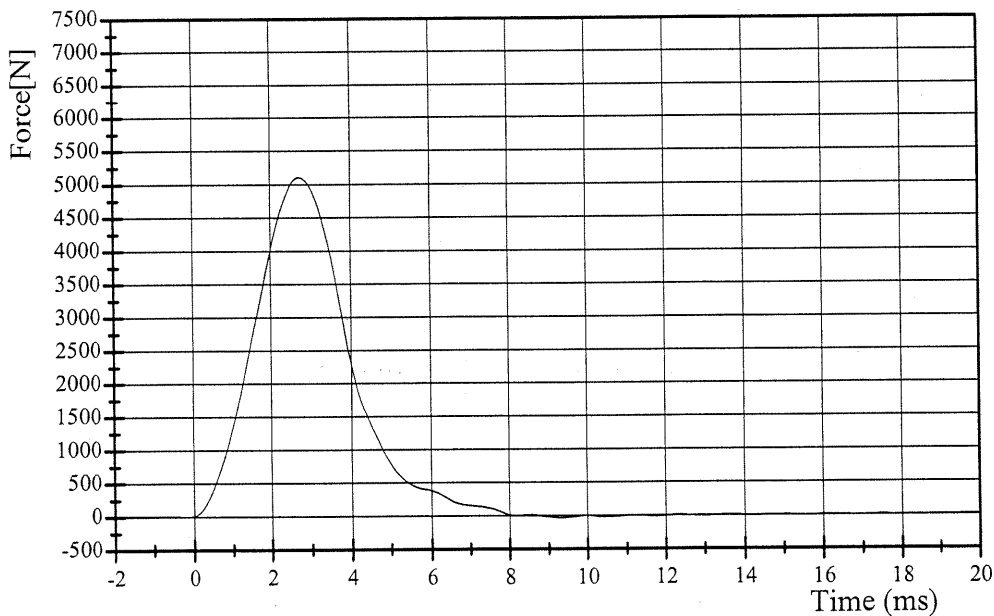


Filter Class: 600

Max: 104.4 g at 2.7 ms

Min: -0.6 g at 9.4 ms

### Pendulum Force



Filter Class: 600

Max: 5106.5 N at 2.7 ms

Min: -31.2 N at 9.4 ms

10.14.2003 15:29:37 2093



# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

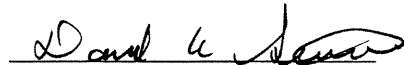
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5218 N	Yes

## Comments:

Technician



Approved



10.14.2003 15:32:10 2092



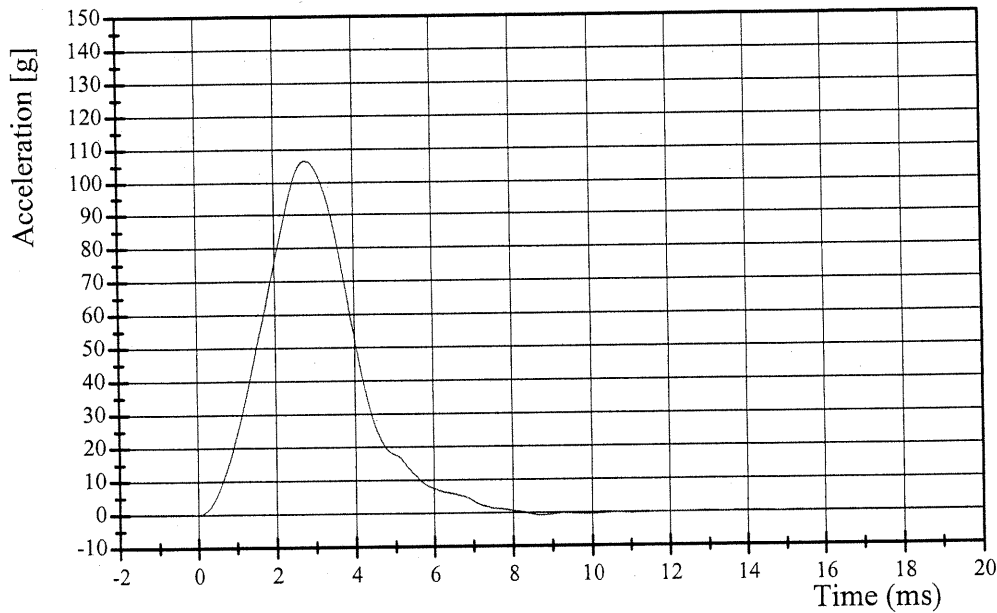
# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 206 Calibration No. 17 - 1

Test Date 10/14/2003

### Pendulum Deceleration

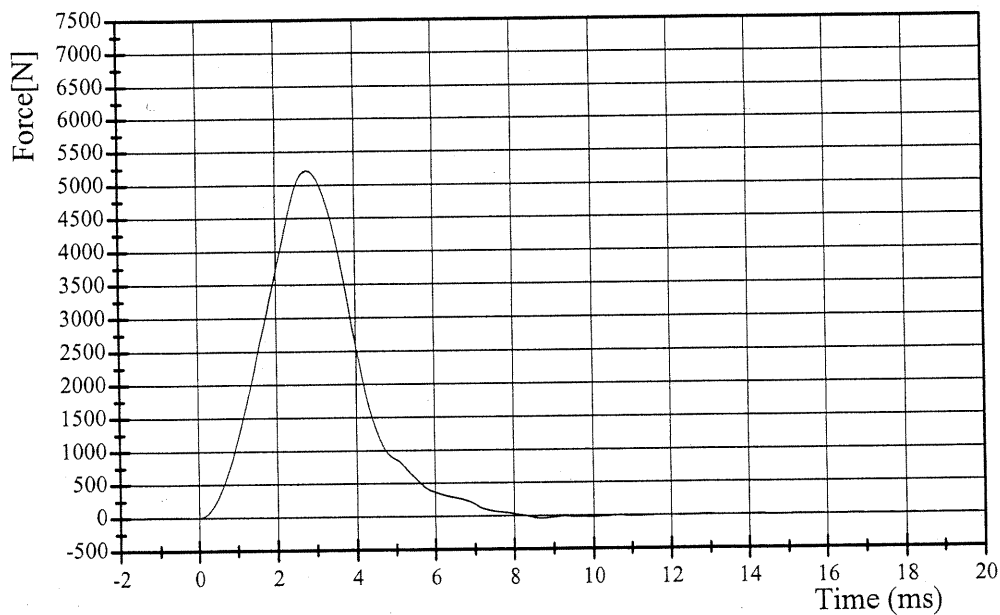


Filter Class: 600

Max: 106.6 g at 2.8 ms

Min: -0.7 g at 8.7 ms

### Pendulum Force



Filter Class: 600

Max: 5217.8 N at 2.8 ms

Min: -36.2 N at 8.7 ms

10.14.2003 15:32:11 2092



Post-Test Calibration

Driver Dummy S/N 202

**Transportation Research Center  
Inc.**

# **ATD Calibration Report**

for

**VRTC**

**HIII 50<sup>th</sup> Serial No. 202  
Calibration No. 20**



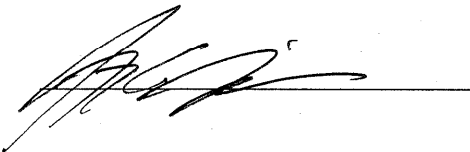
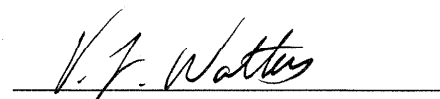
Transportation Research Center Inc.  
P.O. Box B-67  
10820 St. Rt. 347  
East Liberty, OH 43319-0367

**Transportation Research Center Inc.**  
**572E HIII 50th Male Dummy**  
**External Dimensions**  
**Serial No. 202    Calibration No. 20**

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	881	Yes
B	Shoulder Pivot Height	505.5 - 520.7	515	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	137	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	89	Yes
F	Thigh Clearance	139.7 - 154.9	151	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	Yes
H	Skull Cap To Backline	40.6 - 45.7	43	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	336	Yes
J	Elbow Rest Height	190.5 - 210.8	197	Yes
K	Buttock Knee Length	579.1 - 604.5	595	Yes
L	Popliteal Height	429.3 - 454.7	439	Yes
M	Knee Pivot Height	485.1 - 500.4	491	Yes
N	Buttock Popliteal Length	452.1 - 477.5	457	Yes
O	Chest Depth	213.4 - 228.6	221	Yes
P	Foot Length	251.5 - 266.7	260	Yes
V	Shoulder Breadth	421.6 - 436.9	432	Yes
W	Foot Breadth	91.4 - 106.7	102	Yes
Y	Chest Circumference	970.3 - 1000.8	990	Yes
Z	Waist Circumference	835.7 - 866.1	845	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Technician

Approved

# Transportation Research Center Inc.

572E Head Drop Test

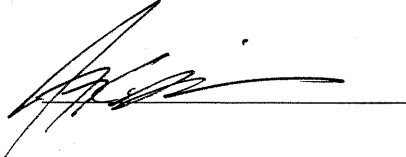
HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/28/2003

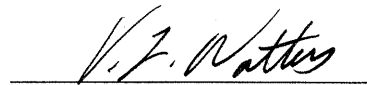
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Peak Resultant Acceleration	225 - 275 g	254.0 g	Yes
Peak Lateral Acceleration	15 g Max	-4.0 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

## Comments:

Technician



Approved



10.28.2003 12:59:39 615



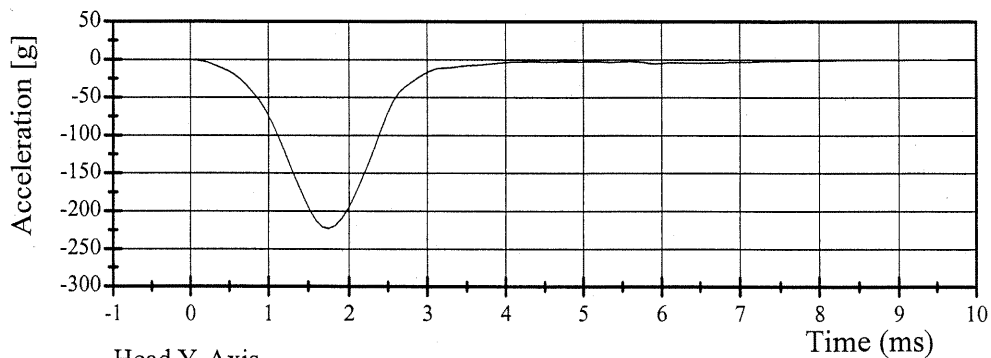
# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/28/2003

Head X-Axis

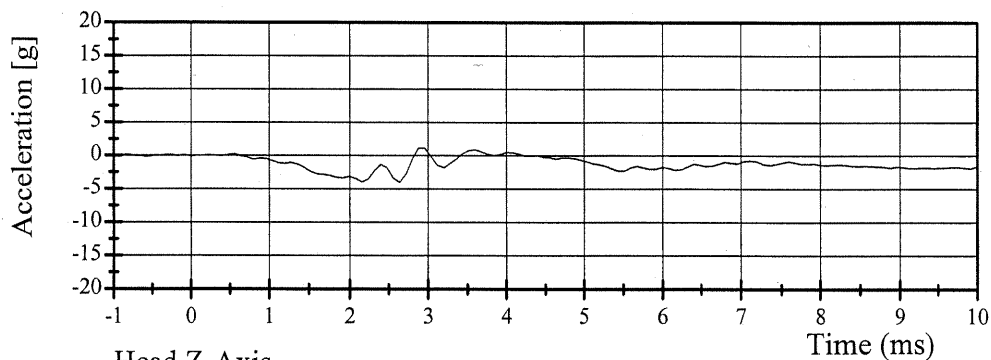


Filter Class: 1000

Max: 0.7 g at 10.0 ms

Min: -222.6 g at 1.8 ms

Head Y-Axis

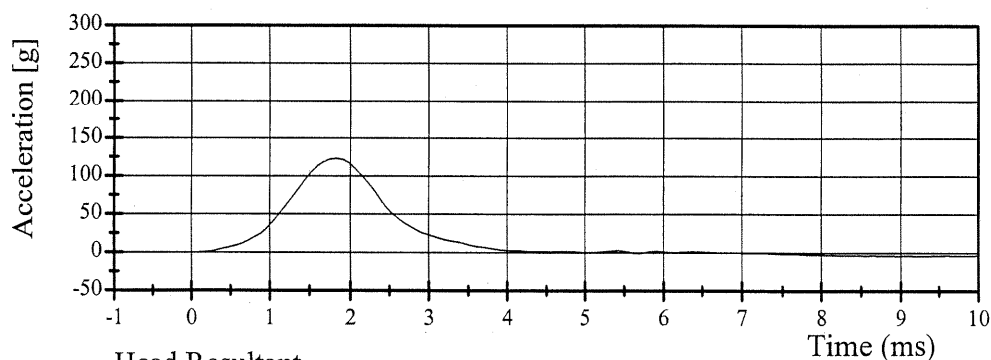


Filter Class: 1000

Max: 1.1 g at 2.9 ms

Min: -4.0 g at 2.6 ms

Head Z-Axis

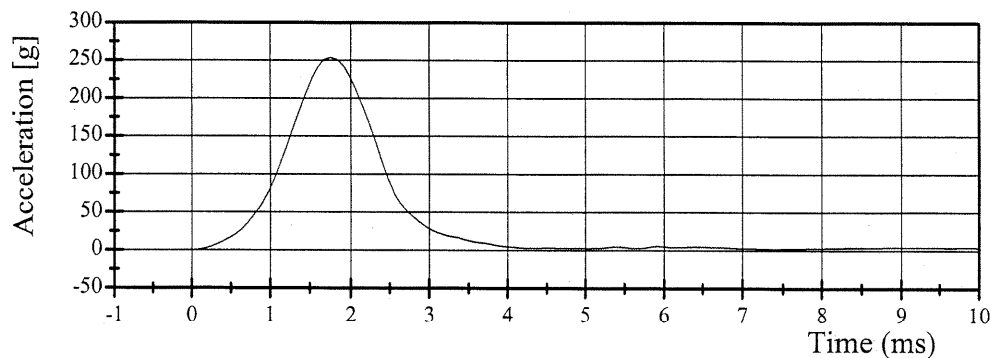


Filter Class: 1000

Max: 123.4 g at 1.8 ms

Min: -4.1 g at 9.0 ms

Head Resultant



Filter Class: 1000

Max: 254.0 g at 1.8 ms

Min: 0.0 g at 0.2 ms

10.28.2003 12:59:40 615



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

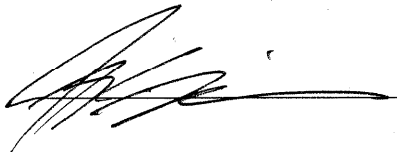
HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Impact Velocity	6.89 - 7.13 m/s	6.97 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	24.81 g	Yes
20 ms	17.60 - 22.60 g	21.36 g	Yes
30 ms	12.50 - 18.50 g	16.56 g	Yes
Max Pendulum Deceleration	29.00 g	25.81 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	16.52 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	34 - 42 ms	36.72 ms	Yes
D Plane Rotation			
Max	64 - 78 °	73.42 °	Yes
Time	57 - 64 ms	57.44 ms	Yes
Moment About Occipital Condyle			
Max	88.1 - 108.5 N·m	99.58 N·m	Yes
Time	47 - 58 ms	49.60 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	113 - 128 ms	117.84 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	97 - 107 ms	99.68 ms	Yes

## Comments:

Technician



Approved



10.29.2003 06:16:07 502



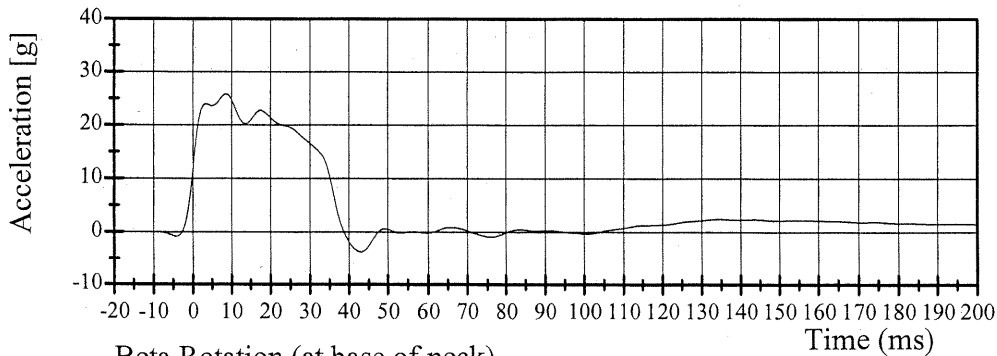
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

Pendulum Deceleration

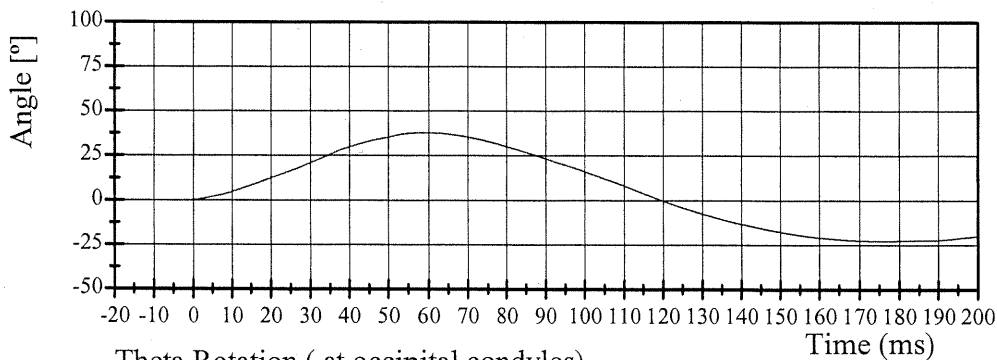


Filter Class: 60

Max: 25.8 g at 8.6 ms

Min: -3.7 g at 43.0 ms

Beta Rotation (at base of neck)

