

V2398

Report Number TRC-96-N12

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

Hyundai Motor Corporation

1996 Hyundai Elantra

4-door sedan

NHTSA Number: MT0305

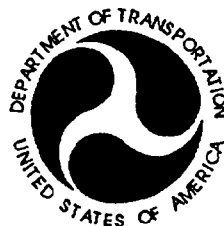
TRC Test Number: 960229

Prepared By:

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Final Report

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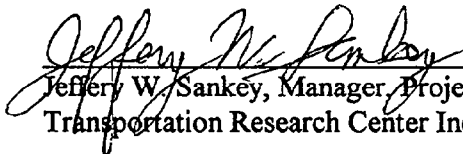
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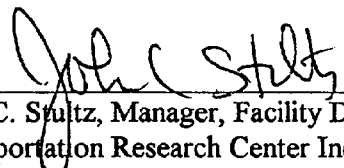
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16. Abstract A 56 kph (35 mph) frontal load cell barrier impact test was conducted on a 1996 Hyundai Elantra 4-door sedan, NHTSA No. MT0305, at Transportation Research Center Inc. on February 29, 1996. This test was conducted to obtain new car assessment and research data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The barrier impact velocity was 56.3 kph. The vehicle's maximum static crush was 558 millimeters. The ambient temperature was 23° C. The driver's Head Injury Criteria (HIC) was 528. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 57.5 g. The driver's maximum chest deflection was 35 mm. The driver's left and right femur maximum axial forces were 4805 N and 5543 N, respectively. The passenger's HIC was 773. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 62.0 g. The passenger's maximum chest deflection was 50 mm. The passenger's left and right femur maximum axial forces were 6917 N and 7328 N, respectively.			
17. Key Words 56 kph (35 mph) Frontal Barrier Impact Test: New Car Assessment Program (NCAP) FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division Nassif Building, Room 5108 400 Seventh Street, S.W. Washington, DC 20590	
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

When You Know Multiply by To Find Symbol

LENGTH

inches	0.025	centimeters	in
feet	30	centimeters	in
yards	0.9	meters	ft
miles	1.6	kilometers	yd
			mi

AREA

in ²	6.5	square centimeters	in ²
ft ²	0.09	square meters	yd ²
yd ²	0.8	square meters	mi ²
mi ²	2.6	square kilometers	
	0.4	hectares	

MASS (weight)

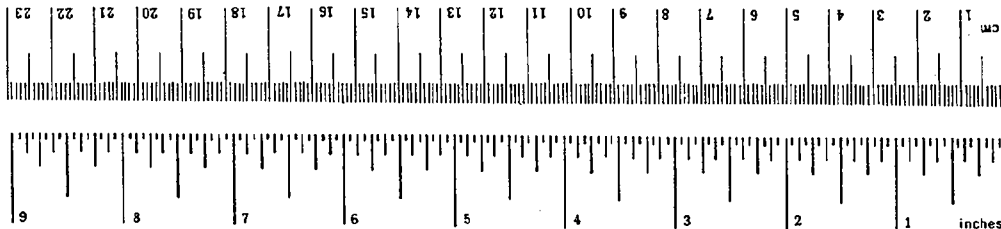
oz	28	grams	oz
lb	0.45	kilograms	lb
	0.9	tonnes	

VOLUME

tsp	5	milliliters	fl oz
tblsp	15	milliliters	pt
fl oz	30	milliliters	qt
c	0.24	liters	gal
pt	0.47	liters	ft ³
qt	0.95	liters	yd ³
gal	3.8	liters	
ft ³	0.03	cubic meters	
yd ³	0.76	cubic meters	

TEMPERATURE (exact)

°F	Fahrenheit temperature	°C	Celsius temperature
	5/9 (after subtracting 32)		



Approximate Conversions from Metric Measures

When You Know Multiply by To Find Symbol

LENGTH

millimeters	0.04	inches	in
centimeters	0.4	inches	in
meters	3.3	feet	ft
meters	1.1	yards	yd
kilometers	0.6	miles	mi

AREA

square centimeters	0.16	square inches	in ²
square meters	1.2	square yards	yd ²
square kilometers	0.4	square miles	mi ²
hectares (10,000 m ²)	2.5	acres	

MASS (weight)

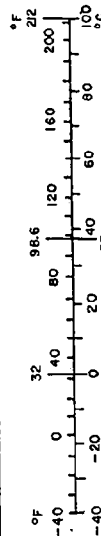
grams	0.035	ounces	oz
kilograms	2.2	pounds	lb
tonnes (1000 kg)	1.1	short tons	

VOLUME

milliliters	0.03	fluid ounces	fl oz
liters	2.1	pints	pt
liters	1.06	quarts	qt
liters	0.26	gallons	gal
cubic meters	35	cubic feet	ft ³
cubic meters	1.3	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	°F	Fahrenheit temperature
	9/5 (then add 32)		



*1 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.45, SO Catalog No. C13.102/286.

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Section 1.0

Purpose and Test Procedure

Purpose

This 56 kph (35 mph) frontal barrier impact test is part of the New Car Assessment Program (NCAP) conducted for the National Highway Traffic Safety Administration's (NHTSA) Office of Market Incentives by Transportation Research Center Inc. (TRC) under Contract Number DTNH22-90-D-22121.

The purpose of this test was to obtain new car assessment and research data for vehicle crashworthiness and occupant restraint system performance for the subject vehicle, a 1996 Hyundai Elantra 4-door sedan, NHTSA Number MT0305, at an impact speed in excess of the current 48 kph (30 mph) FMVSS 208 requirements.

Test Procedure

This test was conducted in accordance with NHTSA's Laboratory Indicant Test Procedure, New Car Assessment Program, dated January 1, 1990. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with nine (9) accelerometers to measure longitudinal axis accelerations. The driver's and passenger's restraint systems were instrumented with load cells to measure lap and shoulder belt forces and potentiometers to measure shoulder belt stretch and spoolout. The vehicle impacted a frontal load cell barrier instrumented with thirty-six (36) barrier face load cells. The vehicle's specified impact velocity range was 55.5 to 57.1 kph.

The test vehicle contained two (2) Part 572E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedures specified in Appendices VII and VIII of the Laboratory Indicant Test Procedure. This test was the first use of the driver dummy and the passenger dummy.

Both dummies were instrumented with primary and redundant head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. The dummies were also instrumented with neck moment and force load cells, chest deflection potentiometers, and foot accelerometers to measure longitudinal and vertical axis accelerations. In addition, both dummy's lower legs were instrumented with upper and lower tibia load cells to measure forces and moments.

The one-hundred-thirty -three (133) data channels were digitally sampled and recorded at 12,500 samples per second and processed per section IP11 of the Laboratory Indicant Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and fourteen (14) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera.

The vehicle, occupant, and load cell barrier data are presented in Section 2.0. The occupant, camera, and vehicle measurements are presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the dummy, vehicle, and load cell barrier data plots. Appendix C contains the dummy certification data. Appendix D contains miscellaneous test information. Appendix E contains the restraint system instructions from the owner's manual.

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This frontal load cell barrier test was conducted at TRC on February 29, 1996.

The test vehicle, a 1996 Hyundai Elantra 4-door sedan, NHTSA Number MT0305, was equipped with a 1.8-liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 1422 kg. The vehicle's impact speed was 56.3 kph. The vehicle sustained 558 mm of static crush during the impact.

The driver's Head Injury Criteria (HIC) was 528. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 57.5 g. The driver's maximum chest deflection was 35 mm. The driver's left and right femur maximum axial forces were 4805 N and 5543 N, respectively.

The right front passenger's HIC was 773. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 62.0 g. The passenger's maximum chest deflection was 50 mm. The passenger's left and right femur maximum axial forces were 6917 N and 7328 N, respectively.

There was no loss of windshield periphery retention.

There was no penetration through the windshield.

Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test or during any portion of the static rollover test.

Data Acquisition Explanations

The driver's chest Z-axis accelerometer, CSTZG1, lost data from 158 to 165 milliseconds and recorded spikes at 204 and 220 to 222 milliseconds as a result of a pinched accelerometer cable. These data losses affected the driver's resultant acceleration calculation, CSTRG1.

The passenger's left lower tibia Z-axis force load cell, ANLZF2, recorded spikes at 38 and 41 milliseconds and lost data after 89 milliseconds as a result of a pinched cable.

Table 1 Crash Test Summary

NHTSA number:	MT0305	
Test type:	Frontal Load Cell Barrier	
Test date:	02/29/96	
Test time:	1506	
Ambient temperature:	23° C	
Vehicle year/make/ model/body style:	1996/Hyundai/Elantra/4-door sedan	
Vehicle test weight:	1422 kg	
Impact angle ¹ :	0°	
Impact velocity ² :	Primary = 56.3 kph Secondary = 56.5 kph	
Maximum static crush:	558 mm	
Average rebound:	477 mm	
Dummies:	Driver #192	Passenger #142
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag and 3-point unbelt	Airbag and 3-point unbelt
Number of data channels:	110	
Number of cameras:	High-speed 14 Real-time 1	

¹ With respect to tow track centerline.

² Speed trap measurement (± .08 kph accuracy)

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1996/Hyundai/Elantra/4-door sedan

Color: Green

VIN: KMHJF34M9TU198376

NHTSA number: MT0305

Engine data:

Placement: Transverse

Cylinders: 4

Displacement 1.8 liters

Transmission data: 3 speed, manual, X automatic, overdrive
 X FWD, RWD, 4WD

Date vehicle received: 2/26/95

Odometer reading: 77

Dealer's name
and address: Hatfield Hyundai, Inc.
1400 Automall Dr.
Columbus, OH 43228

Accessories:

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

Certification data from vehicle's label:

Vehicle manufactured by: Hyundai Motor Company

Date of manufacture: 12/95

VIN: KMHJF34M9TU198376

GVWR: 3660 lb

GAWR: Front: 1962 lb

Rear: 1720 lb

Table 2 Test Vehicle Information, Cont'd.

Size of tires: P195/60R14

Tire pressure with maximum
capacity vehicle load:

Front: 300 kPa

Rear: 300 kPa

Spare tire: T125/70D15

Type of front seats: Bucket

Tire & capacity data from vehicle's label:

Recommended tire size: P195/60R14

Recommended cold tire pressure:

Front: 210 kPa

Rear: 210 kPa

Designated seating capacity:

Front 2

Rear 3

Total 5

Vehicle capacity weight: 850 lbs

Test vehicle attitude:

Delivered attitude: LF 652 mm; RF 653 mm; LR 642 mm; RR 645 mm

Pre-test attitude: LF 621 mm; RF 629 mm; LR 603 mm; RR 605 mm

Post-test attitude: LF 622 mm; RF 631 mm; LR 599 mm; RR 587 mm

Table 2 Test Vehicle Information Cont'd

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

Right front	382 kg	Right rear	224 kg
Left front	383 kg	Left rear	238 kg
Total front weight	765 kg	(62.3% of total vehicle weight)	
Total rear weight	462 kg	(37.7% of total vehicle weight)	
Total delivered weight	1227 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated cargo and luggage weight

UDW = Unloaded delivered weight (1227 kg)

VCW¹ = Vehicle capacity weight (386 kg)

DSC¹ = Designated seating capacity (5)

RCLW = VCW - 68 (DSC) = 386 - 68 (5) = 46 kg

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

Target test weight = 1227 + 46 + 152

Target test weight = 1425 kg

Weight of test vehicle with required dummies and 43 kg of cargo weight:

Right front	414 kg	Right rear	287 kg
Left front	421 kg	Left rear	300 kg
Total front weight	835 kg	(58.7% of total vehicle weight)	
Total rear weight	587 kg	(41.3% of total vehicle weight)	
Total test weight	1422 kg	(0.1% over target test weight)	

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: Trunk lid

CG rearward of front wheel centerline: 1048 mm

¹ From vehicle's tire load label.

Table 3 Post-Impact Data

Test number: 960229
NHTSA number: MT0305
Test date: 02/29/96
Test time: 1506
Test type: Frontal load cell barrier
Impact angle: 0°
Ambient temperature
at impact area: 23° C
Temperature in
occupant compartment: 19° C
Impact velocity:
Primary 56.3 kph
Secondary 56.5 kph
Specified range 55.5 to 57.1 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:

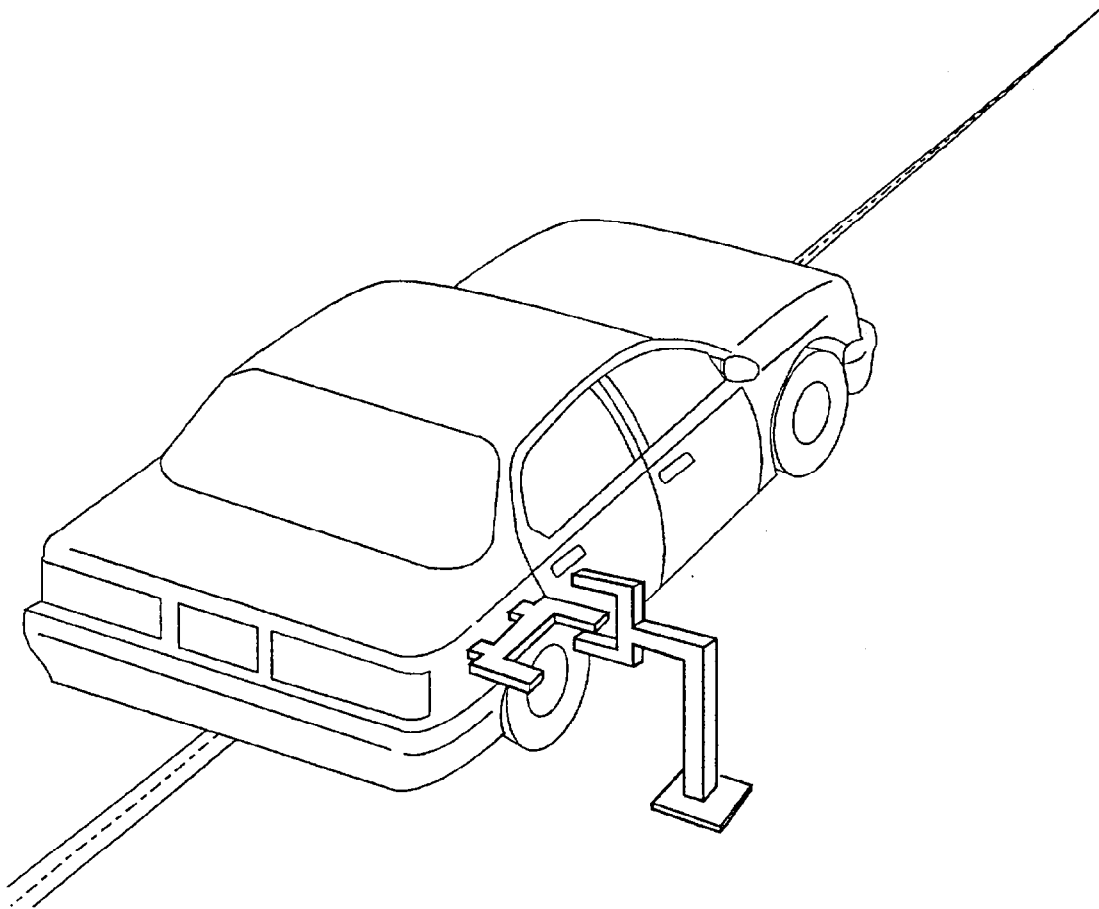
Pre-test: L 4240 mm; C 4425 mm; R 4260 mm
Post-test: L 3800 mm; C 3874 mm; R 3830 mm
Total crush: L 440 mm; C 551 mm; R 430 mm
Average crush: 474 mm

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test: L 520 mm; C 405 mm; R 505 mm
Average rebound 477 mm

Figure 1 Impact Velocity Measurement System



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

The vanes have 305-millimeter spacing.

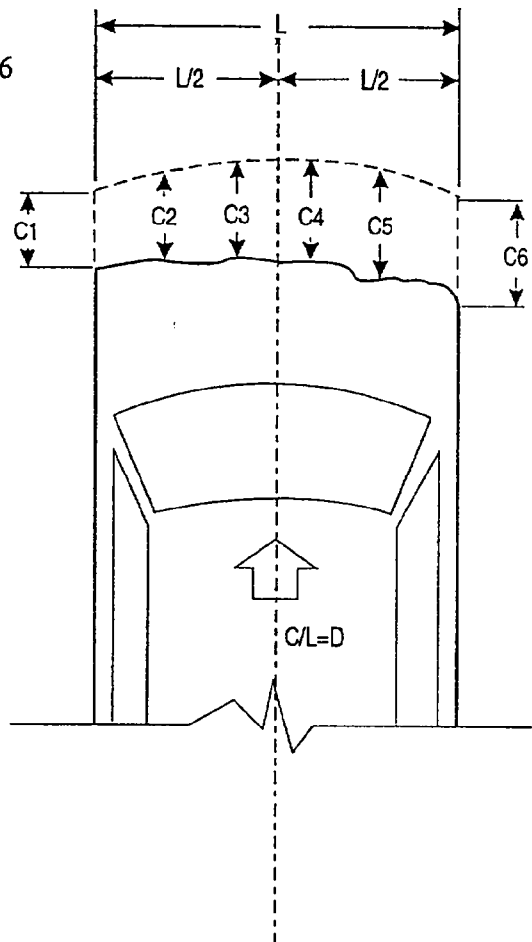
**Figure 2 Accident Investigation Division Data
for 56 kph (35 mph) Frontal Barrier Impact**

NHTSA number: MT0305
 Test date: 02/29/96
 Vehicle year/make/
 model/body style: 1996/Hyundai/Elantra/4-door sedan
 Vehicle size category: Compact
 VIN: KMHJF34M9TU198376
 Build date: 12/95
 Test weight: 1422 kg
 Vehicle wheelbase: 2540 mm
 Maximum width: 1707 mm
 Front overhang: 885 mm

Collision Deformation
 Classification (CDC) code: 12FDEW3

Crush depth
 measurements:

C1	=	440 mm
C2	=	543 mm
C3	=	558 mm
C4	=	547 mm
C5	=	525 mm
C6	=	430 mm



Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 1422 mm

Figure 3 Vehicle Accelerometer Placement

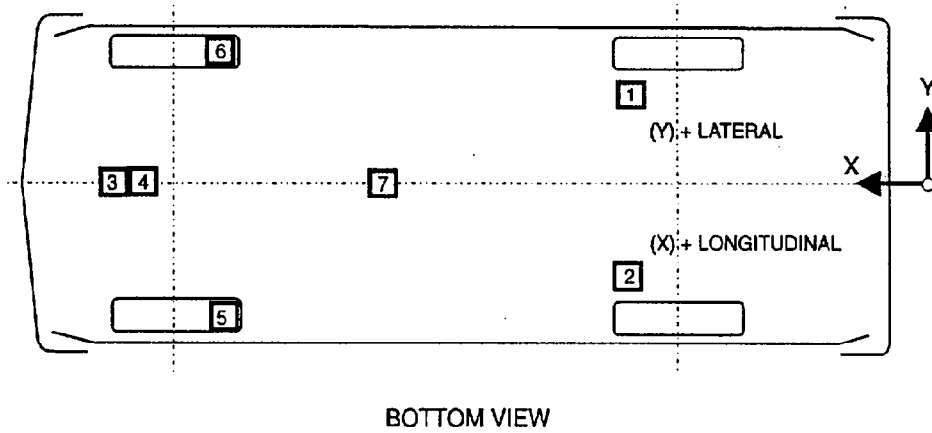
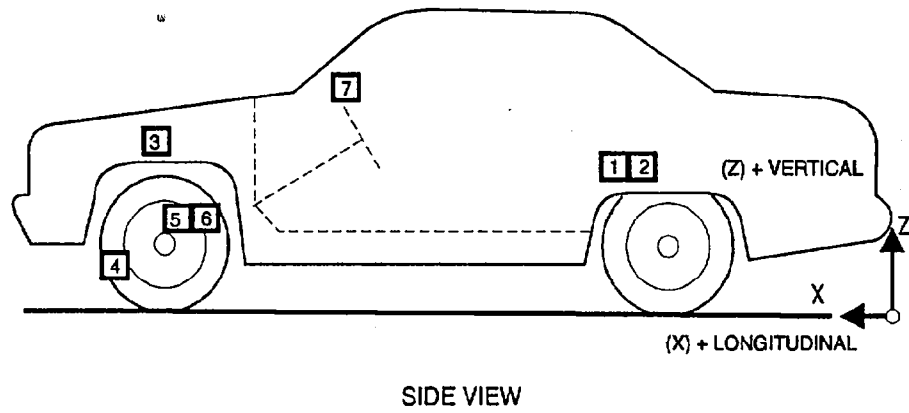


Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 960229 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL REDUNDANT	1595 mm	-638 mm	335 mm	2.3 g @ 117.1 ms 2.3 g @ 117.0 ms	37.0 g @ 34.2 ms 36.9 g @ 34.3 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL REDUNDANT	1590 mm	638 mm	335 mm	2.1 g @ 139.2 ms 2.1 g @ 122.4 ms	36.0 g @ 35.2 ms 36.3 g @ 35.2 ms
3 ENGINE TOP LONGITUDINAL	3785 mm	10 mm	798 mm	48.1 g @ 38.2 ms	155.1 g @ 31.0 ms
4 ENGINE BOTTOM LONGITUDINAL	3630 mm	250 mm	218 mm	12.0 g @ 54.8 ms	103.7 g @ 25.2 ms
5 RIGHT BRAKE CALIPER LONGITUDINAL	3700 mm	614 mm	269 mm	53.0 g @ 57.0 ms	104.4 g @ 37.9 ms
6 LEFT BRAKE CALIPER LONGITUDINAL	3700 mm	-614 mm	269 mm	27.3 g @ 59.4 ms	89.1 g @ 40.9 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	3100 mm	0 mm	918 mm	15.9 g @ 27.9 ms	83.4 g @ 40.7 ms

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS. X-AXIS

LOCATIONS ARE MEASURED REARWARD FROM THE FRONT BUMPER.

REFERENCE: X: + FORWARD ACCELERATION

Y: + LEFT FROM VEHICLE CENTERLINE

Z: + UP FROM GROUND LEVEL

Table 5 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	<u>Driver #192</u>	<u>Passenger #142</u>
Head	Airbag	Airbag
Chest	Airbag	Airbag
Abdomen	None	None
Left knee	Instrument panel	Instrument panel
Right knee	Instrument panel	Instrument panel

Door Opening:

	<u>Left</u>	<u>Right</u>
Front	Difficult, no tools required	Difficult, no tools required
Rear	NA	NA

Seat Movement:

	<u>Seat Back Failure</u>	<u>Seat Shift</u>
Front	None	None
Rear	NA	NA

Glazing Damage:

The entire windshield cracked on impact.

Other Notable Impact Effects:

None

Table 6 FMVSS 208 Data Summary

Vehicle year/make/
model/body style: 1996/Hyundai/Elantra/4-door sedan
Vehicle NHTSA number: MT0305
Test date: 02/29/96

	Driver Dummy #192		Passenger Dummy #142	
<u>Maximum Accelerations:</u>				
Head X-axis	-56.7	g	-65.0	g
Head Y-axis	12.6	g	24.0	g
Head Z-axis	-28.9	g	-28.7	g
Head resultant	59.7	g	70.6	g
Chest X-axis	-57.5	g	-64.6	g
Chest Y-axis	-5.9	g	-5.2	g
Chest Z-axis ¹	-14.6	g	13.2	g
Chest resultant ²	57.5	g	62.0	g
Chest resultant time interval ²	.003	sec	.003	sec
<u>Head Injury Criteria (HIC) Values:</u>				
HIC ³	528		773	
HIC starting time	.049	sec	.057	sec
HIC ending time	.085	sec	.093	sec
Average head resultant acceleration during HIC time interval	46.4	g	54.0	g
<u>Maximum Chest Deflections:</u>				
Chest X-axis	35	mm	50	mm
Maximum chest deflection time	.072	sec	.076	sec
<u>Maximum Compressive Femur Forces:</u>				
Left femur	4805	N	6917	N
Right femur	5543	N	7328	N
<u>Maximum Seat Belt Forces:</u>				
Lap belt	7079	N	3254	N
Shoulder belt	6795	N	6787	N

Note: All values listed must be occurring during primary impact event.
(Head accelerations listed must be during HIC time interval.)

¹ See Data Acquisition Explanations

² 0.003 Sec. Minimum duration.

³ The maximum HIC time interval is 36 milliseconds.

Table 7 Hybrid III Data Summary

Vehicle year/make/
model/body style: 1996/Hyundai/Elantra/4-door sedan
Vehicle NHTSA number: MT0305
Test date: 02/29/96

	Driver Dummy #192	Passenger Dummy #142
<u>Maximum Forces</u>		
Neck X-axis shear force	-443 N	-417 N
Neck Y-axis shear force	-405 N	233 N
Neck Z-axis axial force	1920 N	-1738 N
 <u>Maximum Moments</u>		
Neck moment about X-axis	11 N·m	24 N·m
Neck moment about Y-axis	42 N·m	34 N·m
Neck moment about Z-axis	15 N·m	24 N·m
 <u>Maximum Accelerations:</u>		
Pelvis X-axis	-80.4 g	-80.2 g
Pelvis Y-axis	17.7 g	40.3 g
Pelvis Z-axis	27.3 g	36.9 g
Pelvis resultant	80.7 g	80.5 g

Table 7 Hybrid III Data Summary, Cont'd.

Vehicle year/make/
model/body style: 1996/Hyundai/Elantra/4-door sedan
Vehicle NHTSA number: MT0305
Test date: 02/29/96

	Driver Dummy #192		Passenger Dummy #142	
Left upper tibia moment about X-axis	41	N·m	-45	N·m
Left upper tibia moment about Y-axis	103	N·m	196	N·m
Right upper tibia moment about X-axis	-111	N·m	43	N·m
Right upper tibia moment about Y-axis	305	N·m	159	N·m
Left lower tibia X-axis force	-919	N	-1780	N
Left lower tibia Z-axis force ¹	-1662	N	-5607	N
Left lower tibia moment about Y-axis	-56	N·m	65	N·m
Right lower tibia X-axis force	-2500	N	-1269	N
Right lower tibia Z-axis force	-8757	N	-3301	N
Right lower tibia moment about Y-axis	-147	N·m	-137	N·m
Left foot X-axis acceleration	-56.6	g	-192.5	g
Left foot Z-axis acceleration at heel	70.3	g	126.0	g
Left foot Z-axis acceleration at toe	-102.2	g	183.2	g
Right foot X-axis acceleration	-218.0	g	-148.6	g
Right foot Z-axis acceleration at heel	269.2	g	112.5	g
Right foot Z-axis acceleration at toe	347.8	g	225.3	g

Note: All values listed must be occurring during primary impact event.

¹ See Data Acquisition Explanations

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward impacting both knees into the instrument panel. The dummy's head and chest were restrained by the driver's airbag as the dummy's torso was restrained by the three-point unbelt. The dummy's head rotated forward and then rearward to the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point unbelt.

Right Front Passenger Dummy

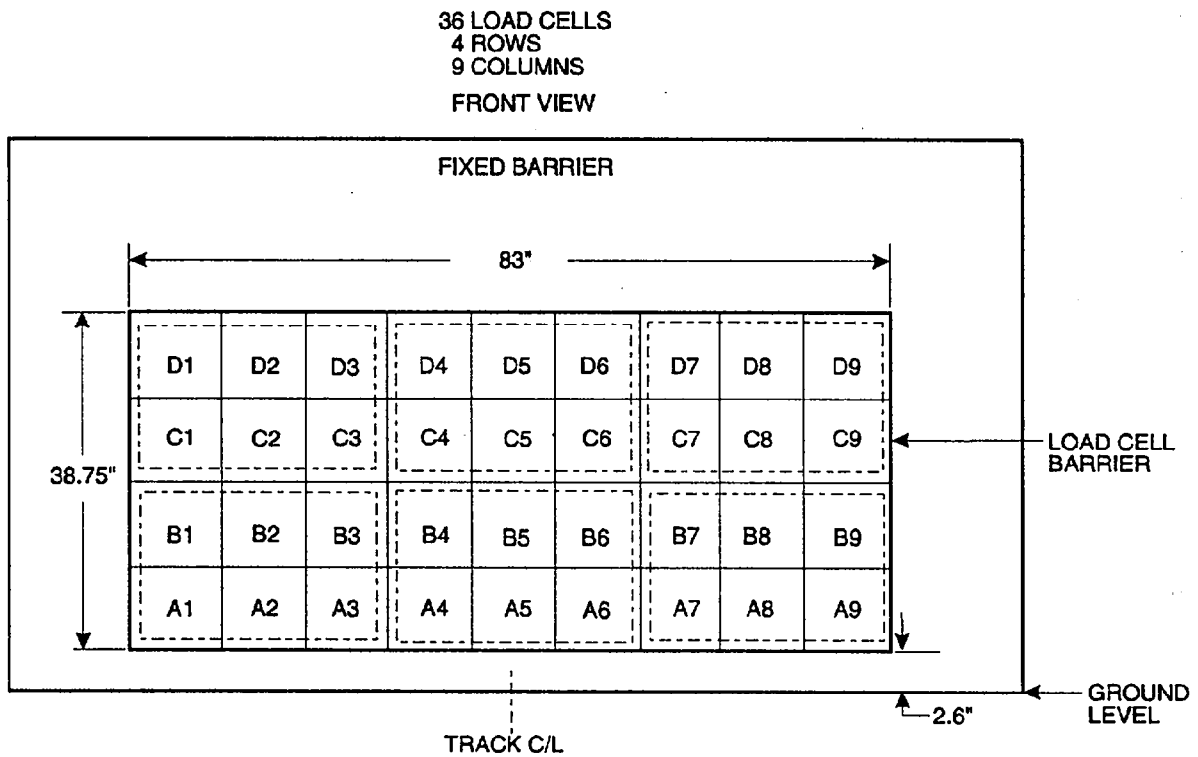
Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest were restrained by the passenger's airbag as the dummy's torso was restrained by the three-point unbelt. The dummy rebounded into the seat back and came to rest seated in the right front passenger's seat, restrained by the three-point unbelt.

Table 8 Seat Belt Performance Assessment Test Data

	Driver	Passenger
<u>Belt length data:</u>		
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	2518 mm	2638 mm
Shoulder belt length as measured on Part 572 dummy.	914 mm	890 mm
Lap belt length as measured on Part 572 dummy.	886 mm	840 mm
<u>Shoulder belt spool-off length:</u>		
As determined by film analysis ¹	NA	NA
As determined mechanically	190 mm	185 mm
As determined electronically	88 mm	89 mm
<u>Belt stretch length:</u>		
As measured mechanically	3 mm/m	10 mm/m
As measured electronically	7 mm/m	0 mm/m
<u>Retractor lock-up time:</u>		
As determined by shoulder belt spool-off ¹	NA	NA

¹ No onboard cameras.

Figure 4 Load Cell Barrier Configuration



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

Table 9 Load Cell Barrier Data Summary

Location	Positive direction	Negative direction
Total group 1	2.0 kN @ 2.3 ms	98.9 kN @ 31.5 ms
Total group 2	0.1 kN @ 214.6 ms	270.1 kN @ 43.8 ms
Total group 3	2.2 kN @ 1.8 ms	126.8 kN @ 27.9 ms
Total group 4	0.6 kN @ 6.2 ms	39.7 kN @ 32.6 ms
Total group 5	0.8 kN @ 2.2 ms	30.1 kN @ 10.8 ms
Total group 6	0.1 kN @ 2.7 ms	21.0 kN @ 30.8 ms
Total load cell force	0.3 kN @ 232.9 ms	535.4 kN @ 31.7 ms

Tension is positive
Compression is negative

Section 3.0

FMVSS 212, 219 (partial), and 301 Data

Figure 5 FMVSS 212 Test Data

Details of windshield mounting such as retention method, trim type, etc.:

Plastic trim around outer perimeter, adhesive around inner perimeter.

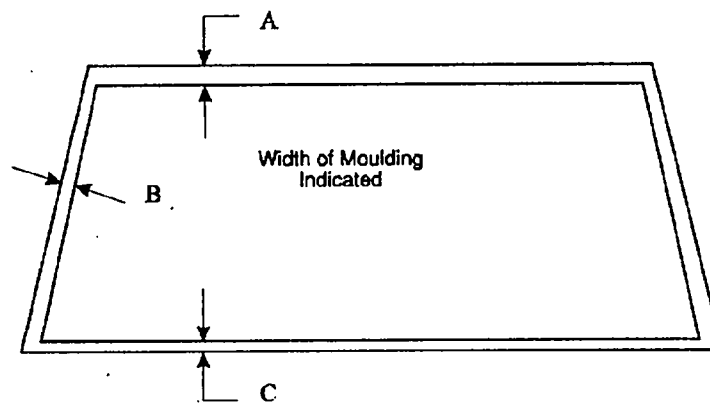
FMVSS 212 requirements: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

	<u>Pre-test</u>	<u>Post-test</u>	<u>Percent retention</u>
Right side	2110 mm	2110 mm	100.0
Left side	2110 mm	2110 mm	100.0
Total	4220 mm	4220 mm	100.0

Pre-test windshield mounting material temperature: 18° C

A = 17 mm
B = 20 mm
C = 25 mm



Front view of windshield¹

Loss of windshield retention lengths:

None

¹ Indicate areas of loss of retention, if any, on windshield diagram.

Figure 6 FMVSS 219 Test Data

Protected zone lower edge requirement:

The lower edge of the protected zone is determined by placing a 165-millimeter diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 13 millimeters from the locus line. The **lower edge of the protected zone** is the longitudinal projection onto the outer surface of the windshield of this line.

Windshield measurements:

A = 1115 mm

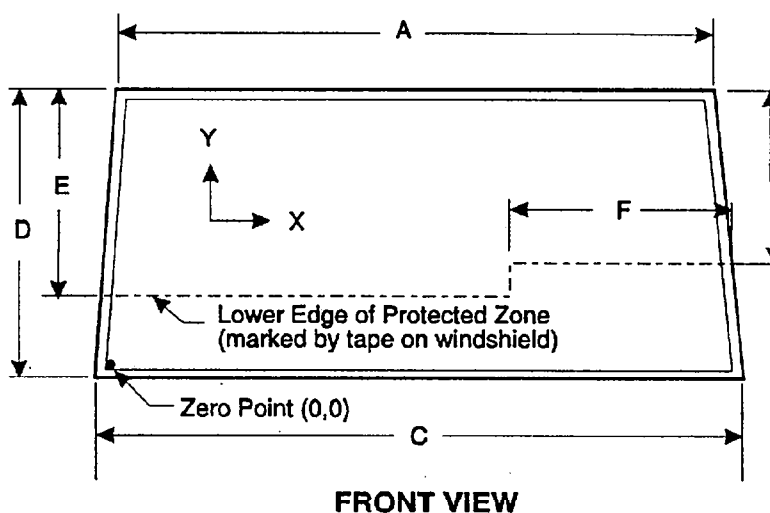
B = 461 mm

C = 1480 mm

D = 860 mm

E = 585 mm

F = 610 mm



Method of adhering protected zone template to windshield: NA

Areas of windshield template penetration greater than 6 mm: NA

Coordinates	
X	Y
1.	
2.	
3.	

Areas of windshield penetration, below the protected zone, through the inner surface of the windshield: None

- 1.
- 2.
- 3.

Table 10 Fuel System Data

Vehicle year/make/ model/body style:	1996/Hyundai/Elantra/4-door sedan
NHTSA number:	MT0305
Fuel system capacity:	14.5 gallons (from owner's manual)
Usable capacity:	14.5 gallons (furnished by COTR)
Test volume range:	13.3 gallons to 13.6 gallons (92-94% of usable)
Actual test volume:	13.5 gallons (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Did electric fuel pump operate with ignition switch "on" and the engine not operating.	No
Details of fuel system:	The fuel tank was located in front of the rear axle. The fuel filler neck was located on the left side

Table 11 FMVSS 301 Post-Impact Test Data

NHTSA number: MT0305
Test date: 02/29/96
Vehicle year/make/
model/body style: 1996/Hyundai/Elantra/4-door sedan

Test requirements:

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

Test vehicle impact type:

- ☒ Frontal (56 kph)
☐ Oblique (48 kph) with ___° barrier face first contacting ___ (driver/pass.) side
☐ Rear moving barrier (48 kph)
☐ Lateral moving barrier (32 kph)

Fuel system fluid spillage measurements:

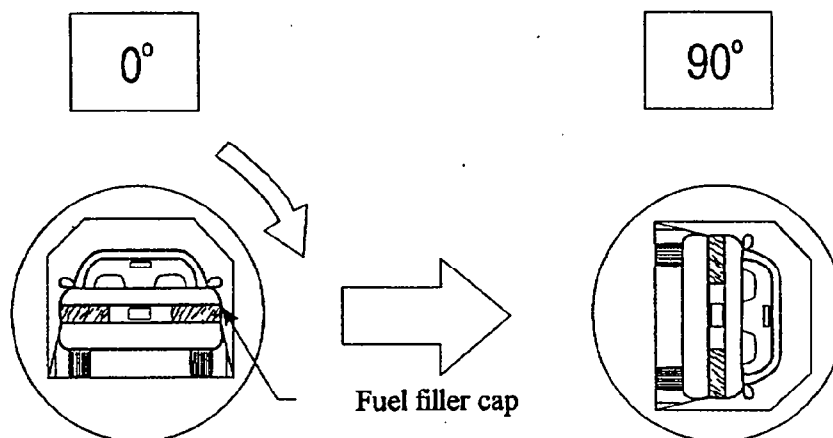
	<u>Test Results</u>	<u>Maximum Allowable</u>
1. From impact until vehicle motion ceases	0 g	28 g
2. 5-minute period after vehicle motion ceases	0 g	142 g
3. Next 25 minutes after 5-minute period	0 g	28 g/min

Fuel system fluid spillage location(s): None

Figure 7 FMVSS 301 Static Rollover Test Data

NHTSA number: MT0305

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

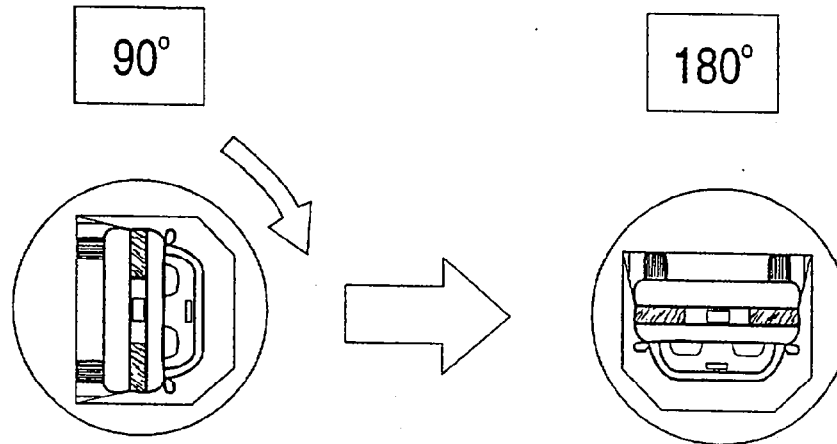
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

Figure 7 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

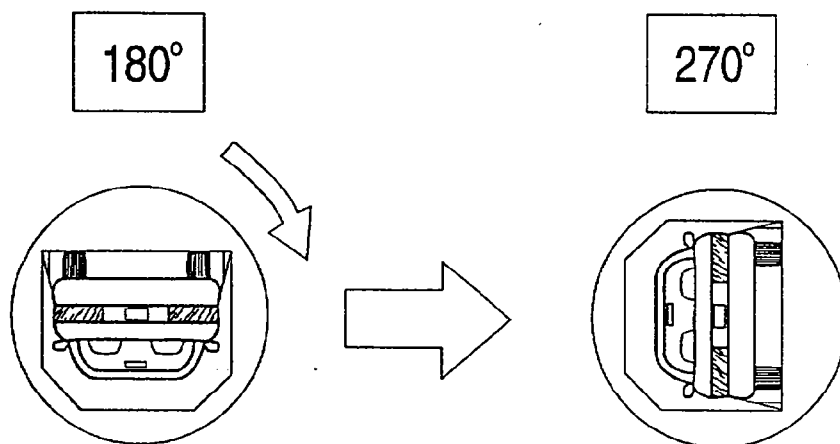
Fuel system fluid spillage measurements:

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 7 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 21 minutes

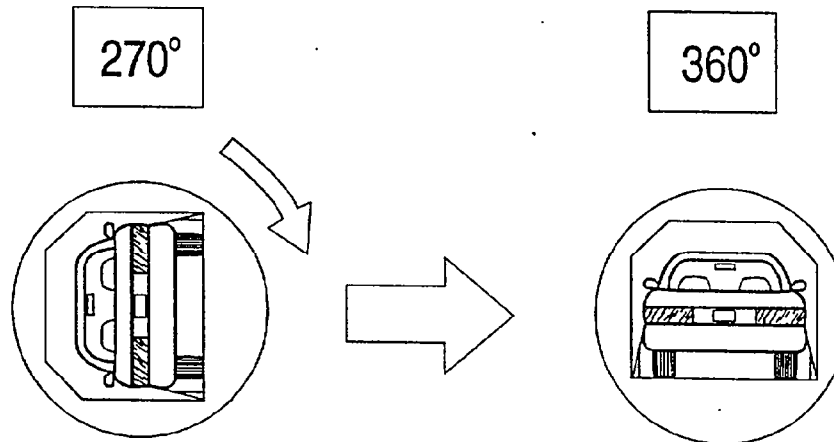
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

Figure 7 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:

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

Fuel system fluid spillage location(s): None

Section 4.0

Occupant, Camera, and Vehicle Information

Figure 8 Dummy Measurement Locations for Front Seat Occupants

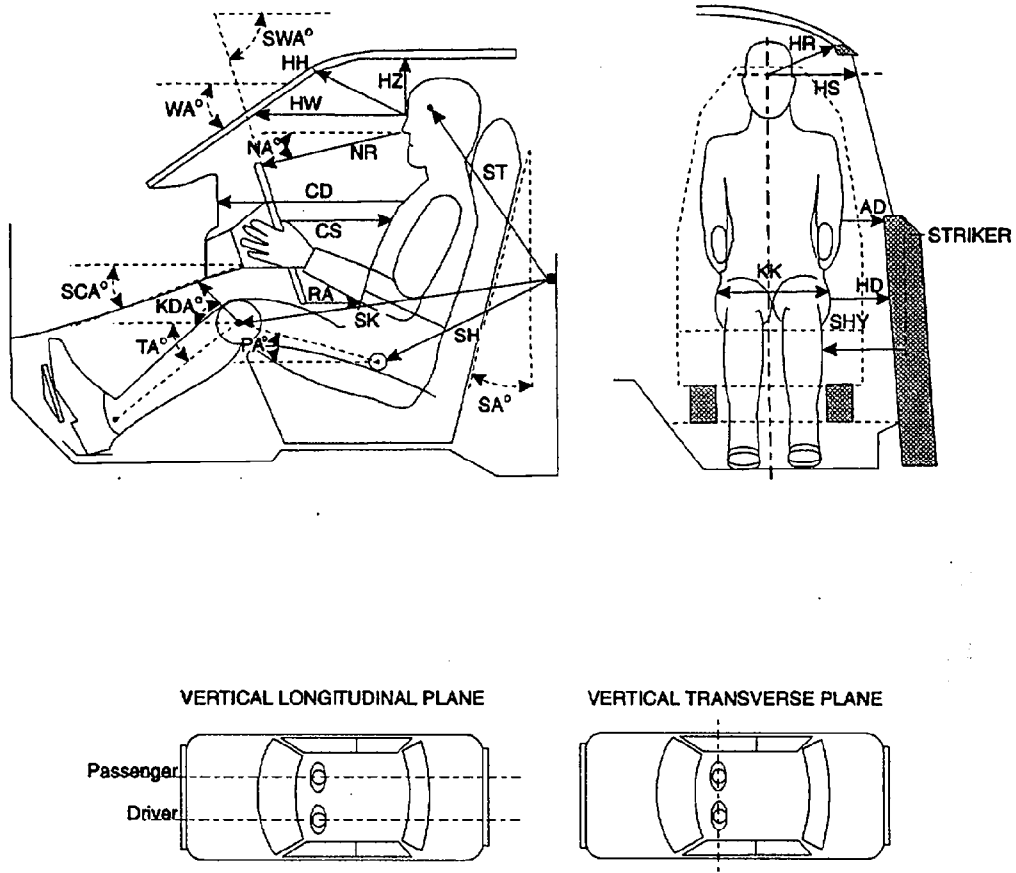


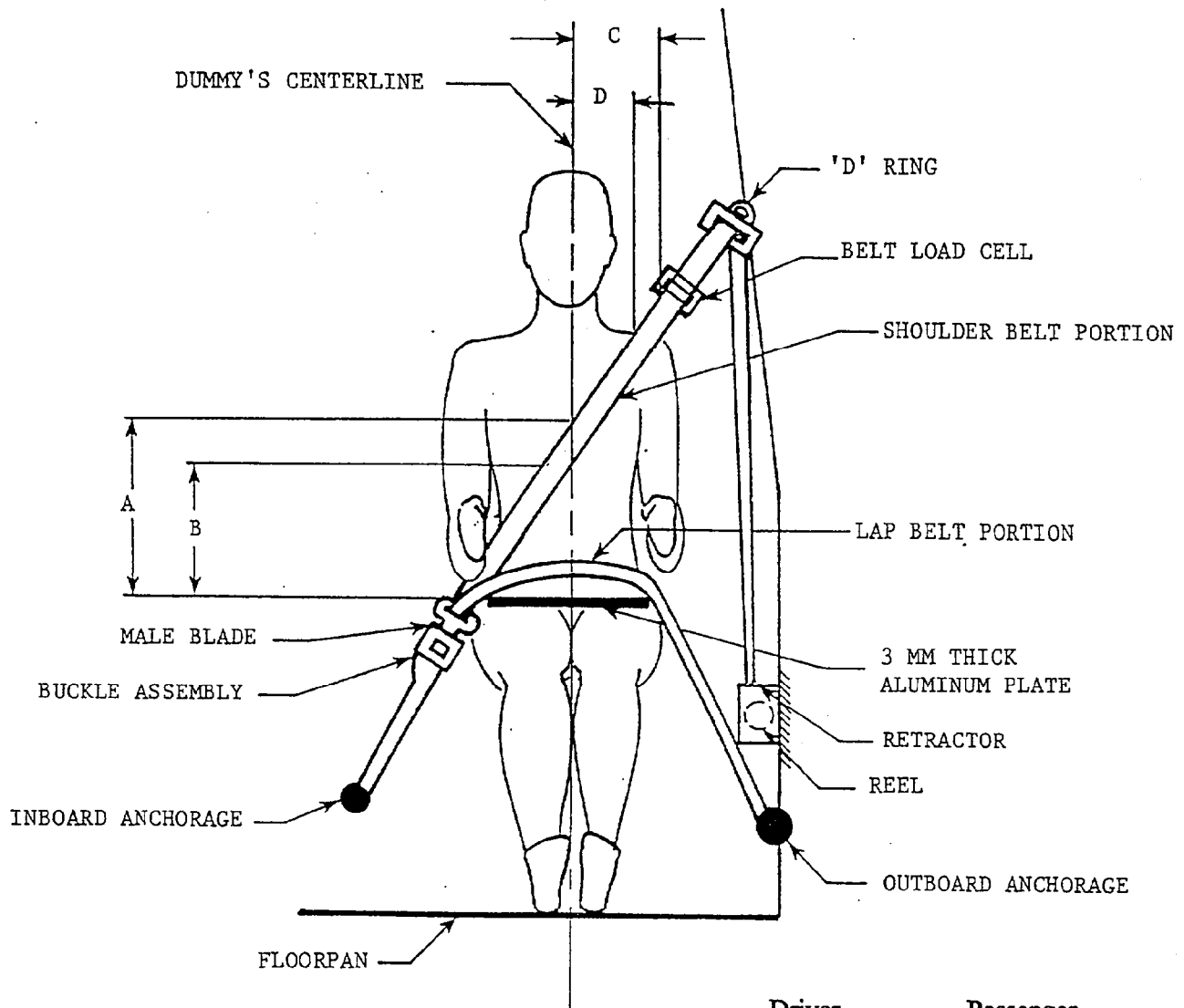
Table 12 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #192)	Passenger (Serial #142)
WA	Windshield angle	29°	NA
SWA	Steering wheel angle	24°	NA
SCA	Steering column angle	65°	NA
SA	Seat back angle	28°	28°
HZ	Head to roof	140 mm	131 mm
HH	Head to header	235 mm	257 mm
HW	Head to windshield	429 mm	450 mm
HR	Head to side header	165 mm	172 mm
NR	Nose to rim	362 mm	NA
NA	Nose to rim angle	14°	NA
CD	Chest to dash	487 mm	578 mm
CS	Steering wheel to chest	289 mm	NA
RA	Rim to abdomen	174 mm	NA
KDL	Left knee to dash	187 mm	185 mm
KDR	Right knee to dash	162 mm	196 mm
KDA	Outboard knee to dash angle	26°	20°
PA	Pelvic angle	21°	24°
TA	Tibial angle	46°	35°
KK	Knee to knee	330 mm	259 mm
ST ¹	Striker to head	535 mm	527 mm
	Striker to head angle	-78°	-81°
SK ¹	Striker to knee	585 mm	612 mm
	Striker to knee angle	1°	1°
SH ¹	Striker to H-point	246 mm	248 mm
	Striker to H-point angle	28°	25°
SHY	Striker to H-point (Y dir.)	197 mm	215 mm
HS	Head to side window	277 mm	267 mm
HD	H-point to door	144 mm	122 mm
AD	Arm to door	126 mm	15 mm

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

¹ A negative angle indicates the measurement point was above the striker.

Figure 9 Seat Belt Positioning Data



	Driver	Passenger
A - Top surface of aluminum plate to belt upper edge	330 mm	275 mm
B - Top surface of aluminum plate to belt lower edge	255 mm	195 mm
C - Dummy centerline to outer edge of belt at chest flesh top	114 mm	157 mm
D - Dummy centerline to inner edge of belt at chest flesh top	50 mm	103 mm
Lap belt tension	18 N	18 N
Shoulder belt tension	18 N	18 N
Position of adjustable belt anchorage	2nd of five	2nd of five

Figure 10 Camera Positions

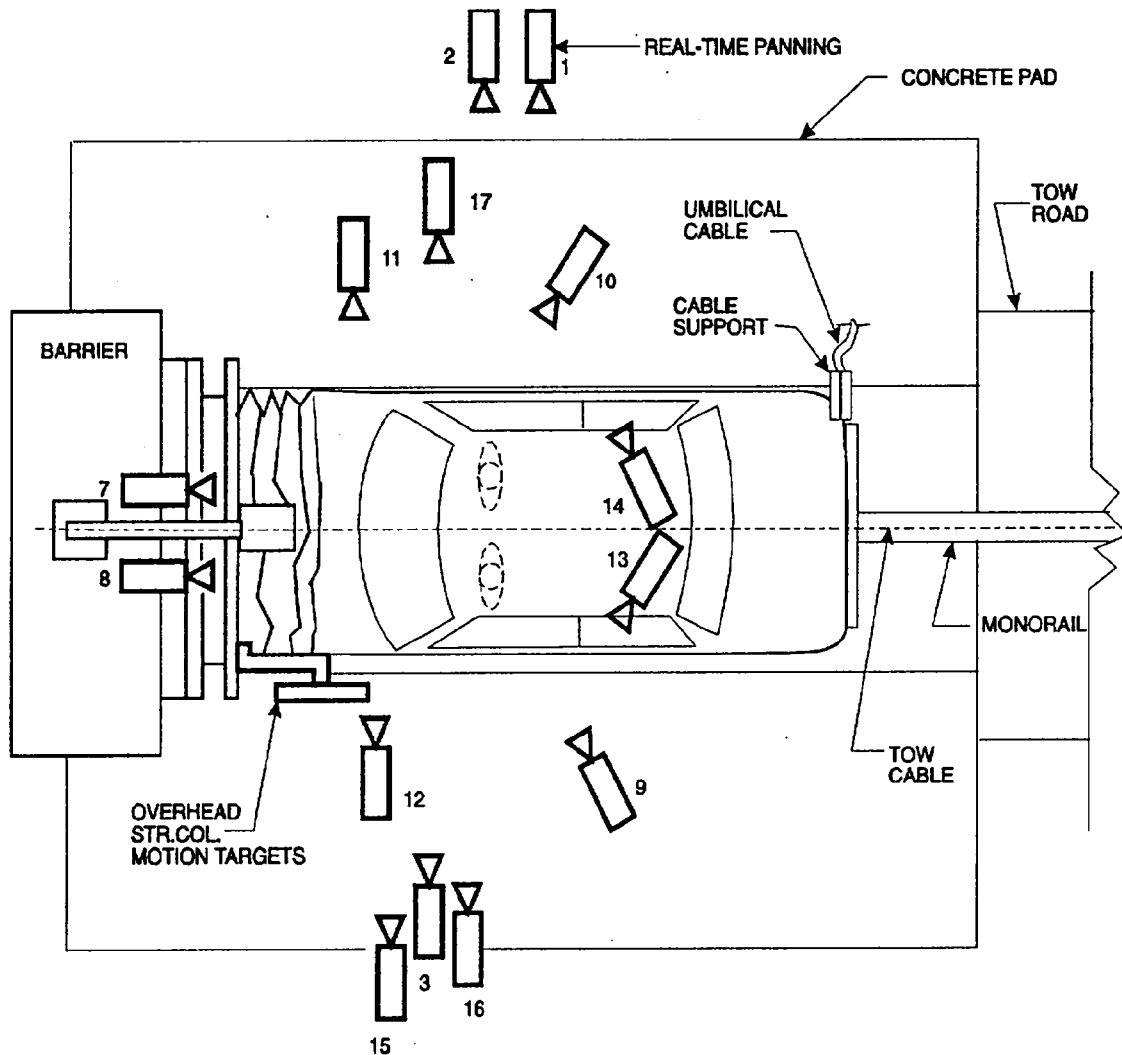


Figure 10 Camera Positions, Cont'd.

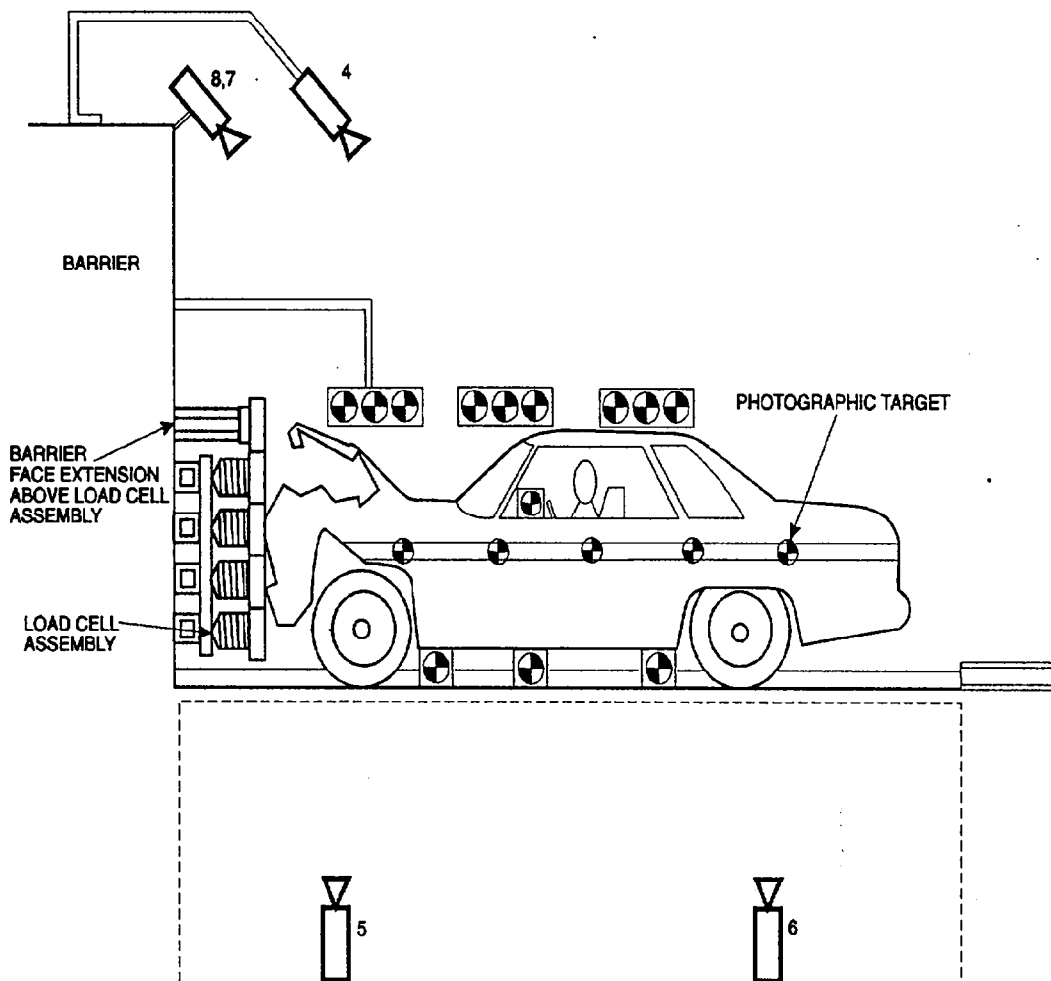


Table 13 Motion Picture Camera Locations

Test Number: 960229

Vehicle year/make/model/body style: 1996/Hyundai/Elantra/4-door sedan

Camera Number	View	Camera Positions ¹			Angle ²	Film Plane to Head Target	Lens	Film Speed
		X	Y	Z				
1	Real-time panning	-3607 mm	-2802 mm	1549 mm	NA	NA	16 mm	24 frames/s
2	Vehicle crush	-2065 mm	-6767 mm	942 mm	-2°	NA	13 mm	505 frames/s
3	Dummy kinematics	-1054 mm	7493 mm	1118 mm	-12°	5740 mm	25 mm	1002 frames/s
4	Windshield damage	-925 mm	0 mm	2489 mm	-40°	NA	13 mm	500 frames/s
5	Crush & fluid spillage	-1283 mm	0 mm	-2347 mm	90°	NA	13 mm	1002 frames/s
6	Fluid spillage	-2522 mm	0 mm	-2515 mm	90°	NA	13 mm	995 frames/s
7	Passenger kinematics	-114 mm	-351 mm	2159 mm	-40°	NA	17 mm	502 frames/s
8	Driver kinematics	-173 mm	368 mm	2159 mm	-41°	NA	17 mm	502 frames/s
9	Driver kinematics	-4572 mm	1854 mm	2591 mm	-27°	2591 mm	25 mm	505 frames/s
10	Passenger kinematics	-4674 mm	-1880 mm	2540 mm	-26°	1956 mm	25 mm	490 frames/s
11	Windshield intrusion	-968 mm	-7775 mm	1118 mm	0°	NA	50 mm	500 frames/s
12	Windshield intrusion	-1346 mm	7859 mm	1074 mm	0°	NA	50 mm	502 frames/s
13	Driver seat belt movement ³	NA	NA	NA	NA	NA	NA	NA
14	Passenger seat belt movement ³	NA	NA	NA	NA	NA	NA	NA
15	Column movement	-2108 mm	7264 mm	2616 mm	-14°	NA	25 mm	502 frames/s
16	Column movement	-2108 mm	7264 mm	1908 mm	-9°	NA	25 mm	500 frames/s
17	Passenger kinematics	-986 mm	-5354 mm	1151 mm	7°	5283 mm	25 mm	995 frames/s

¹ +X = Film plane forward of barrier face
+Y = Film plane to left of monorail centerline
+Z = Film plane above ground level
² +Angle = Film plane angled upward from horizontal plane
³ No onboard cameras were used.

Figure 11 Vehicle Target Locations

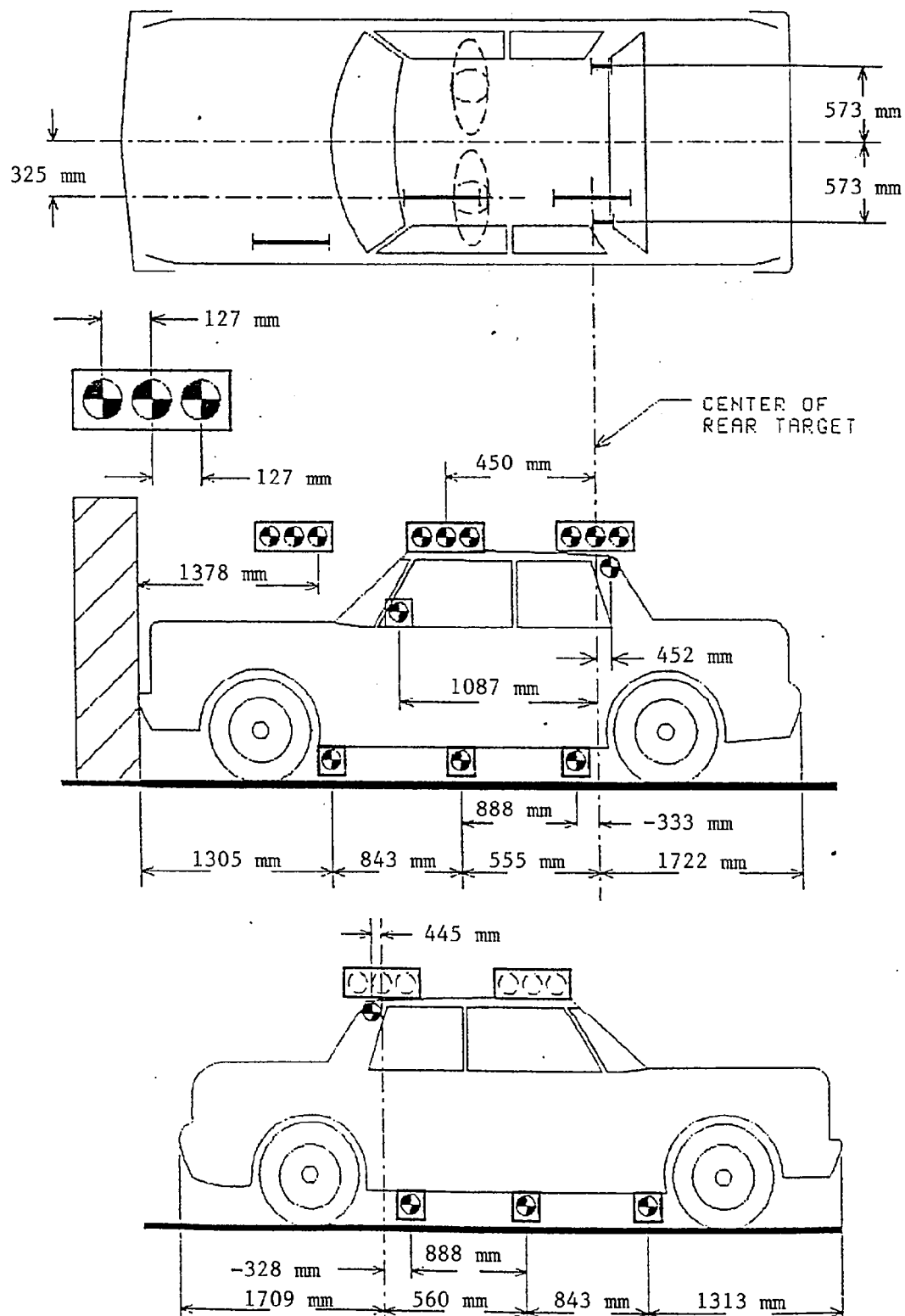


Figure 12 Pre-Test And Post-Test Measurement Points

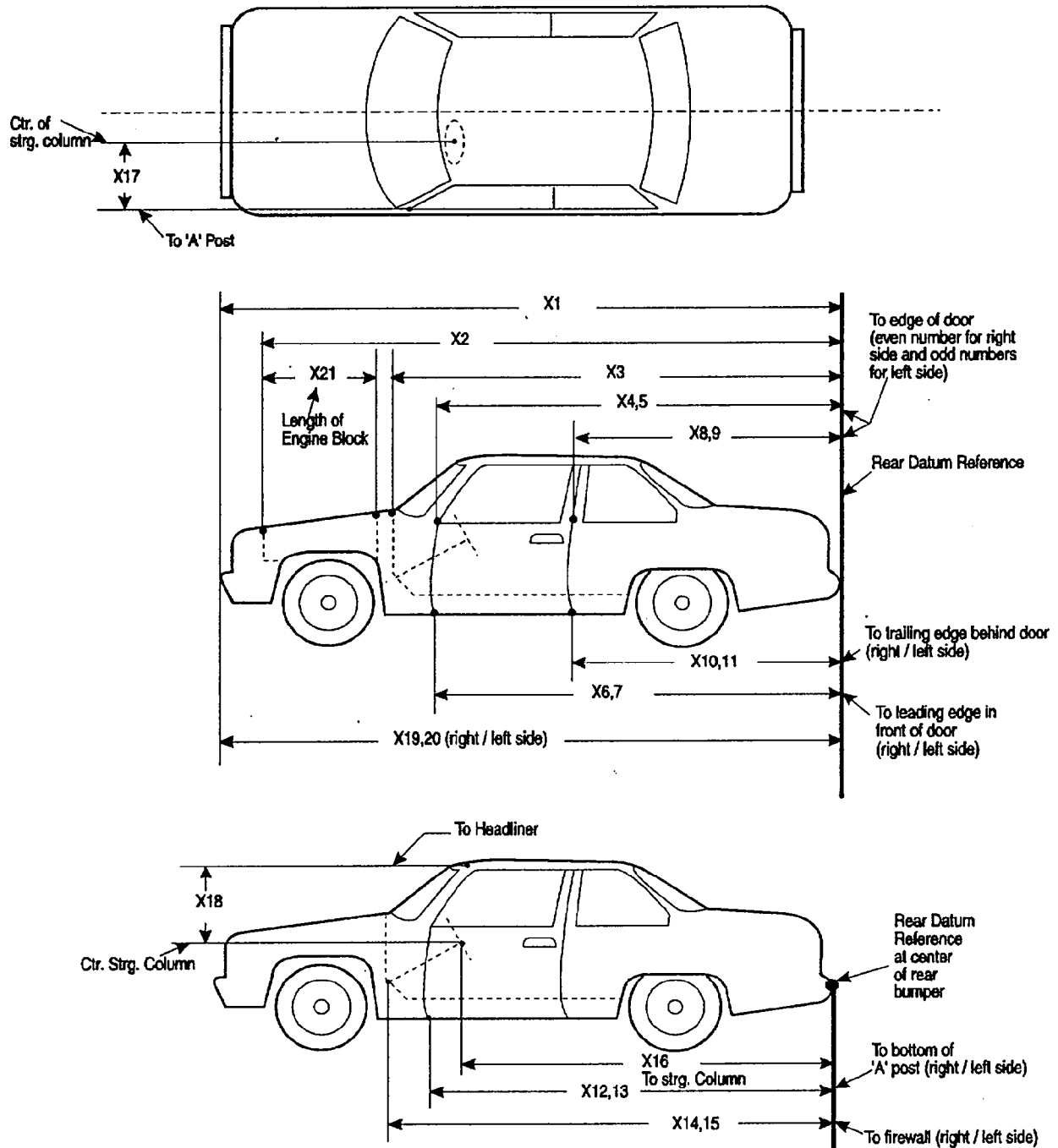


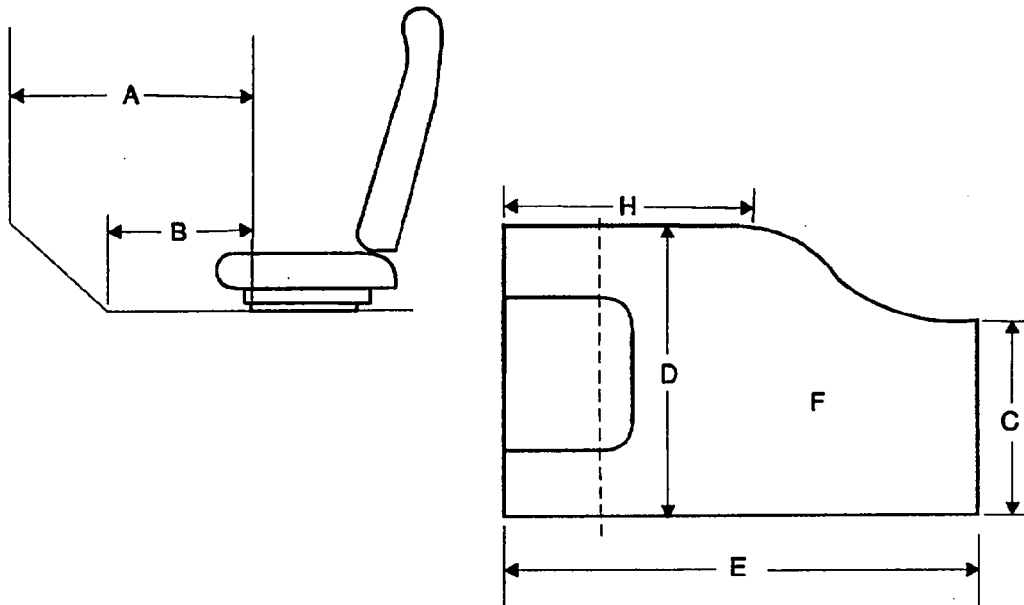
Table 14 Impacted Vehicle Measurements

Vehicle Make/Model: Hyundai/Elantra

Test Number: 960229

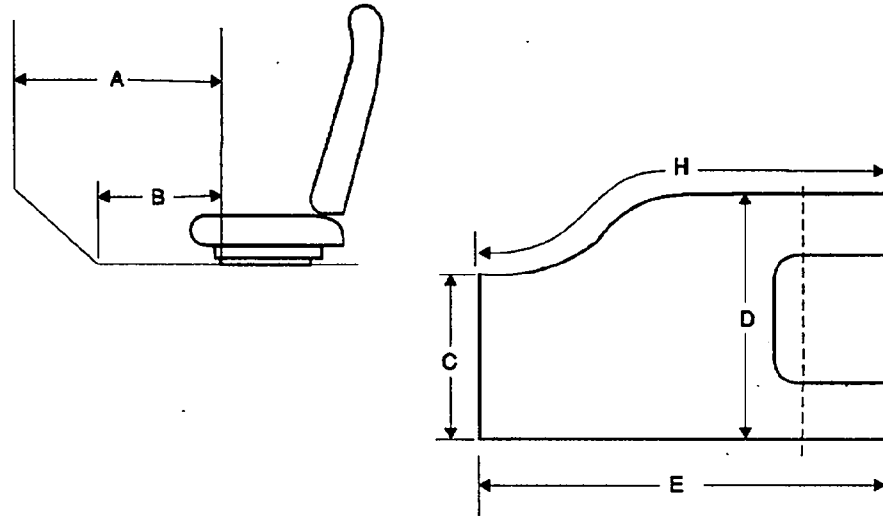
No.	Type of measurement	Pre-test	Post-test	Diff.
X1	Total length of vehicle at centerline	4425 mm	3874 mm	551 mm
X2	Rear surface of vehicle to front of engine block	3840 mm	3608 mm	232 mm
X3	Rear surface of vehicle to firewall	3374 mm	3249 mm	125 mm
X4	Rear surface of vehicle to upper leading edge of right door	3075 mm	3062 mm	13 mm
X5	Rear surface of vehicle to upper leading edge of left door	3075 mm	3055 mm	-20 mm
X6	Rear surface of vehicle to lower leading edge of right door	3060 mm	3043 mm	17 mm
X7	Rear surface of vehicle to lower leading edge of left door	3065 mm	3030 mm	35 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2010 mm	2002 mm	8 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2012 mm	1992 mm	20 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2027 mm	2005 mm	22 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2032 mm	2002 mm	30 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3042 mm	3016 mm	26 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3037 mm	3011 mm	26 mm
X14	Rear surface of vehicle to firewall - right side	3350 mm	3235 mm	115 mm
X15	Rear surface of vehicle to firewall - left side	3337 mm	3228 mm	109 mm
X16	Rear surface of vehicle to steering wheel center	2610 mm	2594 mm	16 mm
X17	Center of steering column to "A" post	293 mm	260 mm	33 mm
X18	Center of steering column to headliner	432 mm	473 mm	-41 mm
X19	Rear surface of vehicle to right side of front bumper	4260 mm	3830 mm	430 mm
X20	Rear surface of vehicle to left side of front bumper	4240 mm	3800 mm	440 mm
X21	Length of engine block	500 mm	500 mm	0 mm

Figure 13 Static Footwell Deformation
(Driver's Side)



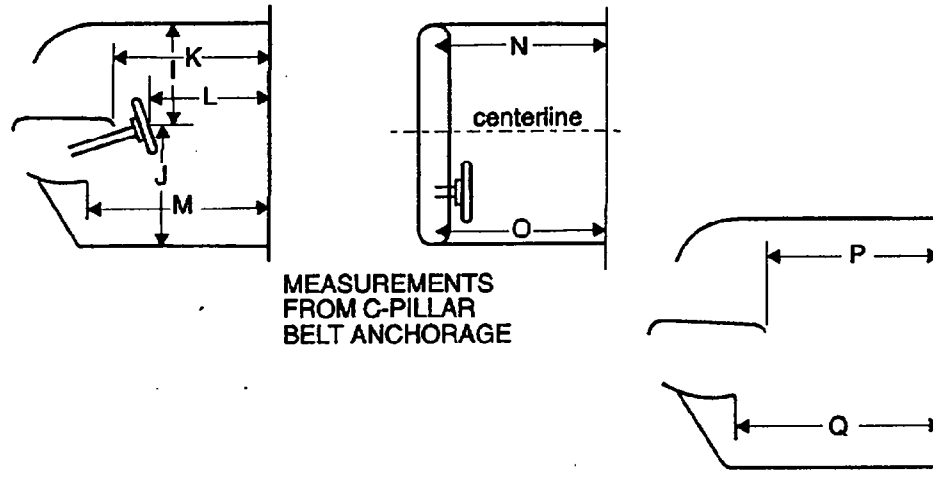
Measurement	Pre-Test	Post-Test	Difference
A	739 mm	615 mm	124 mm
B	544 mm	464 mm	80 mm
C	320 mm	312 mm	8 mm
D	440 mm	430 mm	10 mm
E	1102 mm	818 mm	284 mm
H	1113 mm	875 mm	238 mm

**Figure 14 Static Footwell Deformation
(Passenger's Side)**



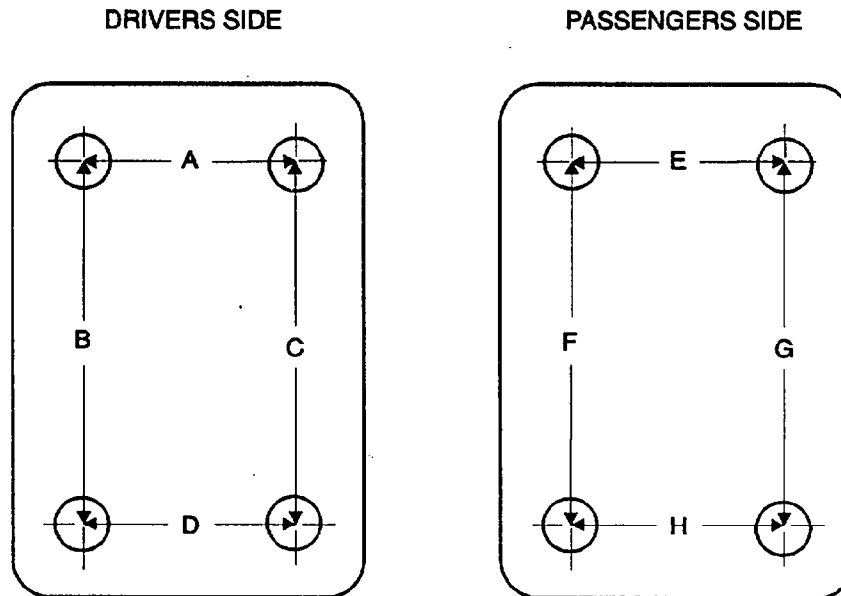
Measurement	Pre-Test	Post-Test	Difference
A	725 mm	600 mm	125 mm
B	510 mm	506 mm	4 mm
C	300 mm	290 mm	10 mm
D	400 mm	370 mm	30 mm
E	1111 mm	793 mm	318 mm
H	1151 mm	880 mm	271 mm

Figure 15 Static Passenger Compartment Intrusion



Measurement	Pre-Test	Post-Test	Difference
I	400 mm	473 mm	-73 mm
J	608 mm	612 mm	-4 mm
K	1913 mm	1885 mm	28 mm
L	1716 mm	1734 mm	-18 mm
M	2114 mm	2115 mm	-1 mm
N	2017 mm	2003 mm	14 mm
O	1962 mm	1955 mm	7 mm
P	1965 mm	1963 mm	2 mm
Q	2126 mm	2122 mm	4 mm

Figure 16 Underbody Floorboard Deformation



Measurement	Pre-Test	Post-Test	Difference
A	400 mm	398 mm	2 mm
B	627 mm	630 mm	-3 mm
C	630 mm	610 mm	20 mm
D	410 mm	410 mm	0 mm
E	430 mm	430 mm	0 mm
F	660 mm	635 mm	25 mm
G	588 mm	587 mm	1 mm
H	430 mm	430 mm	0 mm

Appendix A

Photographs

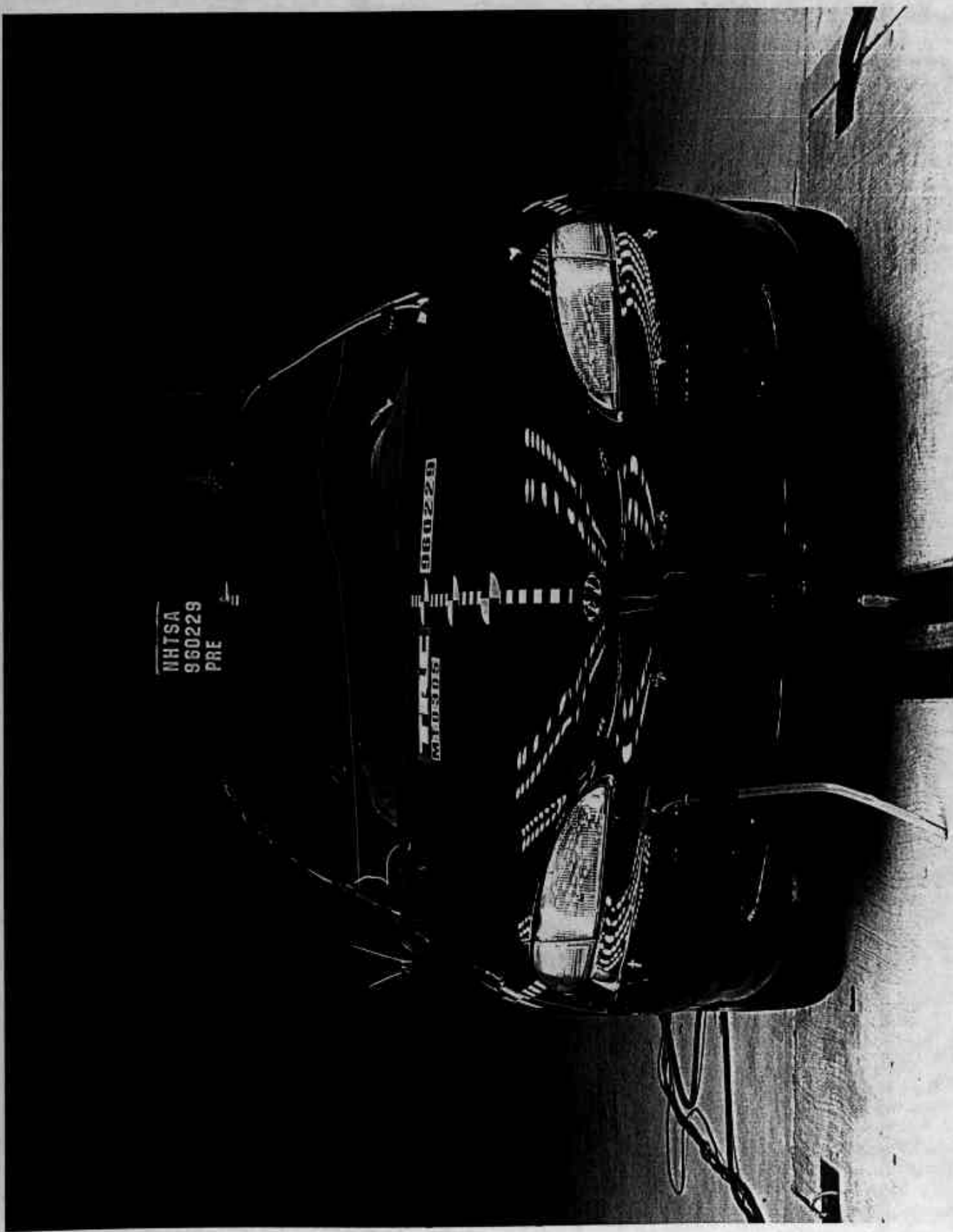


Figure A-1 Pre-Test Front View

A-2

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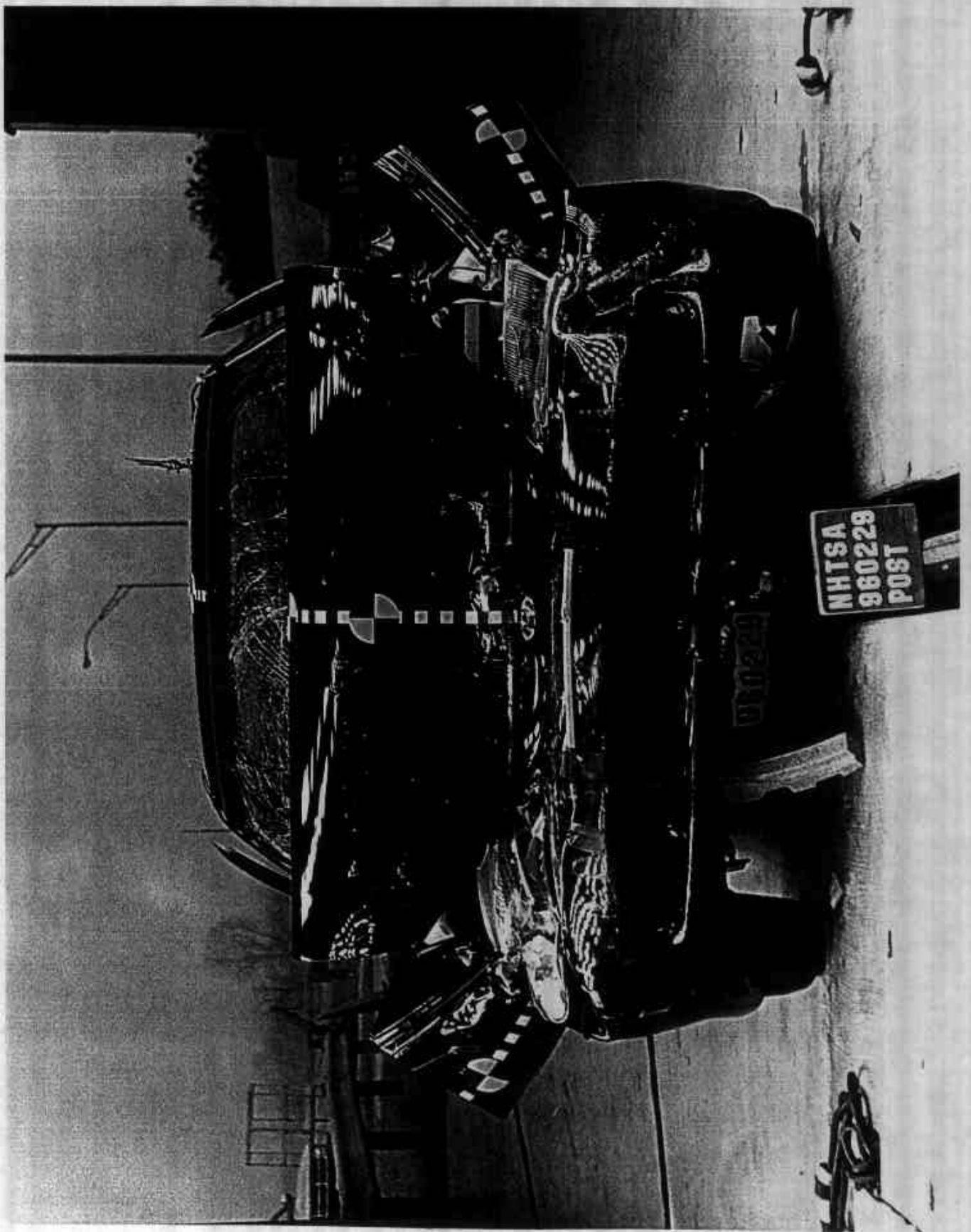


Figure A-2 Post-Test Front View

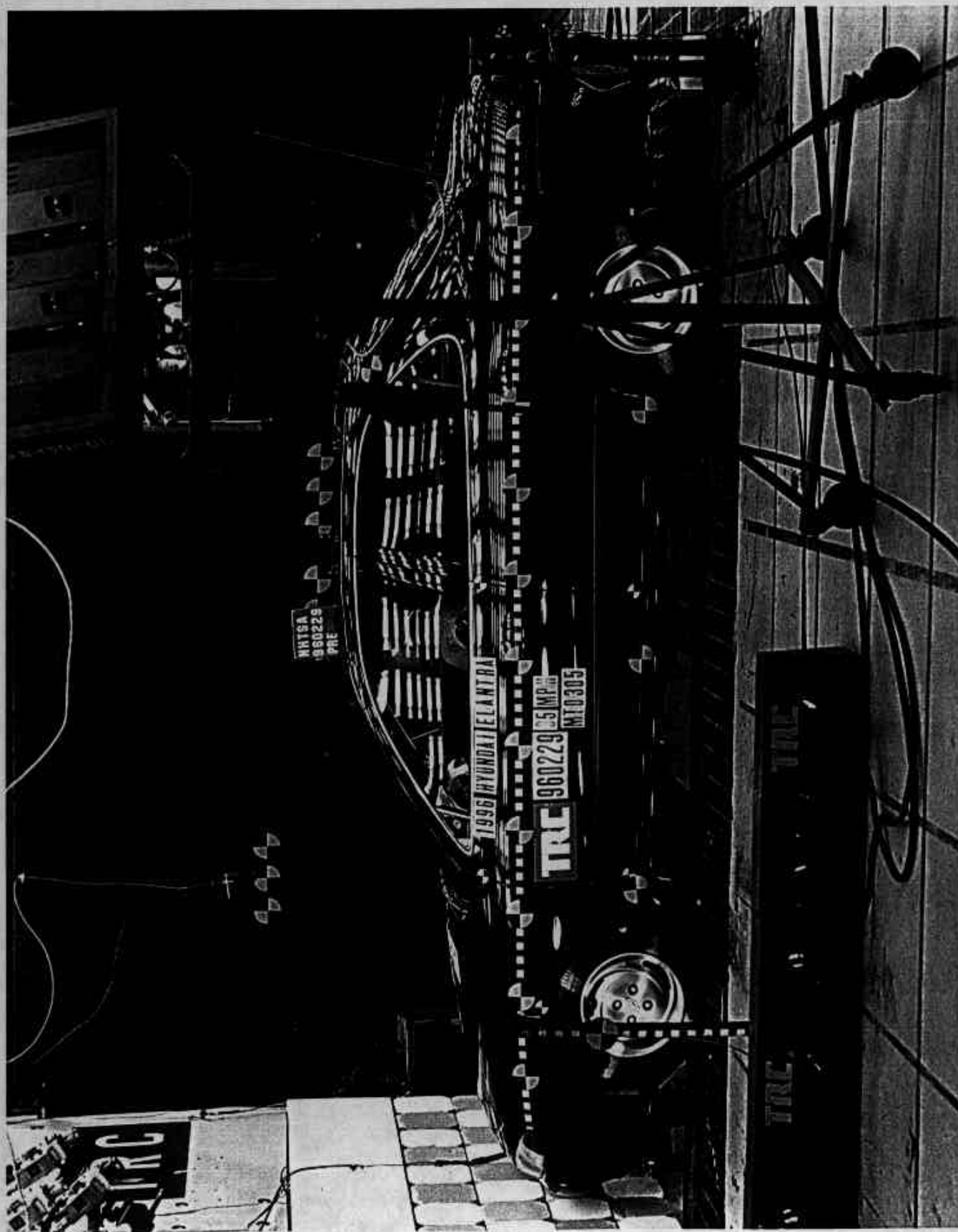


Figure A-3 Pre-Test Left Side View

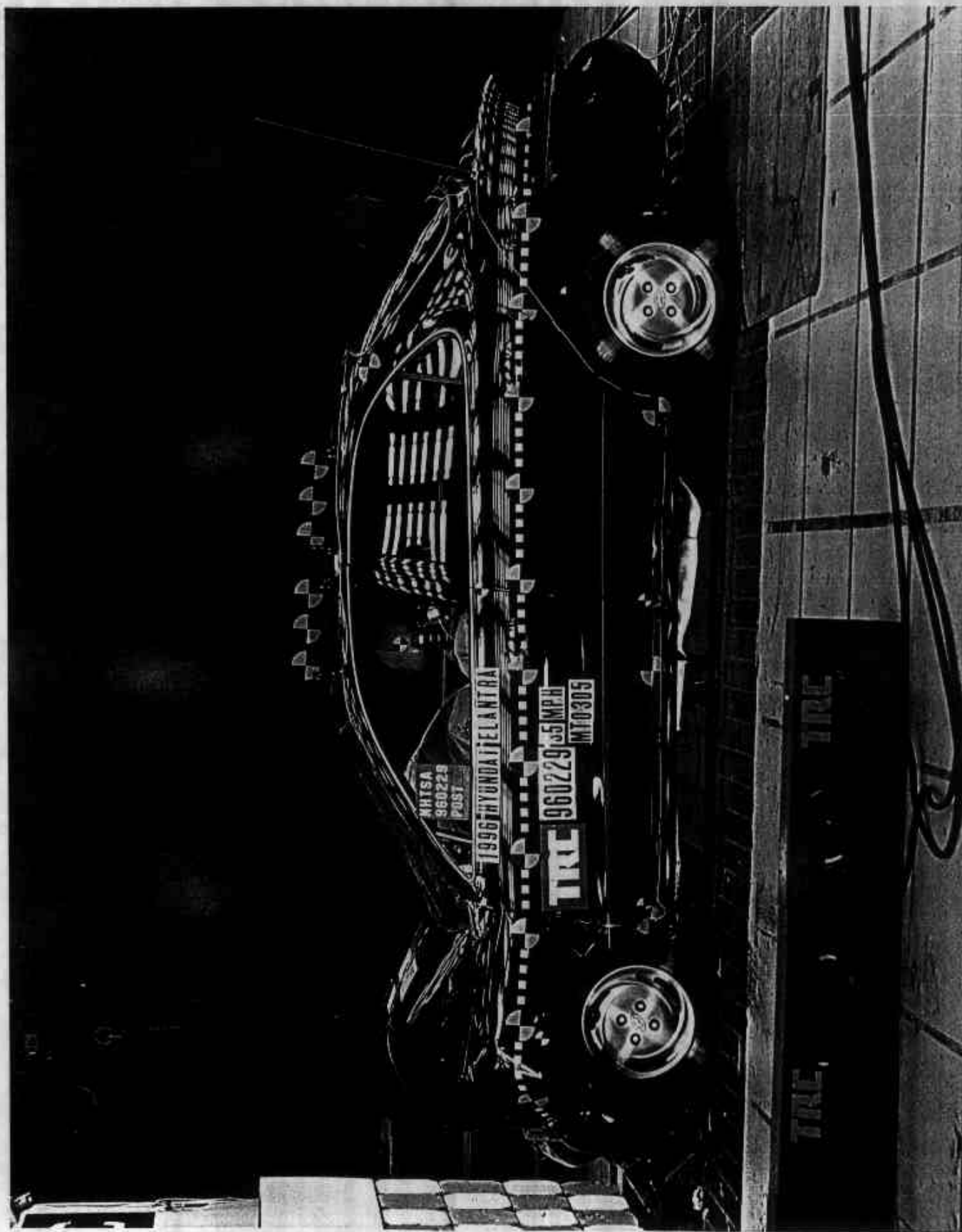


Figure A-4 Post-Test Left Side View

A-5

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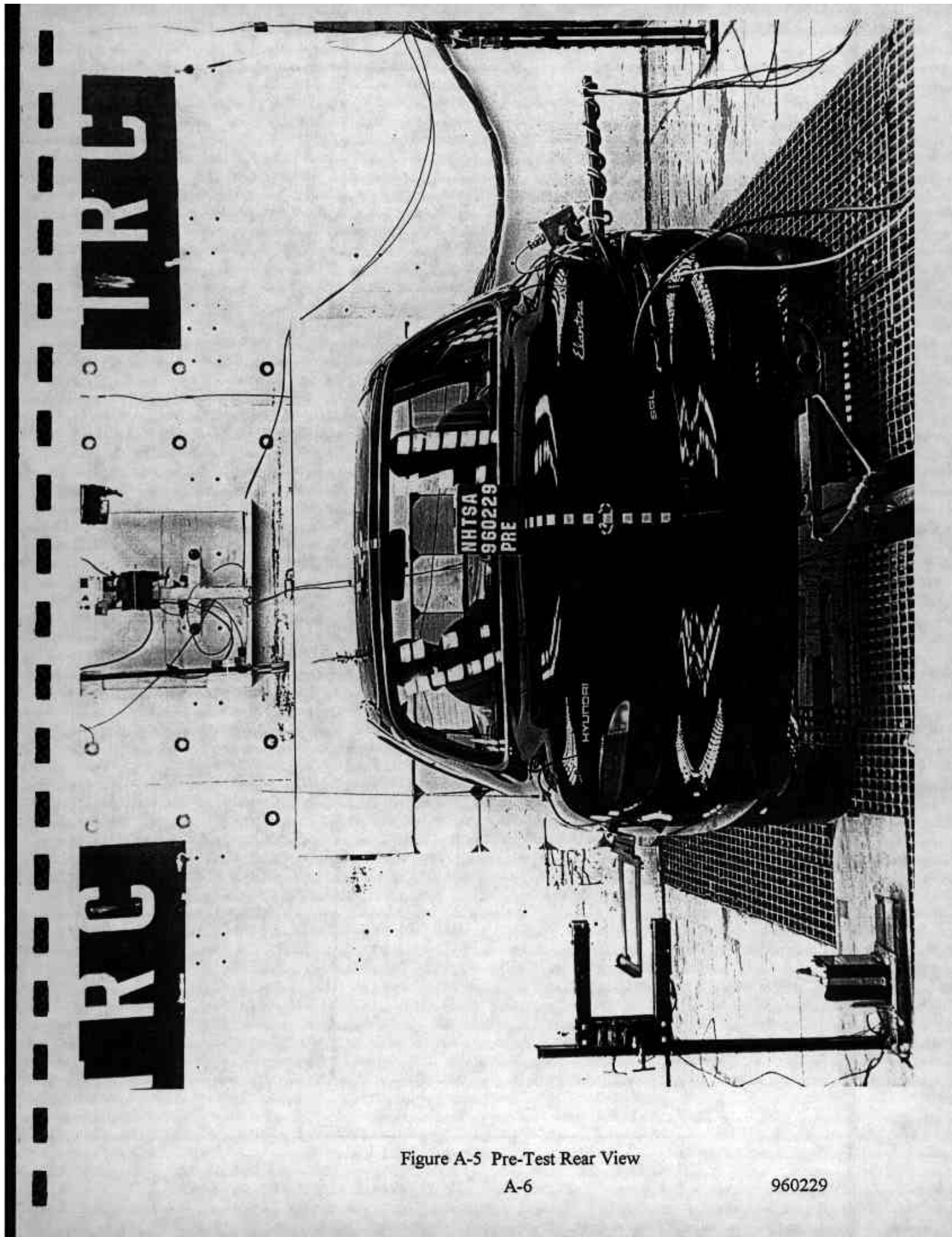


