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Report Number: TRC-96-V009

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

**Moving Deformable Impactor into Front of
1996 Chevrolet Cavalier
at 113 kph at a 25° Angle with 60% Overlap
TRC Test Number: 971010**

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



November 5, 1997

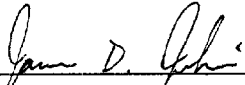
Final Report

**Prepared for:
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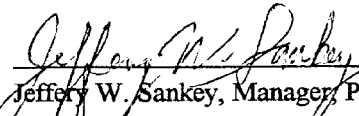
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Technical Report Documentation Page

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16. Abstract A moving deformable impactor into a 1996 Chevrolet Cavalier 2-door sedan, NHTSA No. RT0116, was conducted at Transportation Research Center Inc. on October 10, 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 115.7 kph. The vehicle's test weight was 1461 kg. The vehicle's maximum crush was 534 millimeters. The ambient temperature was 23° C. The driver's Head Injury Criteria (HIC) was 422. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.6 g. The driver's chest maximum deflection was 37 mm. the driver's left and right femur maximum axial forces were 6,772 N and 6,526 N, respectively. The passenger's Head Injury Criteria (HIC) was 703. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 63.1 g. The passenger's chest maximum deflection was 36 mm. The passenger's left and right femur maximum axial forces were 5,741 N and 6,019 N, respectively.			
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METRIC CONVERSION FACTORS

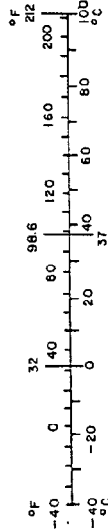
Approximate Conversions to Metric Measures

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
----	------------------------	----------------------------	---------------------	----

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
m	meters	1.1	yards	yd
km	kilometers	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 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Mon., Publ. 218, Units of Weight and Measure, Price \$2.25, SD Catalog No. C13.10-218.

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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 moving deformable barrier at 25° to the target vehicle with 60% overlap. 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. 4, "Frontal Full-Scale Crash Testing for Upgrade of FMVSS 208 Frontal Test Procedure."

The test vehicle was instrumented with fourteen (14) 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 and three (3) accelerometers at the center of gravity to measure longitudinal, lateral, and vertical axis accelerations.

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 pot thorax to measure longitudinal and lateral rib displacement.

The one-hundred-thirty-six (136) 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 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 moving deformable barrier at 25° to the test vehicle with 60% overlap was conducted at TRC on October 10, 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 1460.9 kg. The vehicle's maximum static crush was 534 mm.

The driver's HIC was 422. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.6 g. The driver's chest maximum deflection was 37 mm. The driver's left and right femur maximum compressive forces were 6,772 N and 6,526 N, respectively.

The right front passenger's HIC was 703. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 63.1 g. The right front passenger's chest maximum deflection was 36 mm. The right front passenger's left and right femur maximum compressive forces were 5,741 N and 6,019 N, respectively.

Data Acquisition Explanations

The right front passenger dummy's lower neck X-axis shear force data channel, NKLXF2, recorded anomalous spikes and exceeded its data channel's full scale at approximately 90, 135, 145, 175, milliseconds and between 205 and 245 milliseconds.

The right front passenger left lower rib straight displacement data channel, LLRSD2, did not record any data.

The vehicle's toe pan Y-axis acceleration data channel, TOEYG1, exceeded its data channel's full scale input at 11 and 23 milliseconds. This affected the resultant calculation for the toe pan.

The moving barrier's front bottom left X-axis force data channel, BFFXF2, exceeded its data channel's full scale input at 17 milliseconds and recorded questionable data throughout the event.

The moving barrier's front center X-axis force data channel, BFFXF5, did not record any data.

The moving barrier's center of gravity Y-axis acceleration data channel, BCGYG1, did not record any data. This affected the moving barrier's center of gravity resultant calculation.

The moving barrier's center of gravity Z-axis acceleration data channel, BCGZG1, recorded questionable data throughout the event. This affected the moving barrier's center of gravity resultant calculation.

Table 1 Crash Test Summary

Test type:	113 kph moving deformable barrier at 25° into test vehicle with 60% overlap
Test date:	10/10/97
Test time:	1525
Ambient temperature at impact area:	23° C
Vehicle year/make/ model/body style:	1996/Chevrolet/Cavalier/passenger car
Vehicle test weight:	1460.9 kg
Impact angle ¹ :	335°
Impact velocity ² :	
Primary:	115.7 kph
Secondary:	115.7 kph
Maximum static crush:	534 mm
Number of cameras:	
High-speed:	12
Door opening data:	
Left-front:	Needed tools
Right-front:	Difficult

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 #110</u>	<u>Passenger #001</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	Airbag
Chest:	Airbag	None
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1996/Chevrolet/Cavalier/passenger car		
Color:	White		
VIN:	1G1JC1242T7154392		
Engine data:			
Placement:	Transverse		
Cylinders:	4		
Displacement:	2.2 liters		
Transmission data:	<u>3</u> speed,	<u> </u> manual,	<u> X </u> automatic, <u> </u> overdrive
Final drive:	<u> X </u> fwd,	<u> </u> rwd,	<u> </u> 4wd
Date vehicle received:	NA		
Odometer reading:	30,561		
Dealer's name and address:	N/A		
<u>Accessories:</u>			
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	Yes
Clock	Yes	Rear window defroster	Yes

Certification data from vehicle's label: ¹

Vehicle manufactured by:

Date of manufacture:

VIN:

GVWR:

GAWR: Front:

Rear:

¹ The vehicle did not contain a label stating certification data.

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle:	P195/65R15
Spare tire:	Uniroyal Hideaway T115/70D14
Type of front seats:	Bucket

Tire & capacity data from vehicle's label: ¹

Recommended tire size:

Recommended cold tire pressure:

Front:	psi
--------	-----

Rear:	psi
-------	-----

Designated Seating Capacity:

Front

Rear

Total

Vehicle Capacity Weight:	lbs.
--------------------------	------

Test vehicle attitudes:

Delivered attitude:	LF: 690 mm	RF: 692 mm	LR: 710 mm	RR: 712 mm
Pre-test attitude:	LF: 684 mm	RF: 672 mm	LR: 664 mm	RR: 659 mm
Post-test attitude:	LF: 711 mm	RF: 664 mm	LR: 566 mm	RR: 769 mm

¹ The vehicle did not contain a label stating tire and capacity data.

Table 2 Test Vehicle Information, Cont'd.

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

Right front	393.7 kg	Right rear	211.4 kg
Left front	399.6 kg	Left rear	214.5 kg
Total front weight	793.3 kg	(65.1% of total vehicle weight)	
Total rear weight	425.9 kg	(34.9% of total vehicle weight)	
Total delivered weight	1219.2 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1219.2 kg)

VCW = Vehicle Capacity Weight = 400 kg

DSC = Designated Seating Capacity (5)

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

Target test weight = UDW + RCLW¹ + (Number of Hybrid III dummies x 76 kg per dummy)

Target test weight = 1219.2 + 60 + 152 = 1431.2 kg

Weight of test vehicle with required dummies and 64 kg of cargo weight:

Right front	429.5 kg	Right rear	301.0 kg
Left front	430.0 kg	Left rear	300.4 kg
Total front weight	859.5 kg	(58.8% of total vehicle weight)	
Total rear weight	601.4 kg	(41.2% of total vehicle weight)	
Total test weight ²	1460.9 kg	(2.1% over target test weight)	

Weight of ballast secured in vehicle cargo area: 4.0 kg of Stoddard solvent in fuel tank

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 1085 mm

Vehicle Wheelbase: 2635 mm

¹ From vehicle's tire load label.

² A target test weight of 1461.5 kg was used by instruction of COTR.

Table 3 Post-Impact Data

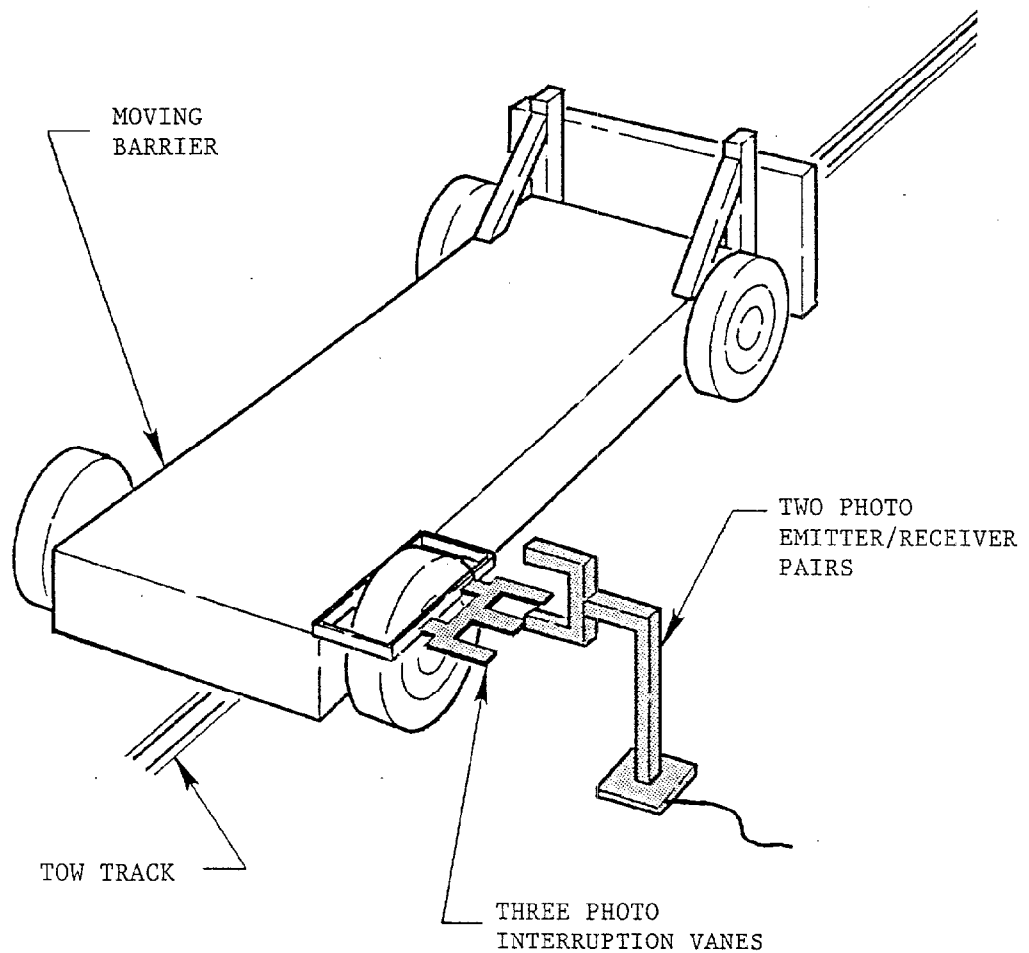
Test number: 971010
Test date: 10/10/97
Test time: 1525
Test type: 113 kph moving deformable barrier into
test vehicle at a 25° angle with 60% overlap
Impact angle: ¹ 335°
Ambient temperature
at impact area: 23° C
Temperature in
occupant compartment: 24° C
Impact velocity:
Primary: 115.7 kph
Secondary 115.7 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: 4166 mm C: 4434 mm R: 4165 mm
Post-test: L: 3632 mm C: 4146 mm R: 4155 mm
Total crush: L: 534 mm C 288 mm R: 10 mm
Average crush: 277 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: 10/10/97
Vehicle year/make/
model/body style: 1996/Chevrolet/Cavalier/passenger car
Volpe No.: RT0116
VIN: 1G1JC1242T7154392
Build date: NA
Test weight: 1460.9 kg
Vehicle wheelbase: 2635 mm
Maximum width: 1745 mm
Front overhang: NA

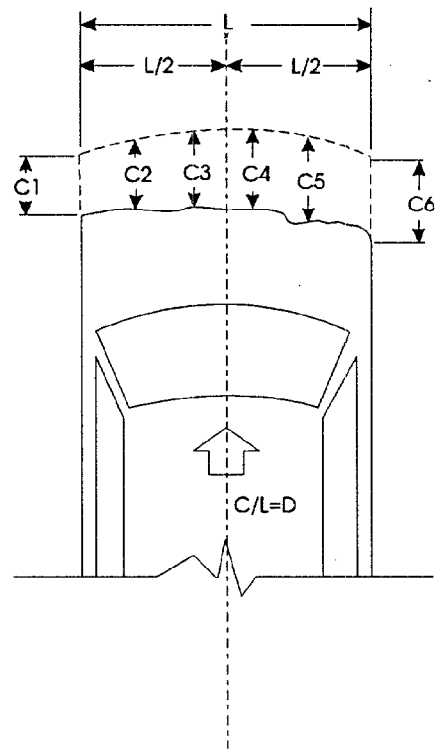
Collision Deformation

Classification (CDC) Code: NA

Crush depth
measurements: C1: 534 mm
C2: 471 mm
C3: 344 mm
C4: 220 mm
C5: 61 mm
C6: 10 mm

Midpoint of damage: D: Vehicle Longitudinal Centerline
4434 mm

Length of damaged
region: L: 1524 mm



Section 3.0

FMVSS 208 and 301 Data

Table 4 Dummy Injury Criteria

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-42.9 g	19.3 g	-29.5 g	51.8 g	23.4 g	-32.0 g	51.0 g
Passenger	-60.7 g	-43.4 g	-37.3 g	67.3 g	-60.8 g	-21.7 g	23.2 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	6,772 N	6,526 N
Passenger	5,741 N	6,019 N

	<u>Head Injury Criteria ¹</u>		
	HIC	Time t ₂	Time t ₃
Driver	422	53.0 ms	89.0 ms
Passenger	703	63.4 ms	96.2 ms

	<u>Head Maximum Resultant Acceleration ²</u>		
	Acceleration	Time t ₂	Time t ₃
Driver	49.1 g	61.3 ms	64.2 ms
Passenger	66.2 g	79.1 ms	82.1 ms

	<u>Chest Maximum Resultant Acceleration ²</u>		
	Acceleration	Time t ₁	Time t ₂
Driver	53.6 g	62.4 ms	65.4 ms
Passenger	63.1 g	67.5 ms	70.6 ms

<u>Maximum Chest Deflection</u>	
Driver	37 mm
Passenger	36 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.:	RT0116
Fuel system capacity:	57.5 liters
Usable capacity:	57.5 liters (furnished by COTR)
Test volume range:	52.9 liters to 54.1 liters (92-94% of usable)
Actual test volume: ¹	4.7 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 was located on the right side and entered the rear of the tank. The fuel lines ran along the left side of the vehicle.

¹ Test volume was for ballast weight only. The remainder of the fluid was added post-test.

Table 6 FMVSS 301 Post-Impact Test Data

Test date: 10/10/97

Volpe No.: RT0116

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:

 X 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:

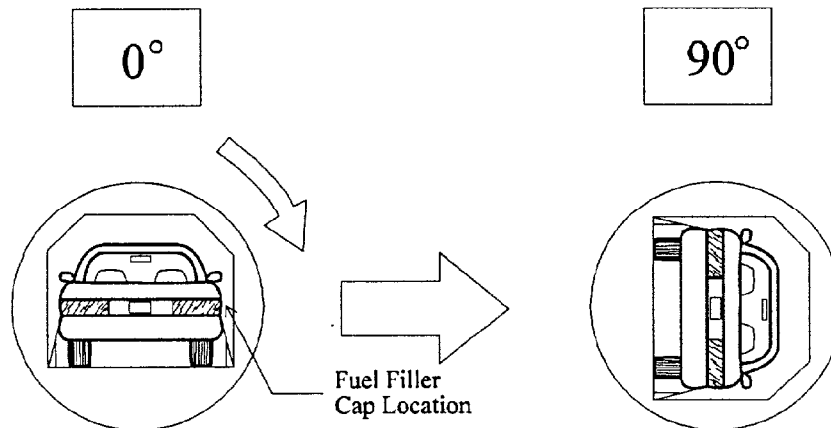
	Test <u>Results</u>	Maximum <u>Allowable</u>
1. From impact until vehicle motion ceases	0 g	28 g
2. 5-Minute period after vehicle motion ceases	0 g	140 g
3. Next 25 minutes after 5-minute period	0 g	28 g/1 min

Fuel system fluid spillage location(s): None

Figure 3 FMVSS 301 Static Rollover Test Data

NHTSA number: RT0116

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	

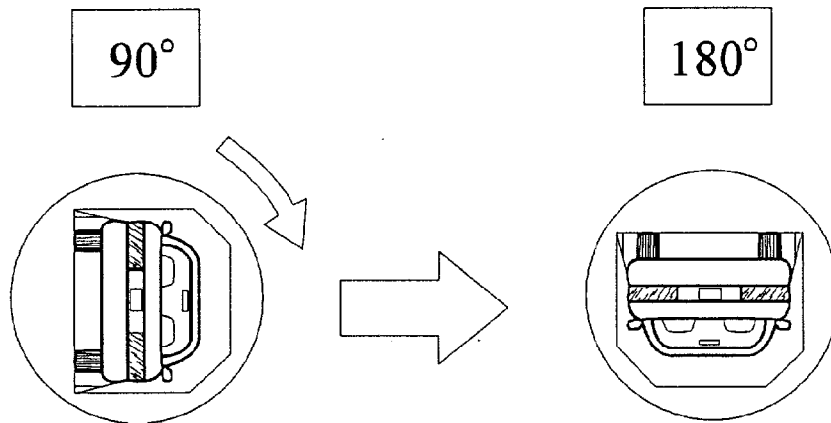
Fuel system fluid spillage measurements:

0° to 90° rotation (fuel filler cap down)	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	=	14	minutes		

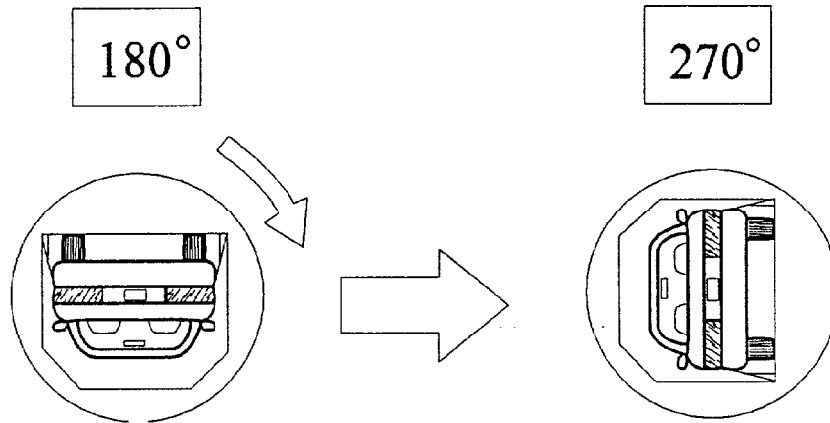
Fuel system fluid spillage measurements:

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	

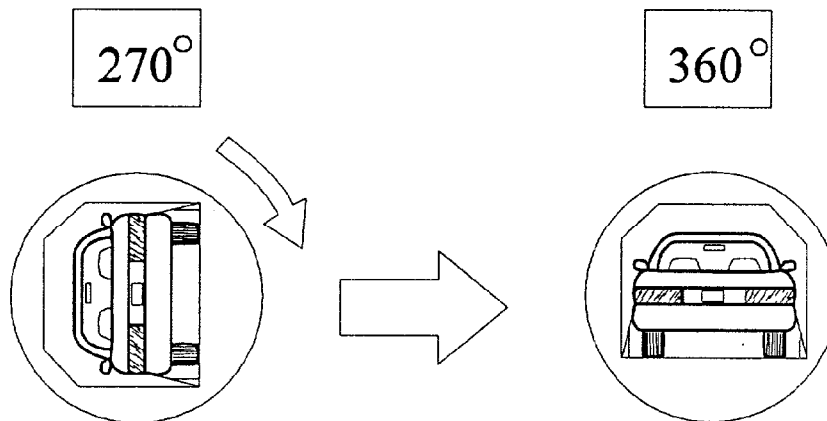
Fuel system fluid spillage measurements:

180 to 270° 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	=	28	minutes		

Fuel system fluid spillage measurements:

270° to 360° 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

Section 4.0

Vehicle, Moving Deformable Barrier, Occupant, and Camera Measurements

Figure 4 Pre-test and Post-test Measurement Points

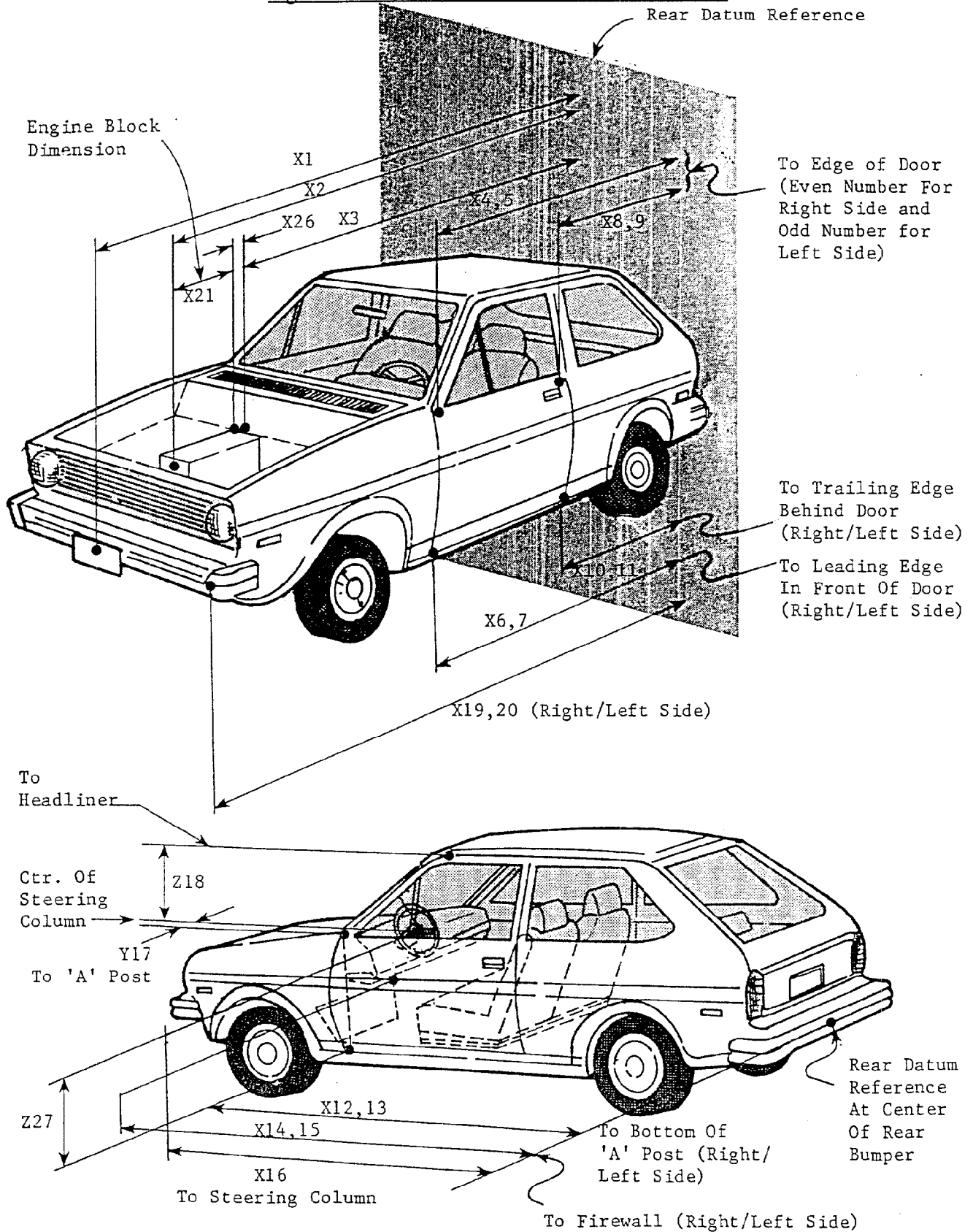


Figure 4 Pre-test and Post-test Measurement Points, Cont'd.

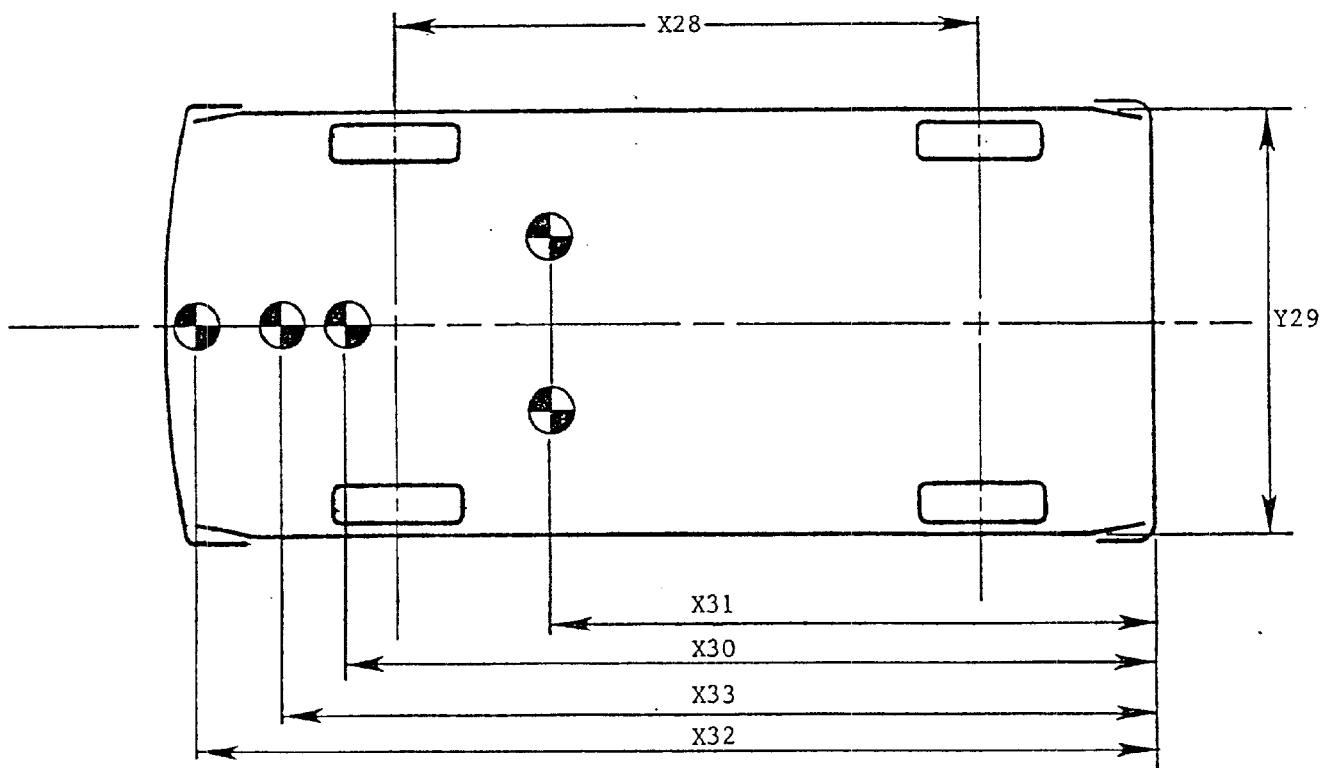
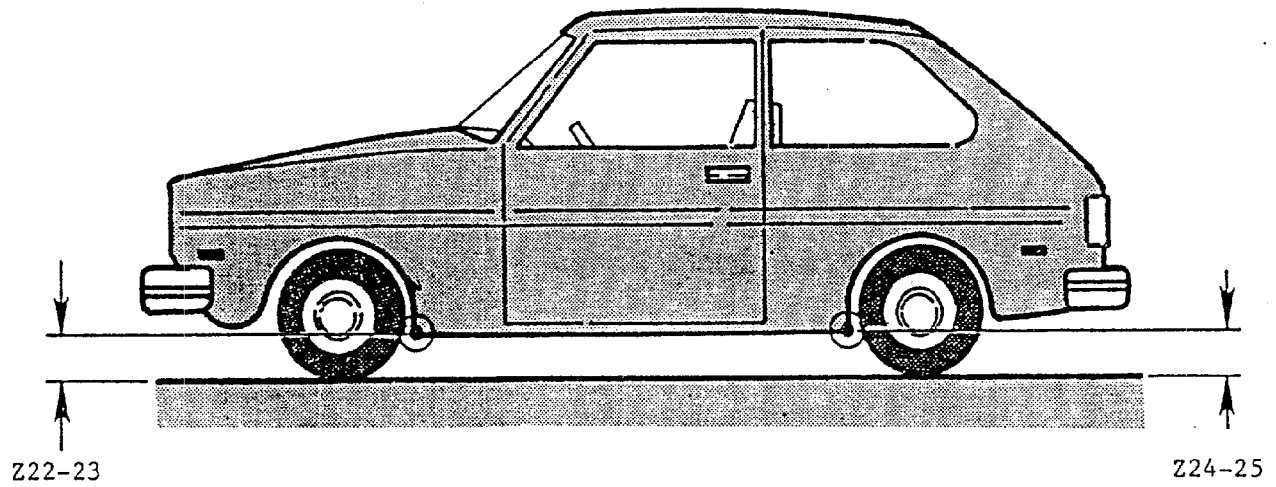


Table 7 Impacted Vehicle Measurements

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

Test Number: 971010

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	4434 mm	4146 mm	288 mm
X2	Rear surface of vehicle to engine at centerline	3712 mm	3481 mm	231 mm
X3	Rear surface of vehicle to firewall	3311 mm	3155 mm	156 mm
X4	Rear surface of vehicle to upper leading edge of right door	2912 mm	2905 mm	7 mm
X5	Rear surface of vehicle to upper leading edge of left door	2923 mm	2854 mm	69 mm
X6	Rear surface of vehicle to lower leading edge of right door	2919 mm	2898 mm	21 mm
X7	Rear surface of vehicle to lower leading edge of left door	2917 mm	2890 mm	27 mm
X8	Rear surface of vehicle to upper trailing edge of right door	1655 mm	1648 mm	7 mm
X9	Rear surface of vehicle to upper trailing edge of left door	1656 mm	1612 mm	44 mm
X10	Rear surface of vehicle to lower trailing edge of right door	1627 mm	1605 mm	22 mm
X11	Rear surface of vehicle to lower trailing edge of left door	1629 mm	1599 mm	30 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	2907 mm	2890 mm	17 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	2910 mm	2800 mm	110 mm
X14	Rear surface of vehicle to firewall - right side	3310 mm	3104 mm	206 mm
X15	Rear surface of vehicle to firewall - left side	3357 mm	2972 mm	385 mm
X16	Rear surface of vehicle to steering wheel center	2467 mm	2410 mm	57 mm
X17	Steering column to "A" post	270 mm	245 mm	25 mm
X18	Steering column to headliner	430 mm	410 mm	20 mm
X19	Rear surface of vehicle to right side of front bumper	4165 mm	4155 mm	10 mm
X20	Rear surface of vehicle to left side of front bumper	4166 mm	3632 mm	534 mm
X21	Width of engine block	435 mm	435 mm	0 mm

Table 7 Impacted Vehicle Measurements, Cont'd.

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

Test Number: 971010

No.	Type of measurement	Pre-test	Post-test	Difference
Z22	Right front sill to ground plane	182 mm	203 mm	-21 mm
X23	Left front sill to ground plane	173 mm	83 mm	90 mm
Z24	Right rear sill to ground plane	180 mm	300 mm	-120 mm
Z25	Left rear sill to ground plane	175 mm	123 mm	52 mm
X26	Firewall to engine or transaxle	235 mm	230 mm	5 mm
Z27	Vertical dimension from rear sill to centerline of steering column	522 mm	668 mm	-146 mm
X28	Left Wheelbase of vehicle	2635 mm	2475 mm	160 mm
Y29	Width of vehicle at maximum width point	1745 mm	1915 mm	-170 mm
X30	Rear surface of vehicle to engine target	3712 mm	3481 mm	231 mm
X31	Rear surface of vehicle to compartment target	2104 mm	2120 mm	-16 mm
X32	Rear surface of vehicle to bumper target	4095 mm	4090 mm	5 mm
X33	Rear surface of vehicle to frame crossmember	3200 mm	3151 mm	49 mm

Table 8 Pre-Test Vehicle Measurements

Measurement	Description	Pre-Test
	Vehicle Exterior Dimensions	
E1	Top of front bumper to ground	530 mm
E2	Bottom of front bumper to ground	267 mm
E3	Top of rear bumper to ground	N/A
E4	Bottom of rear bumper to ground	N/A
E5	Front rocker panel to ground	215 mm
E6	Rear rocker panel to ground	198 mm
E7	Floor board to ground	186 mm
	Front Compartment Measurements ¹	
M1	Front axle to reference plane (RPD)	3465 mm
M2	Heel point to toeboard/floorboard intersection	125 mm
M3	RPD to toeboard/floorboard intersection	2938 mm
M4	RPD to firewall	3335 mm
M5	RPD to bottom of dashboard	2774 mm
M6	RPD to steering wheel pivot point	2565 mm
M7	Windshield/dashboard intersection to edge of dashboard	429 mm
M8	RPD to edge of dashboard	2661 mm
M9	RPD to foremost point of header	2420 mm
M10	RPD to rearmost point of seat cushion	1969 mm
M11	Seat travel from rearmost to foremost position	146 mm
M12	RPD to H-point	2189 mm
M13	Windshield/dashboard intersection to floor	676 mm
M14	Bottom of dashboard to floor	351 mm
M15	Steering wheel pivot point to floor	589 mm
M16	Foremost point of header to floor	1044 mm
M17	Seat rise from rearmost to foremost position	32 mm
M18	Rearmost point of seat cushion to floor	210 mm
M19	H-point to ground	445 mm
M20	Toeboard angle	66°
M21	Steering column angle	22°
M22	Length of windshield	820 mm
M23	Windshield angle	25°
M24	Seat cushion angle	14°
M25	Length of seat cushion	550 mm
M26	Length of seat back	525 mm
M27	Seat back angle	25°

Table 8 Pre-Test Vehicle Measurements, Cont'd.

Measurement	Description	Pre-Test
Steering Assembly Measurements		
S1	Steering wheel outer diameter	382 mm
S2	Steering wheel rim diameter	345 mm
S3	Steering wheel pivot point to top surface of rim	220 mm
S4	Steering wheel pivot point to top of hub	75 mm
S5	Steering wheel pivot point to centerline of column	0 mm
S6	Steering wheel pivot point to shear capsule	N/A
S7	Firewall to shear capsule	N/A
S8	Steering wheel attachment to dash panel	420 mm
S9	Steering wheel attachment to firewall	220 mm
S10	Steering wheel photos (top and side views)	N/A
S11	Weight of steering wheel in pounds	N/A

	Driver Occupant Restraint System Measurements ²	Floor	Firewall	Center XZ
R1	D-ring location	935 mm	1625 mm	214 mm
R2	Torso belt spool location	535 mm	1602 mm	284 mm
R3	Outboard lap belt anchor location	115 mm	1200 mm	288 mm
R4	Belt buckle location	135 mm	1130 mm	240 mm

	Passenger Occupant Restraint System Measurements ²	Floor	Firewall	Center XZ
R1	D-ring location	938 mm	1605 mm	206 mm
R2	Torso belt spool location	518 mm	1598 mm	303 mm
R3	Outboard lap belt anchor location	115 mm	1235 mm	288 mm
R4	Belt buckle location	135 mm	1124 mm	242 mm

¹ All measurements are to be taken on the center X-Z plane of seated occupant. Both driver and passenger side measurements shall be provided if the compartment is not symmetrical to the center X-Z plane of the vehicle.

² Each location is specified by three distance measurements: from the floor, from the firewall, and from the center X-Z plane of the seated occupant. Location measurements for both driver and passenger belt systems shall be provided.

Figure 5 Vehicle Target Locations

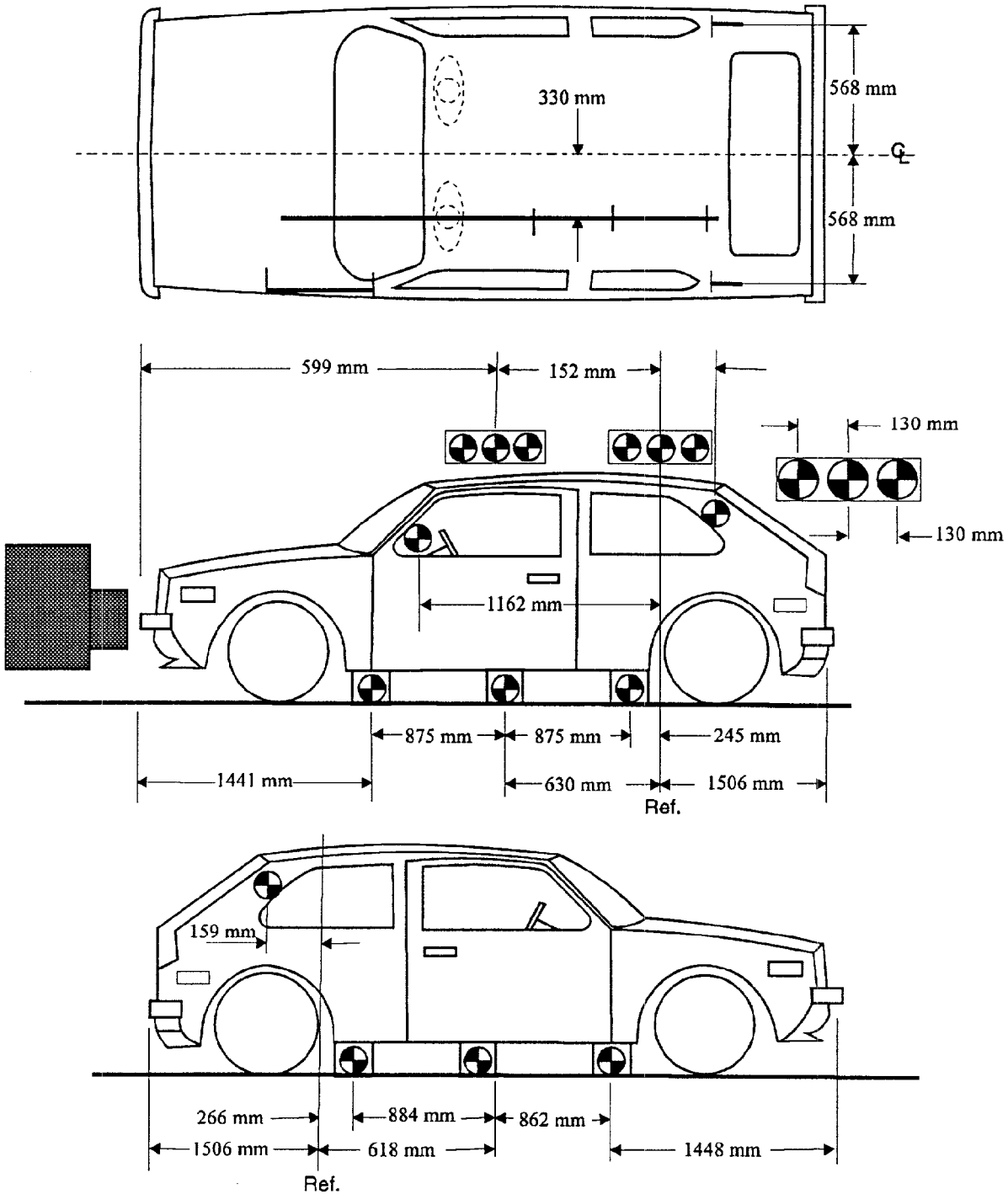


Table 9 Test Vehicle Front Profile Data

X-axis measurements referenced to a plane 4900 millimeters forward of the rear 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	734 mm	593 mm	527 mm	531 mm	590 mm	722 mm
	Y	740 mm	445 mm	165 mm	-180 mm	-440 mm	-735 mm
	Z	358 mm	341 mm	313 mm	312 mm	329 mm	356 mm
Top of front bumper	X	731 mm	565 mm	472 mm	481 mm	559 mm	722 mm
	Y	745 mm	460 mm	150 mm	-155 mm	-458 mm	-750 mm
	Z	522 mm	511 mm	503 mm	496 mm	510 mm	515 mm
Center of Grill	X	805 mm	698 mm	717 mm	732 mm	692 mm	788 mm
	Y	680 mm	445 mm	180 mm	-178 mm	-431 mm	-660 mm
	Z	630 mm	626 mm	594 mm	594 mm	623 mm	630 mm
Front of hood	X	833 mm	790 mm	740 mm	740 mm	799 mm	830 mm
	Y	647 mm	415 mm	146 mm	-143 mm	-412 mm	-640 mm
	Z	699 mm	689 mm	661 mm	670 mm	669 mm	695 mm

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	1215 mm	1045 mm	930 mm	768 mm	682 mm	757 mm
	Y	739 mm	455 mm	175 mm	-165 mm	-432 mm	-734 mm
	Z	516 mm	470 mm	425 mm	399 mm	397 mm	415 mm
Top of front bumper	X	1262 mm	1042 mm	870 mm	715 mm	653 mm	759 mm
	Y	752 mm	455 mm	147 mm	-155 mm	-457 mm	-771 mm
	Z	665 mm	640 mm	608 mm	582 mm	573 mm	577 mm
Center of Grill	X	N/A	N/A	1248 mm	1090 mm	N/A	N/A
	Y	N/A	N/A	195 mm	-150 mm	N/A	N/A
	Z	N/A	N/A	675 mm	662 mm	N/A	N/A
Front of hood	X	1390 mm	N/A	N/A	N/A	N/A	879 mm
	Y	625 mm	N/A	N/A	N/A	N/A	-664 mm
	Z	810 mm	N/A	N/A	N/A	N/A	678 mm

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	-481 mm	-452 mm	-403 mm	-237 mm	-92 mm	-35 mm
	Y	1 mm	-10 mm	-10 mm	-15 mm	-8 mm	-1 mm
	Z	-158 mm	-129 mm	-112 mm	-87 mm	-68 mm	-59 mm
Top of front bumper	X	-531 mm	-477 mm	-398 mm	-234 mm	-94 mm	-37 mm
	Y	-7 mm	5 mm	3 mm	0 mm	-1 mm	21 mm
	Z	-133 mm	-129 mm	-105 mm	-86 mm	-63 mm	-62 mm
Center of Grill	X	N/A	N/A	-531 mm	-358 mm	N/A	N/A
	Y	N/A	N/A	-15 mm	-28 mm	N/A	N/A
	Z	N/A	N/A	-81 mm	-68 mm	N/A	N/A
Front of hood	X	-557 mm	N/A	N/A	N/A	N/A	-49 mm
	Y	22 mm	N/A	N/A	N/A	N/A	24 mm
	Z	-111 mm	N/A	N/A	N/A	N/A	17 mm

+X: Forward from a reference plane 4900 mm forward of the vehicle rear bumper centerline

+Y: Left from vehicle longitudinal centerline

+Z: Up from ground

Table 10 Intrusion Measurements

Intrusion of upper instrument panel on right and left sides above where dummy's knees contact the dash.

Left Side

	Pre-Test			Post-Test			Change		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	2654	624	764	2560	545	910	95	79	-146
Point 2	2654	484	769	2535	356	980	119	130	-211
Point 3	2650	333	970	2524	325	985	126	8	-15
Point 4	2627	89	774	2502	100	805	125	-11	-31

Right Side

	Pre-Test			Post-Test			Change		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	2622	-147	778	2527	-151	804	95	4	-26
Point 2	2633	-308	772	2566	-334	770	67	26	2
Point 3	2637	-454	771	2580	-481	752	57	27	19
Point 4	2628	-548	769	2593	-575	750	35	27	19

+X: Forward of reference plane at rear bumper

+Y: Left from vehicle longitudinal centerline

+Z: Up from floor

Intrusion of toe pan at five locations for each front seat position.

Left Side

	Pre-Test			Post-Test			Change		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	3082	508	460	2850	410	364	232	98	96
Point 2	3022	505	326	2855	450	227	167	55	99
Point 3	3142	142	414	2947	65	329	195	77	85
Point 4	3022	120	283	2925	100	195	97	20	88
Point 5	3132	330	376	2904	240	272	228	90	104

Right Side

	Pre-Test			Post-Test			Change		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	3150	-175	386	3078	-250	332	77	75	54
Point 2	2998	-530	442	3033	-575	412	-35	45	30
Point 3	3092	-200	268	2960	-270	174	132	70	94
Point 4	3000	-525	230	2999	-590	202	1	65	28
Point 5	3095	-310	330	3060	-412	172	35	102	158

+X: Forward of reference point behind the driver and passenger seats.

+Y: Left from vehicle longitudinal centerline.

+Z: Up from ground.

Table 10 Intrusion Measurements

Intrusion of brake pedal

	Pre-Test			Post-Test			Change		
	X mm	Y mm	Z mm	X mm	Y mm	Z mm	X mm	Y mm	Z mm
Point 1	2962	275	353	2735	330	377	227	-55	24

+X: Forward of reference point behind the driver's seat.

+Y: Left from vehicle longitudinal centerline.

+Z: Up from ground.

Shortening of door opening from top A-pillar hinge to rear door striker.

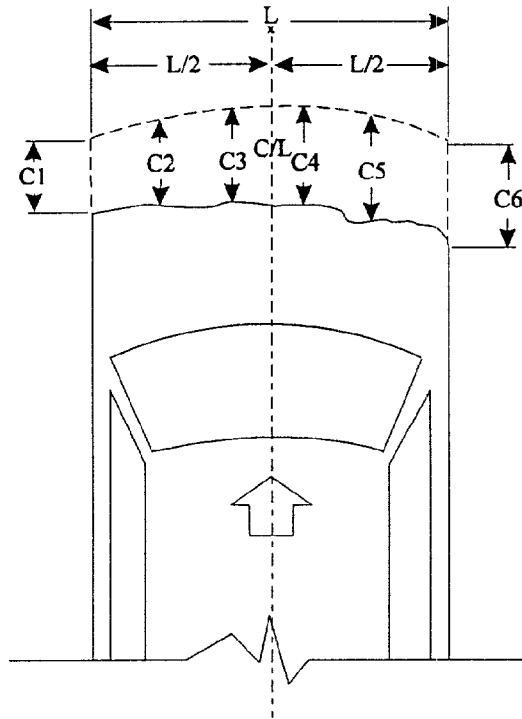
Driver Side

	Pre-Test	Post-Test	Change
	X mm	X mm	X mm
Point 1	1265	1205	60

Passenger Side

	Pre-Test	Post-Test	Change
	X mm	X mm	X mm
Point 1	1265	1245	20

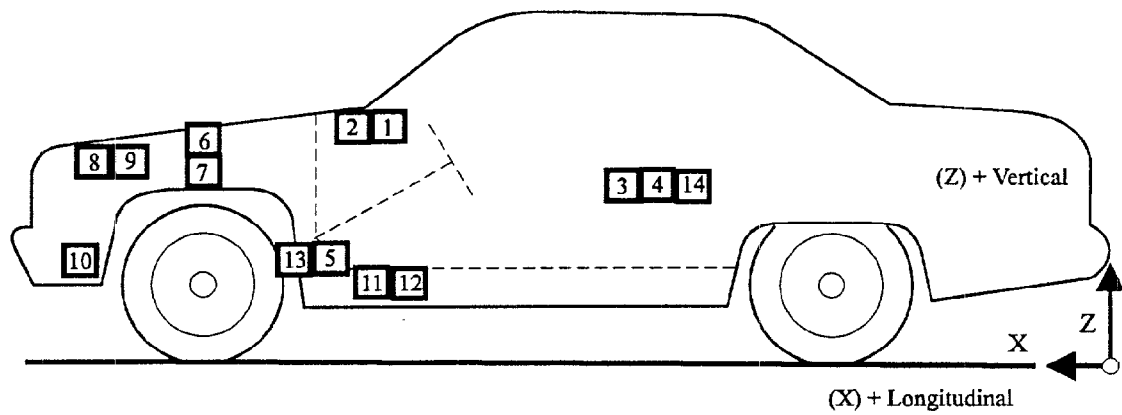
Figure 6 Vehicle Crush



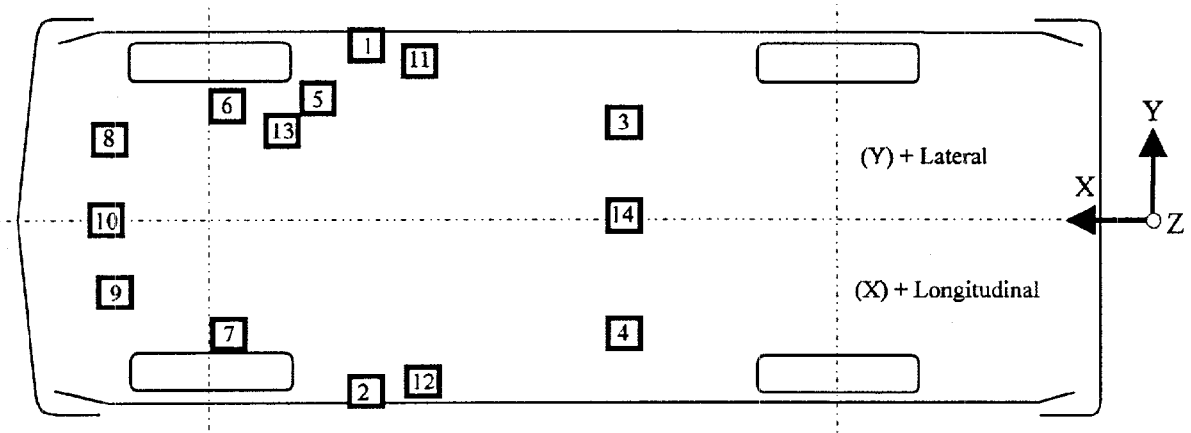
Notes: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.

	Pre-test	Post-test	Crush
L	1524 mm		
C1	4166 mm	3632 mm	534 mm
C2	4331 mm	3860 mm	471 mm
C3	4413 mm	4069 mm	344 mm
C4	4414 mm	4194 mm	220 mm
C5	4326 mm	4265 mm	61 mm
C6	4165 mm	4155 mm	10 mm
CL	4434 mm	4146 mm	288 mm

Figure 7 Vehicle Accelerometer Mounting Locations



Side View



Bottom View

Table 11 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 971010					POSITIVE DIRECTION		NEGATIVE DIRECTION	
No.	LOCATION	X	Y	Z				
1	TOP HINGE LEFT A-PILLAR LONGITUDINAL	PRE 2932 mm	710 mm	808 mm				
		POST 2830 mm	600 mm	705 mm	14.4 g	@ 227.0 ms	70.4 g	@ 47.8 ms
2	TOP HINGE RIGHT A-PILLAR LONGITUDINAL	PRE 2932 mm	-710 mm	805 mm				
		POST 2905 mm	-820 mm	833 mm	25.5 g	@ 120.3 ms	65.6 g	@ 40.1 ms
3	LEFT REAR COMPARTMENT LONGITUDINAL LATERAL	PRE 1610 mm	374 mm	388 mm				
		POST 1610 mm	374 mm	325 mm	1.9 g	@ 201.0 ms	33.9 g	@ 44.0 ms
					2.9 g	@ 65.6 ms	16.6 g	@ 41.4 ms
4	RIGHT REAR COMPARTMENT LONGITUDINAL LATERAL	PRE 1623 mm	-382 mm	388 mm				
		POST 1603 mm	-392 mm	419 mm	2.5 g	@ 140.2 ms	45.6 g	@ 47.5 ms
					2.5 g	@ 148.7 ms	14.9 g	@ 52.6 ms
5	BRAKE PEDAL LONGITUDINAL LATERAL VERTICAL RESULTANT	PRE 2967 mm	325 mm	353 mm				
		POST 2735 mm	330 mm	377 mm	152.7 g	@ 61.0 ms	148.3 g	@ 43.0 ms
					205.8 g	@ 61.5 ms	199.2 g	@ 52.4 ms
					166.0 g	@ 46.6 ms	85.6 g	@ 53.0 ms
					255.4 g	@ 61.4 ms		
6	LEFT SHOCK TOWER LONGITUDINAL VERTICAL	PRE 3416 mm	504 mm	840 mm				
		POST 2960 mm	260 mm	793 mm	42.9 g	@ 50.9 ms	99.2 g	@ 32.1 ms
					61.4 g	@ 31.0 ms	53.2 g	@ 38.6 ms

Table 11 Vehicle Accelerometer Locations and Data Summary. Cont'd.

TEST NUMBER: 971010 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
7 RIGHT SHOCK TOWER	PRE 3420 mm POST 3286 mm	-504 mm -673 mm	843 mm 794 mm		
LONGITUDINAL			28.7 g	@ 59.4 ms	@ 45.4 ms
VERTICAL			19.0 g	@ 70.2 ms	@ 32.8 ms
8 LEFT ENGINE TOP	PRE 3634 mm POST 3343 mm	64 mm 220 mm	753 mm 748 mm		
LONGITUDINAL			30.2 g	@ 63.9 ms	@ 31.3 ms
9 RIGHT ENGINE TOP	PRE 3635 mm POST 3405 mm	-298 mm -580 mm	755 mm 732 mm		
LONGITUDINAL			24.3 g	@ 69.7 ms	@ 29.5 ms
10 ENGINE BOTTOH	PRE 3684 mm POST 3497 mm	75 mm 193 mm	170 mm 193 mm		
LONGITUDINAL			27.2 g	@ 47.1 ms	@ 24.8 ms
LATERAL			9.9 g	@ 10.6 ms	@ 27.7 ms
11 LEFT FRONT FRAME	PRE 3190 mm POST 3102 mm	290 mm 270 mm	150 mm 83 mm		
LONGITUDINAL			17.2 g	@ 59.9 ms	@ 38.6 ms
LATERAL			11.8 g	@ 67.0 ms	@ 23.2 ms
VERTICAL			28.9 g	@ 48.8 ms	@ 27.2 ms
RESULTANT			120.5 g	@ 23.1 ms	

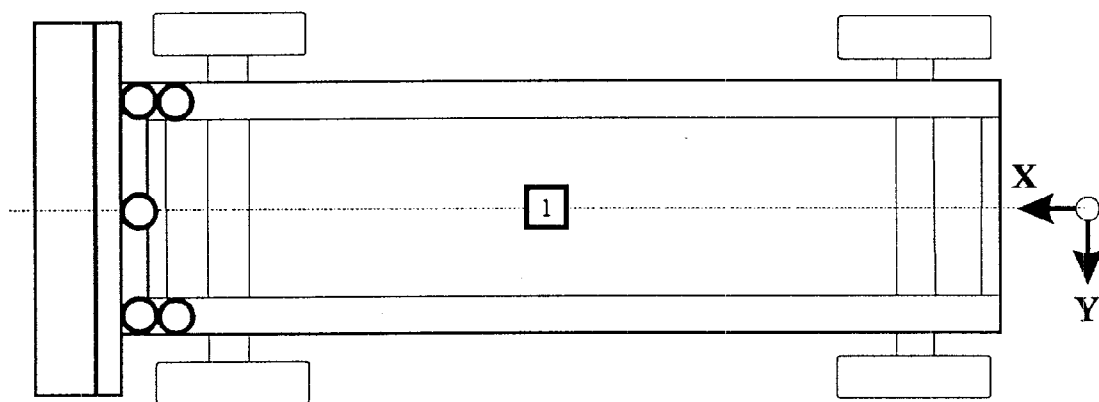
Table 11 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 971010				POSITIVE		NEGATIVE	
No. LOCATION	X	Y	Z	DIRECTION		DIRECTION	
12 RIGHT FRONT FRAME	PRE 3206 mm	-283 mm	146 mm				
	POST 3130 mm	-310 mm	85 mm				
LONGITUDINAL			5.3 g	@ 68.3 ms	165.9 g	@ 36.2 ms	
LATERAL			11.2 g	@ 56.3 ms	90.5 g	@ 36.1 ms	
VERTICAL			22.8 g	@ 68.4 ms	66.0 g	@ 33.1 ms	
RESULTANT			195.6 g	@ 36.2 ms			
13 TOEPAN	PRE 3139 mm	428 mm	373 mm				
	POST 3132 mm	310 mm	272 mm				
LONGITUDINAL			32.7 g	@ 60.2 ms	88.7 g	@ 36.2 ms	
LATERAL ¹			160.7 g	@ 154.5 ms	116.6 g	@ 183.2 ms	
VERTICAL			32.8 g	@ 62.5 ms	59.4 g	@ 36.9 ms	
RESULTANT ¹			160.7 g	@ 154.5 ms			
14 REAR COMPARTMENT	PRE 1610 mm	0 mm	438 mm				
CENTER	POST 1600 mm	0 mm	422 mm				
LONGITUDINAL			3.2 g	@ 139.6 ms	38.7 g	@ 46.7 ms	
LATERAL			3.6 g	@ 63.8 ms	15.1 g	@ 54.1 ms	

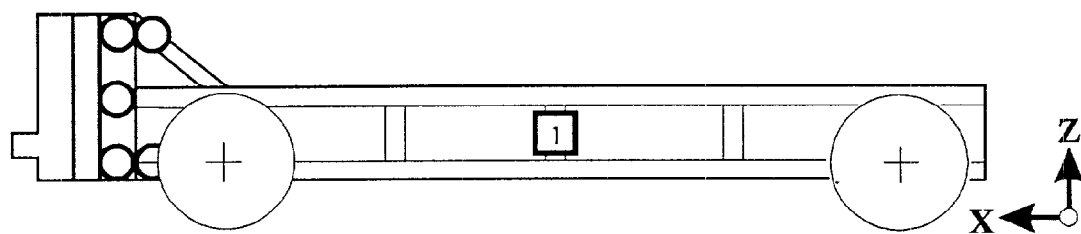
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

¹See DATA ACQUISITION EXPLANATIONS

Figure 8 Moving Deformable Barrier Instrumentation Placement



Top View



Side View

Table 12 Moving Deformable Barrier Load Cell Placement and Data Summary

TEST NUMBER: 971010				POSITIVE		NEGATIVE	
No. LOCATION	X	Y	Z	DIRECTION		DIRECTION	
1 CENTER OF GRAVITY	NA	NA	NA				
LONGITUDINAL				69.9 g	@ 282.7 ms	52.4 g	@ 41.5 ms
LATERAL ¹				0.0 g	@ 282.7 ms	0.0 g	@ 0.0 ms
VERTICAL ¹				-8.4 g	@ 0.8 ms	8.4 g	@ 0.3 ms
RESULTANT ¹				70.4 g	@ 282.7 ms		
2 BARRIER FRONT FORCE	NA	NA	NA				
TOP LEFT				11.4 kN	@ 28.2 ms	77.3 kN	@ 49.0 ms
BOTTOM LEFT ¹				224.0 kN	@ 139.5 ms	95.8 kN	@ 41.4 ms
BOTTOM RIGHT				6.0 kN	@ 207.0 ms	172.6 kN	@ 47.9 ms
TOP RIGHT				7.2 kN	@ 130.3 ms	69.5 kN	@ 49.9 ms
FRONT CENTER ¹				0.0 kN	@ 130.3 ms	0.0 kN	@ 0.0 ms

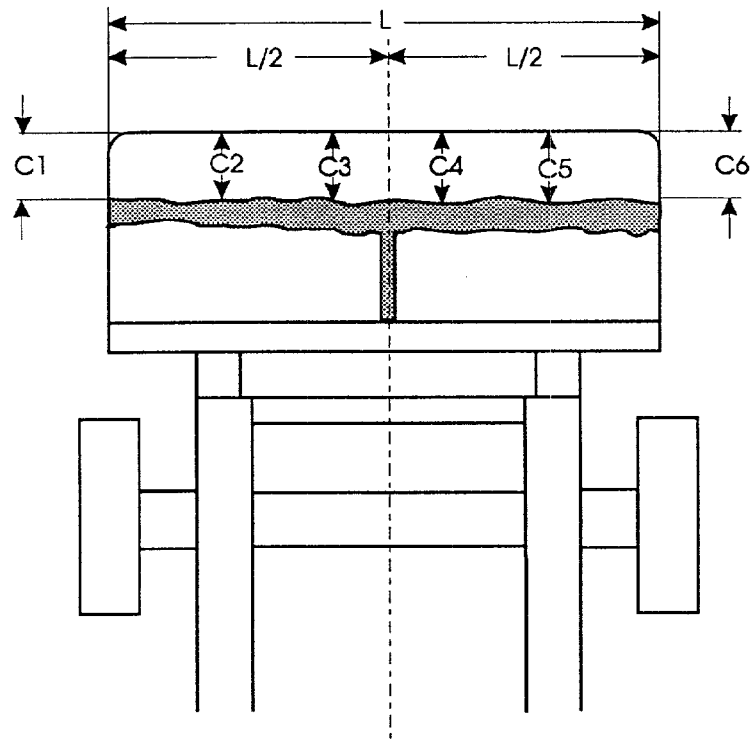
REFERENCE: X: + FORWARD FROM TRAILING EDGE OF BARRIER

Y: + LEFT FROM BARRIER CENTERLINE

Z: + UP FROM GROUND LEVEL

¹ See DATA ACQUISITION EXPLANATIONS

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	Crush
L	1676 mm		
C1	232 mm	430 mm	198 mm
C2	216 mm	483 mm	267 mm
C3	212 mm	541 mm	329 mm
C4	214 mm	620 mm	406 mm
C5	217 mm	567 mm	350 mm
C6	233 mm	600 mm	367 mm
CL	214 mm	611 mm	397 mm

Table 13 Moving Deformable Barrier Face Static Crush

Location	Height	Zero distance at barrier centerline ¹																
		Pre-test profile (distance in millimeters from reference plane ²)																
		813	711	610	508	406	305	203	102	0	102	203	305	406	508	610	711	813
Top of face	813	316	315	319	318	310	317	313	314	315	320	312	313	316	311	311	310	314
Mid-face	559	317	318	319	318	316	319	315	319	315	314	316	314	315	310	315	312	316
Bumper	432	233	218	217	219	213	216	214	316	214	215	218	212	215	213	216	213	232
Post-test profile (distance in millimeters from reference plane ²)																		
Top of face	813	420	415	415	420	408	405	412	453	463	459	480	432	476	521	470	442	410
Mid-face	559	565	565	580	588	587	609	614	628	592	582	567	537	522	502	459	446	420
Bumper	432	600	570	567	567	575	598	620	636	611	593	560	541	536	532	483	462	430
Static crush																		
Top of face	813	104	100	96	102	98	88	99	139	148	139	168	119	160	210	159	132	96
Mid-face	559	248	247	261	270	271	290	299	309	277	268	251	223	207	192	144	134	104
Bumper	432	367	352	350	348	362	382	402	420	397	378	342	329	321	319	267	249	198

¹ Column readings are left to right across barrier face from left to right.

² Reference plane is 762 mm forward of the rear surface of the deformable barrier face.
All measurements are in millimeters

Figure 10 Dummy Measurement Locations for Front Seat Occupants

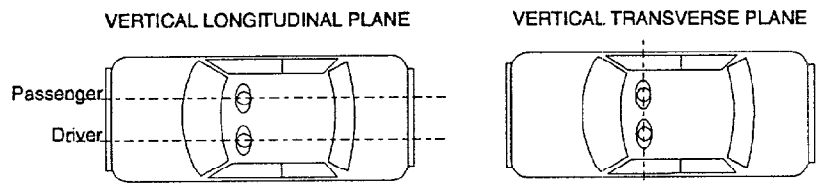
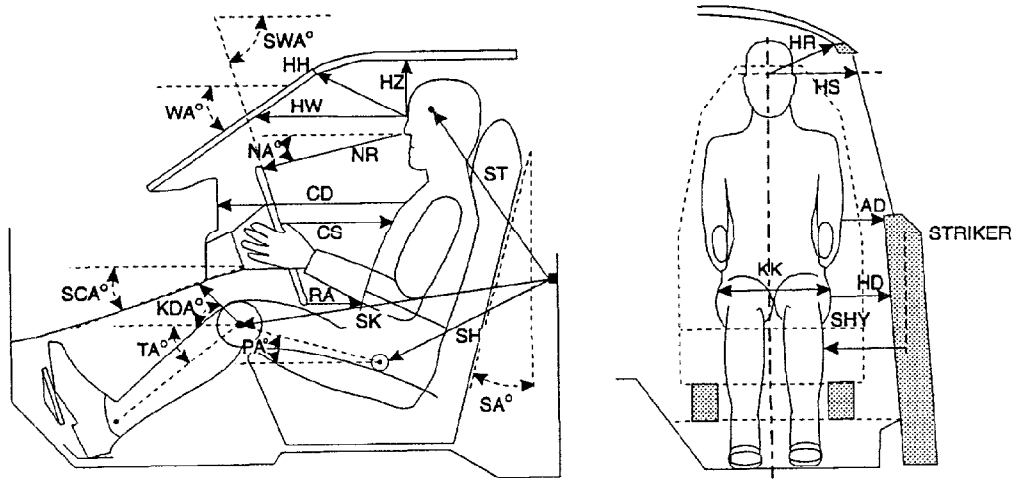
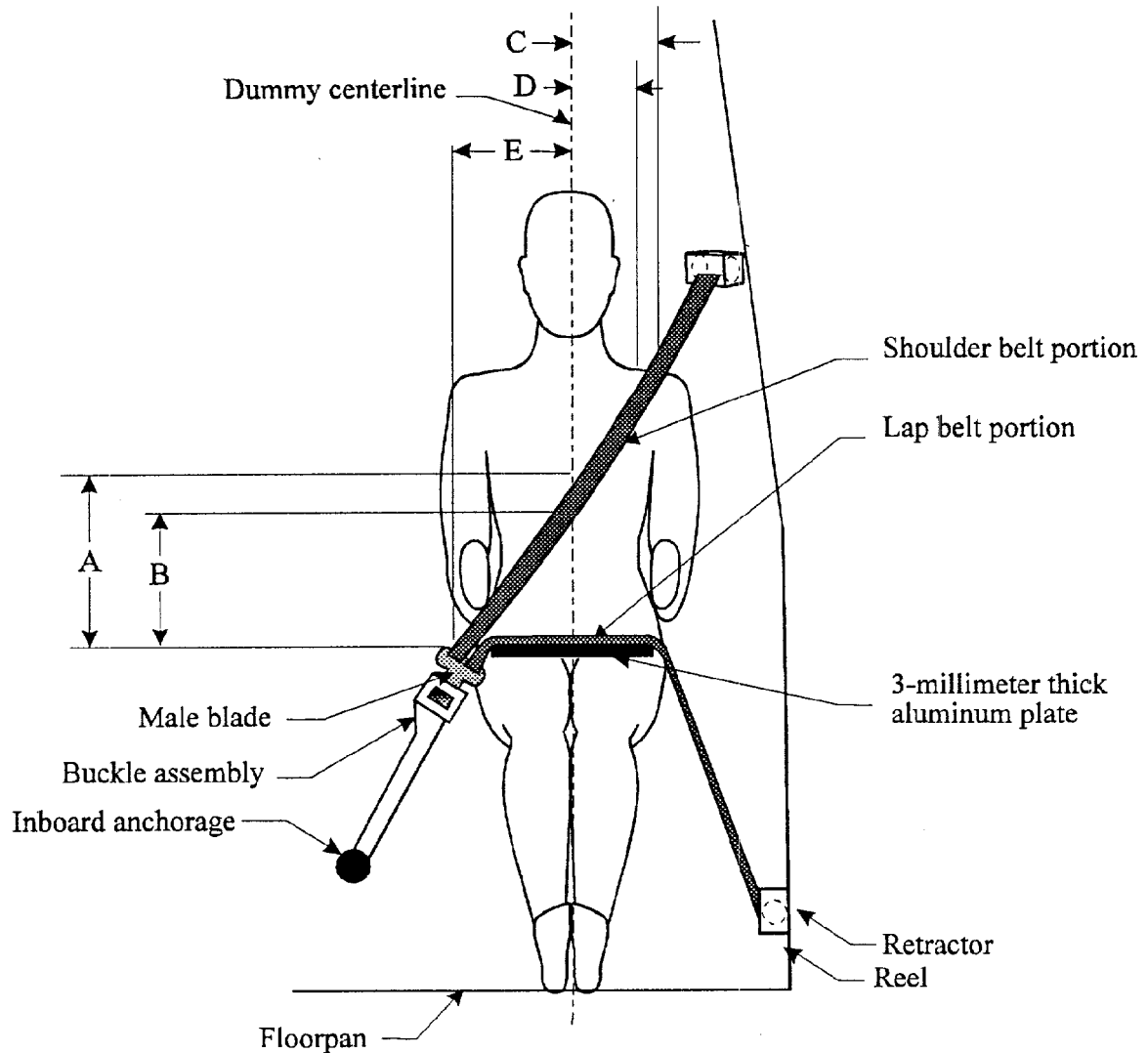


Table 14 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #110)	Passenger (Serial #001)
WA	Windshield angle	25°	25°
SWA	Steering wheel angle	70°	NA
SCA	Steering column angle	20°	NA
SA	Seat back angle	25°	25°
HZ	Head to roof	148 mm	154 mm
HH	Head to header	282 mm	300 mm
HW	Head to windshield	518 mm	533 mm
HR	Head to side header	170 mm	182 mm
NR	Nose to rim	369 mm	NA
NA	Nose to rim angle	11°	NA
CD	Chest to dash	502 mm	481 mm
CS	Steering wheel to chest	301 mm	NA
RA	Rim to abdomen	196 mm	NA
KDL	Left knee to dash	157 mm	140 mm
KDR	Right knee to dash	160 mm	142 mm
KDA	Outboard knee to dash angle	34°	30°
PA	Pelvic angle	24°	23°
TA	Tibial angle	37°	39°
KK	Knee to knee	307 mm	282 mm
ST ¹	Striker to head	626 mm	625 mm
	Striker to head angle	-50°	-52°
SK ¹	Striker to knee	897 mm	919 mm
	Striker to knee angle	3°	5°
SH ¹	Striker to H-point	579 mm	563 mm
	Striker to H-point angle	19°	17°
SHY	Striker to H-point (Y dir.)	261 mm	258 mm
HS	Head to side window	281 mm	316 mm
HD	H-point to door	108 mm	102 mm
AD	Arm to door	98 mm	124 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	342 mm	311 mm
B	Top surface of aluminum plate to belt lower edge	268 mm	233 mm
C	Dummy centerline to outer edge of belt at chest flesh top	97 mm	118 mm
D	Dummy centerline to inner edge of belt at chest flesh top	43 mm	69 mm

Figure 12 Camera Positions

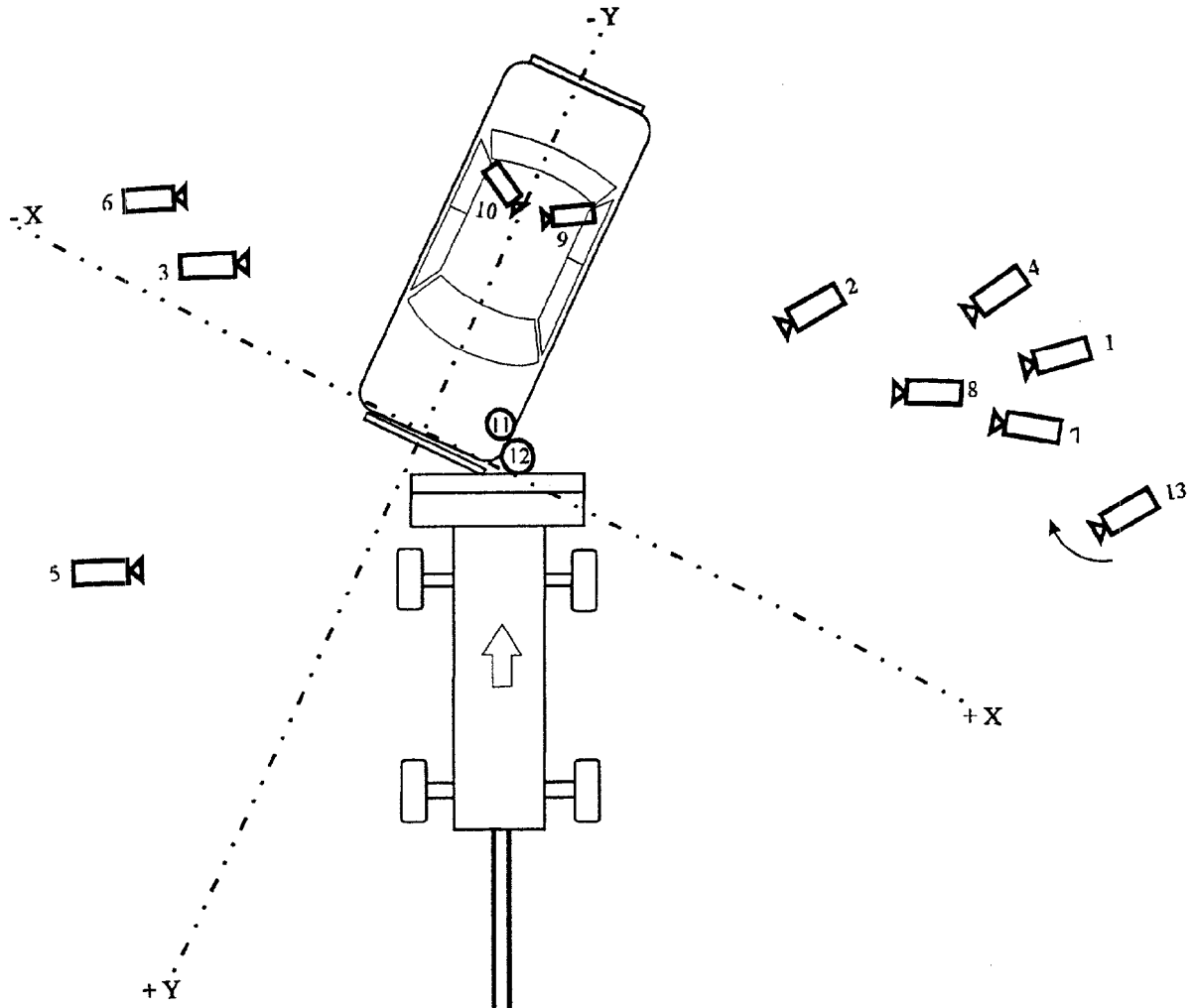


Table 15 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1996/Chevrolet/Cavalier/passenger car Test number: 971010

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	1002 frames/s
2	Impact point	2896	-3632	1118	NA	NA	25 mm	995 frames/s
3	Left side impact point	-7925	-279	1295	NA	NA	25 mm	1002 frames/s
4	Moving barrier - right side	7239	-4470	1245	NA	NA	25 mm	908 frames/s
5	Moving barrier - left side	-6528	3912	1067	NA	NA	25 mm	1010 frames/s
6	Car - passenger side	-9296	-2210	1245	NA	NA	25 mm	992 frames/s
7	Car - driver side	8560	-813	1295	NA	NA	25 mm	992 frames/s
8	Driver and Int. view - right side	9423	-2159	1867	NA	NA	50 mm	995 frames/s
9	Onboard passenger D-ring	NA	NA	NA	NA	NA	8 mm	1000 frames/s
10	Onboard driver D-ring	NA	NA	NA	NA	NA	8 mm	1000 frames/s
11	Overhead - overall wide	940	-500	9805	NA	NA	13 mm	995 frames/s
12	Overhead - tight	940	-300	9805	NA	NA	25 mm	1000 frames/s
13	Real-time panning	NA	NA	NA	NA	NA	N/A	24 frames/s