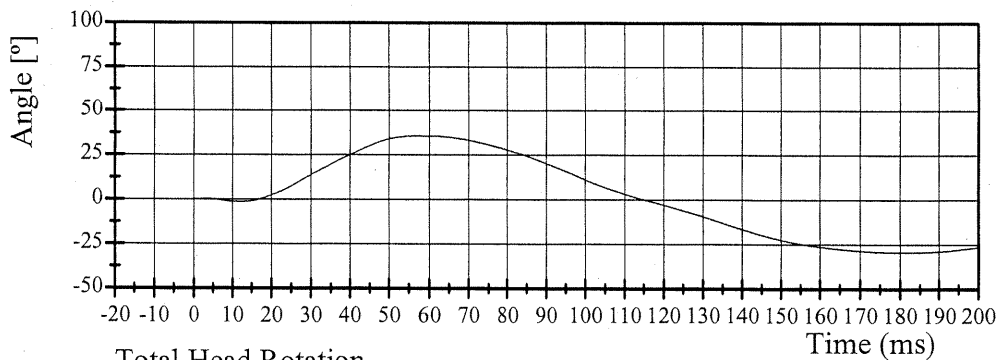


Filter Class: 60

Max: 37.7 ° at 59.0 ms

Min: -22.7 ° at 175.7 ms

Theta Rotation ( at occipital condyles)

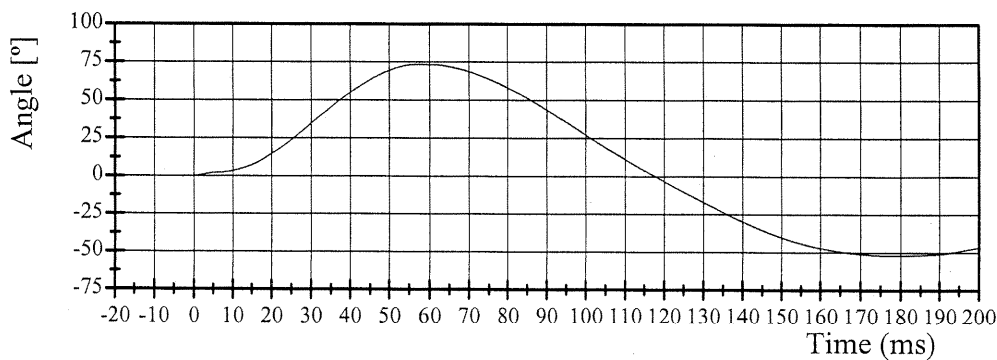


Filter Class: 60

Max: 35.7 ° at 56.7 ms

Min: -29.4 ° at 181.2 ms

Total Head Rotation



Filter Class: 60

Max: 73.4 ° at 57.4 ms

Min: -52.0 ° at 178.2 ms

10.29.2003 06:16:08 502



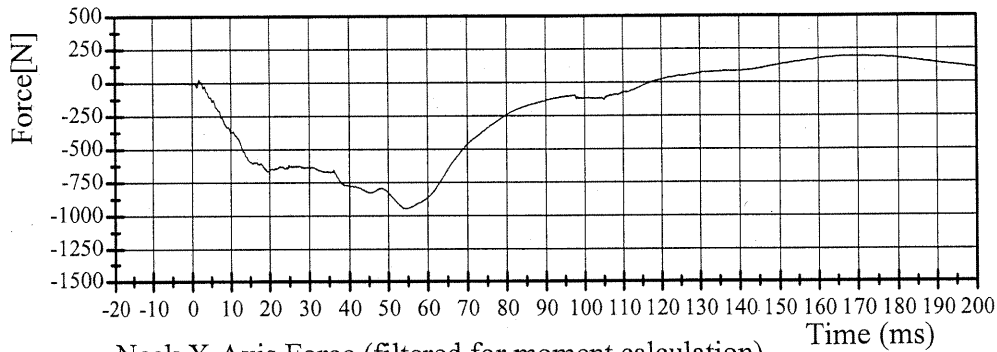
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

Neck X-Axis Force

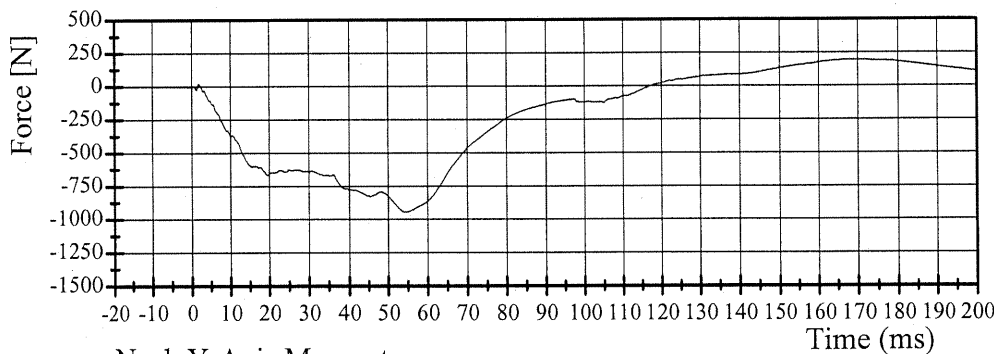


Filter Class: 1000

Max: 194.4 N at 171.3 ms

Min: -946.0 N at 54.7 ms

Neck X-Axis Force (filtered for moment calculation)

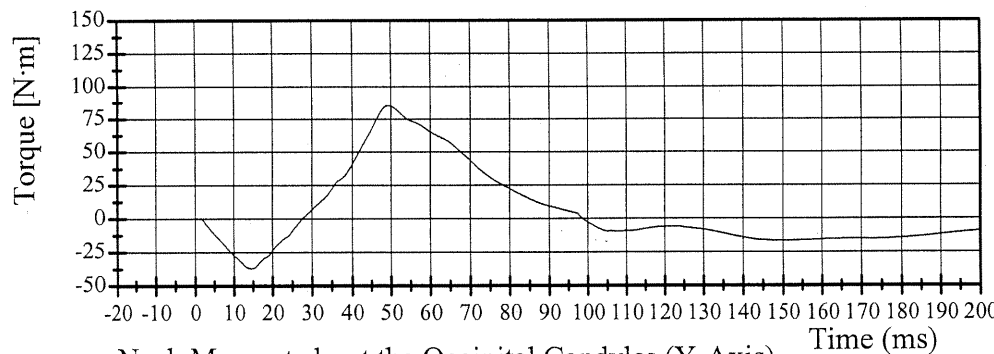


Filter Class: 600

Max: 194.2 N at 171.4 ms

Min: -945.8 N at 54.6 ms

Neck Y-Axis Moment

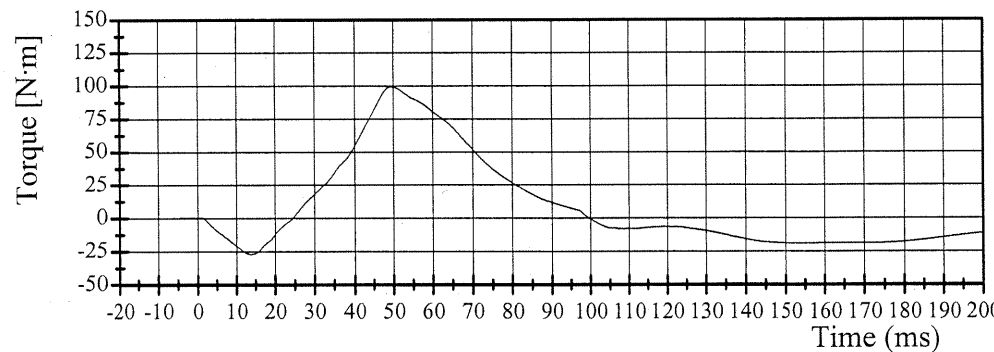


Filter Class: 600

Max: 85.3 N·m at 49.4 ms

Min: -37.1 N·m at 14.6 ms

Neck Moment about the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 99.6 N·m at 49.6 ms

Min: -27.1 N·m at 13.7 ms

10.29.2003 06:16:10 502



# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

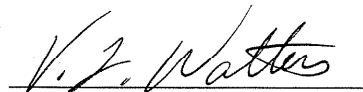
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Impact Velocity	5.95 - 6.19 m/s	5.98 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	18.96 g	Yes
20 ms	14.00 - 19.00 g	16.74 g	Yes
30 ms	11.00 - 16.00 g	14.05 g	Yes
Max Pendulum Deceleration	22.00 g	19.52 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	13.97 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	40.56 ms	Yes
D Plane Rotation			
Max	81 - 106 °	98.87 °	Yes
Time	72 - 82 ms	78.80 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-65.30 N·m	Yes
Time	65 - 79 ms	74.64 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	162.64 ms	Yes
Negative Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	146.80 ms	Yes

## Comments:

Technician



Approved



10.29.2003 07:04:18 583



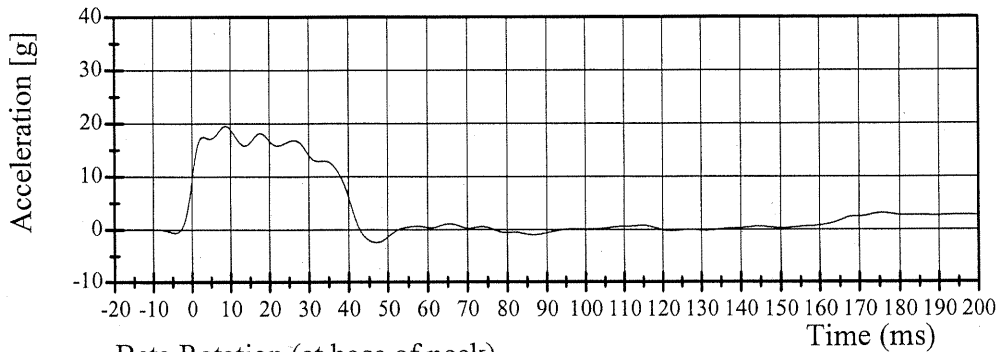
# Transportation Research Center Inc.

572E Neck Extension Test

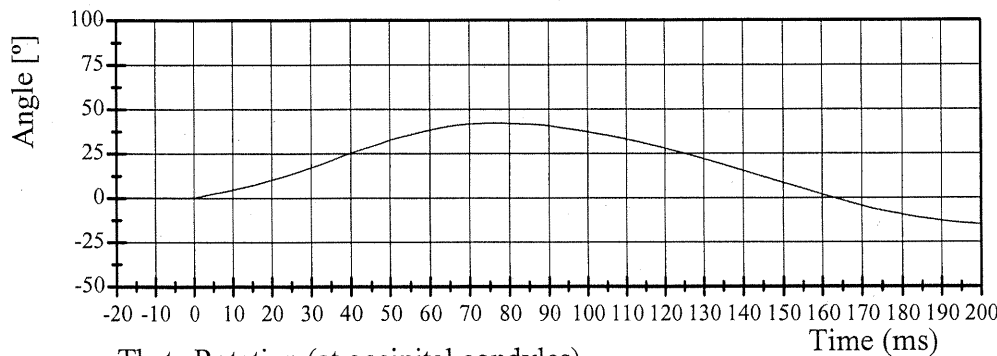
HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

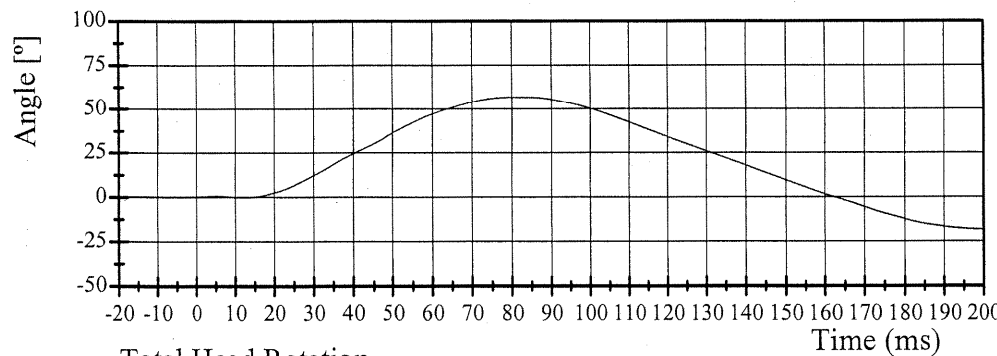
### Pendulum Deceleration



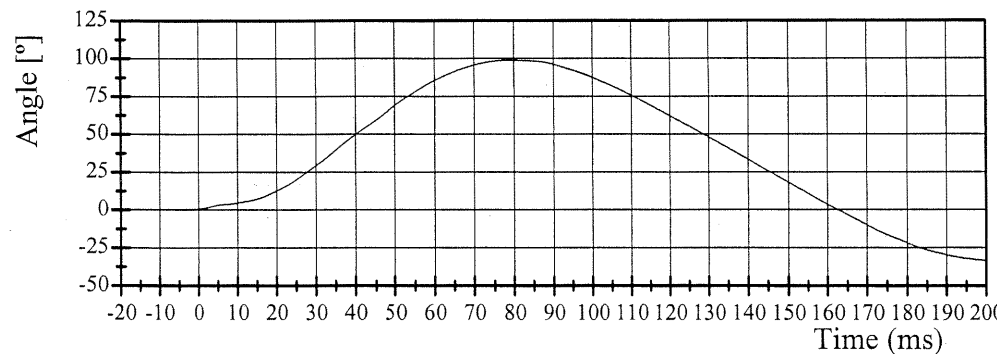
### Beta Rotation (at base of neck)



### Theta Rotation (at occipital condyles)



### Total Head Rotation



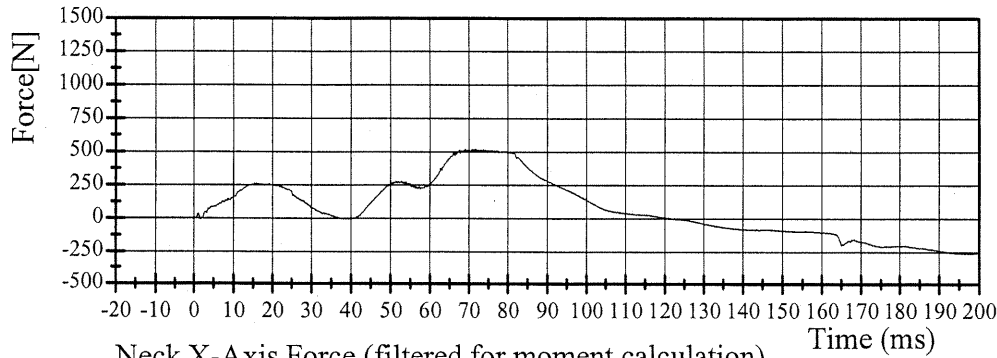
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

Neck X-Axis Force

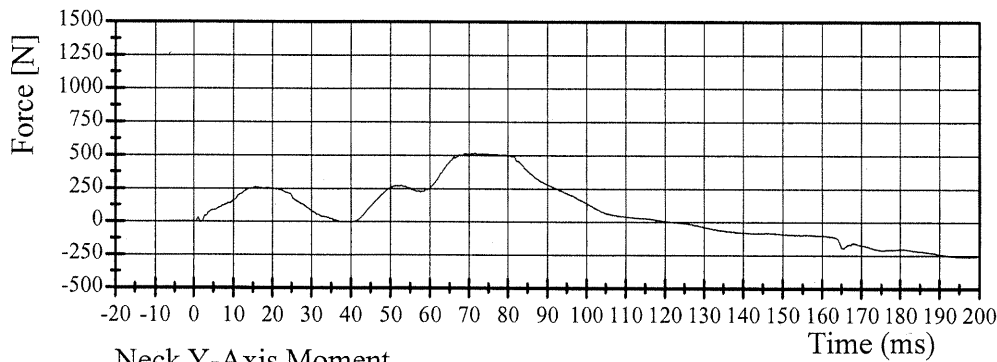


Filter Class: 1000

Max: 519.2 N at 71.8 ms

Min: -261.7 N at 197.4 ms

Neck X-Axis Force (filtered for moment calculation)