Figure A-5 Pre-Test Rear View

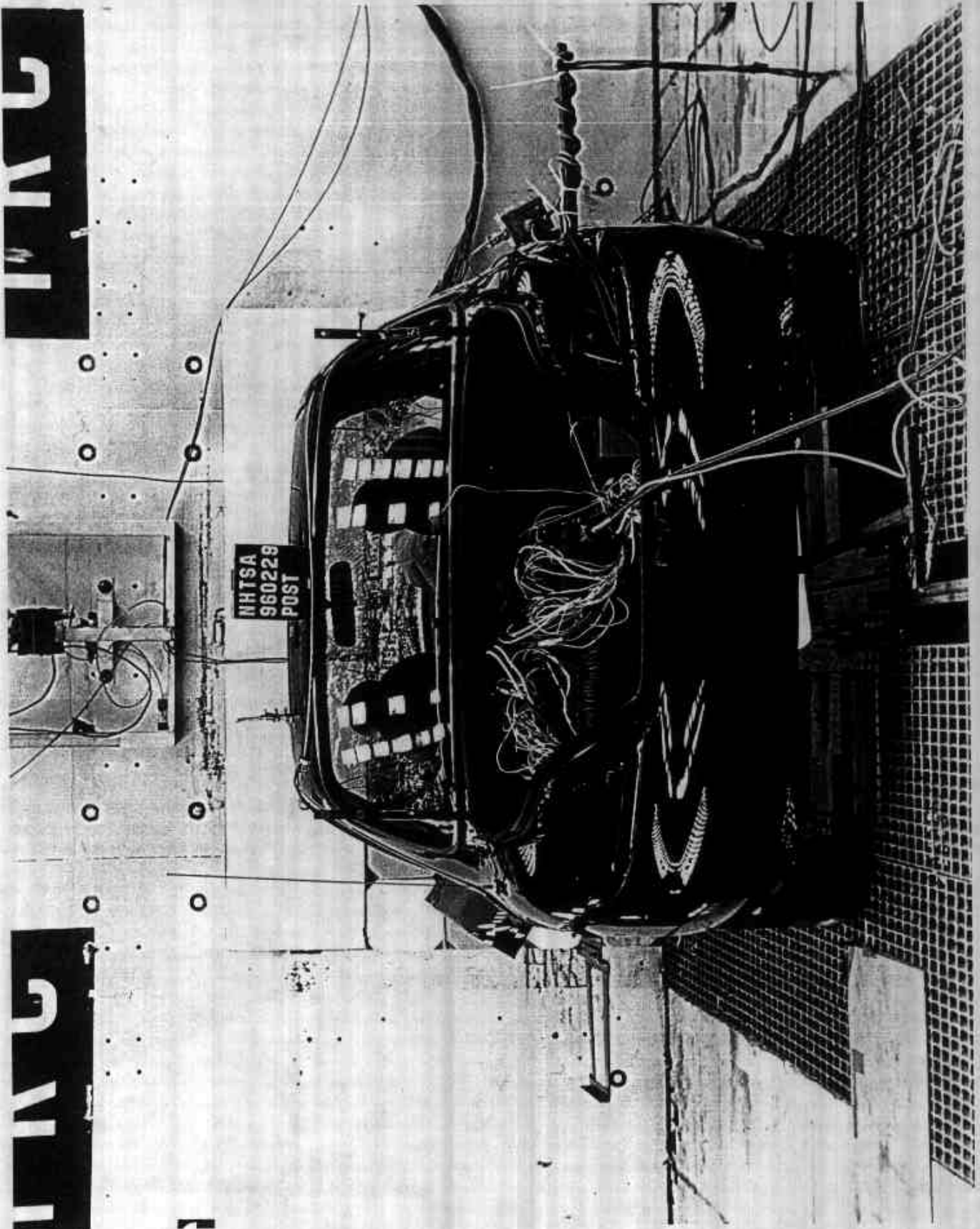


Figure A-6 Post-Test Rear View

A-7

960229

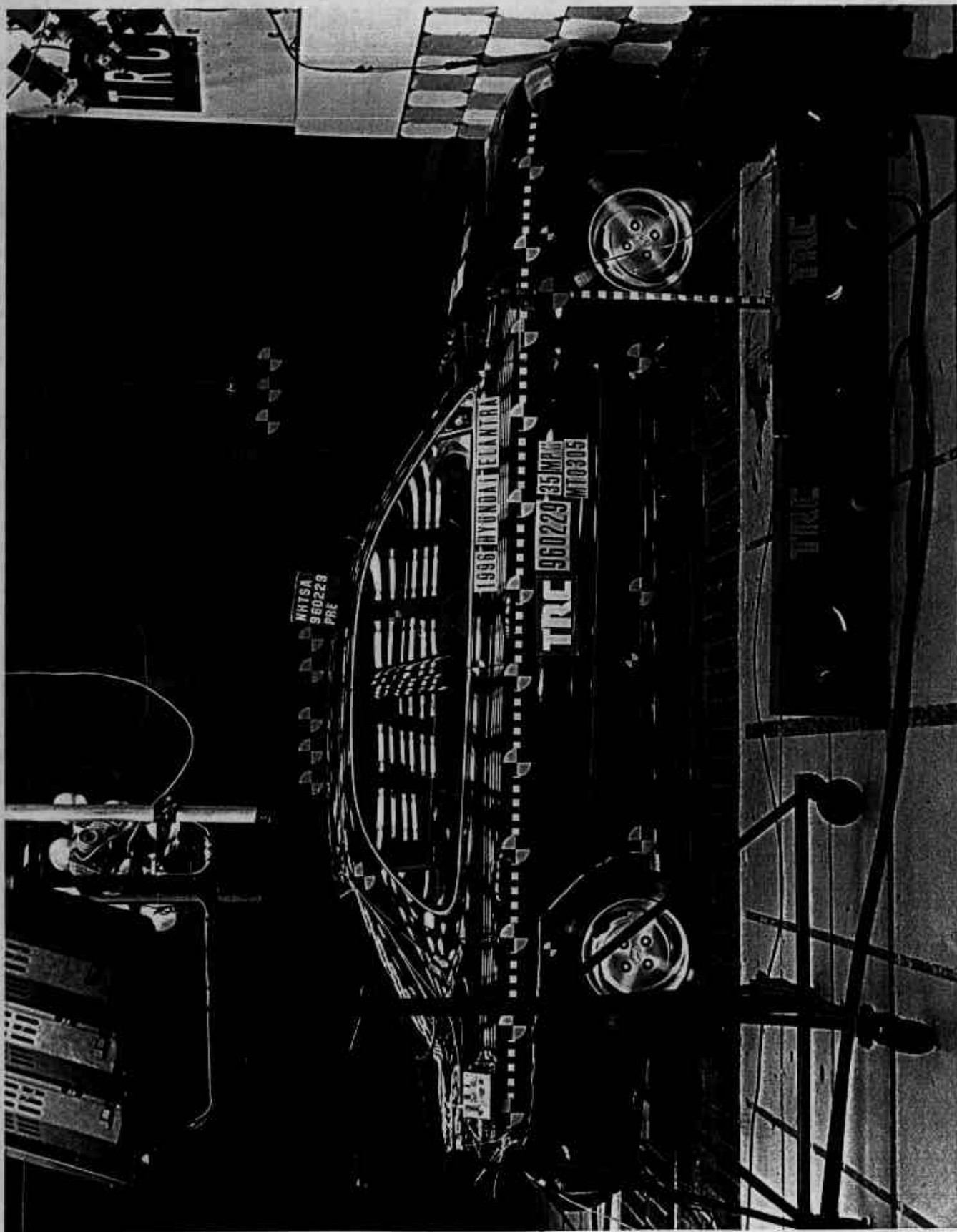


Figure A-7 Pre-Test Right Side View

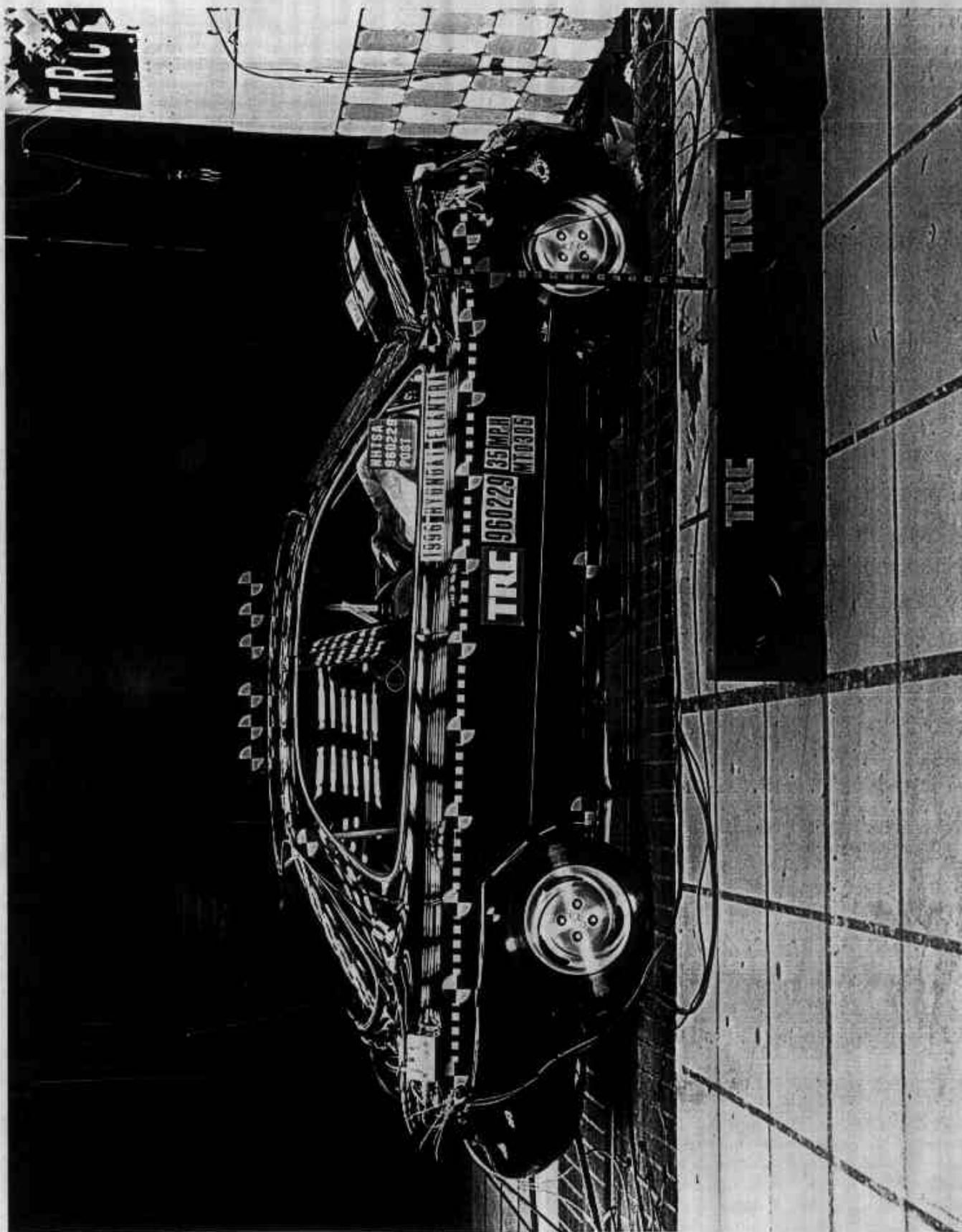


Figure A-8 Post-Test Right Side View

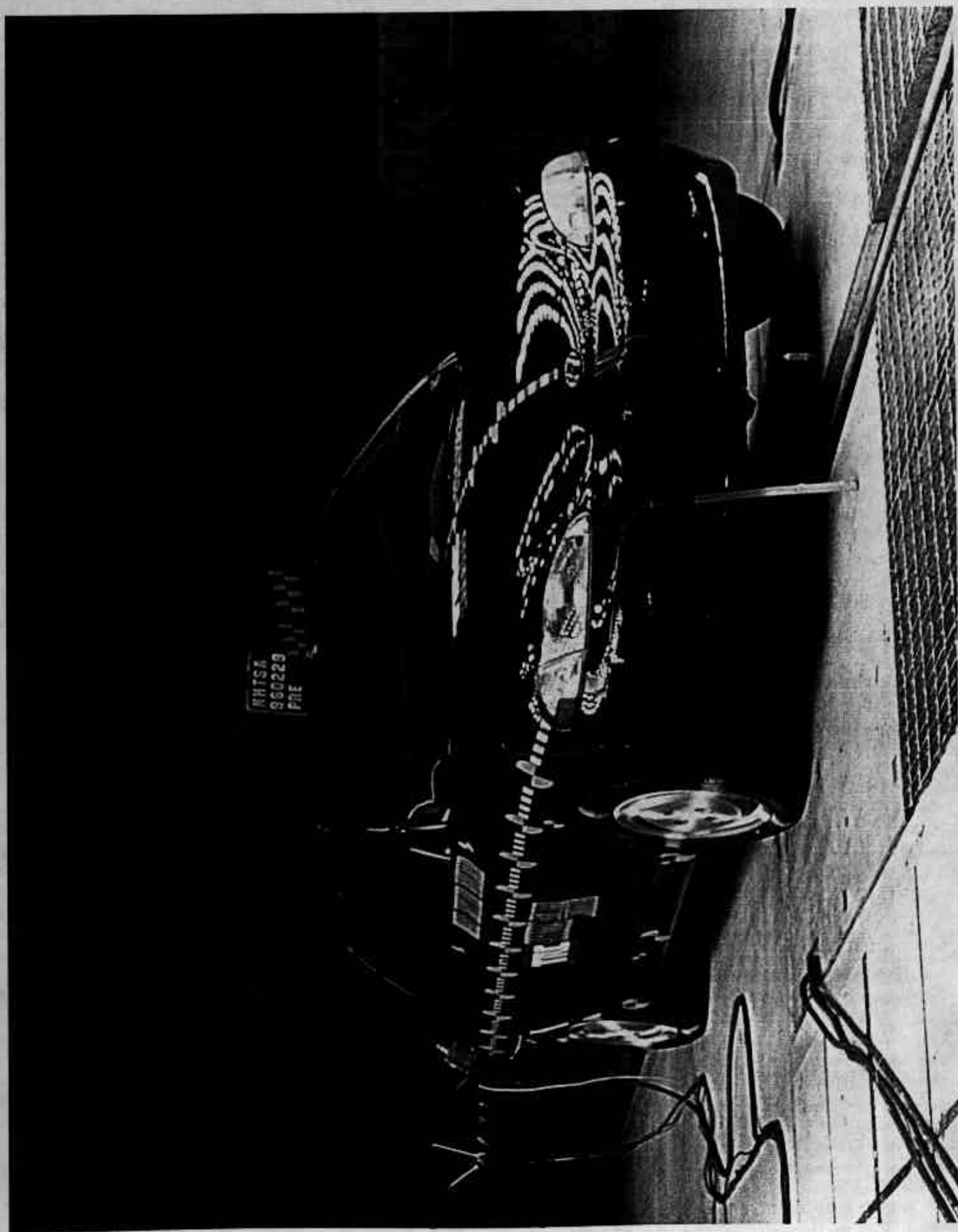


Figure A-9 Pre-Test Right Front Three-Quarter View

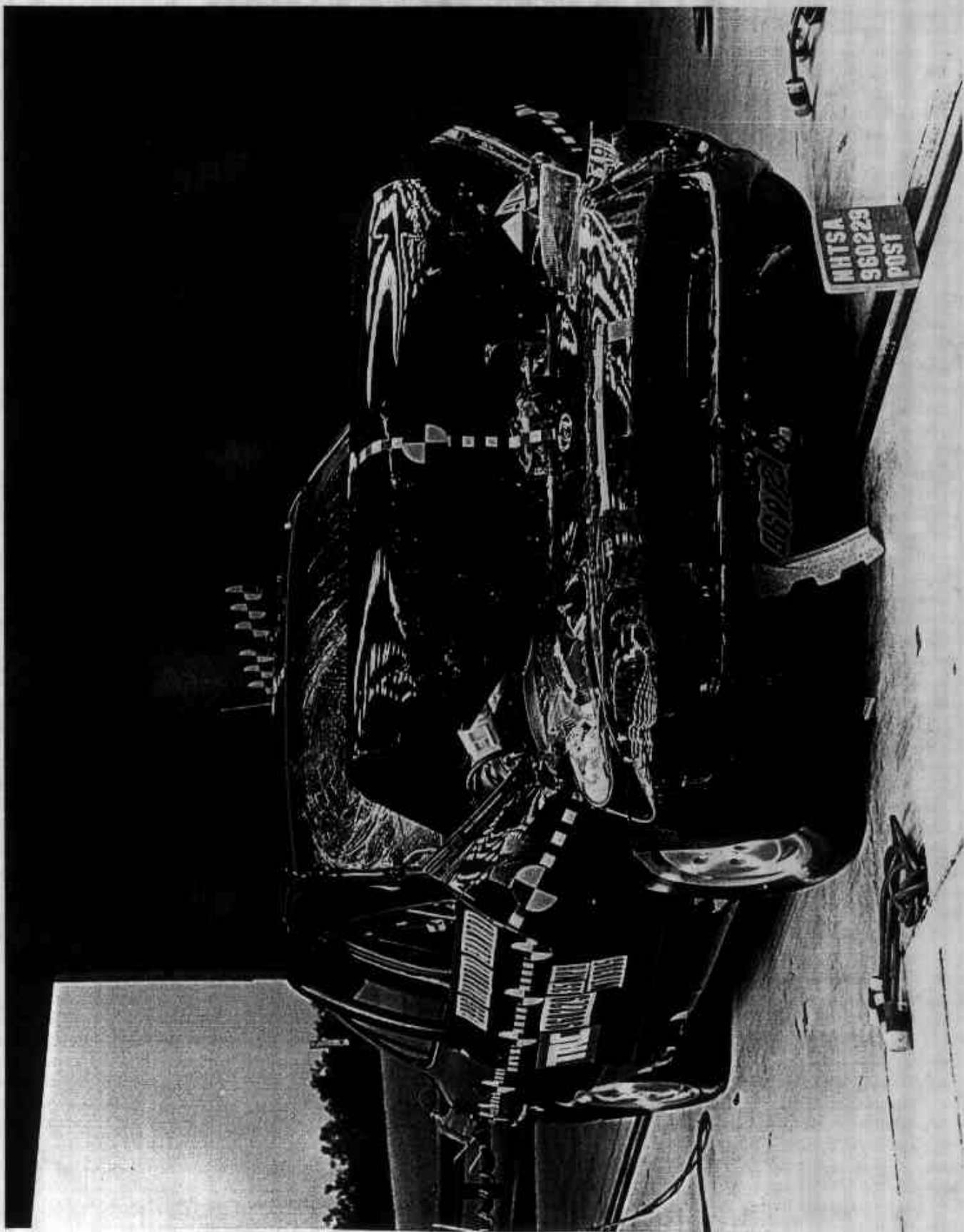


Figure A-10 Post-Test Right Front Three-Quarter View

A-11

960229

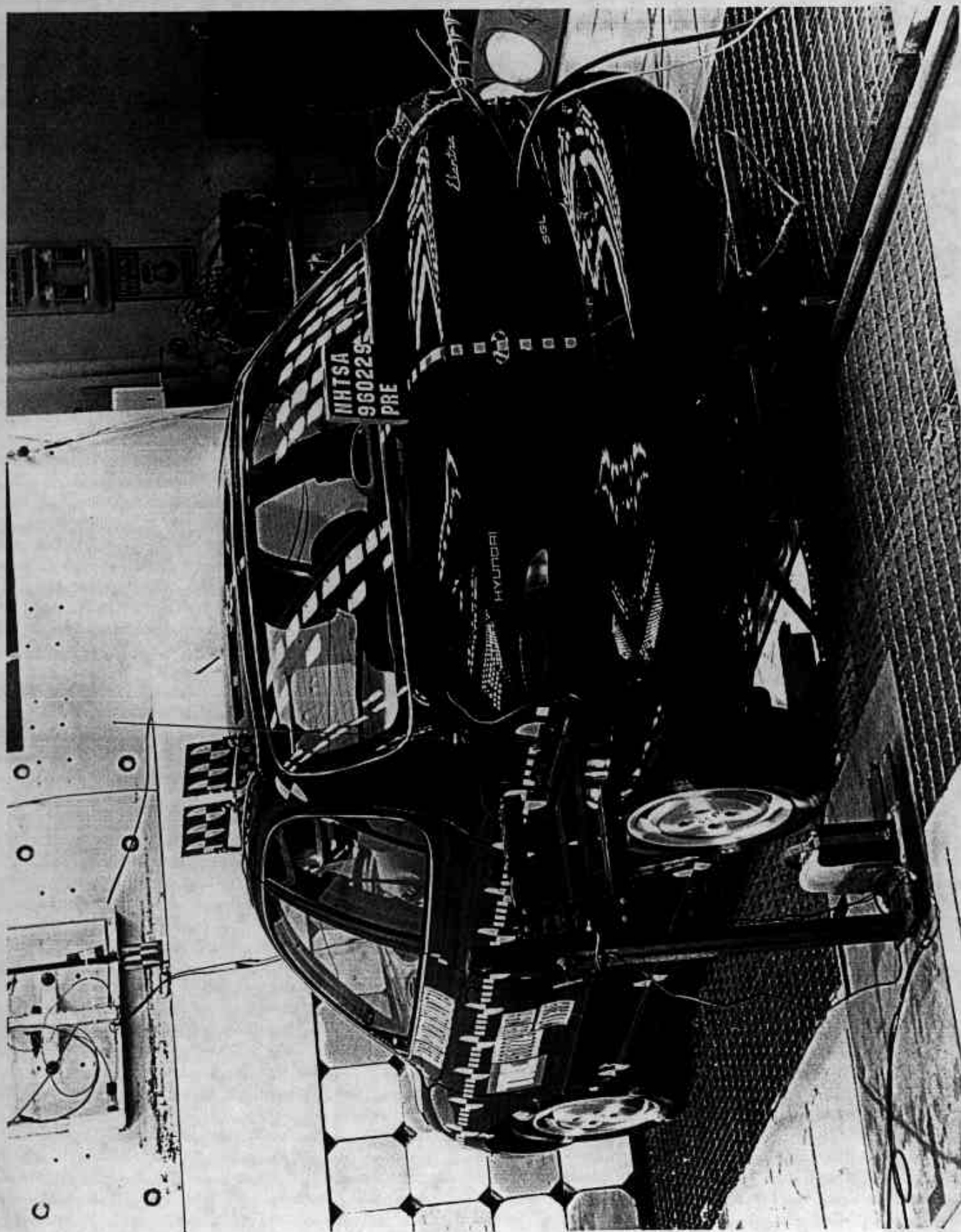


Figure A-11 Pre-Test Left Rear Three-Quarter View

A-12

960229

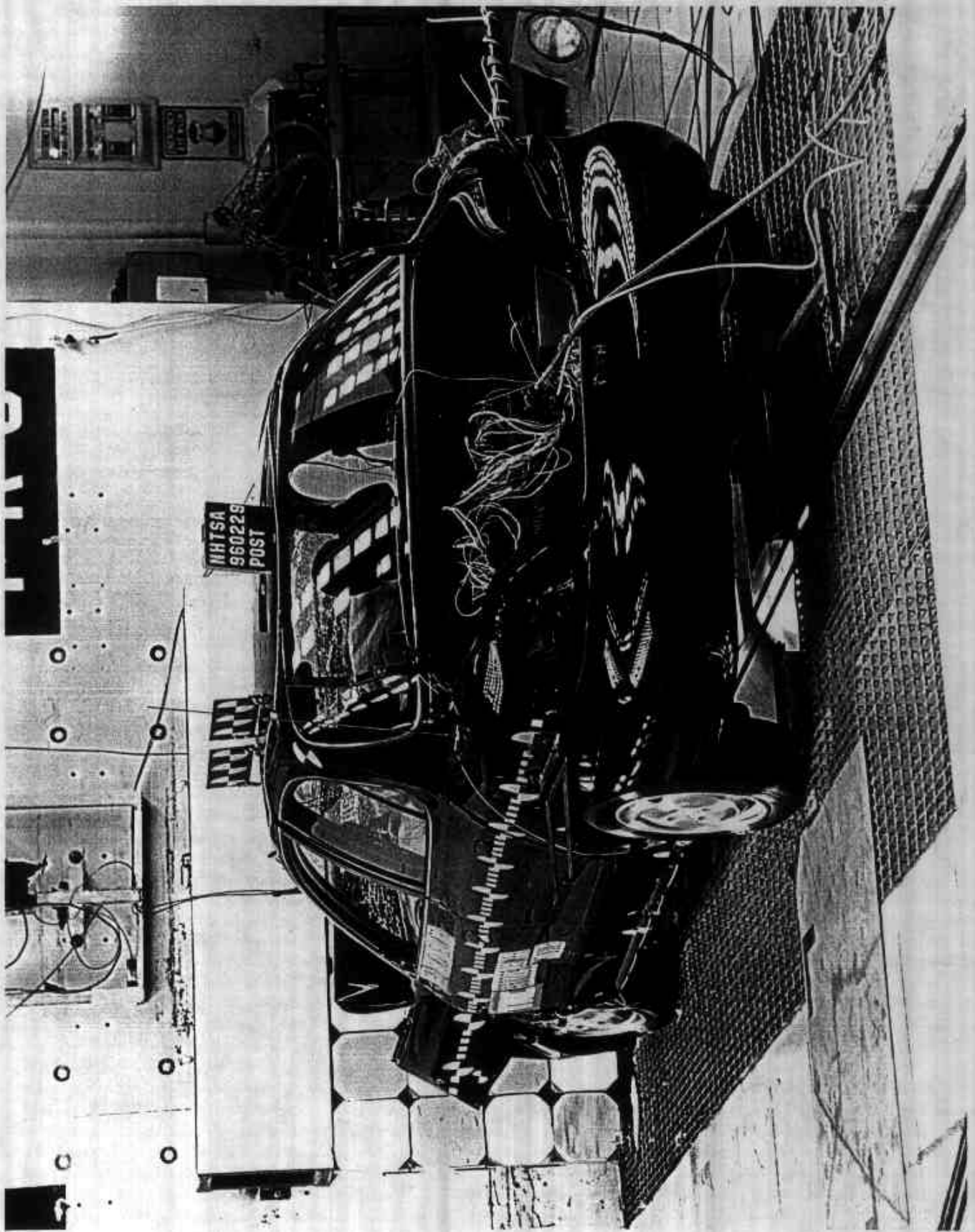


Figure A-12 Post-Test Left Rear Three-Quarter View

A-13

960229



Figure A-13 Pre-Test Windshield View

A-14

960229



Figure A-14 Post-Test Windshield View

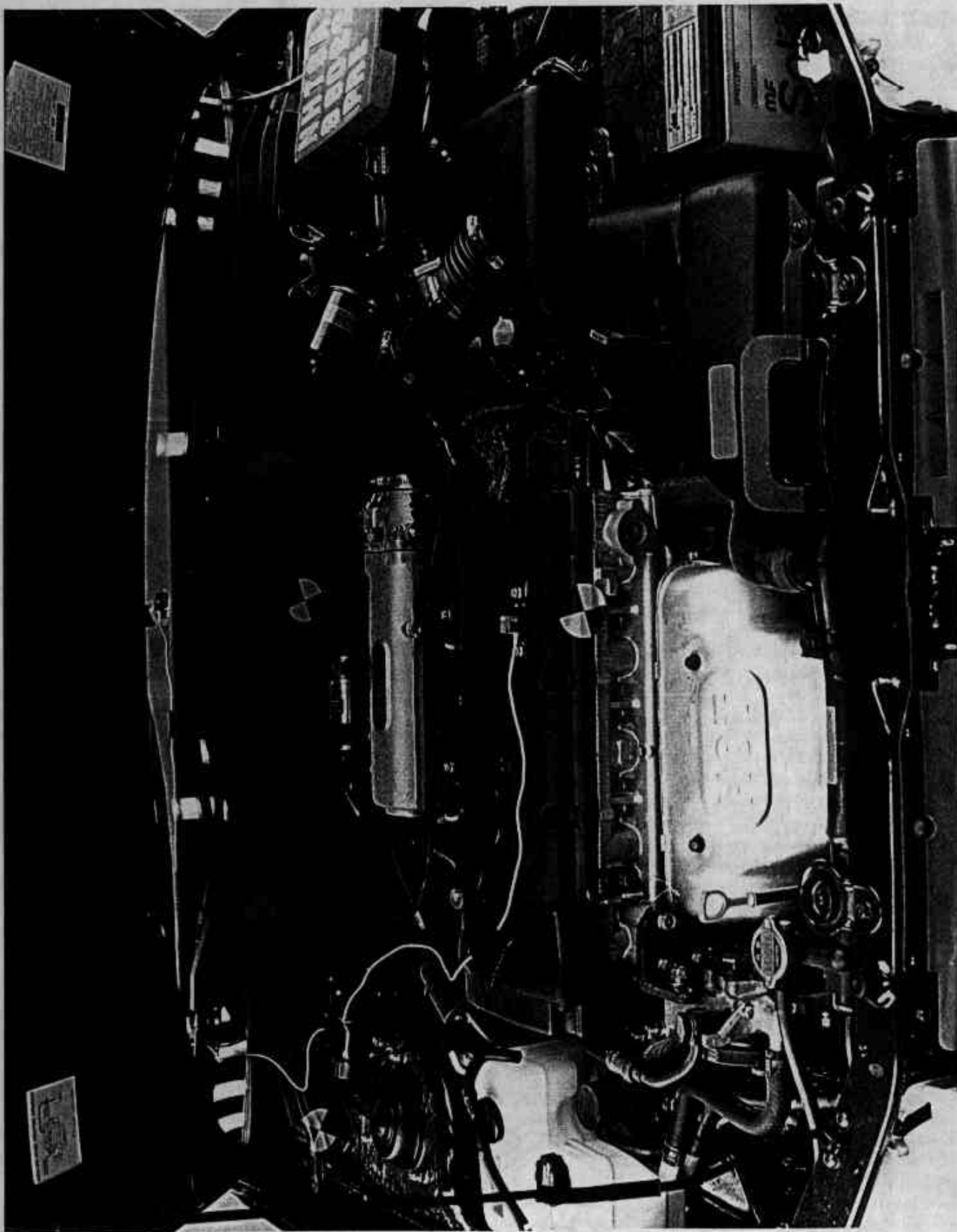


Figure A-15 Pre-Test Engine Compartment View

A-16

960229

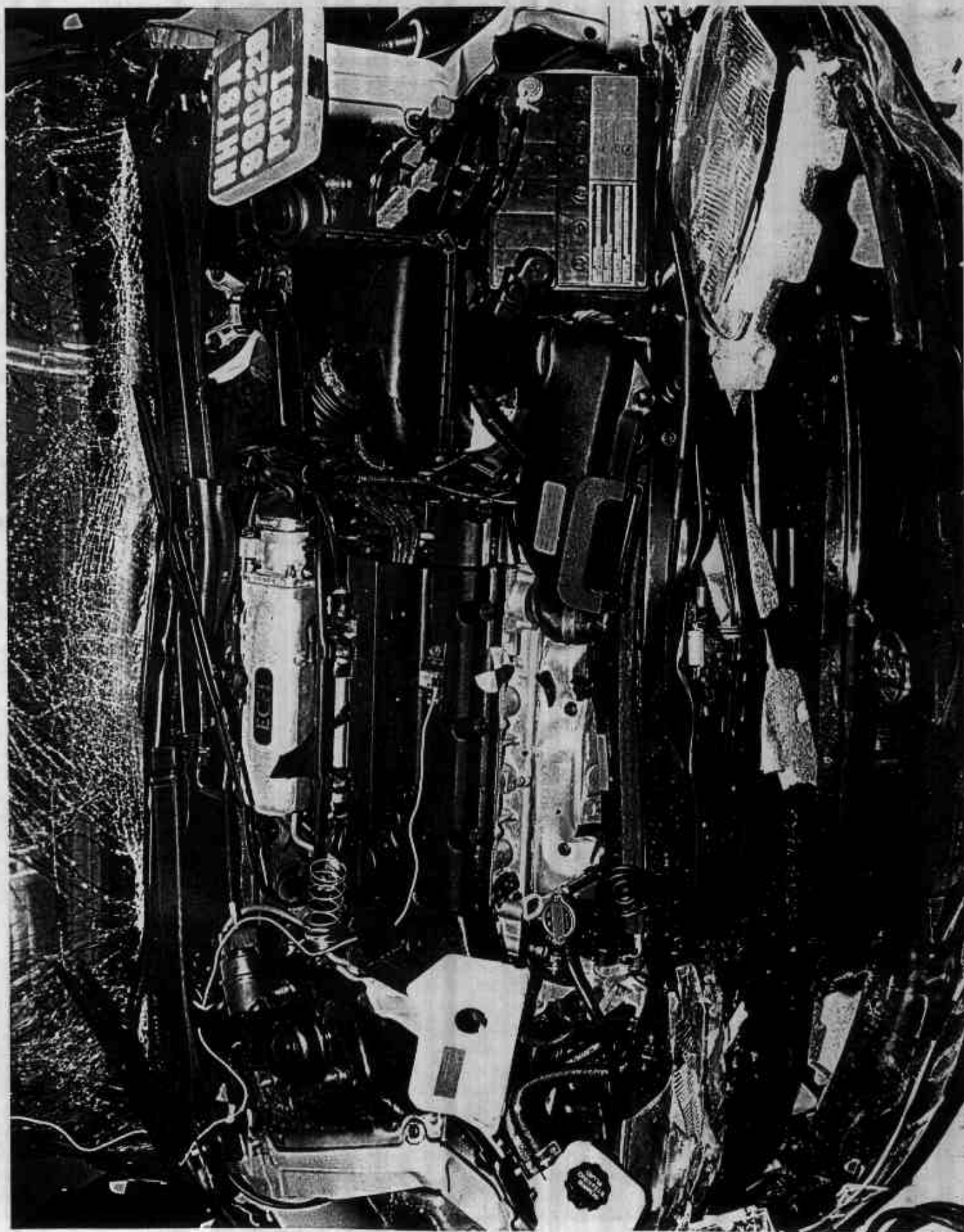


Figure A-16 Post-Test Engine Compartment View

A-17

960229

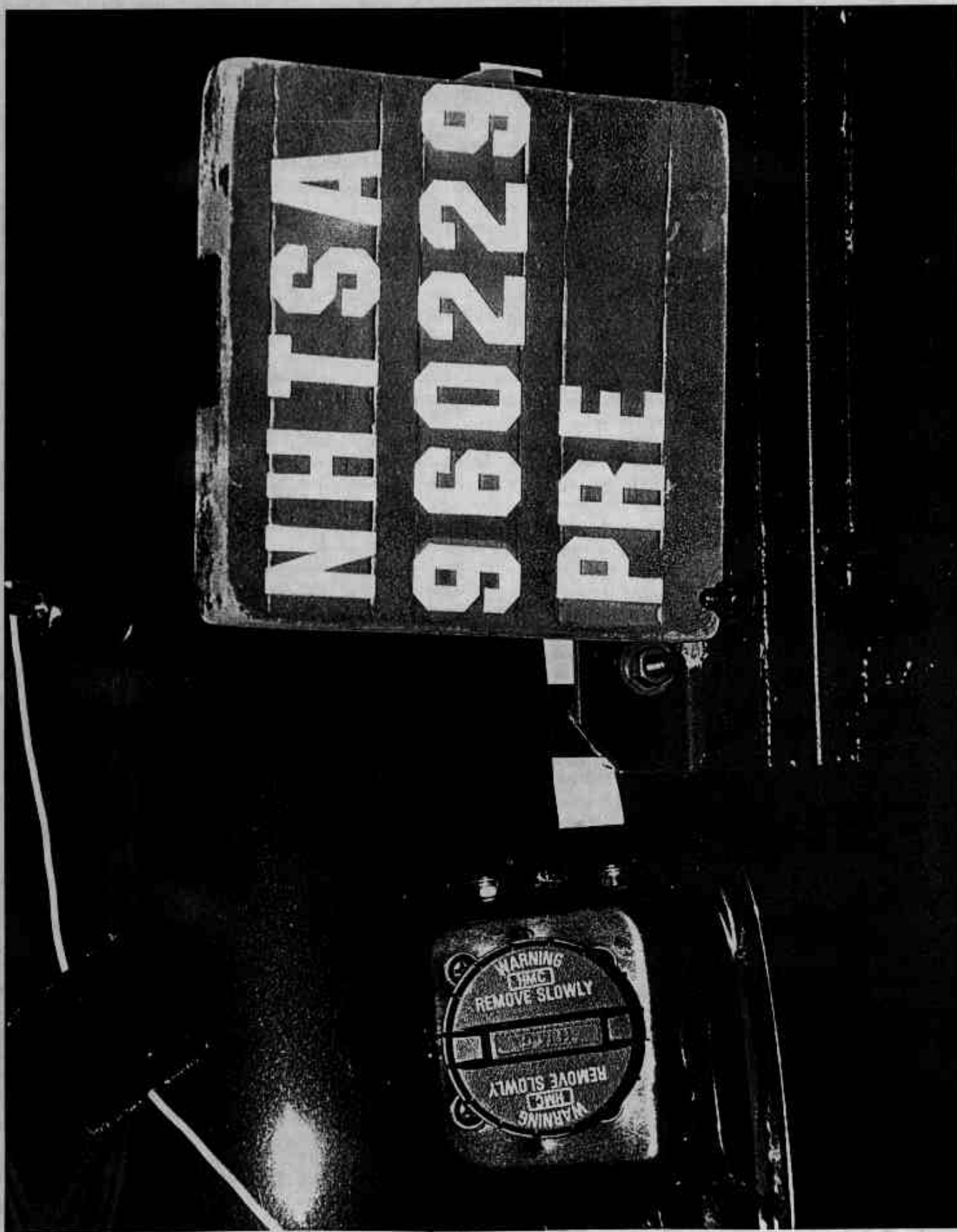


Figure A-17 Pre-Test Fuel Filler Cap View

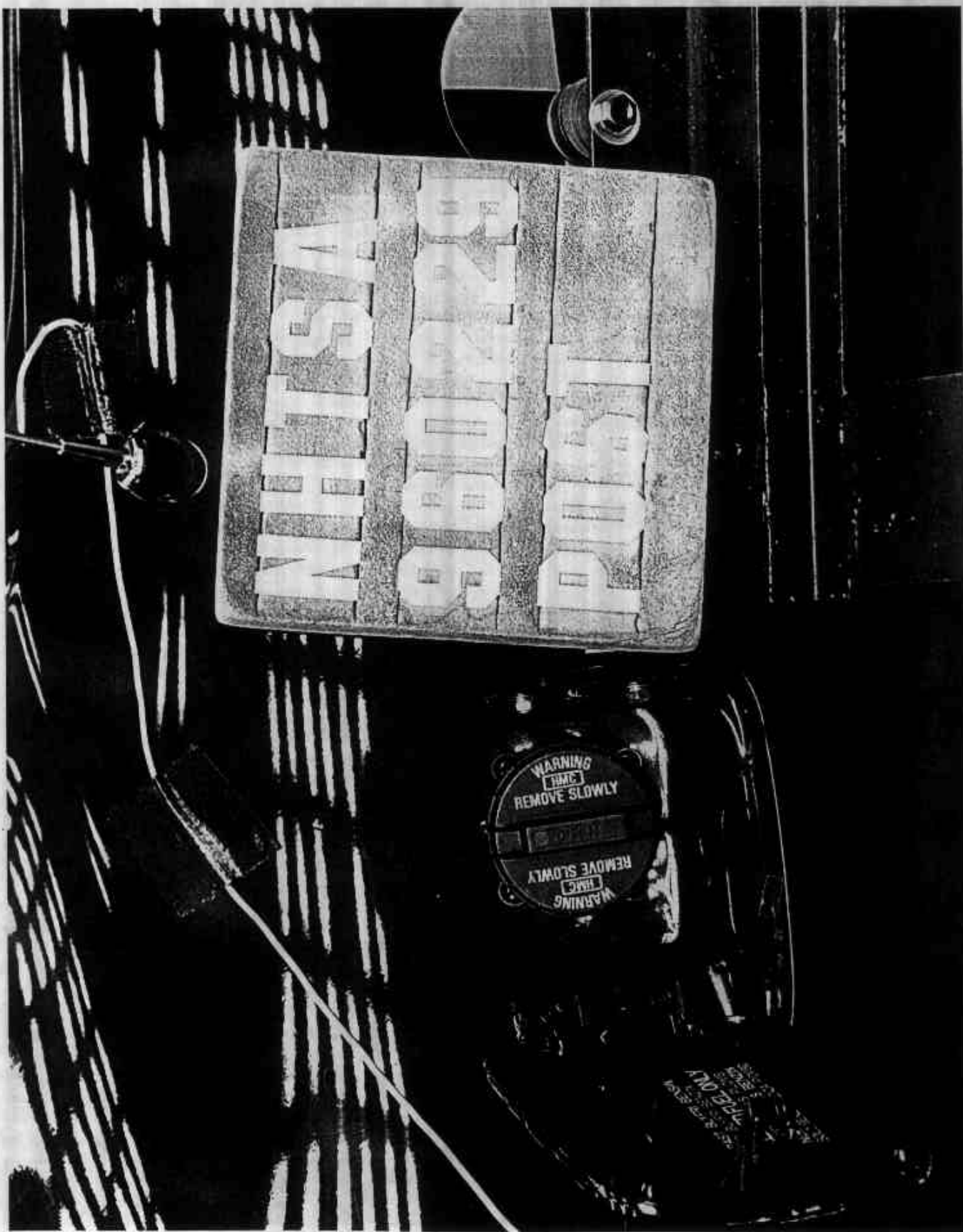


Figure A-18 Post-Test Fuel Filler Cap View



Figure A-19 Pre-Test Fuel Filler Neck View

A-20

960229

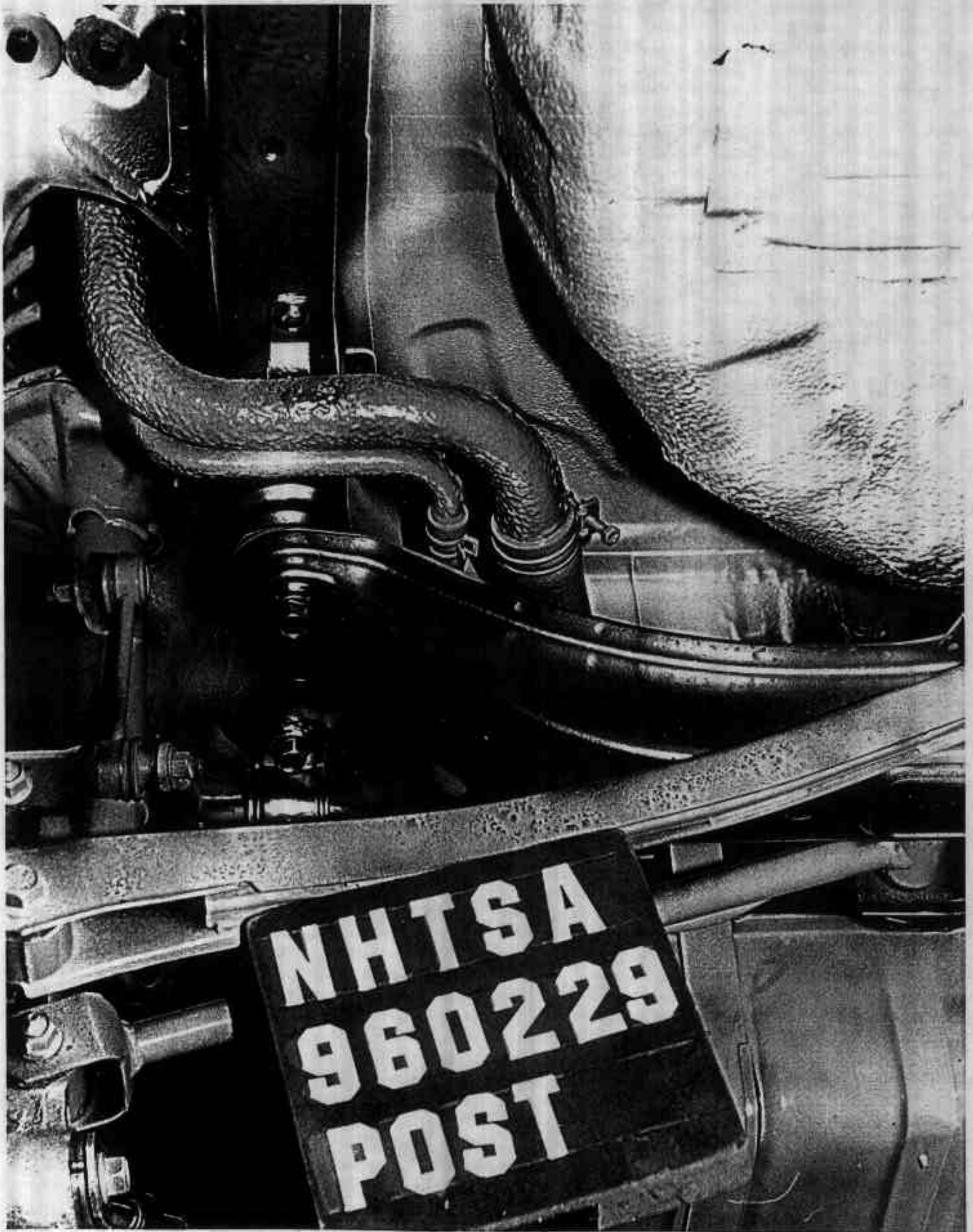


Figure A-20 Post-Test Fuel Filler Neck View

A-21

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Figure A-21 Pre-Test Fuel Tank View

A-22

960229



Figure A-22 Post-Test Fuel Tank View

A-23

960229

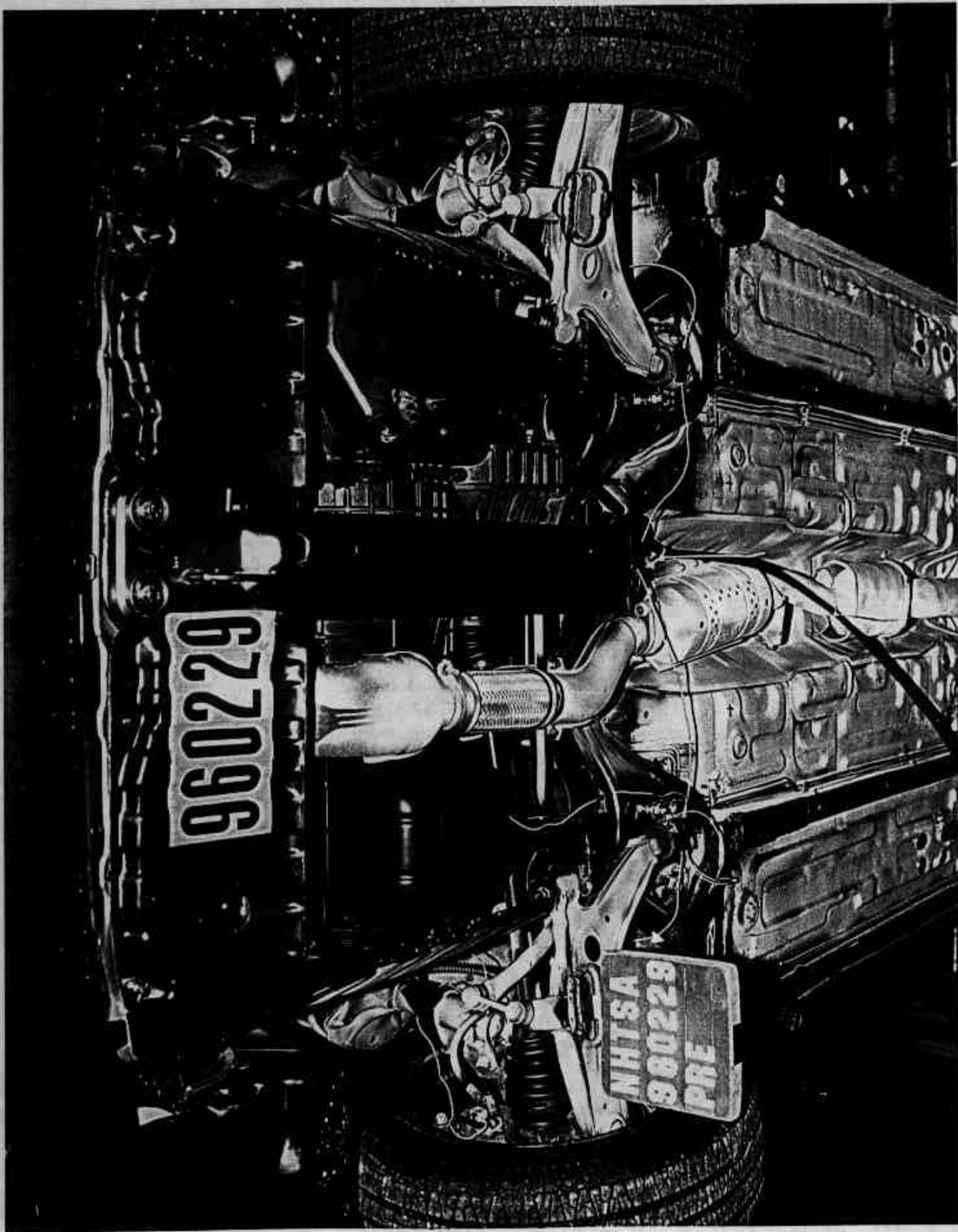


Figure A-23 Pre-Test Front Underbody View

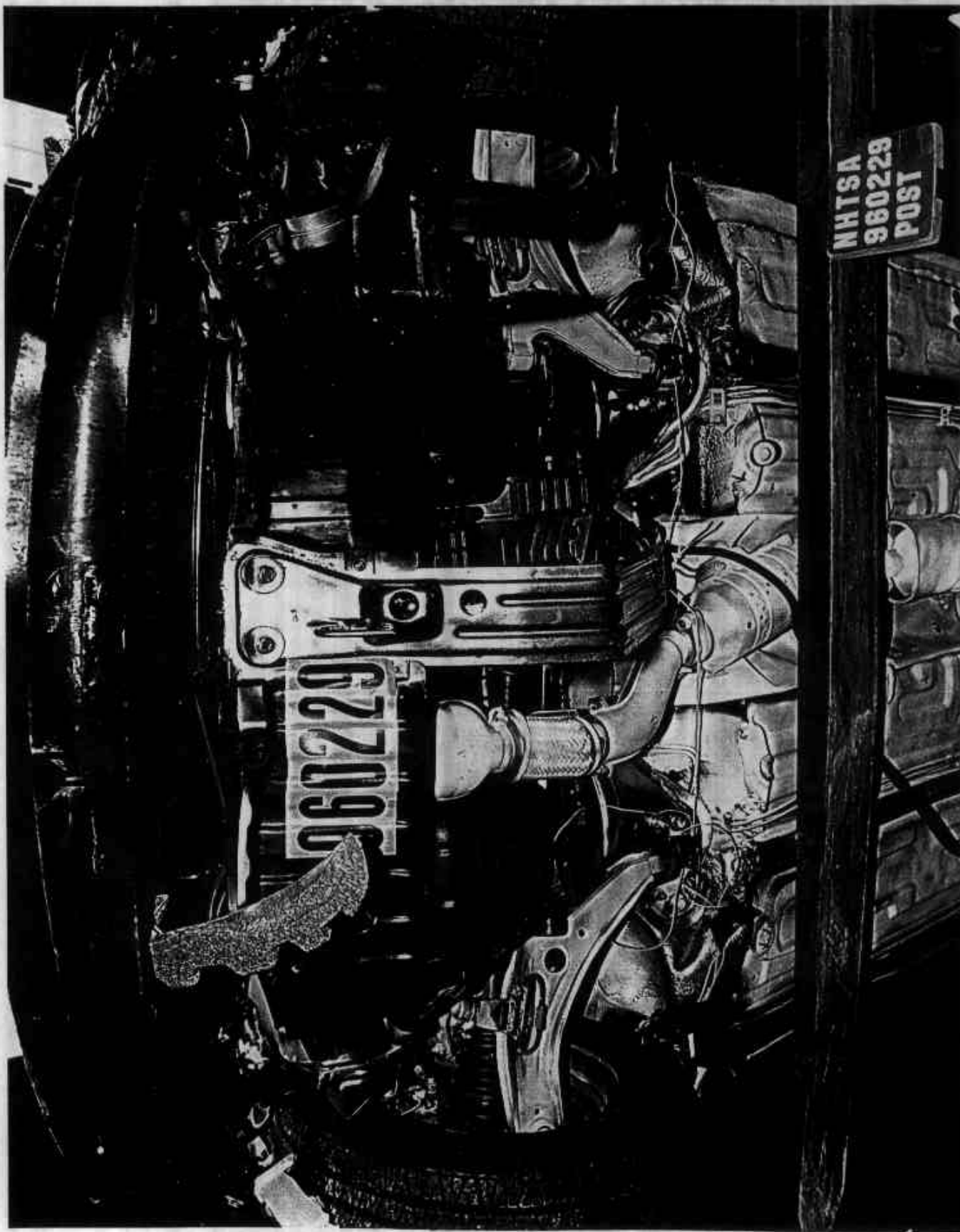


Figure A-24 Post-Test Front Underbody View

A-25

960229

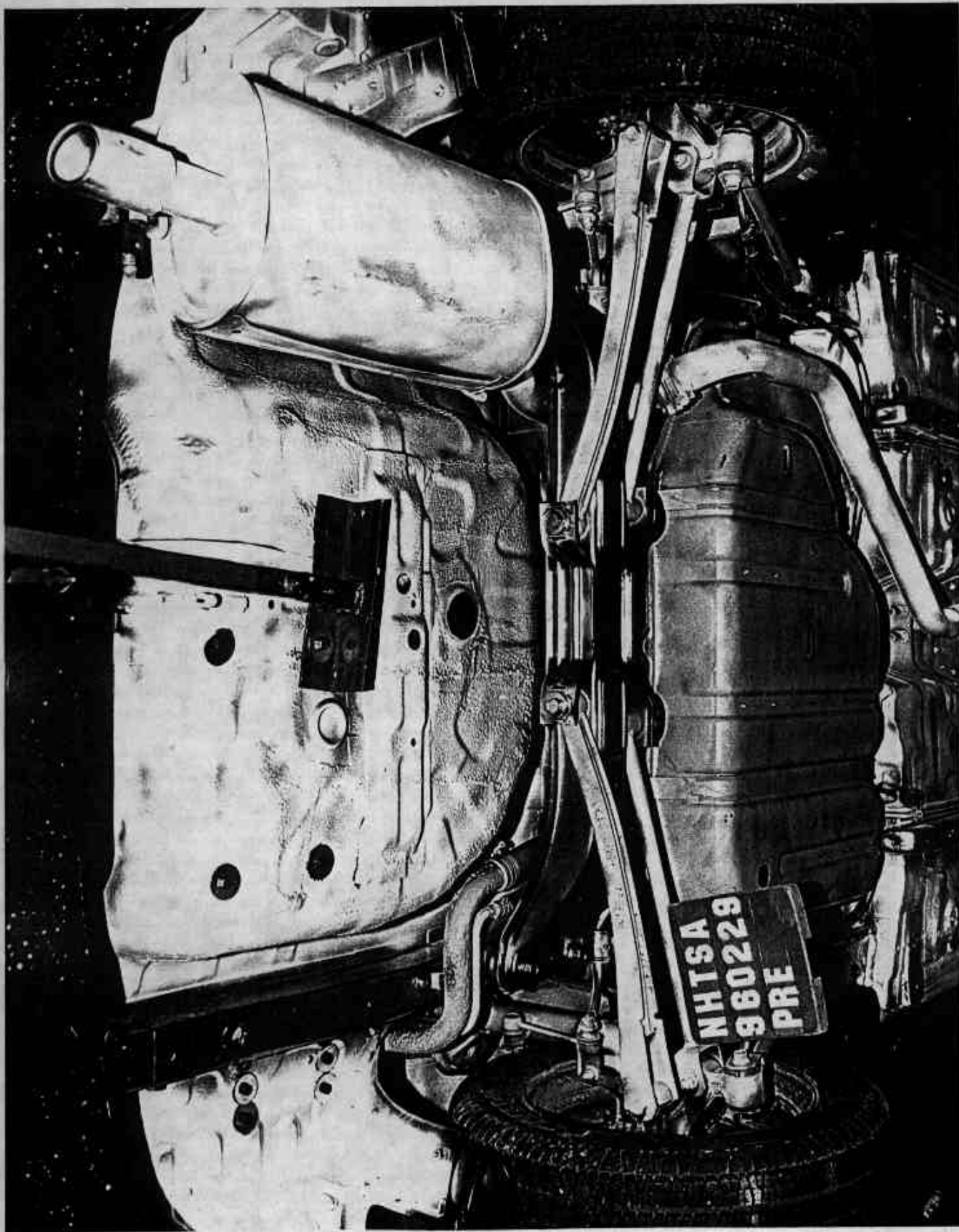


Figure A-25 Pre-Test Rear Underbody View

A-26

960229

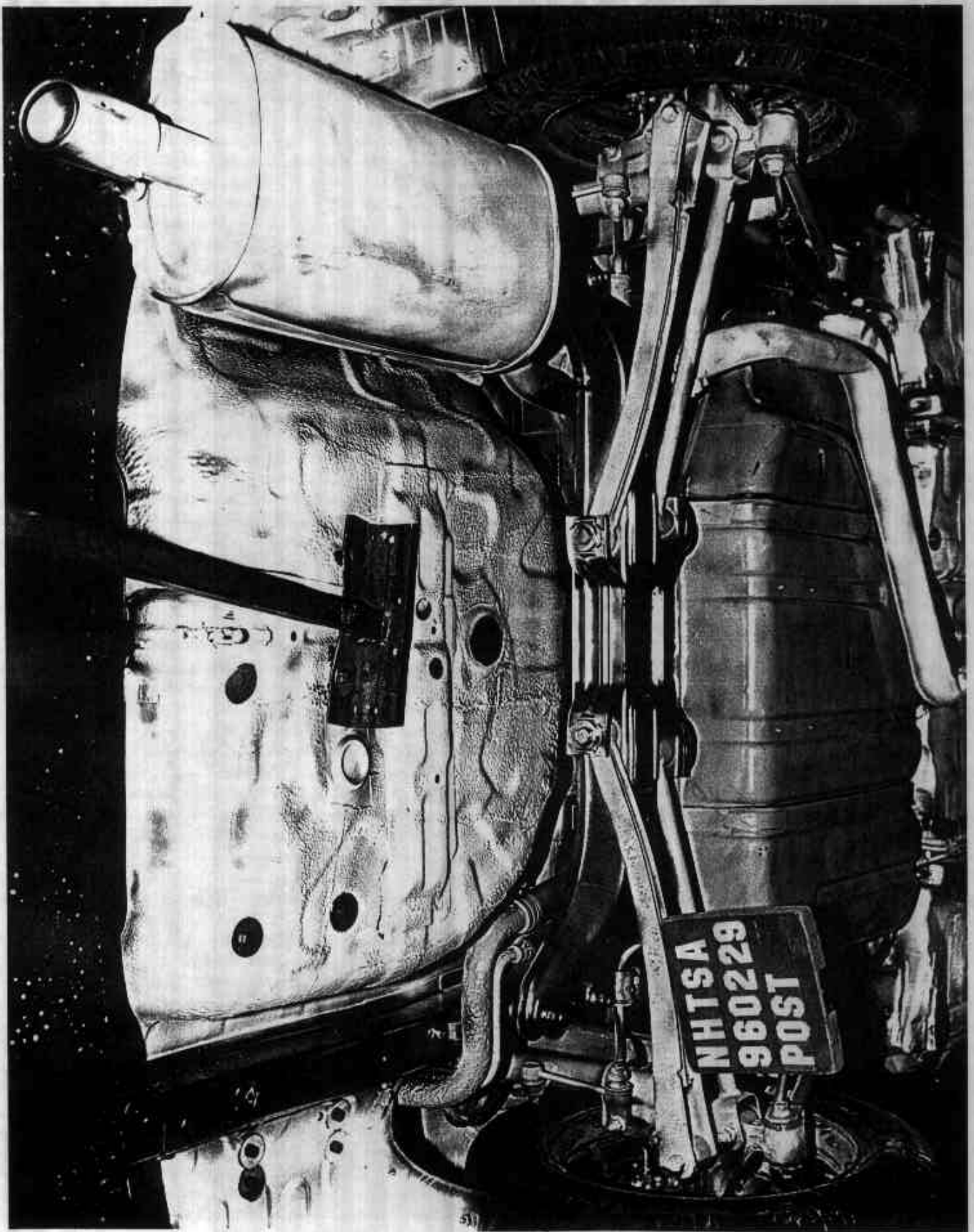


Figure A-26 Post-Test Rear Underbody View

A-27

960229

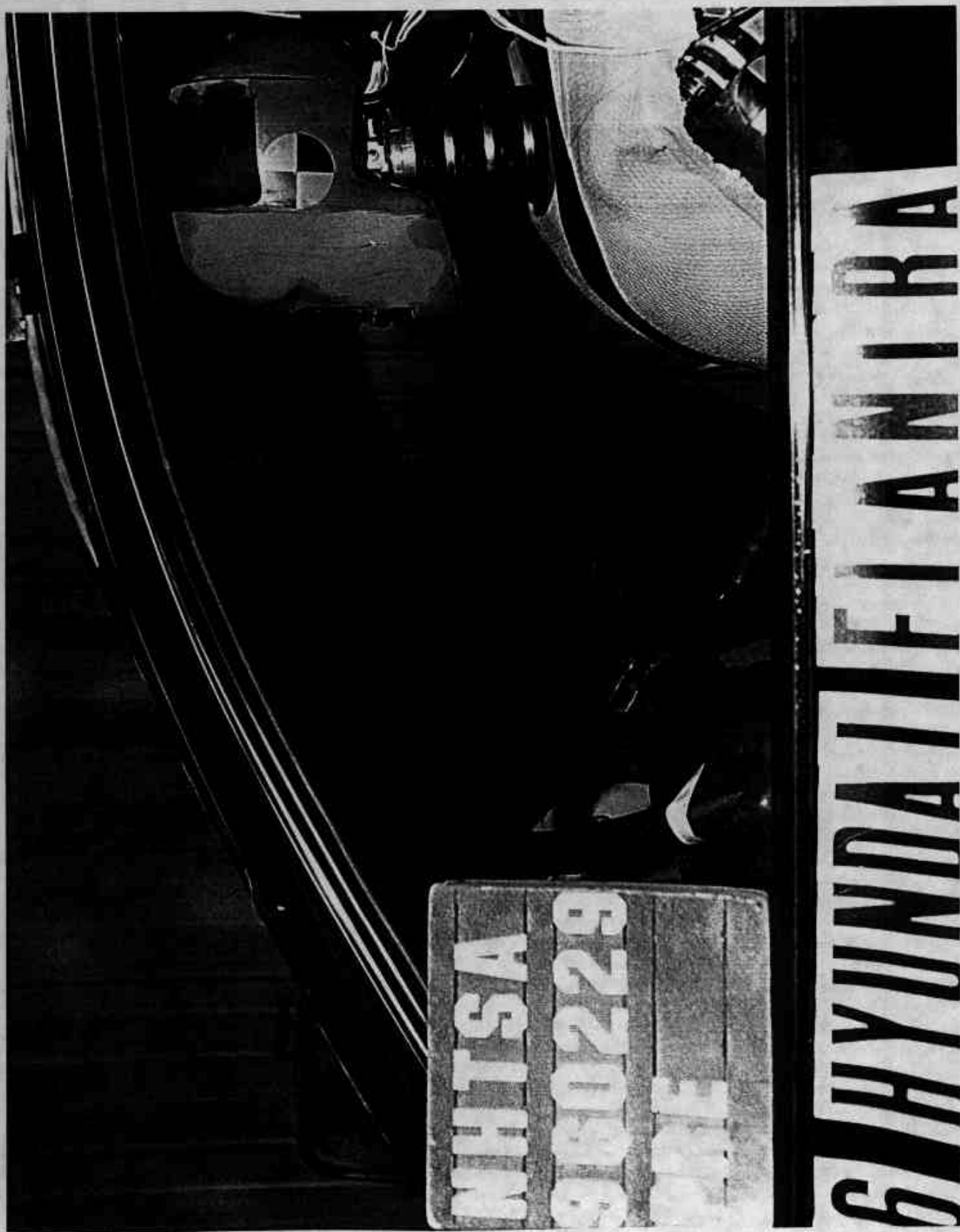


Figure A-27 Pre-Test Driver Dummy Position View

A-28

960229



Figure A-28 Post-Test Driver Dummy Position View



Figure A-29 Pre-Test Passenger Dummy Position View

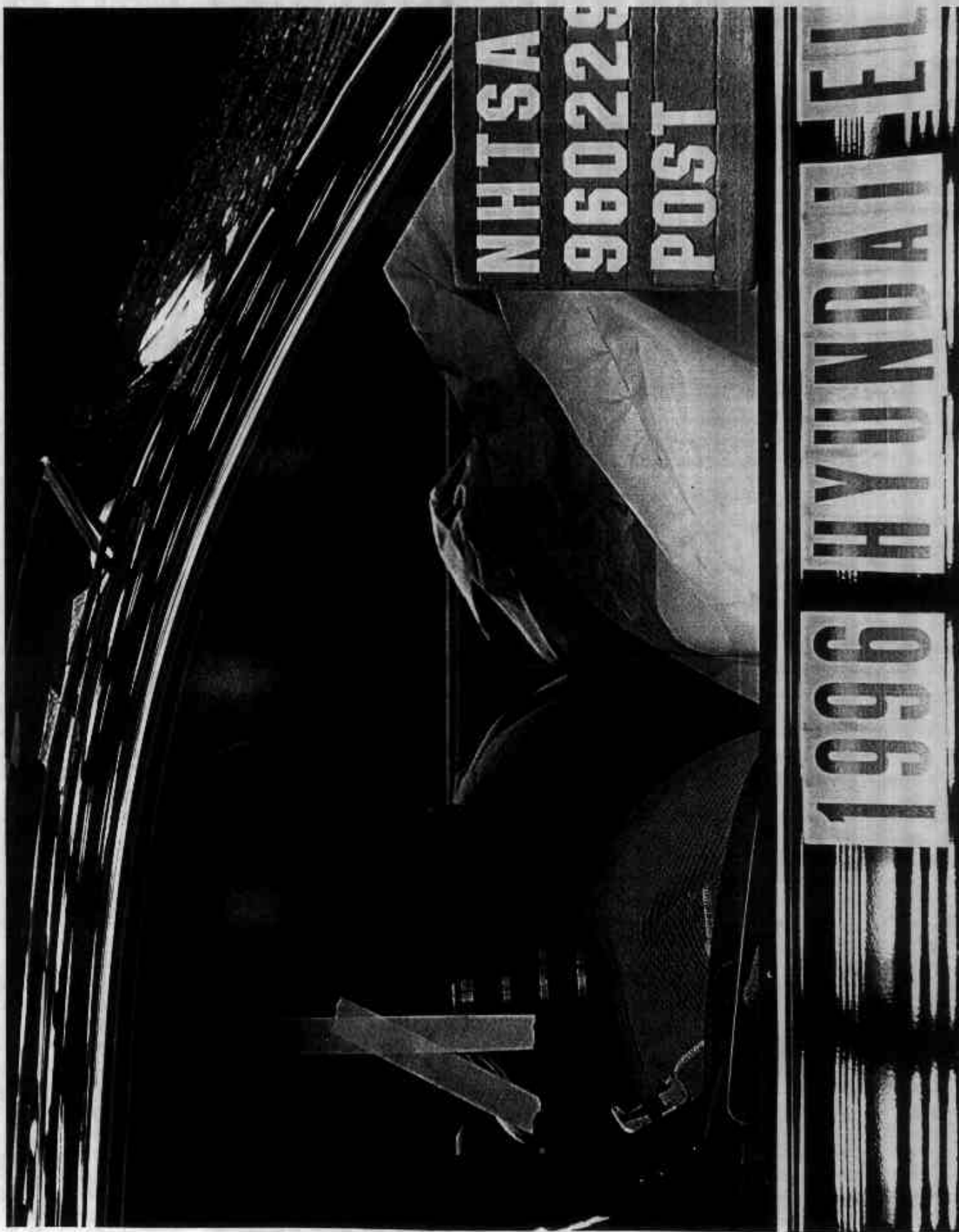


Figure A-30 Post-Test Passenger Dummy Position View

A-31

960229



Figure A-31 Pre-Test Driver Dummy and Vehicle Interior - View 1

A-32

960229



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

A-33

960229



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



Figure A-34 Post-Test Driver Dummy and Vehicle Interior - View 2

A-35

960229



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

A-36

960229



Figure A-36 Post-Test Passenger Dummy and Vehicle Interior - View 1

A-37

960229

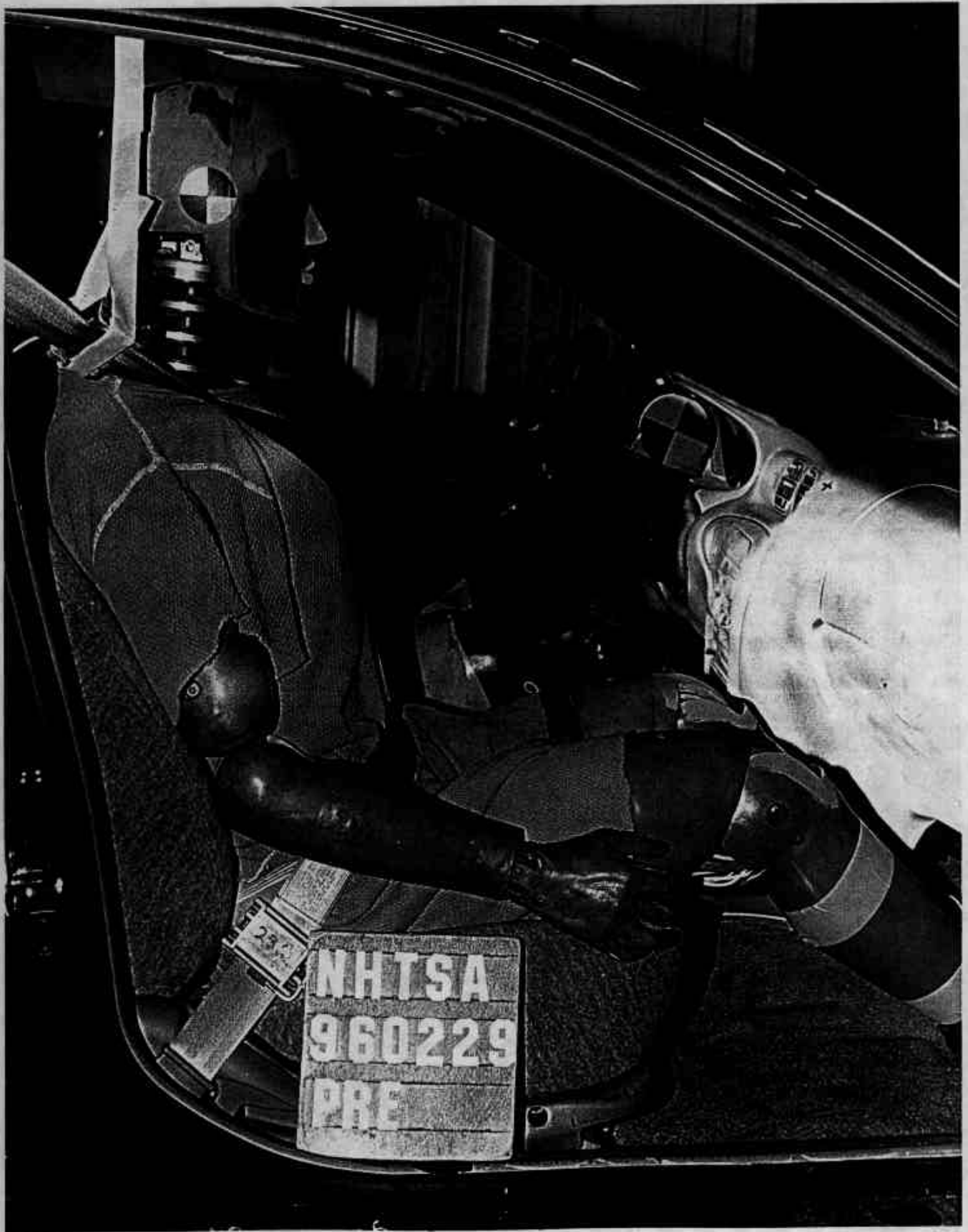


Figure A-37 Pre-Test Passenger Dummy and Vehicle Interior - View 2



Figure A-38 Post-Test Passenger Dummy and Vehicle Interior - View 2

A-39

960229

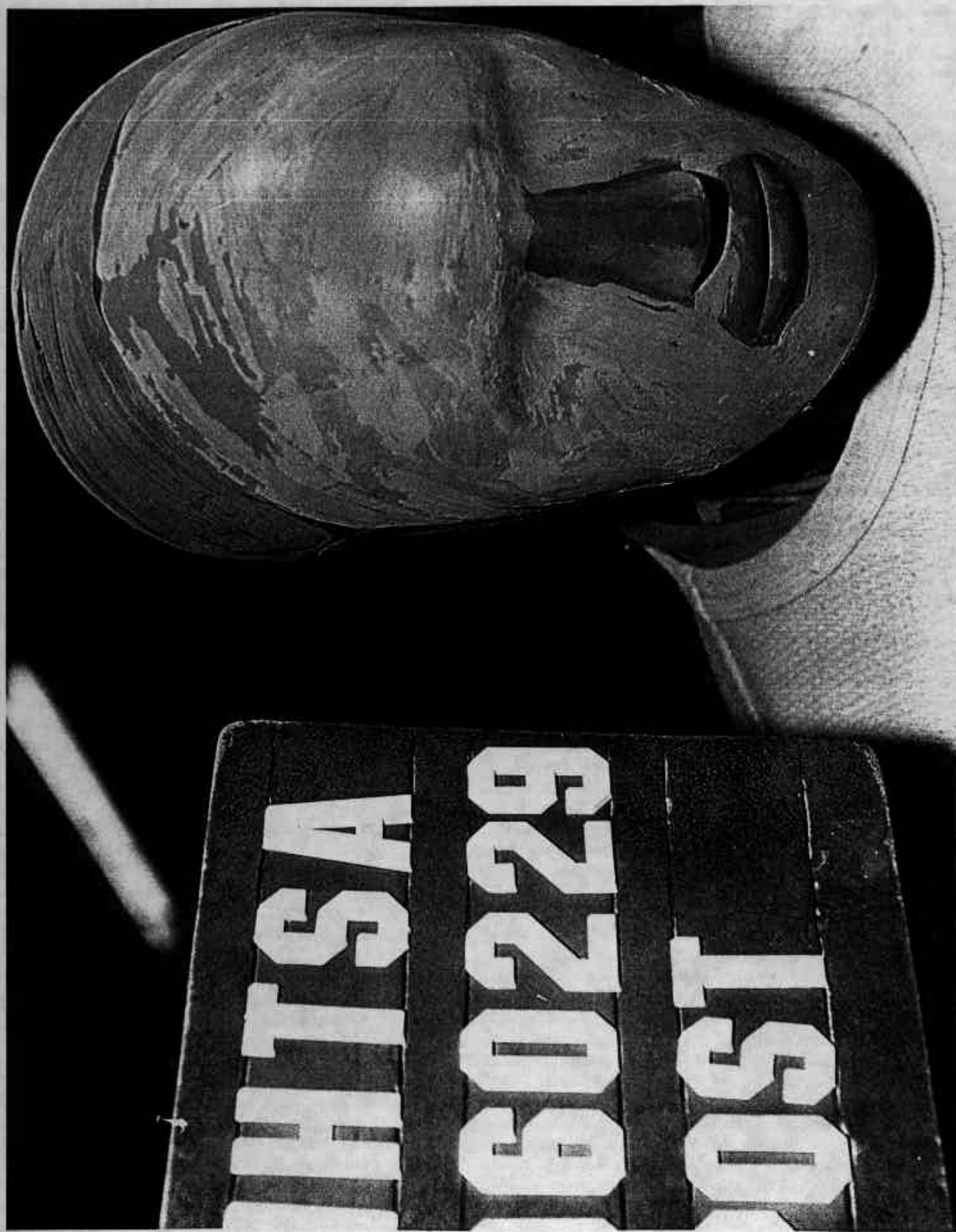


Figure A-39 Post-Test Driver Dummy Head Contact - View 1



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



Figure A-41 Post-Test Driver Dummy Knee Contact - View 1



Figure A-42 Post-Test Driver Dummy Knee Contact - View 2

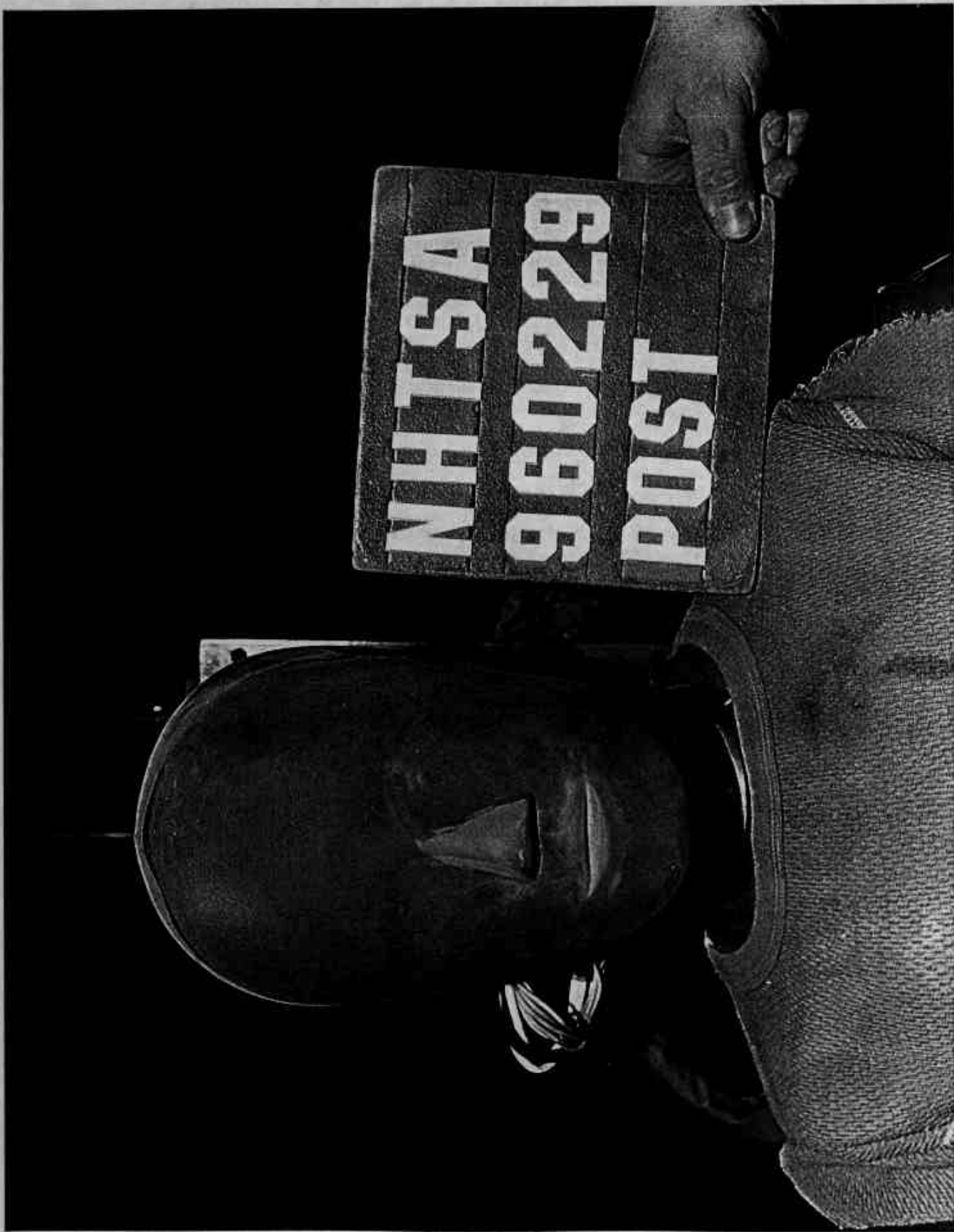


Figure A-43 Post-Test Passenger Dummy Head Contact - View 1

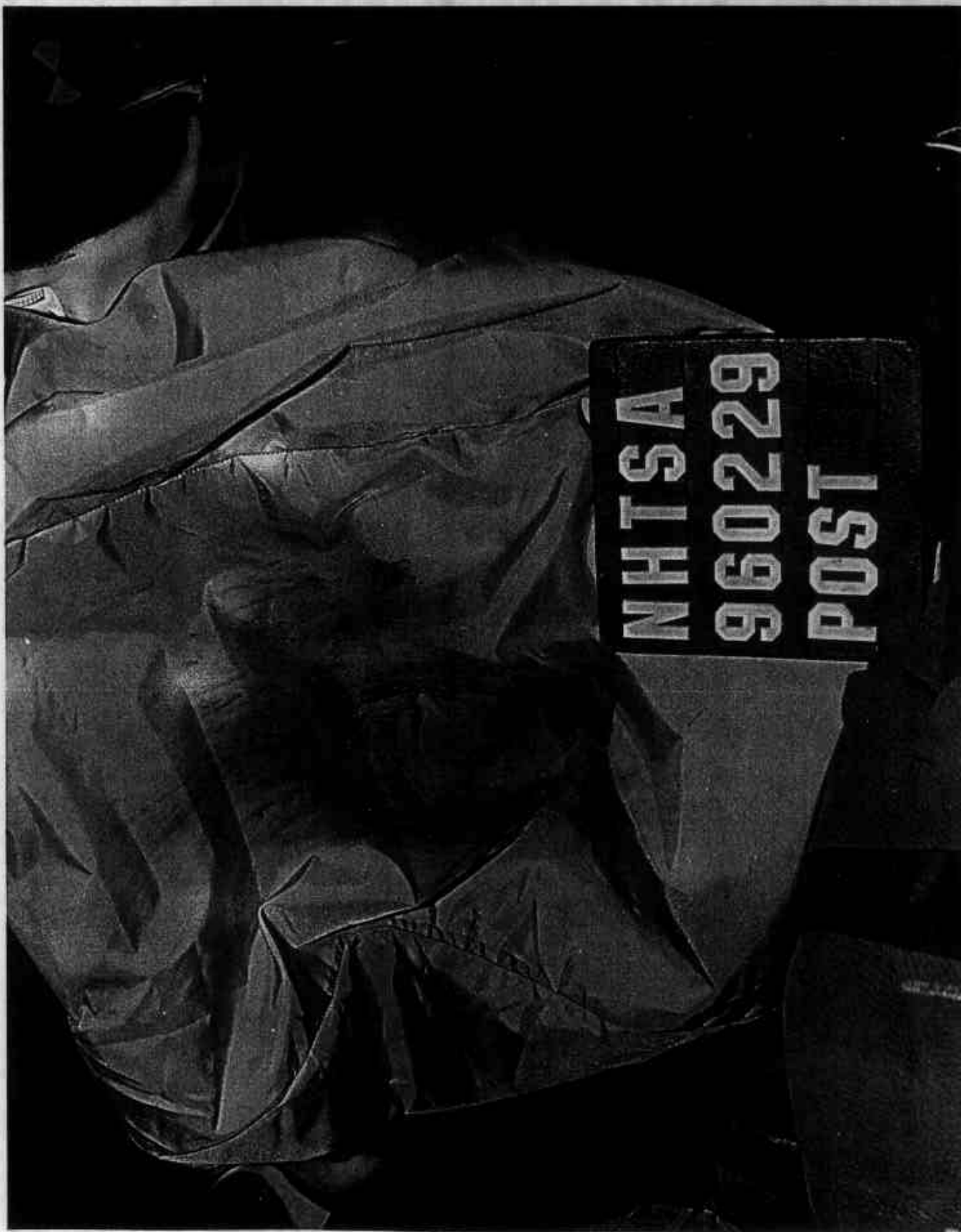


Figure A-44 Post-Test Passenger Dummy Head Contact - View 2



Figure A-45 Post-Test Passenger Dummy Knee Contact - View 1



Figure A-46 Post-Test Passenger Dummy Knee Contact - View 2

A-47

960229

MANUFACTURED IN KOREA BY
HYUNDAI MOTOR COMPANY

DEC/13/95

GVWR 3660 LBS PAINT KJ

GAWR
FRONT

1962 LBS

GAWR
REAR

1720 LBS

TRIM FK

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.A. FEDERAL
MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS
IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE

V.I.N

KMHJF34M9TU198376

PASSENGER CAR

Figure A-47 Pre-Test Vehicle Certification Label View

TIRE INFLATION PRESSURE				
VEHICLE CAPACITY WEIGHT, LBS : 850				
SEATING CAPACITY: TOTAL5 FRONT2 REAR3				
TIRE PRESSURES-GOLD, KPA (PSI) :				
TIRE SIZE	LOAD UPTO 2 PERSONS		MAX. VEHICLE WEIGHT LIMIT	
	FRT	RR	FRT	RR
P175/65 R14	210(30)	210(30)	220(32)	220(32)
P195/60 R14	210(30)	210(30)	210(30)	210(30)
T125/70 D15	420(60)	420(60)	420(60)	420(60)

Figure A-48 Pre-Test Vehicle Recommended Tire Pressure Label View

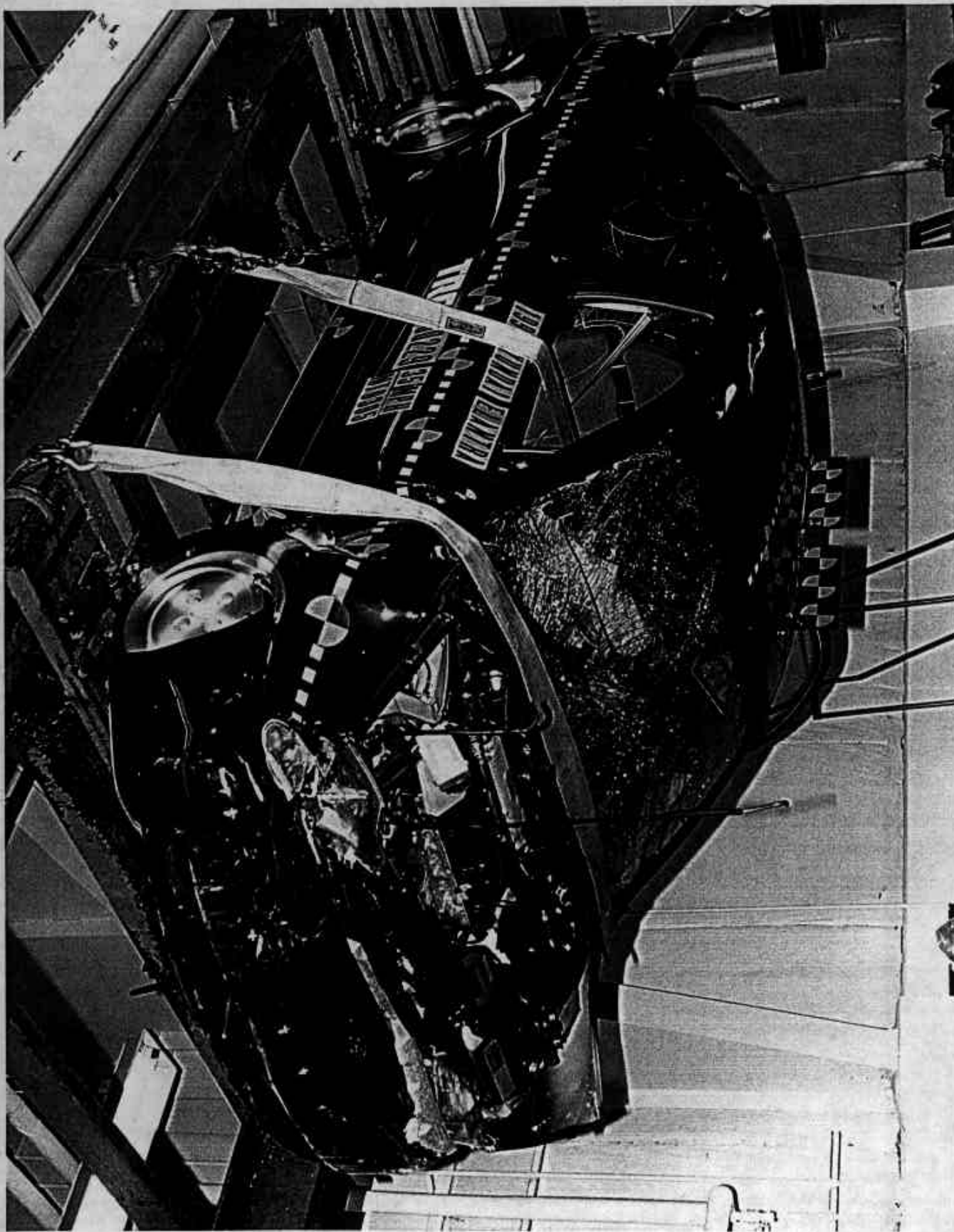


Figure A-49 Post-Test Vehicle on Static Rollover Machine View

A-50

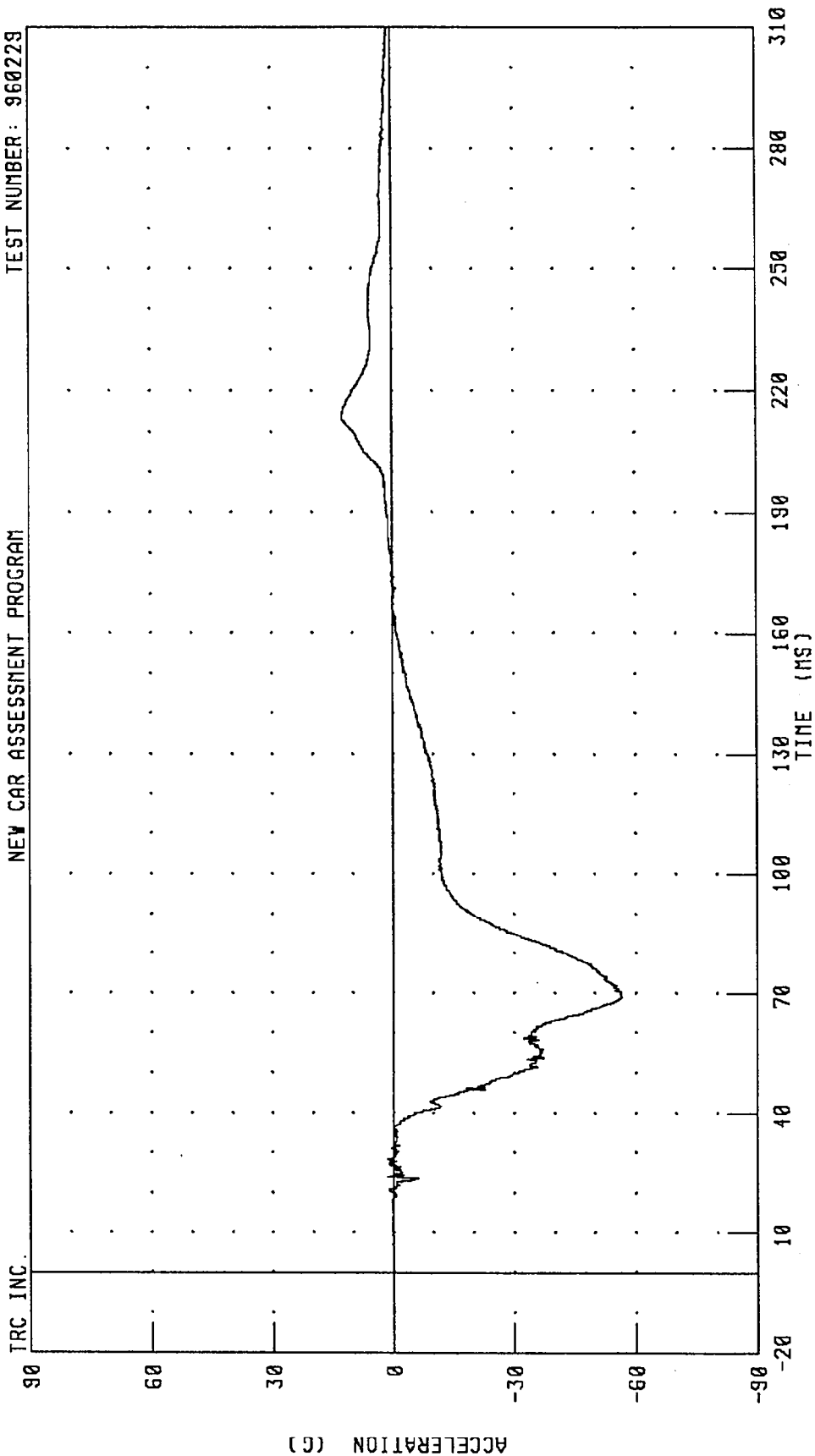
960229

Appendix B

Data Plots

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 12.55 G @ 213.44 MS; -56.67 G @ 69.04 MS

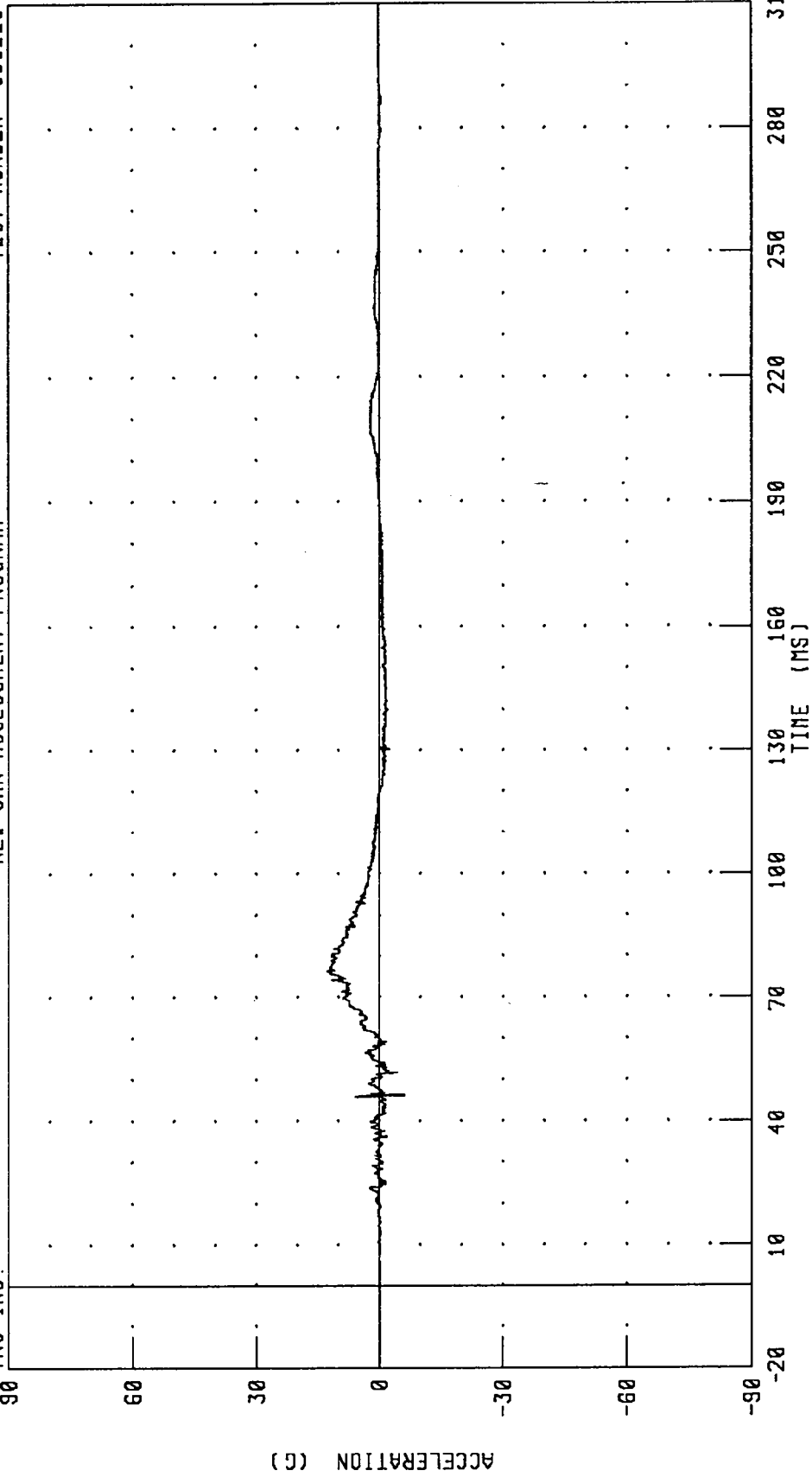
CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

TRC INC.

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000 PEAK DATA: 12.59 G @ 76.08 MS; -6.17 G @ 46.24 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

90

60

30

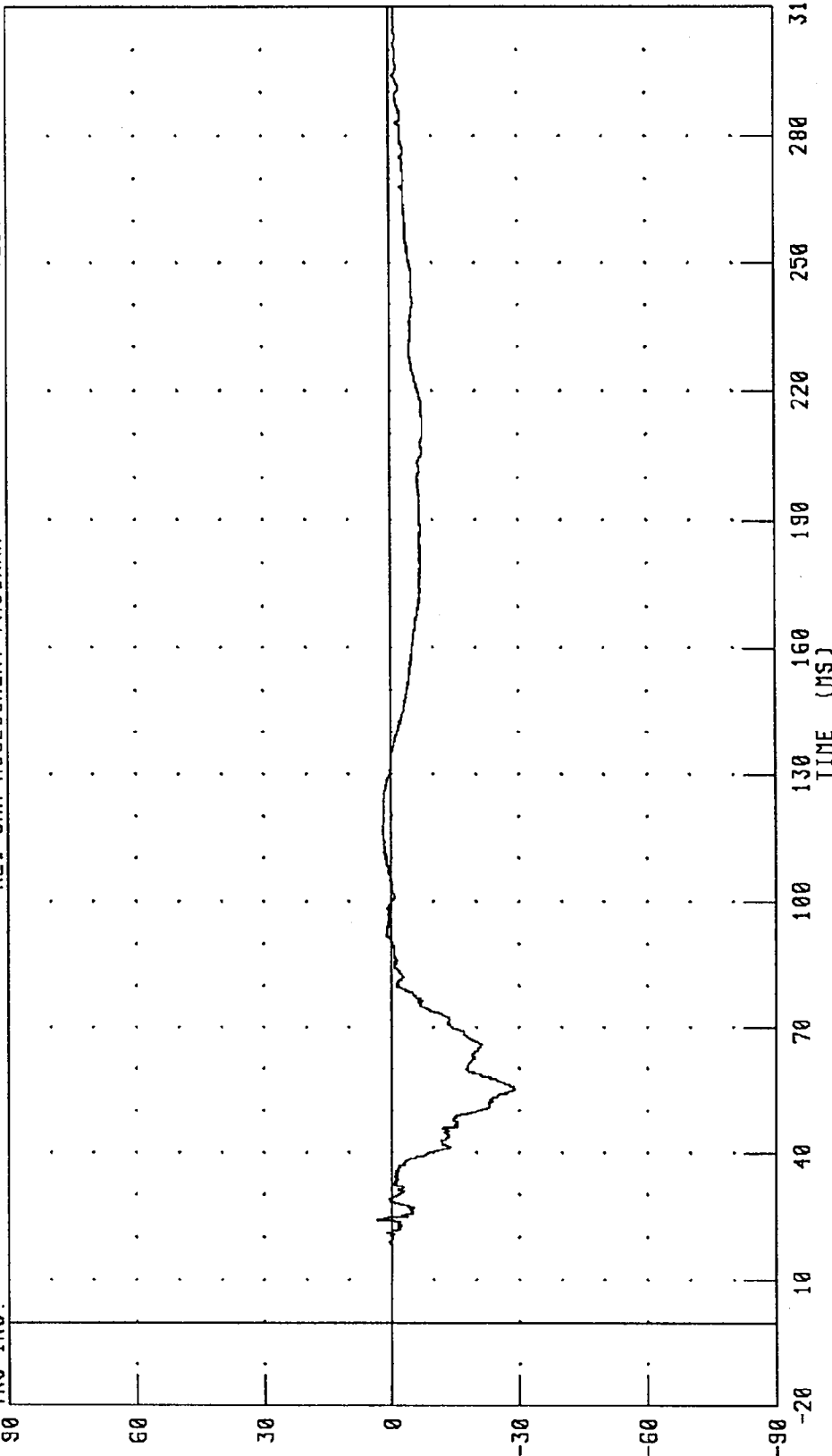
ACCELERATION (G)

B-4

-30

-60

-90



CHANNEL: HDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 3.27 G @ 24.08 MS; -28.88 G @ 55.04 MS

960229

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

PEAK DATA: 59.67 G @ 69.12 MS; 0.11 G @ 13.04 MS

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

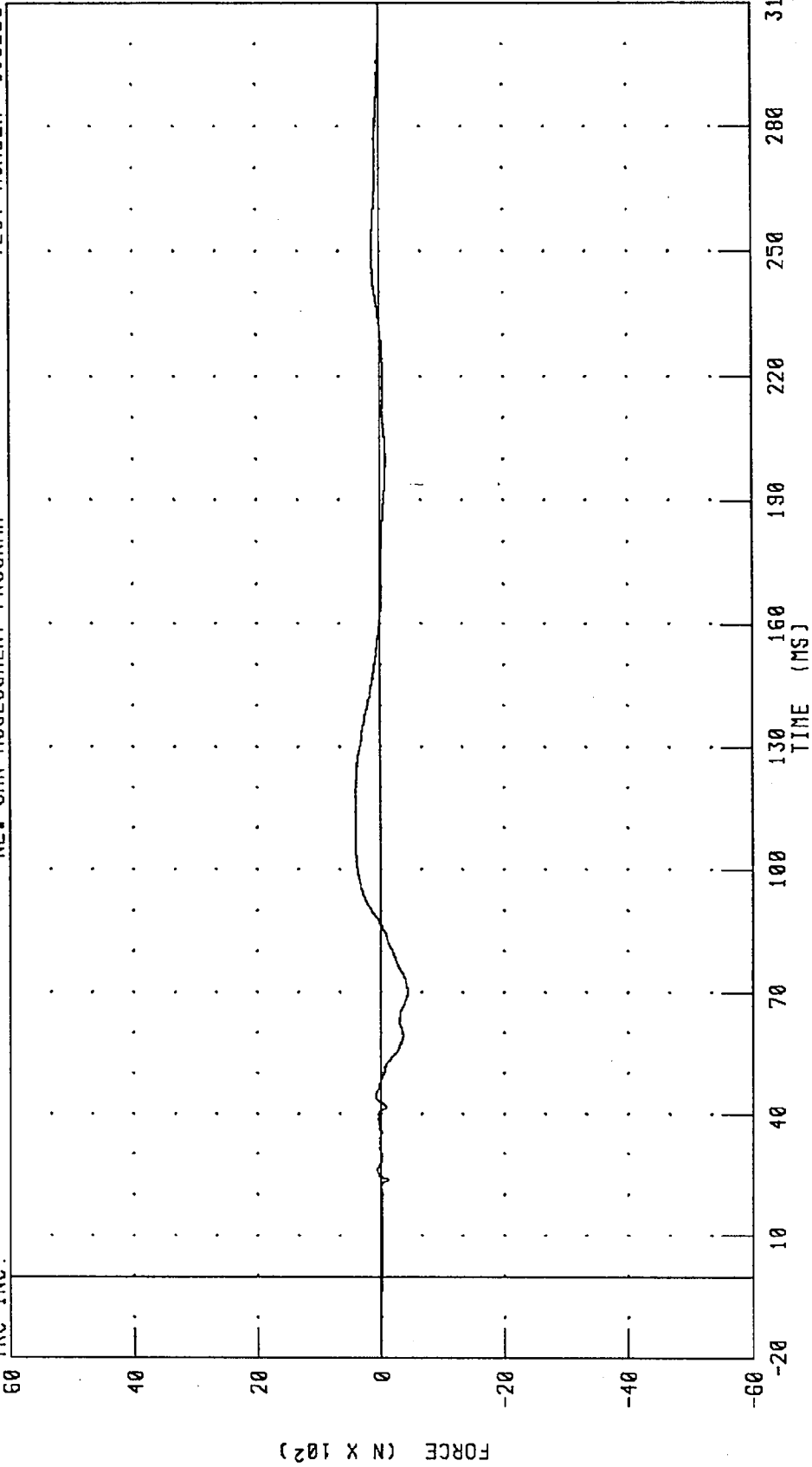
960229

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



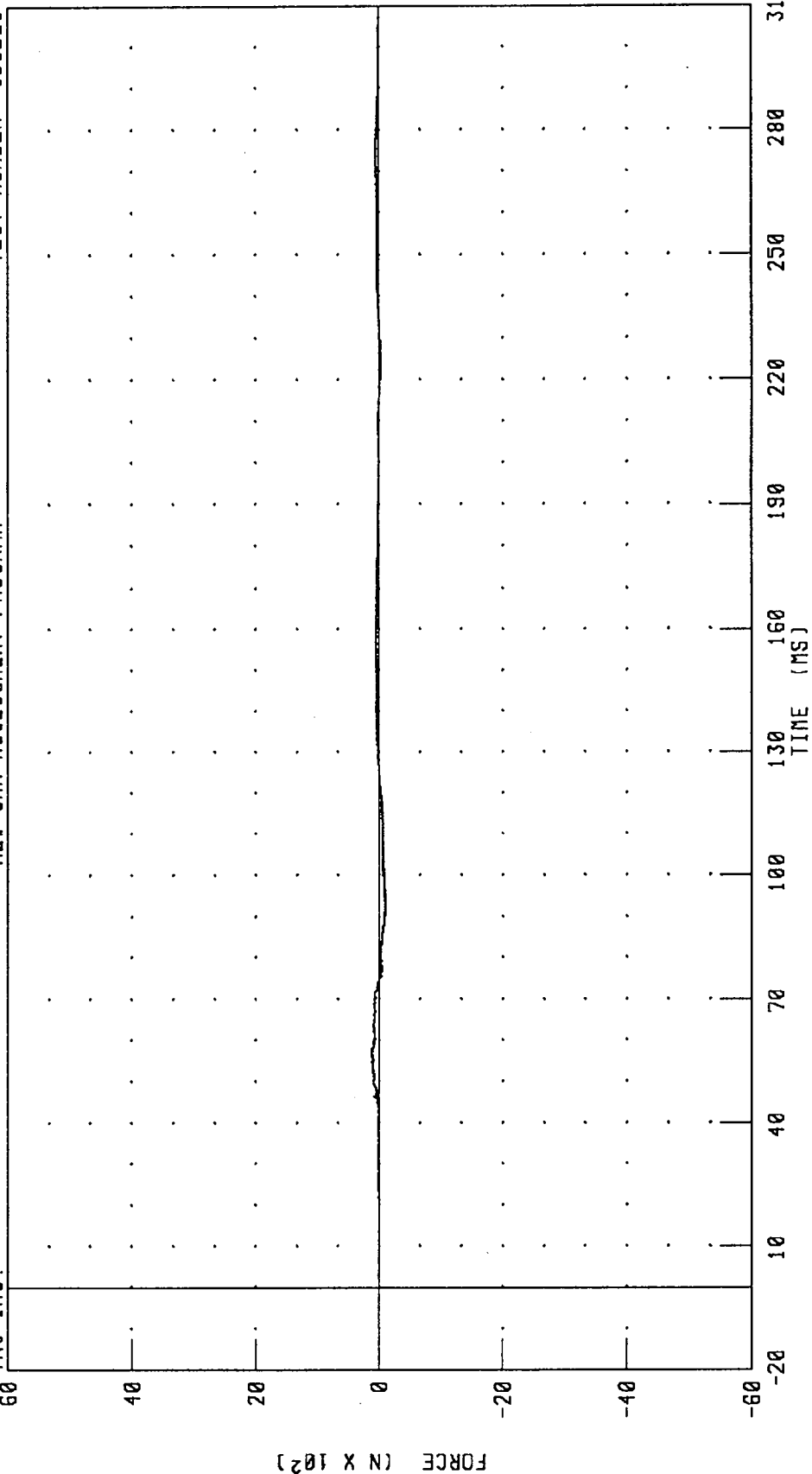
PEAK DATA: 413.35 N @ 107.04 MS; -442.81 N @ 70.16 MS

CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Y-AXIS SHEAR FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

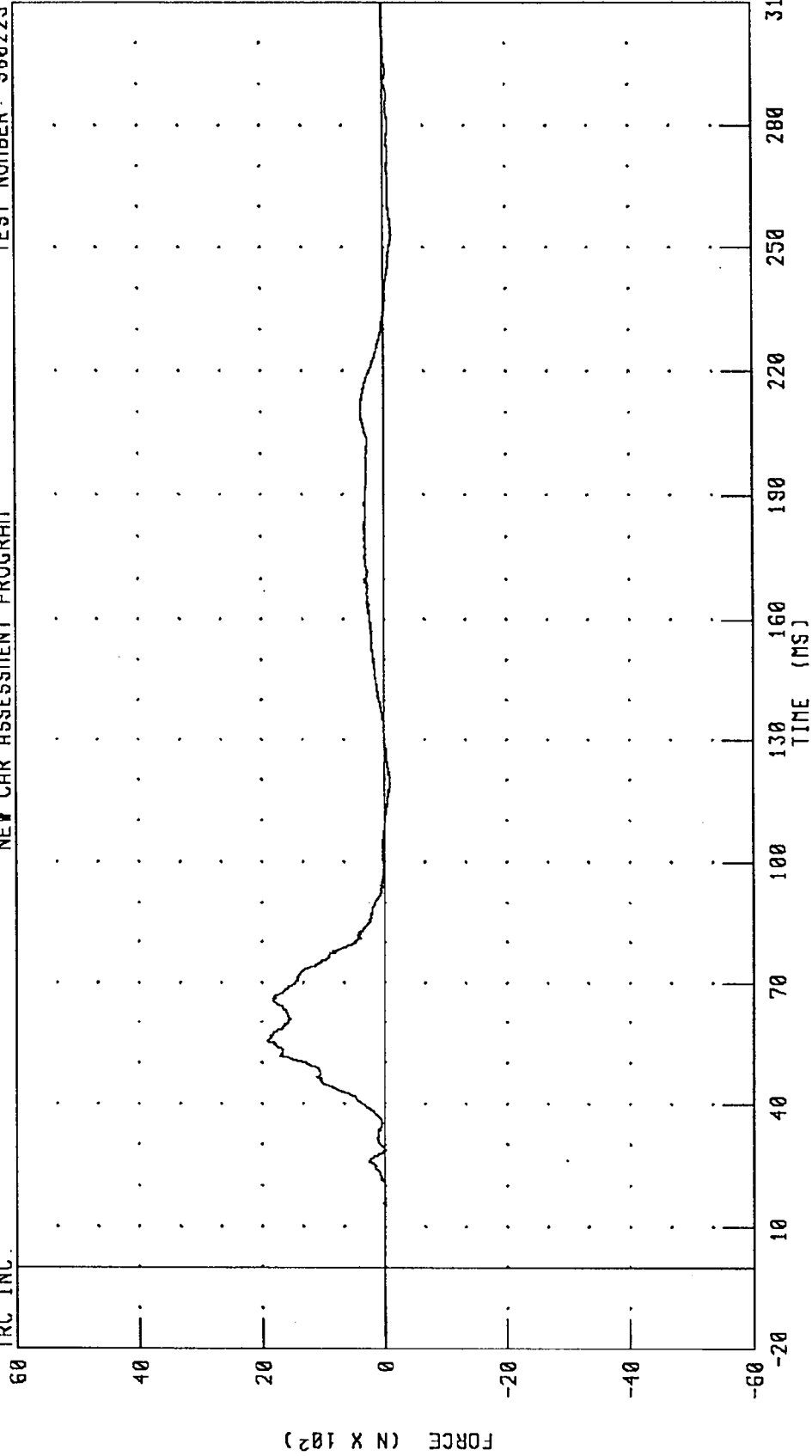
TRC INC.



1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Z-AXIS AXIAL FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



PEAK DATA: 1919.99 N @ 55.20 MS; -127.45 N @ 251.92 MS

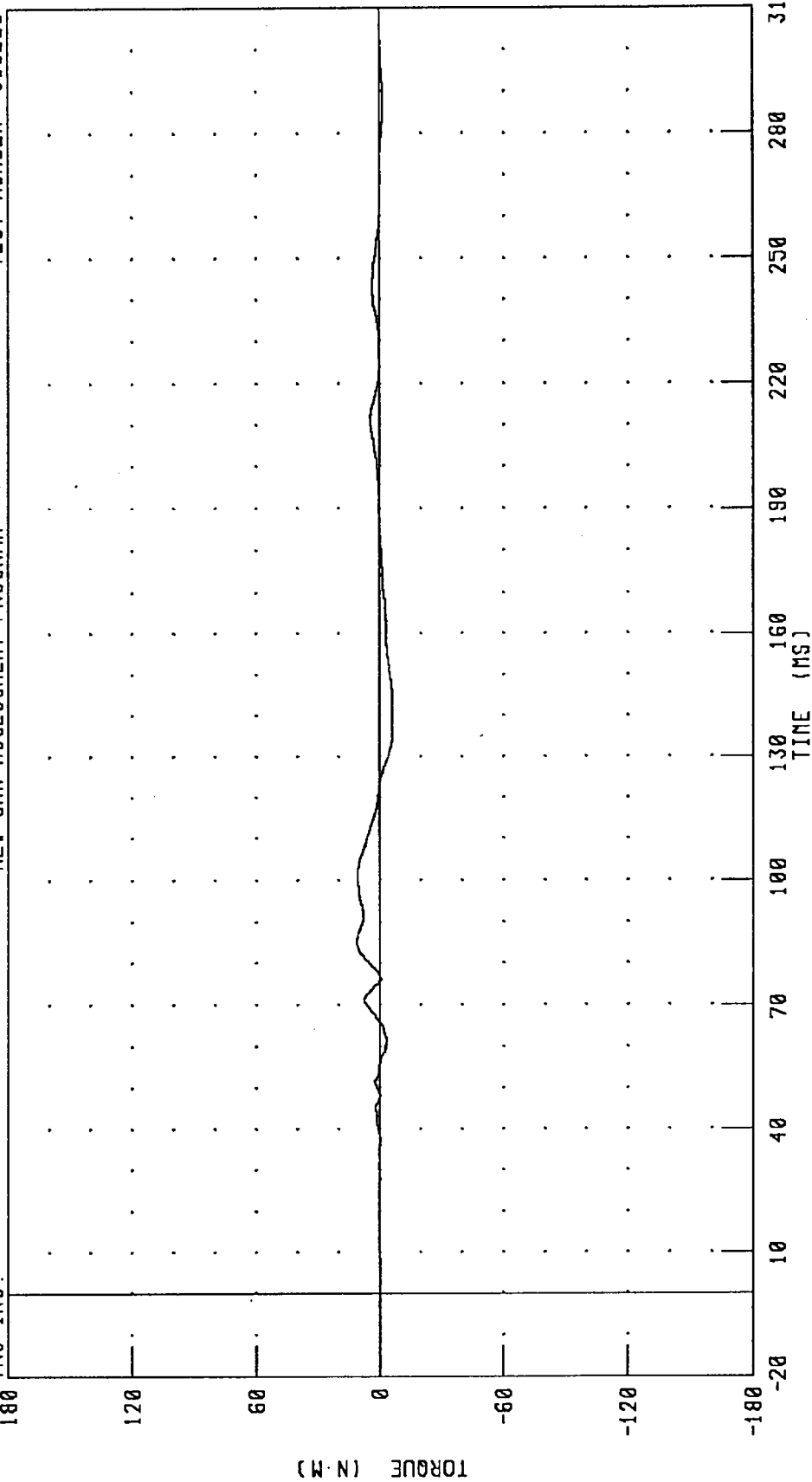
CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



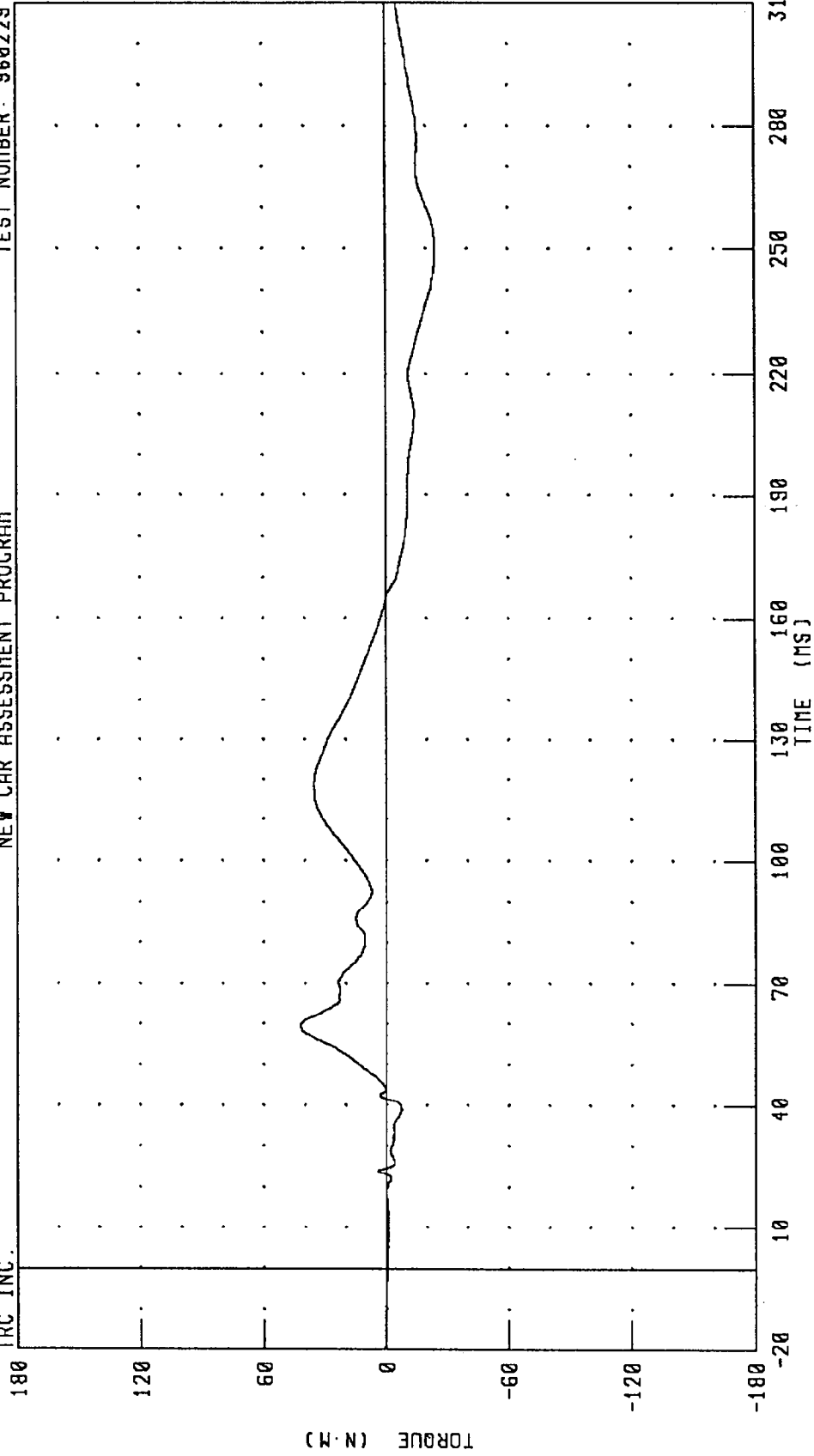
CHANNEL: NEKXM1 FILTER: CH. CLASS 600

PEAK DATA: 11.25 N-M @ 85.28 MS; -6.12 N-M @ 136.48 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: NEKYM1 FILTER: CH. CLASS 600

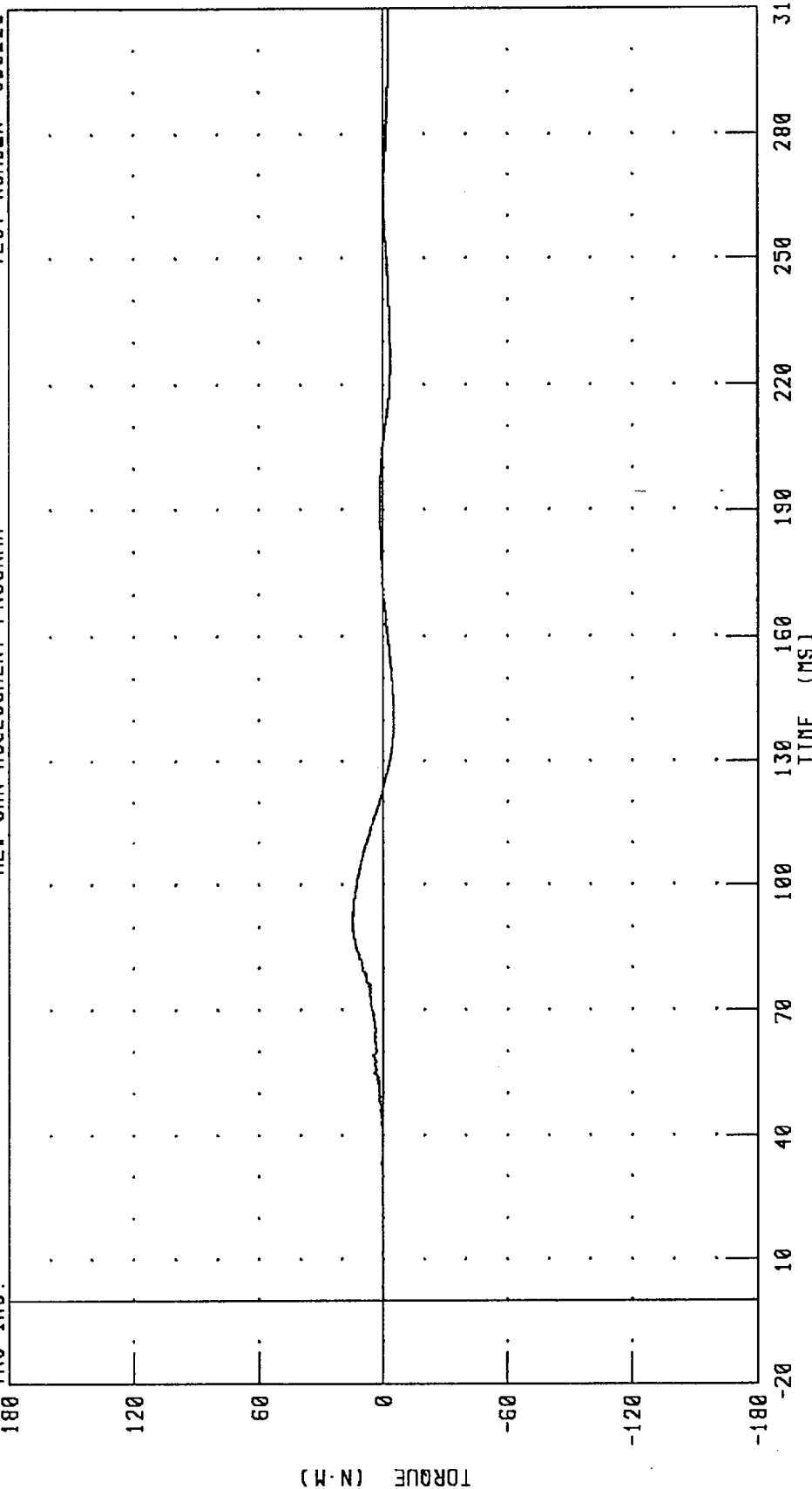
PEAK DATA: 42.38 N·M @ 59.52 MS; -24.47 N·M @ 248.08 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 14.71 N-M @ 91.04 MS; -5.17 N-M @ 141.36 MS

CHANNEL: NEKZM1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

60

40

20

ACCELERATION (G)

0

-20

-40

-60

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

PEAK DATA: 3.51 G @ 247.52 MS; -57.54 G @ 58.64 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

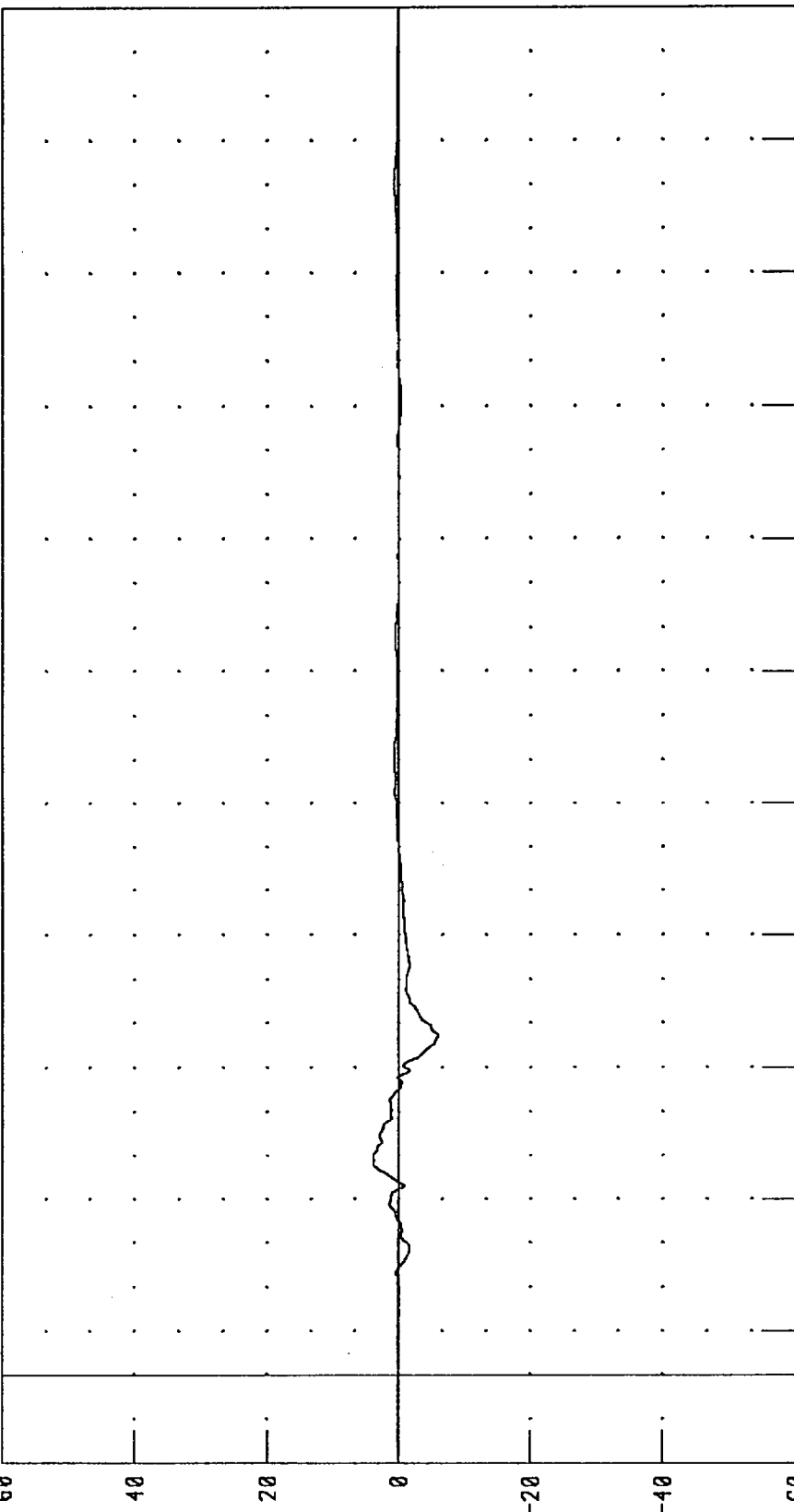
1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

60



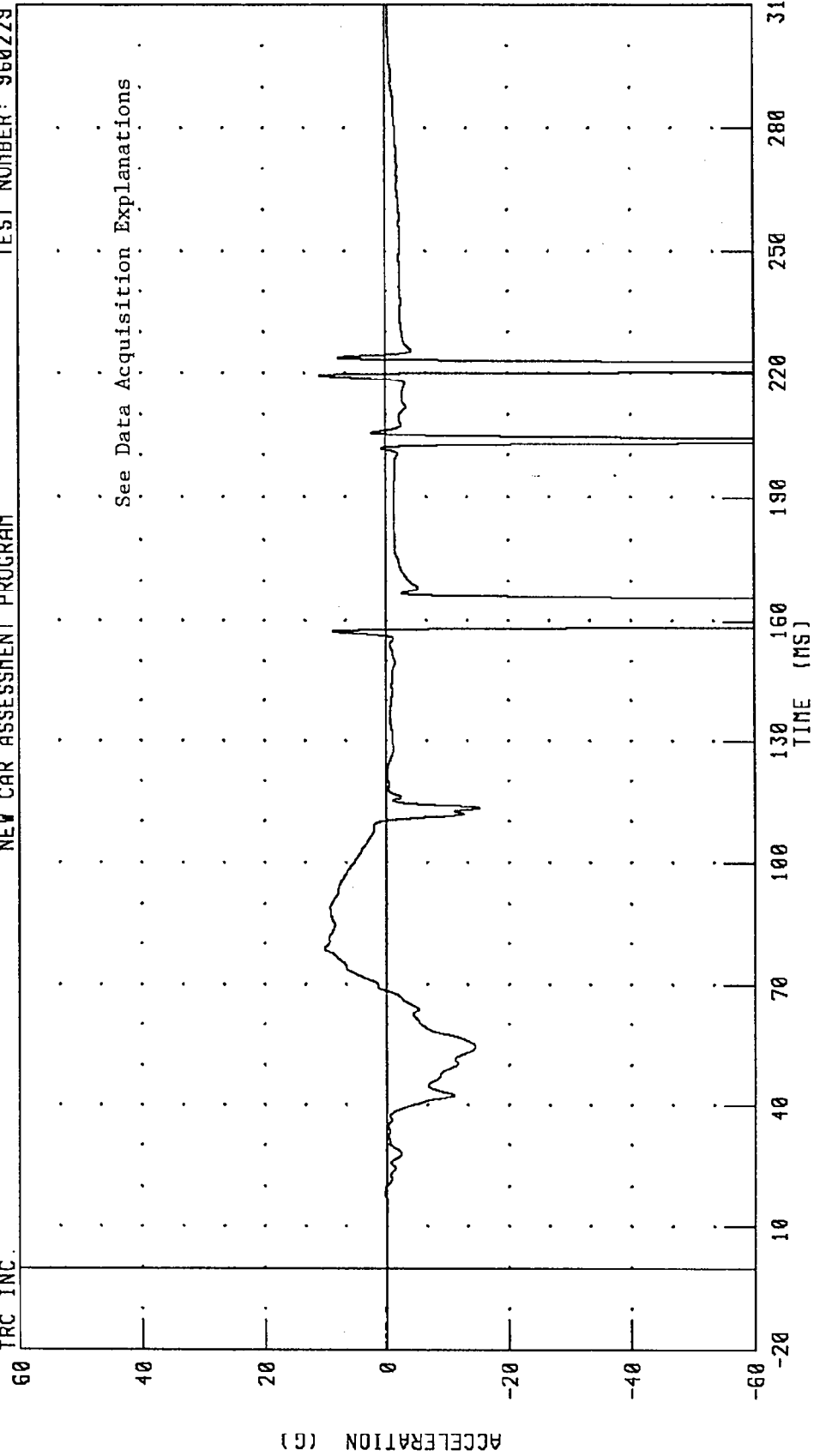
PEAK DATA: 3.96 G @ 49.84 MS; -5.94 G @ 77.20 MS

CHANNEL: CSTYG1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

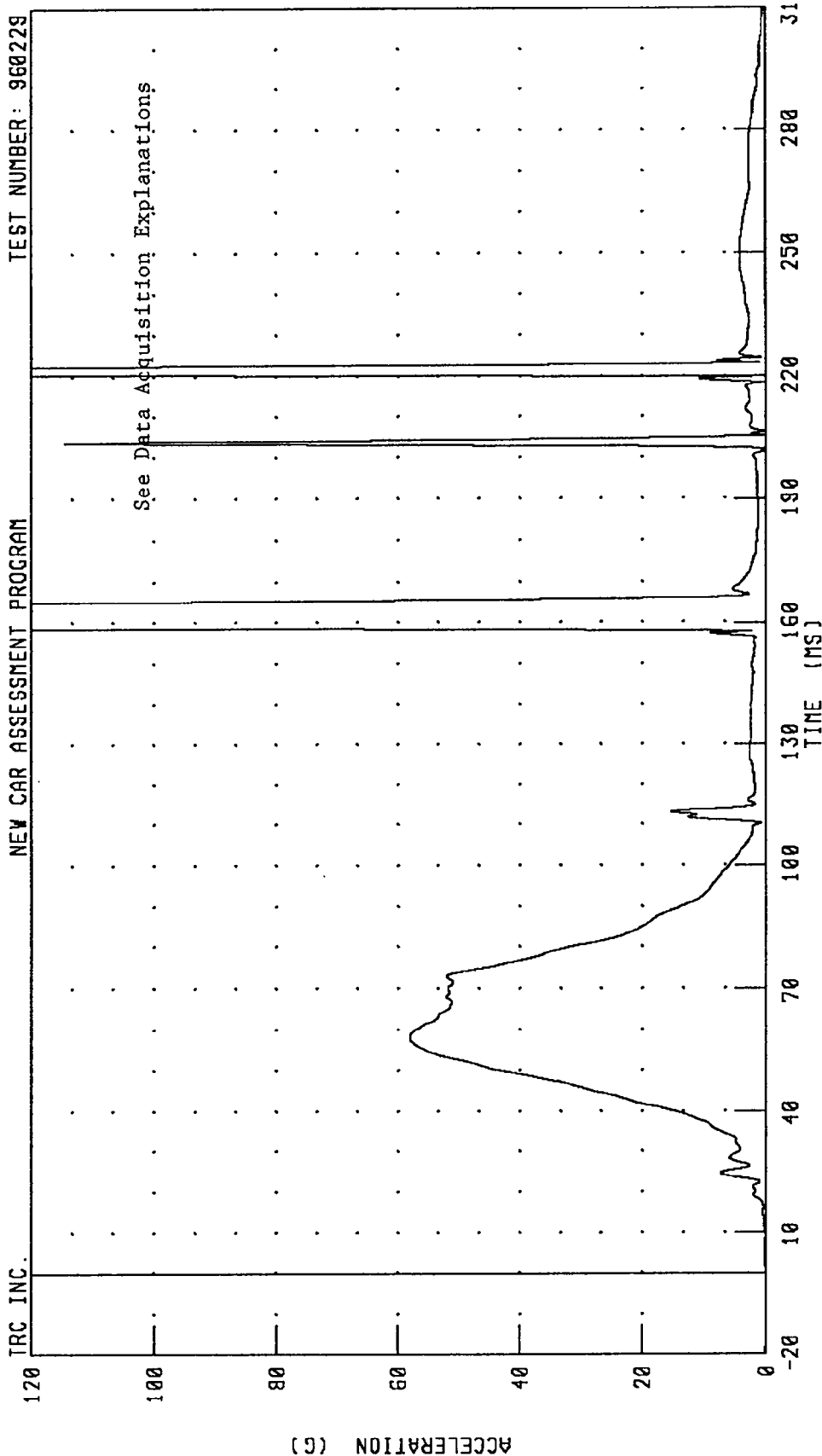
PEAK DATA: 10.78 G @ 219.44 MS; -420.45 G @ 163.36 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



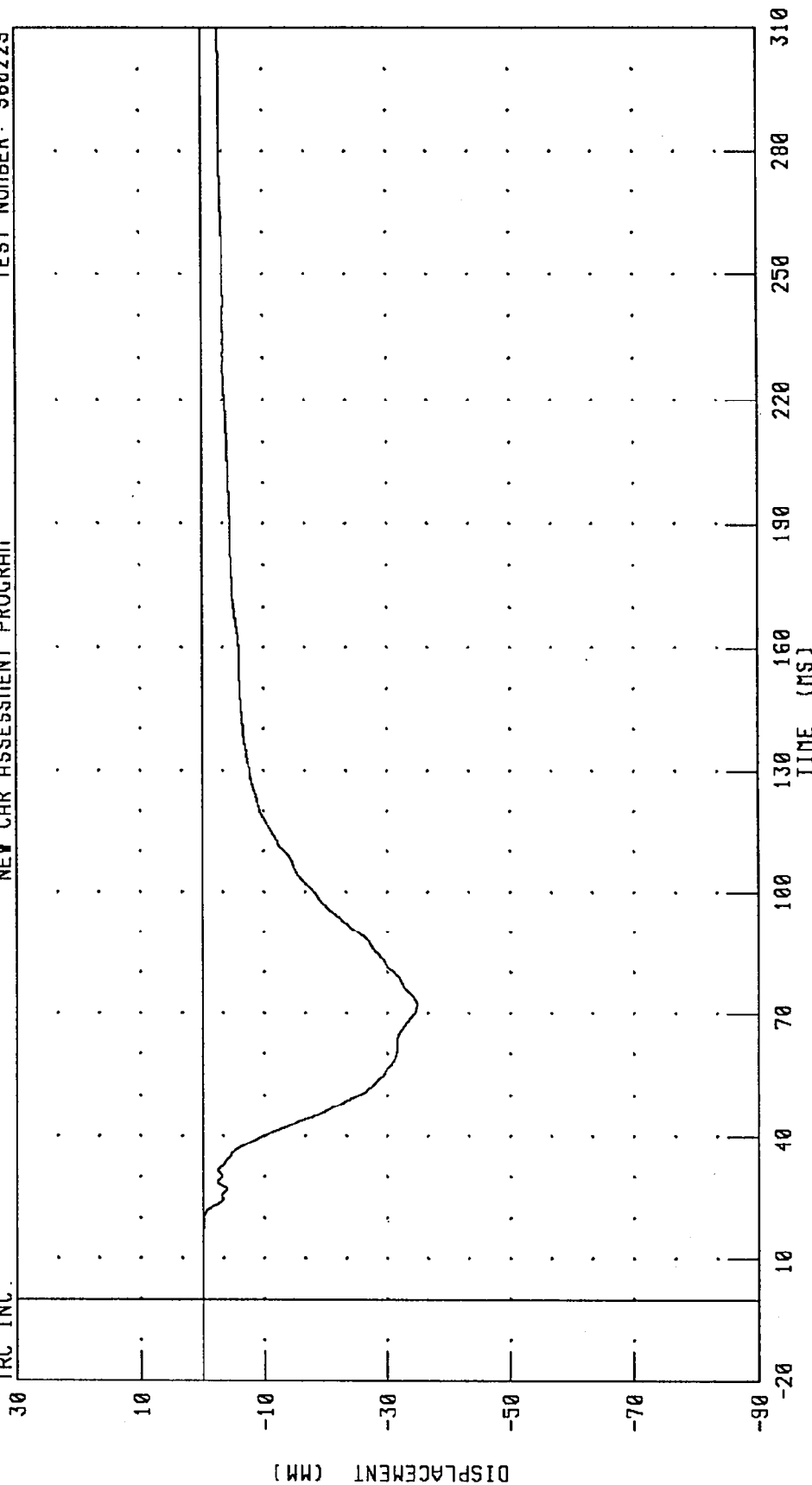
PEAK DATA: 420.46 G @ 163.36 MS; 0.02 G @ -20.00 MS

CHANNEL: CSTRG1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST DEFLECTION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

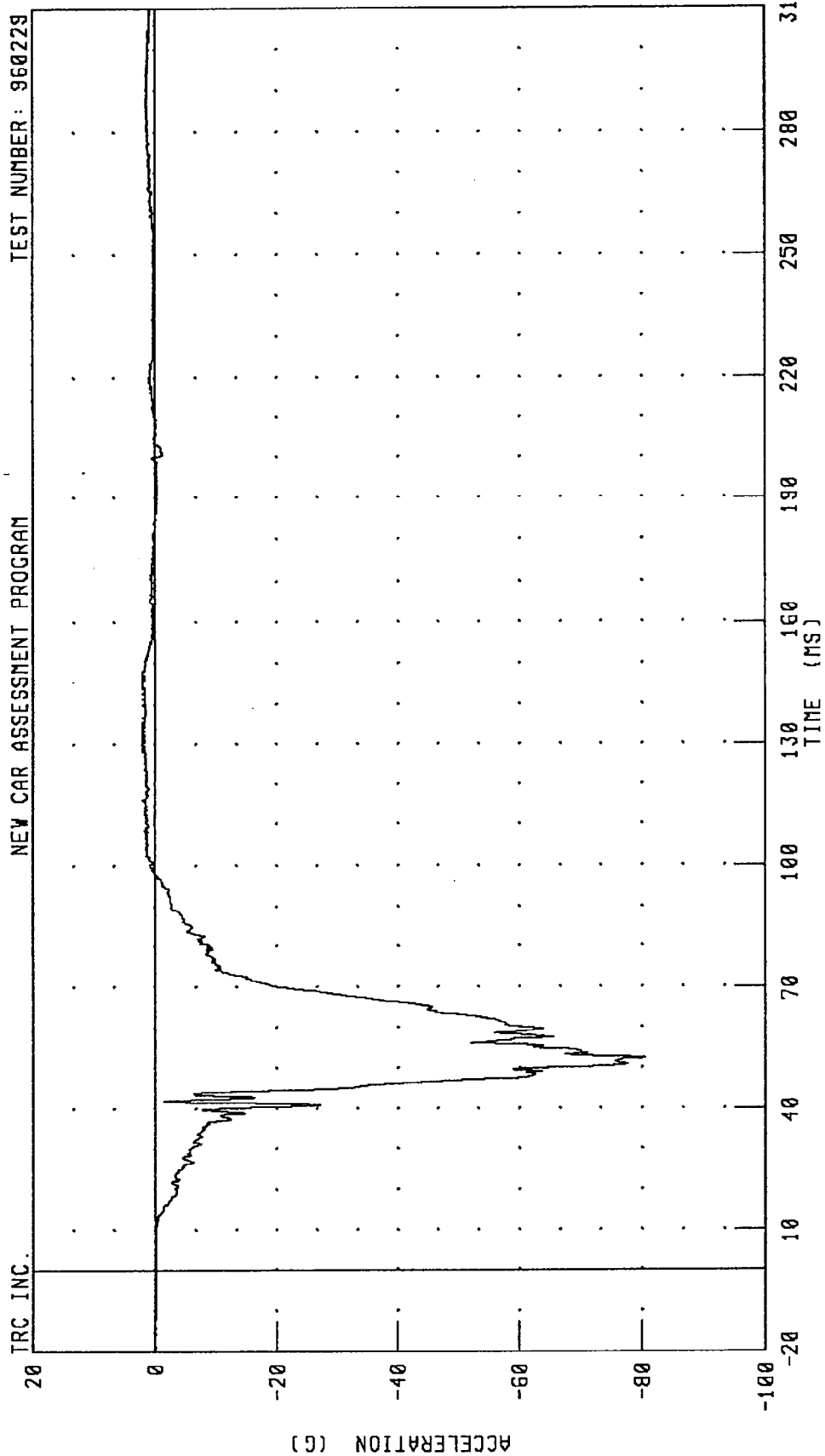


PEAK DATA: 0.02 MM @ -4.32 MS; -34.89 MM @ 72.32 MS

CHANNEL: CSTXD1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS X-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM TEST NUMBER: 960229



CHANNEL: PEVXG1 FILTER: CH. CLASS 1000

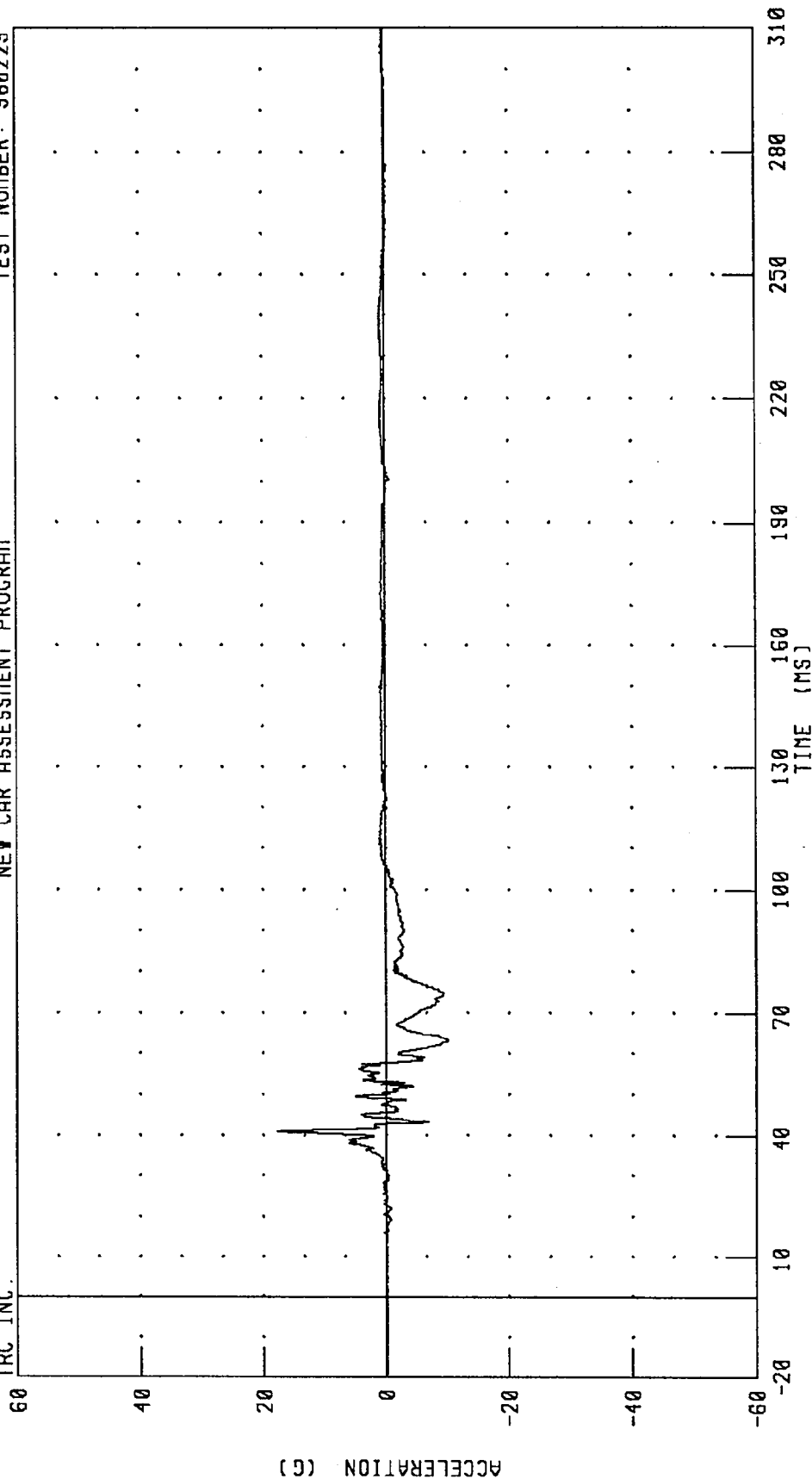
PEAK DATA: 2.14 G @ 129.84 MS; -80.43 G @ 52.40 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



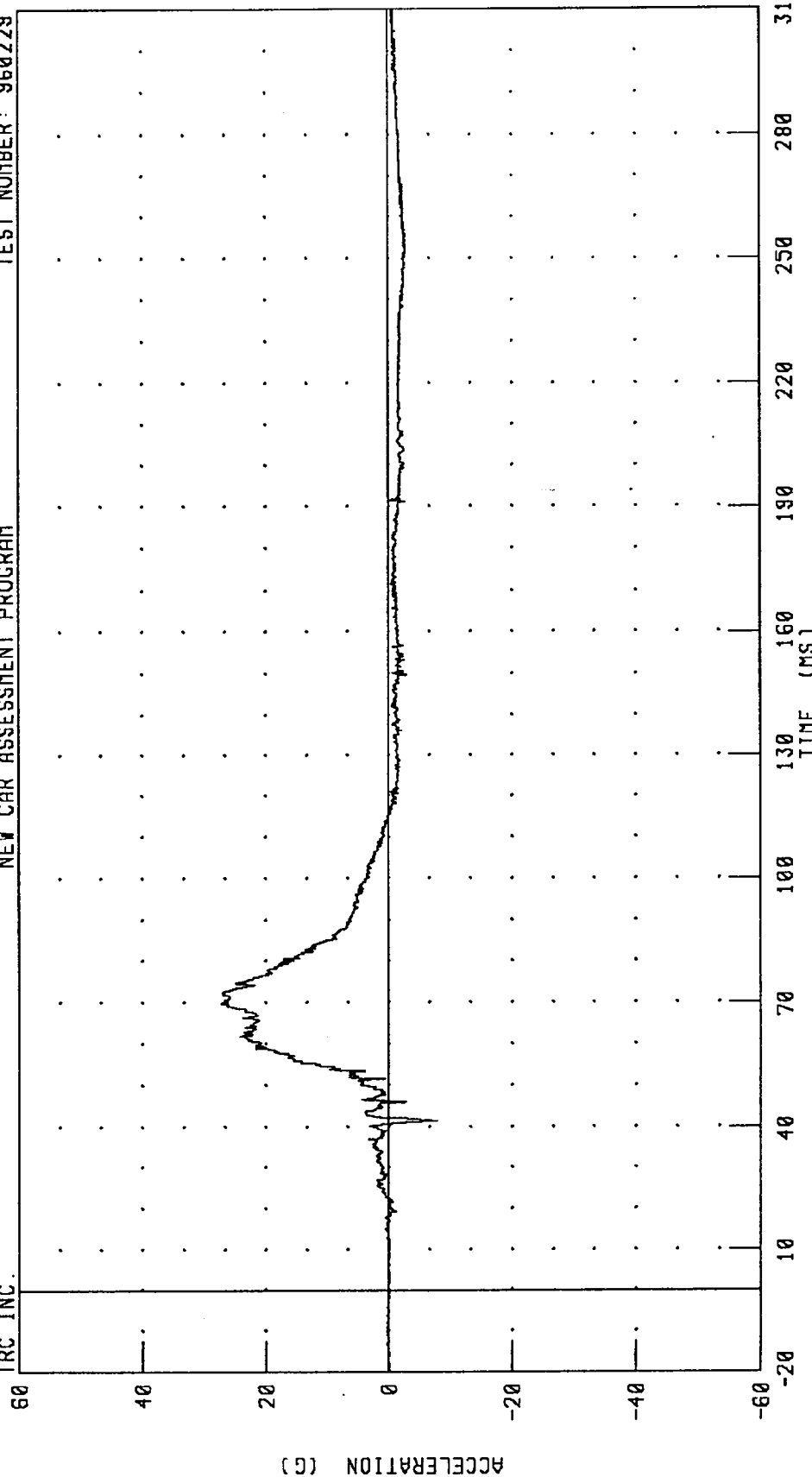
CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 27.29 G @ 69.76 MS; -7.77 G @ 41.60 MS

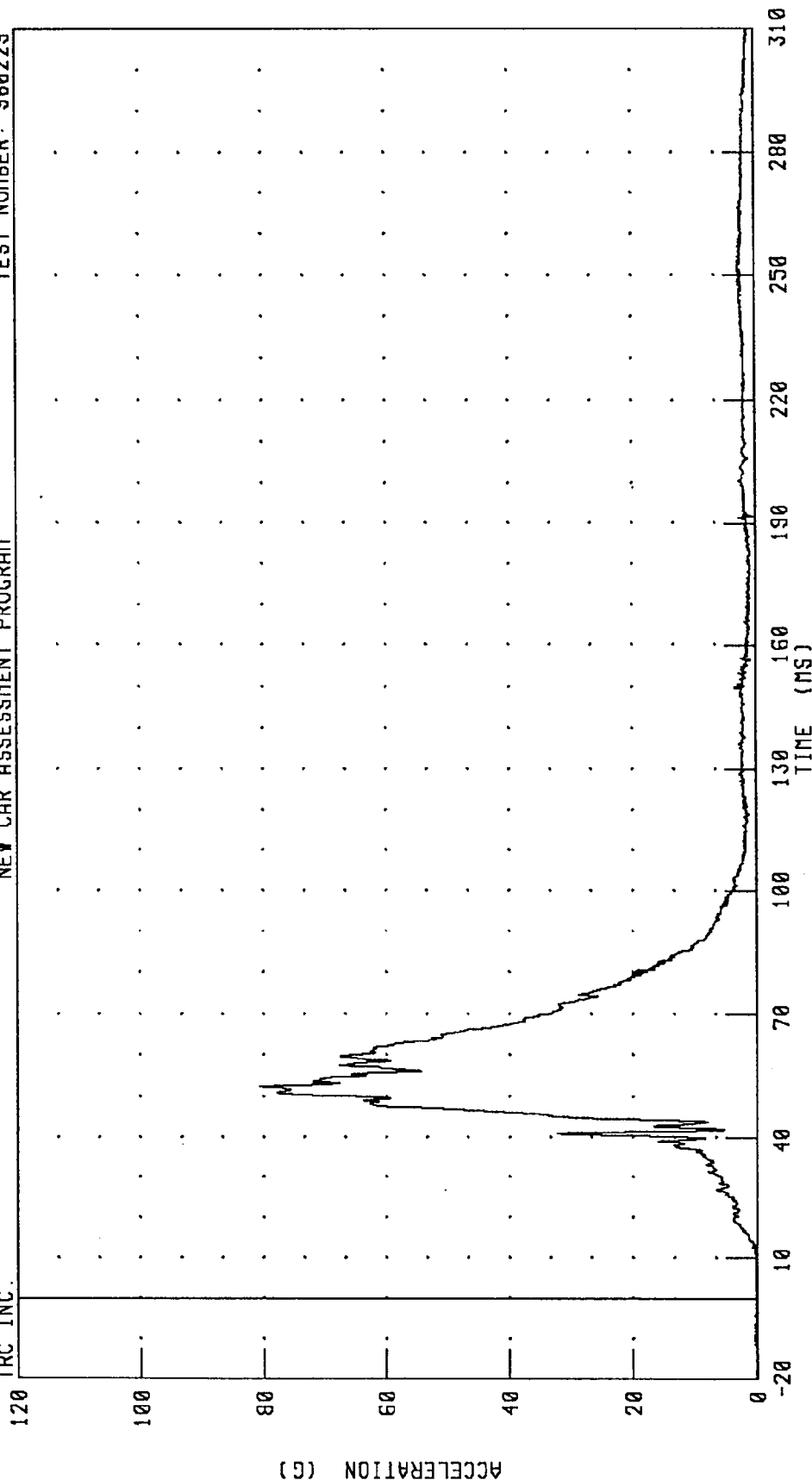
CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 80.66 G @ 52.40 MS; 0.10 G @ -20.00 MS

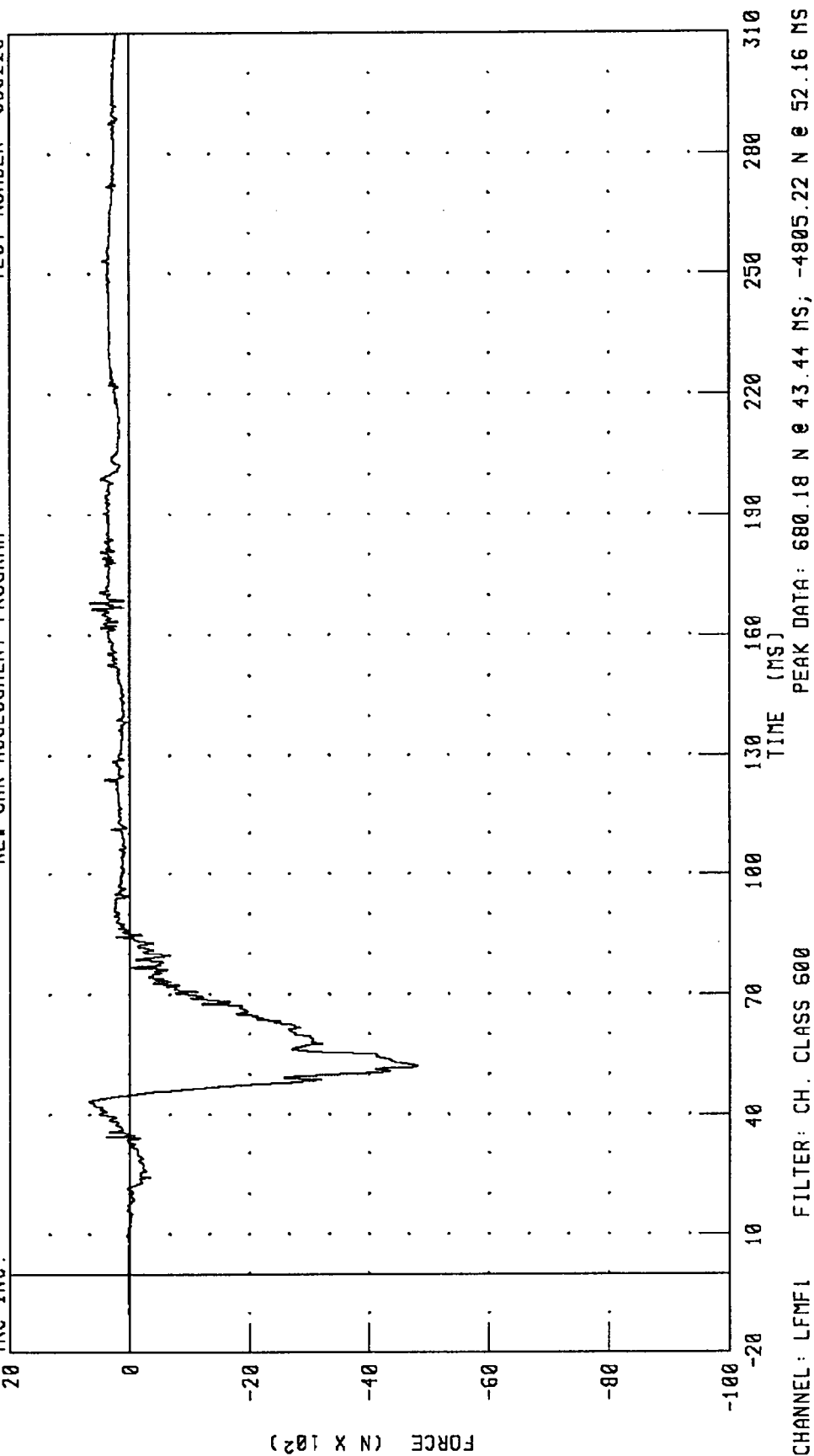
CHANNEL: PEVRG1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FEMUR FORCE

NEW CAR ASSESSMENT PROGRAM

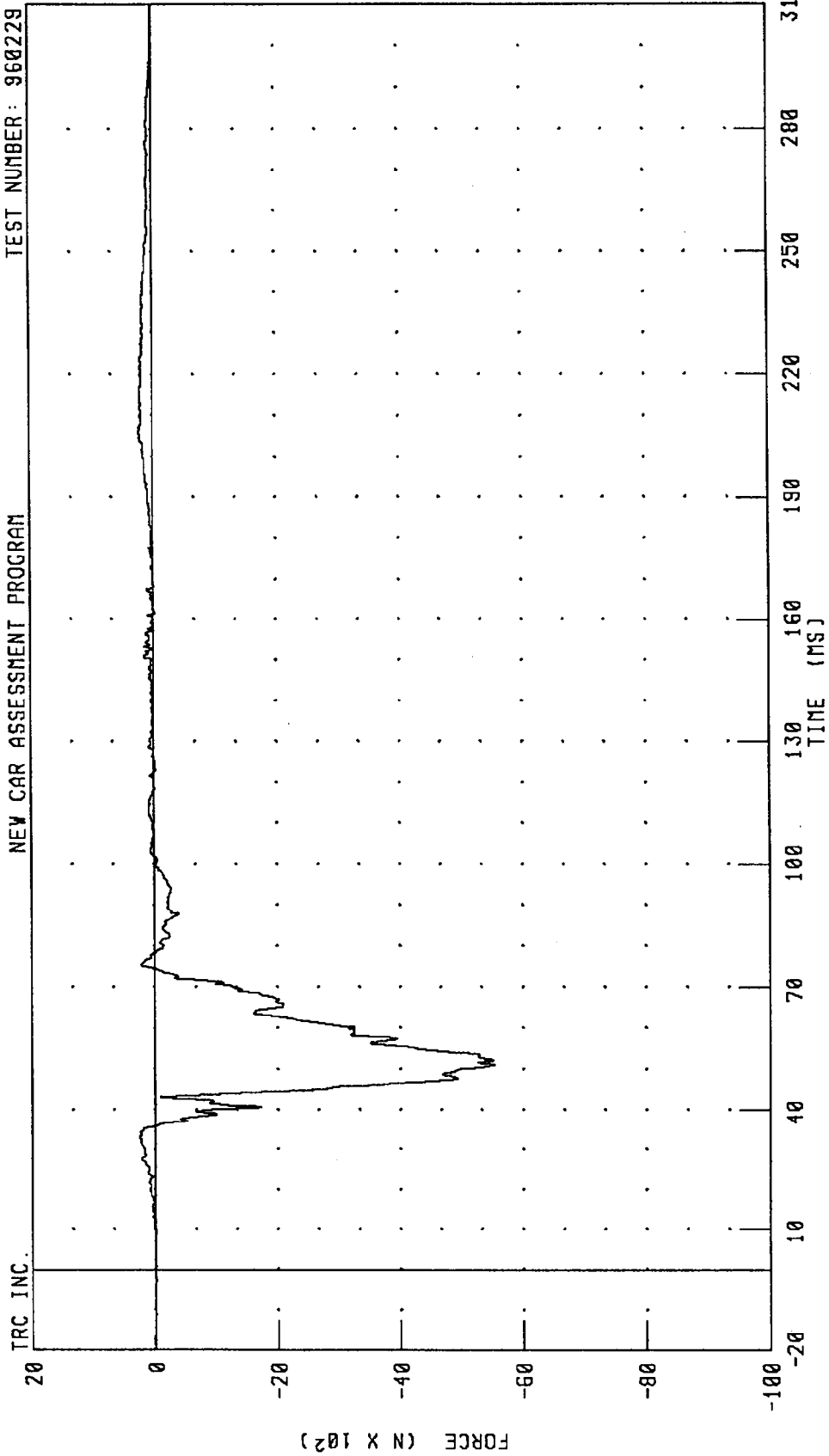
TEST NUMBER: 960229

TRC INC.



