

REPORT NO. TRC-93-N13

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

HYUNDAI MOTOR COMPANY

1994 HYUNDAI ELANTRA

4-DOOR SEDAN

NHTSA NO. MR0501

TRC TEST NO. 940518

PREPARED BY:

TRANSPORTATION RESEARCH CENTER INC.

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JUNE 13, 1994

FINAL REPORT

PREPARED FOR:

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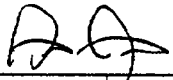
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WASHINGTON, D.C. 20590

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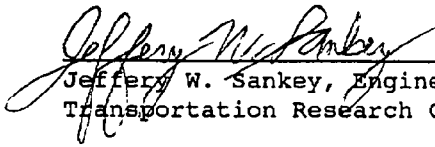
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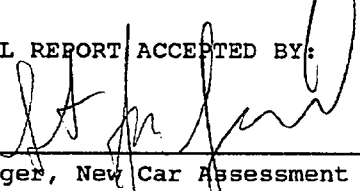
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16. Abstract A 56 kph (35 mph) frontal load cell barrier impact test was conducted on a 1994 Hyundai Elantra 4-door sedan, NHTSA No. MR0501, at Transportation Research Center Inc. on May 18, 1994. This test was conducted to obtain new car assessment 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 508 millimeters. The ambient temperature was 21° C. The driver's Head Injury Criteria (HIC) was 575. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 54.4 g. The driver's chest maximum deflection was 48 millimeters. The driver's left and right femur maximum axial forces were 1956 N and 6336 N, respectively. The passenger's HIC was 1602. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.4 g. The passenger's chest maximum deflection was 68 millimeters. The passenger's left and right femur maximum axial forces were 3983 N and 6025 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 Retention" 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

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

*1 in = 2.54 exactly. For other exact conversions and more detailed tables, see NIST Mon. Publ. 286, Units of Weights and Measures, Price \$2.25, 3D Catalog No. C-1.10286.

Approximate Conversions from Metric Measures

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

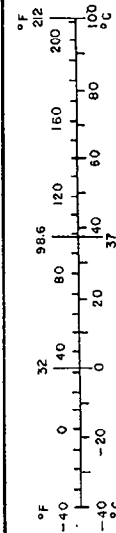


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SECTION 1.0

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 No. 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 1994 Hyundai Elantra 4-door sedan, NHTSA No. MR0501, 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 four (4) seat belt load cells to measure lap belt tension and shoulder belt tension. 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 third use of the driver dummy and the first use of the passenger dummy.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. Each Part 572E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection and a six-axis neck load cell to measure longitudinal, lateral, and vertical forces and moments.

The eighty-three (83) data channels were multiplexed and recorded on two (2) 14-track tape drives. The data was digitally sampled 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 May 18, 1994.

The test vehicle, a 1994 Hyundai Elantra 4-door sedan, NHTSA No. MR0501, was equipped with a 1.8-liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 1379 KG. The vehicle's impact speed was 56.3 kph. The vehicle sustained 508 mm of static crush during the impact.

The driver's Head Injury Criteria (HIC) was 575. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 54.4 g. The driver's chest maximum deflection was 48 mm. The driver's left and right femur maximum axial forces were 1956 N and 6336 N, respectively.

The passenger's HIC was 1602. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.4 g. The passenger's chest maximum deflection was 68 mm. The passenger's left and right femur maximum axial forces were 3983 N and 6025 N, respectively.

There was loss of windshield periphery retention from 150 to 200 millimeters measured from the lower left corner and from 30 to 70 millimeters and from 120 to 180 millimeters measured from the lower right corner along the lower edge.

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 following barrier load cells recorded anomalous oscillations after 200 milliseconds:

BA1F, BA2F, BA3F, BA4F, BA5F, BA6F, BA7F, BA8F, BA9F
BB1F, BB2F, BB3F, BB4F, BB5F, BB6F, BB7F, BB8F, BB9F
BC1F, BC2F, BC3F, BC4F, BC5F, BC6F, BC7F, BC8F, BC9F
BD1F

The cause of the oscillations could not be found after extensive research into the problem.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: MR0501 TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 05/18/94 TEST TIME: 1501 AMBIENT TEMP.: 21° C

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1994/Hyundai/Elantra/4-door sedan

VEHICLE TEST WEIGHT (KG): 1379

IMPACT ANGLE (DEG)¹: 0

IMPACT VELOCITY (KPH)²: PRIMARY = 56.3 SECONDARY = 56.3

MAXIMUM STATIC CRUSH (MM): 508

AVERAGE REBOUND (MM): 490

DUMMIES:	Driver #142	Passenger #192
TYPE:	Part 572 E	Part 572 E
LOCATION:	Left front	Right front
RESTRAINT:	Airbag and 3-point unbelt	3-point passive belt

NUMBER OF DATA CHANNELS: 83

NUMBER OF CAMERAS: HIGH-SPEED 14 REAL-TIME 2

¹With respect to tow track centerline.

²Speed trap measurement (± .08 kph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Hyundai Motor Company

MAKE/MODEL: Hyundai/Elantra VIN: KMHJF22M7RU548836

BODY STYLE: 4-door sedan MODEL YEAR: 1994

NHTSA NO.: MR0501 COLOR: Blue

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT: 1.8-liter

TRANSMISSION DATA: 4 SPEED, MANUAL, X AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 05/12/94 ODOMETER READING: 73

DEALER'S NAME AND ADDRESS: Claremont Hyundai
667-A Claremont Center Drive
Claremont, CA 91711

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	Yes
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	Yes
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes
OTHER			

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Hyundai Motor Company

DATE OF MANUFACTURE: 10/18/93 VIN: KMHJF22M7RU548836

GVWR: 1640 kg

GAWR: FRONT: 900 kg, REAR: 795 kg

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Goodyear, Invicta, 175/65R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 300 kPa
REAR: 300 kPa

SPARE TIRE (MFR., SIZE): General Temp, /T125/70D15

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Adjustable

MAXIMUM WIDTH: 1686 MM

WHEELBASE: 2495 MM

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the driver's door.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P175/65R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 29 psi ; REAR: 29 psi

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR
5 TOTAL

VEHICLE CAPACITY WEIGHT: 860 lb

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE: LF 644; RF 646; LR 643; RR 652

PRE-TEST ATTITUDE: LF 617; RF 617; LR 600; RR 600

POST-TEST ATTITUDE: LF 679; RF 646; LR 603; RR 593

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE AS RECEIVED (WITH MAXIMUM FLUIDS):

RIGHT FRONT	369.0 KG	RIGHT REAR	213.5 KG
LEFT FRONT	385.0 KG	LEFT REAR	214.0 KG
TOTAL FRONT WEIGHT	754.0 KG	(63.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	427.5 KG	(36.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1181.5 KG		

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW¹ = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (1181.5 KG)

VCW = VEHICLE CAPACITY WEIGHT (390 KG)

DSC = DESIGNATED SEATING CAPACITY (5)

RCLW¹ = VCW - 68 (DSC) = 50 KG

TARGET TEST WEIGHT=UDW + RCLW¹ + (NO. OF HYBRID III DUMMIES X 76 KG/DUMMY)

TARGET TEST WEIGHT = 1181.5 + 50 + 152

TARGET TEST WEIGHT = 1383.5 KG

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 46 KG OF CARGO WEIGHT:

RIGHT FRONT	400.0 KG	RIGHT REAR	285.5 KG
LEFT FRONT	421.0 KG	LEFT REAR	273.0 KG
TOTAL FRONT WEIGHT	821.0 KG	(59.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	558.5 KG	(40.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1379.5 KG	(0.4% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE: 0 KG

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Rear bumper, muffler, trunk lid, rear door glass and trim

CG = 1009 MM REARWARD OF FRONT WHEEL CENTERLINE

¹ Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 136 KG, whichever is less.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 940518 NHTSA NO.: MR0501
TEST DATE: 05/18/94 TEST TIME: 1501
TEST TYPE: Frontal load cell barrier IMPACT ANGLE: 0°
AMBIENT TEMPERATURE AT IMPACT AREA: 21° C
TEMPERATURE IN OCCUPANT COMPARTMENT: 21° C
IMPACT VELOCITY: PRIMARY = 56.3 KPH SECONDARY = 56.3 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 (ALL MEASUREMENTS ARE IN MILLIMETERS):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 4170; C 4319; R 4215

POST-TEST: L 3715; C 3817; R 3771

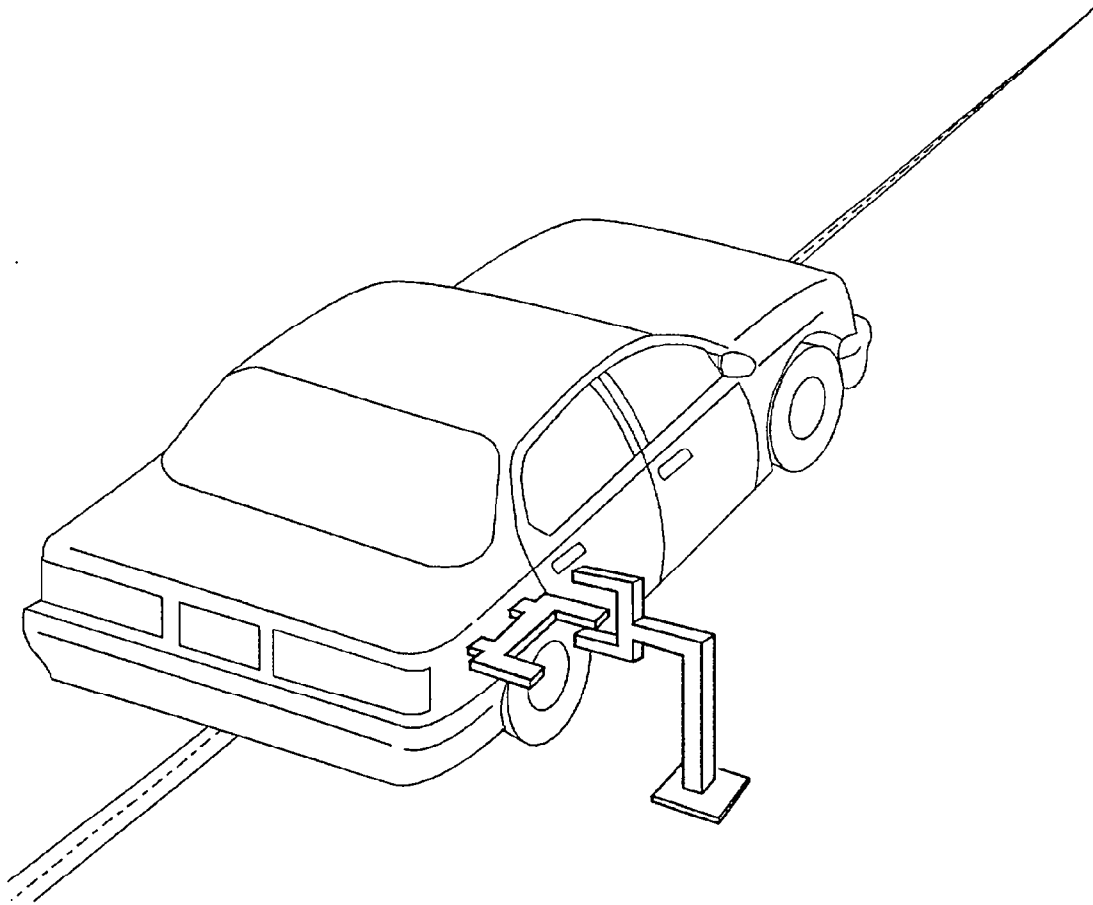
TOTAL CRUSH: L 455; C 502; R 444

AVERAGE CRUSH: 467

TEST VEHICLE REBOUND FROM FLAT BARRIER
(ALL MEASUREMENTS ARE IN MILLIMETERS):

DISTANCE FROM TEST VEHICLE TO BARRIER: L 517; C 456; R 496; AVG. 490

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have 305-millimeter spacing.

FIGURE 2 ACCIDENT INVESTIGATION DIVISION DATA
FOR 56 KPH (35 MPH) FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Hyundai/Elantra/4-door sedan

VEHICLE NHTSA NO.: MR0501; VIN: KMHJF22M7RU548836

MODEL YEAR: 1994; BUILD DATE: 10/18/93; TEST DATE: 05/18/94

VEHICLE SIZE CATEGORY: Compact; TEST WEIGHT: 1379 KG

VEHICLE WHEELBASE: 2495 MM

MAXIMUM WIDTH: 1686 MM

FRONT OVERHANG: 922 MM

COLLISION DEFORMATION
 CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
 MEASUREMENTS:

C1 =	<u>455</u>	MM
C2 =	<u>480</u>	MM
C3 =	<u>508</u>	MM
C4 =	<u>498</u>	MM
C5 =	<u>470</u>	MM
C6 =	<u>444</u>	MM