¹ +X: Rightward from vehicle centerline

+Y: Forward from vehicle 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

Appendix A

Photographs

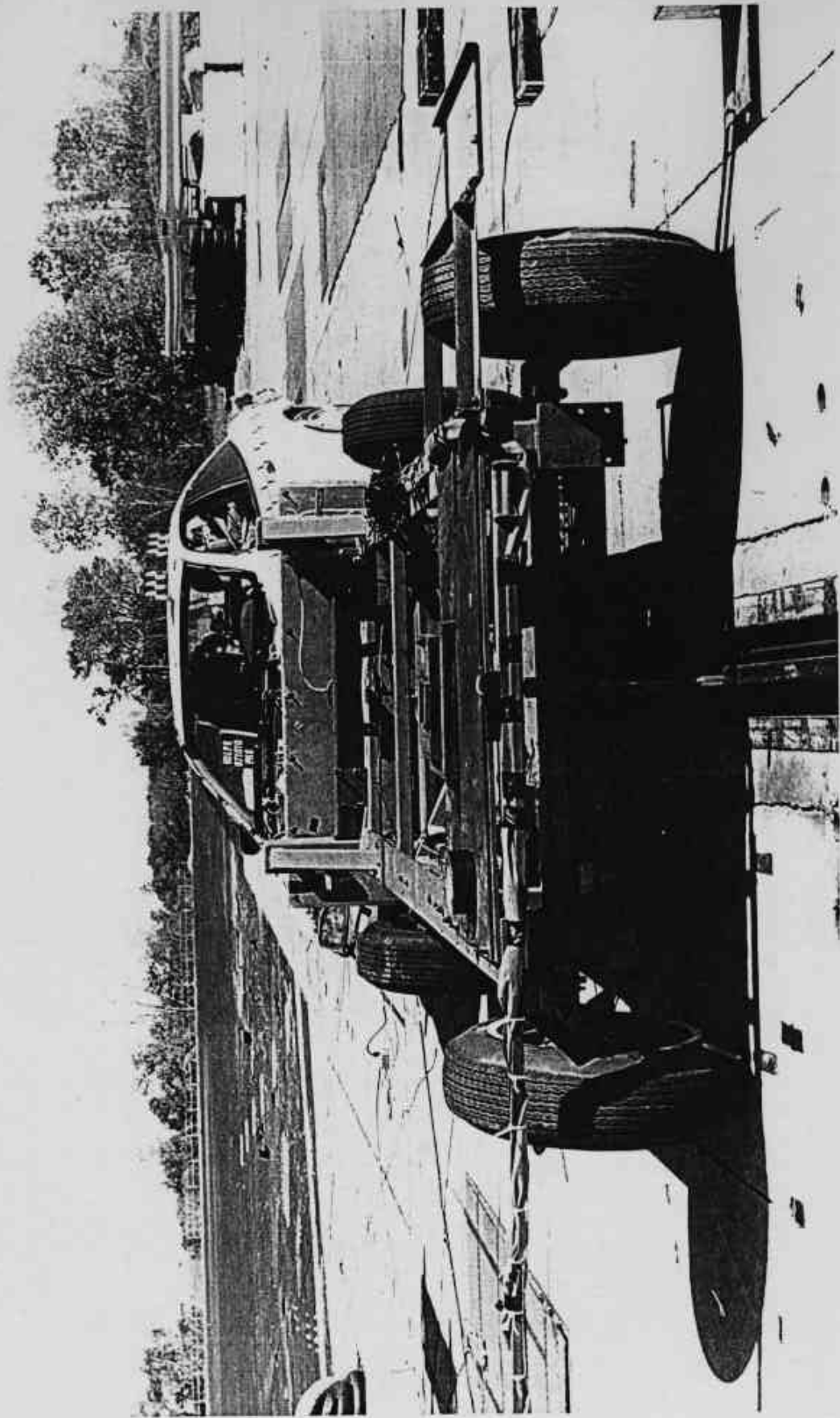


Figure A-1 Pre-Test Front View

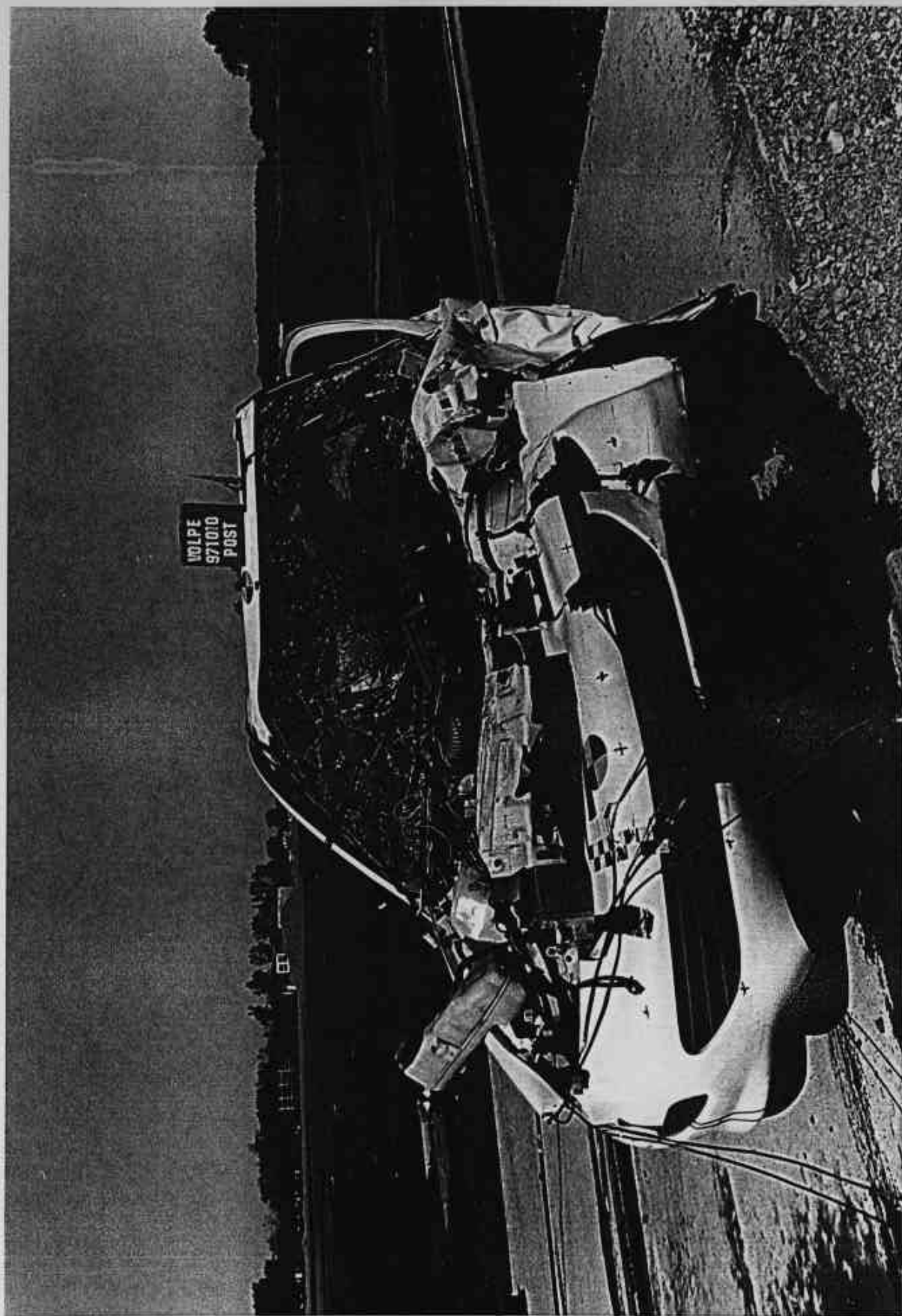


Figure A-2 Post-Test Front View

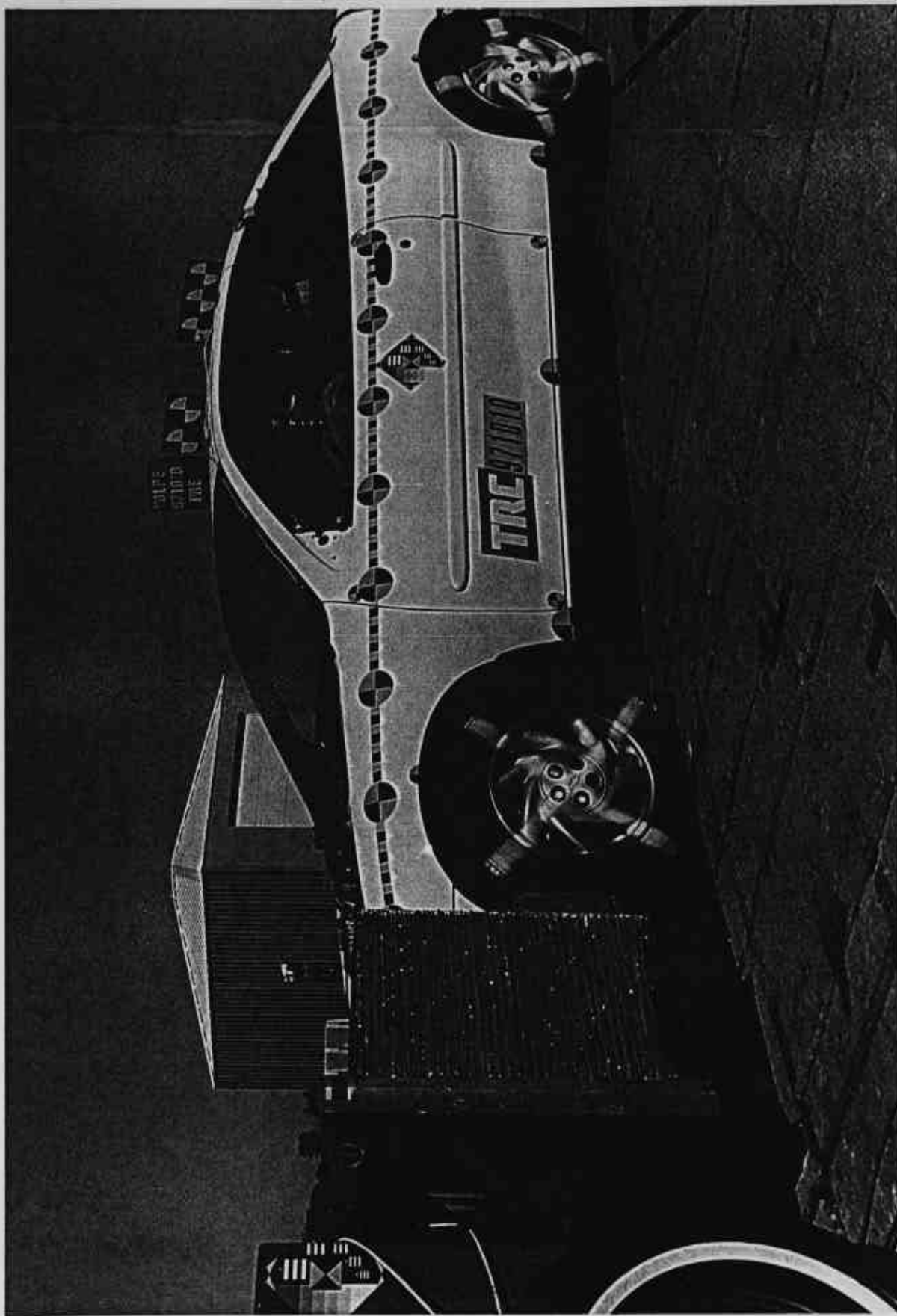


Figure A-3 Pre-Test Left Front View

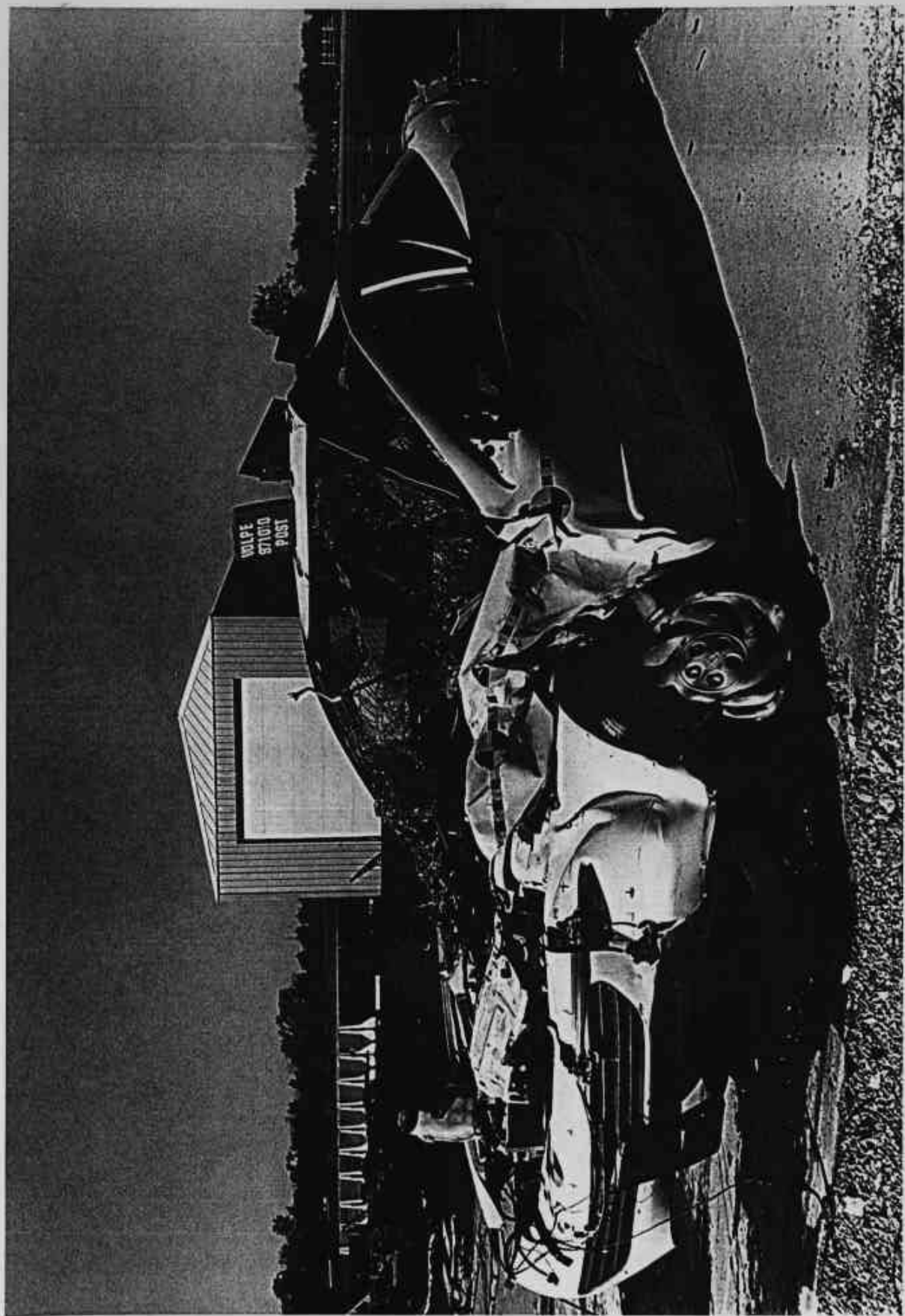


Figure A-4 Post-Test Left Front View

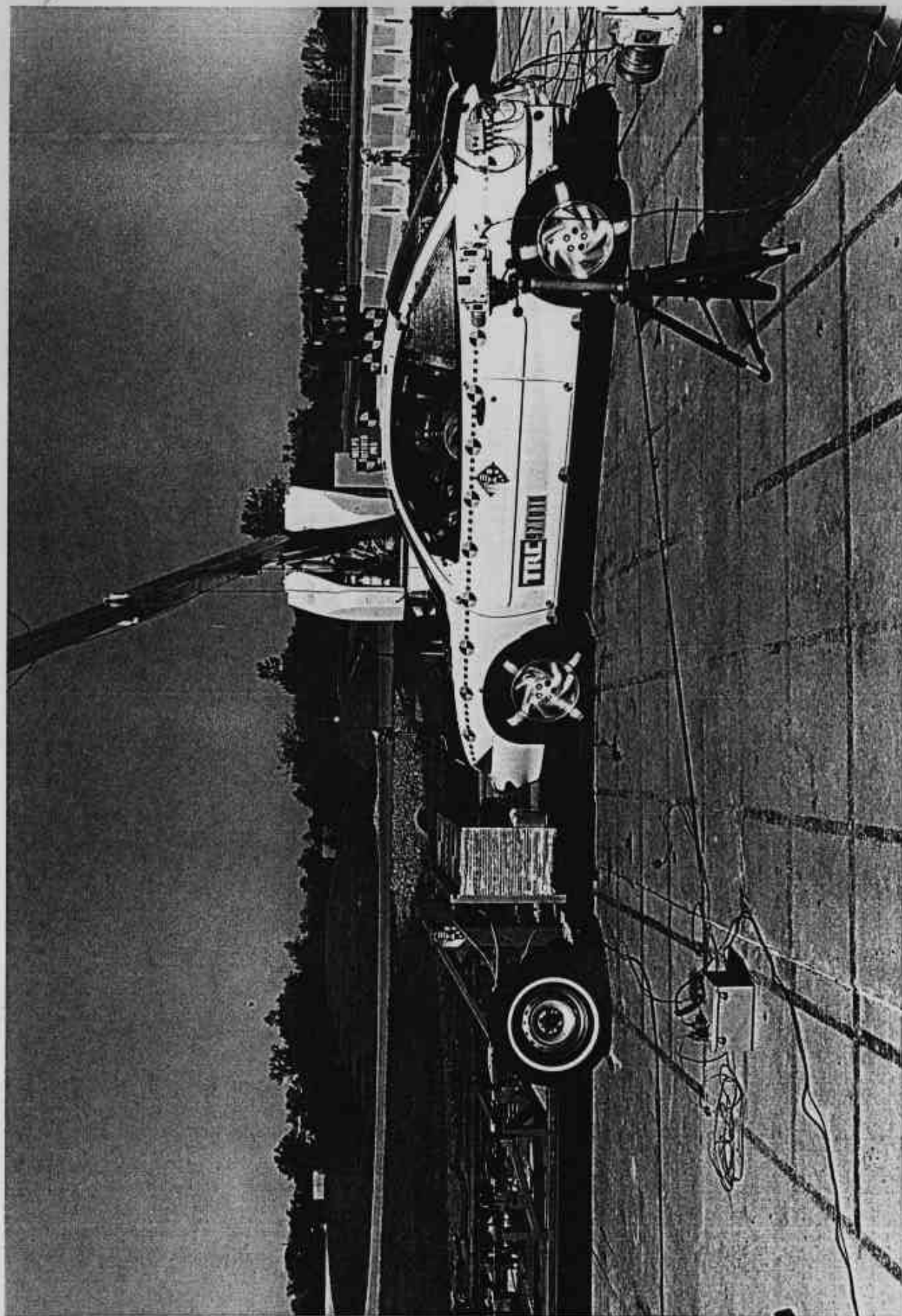


Figure A-5 Pre-Test Left Side View



Figure A-6 Post-Test Left Side View



Figure A-7 Pre-Test Left Rear View



Figure A-8 Post-Test Left Rear View

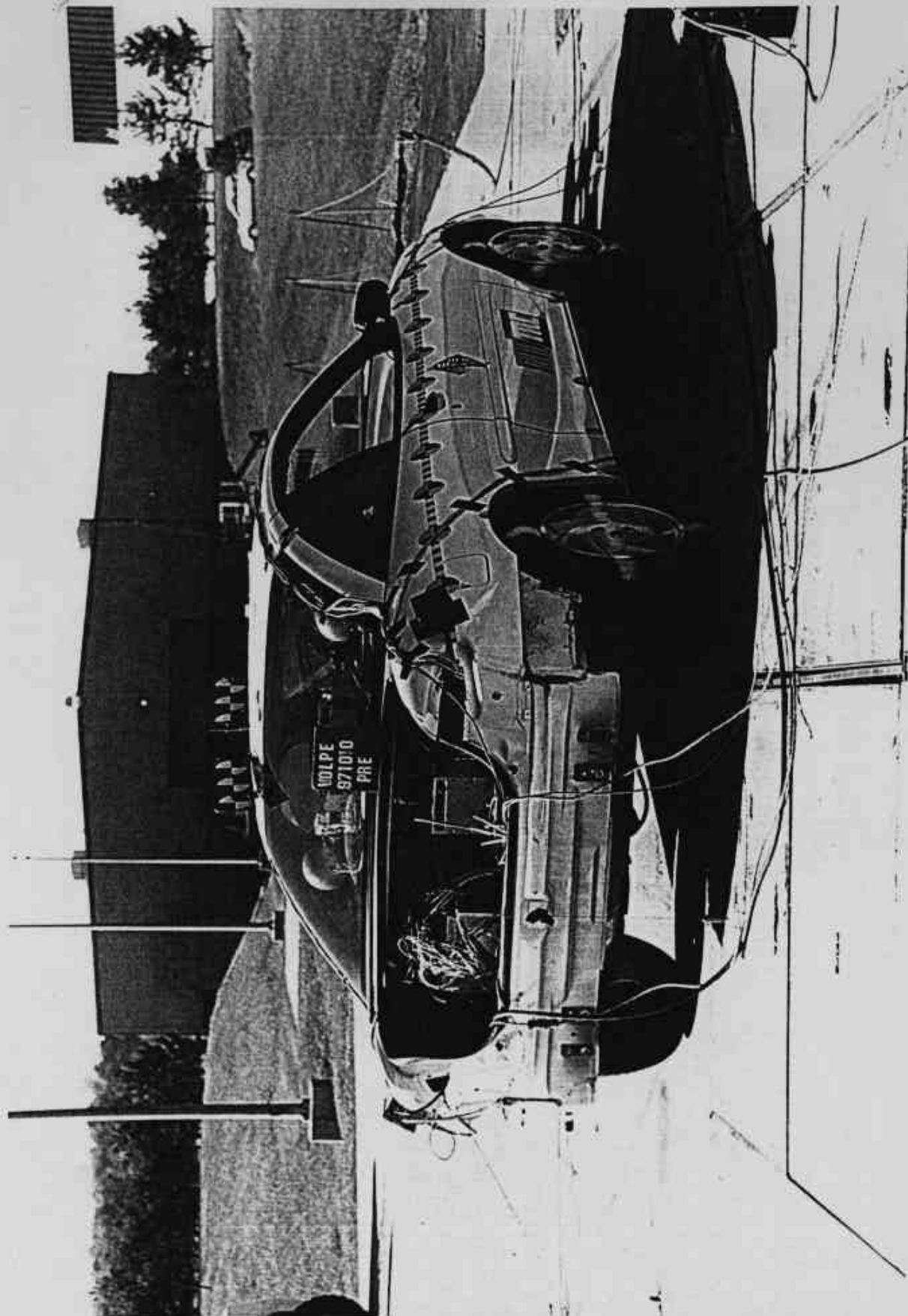


Figure A-9 Pre-Test Rear View

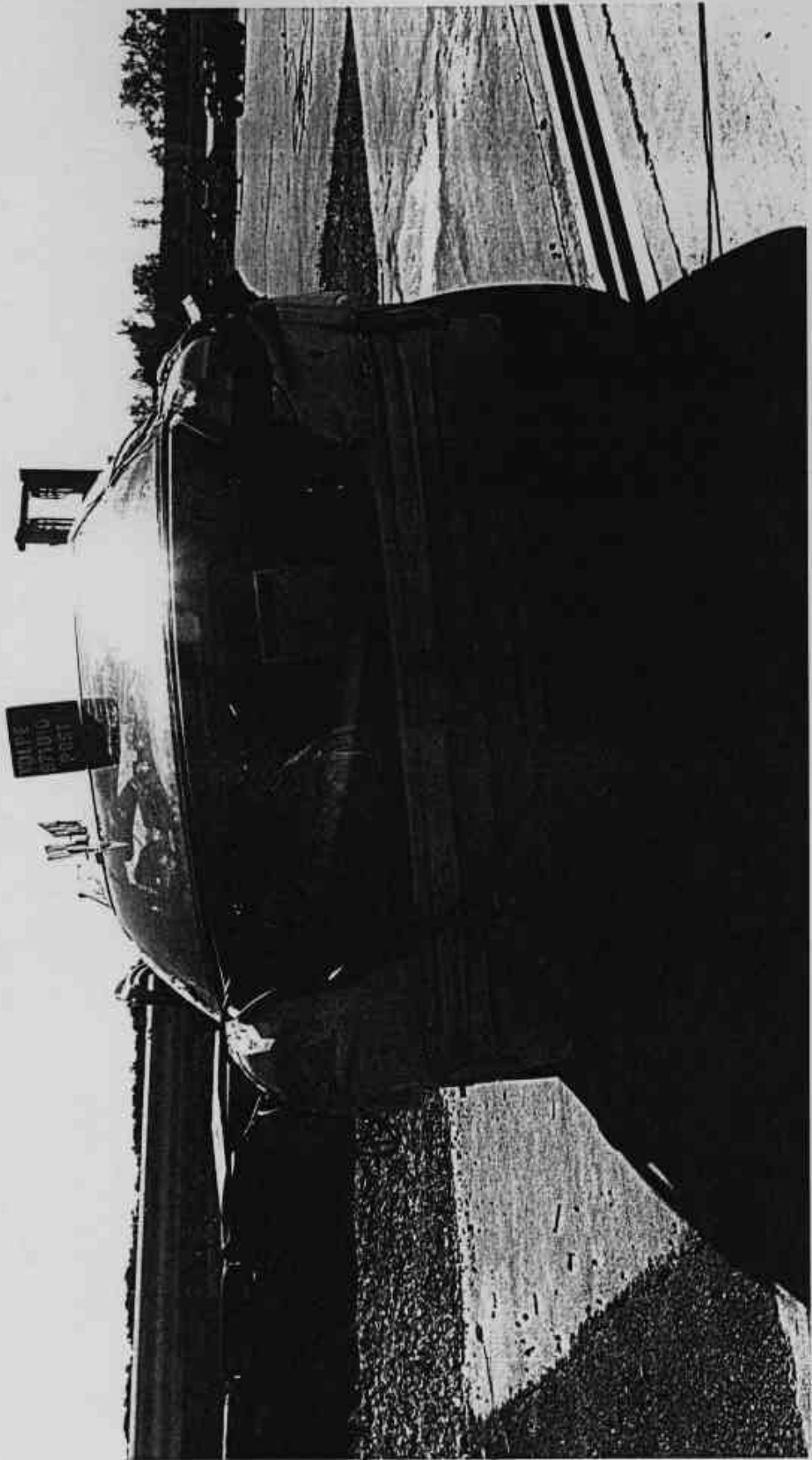


Figure A-10 Post-Test Rear View

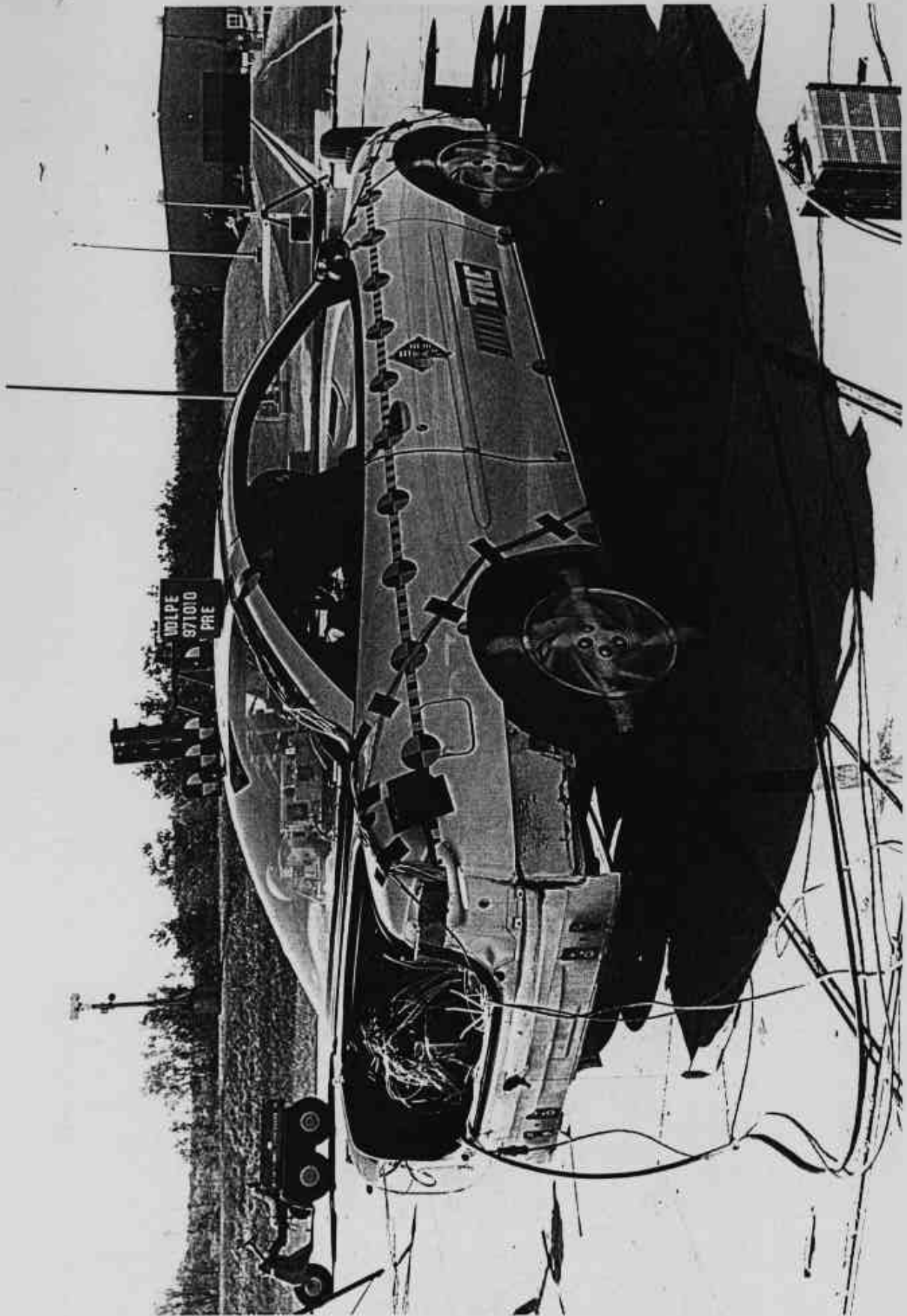


Figure A-11 Pre-Test Right Rear View

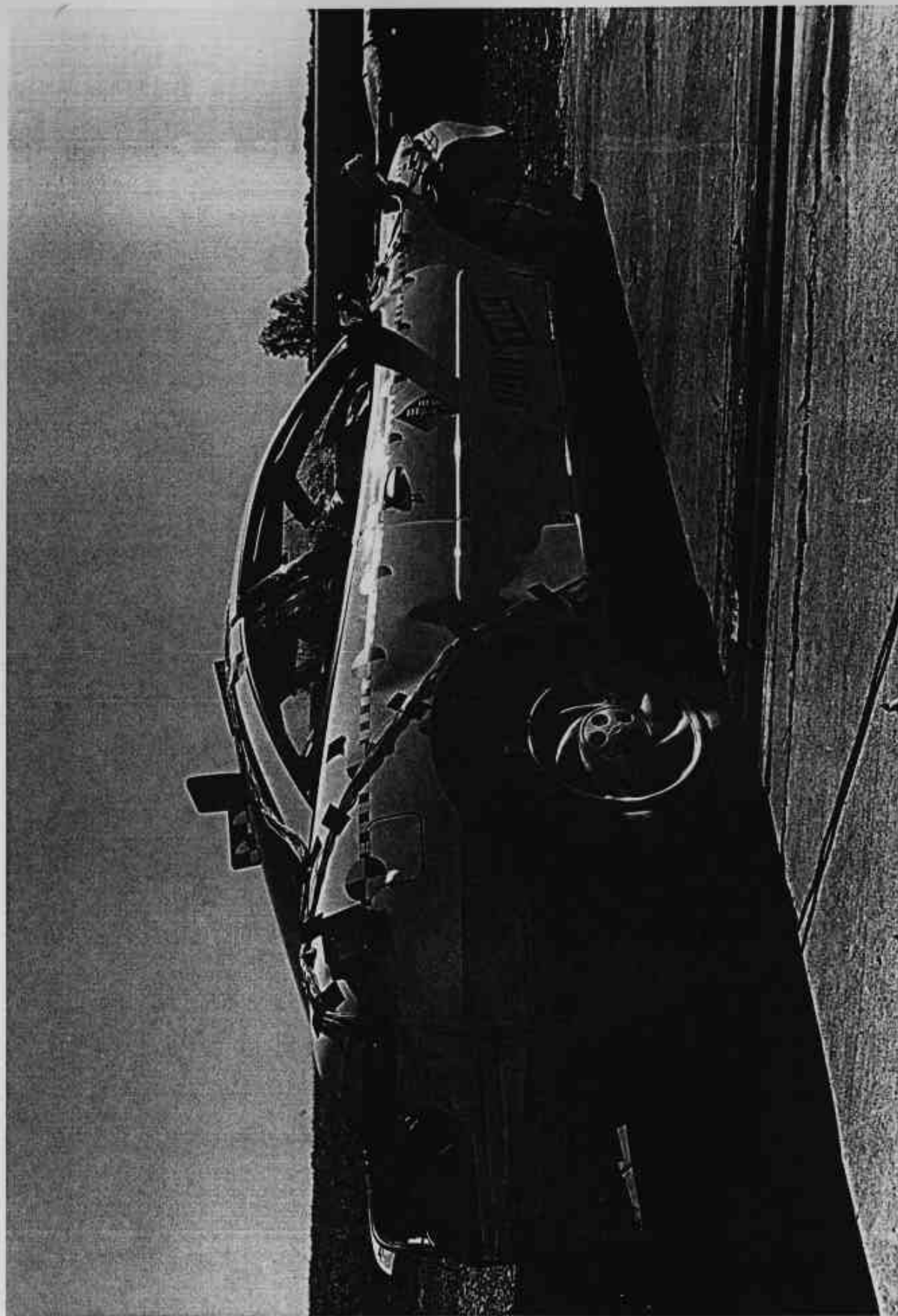


Figure A-12 Post-Test Right Rear View

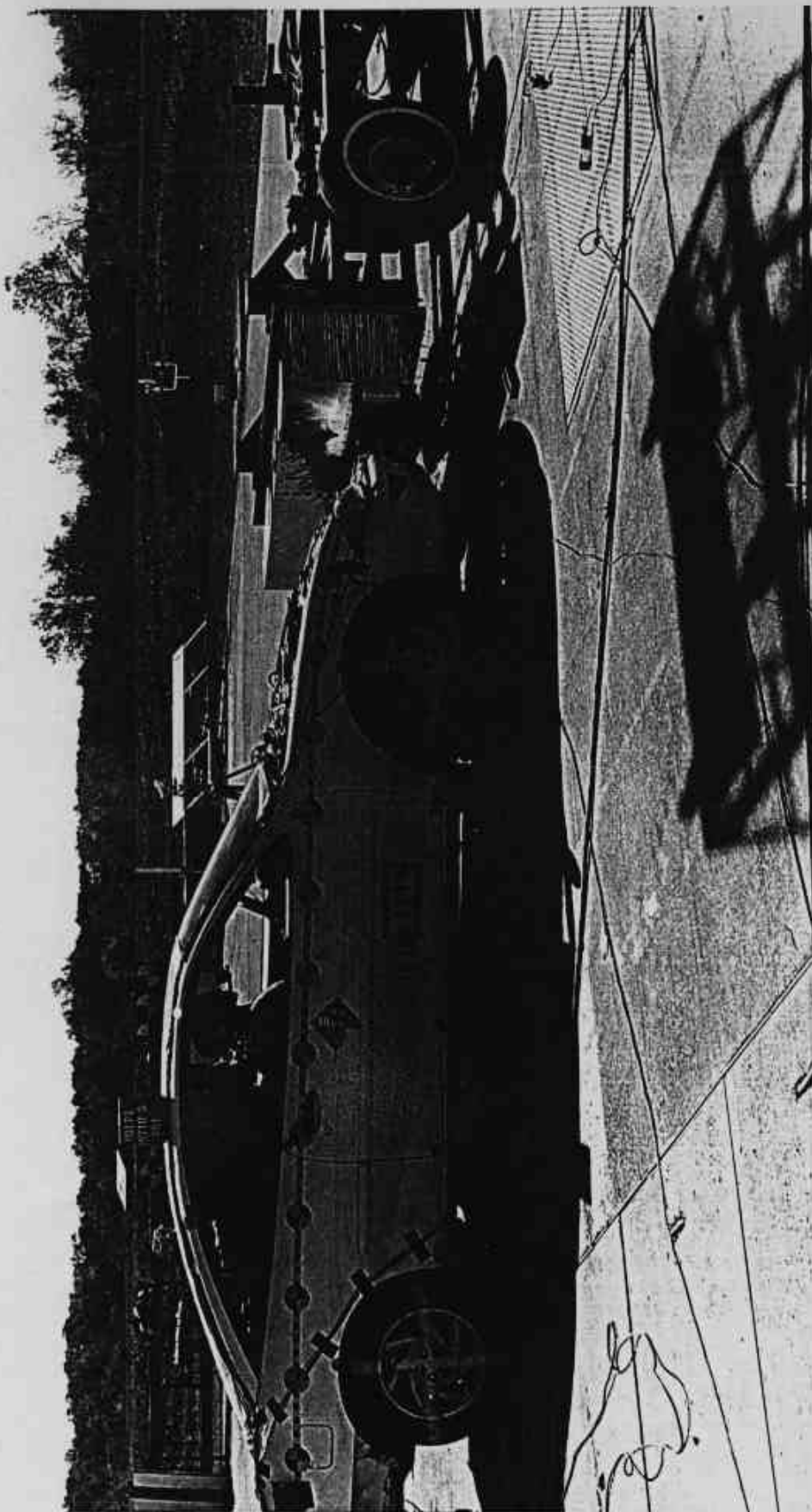


Figure A-13 Pre-Test Right Side View

A-14

971010

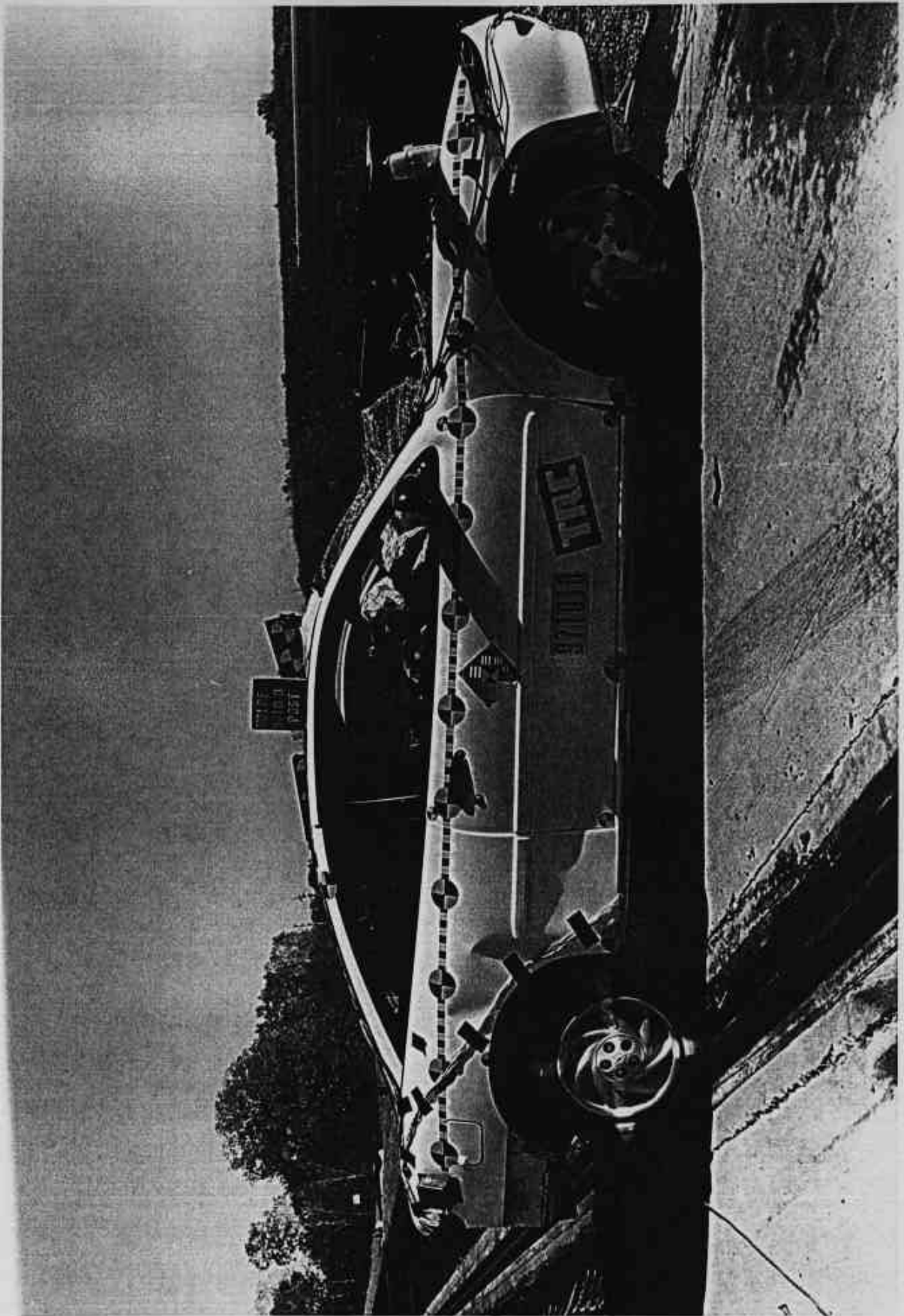


Figure A-14 Post-Test Right Side View

A-15

971010

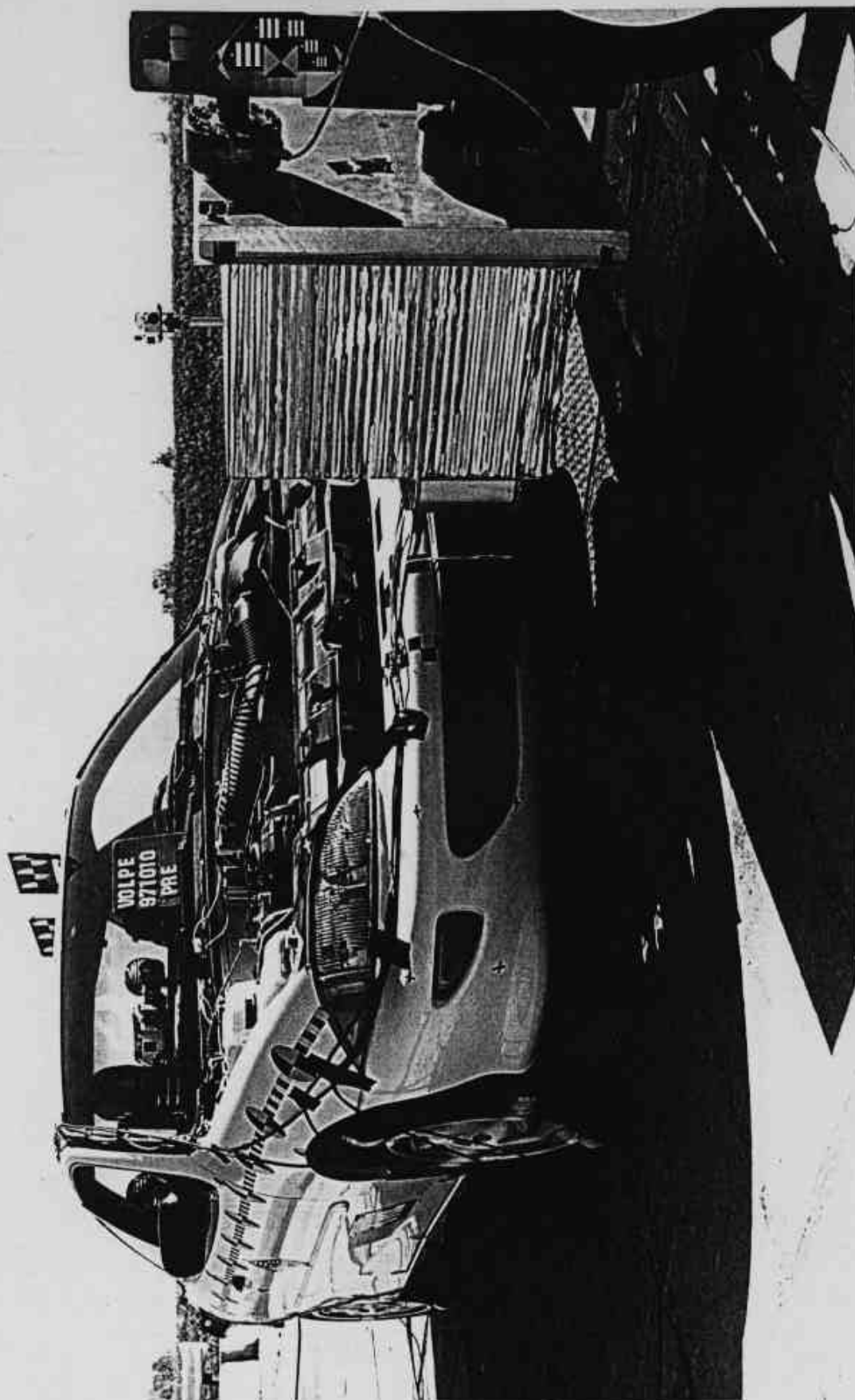


Figure A-15 Pre-Test Right Front View



Figure A-16 Post-Test Right Front View

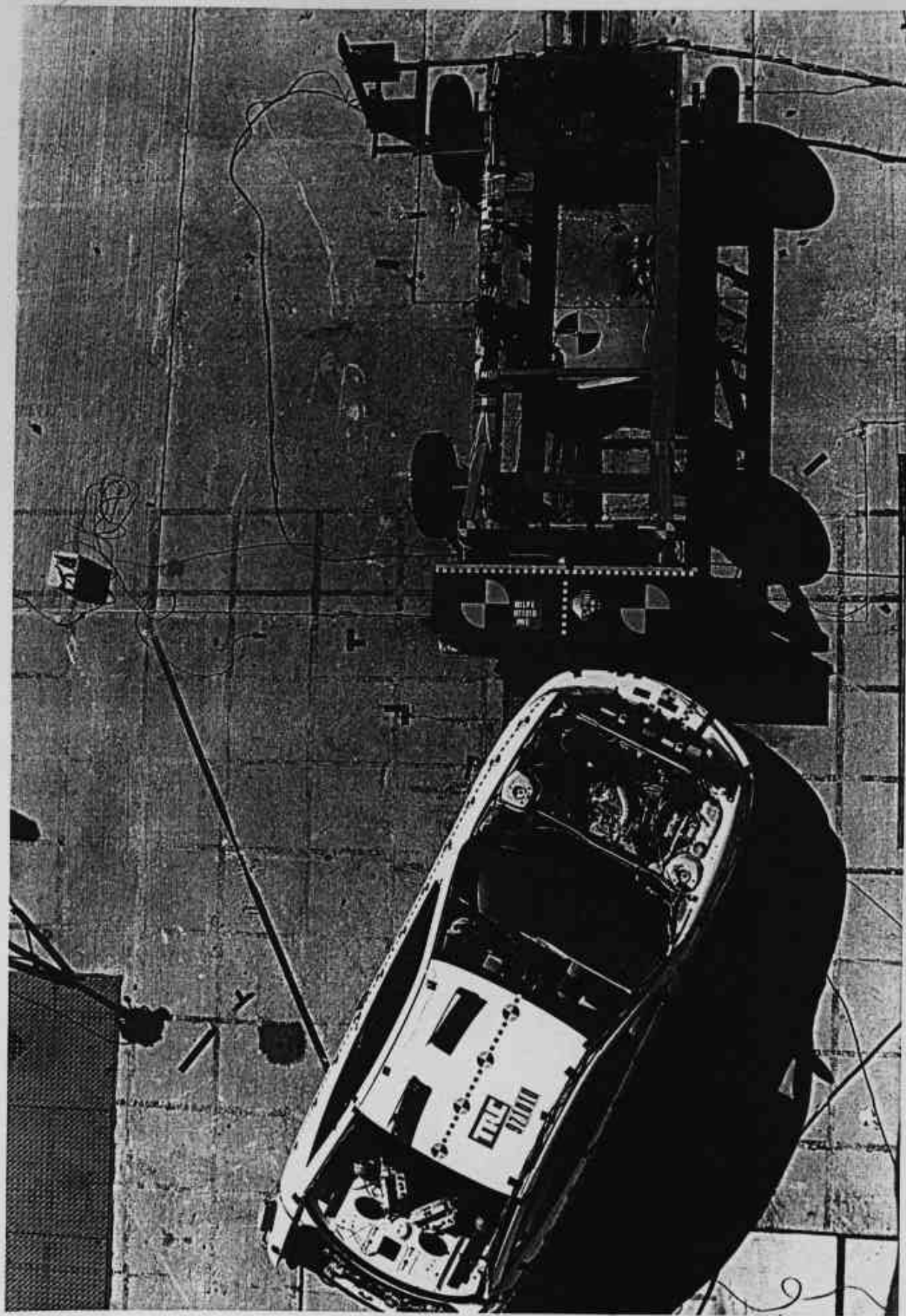


Figure A-17 Pre-Test Overhead - View 1

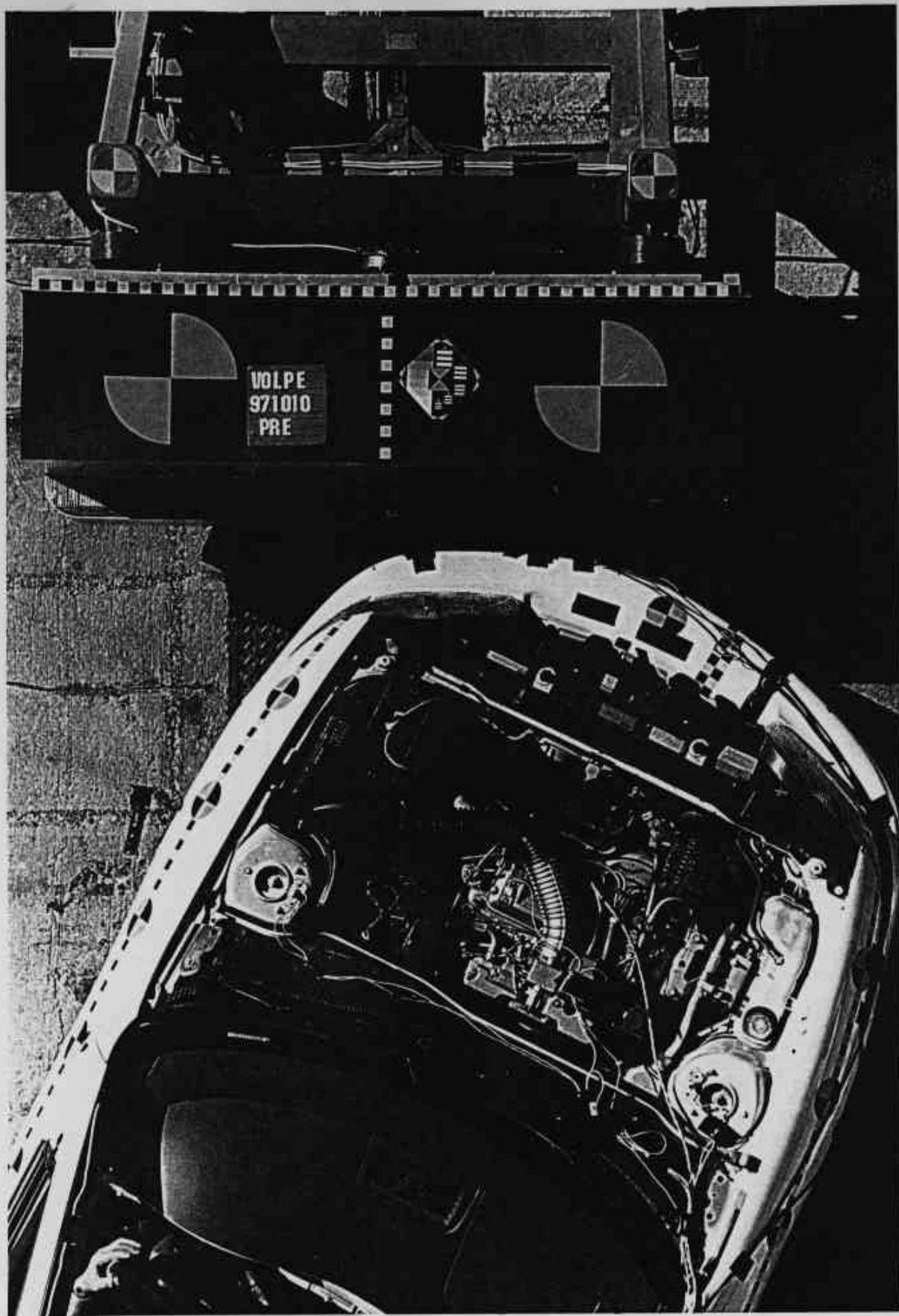


Figure A-18 Pre-Test Overhead - View 2

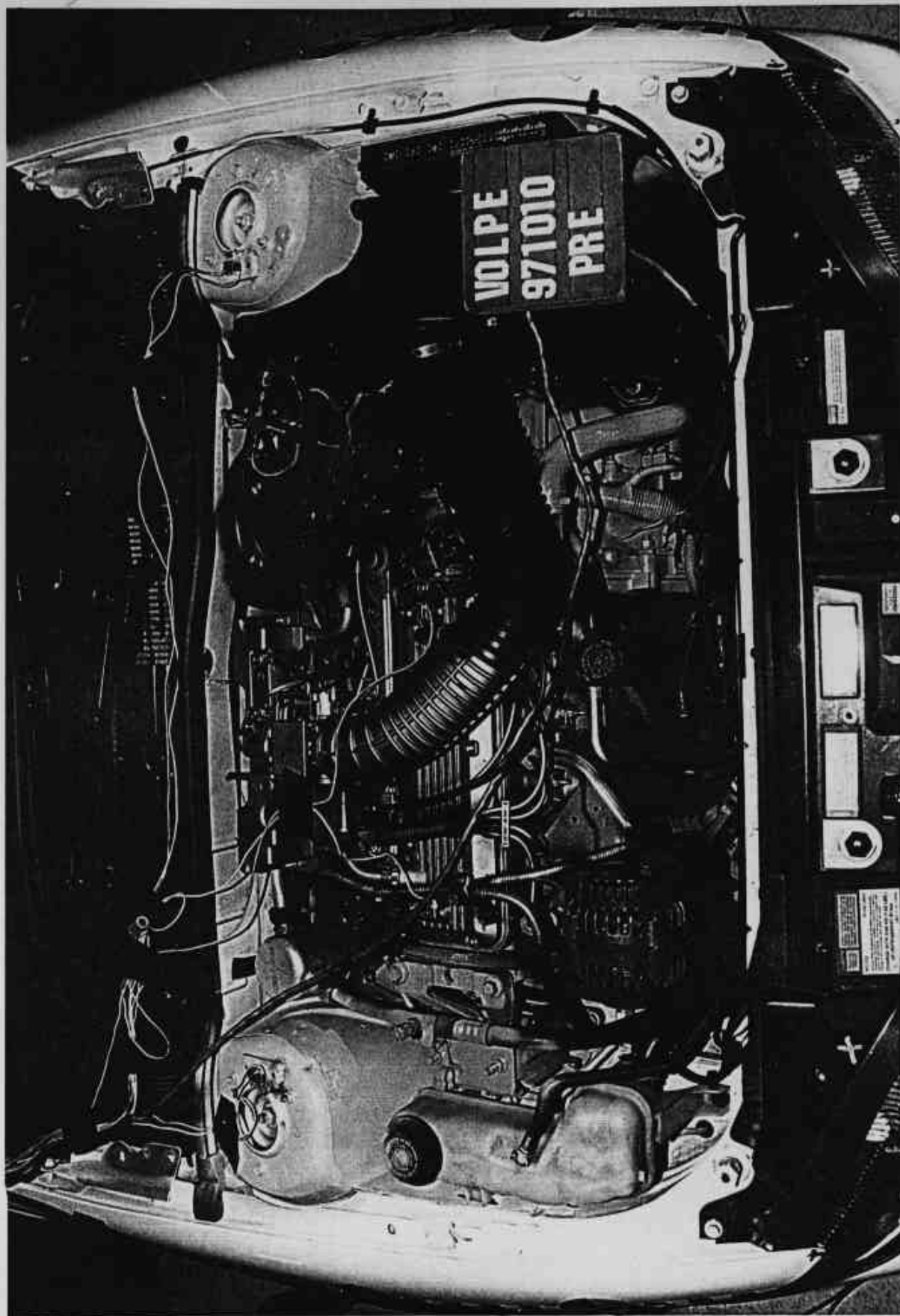


Figure A-19 Pre-Test Engine Compartment View

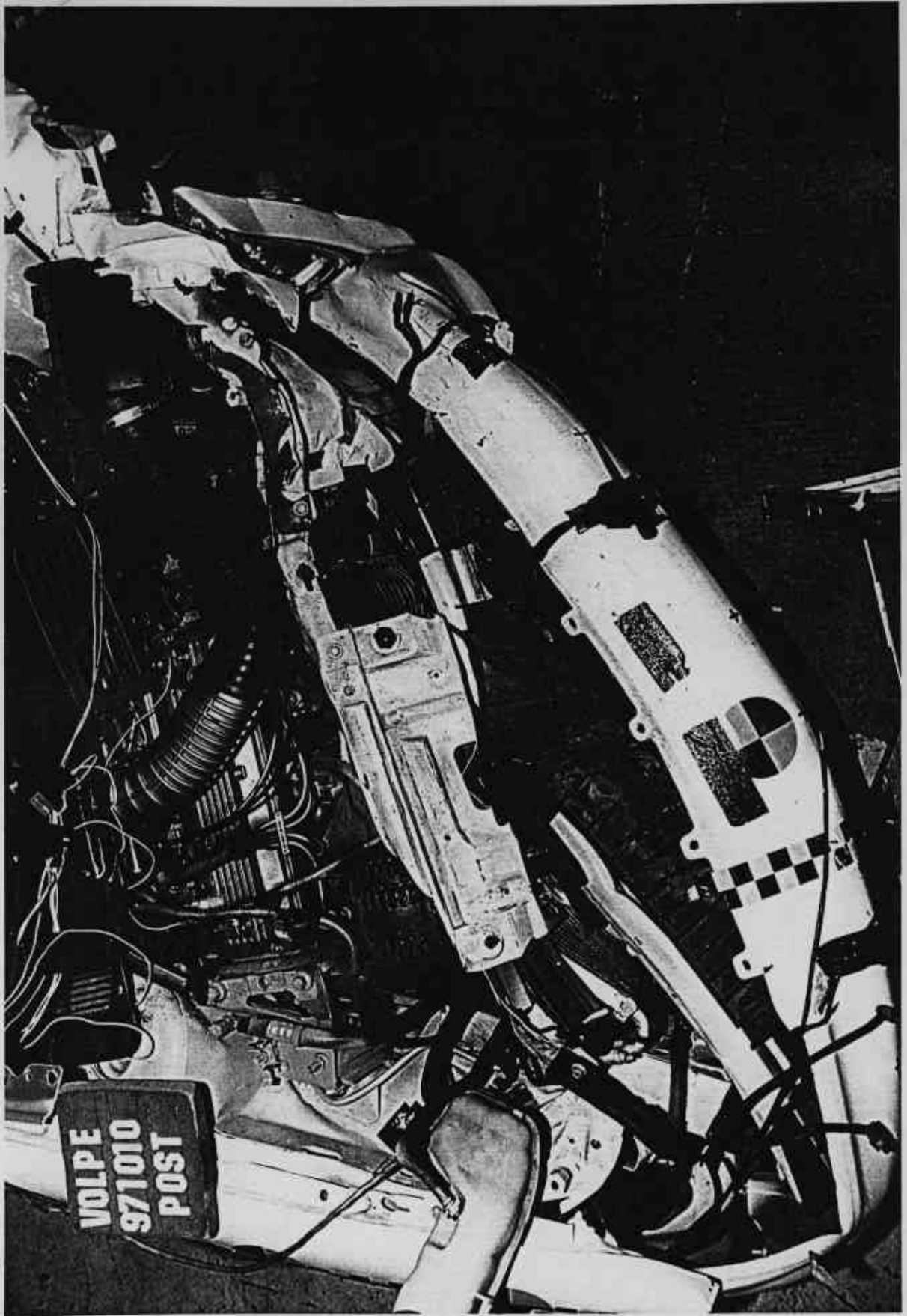


Figure A-20 Post-Test Engine Compartment View

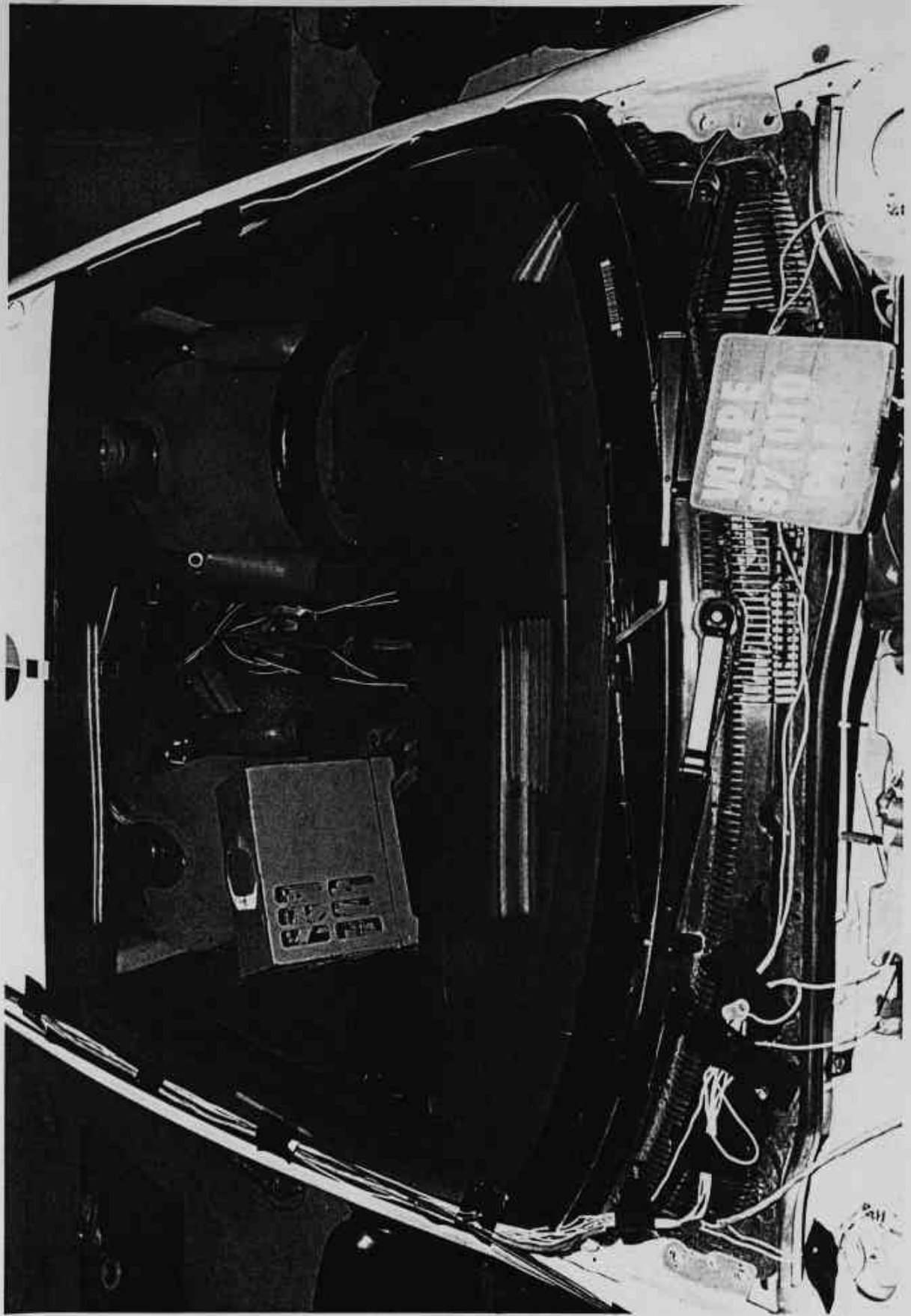


Figure A-21 Pre-Test Windshield View



Figure A-22 Post-Test Windshield View



Figure A-23 Pre-Test Left Front Underbody View

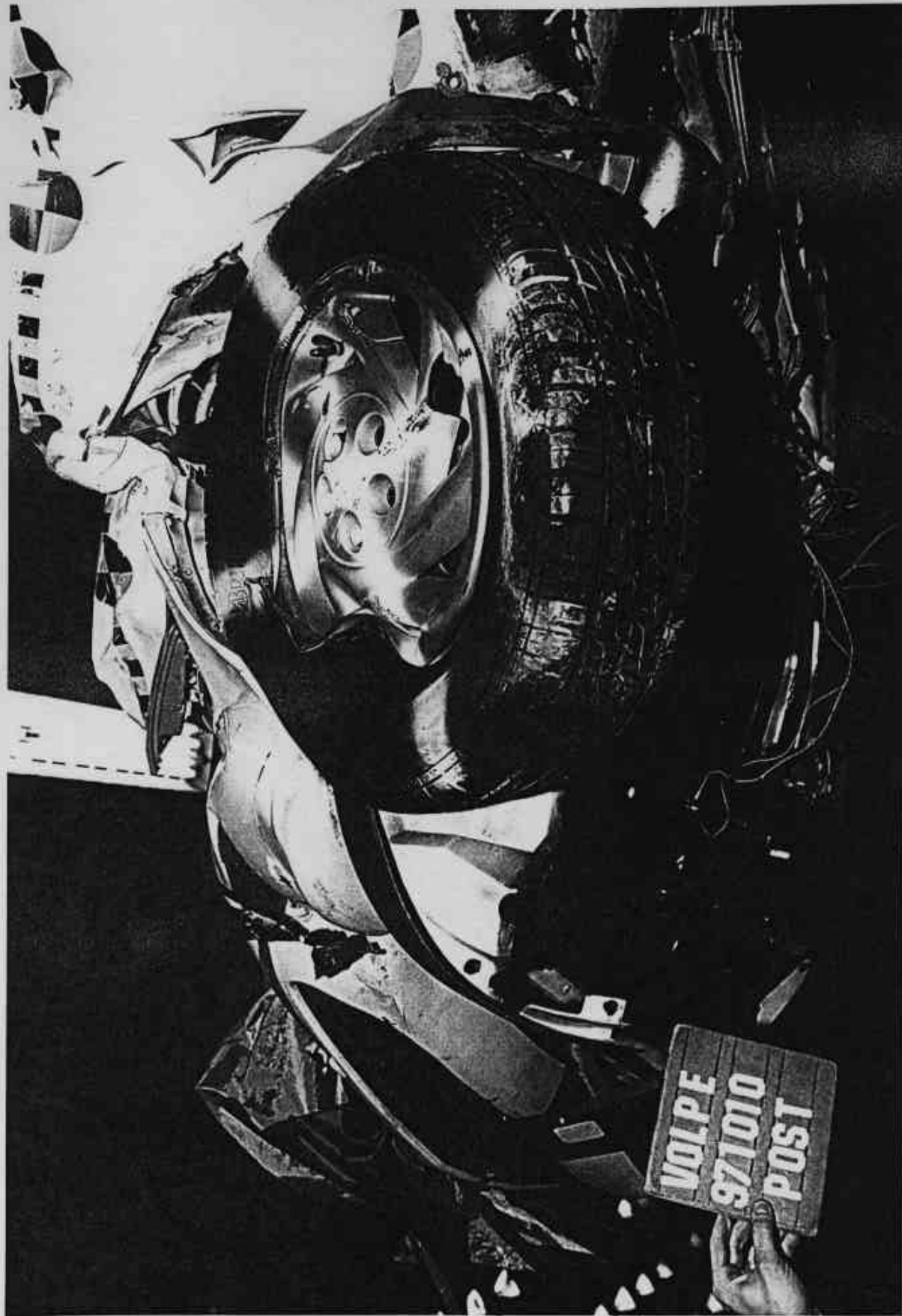


Figure A-24 Post-Test Left Front Underbody View

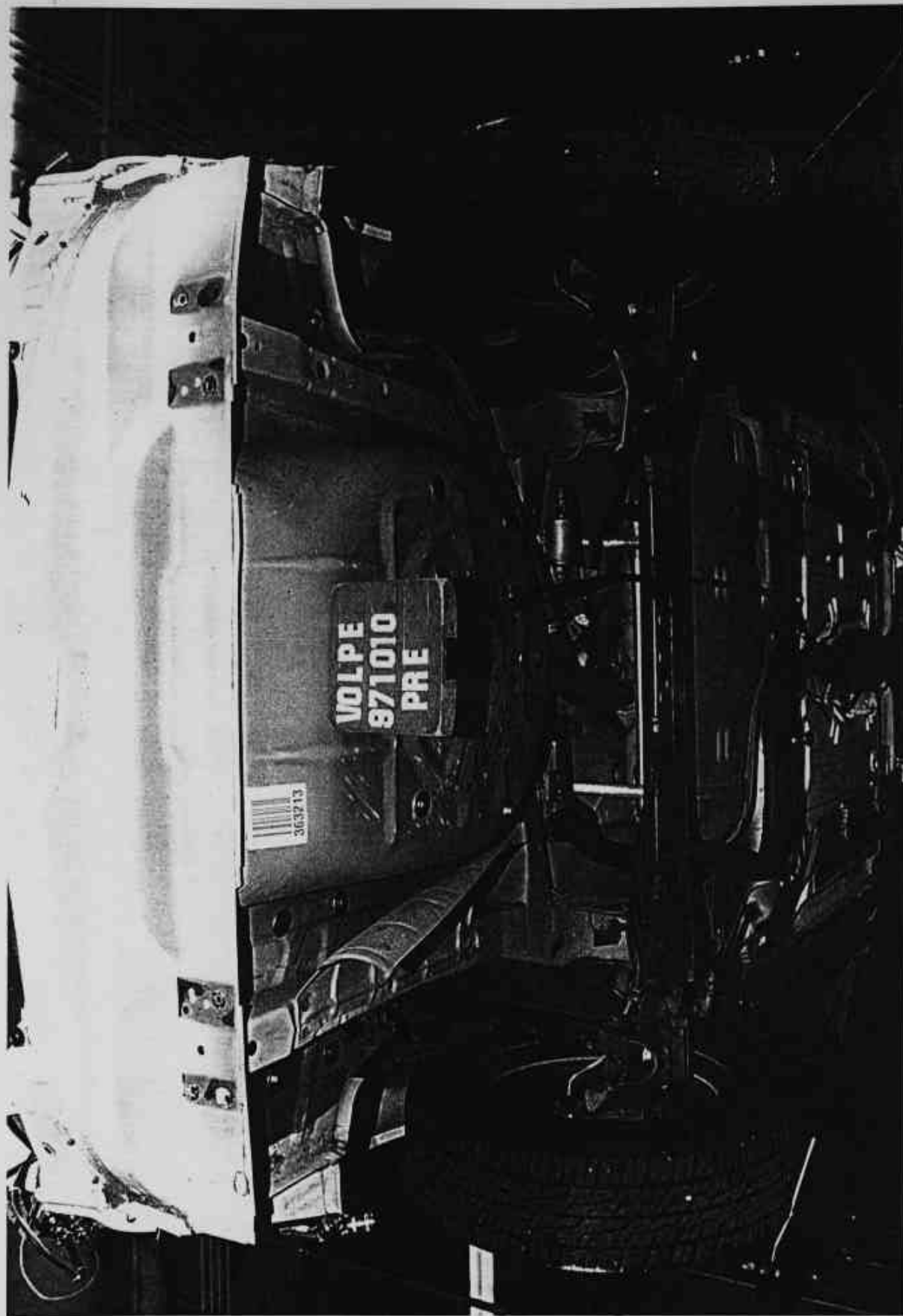


Figure A-25 Pre-Test Rear Underbody View

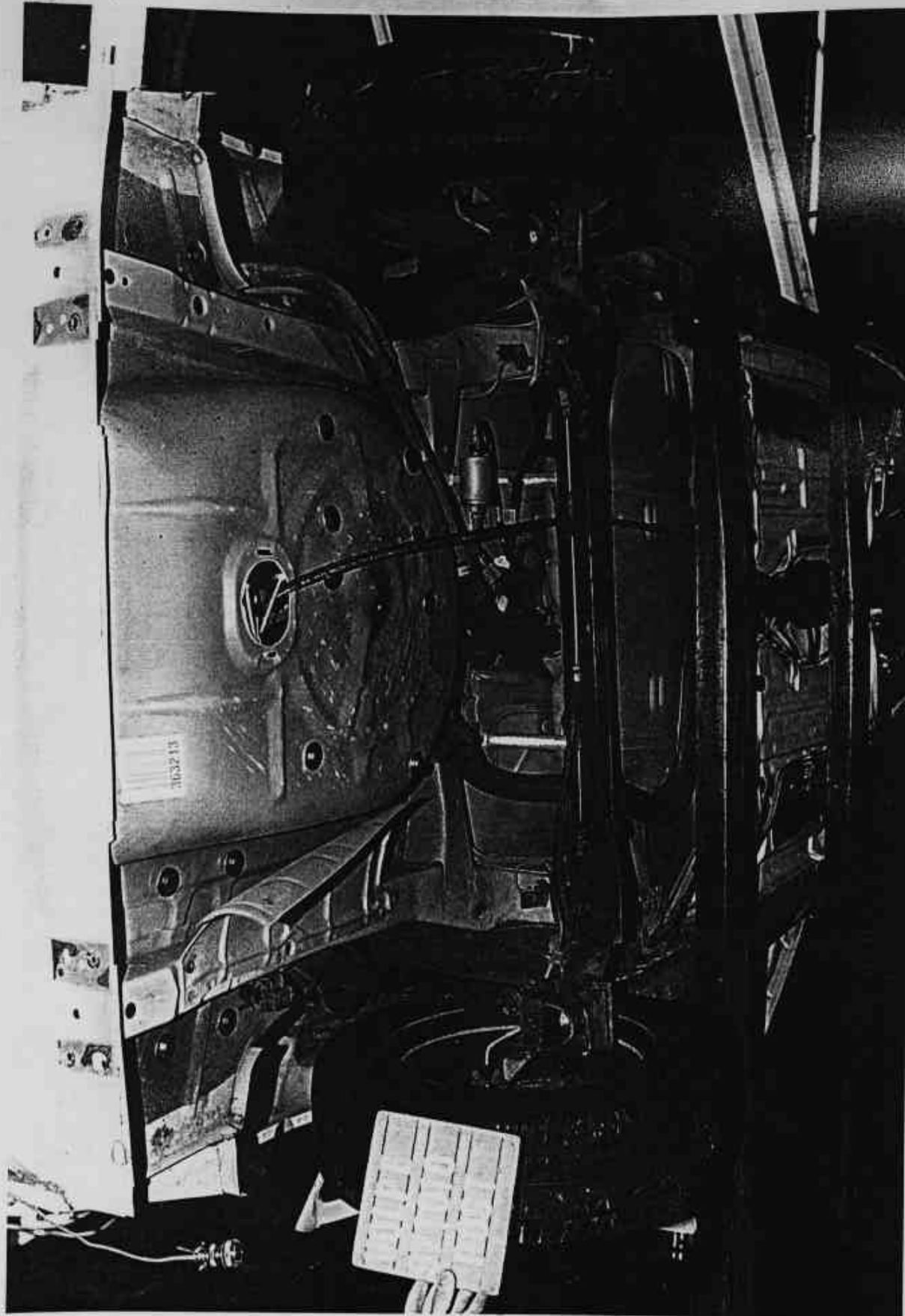


Figure A-26 Post-Test Rear Underbody View

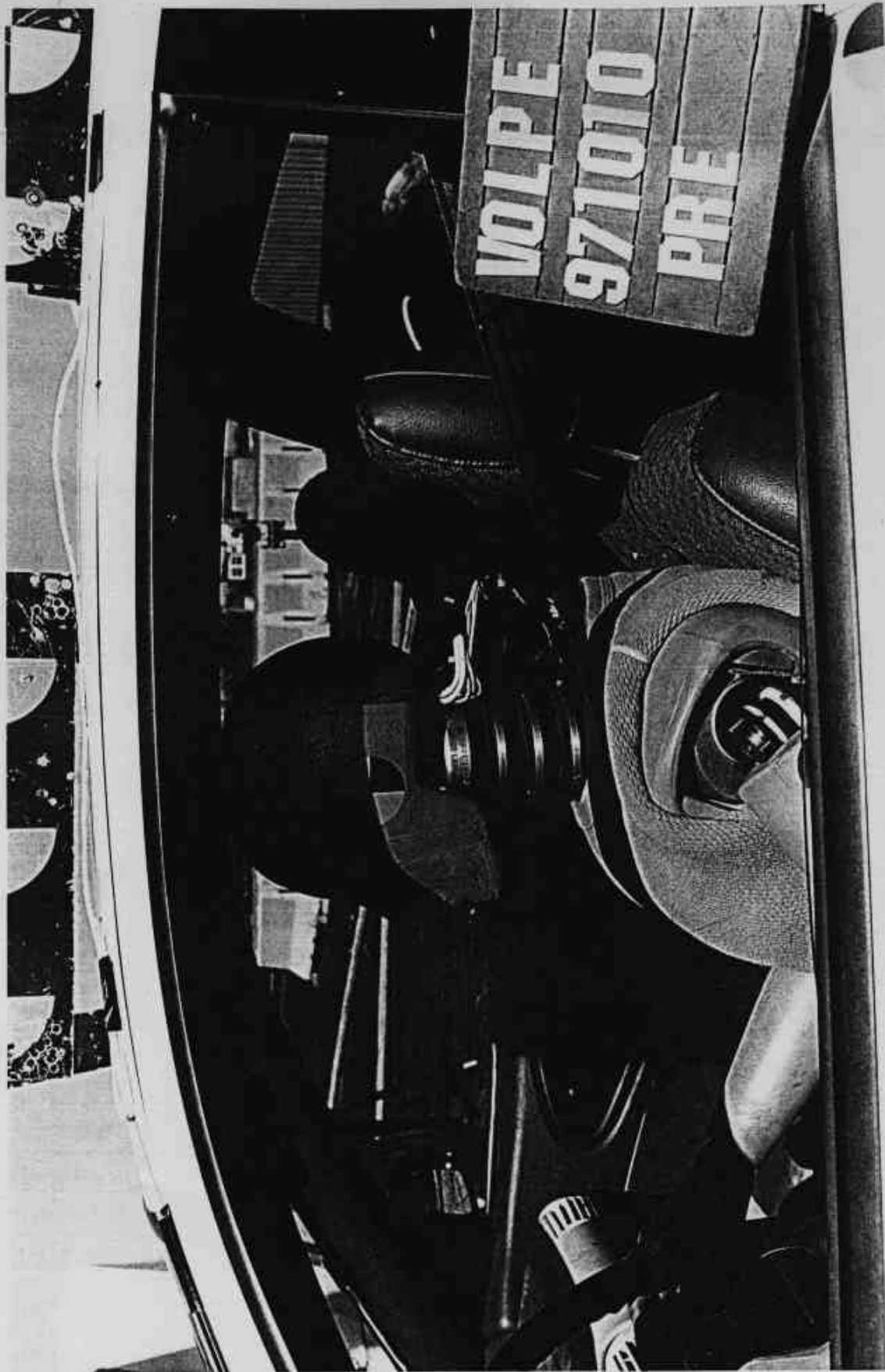


Figure A-27 Pre-Test Driver Dummy - View 1

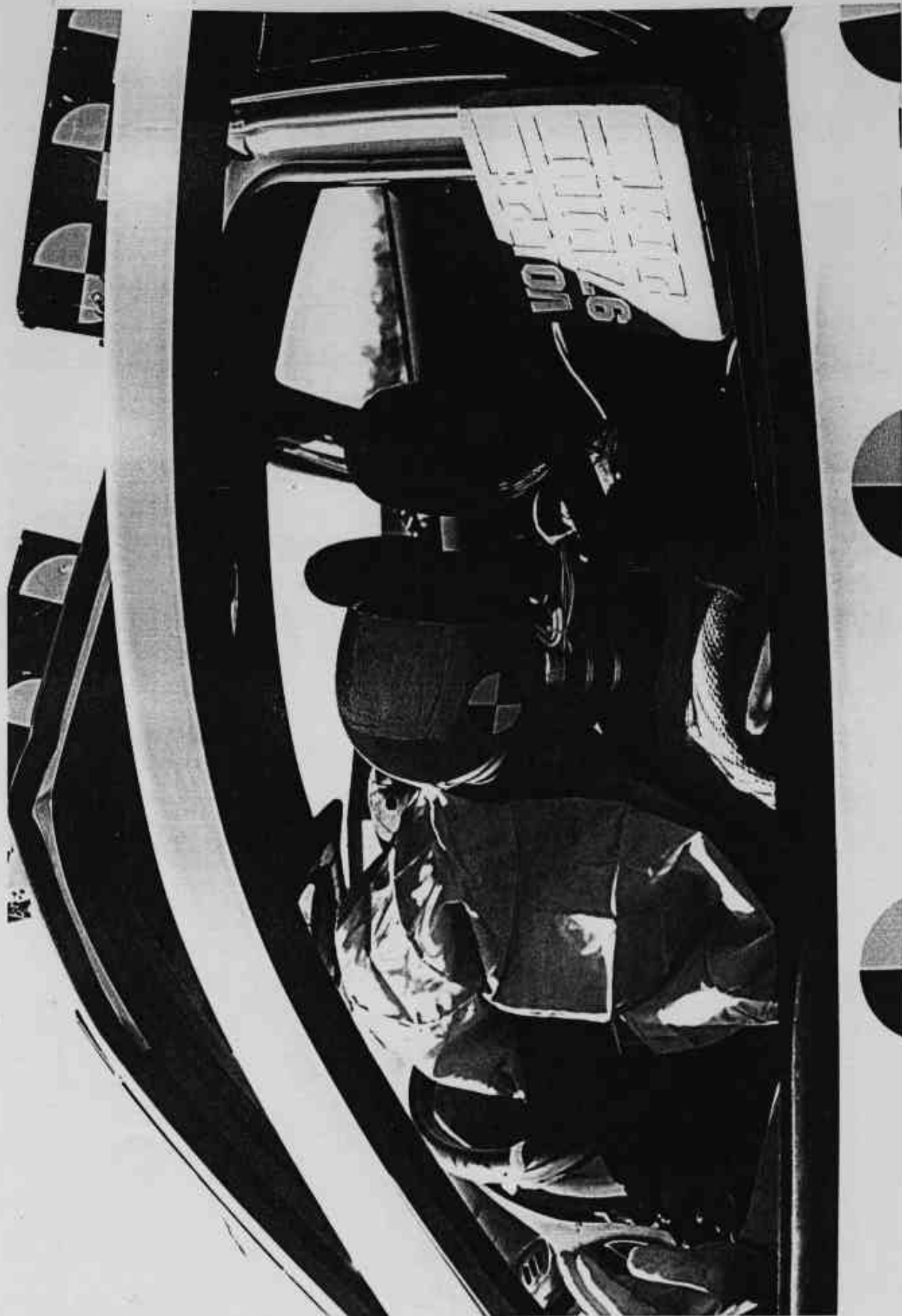


Figure A-28 Post-Test Driver Dummy - View 1



Figure A-29 Pre-Test Driver Dummy - View 2

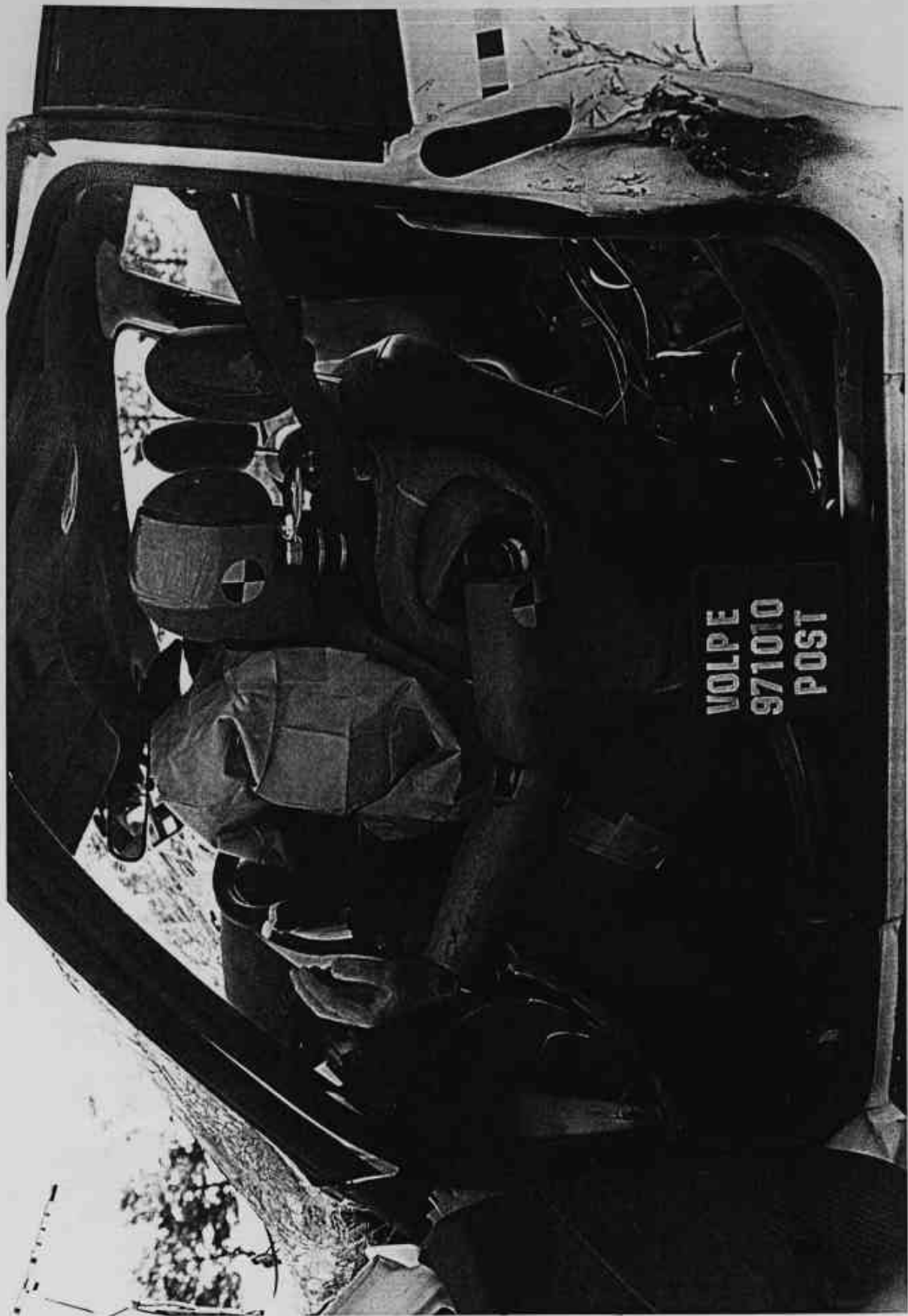


Figure A-30 Post-Test Driver Dummy - View 2



Figure A-31 Pre-Test Driver Dummy - View 3



Figure A-32 Post-Test Driver Dummy - View 3



Figure A-33 Pre-Test Passenger Dummy - View 1

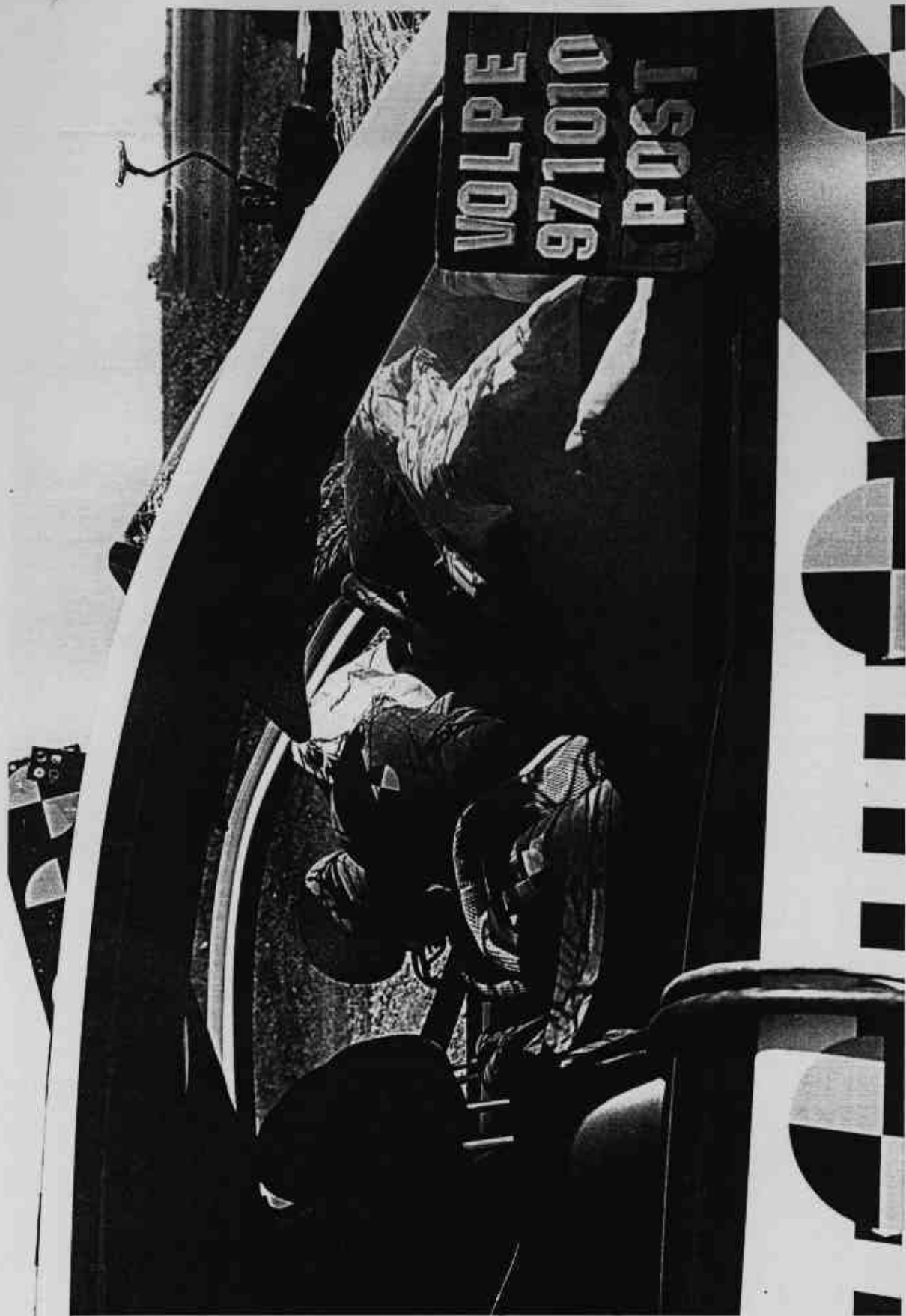


Figure A-34 Post-Test Passenger Dummy - View 1



Figure A-35 Pre-Test Passenger Dummy - View 2



Figure A-36 Post-Test Passenger Dummy - View 2

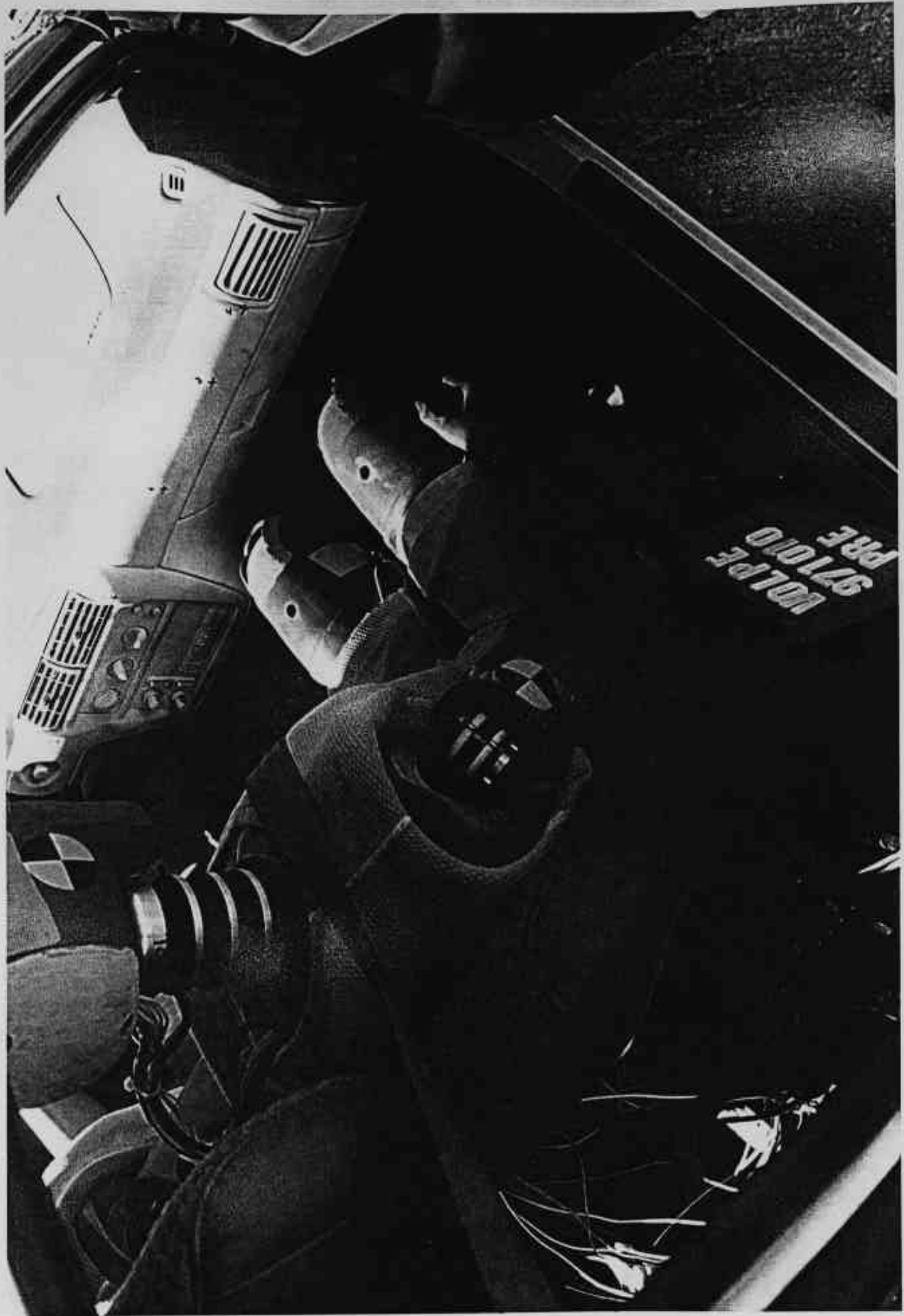


Figure A-37 Pre-Test Passenger Dummy - View 3



Figure A-38 Post-Test Passenger Dummy - View 3

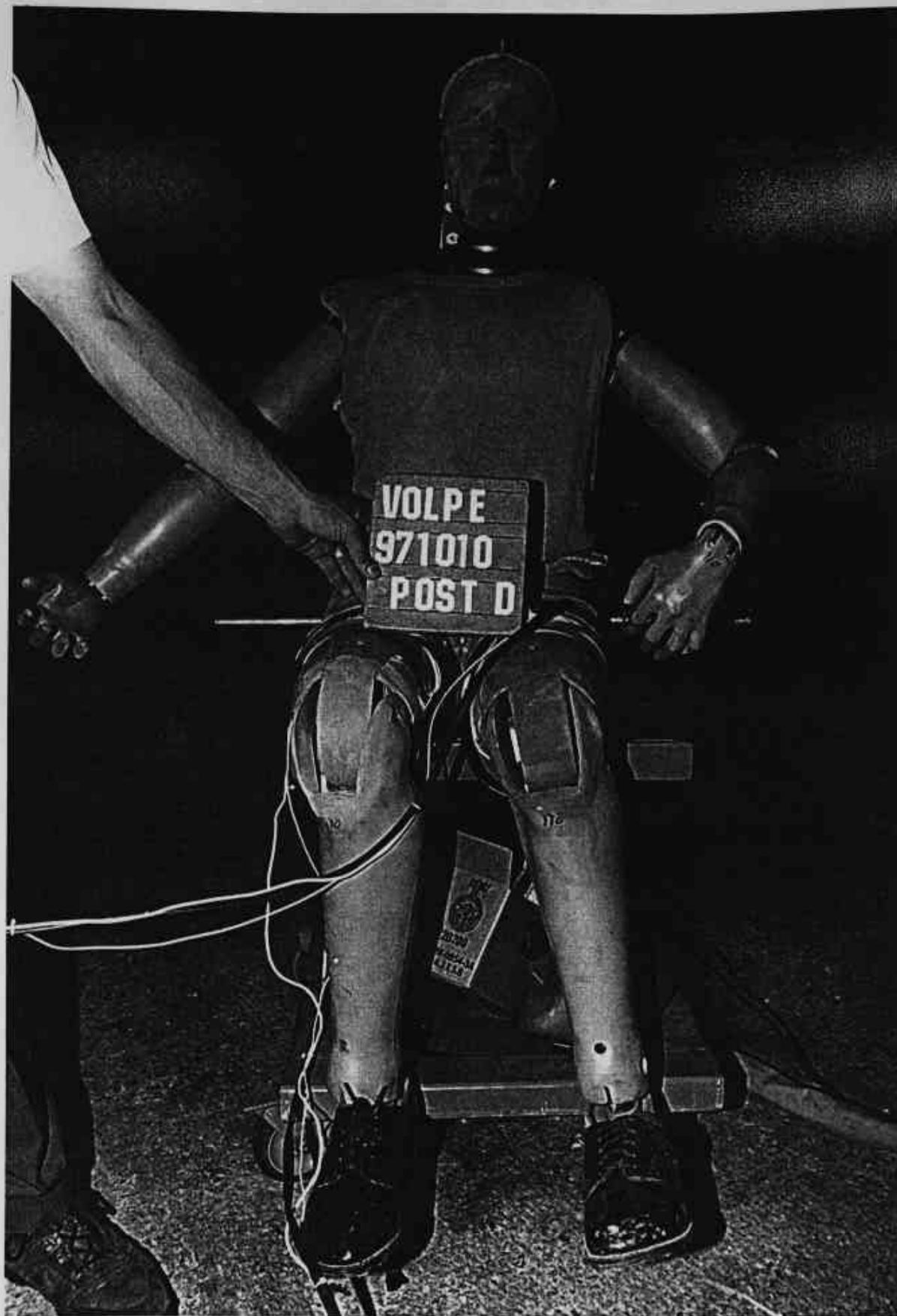


Figure A-39 Post-Test Driver Dummy Contact View

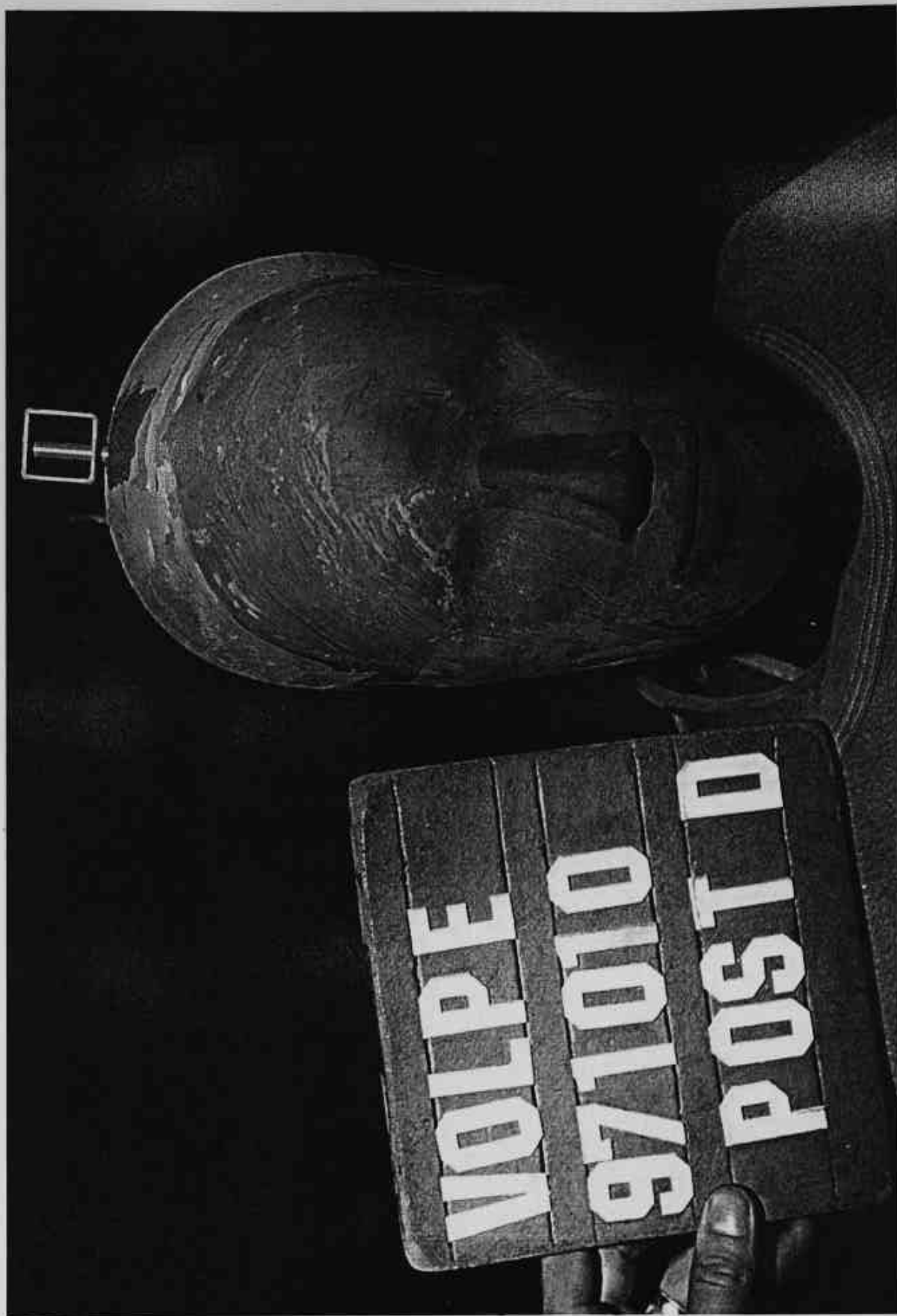


Figure A-40 Post-Test Driver Dummy Head Contact - View 1



Figure A-41 Post-Test Driver Dummy Head Contact - View 2

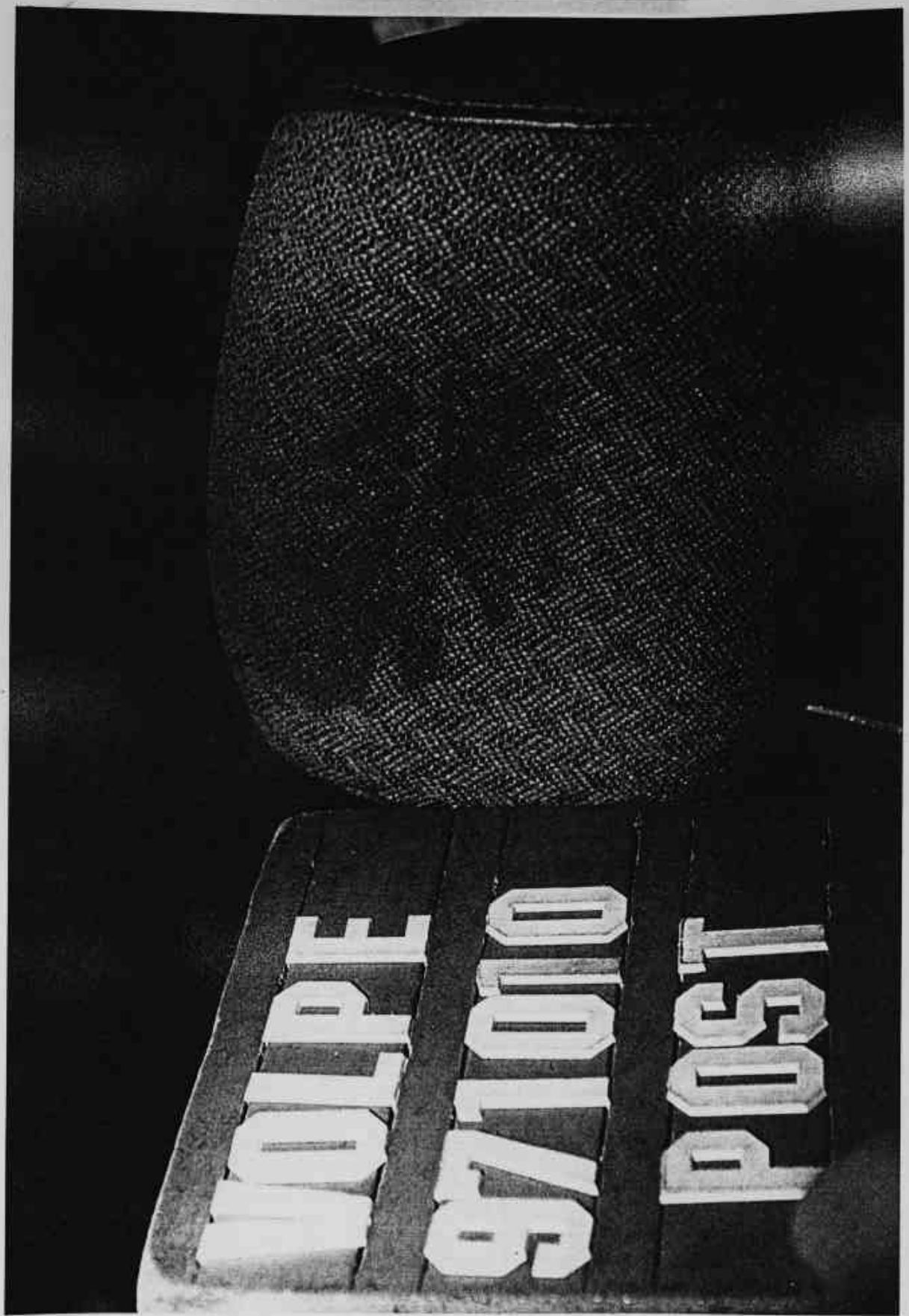


Figure A-42 Post-Test Driver Dummy Head Contact - View 3



Figure A-43 Post-Test Driver Dummy Knee Contact - View 1



Figure A-44 Post-Test Driver Dummy Knee Contact - View 2



Figure A-45 Post-Test Driver Dummy Knee Contact - View 3



Figure A-46 Post-Test Passenger Dummy Contact View

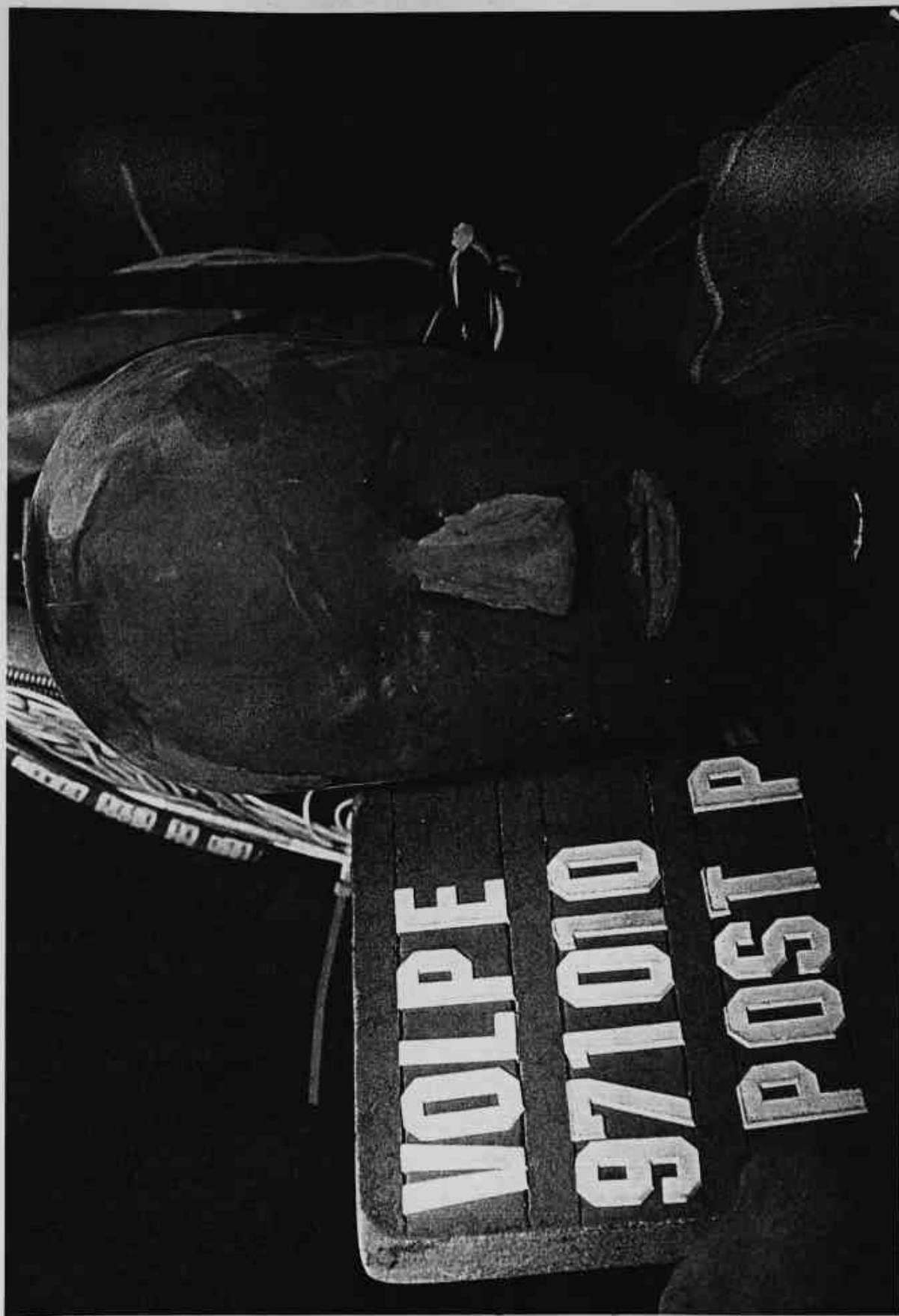


Figure A-47 Post-Test Passenger Dummy Head Contact - View 1

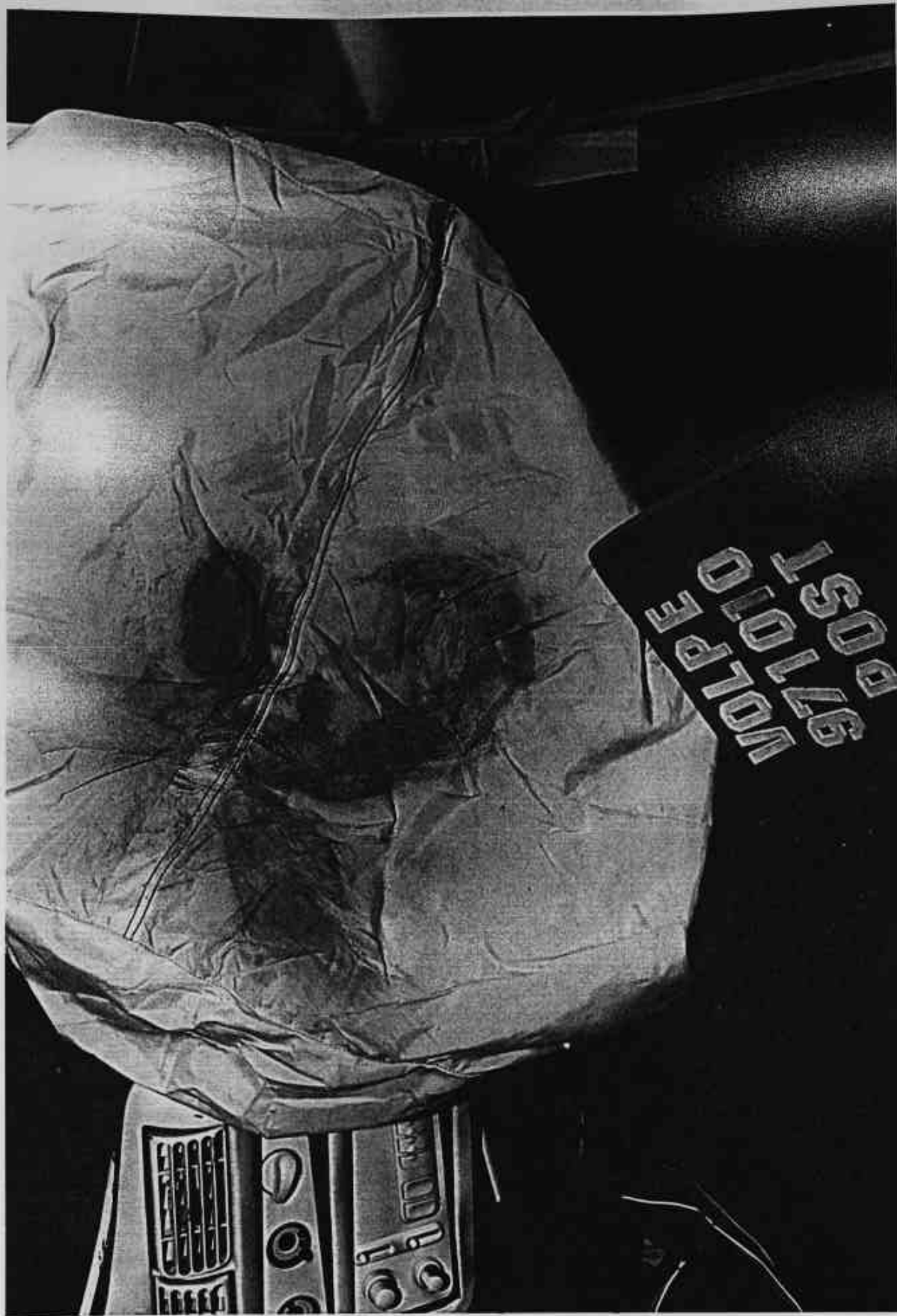


Figure A-48 Post-Test Passenger Dummy Head Contact - View 2



Figure A-49 Post-Test Passenger Dummy Knee Contact - View 1



Figure A-50 Post-Test Passenger Dummy Knee Contact - View 2



Figure A-51 Pre-Test Steering Wheel - Top View



Figure A-52 Pre-Test Steering Wheel - Side View

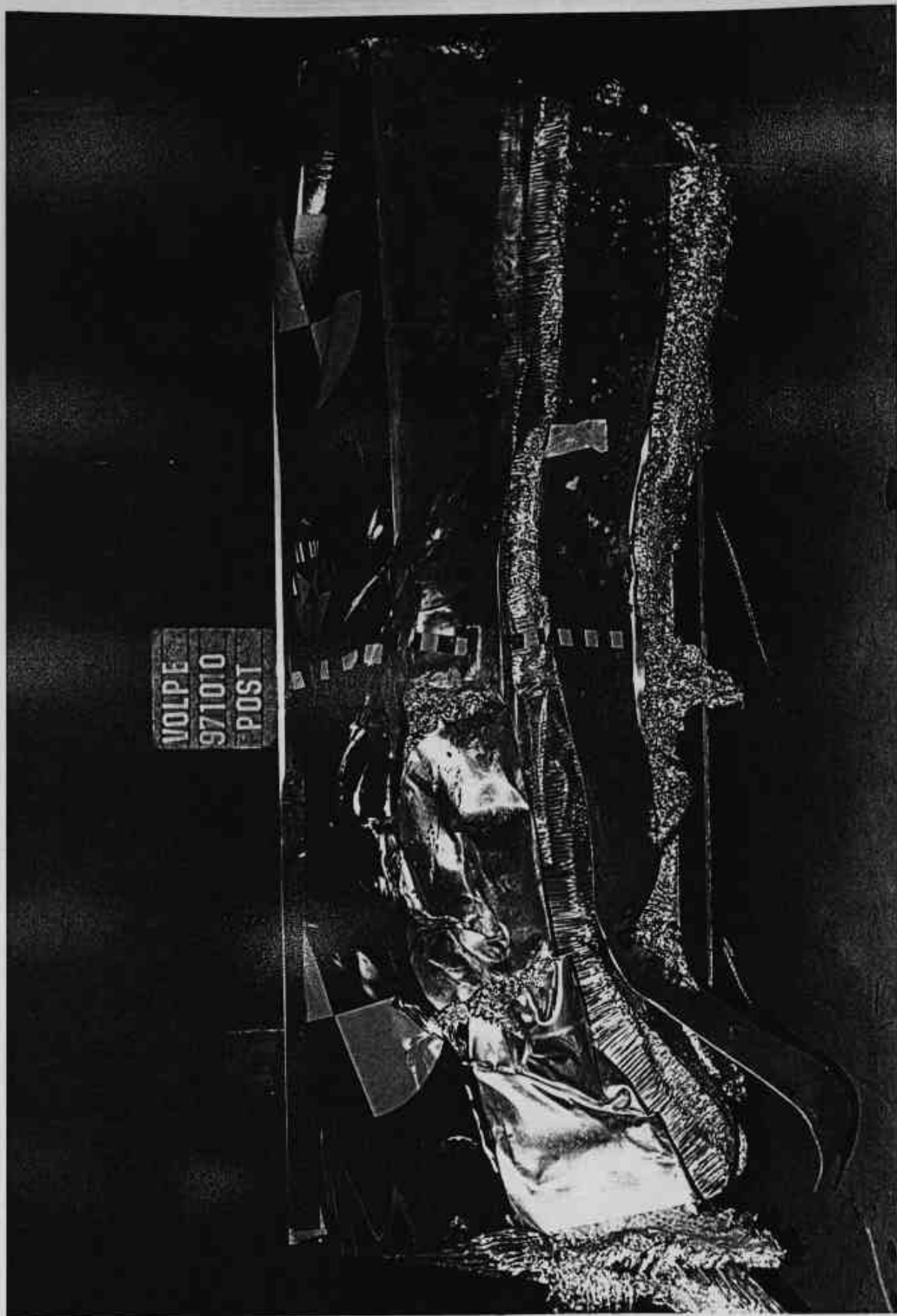


Figure A-53 Post-Test Deformable Barrier - View 1



Figure A-54 Post-Test Deformable Barrier - View 2

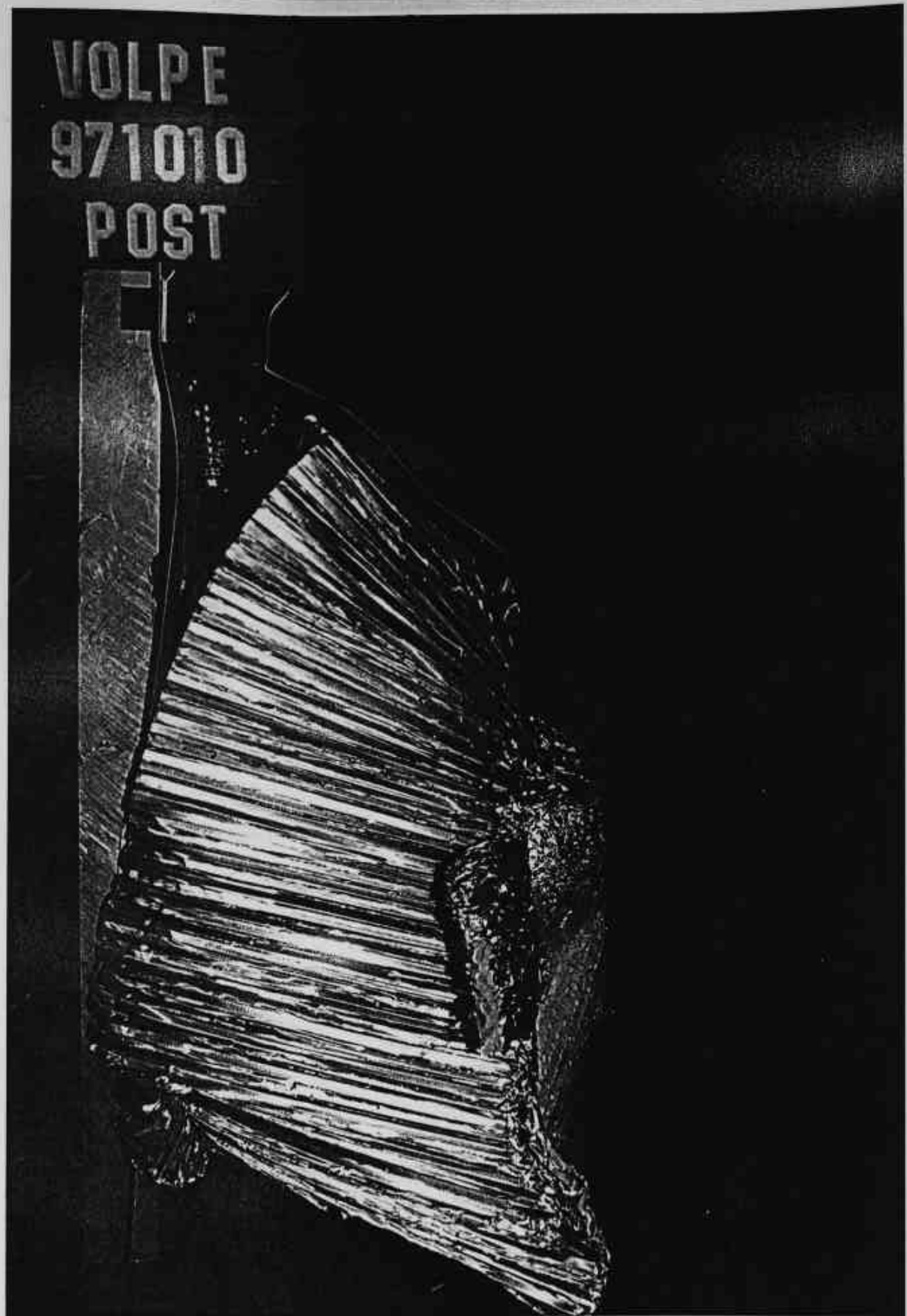


Figure A-55 Post-Test Deformable Barrier - View 3

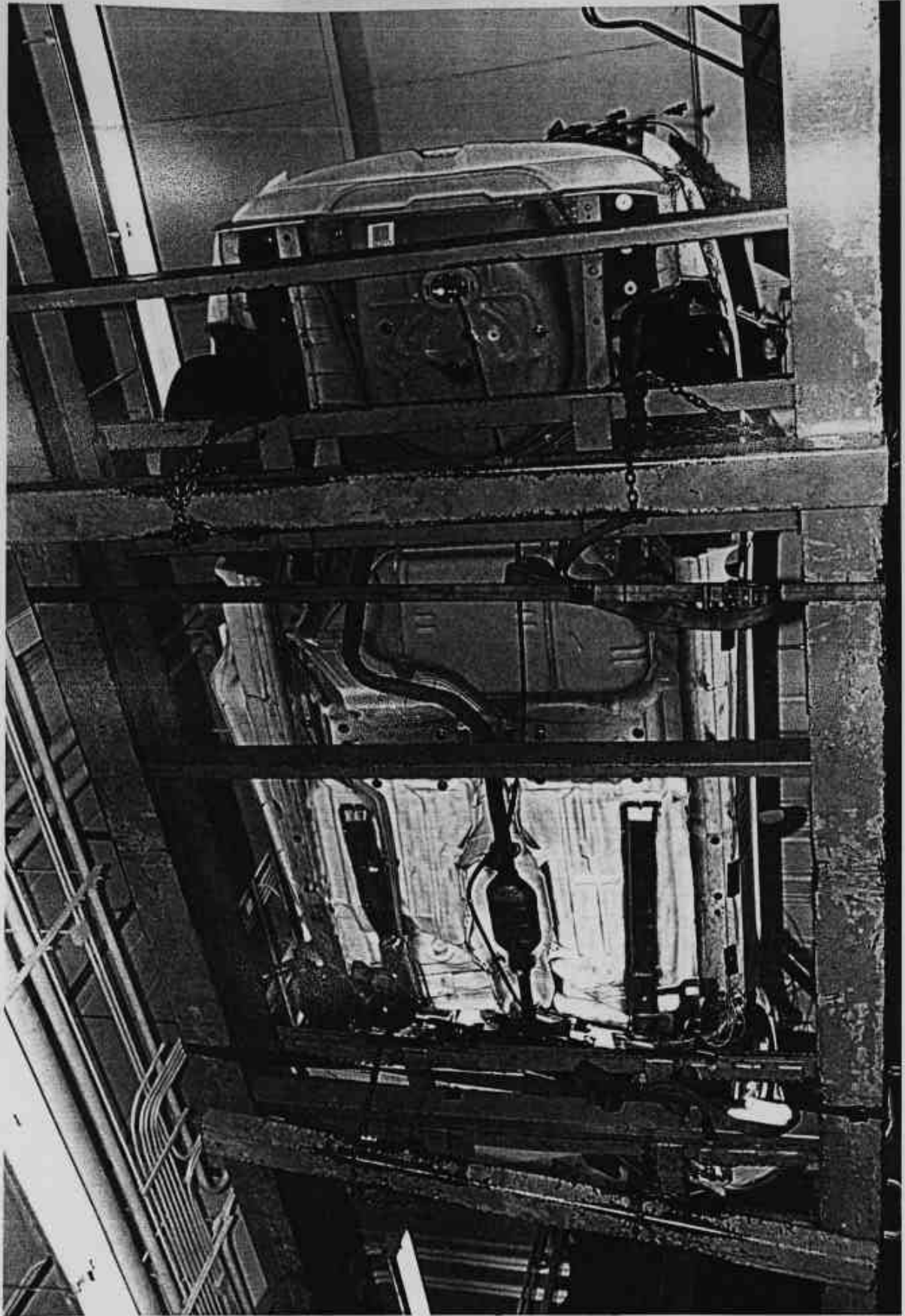


Figure A-56 Post-Test Vehicle on Rollover Device - 90° View

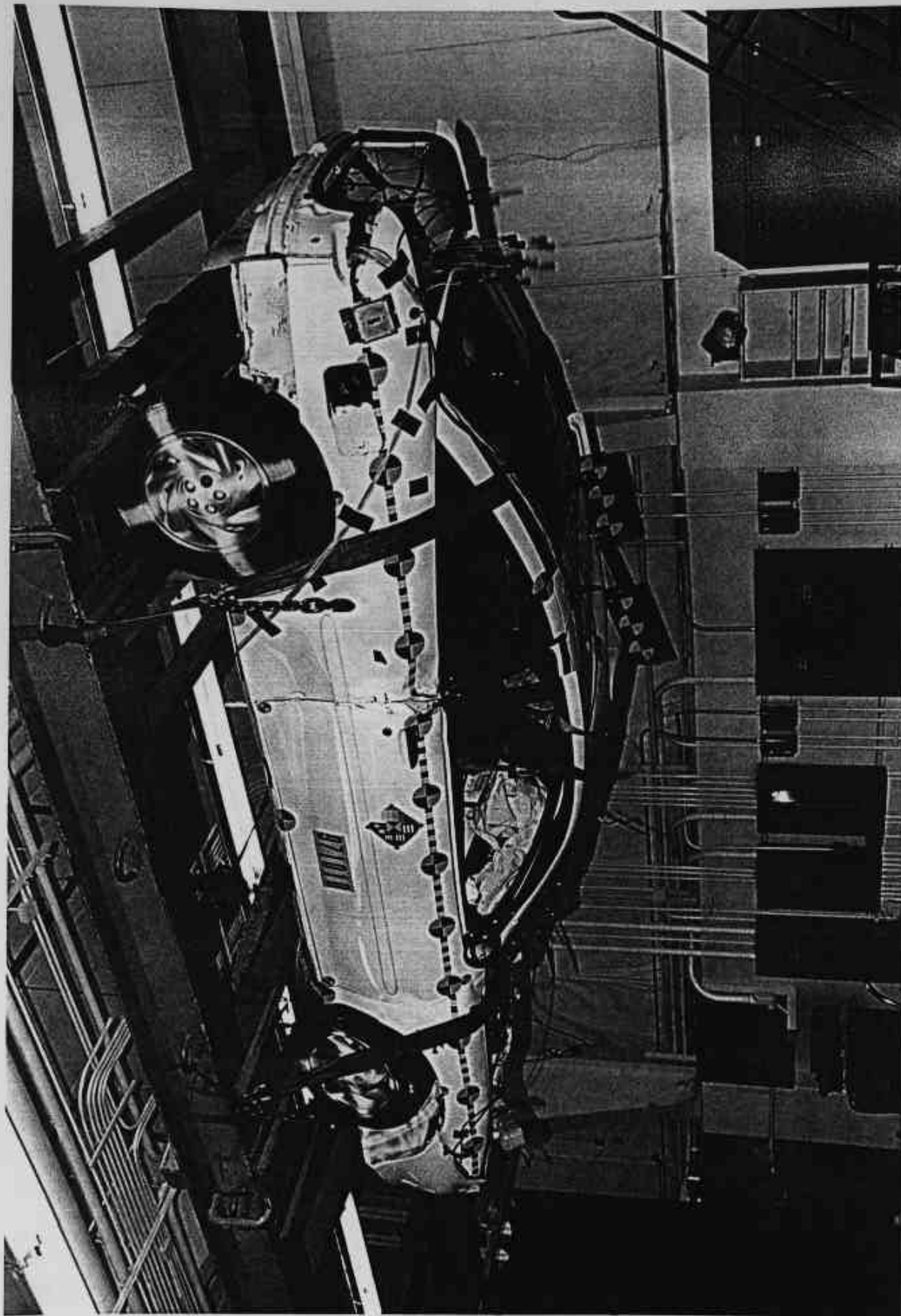


Figure A-57 Post-Test Vehicle on Rollover Device - 180° View

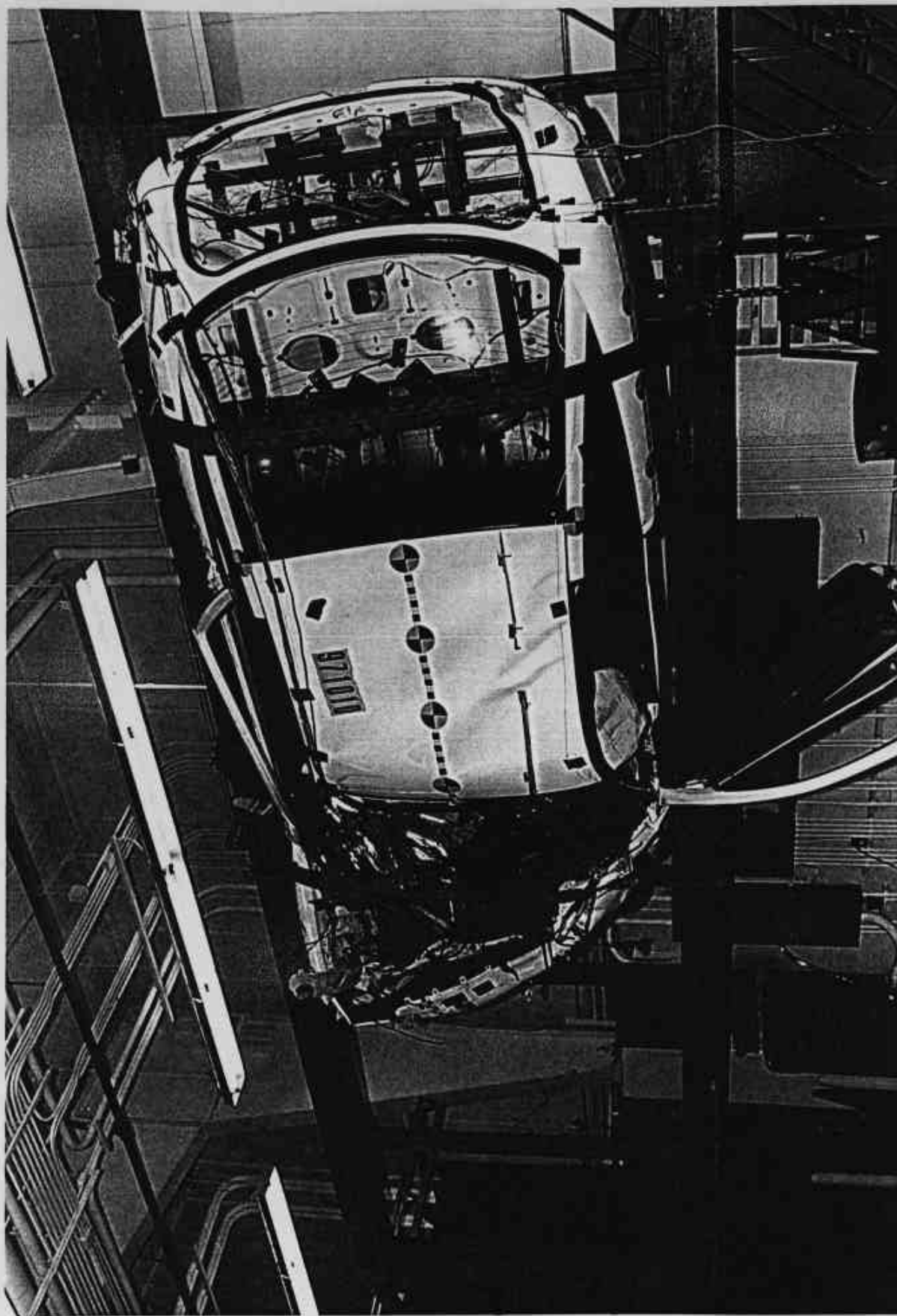


Figure A-58 Post-Test Vehicle on Rollover Device - 270° View

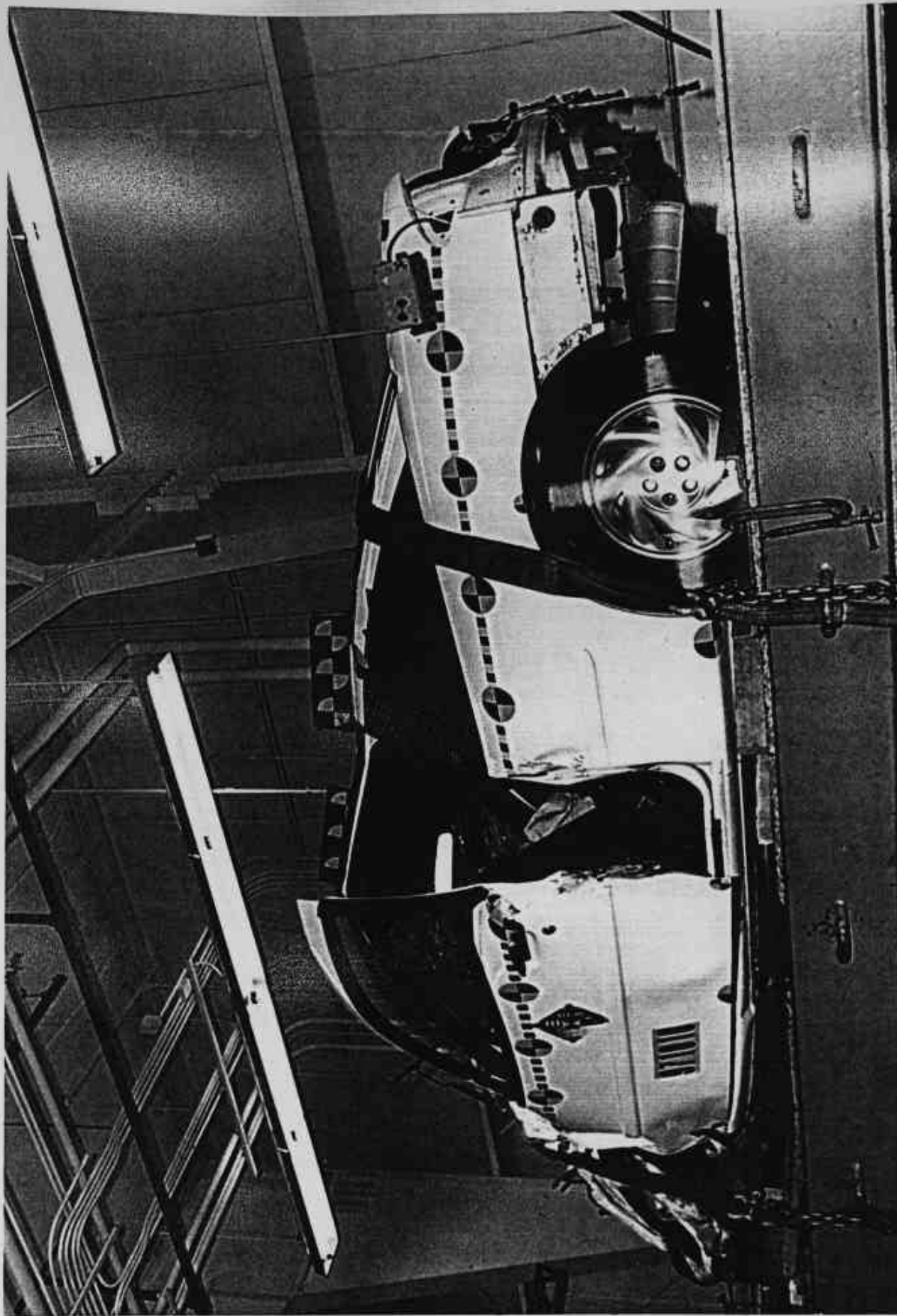


Figure A-59 Post-Test Vehicle on Rollover Device - 360° View

Appendix B

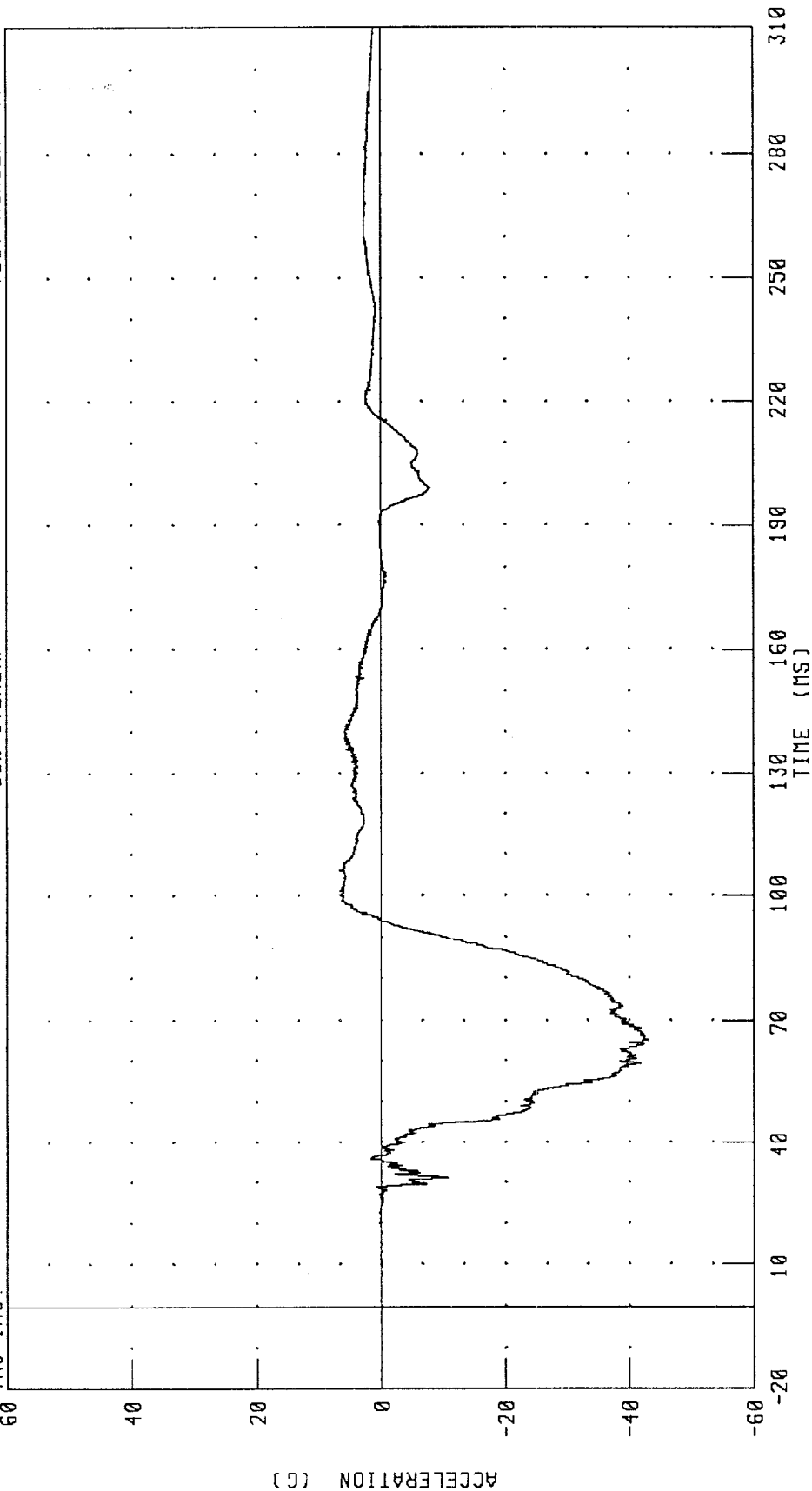
Data Plots

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER HEAD X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 6.70 G @ 101.28 MS; -42.93 G @ 165.28 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

60

40

20

0

-20

-40

-60

ACCELERATION (G)

TIME (MS)

10 40 70 100 130 160 190 220 250 280 310

CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 19.25 G @ 199.20 MS; -18.78 G @ 71.92 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

60

40

20

0

-20

-40

-60

ACCELERATION (G)

TIME (MS)

310

280

250

220

190

160

130

100

70

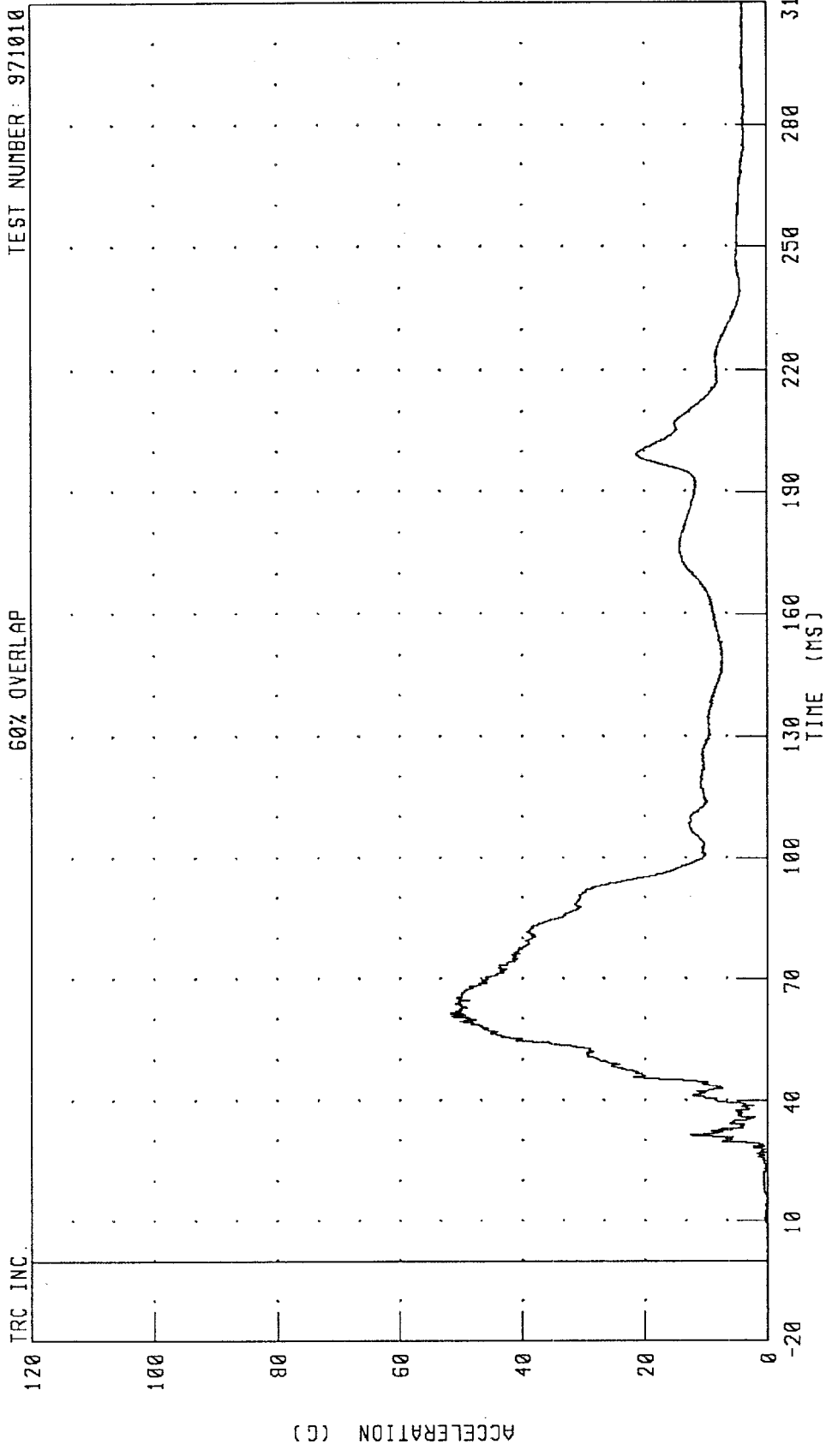
40

10

CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 26.41 G @ 90.64 MS; -29.54 G @ 61.28 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD RESULTANT ACCELERATION



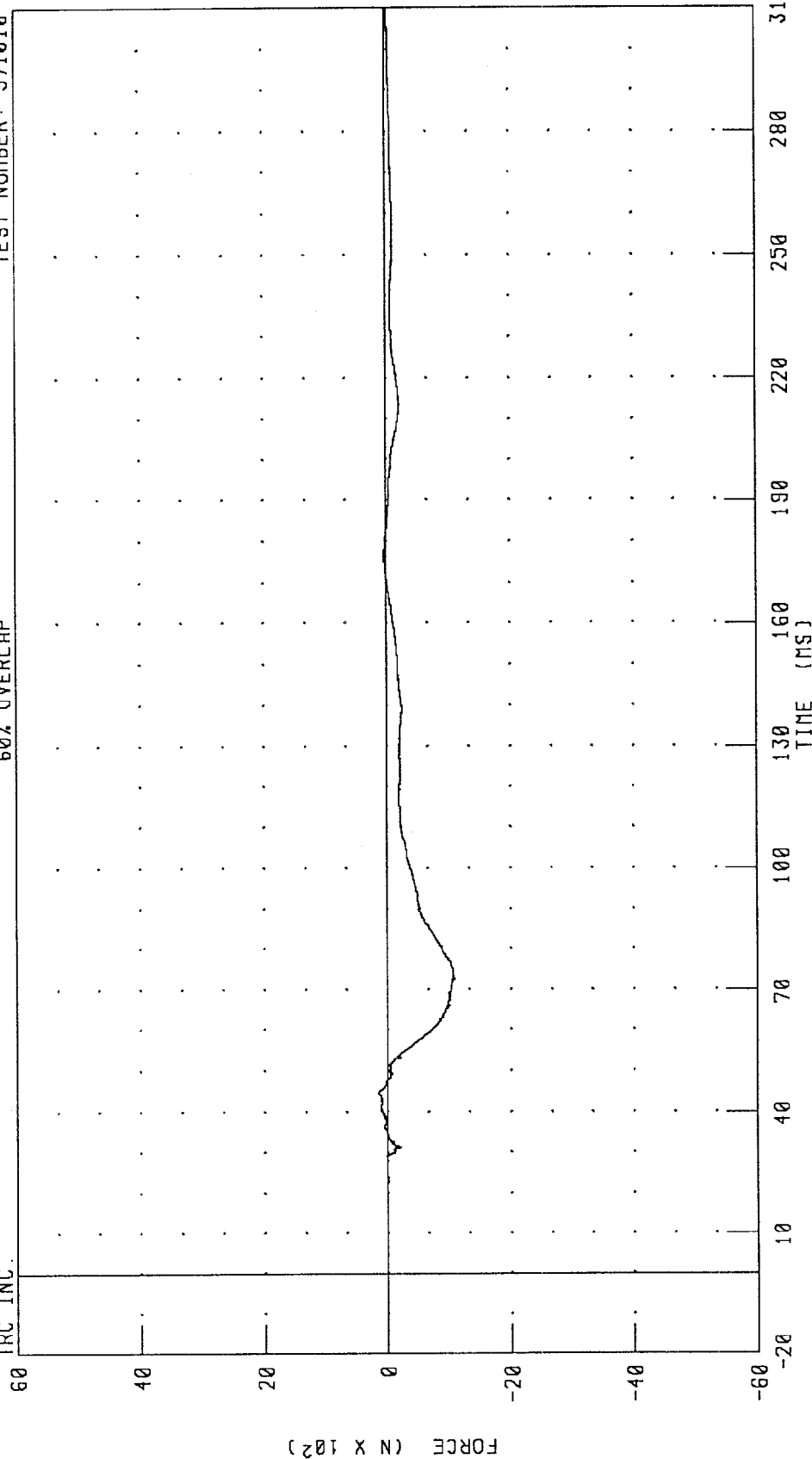
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000 PEAK DATA: 51.78 G @ 61.28 MS; 0.04 G @ -20.00 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER UPPER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

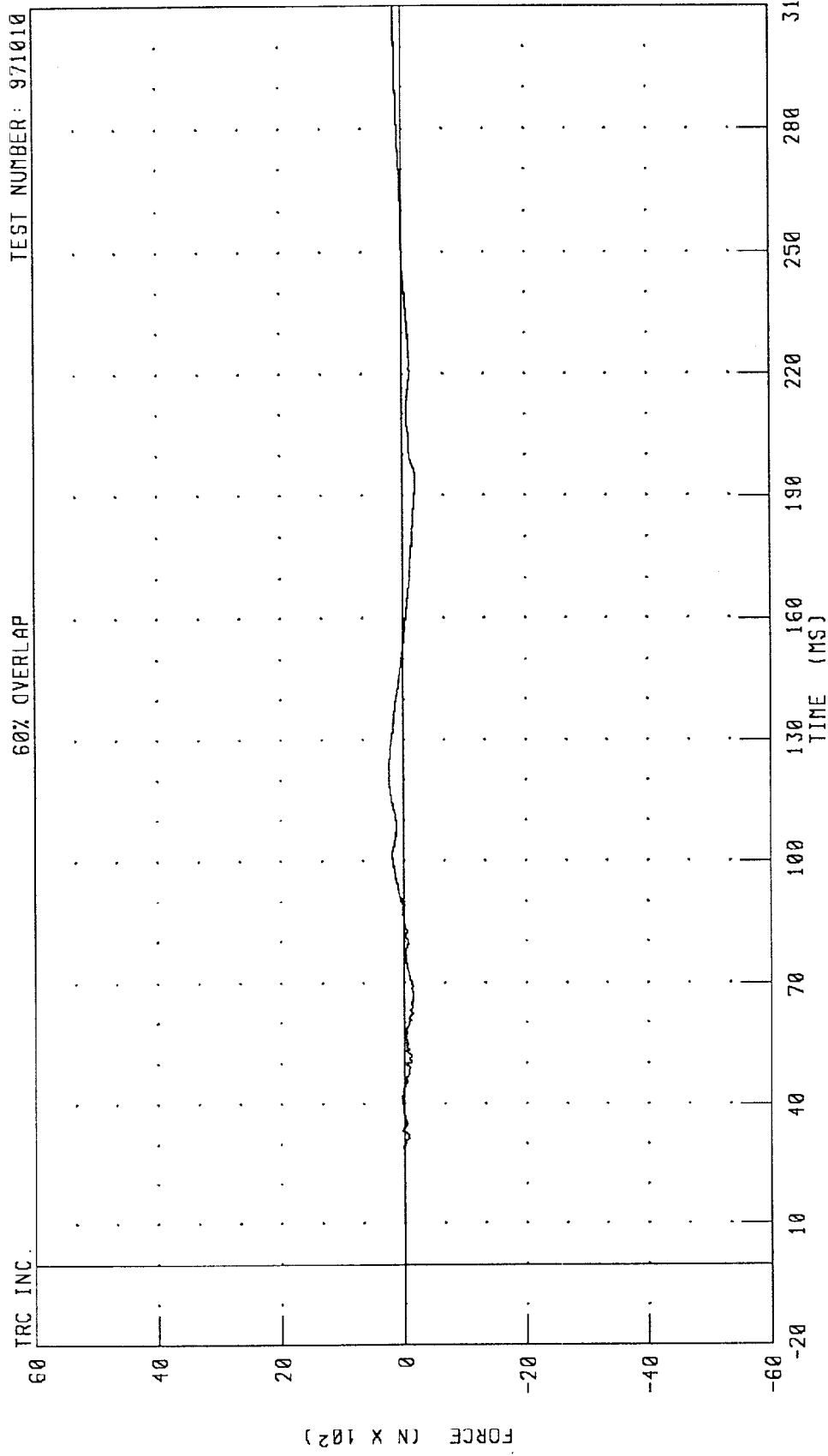
TRC INC.



PEAK DATA: 152.05 N @ 44.40 MS; -1103.33 N @ 72.72 MS

CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER UPPER NECK Y-AXIS SHEAR FORCE



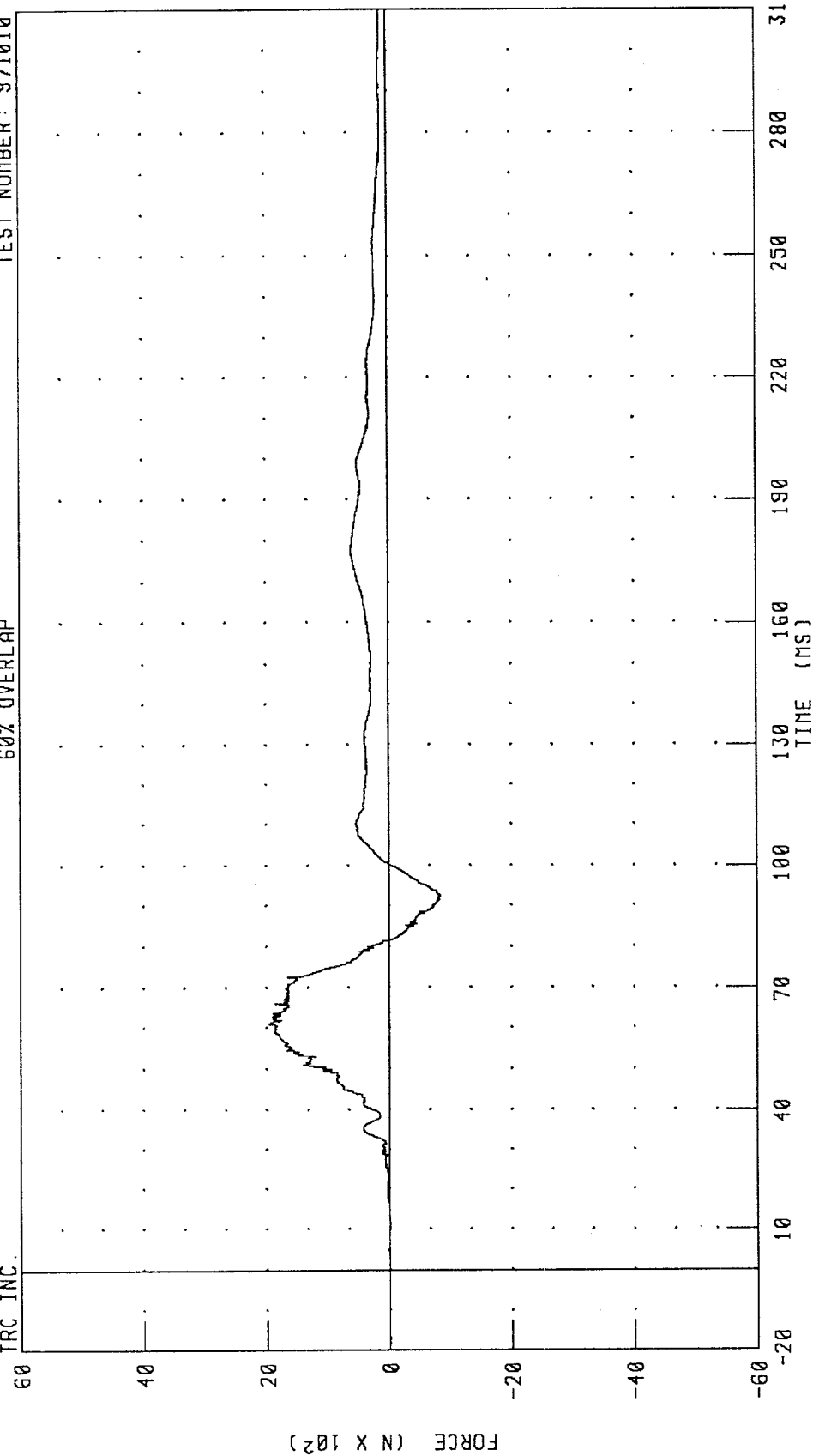
CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER UPPER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1970.73 N @ 60.96 MS; -838.02 N @ 92.48 MS

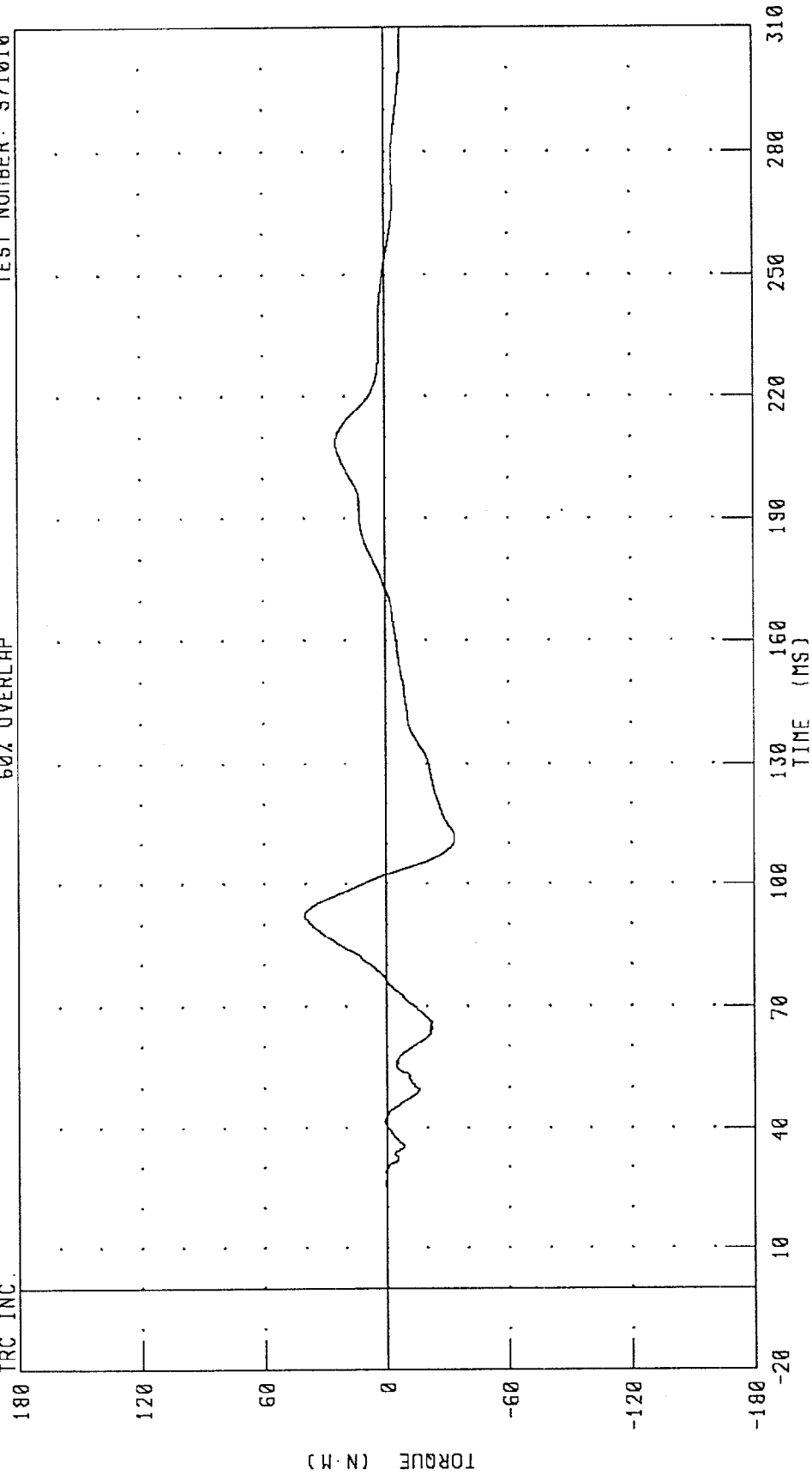
CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER UPPER NECK MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 40.43 N·m @ 92.08 ms; -33.72 N·m @ 111.68 ms

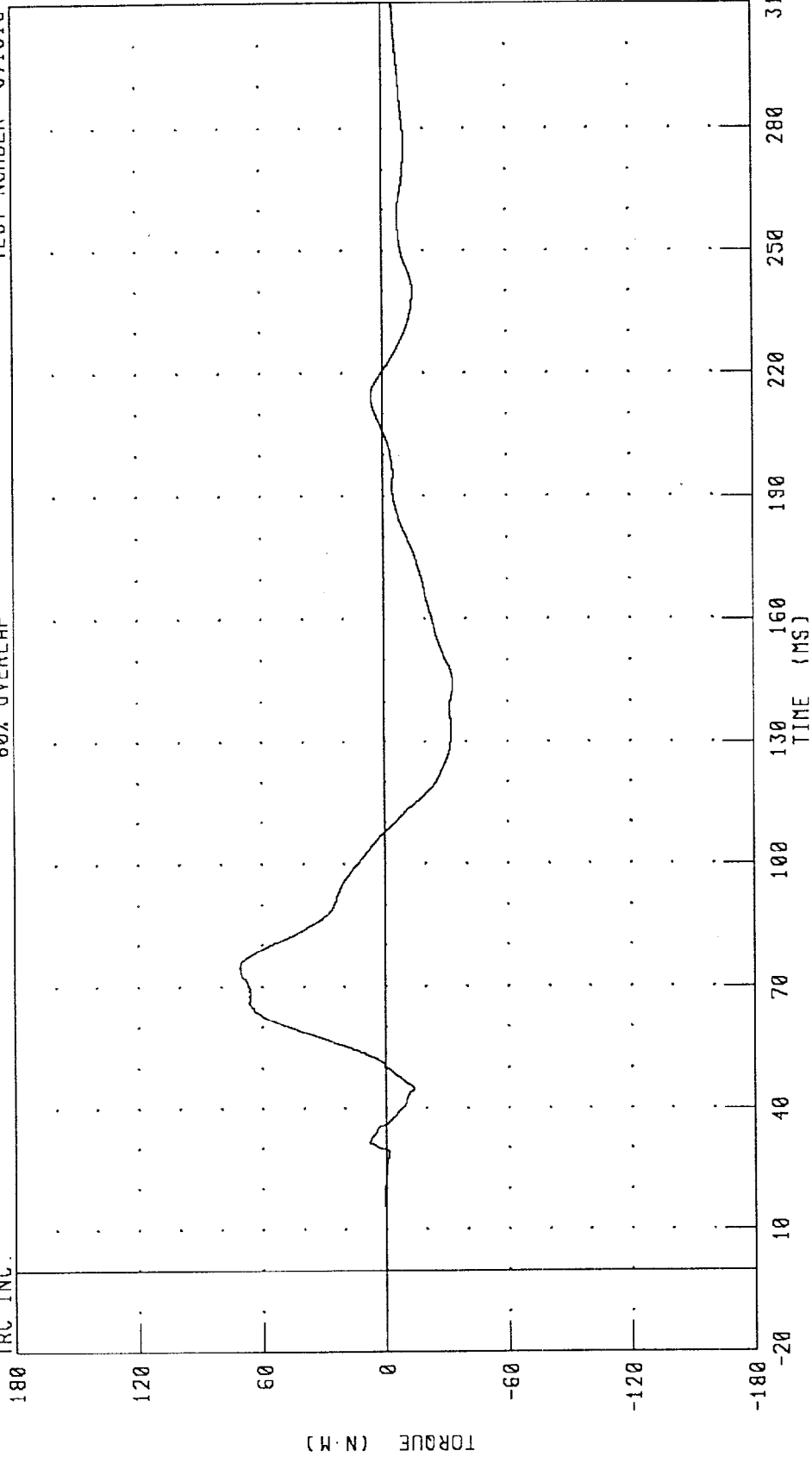
CHANNEL: NEKXMI FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER UPPER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: NEKYM1 FILTER: CH. CLASS 600

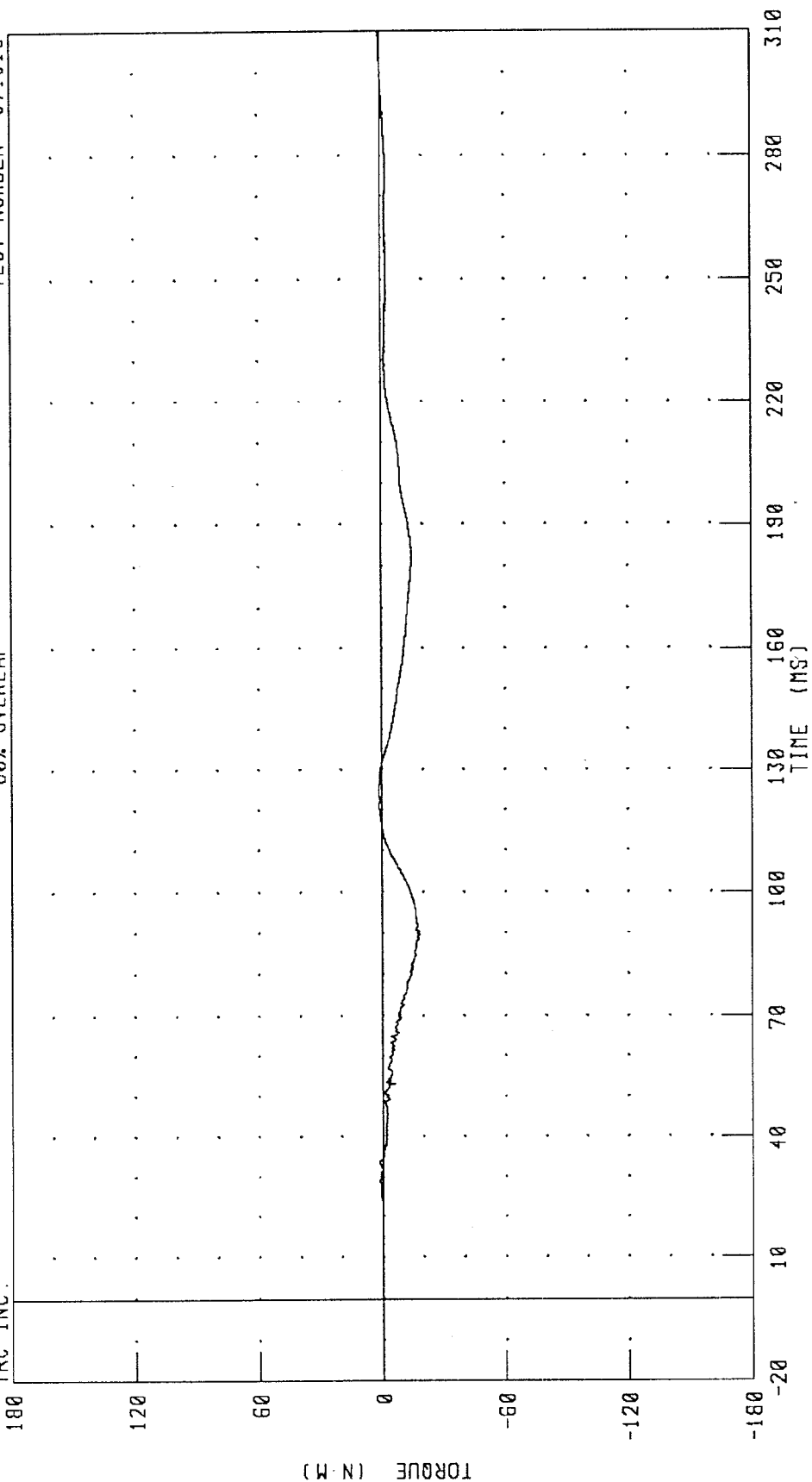
PEAK DATA: 70.92 N·M @ 74.72 MS; -33.65 N·M @ 144.56 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER UPPER NECK MOMENT ABOUT Z-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1.53 N-M @ 33.52 MS; -18.27 N-M @ 90.40 MS

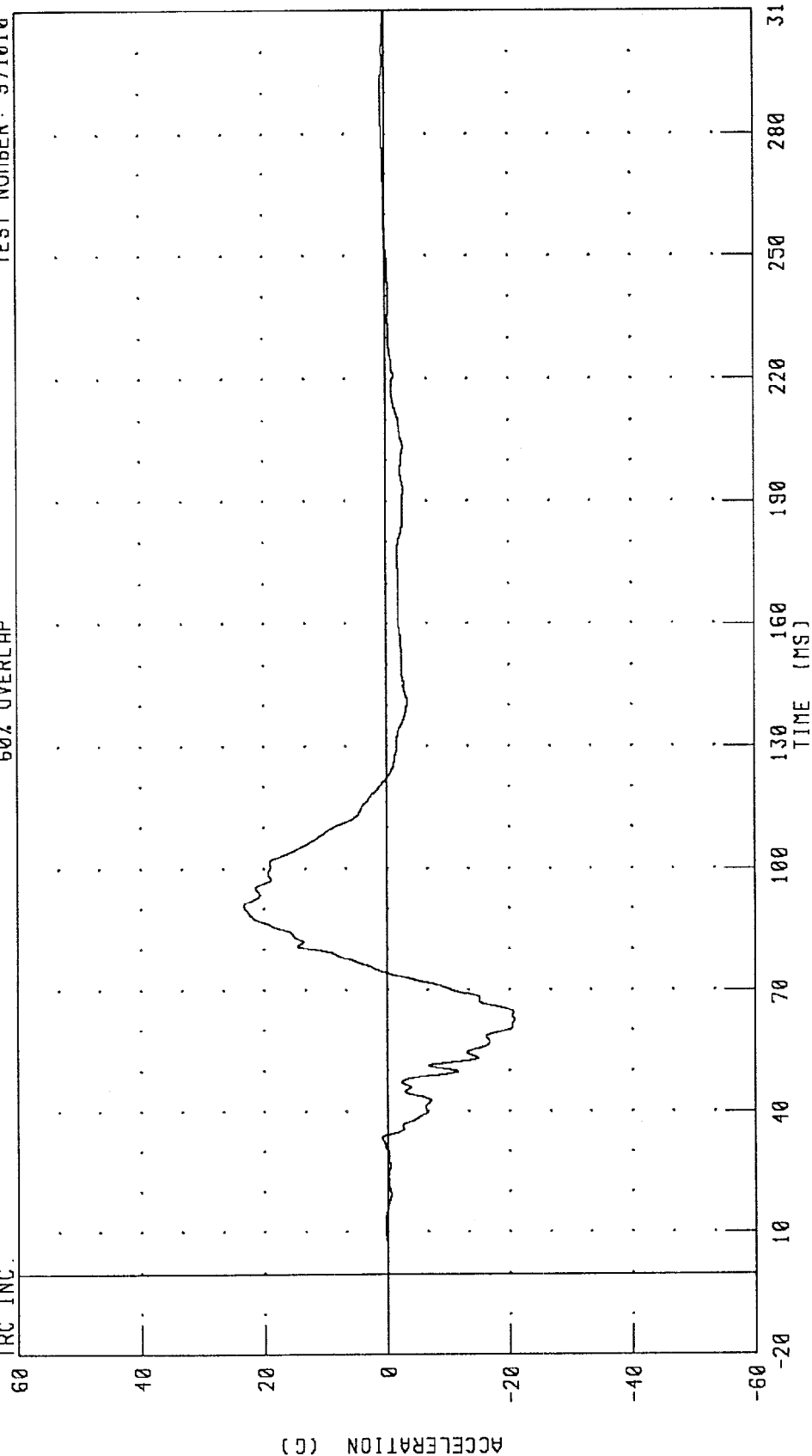
CHANNEL: NEKZM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER CHEST X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 23.37 G @ 90.72 MS; -20.77 G @ 62.56 MS

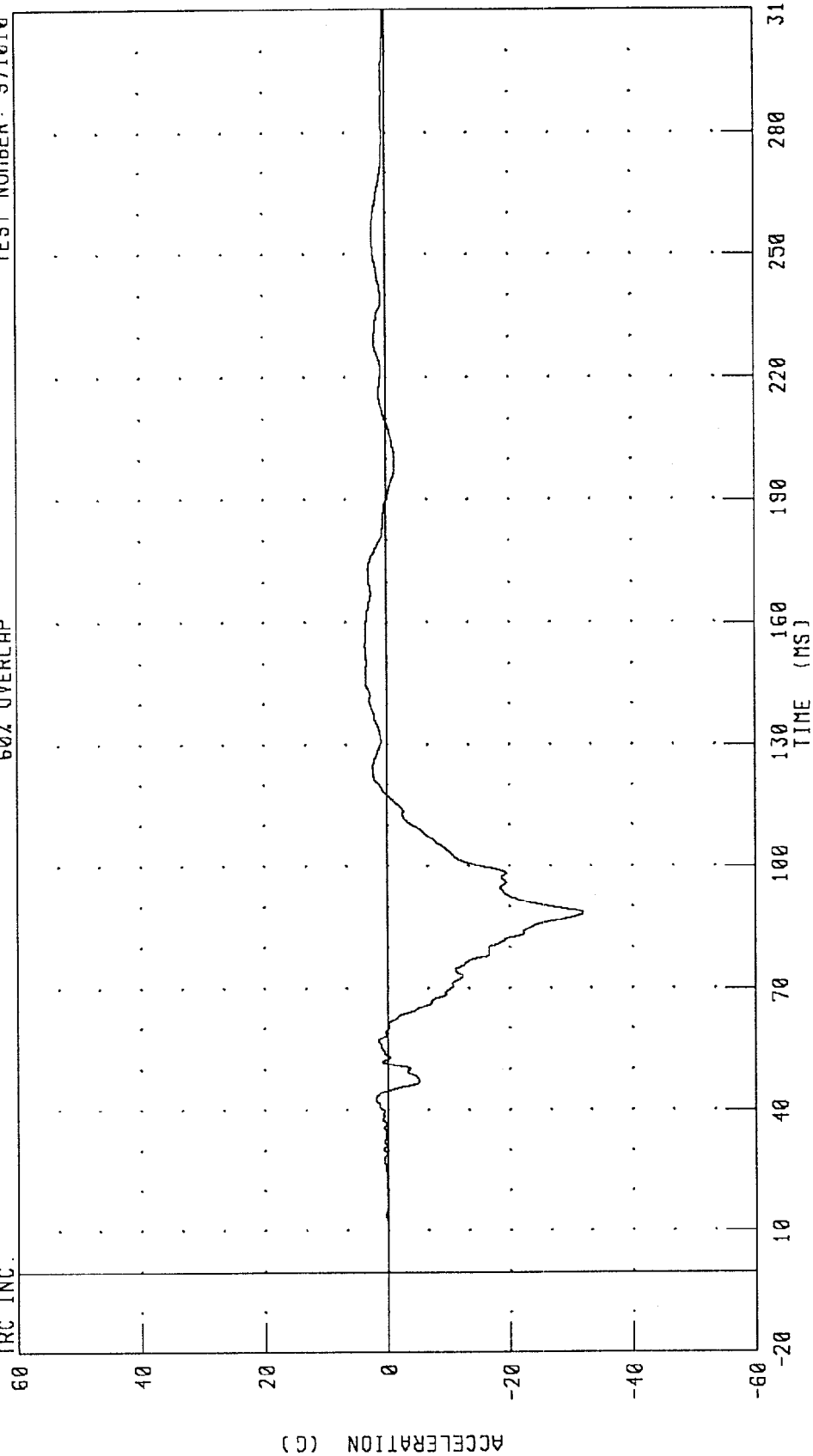
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 3.53 G @ 154.48 MS; -32.01 G @ 88.48 MS

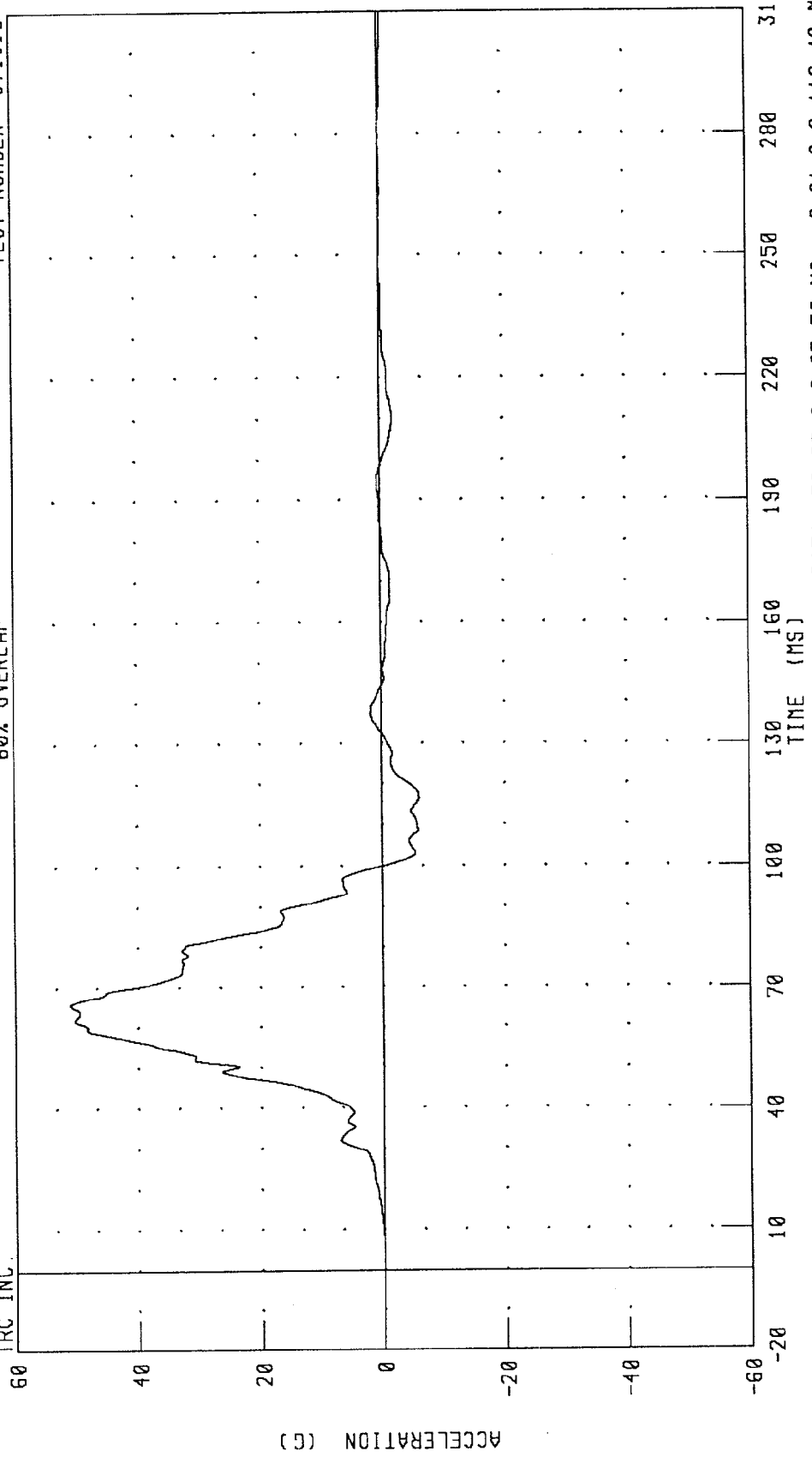
CHANNEL: CSTYG1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER CHEST Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

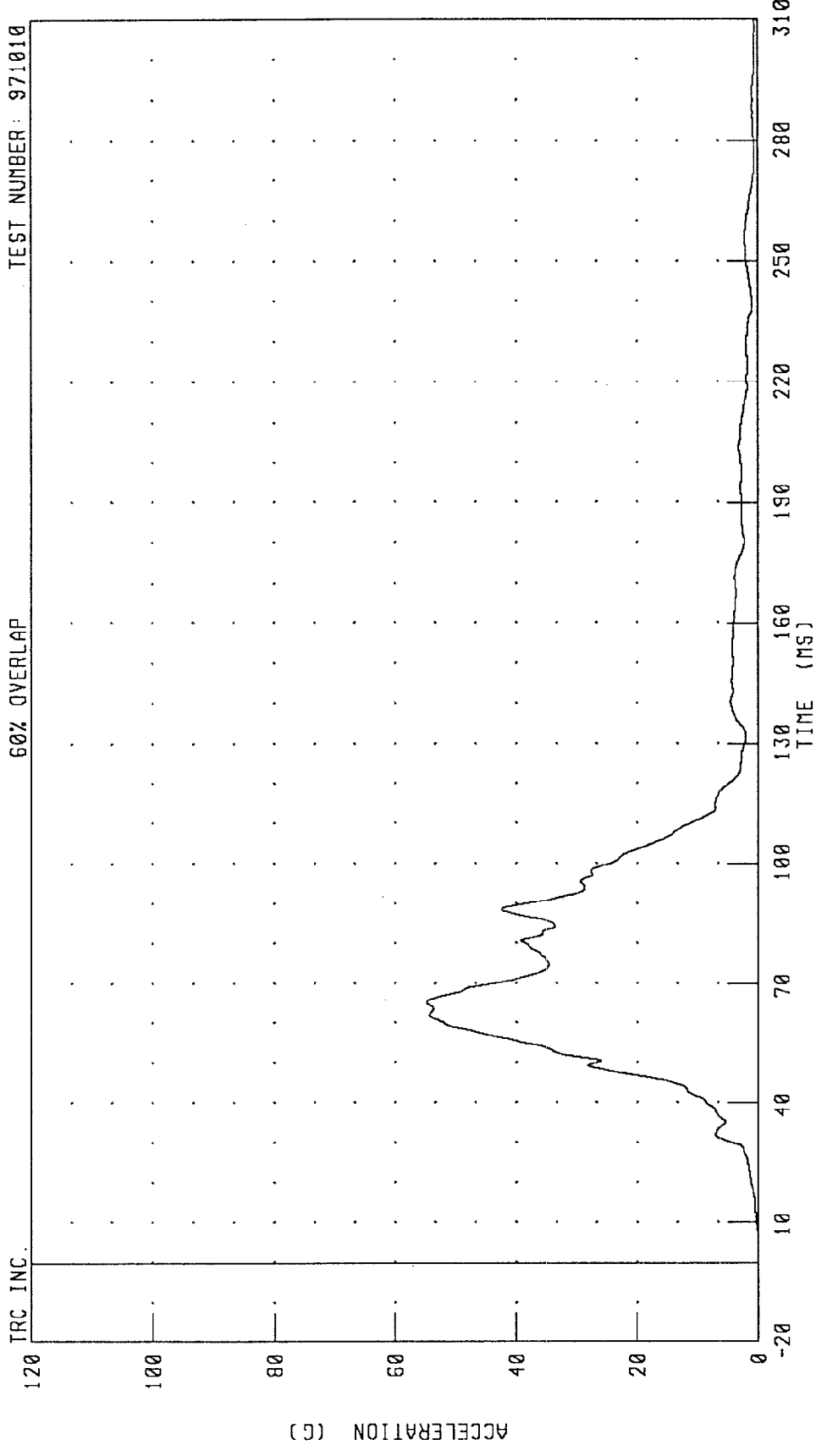
TRC INC.