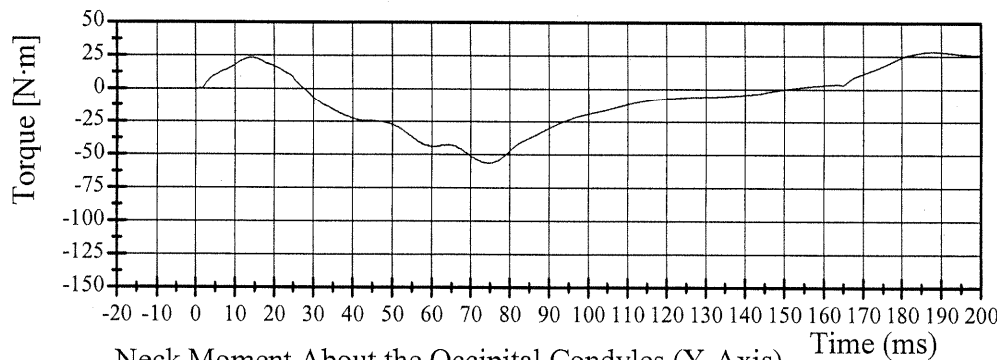


Filter Class: 600

Max: 515.0 N at 71.6 ms

Min: -261.5 N at 197.4 ms

Neck Y-Axis Moment

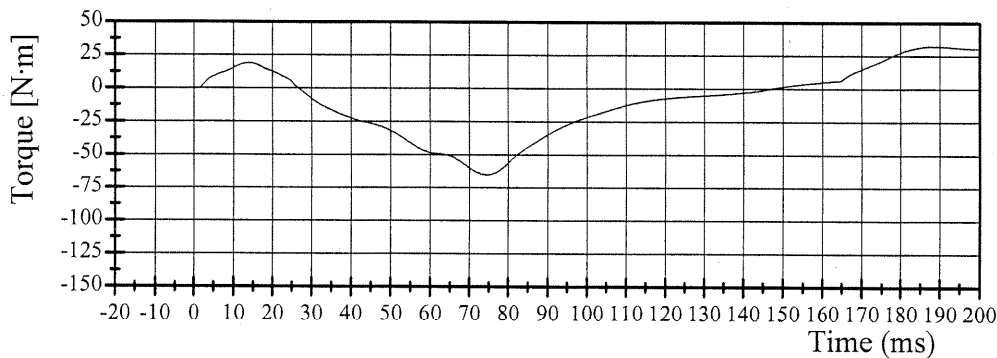


Filter Class: 600

Max: 28.5 N·m at 187.9 ms

Min: -56.3 N·m at 74.7 ms

Neck Moment About the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 32.6 N·m at 188.6 ms

Min: -65.3 N·m at 74.6 ms



# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/28/2003


Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.61 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-69.0 mm	Yes
Maximum Resistive Force	5160 - 5894 N	5848 N	Yes
Internal Hysteresis	69 - 85 %	70 %	Yes

## Comments:

Technician



Approved



10.28.2003 11:15:15 957



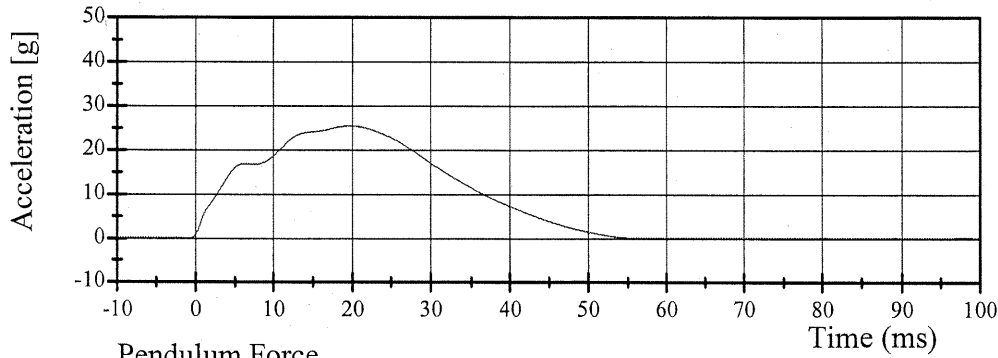
# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/28/2003

### Pendulum Deceleration

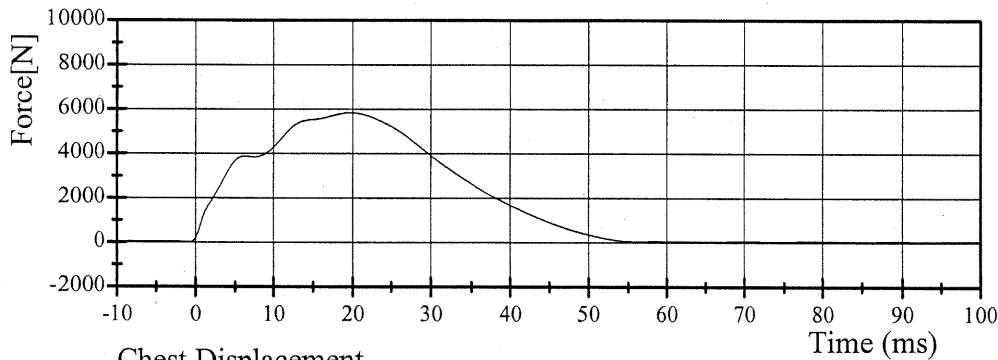


Filter Class: 180

Max: 25.5 g at 19.8 ms

Min: -0.0 g at -74.9 ms

### Pendulum Force

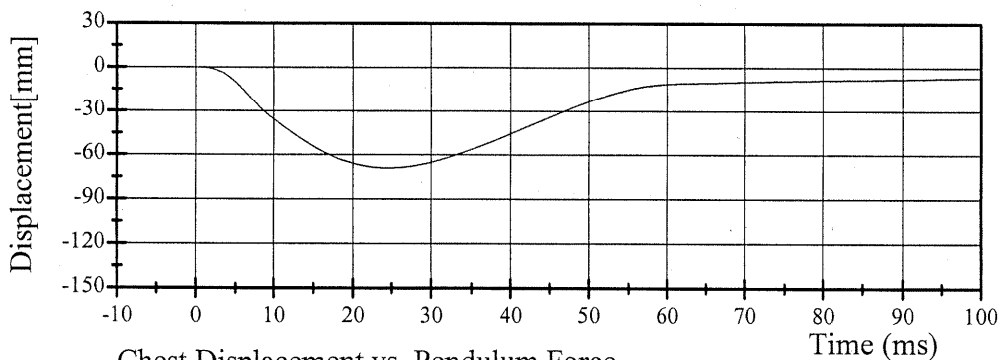


Filter Class: 180

Max: 5847.9 N at 19.8 ms

Min: -8.3 N at -74.9 ms

### Chest Displacement

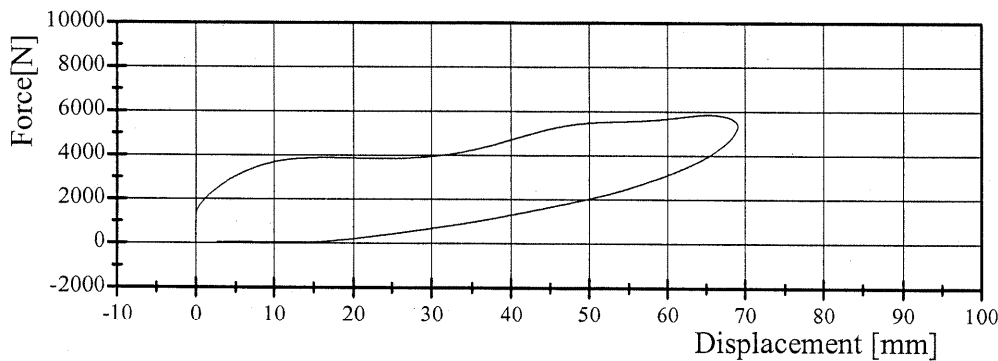


Filter Class: 180

Max: 0.0 mm at 0.5 ms

Min: -69.0 mm at 24.5 ms

### Chest Displacement vs. Pendulum Force



10.28.2003 11:15:16 957



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 202L  
Test Number: 202C20

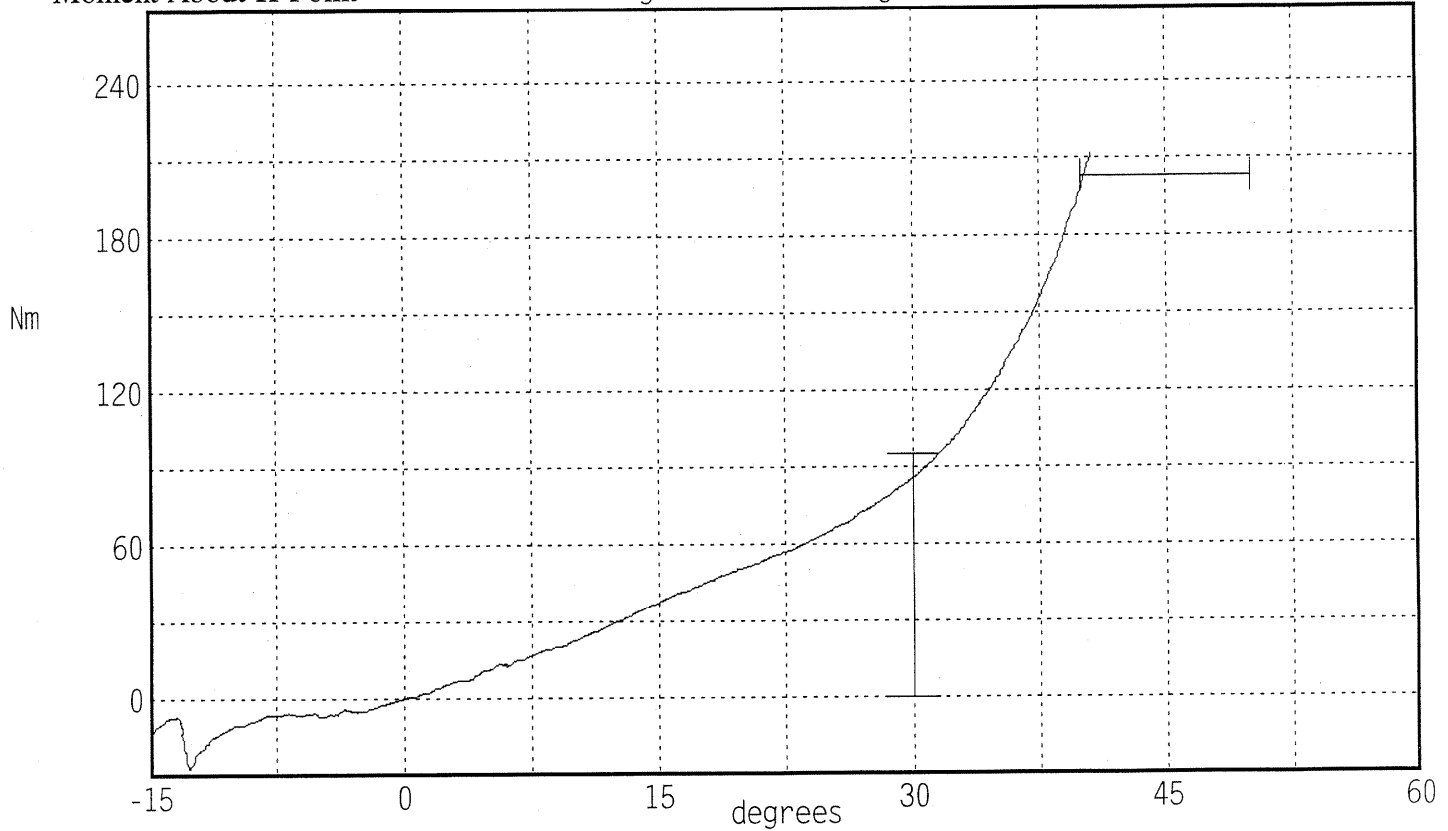
Date: 10/29/2003  
Time: 08:31

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.7 °C	Pass
Humidity	10 - 70	31 %	Pass
Moment at 30 deg	<= 94.9	86.1 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.2 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

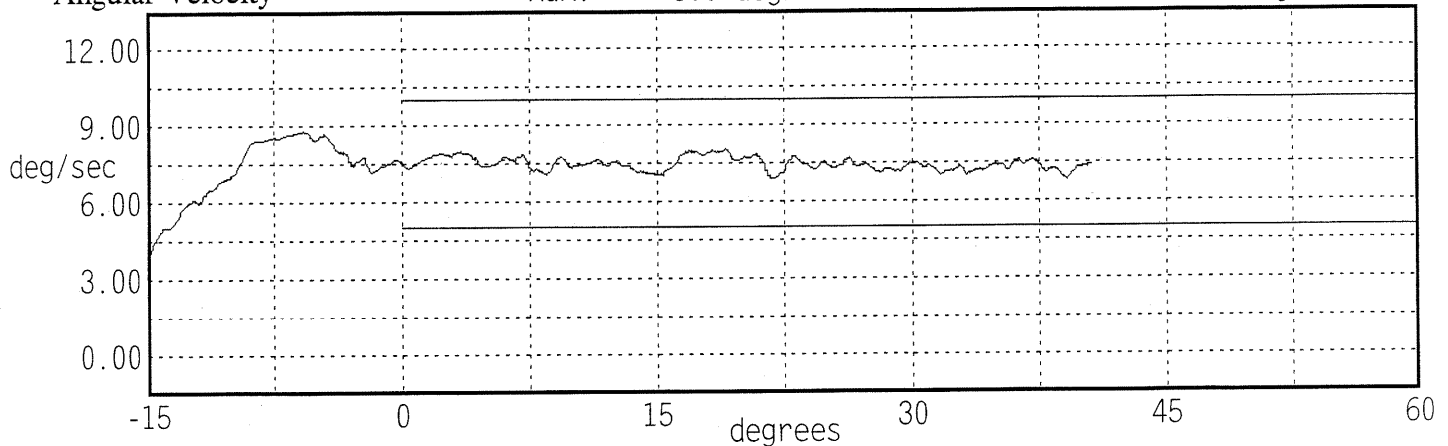
Peak Moment: 211.3 Nm at 40.5 deg  
Peak Angle: 40.5 deg at 211.3 Nm

Moment About H-Point



Angular Velocity

Max: 8.0 deg/sec Min: 6.8 deg/sec



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

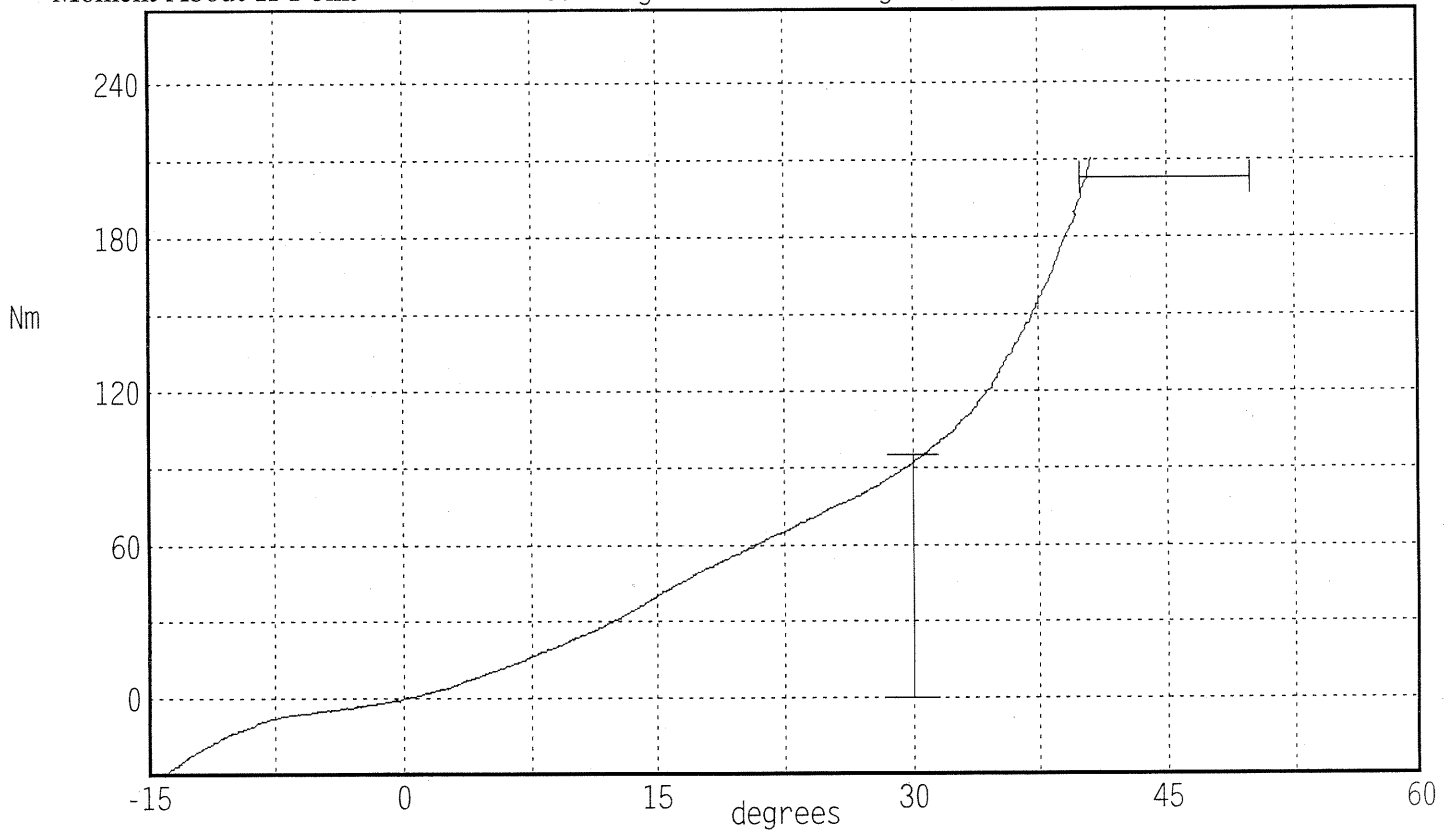
Serial Number: 202R  
Test Number: 202C20  
Comments:

Date: 10/29/2003  
Time: 08:20

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.7 °C Pass
Humidity	10 - 70	31 % Pass
Moment at 30 deg	<= 94.9	92.0 Nm Pass
Angle at 203 Nm	40.0 - 50.0	40.4 deg Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec Pass