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
 REGION: L = 1396 MM

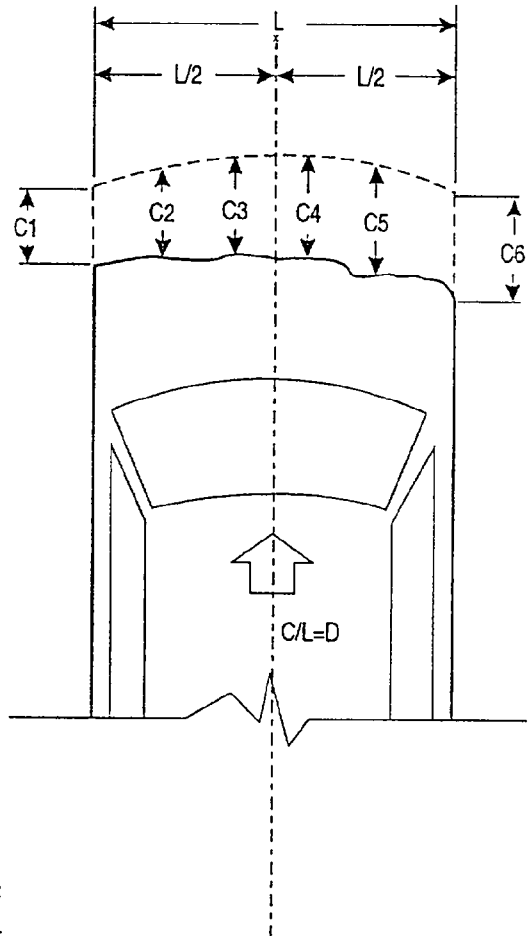
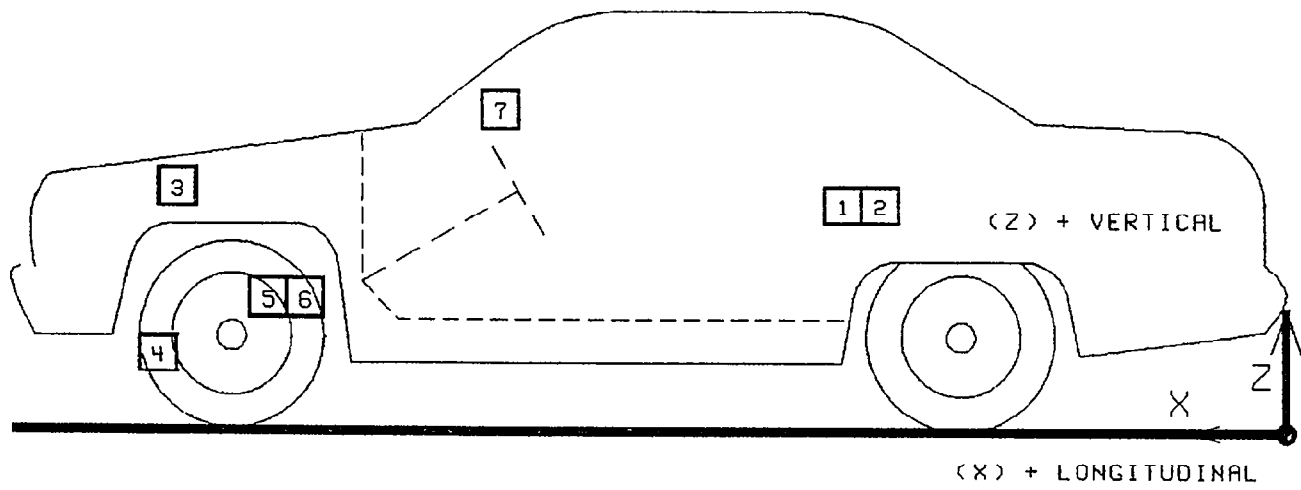
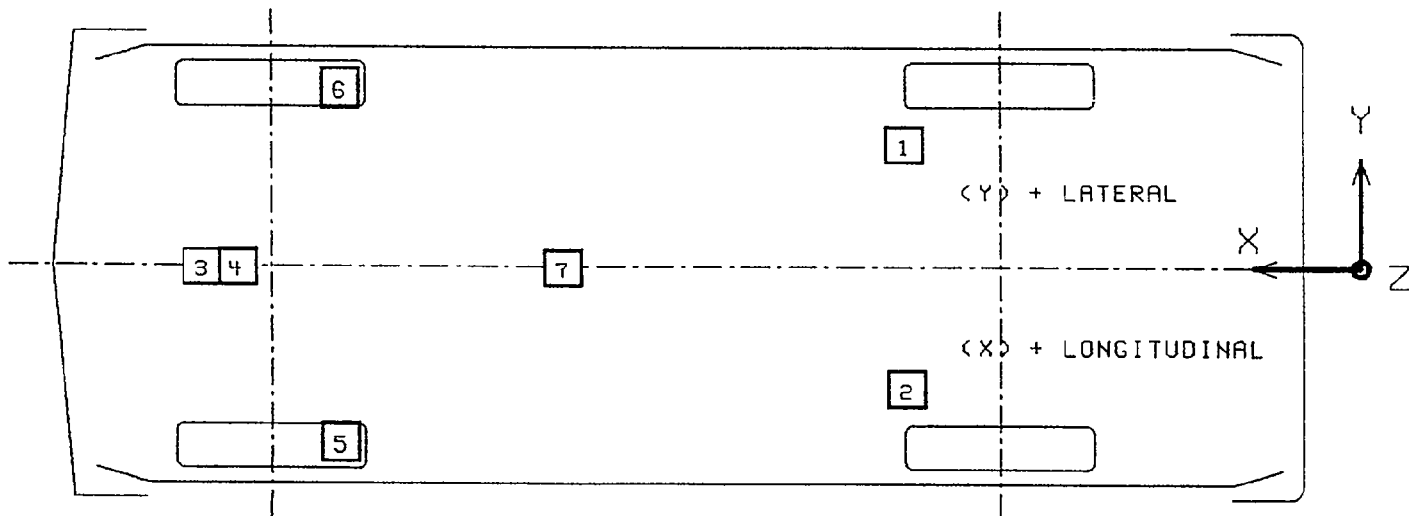


FIGURE 3 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4 VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL REDUNDANT	2725 mm	368 mm	423 mm	3.6 g @ 143.1 ms 3.9 g @ 114.2 ms	56.0 g @ 55.0 ms 56.4 g @ 55.0 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL REDUNDANT	2733 mm	-378 mm	414 mm	4.1 g @ 142.7 ms 4.4 g @ 142.7 ms	55.2 g @ 34.8 ms 55.5 g @ 34.8 ms
3 ENGINE TOP LONGITUDINAL	700 mm	83 mm	769 mm	27.0 g @ 36.0 ms	150.1 g @ 25.8 ms
4 ENGINE BOTTOM LONGITUDINAL	857 mm	255 mm	165 mm	80.2 g @ 31.6 ms	150.4 g @ 21.8 ms
5 RIGHT BRAKE CALIPER LONGITUDINAL	775 mm	-641 mm	270 mm	48.1 g @ 57.4 ms	117.7 g @ 38.6 ms
6 LEFT BRAKE CALIPER LONGITUDINAL	804 mm	641 mm	268 mm	73.7 g @ 57.6 ms	134.0 g @ 39.6 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	1490 mm	5 mm	921 mm	59.8 g @ 58.3 ms	87.7 g @ 49.2 ms

* 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:

	DRIVER #142	PASSENGER #192
HEAD	<u>Airbag</u>	<u>Instrument Panel</u>
CHEST	<u>Airbag</u>	<u>None</u>
ABDOMEN	<u>Steering wheel rim</u>	<u>None</u>
LEFT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>
RIGHT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
FRONT	<u>Easy</u>	<u>Easy</u>
REAR	<u>Easy</u>	<u>Easy</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>None</u>
REAR	<u>NA</u>	<u>NA</u>

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: 1994/Hyundai/Elantra/4-door sedan

VEHICLE NHTSA NO.: MR0501; TEST DATE: 05/18/94

	DRIVER DUMMY #142	PASSENGER DUMMY #192
<u>MAXIMUM ACCELERATIONS (G):</u>		
HEAD X-AXIS	-57.0	-90.3
HEAD Y-AXIS	8.9	-21.4
HEAD Z-AXIS	-29.6	-74.6
HEAD RESULTANT	62.5	105.4
CHEST X-AXIS	-56.0	-56.8
CHEST Y-AXIS	7.6	-11.5
CHEST Z-AXIS	-8.2	-10.5
CHEST RESULTANT ¹	54.4	56.4
CHEST RESULTANT TIME INTERVAL (SEC.) ¹	.003	.003

HEAD INJURY CRITERIA (HIC) VALUES:

HIC ²	575	1602
HIC STARTING TIME (SEC.)	.058	.067
HIC ENDING TIME (SEC.)	.094	.102
AVG. HEAD RESULTANT ACCEL. DURING HIC TIME INTERVAL (G)	48.0	73.3

MAXIMUM CHEST DEFLECTIONS (MM):

CHEST X-AXIS ³	48	68
MAXIMUM CHEST DEFLECTION TIME (SEC)	.079	.088

MAXIMUM COMPRESSIVE FEMUR FORCES (N):

LEFT FEMUR	1956	3983
RIGHT FEMUR	6336	6025

MAXIMUM SEAT BELT FORCES (N):

LAP BELT	8124	4463
SHOULDER BELT	8170	11154

NOTE: ALL VALUES LISTED MUST BE OCCURRING DURING PRIMARY IMPACT EVENT.
(HEAD ACCELERATIONS LISTED MUST BE DURING HIC TIME INTERVAL.)

¹0.003 SEC. MINIMUM DURATION.

²THE MAXIMUM HIC TIME INTERVAL IS 36 MILLISECONDS.

TABLE 7 HYBRID III NECK DATA SUMMARY

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1994/Hyundai/Elantra/4-door sedan

VEHICLE NHTSA NO.: MR0501; TEST DATE: 05/18/94

<u>MAXIMUM VALUES:</u>	<u>DRIVER DUMMY #142</u>	<u>PASSENGER DUMMY #192</u>
NECK X-AXIS FORCE (N)	762	1373
NECK Y-AXIS FORCE (N)	-158	-500
NECK Z-AXIS FORCE (N)	1664	3360
NECK MOMENT ABOUT X AXIS (N-M)	11	-59
NECK MOMENT ABOUT Y AXIS (N-M)	49	-30
NECK MOMENT ABOUT Z AXIS (N-M)	4	43

NOTE: ALL VALUES LISTED MUST BE OCCURRING DURING PRIMARY IMPACT EVENT.

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's upper torso rotated slightly forward with the dummy's head and chest impacting the airbag. The driver dummy was restrained by the airbag and the three-point unbelt. The dummy rebounded rearward into the seat back with the dummy's head contacting the head restraint. The driver dummy came to rest 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 upper torso rotated forward impacting the dummy's head on the dash. The right front passenger dummy was restrained by the three-point belt. The dummy rebounded rearward into the seat back as the dummy's head rotated rearward contacting the head restraint. The right front passenger dummy came to rest in the right front passenger's seat restrained by the three-point passive seat belt.

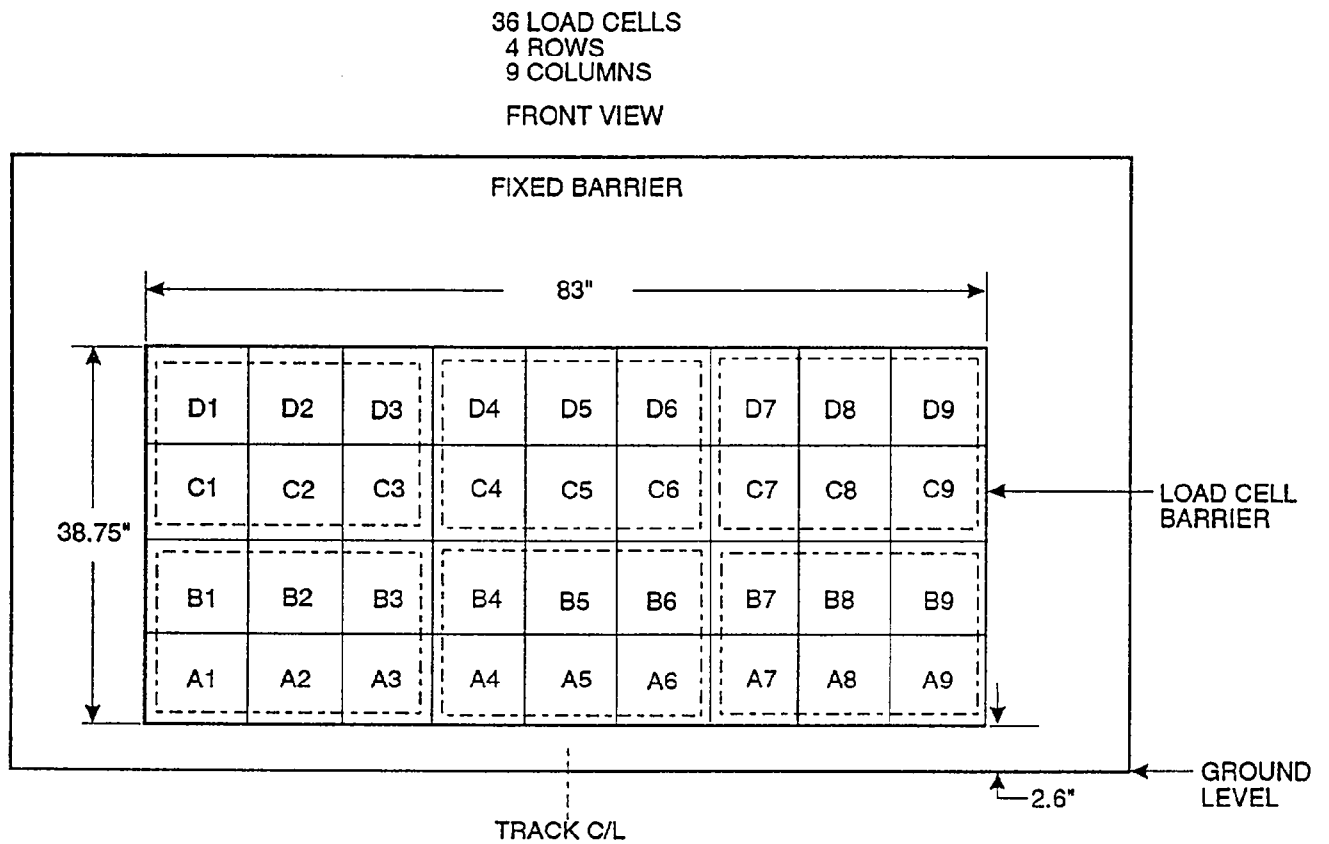
TABLE 8 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	DRIVER	PASSENGER
<u>BELT LENGTH DATA:</u>		
BELT LENGTH FROM TRIM PANEL EXIT TO BOLT HOLE ANCHOR POINT FOR CONTINUOUS WEBBING SYSTEMS.	2580	4137
SHOULDER BELT LENGTH AS MEASURED ON PART 572 DUMMY.	805	840
LAP BELT LENGTH AS MEASURED ON PART 572 DUMMY.	805	590
<u>SHOULDER BELT SPOOL-OFF LENGTH:</u>		
AS DETERMINED BY FILM ANALYSIS ¹	NA	NA
AS DETERMINED MECHANICALLY	68	78
AS DETERMINED ELECTRONICALLY	81	103
<u>BELT STRETCH LENGTH (MM/M):</u>		
AS MEASURED MECHANICALLY	0	9
AS MEASURED ELECTRONICALLY	63	47
<u>RETRACTOR LOCK-UP TIME (MS):</u>		
AS DETERMINED BY SHOULDER BELT SPOOL-OFF	85	68

ALL MEASUREMENTS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

¹There were no cameras mounted on the vehicle because of weight constraints.

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 ¹	89.5 kN @ 261.1 ms	118.1 kN @ 26.6
TOTAL GROUP 2 ¹	91.6 kN @ 261.1 ms	293.2 kN @ 27.8
TOTAL GROUP 3 ¹	84.9 kN @ 261.1 ms	80.9 kN @ 17.2
TOTAL GROUP 4 ¹	78.5 kN @ 261.0 ms	60.3 kN @ 308.5
TOTAL GROUP 5 ¹	50.5 kN @ 261.2 ms	36.2 kN @ 308.9
TOTAL GROUP 6 ¹	61.4 kN @ 261.0 ms	42.7 kN @ 308.6
TOTAL LOAD CELL FORCE ¹	456.2 kN @ 261.1 ms	537.8 kN @ 27.4

TENSION IS POSITIVE
COMPRESSION IS NEGATIVE

¹ See DATA ACQUISITION EXPLANATIONS

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.:

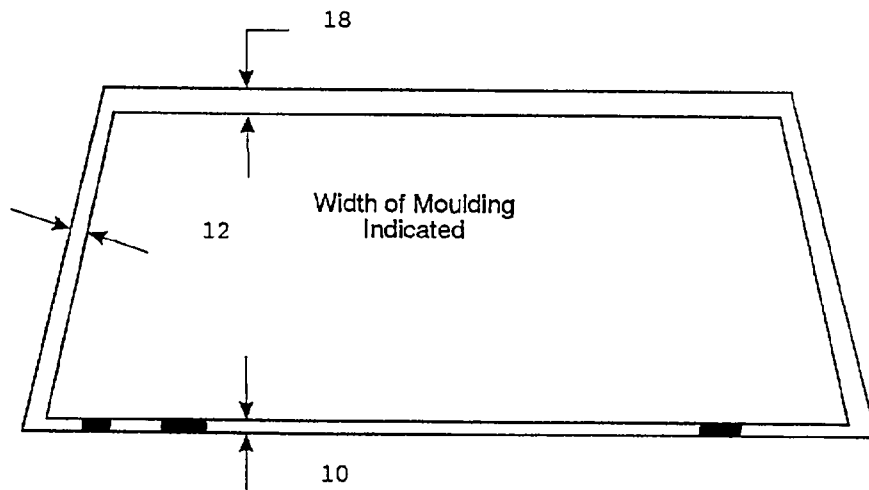
Plastic trim around outer perimeter, adhesive around inner perimeter.