PEAK DATA: 50.96 G @ 65.52 MS; -6.01 G @ 116.40 MS

CHANNEL: CSTZG1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER CHEST RESULTANT ACCELERATION



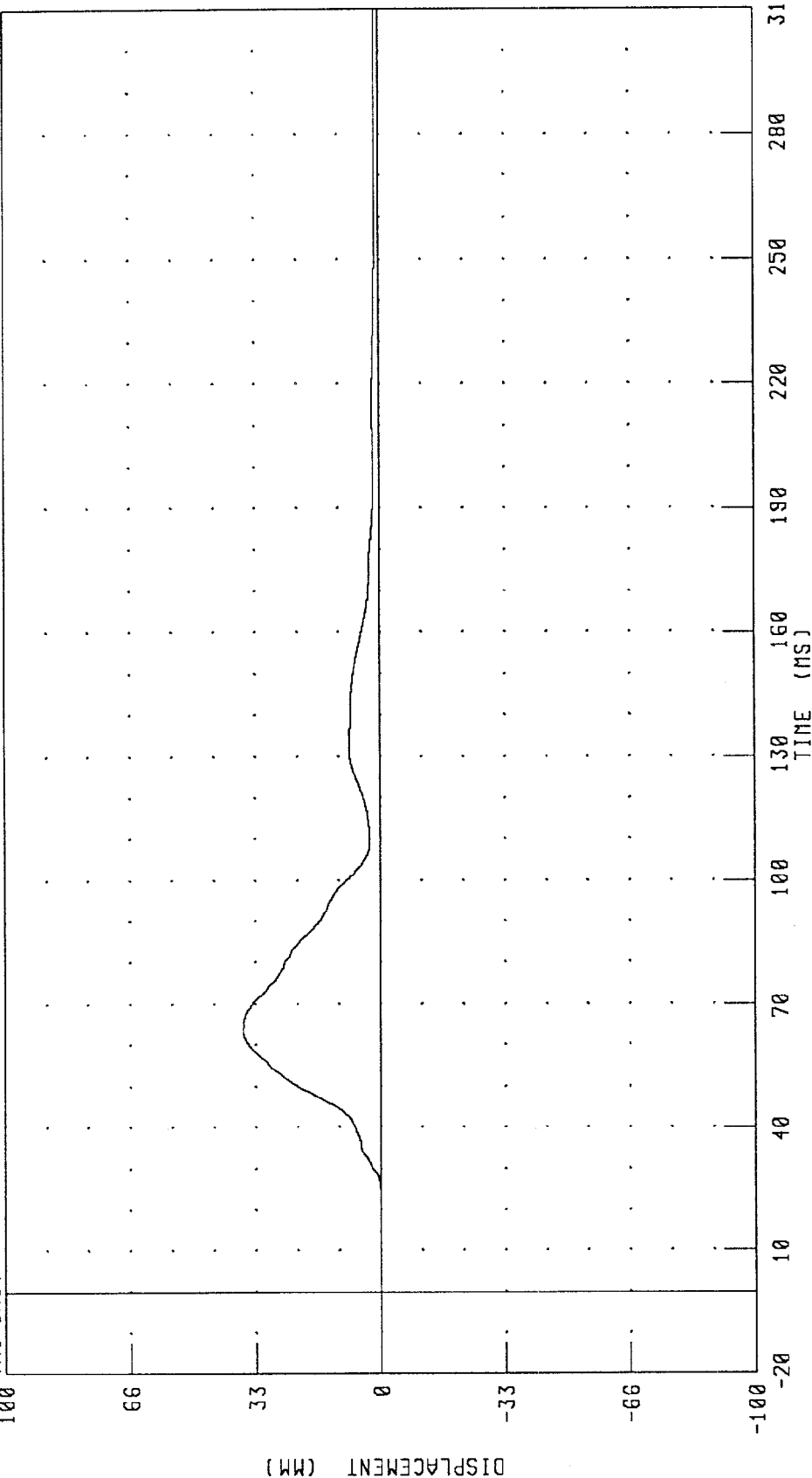
CHANNEL: CSTRG1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER CHEST DEFLECTION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 36.66 MM @ 63.28 MS; 0.00 MM @ 22.72 MS

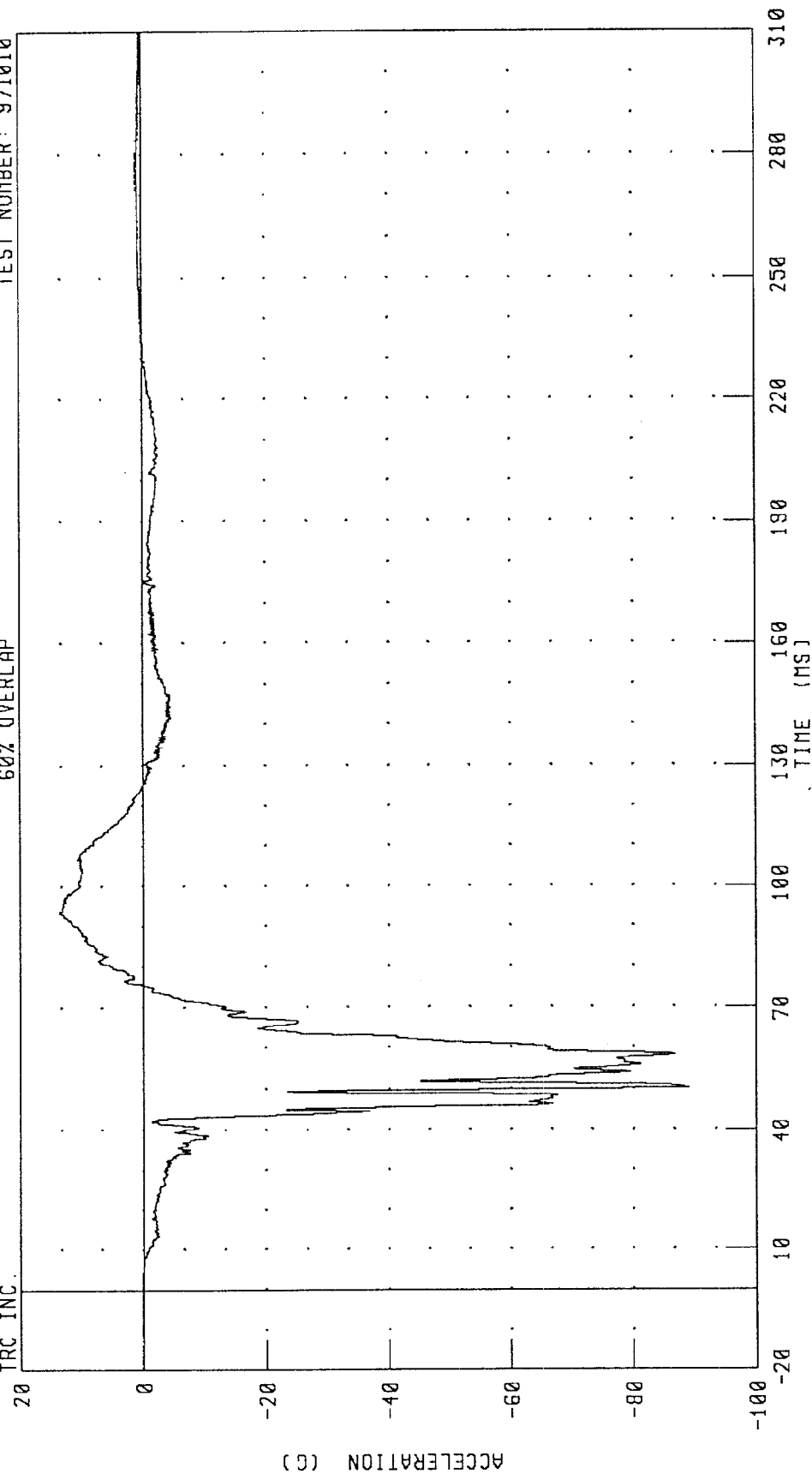
CHANNEL: CSTX01 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER PELVIS X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 13.45 G @ 93.28 MS; -89.00 G @ 50.24 MS

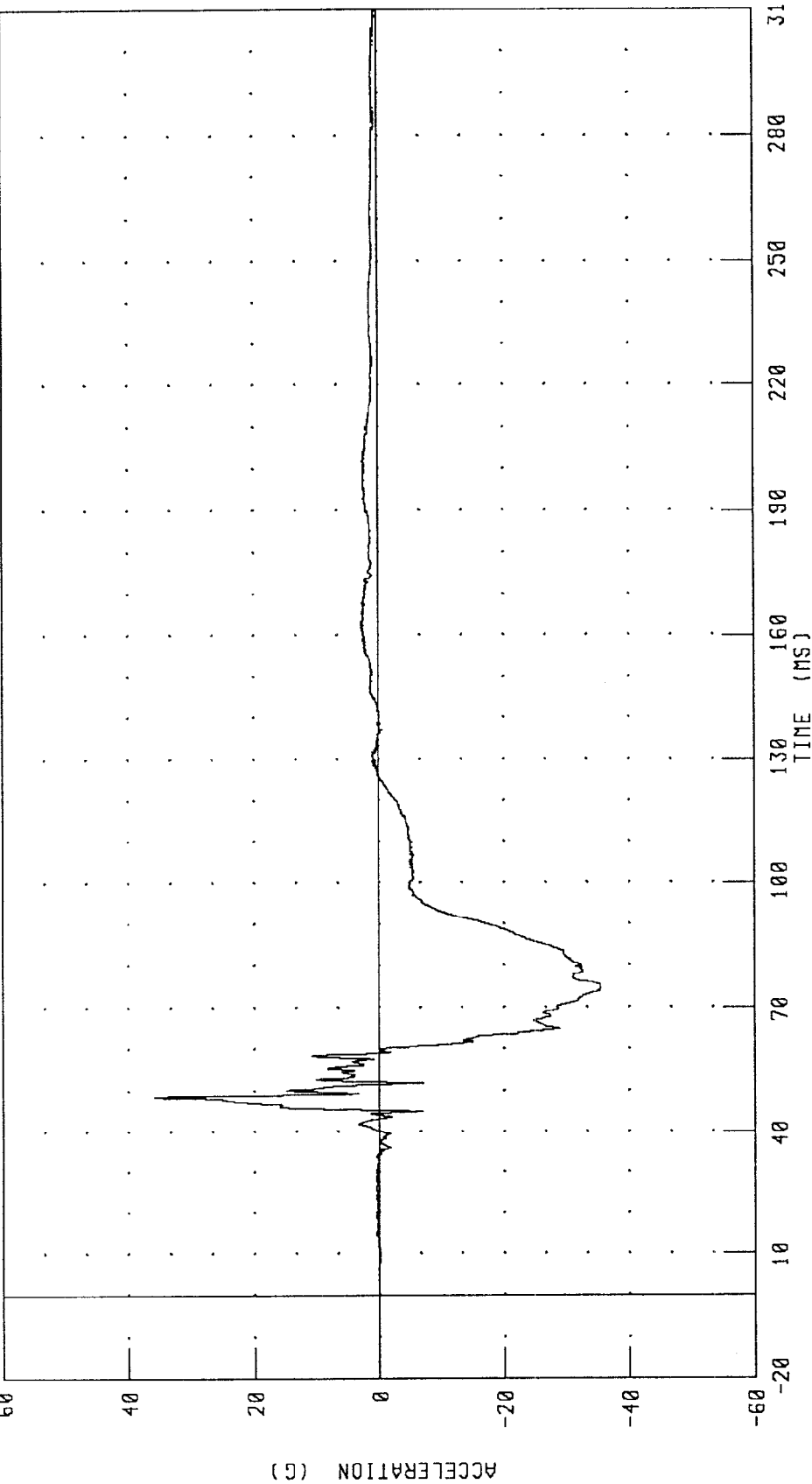
CHANNEL: PEVXG1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

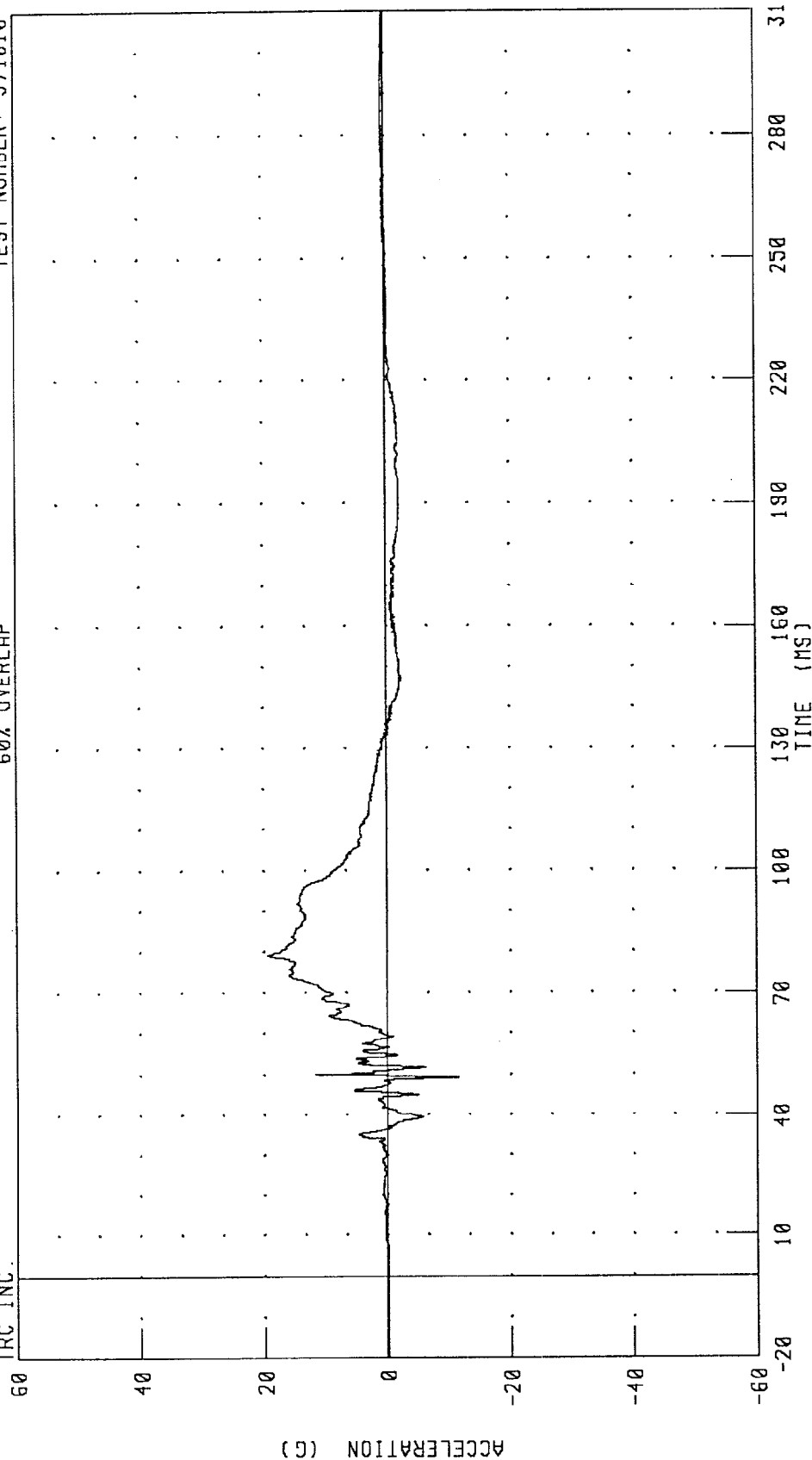
PEAK DATA: 35.88 G @ 48.56 MS; -35.50 G @ 74.48 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 19.40 G @ 79.12 MS; -11.51 G @ 49.28 MS

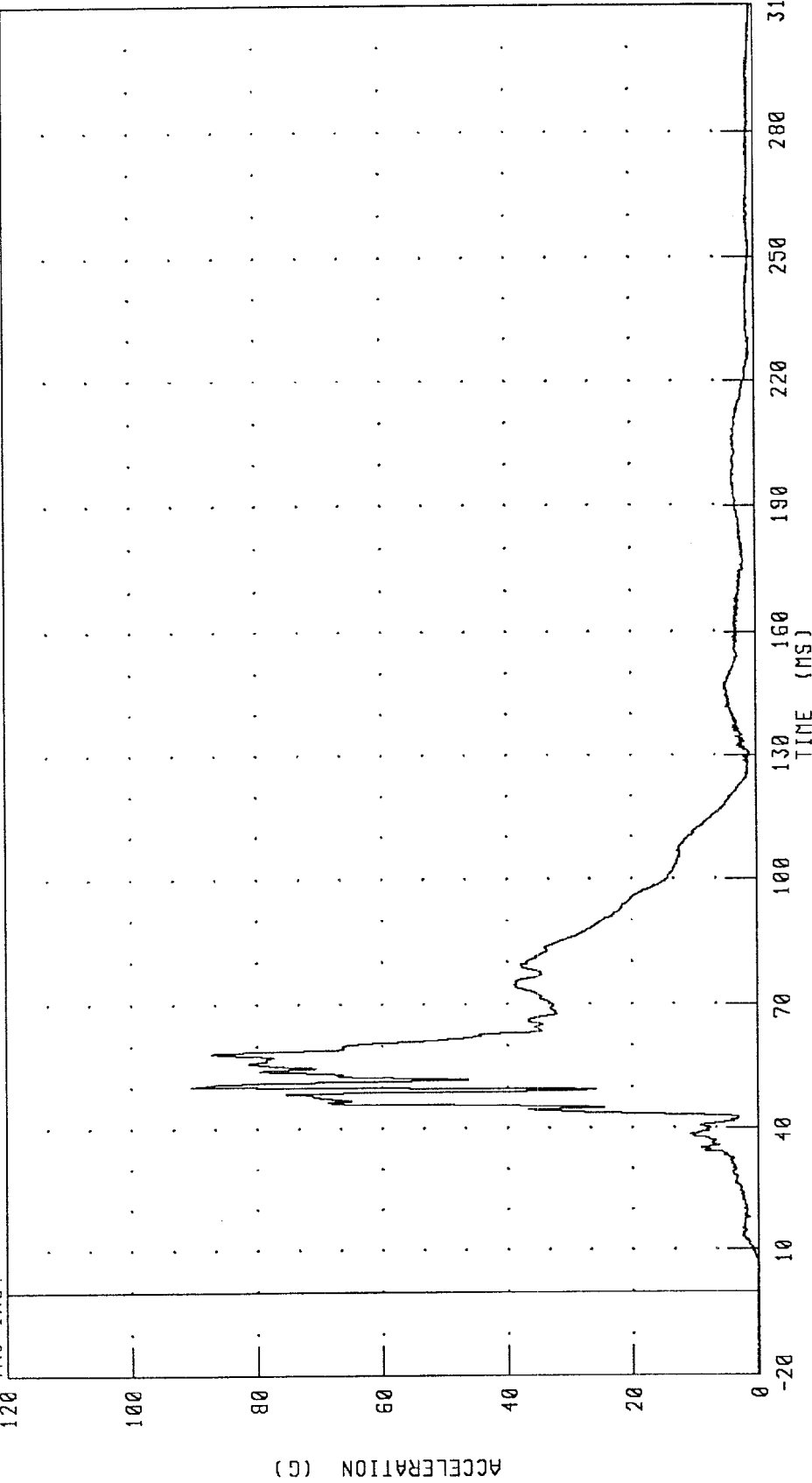
CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 90.57 G @ 50.24 MS; 0.11 G @ -19.84 MS

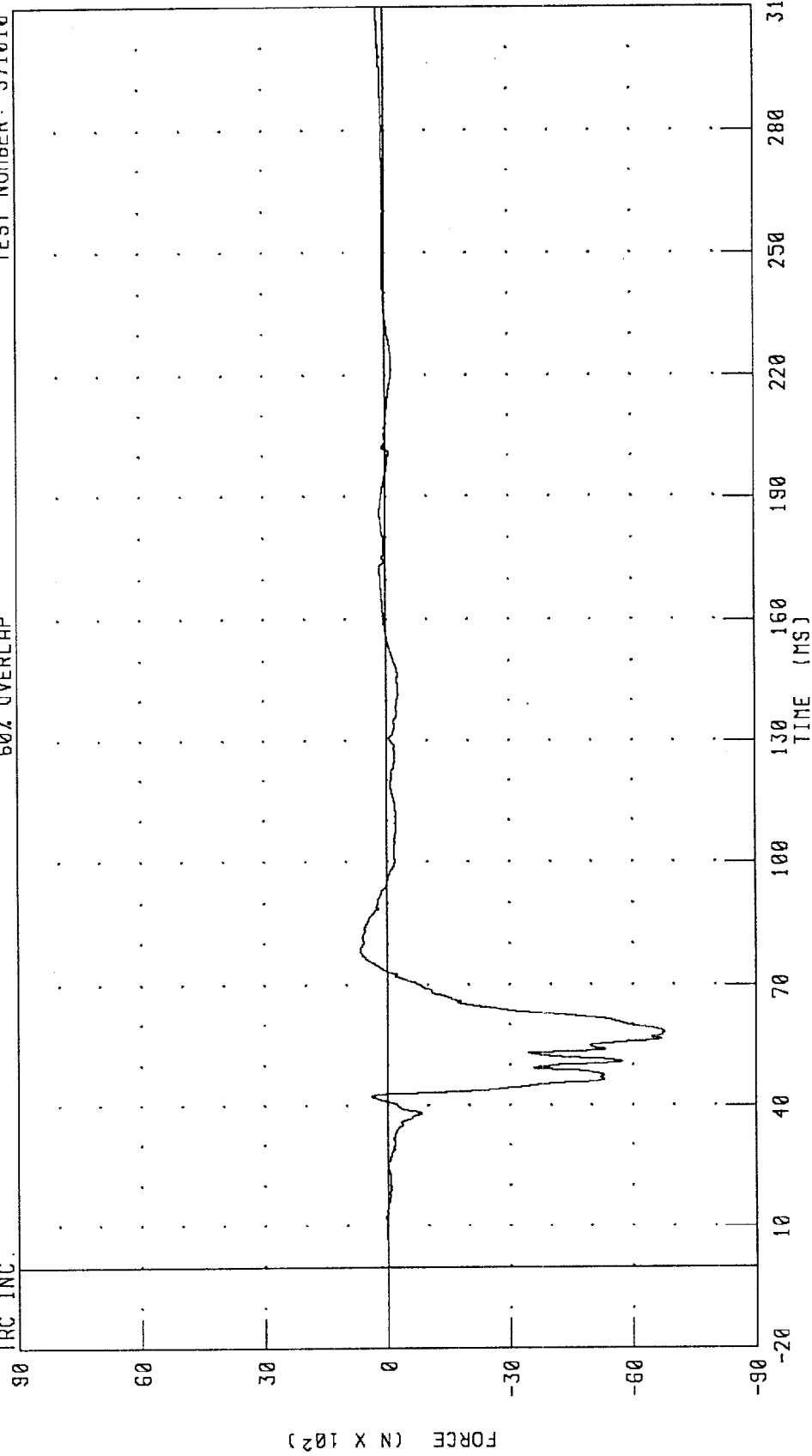
CHANNEL: PEVRG1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LEFT FEMUR FORCE

TEST NUMBER: 971010

60% OVERLAP

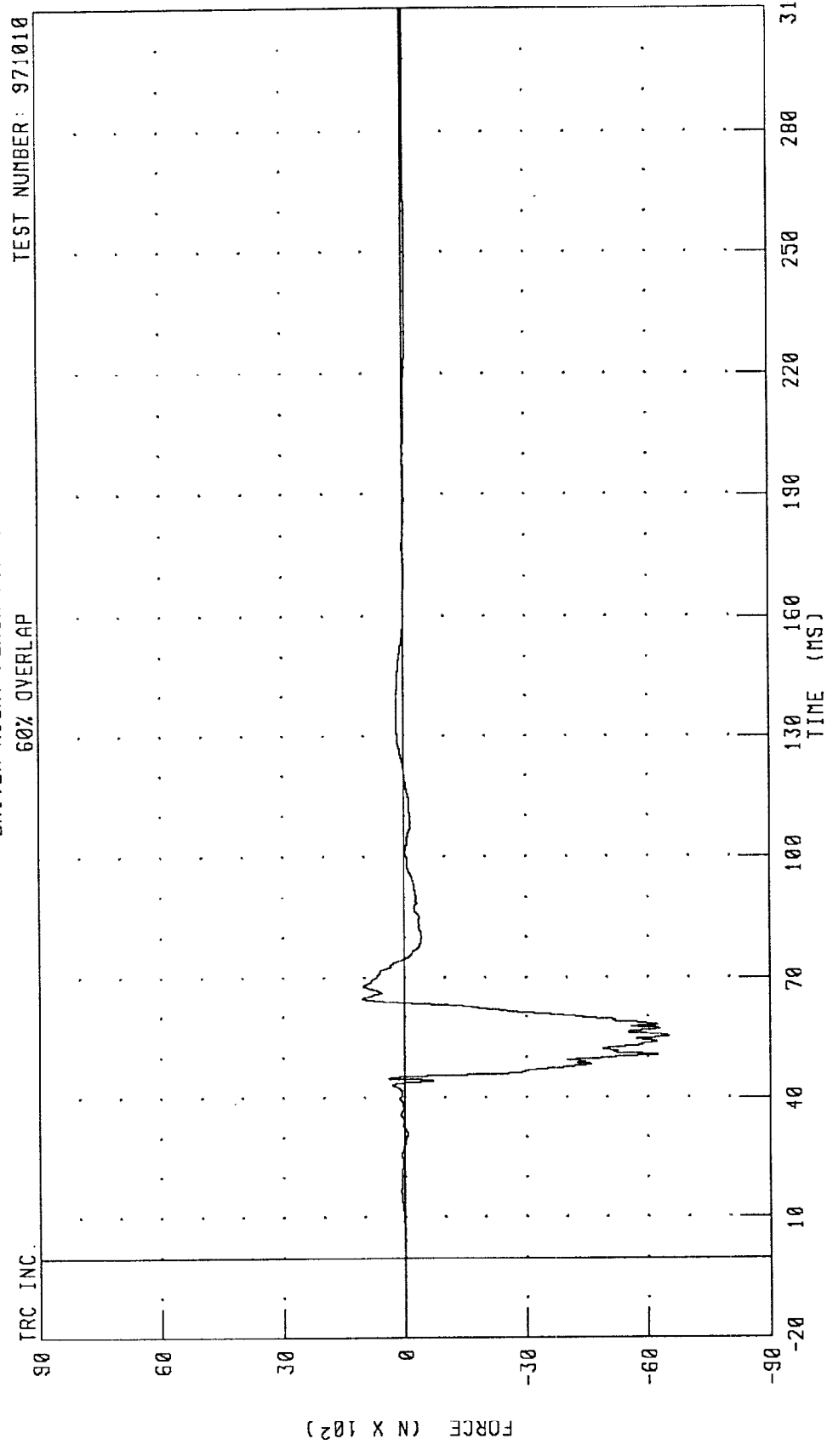
TRC INC.



PEAK DATA: 661.27 N @ 78.64 MS; -6771.92 N @ 58.16 MS

CHANNEL: LFMF1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT FEMUR FORCE



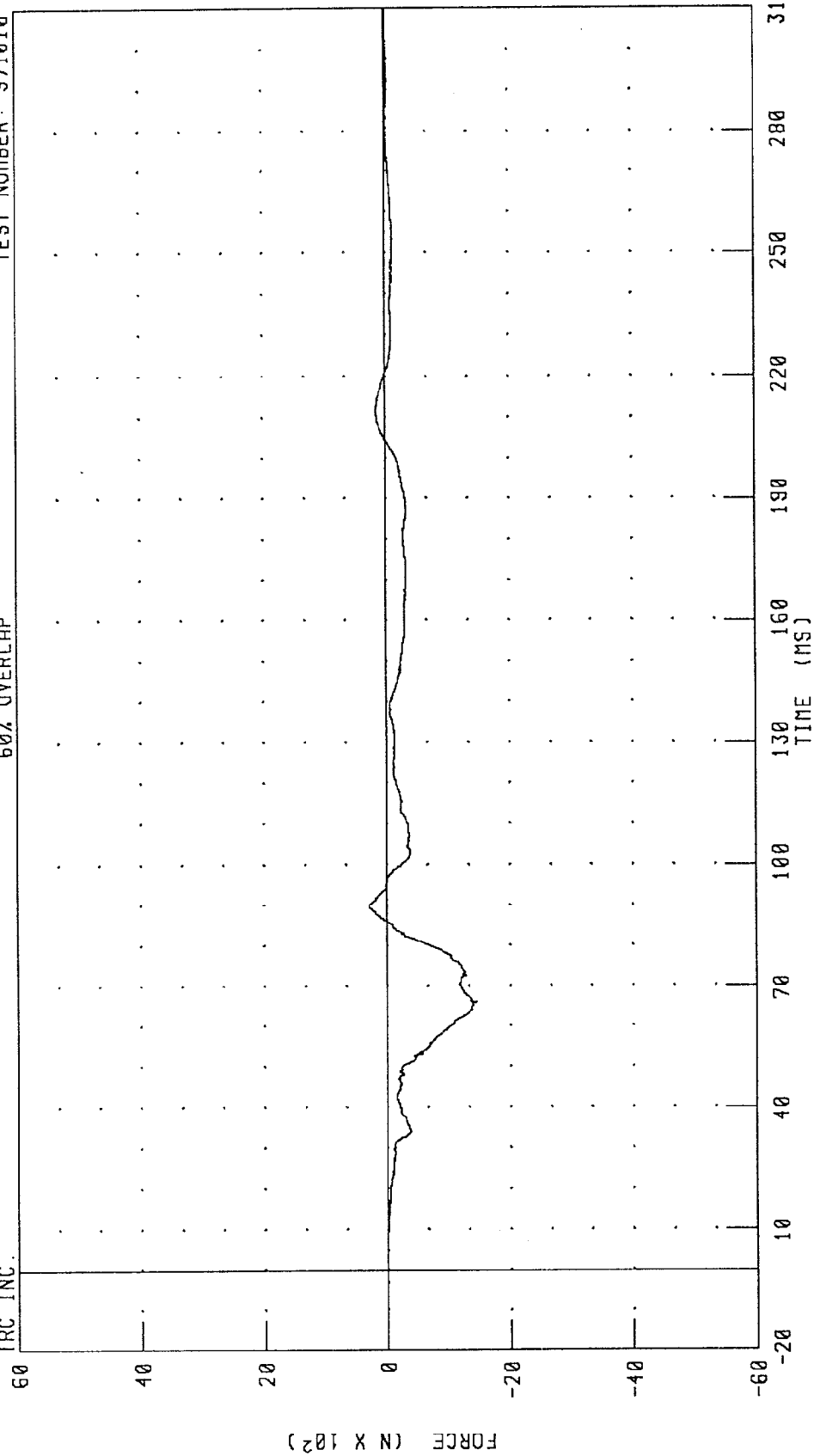
CHANNEL: RFMF1 FILTER: CH. CLASS 600 PEAK DATA: 1038.89 N @ 64.80 MS, -6525.75 N @ 55.20 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LOWER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 297.74 N @ 89.76 MS, -1462.17 N @ 66.08 MS

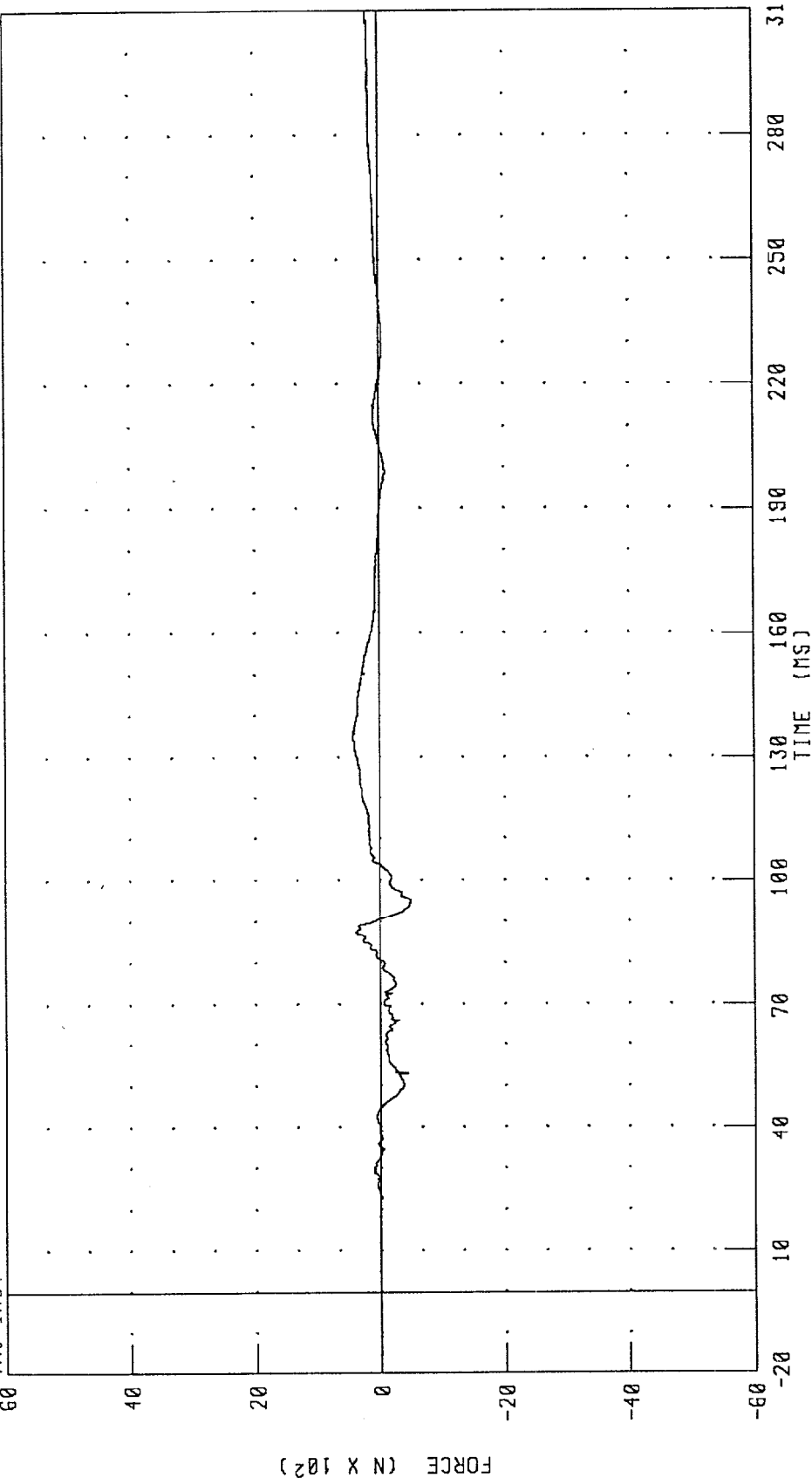
CHANNEL: NKLXF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LOWER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 427.81 N @ 134.40 MS; -490.88 N @ 94.88 MS

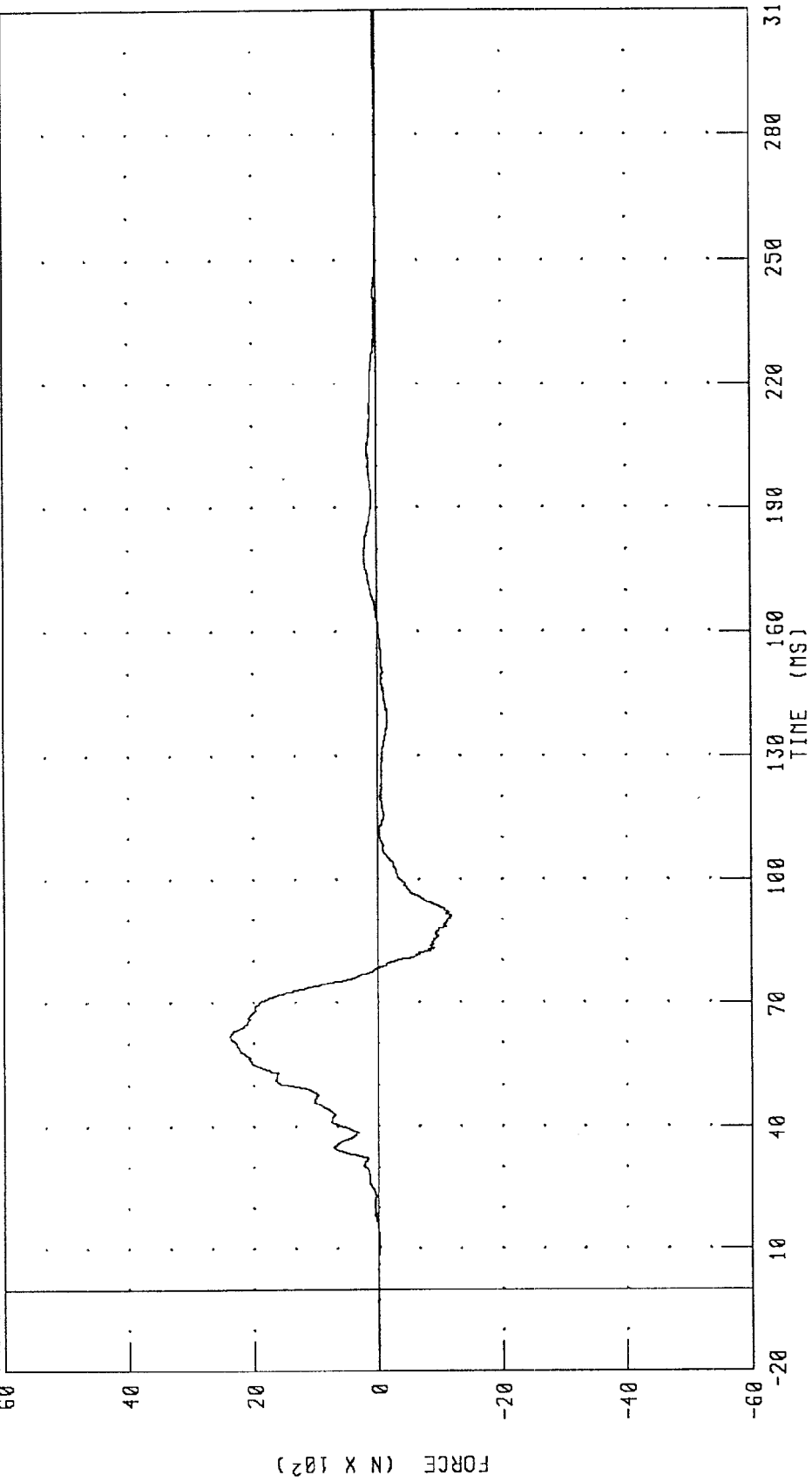
CHANNEL: NKLYF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LOWER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: NKLZF1 FILTER: CH. CLASS 1000

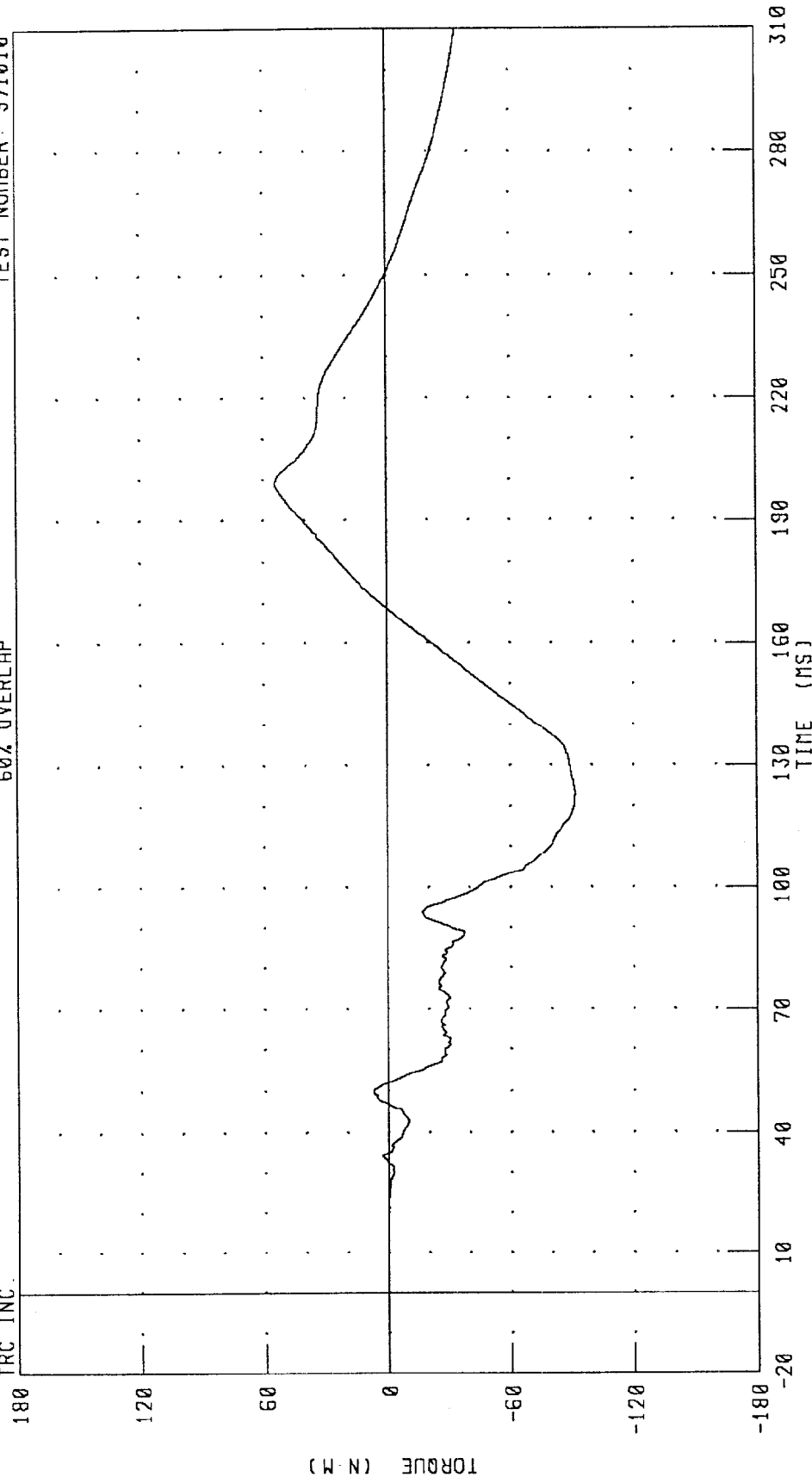
PEAK DATA: 2384.45 N @ 61.92 MS; -1176.62 N @ 91.20 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LOWER NECK MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: NKLXM1 FILTER: CH. CLASS 600

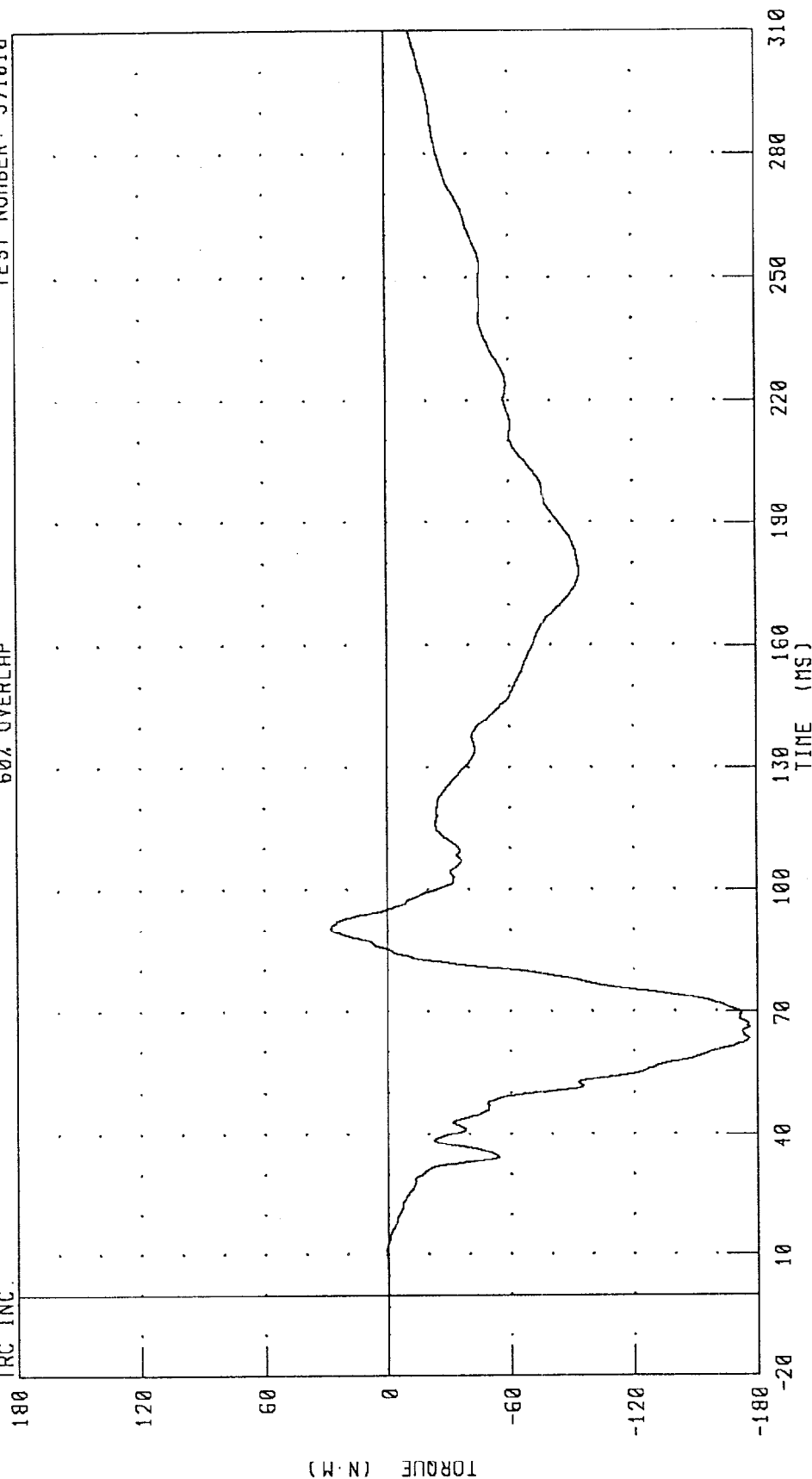
PEAK DATA: 54.39 N-M @ 199.28 MS; -91.74 N-M @ 123.04 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LOWER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 27.73 N.M @ 90.40 MS; -176.50 N.M @ 66.00 MS

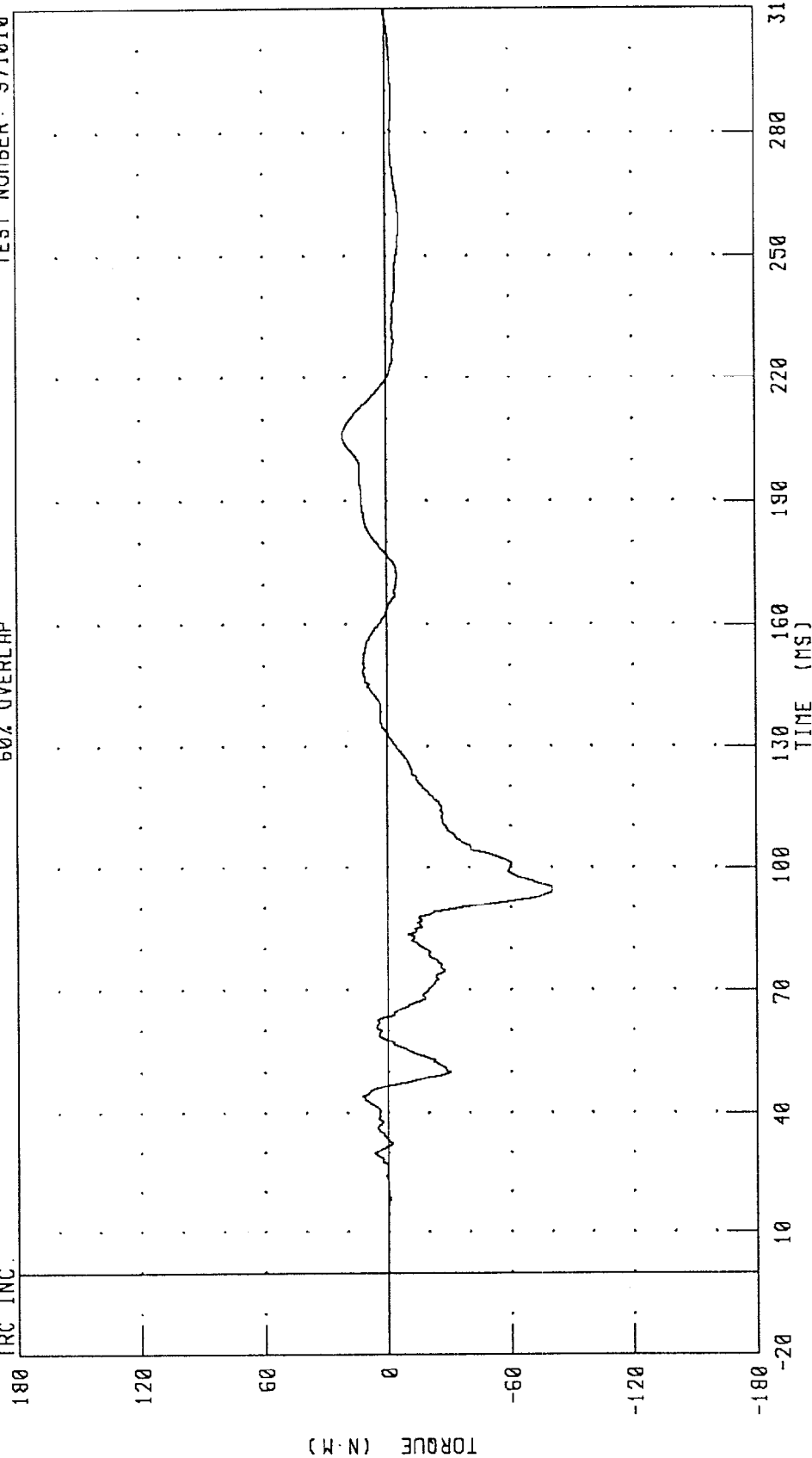
CHANNEL: NKLYM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LOWER NECK MOMENT ABOUT Z-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 21.42 N-M @ 206.56 MS; -80.46 N-M @ 95.04 MS

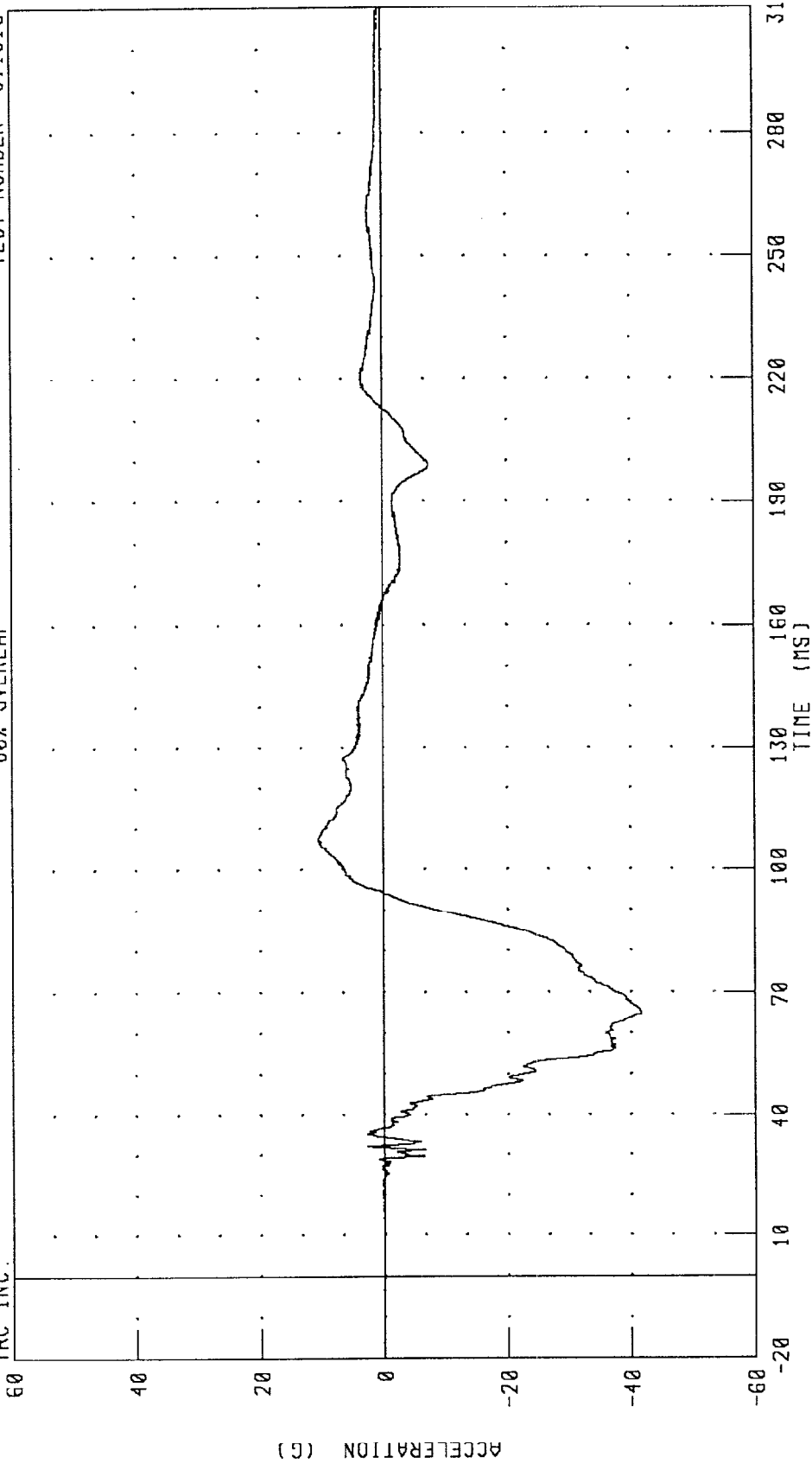
CHANNEL: NKLZM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD POSITION 1 X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

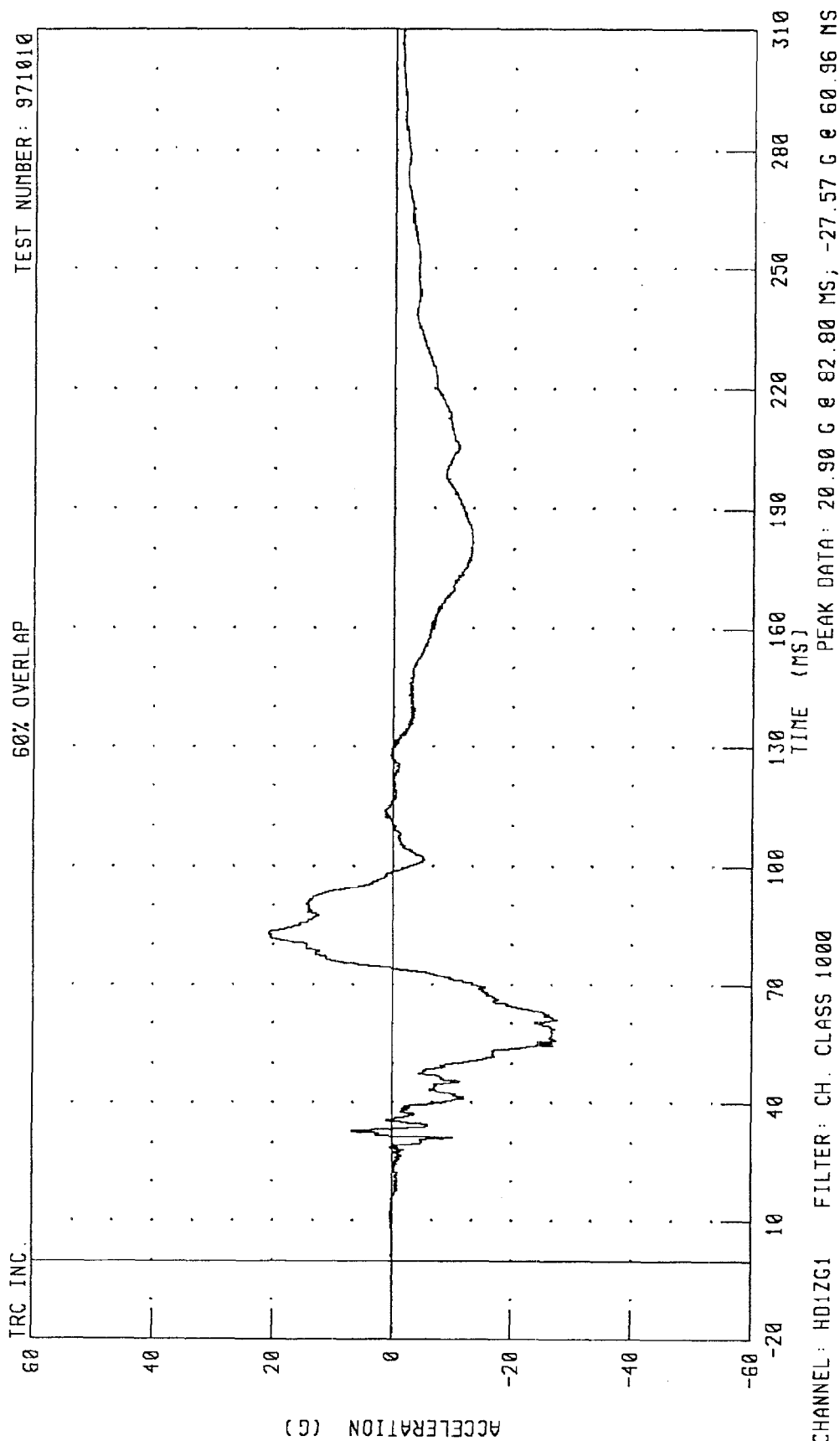
TRC INC.



CHANNEL: HD1XG1 FILTER: CH. CLASS 1000

PEAK DATA: 10.75 G @ 106.96 MS; -41.63 G @ 64.80 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD POSITION 1 Z-AXIS ACCELERATION

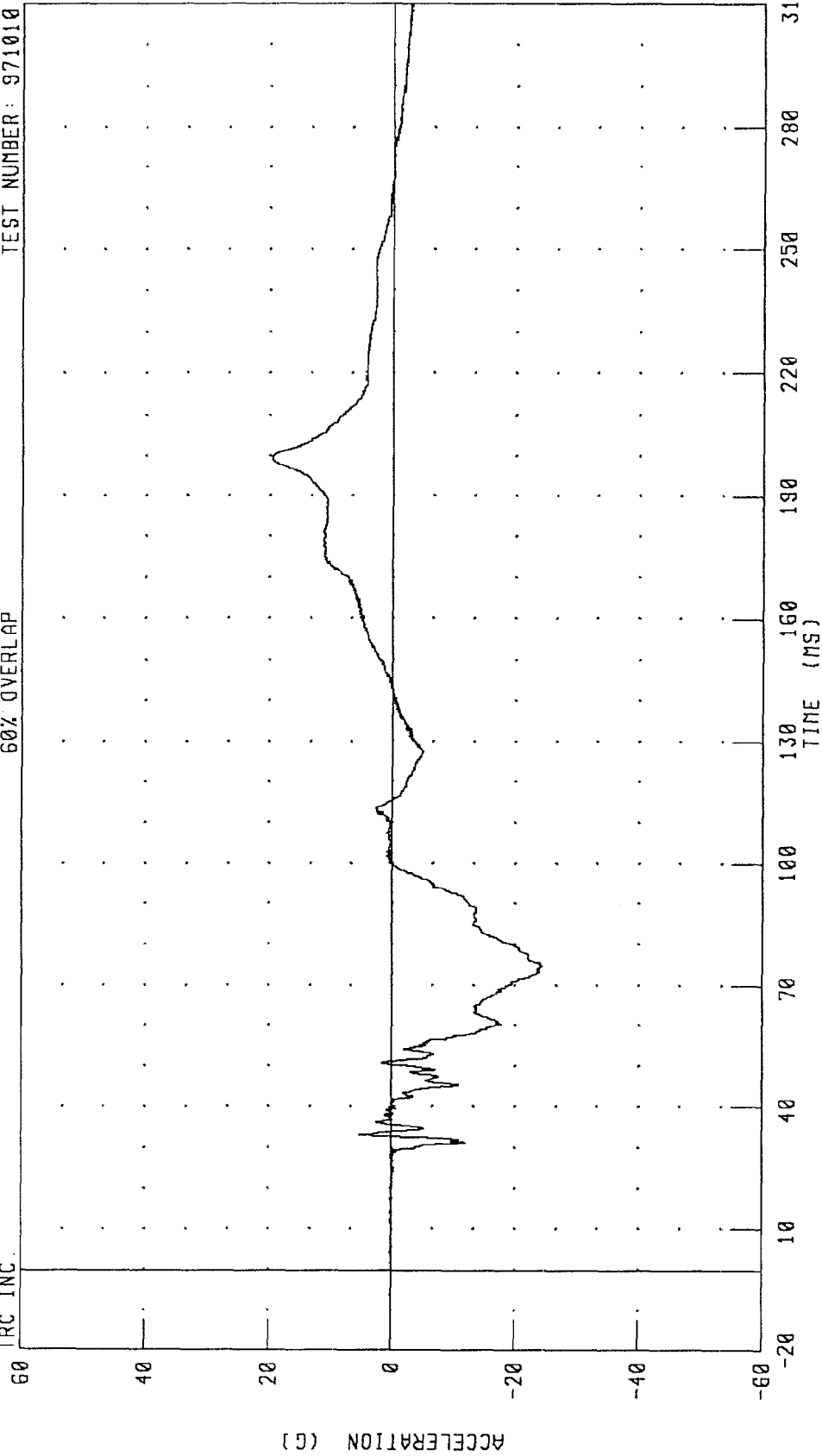


70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD POSITION 2 Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



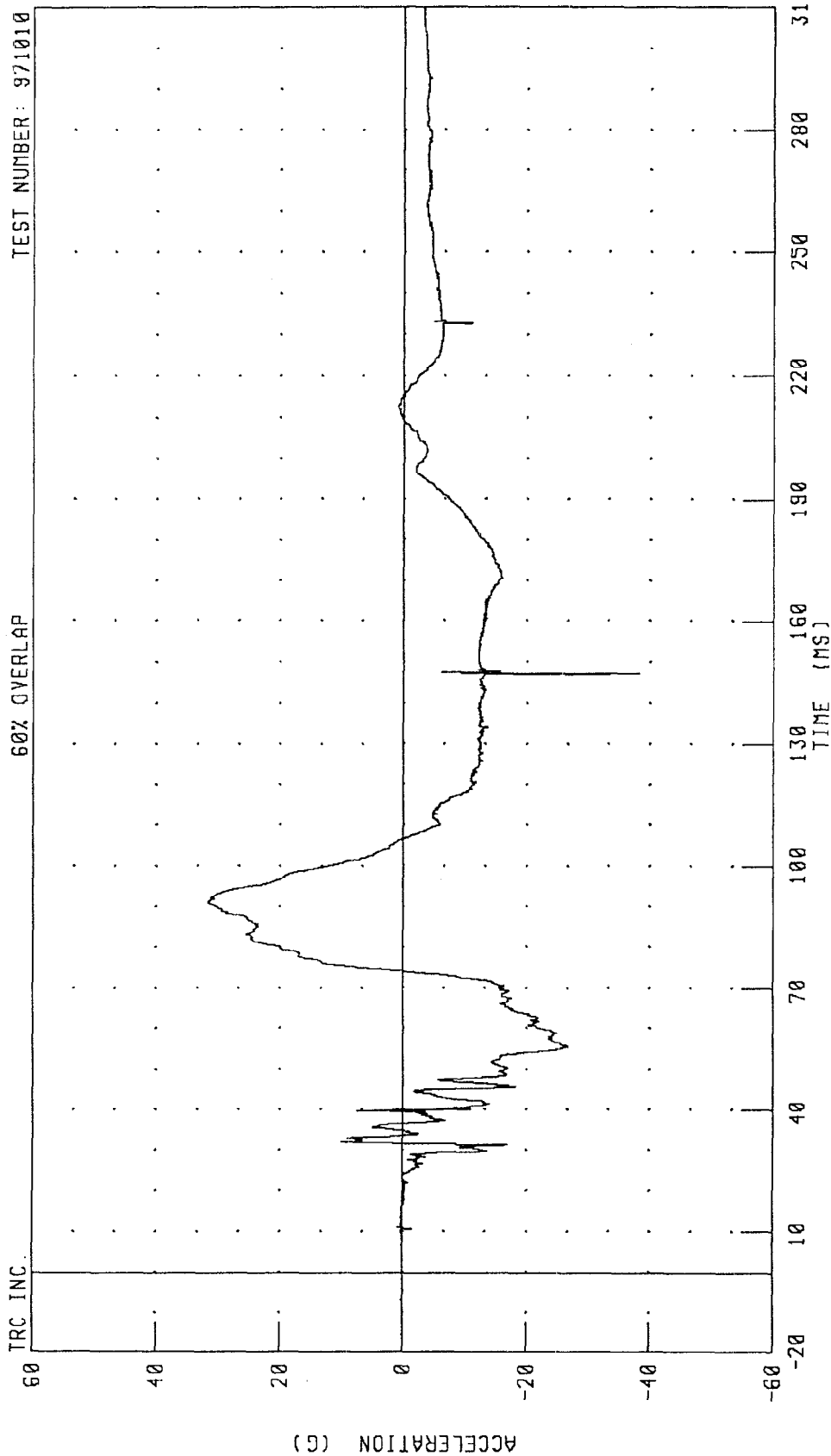
PEAK DATA: 19.65 G @ 199.12 MS; -24.38 G @ 74.72 MS

CHANNEL: HD2YG1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER HEAD POSITION 2 Z-AXIS ACCELERATION

TEST NUMBER: 971010

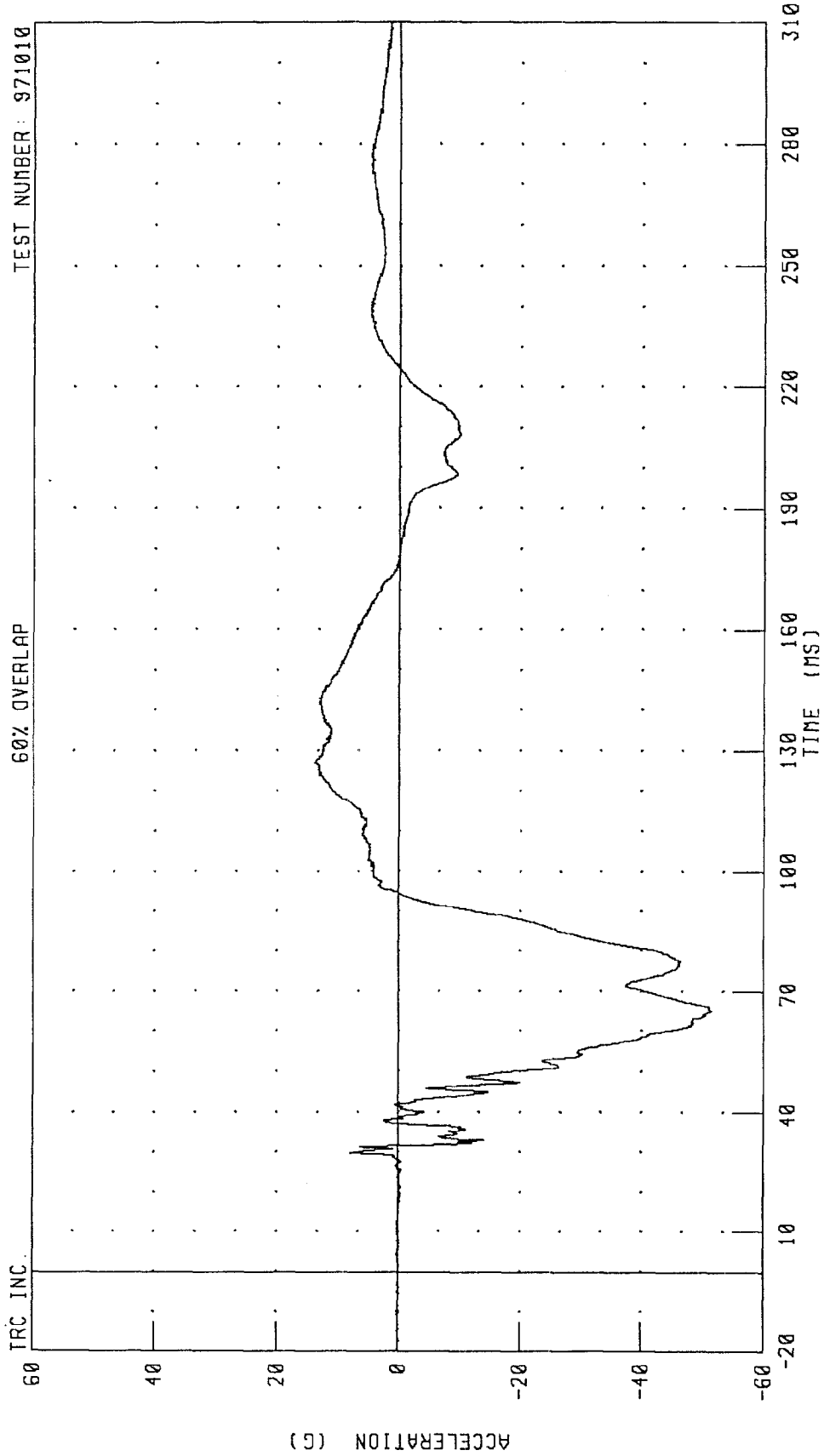
60% OVERLAP



CHANNEL: H02ZG1 FILTER: CH. CLASS 1000

PEAK DATA: 31.69 G @ 91.20 MS, -38.19 G @ 147.36 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD POSITION 3 X-AXIS ACCELERATION

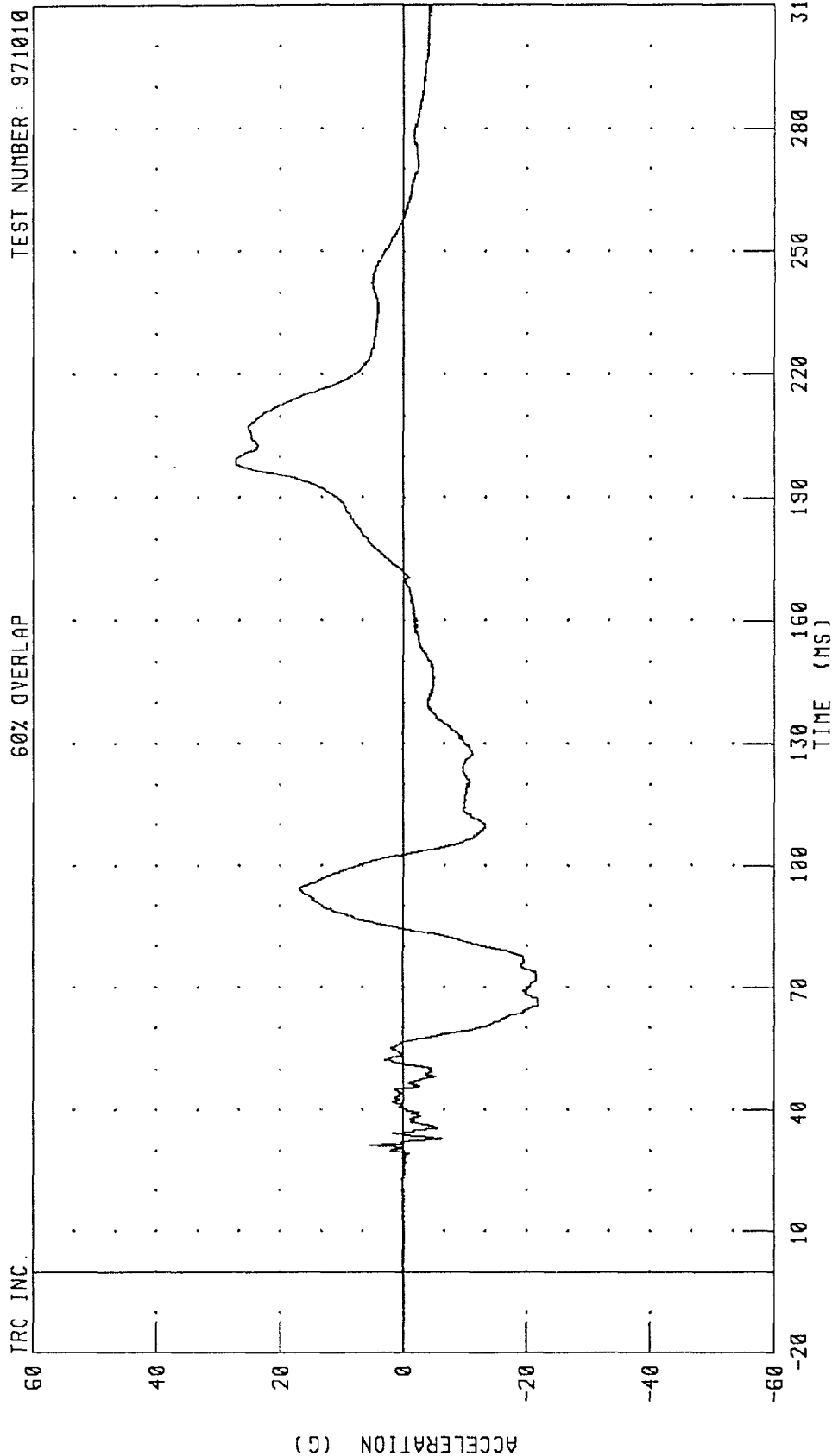


CHANNEL: HD3XG1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER HEAD POSITION 3 Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



CHANNEL: H03YG1 FILTER: CH. CLASS 1000

PEAK DATA: 27.26 G @ 198.72 MS; -22.02 G @ 65.44 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LEFT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

100

66

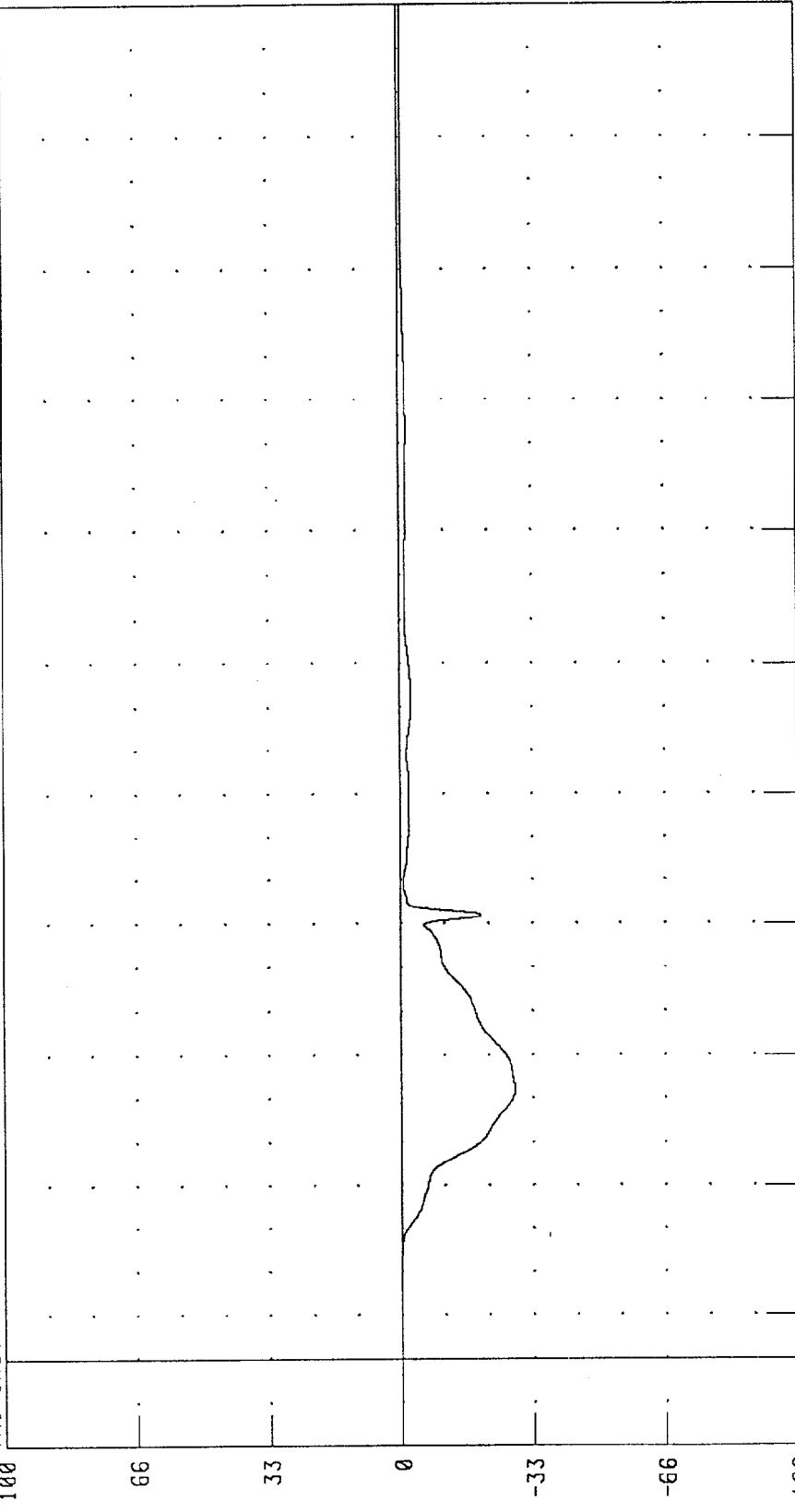
33

0

-33

-66

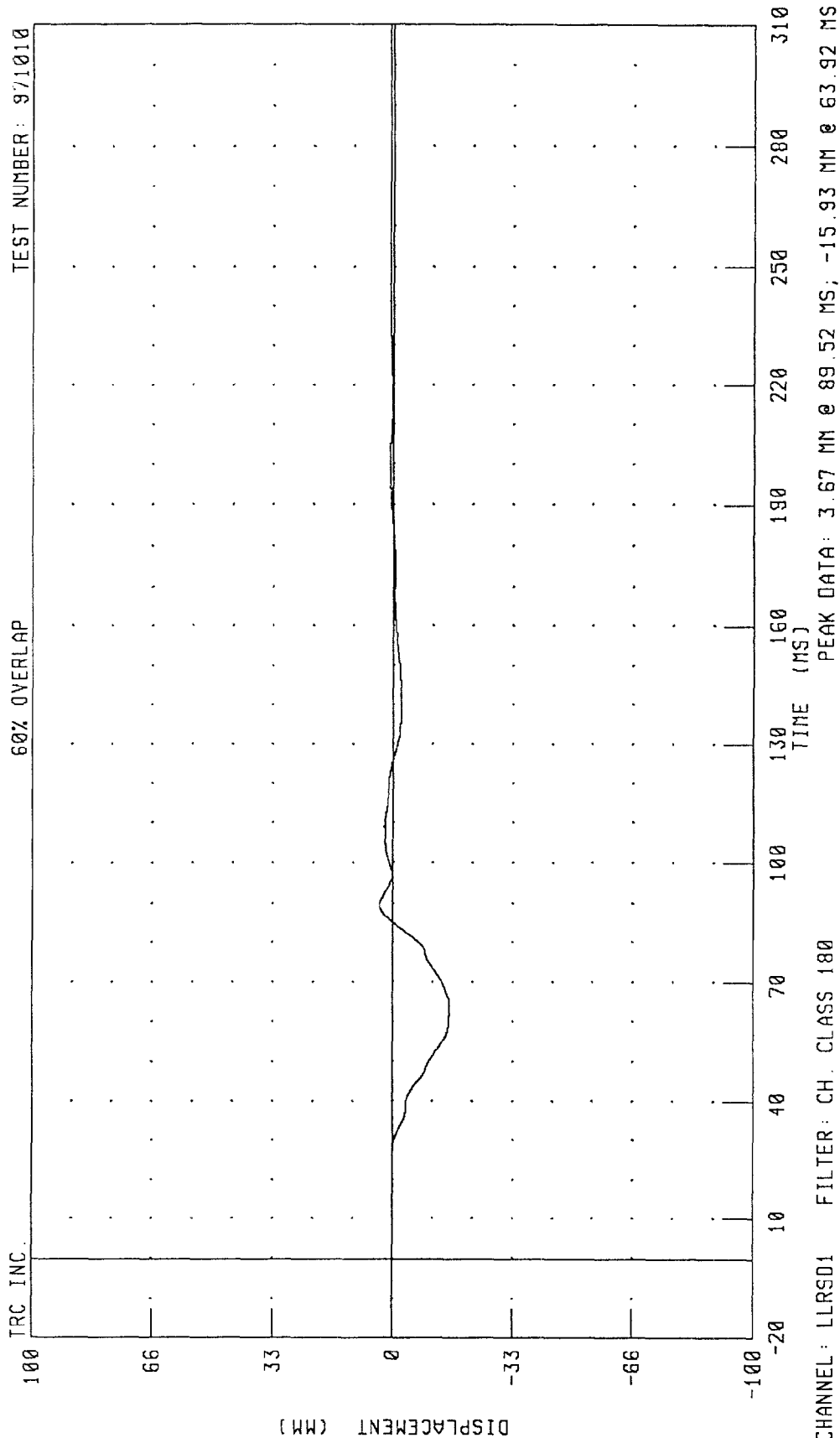
-100



PEAK DATA: 0.01 MM @ 2.48 MS; -28.78 MM @ 62.16 MS

CHANNEL: LURSD1 FILTER: CH. CLASS 180

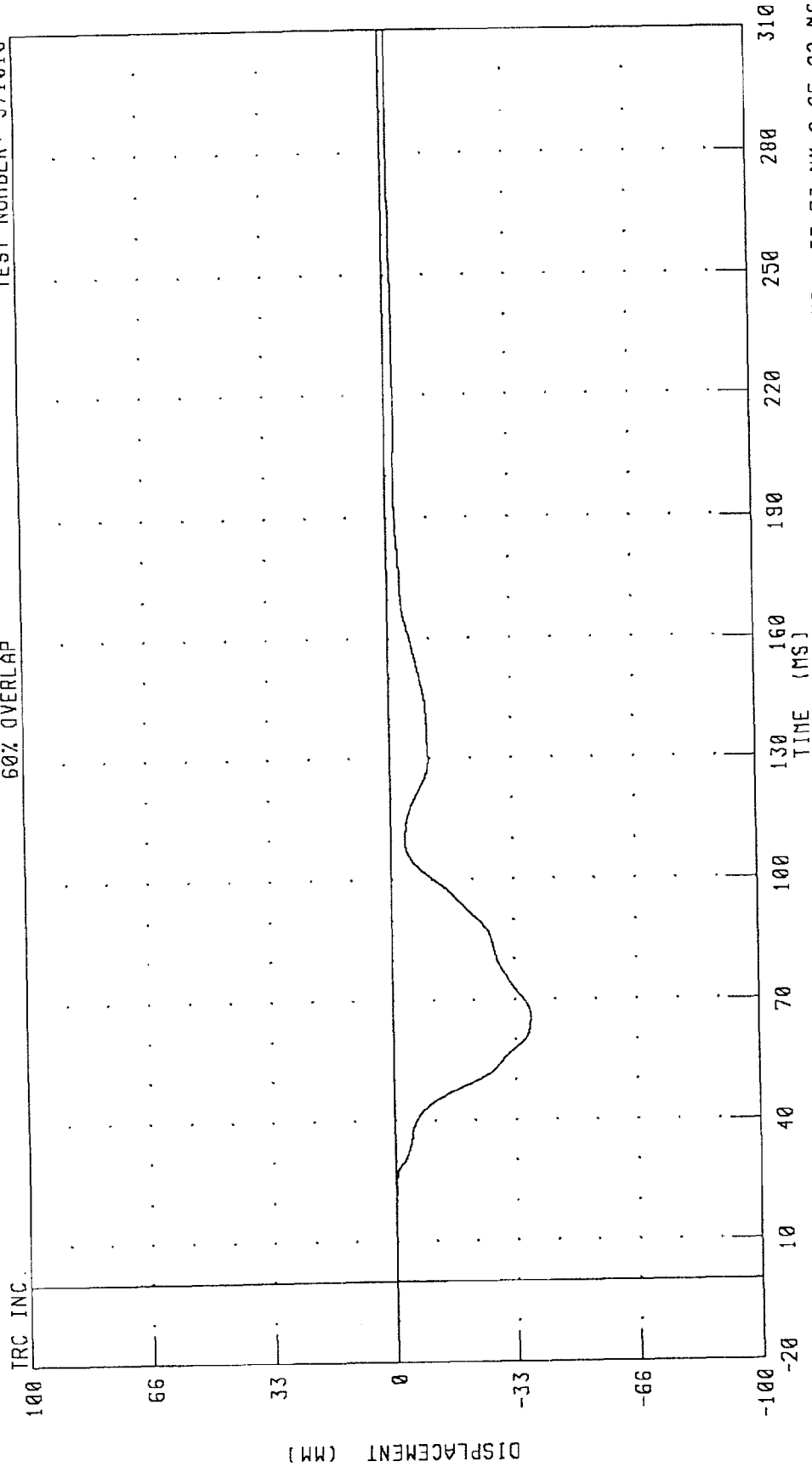
70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT LOWER RIB STRAIGHT DISPLACEMENT



70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP



PEAK DATA: 0.01 MM @ 6.88 MS; -37.73 MM @ 65.92 MS

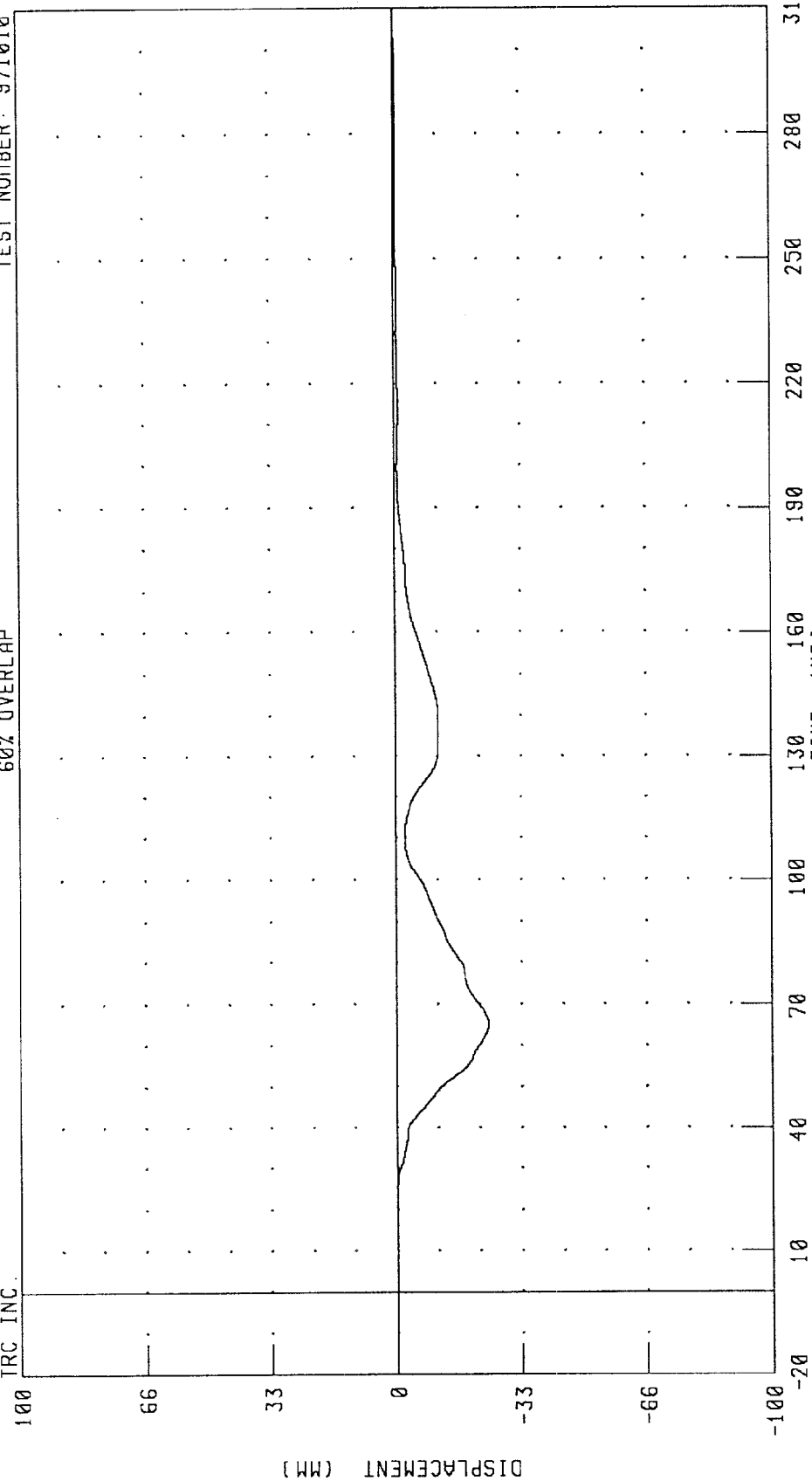
CHANNEL: RURS01 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

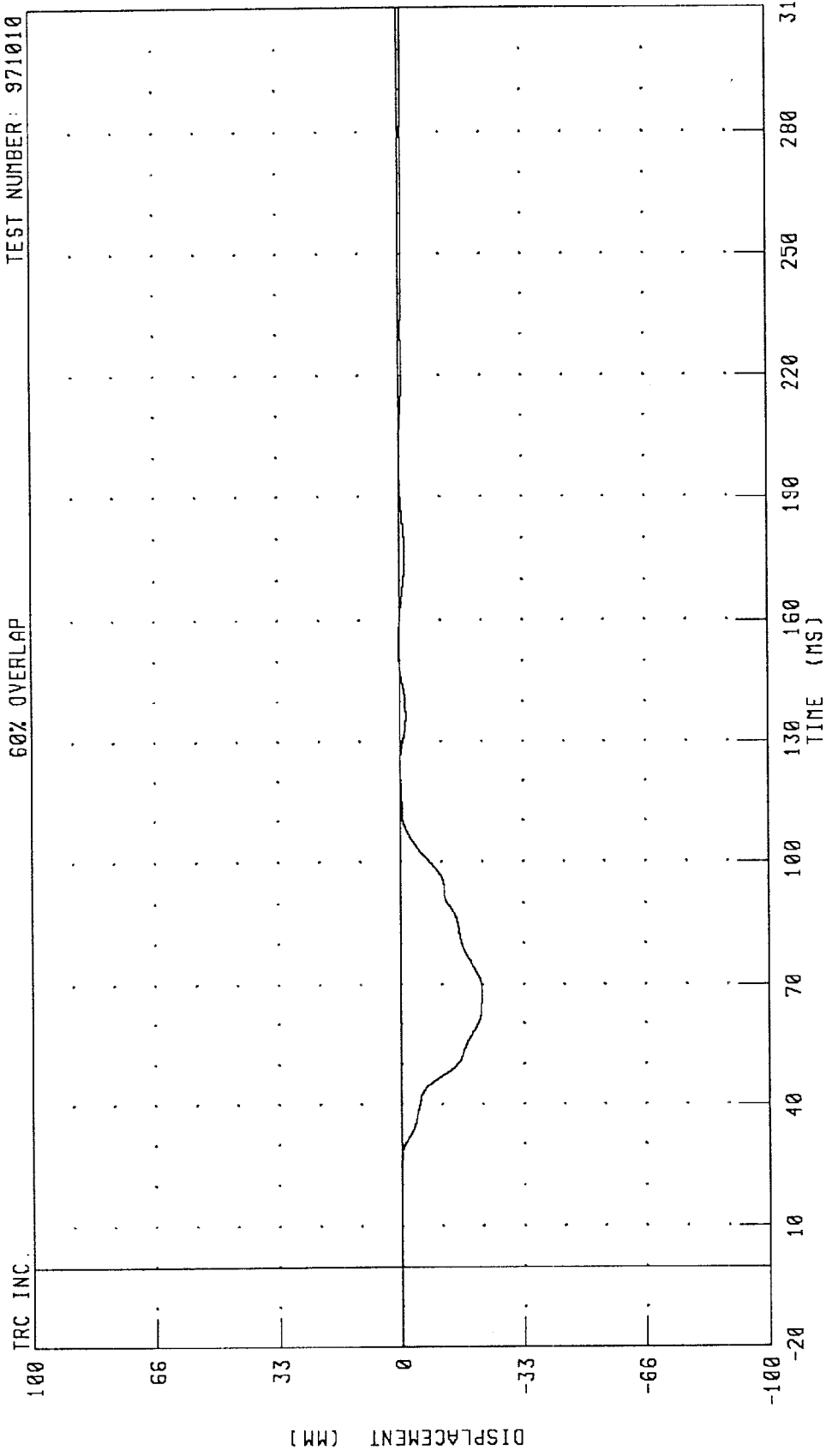


PEAK DATA: 0.00 MM @ -9.76 MS; -24.52 MM @ 65.04 MS

CHANNEL: RLRSD1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT UPPER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010



PEAK DATA: 0.40 MM @ 154.32 MS; -22.00 MM @ 68.40 MS

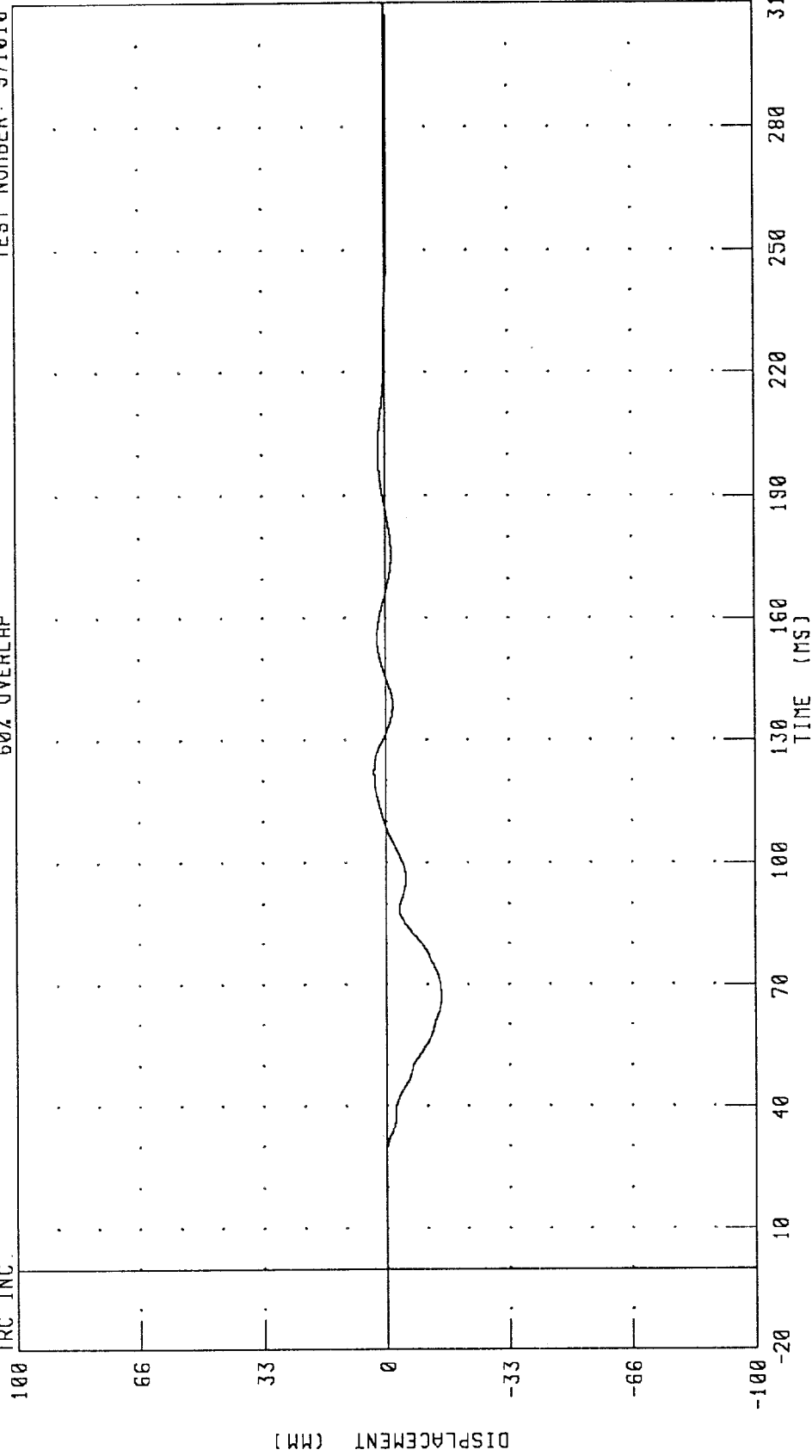
CHANNEL: LURCD1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT LOWER RIB Crossover DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 3.28 MM @ 122.16 MS; -14.88 MM @ 67.04 MS

CHANNEL: LLRCD1 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT UPPER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

100

66

33

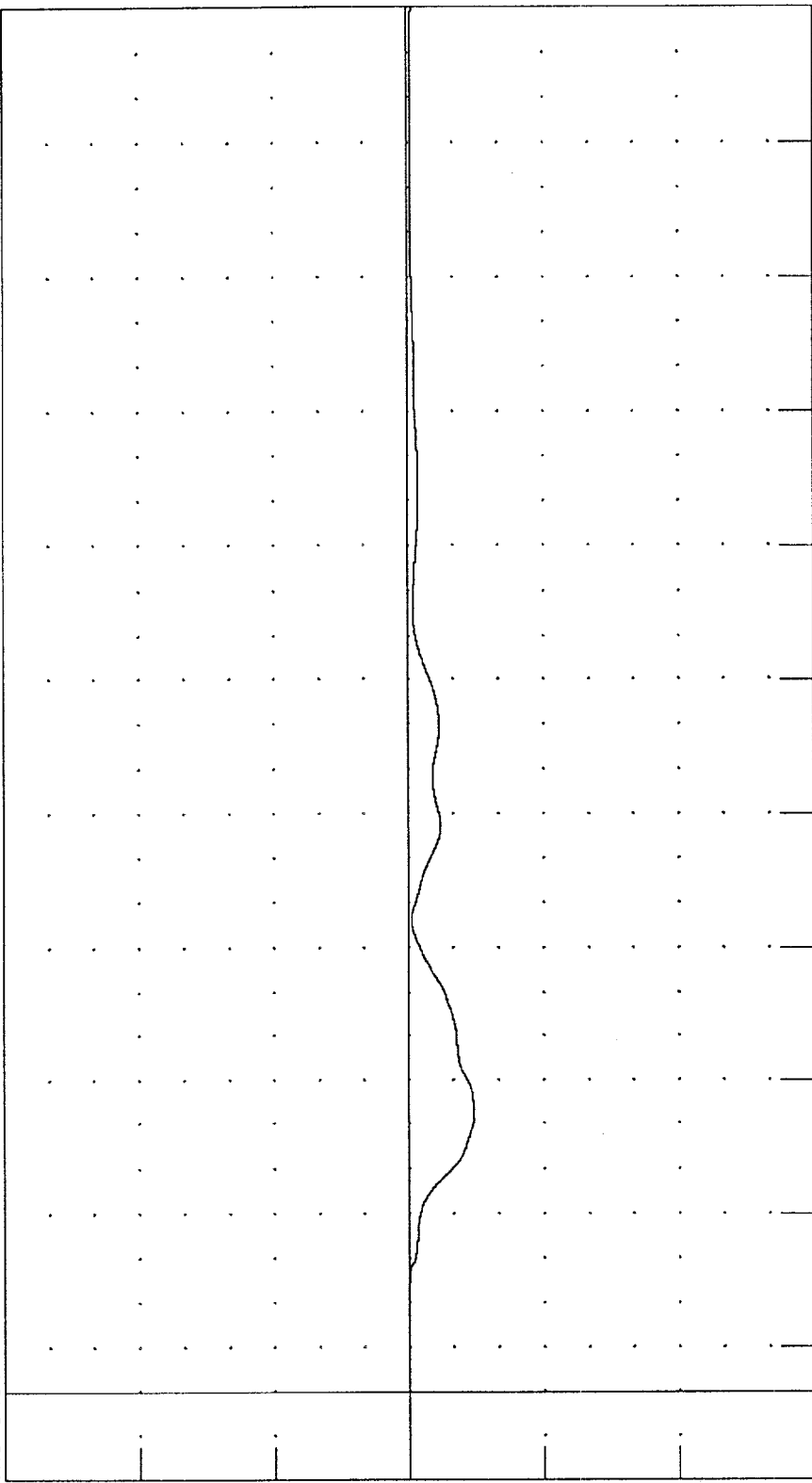
0

-33

-66

-100

DISPLACEMENT (MM)



310 280 250 220 190 160 130 100 70 40 10 0
 TIME (MS)

CHANNEL: RUCD1 FILTER: CH. CLASS 180

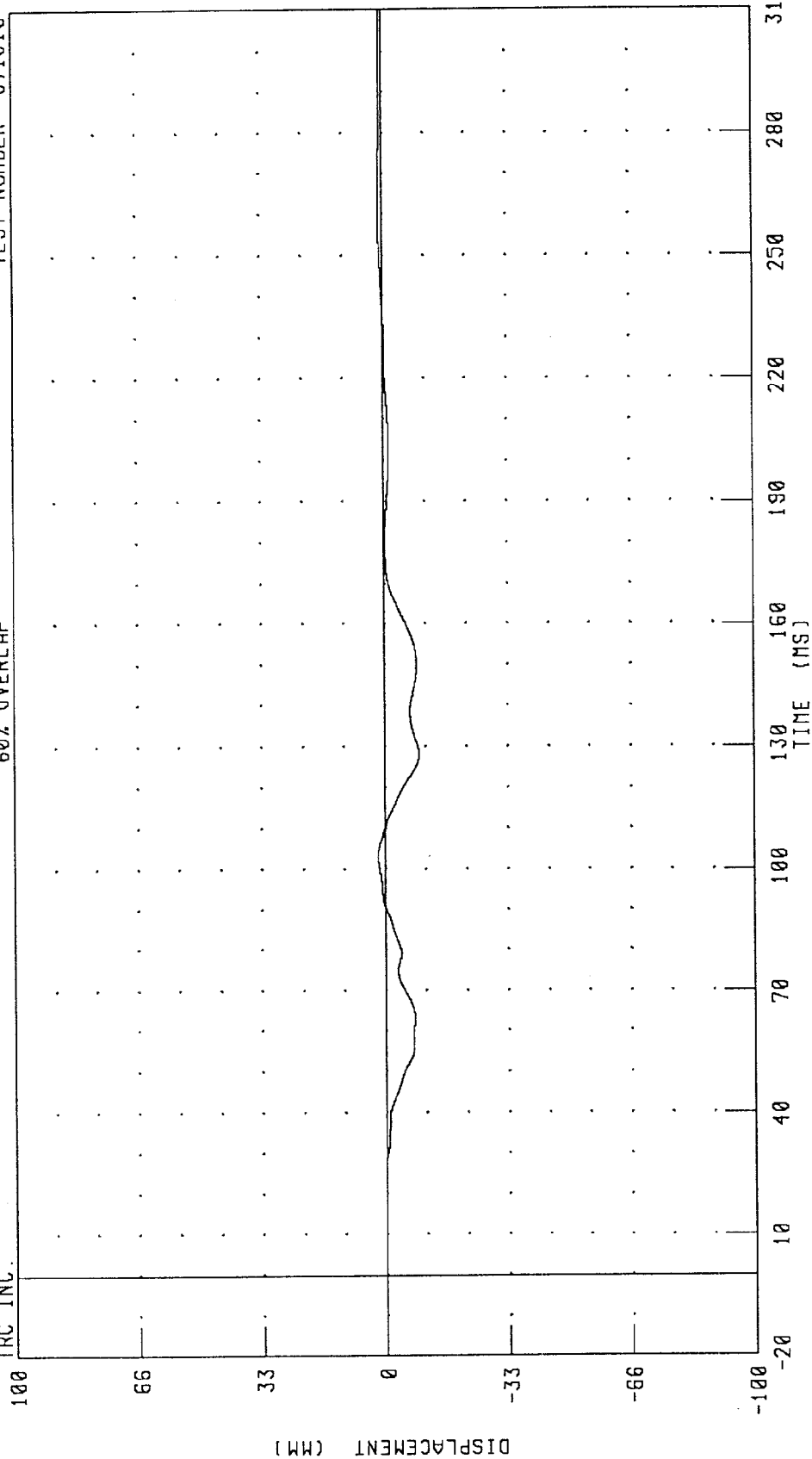
PEAK DATA: 0.00 MM @ 0.96 MS; -16.18 MM @ 61.84 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT LOWER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1.98 MM @ 103.36 MS; -9.30 MM @ 128.08 MS

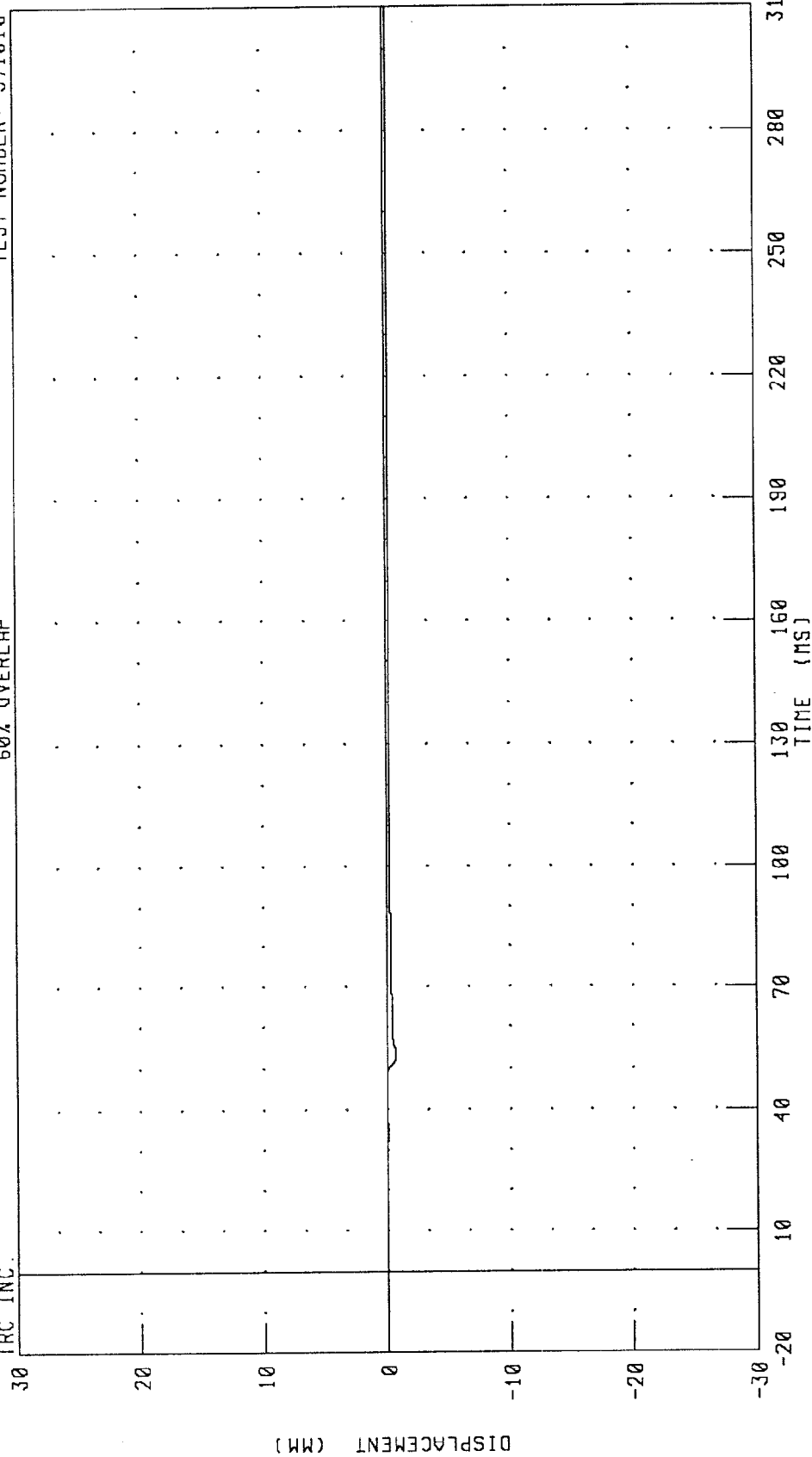
CHANNEL: RLRC01 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT KNEE DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

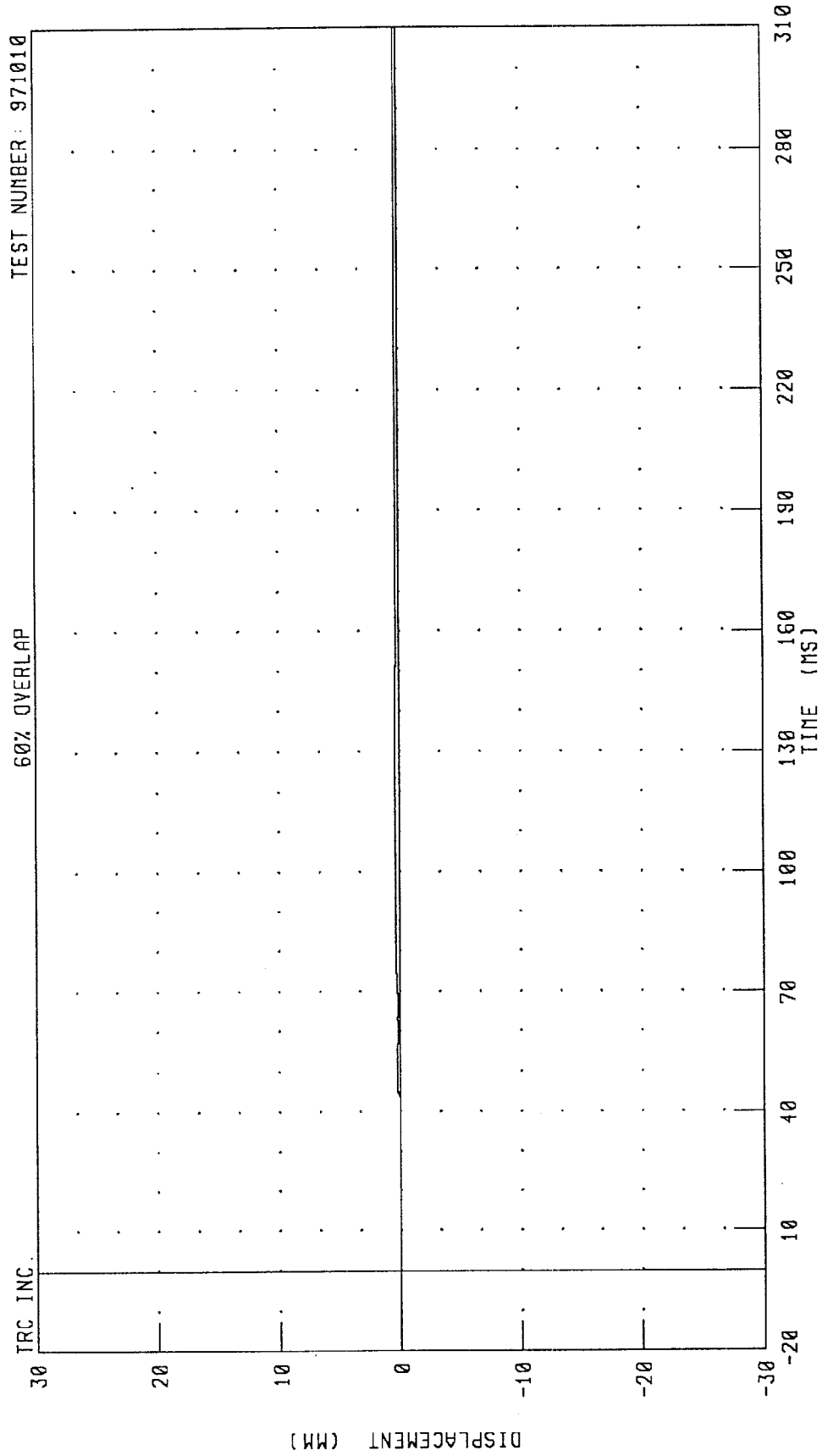
TRC INC.