Peak Moment: 210.5 Nm at 40.7 deg  
Peak Angle: 40.7 deg at 210.5 Nm

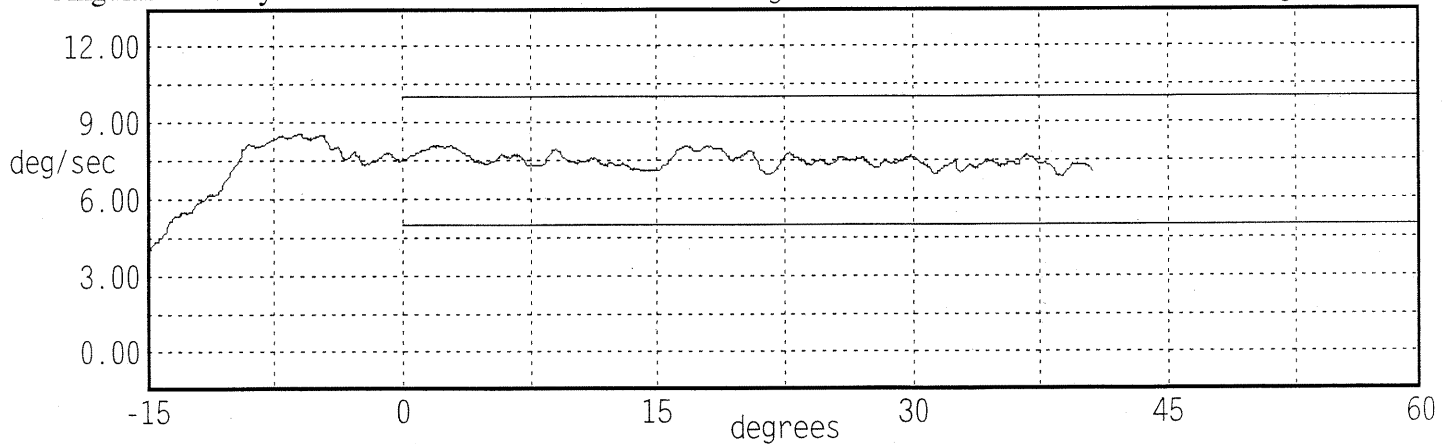
Moment About H-Point



Angular Velocity

Max: 8.1 deg/sec

Min: 6.8 deg/sec



# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

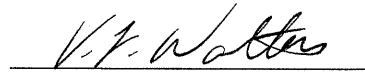
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5687 N	Yes

## Comments:

Technician



Approved



10.29.2003 07:08:54 2101



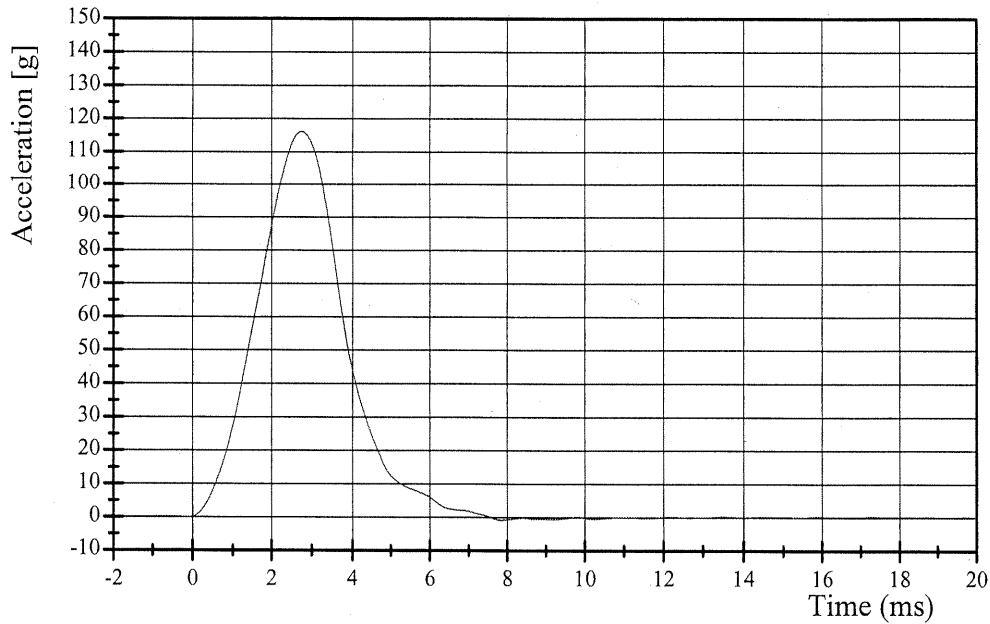
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

### Pendulum Deceleration

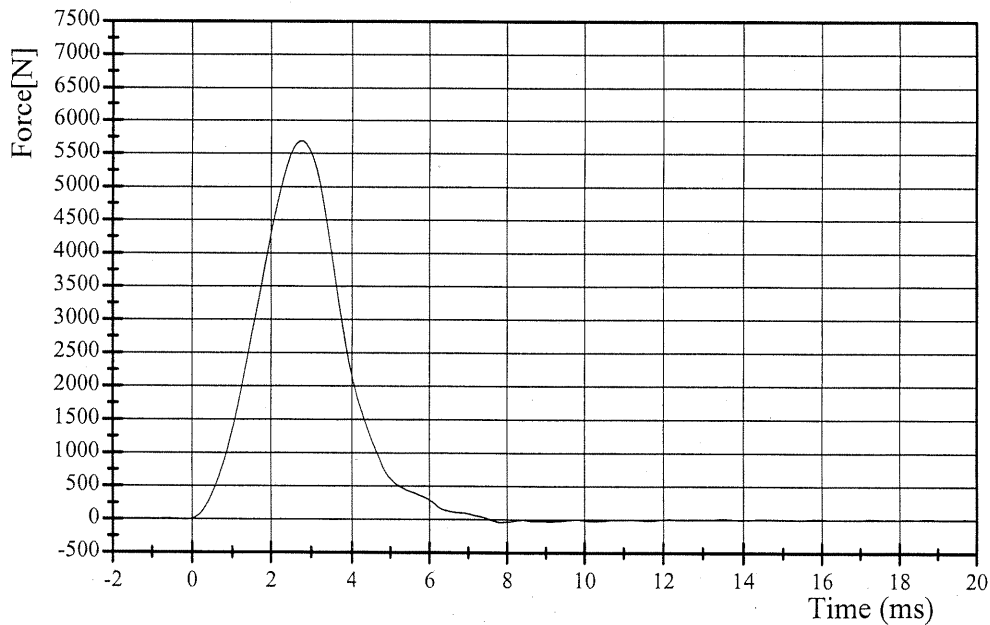


Filter Class: 600

Max: 116.2 g at 2.7 ms

Min: -0.8 g at 7.8 ms

### Pendulum Force



Filter Class: 600

Max: 5687.0 N at 2.7 ms

Min: -40.2 N at 7.8 ms

# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

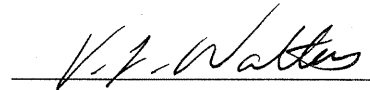
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.10 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5630 N	Yes

## Comments:

Technician



Approved



10.29.2003 07:11:28 2099



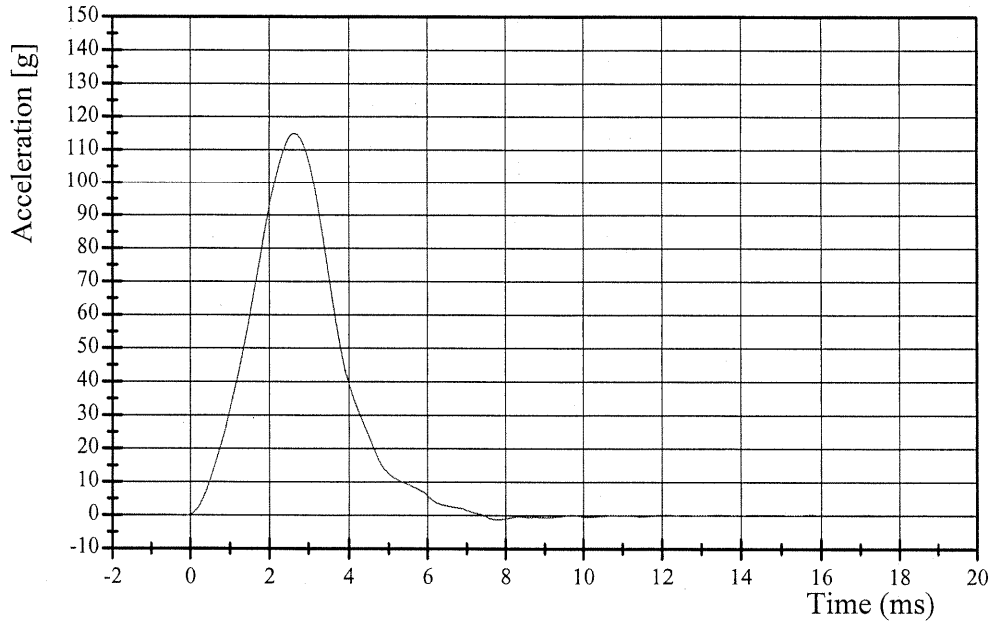
# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 202 Calibration No. 20 - 1

Test Date 10/29/2003

Pendulum Deceleration

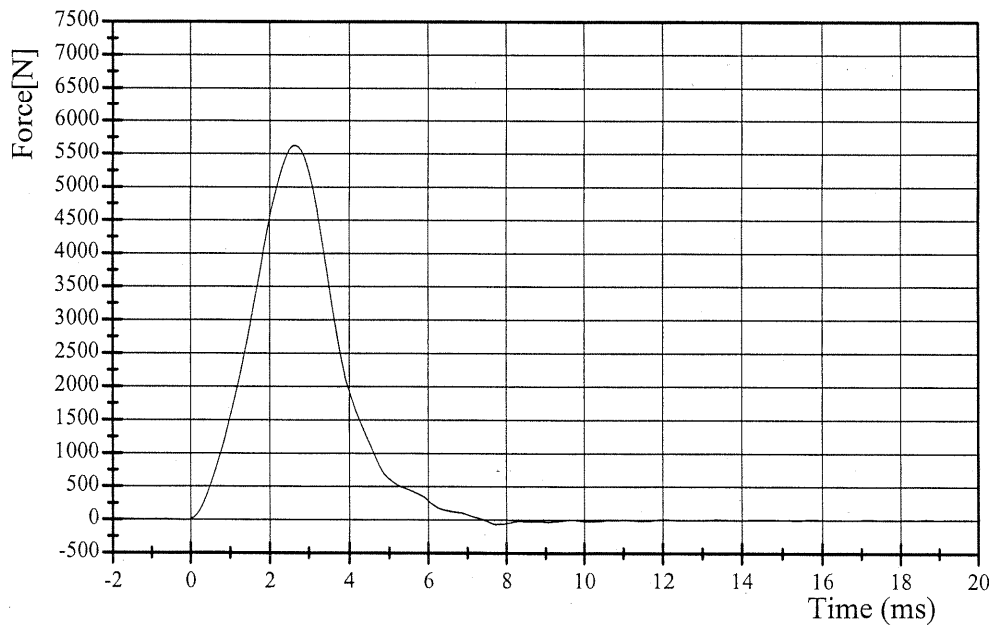


Filter Class: 600

Max: 115.1 g at 2.6 ms

Min: -1.3 g at 7.8 ms

Pendulum Force



Filter Class: 600

Max: 5629.7 N at 2.6 ms

Min: -62.9 N at 7.8 ms

10.29.2003 07:11:29 2099



Post-Test Calibration

Right Rear Passenger Dummy S/N 206

**Transportation Research Center  
Inc.**

# **ATD Calibration Report**

for

**VRTC**

**HIII 50<sup>th</sup> Serial No. 206  
Calibration No. 18**

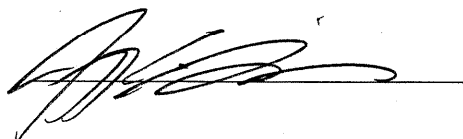


Transportation Research Center Inc.  
P.O. Box B-67  
10820 St. Rt. 347  
East Liberty, OH 43319-0367

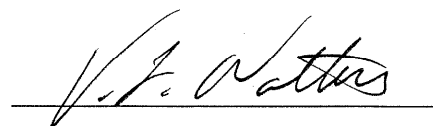
**Transportation Research Center Inc.**  
**572E HIII 50th Male Dummy**  
**External Dimensions**  
**Serial No. 206 Calibration No. 18**

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	879	Yes
B	Shoulder Pivot Height	505.5 - 520.7	510	Yes
C	H-Point Height	83.8 - 88.9	88	Yes
D	H-Point From Seatback	134.6 - 139.7	136	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	89	Yes
F	Thigh Clearance	139.7 - 154.9	147	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	290	Yes
H	Skull Cap To Backline	40.6 - 45.7	43	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	333	Yes
J	Elbow Rest Height	190.5 - 210.8	197	Yes
K	Buttock Knee Length	579.1 - 604.5	591	Yes
L	Popliteal Height	429.3 - 454.7	441	Yes
M	Knee Pivot Height	485.1 - 500.4	497	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	220	Yes
P	Foot Length	251.5 - 266.7	252	Yes
V	Shoulder Breadth	421.6 - 436.9	430	Yes
W	Foot Breadth	91.4 - 106.7	102	Yes
Y	Chest Circumference	970.3 - 1000.8	992	Yes
Z	Waist Circumference	835.7 - 866.1	858	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Technician



Approved



# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/28/2003

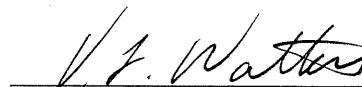
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	43 %	Yes
Peak Resultant Acceleration	225 - 275 g	264.2 g	Yes
Peak Lateral Acceleration	15 g Max	-6.2 g	Yes
Oscillations After Main Pulse	Less Than 10% of Peak Resultant Acceleration?	Yes	Yes