1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT FEMUR FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 253.35 N @ 33.04 MS; -5543.39 N @ 51.12 MS

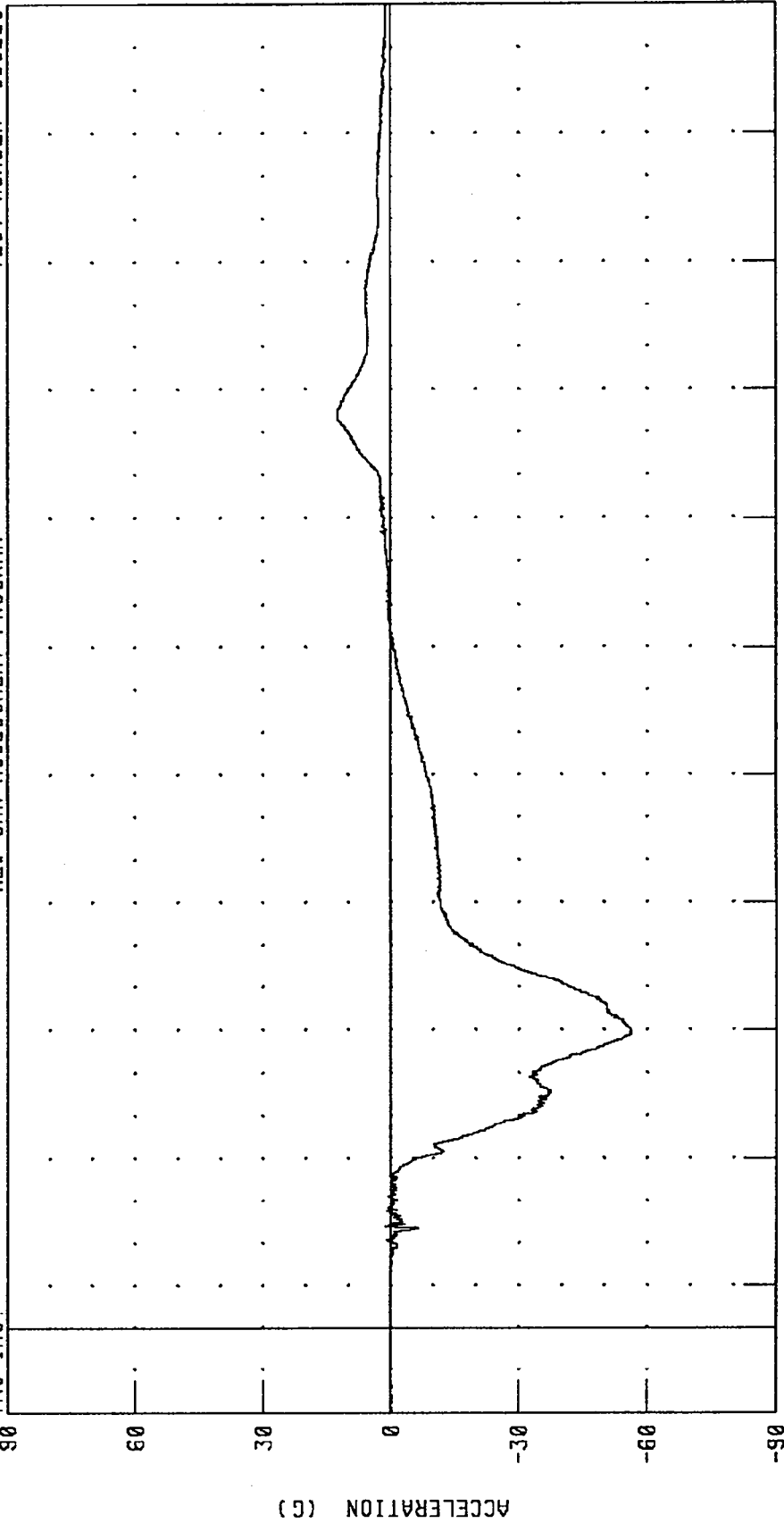
CHANNEL: RFMF1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD X-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: HEDXR1 FILTER: CH. CLASS 1000

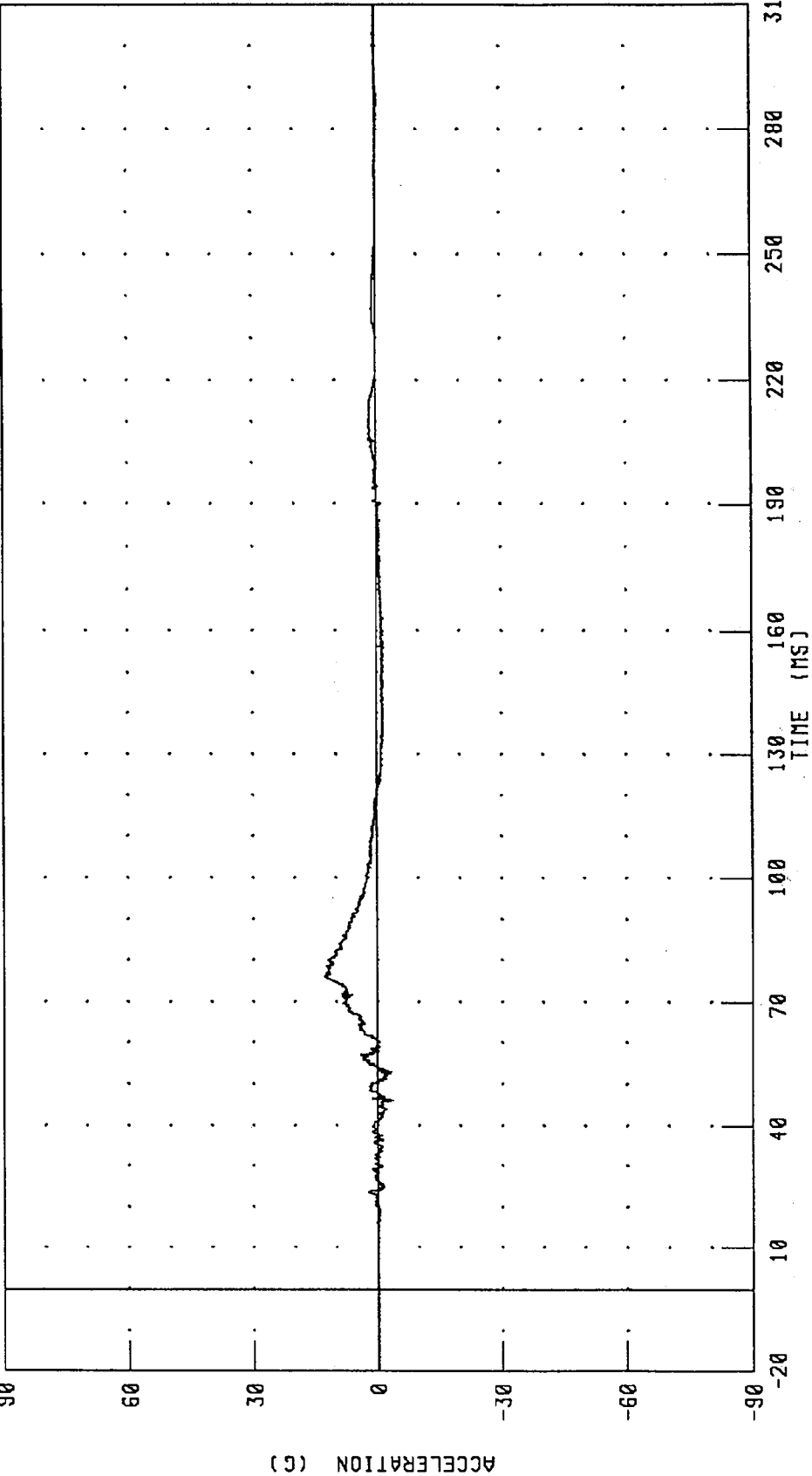
PEAK DATA: 12.58 G @ 213.20 MS; -56.33 G @ 68.96 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: HEDYR1 FILTER: CH. CLASS 1000

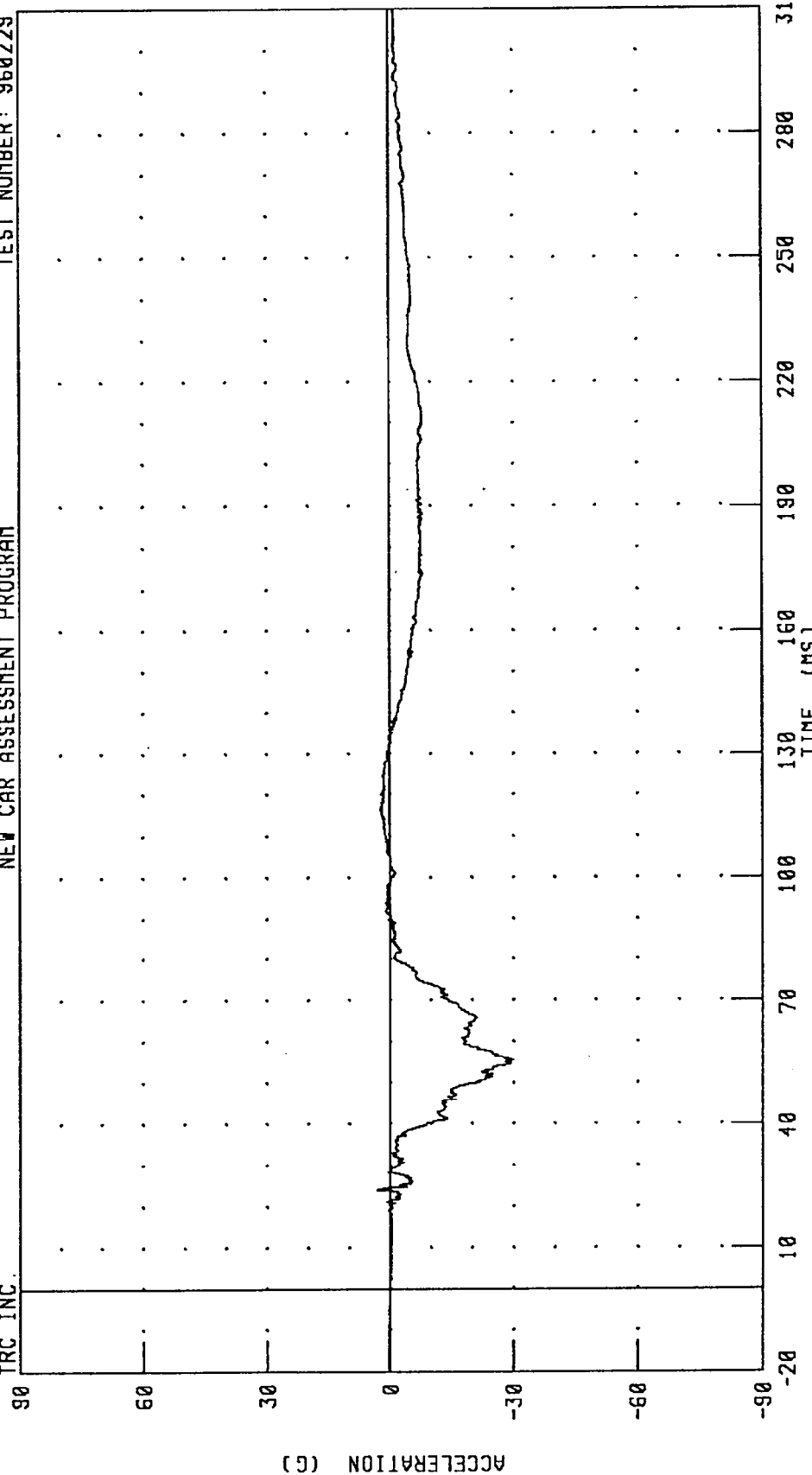
PEAK DATA: 12.66 G @ 76.00 MS; -3.82 G @ 46.08 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 3.17 G @ 24.08 MS; -29.85 G @ 55.44 MS

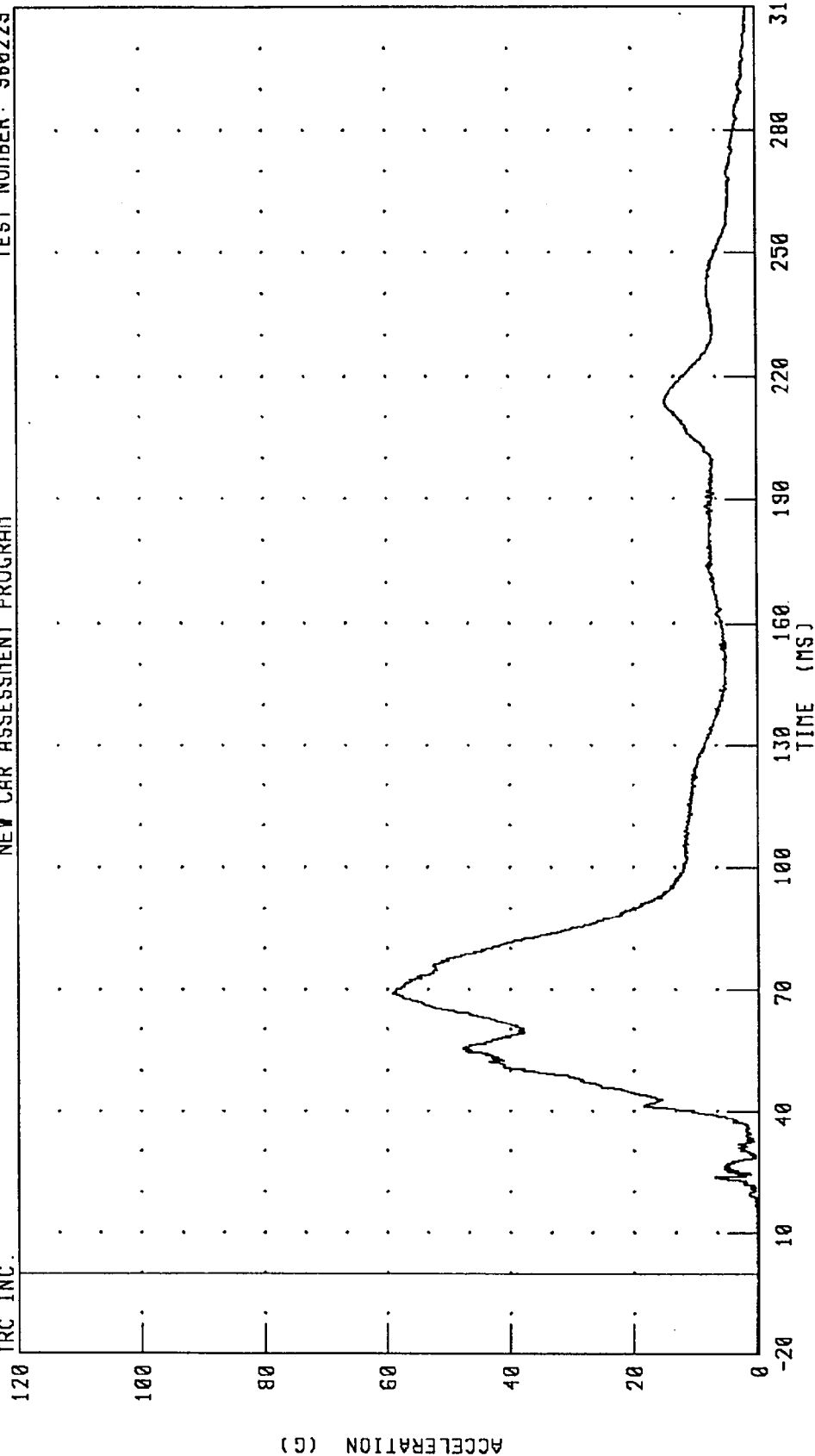
CHANNEL: HEDZR1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD RESULTANT ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 59.15 G @ 68.96 MS; 0.11 G @ -18.48 MS

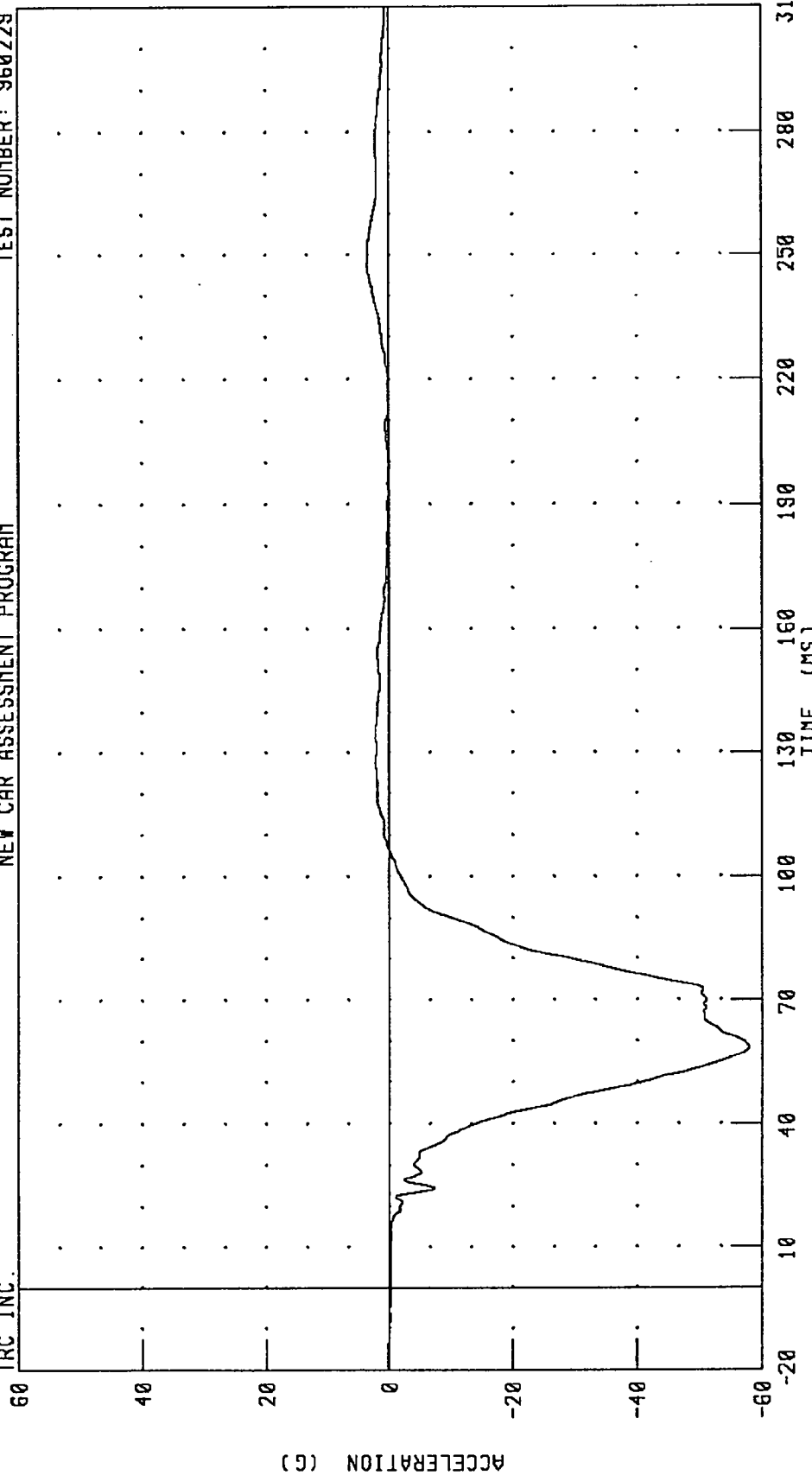
CHANNEL: HEDRR1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST X-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 3.49 G @ 247.60 MS; -57.97 G @ 58.40 MS

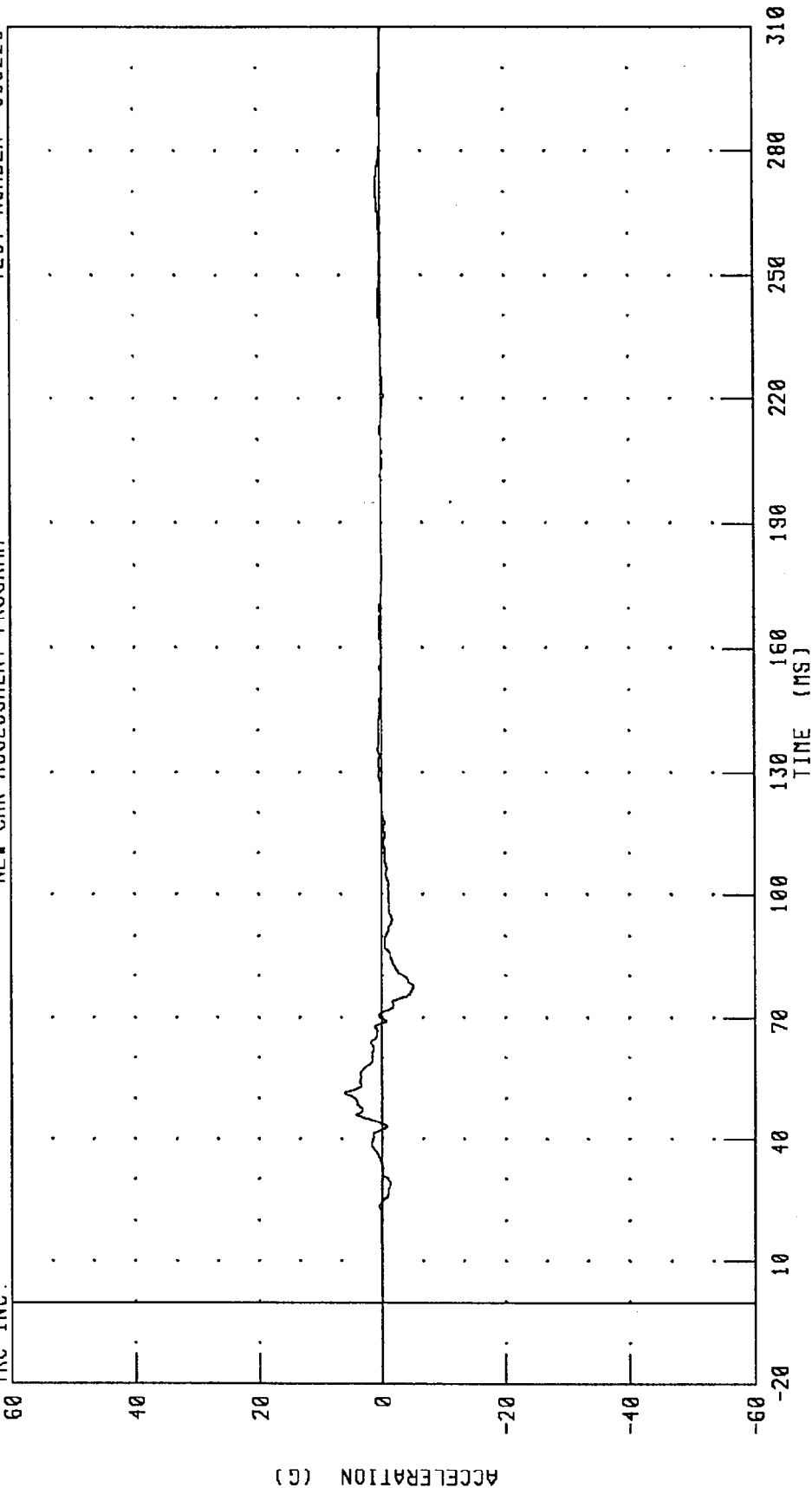
CHANNEL: CSTXR1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



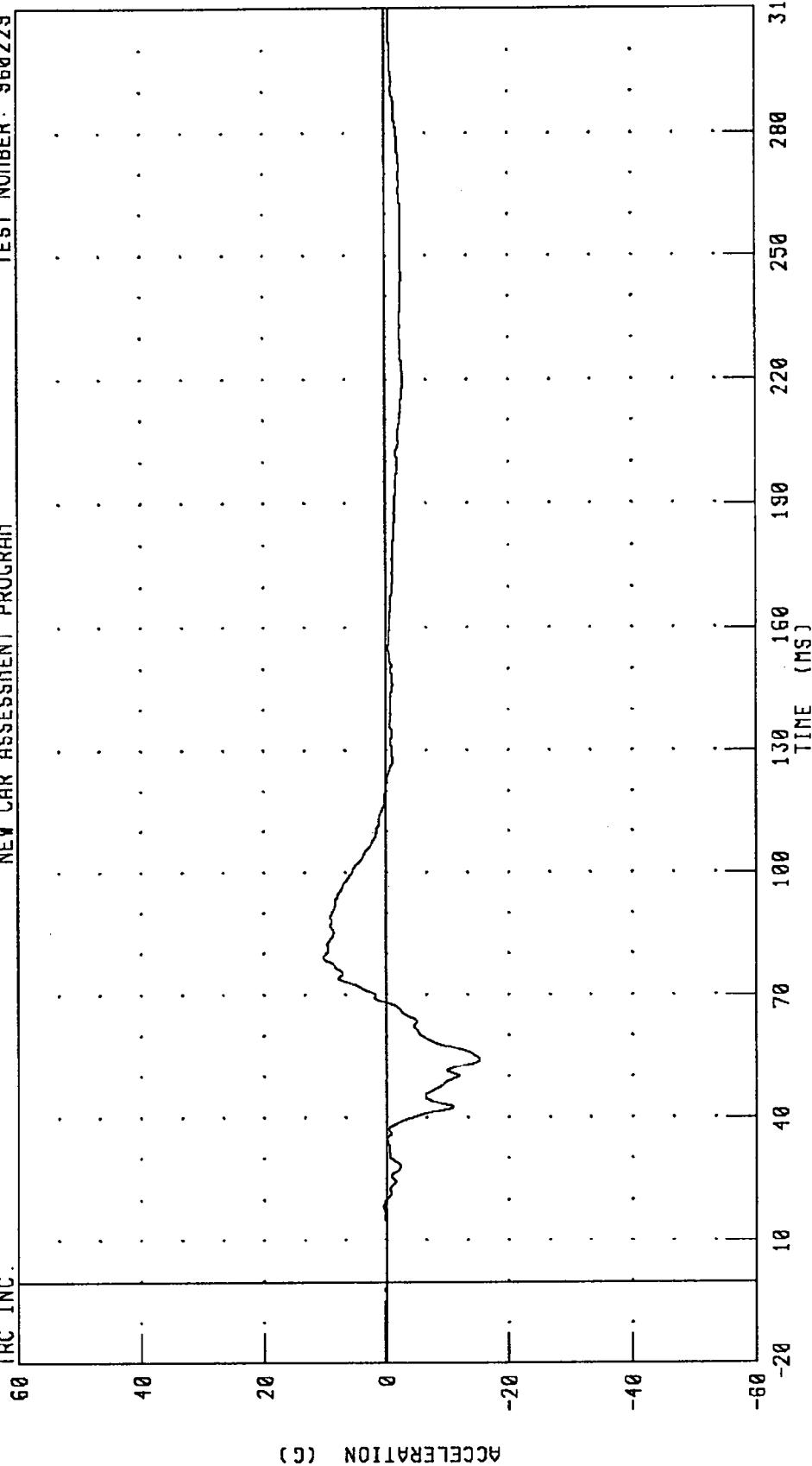
CHANNEL: CSTYR1 FILTER: CH. CLASS 180

PEAK DATA: 6.10 G @ 51.28 MS; -5.13 G @ 77.52 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION - REDUNDANT
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



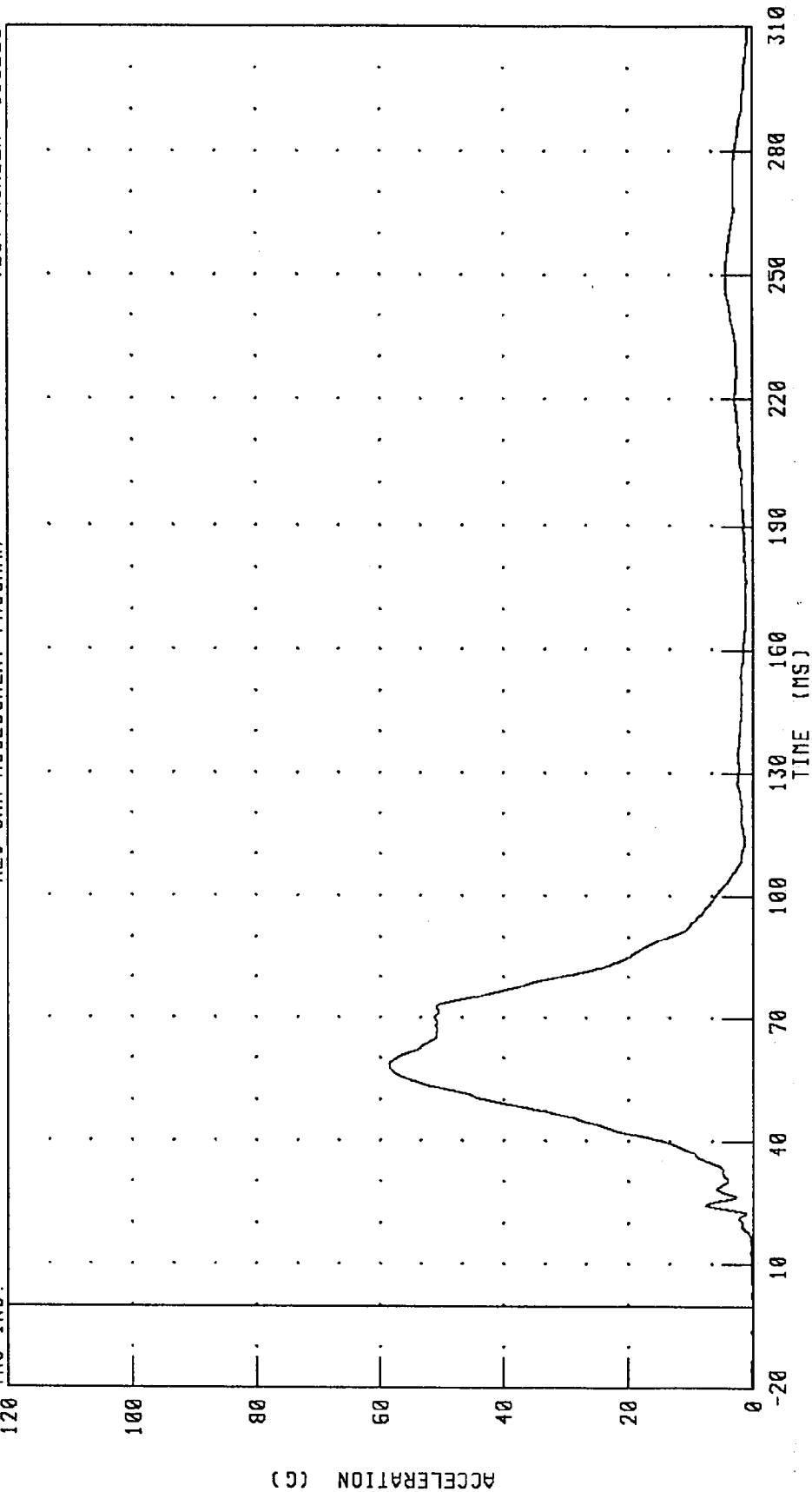
PEAK DATA: 10.36 G @ 79.04 MS; -15.30 G @ 54.32 MS

CHANNEL: CSTZR1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960228

IRC INC.



CHANNEL: CSTRR1 FILTER: CH. CLASS 180

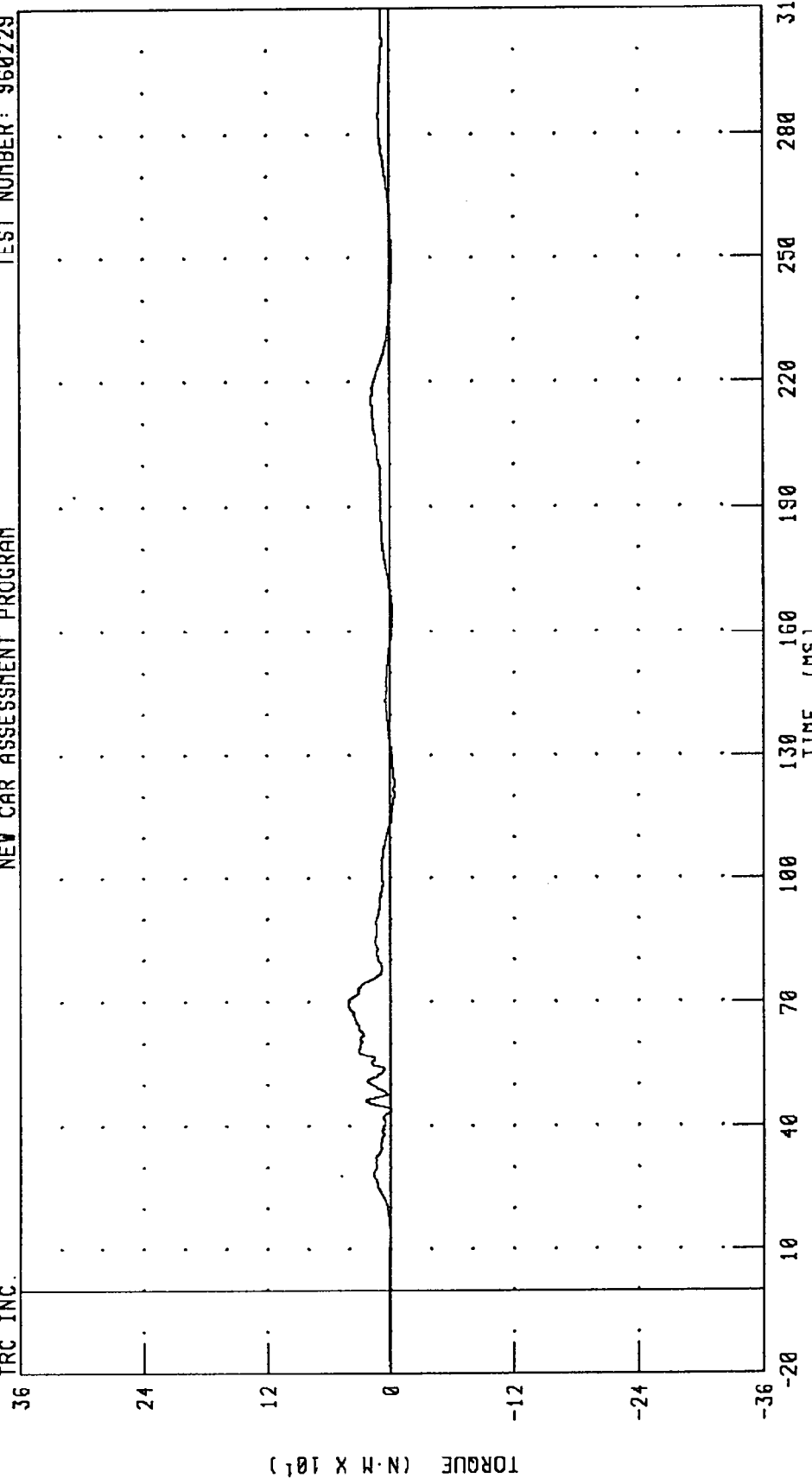
PEAK DATA: 58.54 G @ 58.32 MS; 0.01 G @ -20.00 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: TBLXM1 FILTER: CH. CLASS 600

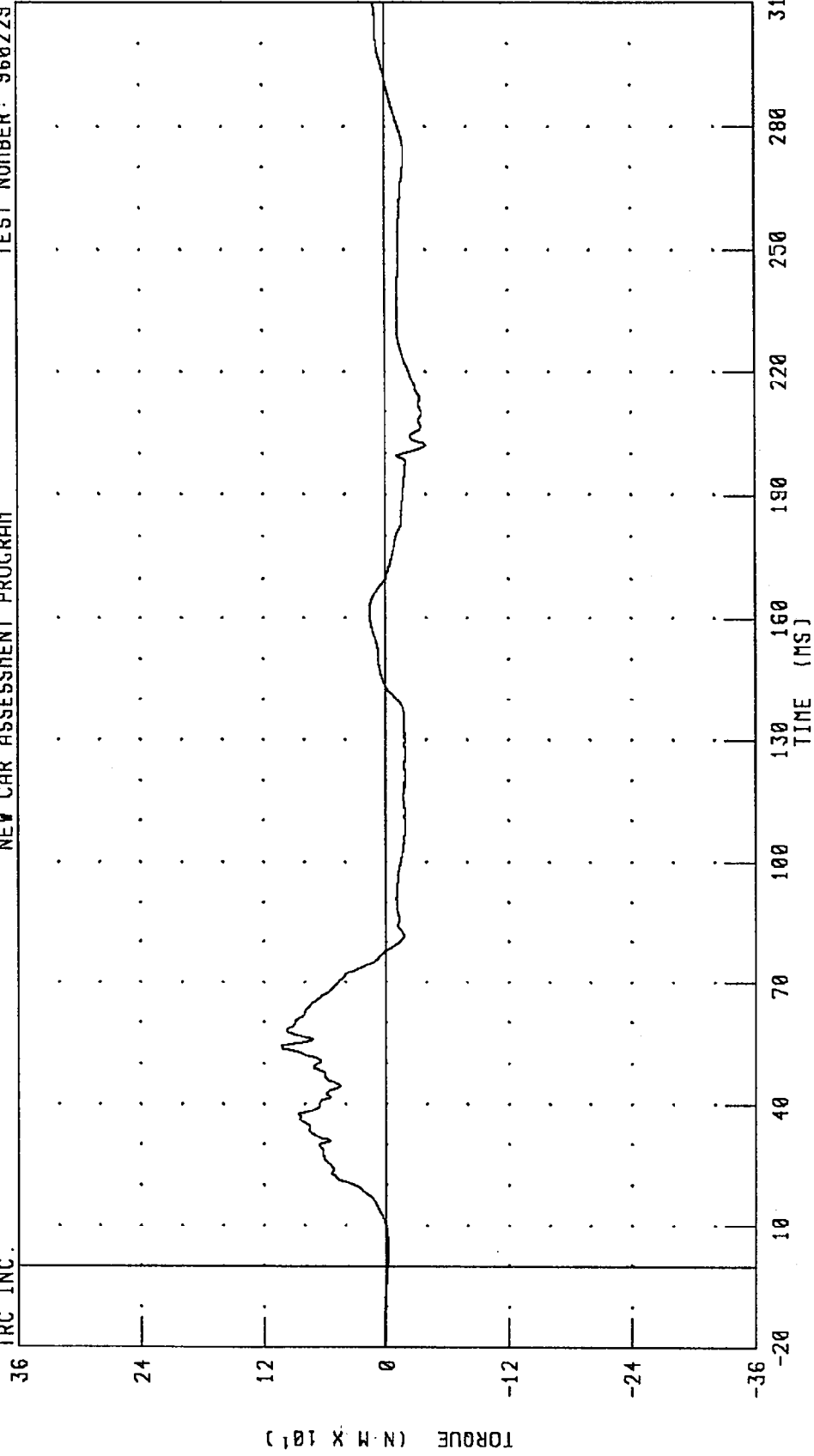
PEAK DATA: 40.91 N·m @ 69.60 MS; -4.02 N·m @ 123.52 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 102.67 N-M @ 53.76 MS; -39.52 N-M @ 202.16 MS

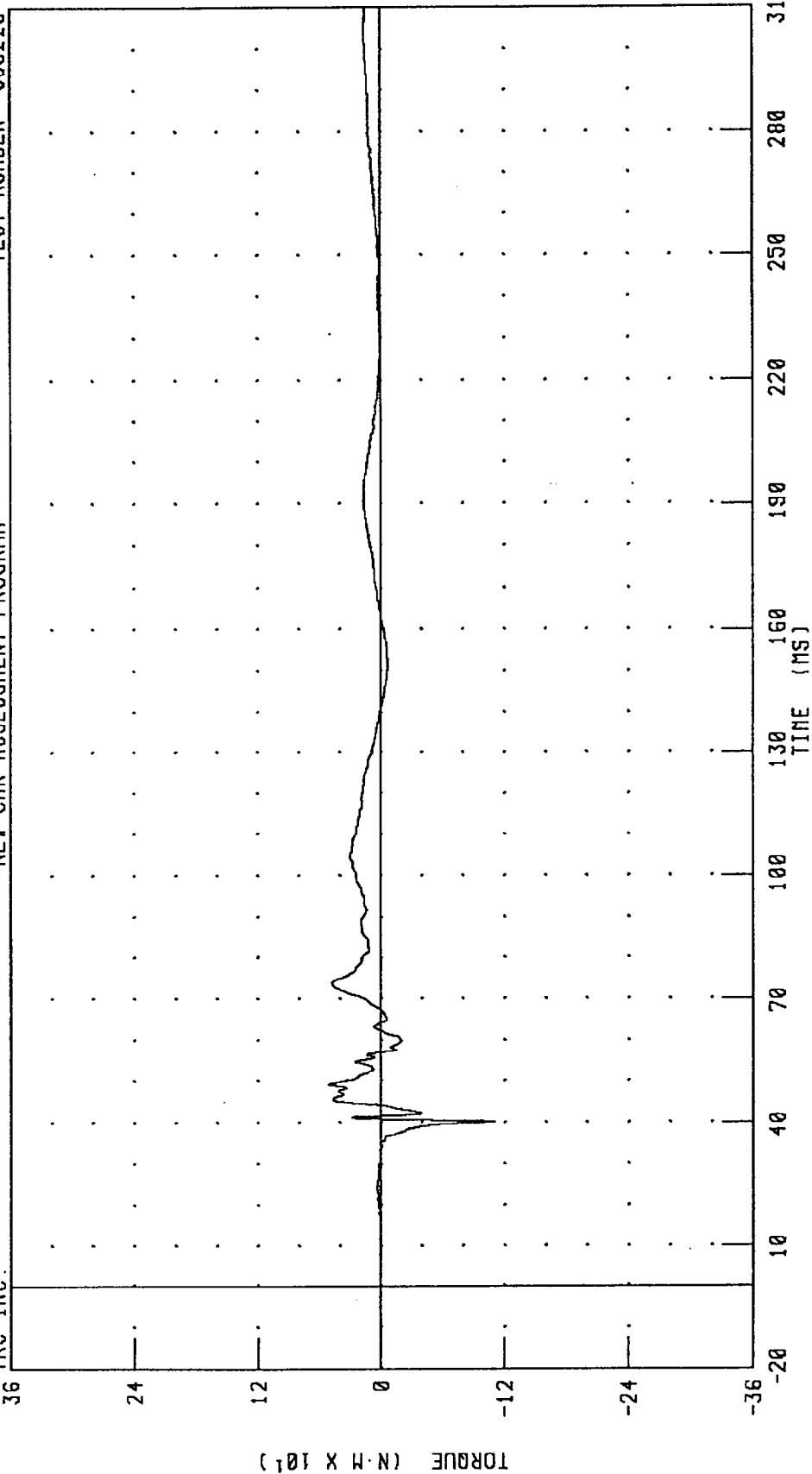
CHANNEL: TOLYM1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: TBRX11 FILTER: CH. CLASS 600

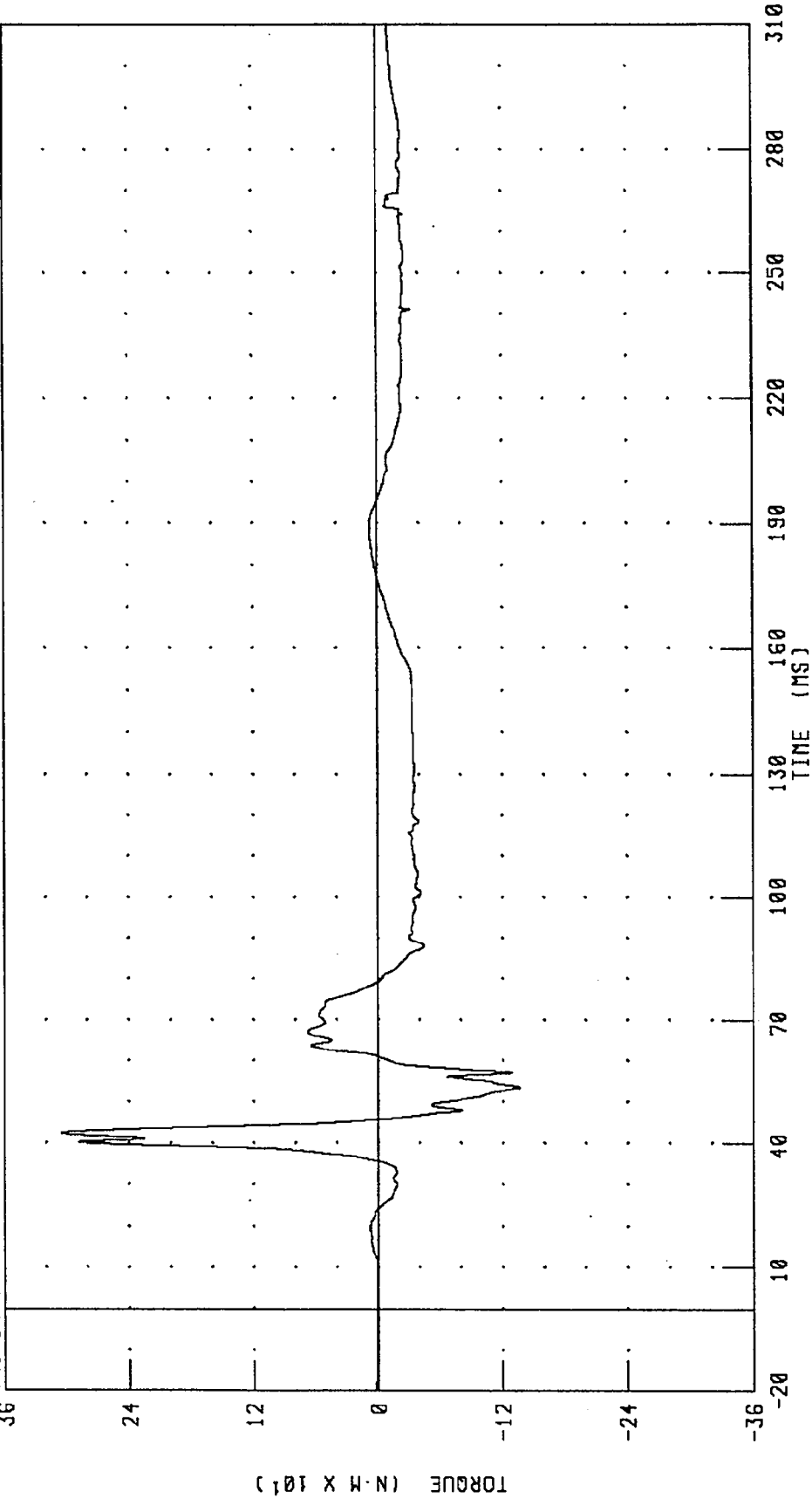
PEAK DATA: 51.00 N·m @ 49.12 MS; -110.52 N·m @ 40.24 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



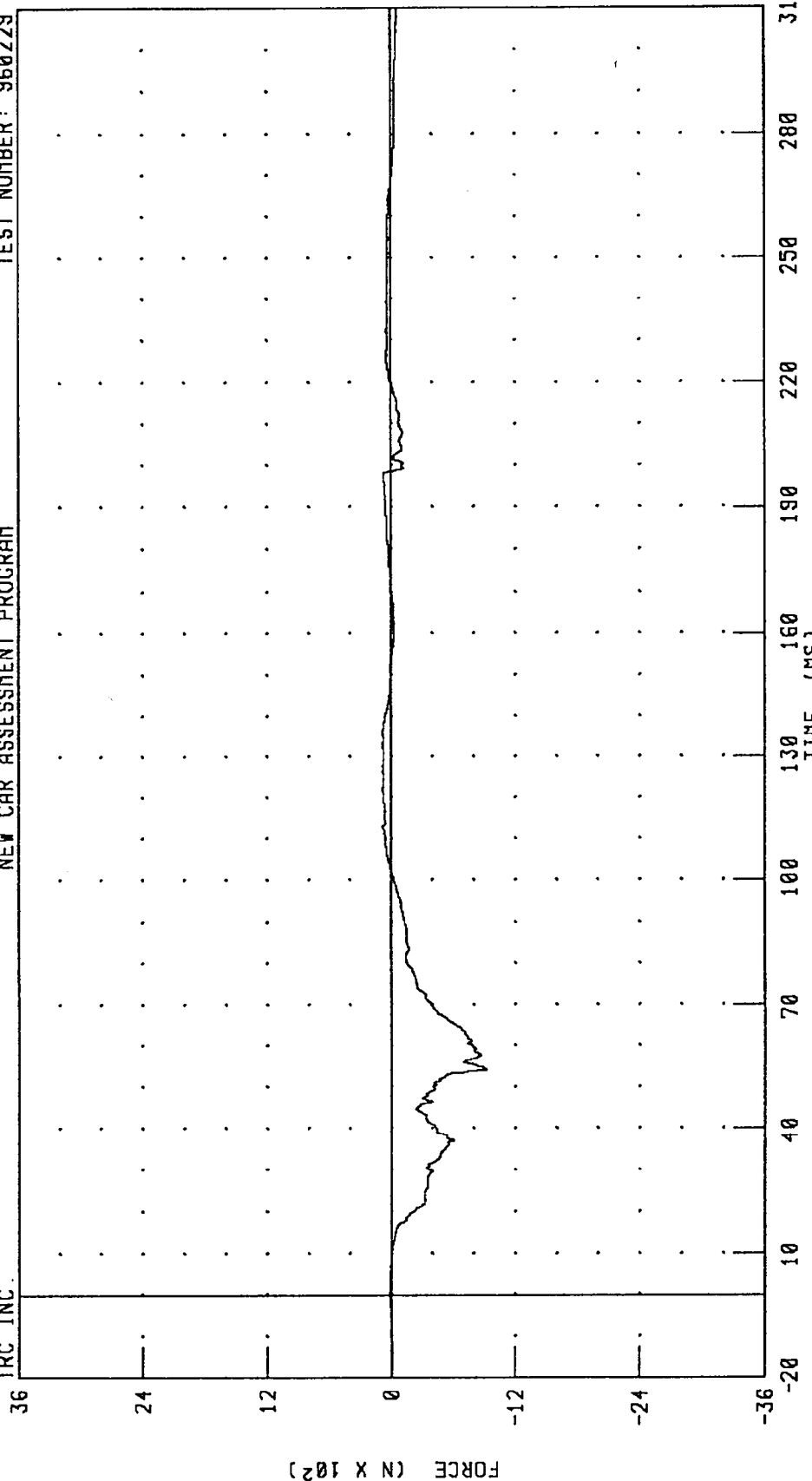
PEAK DATA: 305.04 N-M @ 42.40 MS; -136.21 N-M @ 53.44 MS

CHANNEL: TBRM1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER LEFT LOWER TIBIA X-AXIS FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: ANLXF1 FILTER: CH. CLASS 600

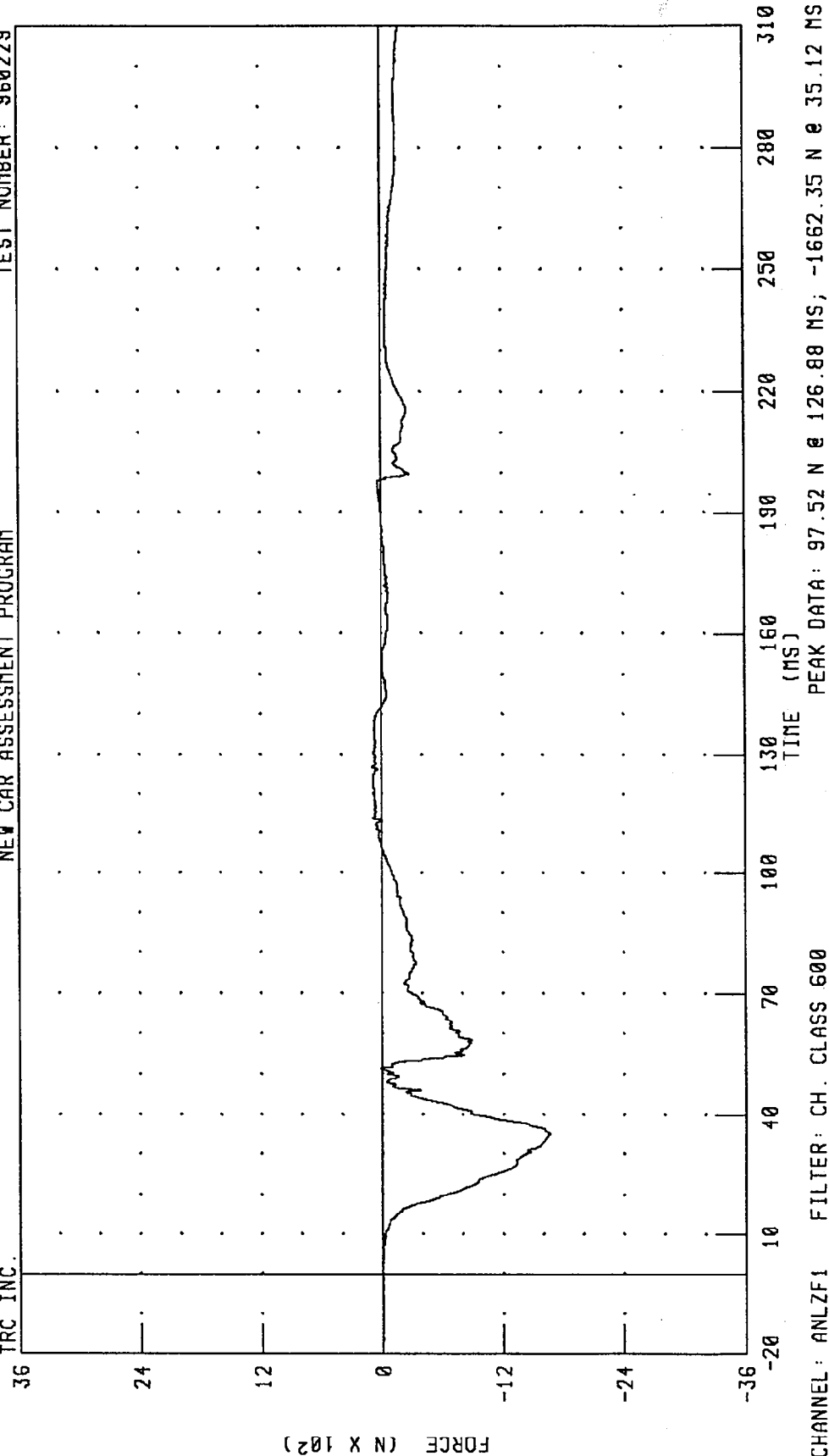
PEAK DATA: 85.55 N @ 126.32 MS; -918.84 N @ 54.08 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960228

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 97.52 N @ 126.88 MS; -1662.35 N @ 35.12 MS

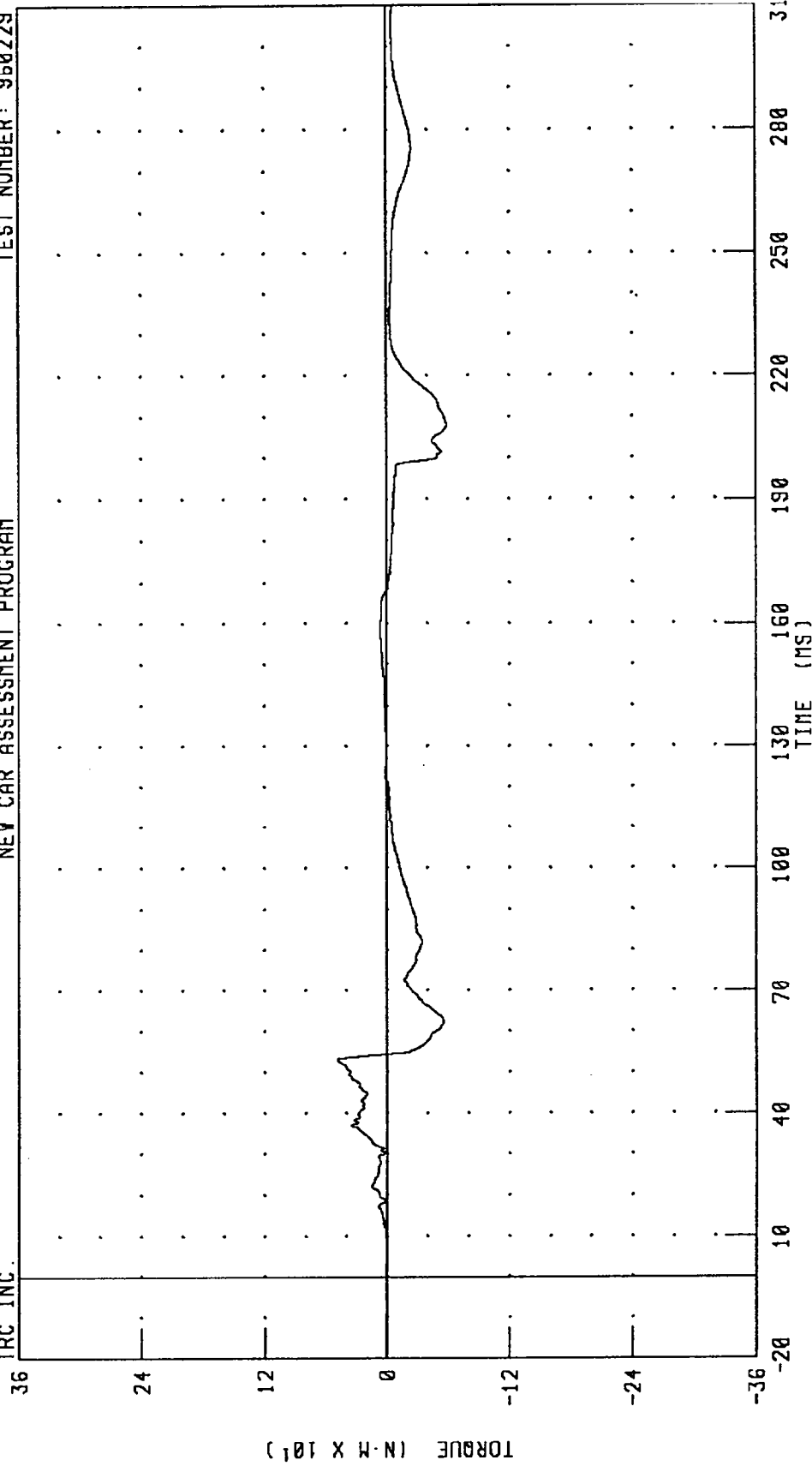
CHANNEL: ANLZF1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: ANLYM1 FILTER: CH. CLASS 600

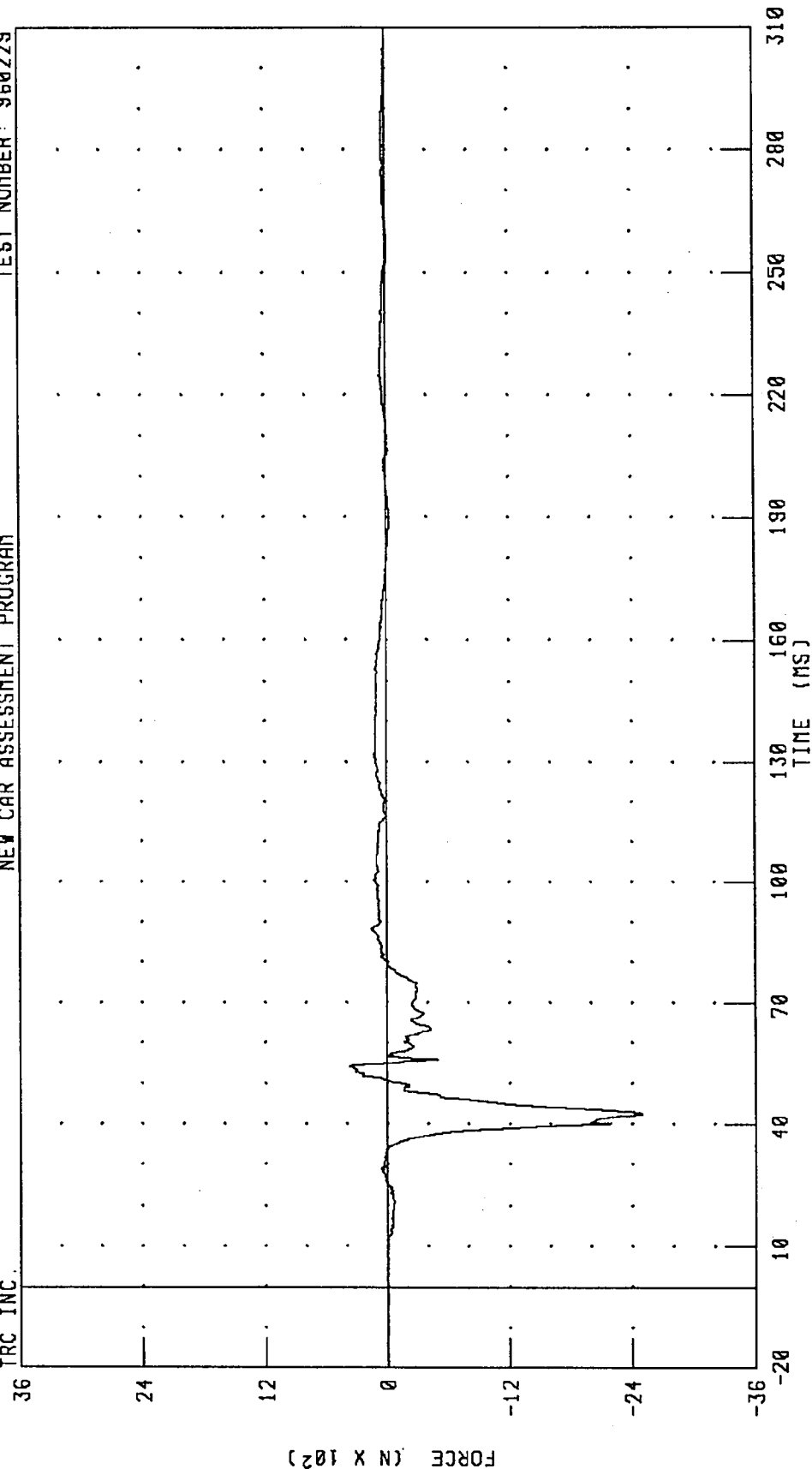
PEAK DATA: 49.24 N-M @ 52.96 MS; -58.52 N-M @ 208.08 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 364.65 N @ 54.16 MS; -2499.69 N @ 42.48 MS

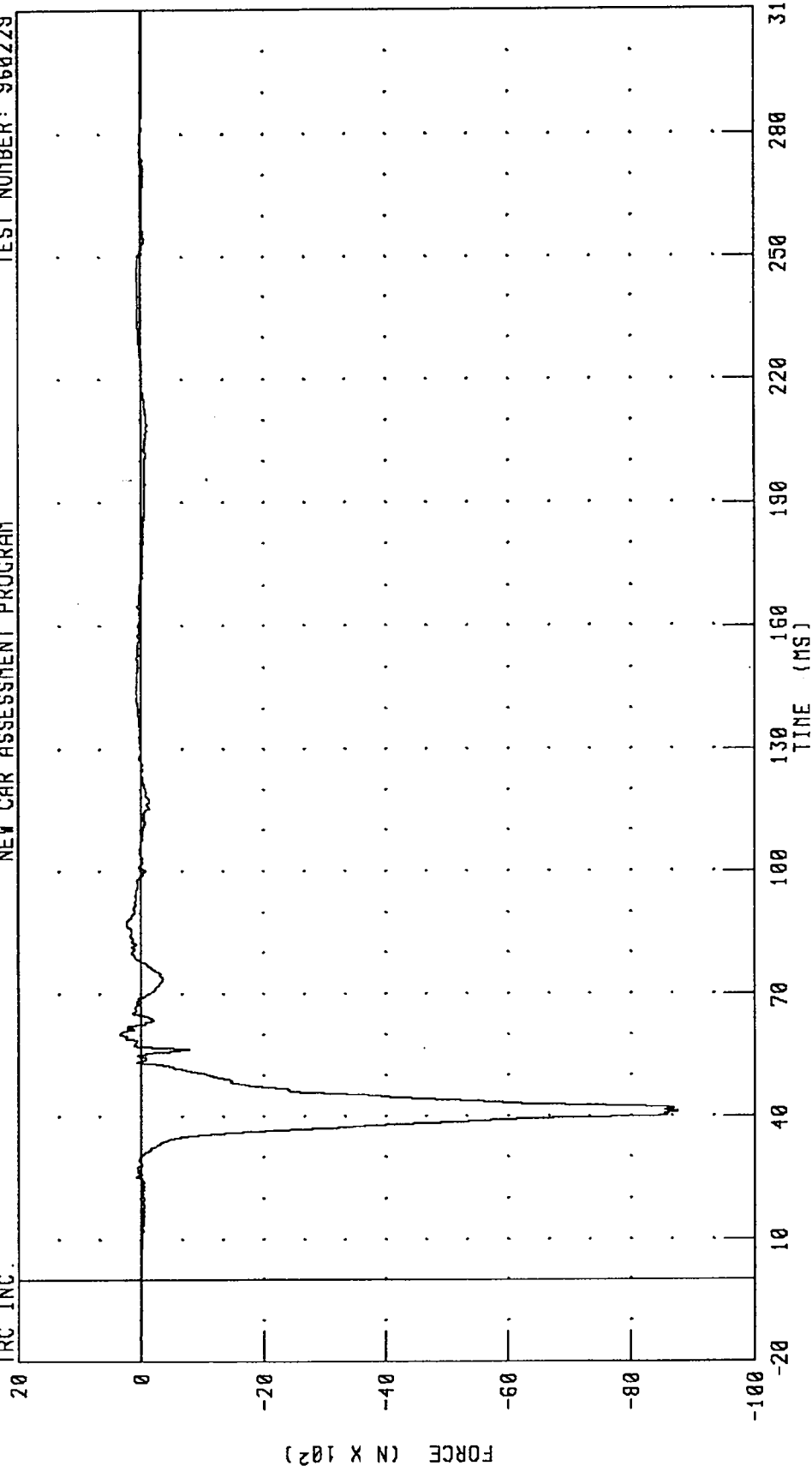
CHANNEL: ANRXF1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: ANRZF1 FILTER: CH. CLASS 600

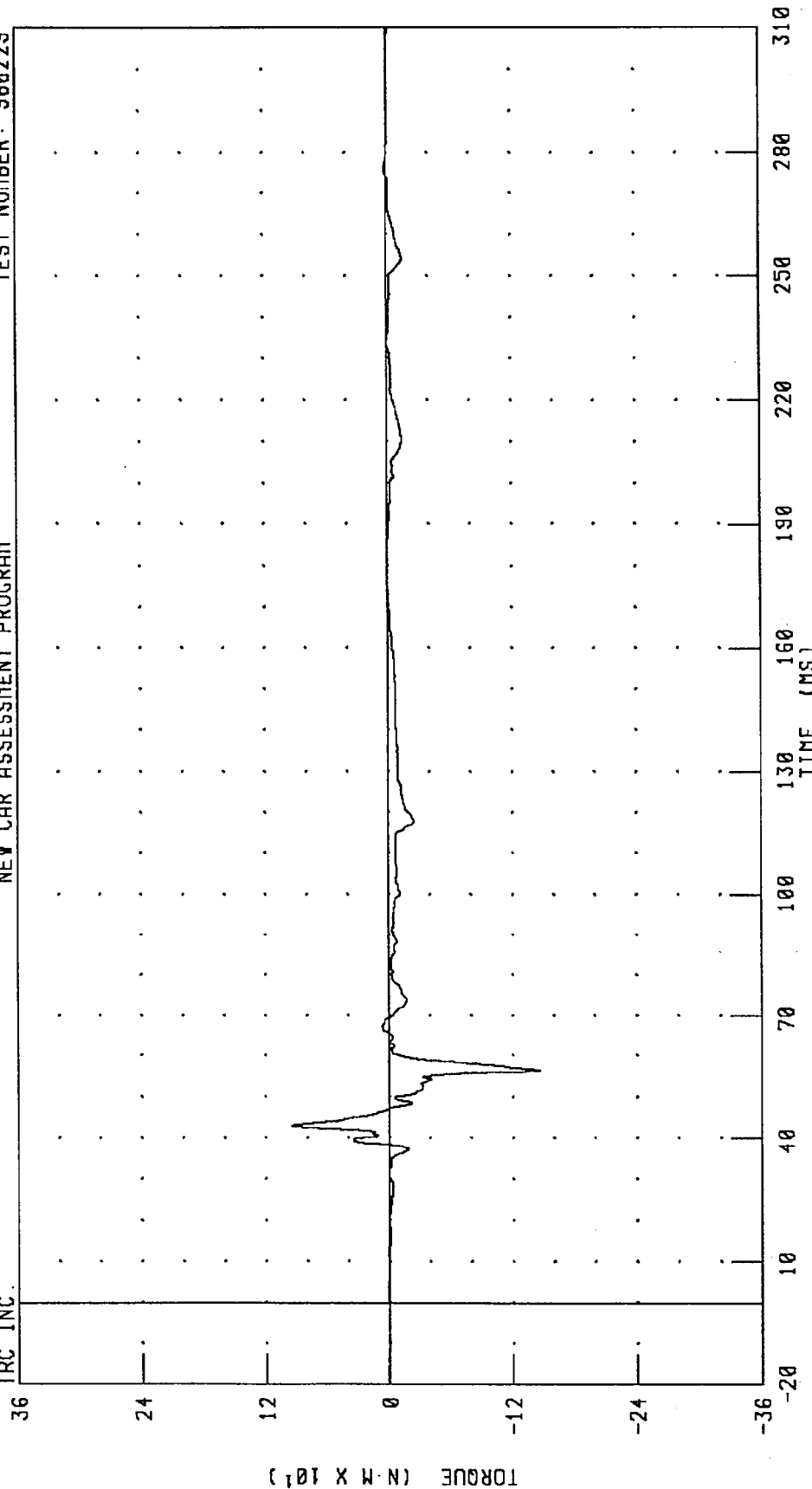
PEAK DATA: 329.88 N @ 60.24 MS; -8757.10 N @ 41.12 MS

1896 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

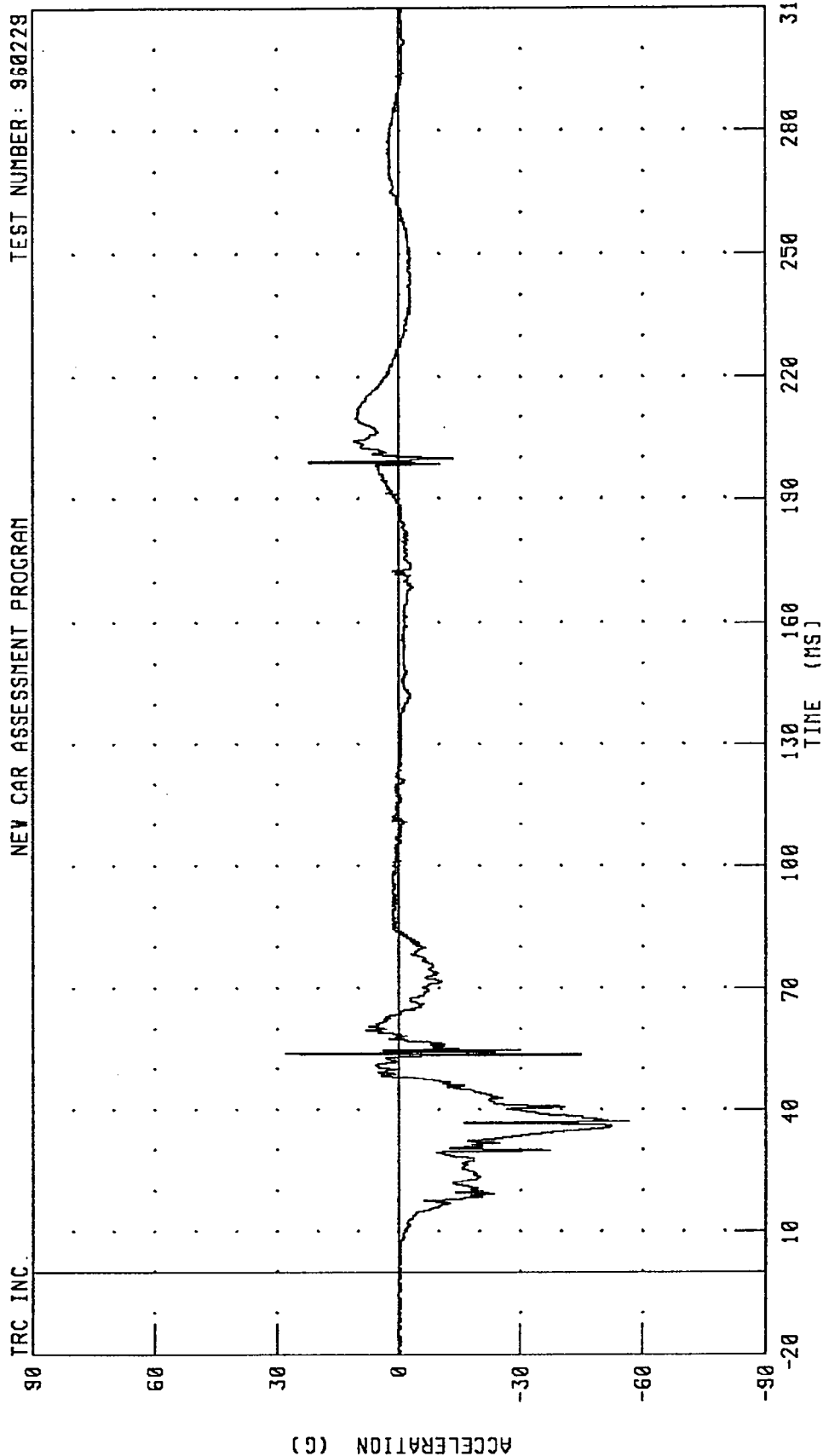


PEAK DATA: 95.16 N-M @ 42.96 MS; -146.67 N-M @ 56.40 MS

CHANNEL: ANRYM1 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER LEFT FOOT X-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



CHANNEL: FTLXG1 FILTER: CH. CLASS 1000

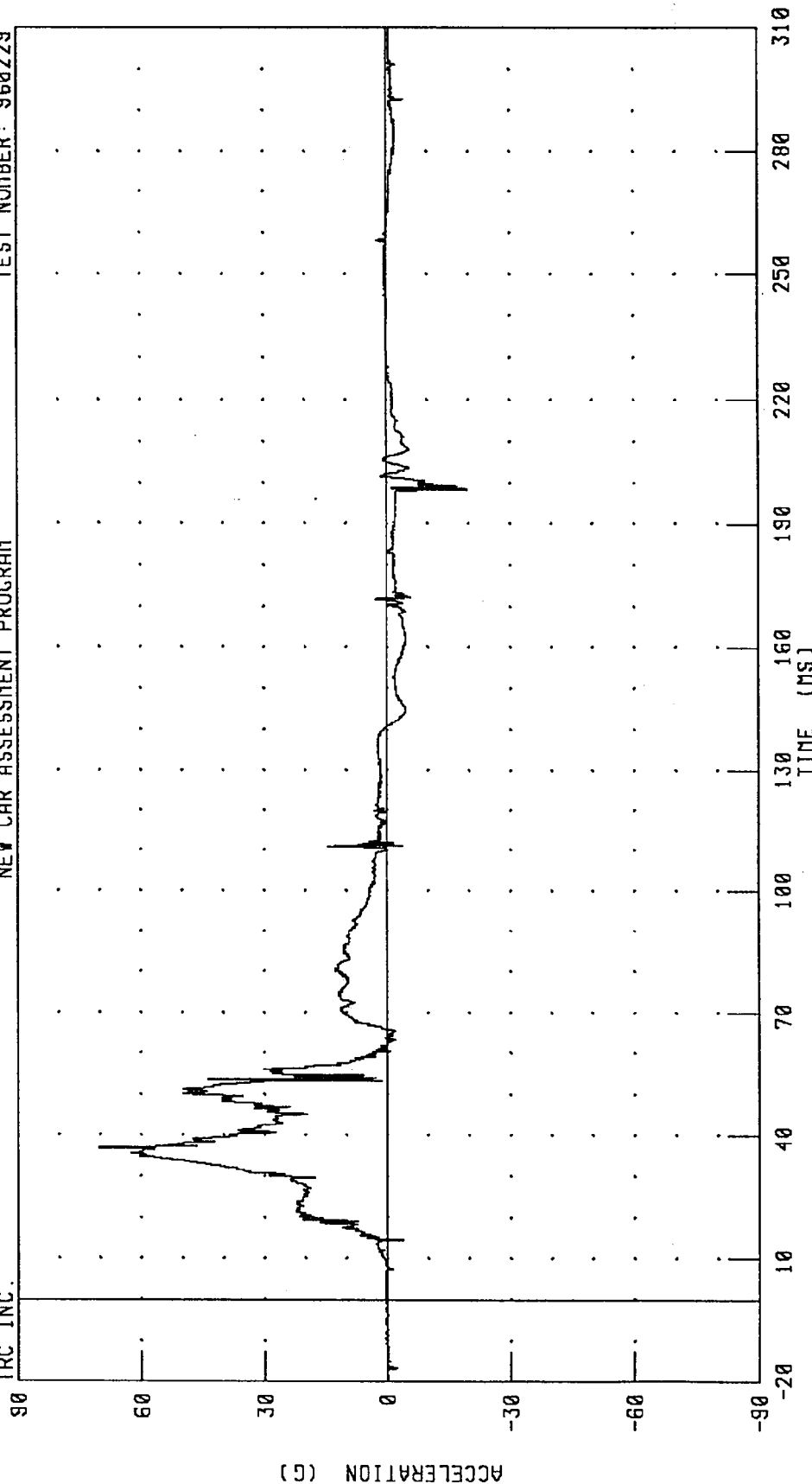
PEAK DATA: 27.94 G @ 53.68 MS; -56.64 G @ 37.20 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT HEEL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 70.33 G @ 36.80 MS; -19.58 G @ 198.56 MS

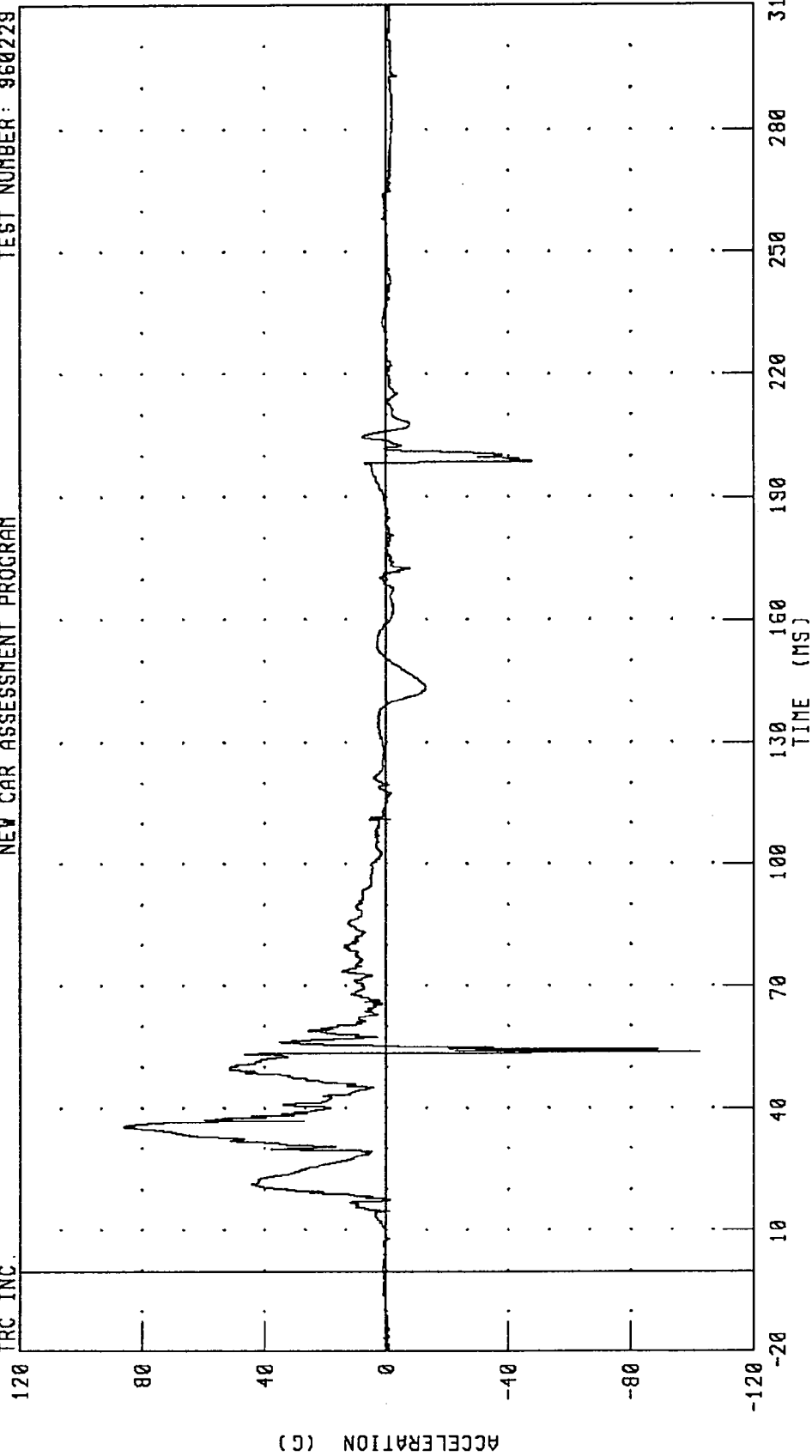
CHANNEL: FTLZH1 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LEFT FOOT Z-AXIS ACCELERATION AT TOE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: FTLZT1 FILTER: CH. CLASS 1000

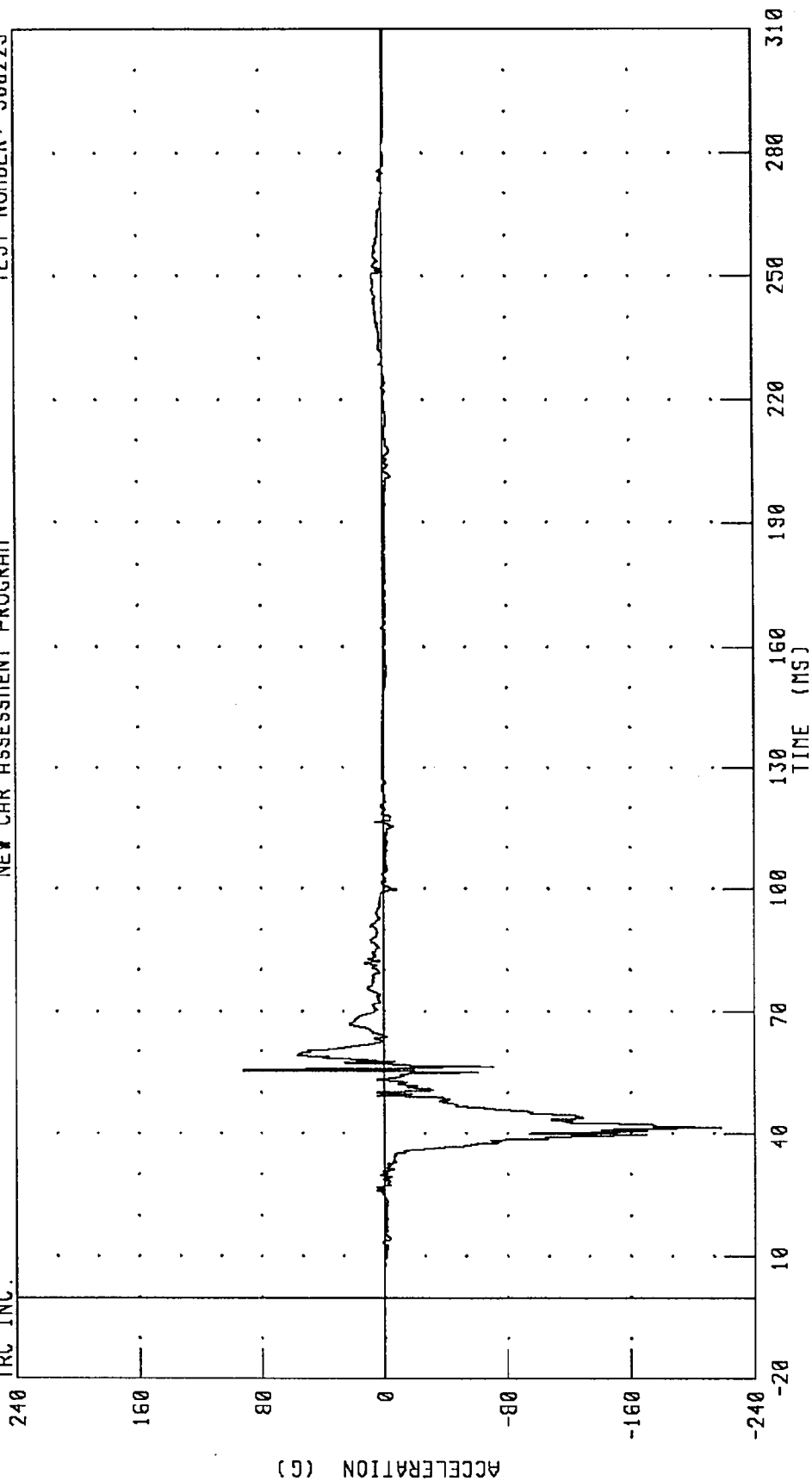
PEAK DATA: 86.20 G @ 35.36 MS; -102.21 G @ 102.21 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT FOOT X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

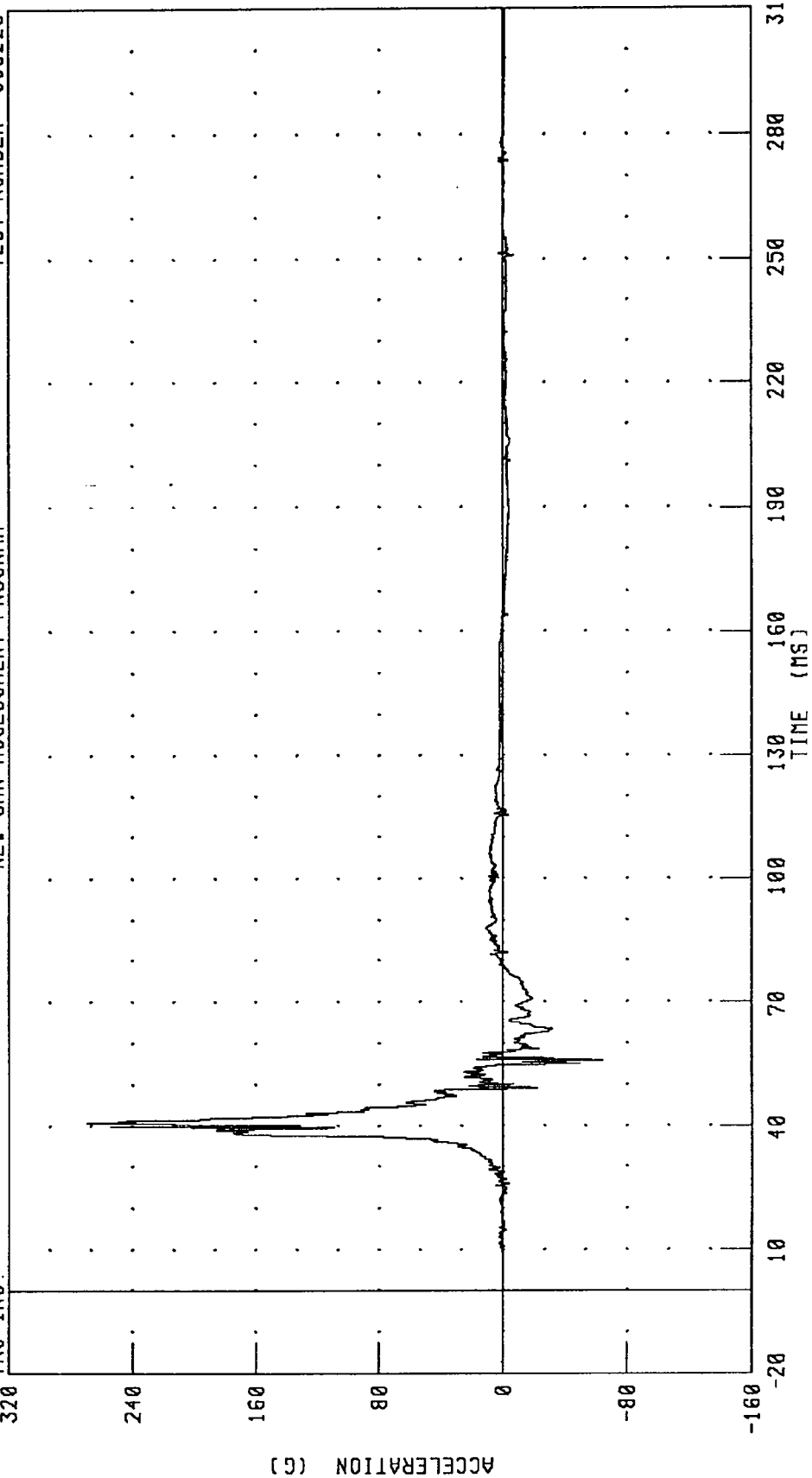


1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT HEEL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: FTRZH1 FILTER: CH. CLASS 1000

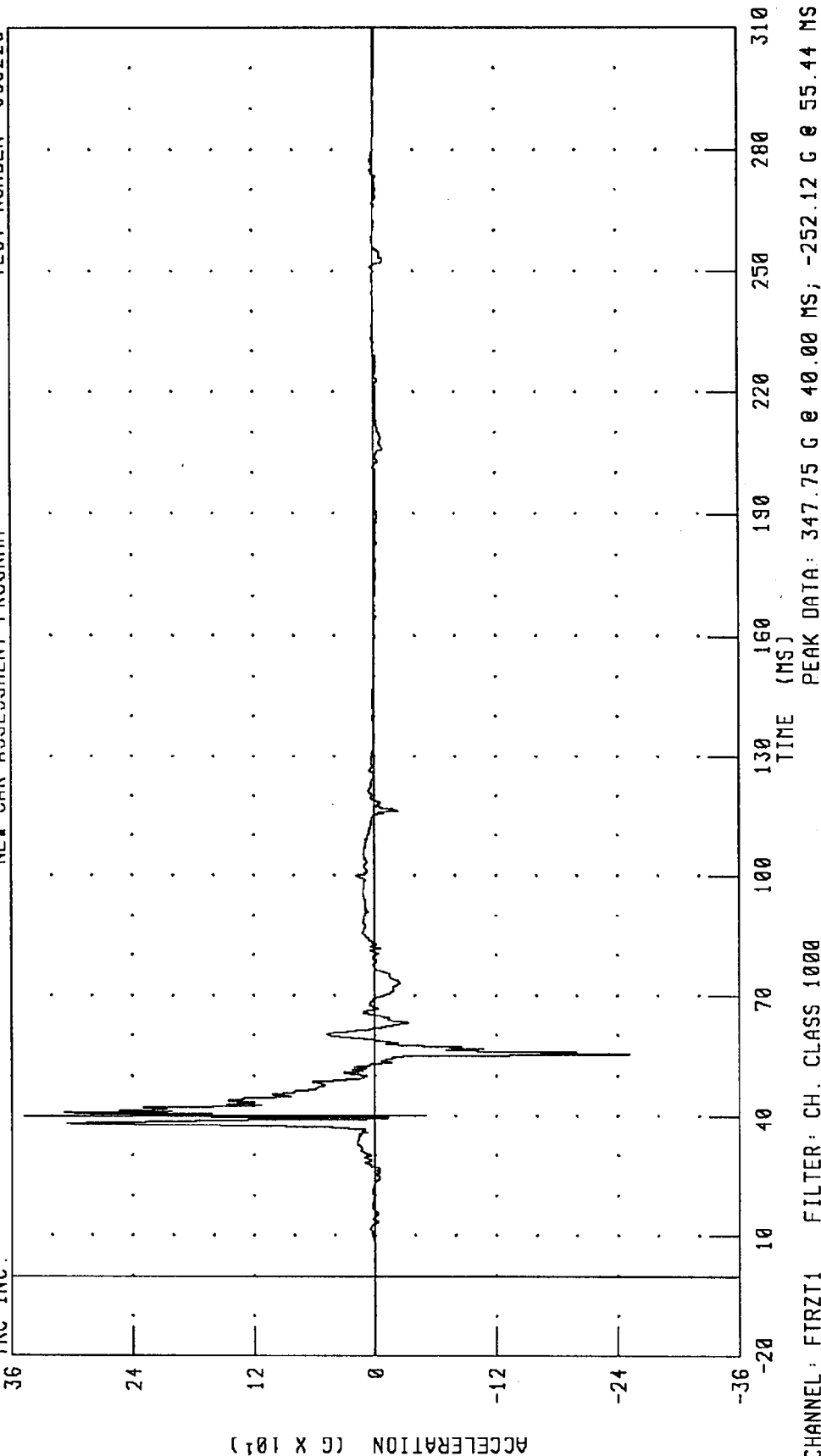
PEAK DATA: 269.24 G @ 40.88 MS; -64.36 G @ 55.76 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER RIGHT FOOT Z-AXIS ACCELERATION AT TOE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



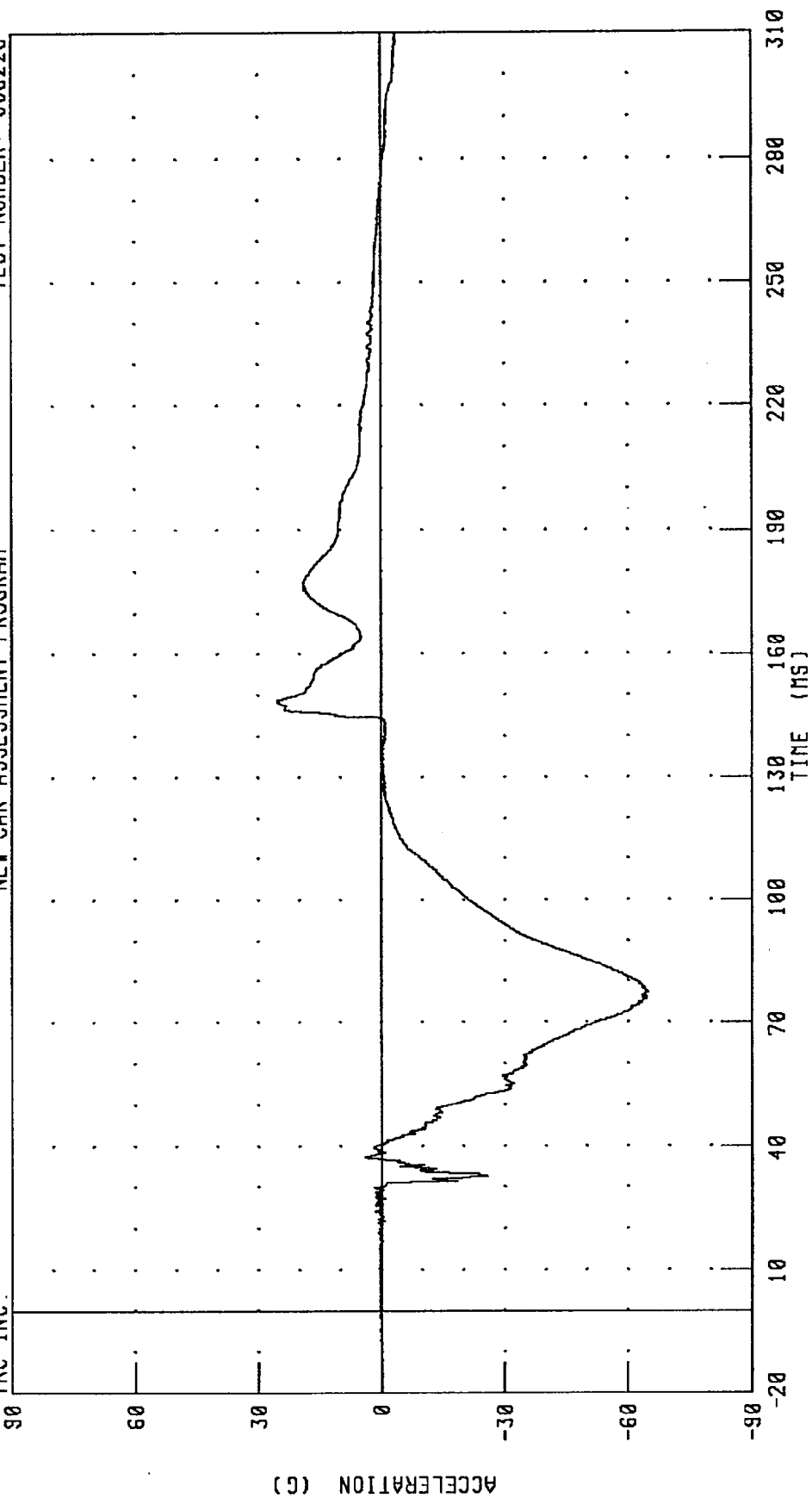
CHANNEL: FTRZT1 FILTER: CH. CLASS 1000

PEAK DATA: 347.75 G @ 40.00 MS; -252.12 G @ 55.44 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

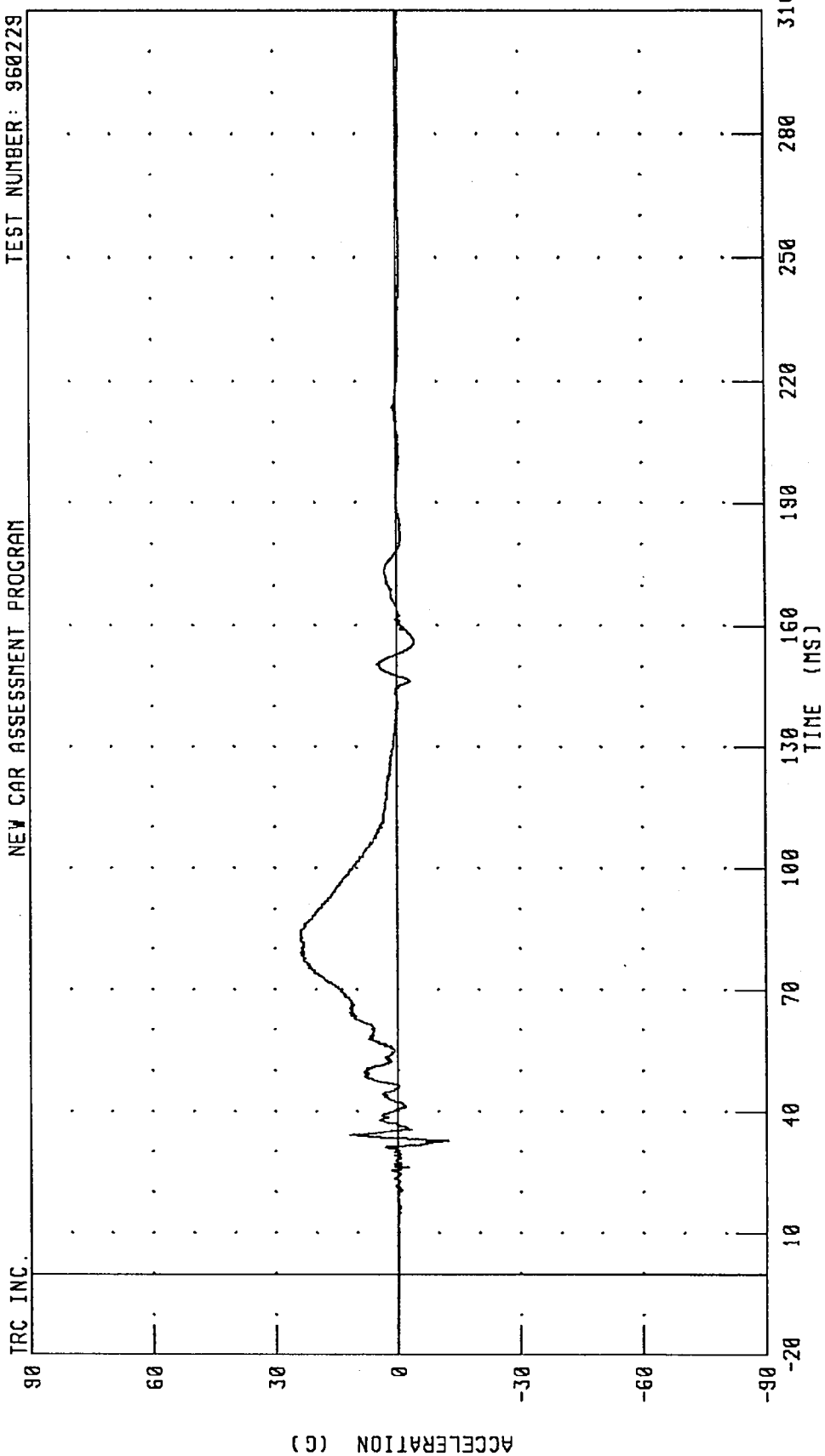
TRC INC.



CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

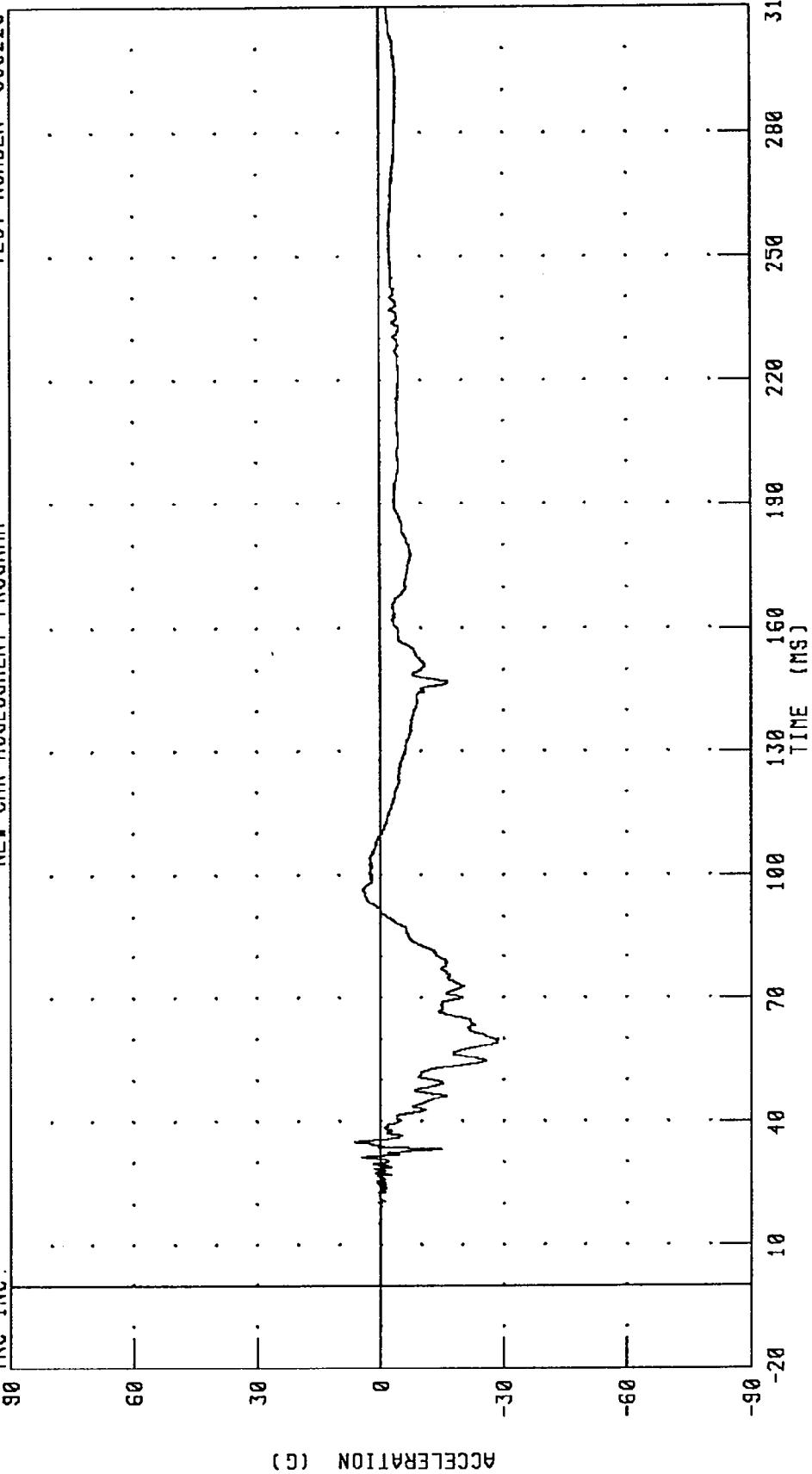
PEAK DATA: 23.96 G @ 81.92 MS; -12.40 G @ 32.72 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

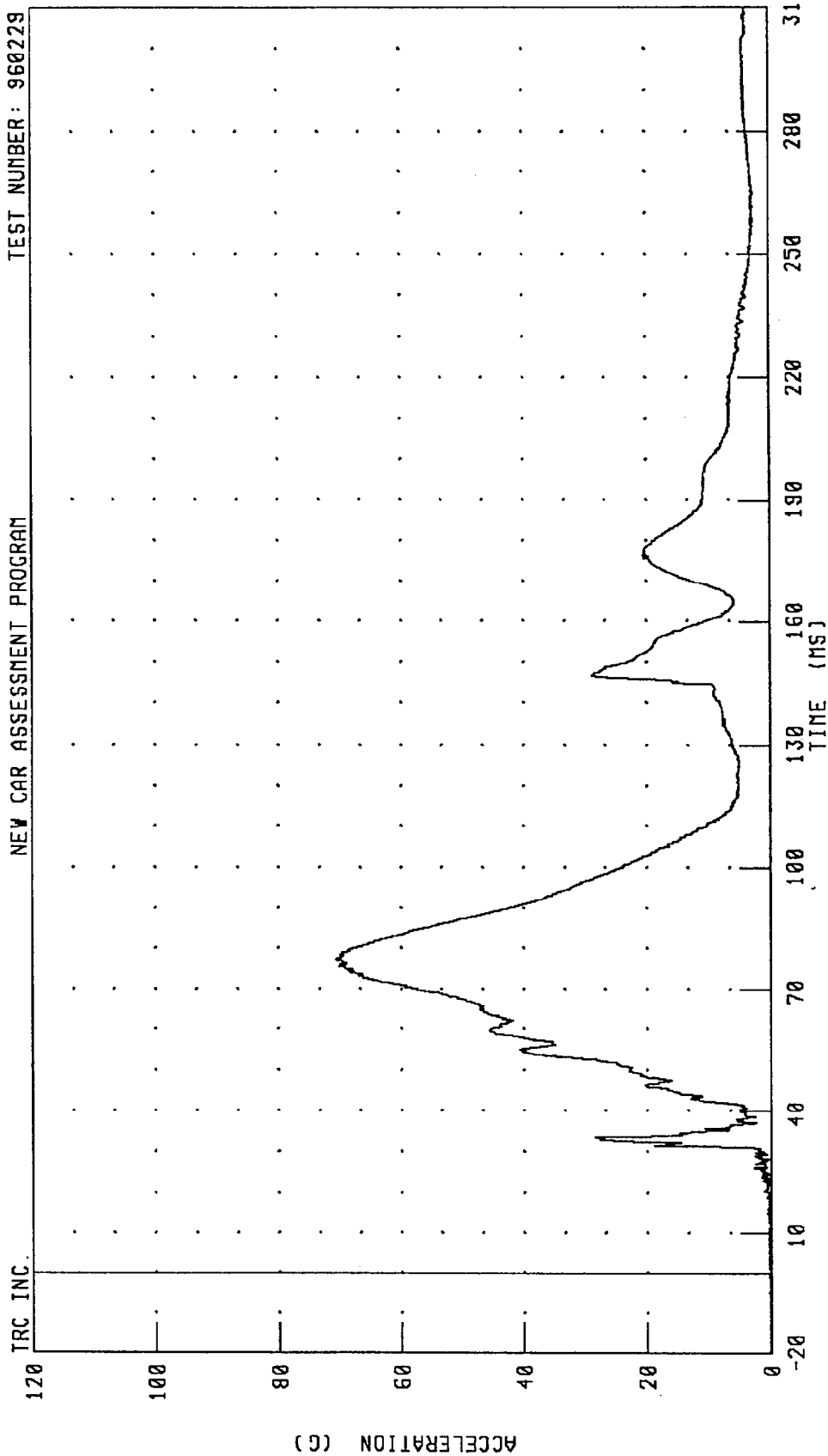


CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 6.40 G @ 35.12 MS; -28.71 G @ 59.92 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

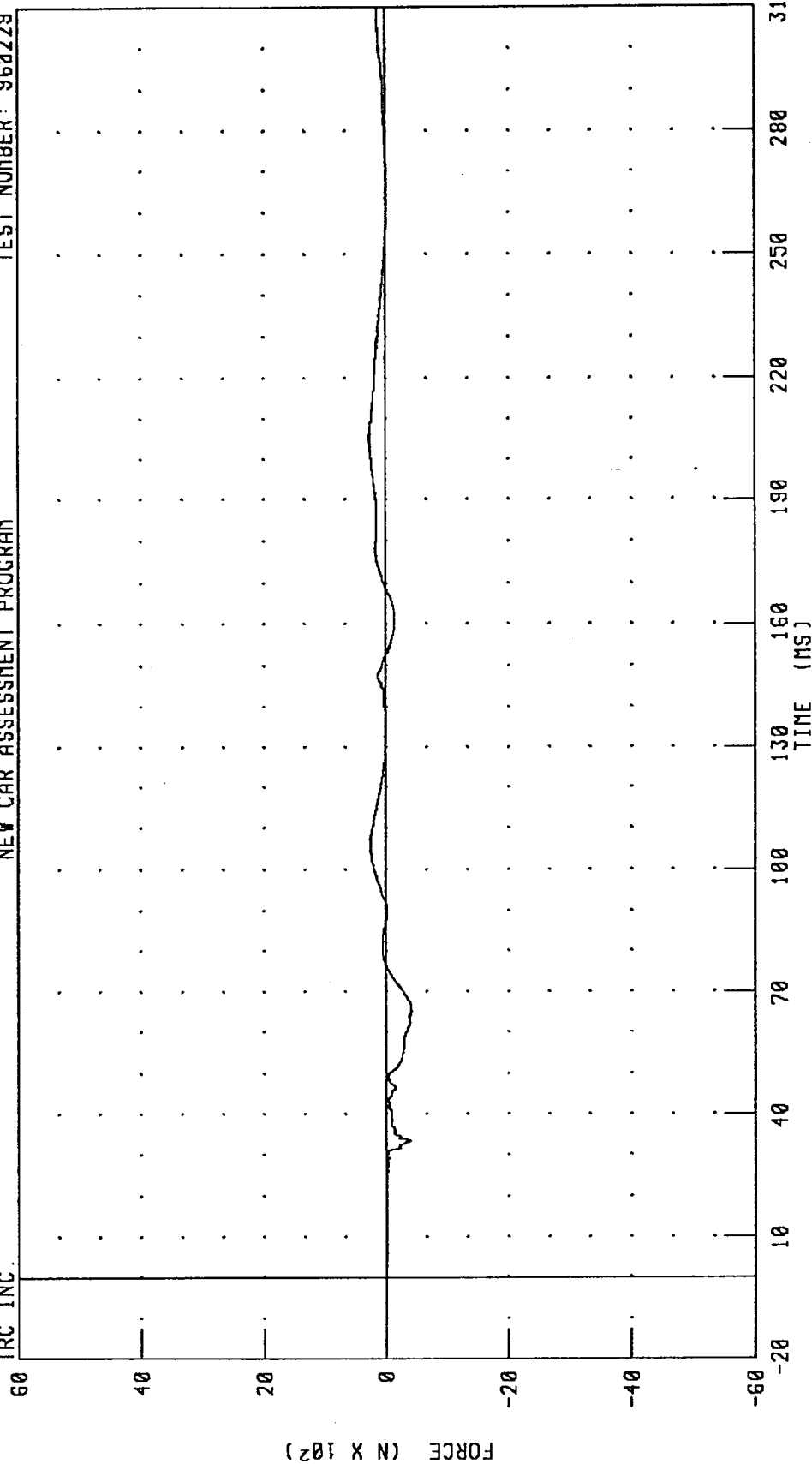
PEAK DATA: 70.62 G @ 77.36 MS; 0.14 G @ 146.62 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

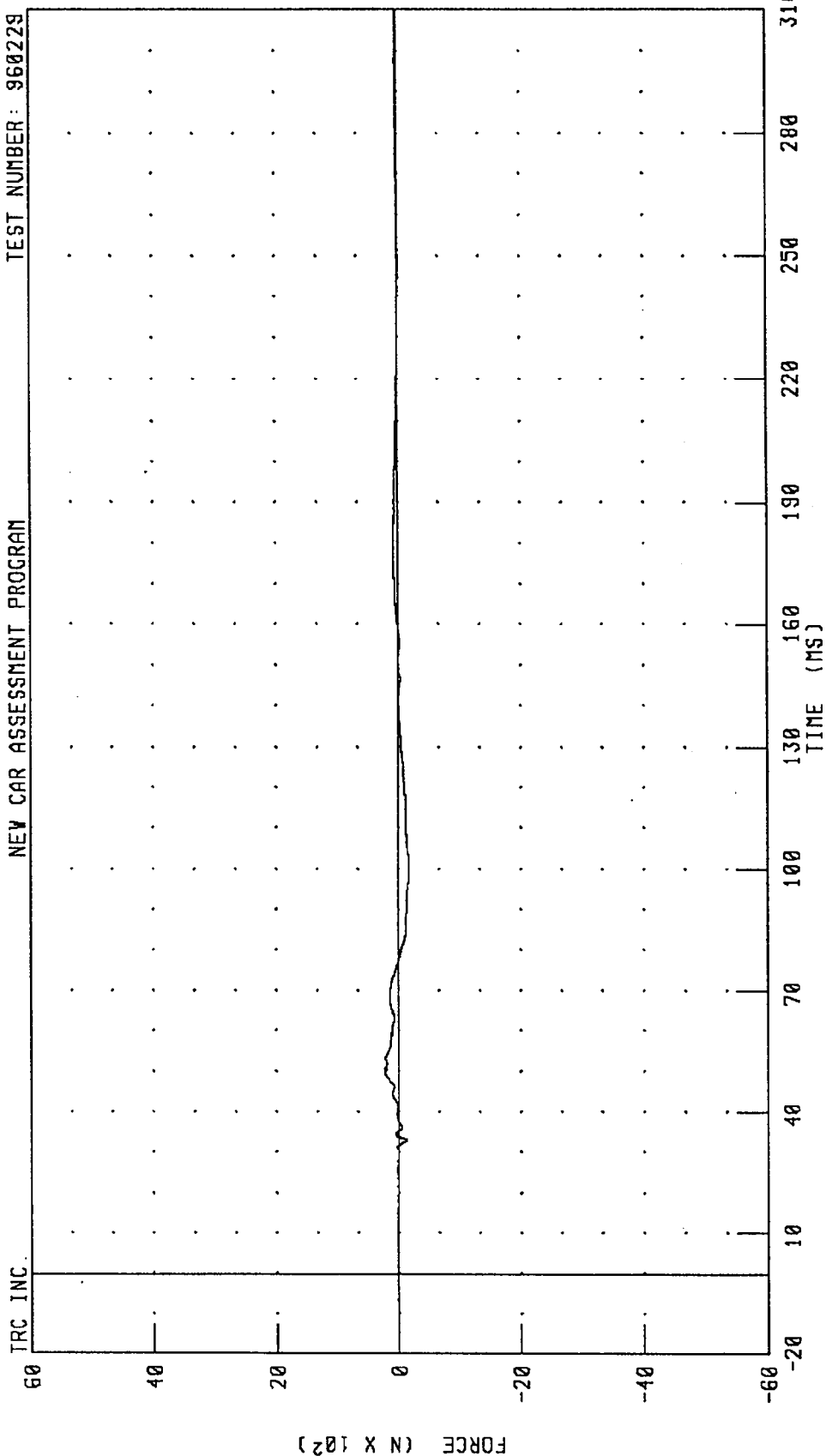


PEAK DATA: 264.95 N @ 204.16 MS; -417.39 N @ 65.44 MS

CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Y-AXIS SHEAR FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 233.37 N @ 50.72 MS; -175.29 N @ 99.28 MS

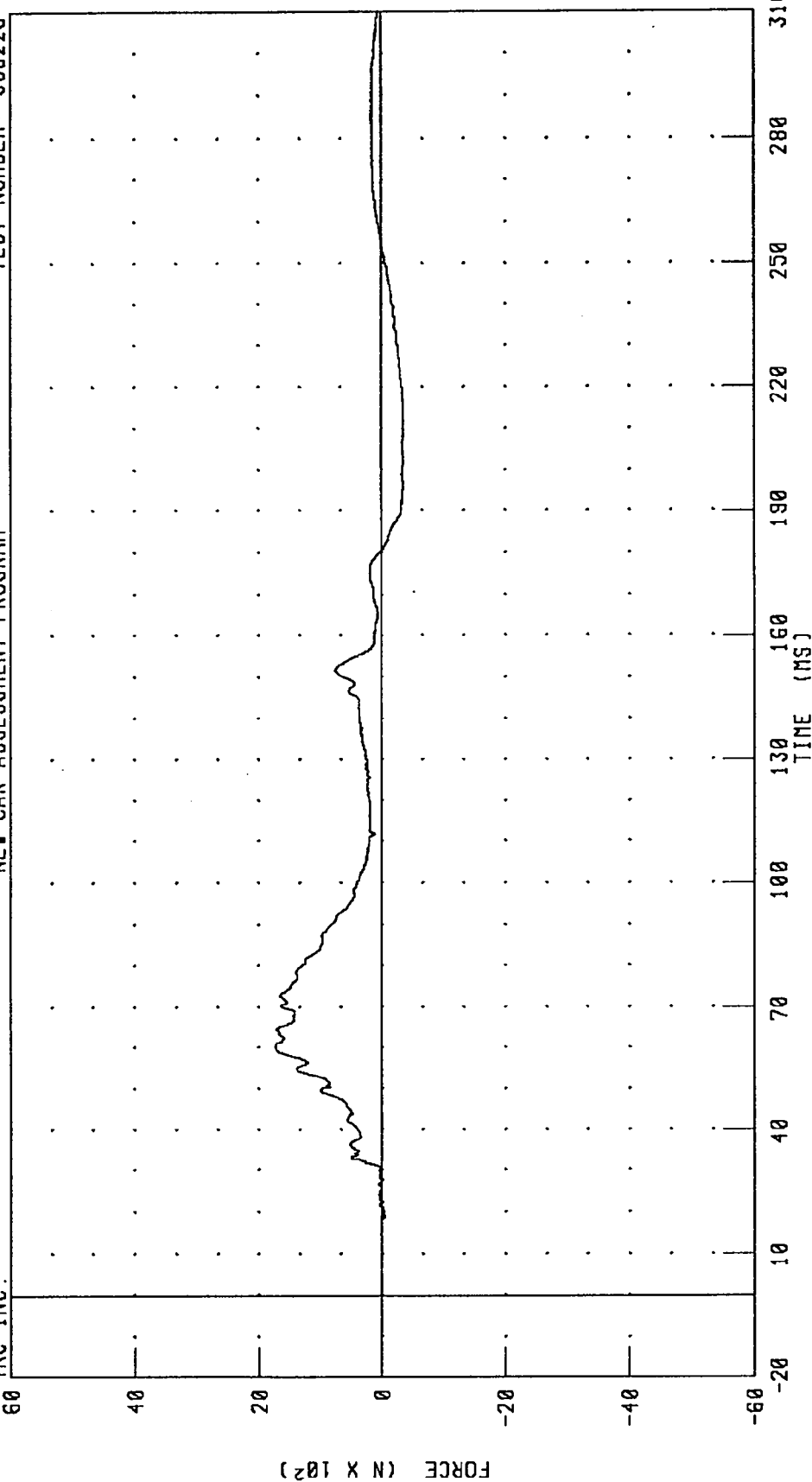
CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 1737.62 N @ 60.00 MS; -362.21 N @ 202.16 MS

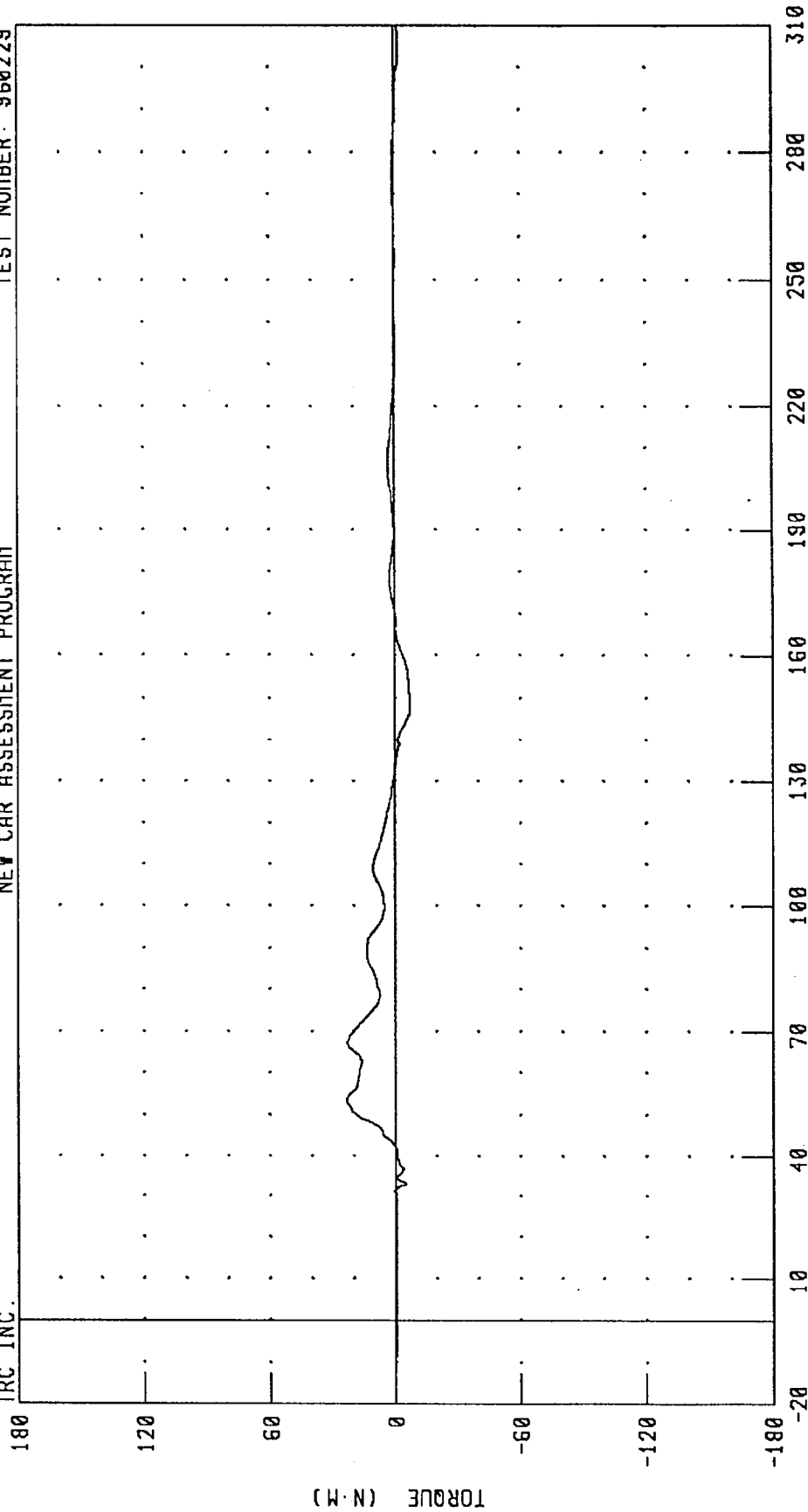
CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: NEKXN2 FILTER: CH. CLASS 600

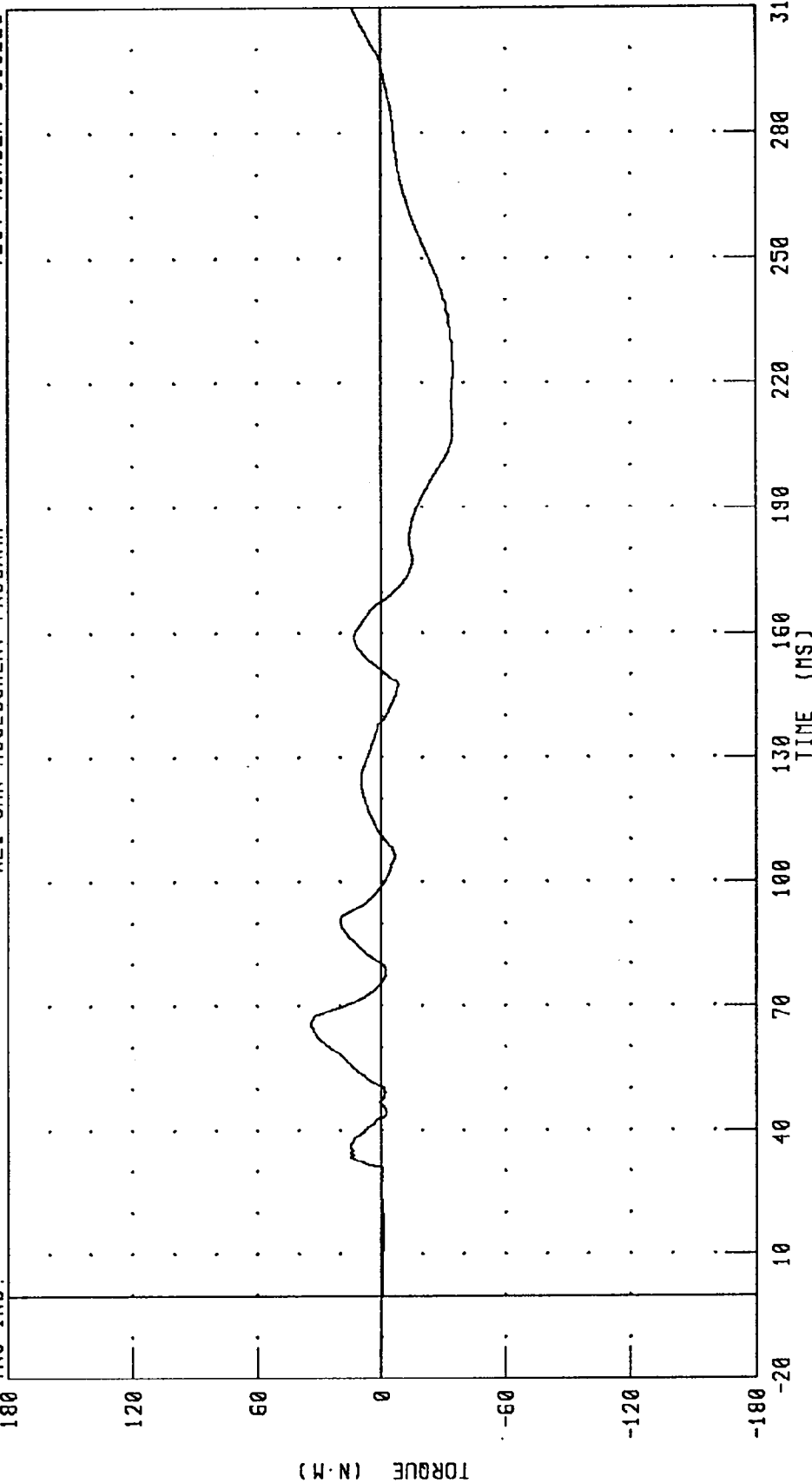
PEAK DATA: 23.64 N·M @ 53.44 MS; -7.31 N·M @ 147.52 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 34.16 N.M @ 65.44 MS; -35.02 N.M @ 222.96 MS

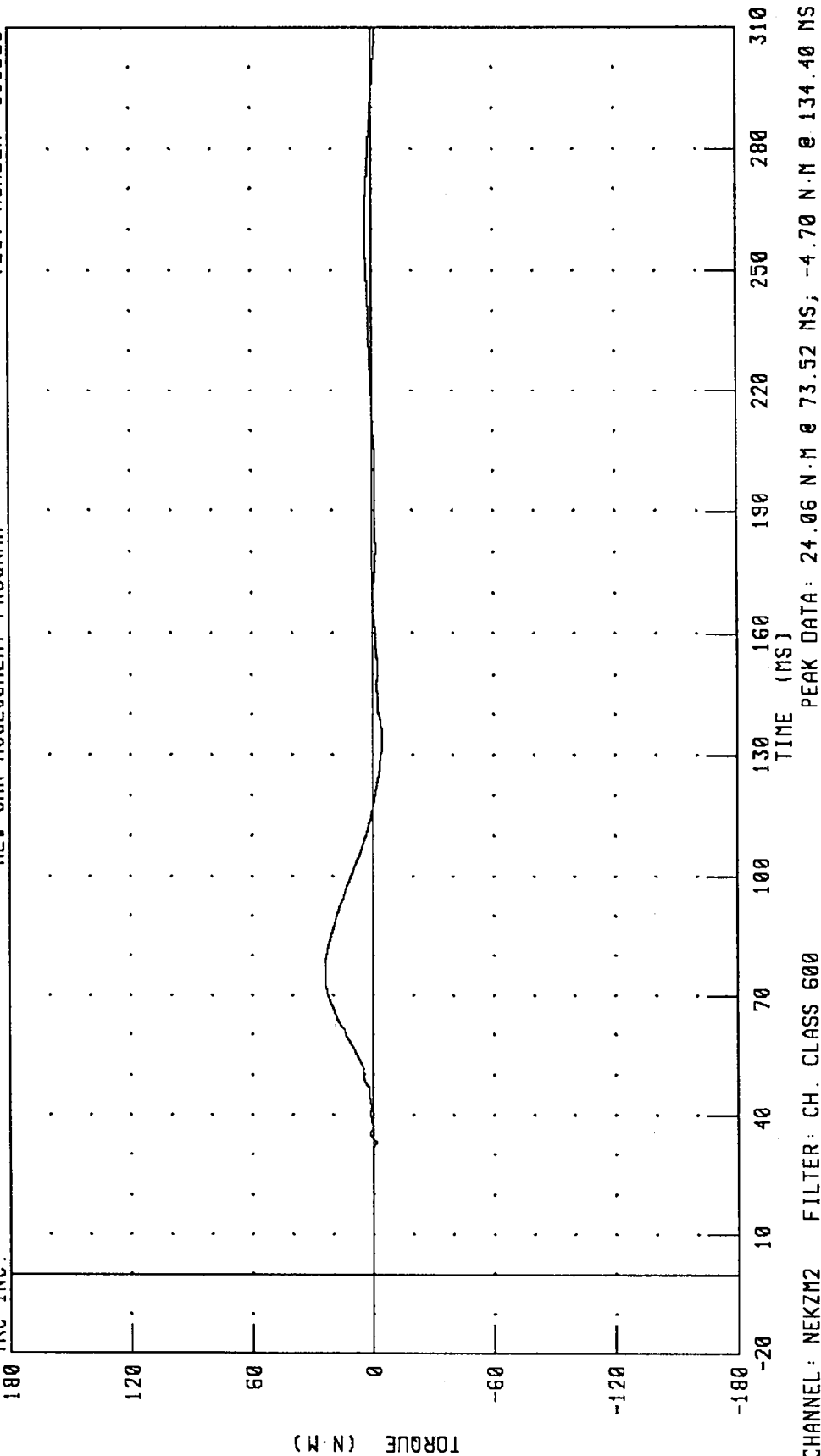
CHANNEL: NEKYM2 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: NEKZM2 FILTER: CH. CLASS 600

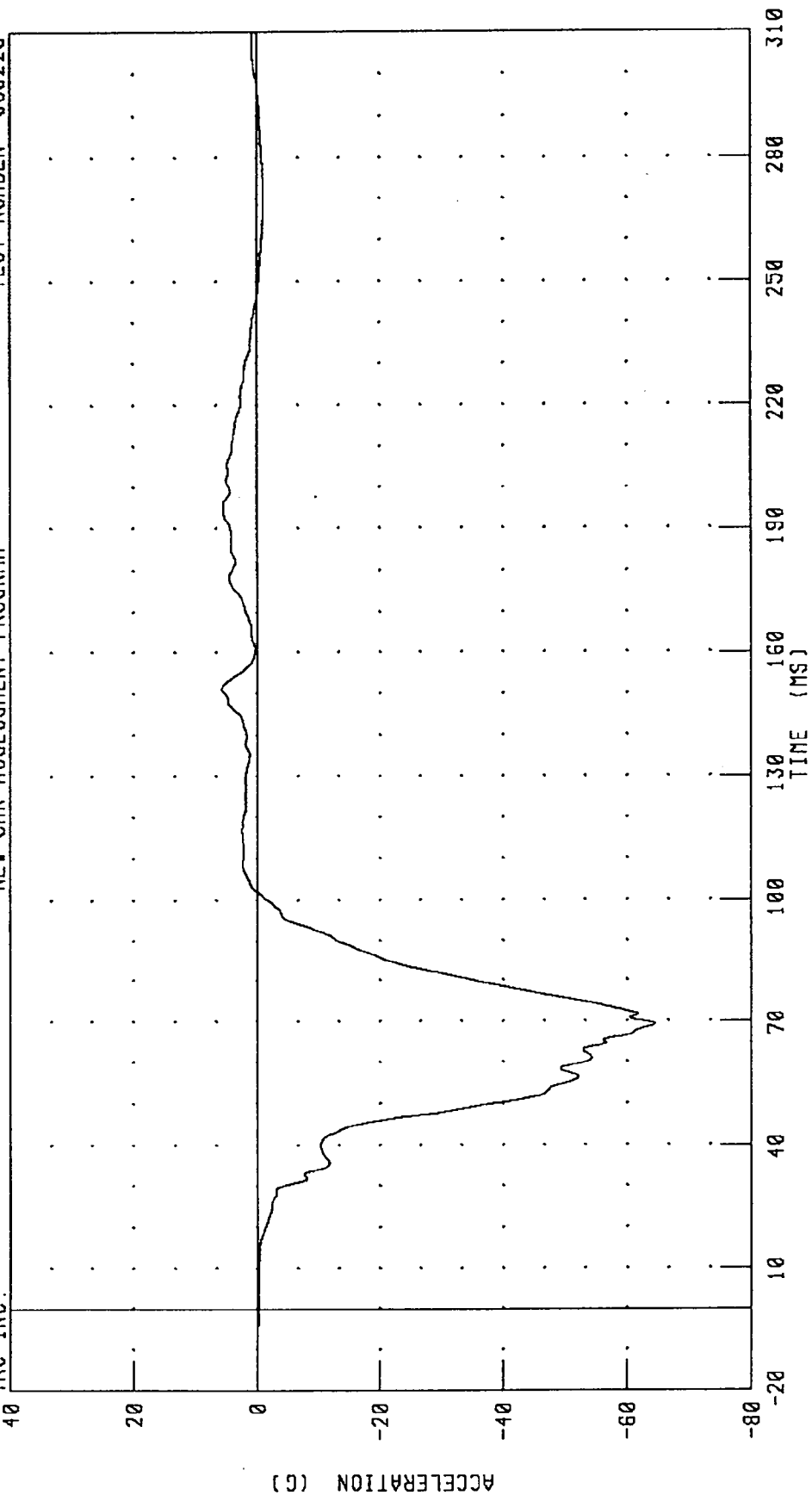
PEAK DATA: 24.06 N-M @ 73.52 MS; -4.70 N-M @ 134.40 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 5.70 G @ 151.12 MS; -64.56 G @ 69.28 MS

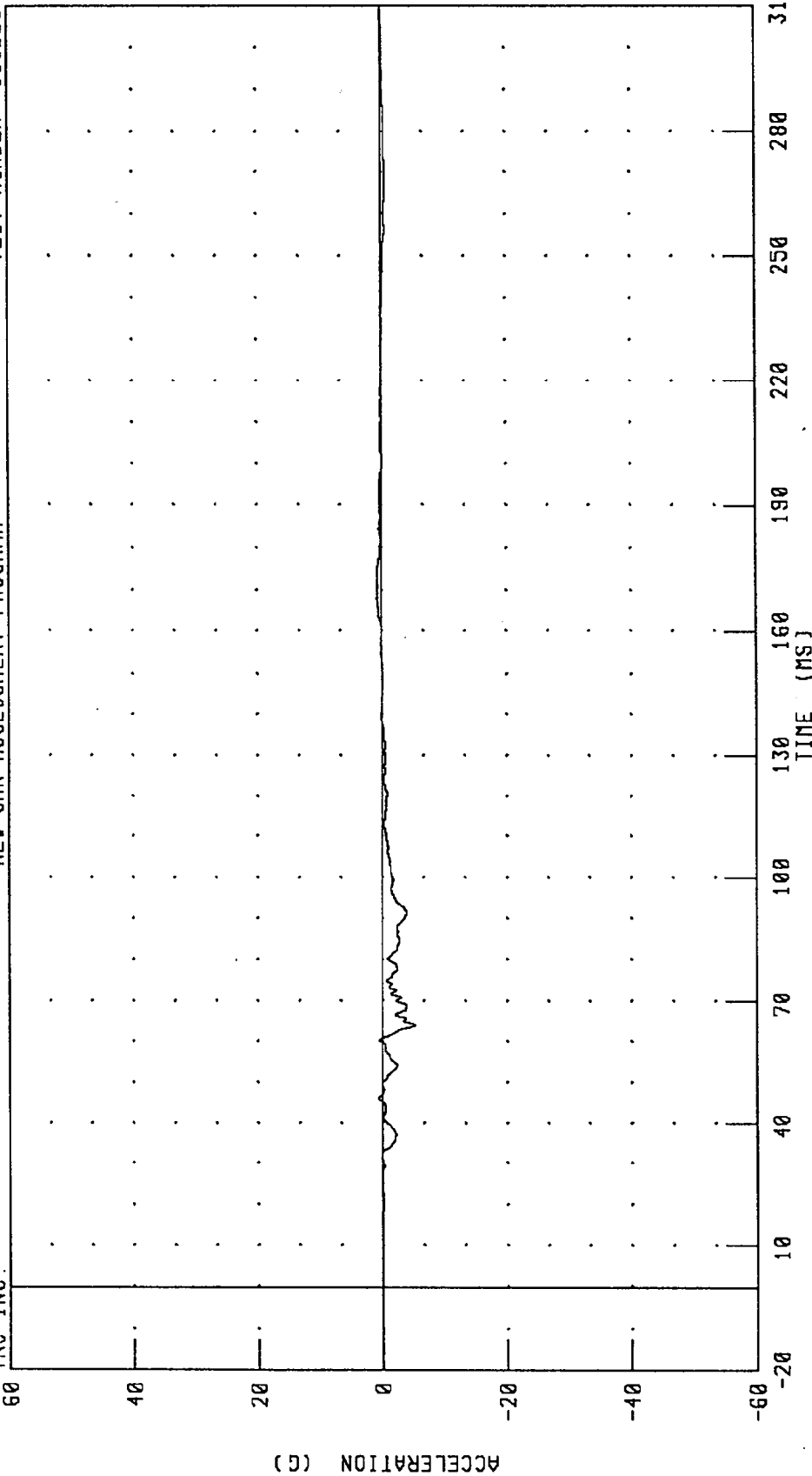
CHANNEL: CSTXG2 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

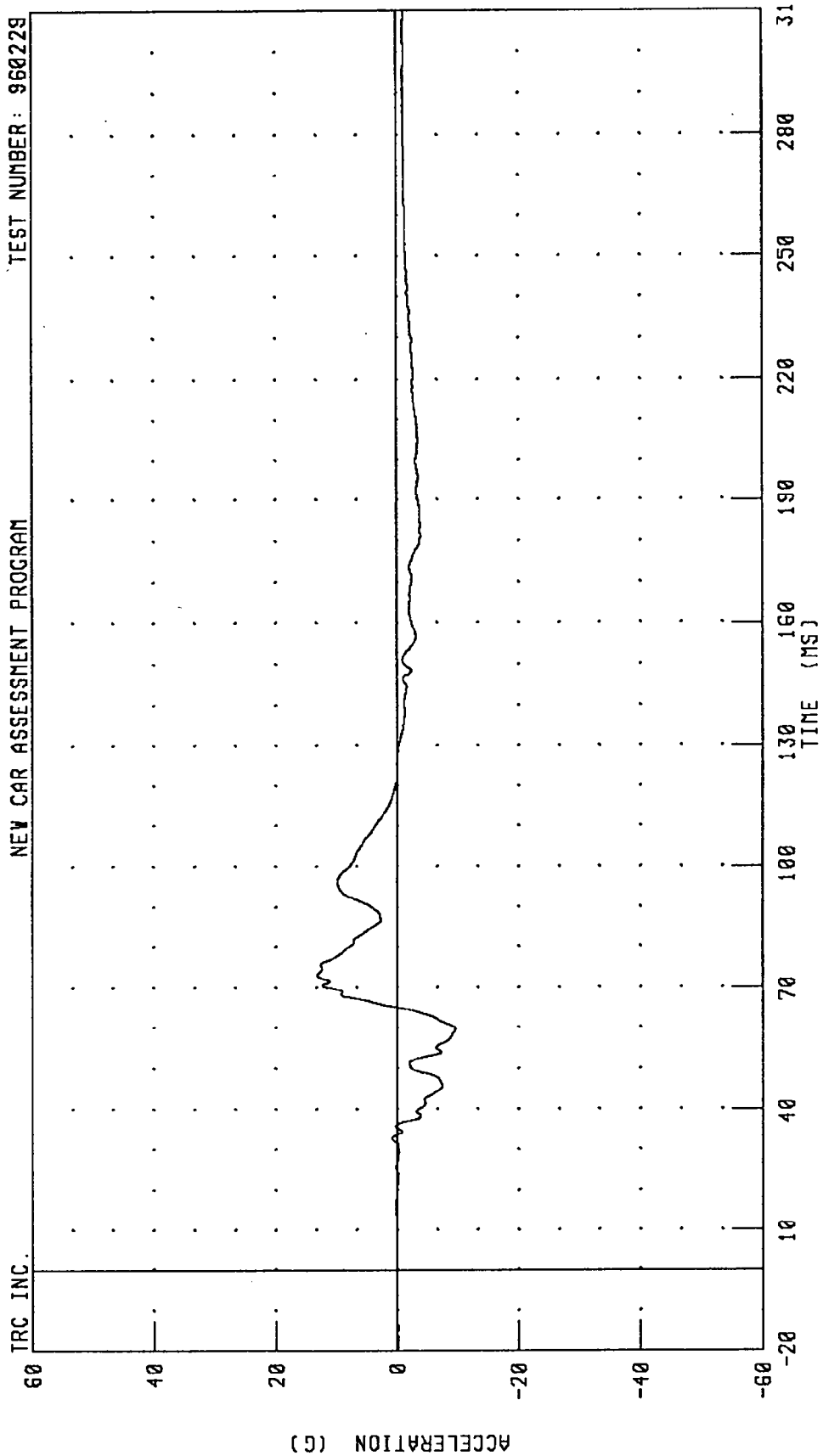


PEAK DATA: 0.77 G @ 167.84 MS; -5.22 G @ 64.00 MS

CHANNEL: CSTYG2 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 13.20 G @ 72.96 MS; -9.59 G @ 59.52 MS

CHANNEL: CSTZG2 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

310

280

250

220

190

160

130

100

70

40

10

-20

TIME (MS)

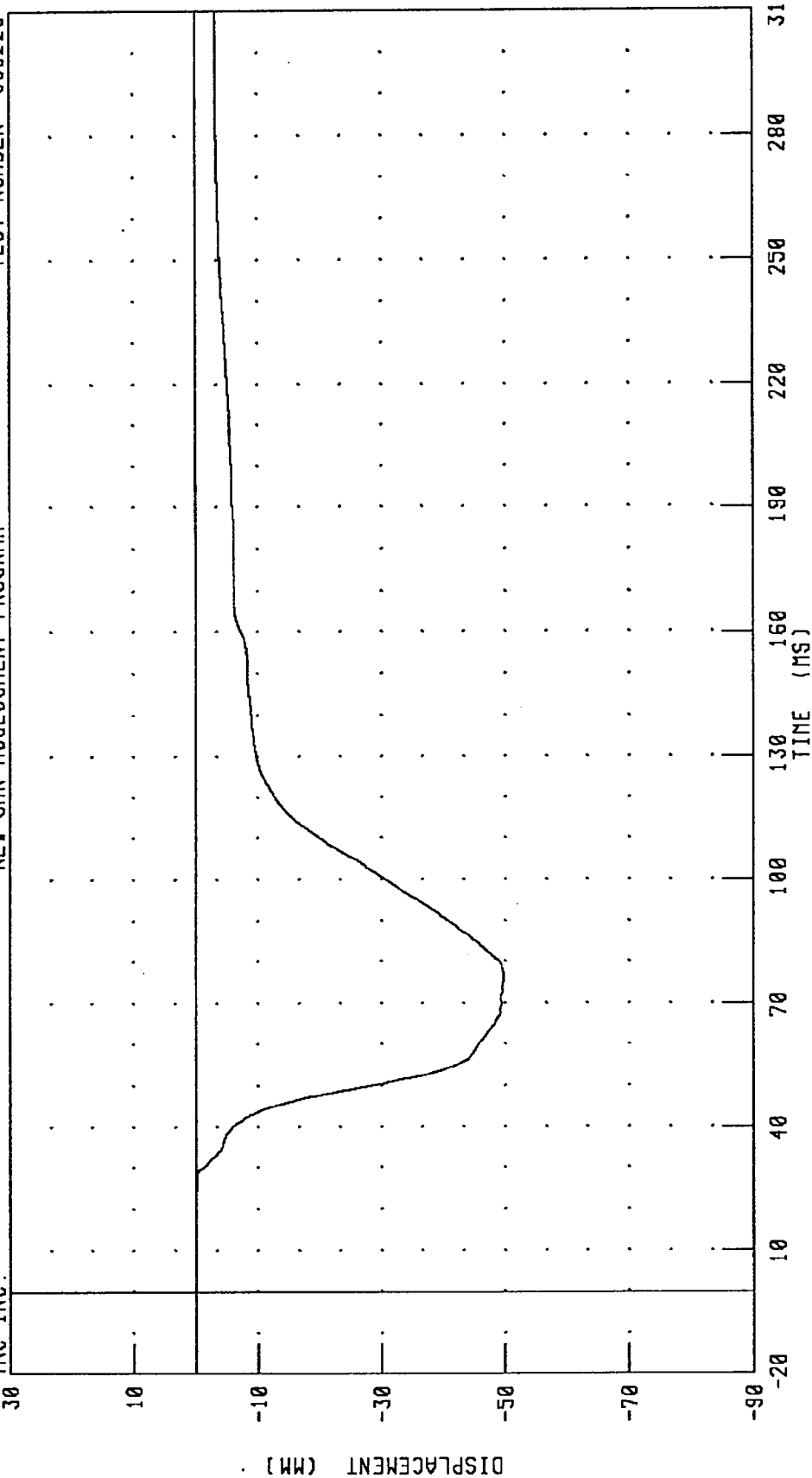
PEAK DATA: 65.33 G @ 69.36 MS; 0.01 G @ -20.00 MS

CHANNEL: CSTRG2 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST DEFLECTION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

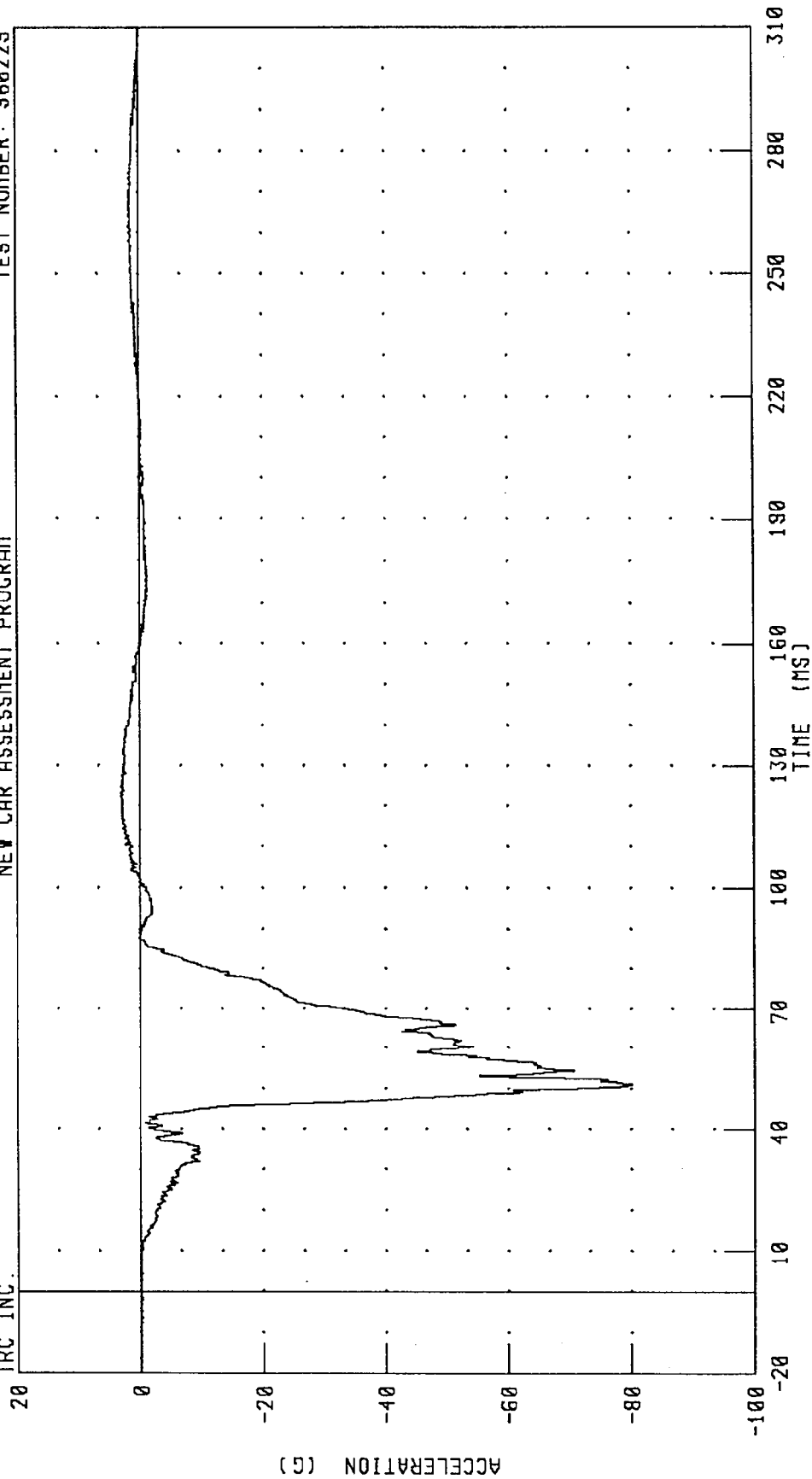


CHANNEL: CSTXD2 FILTER: CH. CLASS 180 PEAK DATA: 0.01 MM @ 2.48 MS; -49.76 MM @ 75.68 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



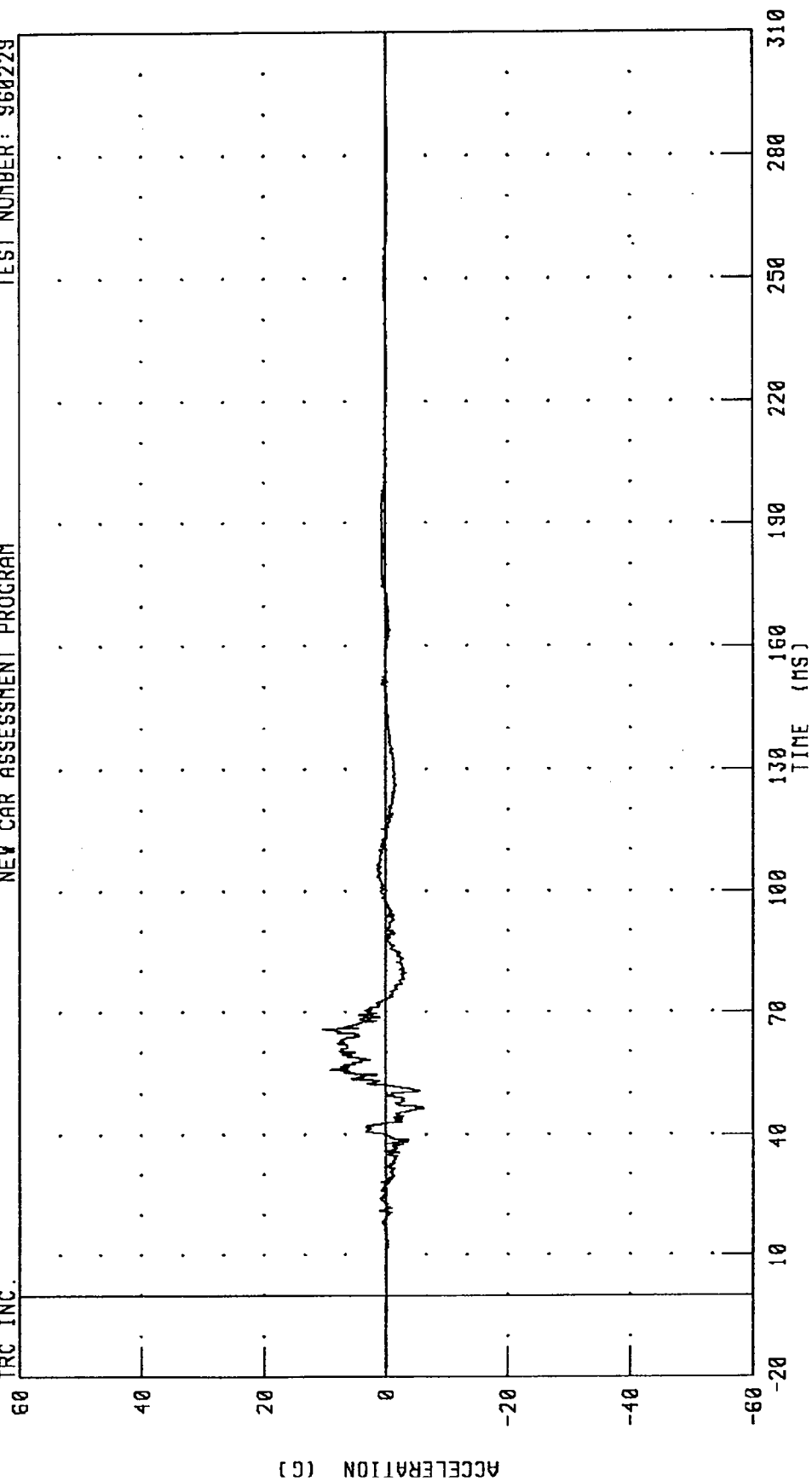
PEAK DATA: 3.08 G @ 122.24 MS; -80.18 G @ 50.96 MS

CHANNEL: PEVXC2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS Y-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

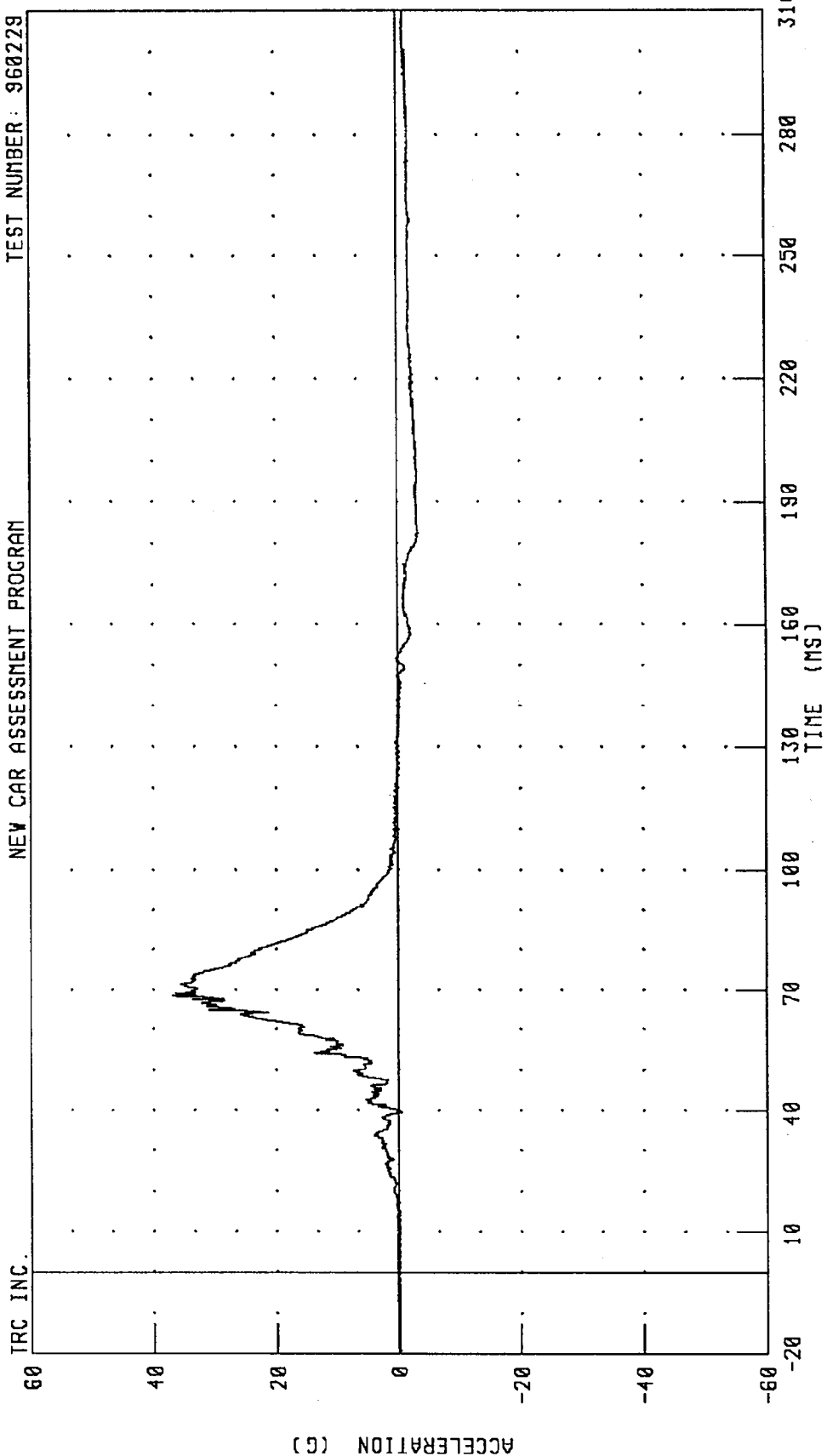


PEAK DATA: 10.27 G @ 65.84 MS; -6.25 G @ 46.48 MS

CHANNEL: PEVYG2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS Z-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



CHANNEL: PEVZG2 FILTER: CH. CLASS 1000

PEAK DATA: 36.87 G @ 68.64 MS; -3.62 G @ 182.48 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

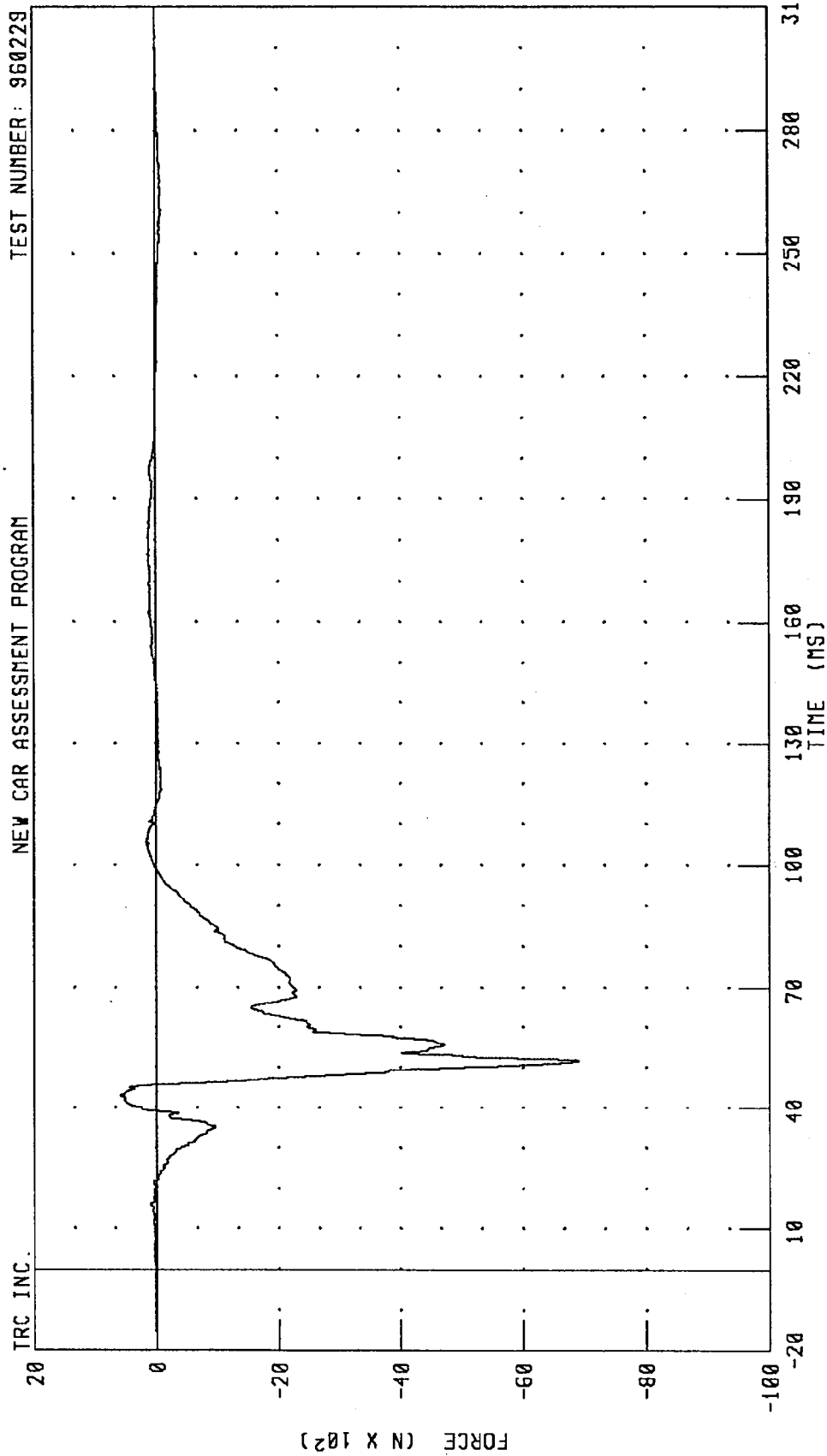
-20

CHANNEL: PEVRG2 FILTER: CH. CLASS 1000

PEAK DATA: 80.50 G @ 51.04 MS; 0.11 G @ -20.00 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

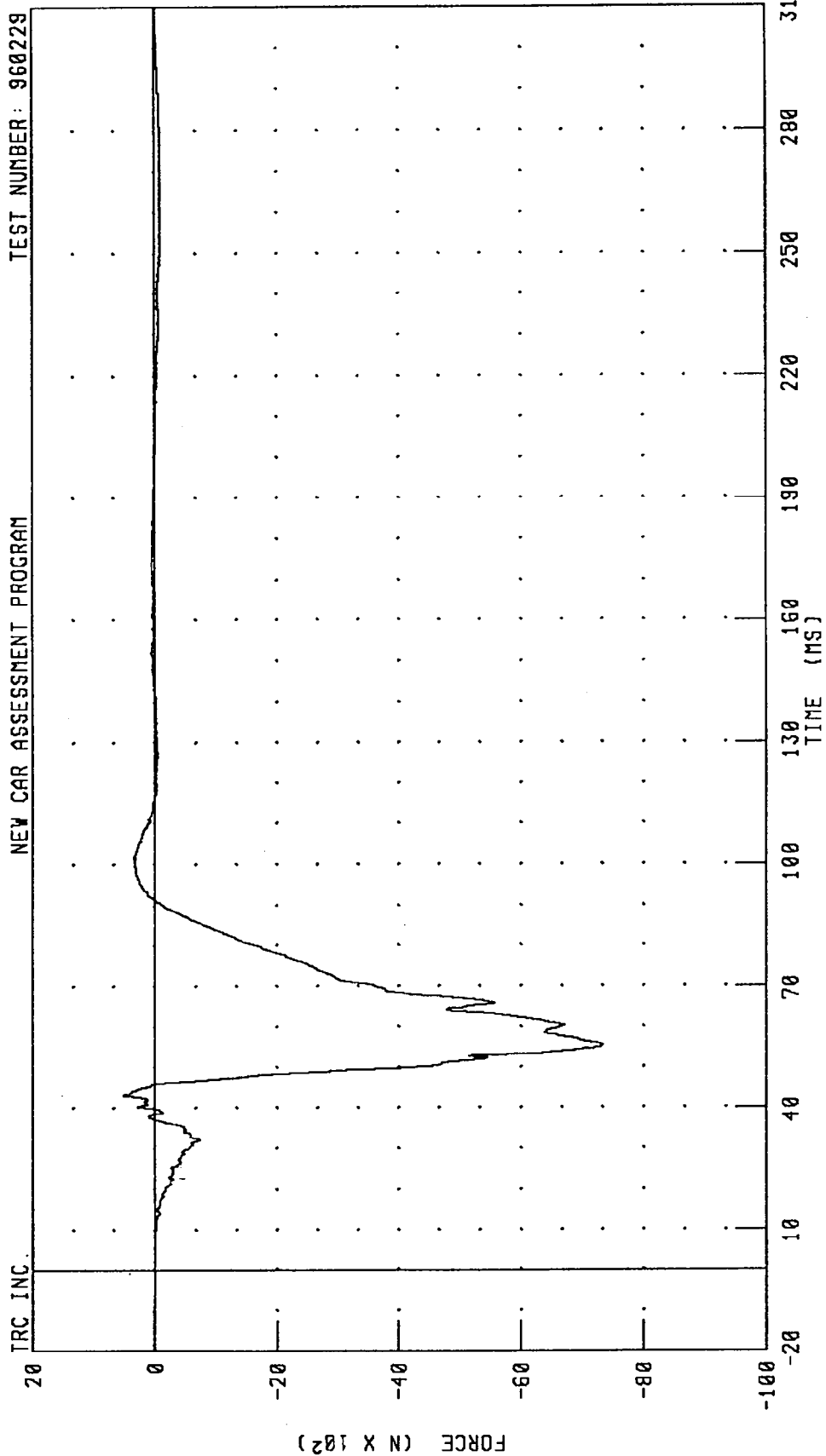


CHANNEL: LFMF2 FILTER: CH. CLASS 600

PEAK DATA: 584.48 N @ 43.04 MS; -6917.33 N @ 51.68 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FEMUR FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

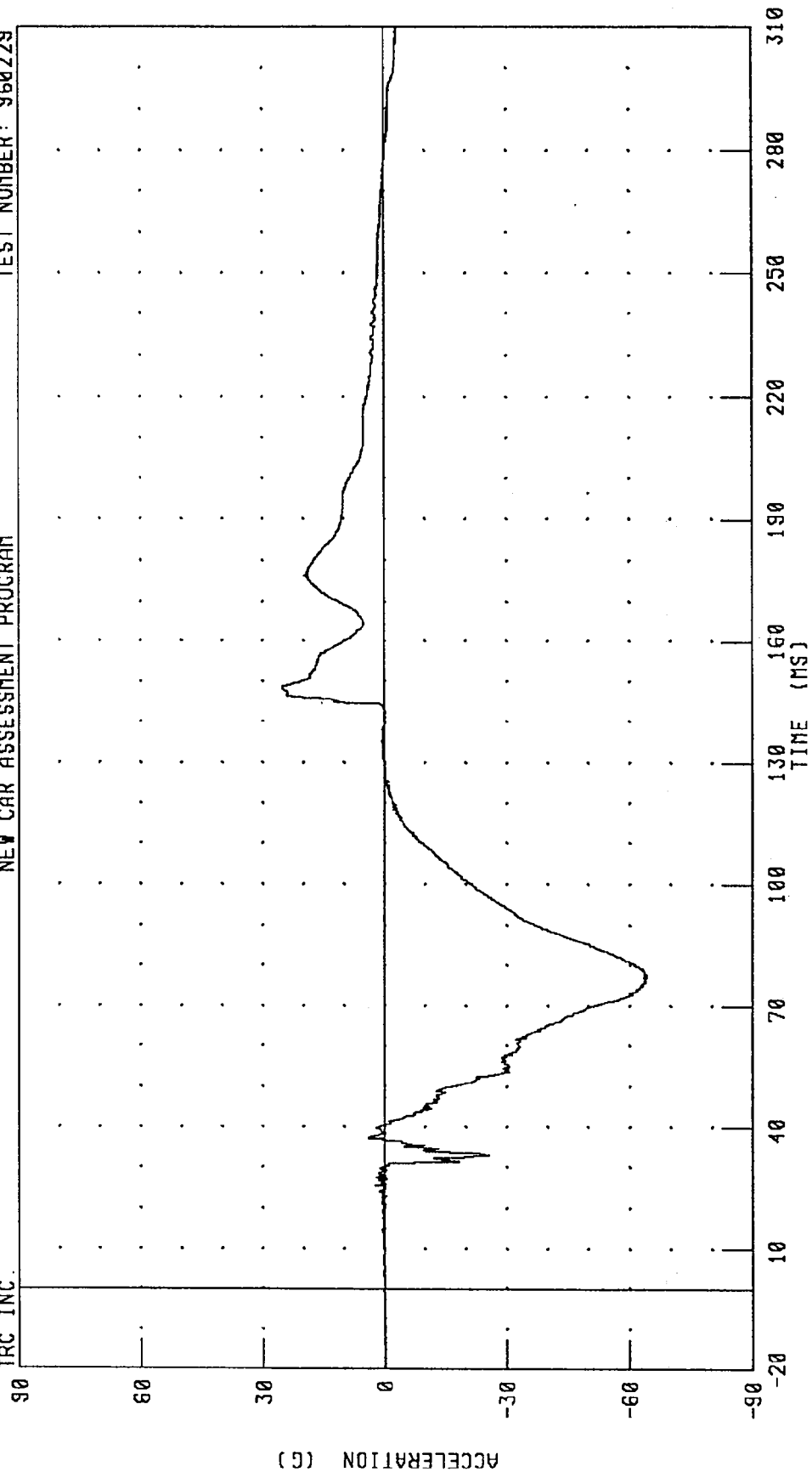


1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: HEDXR2 FILTER: CH. CLASS 1000

960229

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

90

60

30

ACCELERATION (G)

0

-30

-60

-90

-20

40

10

70

100

130

160

190

220

250

280

310

TIME (MS)

PEAK DATA: 24.10 G @ 81.52 MS; -12.19 G @ 32.72 MS

CHANNEL: HEDYR2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

90

60

30

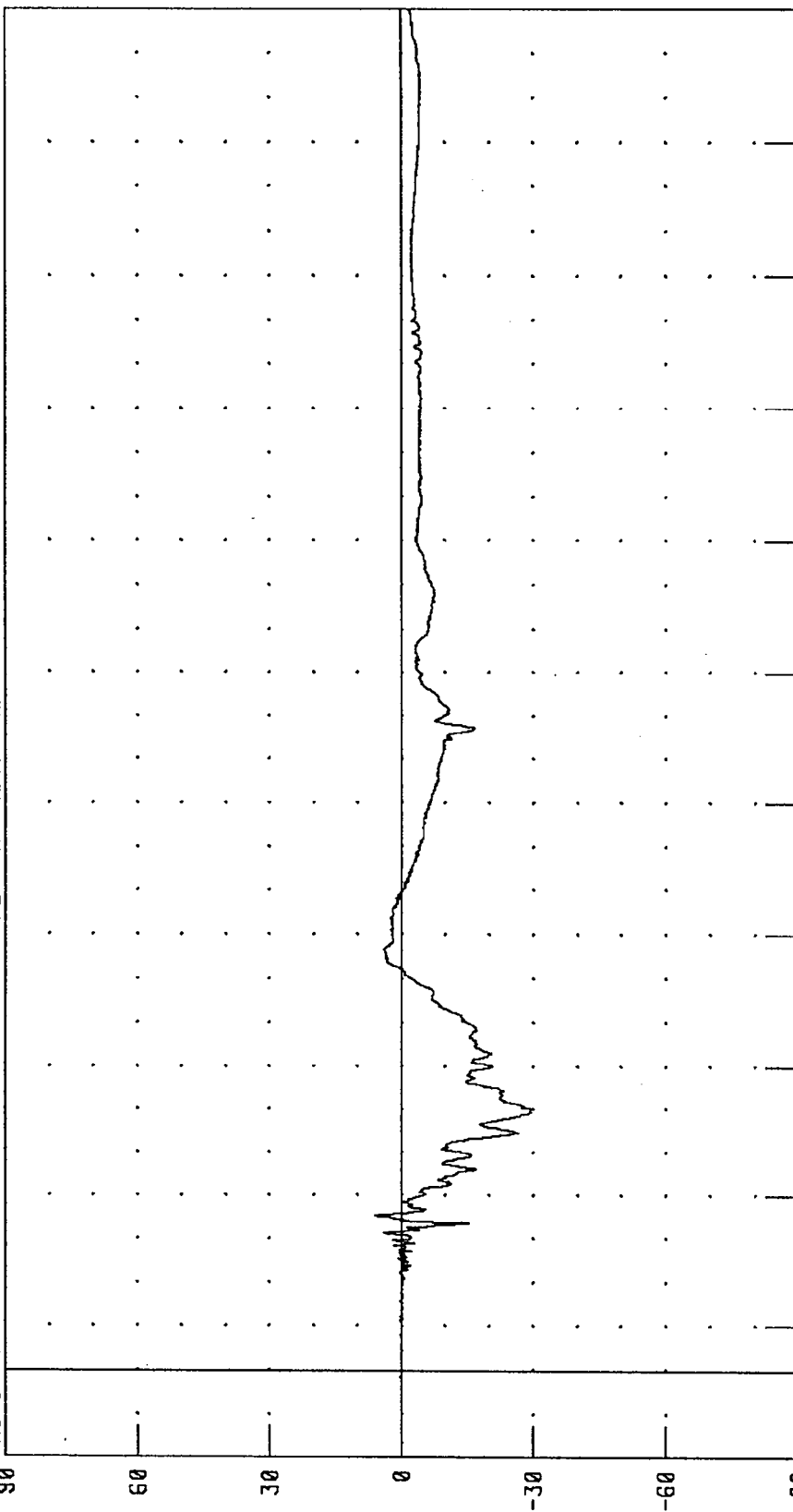
0

-30

-60

-90

ACCELERATION (G)



310 280 250 220 190 160 130 100 70 40 10 -20
TIME (MS)

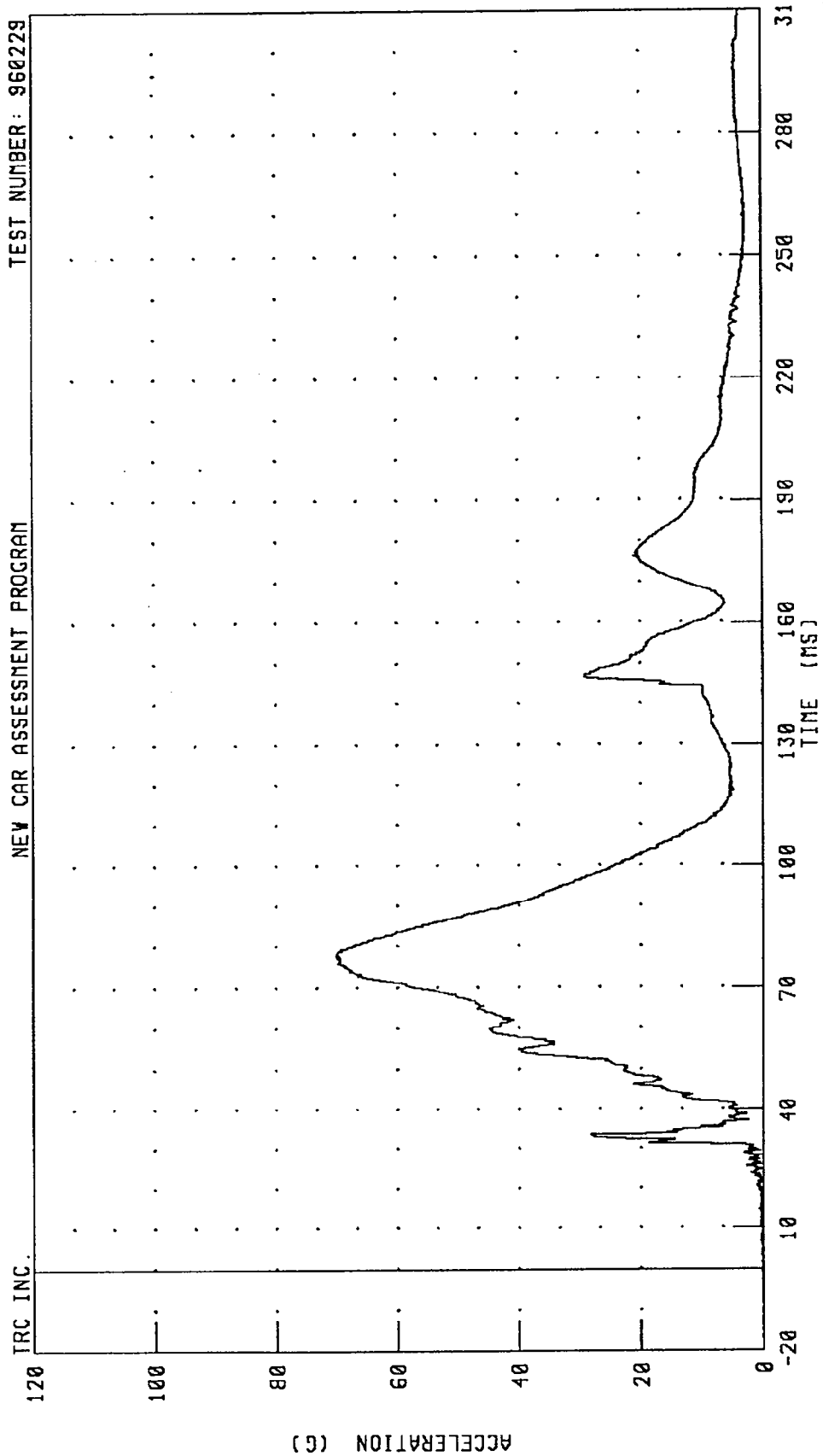
CHANNEL: HEDZR2 FILTER: CH. CLASS 1000

PEAK DATA: 6.04 G @ 35.12 MS; -29.67 G @ 59.36 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM



PEAK DATA: 70.19 G @ 77.68 MS; 16.09 G @ 160.92 MS

CHANNEL: HEORR2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

40

20

0

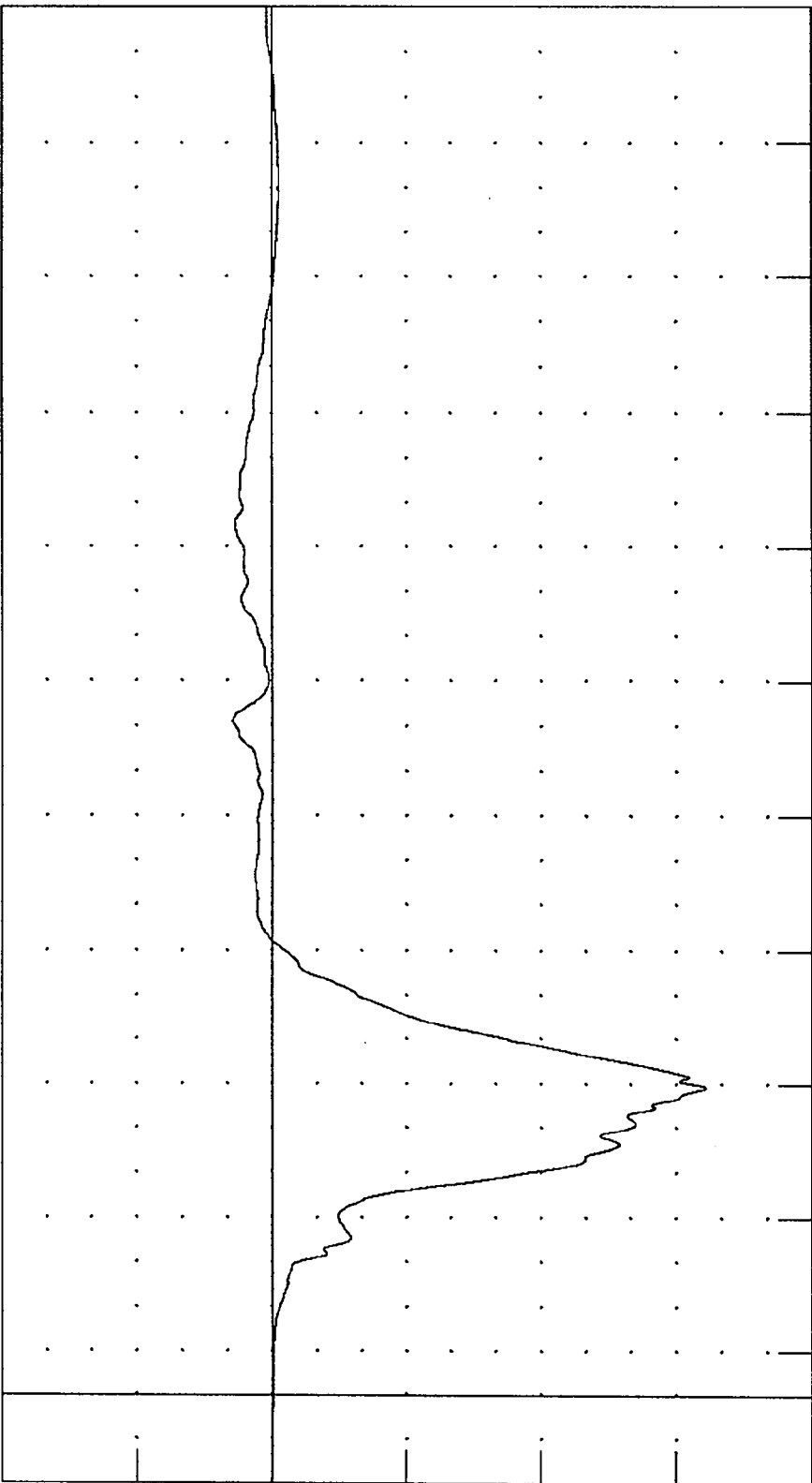
-20

-40

-60

-80

ACCELERATION (G)



TIME (MS)

CHANNEL: CSTXR2 FILTER: CH. CLASS 180

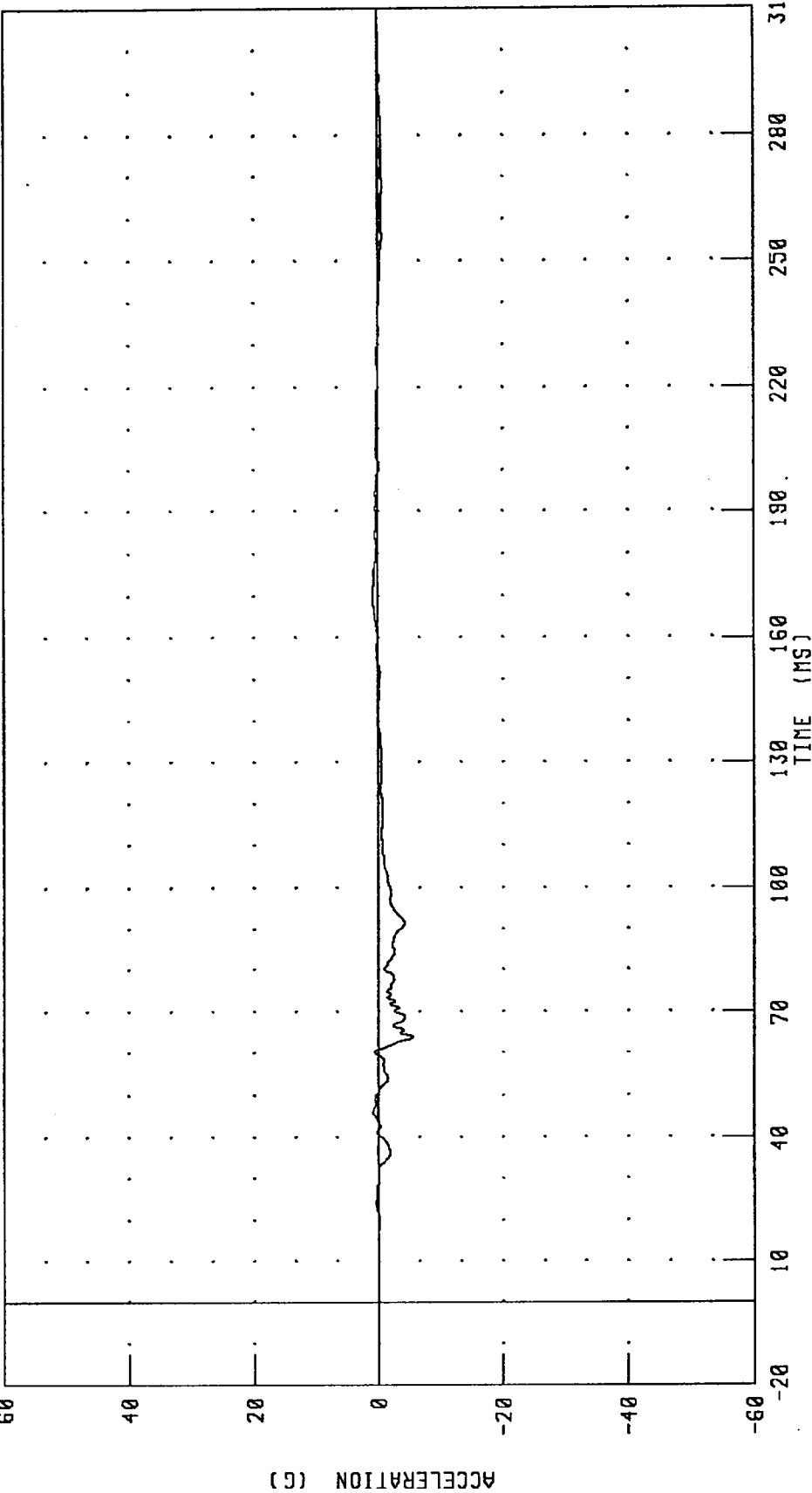
PEAK DATA: 5.85 G @ 151.12 MS; -64.40 G @ 69.36 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Y-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.90 G @ 46.16 MS; -5.53 G @ 63.92 MS

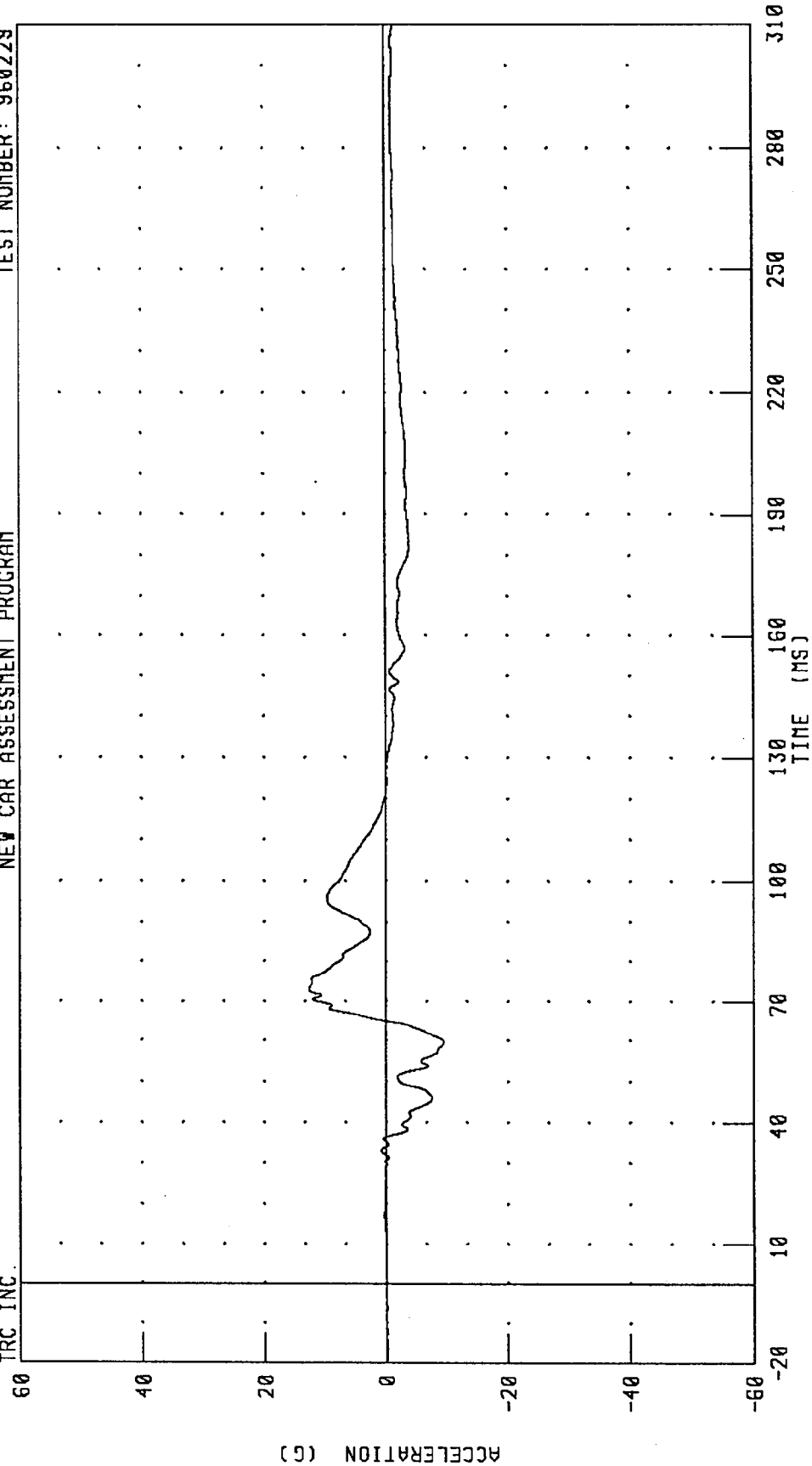
CHANNEL: CSTYR2 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION - REDUNDANT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: CSTZR2 FILTER: CH. CLASS 180

PEAK DATA: 12.74 G @ 73.04 MS; -9.46 G @ 59.76 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION - REDUNDANT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

120

100

80

60

40

20

0

ACCELERATION (G)

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

CHANNEL: CSTR2

FILTER: CH. CLASS 180

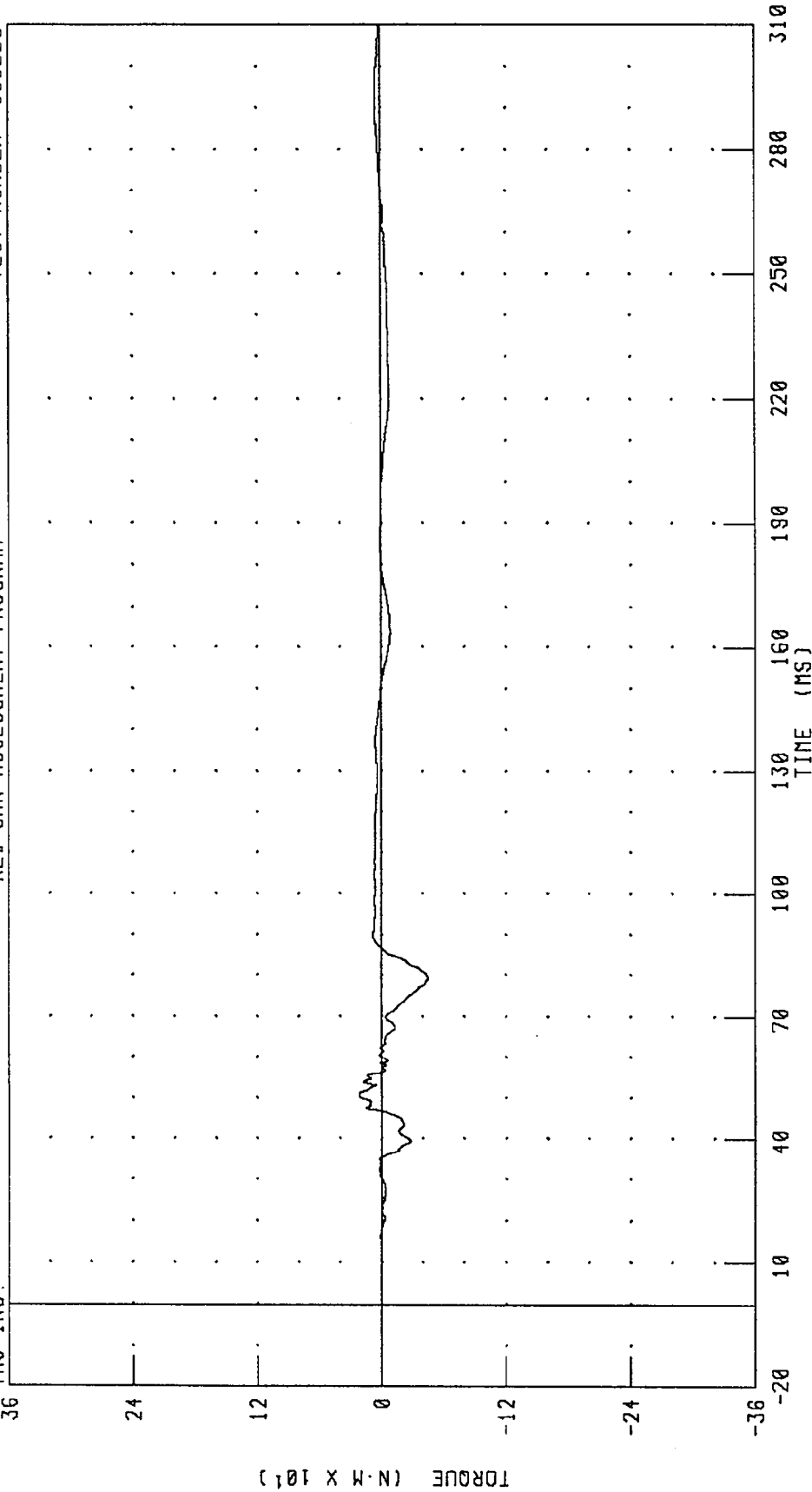
PEAK DATA: 65.17 G @ 69.36 MS; 0.01 G @ -20.00 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: TBLXM2 FILTER: CH. CLASS 600

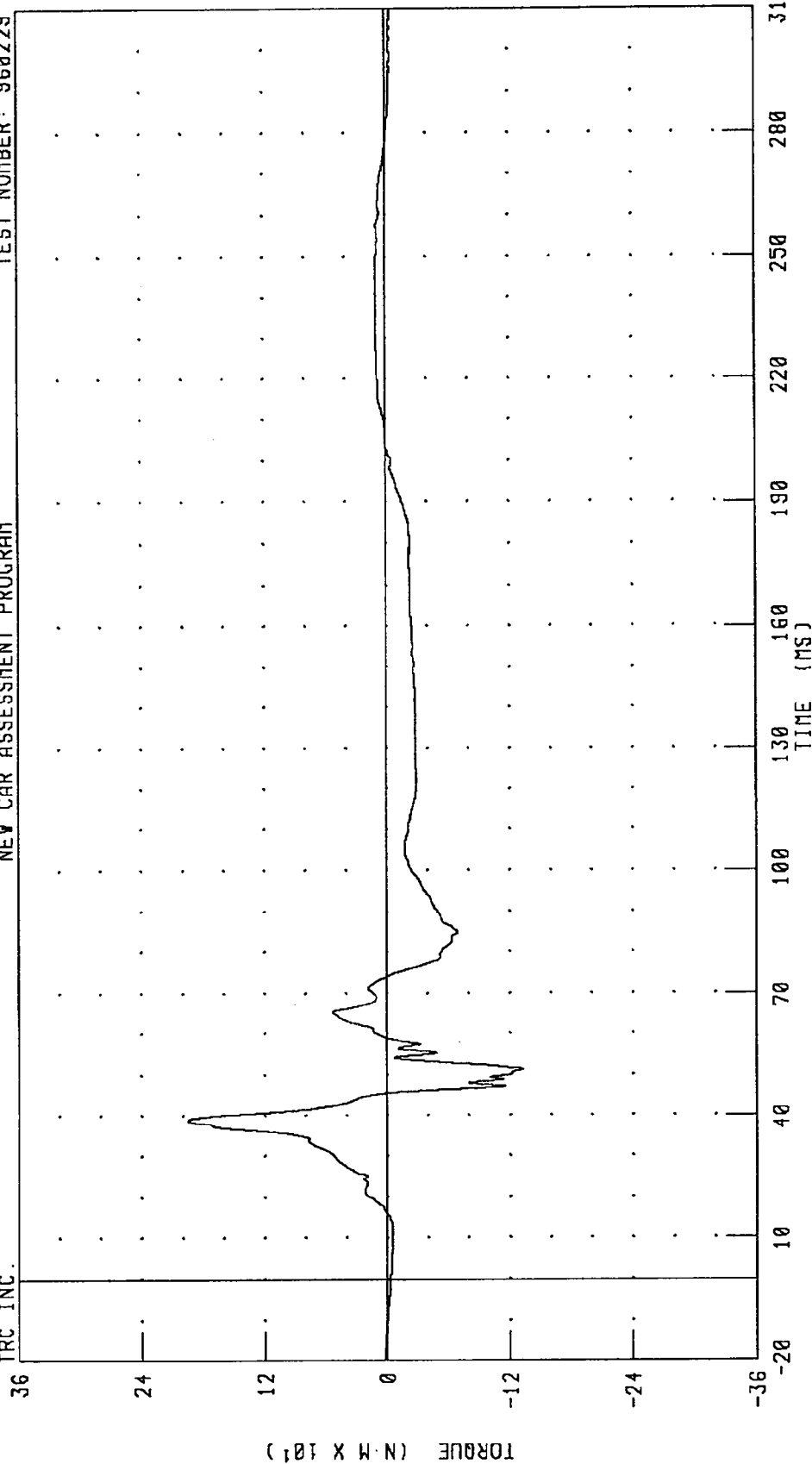
PEAK DATA: 21.43 N·M @ 50.96 MS; -44.68 N·M @ 79.20 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: TBLYM2 FILTER: CH. CLASS 600

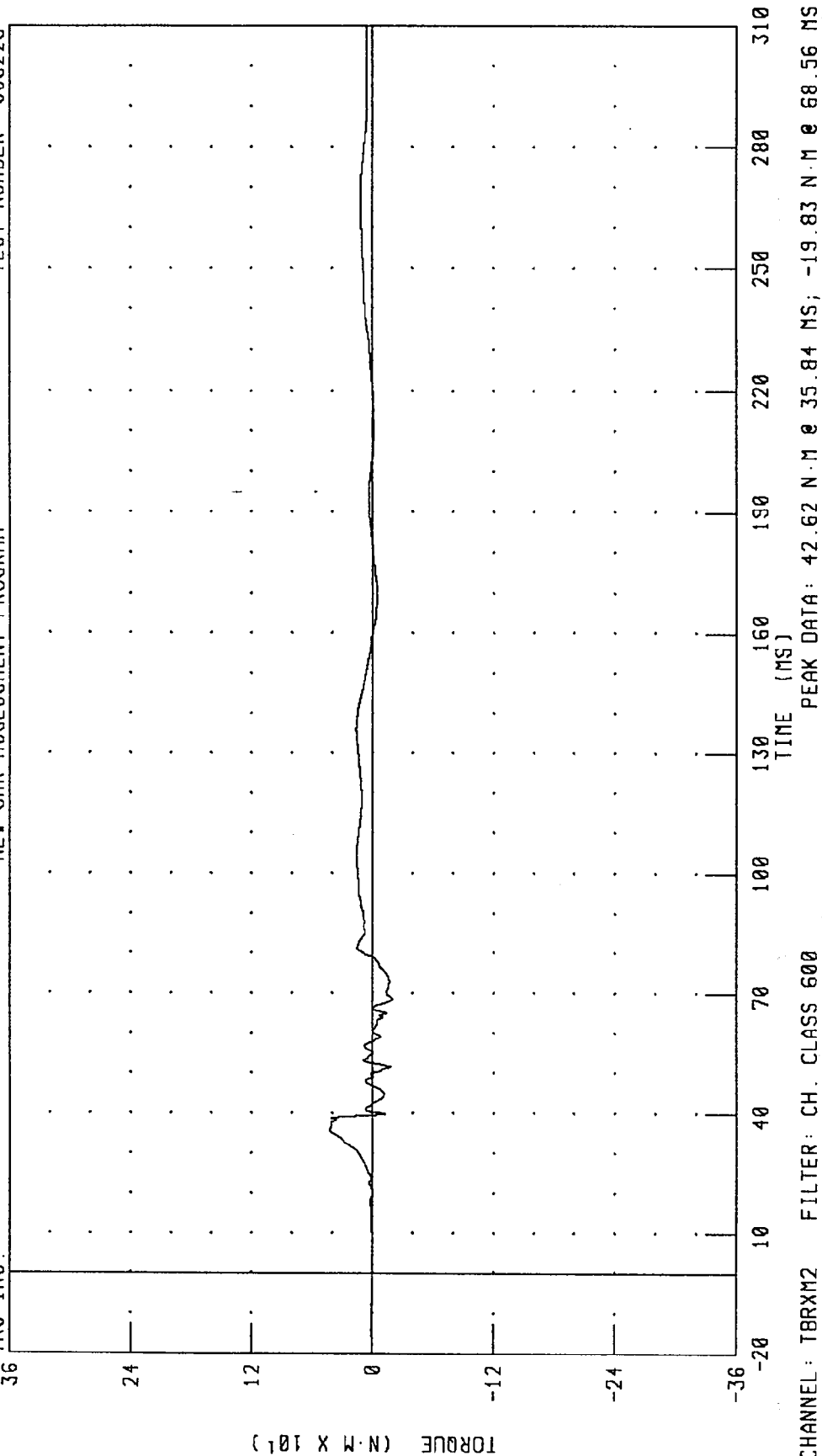
PEAK DATA: 195.55 N-M @ 38.96 MS; -133.52 N-M @ 51.28 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

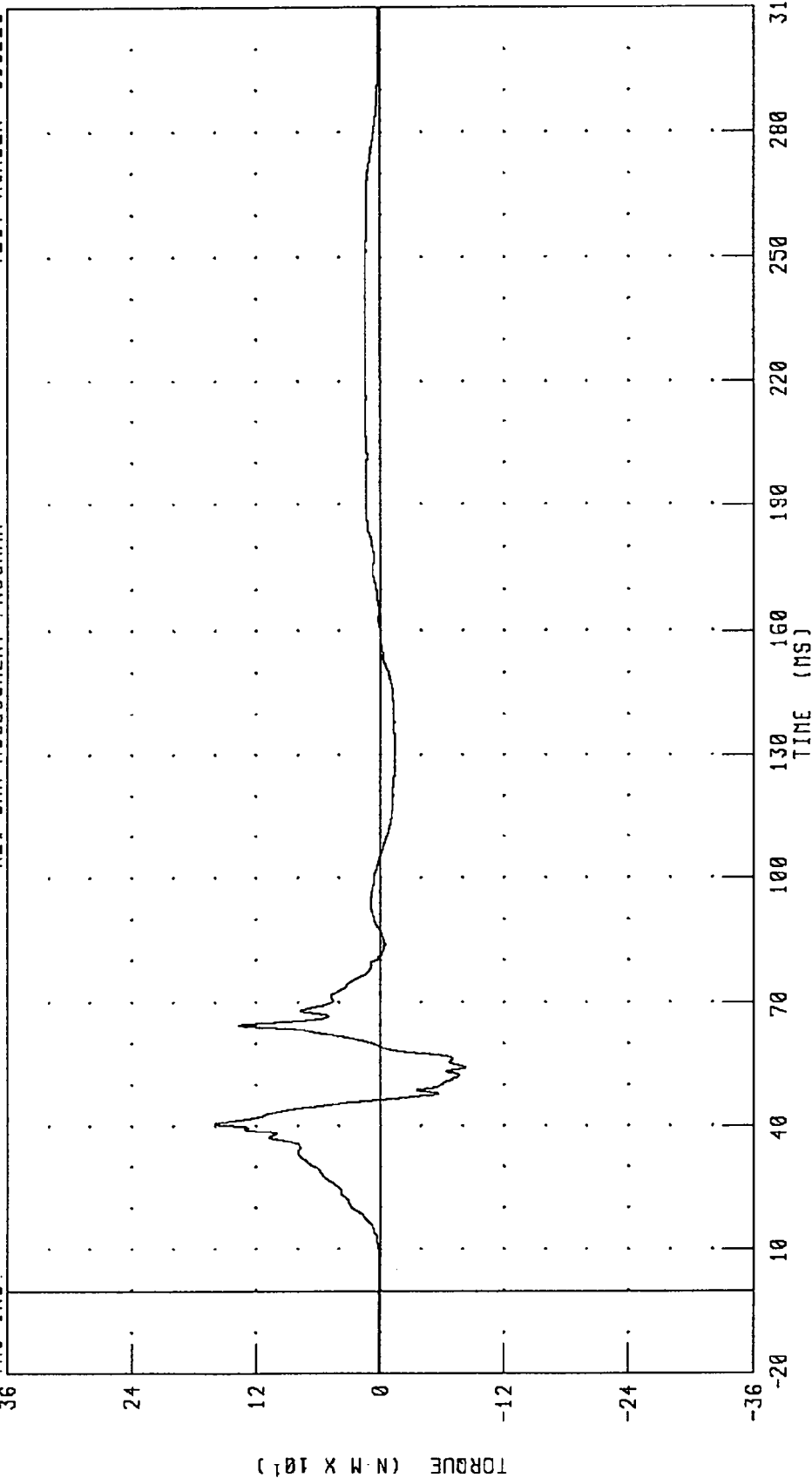
TRC INC.



1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: TBRYM2 FILTER: CH. CLASS 600

PEAK DATA: 159.47 N-M @ 40.64 MS; -83.09 N-M @ 54.32 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

36

24

12

0

-12

-24

-36

FORCE (N X 10²)

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

CHANNEL: ANLXF2 FILTER: CH. CLASS 600

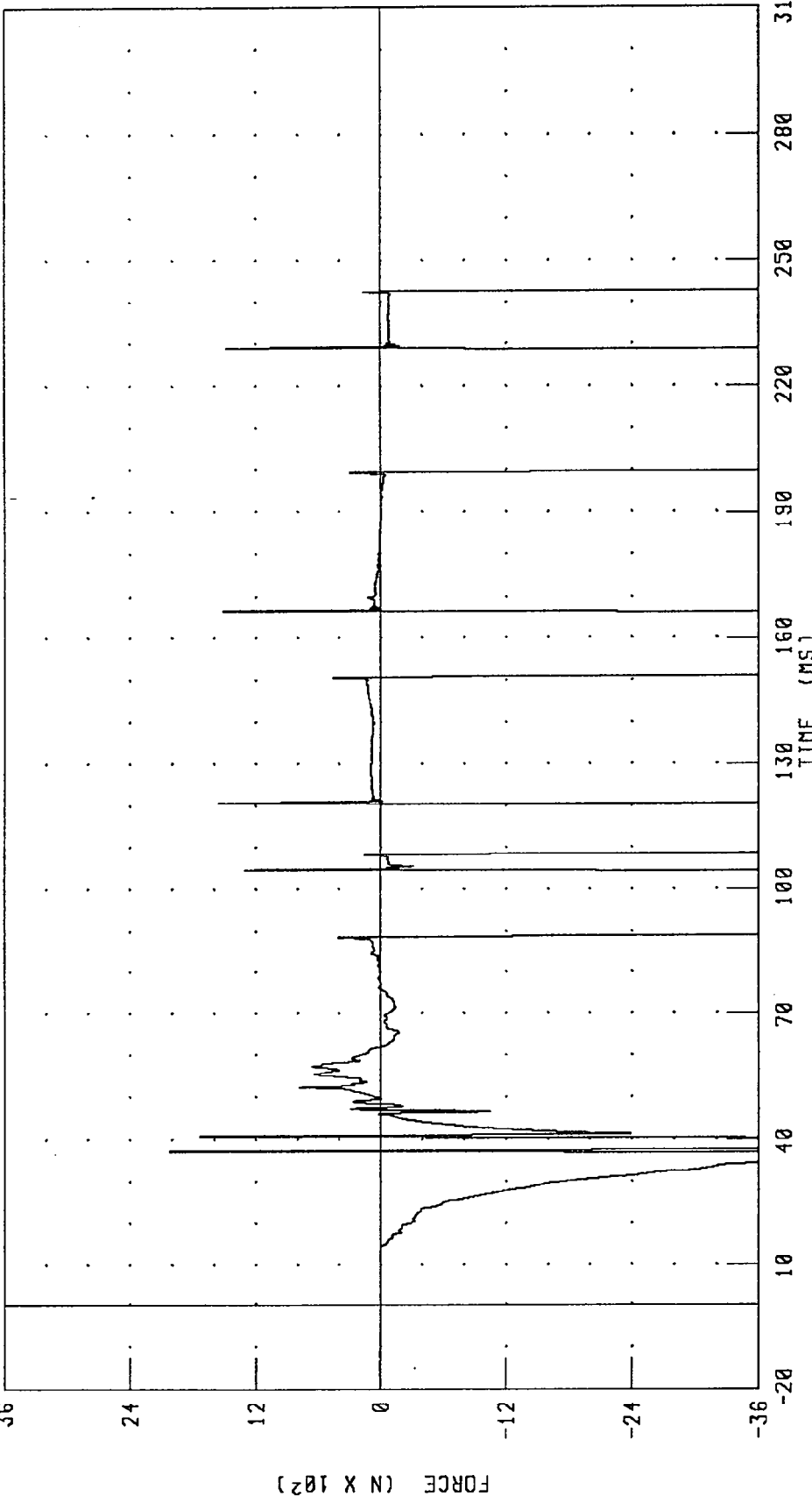
PEAK DATA: 455.95 N @ 50.72 MS; -1780.28 N @ 38.88 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 2027.23 N @ 37.36 MS; -11665.61 N @ 103.92 MS

CHANNEL: ANLZF2 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

36

24

TORQUE (N·M X 10¹)

12

0

-12

-24

-36

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

CHANNEL: ANLYM2 FILTER: CH. CLASS 600

PEAK DATA: 64.71 N·M @ 38.96 MS; -32.73 N·M @ 49.44 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

36

24

12

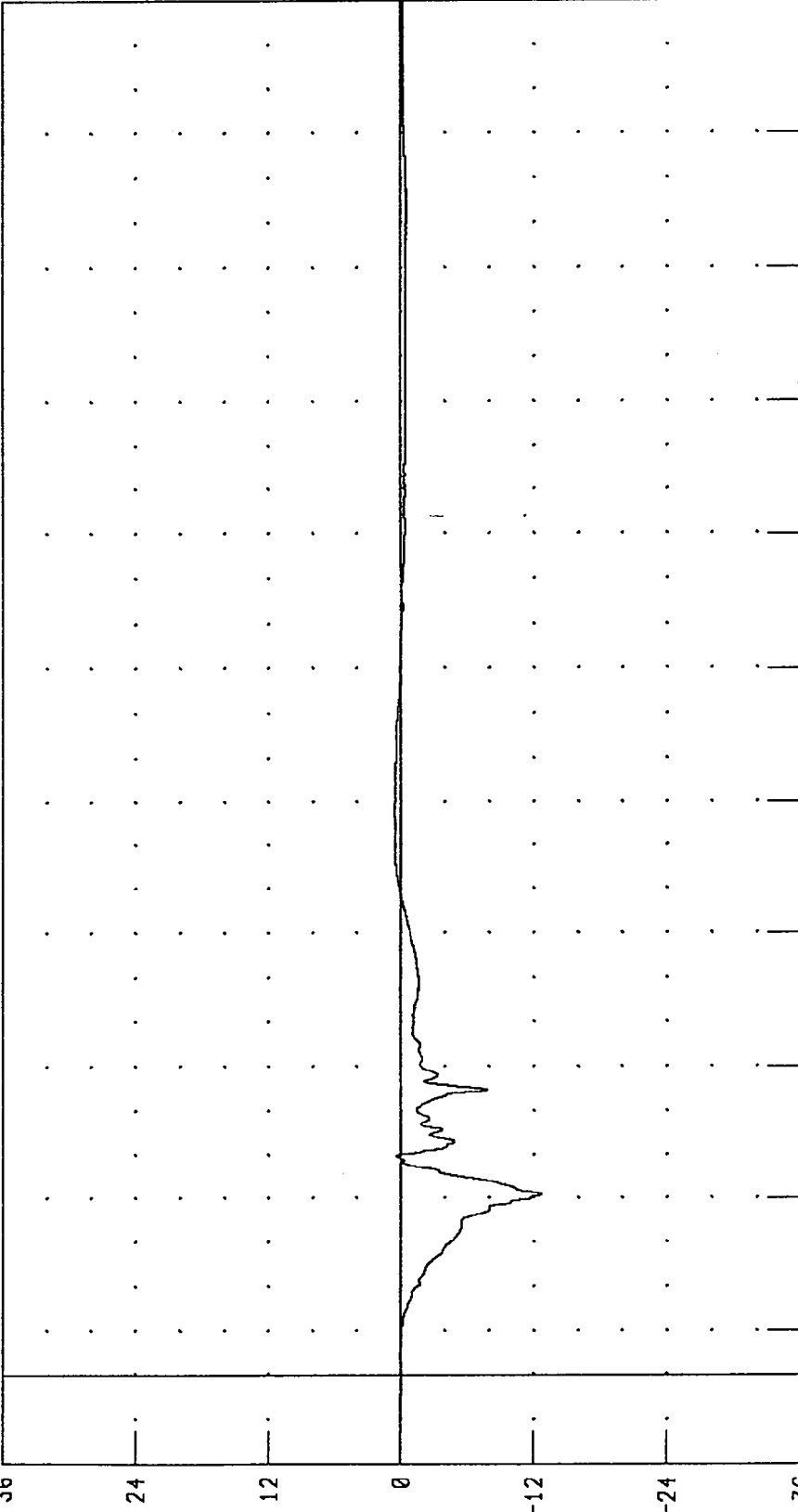
0

-12

-24

-36

FORCE (N X 10²)



PEAK DATA: 58.92 N @ 127.84 MS; -1269.14 N @ 40.88 MS

CHANNEL: ANRXP2 FILTER: CH. CLASS 600

960229

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

36

24

12

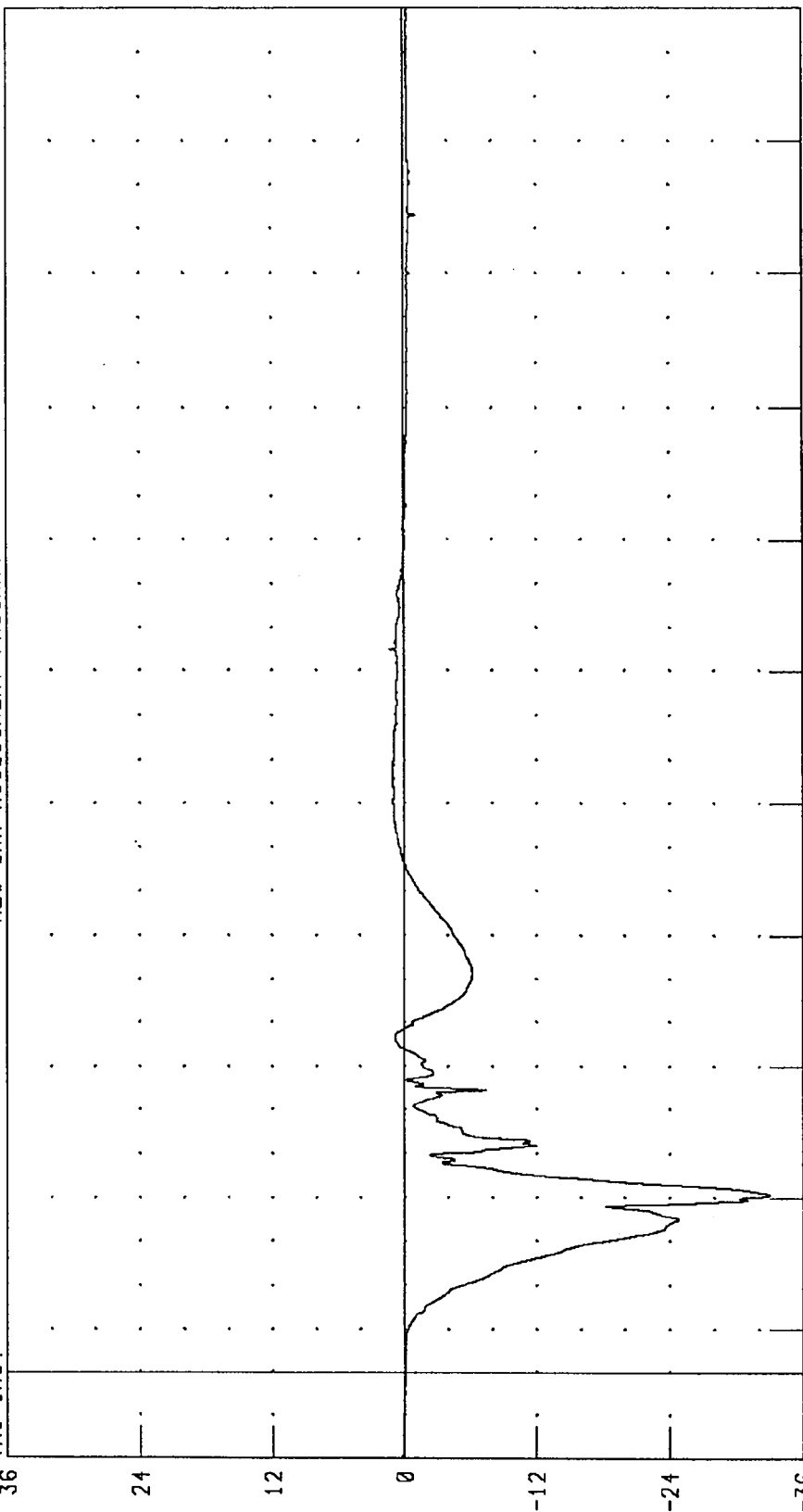
0

-12

-24

-36

FORCE (N X 10²)



TIME (MS)

CHANNEL: ANRZF2 FILTER: CH. CLASS 600

PEAK DATA: 128.88 N @ 164.88 MS; -3301.17 N @ 40.80 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y AXIS

TEST NUMBER: 960229

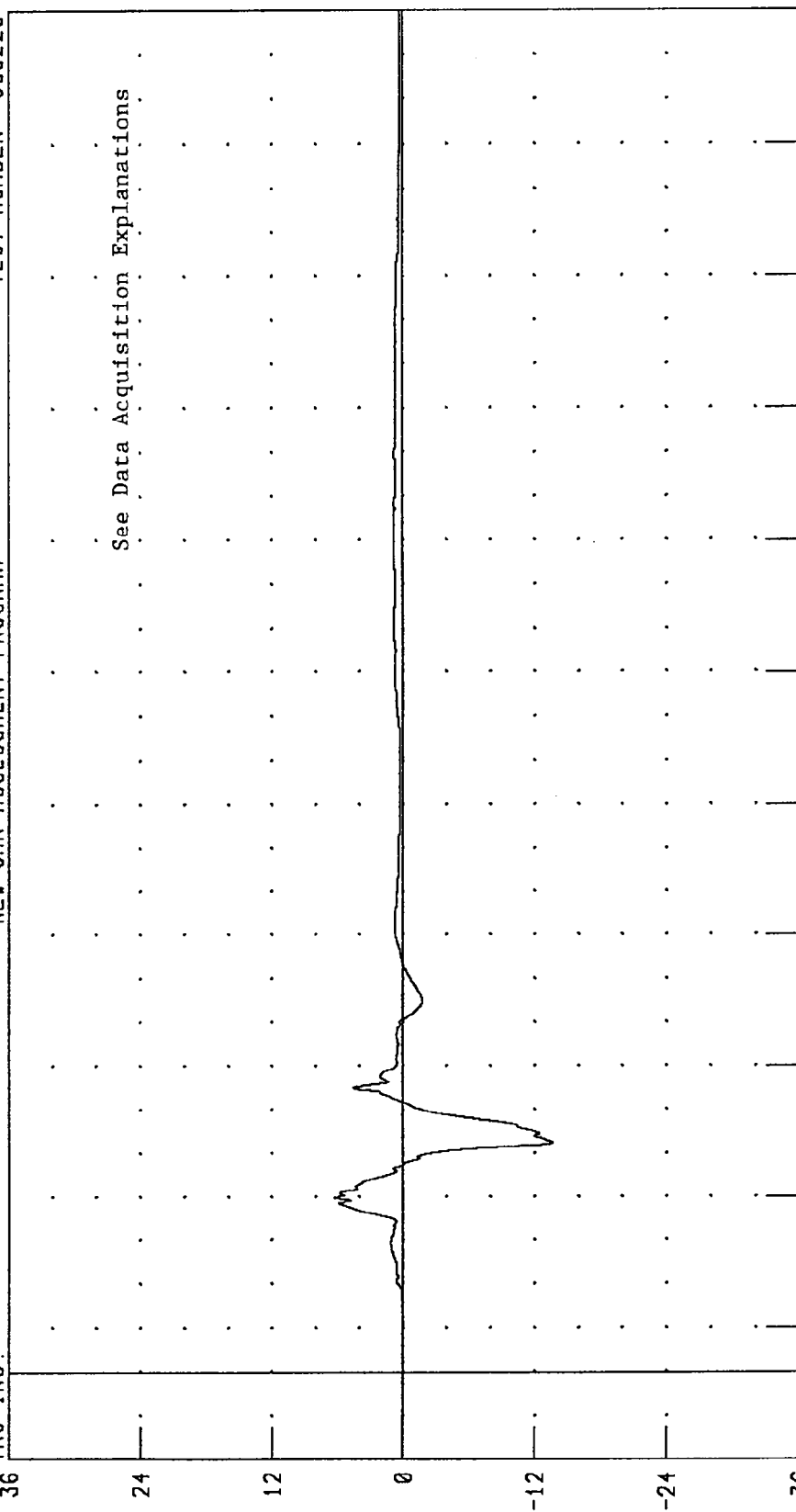
NEW CAR ASSESSMENT PROGRAM

TRC INC.

36

See Data Acquisition Explanations

TORQUE (N·M X 10¹)



PEAK DATA: 63.21 N·M @ 39.84 MS; -136.51 N·M @ 52.32 MS

CHANNEL: ANRYM2 FILTER: CH. CLASS 600

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

IRC INC.

100

50

0

-50

-100

-150

-200

ACCELERATION (G)

310

280

250

220

190

160

130

100

70

40

10

-20

TIME (MS)

PEAK DATA: 43.91 G @ 55.36 MS; -192.50 G @ 38.32 MS

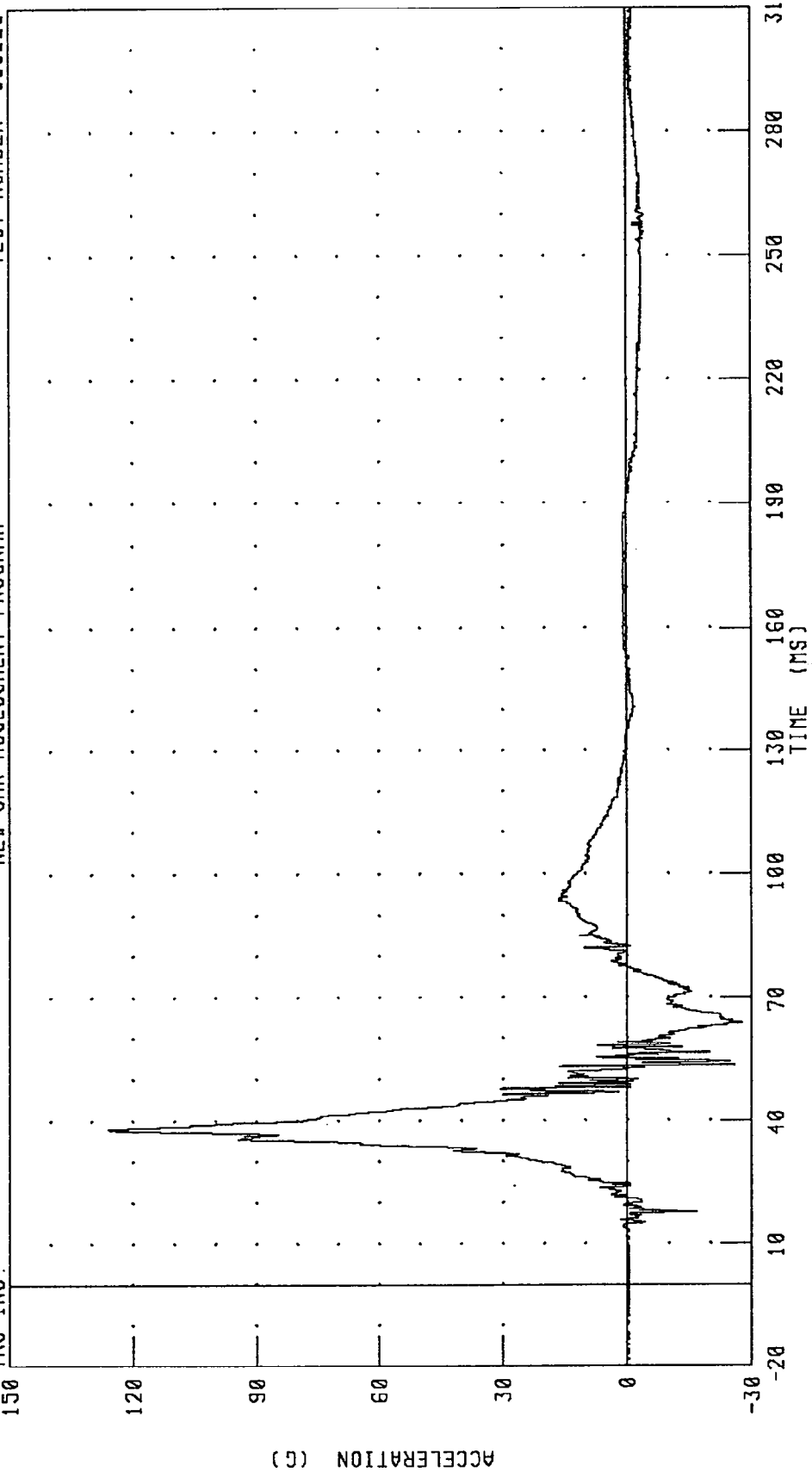
CHANNEL: FTLXG2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT HEEL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

IRC INC.