CHANNEL: KNLXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.04 MM @ 40.88 MS; -0.67 MM @ 53.92 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT KNEE DISPLACEMENT



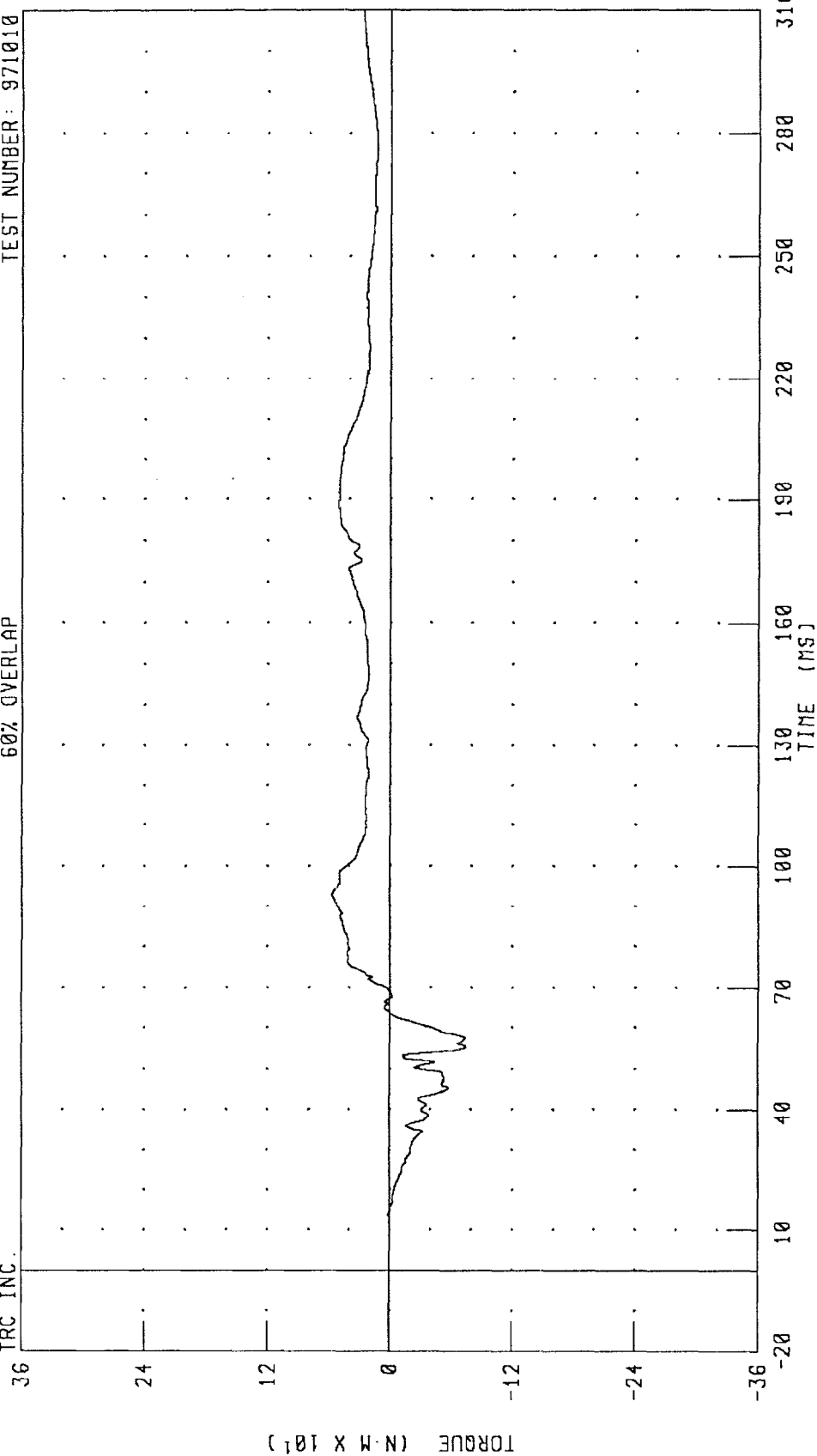
CHANNEL: KNRXD1 FILTER: CH. CLASS 180 PEAK DATA: 0.35 MM @ 139.12 MS; -0.01 MM @ 39.04 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LEFT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 57.01 N·m @ 92.88 ms; -75.57 N·m @ 55.44 ms

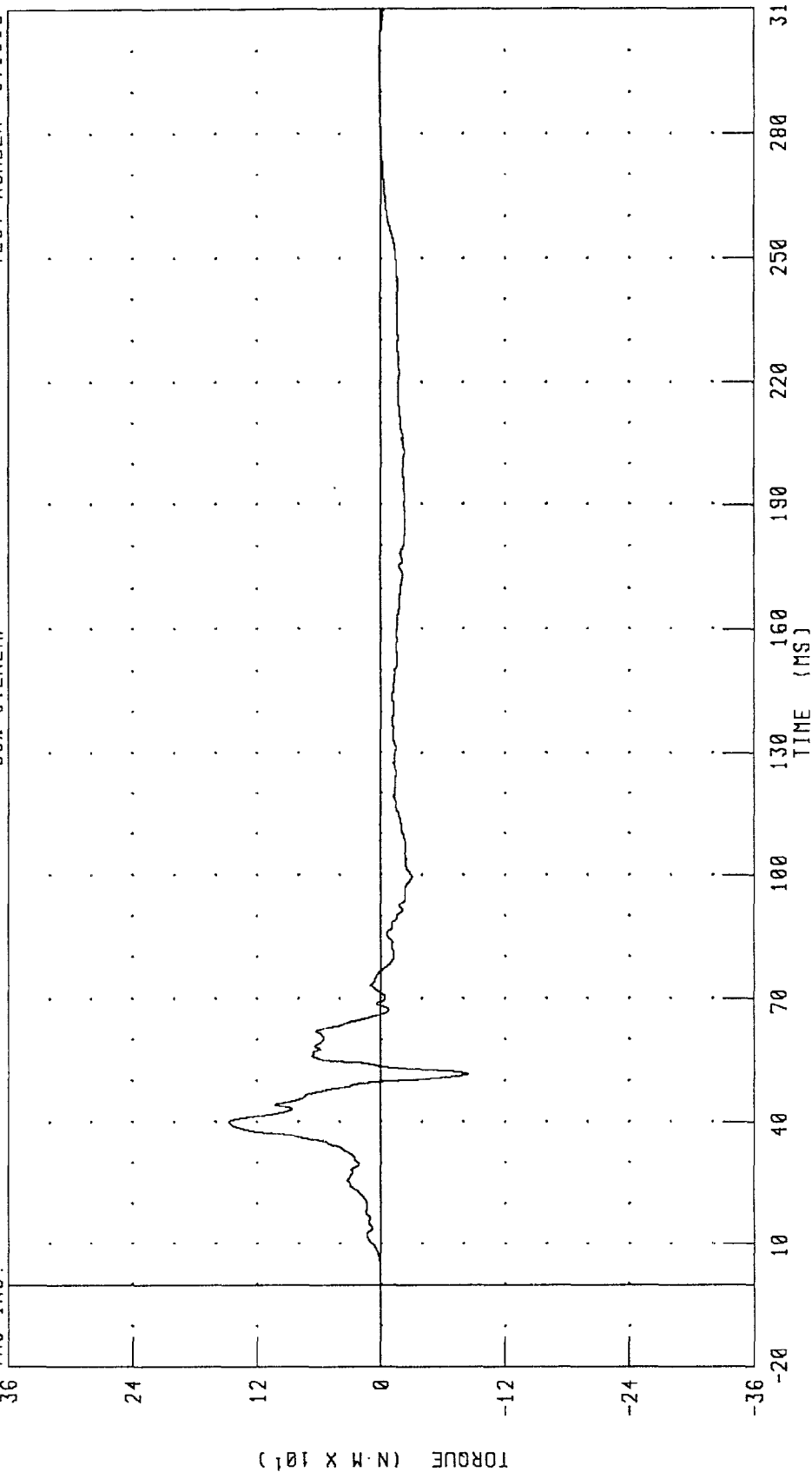
CHANNEL: TBLXM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



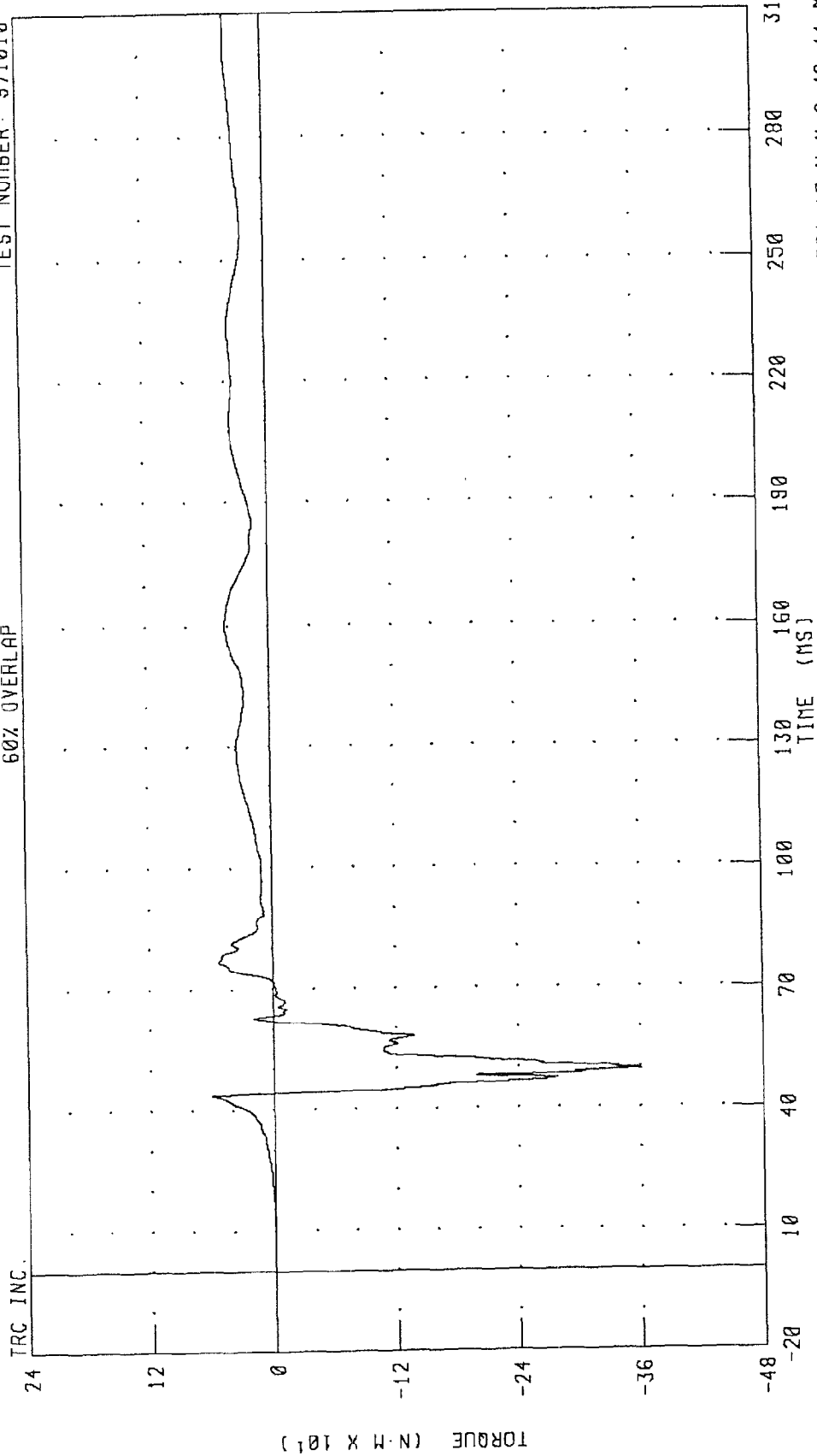
CHANNEL: TBLYM1 FILTER: CH. CLASS 600

PEAK DATA: 147.27 N·m @ 40.16 ms; -84.22 N·m @ 51.60 ms

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP



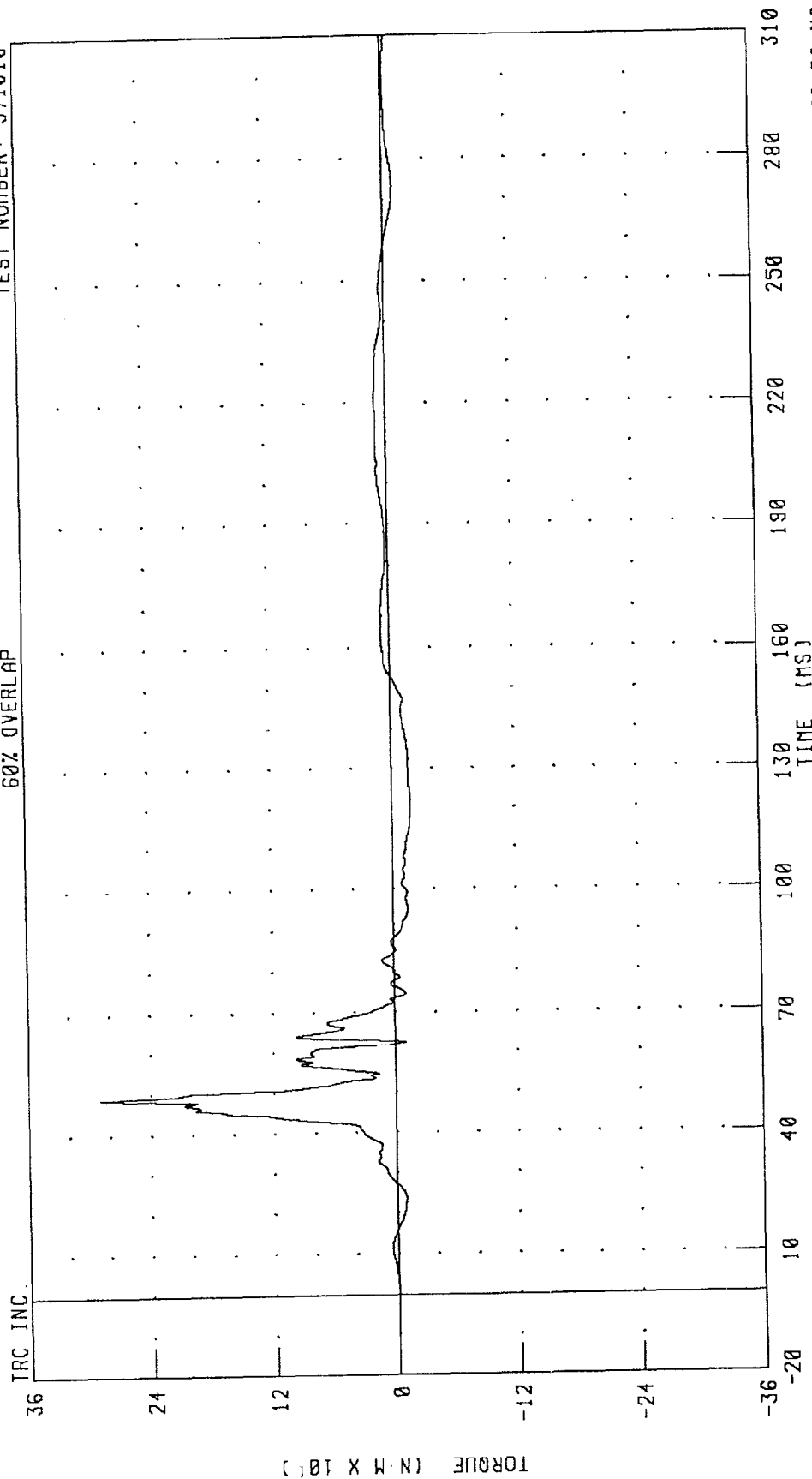
PEAK DATA: 59.82 N-M @ 43.68 MS; -361.17 N-M @ 49.44 MS

CHANNEL: TBRXMI FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

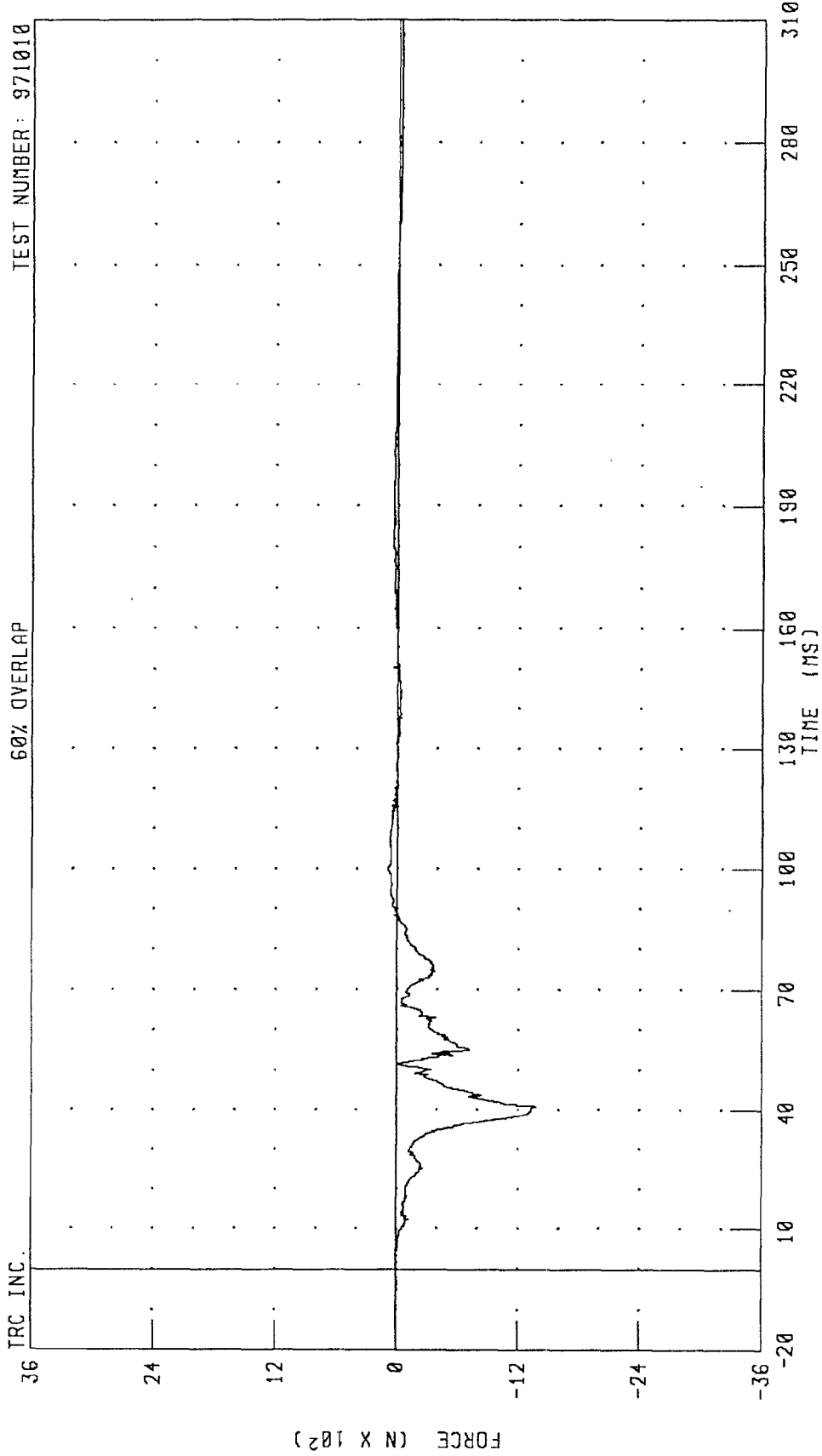
60% OVERLAP



PEAK DATA: 289.23 N.M @ 48.80 MS; -18.27 N.M @ 120.88 MS

CHANNEL: T8RYM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER LEFT LOWER TIBIA X-AXIS FORCE



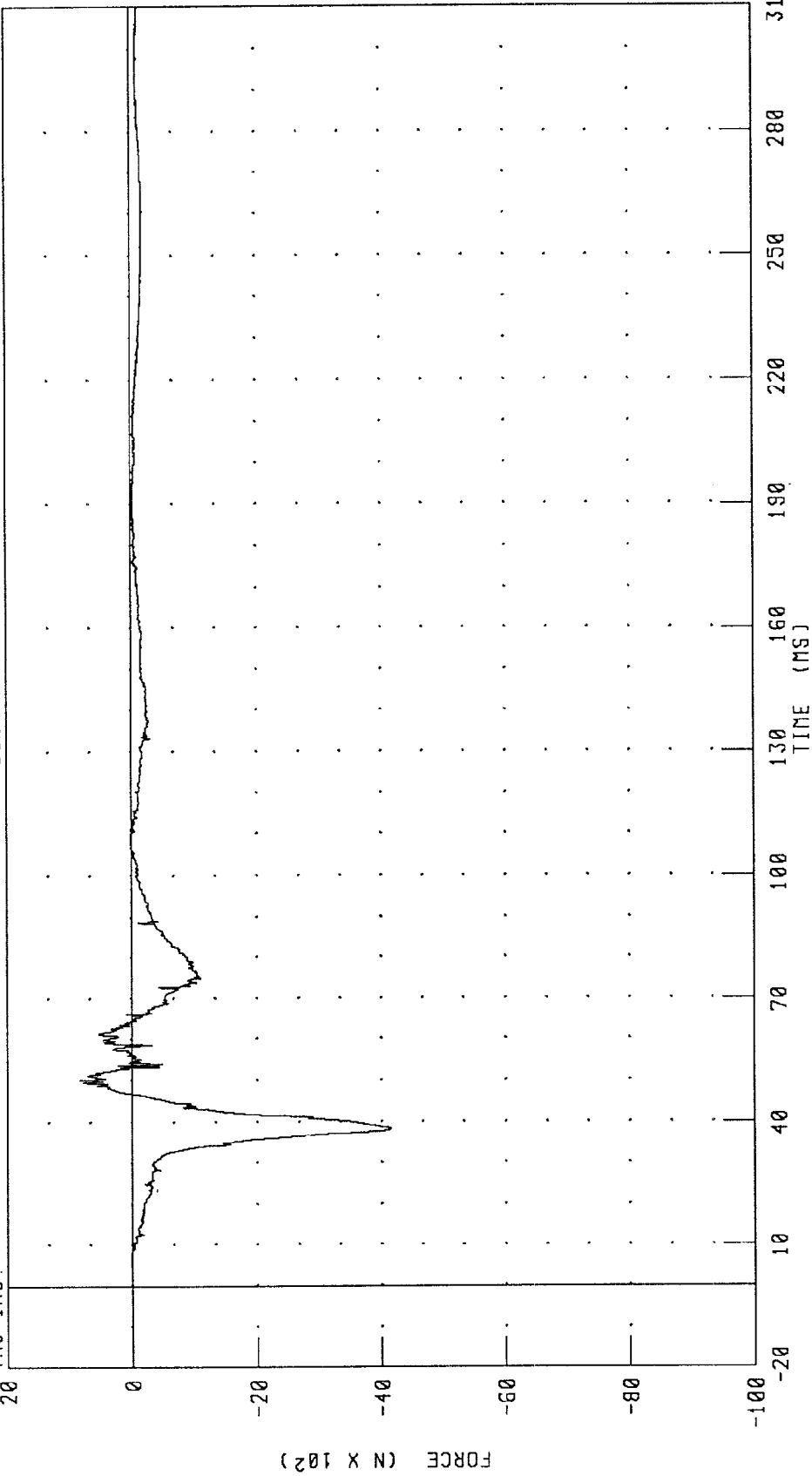
CHANNEL: ANLXF1 FILTER: CH. CLASS 1000 PEAK DATA: 87.29 N @ 99.52 MS; -1385.85 N @ 40.80 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 824.06 N @ 50.16 MS; -4149.86 N @ 38.32 MS

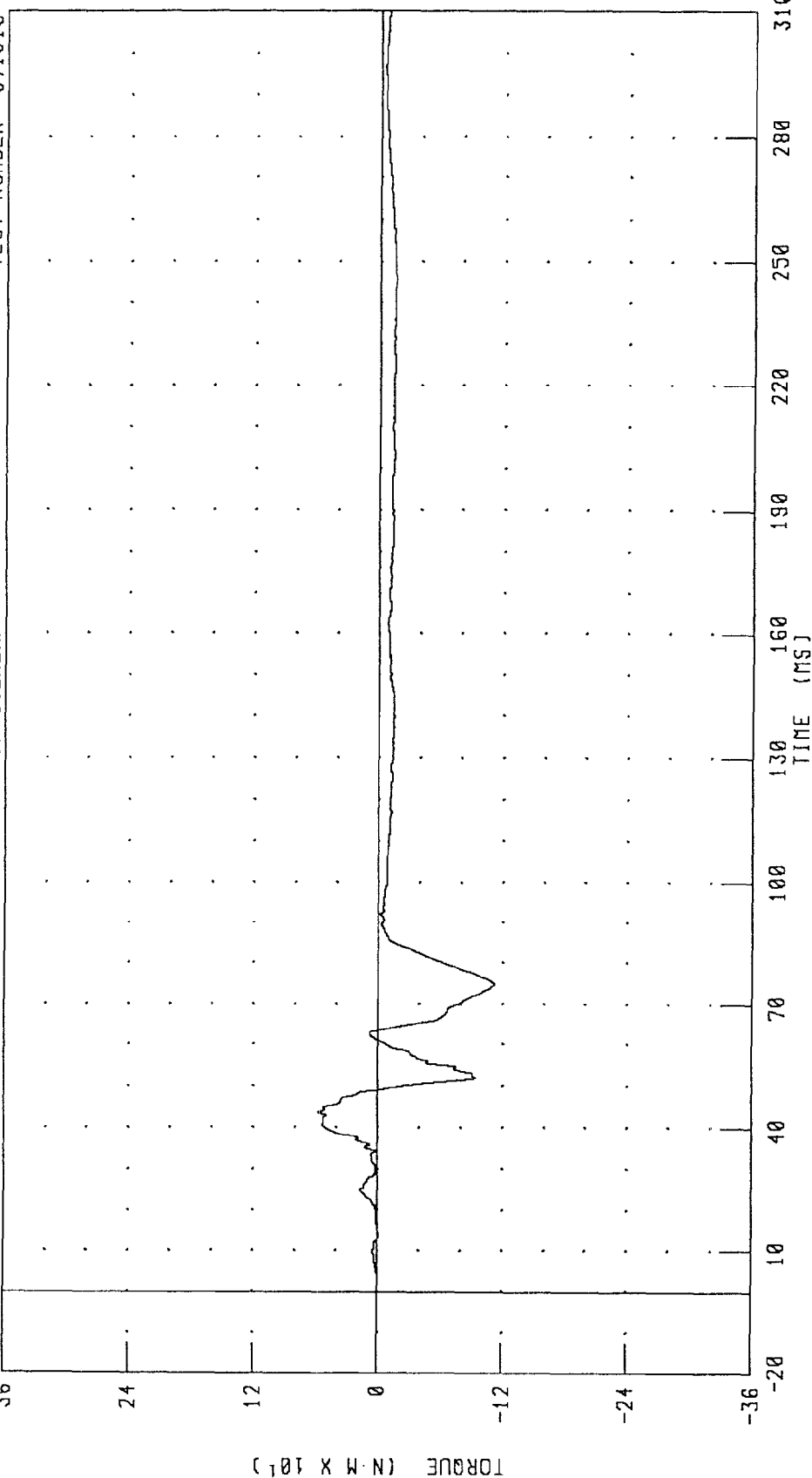
CHANNEL: ANLZF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



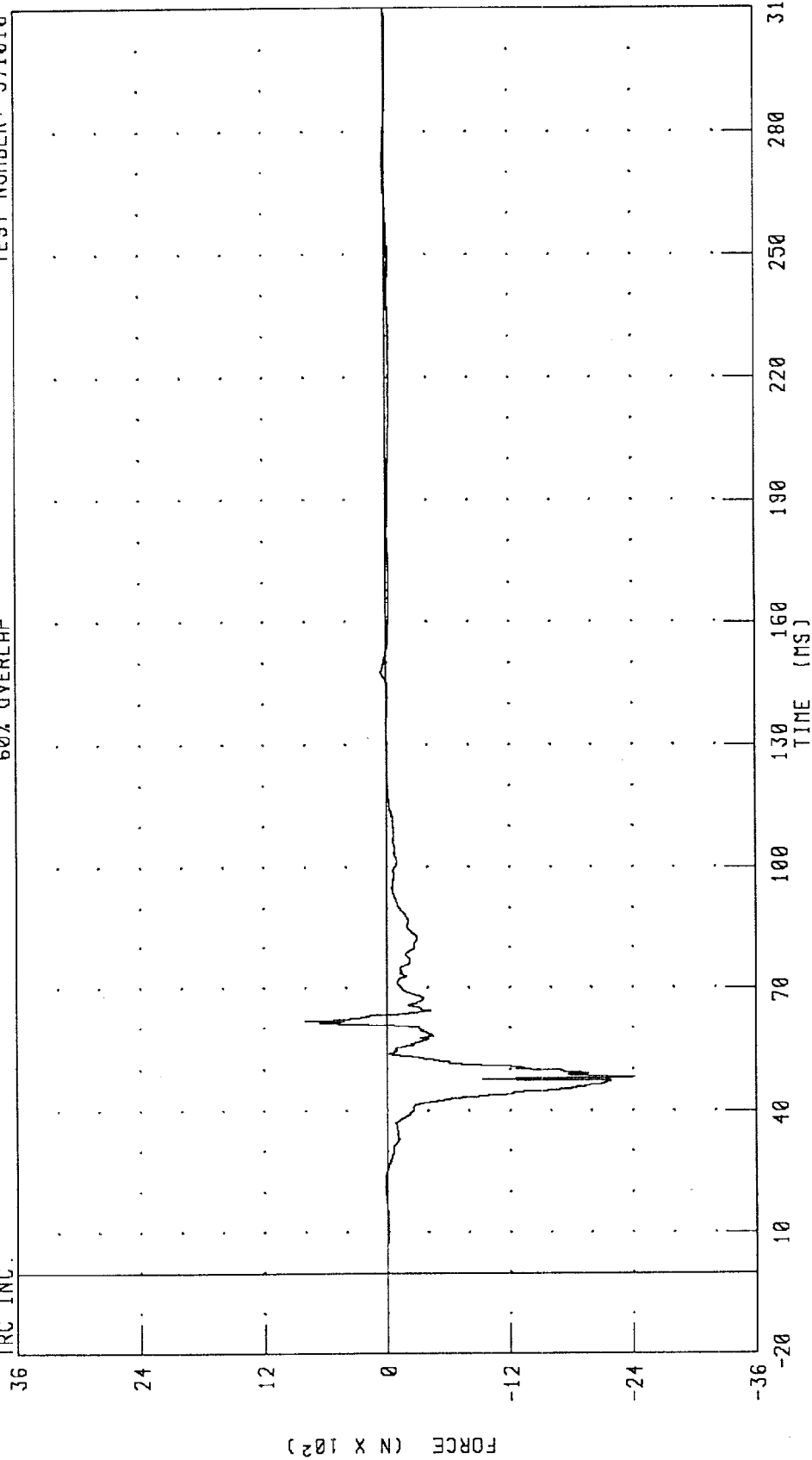
CHANNEL: ANLYM1 FILTER: CH. CLASS 600 PEAK DATA: 57.56 N·m @ 43.76 MS; -112.14 N·m @ 74.88 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
DRIVER RIGHT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 801.56 N @ 62.00 MS; -2412.27 N @ 48.08 MS

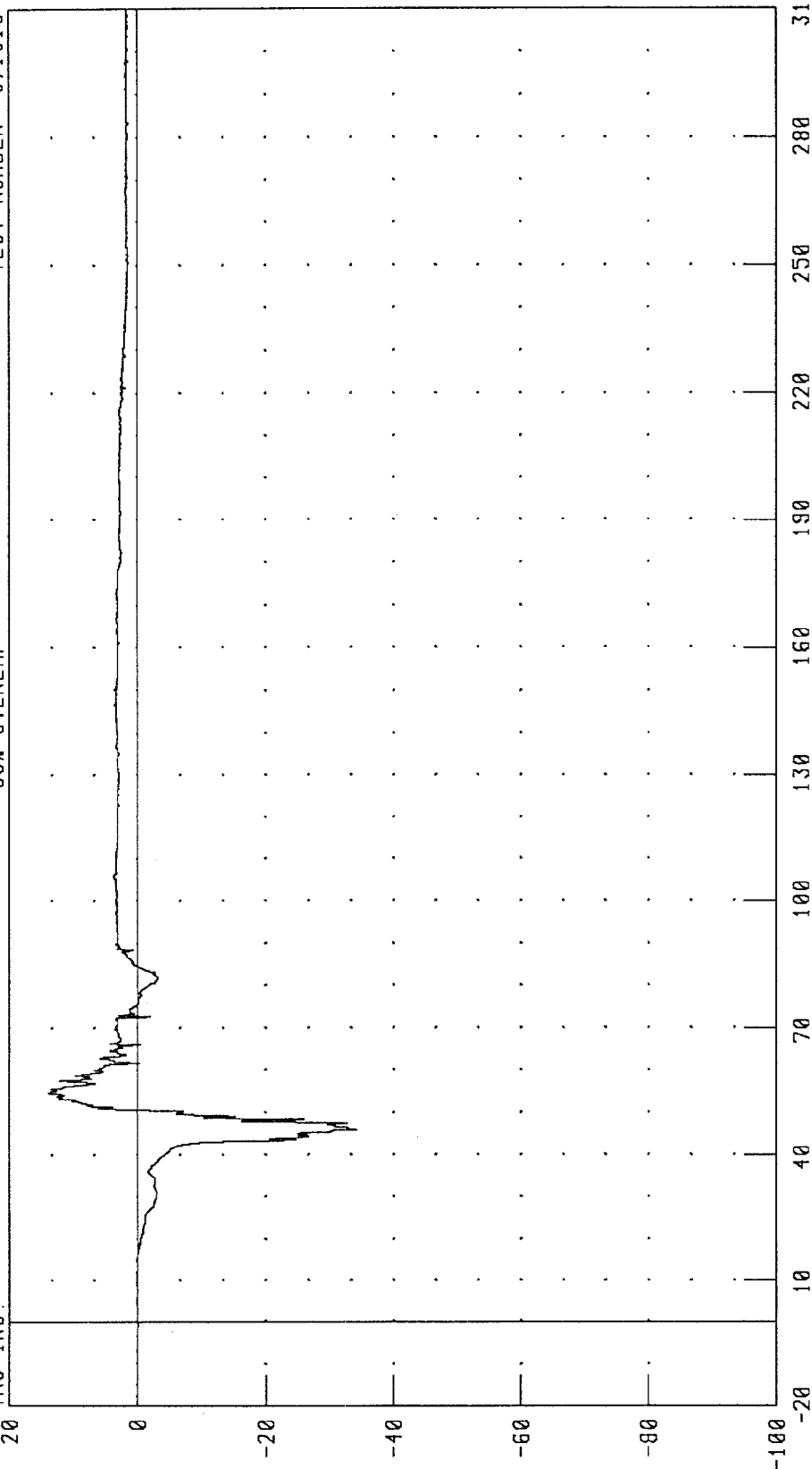
CHANNEL: ANRFX1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1385.83 N @ 54.72 MS; -3427.14 N @ 45.92 MS

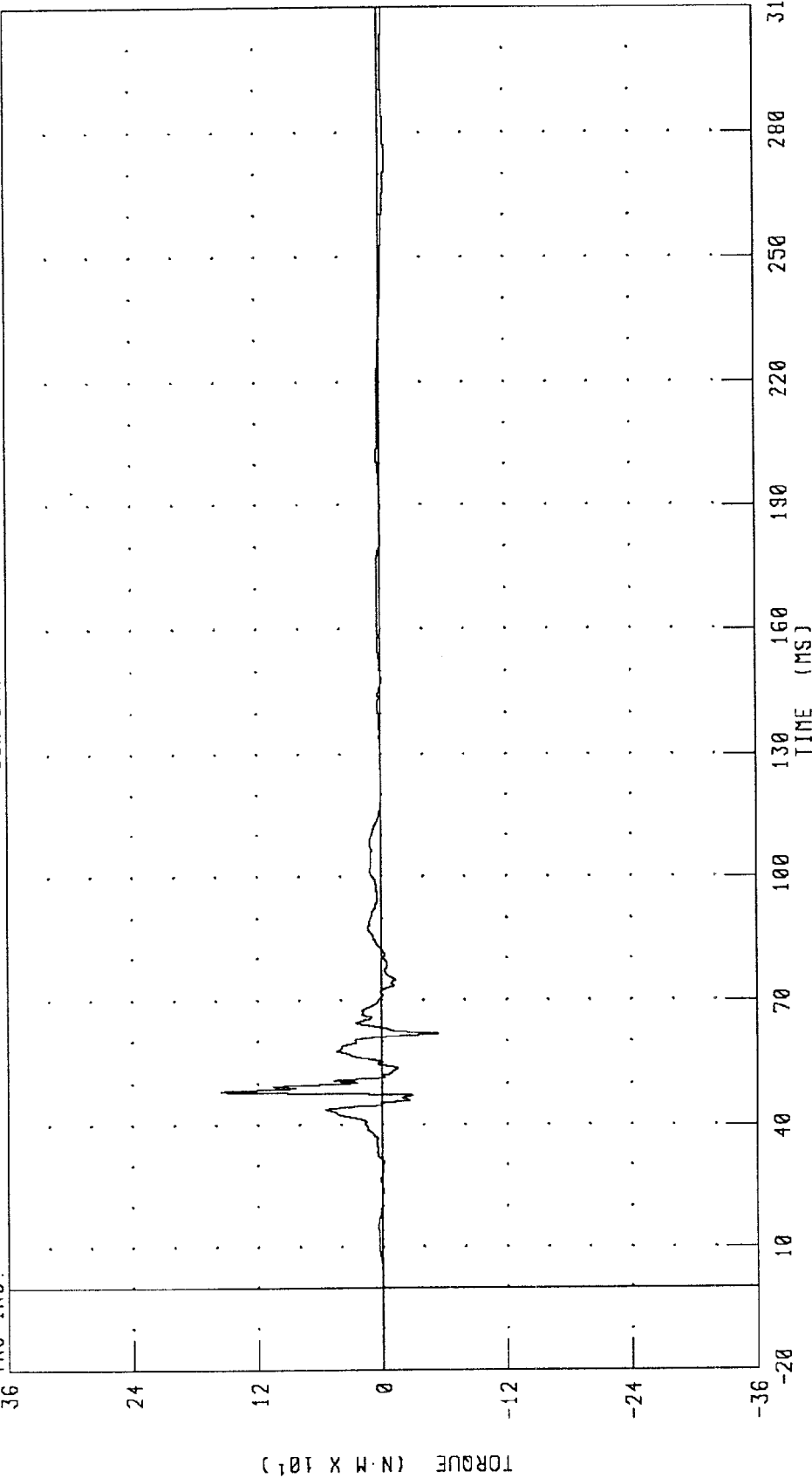
CHANNEL: ANRZF1 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



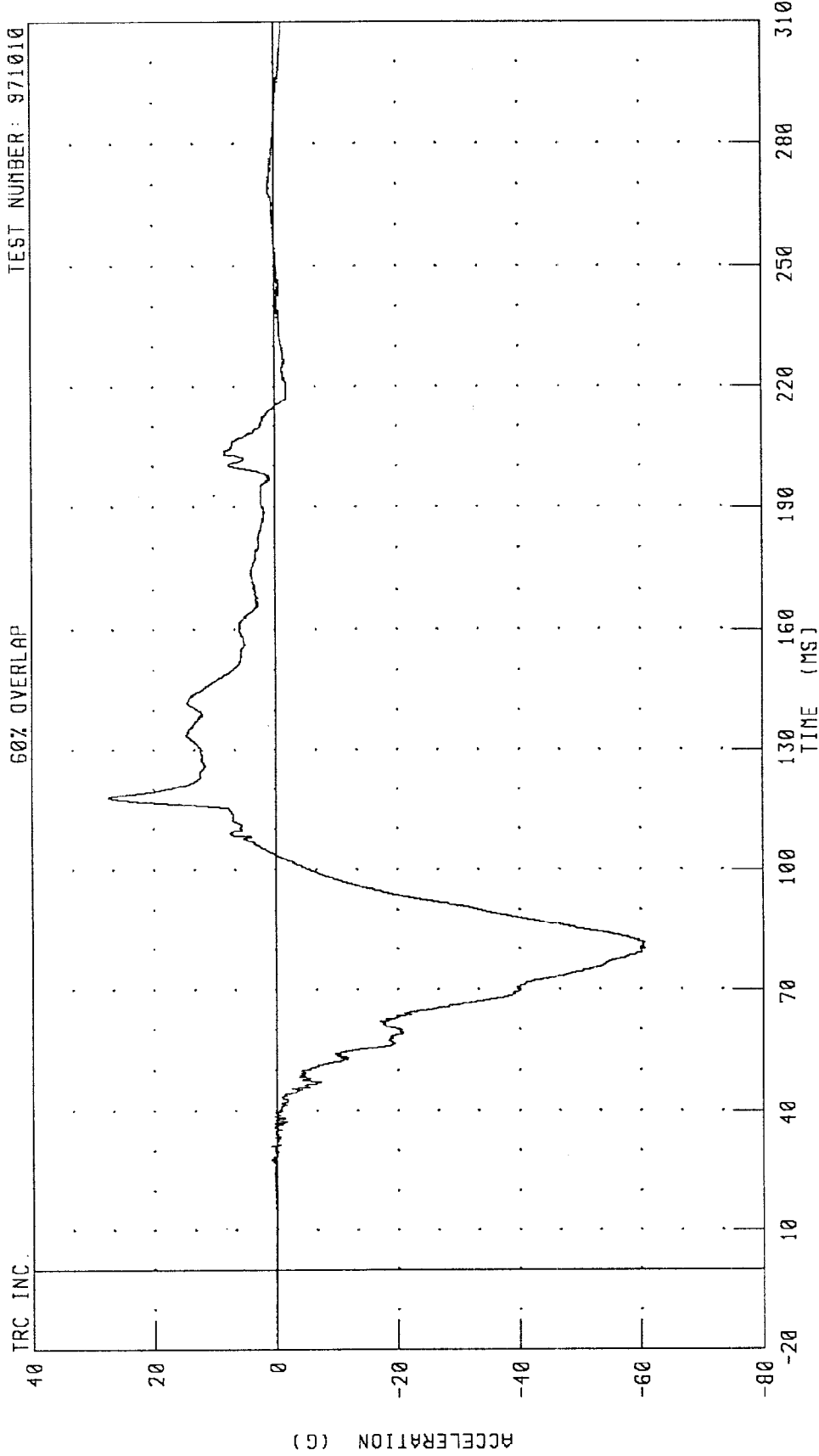
PEAK DATA: 155.92 N.M @ 48.16 MS; -53.90 N.M @ 62.00 MS

CHANNEL: ANRYM1 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

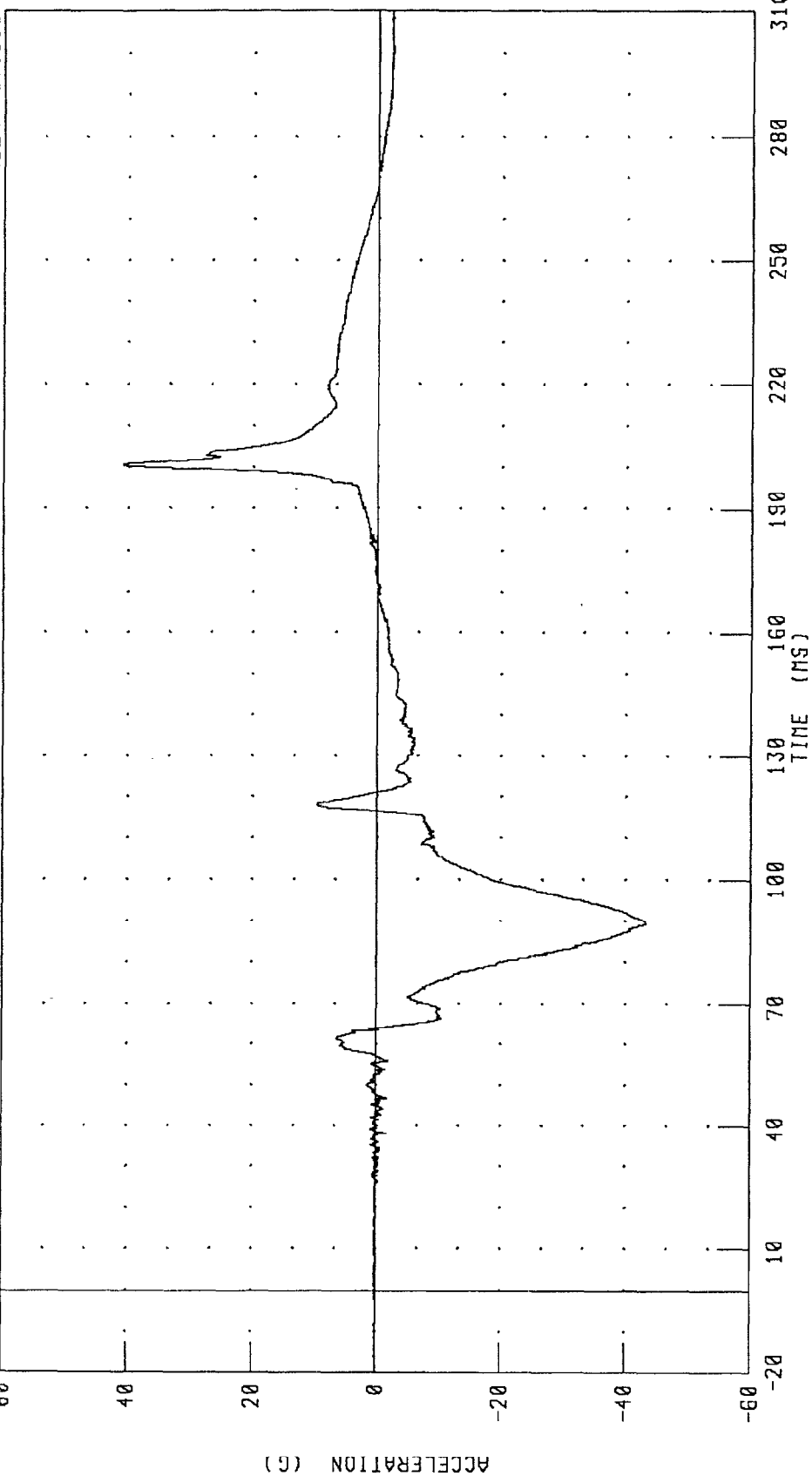
PEAK DATA: 27.43 G @ 118.00 MS, -60.70 G @ 80.16 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

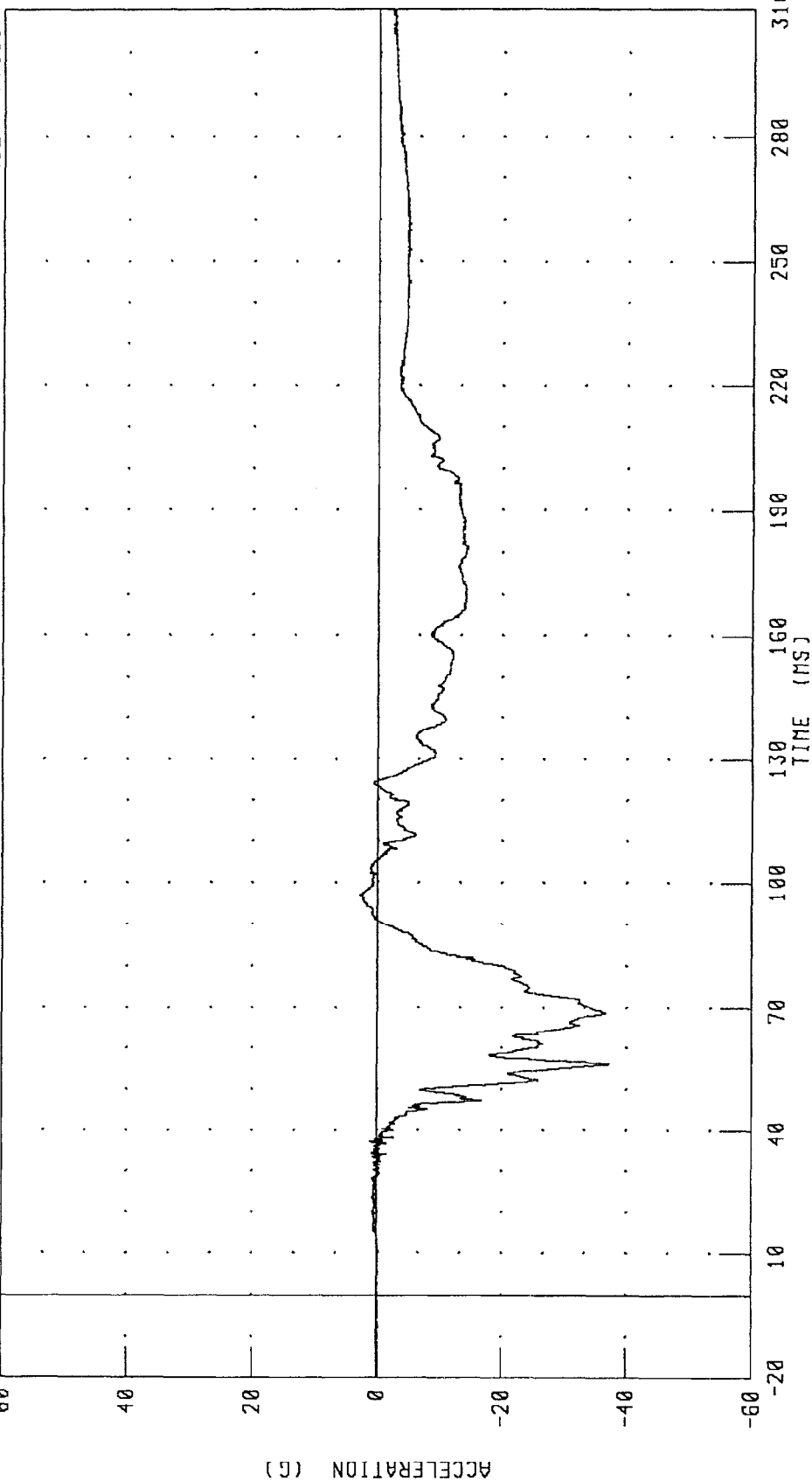
PEAK DATA: 40.90 G @ 200.56 MS; -43.37 G @ 89.28 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

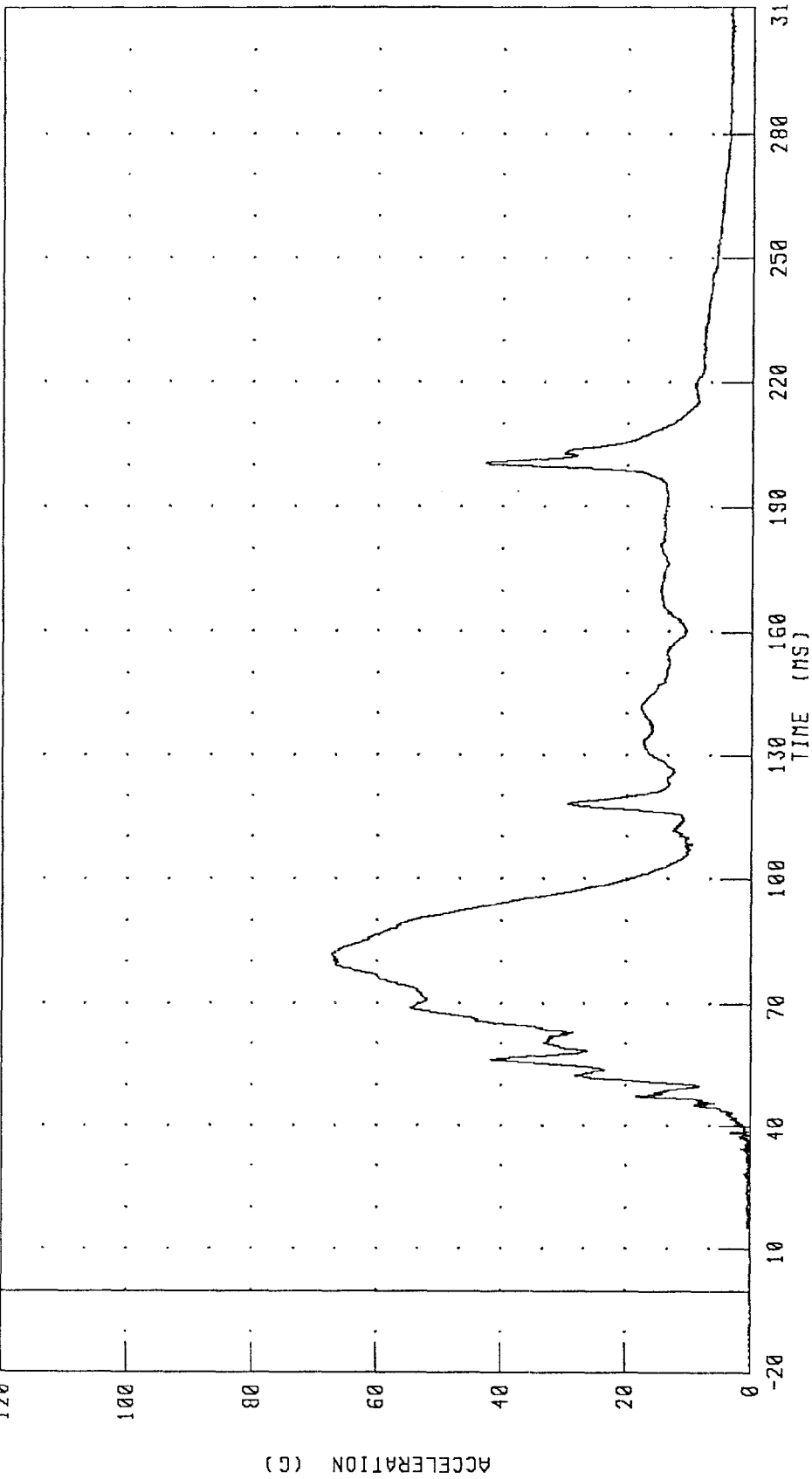
PEAK DATA: 2.83 G @ 97.04 MS; -37.25 G @ 56.24 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

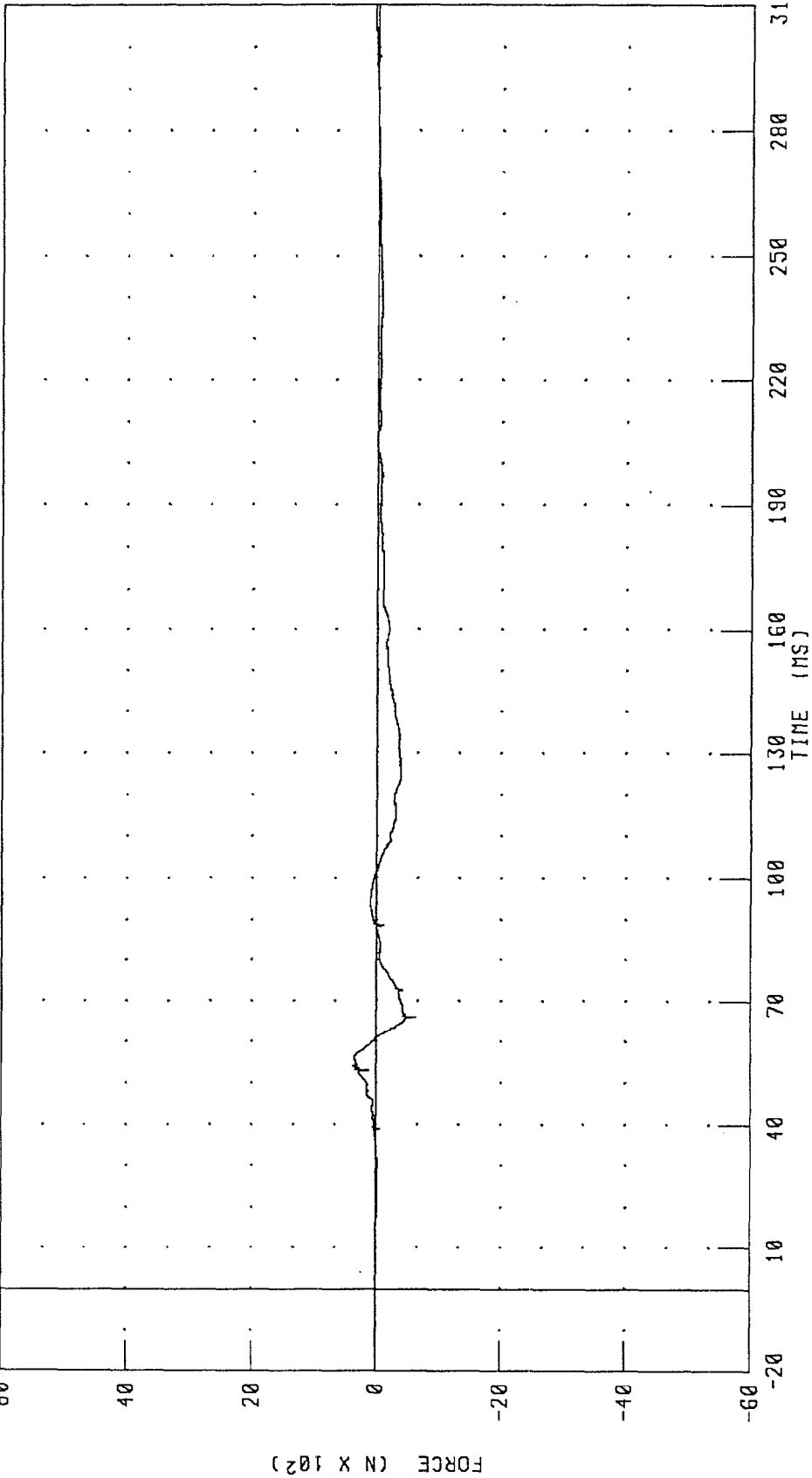
PEAK DATA: 67.35 G @ 81.92 MS; 0.11 G @ -19.92 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER UPPER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

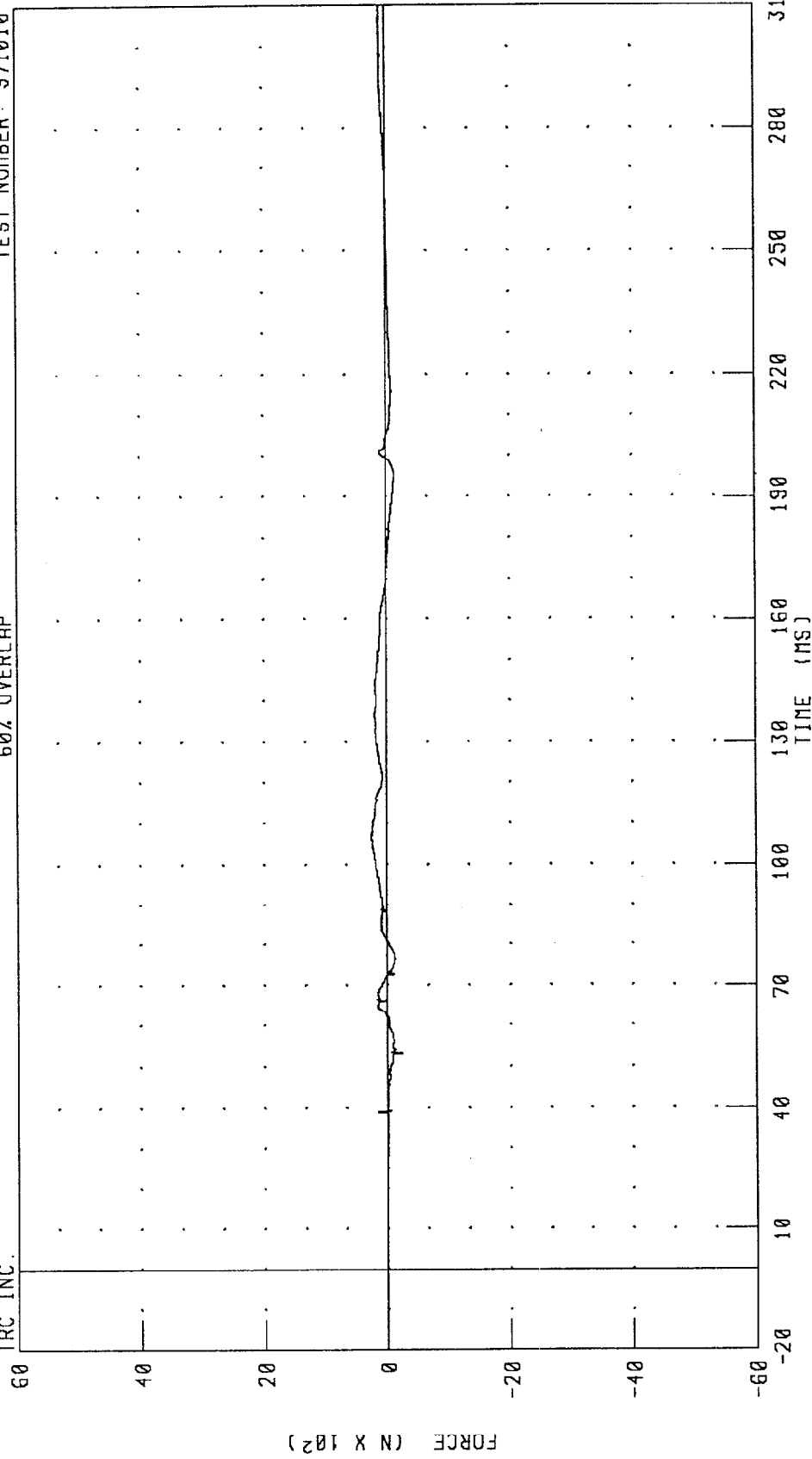
PEAK DATA: 369.94 N @ 54.08 MS, -634.35 N @ 66.08 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER UPPER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



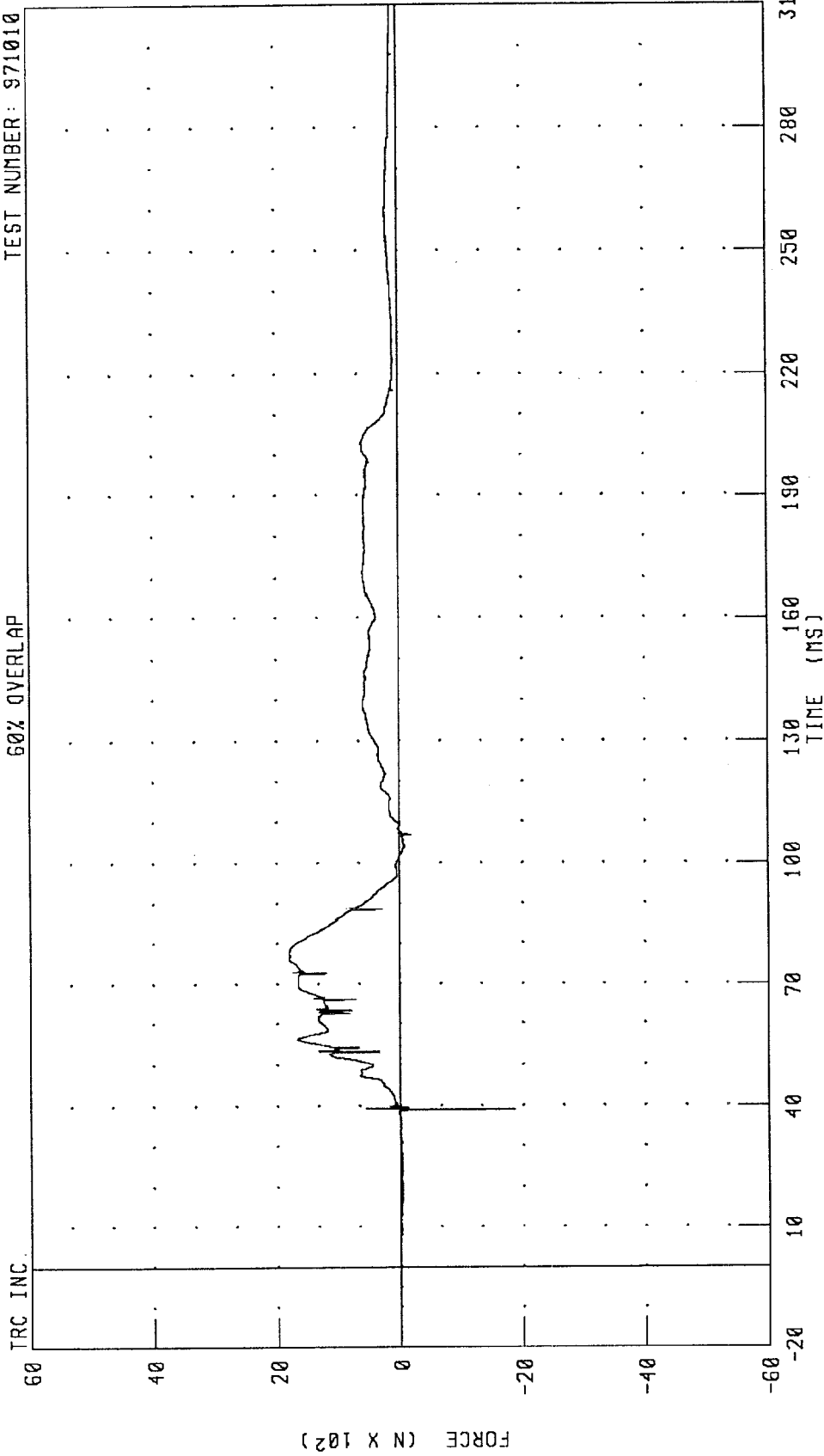
PEAK DATA: 252.97 N @ 106.72 MS; -233.91 N @ 53.04 MS

CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER UPPER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 971010

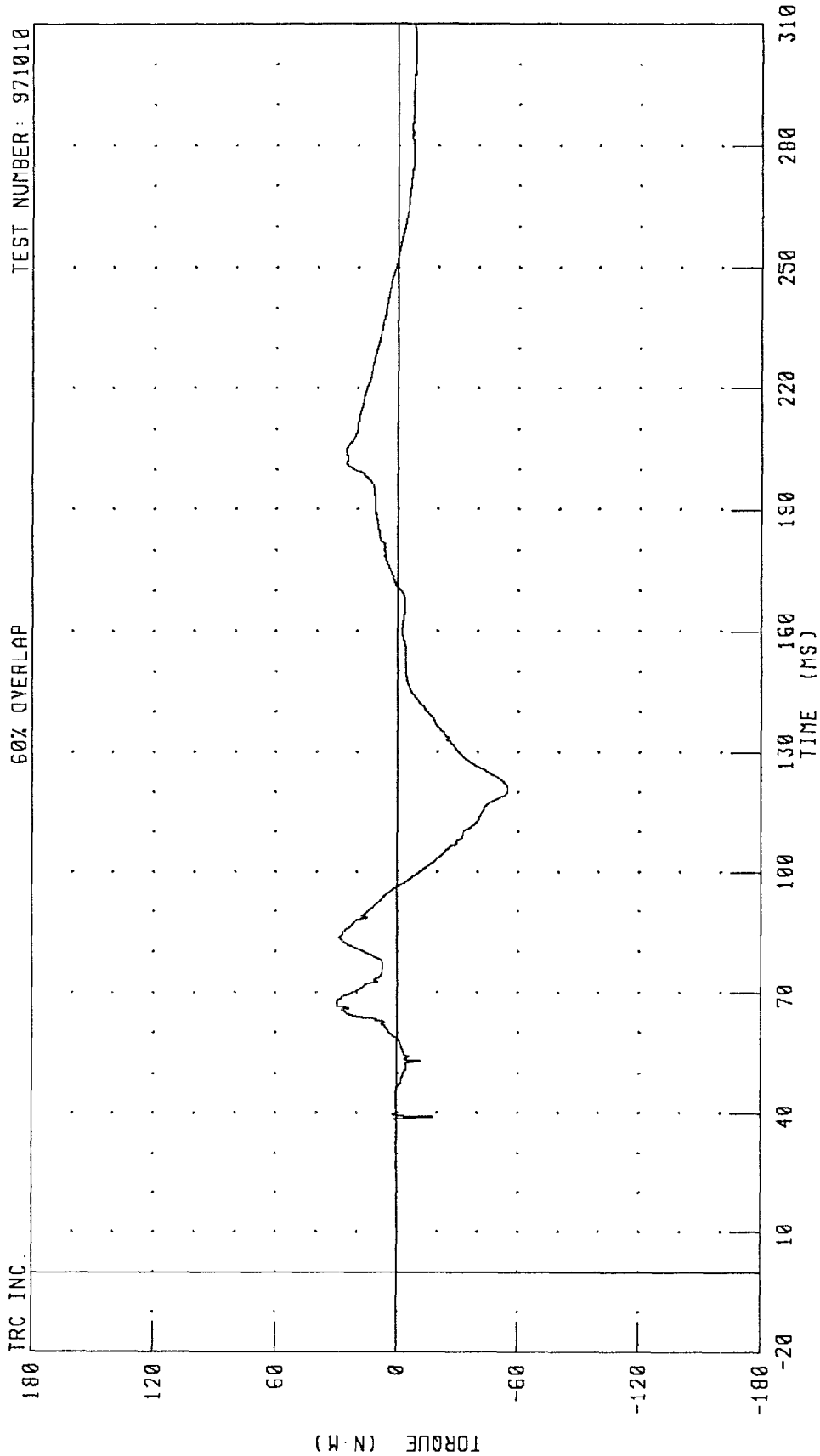
60% OVERLAP



PEAK DATA: 1818.33 N @ 77.44 MS; -1869.89 N @ 39.12 MS

CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER UPPER NECK MOMENT ABOUT X-AXIS



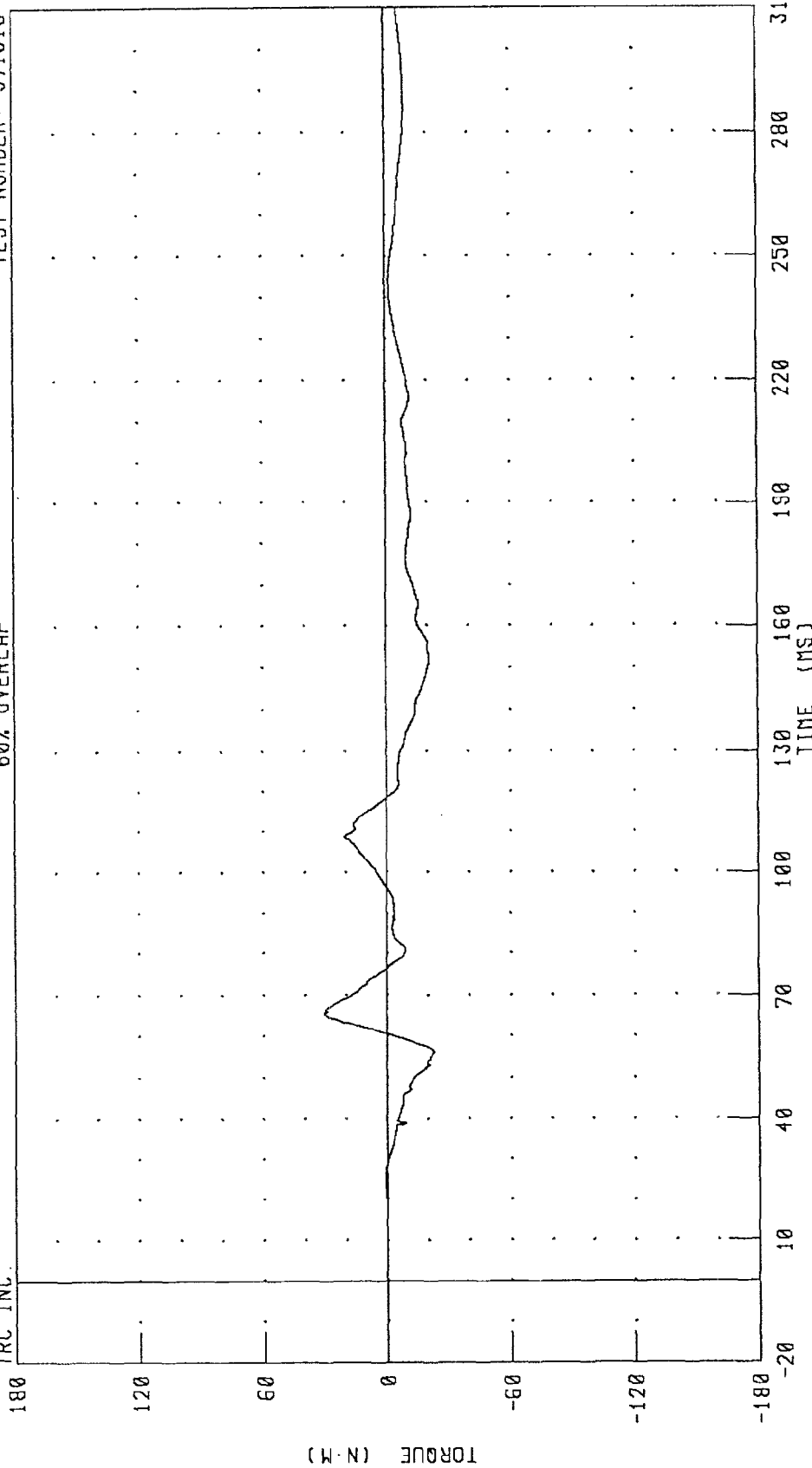
CHANNEL: NEKX12 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER UPPER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 30.62 N-M @ 65.60 MS; -22.66 N-M @ 56.24 MS

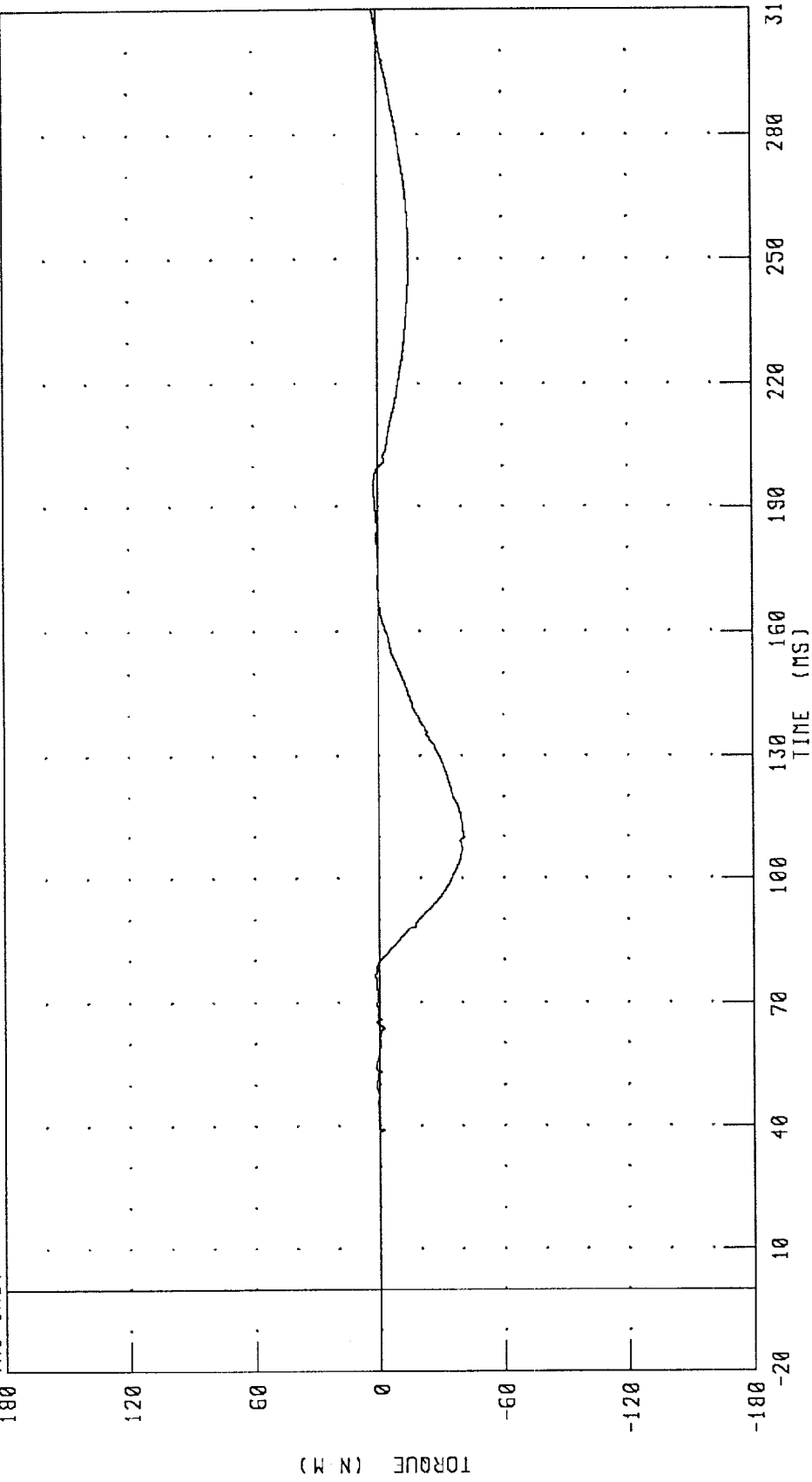
CHANNEL: NEKYM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER UPPER NECK MOMENT ABOUT Z-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: NEKZM2 FILTER: CH. CLASS 600

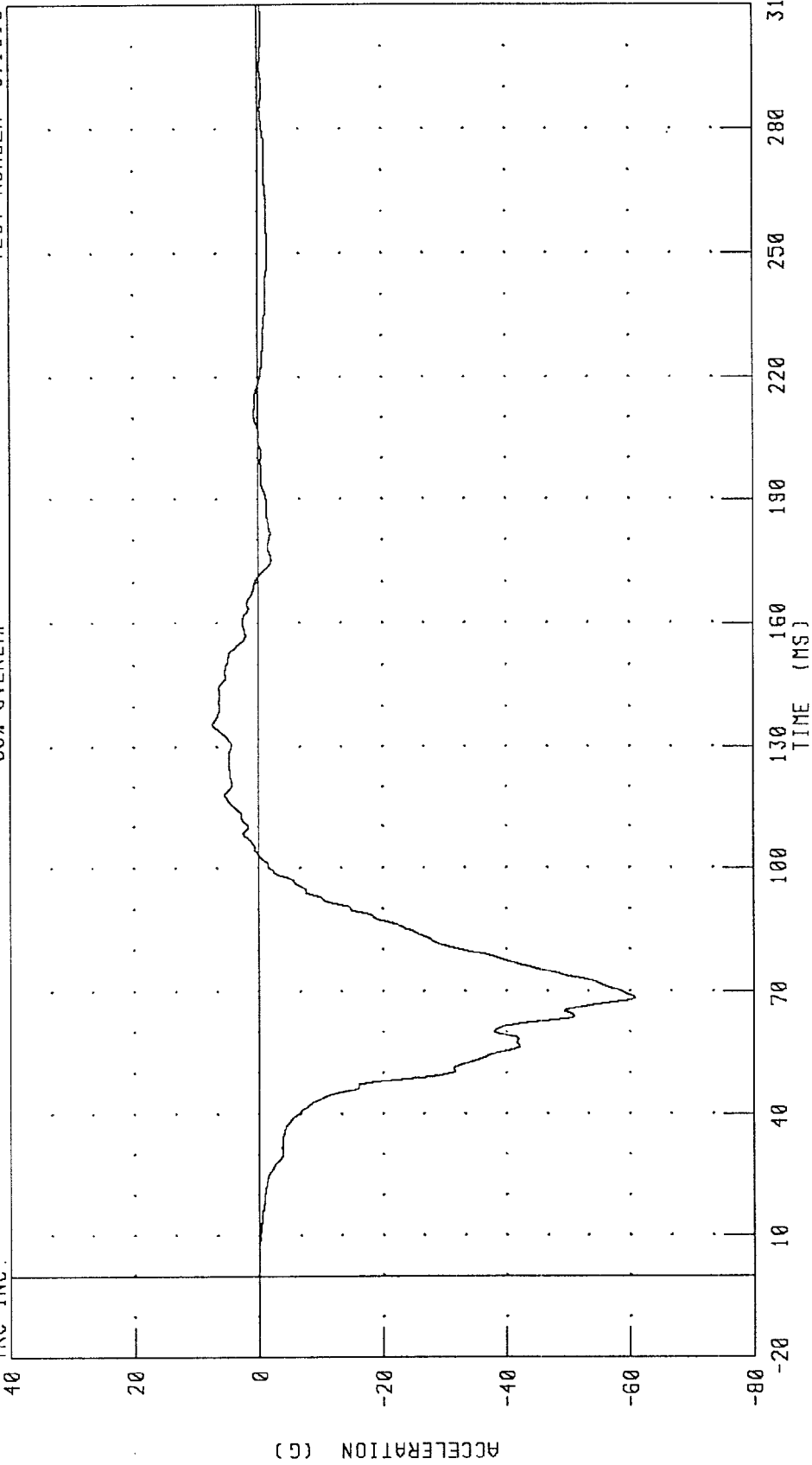
PEAK DATA: 2.25 N.M @ 195.76 MS; -41.01 N.M @ 109.92 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: CSTXC2 FILTER: CH. CLASS 180

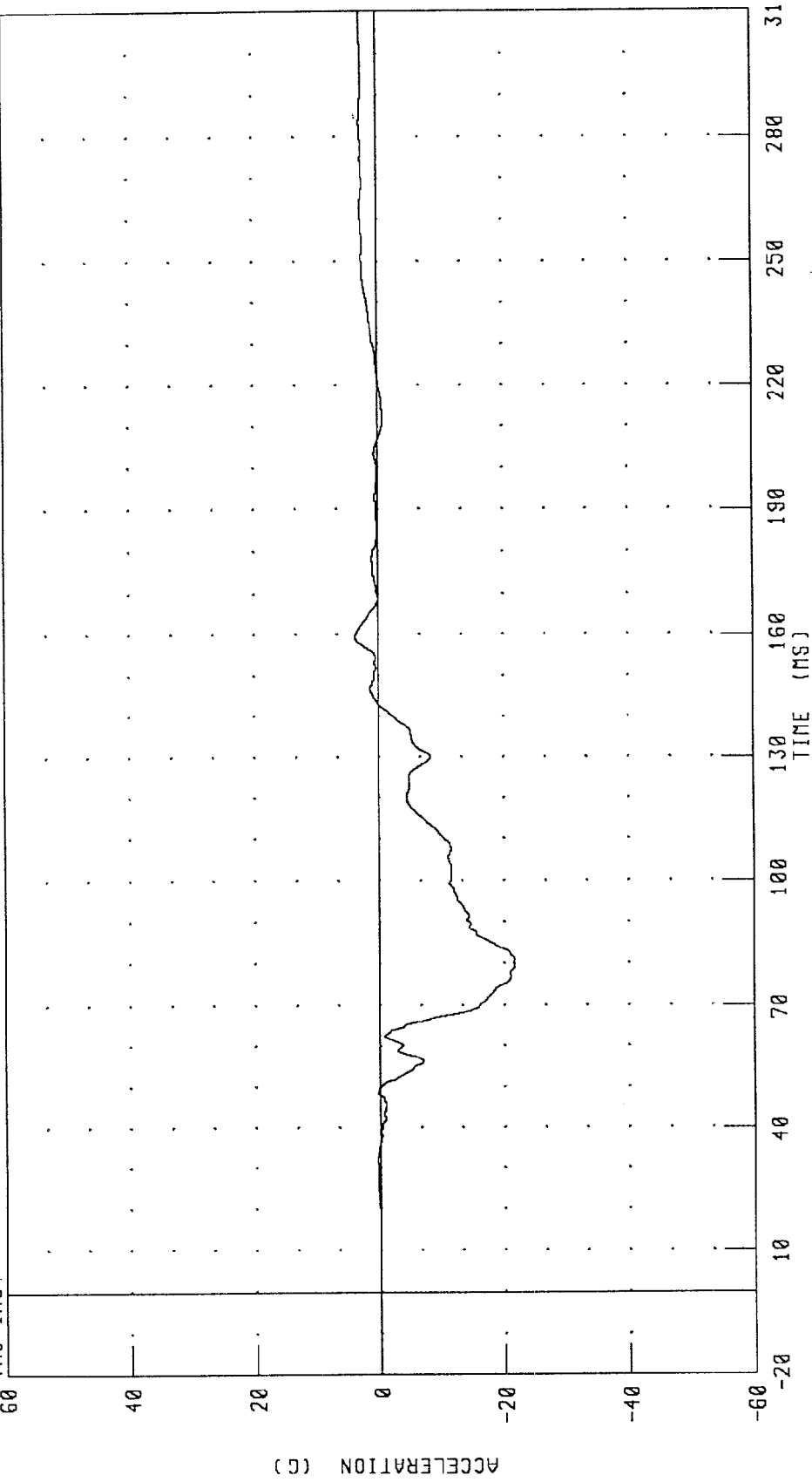
PEAK DATA: 7.41 G @ 135.44 MS; -60.83 G @ 68.48 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: CSTYG2 FILTER: CH. CLASS 180

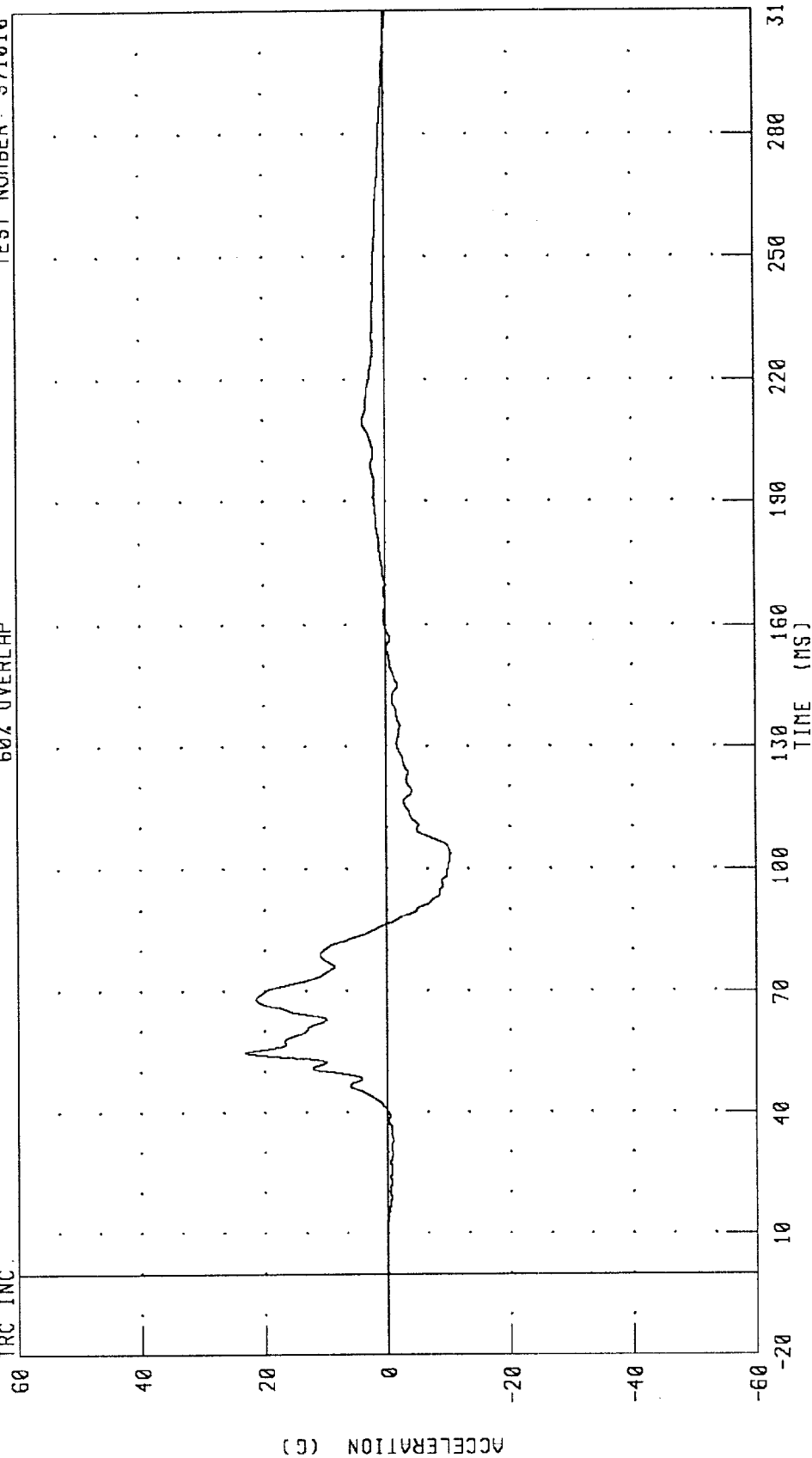
PEAK DATA: 3.73 G @ 159.36 MS; -21.71 G @ 80.88 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

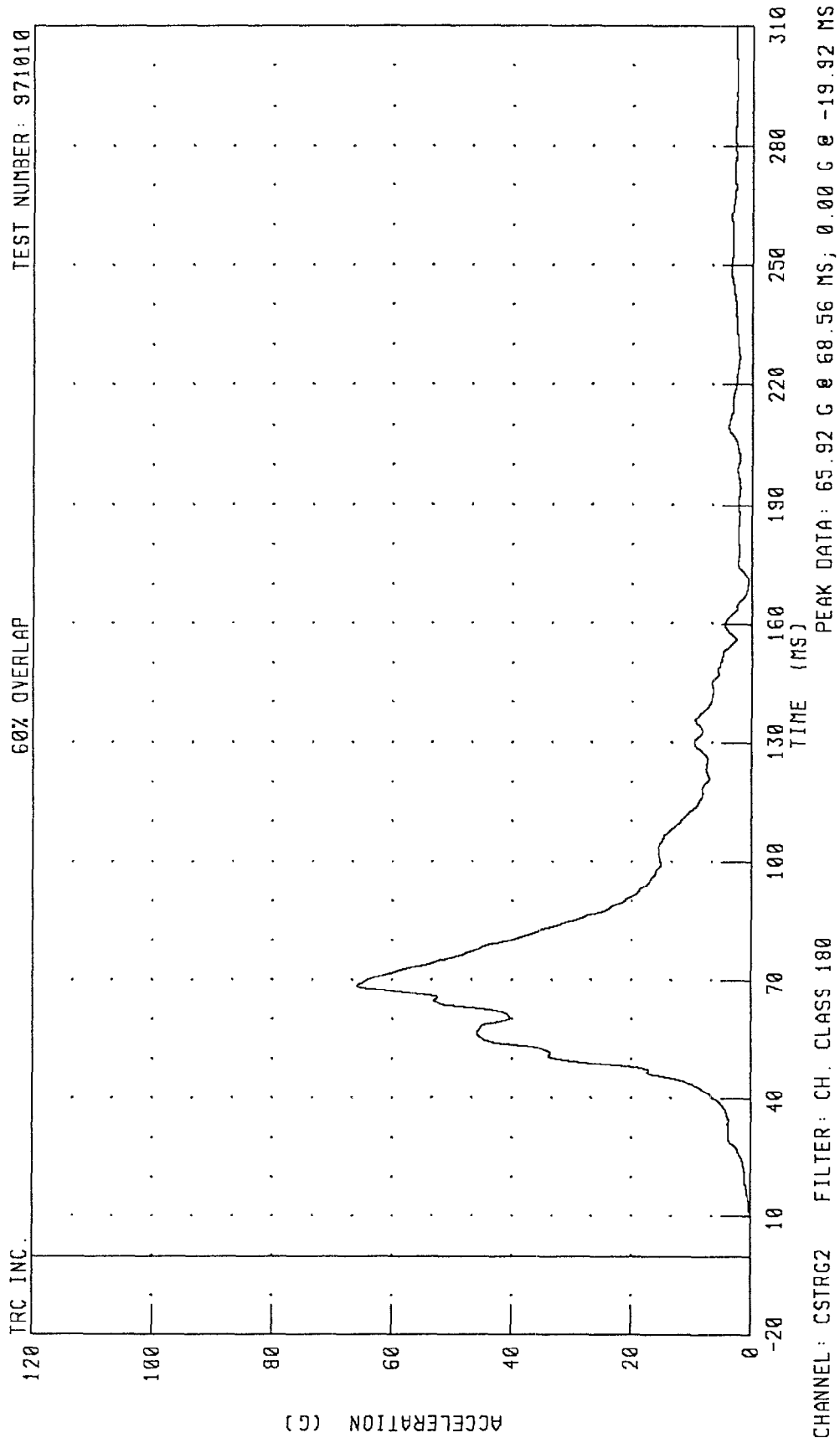
TRC INC.



CHANNEL: CSTZG2 FILTER: CH. CLASS 180

971010

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION



70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER CHEST DEFLECTION

TEST NUMBER: 971010

60% OVERLAP

IRC INC.

100

66

33

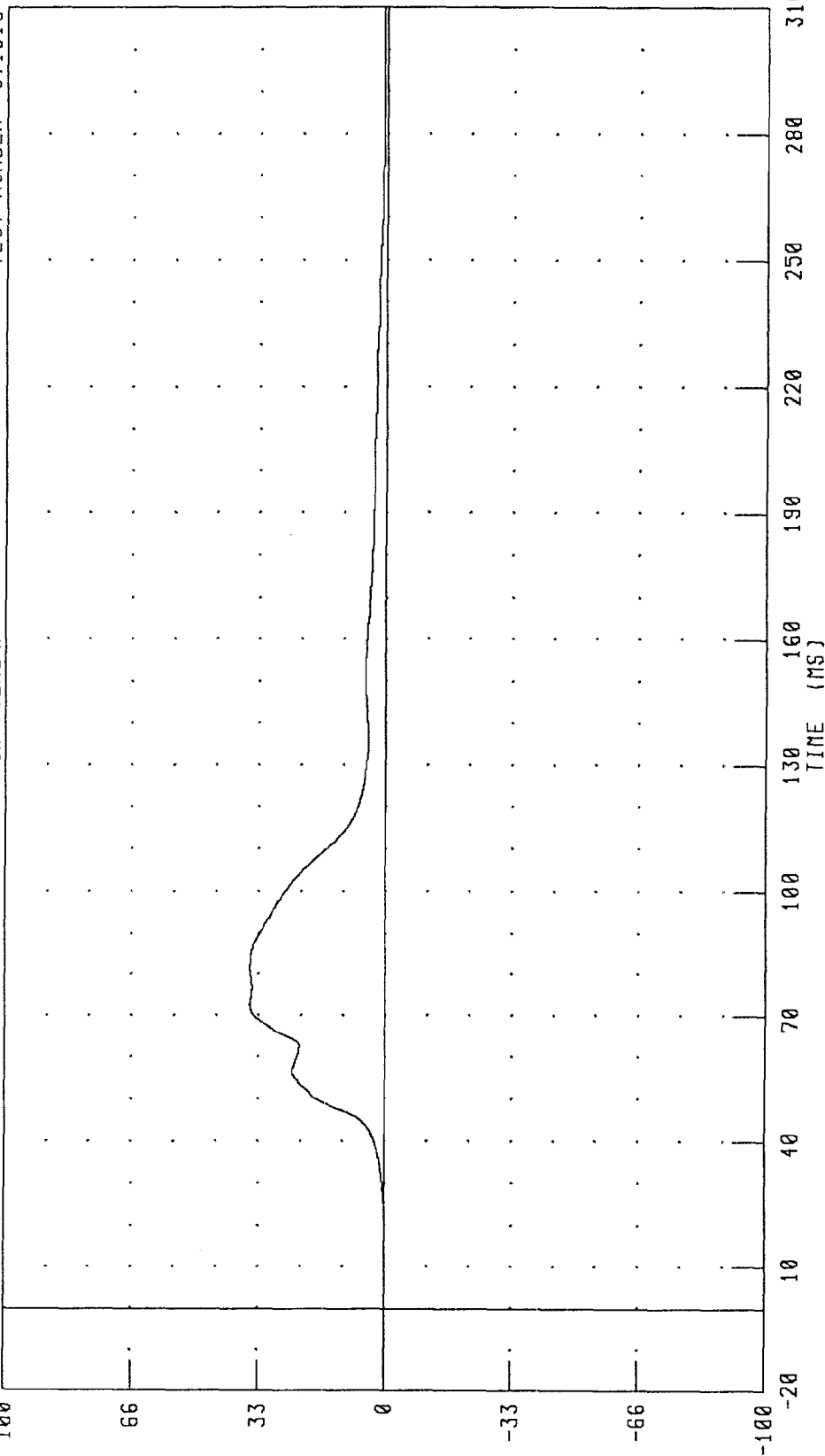
0

-33

-66

-100

DISPLACEMENT (MM)



CHANNEL: CSTXD2 FILTER: CH. CLASS 180

PEAK DATA: 35.78 MM @ 81.44 MS, 0.00 MM @ 13.84 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER PELVIS X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

20

0

-20

-40

-60

-80

-100

ACCELERATION (G)

-20

0

20

40

60

80

100

120

140

160

180

200

220

240

260

280

300

310

TIME (MS)

CHANNEL: PEVXG2 FILTER: CH. CLASS 1000

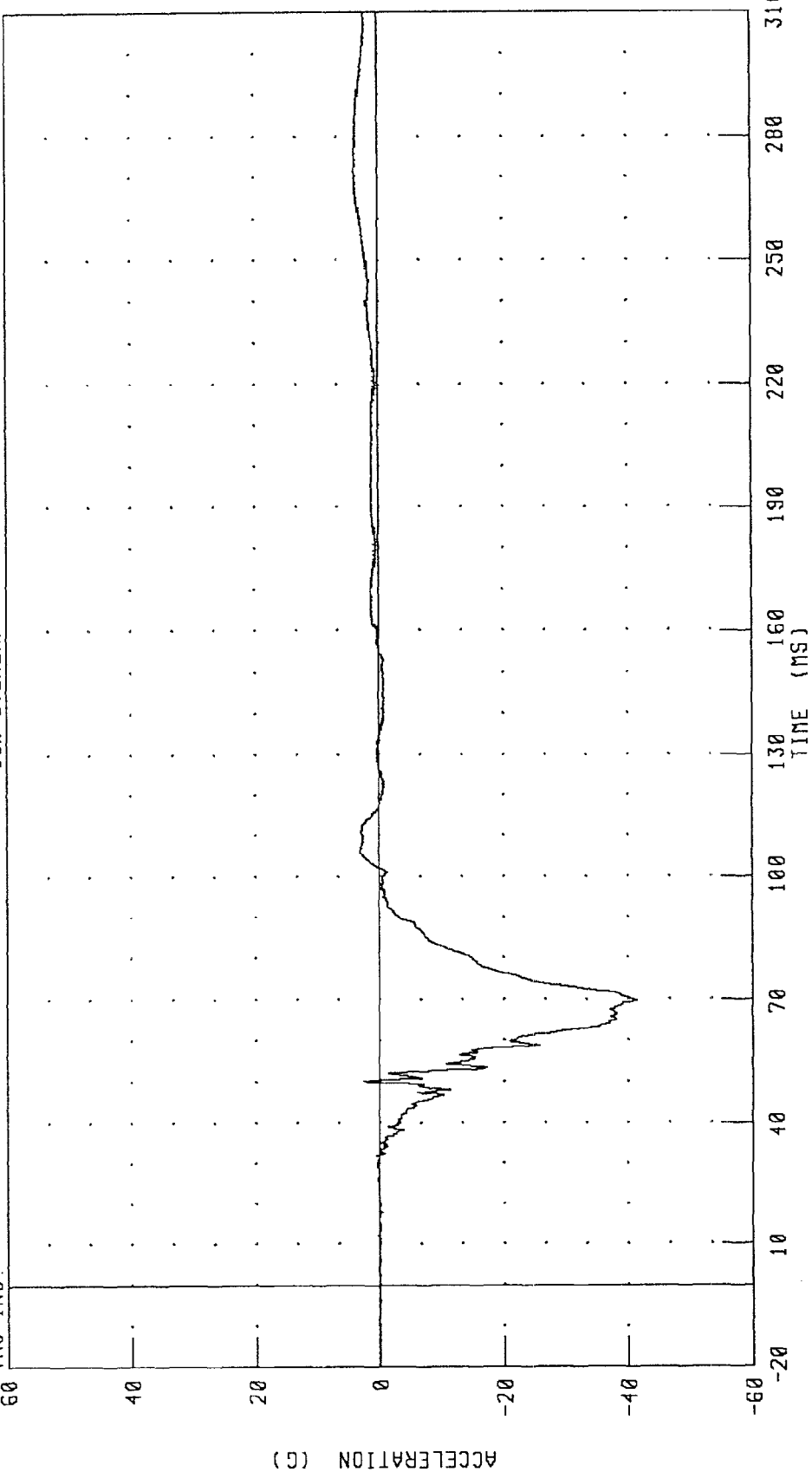
PEAK DATA: 4.45 G @ 130.56 MS; -86.55 G @ 52.24 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

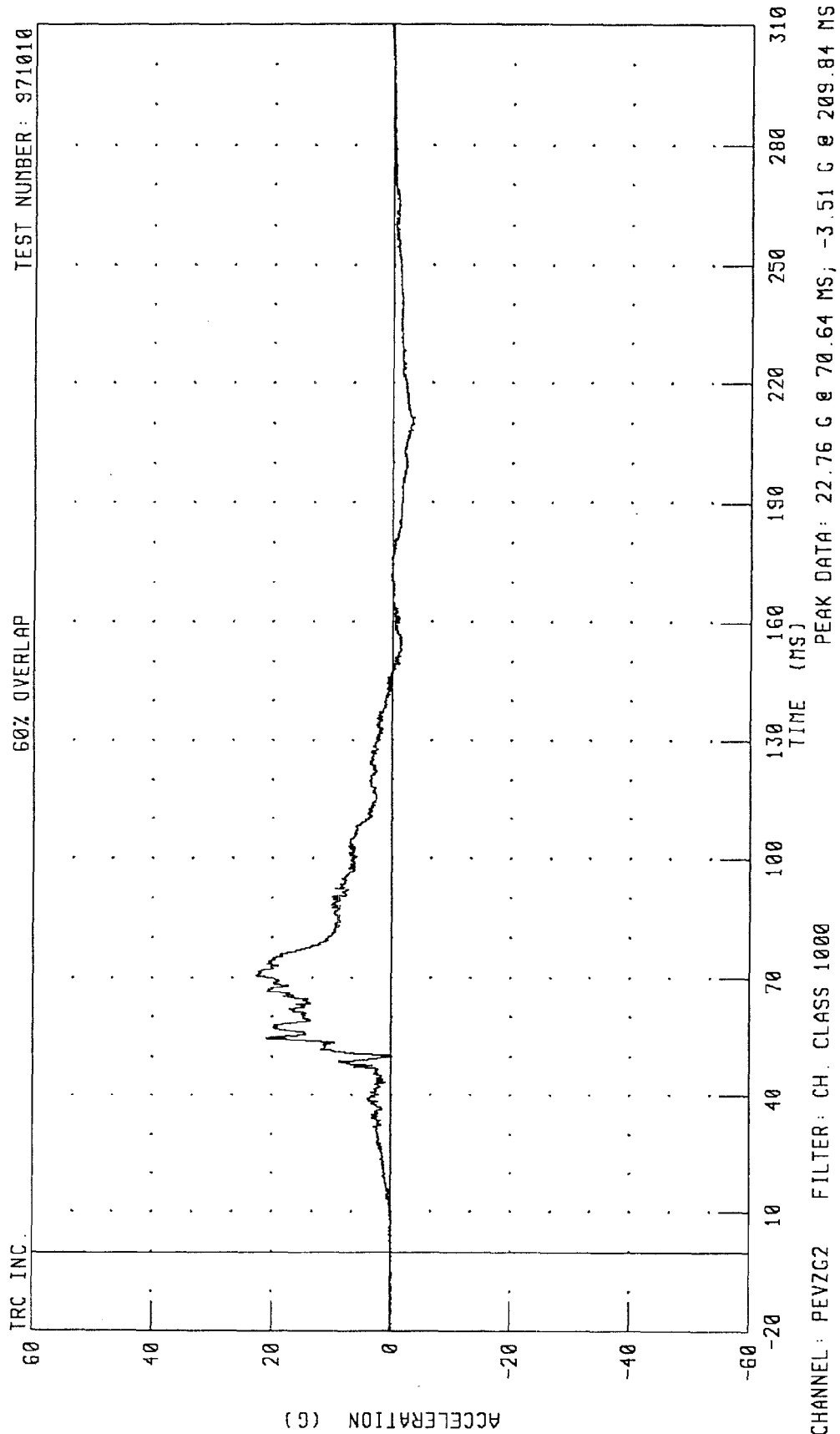
TRC INC.



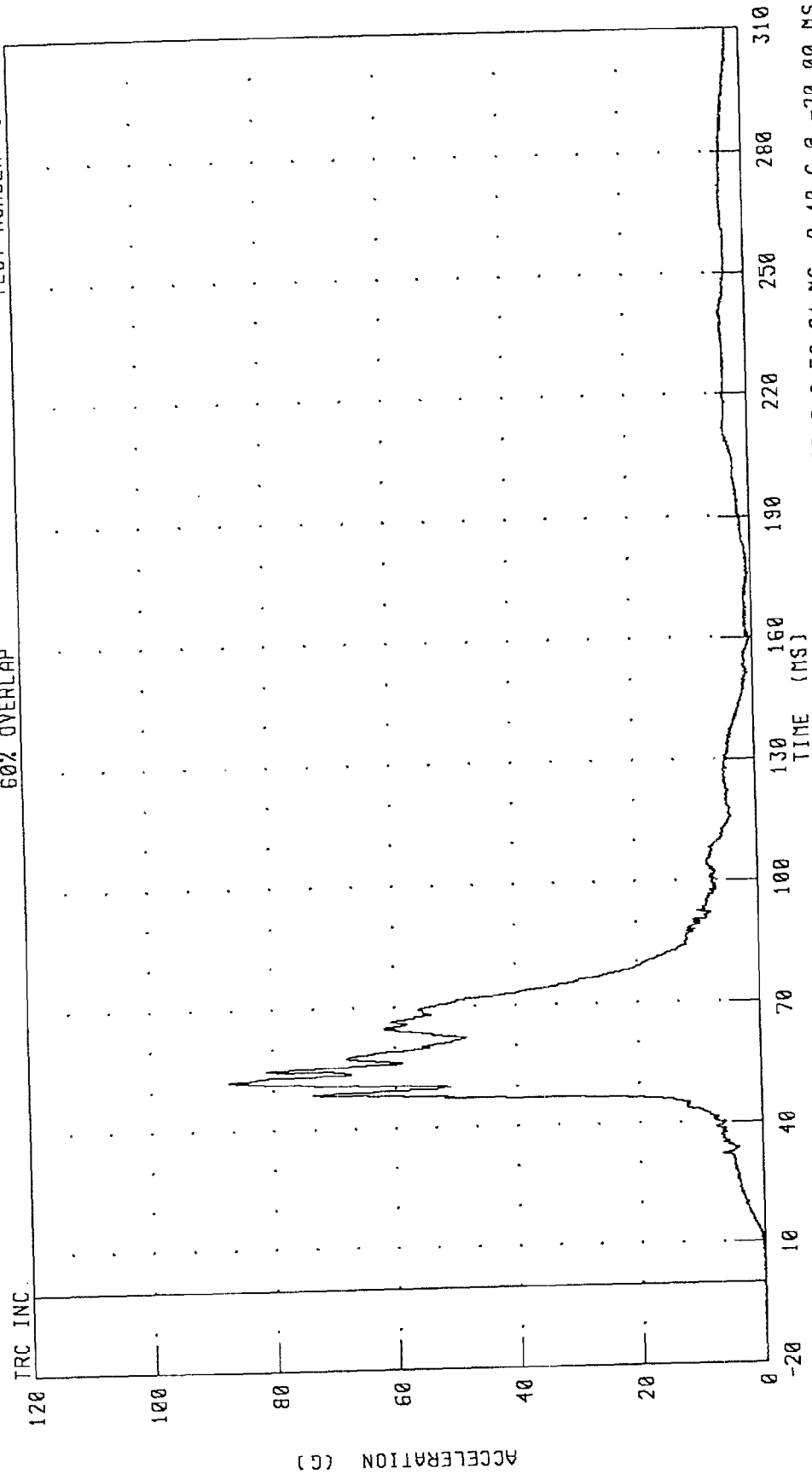
CHANNEL: PEVYG2 FILTER: CH. CLASS 1000

PEAK DATA: 3.93 G @ 271.60 MS; -41.47 G @ 69.84 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER PELVIS Z-AXIS ACCELERATION



70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER PELVIS RESULTANT ACCELERATION
60% OVERLAP
TEST NUMBER: 971010



CHANNEL: PEVRG2 FILTER: CH. CLASS 1000

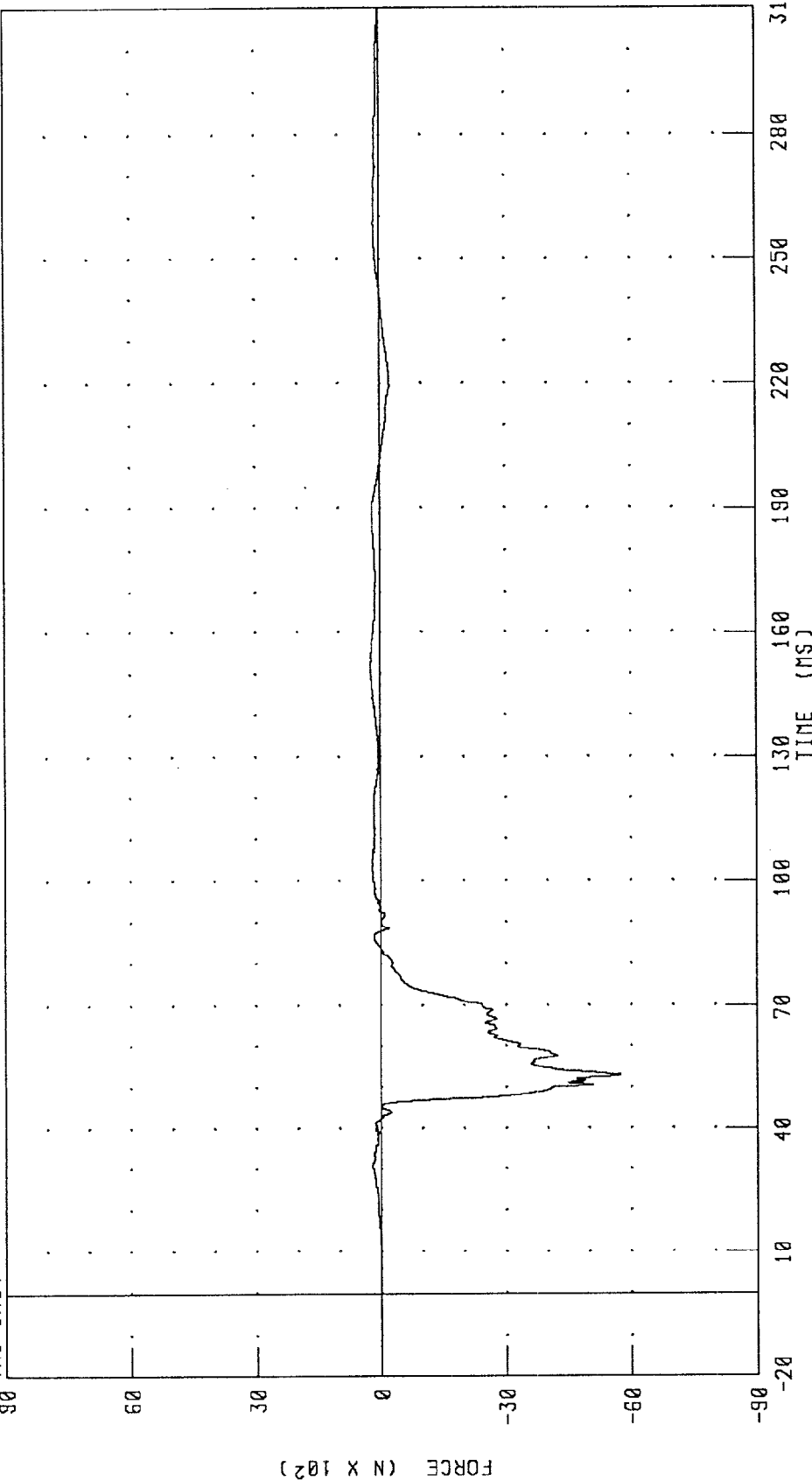
PEAK DATA: 87.33 G @ 52.24 MS; 0.10 G @ -20.00 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TEST NUMBER: 971010

60% OVERLAP

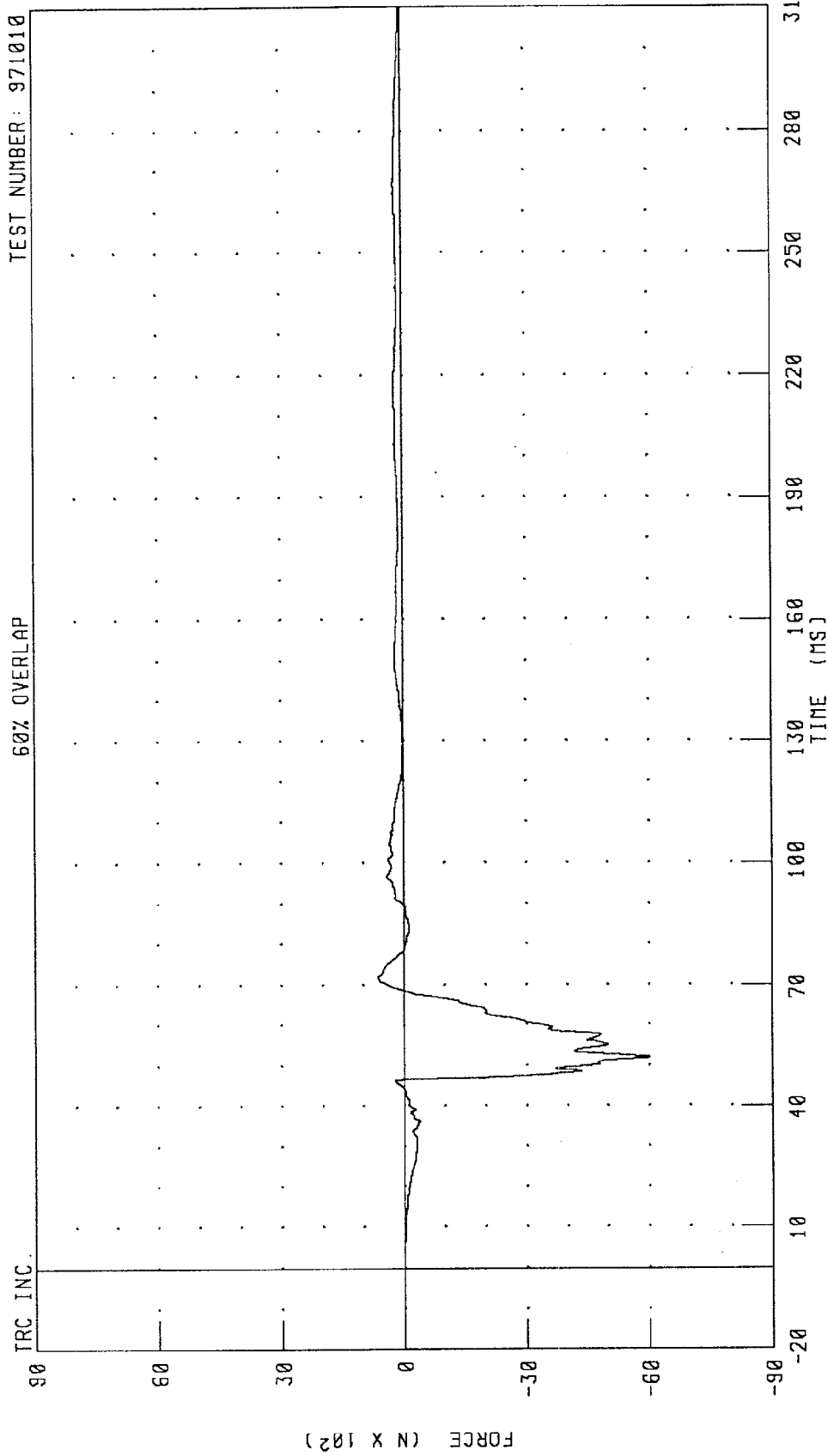
TRC INC.



CHANNEL: LFMF2 FILTER: CH. CLASS 600

PEAK DATA: 240.43 N @ 151.68 MS; -5740.99 N @ 52.96 MS

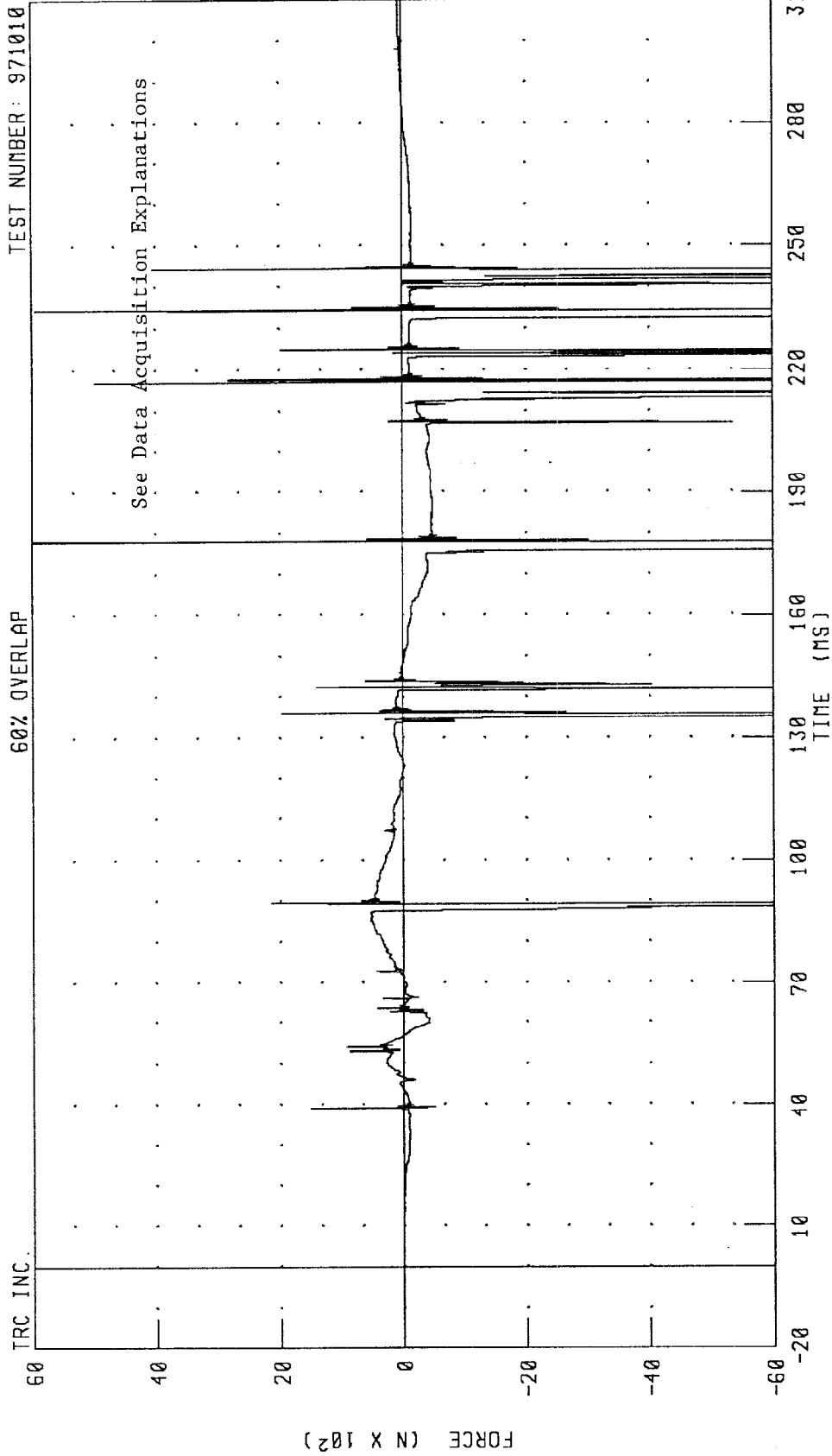
70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE



CHANNEL: RFMF2 FILTER: CH. CLASS 600

PEAK DATA: 627.60 N @ 72.16 MS; -6018.82 N @ 52.00 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LOWER NECK X-AXIS SHEAR FORCE



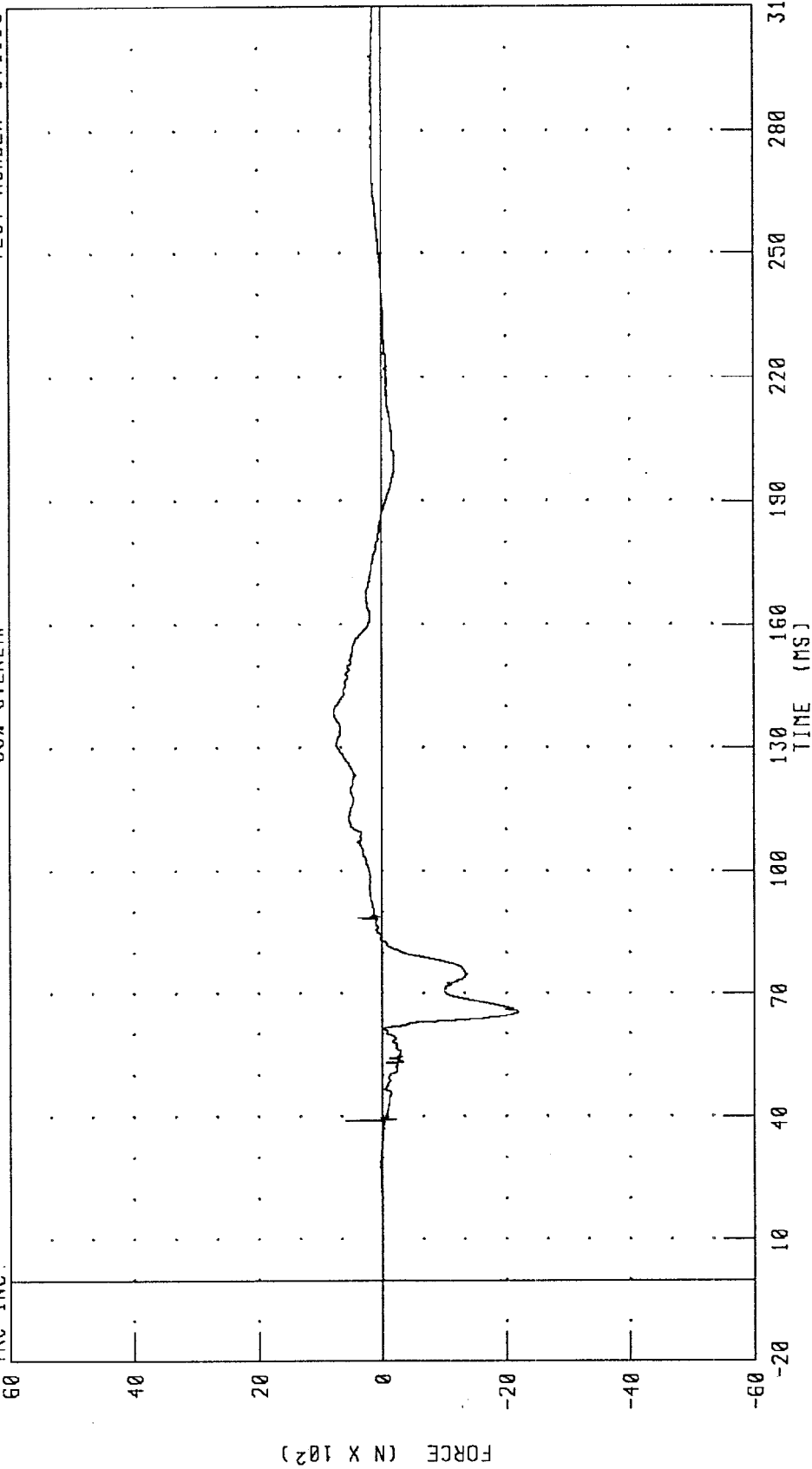
CHANNEL: NKLXF2 FILTER: CH. CLASS 1000 PEAK DATA: 6053.03 N @ 178.08 MS; -13358.48 N @ 135.36 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LOWER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 971010

60% OVERLAP

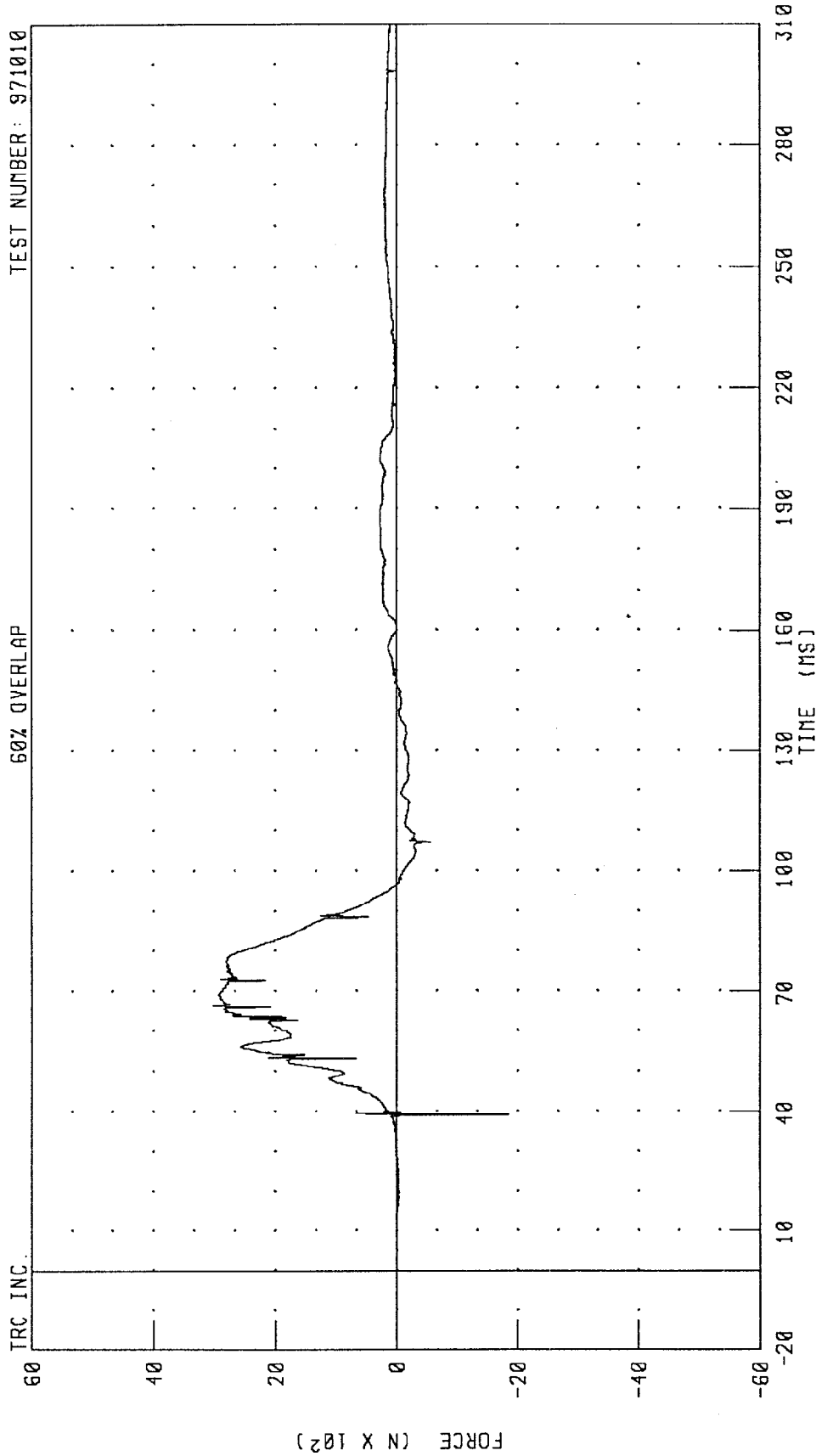
TRC INC.



PEAK DATA: 782.25 N @ 138.08 MS; -2196.86 N @ 65.44 MS

CHANNEL: NKLYF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LOWER NECK Z-AXIS AXIAL FORCE

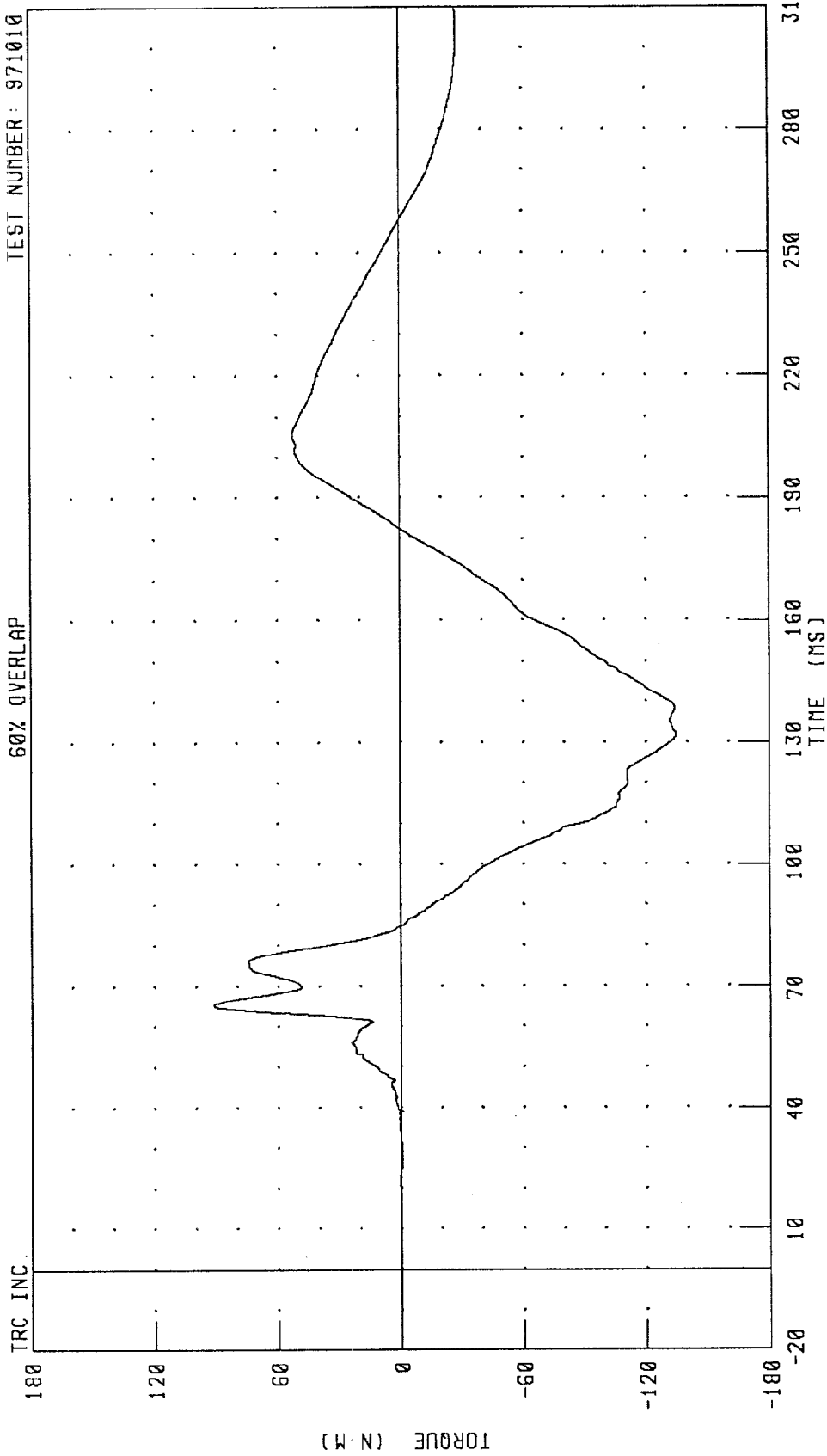


CHANNEL: NKLZF2 FILTER: CH. CLASS 1000 PEAK DATA: 3011.05 N @ 66.40 MS; -1845.66 N @ 39.12 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP



PEAK DATA: 91.54 N-M @ 65.52 MS; -134.57 N-M @ 132.08 MS

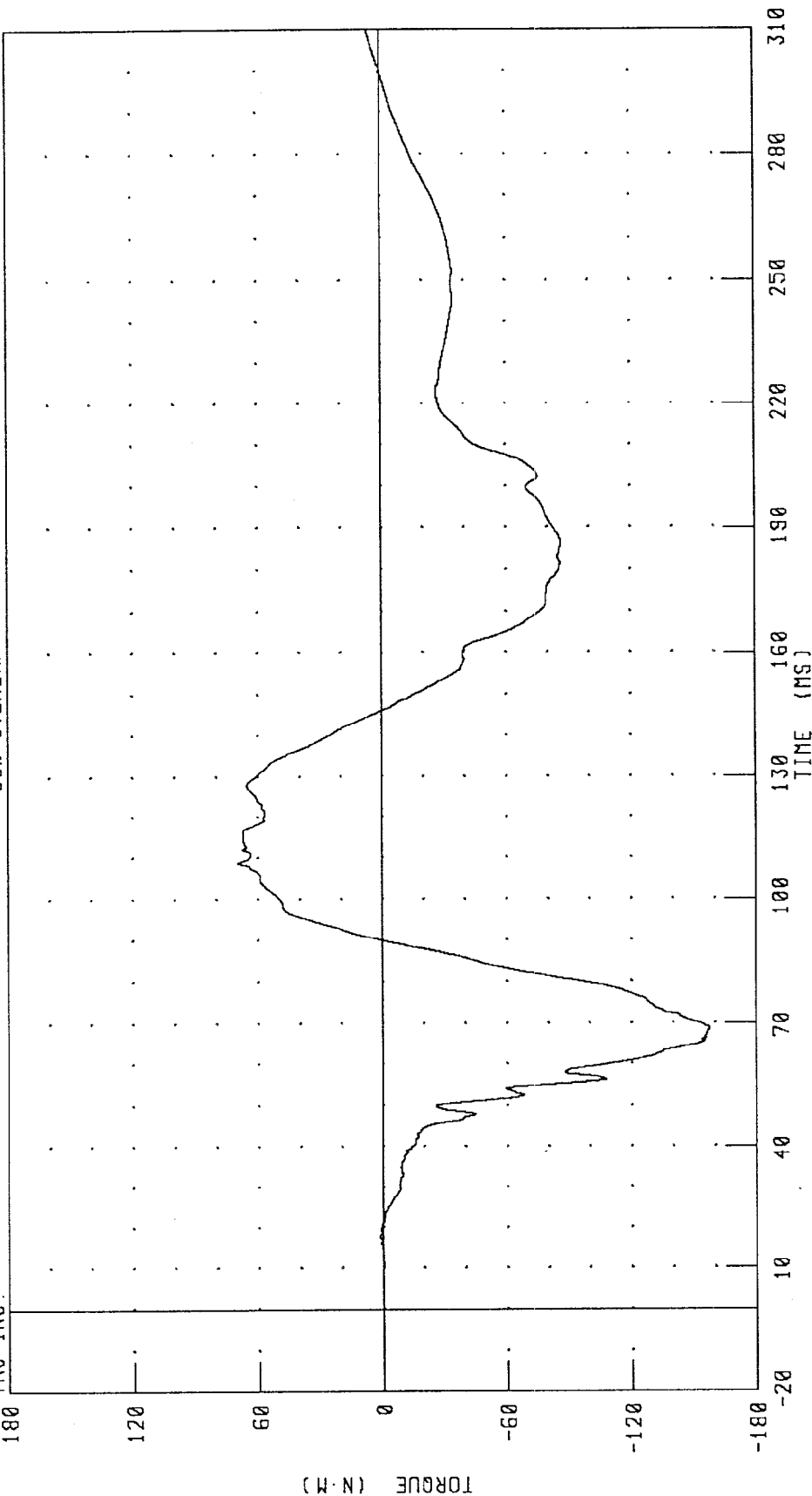
CHANNEL: NKLXM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

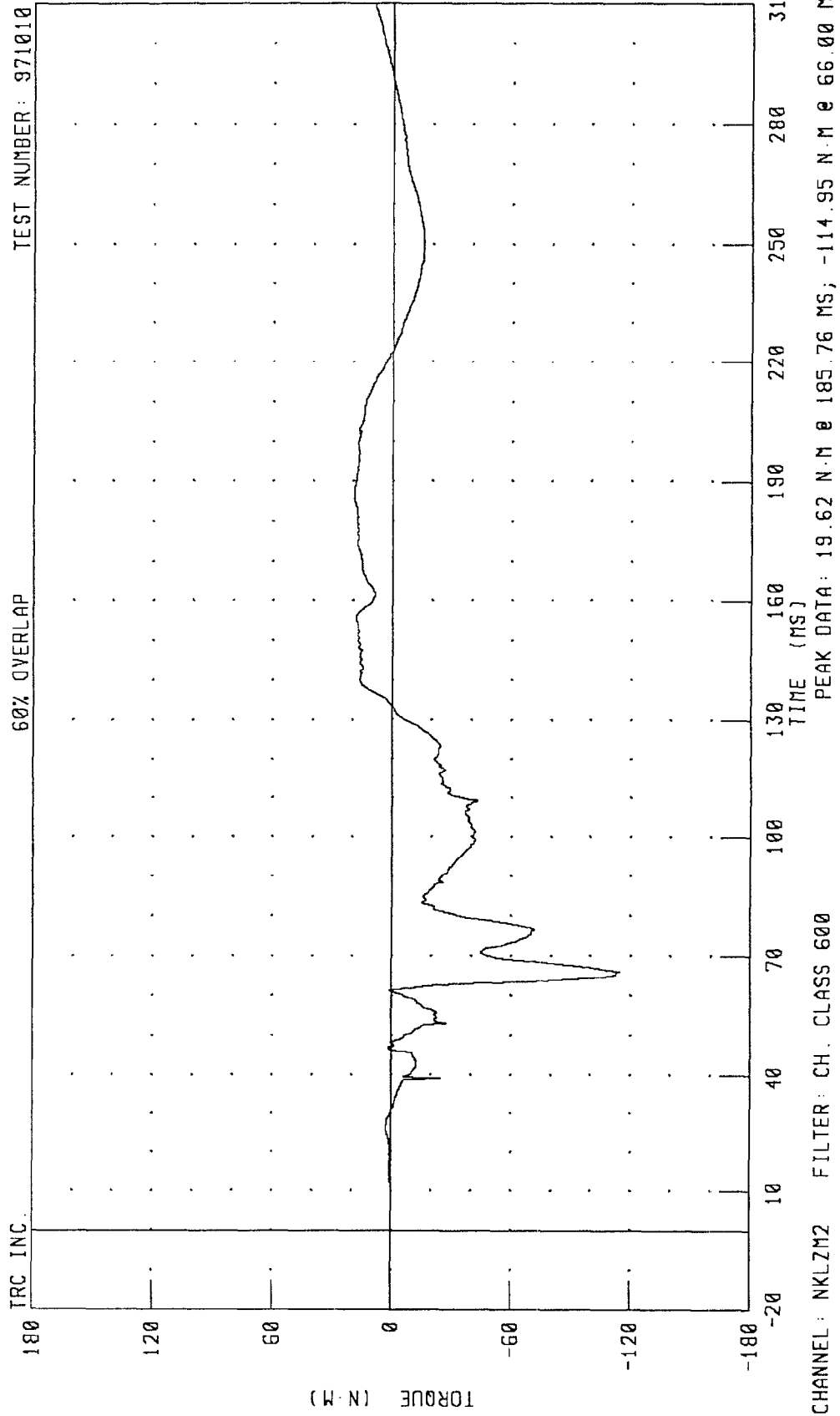
TRC INC.