## Comments:

Technician



Approved



10.28.2003 07:05:10 613

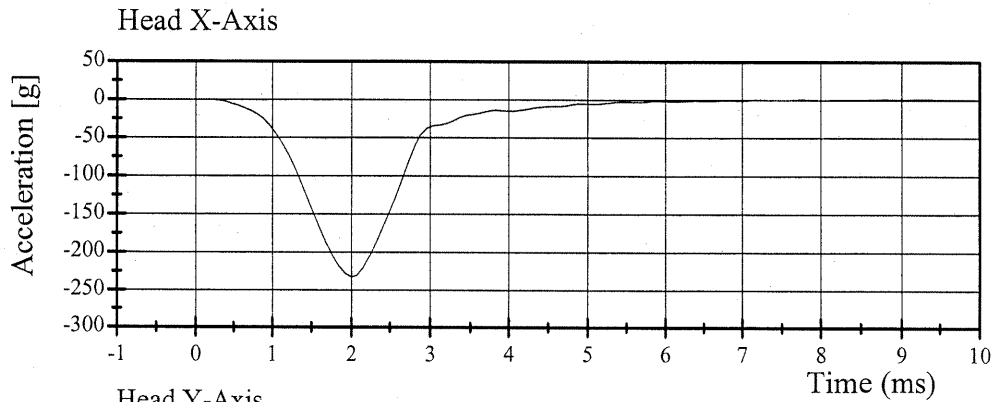


# Transportation Research Center Inc.

572E Head Drop Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

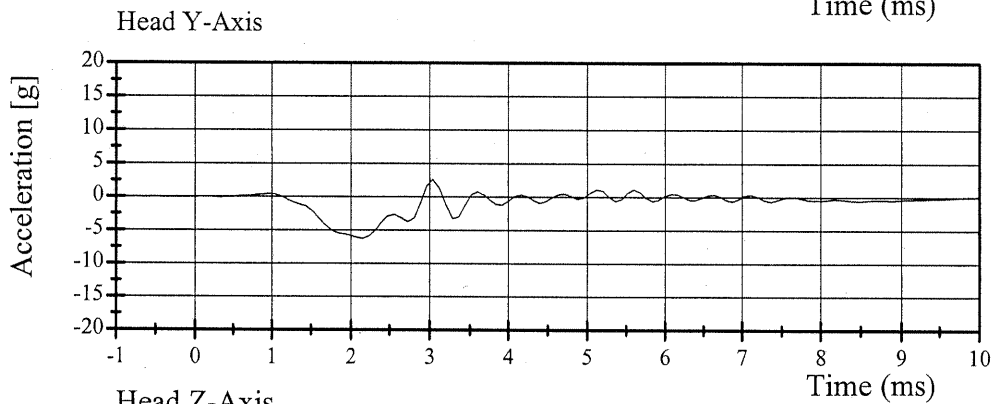
Test Date 10/28/2003



Filter Class: 1000

Max: 1.1 g at 9.2 ms

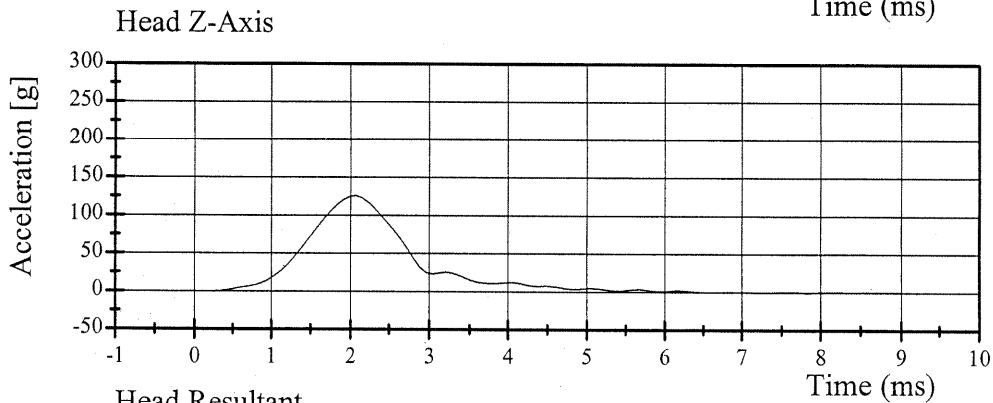
Min: -232.5 g at 2.0 ms



Filter Class: 1000

Max: 2.6 g at 3.0 ms

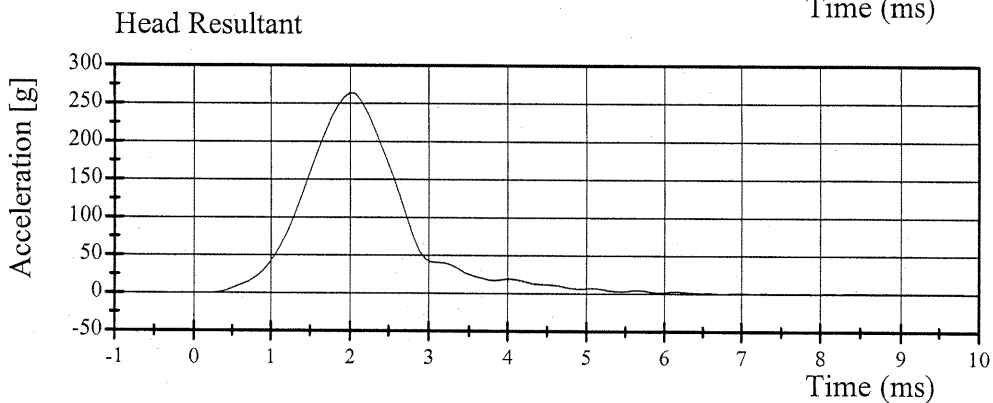
Min: -6.2 g at 2.2 ms



Filter Class: 1000

Max: 126.2 g at 2.1 ms

Min: -0.6 g at 7.2 ms



Filter Class: 1000

Max: 264.2 g at 2.0 ms

Min: 0.0 g at 1.8 ms

10.28.2003 07:05:11 613



# Transportation Research Center Inc.

572E Neck Flexion Test - 6 Channel Transducer

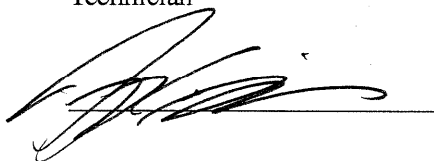
HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impact Velocity	6.89 - 7.13 m/s	7.01 m/s	Yes
Pendulum Deceleration			
10 ms	22.50 - 27.50 g	24.80 g	Yes
20 ms	17.60 - 22.60 g	21.36 g	Yes
30 ms	12.50 - 18.50 g	17.83 g	Yes
Max Pendulum Deceleration	29.00 g	26.31 g	Yes
Max Pendulum Deceleration After 30 ms	29.00 g	17.75 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	34 - 42 ms	36.32 ms	Yes
D Plane Rotation			
Max	64 - 78 °	74.54 °	Yes
Time	57 - 64 ms	59.60 ms	Yes
Moment About Occipital Condyle			
Max	88.1 - 108.5 N·m	96.30 N·m	Yes
Time	47 - 58 ms	49.36 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	113 - 128 ms	118.64 ms	Yes
Positive Moment-Time Curve			
Decay Time To Zero	97 - 107 ms	102.08 ms	Yes

## Comments:

Technician



Approved



10.28.2003 10:35:45 500



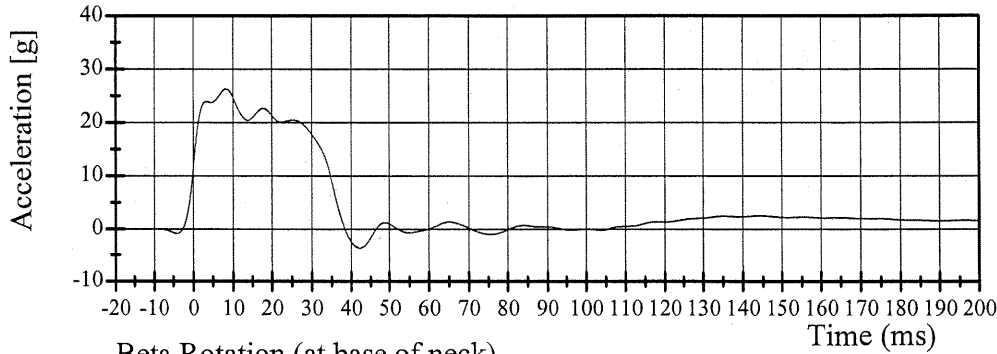
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

### Pendulum Deceleration

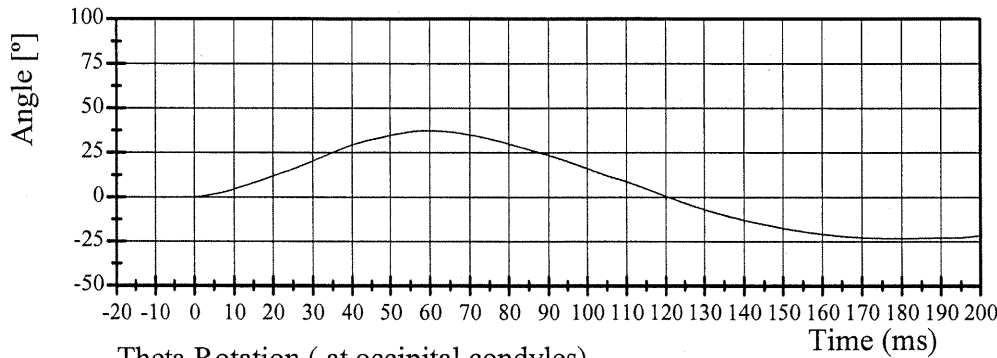


Filter Class: 60

Max: 26.3 g at 8.2 ms

Min: -3.6 g at 42.3 ms

### Beta Rotation (at base of neck)

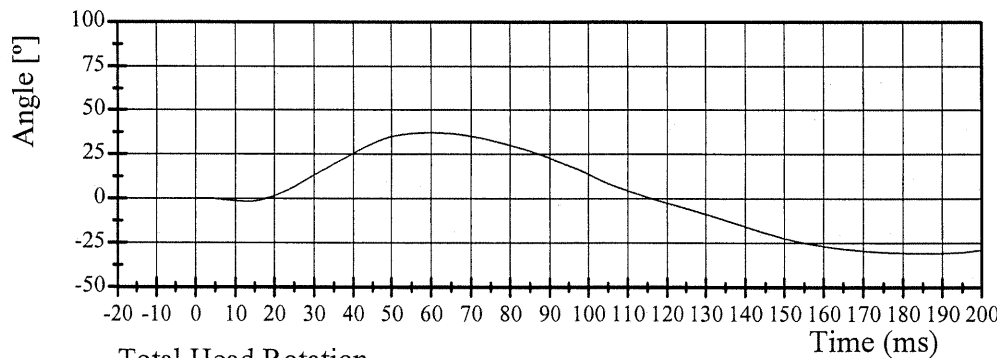


Filter Class: 60

Max: 37.4 ° at 59.6 ms

Min: -23.2 ° at 178.6 ms

### Theta Rotation (at occipital condyles)

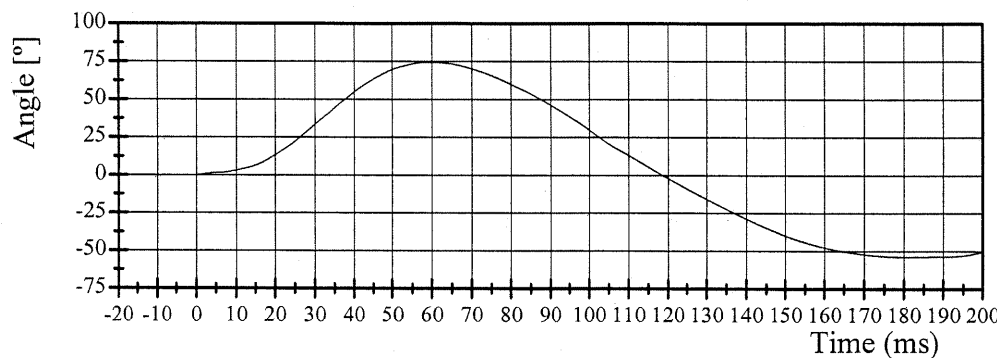


Filter Class: 60

Max: 37.1 ° at 59.5 ms

Min: -30.6 ° at 184.1 ms

### Total Head Rotation



Filter Class: 60

Max: 74.5 ° at 59.6 ms

Min: -53.8 ° at 182.2 ms

10.28.2003 10:35:46 500



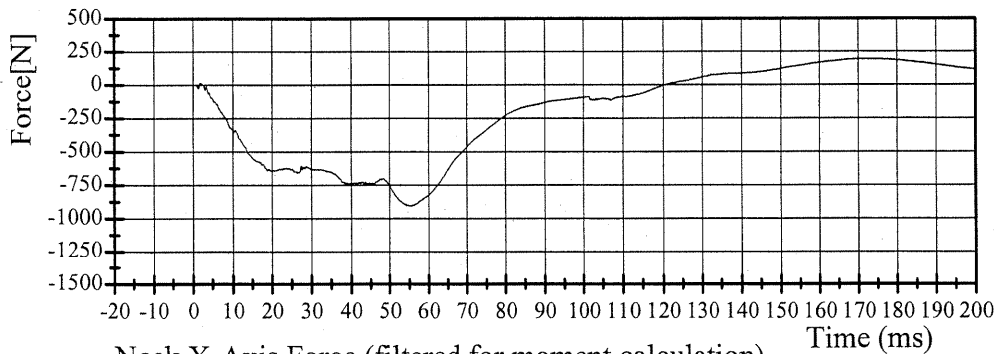
# Transportation Research Center Inc.

572E Neck Flexion Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

Neck X-Axis Force

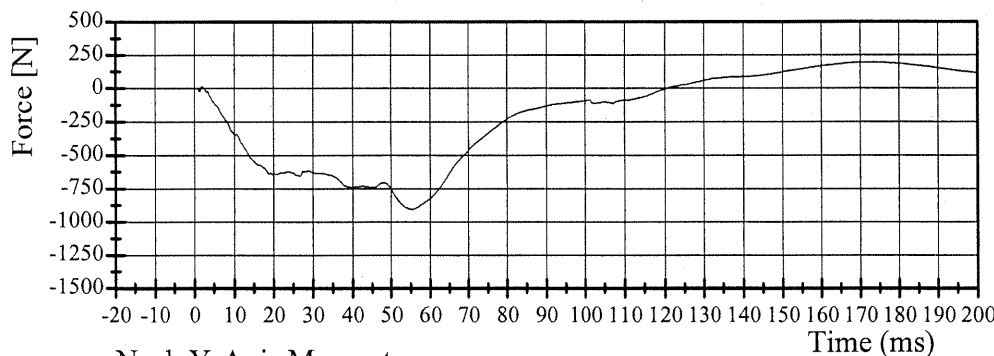


Filter Class: 1000

Max: 193.9 N at 170.9 ms

Min: -906.3 N at 55.2 ms

Neck X-Axis Force (filtered for moment calculation)

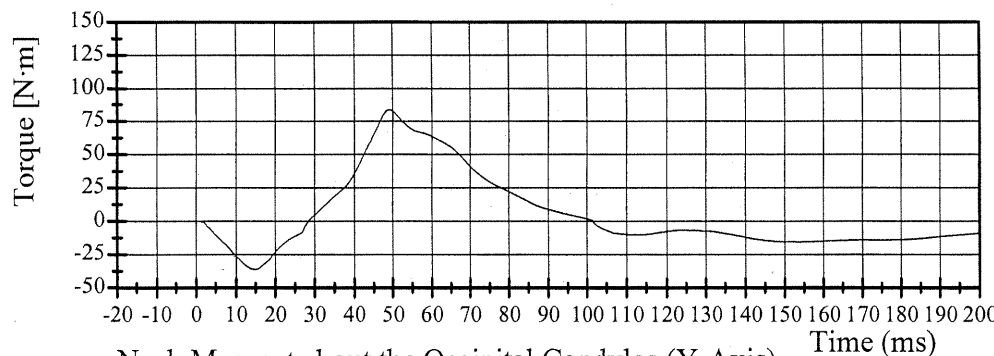


Filter Class: 600

Max: 193.4 N at 171.0 ms

Min: -905.6 N at 55.3 ms

Neck Y-Axis Moment

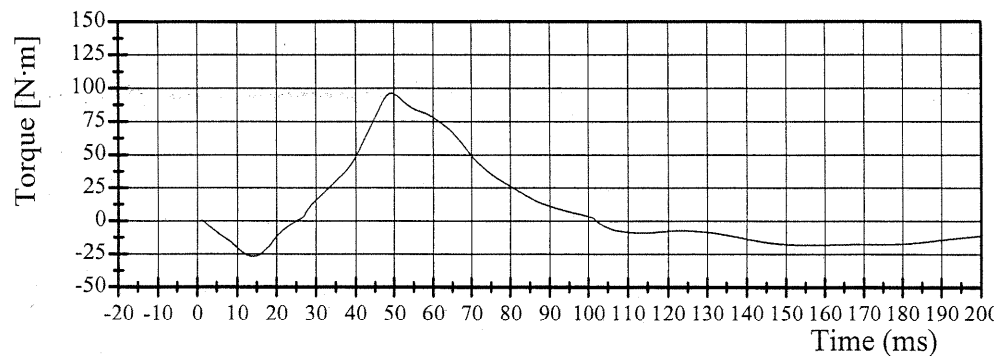


Filter Class: 600

Max: 83.5 N·m at 49.1 ms

Min: -36.2 N·m at 14.8 ms

Neck Moment about the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 96.3 N·m at 49.4 ms

Min: -26.7 N·m at 14.5 ms

10.28.2003 10:35:48 500



# Transportation Research Center Inc.

572E Neck Extension Test - 6 Channel Transducer

HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impact Velocity	5.95 - 6.19 m/s	5.98 m/s	Yes
Pendulum Deceleration			
10 ms	17.20 - 21.20 g	19.69 g	Yes
20 ms	14.00 - 19.00 g	17.33 g	Yes
30 ms	11.00 - 16.00 g	14.58 g	Yes
Max Pendulum Deceleration	22.00 g	20.48 g	Yes
Max Pendulum Deceleration After 30 ms	22.00 g	14.50 g	Yes
Deceleration-Time Curve			
Decay Time To 5g	38 - 46 ms	39.12 ms	Yes
D Plane Rotation			
Max	81 - 106 °	100.80 °	Yes
Time	72 - 82 ms	76.88 ms	Yes
Moment About Occipital Condyle			
Min	-80.0 - (-52.9) N·m	-72.27 N·m	Yes
Time	65 - 79 ms	72.32 ms	Yes
Rotation Angle-Time Curve			
Decay Time To Zero	147 - 174 ms	159.04 ms	Yes
Negative Moment-Time Curve			
Decay Time To Zero	120 - 148 ms	147.92 ms	Yes

## Comments:

Technician



Approved



10.28.2003 13:09:07 579



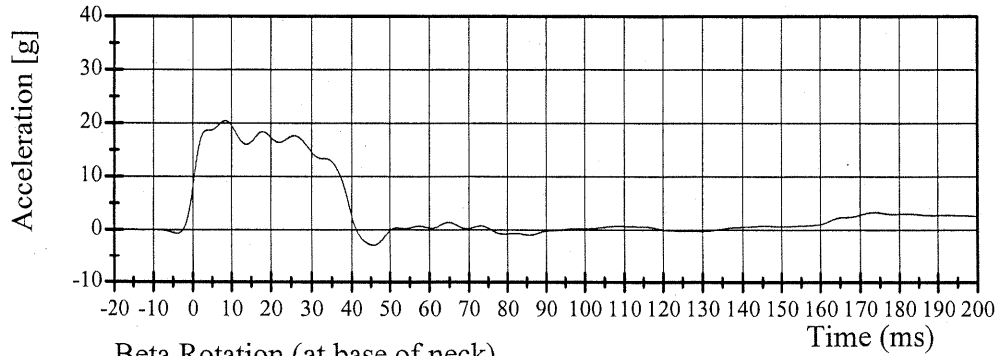
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

