

Report Numbers: TRC-96-V005

**Frontal Full-Scale Crash Testing
for Upgrade of
FMVSS 208 Test Procedure**

V2521

**15° Crabbed Deformable Impactor into Front of
1996 Chevrolet Cavalier
at 113 kph at a 30° Angle
TRC Test Number: 970214**

**Prepared By:
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March 28, 1997

Final Report

**Prepared for:
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16. Abstract A 15° crabbed deformable impactor into a 1996 Chevrolet Cavalier 4-door sedan, NHTSA No. RT0103, was conducted at Transportation Research Center Inc. on February 14, 1997. This frontal full-scale crash testing was conducted for upgrade of Federal Motor Vehicle Safety Standard (FMVSS) 208 Test Procedure. The deformable impactor's velocity was 113.1 kph. The vehicle's test weight was 1462 kg. The vehicle's maximum crush was 815 millimeters. The ambient temperature was -3° C. The driver's Head Injury Criteria (HIC) was 615. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 64.6 g. The driver's chest maximum deflection was 28 mm. the driver's left and right femur maximum axial forces were 10,245 N and 13,383 N, respectively. The passenger's Head Injury Criteria (HIC) was 572. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.4 g. The passenger's chest maximum deflection was 29 mm. The passenger's left and right femur maximum axial forces were 5,913 N and 3,081 N, respectively.			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

* 1 m = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$7.25, SD Catalog No. C1310-286.

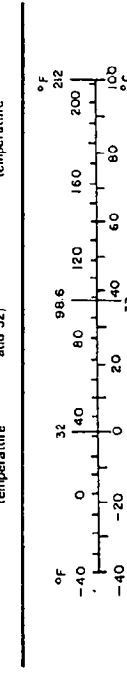


Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
1.0	Purpose and Test Procedure	1-1
2.0	Frontal Deformable Barrier Impact Test Summary	2-1
3.0	FMVSS 208 and 301 Data	3-1
4.0	Vehicle, Moving Deformable Barrier, Occupant, and Camera Measurements	4-1
Appendix A	Photographs	A-1
Appendix B	Data Plots	B-1
Appendix C	Dummy Calibration Information	C-1
Appendix D	Miscellaneous Test Information	D-1

List of Tables

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Crash Test Summary	2-4
2	Test Vehicle Information	2-6
3	Post-Impact Data	2-9
4	Dummy Injury Criteria	3-2
5	Fuel System Data	3-3
6	FMVSS 301 Post-Impact Test Data	3-4
7	Impacted Vehicle Measurements	4-4
8	Pre-Test Vehicle Measurements	4-6
9	Test Vehicle Front Profile Data	4-8
10	Pre-Test Position of Vehicle Accelerometer Mounting Locations	4-13
11	Post-Test Position of Vehicle Accelerometer Mounting Locations	4-14
12	Change In Position of Vehicle Accelerometer Mounting Locations	4-15
13	Vehicle Accelerometer Locations and Data Summary	4-16
14	Moving Deformable Barrier Load Cell Placement and Data Summary	4-20
15	Moving Deformable Barrier Face Static Crush	4-22
16	Dummy Measurement Data for Front Seat Occupants	4-24
17	Motion Picture Camera Locations	4-27

List of Figures

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Impact Velocity Measurement System	2-10
2	Accident Investigation Division Data	2-11
3	FMVSS 301 Static Rollover Test Data	3-5
4	Pre-Test and Post-Test Measurement Points	4-2
5	Vehicle Target Locations	4-7
6	Vehicle Crush	4-11
7	Vehicle Accelerometer Mounting Locations	4-12
8	Moving Deformable Barrier Load Cell Placement	4-19
9	Moving Deformable Barrier Face Crush	4-21
10	Dummy Measurement Locations for Front Seat Occupants	4-23
11	Seat Belt Positioning Data	4-25
12	Camera Positions	4-26

List of Photographs

- Figure A-1 Post-Test Front View
- Figure A-2 Pre-Test Left Front Three-Quarter View
- Figure A-3 Post-Test Left Front Three-Quarter View
- Figure A-4 Pre-Test Left Side View
- Figure A-5 Post-Test Left Side View
- Figure A-6 Pre-Test Left Rear Three-Quarter View
- Figure A-7 Post-Test Left Rear Three-Quarter View
- Figure A-8 Pre-Test Rear View
- Figure A-9 Post-Test Rear View
- Figure A-10 Pre-Test Right Rear Three-Quarter View
- Figure A-11 Post-Test Right Rear Three-Quarter View
- Figure A-12 Pre-Test Right Side View
- Figure A-13 Post-Test Right Side View
- Figure A-14 Pre-Test Right Front Three-Quarter View
- Figure A-15 Pre-Test Vehicle and Barrier - View 1
- Figure A-16 Pre-Test Vehicle and Barrier - View 2
- Figure A-17 Pre-Test Overhead - View 1
- Figure A-18 Pre-Test Overhead - View 2
- Figure A-19 Post-Test Overhead View
- Figure A-20 Pre-Test Fuel Filler Cap View
- Figure A-21 Pre-Test Engine Compartment View
- Figure A-22 Post-Test Engine Compartment View
- Figure A-23 Pre-Test Windshield View
- Figure A-24 Post-Test Windshield View
- Figure A-25 Post-Test Front Underbody - View 1
- Figure A-26 Post-Test Front Underbody - View 2
- Figure A-27 Post-Test Rear Underbody View
- Figure A-28 Pre-Test Driver Dummy Position View
- Figure A-29 Post-Test Driver Dummy Position View

List of Photographs, Cont'd.

- Figure A-30 Pre-Test Passenger Dummy Position View
- Figure A-31 Post-Test Passenger Dummy Position View
- Figure A-32 Pre-Test Driver Dummy and Vehicle Interior - View 1
- Figure A-33 Pre-Test Driver Dummy and Vehicle Interior - View 2
- Figure A-34 Pre-Test Passenger Dummy and Vehicle Interior - View 1
- Figure A-35 Post-Test Passenger Dummy and Vehicle Interior - View 1
- Figure A-36 Pre-Test Passenger Dummy and Vehicle Interior - View 2
- Figure A-37 Post-Test Passenger Dummy and Vehicle Interior - View 2
- Figure A-38 Post-Test Driver Dummy Contact View
- Figure A-39 Post-Test Driver Dummy Head Contact - View 1
- Figure A-40 Post-Test Driver Dummy Head Contact - View 2
- Figure A-41 Post-Test Driver Dummy Knee Contact View
- Figure A-42 Post-Test Passenger Dummy Contact View
- Figure A-43 Post-Test Passenger Dummy Head Contact View
- Figure A-44 Post-Test Passenger Dummy Knee Contact - View 1
- Figure A-45 Post-Test Passenger Dummy Knee Contact - View 2
- Figure A-46 Vehicle on Static Rollover Machine View
- Figure A-47 Wire Profile of Dash Board

Section 1.0

Purpose and Test Procedure

Purpose

This crash test was conducted to determine vehicle and occupant response in the 113 kph frontal impact with a 15° crabbed cart at a 30° angle to the target vehicle. The test was performed on a 1996 Chevrolet Cavalier passenger car.

Test Procedure

This test was conducted per Contract No. DTRS57-95-C-00011, Technical Task Directive No. 3, "Frontal Full-Scale Crash Testing for Upgrade of FMVSS 208 Frontal Test Procedure."

The test vehicle was instrumented with fifteen (15) accelerometers to measure longitudinal axis accelerations; eight (8) accelerometers to measure lateral axis accelerations; and six (6) accelerometers to measure vertical accelerations.

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedure specified in Appendix C of the Laboratory Test Procedure TP-208-09.

The deformable impactor was instrumented with five (5) force load cells to measure longitudinal axis forces on the barrier face.

The impactor's specified velocity range was 111.5 to 114.5 kph.

Both dummies were instrumented with head center of gravity and Position 1, 2, and 3 accelerometers to measure longitudinal, lateral, and vertical accelerations; neck upper and lower 6-axis load cells to measure longitudinal, lateral, and vertical force and moments; chest and pelvis accelerometers to measure longitudinal, lateral, and vertical axis accelerations; and with left and right femur load cells and upper and lower tibia load cells to measure axial forces. Each dummy was instrumented to measure knee displacements. Each Part 572 E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection. Also, each dummy was instrumented with an 8-string potentiometer thorax to measure longitudinal and lateral rib displacement. Additionally, the driver dummy was instrumented with a shoulder belt load cell.

The one-hundred-thirty-four (134) data channels were digitally sampled at 12,500 samples per second and processed per Sections 11.13 through 11.15 of the Laboratory Test Procedure.

The crash event was recorded by twelve (12) high-speed motion picture cameras and a real-time panning camera.

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 208 and 301 data are presented in Section 3.0. The vehicle, moving deformable barrier, occupant, and camera 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 calibration information. Appendix D contains miscellaneous test information.

Section 2.0

Frontal Deformable Barrier Impact Test Summary

Test Results Summary

This 113 kph frontal crash test with a 15° crabbed cart at a 30° angle to the test vehicle was conducted at TRC on February 14, 1997.

The test vehicle, a 1996 Chevrolet Cavalier passenger car, was equipped with airbags and three-point unibelts at the driver's and right front passenger's seating positions. The vehicle's test weight was 1462 kg. The vehicle's maximum static crush was 815 mm.

The driver's HIC was 615. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 64.6 g. The driver's chest maximum deflection was 28 mm. The driver's left and right femur maximum compressive forces were 10,245 N and 13,383 N, respectively.

The right front passenger's HIC was 572. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.4 g. The right front passenger's chest maximum deflection was 29 mm. The right front passenger's left and right femur maximum compressive forces were 5,913 N and 3,081 N, respectively.

Data Acquisition Explanations

The passenger dummy's lower neck X-axis shear force data channel, NKLXF2, recorded a data spike at approximately 73 milliseconds.

The vehicle's brake pedal Y-axis acceleration data channel, PEDYG1, recorded questionable data after approximately 40 milliseconds. This affected the vehicle's brake pedal resultant acceleration calculation, PEDRG1.

The vehicle's left shock tower X-axis acceleration data channel, SFLXG1, recorded questionable data after approximately 40 milliseconds.

The vehicle's left shock tower Z-axis acceleration data channel, SFLZG1, recorded questionable data after approximately 20 milliseconds.

Table 1 Crash Test Summary

Test type:	113 kph 15° crabbed moving deformable barrier at a 30° angle into test vehicle
Test date:	02/14/97
Test time:	1245
Ambient temperature at impact area:	-3° C
Vehicle year/make/ model/body style:	1996/Chevrolet/Cavalier/passenger car
Vehicle test weight:	1462 kg
Impact angle ¹ :	345°
Impact velocity ² :	
Primary:	113.1 kph
Secondary:	113.0 kph
Maximum static crush:	815 mm
Number of cameras:	
High-speed:	12
Door opening data:	
Left-front:	Needed tools
Left-rear:	Needed tools
Right-front:	Easy
Right-rear:	Easy

¹ With respect to the stationary vehicle's centerline.

² Speed trap measurement ($\pm$.08 kph accuracy)

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #134</u>	<u>Passenger #177</u>
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag/3-point unbelt	Airbag/3-point unbelt
Number of data channels:	50	50
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag/head rest	Airbag
Chest:	Airbag/steering wheel	Airbag
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel/airbag

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1996/Chevrolet/Cavalier/passenger car

Color: White

VIN: 1G1JC5248T7160821

Engine data:

Placement: Transverse

Cylinders: 4

Displacement: 2.2 liters

Transmission data: 3 speed, manual, X automatic, overdrive

Final drive: x fwd, rwd, 4wd

Date vehicle received: 01/30/96

Odometer reading: N/A

Dealer's name
and address: N/A

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	No
Clock	Yes	Rear window defroster	Yes
Power door locks	No		

Certification data from vehicle's label:

Vehicle manufactured by: General Motors Corporation

Date of manufacture: 11/95

VIN: 1G1JC5248T7160821

GVWR: 1639 kg

GAWR: Front: 890 kg

Rear: 749 kg

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle:	P195/65R15
Spare tire:	None
Type of front seats:	Bucket

Tire & capacity data from vehicle's label:

Recommended tire size:	P195/65R15
Recommended cold tire pressure:	
Front:	210 kPa
Rear:	210 kPa
Designated Seating Capacity:	
Front	2
Rear	3
Total	5
Vehicle Capacity Weight:	400 kg

Test vehicle attitudes:

Delivered attitude:	LF: N/A	RF: N/A	LR: N/A	RR: N/A
Pre-test attitude:	LF: N/A	RF: N/A	LR: N/A	RR: N/A
Post-test attitude:	LF: 755 mm	RF: 665 mm	LR: 586 mm	RR: 790 mm

Table 2 Test Vehicle Information, Cont'd.

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

Right front	373.8 kg	Right rear	207.3 kg
Left front	375.1 kg	Left rear	210.0 kg
Total front weight	748.9 kg	(64.2% of total vehicle weight)	
Total rear weight	417.3 kg	(35.8% of total vehicle weight)	
Total delivered weight ¹	1166.2 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1166.2 kg)

VCW² = Vehicle Capacity Weight = 400 kg

DSC = Designated Seating Capacity (5)

RCLW = VCW - 68 (DSC) = 400 - 68 (5) = 60 kg

Target test weight = UDW + RCLW² + (Number of Hybrid III dummies x 76 kg
per dummy)

Target test weight = 1166 + 60 + 152 = 1378 kg

Weight of test vehicle with required dummies and 148 kg of cargo weight:

Right front	421.0 kg	Right rear	304.5 kg
Left front	429.5 kg	Left rear	306.5 kg
Total front weight	850.5 kg	(58.2% of total vehicle weight)	
Total rear weight	611.0 kg	(41.8% of total vehicle weight)	
Total test weight	1461.5 kg	(6.4% over target test weight)	

Weight of ballast secured in vehicle cargo area: 0

Components removed to meet target test weight: Trunk lid, exhaust system, rear window glass,
rear tail lights, rear bumper and fascia.

CG rearward of front wheel centerline: 1104 mm

Vehicle Wheelbase: 2640 mm

¹ Delivered car was missing components

² From vehicle's tire load label.

Table 3 Post-Impact Data

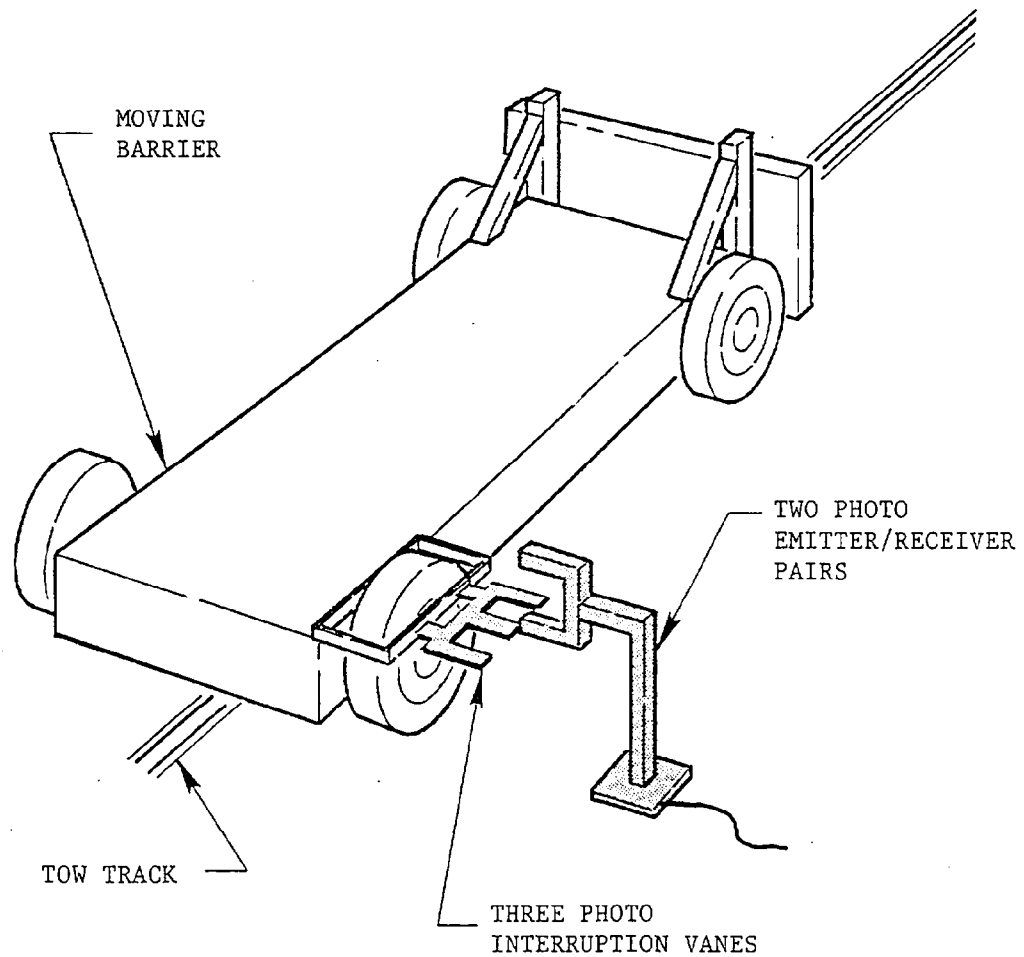
Test number:	970214
Test date:	02/14/97
Test time:	1245
Test type:	113 kph 15° crabbed moving deformable barrier into test vehicle at a 30° angle
Impact angle: ¹	345°
Ambient temperature at impact area:	-3° C
Temperature in occupant compartment:	21° C
Impact velocity:	
Primary:	113.1 kph
Secondary:	113.0 kph
Specified range:	111.5 to 114.5 kph
Distance from vehicle to barrier:	
Entering velocity trap:	356 mm
Exiting velocity trap:	51 mm

Test vehicle static crush:

Overall length of test vehicle:			
Pre-test:	L: 4334 mm	C: 4582 mm	R: 4333 mm
Post-test:	L: 3519 mm	C: 4071 mm	R: 4425 mm
Total crush:	L: 815 mm	C: 511 mm	R: -92 mm
Average crush:	411 mm		

¹ With respect to the stationary vehicle's centerline.

Figure 1 Impact Velocity Measurement System



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

The vanes have 305-millimeter spacing.

Figure 2 Accident Investigation Division Data

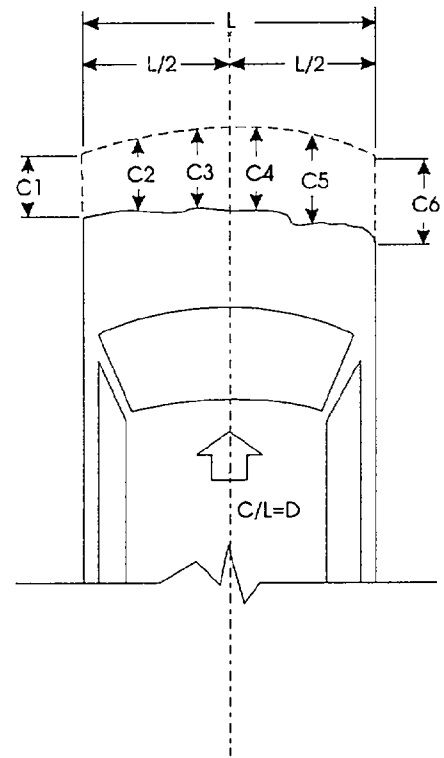
Test date: 02/14/97
Vehicle year/make/
model/body style: 1996/Chevrolet/Cavalier/passenger car
Volpe No.: RT0103
VIN: 1G1JC5248T7160821
Build date: 11/95
Test weight: 1462 kg
Vehicle wheelbase: 2640 mm
Maximum width: 1747 mm
Front overhang: 970 mm

Collision Deformation
Classification (CDC) Code: 11FDEW1

Crush depth
measurements: C1: 815 mm
C2: 773 mm
C3: 560 mm
C4: 426 mm
C5: 169 mm
C6: -92 mm

Midpoint of damage: D: Vehicle Longitudinal Centerline
4071 mm

Length of damaged
region: L: 1492 mm



Section 3.0

FMVSS 208 and 301 Data

Table 4 Dummy Injury Criteria

Maximum Acceleration

	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-57.2 g	45.7 g	-49.6 g	72.5 g	-59.5 g	-20.0 g	33.3 g
Passenger	-37.9 g	-54.8 g	-33.0 g	66.1 g	-48.9 g	-27.8 g	18.9 g

Maximum Femur Compressive Force

	Left Femur	Right Femur
Driver	10,245 N	13,383 N
Passenger	5,913 N	3,081 N

Head Injury Criteria¹

	HIC	Time t ₁	Time t ₂
Driver	615	55.1 ms	80.9 ms
Passenger	572	67.0 ms	102.2 ms

Head Maximum Resultant Acceleration²

	Acceleration	Time t ₁	Time t ₂
Driver	65.1 g	66.0 ms	69.0 ms
Passenger	63.4 g	88.1 ms	91.1 ms

Chest Maximum Resultant Acceleration²

	Acceleration	Time t ₁	Time t ₂
Driver	64.6 g	63.9 ms	66.9 ms
Passenger	53.4 g	69.8 ms	72.8 ms

Maximum Chest Deflection

Driver	28 mm
Passenger	29 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Table 5 Fuel System Data

Vehicle year/make/model/body style:	1996/Chevrolet/Cavalier/passenger car
Volpe No.:	RT0103
Fuel system capacity:	N/A (from owner's manual)
Usable capacity:	59.1 liters (furnished by COTR)
Test volume range:	54.4 liters to 55.6 liters (92-94% of usable)
Actual test volume:	55.0 liters (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	purple
Type of fuel pump:	electric
Does the electric fuel pump operate with ignition switch "on" and the engine not operating.	Yes
Details of fuel system:	The fuel tank is located forward of the rear axle. The fuel filler neck enters the rear of the tank.

Table 6 FMVSS 301 Post-Impact Test Data

Test date: 02/14/97

Volpe No.: RT0103

Vehicle year/make/model/body style: 1996/Chevrolet/Cavalier/passenger car

Test requirements:

Test vehicle fuel tank filled to 92 to 94% of manufacturer's usable capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

Test vehicle impact type:

- ☒ Frontal (113 kph)
- ☐ Oblique (48 kph) with ___° barrier face first contacting (driver's/passenger's) side
- ☐ Rear moving barrier (80 kph)
- ☐ Lateral moving barrier (32 kph)

Fuel system fluid spillage measurements:

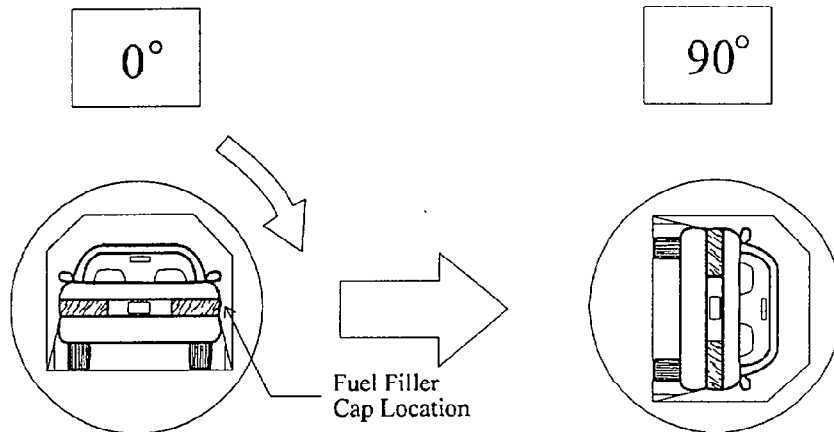
	<u>Test Results</u>	<u>Maximum Allowable</u>
1. From impact until vehicle motion ceases	0 g	28 g
2. 5-Minute period after vehicle motion ceases	0 g	140 g
3. Next 25 minutes after 5-minute period	0 g	28 g/1 min

Fuel system fluid spillage location(s): None

Figure 3 FMVSS 301 Static Rollover Test Data

Volpe No: RT0103

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90° = 2 minutes, 0 seconds

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

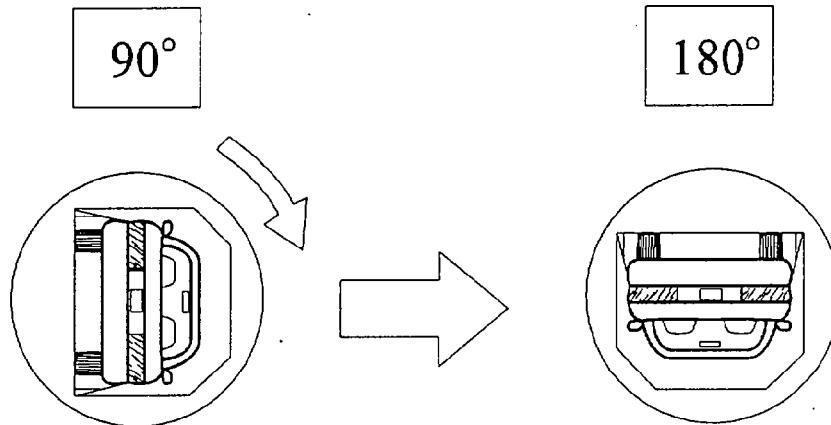
Fuel system fluid spillage measurements:

	Test Results	Maximum Allowable
<u>0° to 90° rotation (fuel filler cap down)</u>		
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 3 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2 minutes,	0 seconds
FMVSS 301 position hold time	=	5 minutes,	0 seconds
Total	=	7 minutes,	0 seconds
Next whole minute interval	=	14 minutes	

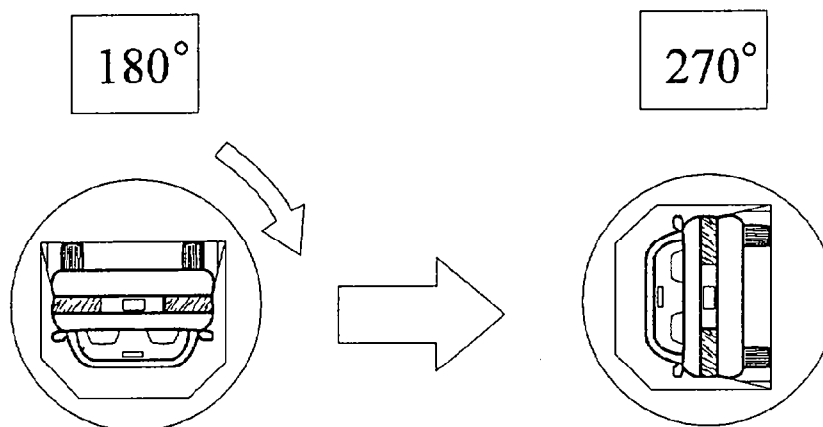
Fuel system fluid spillage measurements:

90° to 180° rotation	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 3 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90° = 2 minutes, 0 seconds

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 21 minutes

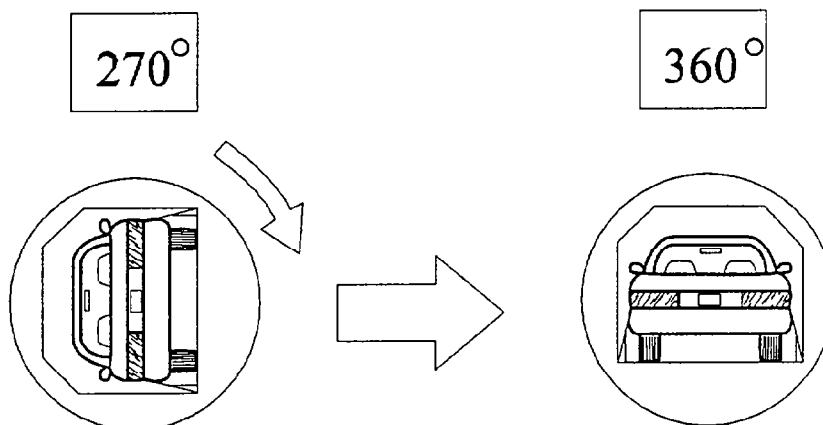
Fuel system fluid spillage measurements:

	Test Results	Maximum Allowable
<u>180 to 270° rotation</u>		
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Figure 3 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90° = 2 minutes, 0 seconds

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 28 minutes

Fuel system fluid spillage measurements:

	Test Results	Maximum Allowable
<u>270° to 360° rotation</u>		
1. First five minutes from onset of rotation	0 g	142 g
2. Sixth minute from onset of rotation	0 g	28 g
3. Seventh minute from onset of rotation	0 g	28 g

Fuel system fluid spillage location(s): None

Section 4.0

Vehicle, Moving Deformable Barrier, Occupant, and Camera Measurements

Figure 4 Pre-test and Post-test Measurement Points

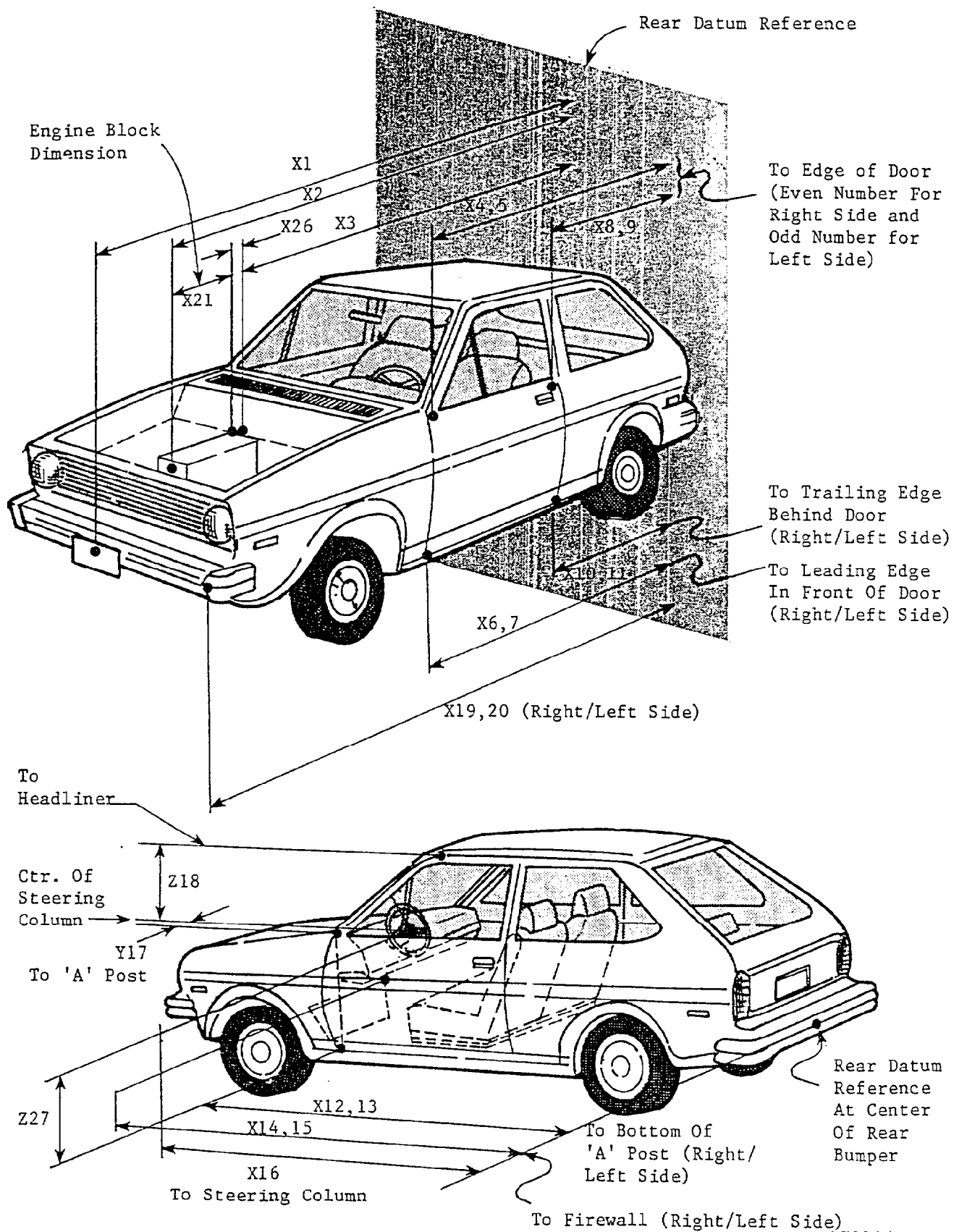


Figure 4 Pre-test and Post-test Measurement Points, Cont'd.

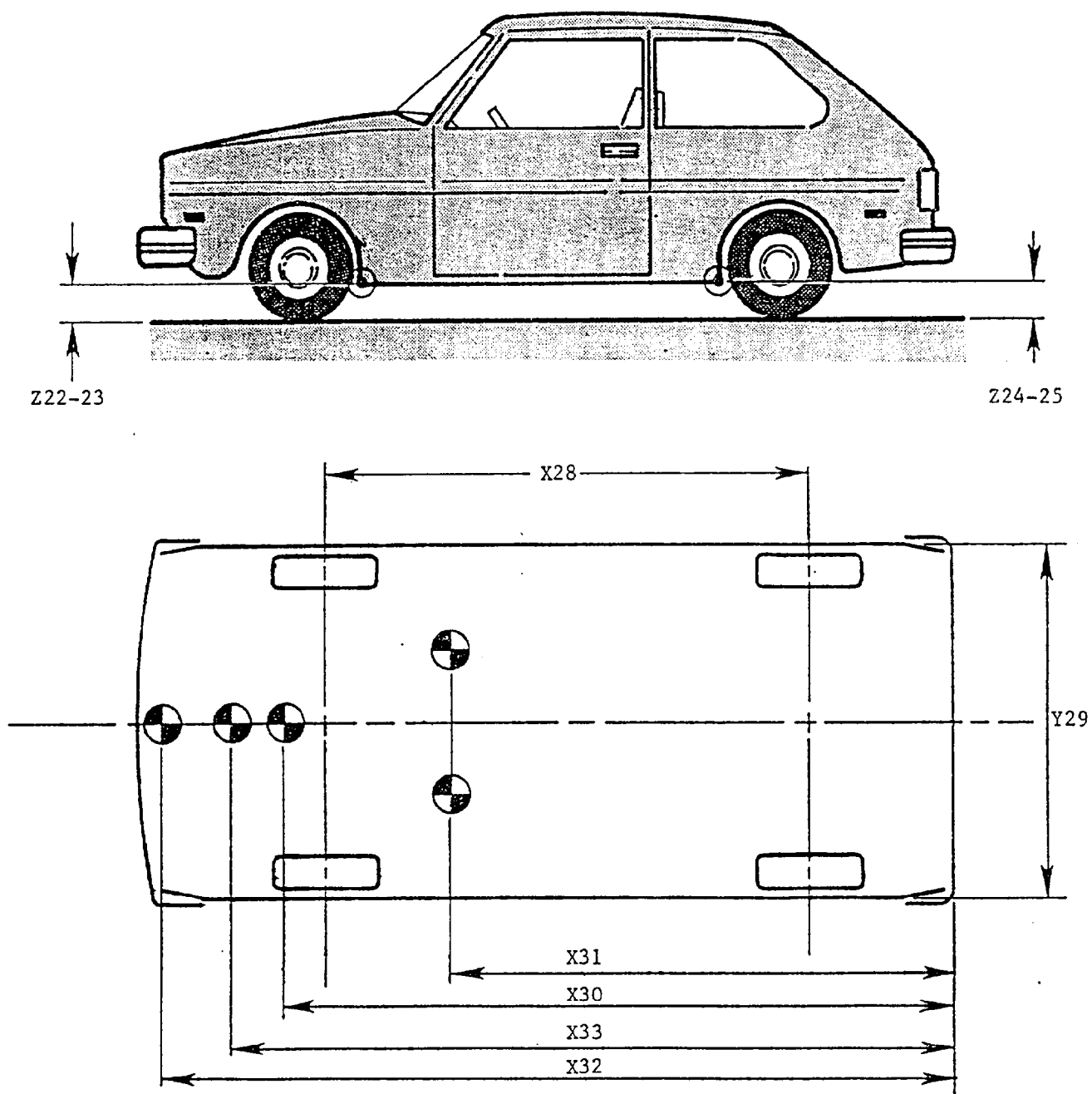


Table 7 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1996/Chevrolet/Cavalier/passenger car Test Number: 970214

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	4582 mm	4071 mm	511 mm
X2	Rear surface of vehicle to front of engine block	3847 mm	3449 mm	398 mm
X3	Rear surface of vehicle to firewall	3450 mm	3046 mm	404 mm
X4	Rear surface of vehicle to upper leading edge of right door	3067 mm	2936 mm	131 mm
X5	Rear surface of vehicle to upper leading edge of left door	3062 mm	2802 mm	260 mm
X6	Rear surface of vehicle to lower leading edge of right door	3073 mm	2916 mm	157 mm
X7	Rear surface of vehicle to lower leading edge of left door	3073 mm	2861 mm	212 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2075 mm	1944 mm	131 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2083 mm	1832 mm	251 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2084 mm	1927 mm	157 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2081 mm	1865 mm	216 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3050 mm	2871 mm	179 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3064 mm	2653 mm	411 mm
X14	Rear surface of vehicle to firewall - right side	3459 mm	3299 mm	160 mm
X15	Rear surface of vehicle to firewall - left side	3495 mm	2987 mm	508 mm
X16	Rear surface of vehicle to steering wheel center	2622 mm	2364 mm	258 mm
X17	Center of steering column to "A" post	283 mm	333 mm	-50 mm
X18	Center of steering column to headliner	420 mm	346 mm	74 mm
X19	Rear surface of vehicle to right side of front bumper	4333 mm	4425 mm	-92 mm
X20	Rear surface of vehicle to left side of front bumper	4334 mm	3519 mm	815 mm
X21	Length of engine block	455 mm	455 mm	0 mm

Table 7. Impacted Vehicle Measurements, Cont'd.

Vehicle year/make/model/body style: 1996/Chevrolet/Cavalier/passenger car Test Number: 970214

No.	Type of measurement	Pre-test	Post-test	Difference
Z22	Right front sill to ground plane	NA	180 mm	NA
X23	Left front sill to ground plane	NA	35 mm	NA
Z24	Right rear sill to ground plane	NA	272 mm	NA
Z25	Left rear sill to ground plane	NA	120 mm	NA
X26	Firewall to engine or transaxle	NA	210 mm	NA
Z27	Vertical dimension from rear sill to centerline of steering column	NA	880 mm	NA
X28	Wheelbase of vehicle	NA	2410 mm	NA
Y29	Width of vehicle at maximum width point	NA	1830 mm	NA
X30	Rear surface of vehicle to engine target	NA	3420 mm	NA
X31	Rear surface of vehicle to compartment target	2181 mm	2062 mm	119 mm
X32	Rear surface of vehicle to bumper target	4462 mm	3921 mm	541 mm
X33	Rear surface of vehicle to frame crossmember	4211 mm	3610 mm	601 mm

Table 8 Pre-Test Vehicle Measurements

M1	Front axle to reference plane (RPD)	2611
M2	Heel point to toeboard/floorboard intersection	128
M3	RPD to toeboard/floorboard intersection	476
M4	RPD to firewall	605
M5	RPD to bottom of dashboard	240
M6	RPD to steering wheel pivot point	N/A
M7	Windshield/dashboard intersection to edge of dashboard	470
M8	RPD to edge of dashboard	39
M9	RPD to foremost point of header	594
M10	RPD to rearmost point of seat cushion	1132
M11	Seat travel from rearmost to foremost position	185
M12	RPD to H-point	1293
M13	Windshield/dashboard intersection to floor	685
M14	Bottom of dashboard to floor	425
M15	Steering wheel pivot point to floor	N/A
M16	Foremost ppoint of header to floor	1079
M17	Seat rise from rearmost to foremost position	15
M18	Rearmost point of seat cushion to floor	214
M19	H-point to floor	310
M20	Toeboard angle	75°
M21	Steering column angle	20°
M22	Length of windshield	792
M23	Windshield angle	28°
M24	Seat cushion angle	10°
M25	Length of seat cushion	505
M26	Length of seat back	500

All measurements are referenced to the X-Z plane of seated occupant.

1. The first step in the process of creating a new product is to identify a market need. This involves conducting market research to understand what consumers want and what problems they are facing. Once a need is identified, the next step is to develop a concept that addresses that need. This is often done through brainstorming and sketching ideas. The third step is to create a prototype, which is a physical model of the product that can be used to test and refine the design. This is followed by a series of iterations where the design is improved based on feedback from users and testing. Finally, the product is ready for production and distribution.



Table 9 Test Vehicle Front Profile Data

X-axis measurements referenced to a plane 500 millimeters forward of the front bumper centerline. Y-axis measurements are left and right of the original vehicle centerline. Y-axis measurements (6 points) should divide the width of the car and be clearly indicated on the form. Z-axis (height) measurements are from the ground.

		Pre-Test Profile					
		Vehicle Left			Vehicle Right		
		pt. 1	pt. 2	pt. 3	pt. 4	pt. 5	pt. 6
Bottom of front bumper	X	684	534	478	472	537	697
	Y	714	378	93	-76	-376	-722
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Top of front bumper	X	649	476	472	419	498	671
	Y	740	393	83	-87	-401	-760
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Center of Grill	X	754	628	66	672	632	760
	Y	695	380	683	-85	-385	-702
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Front of hood	X	801	760	777	785	765	812
	Y	659	371	83	-91	-384	-653
	Z	N/A	N/A	N/A	N/A	N/A	N/A

Table 9 Test Vehicle Front Profile Data, Cont'd.

		Post-Test Profile					
		Vehicle Left			Vehicle Right		
		pt. 1	pt. 2	pt. 3	pt. 4	pt. 5	pt. 6
Bottom of front bumper	X	1402	1102	879	762	621	626
	Y	700	381	96	-69	-370	-724
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Top of front bumper	X	1464	1186	935	820	645	557
	Y	752	402	89	-82	-394	-723
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Center of Grill	X	1242	1076	958	736	654	572
	Y	500	333	172	-161	-330	-505
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Front of hood	X	1552	1422	1217	1090	1042	941
	Y	714	309	84	-82	-306	-625
	Z	N/A	N/A	N/A	N/A	N/A	N/A

Table 9 Test Vehicle Front Profile Data, Cont'd.

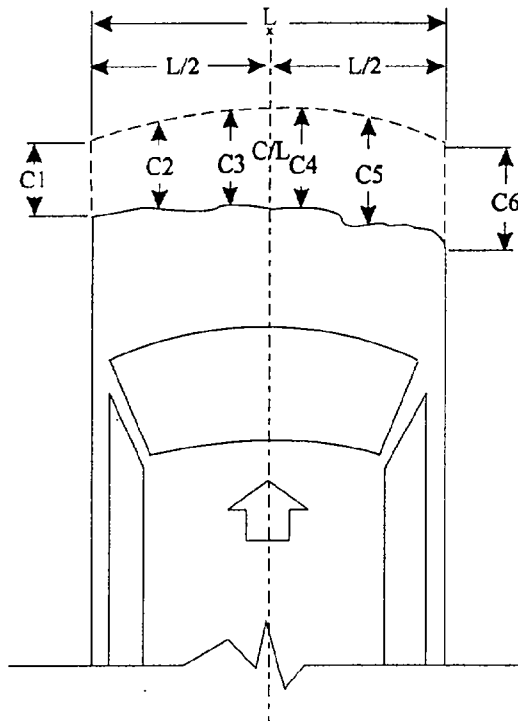
		Change					
		Vehicle Left			Vehicle Right		
		pt. 1	pt. 2	pt. 3	pt. 4	pt. 5	pt. 6
Bottom of front bumper	X	-718	-568	-401	-290	-84	71
	Y	14	-3	-3	-7	-6	2
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Top of front bumper	X	-753	-626	-407	-343	-123	45
	Y	40	12	-13	-18	-31	-36
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Center of Grill	X	-488	-448	-282	-64	-22	188
	Y	195	47	511	76	-55	-197
	Z	N/A	N/A	N/A	N/A	N/A	N/A
Front of hood	X	-751	-662	-440	-305	-277	-129
	Y	-55	62	-1	-9	-78	-28
	Z	N/A	N/A	N/A	N/A	N/A	N/A

+X: Rearward from a reference plane 500 mm forward of the vehicle rear bumper centerline

+Y: Left from vehicle longitudinal centerline

+Z: Up from ground

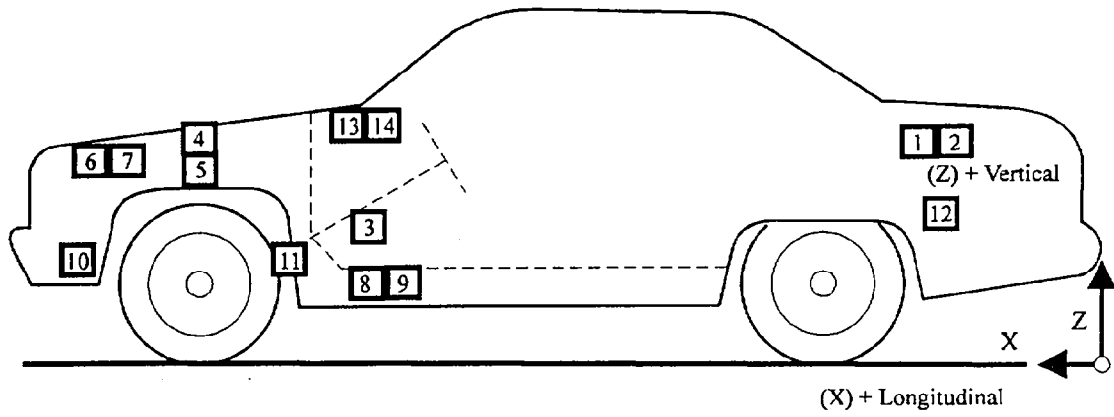
Figure 6 Vehicle Crush



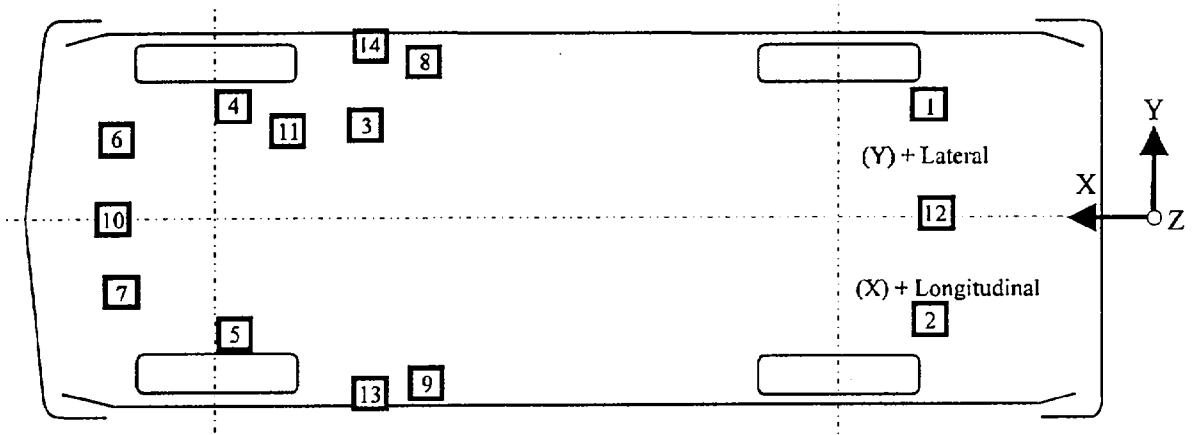
Notes: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.

	Pre-test	Post-test	Crush
L	1492 mm		
C1	4334 mm	3519 mm	815 mm
C2	4511 mm	3738 mm	773 mm
C3	4582 mm	4022 mm	560 mm
C4	4577 mm	4151 mm	426 mm
C5	4512 mm	4343 mm	169 mm
C6	4333 mm	4425 mm	-92 mm
CL	4582 mm	4071 mm	511 mm

Figure 7 Vehicle Accelerometer Mounting Locations



Side View



Bottom View

Table 10 Pre-Test Position of Vehicle Accelerometer Mounting Locations

Accelerometer Description	X, Y, Z Location ¹		
	X	Y	Z
Left rear compartment	1742 mm	385 mm	N/A
Right rear compartment	1742 mm	-384 mm	N/A
Brake pedal	3126 mm	290 mm	N/A
Left shock tower	3625 mm	564 mm	N/A
Right shock tower	3627 mm	-567 mm	N/A
Left engine	3776 mm	60 mm	N/A
Right engine	3795 mm	-252 mm	N/A
Left front frame rail	3318 mm	287 mm	N/A
Right front frame rail	3315 mm	-270 mm	N/A
Engine bottom	3820 mm	7 mm	N/A
Toe pan	3760 mm	289 mm	N/A
Rear compartment center	1704 mm	3 mm	N/A
Top hinge right A-pillar	3065 mm	-715 mm	N/A
Top hinge left A-pillar	3065 mm	715 mm	N/A

¹ Reference Point: X - vertical plane at rear bumper
Y - vehicle centerline
Z - ground

Table 11 Post-Test Position of Vehicle Accelerometer Mounting Locations

Accelerometer Description	X, Y, Z Location ¹		
	X	Y	Z
Left rear compartment	1552 mm	-384 mm	322 mm
Right rear compartment	1572 mm	-384 mm	425 mm
Brake pedal	2790 mm	330 mm	165 mm
Left shock tower	3045 mm	350 mm	885 mm
Right shock tower	3487 mm	710 mm	810 mm
Left engine	3420 mm	202 mm	771 mm
Right engine	3543 mm	530 mm	725 mm
Left front frame rail	3093 mm	220 mm	97 mm
Right front frame rail	3109 mm	470 mm	100 mm
Engine bottom	3555 mm	50 mm	210 mm
Toe pan	2930 mm	355 mm	195 mm
Rear compartment center	1696 mm	3 mm	475 mm
Top hinge right A-pillar	2952 mm	810 mm	795 mm
Top hinge left A-pillar	2759 mm	683 mm	715 mm

¹ Reference Point: X - vertical plane at rear bumper
Y - vehicle centerline
Z - ground

Table 12 Change In Position of Vehicle Accelerometer Mounting Locations

Accelerometer Description	X, Y, Z Location ¹		
	X	Y	Z
Left rear compartment	190 mm	1 mm	N/A
Right rear compartment	170 mm	0 mm	N/A
Brake pedal	336 mm	-40 mm	N/A
Left shock tower	540 mm	214 mm	N/A
Right shock tower	140 mm	-143 mm	N/A
Left engine	356 mm	-142 mm	N/A
Right engine	252 mm	278 mm	N/A
Left front frame rail	225 mm	67 mm	N/A
Right front frame rail	206 mm	-200 mm	N/A
Engine bottom	265 mm	-43 mm	N/A
Toepan	830 mm	-66 mm	N/A
Rear compartment center	8 mm	0 mm	N/A
Top hinge right A-pillar	113 mm	-95 mm	N/A
Top hinge left A-pillar	306 mm	32 mm	N/A

¹ Reference Point: X - vertical plane at rear bumper
Y - vehicle centerline
Z - ground

Table 13 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 970214 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR COMPARTMENT LONGITUDINAL LATERAL	1742 mm	385 mm	NA	1.0 g @ 135.6 ms 1.4 g @ 1.8 ms	37.1 g @ 45.4 ms 16.6 g @ 42.6 ms
2 RIGHT REAR COMPARTMENT LONGITUDINAL LATERAL	1742 mm	-384 mm	NA	1.0 g @ 168.0 ms 2.4 g @ 11.4 ms	37.5 g @ 47.0 ms 18.1 g @ 51.3 ms
3 BRAKE PEDAL LONGITUDINAL LATERAL ¹ VERTICAL RESULTANT ¹	3126 mm	290 mm	NA	94.0 g @ 55.2 ms ----- @ ----- 145.2 g @ 50.4 ms ----- @ -----	226.8 g @ 43.3 ms ----- @ ----- 85.4 g @ 84.7 ms
4 LEFT SHOCK TOWER LONGITUDINAL ¹ VERTICAL ¹	3625 mm	564 mm	NA	----- @ ----- ----- @ -----	113.6 g @ 35.8 ms ----- @ -----
5 RIGHT SHOCK TOWER LONGITUDINAL LATERAL	3627 mm	-567 mm	NA	9.4 g @ 10.2 ms 99.9 g @ 46.6 ms	84.3 g @ 50.7 ms 22.5 g @ 57.4 ms
6 ENGINE LEFT LONGITUDINAL	3776 mm	60 mm	NA	39.5 g @ 51.9 ms	97.7 g @ 36.0 ms

Table 13 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 970214				POSITIVE		NEGATIVE	
No. LOCATION	X	Y	Z	DIRECTION		DIRECTION	
7 ENGINE RIGHT LONGITUDINAL	3795 mm	-252 mm	NA	20.8 g	@ 63.8 ms	82.5 g	@ 29.5 ms
8 LEFT FRONT FRAME RAIL LONGITUDINAL	3318 mm	287 mm	NA	23.6 g	@ 23.7 ms	90.2 g	@ 37.8 ms
LATERAL				15.1 g	@ 58.7 ms	60.3 g	@ 35.4 ms
VERTICAL				47.3 g	@ 56.2 ms	101.0 g	@ 23.8 ms
RESULTANT				103.7 g	@ 23.8 ms		
9 RIGHT FRONT FRAME RAIL LONGITUDINAL	3315 mm	-270 mm	NA	9.6 g	@ 76.4 ms	91.2 g	@ 37.6 ms
LATERAL				16.7 g	@ 59.3 ms	60.3 g	@ 34.4 ms
VERTICAL				24.7 g	@ 54.1 ms	52.8 g	@ 38.8 ms
RESULTANT				105.9 g	@ 37.8 ms		
10 ENGINE BOTTOM LONGITUDINAL	3820 mm	7 mm	NA	16.7 g	@ 56.8 ms	77.6 g	@ 25.6 ms
LATERAL				29.5 g	@ 46.6 ms	55.8 g	@ 38.7 ms
11 TOE PAN LONGITUDINAL	3760 mm	289 mm	NA	53.8 g	@ 56.2 ms	124.0 g	@ 39.0 ms
LATERAL				23.1 g	@ 58.7 ms	104.2 g	@ 39.4 ms
VERTICAL				48.2 g	@ 59.0 ms	87.8 g	@ 37.8 ms
RESULTANT				175.0 g	@ 38.6 ms		

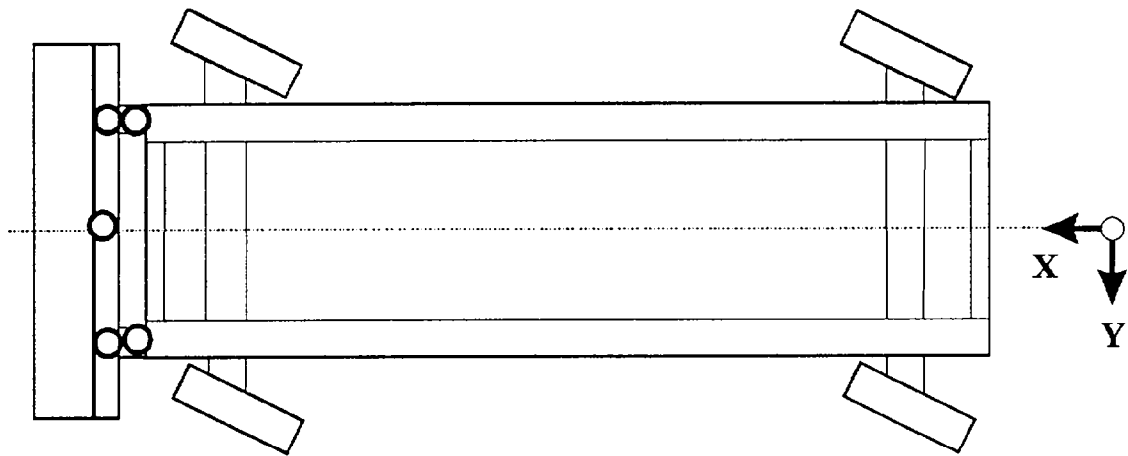
Table 13 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 970214 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
12 REAR COMPARTMENT CENTER LONGITUDINAL VERTICAL	1704 mm	3 mm	NA	0.9 g @ 179.2 ms 7.6 g @ 61.8 ms	37.5 g @ 48.3 ms 10.6 g @ 39.4 ms
13 TOP HINGE ON A-PILLAR RIGHT LONGITUDINAL	3065 mm	-715 mm	NA	14.8 g @ 239.6 ms	47.5 g @ 48.5 ms
14 TOP HINGE ON A-PILLAR LEFT LONGITUDINAL	3065 mm	715 mm	NA	66.4 g @ 87.8 ms	83.6 g @ 52.0 ms

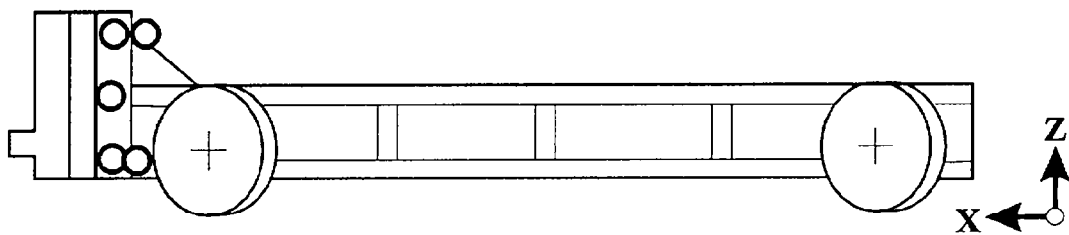
REFERENCE: X: + FORWARD ACCELERATION
Y: + LEFT FROM VEHICLE CENTERLINE
Z: + UP FROM GROUND LEVEL

¹See DATA ACQUISITION EXPLANATIONS

Figure 8 Moving Deformable Barrier Load Cell Placement



Top View



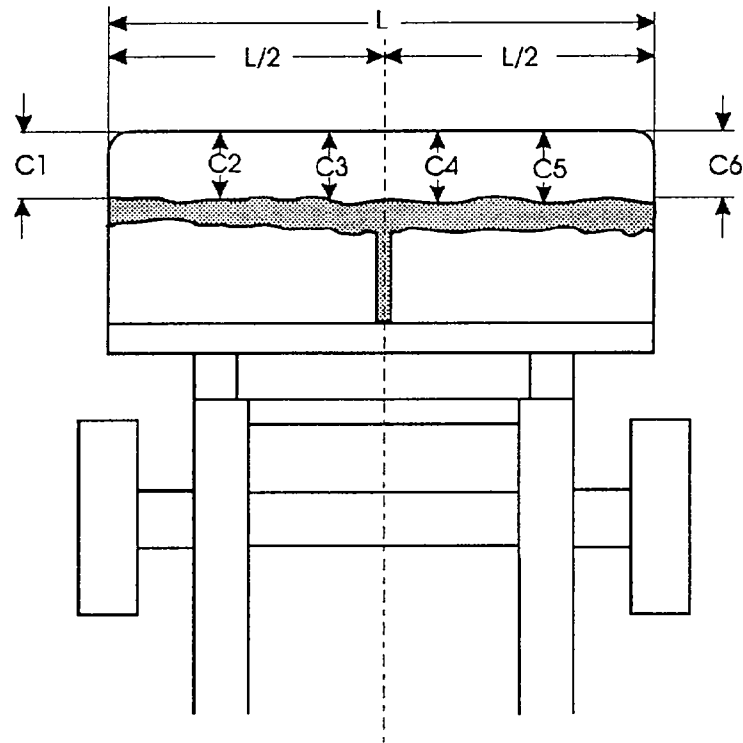
Side View

Table 14 Moving Deformable Barrier Load Cell Placement and Data Summary

TEST NUMBER: 970214							
No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 MOVING DEFORMABLE	NA	NA	NA				
BARRIER FORCE				62.2 kN	@ 52.6 ms	36.3 kN	@ 181.1 ms
LEFT UPPER				102.7 kN	@ 50.2 ms	2.1 kN	@ 28.3 ms
RIGHT UPPER				-----	@ -----	152.1 kN	@ 43.8 ms
CENTER ¹				48.4 kN	@ 177.7 ms	223.4 kN	@ 37.3 ms
LEFT LOWER				8.6 kN	@ 1.2 ms	129.9 kN	@ 49.8 ms
RIGHT LOWER							

¹ NO POSITIVE VALUE IN TIME FRAME OF INTEREST

Figure 9 Moving Deformable Barrier Face Crush



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

	Pre-test	Post-test ¹	Crush
L	1676 mm		
C1	396 mm	N/A	N/A
C2	377 mm	N/A	N/A
C3	376 mm	N/A	N/A
C4	382 mm	N/A	N/A
C5	376 mm	N/A	N/A
C6	395 mm	N/A	N/A
CL	378 mm	N/A	N/A

¹ Post-Test damage was too severe to measure.

Table 15 Moving Deformable Barrier Face Static Crush

Location	Height	Pre-test Profile (distance in millimeters from reference plane ¹)										
		24	28	32	24	20	16	12	8	4	0	4
Top of face	813	482	483	485	483	483	480	480	477	483	481	485
	559	480	483	485	480	482	480	482	480	482	47	482
	432	377	380	396	378	378	377	380	376	379	378	382
Pre-test profile (distance in millimeters from reference plane ²)												
Top of face	813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	559	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Post-test profile ² (distance in millimeters from reference plane)												
Top of face	813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	559	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Static crush												
Top of face	813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	559	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

¹ Reference plane is 914 mm forward of the rear surface of the deformable barrier face.

² Post-test damage was too severe to measure

All measurements are in millimeters

Figure 10 Dummy Measurement Locations for Front Seat Occupants

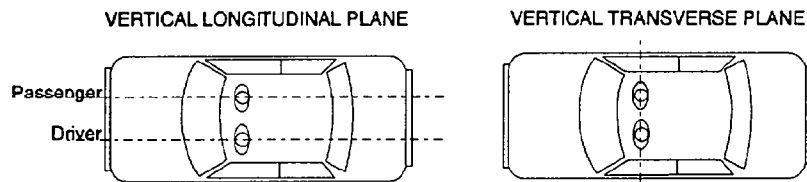
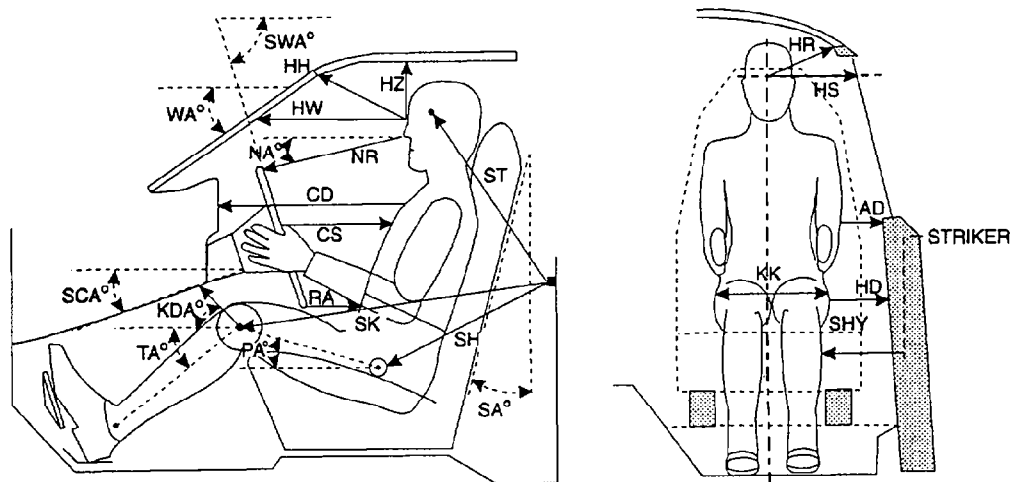
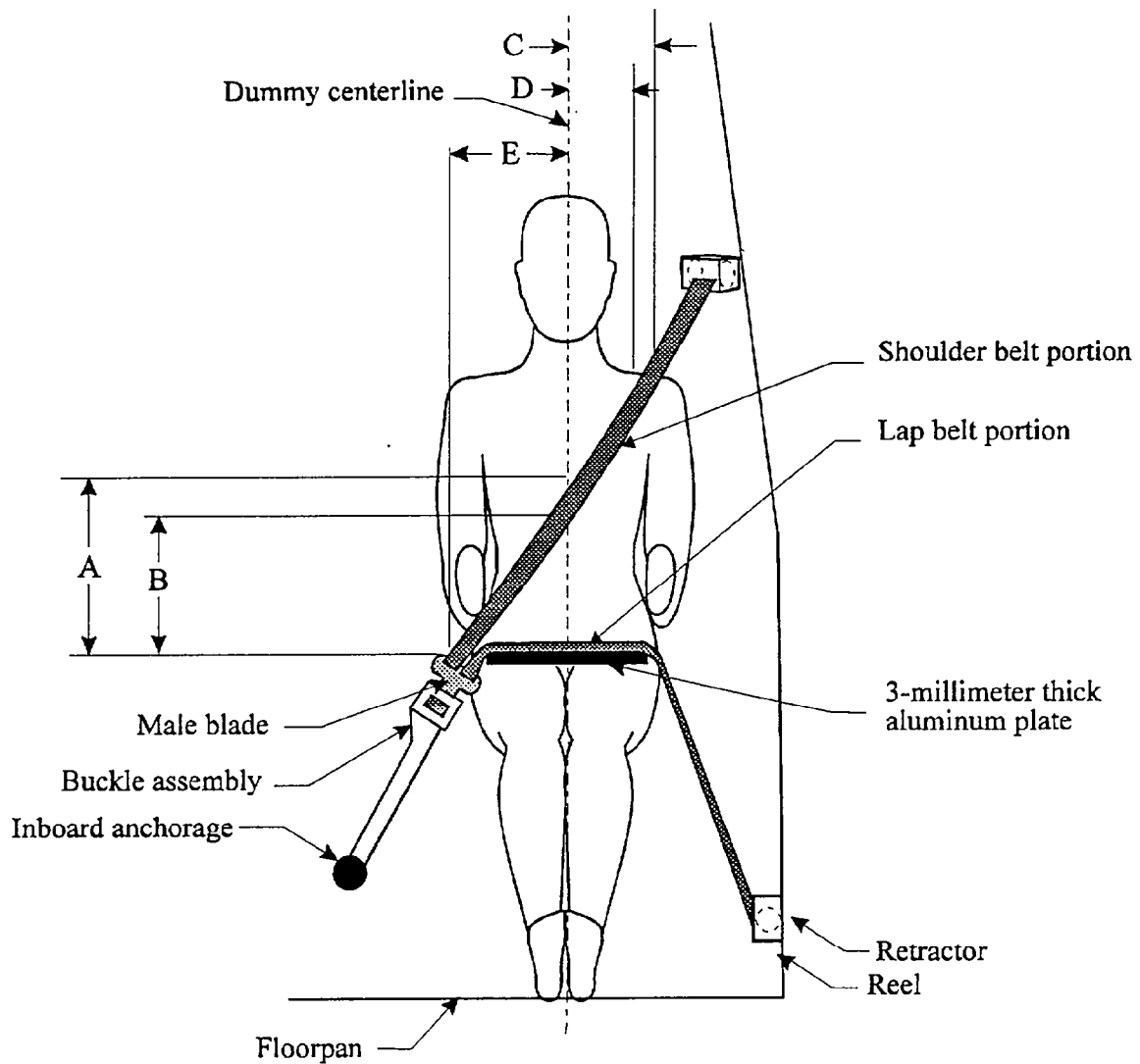


Table 16 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #134)	Passenger (Serial #177)
WA	Windshield angle	28°	28°
SWA	Steering wheel angle	70°	NA
SCA	Steering column angle	20°	NA
SA	Seat back angle	25°	25°
HZ	Head to roof	176 mm	170 mm
HH	Head to header	281 mm	297 mm
HW	Head to windshield	499 mm	535 mm
HR	Head to side header	173 mm	183 mm
NR	Nose to rim	356 mm	NA
NA	Nose to rim angle	6°	NA
CD	Chest to dash	497 mm	473 mm
CS	Steering wheel to chest	304 mm	NA
RA	Rim to abdomen	200 mm	NA
KDL	Left knee to dash	164 mm	137 mm
KDR	Right knee to dash	154 mm	149 mm
KDA	Outboard knee to dash angle	31°	25°
PA	Pelvic angle	25°	24°
TA	Tibial angle	38°	37°
KK	Knee to knee	320 mm	260 mm
ST ¹	Striker to head	542 mm	536 mm
	Striker to head angle	-80°	-83°
SK ¹	Striker to knee	542 mm	581 mm
	Striker to knee angle	4°	1°
SH ¹	Striker to H-point	233 mm	214 mm
	Striker to H-point angle	32°	32°
SHY	Striker to H-point (Y dir.)	230 mm	262 mm
HS	Head to side window	295 mm	293 mm
HD	H-point to door	143 mm	126 mm
AD	Arm to door	116 mm	131 mm

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

Figure 11 Seat Belt Positioning Data



		Driver	Passenger
A	Top surface of aluminum plate to belt upper edge	353 mm	306 mm
B	Top surface of aluminum plate to belt lower edge	285 mm	230 mm
C	Dummy centerline to outer edge of belt at chest flesh top	97 mm	110 mm
D	Dummy centerline to inner edge of belt at chest flesh top	37 mm	85 mm
E	Dummy centerline to intersection of upper torso belt and lap belt	N/A	N/A

Figure 12 Camera Positions

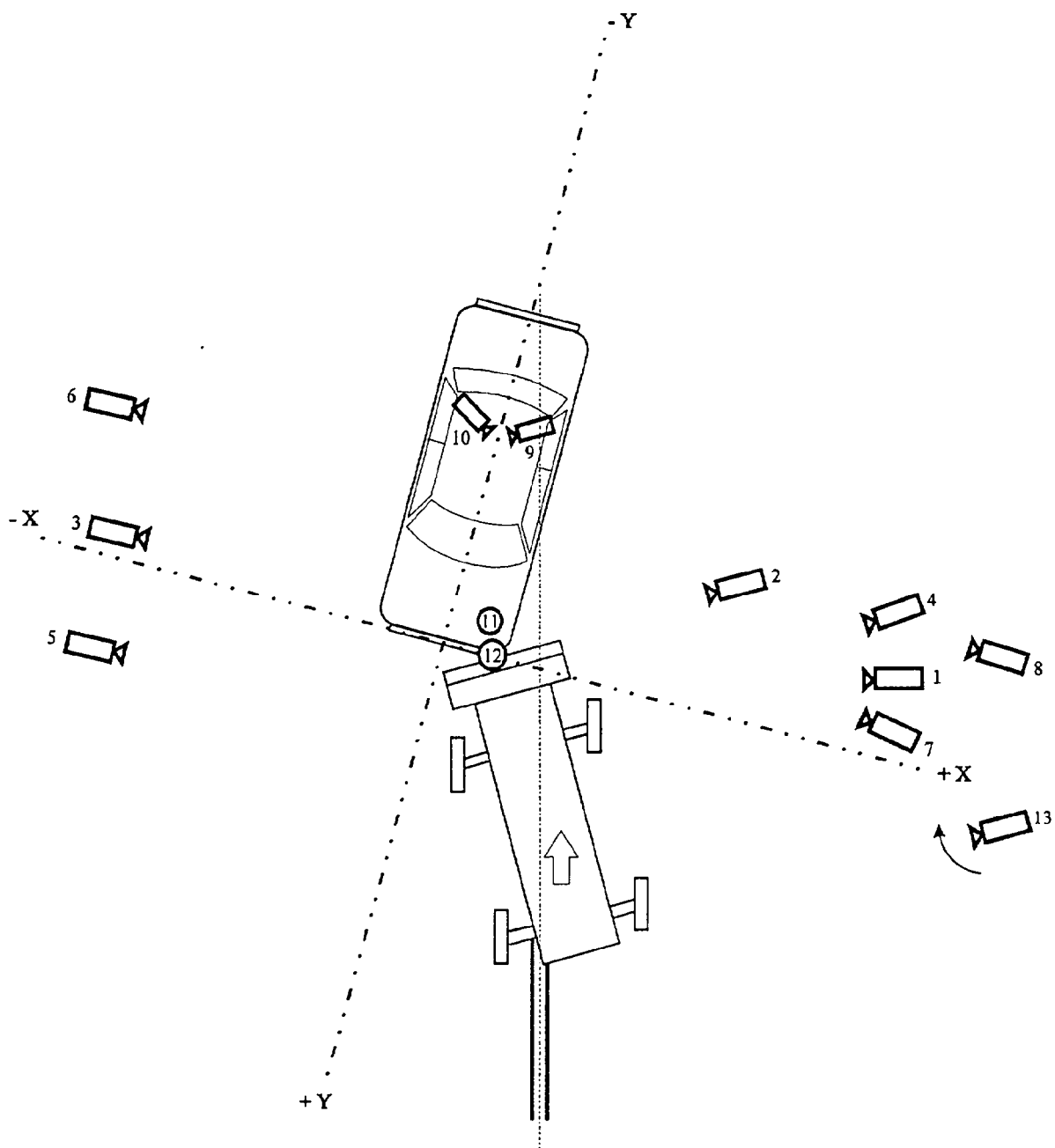


Table 17 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1996/Chevrolet/Cavalier/passenger car

Test number: 970214

Camera Number	View	Camera Positions ¹			Angle of Inclination ²	Angle of Rotation ³	Camera Lens	Film Speed
		X	Y	Z				
1	Overall right wide	7341	-2489	1321	NA	NA	13 mm	N/A ⁴
2	Impact point	2896	-3632	1118	NA	NA	25 mm	N/A ⁴
3	Left side impact point	-7925	-279	1295	NA	NA	25 mm	970 frames/s
4	Moving barrier - right side	7239	-4470	1245	NA	NA	25 mm	850 frames/s
5	Moving barrier - left side	-6528	3912	1067	NA	NA	25 mm	970 frames/s
6	Car - passenger side	-9296	-2210	1245	NA	NA	25 mm	1008 frames/s
7	Car - driver side	8560	-813	1295	NA	NA	25 mm	335 frames/s
8	Driver and Int. view - right side	9423	-2159	1867	NA	NA	50 mm	295 frames/s
9	Onboard passenger D-ring	NA	NA	NA	NA	NA	8 mm	860 frames/s
10	Onboard driver D-ring	NA	NA	NA	NA	NA	8 mm	952 frames/s
11	Overhead - overall wide	940	-500	9805	NA	NA	13 mm	980 frames/s
12	Overhead - tight	940	-300	9805	NA	NA	25 mm	980 frames/s
13	Real-time panning	NA	NA	NA	NA	NA	N/A	24 frames/s

¹ +X: Leftward from longitudinal centerline of vehicle

+Y: Forward from front bumper

+Z: Upward from ground level

² +Angle of Inclination: Camera lens (upward from horizontal)

³ +Angle of Rotation: Camera lens toward barrier from line perpendicular to monorail centerline

⁴ Camera ran too slow to use.