PEAK DATA: 69.95 N-M @ 108.88 MS; -157.66 N-M @ 68.64 MS

CHANNEL: NKLYM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LOWER NECK MOMENT ABOUT Z-AXIS

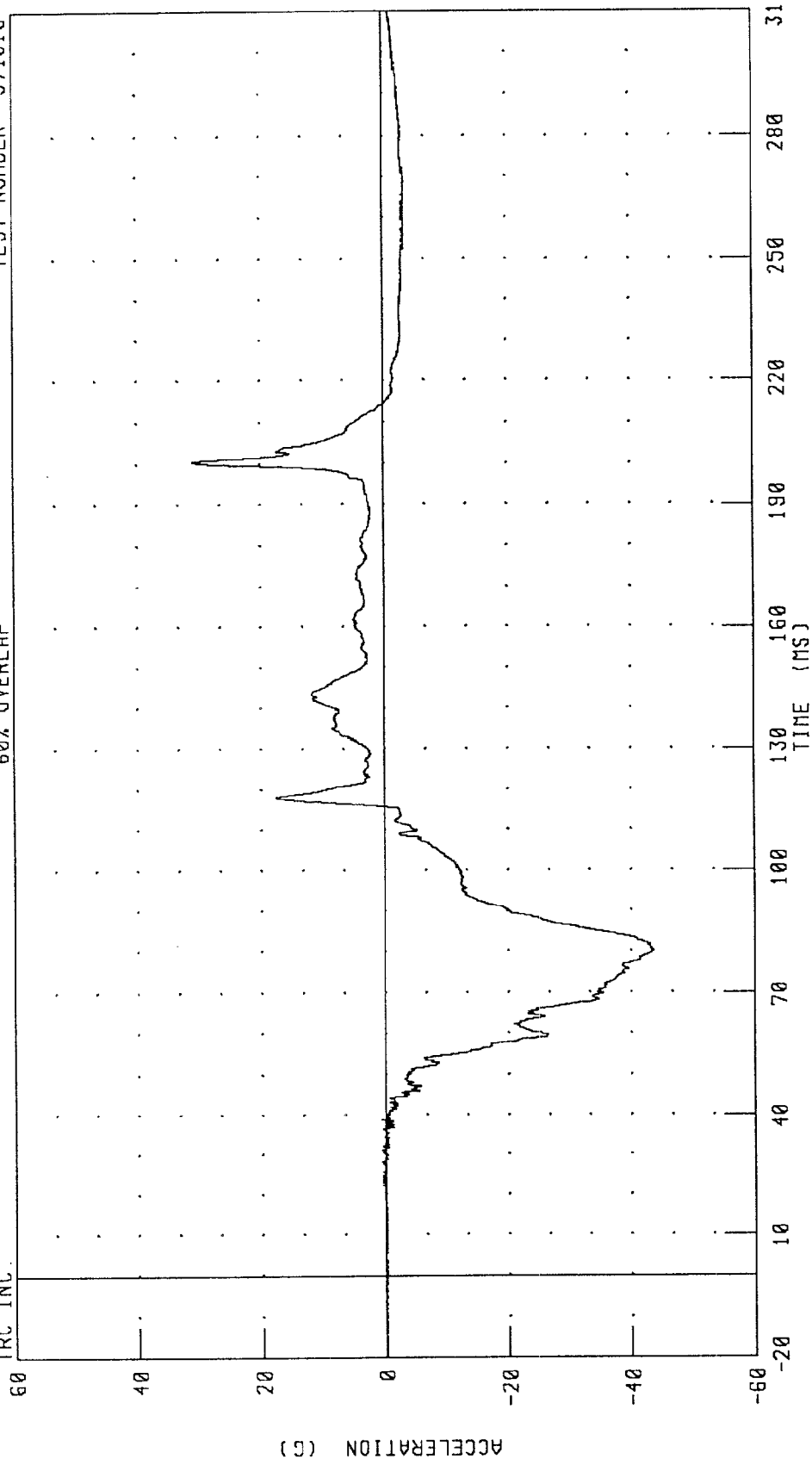


70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 1 X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 30.98 G @ 200.56 MS; -43.72 G @ 80.24 MS

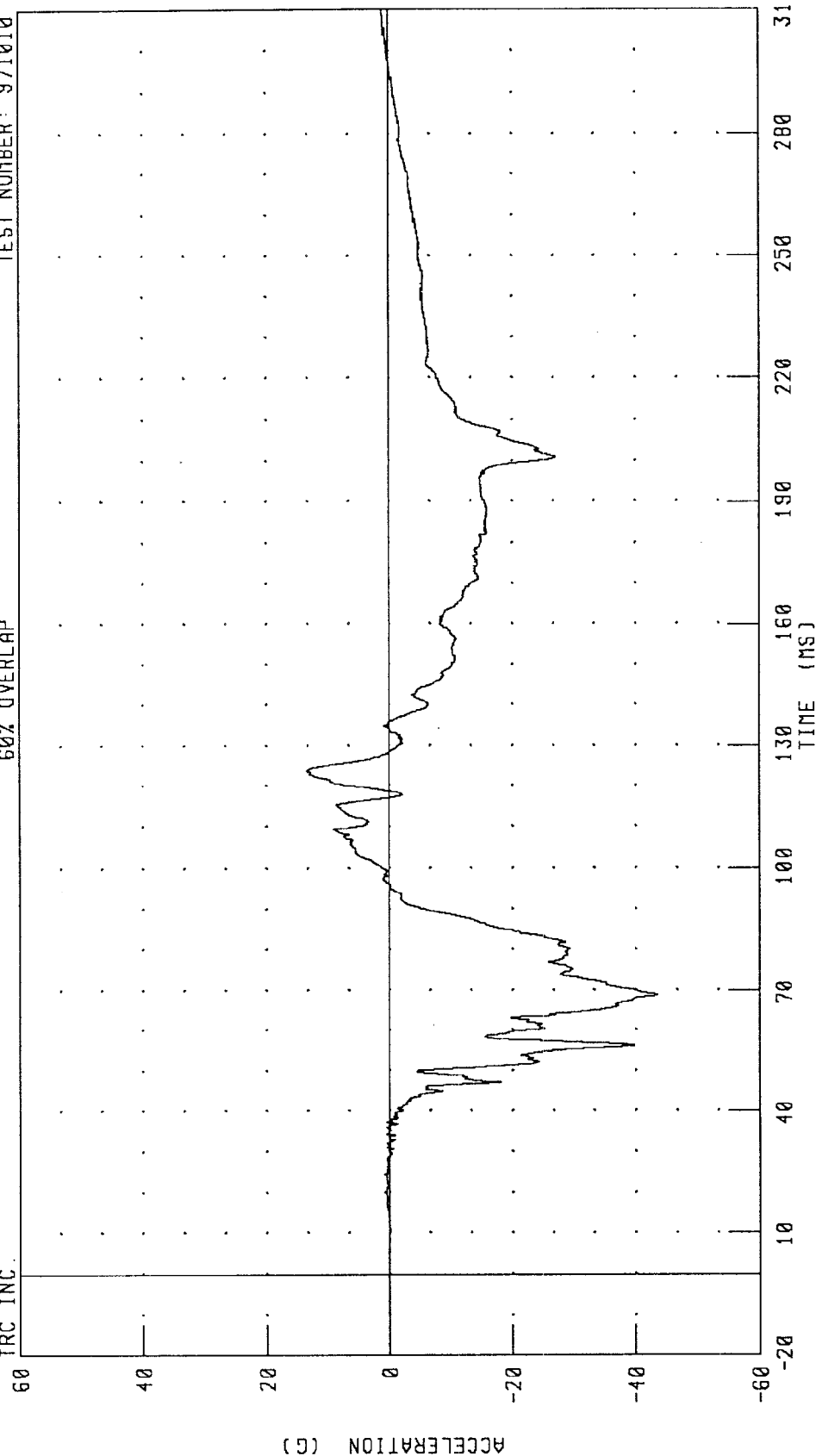
CHANNEL: HD1XG2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 1 Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



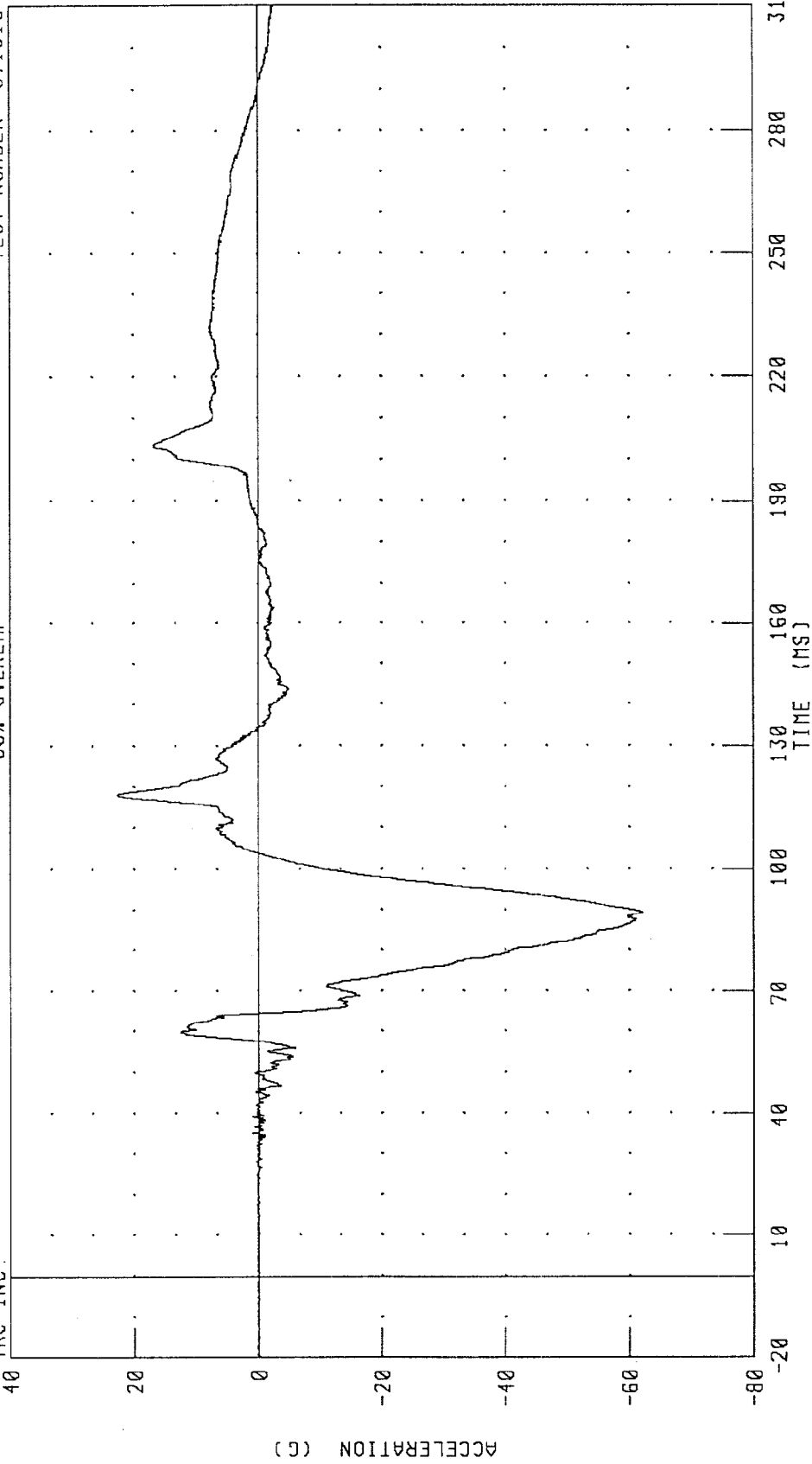
PEAK DATA: 13.52 G @ 123.76 MS; -43.51 G @ 68.80 MS

CHANNEL: HD12G2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 2 Y-AXIS ACCELERATION
60% OVERLAP

TEST NUMBER: 971010

TRC INC.



CHANNEL: HD2YG2 FILTER: CH. CLASS 1000

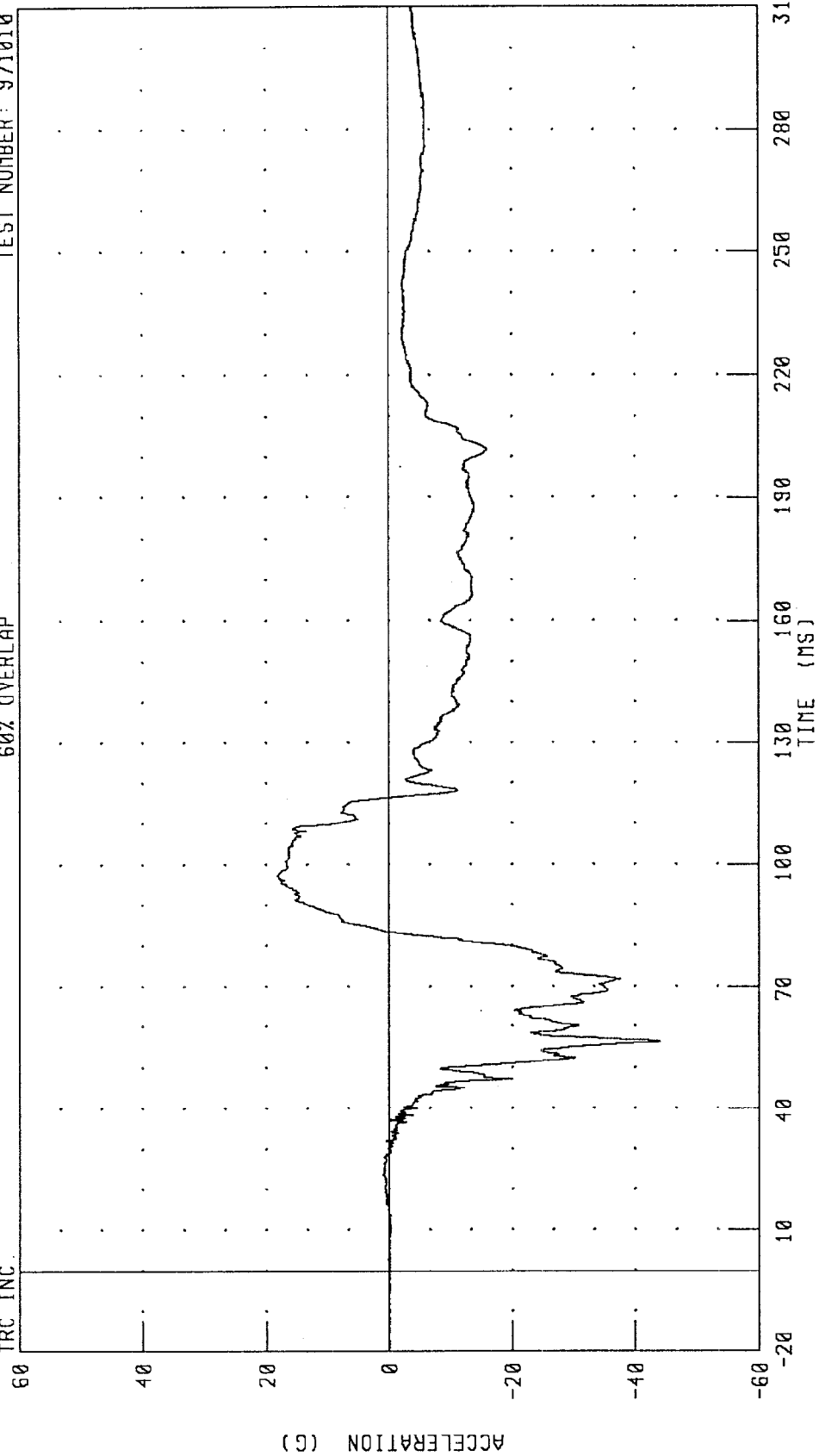
PEAK DATA: 22.73 G @ 118.00 MS, -62.12 G @ 89.36 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 2 Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



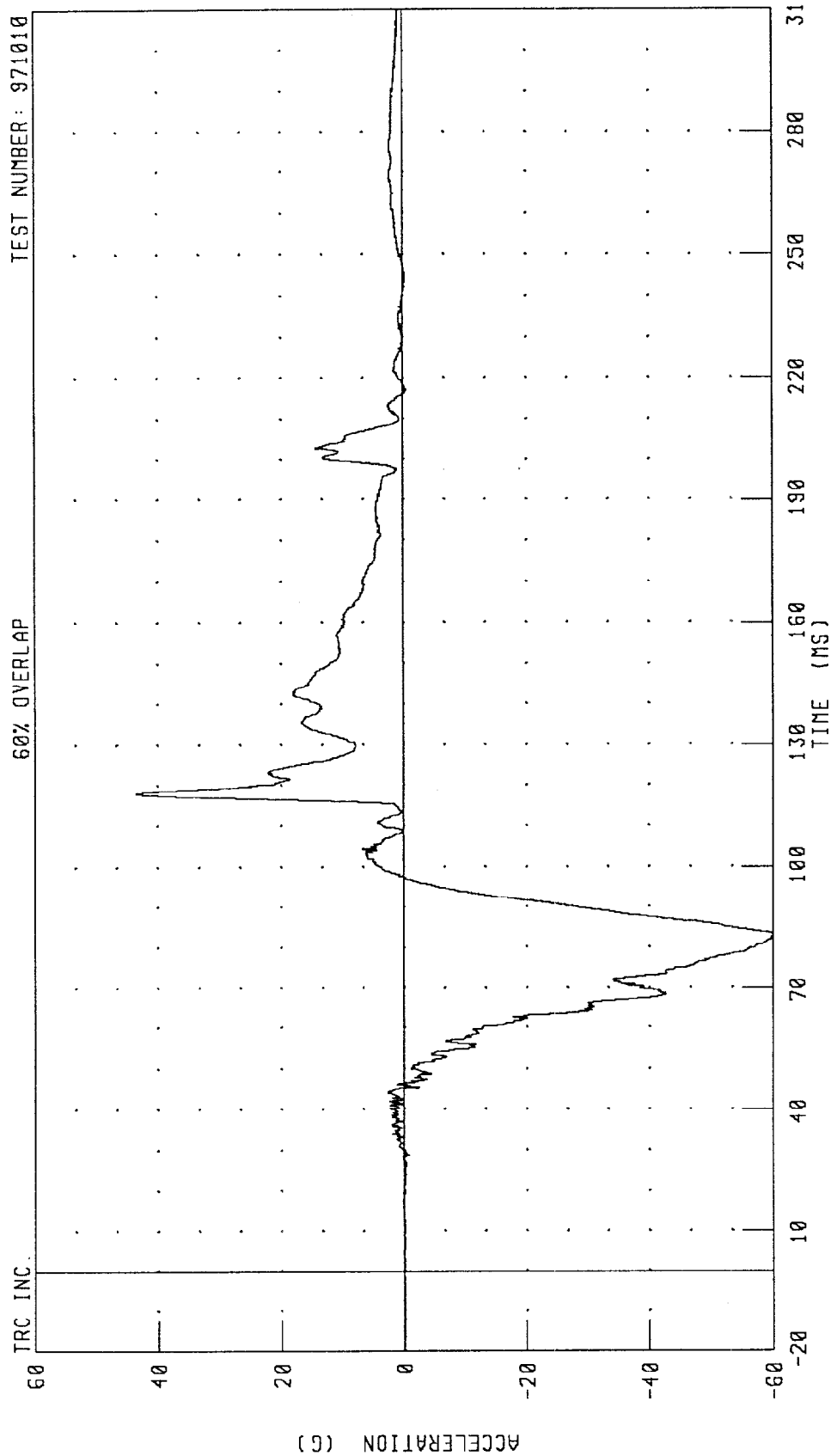
CHANNEL: HD2ZG2 FILTER: CH. CLASS 1000

PEAK DATA: 18.35 G @ 97.44 MS; -44.07 G @ 56.24 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 3 X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

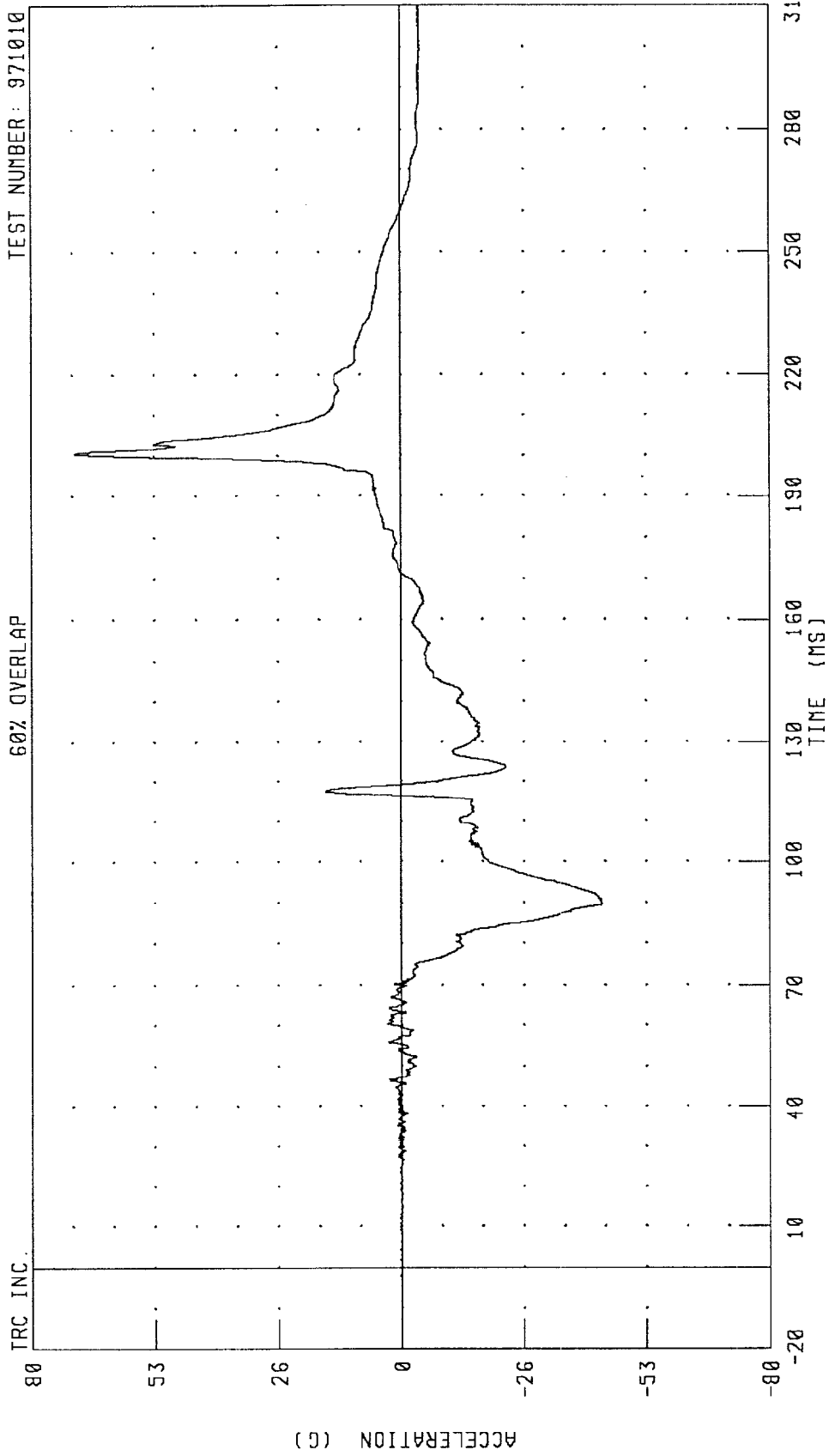


CHANNEL: HD3XG2 FILTER: CH. CLASS 1000

PEAK DATA: 43.48 G @ 118.00 MS; -60.62 G @ 82.56 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER HEAD POSITION 3 Y-AXIS ACCELERATION

60% OVERLAP TEST NUMBER: 971010



CHANNEL: HD3YG2 FILTER: CH. CLASS 1000

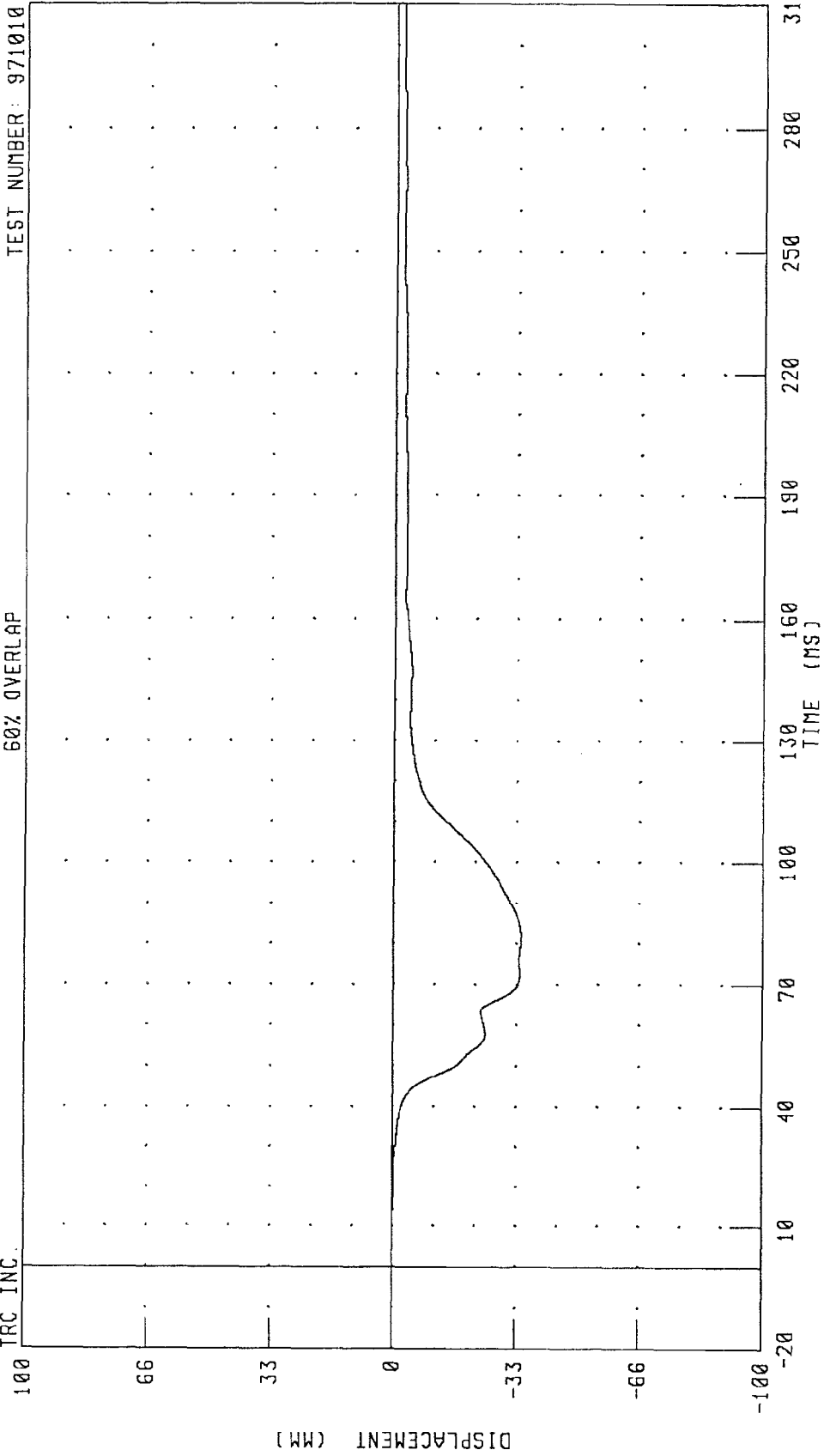
PEAK DATA: 70.41 G @ 200.64 MS; -43.86 G @ 89.92 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: LURSD2 FILTER: CH. CLASS 180

PEAK DATA: 0.01 MM @ -13.36 MS; -34.71 MM @ 81.12 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

100

66

33

0

-33

-66

-100

DISPLACEMENT (MM)

See DATA ACQUISITION EXPLANATIONS

TIME (MS) 10 40 70 100 130 160 190 220 250 280 310

PEAK DATA: 0.02 MM @ 44.48 MS; 0.00 MM @ 98.00 MS

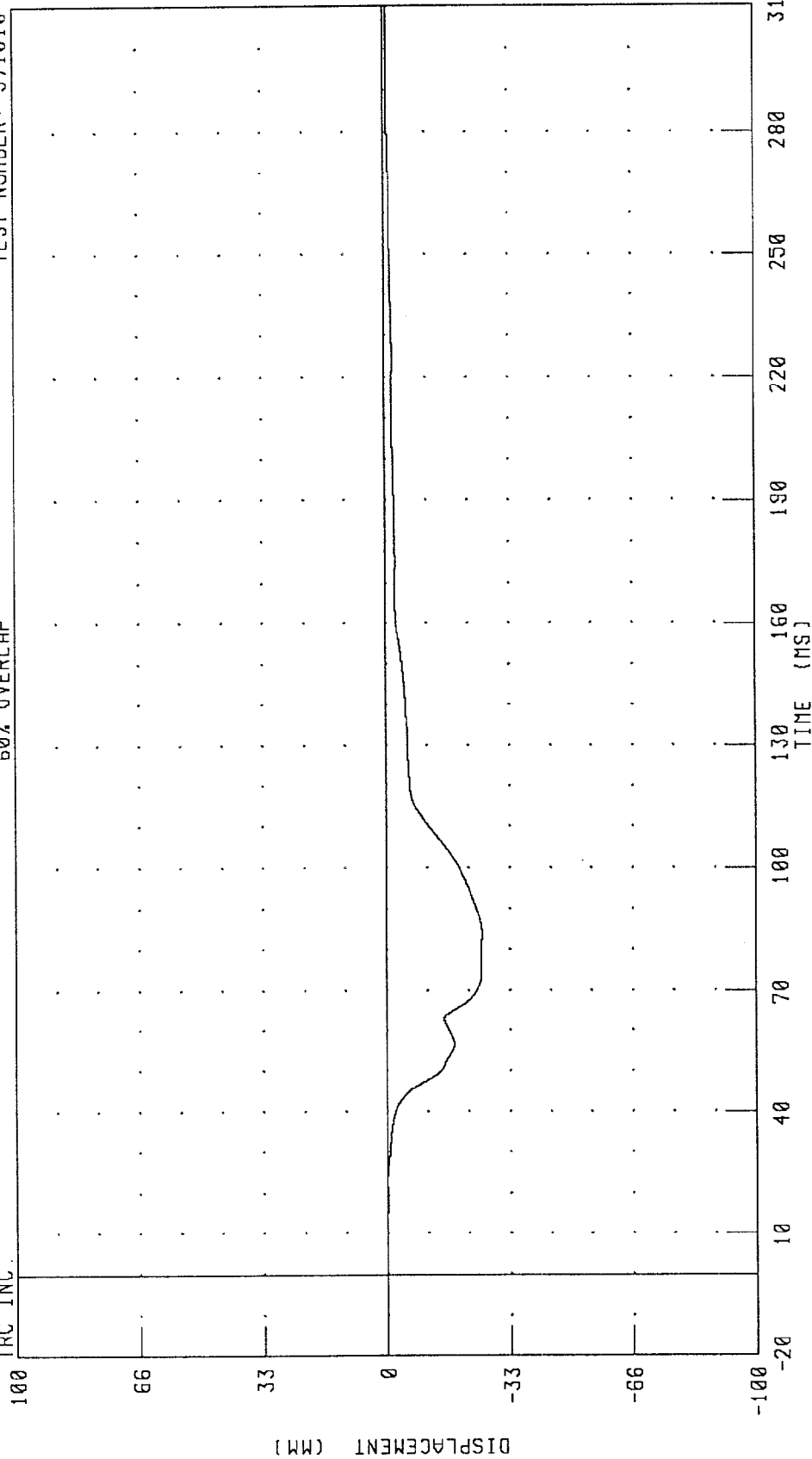
CHANNEL: LLRS02 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT UPPER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



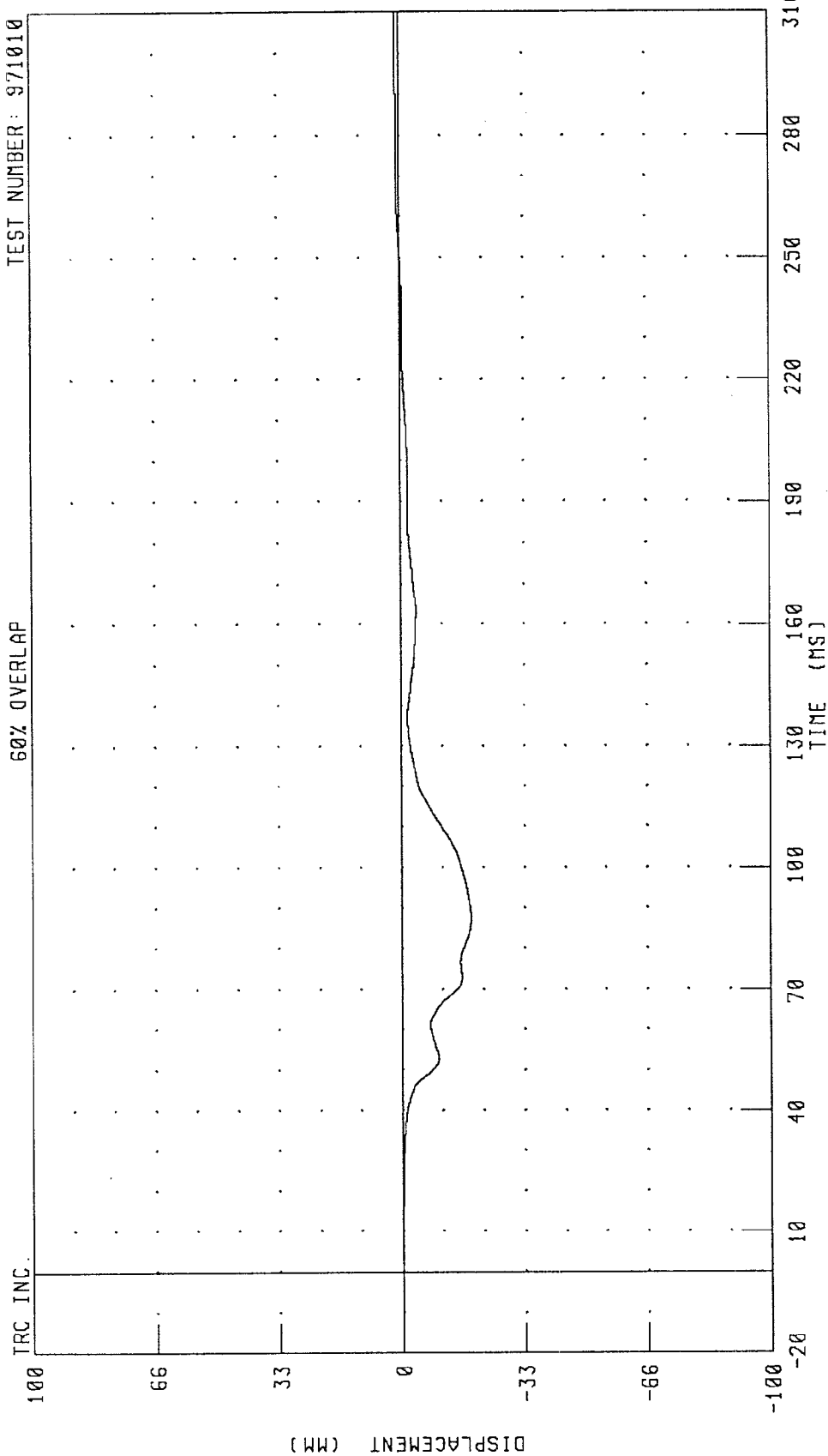
CHANNEL: RURSD2 FILTER: CH. CLASS 180

PEAK DATA: 0.01 MM @ -19.12 MS; -25.88 MM @ 83.60 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT LOWER RIB STRAIGHT DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP



PEAK DATA: 1.14 MM @ 305.76 MS; -18.89 MM @ 87.44 MS

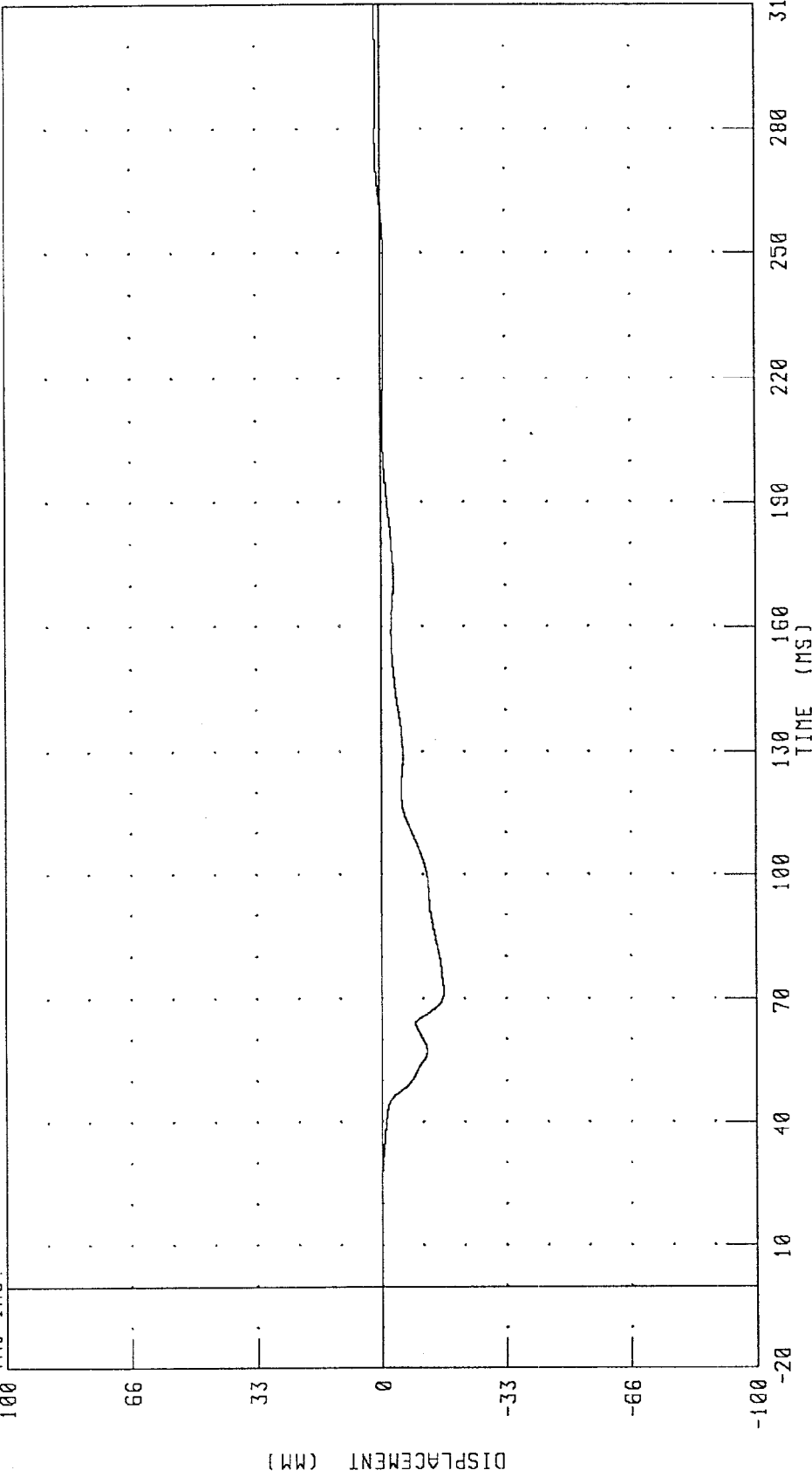
CHANNEL: RLRSD2 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LEFT UPPER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1.41 MM @ 309.52 MS; -16.60 MM @ 71.84 MS

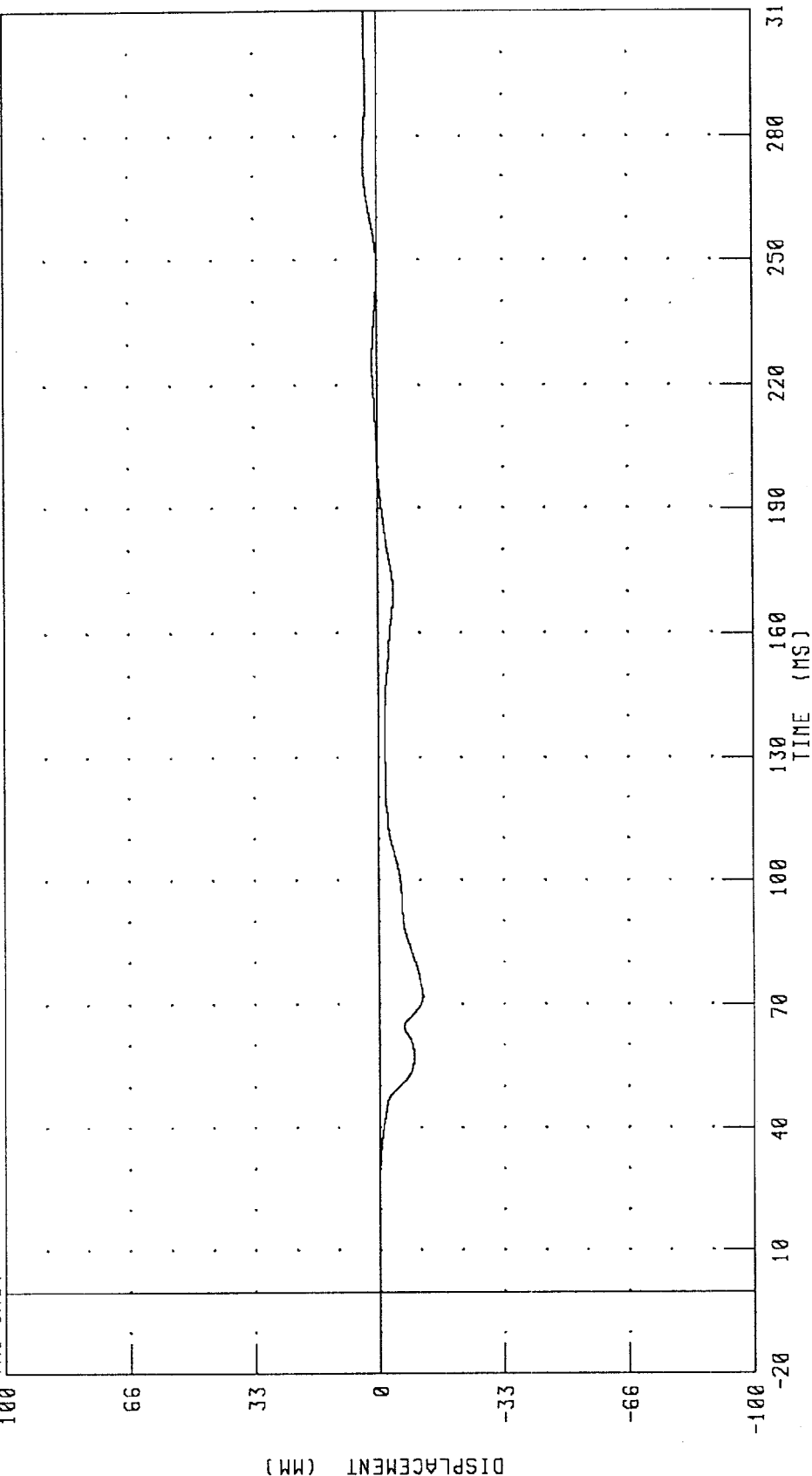
CHANNEL: LURCD2 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT LOWER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 3.72 MM @ 274.64 MS; -11.72 MM @ 72.00 MS

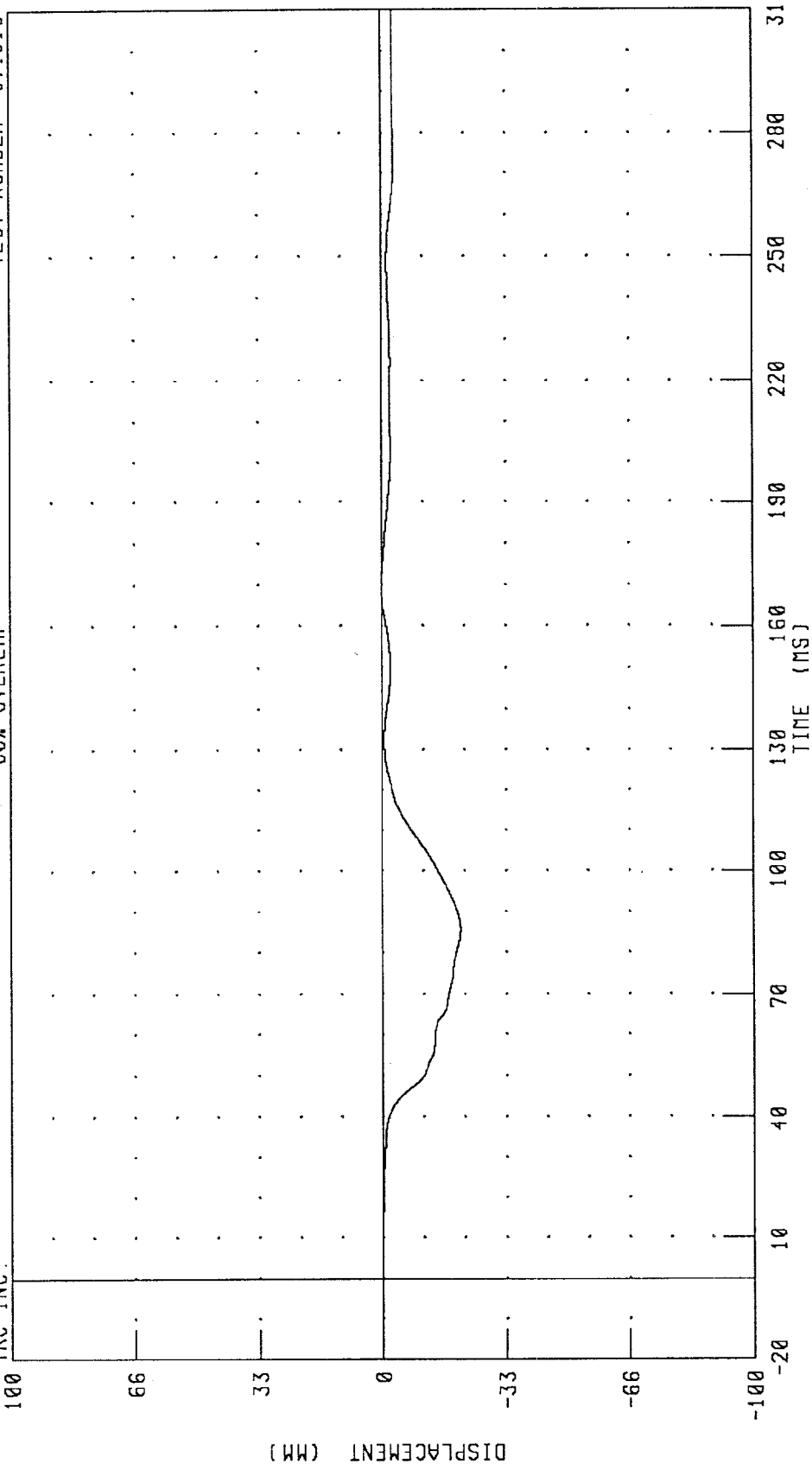
CHANNEL: LLRCD2 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT UPPER RIB CROSSOVER DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

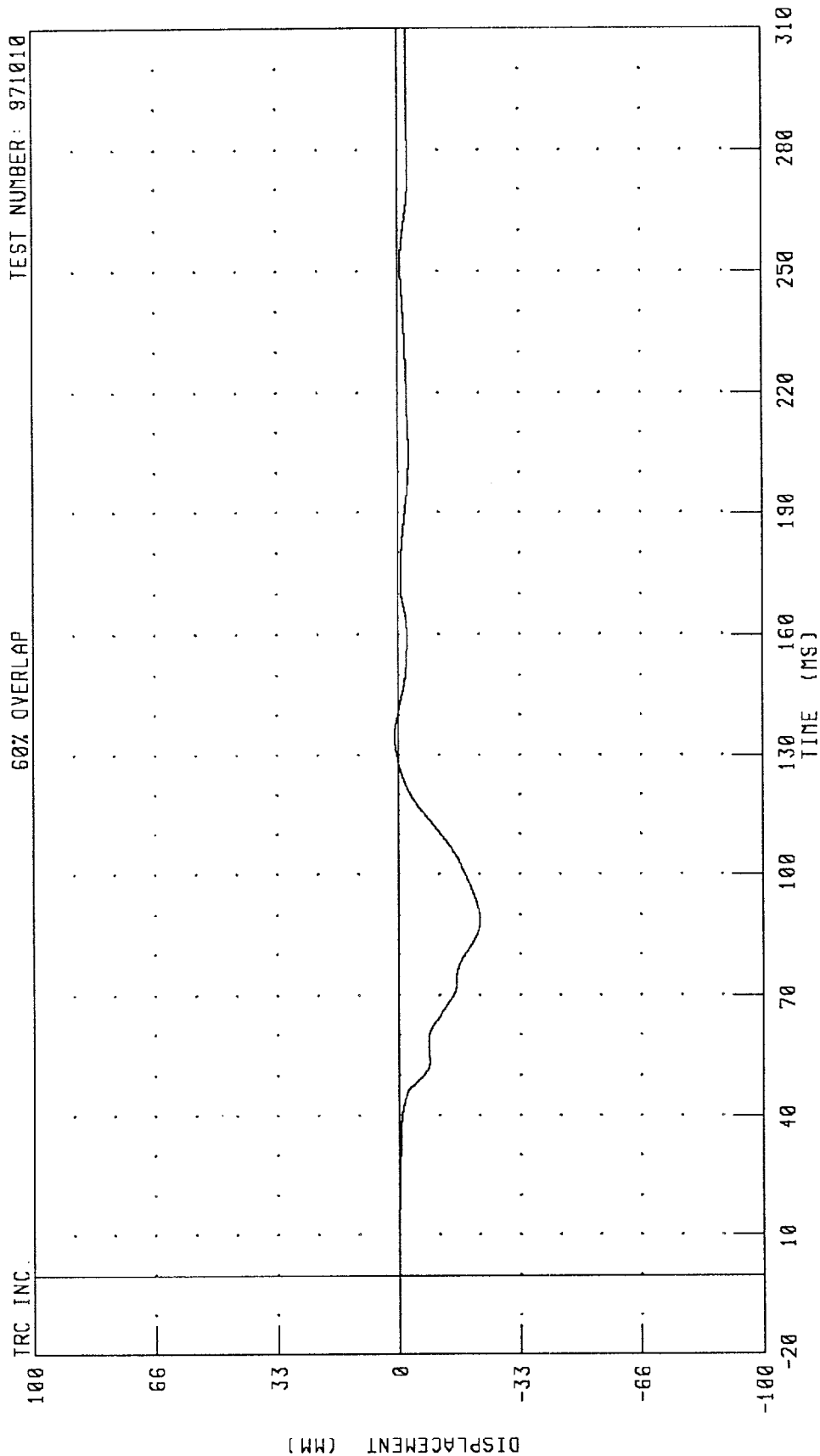
TRC INC.



CHANNEL: RUCRD2 FILTER: CH. CLASS 180

PEAK DATA: 0.01 MM @ -8.00 MS; -21.03 MM @ 85.52 MS

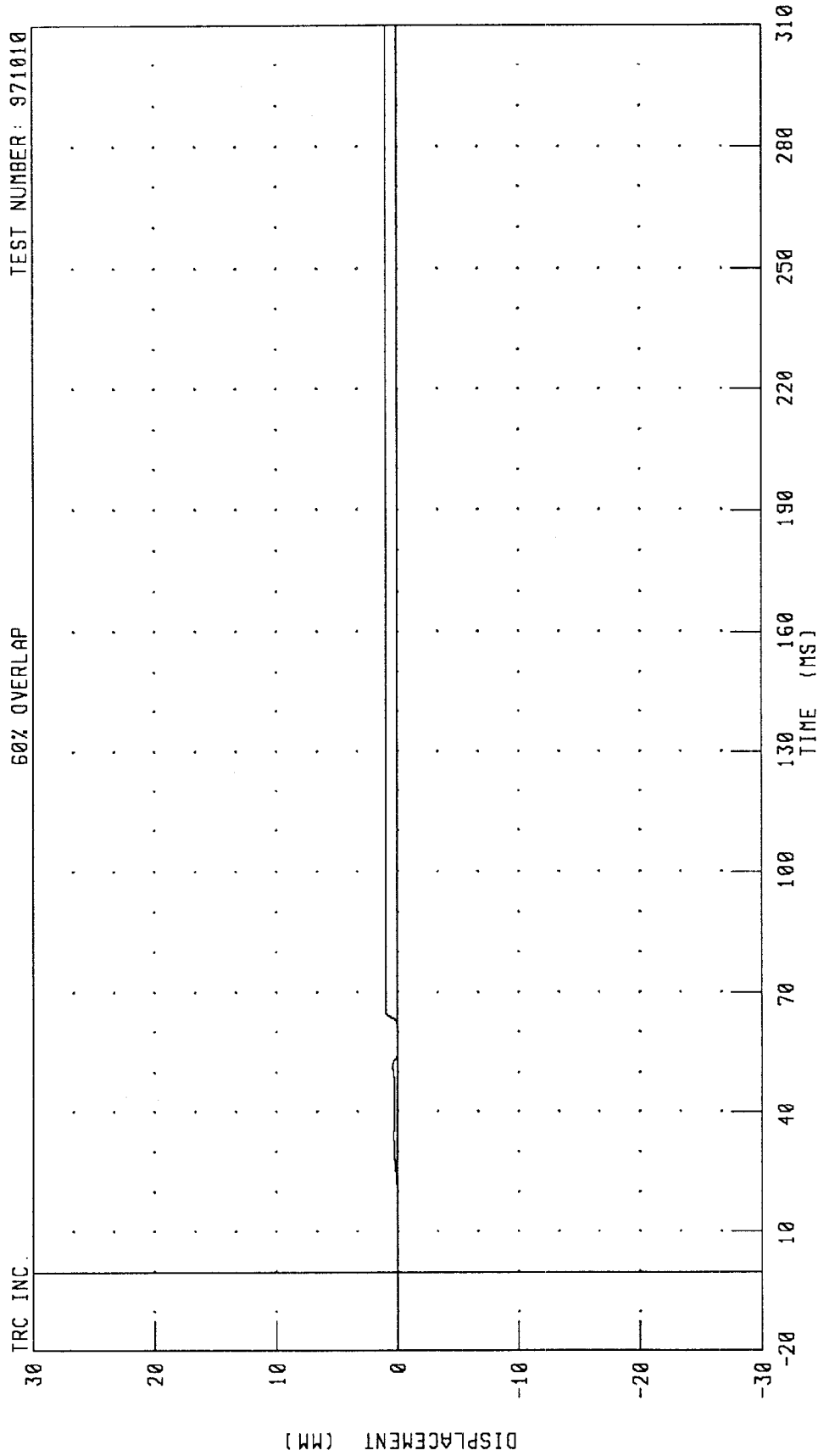
70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT LOWER RIB CROSSOVER DISPLACEMENT



PEAK DATA: 1.15 MM @ 134.80 MS; -22.36 MM @ 88.56 MS

CHANNEL: RLRC02 FILTER: CH. CLASS 180

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LEFT KNEE DISPLACEMENT



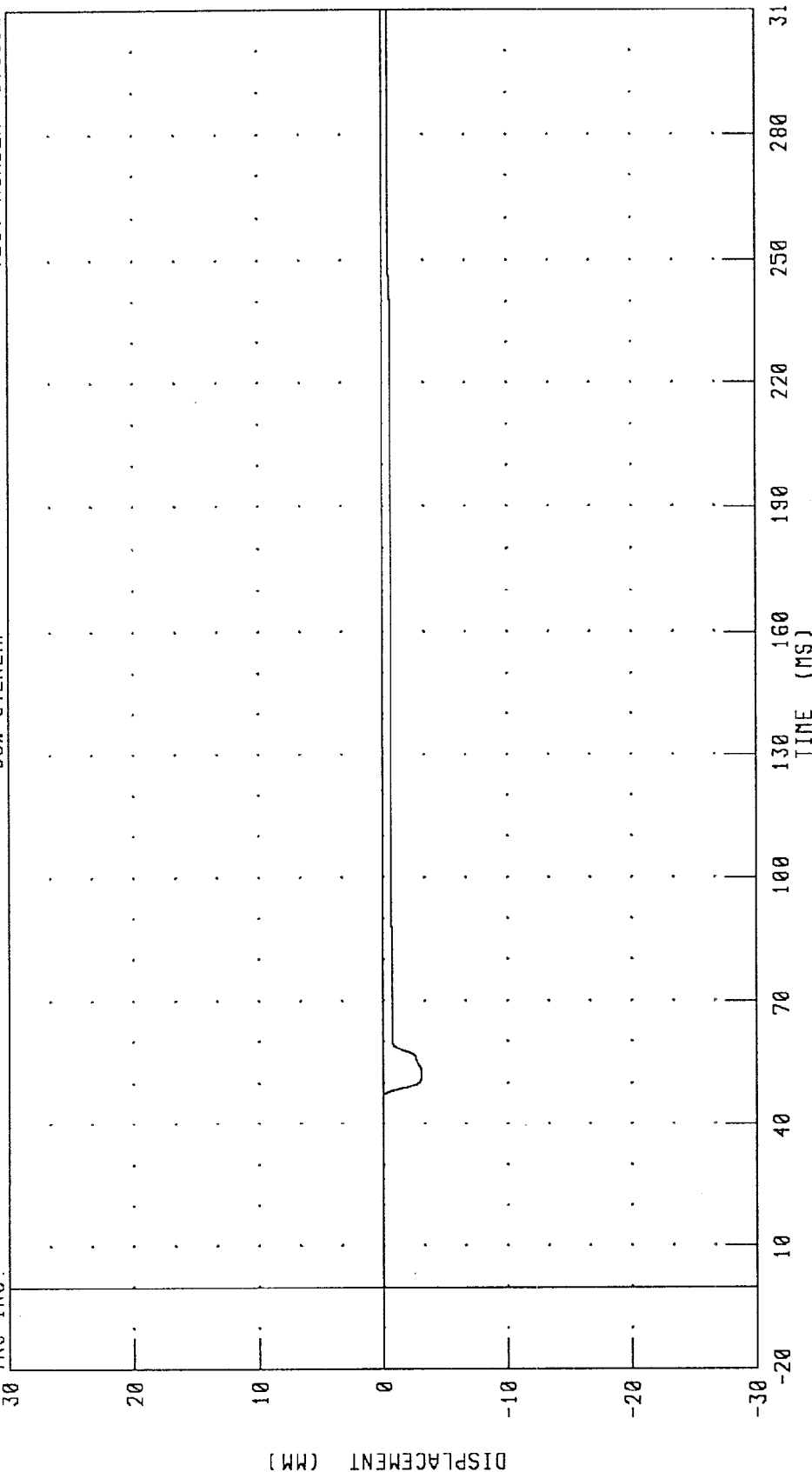
CHANNEL: KNLXD2 FILTER: CH. CLASS 180 PEAK DATA: 0.94 MM @ 65.04 MS, 0.00 MM @ 16.88 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER RIGHT KNEE DISPLACEMENT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: KNRX02 FILTER: CH. CLASS 180

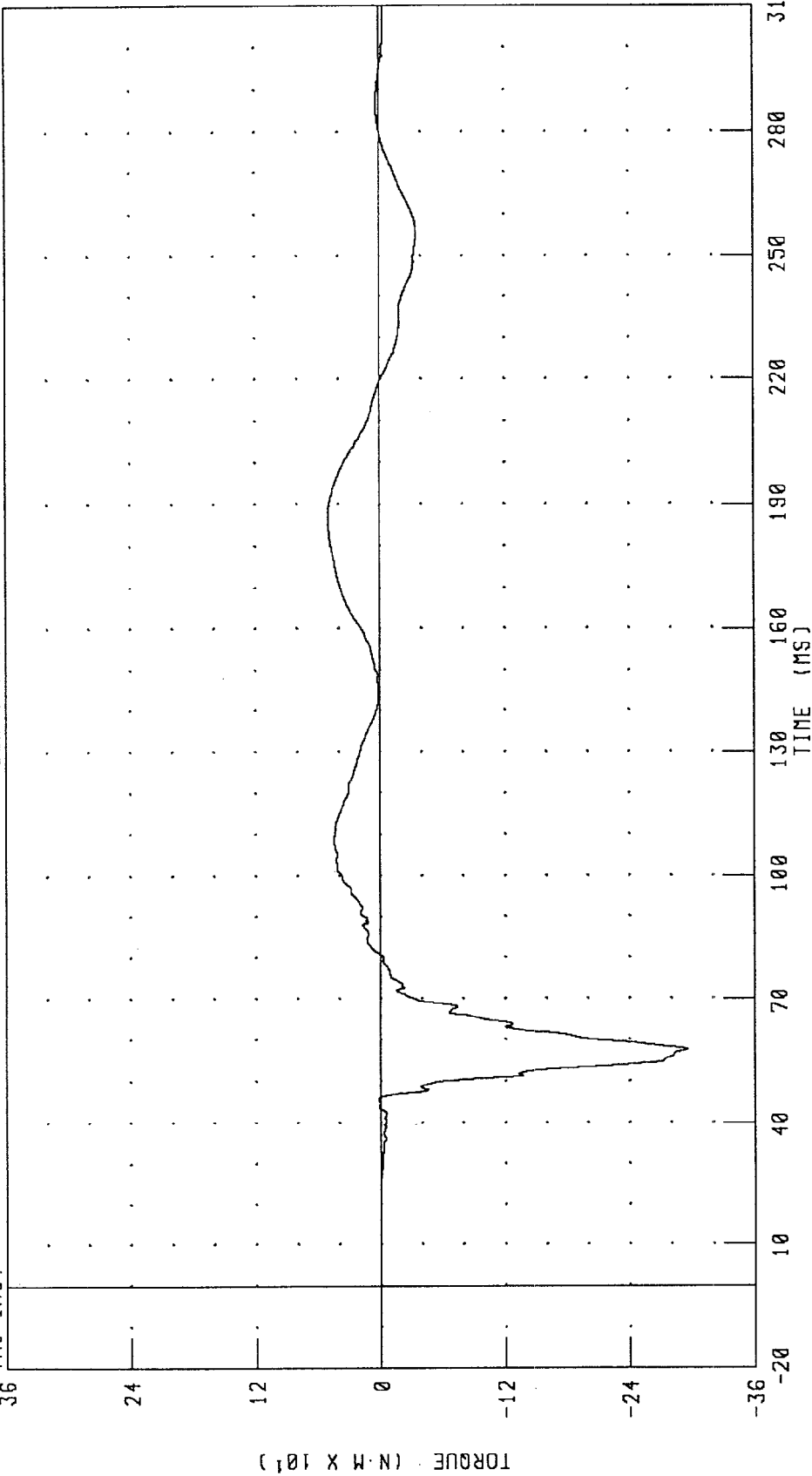
PEAK DATA: 0.03 MM @ 46.64 MS; -3.03 MM @ 51.04 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 50.18 N·m @ 186.16 MS; -295.23 N·m @ 57.68 MS

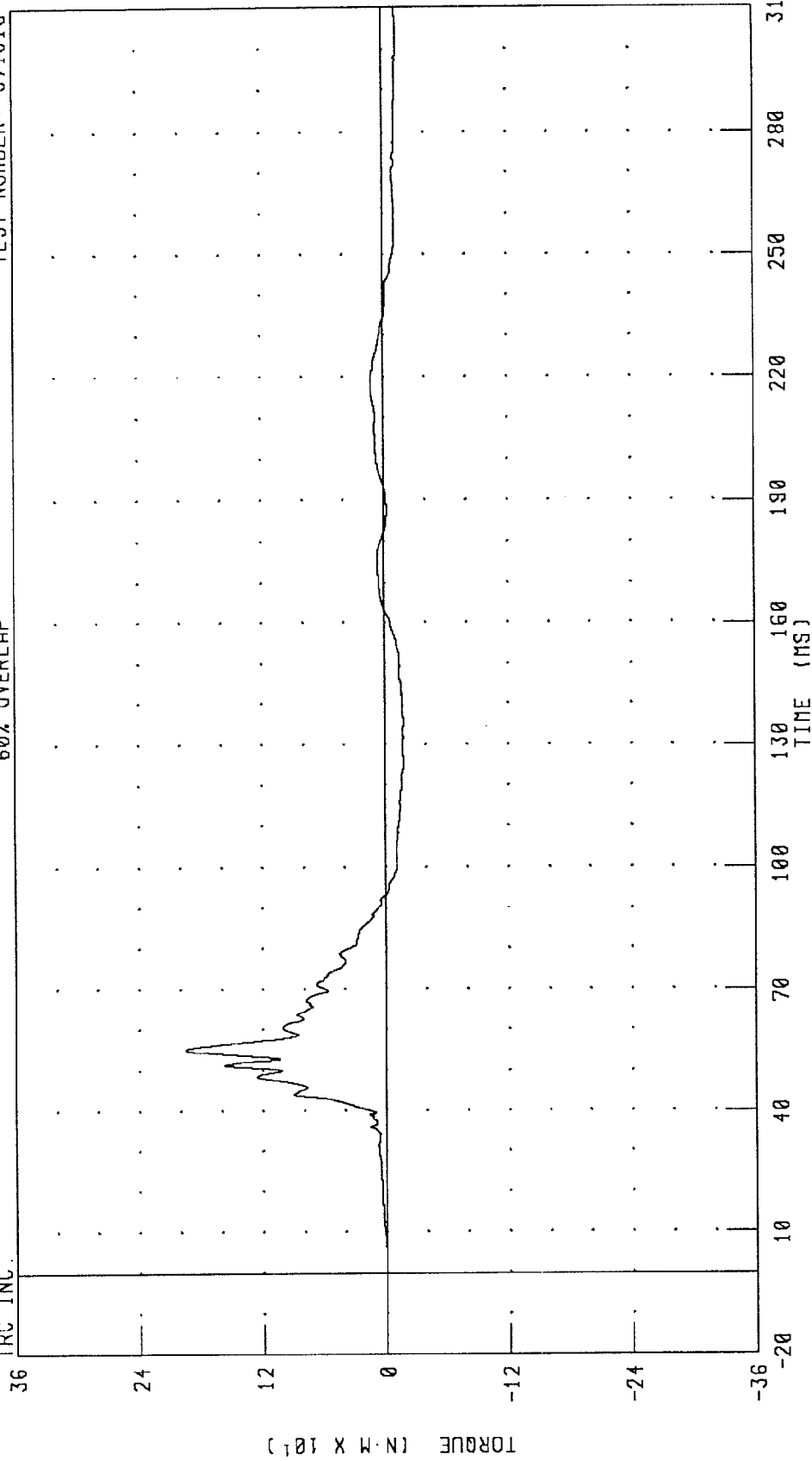
CHANNEL: TBLXM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



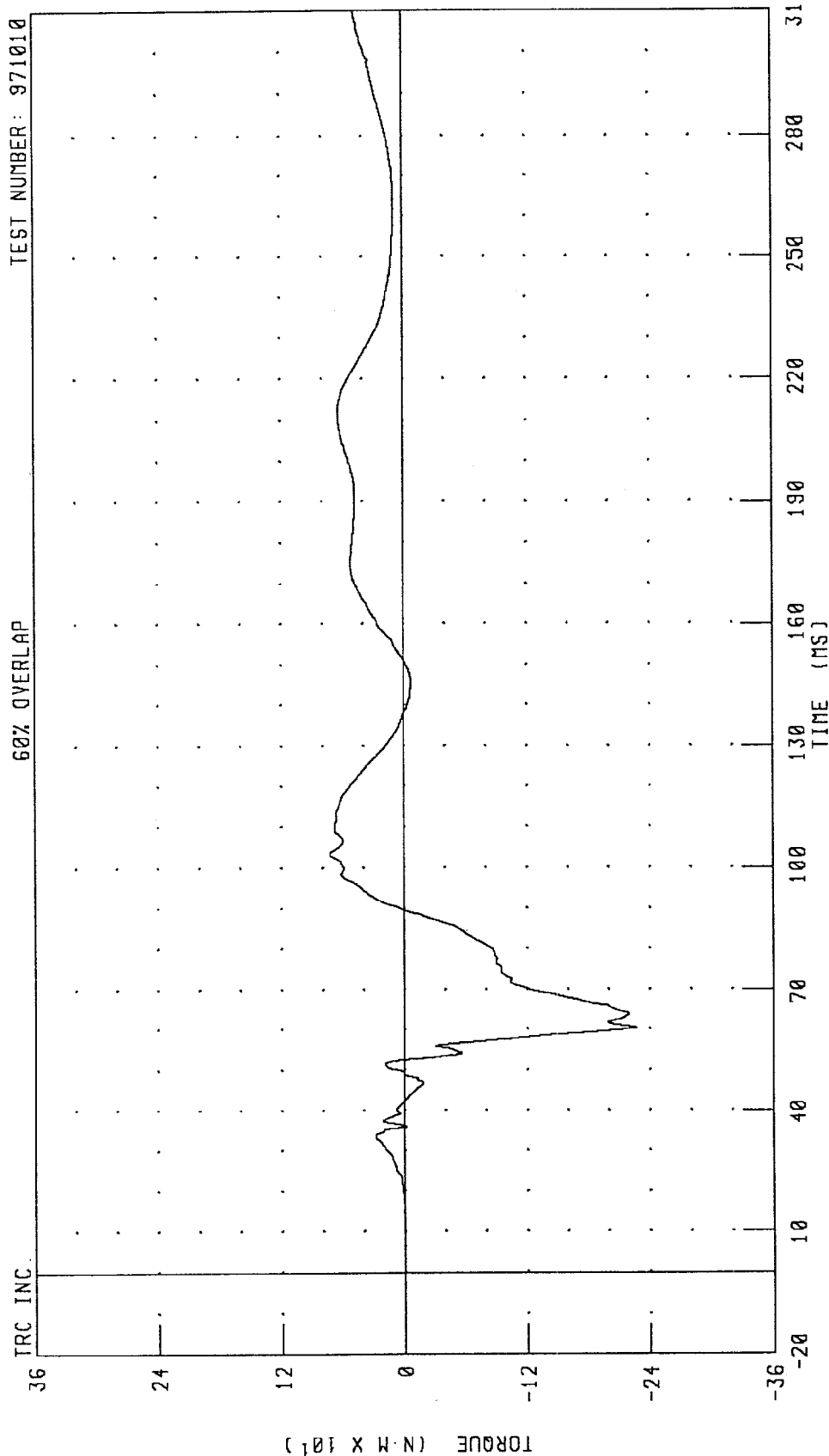
CHANNEL: TBLYM2 FILTER: CH. CLASS 600

PEAK DATA: 194.90 N·m @ 55.12 ms; -18.37 N·m @ 124.96 ms

70 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 971010

60% OVERLAP



PEAK DATA: 72.96 N·m @ 103.36 ms; -226.12 N·m @ 60.40 ms

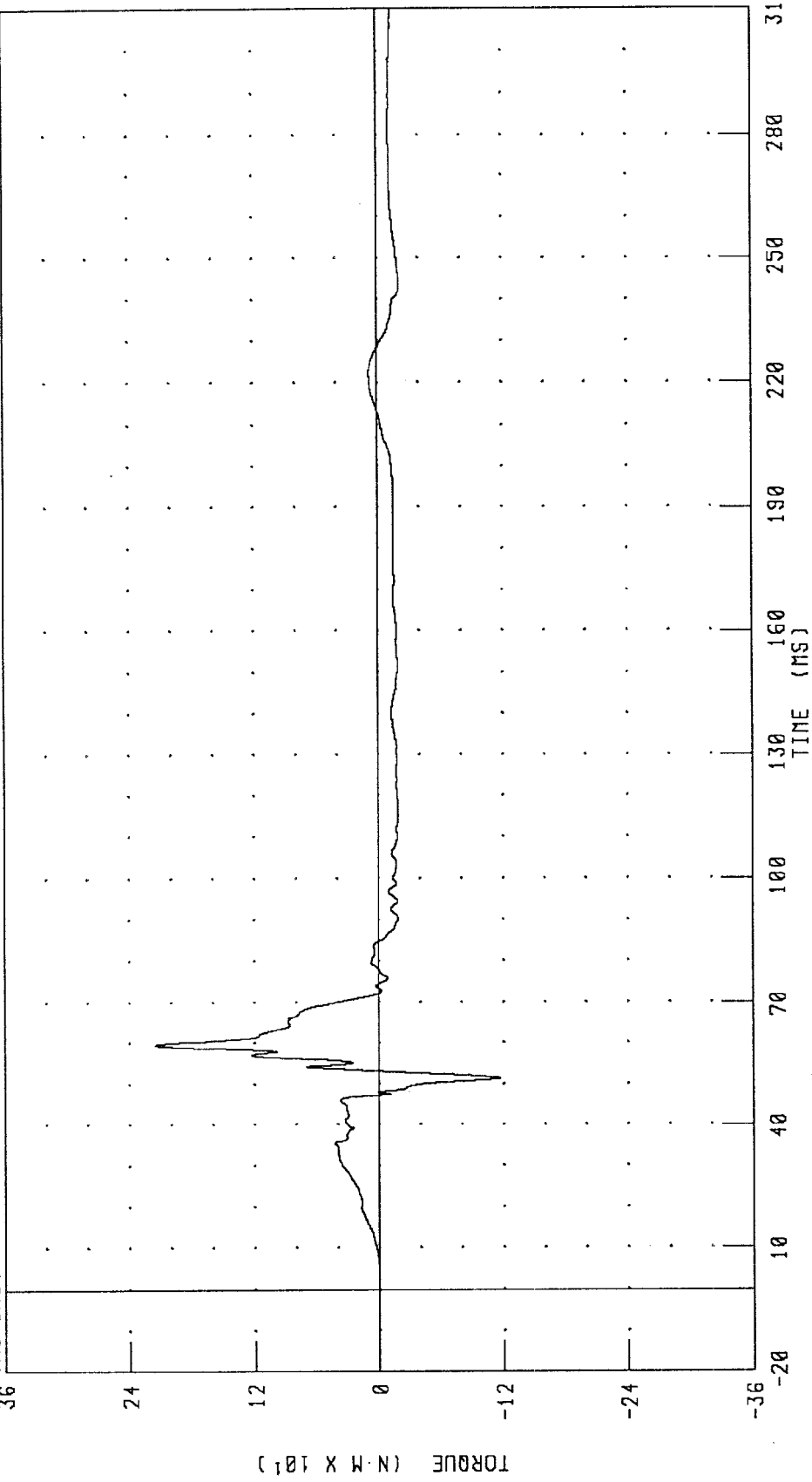
CHANNEL: TBRXM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 215.18 N·M @ 59.60 MS; -117.15 N·M @ 51.36 MS

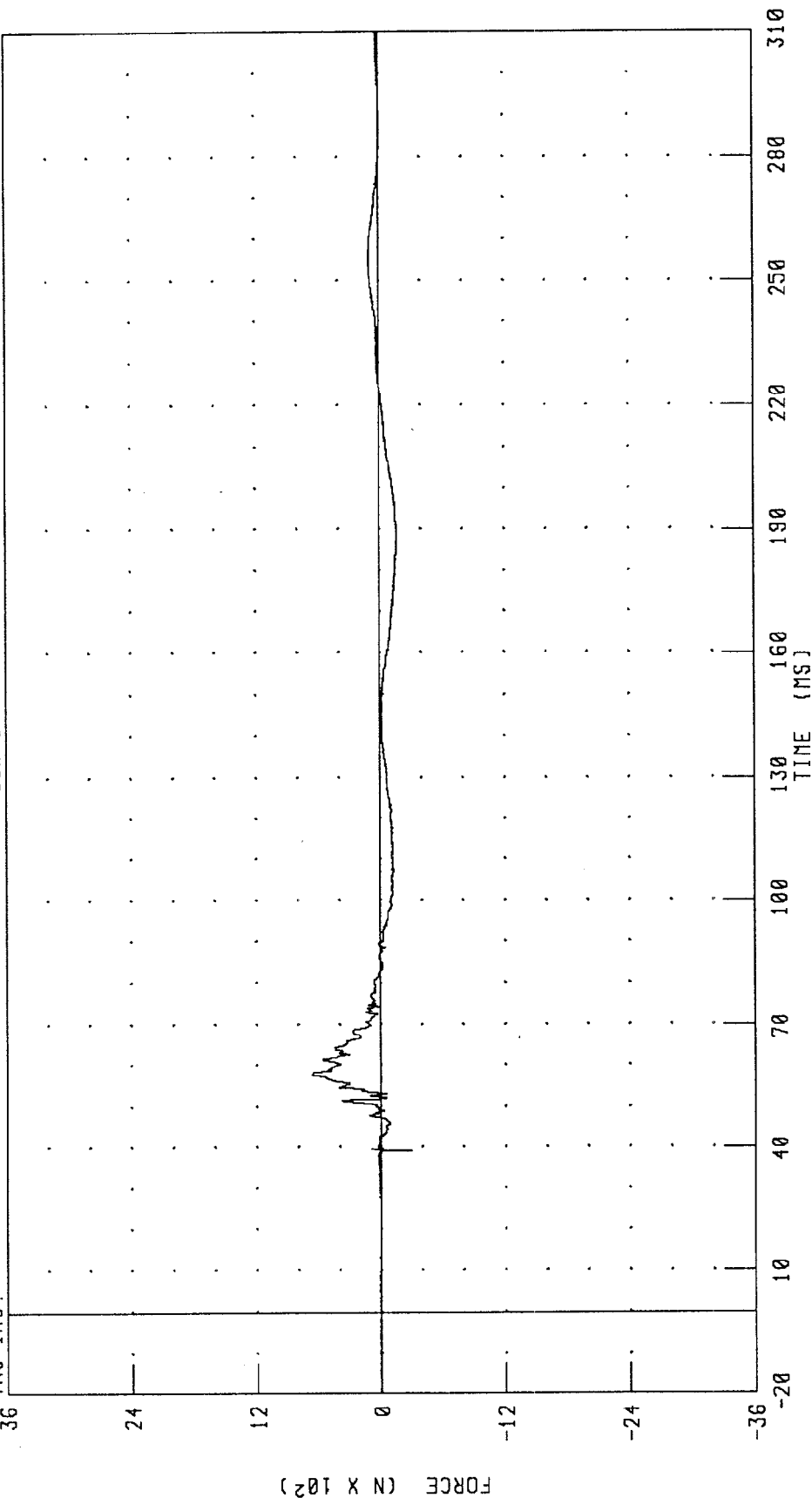
CHANNEL: TBRYM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 668.75 N @ 57.76 MS, -292.39 N @ 39.12 MS

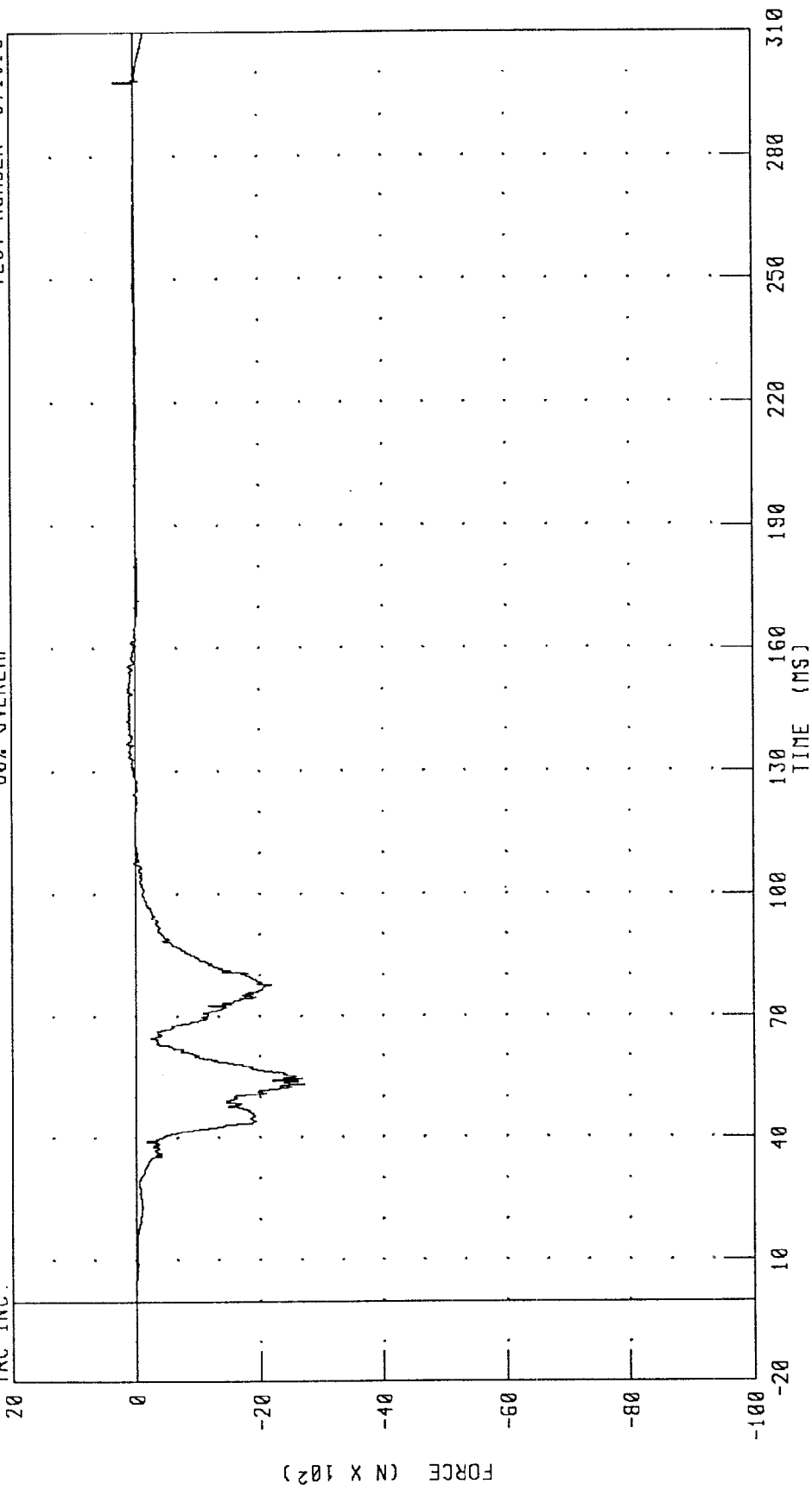
CHANNEL: ANLXF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1986 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

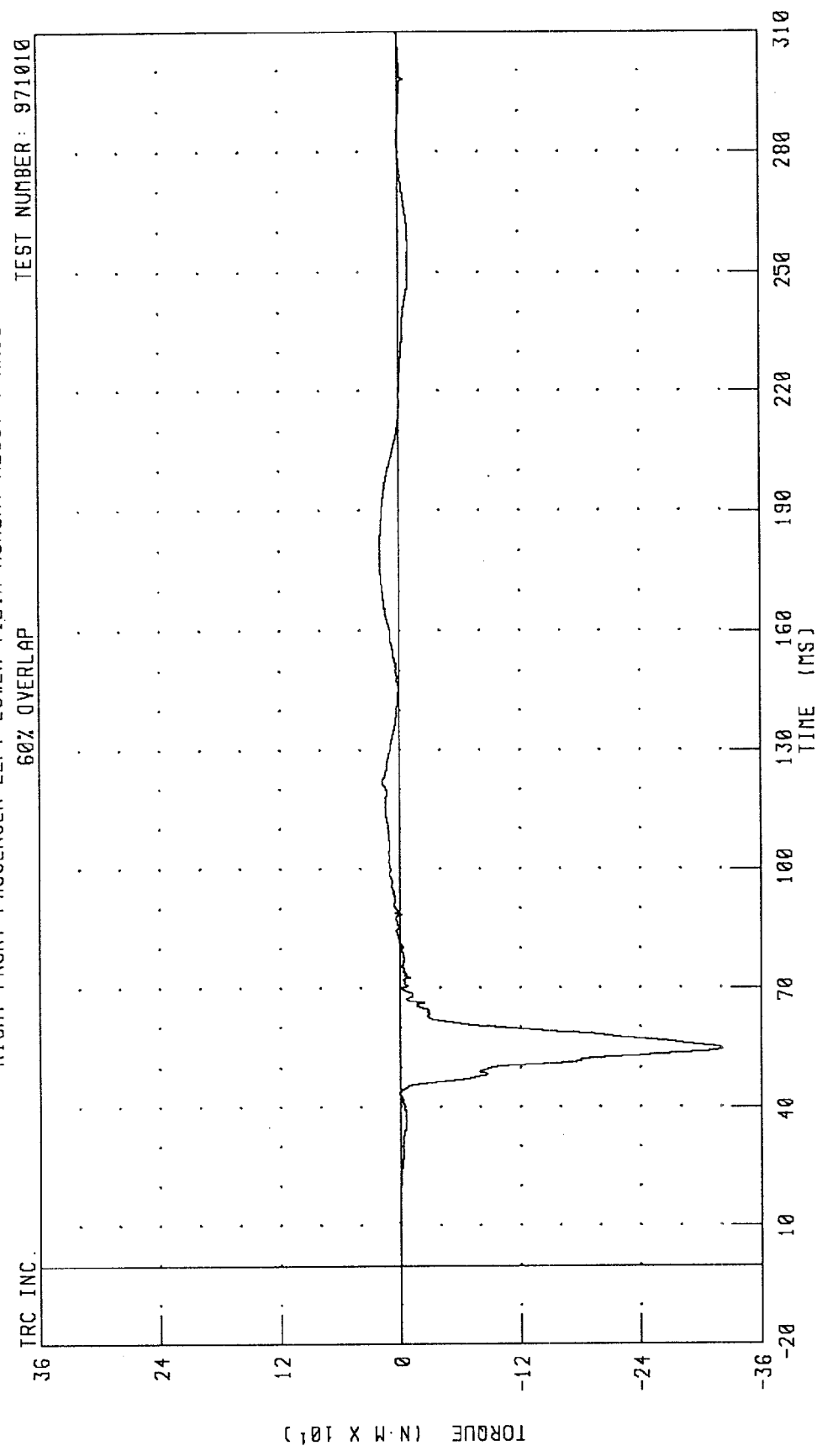
TRC INC.



PEAK DATA: 324.27 N @ 298.00 MS; -2714.57 N @ 53.04 MS

CHANNEL: ANLZF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y-AXIS



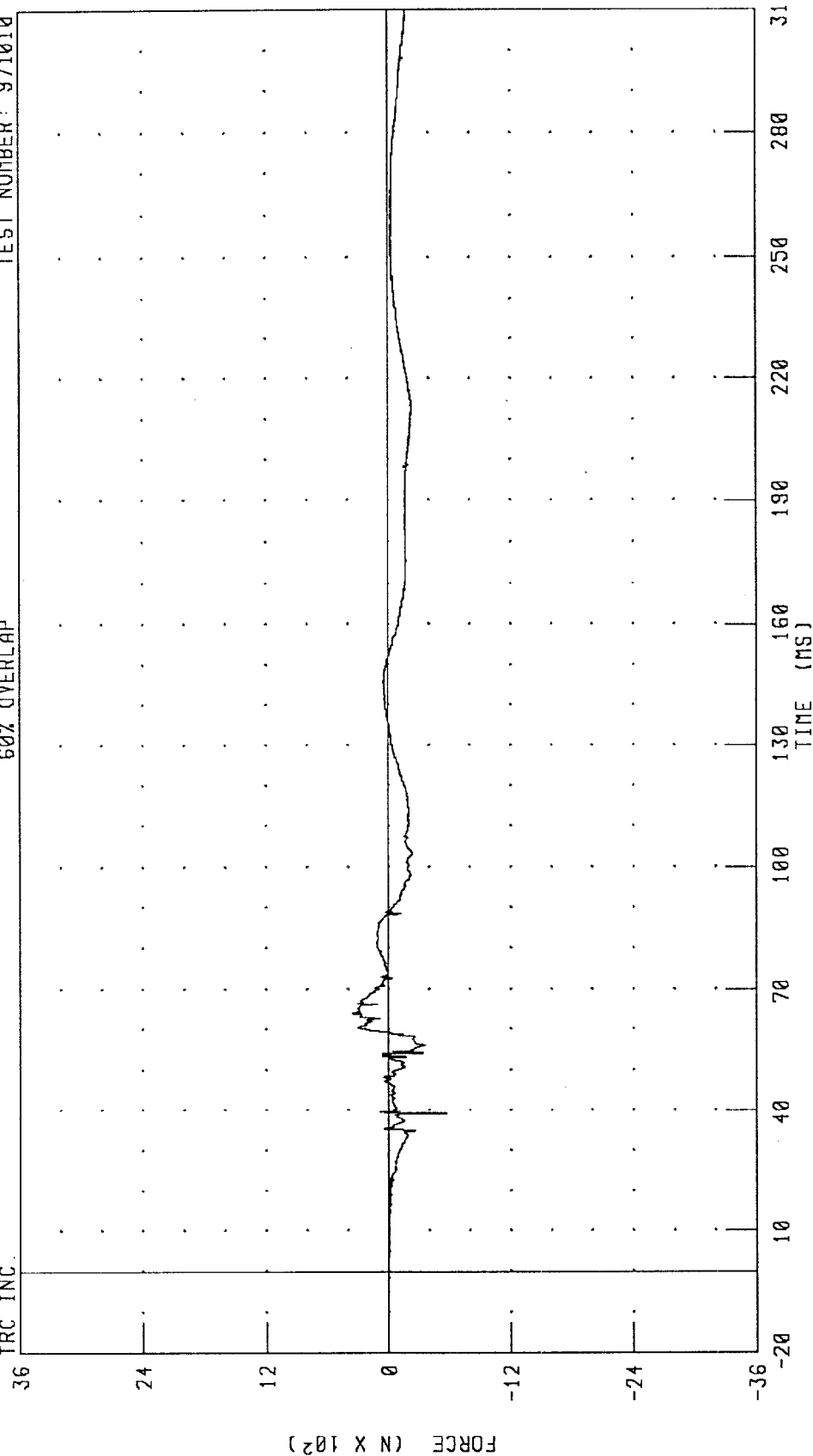
CHANNEL: ANLYM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 352.71 N @ 63.84 MS; -565.23 N @ 39.12 MS

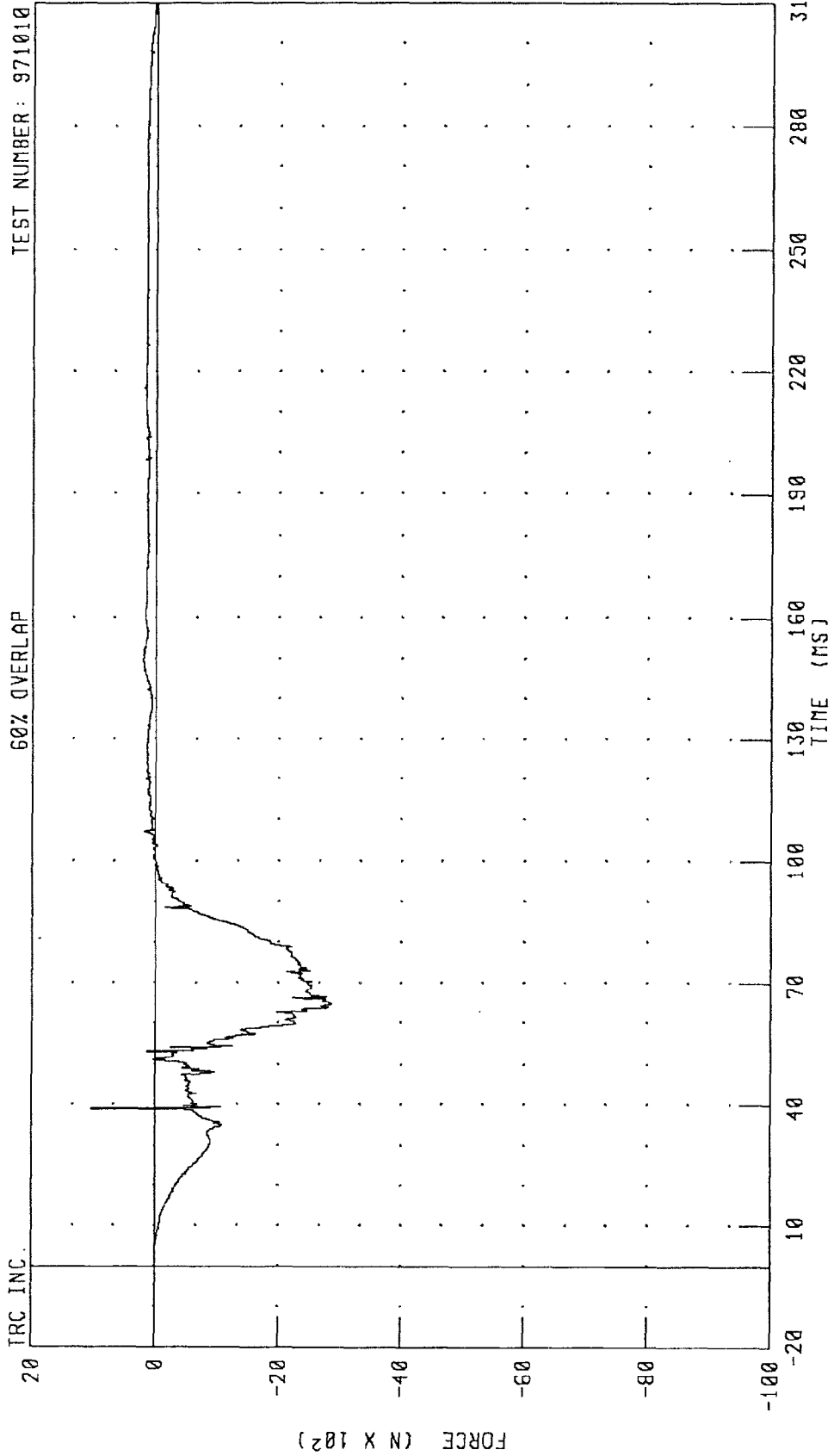
CHANNEL: ANRXF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 1037.04 N @ 39.12 MS; -2864.06 N @ 64.64 MS

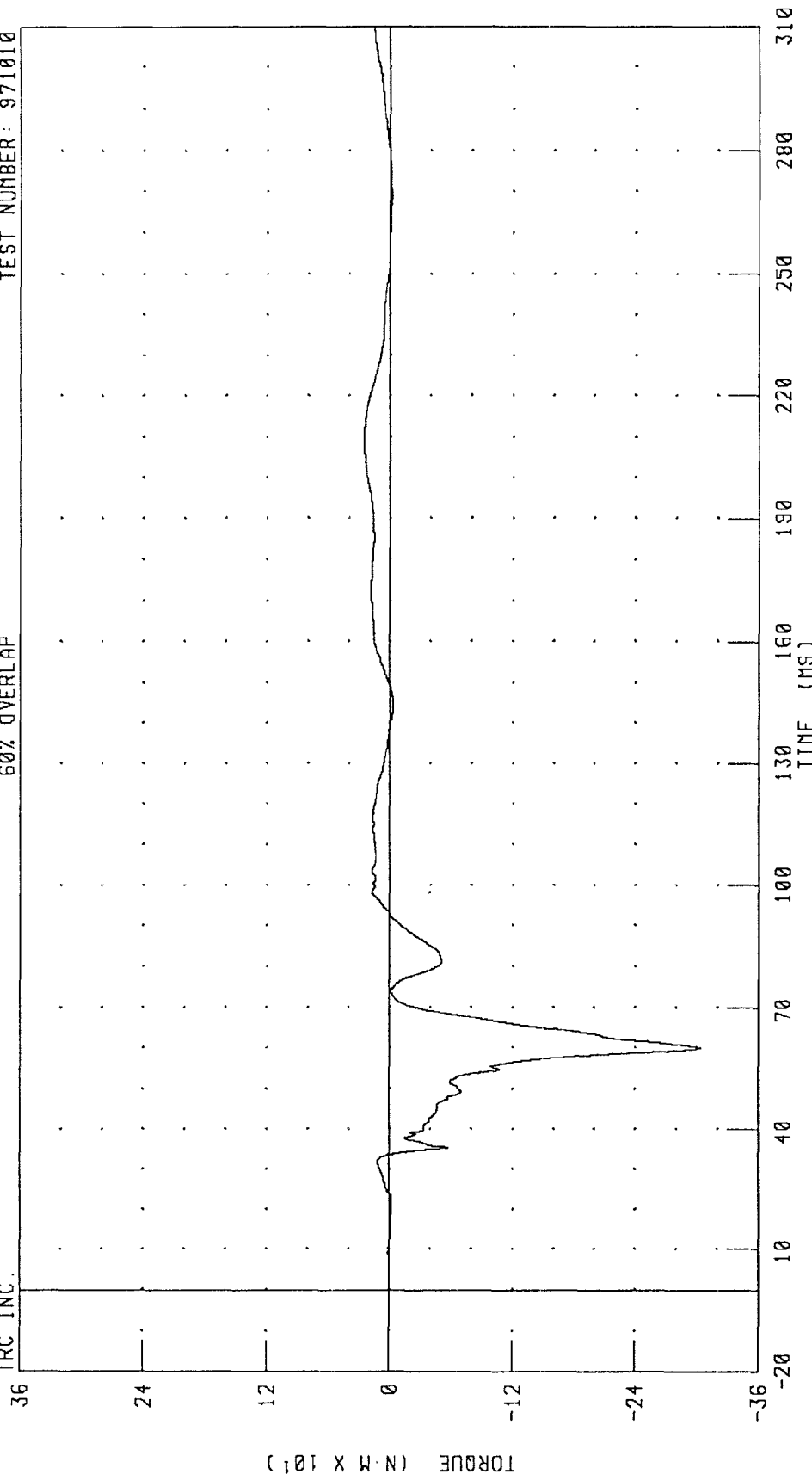
CHANNEL: ANRZF2 FILTER: CH. CLASS 1000

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 971010

60% OVERLAP

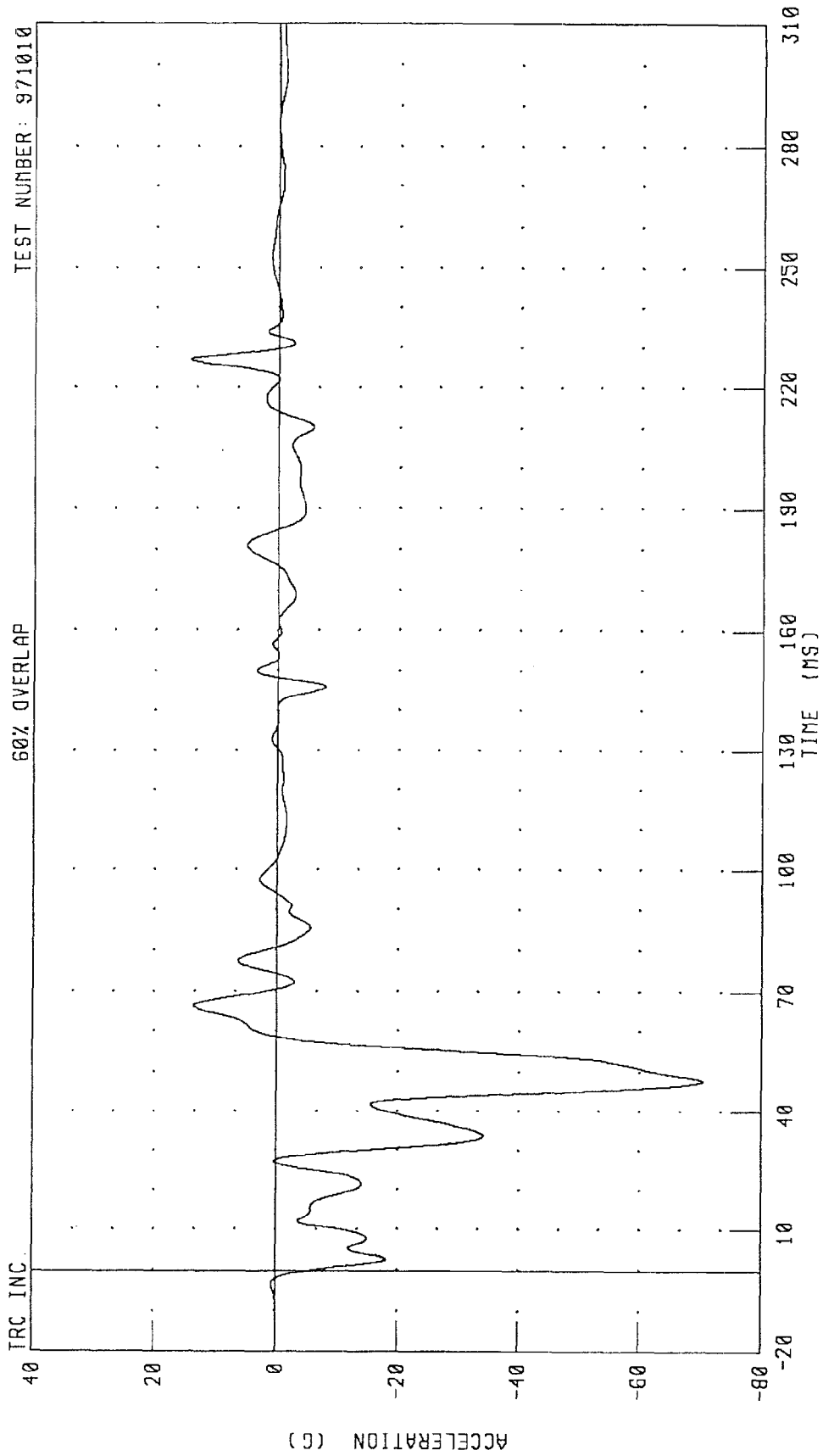
TRC INC.



PEAK DATA: 25.50 N·m @ 208.40 MS; -303.48 N·m @ 59.92 MS

CHANNEL: ANRYM2 FILTER: CH. CLASS 600

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
TOP HINGE ON LEFT A-PILLAR X-AXIS ACCELERATION

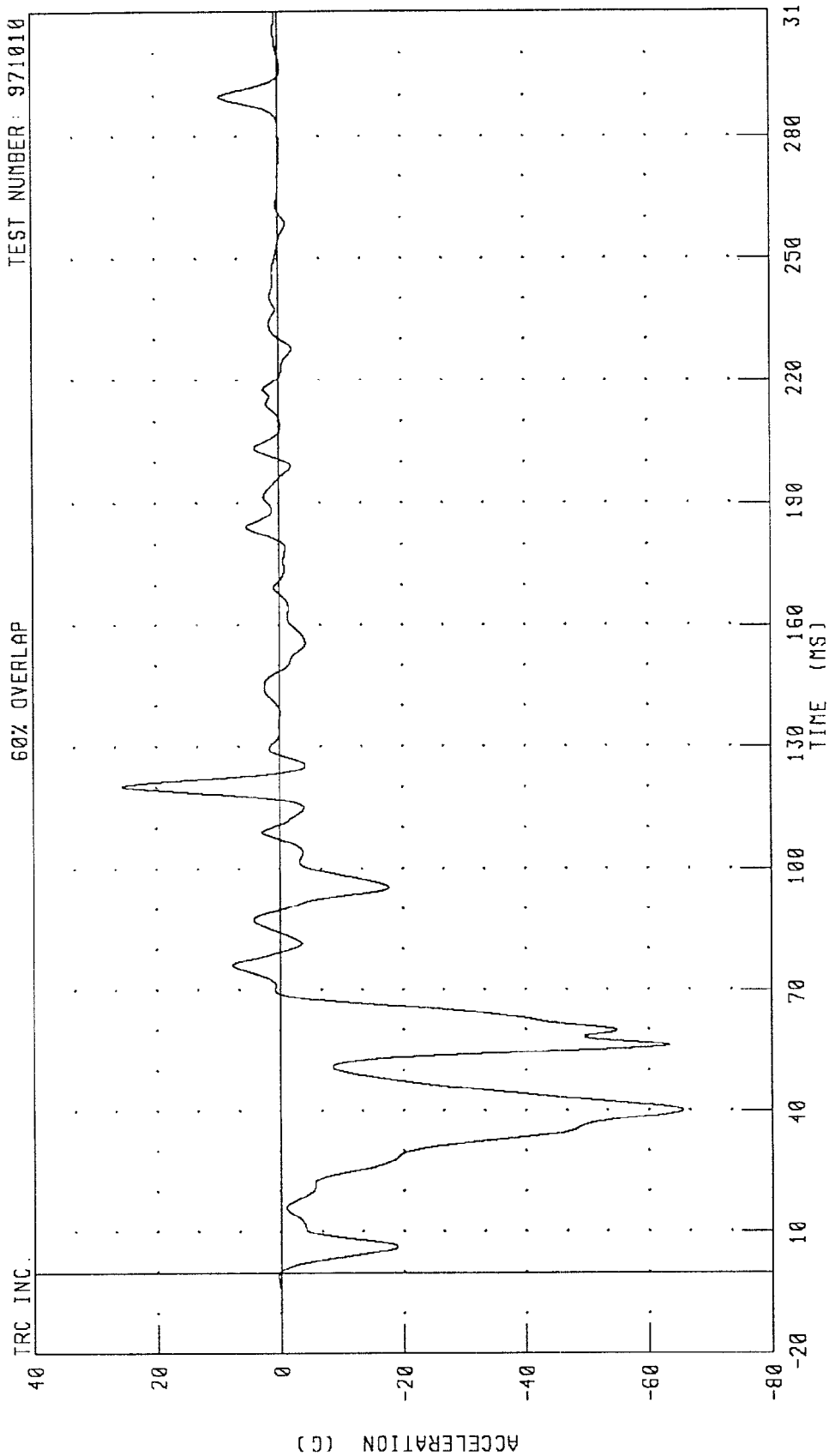


CHANNEL: APLXG1 FILTER: CH. CLASS 60

PEAK DATA: 14.39 G @ 227.04 MS, -70.42 G @ 47.76 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
TOP HINGE ON RIGHT A-PILLAR X-AXIS ACCELERATION

60% OVERLAP TEST NUMBER: 971010



CHANNEL: APRXG1 FILTER: CH. CLASS 60

971010

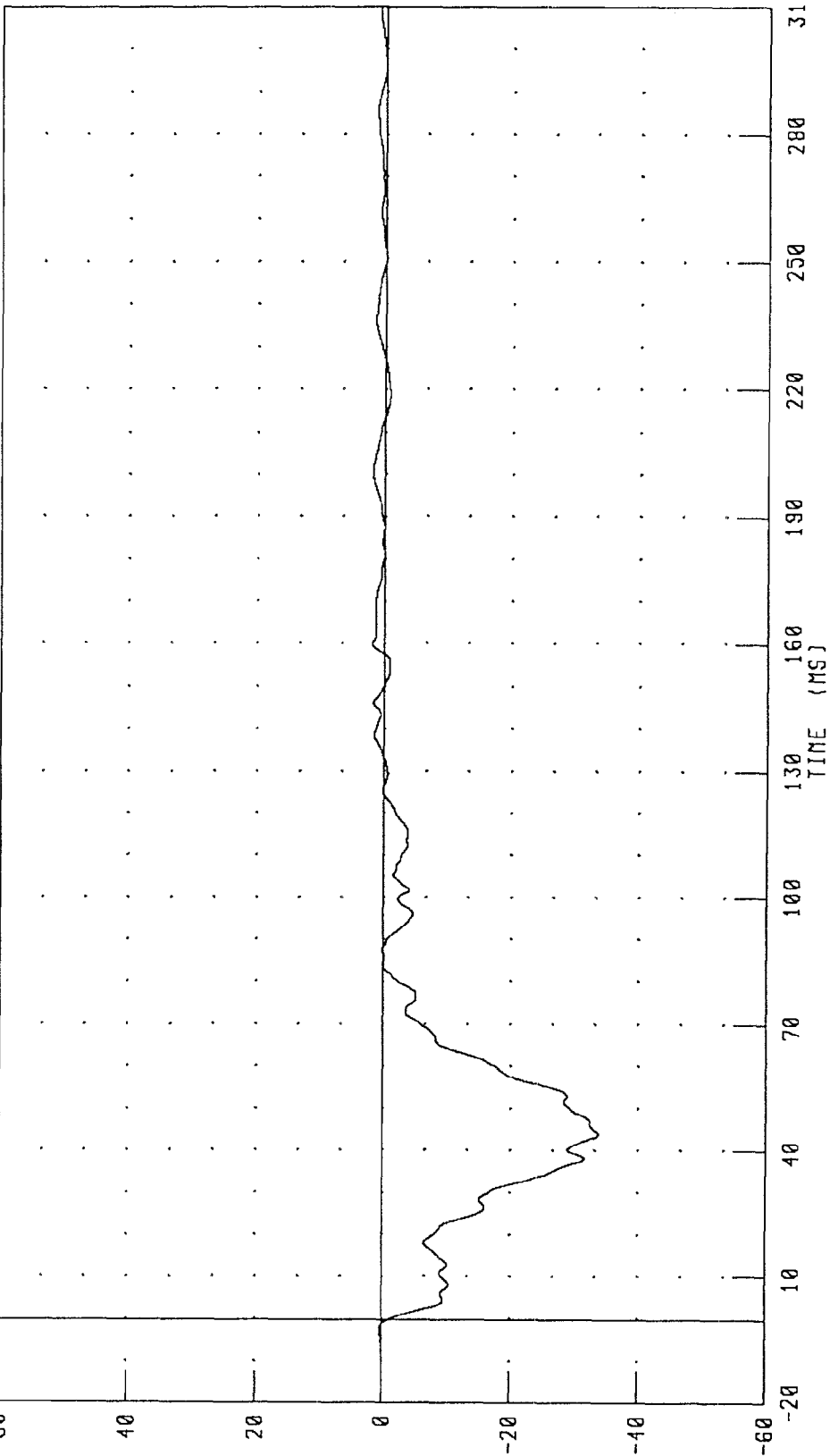
70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT REAR COMPARTMENT X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

IRC INC.