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>PERCENT POST-TEST</u>	<u>RETENTION</u>
RIGHT SIDE	1975	1875	94.9%
LEFT SIDE	1975	1925	97.5%
TOTAL	3950	3800	96.2%

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 21° C



FRONT VIEW OF WINDSHIELD¹

LOSS OF WINDSHIELD RETENTION LENGTHS:

There was loss of windshield periphery retention from 150 to 200 millimeters measured from the lower left corner and from 30 to 70 millimeters and from 120 to 180 millimeters measured from the right along the lower edge.

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

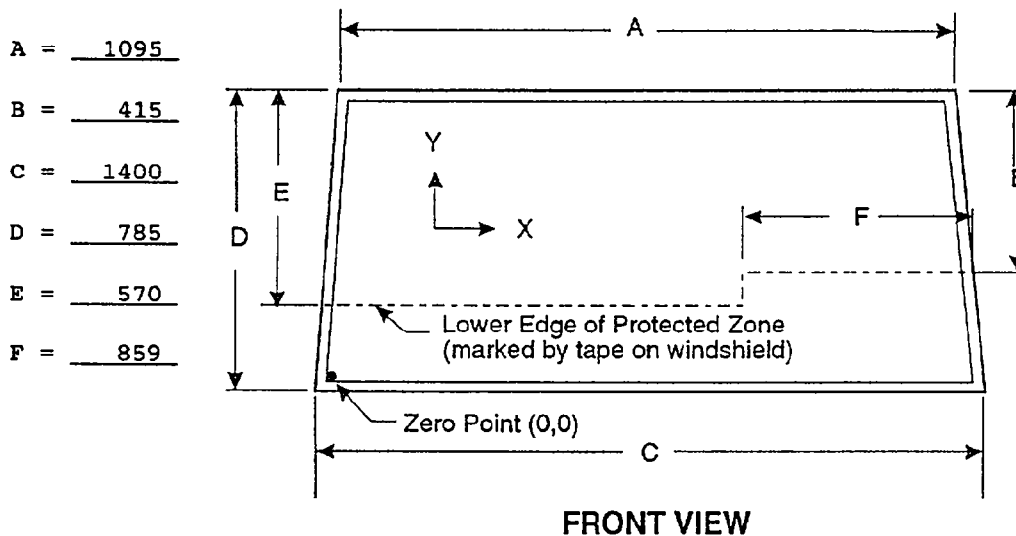
¹INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

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:



METHOD OF ADHERING PROTECTED ZONE TEMPLATE TO WINDSHIELD: NA

AREAS OF WINDSHIELD TEMPLATE PENETRATION

GREATER THAN 6.0 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.

ALL MEASUREMENTS ARE IN MILLIMETERS.

TABLE 10 FUEL SYSTEM DATA

MAKE/MODEL: Hyundai/Elantra

NHTSA NO.: MR0501

FUEL SYSTEM CAPACITY: 52.0 LITERS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 51.9 LITERS (FURNISHED BY COTR)

TEST VOLUME RANGE: 47.7 LITERS TO 48.8 LITERS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 48.3 LITERS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel tank is located in front of the rear axle. The fuel filler neck is located on the right side. The fuel lines run along the left side to the front.

ELECTRIC FUEL PUMP: Yes FUEL INJECTION: Yes

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? No

TABLE 11 FMVSS 301 POST-IMPACT TEST DATA

TEST VEHICLE NHTSA NO.: MR0501; TEST DATE: 05/18/94

VEHICLE MAKE/MODEL/BODY STYLE: 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:

 X 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:

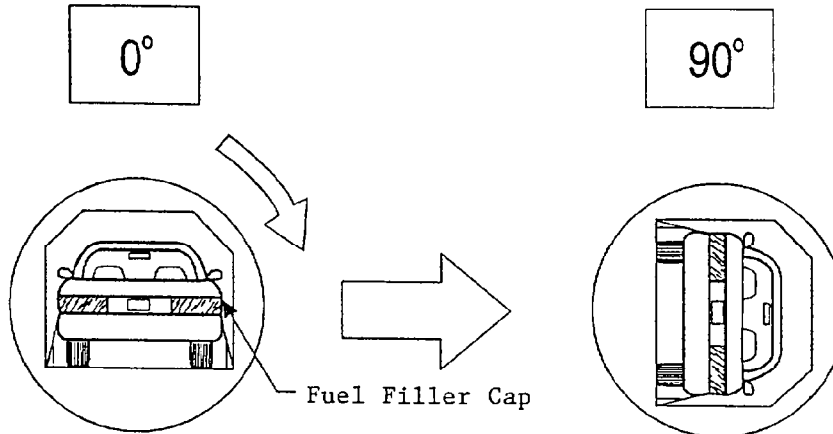
	<u>TEST</u> <u>RESULTS</u>	<u>MAXIMUM</u> <u>ALLOWABLE</u>
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 G	28 G
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 G	142 G
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 G	28 G/MN

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA

NHTSA NO.: MRO501
TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQUIRED FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds
FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds
TOTAL - - - - - = 7 minutes, 00 seconds
NEXT WHOLE MINUTE INTERVAL - - - - - = 7 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

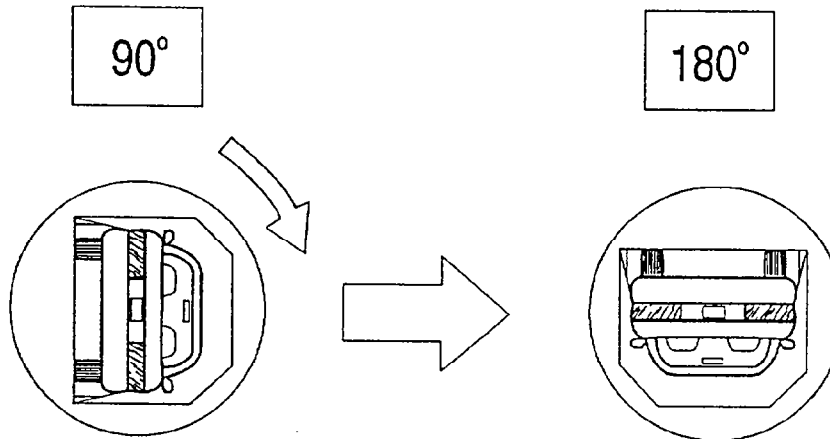
<u>0° TO 90° ROTATION (FUEL FILLER CAP DOWN)</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: MR0501
TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQUIRED FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds
 FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds
 TOTAL - - - - - = 7 minutes, 00 seconds
 NEXT WHOLE MINUTE INTERVAL - - - - - = 14 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

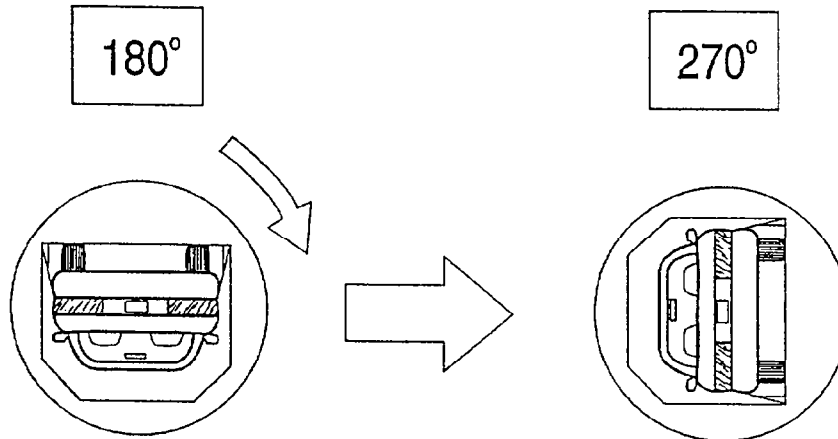
<u>90° TO 180° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: MR0501
TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQUIRED FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds
FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds
TOTAL - - - - - = 7 minutes, 00 seconds
NEXT WHOLE MINUTE INTERVAL - - - - - = 21 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>180° TO 270° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G

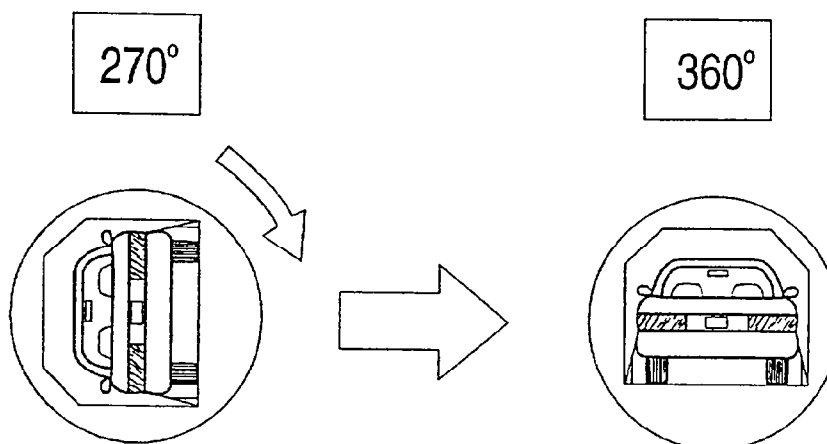
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None _____

FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: MR0501

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQUIRED FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - = 7 minutes, 00 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 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 G	142 G
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 G	28 G

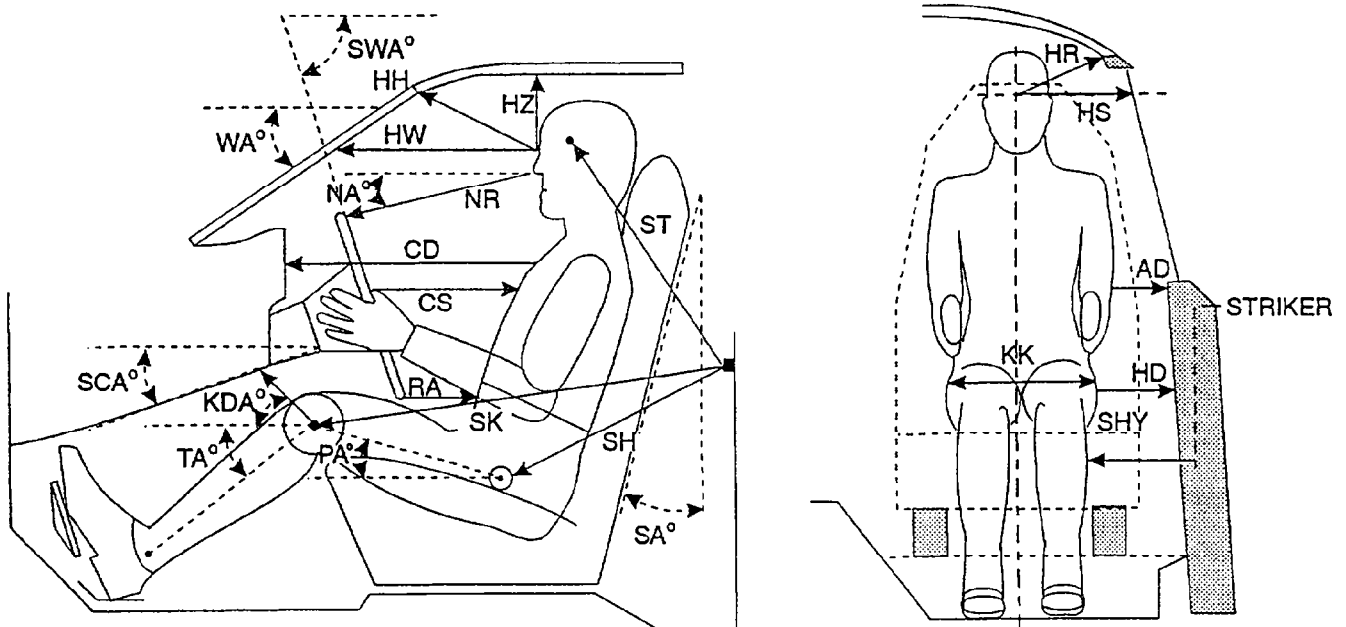
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

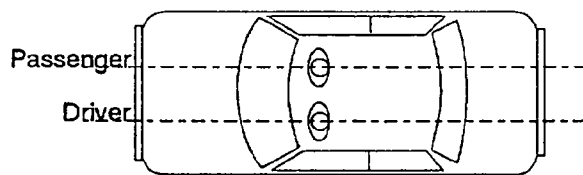
SECTION 4.0

VEHICLE, OCCUPANT, AND CAMERA INFORMATION

FIGURE 8 DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS



VERTICAL LONGITUDINAL PLANE



VERTICAL TRANSVERSE PLANE

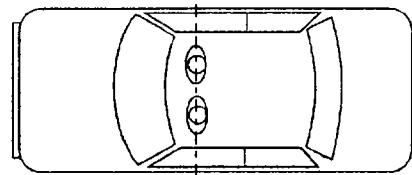


TABLE 12 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

DESIGNATION	TYPE OF MEASUREMENT	DRIVER (SERIAL #142)	PASSENGER (SERIAL #192)
WA°	WINDSHIELD ANGLE	30	30
SWA°	STEERING WHEEL ANGLE	66	NA
SCA°	STEERING COLUMN ANGLE	24	NA
SA°	SEAT BACK ANGLE ¹	18	18
HZ	HEAD TO ROOF	162	130
HH	HEAD TO HEADER	339	303
HW	HEAD TO WINDSHIELD	525	506
HR	HEAD TO SIDE HEADER	182	202
NR	NOSE TO RIM	419	NA
NA	NOSE TO RIM ANGLE	13	NA
CD	CHEST TO DASH	555	573
CS	STEERING WHEEL TO CHEST	337	NA
RA	RIM TO ABDOMEN	209	NA
KDL	LEFT KNEE TO DASH	230	206
KDR	RIGHT KNEE TO DASH	218	207
KDA	OUTBOARD KNEE TO DASH ANGLE	25	20
PA°	PELVIC ANGLE	24	20
TA°	TIBIAL ANGLE	33	36
KK	KNEE TO KNEE	274	274
ST	STRIKER TO HEAD	533	524
	STRIKER TO HEAD ANGLE	-96	-100
SK	STRIKER TO KNEE	582	571
	STRIKER TO KNEE ANGLE	4	2
SH	STRIKER TO H-POINT	216	242
	STRIKER TO H-POINT ANGLE	32	31
SHY	STRIKER TO H-POINT (Y DIR.)	235	220
HS	HEAD TO SIDE WINDOW	225	232
HD	H-POINT TO DOOR	131	130
AD	ARM TO DOOR	120	143