Appendix A

Photographs

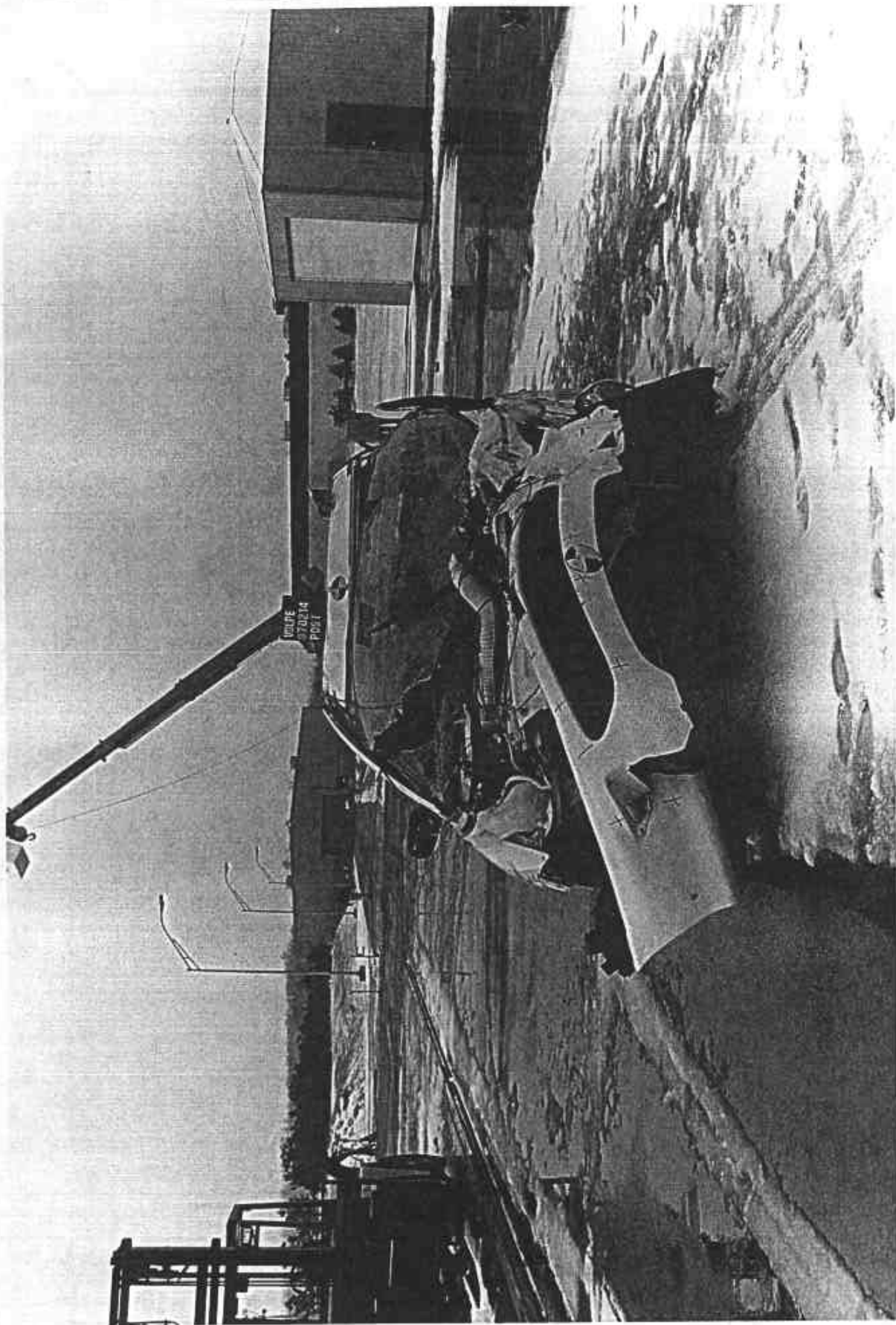


Figure A-1 Post-Test Front View



Figure A-2 Pre-Test Left Front Three-Quarter View



Figure A-3 Post-Test Left Front Three-Quarter View



Figure A-4 Pre-Test Left Side View

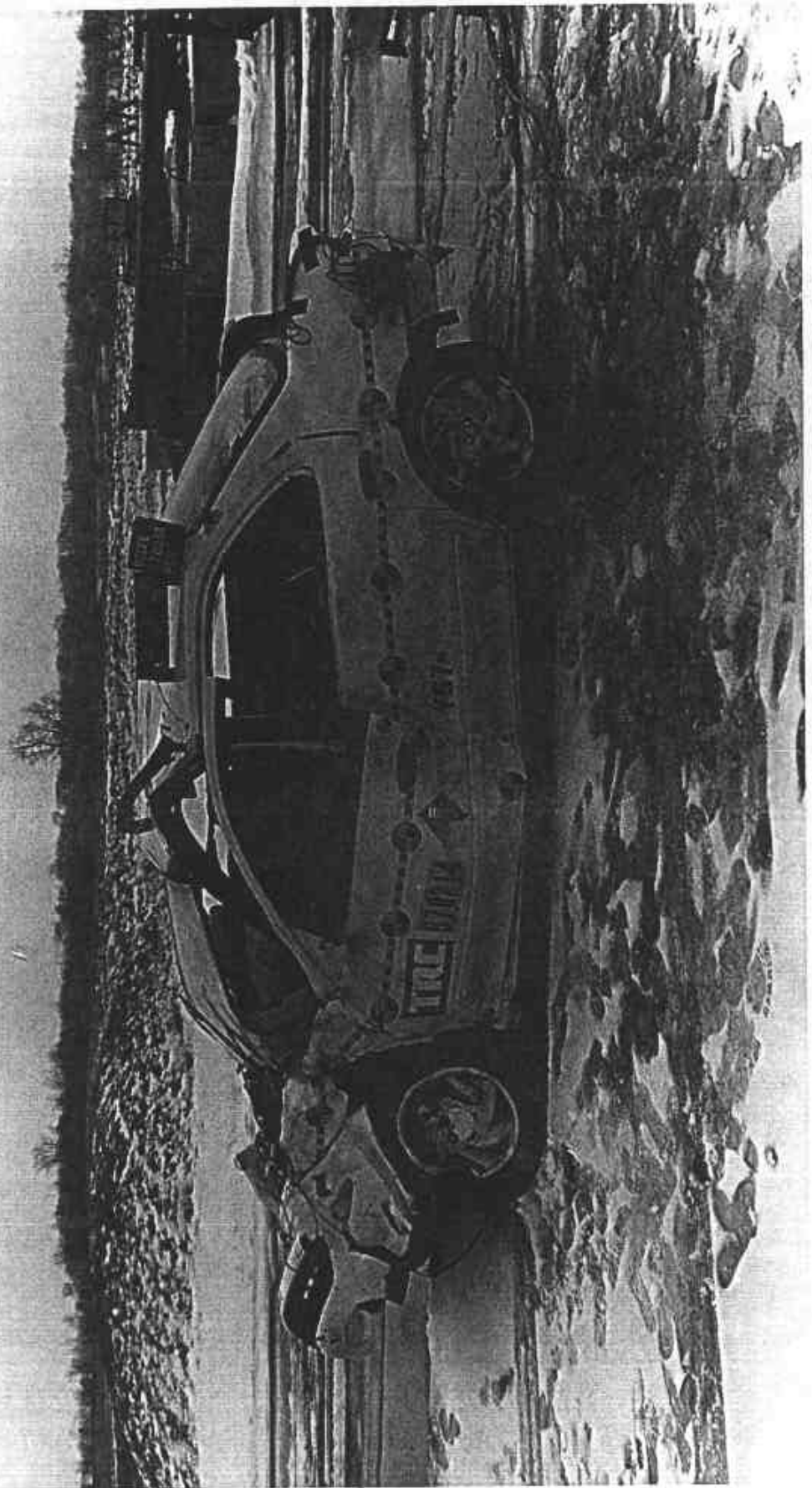


Figure A-5 Post-Test Left Side View

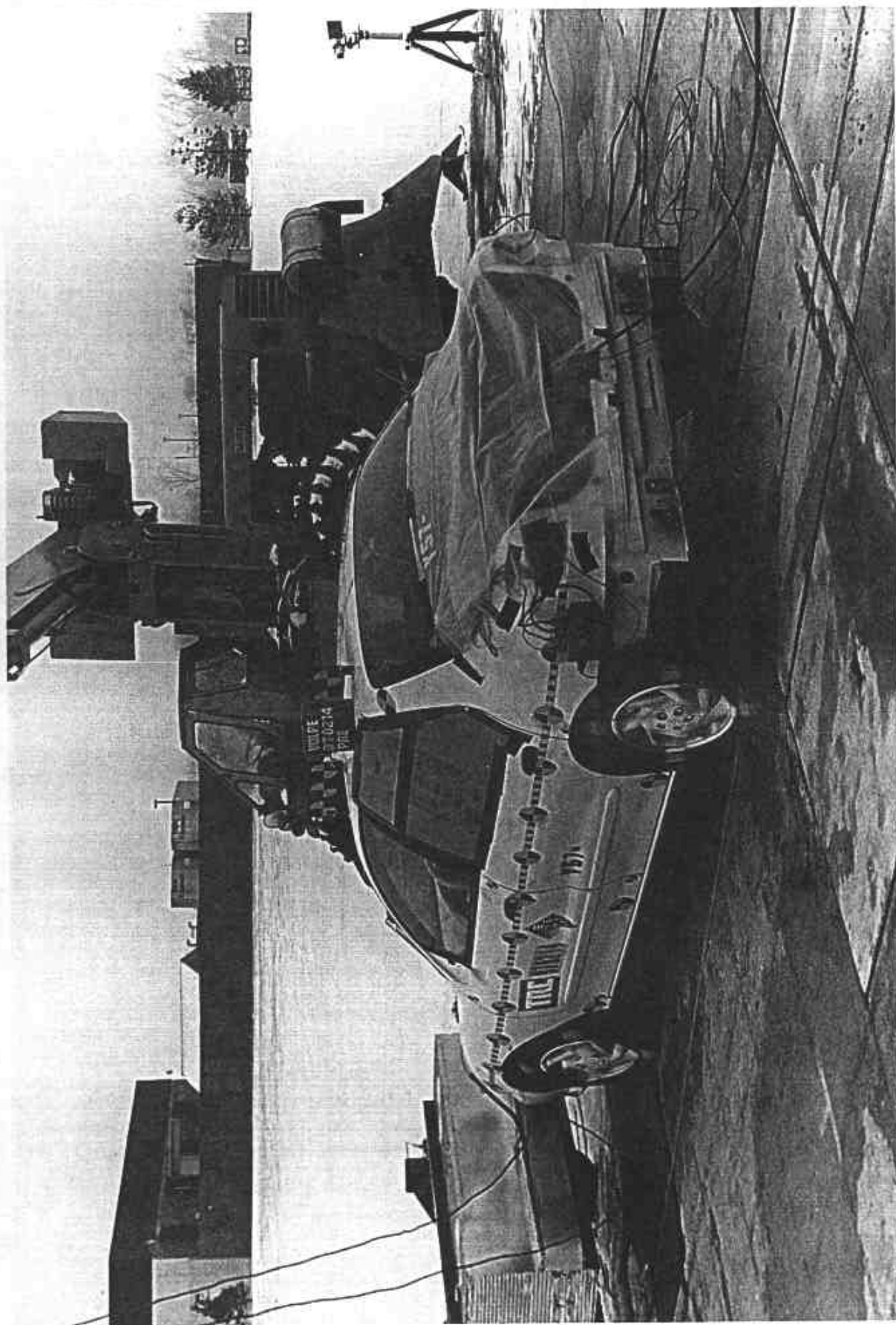


Figure A-6 Pre-Test Left Rear Three-Quarter View



Figure A-7 Post-Test Left Rear Three-Quarter View

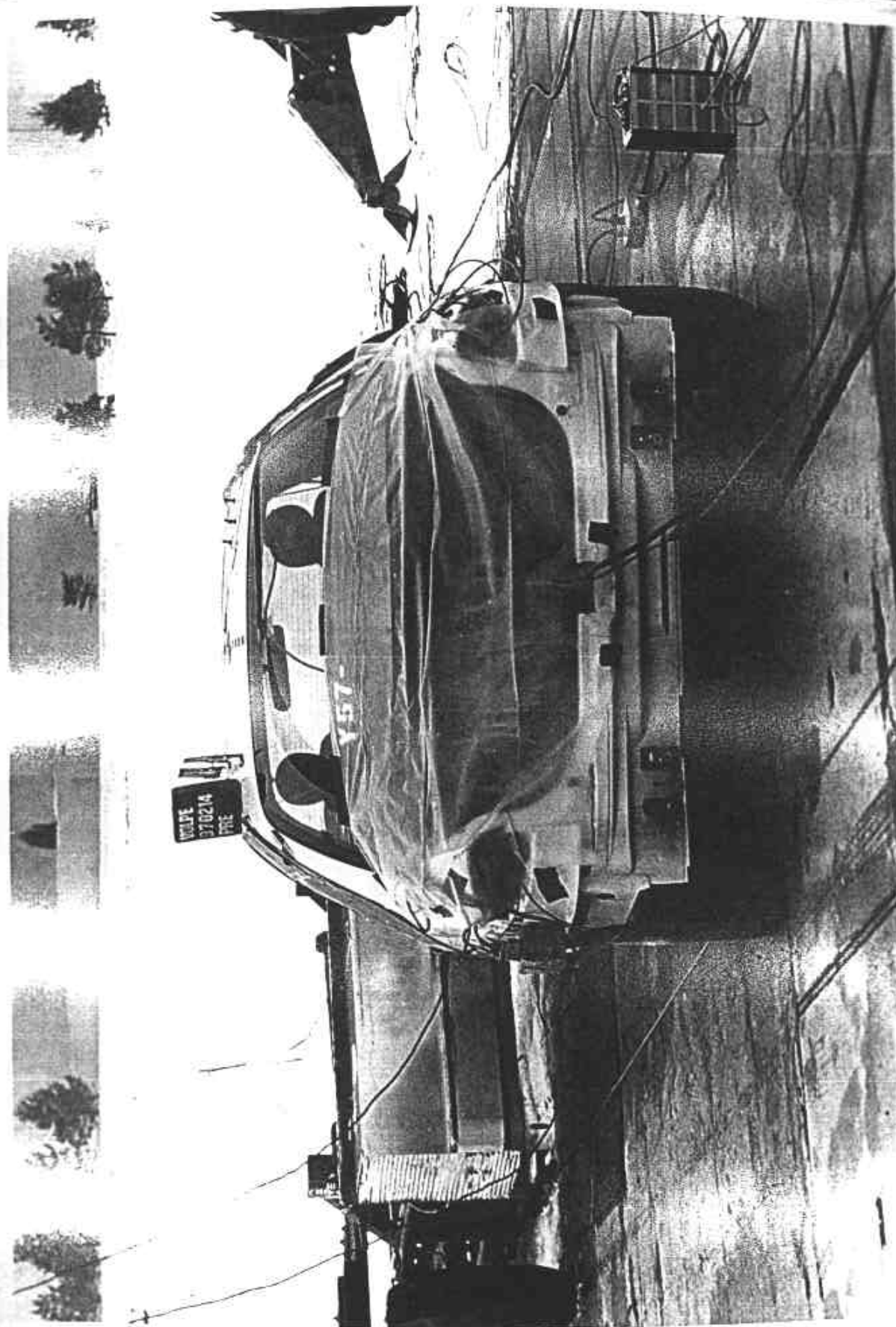


Figure A-8 Pre-Test Rear View



Figure A-9 Post-Test Rear View



Figure A-10 Pre-Test Right Rear Three-Quarter View

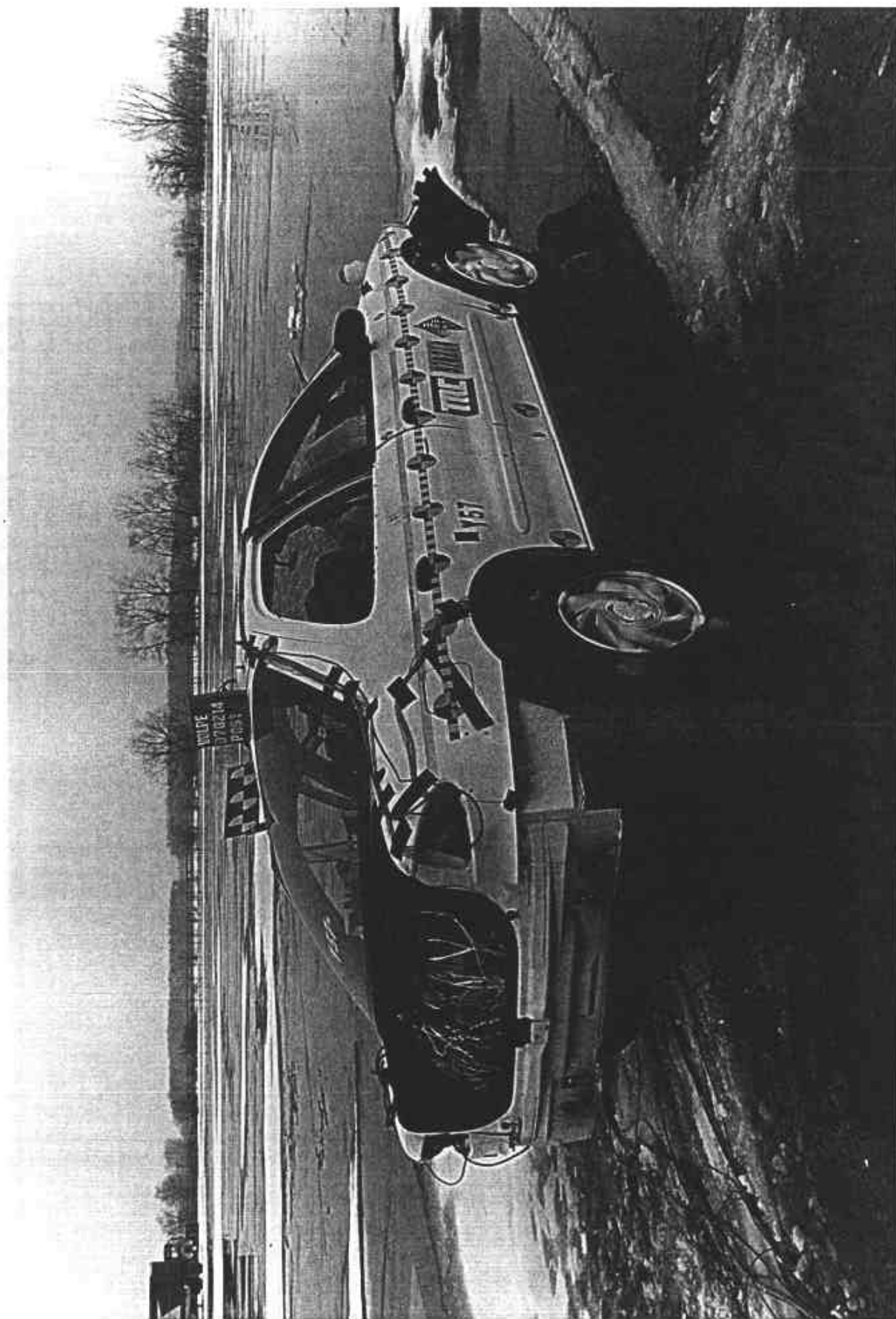


Figure A-11 Post-Test Right Rear Three-Quarter View

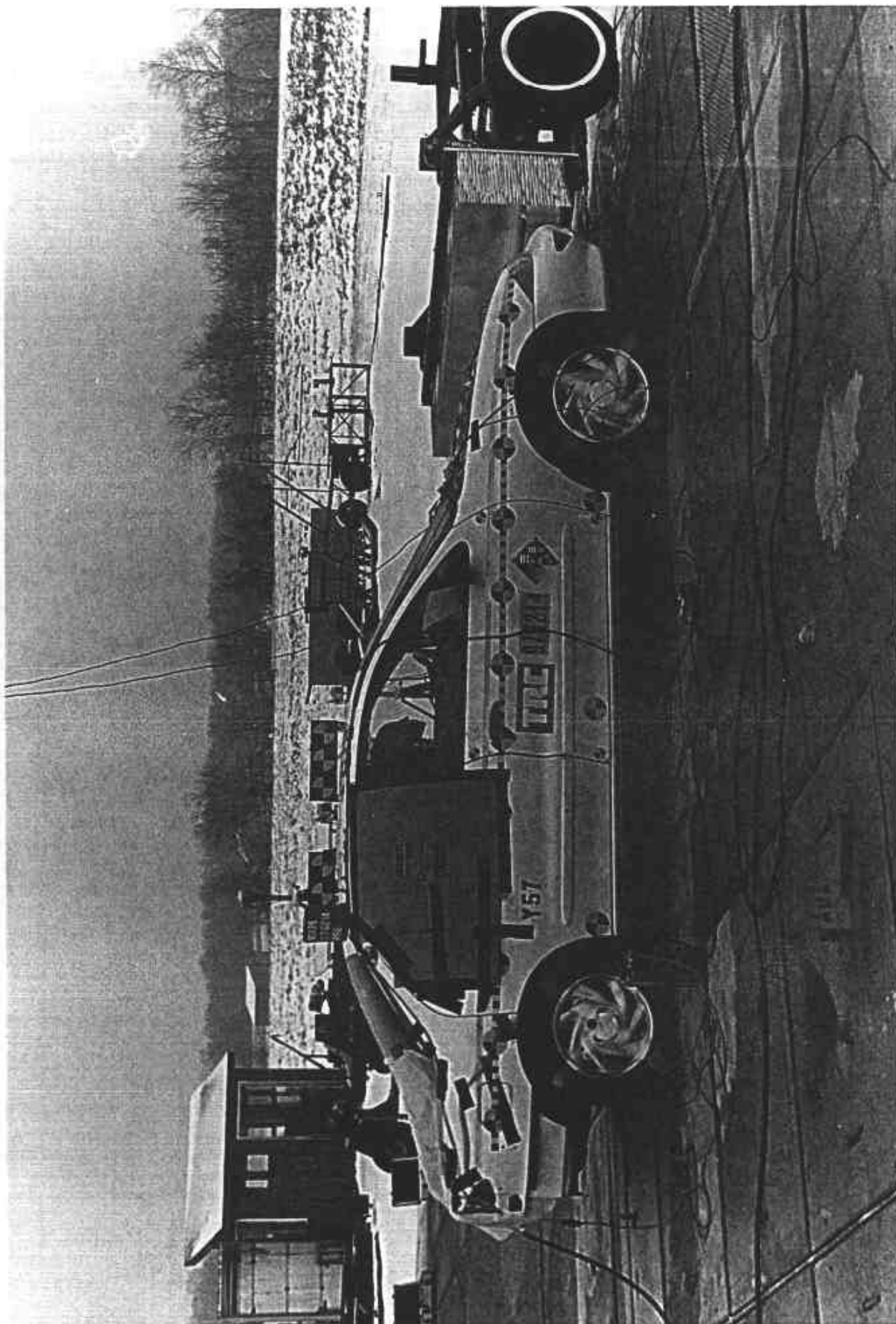


Figure A-12 Pre-Test Right Side View

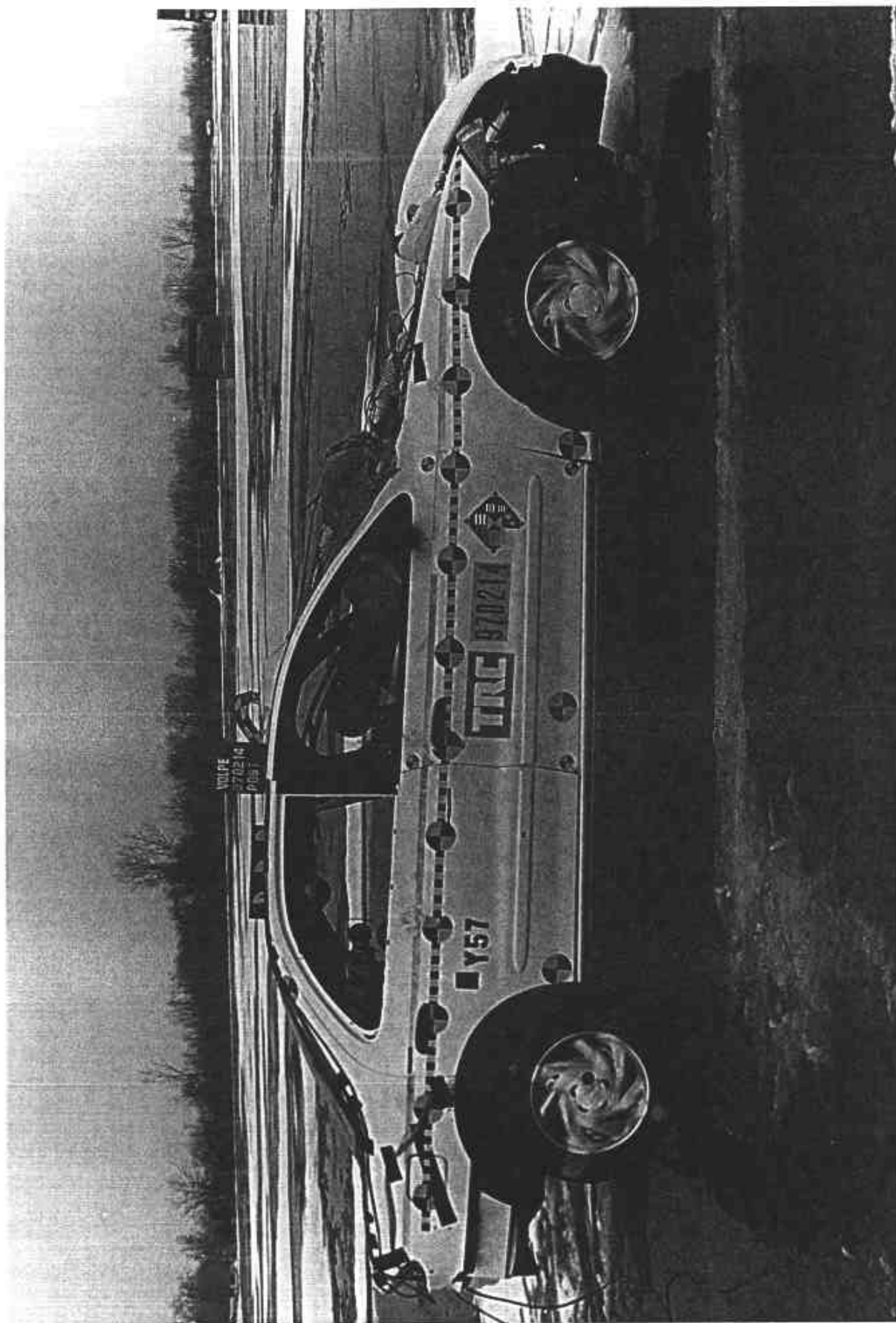


Figure A-13 Post-Test Right Side View



Figure A-14 Pre-Test Right Front Three-Quarter View

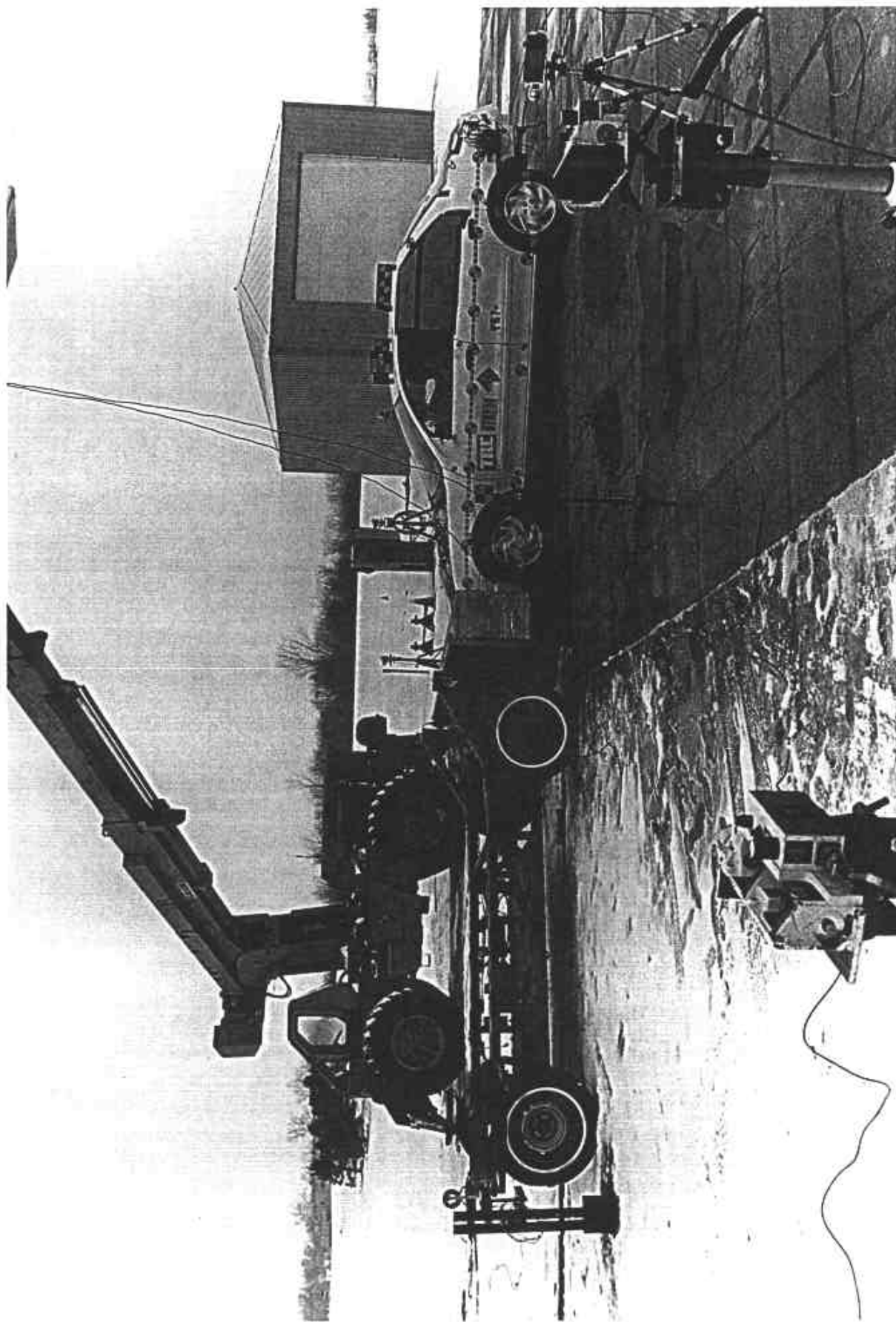


Figure A-15 Pre-Test Vehicle and Barrier - View 1

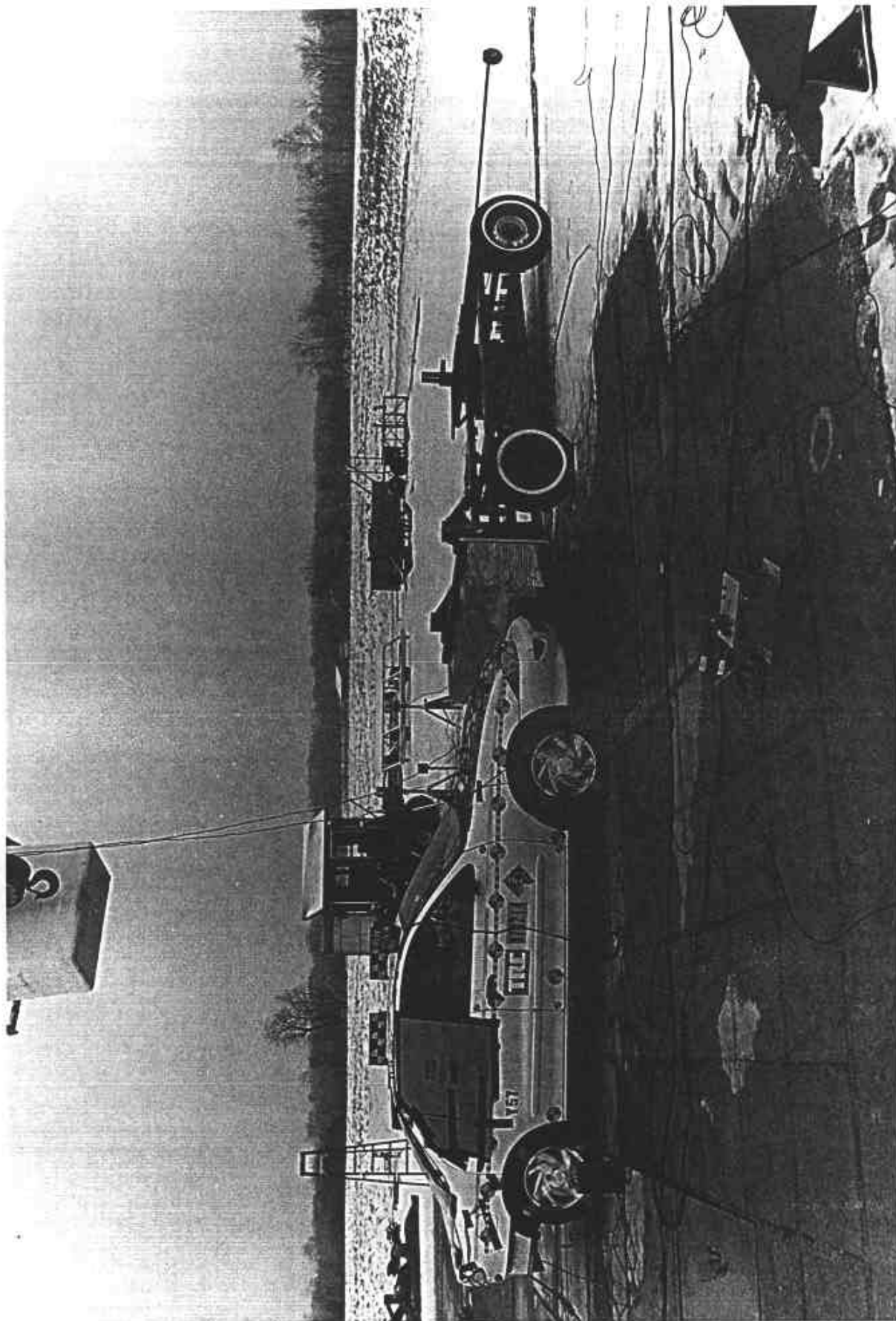


Figure A-16 Pre-Test Vehicle and Barrier - View 2

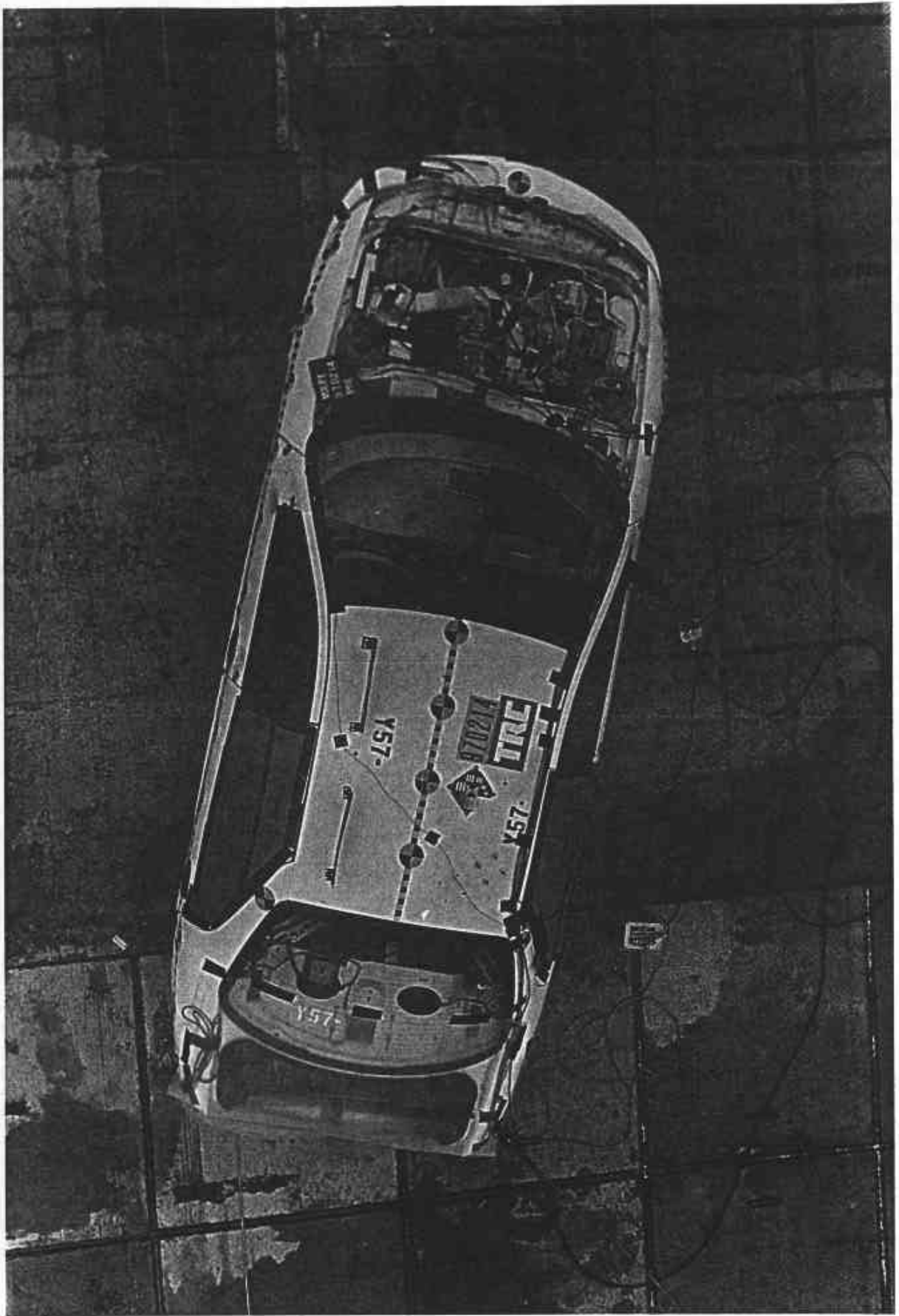


Figure A-17 Pre-Test Overhead - View 1

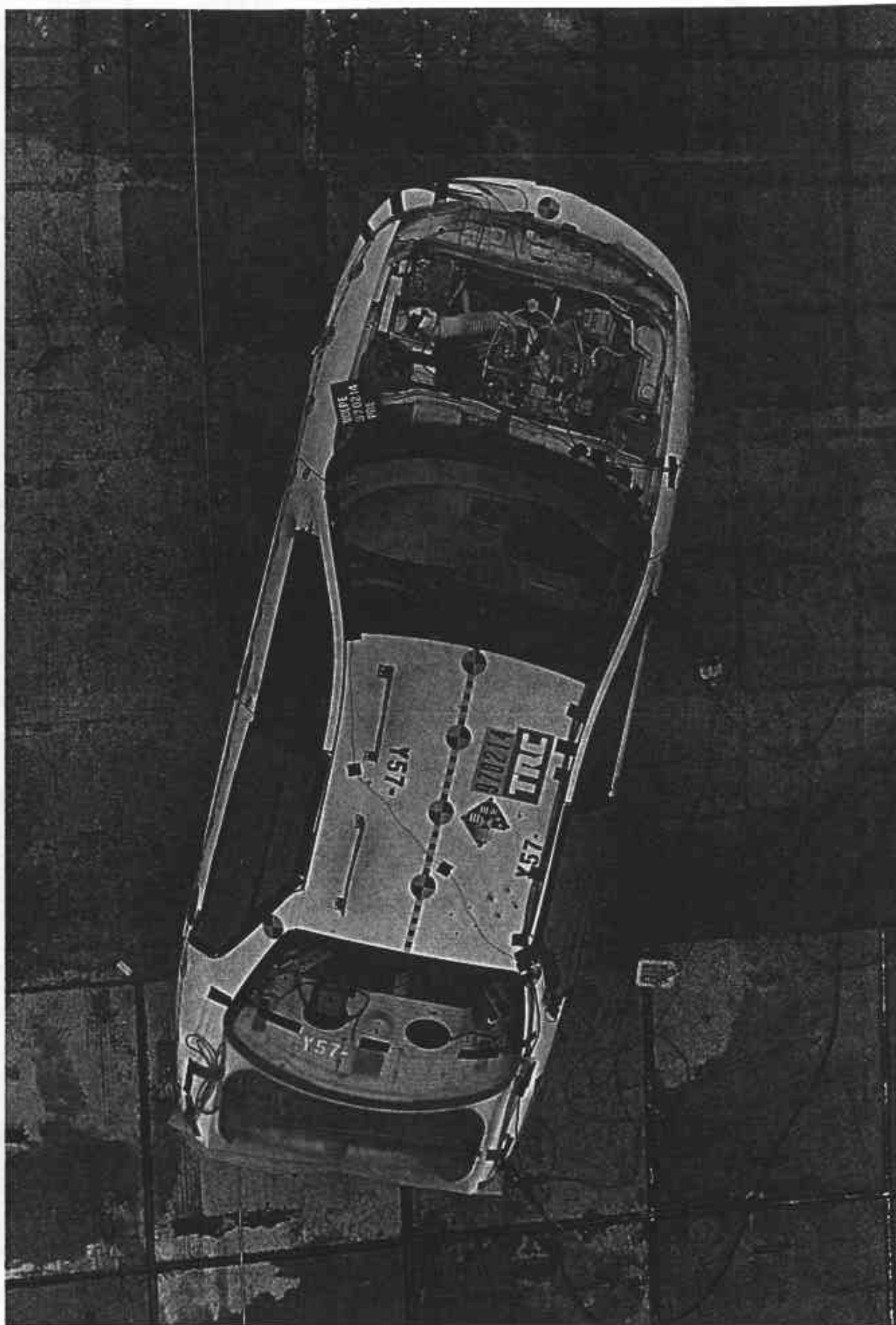


Figure A-18 Pre-Test Overhead - View 2

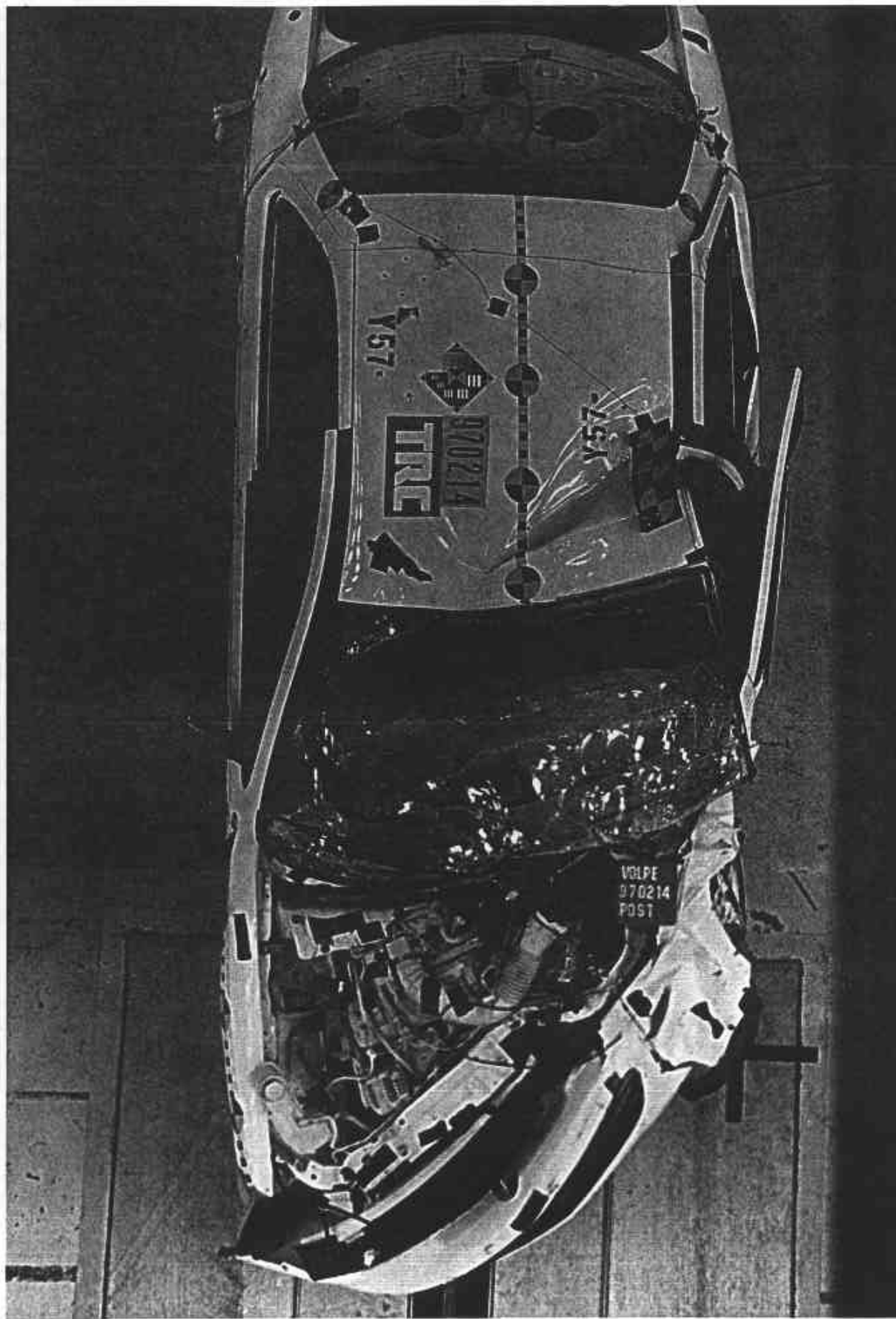


Figure A-19 Post-Test Overhead View



Figure A-20 Pre-Test Fuel Filler Cap View

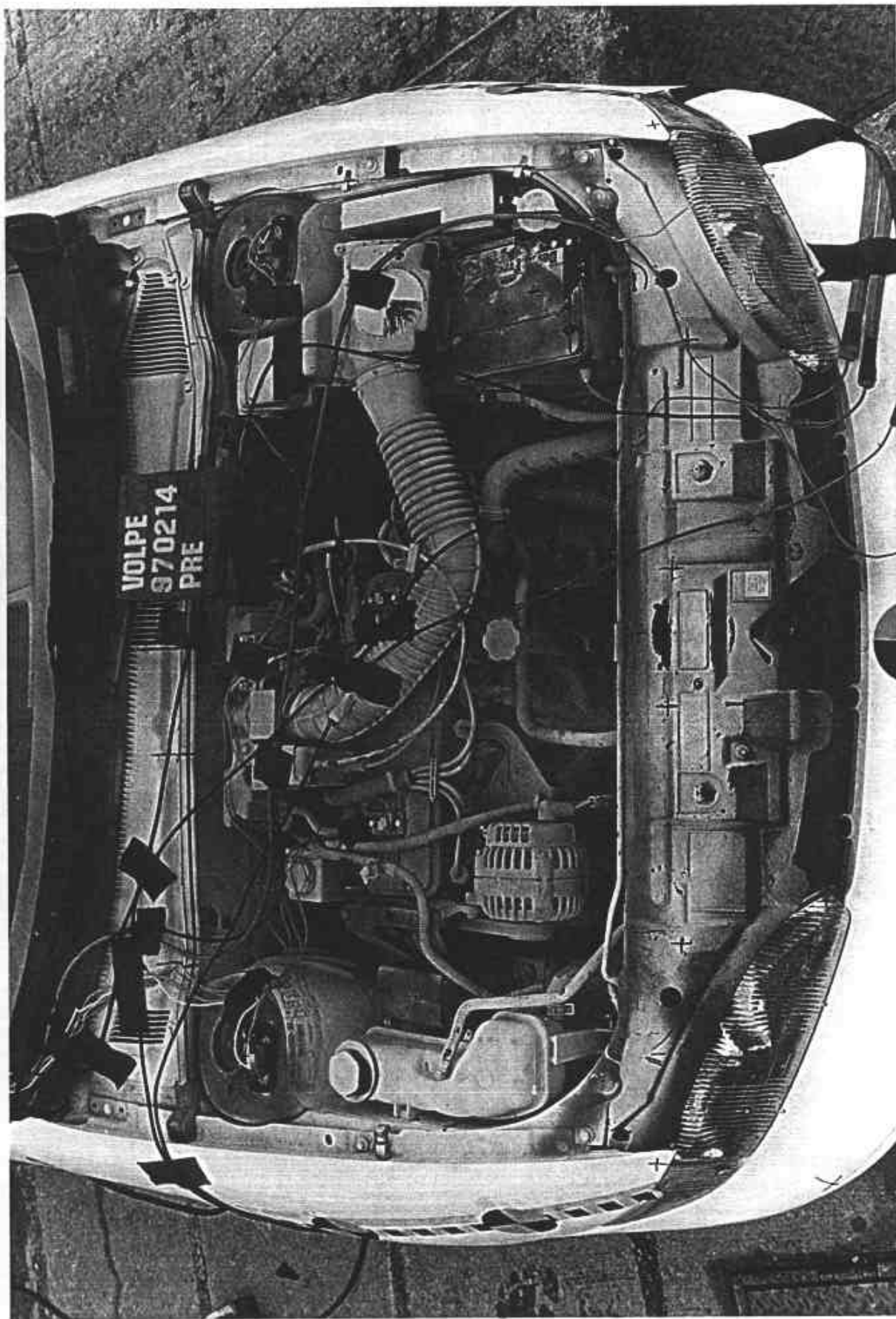


Figure A-21 Pre-Test Engine Compartment View

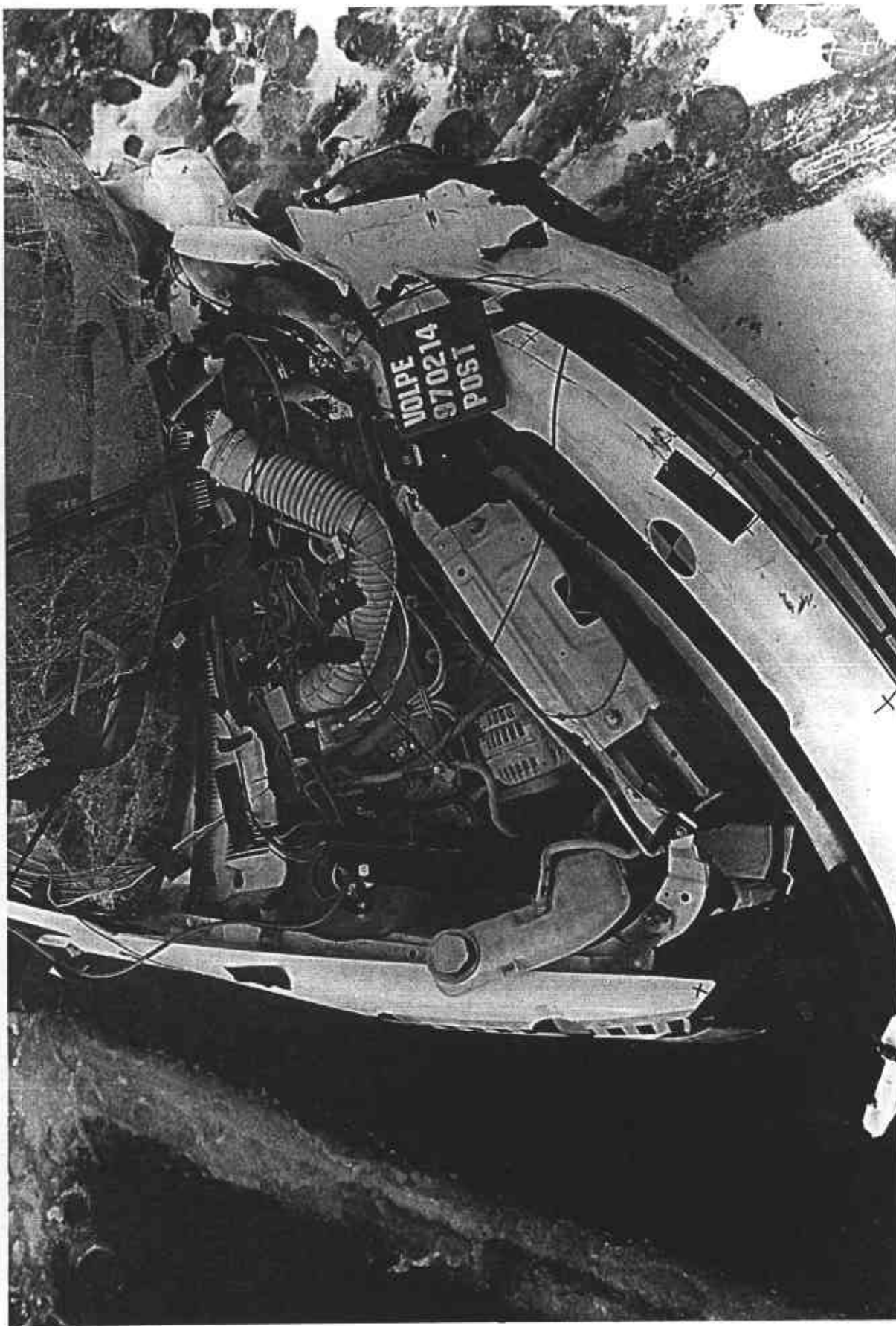


Figure A-22 Post-Test Engine Compartment View

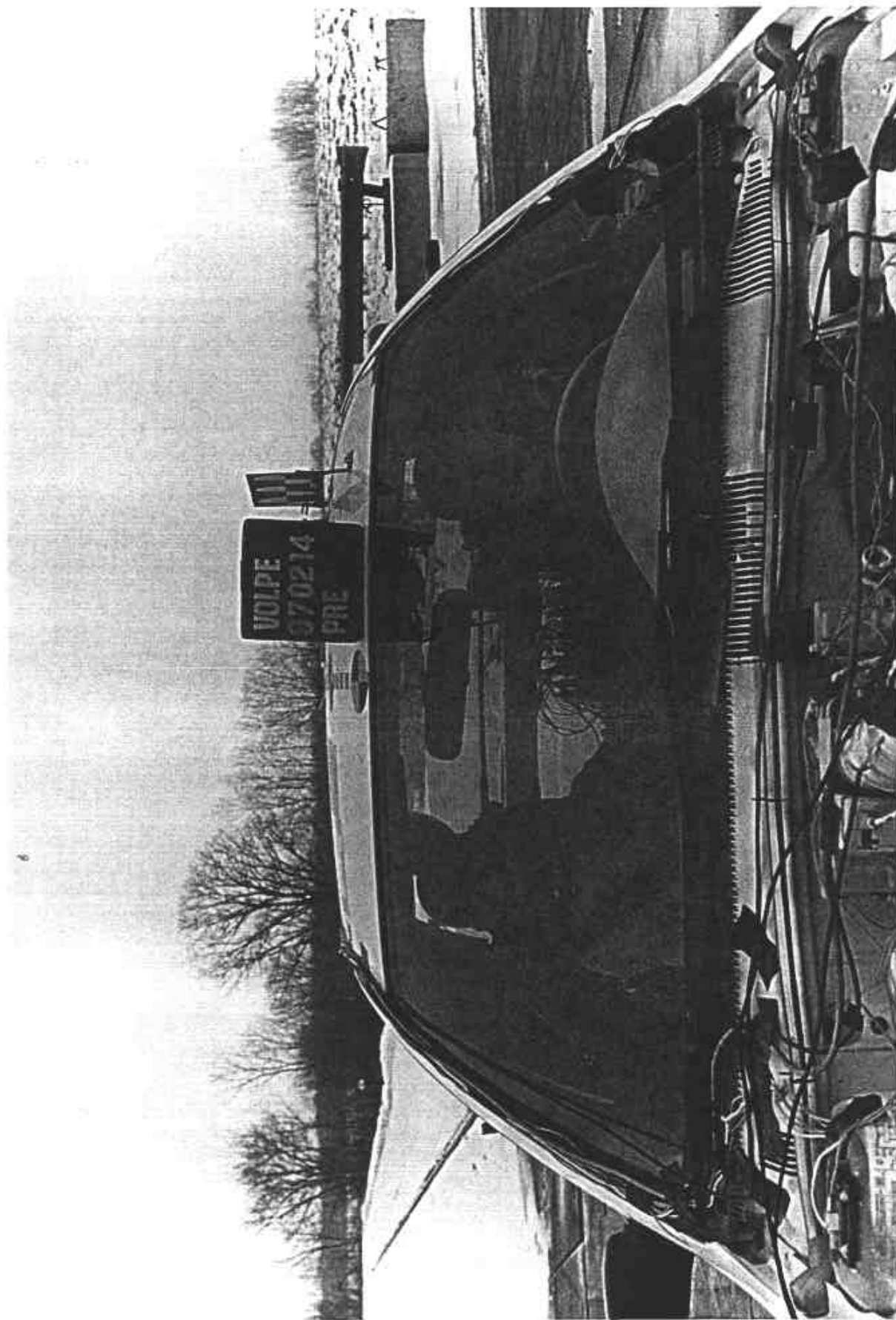


Figure A-23 Pre-Test Windshield View

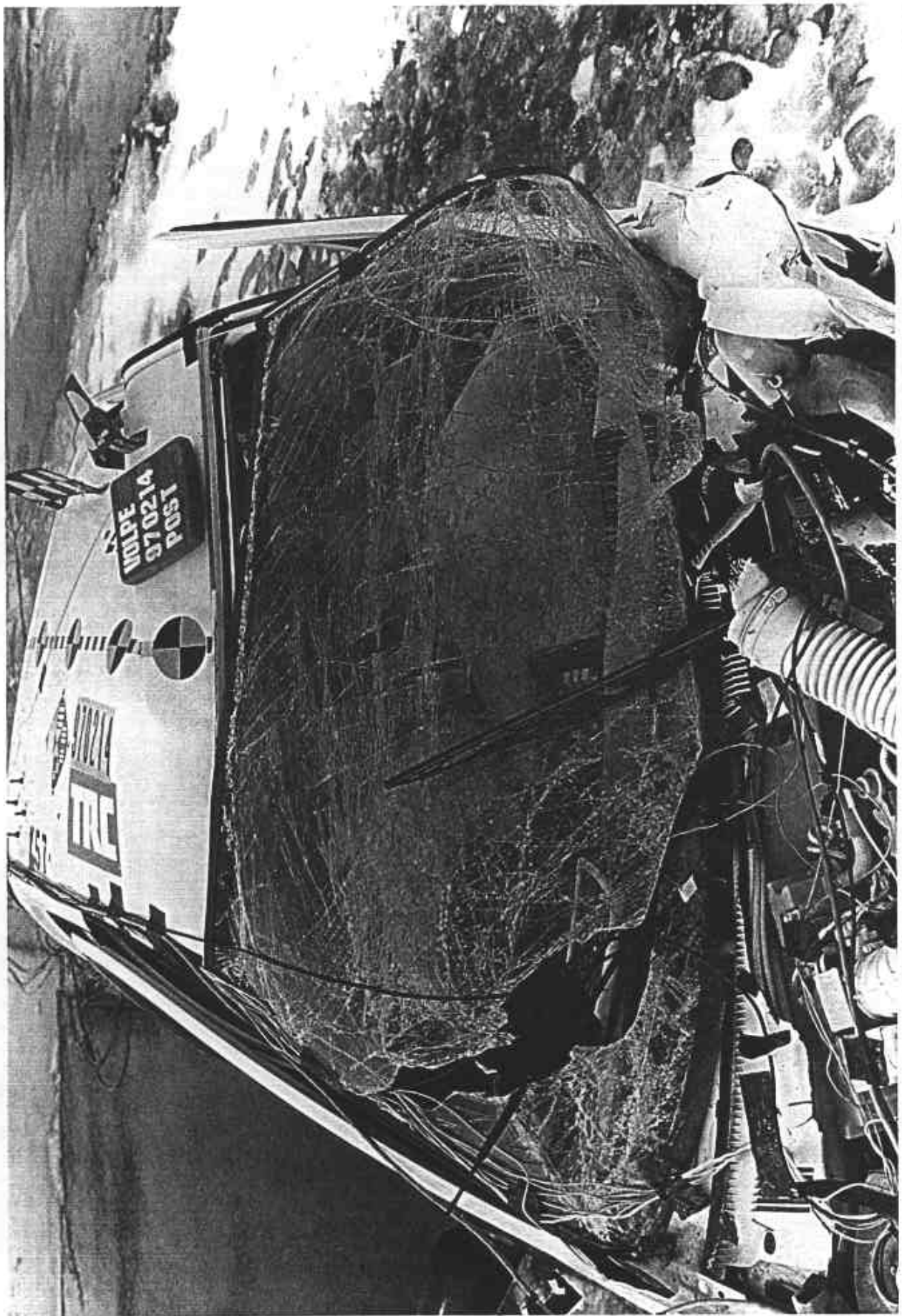


Figure A-24 Post-Test Windshield View



Figure A-25 Post-Test Front Underbody - View 1

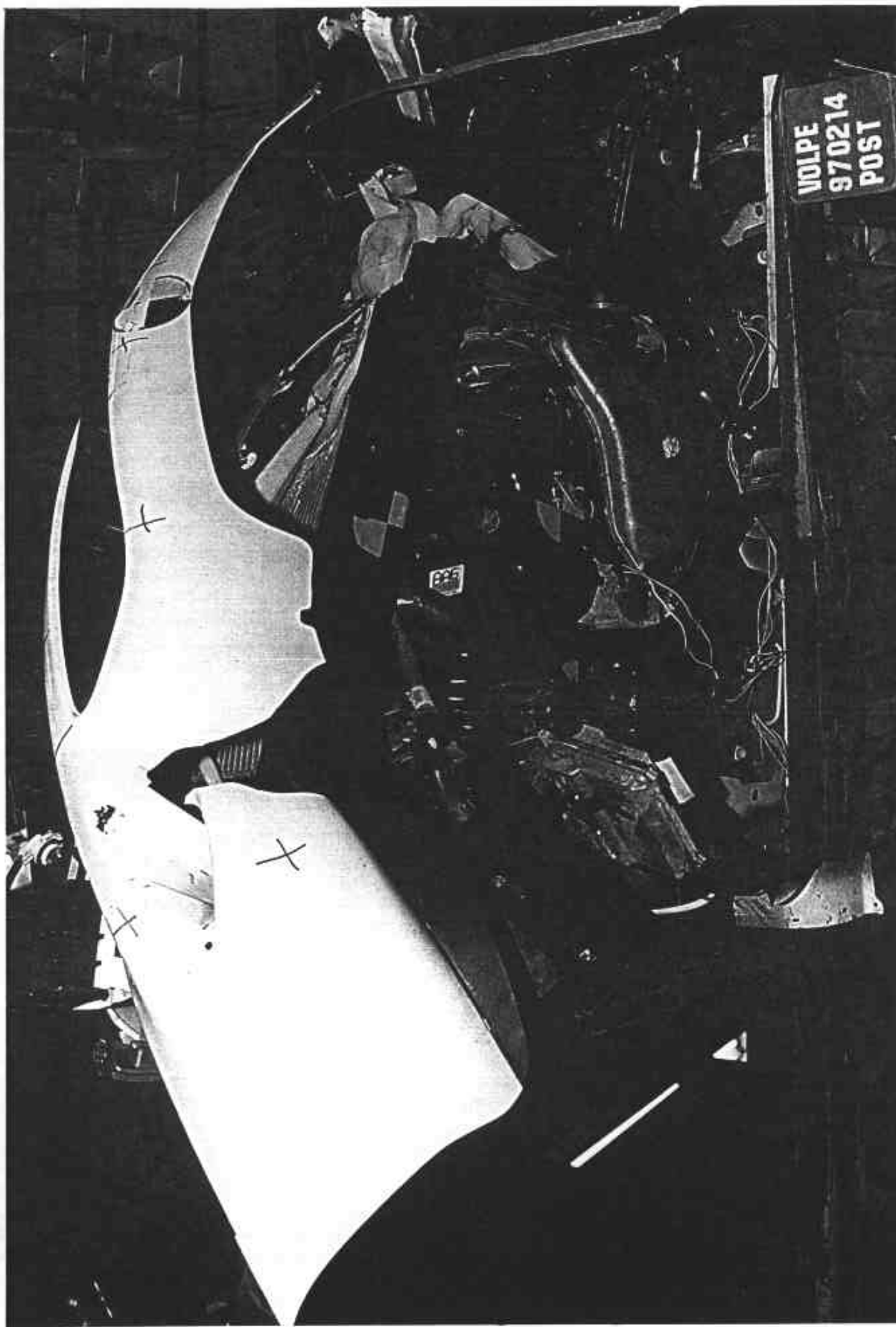


Figure A-26 Post-Test Front Underbody - View 2

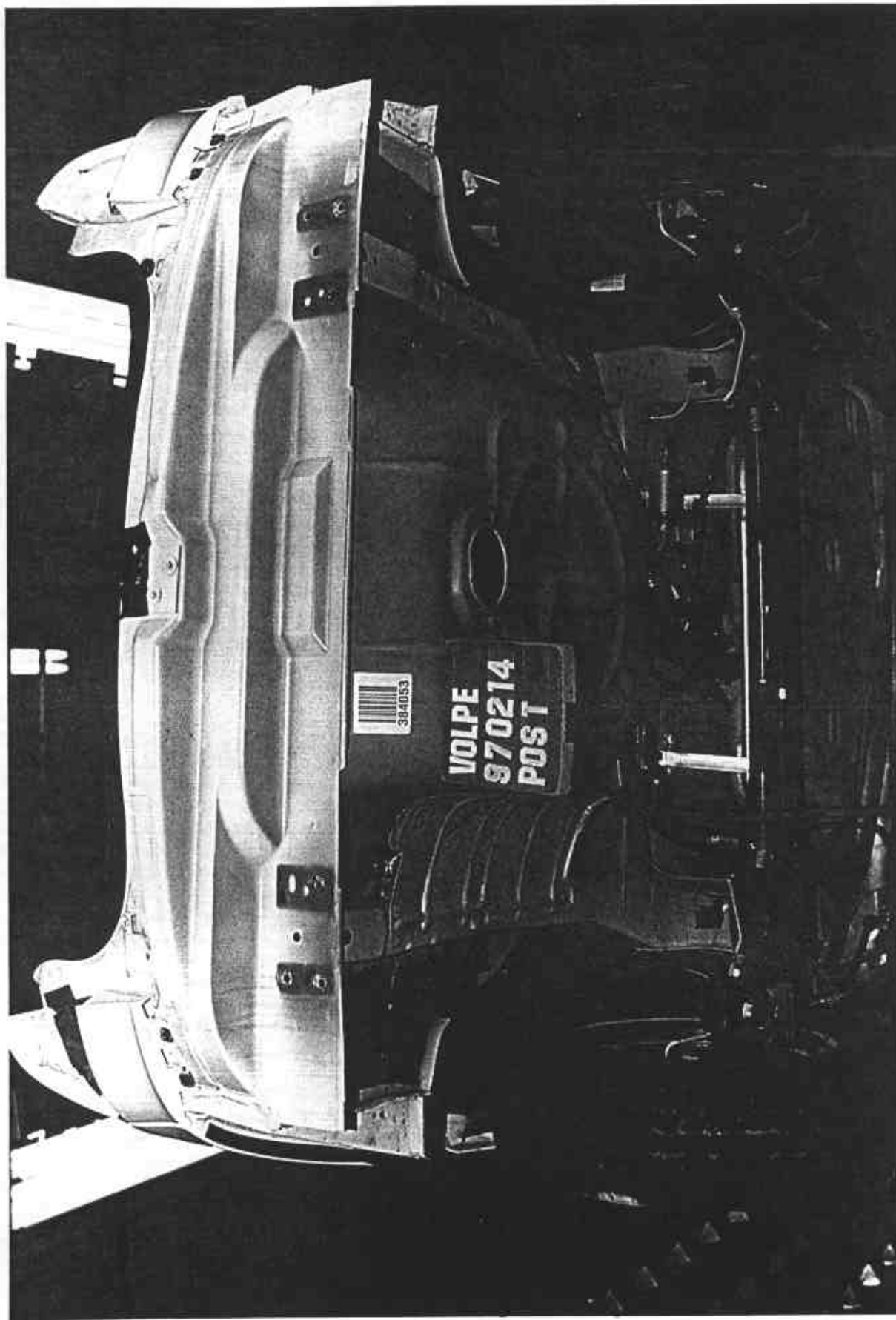


Figure A-27 Post-Test Rear Underbody View

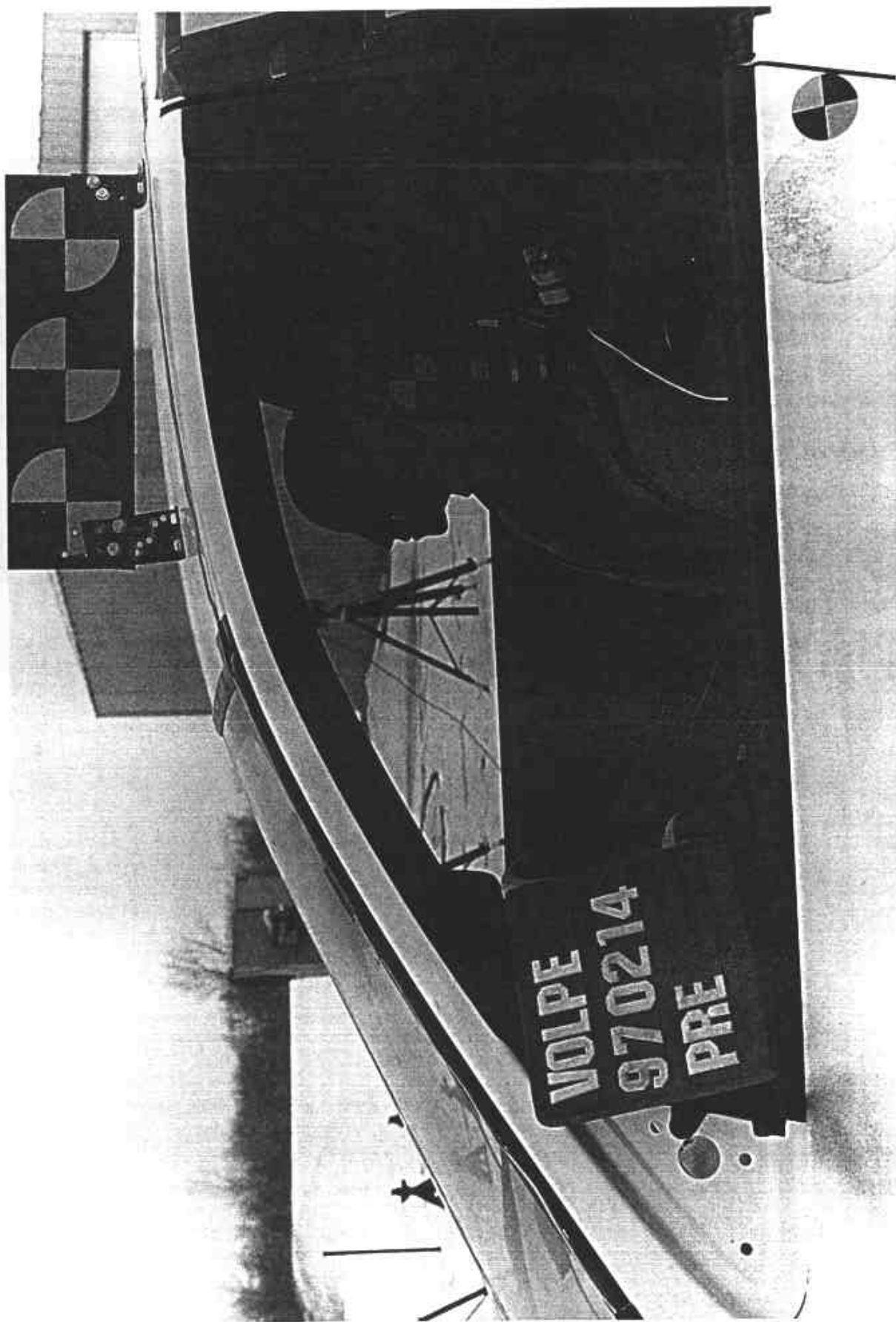


Figure A-28 Pre-Test Driver Dummy Position View

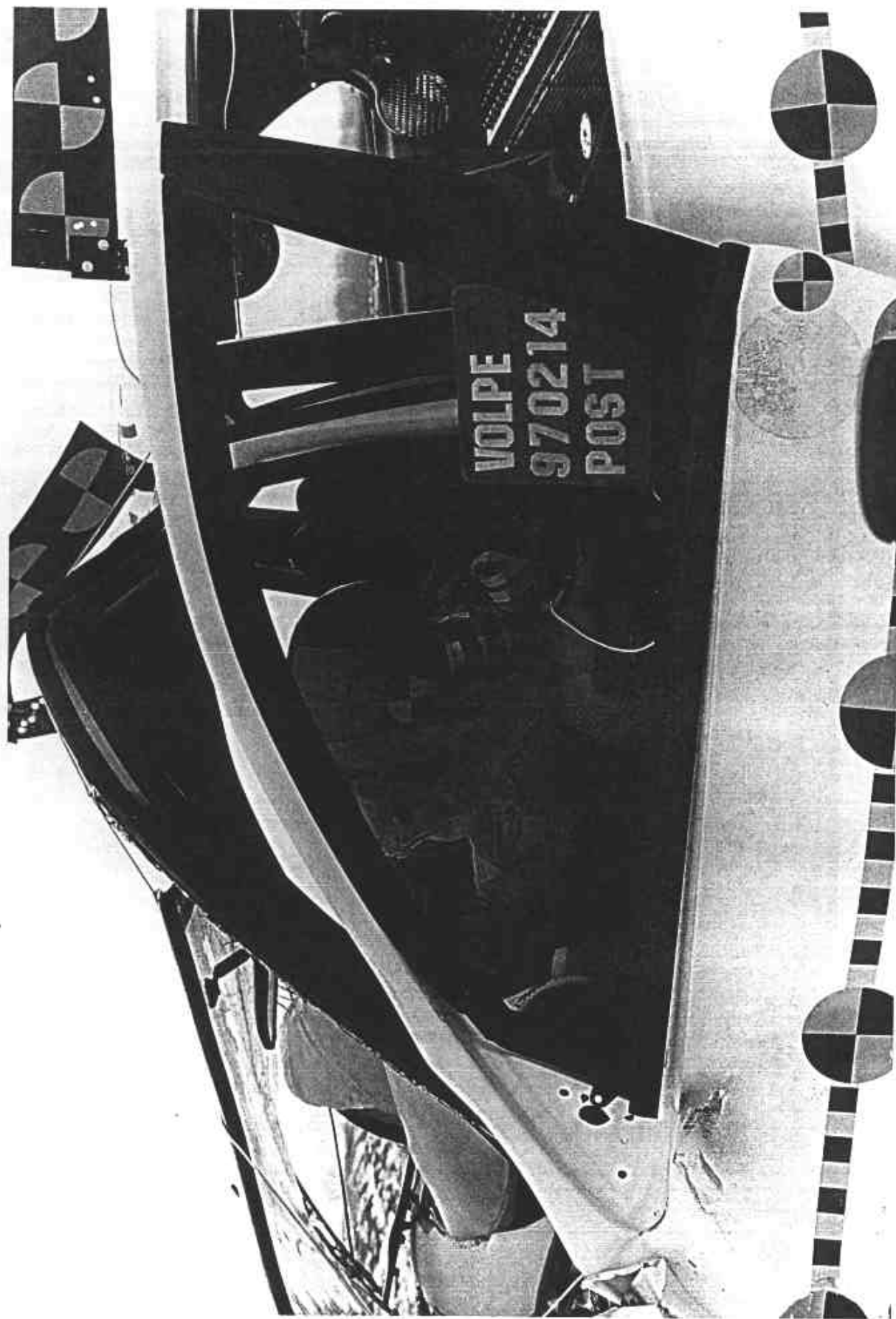


Figure A-29 Post-Test Driver Dummy Position View

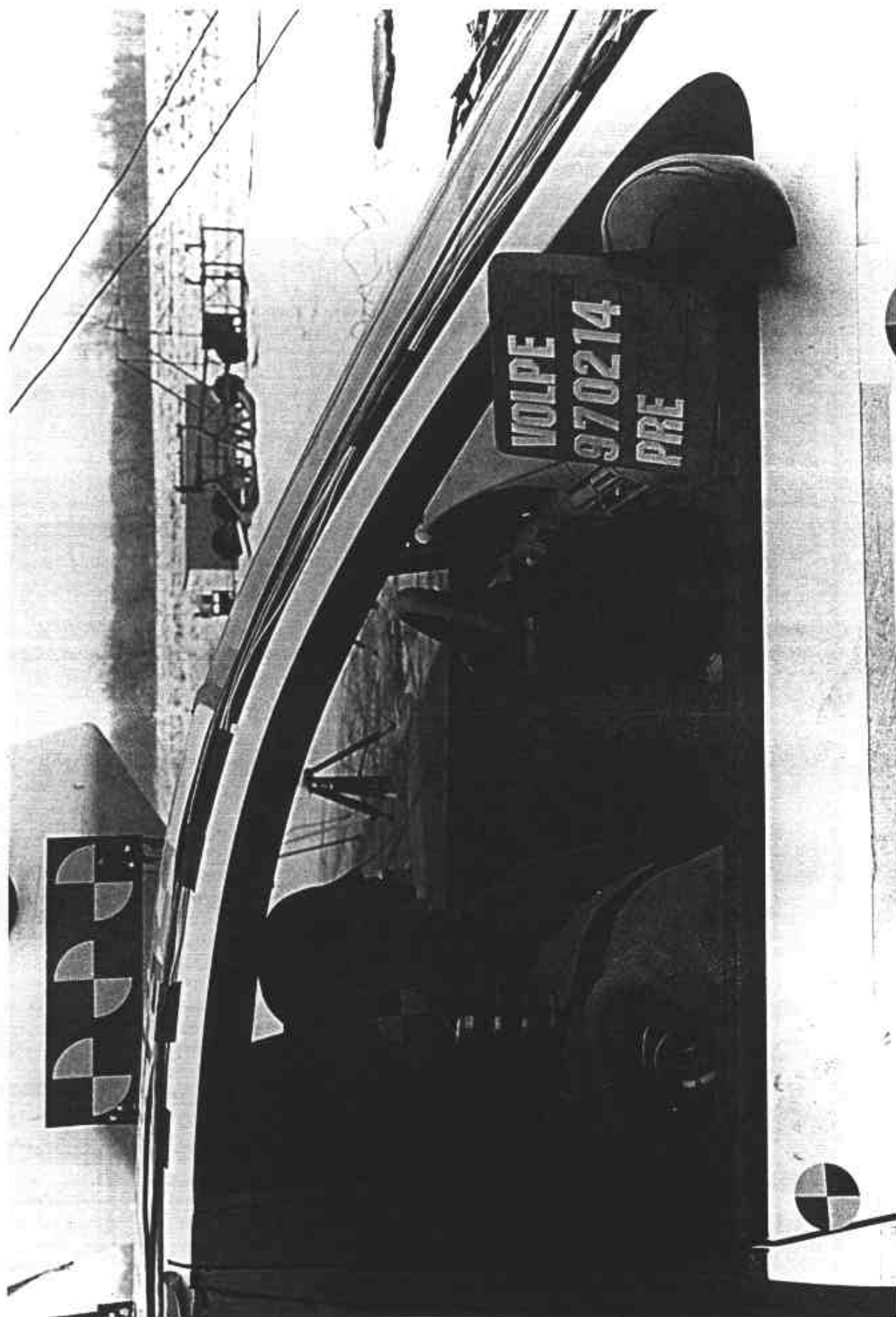


Figure A-30 Pre-Test Passenger Dummy Position View



Figure A-31 Post-Test Passenger Dummy Position View



Figure A-32 Pre-Test Driver Dummy and Vehicle Interior - View 1

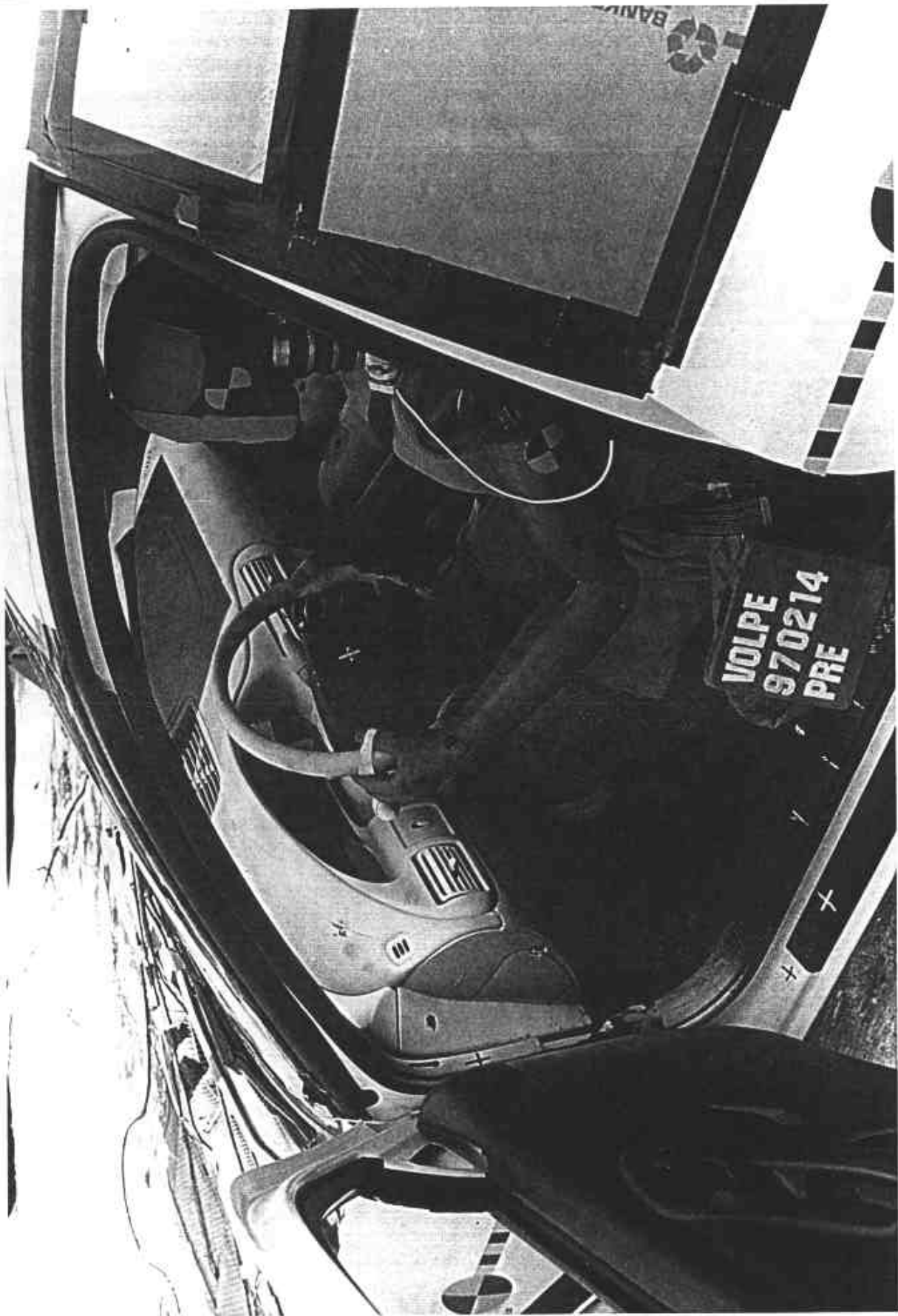


Figure A-33 Pre-Test Driver Dummy and Vehicle Interior - View 2

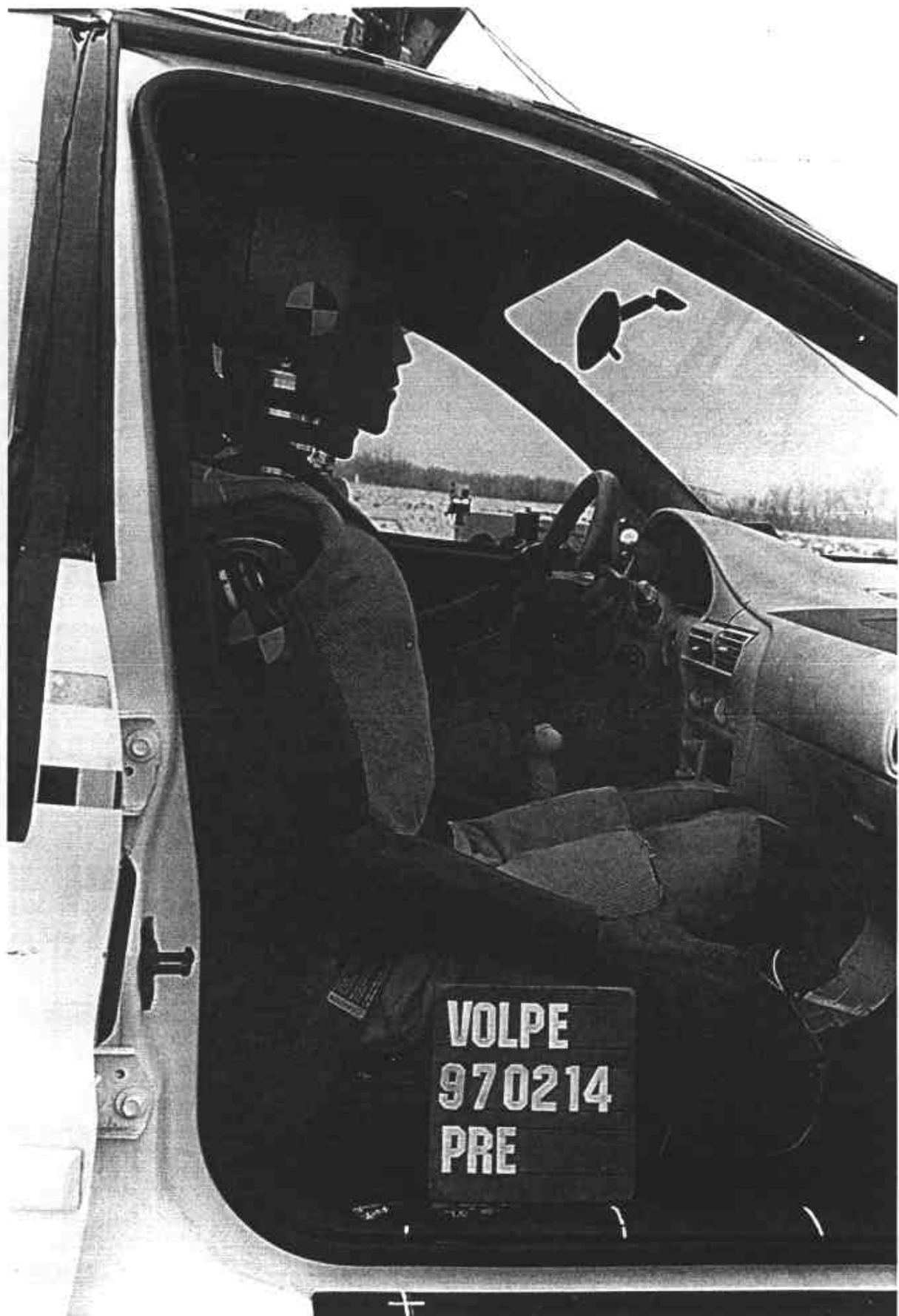


Figure A-34 Pre-Test Passenger Dummy and Vehicle Interior - View 1



Figure A-35 Post-Test Passenger Dummy and Vehicle Interior - View 1



Figure A-36 Pre-Test Passenger Dummy and Vehicle Interior - View 2



Figure A-37 Post-Test Passenger Dummy and Vehicle Interior - View 2



Figure A-38 Post-Test Driver Dummy Contact View

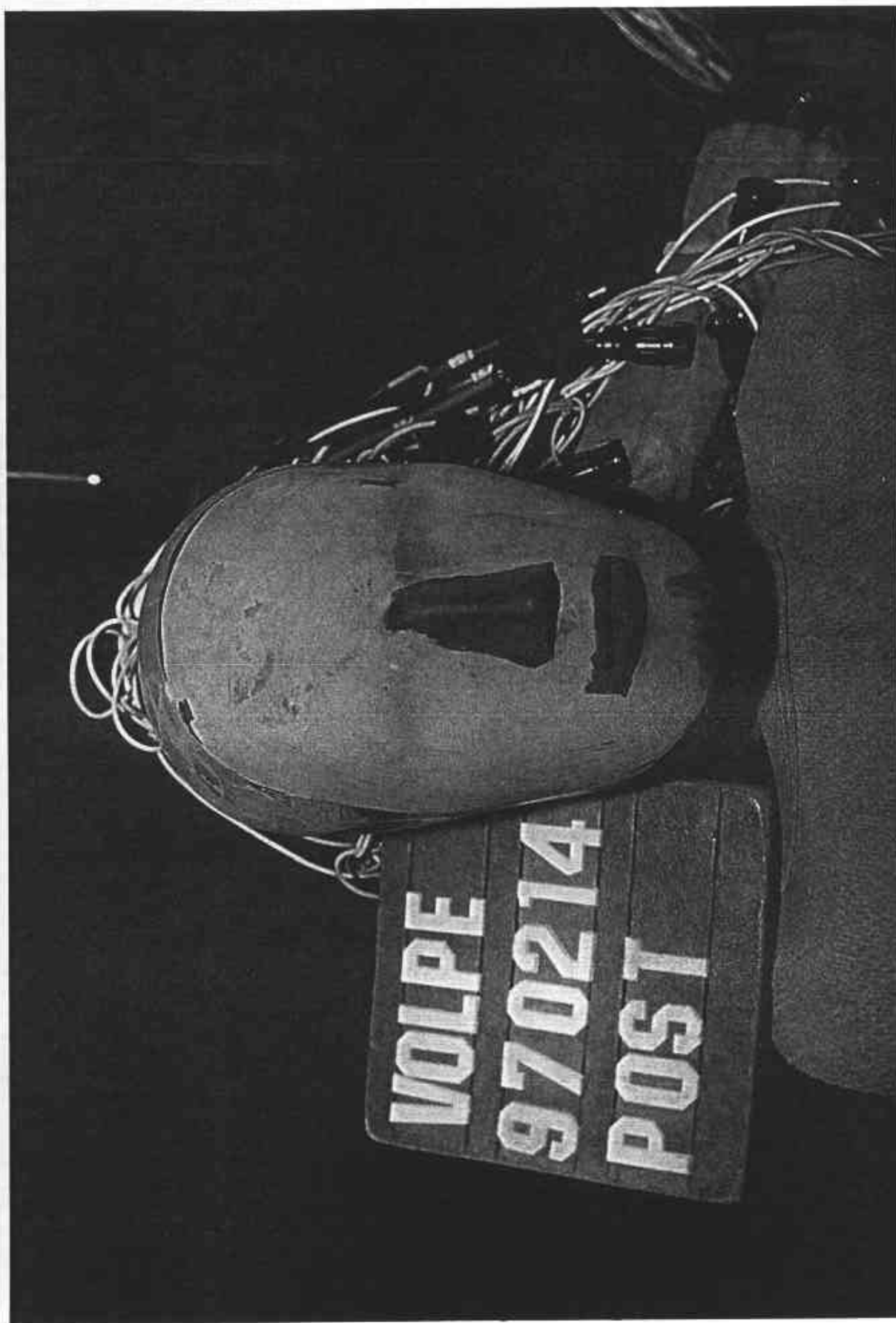


Figure A-39 Post-Test Driver Dummy Head Contact - View 1



Figure A-40 Post-Test Driver Dummy Head Contact - View 2



Figure A-41 Post-Test Driver Dummy Knee Contact View



Figure A-42 Post-Test Passenger Dummy Contact View

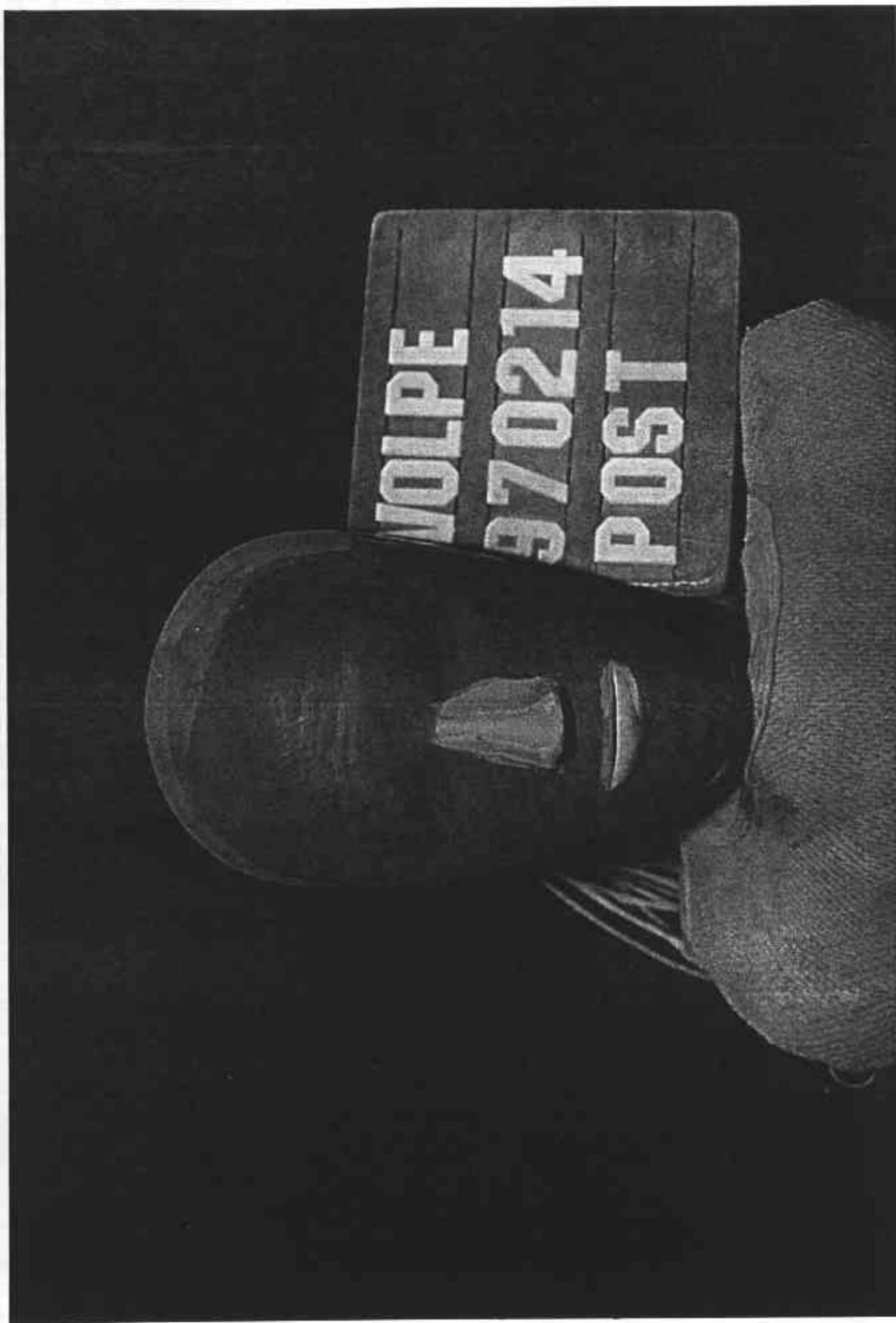


Figure A-43 Post-Test Passenger Dummy Head Contact View



Figure A-44 Post-Test Passenger Dummy Knee Contact - View 1

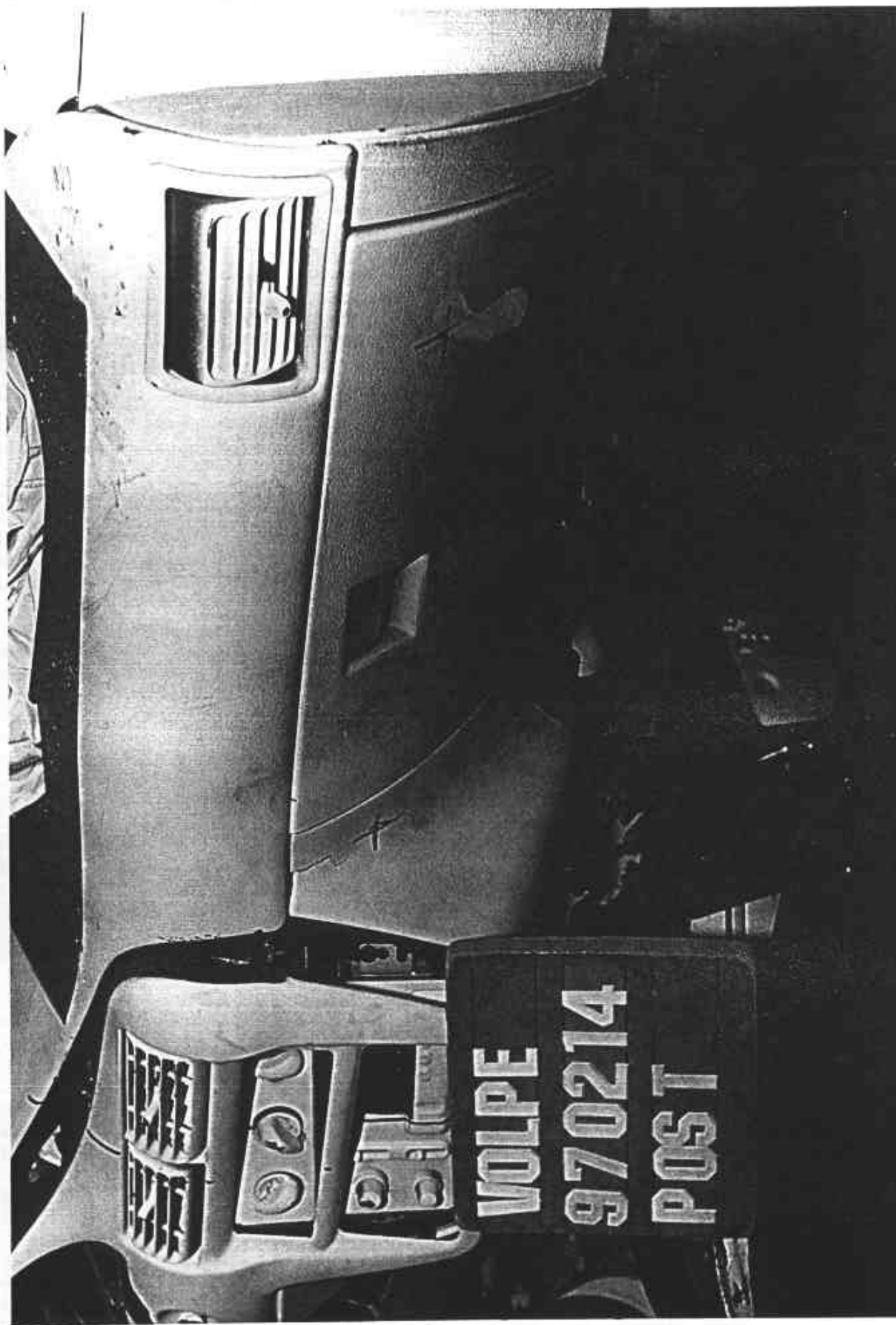


Figure A-45 Post-Test Passenger Dummy Knee Contact - View 2

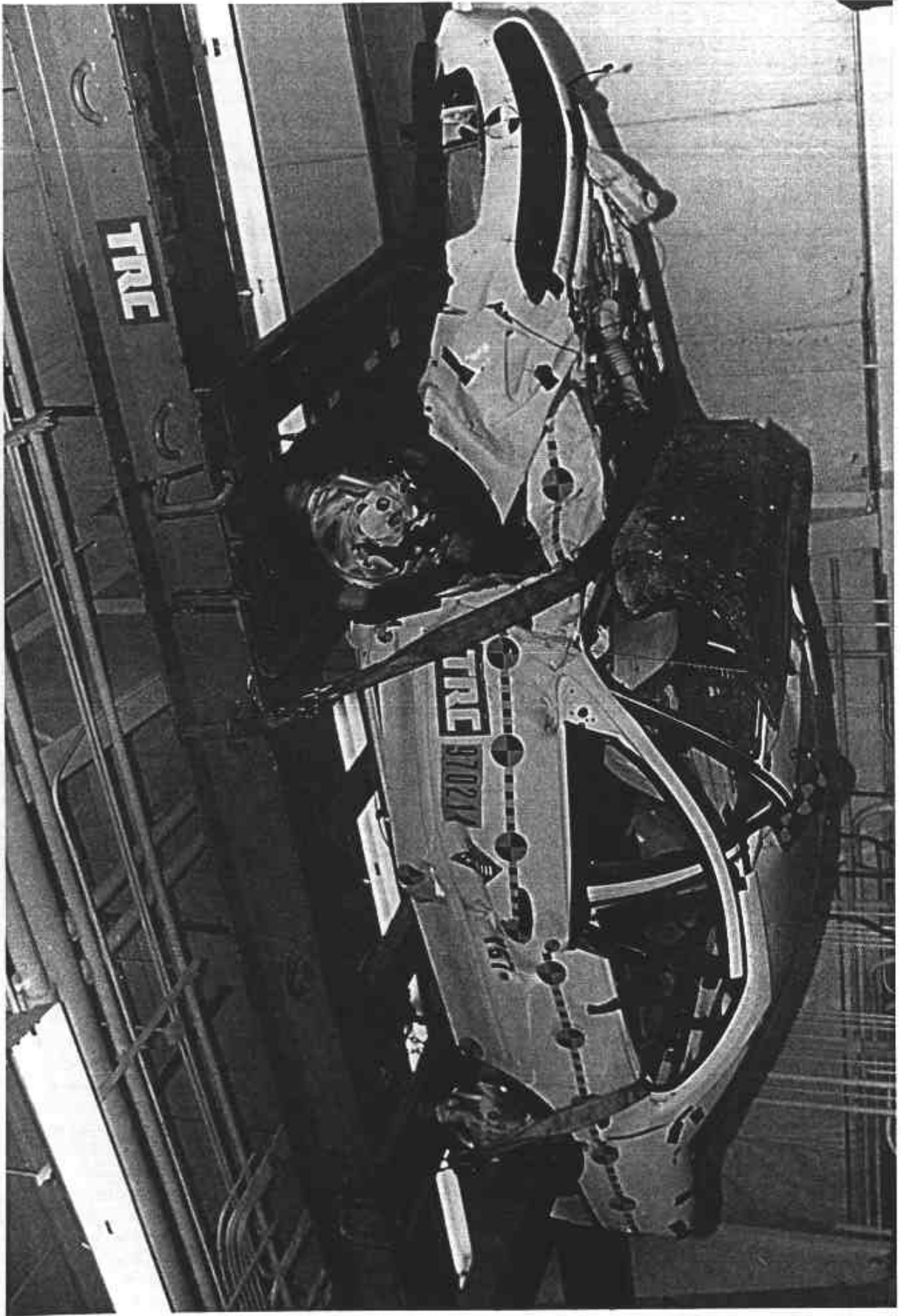


Figure A-46 Vehicle on Static Rollover Machine View



Figure A-47 Wire Profile of Dash Board

Appendix B

Data Plots

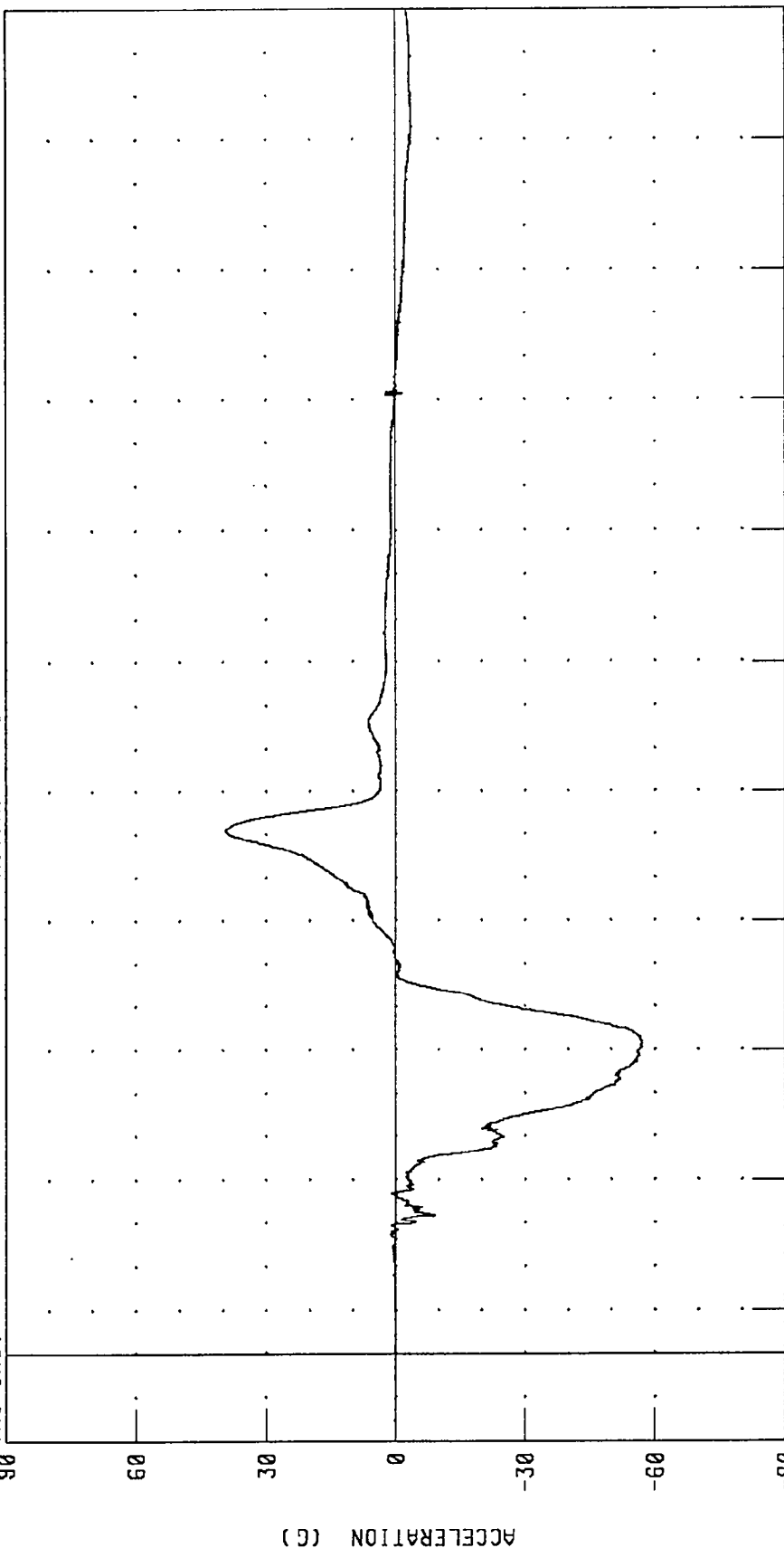
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD LONGITUDINAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

90



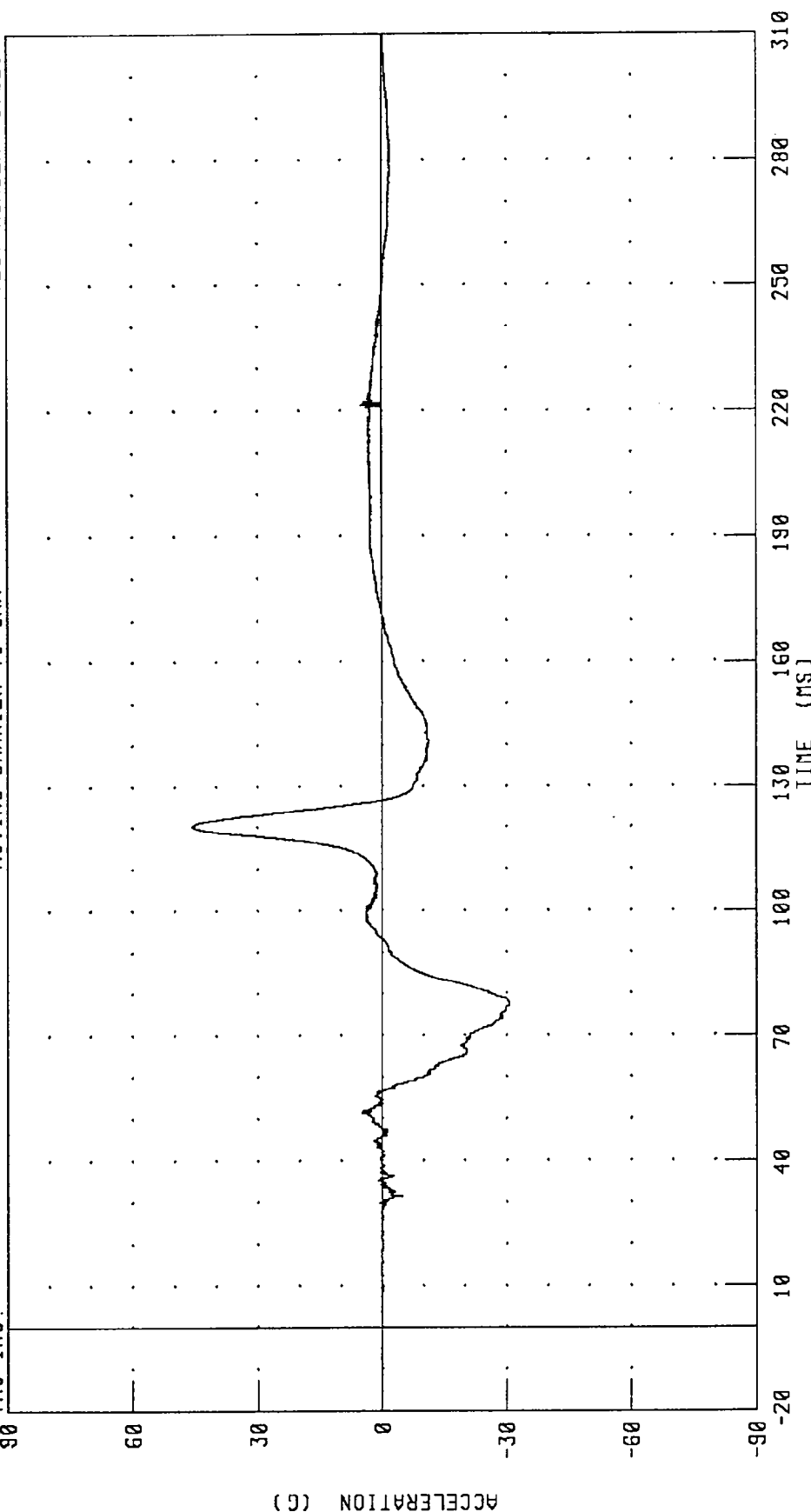
PEAK DATA: 39.31 G @ 120.80 MS; -57.15 G @ 70.48 MS

CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD LATERAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

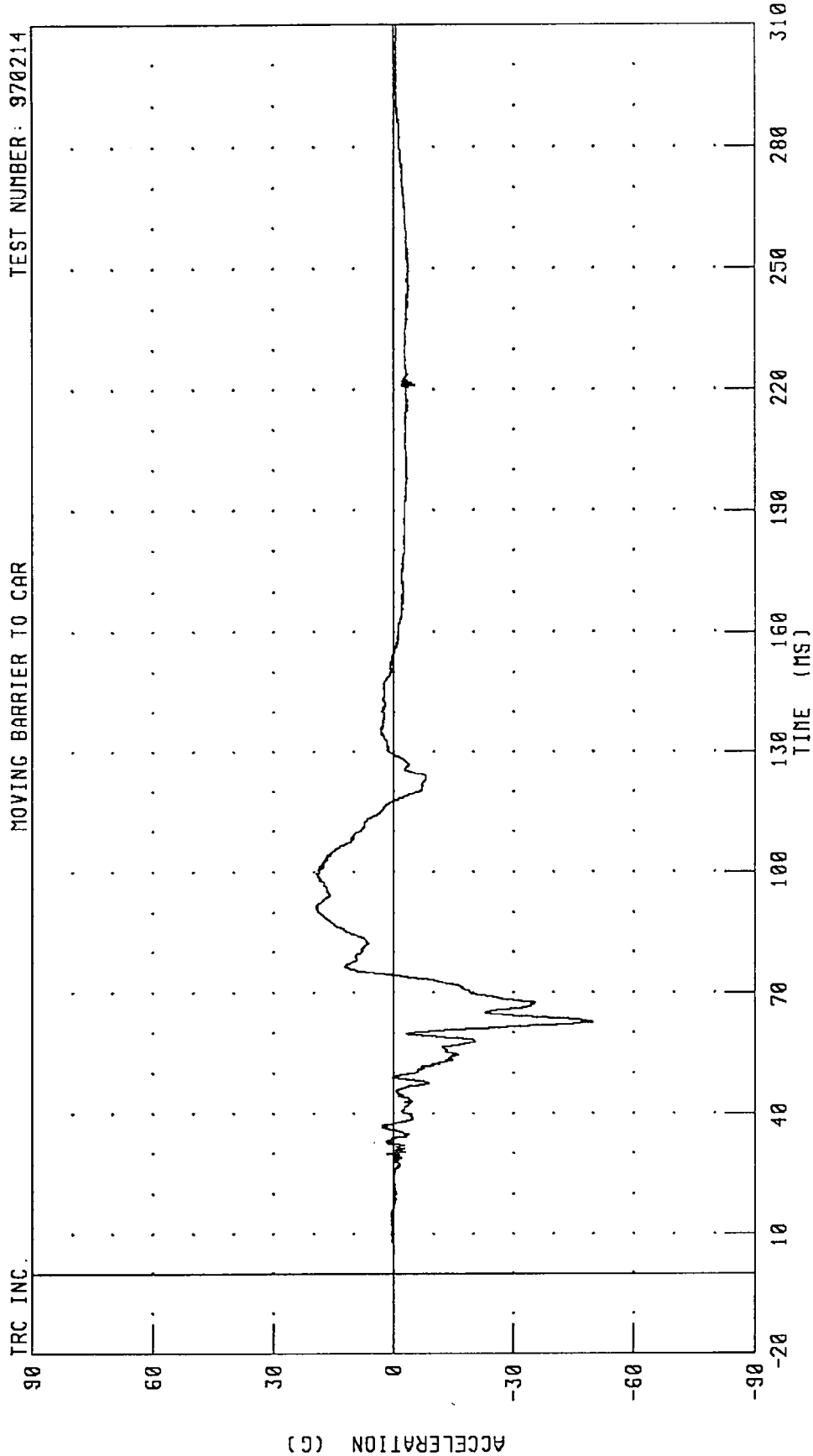


CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 45.68 G @ 120.40 MS; -30.81 G @ 77.20 MS

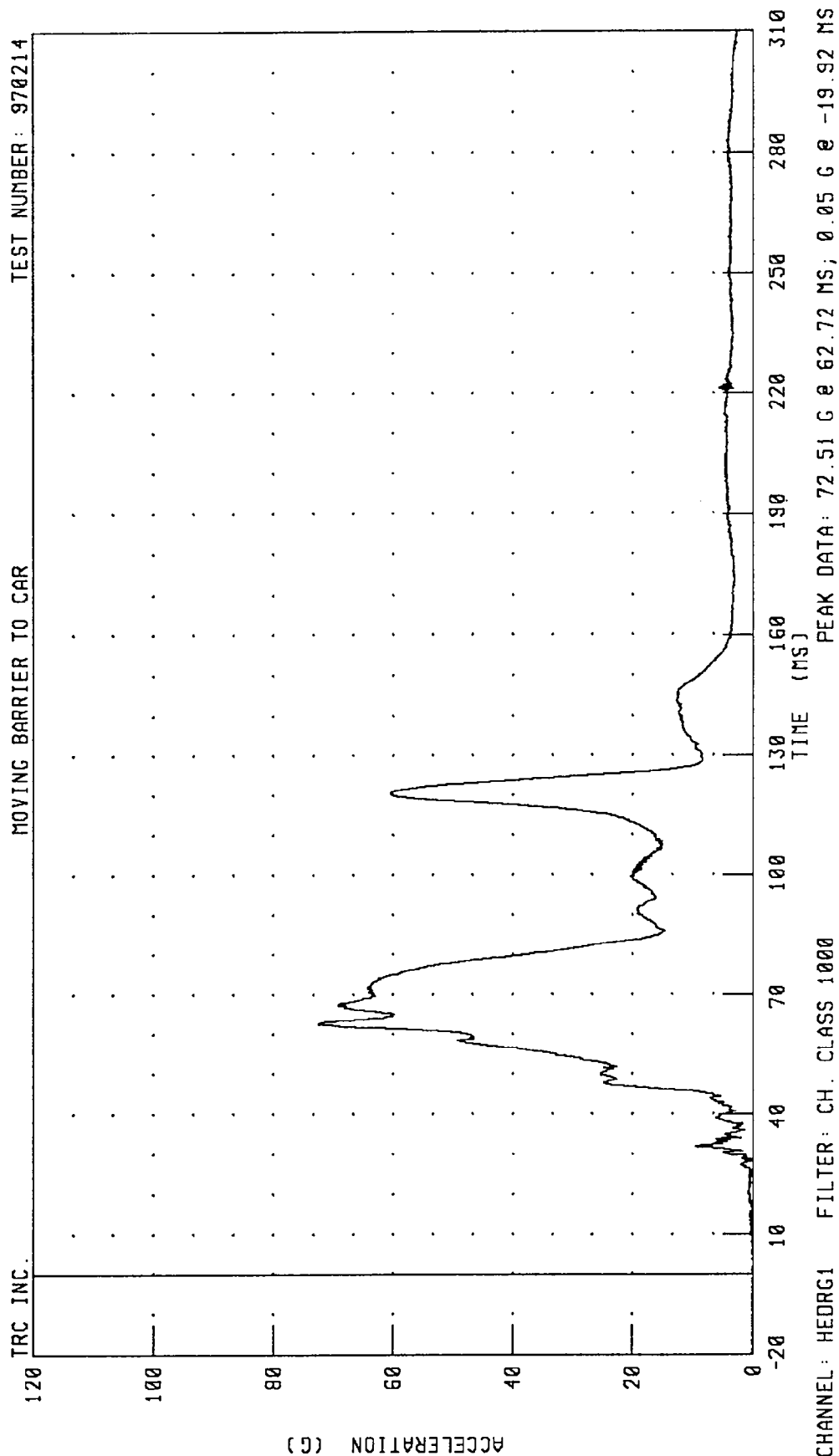
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD VERTICAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD RESULTANT ACCELERATION
 MOVING BARRIER TO CAR



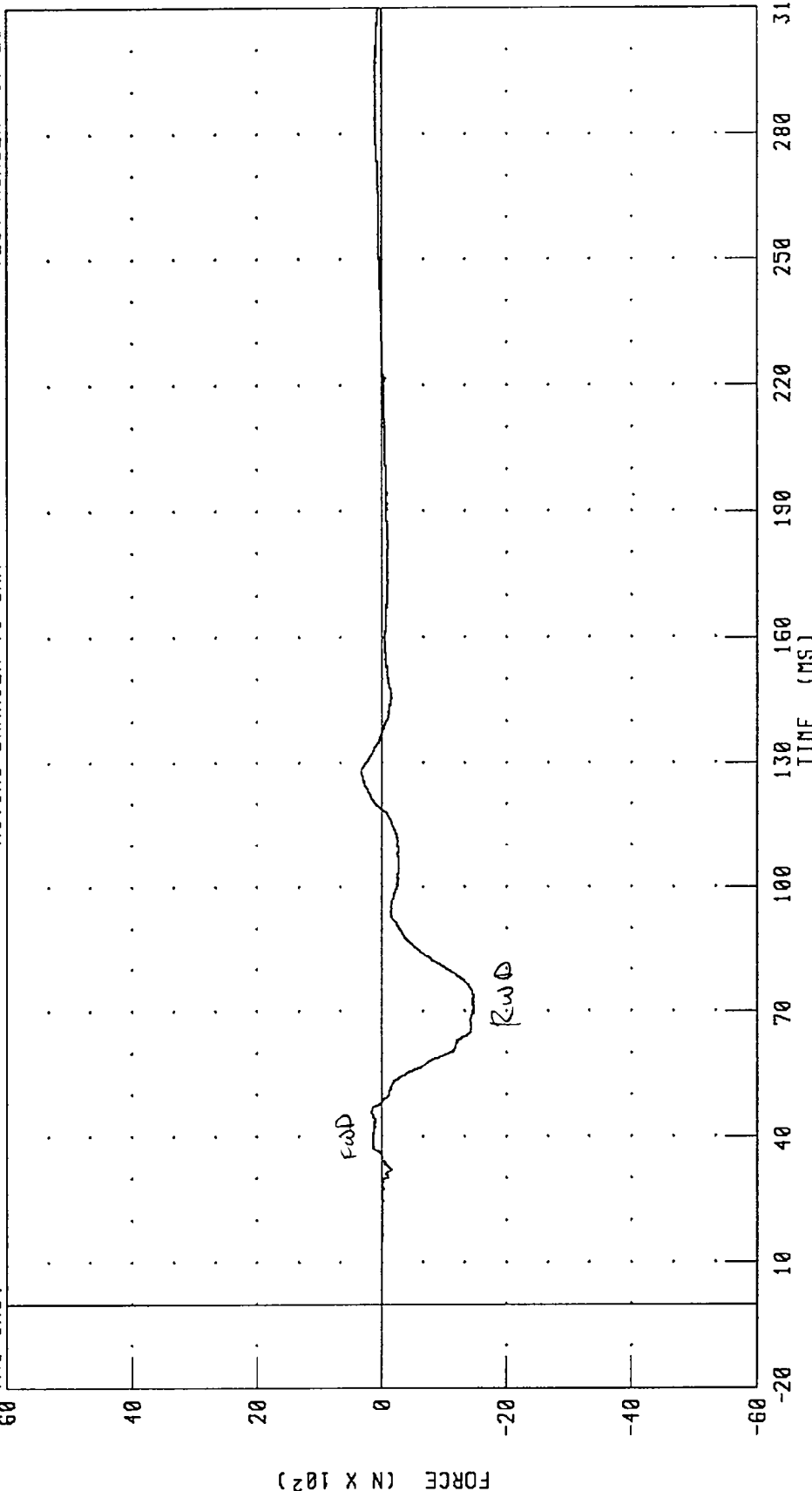
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER

DRIVER NECK X-AXIS SHEAR FORCE

MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



PEAK DATA: 333.82 N @ 127.52 MS; -1479.68 N @ 71.04 MS

CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER NECK Y-AXIS SHEAR FORCE
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

60

40

20

0

-20

-40

-60

FORCE (N X 10²)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

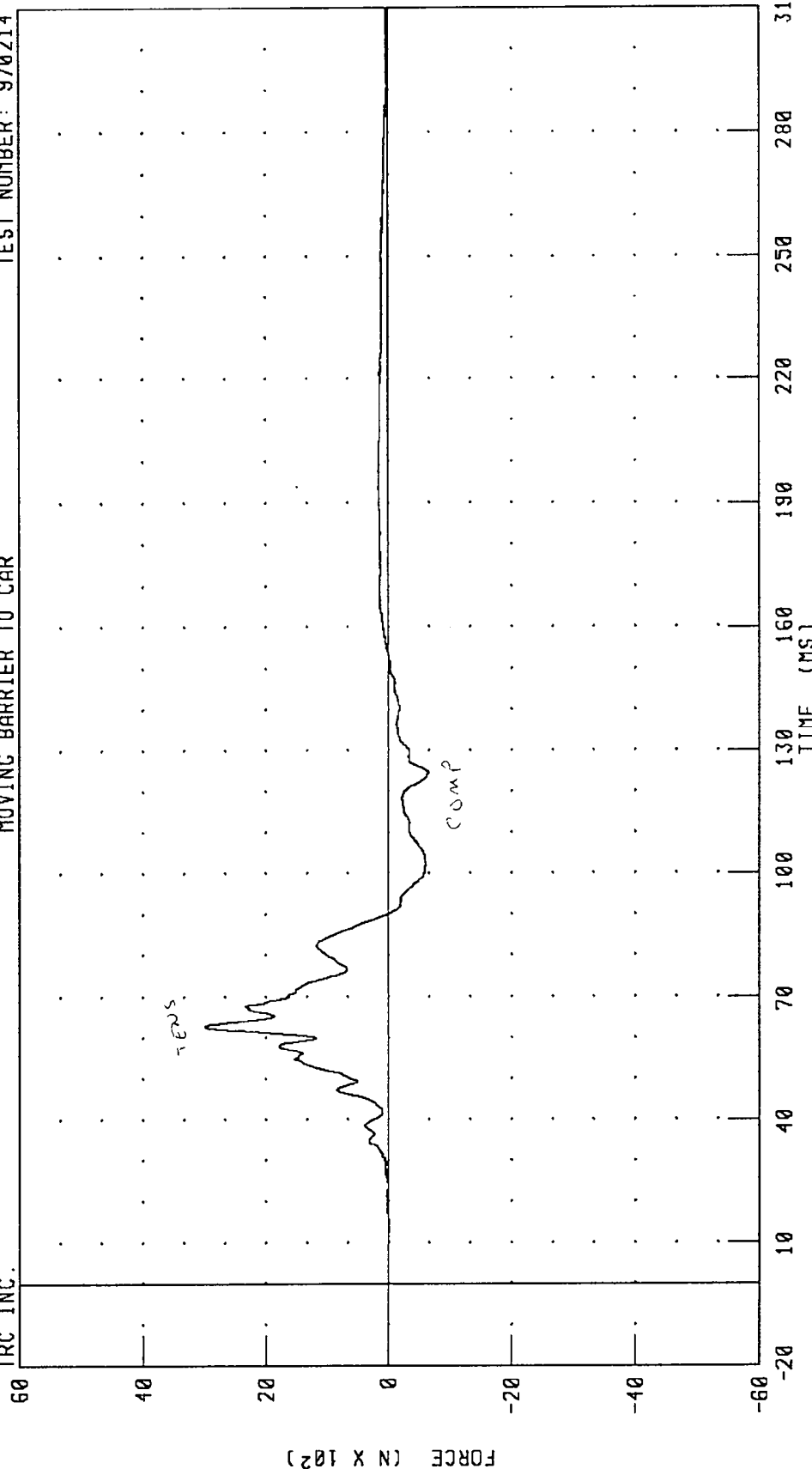
PEAK DATA: 1020.71 N @ 124.24 MS; -661.53 N @ 85.68 MS

CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER NECK Z-AXIS SHEAR FORCE
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

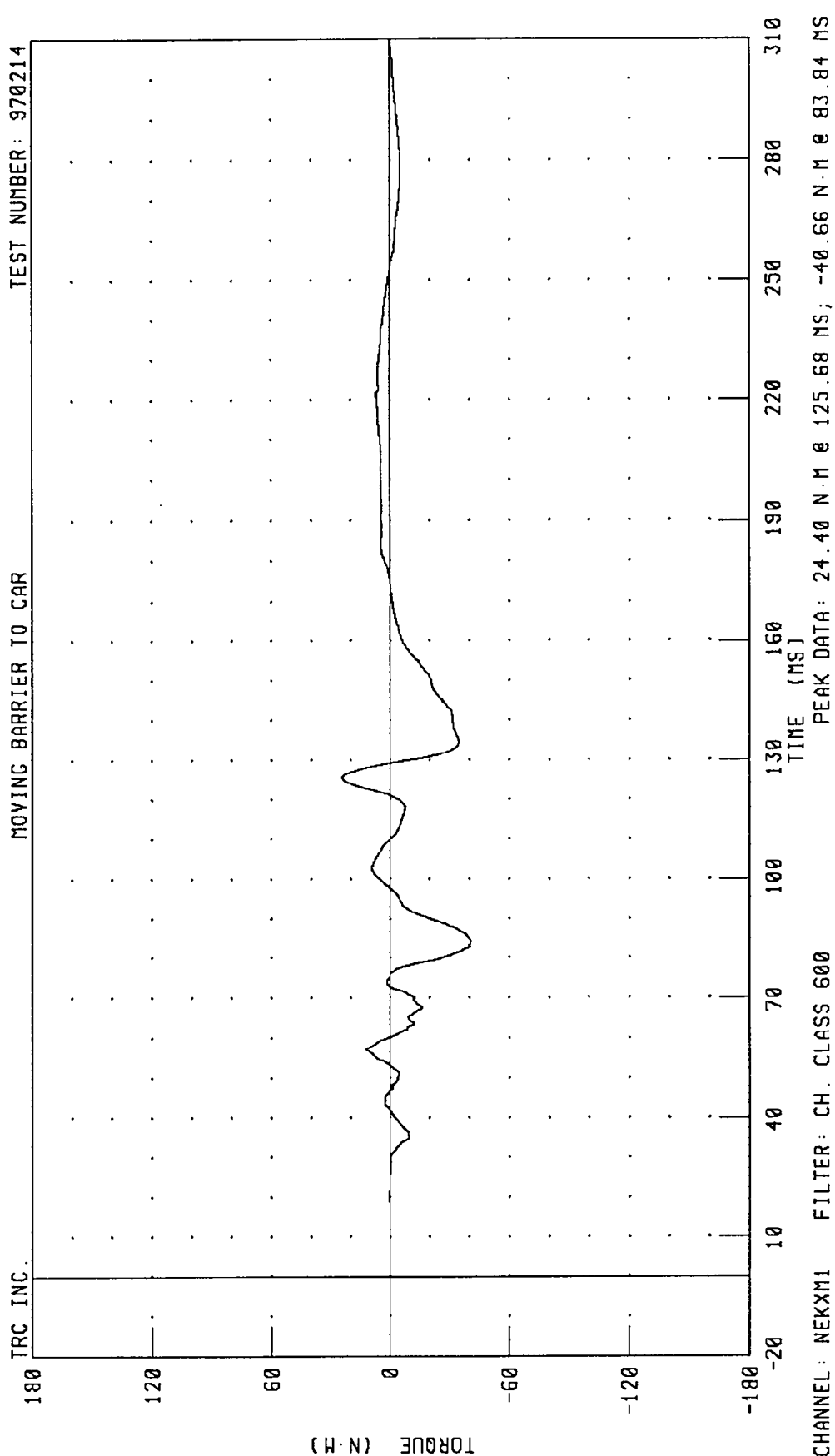


PEAK DATA: 2984.41 N @ 62.88 MS; -651.67 N @ 124.56 MS

CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER NECK MOMENT ABOUT X-AXIS
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



CHANNEL: NEKXMI FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER

DRIVER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

IRC INC.

180

120

60

0

-60

-120

-180

TORQUE (N·M)

EXTENSION - SHOULD BE NEGATIVE

FLEX - SHOULD BE POS

TIME (MS)

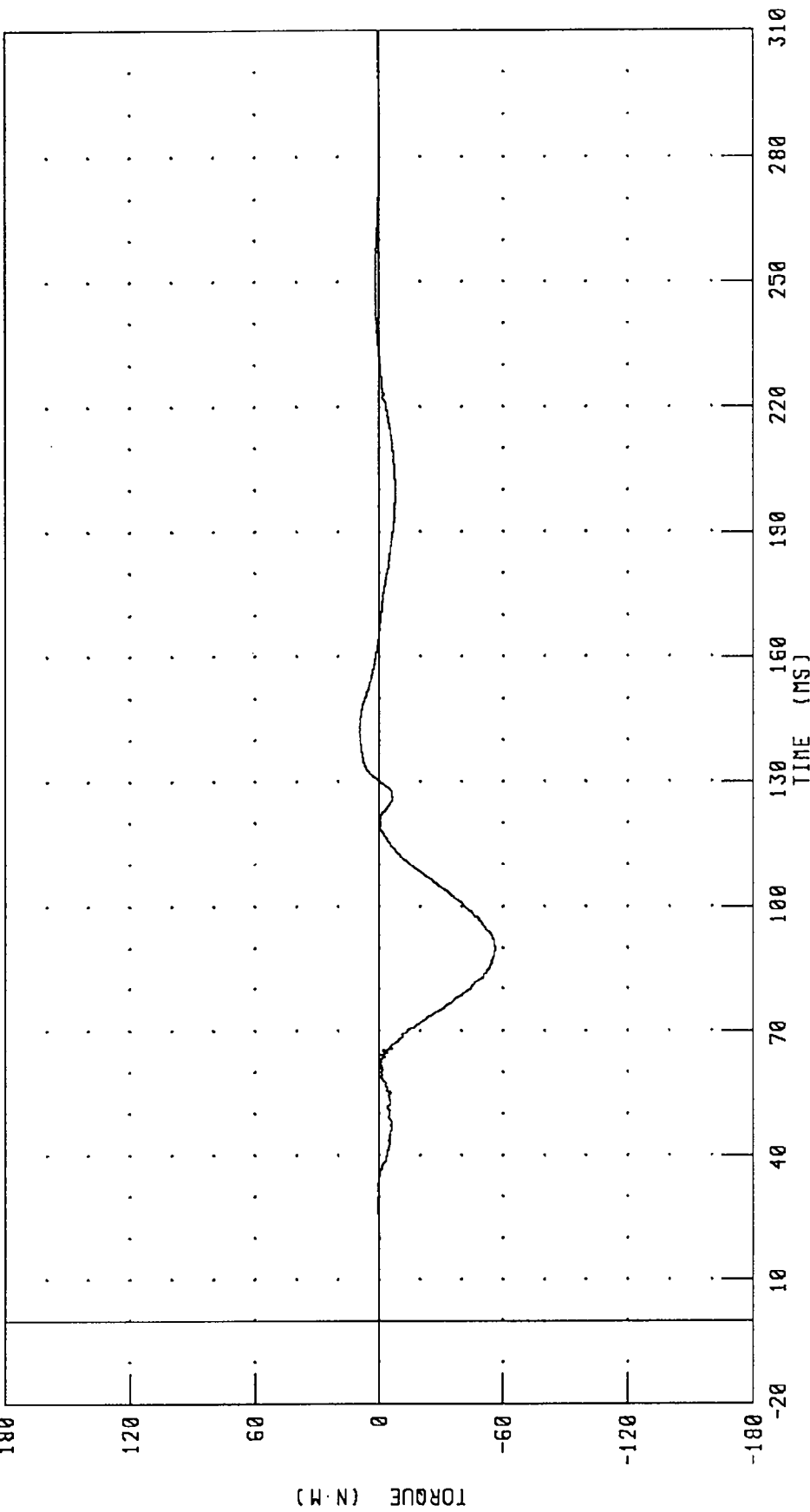
PEAK DATA: 88.54 N·M @ 65.28 MS, -42.28 N·M @ 127.84 MS

CHANNEL: NEKYM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER NECK MOMENT ABOUT Z-AXIS
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

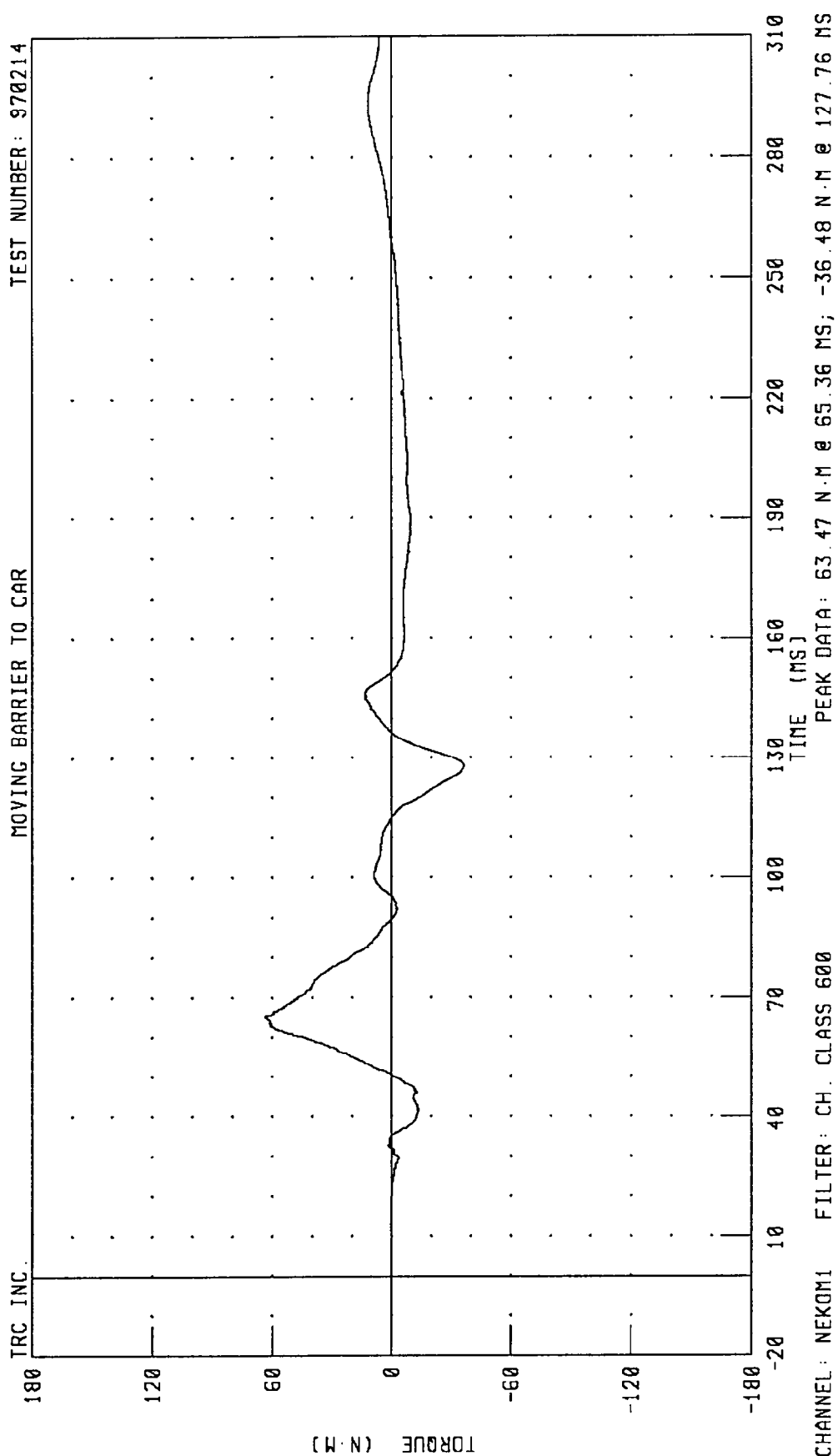


PEAK DATA: 9.69 N-M @ 143.04 MS; -56.48 N-M @ 90.08 MS

CHANNEL: NEKZM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER NECK CORRECTED MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

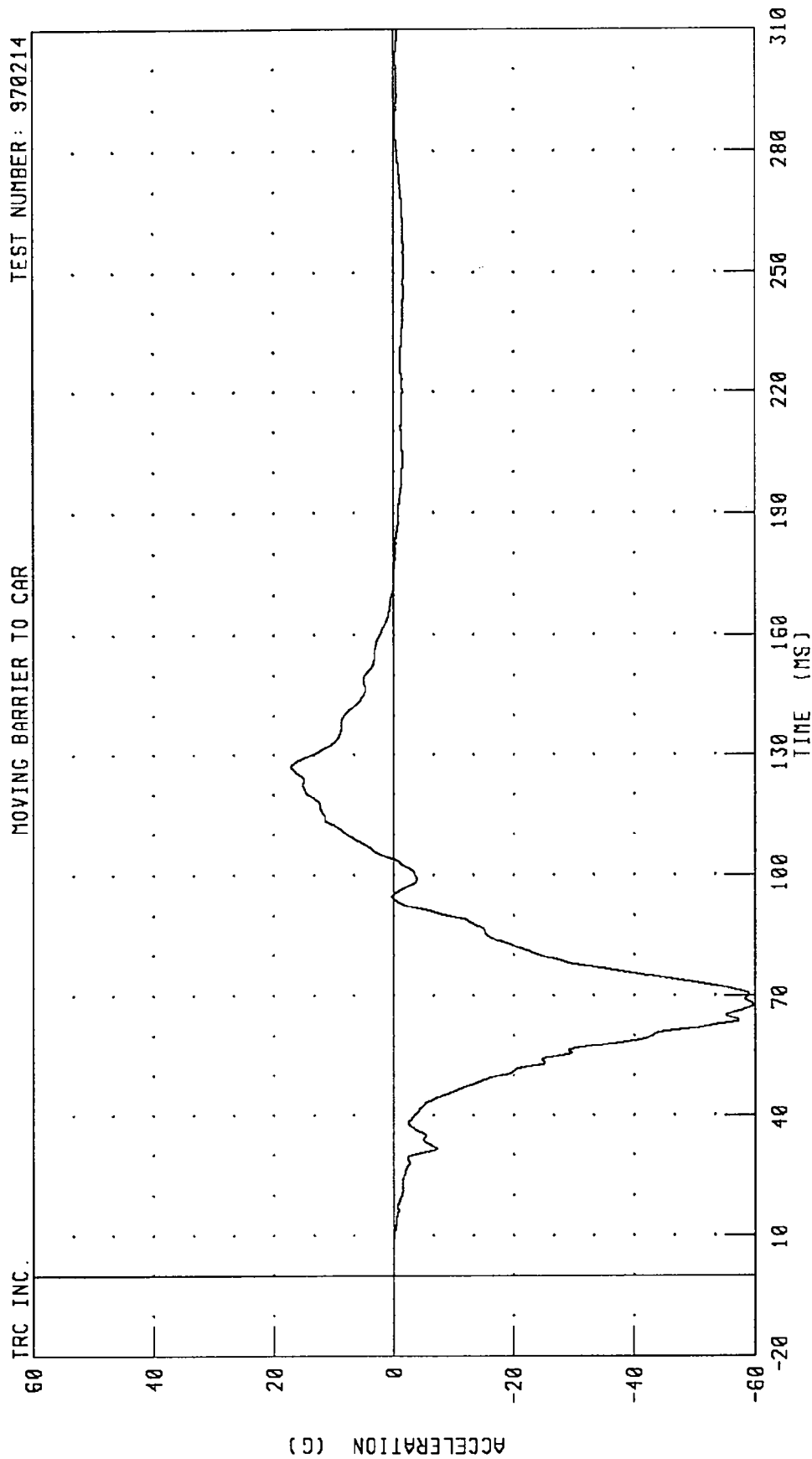


CHANNEL: NEKOM1 FILTER: CH. CLASS 600

PEAK DATA: 63.47 N.M @ 65.36 MS; -36.48 N.M @ 127.76 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER CHEST LONGITUDINAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



PEAK DATA: 17.21 G @ 127.12 MS; -59.54 G @ 67.60 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER CHEST LATERAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

60

40

20

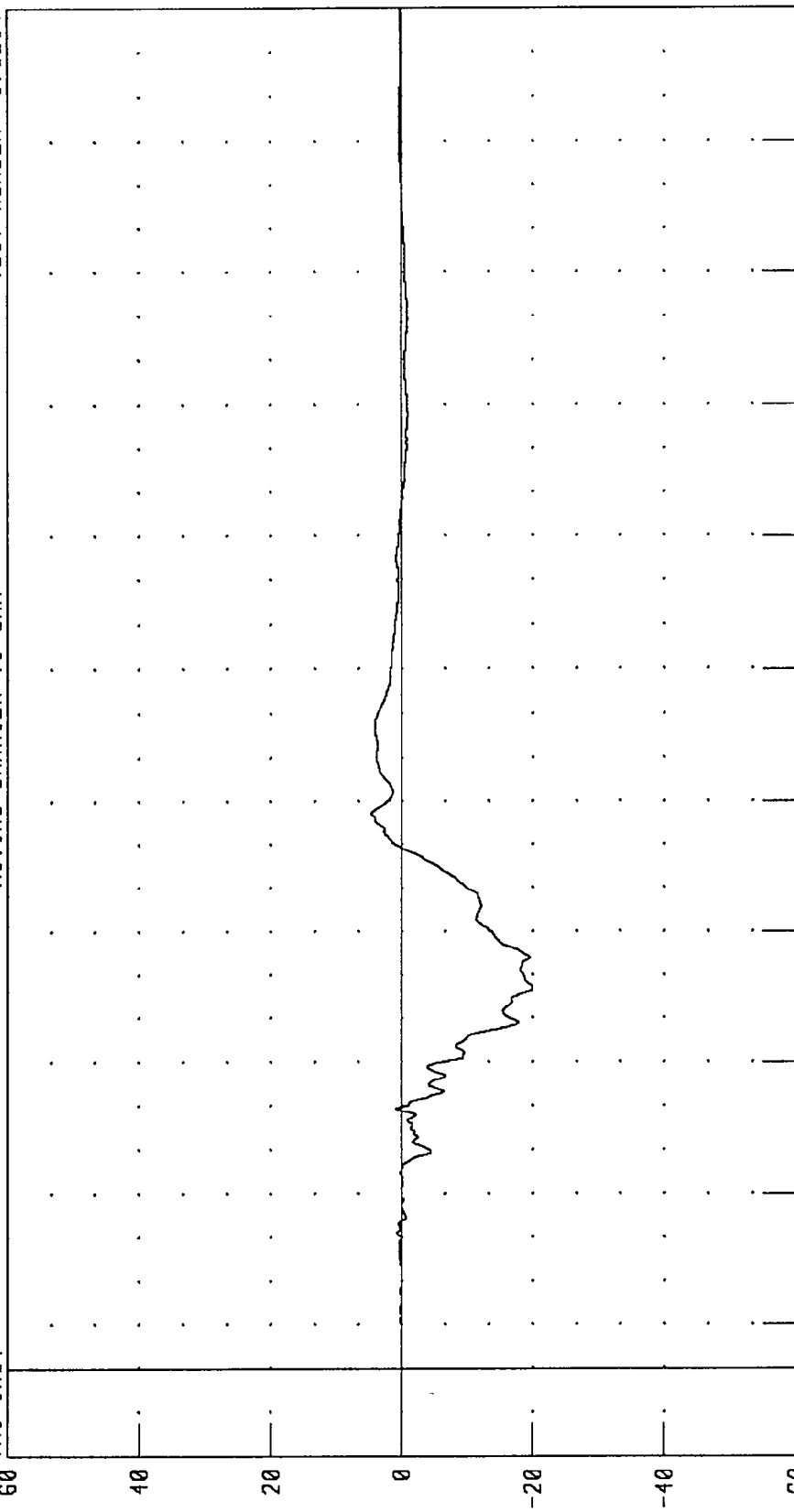
0

-20

-40

-60

ACCELERATION (G)



TIME (MS)

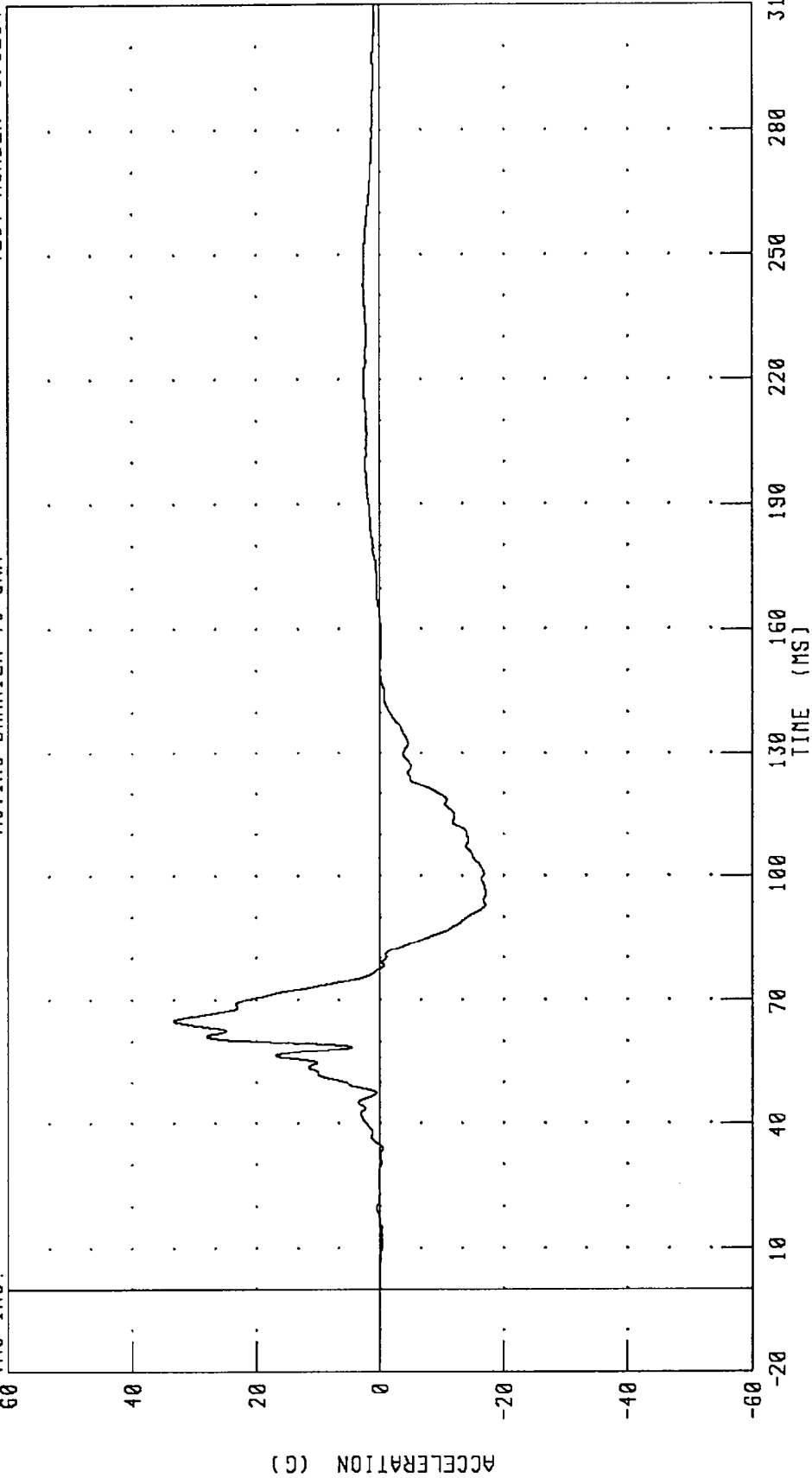
PEAK DATA: 4.68 G @ 127.28 MS; -20.04 G @ 87.04 MS

CHANNEL: CSTYGI FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER CHEST VERTICAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

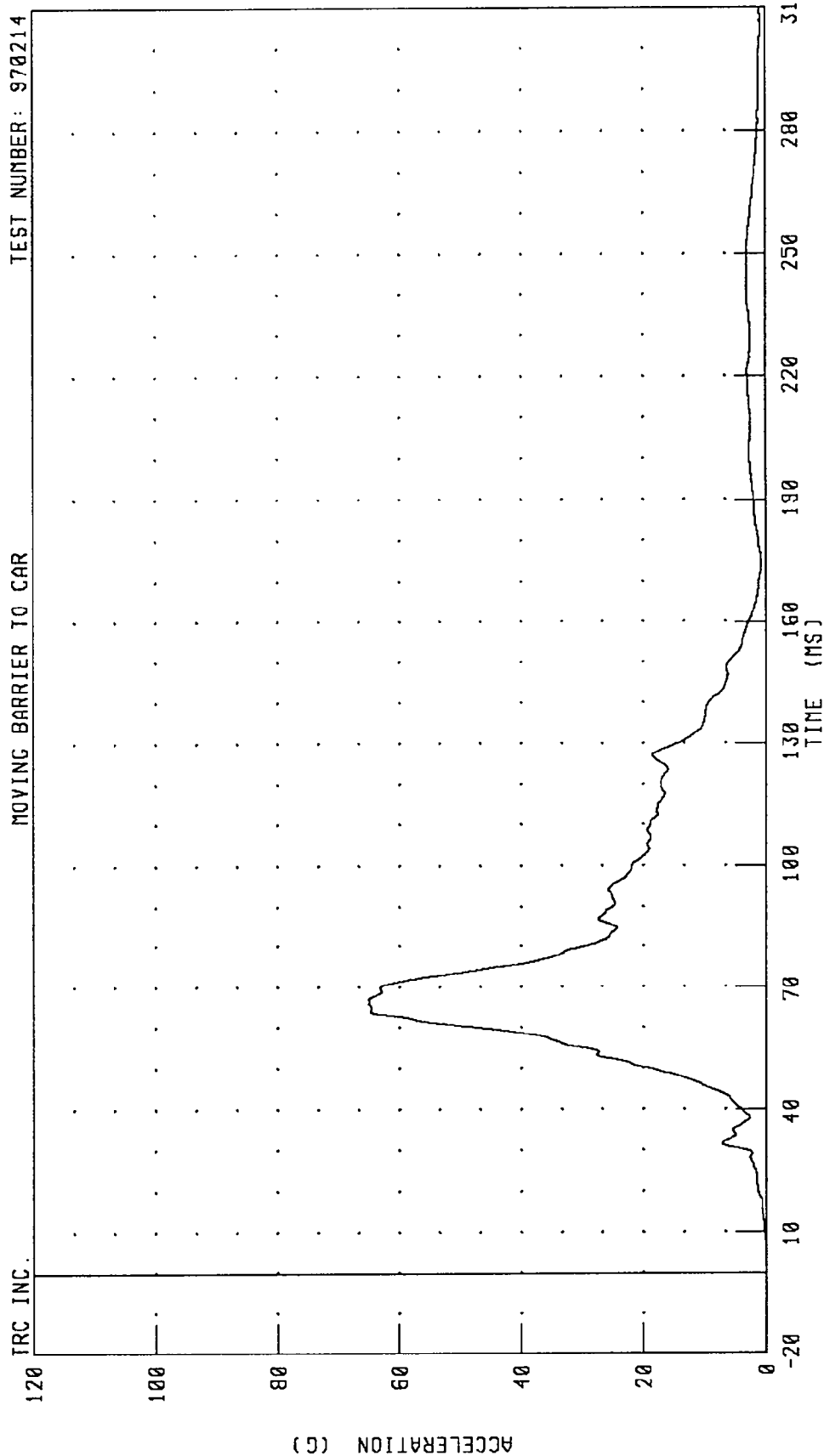


PEAK DATA: 33.33 G @ 65.04 MS; -17.06 G @ 96.08 MS

CHANNEL: CSTZG1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER CHEST RESULTANT ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

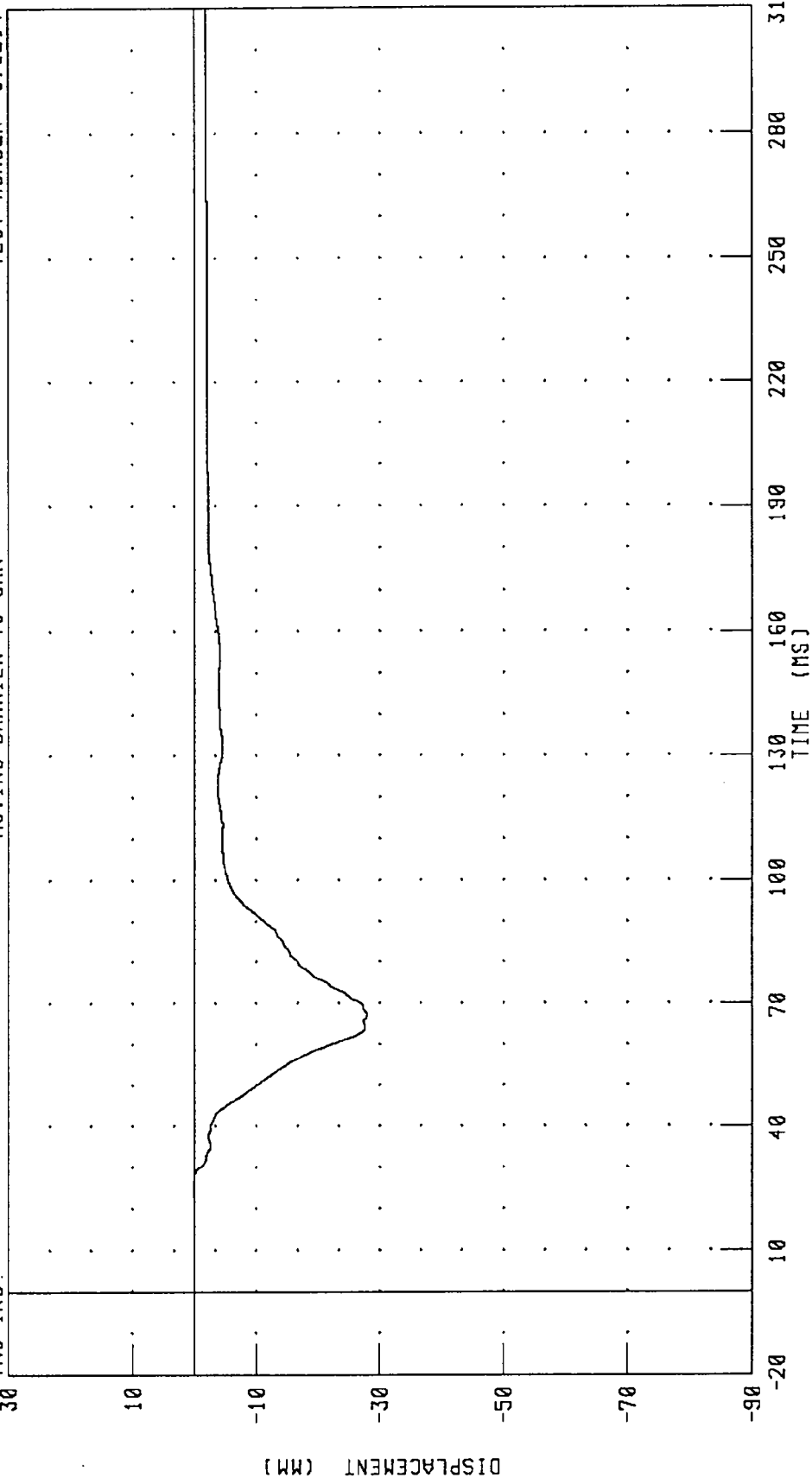


CHANNEL: CSTRG1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER CHEST DEFLECTION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



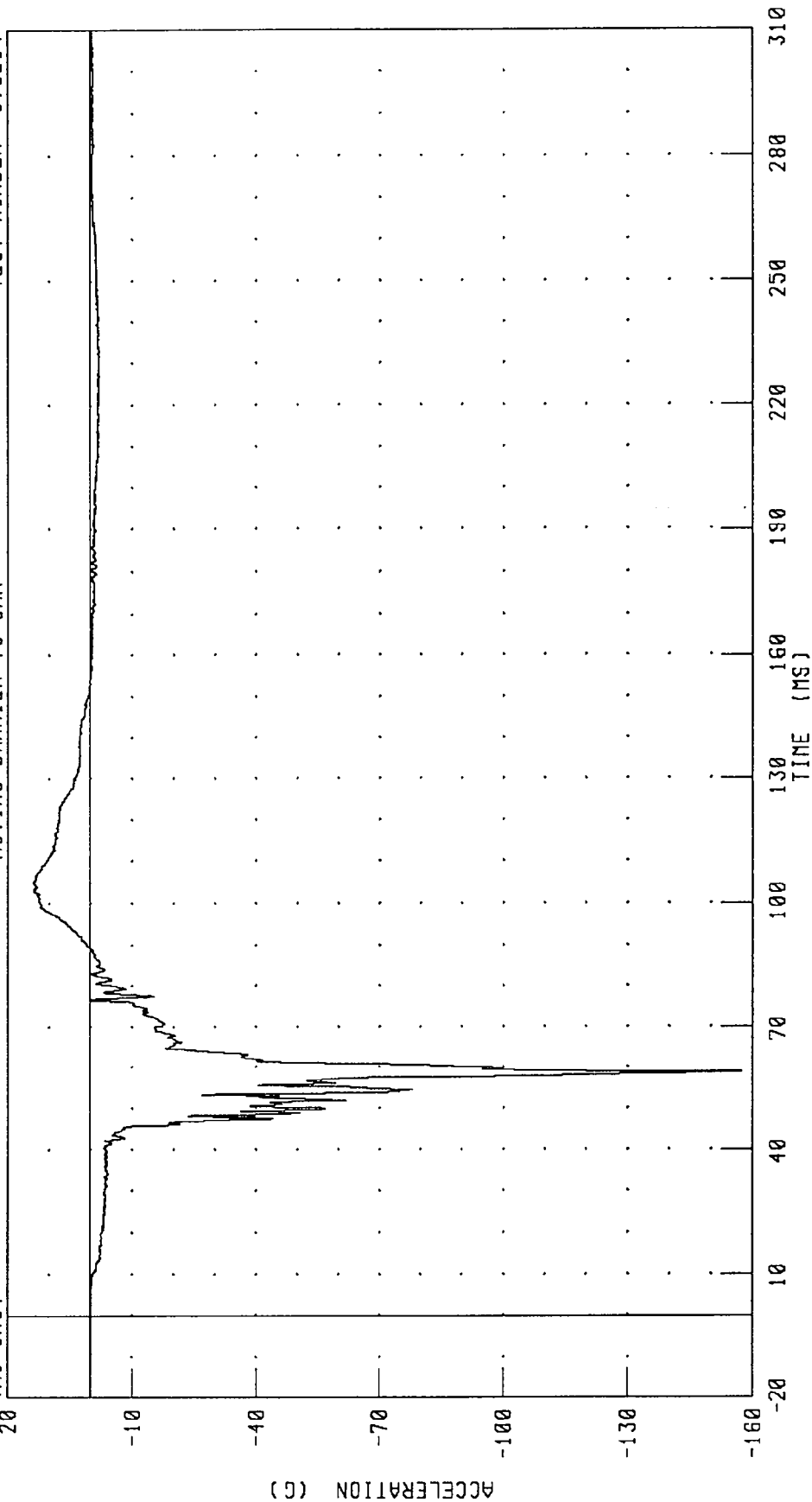
CHANNEL: CSTXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.22 MM @ 25.44 MS; -27.96 MM @ 67.20 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER PELVIS LONGITUDINAL AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



CHANNEL: PEVXG1 FILTER: CH. CLASS 1000

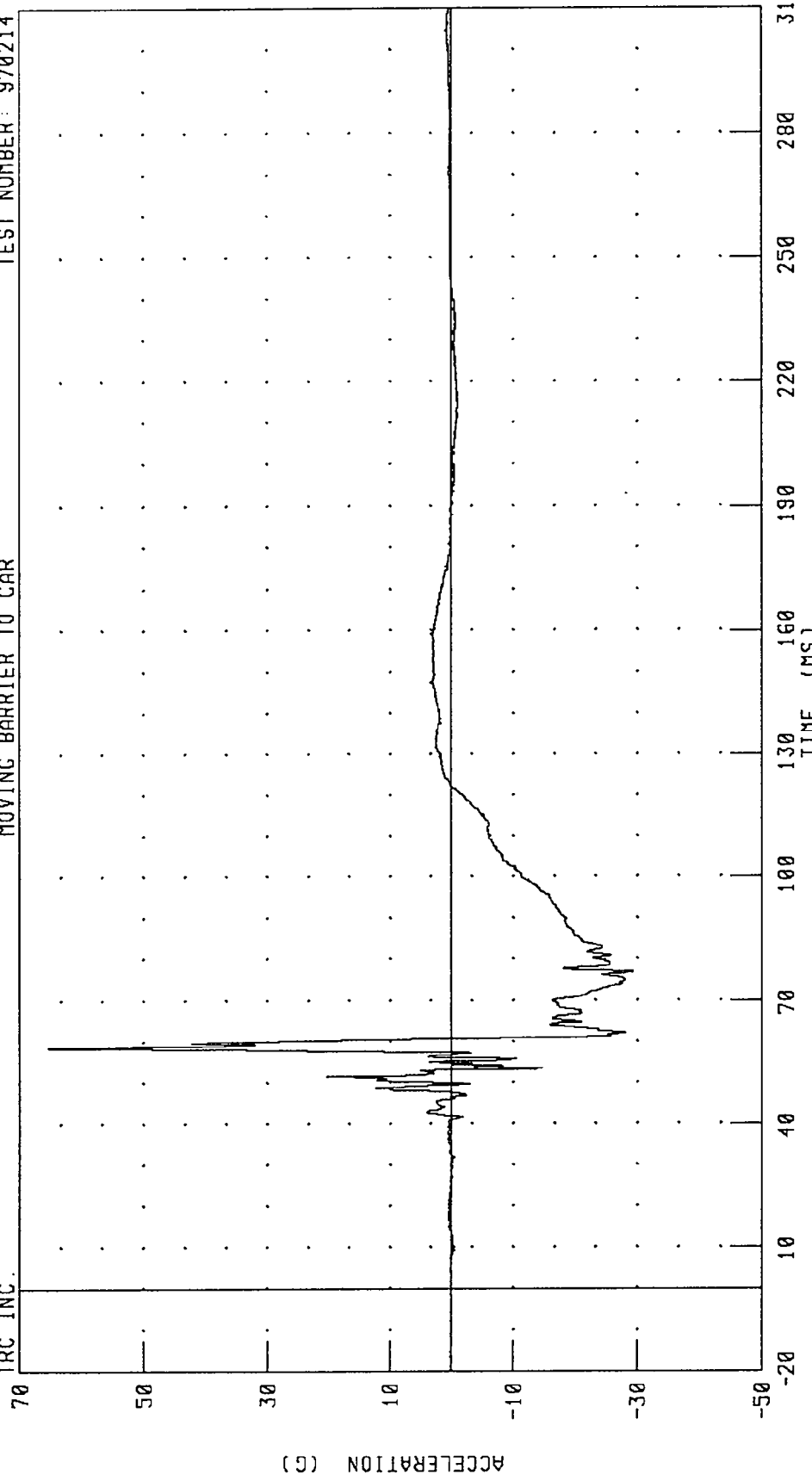
PEAK DATA: 13.73 G @ 105.04 MS; -157.44 G @ 58.64 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER PELVIS LATERAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

PEAK DATA: 65.42 G @ 58.72 MS, -29.29 G @ 76.88 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER PELVIS VERTICAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

60

40

20

ACCELERATION (G)

B-20

-20

-40

-60

TIME (MS)

310

280

250

220

190

160

130

100

70

40

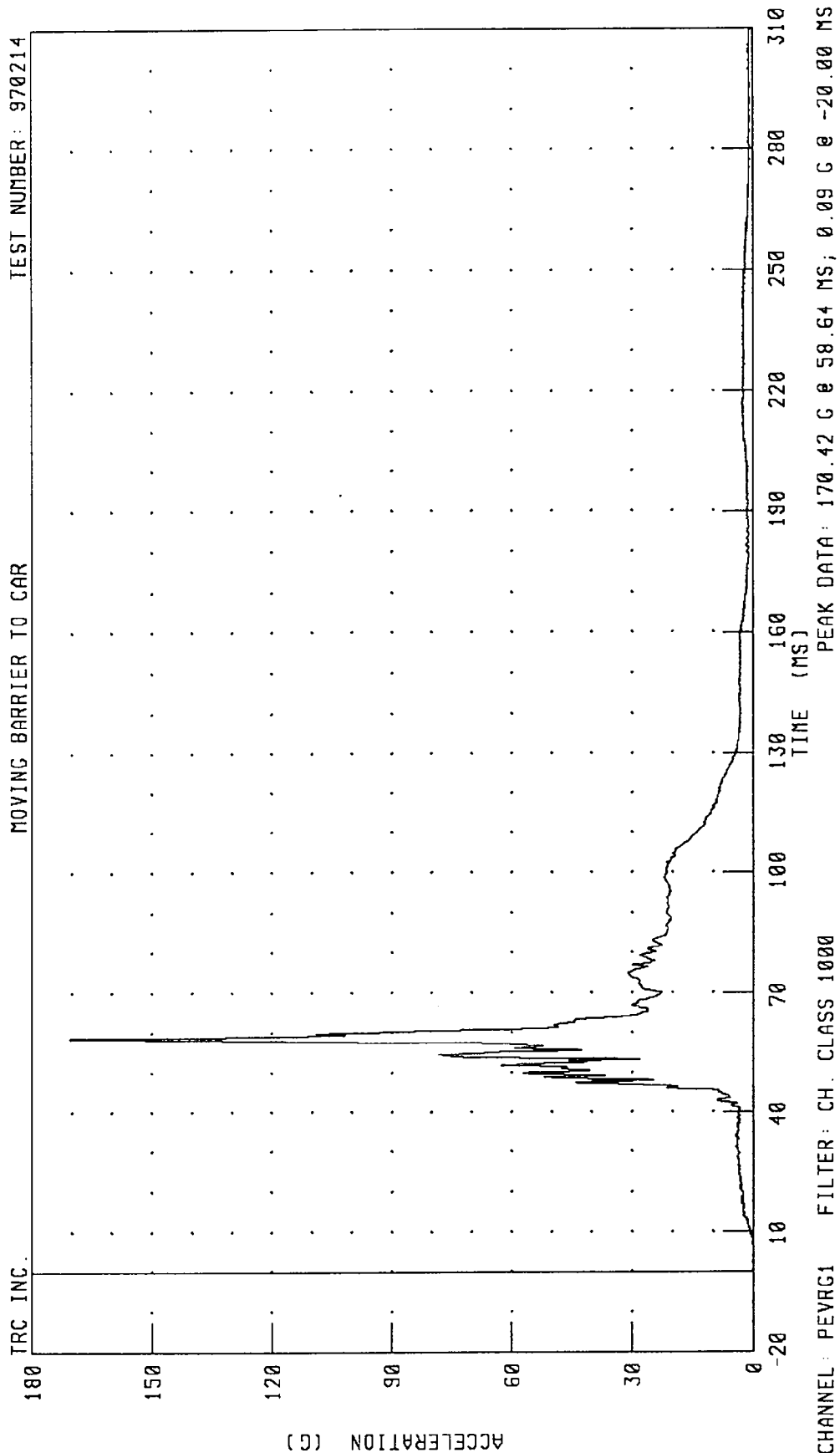
10

CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

PEAK DATA: 14.15 G @ 98.40 MS; -21.42 G @ 59.20 MS

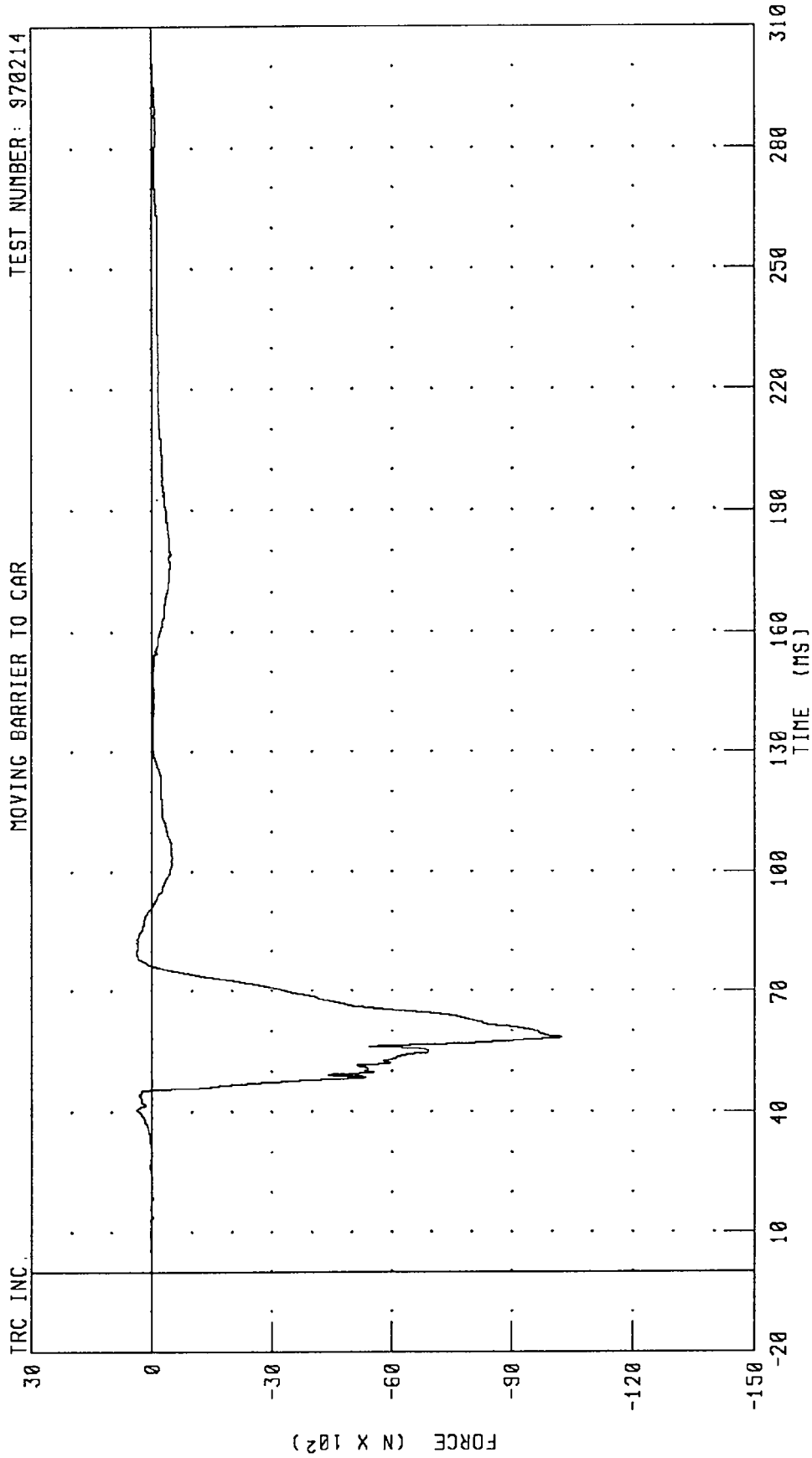
970214

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER PELVIS RESULTANT ACCELERATION



CHANNEL: PEVRG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT FEMUR FORCE
 MOVING BARRIER TO CAR



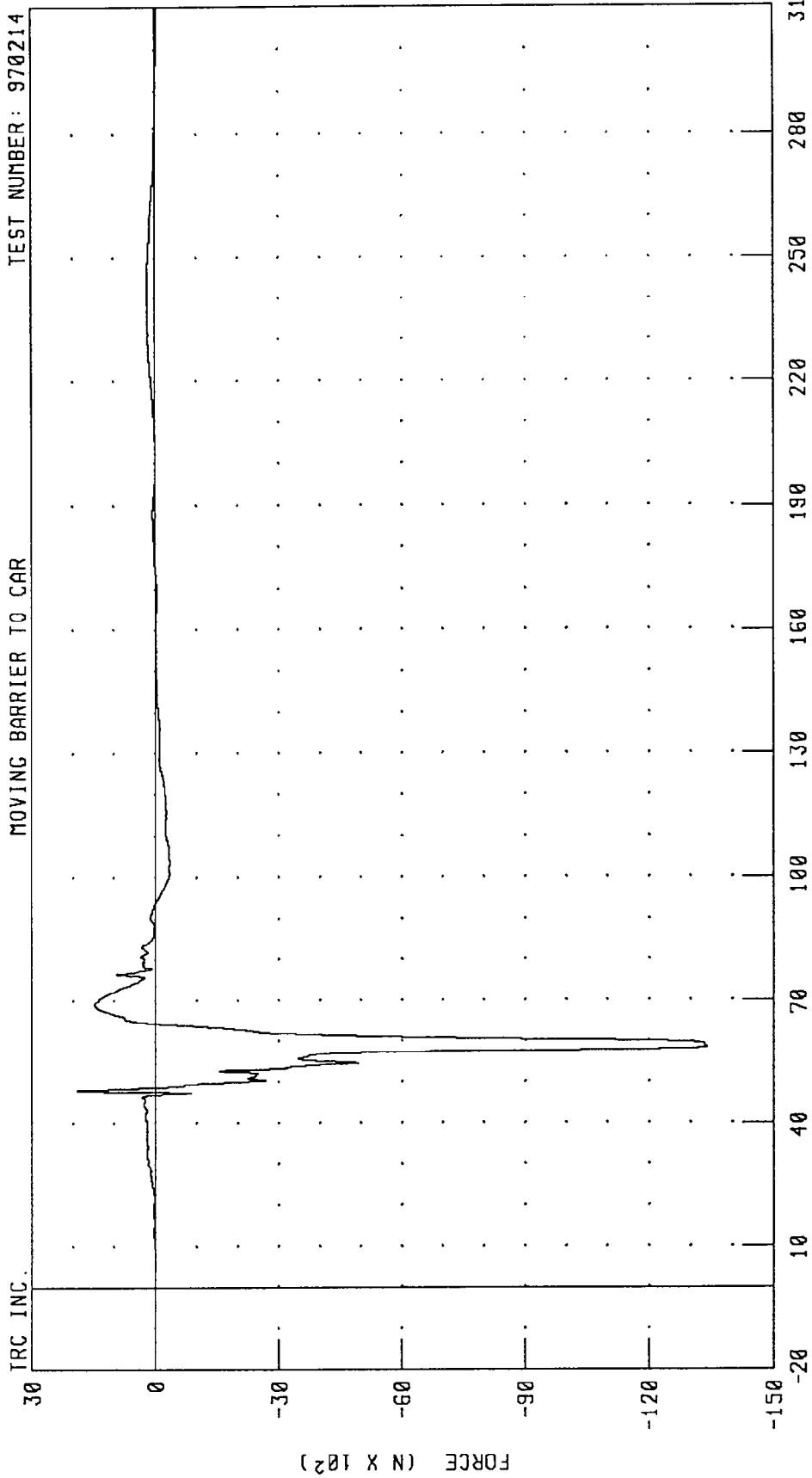
CHANNEL: LFMF1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER

DRIVER RIGHT FEMUR FORCE

MOVING BARRIER TO CAR

TEST NUMBER: 970214

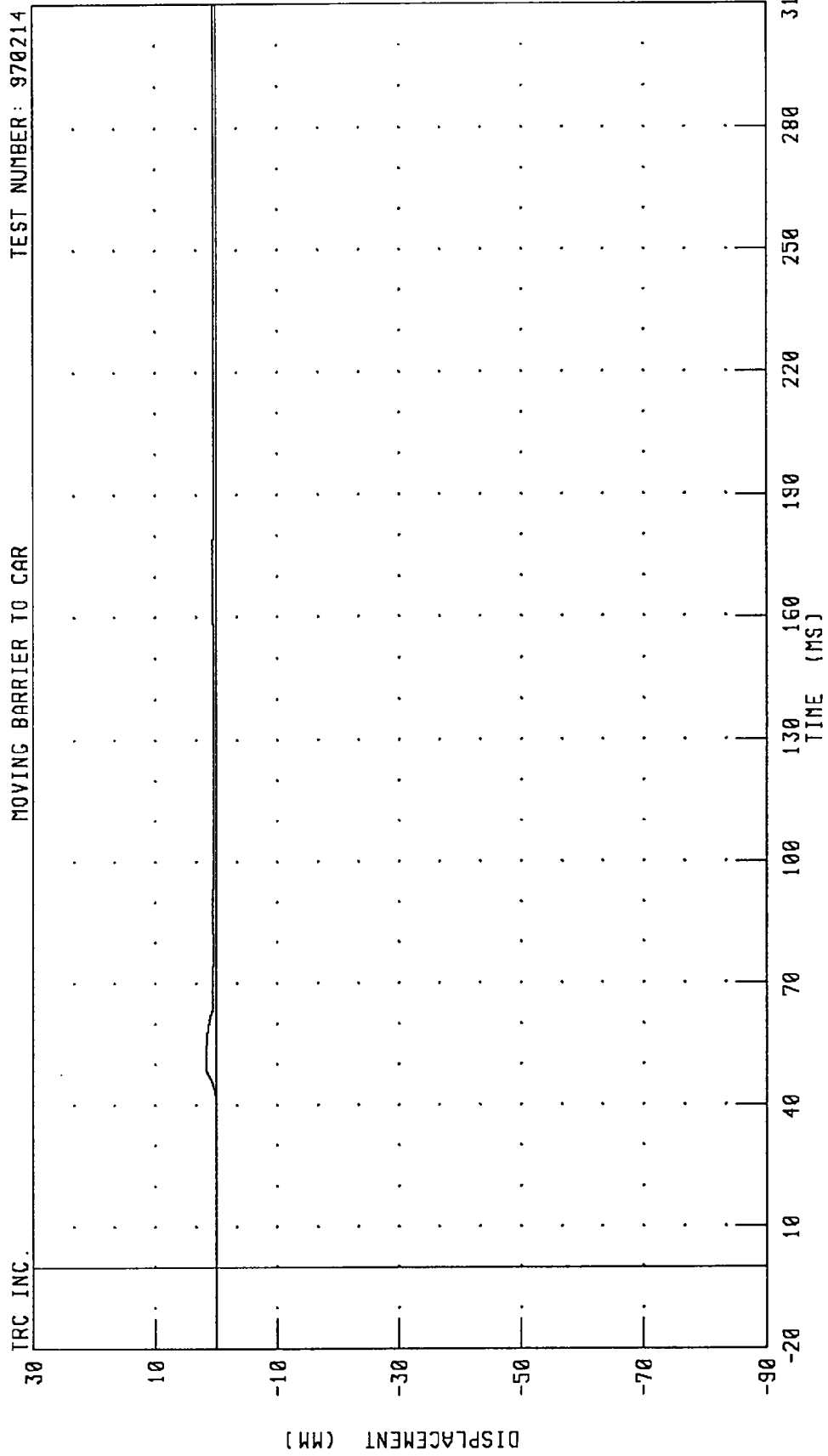


PEAK DATA: 1878.87 N @ 48.00 MS; -13383.31 N @ 58.40 MS

CHANNEL: RFMF1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT KNEE DISPLACEMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



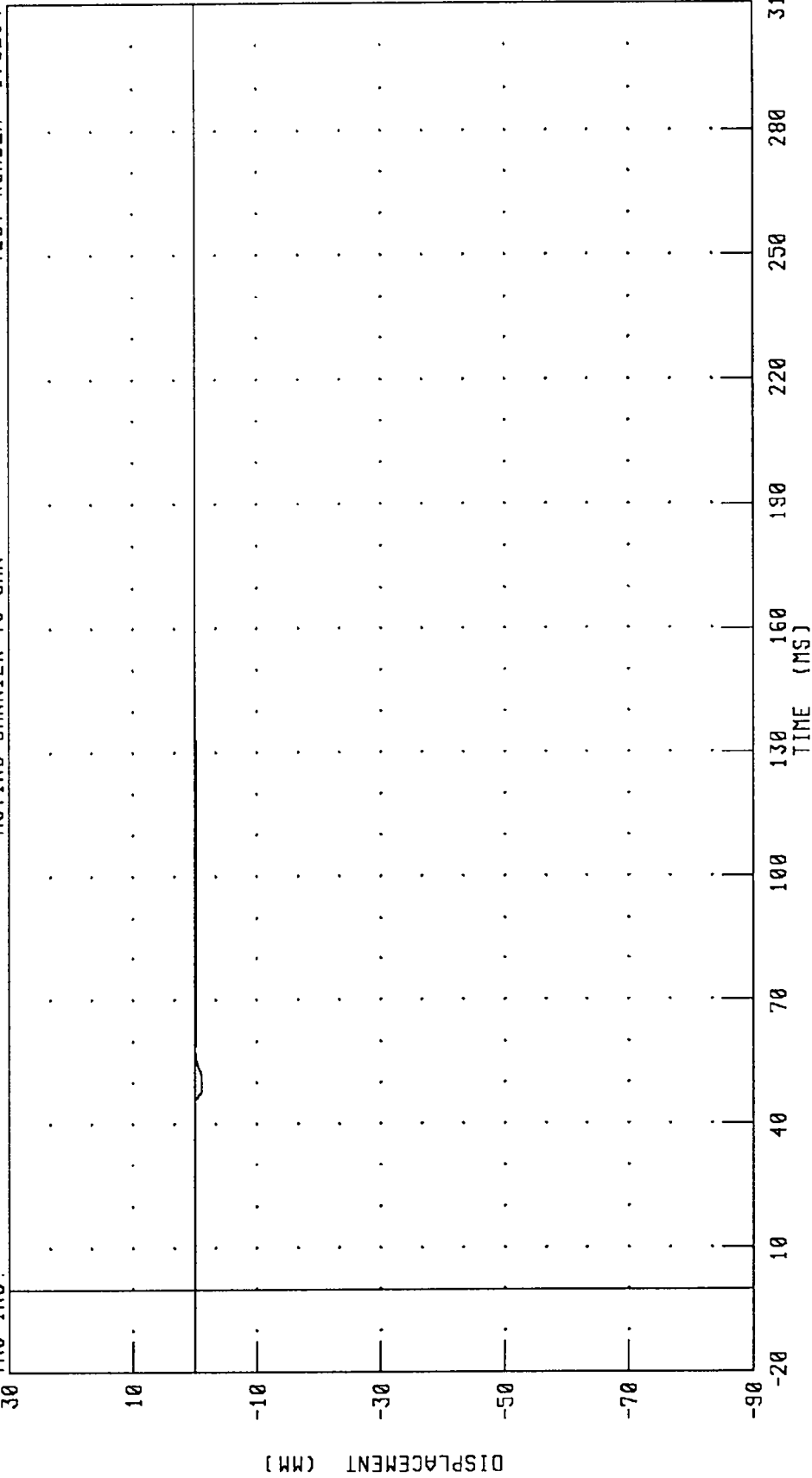
PEAK DATA: 1.66 MM @ 49.28 MS; 0.00 MM @ 0.48 MS

CHANNEL: KNLXD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT KNEE DISPLACEMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

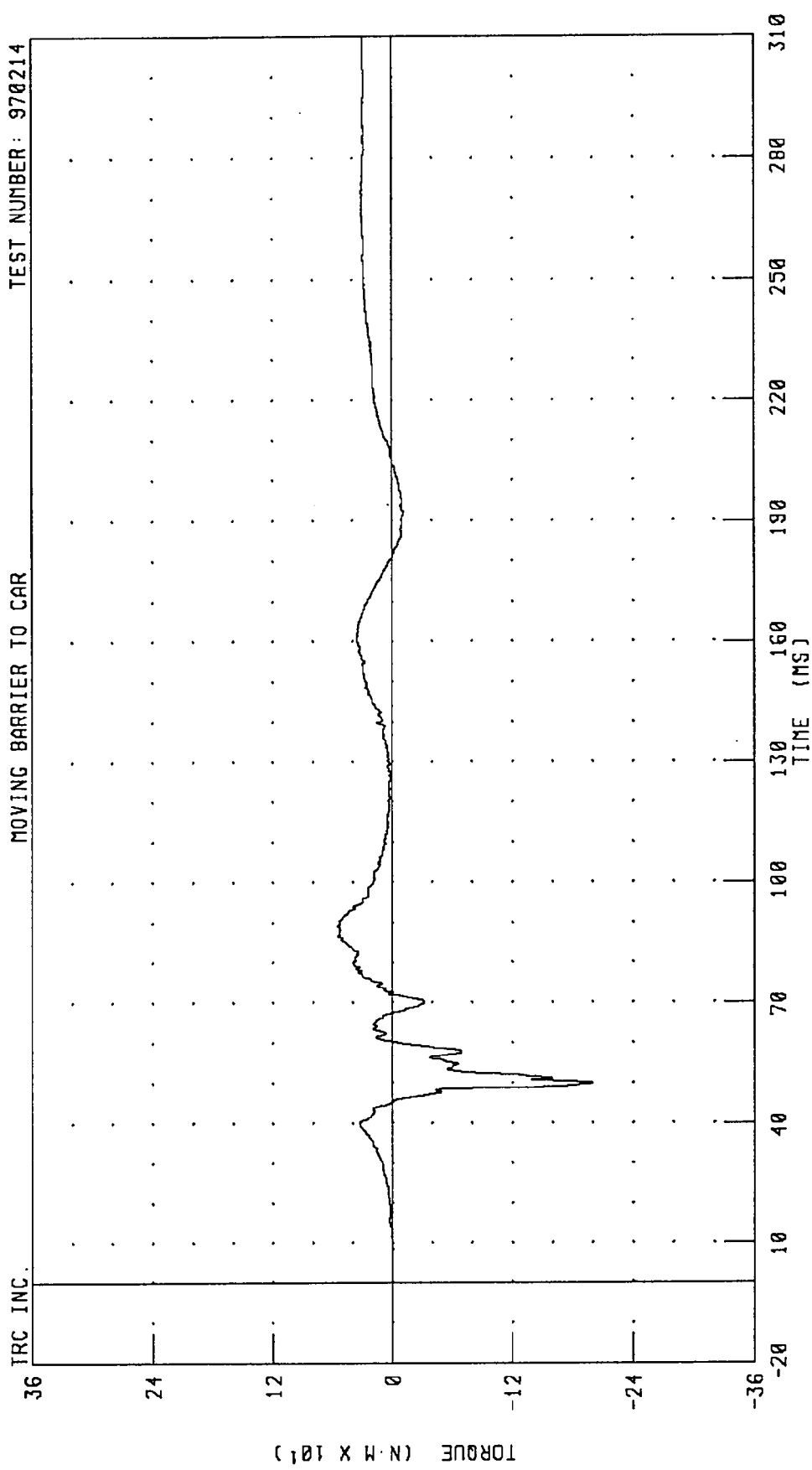


CHANNEL: KNRXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.03 MM @ 175.36 MS; -1.03 MM @ 48.40 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT UPPER TIBIA X MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



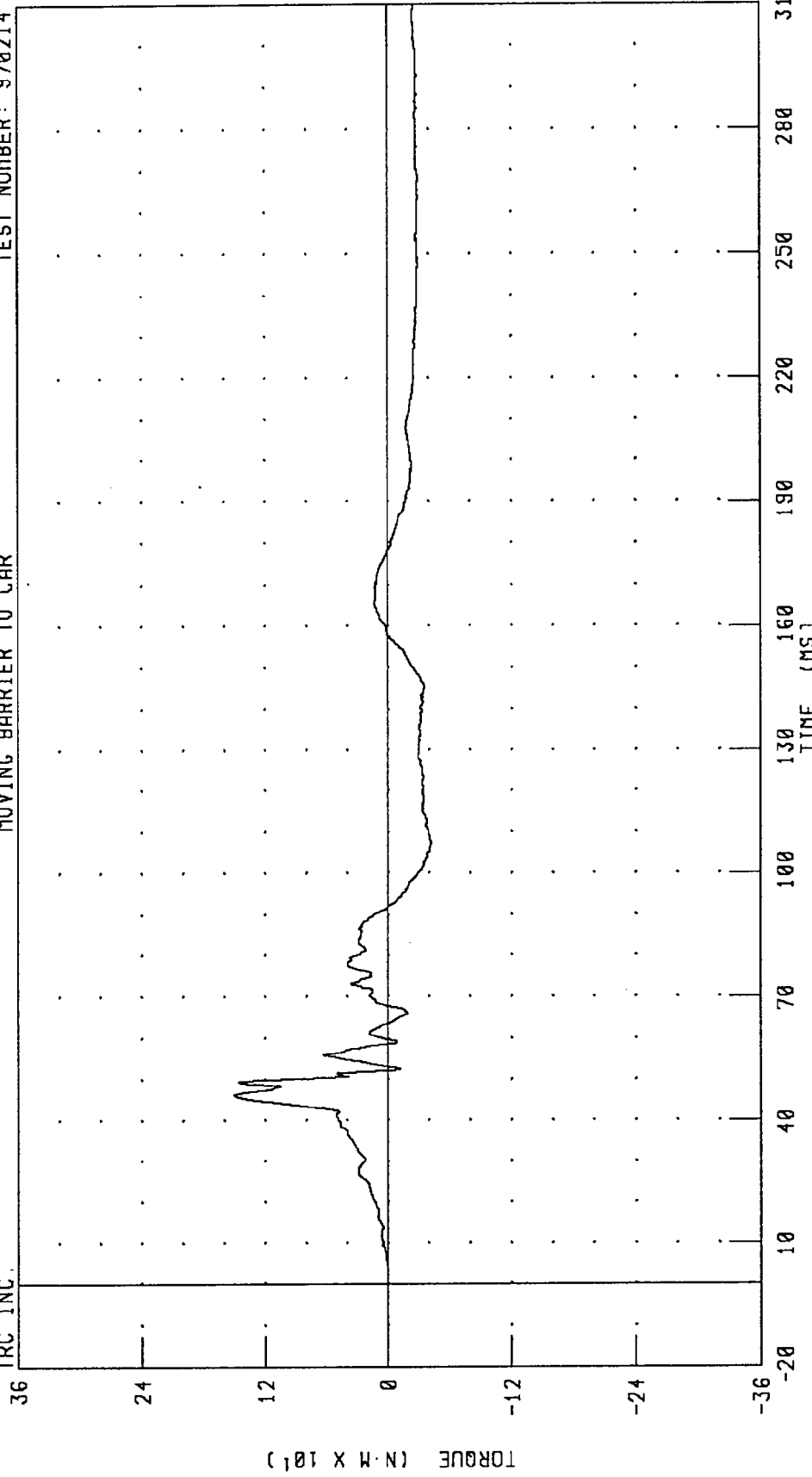
PEAK DATA: 55.84 N·m @ 89.28 ms; -200.39 N·m @ 49.92 ms

CHANNEL: TBLXMI FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT UPPER TIBIA Y MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

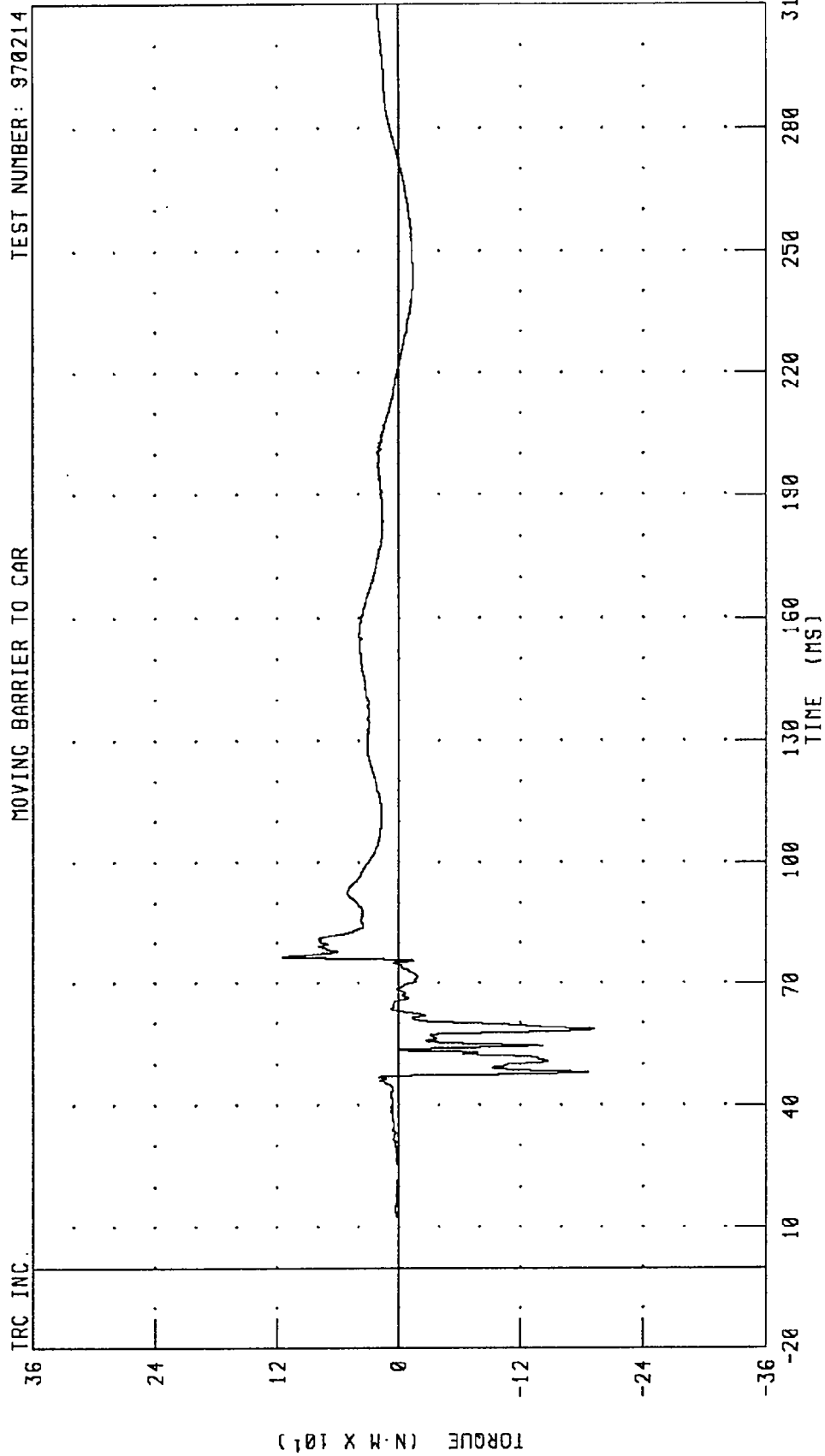
TRC INC.



CHANNEL: TBLYM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT UPPER TIBIA X MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

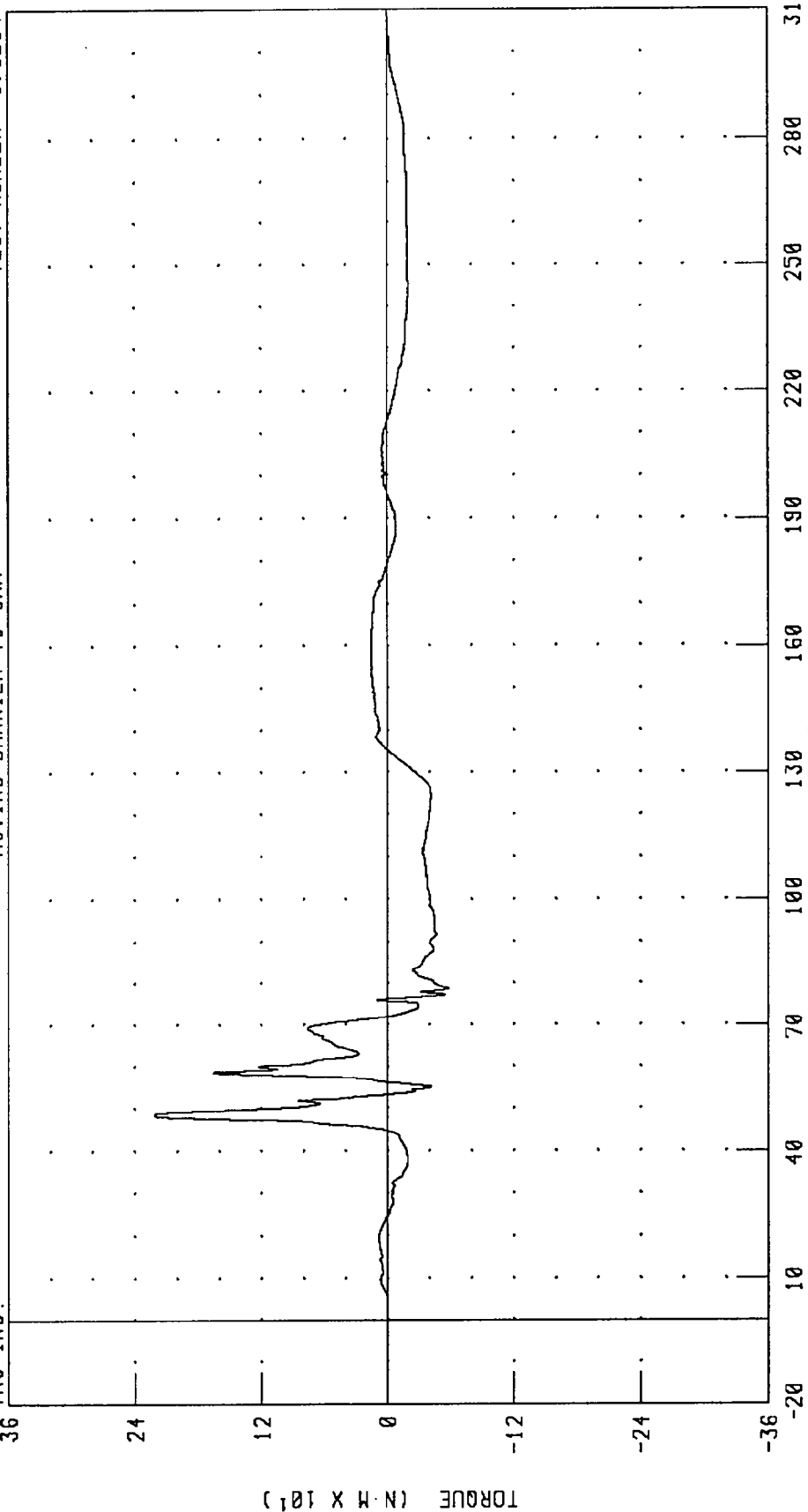


CHANNEL: TBRXM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT UPPER TIBIA Y MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.

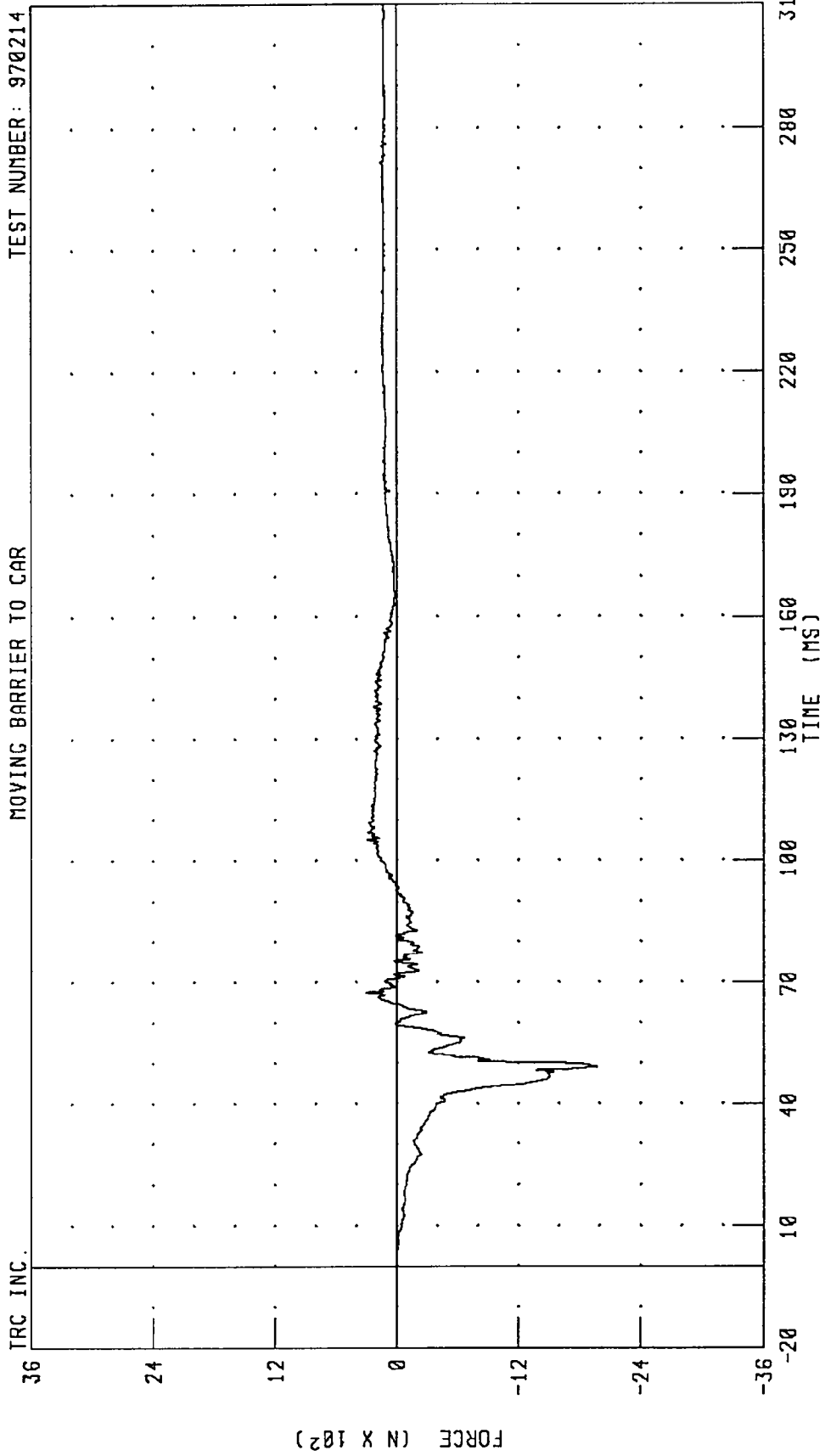


CHANNEL: TBRYM1 FILTER: CH. CLASS 600

PEAK DATA: 221.50 N·m @ 48.40 MS; -57.48 N·m @ 78.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT LOWER TIBIA X-AXIS FORCE
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



CHANNEL: ANLXF1 FILTER: CH. CLASS 600

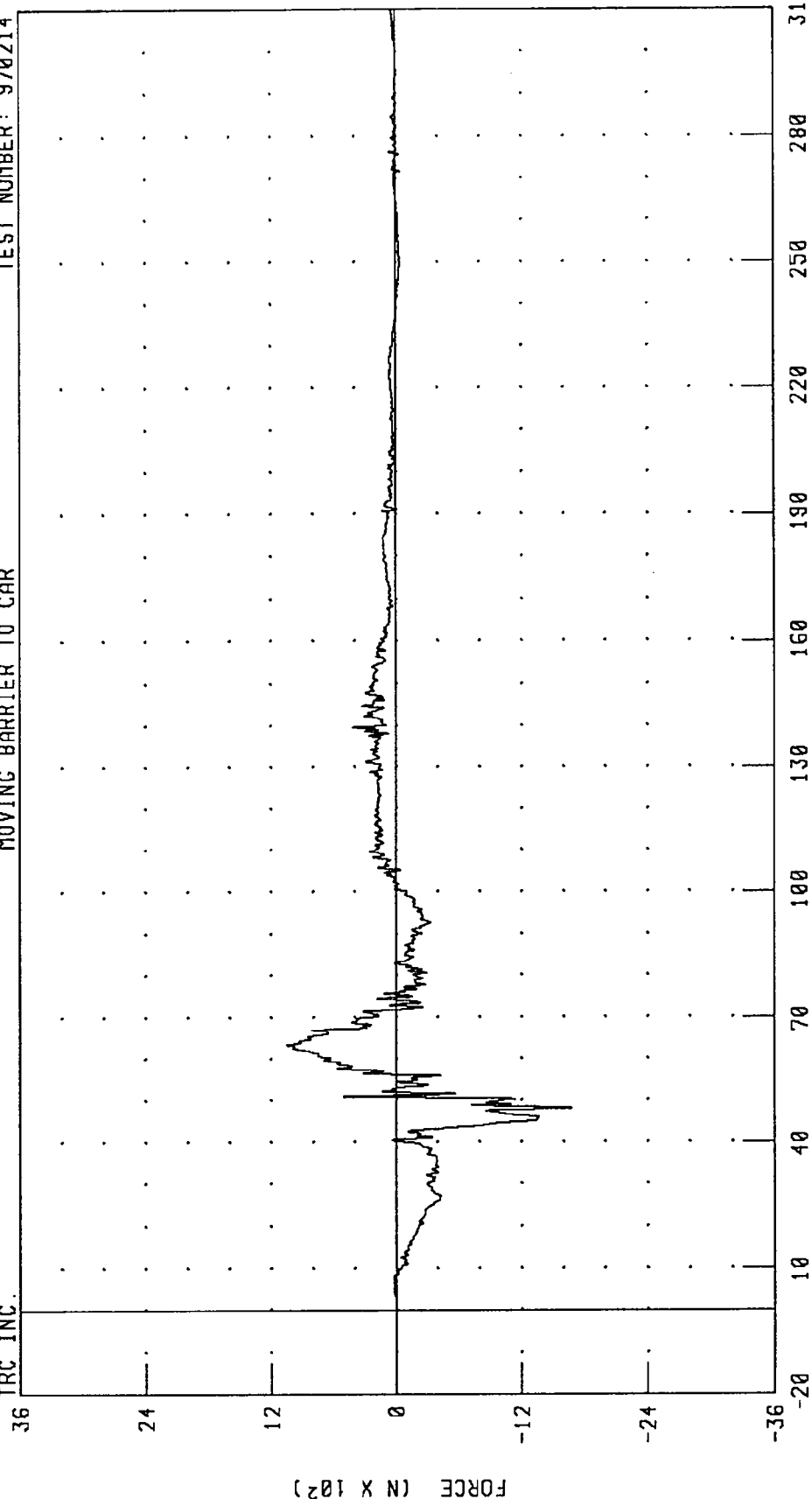
PEAK DATA: 303.13 N @ 67.44 MS; -1972.56 N @ 49.04 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 1053.26 N @ 63.28 MS; -1678.40 N @ 48.00 MS

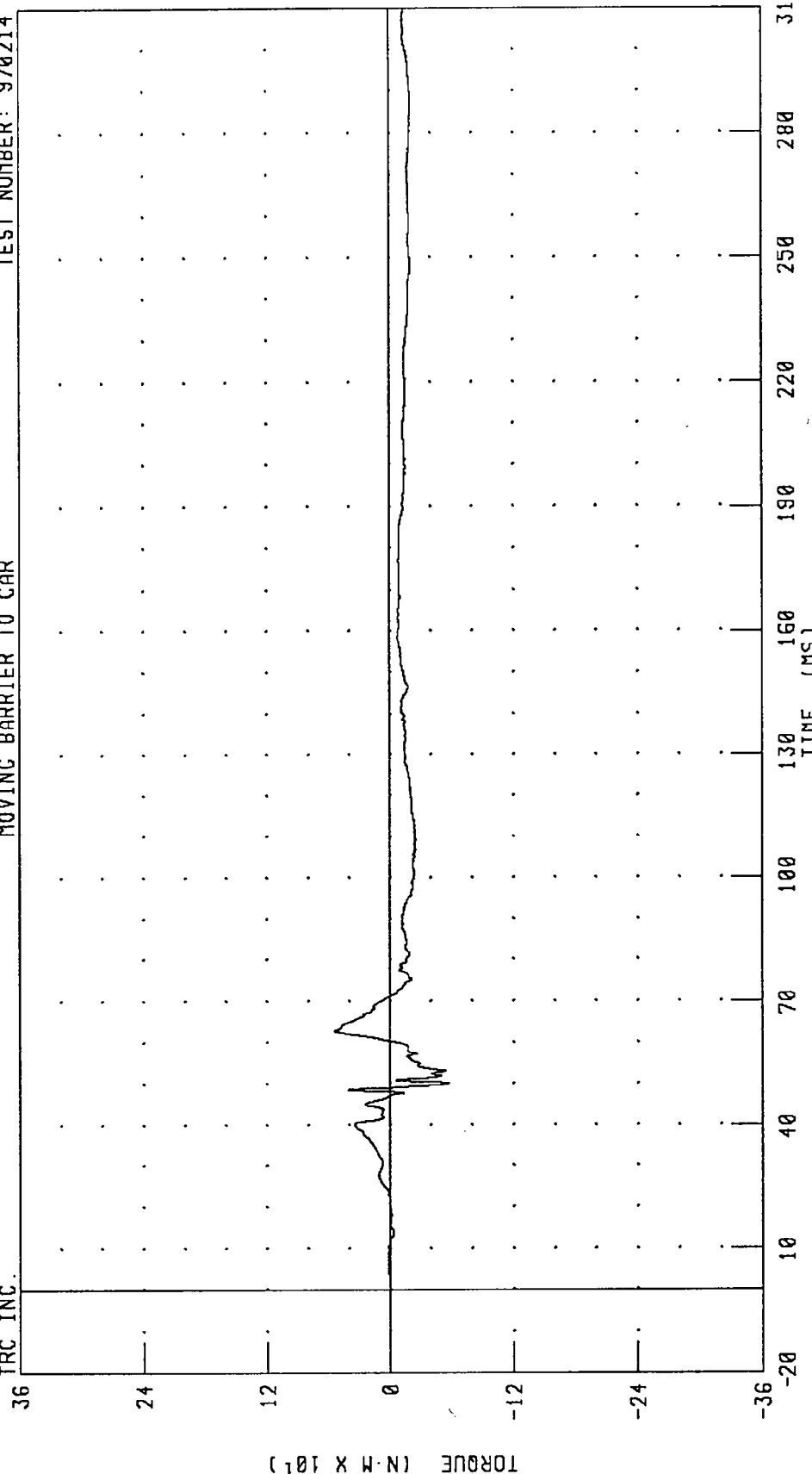
CHANNEL: ANLZF1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

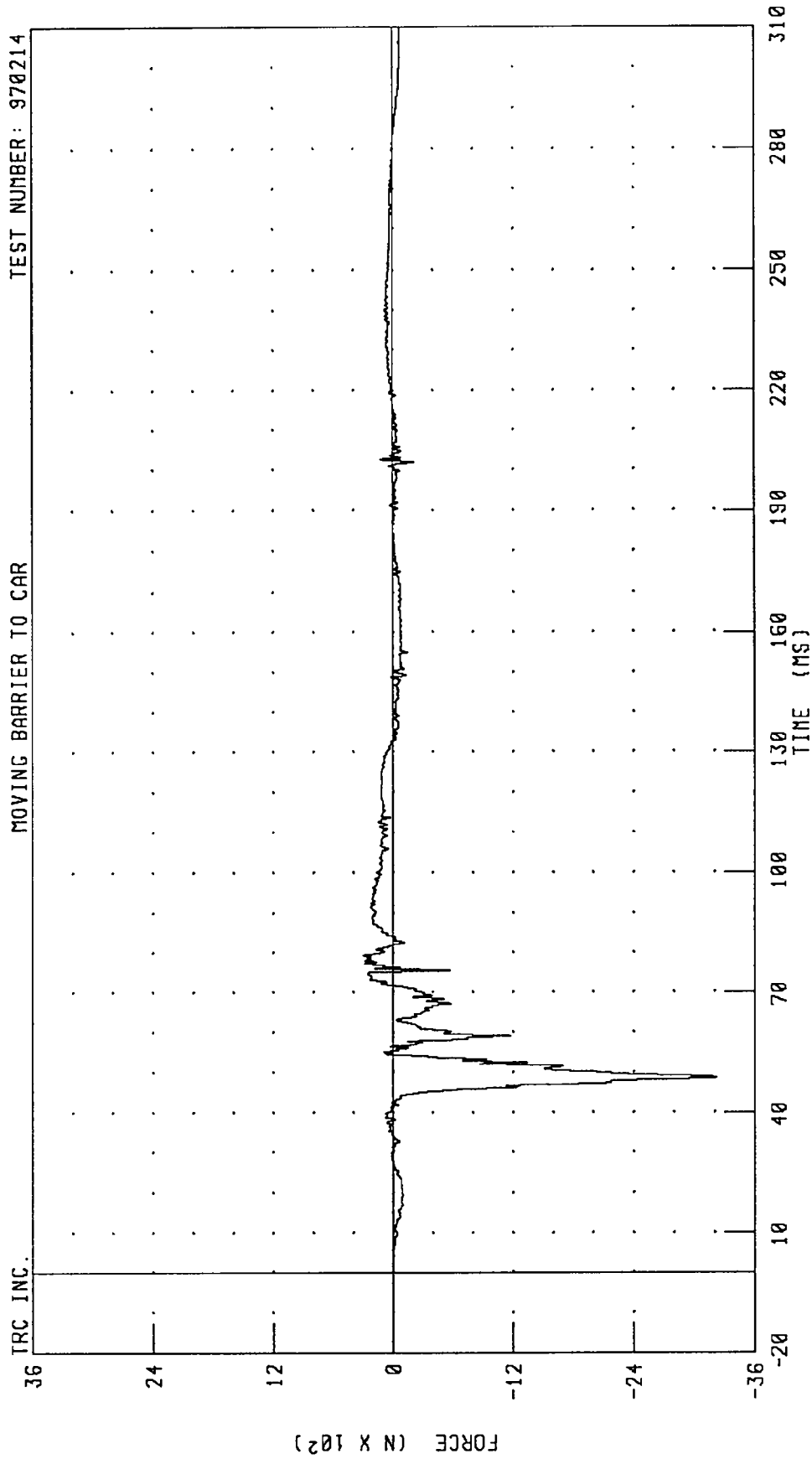


PEAK DATA: 54.50 N-M @ 62.80 MS; -58.05 N-M @ 50.00 MS

CHANNEL: ANLYM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT LOWER TIBIA X-AXIS FORCE
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



PEAK DATA: 307.35 N @ 79.36 MS; -3221.33 N @ 48.56 MS

CHANNEL: ANRXF1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

36

24

12

FORCE (N X 10²)

-12

-24

-36

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

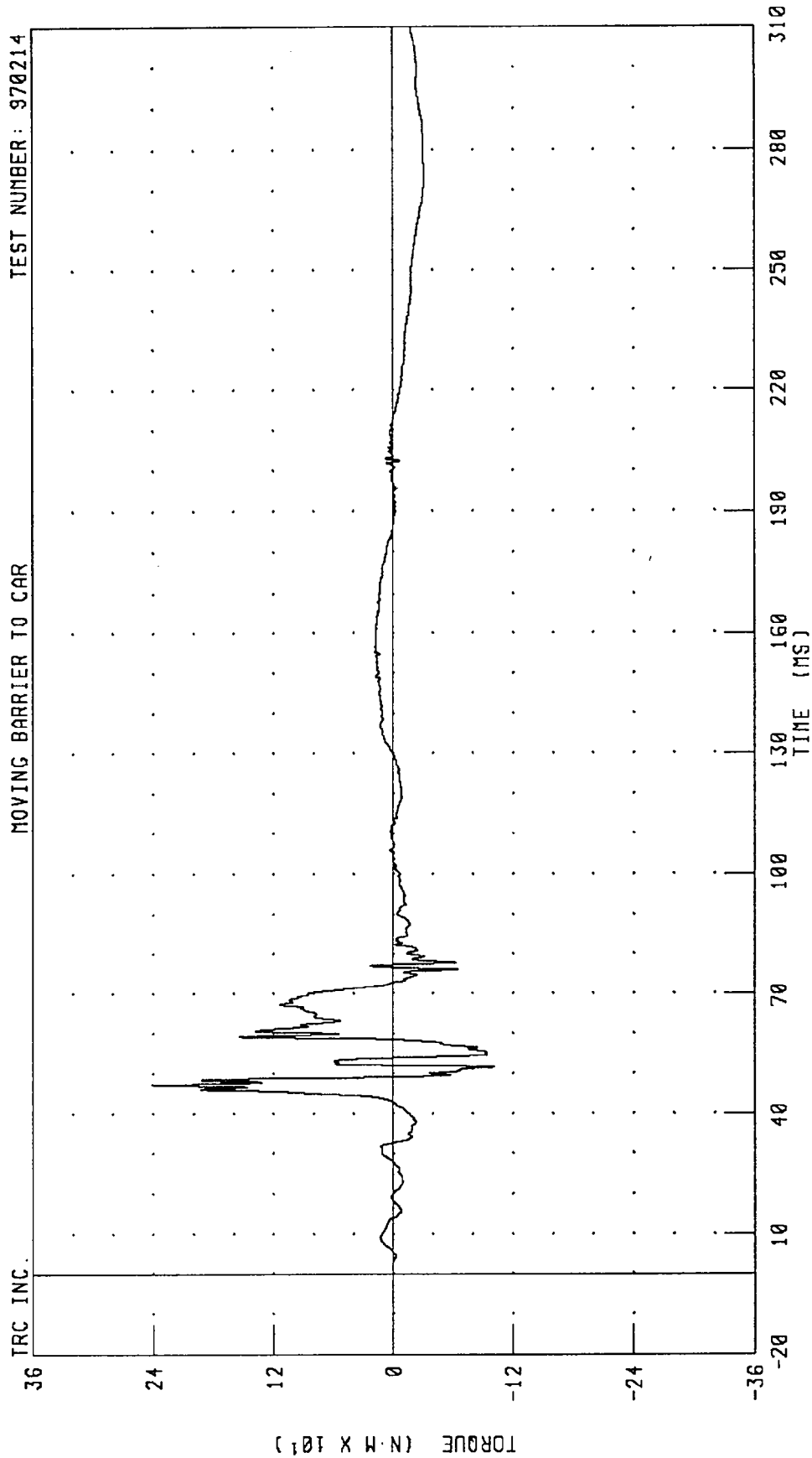
-20

CHANNEL: ANRZF1 FILTER: CH. CLASS 600

PEAK DATA: 244.51 N @ 55.12 MS; -2592.52 N @ 49.20 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



PEAK DATA: 241.67 N·m @ 47.28 MS; -101.90 N·m @ 51.60 MS

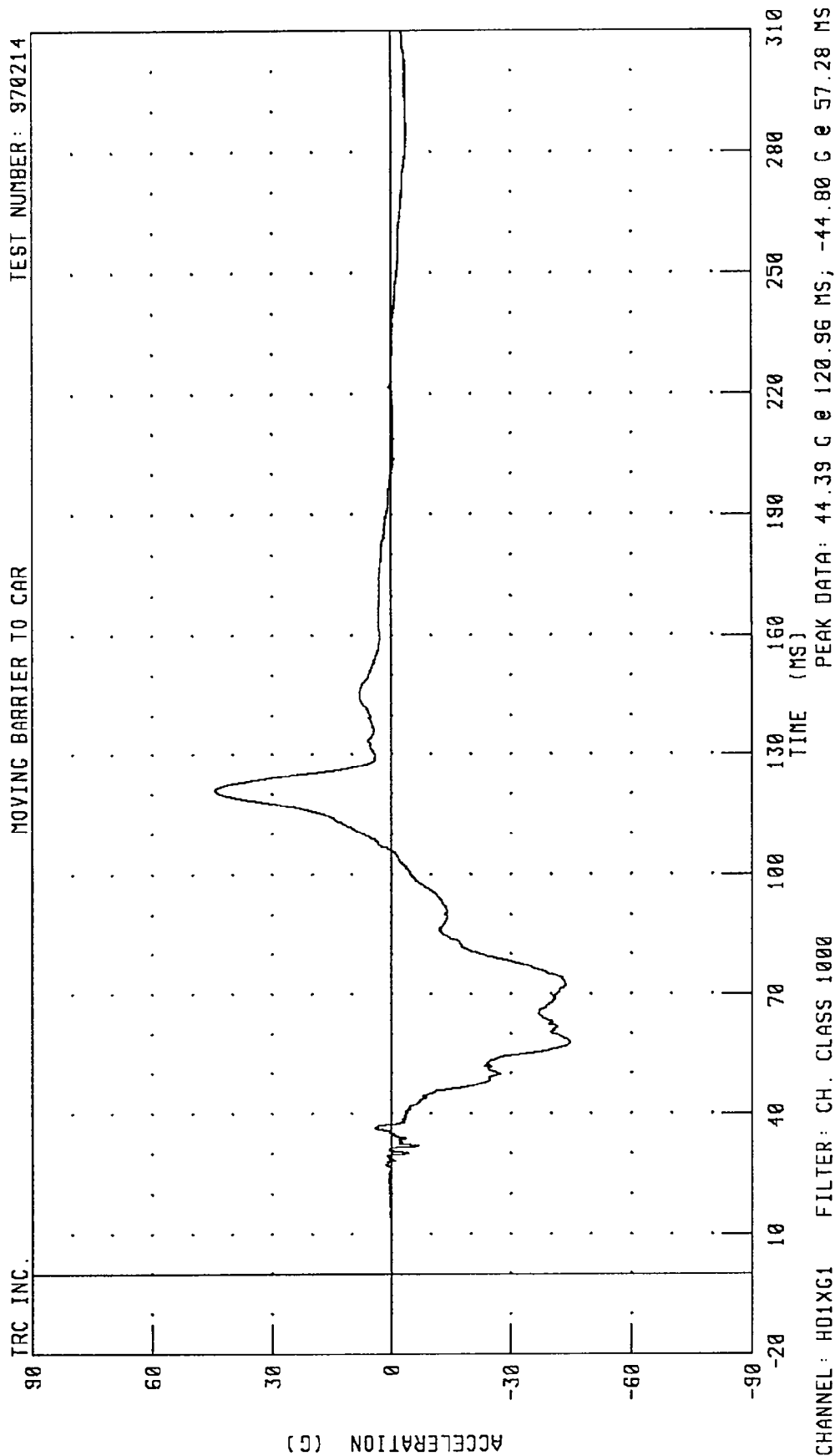
CHANNEL: ANRYM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD ARRAY 1 X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



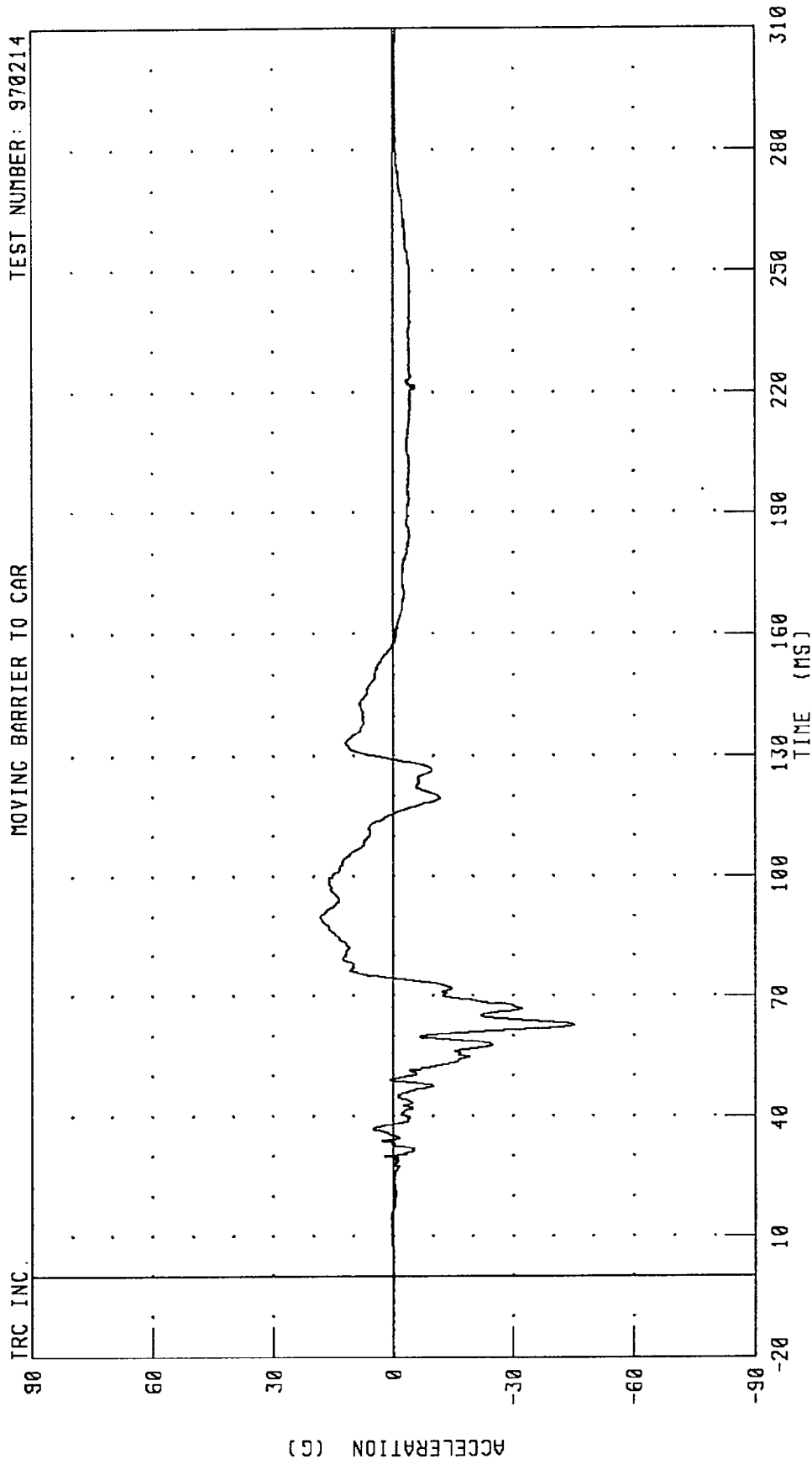
CHANNEL: HD1XG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD ARRAY 1 Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

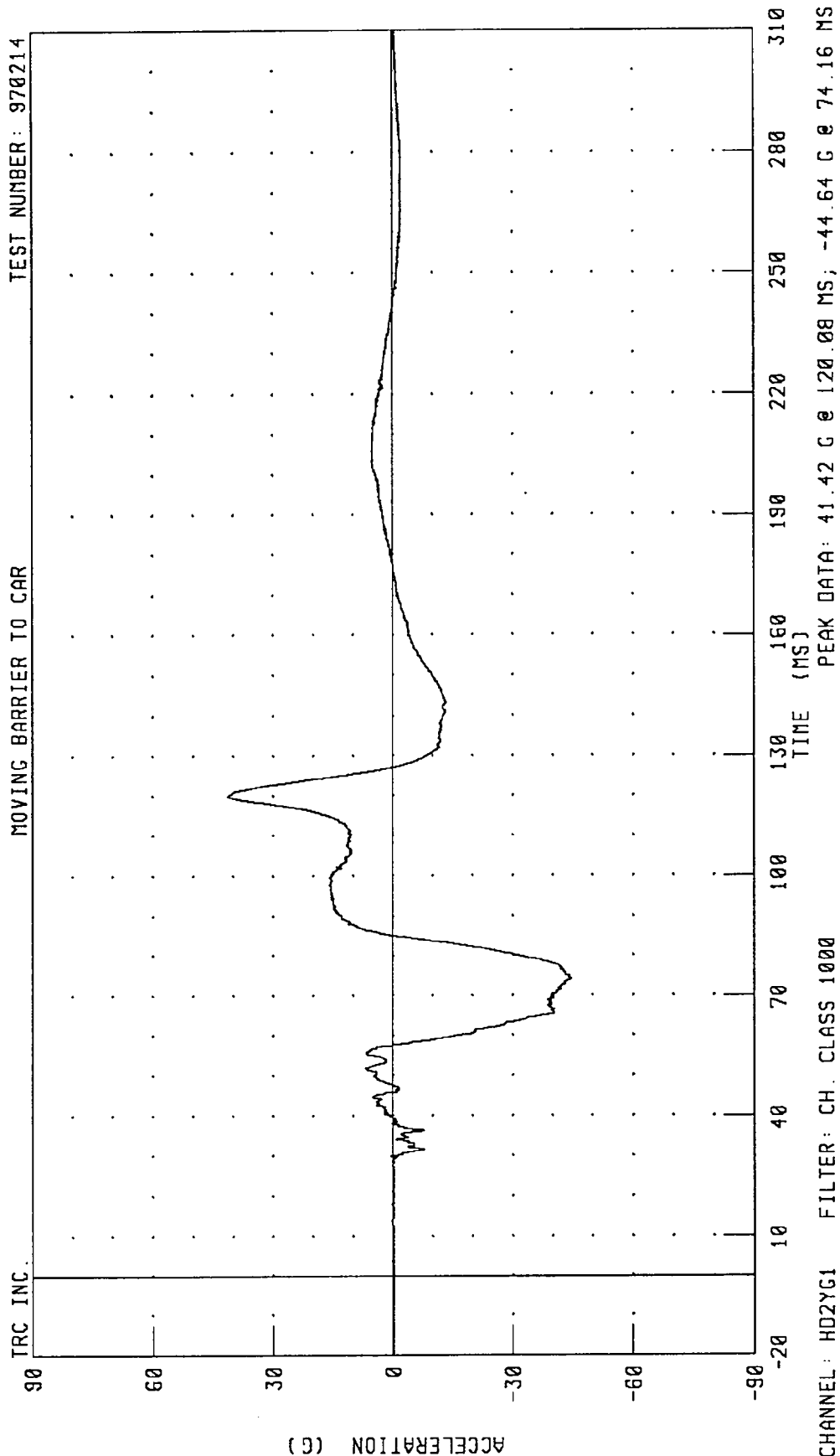


CHANNEL: HD1ZG1 FILTER: CH. CLASS 1000

PEAK DATA: 18.56 G @ 89.92 MS; -45.15 G @ 62.64 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD ARRAY 2 Y-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

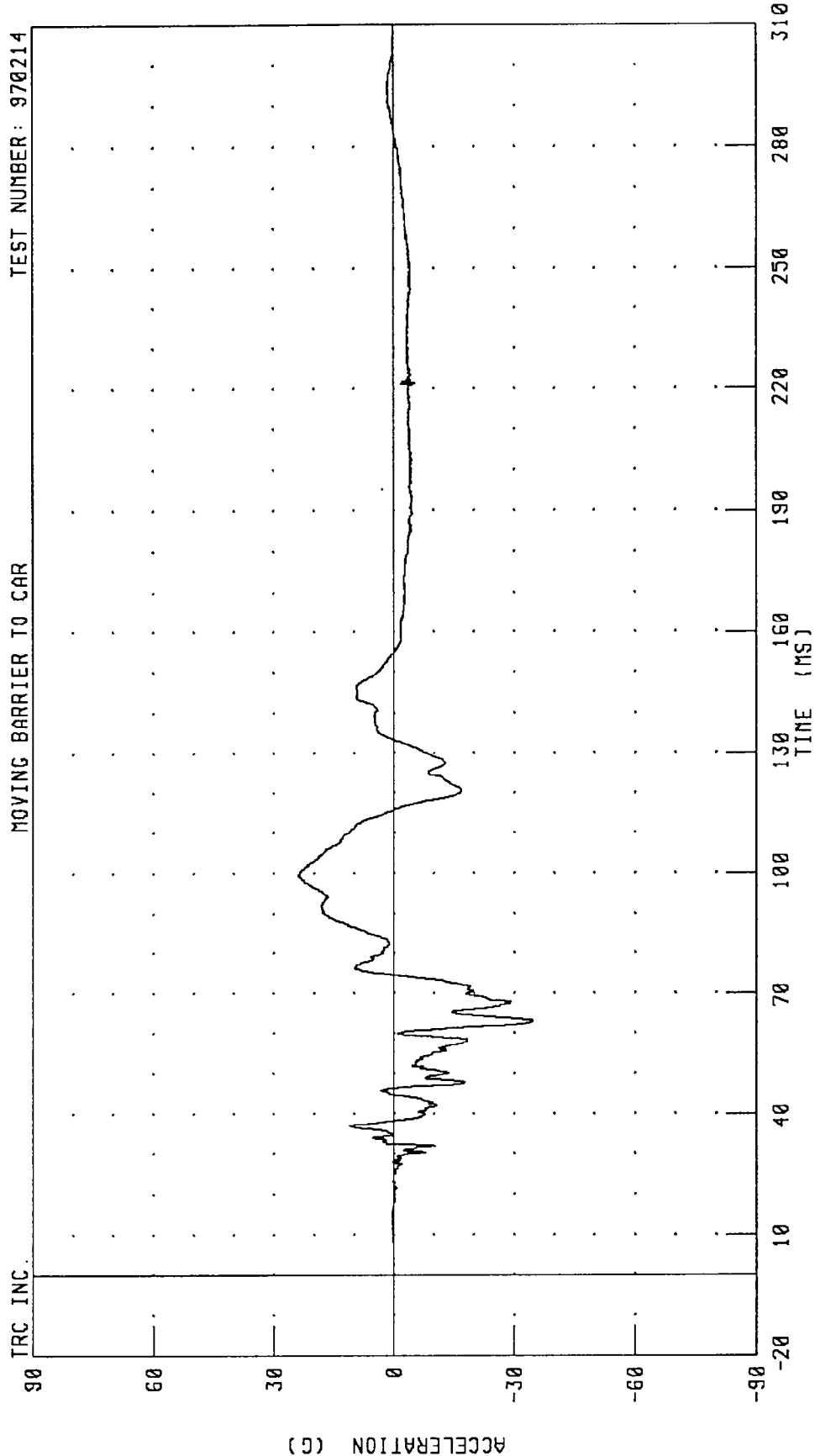


CHANNEL: HD2YG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD ARRAY 2 Z-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



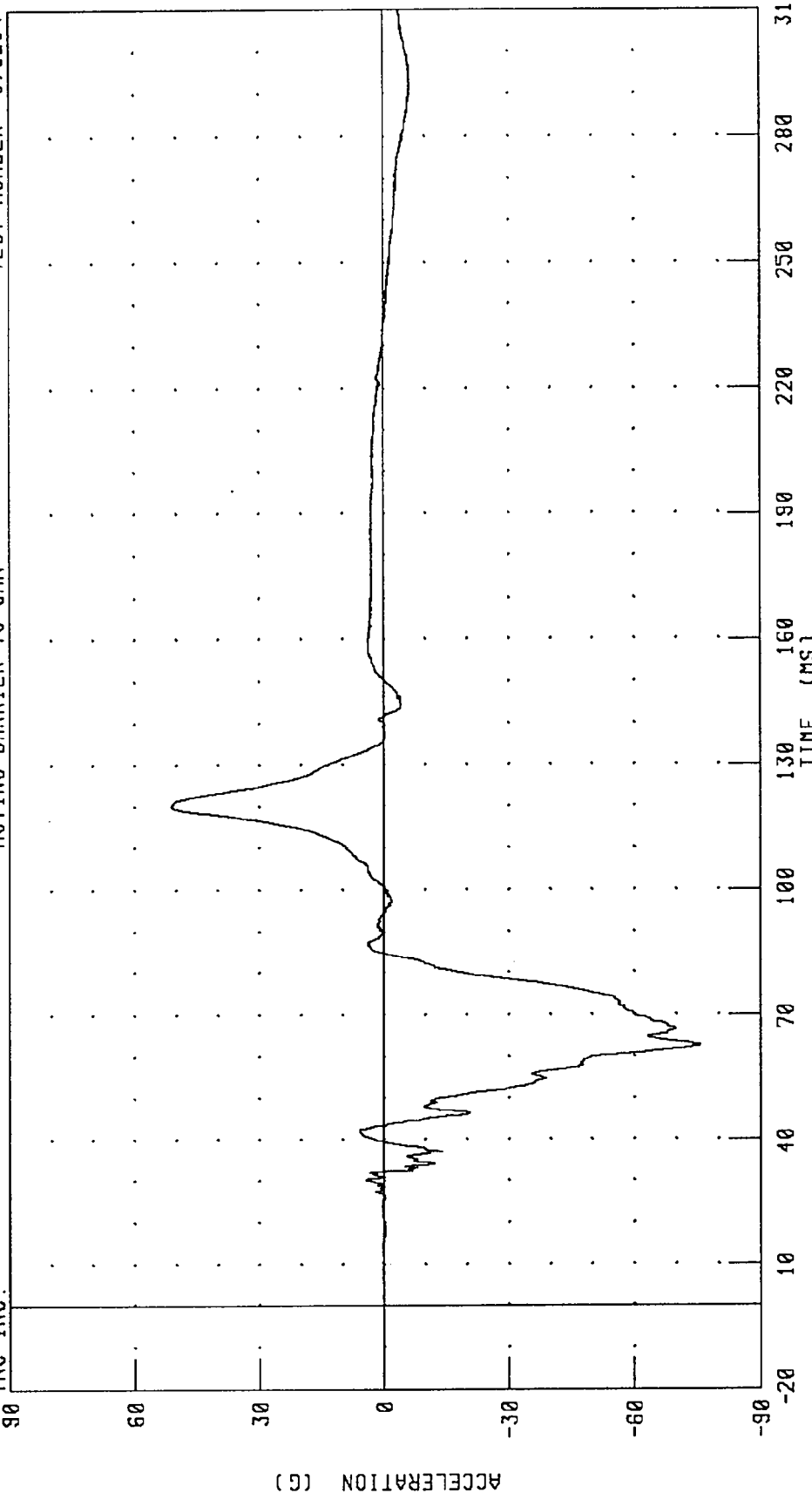
PEAK DATA: 24.01 G @ 99.52 MS; -34.62 G @ 62.96 MS

CHANNEL: HD2ZG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER HEAD ARRAY 3 X-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



PEAK DATA: 51.25 G @ 120.24 MS; -75.61 G @ 120.56 MS

CHANNEL: HD3XG1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER HEAD ARRAY 3 Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

90

60

30

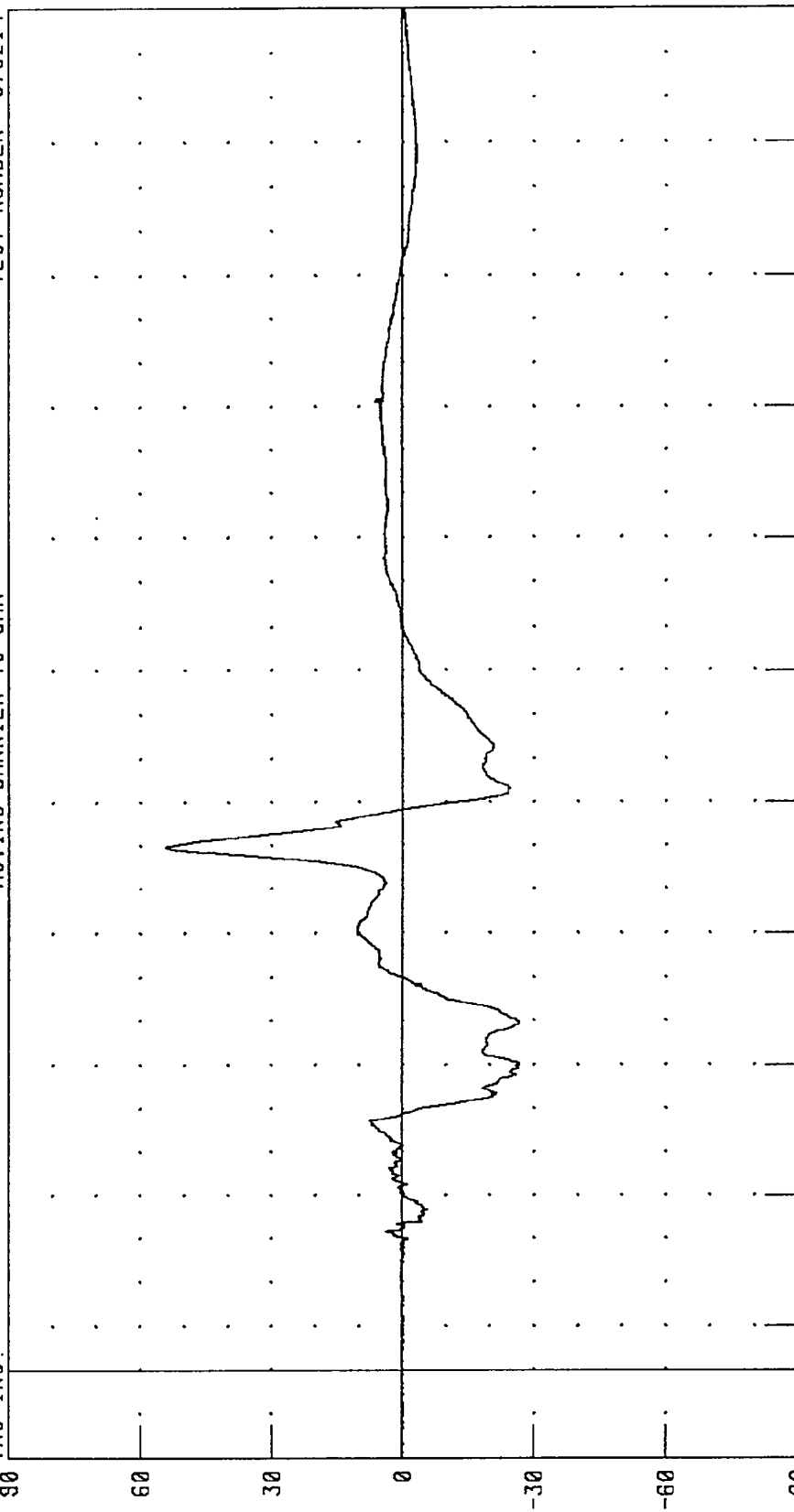
0

-30

-60

-90

ACCELERATION (G)

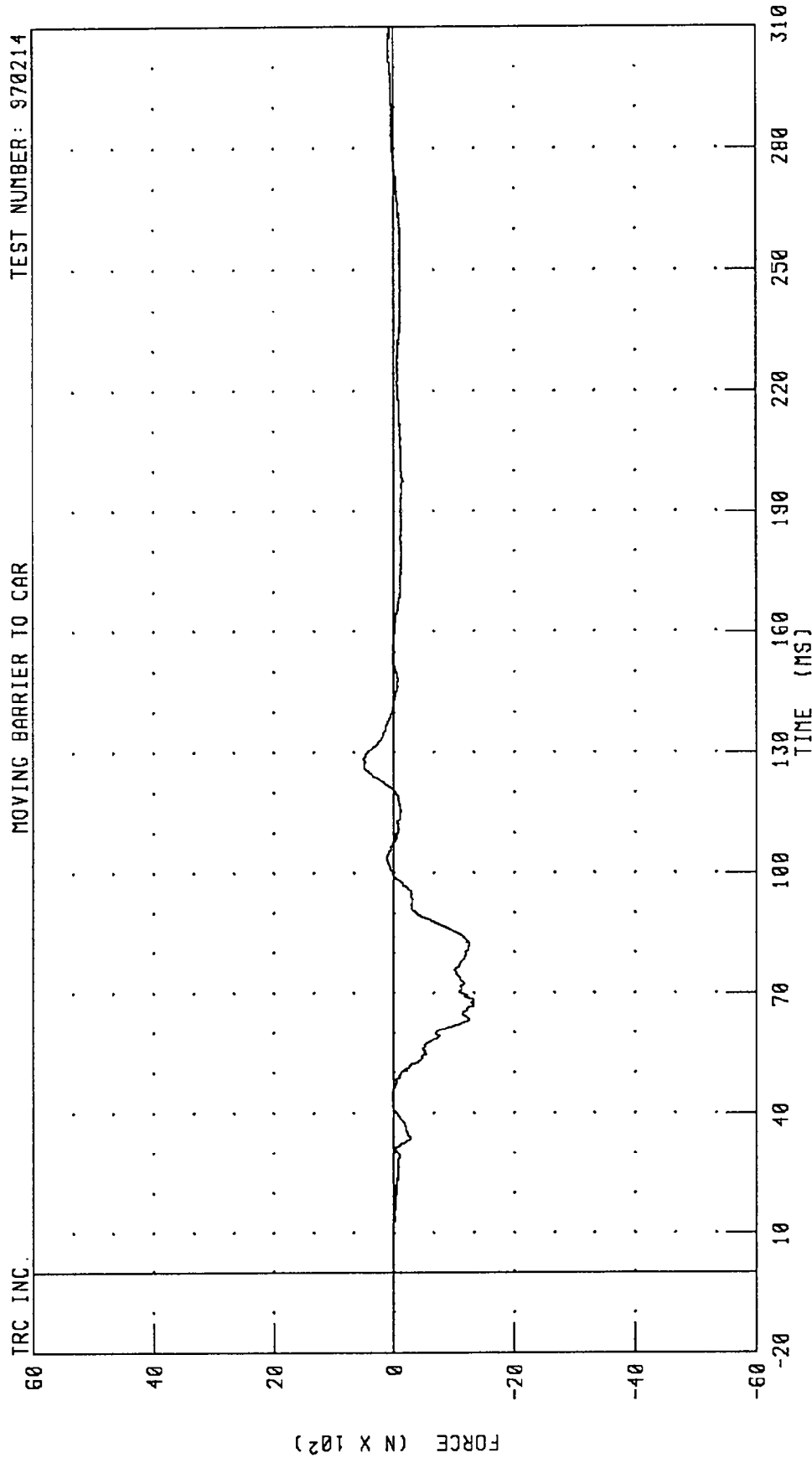


310 280 250 220 190 160 130 TIME (MS)

CHANNEL: HD3YGI FILTER: CH. CLASS 1000

PEAK DATA: 54.31 G @ 119.68 MS; -26.75 G @ 70.16 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LOWER NECK X-AXIS FORCE
 MOVING BARRIER TO CAR

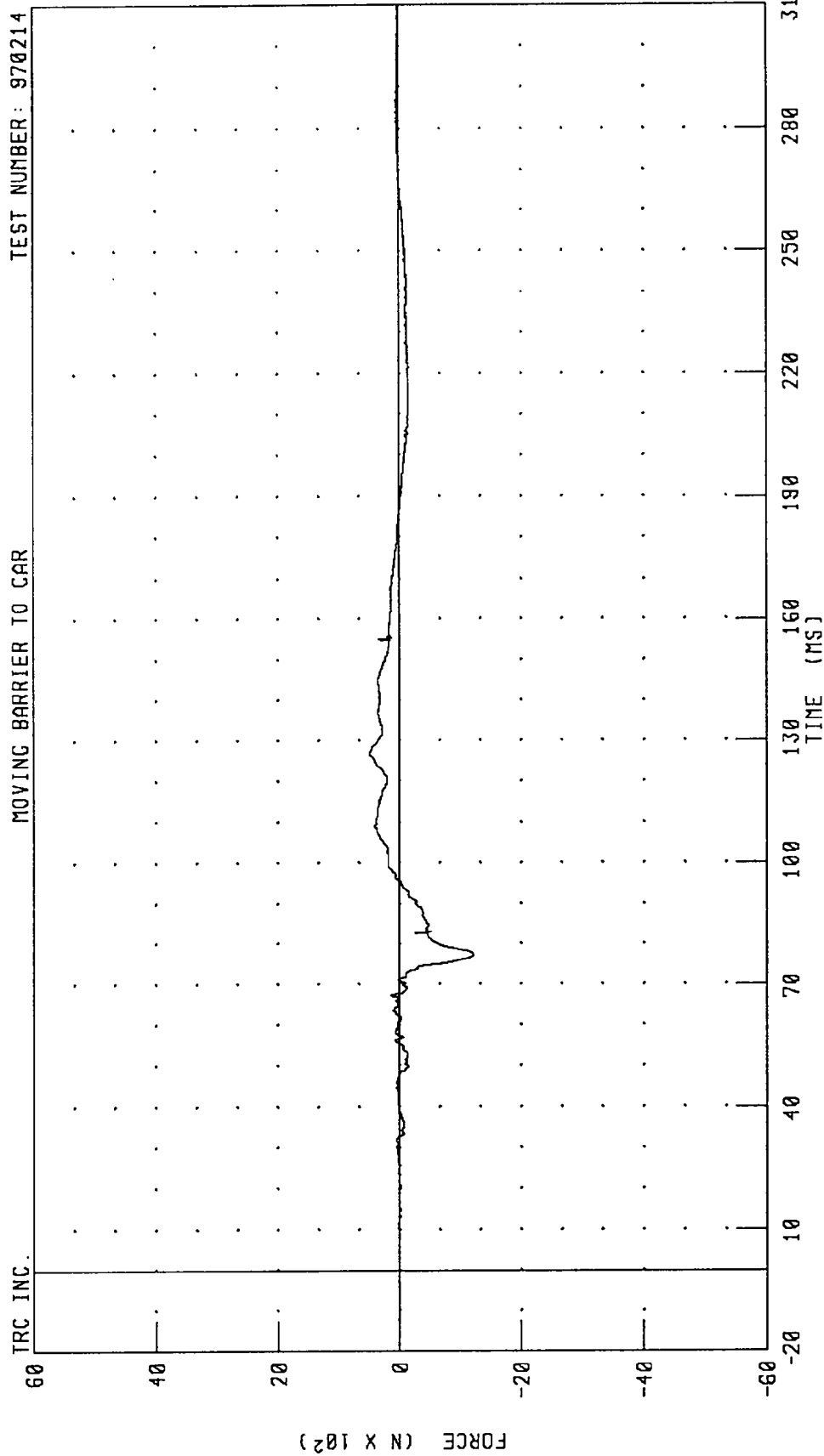


PEAK DATA: 501.41 N @ 128.24 MS; -1331.47 N @ 66.88 MS

CHANNEL: NKLXF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LOWER NECK Y-AXIS FORCE
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



PEAK DATA: 492.34 N @ 126.48 MS; -1215.60 N @ 77.12 MS

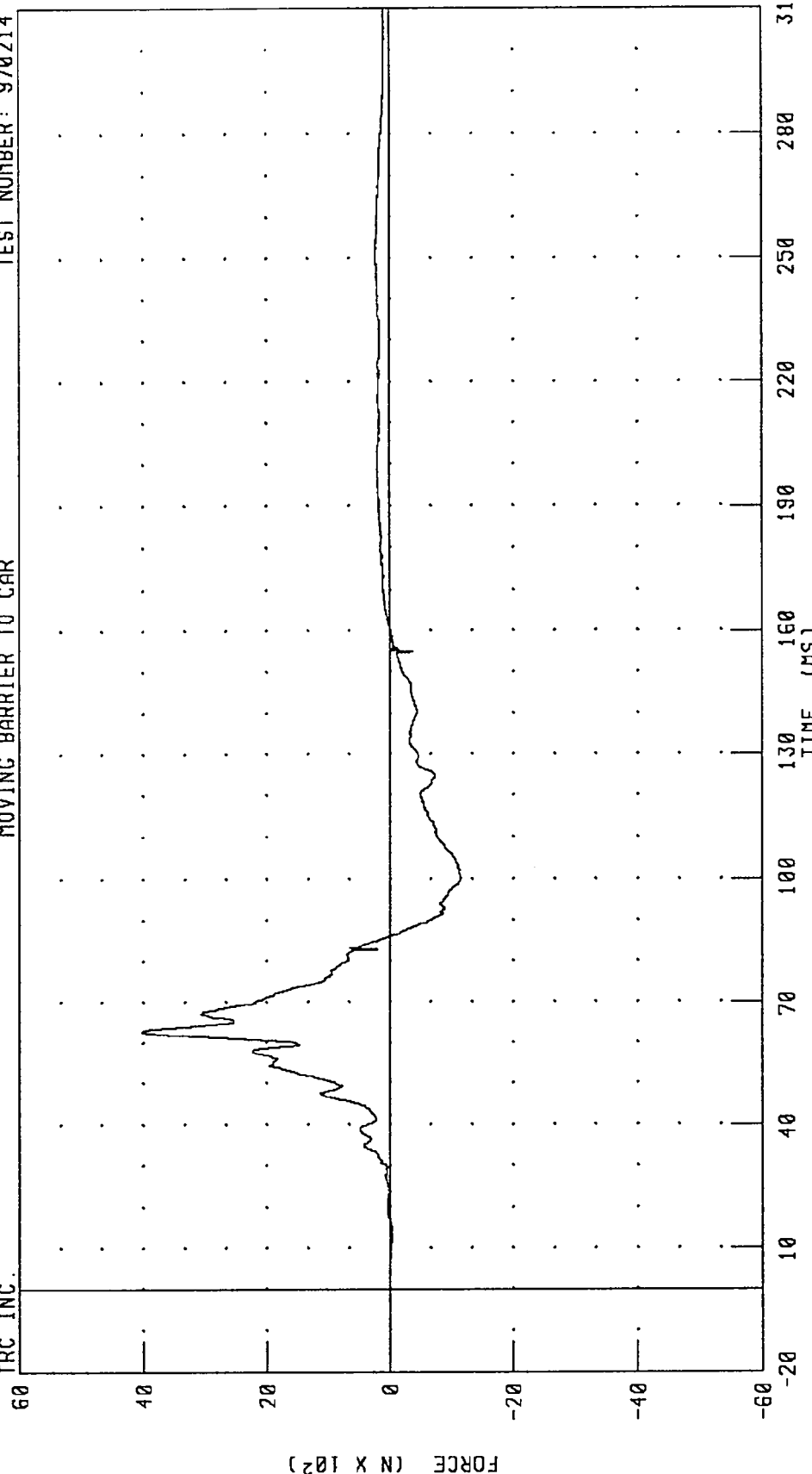
CHANNEL: NKLYF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER LOWER NECK Z-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 4017.28 N @ 62.72 MS; -1145.83 N @ 100.00 MS

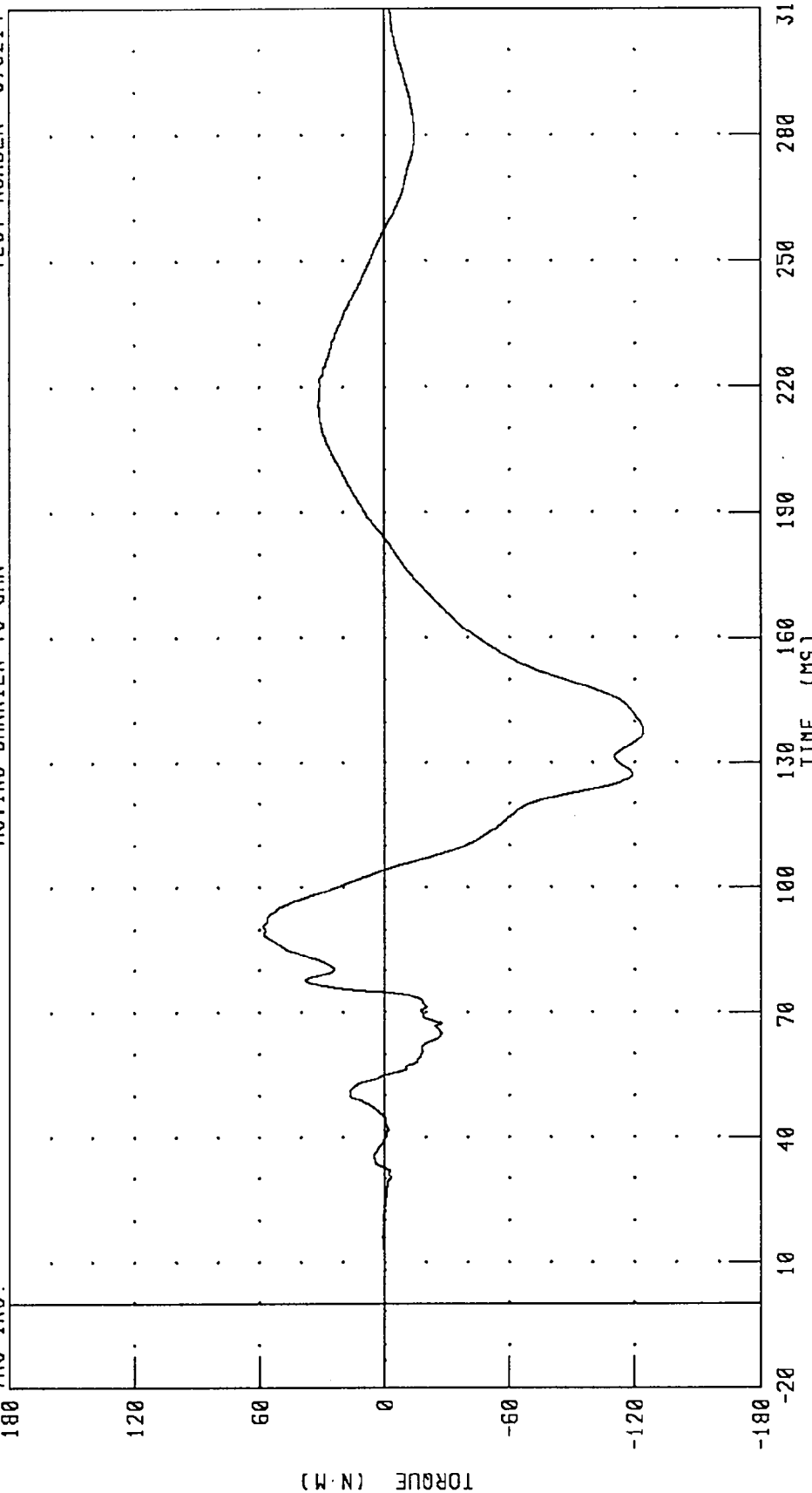
CHANNEL: NKLZF1 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER LOWER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



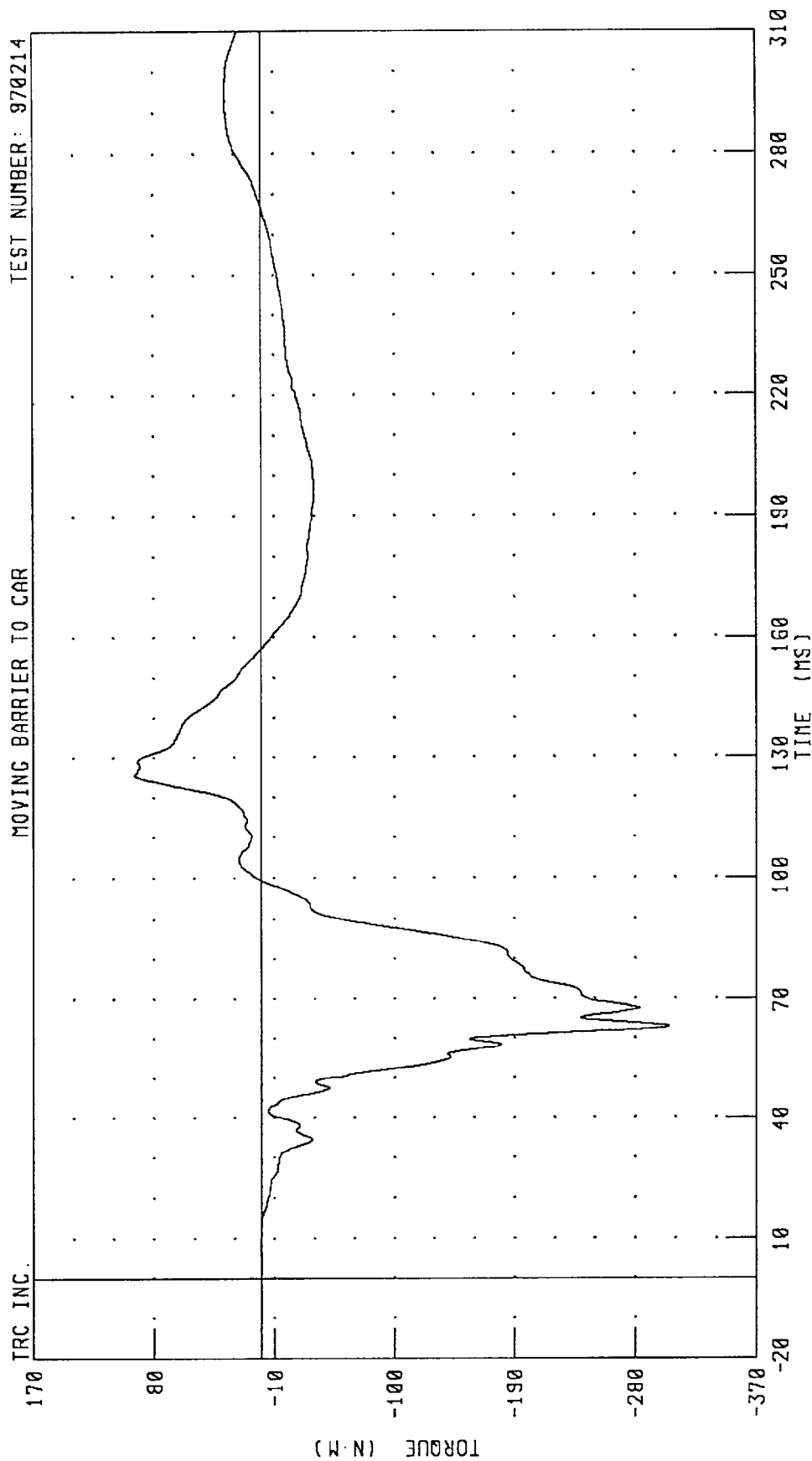
PEAK DATA: 58.62 N·M @ 90.88 MS; -124.07 N·M @ 137.68 MS

CHANNEL: NKLXMI FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LOWER NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR



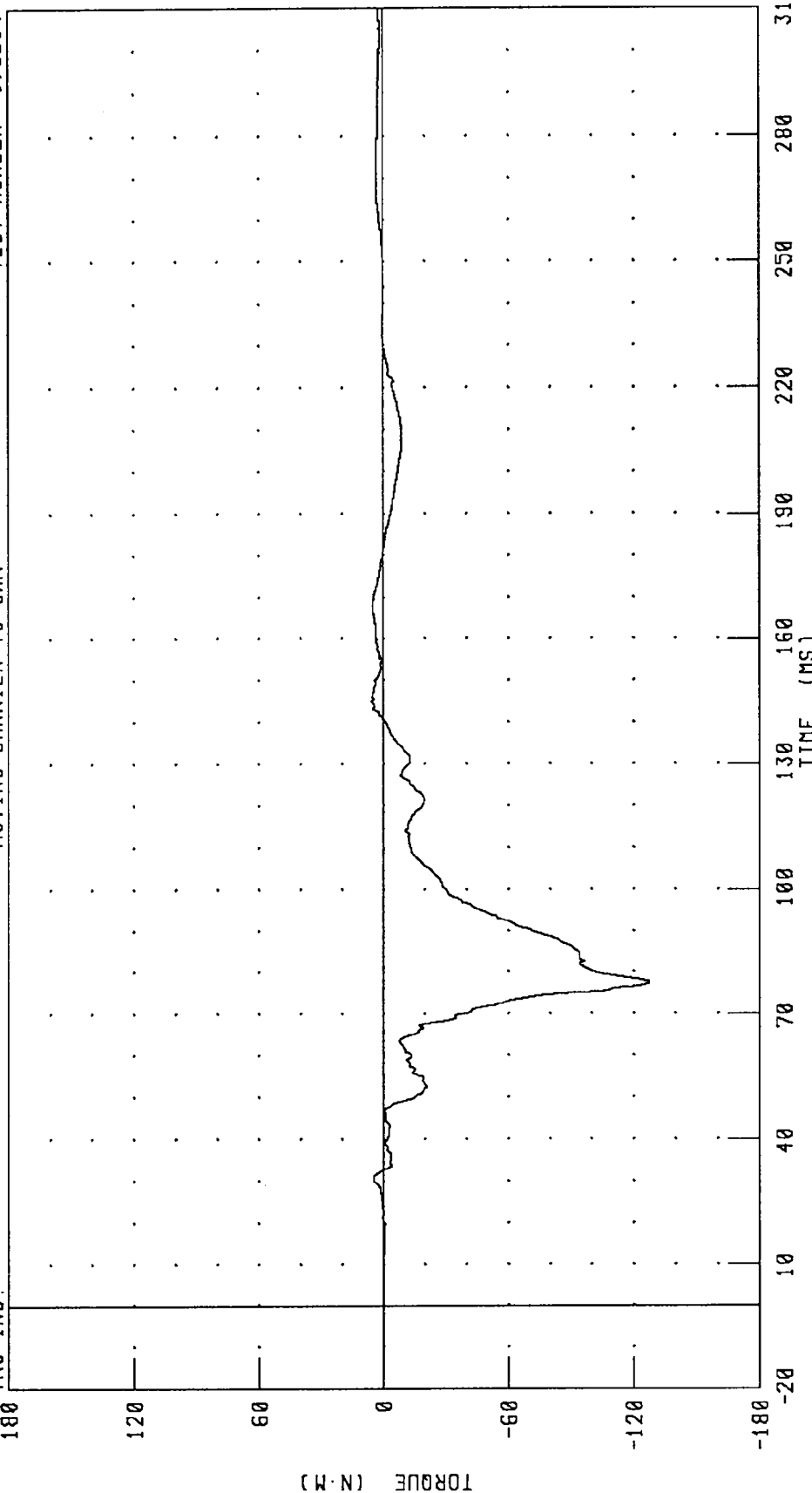
PEAK DATA: 94.10 N-M @ 125.84 MS; -304.63 N-M @ 62.96 MS

CHANNEL: NKLYM1 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LOWER NECK MOMENT ABOUT Z AXIS
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



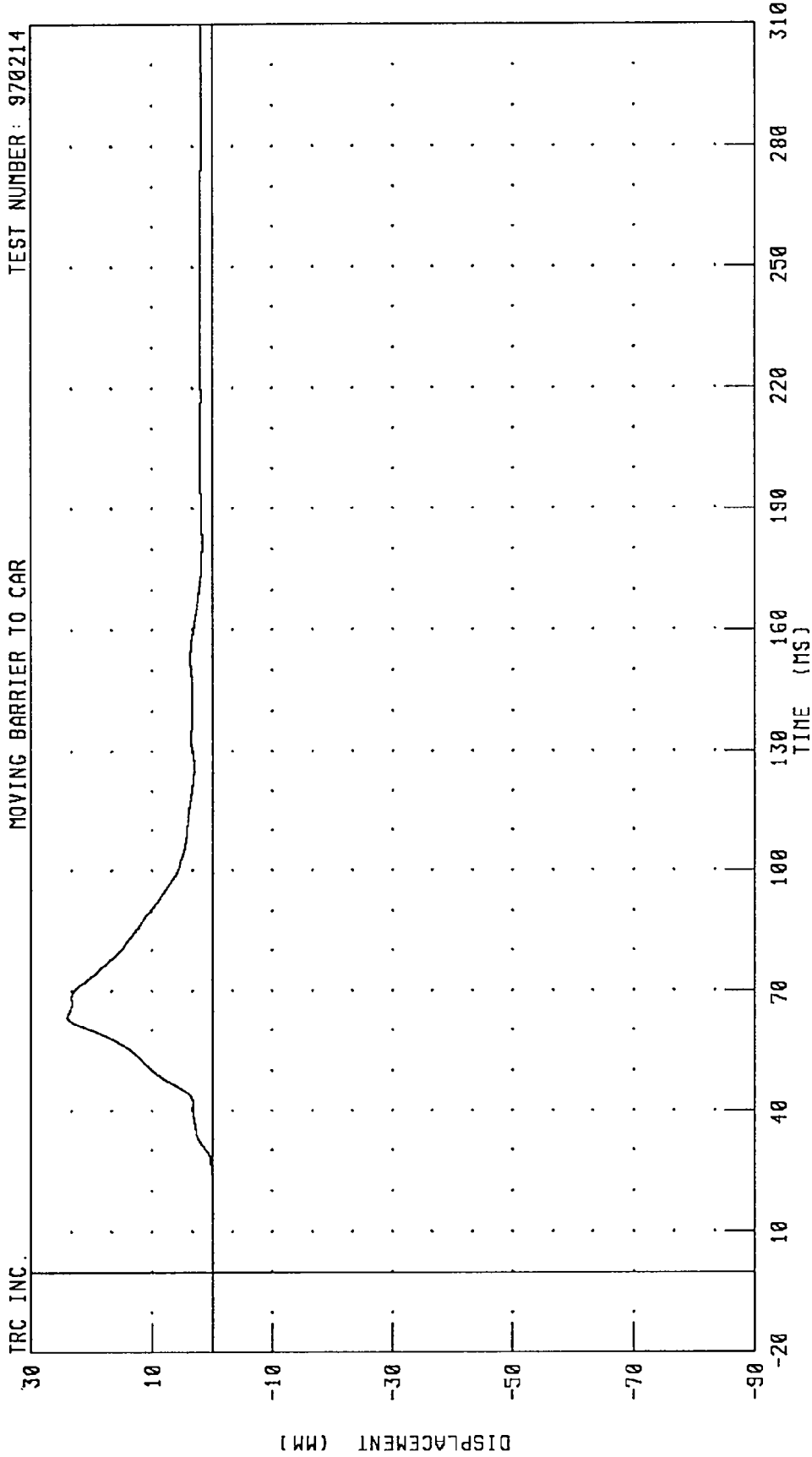
CHANNEL: NKLZM1 FILTER: CH. CLASS 600

PEAK DATA: 6.28 N.M @ 145.04 MS; -127.08 N.M @ 77.52 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER LEFT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR



CHANNEL: LURSD1 FILTER: CH. CLASS 180

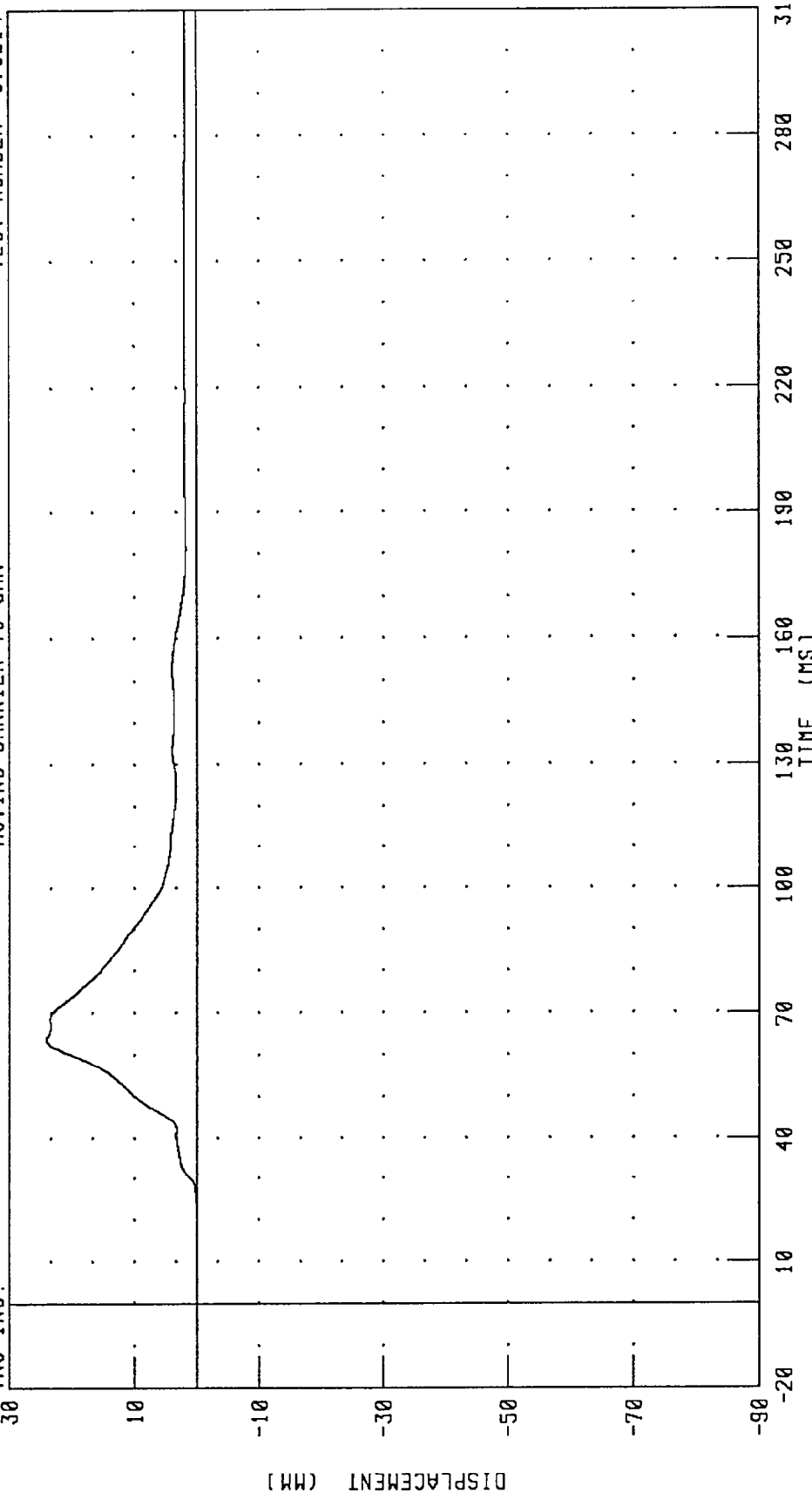
PEAK DATA: 23.95 MM @ 63.60 MS; -0.01 MM @ 0.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT UPPER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



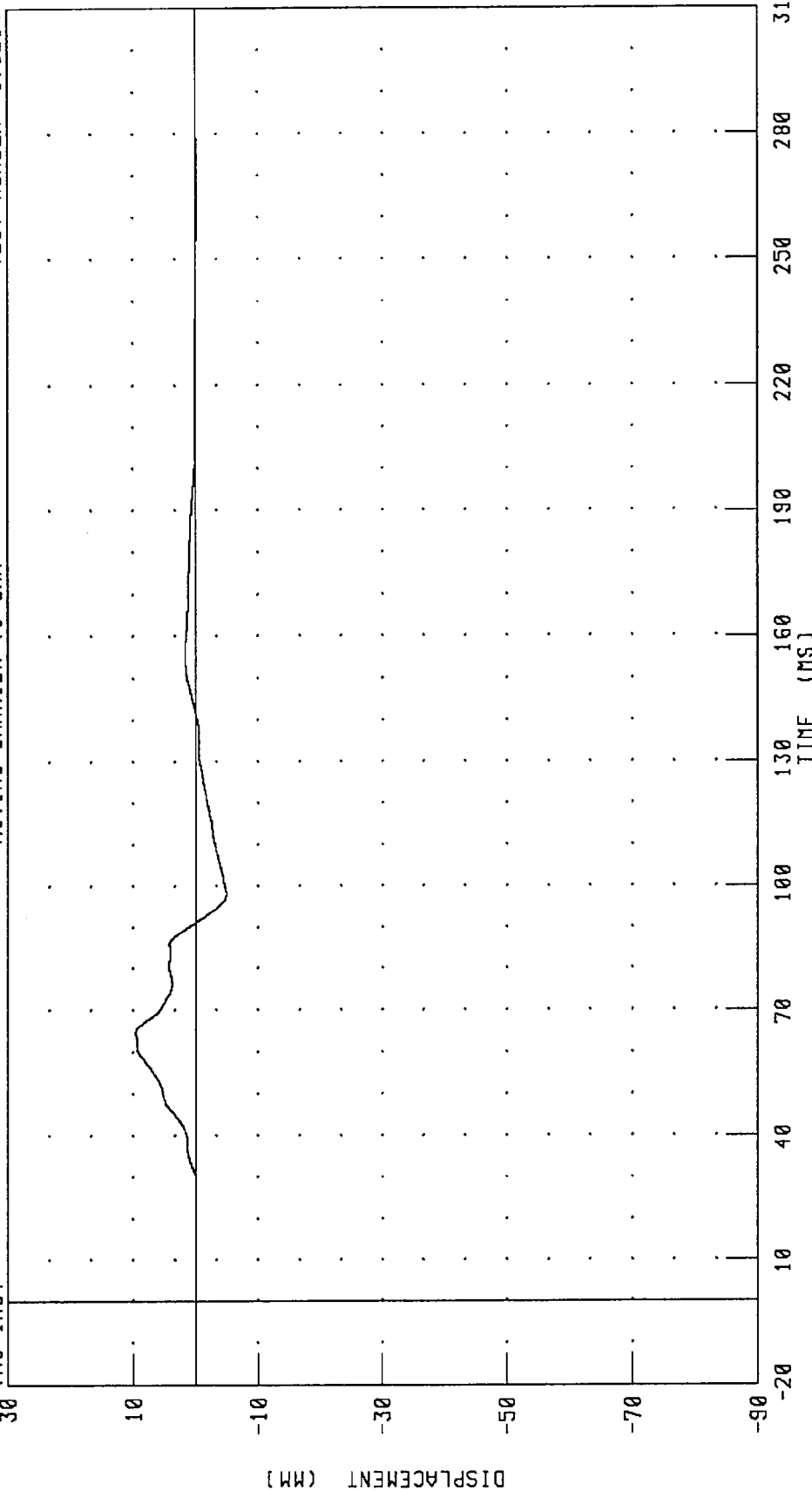
CHANNEL: LURXD1 FILTER: CH. CLASS 180

PEAK DATA: 24.10 MM @ 63.60 MS; -0.01 MM @ 0.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT LOWER RIB STRAIGHT DISPLACEMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



CHANNEL: LLRS01 FILTER: CH. CLASS 180

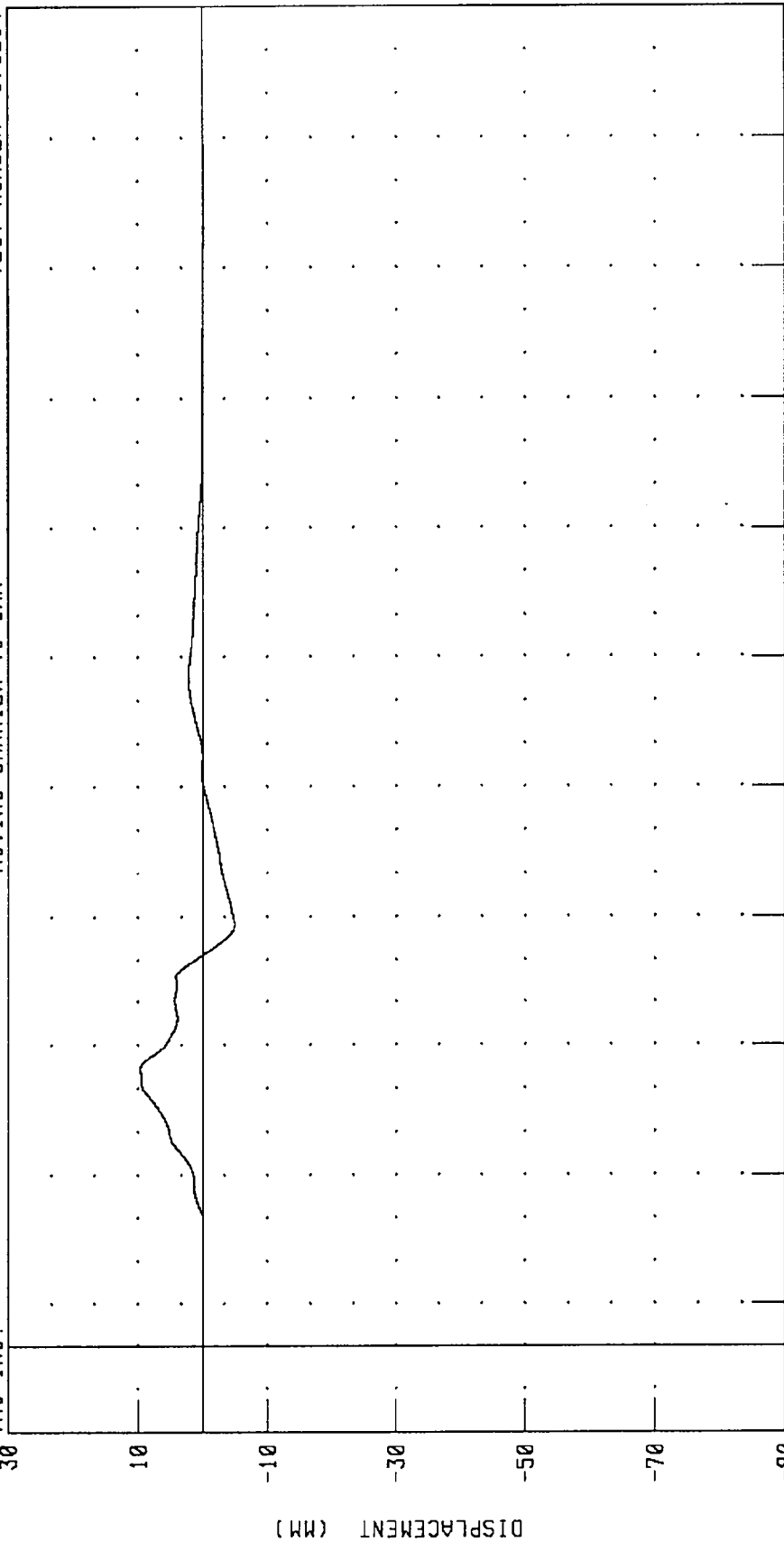
PEAK DATA: 9.56 MM @ 64.64 MS; -4.87 MM @ 98.24 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT LOWER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 9.65 NM @ 64.56 MS; -4.86 NM @ 98.24 MS

CHANNEL: LLRXD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER RIGHT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

40

20

0

-20

-40

-60

-80

DISPLACEMENT (MM)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

CHANNEL: RURSD1 FILTER: CH. CLASS 180

PEAK DATA: 32.37 MM @ 68.80 MS; 0.00 NM @ 10.56 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT UPPER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

40

20

0

-20

-40

-60

-80

DISPLACEMENT (MM)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

CHANNEL: RURXD1 FILTER: CH. CLASS 180

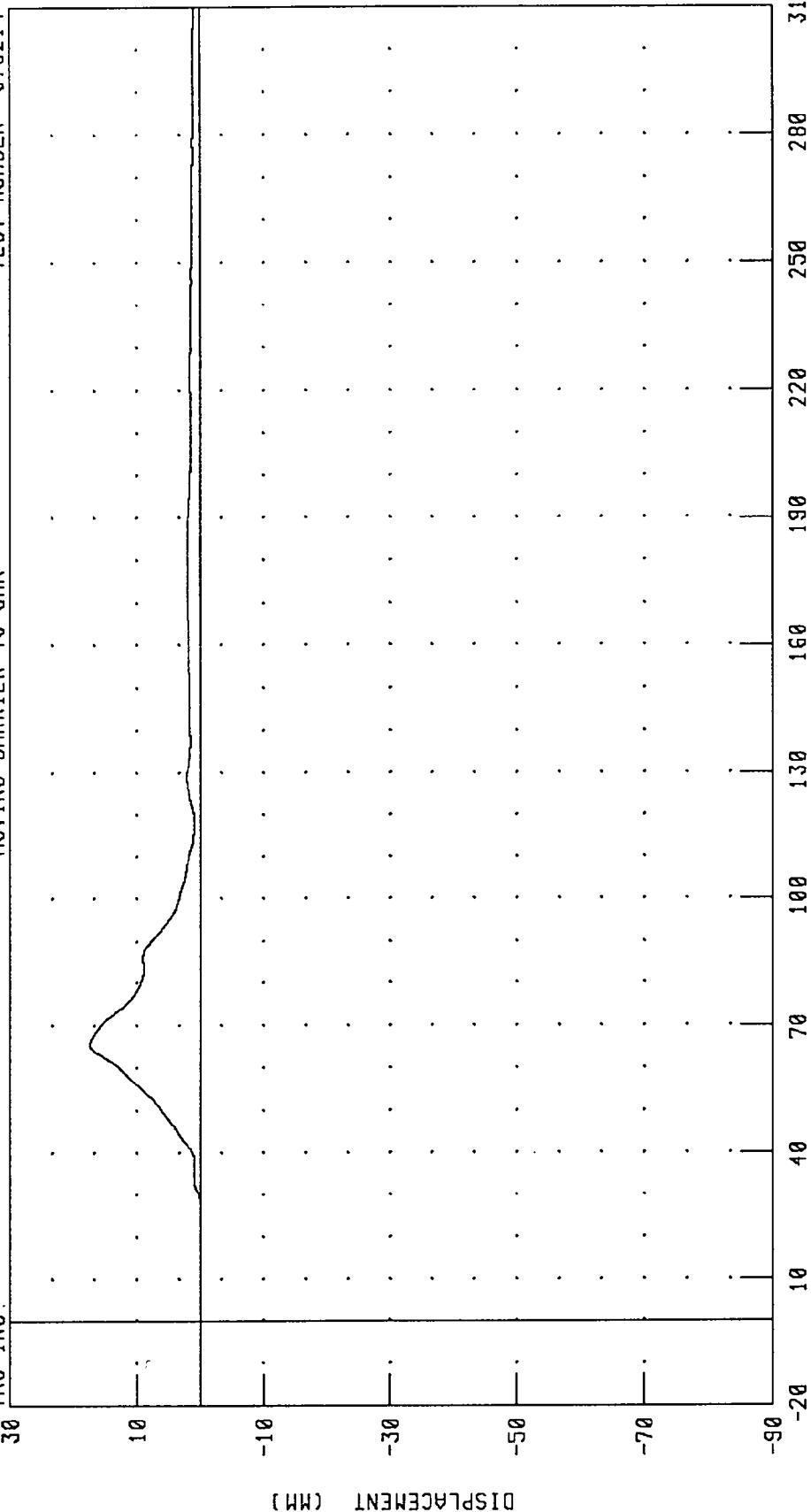
PEAK DATA: 32.99 MM @ 68.80 MS; 0.00 MM @ 10.56 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER RIGHT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

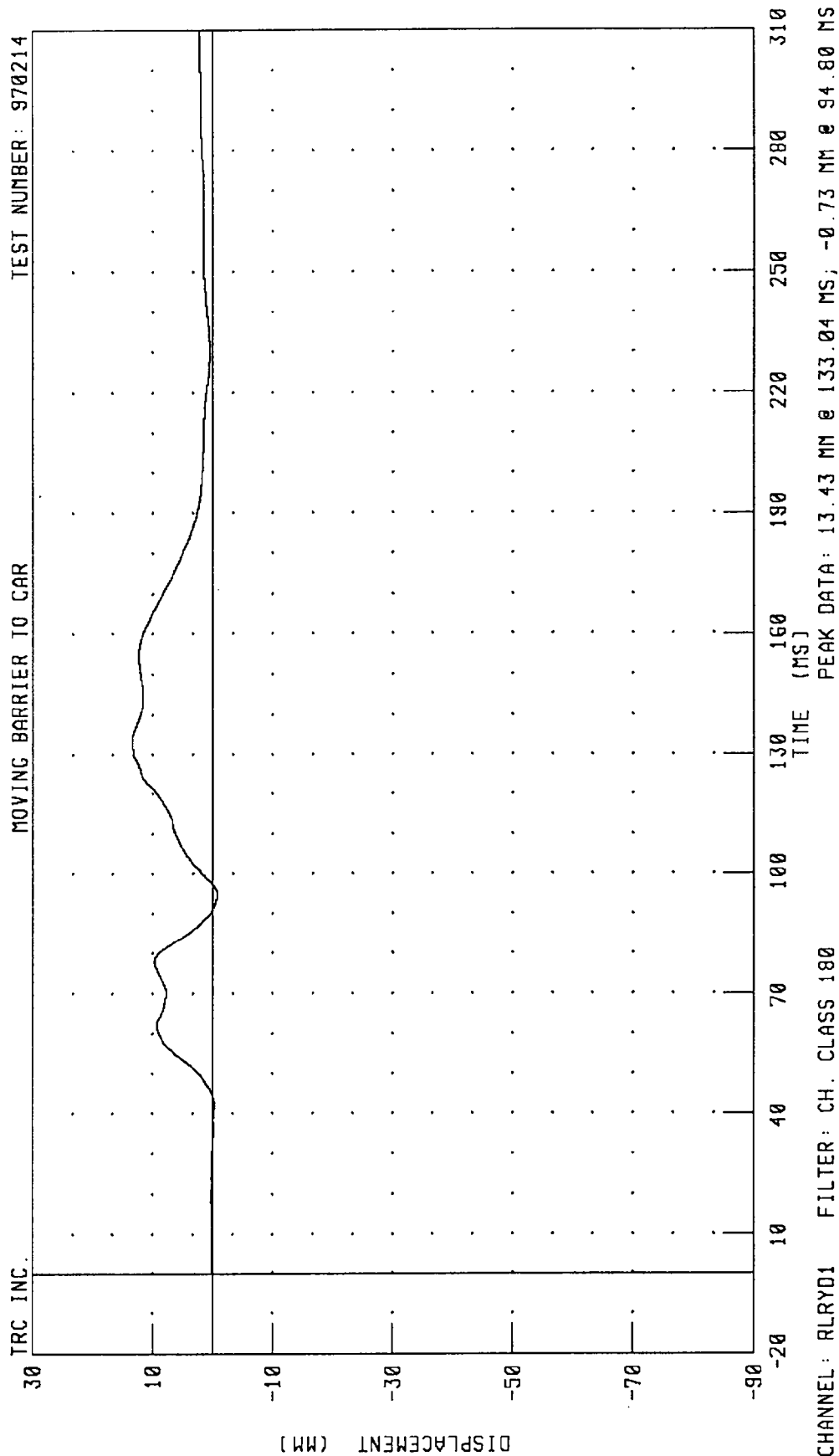
TRC INC.



PEAK DATA: 17.46 MM @ 65.52 MS; -0.04 MM @ 25.52 MS

CHANNEL: RLRSD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT LOWER RIB X-AXIS DISPLACEMENT

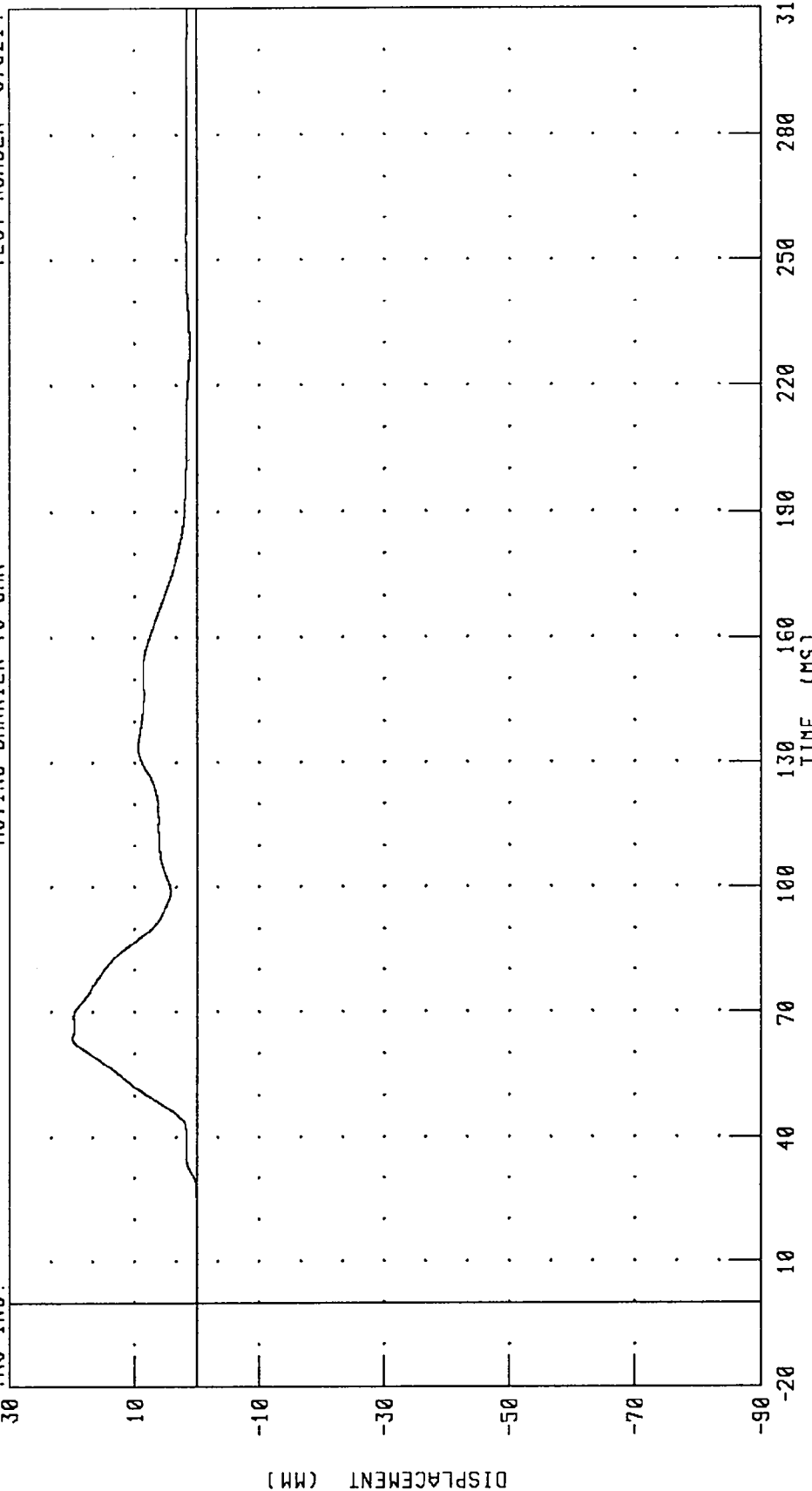


70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
DRIVER LEFT UPPER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



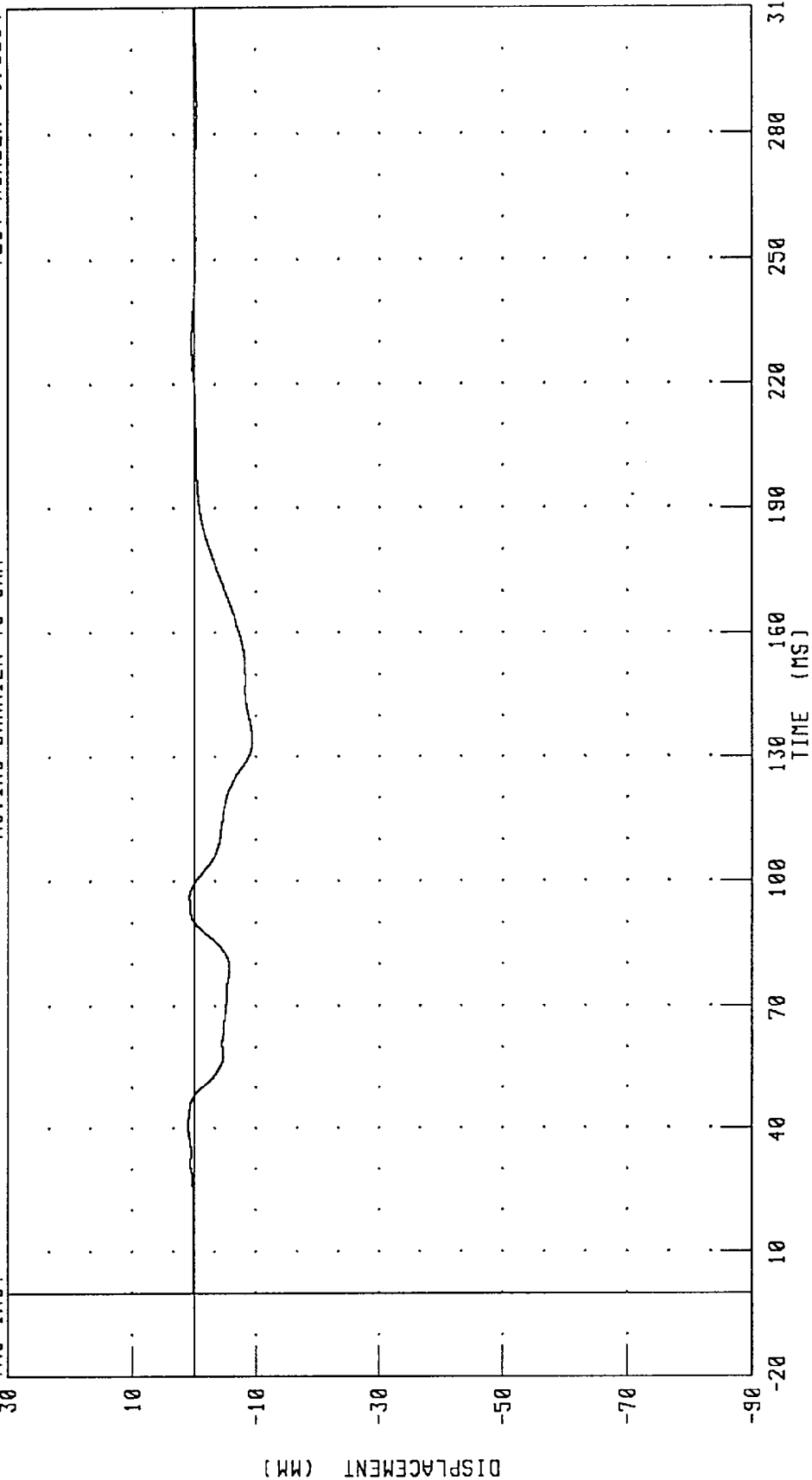
PEAK DATA: 19.90 MM @ 63.84 MS; 0.00 MM @ 9.68 MS

CHANNEL: LURCD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT UPPER RIB Y-AXIS DISPLACEMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



CHANNEL: LURYD1 FILTER: CH. CLASS 180

PEAK DATA: 1.01 MM @ 40.96 MS; -9.34 MM @ 133.92 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER LEFT LOWER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30

10

-10

-30

-50

-70

-90

DISPLACEMENT (MM)

310

280

250

220

190

160

130

100

70

40

10

-20

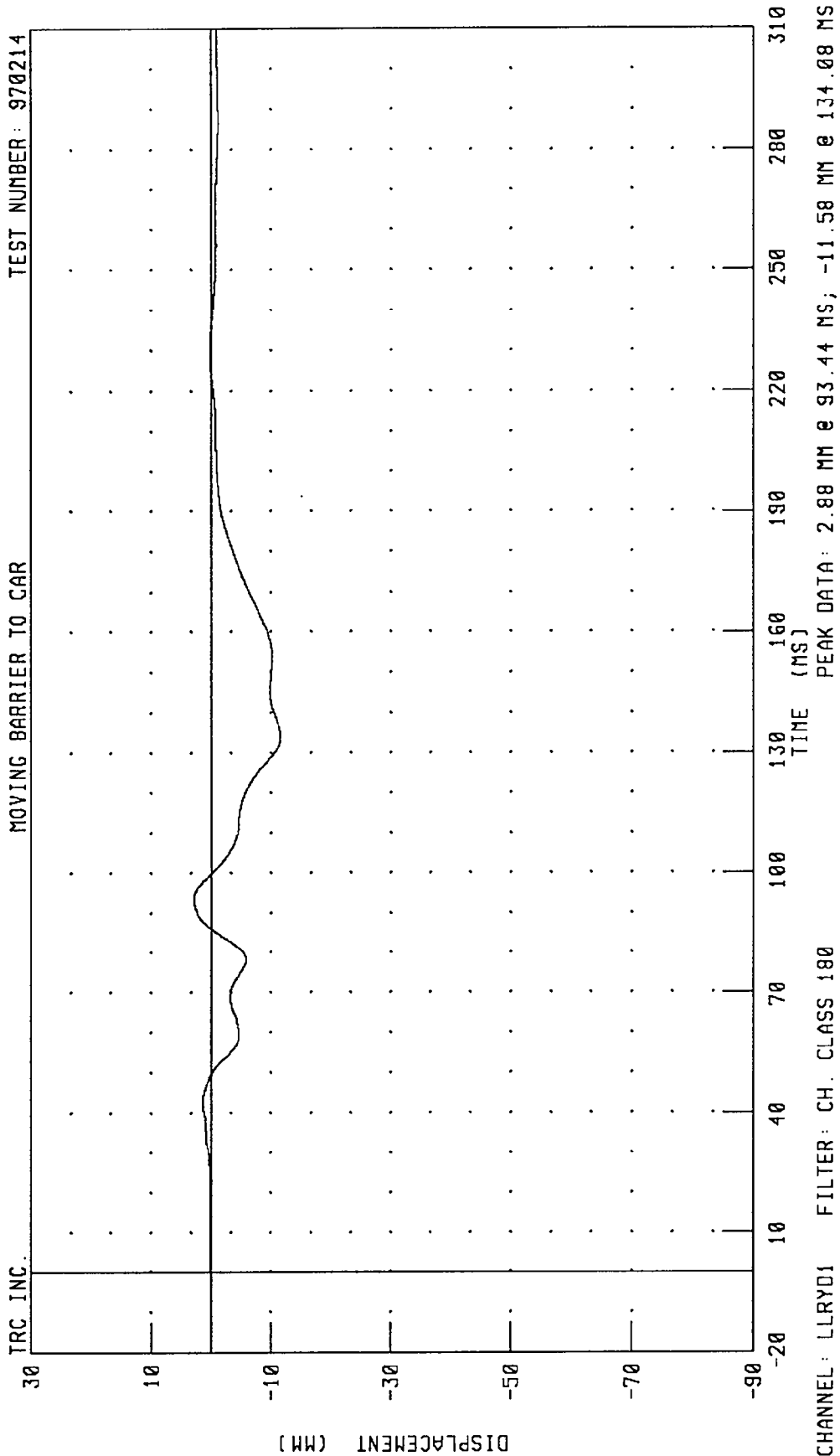
-90

TIME (MS)

CHANNEL: LLRCD1 FILTER: CH. CLASS 180

PEAK DATA: 9.97 MM @ 60.64 MS; -4.62 MM @ 96.40 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
DRIVER LEFT LOWER RIB Y-AXIS DISPLACEMENT



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT UPPER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30

10

-10

-30

-50

-70

-90

DISPLACEMENT (MM)

20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 310

TIME (MS)

CHANNEL: RUC01 FILTER: CH. CLASS 180

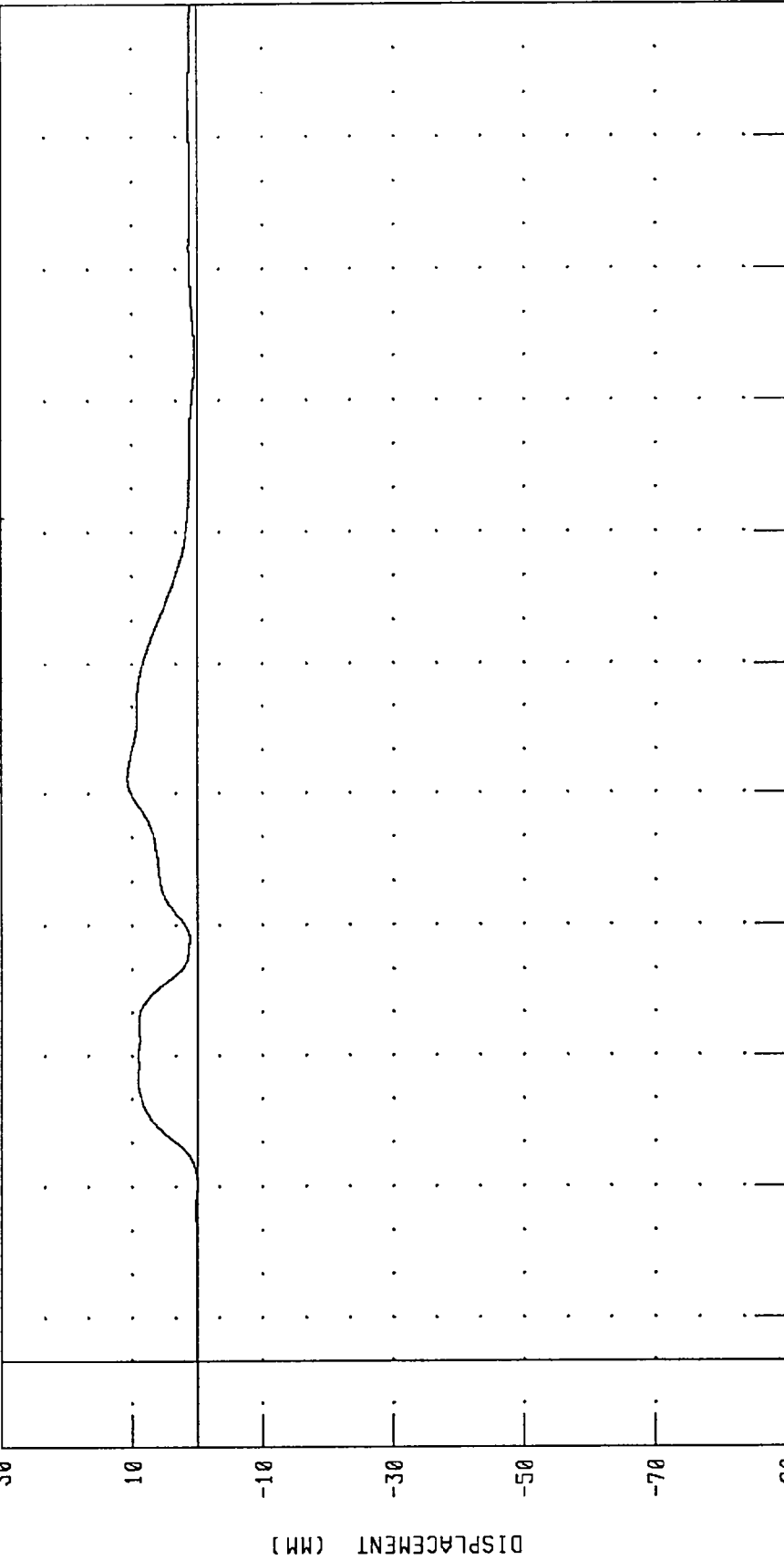
PEAK DATA: 13.89 MM @ 68.80 MS; -3.62 MM @ 150.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT UPPER RIB Y-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



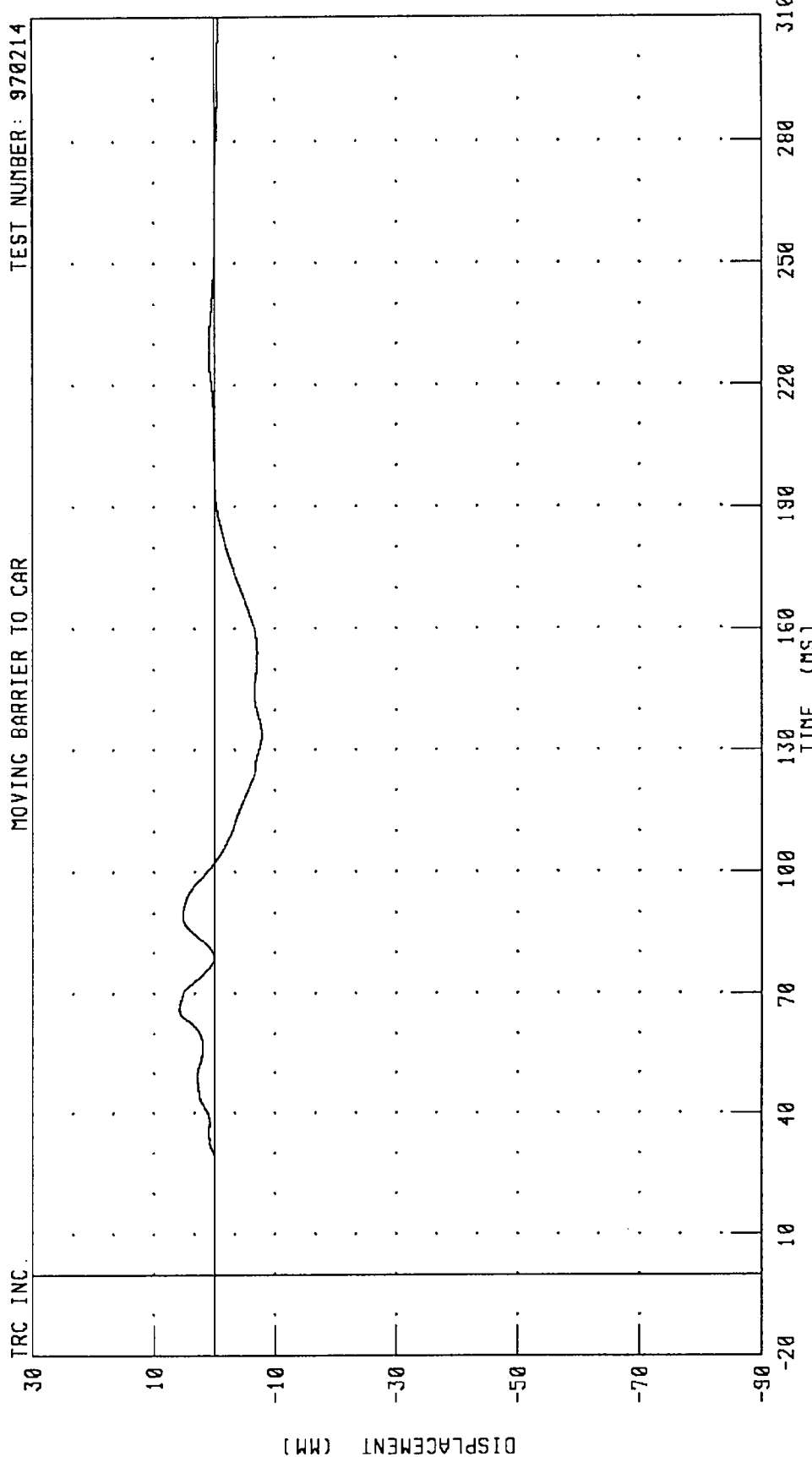
PEAK DATA: 10.76 MM @ 133.60 MS; 0.00 NM @ 40.56 MS

CHANNEL: RURYD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT LOWER RIB Crossover DISPLACEMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

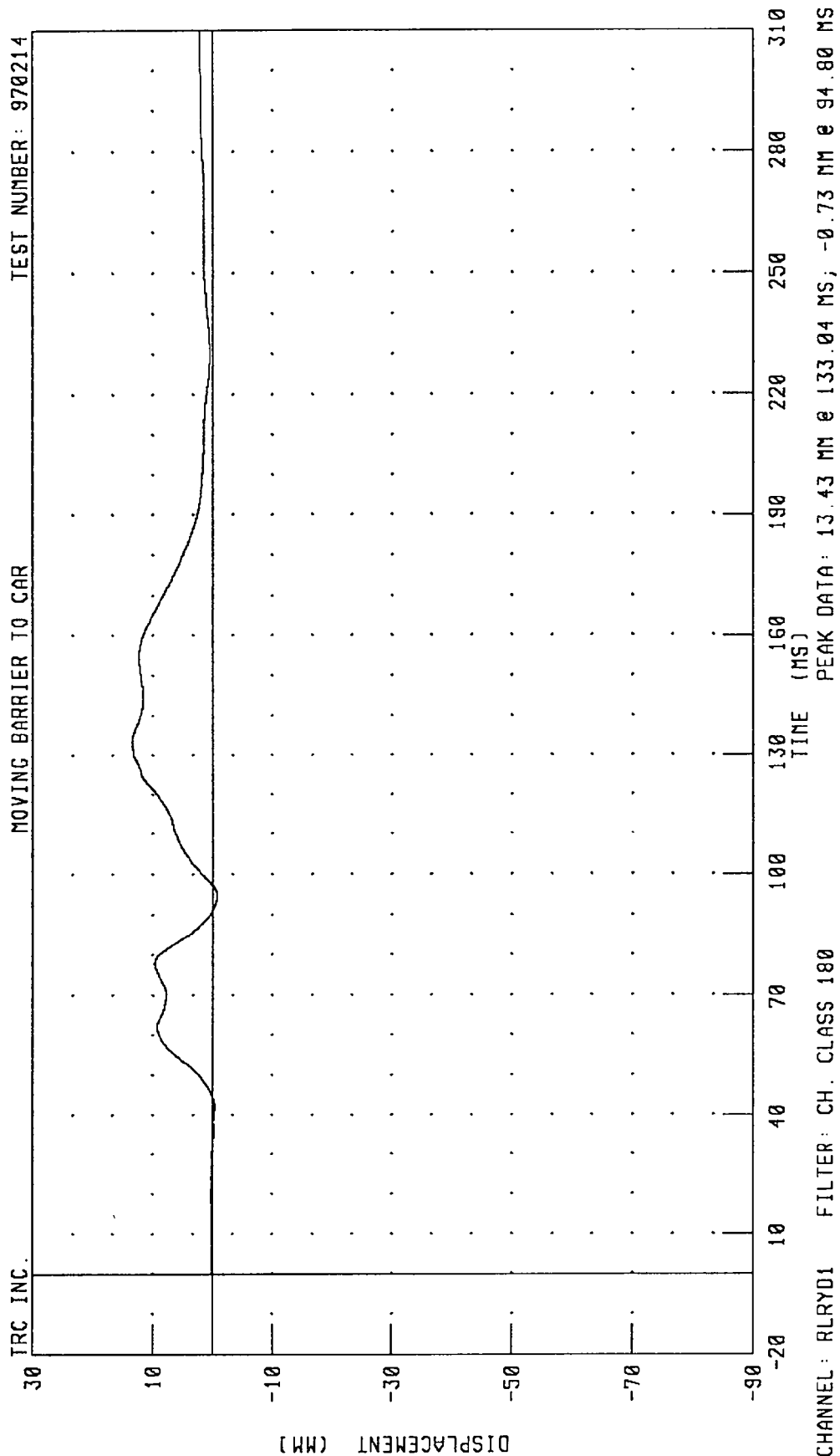
TRC INC.