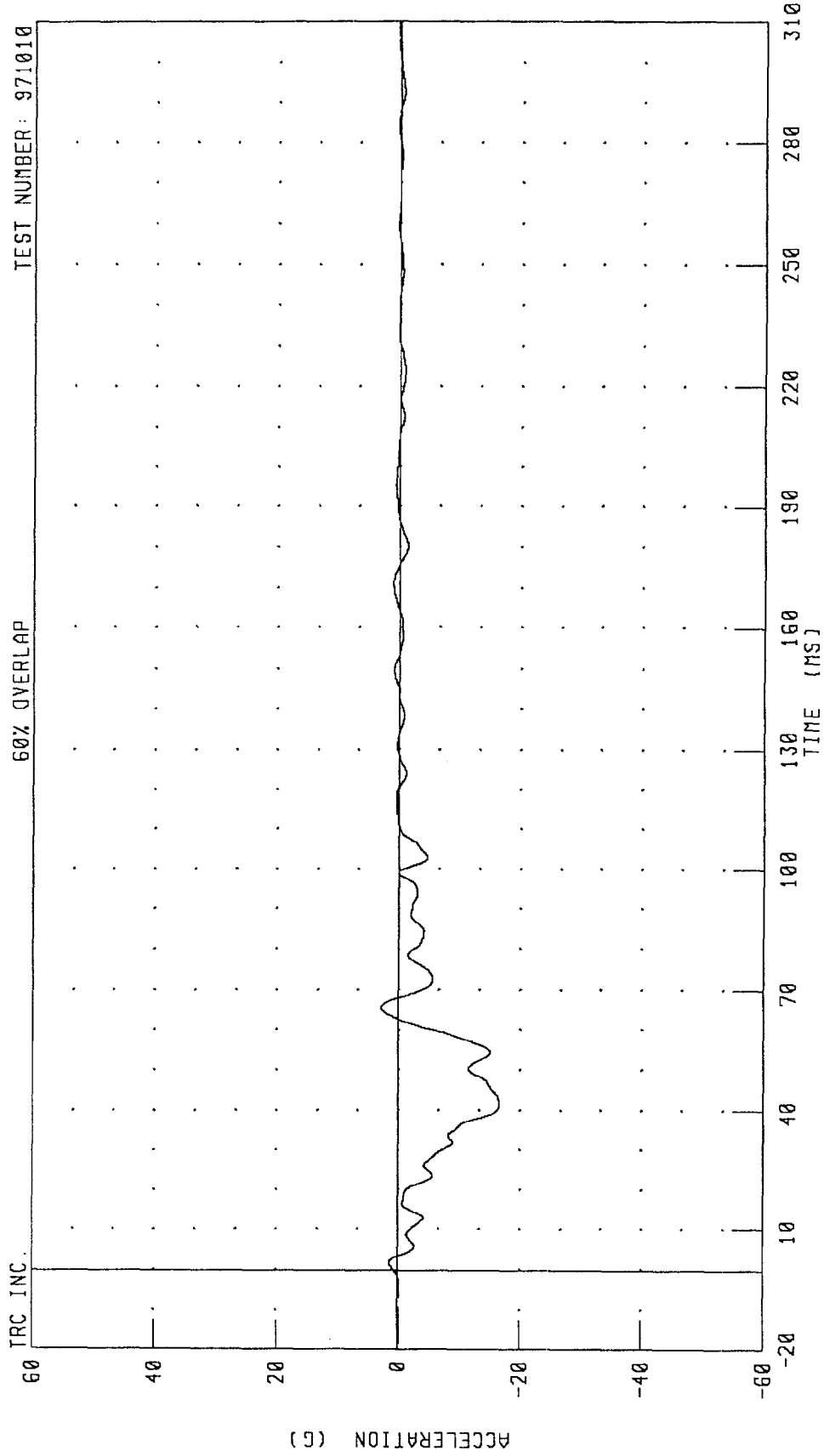
60



CHANNEL: LRCXG1 FILTER: CH. CLASS 60

PEAK DATA: 1.87 G @ 200.96 MS; -33.88 G @ 44.00 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 LEFT REAR COMPARTMENT Y-AXIS ACCELERATION



CHANNEL: LRCYG1 FILTER: CH. CLASS 60 PEAK DATA: 2.86 G @ 65.60 MS, -16.58 G @ 41.36 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT REAR COMPARTMENT X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

60

40

20

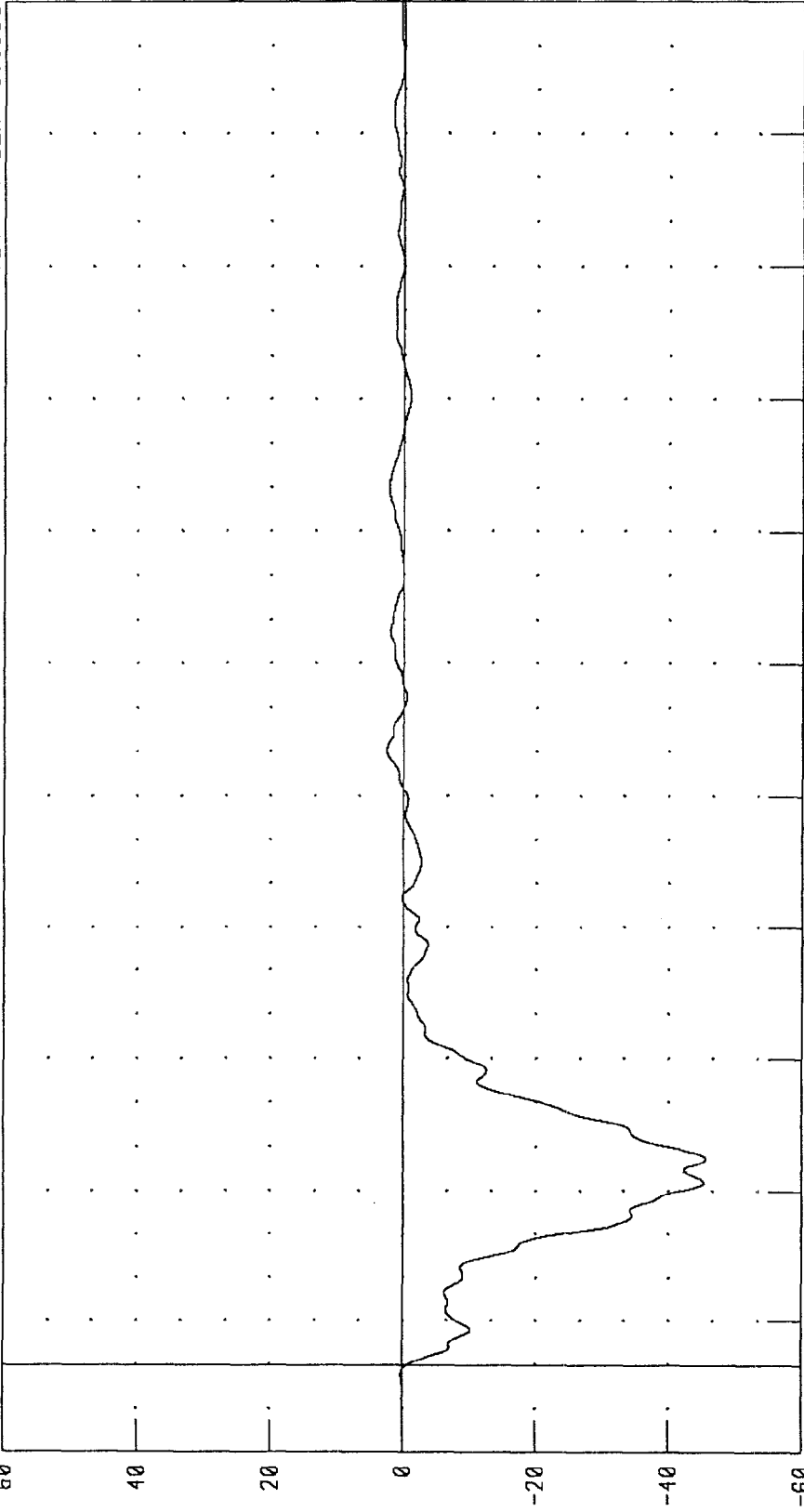
0

-20

-40

-60

ACCELERATION (G)



TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

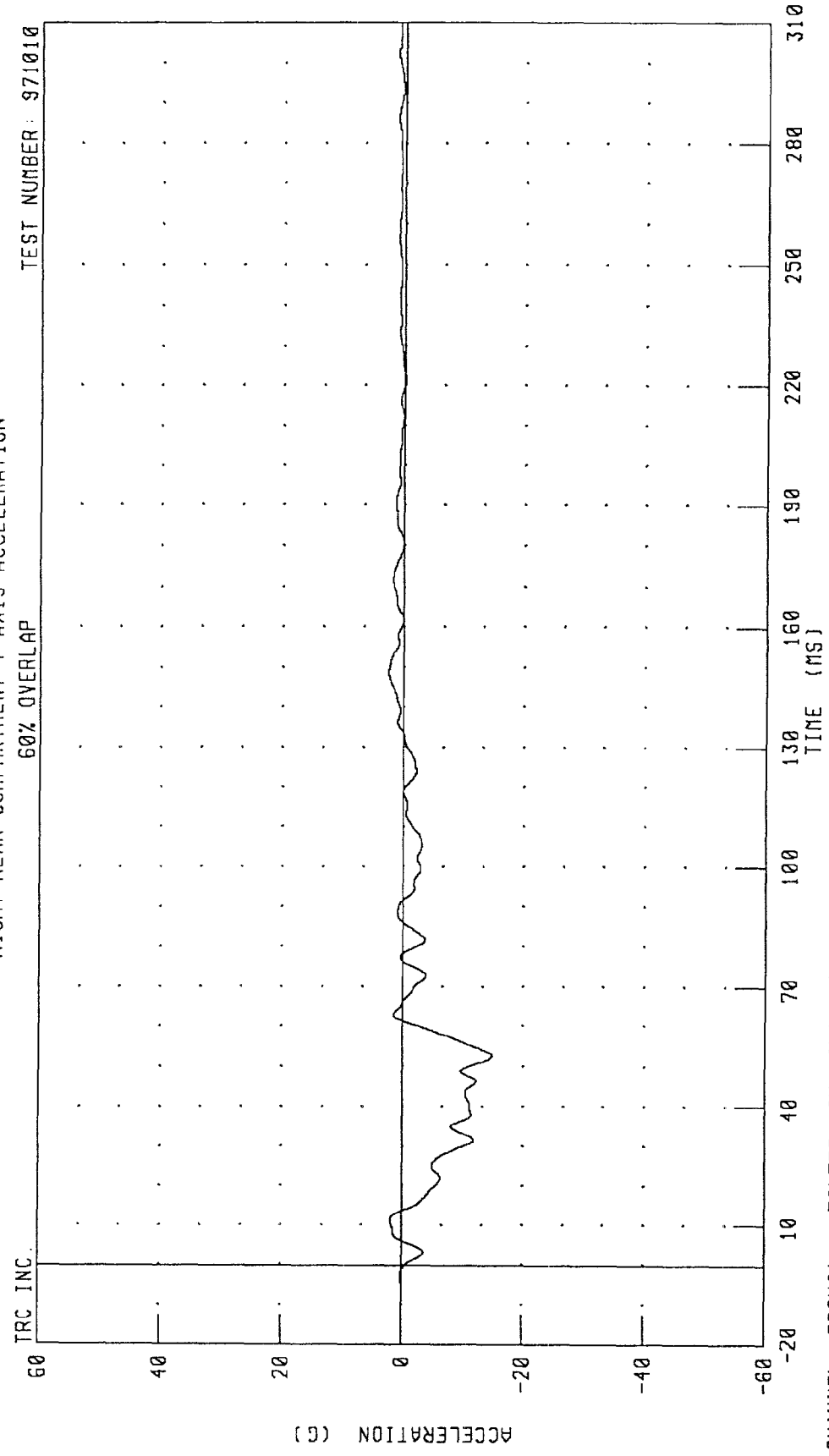
-40

-60

CHANNEL: RRCXG1 FILTER: CH. CLASS 60

PEAK DATA: 2.51 G @ 140.24 MS; -45.61 G @ 47.52 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT REAR COMPARTMENT Y-AXIS ACCELERATION



CHANNEL: RRCYG1 FILTER: CH. CLASS 60 PEAK DATA: 2.50 G @ 148.72 MS; -14.86 G @ 52.56 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
BRAKE PEDAL X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

200

133

66

ACCELERATION (G)

0

-66

-133

-200

TIME (MS)

130

160

190

220

250

280

310

340

370

400

430

460

490

520

550

580

610

640

670

700

730

760

790

820

850

880

910

940

970

1000

1030

1060

1090

1120

1150

1180

1210

1240

1270

1300

1330

1360

1390

1420

1450

1480

1510

1540

1570

1600

1630

1660

1690

1720

1750

1780

1810

1840

1870

1900

1930

1960

1990

2020

2050

2080

2110

2140

2170

2200

2230

2260

2290

2320

2350

2380

2410

2440

2470

2500

2530

2560

2590

2620

2650

2680

2710

2740

2770

2800

2830

2860

2890

2920

2950

2980

3010

3040

3070

3100

3130

3160

3190

3220

3250

3280

3310

3340

3370

3400

3430

3460

3490

3520

3550

3580

3610

3640

3670

3700

3730

3760

3790

3820

3850

3880

3910

3940

3970

4000

4030

4060

4090

4120

4150

4180

4210

4240

4270

4300

4330

4360

4390

4420

4450

4480

4510

4540

4570

4600

4630

4660

4690

4720

4750

4780

4810

4840

4870

4900

4930

4960

4990

5020

5050

5080

5110

5140

5170

5200

5230

5260

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6970

7000

7030

7060

7090

7120

7150

7180

7210

7240

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8980

9010

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9070

9100

9130

9160

9190

9220

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9430

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9520

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9580

9610

9640

9670

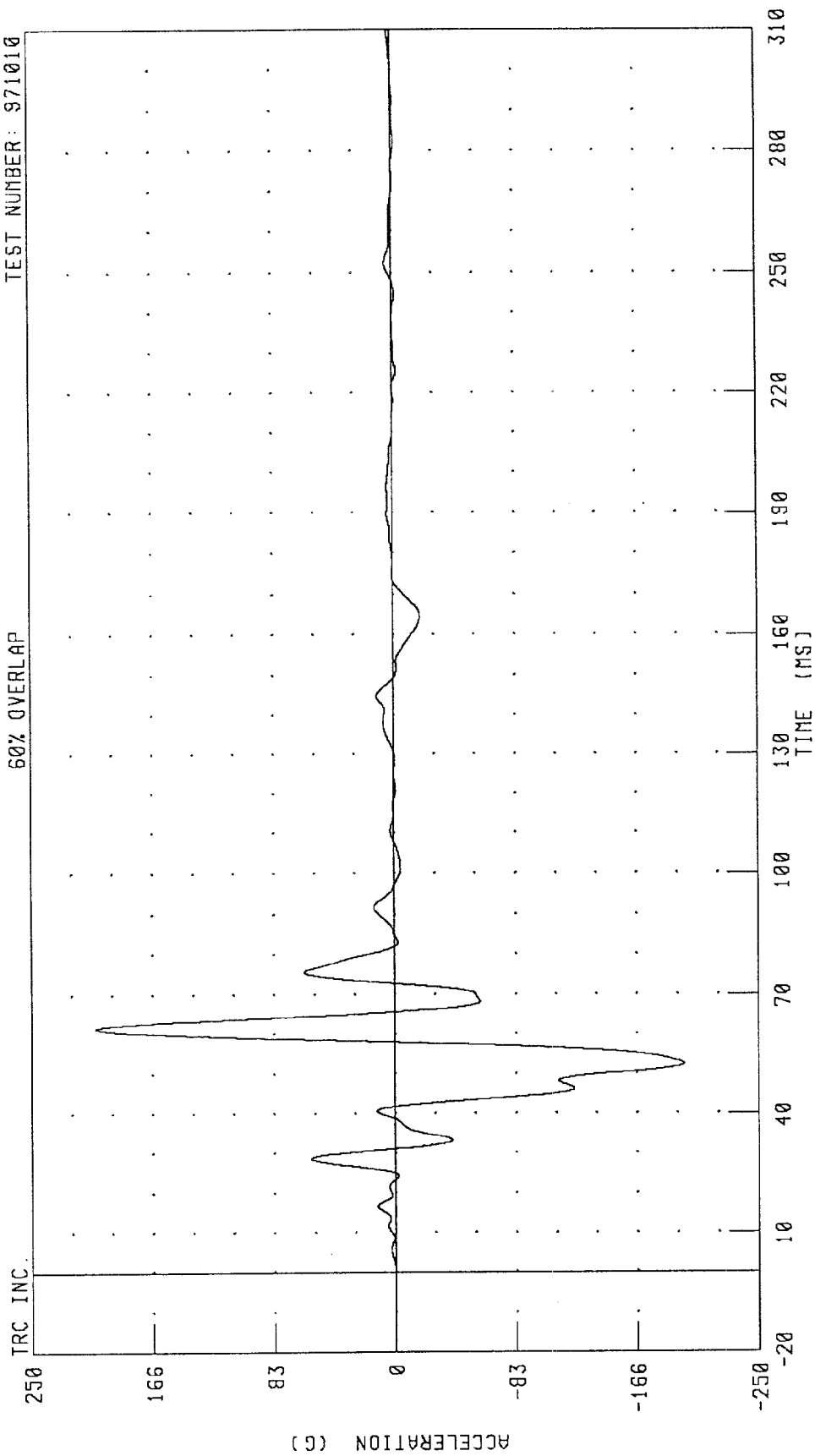
9700

9730

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 BRAKE PEDAL Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



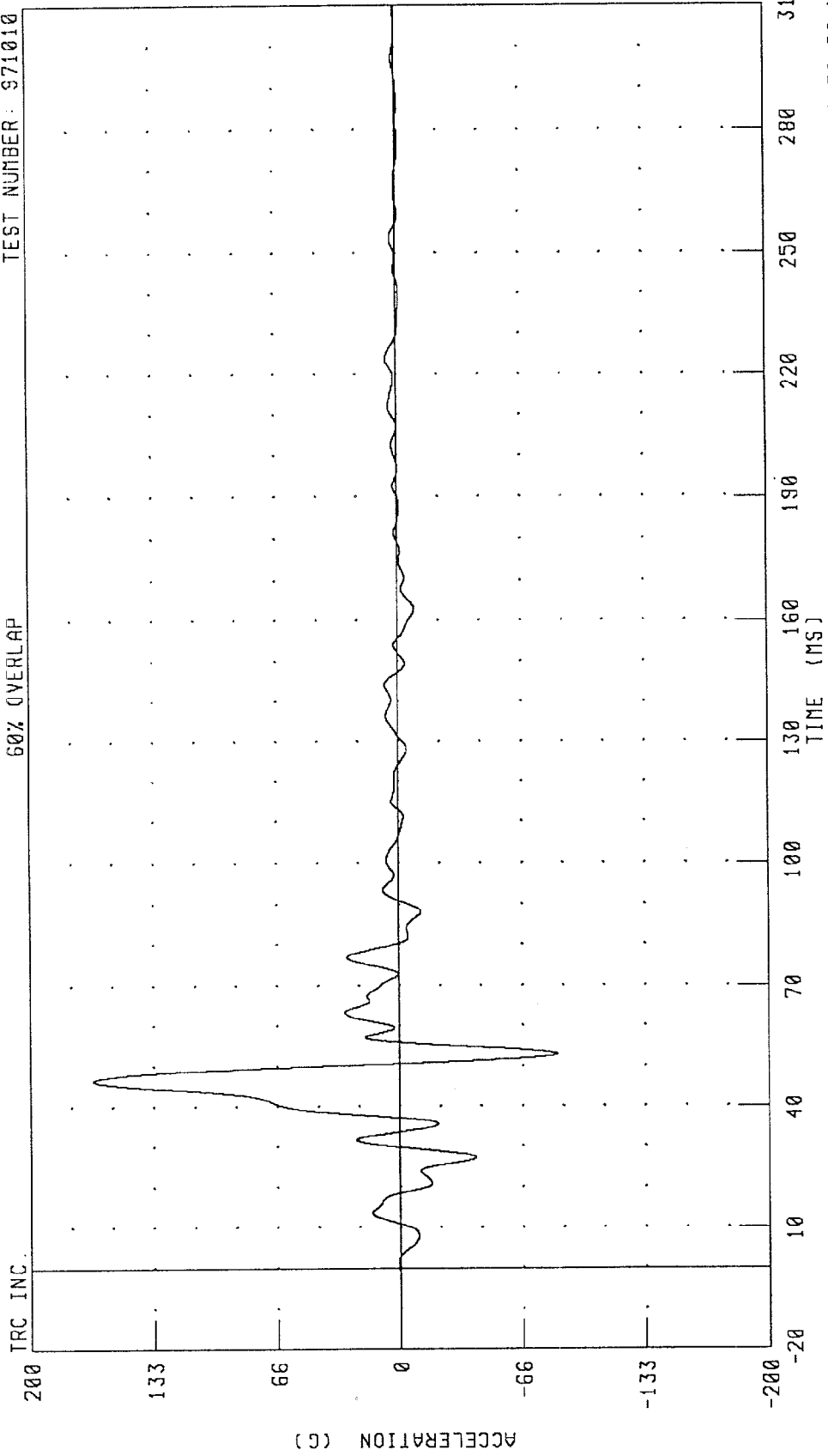
PEAK DATA: 205.78 G @ 61.52 MS; -199.17 G @ 52.40 MS

CHANNEL: BPYGI FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
BRAKE PEDAL Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



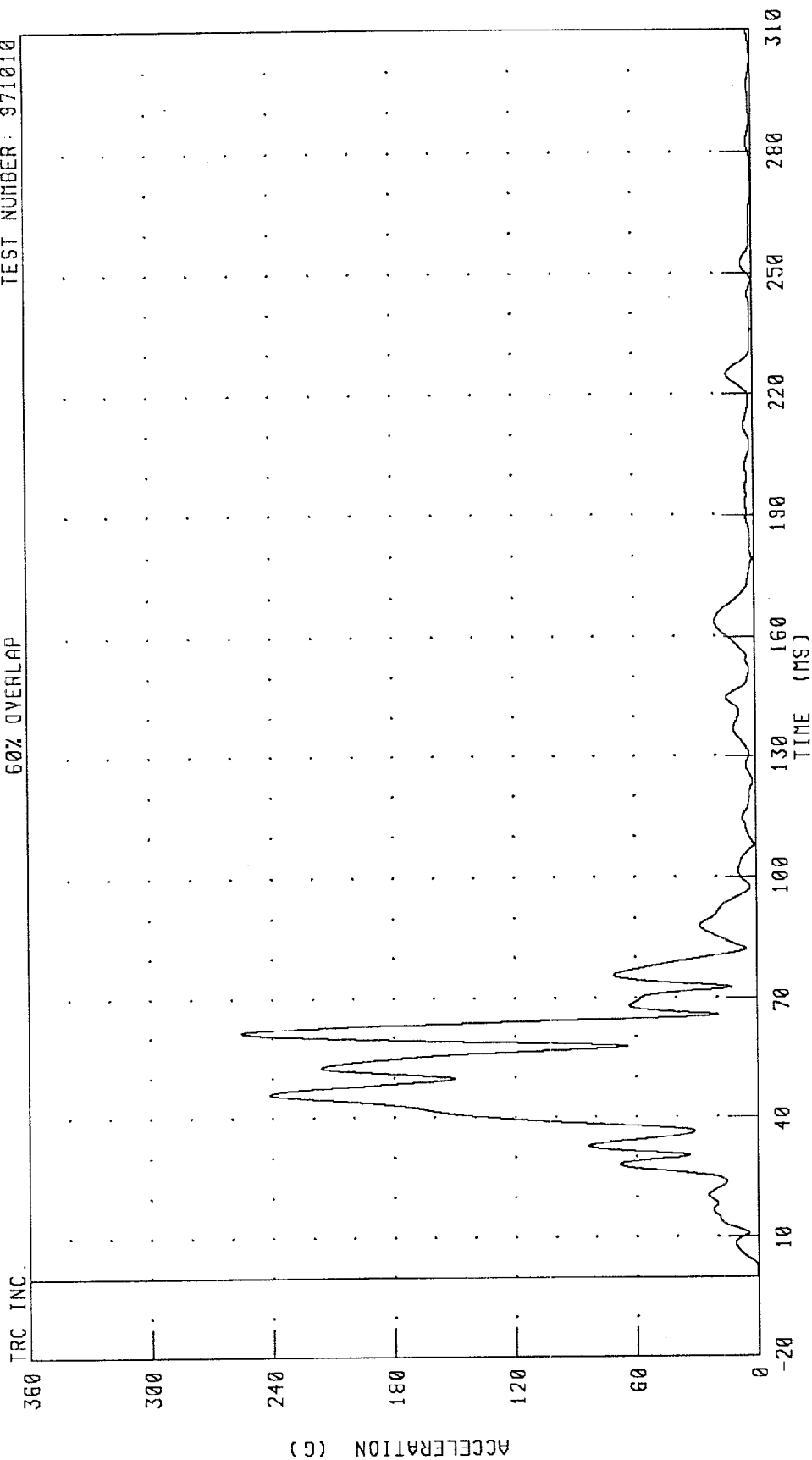
CHANNEL: BPZG1 FILTER: CH. CLASS 60

PEAK DATA: 166.03 G @ 46.56 MS; -85.57 G @ 52.96 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
BRAKE PEDAL X-AXIS RESULTANT

TEST NUMBER: 971010

60% OVERLAP



PEAK DATA: 255.39 G @ 61.44 MS; 0.00 G @ -8.56 MS

CHANNEL: BPRG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT SHOCK TOWER X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

120

80

40

0

-40

-80

-120

ACCELERATION (G)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

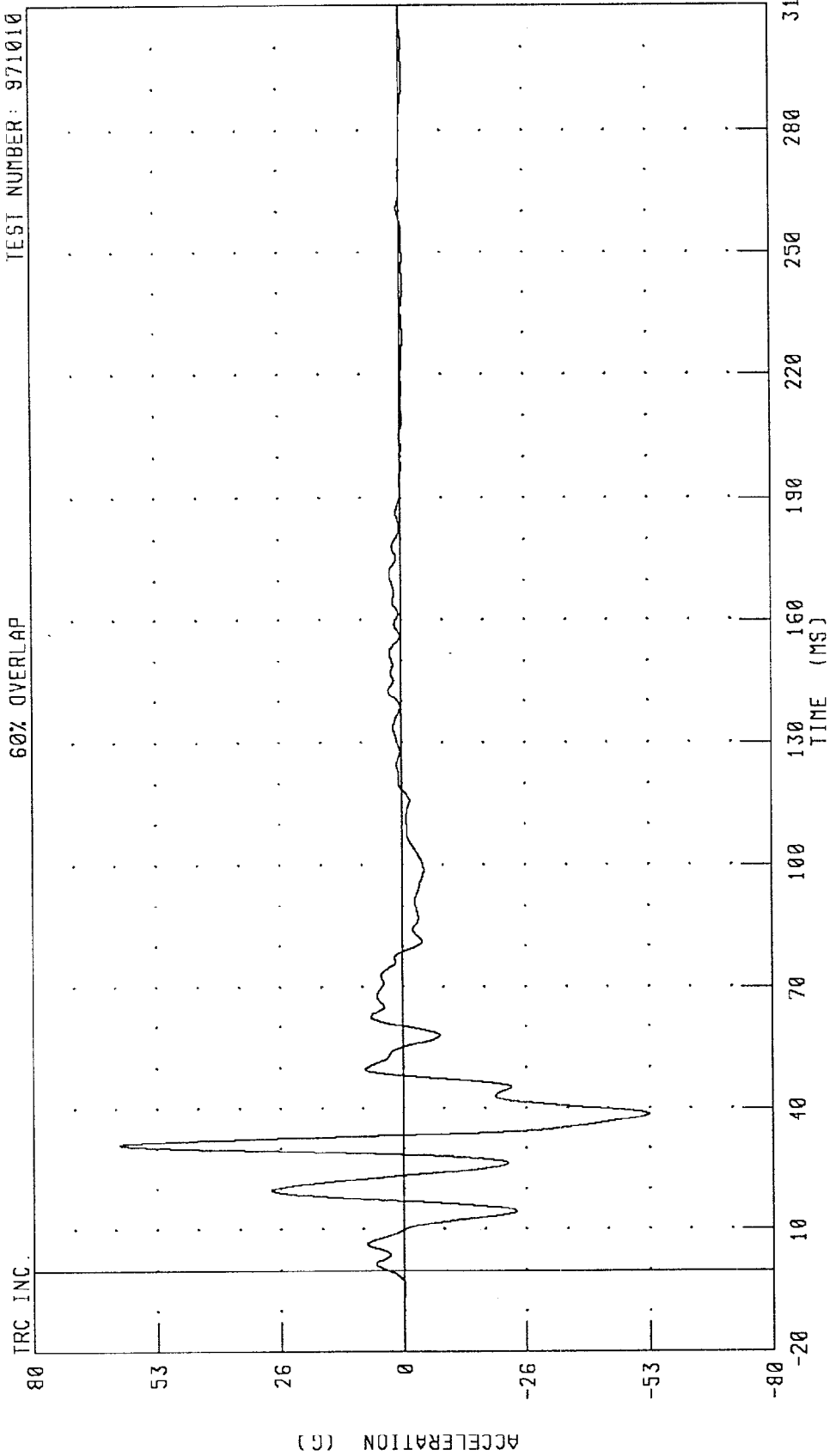
-20

PEAK DATA: 42.94 G @ 50.88 MS; -99.20 G @ 32.08 MS

CHANNEL: LSTXG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT SHOCK TOWER Z-AXIS ACCELERATION

TEST NUMBER: 971010



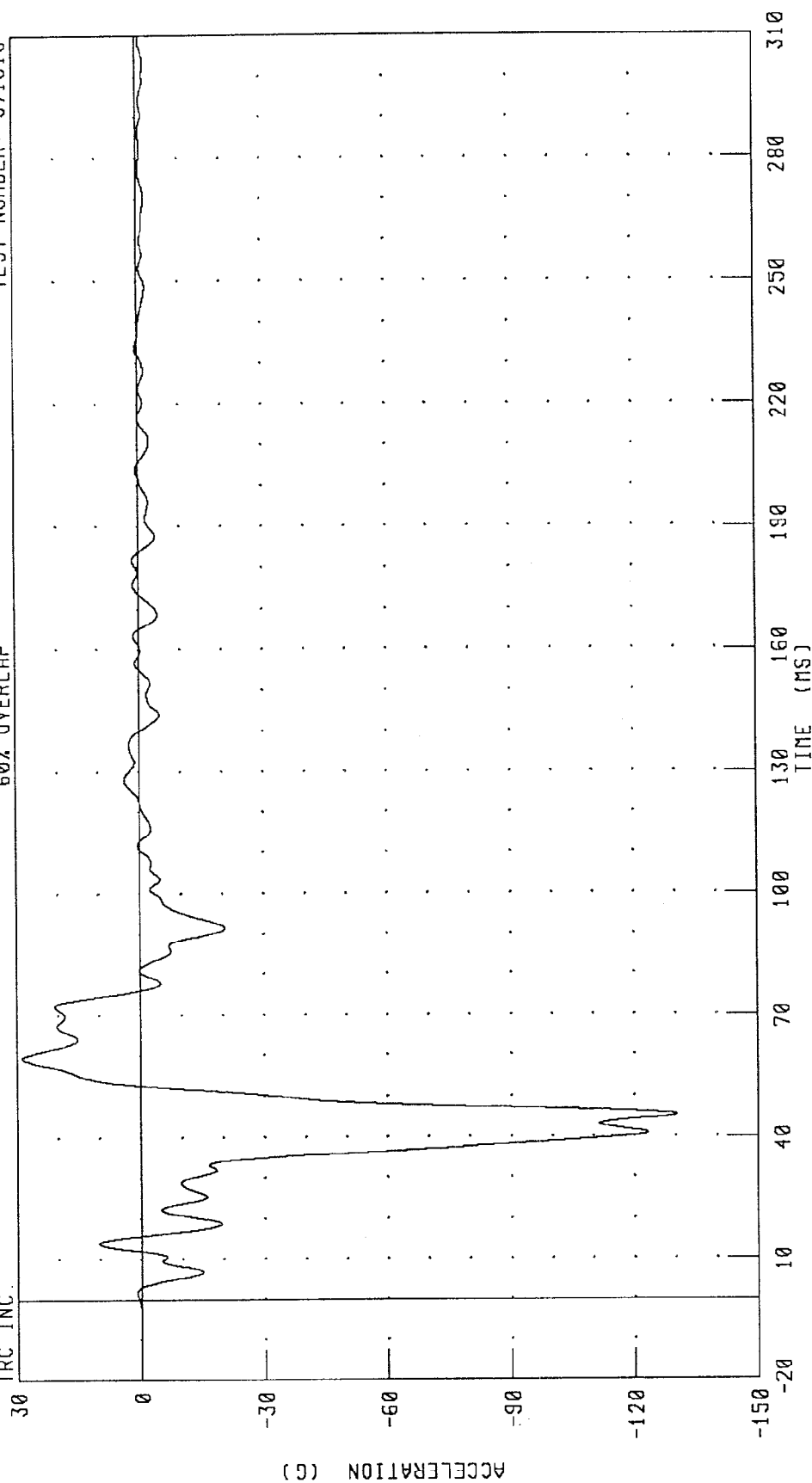
CHANNEL: LSTZG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT SHOCK TOWER X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 28.65 G @ 59.44 MS; -130.33 G @ 45.44 MS

CHANNEL: RSTXG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT SHOCK TOWER Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

40

20

ACCELERATION (G)

-20

-40

-60

-80

-20

40

100

130

160

190

220

250

280

310

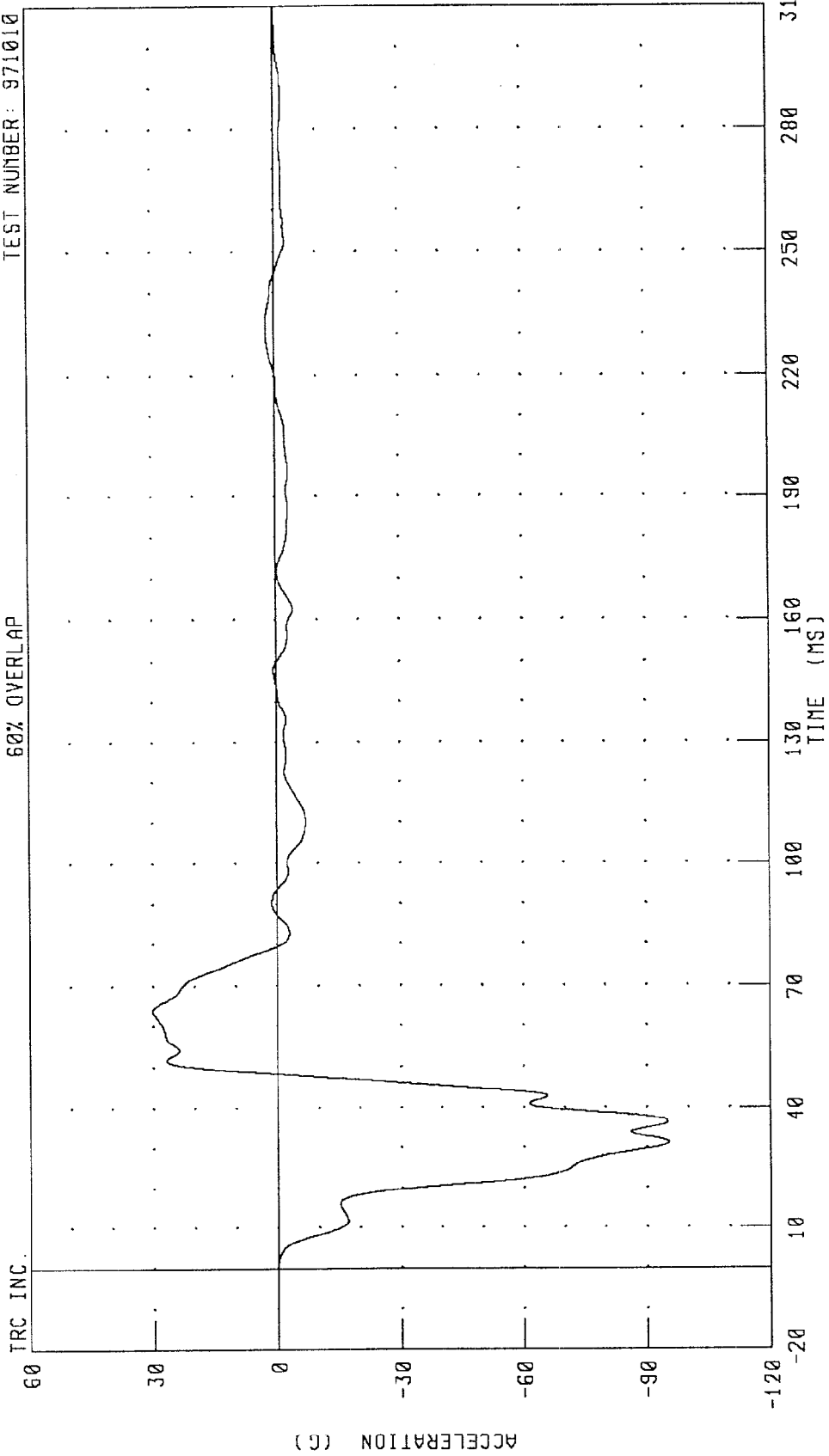
TIME (MS)

CHANNEL: RSTZG1 FILTER: CH. CLASS 60

PEAK DATA: 18.99 G @ 70.24 MS; -66.21 G @ 32.80 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT ENGINE TOP X-AXIS ACCELERATION

TRC INC. 60% OVERLAP TEST NUMBER: 971010

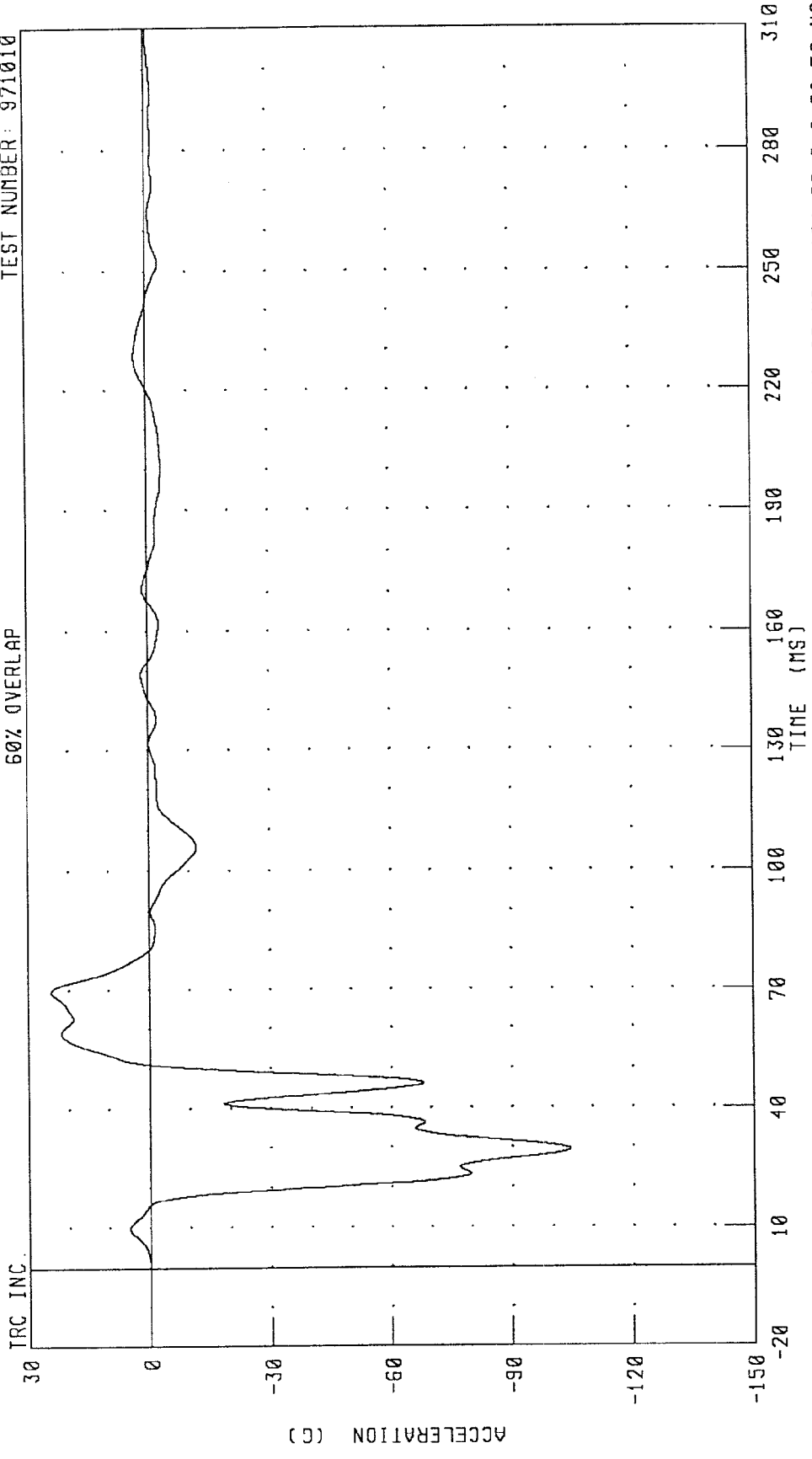


PEAK DATA: 30.23 G @ 63.92 MS; -95.39 G @ 31.28 MS

CHANNEL: ENGCG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 RIGHT ENGINE TOP X-AXIS ACCELERATION
 60% OVERLAP

TEST NUMBER: 971010



PEAK DATA: 24.31 G @ 69.68 MS; -104.52 G @ 29.52 MS

CHANNEL: ENGXC2 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
ENGINE BOTTOM X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

30

0

-30

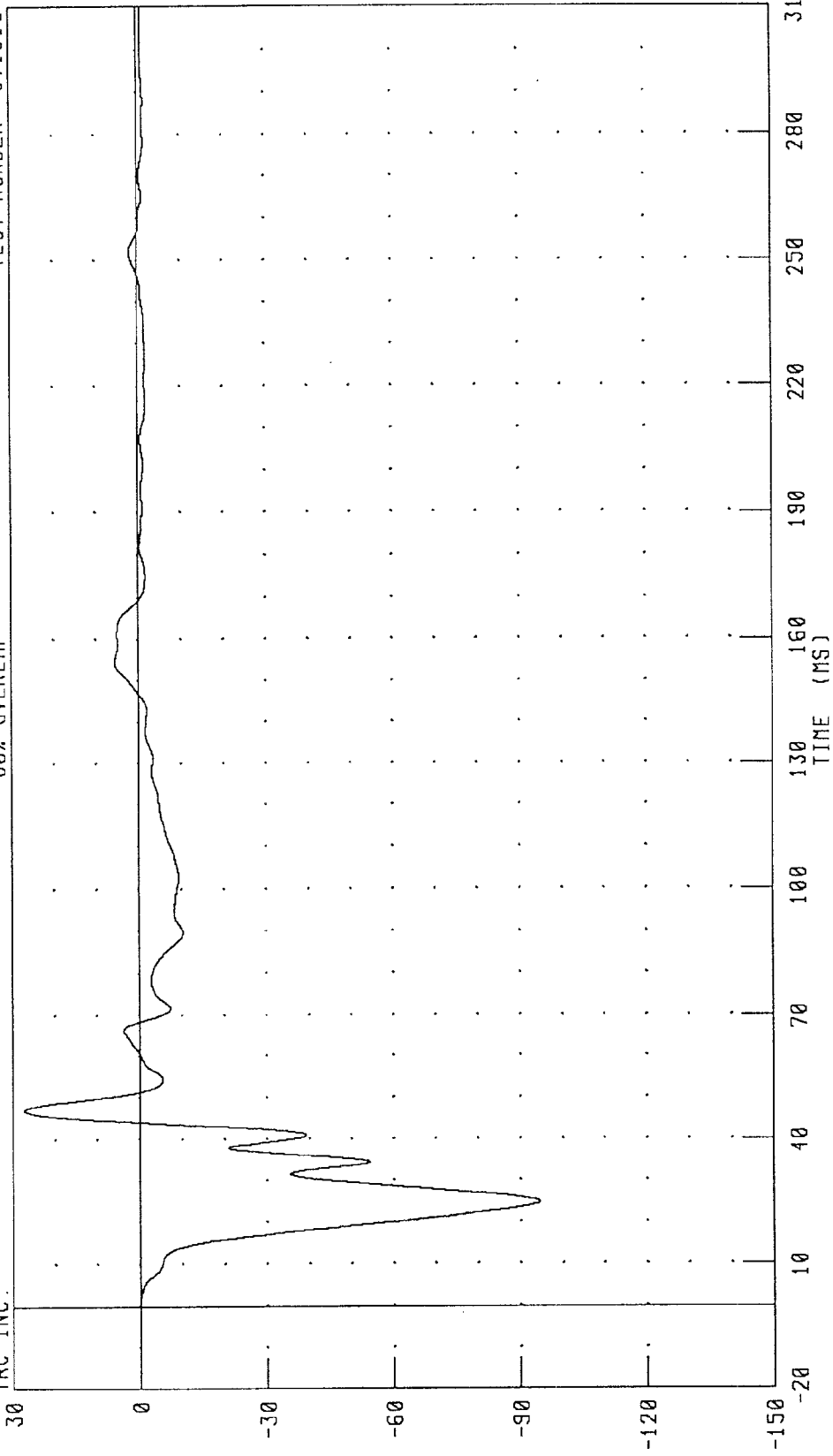
-60

-90

-120

-150

ACCELERATION (G)



PEAK DATA: 27.20 G @ 47.12 MS; -94.65 G @ 24.80 MS

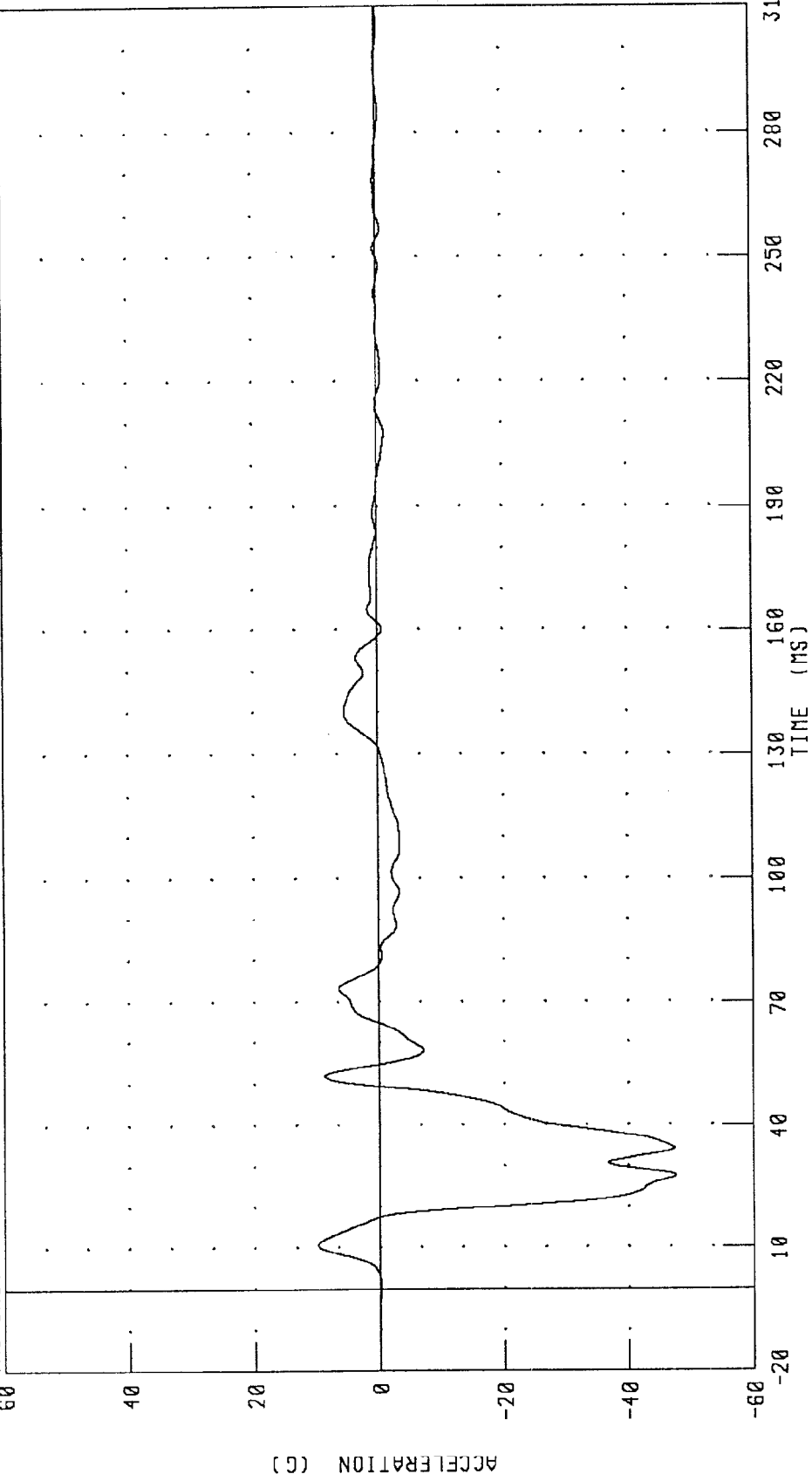
CHANNEL: ENGXC3 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
ENGINE BOTTOM Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: ENYG3 FILTER: CH. CLASS 60

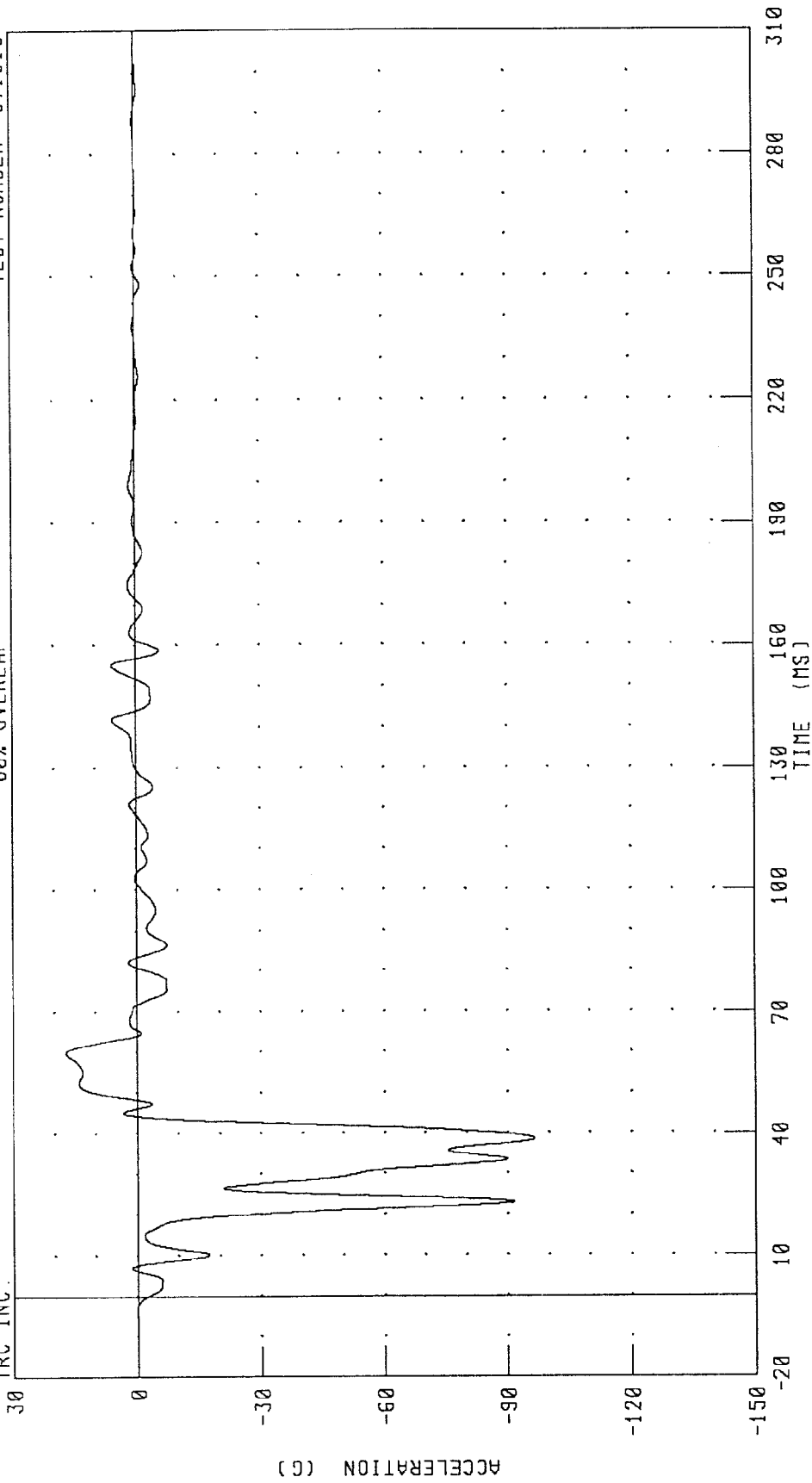
PEAK DATA: 9.93 G @ 10.64 MS, -47.54 G @ 27.68 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 LEFT FRONT FRAME RAIL X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



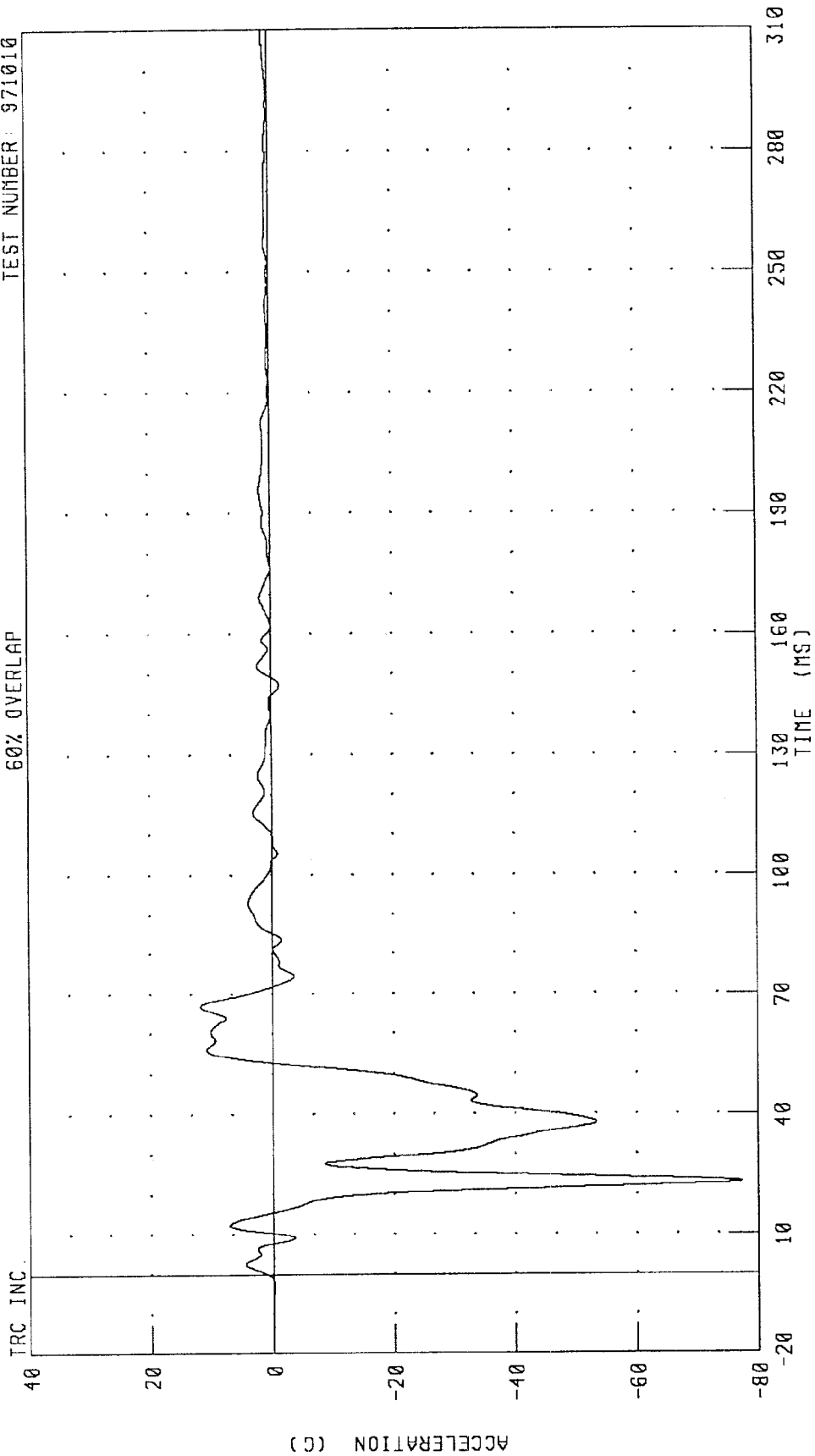
PEAK DATA: 17.15 G @ 59.92 MS; -96.65 G @ 38.64 MS

CHANNEL: LFFXG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT FRONT FRAME RAIL Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



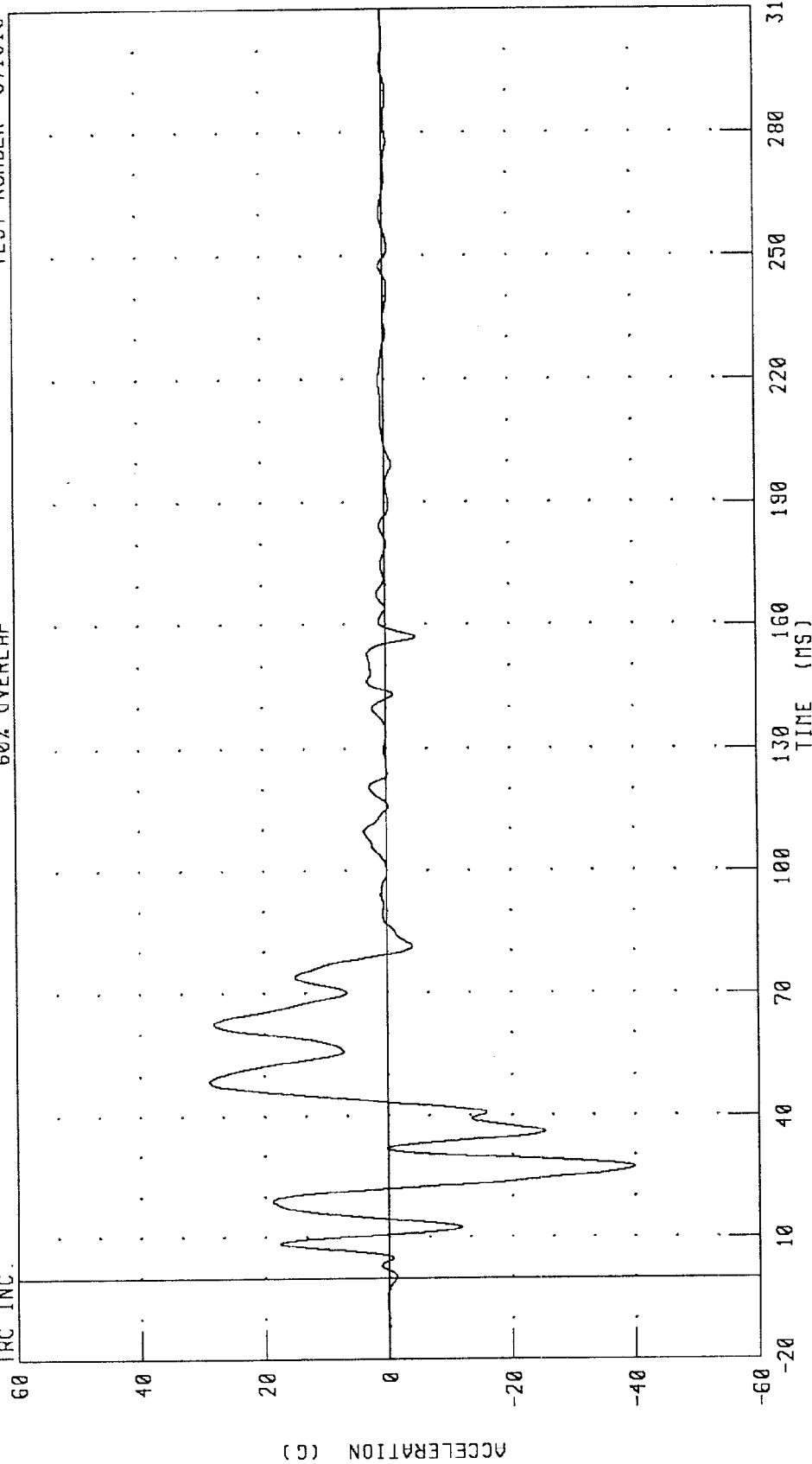
CHANNEL: LFFYG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
LEFT FRONT FRAME RAIL Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: LFFZG1 FILTER: CH. CLASS 60

PEAK DATA: 28.92 G @ 48.80 MS; -39.91 G @ 27.20 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 LEFT FRONT FRAME RAIL X-AXIS RESULTANT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

120

100

80

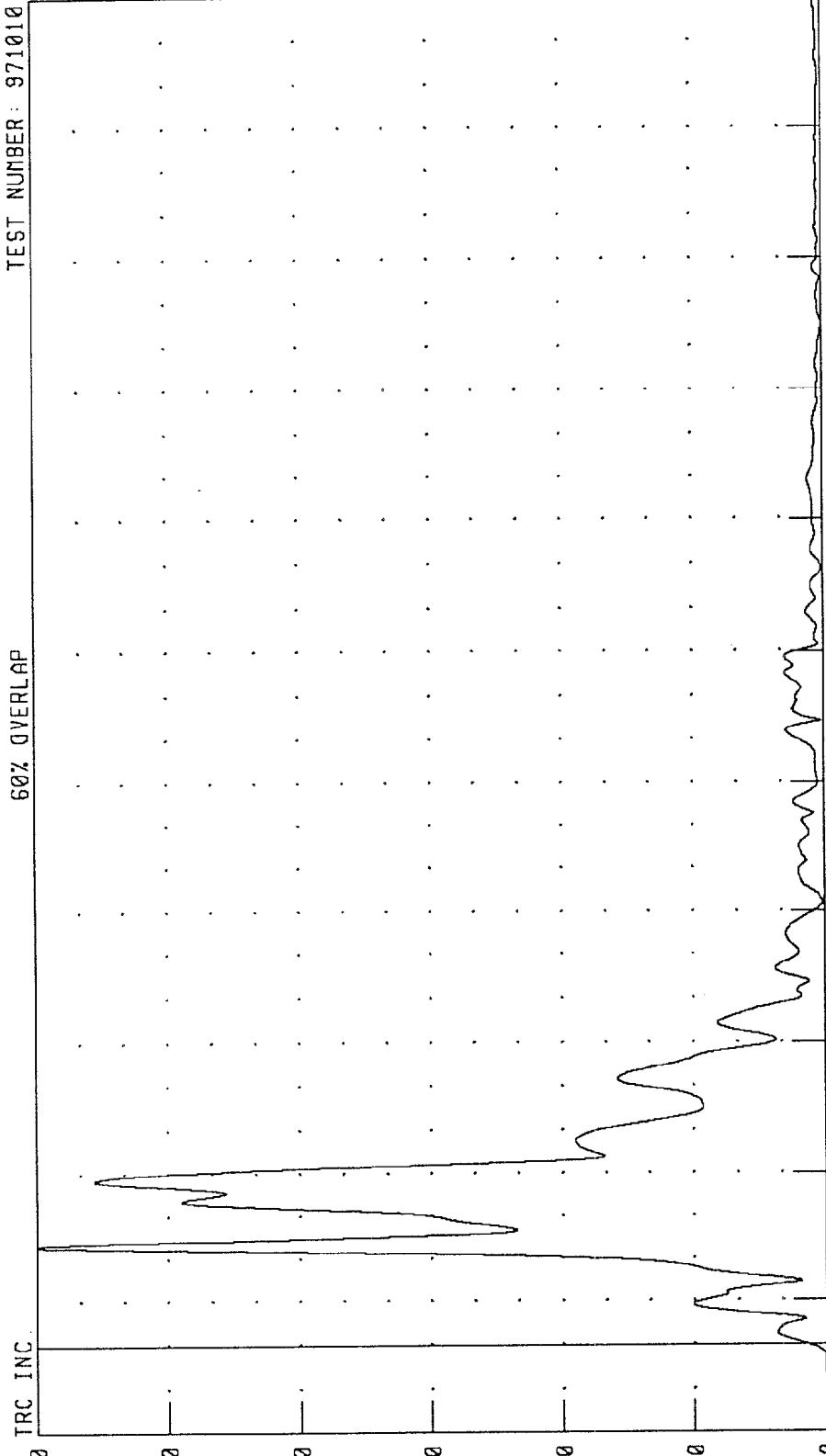
60

40

20

0

ACCELERATION (G)



TIME (MS)

100

70

40

10

-20

310

PEAK DATA: 120.46 G @ 23.12 MS; 0.03 G @ -20.00 MS

CHANNEL: LFRC1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT FRAME RAIL X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

10

ACCELERATION (G)

-20

-50

-80

-110

-140

-170

TIME (MS)

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

180

190

200

210

220

230

240

250

260

270

280

290

300

310

320

330

340

350

360

370

380

390

400

410

420

430

440

450

460

470

480

490

500

510

520

530

540

550

560

570

580

590

600

610

620

630

640

650

660

670

680

690

700

710

720

730

740

750

760

770

780

790

800

810

820

830

840

850

860

870

880

890

900

910

920

930

940

950

960

970

980

990

1000

1010

1020

1030

1040

1050

1060

1070

1080

1090

1100

1110

1120

1130

1140

1150

1160

1170

1180

1190

1200

1210

1220

1230

1240

1250

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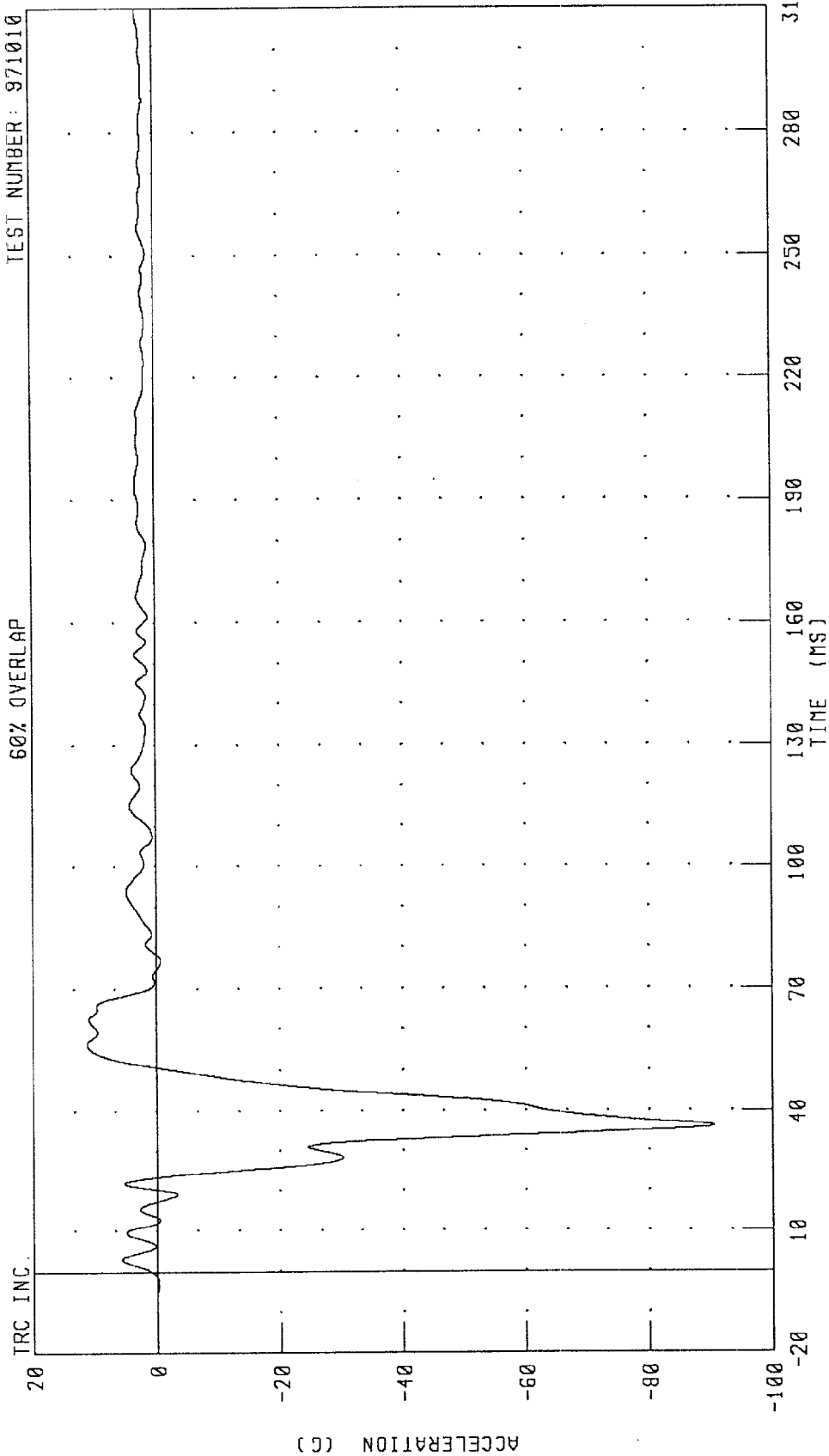
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70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT FRAME RAIL Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP



CHANNEL: RFFYG1 FILTER: CH. CLASS 60

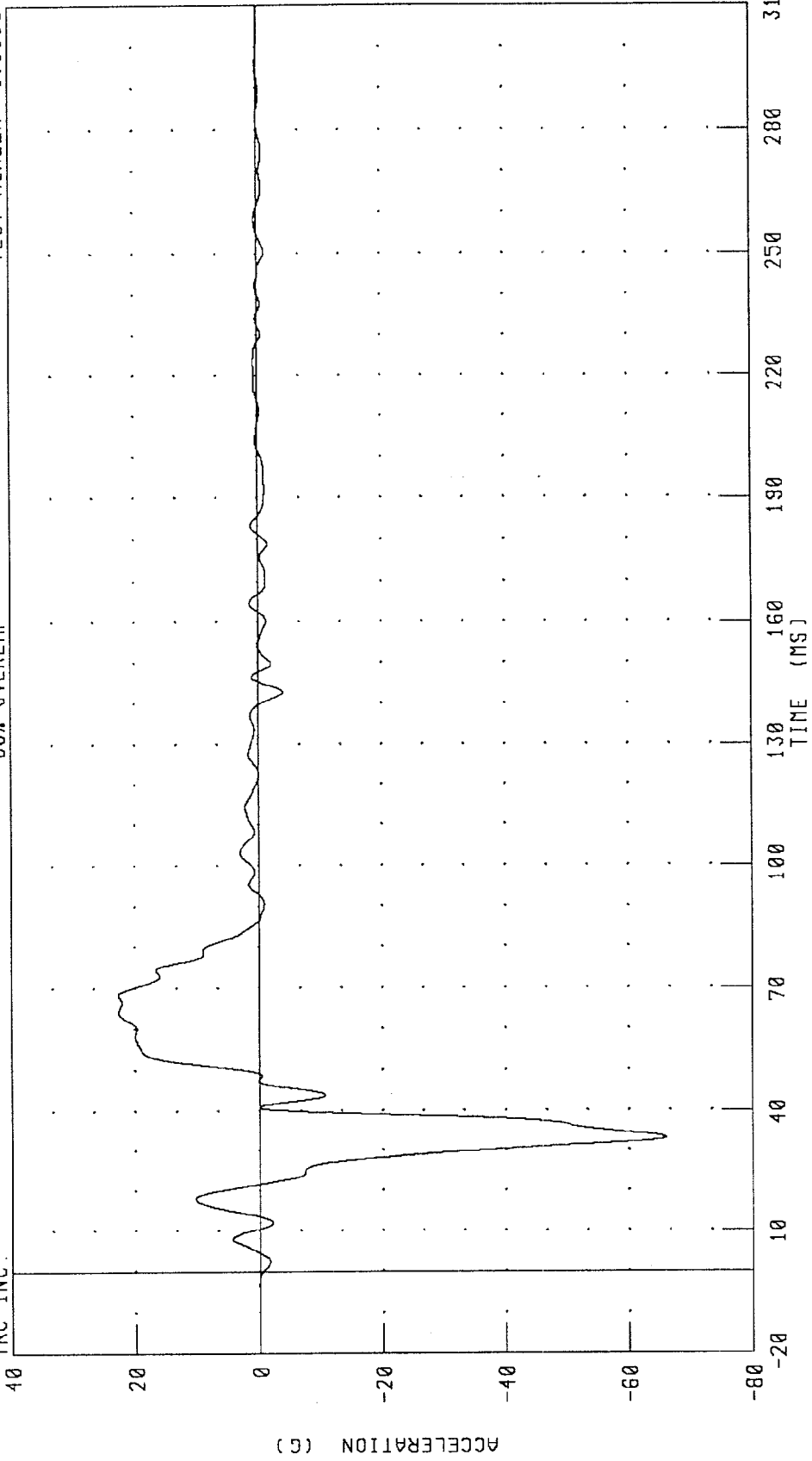
PEAK DATA: 11.18 G @ 56.32 MS; -90.49 G @ 36.08 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT FRAME RAIL Z-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: RFFZG1 FILTER: CH. CLASS 60

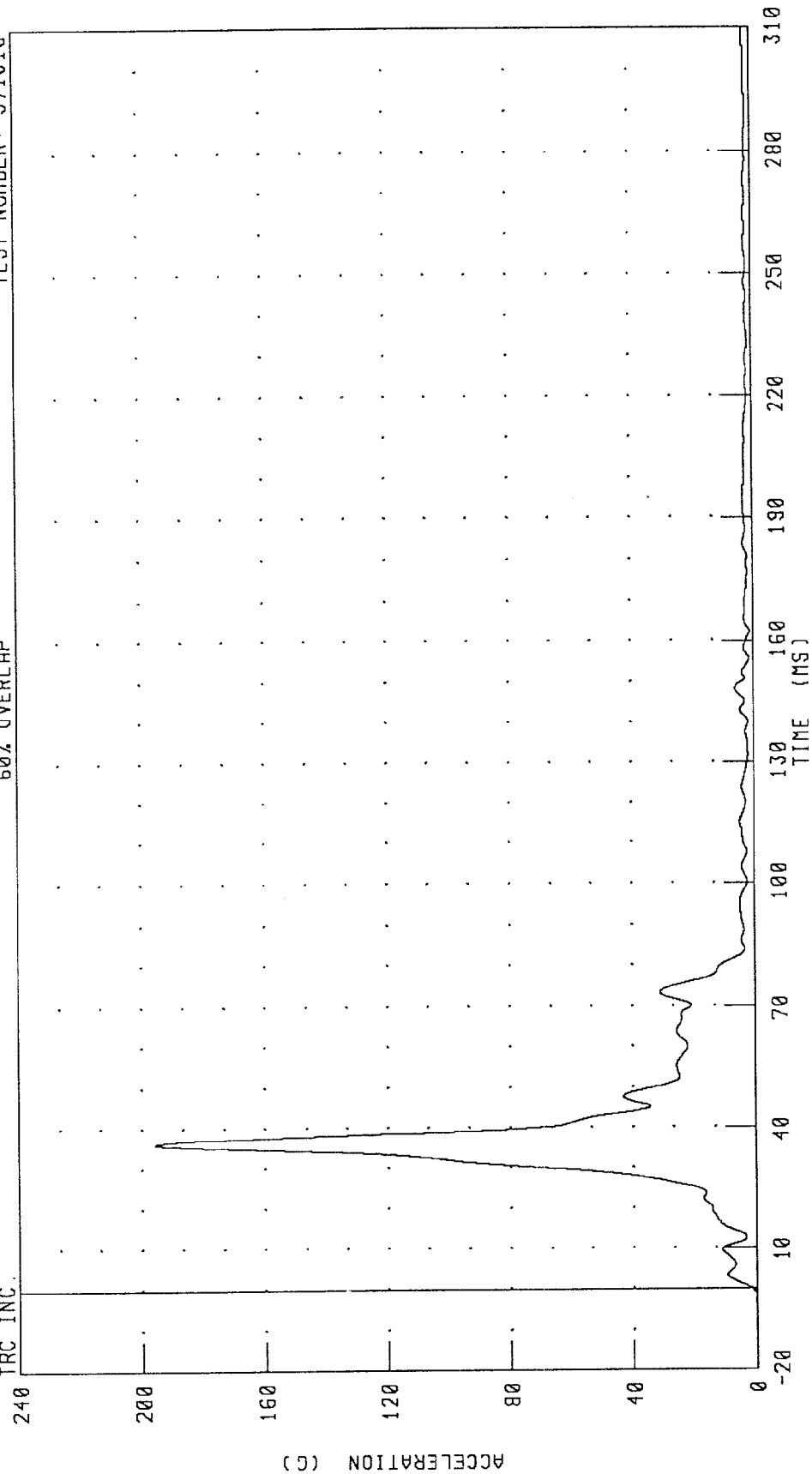
PEAK DATA: 22.76 G @ 68.40 MS; -66.01 G @ 33.12 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
RIGHT FRONT FRAME RAIL RESULTANT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 195.62 G @ 36.16 MS; 0.00 G @ -7.20 MS

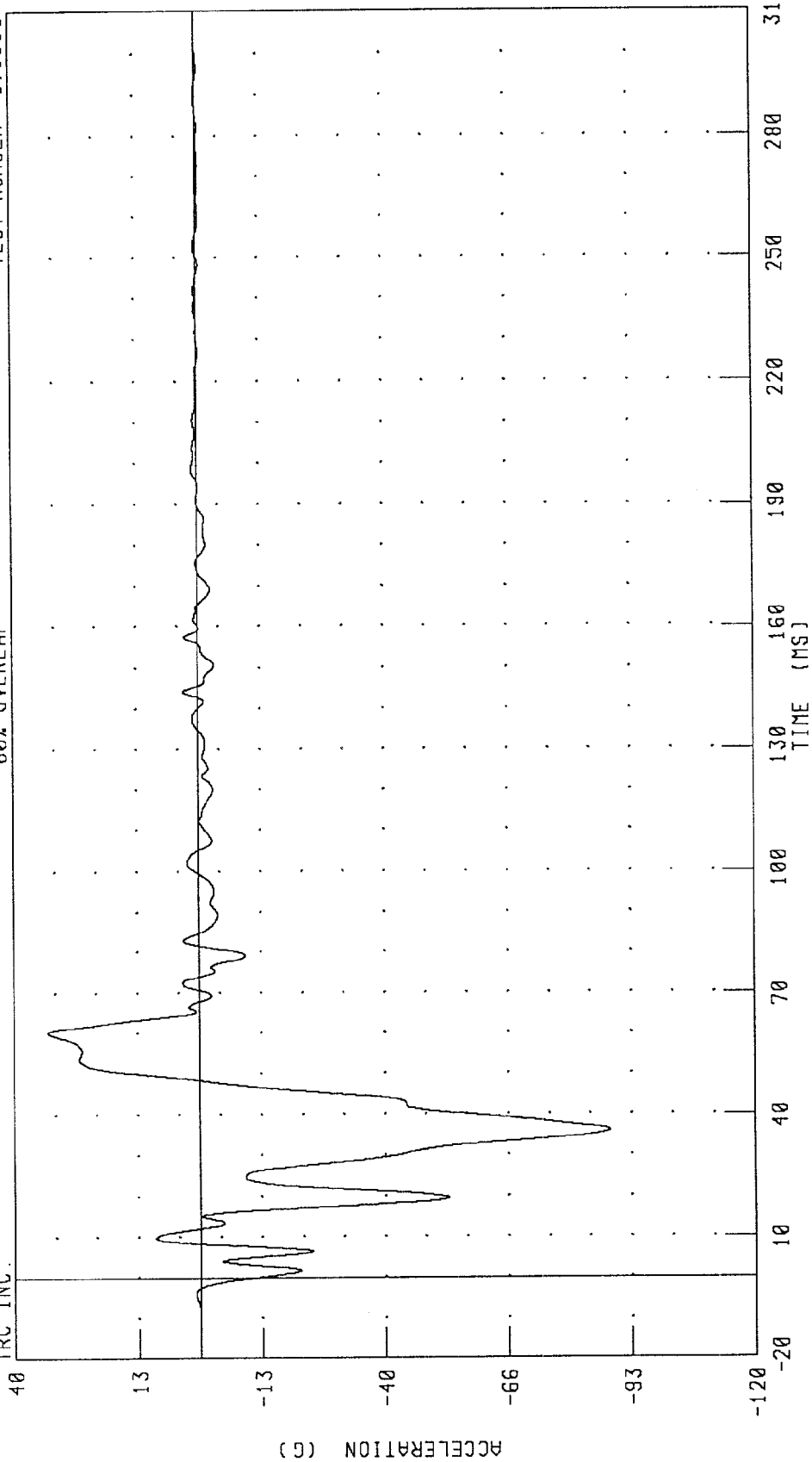
CHANNEL: RFFRG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 TOE PAN X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

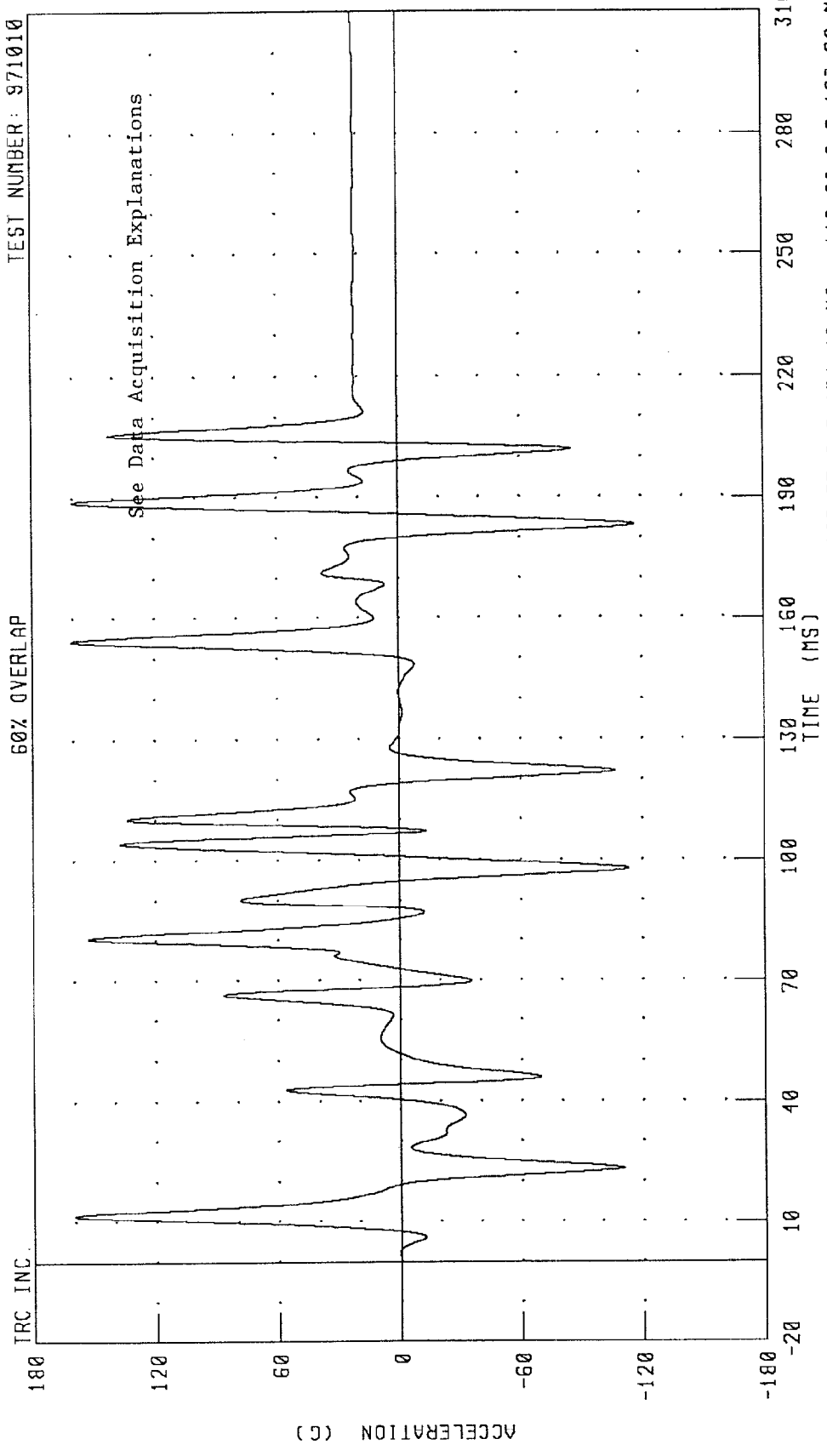


CHANNEL: TOEXG1 FILTER: CH. CLASS 60

PEAK DATA: 32.67 G @ 60.16 MS; -88.72 G @ 36.16 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 TOE PAN Y-AXIS ACCELERATION
 60% OVERLAP

TEST NUMBER: 971010



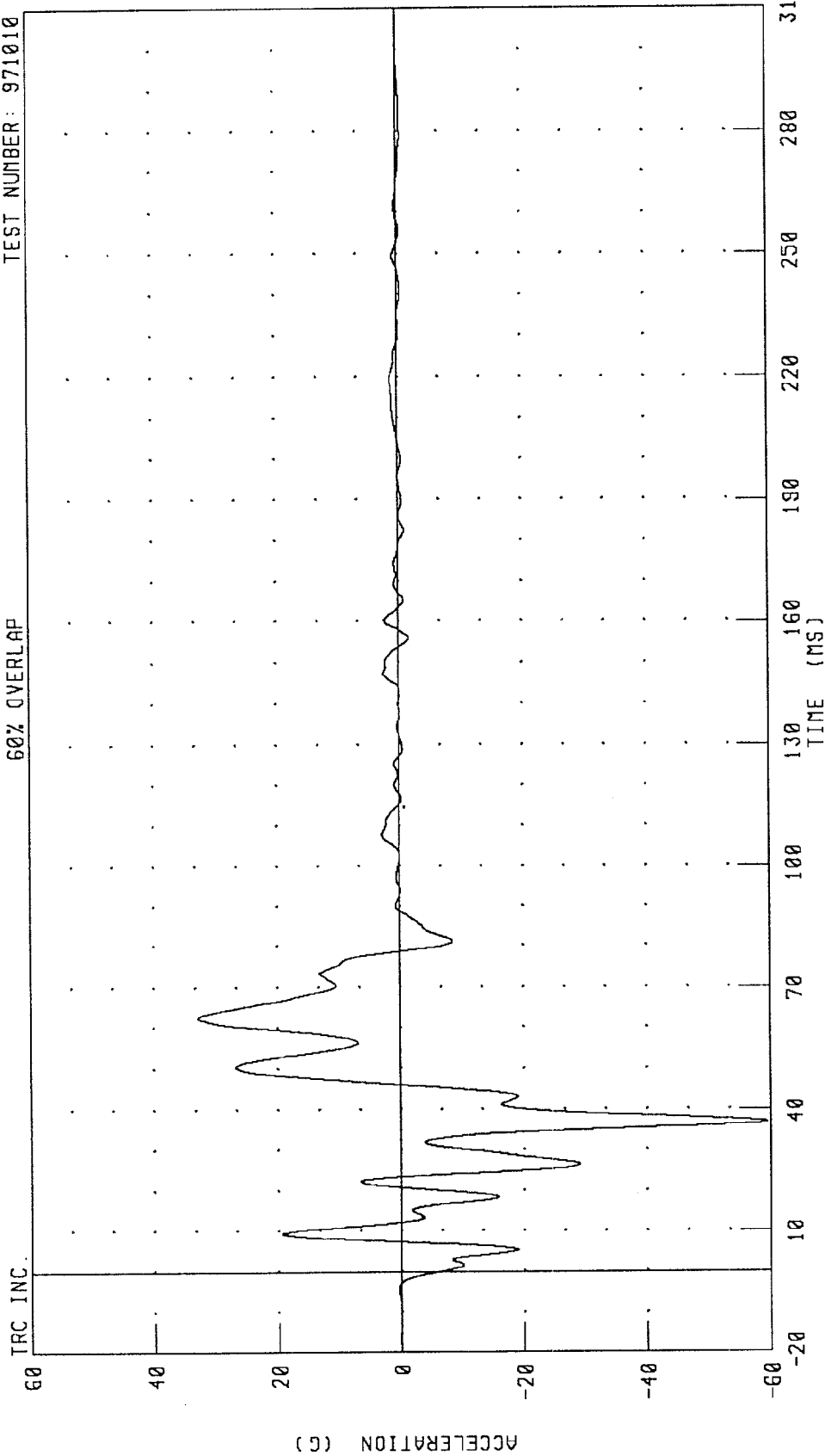
PEAK DATA: 160.73 G @ 154.48 MS; -116.60 G @ 183.20 MS

CHANNEL: TOEY01 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 TOE PAN Z-AXIS ACCELERATION

TEST NUMBER: 971010

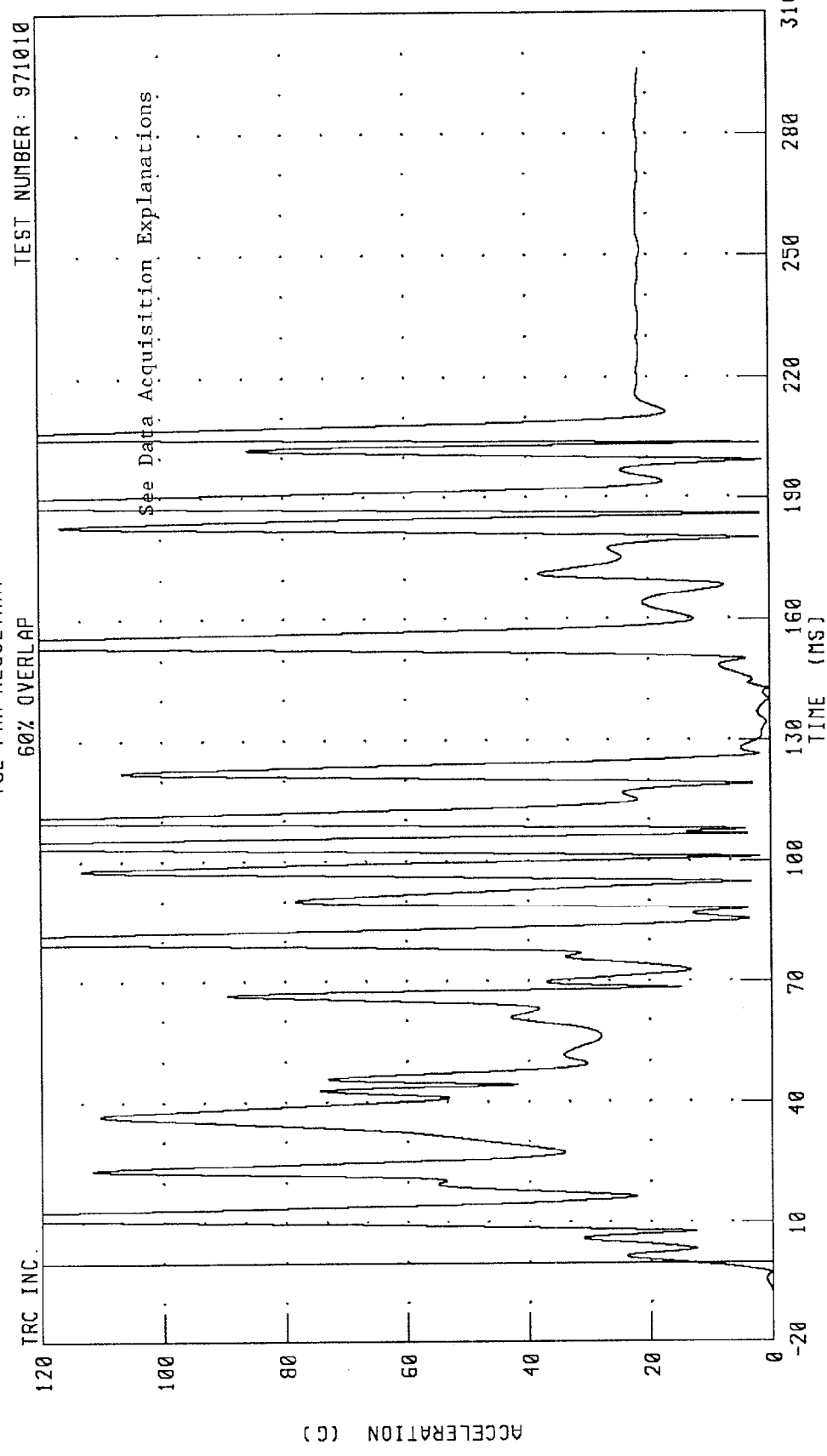
60% OVERLAP



CHANNEL: TOEZG1 FILTER: CH. CLASS 60

PEAK DATA: 32.83 G @ 62.48 MS; -59.39 G @ 36.88 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
TOE PAN RESULTANT



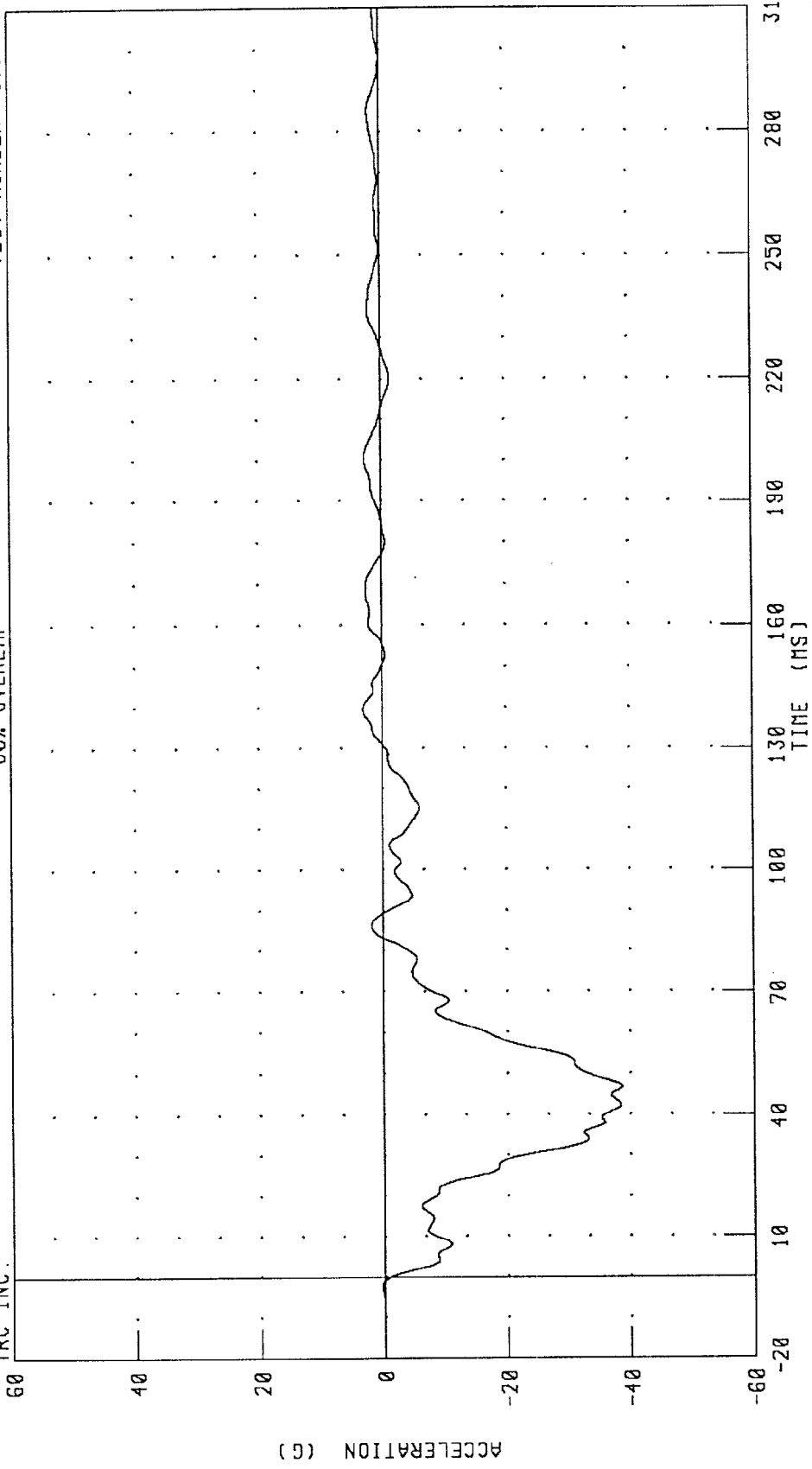
CHANNEL: TOERG1 FILTER: CH. CLASS 60 PEAK DATA: 160.74 G @ 154.48 MS; 0.01 G @ -11.60 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
REAR COMPARTMENT CENTER X-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



CHANNEL: RCCXG1 FILTER: CH. CLASS 60

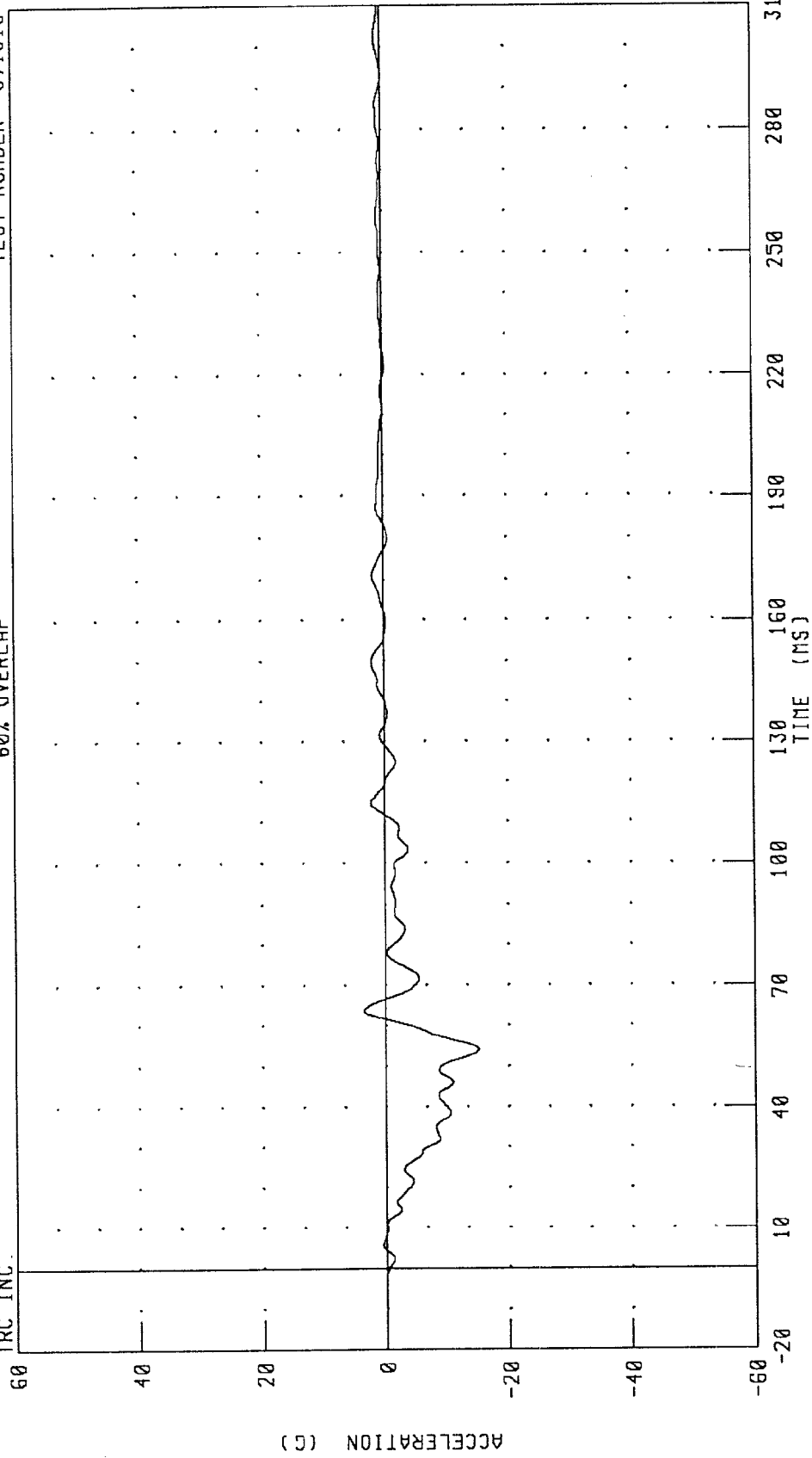
PEAK DATA: 3.17 G @ 139.60 MS; -38.72 G @ 46.72 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
REAR COMPARTMENT CENTER Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



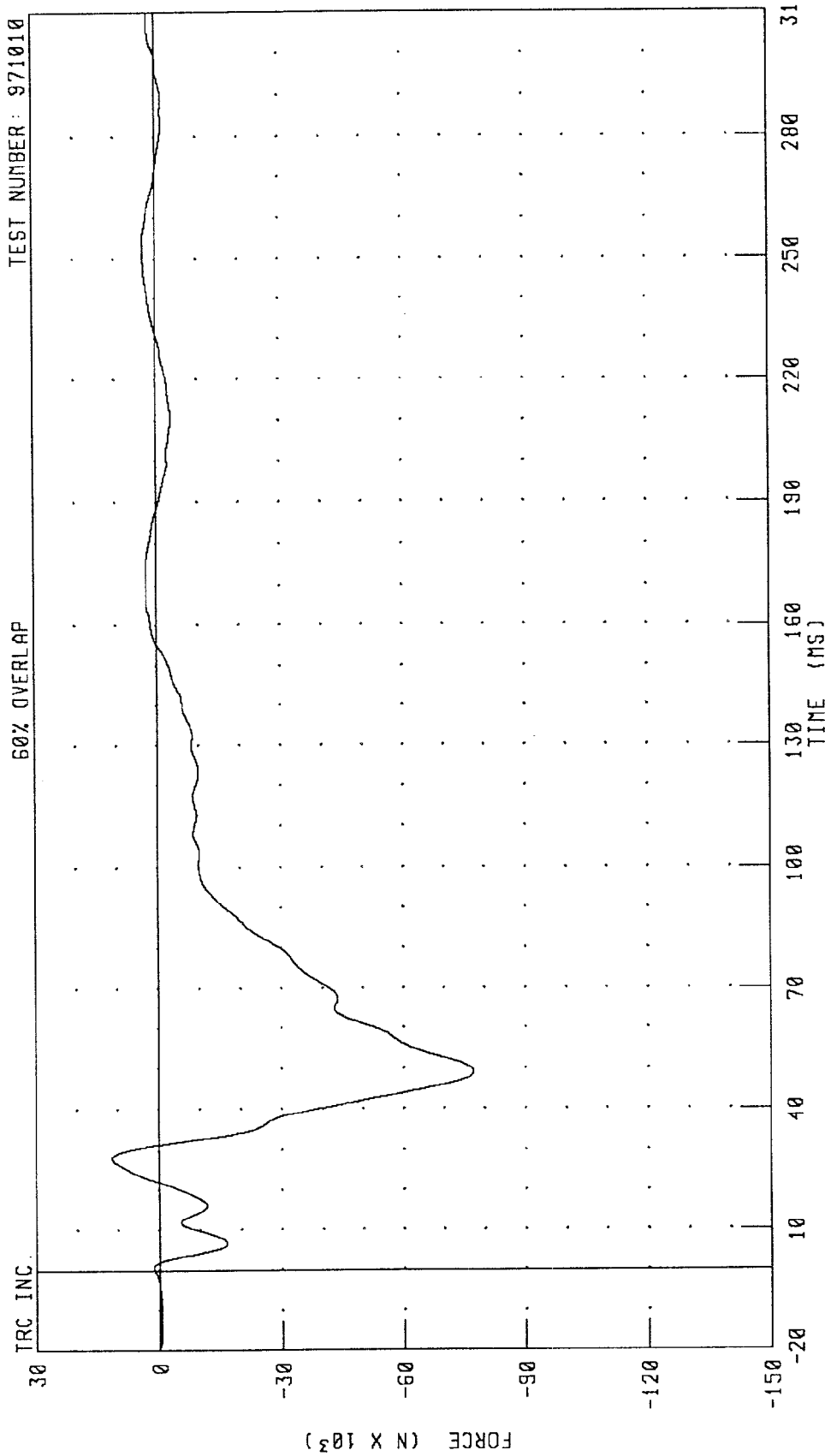
PEAK DATA: 3.60 G @ 63.76 MS; -15.15 G @ 54.08 MS

CHANNEL: RCCYG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 BARRIER FRONT TOP LEFT FORCE

TEST NUMBER: 971010

60% OVERLAP



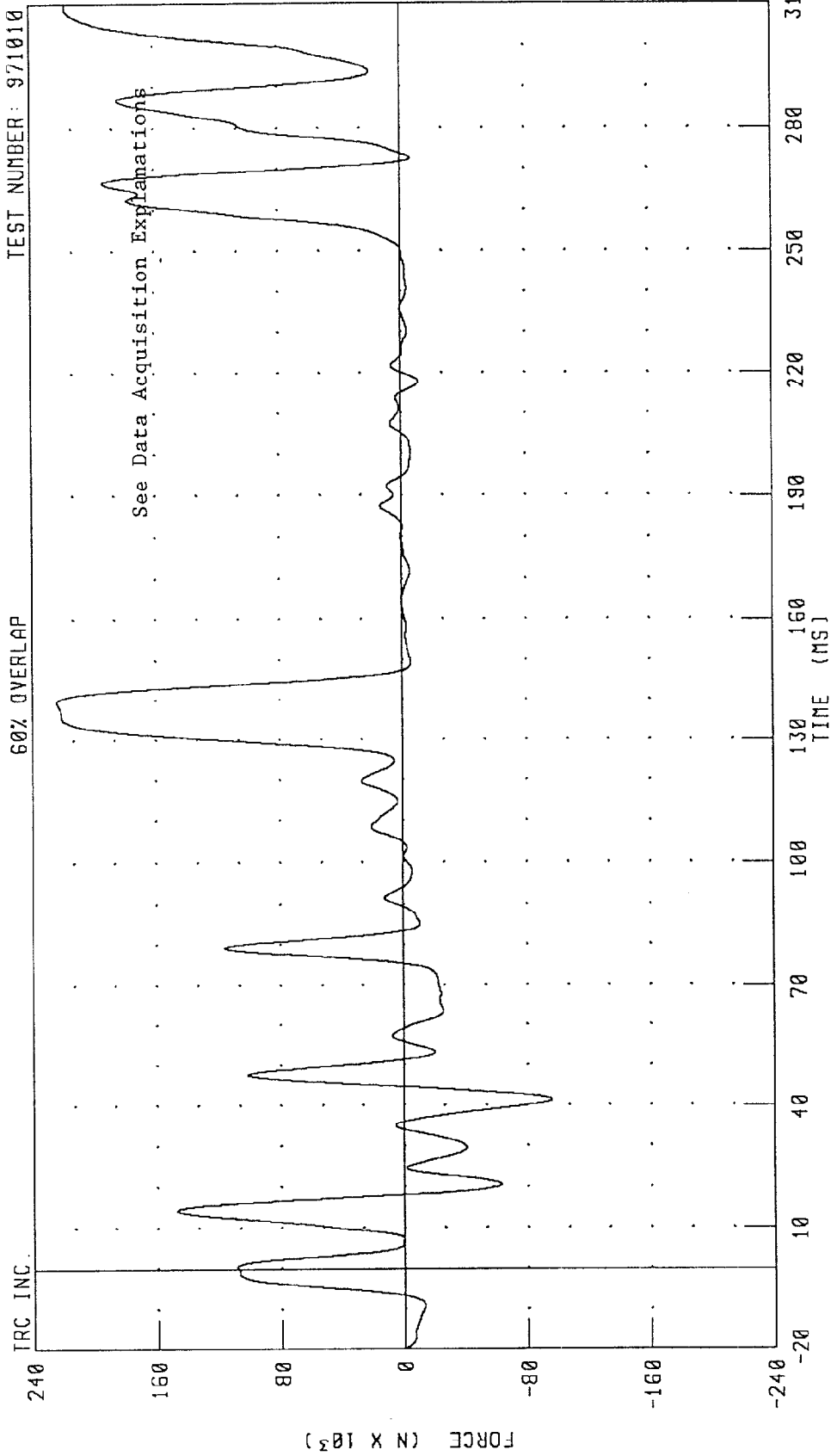
PEAK DATA: 11445.57 N @ 28.16 MS; -77260.09 N @ 49.04 MS

CHANNEL: BFFXF1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
BARRIER FRONT BOTTOM LEFT FORCE

TEST NUMBER: 971010

60% OVERLAP



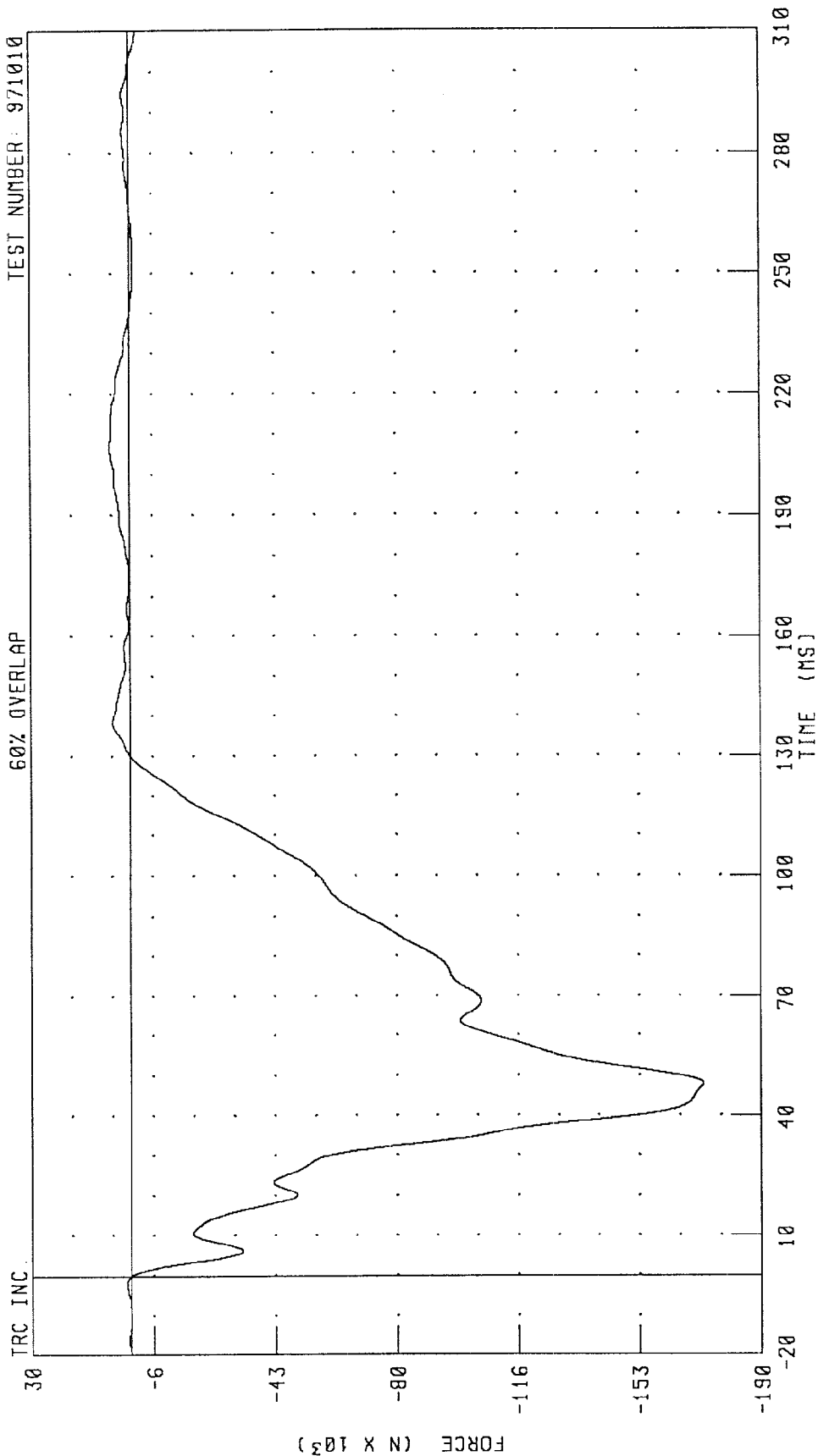
PEAK DATA: 223959.52 N @ 139.52 MS; -95764.14 N @ 41.36 MS

CHANNEL: BFFXF2 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 BARRIER FRONT BOTTOM RIGHT FORCE

TEST NUMBER: 971010

60% OVERLAP

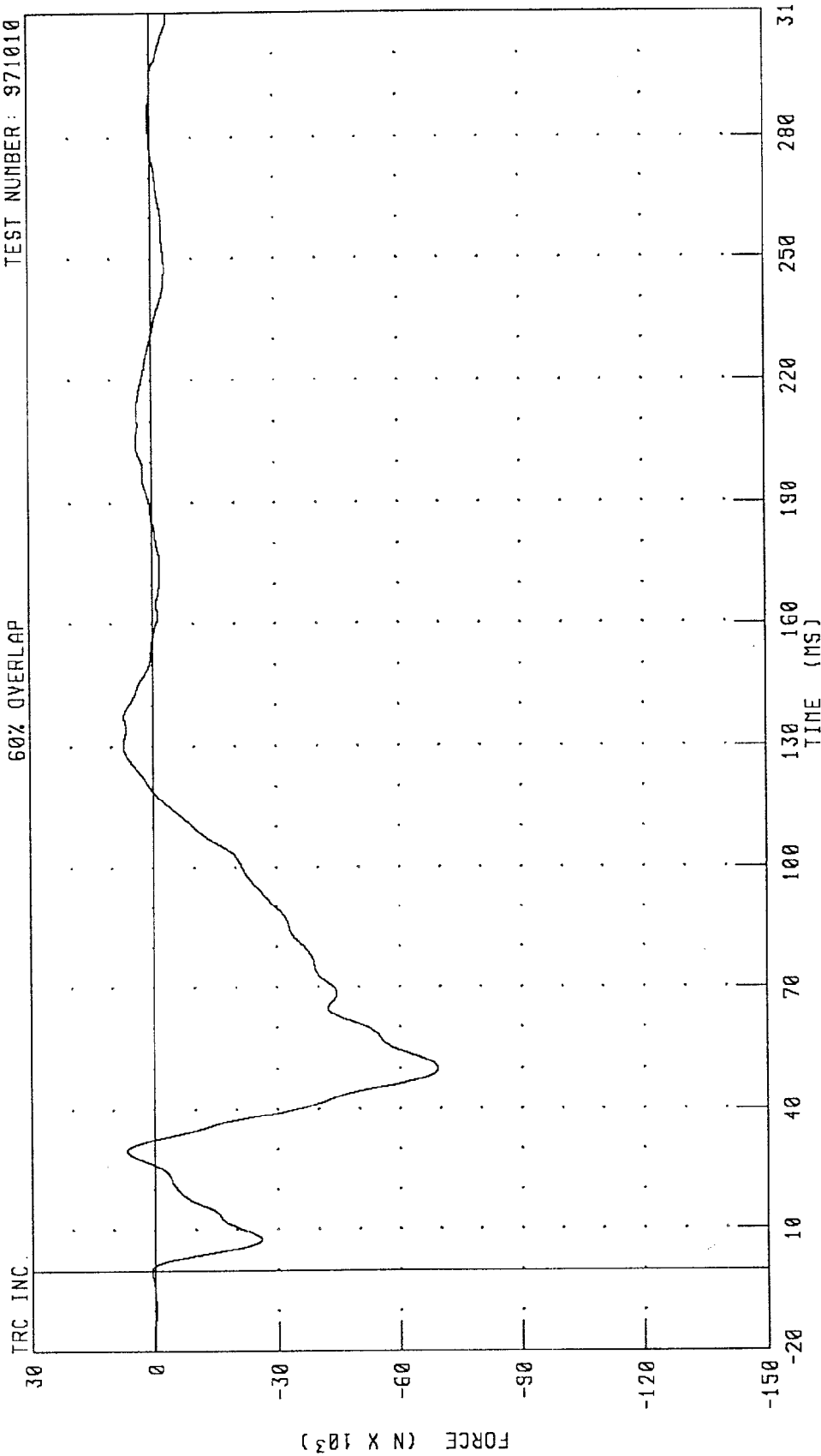


PEAK DATA: 6026.36 N @ 207.04 MS; -172558.58 N @ 47.92 MS

CHANNEL: BFFXF3 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 BARRIER FRONT TOP RIGHT FORCE

60% OVERLAP TEST NUMBER: 971010



PEAK DATA: 7198.64 N @ 130.32 MS; -69454.84 N @ 49.92 MS

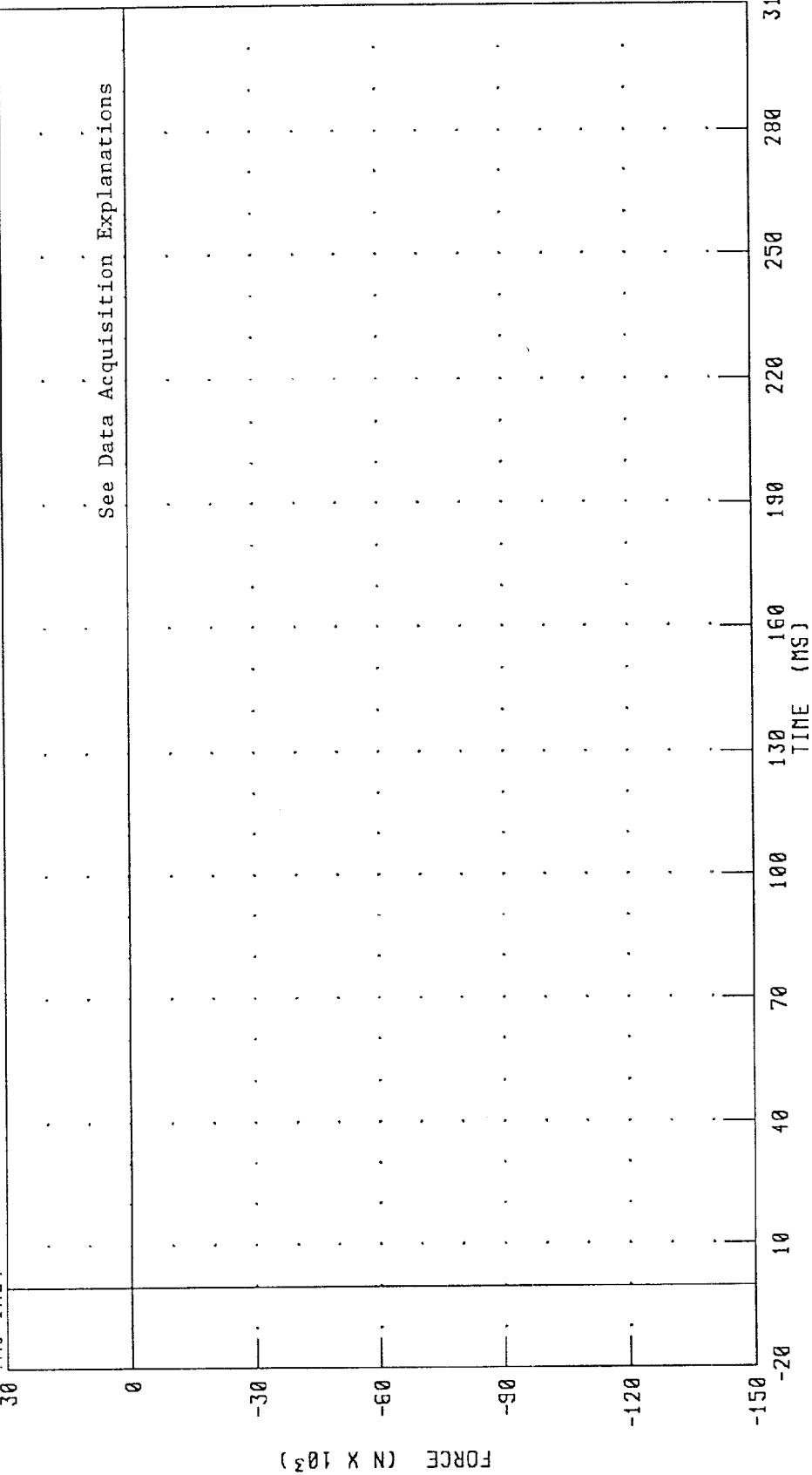
CHANNEL: BFFXF4 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
 BARRIER FRONT CENTER FORCE

TEST NUMBER: 971010

60% OVERLAP

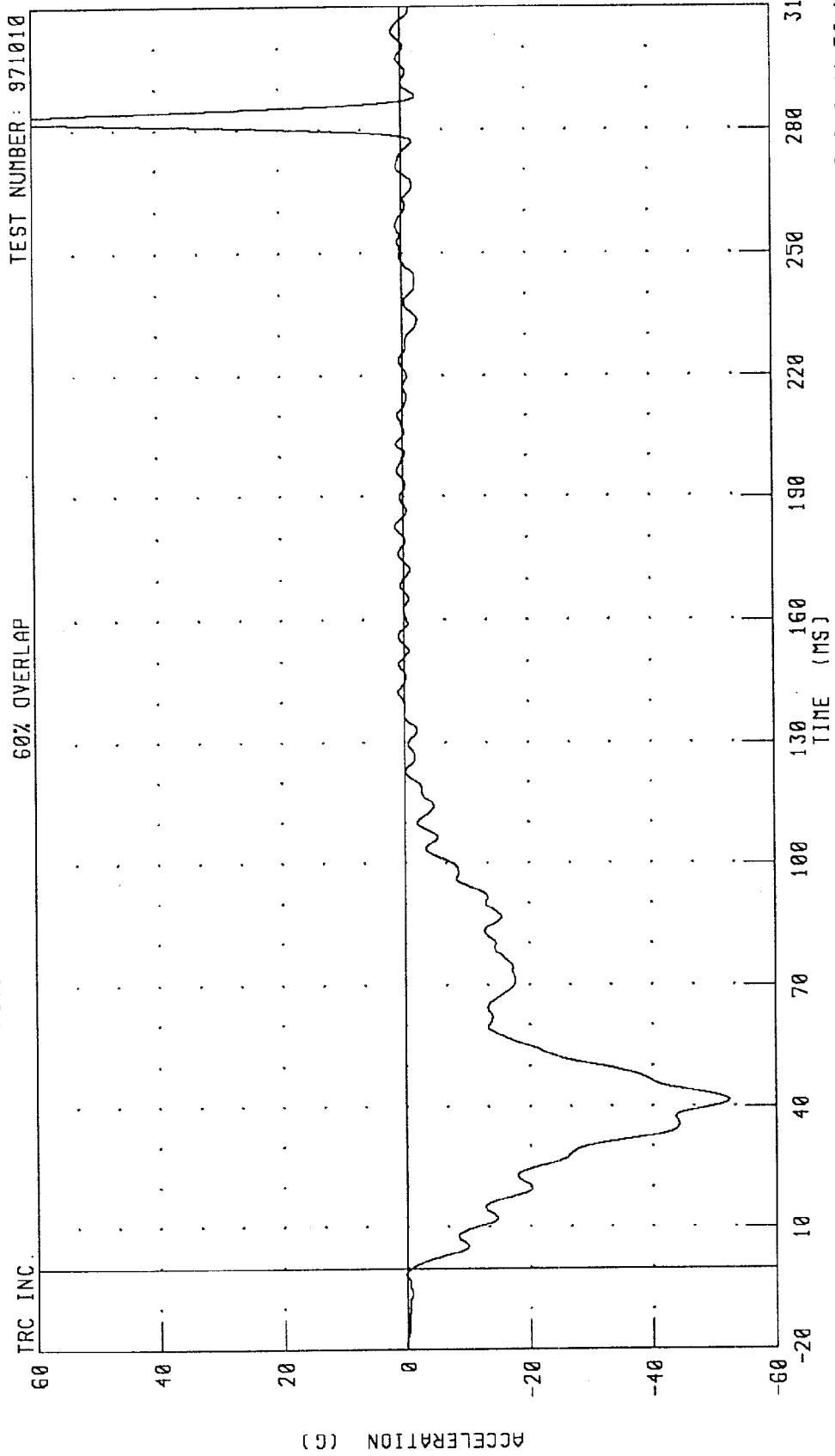
TRC INC.



PEAK DATA: 0.00 N @ 310.00 MS; 0.00 N @ -20.00 MS

CHANNEL: BFFXF5 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
MOVING BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION



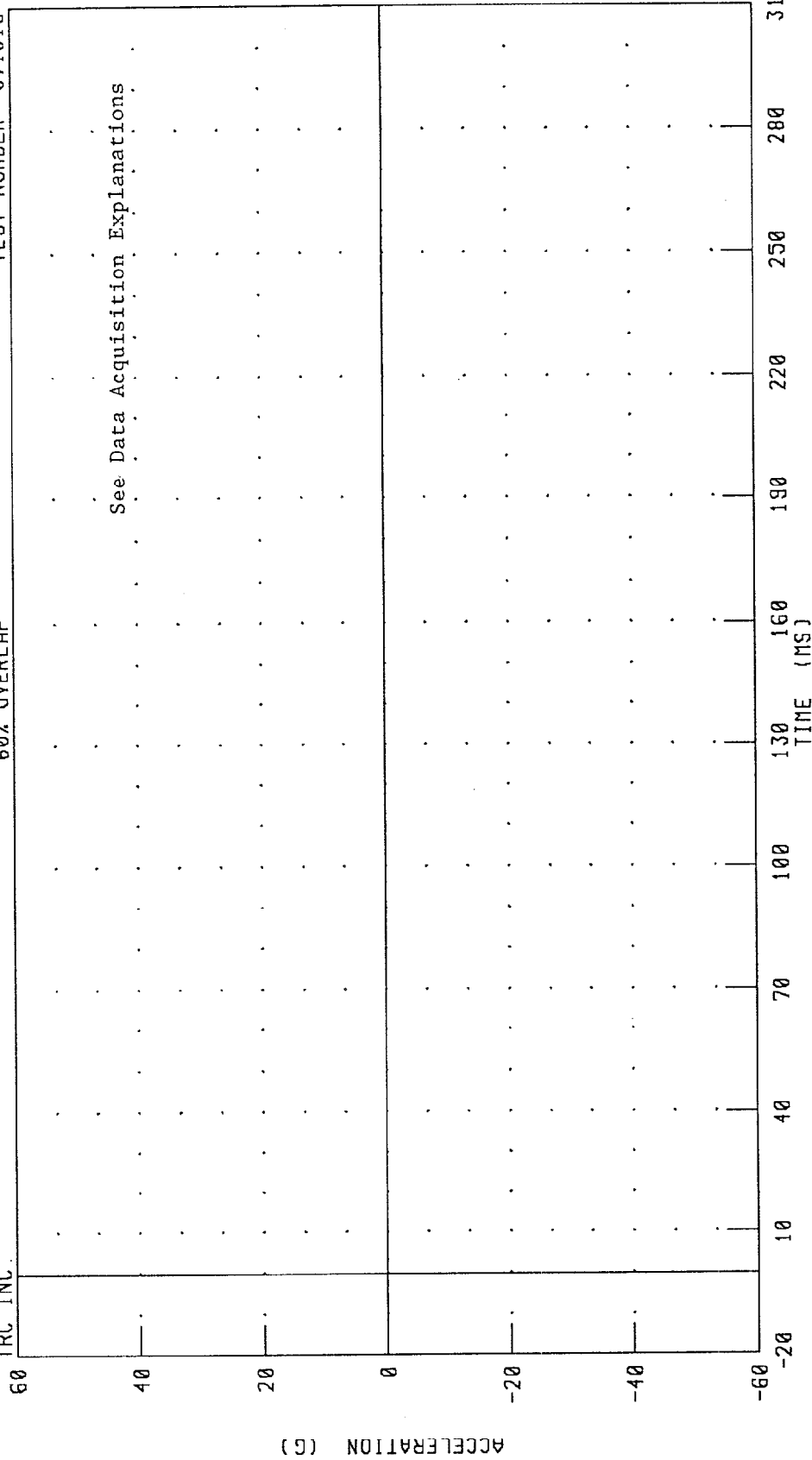
CHANNEL: BCGXG1 FILTER: CH. CLASS 60

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
MOVING BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION

TEST NUMBER: 971010

60% OVERLAP

TRC INC.

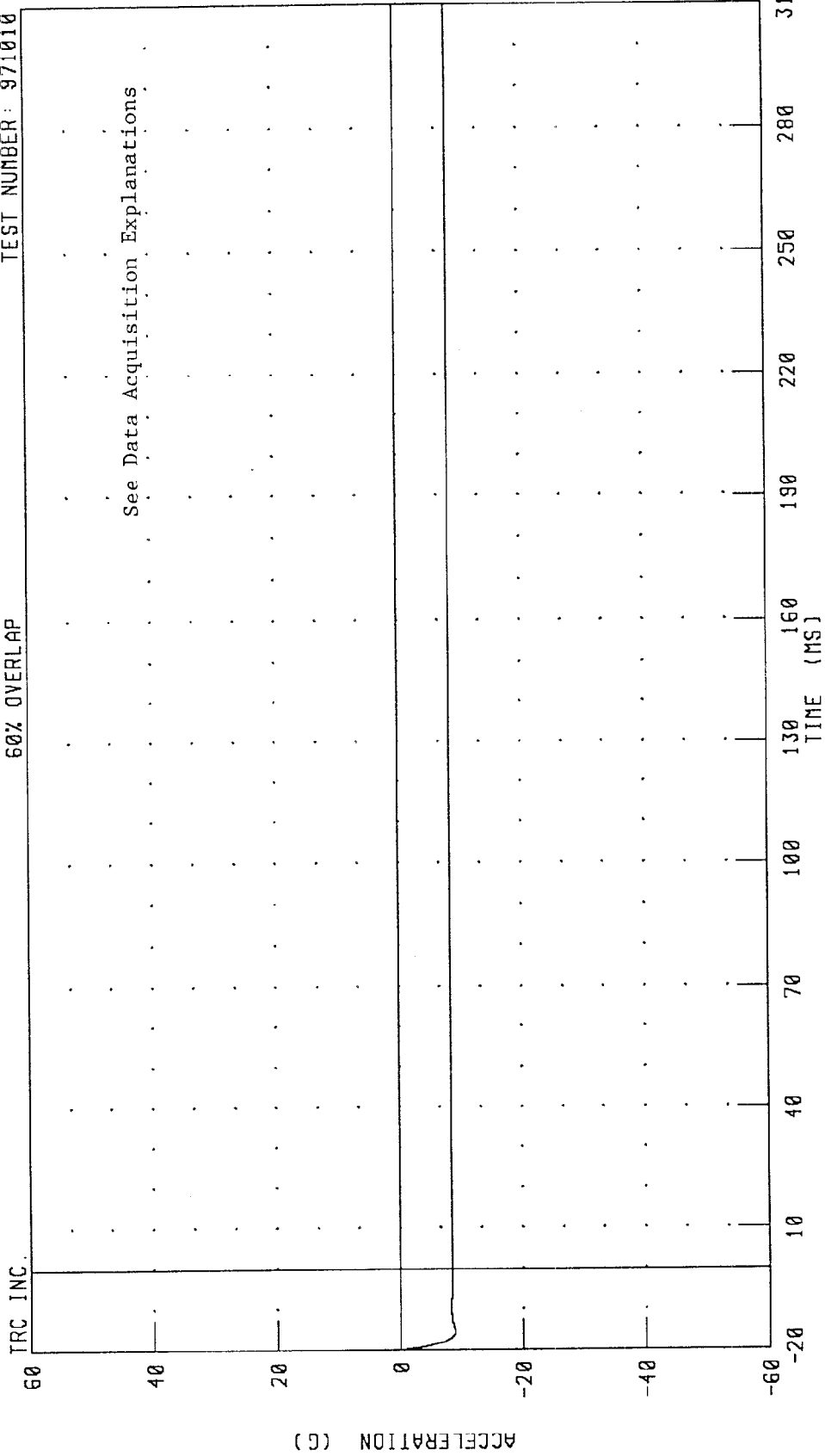


CHANNEL: BCCYG1 FILTER: CH. CLASS 60

PEAK DATA: 0.00 G @ 310.00 MS, 0.00 G @ -20.00 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
MOVING BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION

TEST NUMBER: 971010



CHANNEL: BCGZG1 FILTER: CH. CLASS 60

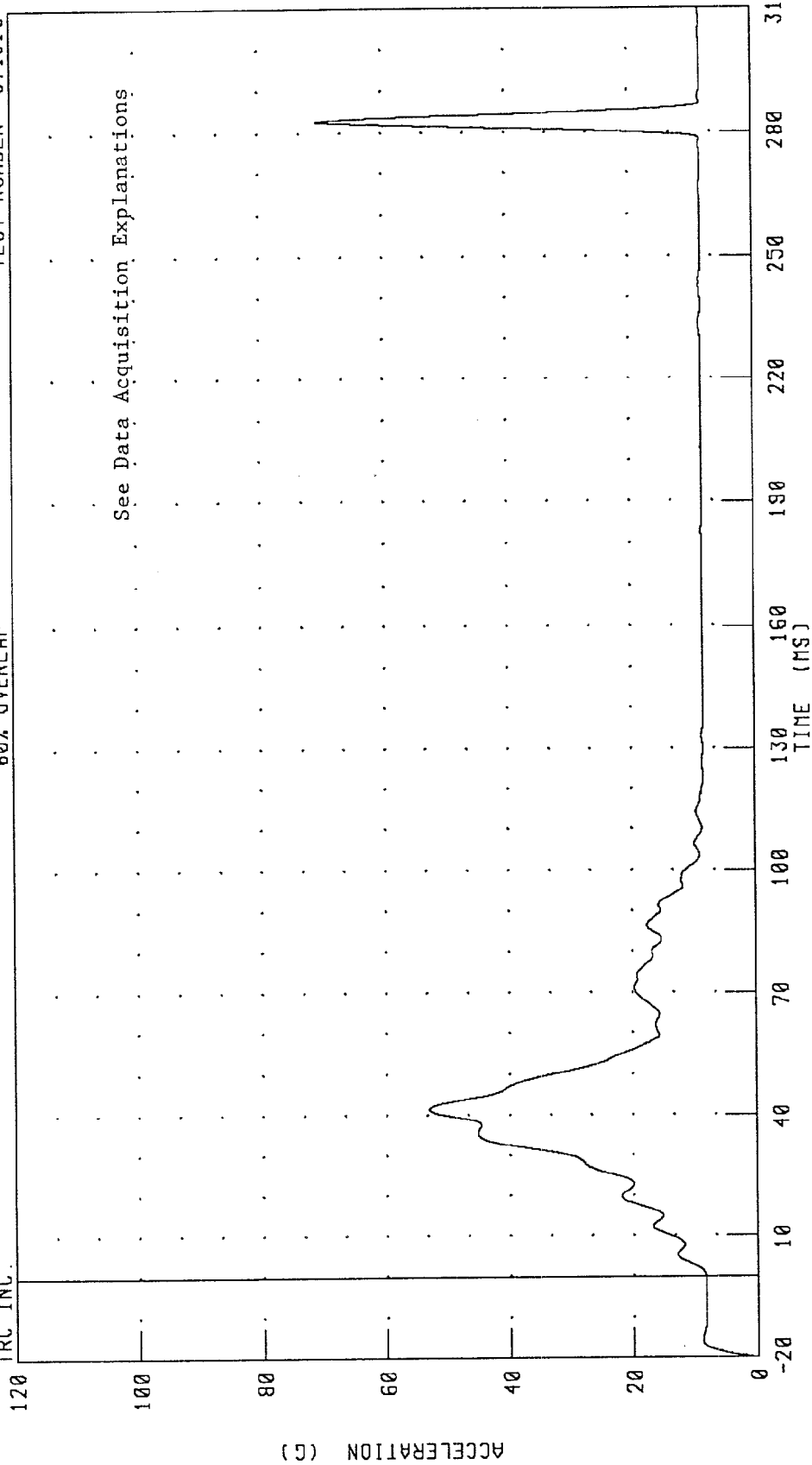
PEAK DATA: -0.19 G @ -20.00 MS; -8.94 G @ -15.76 MS

70 MPH MOVING DEFORMABLE BARRIER INTO 1996 CHEVROLET CAVALIER (25 DEGREE 60% OVERLAP)
MOVING BARRIER CENTER OF GRAVITY RESULTANT

TEST NUMBER: 971010

60% OVERLAP

TRC INC.



PEAK DATA: 70.44 G @ 282.72 MS; 0.21 G @ -20.00 MS

CHANNEL: BCG01 FILTER: CH. CLASS 60

Appendix C

Dummy Calibration Information

Pre-Test Calibration

Serial Number 110

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III EXTERNAL DIMENSIONS

SN110 VECTOR

07-OCT-97

TRC INC.

TEST NO: 110C5ED1

572E SN110 EXT.DIMENSION CAL05

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	859. MM
CHEST DEPTH (O)		213 - 229 MM	221. 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	145. MM
BUTTOCK KNEE LENGTH (K)		579 - 605 MM	602. MM
BUTTOCK POPLITEAL LENGTH (N)		452 - 478 MM	457. MM
POPLITEAL HEIGHT (L)		429 - 455 MM	452. MM
KNEE PIVOT HEIGHT (M)		485 - 500 MM	488. MM
FOOT LENGTH (P)		252 - 267 MM	262. MM
FOOT BREADTH (W)		91 - 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE (E)		84 - 94 MM	91. MM
SHOULDER BREADTH (V)		422 - 437 MM	424. MM
SHOULDER PIVOT HEIGHT (B)		506 - 521 MM	508. MM
ELBOW REST HEIGHT (J)		191 - 211 MM	201. 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

Ray C. Holt

RUN NUMBER: 111297.1251

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

TRC INC.