CHANNEL: FTLZH2 FILTER: CH. CLASS 1000

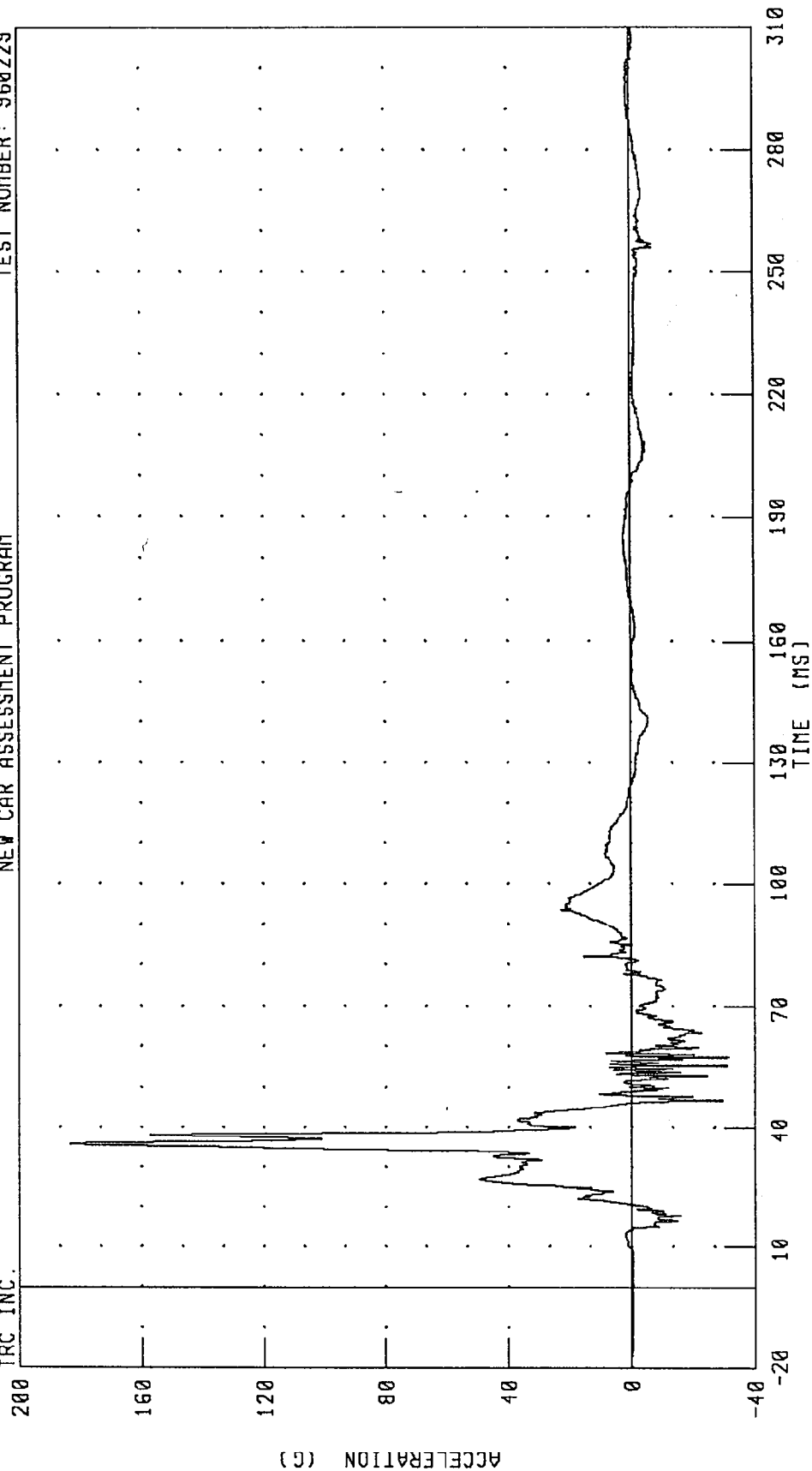
PEAK DATA: 125.95 G @ 38.16 MS; -27.71 G @ 63.76 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LEFT FOOT Z-AXIS ACCELERATION AT TOE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

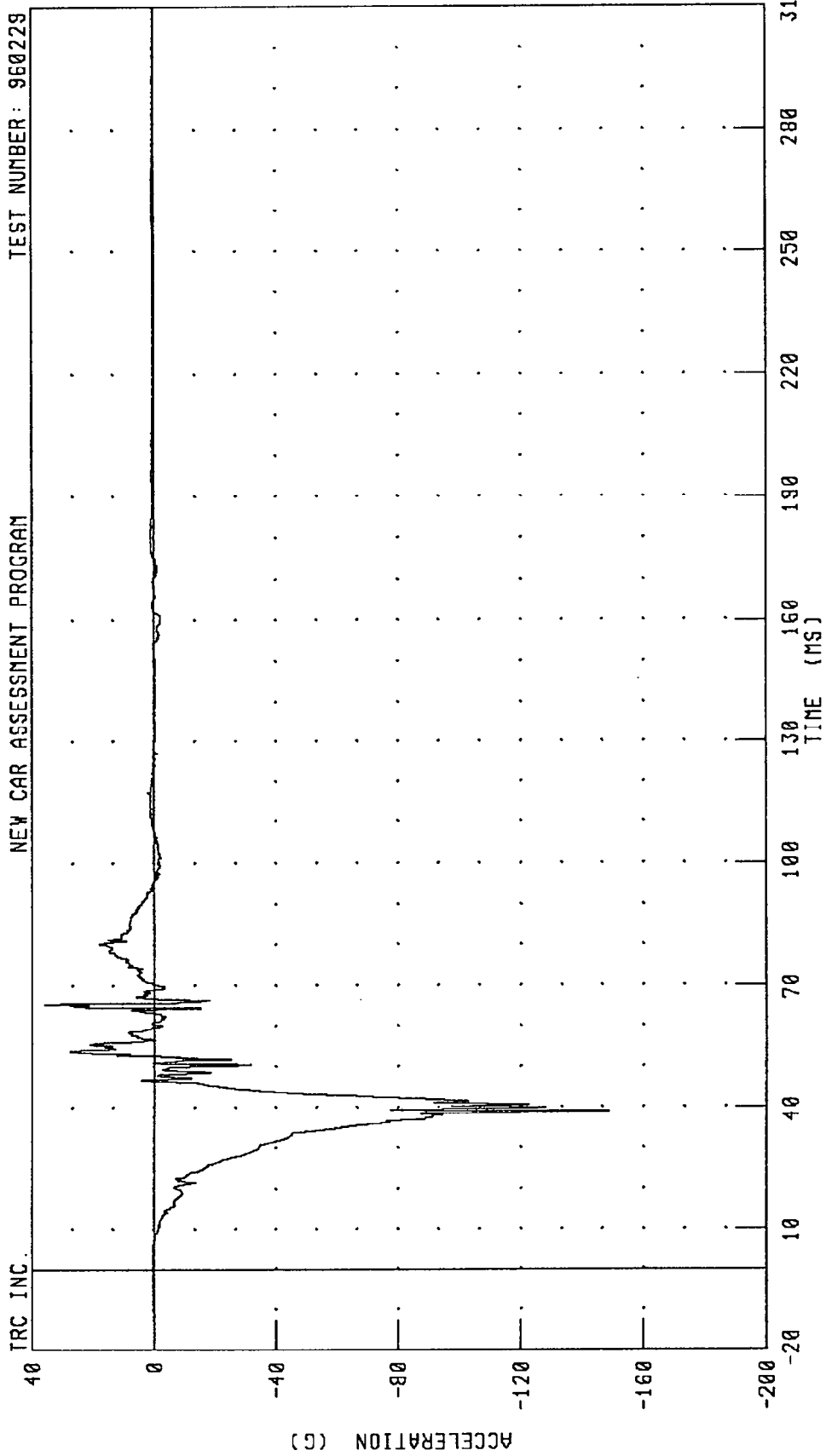


PEAK DATA: 183.23 G @ 35.84 MS; -31.37 G @ 57.44 MS

CHANNEL: FTLZT2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FOOT X-AXIS ACCELERATION

NEW CAR ASSESSMENT PROGRAM TEST NUMBER: 960229

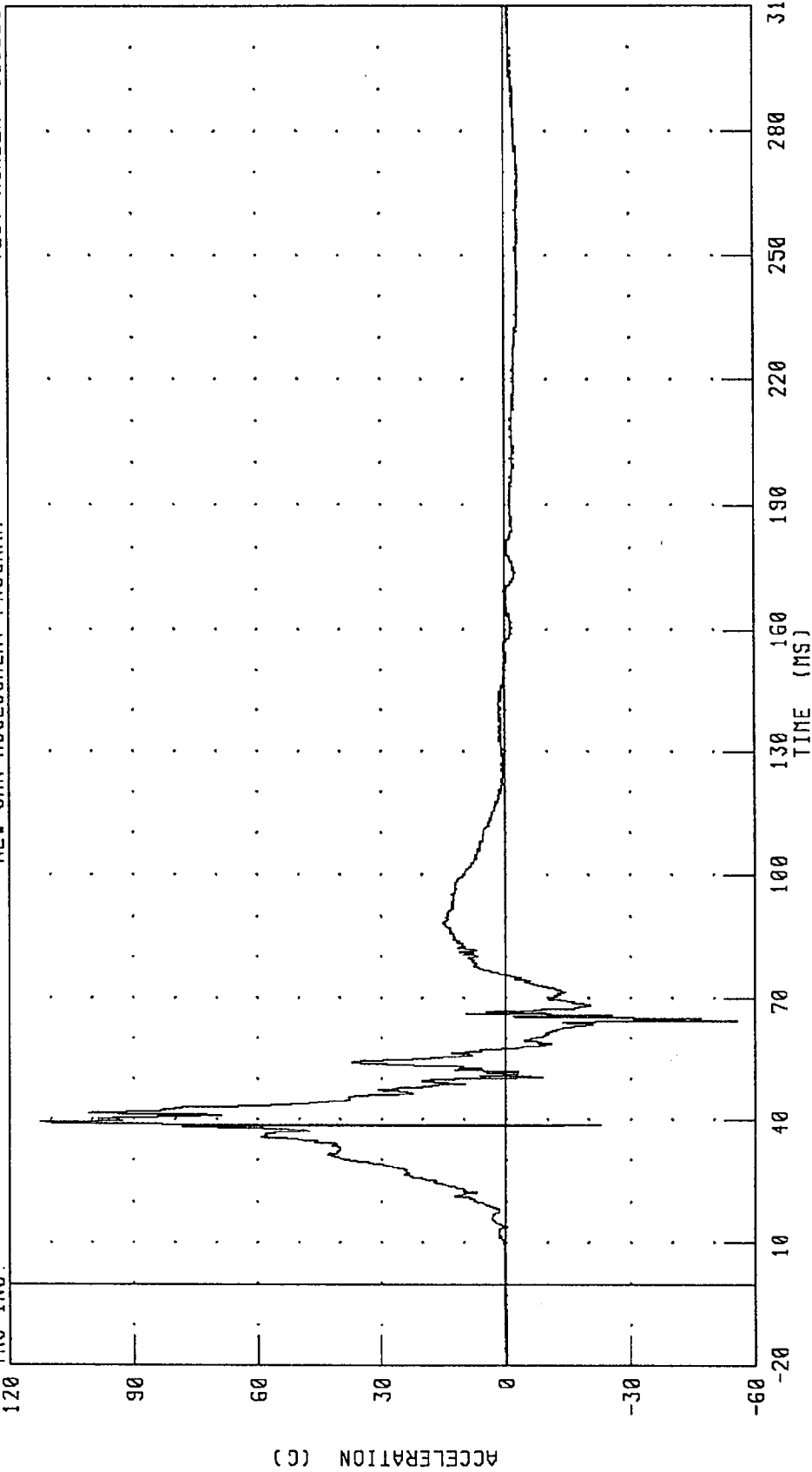


CHANNEL: FTRXC2 FILTER: CH. CLASS 1000

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FOOT Z-AXIS ACCELERATION AT HEEL
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: FTRZH2 FILTER: CH. CLASS 1000

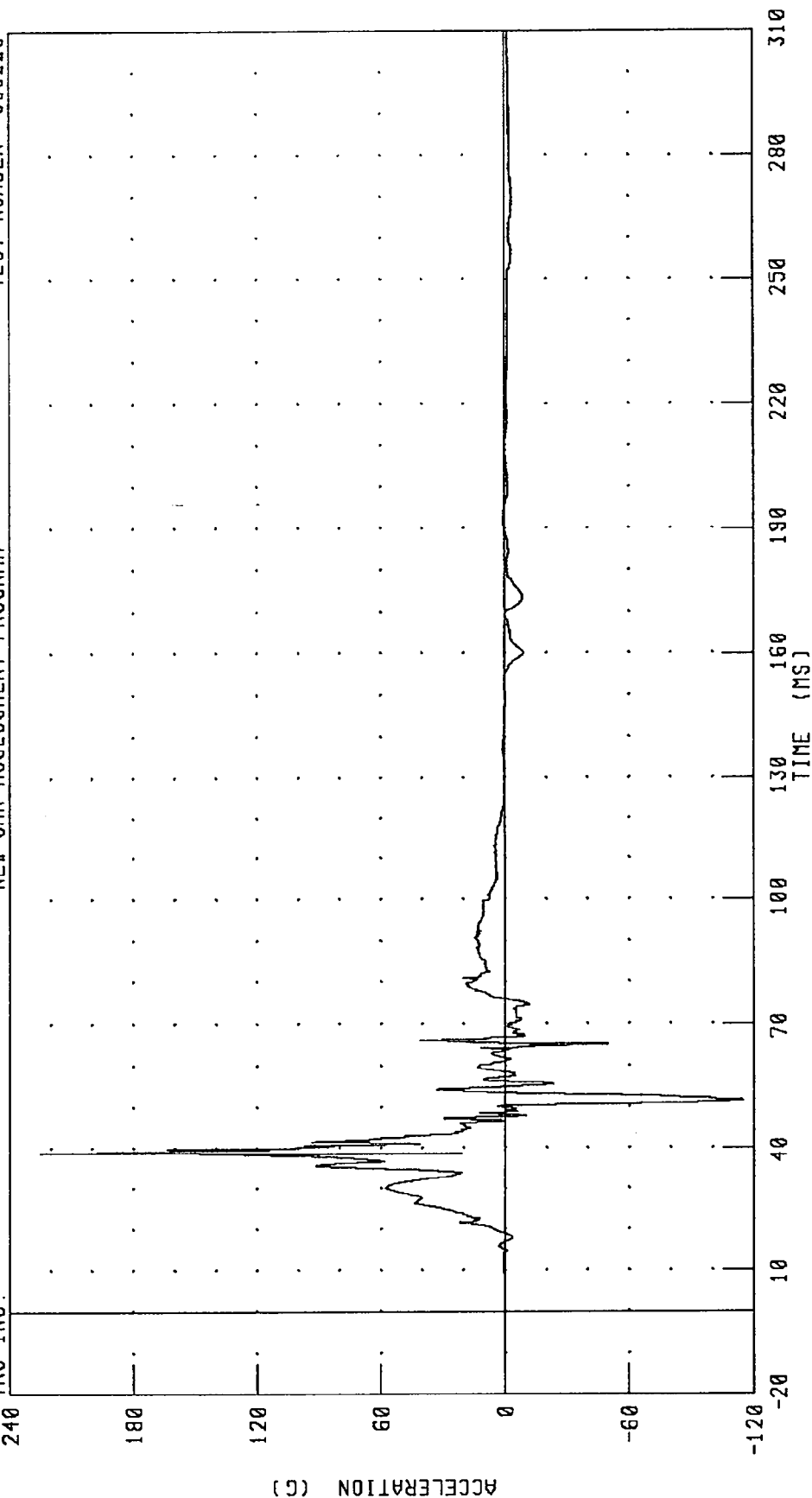
PEAK DATA: 112.47 G @ 39.44 MS; -55.65 G @ 64.48 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER RIGHT FOOT Z-AXIS ACCELERATION AT TOE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



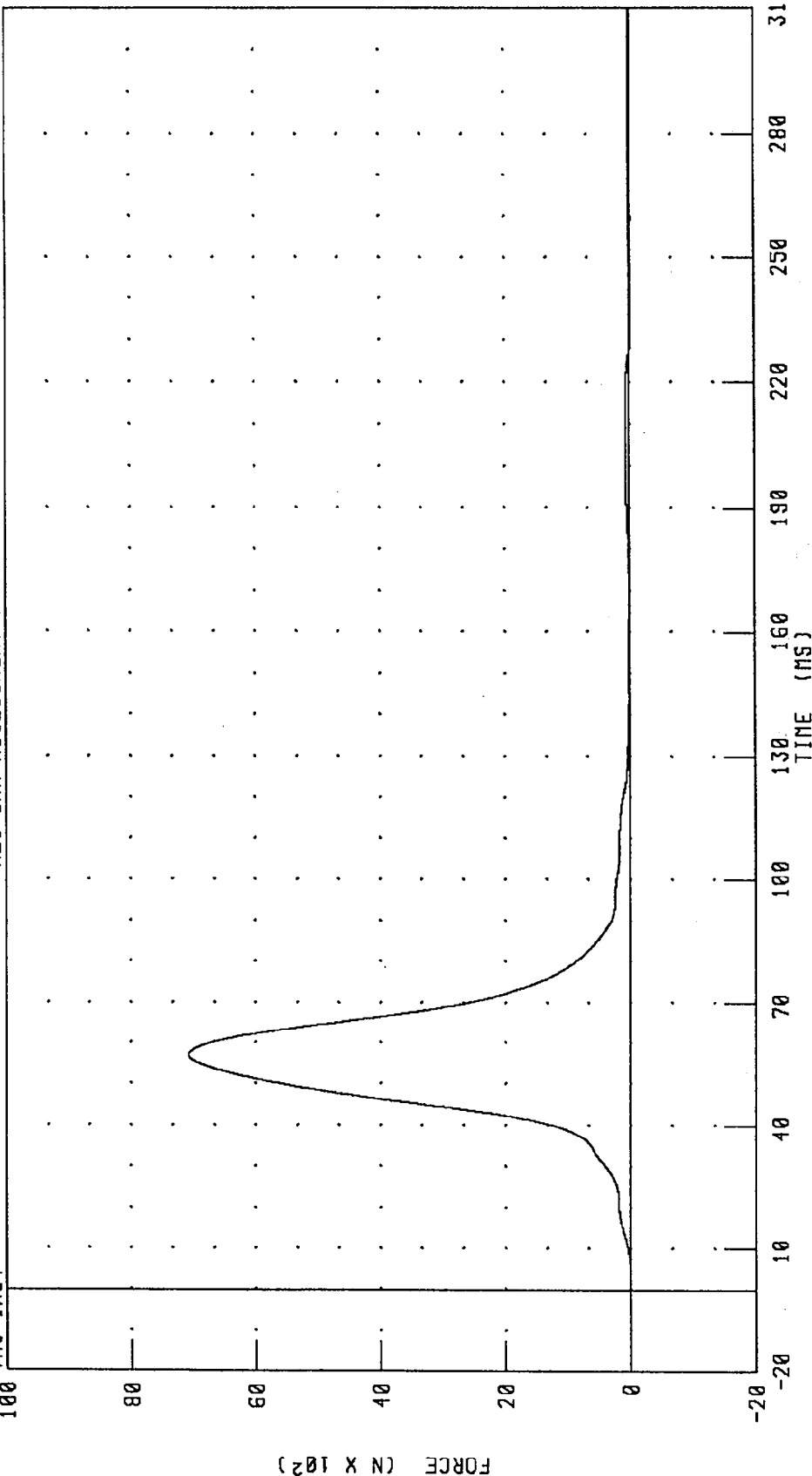
CHANNEL: FTRZT2 FILTER: CH. CLASS 1000

PEAK DATA: 225.27 G @ 39.04 MS; -114.55 G @ 51.44 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER LAP BELT OUTBOARD FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

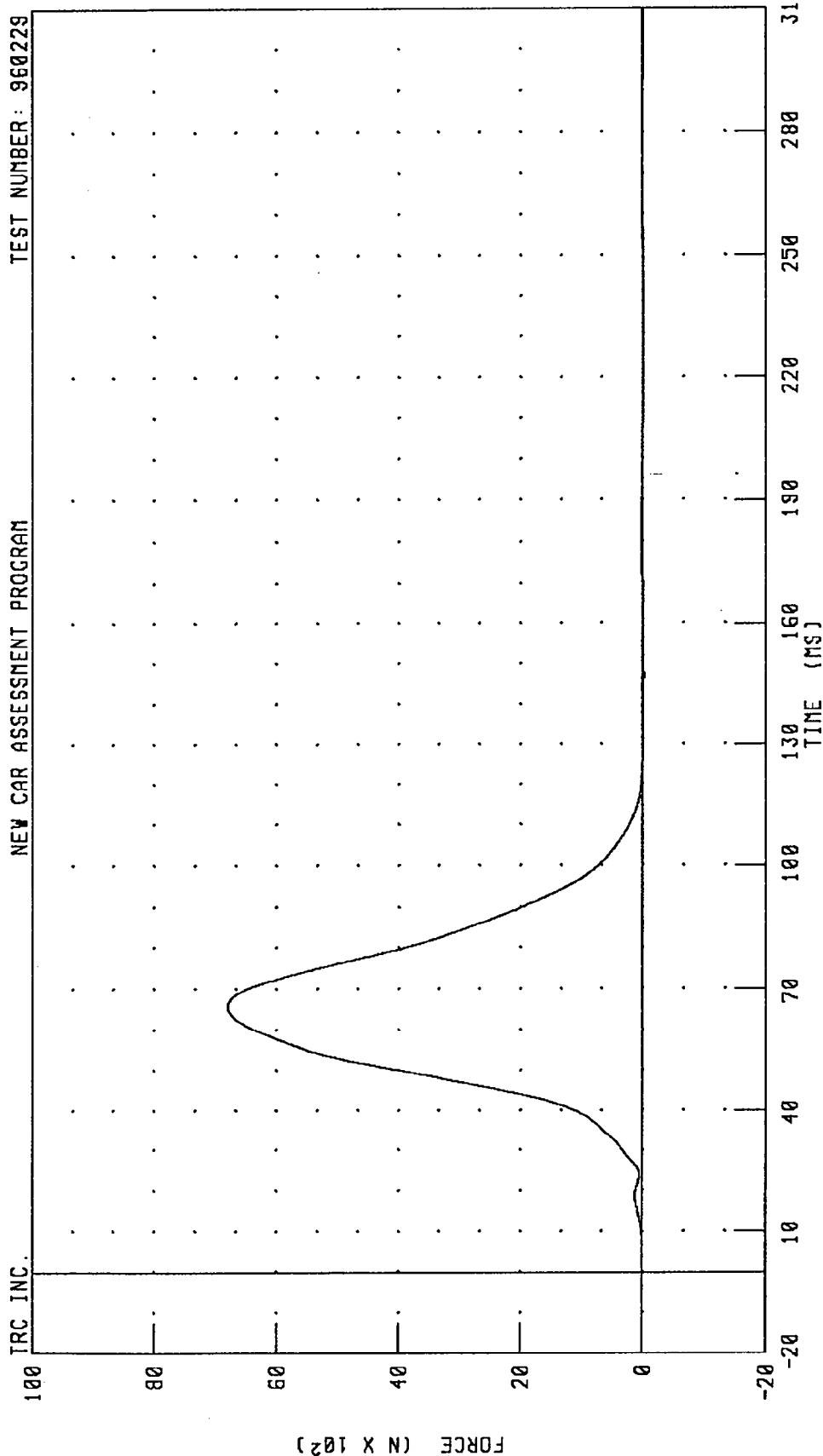


CHANNEL: LBOFI FILTER: CH. CLASS 60

PEAK DATA: 7079.32 N @ 56.88 MS; -20.39 N @ 259.60 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



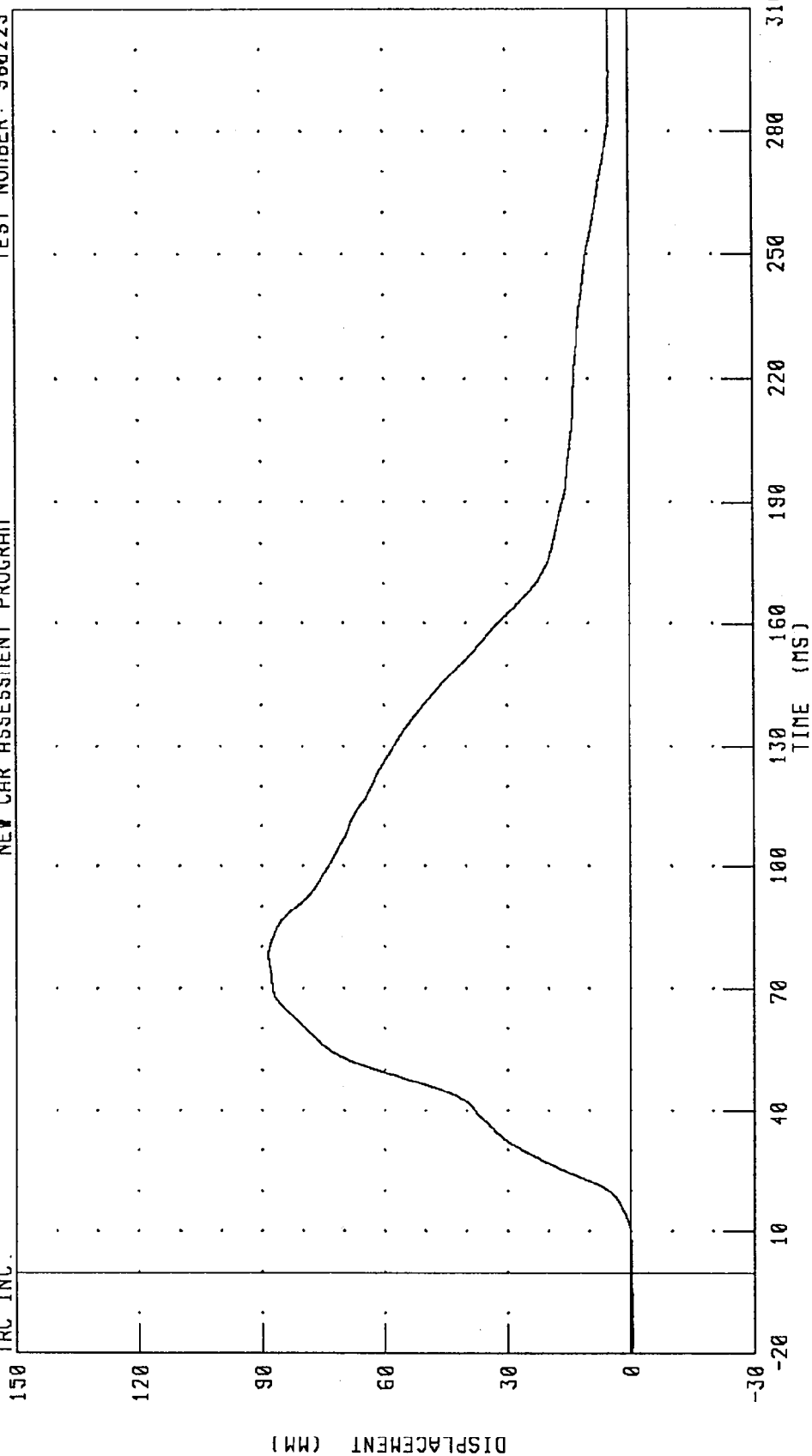
PEAK DATA: 6795.02 N @ 65.84 MS; -20.51 N @ 147.04 MS

CHANNEL: SHBF1 FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER SHOULDER BELT DISPLACEMENT
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

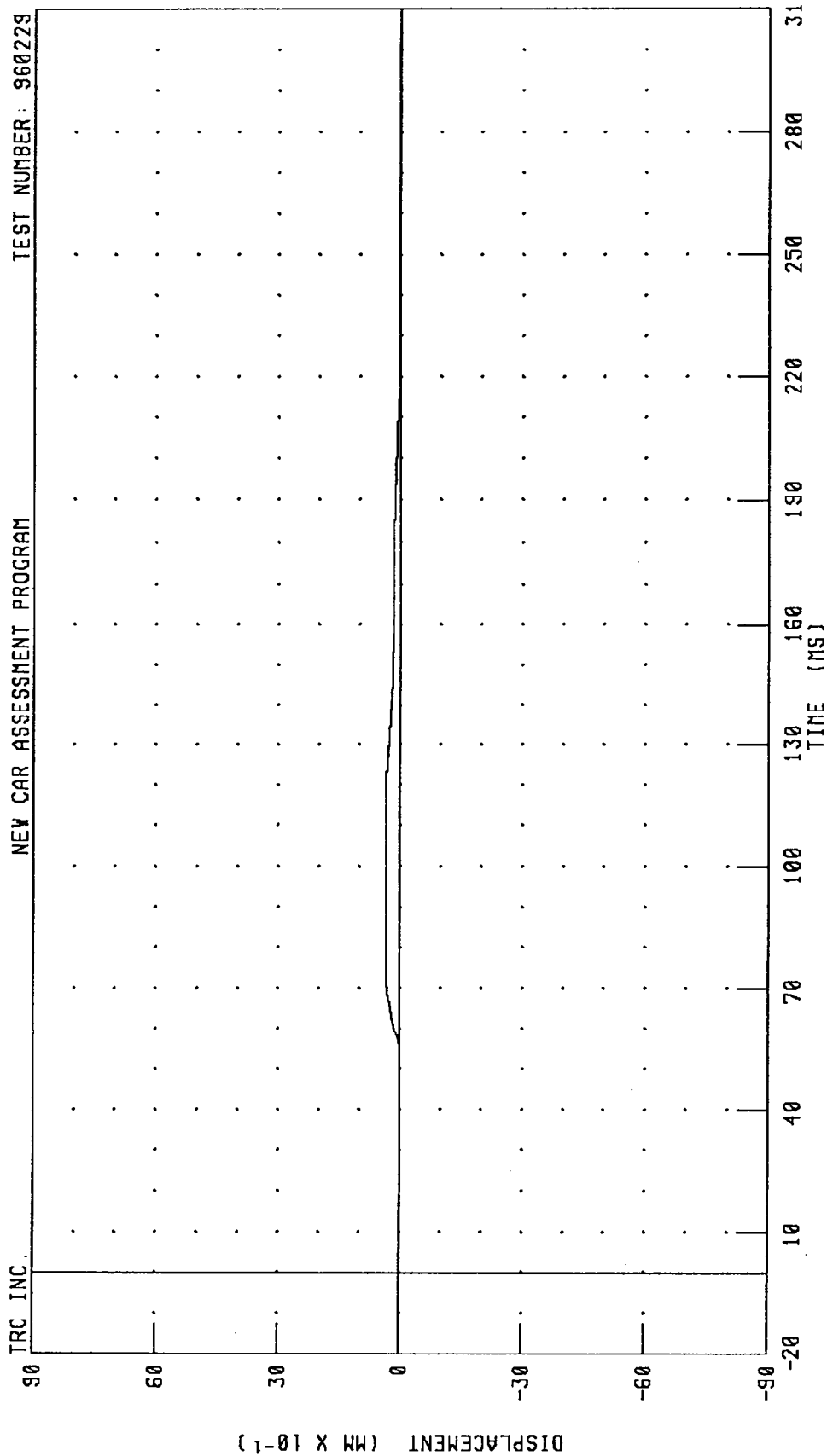


PEAK DATA: 88.41 MM @ 78.08 MS; -0.41 MM @ -16.48 MS

CHANNEL: SHBD1 FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT BELT EXTENSION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

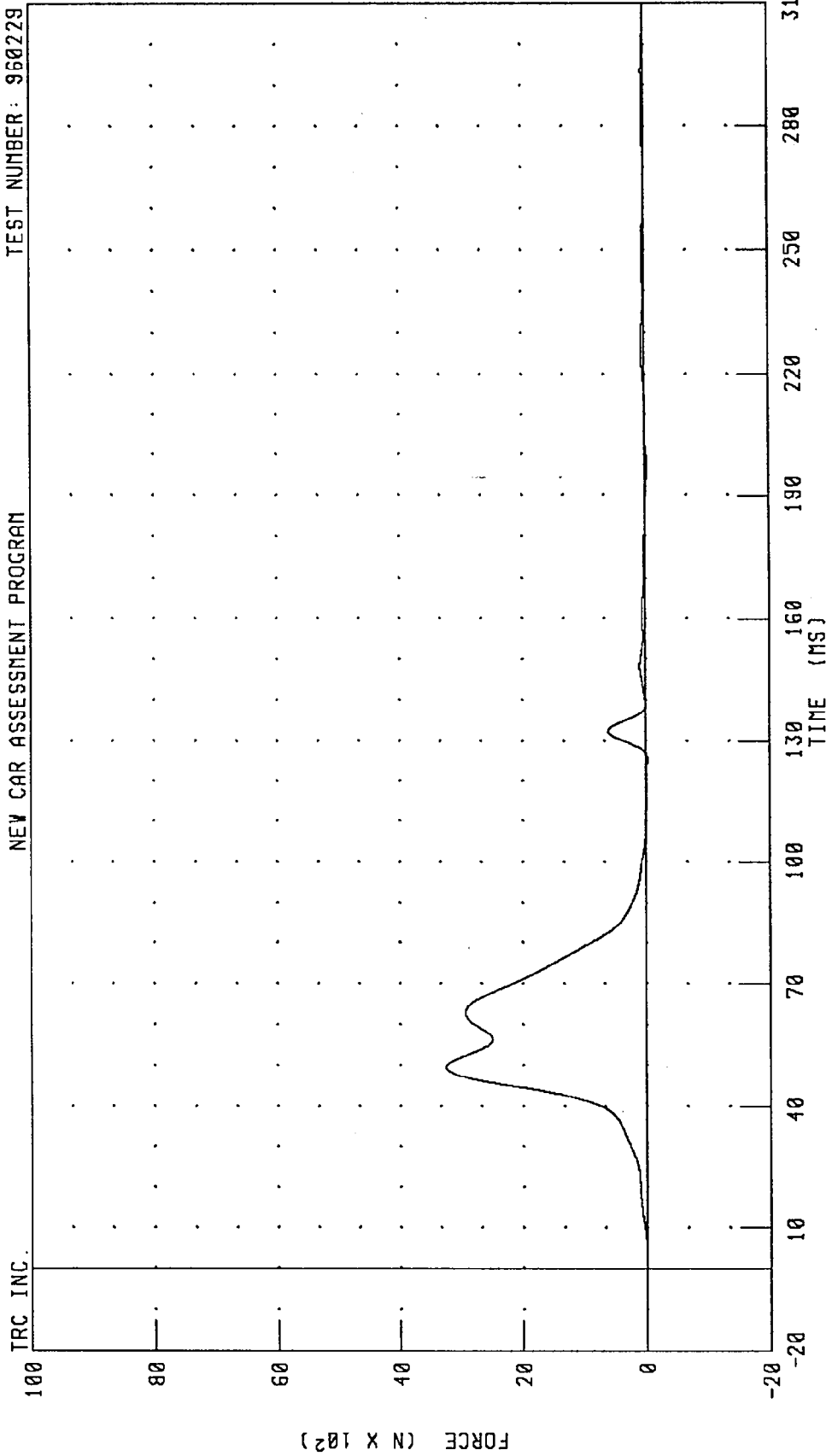


CHANNEL: SBED1 FILTER: CH. CLASS 60

PEAK DATA: 0.34 MM @ 77.44 MS; 0.00 NM @ 53.68 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 3253.75 N @ 49.60 MS; -34.81 N @ 197.12 MS

CHANNEL: LBOF2 FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

100

80

60

40

20

0

-20

FORCE (N X 10²)

TIME (MS)

130

160

190

220

250

280

310

CHANNEL: SHBF2

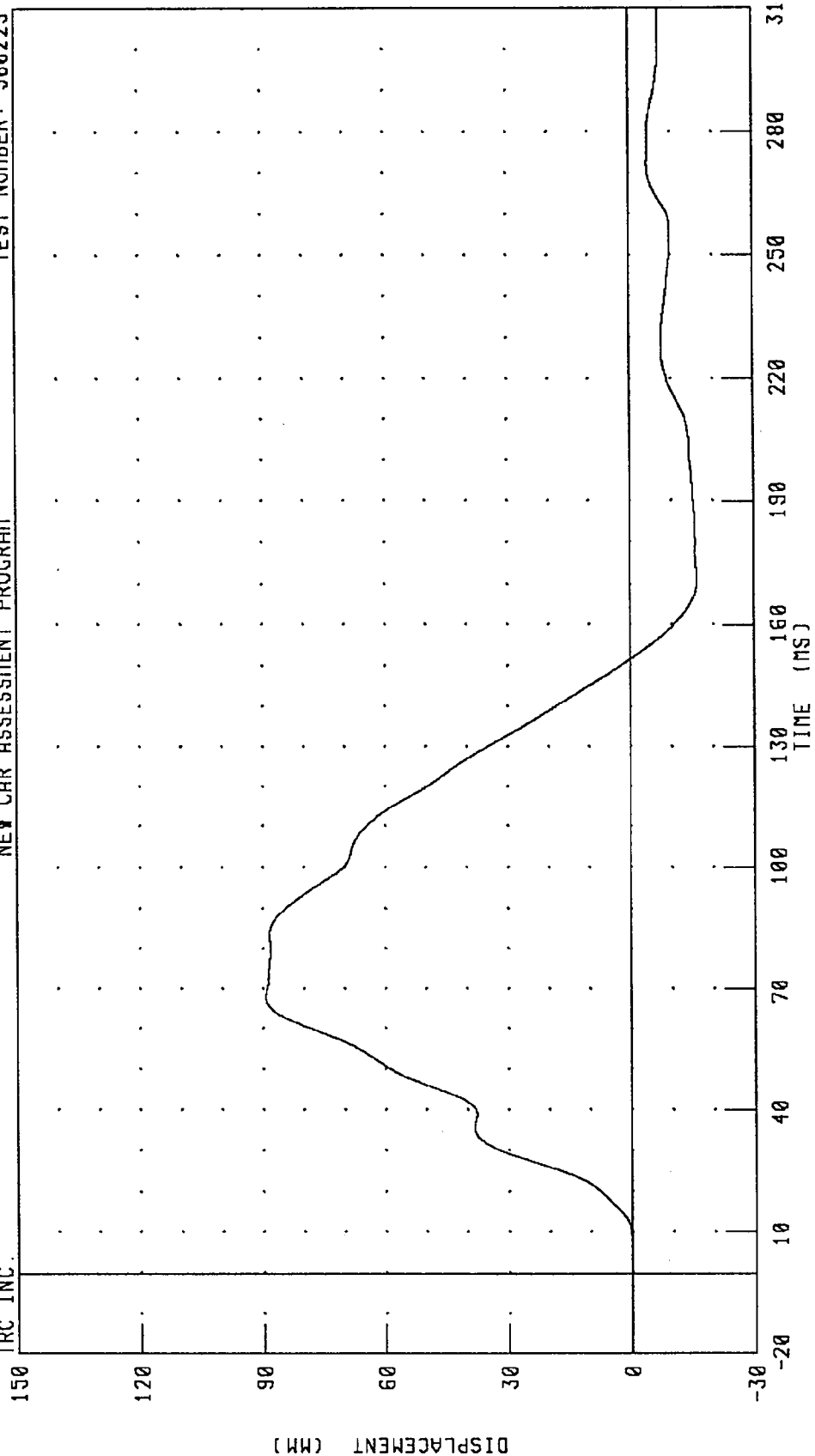
FILTER: CH. CLASS 60

PEAK DATA: 6787.22 N @ 69.12 MS; -17.46 N @ 148.72 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.

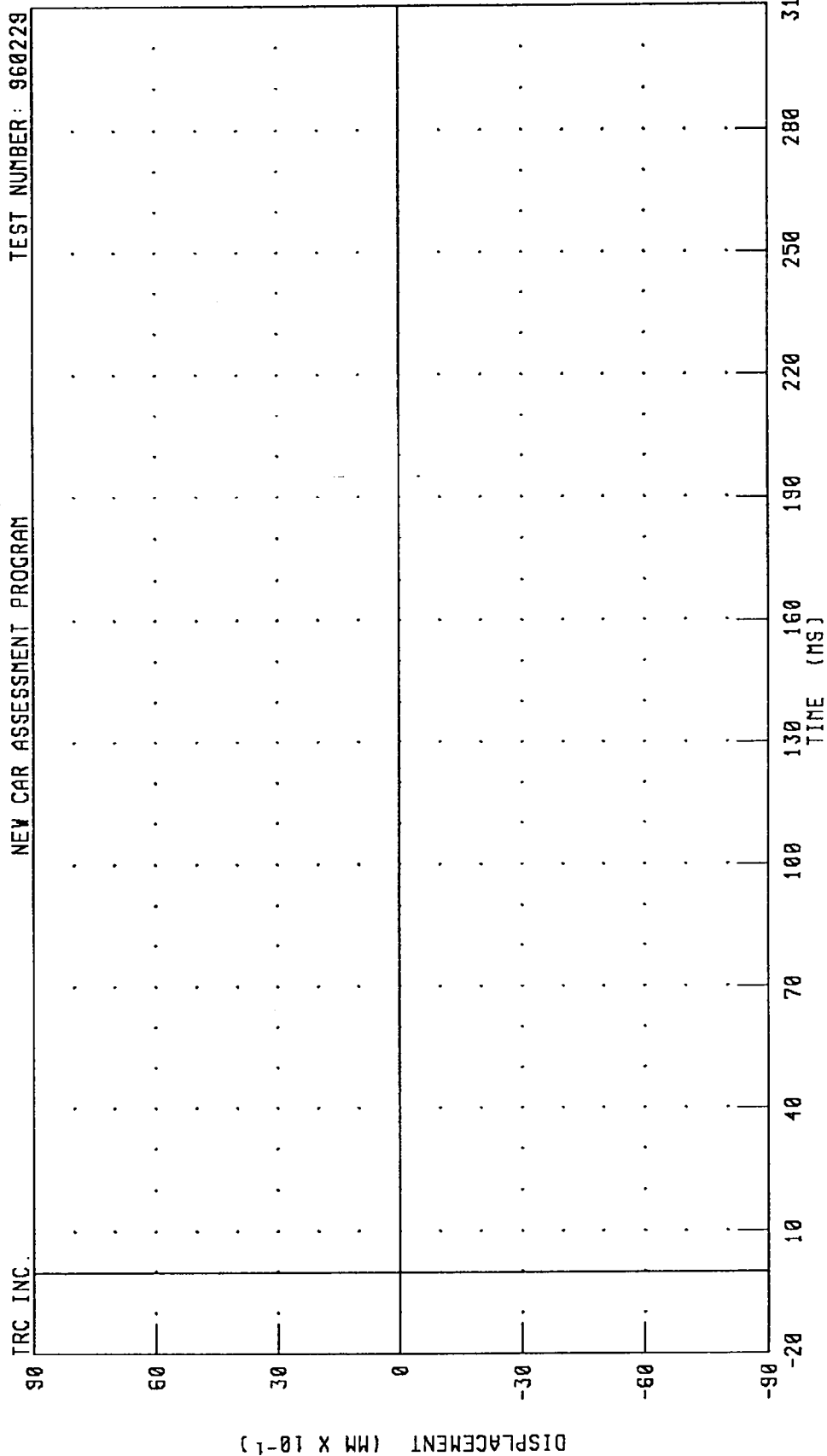


PEAK DATA: 89.41 MM @ 68.00 MS; -16.30 MM @ 171.28 MS.

CHANNEL: SH002 FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



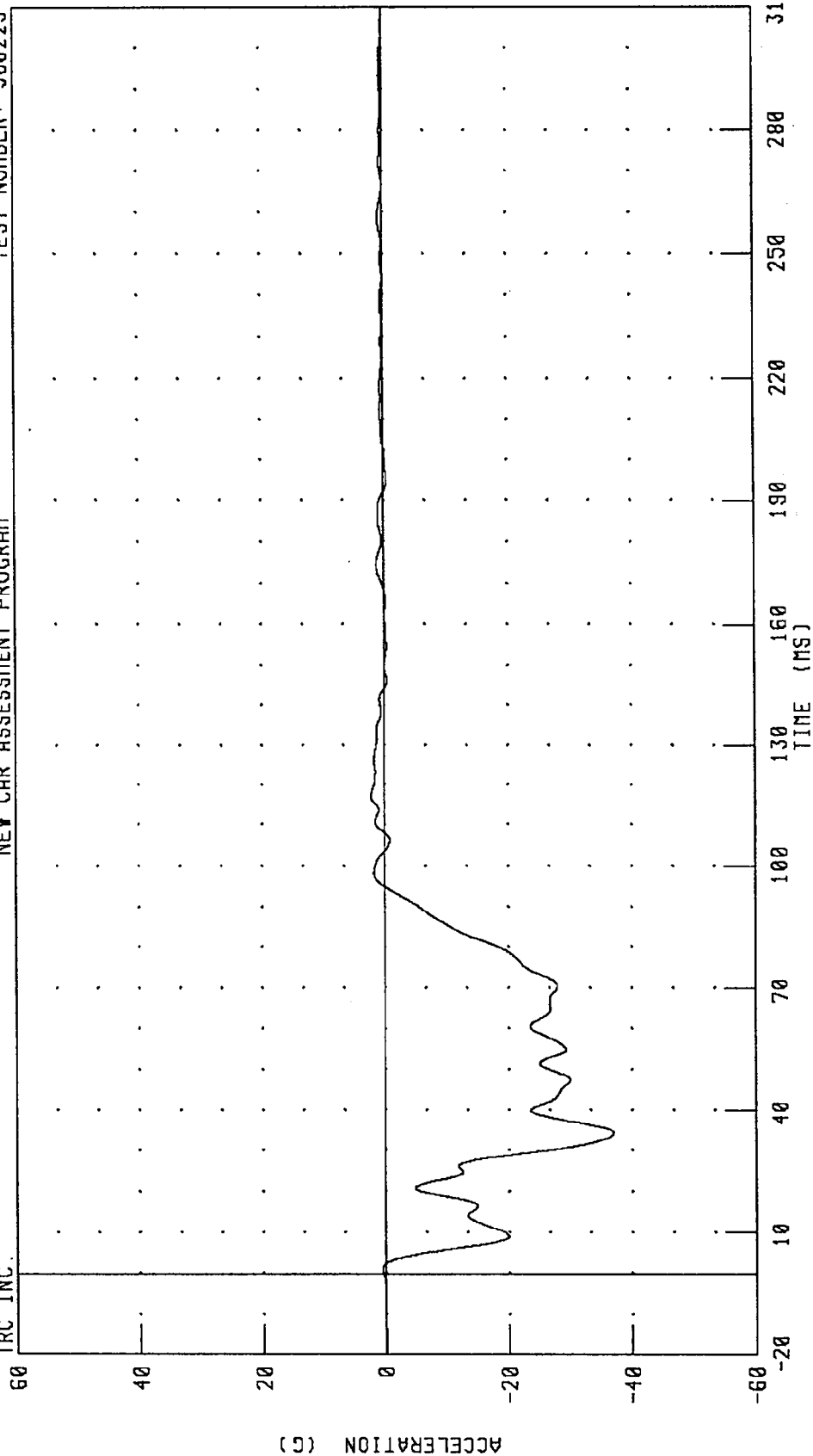
CHANNEL: SBED2 FILTER: CH. CLASS 60

PEAK DATA: 0.00 NM @ 155.60 MS; 0.00 NM @ 35.44 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



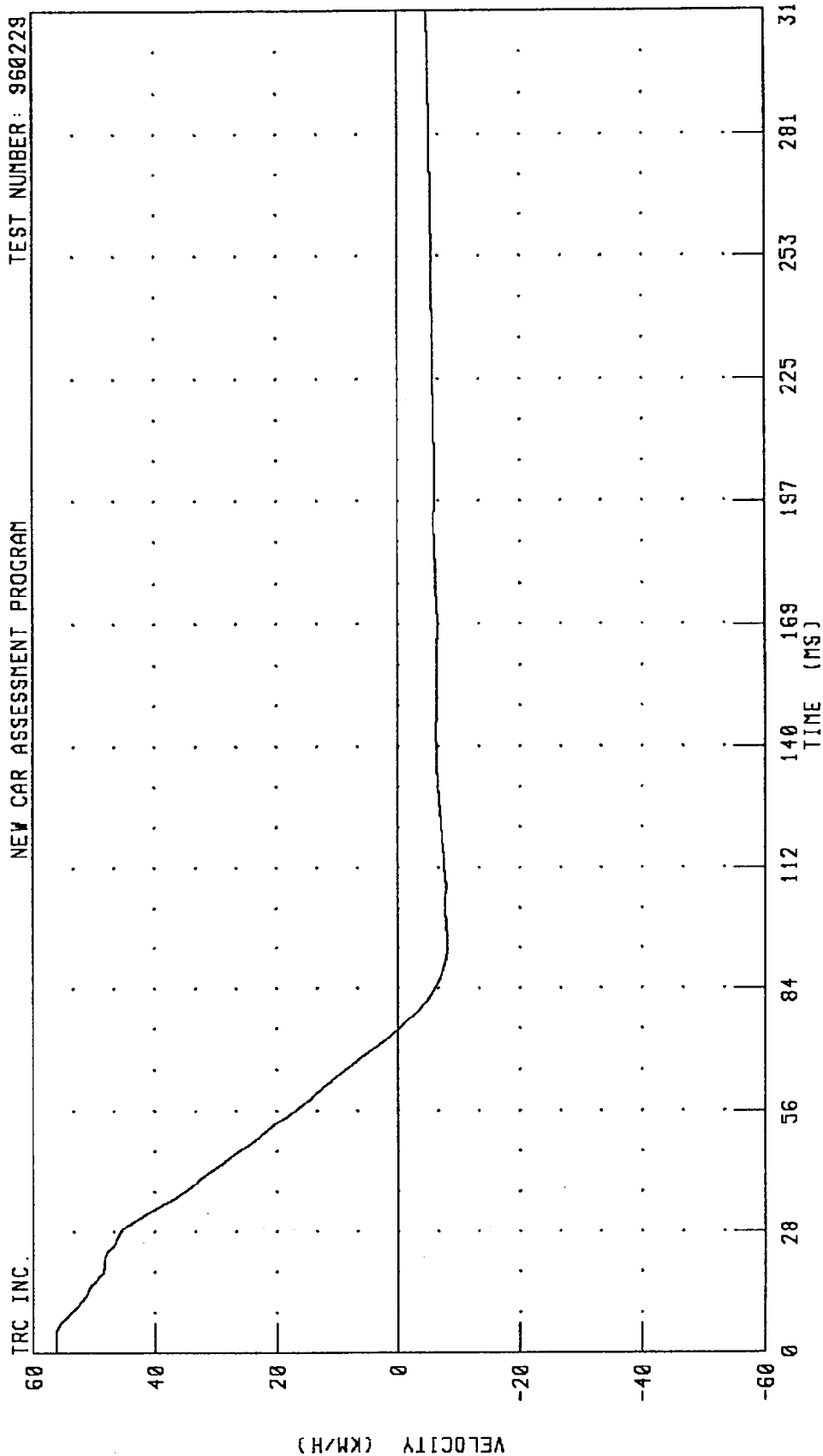
CHANNEL: TLRXG1 FILTER: CH. CLASS 60

PEAK DATA: 2.25 G @ 117.12 MS, -37.00 G @ 34.24 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS VELOCITY

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM



PEAK DATA: 56.31 KM/H @ 3.44 MS; -8.16 KM/H @ 94.96 MS

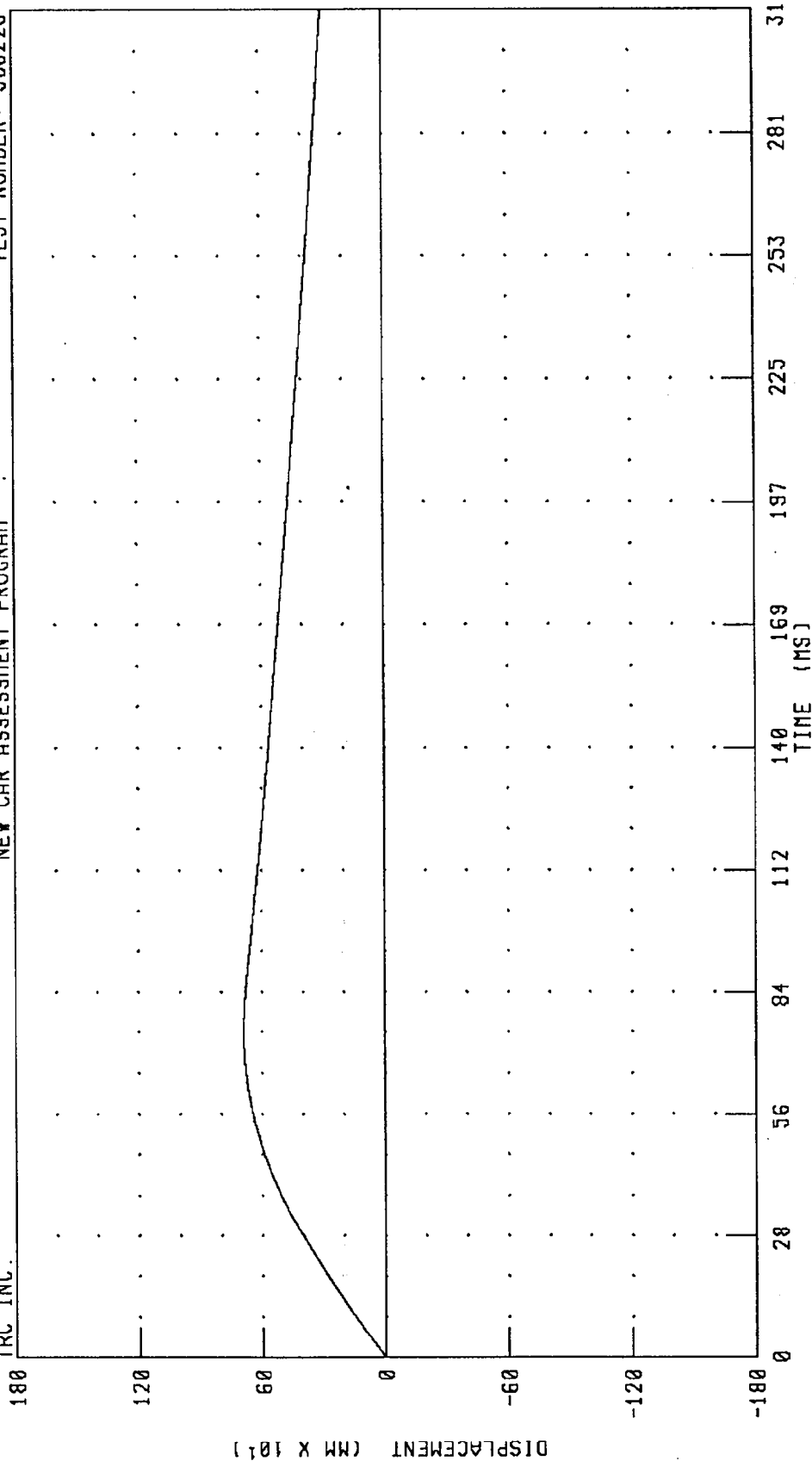
CHANNEL: TLRXV1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS DISPLACEMENT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

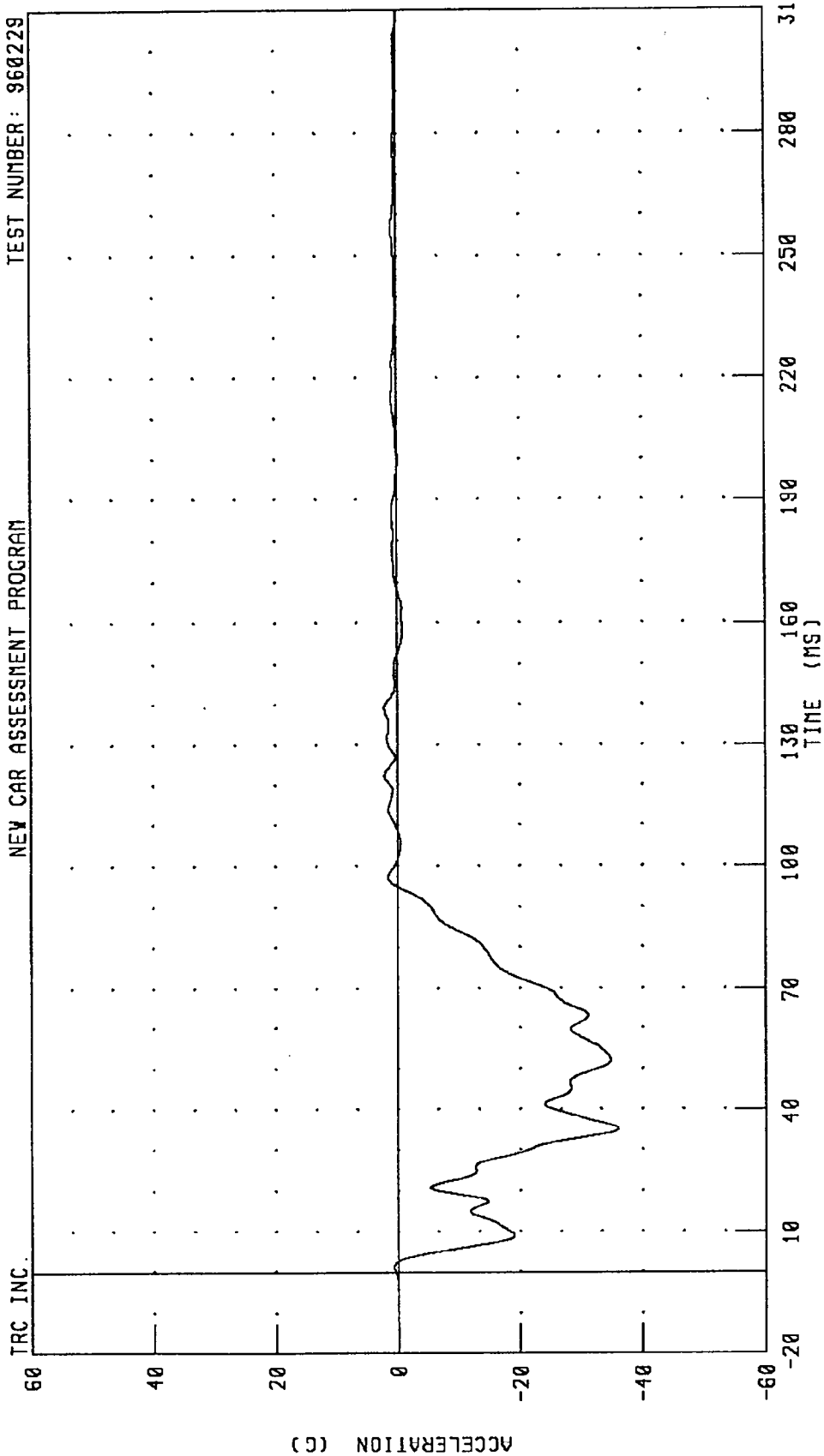


PEAK DATA: 690.12 MM @ 74.96 MS; 0.00 MM @ 0.00 MS

CHANNEL: TLRXD1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

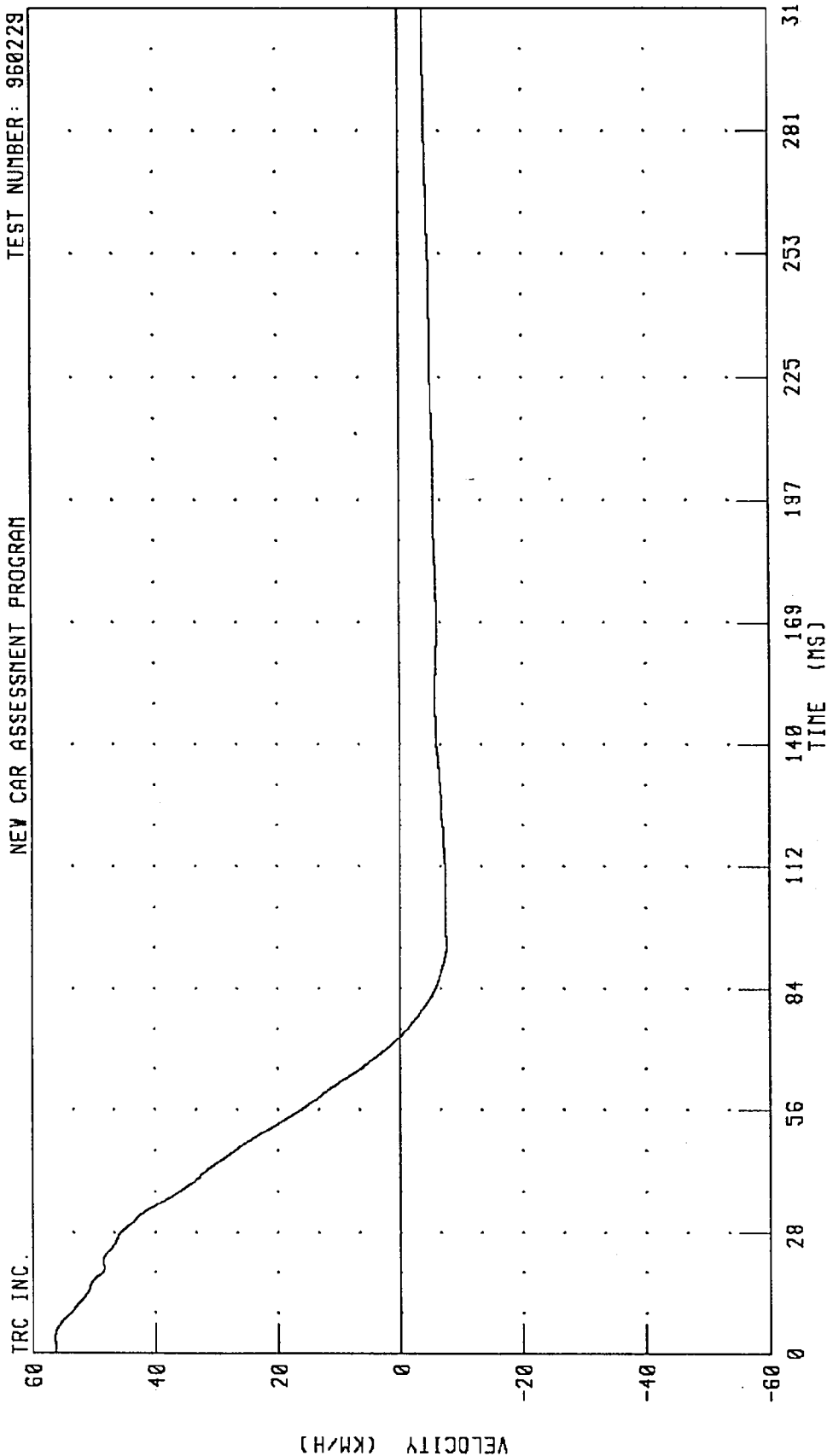


CHANNEL: TRRXG1 FILTER: CH. CLASS 60

PEAK DATA: 2.15 G @ 139.20 MS; -36.04 G @ 35.20 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS VELOCITY
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



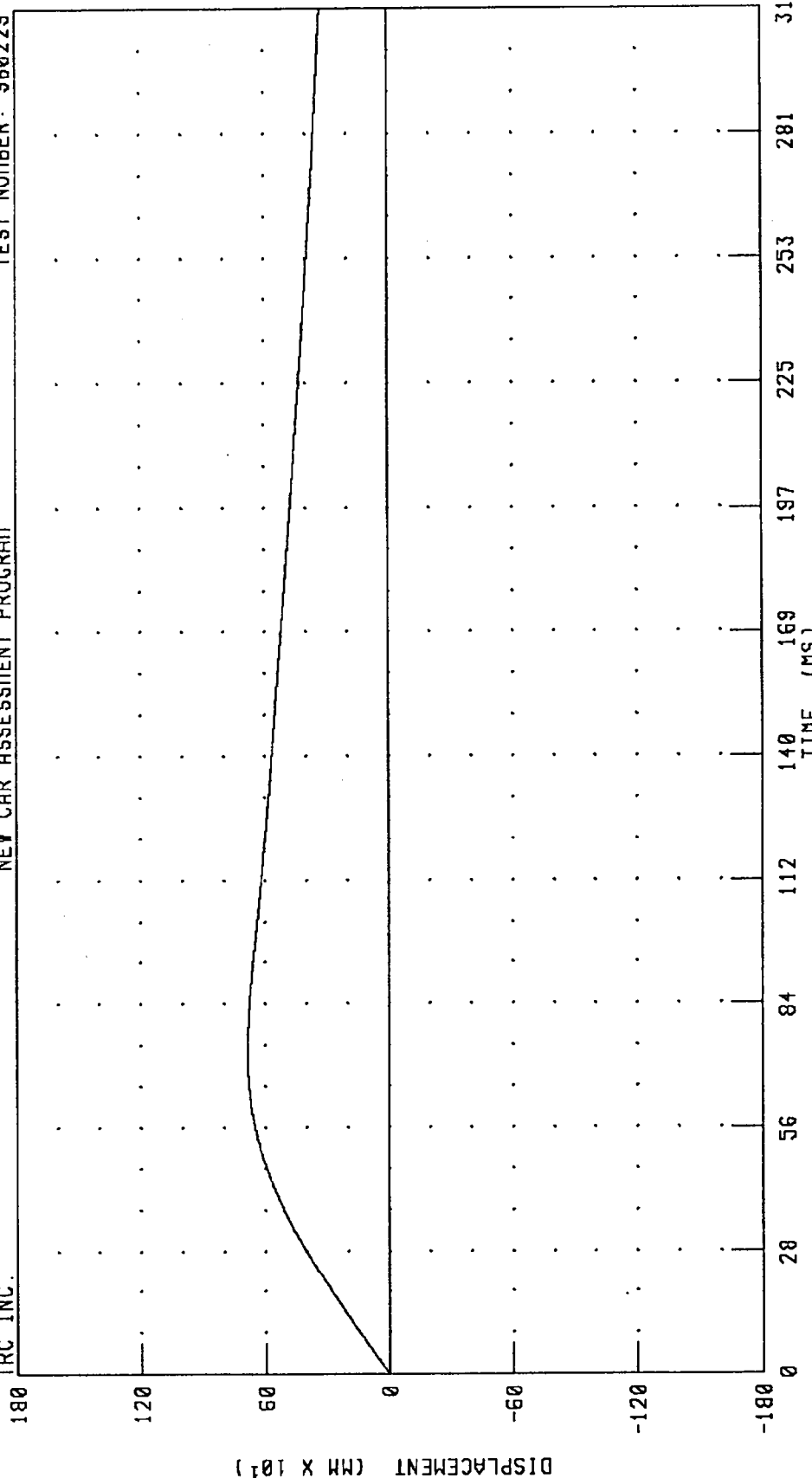
CHANNEL: TRRXV1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS DISPLACEMENT

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



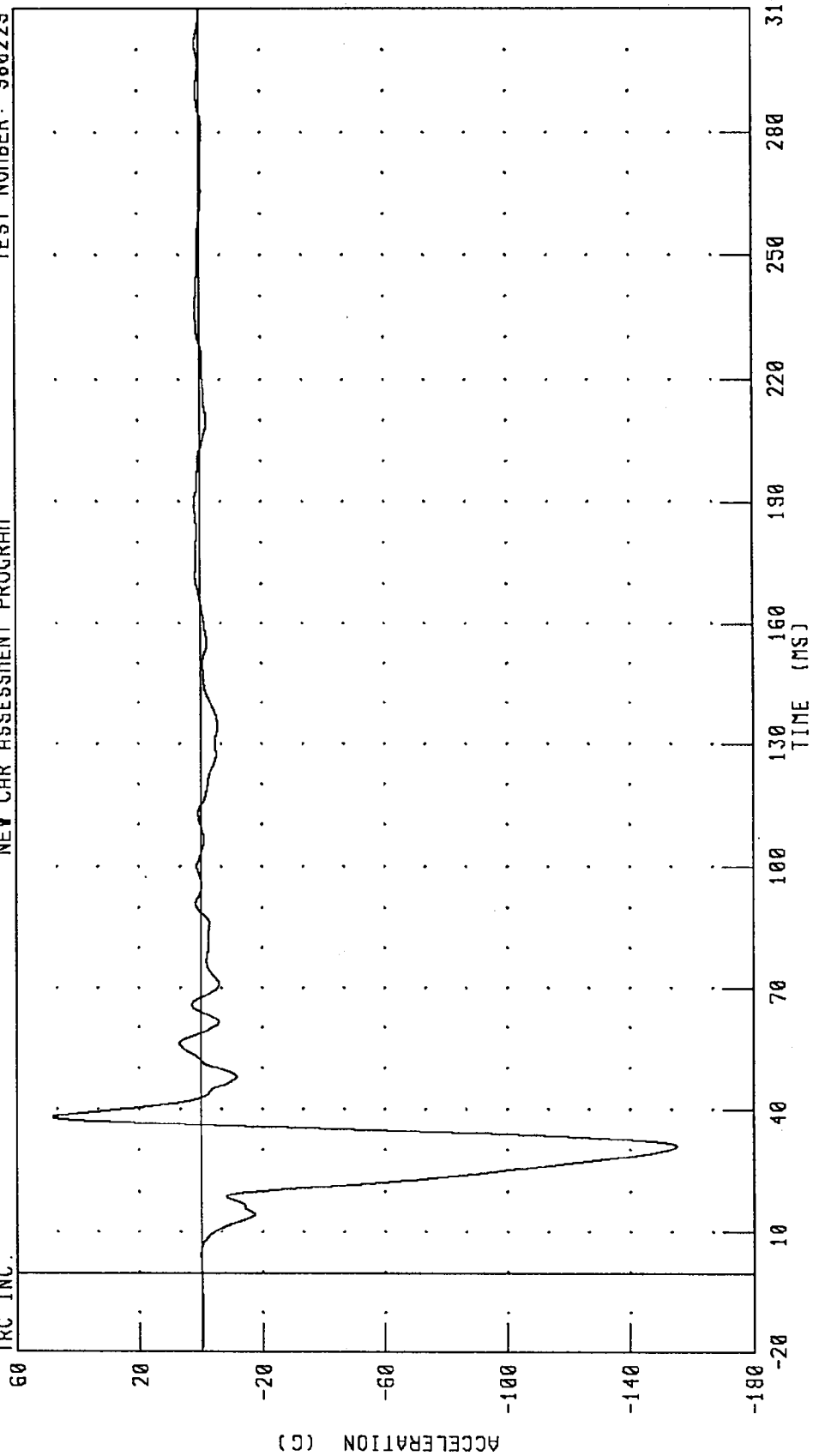
PEAK DATA: 686.32 MM @ 73.28 MS; 0.00 MM @ 0.00 MS

CHANNEL: TRRXD1 FILTER: CH. CLASS 180

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
ENGINE TOP X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960228

TRC INC.

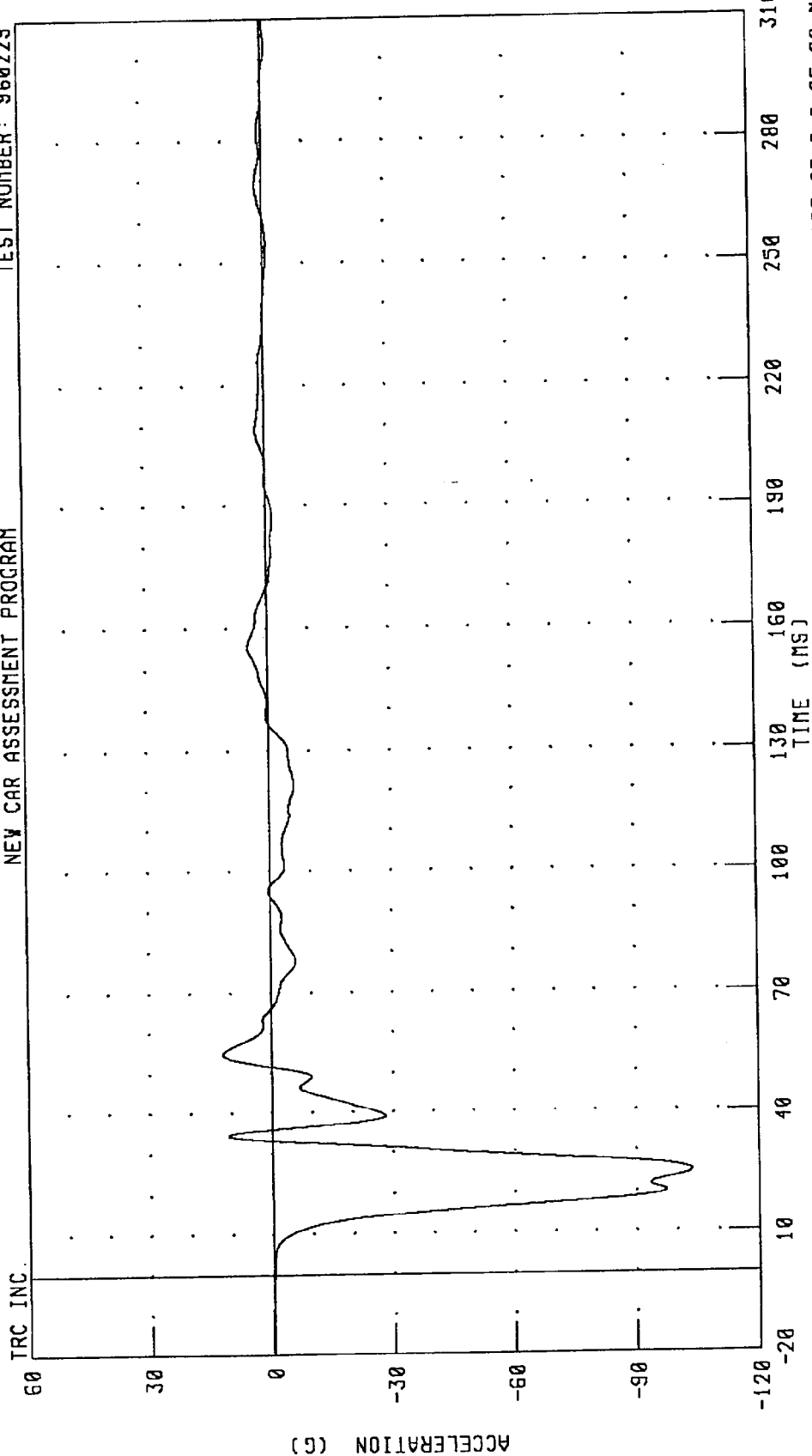


CHANNEL: ENGXG1 FILTER: CH. CLASS 60

PEAK DATA: 48.12 G @ 38.16 MS; -155.12 G @ 31.04 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION
NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

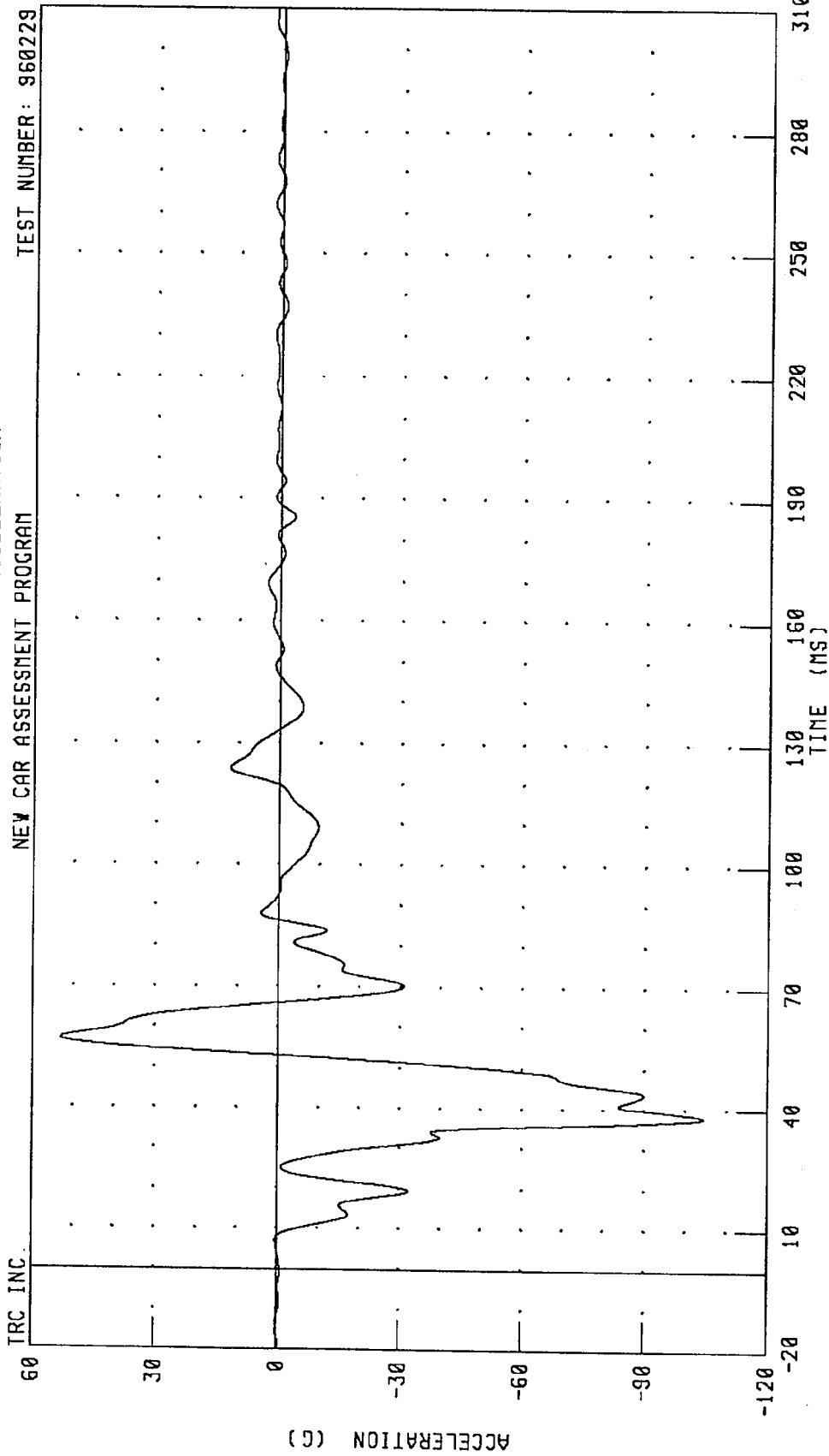


CHANNEL: ENGXC2 FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM



CHANNEL: BCRXG1 FILTER: CH. CLASS 60

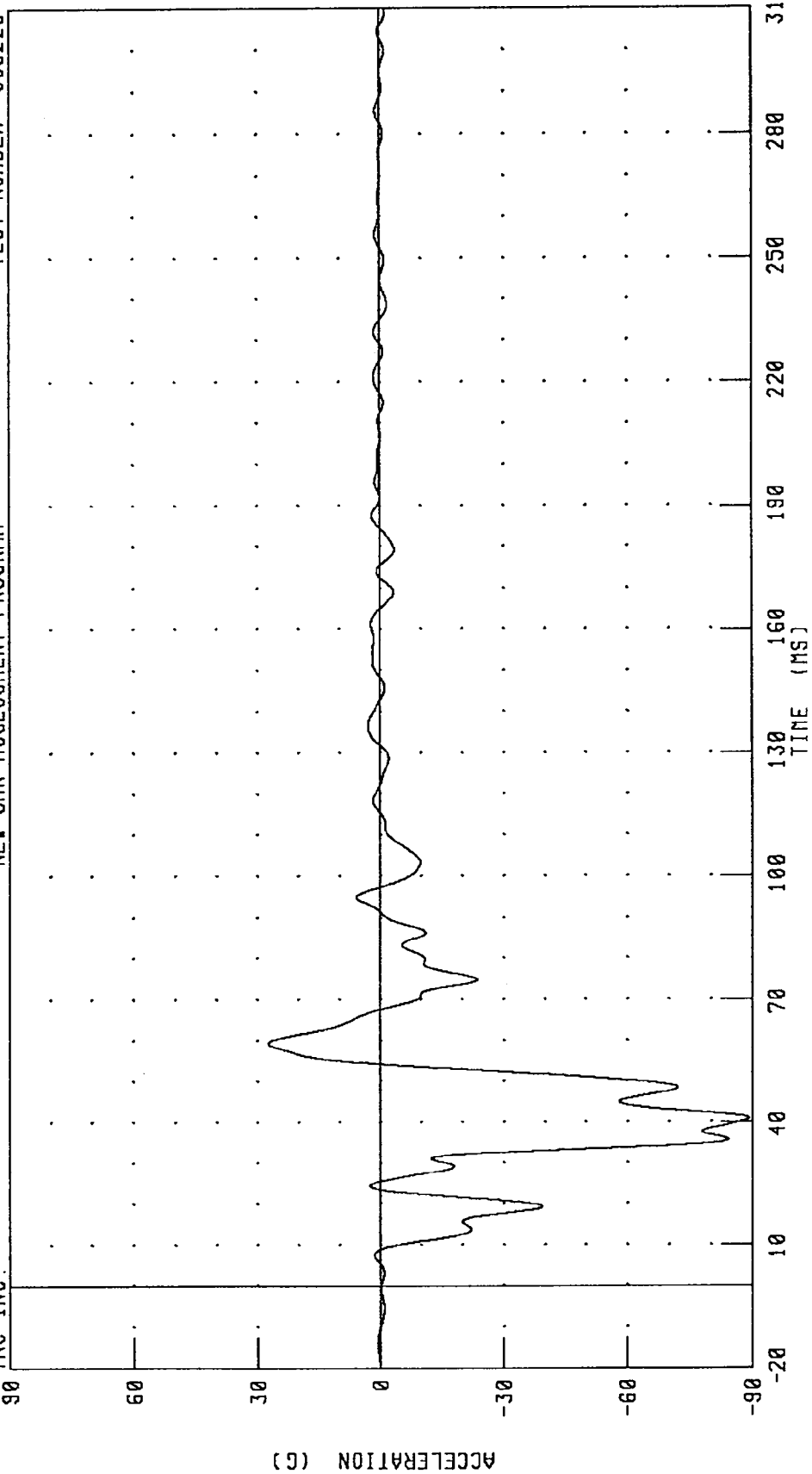
PEAK DATA: 53.01 G @ 56.96 MS; -104.39 G @ 37.92 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 27.35 G @ 59.36 MS; -89.13 G @ 40.88 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

20

ACCELERATION (G)

-20

-40

-60

-80

-100

0

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

1260

1270

1280

1290

1300

1310

1320

1330

1340

1350

1360

1370

1380

1390

1400

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1420

1430

1440

1450

1460

1470

1480

1490

1500

1510

1520

1530

1540

1550

1560

1570

1580

1590

1600

1610

1620

1630

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1800

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1820

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1910

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1940

1950

1960

1970

1980

1990

2000

2010

2020

2030

2040

2050

2060

2070

2080

2090

2100

2110

2120

2130

2140

2150

2160

2170

2180

2190

2200

2210

2220

2230

2240

2250

2260

2270

2280

2290

2300

2310

2320

2330

2340

2350

2360

2370

2380

2390

2400

2410

2420

2430

2440

2450

2460

2470

2480

2490

2500

2510

2520

2530

2540

2550

2560

2570

2580

2590

2600

2610

2620

2630

2640

2650

2660

2670

2680

2690

2700

2710

2720

2730

2740

2750

2760

2770

2780

2790

2800

2810

2820

2830

2840

2850

2860

2870

2880

2890

2900

2910

2920

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2990

3000

3010

3020

3030

3040

3050

3060

3070

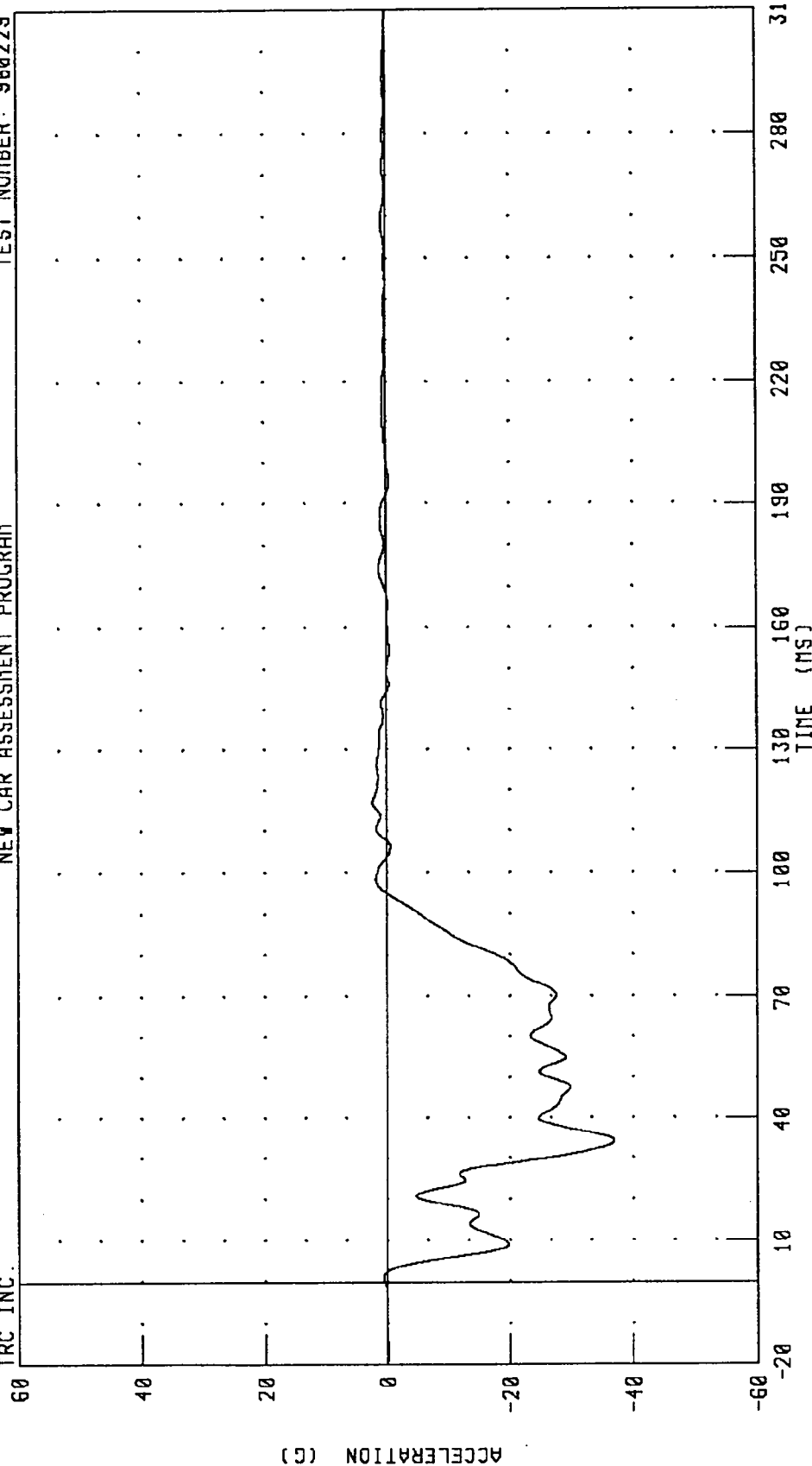
3080

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT REDUNDANT X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



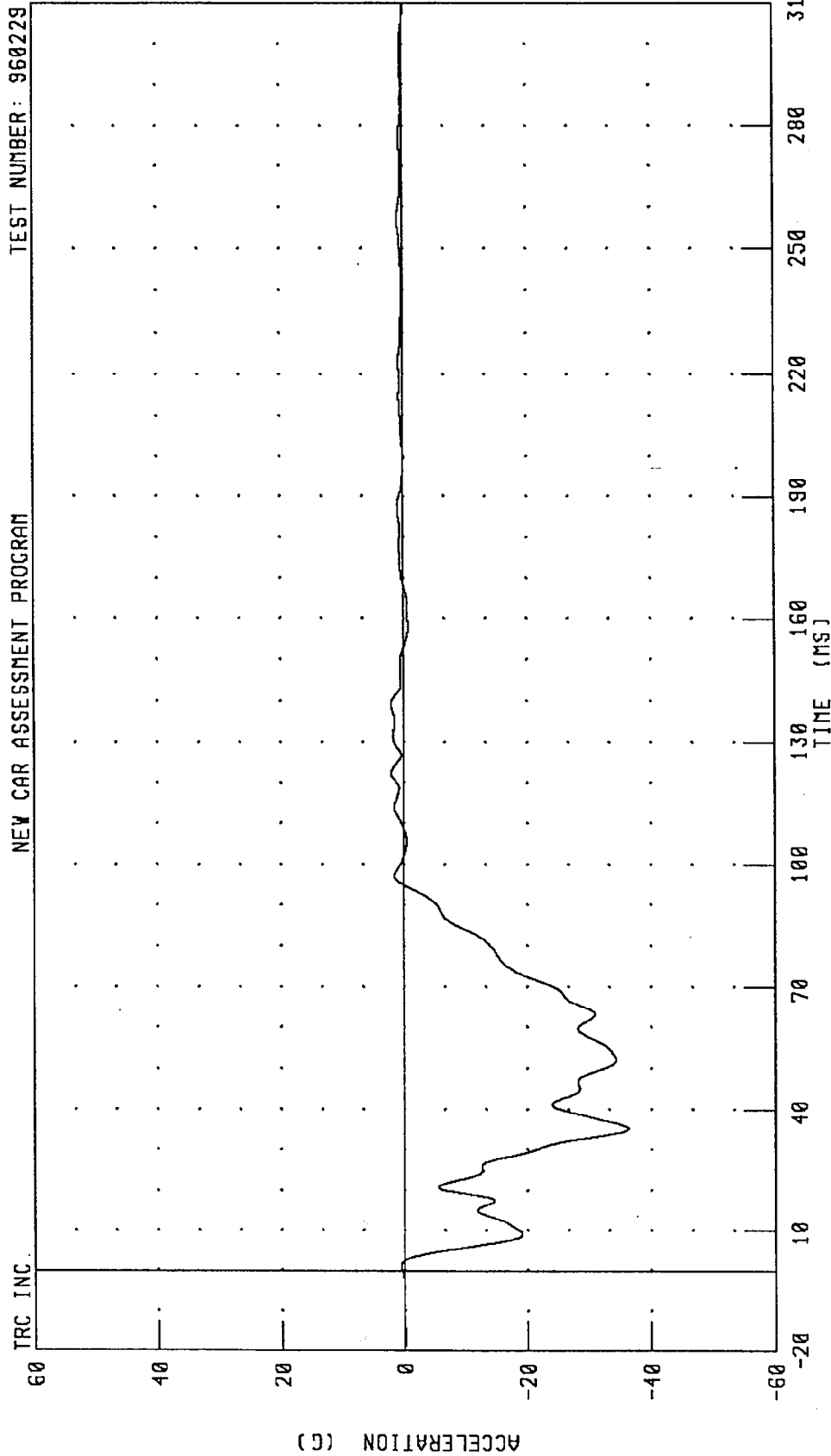
CHANNEL: TLRXGA FILTER: CH. CLASS 60

PEAK DATA: 2.32 G @ 117.04 MS; -36.95 G @ 34.32 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT REDUNDANT X-AXIS ACCELERATION

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM



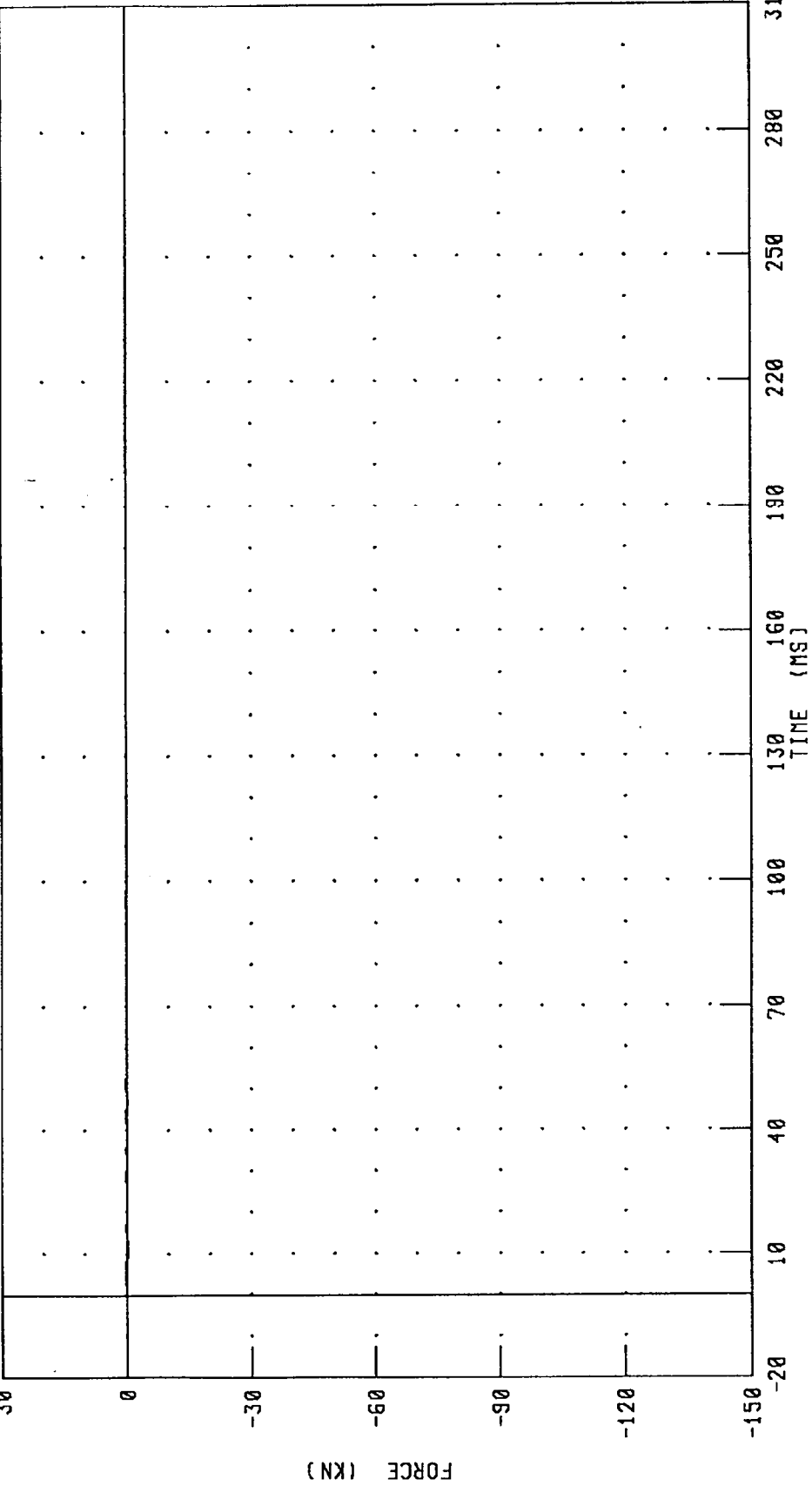
CHANNEL: TRRXGA FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A1 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BA1F FILTER: CH. CLASS 60

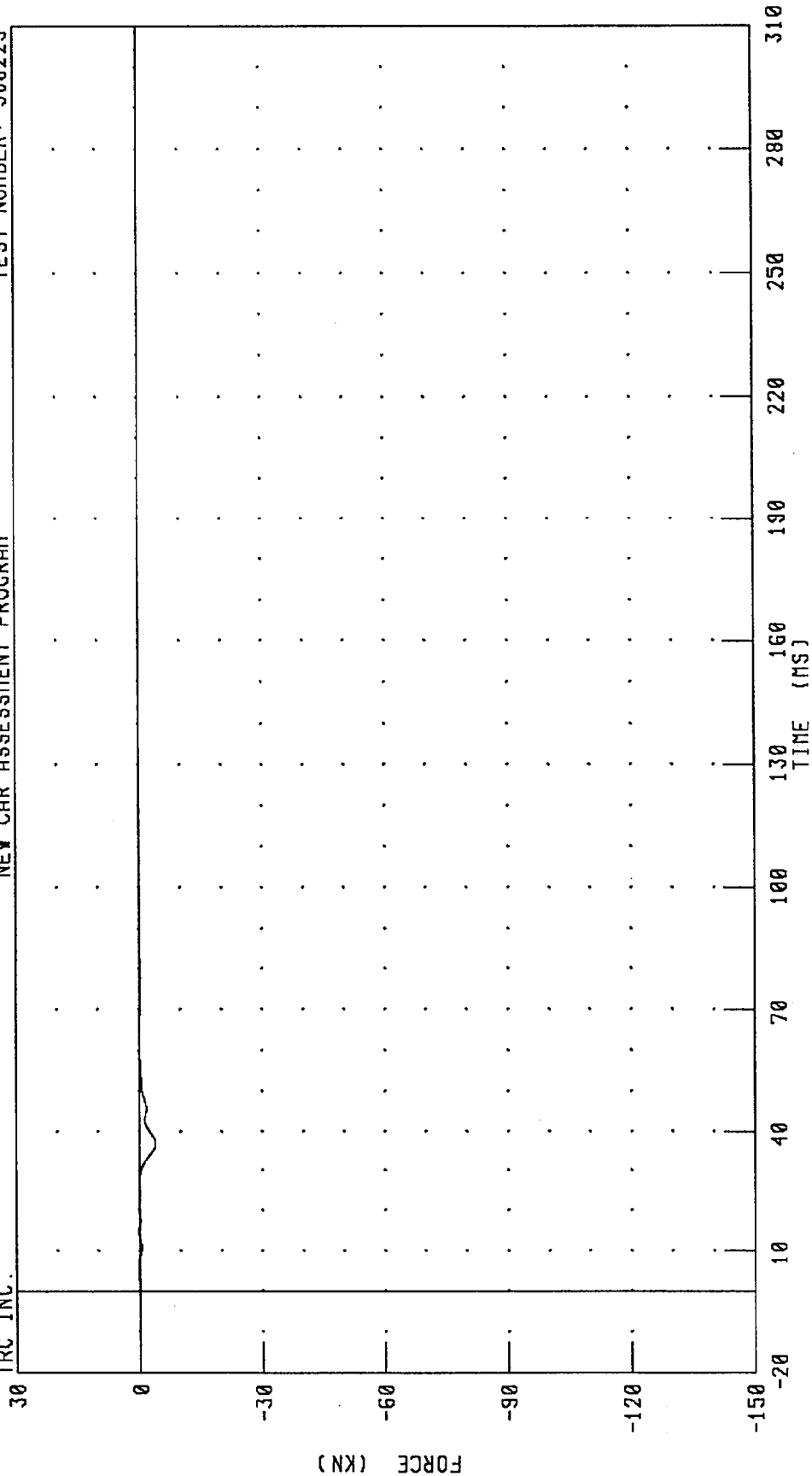
PEAK DATA: 0.31 KN @ 6.48 MS; -0.42 KN @ 10.72 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A2 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.25 KN @ 6.32 MS; -3.89 KN @ 36.88 MS

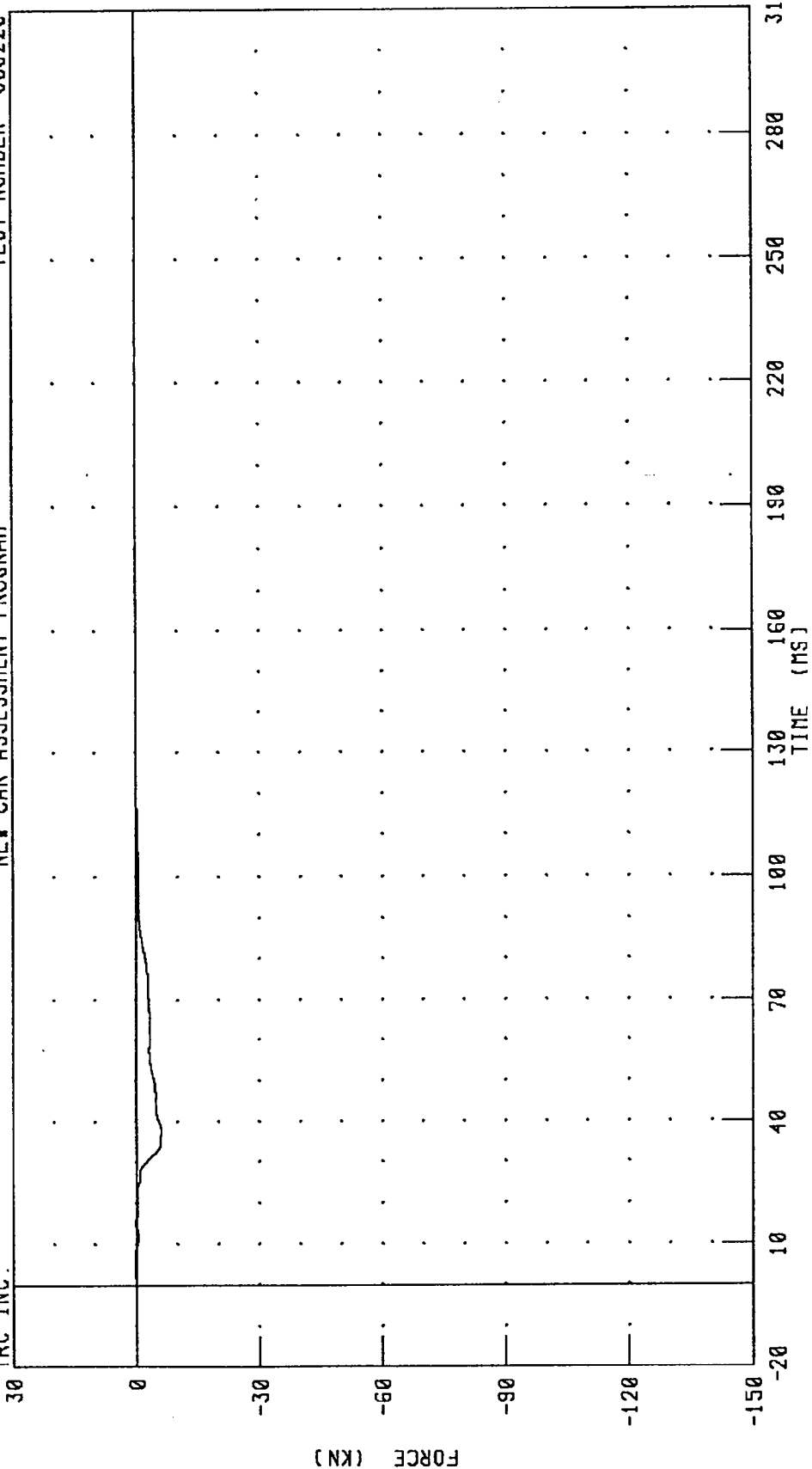
CHANNEL: BA2F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A3 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BA3F

FILTER: CH. CLASS 60

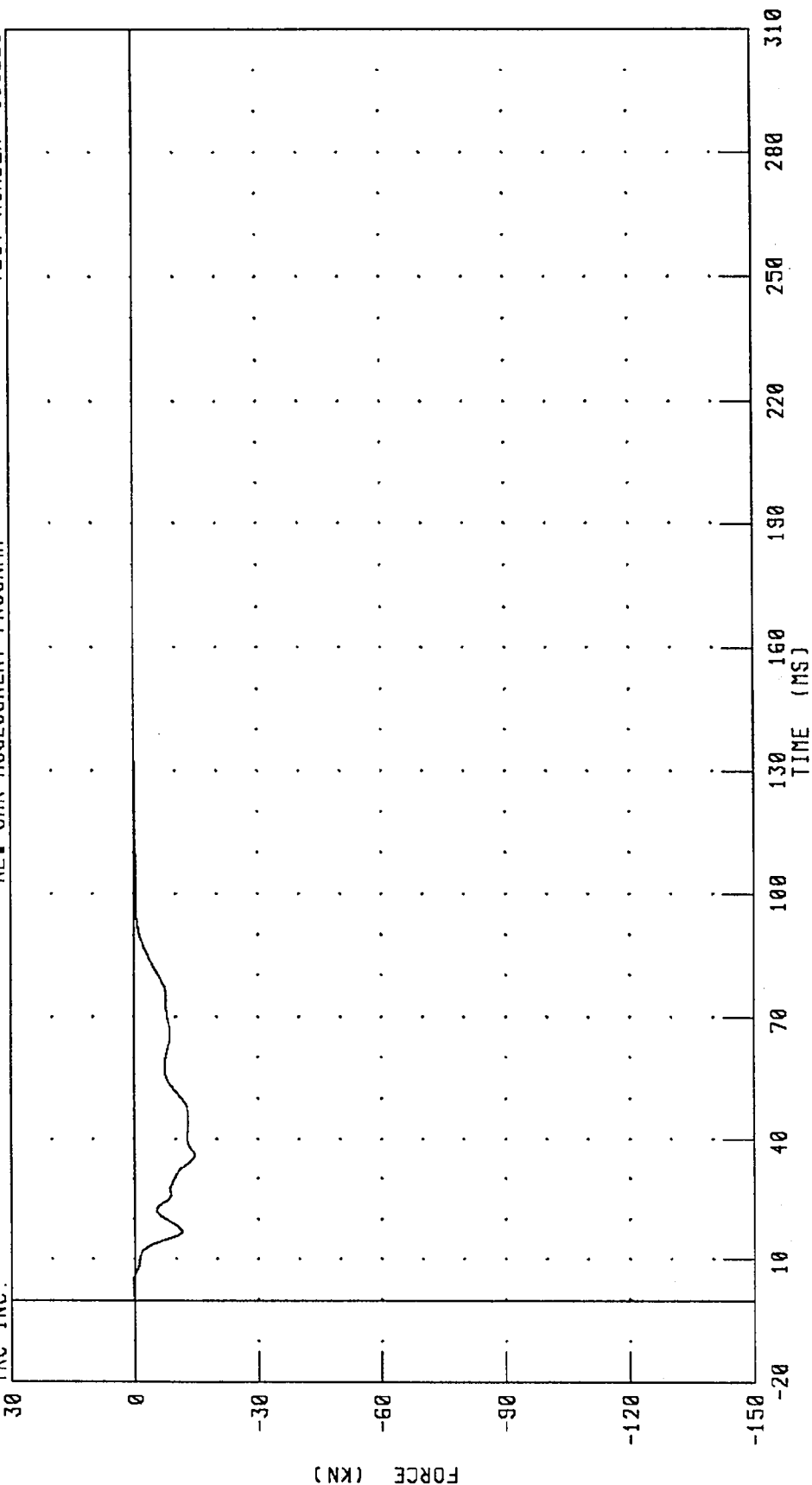
PEAK DATA: 0.25 KN @ 5.84 MS; -6.13 KN @ 37.76 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A4 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BA4F

FILTER: CH. CLASS 60

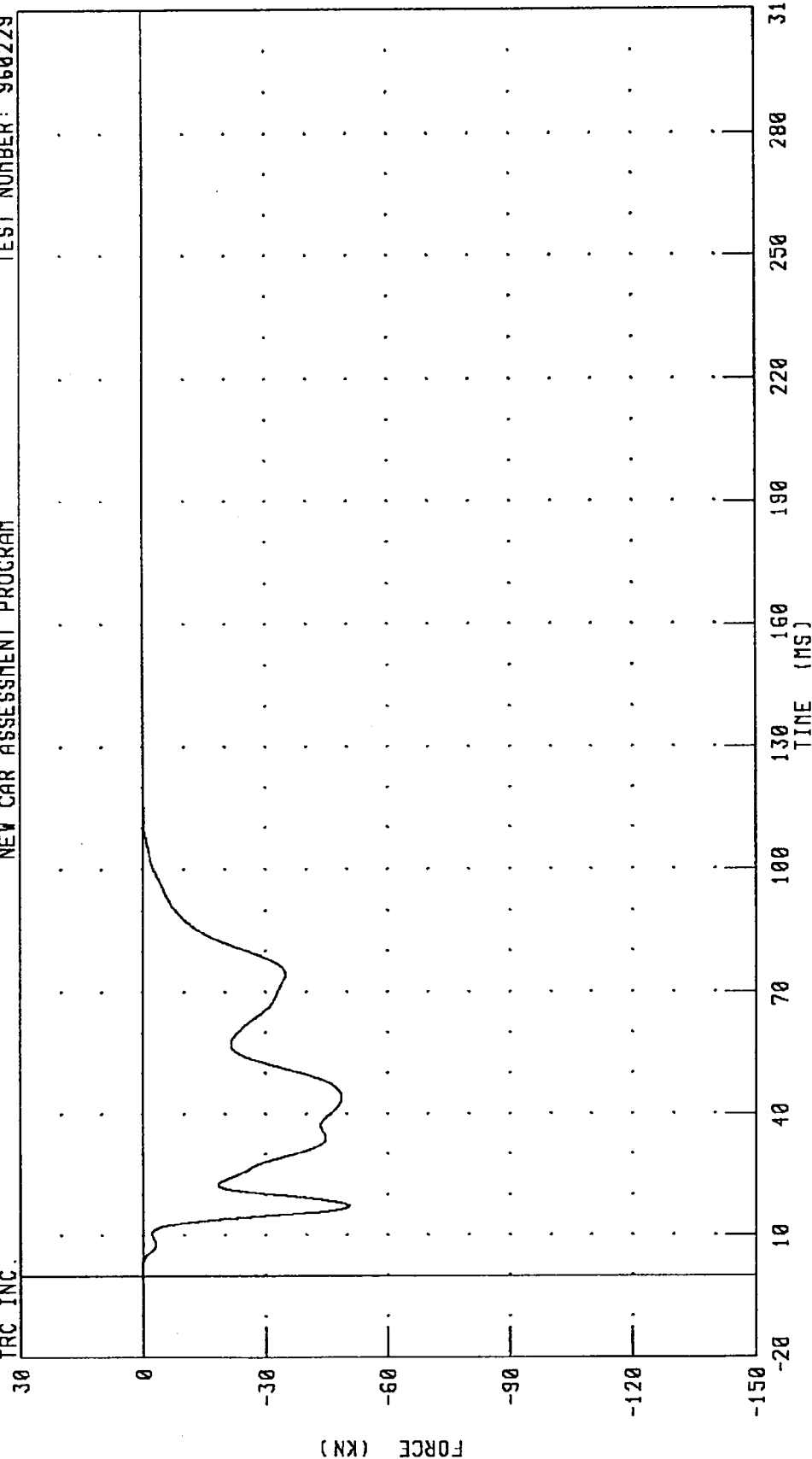
PEAK DATA: 0.24 KN @ 4.32 MS; -14.47 KN @ 35.84 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A5 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.26 KN @ 1.68 MS; -50.52 KN @ 17.20 MS

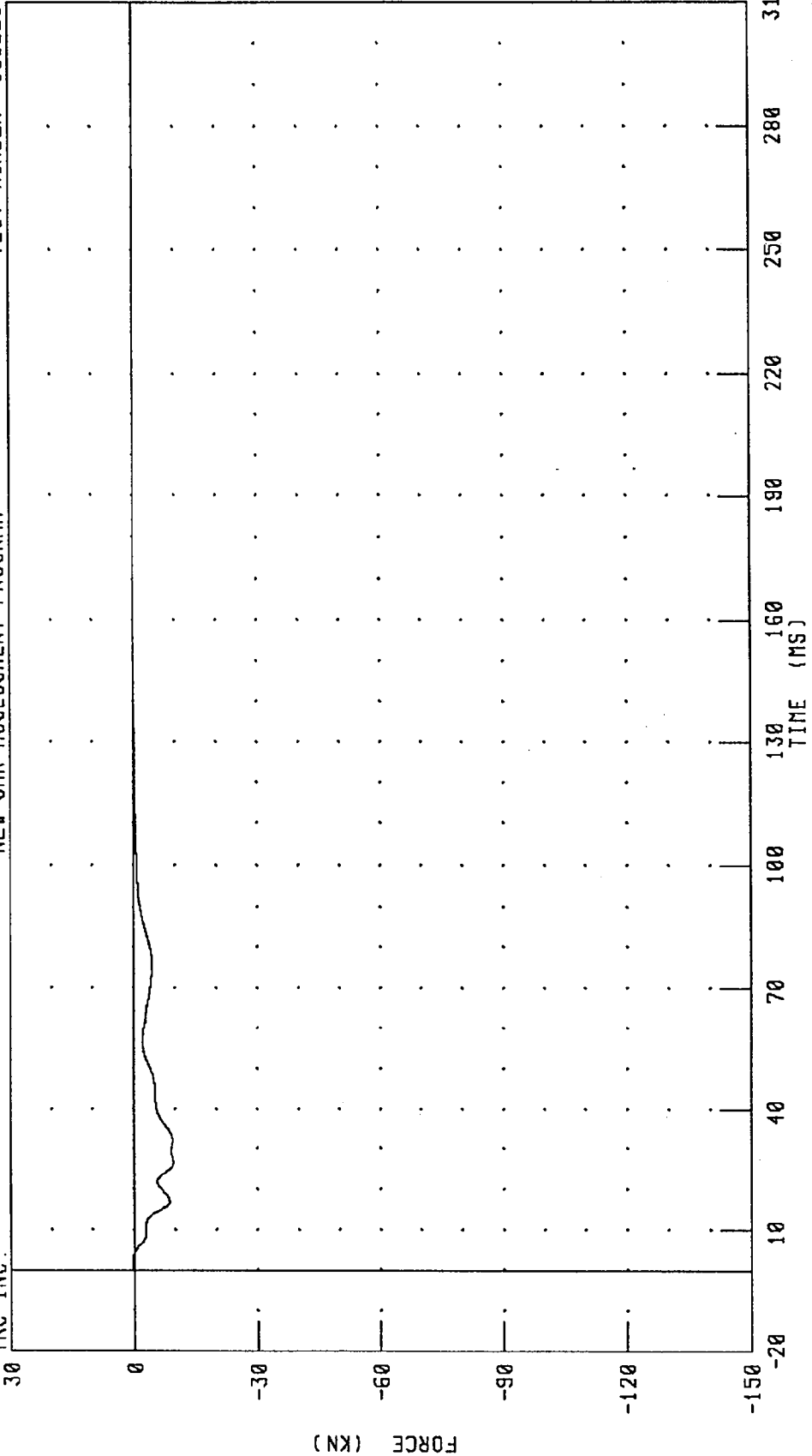
CHANNEL: BASF FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



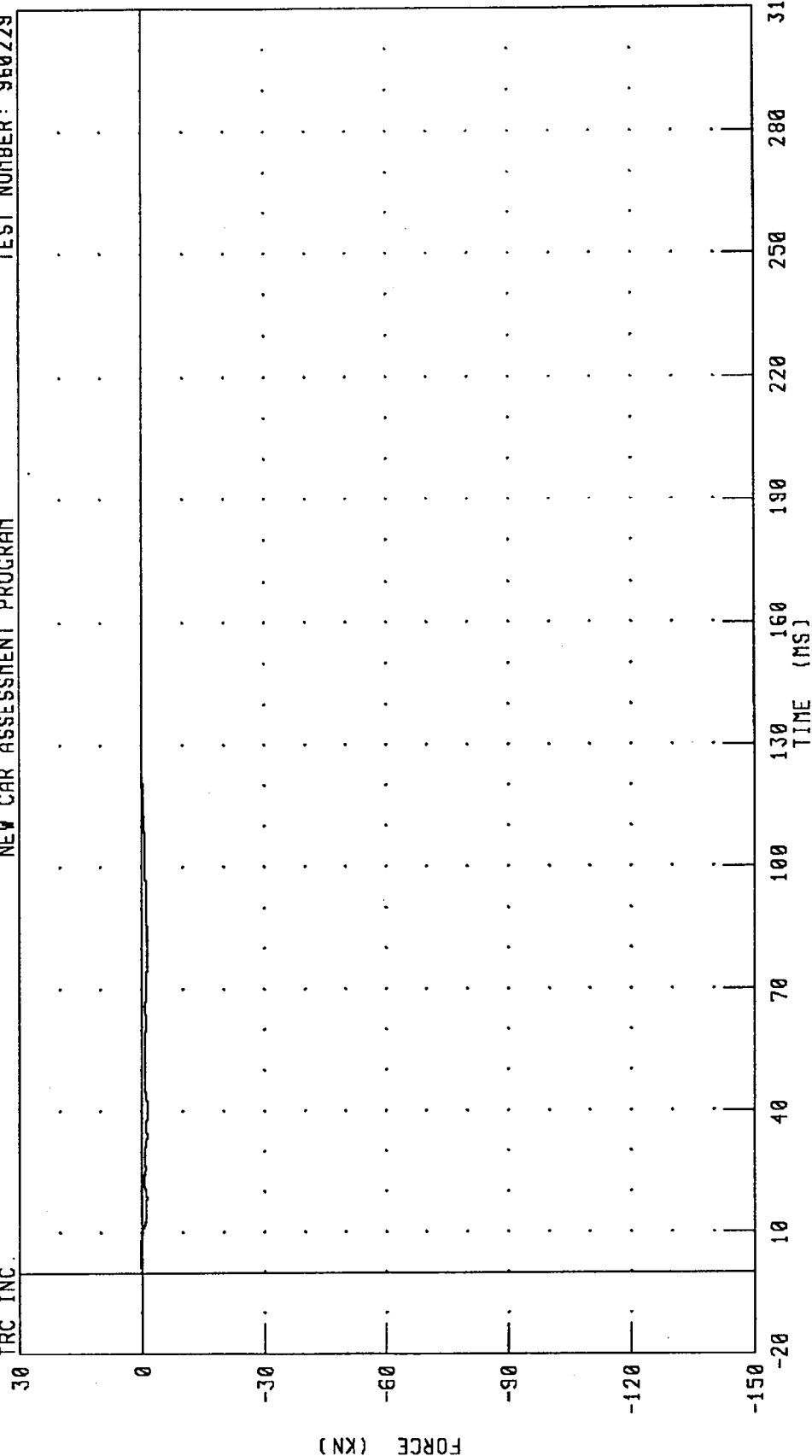
CHANNEL: BAGF FILTER: CH. CLASS 60 PEAK DATA: 0.24 KN @ 2.24 MS; -9.58 KN @ 26.56 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A7 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.27 KN @ 6.16 MS; -1.34 KN @ 79.68 MS

FILTER: CH. CLASS 60

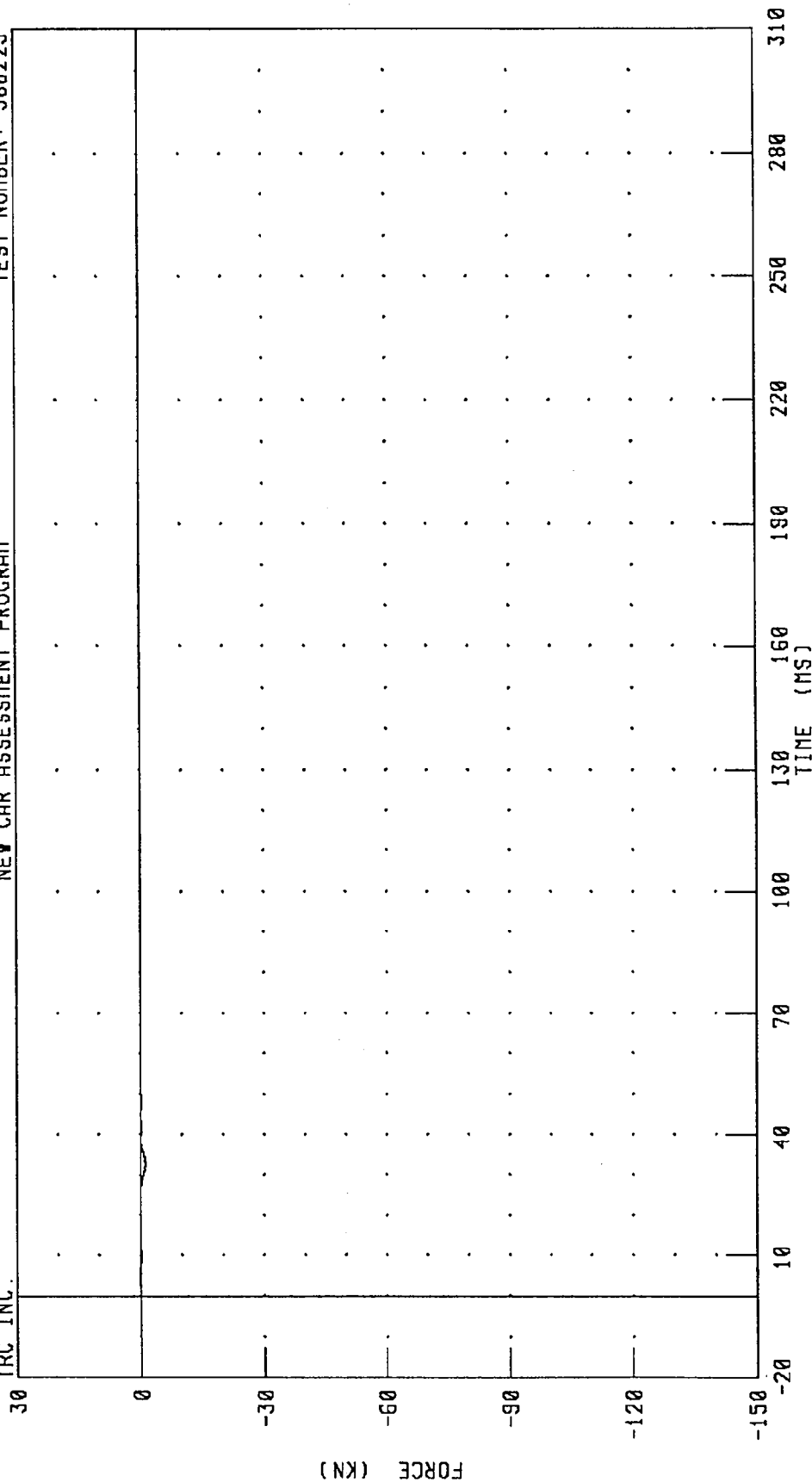
CHANNEL: BA7F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A8 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: B8BF

FILTER: CH. CLASS 60

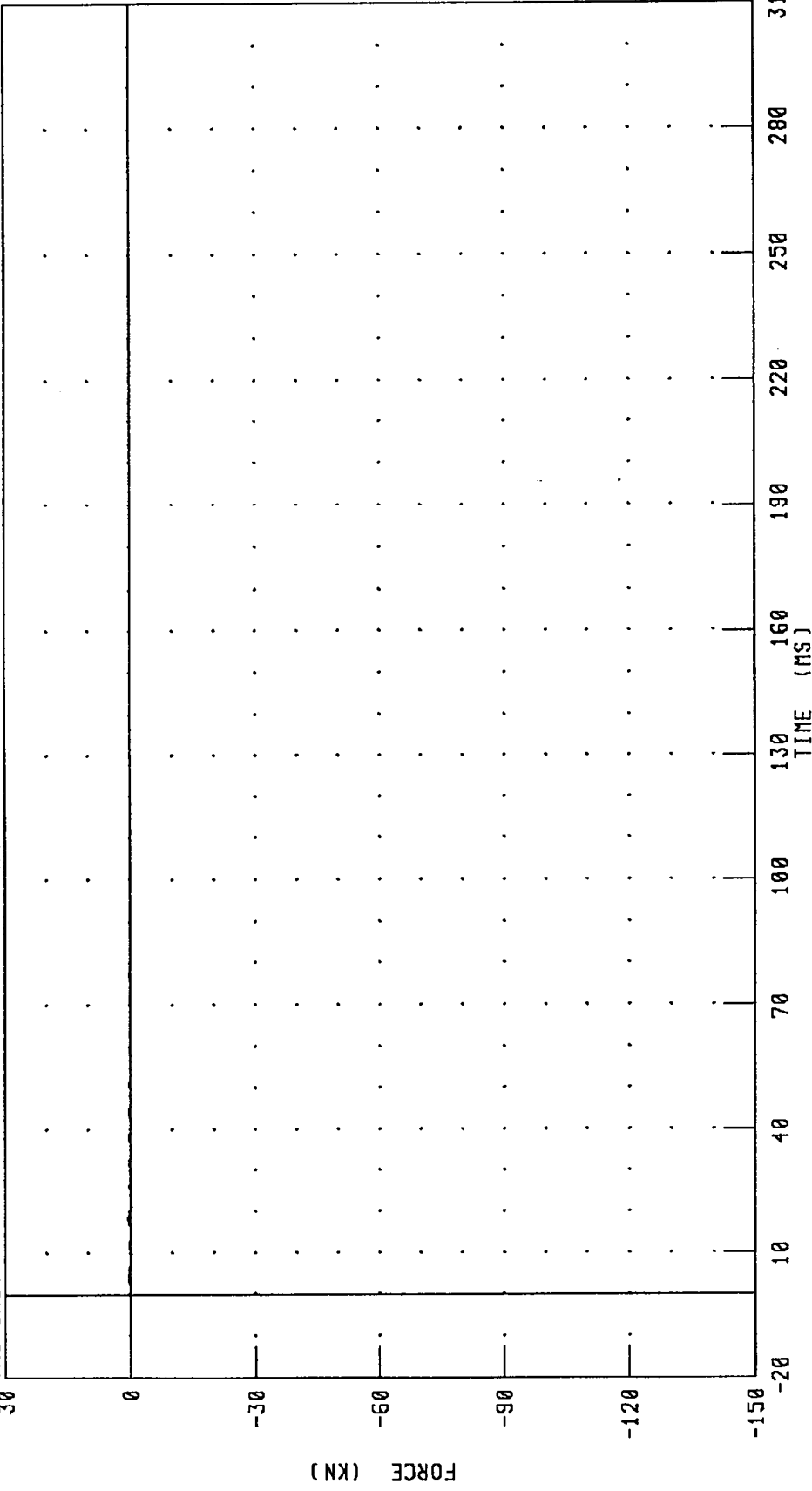
PEAK DATA: 0.22 KN @ 5.52 MS; -1.21 KN @ 32.56 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION AS FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