CHANNEL: RLRC01 FILTER: CH. CLASS 180

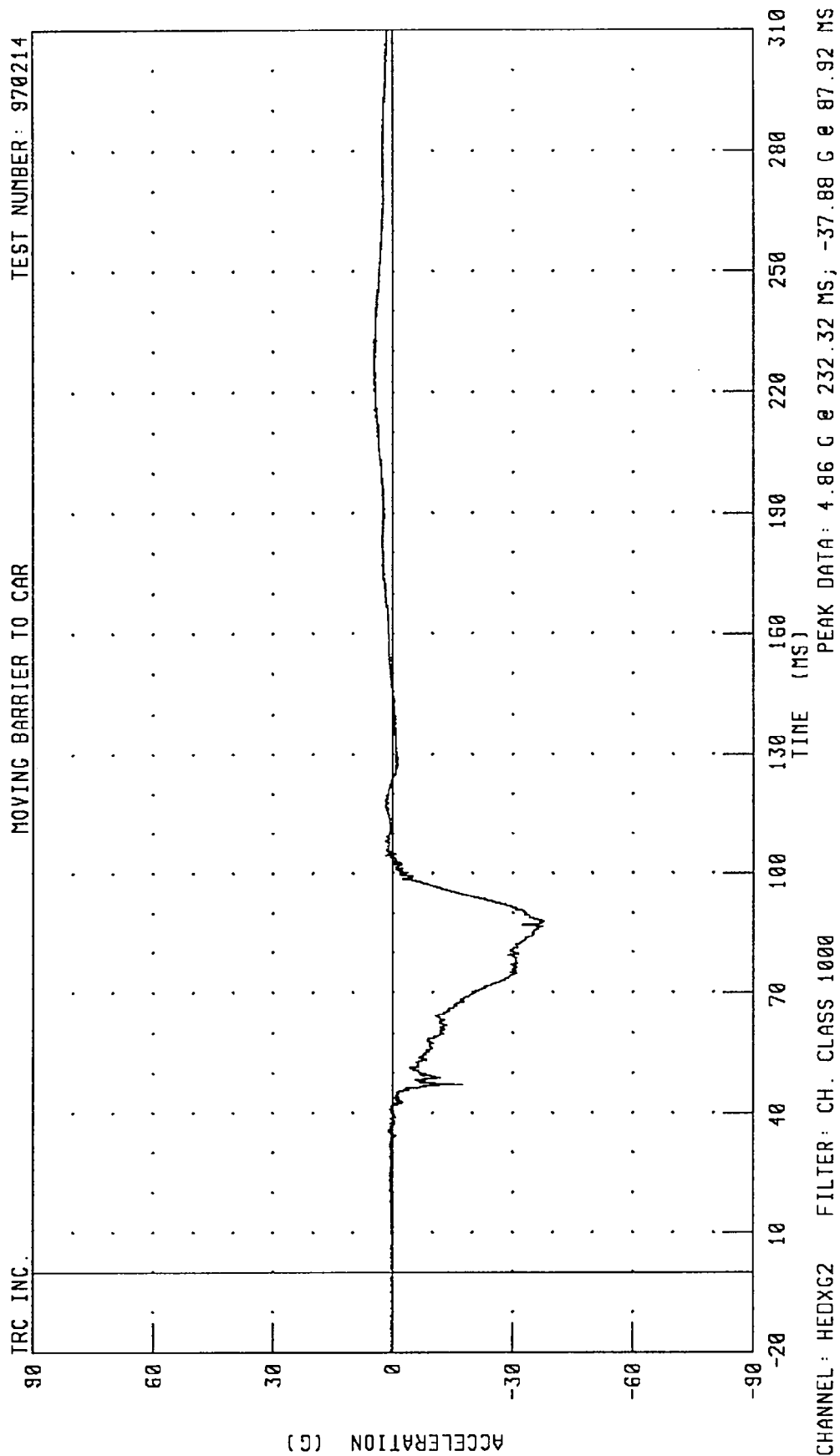
PEAK DATA: 5.84 MM @ 66.16 MS; -7.79 MM @ 133.84 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER RIGHT LOWER RIB Y-AXIS DISPLACEMENT



CHANNEL: RLRYD1 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD LONGITUDINAL AXIS ACCELERATION

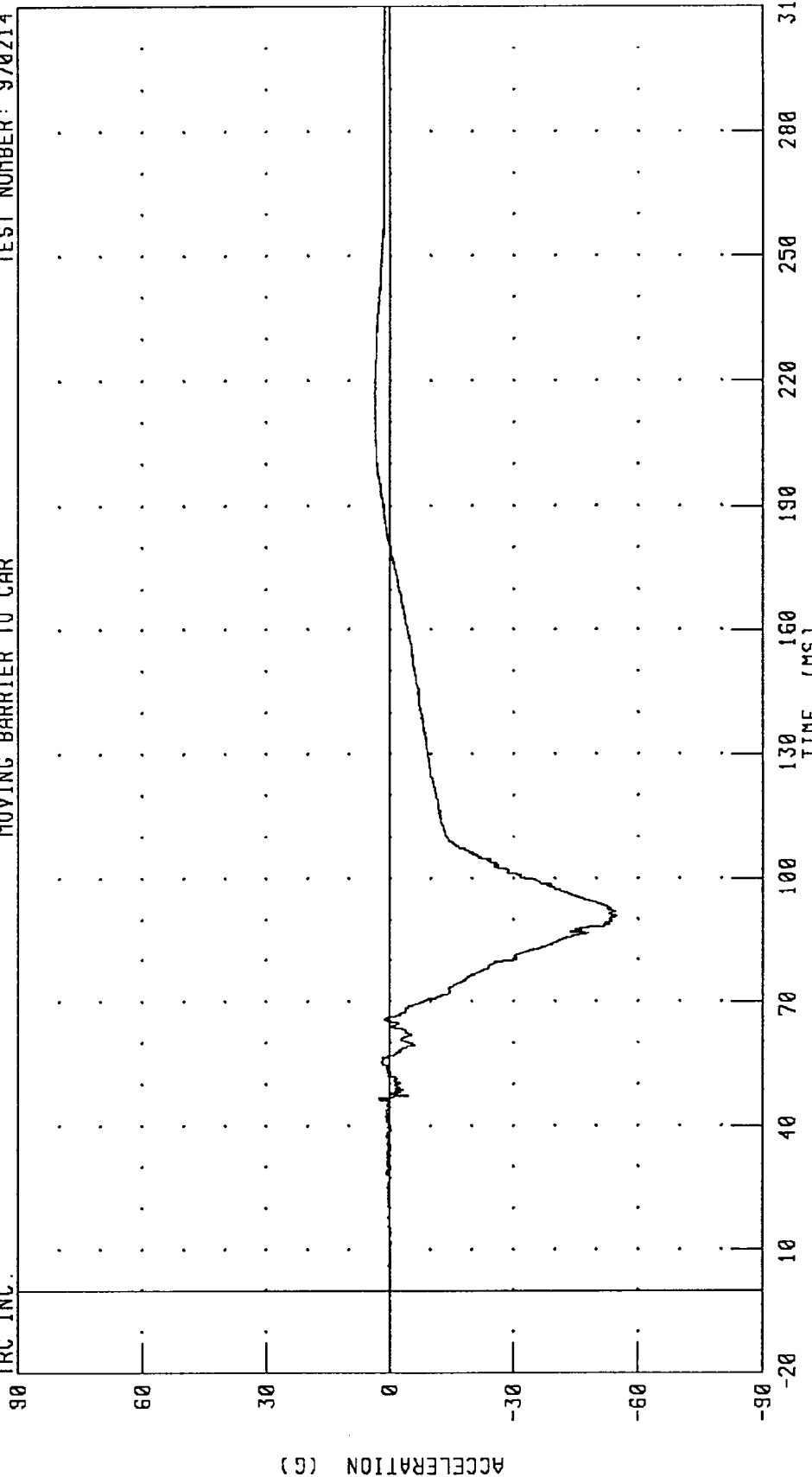


70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER HEAD LATERAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

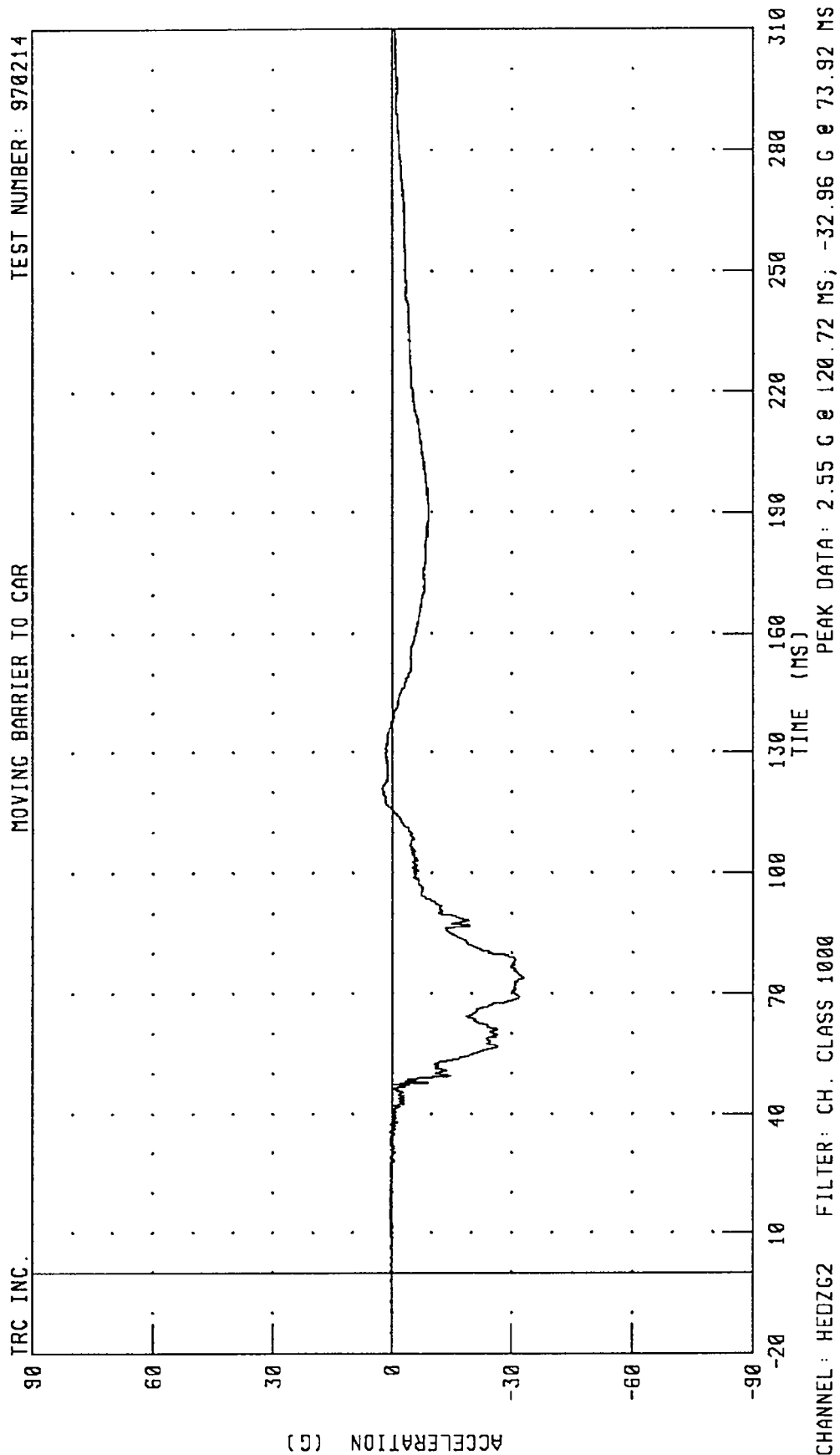
TRC INC.



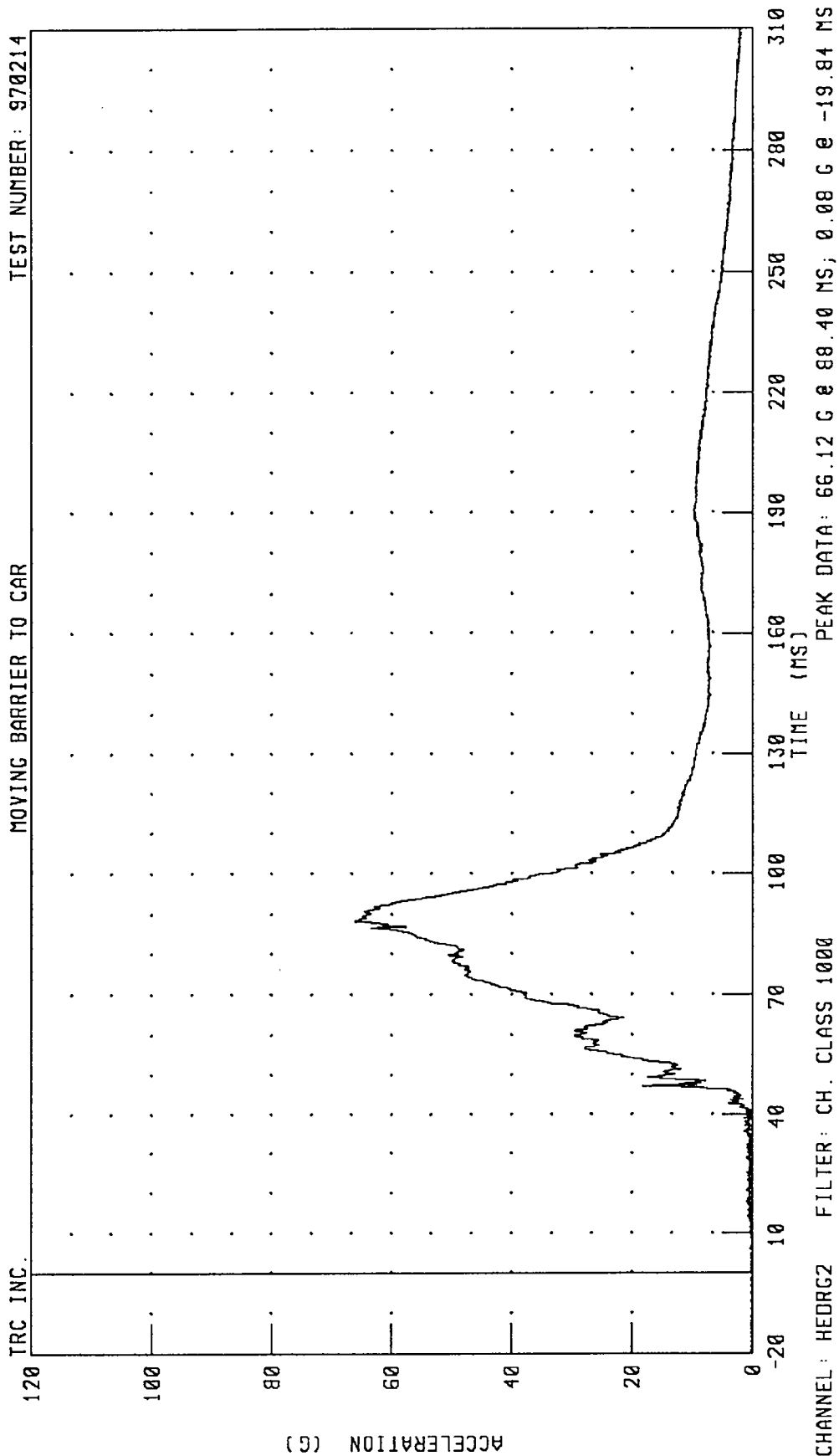
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 3.80 G @ 207.92 MS; -54.83 G @ 90.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER HEAD VERTICAL AXIS ACCELERATION



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION



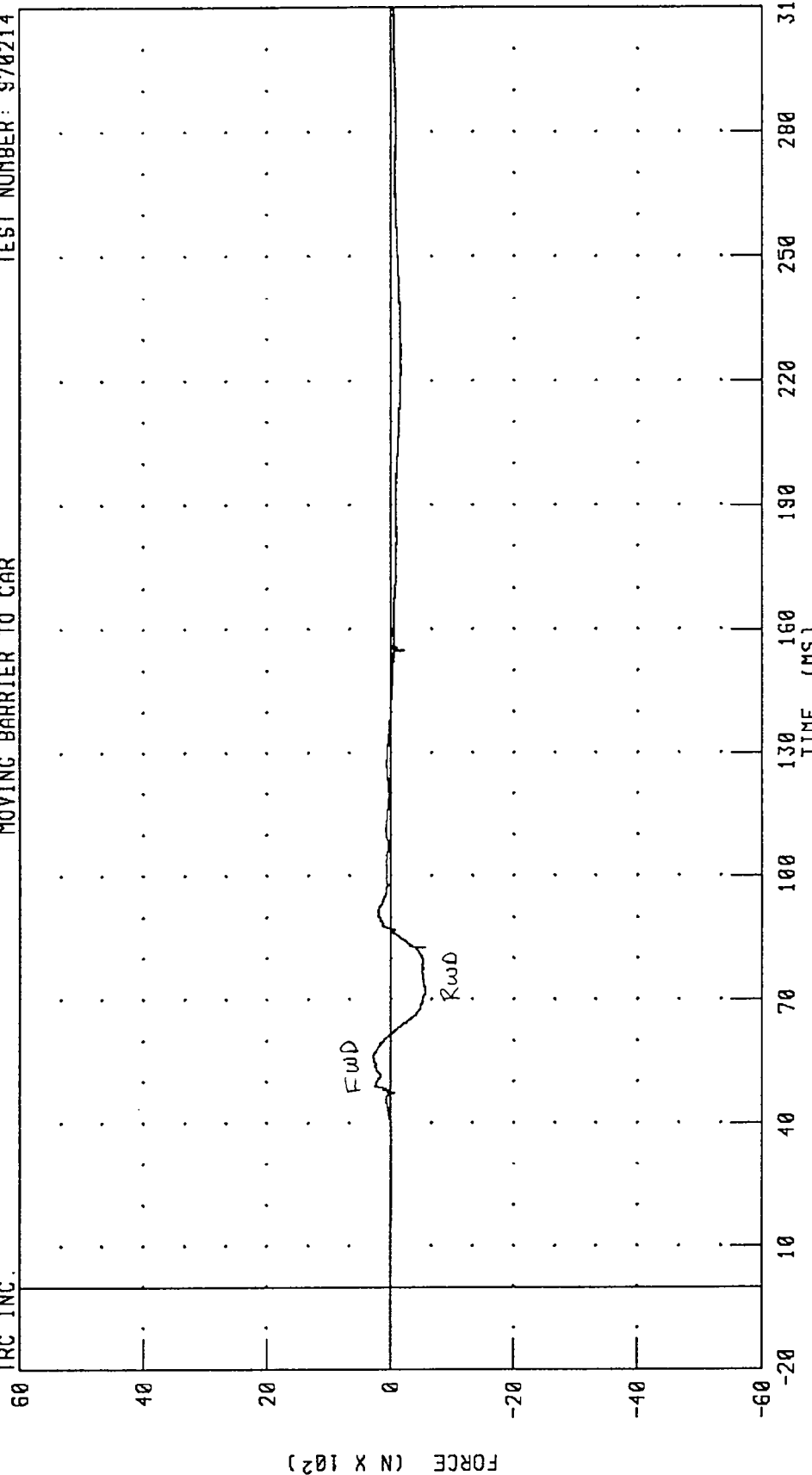
CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

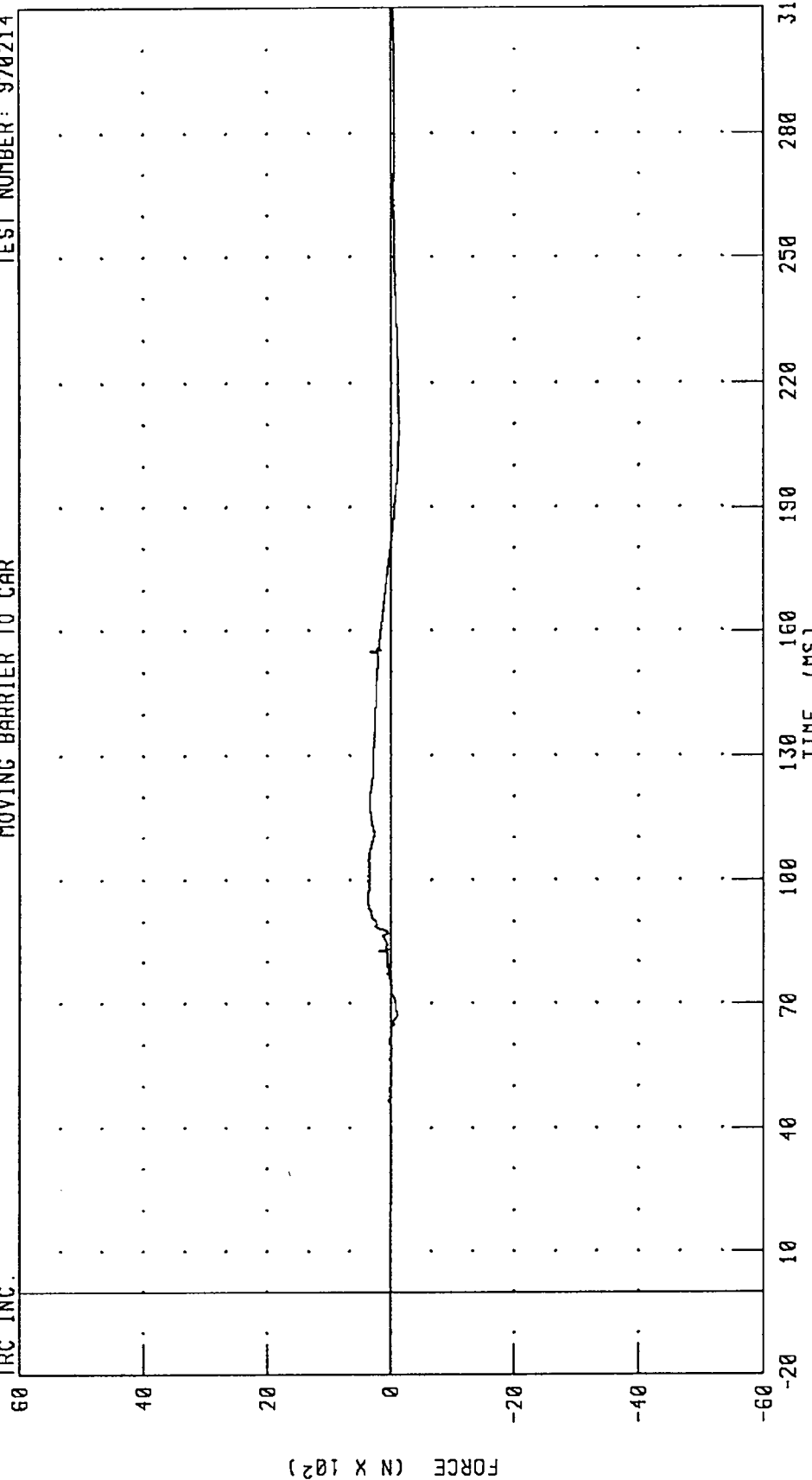
PEAK DATA: 285.55 N @ 55.92 MS; -562.47 N @ 72.00 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 376.16 N @ 95.20 MS; -127.66 N @ 205.20 MS

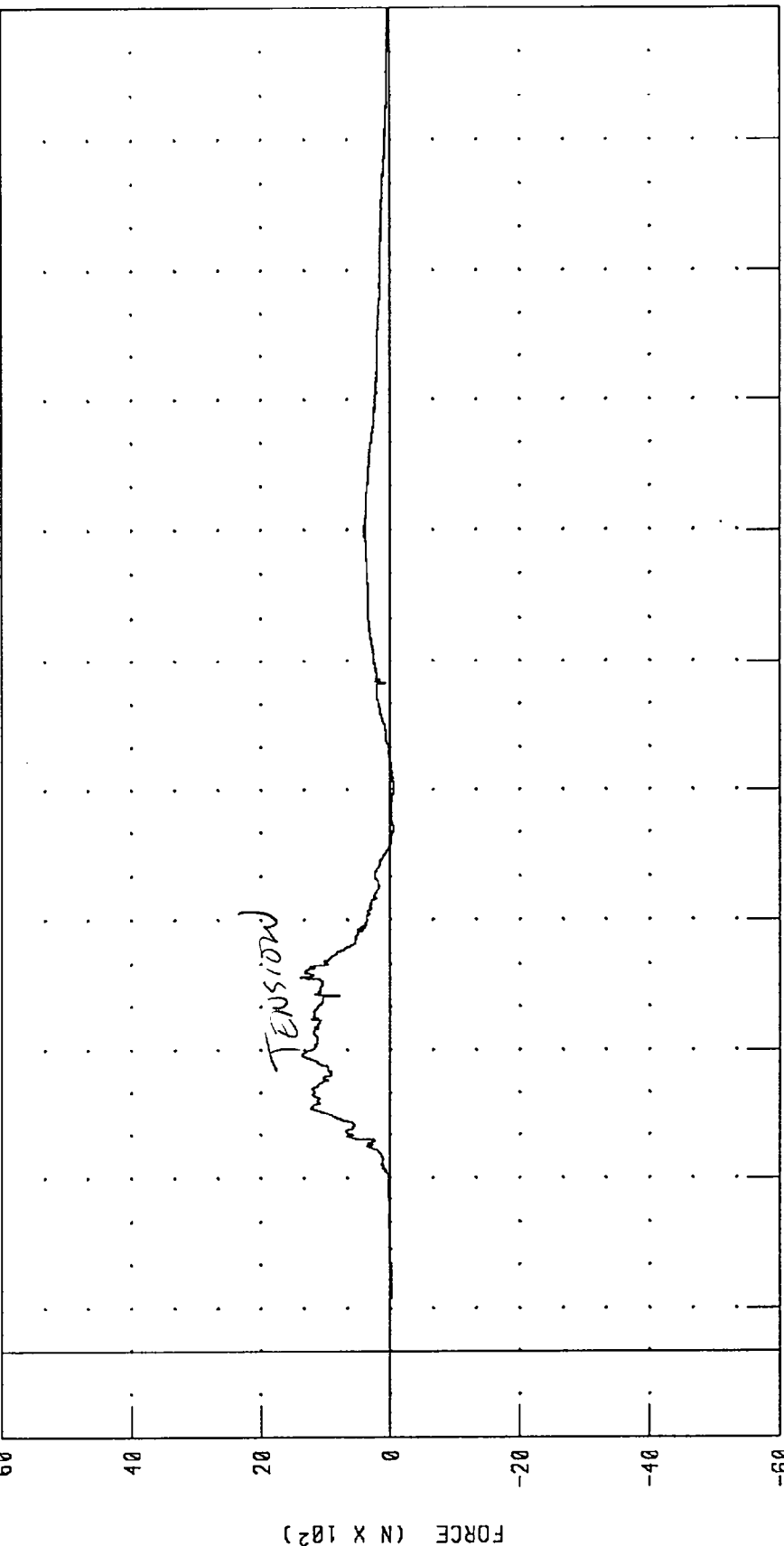
CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK Z-AXIS SHEAR FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

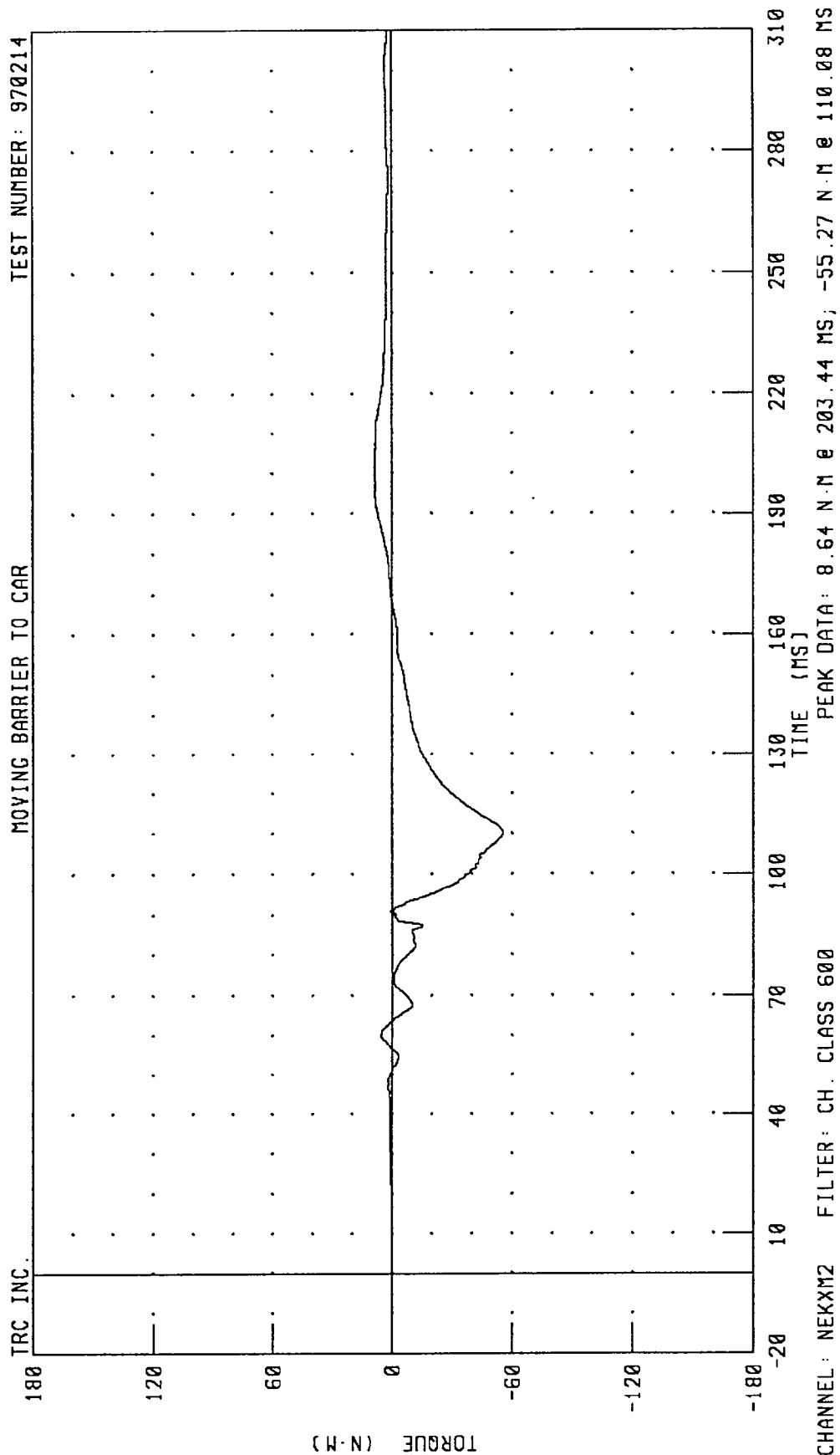
TRC INC.



PEAK DATA: 1410.08 N @ 87.04 MS; -50.20 N @ 120.64 MS

CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK MOMENT ABOUT X-AXIS



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

180

120

60

0

-60

-120

-180

TORQUE (N·M)

EXT - (-)

FLEX - (+)

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

CHANNEL: NEKYM2 FILTER: CH. CLASS 600

PEAK DATA: 44.53 N·M @ 80.40 MS; -19.65 N·M @ 199.44 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Z-AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

180

120

60

TORQUE (N·M)

B-73

0

-60

-120

-180

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

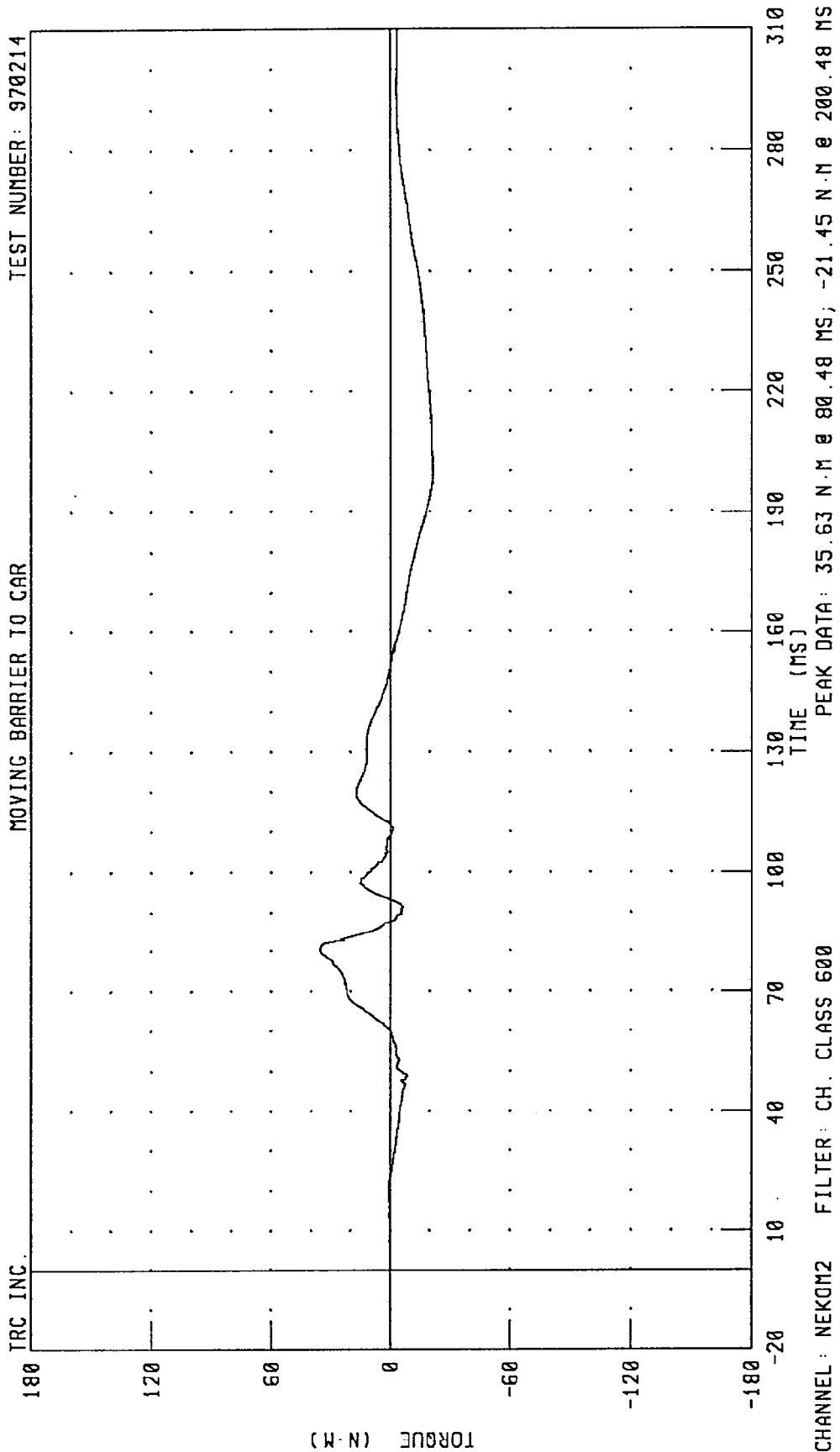
-20

CHANNEL: NEK2M2 FILTER: CH. CLASS 600

PEAK DATA: 18.09 N·M @ 150.08 MS, -75.81 N·M @ 102.88 MS

970214

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER NECK CORRECTED MOMENT



CHANNEL: NEKOM2 FILTER: CH. CLASS 600

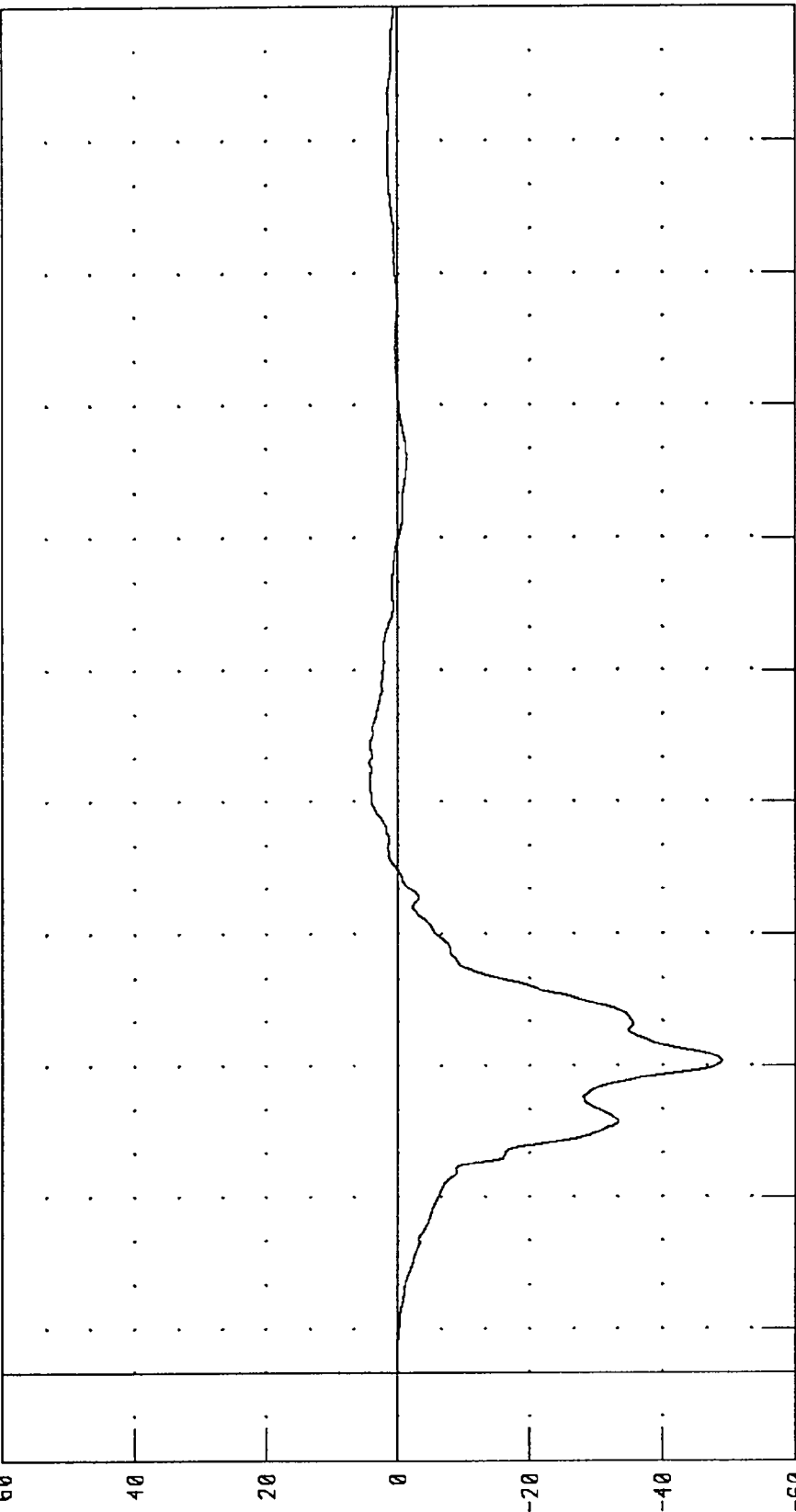
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER CHEST LONGITUDINAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

60



PEAK DATA: 4.40 G @ 138.96 MS; -48.88 G @ 71.12 MS

CHANNEL: CSTXG2 FILTER: CH. CLASS 180

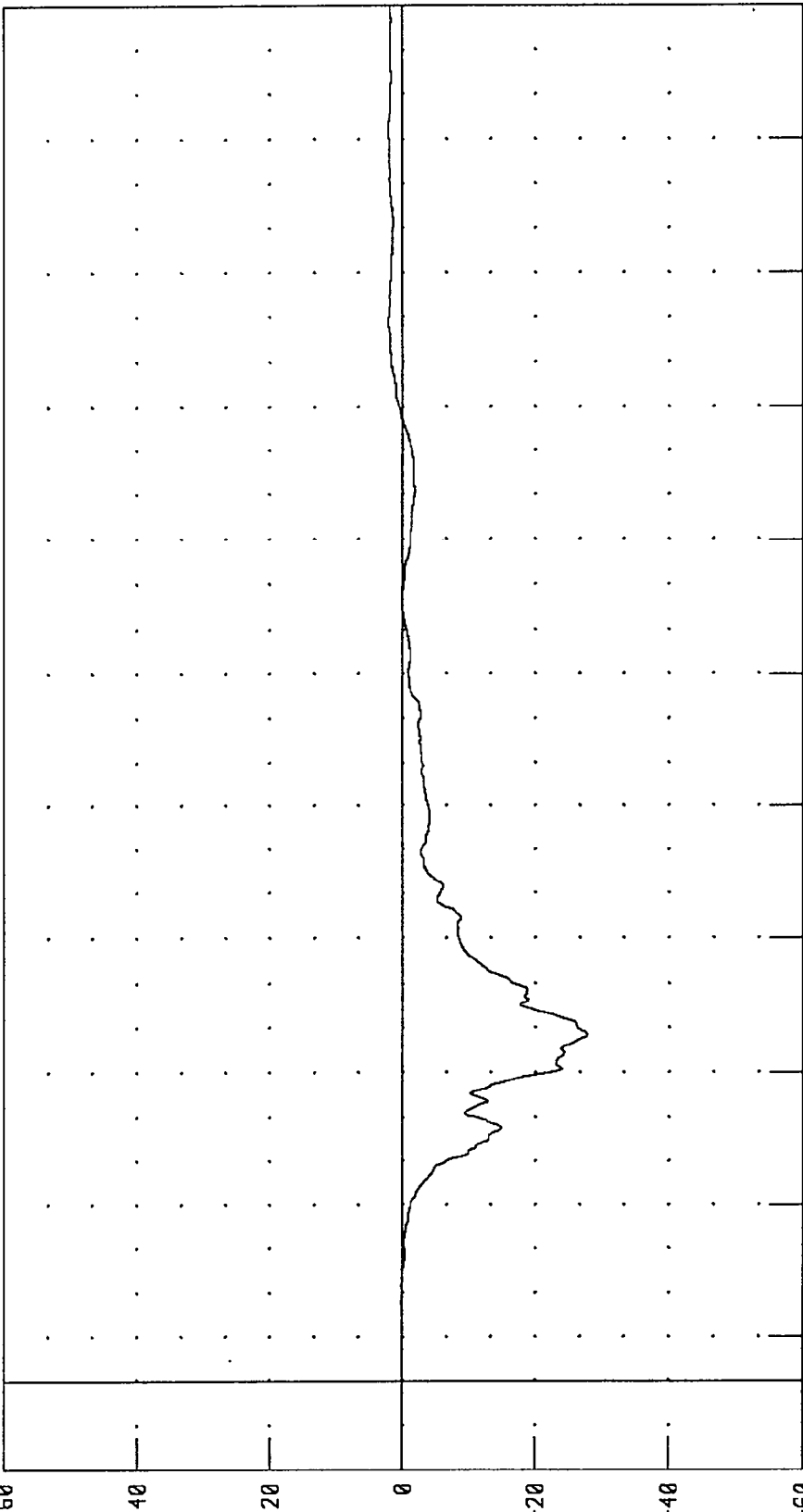
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER CHEST LATERAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

IRC INC.

60



PEAK DATA: 2.24 G @ 282.72 MS; -27.84 G @ 78.56 MS

CHANNEL: CSTYG2 FILTER: CH. CLASS 180

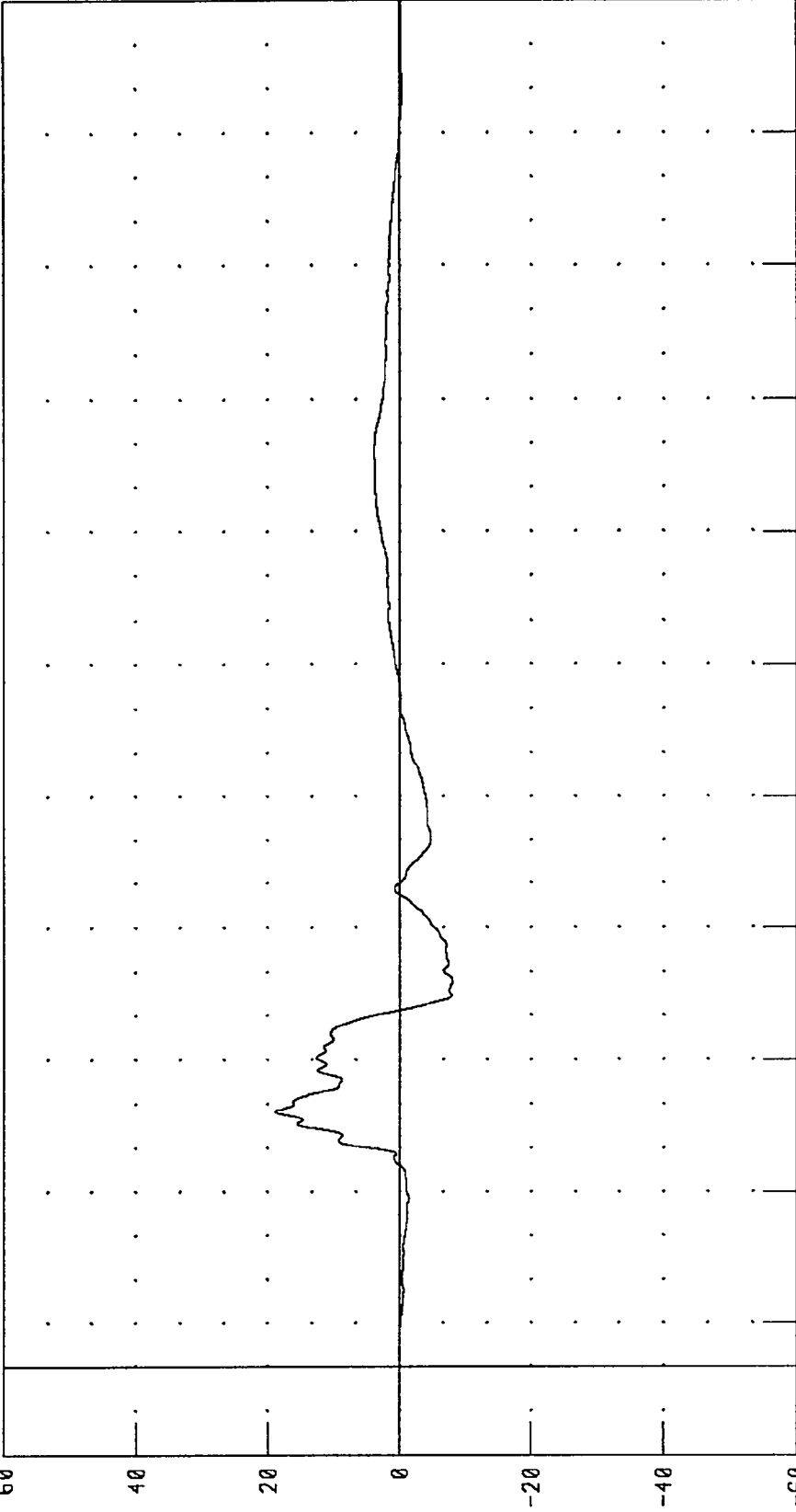
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER CHEST VERTICAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

60



TIME (MS)

PEAK DATA: 18.90 G @ 58.32 MS; -7.90 G @ 84.56 MS

CHANNEL: CSTZG2 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

CHANNEL: CSTRG2 FILTER: CH. CLASS 180

PEAK DATA: 55.83 G @ 70.96 MS; 0.00 G @ -20.00 MS

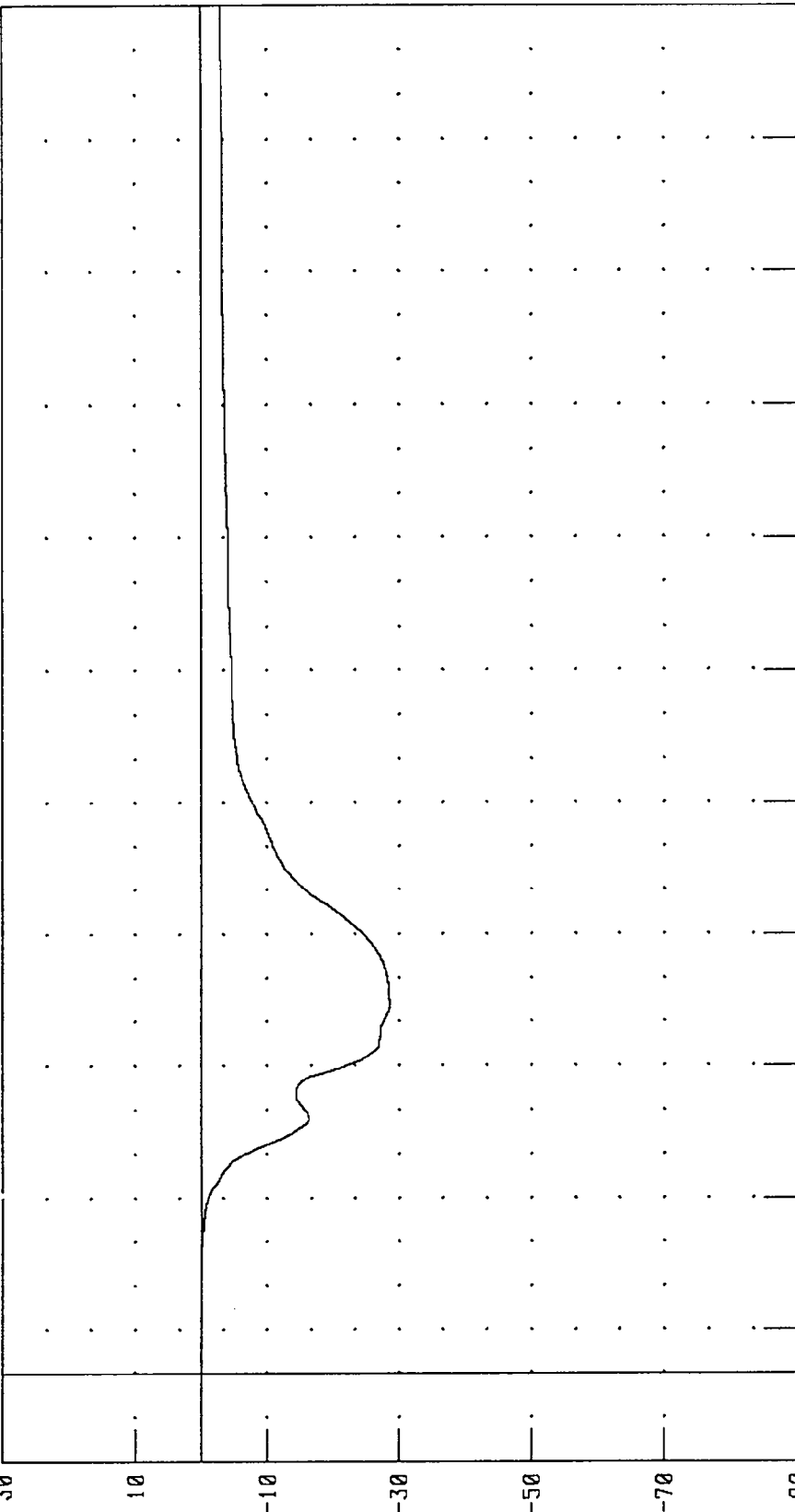
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER CHEST DEFLECTION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30



DISPLACEMENT (MM)

PEAK DATA: 0.01 MM @ -12.24 MS; -28.58 MM @ 83.36 MS

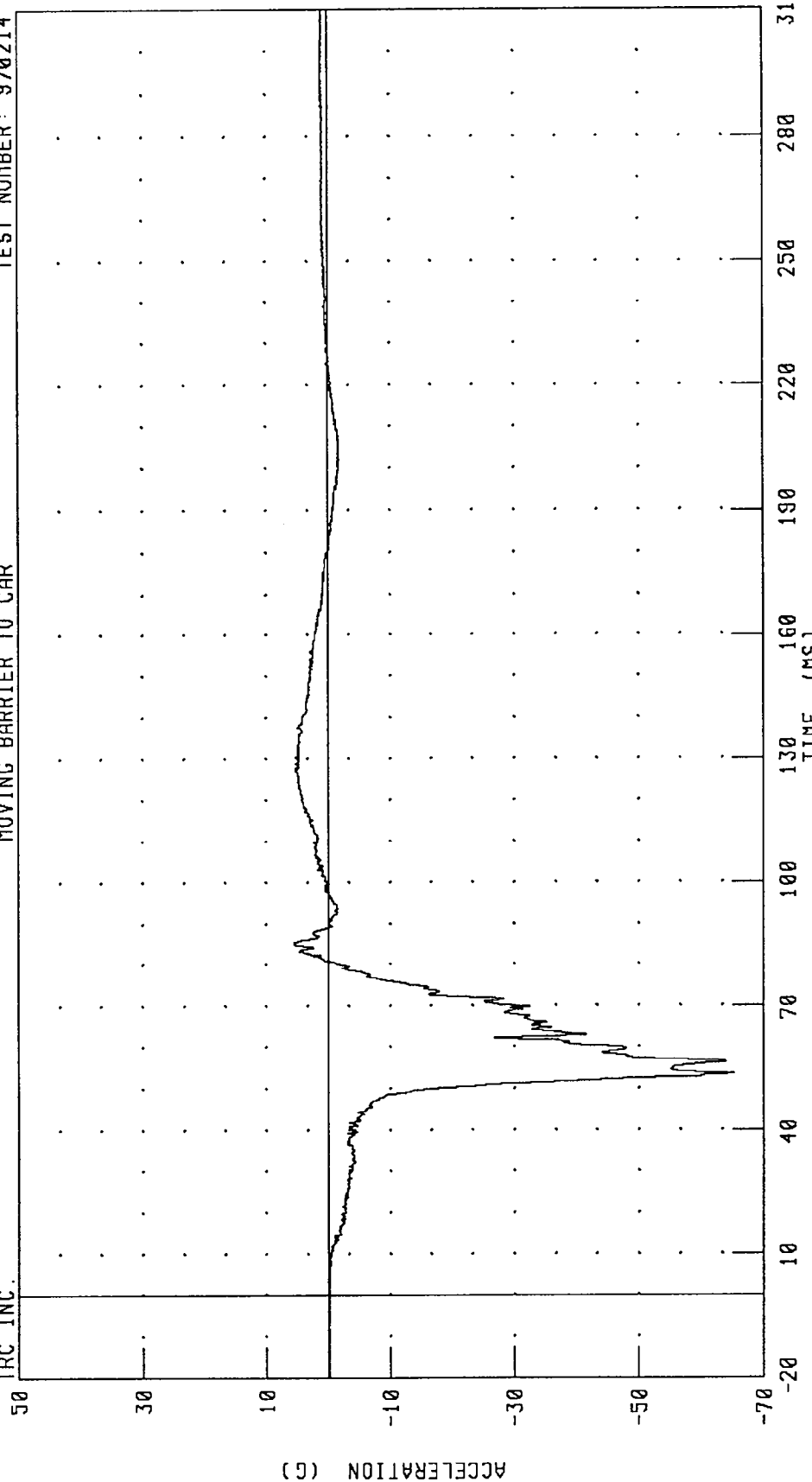
CHANNEL: CSTXD2 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER PELVIS LONGITUDINAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 5.56 G @ 85.28 MS; -65.15 G @ 53.44 MS

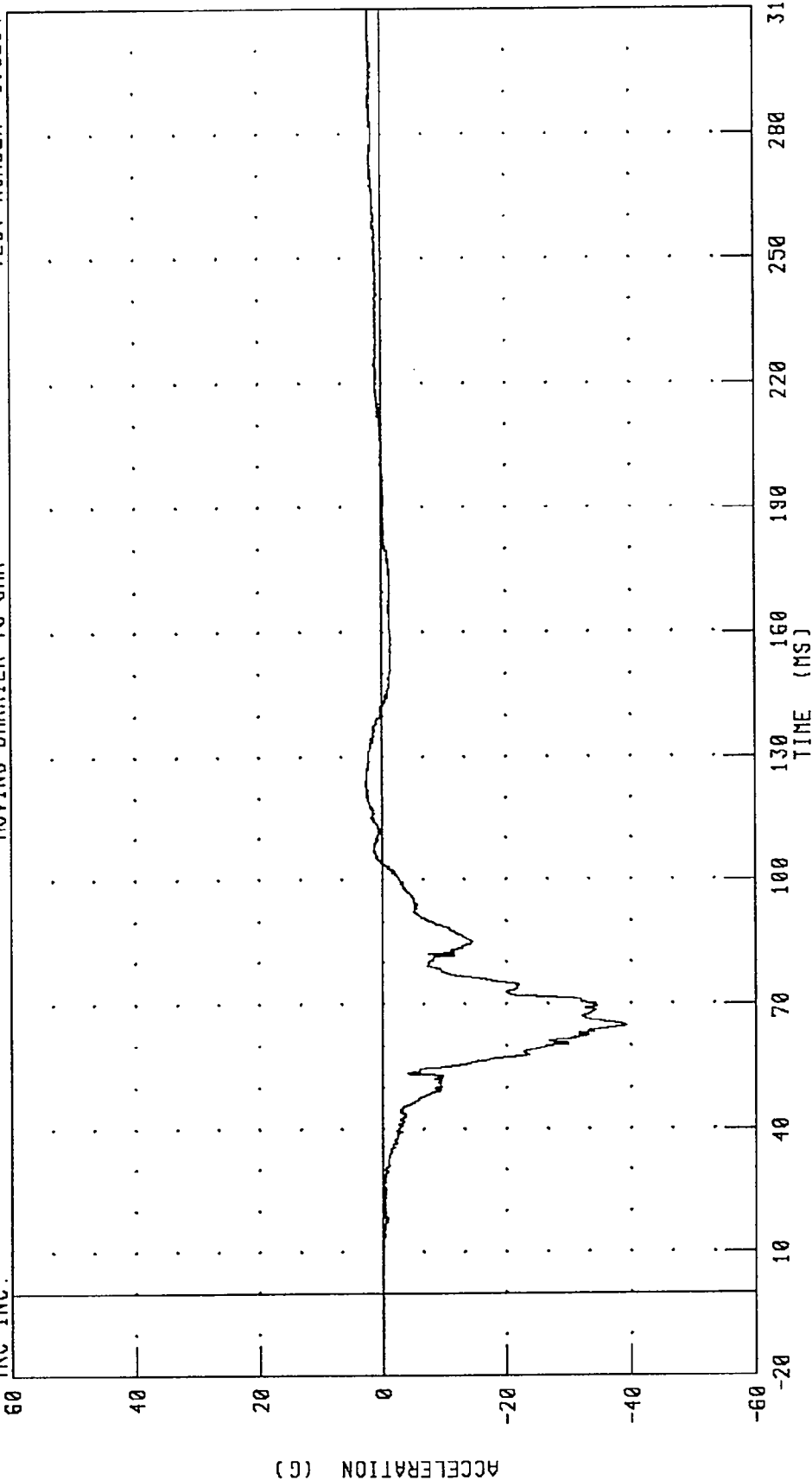
CHANNEL: PEVXG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER PELVIS LATERAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: PEVYG2 FILTER: CH. CLASS 1000

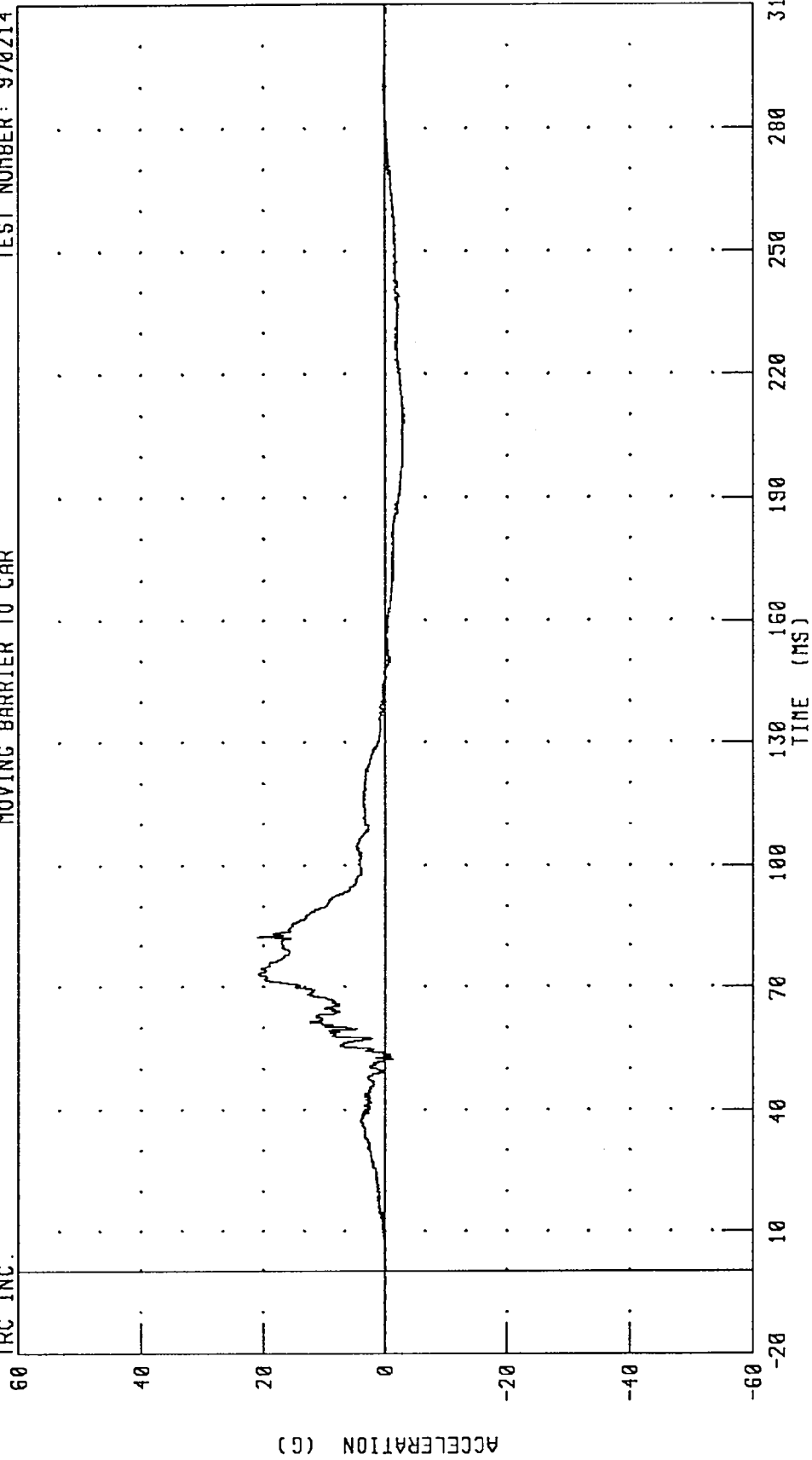
PEAK DATA: 2.78 G @ 122.72 MS; -39.22 G @ 64.88 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER PELVIS VERTICAL AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



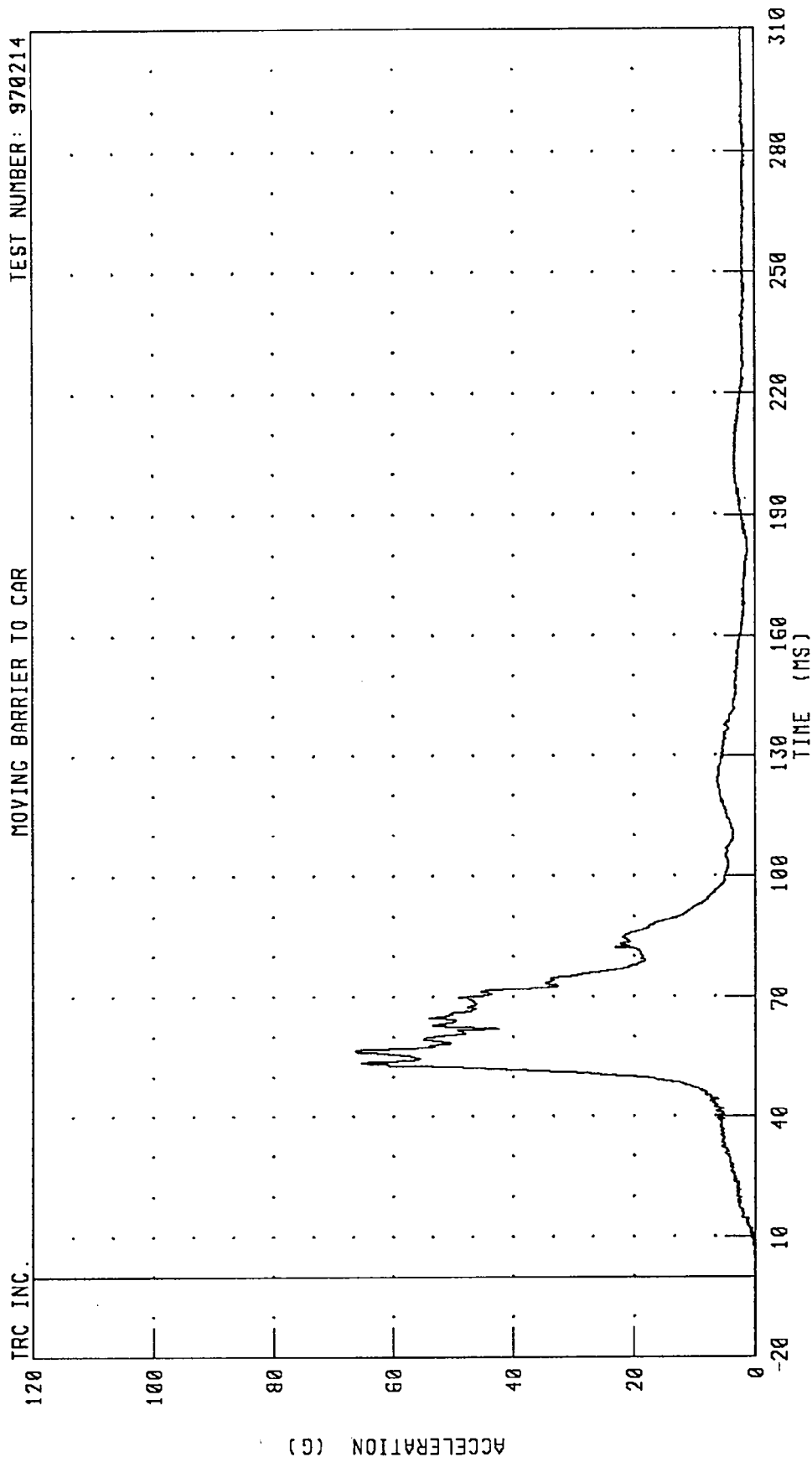
CHANNEL: PEVZG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 66.27 G @ 56.48 MS; 0.08 G @ -19.84 MS

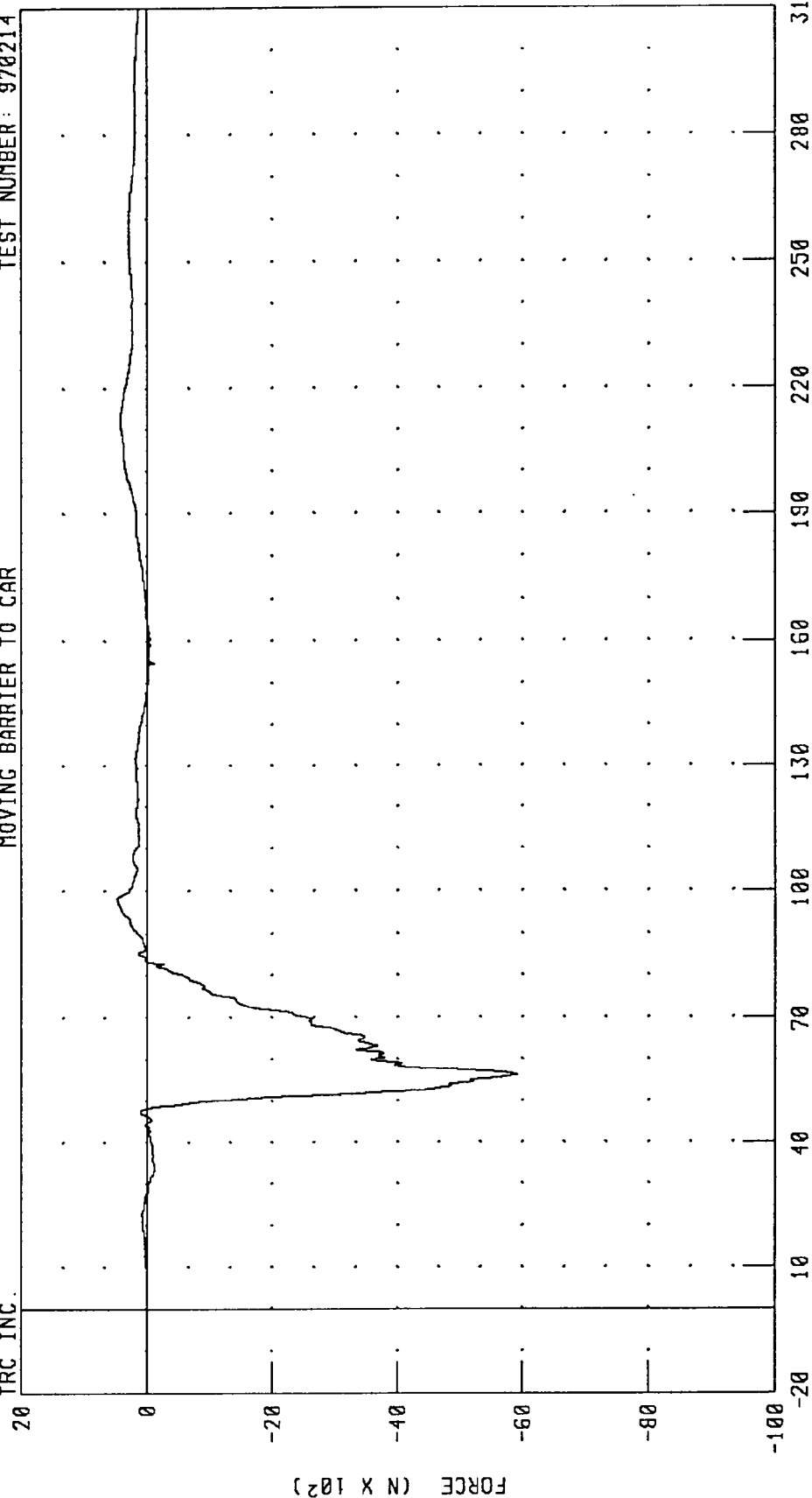
CHANNEL: PEVRG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 47.30 N @ 98.16 MS; -5913.18 N @ 56.16 MS

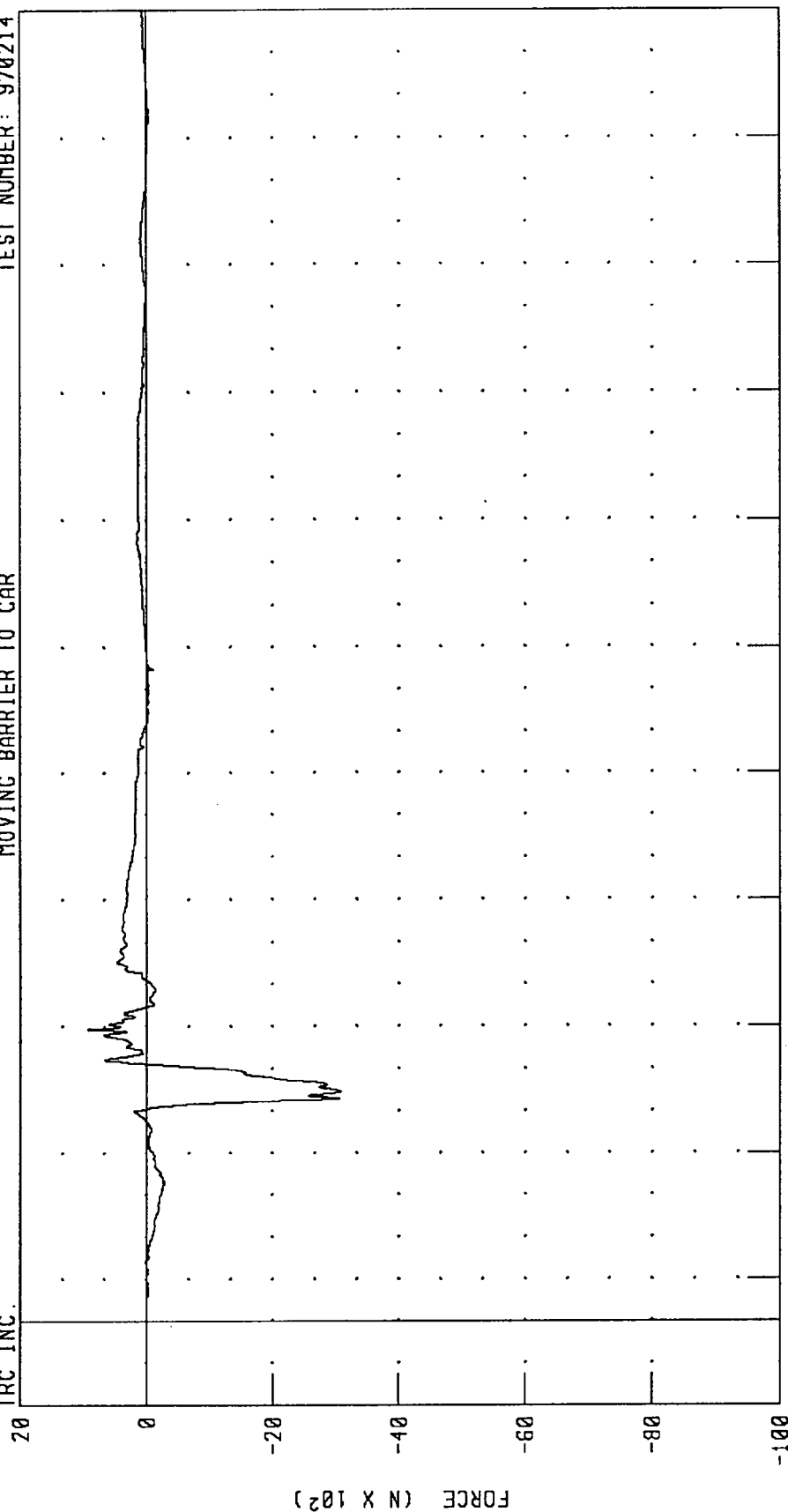
CHANNEL: LFMF2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

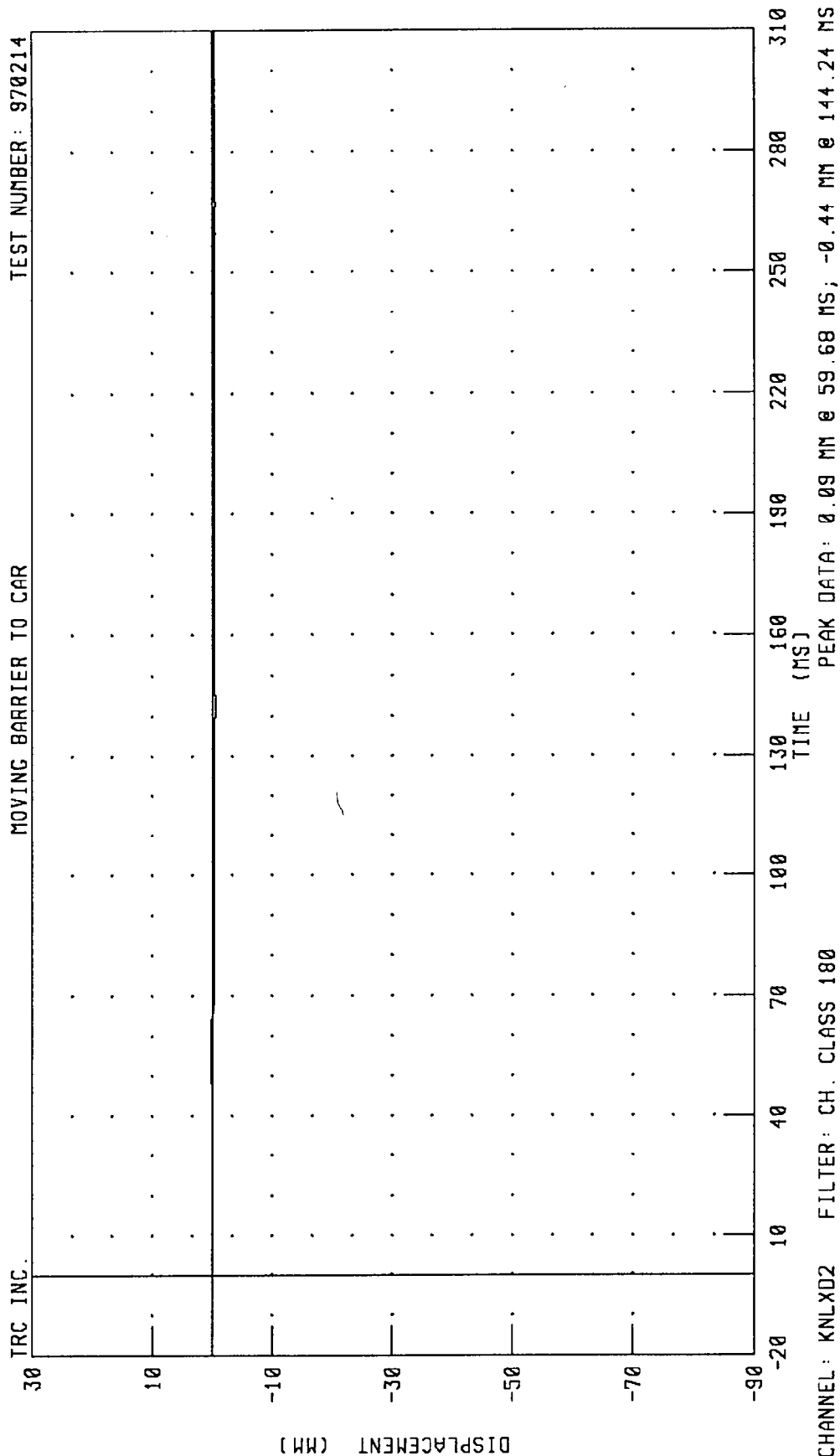
TRC INC.



PEAK DATA: 929.34 N @ 69.36 MS; -3081.20 N @ 54.40 MS

CHANNEL: RFMF2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT KNEE DISPLACEMENT

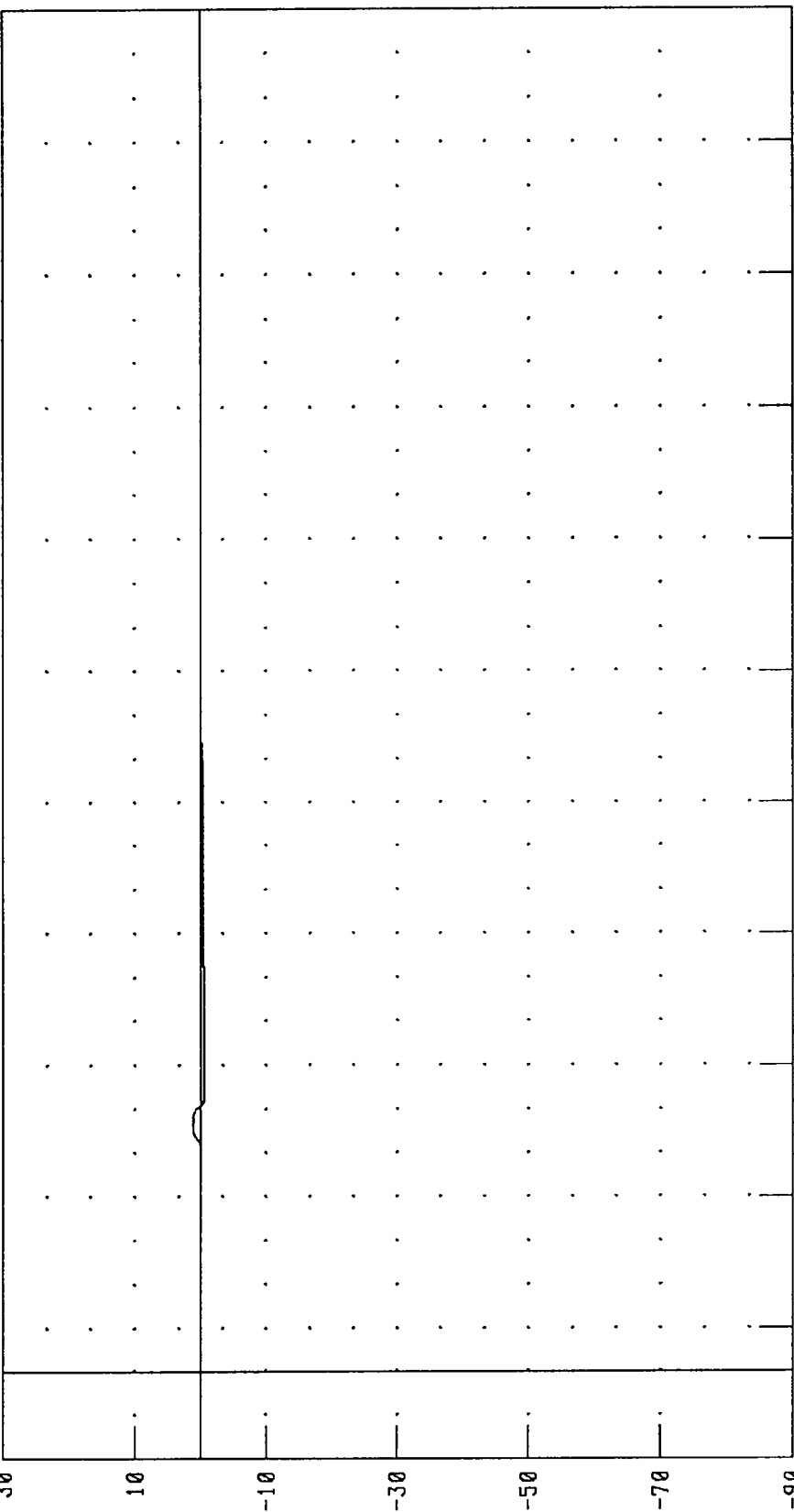


70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT KNEE DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 1.14 MM @ 58.24 MS; -0.49 MM @ 62.56 MS

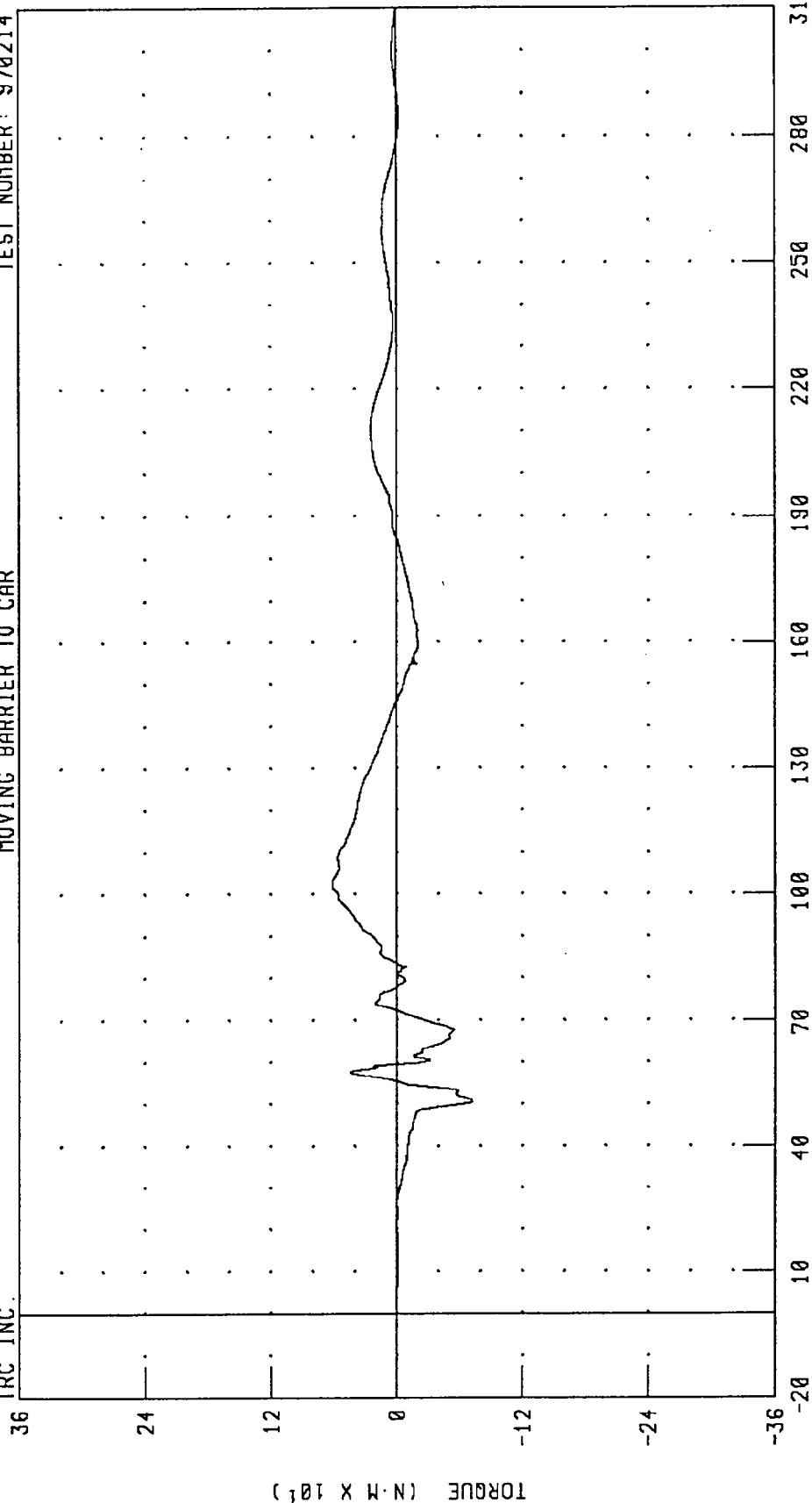
CHANNEL: KNRX02 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT UPPER TIBIA X MOMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 61.16 N·M @ 101.92 MS; -72.26 N·M @ 50.72 MS

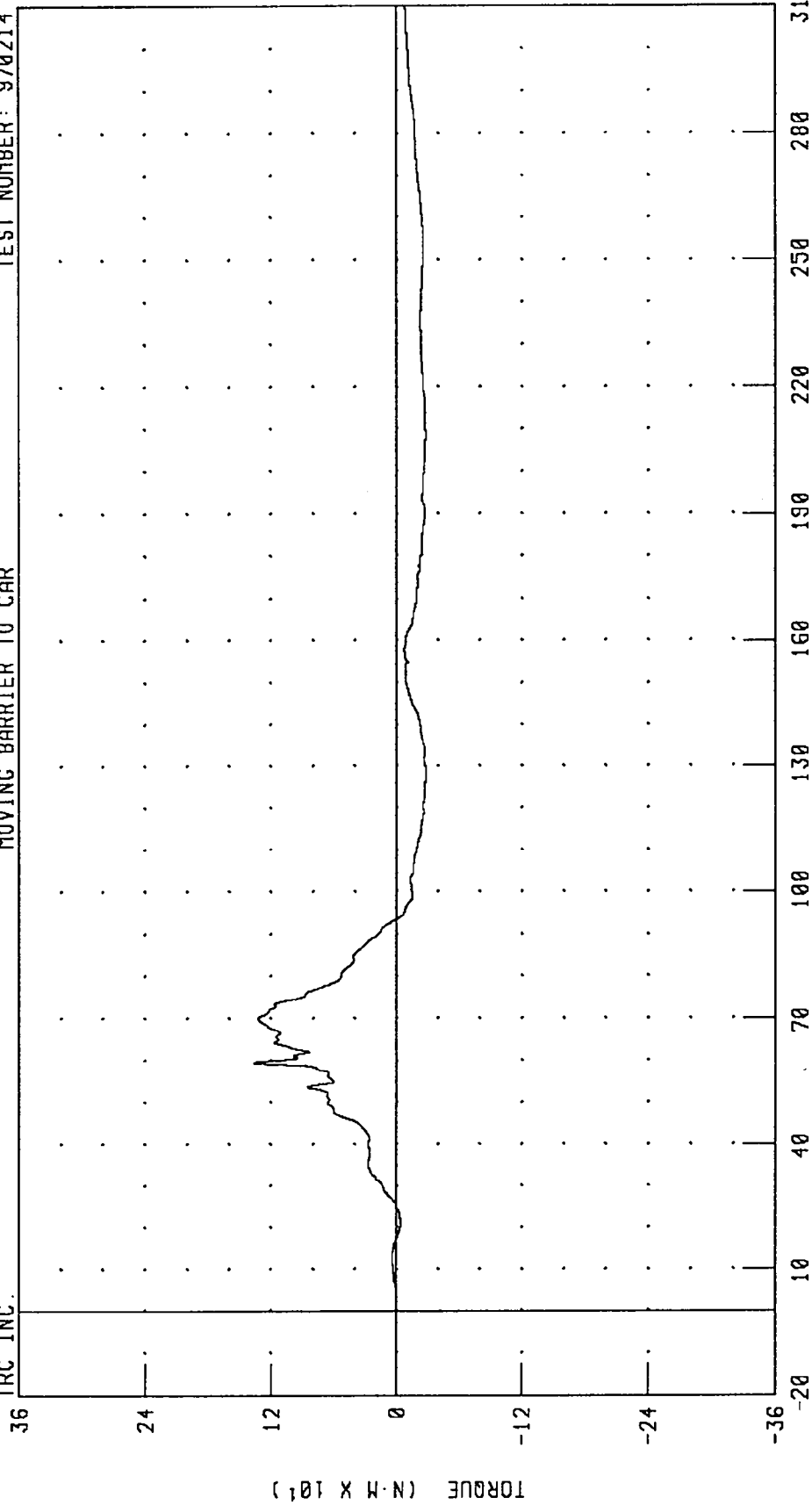
CHANNEL: TBLXM2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT UPPER TIBIA Y MOMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: TBLYM2 FILTER: CH. CLASS 600

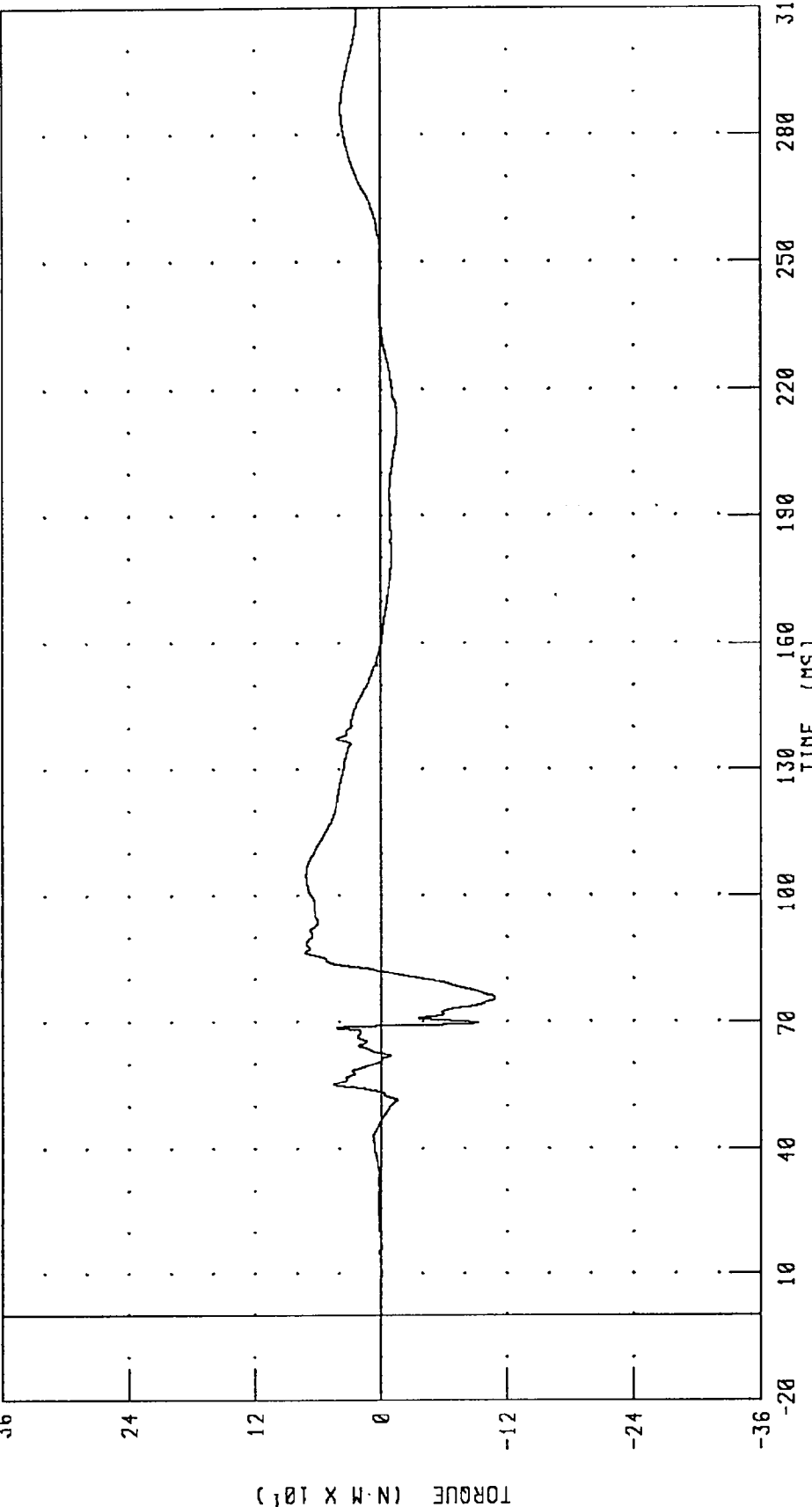
PEAK DATA: 136.49 N·m @ 59.52 MS, -28.60 N·m @ 128.48 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER RIGHT UPPER TIBIA X MOMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



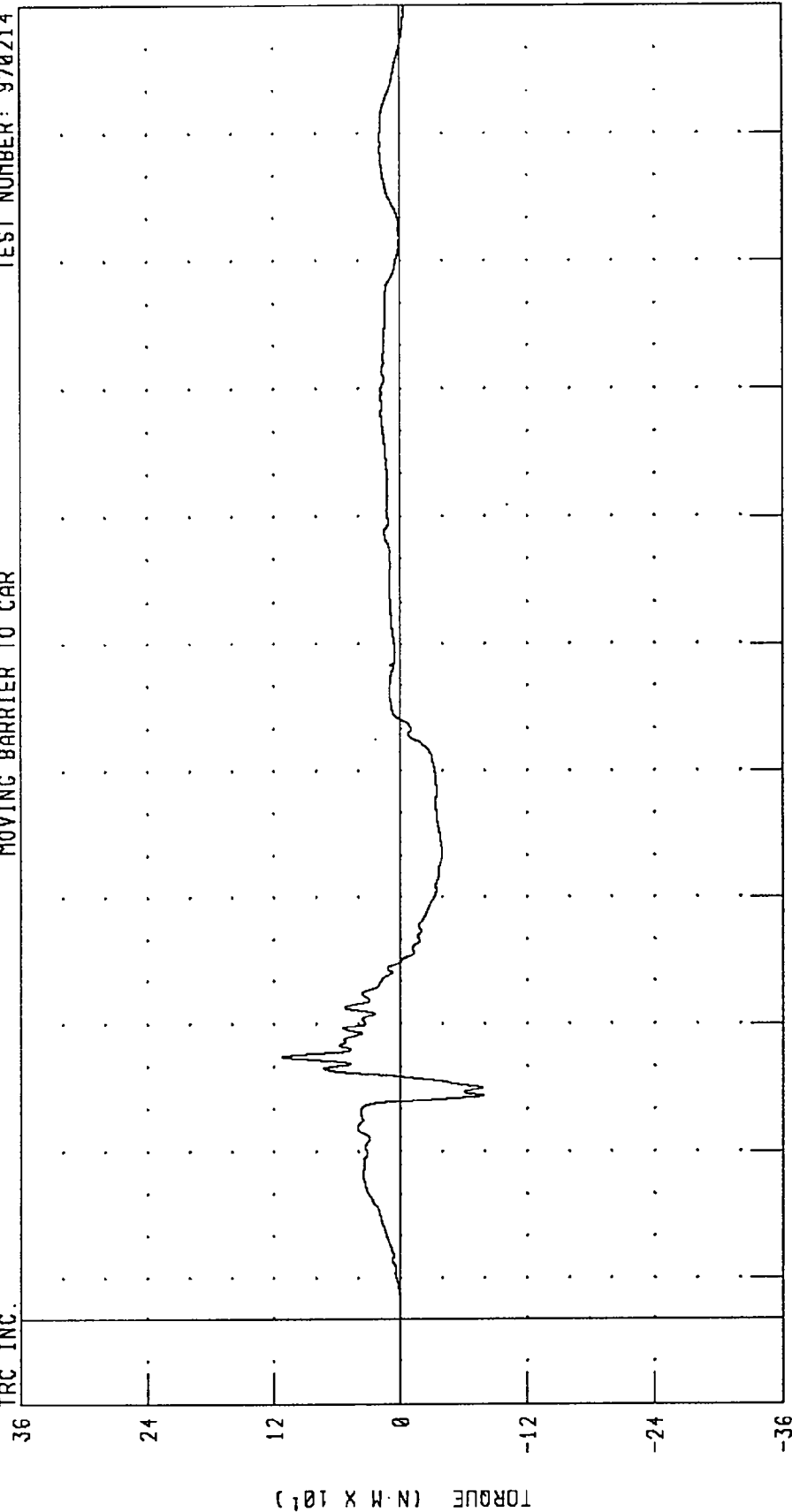
CHANNEL: TBRX12 FILTER: CH. CLASS 600

PEAK DATA: 72.81 N-M @ 86.56 MS; -109.07 N-M @ 75.68 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT UPPER TIBIA Y MOMENT
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



PEAK DATA: 112.93 N·M @ 62.40 MS; -79.49 N·M @ 53.04 MS

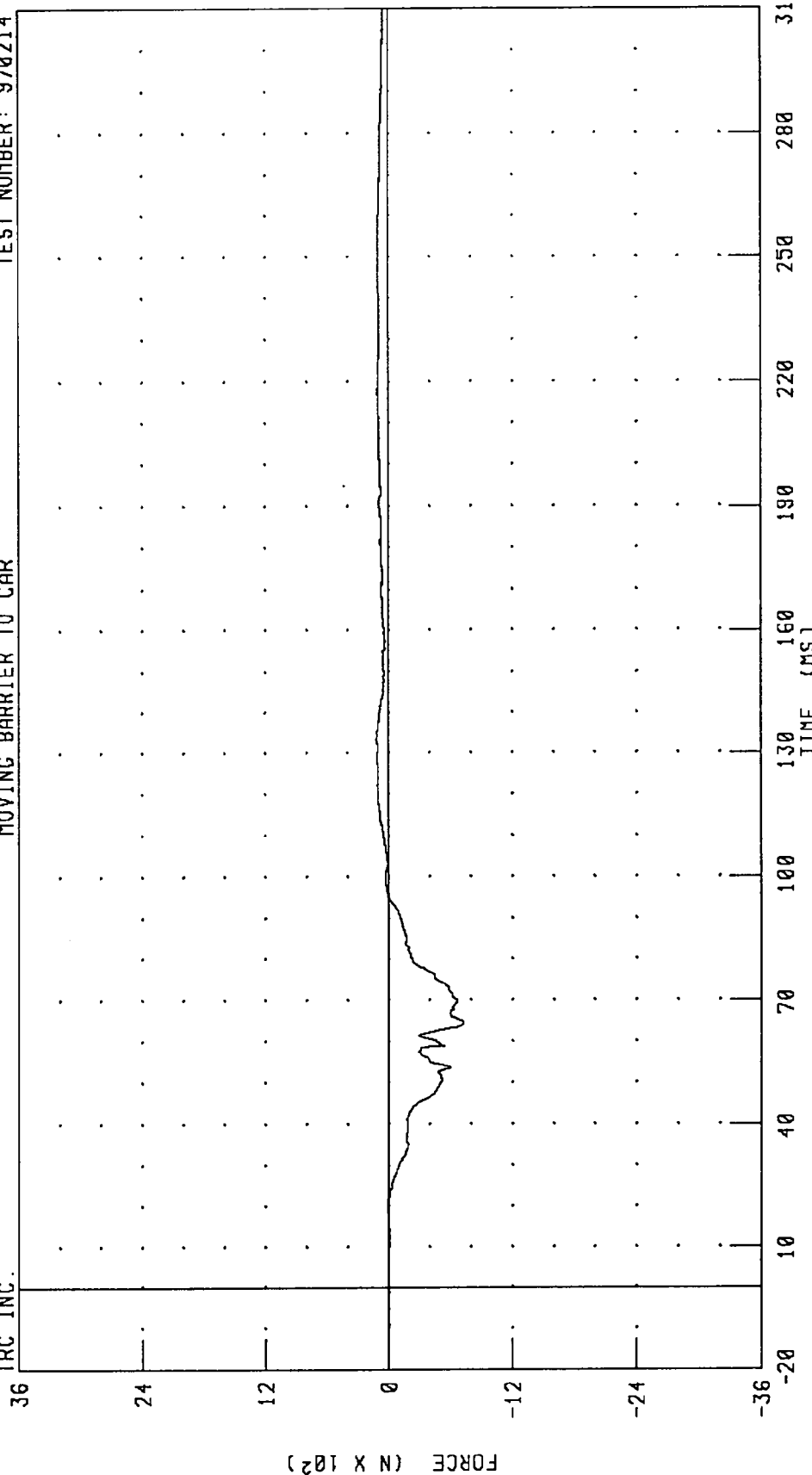
CHANNEL: TBRYM2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

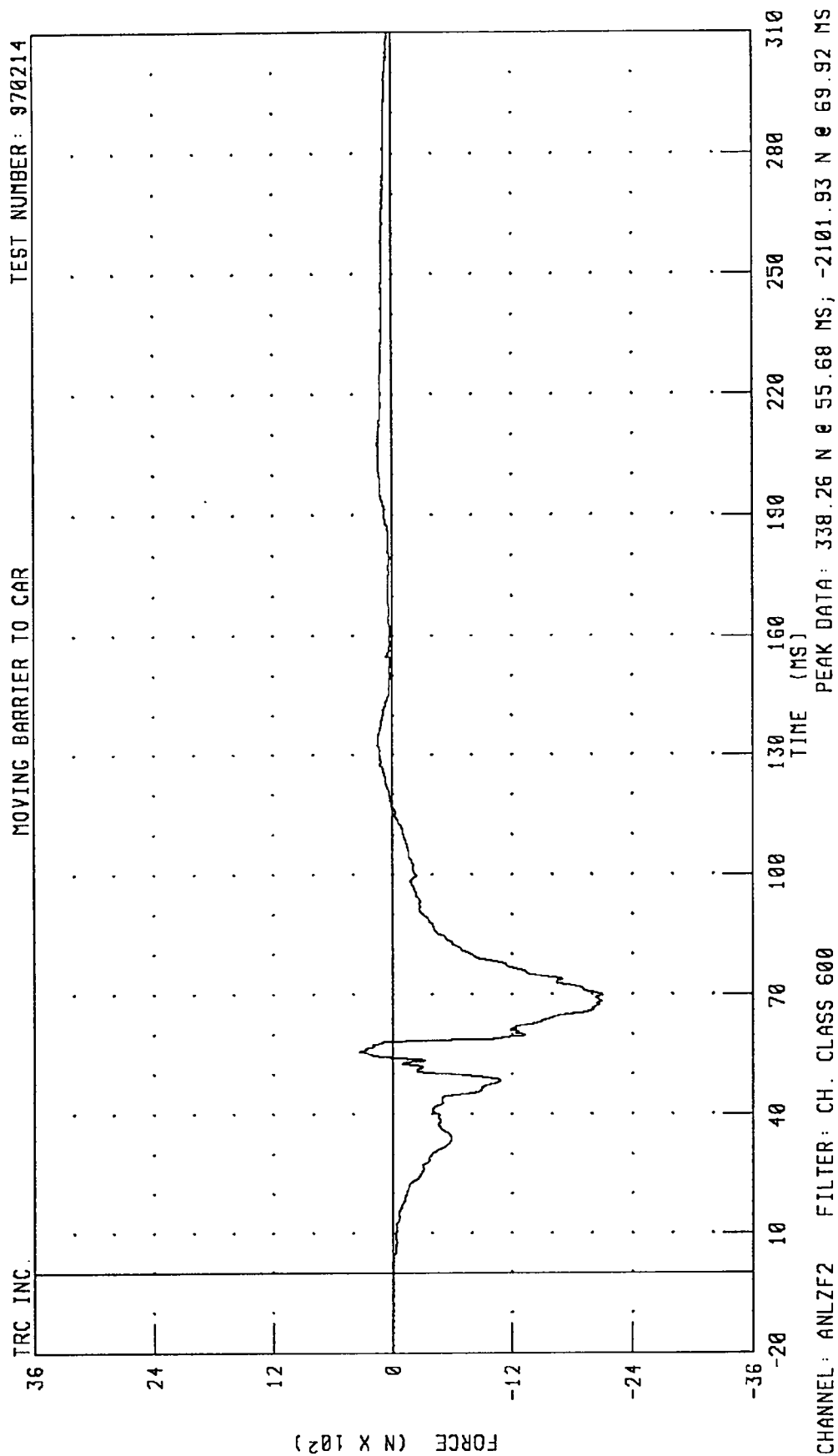
TRC INC.