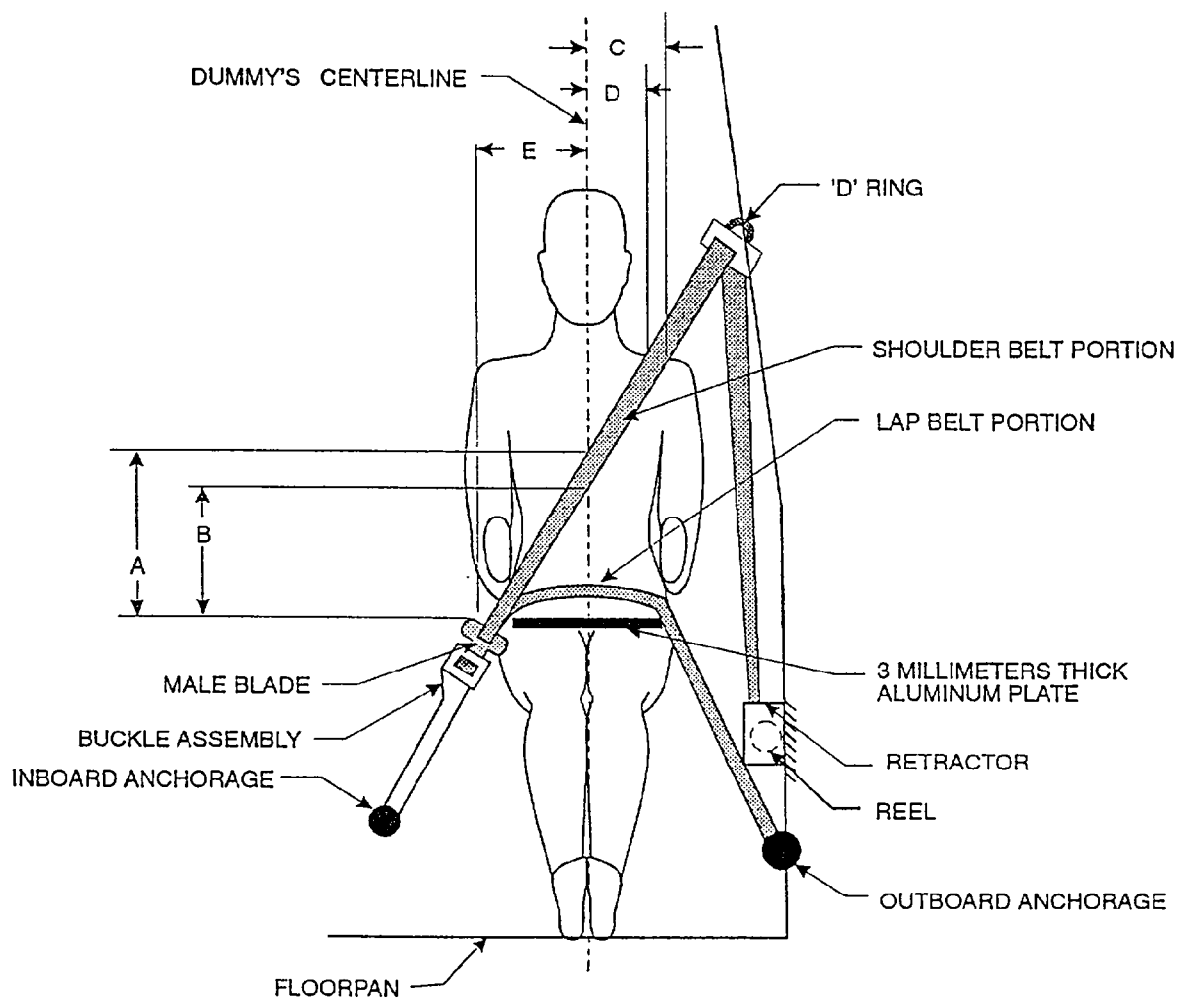
THE SEAT BACK ANGLE (SA°) IS MEASURED RELATIVE TO VERTICAL, ALL OTHER ANGLES ARE MEASURED RELATIVE TO HORIZONTAL.

ALL ANGLE MEASUREMENTS ARE IN DEGREES.

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

¹Angle measured from head restraint support.

FIGURE 9 SEAT BELT POSITIONING DATA



	DRIVER	PASSENGER
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	311	291
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	240	210
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	155	203
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	94	132
LAPBELT TENSION (N)	3	NA
SHOULDER BELT TENSION (N)	3	NA
ADJUSTABLE SEAT BELT ANCHORAGE POSITION	3rd of 5	3rd of 5

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10 CAMERA POSITIONS

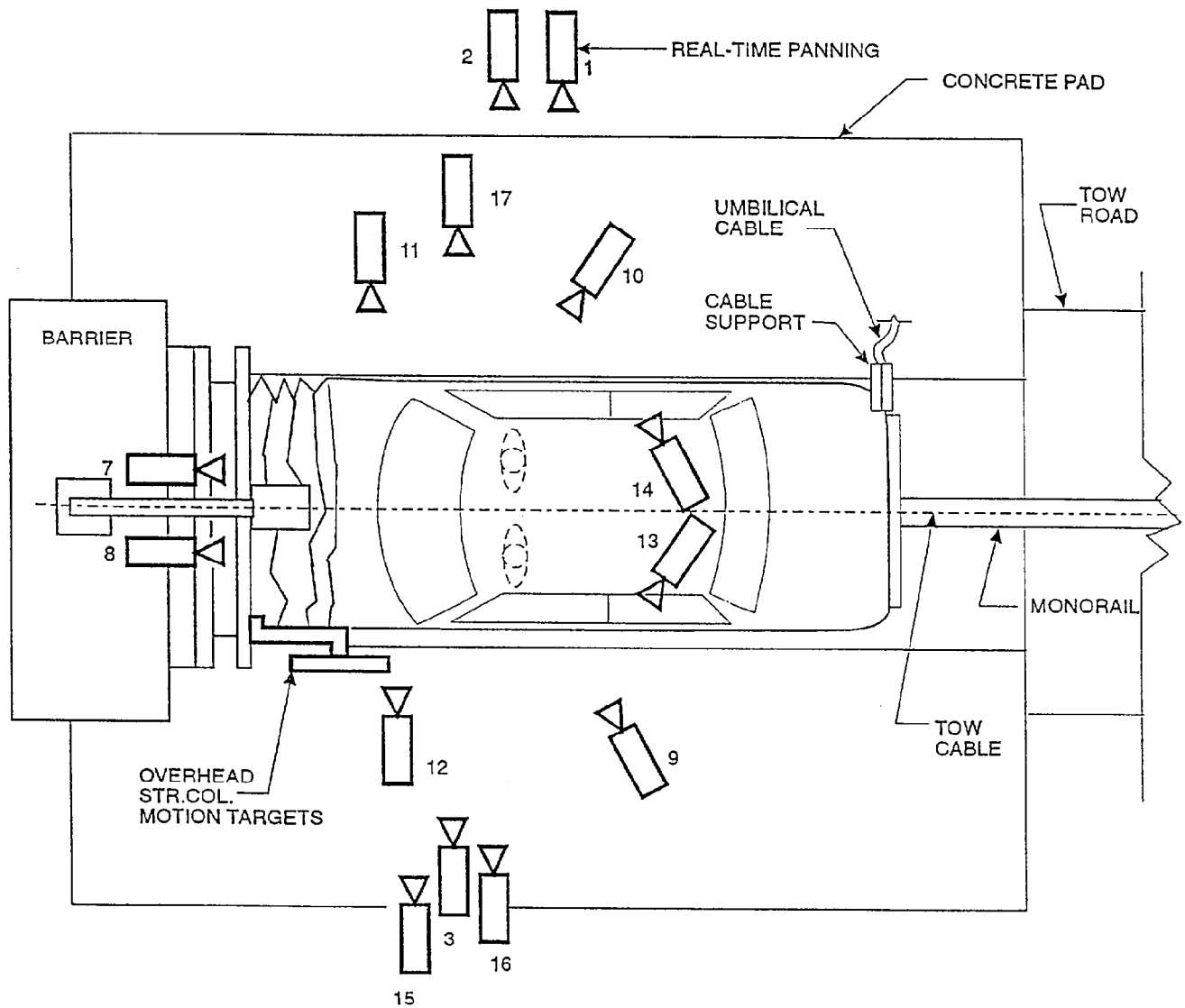


FIGURE 10 CAMERA POSITIONS, CONT'D.

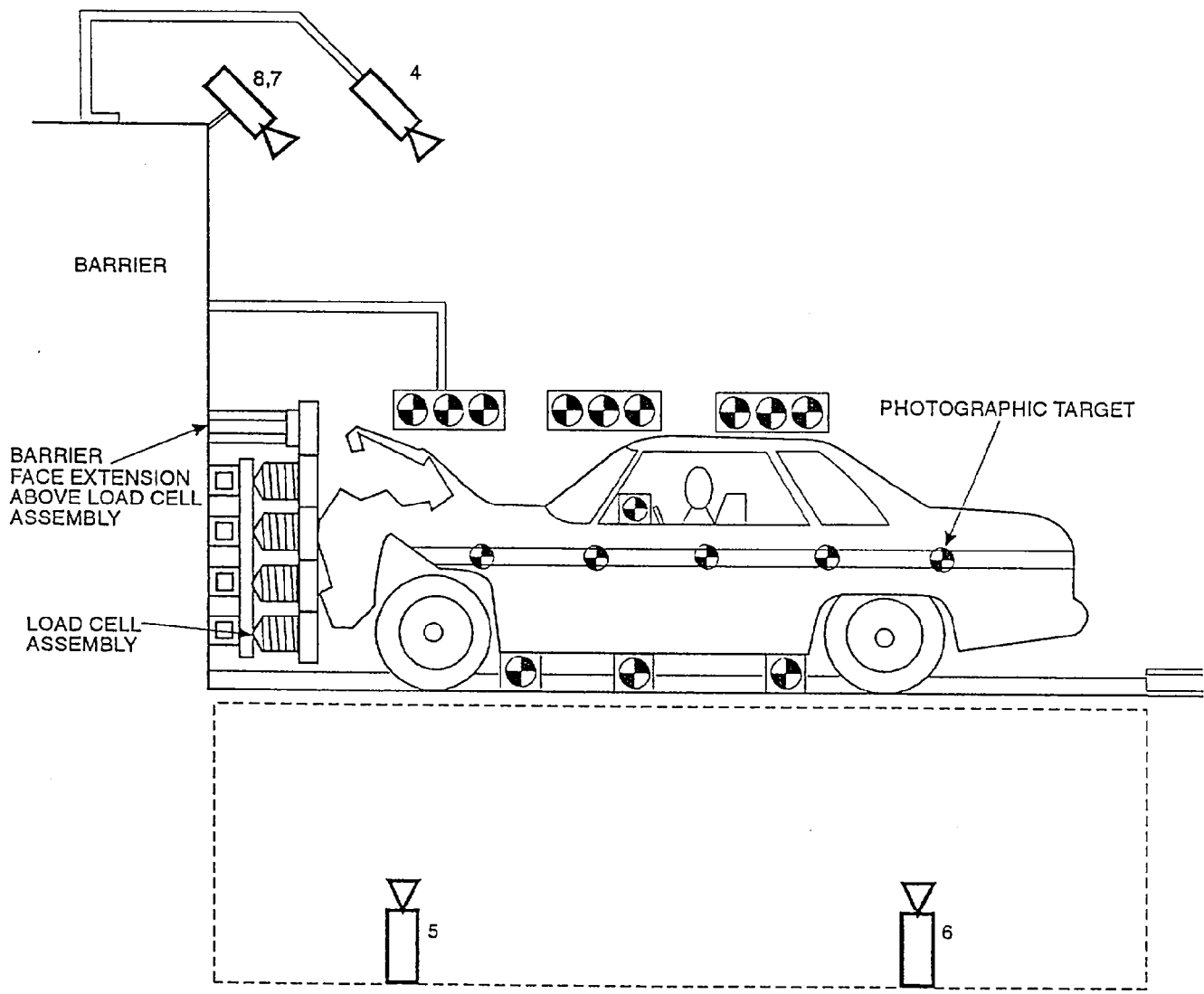


TABLE 13 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 940518		VEHICLE: 1994 Hyundai Elantra				FILM PLANE			FILM SPEED (FPS)
CAMERA NO.	VIEW	CAMERA POSITIONS (MM) ¹			ANGLE ² (DEG)	TO HEAD TARGET (MM)	LENS (MM)		
		X	Y	Z					
1	Real-time panning	-3607	-12802	1549	NA	NA	16	24	
2	Vehicle crush	-2065	-6767	942	-2	NA	13	498	
3	Dummy kinematics	-1054	7493	1118	-12	5309	25	1005	
4	Windshield damage	-925	0	2489	-40	NA	13	502	
5	Crush & fluid spillage	-1283	0	-2347	90	NA	13	500	
6	Fluid spillage	-2522	0	-2515	90	NA	13	510	
7	Passenger kinematics	-114	-351	2159	-40	NA	17	498	
8	Driver kinematics	-173	368	2159	-41	NA	17	520	
9	Driver kinematics	-4572	1854	2591	-27	2362	25	498	
10	Passenger kinematics	-4674	-1880	2540	-26	2159	25	495	
11	Windshield intrusion	-968	-7775	1118	0	NA	50	502	
12	Windshield intrusion	-1346	7859	1074	0	NA	50	502	
13 ³	Driver seat belt movement	NA	NA	NA	NA	NA	NA	NA	
14 ³	Passenger seat belt movement	NA	NA	NA	NA	NA	NA	NA	
15	Column movement	-2235	7264	2616	-14	NA	25	505	
16	Column movement	-2235	7264	1908	-9	NA	25	508	
17	Passenger kinematics	-986	-5354	1151	7	5283	25	1018	