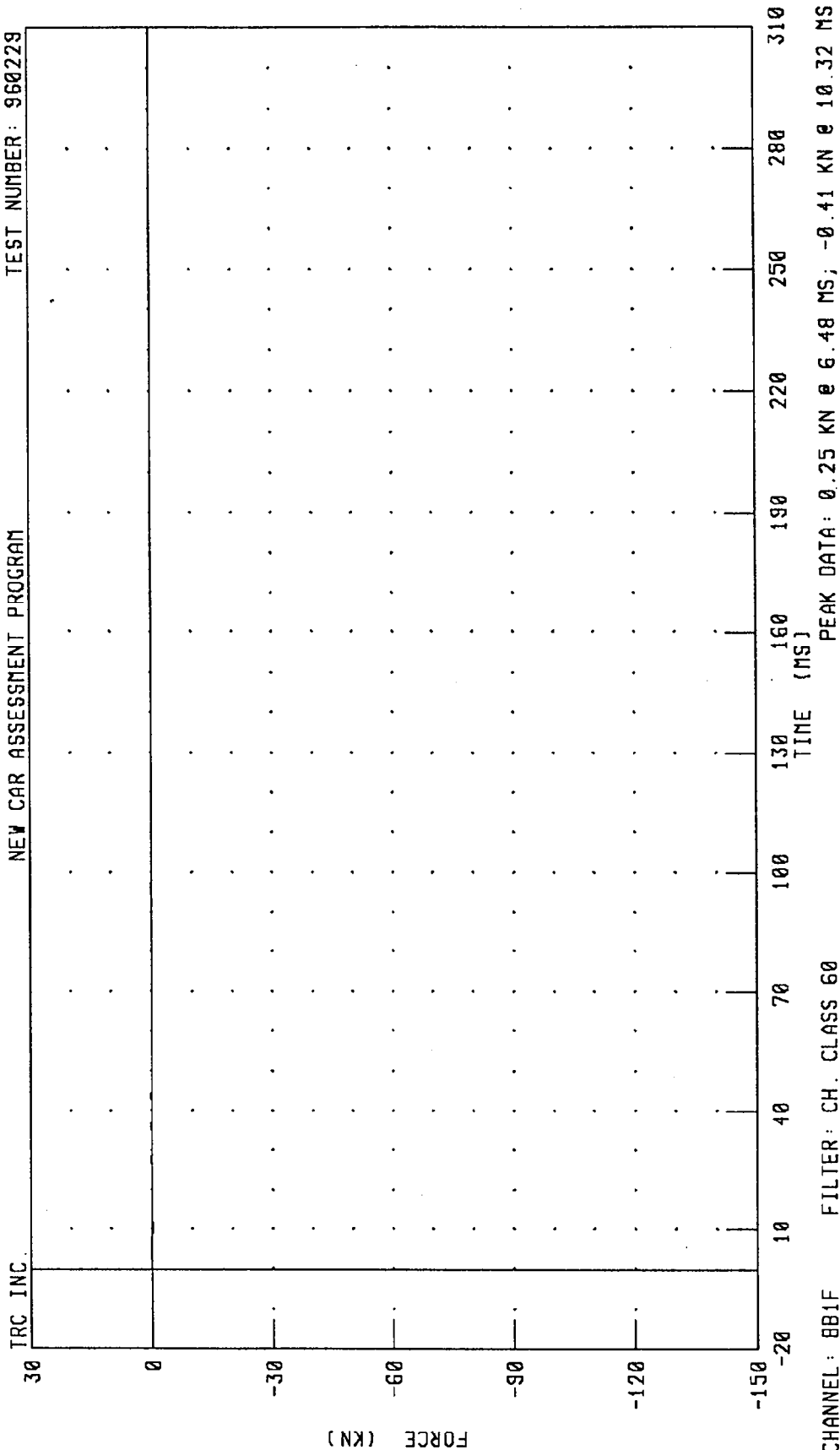
PEAK DATA: 0.38 KN @ 18.40 MS; -0.34 KN @ 9.12 MS

FILTER: CH. CLASS 60

CHANNEL: BASF

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B1 FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

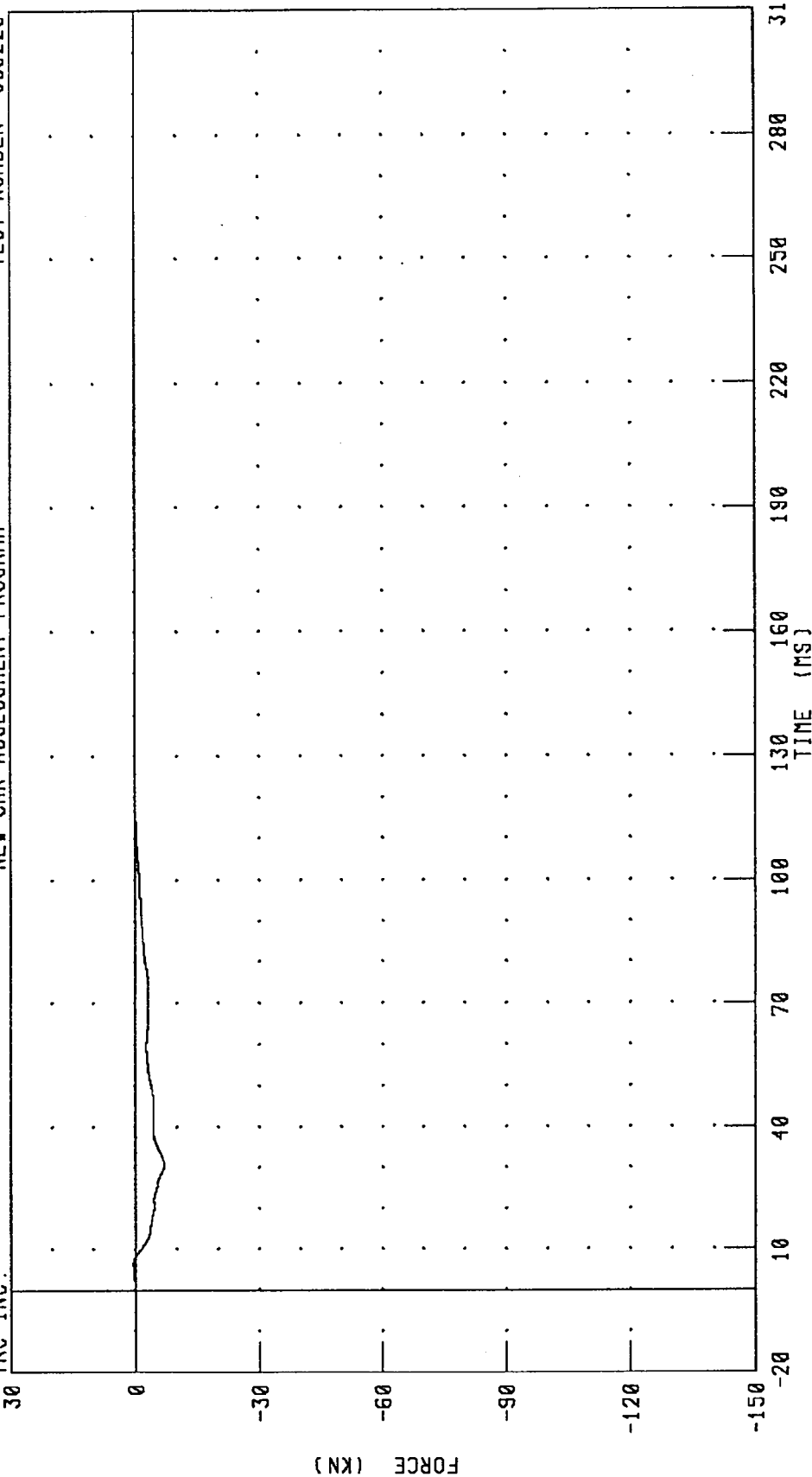


1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.36 KN @ 6.32 MS; -6.92 KN @ 30.72 MS

FILTER: CH. CLASS 60

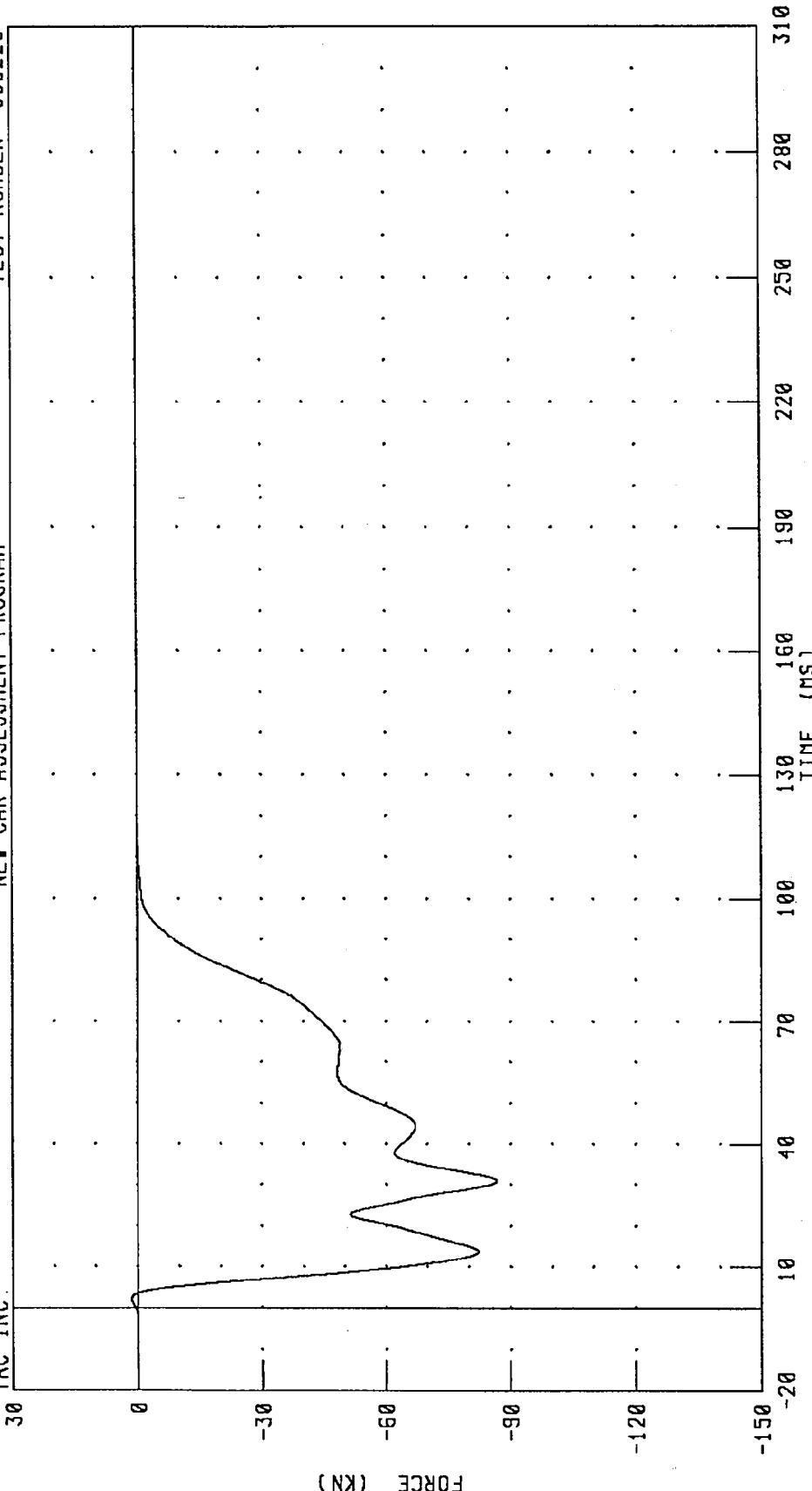
CHANNEL: BB2F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B3 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 1.50 KN @ 2.00 MS, -86.76 KN @ 30.96 MS

FILTER: CH. CLASS 60

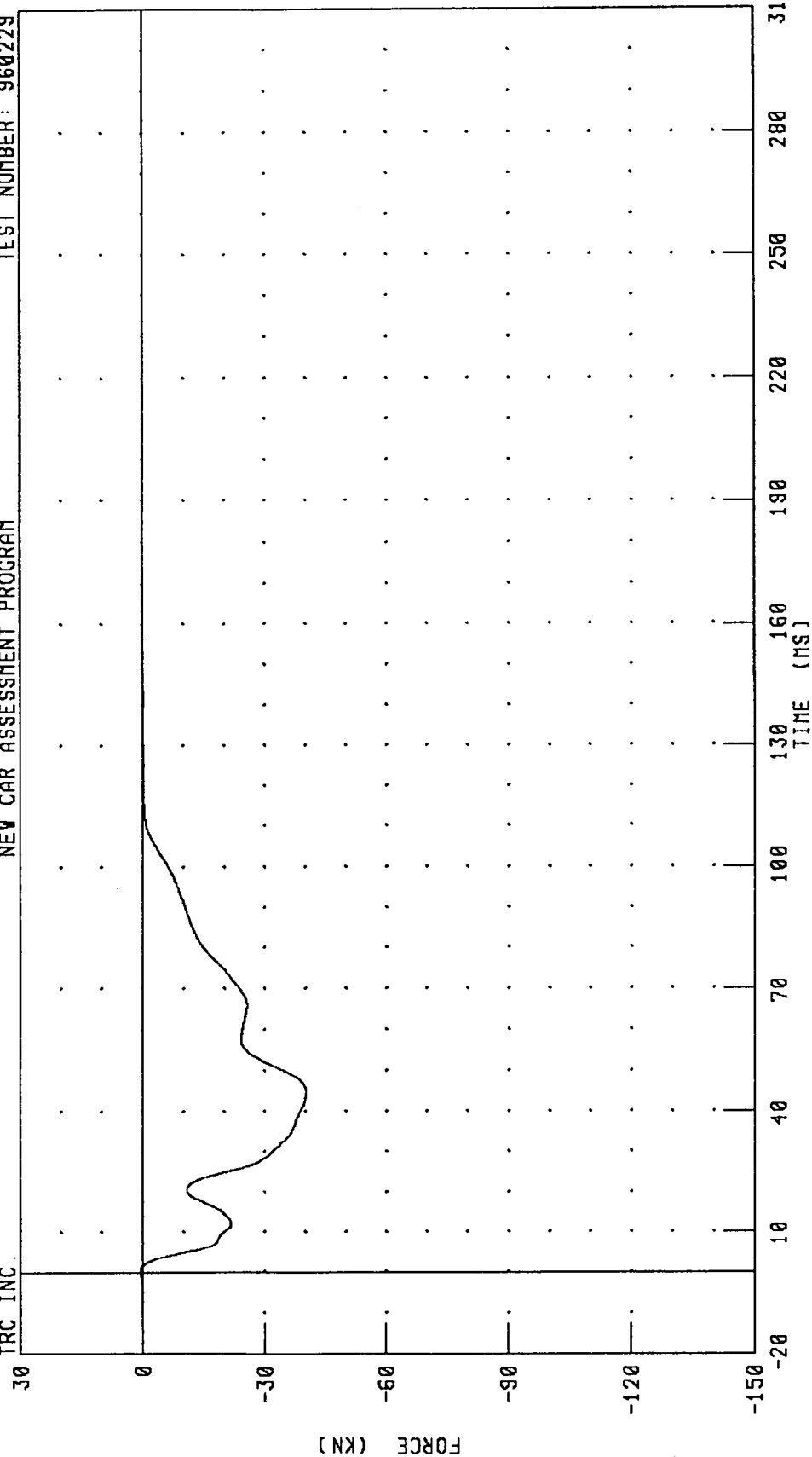
CHANNEL: BB3F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

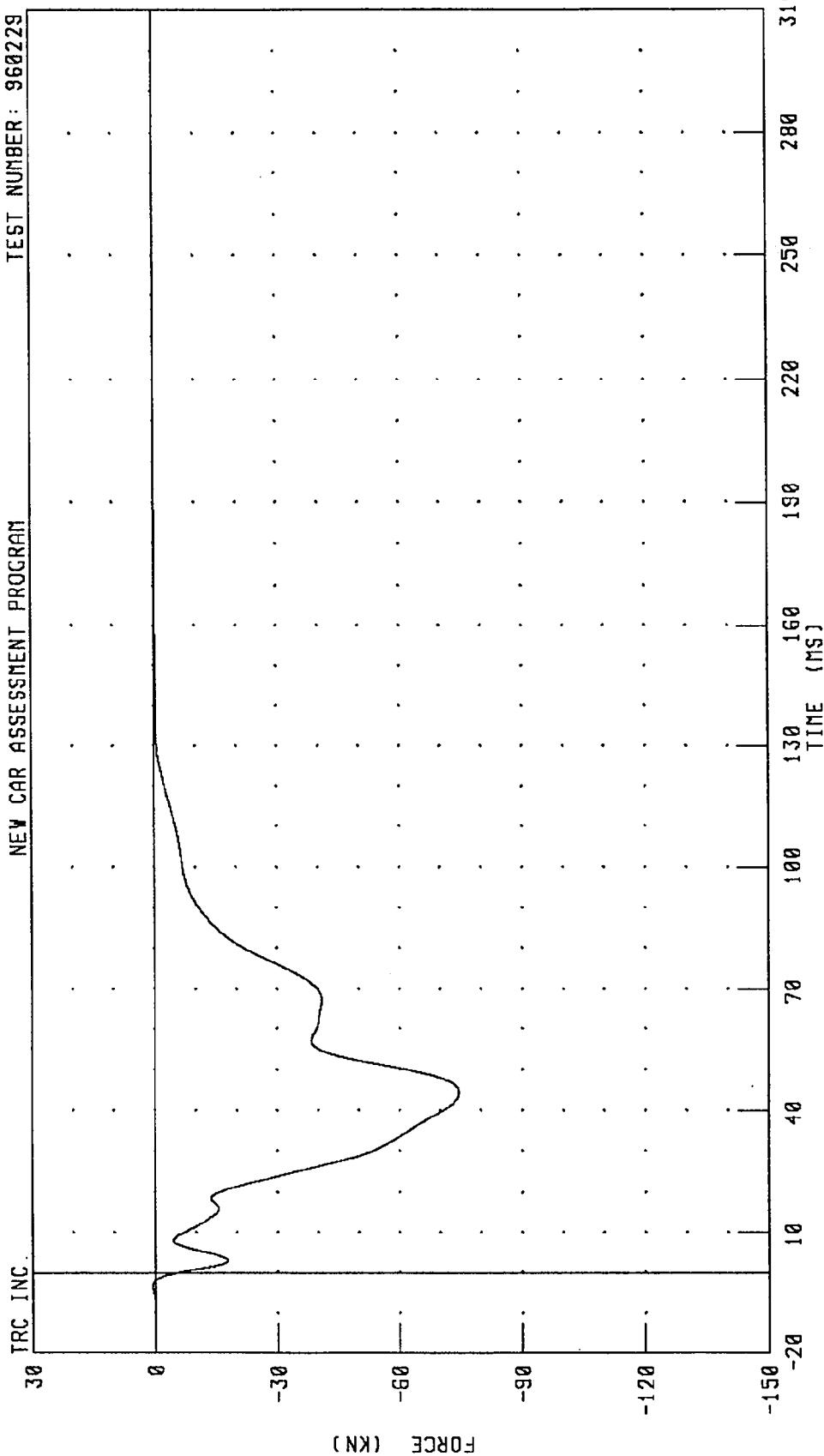


CHANNEL: BB4F FILTER: CH. CLASS 60

PEAK DATA: 0.54 KN @ 0.16 MS; -40.17 KN @ 44.80 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B5 FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 0.69 KN @ -3.36 MS; -74.60 KN @ 44.40 MS

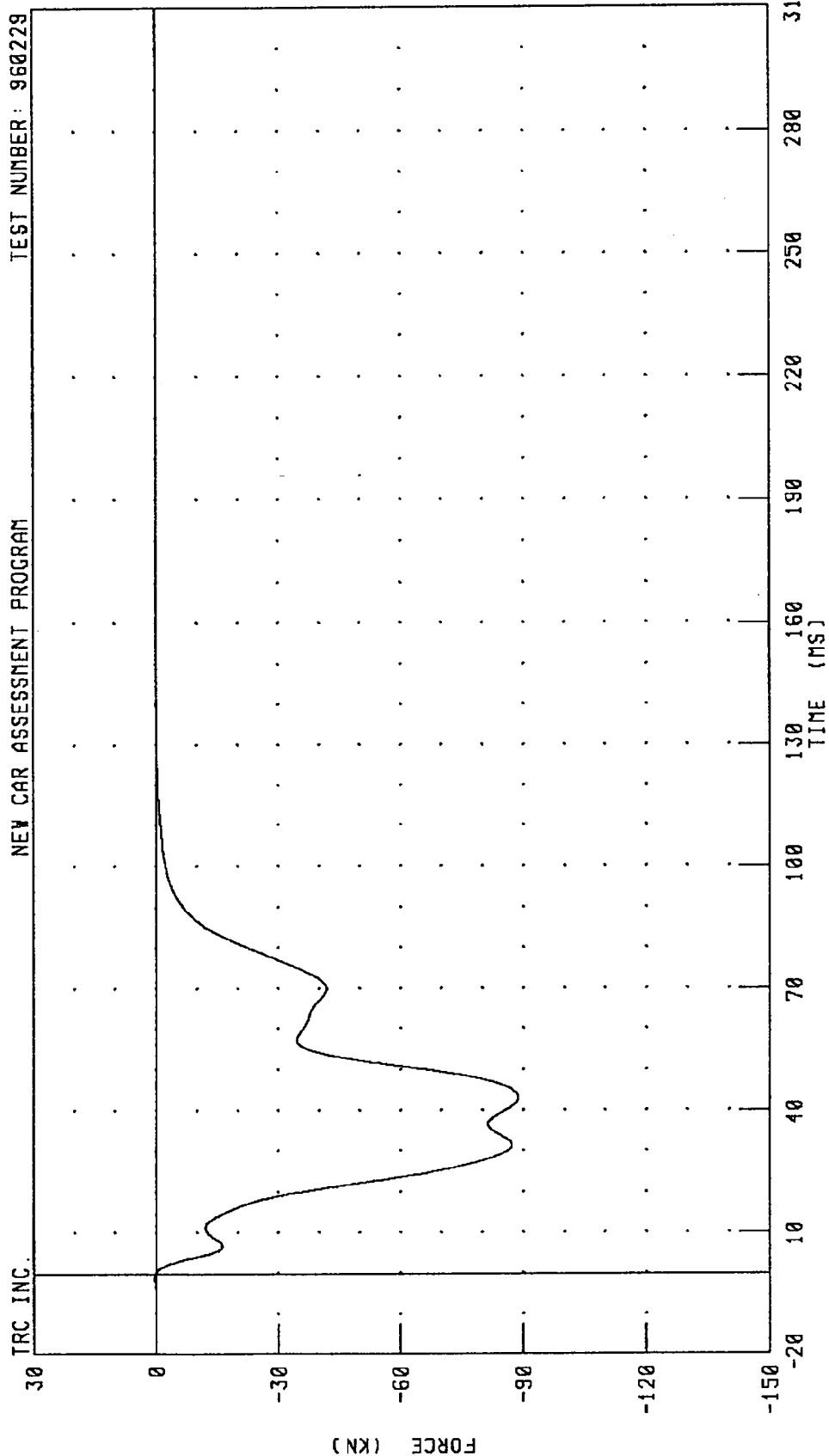
FILTER: CH. CLASS 60

CHANNEL: BB5F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE

NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



PEAK DATA: 0.38 KN @ -1.12 MS; -88.73 KN @ 43.12 MS

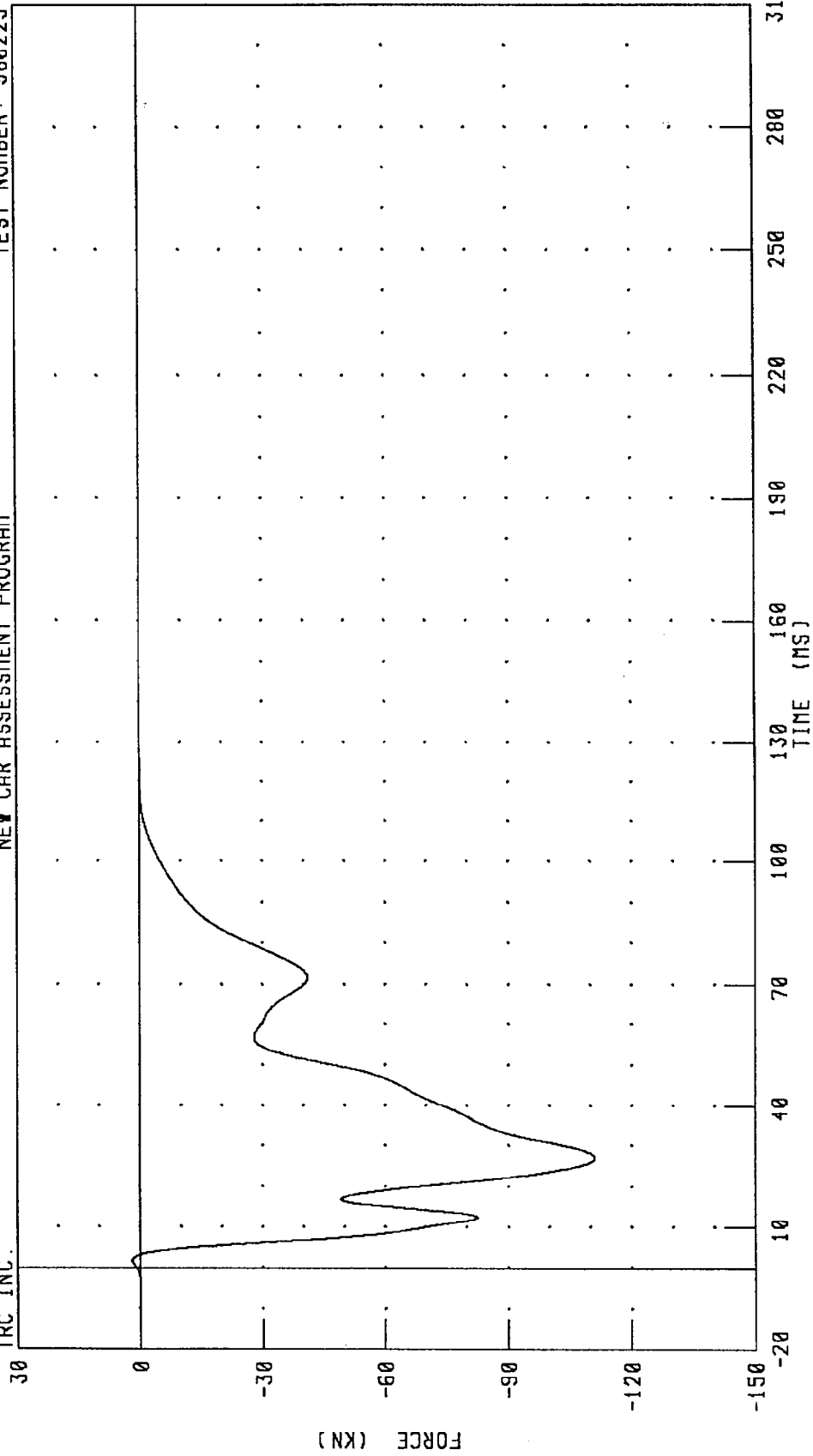
CHANNEL: 886F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B7 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 1.89 KN @ 1.68 MS; -111.08 KN @ 27.04 MS

FILTER: CH. CLASS 60

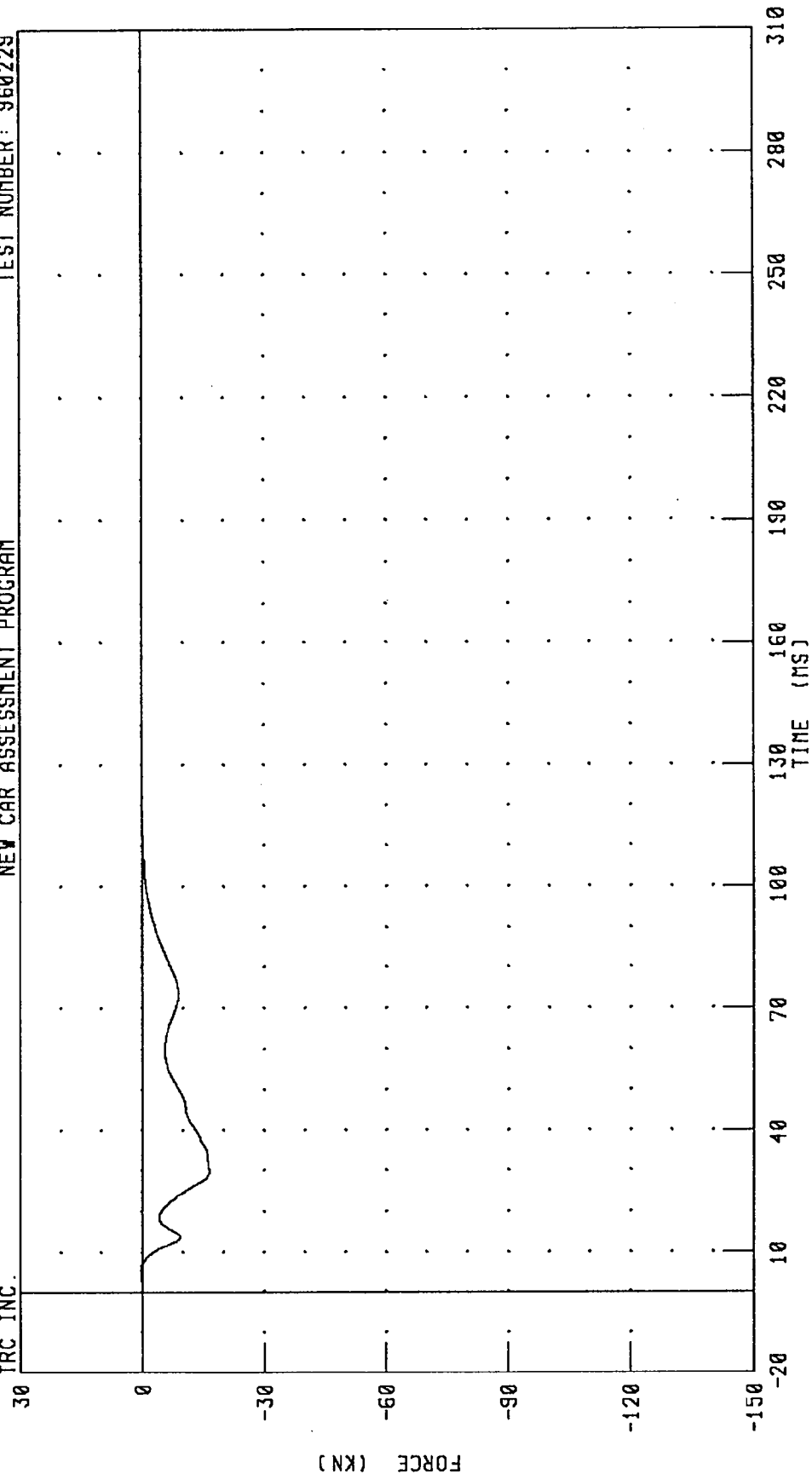
CHANNEL: BB7F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B8 FORCE

NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

IRC INC.



CHANNEL: BB8F FILTER: CH. CLASS 60

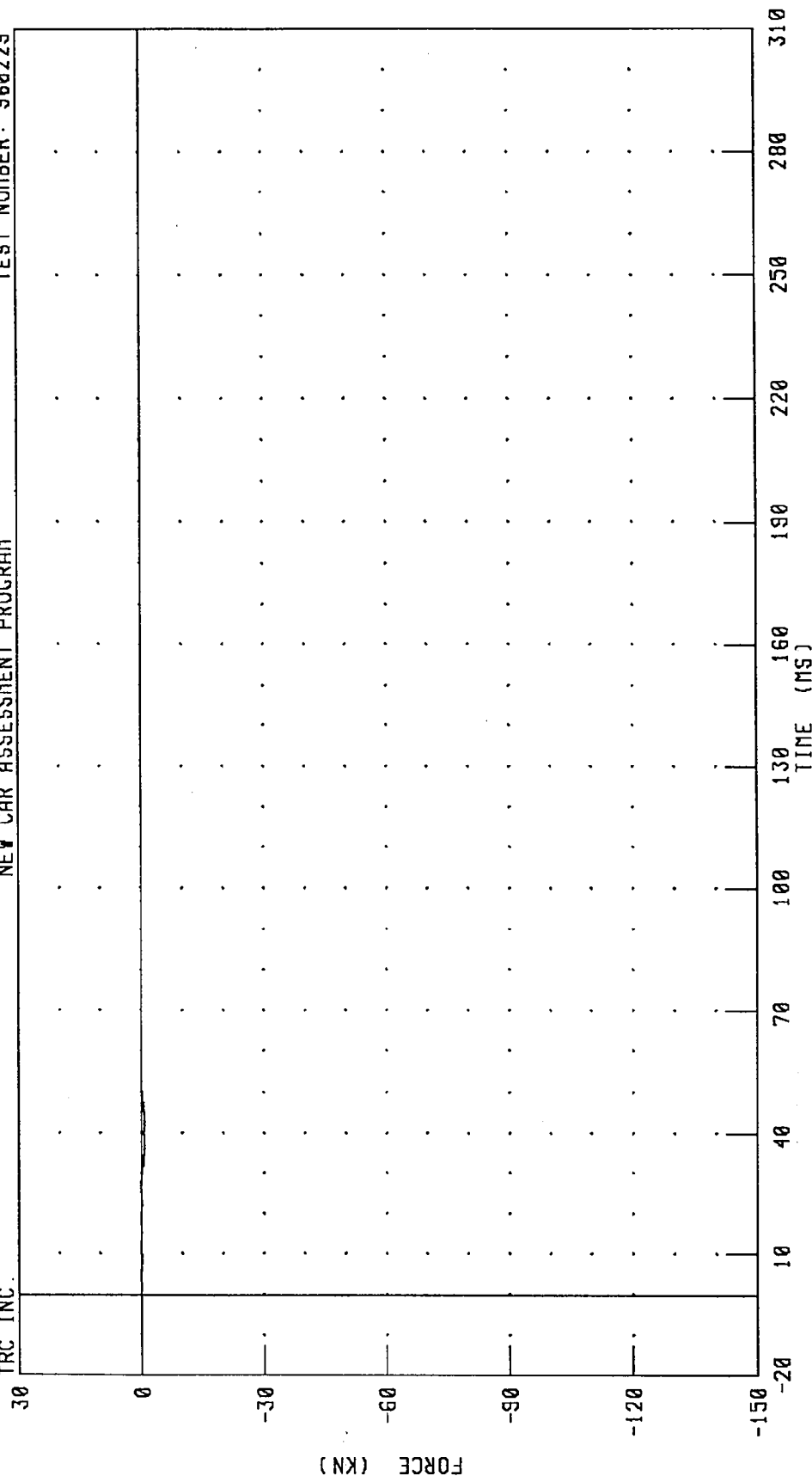
PEAK DATA: 0.29 KN @ 5.36 MS, -16.47 KN @ 29.84 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B9 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.24 KN @ 11.76 MS; -0.79 KN @ 43.52 MS

FILTER: CH. CLASS 60

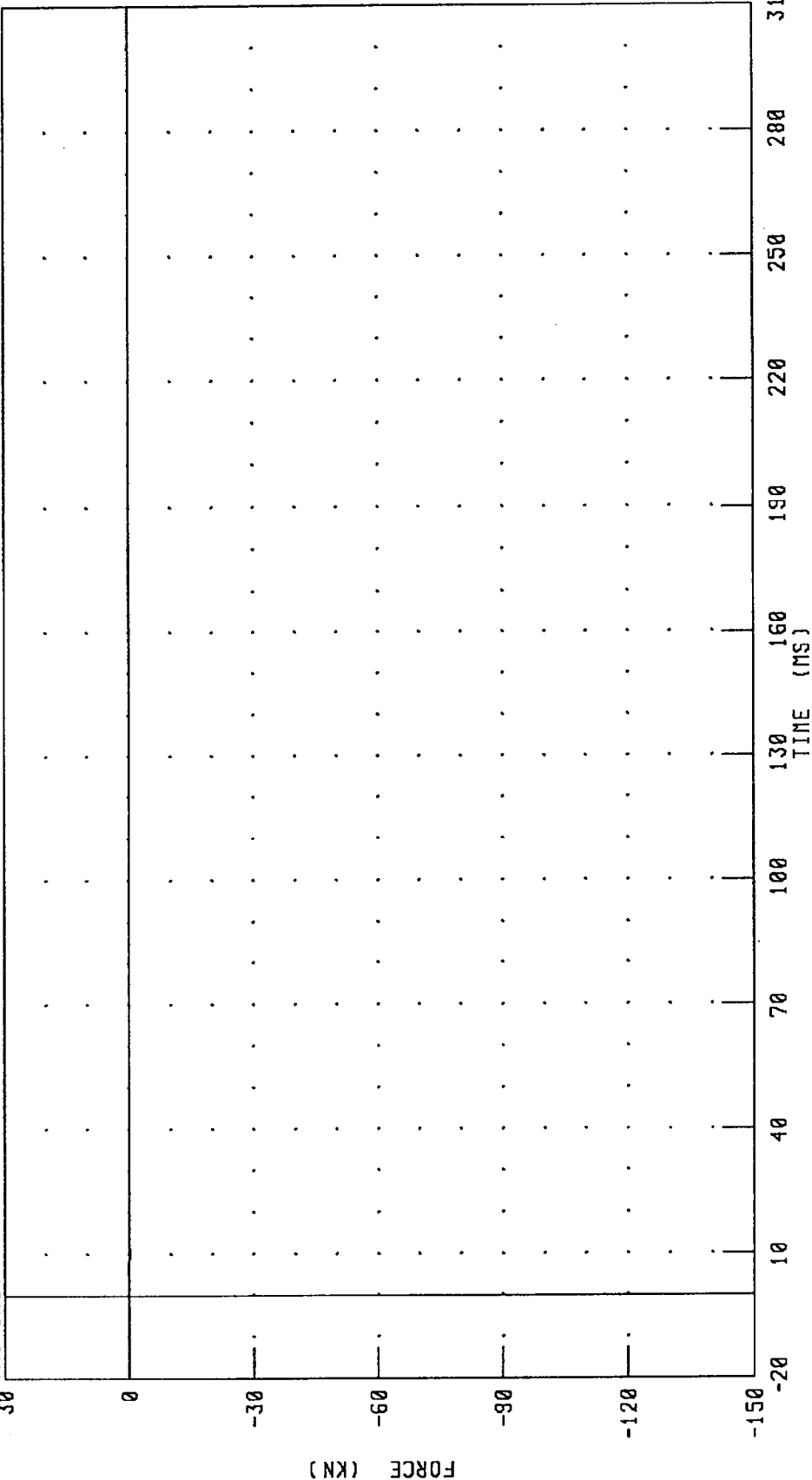
CHANNEL: BB9F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.16 KN @ 6.56 MS; -0.35 KN @ 10.24 MS

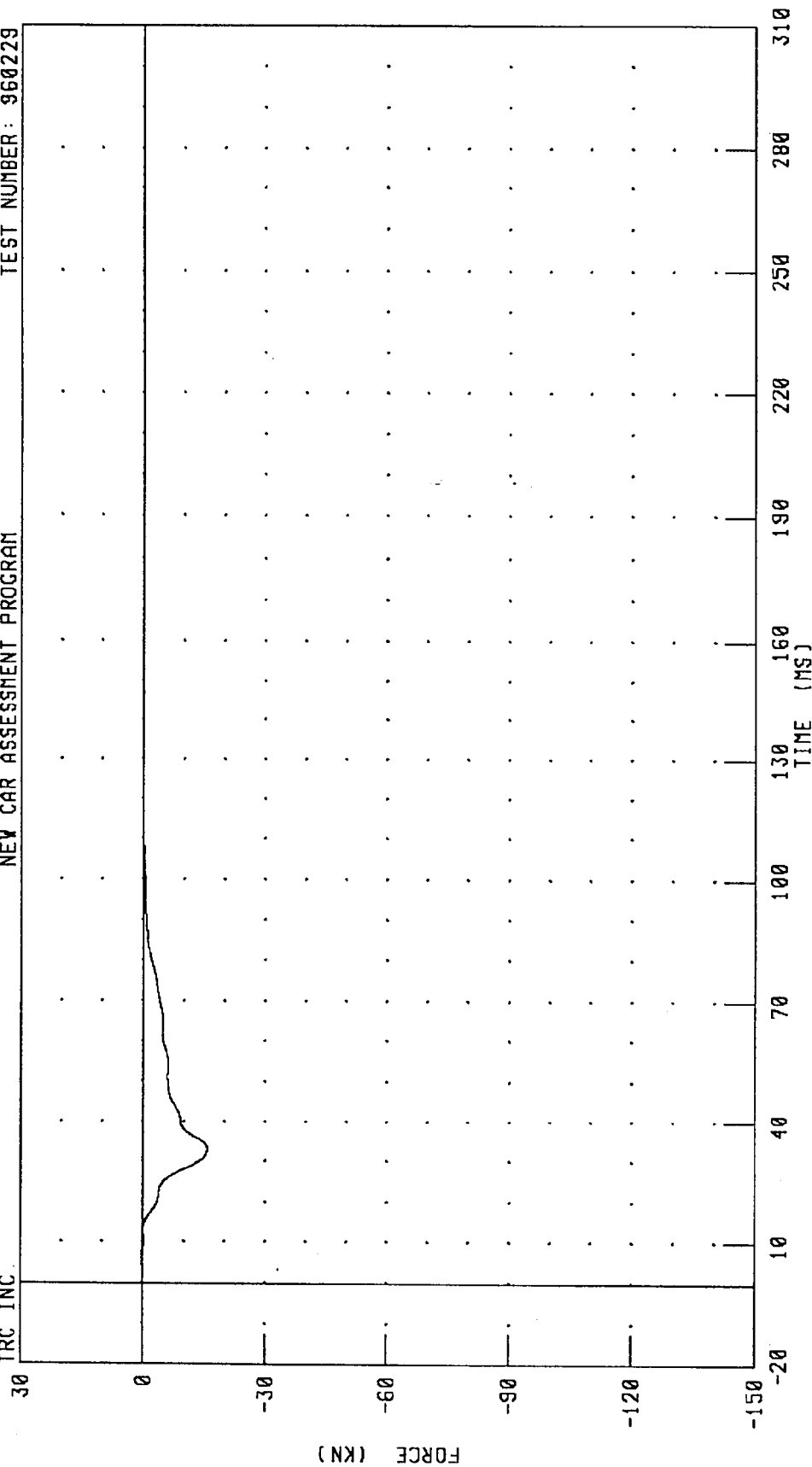
CHANNEL: BC1F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C2 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.19 KN @ 6.40 MS; -15.78 KN @ 32.96 MS

FILTER: CH. CLASS 60

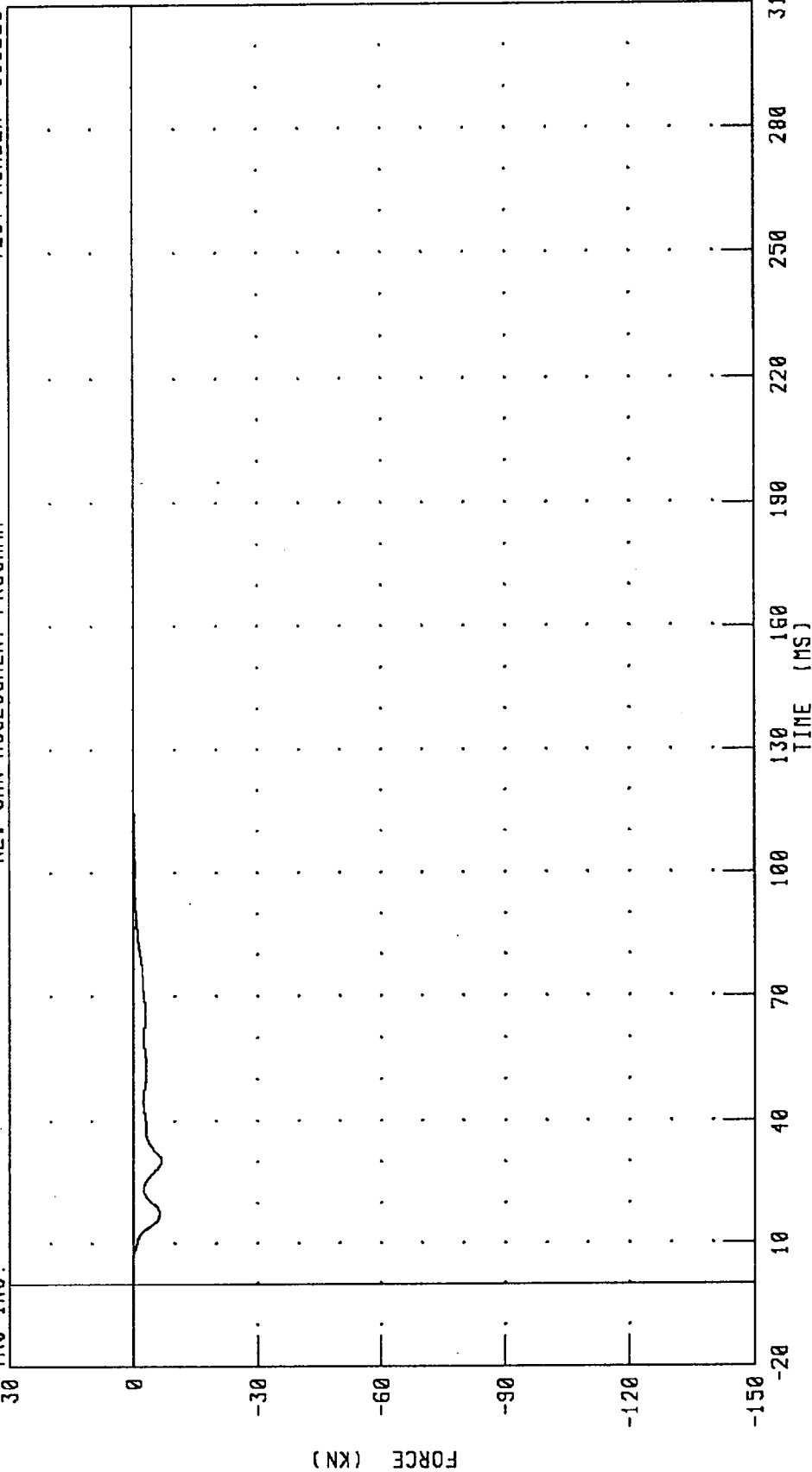
CHANNEL: BC2F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C3 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.18 KN @ 5.68 MS; -6.71 KN @ 30.40 MS

FILTER: CH. CLASS 60

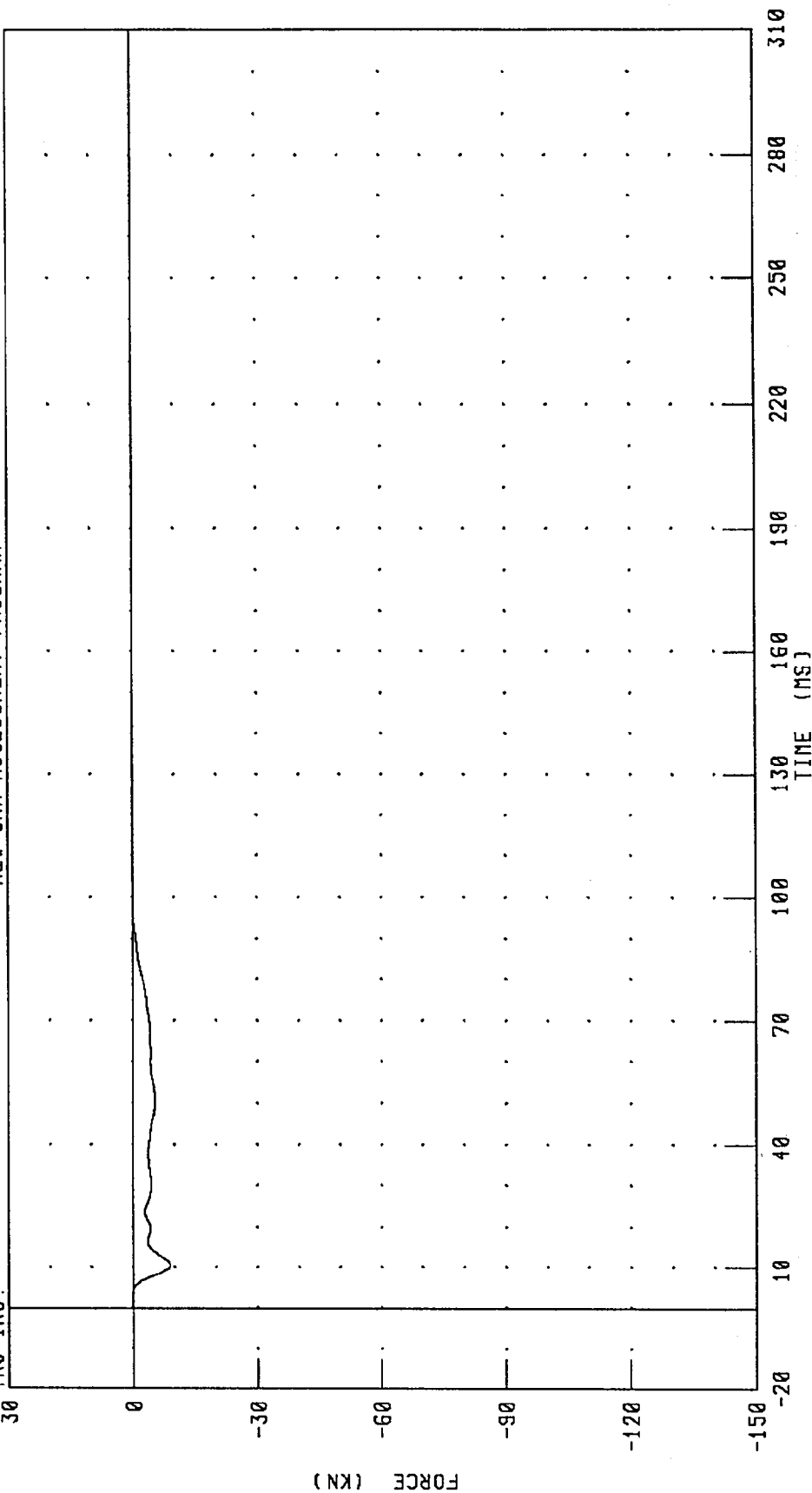
CHANNEL: BC3F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C4 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



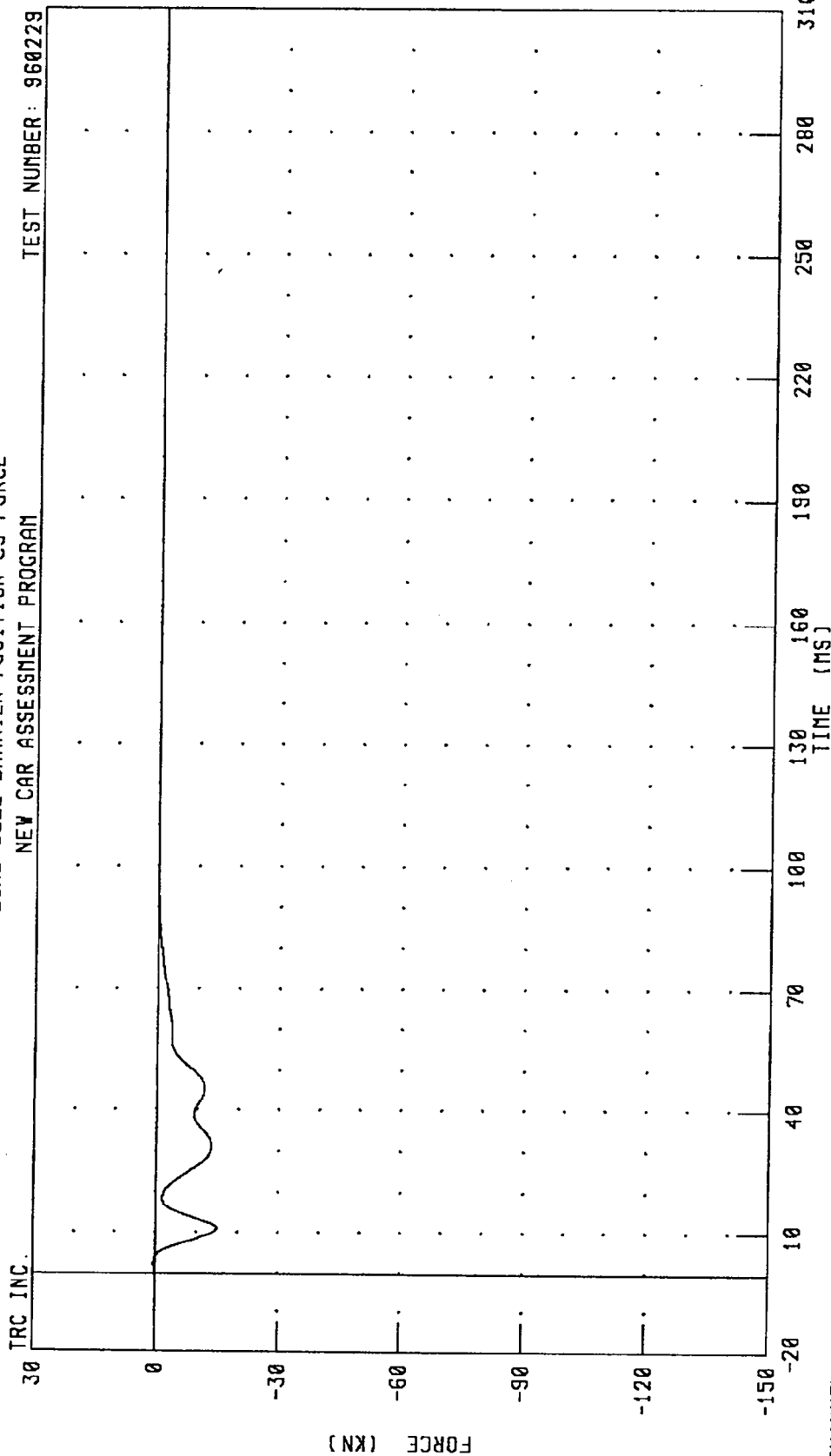
CHANNEL: BC4F

FILTER: CH. CLASS 60

PEAK DATA: 0.19 KN @ 2.00 MS; -9.03 KN @ 10.56 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE

NEW CAR ASSESSMENT PROGRAM TEST NUMBER: 960229



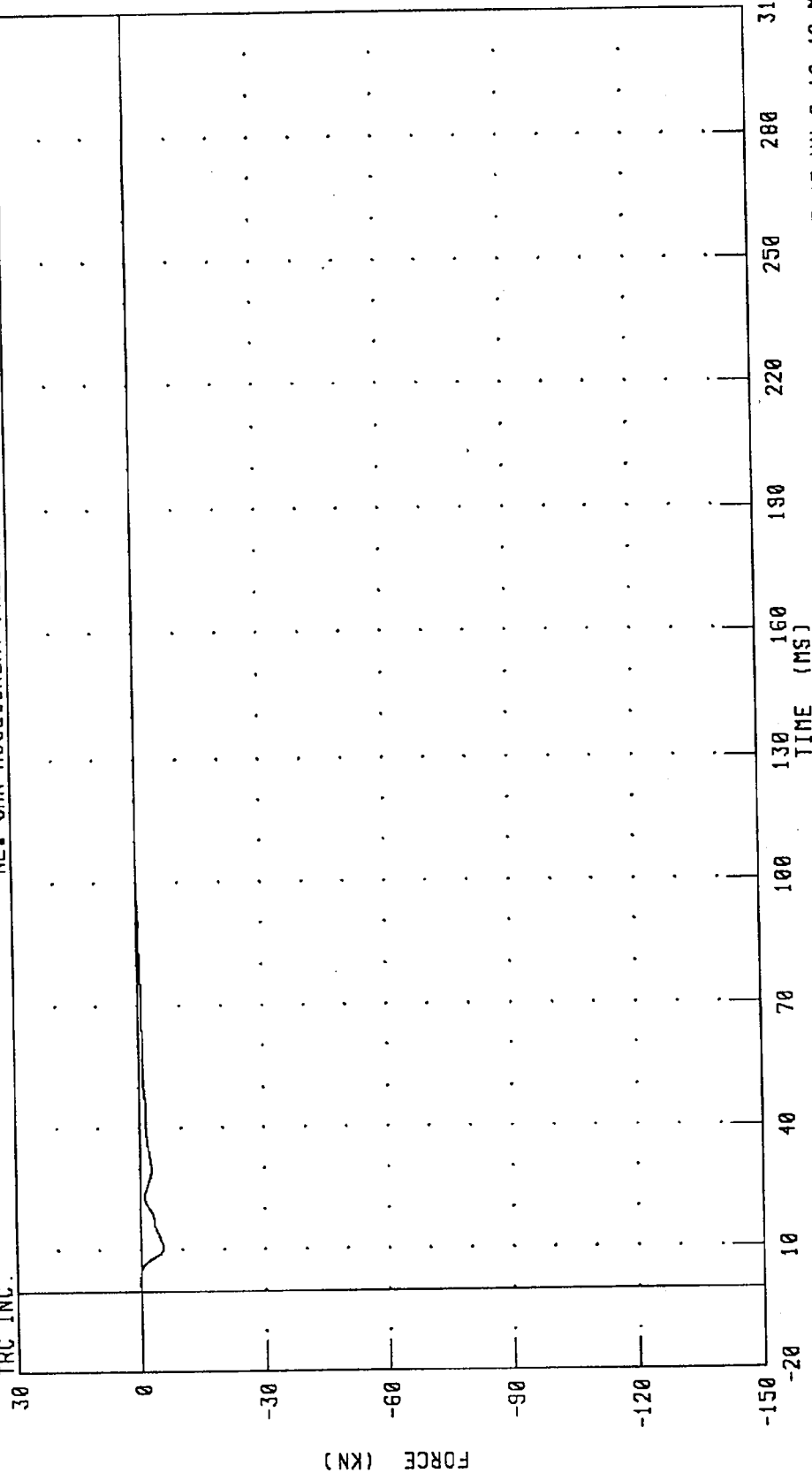
CHANNEL: BC5F FILTER: CH. CLASS 60 PEAK DATA: 0.35 KN @ 2.24 MS; -14.99 KN @ 10.96 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C6 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BCGF

FILTER: CH. CLASS 60

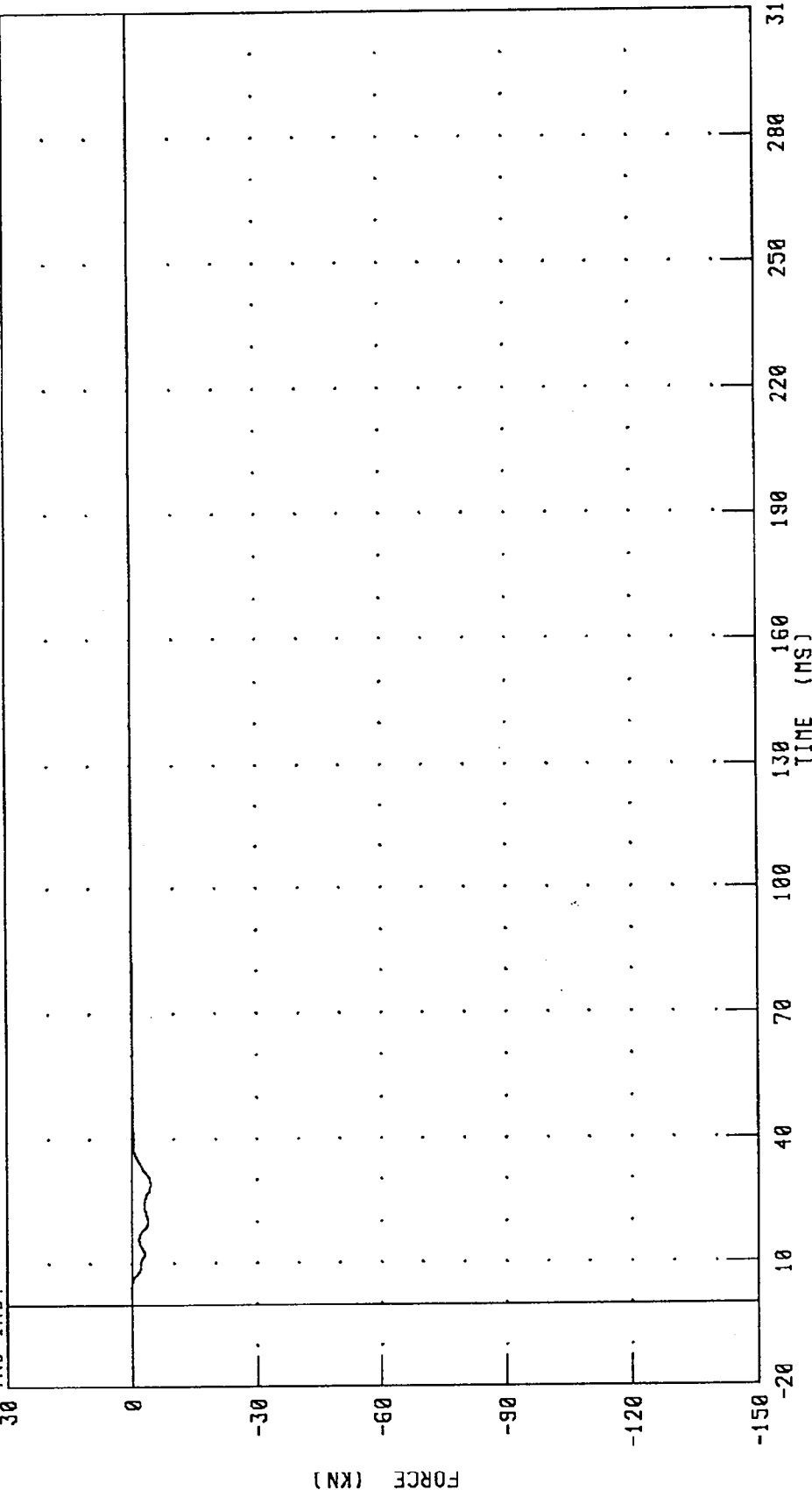
PEAK DATA: 0.12 KN @ 2.16 MS; -5.45 KN @ 10.48 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.12 KN @ 2.72 MS; -4.51 KN @ 29.12 MS

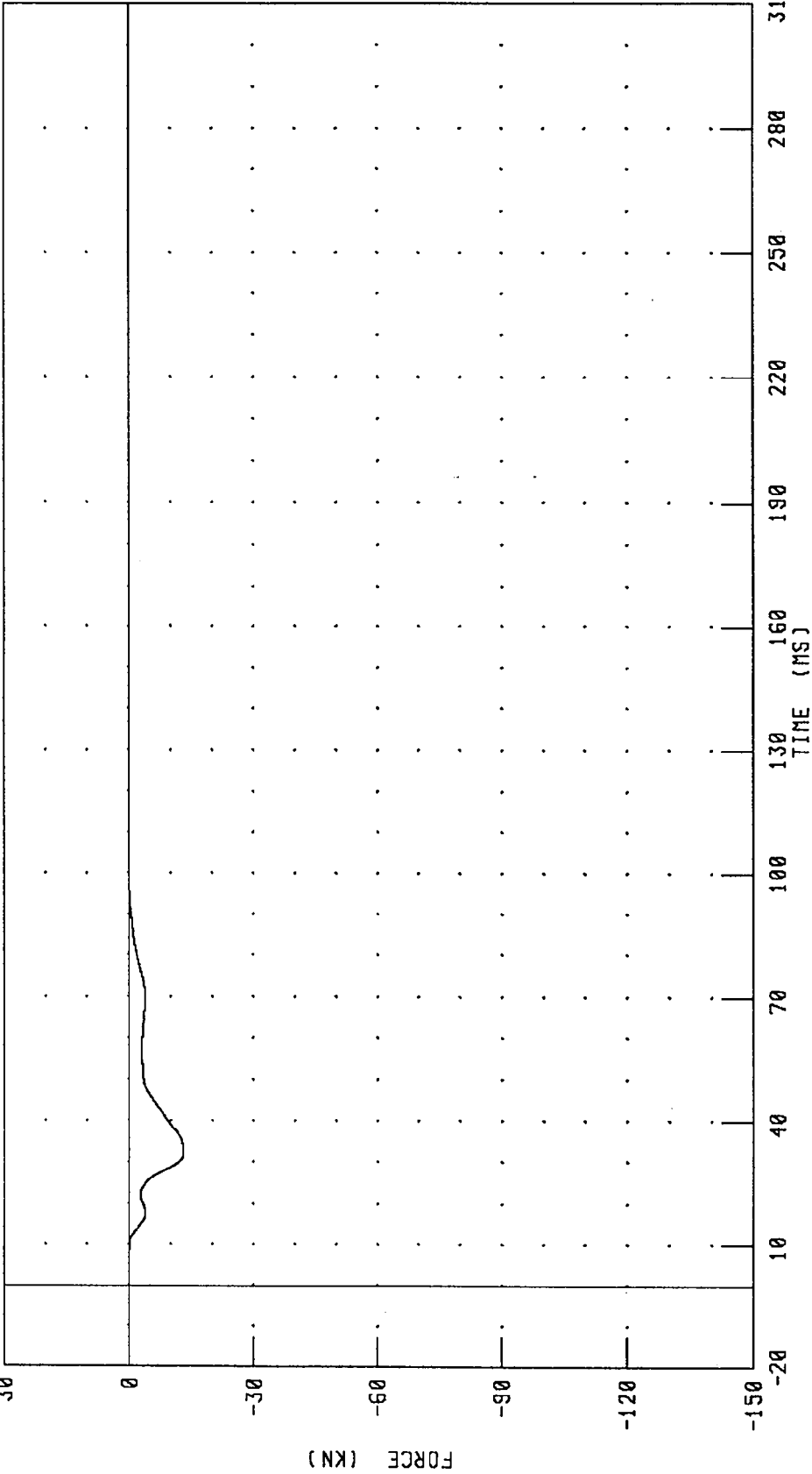
CHANNEL: BC7F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C8 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.05 KN @ 5.52 MS, -13.10 KN @ 32.40 MS

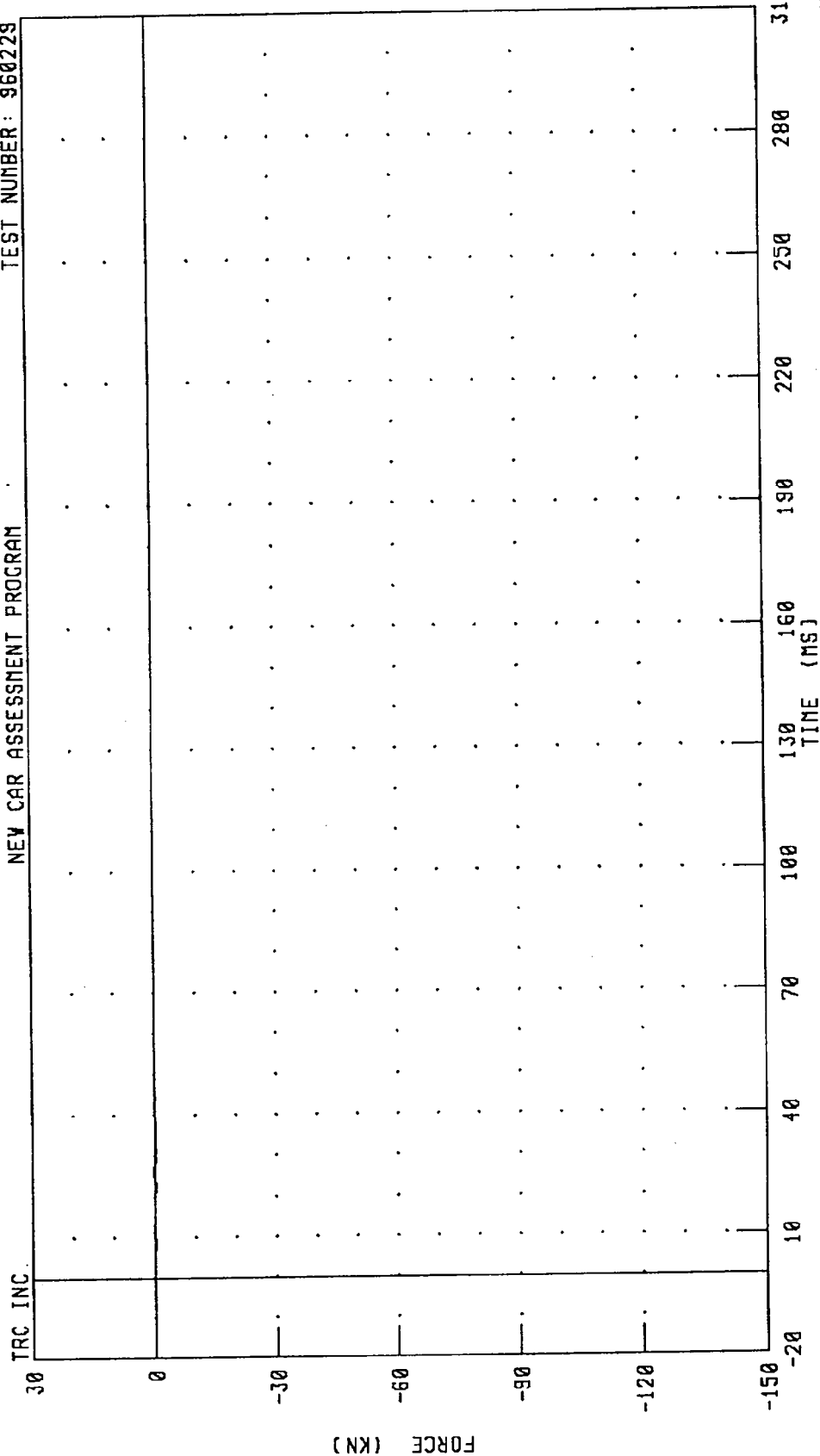
FILTER: CH. CLASS 60

CHANNEL: BC8F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE

TEST NUMBER: 960229

NEV CAR ASSESSMENT PROGRAM



PEAK DATA: 0.23 KN @ 26.16 MS; -0.29 KN @ 8.64 MS

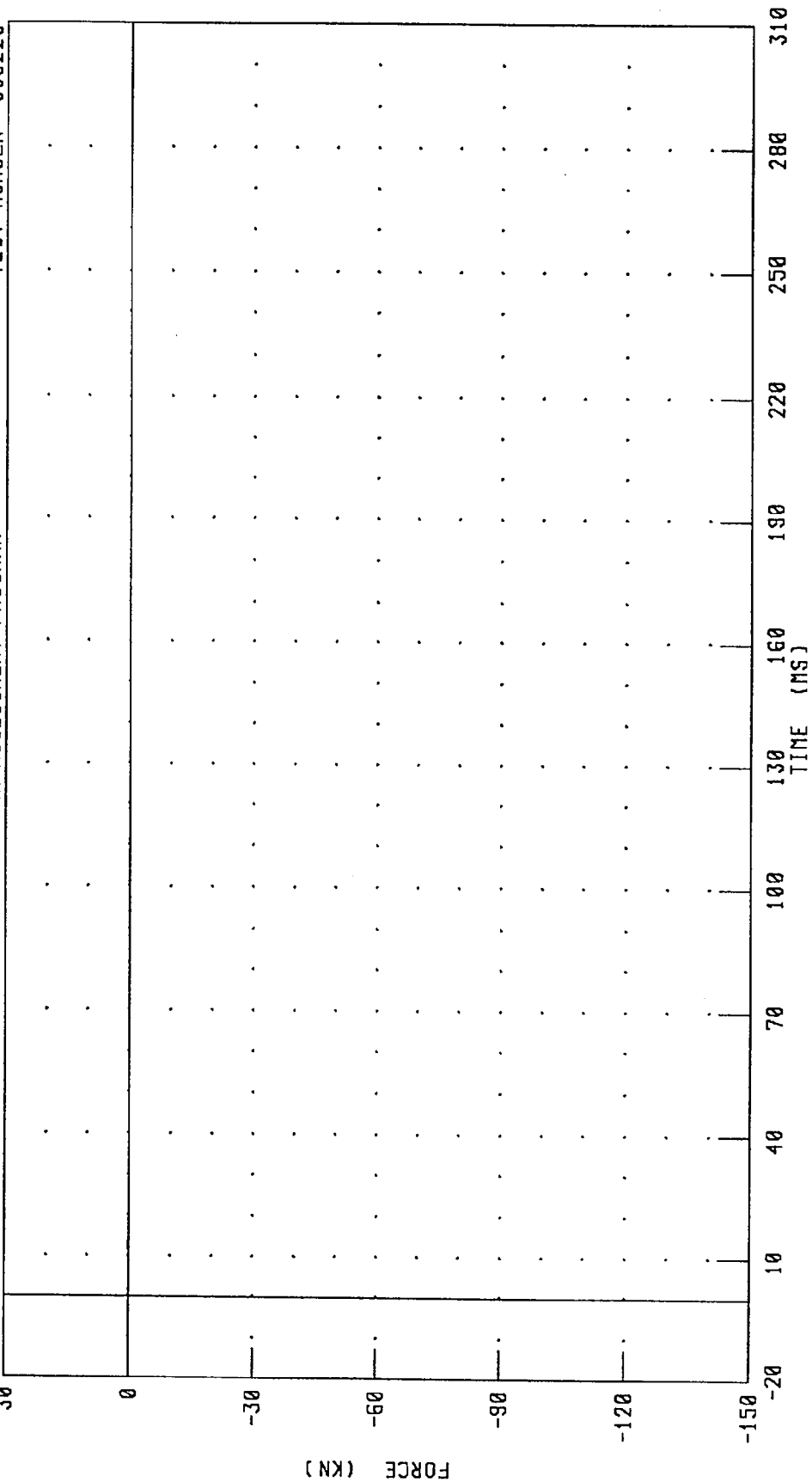
CHANNEL: BC9F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D1 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

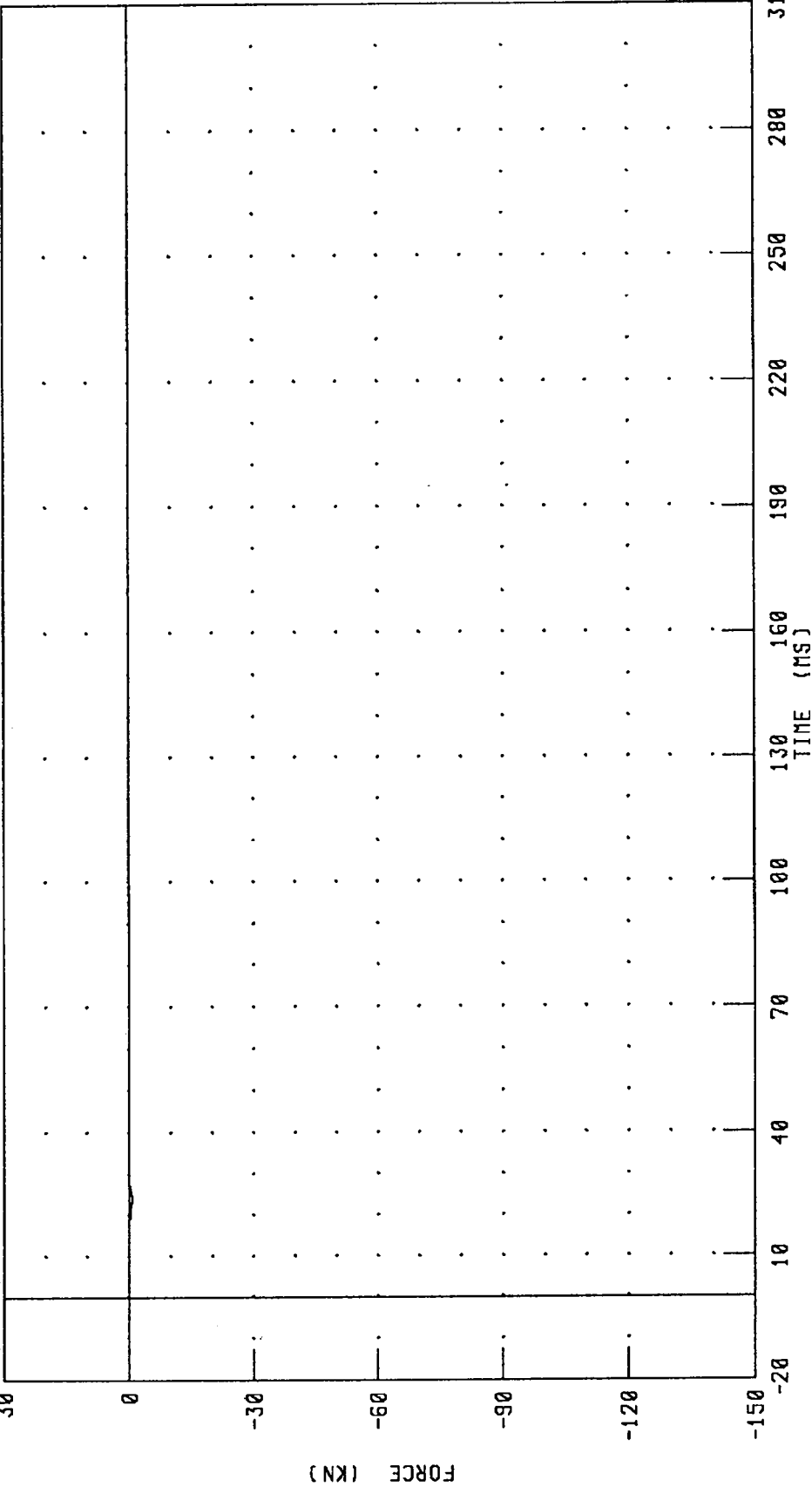


1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D2 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.08 KN @ 37.92 MS; -0.83 KN @ 23.92 MS

FILTER: CH. CLASS 60

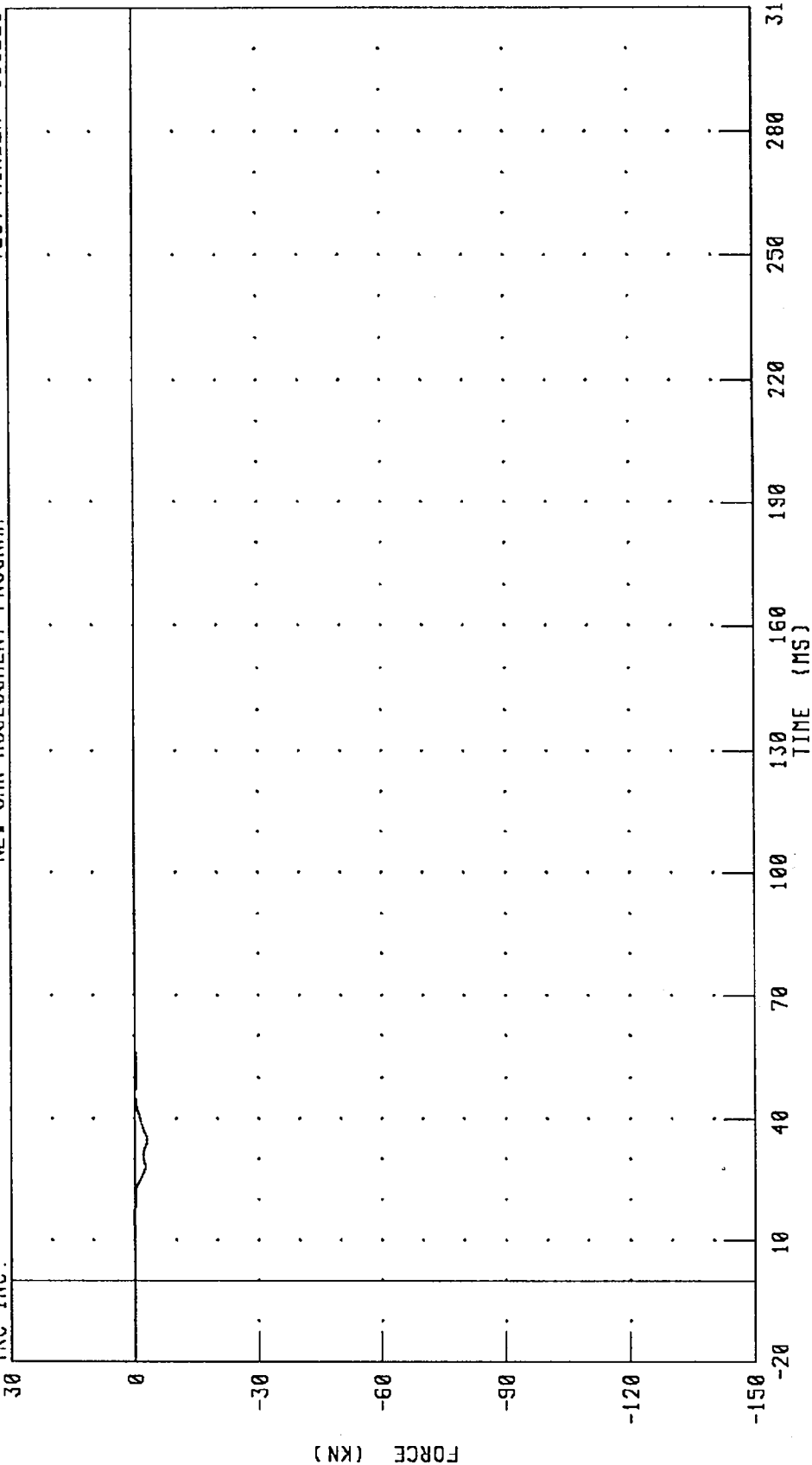
CHANNEL: B02F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D3 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

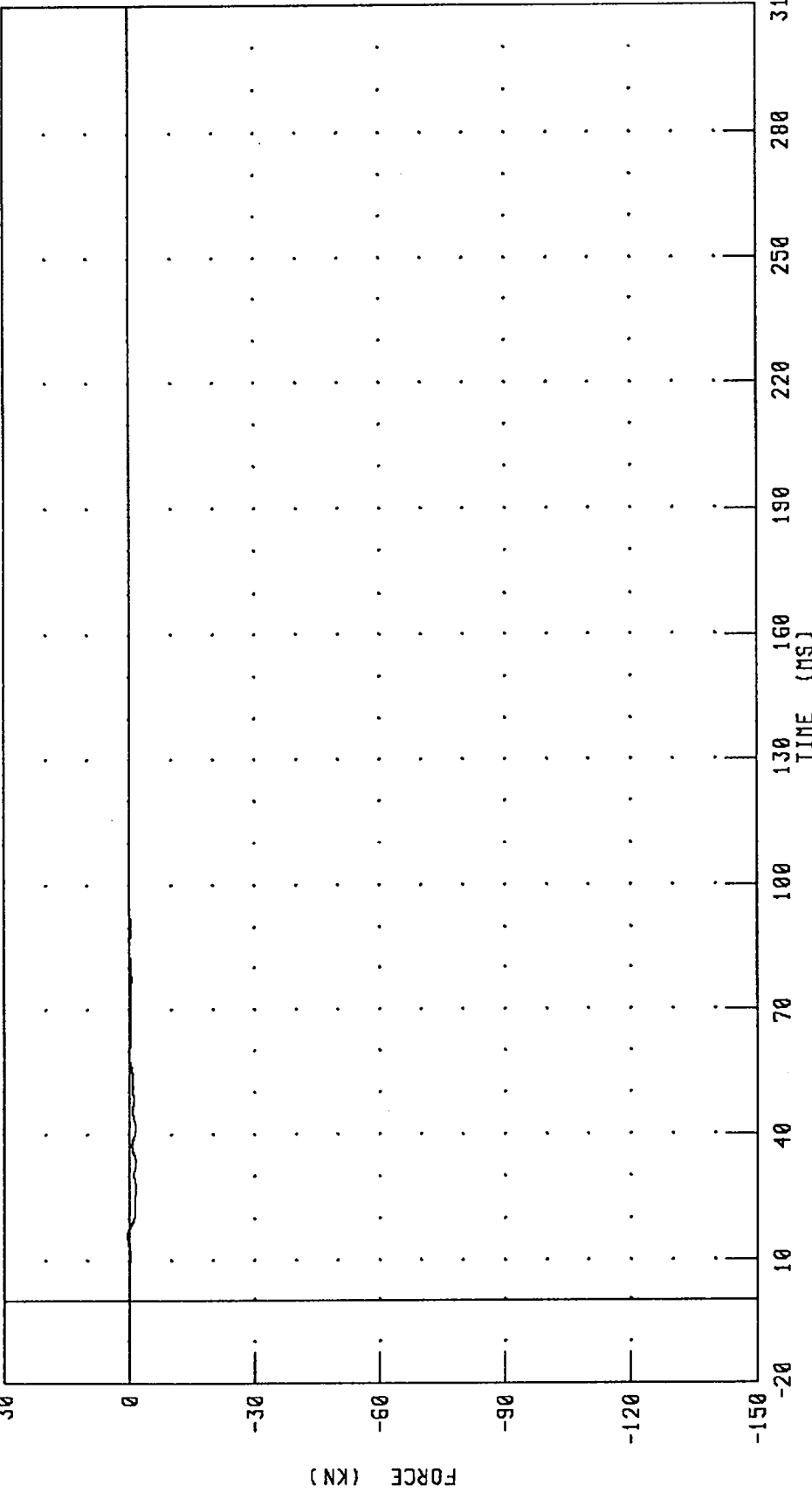


1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D4 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: BD4F

FILTER: CH. CLASS 60

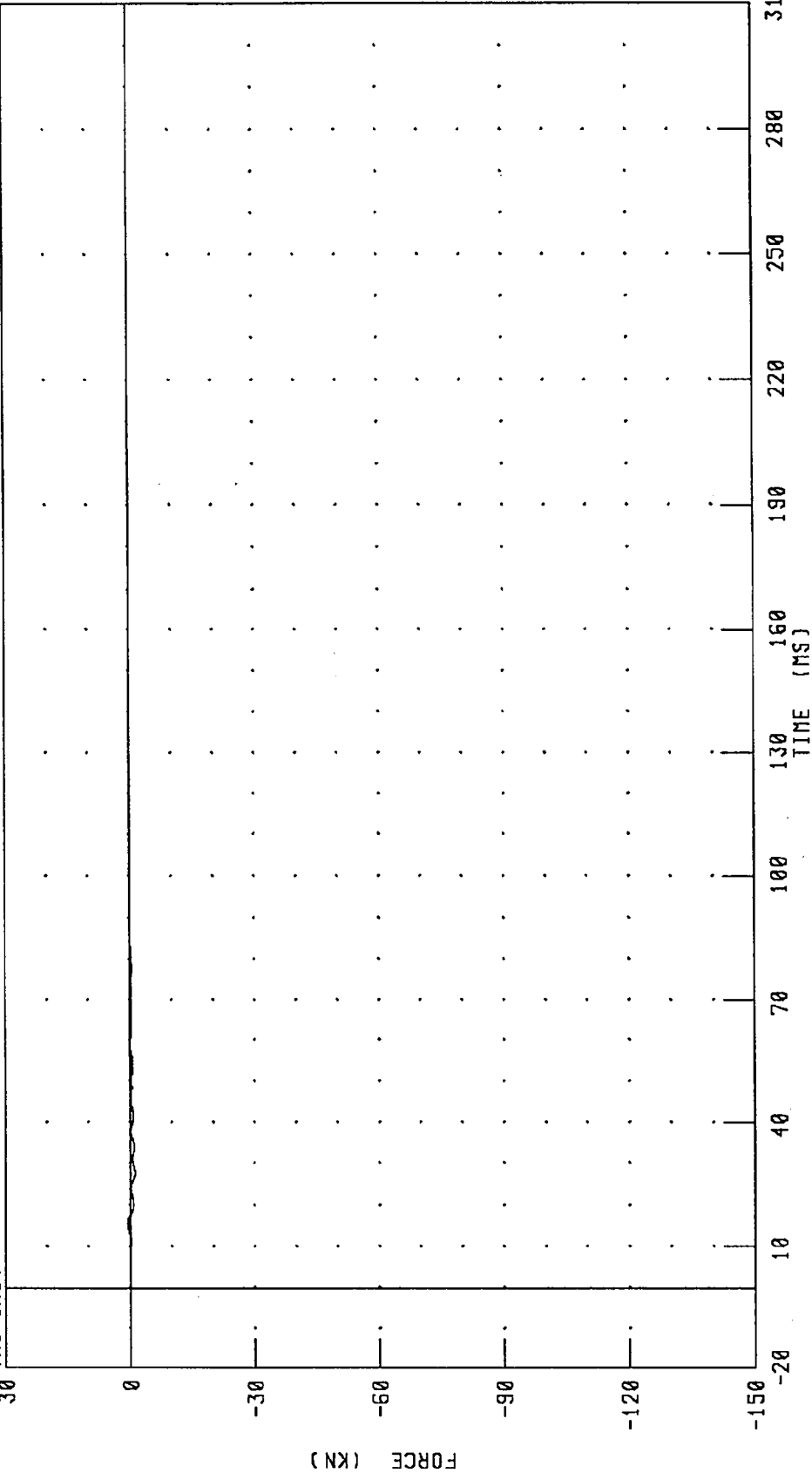
PEAK DATA: 0.38 KN @ 15.84 MS; -1.68 KN @ 27.04 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION 05 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: B05F

FILTER: CH. CLASS 60

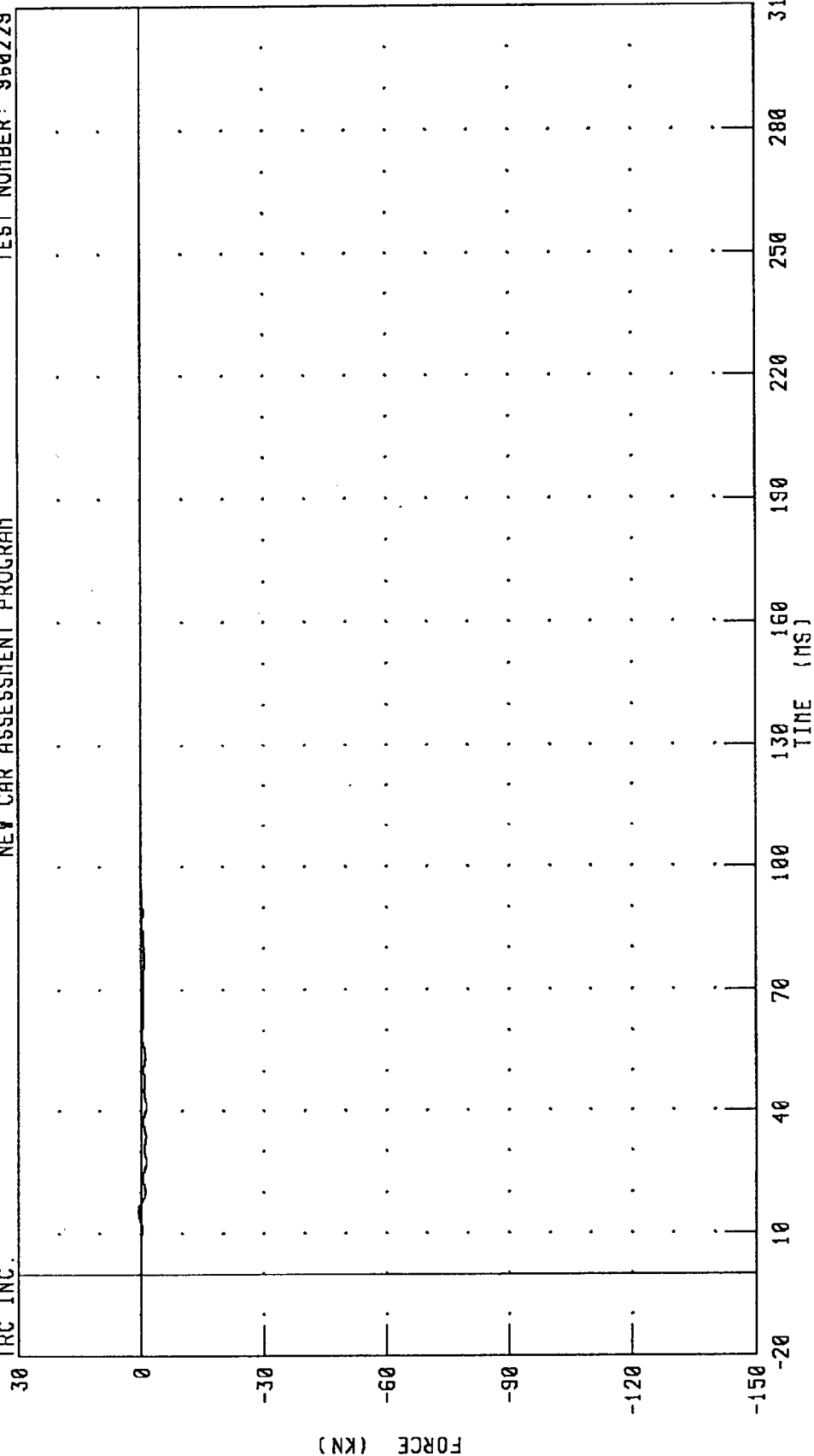
PEAK DATA: 0.51 KN @ 15.68 MS; -1.24 KN @ 27.68 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D6 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.61 KN @ 15.36 MS; -1.36 KN @ 41.28 MS

FILTER: CH. CLASS 60

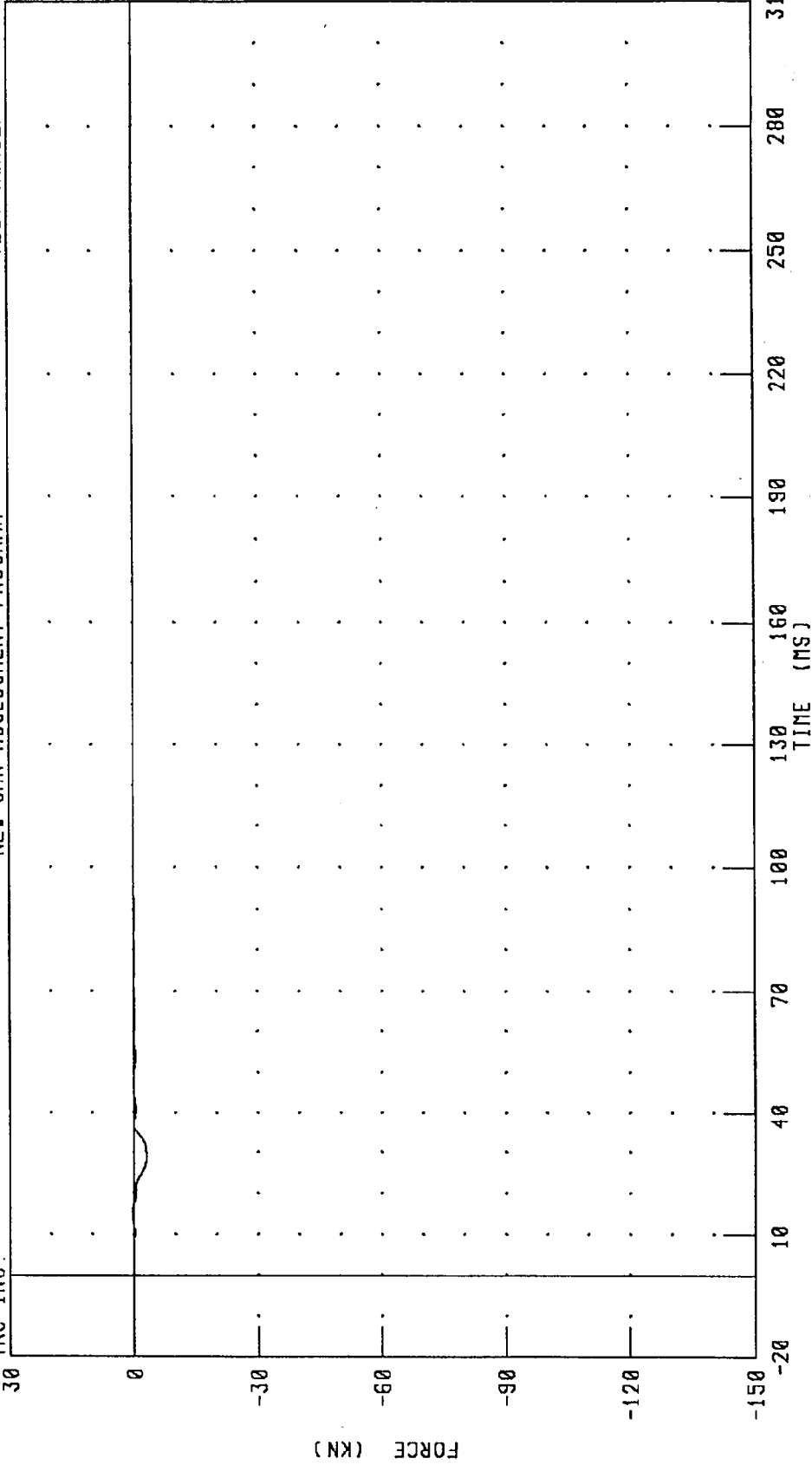
CHANNEL: BD6F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D7 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.54 KN @ 15.12 MS; -3.09 KN @ 28.56 MS

FILTER: CH. CLASS 60

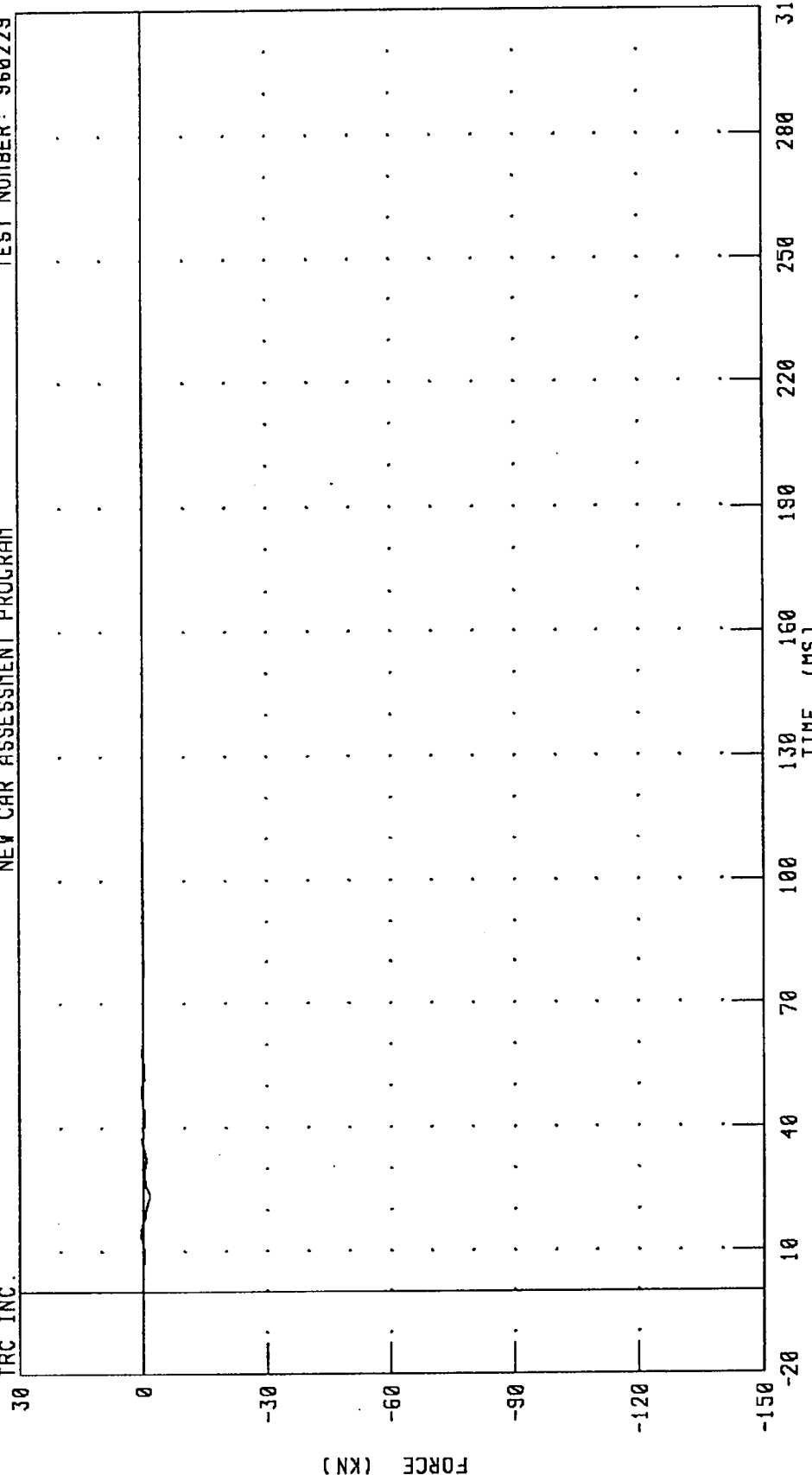
CHANNEL: 807F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D8 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.46 KN @ 14.40 MS; -1.53 KN @ 23.44 MS

FILTER: CH. CLASS 60

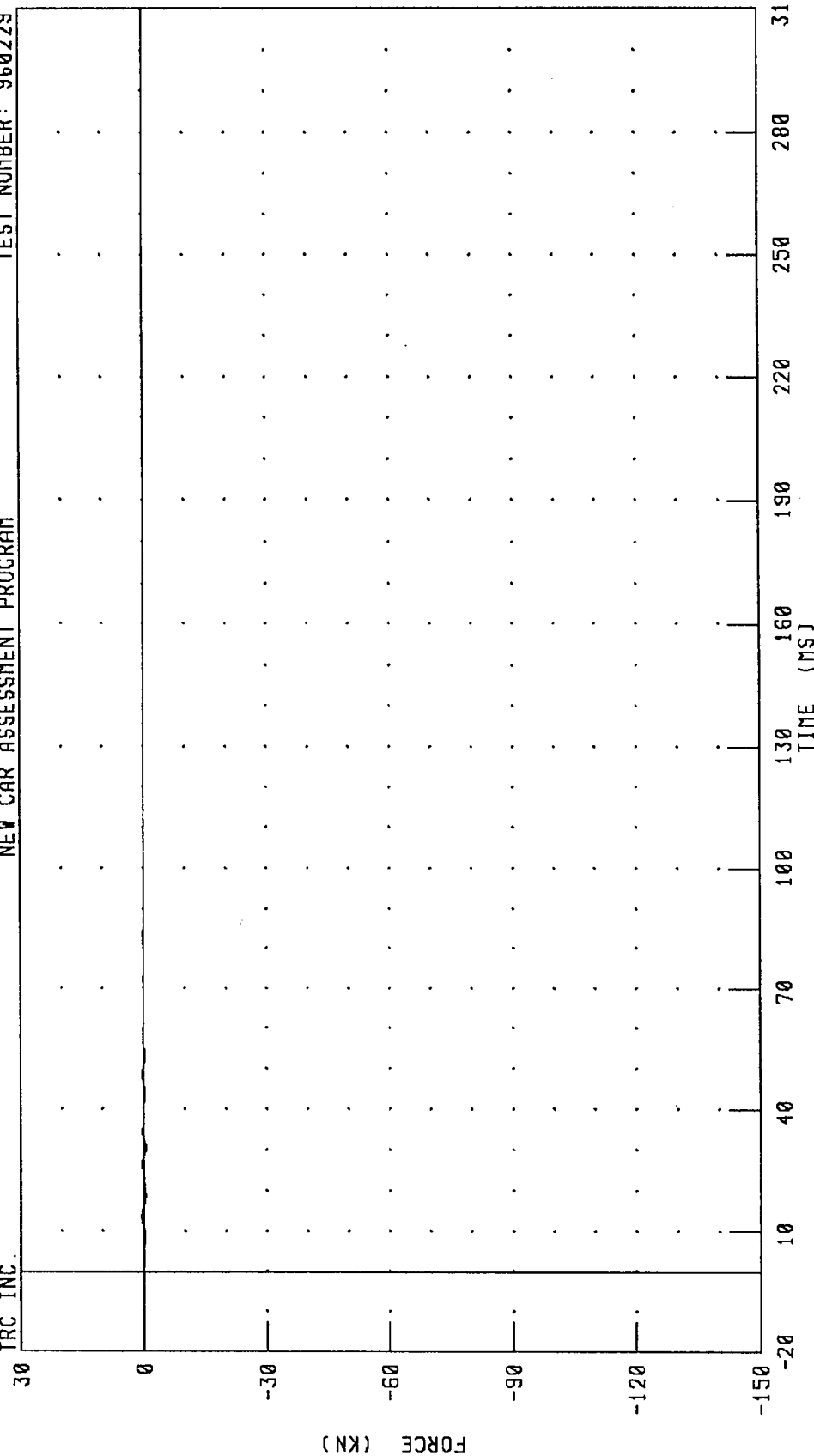
CHANNEL: B08F

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D9 FORCE

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: 809F

FILTER: CH. CLASS 60

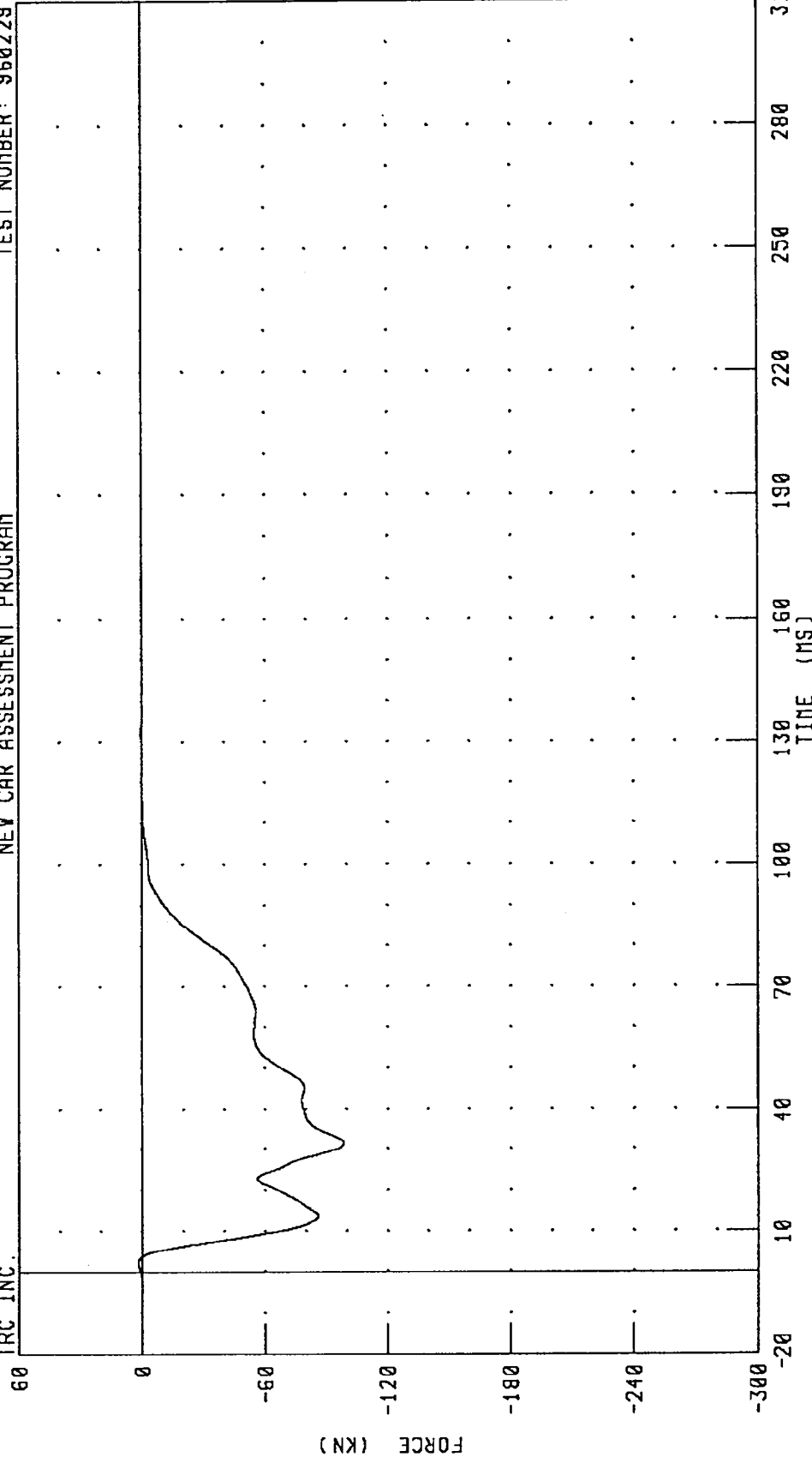
PEAK DATA: 0.62 KN @ 13.76 MS; -0.60 KN @ 30.48 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 1 FORCE TOTAL

TEST NUMBER: 960229

NEV CAR ASSESSMENT PROGRAM

TRC INC.



CHANNEL: LCBGIF FILTER: CH. CLASS 60

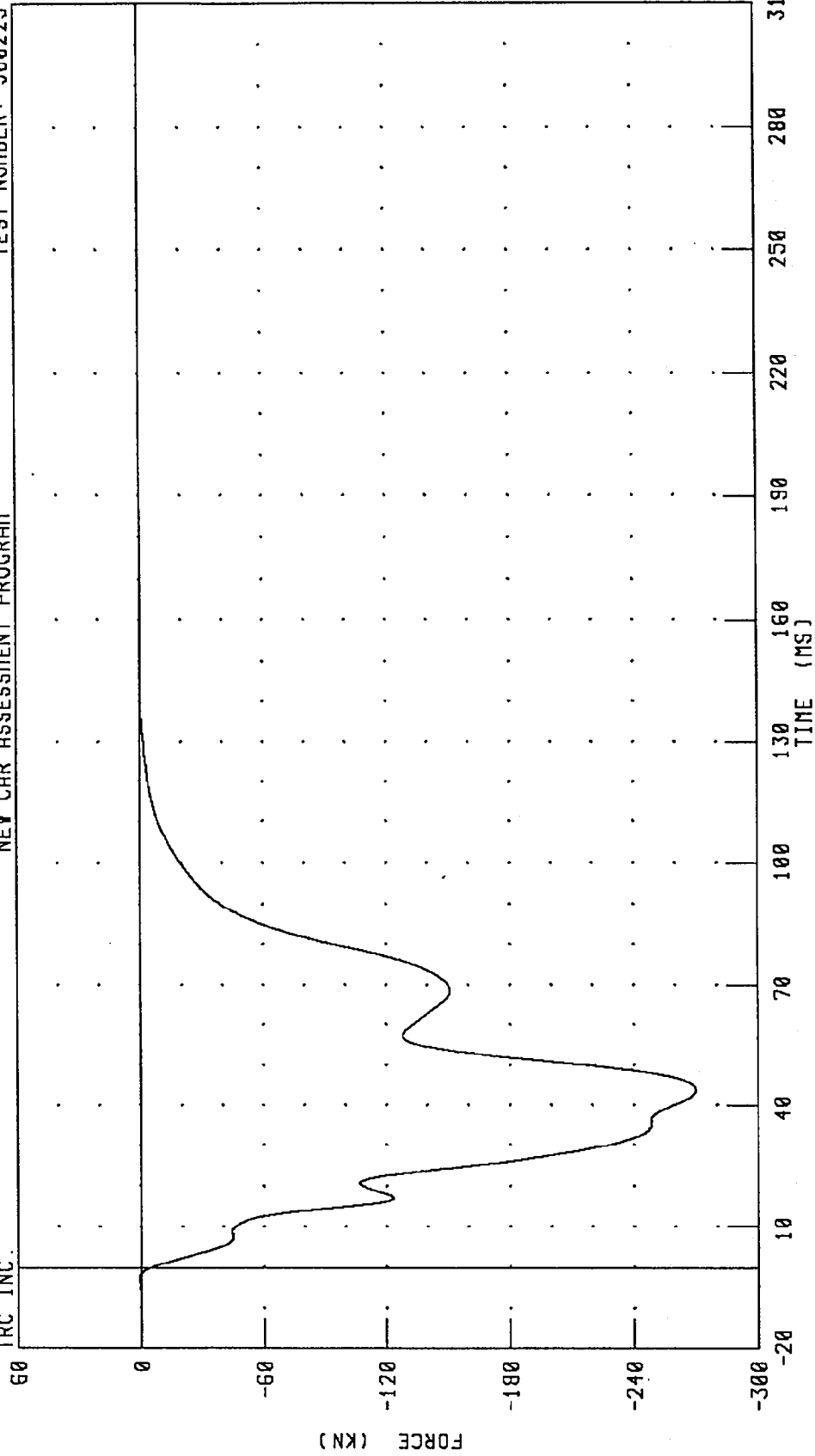
PEAK DATA: 1.95 KN @ 2.32 MS; -98.85 KN @ 31.52 MS

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 2 FORCE TOTAL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.84 KN @ -2.88 MS; -270.10 KN @ 43.76 MS

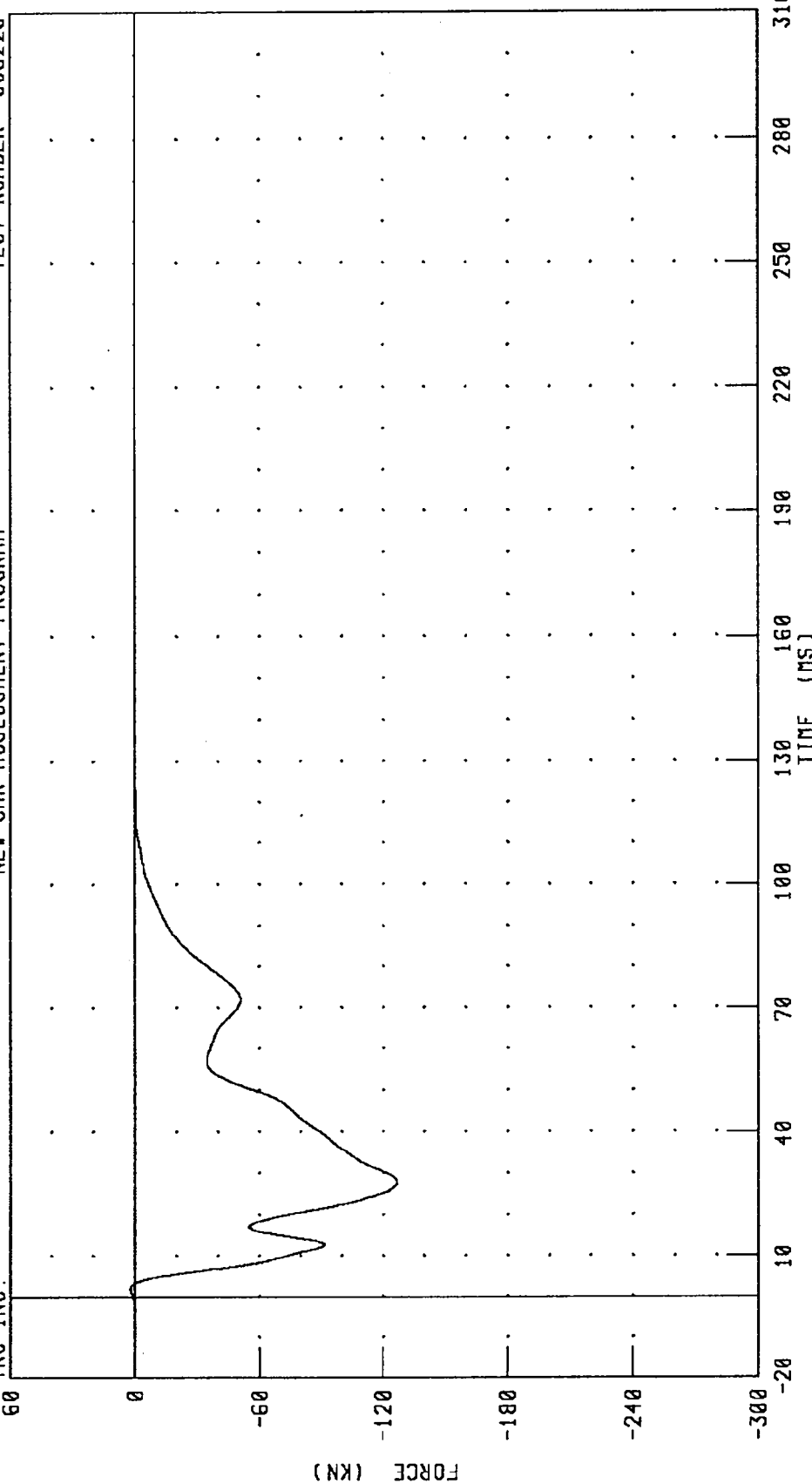
CHANNEL: LCBG2F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 3 FORCE TOTAL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 2.21 KN @ 1.84 MS; -126.77 KN @ 27.92 MS

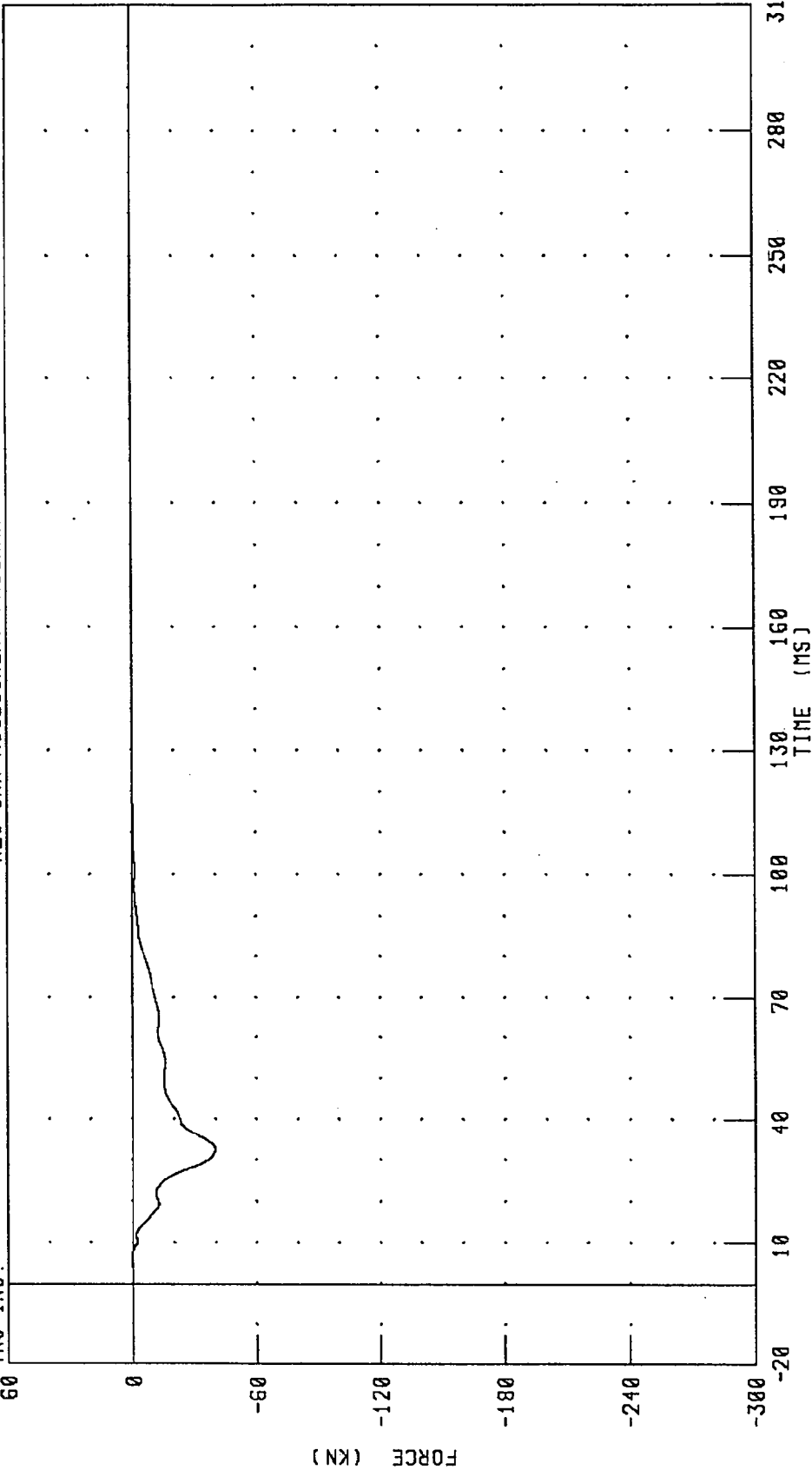
CHANNEL: LCBG3F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 4 FORCE TOTAL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.58 KN @ 6.24 MS; -39.66 KN @ 32.56 MS

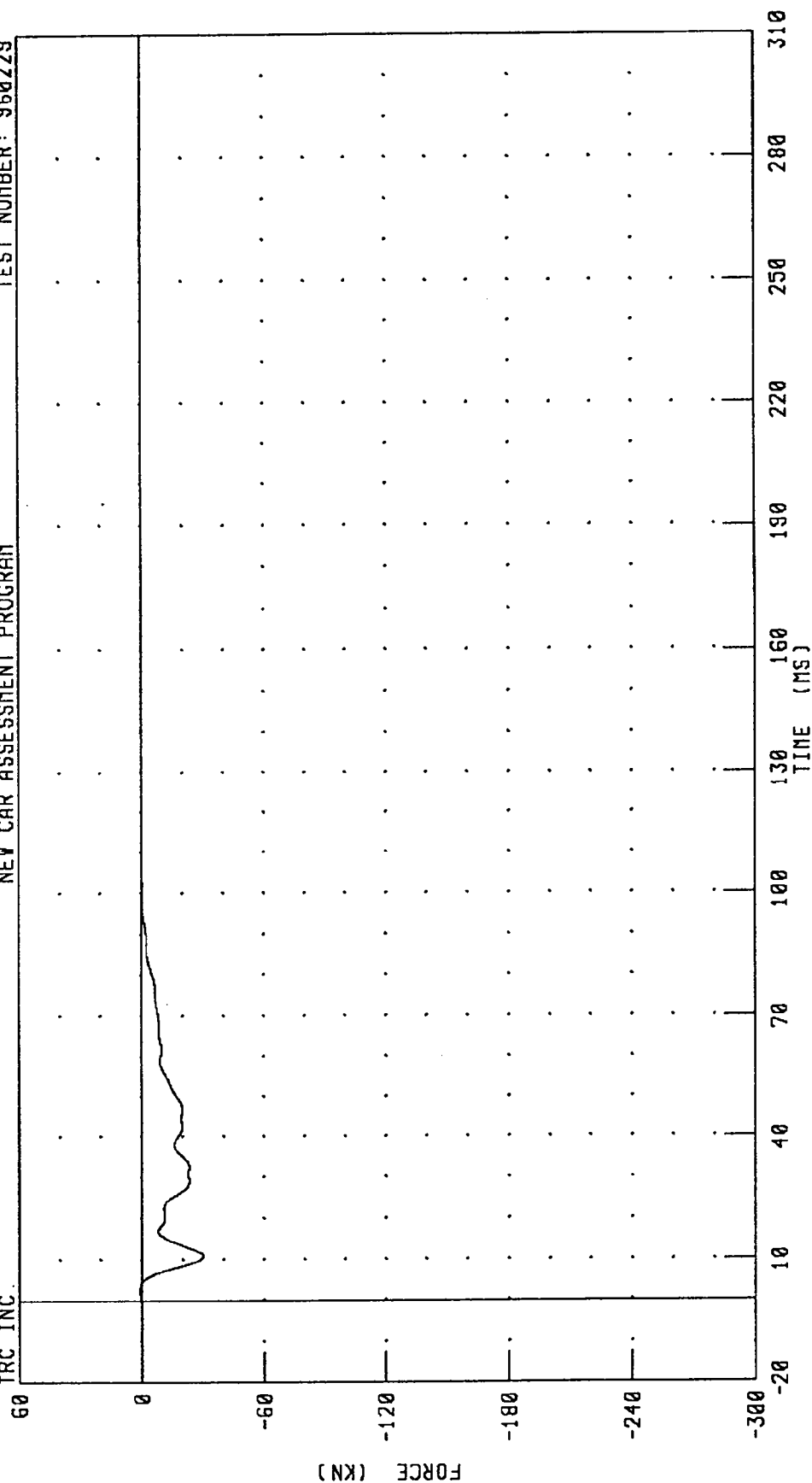
CHANNEL: LCBG4F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 5 FORCE TOTAL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.