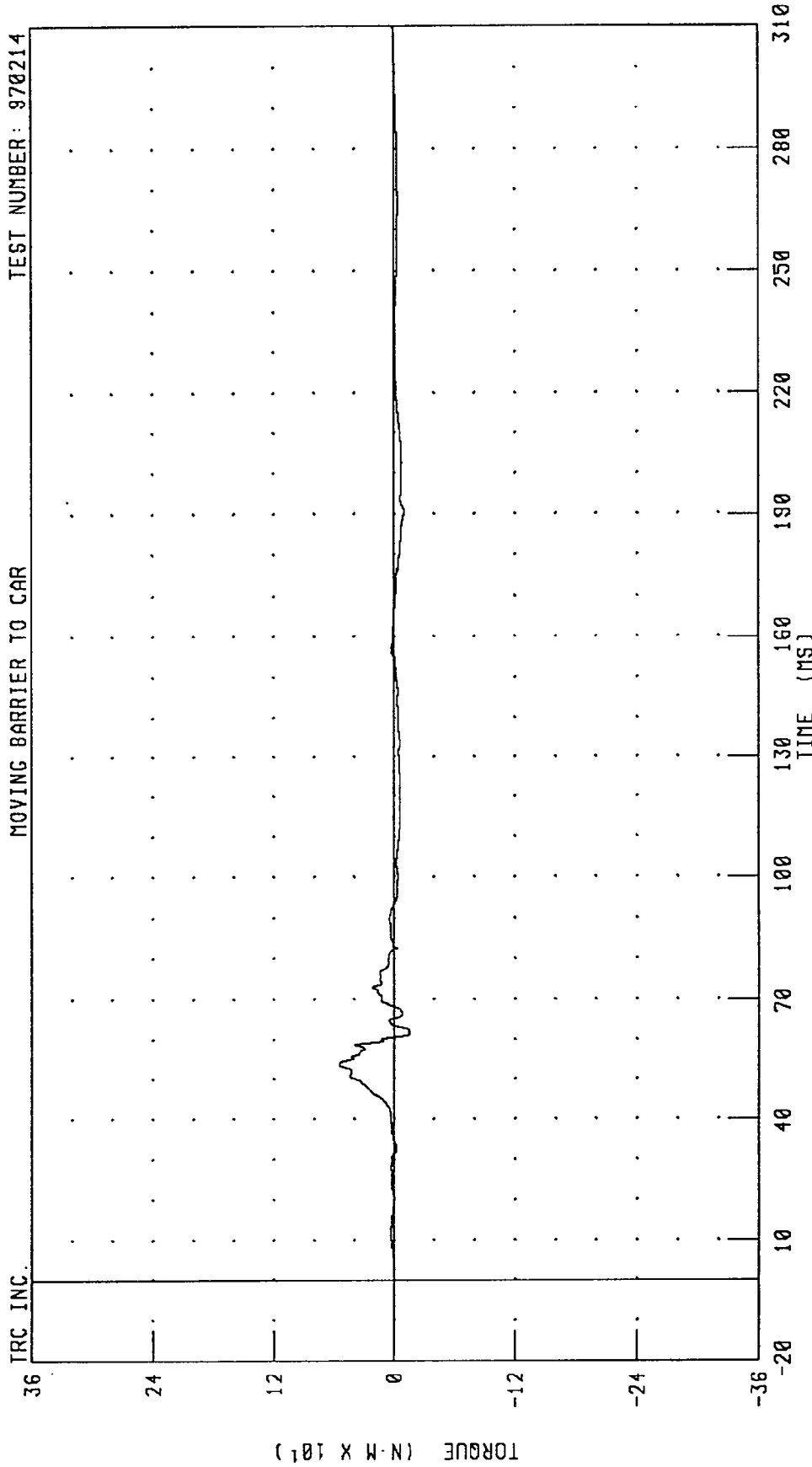
CHANNEL: ANLXF2 FILTER: CH. CLASS 600

PEAK DATA: 118.11 N @ 133.20 MS; -723.91 N @ 64.64 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE



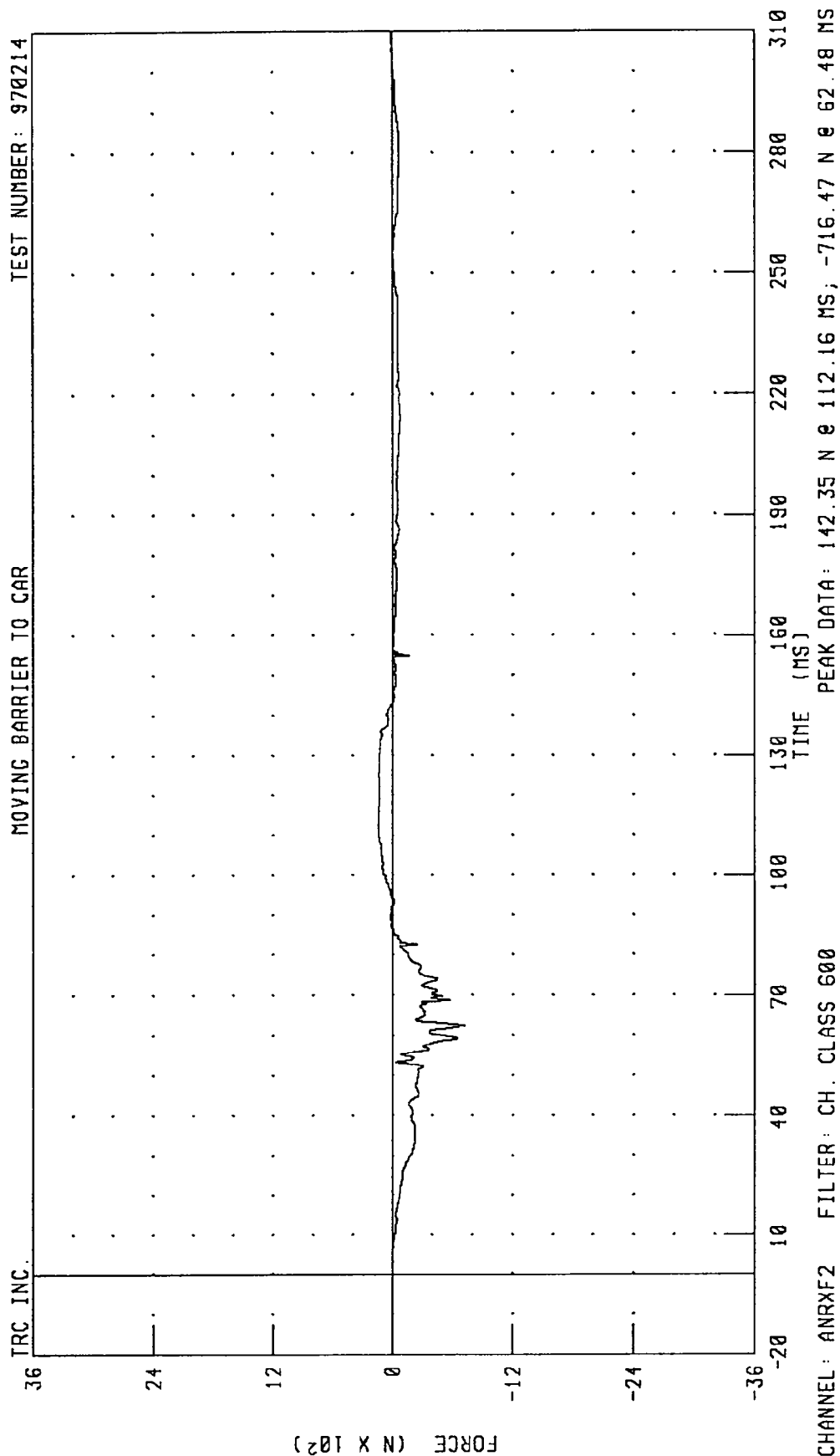
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS



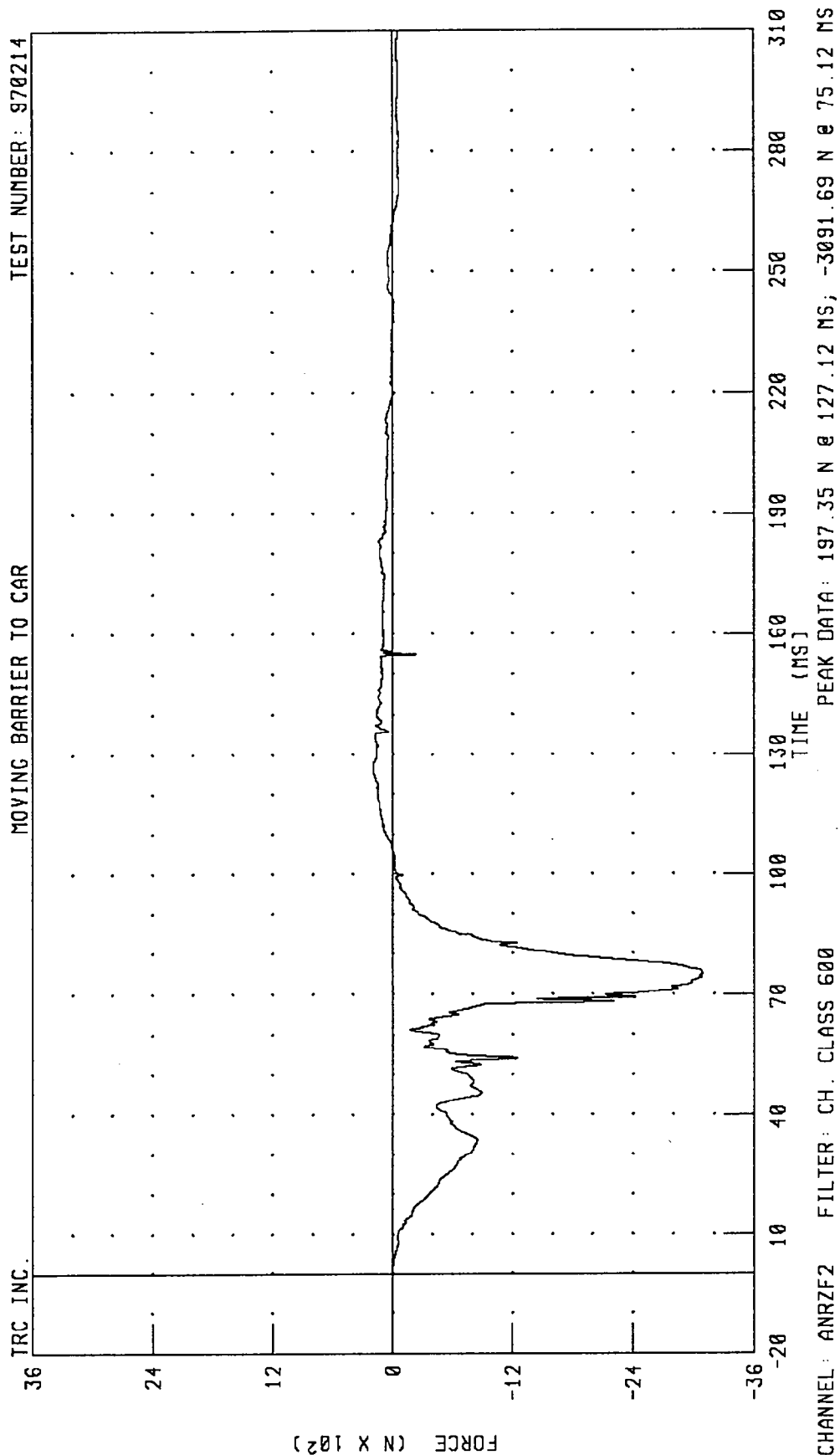
PEAK DATA: 55.25 N·M @ 53.52 MS; -16.35 N·M @ 61.52 MS

CHANNEL: ANLYM2 FILTER: CH. CLASS 600

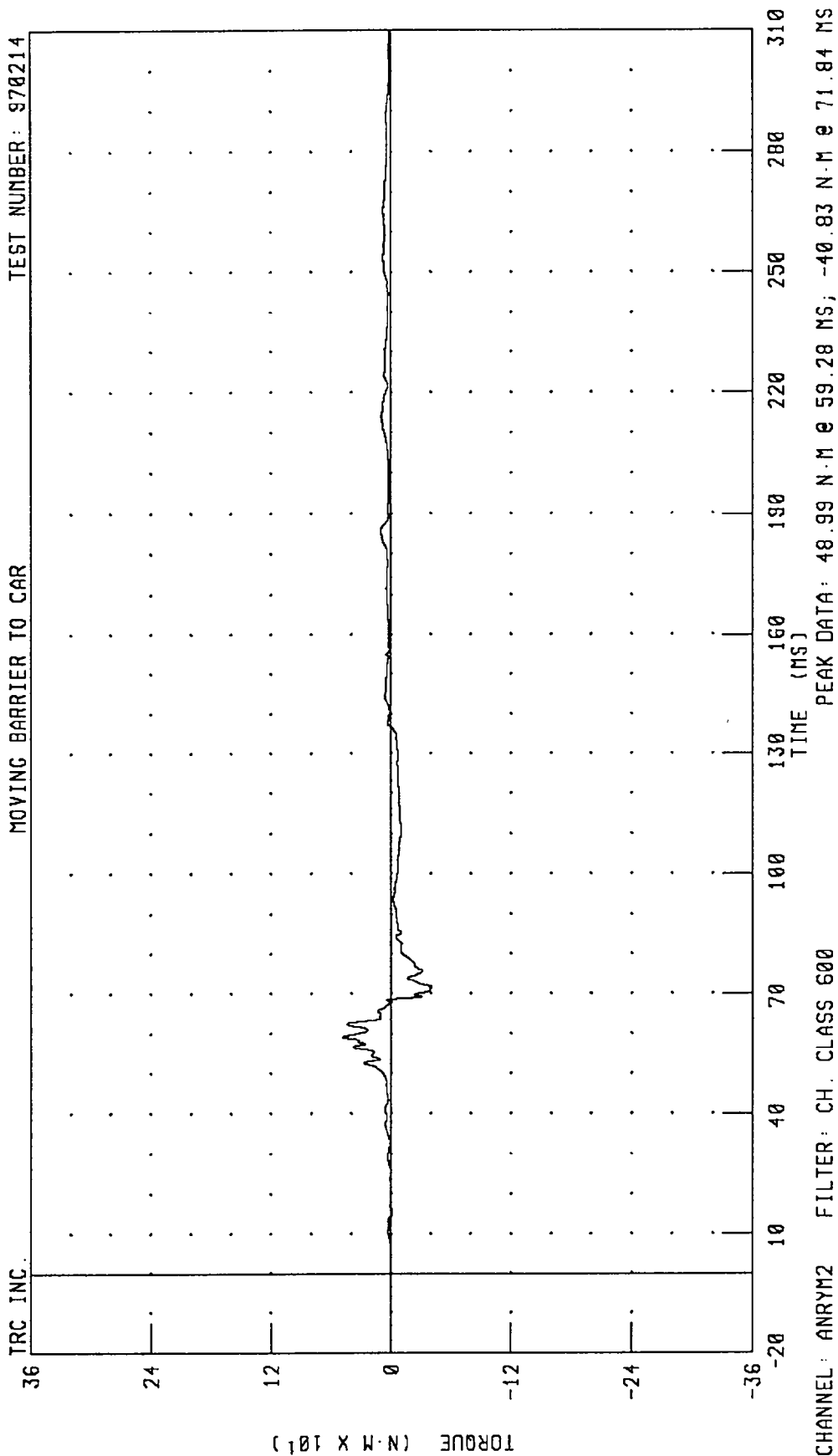
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS

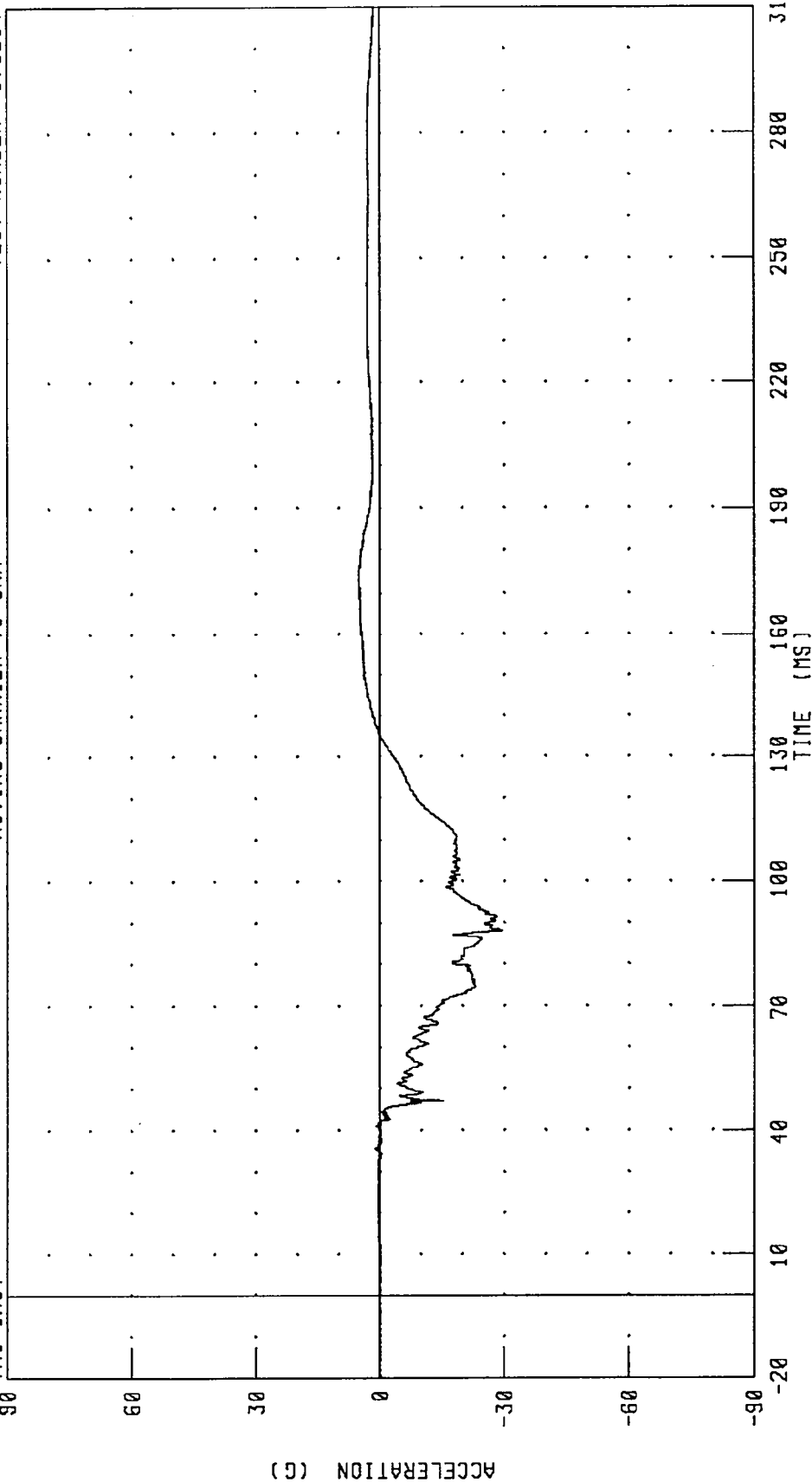


CHANNEL: ANRYM2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD ARRAY 1 X-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

TRC INC.



CHANNEL: HD1XG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER HEAD ARRAY 1 Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

90

60

30

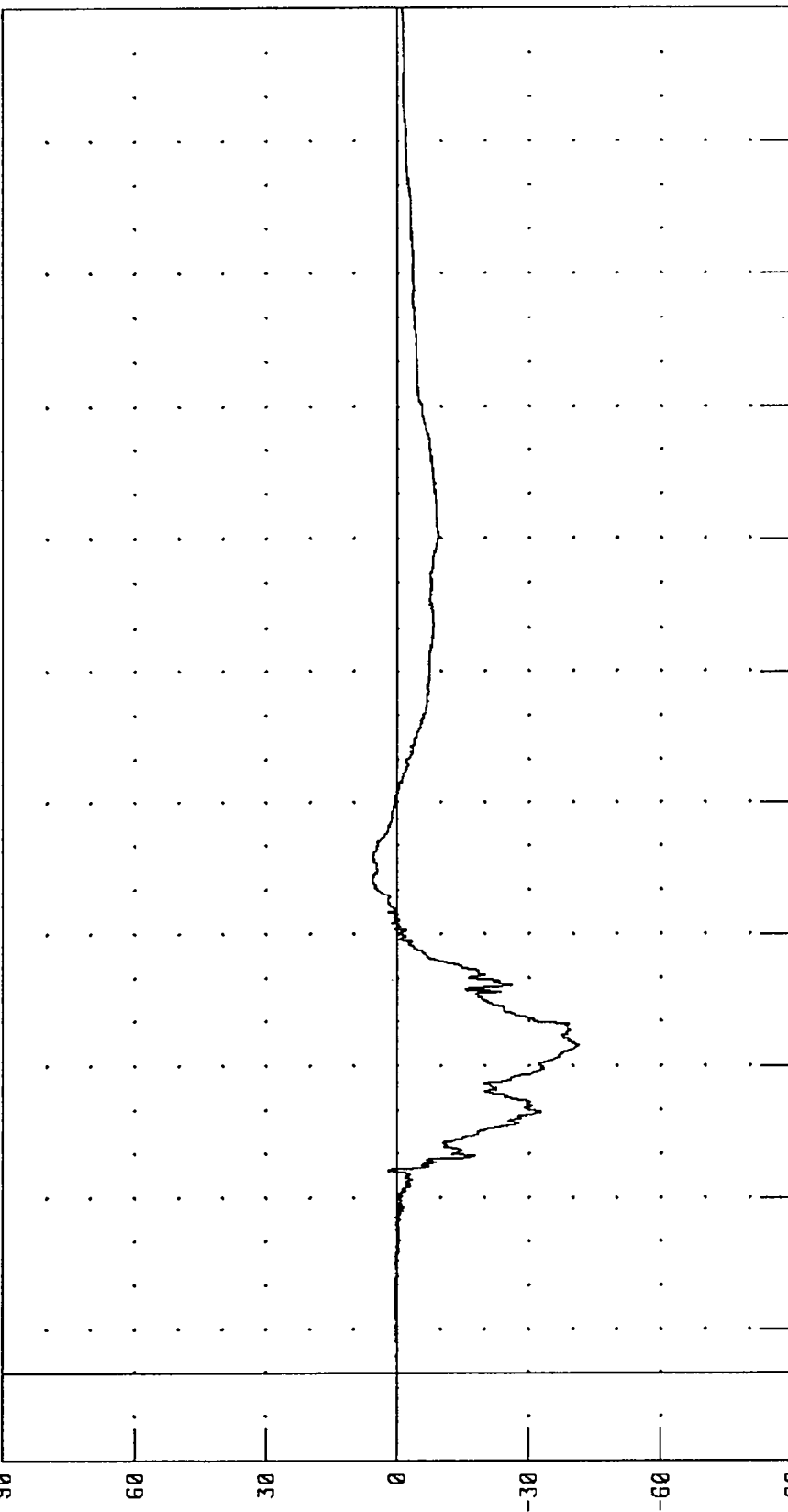
0

-30

-60

-90

ACCELERATION (G)



PEAK DATA: 5.69 G @ 111.68 MS; -41.27 G @ 74.72 MS

CHANNEL: HD1ZG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD ARRAY 2 Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

90

60

30

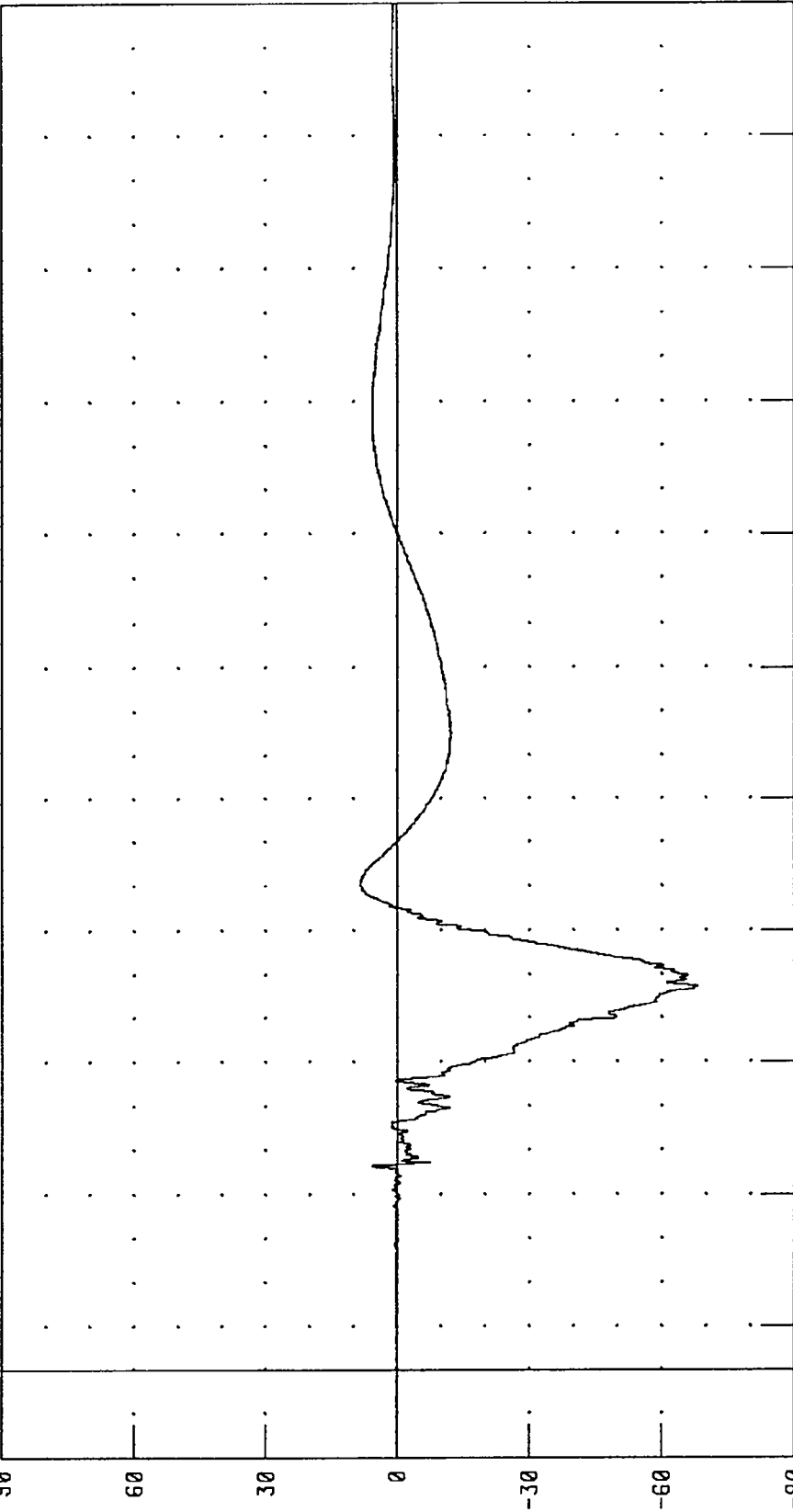
0

-30

-60

-90

ACCELERATION (G)



TIME (MS)

310

280

250

220

190

160

130

100

70

40

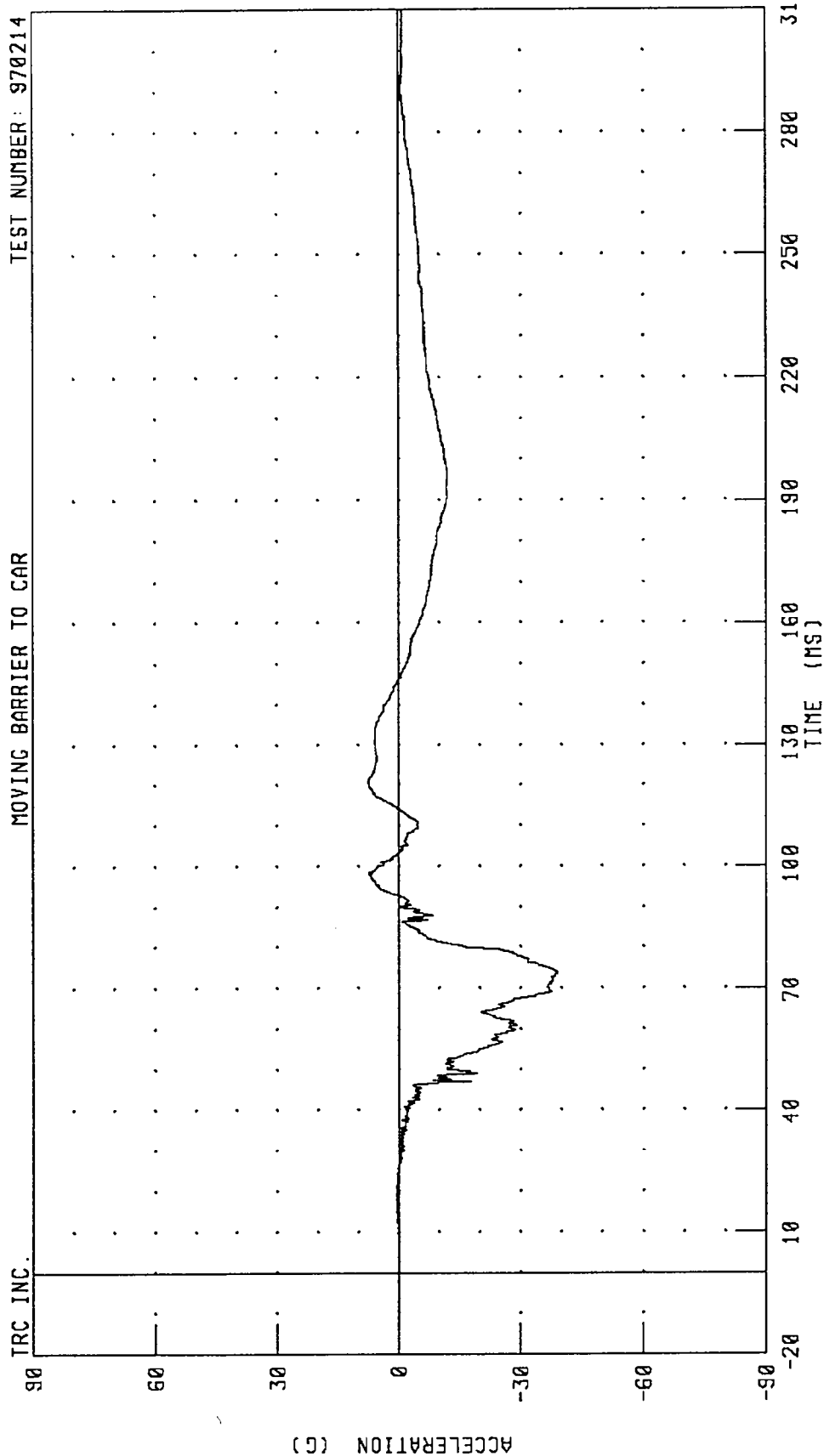
10

-20

CHANNEL: HD2YG2 FILTER: CH. CLASS 1000

PEAK DATA: 8.66 G @ 110.32 MS; -67.99 G @ 87.36 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD ARRAY 2 Z-AXIS ACCELERATION



CHANNEL: HD2ZG2 FILTER: CH. CLASS 1000

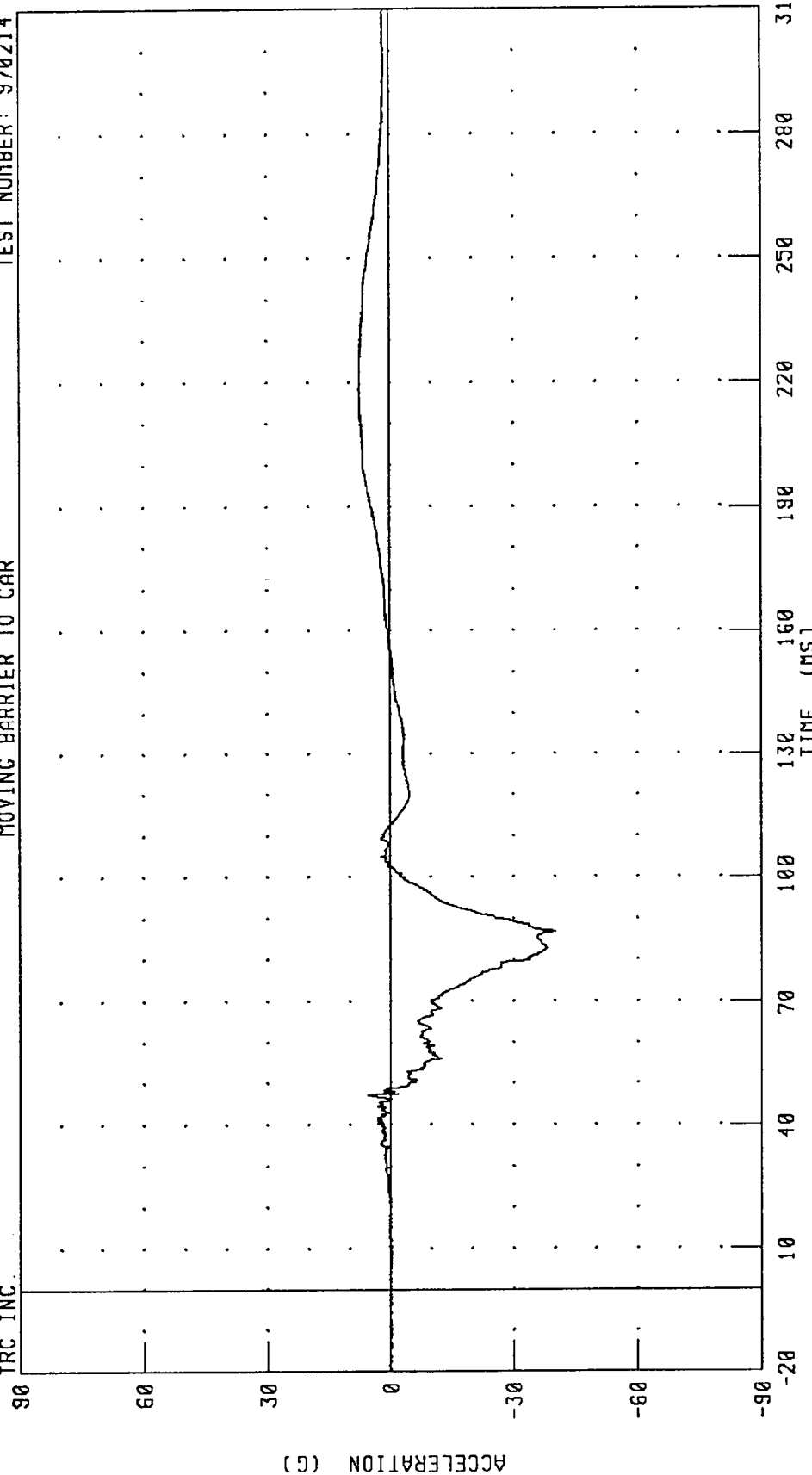
PEAK DATA: 7.71 G @ 120.56 MS; -39.13 G @ 73.84 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD ARRAY 3 X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



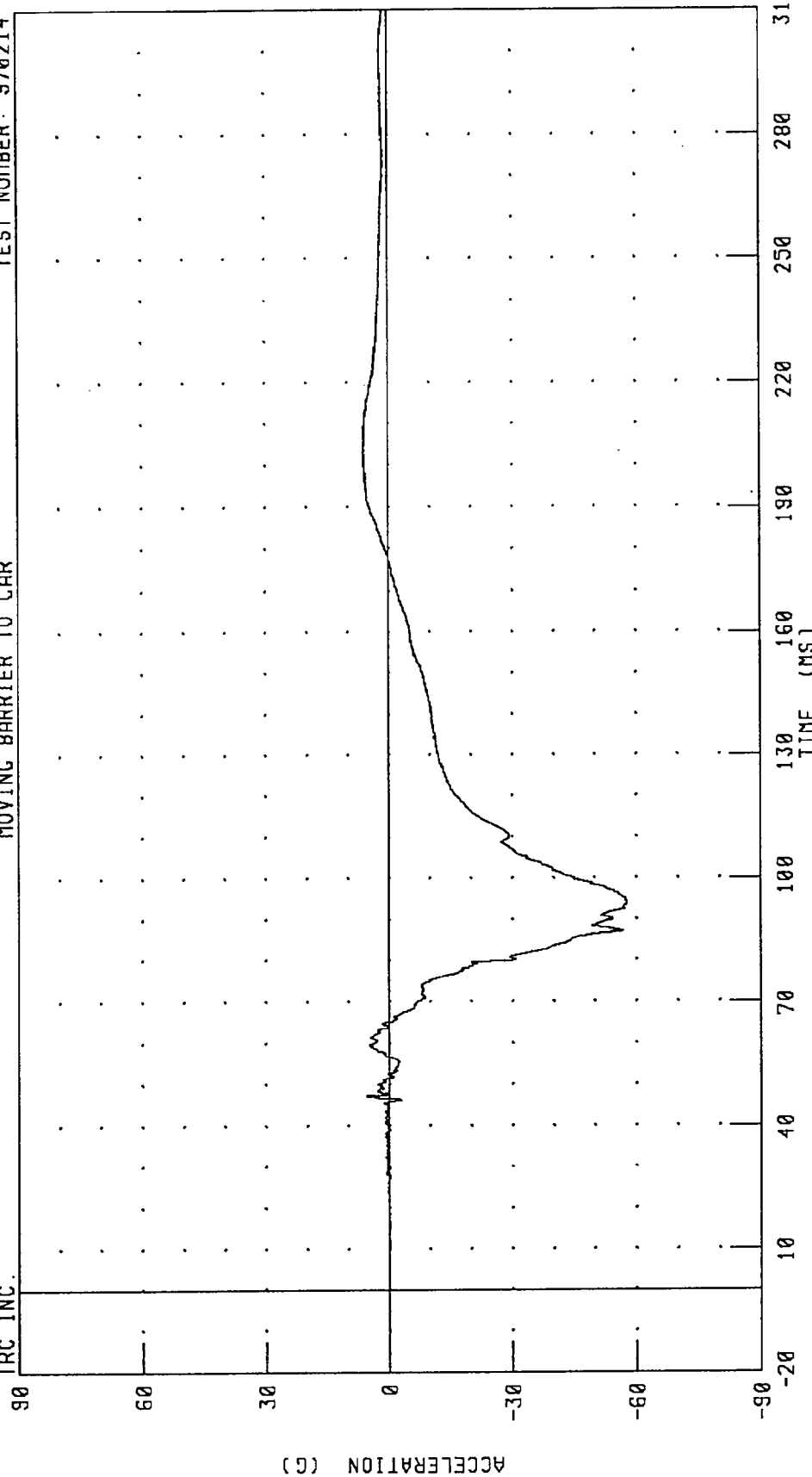
CHANNEL: HD3XG2 FILTER: CH. CLASS 1000

PEAK DATA: 7.67 G @ 218.40 MS; -40.23 G @ 87.04 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER HEAD ARRAY 3 Y-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214

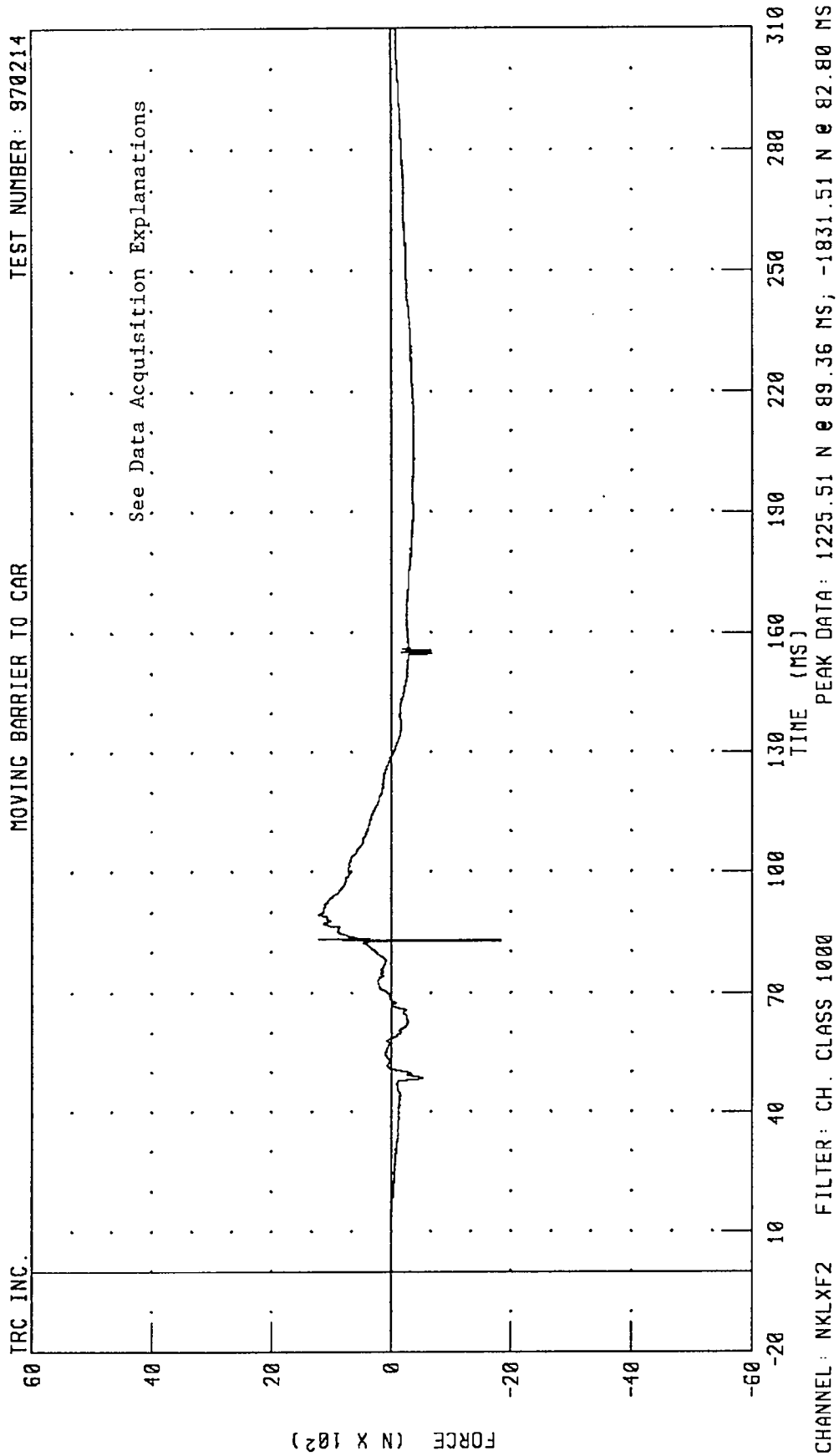
TRC INC.



PEAK DATA: 6.06 G @ 199.68 MS; -57.67 G @ 93.60 MS

CHANNEL: HD3YG2 FILTER: CH. CLASS 1000

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LOWER NECK X-AXIS FORCE

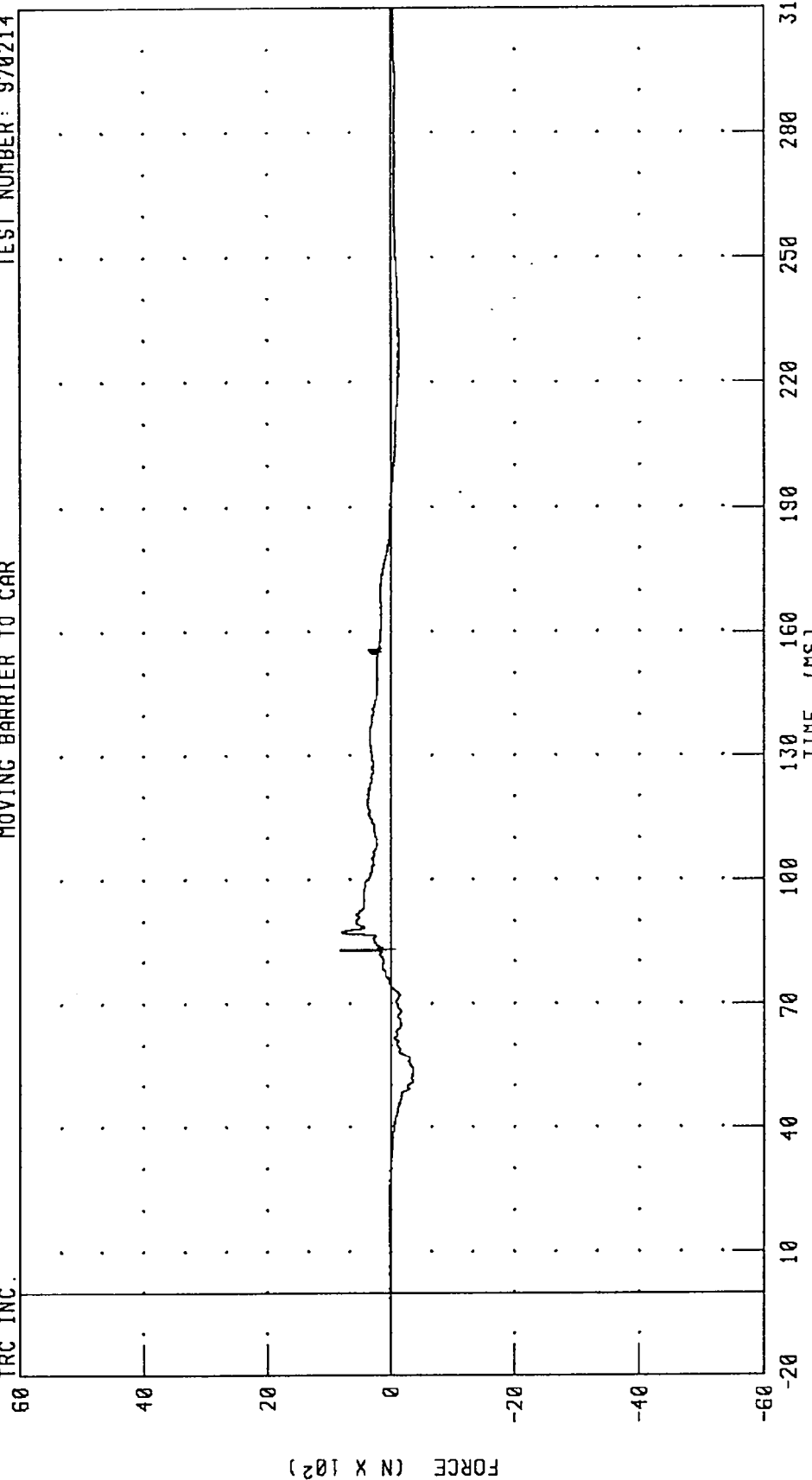


70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LOWER NECK Y-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: NKLYF2 FILTER: CH. CLASS 1000

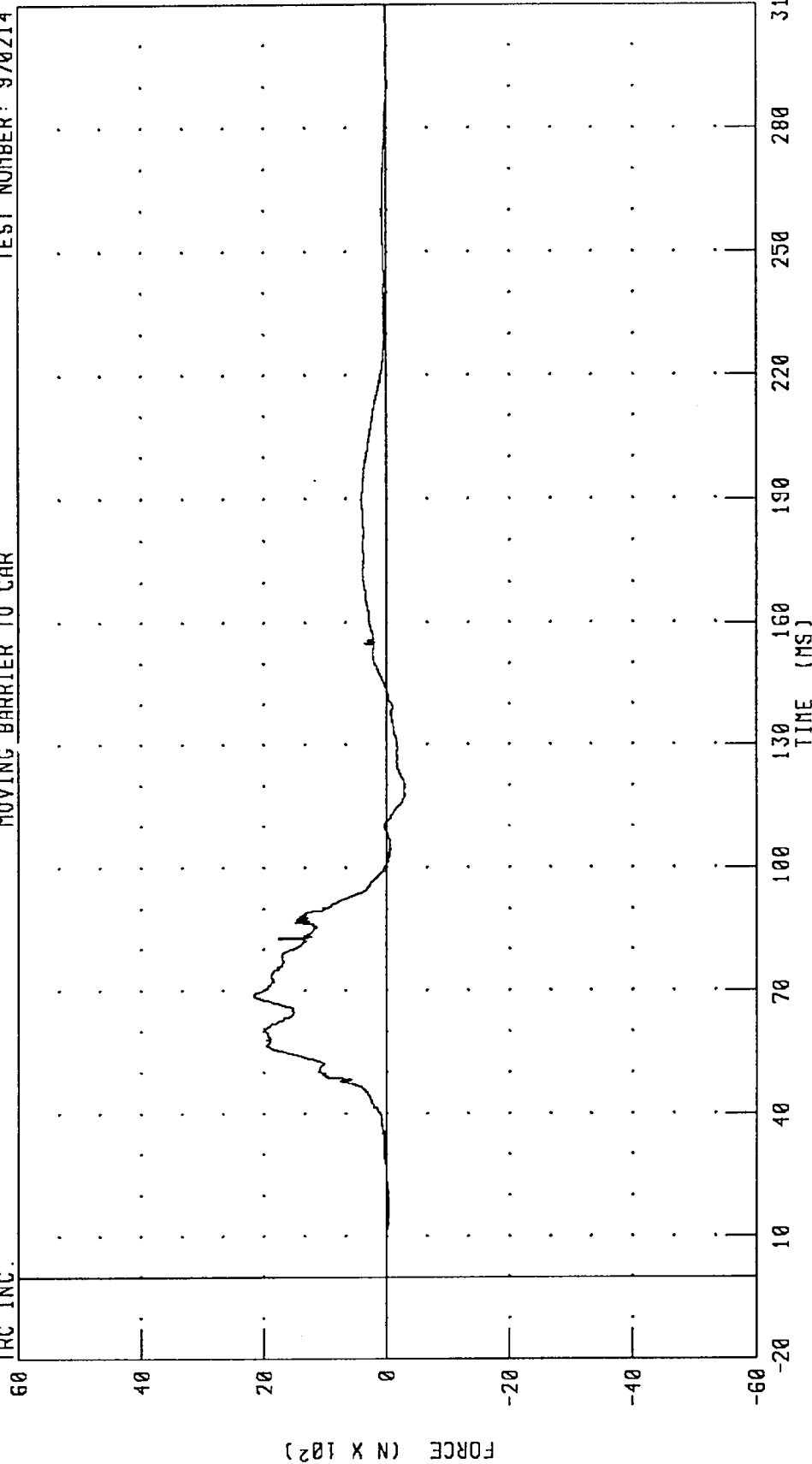
PEAK DATA: 833.25 N @ 82.80 MS; -352.58 N @ 50.96 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LOWER NECK Z-AXIS FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: NKLZF2 FILTER: CH. CLASS 1000

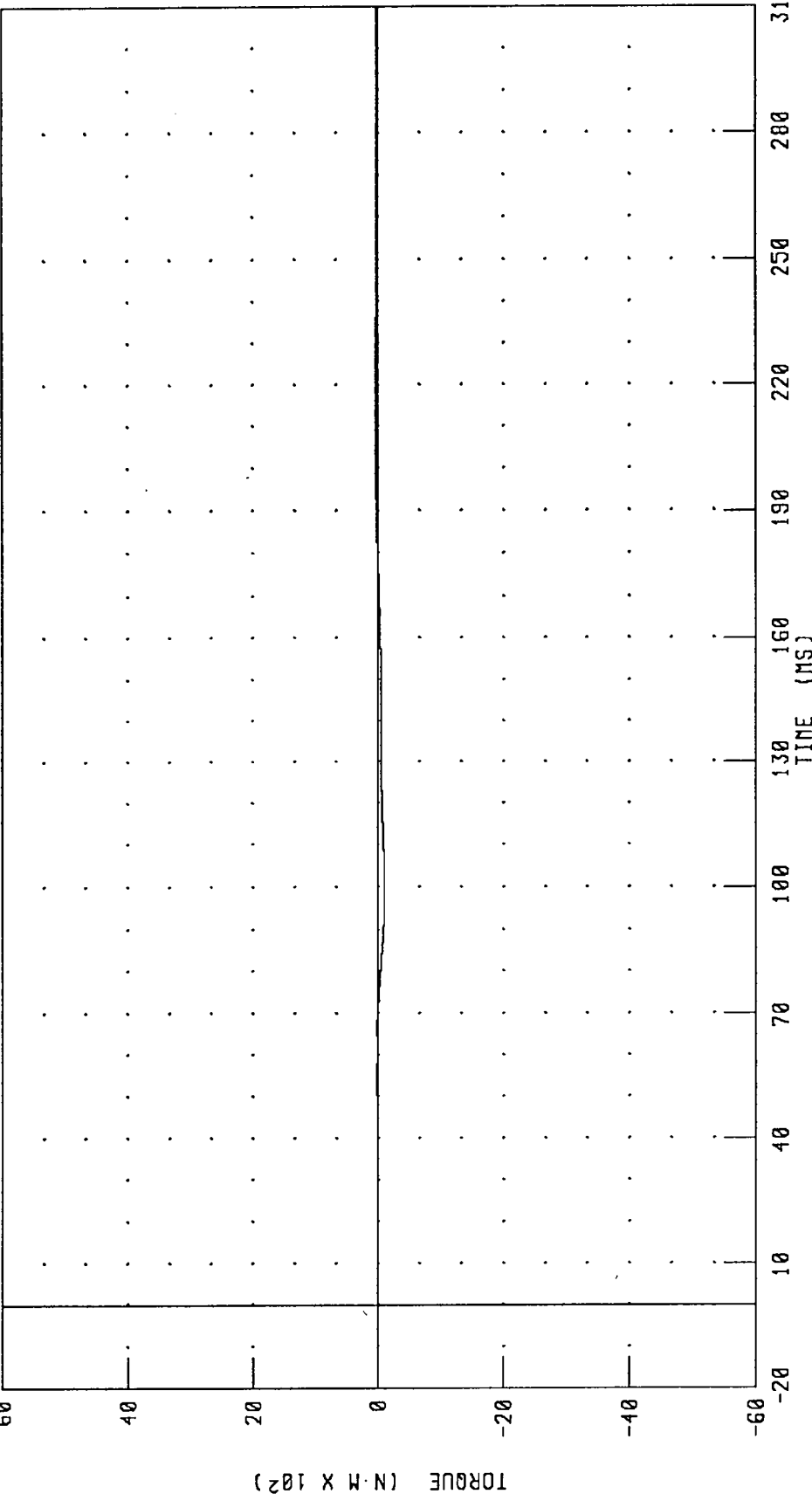
PEAK DATA: 2165.68 N @ 68.64 MS; -299.67 N @ 117.44 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: NKLX12 FILTER: CH. CLASS 600

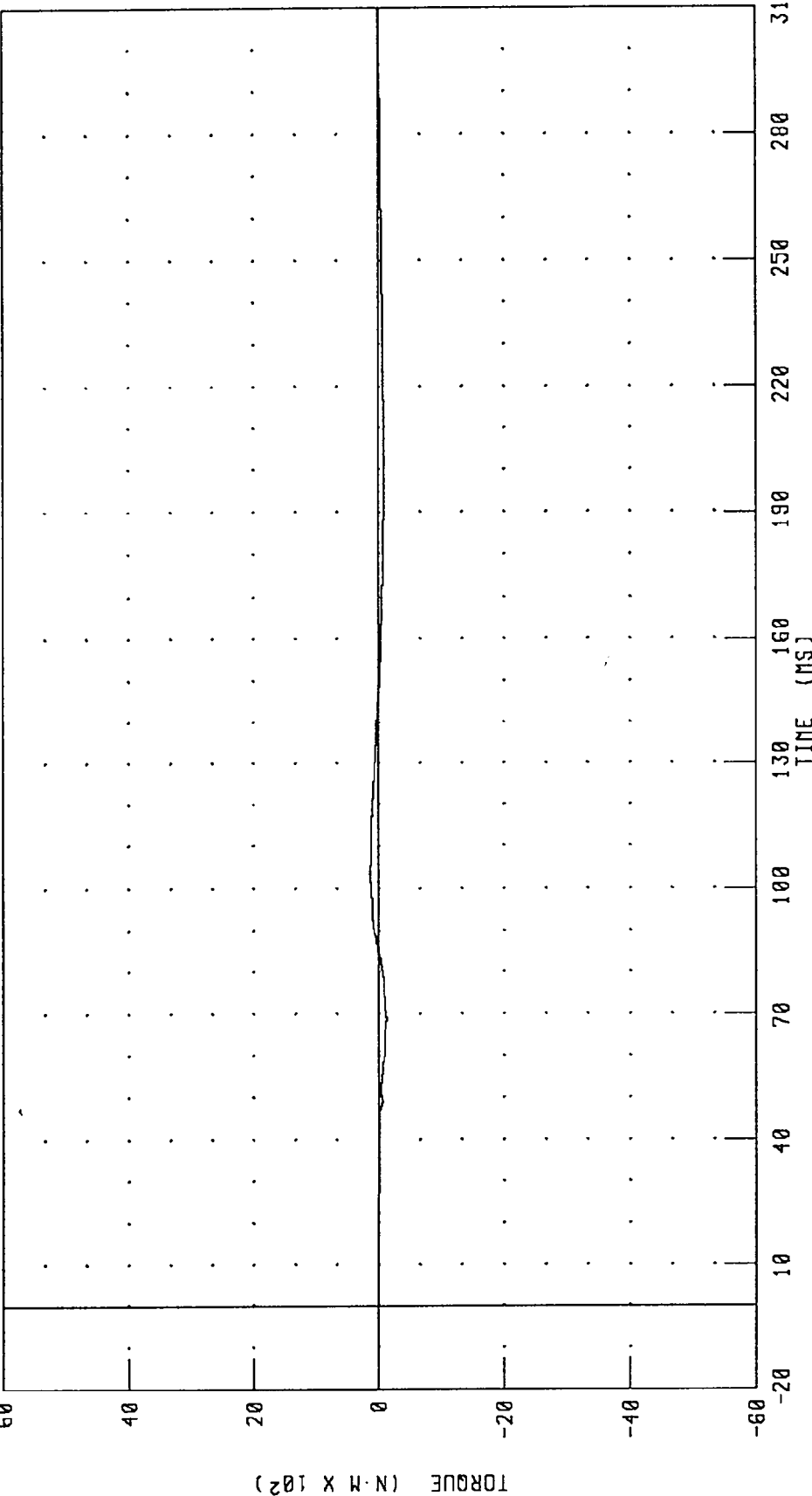
PEAK DATA: 38.99 N-M @ 207.04 MS; -106.28 N-M @ 99.04 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

IRC INC.



CHANNEL: NKLYM2 FILTER: CH. CLASS 600

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

60

40

20

0

-20

-40

-60

TORQUE (N·M X 10²)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

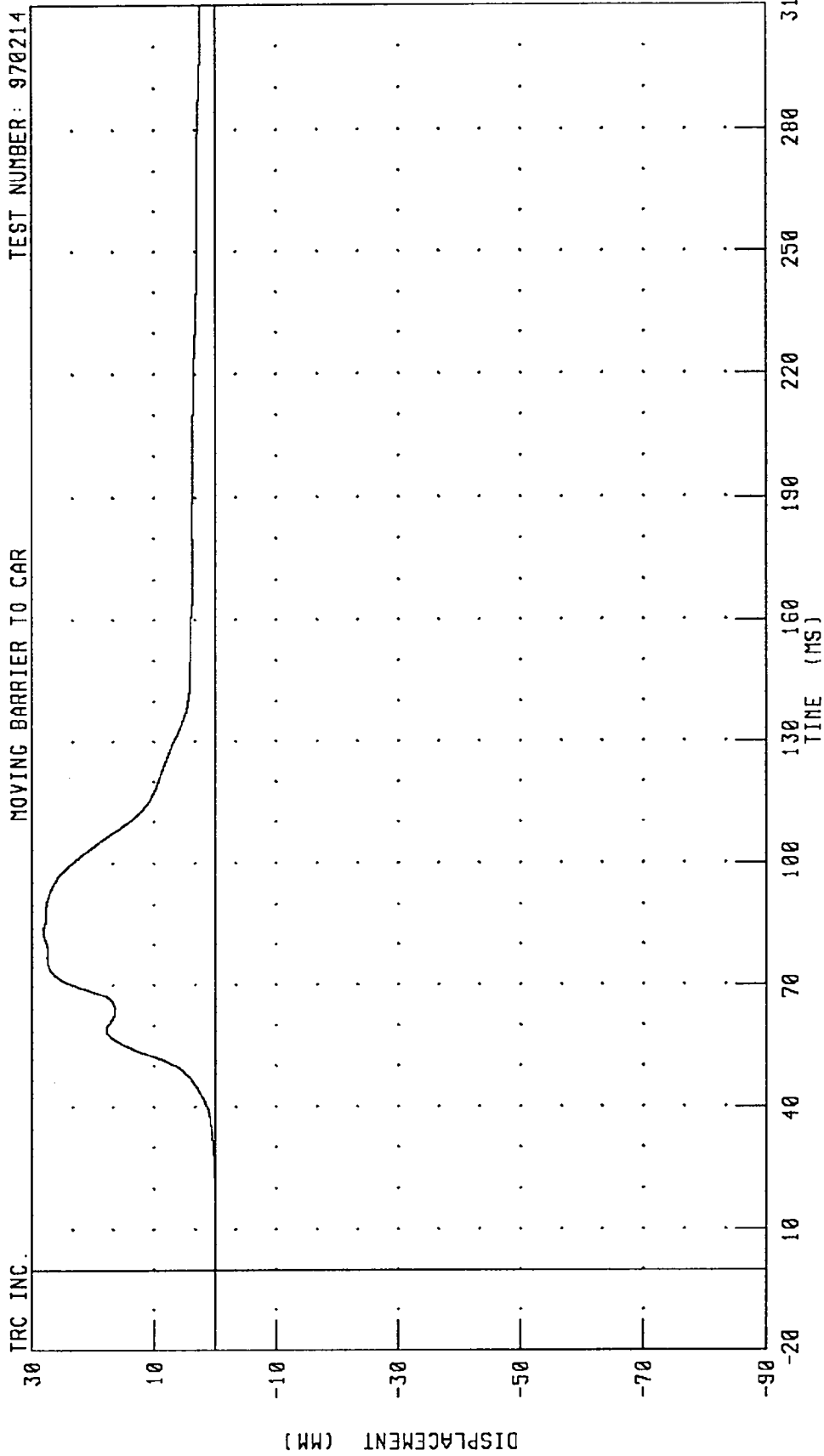
10

CHANNEL: NKLZM2 FILTER: CH. CLASS 600 PEAK DATA: 29.42 N·M @ 141.44 MS; -79.11 N·M @ 103.44 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR



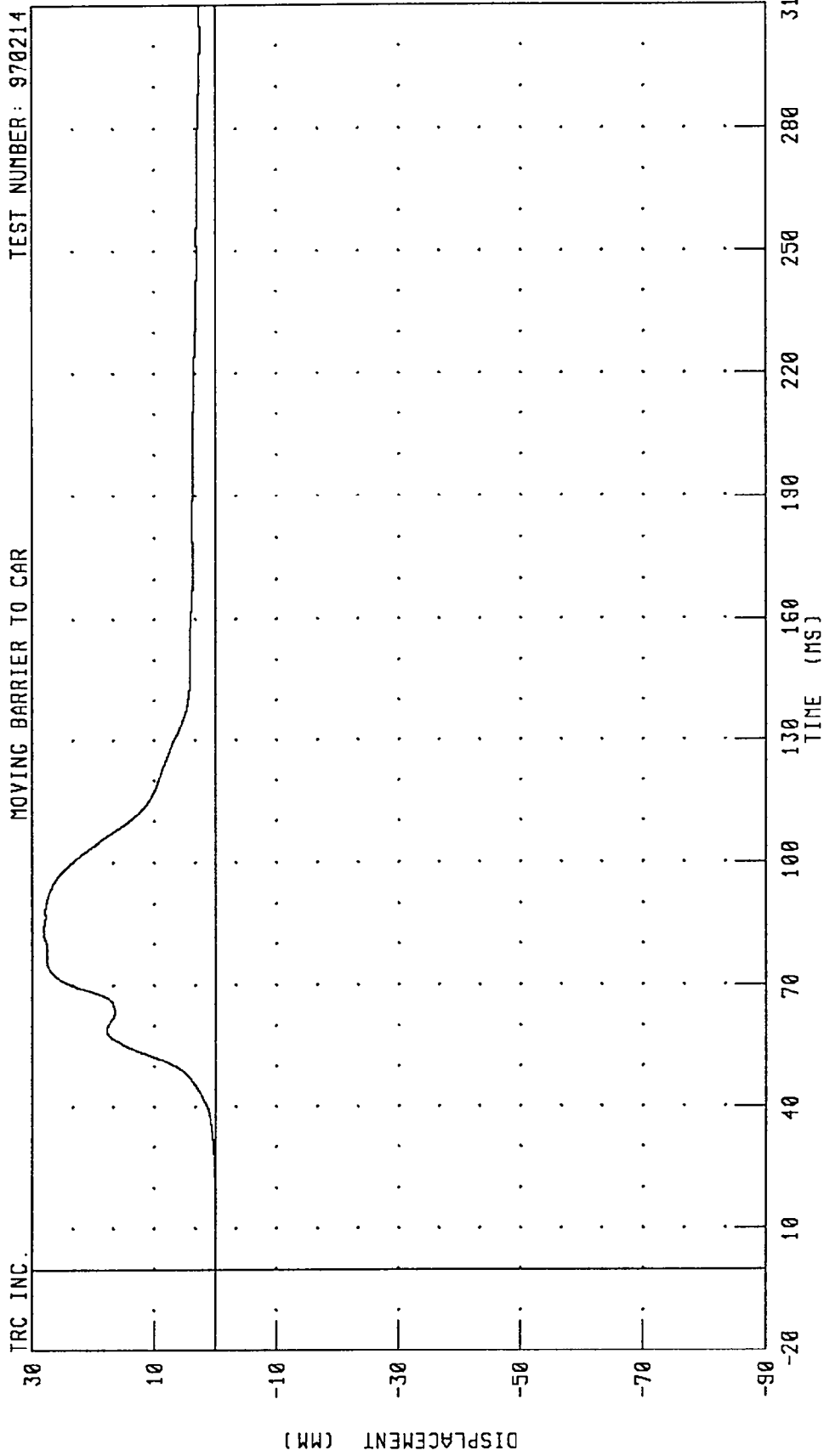
CHANNEL: LURSD2 FILTER: CH. CLASS 180

PEAK DATA: 28.09 MM @ 83.04 MS; 0.03 MM @ 4.24 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT UPPER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR



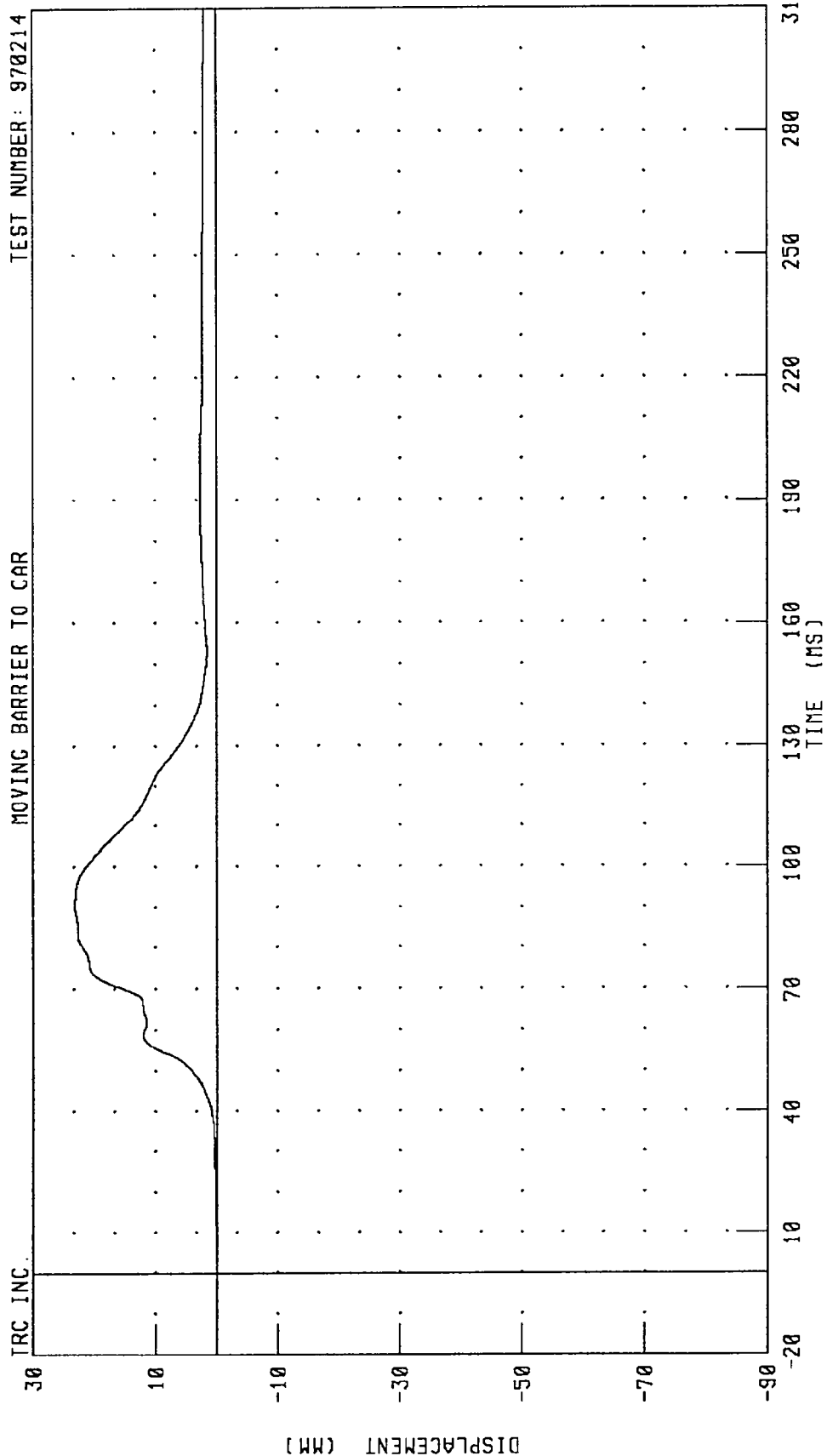
CHANNEL: LURXD2 FILTER: CH. CLASS 180

PEAK DATA: 28.14 MM @ 83.04 MS; 0.00 MM @ 4.24 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR



PEAK DATA: 23.15 MM @ 90.32 MS; -0.01 MM @ -6.56 MS

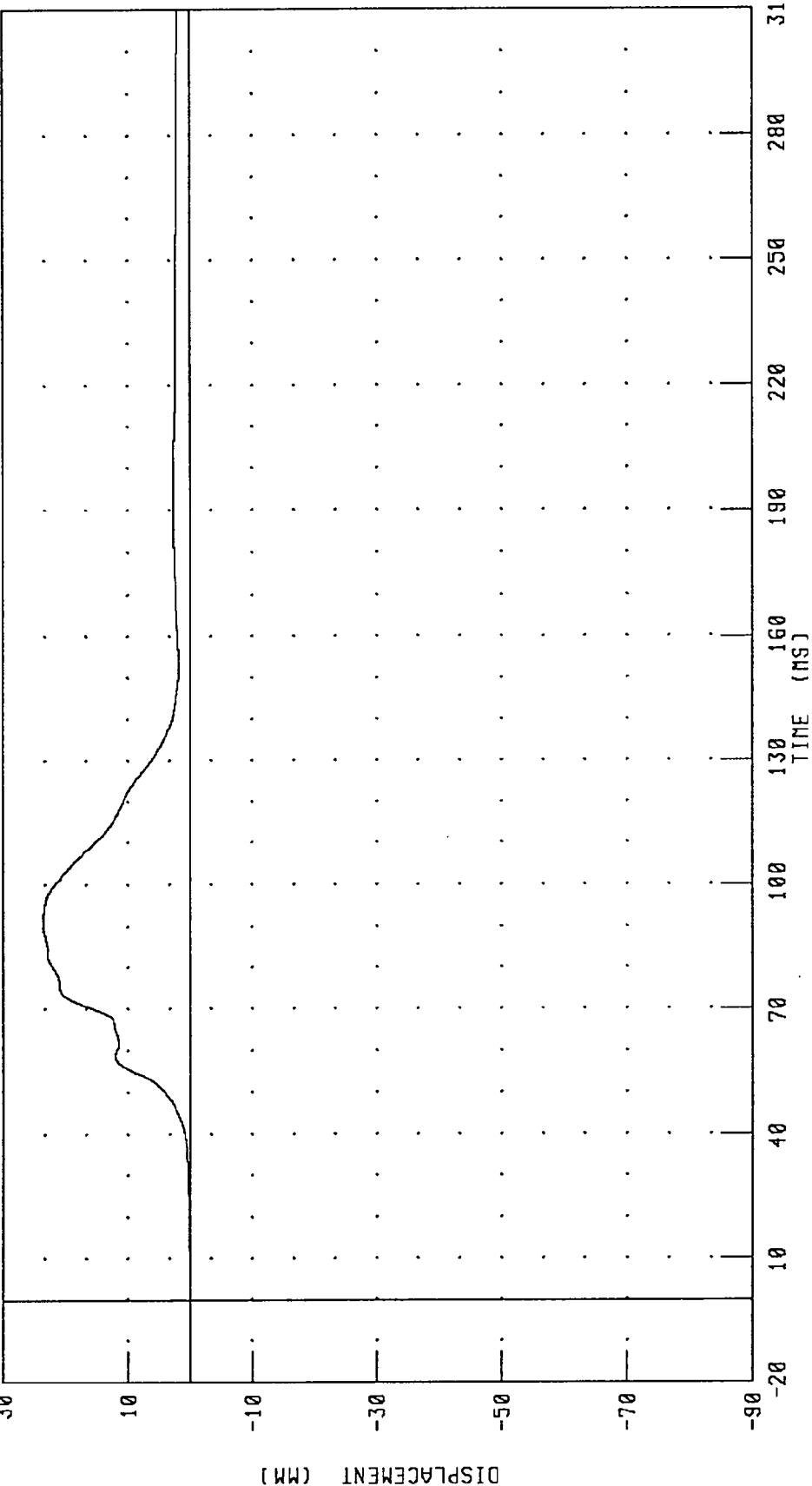
CHANNEL: LLRS02 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: LLRX02 FILTER: CH. CLASS 180

PEAK DATA: 23.52 MM @ 90.48 MS; 0.00 MM @ 1.44 NS

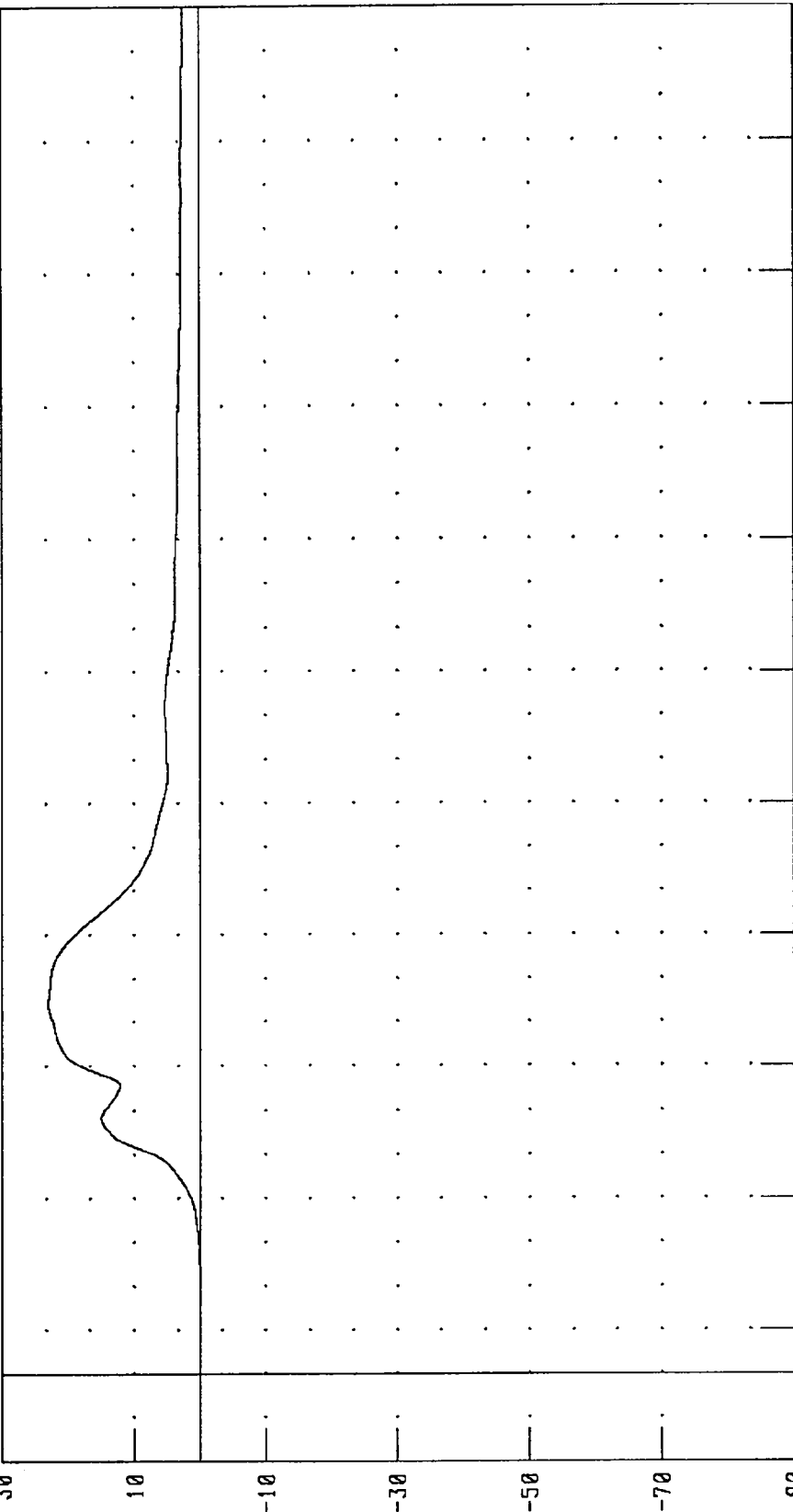
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30



DISPLACEMENT (MM)

PEAK DATA: 22.98 MM @ 84.16 MS; -0.05 MM @ 21.36 MS

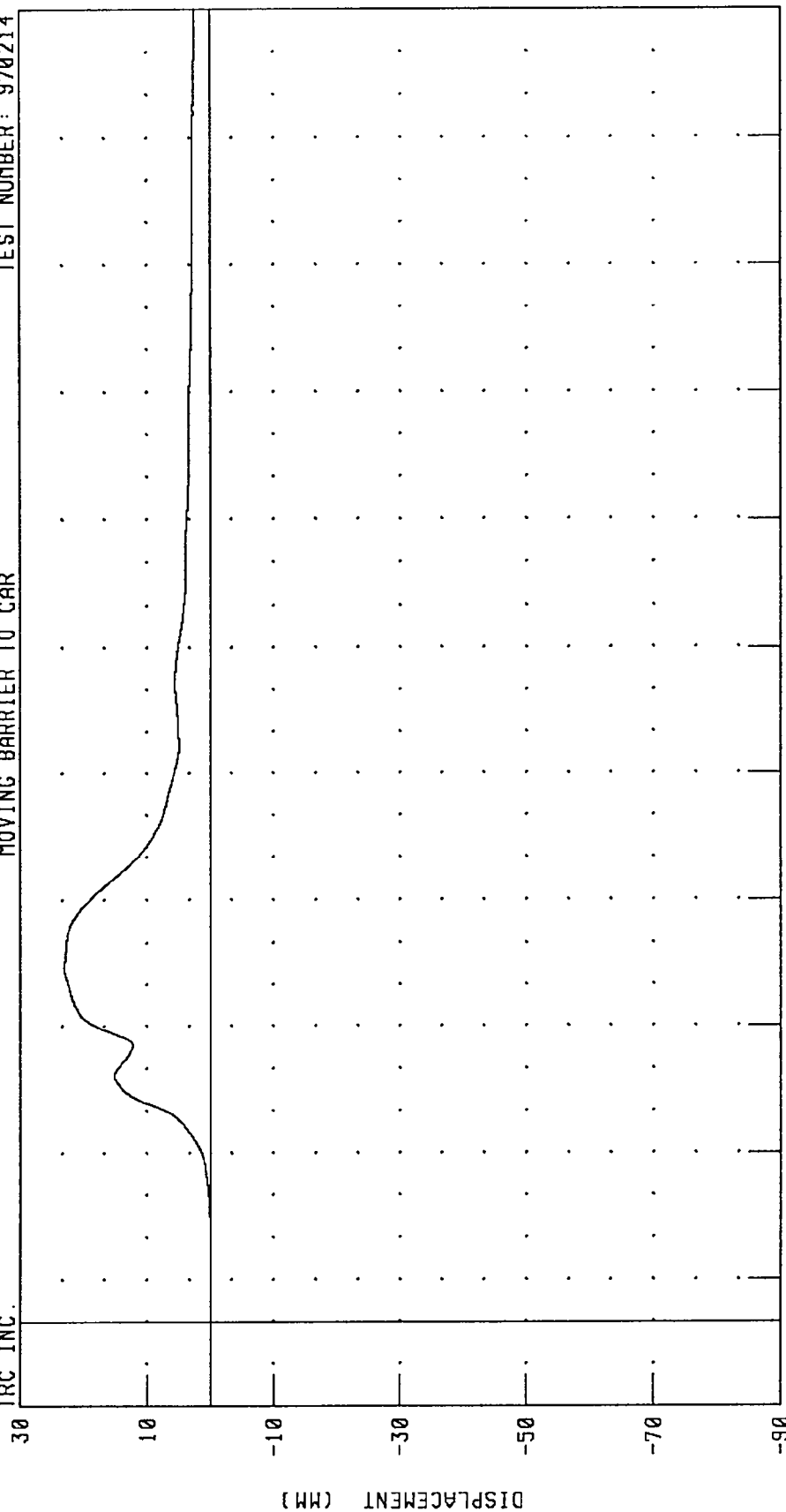
CHANNEL: RURSD2 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT UPPER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: RURXD2 FILTER: CH. CLASS 180

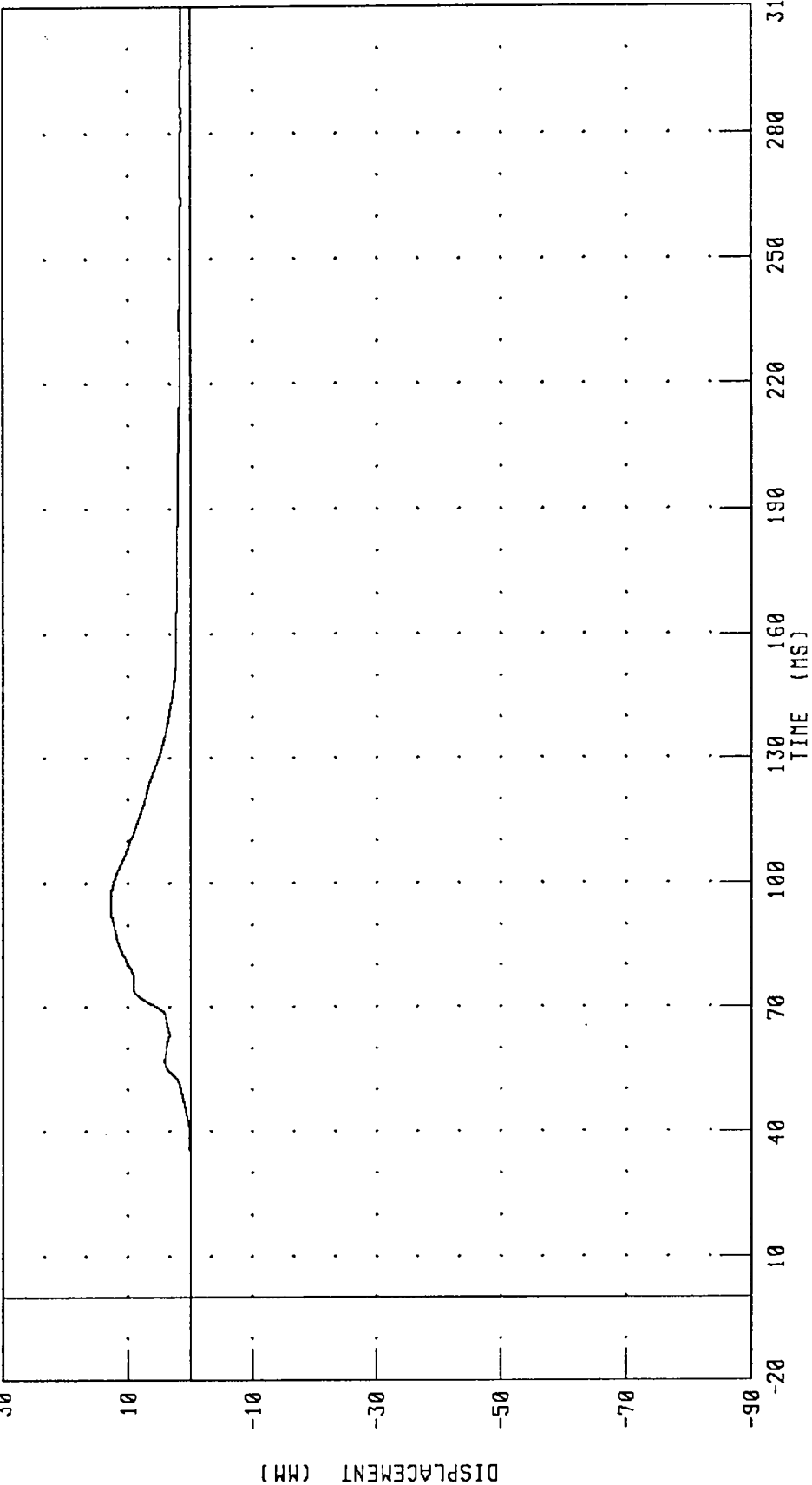
PEAK DATA: 23.01 MM @ 84.08 MS; -0.05 MM @ 21.36 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: RLRSD2 FILTER: CH. CLASS 180

PEAK DATA: 12.76 MM @ 94.64 MS; 0.00 MM @ 6.56 MS

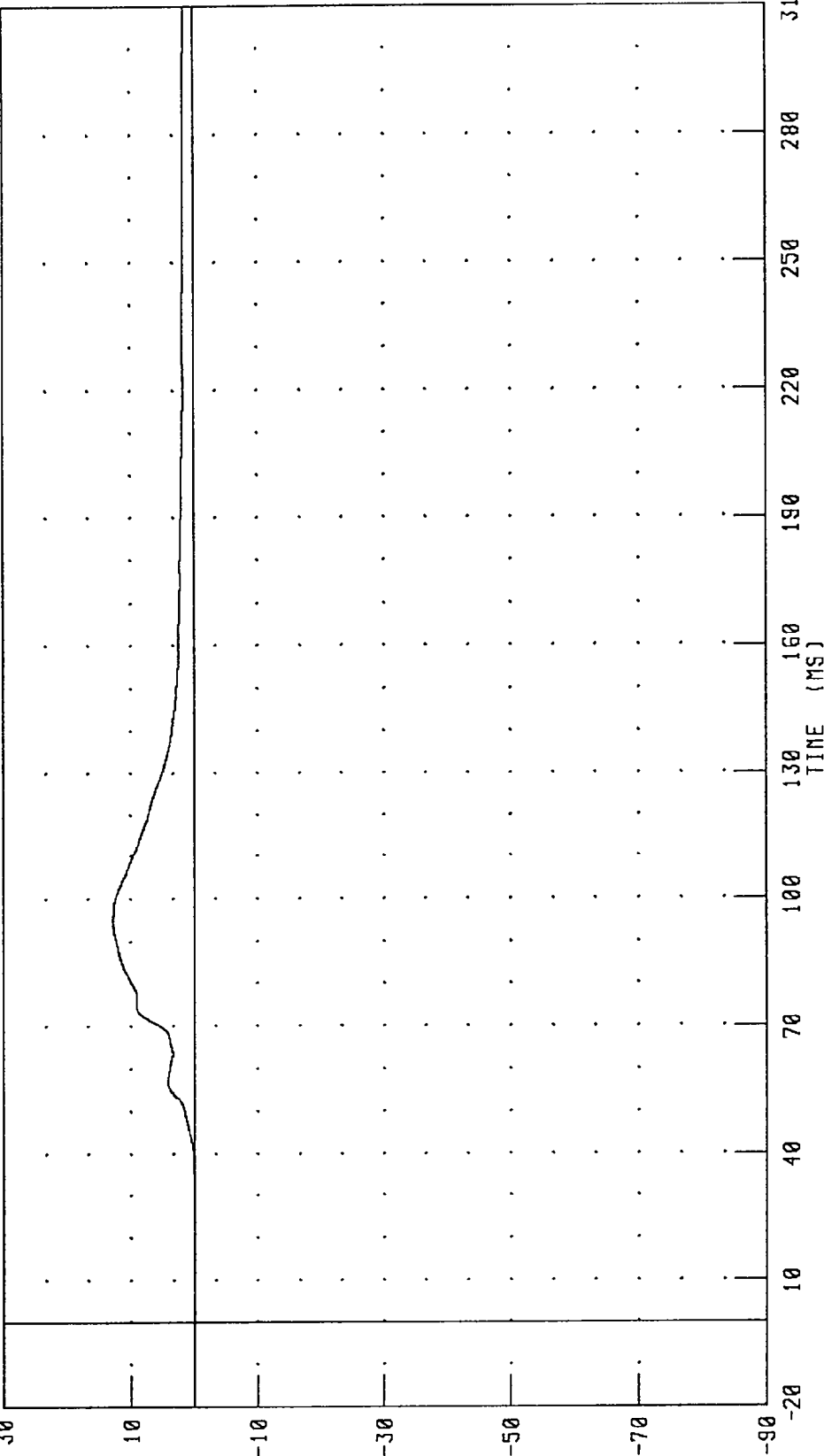
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER RIB X-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

DISPLACEMENT (MM)



PEAK DATA: 12.80 MM @ 94.72 MS; 0.00 MM @ 6.48 MS

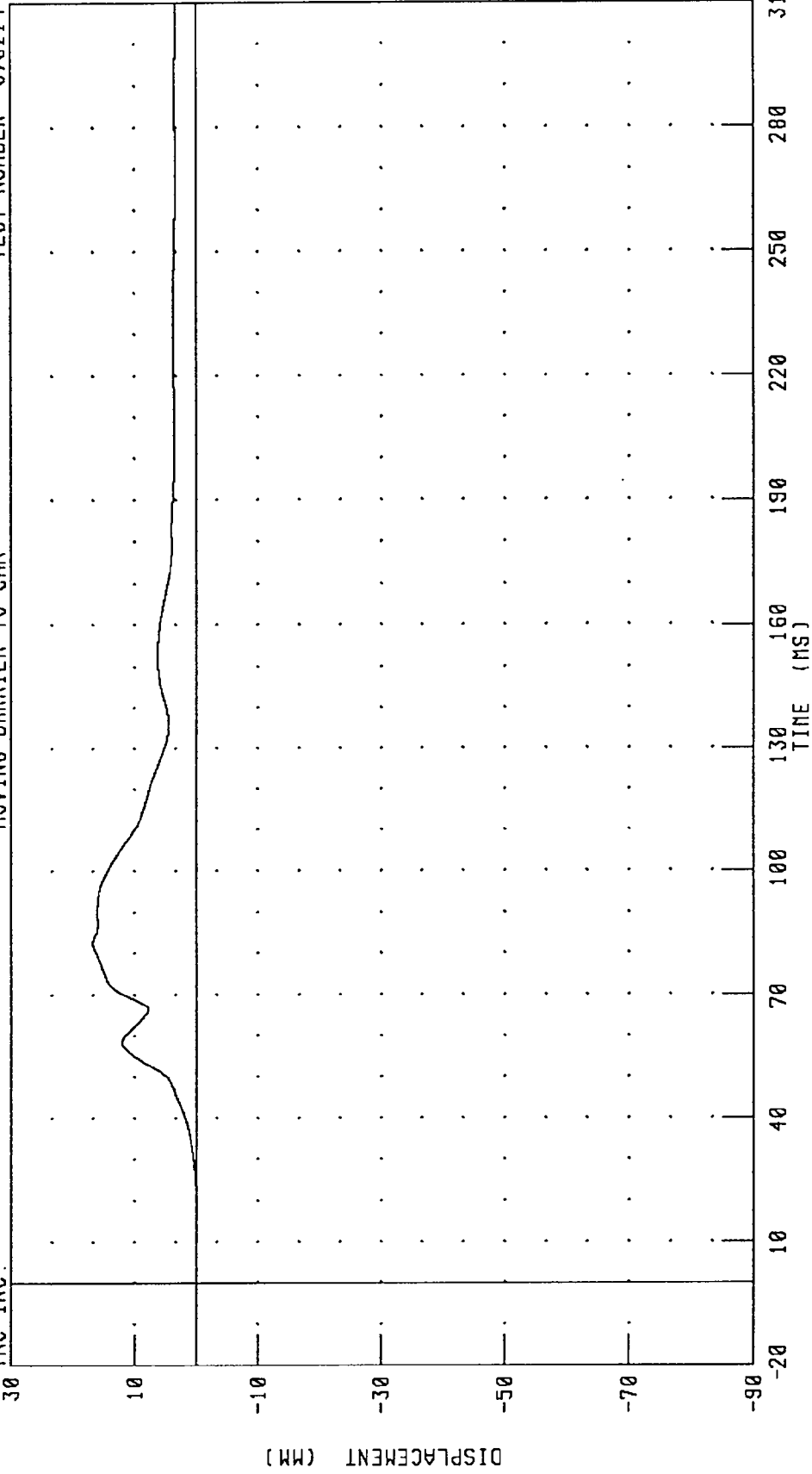
CHANNEL: RLRXD2 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT UPPER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

IRC INC.



CHANNEL: LURC02 FILTER: CH. CLASS 180

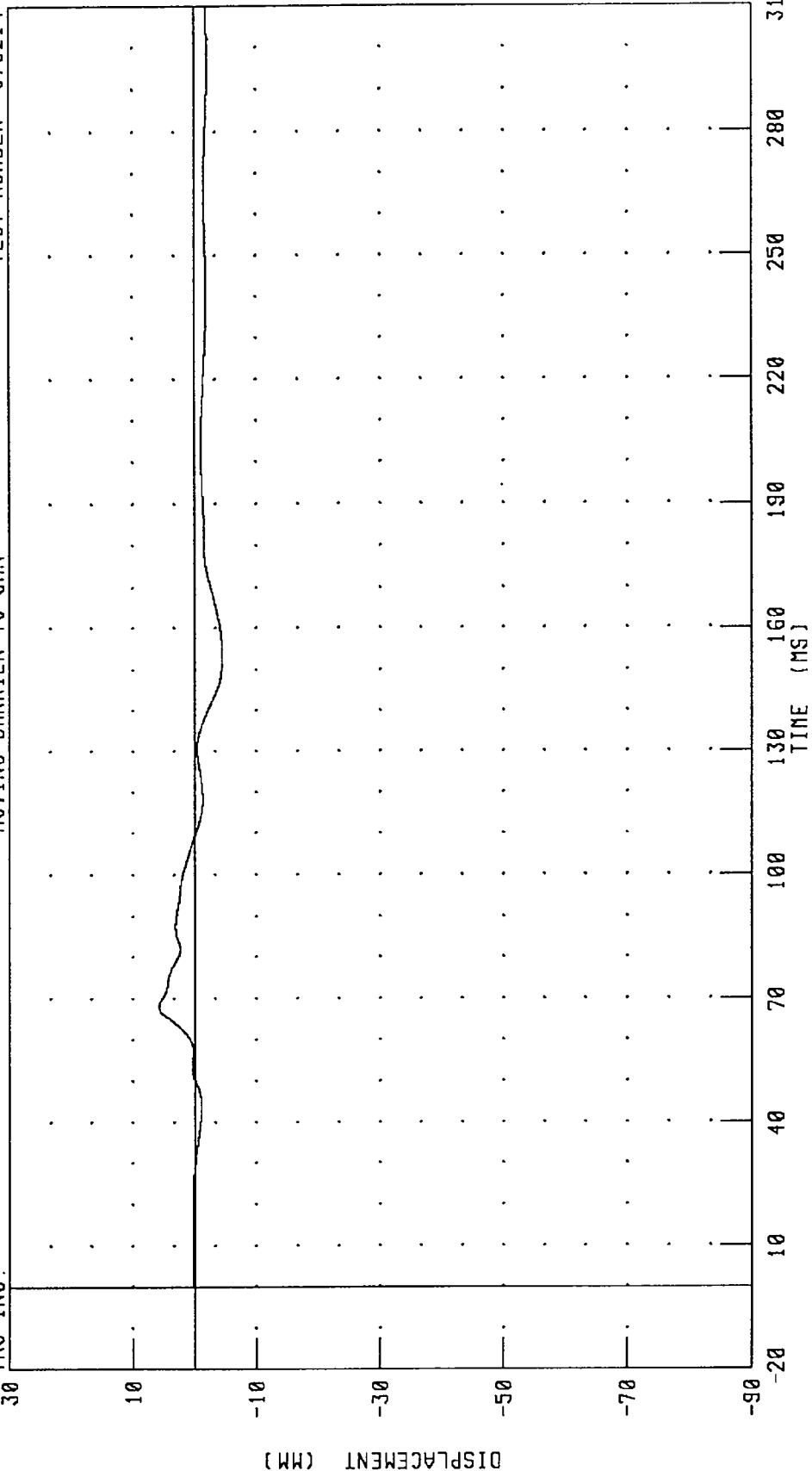
PEAK DATA: 16.70 MM @ 82.48 MS; -0.01 MM @ -9.68 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT PASSENGER LEFT UPPER RIB Y-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: LURYD2 FILTER: CH. CLASS 180

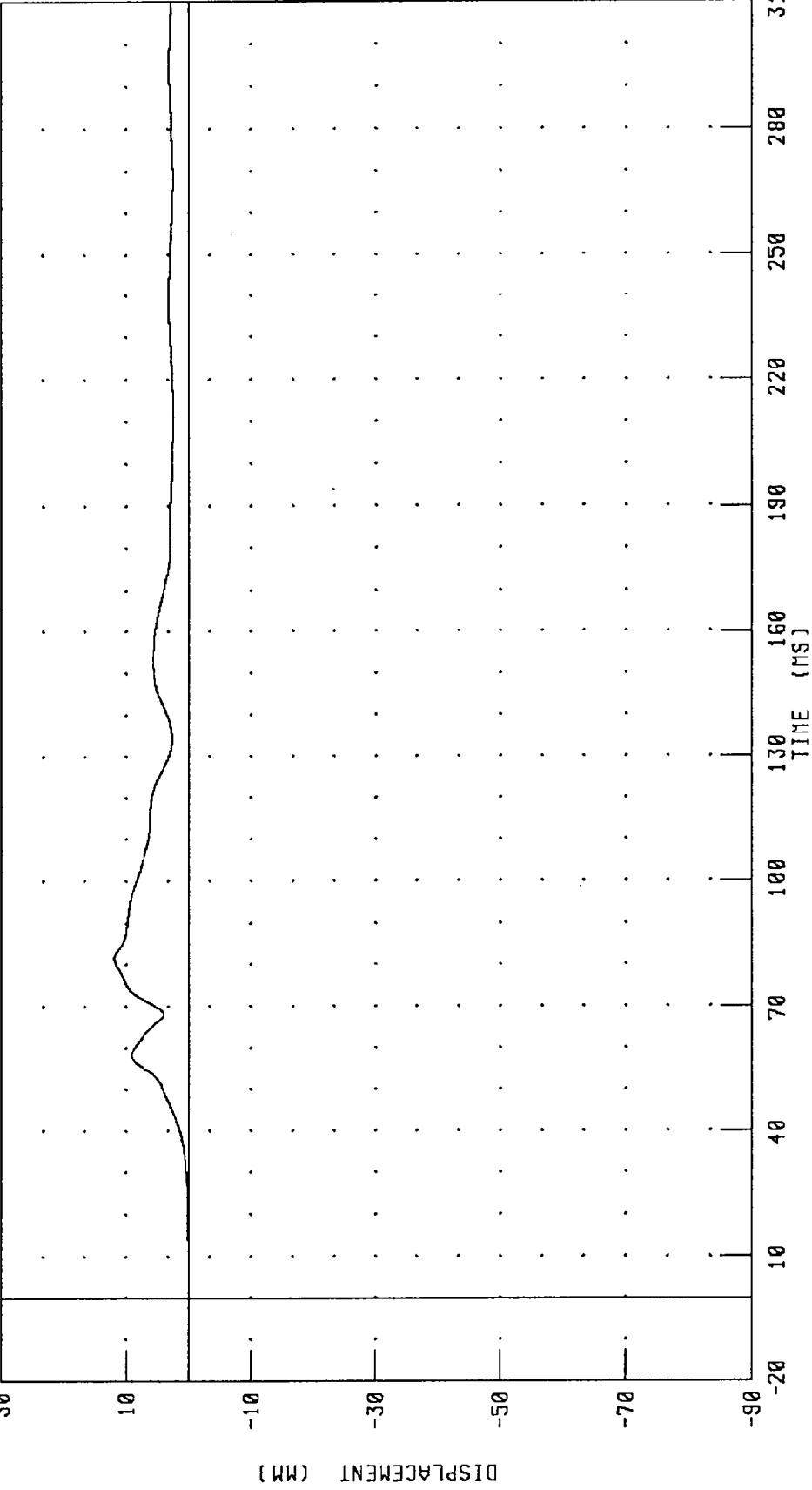
PEAK DATA: 5.83 MM @ 68.00 MS; -4.49 MM @ 153.68 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

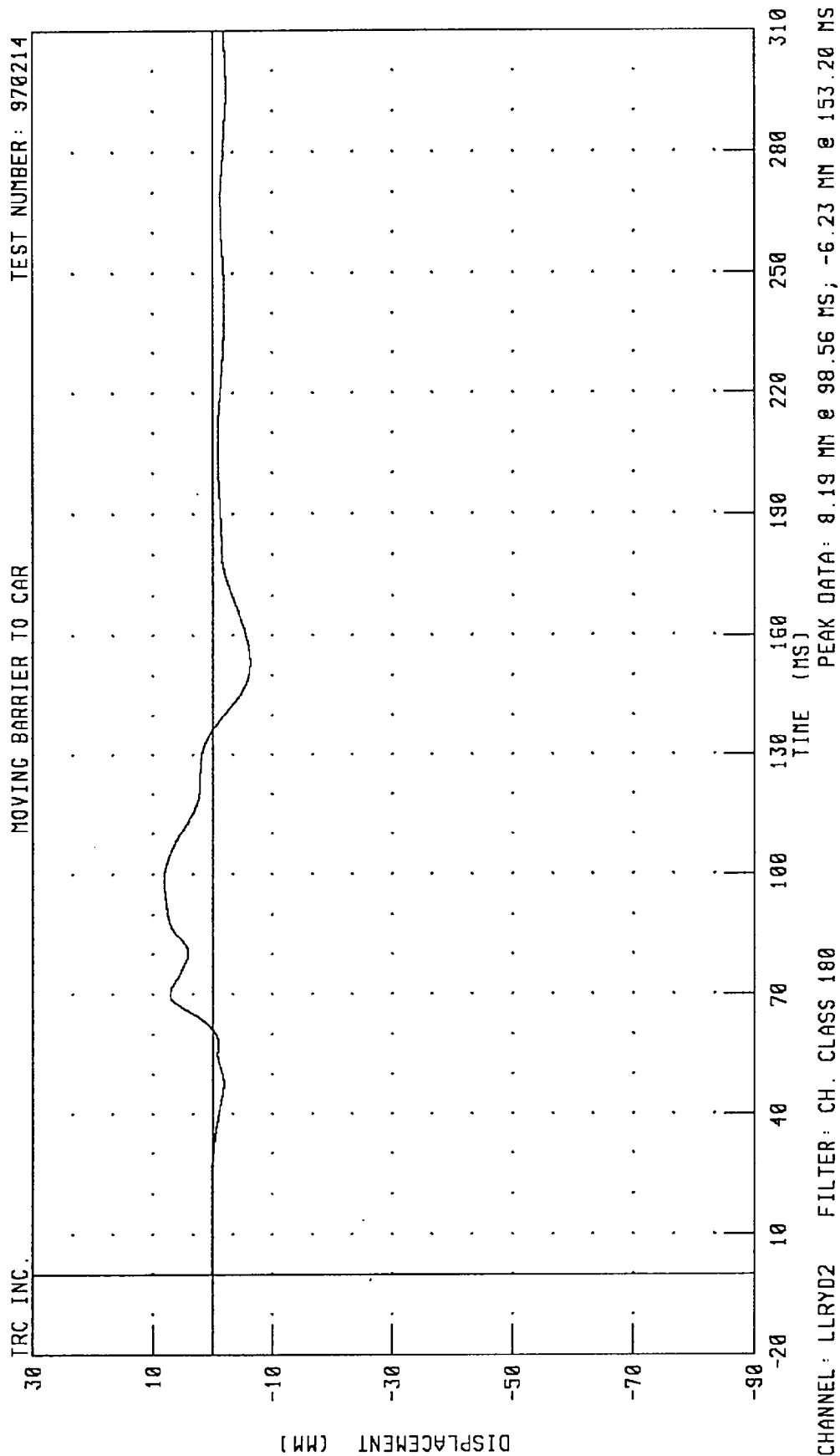
TRC INC.



CHANNEL: LLRCD2 FILTER: CH. CLASS 180

PEAK DATA: 11.93 MM @ 81.60 MS, -0.02 MM @ -10.32 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER LEFT LOWER RIB Y-AXIS DISPLACEMENT



CHANNEL: LLRYD2 FILTER: CH. CLASS 180

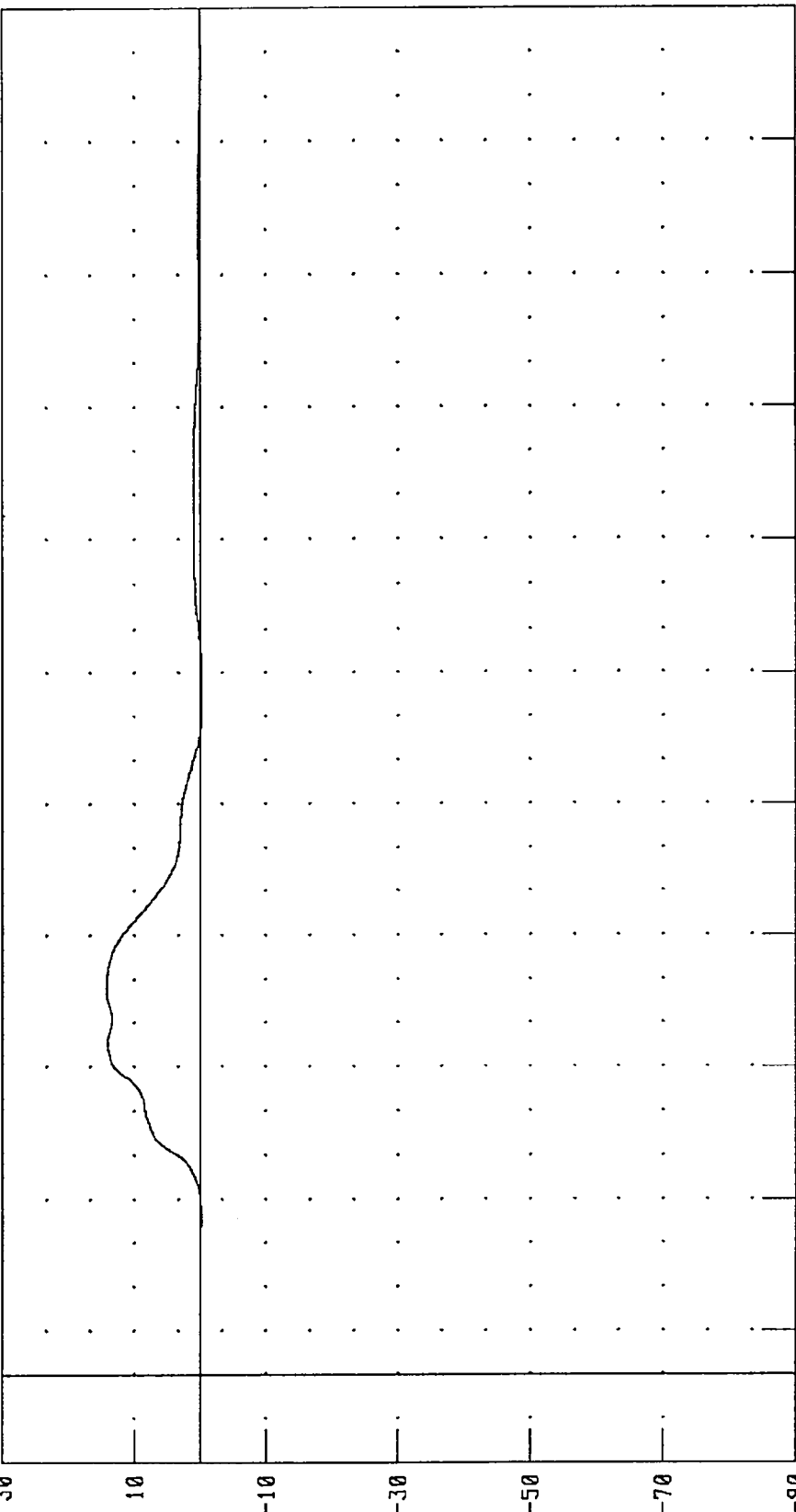
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT UPPER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30



DISPLACEMENT (MM)

-90

-70

-50

-30

-10

10

30

50

70

90

110

130

150

170

190

210

230

250

270

290

310

330

350

370

390

410

430

450

470

490

510

530

550

570

590

610

630

650

670

690

710

730

750

770

790

810

830

850

870

890

910

930

950

970

990

1010

1030

1050

1070

1090

1110

1130

1150

1170

1190

1210

1230

1250

1270

1290

1310

1330

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1830

1850

1870

1890

1910

1930

1950

1970

1990

2010

2030

2050

2070

2090

2110

2130

2150

2170

2190

2210

2230

2250

2270

2290

2310

2330

2350

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2990

3010

3030

3050

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3090

3110

3130

3150

3170

3190

3210

3230

3250

3270

3290

3310

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4010

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4130

4150

4170

4190

4210

4230

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4270

4290

4310

4330

4350

4370

4390

4410

4430

4450

4470

4490

4510

4530

4550

4570

4590

4610

4630

4650

4670

4690

4710

4730

4750

4770

4790

4810

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4870

4890

4910

4930

4950

4970

4990

5010

5030

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5070

5090

5110

5130

5150

5170

5190

5210

5230

5250

5270

5290

5310

5330

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5390

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5990

6010

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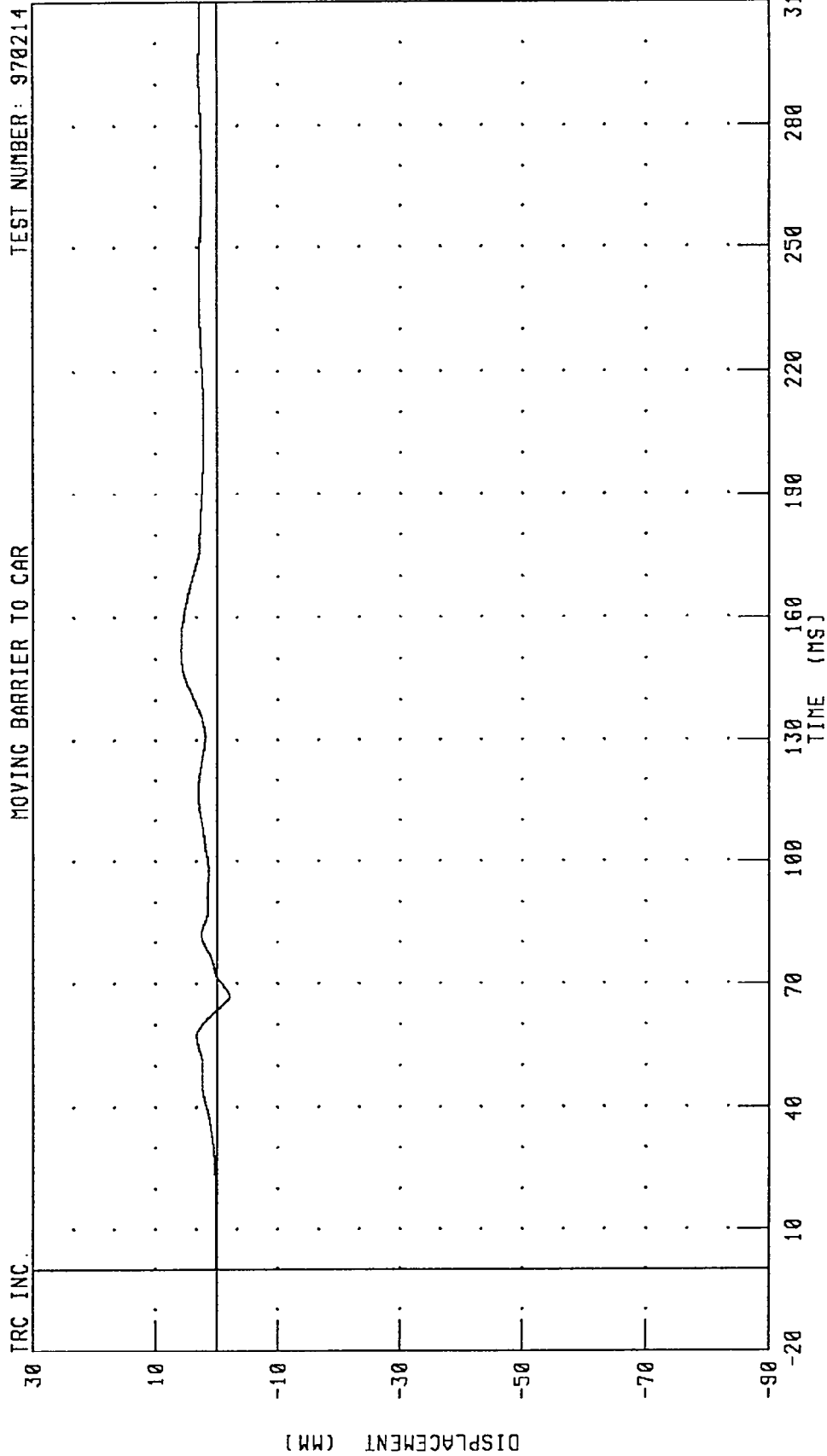
6050

6070

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT UPPER RIB Y-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR



CHANNEL: RURYD2 FILTER: CH. CLASS 180

PEAK DATA: 5.83 MM @ 152.32 MS; -2.05 MM @ 67.04 MS

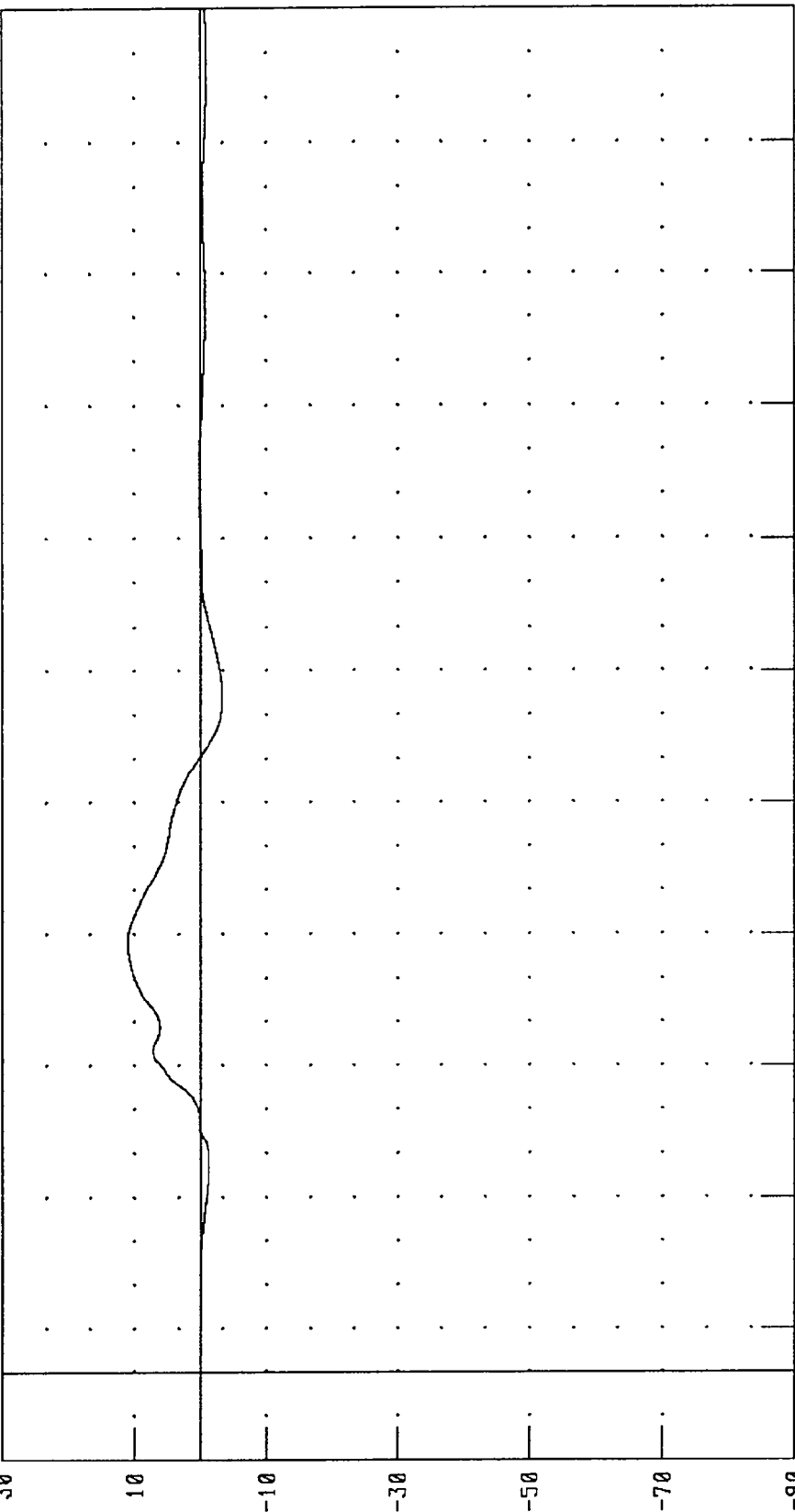
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER RIB Crossover DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30



DISPLACEMENT (MM)

PEAK DATA: 11.06 MM @ 98.24 MS; -3.32 MM @ 154.16 MS

CHANNEL: RLRC02 FILTER: CH. CLASS 180

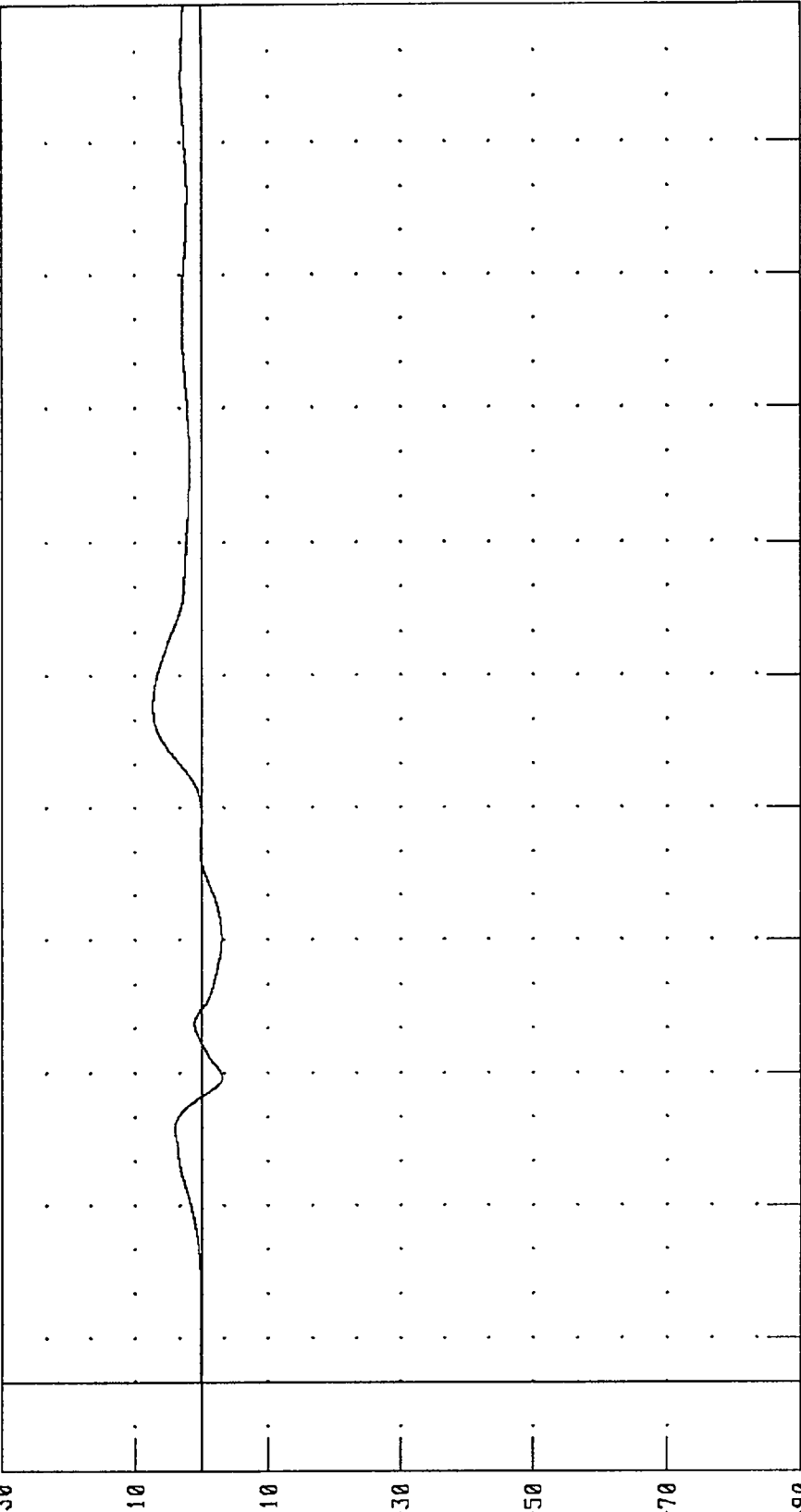
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT PASSENGER RIGHT LOWER RIB Y-AXIS DISPLACEMENT

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

30



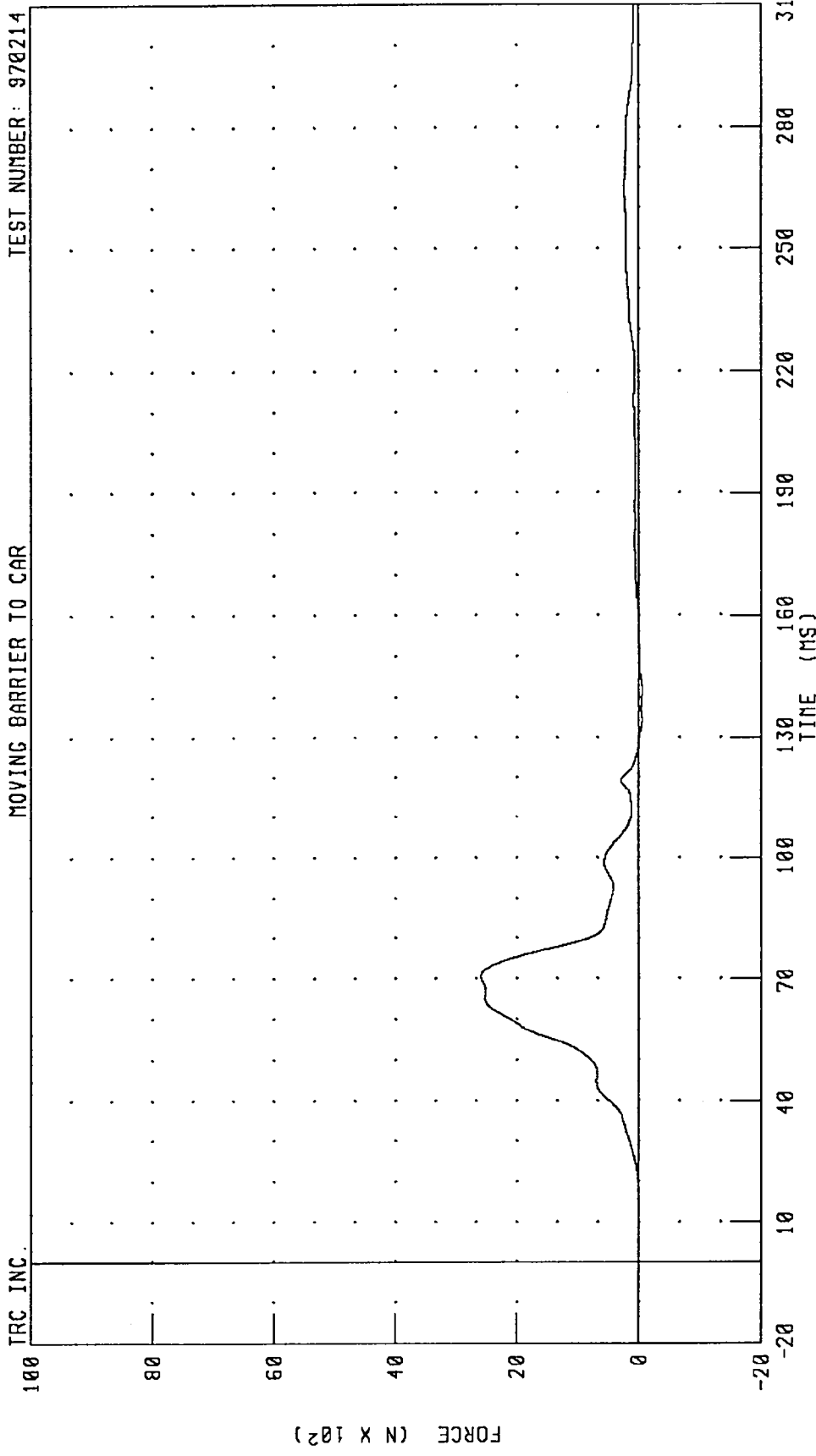
PEAK DATA: 7.38 MM @ 153.36 MS; -3.06 MM @ 69.04 MS

CHANNEL: RLRYD2 FILTER: CH. CLASS 180

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 DRIVER SHOULDER BELT FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR



CHANNEL: SHBF1 FILTER: CH. CLASS 60

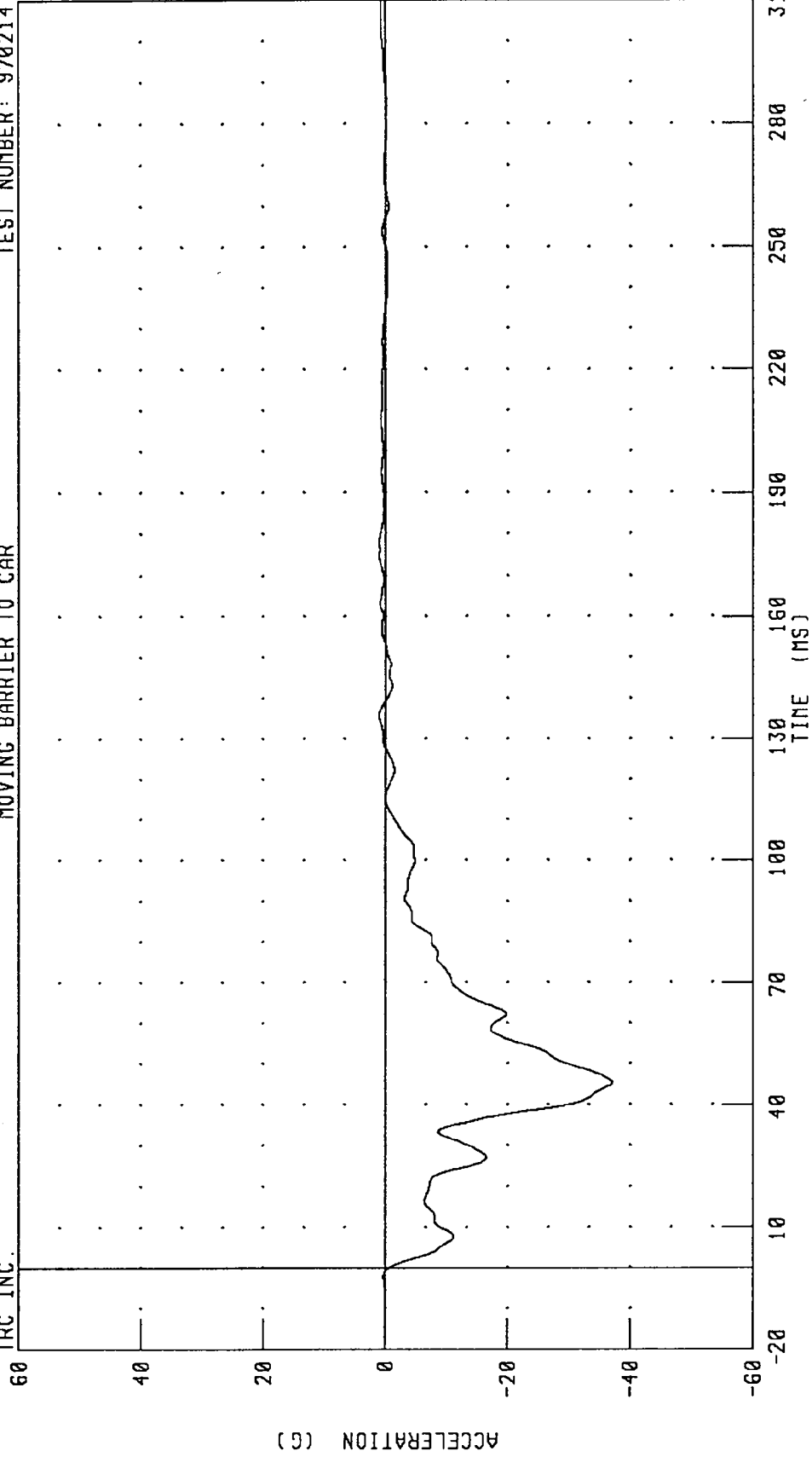
PEAK DATA: 2589.34 N @ 70.64 MS; -57.31 N @ 141.84 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT REAR COMPARTMENT X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: LRFXG1 FILTER: CH. CLASS 60

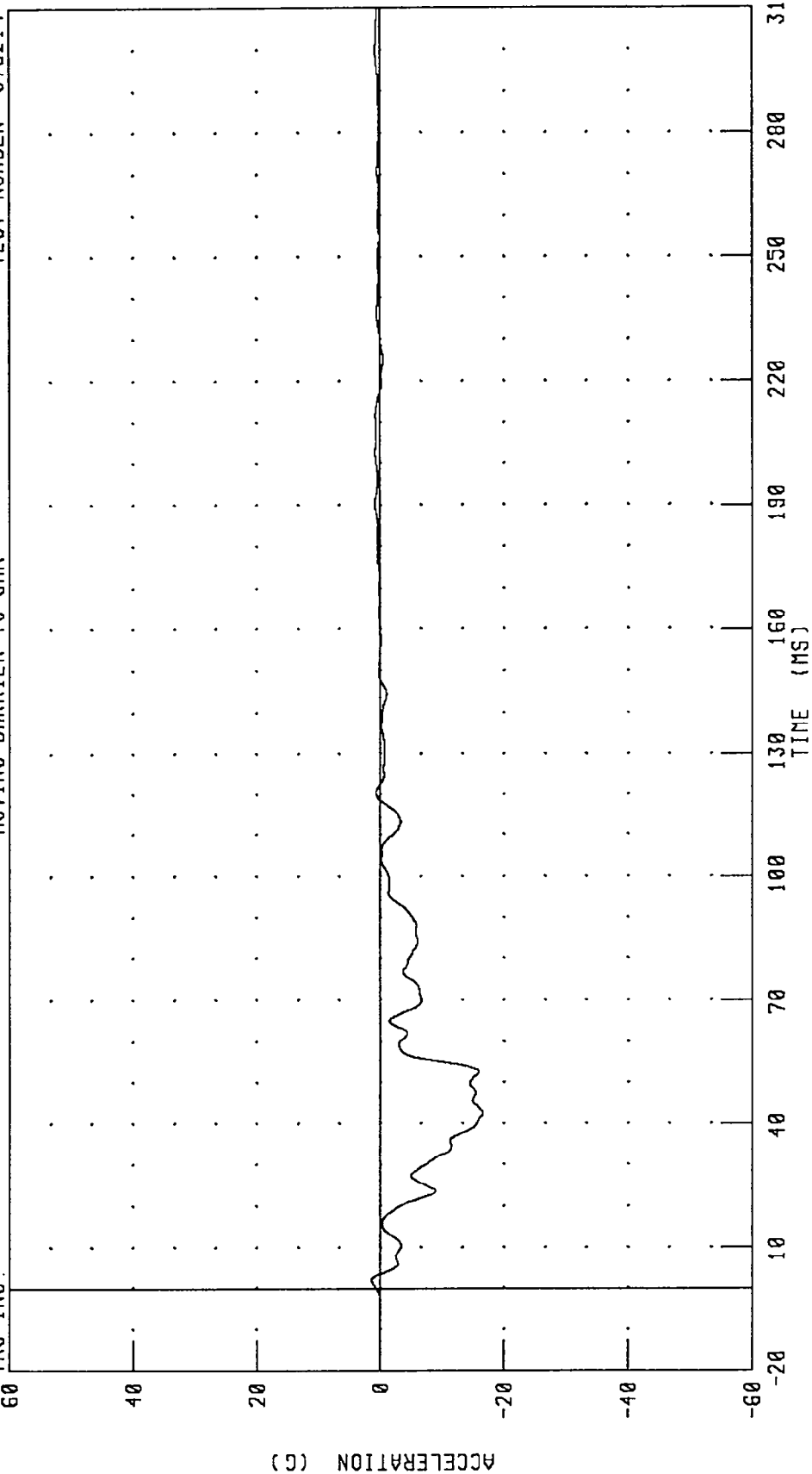
PEAK DATA: 1.01 G @ 135.60 MS; -37.00 G @ 45.36 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT REAR COMPARTMENT Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: LRFYC1 FILTER: CH. CLASS 60

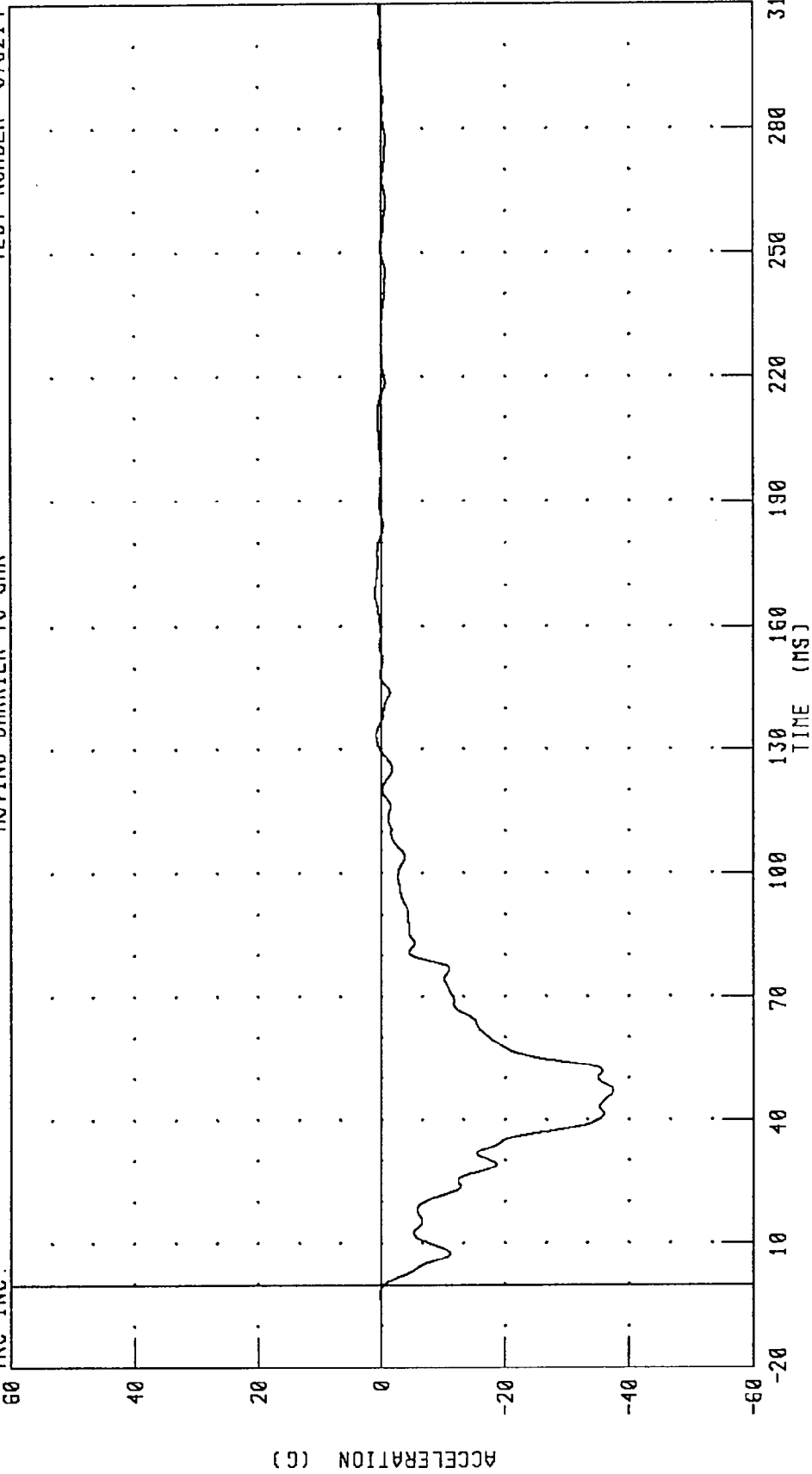
PEAK DATA: 1.37 G @ 1.84 MS; -16.58 G @ 42.56 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
RIGHT REAR COMPARTMENT X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: RRFXC1 FILTER: CH. CLASS 60

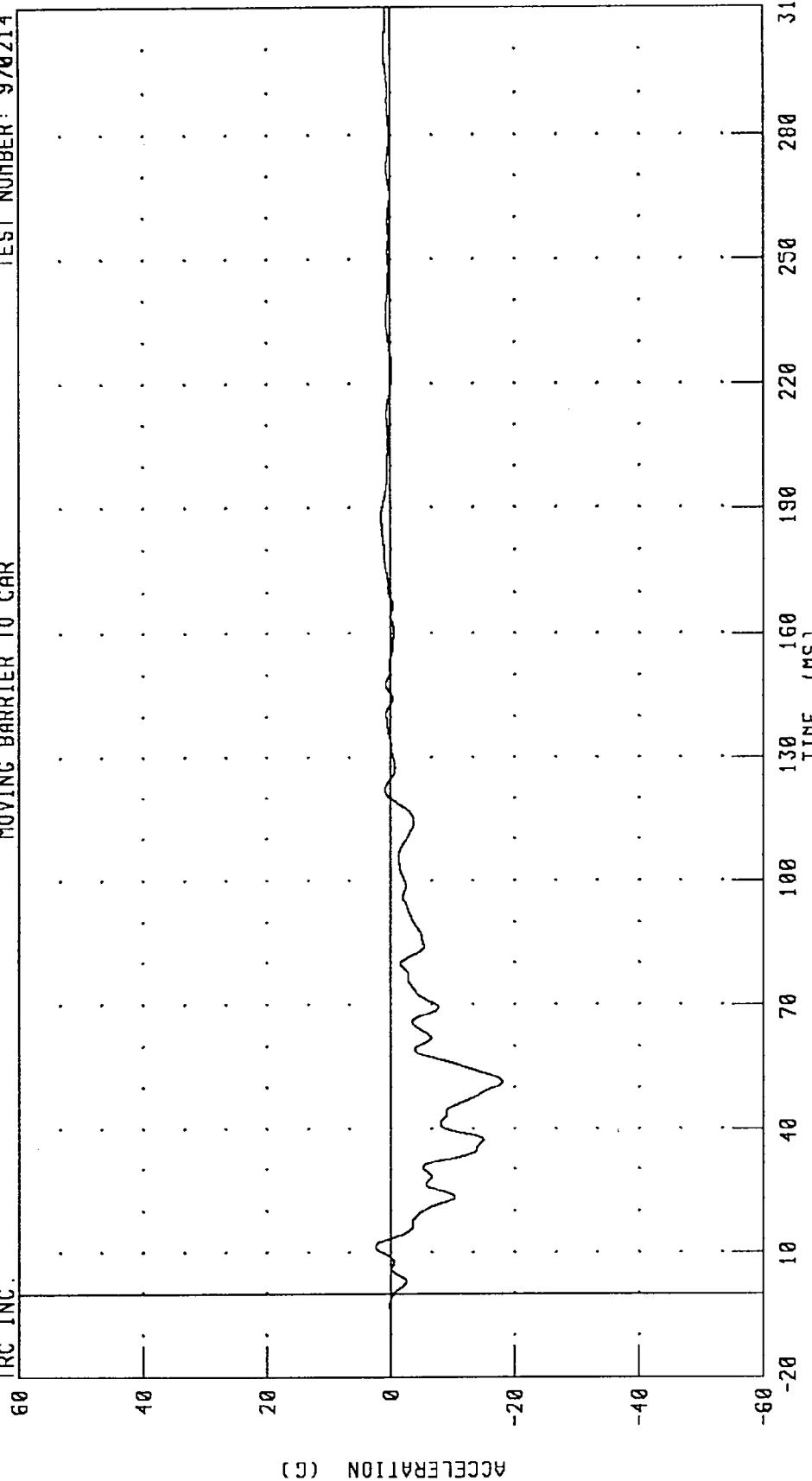
PEAK DATA: 1.05 G @ 168.00 MS; -37.45 G @ 47.04 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT REAR COMPARTMENT Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

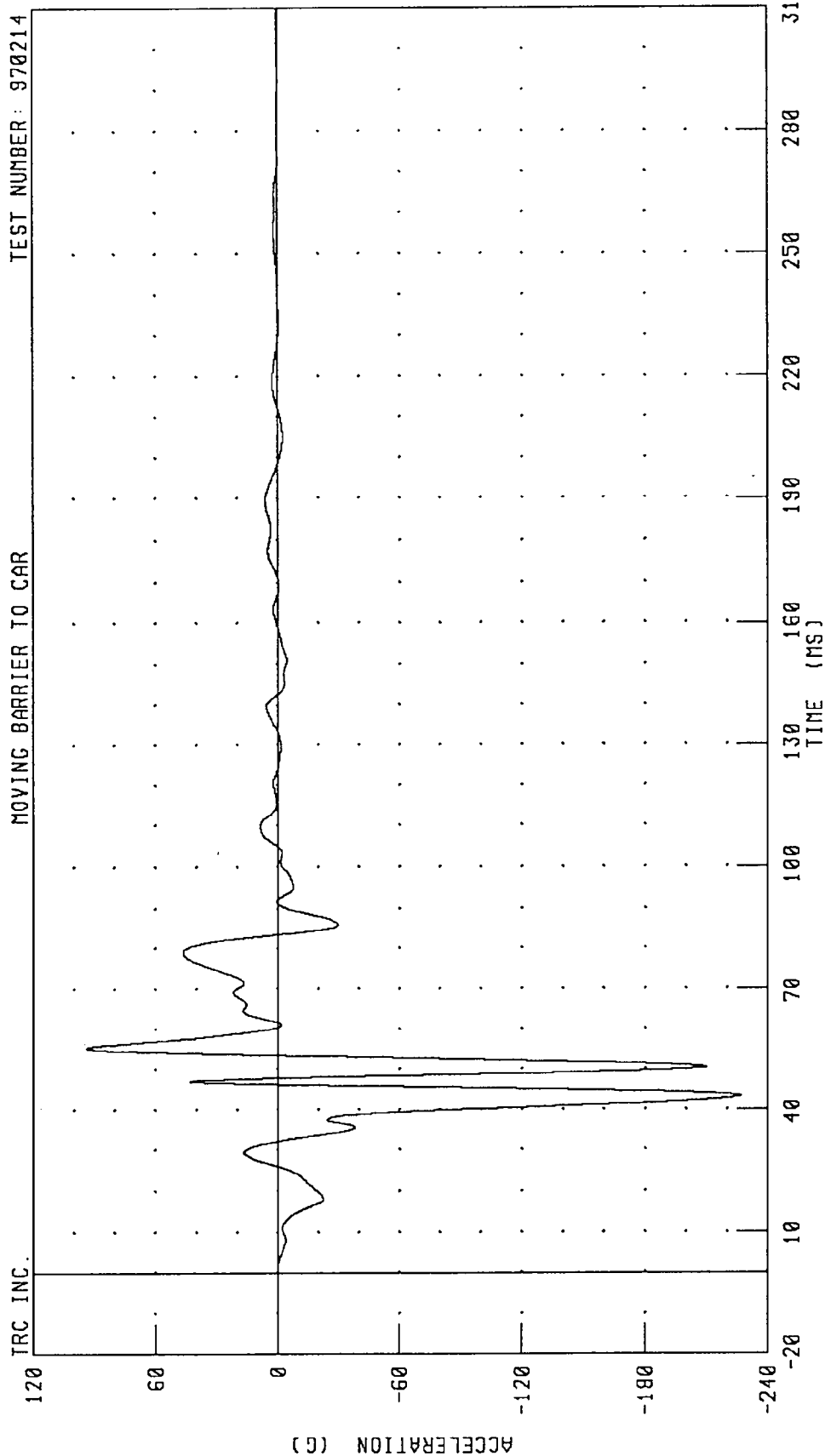
TRC INC.