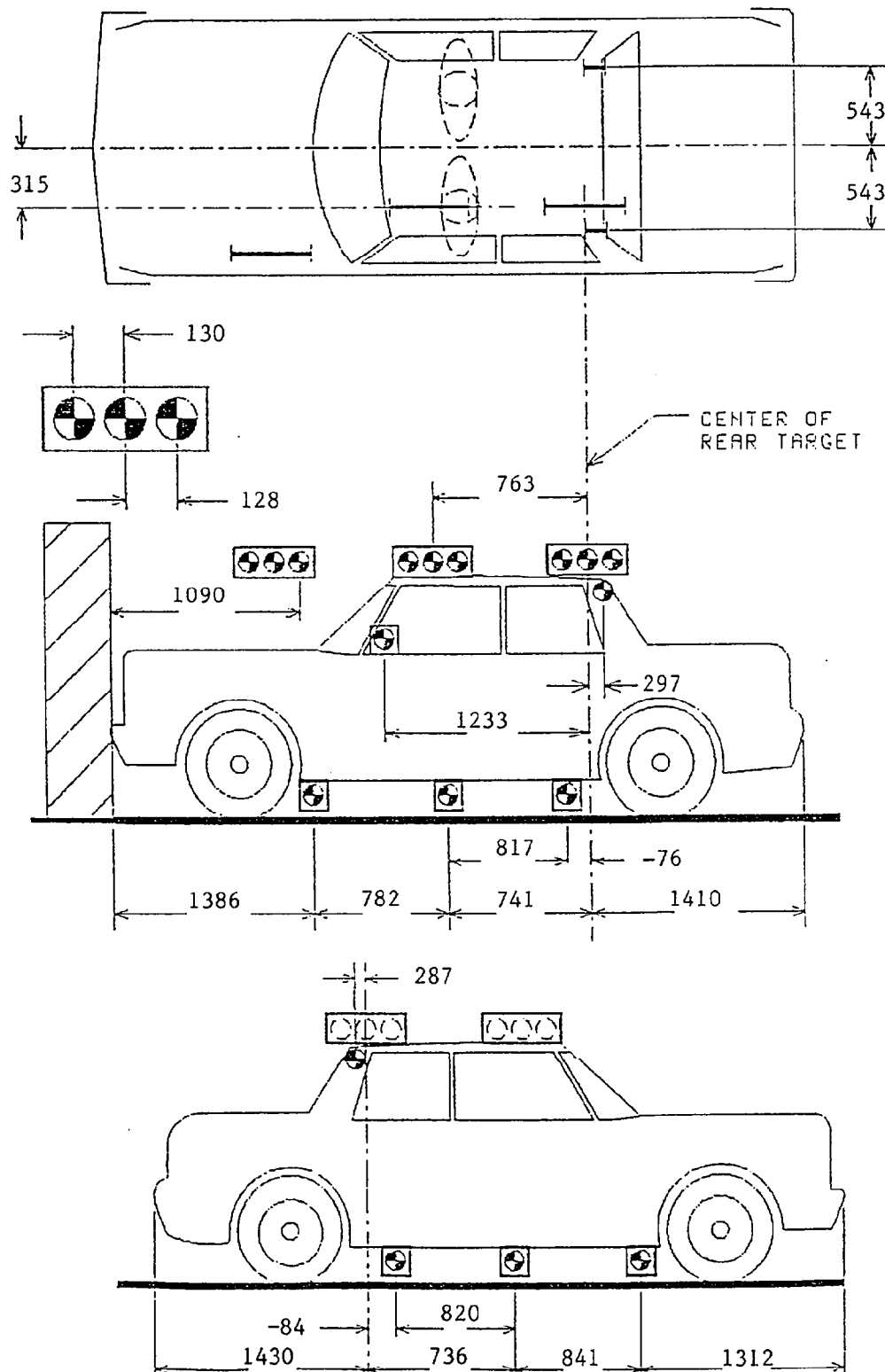
¹ +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

² +Angle = Film plane angled upward from horizontal plane³ There were no cameras mounted on the vehicle because of weight constraints.

FIGURE 11 VEHICLE TARGET LOCATIONS



All measurements are in millimeters.

FIGURE 12 PRE-TEST AND POST-TEST MEASUREMENT POINTS

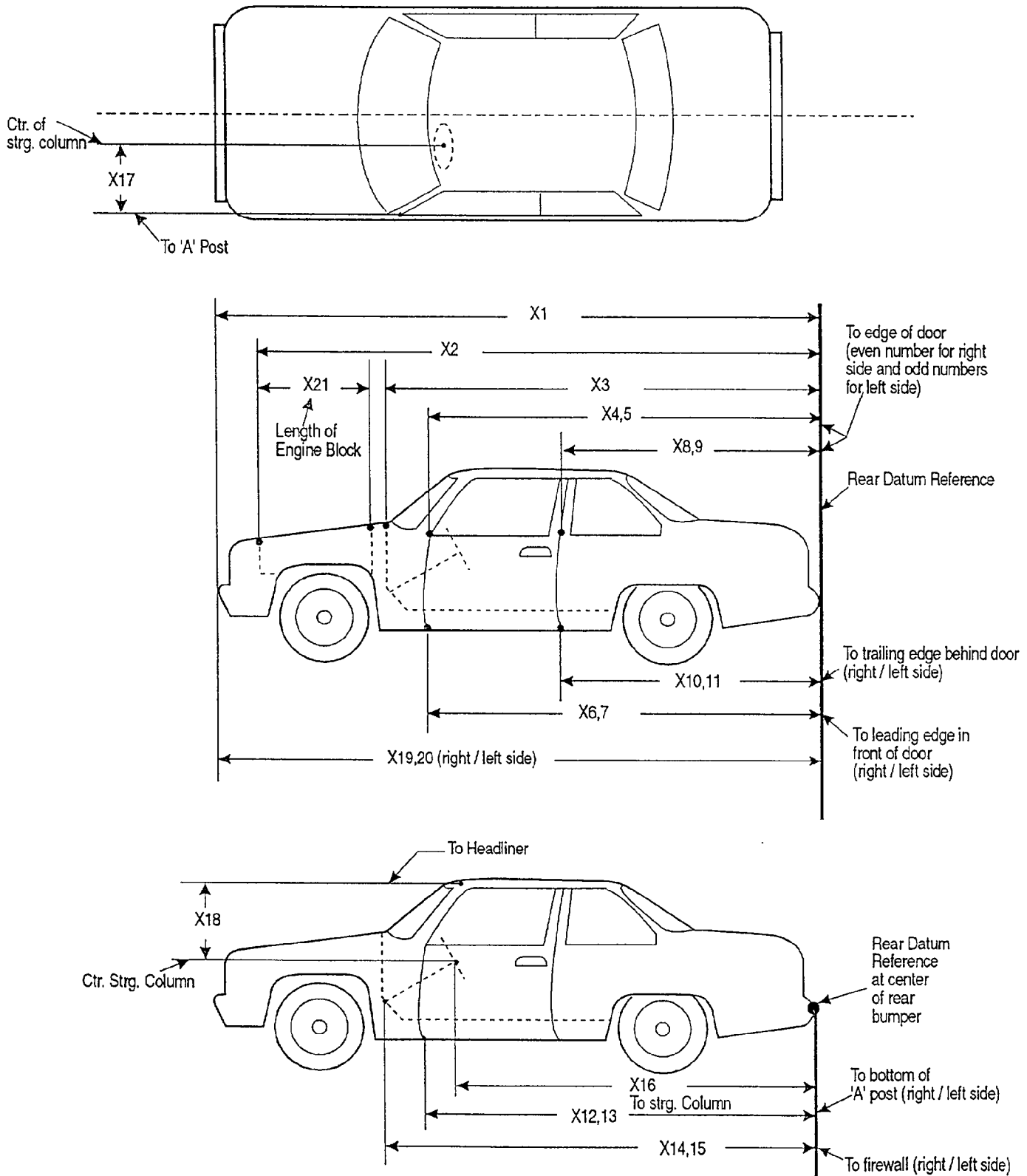


TABLE 14 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Hyundai/Elantra TEST NUMBER: 940518

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4319	3817	502
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	3801	3538	263
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3239	3156	83
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	2944	2944	0
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	2942	2928	14
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	2928	2912	16
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	2927	2908	19
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	1900	1900	0
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	1897	1887	10
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	1896	1890	6
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	1904	1881	23
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	2880	2883	-3
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	2895	2861	34
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3213	3159	54
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3224	3128	96
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2513	2502	11
X17	CENTER OF STEERING COLUMN TO "A" POST	292	282	10
X18	CENTER OF STEERING COLUMN TO HEADLINER	415	425	-10
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4215	3771	444
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4170	3715	455
X21	LENGTH OF ENGINE BLOCK	430	430	0

All measurements are in millimeters.