### Pendulum Deceleration

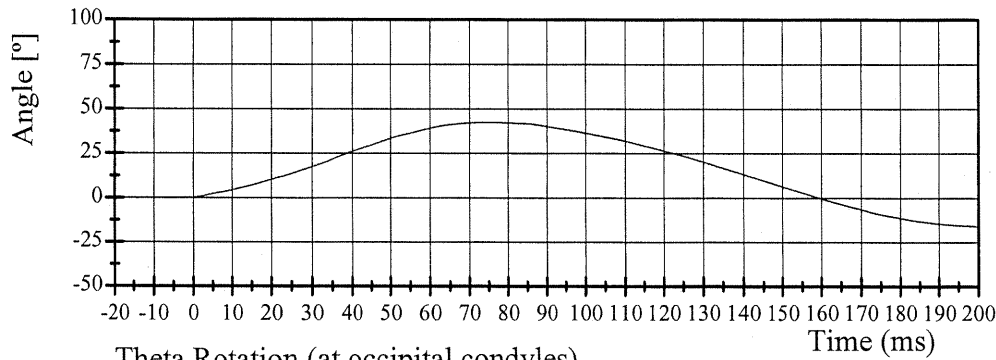


Filter Class: 60

Max: 20.5 g at 8.5 ms

Min: -2.9 g at 45.7 ms

### Beta Rotation (at base of neck)

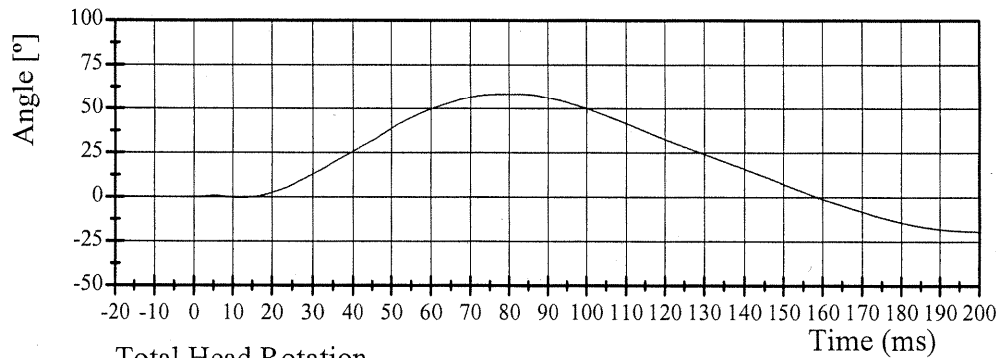


Filter Class: 60

Max: 42.5 ° at 75.0 ms

Min: -15.9 ° at 201.6 ms

### Theta Rotation (at occipital condyles)

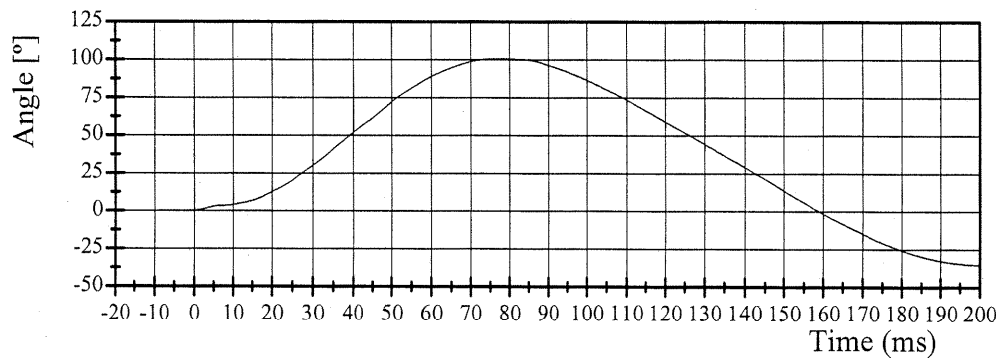


Filter Class: 60

Max: 58.4 ° at 79.8 ms

Min: -19.3 ° at 201.6 ms

### Total Head Rotation



Filter Class: 60

Max: 100.8 ° at 76.9 ms

Min: -35.2 ° at 201.6 ms



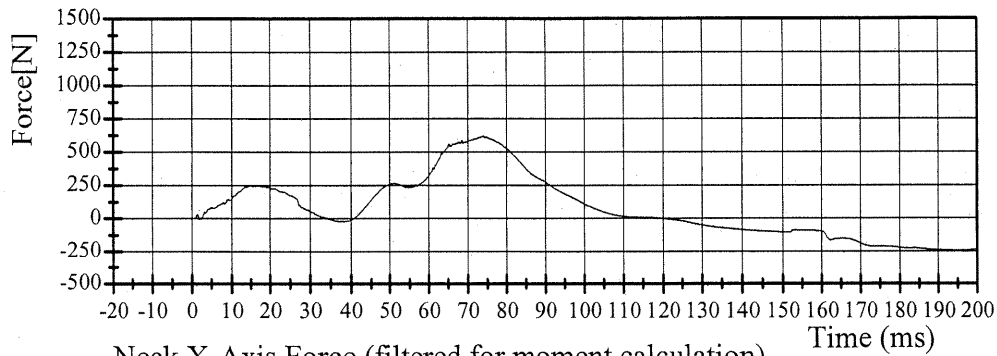
# Transportation Research Center Inc.

572E Neck Extension Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 2

Test Date 10/28/2003

Neck X-Axis Force

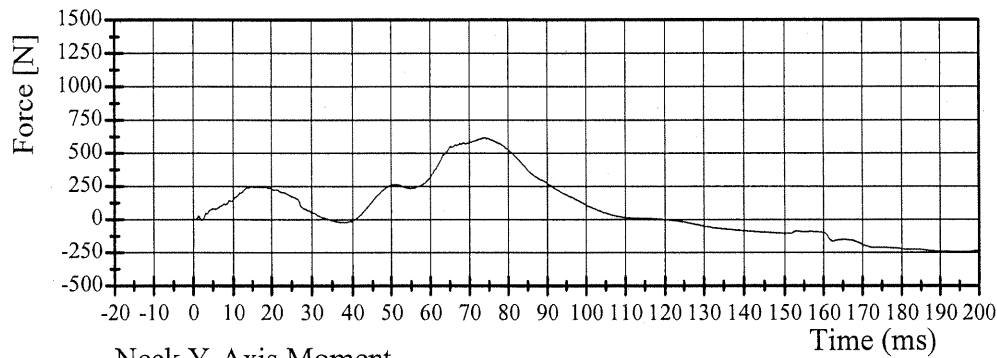


Filter Class: 1000

Max: 620.5 N at 73.9 ms

Min: -242.7 N at 196.1 ms

Neck X-Axis Force (filtered for moment calculation)

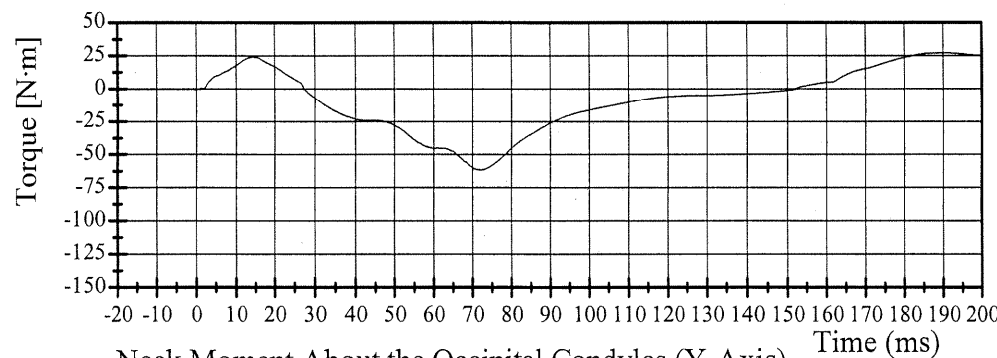


Filter Class: 600

Max: 618.3 N at 73.9 ms

Min: -242.3 N at 196.1 ms

Neck Y-Axis Moment

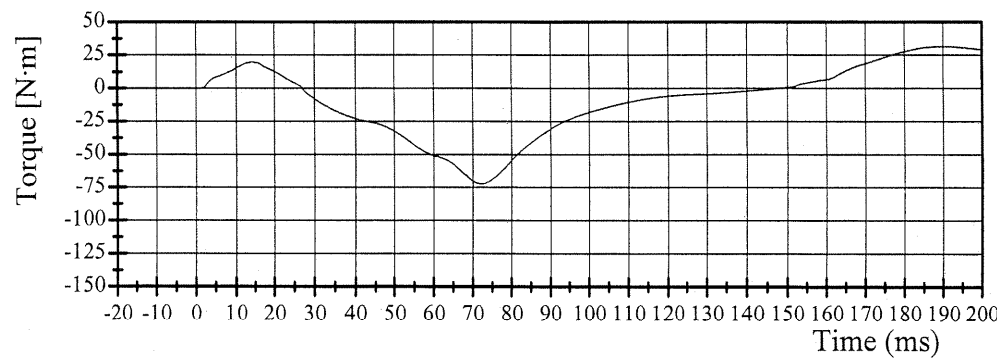


Filter Class: 600

Max: 27.2 N·m at 190.8 ms

Min: -61.6 N·m at 72.0 ms

Neck Moment About the Occipital Condyles (Y-Axis)



Filter Class: 600

Max: 31.4 N·m at 191.0 ms

Min: -72.3 N·m at 72.3 ms

10.28.2003 13:09:09 579



# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

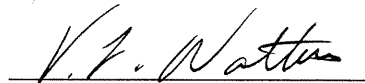
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.65 m/s	Yes
Maximum Chest Deflection	-72.6 - (-63.5) mm	-68.9 mm	Yes
Maximum Resistive Force	5160 - 5894 N	5867 N	Yes
Internal Hysteresis	69 - 85 %	70 %	Yes

## Comments:

Technician



Approved



10.29.2003 07:51:27 957



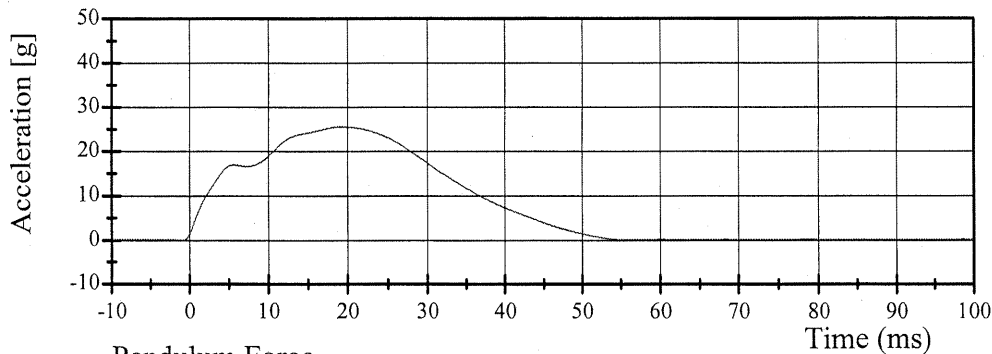
# Transportation Research Center Inc.

572E Thorax Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

Pendulum Deceleration

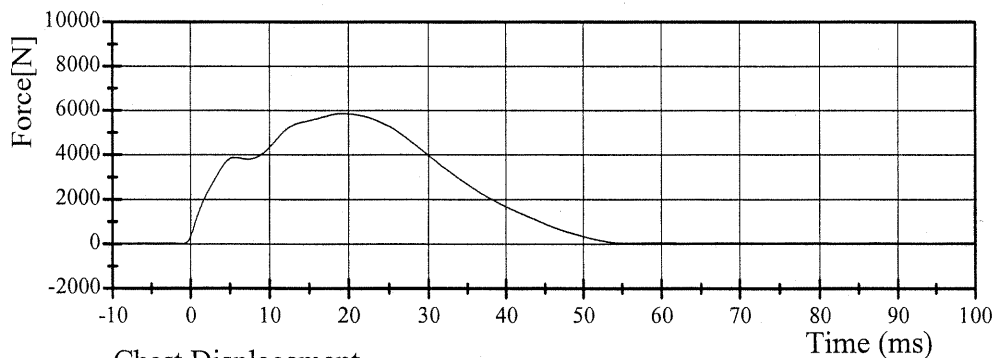


Filter Class: 180

Max: 25.6 g at 19.4 ms

Min: -0.0 g at -75.7 ms

Pendulum Force

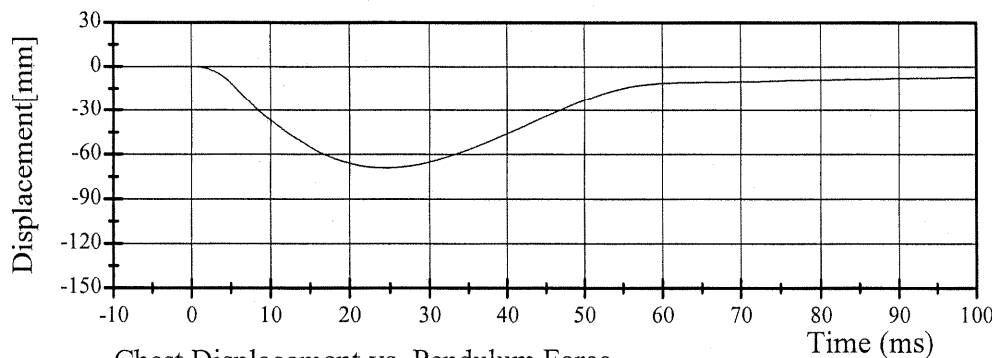


Filter Class: 180

Max: 5867.0 N at 19.4 ms

Min: -11.2 N at -75.7 ms

Chest Displacement

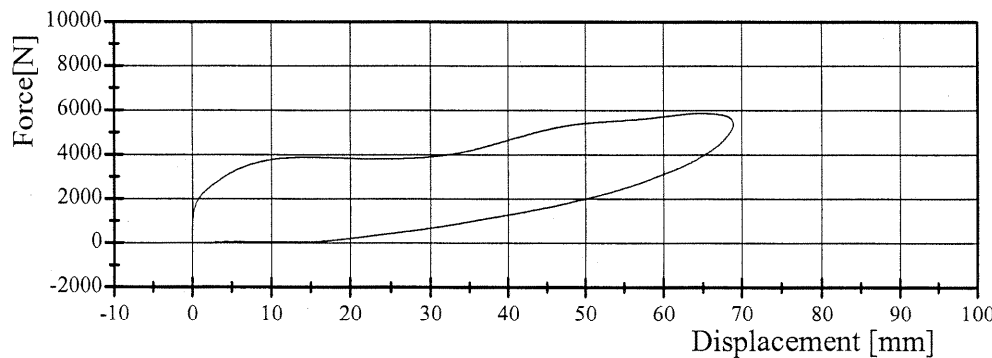


Filter Class: 180

Max: 0.0 mm at 0.0 ms

Min: -68.9 mm at 24.6 ms

Chest Displacement vs. Pendulum Force



10.29.2003 07:51:27 957



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 206L  
Test Number: 206C18

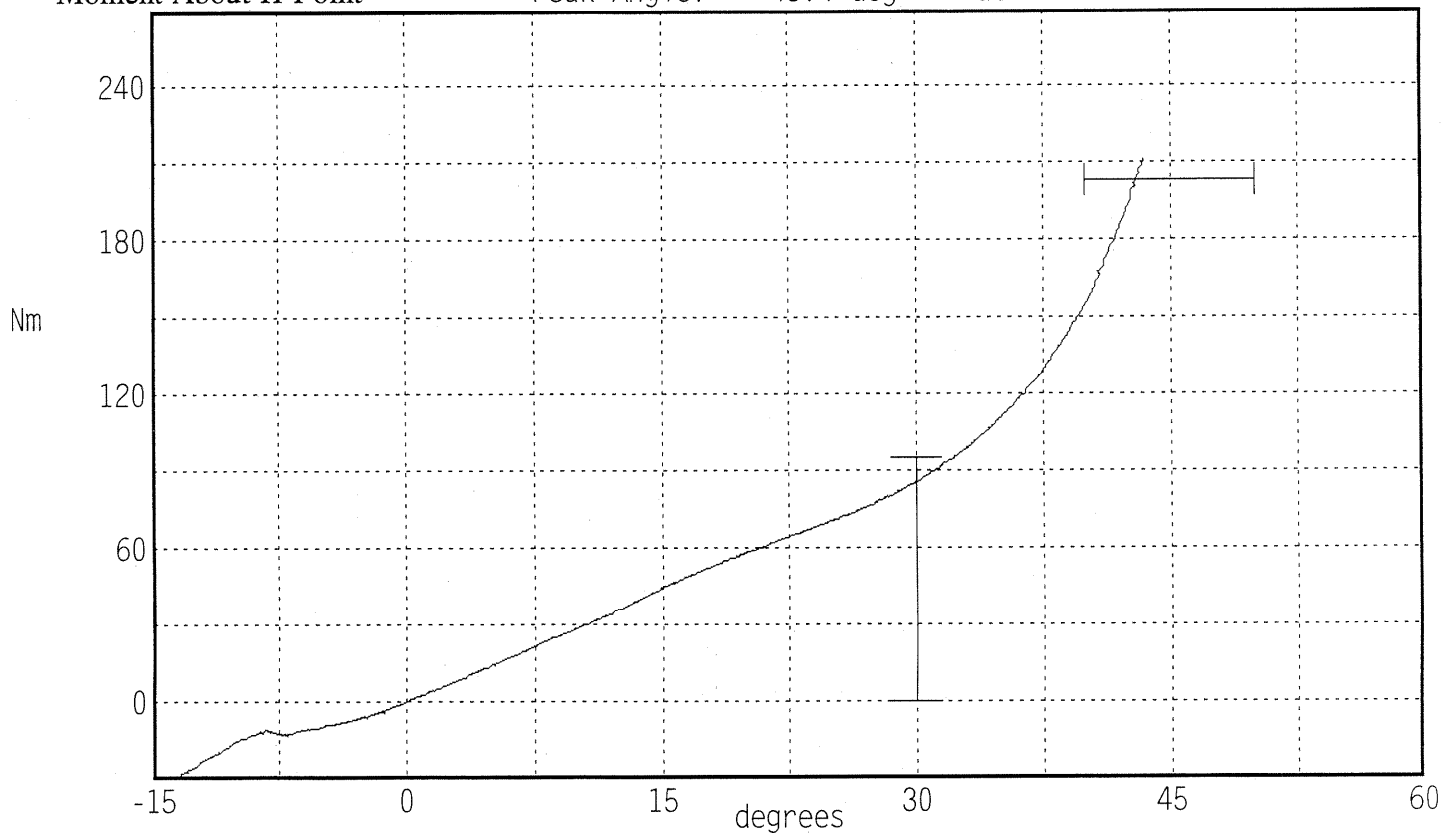
Date: 10/24/2003  
Time: 13:54

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	21.1 °C	Pass
Humidity	10 - 70	38 %	Pass
Moment at 30 deg	<= 94.9	85.4 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	43.0 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Peak Moment: 211.0 Nm at 43.4 deg  
Peak Angle: 43.4 deg at 211.0 Nm