CHANNEL: RRFY01 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 BRAKE PEDAL X-AXIS ACCELERATION
 MOVING BARRIER TO CAR

TEST NUMBER: 970214



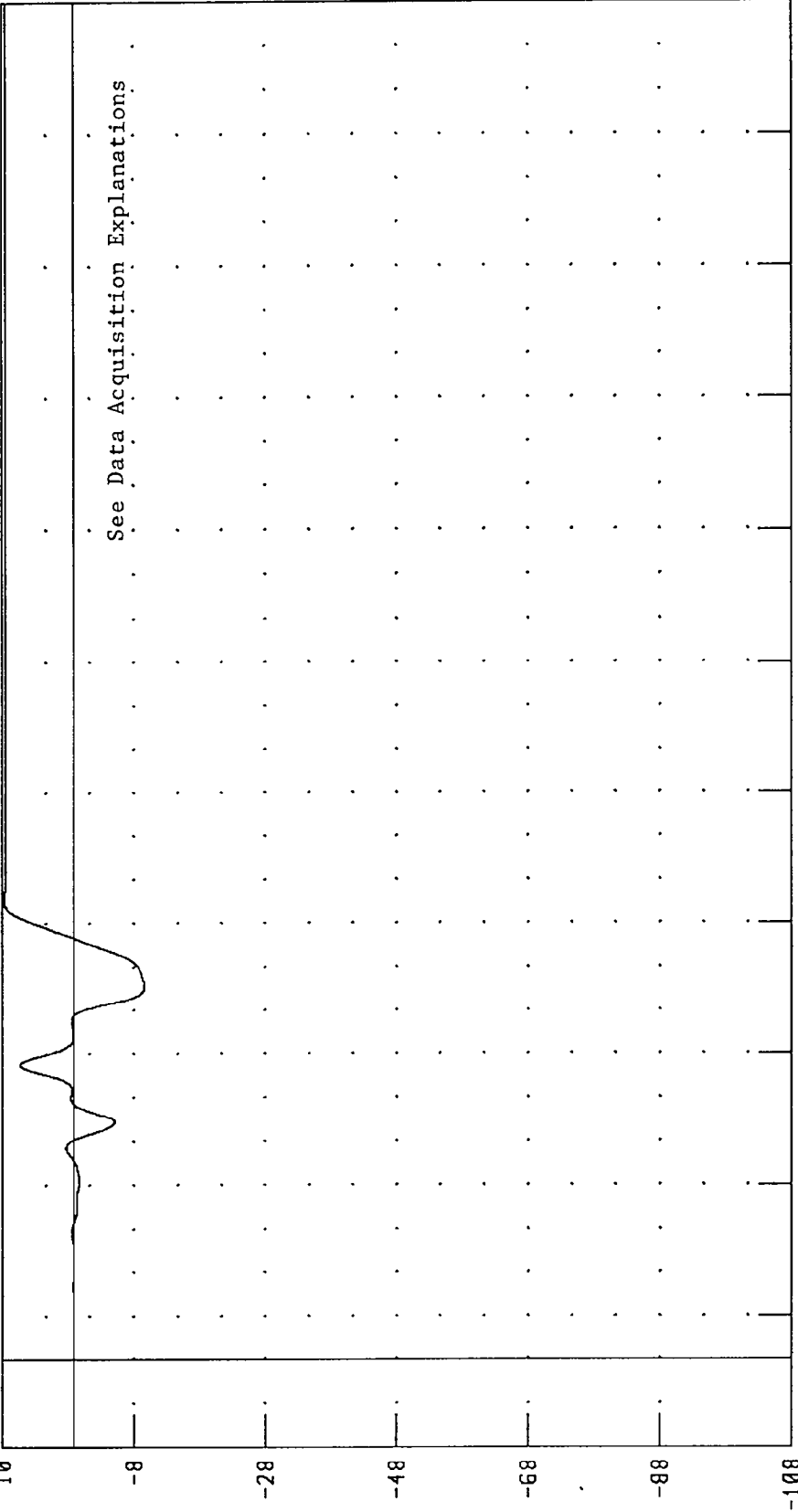
CHANNEL: PEDXG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 BRAKE PEDAL Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



ACCELERATION (G X 10²)

TIME (MS)

CHANNEL: PEDYG1 FILTER: CH. CLASS 60

PEAK DATA: 1043.22 G @ 105.28 MS; -1060.33 G @ 85.68 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
BRAKE PEDAL Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

180

120

60

ACCELERATION (G)

0

-60

-120

-180

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

CHANNEL: PEDZG1 FILTER: CH. CLASS 60

PEAK DATA: 145.21 G @ 50.40 MS; -85.42 G @ 84.72 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
BRAKE PEDAL RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

108

See Data Acquisition Explanations

90

ACCELERATION (G X 10¹)

72

54

36

18

0

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

CHANNEL: PEDRG1 FILTER: CH. CLASS 60

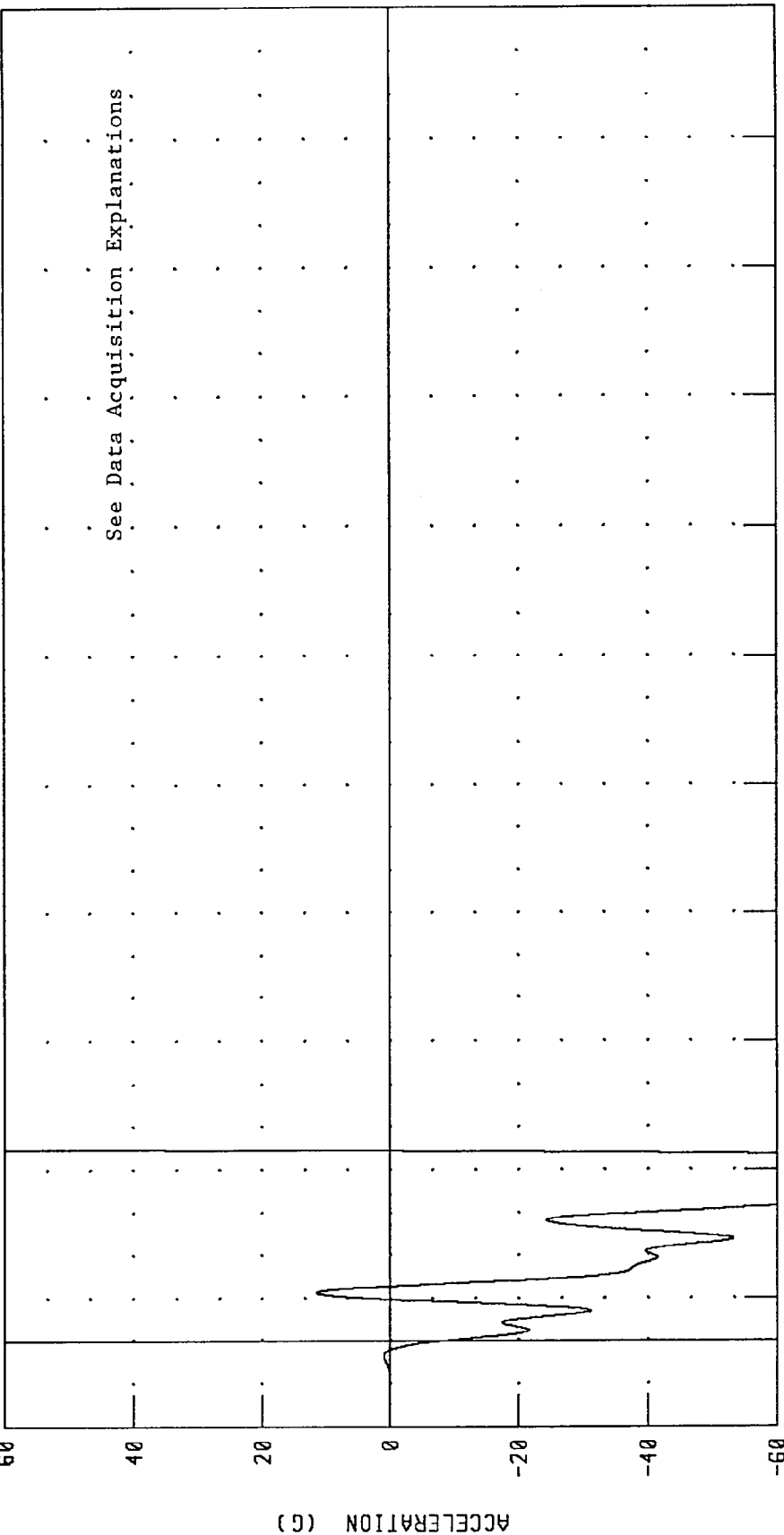
PEAK DATA: 1062.90 G @ 85.60 MS; 0.02 G @ -12.96 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT SHOCK TOWER X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

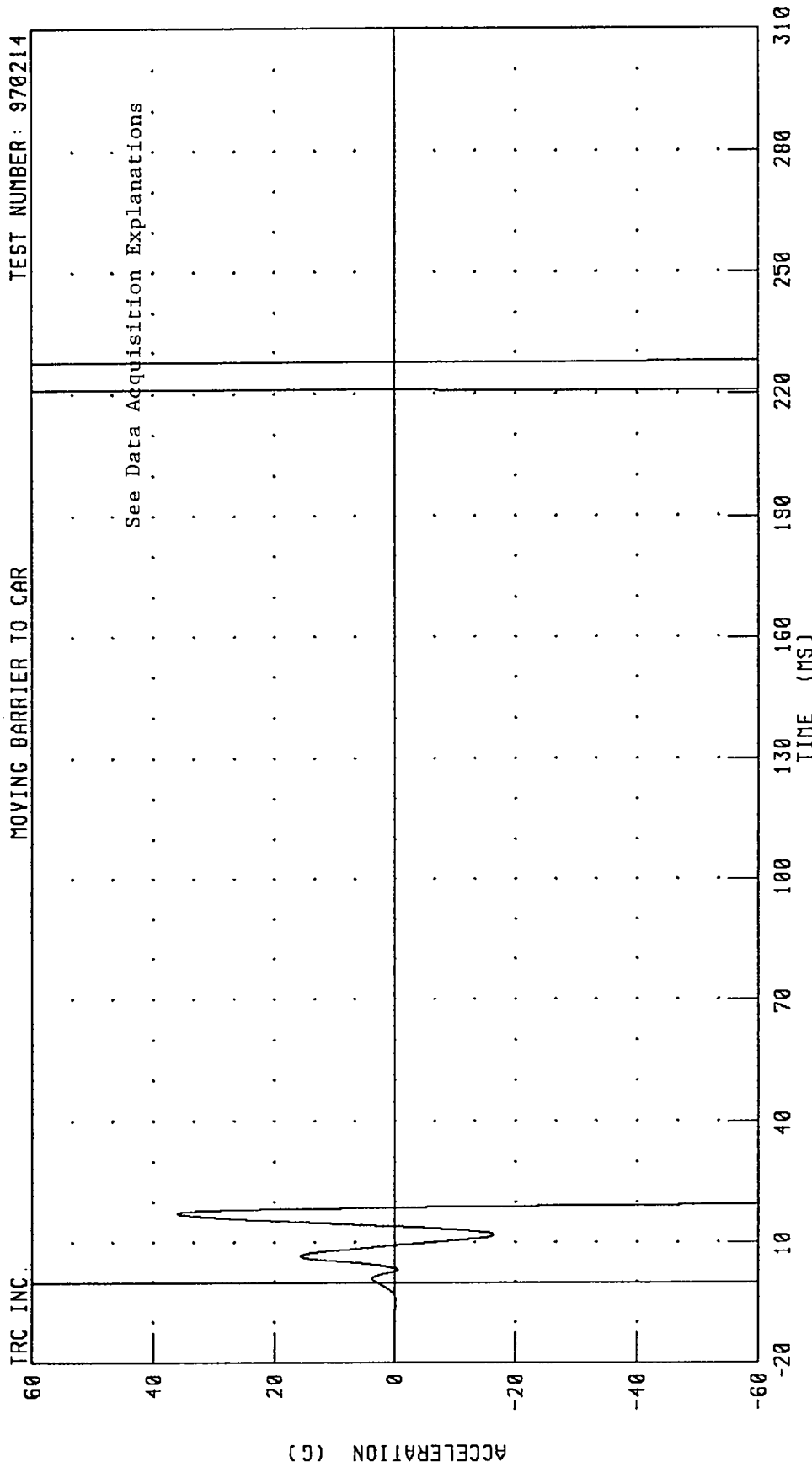
IRC INC.



CHANNEL: SFLXG1 FILTER: CH. CLASS 60

PEAK DATA: 1055.09 G @ 51.04 MS; -113.56 G @ 35.76 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT SHOCK TOWER Z-AXIS ACCELERATION



CHANNEL: SFLZG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT SHOCK TOWER X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

50

23

ACCELERATION (G)

-3

-30

-56

-83

-110

TIME (MS)

310

280

250

220

190

160

130

100

70

40

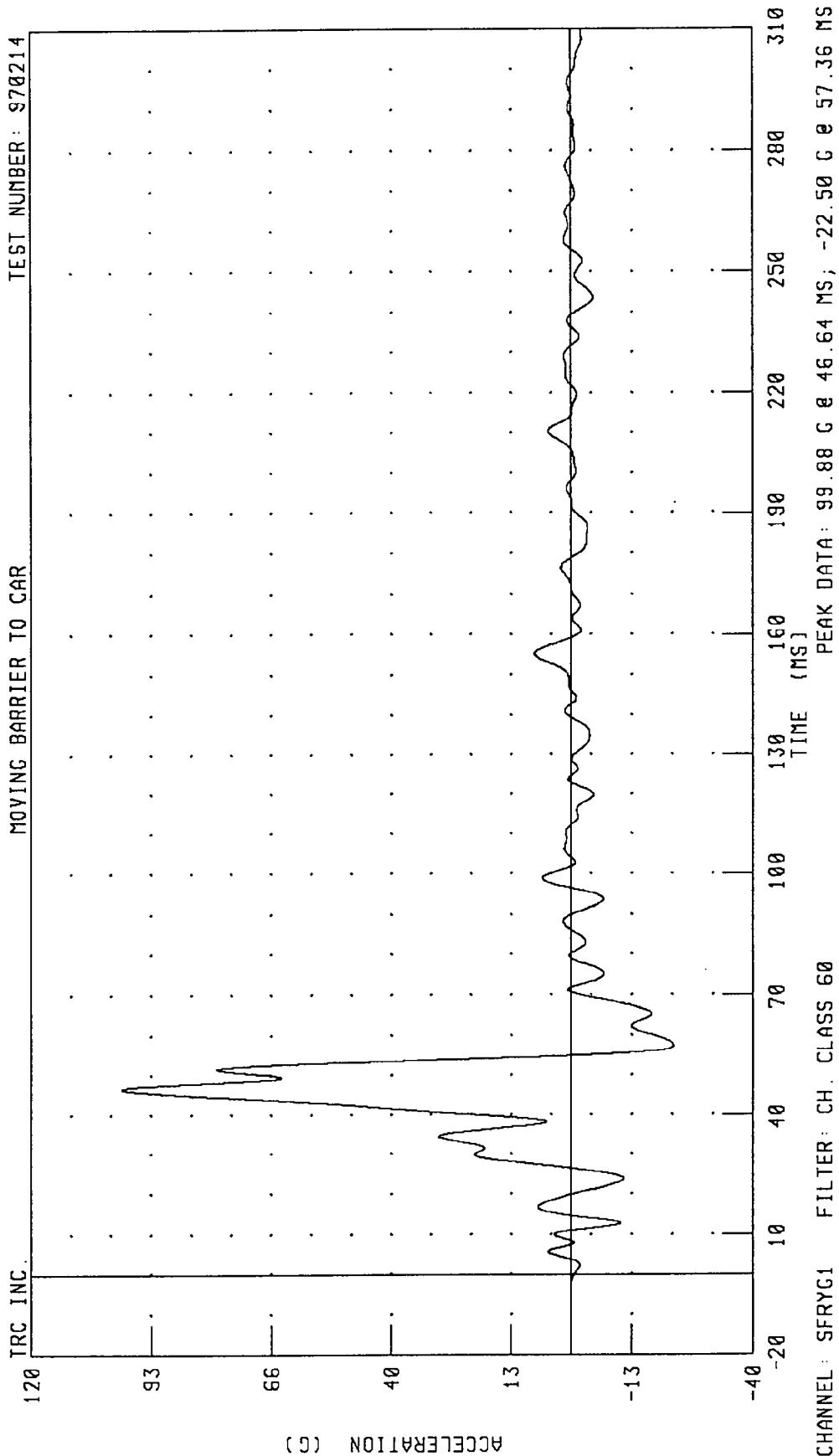
10

-20

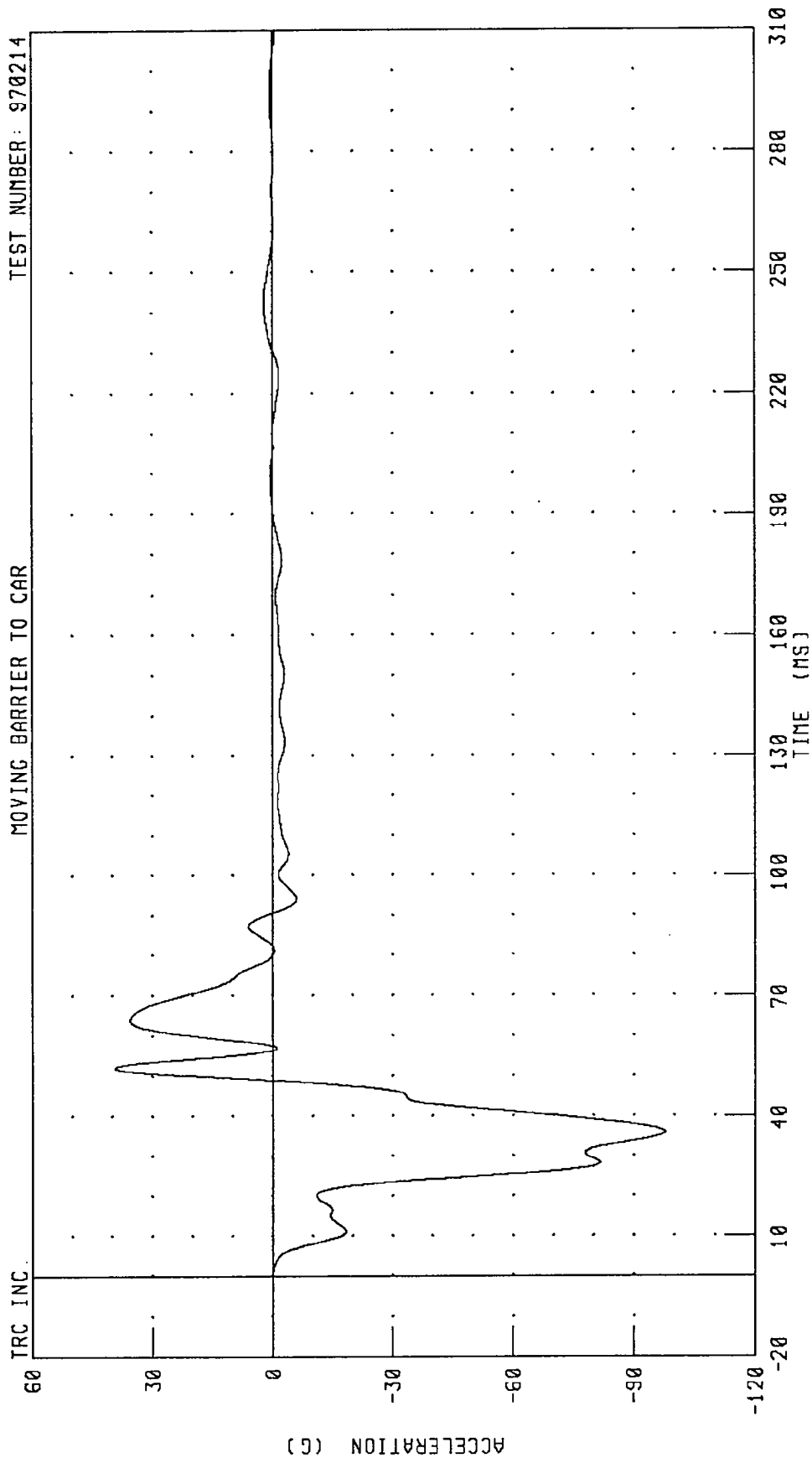
CHANNEL: SFRXC1 FILTER: CH. CLASS 60

PEAK DATA: 9.44 G @ 10.16 MS; -84.33 G @ 50.72 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT SHOCK TOWER Y-AXIS ACCELERATION



70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT ENGINE X-AXIS ACCELERATION



PEAK DATA: 39.45 G @ 51.92 MS, -97.73 G @ 36.00 MS

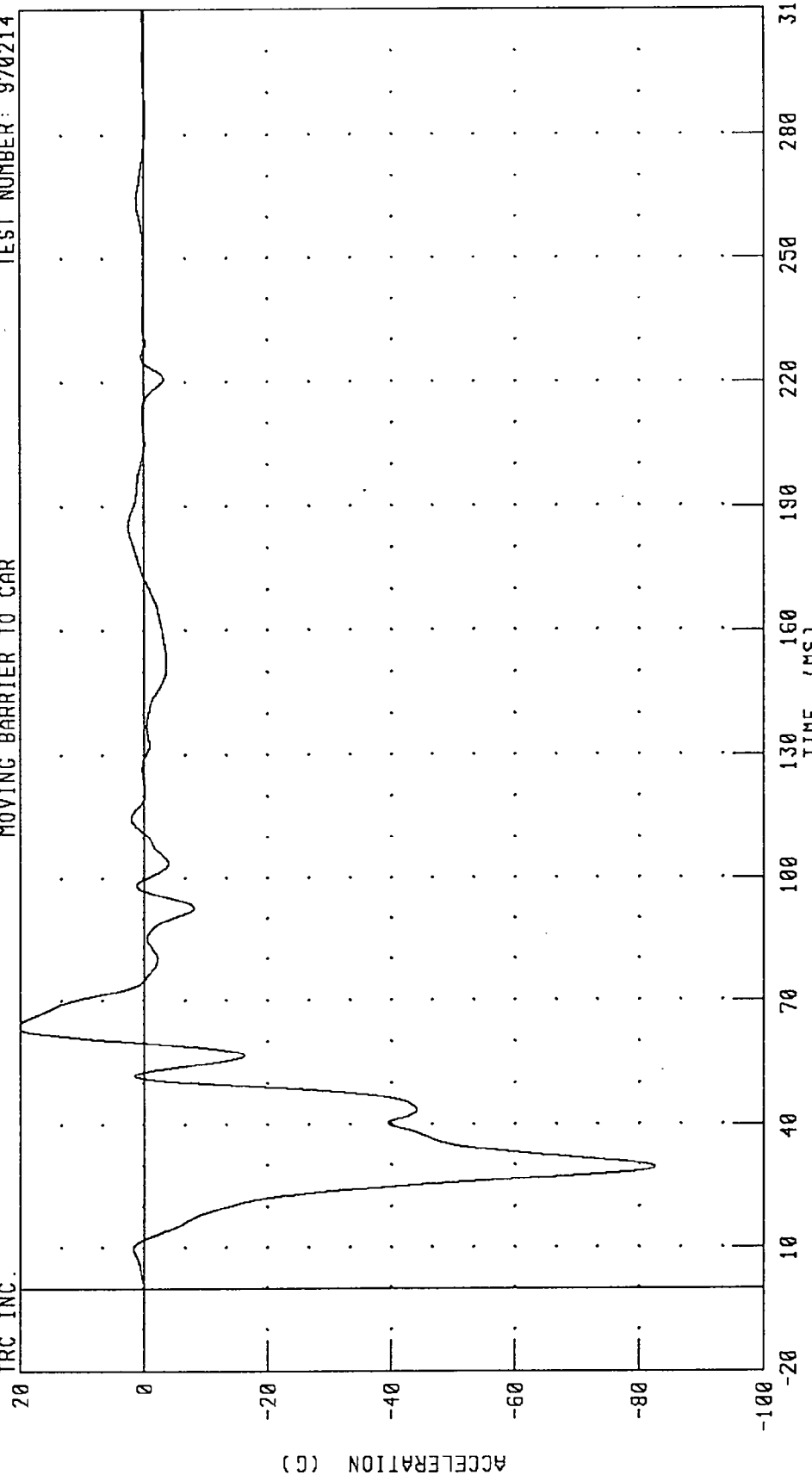
CHANNEL: ENCXC1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT ENGINE X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 20.80 G @ 63.84 MS, -82.53 G @ 29.52 MS

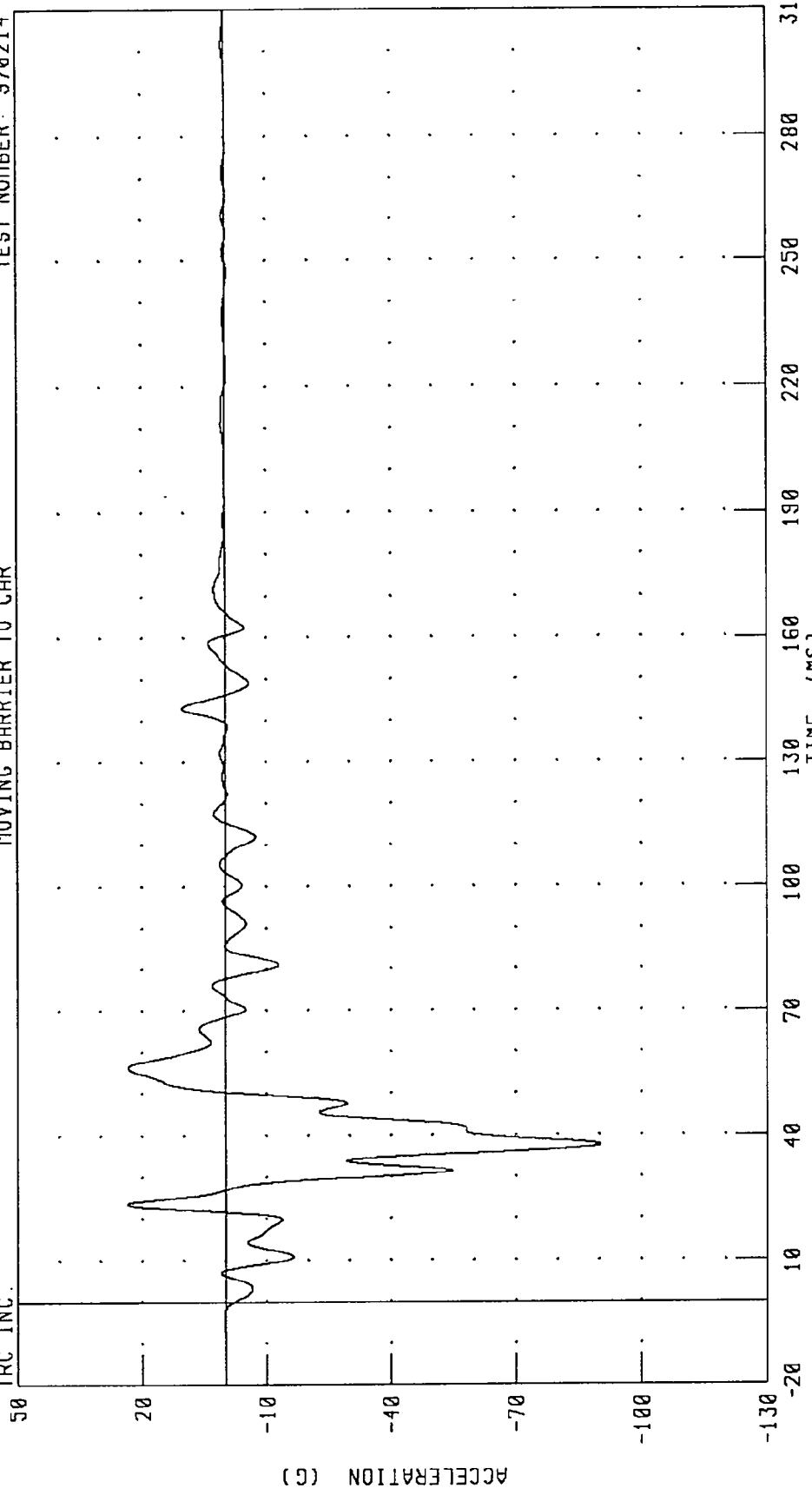
CHANNEL: ENGXC2 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT FRONT FRAME RAIL X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 23.64 G @ 23.68 MS; -90.17 G @ 37.76 MS

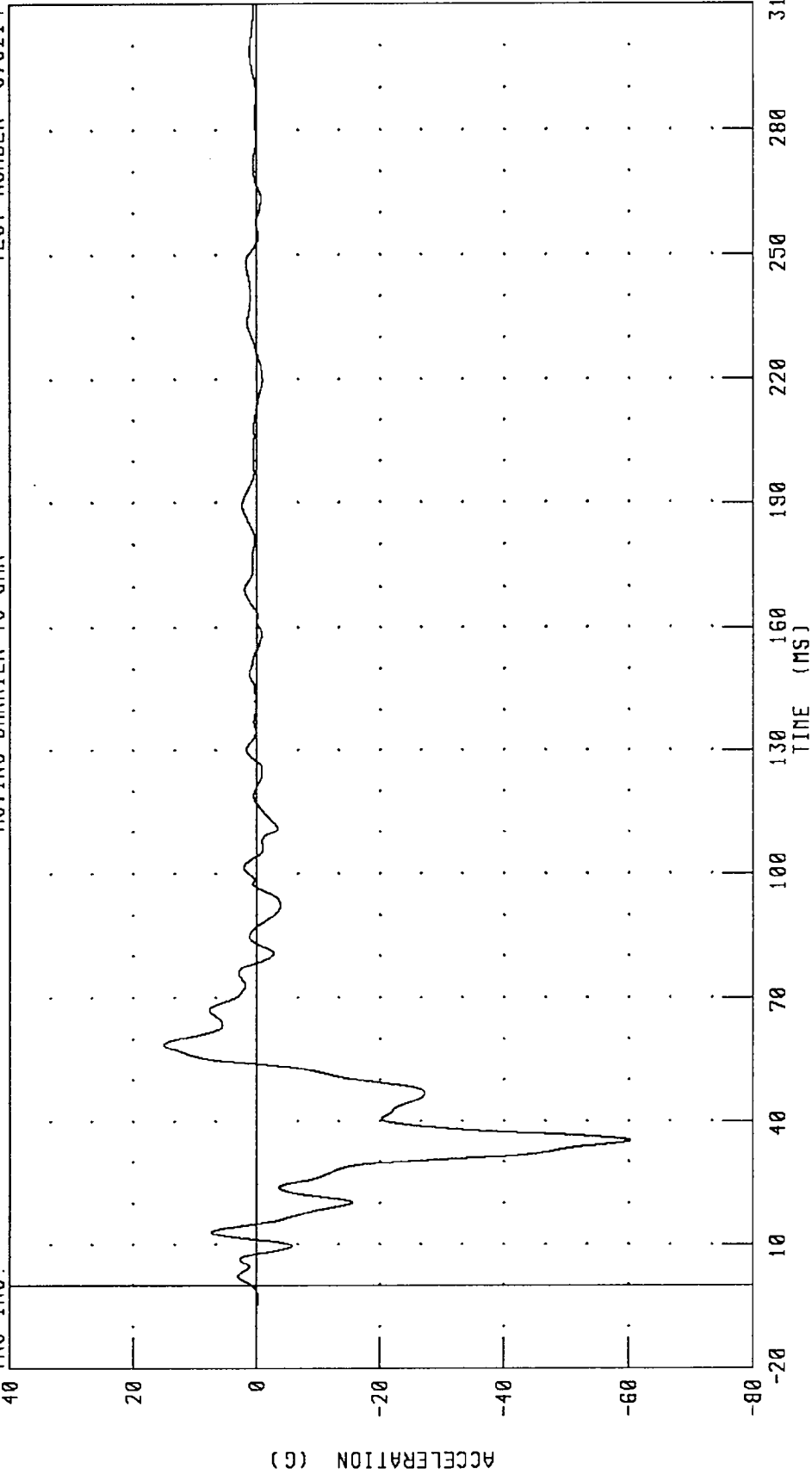
CHANNEL: FFRXG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT FRONT FRAME RAIL Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: FFRYG1 FILTER: CH. CLASS 60

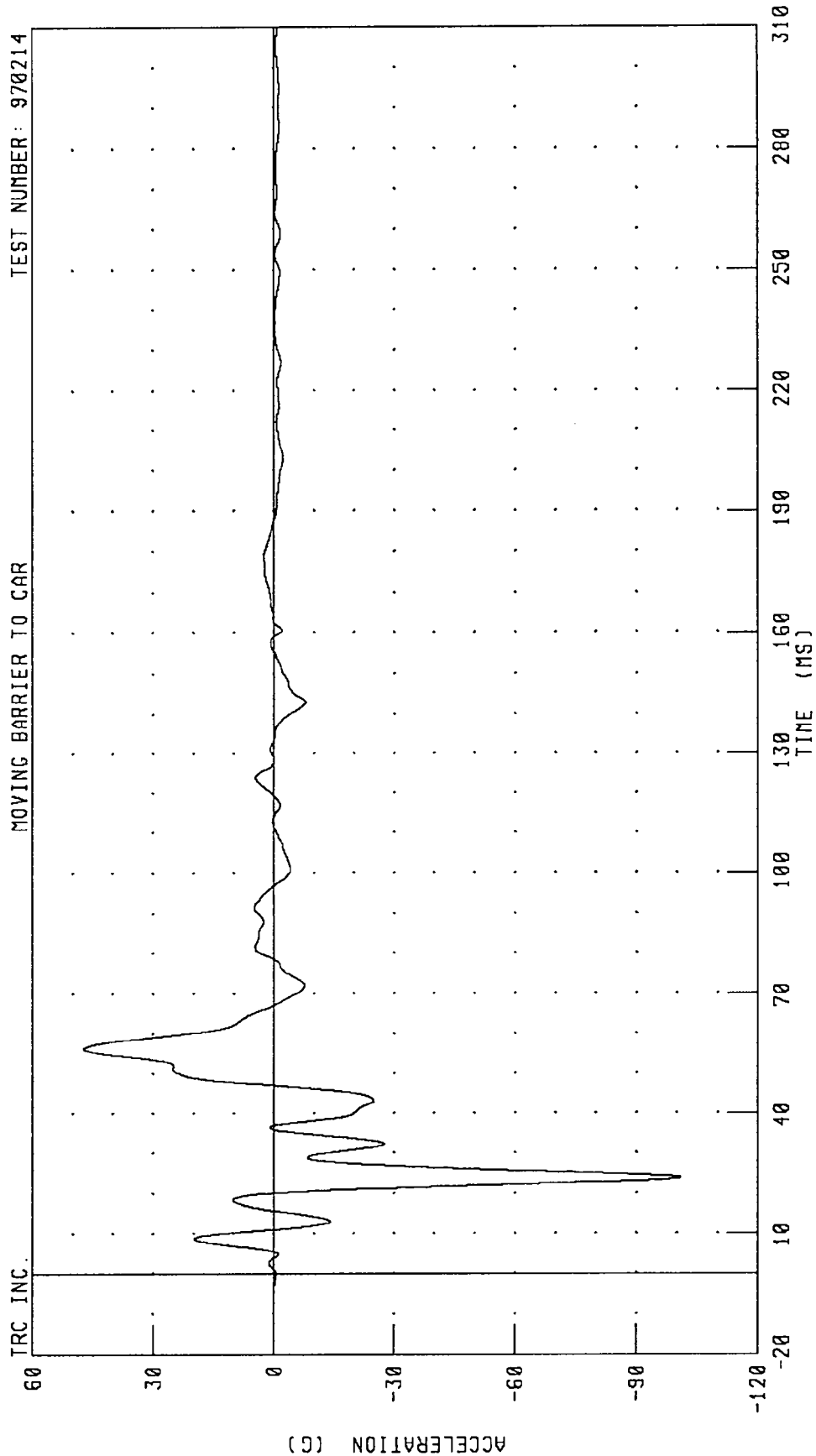
PEAK DATA: 15.06 G @ 58.72 MS; -60.33 G @ 35.44 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT FRONT FRAME RAIL Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



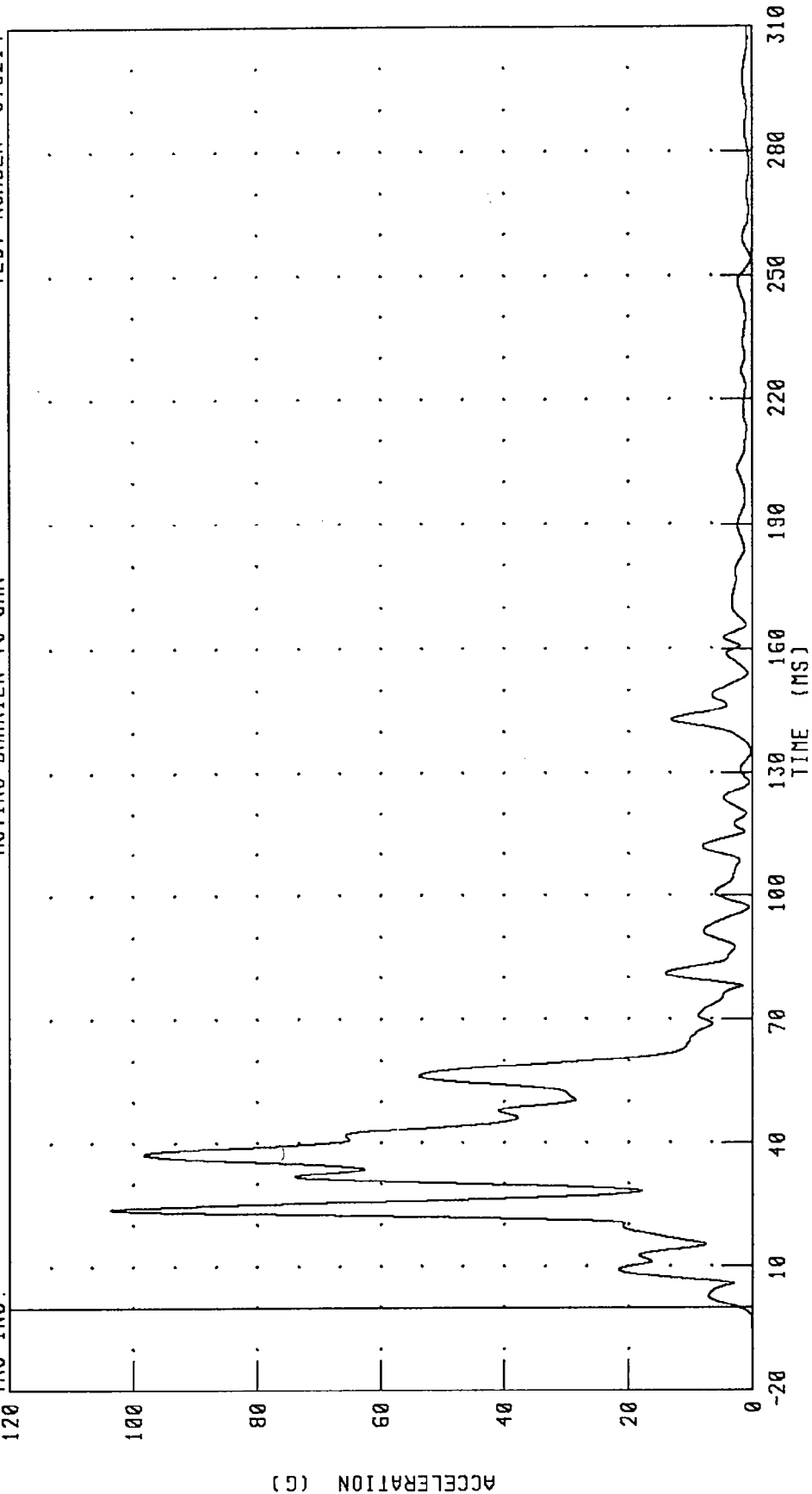
CHANNEL: FFRZG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT FRONT FRAME RAIL RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: FFRRG1 FILTER: CH. CLASS 60

PEAK DATA: 103.75 G @ 23.76 MS; 0.00 G @ -19.28 MS

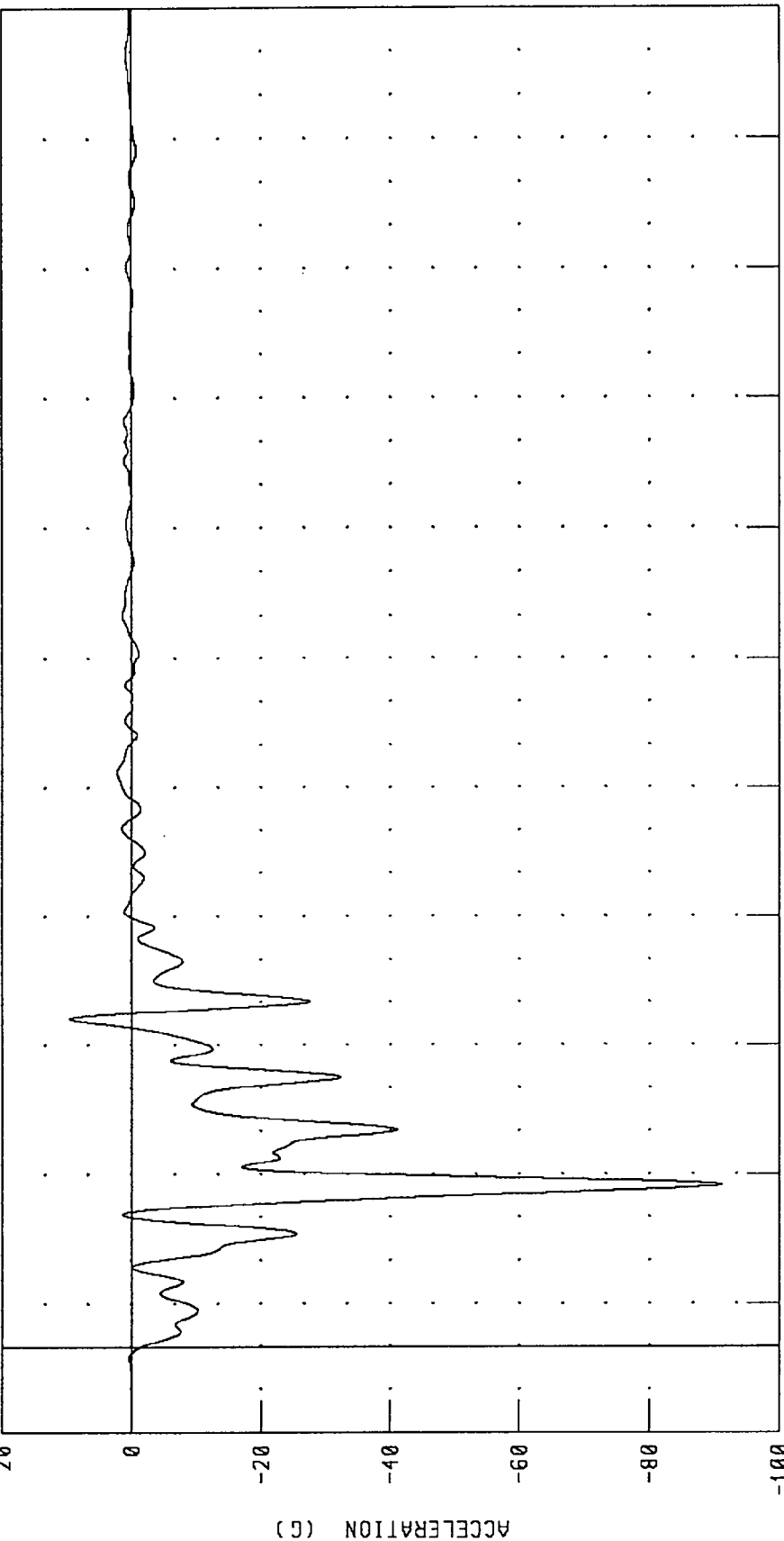
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT FRAME RAIL X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

20



CHANNEL: FFRXG2 FILTER: CH. CLASS 60

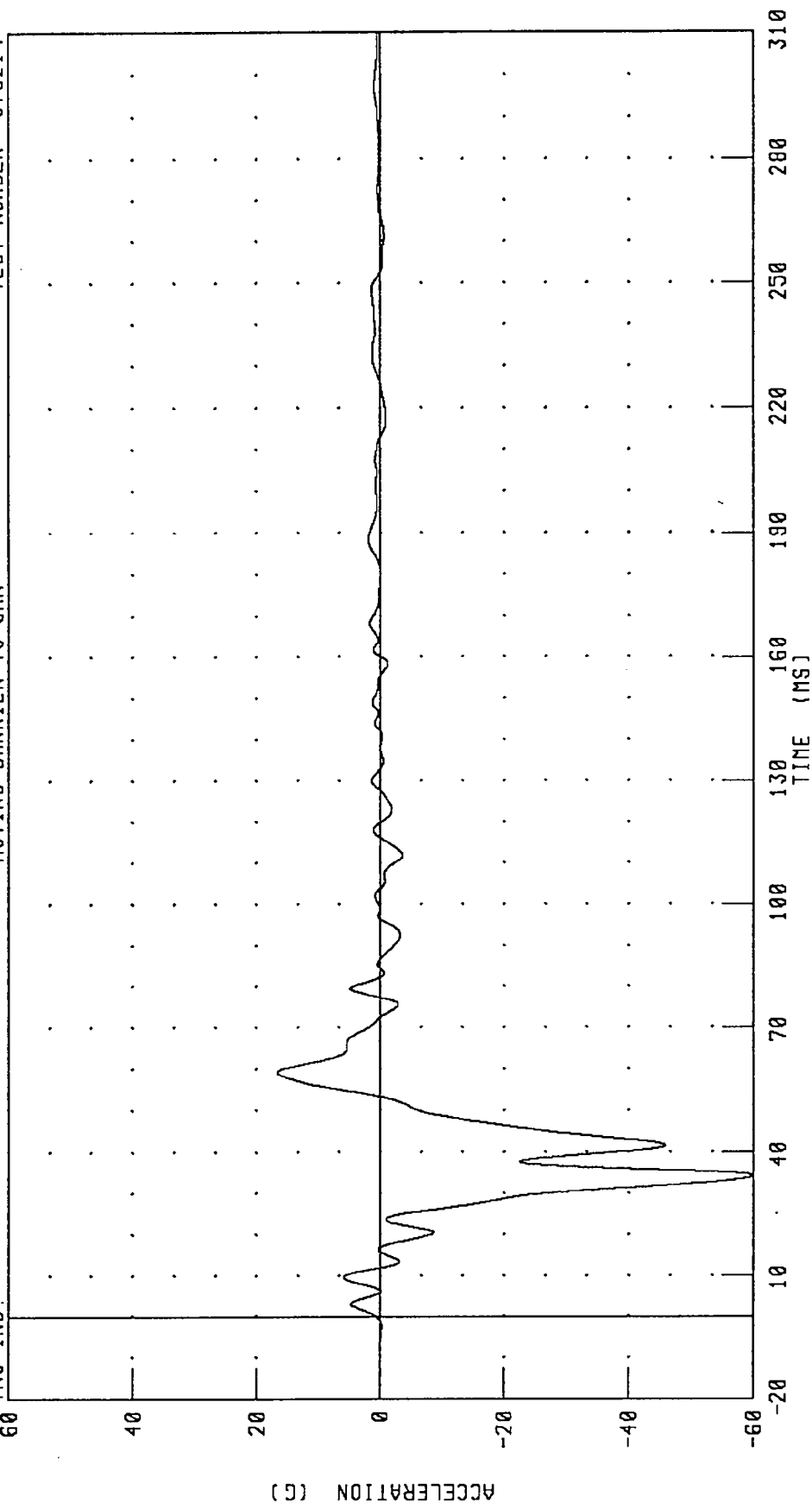
PEAK DATA: 9.57 G @ 76.40 MS; -91.20 G @ 37.60 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT FRAME RAIL Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



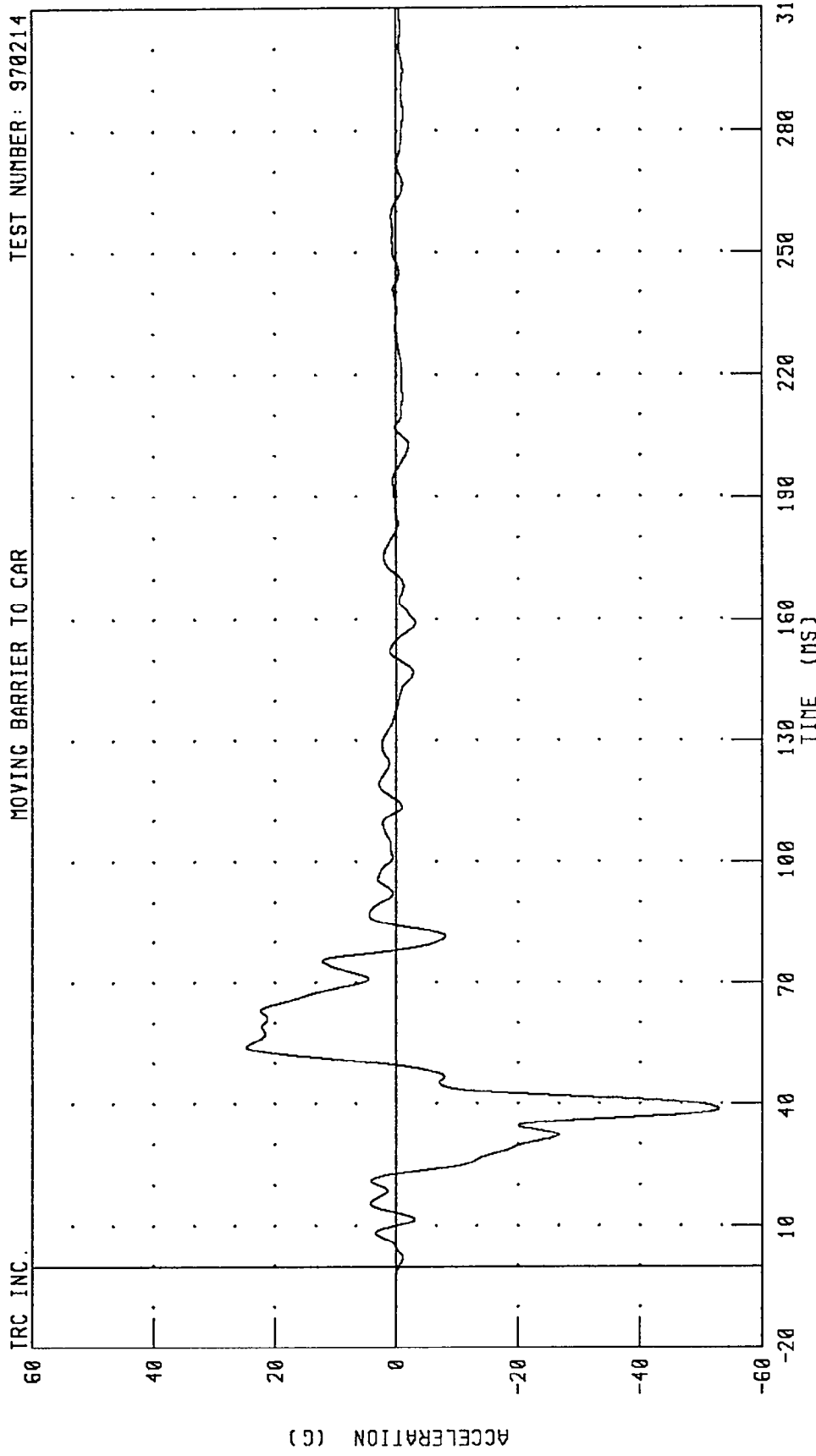
CHANNEL: FFRY02 FILTER: CH. CLASS 60

PEAK DATA: 16.68 G @ 59.28 MS; -60.31 G @ 34.40 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT FRONT FRAME RAIL Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



CHANNEL: FFRZG2 FILTER: CH. CLASS 60

PEAK DATA: 24.72 G @ 54.08 MS; -52.83 G @ 38.80 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
RIGHT FRONT FRAME RAIL RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

-20

10

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70

80

90

100

110

120

130

140

150

160

170

180

190

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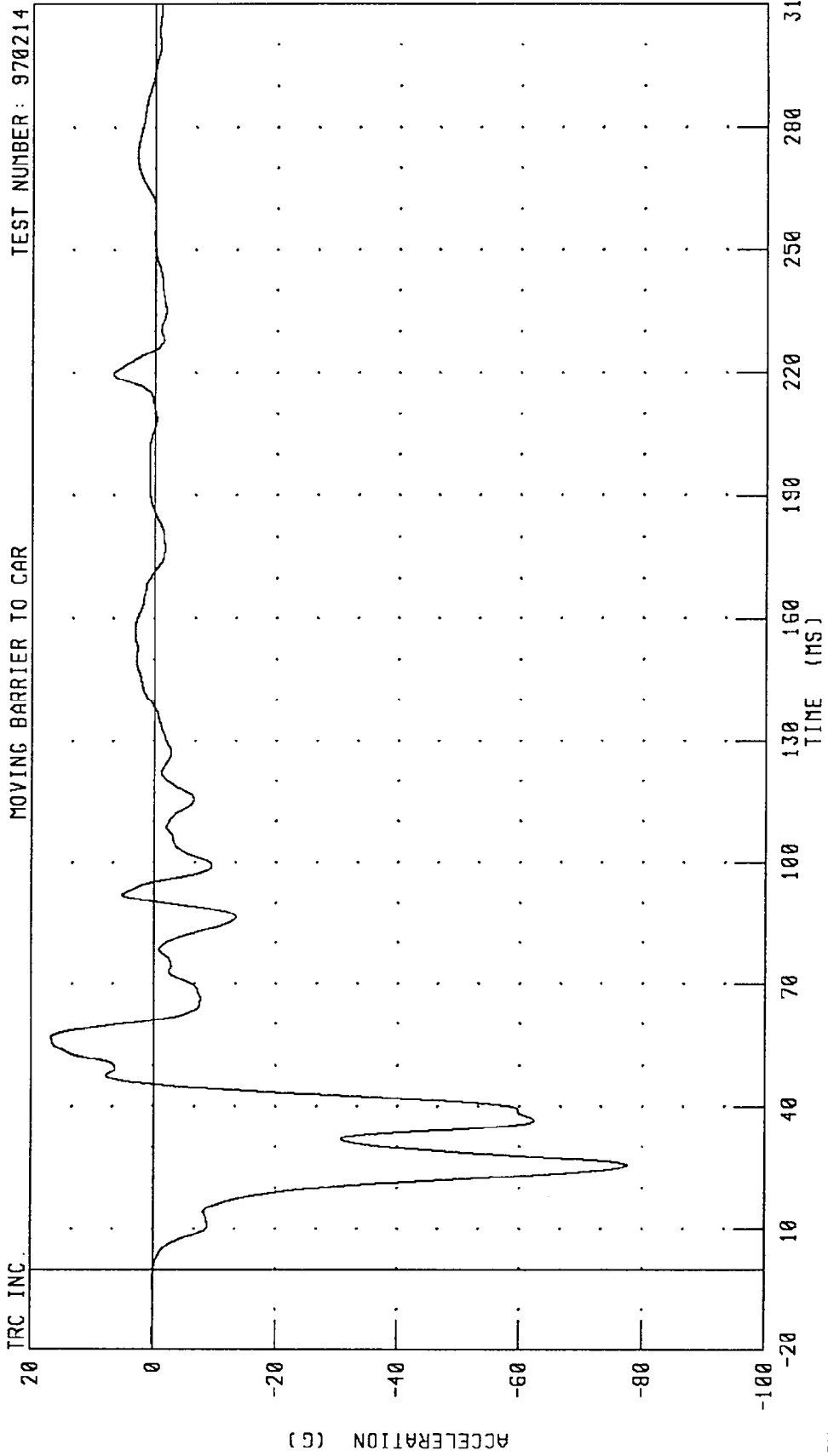
3060

3070

3080

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
ENGINE BOTTOM X-AXIS ACCELERATION
MOVING BARRIER TO CAR

TEST NUMBER: 970214

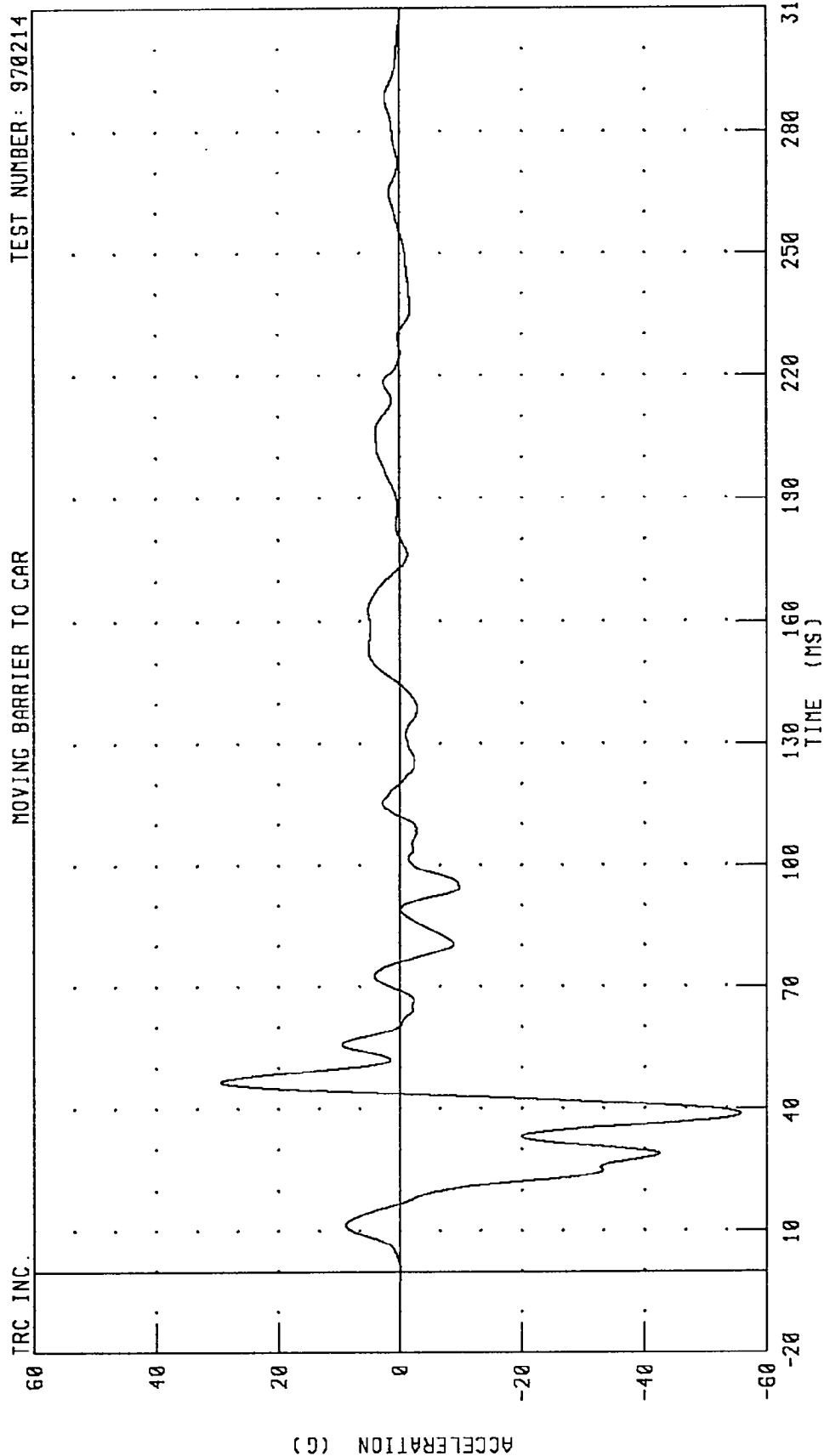


CHANNEL: ENGCG3 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
ENGINE BOTTOM Y-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



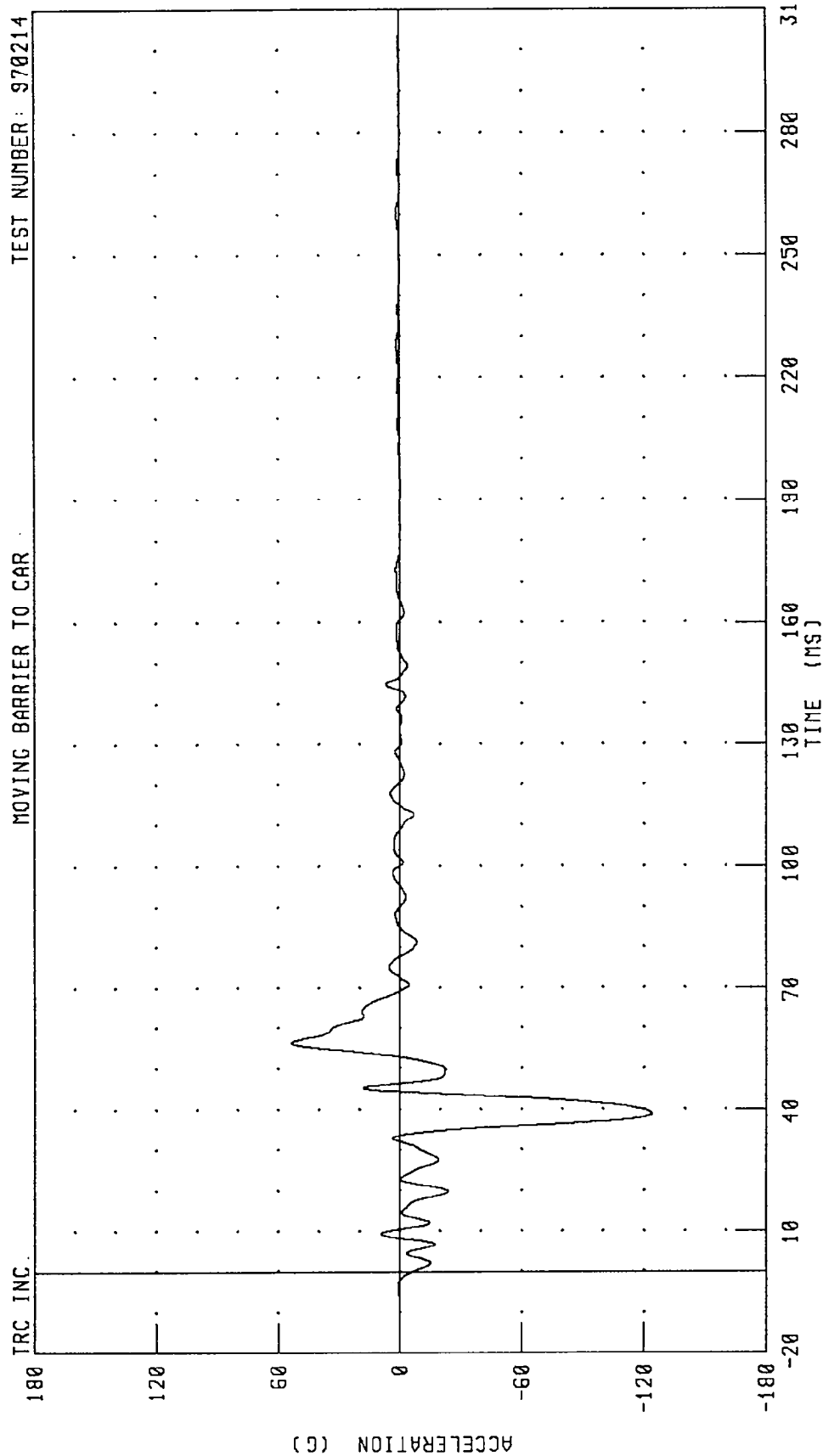
PEAK DATA: 29.49 G @ 46.56 MS, -55.78 G @ 38.72 MS

CHANNEL: ENCYG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
TOEPAN X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



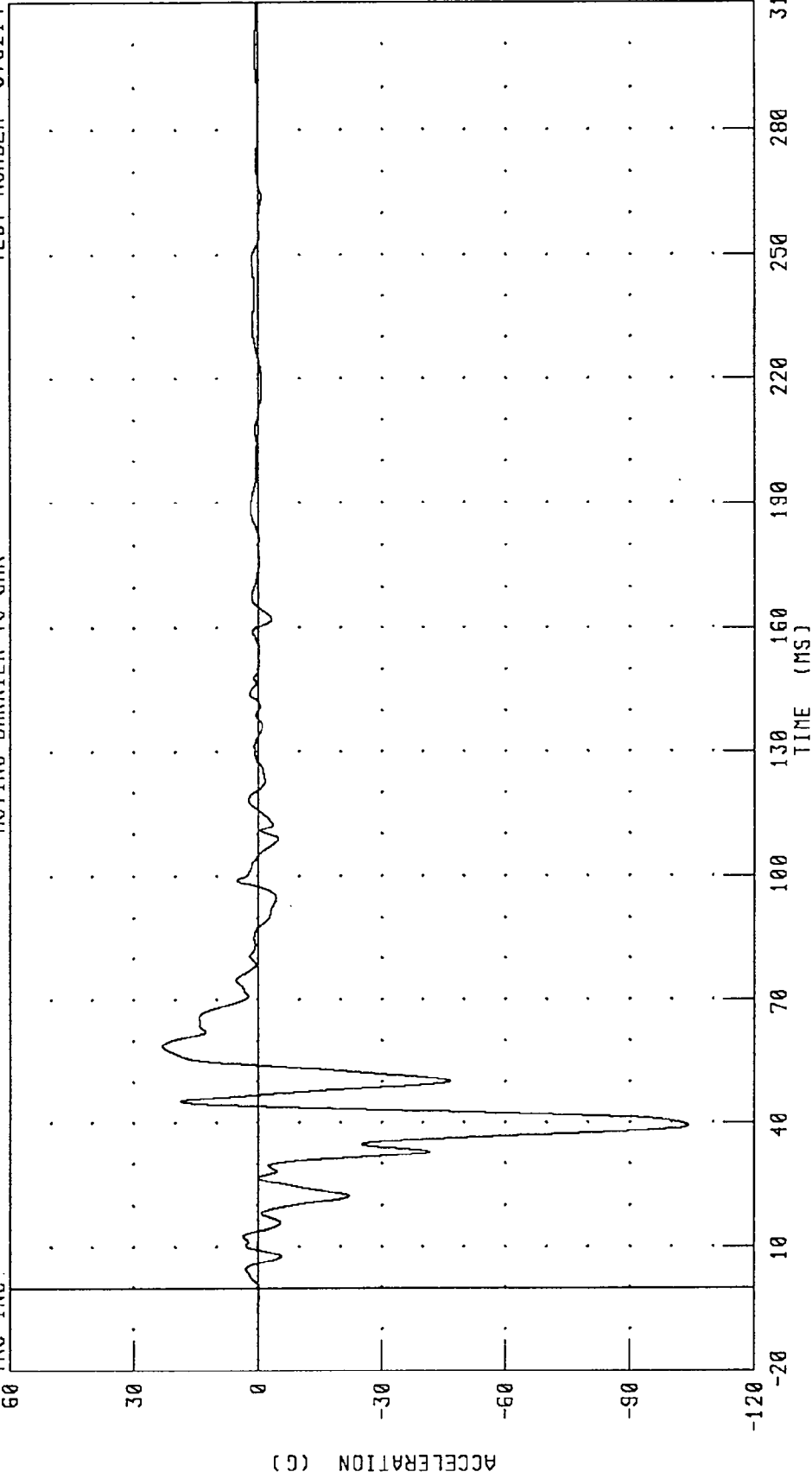
CHANNEL: LFFXG1 FILTER: CH. CLASS 60

PEAK DATA: 53.84 G @ 56.16 MS; -124.00 G @ 39.04 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
TOEPAN Y-AXIS ACCELERATION
MOVING BARRIER TO CAR

TEST NUMBER: 970214

IRC INC.



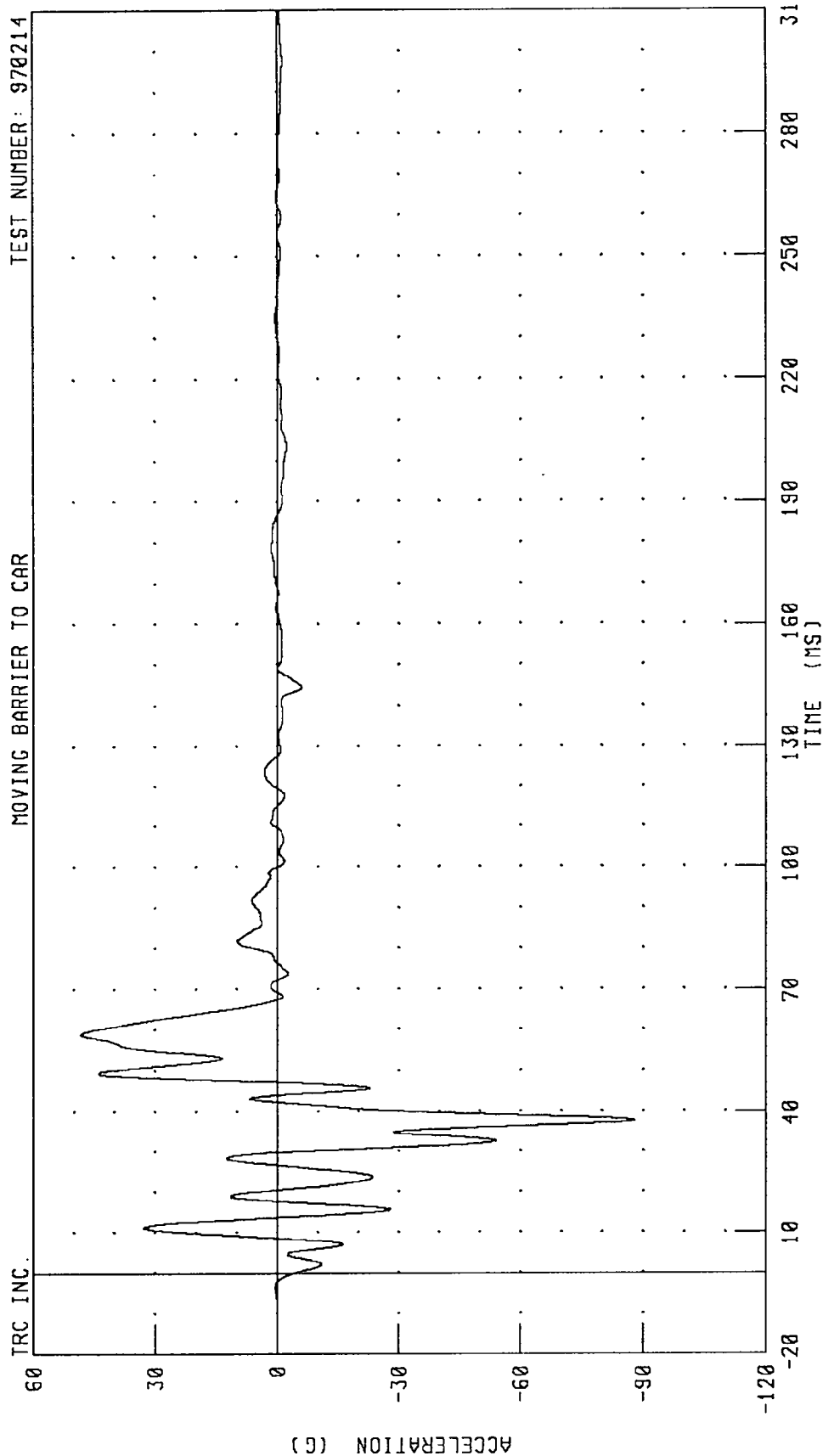
CHANNEL: LFFYG1 FILTER: CH. CLASS 60

PEAK DATA: 23.05 G @ 58.72 MS; -104.22 G @ 39.36 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
TOEPAN Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



PEAK DATA: 48.22 G @ 59.04 MS; -87.77 G @ 37.76 MS

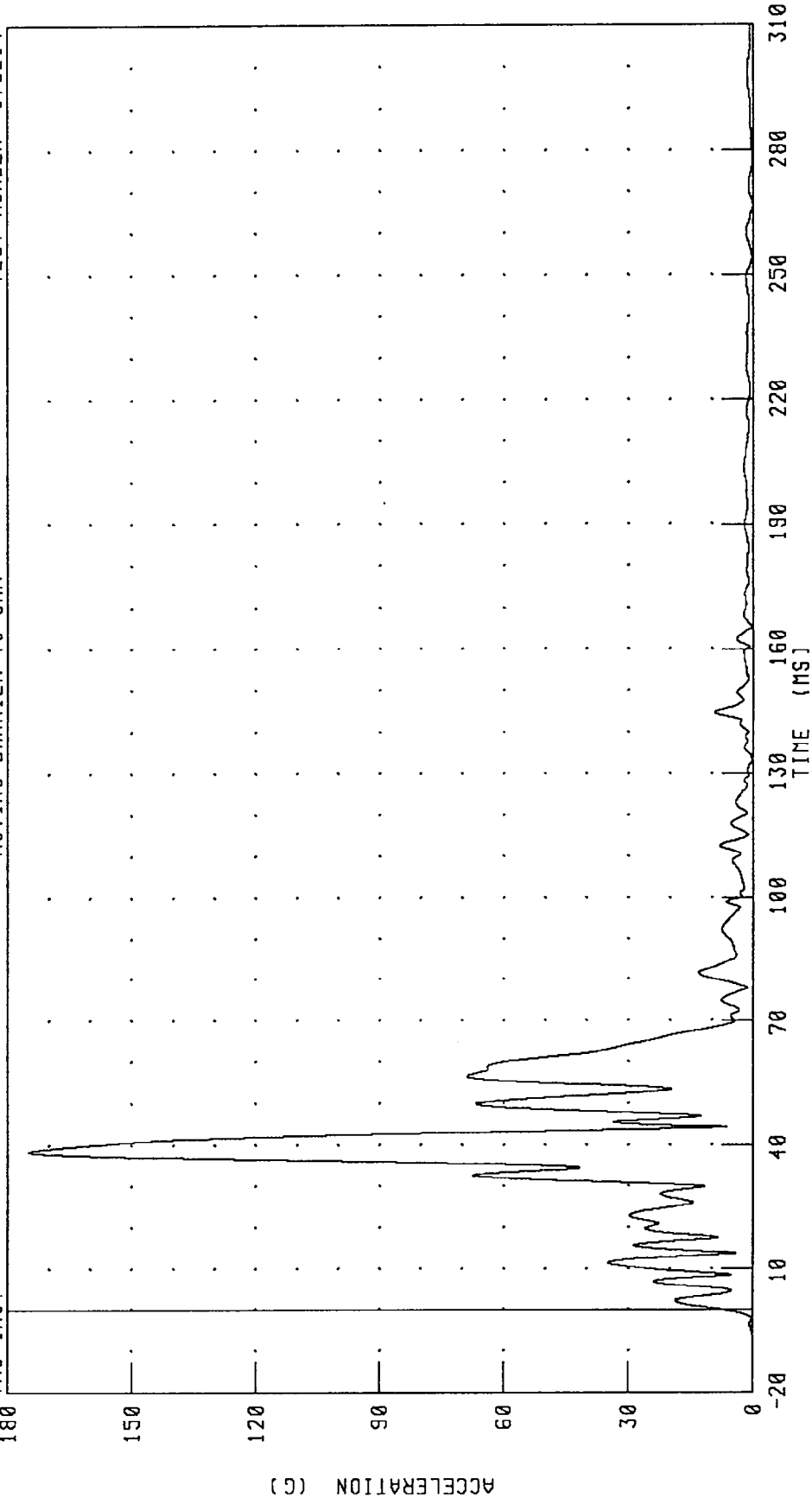
CHANNEL: LFFZG1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
TOEPAN RESULTANT ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



CHANNEL: LFFRG1 FILTER: CH. CLASS 60

PEAK DATA: 174.95 G @ 38.56 MS; 0.01 G @ -18.88 MS

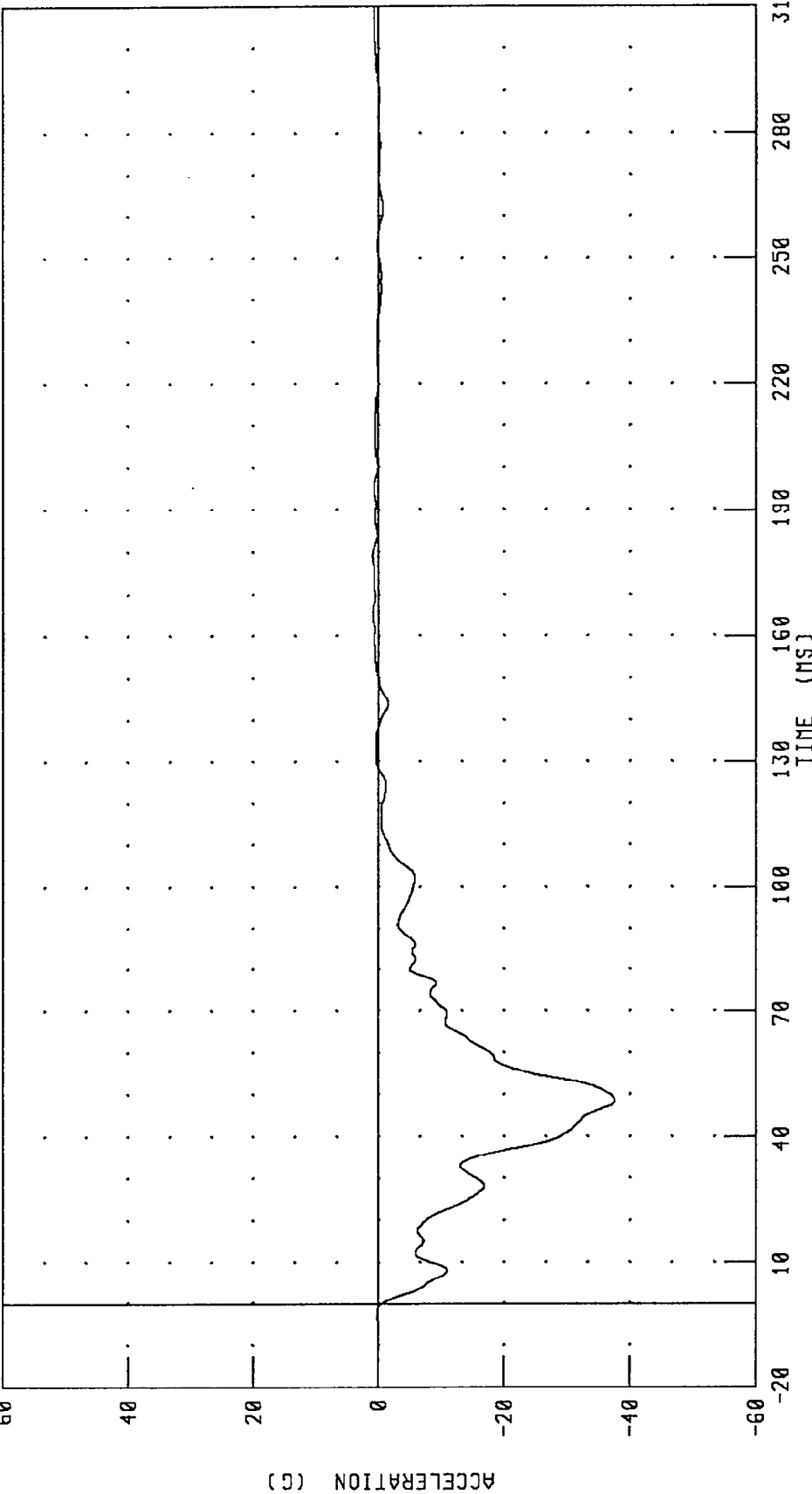
70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 REAR COMPARTMENT CENTER X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.

60



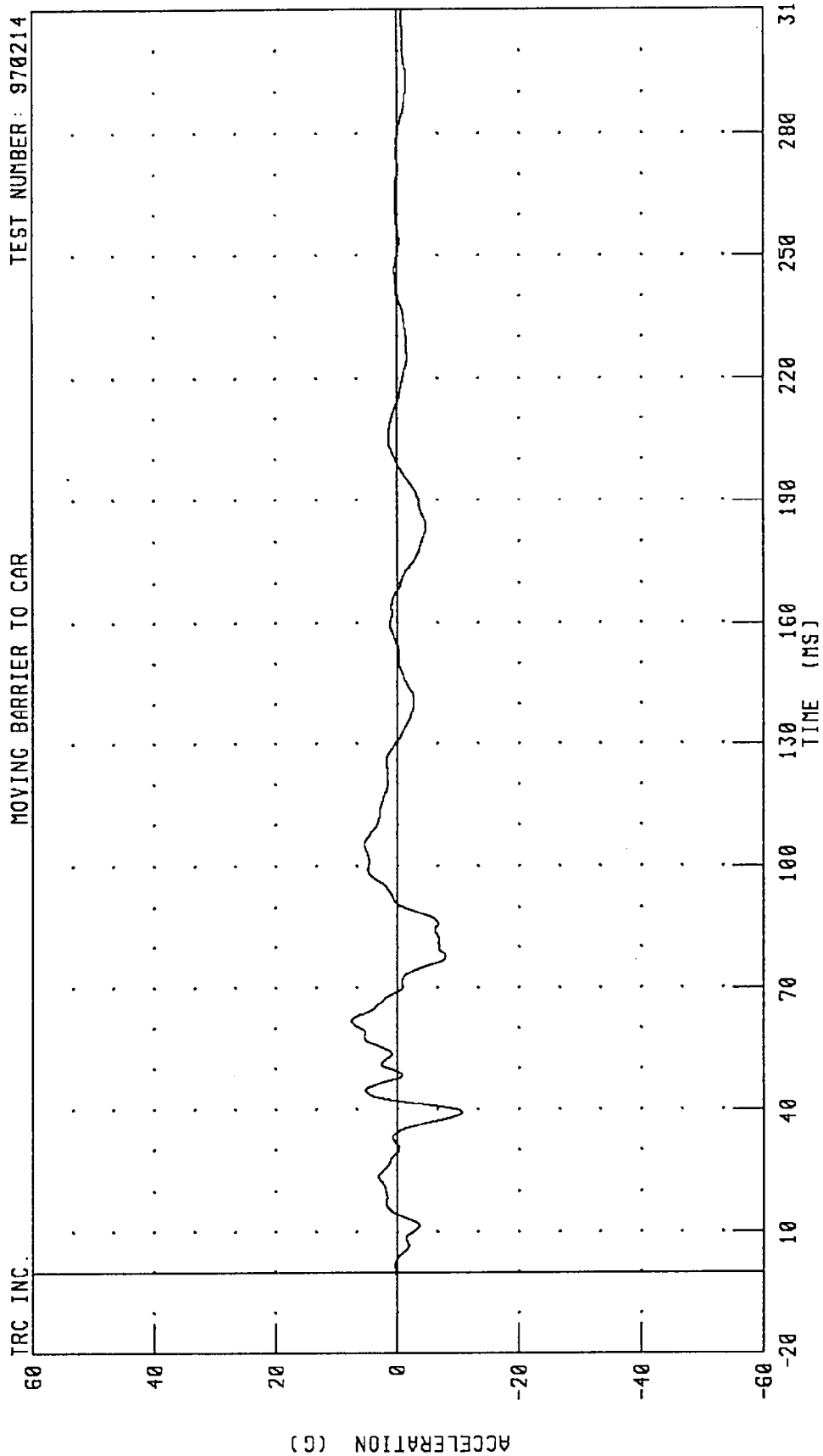
CHANNEL: FTUXG1 FILTER: CH. CLASS 60

PEAK DATA: 0.94 G @ 179.20 MS; -37.55 G @ 48.32 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
 REAR COMPARTMENT CENTER Z-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



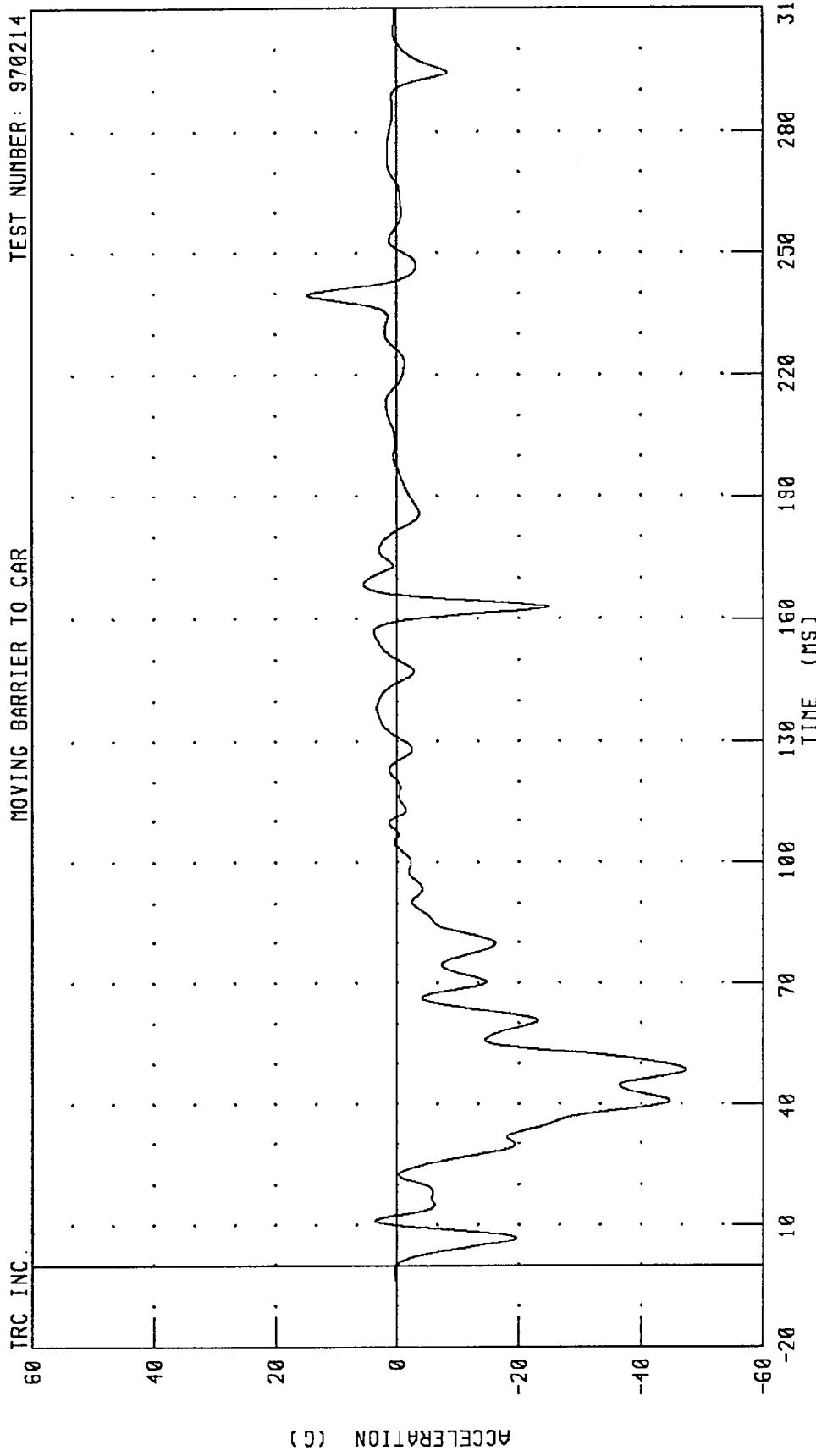
CHANNEL: FTUZG1 FILTER: CH. CLASS 60

PEAK DATA: 7.60 G @ 61.84 MS, -10.62 G @ 39.44 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
 RIGHT TOP HINGE ON A-PILLAR X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



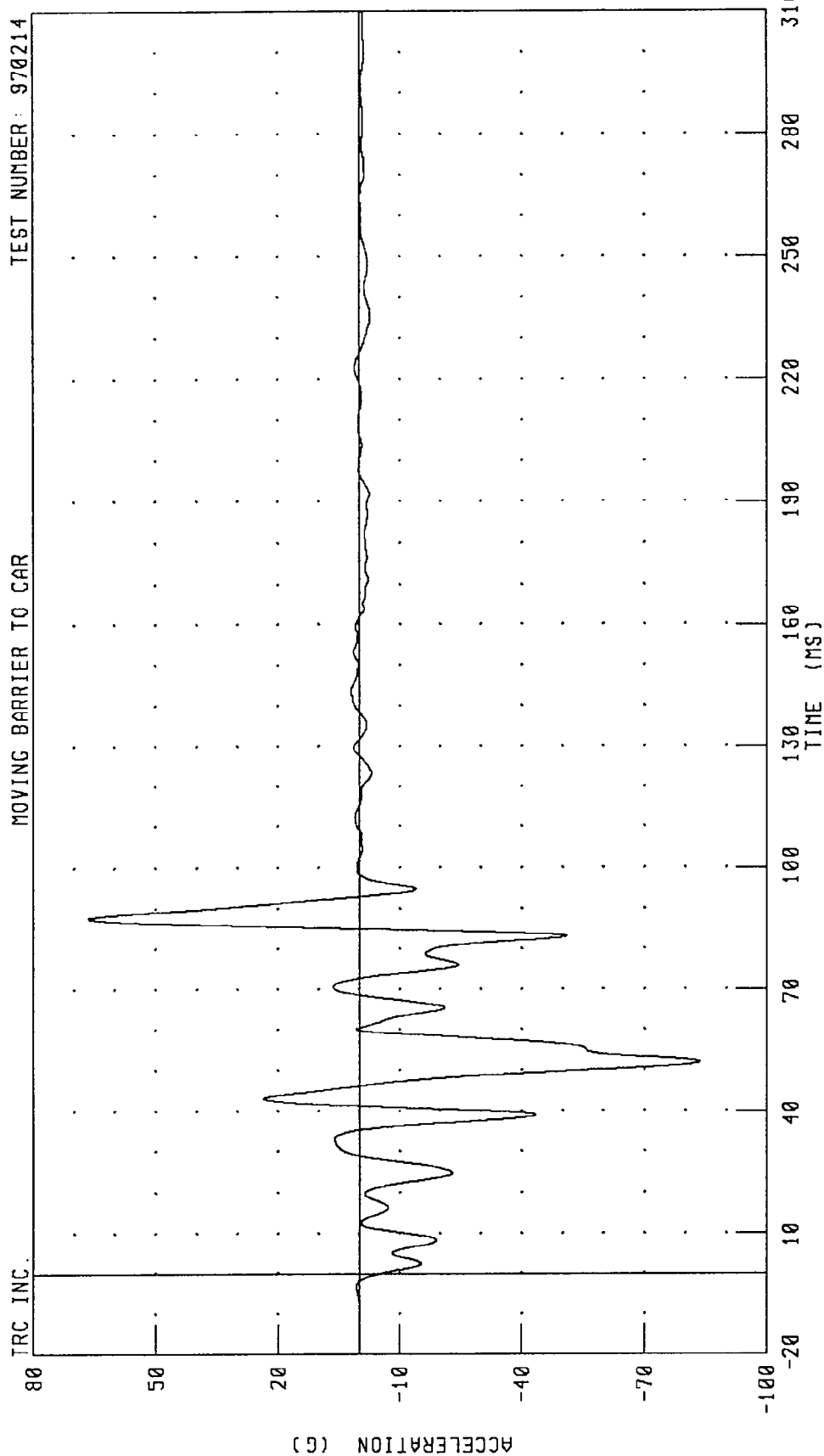
CHANNEL: RPAXG1 FILTER: CH. CLASS 60

PEAK DATA: 14.82 G @ 239.60 MS; -47.47 G @ 48.48 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
LEFT TOP HINGE ON A-PILLAR X-AXIS ACCELERATION

TEST NUMBER: 970214

MOVING BARRIER TO CAR



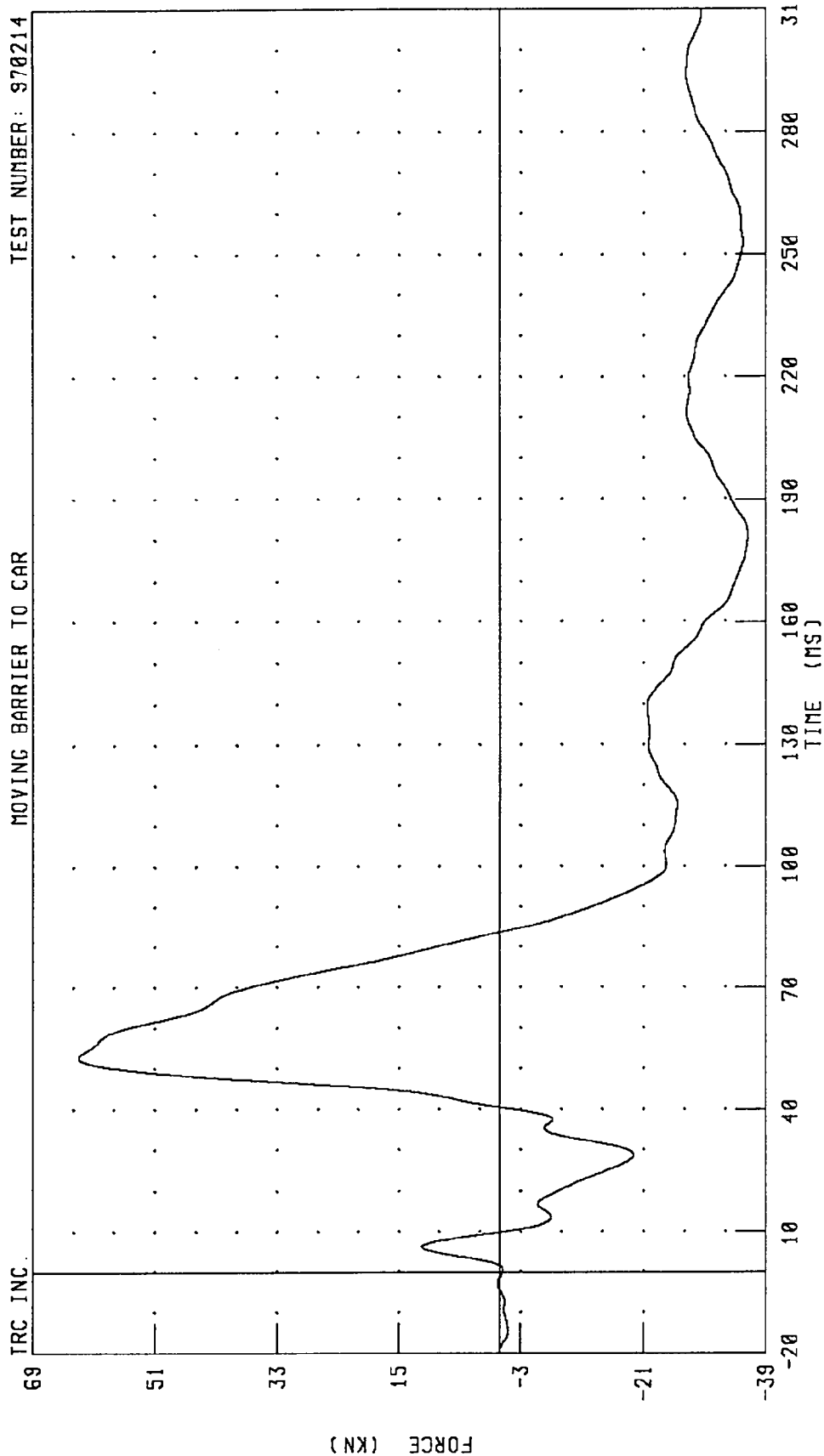
CHANNEL: LPXG1 FILTER: CH. CLASS 60

PEAK DATA: 66.45 G @ 87.76 MS, -83.64 G @ 52.00 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE POSITION 1 FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR



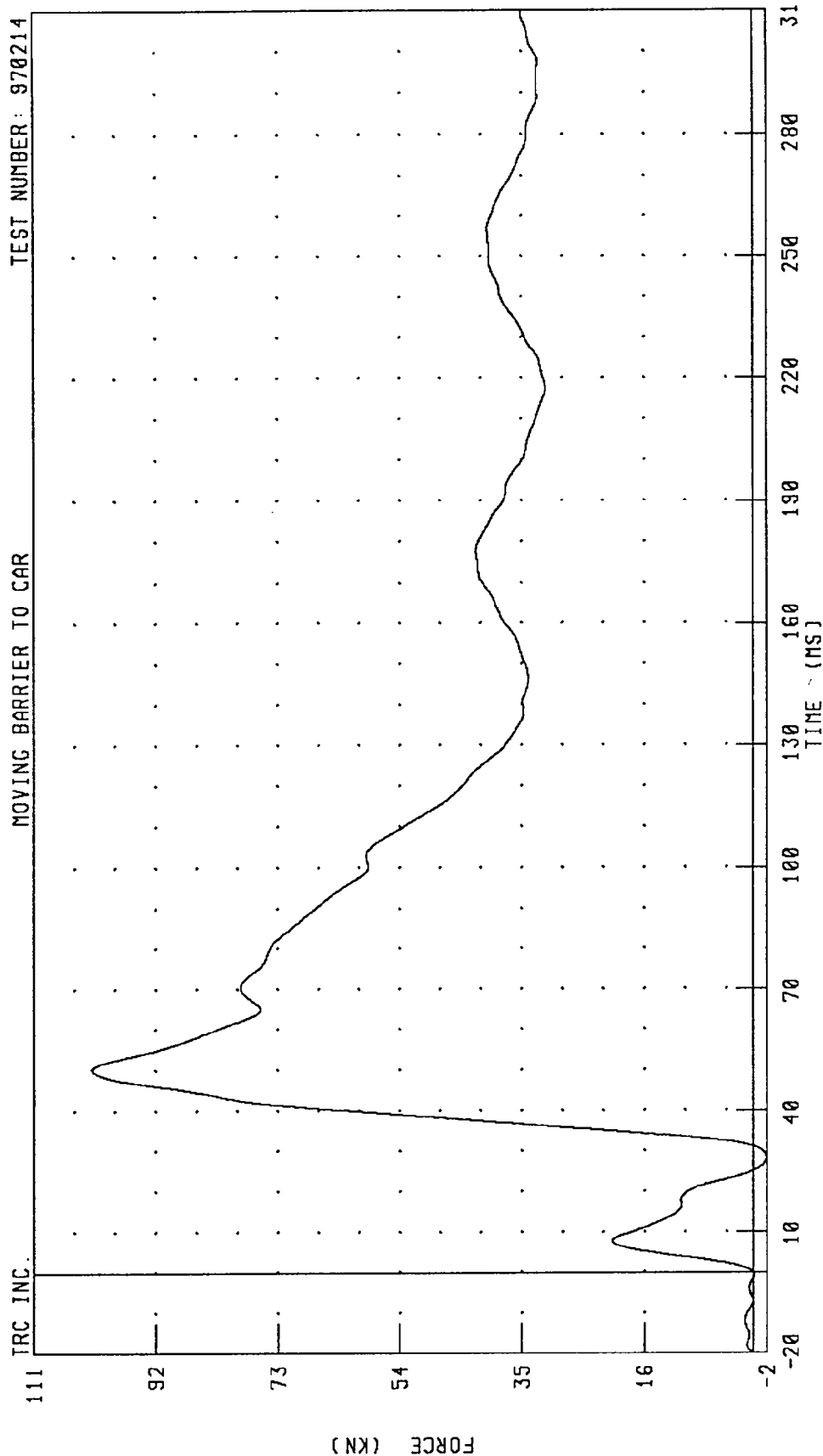
PEAK DATA: 62.16 KN @ 52.64 MS; -36.34 KN @ 181.12 MS

CHANNEL: NOBF1 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE POSITION 2 FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR



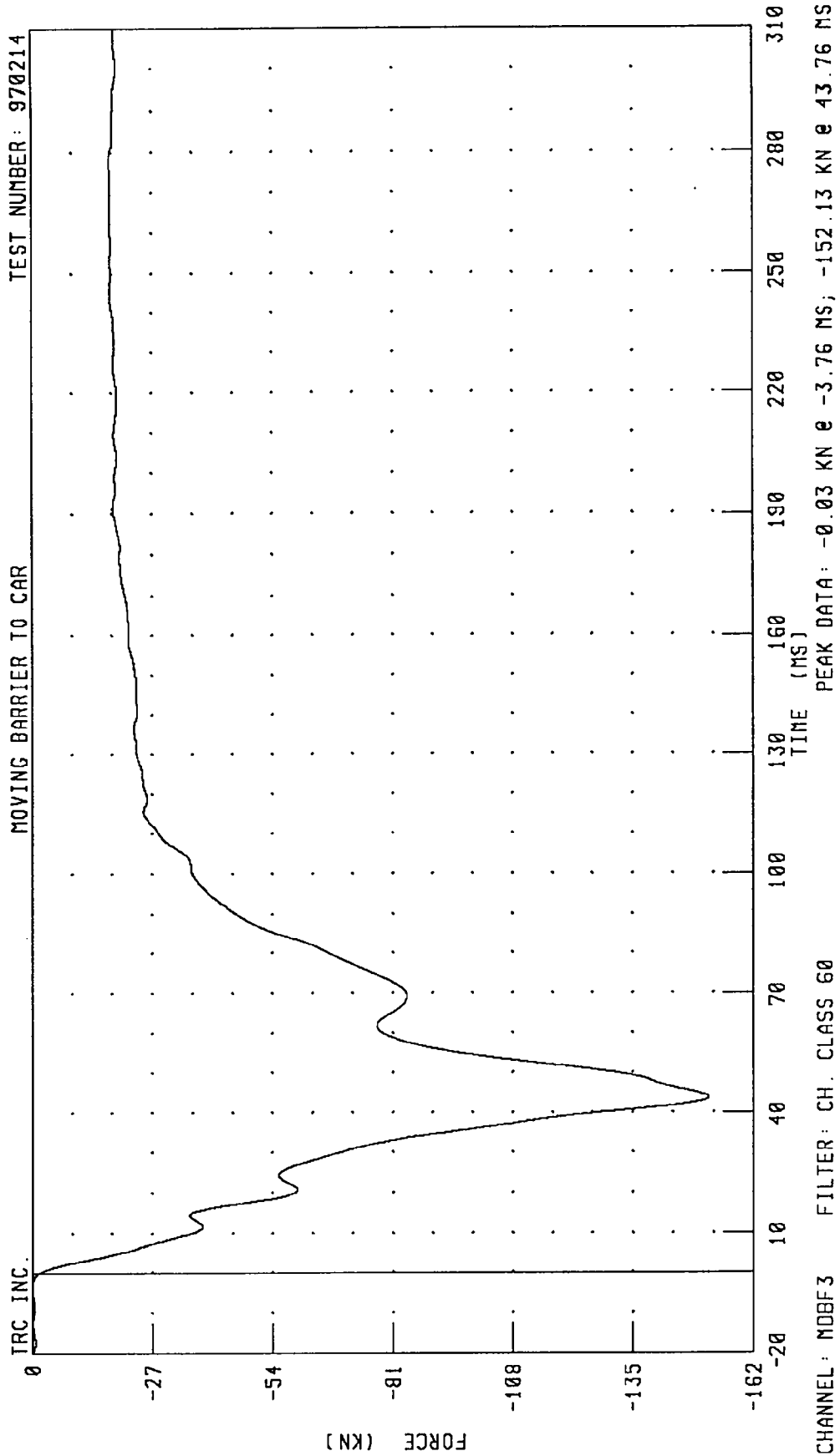
CHANNEL: M0BF2 FILTER: CH. CLASS 60

PEAK DATA: 102.69 KN @ 50.16 MS, -2.09 KN @ 28.32 MS

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE POSITION 3 FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR



PEAK DATA: -0.03 KN @ -3.76 MS; -152.13 KN @ 43.76 MS

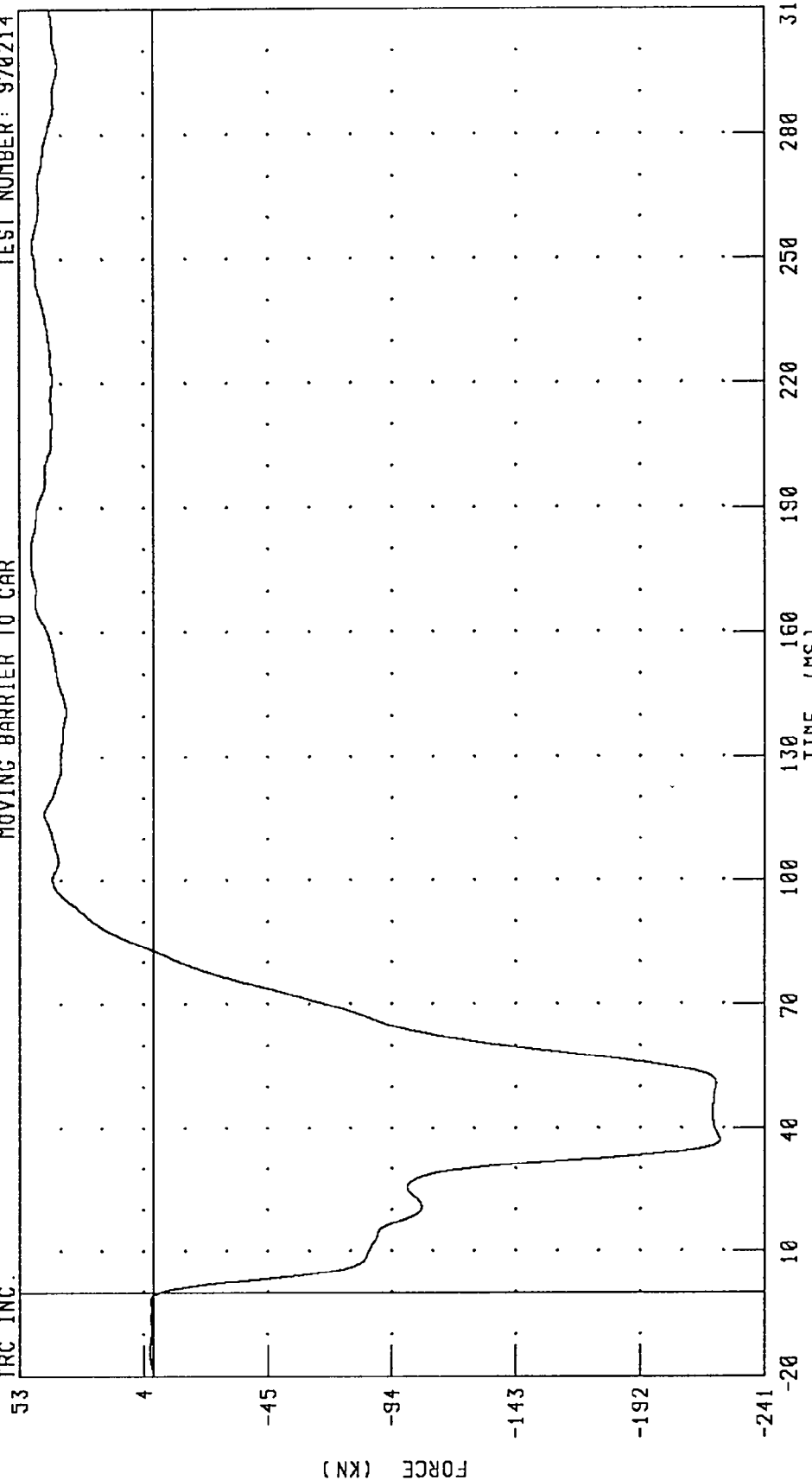
CHANNEL: NDBF3 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE POSITION 4 FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



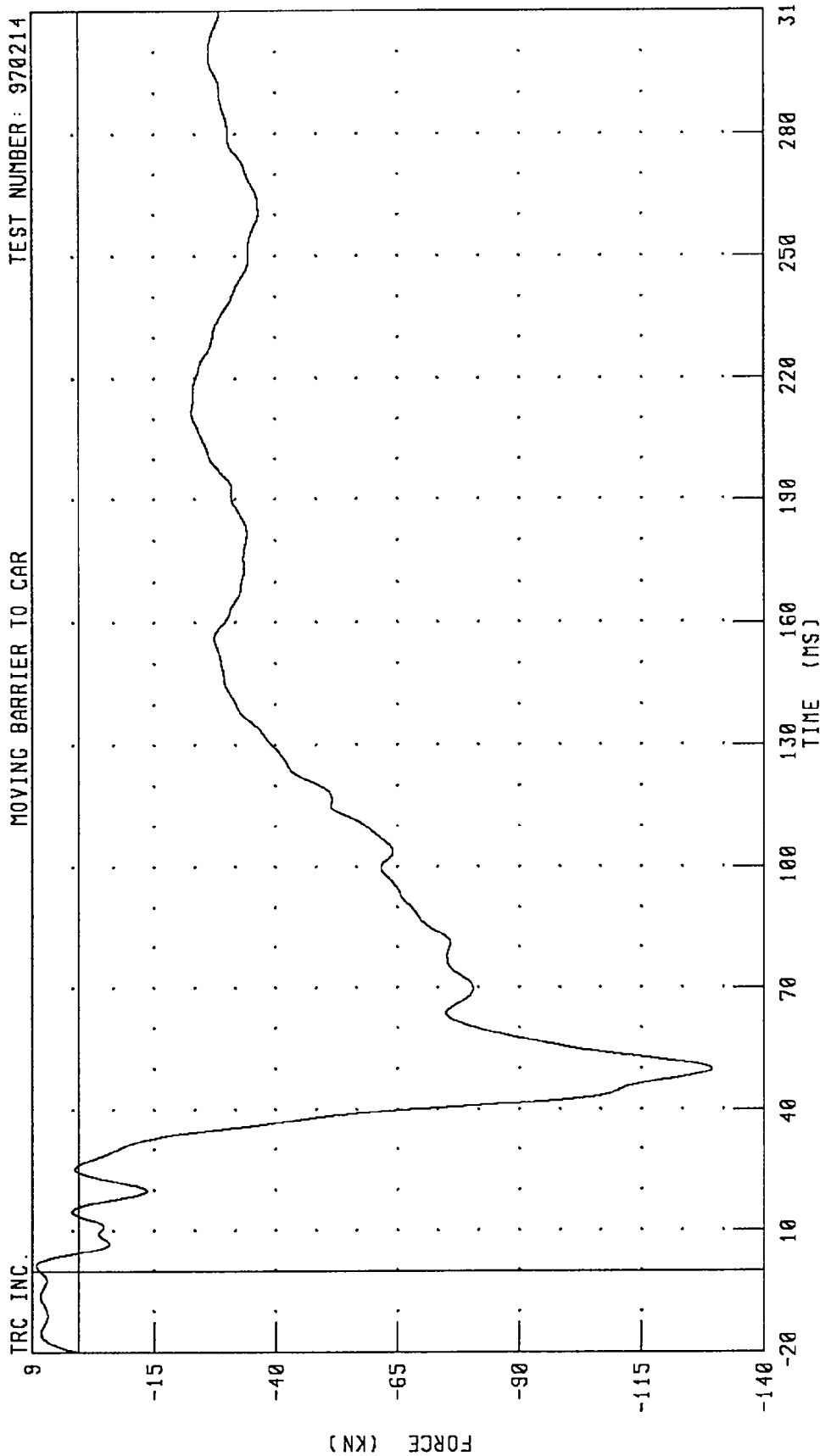
PEAK DATA: 48.40 KN @ 177.68 MS; -223.39 KN @ 37.28 MS

CHANNEL: NDBF4 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE POSITION 5 FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR



PEAK DATA: 8.64 KN @ 1.20 MS; -129.91 KN @ 49.84 MS

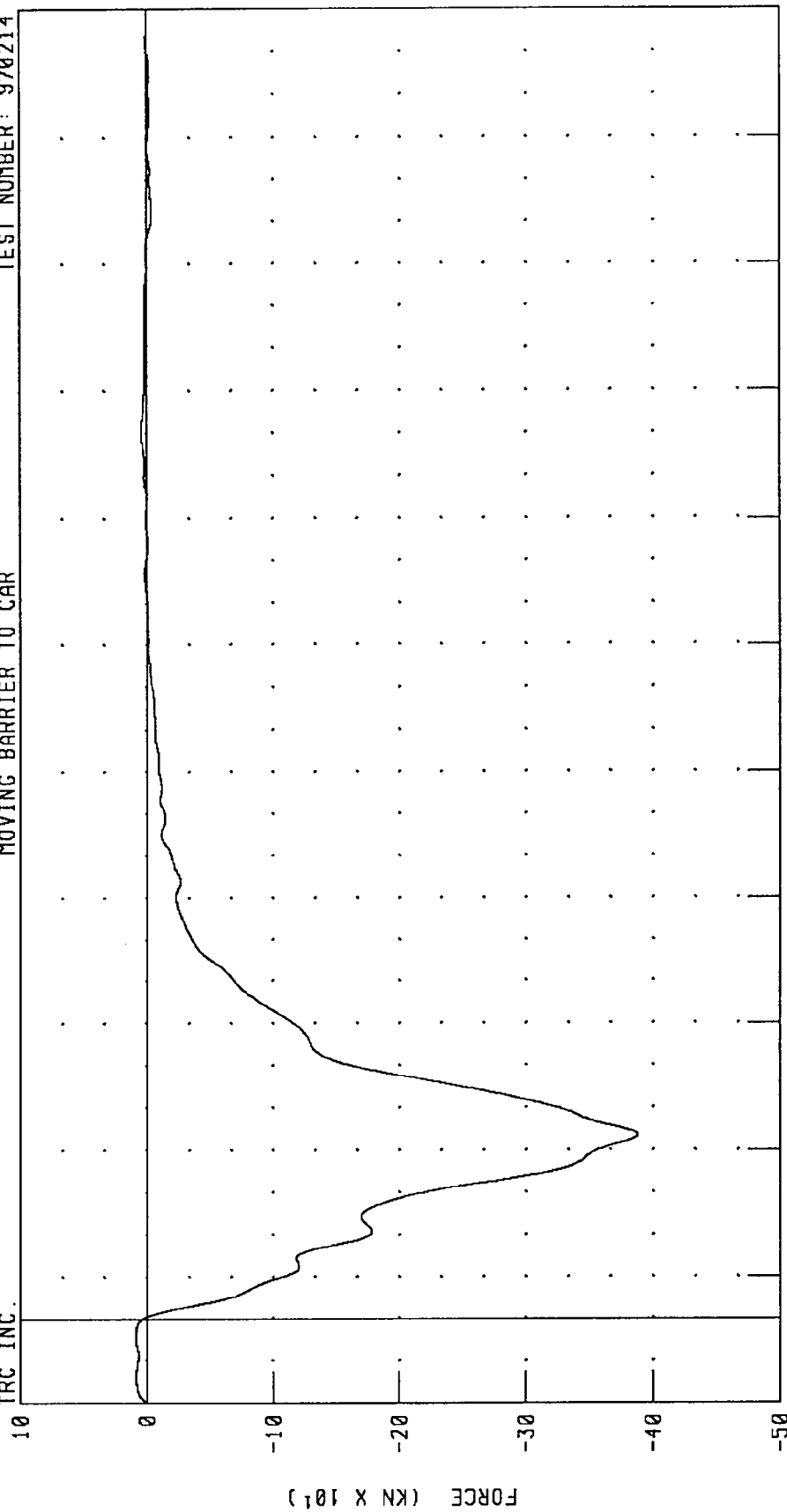
CHANNEL: M0BF5 FILTER: CH. CLASS 60

70.2 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER
MOVING DEFORMABLE BARRIER FACE TOTAL FORCE

TEST NUMBER: 970214

MOVING BARRIER TO CAR

TRC INC.