TEST NO: 110C5HD1

572E SN110 HEAD DROP CAL 05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	41.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	266.03 G
PEAK LATERAL ACCELERATION	15 G MAX	-5.40 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

Ben Cult

RUN NUMBER: 100397.1028;1

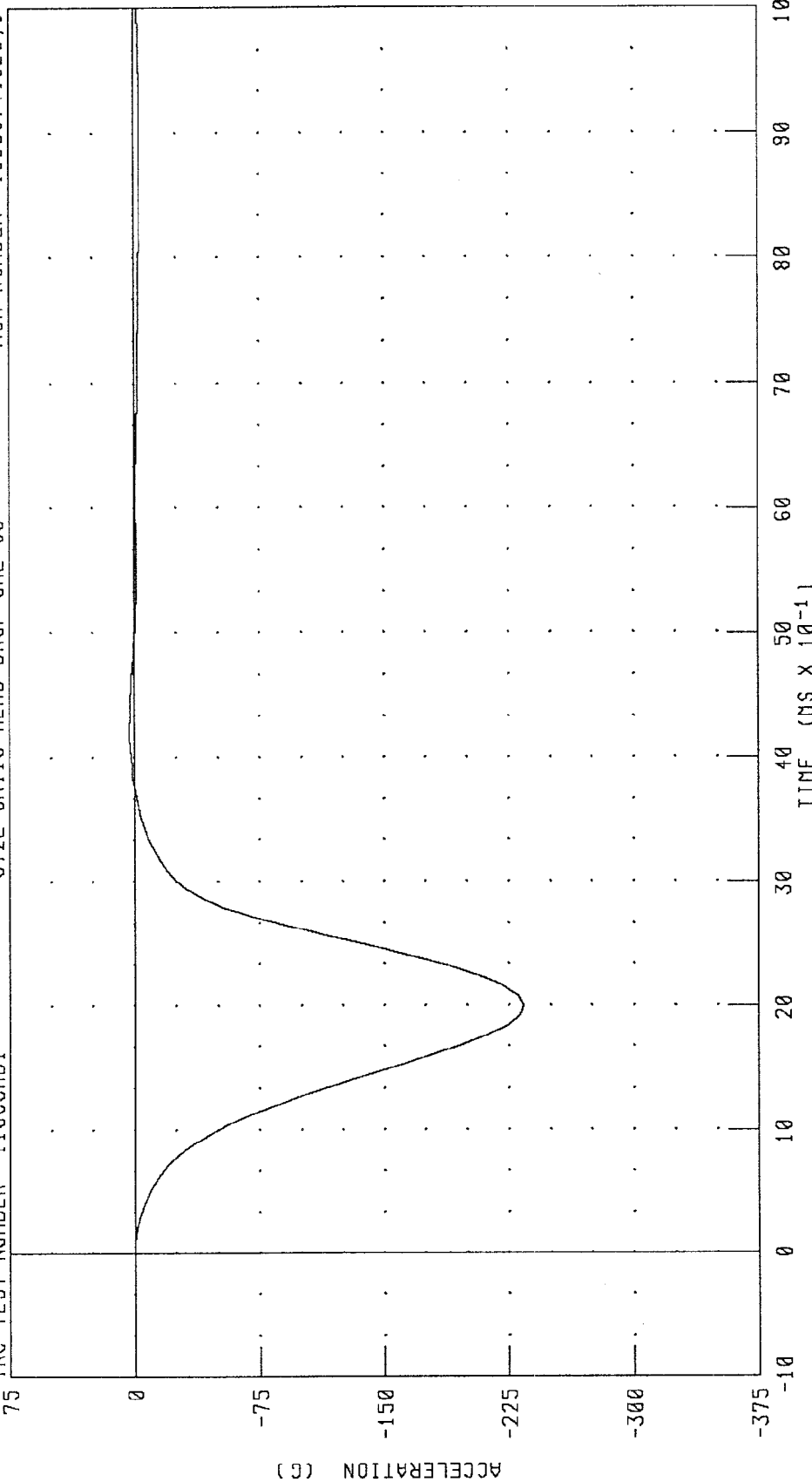
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

572E SN110 HEAD DROP CAL 05

IRC TEST NUMBER: 110C5HD1

RUN NUMBER: 100397.1029;1



PEAK DATA: 3.02 G @ 4.24 MS; -234.03 G @ 2.00 MS

CHANNEL: HEDXG FILTER: CH. CLASS 1000

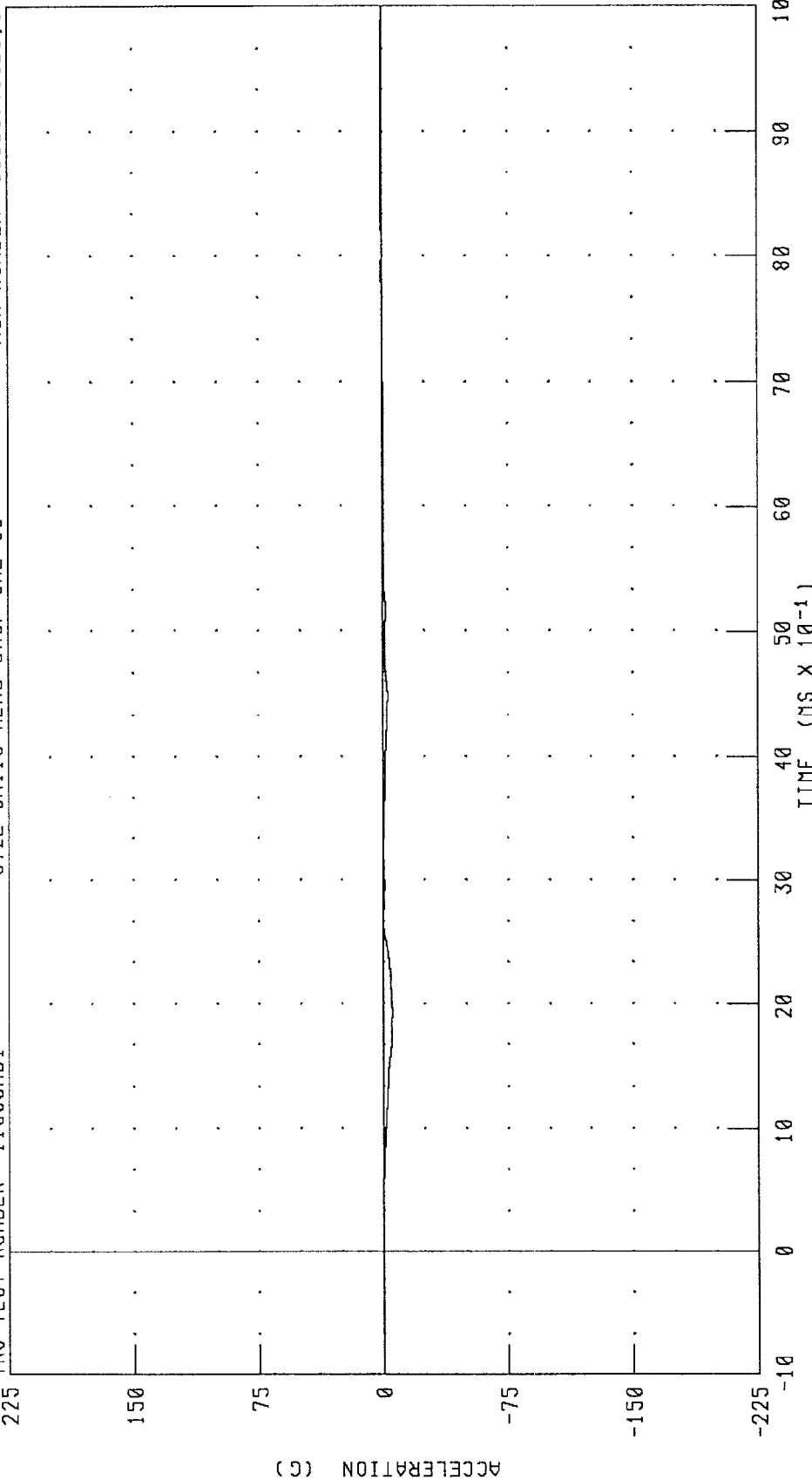
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 110C5H01

572E SN110 HEAD DROP CAL 05

RUN NUMBER: 100397.1029,1



CHANNEL: HEDYG FILTER: CH. CLASS 1000

PEAK DATA: 0.92 G @ 9.60 MS; -5.41 G @ 1.92 MS

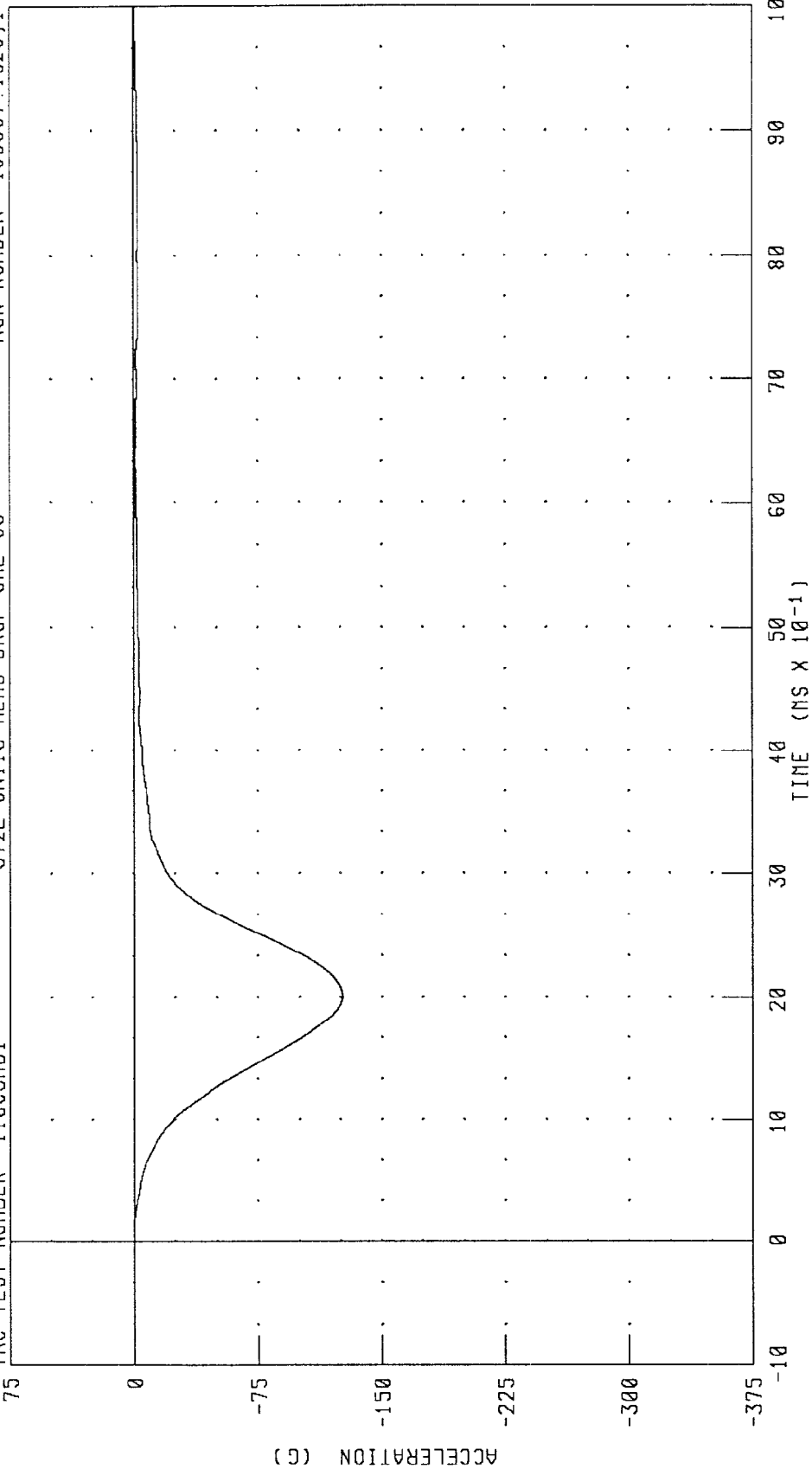
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 110C5H01

572E SN110 HEAD DROP CAL 05

RUN NUMBER: 100397.1029;1



CHANNEL: HEDZG FILTER: CH. CLASS 1000

PEAK DATA: 0.07 G @ -0.56 MS; -126.41 G @ 2.00 MS

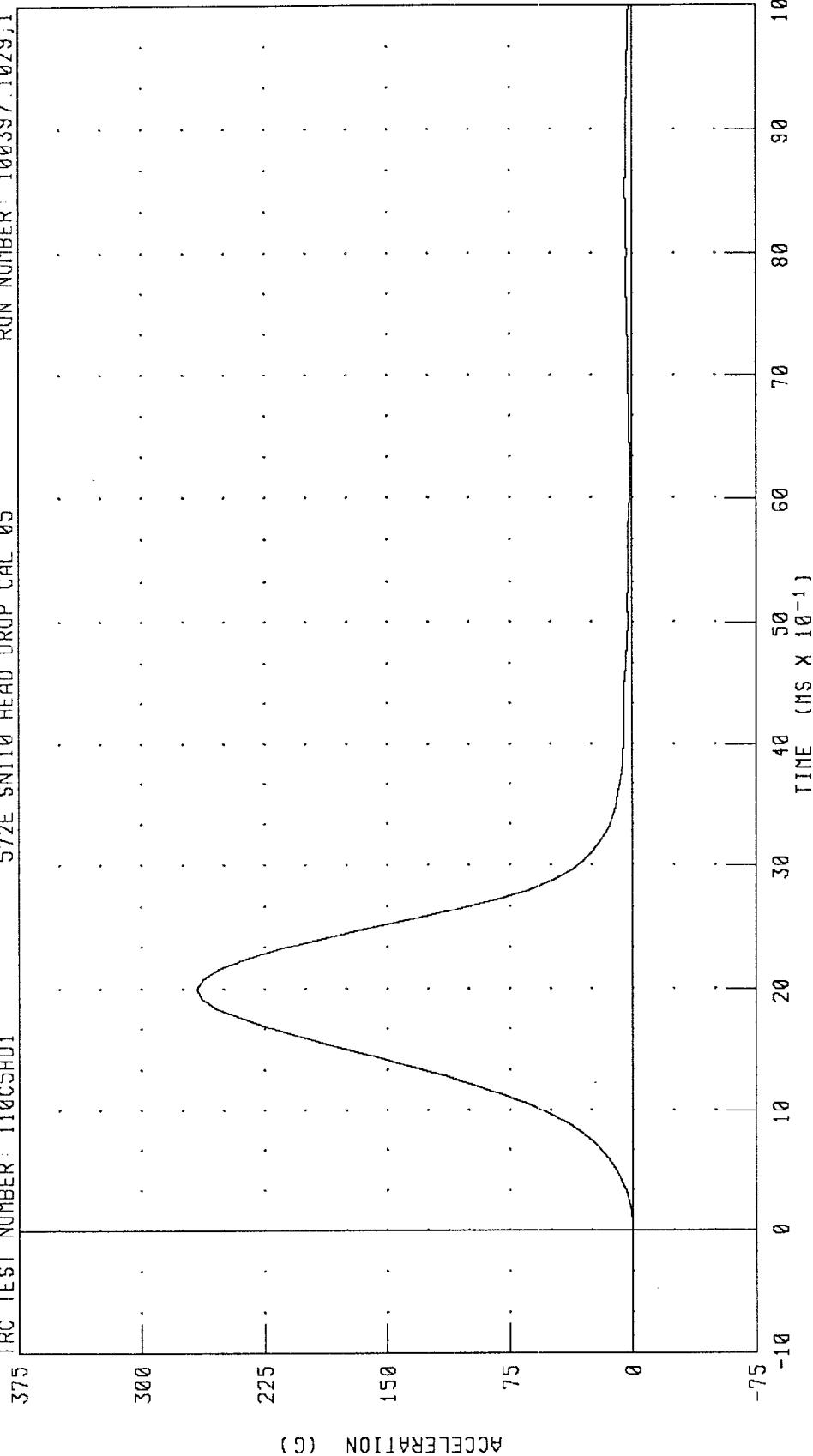
PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN110 HEAD DROP CAL 05

RUN NUMBER: 100397.1029,1

TRC TEST NUMBER: 110C5HD1



CHANNEL: HEDRG FILTER: CH. CLASS 1000

PEAK DATA: 266.04 G @ 2.00 MS; 0.05 G @ -0.72 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 110C5NF6 572E SN110 NECK FLEXION CAL05

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	65.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	6.93 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.89 G
	20 MS	17.60 - 22.60 G	20.68 G
	30 MS	12.50 - 18.50 G	16.61 G
MAX PENDULUM G		29 G MAX	23.66 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.55 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	38.24 MS
D PLANE	MAX	64 - 78 DEG.	72.20 DEG.
ROTATION	TIME	57 - 64 MS	60.64 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	91.42 NM
	TIME	47 - 58 MS	51.92 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	119.52 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.48 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

B. Alt

RUN NUMBER: 100697.1129;1

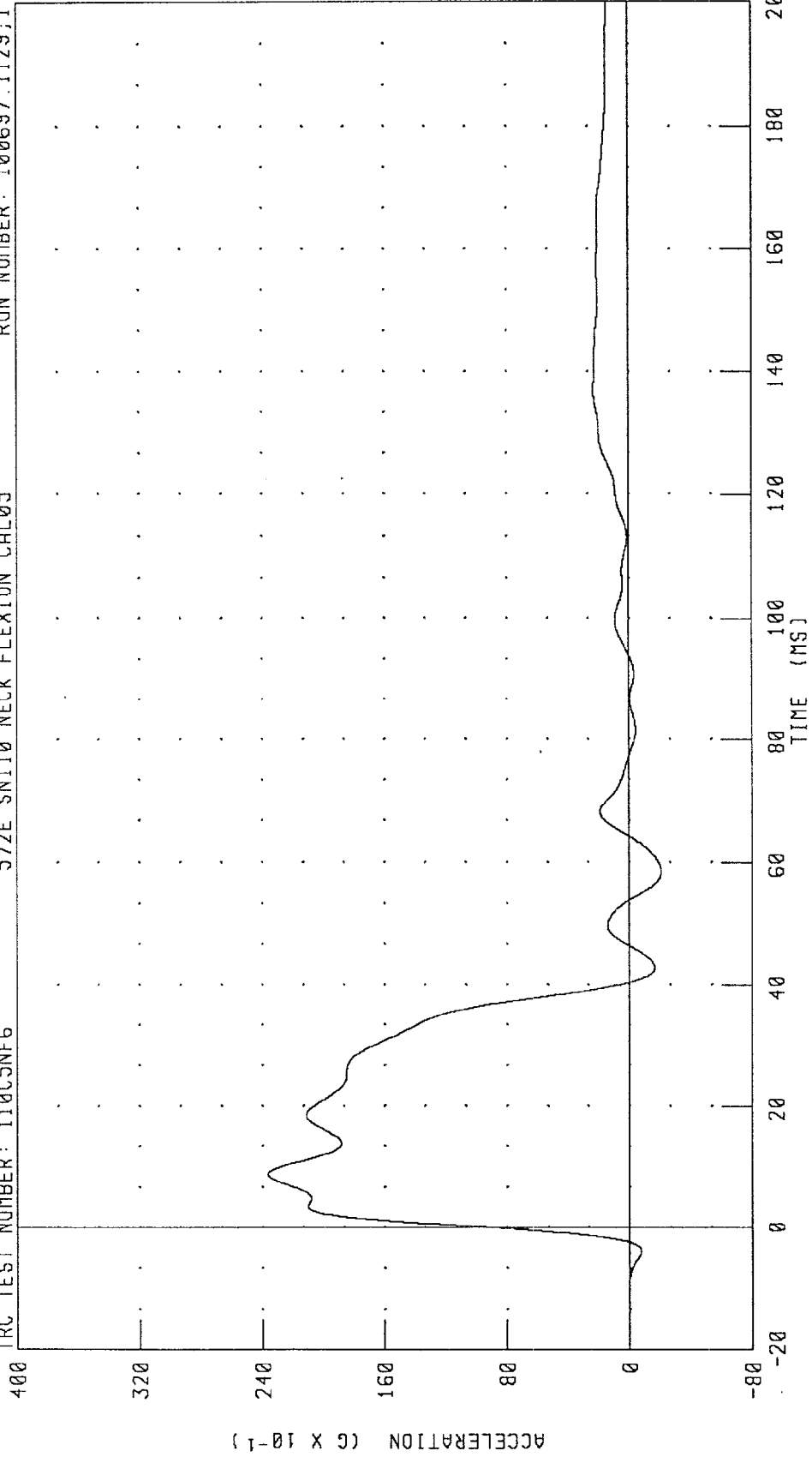
PART 572-E HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 110C5NF6

572E SN110 NECK FLEXION CAL05

RUN NUMBER: 100697.1129,1



CHANNEL: PENXC FILTER: CH. CLASS 60

PEAK DATA: 23.66 G @ 8.80 MS; -2.07 G @ 58.48 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN110 NECK FLEXION CAL05

TRC TEST NUMBER: 110C5NF6

120

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30

0

-30

-60

-90

-120

-150

-180

-210

-240

-270

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-330

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-510

-540

-570

-600

-630

-660

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-720

-750

-780

-810

-840

-870

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-930

-960

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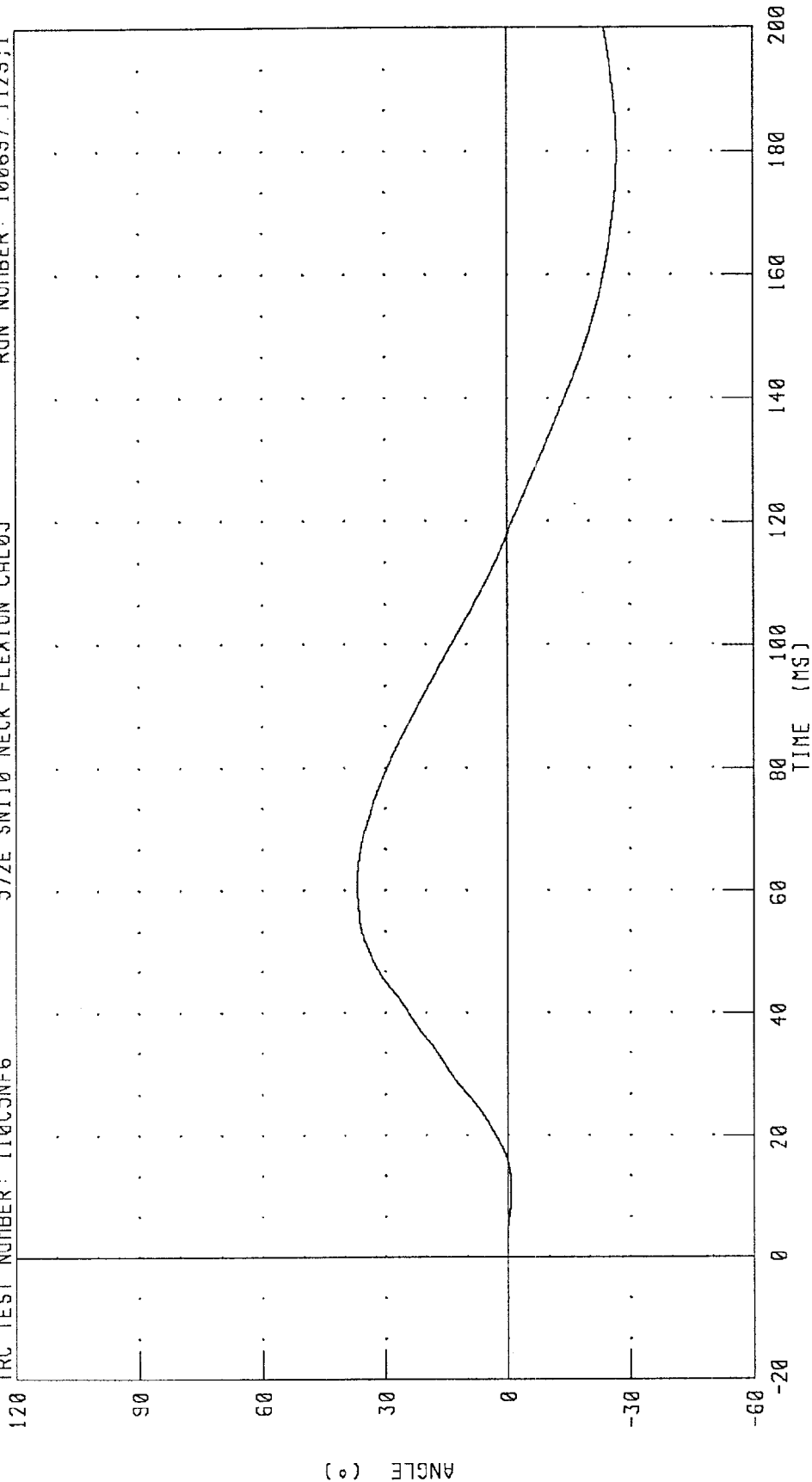
-8370

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

TRC TEST NUMBER: 110C5NF6

572E SN110 NECK FLEXION CAL05

RUN NUMBER: 100697.1129.1



PEAK DATA: 36.91 ° @ 60.88 MS; -26.79 ° @ 180.00 MS

CHANNEL: THETA FILTER: CH. CLASS 60

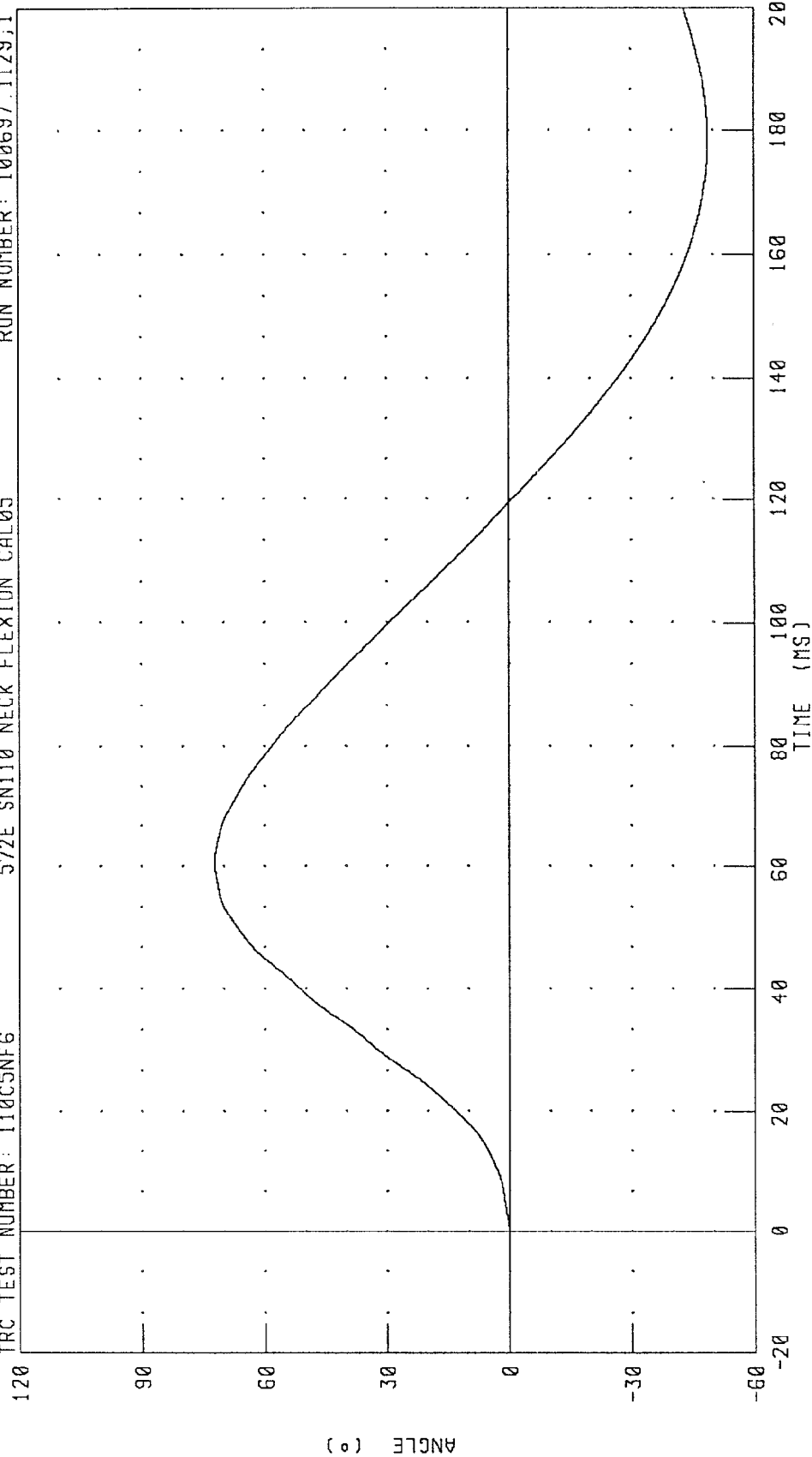
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 110C5NF6

572E SN110 NECK FLEXION CAL05

RUN NUMBER: 100697.1129,1



PEAK DATA: 72.20 ° @ 60.64 MS; -48.79 ° @ 178.48 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

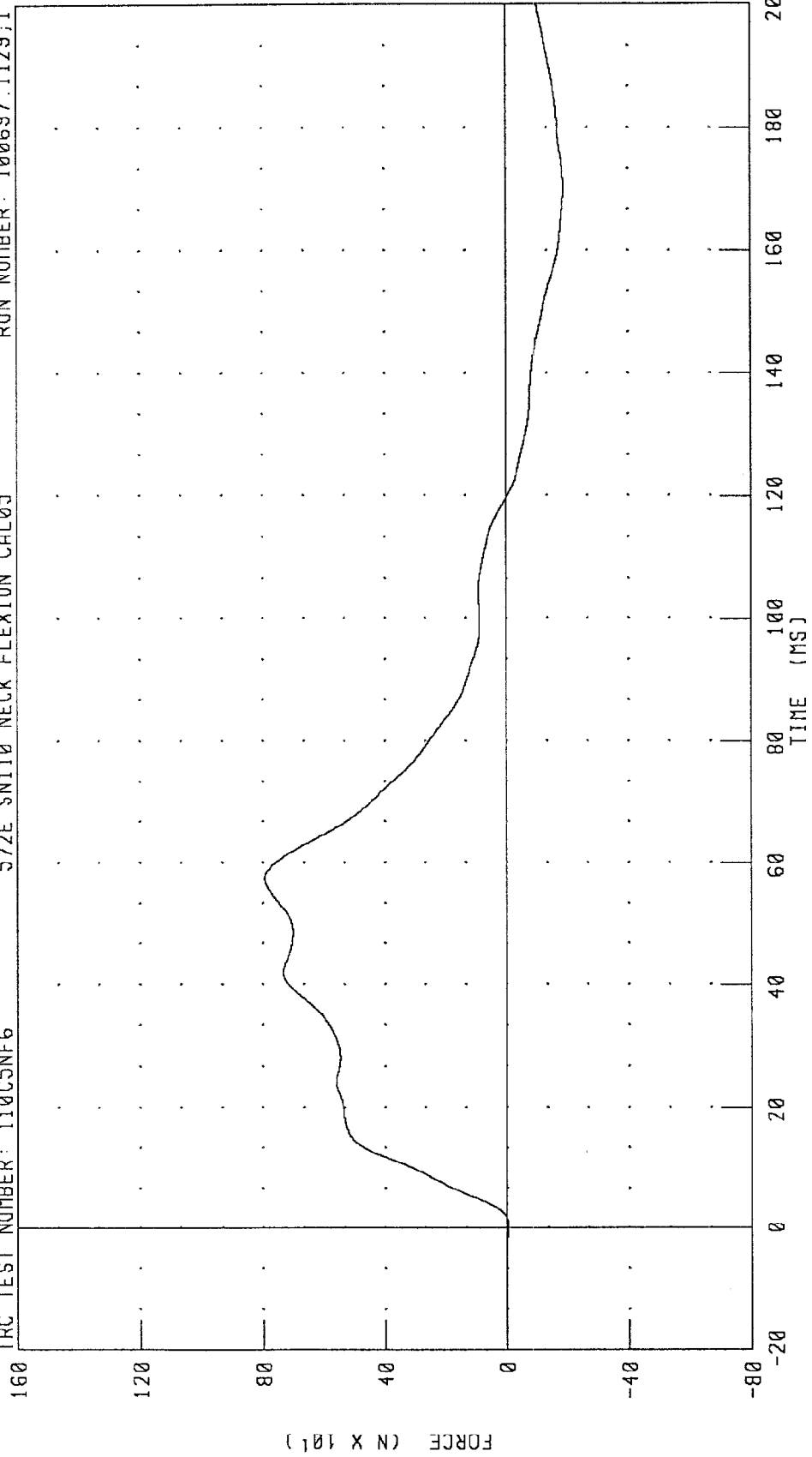
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 110C5NF6

572E SN110 NECK FLEXION CAL05

RUN NUMBER: 100697.1129;1



PEAK DATA: 794.84 N @ 57.44 MS; -188.27 N @ 170.16 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

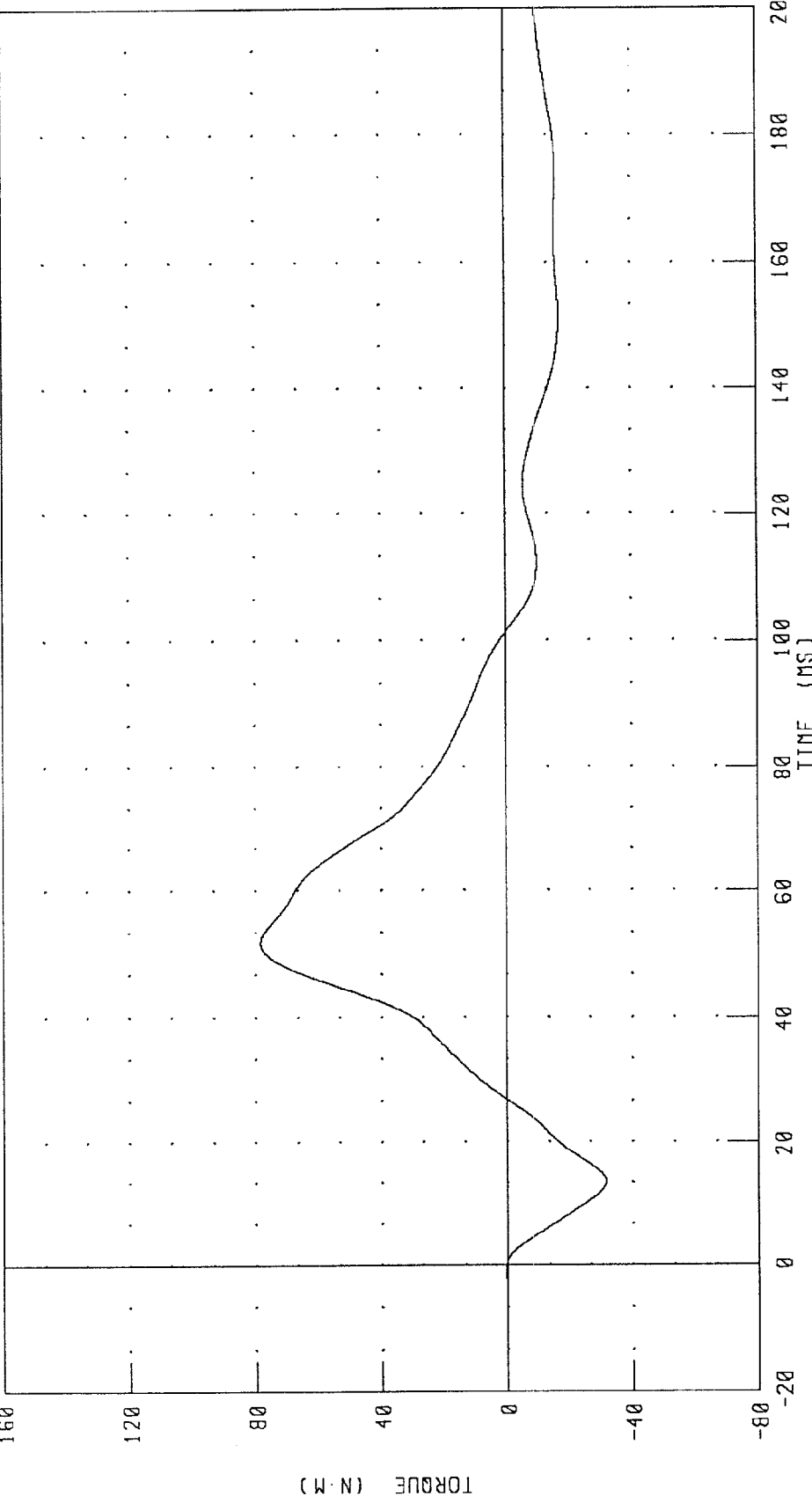
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

572E SN110 NECK FLEXION CAL05

IRC TEST NUMBER: 110C5NF6

RUN NUMBER: 100697.1129,1



PEAK DATA: 78.53 N-M @ 51.68 MS; -31.43 N-M @ 13.52 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

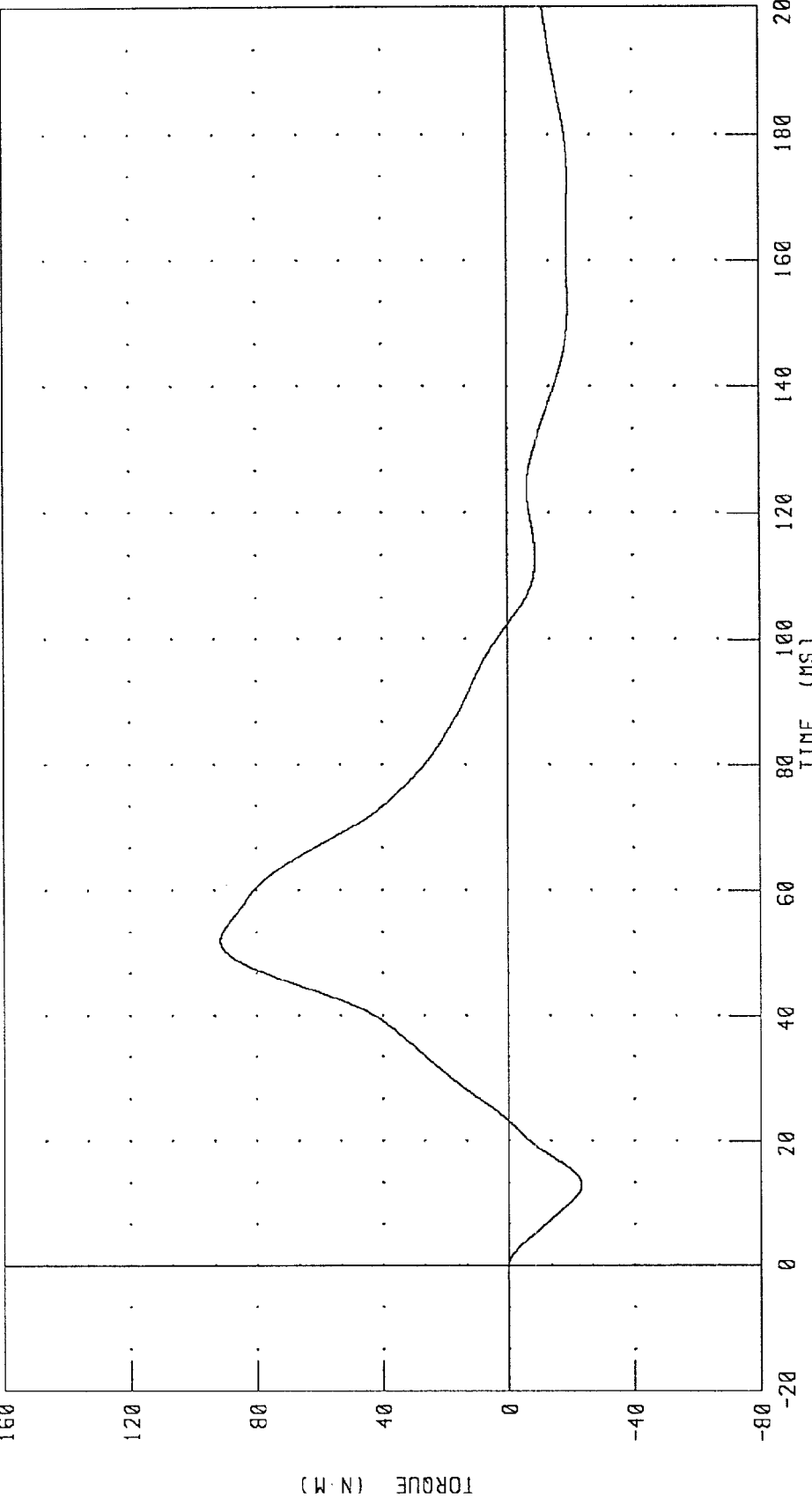
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 11005NF6

572E SN110 NECK FLEXION CAL05

RUN NUMBER: 100697.1129,1



PEAK DATA: 91.42 N.M @ 51.92 MS; -23.13 N.M @ 13.04 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 110C5NE1 572E SN110 NECK EXT. CAL5

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	65.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.25 G
	20 MS	14.00 - 19.00 G	15.76 G
	30 MS	11.00 - 16.00 G	13.57 G
MAX PENDULUM G		22 G MAX	17.46 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	13.53 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	45.04 MS
D PLANE	MAX	81 - 106 DEG.	89.29 DEG.
ROTATION	TIME	72 - 82 MS	78.08 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-63.33 NM
	TIME	65 - 79 MS	72.40 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	159.76 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	143.04 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN By Cult

RUN NUMBER: 100697.1221;1

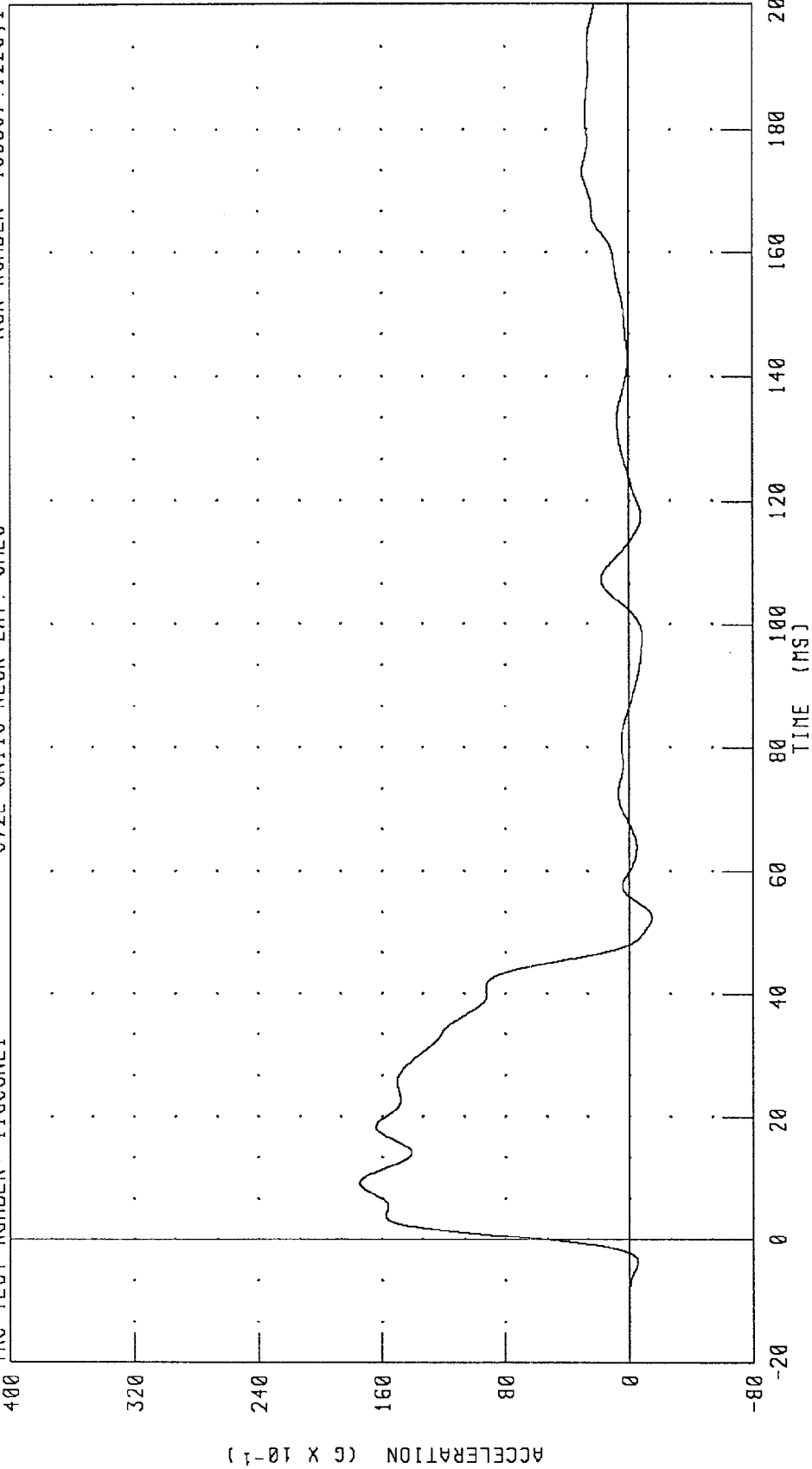
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 110C5NE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223;1



CHANNEL: PENXG FILTER: CH. CLASS 60

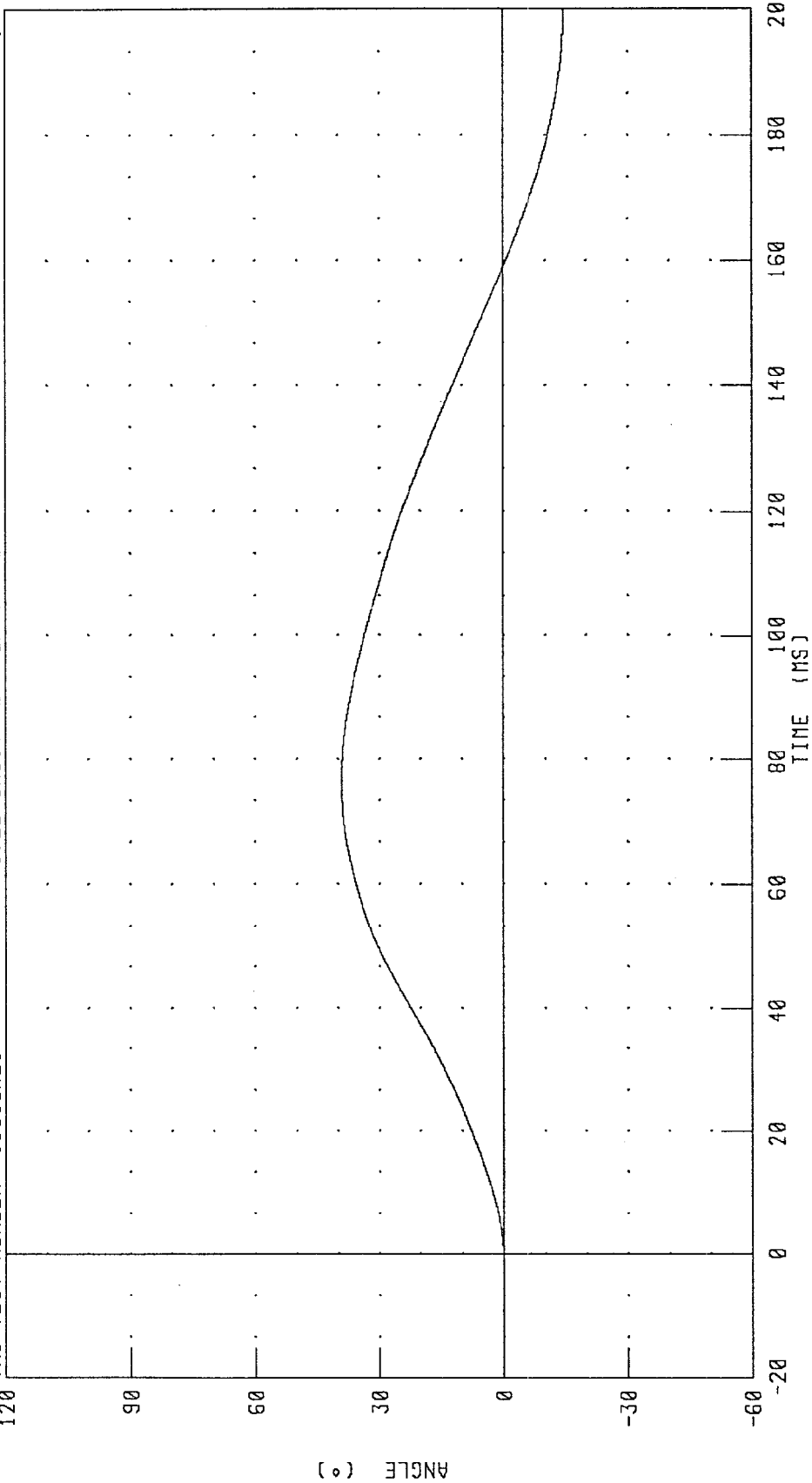
PEAK DATA: 17.46 G @ 9.20 MS; -1.48 G @ 52.48 MS

ROTATION ABOUT BASE OF NECK

RUN NUMBER: 100697.1223;1

TRC TEST NUMBER: 1105NE1

120



CHANNEL: BETA

FILTER: CH. CLASS 60

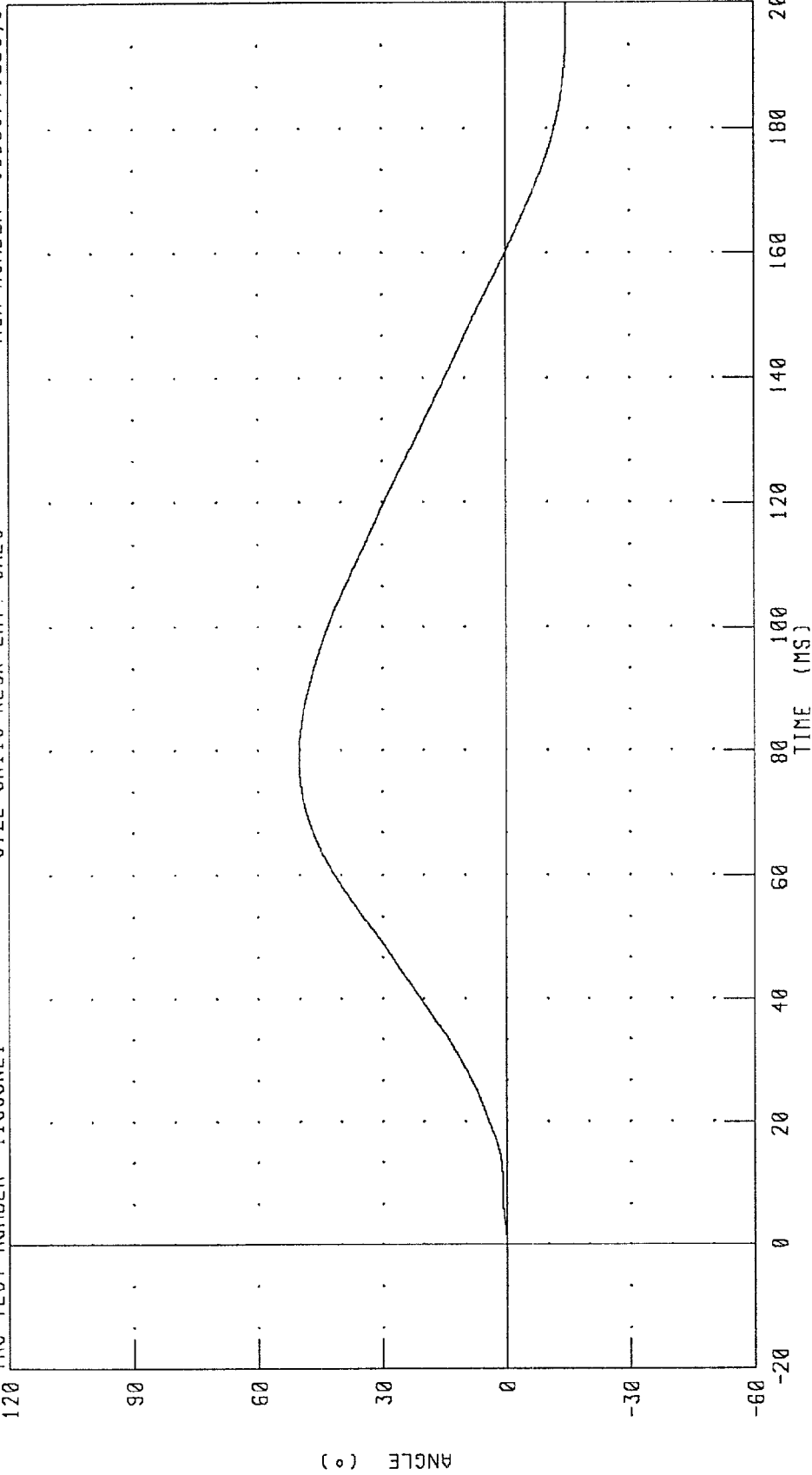
PEAK DATA: 39.17 ° @ 76.48 MS; -14.45 ° @ 199.60 MS

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

TRC TEST NUMBER: 110C5NE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223;1



PEAK DATA: 50.18 ° @ 79.20 MS; -14.65 ° @ 195.04 MS

CHANNEL: THETA FILTER: CH. CLASS 60

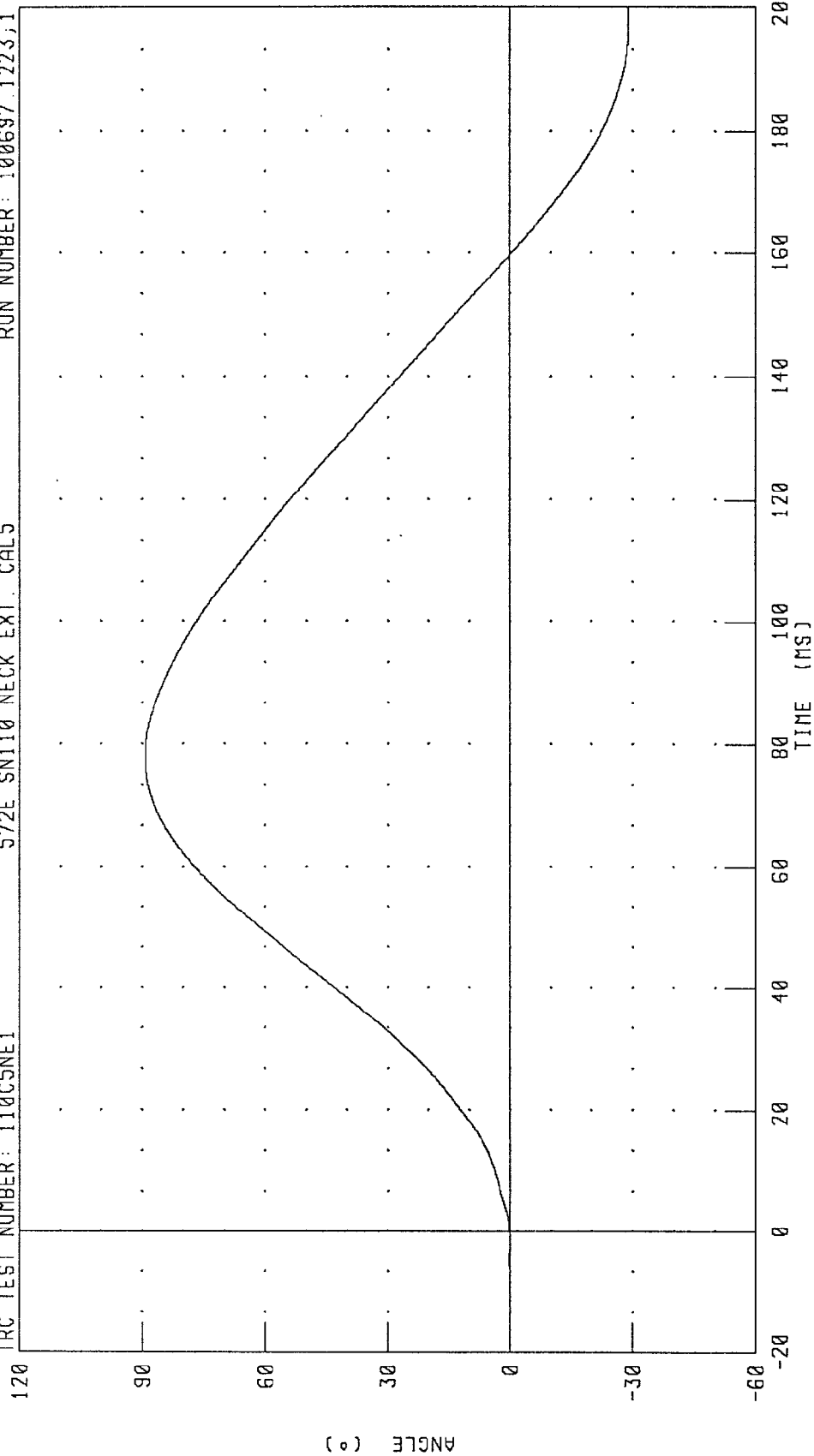
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 110C5NE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223,1



PEAK DATA: 89.29 ° @ 78.08 MS; -29.04 ° @ 198.40 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

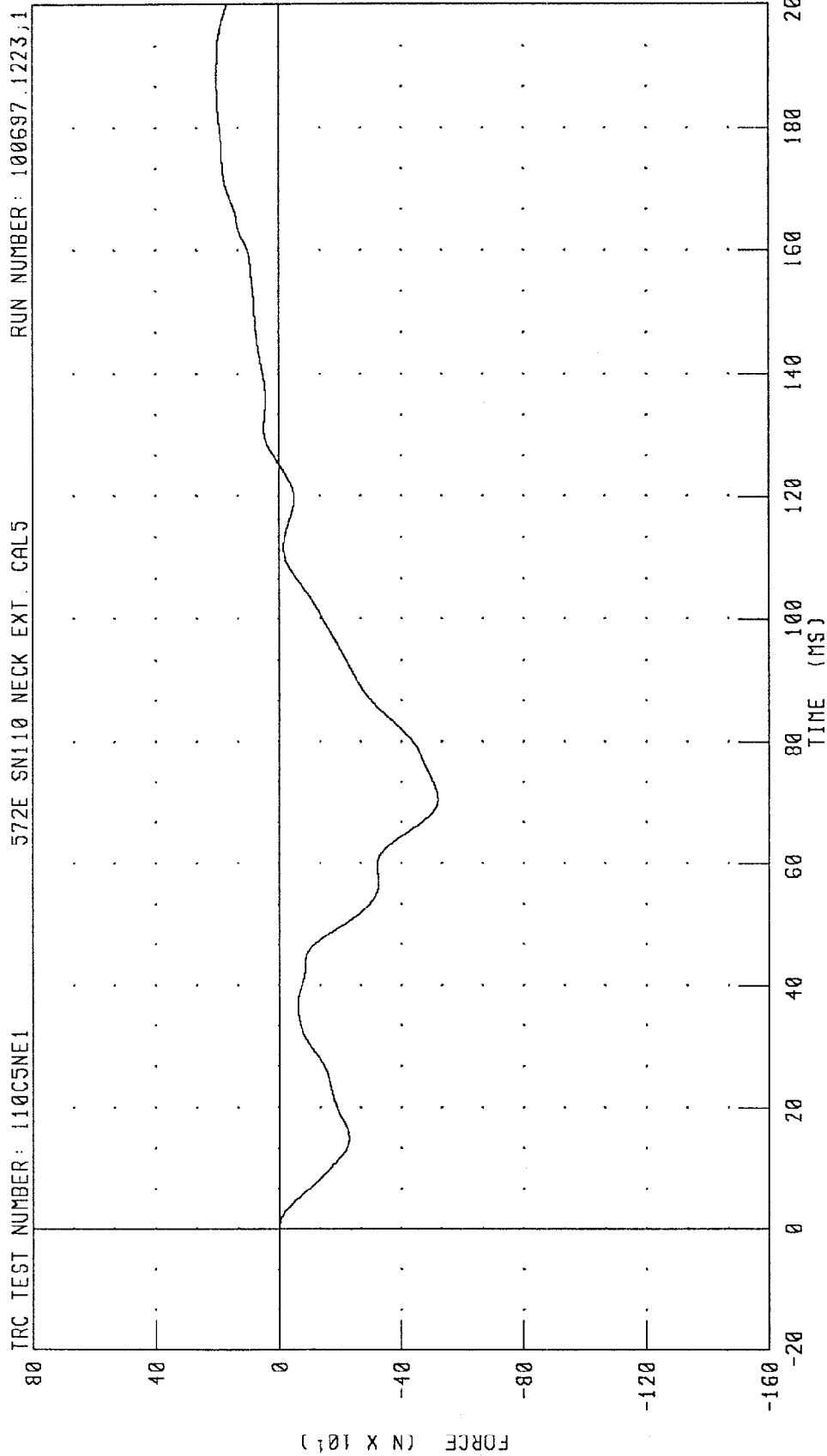
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 110C5NE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223,1



PEAK DATA: 201.84 N @ 187.76 MS; -520.28 N @ 70.56 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

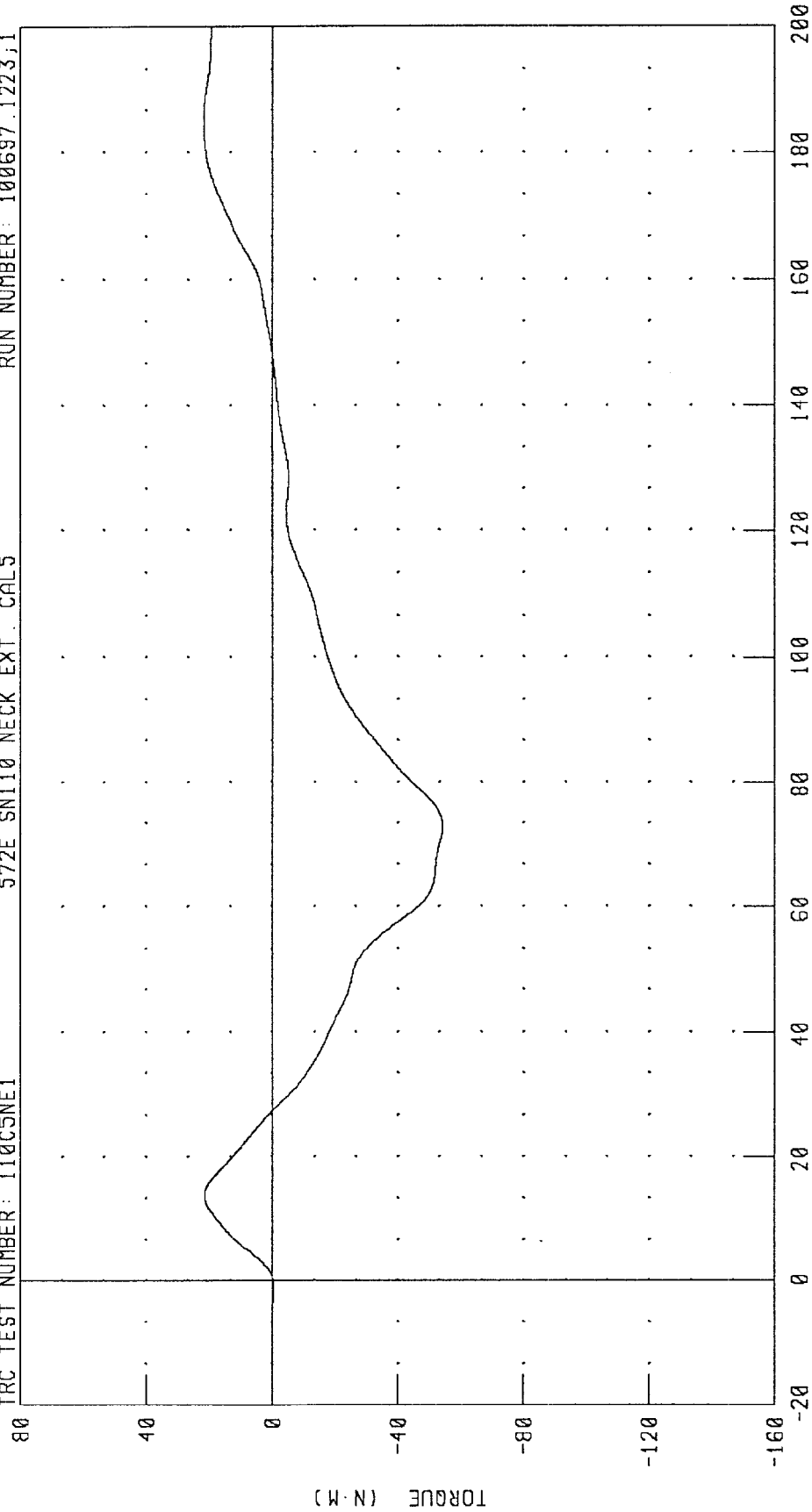
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 1106SNE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223,1



PEAK DATA: 21.77 N.M @ 184.72 MS; -54.23 N.M @ 72.80 MS

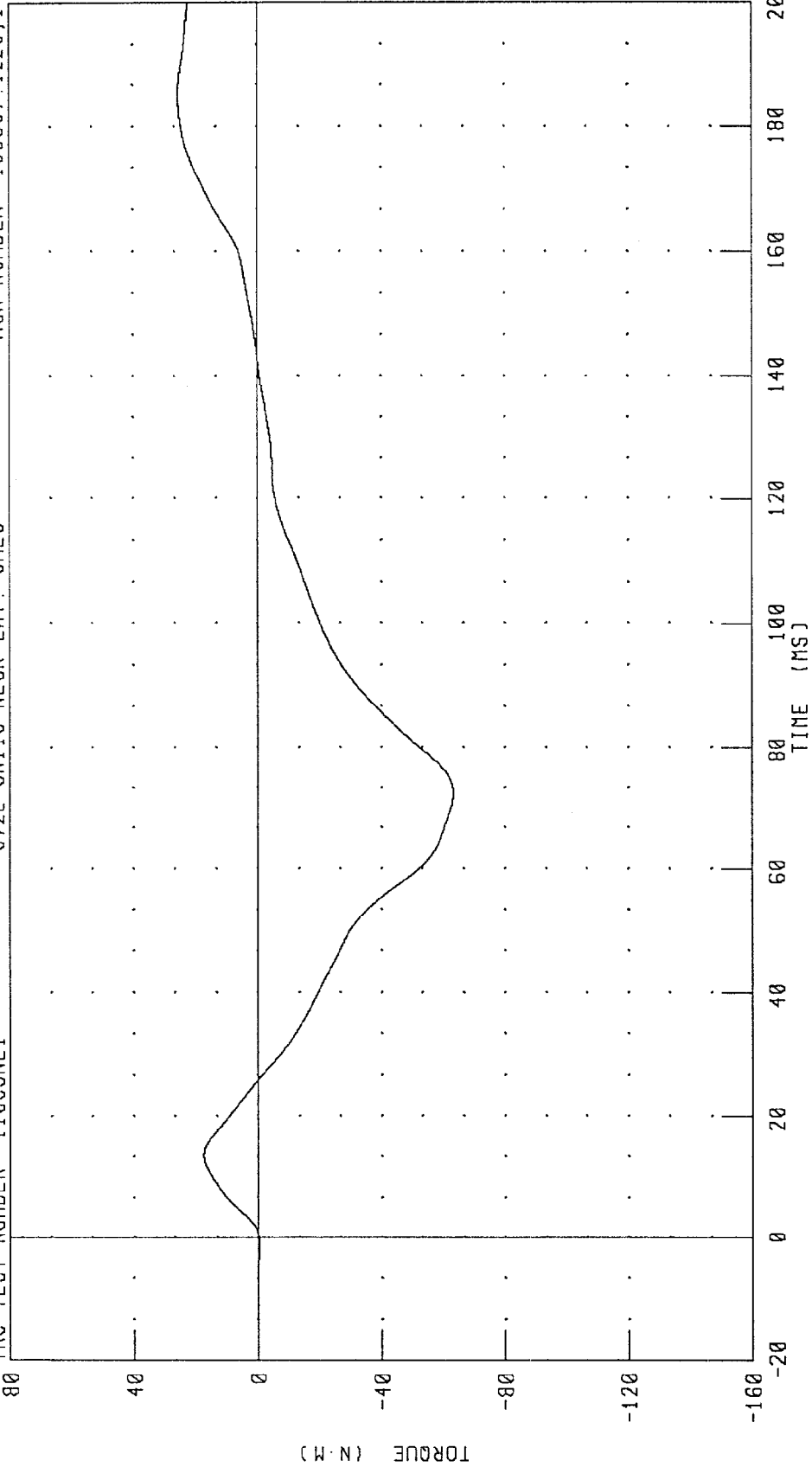
CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: L10C5NE1

572E SN110 NECK EXT. CAL5

RUN NUMBER: 100697.1223;1



PEAK DATA: 25.33 N.M @ 184.96 MS; -63.33 N.M @ 72.40 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

TRC INC.

TEST NO: 110C5TH1

572E SN110 H.S.THORAX CAL05

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.3 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5569. N
INTERNAL HYSTERESIS	69% - 85%	72.8%

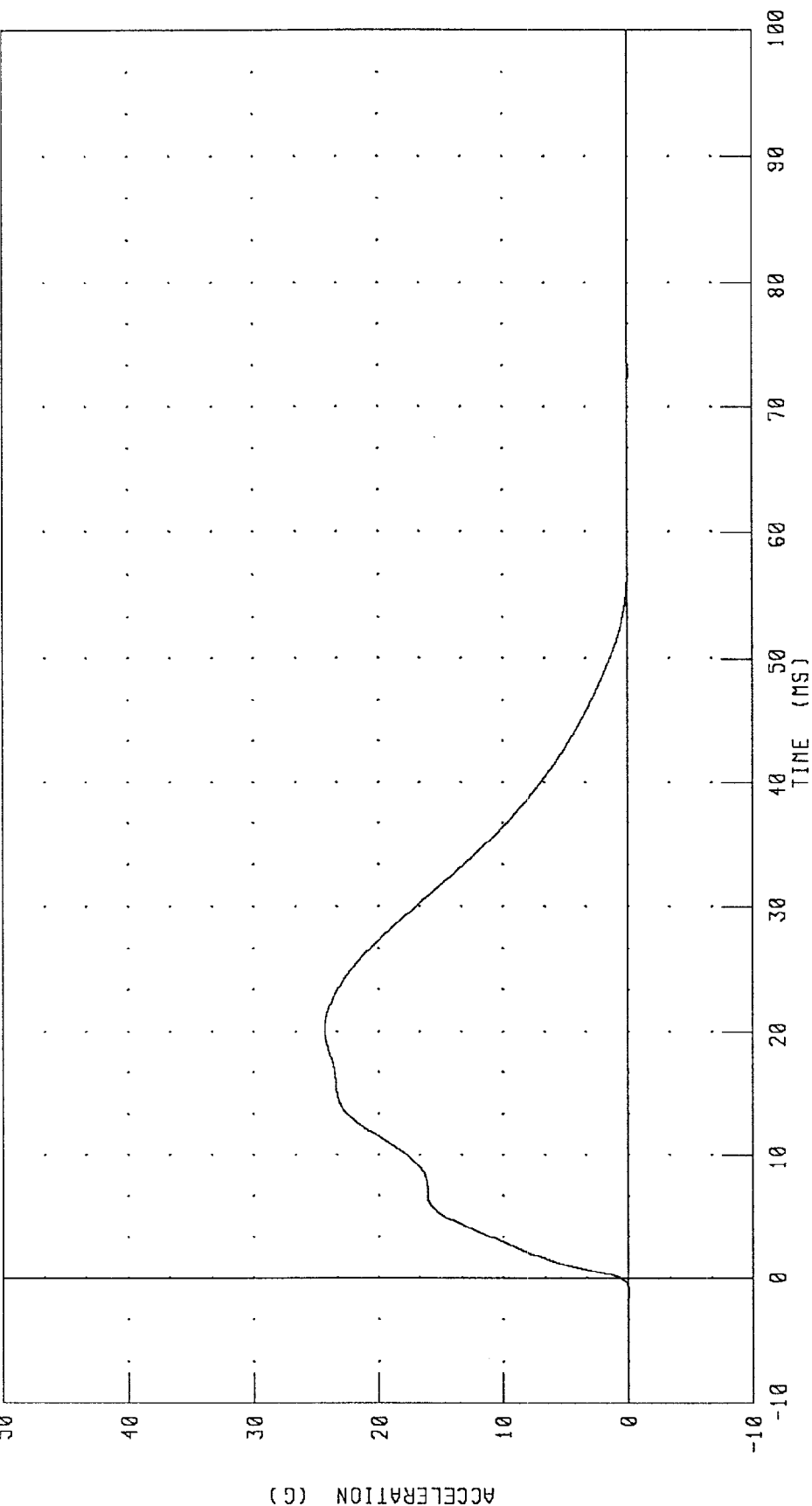
TEST MEETS SPECIFICATIONS

TECHNICIAN Ben Calt

RUN NUMBER: 100797.1130;1

PART 572-E HYBRID III THORAX CALIBRATION
 PENDULUM DECELERATION

IRC TEST NUMBER: 110C5TH1 572E SN110 H.S.THORAX CAL05 RUN NUMBER: 100797.1131.1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 24.31 G @ 20.24 MS; -0.05 G @ -1.04 MS

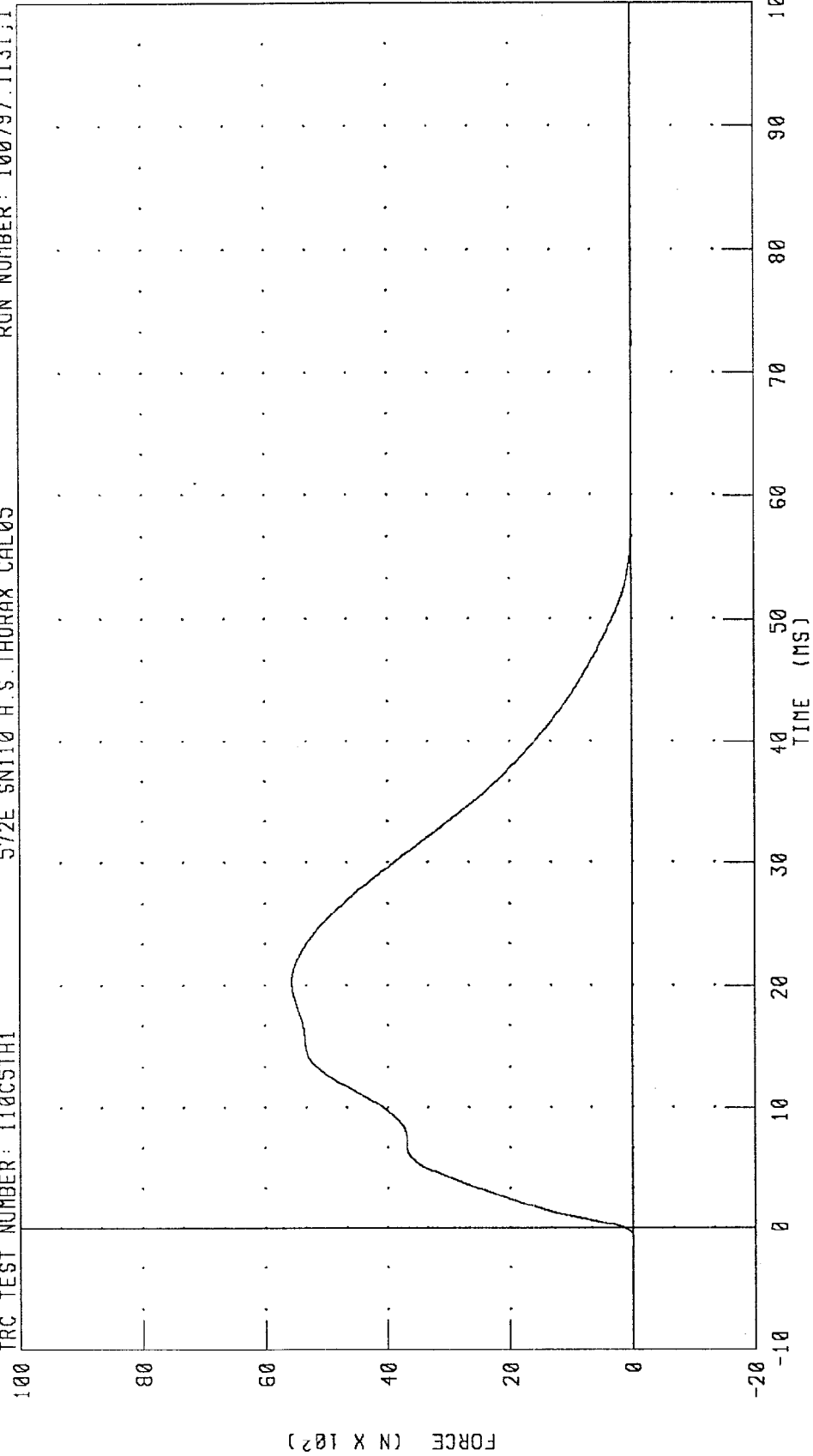
PART 572-E HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 110C5TH1

572E SN110 H.S. THORAX CAL05

RUN NUMBER: 100797.1131;1



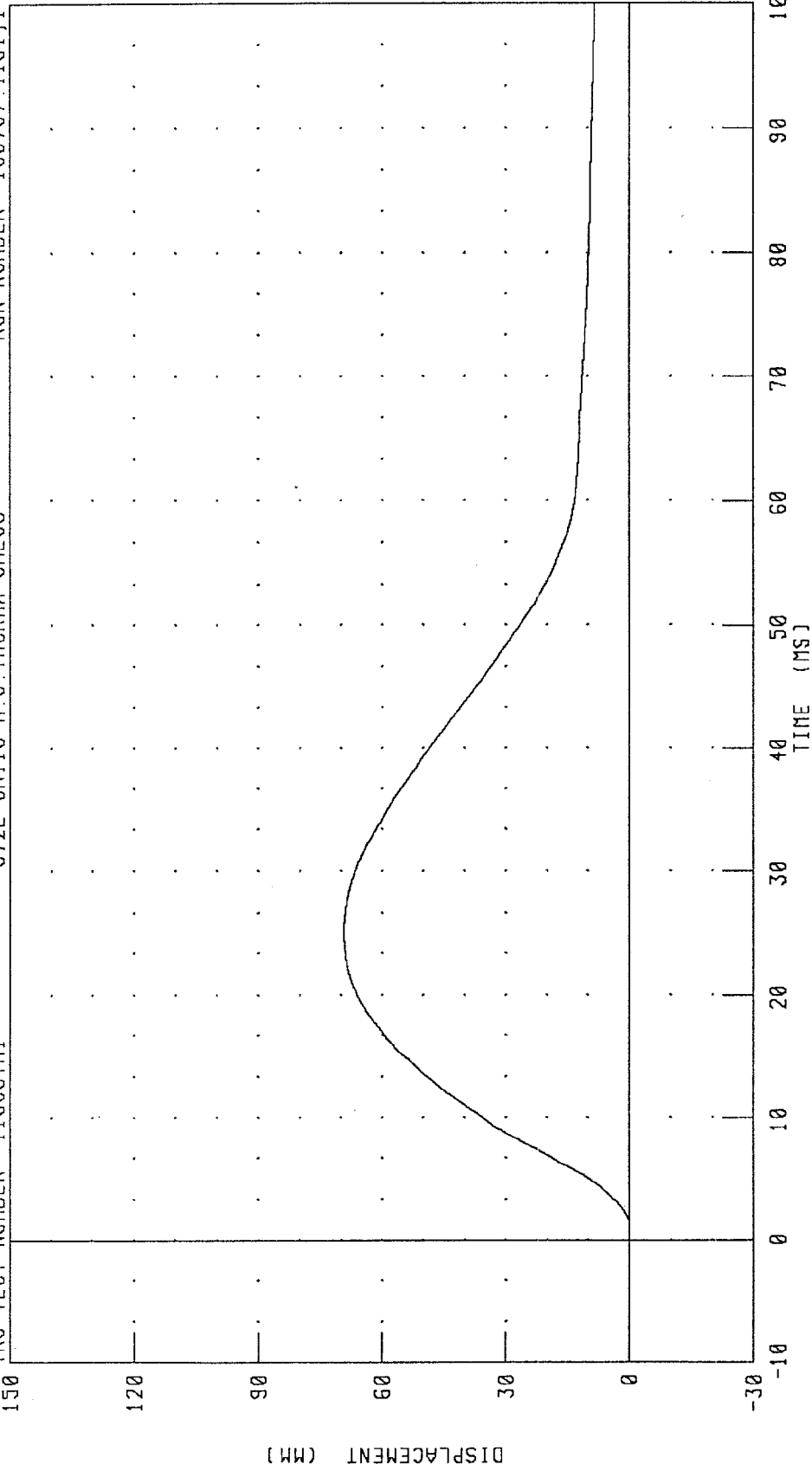
CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 5569.78 N @ 20.24 MS,

-11.10 N @ -1.04 MS

PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

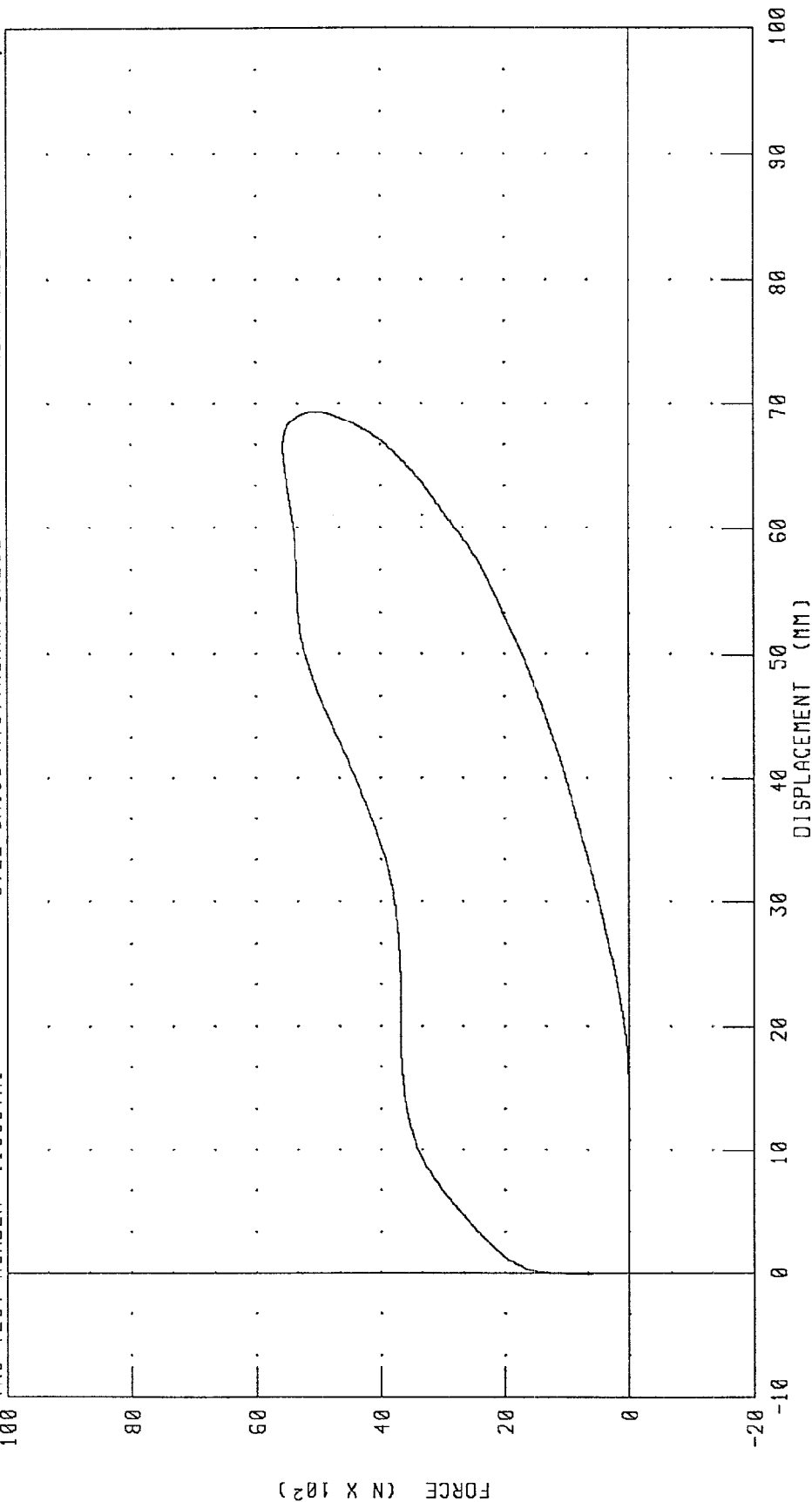
TRC TEST NUMBER: 110C5TH1 572E SN110 H.S. THORAX CAL05 RUN NUMBER: 100797.1131,1



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 69.39 MM @ 25.12 MS; -0.03 MM @ 0.80 MS

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

TRC TEST NUMBER: L10C5TH1 572E SN110 H.S. THORAX CAL05 RUN NUMBER: 100797.1131.1



CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180
PEAK DATA: 69.39 MM @ 25.12 MS; -0.03 NM @ 0.80 MS
5569.78 N @ 20.24 MS; -11.10 N @ -1.04 MS

TRANSPORTATION RESEARCH CENTER INC.

KNEE SLIDER TEST

RIGHT KNEE
TRC INC.

TEST NO: 110C5RS3

572E SN110 RIGHT SLIDER CAL05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.76 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1500. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2773. N

TEST MEETS SPECIFICATIONS

TECHNICIAN Bryant Craft

RUN NUMBER: 100797.1100;1

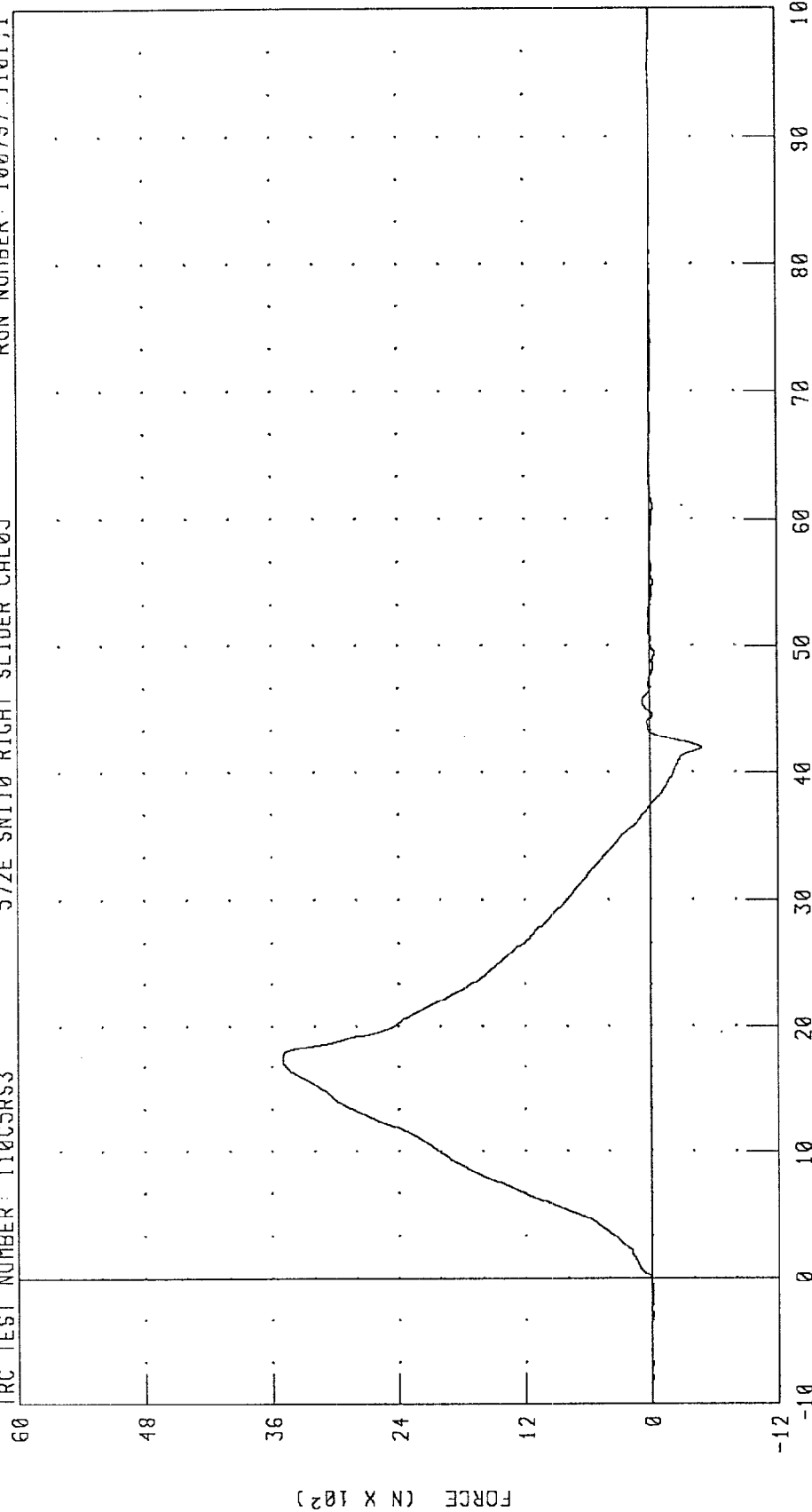
PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION

RIGHT FEMUR FORCE

TRC TEST NUMBER: 110C5RS3

572E SN110 RIGHT SLIDER CAL05

RUN NUMBER: 100797.1101.1

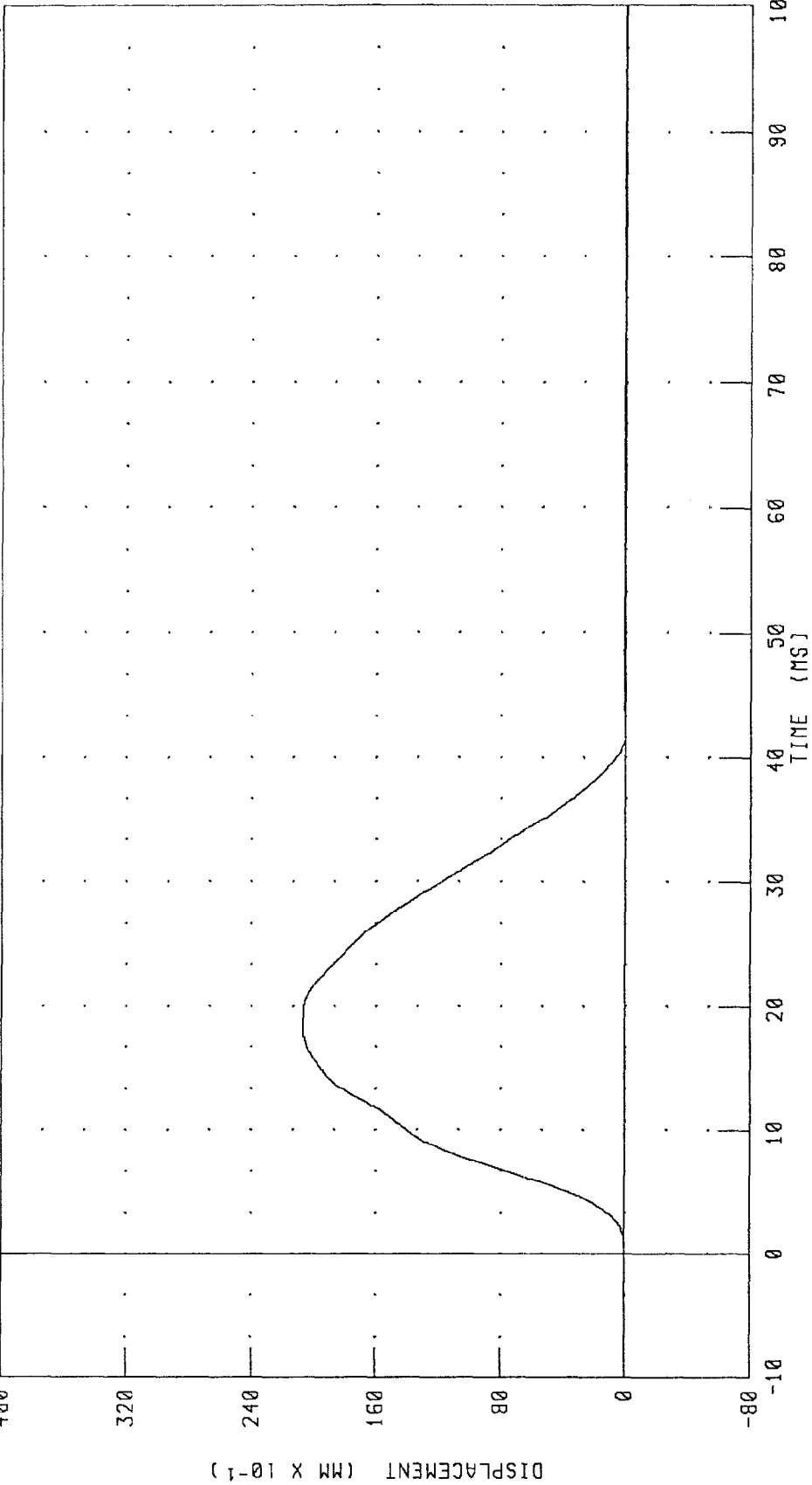


PEAK DATA: 3502.31 N @ 17.28 MS, -484.49 N @ 41.84 MS

CHANNEL: RFMF FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 110C5RS3 572E SN110 RIGHT SLIDER CAL05 RUN NUMBER: 100797 1101,1



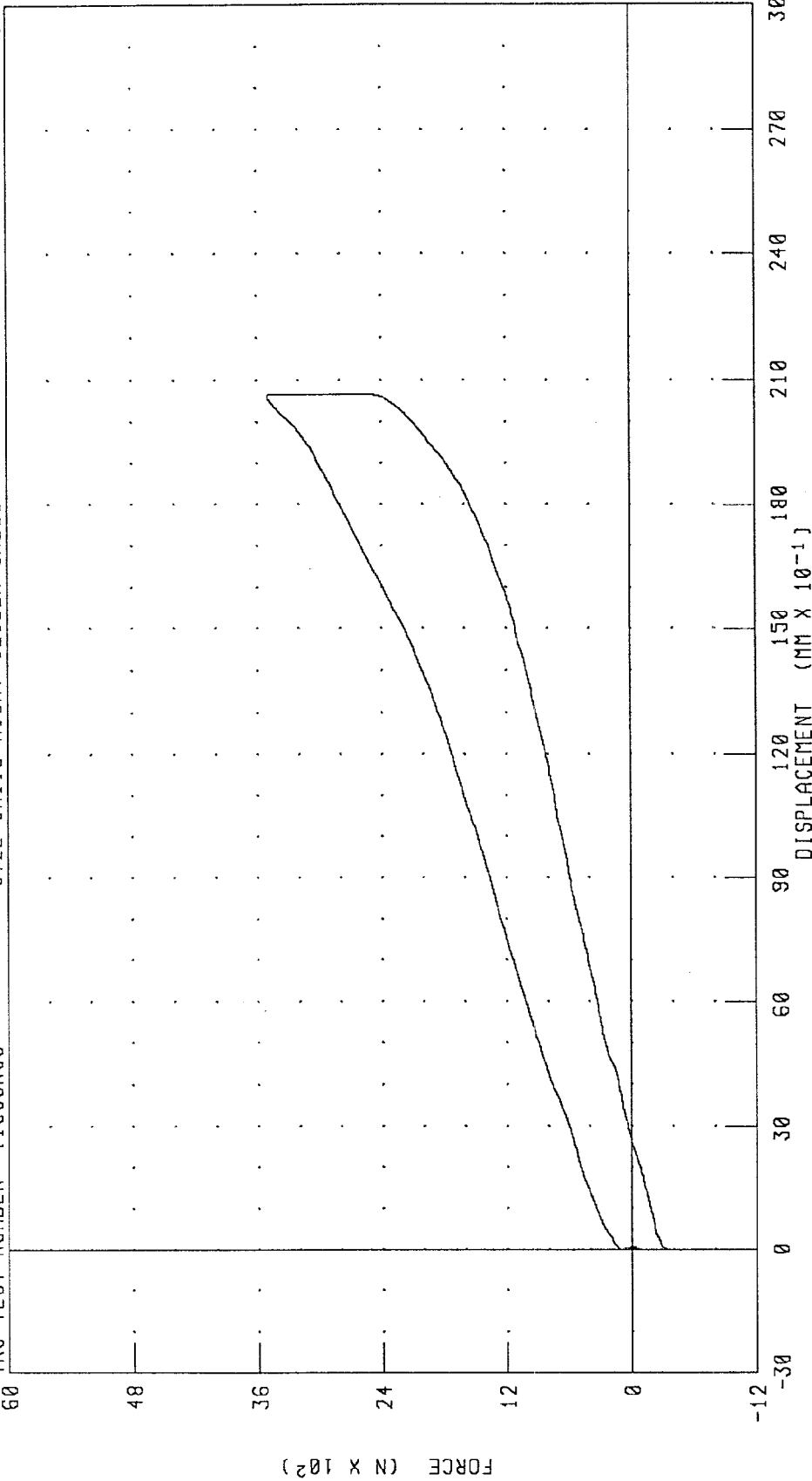
CHANNEL: KNRXD FILTER: CH. CLASS 600 PEAK DATA: 20.68 MM @ 19.12 MS; -0.01 MM @ 41.76 MS

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

TRC TEST NUMBER: 110C5RS3

572E SN110 RIGHT SLIDER CAL05

RUN NUMBER: 100797.1101.1



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

PEAK DATA: 20.68 MM @ 19.12 MS;
 3502.31 N @ 17.28 MS;
 -0.01 MM @ 41.76 MS;
 -484.49 N @ 41.84 MS

TRANSPORTATION RESEARCH CENTER INC.

KNEE SLIDER TEST

LEFT KNEE
TRC INC.

TEST NO: 110C5LS2

572E SN110 LEFT SLIDER CAL05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.76 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1703. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	3432. N *

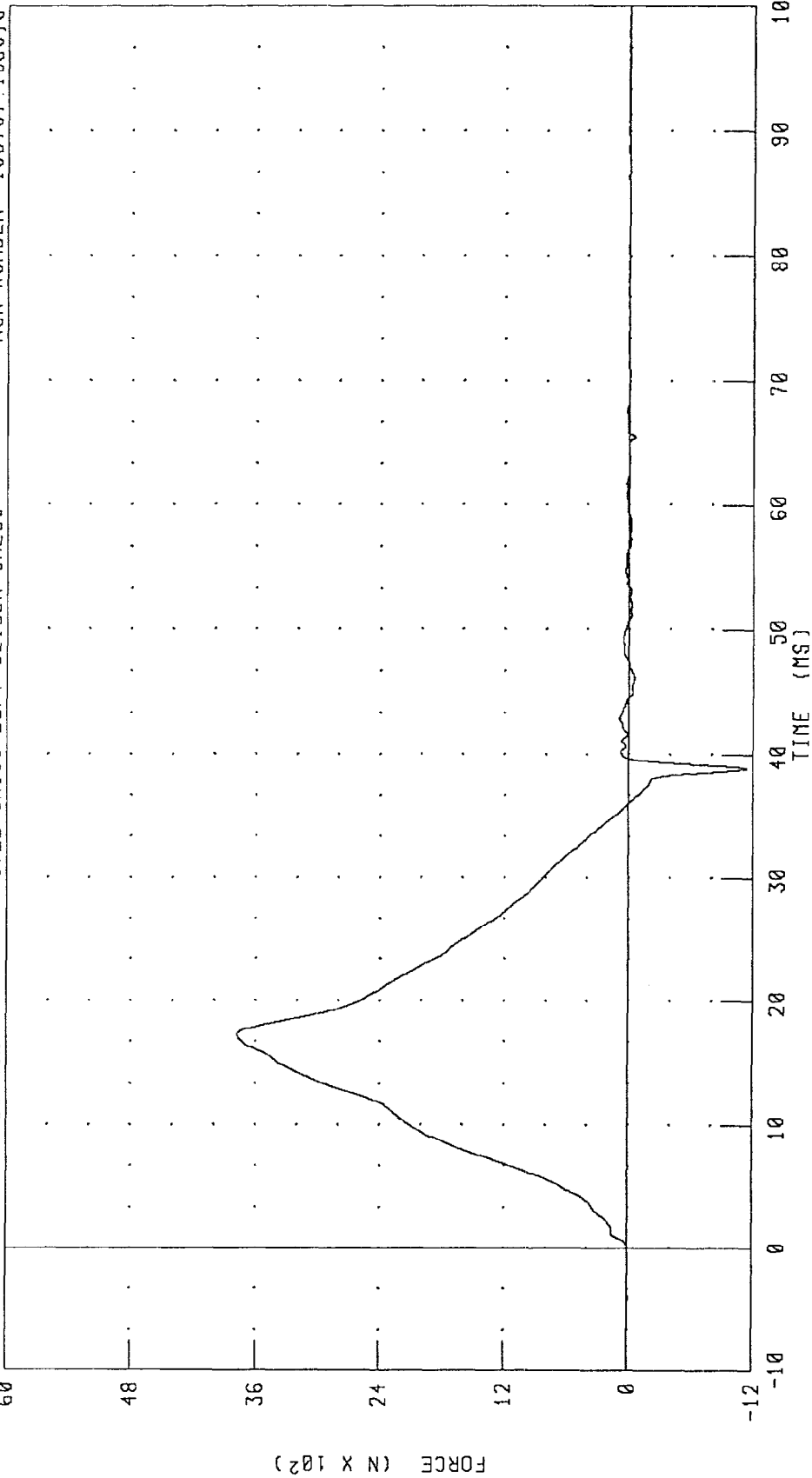
* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN Ben Calt

RUN NUMBER: 100797.1033;3

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

TRC TEST NUMBER: 110C5LS2 572E SN110 LEFT SLIDER CAL05 RUN NUMBER: 100797.1033,3



CHANNEL: LFMF FILTER: CH. CLASS 600

PEAK DATA: 3778 64 N @ 17.20 MS; -1131.93 N @ 38.88 MS

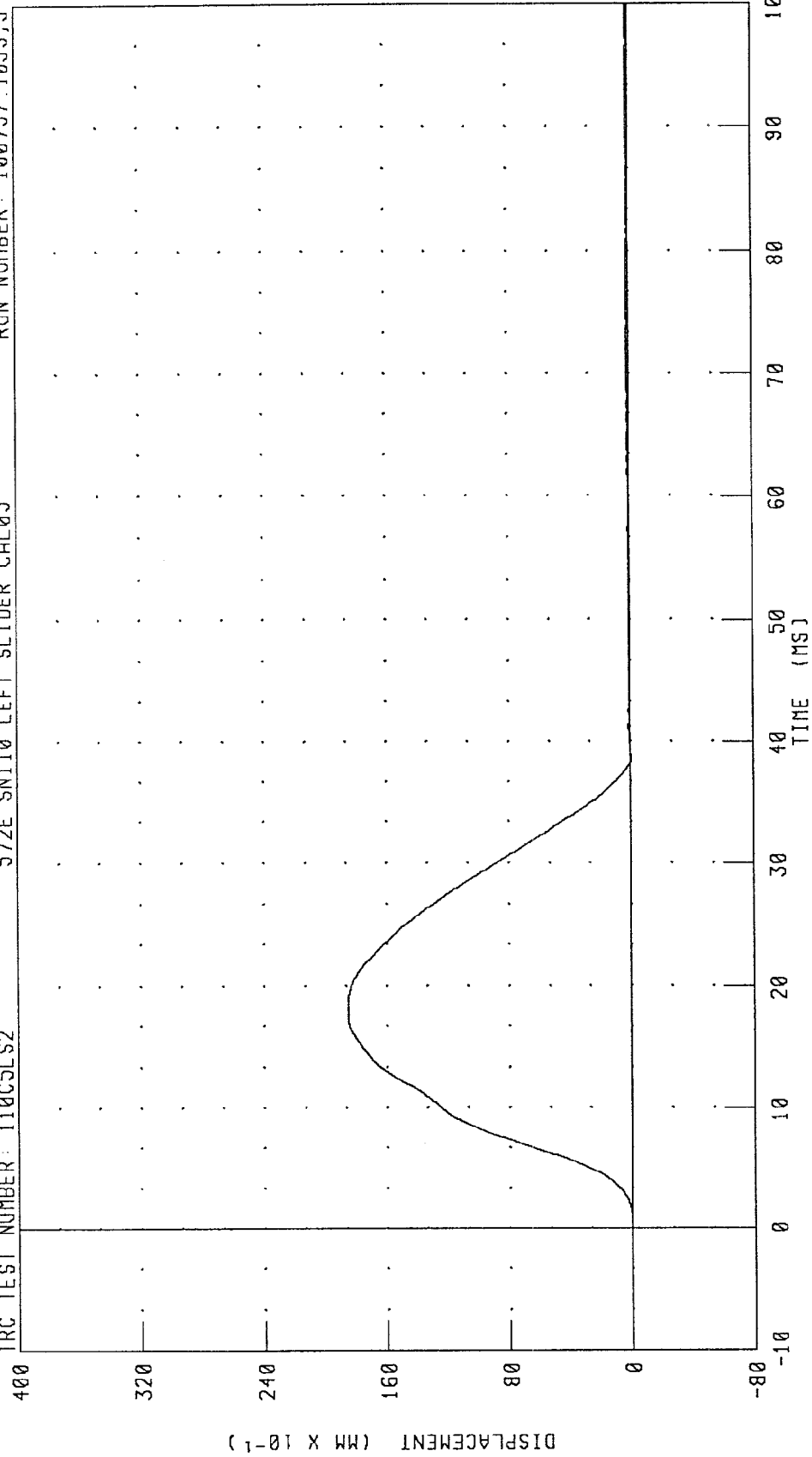
PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION

LEFT KNEE DISPLACEMENT

TRC TEST NUMBER: 110C5LS2

572E SN110 LEFT SLIDER CAL05

RUN NUMBER: 100797.1033,3



PEAK DATA: 18.52 MM @ 18.32 MS; -0.03 MM @ 38.48 MS

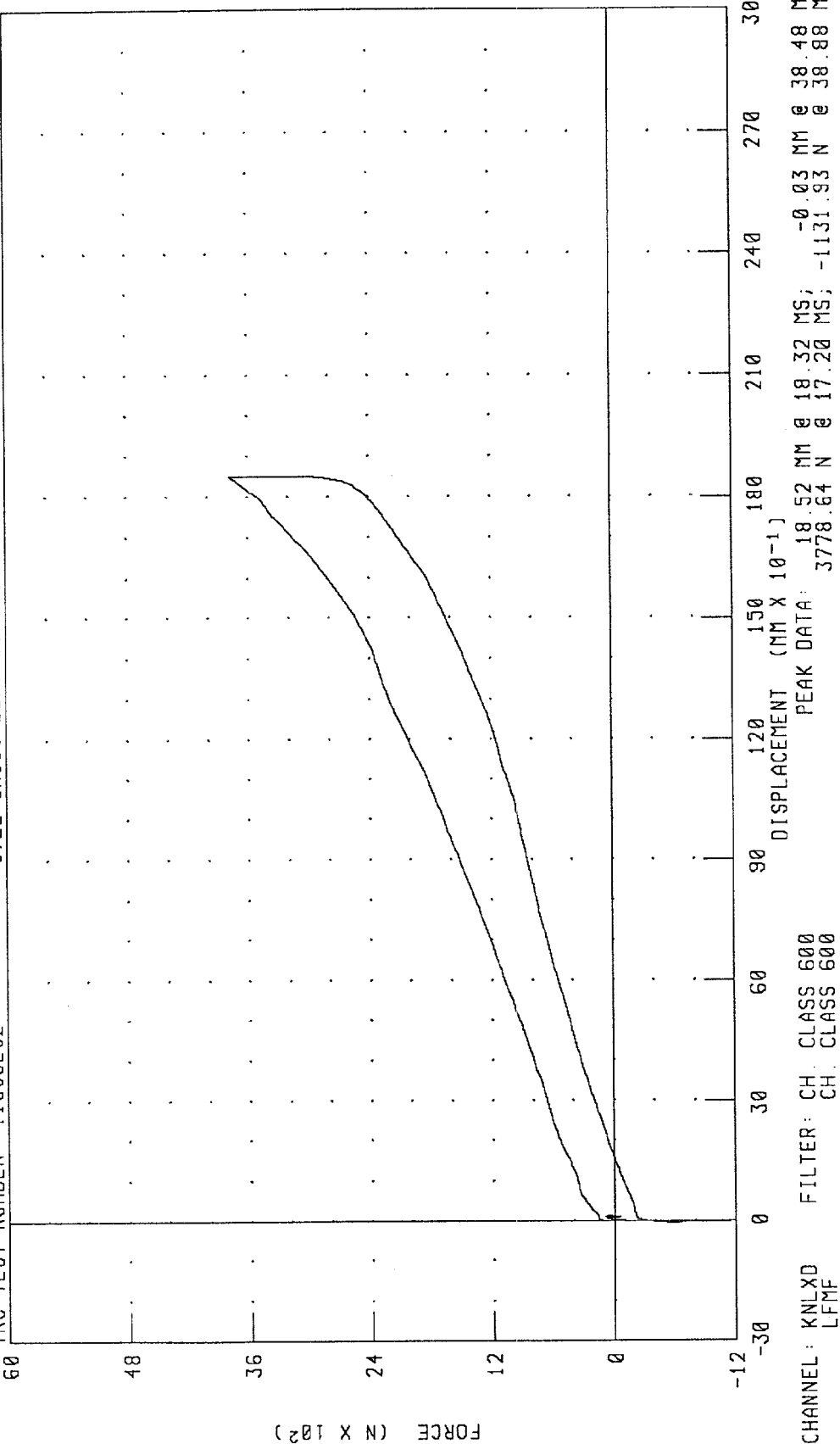
CHANNEL: KNLXD FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 110C5LS2

572E SN110 LEFT SLIDER CAL05

RUN NUMBER: 100797.1033.3



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

TRC INC.

TEST NO: 110C5RK1

572E SN110 RIGHT KNEE CAL 05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	41.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5395.4 N

TEST MEETS SPECIFICATIONS

TECHNICIAN B. J. Calt

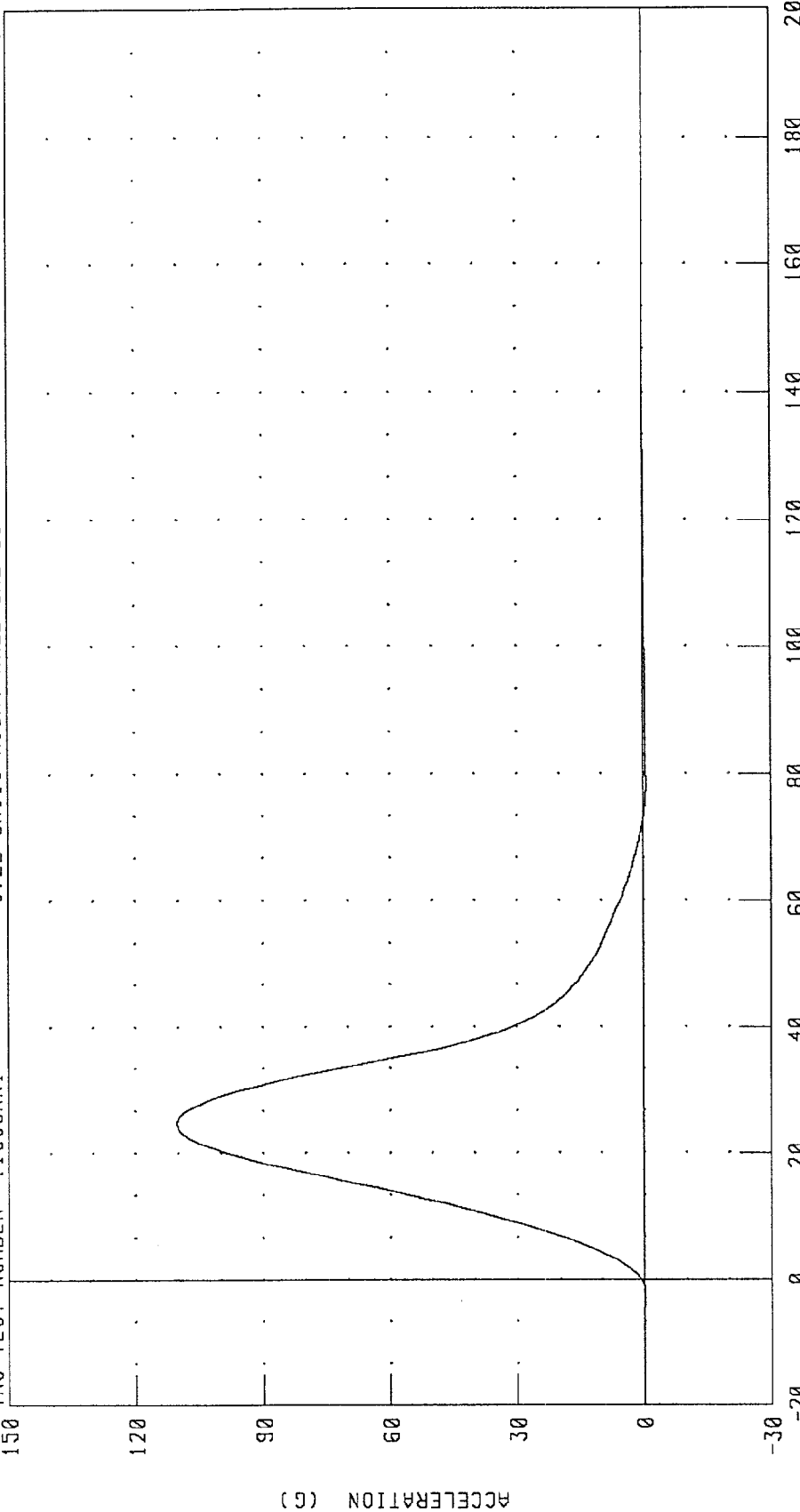
RUN NUMBER: 100397.0753;1

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

TRC TEST NUMBER: 110C5RK1

572E SN110 RIGHT KNEE CAL 05

RUN NUMBER: 100397.0754,1



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 110.27 G @ 2.48 MS, -0.59 G @ 7.84 MS

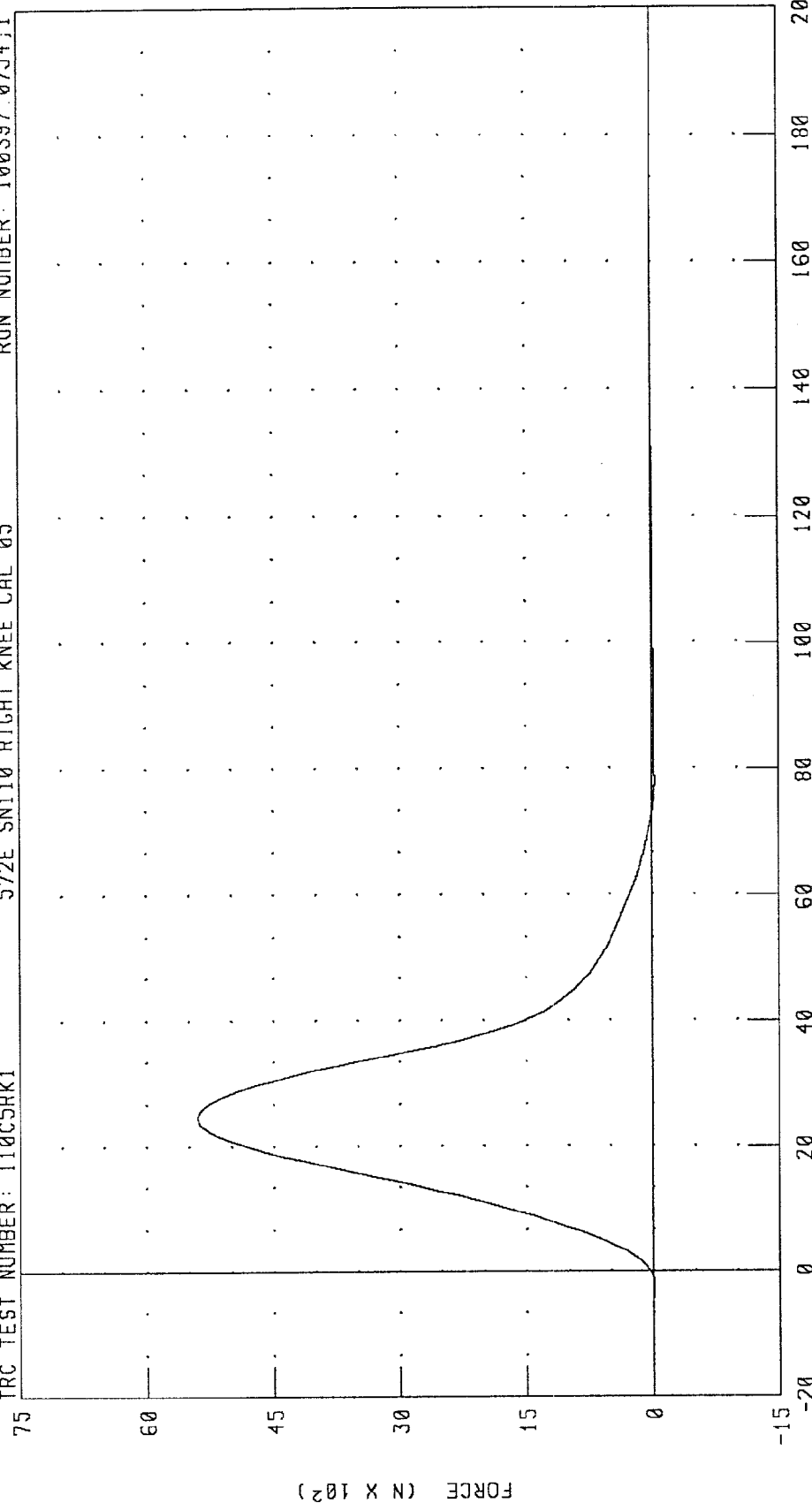
PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN110 RIGHT KNEE CAL 05

RUN NUMBER: 100397 0754,1

TRC TEST NUMBER: 110C5RK1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5395.40 N @ 2.48 MS, -28.94 N @ 7.84 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

TRC INC.

TEST NO: 110C5LK1

572E SN110 LEFT KNEE CAL 05

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	41.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	4815.9 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

By Calt

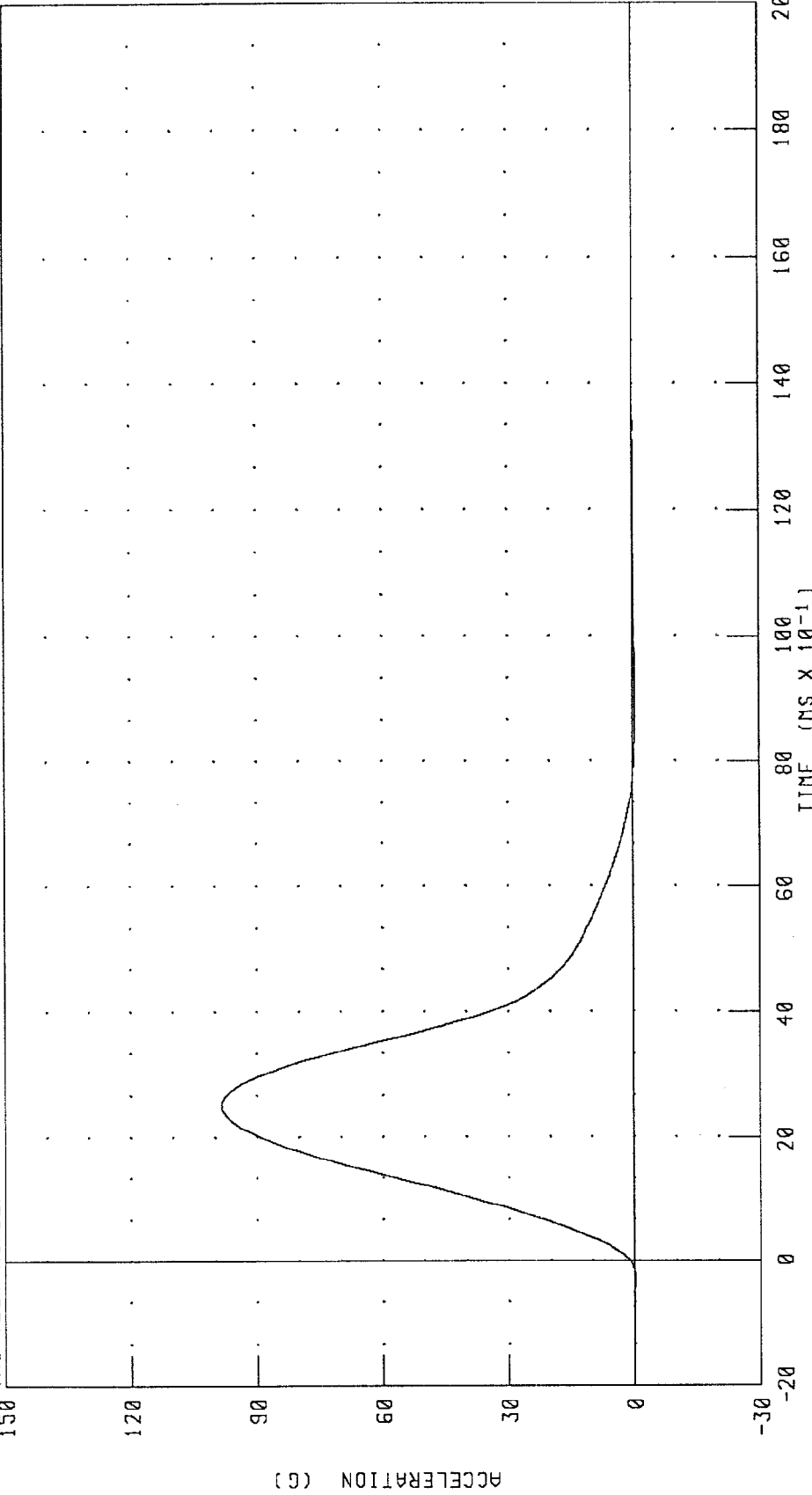
RUN NUMBER: 100397.0748;1

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

TRC TEST NUMBER: 110C5LK1

572E SN110 LEFT KNEE CAL 05

RUN NUMBER: 100397.0748;1



PEAK DATA: 98.43 G @ 2.48 MS; -0.47 G @ 8.88 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

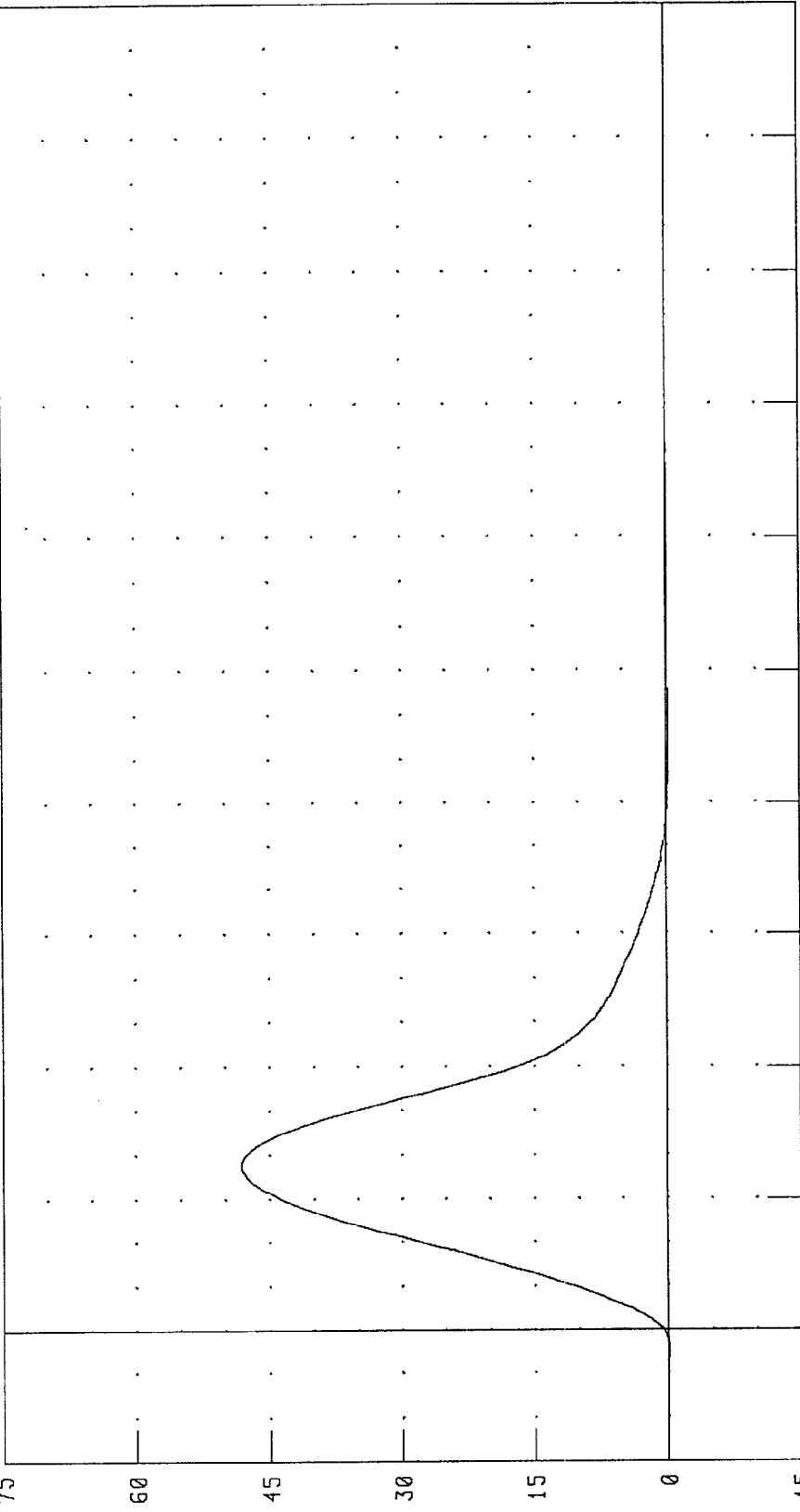
PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN110 LEFT KNEE CAL 05

RUN NUMBER: 100397.0748,1

TRC TEST NUMBER: 110C5LK1



PEAK DATA: 4815.92 N @ 2.48 MS; -23.13 N @ 8.88 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

Pre-Test Calibration

Serial Number 001

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS

SN001 UTAHA

07-OCT-97

TRC INC. TEST NO: 001C1ED1 572E SN001 EXT.DIMENSION CAL01

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	988. MM
WAIST CIRCUMFERENCE	(Z)	836 - 866 MM	856. MM
CHEST DEPTH	(O)	213 - 229 MM	221. MM
H-POINT HEIGHT	(C)	84 - 89 MM	86. MM
H-POINT FROM SEATBACK	(D)	135 - 140 MM	140. MM
SKULL CAP TO BACKLINE	(H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT	(A)	879 - 889 MM	881. MM
THIGH CLEARANCE	(F)	140 - 155 MM	150. MM
BUTTOCK KNEE LENGTH	(K)	579 - 605 MM	599. MM
BUTTOCK POPLITEAL LENGTH	(N)	452 - 478 MM	472. MM
POPLITEAL HEIGHT	(L)	429 - 455 MM	429. MM
KNEE PIVOT HEIGHT	(M)	485 - 500 MM	493. MM
FOOT LENGTH	(P)	252 - 267 MM	262. MM
FOOT BREADTH	(W)	91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84 - 94 MM	94. MM
SHOULDER BREADTH	(V)	422 - 437 MM	429. MM
SHOULDER PIVOT HEIGHT	(B)	506 - 521 MM	513. MM
ELBOW REST HEIGHT	(J)	191 - 211 MM	203. MM
SHOULDER-ELBOW LENGTH	(I)	330 - 345 MM	338. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290 - 305 MM	292. MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

By [Signature]

RUN NUMBER: 111297.1245

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

TRC INC.