PEAK DATA: 0.78 KN @ 2.24 MS; -30.13 KN @ 10.80 MS

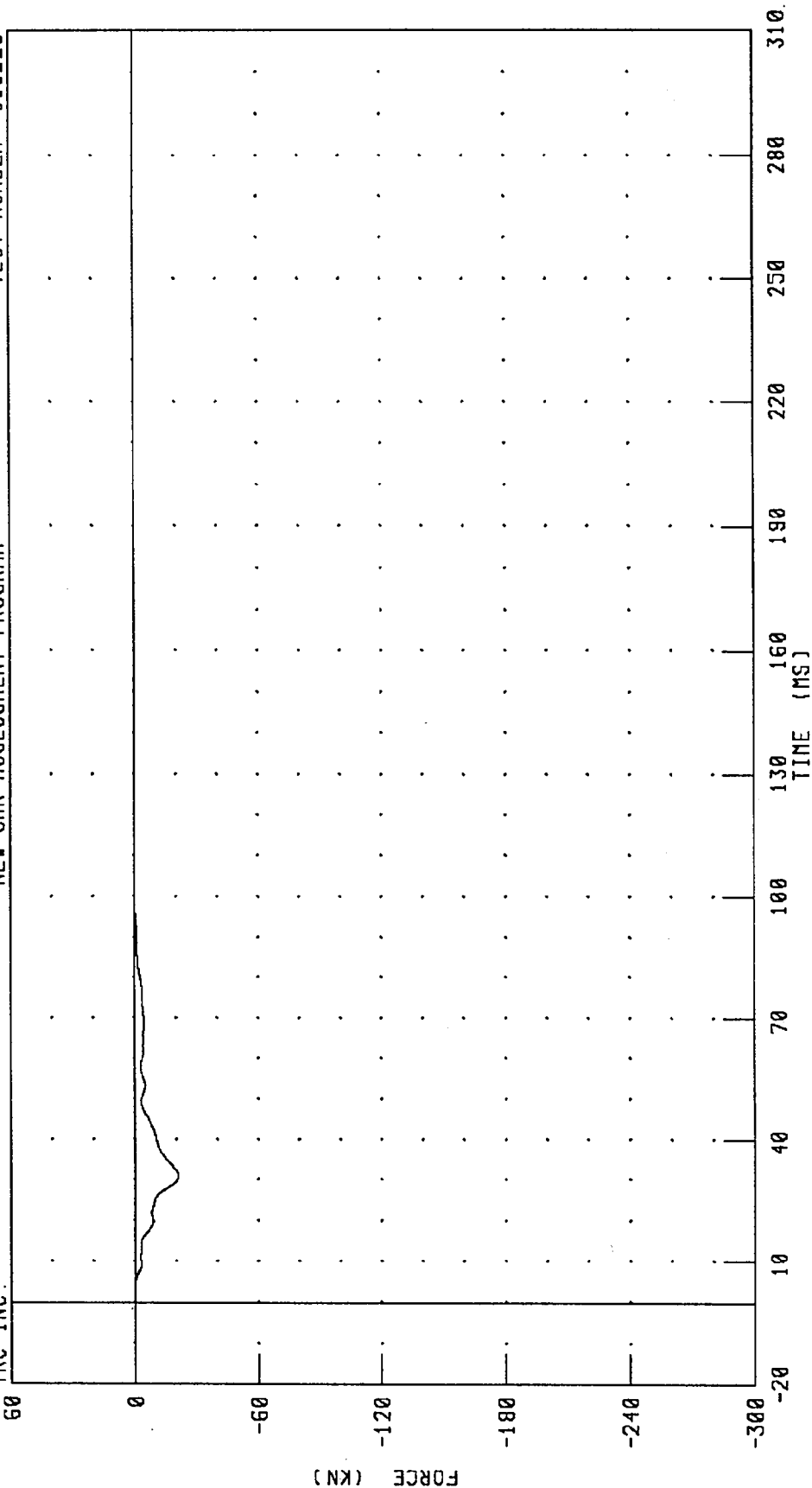
CHANNEL: LCBG5F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 6 FORCE TOTAL

TEST NUMBER: 960229

NEW CAR ASSESSMENT PROGRAM

TRC INC.

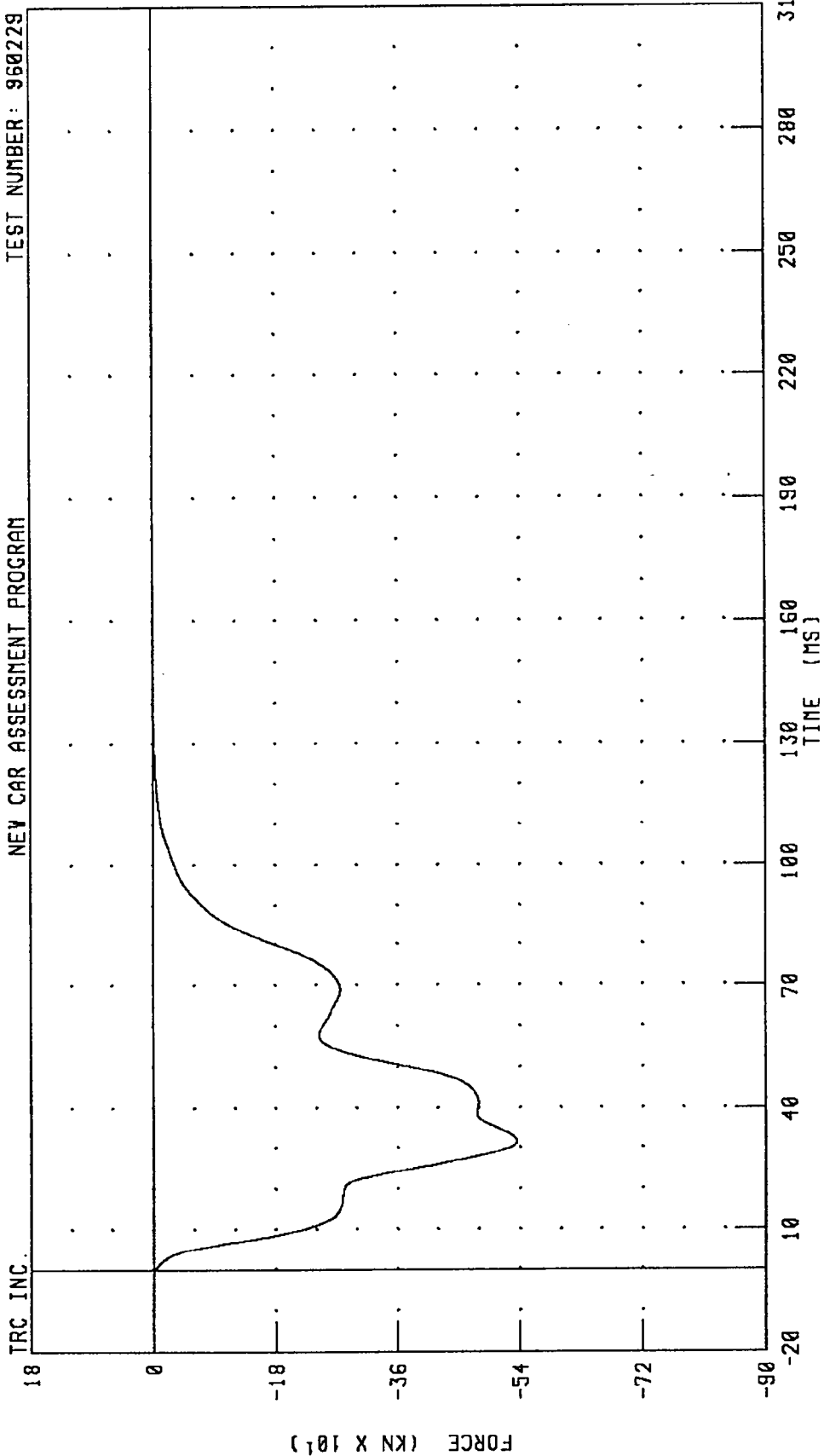


PEAK DATA: 0.15 KN @ 2.72 MS; -21.01 KN @ 30.80 MS

CHANNEL: LCBG6F FILTER: CH. CLASS 60

1996 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 TOTAL LOAD CELL BARRIER FORCE
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229



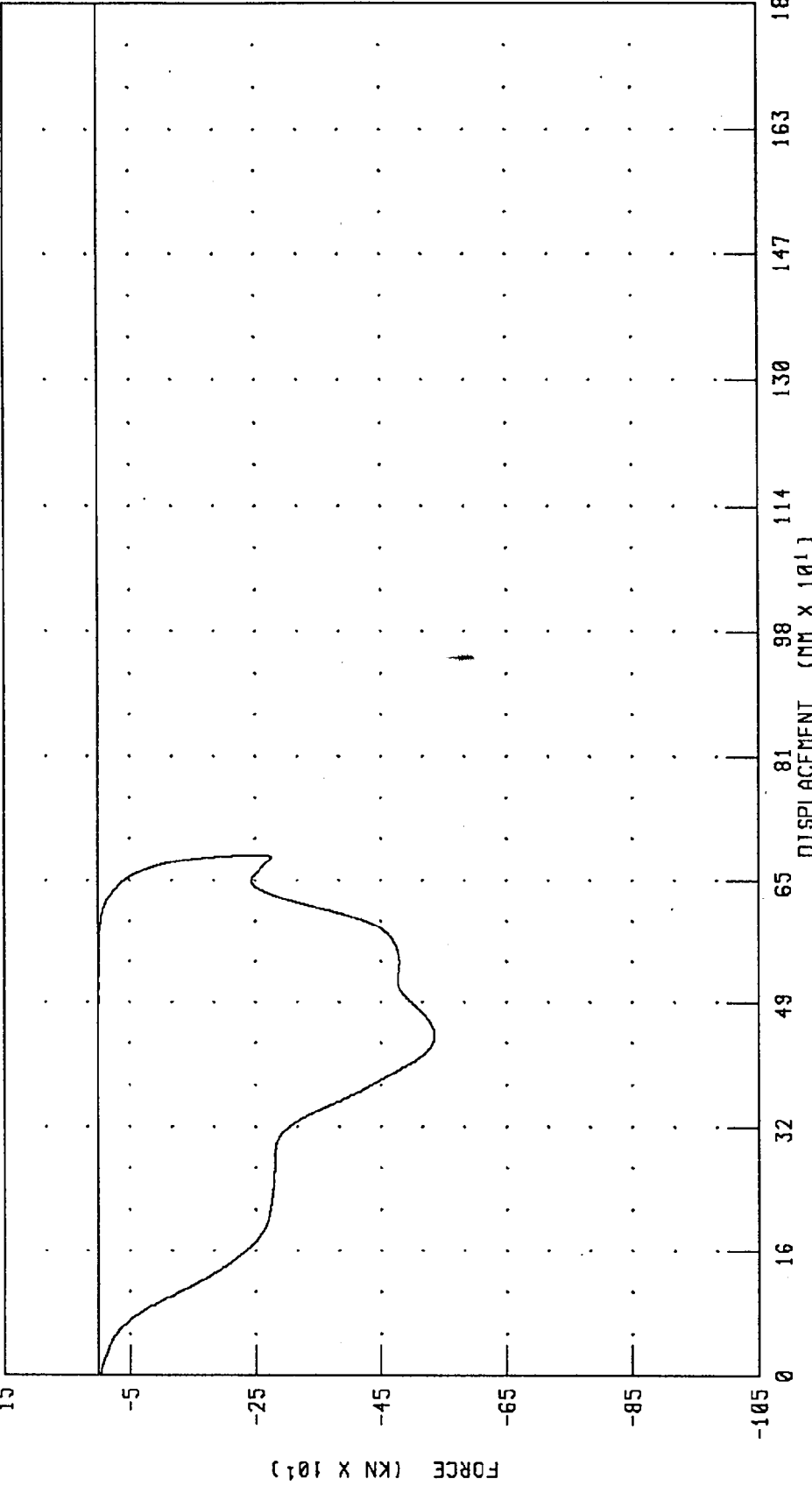
PEAK DATA: 0.49 KN @ -2.56 MS; -535.38 KN @ 31.68 MS

CHANNEL: LCBGT FILTER: CH. CLASS 60

1396 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 TOTAL LOAD CELL BARRIER FORCE VS AVERAGE VEHICLE X-AXIS DISPLACEMENT
 NEW CAR ASSESSMENT PROGRAM

TEST NUMBER: 960229

TRC INC.



CHANNEL: 0THXD
 LCBGT
 FILTER: CH. CLASS 180
 CH. CLASS 60
 DISPLACEMENT ($\text{MM} \times 10^1$)
 PEAK DATA: 688.15 NM @ 74.24 MS;
 0.32 KN @ 232.88 MS; -535.38 KN @ 31.68 MS

Appendix C

Dummy Certification Data

Pre-test Certification Data

Driver Dummy S/N: 192

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III EXTERNAL DIMENSIONS

192 ALDERSON

26-FEB-96

TRC INC.

TEST NO: 192C32ED1

572E SN192 EXT.DIMENSION CAL32

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226 - 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)		970 - 1001 MM	980. MM
WAIST CIRCUMFERENCE (Z)		836 - 866 MM	851. MM
CHEST DEPTH (O)		213 - 229 MM	218. MM
H-POINT HEIGHT (C)		84 - 89 MM	84. MM
H-POINT FROM SEATBACK (D)		135 - 140 MM	135. MM
SKULL CAP TO BACKLINE (H)		41 - 46 MM	43. MM
TOTAL SITTING HEIGHT (A)		879 - 889 MM	889. MM
THIGH CLEARANCE (F)		140 - 155 MM	150. MM
BUTTOCK KNEE LENGTH (K)		579 - 605 MM	597. MM
BUTTOCK POPLITEAL LENGTH (N)		452 - 478 MM	470. MM
POPLITEAL HEIGHT (L)		429 - 455 MM	447. MM
KNEE PIVOT HEIGHT (M)		485 - 500 MM	493. MM
FOOT LENGTH (P)		252 - 267 MM	259. MM
FOOT BREADTH (W)		91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE (E)		84 - 94 MM	94. MM
SHOULDER BREADTH (V)		422 - 437 MM	429. MM
SHOULDER PIVOT HEIGHT (B)		506 - 521 MM	516. MM
ELBOW REST HEIGHT (J)		191 - 211 MM	211. MM
SHOULDER-ELBOW LENGTH (I)		330 - 345 MM	345. MM
BACK OF ELBOW TO WRIST PIVOT (G)		290 - 305 MM	290. MM

 DUMMY MEETS SPECIFICATIONS
 TECHNICIAN Chas. Mudditt

RUN NUMBER: 022996.0833

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

27-FEB-96

TRC INC.

TEST NO: 192C32HD1

572E SN192 HEAD DROP CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	251.83 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.57 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chris Middel

RUN NUMBER: 022796.0836;1

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

TRC TEST NUMBER: 192C32HD1

572E SN192 HEAD DROP CAL 32

RUN NUMBER: 032996.0804;1

75

0

-75

-150

-225

-300

-375

ACCELERATION (G)

TIME (MS X 10⁻¹)

PEAK DATA: 0.08 G @ -0.16 MS; -217.72 G @ 2.00 MS

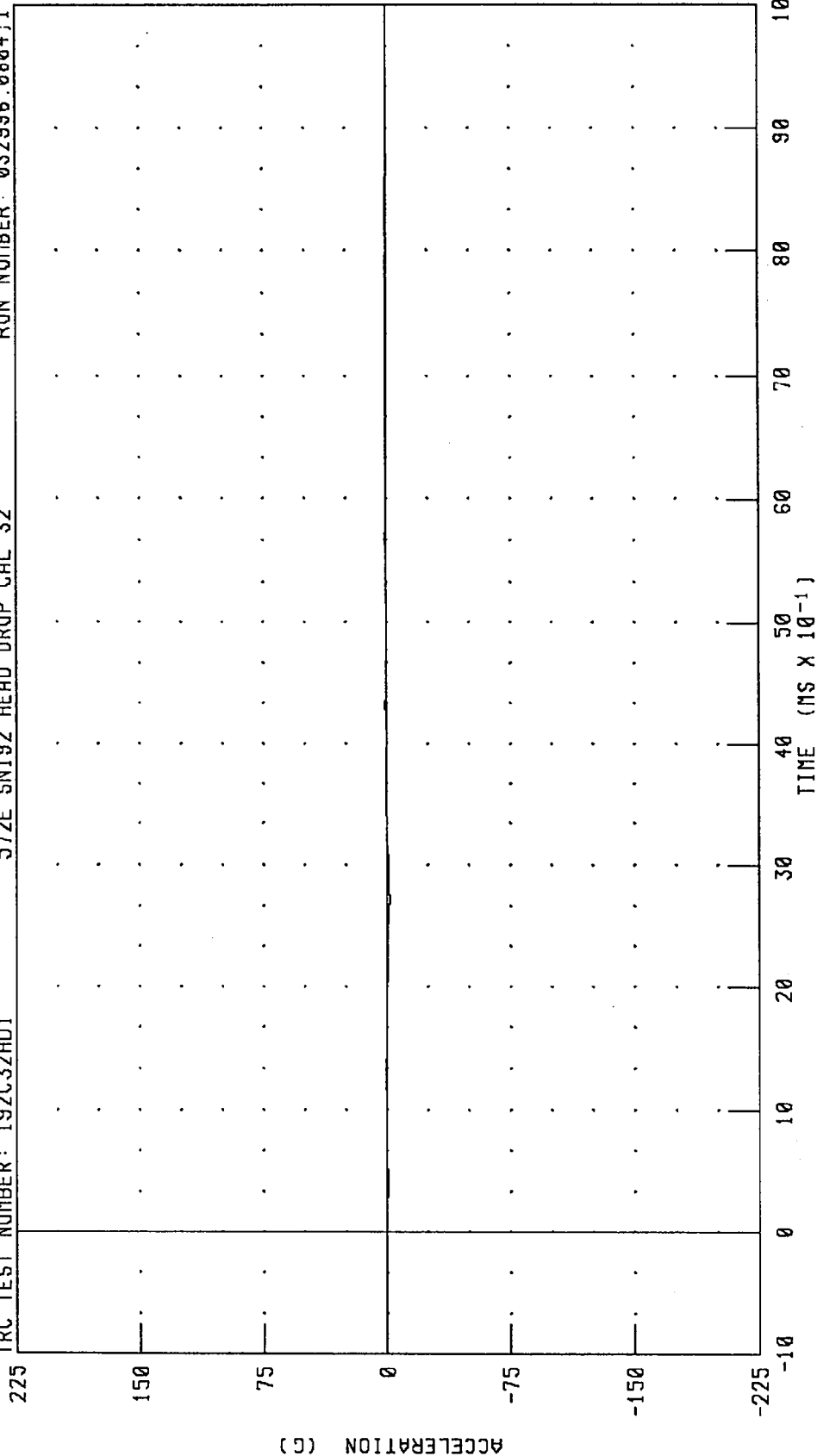
CHANNEL: HEDXG FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 192C32HD1

572E SN192 HEAD DRQP CAL 32

RUN NUMBER: 032996.0804;1

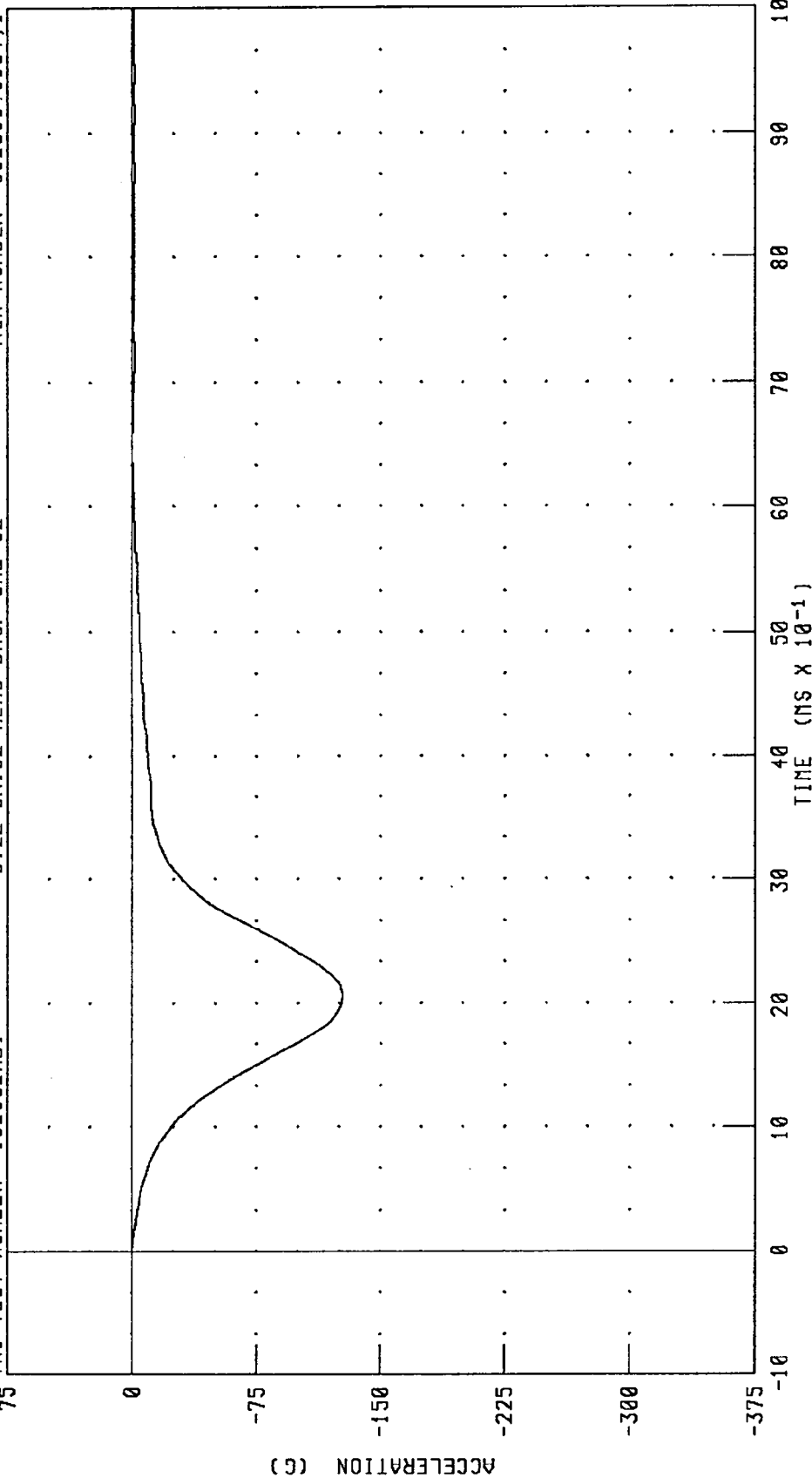


PEAK DATA: 1.01 G @ 4.32 MS; -1.57 G @ 2.72 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 192C32HD1 572E SNI92 HEAD DROP CAL 32 RUN NUMBER: 032996.0804,1



PEAK DATA: 0.03 G @ -0.08 MS; -126.86 G @ 2.08 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

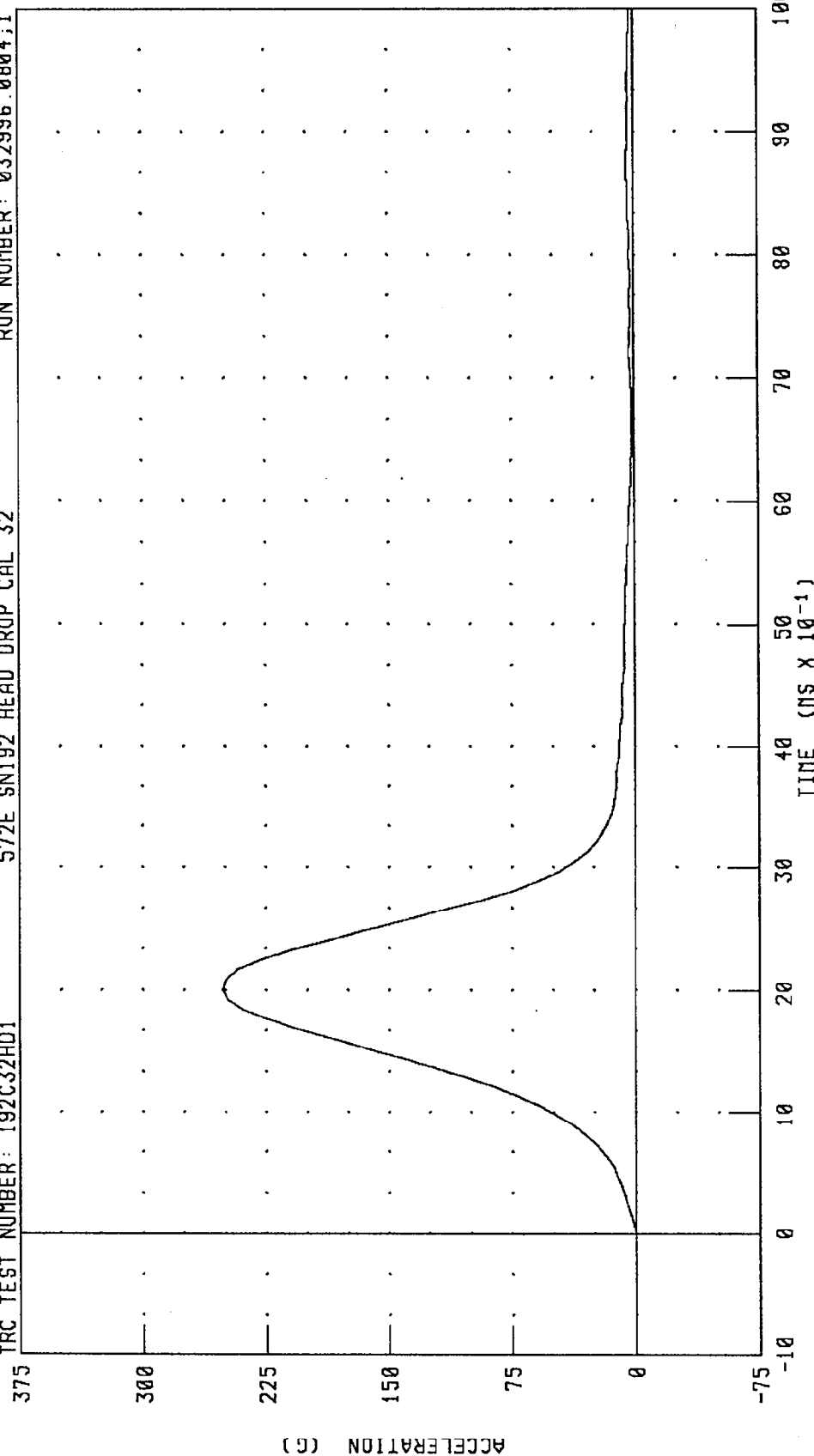
PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN192 HEAD DROP CAL 32

RUN NUMBER: 032996.0804;1

TRC TEST NUMBER: 192C32HD1



PEAK DATA: 251.83 G @ 2.00 MS; 0.02 G @ -0.80 MS

CHANNEL: HEDRG FILTER: CH. CLASS 1000

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

HYBRID III

27-FEB-96

TRC INC. TEST NO: 192C32NF1 572E SN192 NECK FLEXION CAL32

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	23.60 G
	20 MS	17.60 - 22.60 G	19.24 G
	30 MS	12.50 - 18.50 G	15.71 G
MAX PENDULUM G		29 G MAX	24.54 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	15.66 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	38.24 MS
D PLANE	MAX	64 - 78 DEG.	70.78 DEG.
ROTATION	TIME	57 - 64 MS	59.36 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	96.56 NM
	TIME	47 - 58 MS	51.36 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	114.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.72 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middel

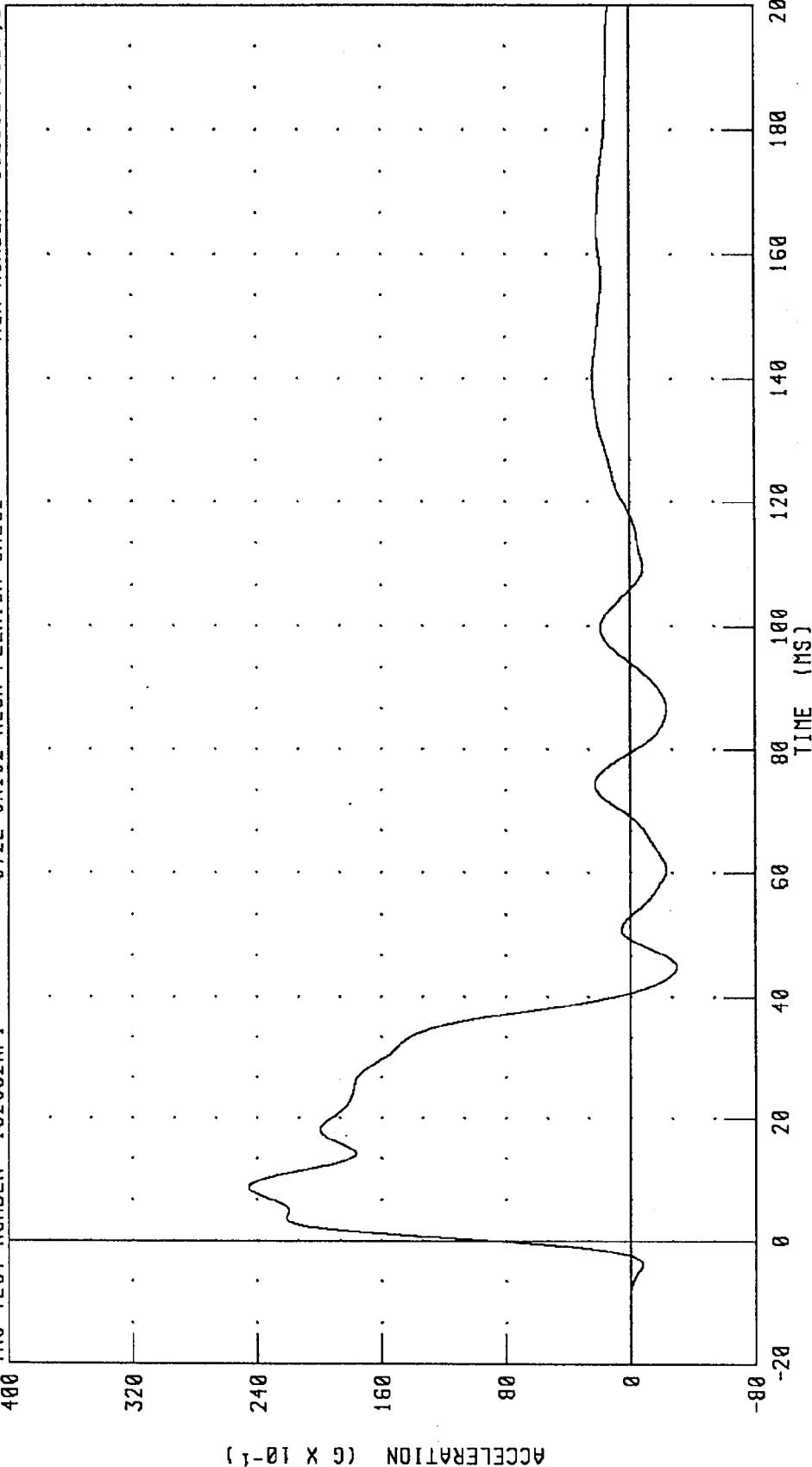
RUN NUMBER: 022796.1232;3

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 192C32NF1

572E SN192 NECK FLEXION CAL32

RUN NUMBER: 032996.0804;3

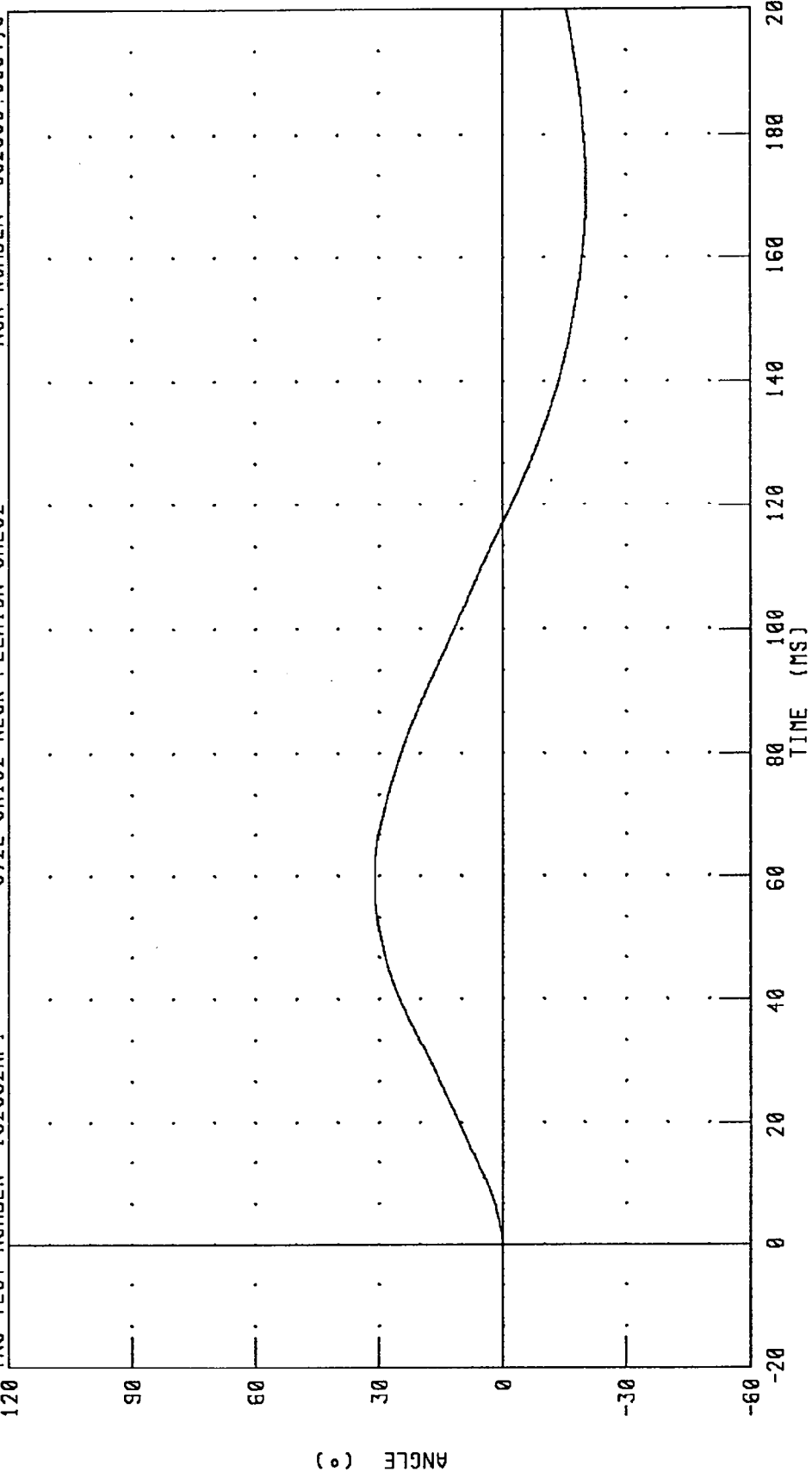


PEAK DATA: 24.54 G @ 8.64 MS; -2.95 G @ 41.96 MS

CHANNEL: PENXC FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 192C32NF1 572E SN192 NECK FLEXION CAL32 RUN NUMBER: 032996.0804,3



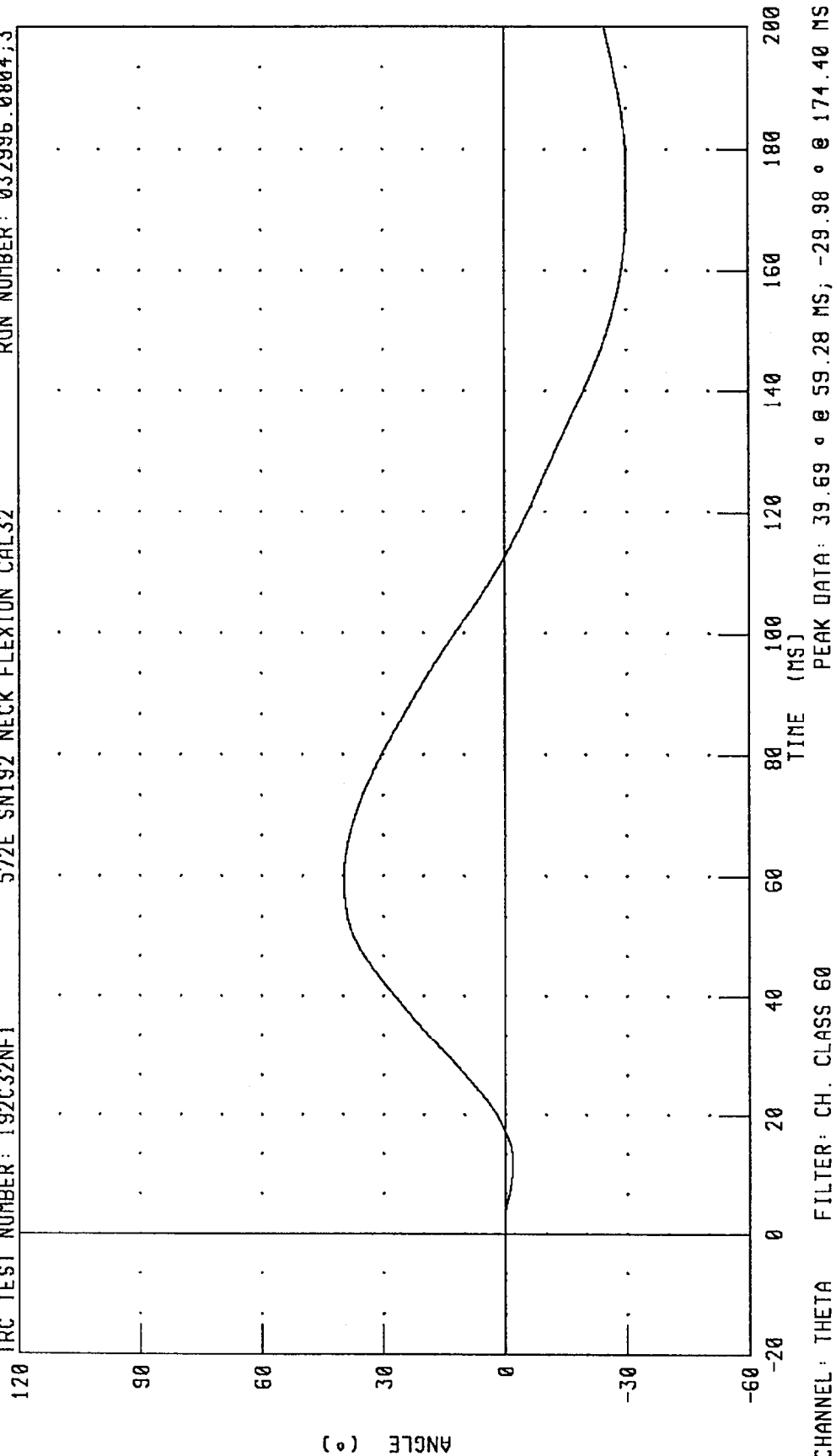
PEAK DATA: 31.10 ° @ 59.36 MS; -20.19 ° @ 168.08 MS

CHANNEL: BETA FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 192C32NF1 RUN NUMBER: 032996.0804;3

572E SN192 NECK FLEXION CAL32



CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

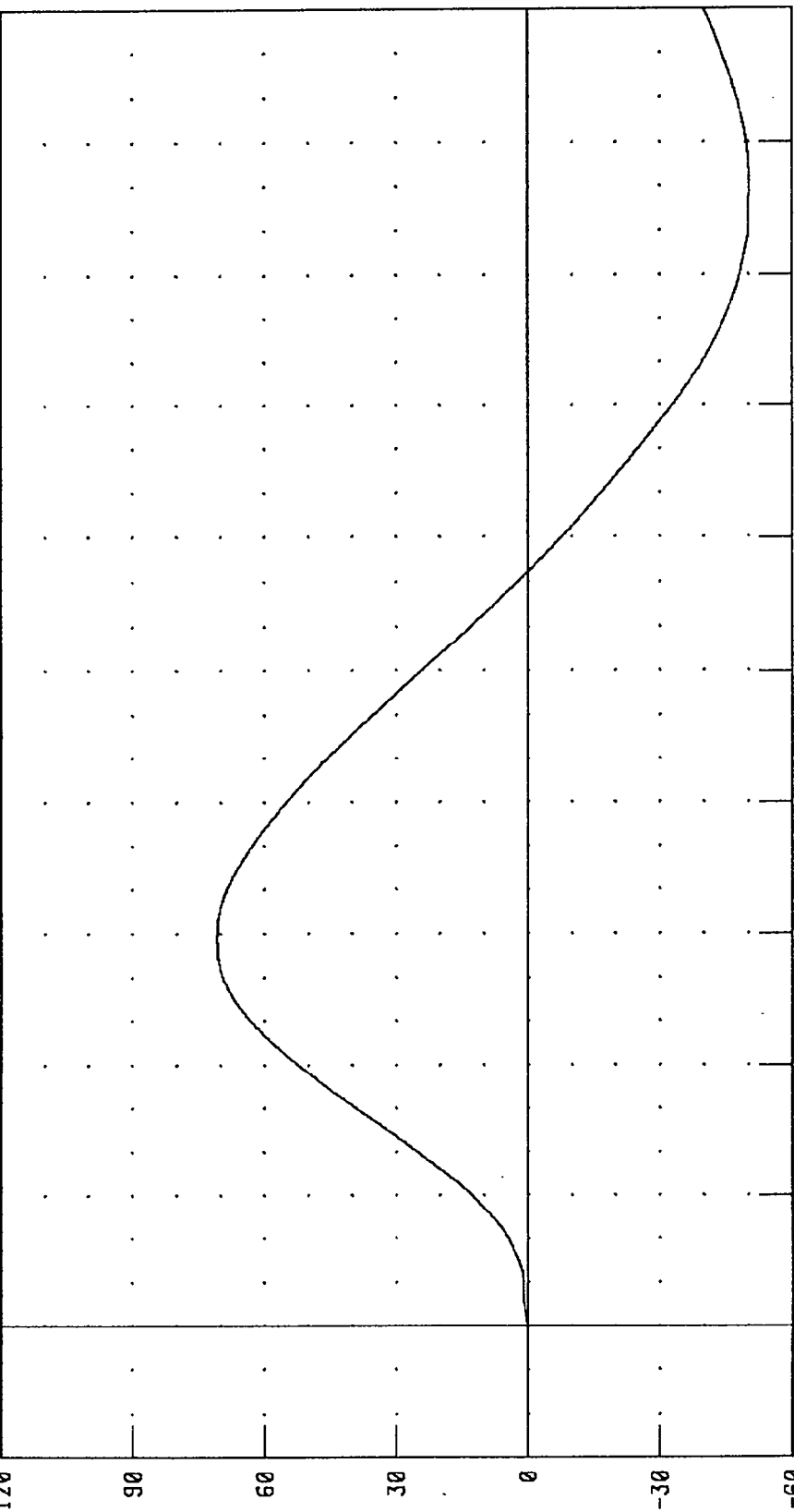
TOTAL ROTATION

IRC TEST NUMBER: 192C32NF1

572E SN192 NECK FLEXION CAL32

RUN NUMBER: 032996.0804,3

120



PEAK DATA: 70.79 ° @ 59.36 MS; -50.17 ° @ 174.24 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

960229

PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 192C32NF1

572E SN192 NECK FLEXION CAL32

RUN NUMBER: 032996.0804;3

160

120

80

40

0

-40

-80

FORCE (N X 10¹)

TIME (MS)

200

180

160

140

120

100

80

60

40

20

0

-20

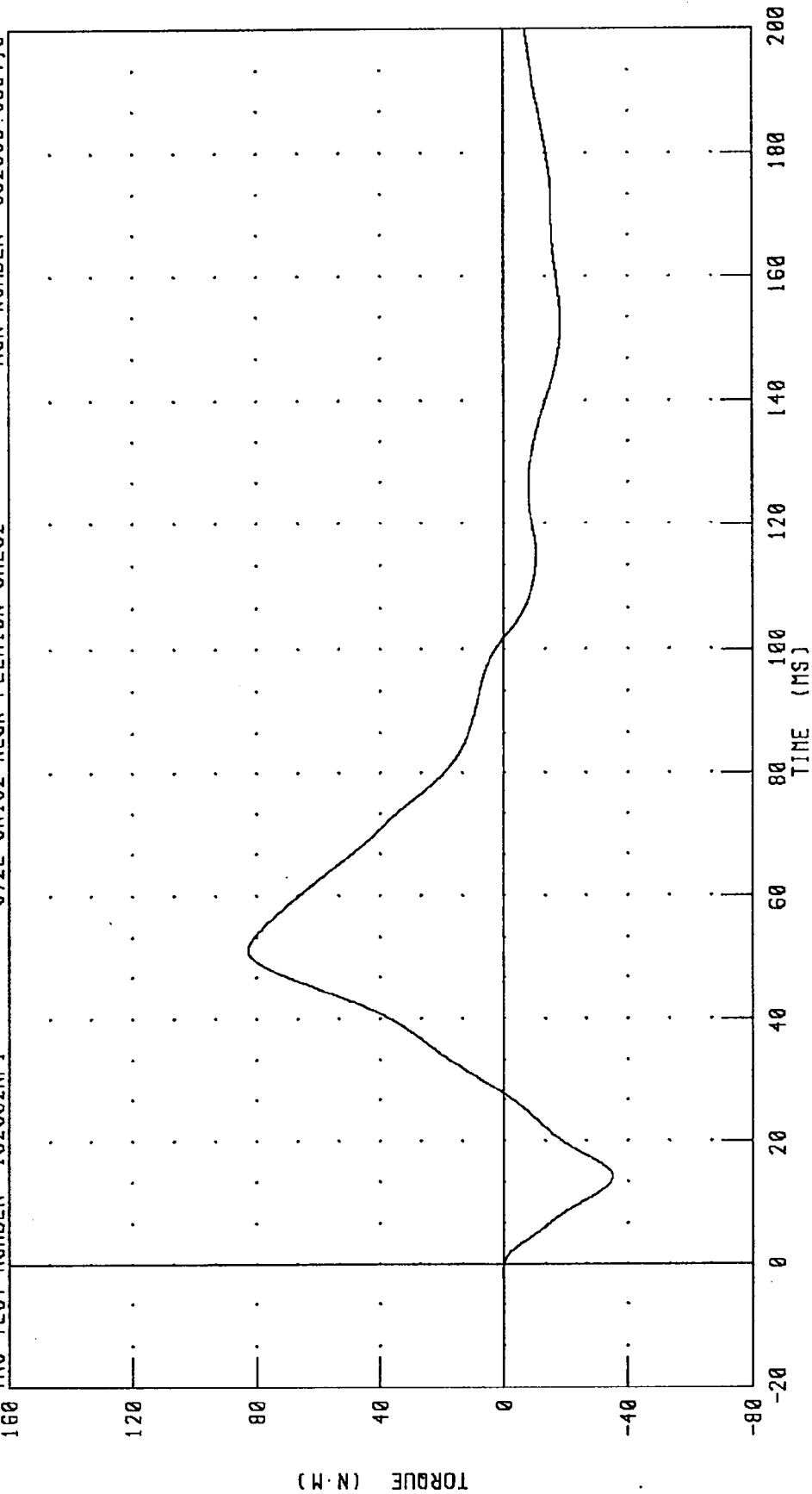
FILTER: CH. CLASS 60

CHANNEL: NEKXF

PEAK DATA: 809.08 N @ 57.28 MS; -168.23 N @ 166.64 MS

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

TRC TEST NUMBER: 192C32NF1 572E SN192 NECK FLEXION CAL32 RUN NUMBER: 032996 0804;3



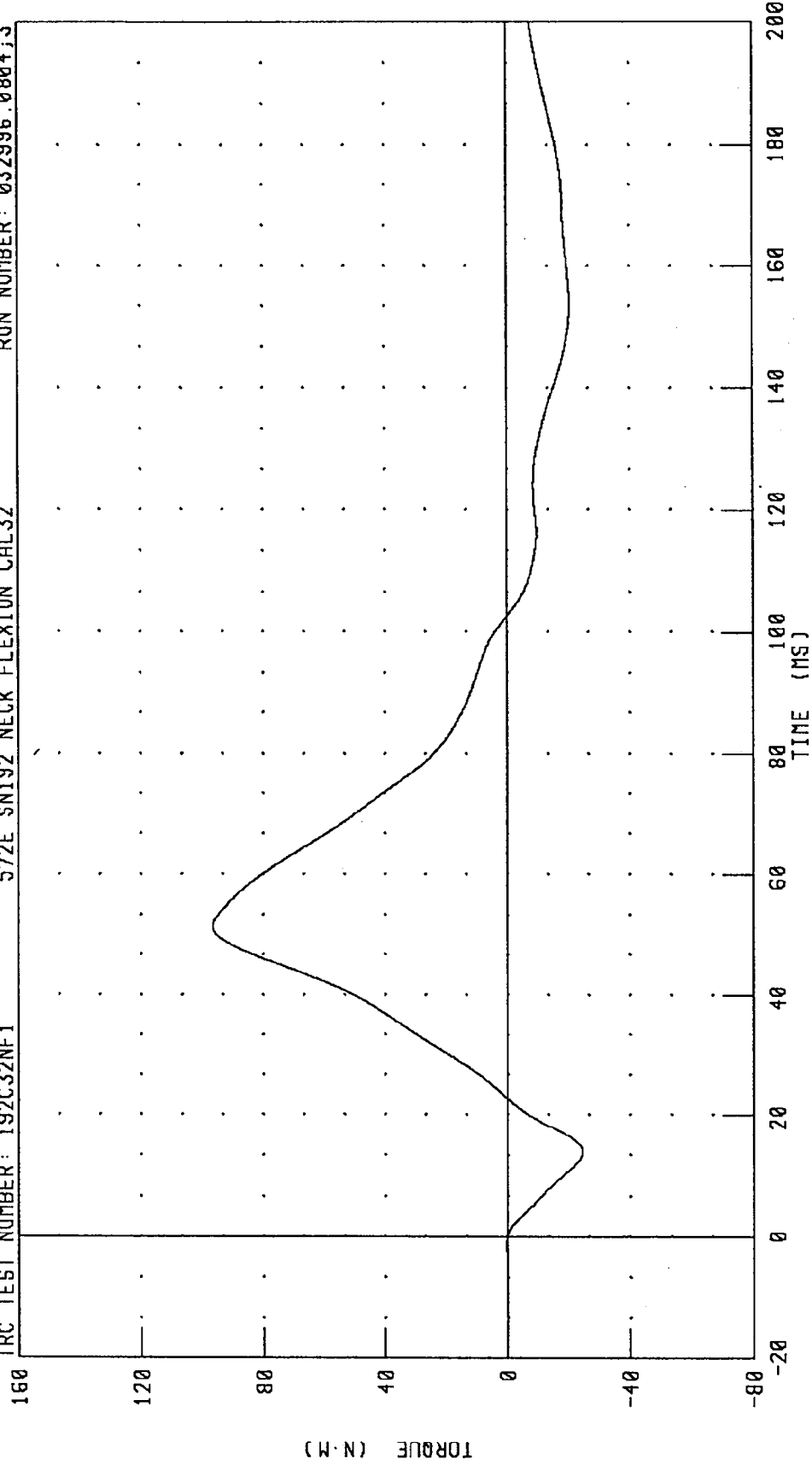
CHANNEL: NEKYM FILTER: CH. CLASS 60

PEAK DATA: 82.86 N·M @ 51.28 MS, -35.06 N·M @ 14.24 MS

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

TRC TEST NUMBER: 192C32NF1 RUN NUMBER: 032996.0804;3

572E SN192 NECK FLEXION CAL32



PEAK DATA: 96.56 N·M @ 51.36 MS, -24.47 N·M @ 13.92 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

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

HYBRID III

27-FEB-96

TRC INC. TEST NO: 192C32NE1 572E SN192 NECK EXT. CAL32

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.42 G
	20 MS	14.00 - 19.00 G	16.50 G
	30 MS	11.00 - 16.00 G	11.14 G
MAX PENDULUM G		22 G MAX	17.69 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	11.06 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	45.20 MS
D PLANE	MAX	81 - 106 DEG.	94.15 DEG.
ROTATION	TIME	72 - 82 MS	76.80 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-62.27 NM
	TIME	65 - 79 MS	68.24 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	157.44 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.72 MS

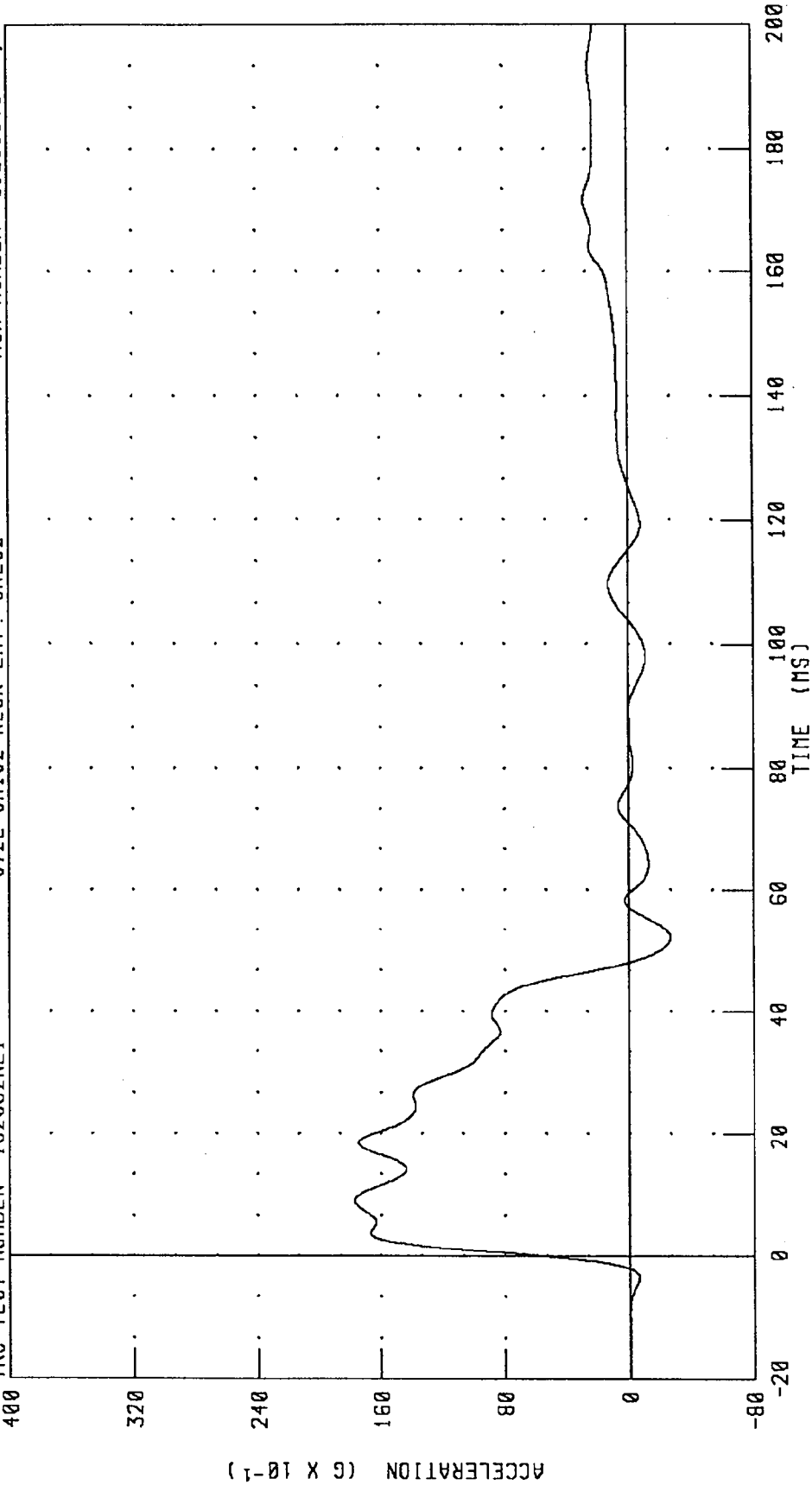
TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middel

RUN NUMBER: 022796.1317;2

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 192C32NE1 572E SNI92 NECK EXT. CAL32 RUN NUMBER: 032996.0804;2



PEAK DATA: 17.70 G @ 9.04 MS; -2.64 G @ 52.00 MS

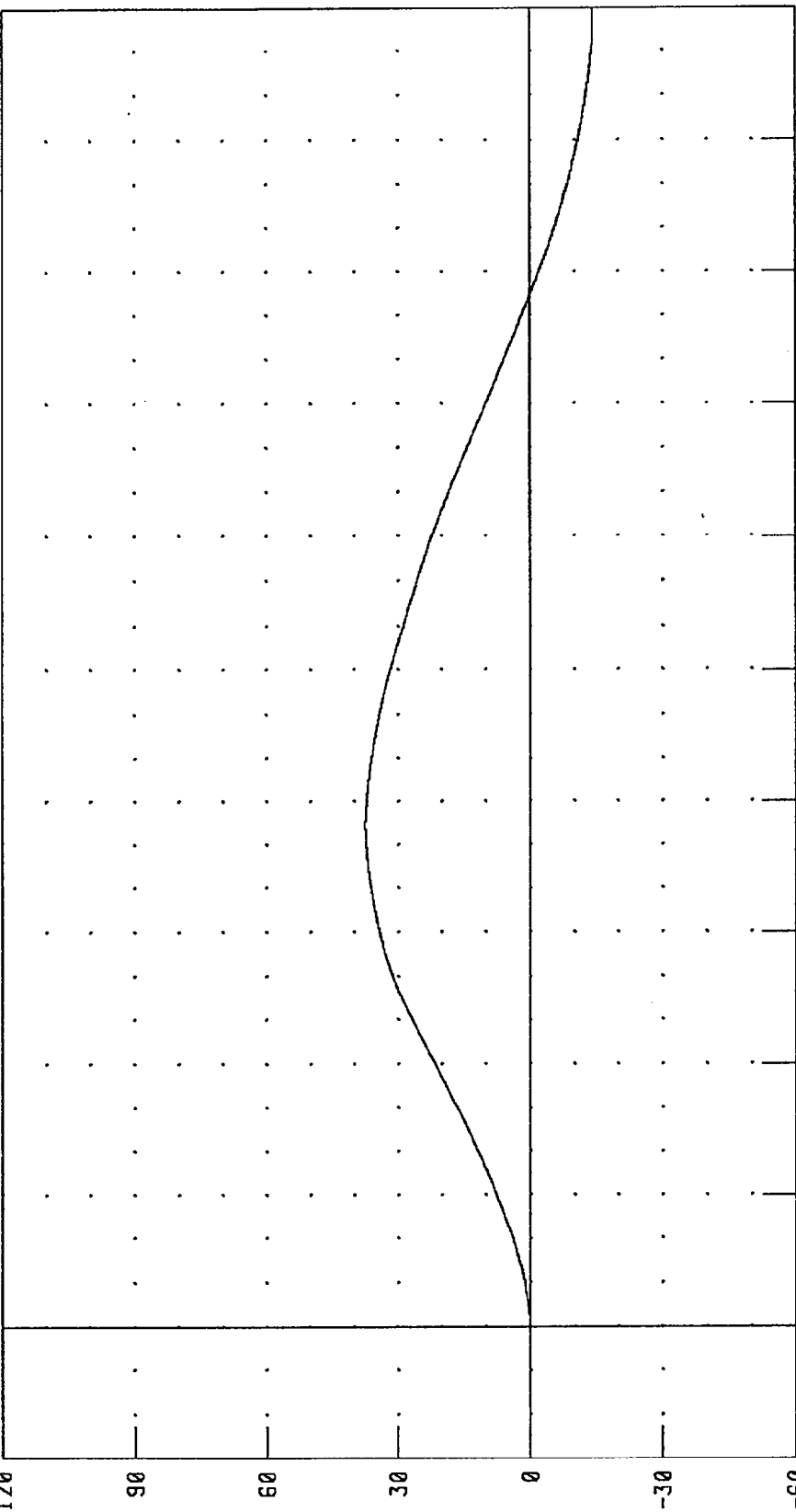
CHANNEL: PENXG FILTER: CH. CLASS 60

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

IRC TEST NUMBER: 192C32NE1 RUN NUMBER: 032996.0804;2

572E SN192 NECK EXT. CAL32

120



ANGLE (°)

TIME (MS)

CHANNEL: BETA

FILTER: CH. CLASS 60

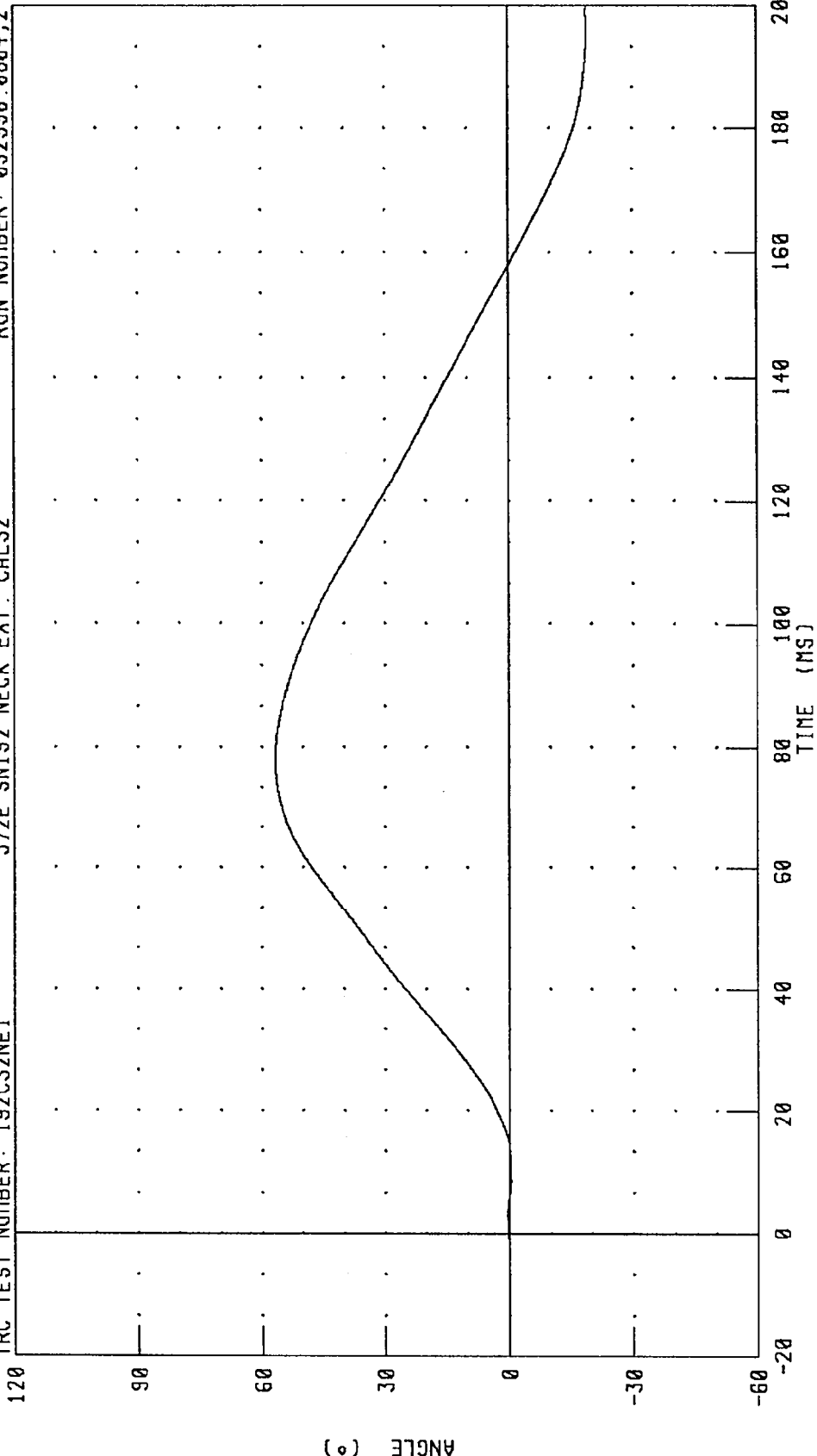
PEAK DATA: 37.53 ° @ 76.24 MS; -14.23 ° @ 200.00 MS

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

TRC TEST NUMBER: 192C32NE1

572E SNI92 NECK EXT. CAL32

RUN NUMBER: 032996.0804;2



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 56.65 ° @ 78.00 MS; -18.90 ° @ 194.48 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

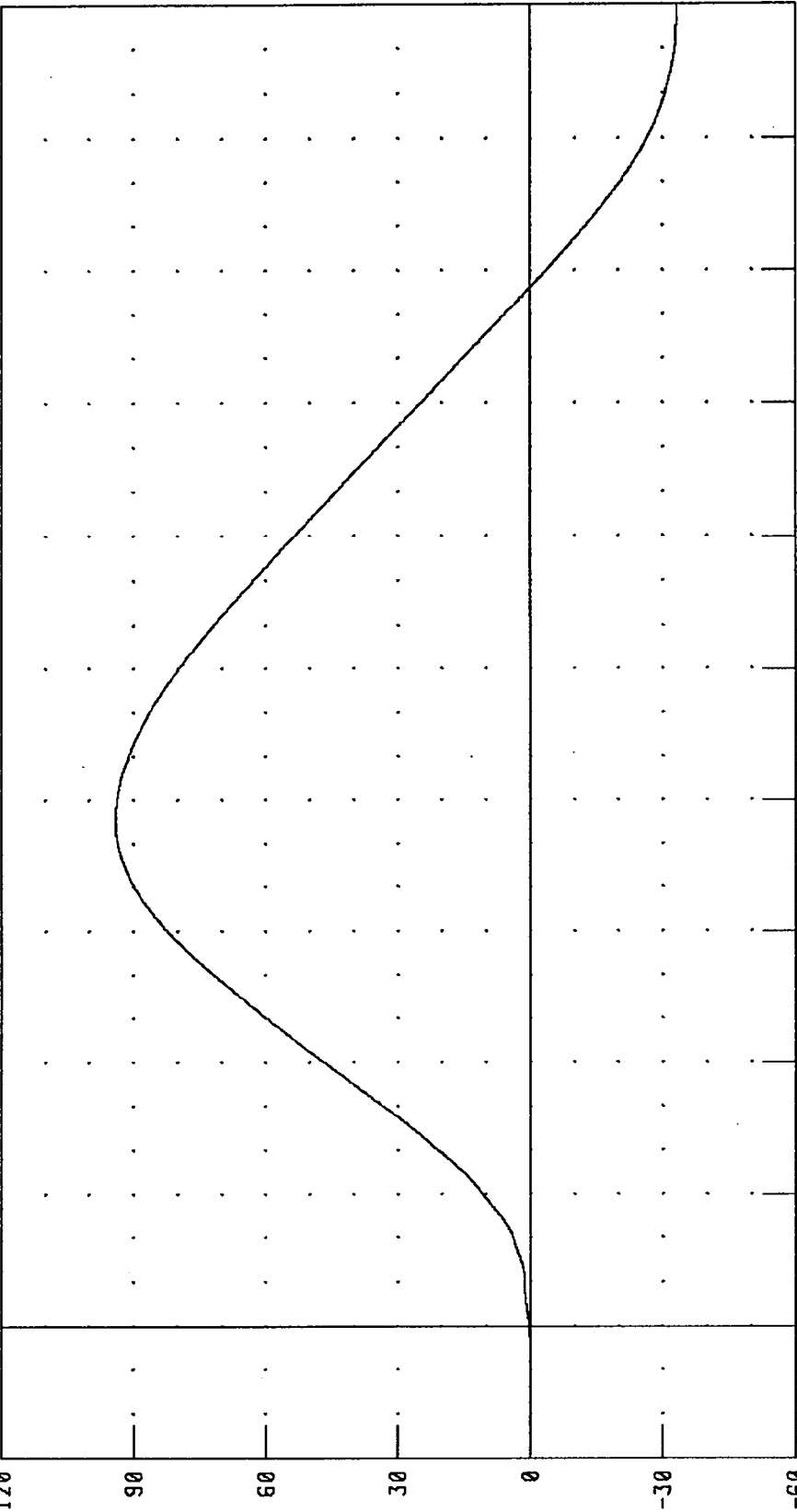
TOTAL ROTATION

TRC TEST NUMBER: 192C32NE1

572E SNI92 NECK EXT. CAL32

RUN NUMBER: 032996.0804,2

120



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 94.15 ° @ 76.80 MS; -33.11 ° @ 200.00 MS

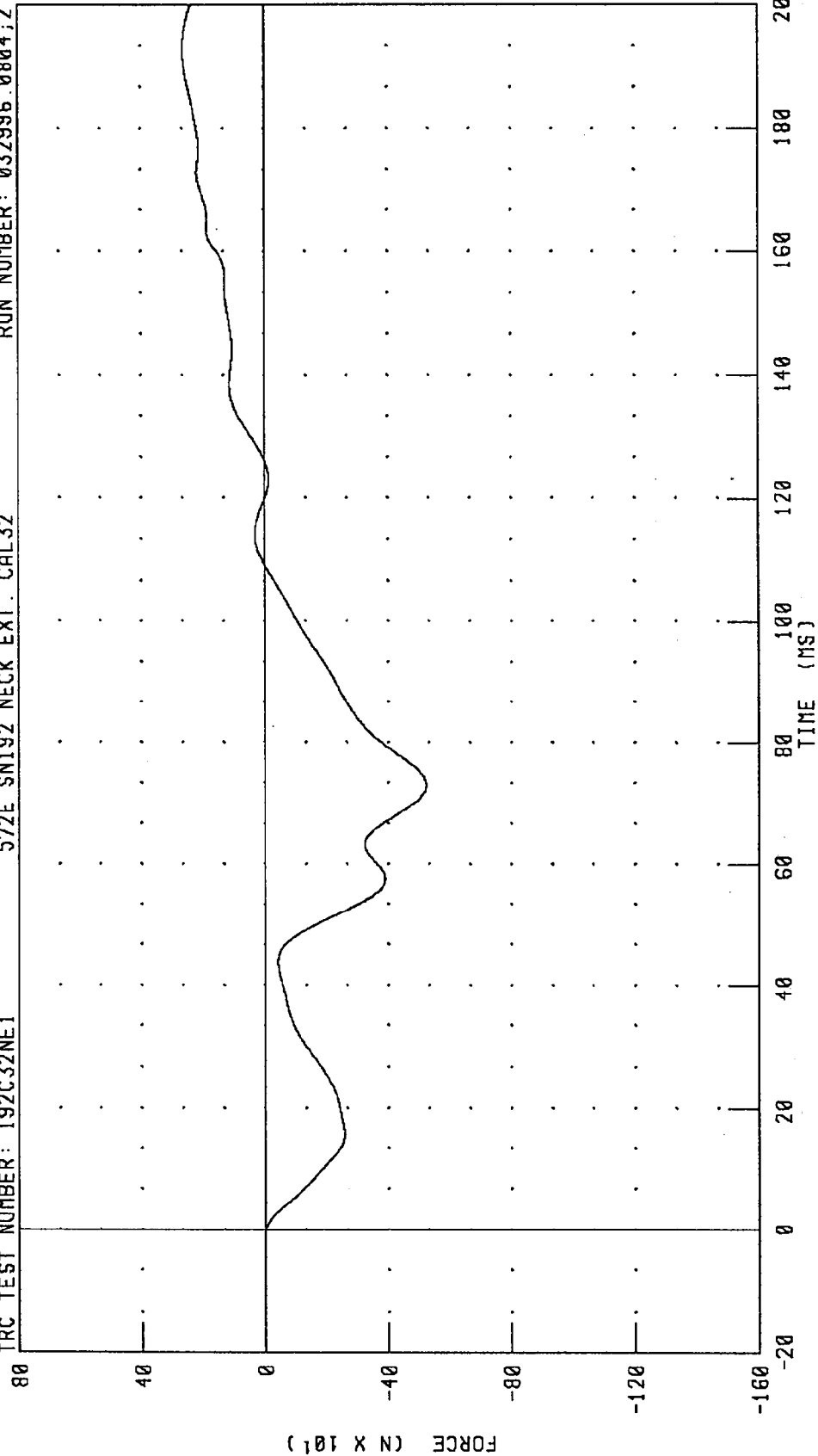
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 192C32NE1

572E SN192 NECK EXT. CAL32

RUN NUMBER: 032996.0804;2



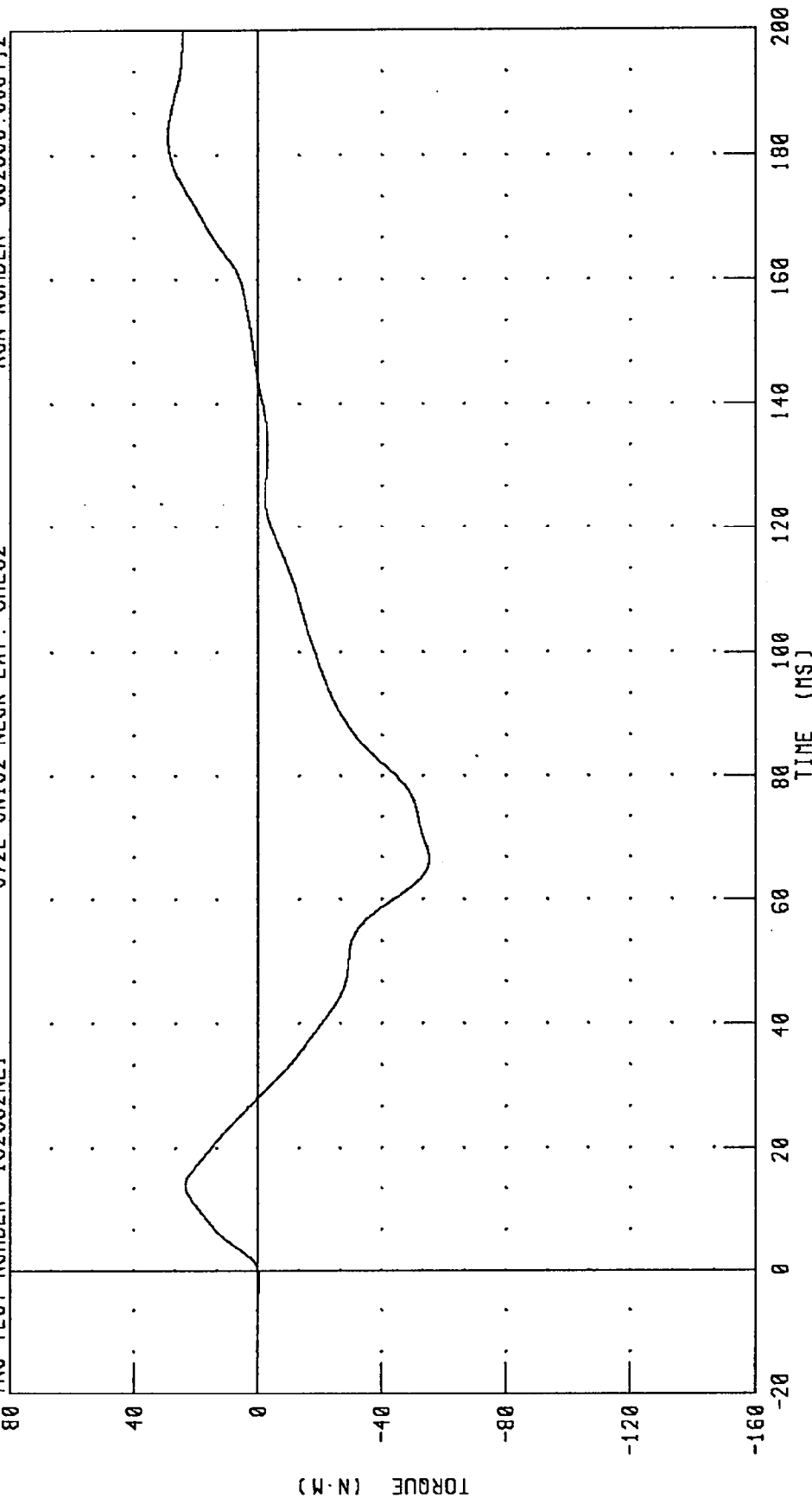
PEAK DATA: 263.78 N @ 192.88 MS; -524.15 N @ 72.96 MS

FILTER: CH. CLASS 60

CHANNEL: NEKXF

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

TRC TEST NUMBER: 192C32NE1 572E SN192 NECK EXT. CAL32 RUN NUMBER: 032996 0804;2

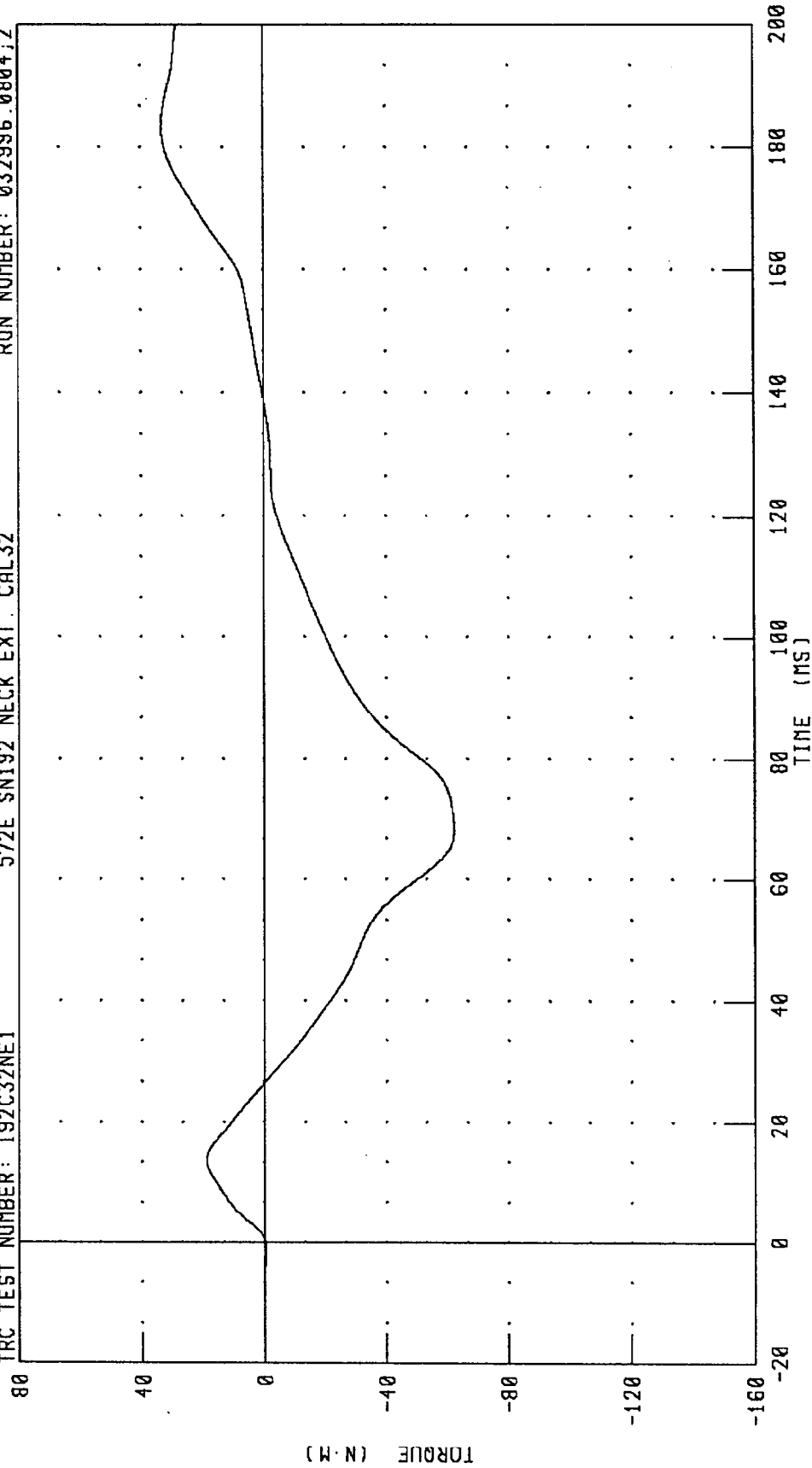


CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 29.07 N·M @ 183.04 MS; -55.19 N·M @ 66.40 MS

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

TRC TEST NUMBER: 192C32NE1 RUN NUMBER: 032996.0804;2

572E SN192 NECK EXT. CAL32



PEAK DATA: 33.20 N·M @ 183.52 MS; -62.27 N·M @ 68.24 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

27-FEB-96

TRC INC.

TEST NO: 192C32TH1

572E SN192 H.S.THORAX CAL32

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.4 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	65.7 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5730. N
INTERNAL HYSTERESIS	69% - 85%	71.8%

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middel

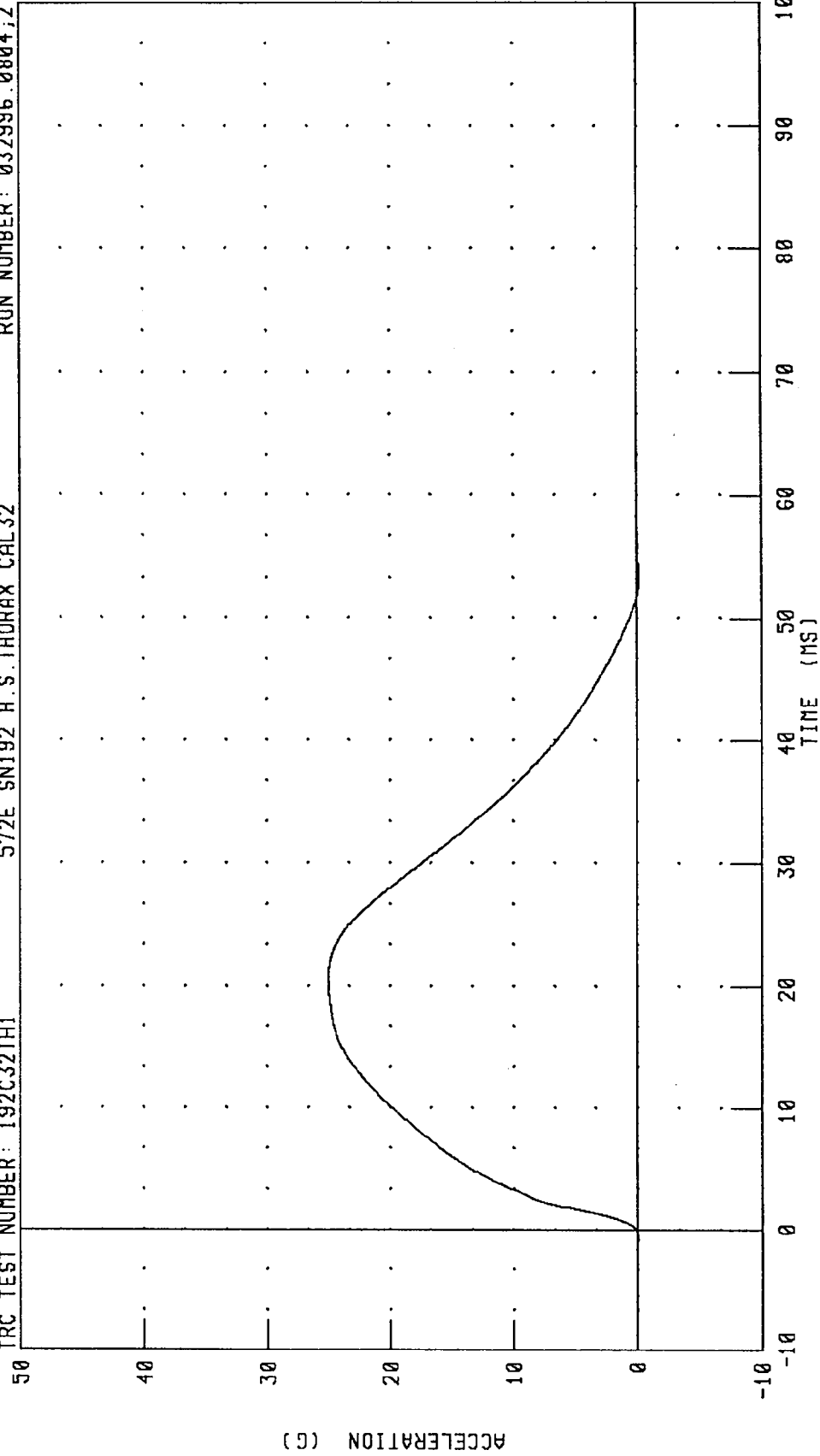
RUN NUMBER: 032896.1406;2

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

IRC TEST NUMBER: 192C32TH1

572E SN192 H.S.THORAX CAL32

RUN NUMBER: 032996.0804;2

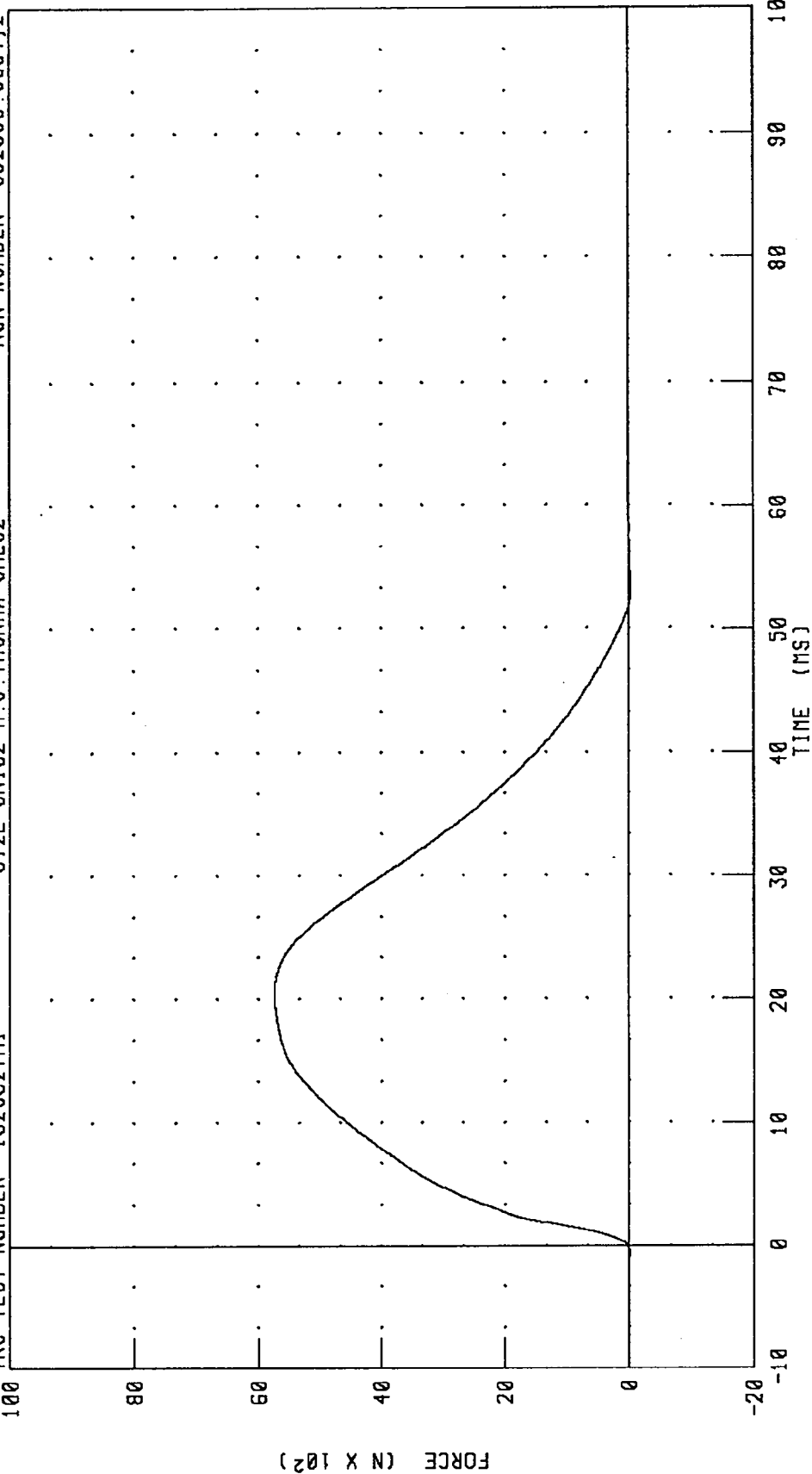


PEAK DATA: 25.01 G @ 20.40 MS; -0.16 G @ 53.28 MS

CHANNEL: PENXG FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION PENDULUM FORCE

TRC TEST NUMBER: 192C32TH1 572E SN192 H.S. THORAX CAL32 RUN NUMBER: 032996 080412



PEAK DATA: 5730.08 N @ 20.40 MS; -36.46 N @ 53.28 MS

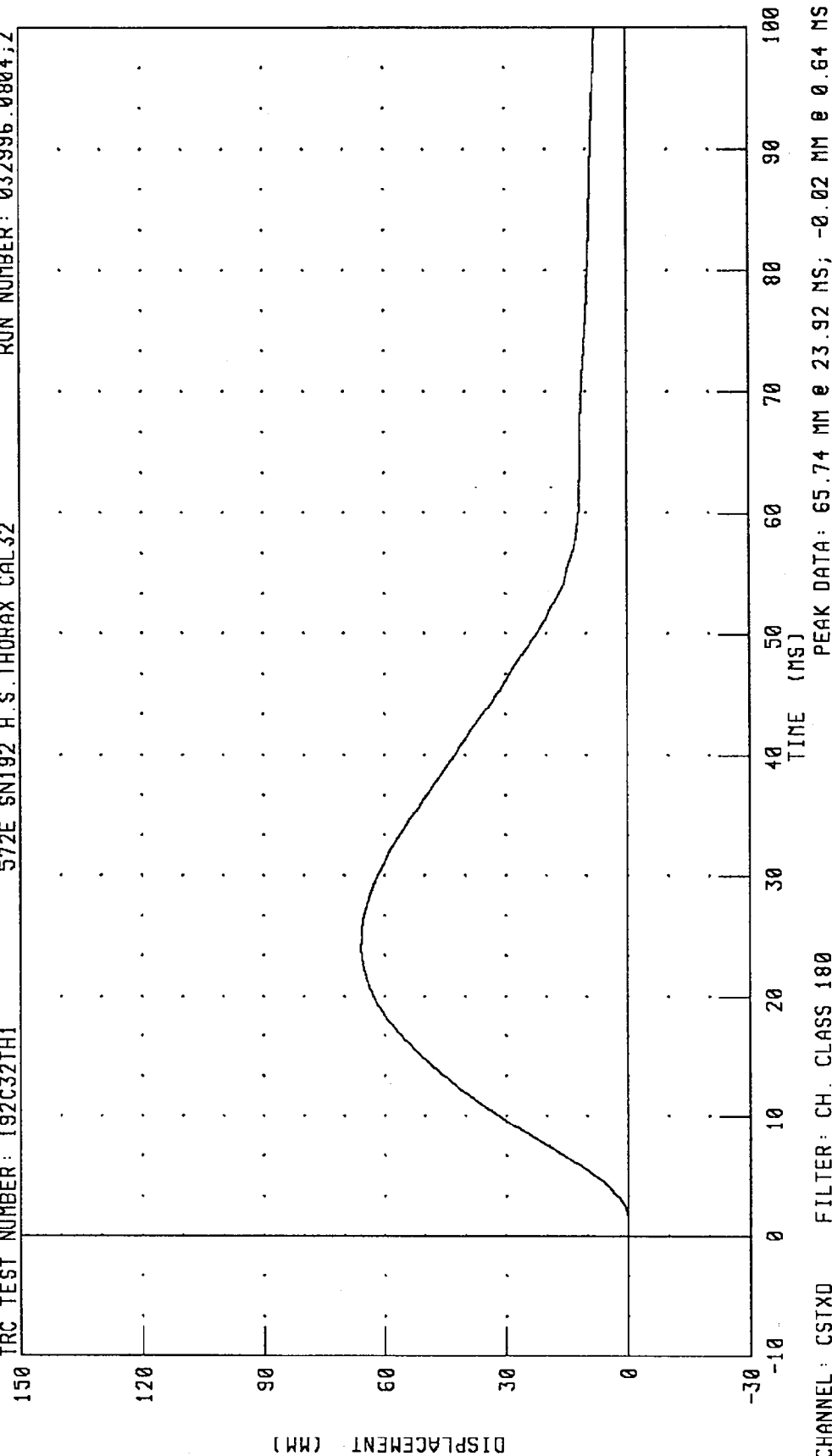
CHANNEL: PENXF FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 192C32TH1

572E SN192 H.S. THORAX CAL32

RUN NUMBER: 032996.0804;2

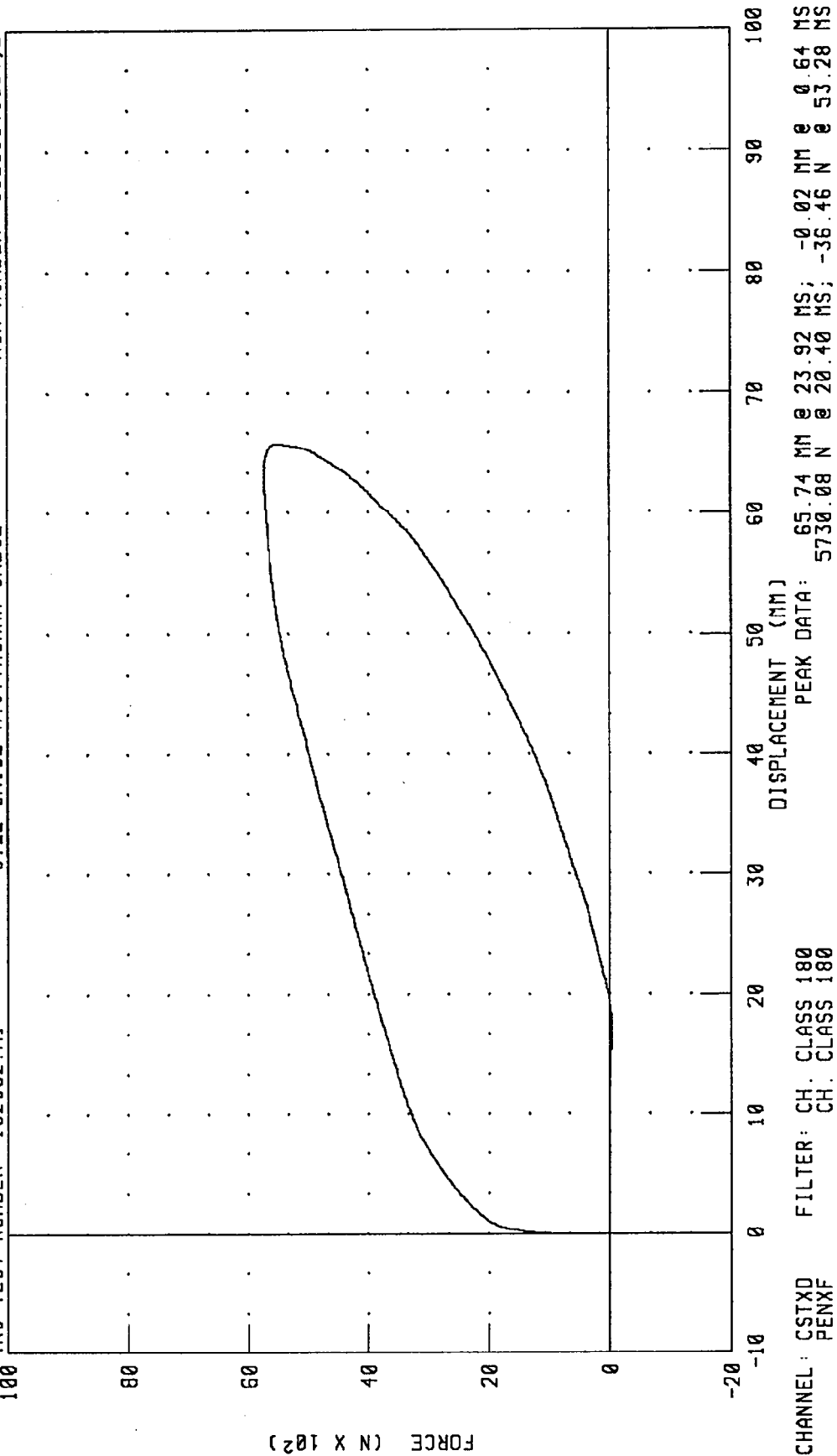


CHANNEL: CSTXD FILTER: CH. CLASS 180

PEAK DATA: 65.74 MM @ 23.92 MS; -0.02 MM @ 0.64 MS

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

TRC TEST NUMBER: 192C32TH1 572E SN192 H.S. THORAX CAL32 RUN NUMBER: 032996.0804;2



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

26-FEB-96

TRC INC.

TEST NO: 192C32RK1

572E SN192 RIGHT KNEE CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	48.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5335.9 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Chris Middelt

RUN NUMBER: 022696.1327;1

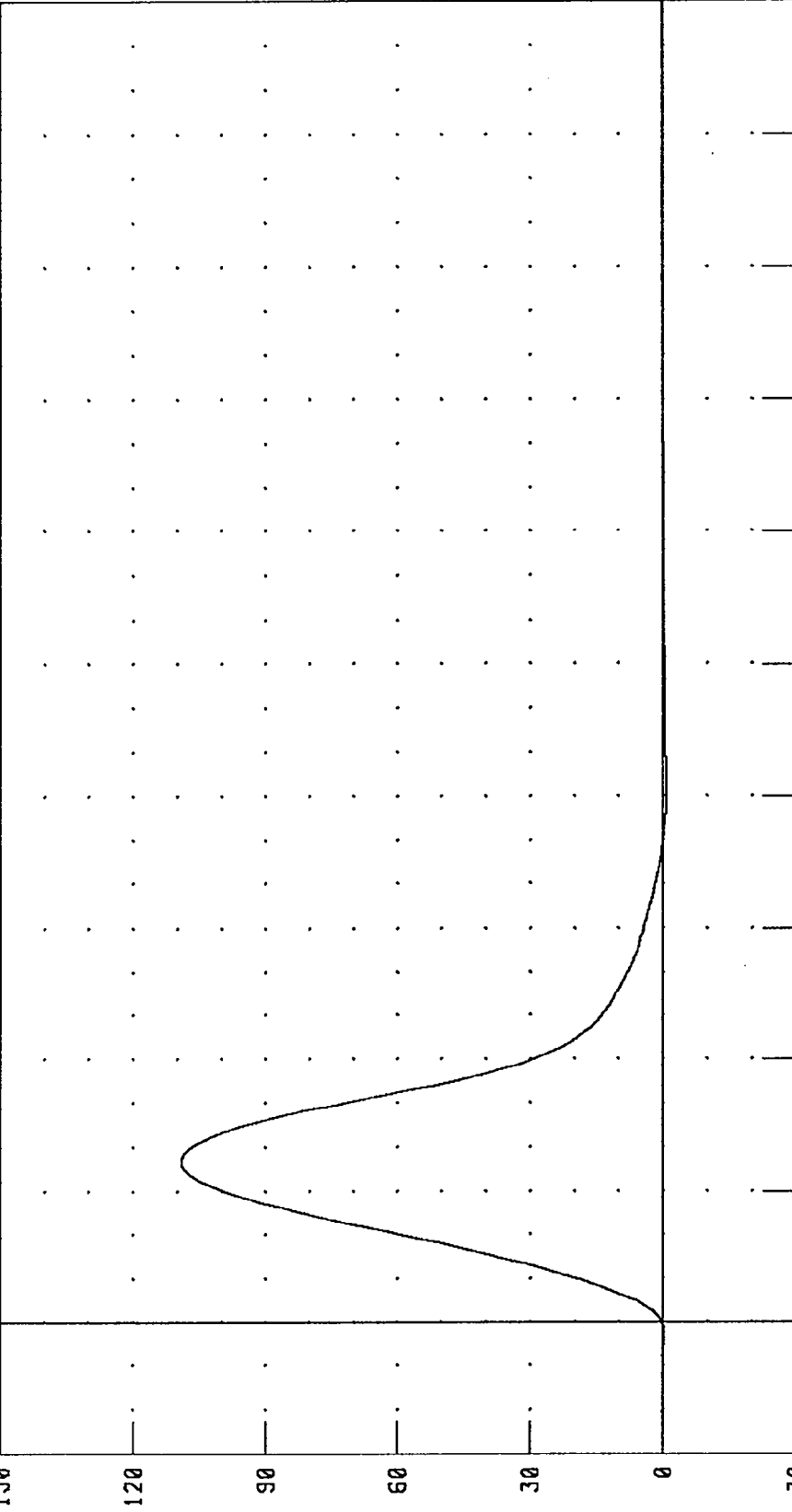
PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENDULUM DECELERATION (5 KG PEND.)

IRC TEST NUMBER: 192C32RK1

572E SN192 RIGHT KNEE CAL 32

RUN NUMBER: 032996.0004;1

150



TIME (MS X 10⁻¹)

PEAK DATA: 109.06 G @ 2.48 MS; -0.73 G @ 8.00 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN192 RIGHT KNEE CAL 32

TRC TEST NUMBER: 192C32RK1

75

75

75

75

75

RUN NUMBER: 032996 0804;1

572E SN192 RIGHT KNEE CAL 32

TRC TEST NUMBER: 192C32RK1

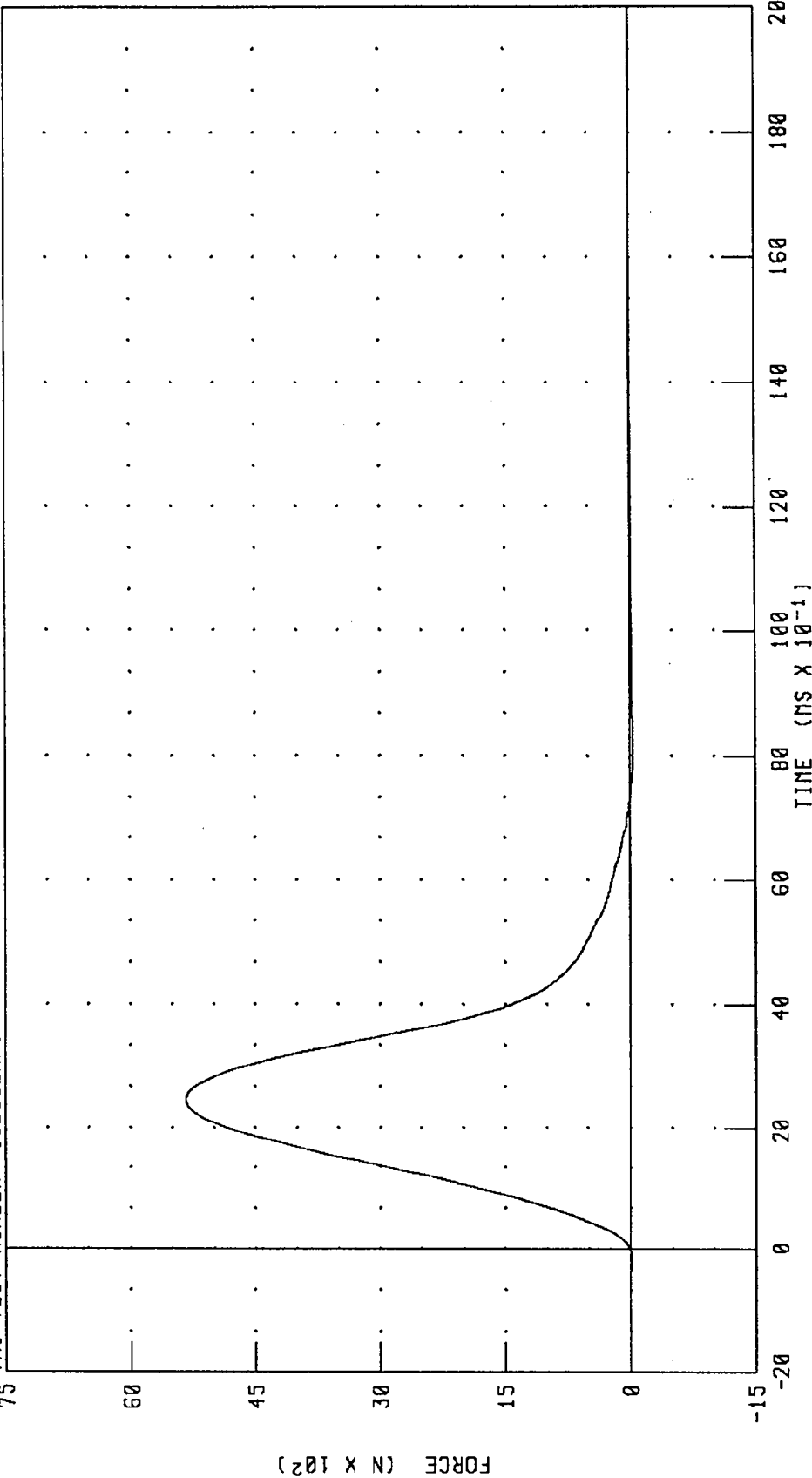
75

75

75

75

75



CHANNEL: PENXF FILTER: CH. CLASS 600

622096

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

26-FEB-96

TRC INC.

TEST NO: 192C32LK1.

572E SN192 LEFT KNEE CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	48.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5274.4 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middel

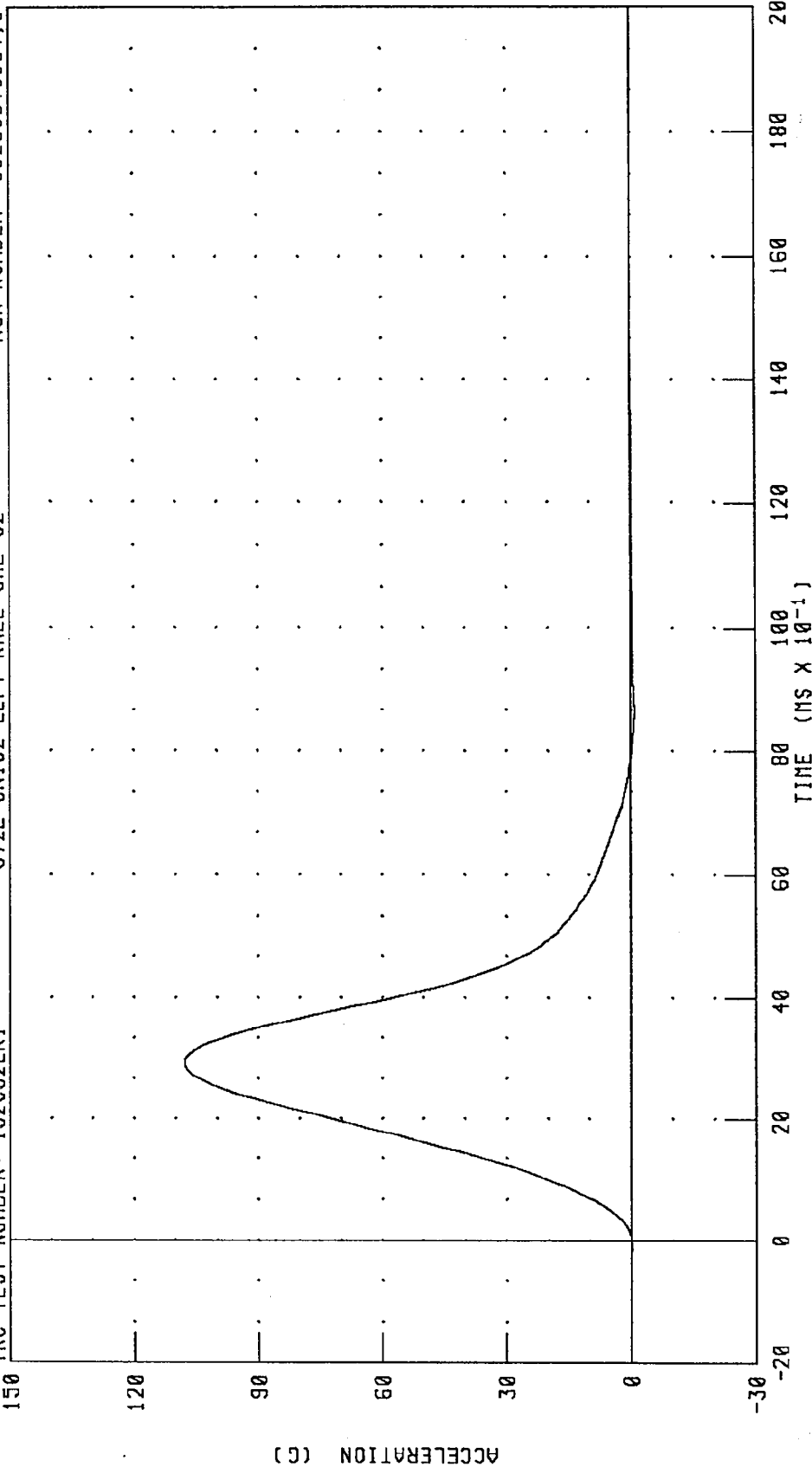
RUN NUMBER: 022696.1337;3

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

TRC TEST NUMBER: 192C32LK1

572E SN192 LEFT KNEE CAL 32

RUN NUMBER: 032996.0804;3



PEAK DATA: 107.80 G @ 2.88 MS; -0.84 G @ 8.64 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

PART 572-E HYBRID III LEFT KNEE CALIBRATION

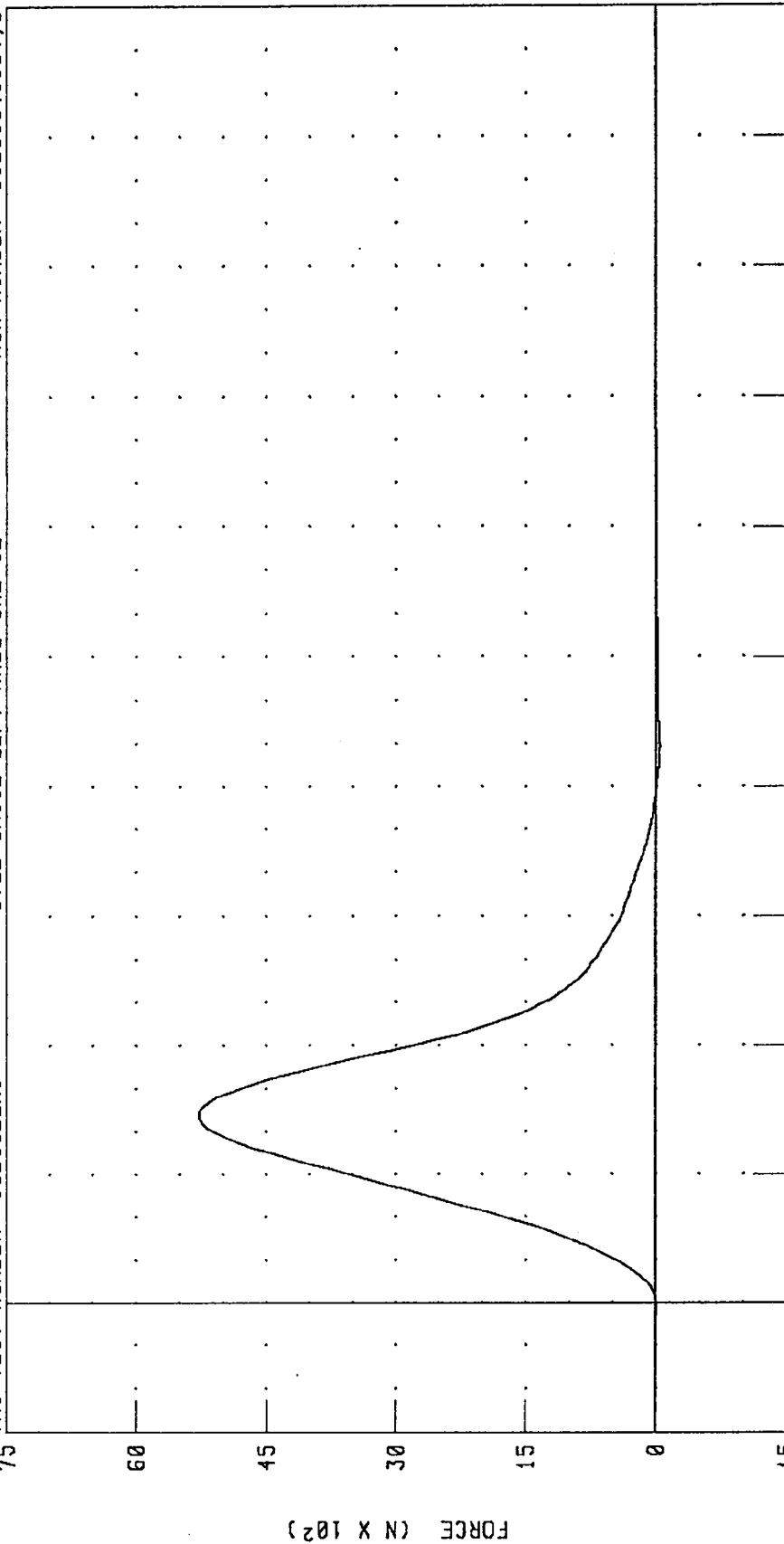
PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 192C32LK1

572E SN192 LEFT KNEE CAL 32

RUN NUMBER: 032996.0804;3

75



CHANNEL: PENXF FILTER: CH. CLASS 600

TIME (MS X 10⁻¹)

PEAK DATA: 5274.43 N @ 2.88 MS; -41.15 N @ 8.64 MS

Pre-test Certification Data

Passenger Dummy S/N: 142

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS

142 HUMANOID

26-FEB-96

TRC INC. TEST NO: 142C32ED1 572E SN142 EXT.DIMENSION CAL32

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	848. MM
CHEST DEPTH (O)		213 - 229 MM	221. MM
H-POINT HEIGHT (C)		84 - 89 MM	84. 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	470. MM
POPLITEAL HEIGHT (L)		429 - 455 MM	445. MM
KNEE PIVOT HEIGHT (M)		485 - 500 MM	488. MM
FOOT LENGTH (P)		252 - 267 MM	257. MM
FOOT BREADTH (W)		91 - 107 MM	97. MM
SHOULDER PIVOT FROM BACKLINE (E)		84 - 94 MM	91. MM
SHOULDER BREADTH (V)		422 - 437 MM	429. MM
SHOULDER PIVOT HEIGHT (B)		506 - 521 MM	508. MM
ELBOW REST HEIGHT (J)		191 - 211 MM	203. MM
SHOULDER-ELBOW LENGTH (I)		330 - 345 MM	345. MM
BACK OF ELBOW TO WRIST PIVOT (G)		290 - 305 MM	292. MM

DUMMY MEETS SPECIFICATIONS
TECHNICIAN Chas. M. Miedt

RUN NUMBER: 022996.0836

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

27-FEB-96

TRC INC.