PEAK DATA: 8.63 KN @ -4.88 MS; -387.98 KN @ 43.44 MS

CHANNEL: M0BFT FILTER: CH. CLASS 60

Appendix C

Dummy Calibration Information

Pre-Test Calibration

Serial Number 134

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III EXTERNAL DIMENSIONS

SN 134 ALDERSON

30-JAN-97

TRC INC.

TEST NO: 134C68ED1

572E SN134 EXT.DIMENSION CAL68

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226 - 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970 - 1001 MM	986. MM
WAIST CIRCUMFERENCE	(Z)	836 - 866 MM	843. MM
CHEST DEPTH	(O)	213 - 229 MM	216. MM
H-POINT HEIGHT	(C)	84 - 89 MM	86. MM
H-POINT FROM SEATBACK	(D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE	(H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT	(A)	879 - 889 MM	879. MM
THIGH CLEARANCE	(F)	140 - 155 MM	150. MM
BUTTOCK KNEE LENGTH	(K)	579 - 605 MM	594. MM
BUTTOCK POPLITEAL LENGTH	(N)	452 - 478 MM	470. MM
POPLITEAL HEIGHT	(L)	429 - 455 MM	437. MM
KNEE PIVOT HEIGHT	(M)	485 - 500 MM	495. MM
FOOT LENGTH	(P)	252 - 267 MM	259. MM
FOOT BREADTH	(W)	91 - 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84 - 94 MM	86. MM
SHOULDER BREADTH	(V)	422 - 437 MM	427. MM
SHOULDER PIVOT HEIGHT	(B)	506 - 521 MM	513. MM
ELBOW REST HEIGHT	(J)	191 - 211 MM	198. MM
SHOULDER-ELBOW LENGTH	(I)	330 - 345 MM	340. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290 - 305 MM	292. MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Richard L. Van

RUN NUMBER: 031997.1301

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 134C68HD1

572E SN134 HEAD DROP CAL 68

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	239.28 G
PEAK LATERAL ACCELERATION	15 G MAX	-6.07 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

Richard L. Davis

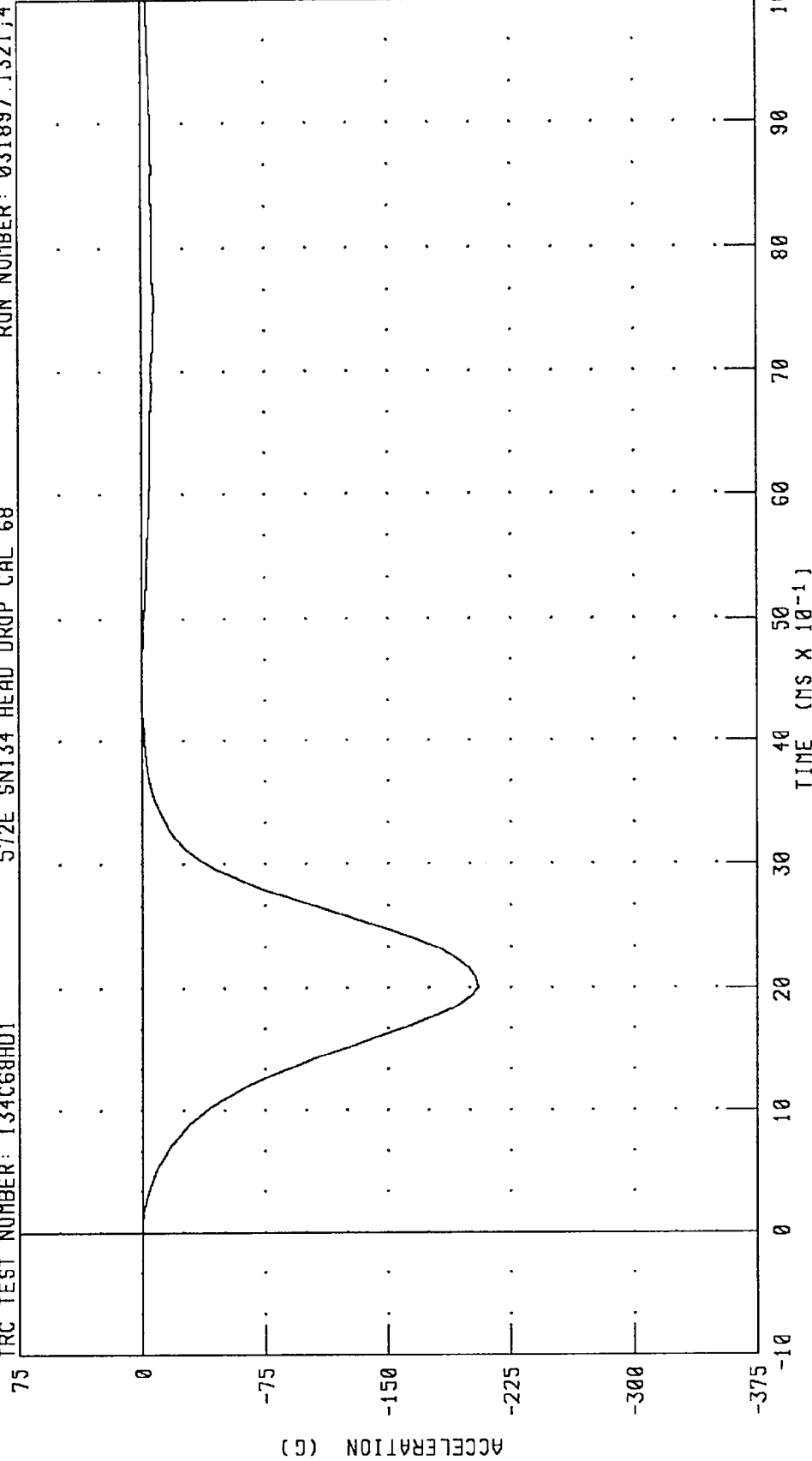
RUN NUMBER: 013197.0824;4

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 134C68HD1

572E SN134 HEAD DROP CAL 68

RUN NUMBER: 031897.1321.4



PEAK DATA: 0.20 G @ 0.00 MS; -205.04 G @ 2.00 MS

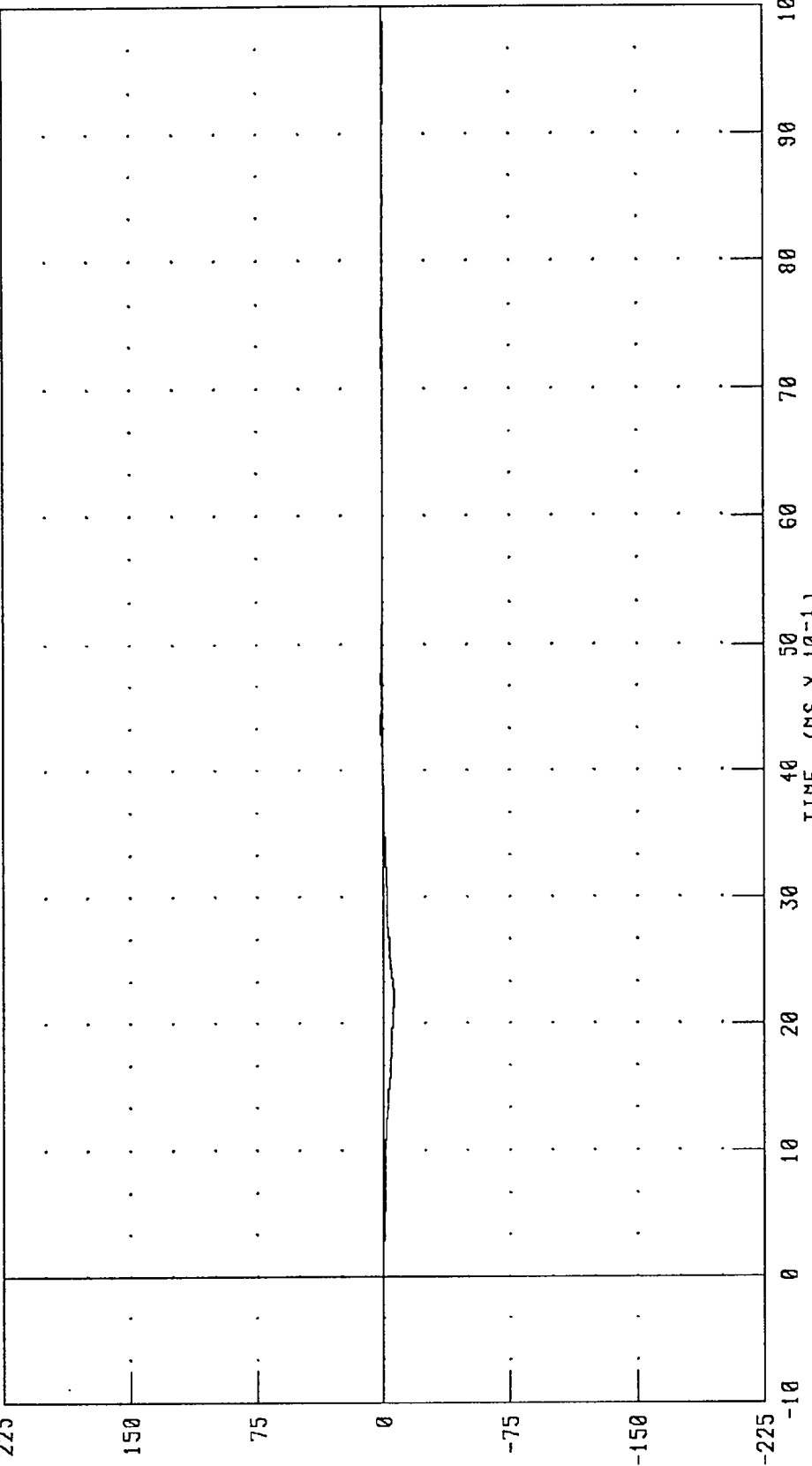
CHANNEL: HEDXC FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 134C68HD1

572E SN134 HEAD DROP CAL 68

RUN NUMBER: 031897.1321.4



PEAK DATA: 1.18 G @ 4.40 MS; -6.07 G @ 2.16 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 134C68HD1

572E SN134 HEAD DROP CAL 68

RUN NUMBER: 031897.1321,4

75

0

-75

-150

-225

-300

-375

ACCELERATION (G)

-10

0

10

20

30

40

50

60

70

80

90

100

TIME (NS X 10⁻¹)

CHANNEL: HEDZG

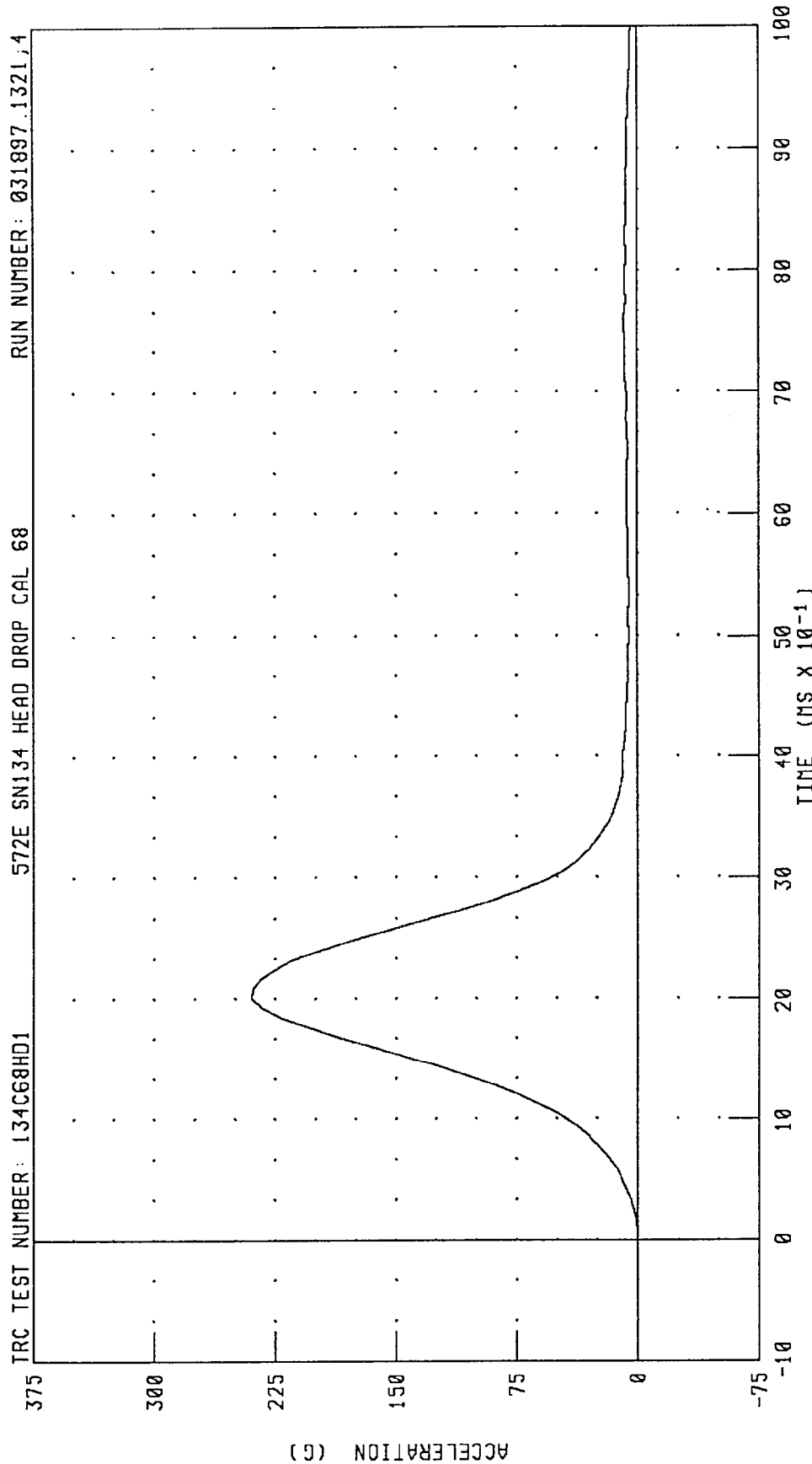
FILTER: CH. CLASS 1000

PEAK DATA: 0.08 G @ -0.32 MS; -124.26 G @ 2.08 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 134C68HD1 RUN NUMBER: 031897.1321,4

572E SN134 HEAD DROP CAL 68



CHANNEL: HEDRG FILTER: CH. CLASS 1000

PEAK DATA: 239.28 G @ 2.00 MS; 0.01 G @ -0.80 MS

TRANSPORTATION RESEARCH CENTER INC.
NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

31-JAN-97

TRC INC. TEST NO: 134C68NF2 572E SN134 NECK FLEXION CAL68

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	23.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.16 G
	20 MS	17.60 - 22.60 G	21.78 G
	30 MS	12.50 - 18.50 G	17.55 G
MAX PENDULUM G		29 G MAX	24.25 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	17.49 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	35.20 MS
D PLANE	MAX	64 - 78 DEG.	70.66 DEG.
ROTATION	TIME	57 - 64 MS	59.52 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	90.31 NM
	TIME	47 - 58 MS	48.72 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	116.40 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.68 MS

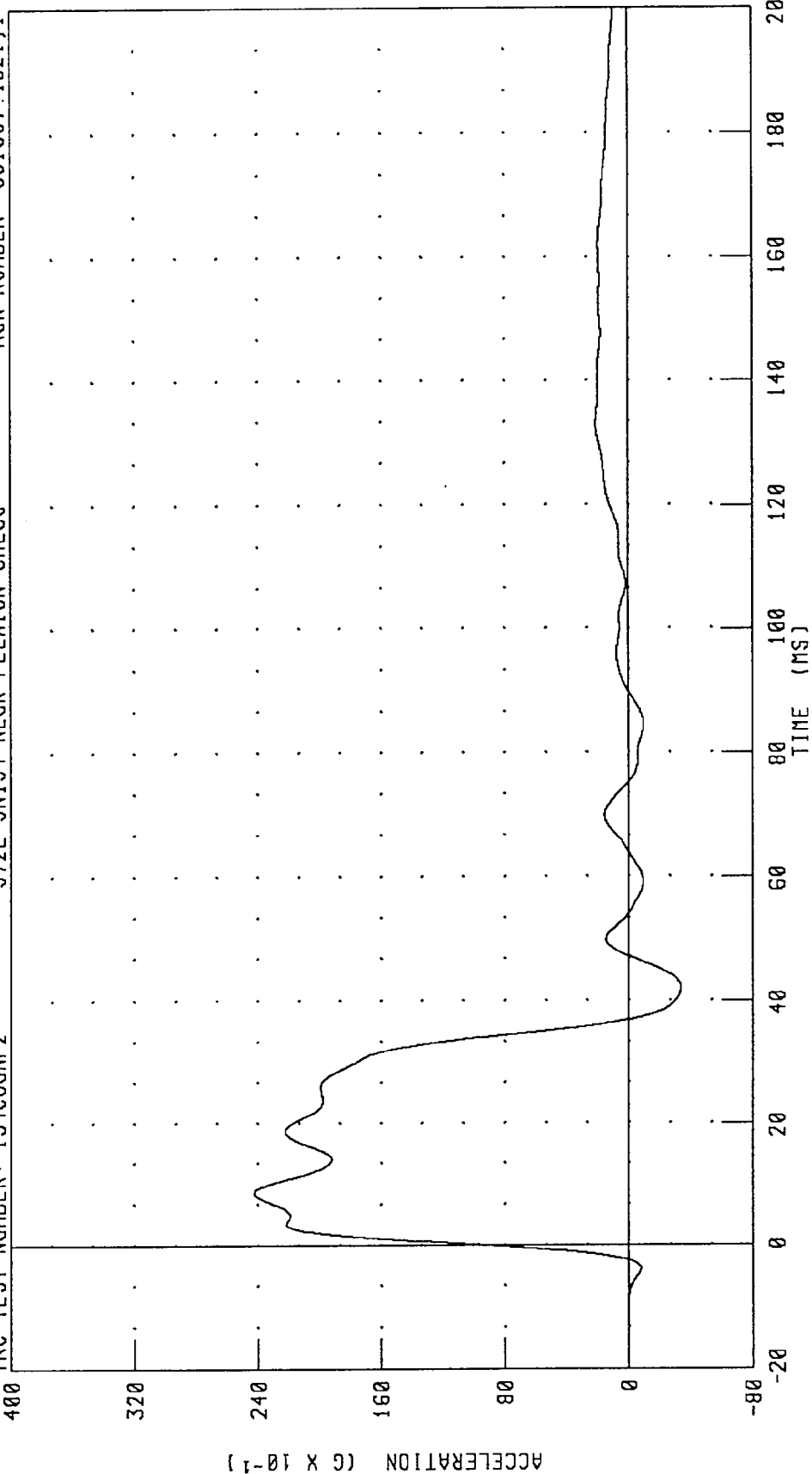
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. Van

RUN NUMBER: 013197.1133;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 134C68NF2 572E SN134 NECK FLEXION CAL68 RUN NUMBER: 031897.1321,1



PEAK DATA: 24.25 G @ 8.48 MS; -3.36 G @ 42.00 MS

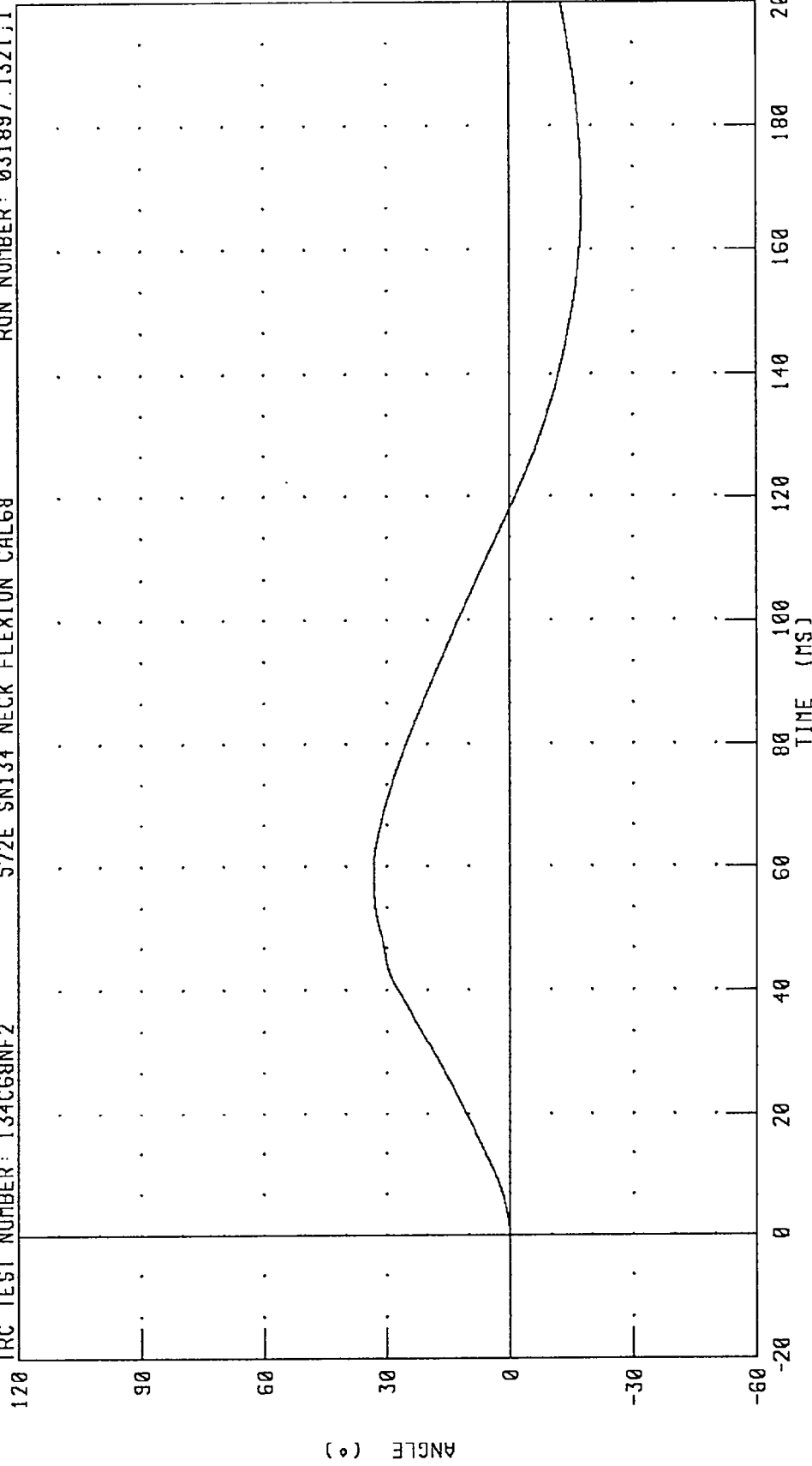
CHANNEL: PENXG FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 134C68NF2

572E SN134 NECK FLEXION CAL68

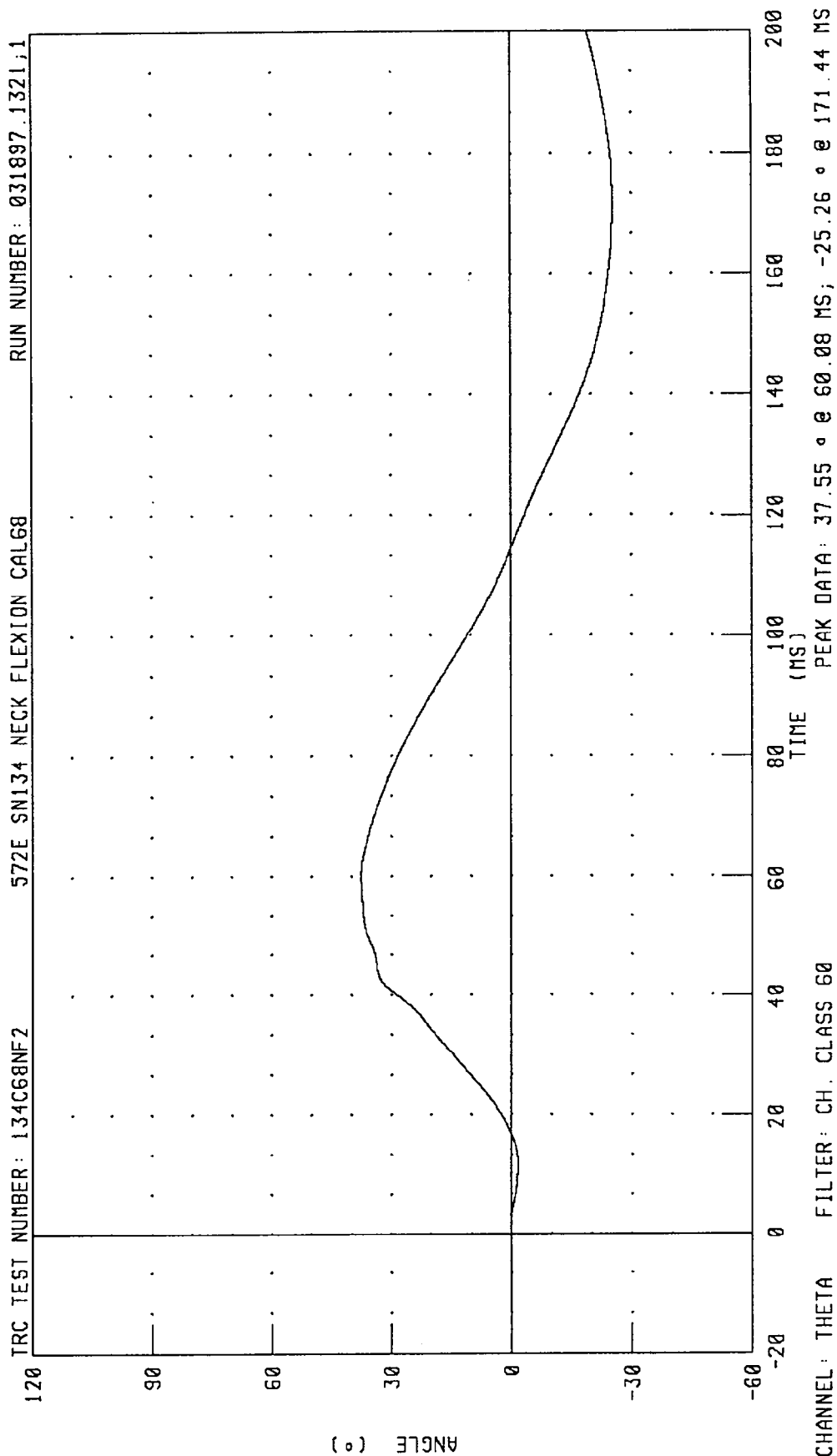
RUN NUMBER: 031897.1321;1



PEAK DATA: 33.14 ° @ 58.64 MS; -17.61 ° @ 168.40 MS

CHANNEL: BETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 ROTATION ABOUT OCCIPITAL CONDYLE



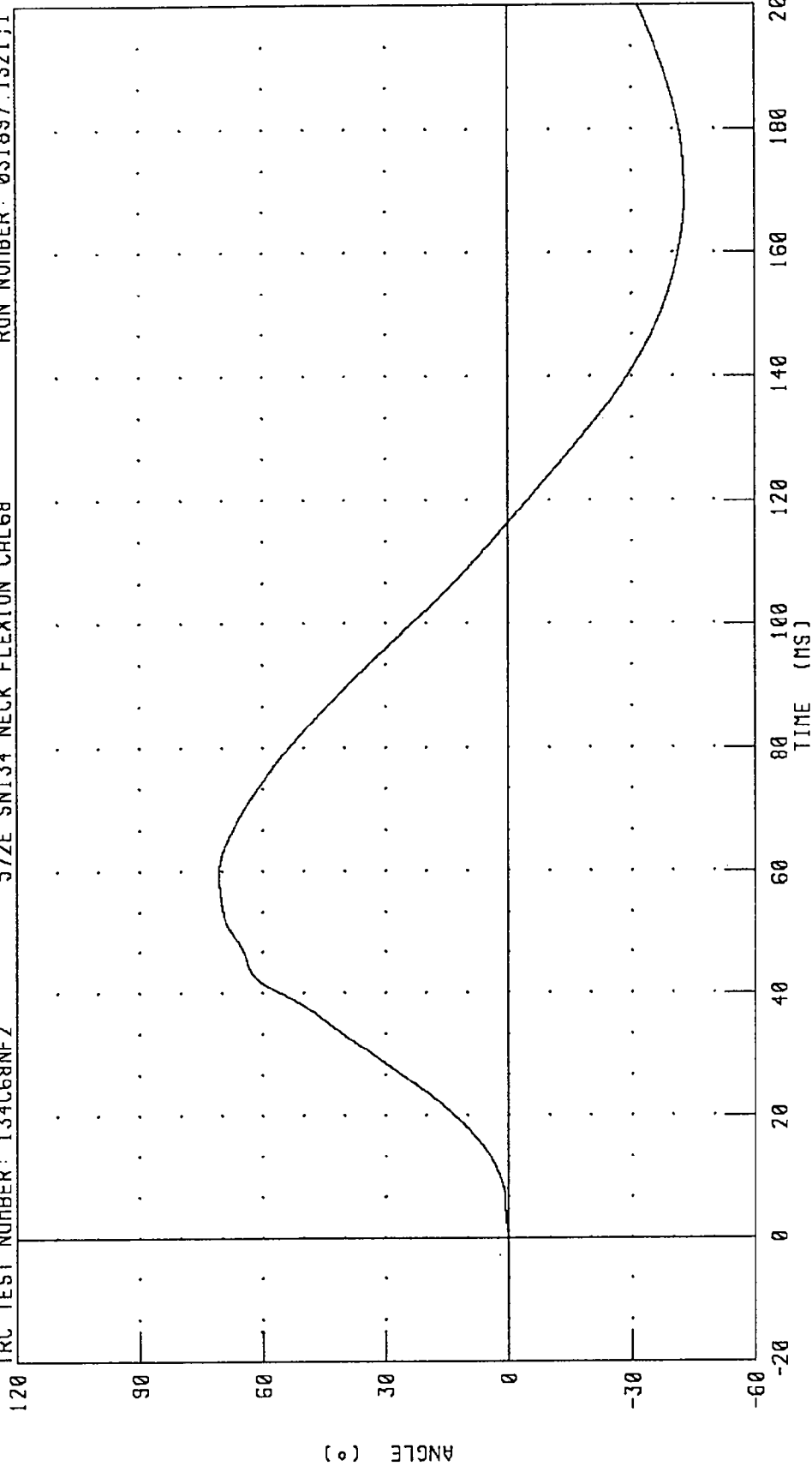
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 134C68NF2

572E SN134 NECK FLEXION CAL68

RUN NUMBER: 031897.1321,1



PEAK DATA: 70.67 ° @ 59.52 MS, -42.84 ° @ 169.44 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

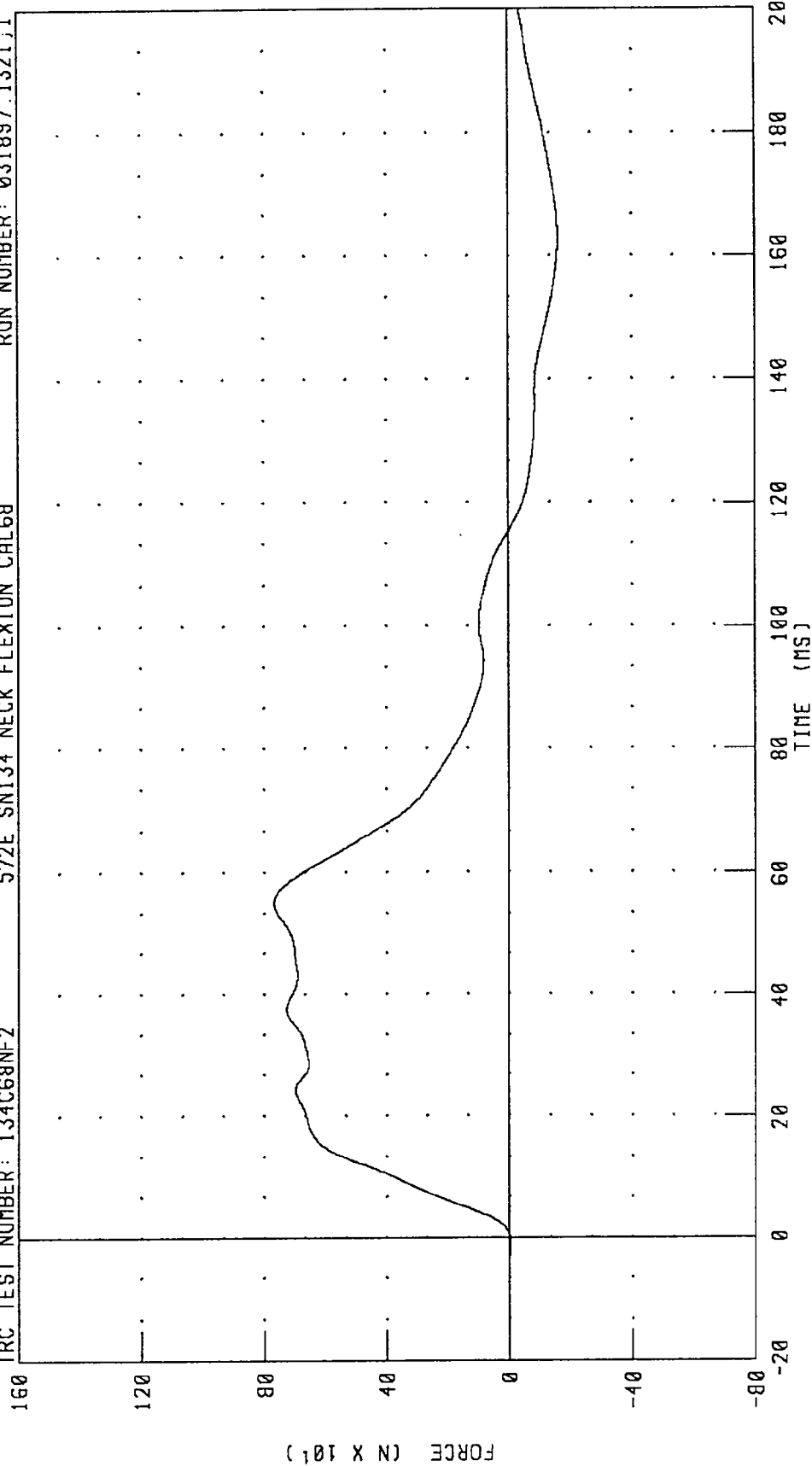
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 134C68NF2

572E SN134 NECK FLEXION CAL68

RUN NUMBER: 031897.1321,1



PEAK DATA: 768.23 N @ 55.04 MS; -161.21 N @ 162.64 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

PART 572-E HYBRID J11 NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 134C68NF2

572E SN134 NECK FLEXION CAL68

RUN NUMBER: 031897.1321;1

160

120

80

40

0

-40

-80

TORQUE (N·M)

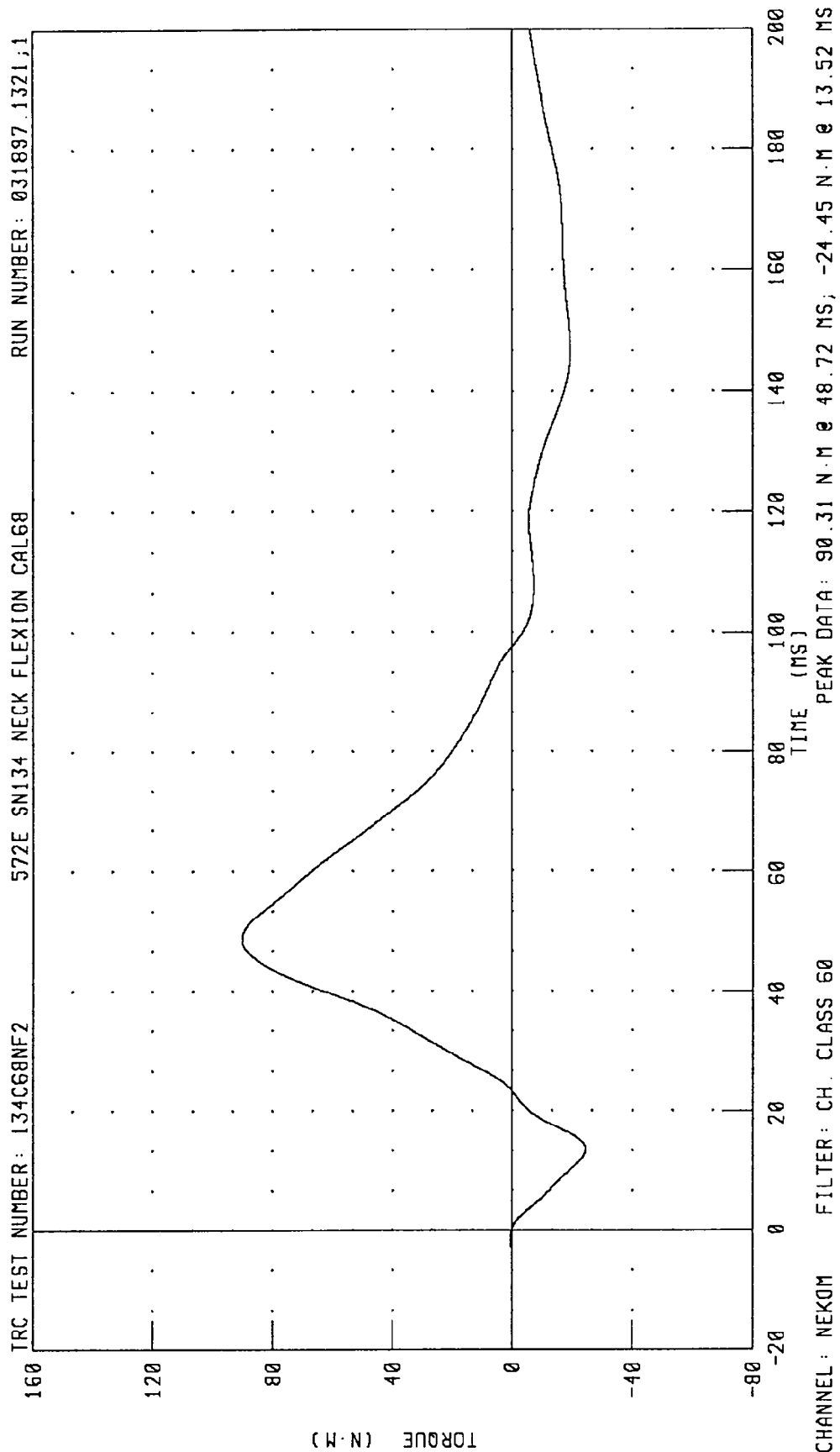
0 20 40 60 80 100 120 140 160 180 200

TIME (MS)

PEAK DATA: 77.77 N·M @ 48.64 MS; -34.47 N·M @ 14.08 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE



TRANSPORTATION RESEARCH CENTER INC.
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

31-JAN-97

TRC INC. TEST NO: 134C68NE1 572E SN134 NECK EXT. CAL68

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	25.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.62 G
	20 MS	14.00 - 19.00 G	17.20 G
	30 MS	11.00 - 16.00 G	14.68 G
MAX PENDULUM G		22 G MAX	19.14 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.62 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	38.00 MS
D PLANE	MAX	81 - 106 DEG.	93.33 DEG.
ROTATION	TIME	72 - 82 MS	74.96 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-54.27 NM
	TIME	65 - 79 MS	70.16 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	156.56 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	137.76 MS

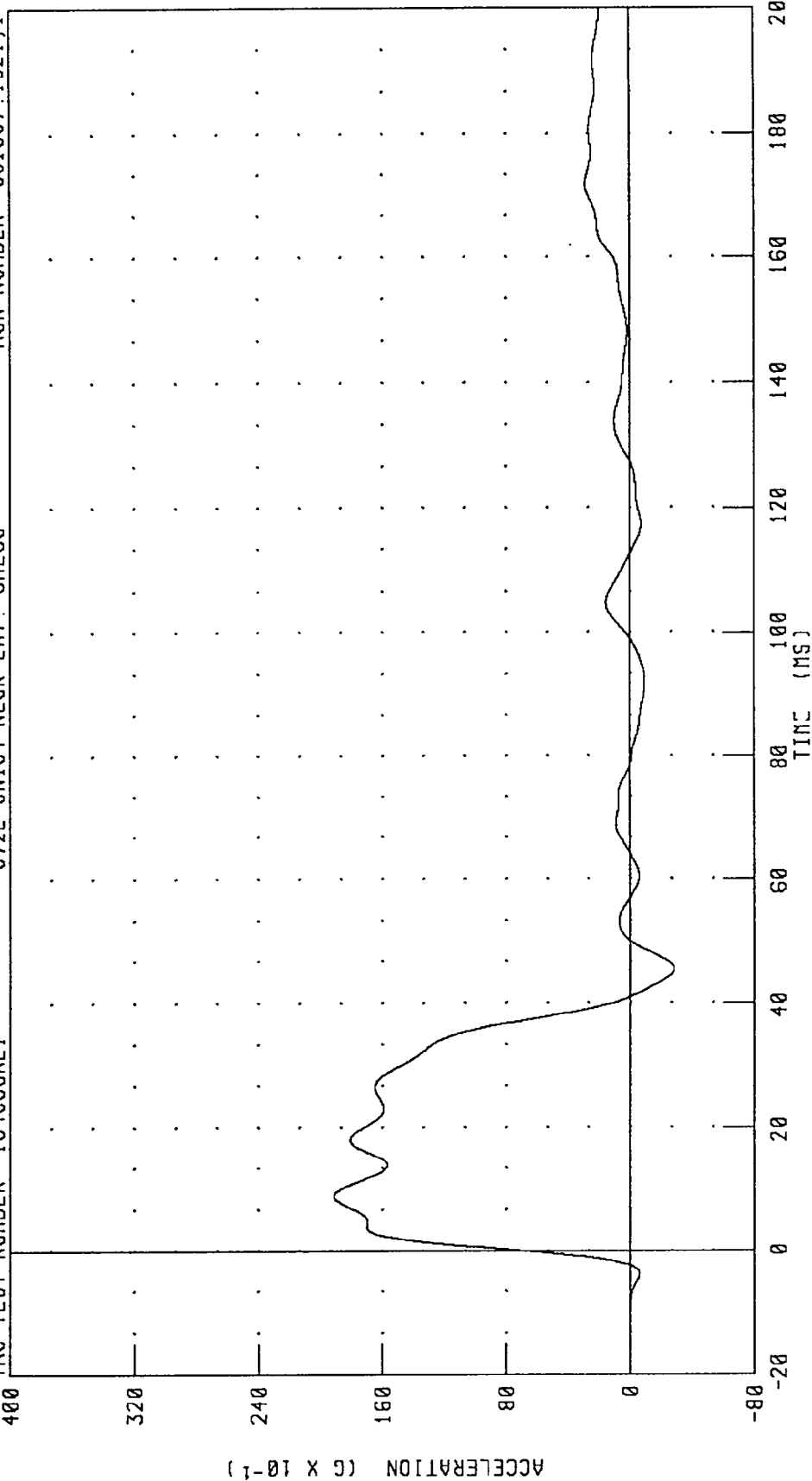
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. Lee

RUN NUMBER: 013197.1222;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 134C68NE1 572E SN134 NECK EXT. CAL68 RUN NUMBER: 031897.1321;1



PEAK DATA: 19.14 G @ 8.80 MS; -2.83 G @ 45.44 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

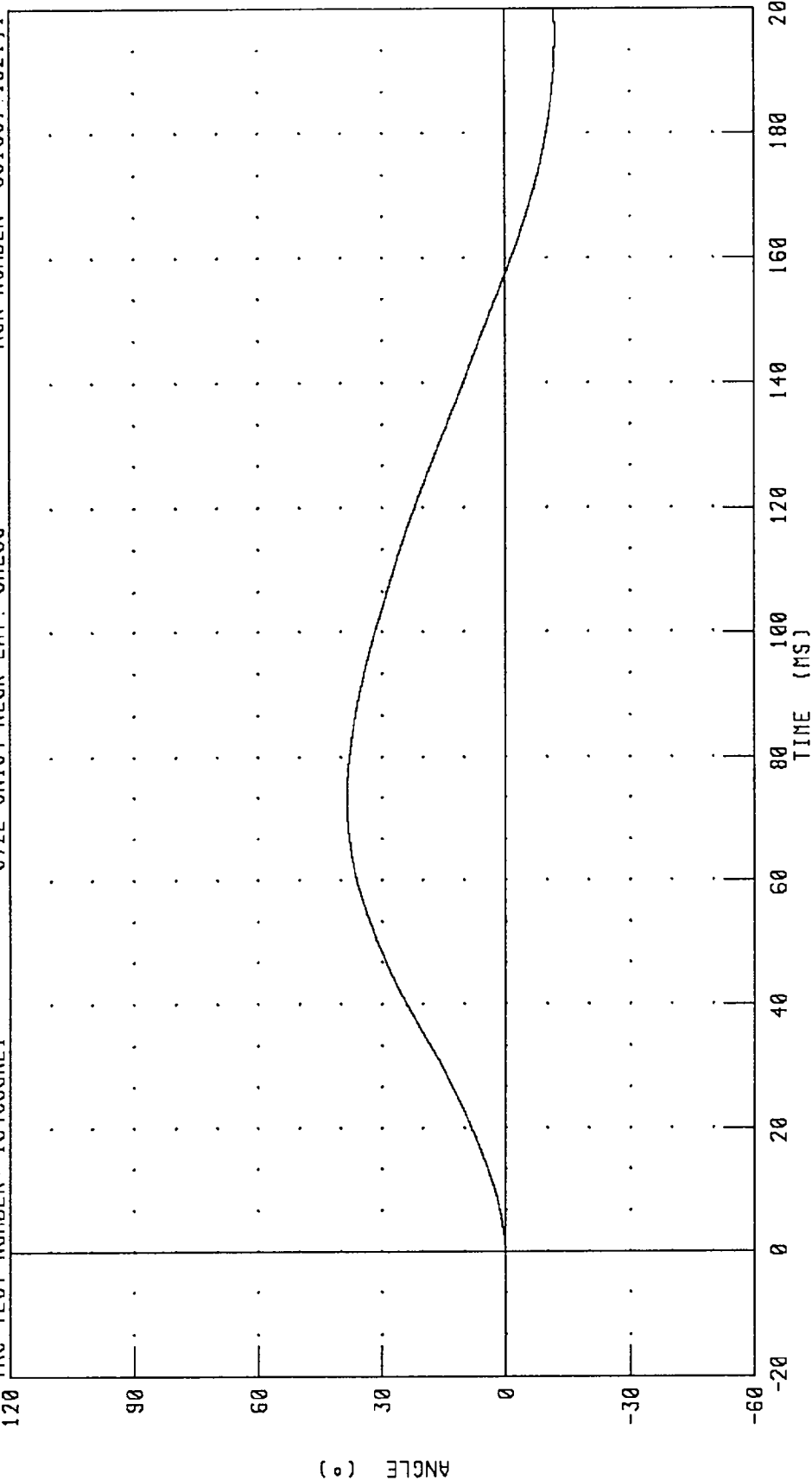
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 134C68NE1

572E SN134 NECK EXT. CAL68

RUN NUMBER: 031897 1321,1



PEAK DATA: 38.47 ° @ 73.04 MS; -12.05 ° @ 195.84 MS

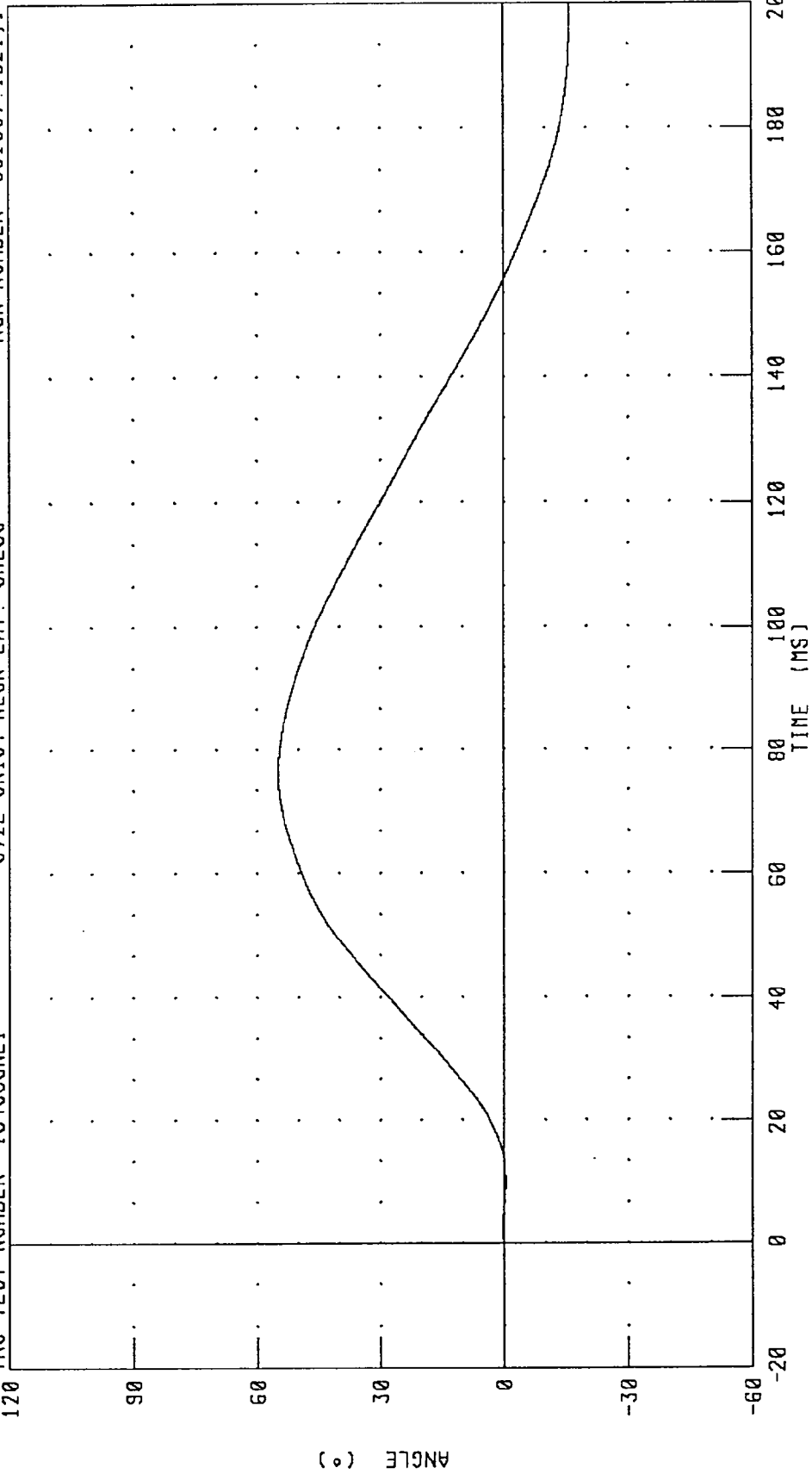
CHANNEL: BETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 134C68NE1

572E SN134 NECK EXT. CAL68

RUN NUMBER: 031897.1321;1



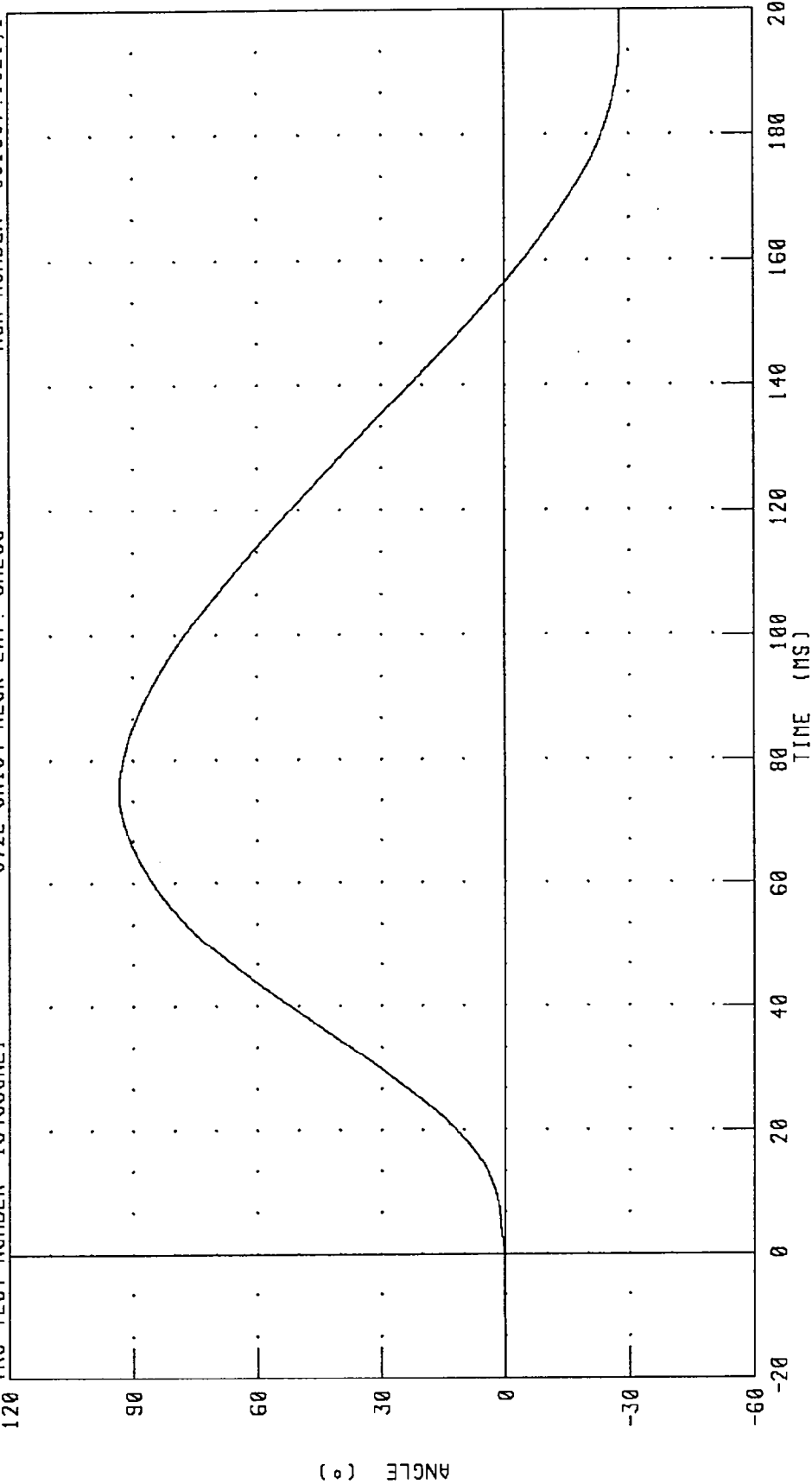
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 54.95 ° @ 76.08 MS; -15.89 ° @ 197.60 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 134C68NE1 572E SN134 NECK EXT. CAL68 RUN NUMBER: 031897.1321;1



PEAK DATA: 93.33 ° @ 74.96 MS; -27.93 ° @ 196.48 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

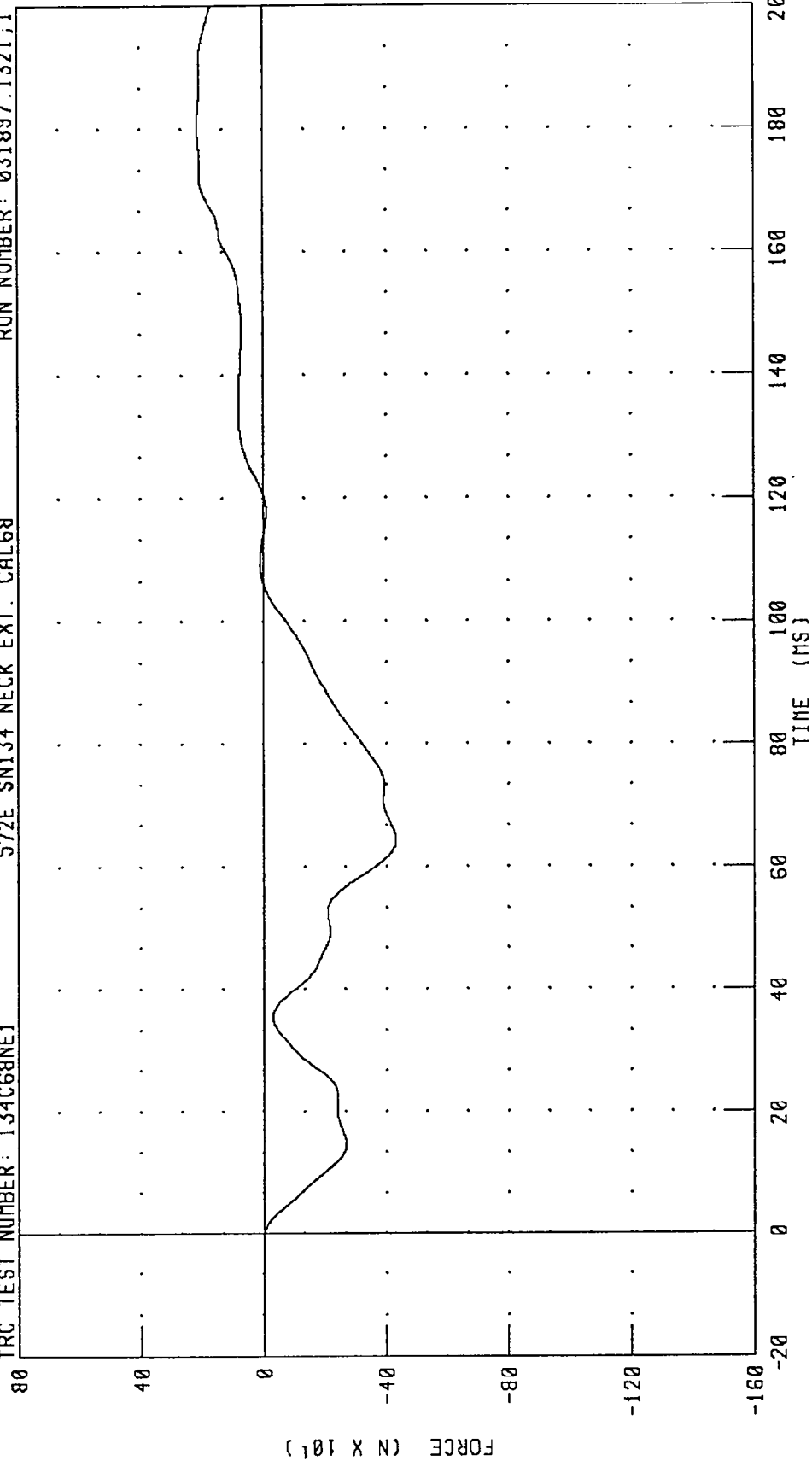
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 134C68NE1

572E SN134 NECK EXT. CAL68

RUN NUMBER: 031897.1321;1



PEAK DATA: 213.36 N @ 180.40 MS; -431.98 N @ 64.24 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

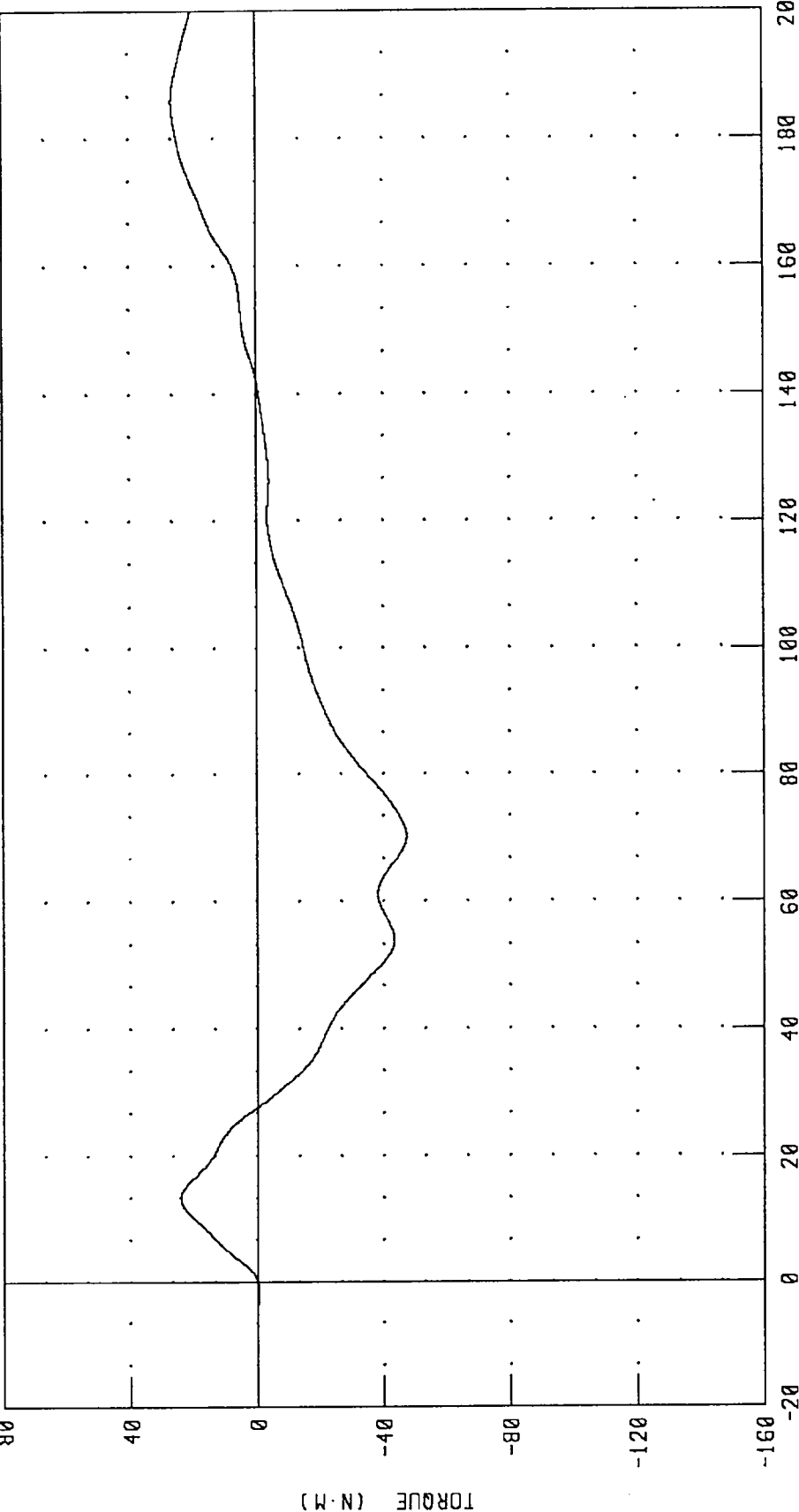
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 134C68NE1

572E SN134 NECK EXT. CAL68

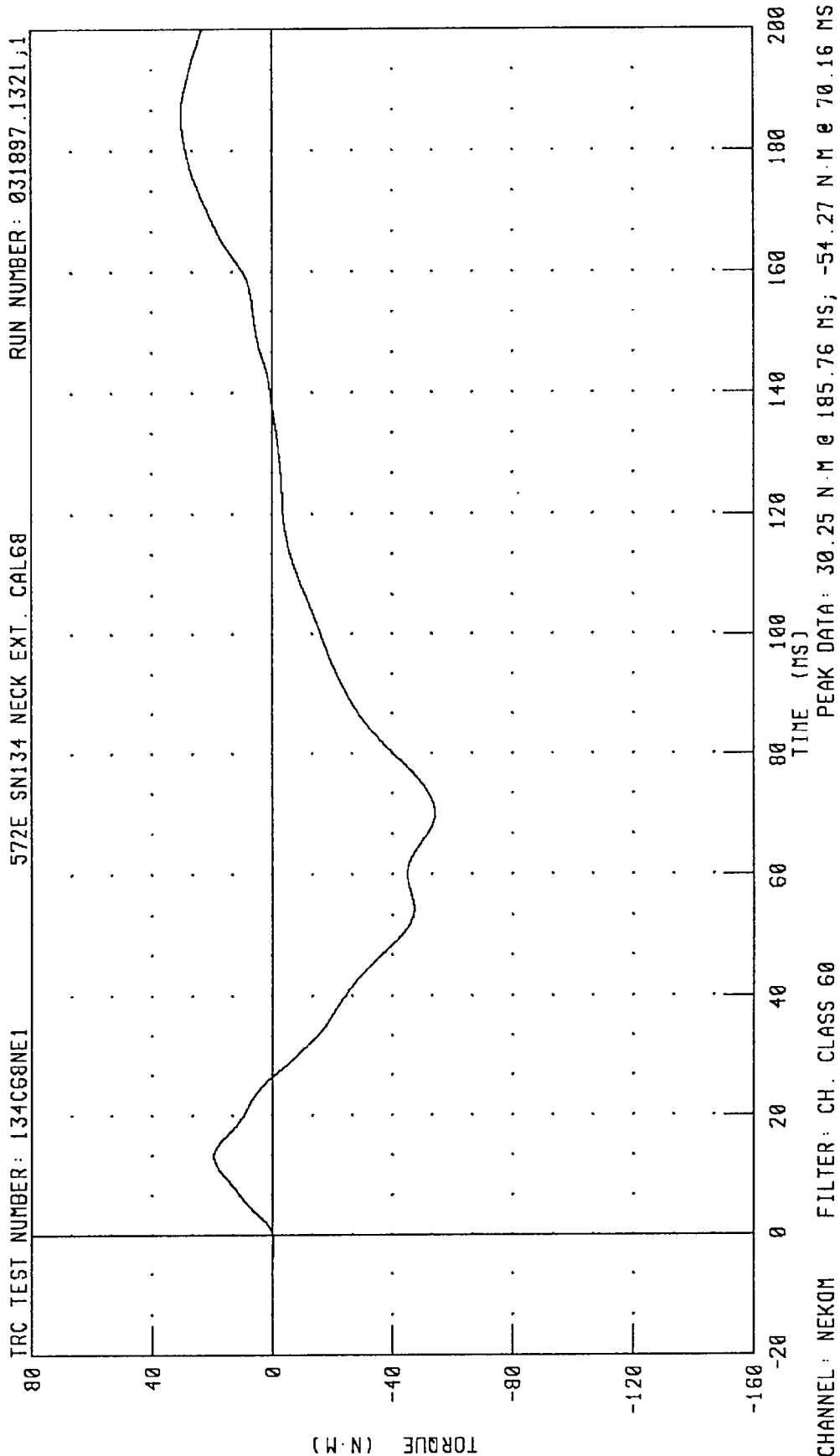
RUN NUMBER: 031897 1321;1



PEAK DATA: 26.57 N-M @ 185.84 MS; -47.30 N-M @ 70.24 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE



TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

01-FEB-97

TRC INC.

TEST NO: 134C68TH4

572E SN134 H.S.THORAX CAL68

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	22.2 DEG. C
RELATIVE HUMIDITY	10 - 70 %	34.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	65.4 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5873. N
INTERNAL HYSTERESIS	69% - 85%	74.2%

TEST MEETS SPECIFICATIONS

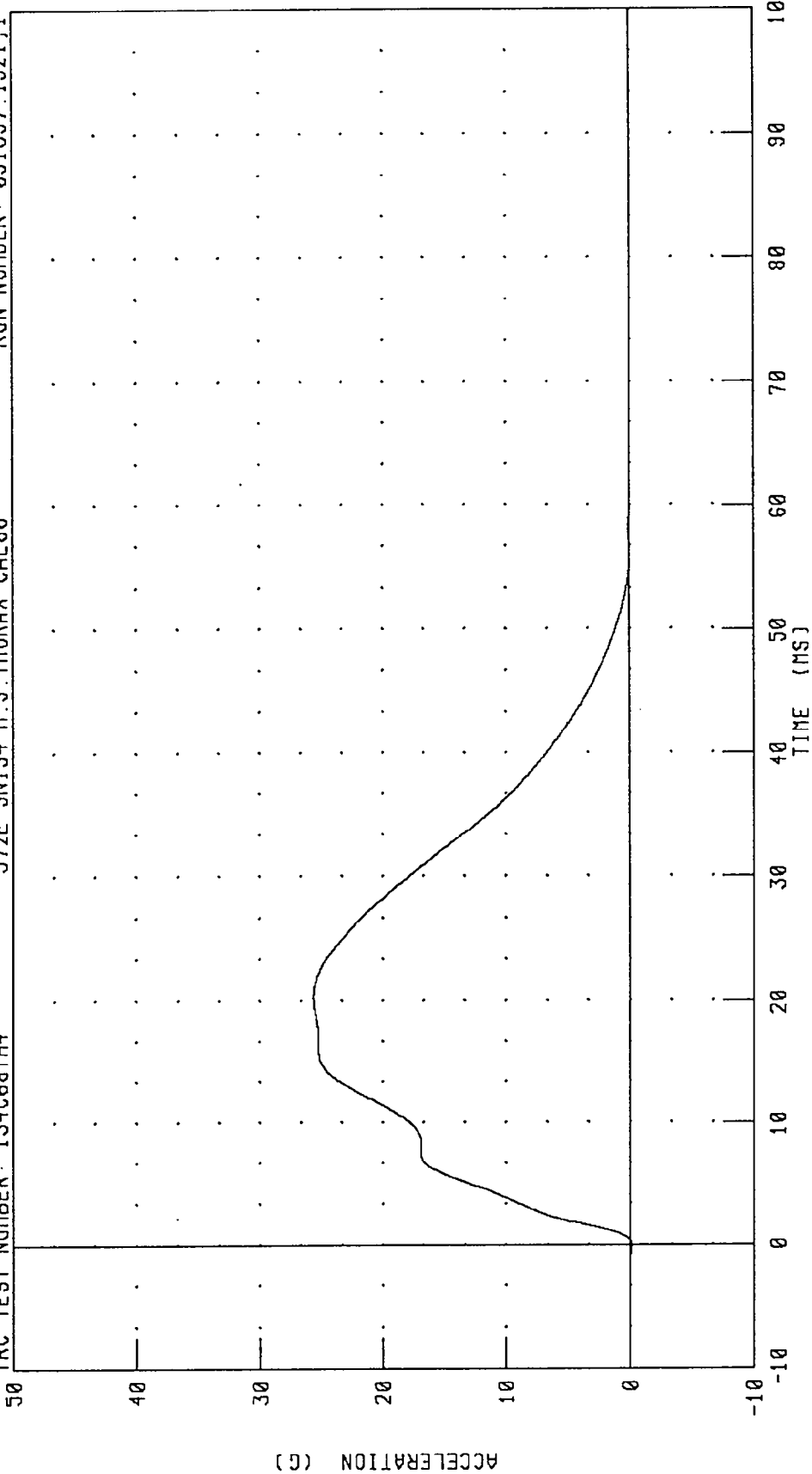
TECHNICIAN

Richard L. Loman

RUN NUMBER: 020697.1449;1

PART 572-E HYBRID III THORAX CALIBRATION PENDULUM DECELERATION

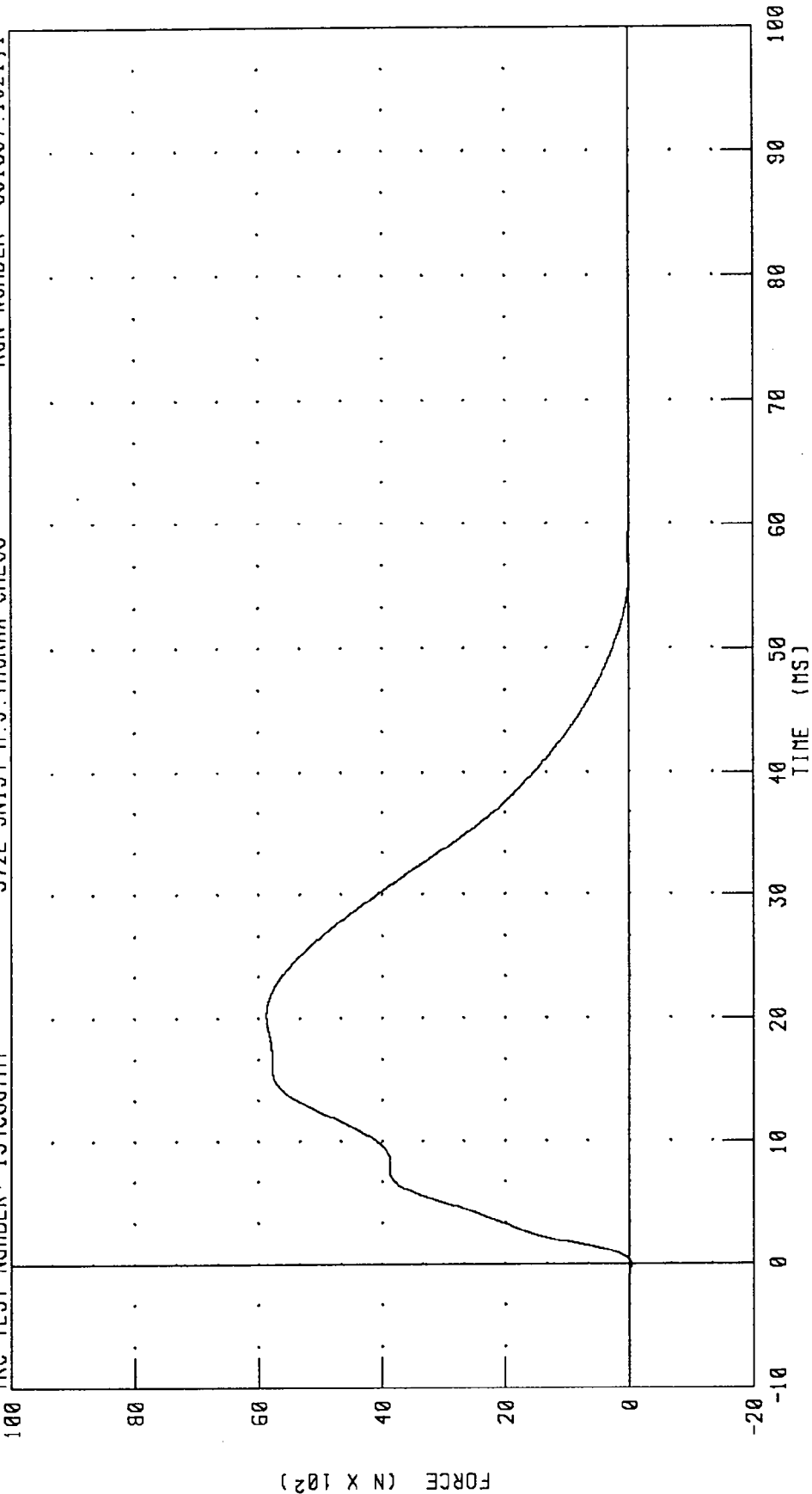
TRC TEST NUMBER: 134C68TH4 572E SN134 H.S. THORAX CAL68 RUN NUMBER: 031897.1321;1



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 25.64 G @ 20.24 MS; -0.10 G @ -0.08 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 134C68TH4 572E SN134 H.S. THORAX CAL68 RUN NUMBER: 031897.1321;1



PEAK DATA: 5873.15 N @ 20.24 MS; -23.37 N @ -0.08 MS

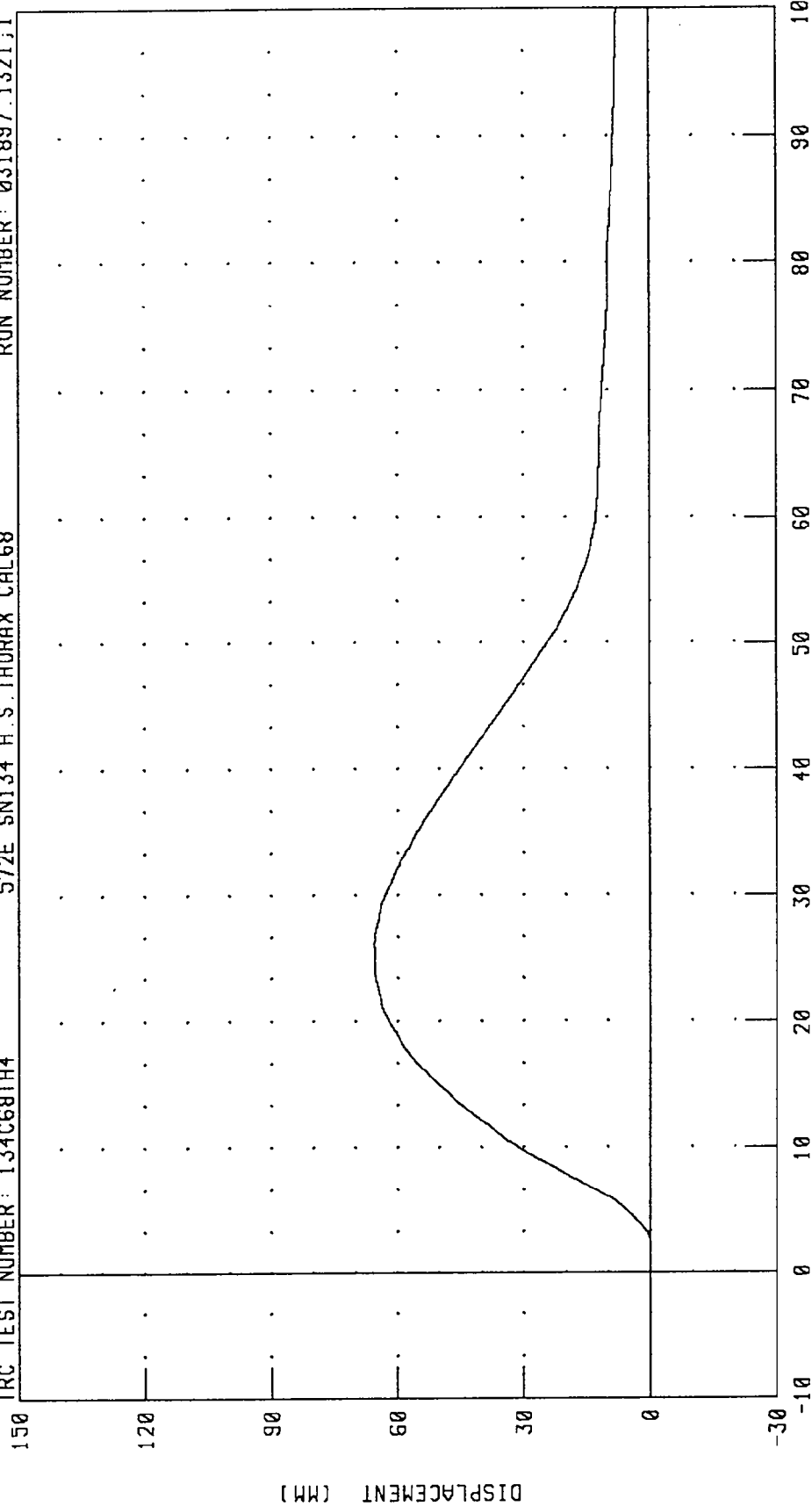
CHANNEL: PENXF FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 134C68TH4

572E SN134 H.S. THORAX CAL68

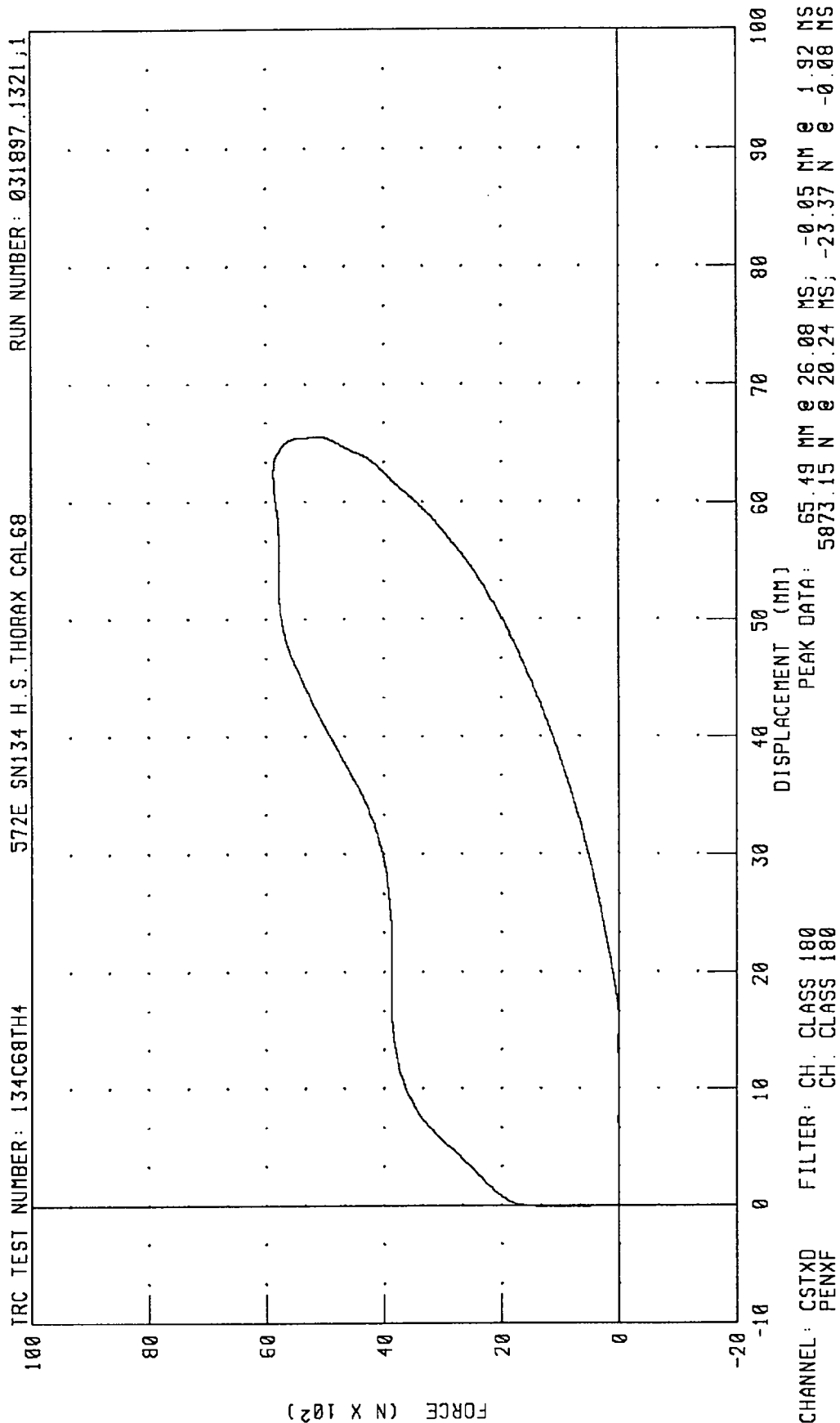
RUN NUMBER: 031897.1321,1



PEAK DATA: 65.49 MM @ 26.08 MS; -0.05 MM @ 1.92 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

30-JAN-97

TRC INC.

TEST NO: 134C68RK1

572E SN134 RIGHT KNEE CAL 68

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	23.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5517.1 N

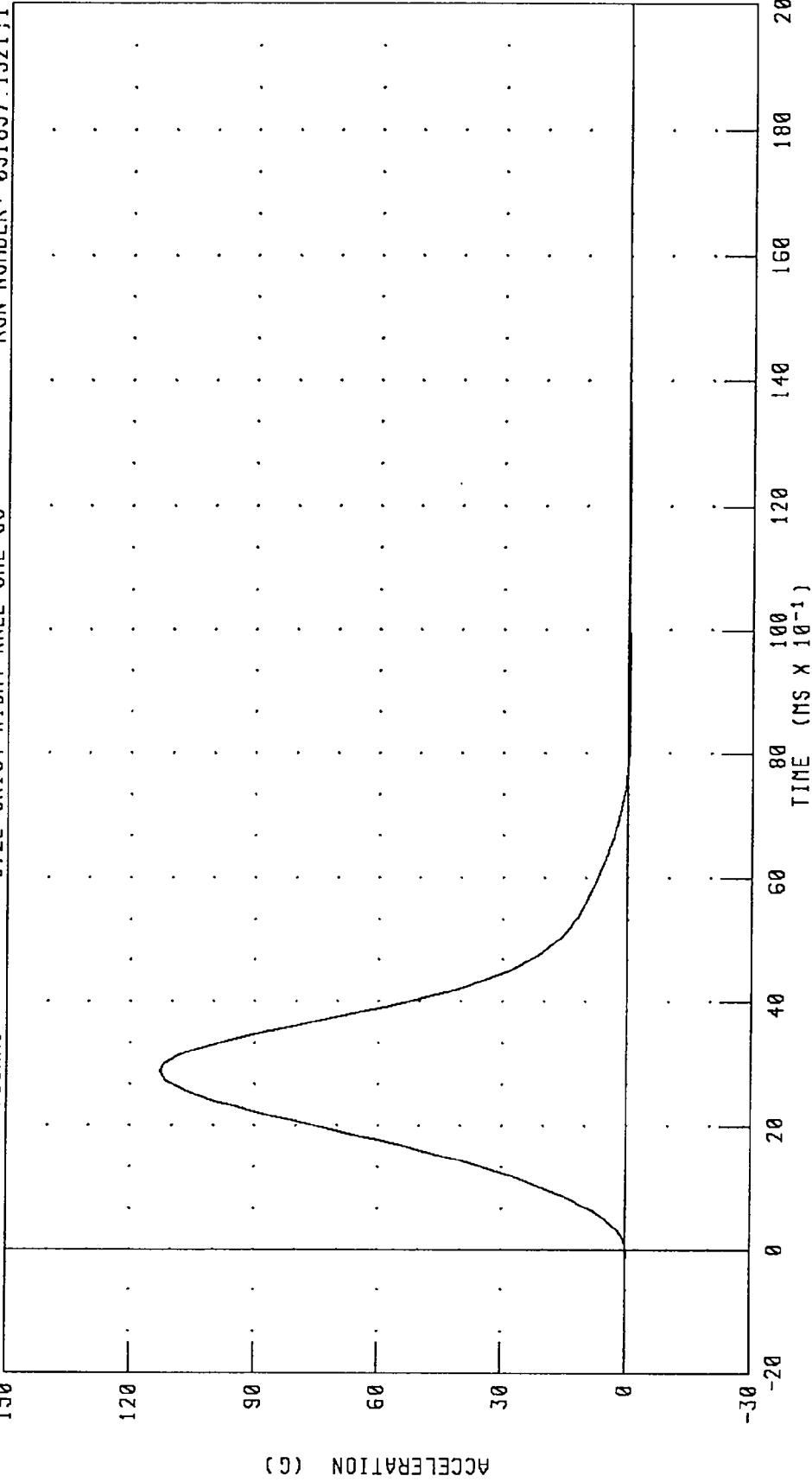
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard Le Van

RUN NUMBER: 013097.0913;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 134CG8RK1 572E SN134 RIGHT KNEE CAL 68 RUN NUMBER: 031897.1321;1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 112.76 G @ 2.88 MS; -0.54 G @ 8.48 MS

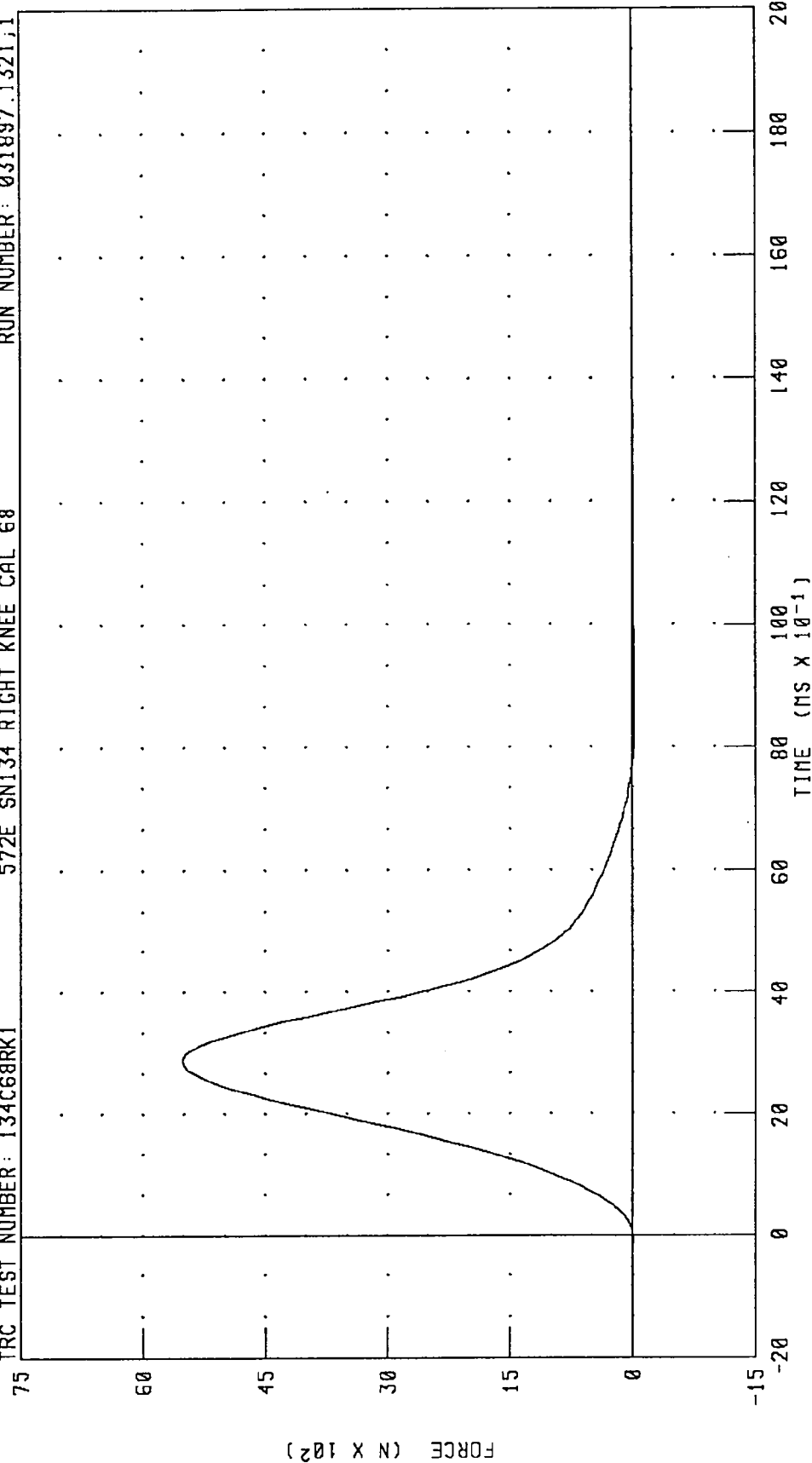
PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 134C68RK1

572E SN134 RIGHT KNEE CAL 68

RUN NUMBER: 031897.1321,1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5517.13 N @ 2.88 MS; -26.36 N @ 8.48 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

30-JAN-97

TRC INC.

TEST NO: 134C68LK1

572E SN134 LEFT KNEE CAL 68

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	23.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5514.1 N

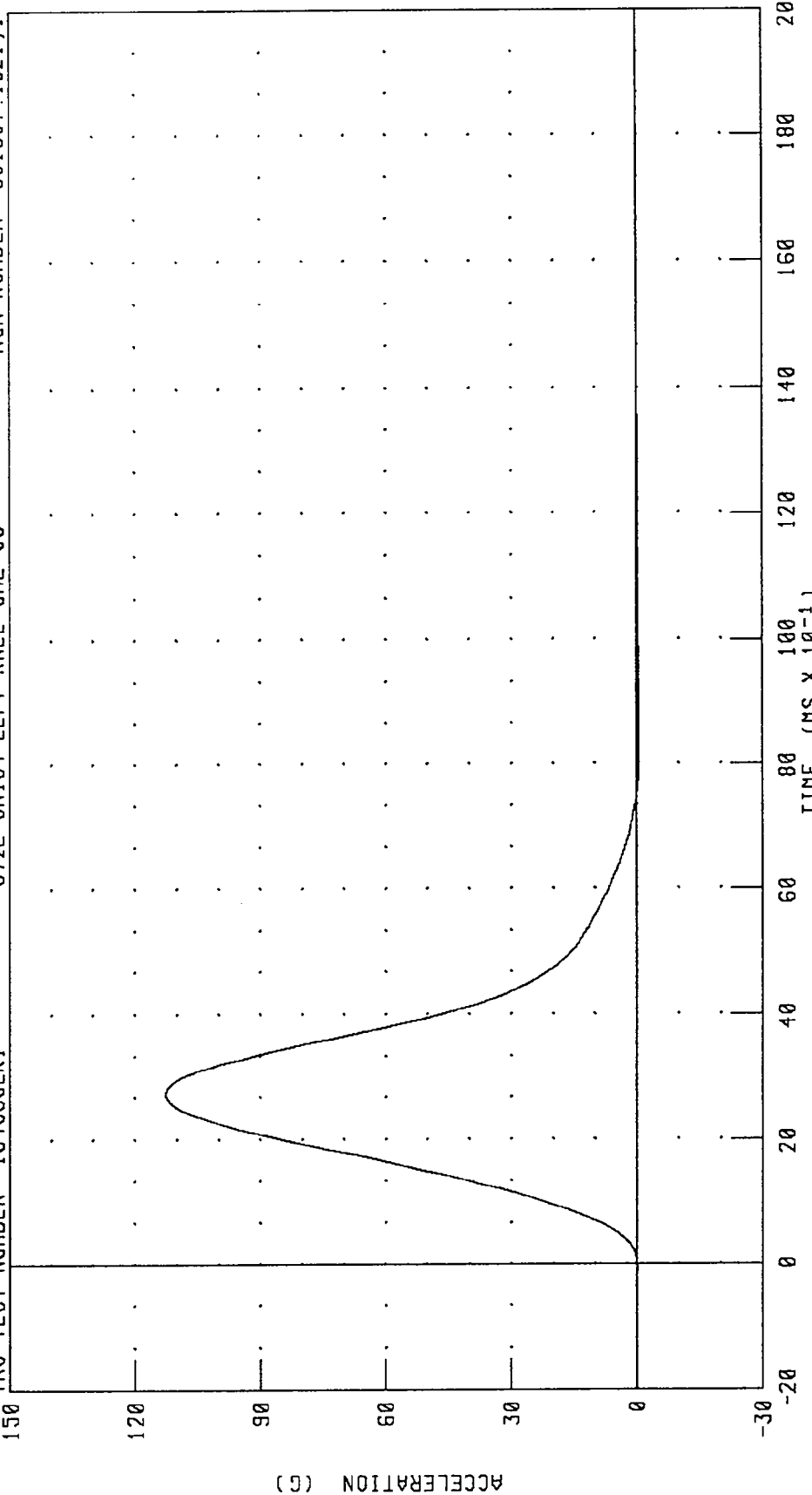
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard Le Van

RUN NUMBER: 013097.0906;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM DECELERATION (5 KC PEND.)

TRC TEST NUMBER: 134C68LK1 572E SN134 LEFT KNEE CAL 68 RUN NUMBER: 031897.1321.1



PEAK DATA: 112.70 G @ 2.72 MS; -0.53 G @ 8.16 MS

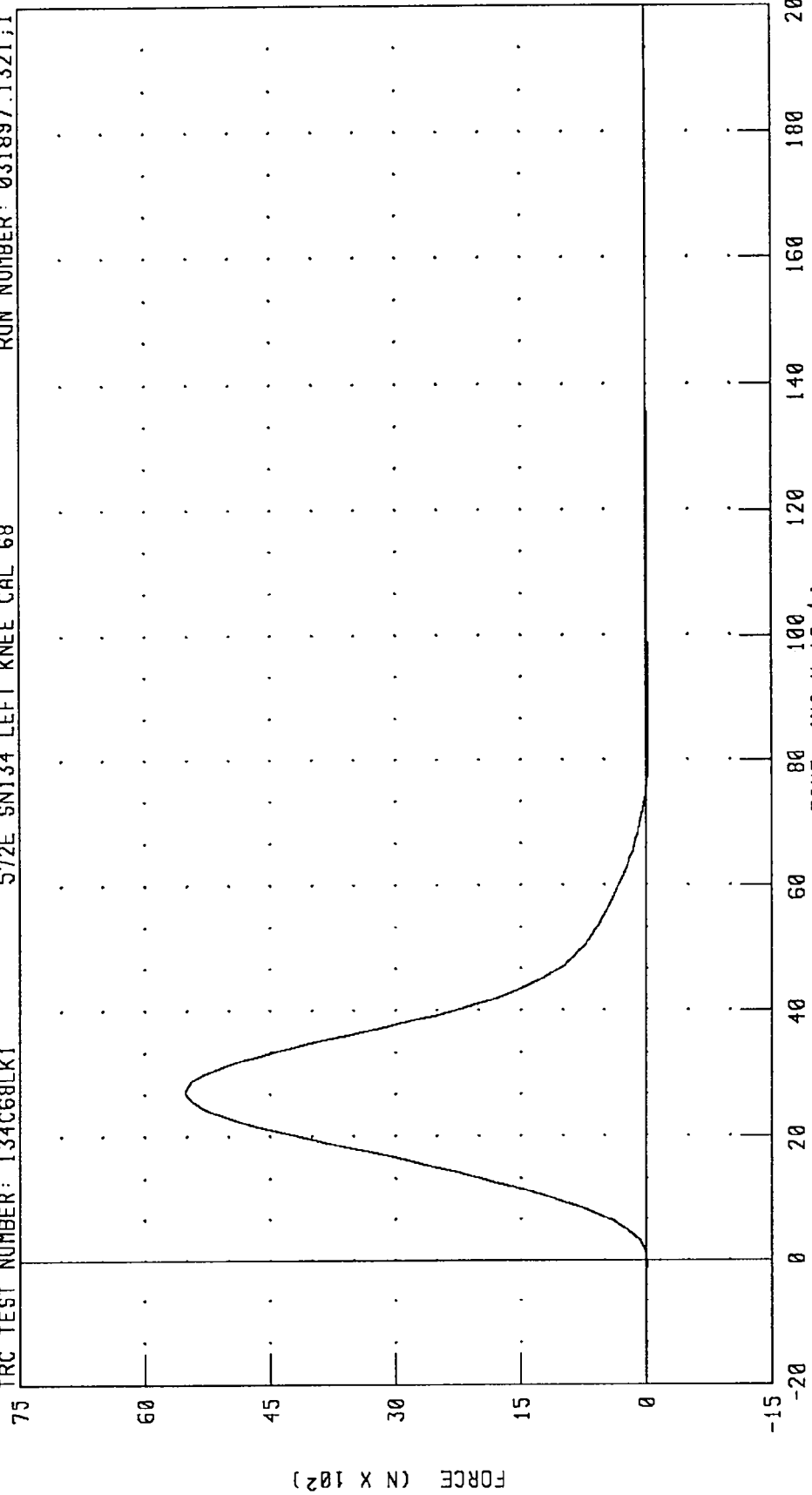
CHANNEL: PENXG FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 134C68LK1

572E SN134 LEFT KNEE CAL 68

RUN NUMBER: 031897.1321;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5514.11 N @ 2.72 MS, -26.12 N @ 8.16 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE SLIDER TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 134C68RS2

572E SN134 RIGHT SLIDER CAL68

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.75 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1542. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2618. N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Richard L. Van

RUN NUMBER: 013197.1030;1

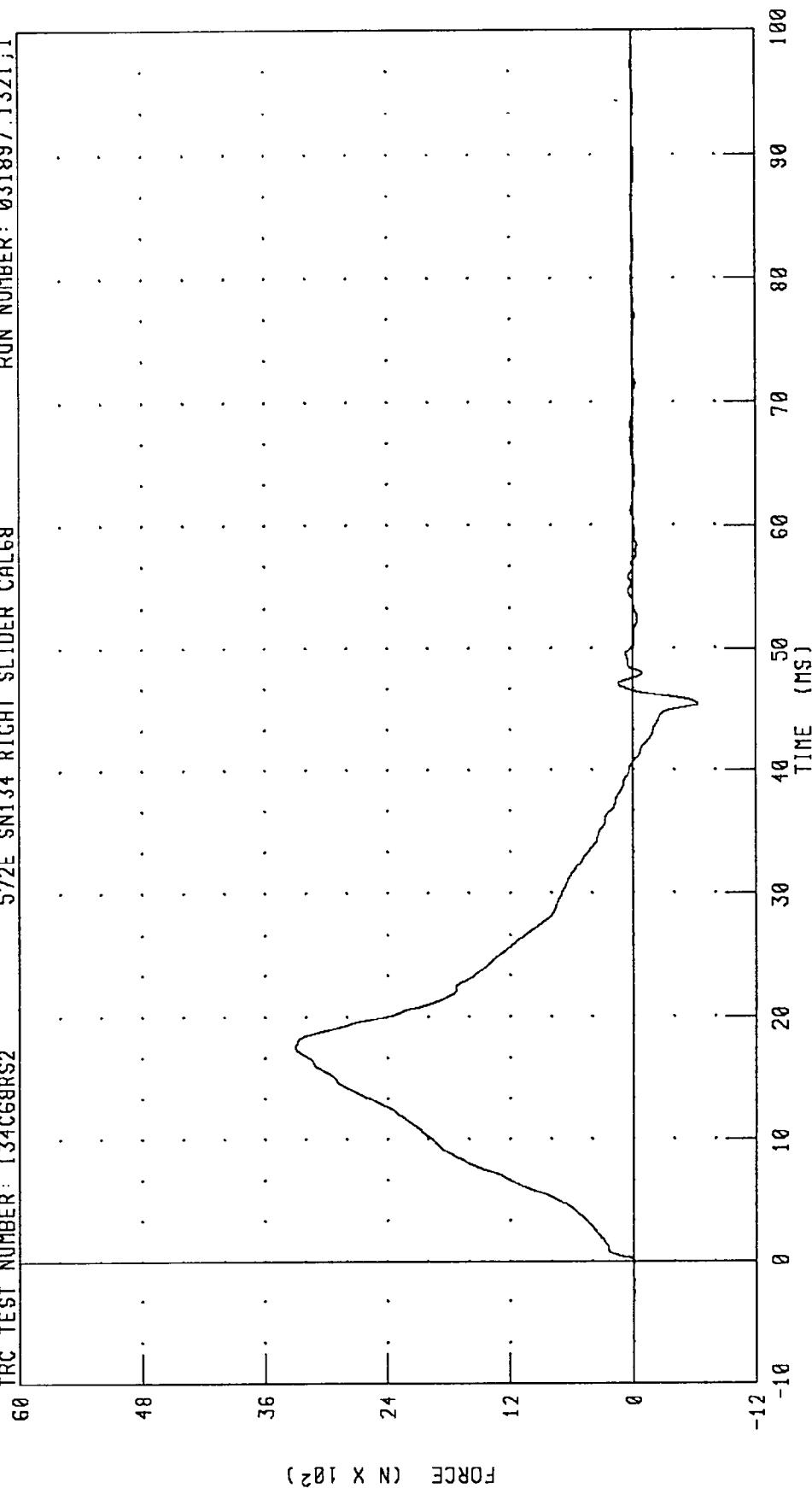
PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION

RIGHT FEMUR FORCE

TRC TEST NUMBER: 134C68RS2

572E SN134 RIGHT SLIDER CAL68

RUN NUMBER: 031897.1321;1

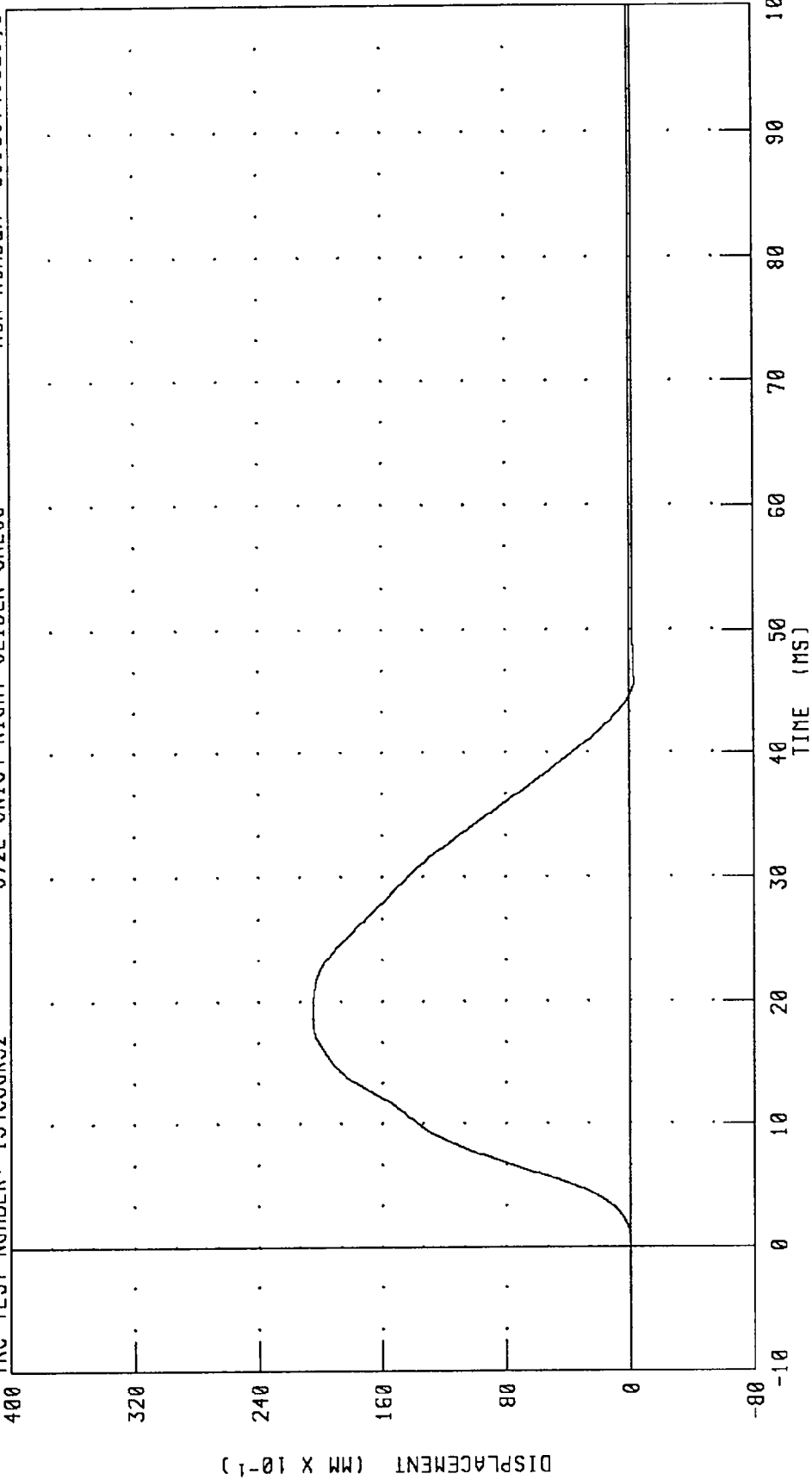


PEAK DATA: 3302.51 N @ 17.52 MS; -631.13 N @ 45.44 MS

CHANNEL: RFMF FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION
RIGHT KNEE DISPLACEMENT

TRC TEST NUMBER: 134C68RS2 572E SN134 RIGHT SLIDER CAL68 RUN NUMBER: 031897.1321;1

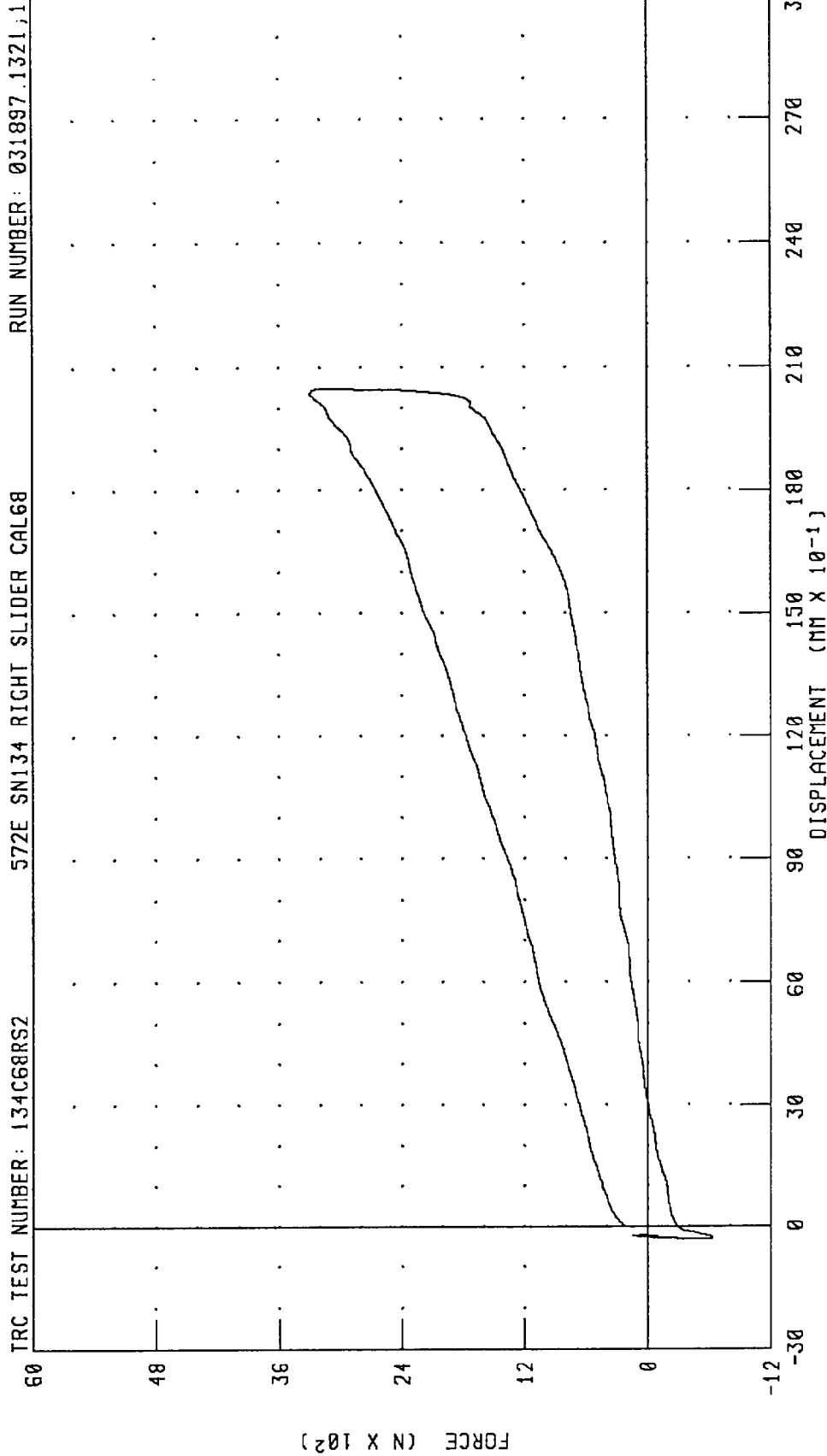


PEAK DATA: 20.50 NM @ 18.64 MS, -0.31 NM @ 45.76 MS

CHANNEL: KNRXD FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION
RIGHT KNEE DISPLACEMENT VS FEMUR FORCE

TRC TEST NUMBER: 134C68RS2 572E SN134 RIGHT SLIDER CAL68 RUN NUMBER: 031897.1321,1



CHANNEL: KNRXD FILTER: CH: CLASS 600
RFMF CH: CLASS 600
PEAK DATA: 20.50 MM @ 18.64 NS; -0.31 MM @ 45.76 NS
3302.51 N @ 17.52 NS; -631.13 N @ 45.44 NS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE SLIDER TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 134C68LS2

572E SN134 LEFT SLIDER CAL68

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.77 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1425. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2442. N

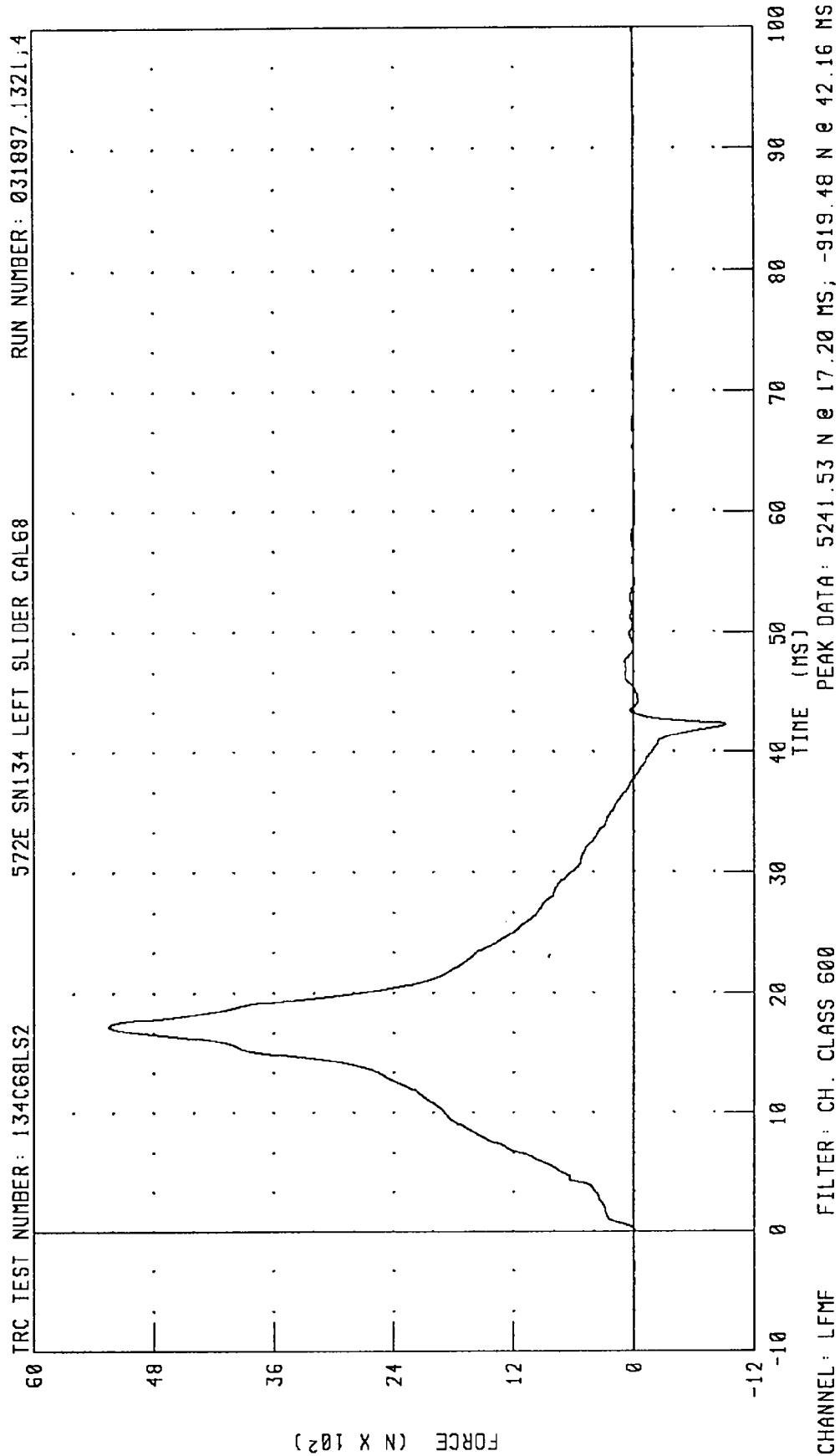
TEST MEETS SPECIFICATIONS

TECHNICIAN

Richard L. Lee

RUN NUMBER: 013197.1317;4

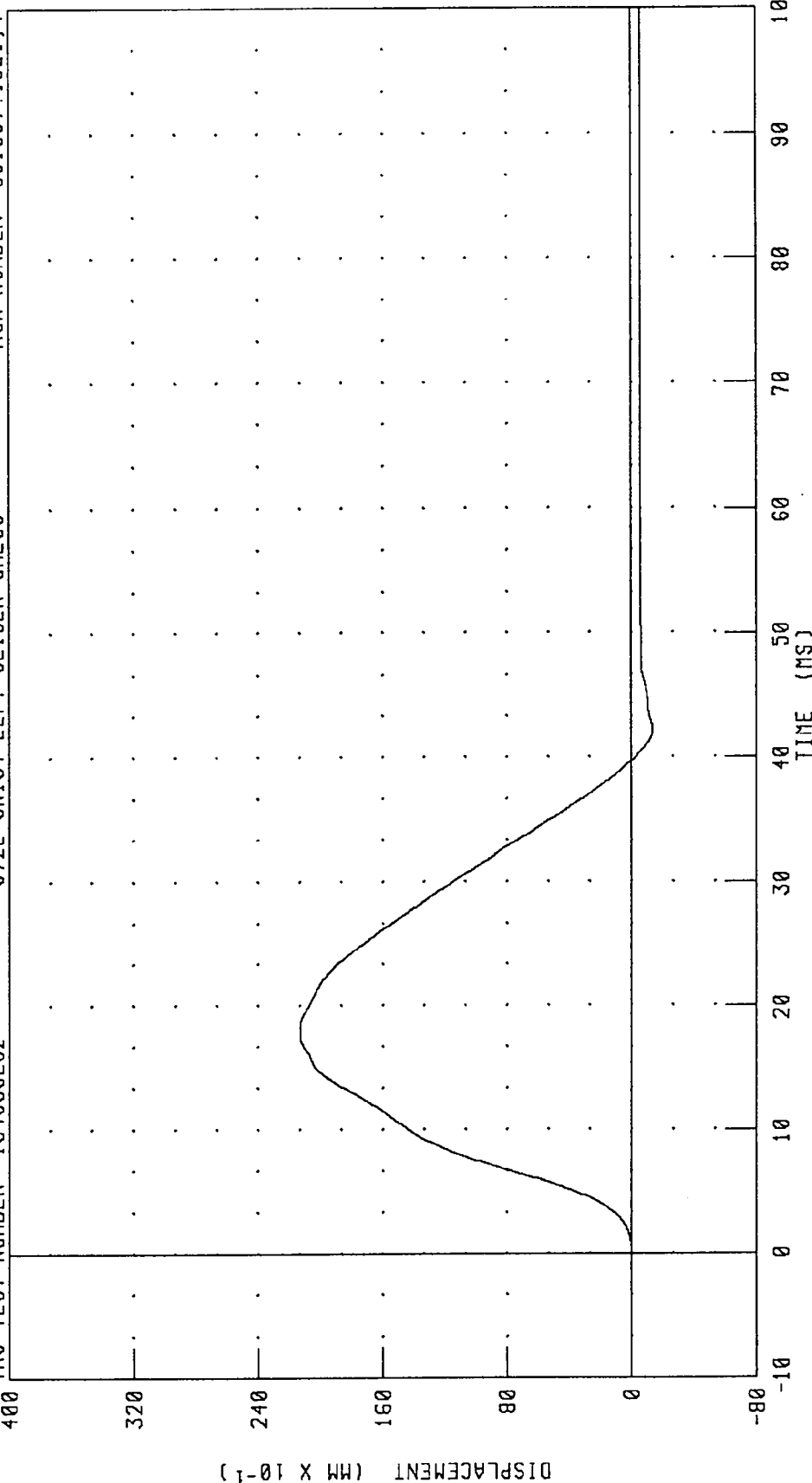
PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT FEMUR FORCE



CHANNEL: LFMF FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT KNEE DISPLACEMENT

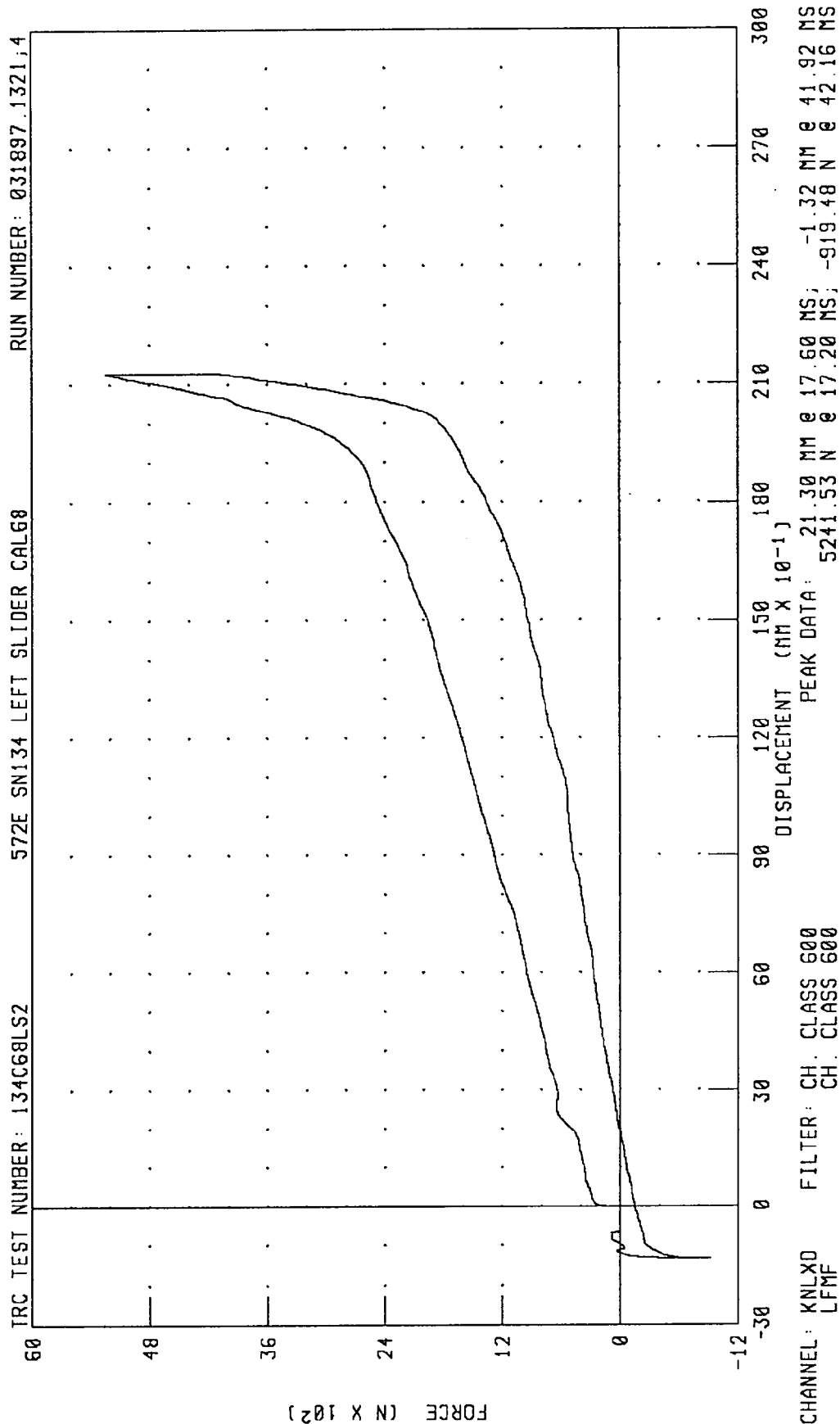
TRC TEST NUMBER: 134C68LS2 572E SN134 LEFT SLIDER CAL68 RUN NUMBER: 031897.1321;4



PEAK DATA: 21.30 MM @ 17.60 MS; -1.32 MM @ 41.92 MS

CHANNEL: KNLXD FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT KNEE DISPLACEMENT VS FEMUR FORCE



Pre-Test Calibration

Serial Number 177

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
SN 177 ALDERSON

30-JAN-97

TRC INC. TEST NO: 177C72ED1 572E SN177 EXT.DIMENSION CAL72

TEST PARAMETER (DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226 - 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)	970 -1001 MM	980. MM
WAIST CIRCUMFERENCE (Z)	836 - 866 MM	848. MM
CHEST DEPTH (O)	213 - 229 MM	216. MM
H-POINT HEIGHT (C)	84 - 89 MM	86. MM
H-POINT FROM SEATBACK (D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE (H)	41 - 46 MM	46. MM
TOTAL SITTING HEIGHT (A)	879 - 889 MM	881. MM
THIGH CLEARANCE (F)	140 - 155 MM	145. MM
BUTTOCK KNEE LENGTH (K)	579 - 605 MM	602. MM
BUTTOCK POPLITEAL LENGTH (N)	452 - 478 MM	475. MM
POPLITEAL HEIGHT (L)	429 - 455 MM	450. MM
KNEE PIVOT HEIGHT (M)	485 - 500 MM	493. MM
FOOT LENGTH (P)	252 - 267 MM	259. MM
FOOT BREADTH (W)	91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE (E)	84 - 94 MM	91. MM
SHOULDER BREADTH (V)	422 - 437 MM	429. MM
SHOULDER PIVOT HEIGHT (B)	506 - 521 MM	508. MM
ELBOW REST HEIGHT (J)	191 - 211 MM	206. MM
SHOULDER-ELBOW LENGTH (I)	330 - 345 MM	338. MM
BACK OF ELBOW TO WRIST PIVOT (G)	290 - 305 MM	295. MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Richard Le Van

RUN NUMBER: 031997.1305

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 177C72HD2

572E SN177 HEAD DROP CAL 72

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	259.97 G
PEAK LATERAL ACCELERATION	15 G MAX	-4.15 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