TEST NO: 001C2HD1

572E SN001 HEAD DROP CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	63.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	258.49 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.11 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

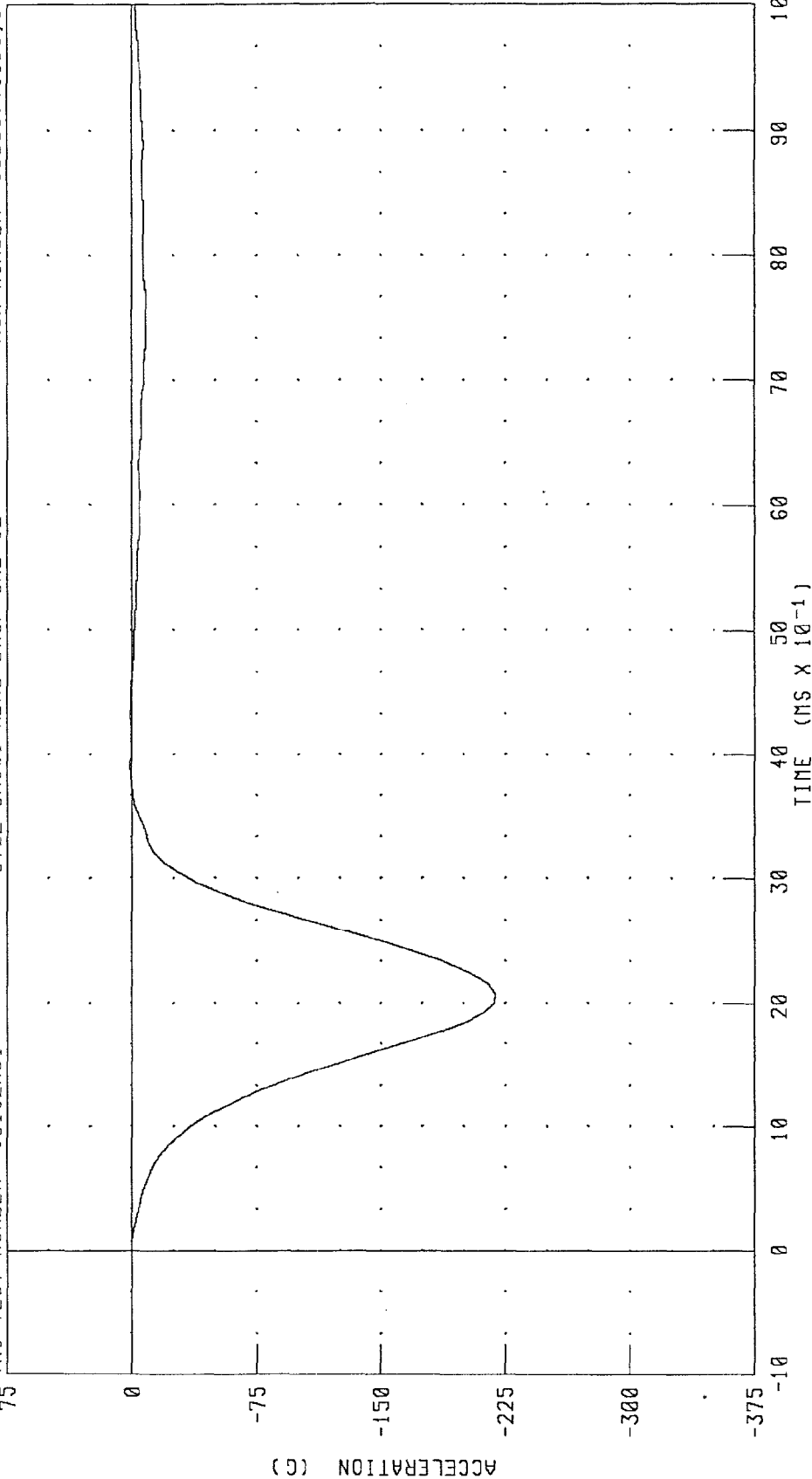
TEST MEETS SPECIFICATIONS

TECHNICIAN By Cult

RUN NUMBER: 100997.1015;1

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

TRC TEST NUMBER: 001C2H01 572E SN001 HEAD DROP CAL 02 RUN NUMBER: 100997.1016;1



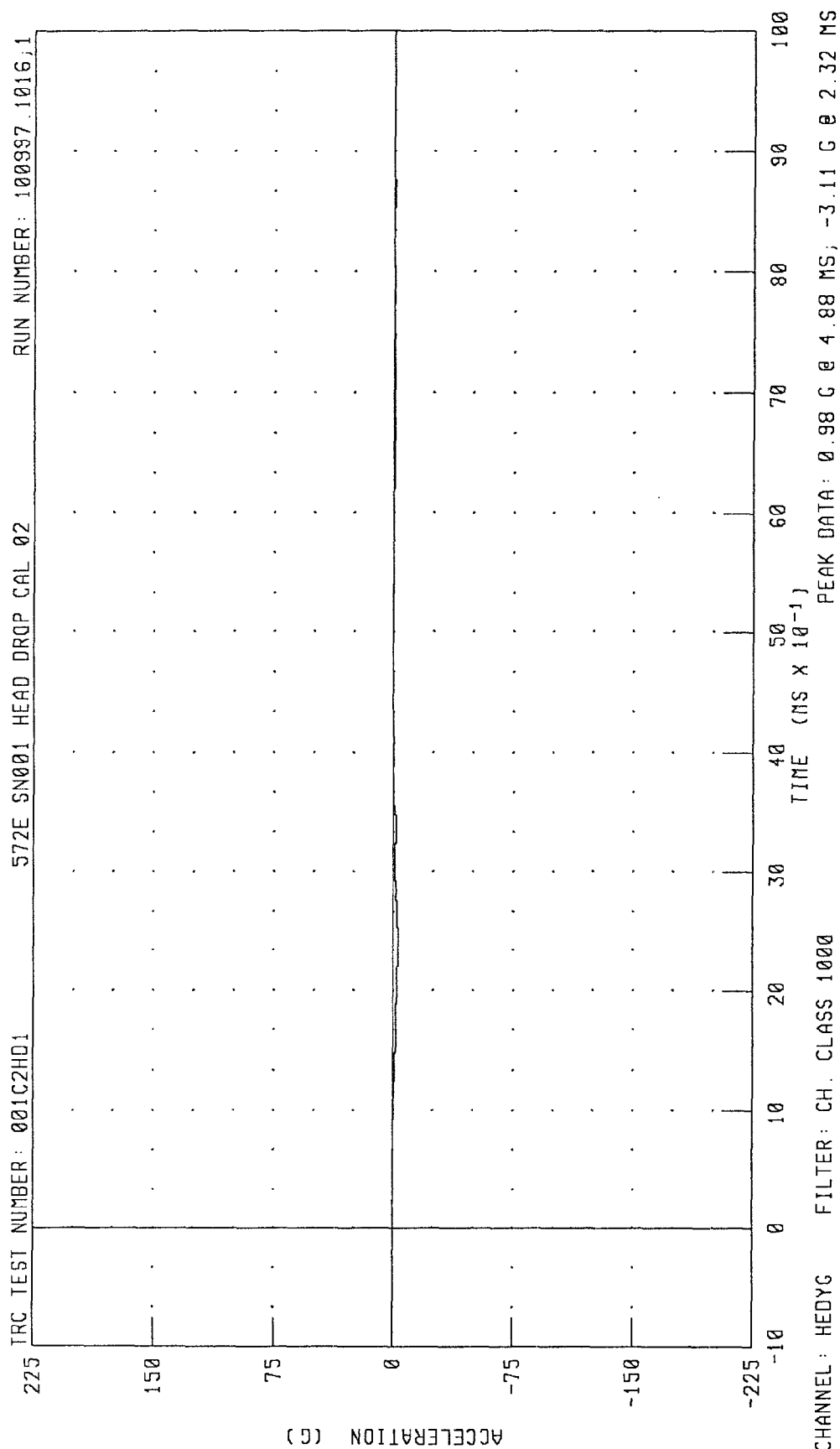
PEAK DATA: 1.09 G @ 3.92 MS; -219.17 G @ 2.08 MS

CHANNEL: HEDXG FILTER: CH. CLASS 1000

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

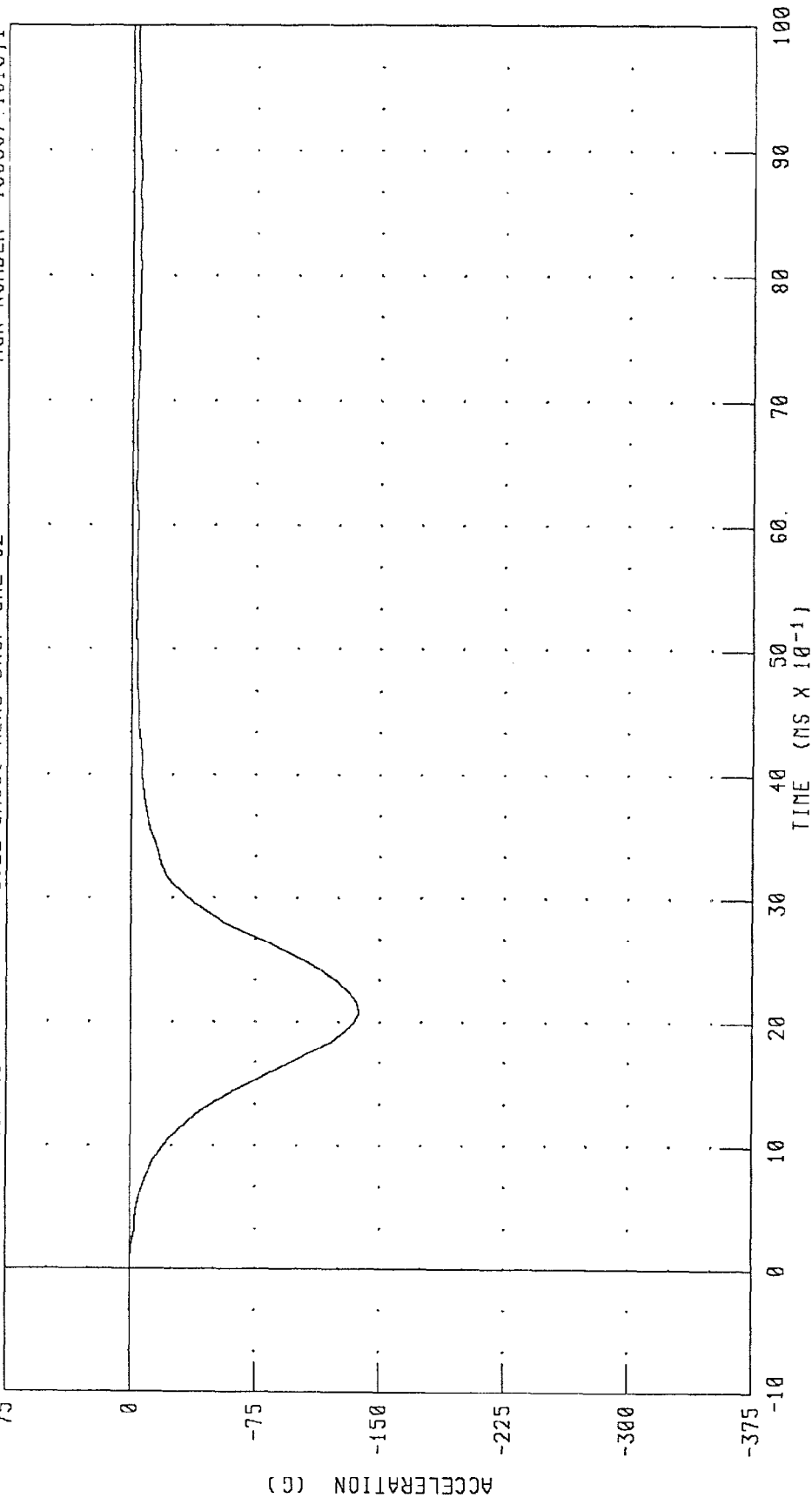
572E SN001 HEAD DRQP CAL 02 RUN NUMBER: 100997.1016;1

IRC TEST NUMBER: 001C2HD1



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

TRC TEST NUMBER: 001C2HD1 572E SN001 HEAD DROP CAL 02 RUN NUMBER: 100997.1016;1



PEAK DATA: -0.01 G @ 0.00 MS; -137.02 G @ 2.08 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

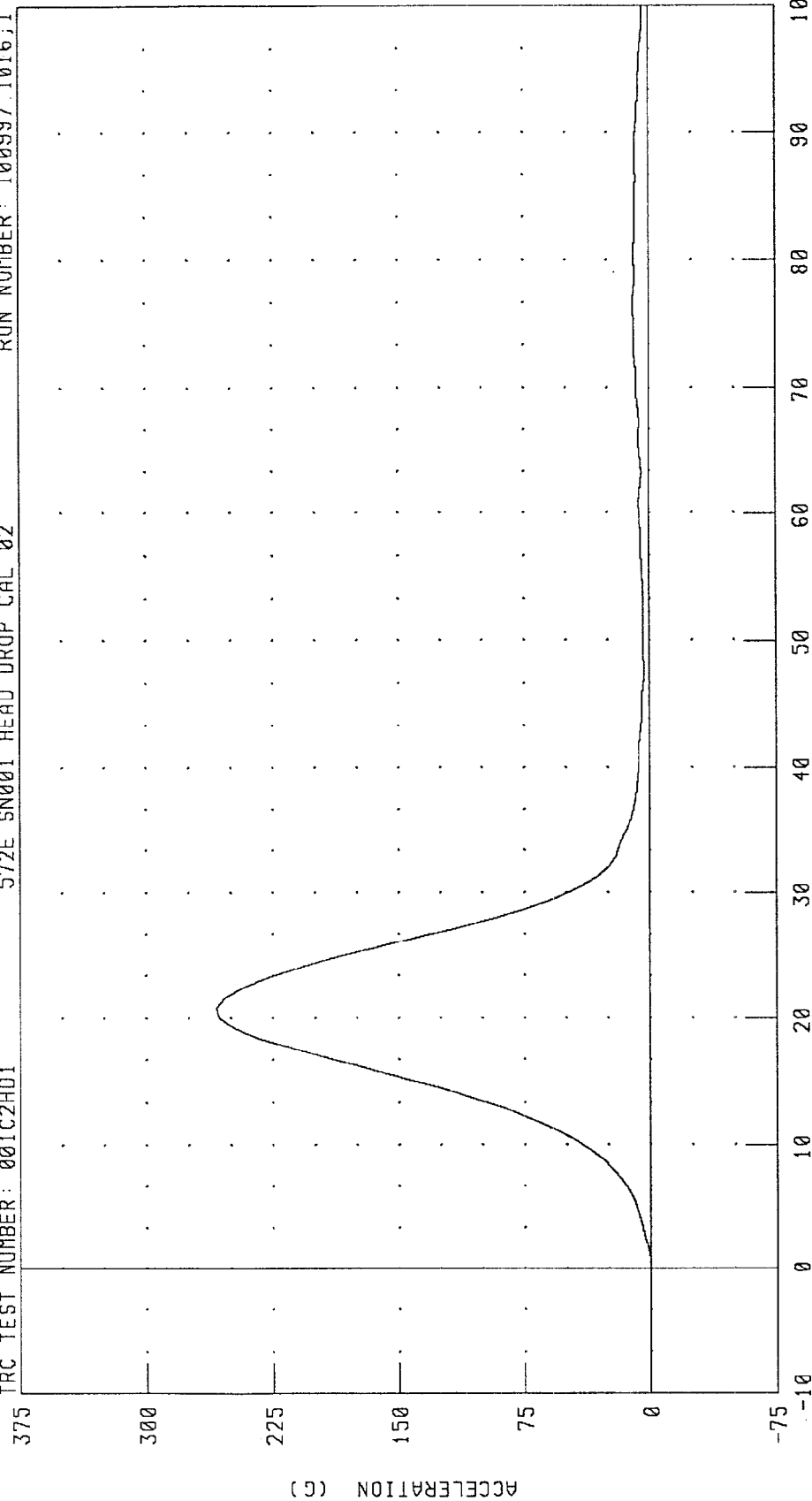
PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN001 HEAD DROP CAL 02

RUN NUMBER: 100997.1016,1

TRC TEST NUMBER: 001C2HD1



CHANNEL: HEDRG FILTER: CH. CLASS 1000

PEAK DATA: 258.49 G @ 2.08 MS; 0.04 G @ -0.32 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 001C1NF4 572E SN001 NECK FLEXION CAL01

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	41.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	6.93 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.53 G
	20 MS	17.60 - 22.60 G	22.25 G
	30 MS	12.50 - 18.50 G	18.47 G
MAX PENDULUM G		29 G MAX	24.14 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	18.35 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	34.32 MS
D PLANE	MAX	64 - 78 DEG.	76.03 DEG.
ROTATION	TIME	57 - 64 MS	59.68 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	92.89 NM
	TIME	47 - 58 MS	56.96 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.68 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.28 MS

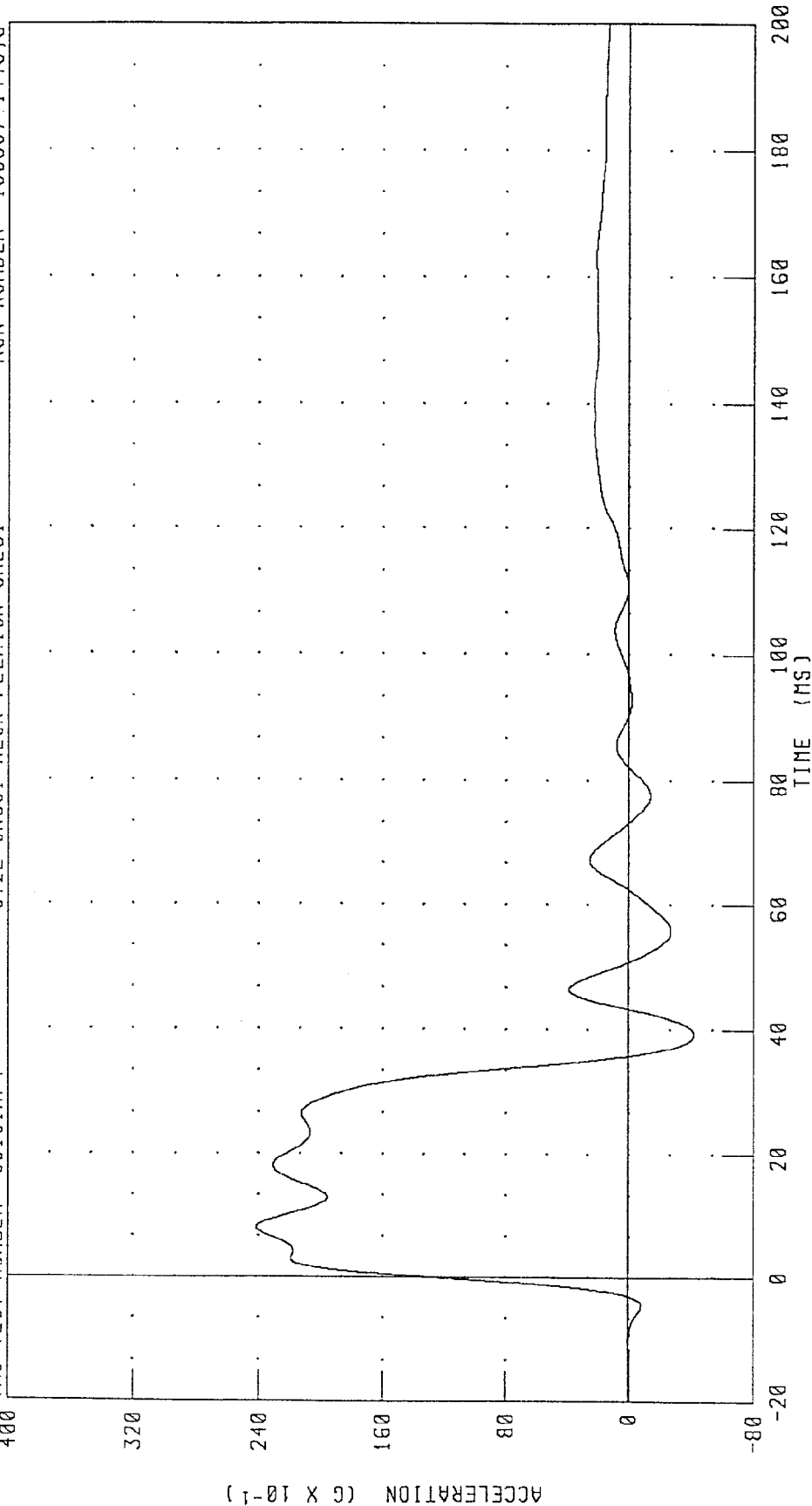
TEST MEETS SPECIFICATIONS

TECHNICIAN By Caltan

RUN NUMBER: 100397.1440;6

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 PENDULUM DECELERATION

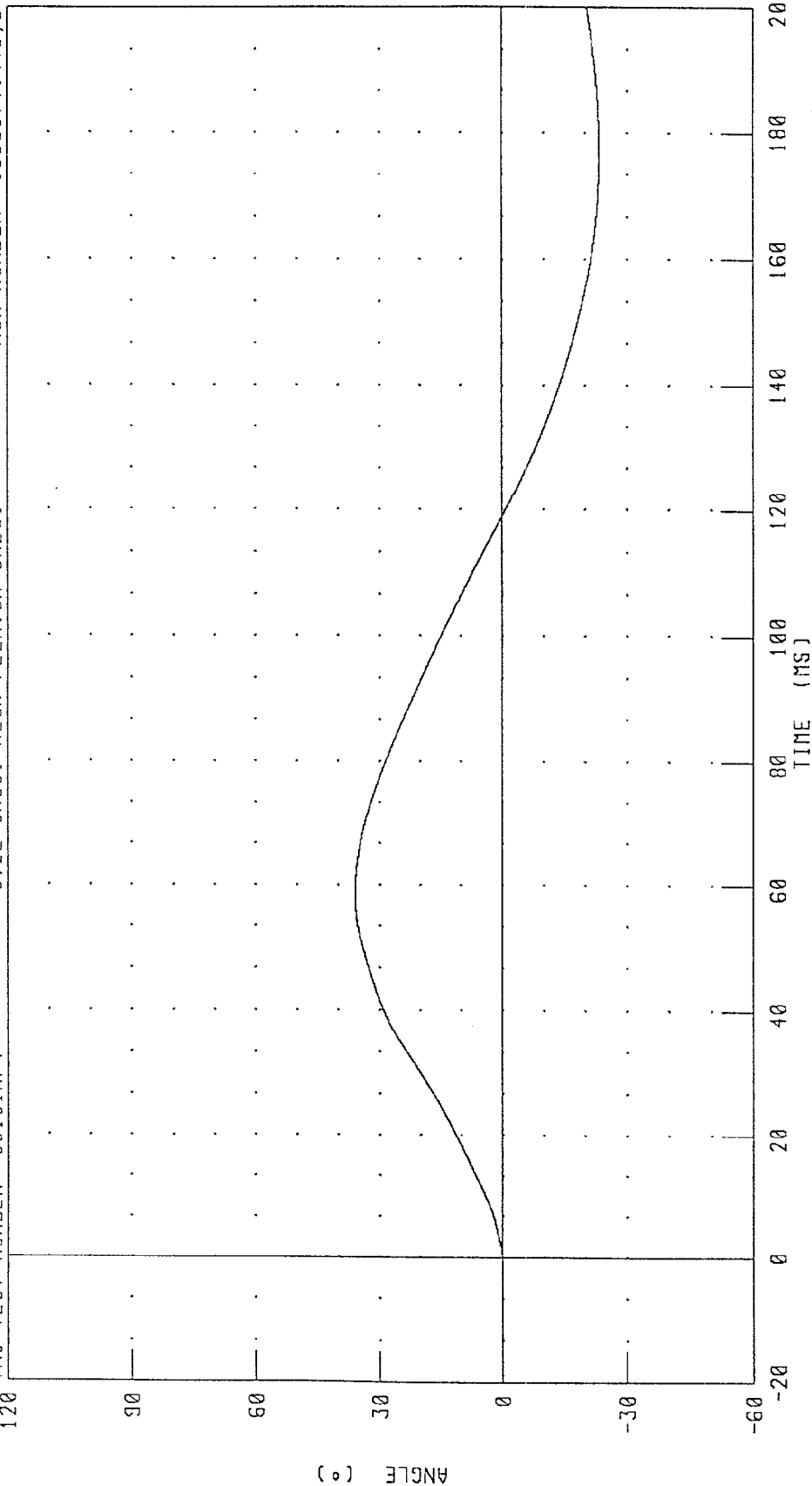
TRC TEST NUMBER: 001CINF4 572E SN001 NECK FLEXION CAL01 RUN NUMBER: 100397.1440,6



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 24.15 G @ 8.08 MS; -4.18 G @ 39.28 MS

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

TRC TEST NUMBER: 001C1NF4 572E SN001 NECK FLEXION CAL01 RUN NUMBER: 100397.1440;6

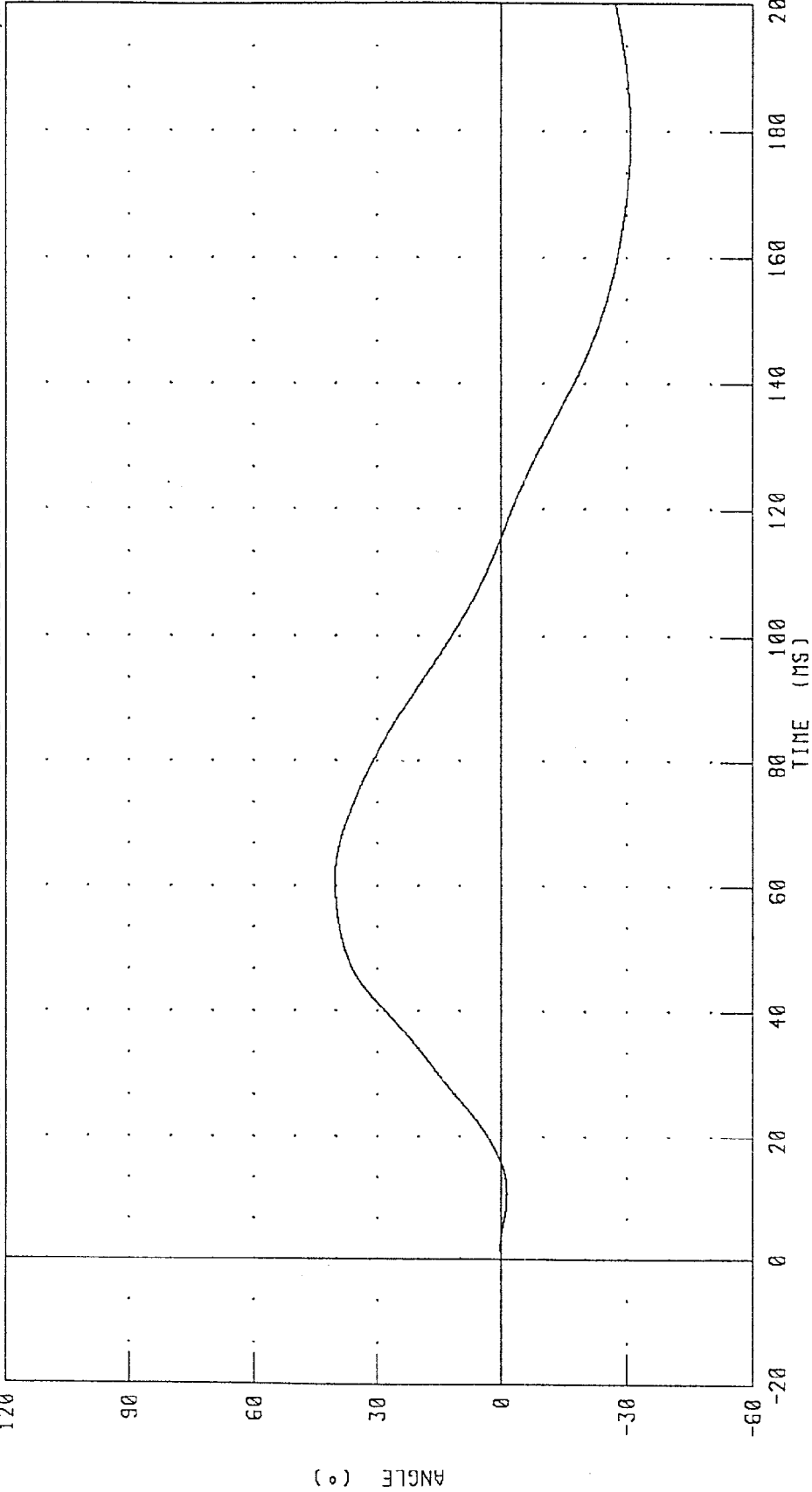


PEAK DATA: 35.90 ° @ 58.56 MS; -23.36 ° @ 176.80 MS

CHANNEL: BETA FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 001C1NF4 572E SN001 NECK FLEXION CAL01 RUN NUMBER: 100397.1440;6



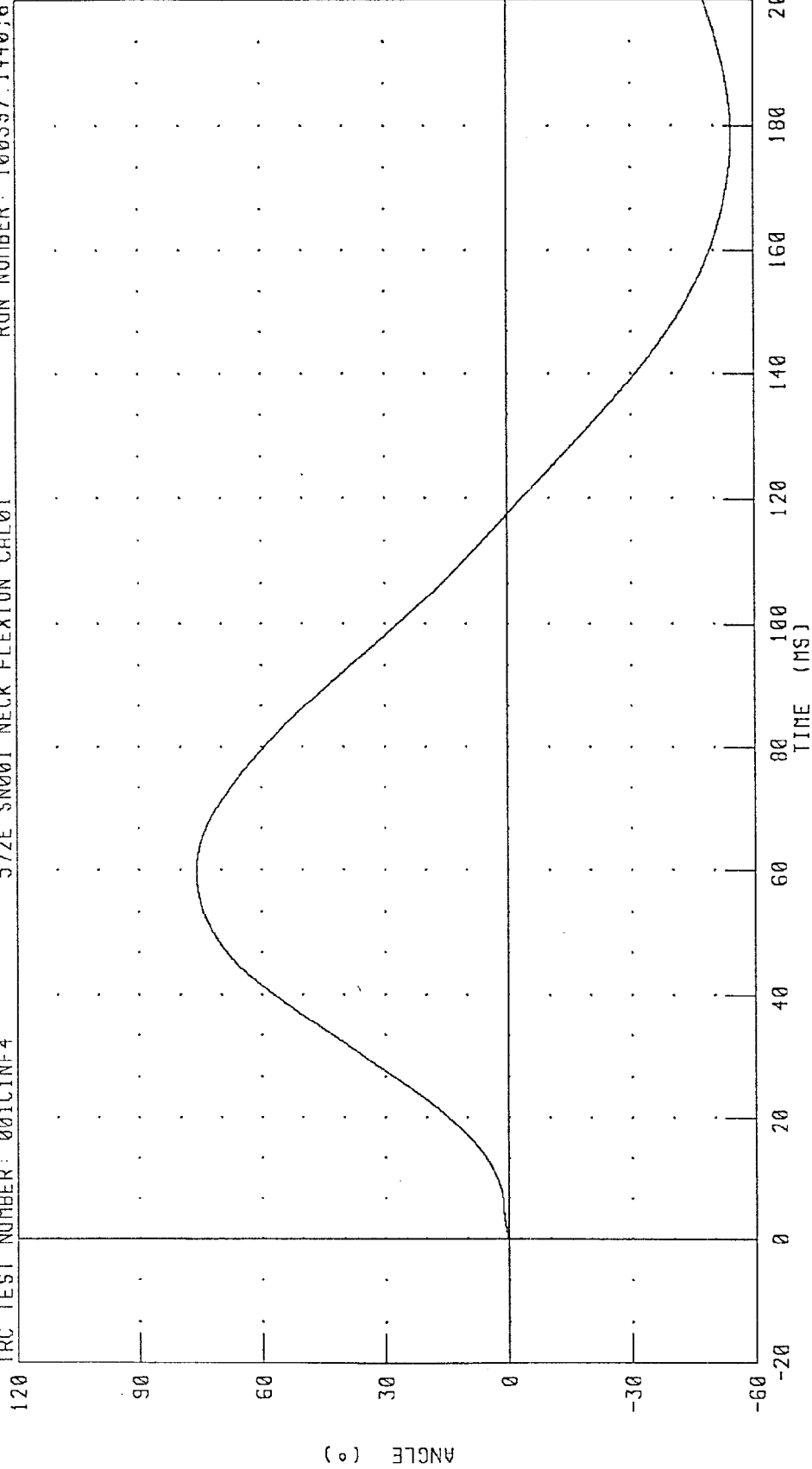
PEAK DATA: 40.19 ° @ 50.72 MS; -31.06 ° @ 179.36 MS

CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 001CINF4 572E SN001 NECK FLEXION CAL01 RUN NUMBER: 100397.1440,6



PEAK DATA: 76.04 ° @ 59.68 MS; -54.38 ° @ 178.32 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 001C1NF4

572E SN001 NECK FLEXION CAL01

RUN NUMBER: 100397.1440;6

160

120

80

40

0

-40

-80

FORCE (N X 10¹)

TIME (MS)

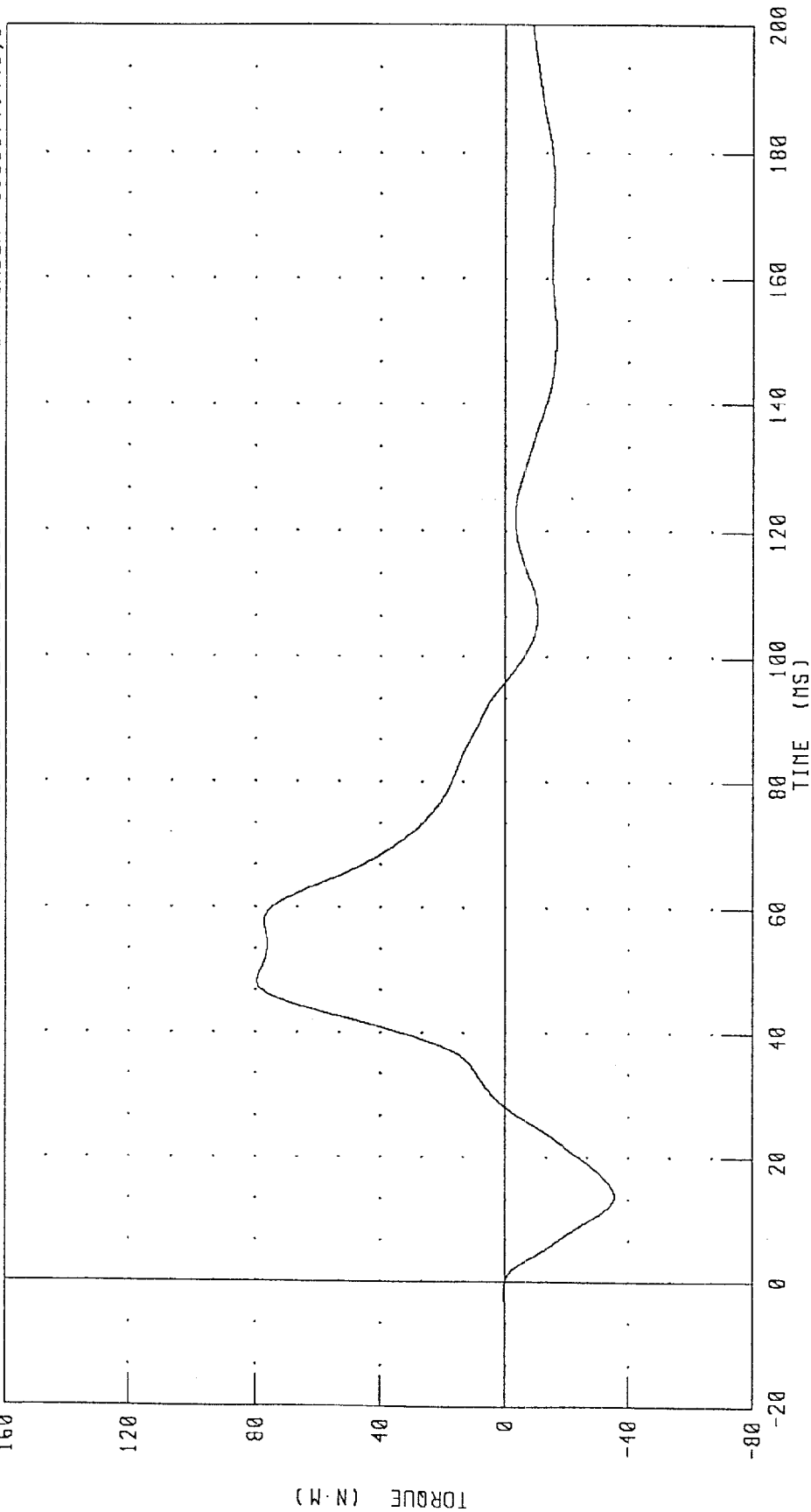
PEAK DATA: 896.72 N @ 55.44 MS; -185.31 N @ 168.96 MS

FILTER: CH. CLASS 60

CHANNEL: NEKXF

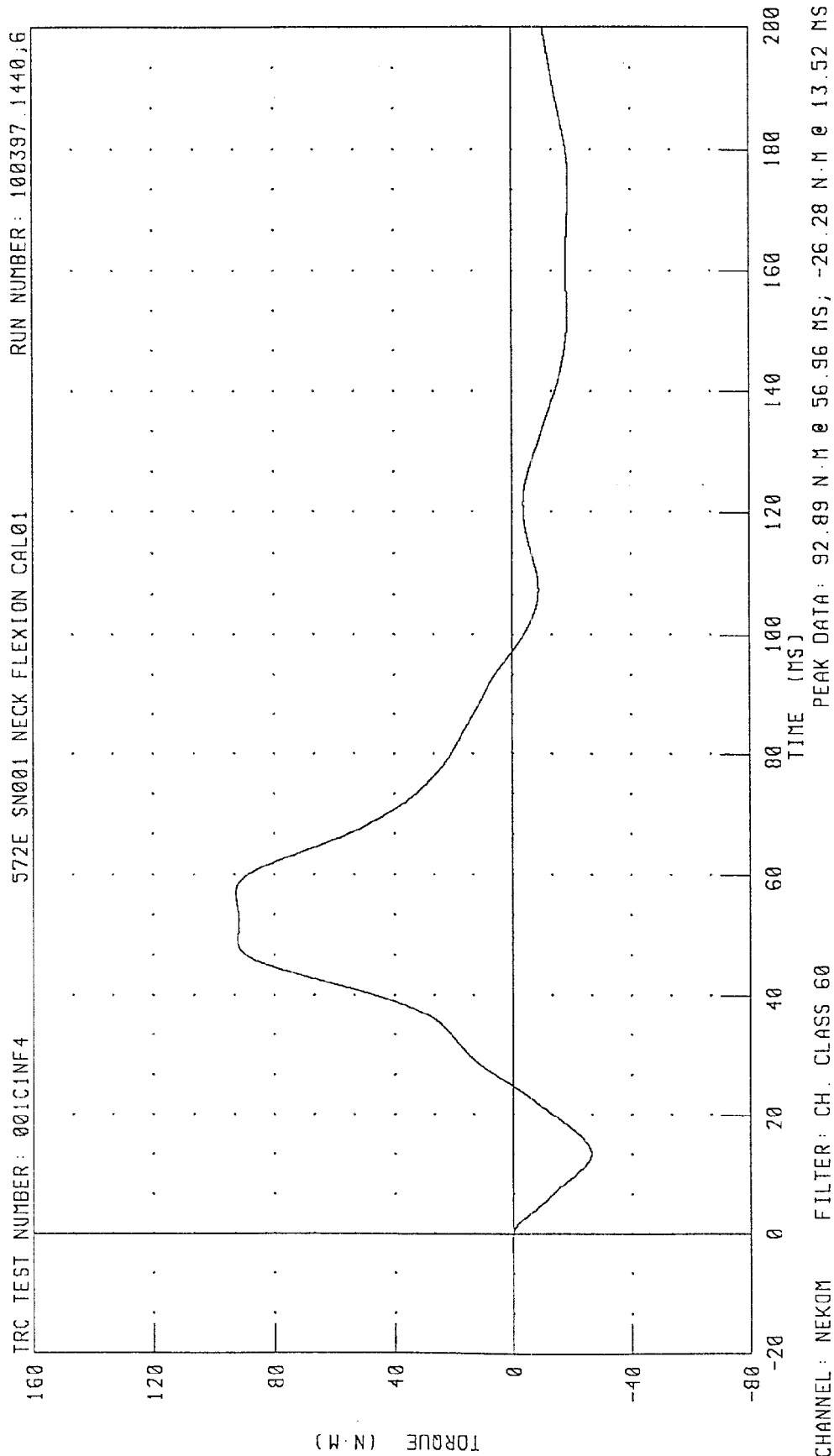
PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

TRC TEST NUMBER: 001C1NF4 572E SN001 NECK FLEXION CAL01 RUN NUMBER: 100397.1440,6



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 79.61 N·M @ 48.16 MS; -35.42 N·M @ 14.00 MS

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



TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 001C1NE2 572E SN001 NECK EXT. CAL02

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	41.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.00 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.28 G
	20 MS	14.00 - 19.00 G	17.12 G
	30 MS	11.00 - 16.00 G	15.65 G
MAX PENDULUM G		22 G MAX	17.92 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	15.59 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	38.80 MS
D PLANE	MAX	81 - 106 DEG.	99.07 DEG.
ROTATION	TIME	72 - 82 MS	76.08 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-70.49 NM
	TIME	65 - 79 MS	70.80 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	157.60 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	136.64 MS

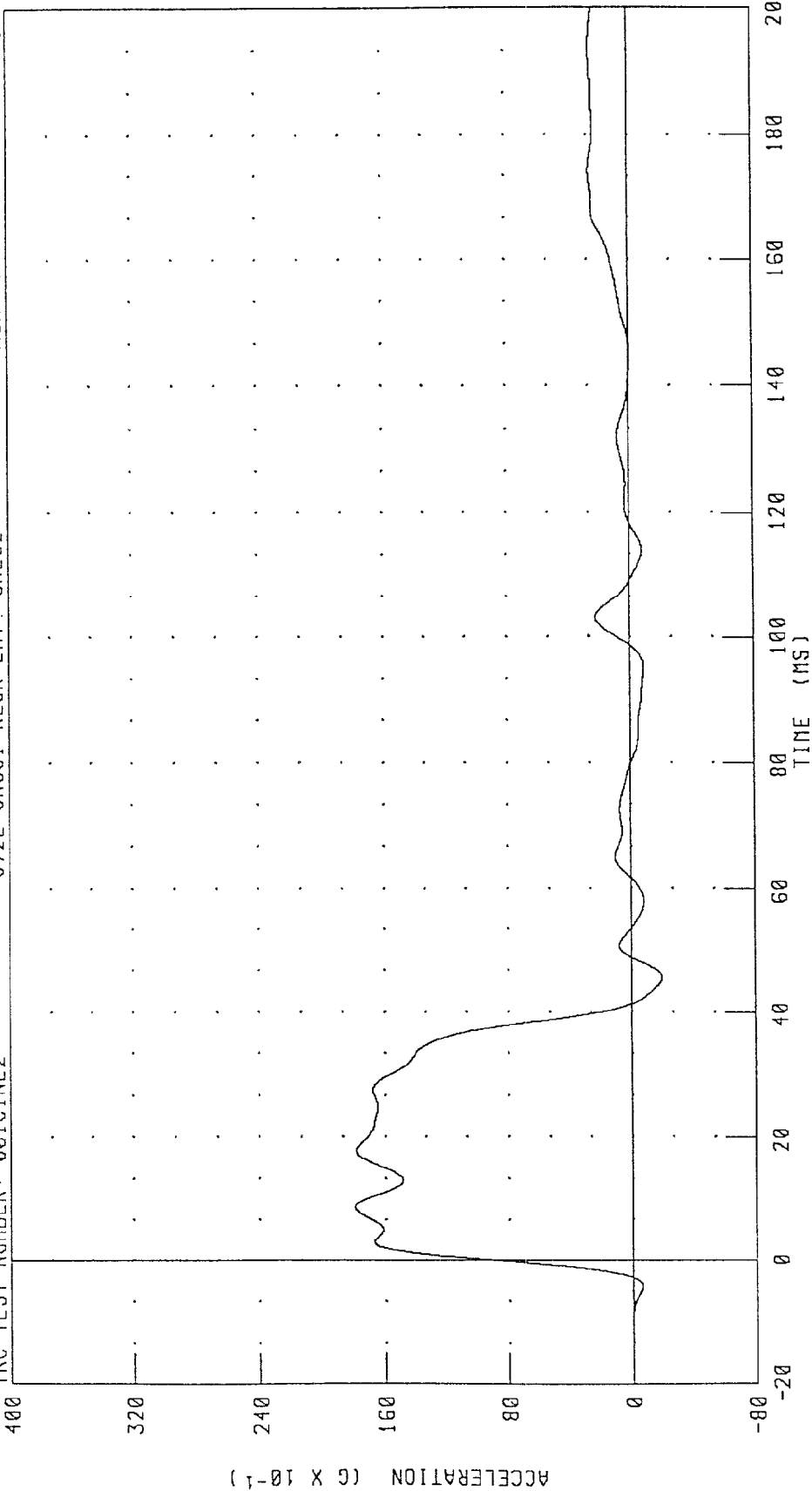
TEST MEETS SPECIFICATIONS

TECHNICIAN By Calt

RUN NUMBER: 100397.1526;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 001CINE2 572E SN001 NECK EXT. CAL02 RUN NUMBER: 100397 1528,1

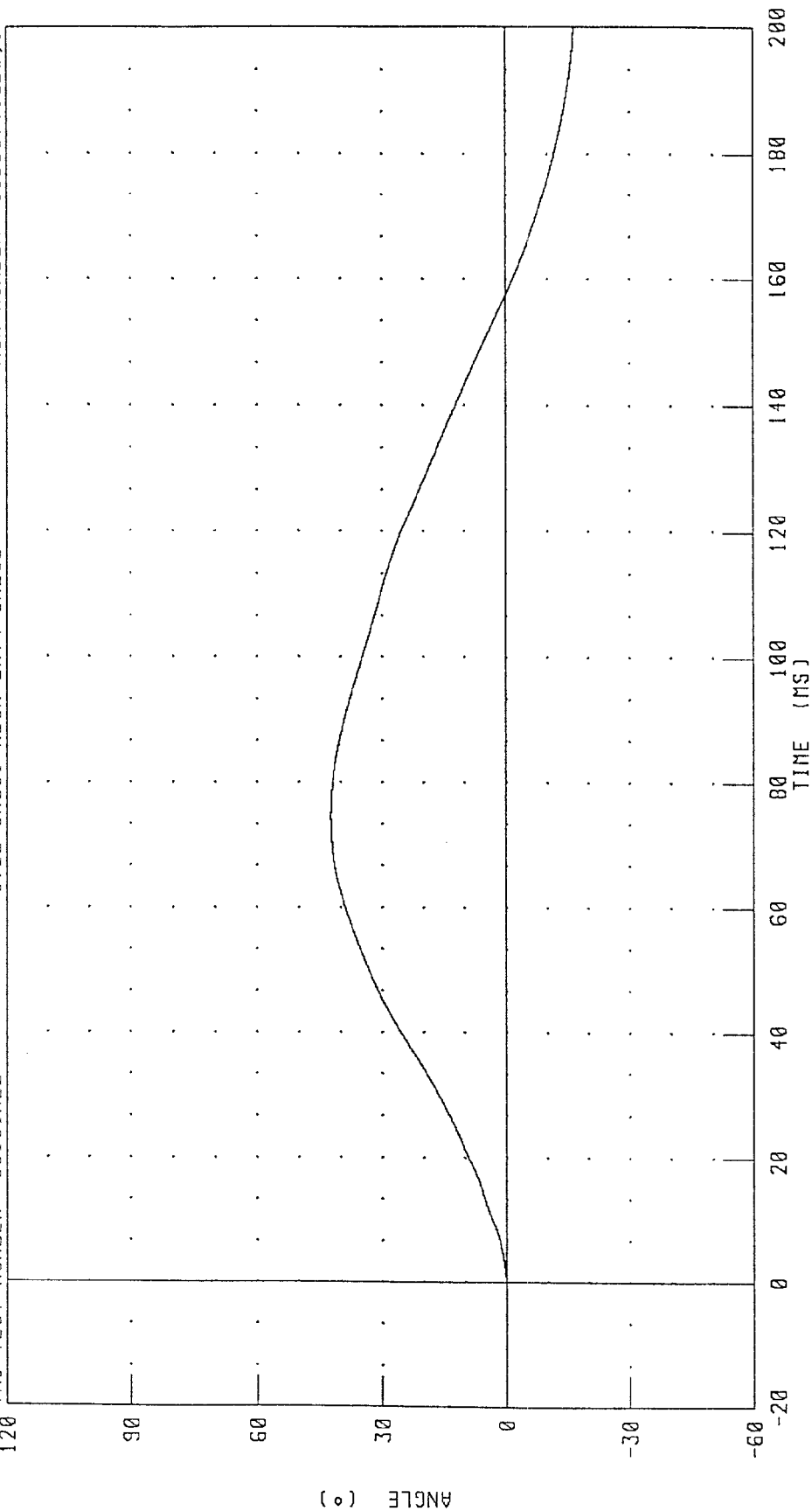


PEAK DATA: 17.92 G @ 8.72 MS; -1.95 G @ 45.52 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 001C1NE2 572E SN001 NECK EXT. CAL02 RUN NUMBER: 100397 1528;1

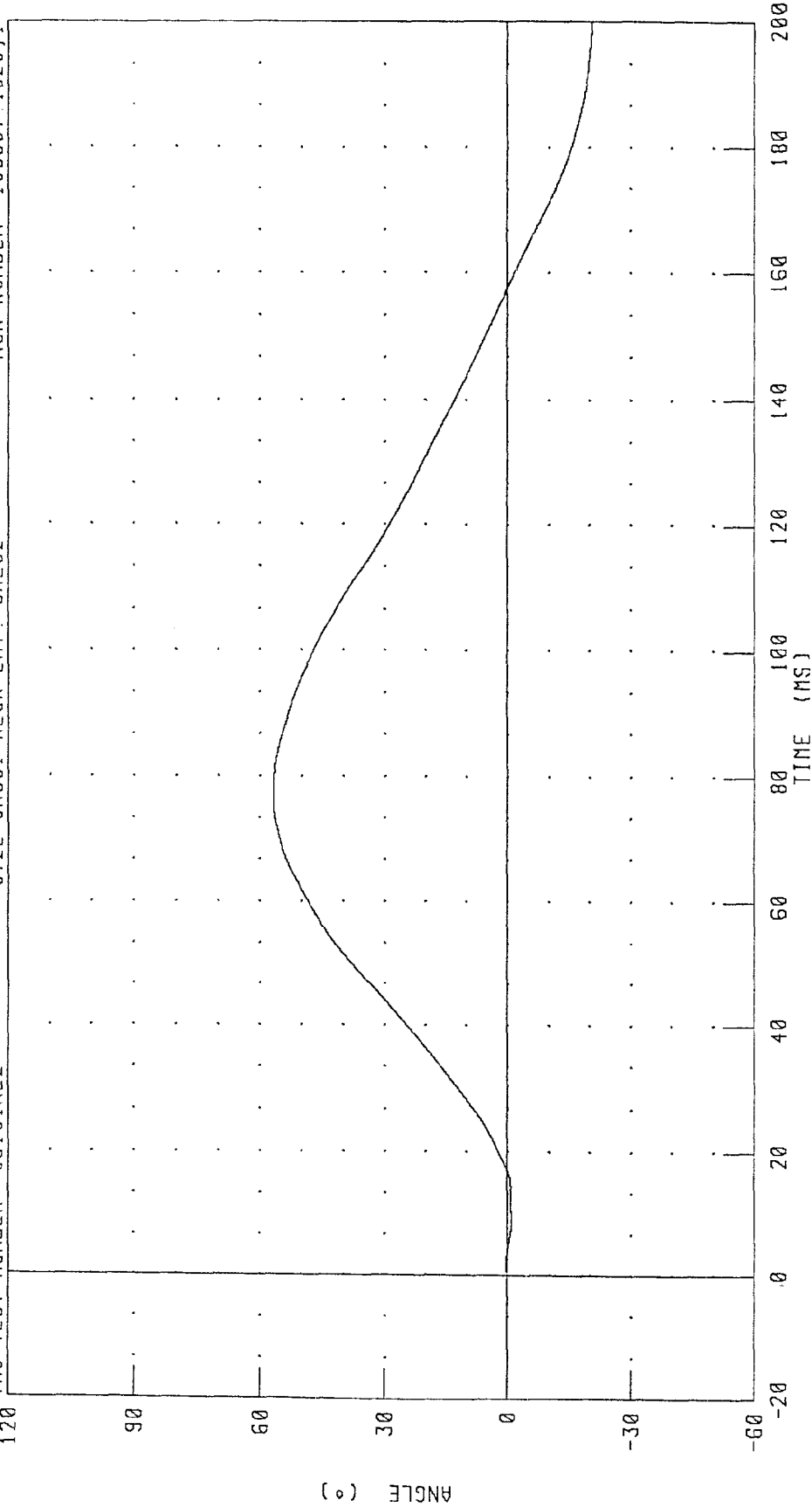


PEAK DATA: 42.34 ° @ 74.56 MS; -16.40 ° @ 200.00 MS

CHANNEL: BETA FILTER: CH. CLASS 60

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

IRC TEST NUMBER: 001C1NE2 572E SN001 NECK EXT. CAL02 RUN NUMBER: 100397 1528,1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 56.79 ° @ 76.88 MS; -20.53 ° @ 200.00 MS

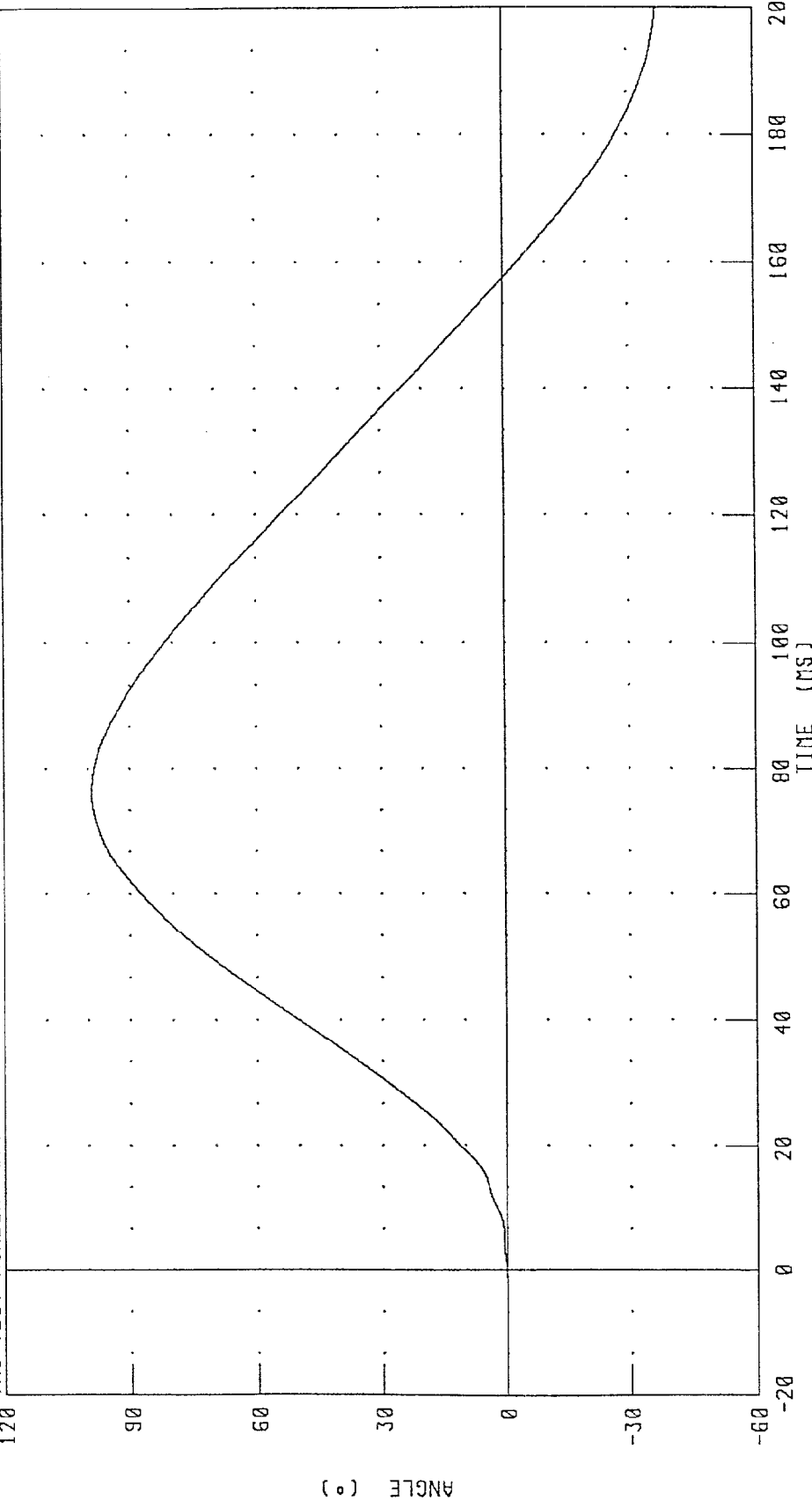
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 001C1NE2

572E SN001 NECK EXT. CAL02

RUN NUMBER: 100397.1528;1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 99.07 ° @ 76.08 MS; -36.93 ° @ 200.00 MS

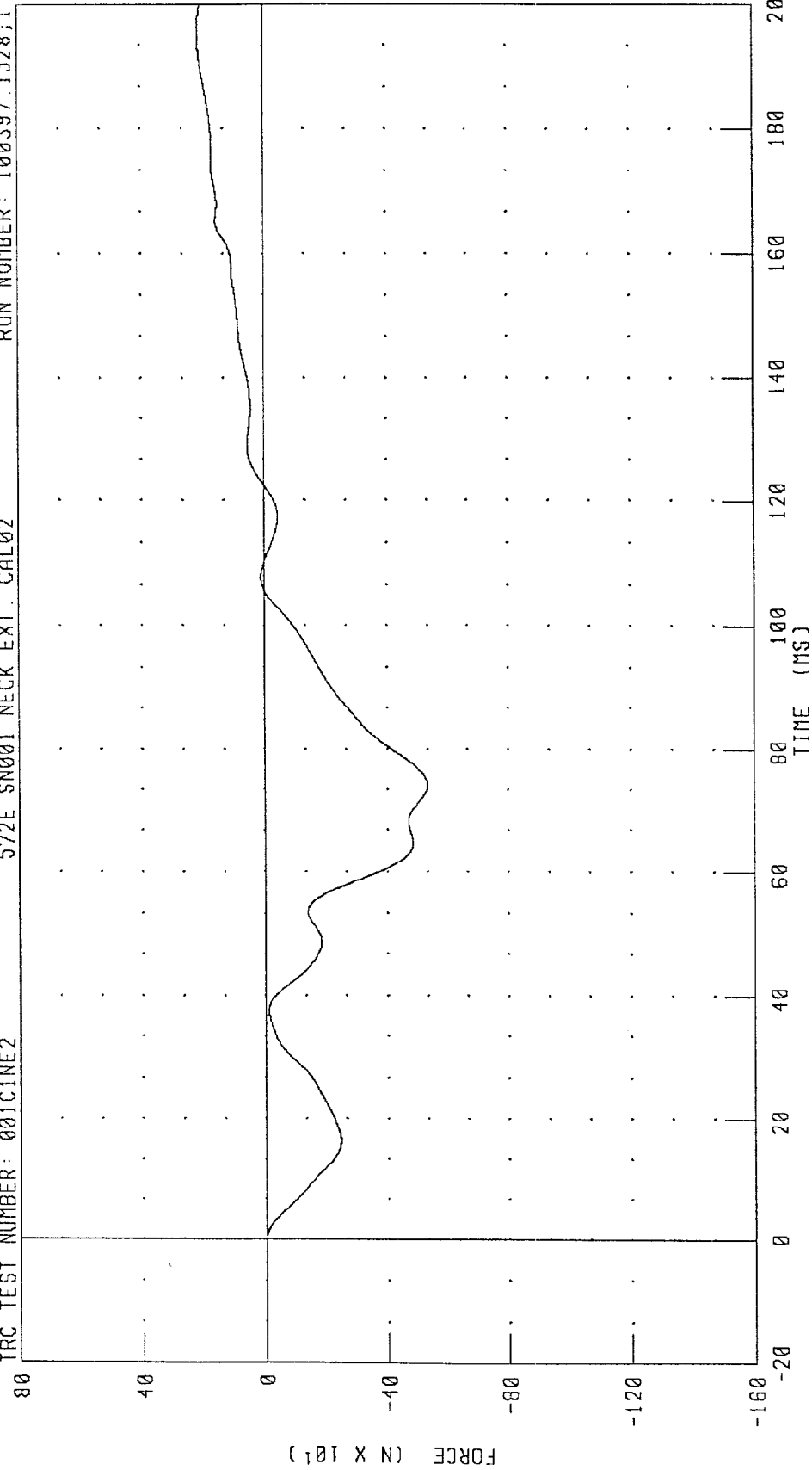
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 001C1NE2

572E SN001 NECK EXT. CAL02

RUN NUMBER: 100397.1528;1



PEAK DATA: 213.61 N @ 195.60 MS; -532.47 N @ 74.16 MS

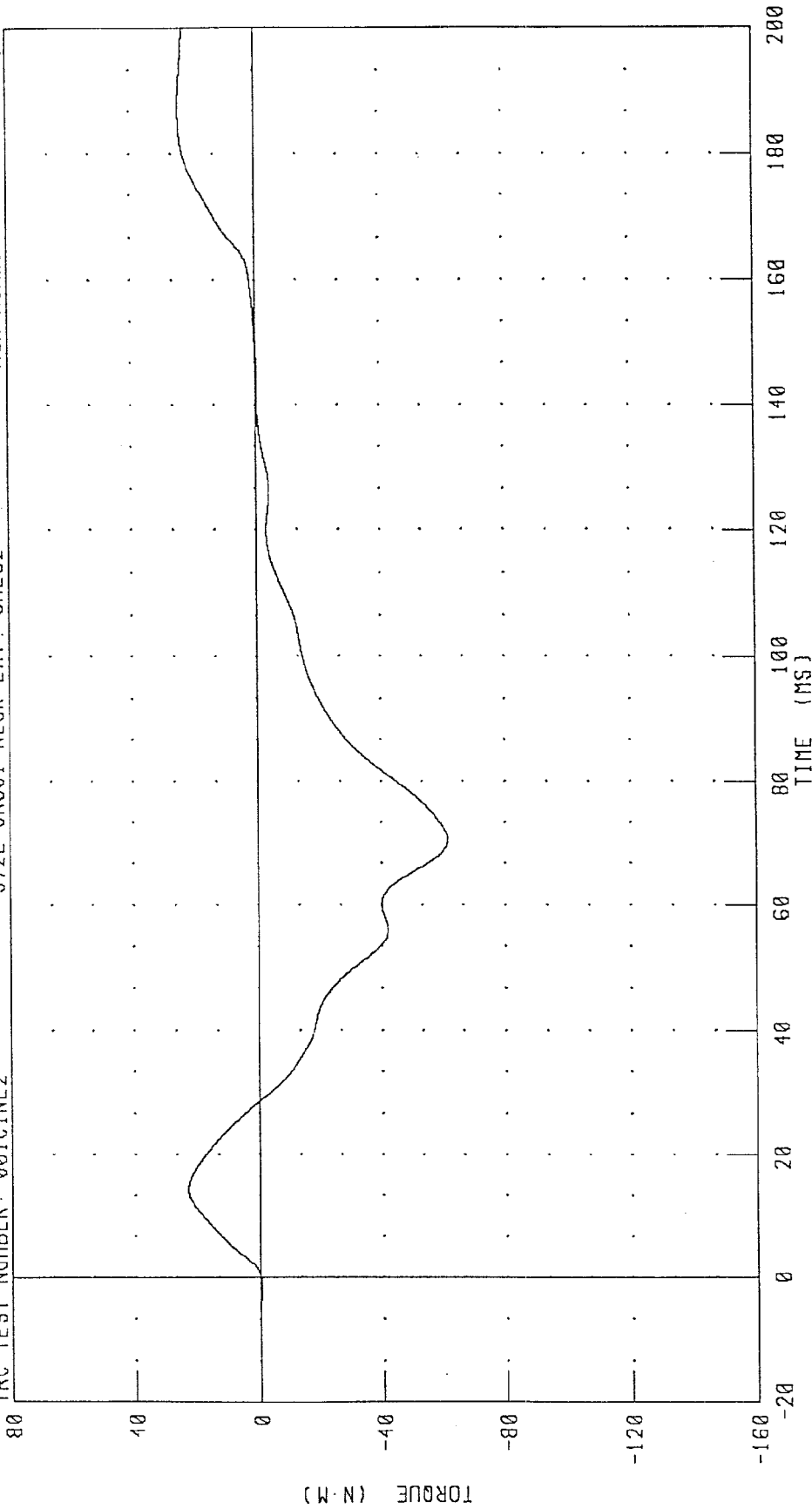
FILTER: CH. CLASS 60

CHANNEL: NEKXF

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 001C1NE2 572E SN001 NECK EXT. CAL02 RUN NUMBER: 100397.1528;1



PEAK DATA: 24.27 N·M @ 187.52 MS; -61.72 N·M @ 70.48 MS

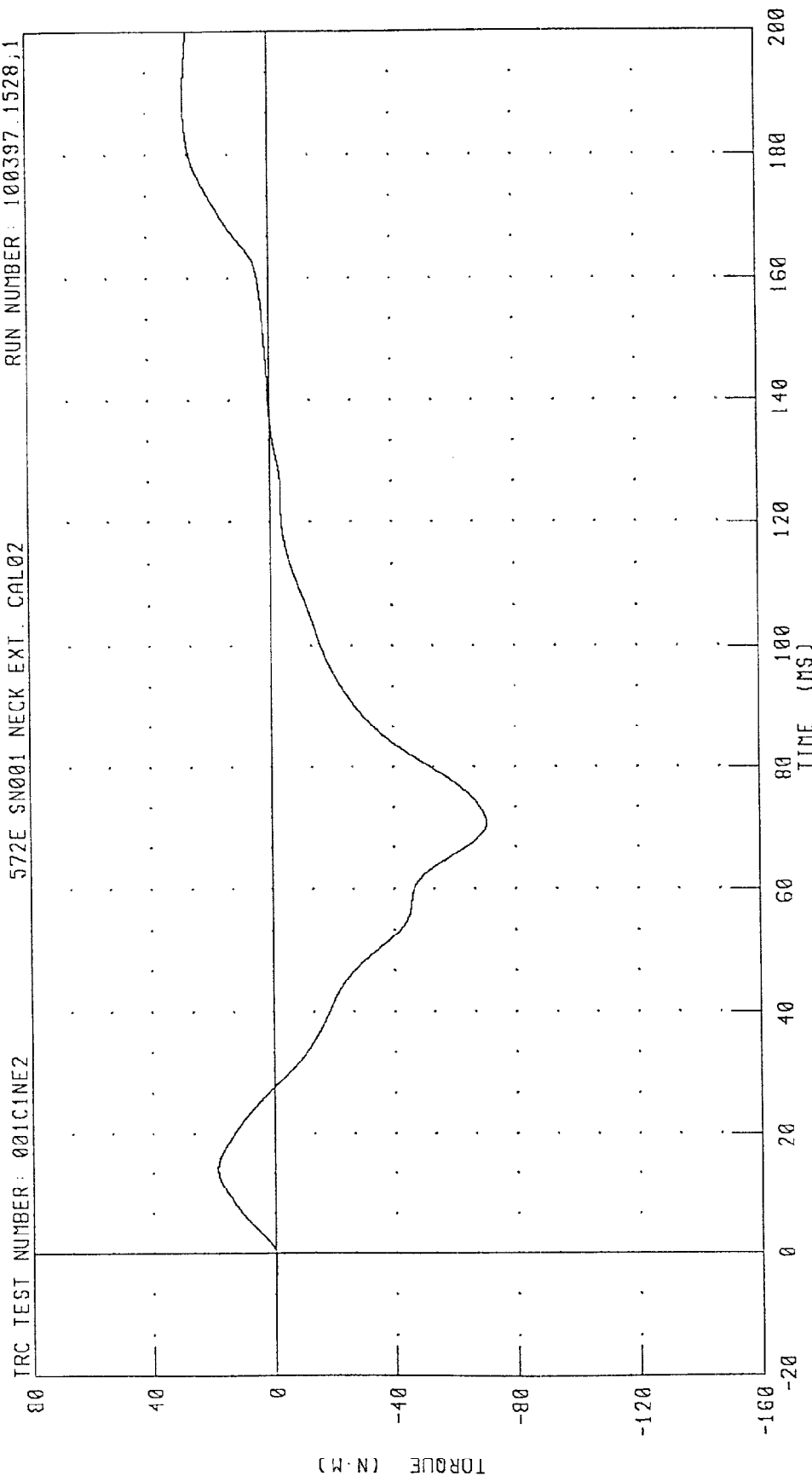
CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 001CINE2

572E SN001 NECK EXT. CAL02

RUN NUMBER: 100397.1528,1



PEAK DATA: 27.82 N·M @ 189.04 MS; -70.49 N·M @ 70.80 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

TRC INC. TEST NO: 001C2TH2 572E SN001 H.S.THORAX CAL02

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	22.2 DEG. C
RELATIVE HUMIDITY	10 - 70 %	63.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	68.7 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5717. N
INTERNAL HYSTERESIS	69% - 85%	71.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN

By Calt

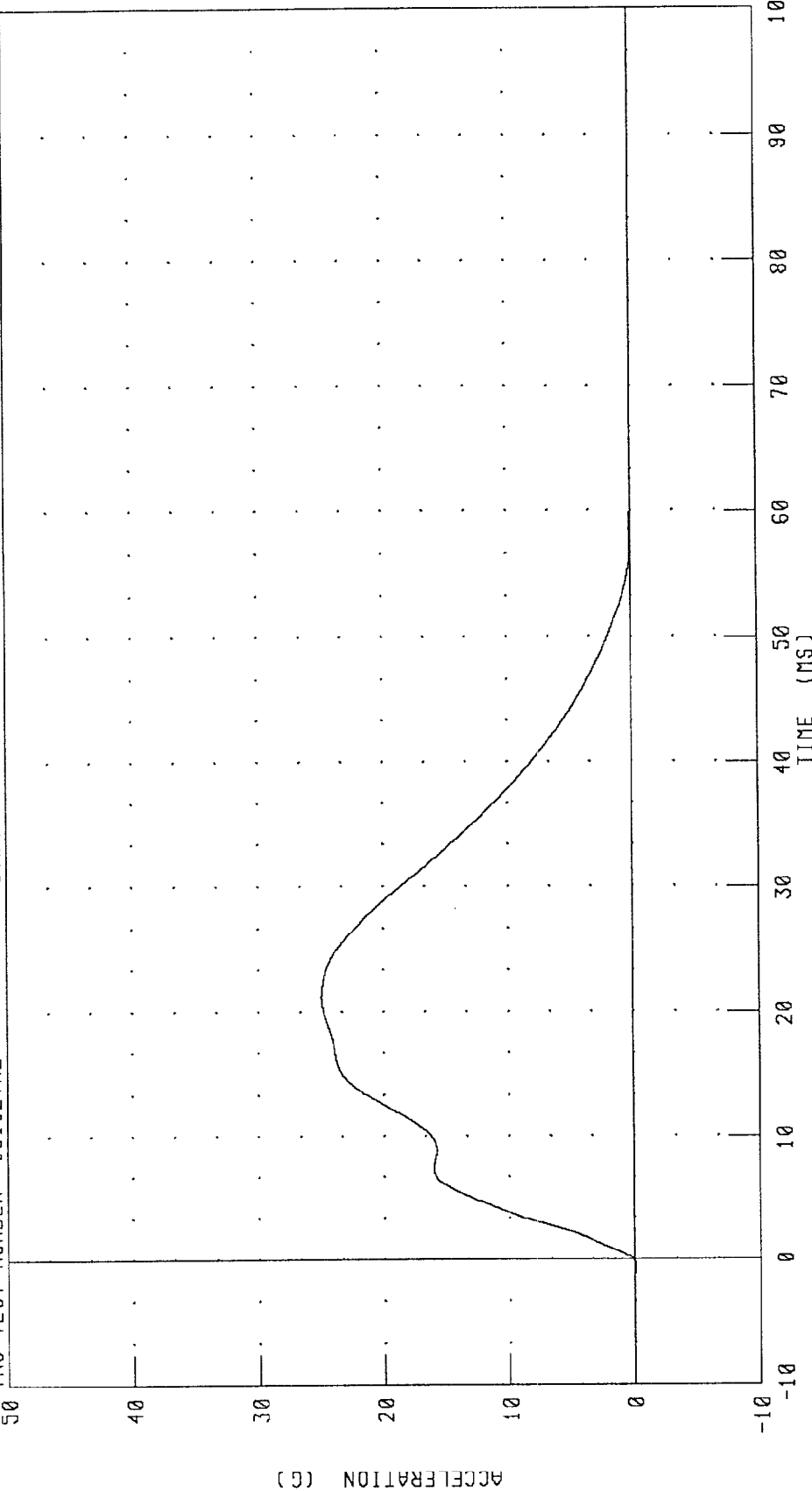
RUN NUMBER: 100997.1512;2

PART 572-E HYBRID III THORAX CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 001C2TH2

572E SN001 H.S. THORAX CAL02

RUN NUMBER: 100997.1515;2

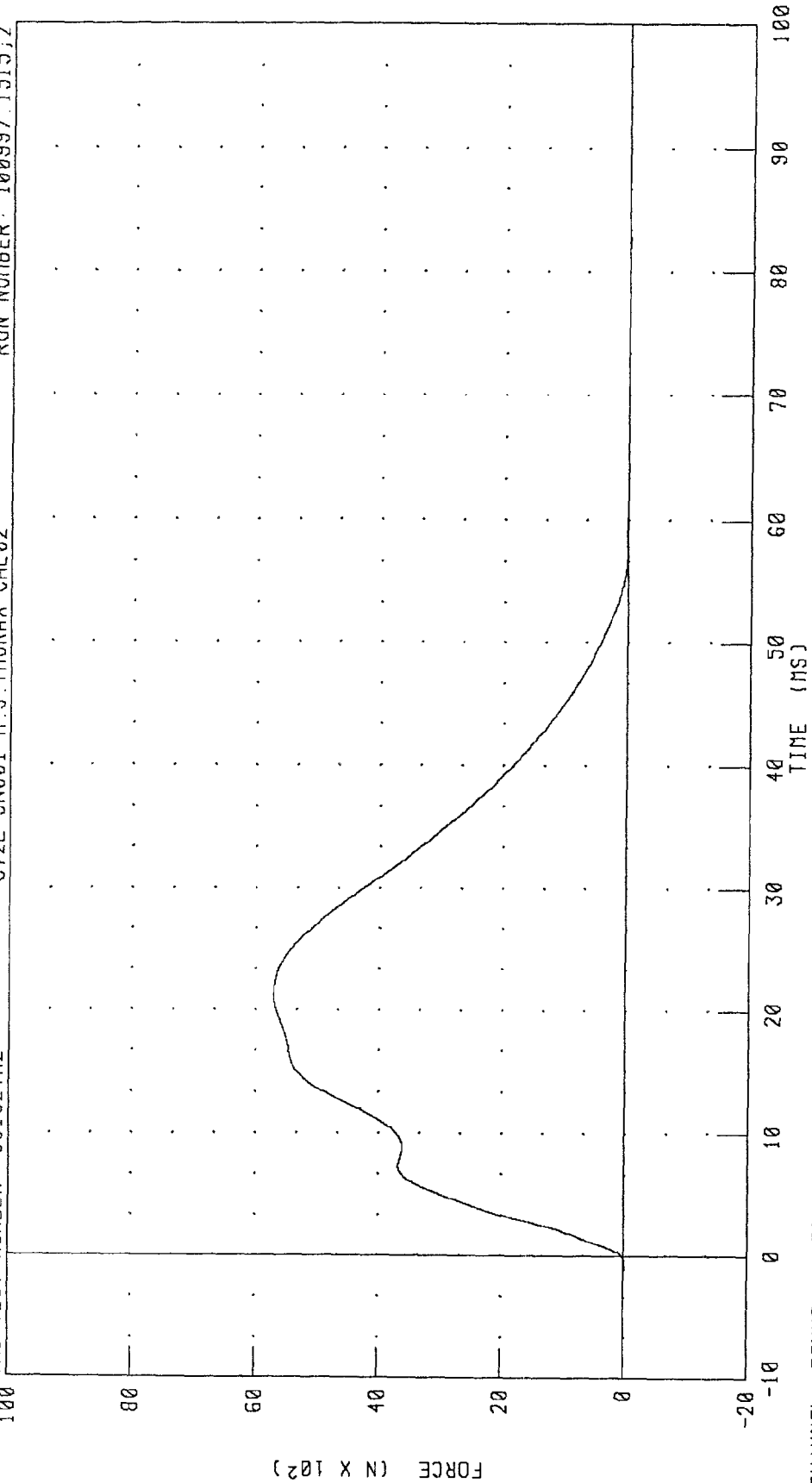


PEAK DATA: 24.96 G @ 21.20 MS; -0.06 G @ -0.64 MS

CHANNEL: PENXG FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 001C2TH2 572E SN001 H.S. THORAX CAL02 RUN NUMBER: 100997.151512



CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 5717.33 N @ 21.20 MS; -12.97 N @ -0.64 MS

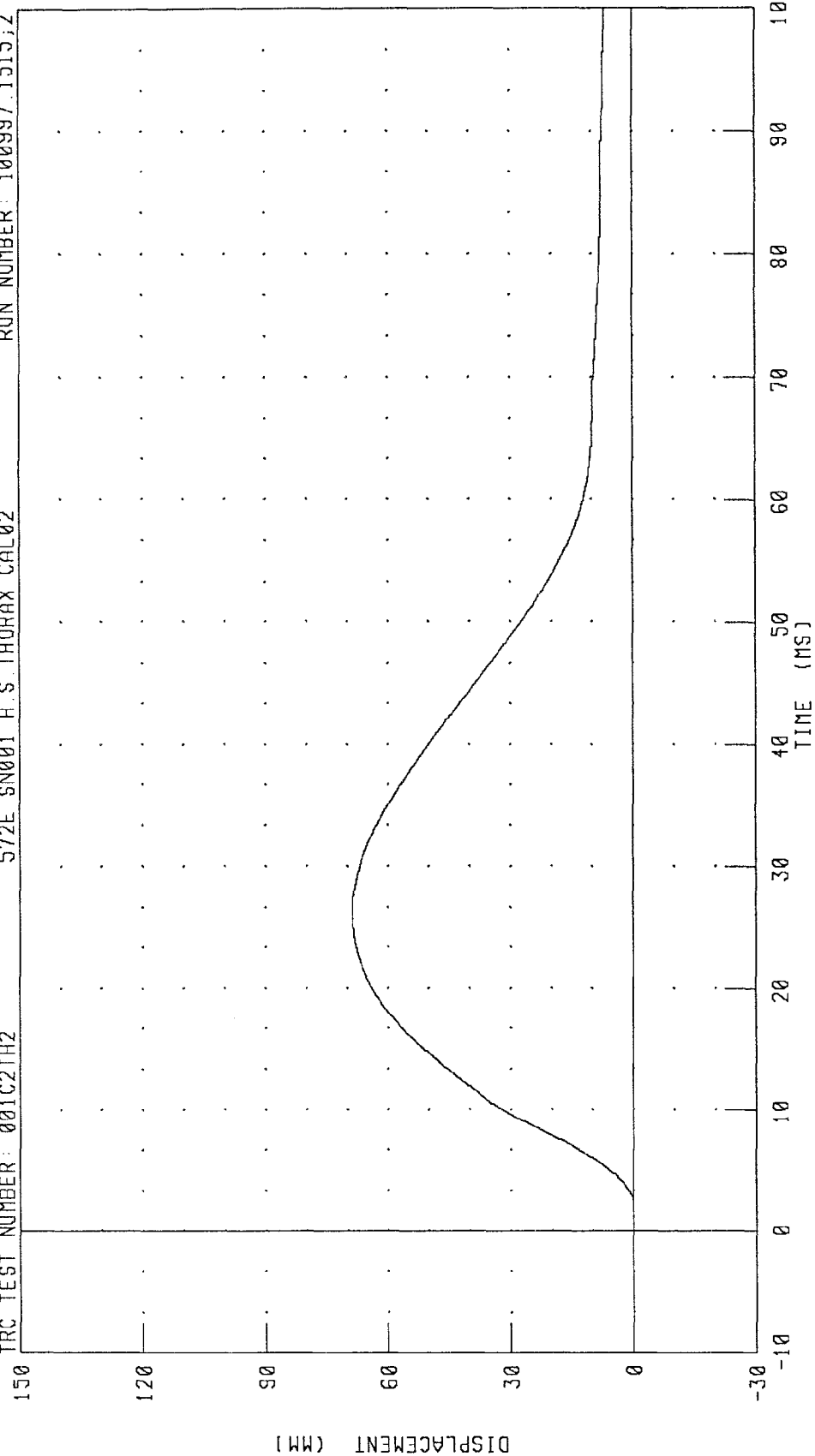
PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 001C2TH2

572E SN001 H.S. THORAX CAL02

RUN NUMBER: 100997.1515;2

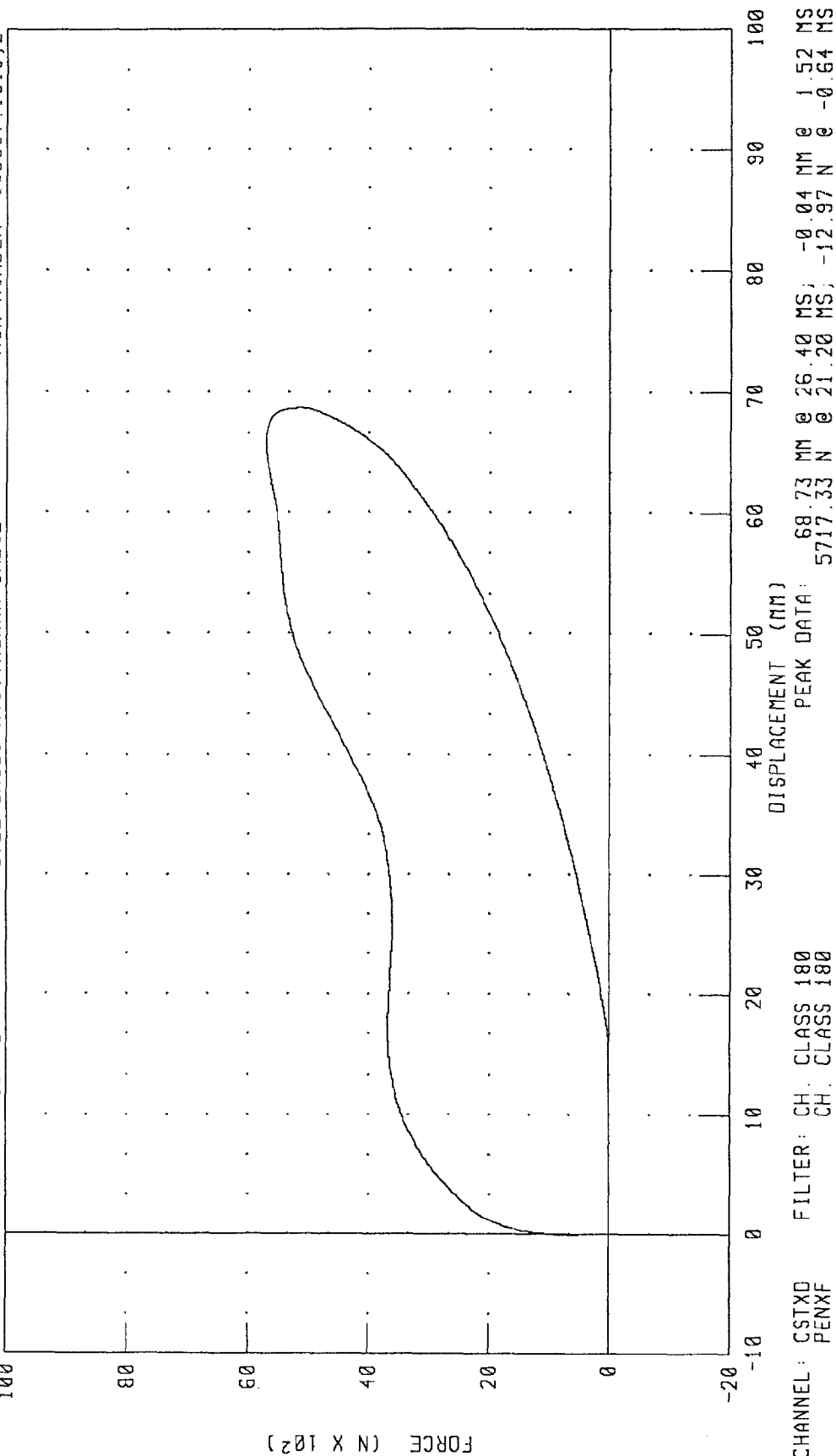


PEAK DATA: 68.73 MM @ 26.40 MS; -0.04 MM @ 1.52 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180

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

TRC TEST NUMBER: 001C2IH2 572E SN001 H.S. THORAX CAL02 RUN NUMBER: 100997.1515;2



TRANSPORTATION RESEARCH CENTER INC.

KNEE SLIDER TEST

RIGHT KNEE
TRC INC.

TEST NO: 001C1RS1

572E SN001 RIGHT SLIDER CAL01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.76 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1479. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2560. N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Ray Calt

RUN NUMBER: 100697.1815;4

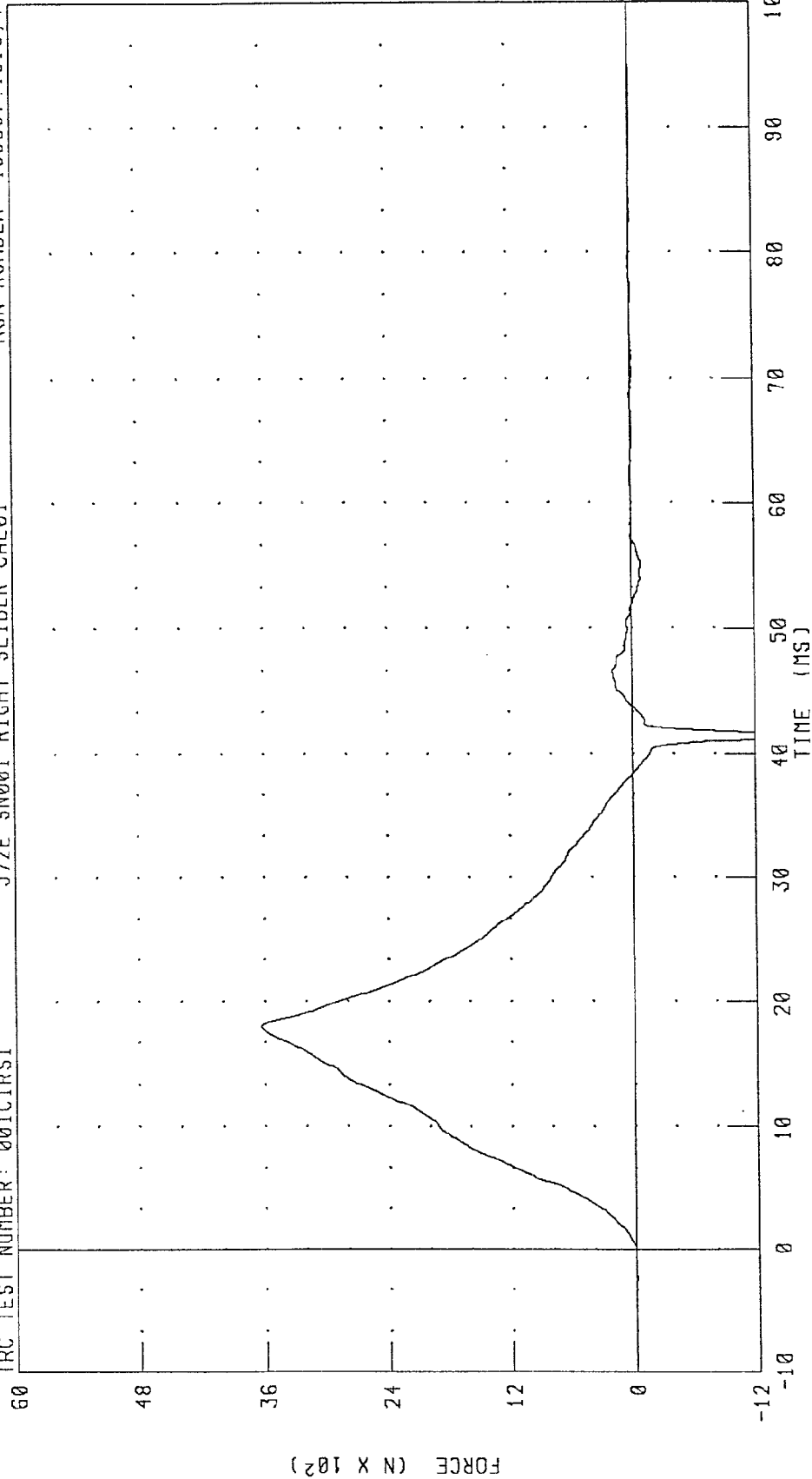
PART 572-E HYBRID III RIGHT KNEE SLIDER CALIBRATION

RIGHT FEMUR FORCE

TRC TEST NUMBER: 001C1RS1

572E SN001 RIGHT SLIDER CAL01

RUN NUMBER: 100697.1816,4



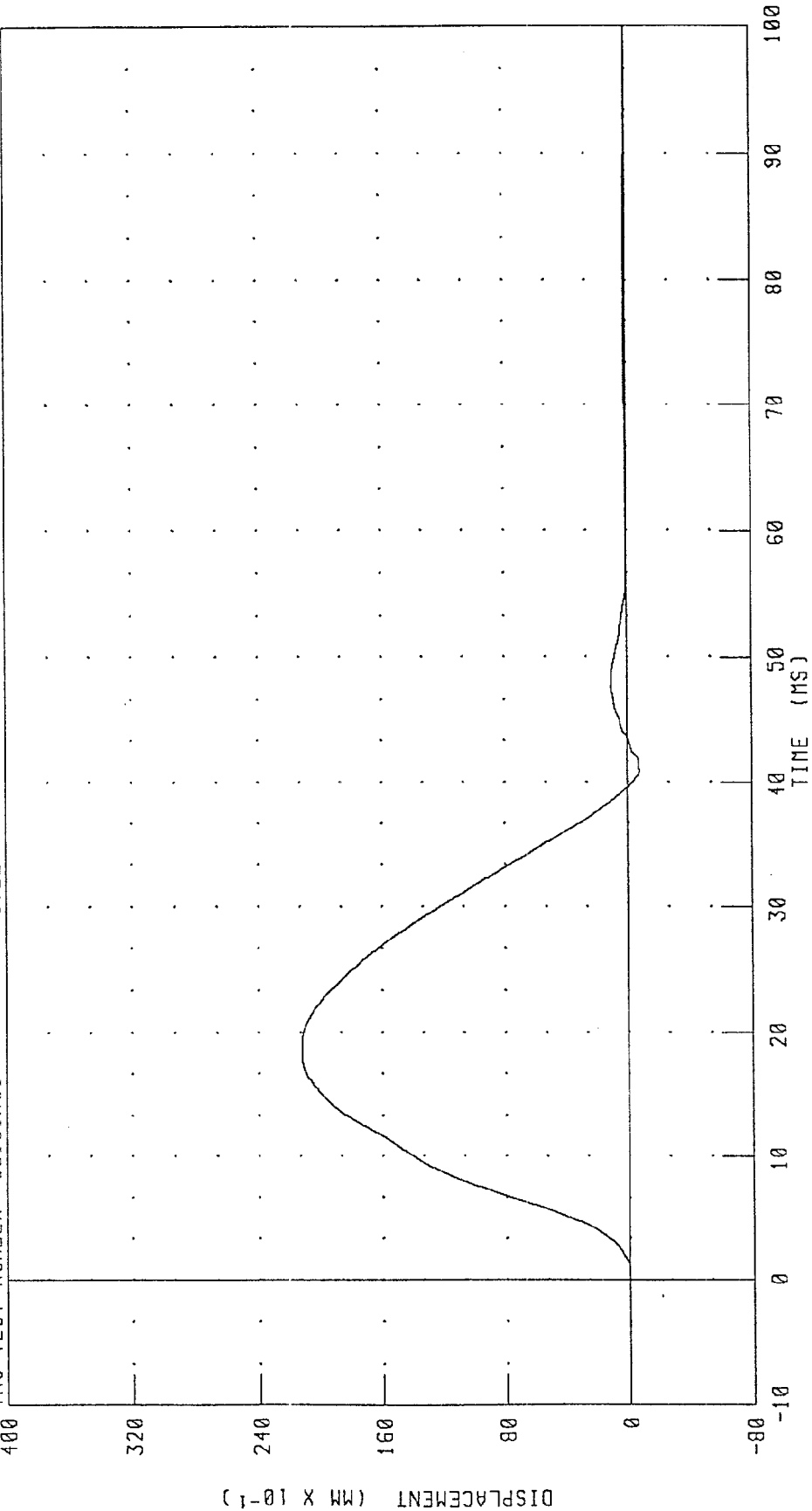
PEAK DATA: 3637.21 N @ 17.92 MS; -1575.10 N @ 41.36 MS

FILTER: CH. CLASS 600

CHANNEL: RFMF

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

TRC TEST NUMBER: 001CIRS1 572E SN001 RIGHT SLIDER CAL01 RUN NUMBER: 100697.1816;4

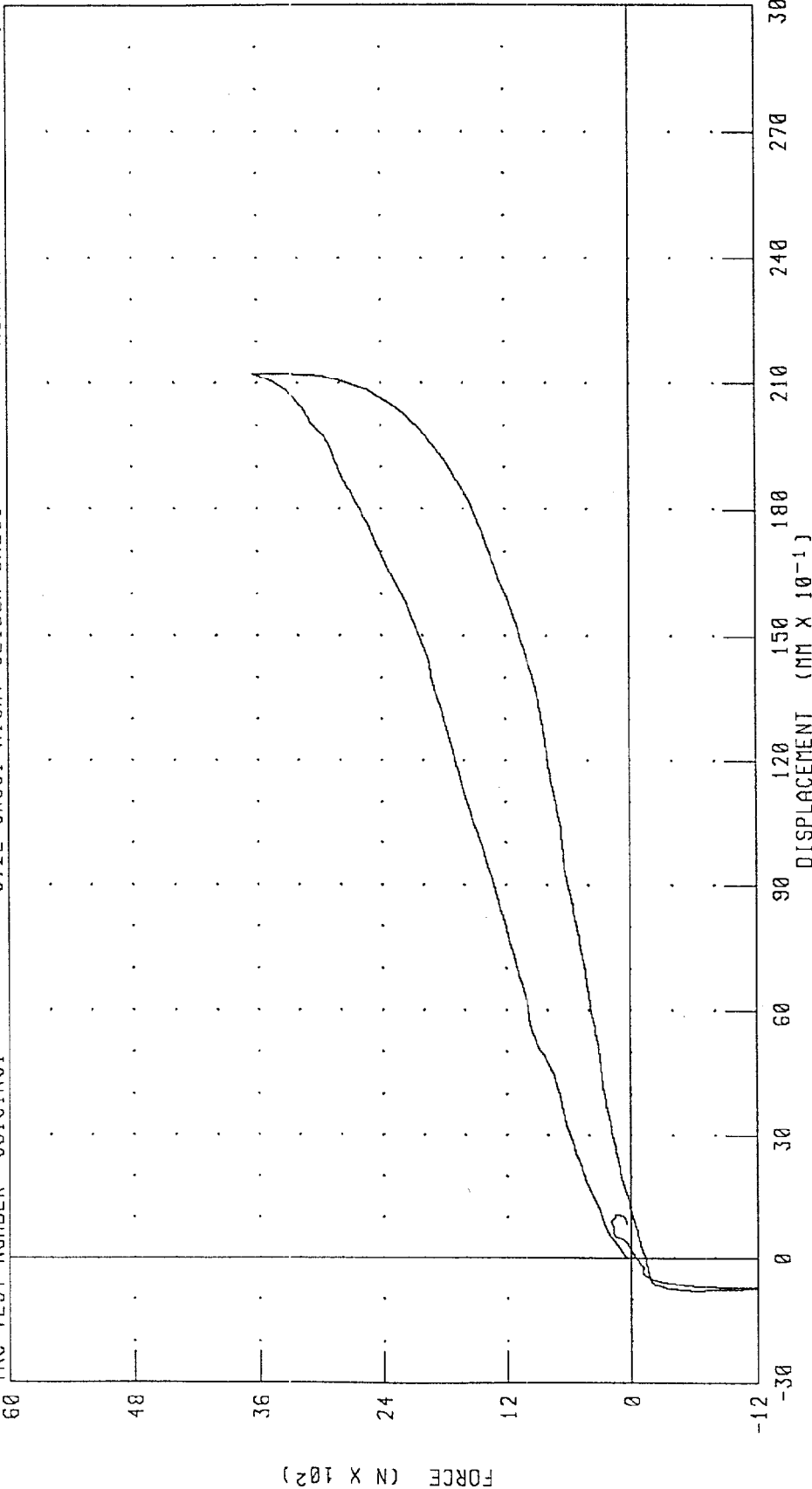


PEAK DATA: 21.24 MM @ 18.08 MS; -0.77 MM @ 40.88 MS

CHANNEL: KNRXD FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 001CIRSI 572E SN001 RIGHT SLIDER CAL01 RUN NUMBER: 100697 1816,4



CHANNEL: KNRXD FILTER: CH. CLASS 600
 RFMF CH. CLASS 600
 PEAK DATA: 21.24 MM @ 18.08 MS; -0.77 MM @ 40.88 MS
 3637.21 N @ 17.92 MS; -1575.10 N @ 41.36 MS

TRANSPORTATION RESEARCH CENTER INC.

KNEE SLIDER TEST

LEFT KNEE

TRC INC.

TEST NO: 001C1LS1

572E SN001 LEFT SLIDER CAL01

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	2.70-2.80 M/S	2.76 M/S
FORCE AT 10.0 MM DISPLACEMENT	1259 - 1721 N	1365. N
FORCE AT 18.0 MM DISPLACEMENT	2268 - 3096 N	2324. N

TEST MEETS SPECIFICATIONS

TECHNICIAN

By Calt

RUN NUMBER: 100697.1754;2

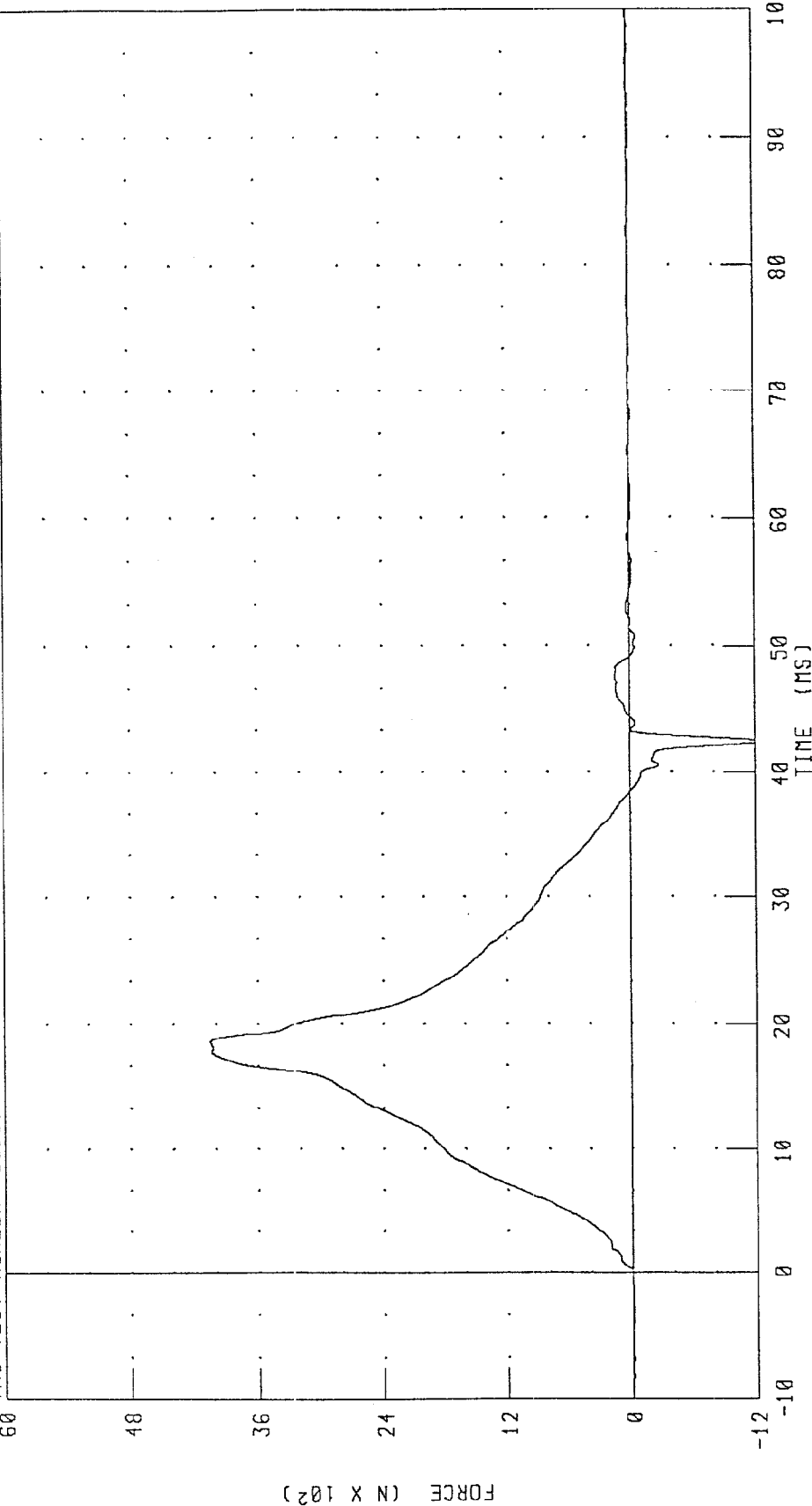
PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION

LEFT FEMUR FORCE

TRC TEST NUMBER: 001C1LS1

572E SN001 LEFT SLIDER CAL01

RUN NUMBER: 100697.1755;2



PEAK DATA: 4053.06 N @ 18.56 MS; -1328.90 N @ 42.40 MS

FILTER: CH. CLASS 600

CHANNEL: LFMF

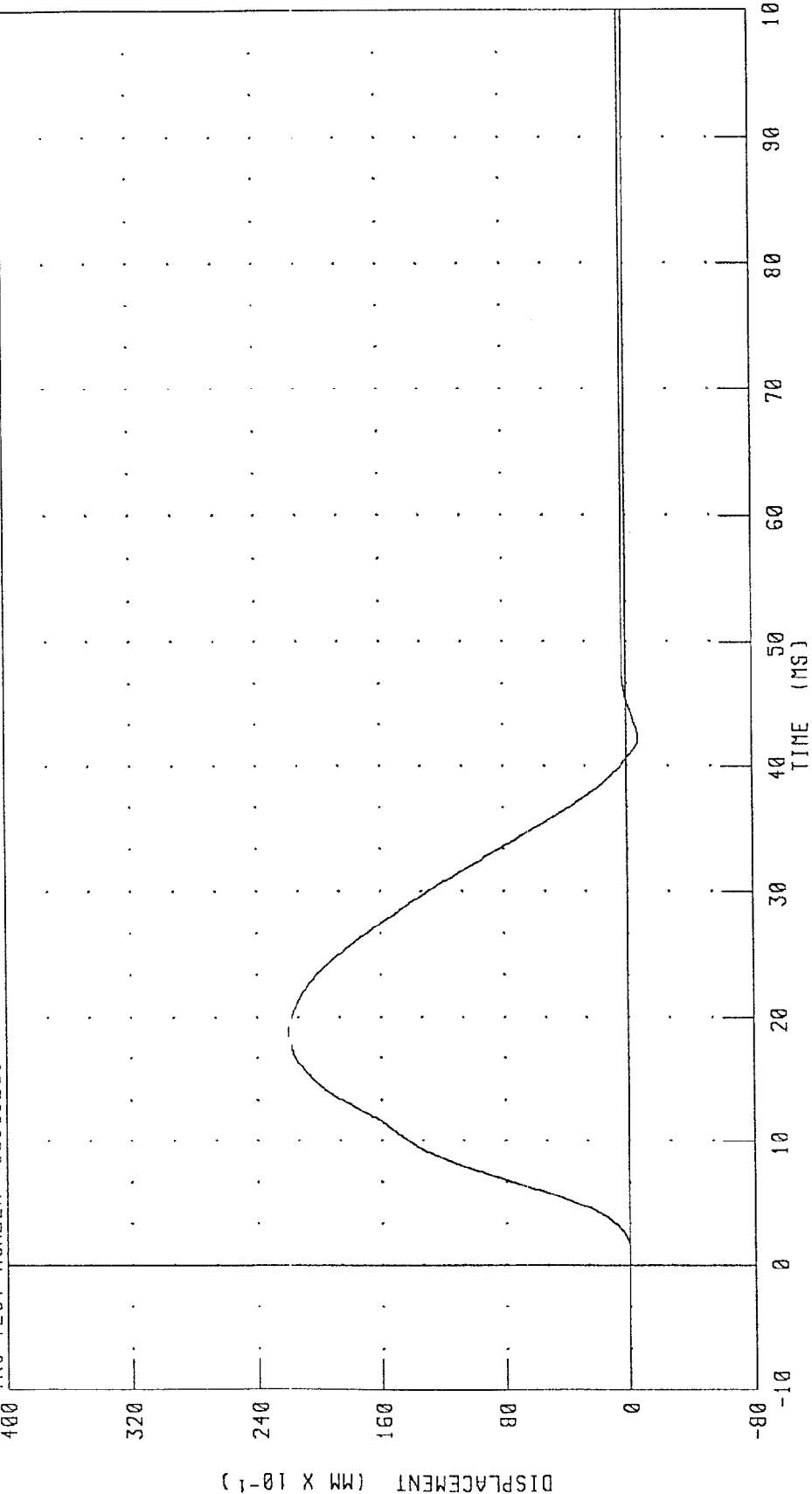
PART 572-E HYBRID III LEFT KNEE SLIDER CALIBRATION

LEFT KNEE DISPLACEMENT

572E SN001 LEFT SLIDER CAL01

TRC TEST NUMBER: 001C1LS1

RUN NUMBER: 100697.1755;2

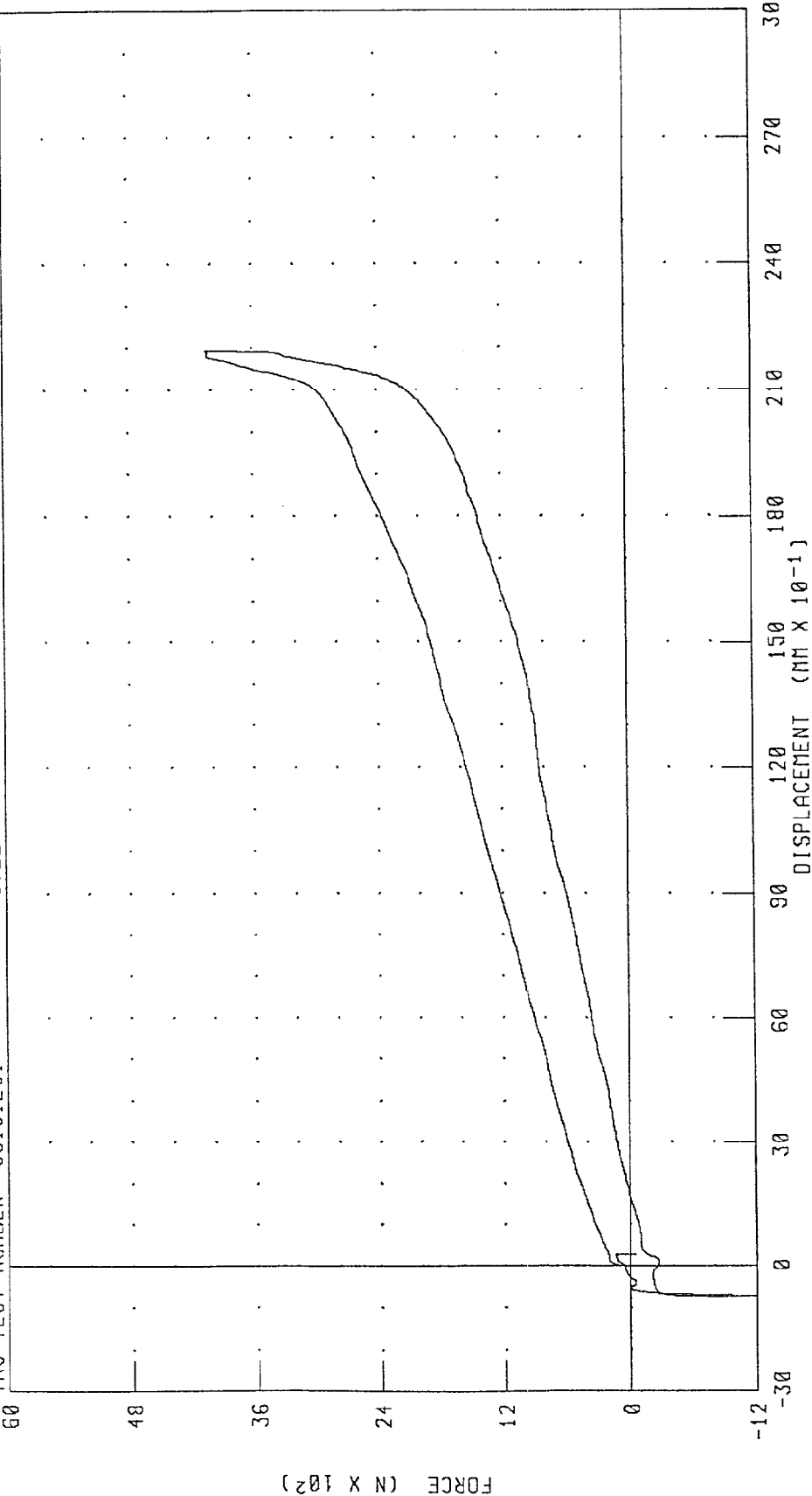


PEAK DATA: 21.95 MM @ 18.72 MS; -0.72 MM @ 42.08 MS

CHANNEL: KNLXD FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 001C1LS1 572E SN001 LEFT SLIDER CAL01 RUN NUMBER: 100697.1755;2



CHANNEL: KNLXD FILTER: CH. CLASS 600
LFMF CH. CLASS 600
PEAK DATA: 21.95 NM @ 18.72 MS; -0.72 NM @ 42.08 MS
4053.06 N @ 18.56 MS; -1328.90 N @ 42.40 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

TRC INC. TEST NO: 001C2RK2 572E SN001 RIGHT KNEE CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	63.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5447.8 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Ray C. Holt

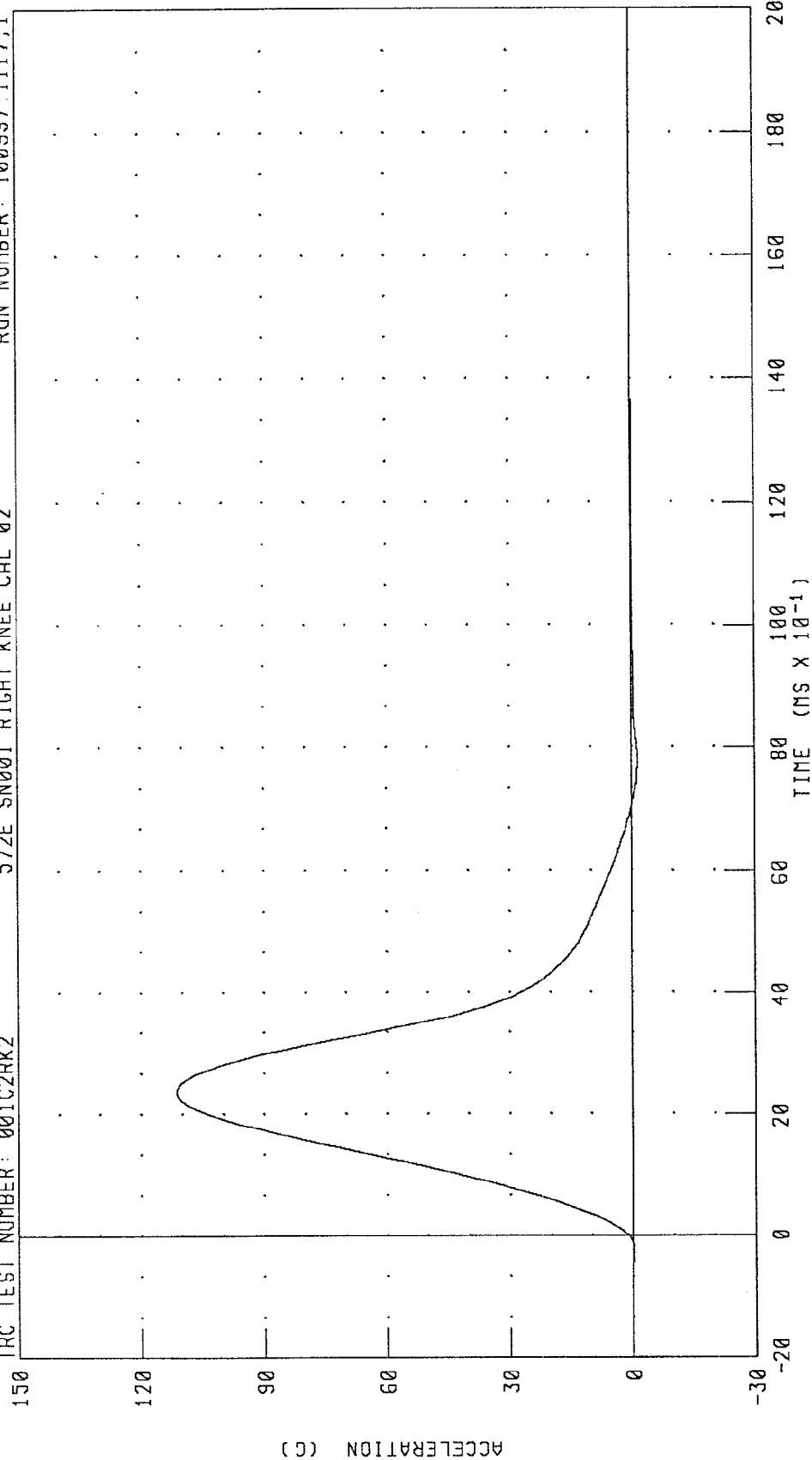
RUN NUMBER: 100997.1116;1

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

TRC TEST NUMBER: 001C2RK2

572E SN001 RIGHT KNEE CAL 02

RUN NUMBER: 100997.1117.1



PEAK DATA: 111.34 G @ 2.32 MS; -1.40 G @ 7.76 MS

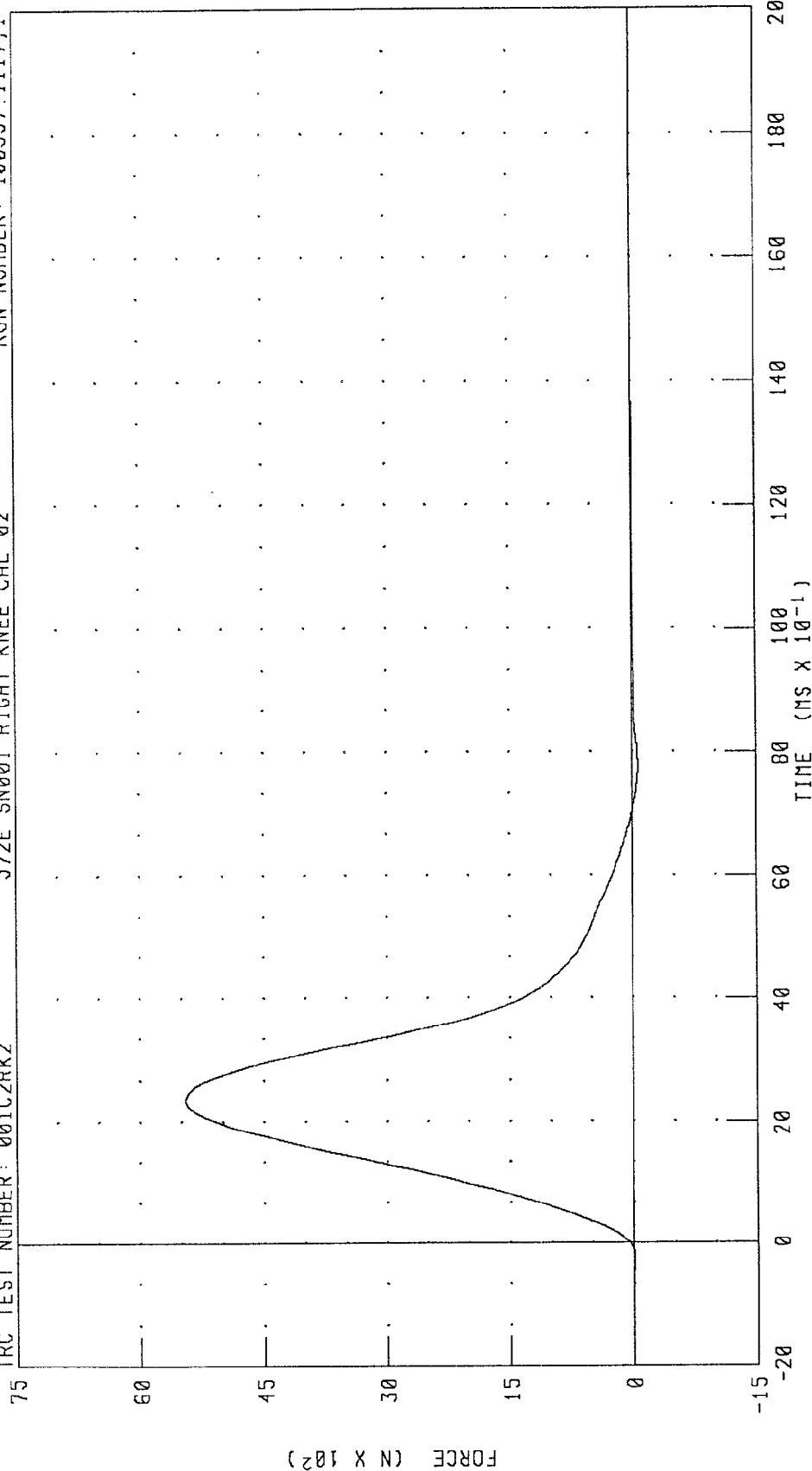
CHANNEL: PENXG FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 001C2RK2

572E SN001 RIGHT KNEE CAL 02

RUN NUMBER: 100997.1117;1



PEAK DATA: 5447.88 N @ 2.32 MS; -68.34 N @ 7.76 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

TRC INC. TEST NO: 001C2LK2 572E SN001 LEFT KNEE CAL 02

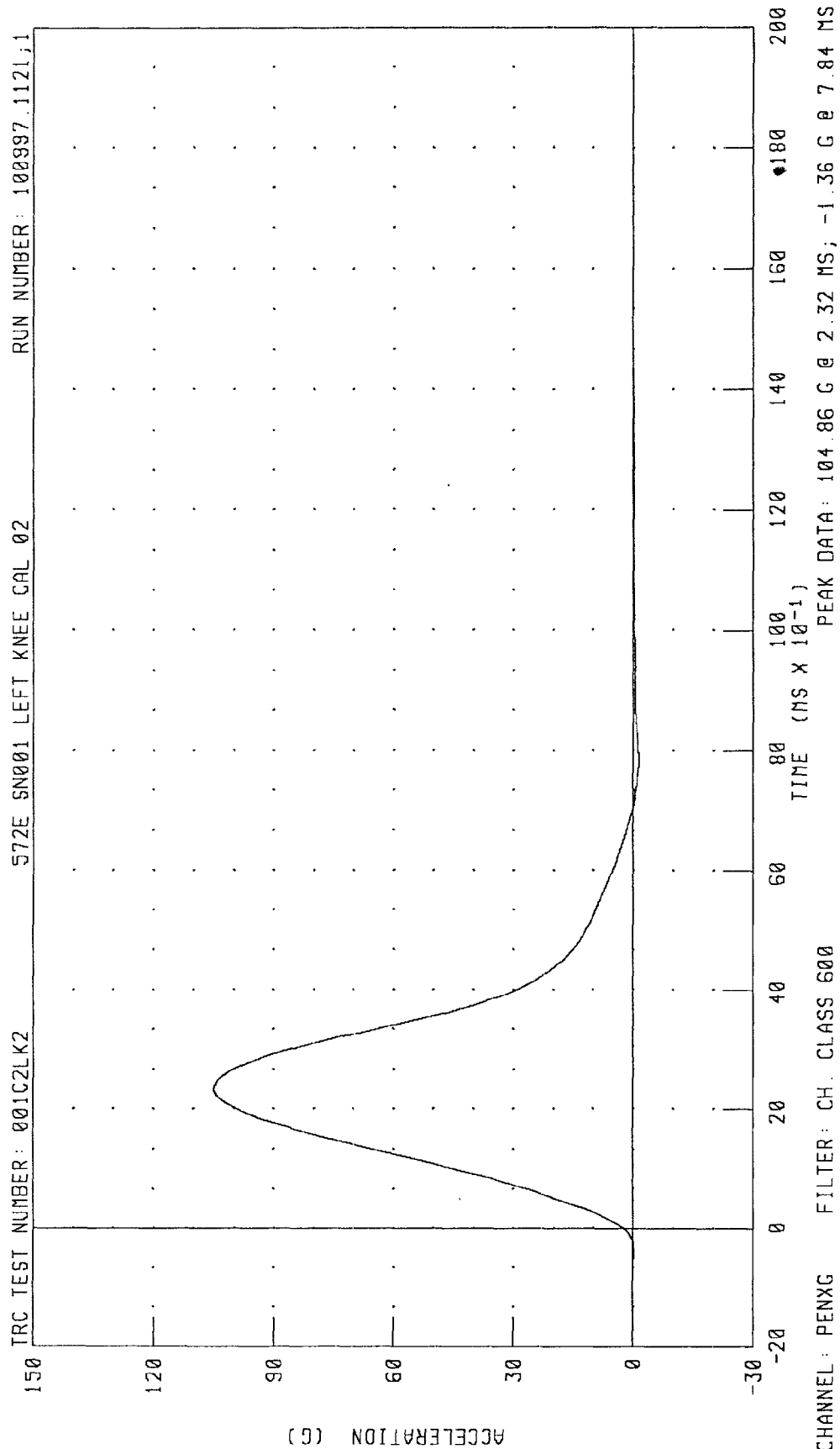
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	63.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5130.3 N

TEST MEETS SPECIFICATIONS

TECHNICIAN By Calt

RUN NUMBER: 100997.1121;1

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



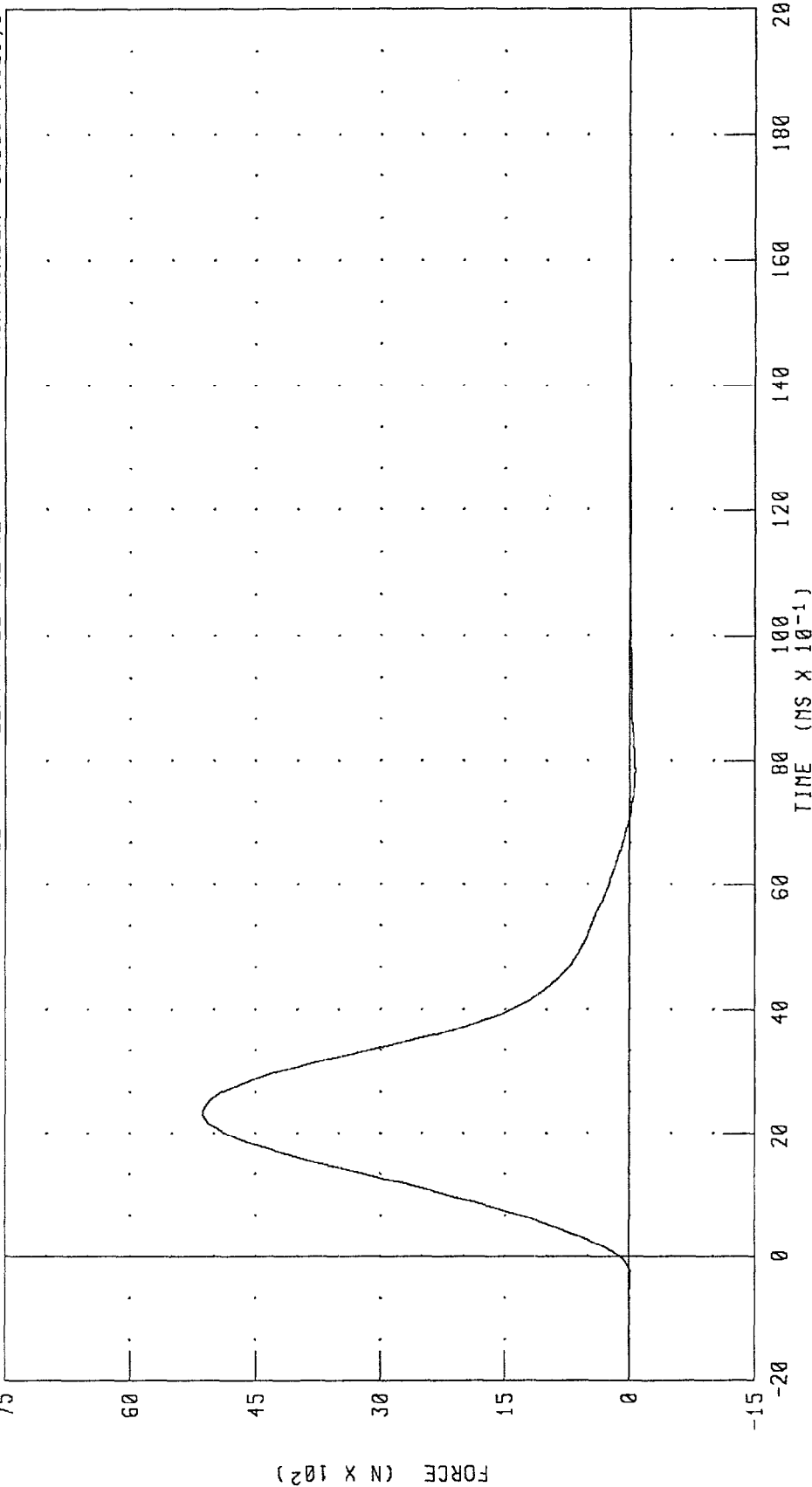
PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN001 LEFT KNEE CAL 02

TRC TEST NUMBER: 001C2LK2

RUN NUMBER: 100997.1121;1



PEAK DATA: 5130.37 N @ 2.32 MS; -66.70 N @ 7.84 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

Appendix D

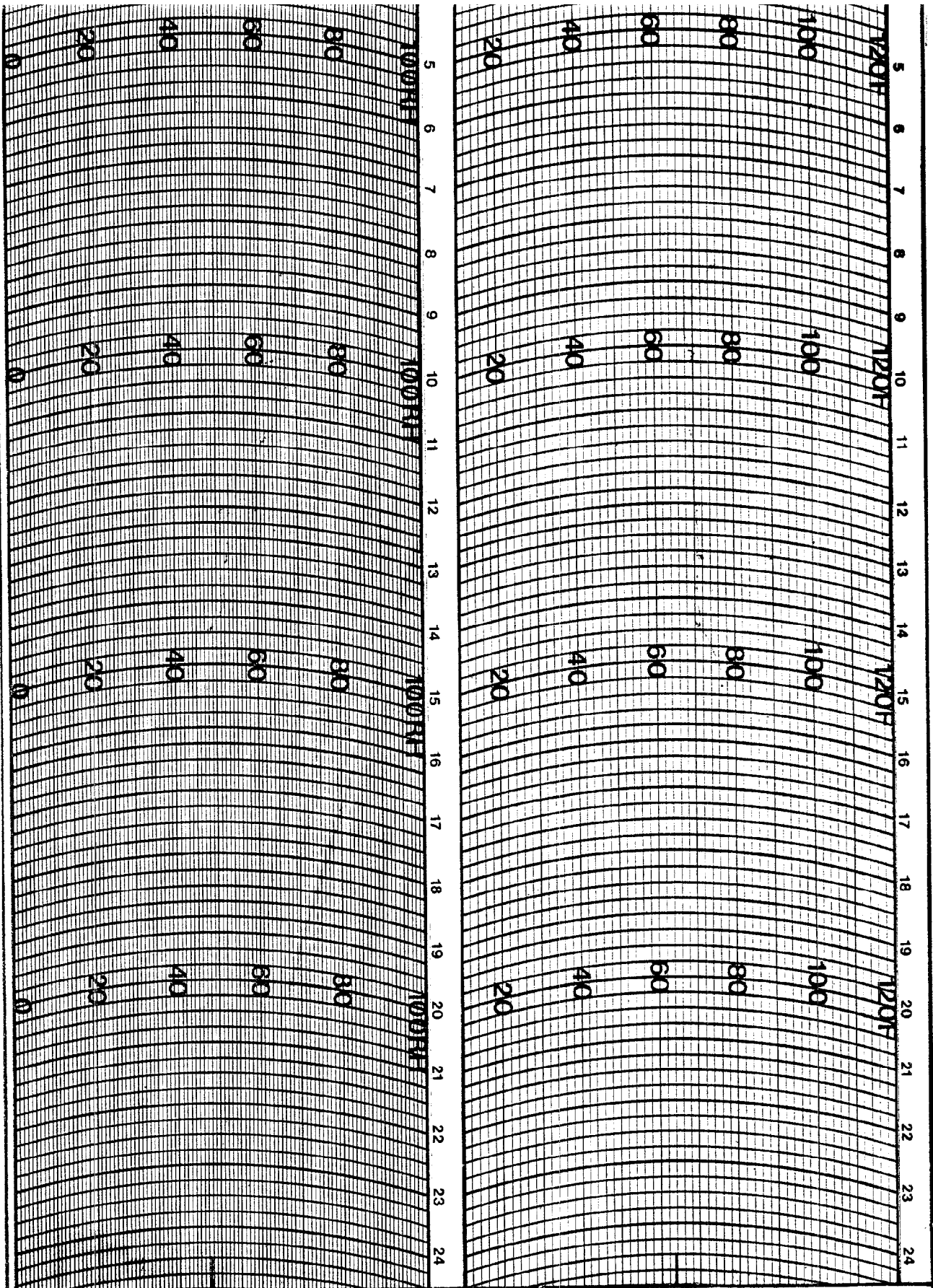
Miscellaneous Test Information

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



WEATHER MEASURE
P.O. BOX 41257
SACRAMENTO, CA. 95841
PHONE (916) 481-7565

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # 699123

STATION _____ DATE ON 10/10/97 DATE OFF _____