TEST NO: 142C32HD1

572E SN142 HEAD DROP CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	249.22 G
PEAK LATERAL ACCELERATION	15 G MAX	-9.97 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chris Middleton

RUN NUMBER: 022796.0822;1

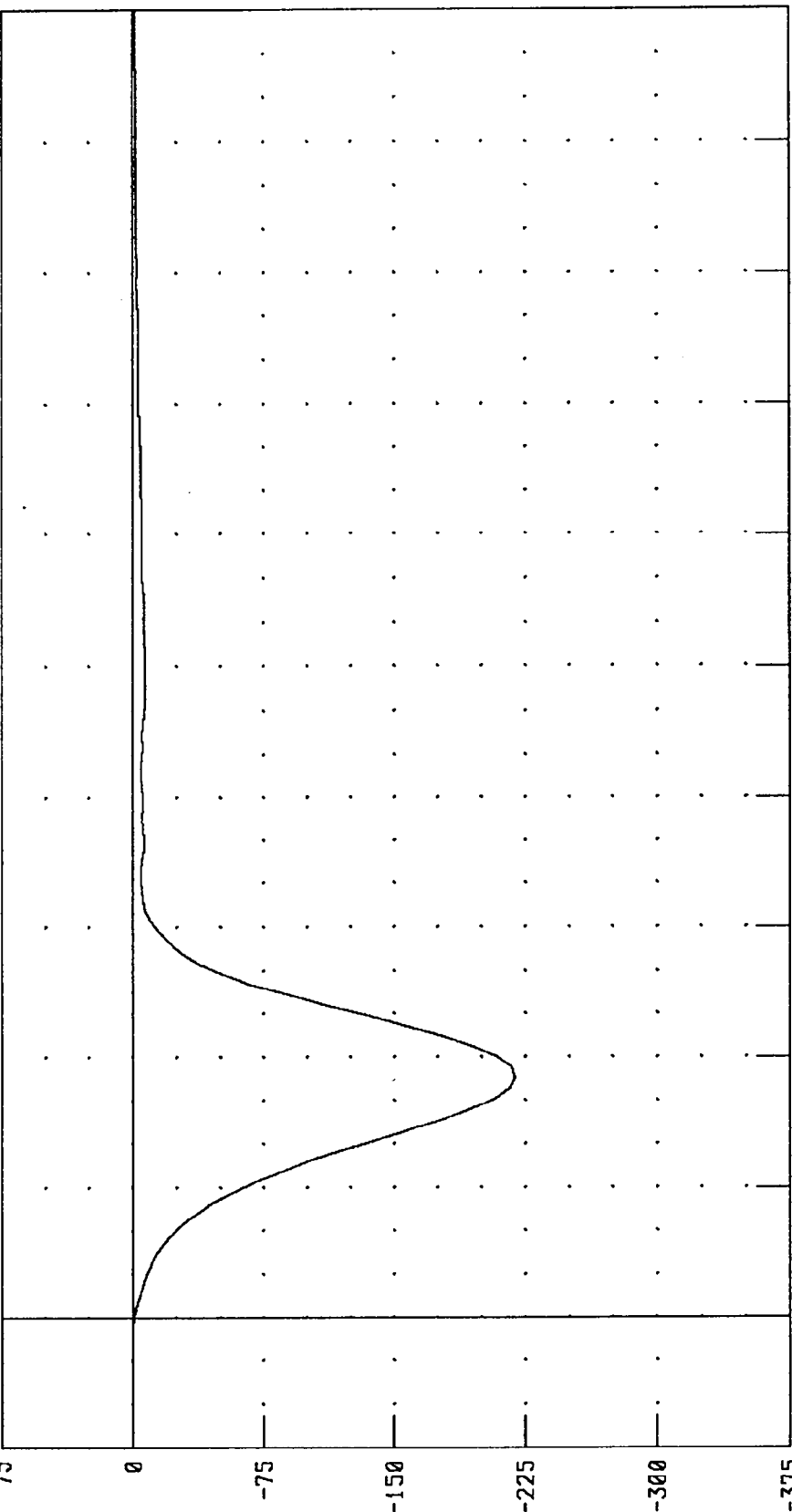
PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 142C32HD1

572E SN142 HEAD DROP CAL 32

RUN NUMBER: 032996.0013.1

75



TIME (MS X 10⁻¹)

CHANNEL: HEDXC FILTER: CH. CLASS 1000

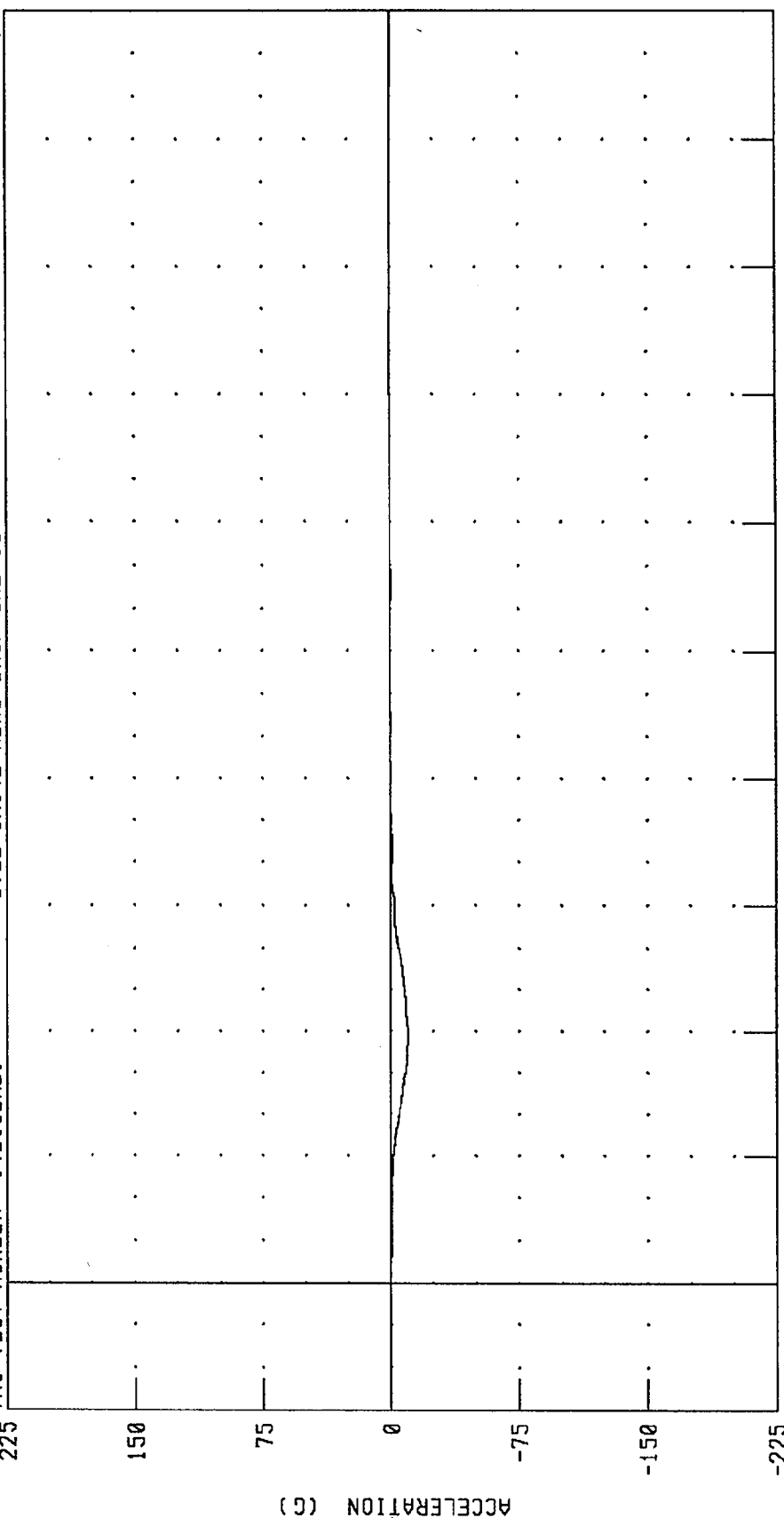
PEAK DATA: 0.08 G @ -0.16 MS; -219.46 G @ 1.84 MS

PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

572E SN142 HEAD DROP CAL 32 RUN NUMBER: 032996.0813;1

TRC TEST NUMBER: 142C32HD1

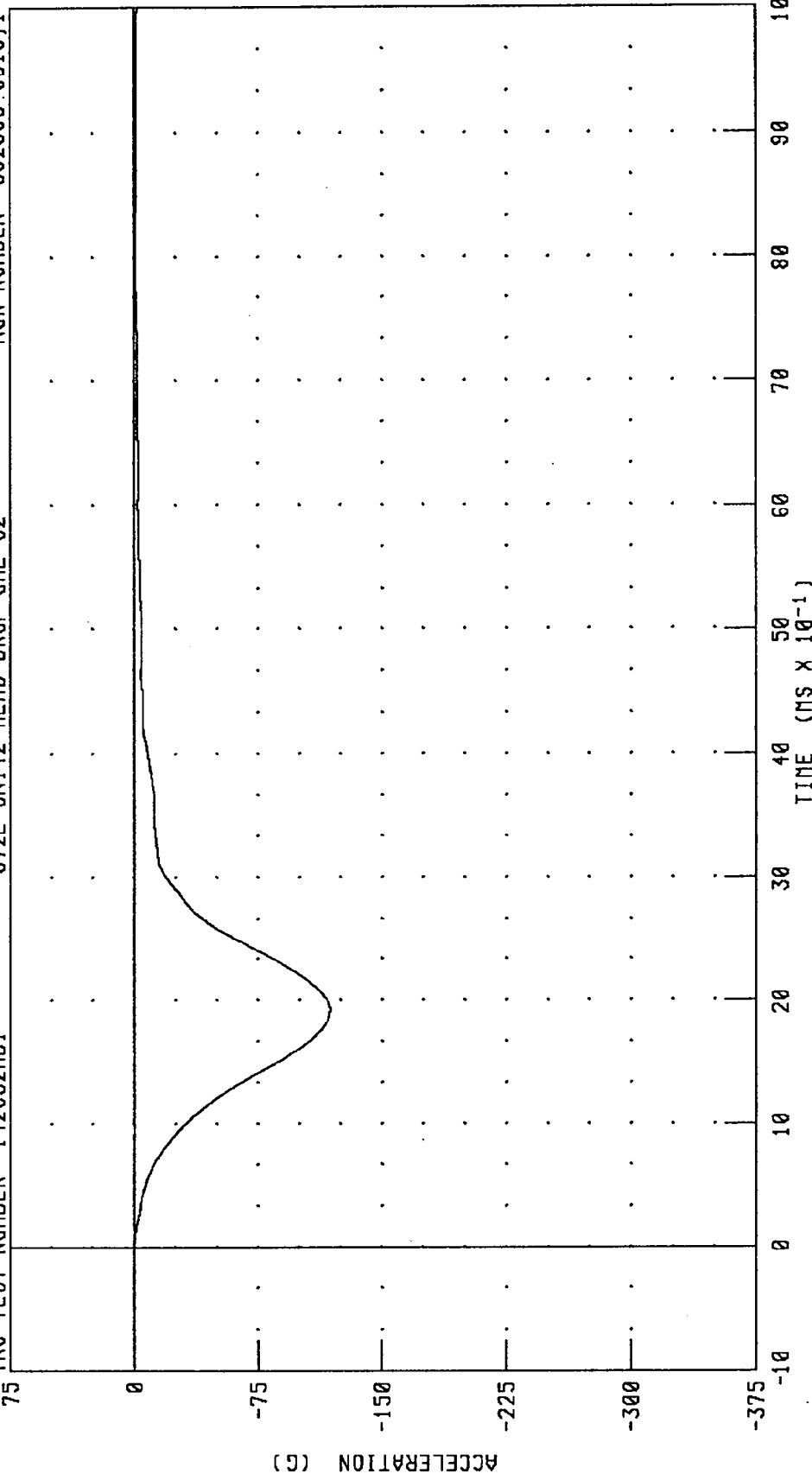


PEAK DATA: 0.49 G @ 7.44 MS; -9.98 G @ 1.92 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 142C32HD1 572E SN142 HEAD DROP CAL 32 RUN NUMBER: 032896 0813;1



PEAK DATA: 0.03 G @ -0.08 MS; -118.77 G @ 1.92 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION
 HEAD RESULTANT ACCELERATION
 572E SN142 HEAD DRDP CAL 32

RUN NUMBER: 032996.0813,1

TRC TEST NUMBER: 142C32HD1

375

300

ACCELERATION (G)

225

150

75

0

-75

-10

0

10

20

30

40

50

60

70

80

90

100

TIME (NS X 10⁻¹)

PEAK DATA: 249.22 G @ 1.84 MS; 0.04 G @ -0.56 MS

CHANNEL: HEDRG

FILTER: CH. CLASS 1000

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

27-FEB-96

TRC INC. TEST NO: 142C32NF1 572E SN142 NECK FLEXION CAL32

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.98 G
	20 MS	17.60 - 22.60 G	20.25 G
	30 MS	12.50 - 18.50 G	17.11 G
MAX PENDULUM G		29 G MAX	23.80 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	17.07 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.92 MS
D PLANE	MAX	64 - 78 DEG.	75.81 DEG.
ROTATION	TIME	57 - 64 MS	60.48 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	92.66 NM
	TIME	47 - 58 MS	52.24 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	118.56 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	105.60 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chris Middel

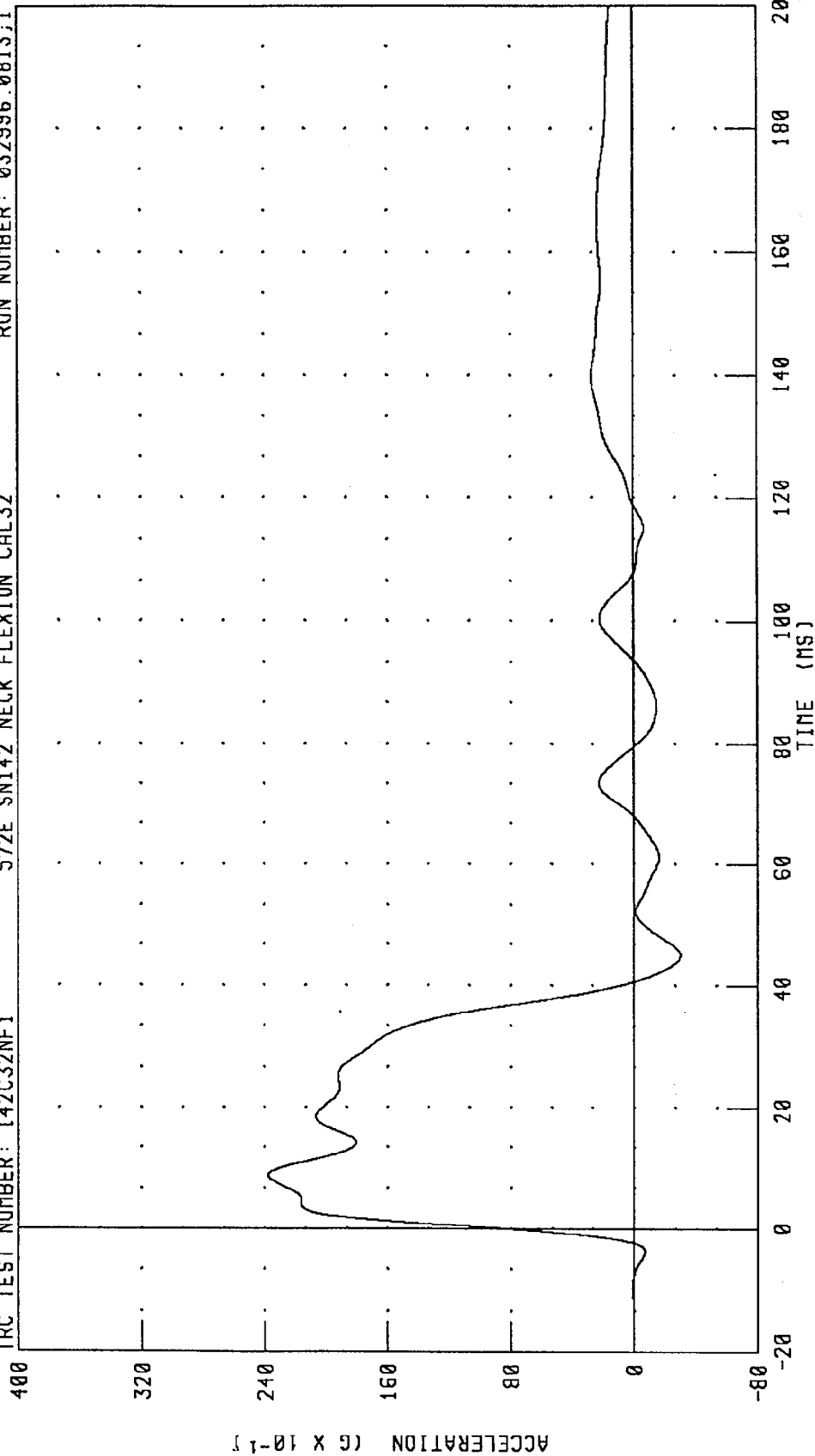
RUN NUMBER: 022796.0910;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 142C32NF1

572E SN142 NECK FLEXION CAL32

RUN NUMBER: 032996.0813;1



PEAK DATA: 23.80 G @ 8.72 MS; -3.01 G @ 44.96 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN142 NECK FLEXION CAL32

IRC TEST NUMBER: 142C32NF1

120

90

60

30

0

RUN NUMBER: 032996.0813;1

TIME (MS)

0 20 40 60 80 100 120 140 160 180 200

ANGLE (°)

-30

-60

32.42

61.20

MS

CH. CLASS 60

BETA

960229

C-45

960229

960229

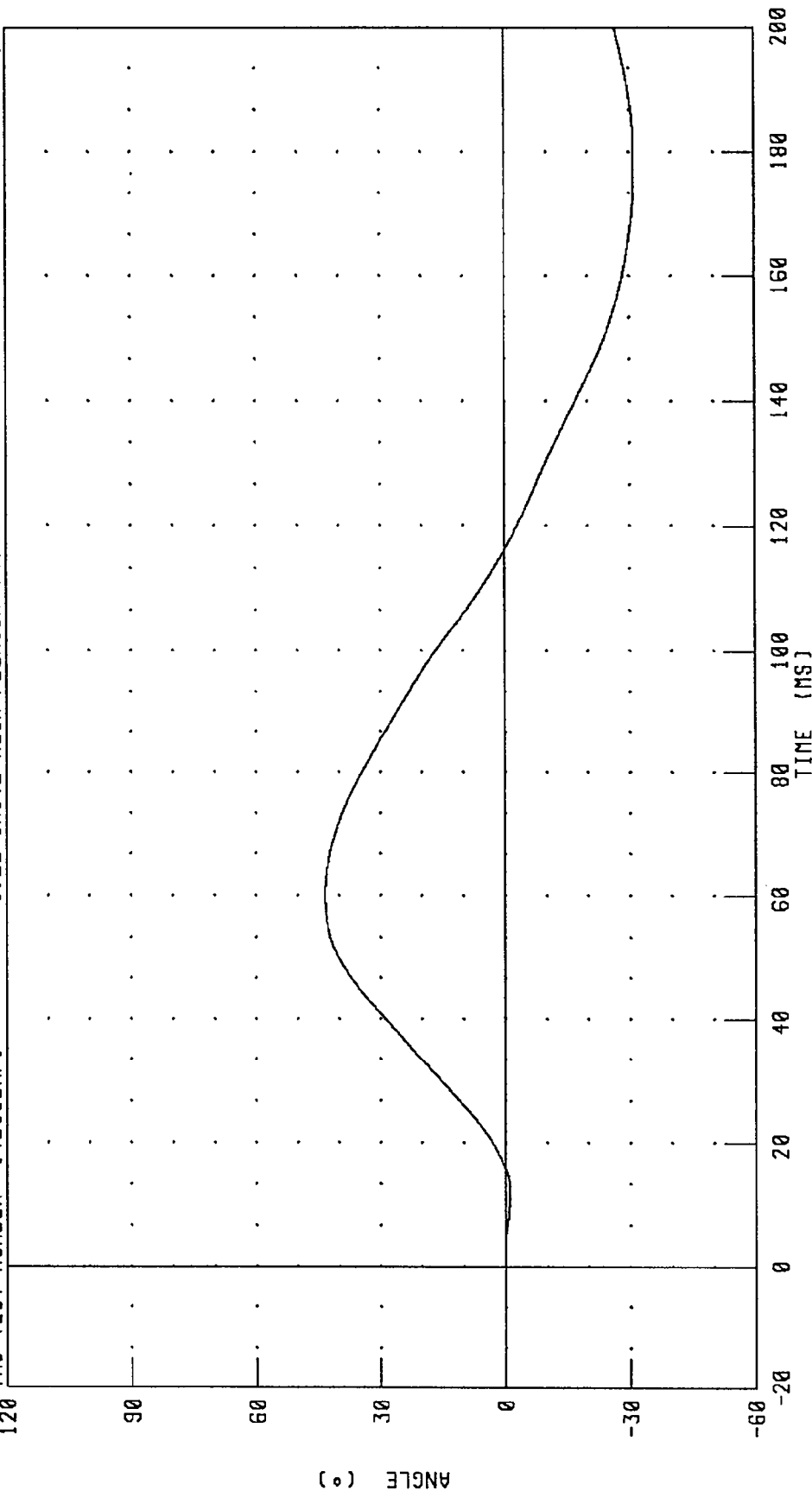
960229

960229

960229

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

TRC TEST NUMBER: 142C32NF1 572E SN142 NECK FLEXION CAL32 RUN NUMBER: 032996 0813;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 43.41 ° @ 60.00 MS; -30.88 ° @ 181.76 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 142C32NF1

572E SN142 NECK FLEXION CAL32

RUN NUMBER: 032996.0813;1

120

90

60

30

0

-30

-60

ANGLE (°)

TIME (MS)

PEAK DATA: 75.81 ° @ 60.48 MS; -50.75 ° @ 173.92 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

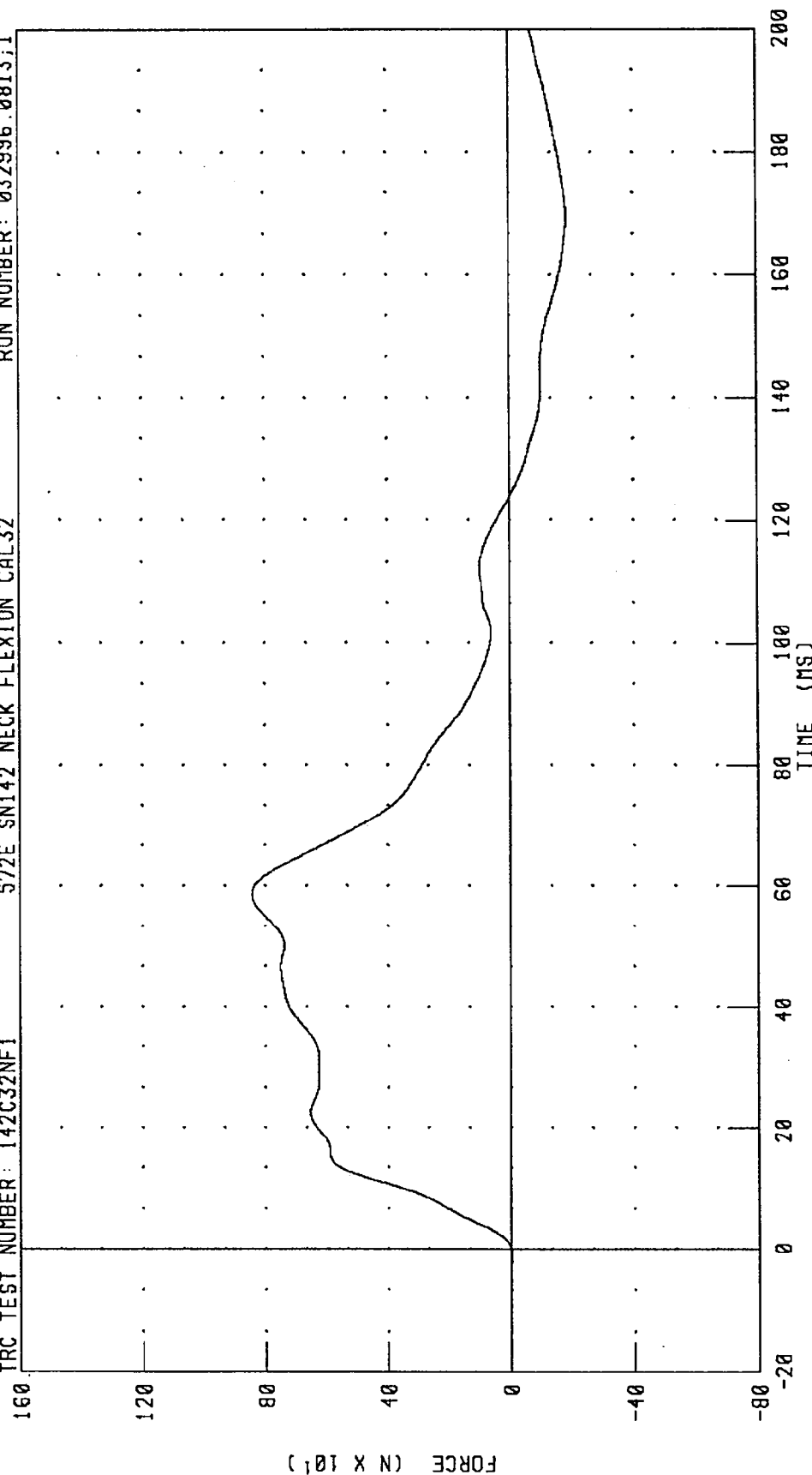
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C32NF1

572E SN142 NECK FLEXION CAL32

RUN NUMBER: 032996.0813.1



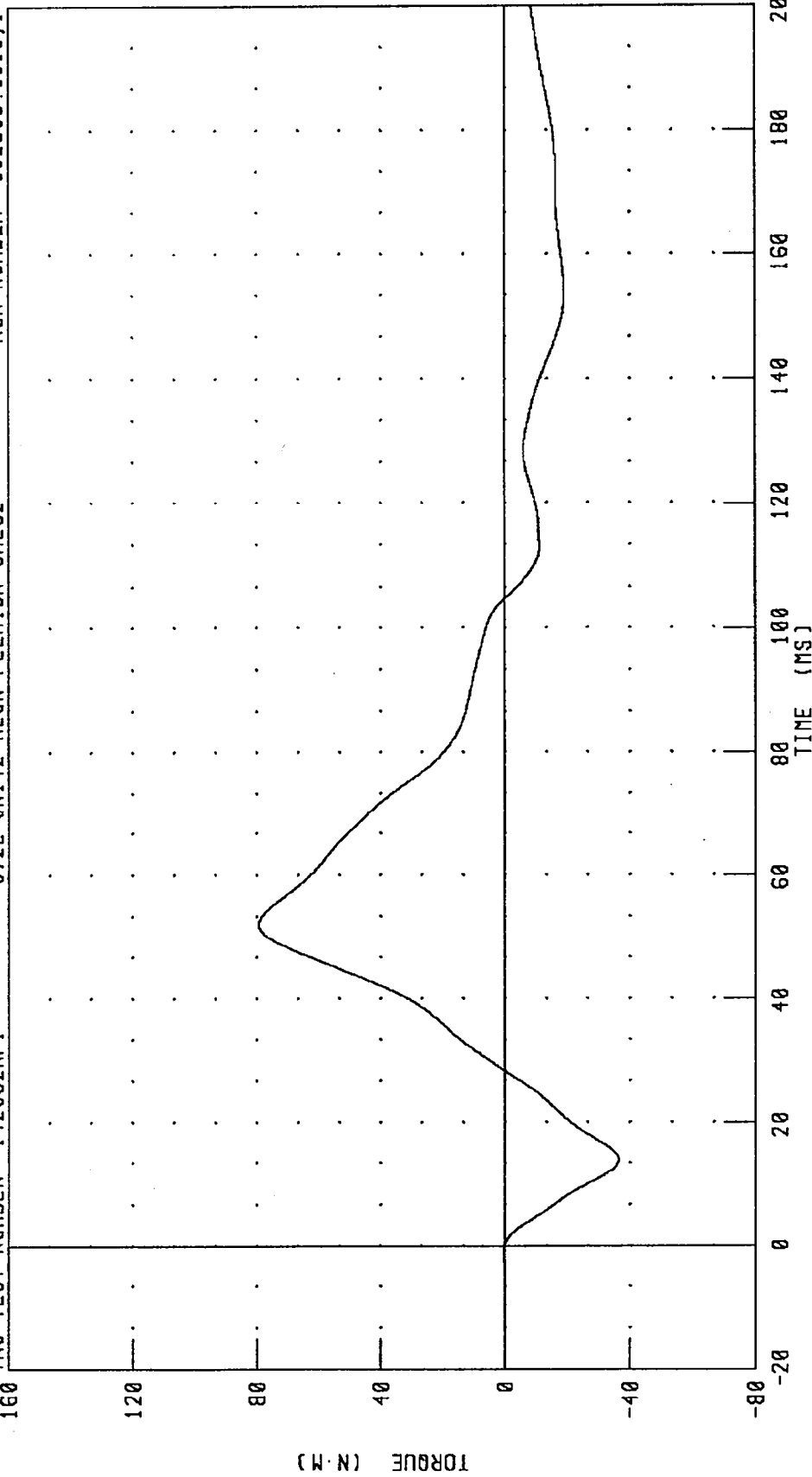
PEAK DATA: 844.98 N @ 58.56 MS; -185.40 N @ 169.36 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

IRC TEST NUMBER: 142C32NF1 572E SN142 NECK FLEXION CAL32 RUN NUMBER: 032996.0813;1

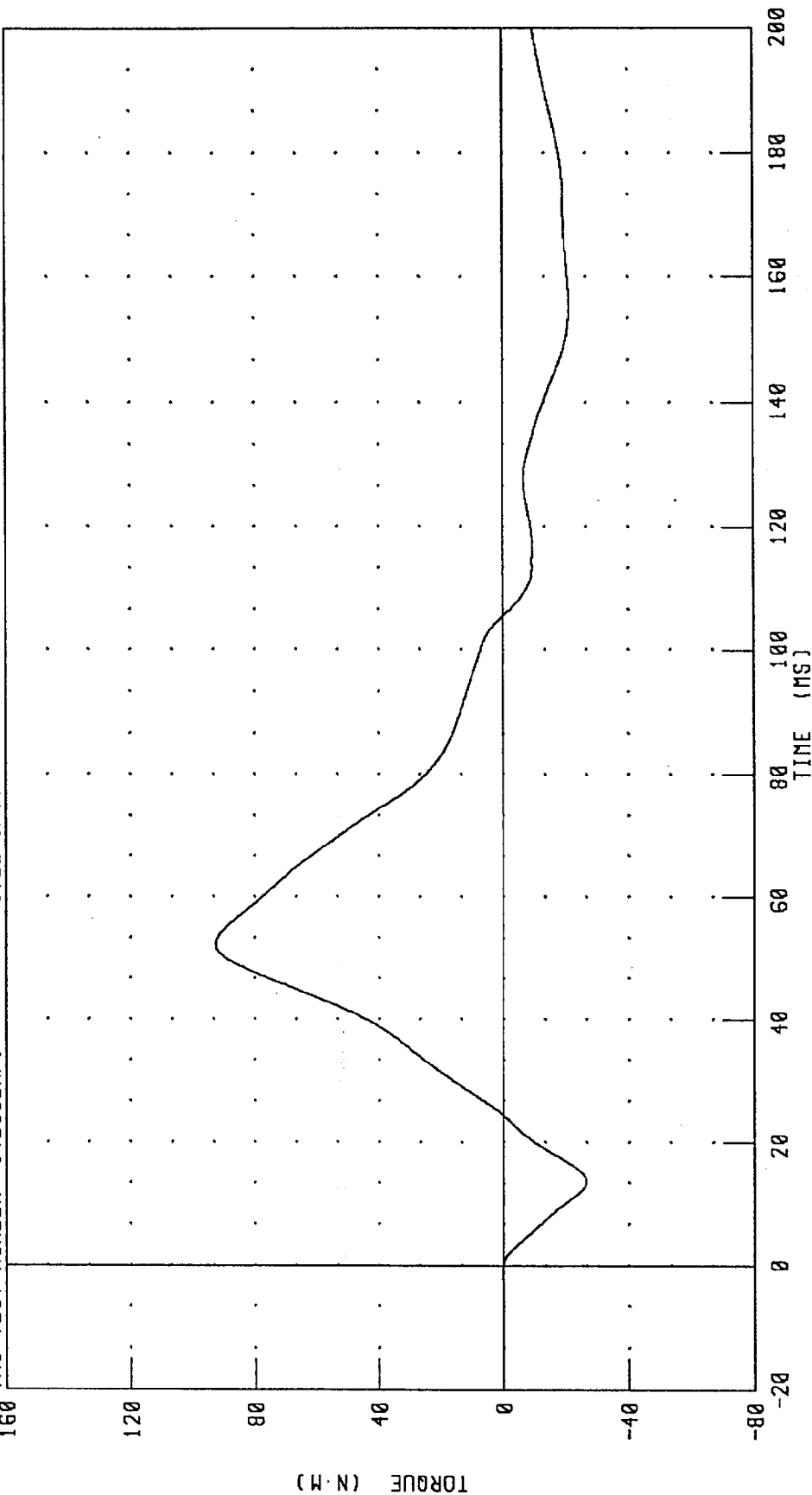


PEAK DATA: 79.30 N·M @ 52.08 MS; -36.45 N·M @ 13.92 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 142C32NF1 572E SN142 NECK FLEXION CAL32 RUN NUMBER: 032996.0813.1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 92.66 N-M @ 52.24 MS; -26.31 N-M @ 136.00 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

27-FEB-96

TRC INC.

TEST NO: 142C32NE1

572E SN142 NECK EXT. CAL32

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.96 G
	20 MS	14.00 - 19.00 G	16.94 G
	30 MS	11.00 - 16.00 G	15.06 G
MAX PENDULUM G		22 G MAX	18.37 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.99 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	39.44 MS
D PLANE	MAX	81 - 106 DEG.	92.63 DEG.
ROTATION	TIME	72 - 82 MS	76.96 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-77.58 NM
	TIME	65 - 79 MS	68.80 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	148.32 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	133.12 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chris M. Millert

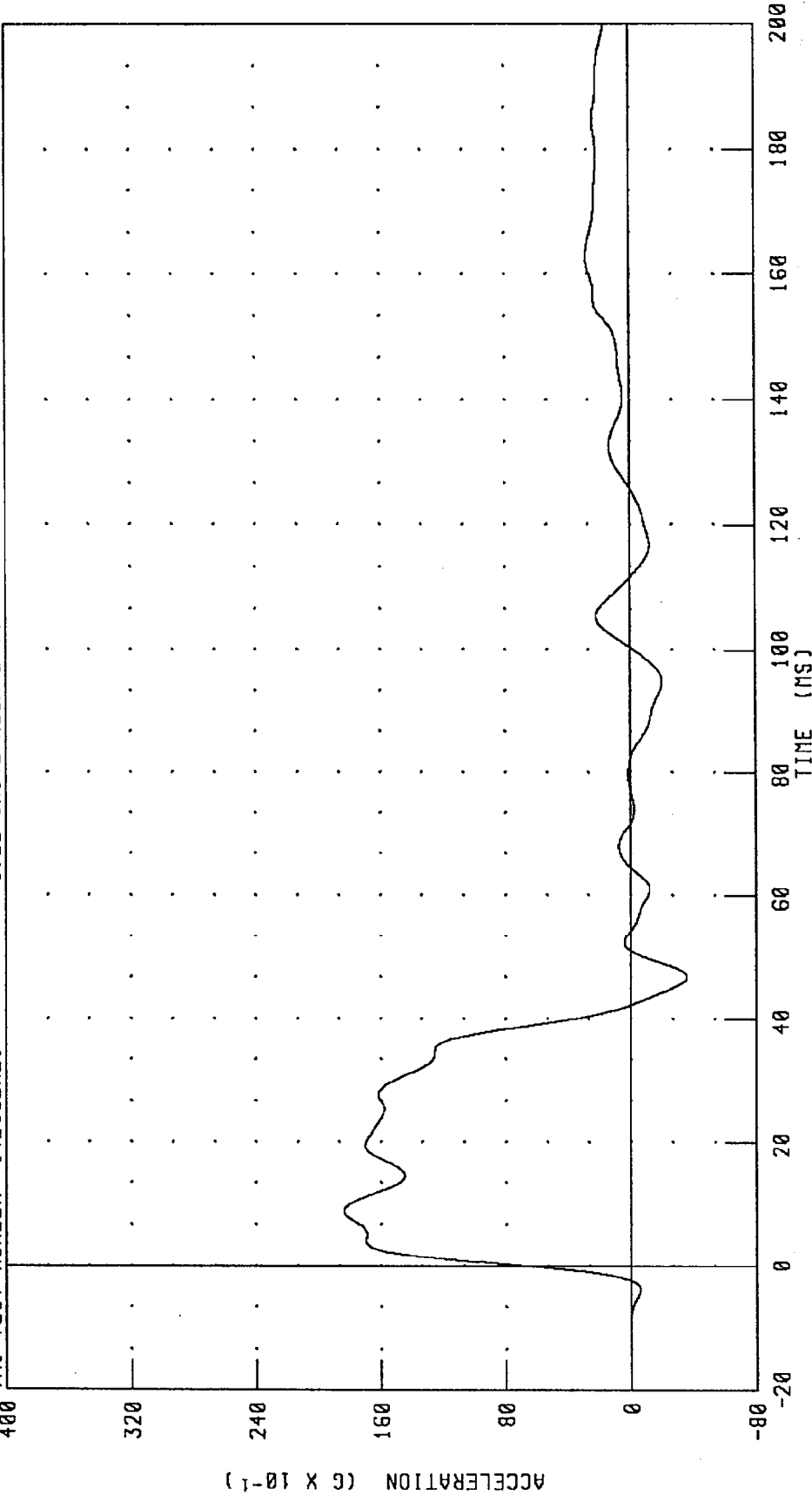
RUN NUMBER: 022796.1018;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 PENDULUM DECELERATION

TRC TEST NUMBER: 142C32NE1

572E SN142 NECK EXT. CAL32

RUN NUMBER: 032996.0813.1



PEAK DATA: 18.38 G @ 8.80 MS; -3.59 G @ 46.72 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 142C32NE1

572E SN142 NECK EXT. CAL32

RUN NUMBER: 032996.0813,1

120

90

60

30

0

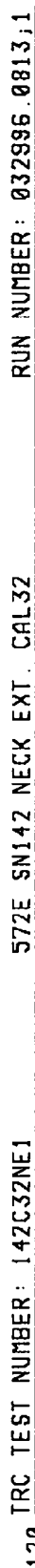
ANGLE (°)

-30

-60

TIME (MS)

0 20 40 60 80 100 120 140 160 180 200



PEAK DATA: 34.96 ° @ 74.48 MS; -14.55 ° @ 191.84 MS

CHANNEL: BETA

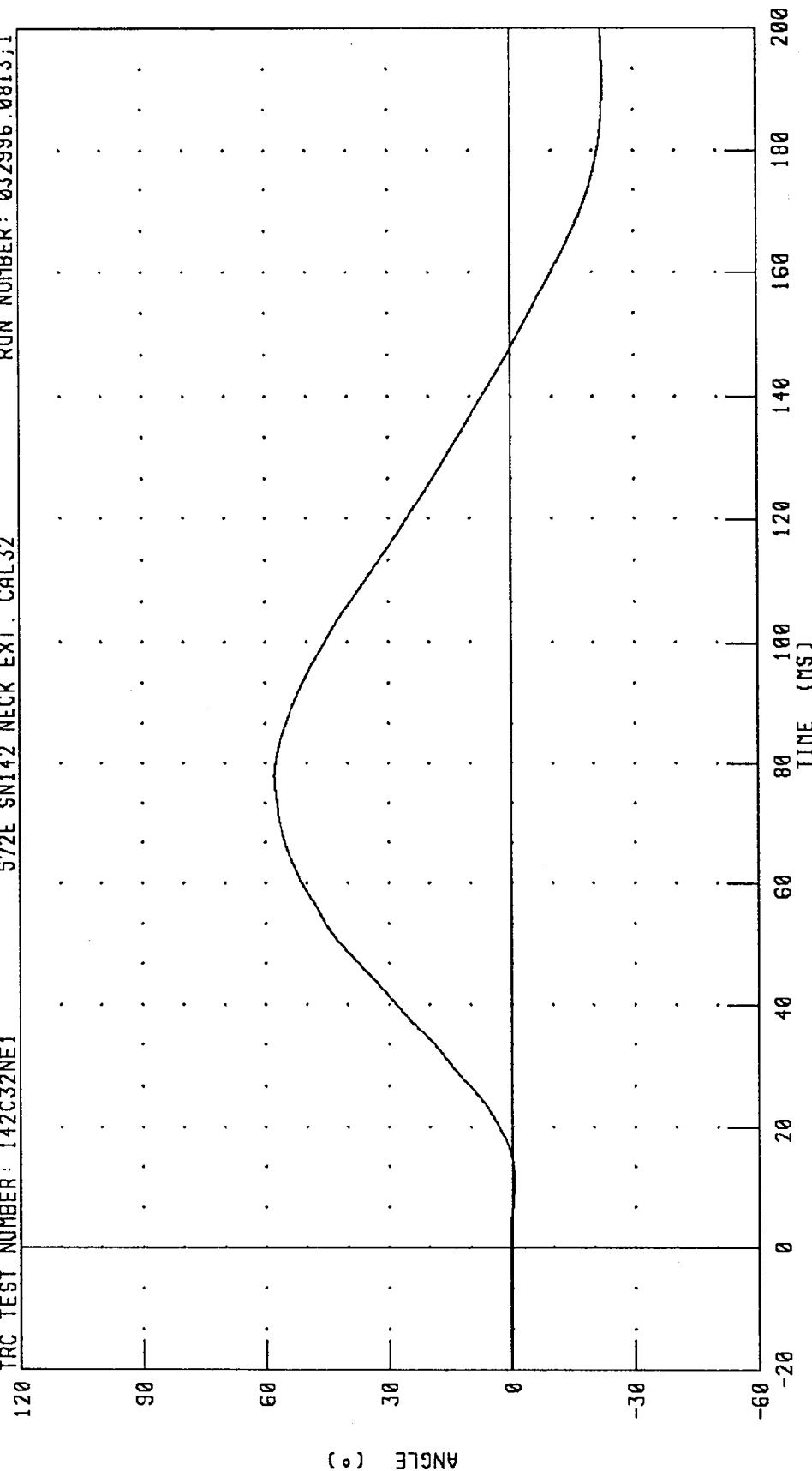
FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 142C32NE1

572E SN142 NECK EXT. CAL32

RUN NUMBER: 032996.0813.1



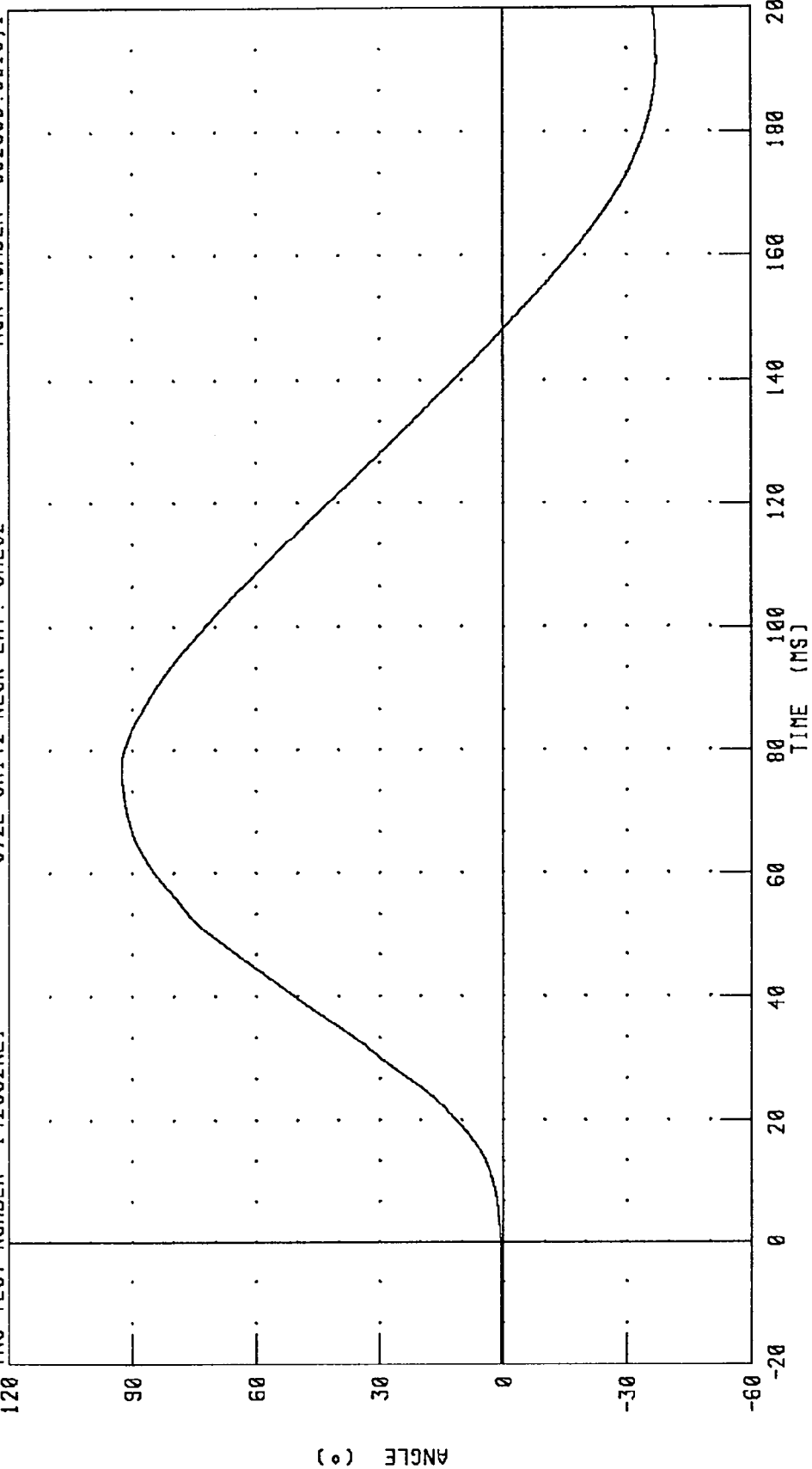
PEAK DATA: 57.83 ° @ 77.84 MS; -22.62 ° @ 191.36 MS

CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

IRC TEST NUMBER: 142C32NE1 572E SN142 NECK EXT. CAL32 RUN NUMBER: 032996.0813;1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 92.63 ° @ 76.96 MS; -37.18 ° @ 191.44 MS

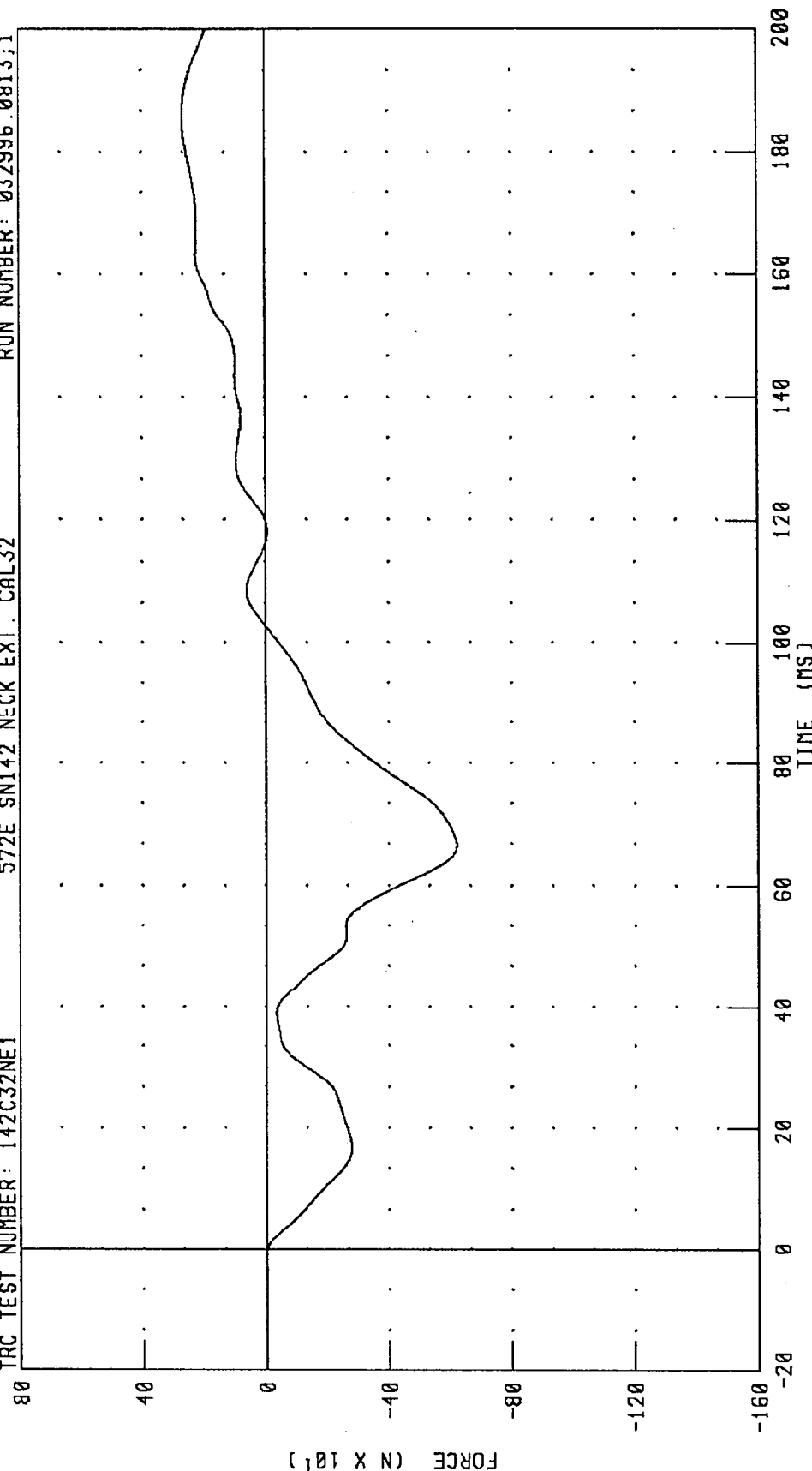
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C32NE1

572E SN142 NECK EXT. CAL32

RUN NUMBER: 032996.0813;1

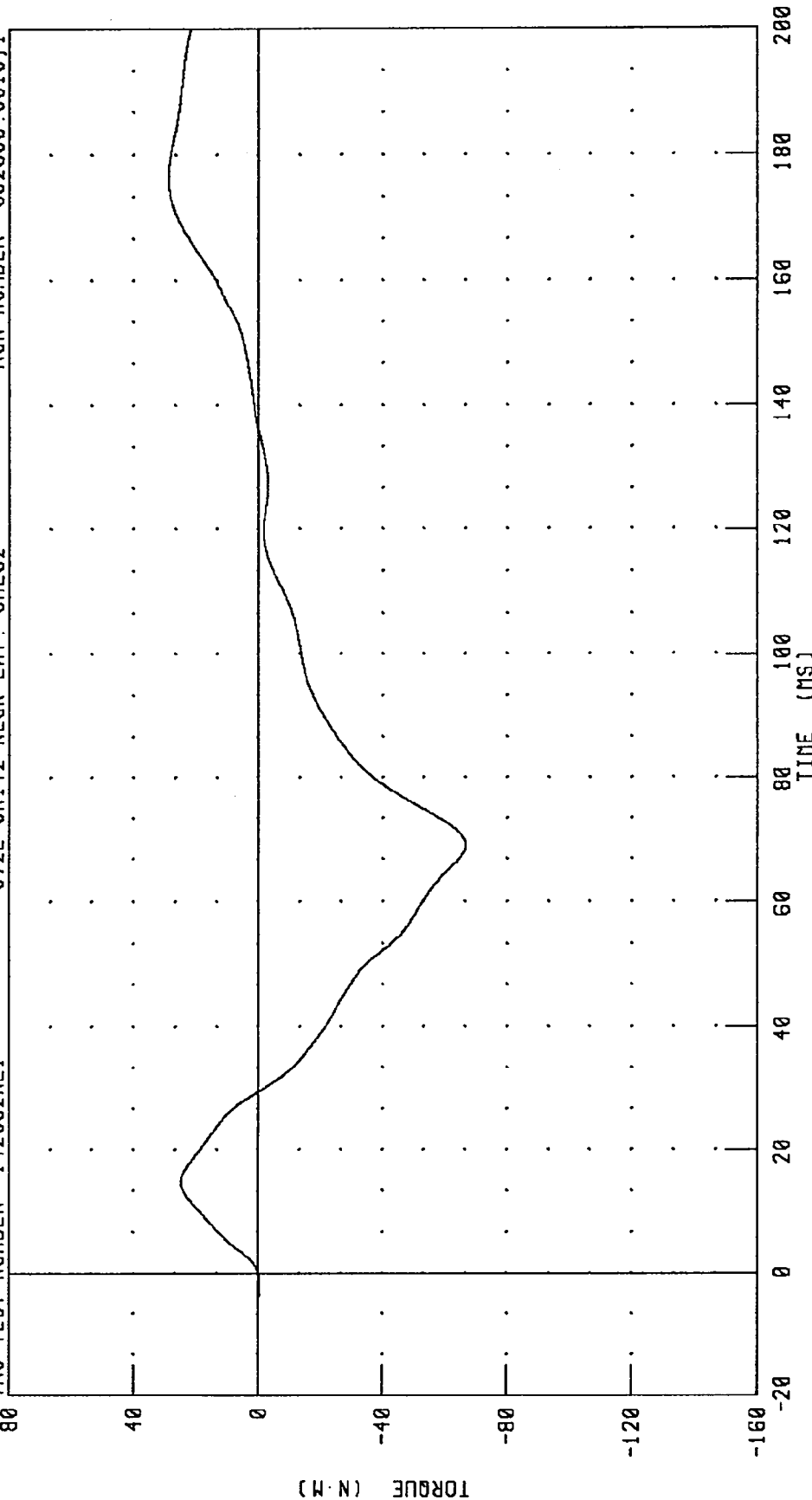


PEAK DATA: 268.18 N @ 185.60 MS; -622.08 N @ 66.48 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

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

IRC TEST NUMBER: 142C32NE1 572E SN142 NECK EXT. CAL32 RUN NUMBER: 032996.0813,1



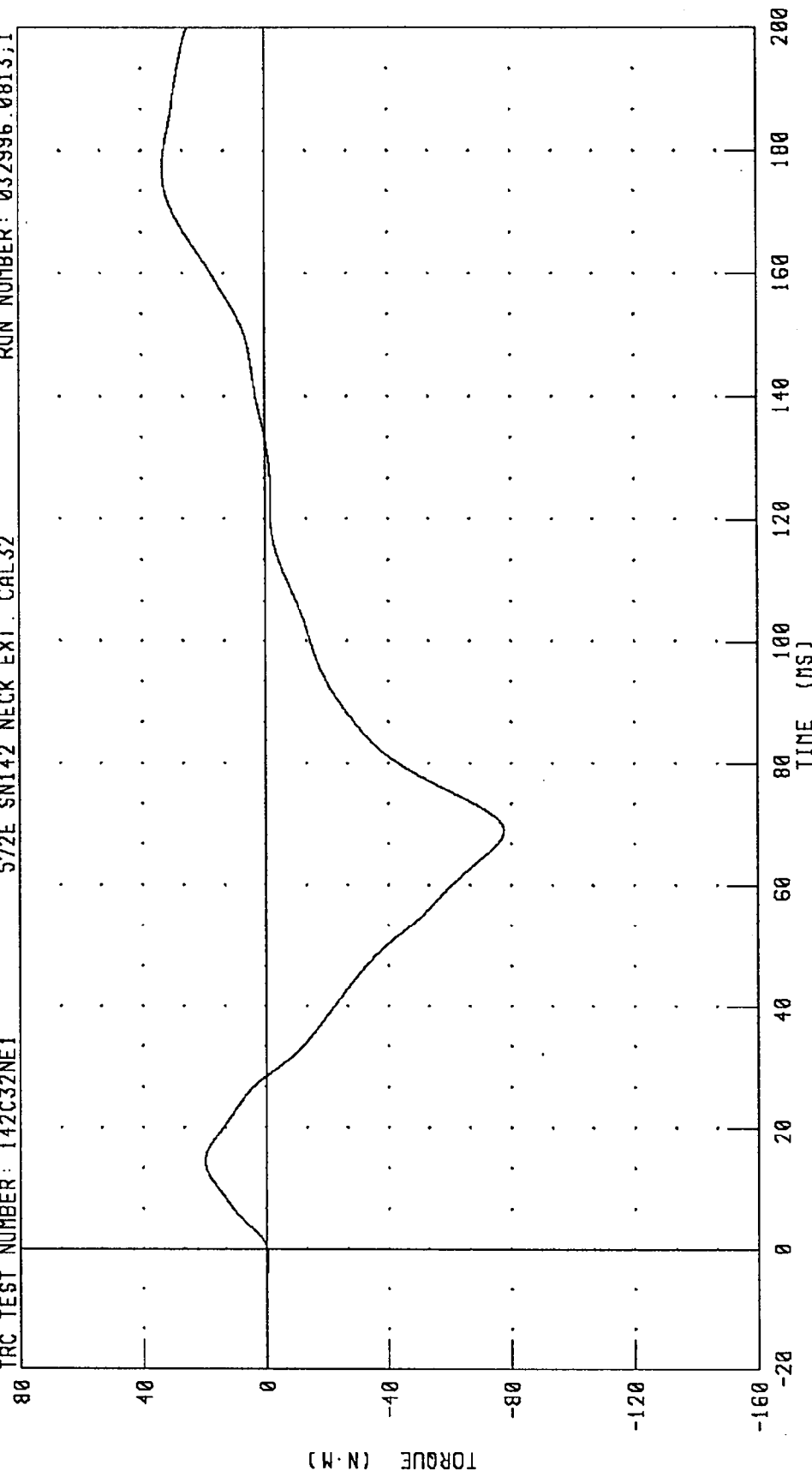
CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 28.85 N·M @ 176.48 MS, -66.80 N·M @ 69.04 MS

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

TRC TEST NUMBER: 142C32NE1

572E SN142 NECK EXT. CAL32

RUN NUMBER: 032996.0813,1



PEAK DATA: 33.14 N-M @ 177.04 MS; -77.58 N-M @ 68.80 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

27-FEB-96

TRC INC.

TEST NO: 142C32TH1

572E SN142 H.S.THORAX CAL32

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.8 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	72.0 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5657. N
INTERNAL HYSTERESIS	69% - 85%	71.6%

TEST MEETS SPECIFICATIONS

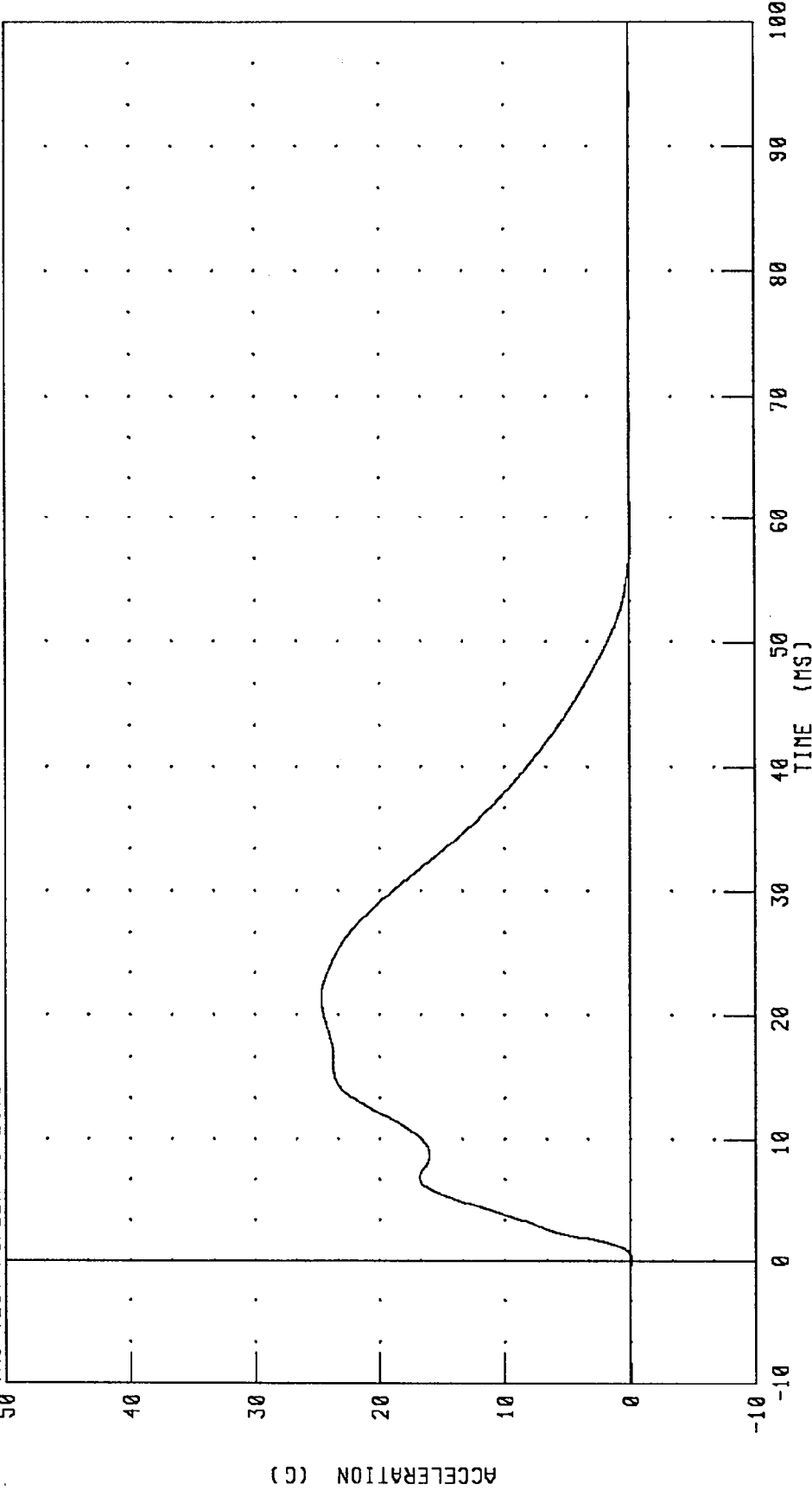
TECHNICIAN

Chas. Middel

RUN NUMBER: 022796.1449;1

PART 572-E HYBRID III THORAX CALIBRATION
 PENDULUM DECELERATION

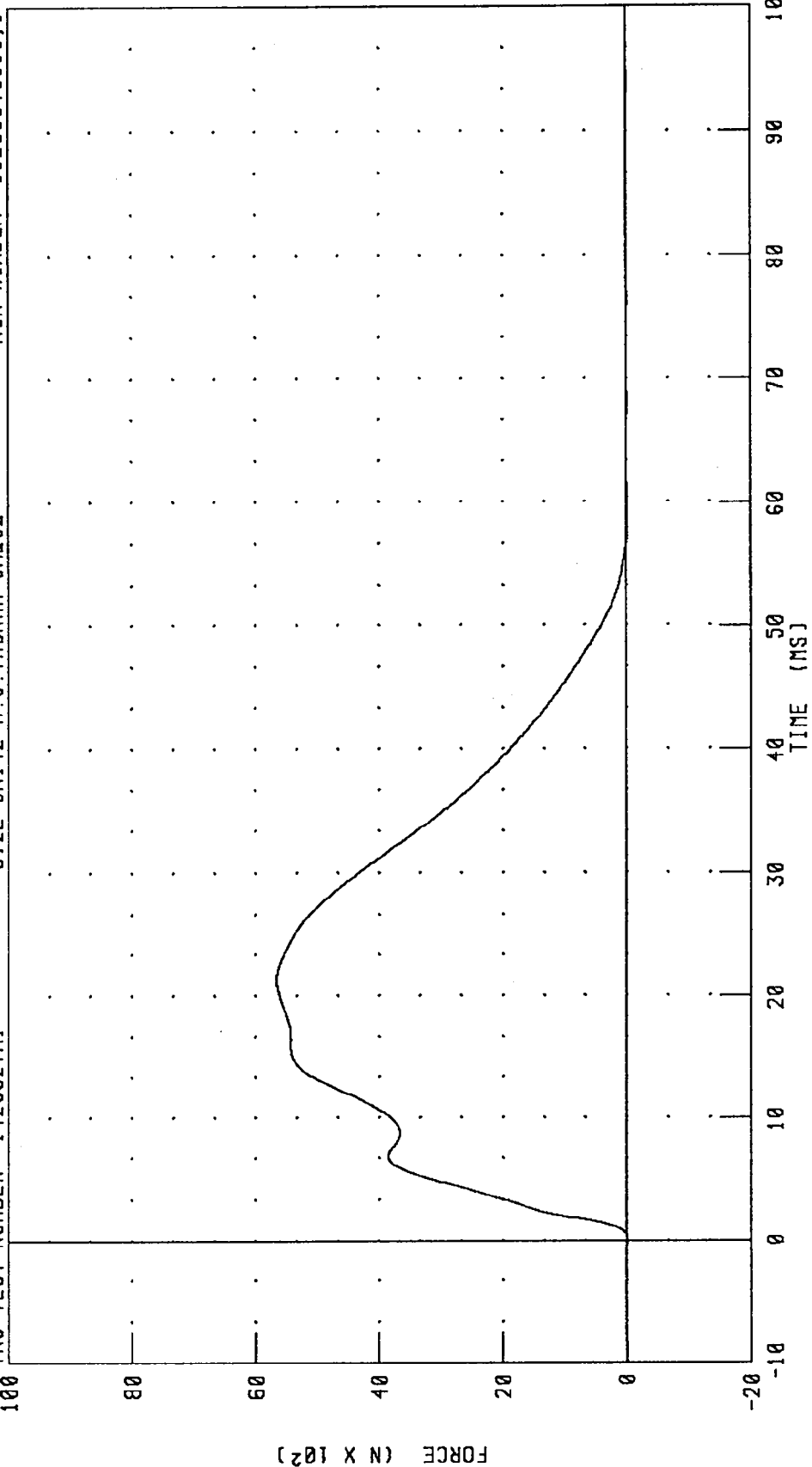
TRC TEST NUMBER: 142C32TH1 572E SN142 H.S. THORAX CAL32 RUN NUMBER: 032996.0813;1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 24.70 G @ 21.28 MS; -0.08 G @ 0.16 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

IRC TEST NUMBER: 142C32TH1 572E SN142 H.S.THORAX CAL32 RUN NUMBER: 032996.0813;1



PEAK DATA: 5657.57 N @ 21.28 MS; -17.42 N @ 0.16 MS

CHANNEL: PENXF FILTER: CH. CLASS 180

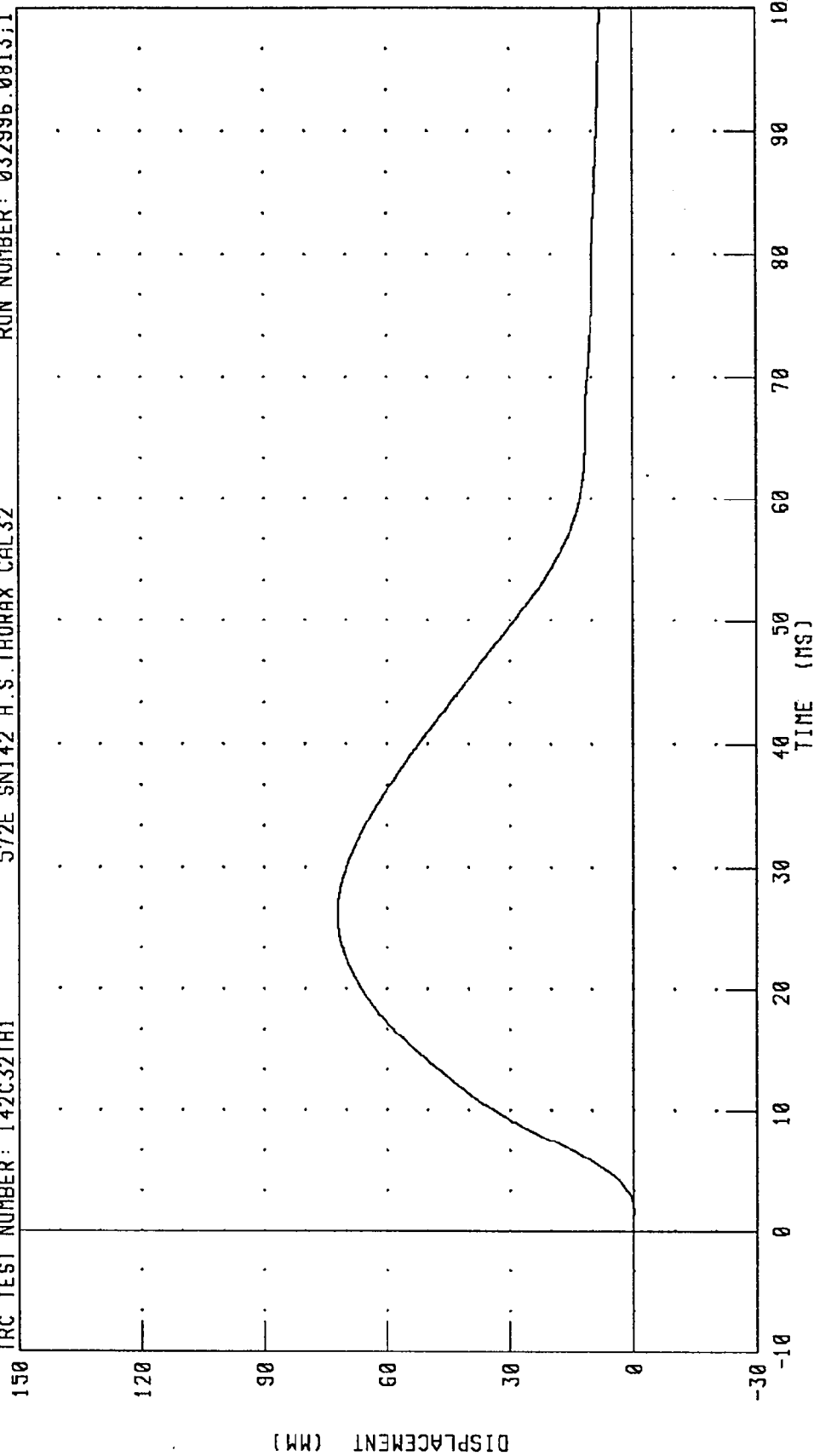
PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 142C32TH1

572E SN142 H.S. THORAX CAL32

RUN NUMBER: 032996.0813;1



CHANNEL: CSTXD FILTER: CH. CLASS 180

PEAK DATA: 72.02 MM @ 26.24 MS; -0.07 MM @ 1.76 MS

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

TRC TEST NUMBER: 142C32TH1

572E SN142 H.S. THORAX CAL32

RUN NUMBER: 032996.0813.1

100

80

60

40

20

0

-20

FORCE (N X 10²)



DISPLACEMENT (MM)

100

90

80

70

60

50

40

30

20

10

0

-10

CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180

PEAK DATA: 72.02 MM @ 26.24 MS; -0.07 MM @ 1.76 MS
5657.57 N @ 21.28 MS; -17.42 N @ 0.16 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

26-FEB-96

TRC INC.

TEST NO: 142C32RK1

572E SN142 RIGHT KNEE CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	48.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	4848.3 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

RUN NUMBER: 022696.1255;1

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

TRC TEST NUMBER: 142C32RK1

572E SN142 RIGHT KNEE CAL 32

RUN NUMBER: 032996.0813;1

150

120

90

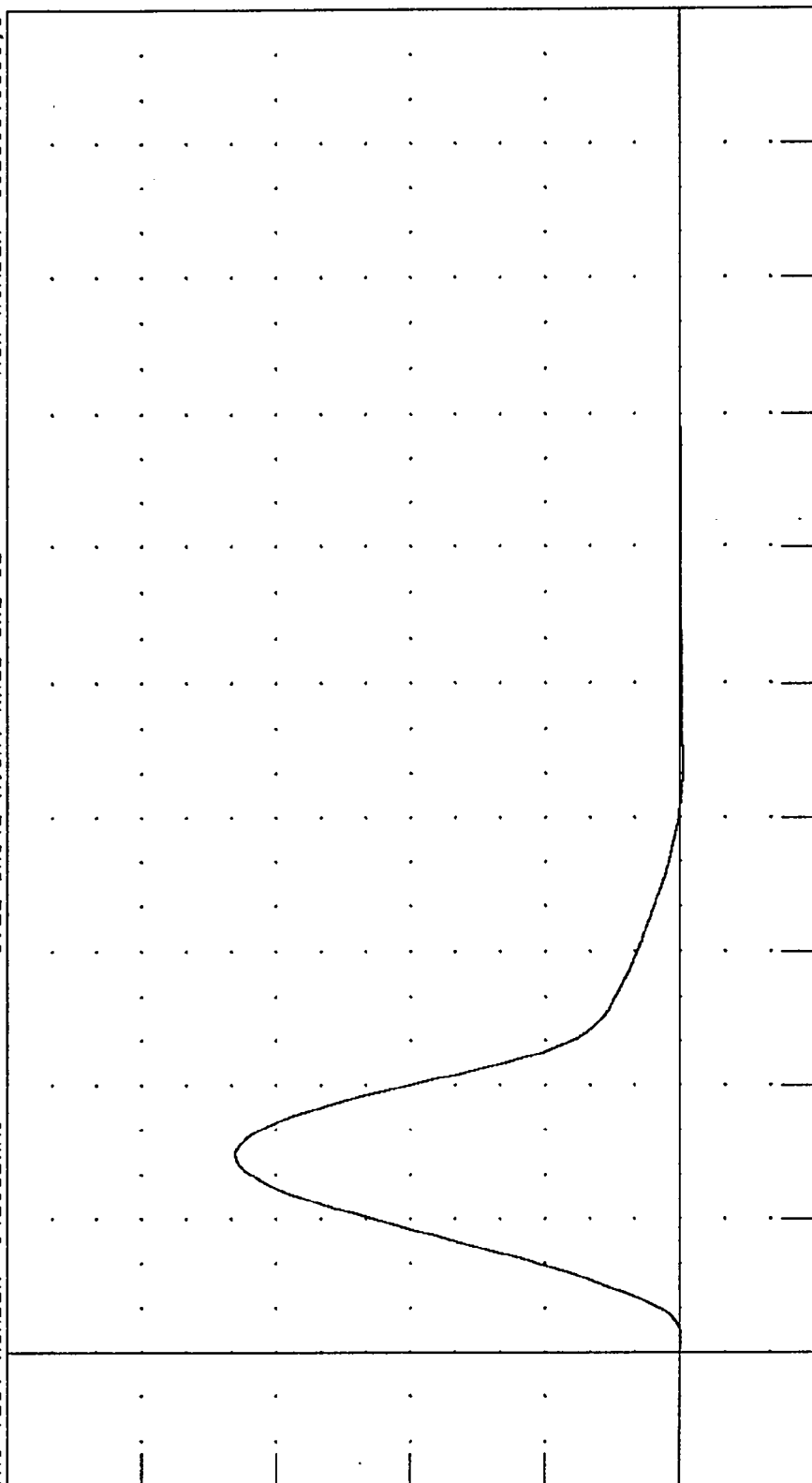
60

30

0

-30

ACCELERATION (G)



TIME (MS X 10⁻¹)

80

60

40

20

0

-20

180

160

140

120

100

80

60

40

20

0

-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

-1260

-1270

-1280

-1290

-1300

-1310

-1320

-1330

-1340

-1350

-1360

-1370

-1380

-1390

-1400

-1410

-1420

-1430

-1440

-1450

-1460

-1470

-1480

-1490

-1500

-1510

-1520

-1530

-1540

-1550

-1560

-1570

-1580

-1590

-1600

-1610

-1620

-1630

-1640

-1650

-1660

-1670

-1680

-1690

-1700

-1710

-1720

-1730

-1740

-1750

-1760

-1770

-1780

-1790

-1800

-1810

-1820

-1830

-1840

-1850

-1860

-1870

-1880

-1890

-1900

-1910

-1920

-1930

-1940

-1950

-1960

-1970

-1980

-1990

-2000

-2010

-2020

-2030

-2040

-2050

-2060

-2070

-2080

-2090

-2100

-2110

-2120

-2130

-2140

-2150

-2160

-2170

-2180

-2190

-2200

-2210

-2220

-2230

-2240

-2250

-2260

-2270

-2280

-2290

-2300

-2310

-2320

-2330

-2340

-2350

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-2410

-2420

-2430

-2440

-2450

-2460

-2470

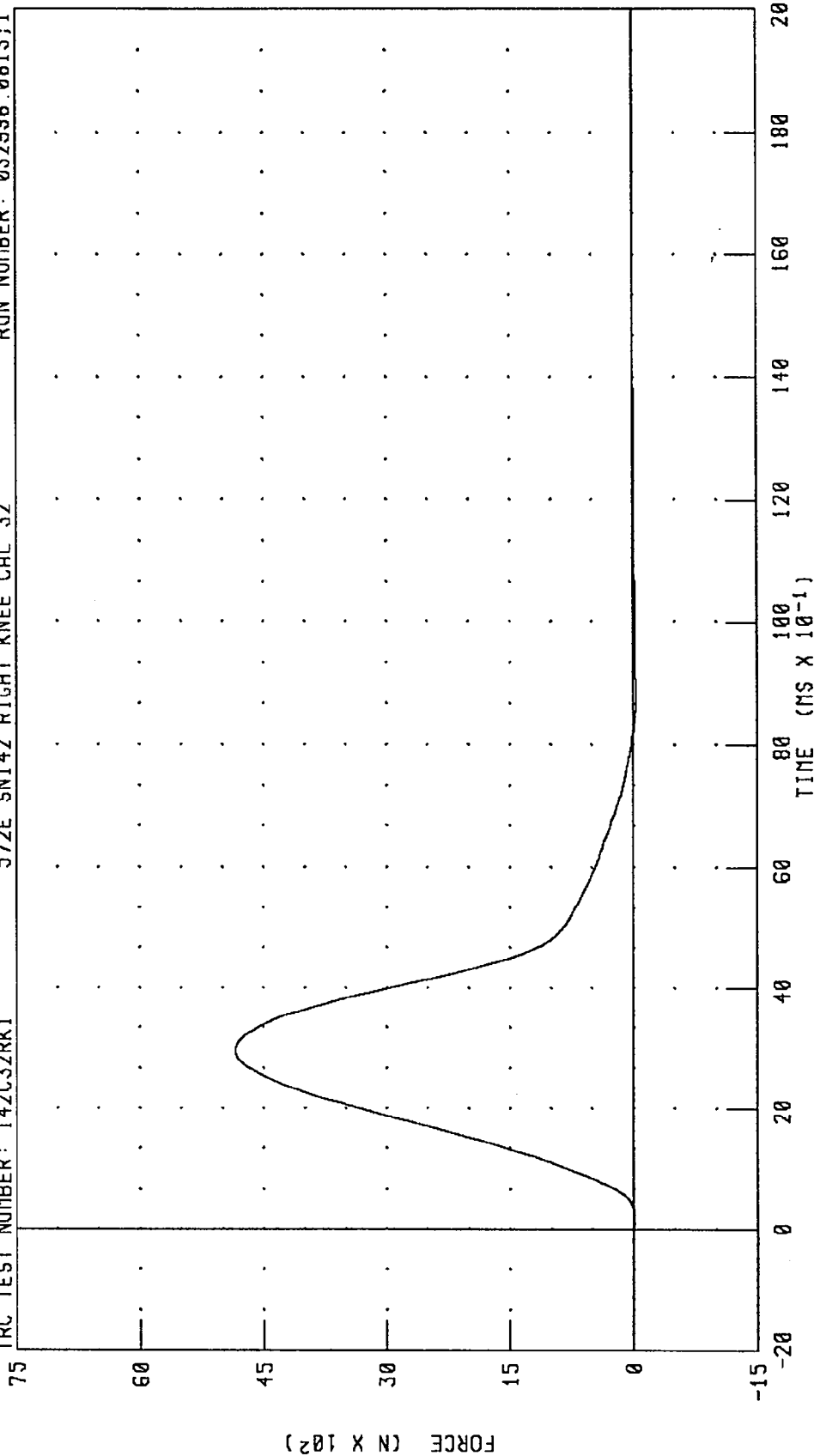
PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN142 RIGHT KNEE CAL 32

TRC TEST NUMBER: 142C32RK1

RUN NUMBER: 032996.0813;1



PEAK DATA: 4848.36 N @ 2.96 MS; -34.27 N @ 8.72 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

26-FEB-96

TRC INC.

TEST NO: 142C32LK1

572E SN142 LEFT KNEE CAL 32

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	48.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5202.4 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middel

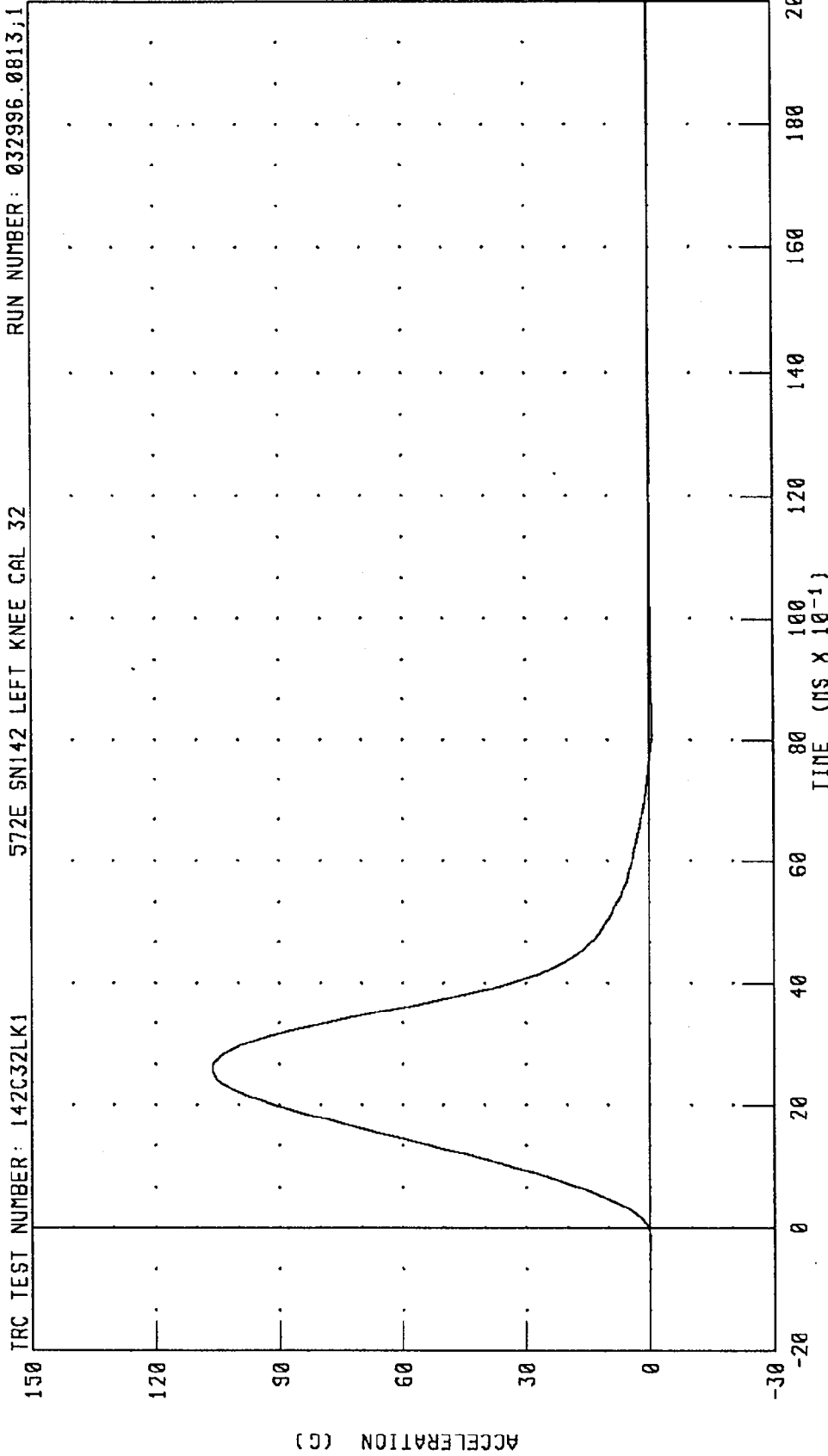
RUN NUMBER: 022696.1251;1

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

TRC TEST NUMBER: 142C32LK1

572E SN142 LEFT KNEE CAL 32

RUN NUMBER: 032996.0813.1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 106.33 G @ 2.56 MS; -0.71 G @ 8.24 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN142 LEFT KNEE CAL 32

TRC TEST NUMBER: 142C32LK1

75

60

45

30

15

0

-15

FORCE (N X 10²)

0

20

40

60

80

100

120

140

160

180

200

TIME (MS X 10⁻¹)

PEAK DATA: 5202.49 N @ 2.56 MS; -34.71 N @ 8.24 MS

CHANNEL: PENXF

FILTER: CH. CLASS 600

RUN NUMBER: 032996.0813;1

960229

Appendix D

Miscellaneous Test Information

Dummy Instrument Calibrations

Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Head X-axis accelerometer	AAL82	7264	Endevco	02/26/96	08/26/96
Head X-axis accelerometer-redundant	AJ8J7	7264	Endevco	02/27/96	08/27/96
Head Y-axis accelerometer	A84JJ	7264	Endevco	02/26/96	08/26/96
Head Y-axis accelerometer-redundant	AJ8A6	7264	Endevco	02/27/96	08/27/96
Head Z-axis accelerometer	FH87J	7264	Endevco	02/26/96	08/26/96
Head Z-axis accelerometer-redundant	AC8W6	7264	Endevco	02/27/96	08/27/96
Chest X-axis accelerometer	CT22H	7264	Endevco	02/26/96	08/26/96
Chest X-axis accelerometer-redundant	A79GJ	7264	Endevco	02/27/96	08/27/96
Chest Y-axis accelerometer	AC708	7264	Endevco	02/26/96	08/26/96
Chest Y-axis accelerometer-redundant	AGR69	7264	Endevco	02/27/96	08/27/96
Chest Z-axis accelerometer	CW59H	7264	Endevco	02/26/96	08/26/96
Chest Z-axis accelerometer-redundant	DB74H	7264	Endevco	02/27/96	08/27/96
Left femur force load cell	986	2430	GSE	02/26/96	08/26/96
Right femur force load cell	987	2430	GSE	02/26/96	08/26/96
Neck X-axis force load cell ¹	85	1716	Denton	02/26/96	08/26/96
Neck Y-axis force load cell ¹	85	1716	Denton	02/26/96	08/26/96
Neck Z-axis force load cell ¹	85	1716	Denton	02/26/96	08/26/96
Neck Moment about X-axis load cell ¹	85	1716	Denton	02/26/96	08/26/96
Neck Moment about Y-axis load cell ¹	85	1716	Denton	02/26/96	08/26/96
Neck Moment about Z-axis load cell ¹	85	1716	Denton	02/26/96	08/26/96
Pelvis X-axis accelerometer	AJ694	7264	Endevco	02/26/96	08/26/96
Pelvis Y-axis accelerometer	AJ656	7264	Endevco	02/26/96	08/26/96
Pelvis Z-axis accelerometer	AJ788	7264	Endevco	02/26/96	08/26/96
Chest deflection potentiometer ¹	87313-96	14CB1-2981	Vernitech	02/26/96	08/26/96
Lap belt force load cell	130	3419	Lebow	01/22/96	07/22/96
Shoulder belt force load cell	612	3419	Lebow	01/22/96	07/22/96

¹ Hybrid III use only.

Dummy Instrument Calibrations, Cont'd.
Driver Dummy #192

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Left upper tibia moment about X-axis load cell	82	1583	Denton	01/16/96	07/16/96
Left upper tibia moment about Y-axis load cell	82	1583	Denton	01/16/96	07/16/96
Right upper tibia moment about X-axis load cell	83	1583	Denton	01/16/96	07/16/96
Right upper tibia moment about Y-axis load cell	83	1583	Denton	01/16/96	07/16/96
Left Lower tibia X-axis force load cell	77	1584	Denton	01/16/96	07/16/96
Left Lower tibia Z-axis force load cell	77	1584	Denton	01/16/96	07/16/96
Left Lower tibia moment about Y-axis load cell	77	1584	Denton	01/16/96	07/16/96
Right Lower tibia X-axis force load cell	76	1584	Denton	01/16/96	07/16/96
Right Lower tibia Z-axis force load cell	76	1584	Denton	01/16/96	07/16/96
Right Lower tibia moment about Y-axis load cell	76	1584	Denton	01/16/96	07/16/96
Left foot X-axis accelerometer	10073	7264	Endevco	10/17/95	04/17/96
Left foot heel Z-axis accelerometer	10263	7264	Endevco	10/16/95	04/16/96
Left foot toe Z-axis accelerometer	10101	7264	Endevco	10/17/95	04/17/96
Right foot X-axis accelerometer	APYT4	7264	Endevco	10/17/95	04/17/96
Right foot heel Z-axis accelerometer	APOR8	7264	Endevco	10/17/95	04/17/96
Right foot toe Z-axis accelerometer	10076	7264	Endevco	10/16/95	04/16/96

Dummy Instrument Calibrations, Cont'd.
Right Front Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Head X-axis accelerometer	A74JJ	7264	Endevco	02/26/96	08/26/96
Head X-axis accelerometer-redundant	AC8L5	7264	Endevco	02/26/96	08/26/96
Head Y-axis accelerometer	ACCR7	7264	Endevco	02/26/96	08/26/96
Head Y-axis accelerometer-redundant	AC872	7264	Endevco	02/26/96	08/26/96
Head Z-axis accelerometer	ACCJ1	7264	Endevco	02/26/96	08/26/96
Head Z-axis accelerometer-redundant	A68JJ	7264	Endevco	02/26/96	08/26/96
Chest X-axis accelerometer	AC721	7264	Endevco	02/26/96	08/26/96
Chest X-axis accelerometer-redundant	A65JJ	7264	Endevco	02/26/96	08/26/96
Chest Y-axis accelerometer	CY47H	7264	Endevco	02/26/96	08/26/96
Chest Y-axis accelerometer-redundant	FH14J	7264	Endevco	02/26/96	08/26/96
Chest Z-axis accelerometer	AAL44	7264	Endevco	02/26/96	08/26/96
Chest Z-axis accelerometer-redundant	AC745	7264	Endevco	02/26/96	08/26/96
Left femur force load cell	903	2430	GSE	02/26/96	08/26/96
Right femur force load cell	904	2430	GSE	02/26/96	08/26/96
Neck X-axis force load cell ¹	280	1716	Denton	02/26/96	08/26/96
Neck Y-axis force load cell ¹	280	1716	Denton	02/26/96	08/26/96
Neck Z-axis force load cell ¹	280	1716	Denton	02/26/96	08/26/96
Neck Moment about X-axis load cell ¹	280	1716	Denton	02/26/96	08/26/96
Neck Moment about Y-axis load cell ¹	280	1716	Denton	02/26/96	08/26/96
Neck Moment about Z-axis load cell ¹	280	1716	Denton	02/26/96	08/26/96
Pelvis X-axis accelerometer	CY63H	7264	Endevco	02/26/96	08/26/96
Pelvis Y-axis accelerometer	AMWA9	7264	Endevco	02/26/96	08/26/96
Pelvis Z-axis accelerometer	ANA55	7264	Endevco	02/26/96	08/26/96
Chest deflection potentiometer ¹	142	14CB1-2981	Vernitech	02/26/96	08/26/96
Lap belt force load cell	236	3419	Lebow	01/19/96	07/19/96
Shoulder belt force load cell	613	3419	Lebow	01/19/96	07/19/96

¹ Hybrid III use only.

Dummy Instrument Calibrations, Cont'd.
Right Front Passenger Dummy #142

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Left upper tibia moment about X-axis load cell	297	1583	Denton	01/23/96	07/23/96
Left upper tibia moment about Y-axis load cell	297	1583	Denton	01/23/96	07/23/96
Right upper tibia moment about X-axis load cell	298	1583	Denton	01/23/96	07/23/96
Right upper tibia moment about Y-axis load cell	298	1583	Denton	01/23/96	07/23/96
Left Lower tibia X-axis force load cell	286	1584	Denton	01/23/96	07/23/96
Left Lower tibia Z-axis force load cell	286	1584	Denton	01/23/96	07/23/96
Left Lower tibia moment about Y-axis load cell	286	1584	Denton	01/23/96	07/23/96
Right Lower tibia X-axis force load cell	287	1584	Denton	01/23/96	07/23/96
Right Lower tibia Z-axis force load cell	287	1584	Denton	01/23/96	07/23/96
Right Lower tibia moment about Y-axis load cell	287	1584	Denton	01/23/96	07/23/96
Left foot X-axis accelerometer	APOA1	7264	Endevco	10/16/95	04/16/96
Left foot heel Z-axis accelerometer	10102	7264	Endevco	10/16/95	04/16/96
Left foot toe Z-axis accelerometer	10074	7264	Endevco	10/16/95	04/16/96
Right foot X-axis accelerometer	10088	7264	Endevco	10/16/95	04/16/96
Right foot heel Z-axis accelerometer	10089	7264	Endevco	10/16/95	04/16/96
Right foot toe Z-axis accelerometer	10087	7264	Endevco	10/17/95	04/17/96

Vehicle and Calibration Laboratory Instrument Calibrations

Vehicle Accelerometers

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Left rear seat crossmember X-axis	APBG4	7264	Endevco	02/13/96	08/13/96
Left rear seat crossmember X-axis redundant	J11200	7264	Endevco	02/07/96	08/07/96
Right rear seat crossmember X-axis	J10928	7264	Endevco	11/30/95	05/30/96
Right rear seat crossmember X-axis redundant	AMTA6	7264	Endevco	01/17/96	07/17/96
Engine top X-axis	AHRN6	7264	Endevco	01/16/96	07/16/96
Engine bottom X-axis	CJ75H	7264	Endevco	01/24/96	07/24/96
Right brake caliper X-axis	CW69H	7264	Endevco	01/22/96	07/22/96
Left brake caliper X-axis	DY16J	7264	Endevco	10/13/95	04/13/95
Instrument panel center X-axis	DK73J	7264	Endevco	01/22/96	07/22/96

Calibration Laboratory Instruments

	Serial Number	Model Number	Manufacturer	Calibration Date	
				Last	Due
Neck bending pendulum accelerometer	CB27	7232	Endevco	09/19/95	03/19/96
Neck bending rotary potentiometer	NA	35435-1-102	Bournes	Mfr. Specification	
Neck bending linear potentiometer	NA	5184-2051846003	Bournes	09/19/95	03/19/96
Thorax/Hybrid II femur pendulum accelerometer	CC64	7232	Endevco	09/19/95	03/19/96
Lumbar flexion force gauge	NA	DPPH-50	Chatillon	05/03/89	repaired
Lumbar flexion rotation gauge	CP17-0601-1	7020	Humphrey	Mfr. Specification	
Abdomen compression displacement gauge	4075-175	80294-2051941504	Bournes	09/19/95	03/19/96
Abdomen compression force gauge	3443	3167	Lebow	09/19/95	03/19/96
Hybrid III femur pendulum accelerometer	CG83	7232	Endevco	09/19/95	03/19/96

Sign Convention
NHTSA Data Tape Reference Guide

Accelerometers:

+X: Forward
+Y: Leftward
+Z: Upward

Potentiometers:

+Chest longitudinal deflection: Outward
+Chest lateral deflection: Leftward
+Seat belt displacement: Outward
+Seat belt extension: Elongation
+Knee slider displacement: Distance between femur and tibia increased
(in relation to a seated dummy)

Load cells:

+Femur force: Tension
+Seat belt force: Tension
+Barrier force: Tension

Neck load cells:

+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

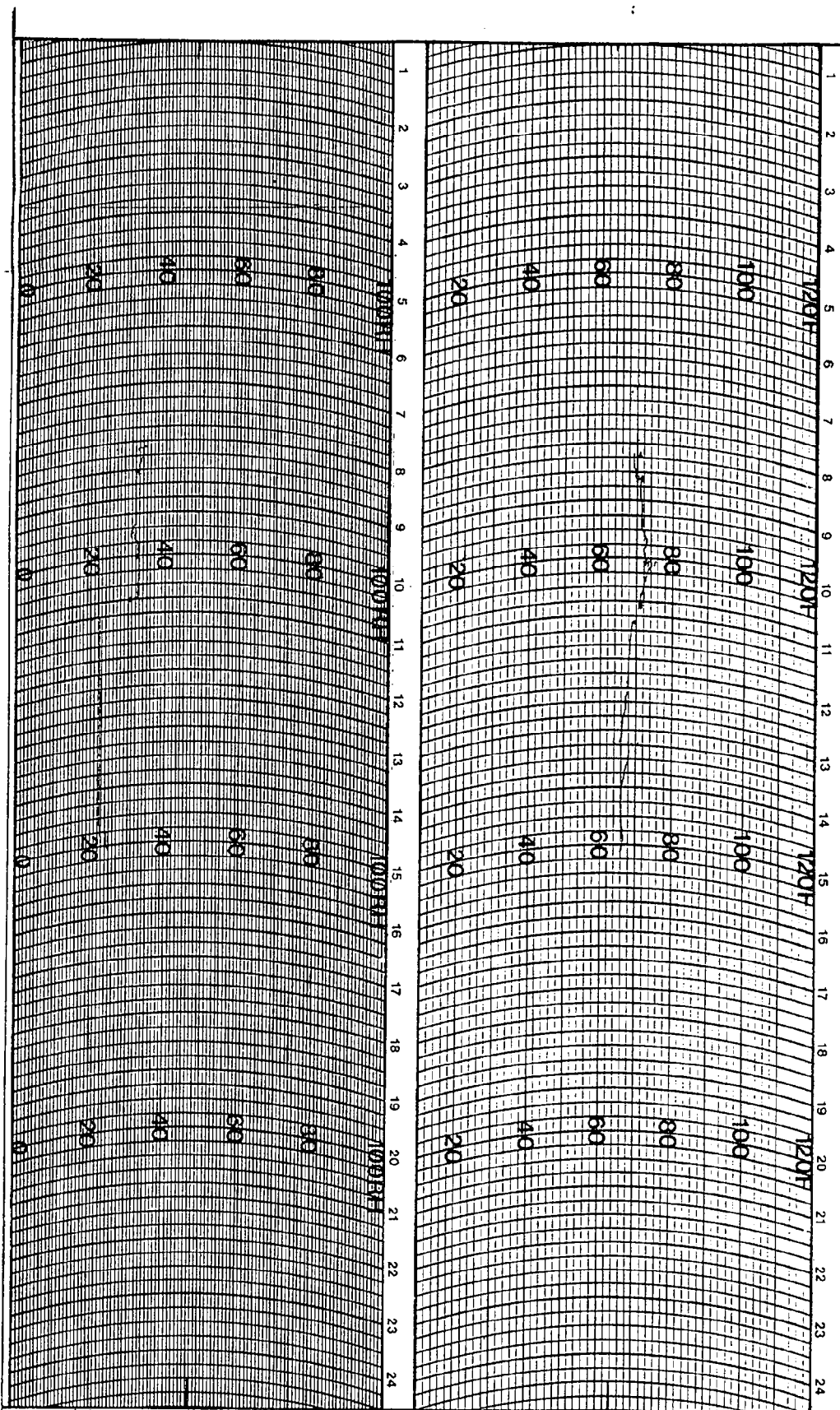
Tibia load cells:

+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 _____ DATE OFF _____

Appendix E

Restraint System Instructions from Owner's Manual

FEATURES OF YOUR HYUNDAI

SB090A1-A

SEAT BELT PRECAUTIONS

All occupants of the vehicle must wear their seat belts at all times. Note that this vehicle is equipped with a Supplemental Restraint (Airbag) System as discussed beginning on page 1-16. The seat belts must be used in conjunction with the supplemental airbag system. Your states laws may require that some or all occupants of the vehicle use seat belts. The possibility of increased injury or severity of injury in an accident will be increased if this elementary safety precaution is not observed. In addition, the following recommendations are made:

SB090B1-F

Baby or Small Children

Some countries require the use of child restraint systems for babies and small children. Whether this is required by law or not, it is strongly recommended that a child restraint seat or infant restraint system be used for babies or small children weighing less than 18 kilograms (40 pounds).

SB090C1-F

Larger Children

It is recommended that larger children occupy the rear seat and wear their seat belts. If the child is in the front seat, child should be securely restrained by the seat belt. Under no circumstances should the child be allowed to stand or kneel on the seat. Children are afforded the most safety in the event of an accident when they are restrained by a proper child restraint system.

SB090D1-F

Pregnant Women

The use of a seat belt is recommended for pregnant women to lessen the chance of injury in an accident. When a seat belt is used, it should be placed as low and snugly as possible on the hips, not across the abdomen. For specific recommendations, consult a physician.

SB090E1-F

Injured Person

A seat belt should be used when an injured person is being transported. When this is necessary, you should consult a physician for recommendations.

SB090F1-F

One Person Per Belt

Two people (including children) should never attempt to use a single seat belt. This could increase the severity of injuries in case of an accident.

SB090G1-F

Do Not Lie Down

To reduce the chance of injuries in the event of an accident, and to achieve maximum effectiveness of the restraint system, all passengers should be sitting up and the front seats should be in an upright position when the car is moving. A seat belt cannot operate properly if the person is lying down in the rear seat or if the front seat is at or near a fully reclined position.

SB090H1-A

CARE OF SEAT BELTS

Seat belt systems should never be disassembled or modified. In addition, care should be taken to assure that seat belts and belt hardware are not damaged by seat hinges, doors or other abuse.

WARNING:

When you return the rear seatback to its upright position after the rear seatback was folded down, be careful not to damage the seat belt webbing or buckle. Be sure that the webbing or buckle does not get caught or pinched in the rear seat.

SB090I1-F

Periodic Inspection

It is recommended that all seat belts be inspected periodically for wear or damage of any kind. Parts of the system that are damaged should be replaced as soon as possible.

SB090J1-F

Keep Belts Clean and Dry

Seat belts should be kept clean and dry. If belts become dirty, they can be cleaned using a mild soap solution and warm water. Bleach, dye, strong detergents or abrasives should not be used because they may damage and weaken the fabric.

FEATURES OF YOUR HYUNDAI

SB090K1-F

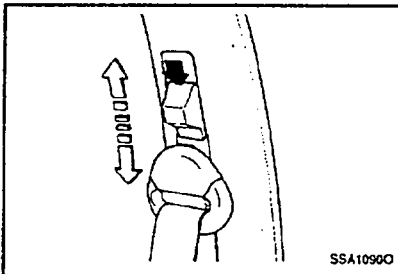
When to Replace Seat Belts

The entire seat belt assembly or assemblies should be replaced if the vehicle has been involved in an accident. This should be done even if no damage is visible. Additional questions concerning seat belt operation should be directed to your Hyundai Dealer.

SB090O1-F

FRONT SEATBELT PIVOT HEIGHT ADJUSTMENT (If installed)

The location of the upper anchorage point can be set (for greater belt comfort and security) to any one of five preset positions. To adjust the seat belt pivot push the knob upward or downward to the required setting, ensuring that it engages one of the preset positions (on releasing the knob). The height adjuster must always be locked into position while the vehicle is stationary. Do not attempt to adjust the height of the upper anchorage point while the vehicle is moving.



1- 10

If you are any doubt as to the method of adjustment or the optimum height position for your front seat belt always contact your nearest Hyundai Dealer.

WARNING:

The height adjuster must be in the locked position whenever the vehicle is moving.

YB090T1-A

SEAT BELT-Driver's 3-Point System with Emergency Locking Retractor To Fasten Your Belt

To fasten your seat belt, pull it out of the retractor and insert the metal tab into the buckle. There will be an audible "click" when the tab locks into the buckle.

The seat belt automatically adjusts to the proper length only after the lap belt portion is adjusted manually so that it fits snugly around your hips. If you lean forward in a slow, easy motion, the belt will extend and let you move around. If there is a sudden stop or impact, however, the belt will lock into position. It will also lock if you try to lean forward too quickly.

NOTE:

If the driver's seat belt is not fastened when the ignition key is in the "ON" position, the seat belt warning light will flash and the warning chime will sound for approximately six seconds.

YB220A4-A

SEAT BELTS-Front Passenger and Outboard Rear Seat 3-Point System with Combination Locking Retractor To Fasten Your Belt

Combination retractor type seat belts are installed in the rear seat outboard positions to help accommodate the installation of child restraint systems. Although a combination retractor is also installed in the front passenger seat position, HYUNDAI recommends that children always be seated in the rear seat.

This type of seat belt combines the features of both an emergency locking retractor seat belt and an automatic locking retractor seat belt.

To fasten your seat belt, pull it out of the retractor and insert the metal tab into the buckle. There will be an audible "click" when the tab locks into the buckle.

When not securing a child restraint, the seat belt operates in the same way as driver's seat belt (Emergency Locking Retractor Type). It automatically adjusts to the proper length only after the lap belt portion of the seat belt is adjusted manually so that it fits snugly around your hips. When the seat belt is fully extended from the retractor to allow the installation of a child restraint system, the seat belt operation changes to allow the belt to retract, but not to extend. (Automatic Locking Retractor Type)

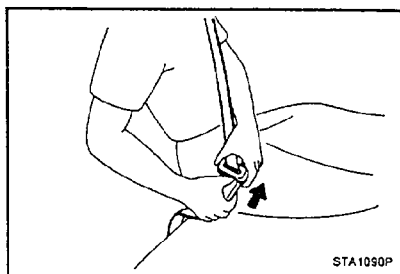
FEATURES OF YOUR HYUNDAI

NOTE:

Although the combination retractor provides the same level of protection for seated passengers in either emergency or automatic locking modes, it is recommended that seated passengers use the emergency locking feature for improved convenience. The automatic locking function is intended to facilitate child restraint installation. To convert from the automatic locking feature to the emergency locking operation mode, allow the unbuckled seat belt to fully retract.

WARNING:

- o For maximum restraint system protection, the seat belts must always be used whenever the car is moving.
- o Seat belts are most effective when seatbacks are in the upright position.
- o Hyundai recommends that children be seated in the rear seats.



- o The shoulder belt should be positioned midway over the shoulder nearest the door for the most effective protection. Never wear the seat belt under the arm nearest the door.
- o Avoid wearing twisted seat belts.
- o Be careful not to damage the belt webbing or hardware.
- o The retractors lock only on sudden impacts or stops. The belt will allow some freedom of movement if done slowly.

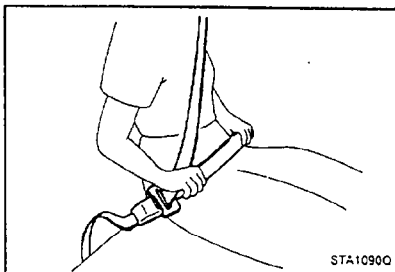
ZB090U2-A

Adjusting Your Seat Belt

WARNING:

You should place the lap belt portion as low as possible and snugly across your hips, not on your waist.

If the lap belt is located too high on your waist, it may increase the chance of injury in the event of a collision. Both arms should



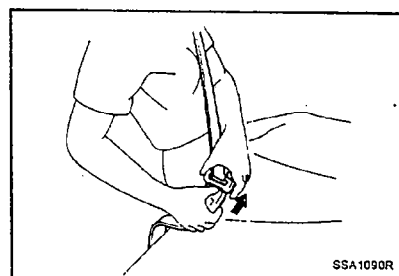
not be under or over the belt. Rather, one should be over and the other under, as shown in the illustration.

ZB090V1-A

To Release the Seat Belt

The seat belt is released by pressing the release button in the locking buckle. When it is released, the belt should automatically draw back into the retractor.

If this does not happen, check the belt to be sure it is not twisted, then try again.



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FEATURES OF YOUR HYUNDAI

SB090S1-F

SEAT BELTS (2-Point Static Type) (If installed) (Rear Seat Center)

To Fasten Your Belt

To fasten a 2-point static type belt, insert the metal tab into the locking buckle. There will be an "audible click" when the tab locks into the buckle. Check to make sure the belt is properly locked and that the belt is not twisted.

SB090T1-F

Adjusting Your Seat Belt

With a 2-point static type belt, the length must be adjusted manually so it fits snugly around your body. Fasten the belt and pull on the loose end to tighten. The belt should be placed as low as possible on your hips, not on your waist. If the belt is too high it could increase the possibility of your being injured in an accident because you could slide under it.

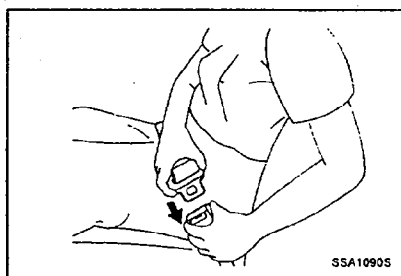
SB090U1-A

To Release the Seat Belt

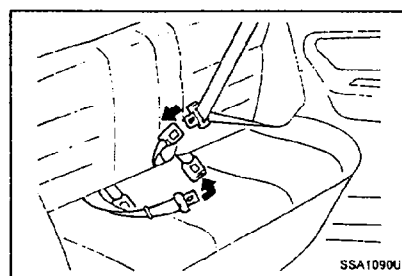
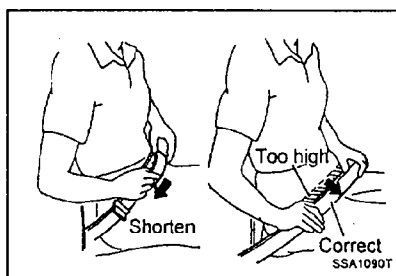
When you want to release the seat belt, press the button in the locking buckle.

WARNING:

The center lap belt latching mechanism is different from those for the rear seat shoulder belts. When fastening the rear seat shoulder belts or the center lap belt, make sure they are inserted into the correct buckle to obtain maximum protection from the seat belt system and assure proper operation.



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FEATURES OF YOUR HYUNDAI

SB100A1-A

CHILD RESTRAINT SYSTEM

Children riding in the car should sit in the rear seat and be restrained to minimize the risk of injury in an accident, sudden stop or sudden maneuver. According to accident statistics provided by the National Highway Traffic Safety Administration (NHTSA), children are safer when properly restrained in the rear seating positions than in the front seat. Larger children should use one of the seat belts provided.

For smaller children, we strongly recommend the use of a commercially available child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards (FMVSS), because it offers the most protection against injury or death. All states now have laws which require that small children must be seated in a child passenger seat restraint system. Check local laws. All child restraint systems are designed to be secured by lap belts or the lap belt portion of a lap-shoulder belt.

Children could be injured in a crash if their restraints are not properly secured. For small children and babies we strongly recommend a child seat or infant seat. Before buying a particular child restraint system, make sure it fits your car seat and seat belts, and fits your child. Follow all the instructions provided by the manufacturer when installing the child restraint system.

SB100B1-A

WARNING:

- o A child restraint system must be placed in the rear seat. Never install a child restraint system on the front passenger's seat. Should an accident occur and cause the passenger-side supplemental airbag to deploy, it could severely injure an infant seated in a child restraint. Thus only use a child restraint in the rear seat of your vehicle.
- o Since a safety belt or child restraint system can become very hot if it is left in a closed vehicle, be sure and check the seat cover and buckles before placing a child there.
- o When the child restraint system is not in use, store it in the trunk or fasten it with a safety belt so that it will not be thrown forward in the case of a sudden stop or an accident.
- o Children who are not required by law to be in a child restraint should sit in the rear seat and be restrained with the seat belt.
- o Always make sure that the shoulder belt portion of the outboard lap/shoulder belt is positioned midway over the shoulder-never across the neck. The lap belt portion of the lap/shoulder belt or the center seat lap belt must always be positioned as low as possible on your hips, not on your waist.
- o If the seat belt will not properly fit the child, we recommend the use of an approved booster seat in the rear seat in order to raise the child's seating height so that the

seat belt will properly fit the child. Before purchasing a booster seat, make sure that it meets applicable Federal Motor Vehicle Safety Standards and that it is satisfactory for use with this vehicle.

- o Never allow a child to stand up or kneel on the seat.
- o Never use an infant carrier or child safety seat that "hooks" over a seatback; it may not provide adequate security in an accident.
- o Never allow a child to be held in a person's arms while they are in a moving vehicle, as this could result in serious injury to the child in the event of an accident or sudden stop. Holding a child in a moving vehicle does not provide the child with any means of protection during an accident, even if the person holding the child is wearing a seat belt.

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FEATURES OF YOUR HYUNDAI

SB100C1-A

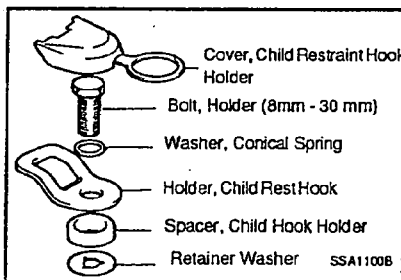
Using a Child Restraint System

To install a child restraint hook holder, use a 5/16" 18 UNC thread bolt and 10 mm spacer as indicated in the illustration below. You can damage the holder nut on your vehicle if you force a bolt with a different thread into the holder nut.

SB100D1-A

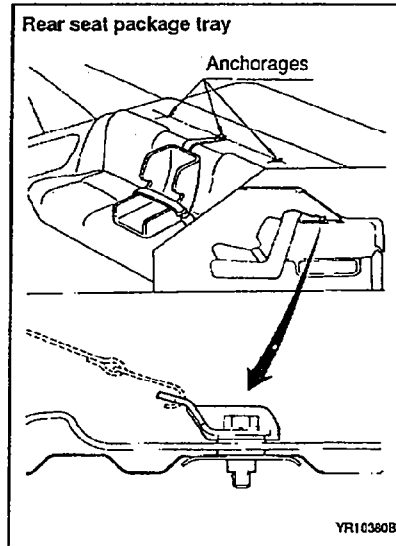
CHILD RESTRAINT HOOK HOLDER NUT LOCATION (SEDAN)

Three child restraint hook holder nuts are located on the rear seat package tray and the anchor holes are covered with plugs.



1- 14

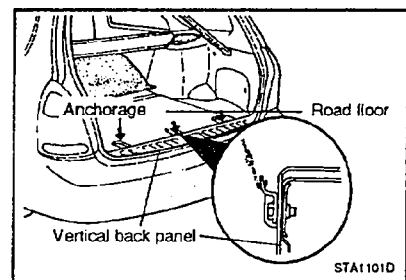
If you want to install a child restraint system hook holder, remove one of the 3 anchorage trim plugs from the rear seat package tray trim, then install the hook holder for your child restraint system with the bolt and spacer to the torque of 1.7~2.6 kgf.m (12.3~18.8 lb.ft, 16.7~25.5 N.m).



SB100D1-D

CHILD RESTRAINT ANCHORAGE FITTING NUT LOCATION (WAGON)

Child Restraint Anchorage Fitting Points (Holes) are in the vertical back panel as illustrated. To install the child restraint system, pull up the road floor then install the "Anchorage Fitting Package(s)" (as per diagram shown in this manual) tightening the "Attachment bolt" by applying a torque of 1.7~2.6 Kg f.m. (12-18.8 lb.ft, 16.7-25.5 Nm).



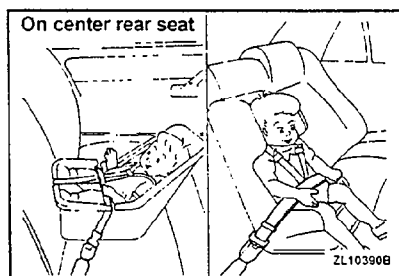
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SB100F1-A

Installation on Center Rear Seat

Use the center seat belt for the rear seat to secure the child restraint system as illustrated. After installation of the child restraint system, rock the child seat back and forth, and side to side to ensure that it is properly secured by the seat belt.

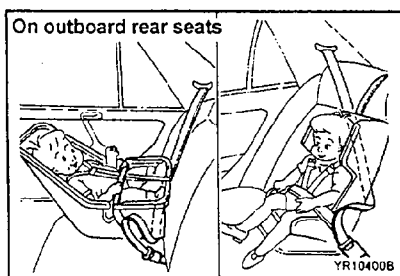
If the child seat moves, readjust the length of the seat belt. Then, if equipped, insert the child restraint tether strap hook into the child restraint hook holder and tighten to secure the seat. Always refer to the child restraint system manufacturer's recommendation before installing the child restraint system in your vehicle.



SB100G1-A

Installation on Outboard Rear Seats

To install a child restraint system on the outboard rear seats, extend the shoulder/lap belt entirely from its retractor until a "click" is felt. This will engage the seat belt retractor automatic locking feature, which allows the seat belt to retract but not extend. Install the child restraint system, buckle the seat belt and allow the seat belt to take up any slack. Make sure that the lap portion of the belt is tight around the child restraint system and the shoulder portion of the belt is positioned so that it can not interfere with the child's head or neck. Also, double check to be sure that the retractor has engaged the Automatic Locking mode by trying to extend webbing out of the retractor. If the retractor is in the Automatic Locking mode, the belt will be locked. After installation of the child restraint system, try to move it in all directions to be sure the child restraint system is securely installed. If you need



to tighten the belt, pull more webbing toward the retractor. When you unbuckle the seat belt and allow it to retract, the retractor will automatically revert back to its normal seated passenger Emergency Locking usage condition.

NOTE:

- o Before installing the child restraint system in any seating position, read the instructions supplied by the child restraint system manufacturer.
- o If the seat belt does not operate as described, have the system checked immediately by your authorized Hyundai dealer.

WARNING:

- o If the retractor is not in the Automatic Locking mode, the child restraint system can move when your vehicle turns or stops abruptly.
- o Do not install a child restraint system in the front passenger seat. Should an accident occur and cause the passenger side supplemental airbag to deploy, it could severely injure an infant seated in a child restraint. Therefore, only use a child restraint in the rear seat of your vehicle.

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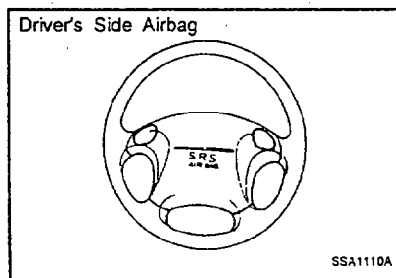
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YB150A1-A

SUPPLEMENTAL RESTRAINT (AIRBAG) SYSTEM (If installed)

Your Hyundai is equipped with a Supplemental Restraint (Airbag) System. The indications of the system's presence are the letters "SRS AIR BAG" embossed on the airbag pad cover in the steering wheel and the passenger's side front panel pad above the glove box.

The Hyundai SRS consists of airbags installed under the pad covers in the center of the steering wheel and the passenger's side front panel above the glove box. The purpose of the SRS is to provide the vehicle's driver and/or the front passenger with additional restraint than that offered by the seat-belt system alone, in case of a frontal impact of sufficient severity.



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NOTE:

Be sure to read information about the SRS on the labels provided on the backside of the sun visor and in the glove box.

WARNING:

- o As its name implies, the SRS is designed to work with, and be supplemental to, the driver's and the passenger's three point seatbelt systems and is not a substitute for them. Therefore your seat belts must be worn at all times while the vehicle is in motion. In addition, the airbags deploy only in certain frontal impact conditions severe enough to likely cause significant injury to the vehicle occupants.
- o The SRS is designed to deploy the airbags only when an impact is sufficiently severe and when the impact angle is less than 30° from the forward longitudinal axis of the vehicle and will not deploy in side, rear or rollover impacts.
- o For maximum safety protection in all types of crashes, all occupants including the driver should always wear their seat belts whether or not an airbag is also provided at their seating position to minimize the risk of severe injury or death in the event of a crash. Do not sit or lean unnecessarily close to the airbag while the vehicle is in motion.

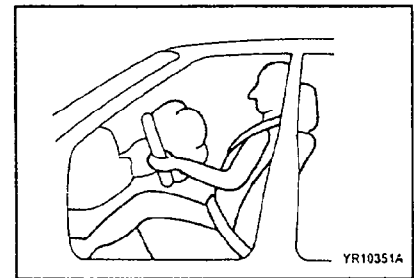
YB150B1-A

SRS Components and Functions

The SRS consists of the following components:

- Driver's Side Airbag Module
- Passenger's Side Airbag Module
- Knee Bolster
- SRS Service Reminder Indicator (SRI).
- SRS Control Module (SRSCM)

The SRSCM continually monitors all elements while the ignition is "ON" to determine if a frontal or near-frontal impact is severe enough to require airbag deployment.



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The SRS service reminder indicator (SRI) on the instrument panel will blink for about 6 seconds after the ignition key is turned to the "ON" position or after the engine is started, after which the SRI should go out.

The airbag modules are located both in the center of the steering wheel and in the front passenger's panel above the glove box. When the SRSCM detects a considerable impact to the front of the vehicle, it will automatically deploy the airbags.

Upon deployment, tear seams molded directly into the pad covers will separate under pressure from the expansion of the airbags. Further opening of the covers then allows full inflation of the airbags.

A fully inflated airbag in combination with a properly worn seat belt slows the driver's or the passenger's forward motion, thus reducing the risk of head or chest injury.

After complete inflation, the airbag immediately starts deflating, enabling the driver to obtain forward visibility.

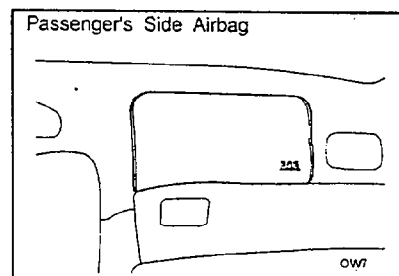
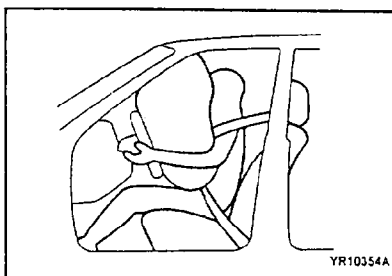
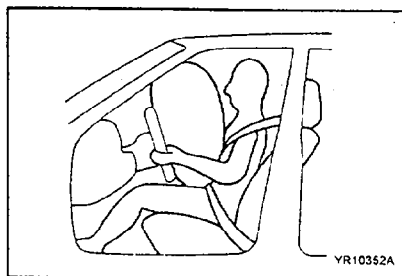
WARNING:

- o When the SRS is activated, there may be a loud noise and fine dust will be released through the instruments.

These conditions are normal and are not hazardous.

However, the fine dust generated during airbag deployment may cause skin irritation. Be sure to wash your hands and face thoroughly with lukewarm water and a mild soap after an accident in which the airbags were deployed.

- o The SRS can function only when the ignition key is in the "ON" position. If the SRS SRI does not come on, or continuously remains on, after flashing for about 6 seconds when the ignition key is turned to the "ON" position, or after the engine is started, or comes on while driving, the SRS is not working properly.



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If this occurs, have your vehicle immediately inspected by your Hyundai dealer.

- o Before you replace a fuse or disconnect a battery terminal, turn the ignition key to the "LOCK" position or remove the ignition key.

Never remove or replace fuse No. 10 when the ignition key is in the "ON" position. Failure to heed this warning will cause the SRS SRI to illuminate.

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SRS Care

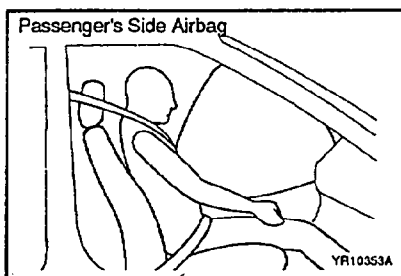
- o The SRS is virtually maintenance-free and so there are no parts you can safely service by yourself. The entire SRS system must be inspected by an authorized Hyundai dealer 10 years after the date that the vehicle was manufactured.
- o Any work on the SRS system, such as removing, installing, repairing, or any work on the steering wheel must be performed by a qualified Hyundai technician. Improper handling of the airbag system may result in serious personal injury.

WARNING:

- o Modification to SRS components or wiring, including the addition of any kind of badges to the pad covers or modifications to the body structure, can adversely affect SRS performance and lead to possible injury.
- o For cleaning the airbag pad covers, use only a soft, dry cloth or one which has been moistened with plain water. Solvents or cleaners could adversely affect the airbag covers and proper deployment of the system.
- o No objects should be placed over or near the airbag modules on the steering wheel, instrument panel, and the front passenger's panel above the glove box, because

any such object could cause harm if the vehicle is in a crash severe enough to cause the airbags to inflate.

- o If the airbags inflate, they must be replaced by an authorized Hyundai dealer.
- o Do not tamper with or disconnect SRS wiring, or other components of the SRS system. Doing so could result in injury, due to accidental firing of the airbags or by rendering the SRS inoperative.
- o Do not install a child restraint system in the front passenger seat position. A child restraint system must never be placed in the front seat. The infant or baby could be severely injured by an airbag deployment in case of an accident.
- o If components of the airbag system must be discarded, or if the vehicle must be scrapped, certain safety precautions must be observed. Your Hyundai dealer knows these precautions and can give you the necessary information. Failure to follow these precautions and procedures could increase the risk of personal injury.
- o If you sell your vehicle, be sure to inform the new owner of these important points and make certain that this manual is transferred to the new owner.
- o If your car was flooded and has soaked carpeting or water on flooring, you shouldn't try to start engine; have car towed to authorized Hyundai dealer.



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