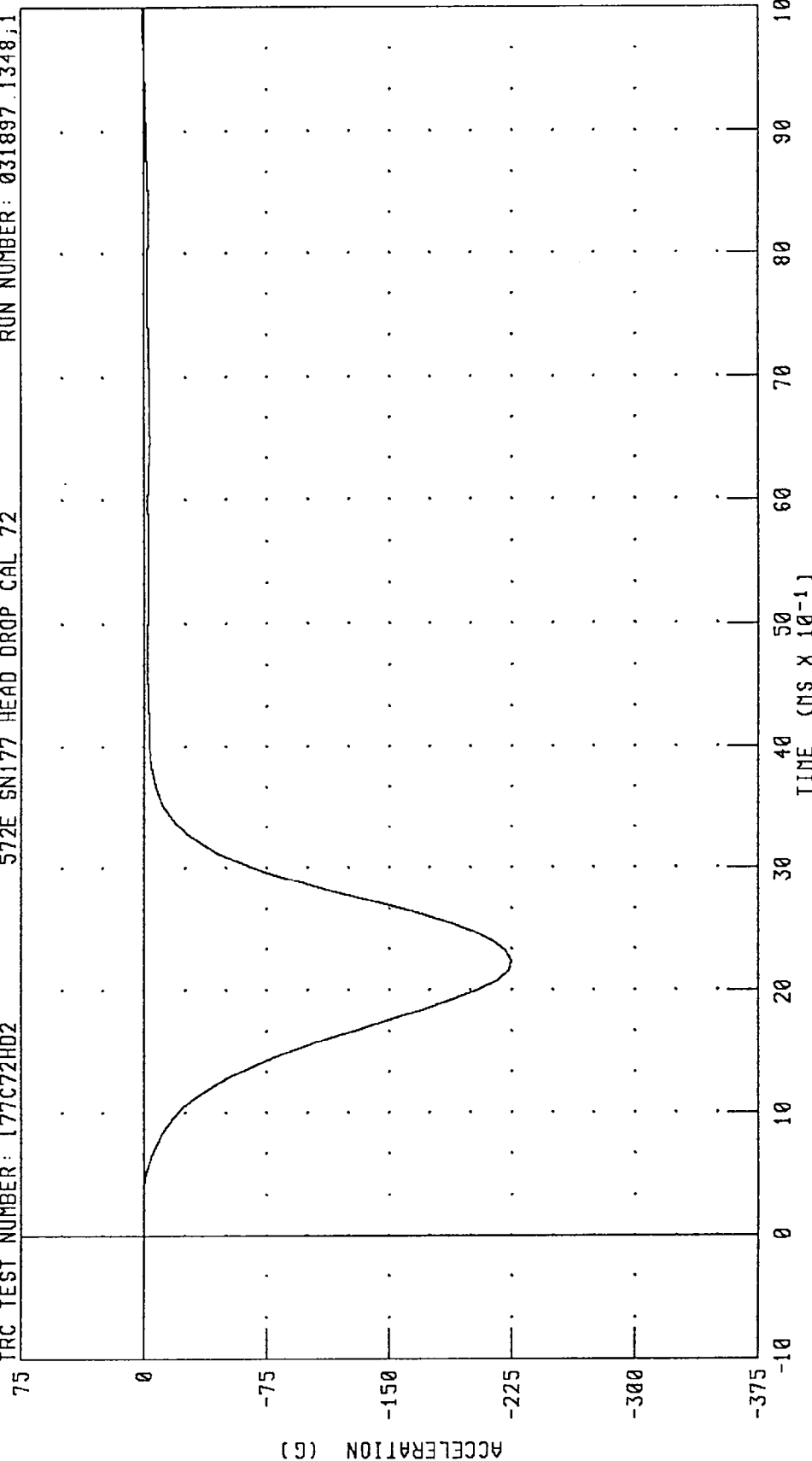
TECHNICIAN Richard L. Van

RUN NUMBER: 013197.1255;1

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS

572E SN177 HEAD DROP CAL 72 RUN NUMBER: 031897.1348;1

TRC TEST NUMBER: 177C72HD2

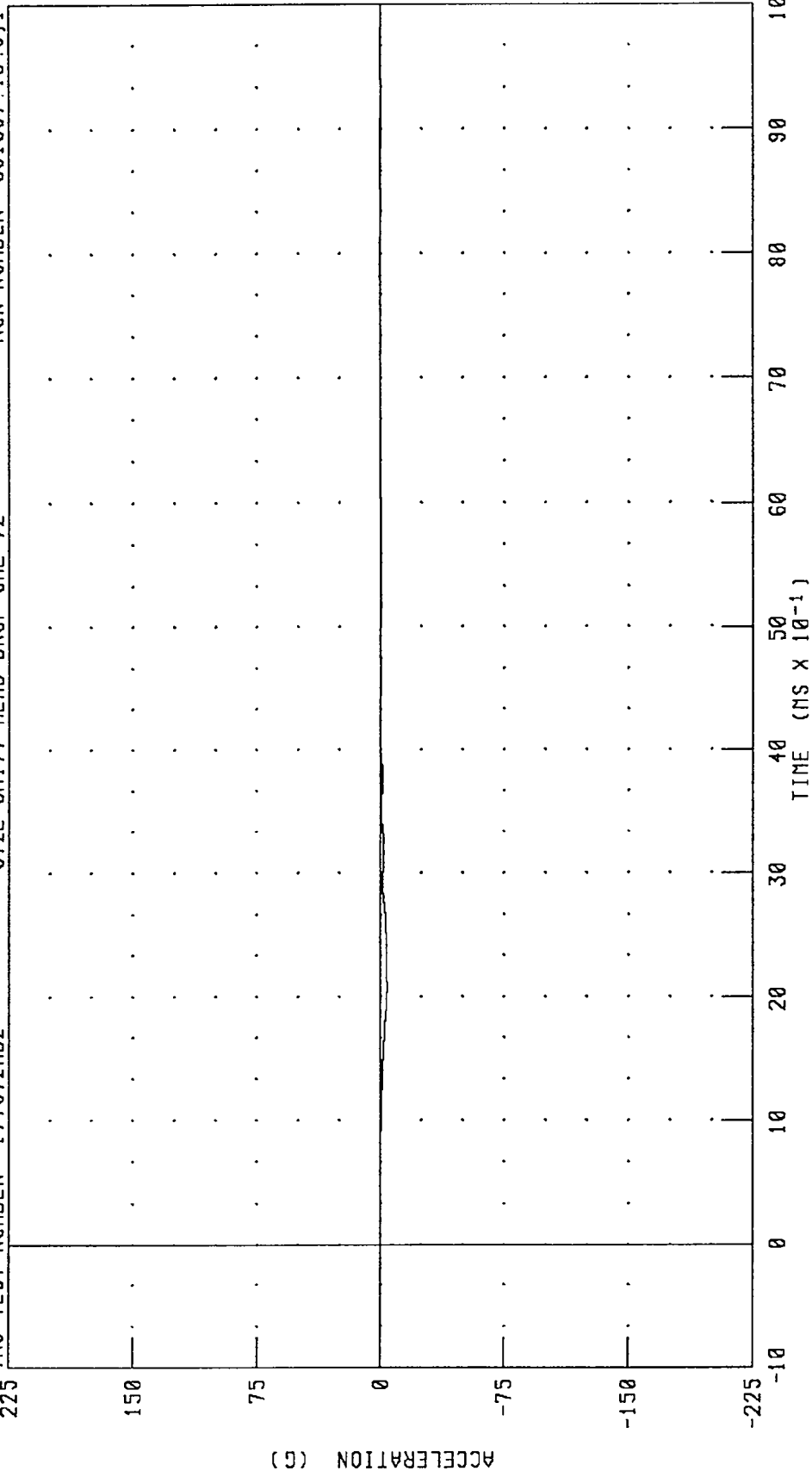


PEAK DATA: 0.47 G @ 9.92 MS; -224.79 G @ 2.24 MS

CHANNEL: HEDXG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 177C72HD2 572E SN177 HEAD DROP CAL 72 RUN NUMBER: 031897.1348;1

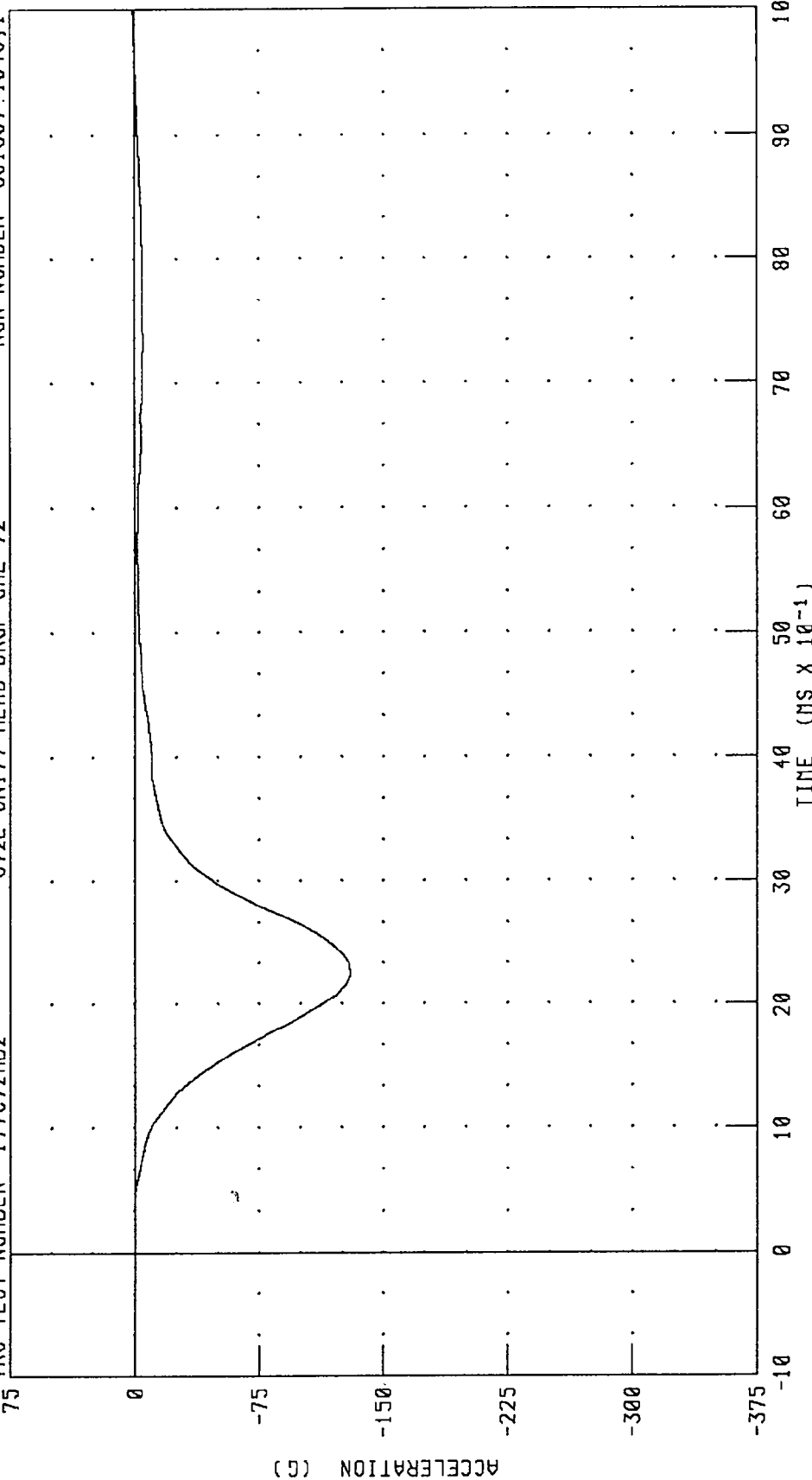


PEAK DATA: 0.77 G @ 8.80 MS; -4.15 G @ 2.08 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 177C72HD2 572E SN177 HEAD DROP CAL 72 RUN NUMBER: 031897.1348.1



PEAK DATA: 0.95 G @ 10.00 MS; -130.54 G @ 2.24 MS

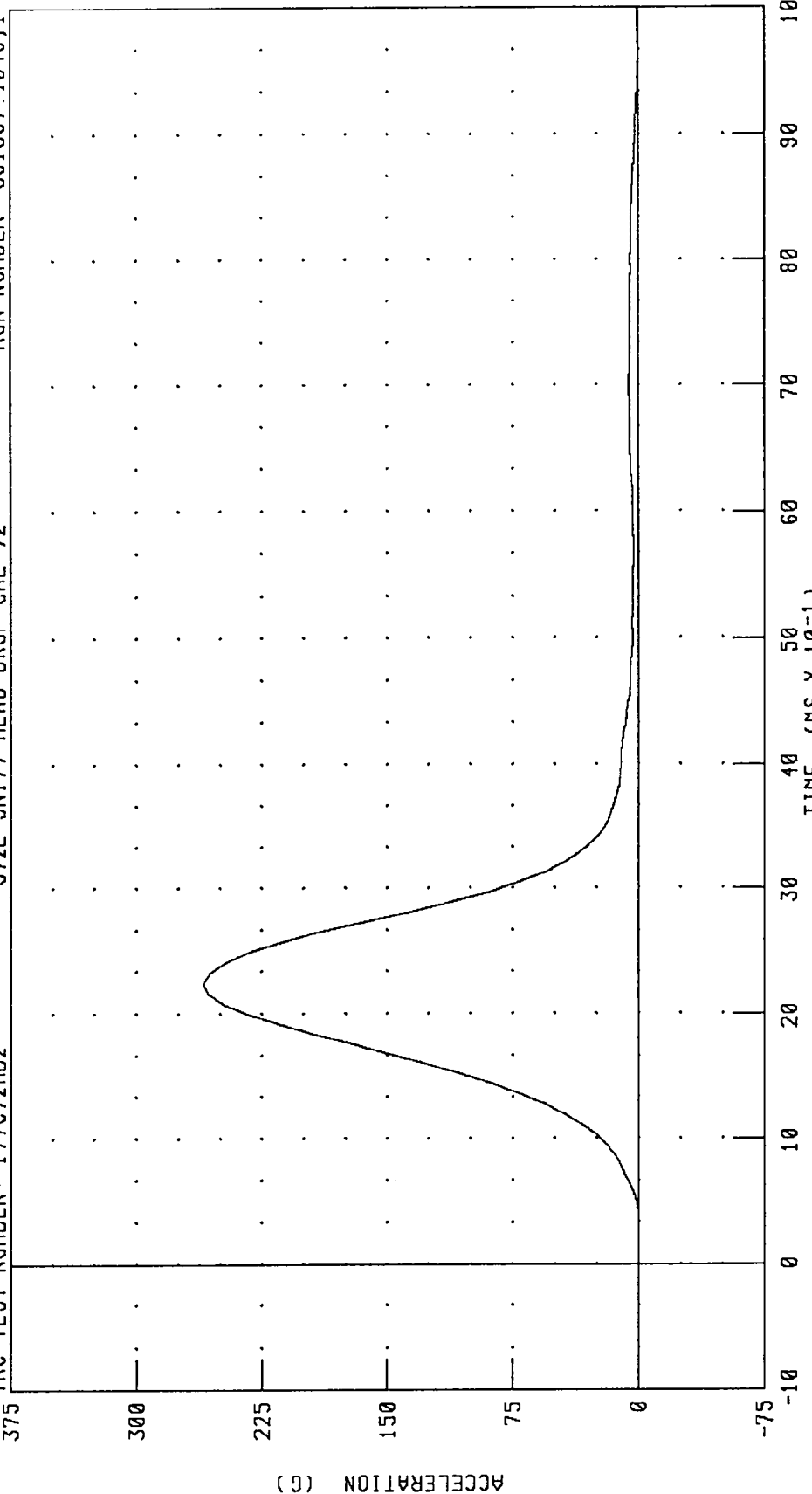
CHANNEL: HEDZG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 177C72HD2

572E SN177 HEAD DROP CAL 72

RUN NUMBER: 031897.1348,1



PEAK DATA: 259.98 G @ 2.24 MS; 0.03 G @ 0.00 MS

CHANNEL: HEDRG FILTER: CH. CLASS 1000

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

31-JAN-97

TRC INC. TEST NO: 177C72NF1 572E SN177 NECK FLEXION CAL72

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	25.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	6.99 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.92 G
	20 MS	17.60 - 22.60 G	20.35 G
	30 MS	12.50 - 18.50 G	16.73 G
MAX PENDULUM G		29 G MAX	23.65 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.71 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	36.88 MS
D PLANE	MAX	64 - 78 DEG.	69.23 DEG.
ROTATION	TIME	57 - 64 MS	58.96 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	90.47 NM
	TIME	47 - 58 MS	50.32 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	116.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.80 MS

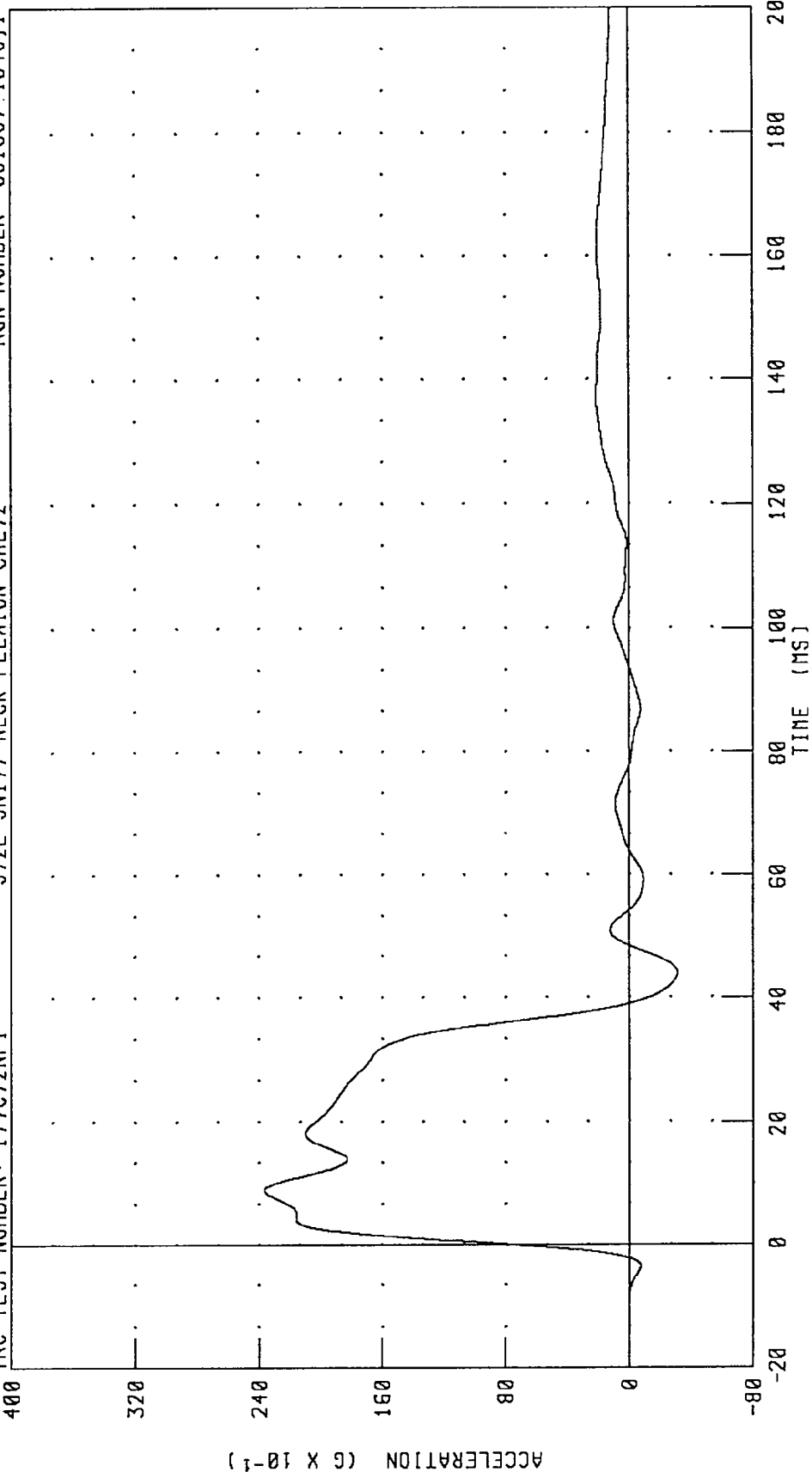
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. Leman

RUN NUMBER: 013197.1449;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 177C72NF1 572E SN177 NECK FLEXION CAL72 RUN NUMBER: 031897.1348;1



PEAK DATA: 23.66 G @ 8.88 MS; -3.12 G @ 43.92 MS

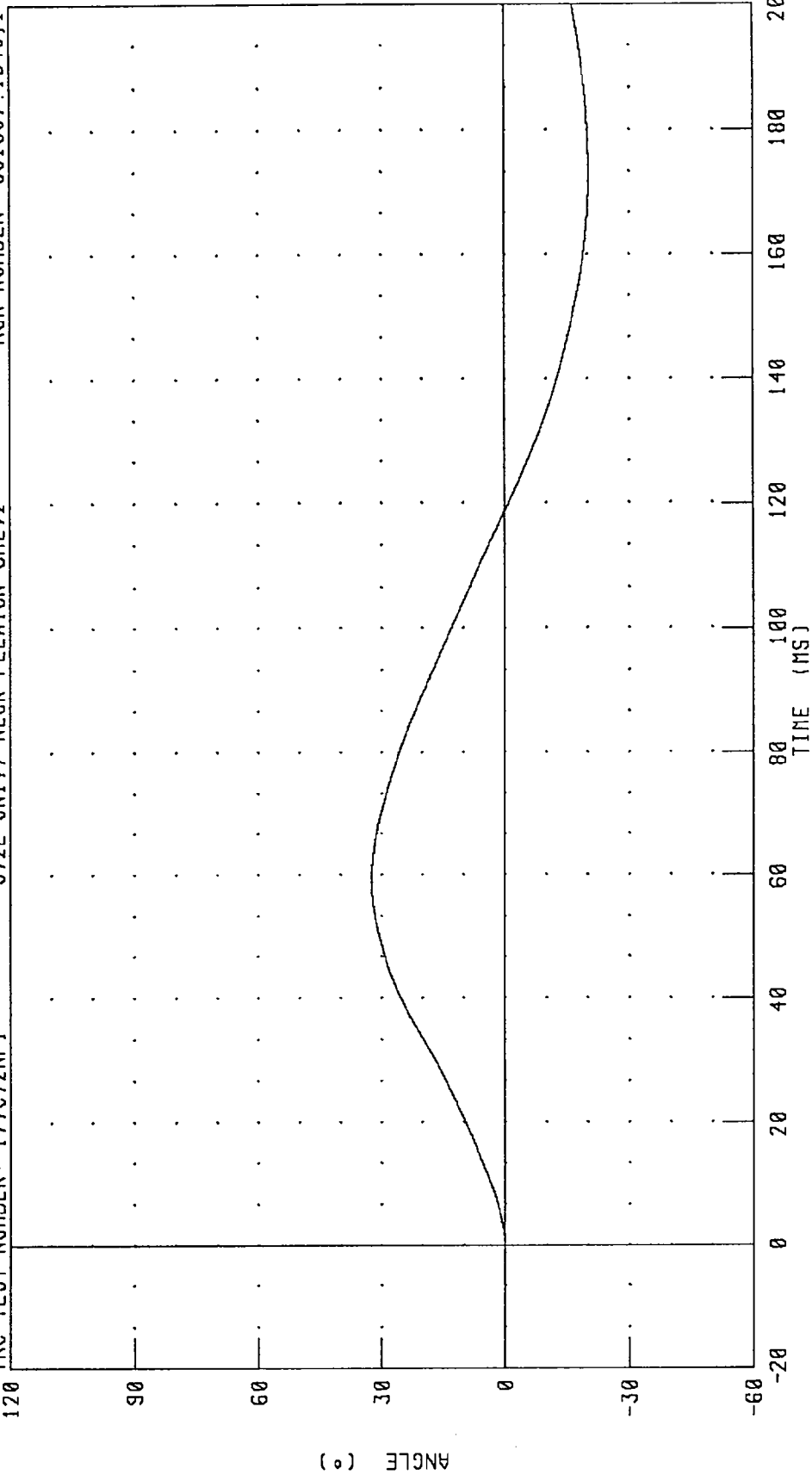
CHANNEL: PENXG FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 177C72NF1

572E SN177 NECK FLEXION CAL72

RUN NUMBER: 031897.1348;1

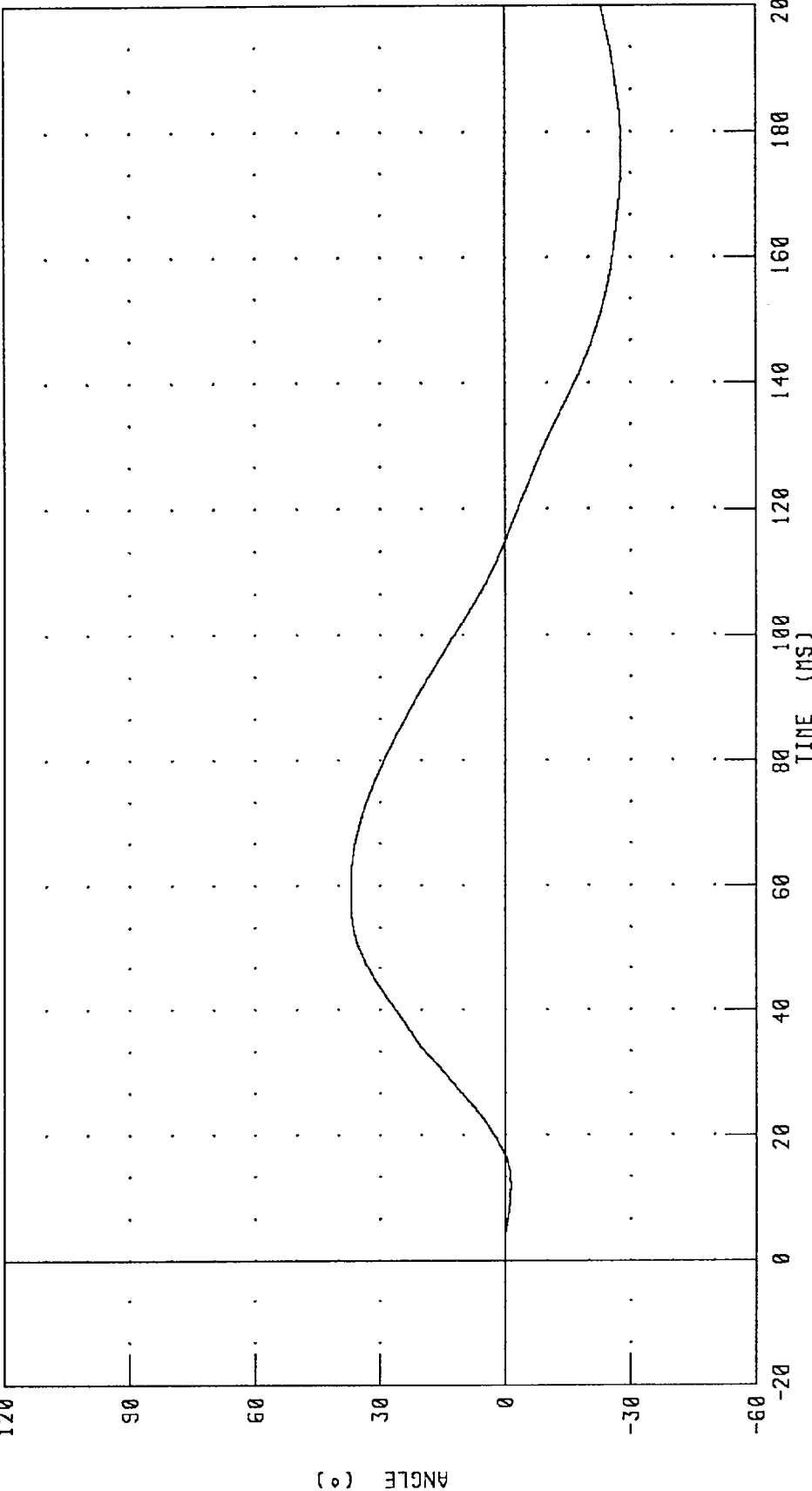


PEAK DATA: 32.29 ° @ 59.04 MS; -20.23 ° @ 172.56 MS

CHANNEL: BETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 177C72NF1 572E SN177 NECK FLEXION CAL72 RUN NUMBER: 031897.1348;1

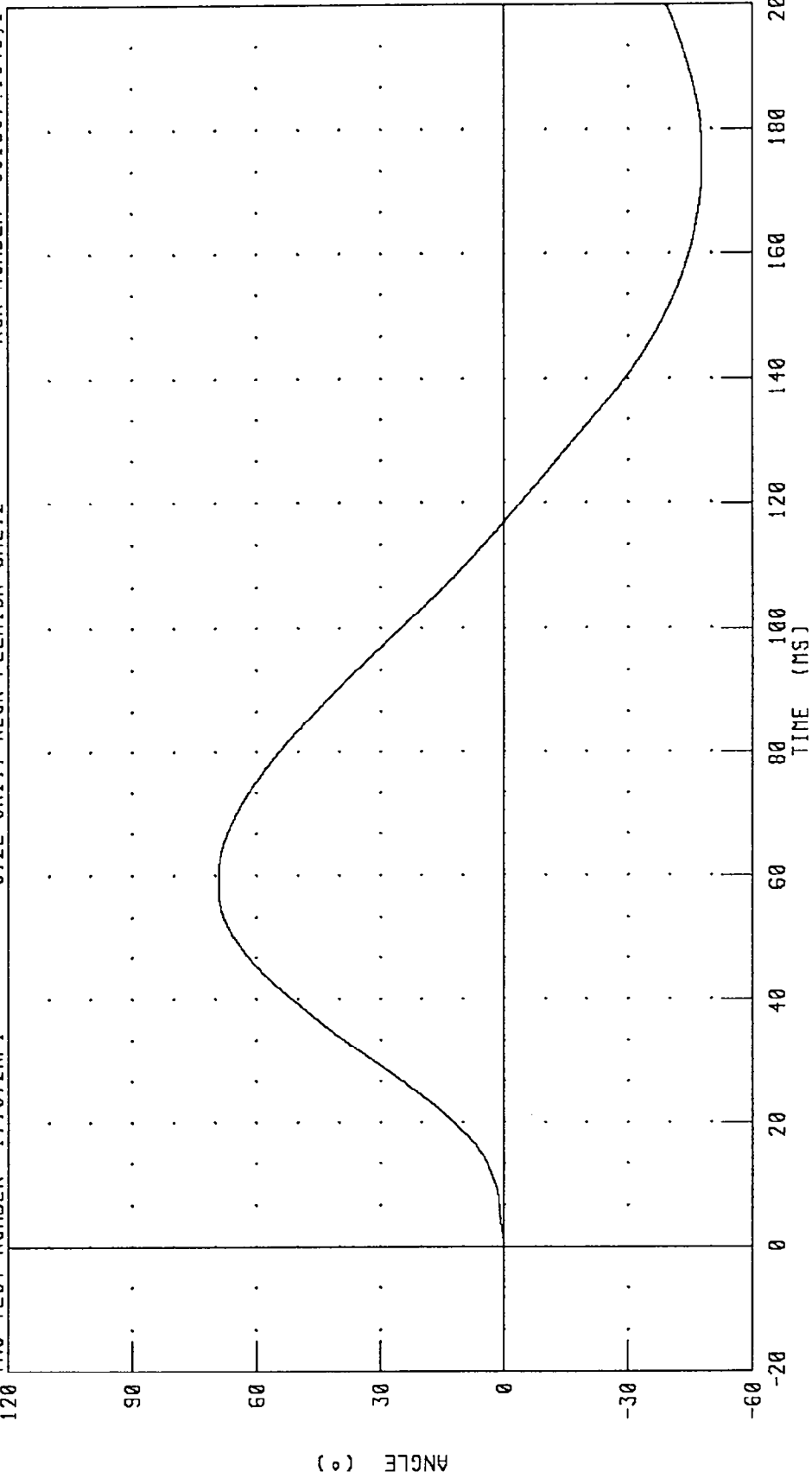


CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 36.95 ° @ 58.48 MS; -27.64 ° @ 176.32 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 177C72NF1 572E SN177 NECK FLEXION CAL72 RUN NUMBER: 031897.1348;1

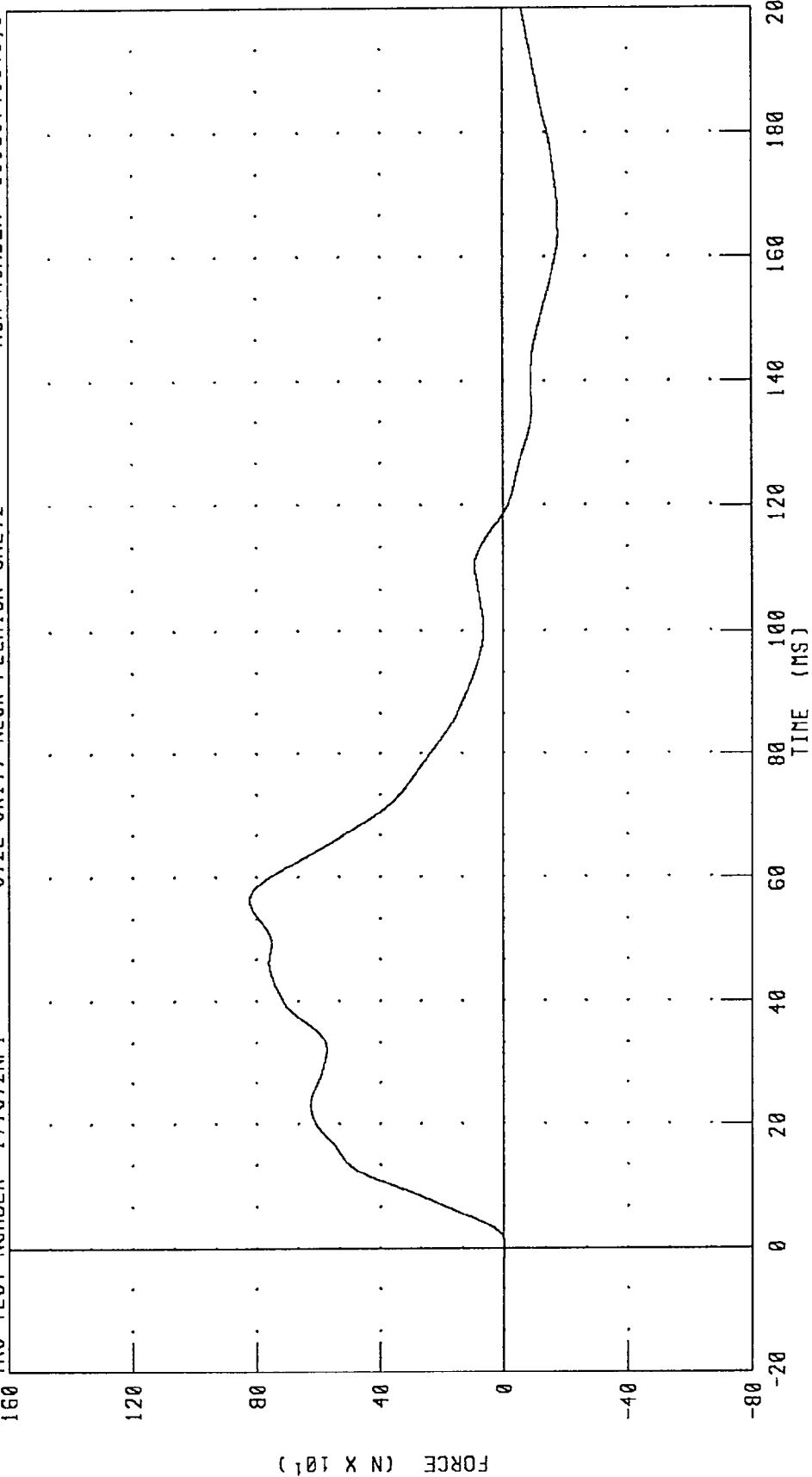


PEAK DATA: 69.24 ° @ 58.96 MS; -47.83 ° @ 174.48 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION NECK FORCE X AXIS

IRC TEST NUMBER: 177C72NF1 572E SN177 NECK FLEXION CAL72 RUN NUMBER: 031897.1348;1



PEAK DATA: 823.51 N @ 56.32 MS; -177.27 N @ 163.52 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

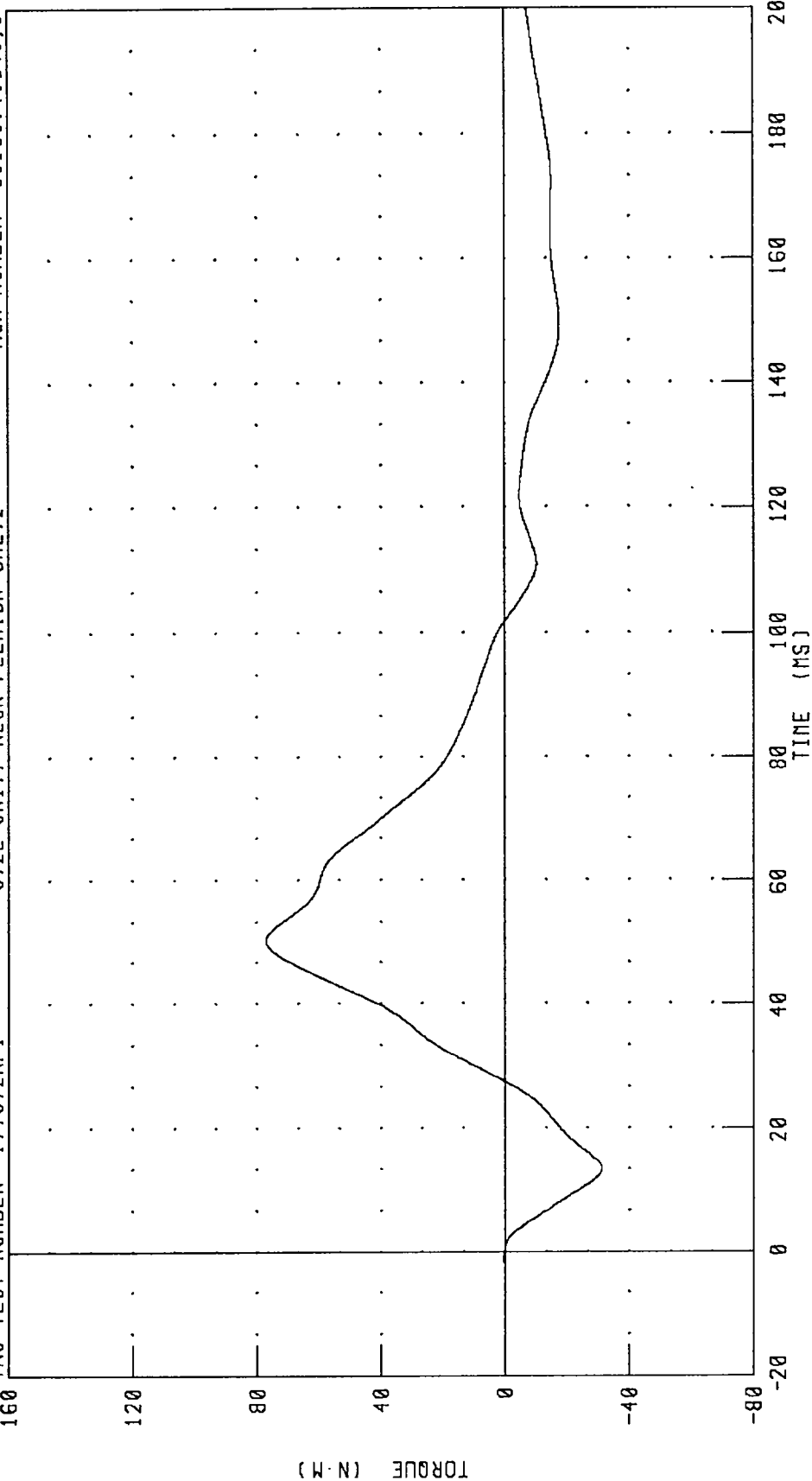
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 177C72NF1

572E SN177 NECK FLEXION CAL72

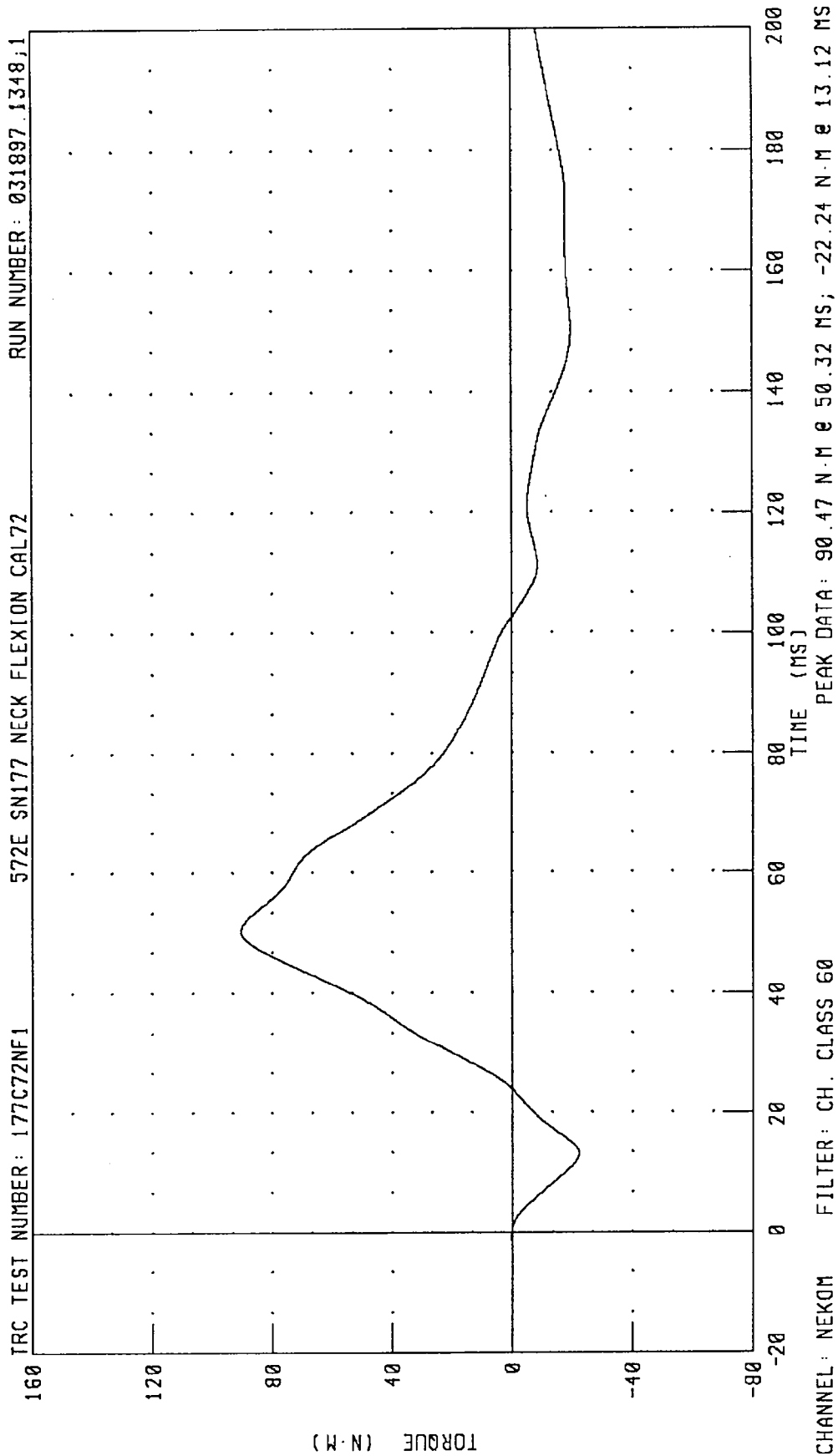
RUN NUMBER: 031897.1348;1



PEAK DATA: 77.04 N·M @ 50.24 MS; -31.09 N·M @ 13.44 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE



TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

31-JAN-97

TRC INC. TEST NO: 177C72NE2 572E SN177 NECK EXT. CAL72

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	25.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.78 G
	20 MS	14.00 - 19.00 G	17.02 G
	30 MS	11.00 - 16.00 G	15.23 G
MAX PENDULUM G		22 G MAX	19.01 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	15.18 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	38.08 MS
D PLANE	MAX	81 - 106 DEG.	94.01 DEG.
ROTATION	TIME	72 - 82 MS	74.80 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-69.65 NM
	TIME	65 - 79 MS	70.48 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	152.56 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.32 MS

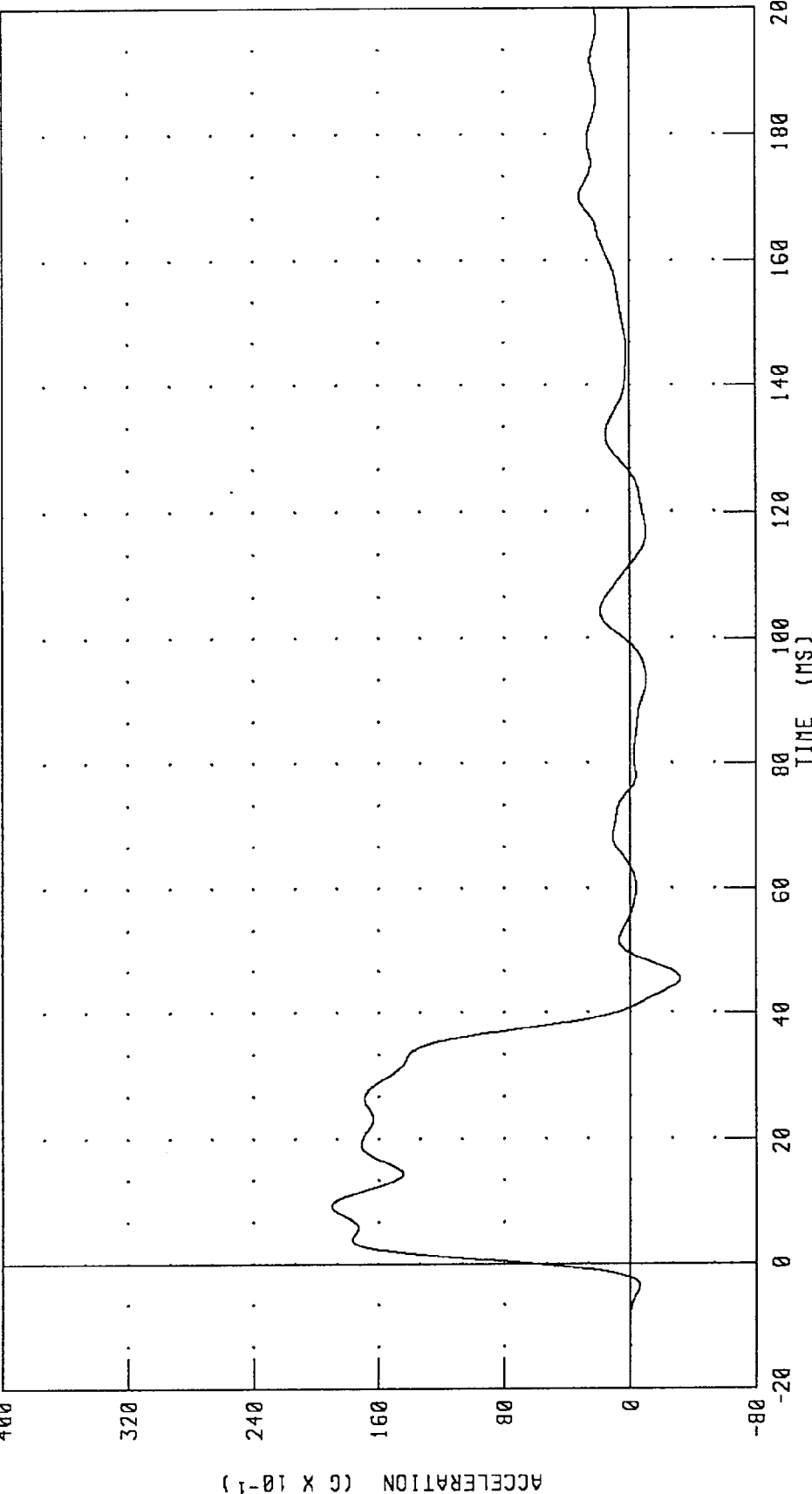
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. Loran

RUN NUMBER: 013197.1605;3

PART 572-E HYBRID III NECK EXTENSION CALIBRATION PENDULUM DECELERATION

TRC TEST NUMBER: 177C72NE2 572E SN177 NECK EXT. CAL72 RUN NUMBER: 031897.1348;3



PEAK DATA: 19.02 G @ 9.28 MS; -3.19 G @ 45.52 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 177C72NE2

572E SN177 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3

120

90

60

30

0

-30

-60

ANGLE (°)

0

20

40

60

80

100

120

140

160

180

200

TIME (MS)

PEAK DATA: 38.81 ° @ 73.52 MS; -15.31 ° @ 197.44 MS

CHANNEL: BETA

FILTER: CH. CLASS 60

19-3

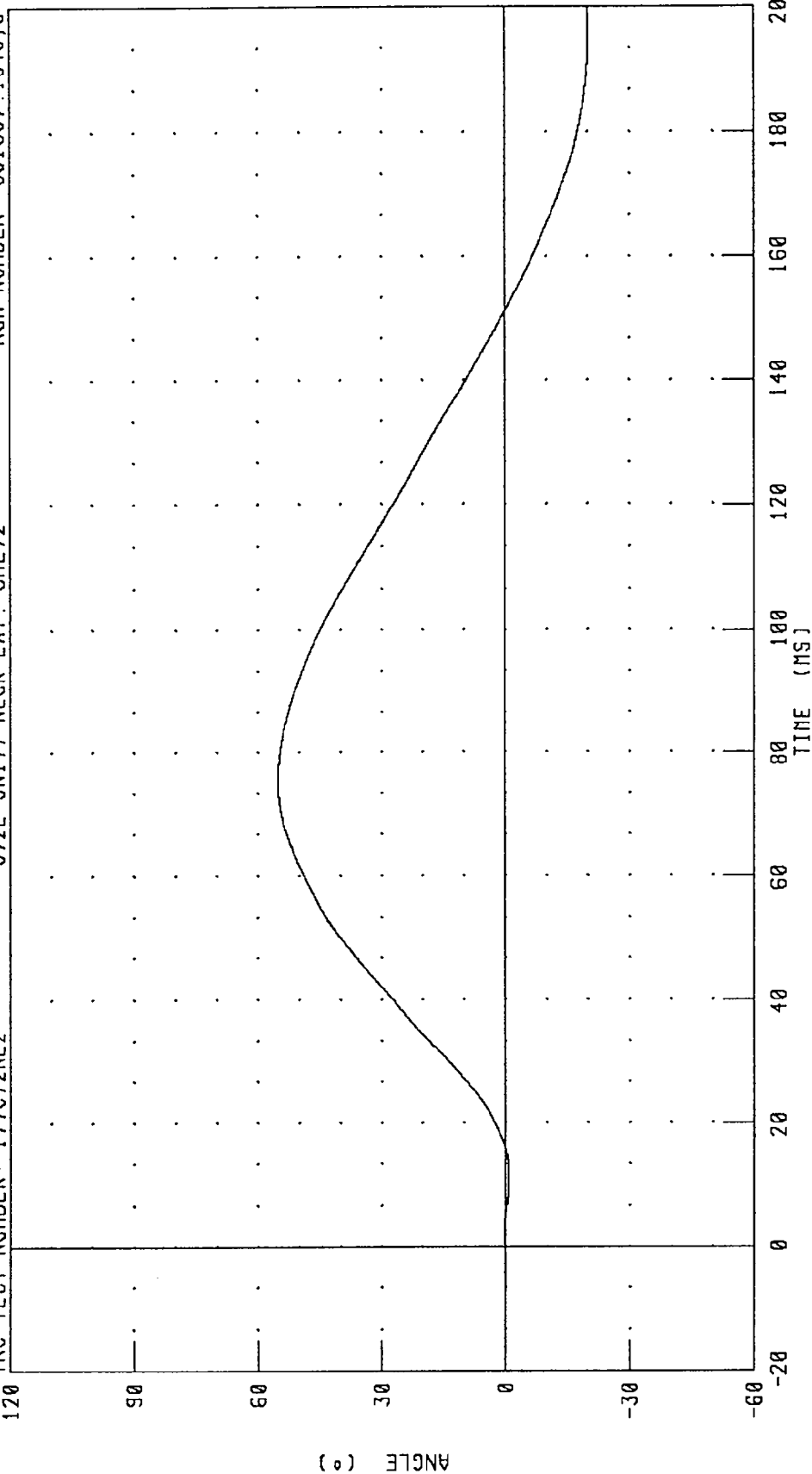
970214

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 177C72NE2

572E SN177 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3



PEAK DATA: 55.23 ° @ 75.36 MS; -20.03 ° @ 195.68 MS

CHANNEL: THETA FILTER: CH. CLASS 60

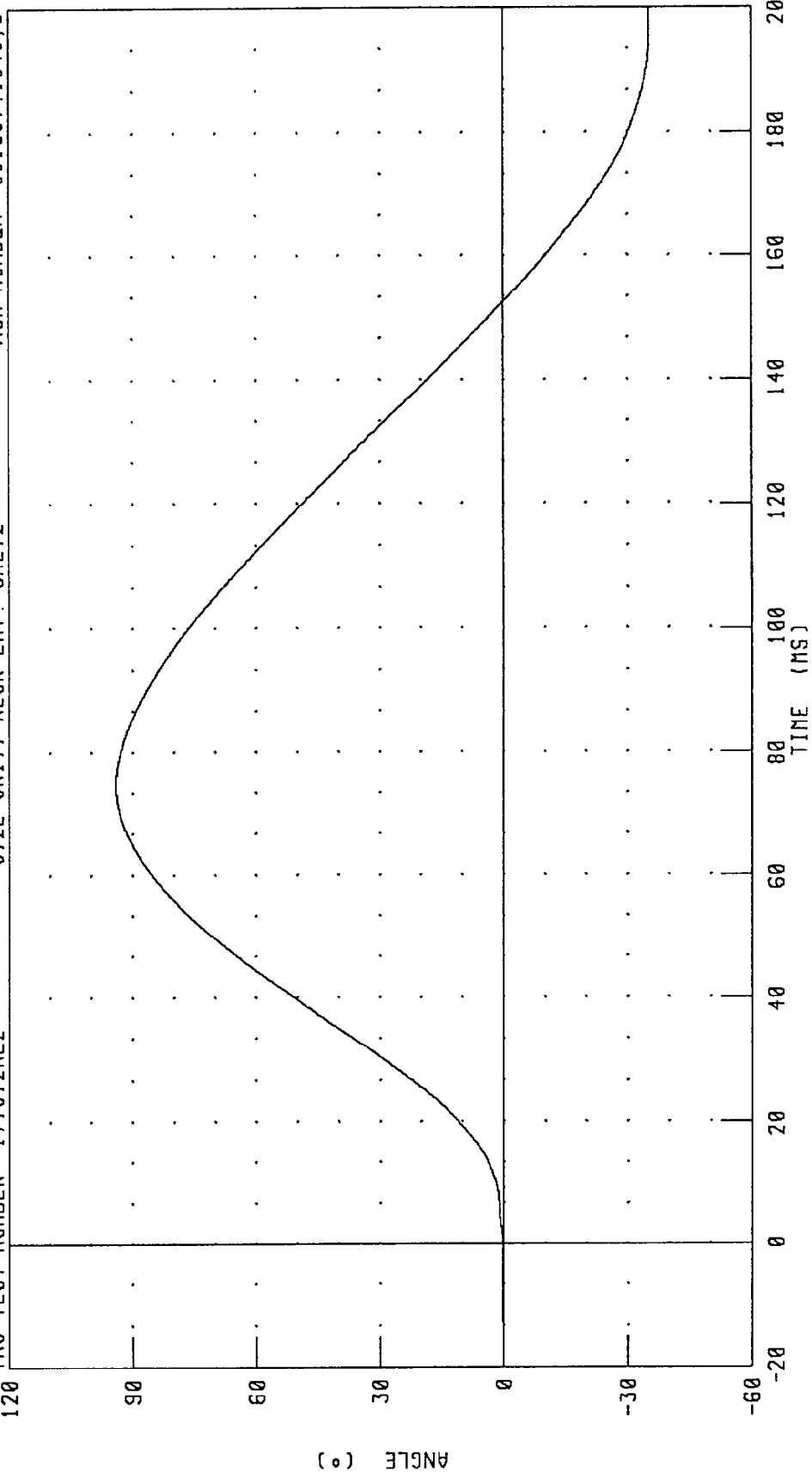
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 177C72NE2

572E SNI77 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3



PEAK DATA: 94.01 ° @ 74.80 MS; -35.33 ° @ 197.12 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

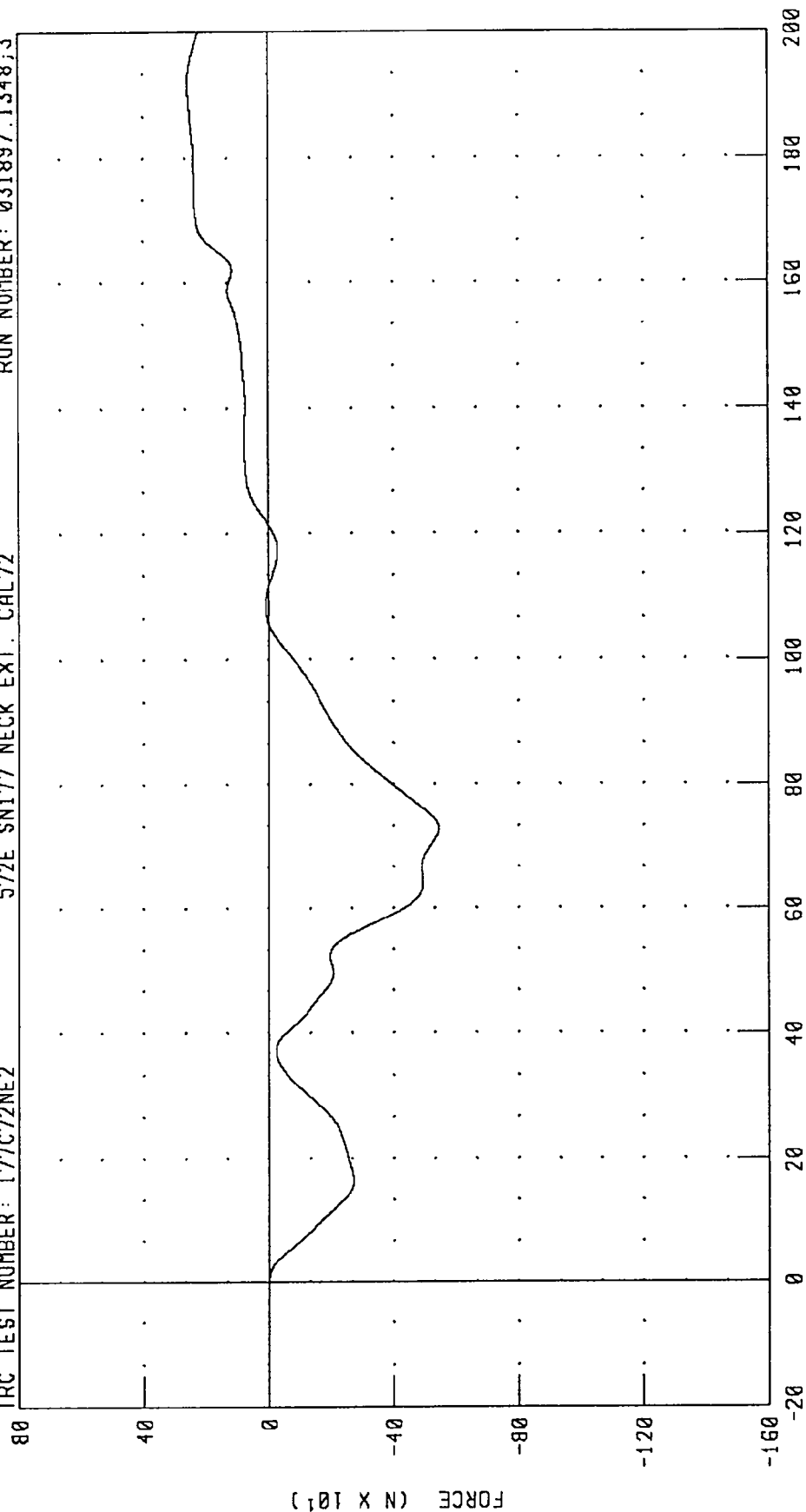
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 177C72NE2

572E SN177 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 257.09 N @ 191.92 MS; -545.72 N @ 72.96 MS

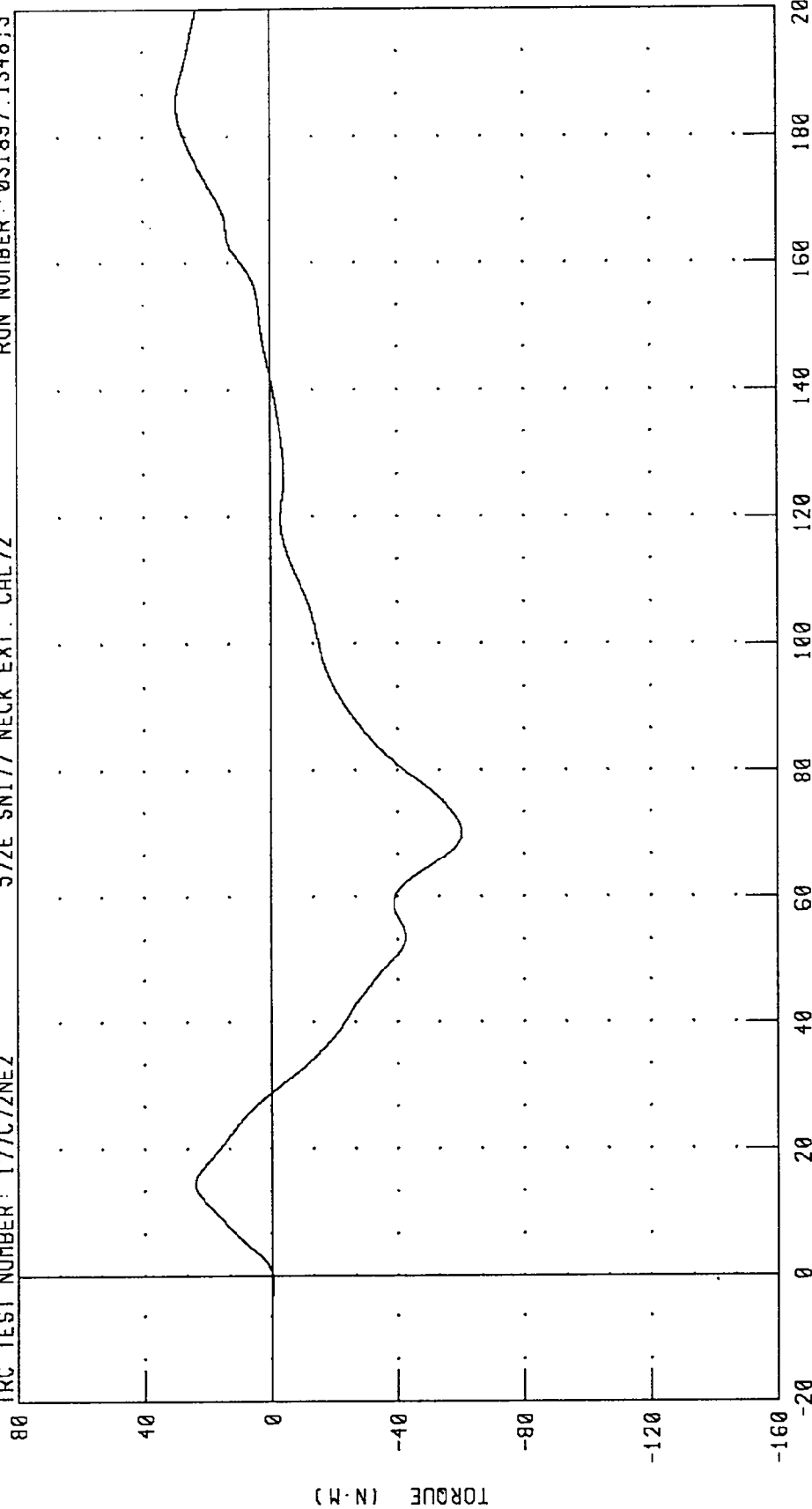
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 177C72NE2

572E SN177 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3



PEAK DATA: 29.43 N·M @ 185.12 MS; -60.40 N·M @ 70.08 MS

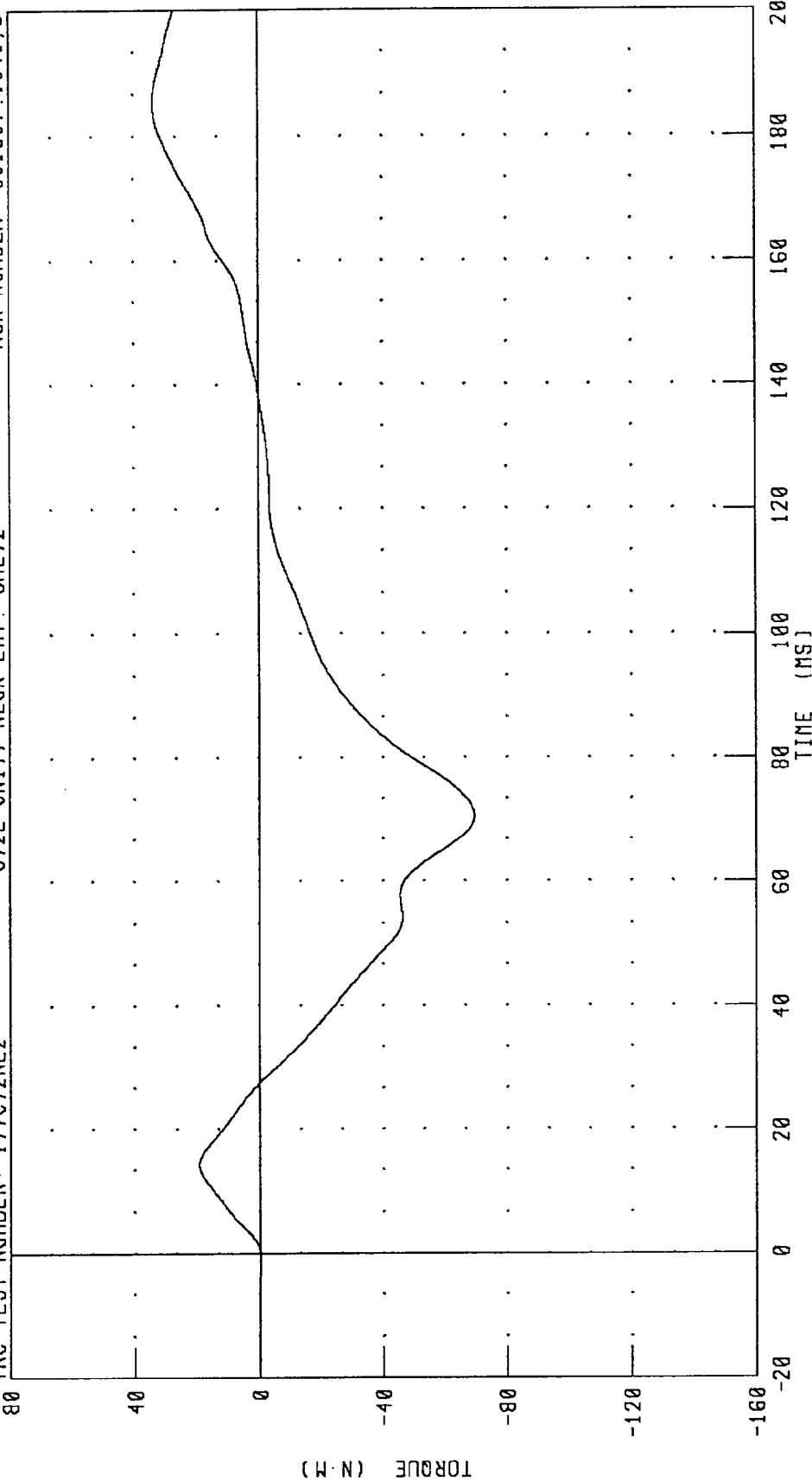
CHANNEL: NEKYM FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

IRC TEST NUMBER: 177C72NE2

572E SN177 NECK EXT. CAL72

RUN NUMBER: 031897.1348;3



PEAK DATA: 33.85 N·M @ 185.36 MS; -69.65 N·M @ 70.48 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

01-FEB-97

TRC INC.

TEST NO: 177C72TH1

572E SN177 H.S.THORAX CAL72

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.8 DEG. C
RELATIVE HUMIDITY	10 - 70 %	35.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.68 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.0 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5561. N
INTERNAL HYSTERESIS	69% - 85%	74.7%

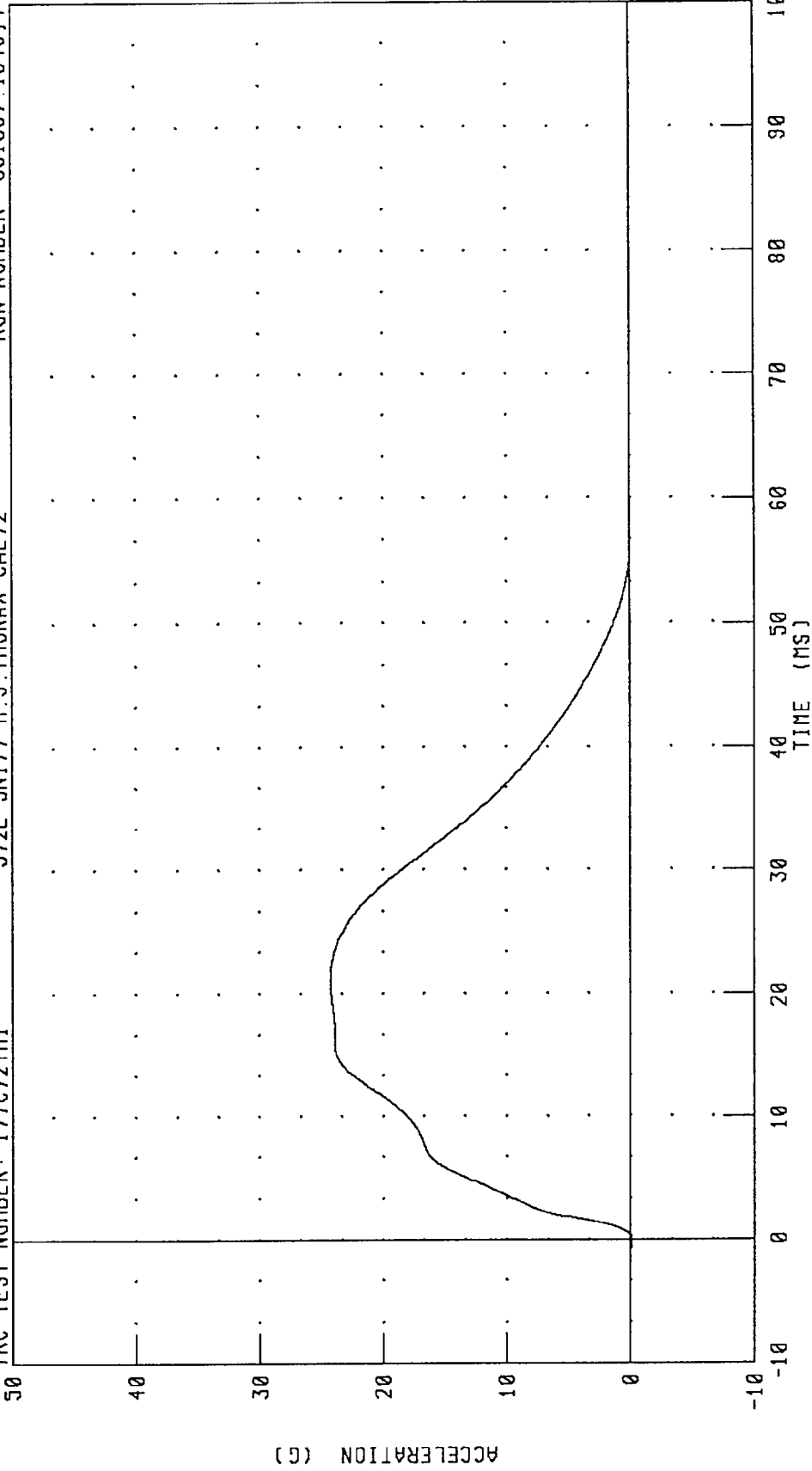
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. L...

RUN NUMBER: 020197.1646;4

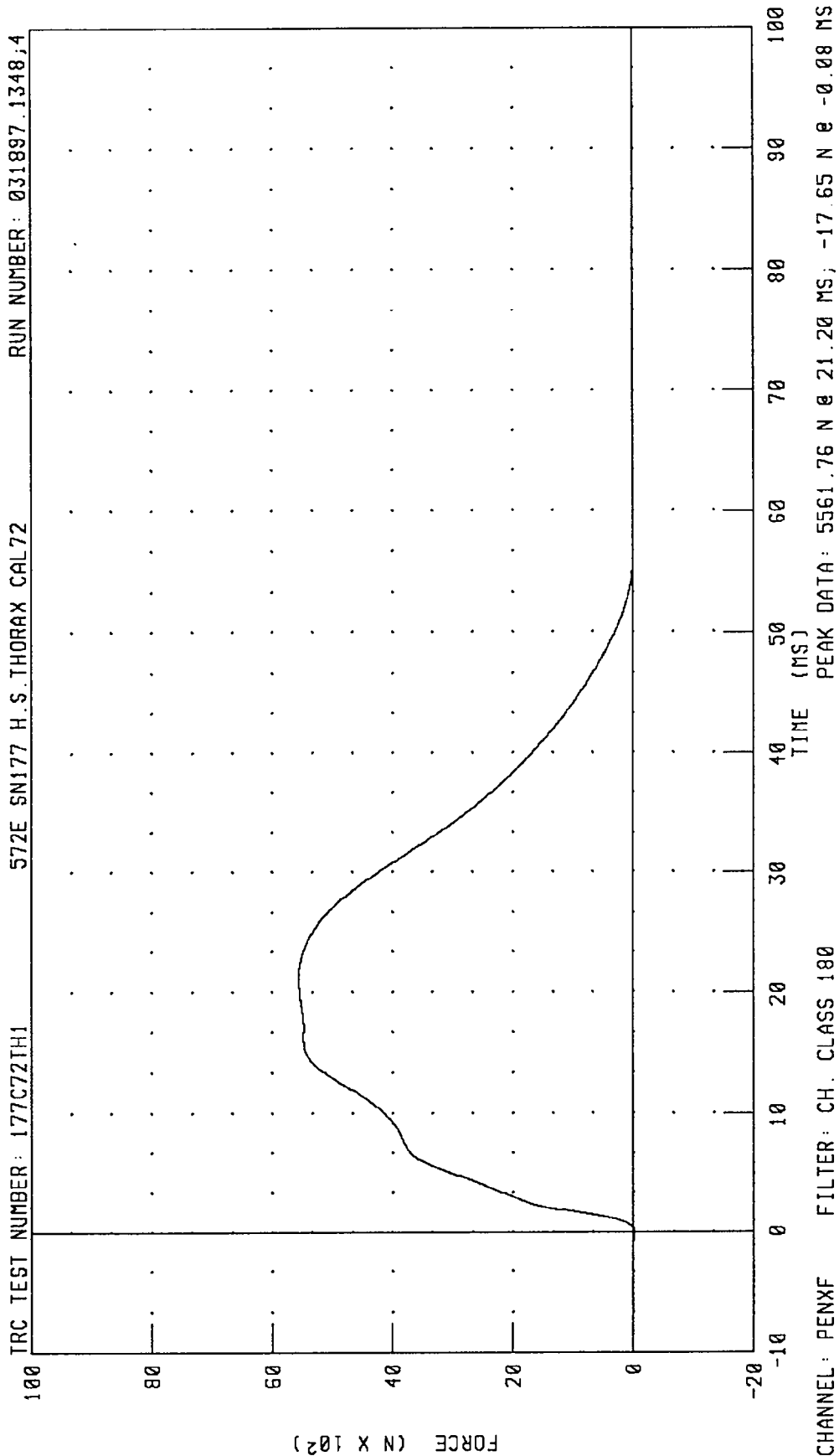
PART 572-E HYBRID III THORAX CALIBRATION PENDULUM DECELERATION

TRC TEST NUMBER: 177C72TH1 572E SN177 H.S. THORAX CAL72 RUN NUMBER: 031897 1348;4



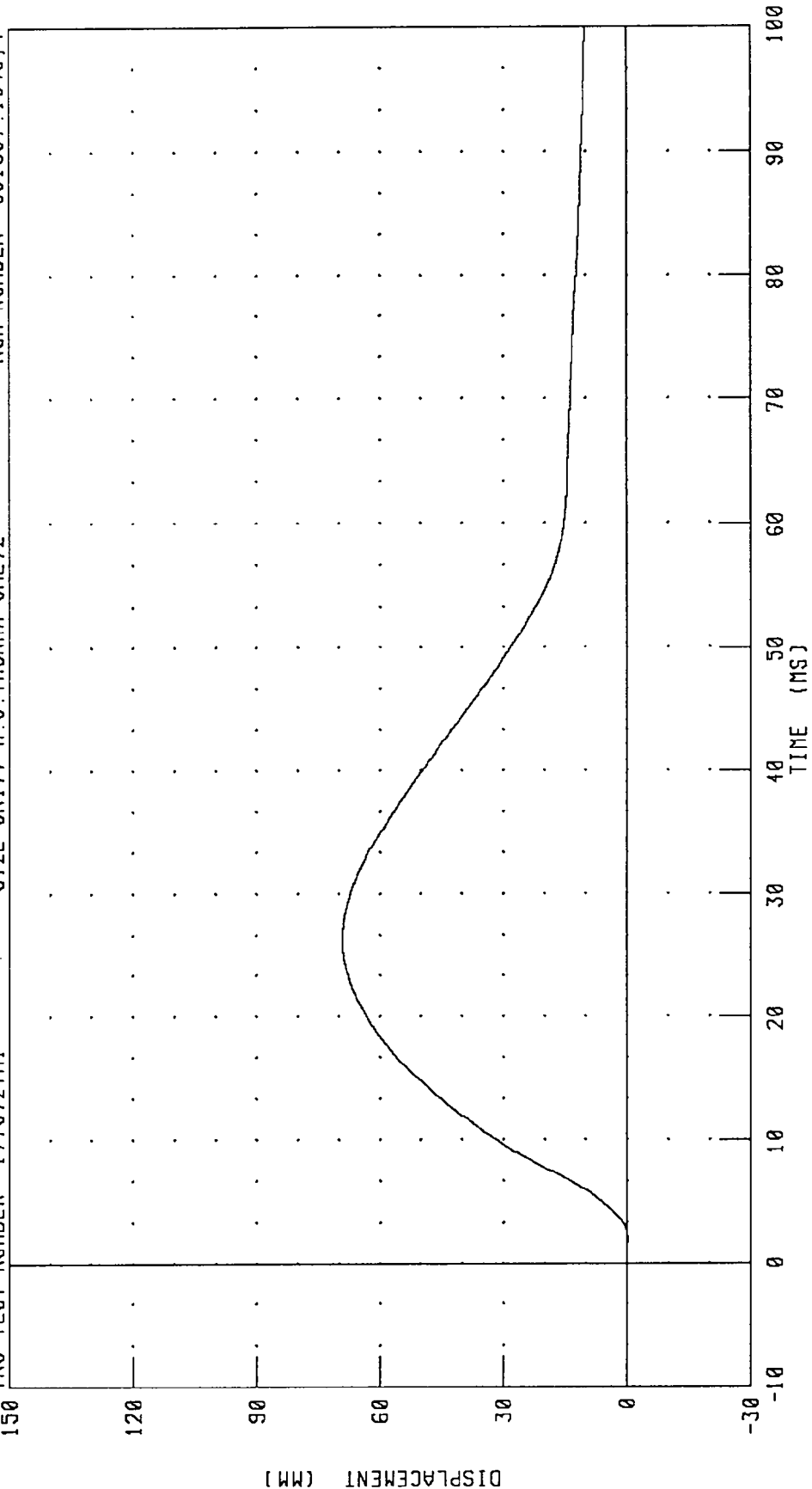
CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 24.28 G @ 21.20 MS; -0.08 G @ -0.08 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE



PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

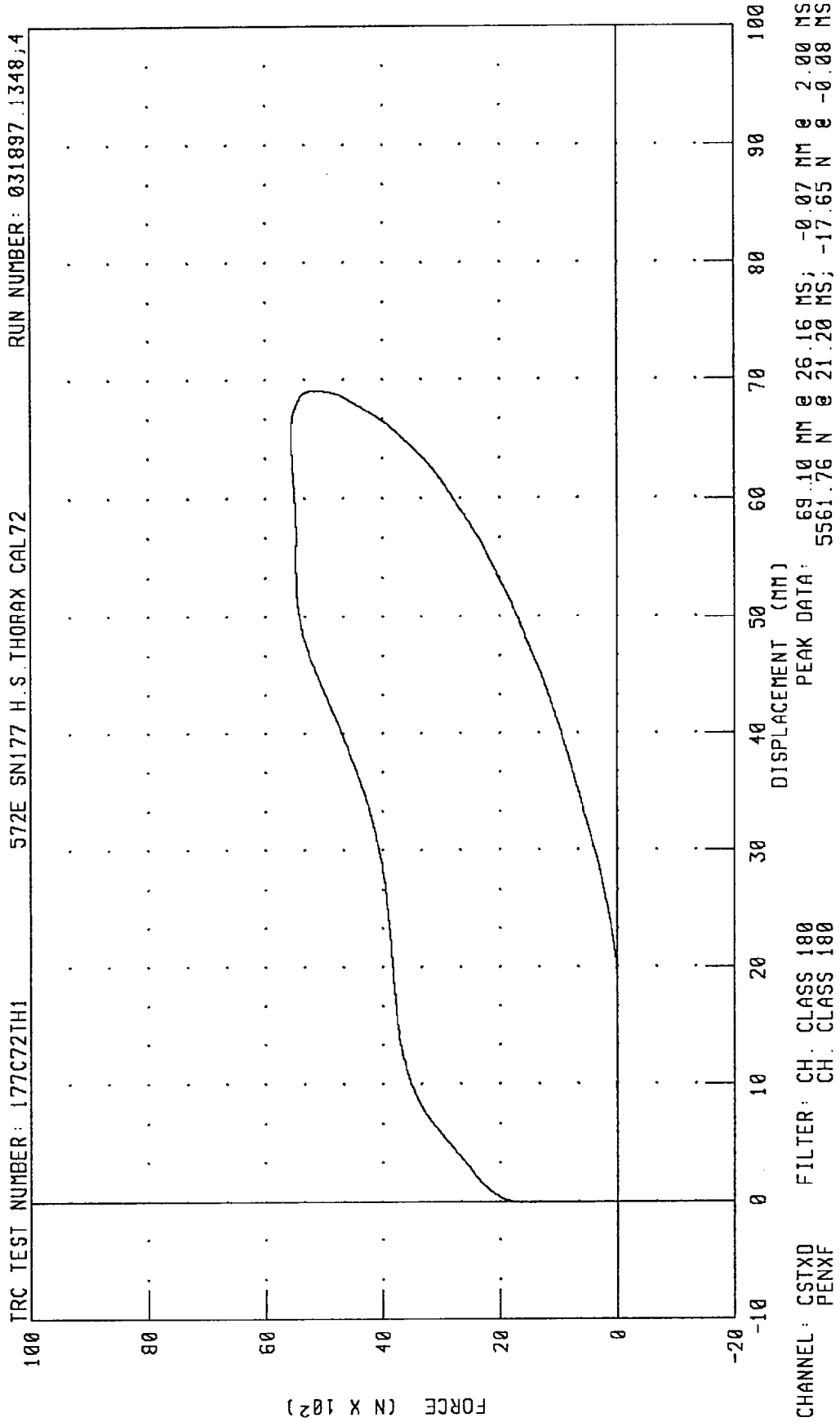
IRC TEST NUMBER: 177C72TH1 572E SN177 H.S. THORAX CAL72 RUN NUMBER: 031897.1348;4



PEAK DATA: 69.10 MM @ 26.16 MS; -0.07 MM @ 2.00 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

30-JAN-97

TRC INC.

TEST NO: 177C72RK1

572E SN177 RIGHT KNEE CAL 72

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	23.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5572.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Richard L. Lee

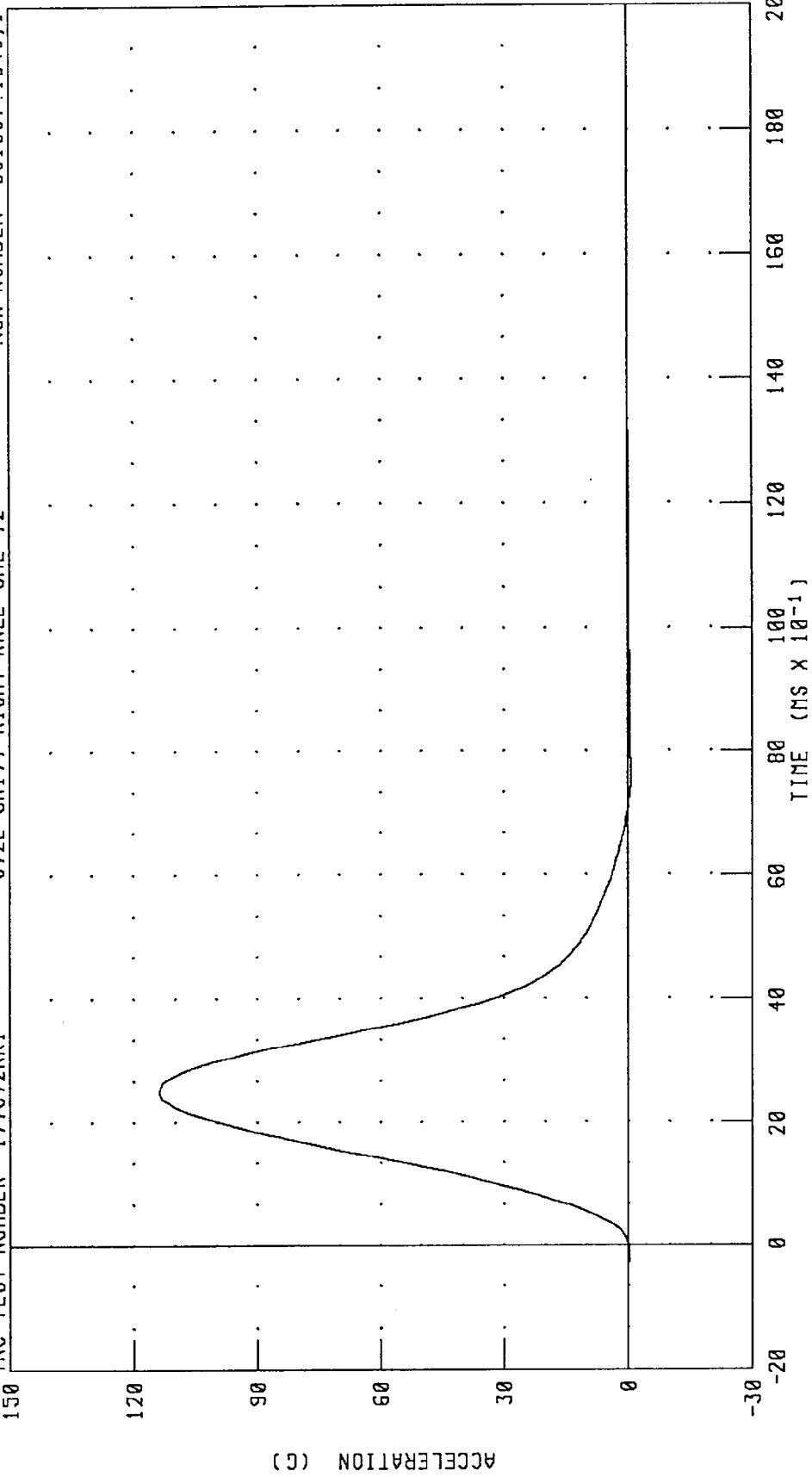
RUN NUMBER: 013097.0914;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 177C72RK1

572E SN177 RIGHT KNEE CAL 72

RUN NUMBER: 031897.1348;1



PEAK DATA: 113.90 G @ 2.48 MS; -0.70 G @ 7.60 MS

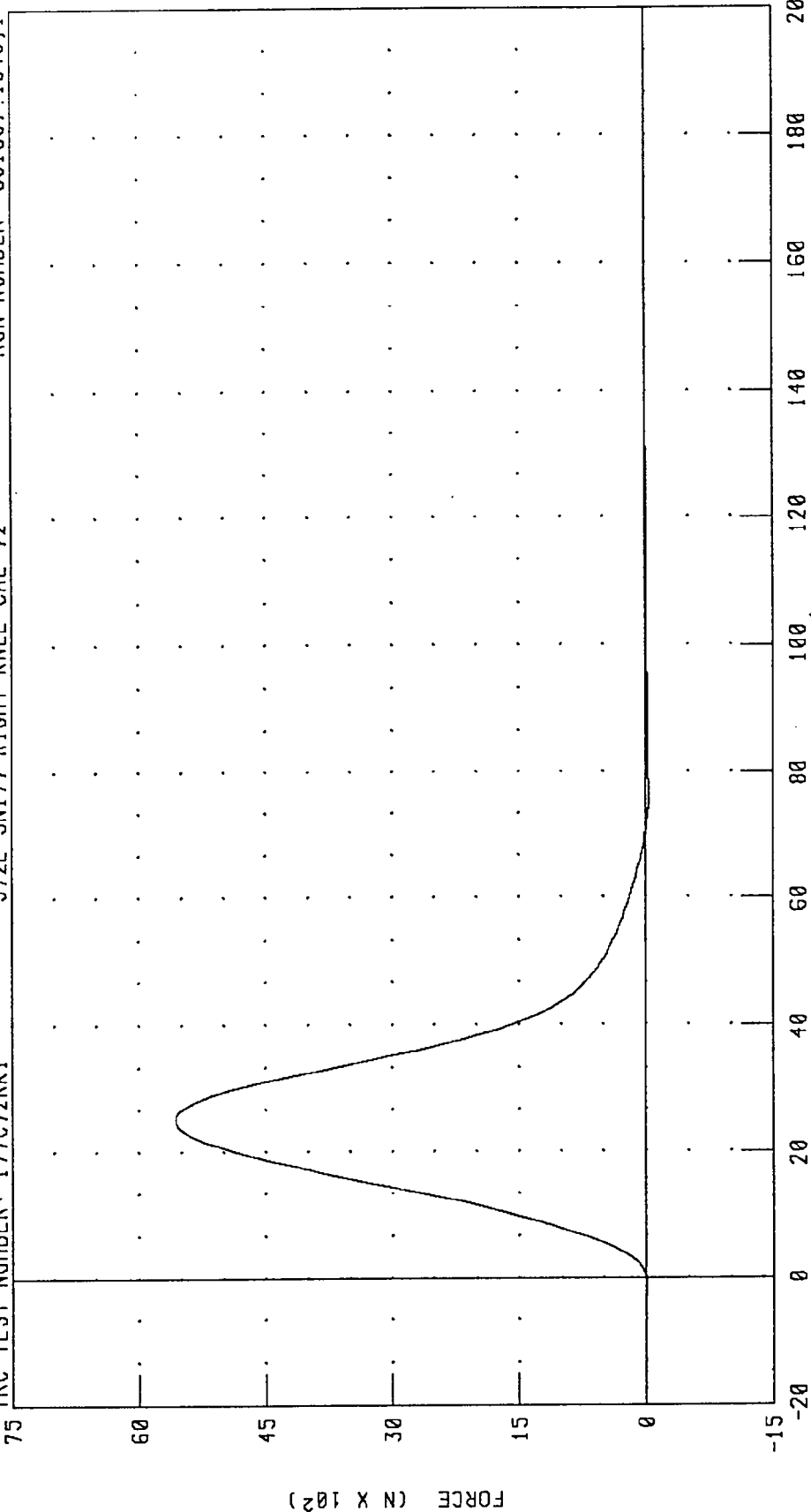
CHANNEL: PENXG FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 177C72RK1

572E SN177 RIGHT KNEE CAL 72

RUN NUMBER: 031897.1348.1



PEAK DATA: 5572.76 N @ 2.48 MS; -34.42 N @ 7.60 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

30-JAN-97

TRC INC.

TEST NO: 177C72LK1

572E SN177 LEFT KNEE CAL 72

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	23.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5593.1 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. Van

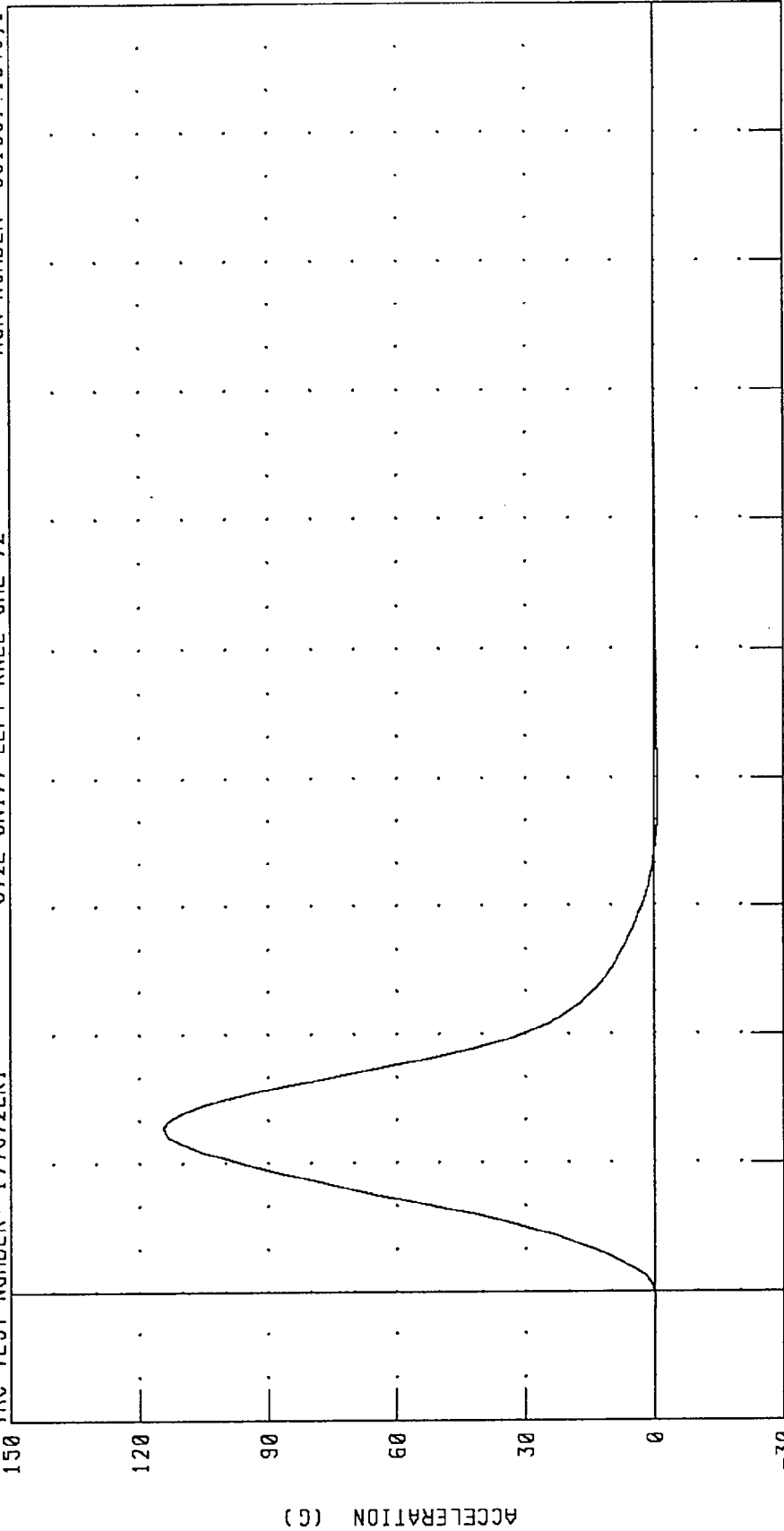
RUN NUMBER: 013097.0905;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 177C72LK1

572E SN177 LEFT KNEE CAL 72

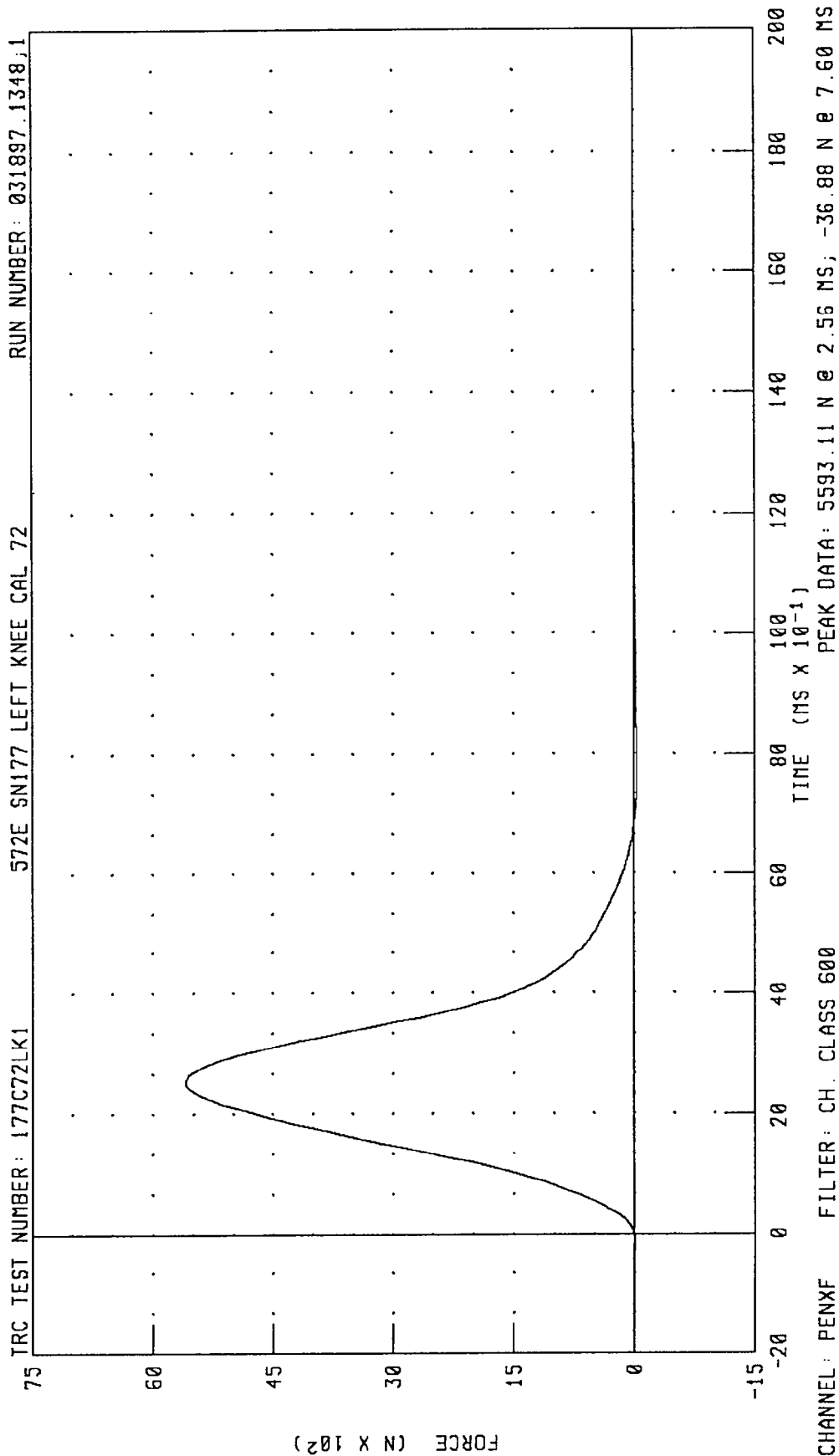
RUN NUMBER: 031897.1348;1



CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 114.31 G @ 2.56 MS; -0.75 G @ 7.60 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM FORCE (5 KG PEND.)



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE SLIDER TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 177C72RS1

572E SN177 RIGHT SLIDER CAL72

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.76 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1282. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2364. N

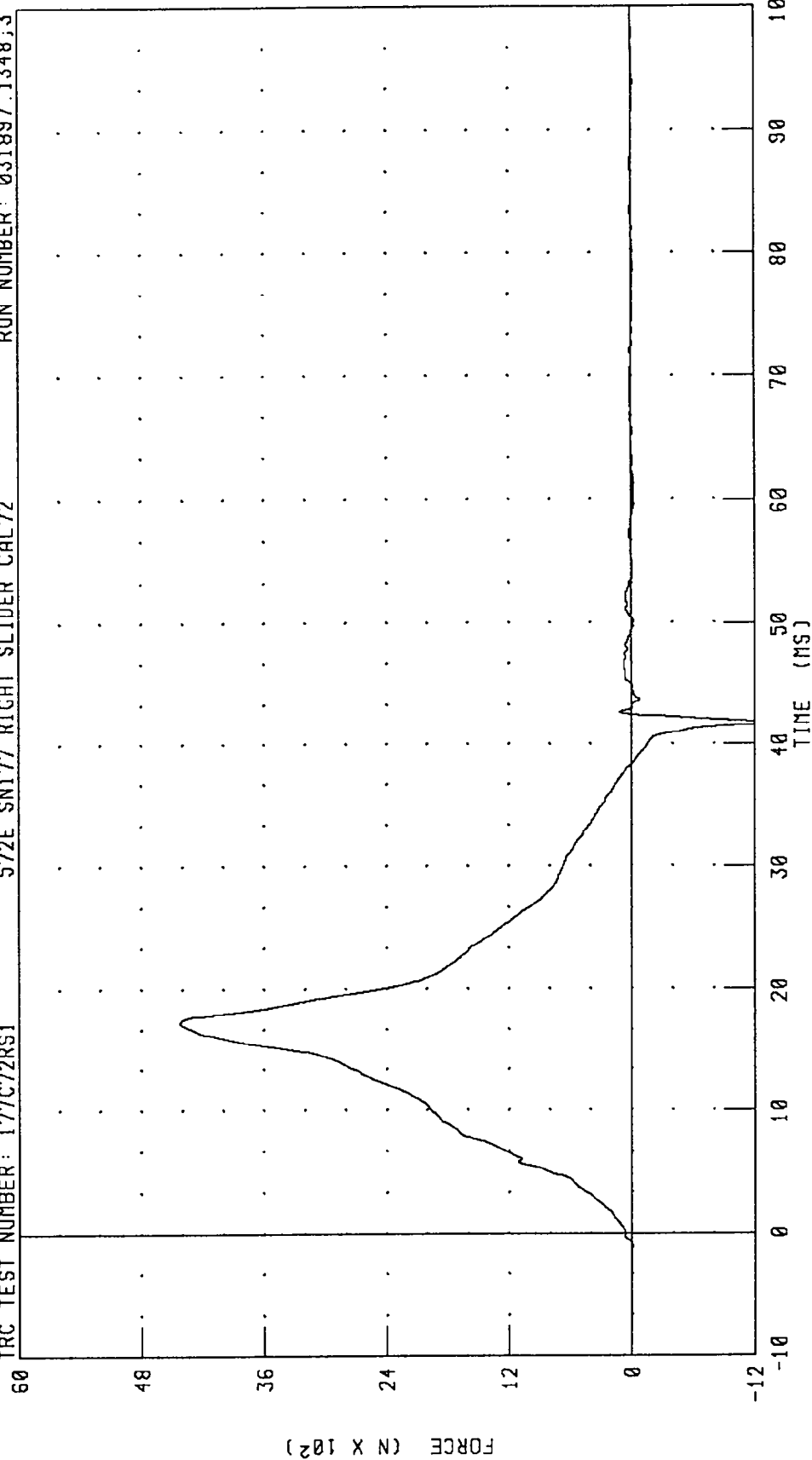
TEST MEETS SPECIFICATIONS

TECHNICIAN Richard L. L...

RUN NUMBER: 013197.1454;3

PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION
RIGHT FEMUR FORCE

TRC TEST NUMBER: 177C72RS1 572E SN177 RIGHT SLIDER CAL72 RUN NUMBER: 031897.1348,3



PEAK DATA: 4421.63 N @ 17.28 MS, -1309.19 N @ 41.76 MS

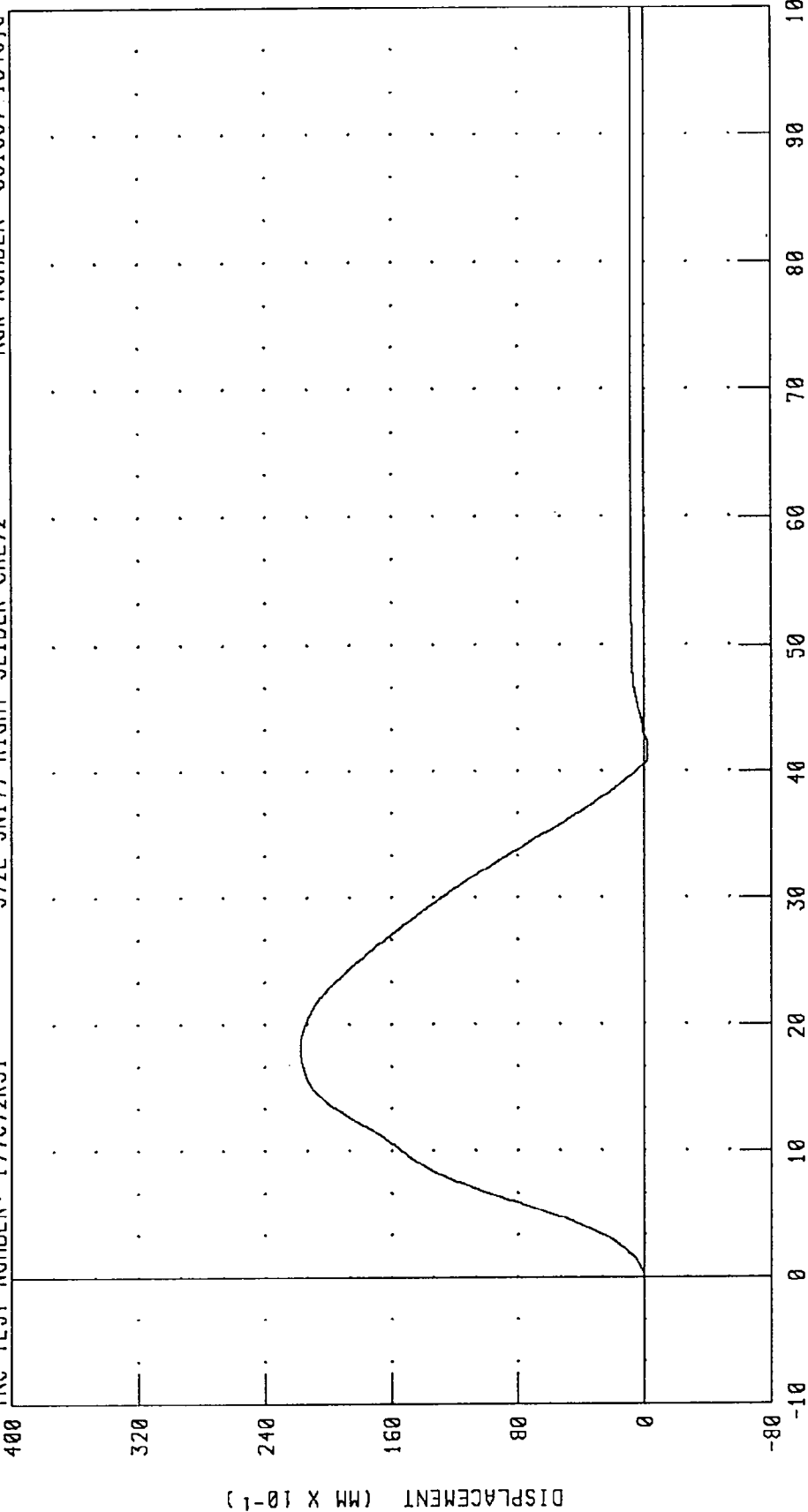
CHANNEL: RFMF FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION
RIGHT KNEE DISPLACEMENT

TRC TEST NUMBER: 177C72RS1

572E SN177 RIGHT SLIDER CAL72

RUN NUMBER: 031897 1348,3



PEAK DATA: 21.74 MM @ 17.76 MS; -0.22 MM @ 41.12 MS

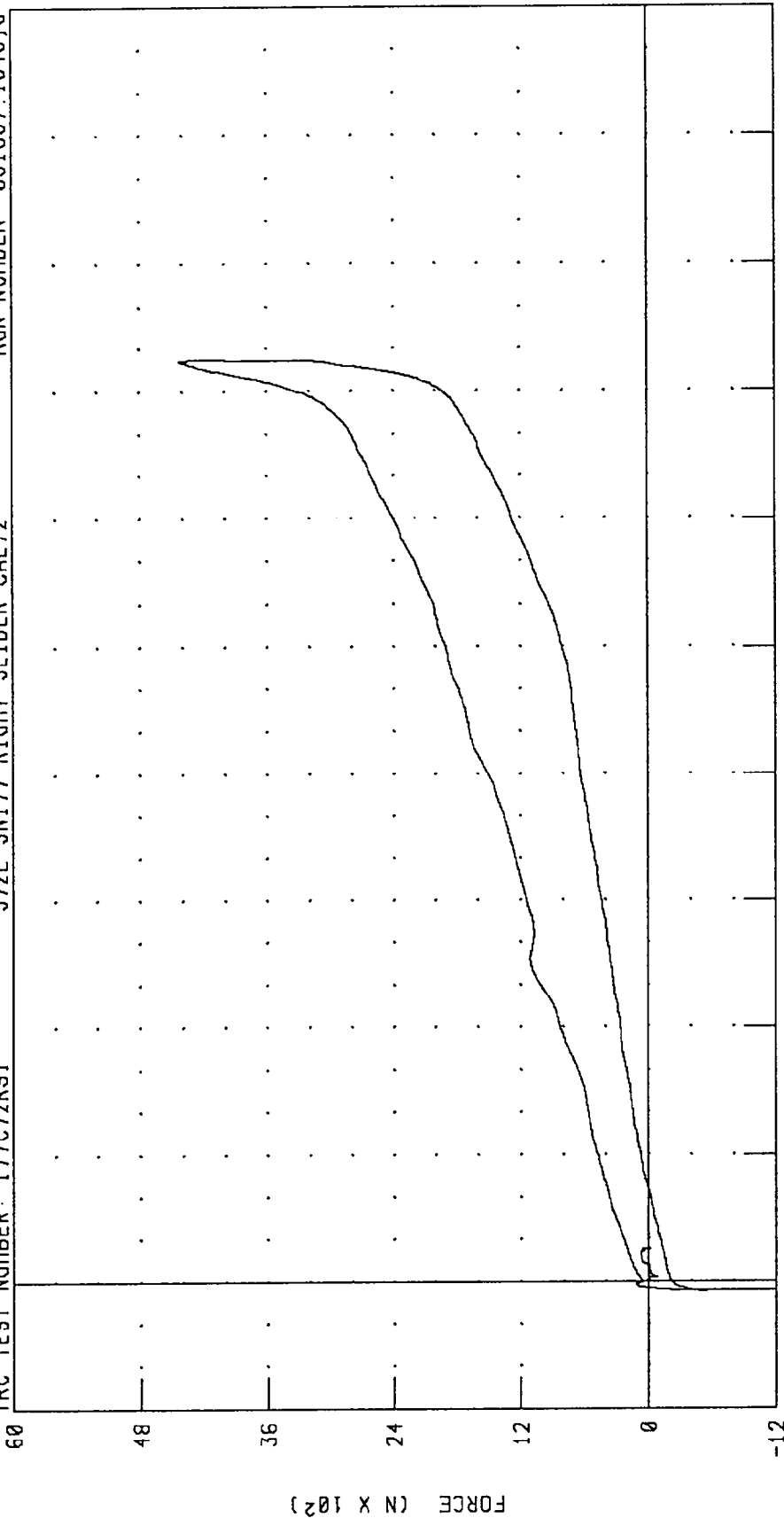
CHANNEL: KNRXD FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION
RIGHT KNEE DISPLACEMENT VS FEMUR FORCE

TRC TEST NUMBER: 177C72RS1

572E SN177 RIGHT SLIDER CAL72

RUN NUMBER: 031897.1348;3



CHANNEL: KNRXD FILTER: CH. CLASS 600
RFMF CH. CLASS 600

PEAK DATA: 21.74 MM @ 17.76 MS; -0.22 MM @ 41.12 MS
4421.63 N @ 17.28 MS; -1309.19 N @ 41.76 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE SLIDER TEST

HYBRID III

31-JAN-97

TRC INC.

TEST NO: 177C72LS1

572E SN177 LEFT SLIDER CAL72

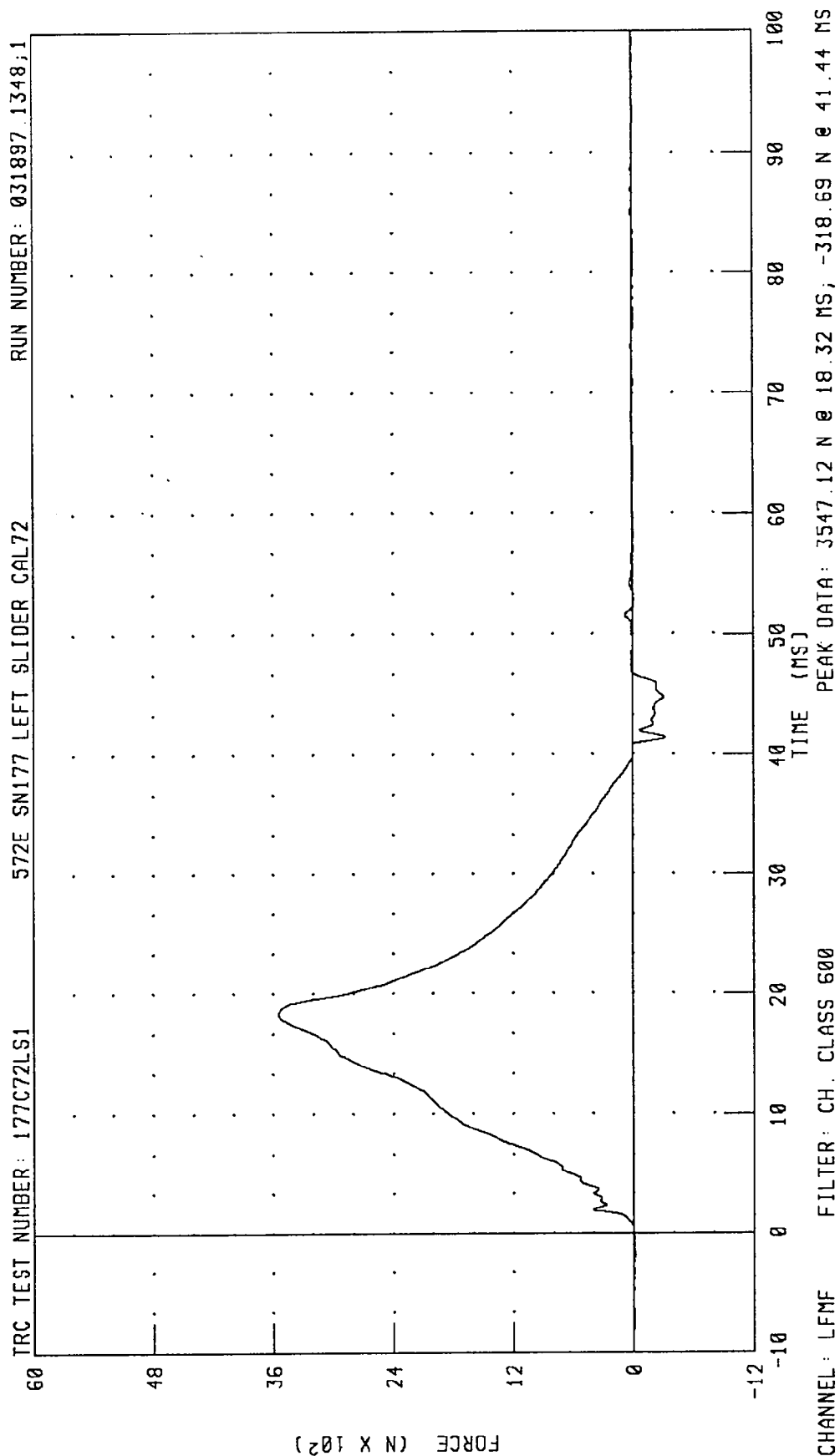
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	25.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.75 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1554. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2735. N

TEST MEETS SPECIFICATIONS

TECHNICIAN Richard Le Van

RUN NUMBER: 013197.1356;1

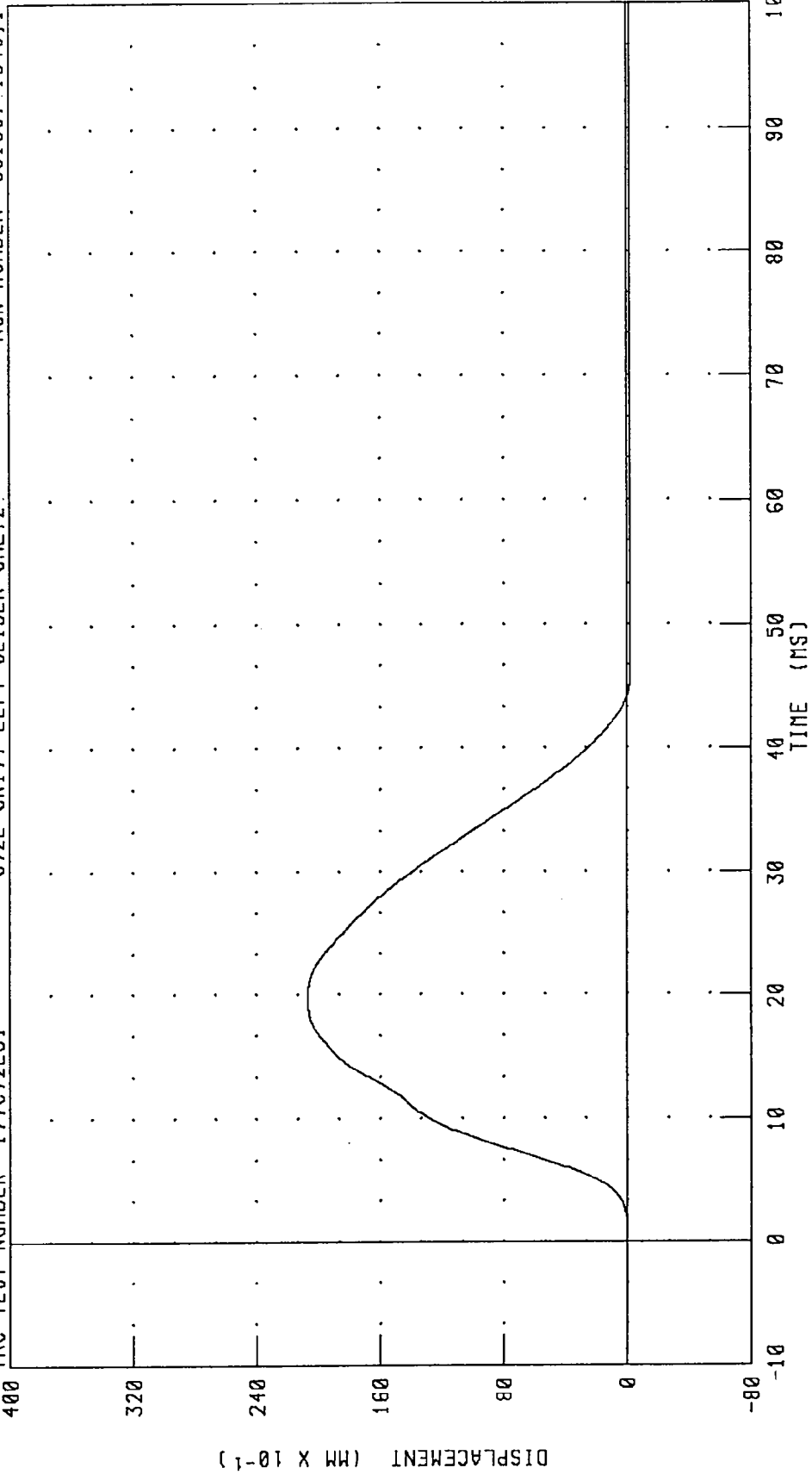
PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT FEMUR FORCE



CHANNEL: LFMF FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT KNEE DISPLACEMENT

TRC TEST NUMBER: 177C72LS1 572E SN177 LEFT SLIDER CAL72 RUN NUMBER: 031897 1348,1

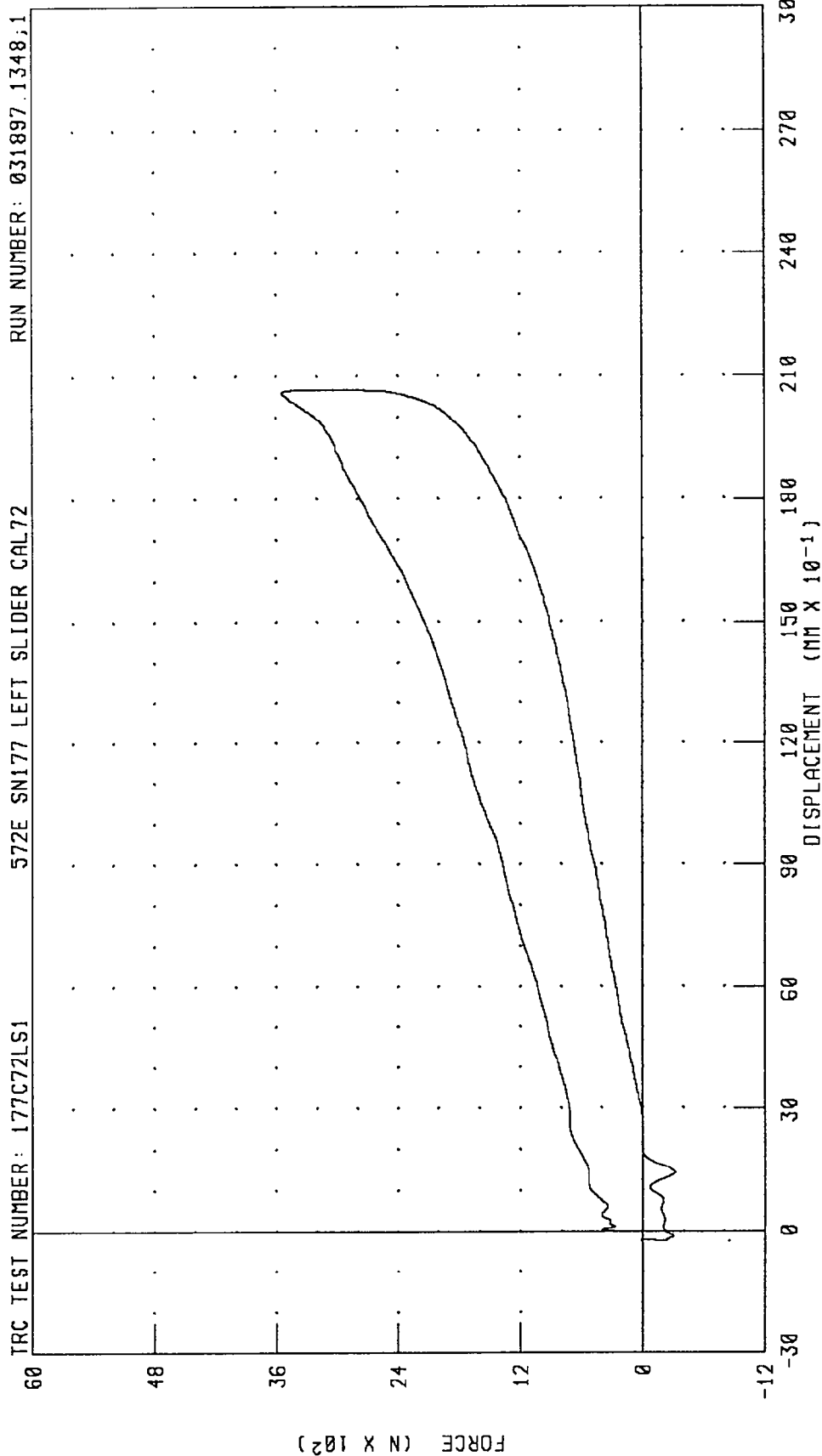


PEAK DATA: 20.67 MM @ 19.28 MS; -0.21 MM @ 88.56 MS

CHANNEL: KNLXD FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION
LEFT KNEE DISPLACEMENT VS FEMUR FORCE

TRC TEST NUMBER: 177C72LS1 572E SN177 LEFT SLIDER CAL72 RUN NUMBER: 031897.1348;1



CHANNEL: KNLXD FILTER: CH. CLASS 600
LFMF CH. CLASS 600

PEAK DATA: 20.67 MM @ 19.28 MS;
3547.12 N @ 18.32 MS; -0.21 MM @ 46.08 MS
-318.69 N @ 41.44 MS

Appendix D

Miscellaneous Test Information

Sign Convention
NHTSA Data Tape Reference Guide

<u>Accelerometers:</u>	+X: Forward	
	+Y: Leftward	
	+Z: Upward	
<u>Potentiometers:</u>	+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)
<u>Load cells:</u>	+Femur force:	Tension
	+Seat belt force:	Tension
	+Barrier force:	Tension
<u>Neck load cells:</u>	+X force:	Head pushed forward
	+y force:	Head pushed leftward
	+Z force:	Head pulled upward (tension on neck)
	+X moment:	Right ear rotating toward right shoulder
	+Y moment:	Chin rotating toward chest
	+Z moment:	Chin rotating toward left shoulder
<u>Tibia load cells:</u>	+X force:	Tension
	+Y force:	Tension
	+Z force:	Tension
	+X moment:	Bottom of tibia moving leftward
	+Y moment:	Bottom of tibia moving rearward

Frequency Response Classes
SAE J211 OCT88

<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