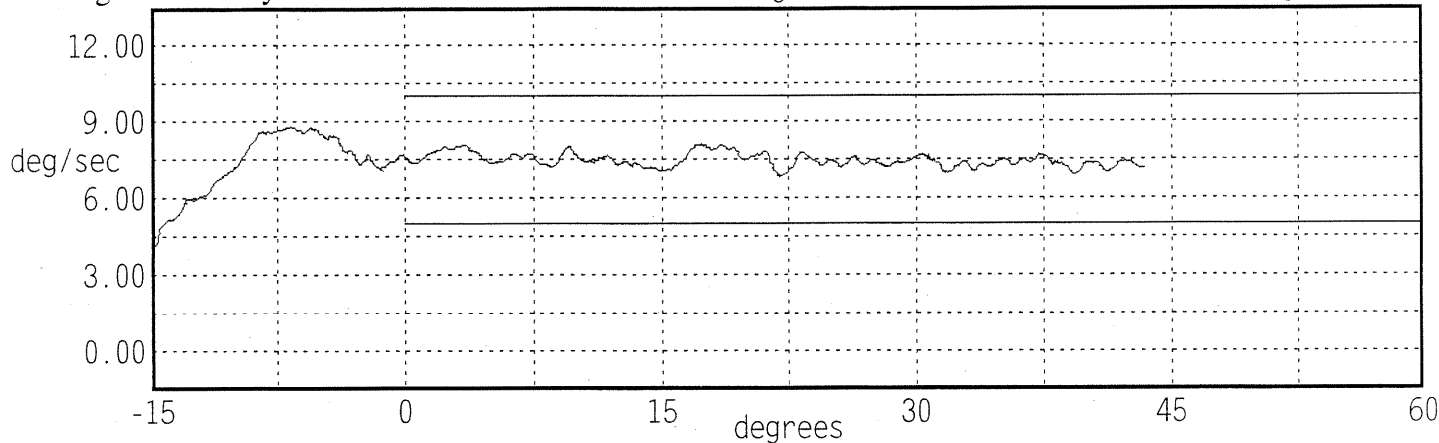
Moment About H-Point



Angular Velocity

Max: 8.1 deg/sec

Min: 6.8 deg/sec



# Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 206R  
Test Number: 206C18

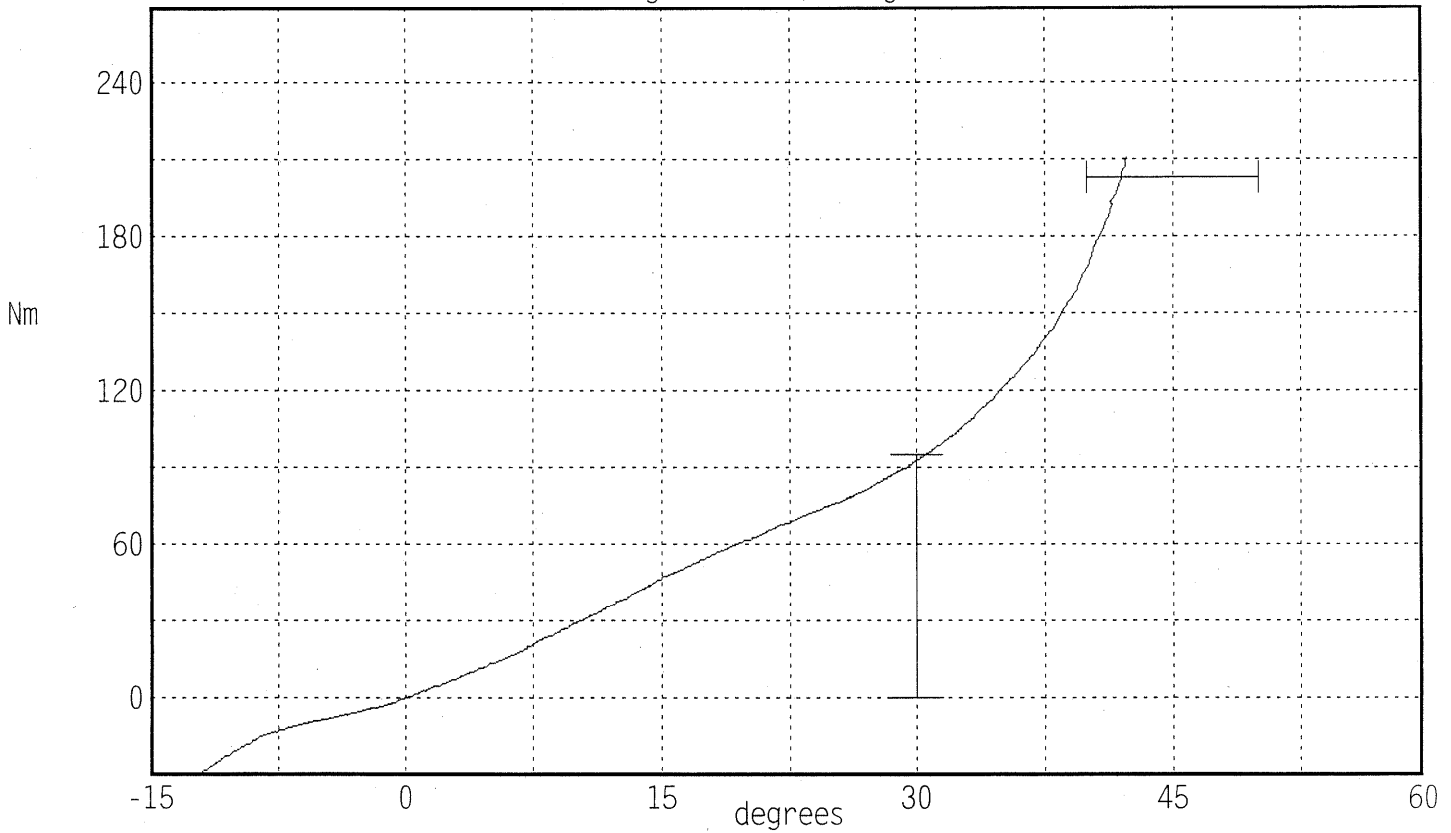
Date: 10/24/2003  
Time: 14:45

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.1 °C Pass
Humidity	10 - 70	38 % Pass
Moment at 30 deg	<= 94.9	92.9 Nm Pass
Angle at 203 Nm	40.0 - 50.0	42.0 deg Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec Pass

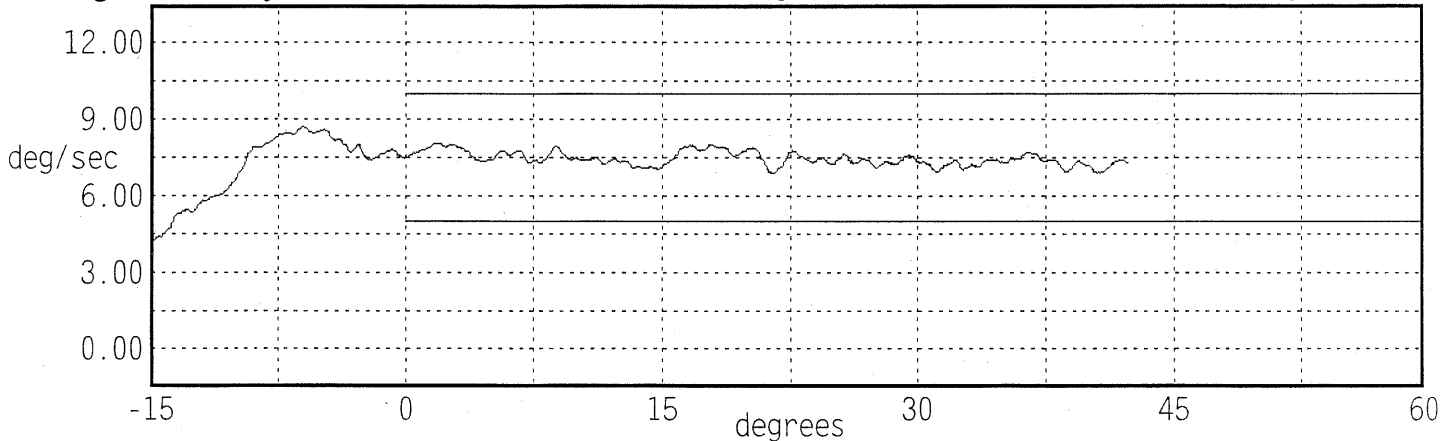
Peak Moment: 210.4 Nm at 42.3 deg  
Peak Angle: 42.3 deg at 210.4 Nm

Moment About H-Point



Angular Velocity

Max: 8.1 deg/sec Min: 6.9 deg/sec



# Transportation Research Center Inc.

572E Left Knee Test

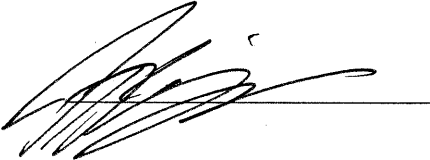
HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

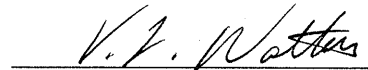
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.09 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5539 N	Yes

## Comments:

Technician



Approved



10.29.2003 07:06:04 2104



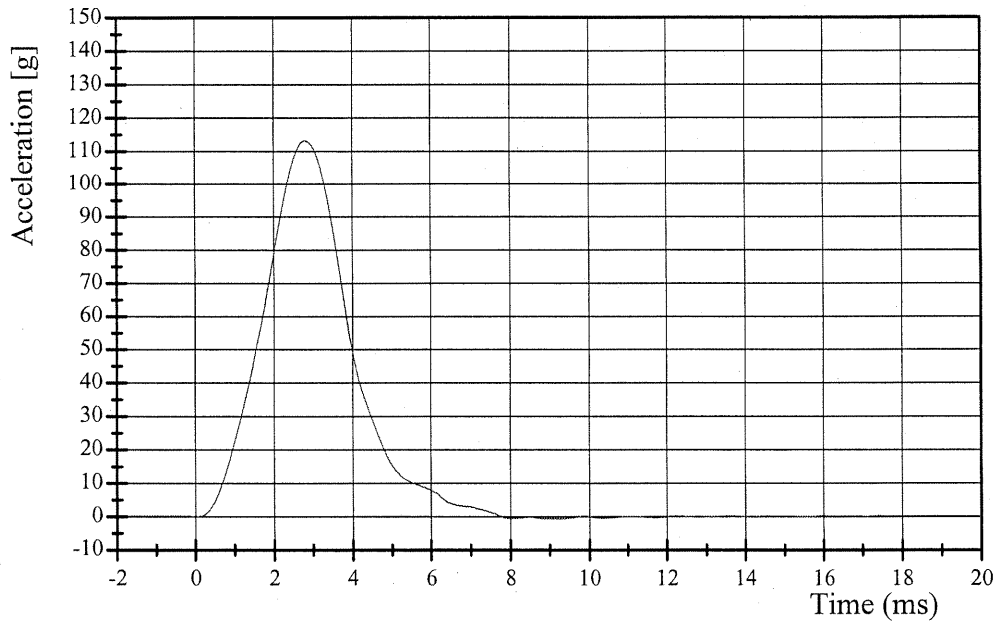
# Transportation Research Center Inc.

572E Left Knee Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

### Pendulum Deceleration

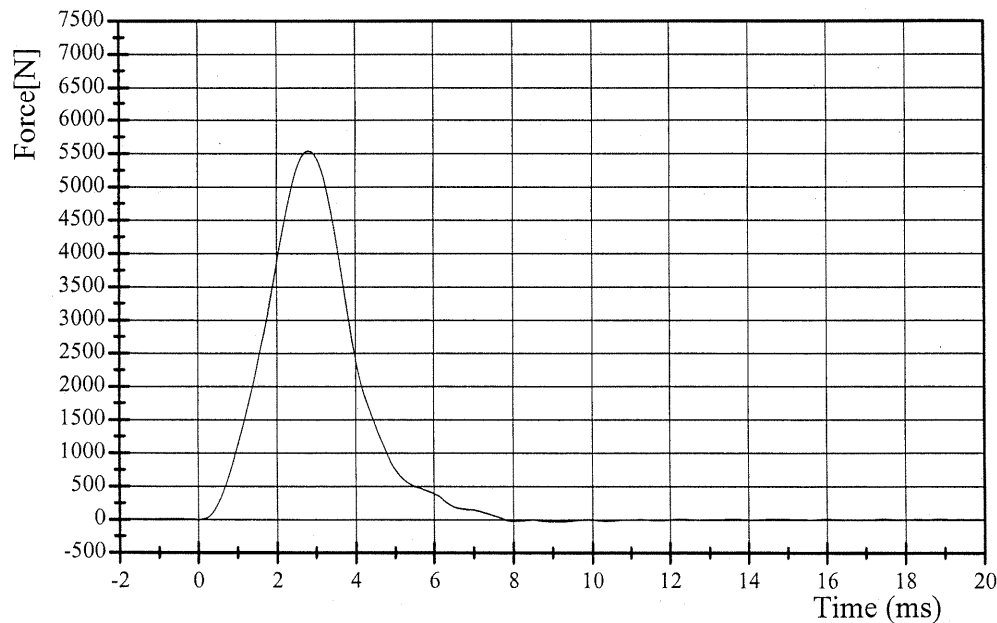


Filter Class: 600

Max: 113.2 g at 2.8 ms

Min: -0.6 g at 9.2 ms

### Pendulum Force



Filter Class: 600

Max: 5538.7 N at 2.8 ms

Min: -28.8 N at 9.2 ms

10.29.2003 07:06:05 2104



# Transportation Research Center Inc.

572E Right Knee Test

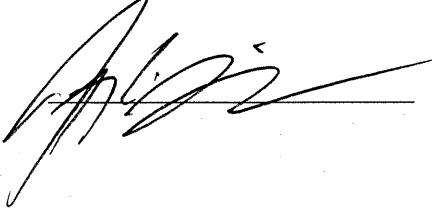
HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

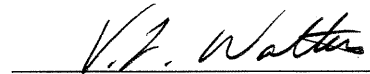
Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	31 %	Yes
Pendulum Velocity	2.07 - 2.13 m/s	2.08 m/s	Yes
Maximum Pendulum Force	4715 - 5783 N	5468 N	Yes

## Comments:

Technician



Approved



10.29.2003 06:22:30 2108



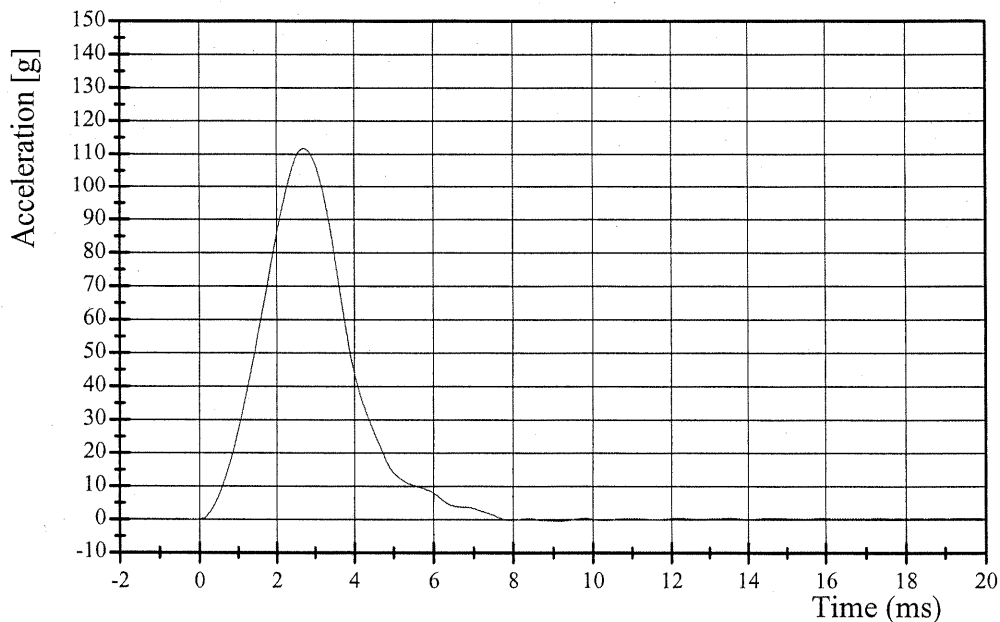
# Transportation Research Center Inc.