APPENDIX A

PHOTOGRAPHS

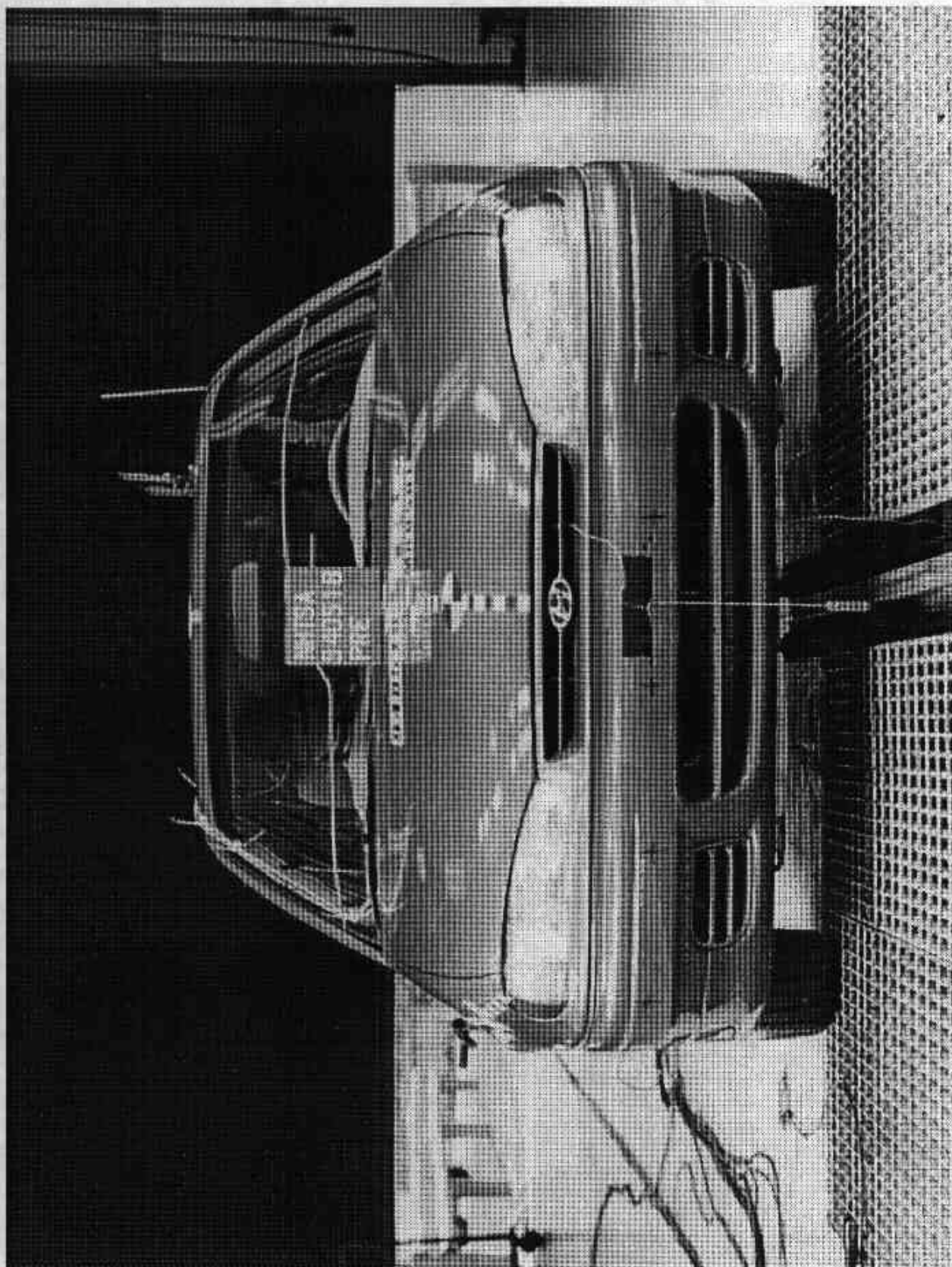


Figure A-1. PRE-TEST FRONT VIEW

A-2

940518

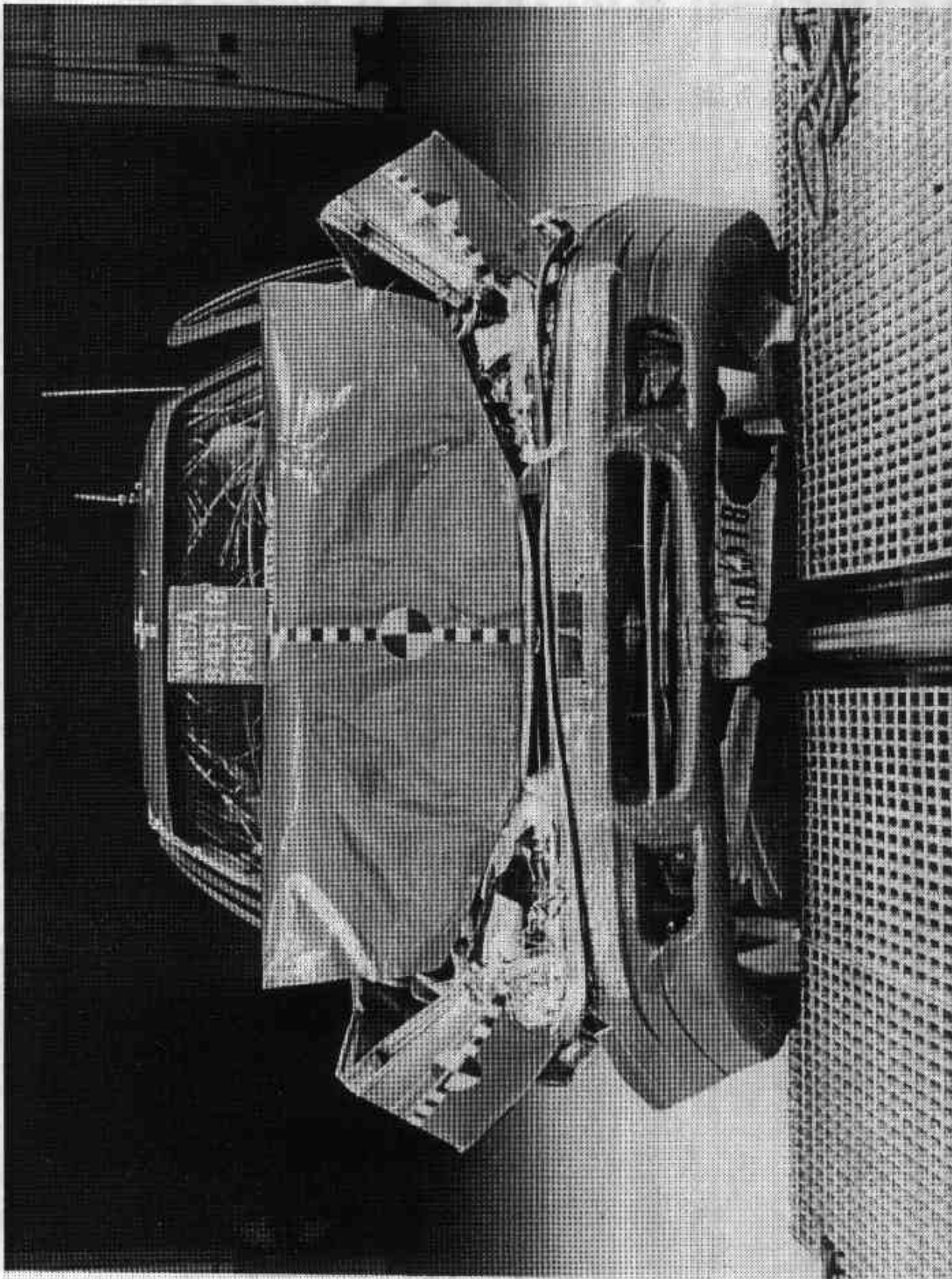


Figure A-2. POST-TEST FRONT VIEW
A-3

940518

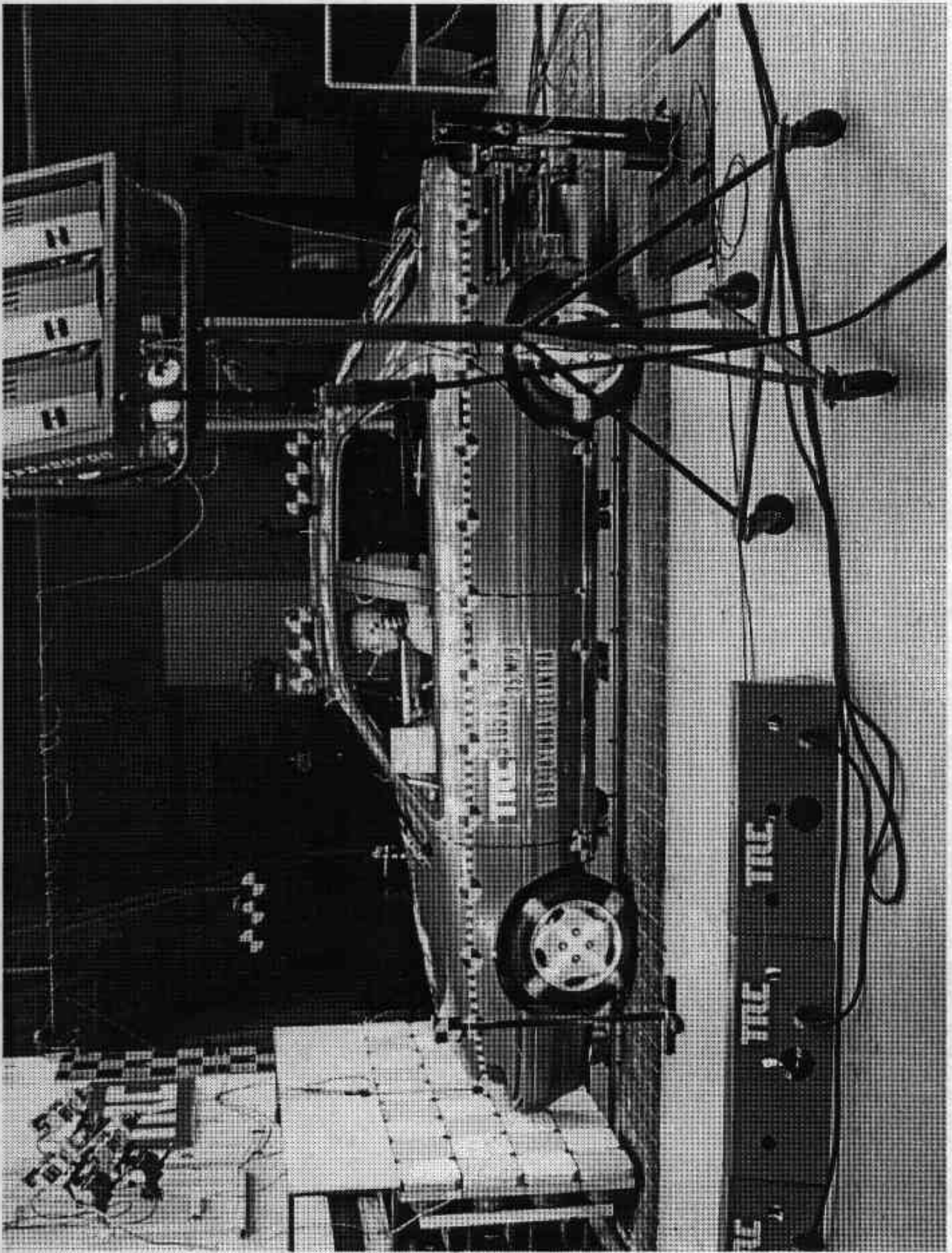


Figure A-3. PRE-TEST LEFT SIDE VIEW

A-4

940518

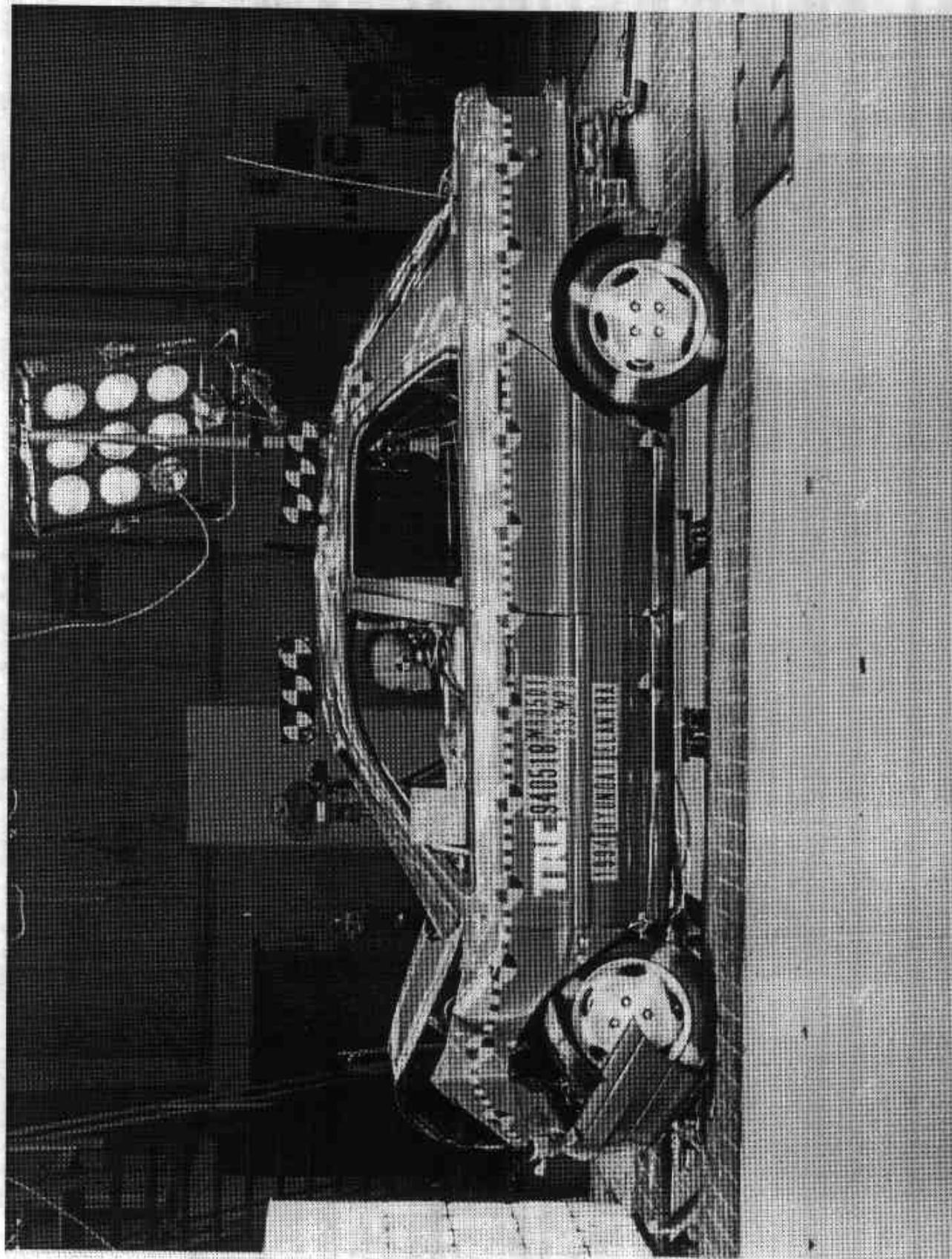


Figure A-4. POST-TEST LEFT SIDE VIEW
A-5

940518

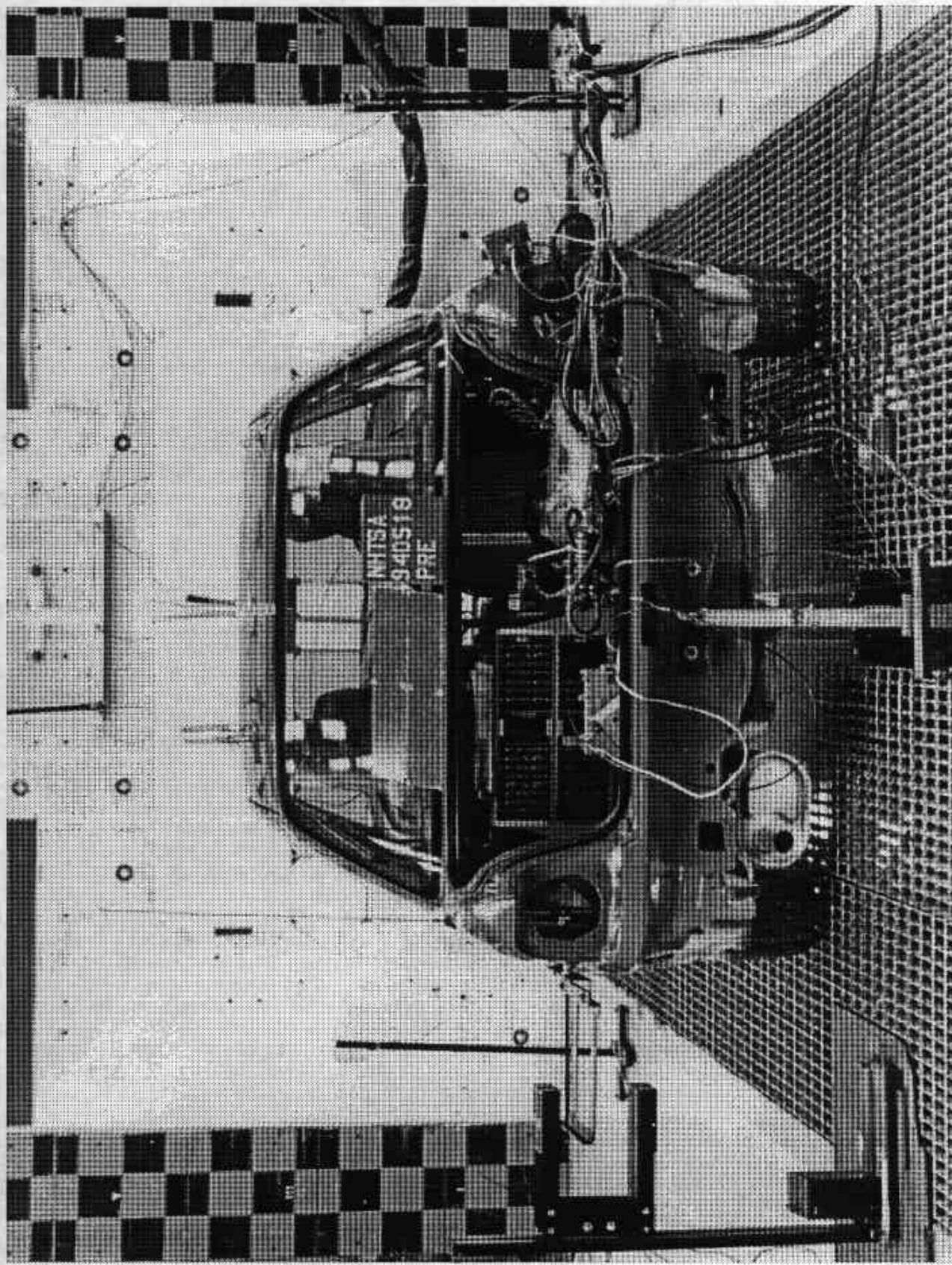


Figure A-5. PRE-TEST REAR VIEW

A-6

940518