572E Right Knee Test

HIII 50th Male Serial No. 206 Calibration No. 18 - 1

Test Date 10/29/2003

### Pendulum Deceleration

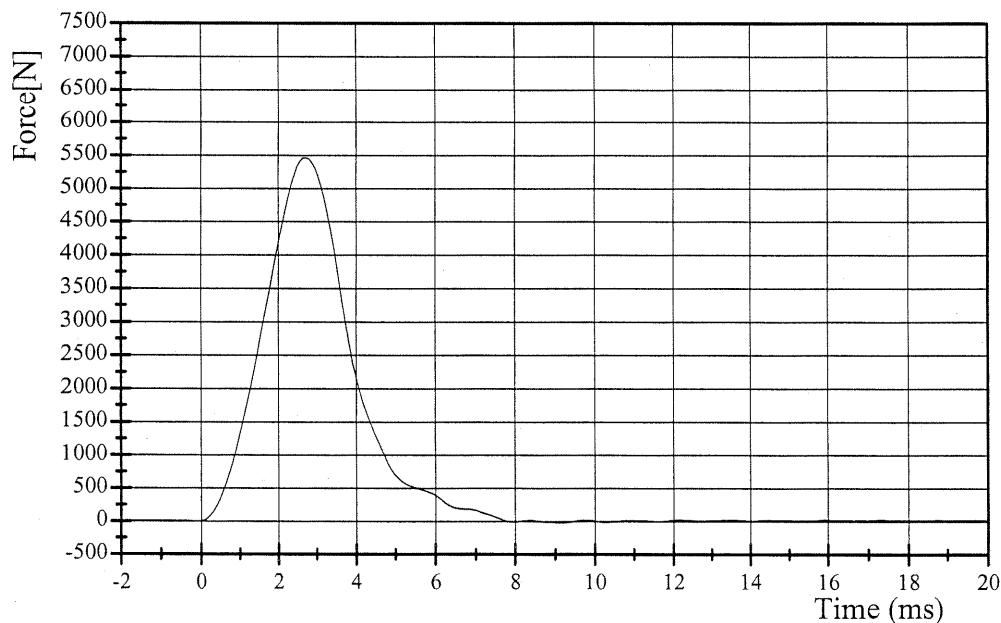


Filter Class: 600

Max: 111.8 g at 2.7 ms

Min: -0.4 g at 9.2 ms

### Pendulum Force



Filter Class: 600

Max: 5468.2 N at 2.7 ms

Min: -20.7 N at 9.2 ms



Appendix D

Miscellaneous Test Information

Sign Convention  
SAE J211 MAR95

Accelerometers:  
+X: Forward  
+Y: Rightward  
+Z: Downward

Potentiometers:  
+Chest longitudinal deflection: Outward  
+Chest lateral deflection: Leftward  
+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

Sign Convention, Cont'd.  
SAE J211 MAR95

Lumbar load cells:

+X force:	Chest rearward, pelvis forward
+Y force:	Chest leftward, pelvis rightward
+Z force:	Chest upward, pelvis downward
+X moment:	Left shoulder toward left hip
+Y moment:	Sternum toward front of legs
+Z moment:	Right shoulder forward, left shoulder 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	180
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

## 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.

To locate time-zero, observe the continuous LED that is visible on the left side of the frame at the beginning of each view. Locate the frame where the left side LED is fully extinguished and reverse 4 frames for the Photosonic cameras; reverse 5 frames for Hycam cameras; reverse 2 frames for Stalex cameras. This frame is time-zero.

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.

# Channel Report

10/21/2003 3:09:50 PM

Name of Test 031021

System MINIDAU

Name of DAU DAU6

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
6001	98H13-F16	HEDXG1	Head Accel X	Rwd	789.68474 g	-	8/28/2003	OK 202v	Entran	EGE-73BQ-2000
6002	02A16-A09	HEDYG1	Head Accel Y	Rgt	807.23993 g	+	8/28/2003	OK 202v	Entran	EGE-73B6Q-200
6003	00L13-F11	HEDZG1	Head Accel Z	Up	798.65227 g	-	8/28/2003	OK 202v	Entran	EGE-73B6Q-200
6004	ARS-06-0033	HEDAV1	Head Angular Vel Y VRTC2	Chn	6169.8425 %s	-	6/23/2003	OK 202v	ATA	ARS-06
6005	1716A-0853-FX	NEKXF1	Neck Force X	Hd	8885.1842 N	-	9/30/2003	OK 202v	Denton	1716A
6006	1716A-0853-FY	NEKYF1	Neck Force Y	Hd	8891.1138 N	+	9/30/2003	OK 202v	Denton	1716A
6007	1716A-0853-FZ	NEKZF1	Neck Force Z	Hd	13353.078 N	+	9/30/2003	OK 202v	Denton	1716A
6008	1716A-0853-MX	NEKXM1	Neck Moment X	Rt Ear	282.20084 N·m	-	9/30/2003	OK 202v	Denton	1716A
6009	1716A-0853-MY	NEKYM1	Neck Moment Y	Chn	282.57665 N·m	+	9/30/2003	OK 202v	Denton	1716A
6010	1716A-0853-MZ	NEKZM1	Neck Moment Z	Chn	282.35860 N·m	+	9/30/2003	OK 202v	Denton	1716A
6011	1794A-0121-FX	NKLXF1	Lwr Neck Force X	Hd	8902.6868 N	-	9/18/2003	OK 8896	Denton	1794A
6012	1794A-0121-FY	NKLYF1	Lwr Neck Force Y	Hd	8888.9413 N	+	9/18/2003	OK 202v	Denton	1794A
6013	1794A-0121-FZ	NKLZF1	Lwr Neck Force Z	Hd	13354.378 N	+	9/18/2003	OK 202v	Denton	1794A
6014	1794A-0121-MX	NKLXM1	Lwr Neck Moment X	Rt Ear	283.19482 N·m	-	9/18/2003	OK 202v	Denton	1794A
6015	1794A-0121-MY	NKLYM1	Lwr Neck Moment Y	Chn	282.86394 N·m	+	9/18/2003	OK 202v	Denton	1794A
6016	1794A-0121-MZ	NKLZM1	Lwr Neck Moment Z	Chn	282.32052 N·m	+	9/18/2003	OK 202v	Denton	1794A
6017	98H13-F15	CSTXG1	Chest Accel X	Fwd	402.42713 g	+	8/28/2003	OK 202v	Entran	EGE-73BQ-2000
D-7 6018	02A16-A20	CSTYG1	Chest Accel Y	Lft	399.22027 g	-	9/3/2003	OK 202v	Entran	EGE-73B6Q-200
6019	01L26-F06	CSTZG1	Chest Accel Z	Up	398.23284 g	-	9/3/2003	OK 202v	Entran	EGE-73B6Q-200
6020	14CB1-2847-013	CSTXD1	Chest Deflection X	Strnm	100.03145 mm	+	10/3/2003	OK 202v	Servo	14CB1-2847
6021	ARS-06-0035	CSTAV1	Chest Angular Vel Y VRTC12	Strnm	6001.9640 %s	+	6/23/2003	OK 202v	ATA	ARS-06
6022	2430-96662	LFMZ1	Left Femur Force Z 002	Knee	33379.621 N	+	10/3/2003	OK 202v	GSE	2430
6024	2430-96661	RFMZ1	Right Femur Force Z 001	Knee	33309.634 N	+	10/3/2003	OK 202v	GSE	2430
6025	B02A25-N02	PEVXG1	Pelvis Accel X	Rr	597.73979 g	-	8/28/2003	OK 202v	Entran	EGE-73B6Q-200
6026	00L13-F26	PEVYG1	Pelvis Accel Y	Lft	602.21124 g	-	8/27/2003	OK 202v	Entran	EGE-73B6Q-200
6027	02A18-N16	PEVZG1	Pelvis Accel Z	Up	606.26154 g	-	8/28/2003	OK 202v	Entran	EGE-73B6Q-200
6028	98H14-K06	HEDXG3	Head Accel X	Rwd	788.35938 g	-	9/23/2003	OK 206v	Entran	EGE-73BQ-2000
6029	98H14-K10	HEDYG3	Head Accel Y	Rgt	793.65079 g	+	9/23/2003	OK 206v	Entran	EGE-73BQ-2000
6030	98H10-F17	HEDZG3	Head Accel Z	Up	792.80283 g	-	9/23/2003	OK 206v	Entran	EGE-73BQ-2000
6031	ARS-06-0031	HEDAV3	Head Angular Vel Y S230	Chn	5992.1568 %s	-	6/23/2003	OK 206v	ATA	ARS-06
6032	IF-205-157-FX	NEKXF3	Neck Force X	Hd	8886.4165 N	-	9/23/2003	OK 206v	FTSS	IF-205

# Channel Report

10/21/2003 3:09:51 PM

Name of Test 031021

System MINIDAU

Name of DAU DAU7

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
7001	IF-205-157-FY	NEKYF3	Neck Force Y	Hd	8908.7851	N	+ 9/23/2003	OK 206v	FTSS	IF-205
7002	IF-205-157-FZ	NEKZF3	Neck Force Z	Hd	13339.578	N	+ 9/23/2003	OK 206v	FTSS	IF-205
7003	IF-205-157-MX	NEKXM3	Neck Moment X	Rt Ear	282.07751	N	- 9/23/2003	OK 206v	FTSS	IF-205
7004	IF-205-157-MY	NEKYM3	Neck Moment Y	Chn	282.53420	N	+ 9/23/2003	OK 206v	FTSS	IF-205
7005	IF-205-157-MZ	NEKZM3	Neck Moment Z	Chn	282.03122	N	+ 9/23/2003	OK 206v	FTSS	IF-205
7006	1794A-216-FX	NKLXF3	Lwr Neck Force X	Hd	8896.5389	N	- 9/23/2003	OK 206v	Denton	1794A
7007	1794A-216-FY	NKLYF3	Lwr Neck Force Y	Hd	8893.8787	N	+ 9/23/2003	OK 206v	Denton	1794A
7008	1794A-216-FZ	NKLZF3	Lwr Neck Force Z	Hd	13333.750	N	+ 9/23/2003	OK 206v	Denton	1794A
7009	1794A-216-MX	NKLXM3	Lwr Neck Moment X	Rt Ear	282.79064	N·m	- 9/23/2003	OK 206v	Denton	1794A
7010	1794A-216-MY	NKLYM3	Lwr Neck Moment Y	Chn	283.04506	N·m	+ 9/23/2003	OK 206v	Denton	1794A
7011	1794A-216-MZ	NKLZM3	Lwr Neck Moment Z	Chn	282.78360	N·m	+ 9/23/2003	OK 206v	Denton	1794A
7012	98H10-F07	CSTXG3	Chest Accel X	Fwd	401.94693	g	+ 9/23/2003	OK 206v	Entran	EGE-73BQ-2000
7013	01J02-F05	CSTYG3	Chest Accel Y	Lft	400.27518	g	- 9/23/2003	OK 206v	Entran	EGE-73B6Q-200
7014	01J02-F10	CSTZG3	Chest Accel Z	Up	398.92788	g	- 9/23/2003	OK 206v	Entran	EGE-73B6Q-200
7015	14CB1-2847-206	CSTXD3	Chest Deflection X	Strnm	100.14767	mm	+ 10/1/2003	OK 206v	Servo	14CB1-2847
7016	ARS-06-0027	CSTAV3	Chest Angular Vel Y SJ3	Strnm	5018.0623	%s	+ 6/23/2003	OK 206v	ATA	ARS-06
7017	2430-717	LFMZ3	Left Femur Force Z 2017	Knee	33337.552	N	+ 9/26/2003	OK 206v	GSE	2430
7018	2430-744	RFMZ3	Right Femur Force Z 2018	Knee	33396.787	N	+ 9/26/2003	OK 206v	GSE	2430
7019	03E03D30-N19	PEVXG3	Pelvis Accel X	Rr	602.43090	g	- 9/23/2003	OK 206v	Entran	EGE-73B6Q-200
7020	98H10-F10	PEVYG3	Pelvis Accel Y	Lft	593.98129	g	- 9/2/2003	OK 206v	Entran	EGE-73BQ-2000
7021	01J02-F03	PEVZG3	Pelvis Accel Z	Up	598.15879	g	- 9/23/2003	OK 206v	Entran	EGE-73B6Q-200
7022	P27960	RDKXG1	RR FLOOR PAN ABOVE	RR	993.17194	g	- 7/19/2003	OK -1	Endevco	7264C-2K-2-180
7023	P28610	RDKYG1	RR FLOORPAN ABOVE AXLE	RT	1008.3702	g	+ 6/20/2003	OK -1	Endevco	7264C-2K-2-180
7024	P22073	RDKZG1	RR FLOORPAN ABOVE AXLE	UP	988.87515	g	- 9/15/2003	OK -1	Endevco	7264C-2K-2-180
7025	P27908	LFTXG1	LT FR OCCUPANT	FWD	1504.9970	g	+ 7/19/2003	OK -1	Endevco	7264C-2K-2-180
7026	P28091	LFTYG1	LT FR OCCUPANT	LT	1556.0418	g	- 7/19/2003	OK -1	Endevco	7264C-2K-2-180
7027	P27513	LFTZG1	LT FR OCCUPANT	UP	1485.0910	g	- 7/19/2003	OK -1	Endevco	7264C-2K-2-180
7028	3419T-606	LBOF1	FRONT DRIVER LAP BELT		13325.952	N	+ 7/21/2003	OK -1	Lebow	3419T
7029	ST3	SPOOL1	FRONT DRIVER BLET SPOOL		12.309319	mm	+ 6/18/2001	--- -1	Bourns	205141410
7030	3419T-615	SHBF1	FRONT DRIVER SHOULDER		13342.228	N	+ 10/16/2003	OK -1	Lebow	3419T
7031	3419T-130	LBOF3	RR PASSENGER LAP BELT	S1504	13356.287	N	+ 10/3/2003	OK -1	Lebow	3419T
7032	2091	SPOOL3	RR PASSENGER BELT SPOOL		12.409112	mm	+ 6/18/2001	--- -1	Bourns	205141410

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031021-2

# Channel Report

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Name of Test 031021

System MINIDAU

Name of DAU DAU8

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
8001	3419T-806	SHBF3	RR PASSENGER SHOULDER	P14	13365.101	N	+ 6/2/2003	OK -1	Lebow	3419T
8002	162-3405H-0266	SPOOL1L	FRONT DRIVER LT SEAT		1112.0812	mm	+ 6/10/2003	OK -1	Space Age	162-3405H
8003	162-3405H-0268	SPOOL1R	FR DRIVER RT SEAT BACK		1110.7399	mm	+ 7/8/2003	OK -1	Space Age	162-3405H
8004	162-3405H-0268	SPOOL3L	RR PASS LEFT SEAT BACK		1112.0805	mm	+ 7/8/2003	OK -1	Space Age	162-3405H
8005	162-3405H-0265	SPOOL3R	RR PASS RT SEAT BACK		1108.9566	mm	+ 5/29/2003	OK -1	Space Age	162-3405H
8006	ARS-06-0032	LRPOT3	LT PASS SEAT ROTARY POT	B10	5914.8387	%s	+ 6/23/2003	OK -1	ATA	ARS-06
8007	ARS-06-0034	RRPOT3	RT PASS SEAT ROTARY POT	N	5993.3812	%s	+ 6/23/2003	OK -1	ATA	ARS-06
8008	6009-2140-1707	GYROY1	FR DRIV. LT SEAT BACK		360.14110	°	+ 7/2/2003	OK -1	JDK	6009-2140
8009	6009-2140-1710	GYROY2	FR DRIV. RT SEAT BACK		360.31090	°	+ 7/2/2003	OK -1	JDK	6009-2140
8010	6009-2140-1711	GYROY3	RR PASS LT SEAT BACK		366.89621	°	+ 7/2/2003	OK -1	JDK	6009-2140
8011	6009-2140-1709	GYROY4	RR PASS RT SEAT BACK		357.86802	°	+ 7/2/2003	OK -1	JDK	6009-2140
8012	ARS-01-173	GYROY5	FR DRIVER DOOR SILL		4977.1672	%s	+ 8/15/2002	--- -1	ATA	ARS-01
8013	ARS-01-167	GYROY6	RR PASS DOOR SILL		3996.6528	%s	+ 8/15/2002	--- -1	ATA	ARS-01
8014	ARS-06-0074	LRPOT1	LEFT DRIVER SEAT ROTARY		6086.6443	%s	+ 9/4/2003	OK -1	ATA	ARS-06
8015	ARS-06-0076	RRPOT1	RIGHT DRIVER SEAT		6048.9899	%s	+ 9/4/2003	OK -1	ATA	ARS-06

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031021-2

# Channel Report

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Name of Test 031021

System MINIDAU

Name of DAU DAU9

Chan.#	Sensor #	Mnemonic	Description	Dir.	Range	Pol.	Cal.	Group	Mfg.	Model
9001	P25843	BCGXG1	MB CG X-AXIS	FWD	605.25818	g	+ 7/19/2003	OK -1	Endevco	7264C-2K-2-180
9002	P27453	BCGYG1	MB CG Y-AXIS	LT	593.14179	g	- 8/1/2003	OK -1	Endevco	7264C-2K-2-180
9003	P27530	BCGZG1	MB CG Z-AXIS	UP	599.37720	g	- 7/19/2003	OK -1	Endevco	7264C-2K-2-180
9004	P27907	LRRXG1	MB LT RR X-AXIS	FWD	599.25093	g	+ 7/19/2003	OK -1	Endevco	7264C-2K-2-180
9005	P27963	LRRYG1	MB LT RR Y-AXIS	RT	597.08454	g	+ 7/19/2003	OK -1	Endevco	7264C-2K-2-180
9006	EVENT	EVENT	EVENT		5.12	V	+ 10/15/2002	--- -1	TRC	Event

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REAR IMPACT (MOVING BARRIER) / 031021-2

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