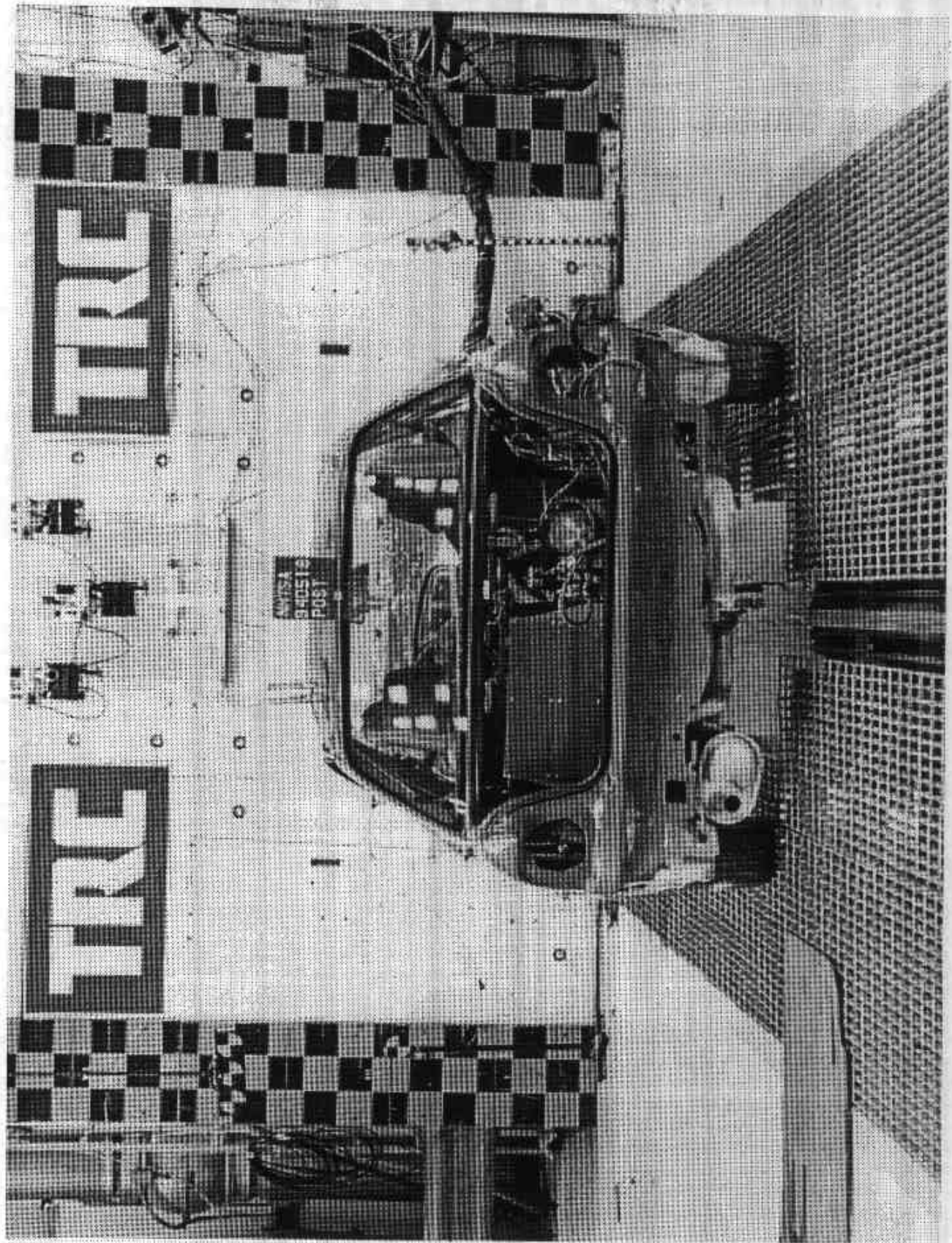


Figure A-6. POST-TEST REAR VIEW

A-7

940518

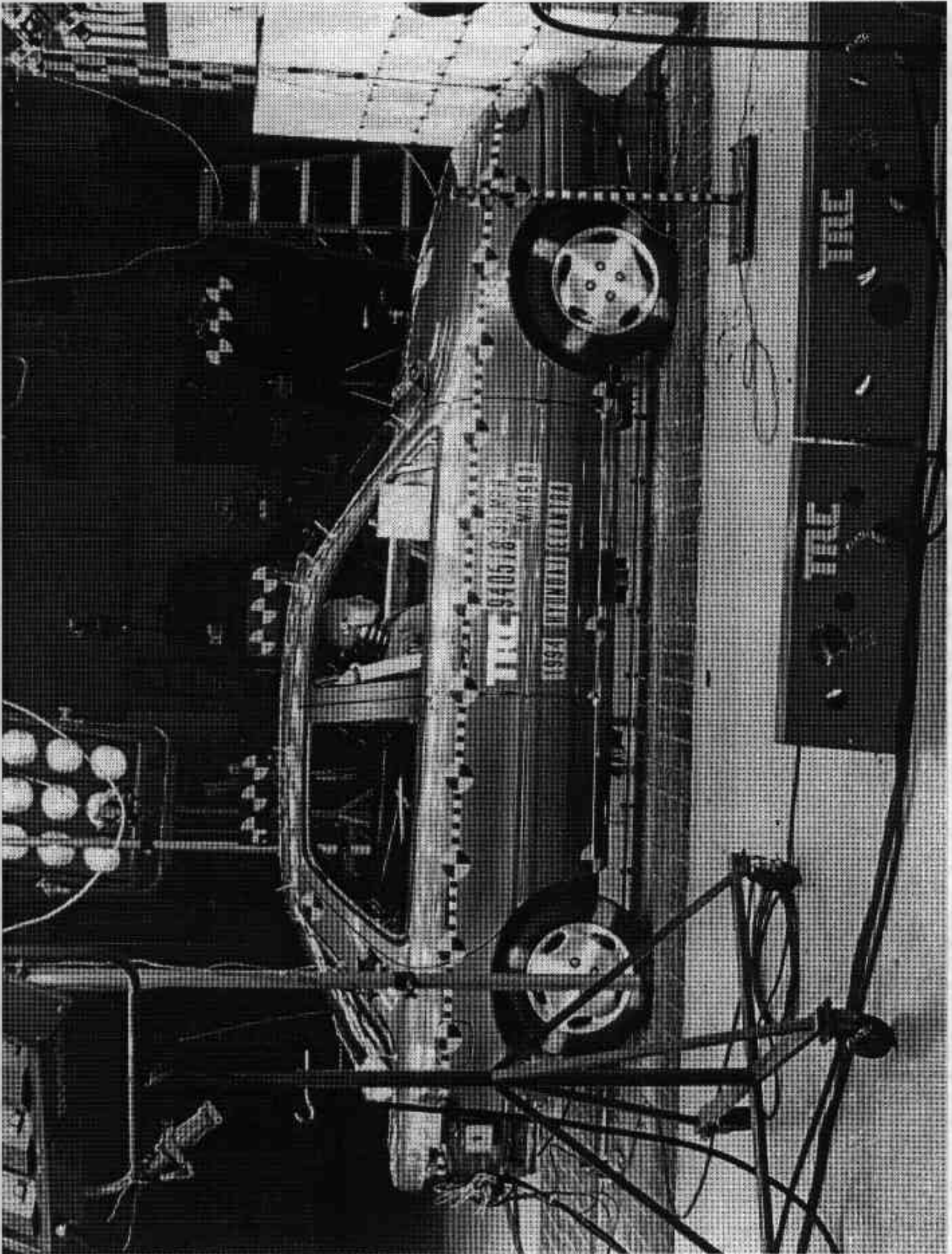


Figure A-7. PRE-TEST RIGHT SIDE VIEW

A-8

940518

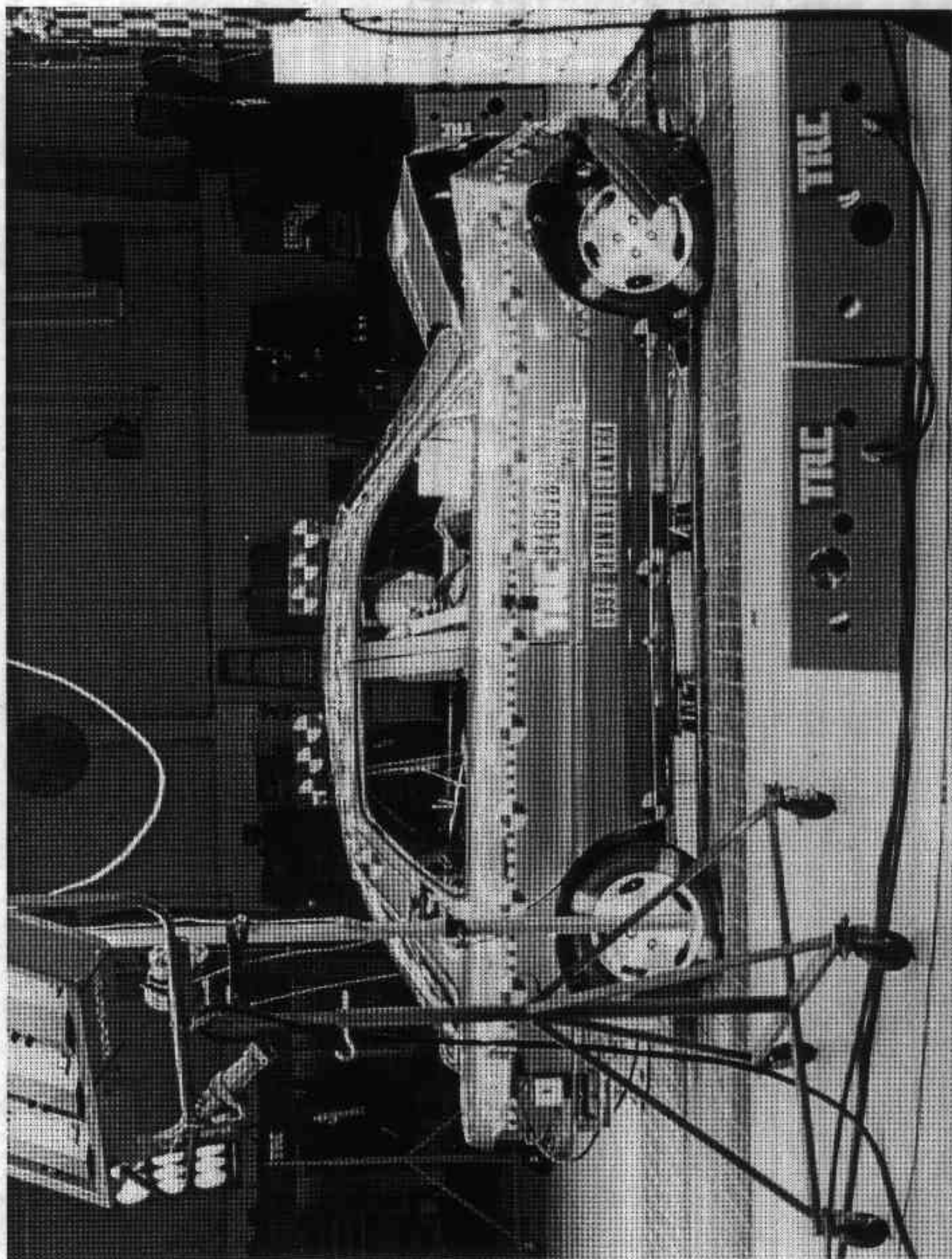


Figure A-8. POST-TEST RIGHT SIDE VIEW
A-9

940518

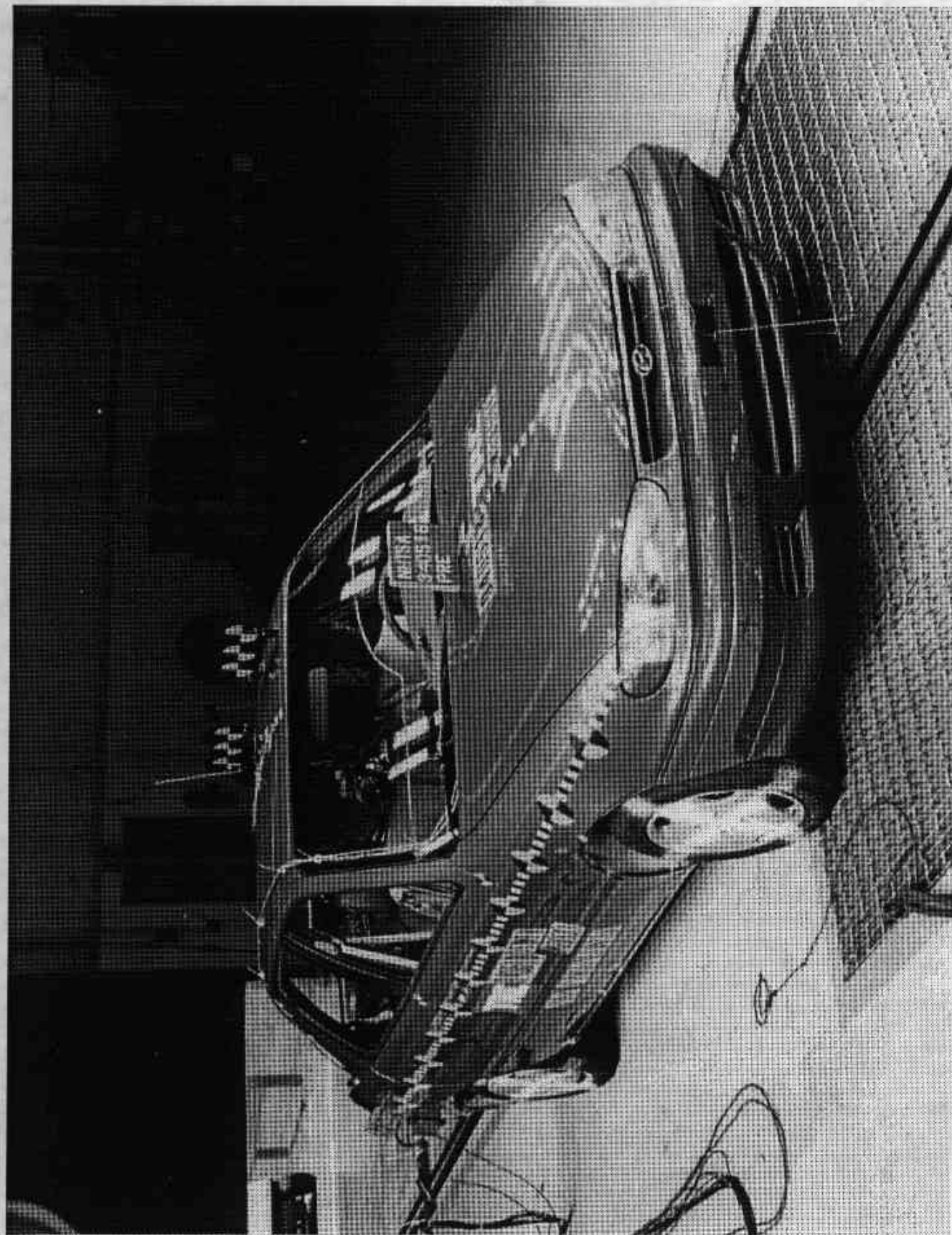


Figure A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

940518

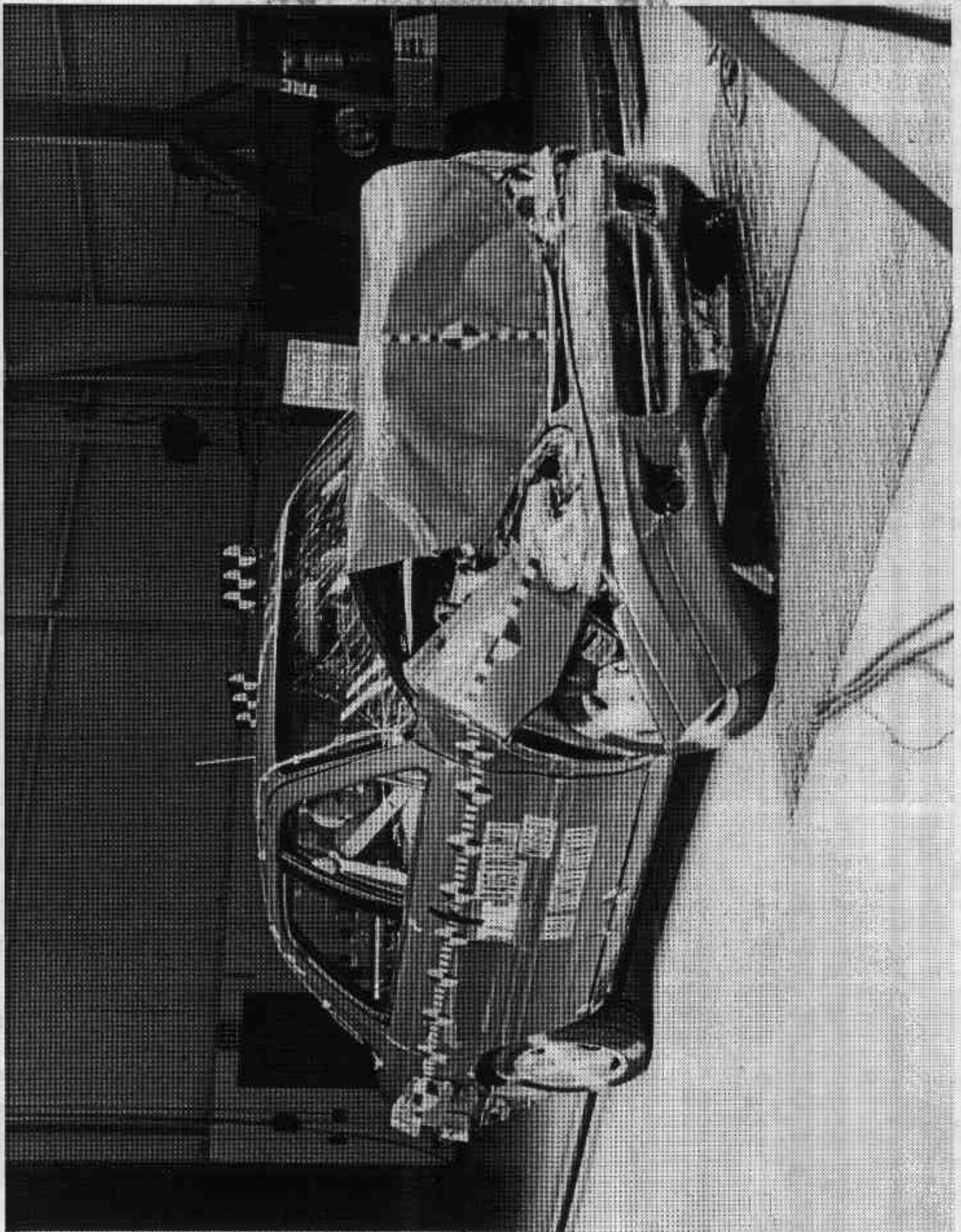


Figure A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

940518

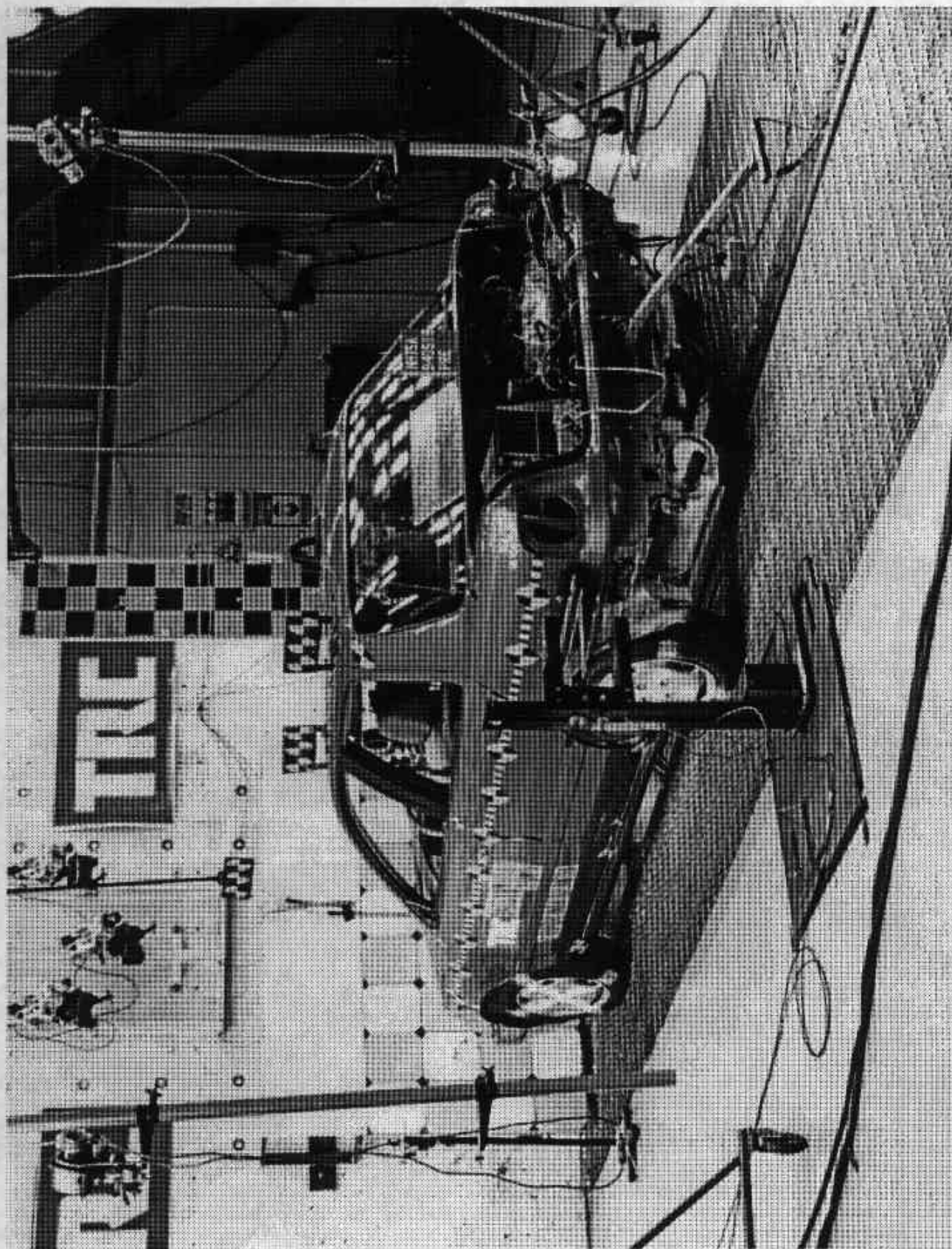


Figure A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-12

940518

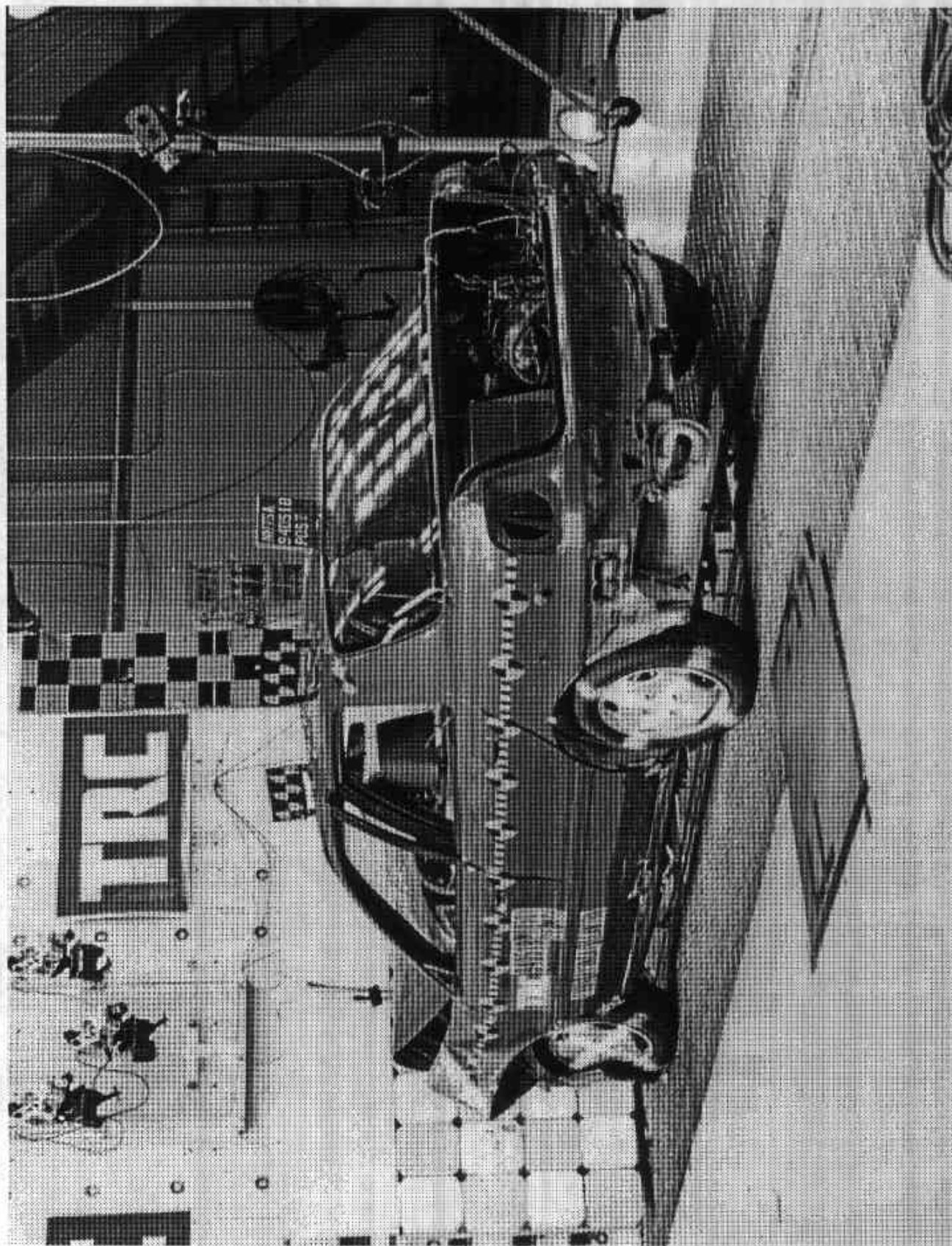


Figure A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

A-13

940518

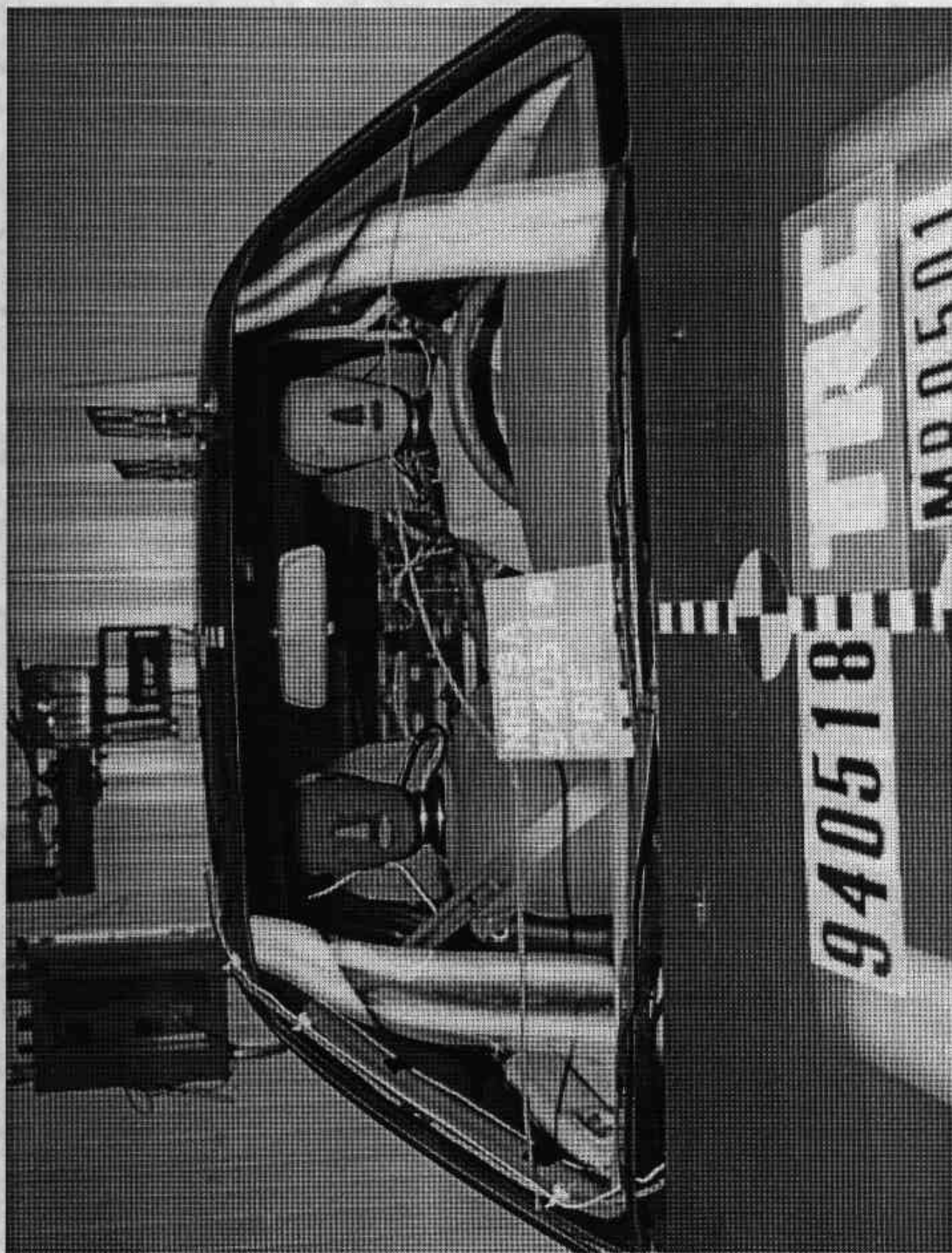


Figure A-13. PRE-TEST WINDSHIELD VIEW
A-14

940518



Figure A-14. POST-TEST WINDSHIELD VIEW
A-15

940518

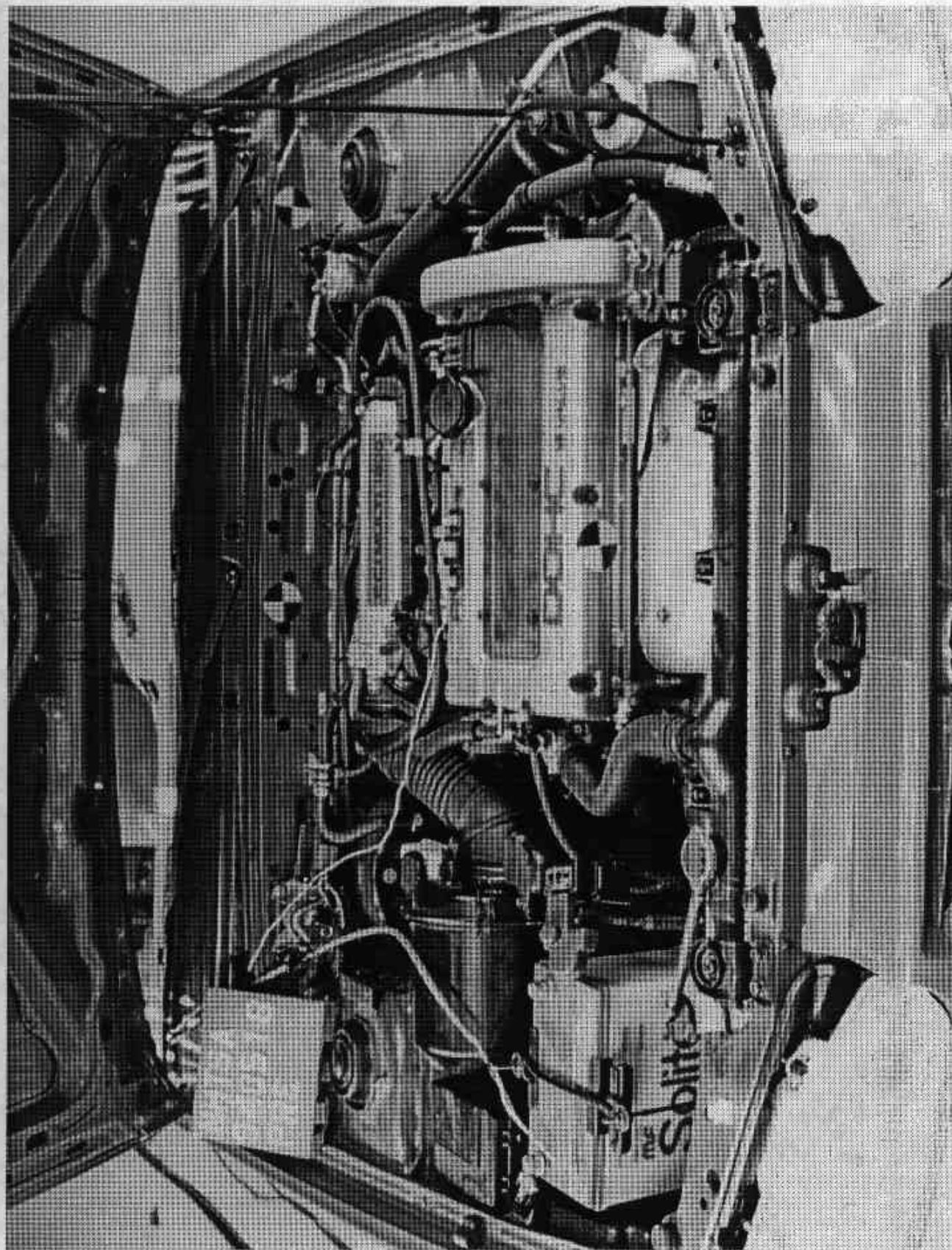


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW
A-16

940518

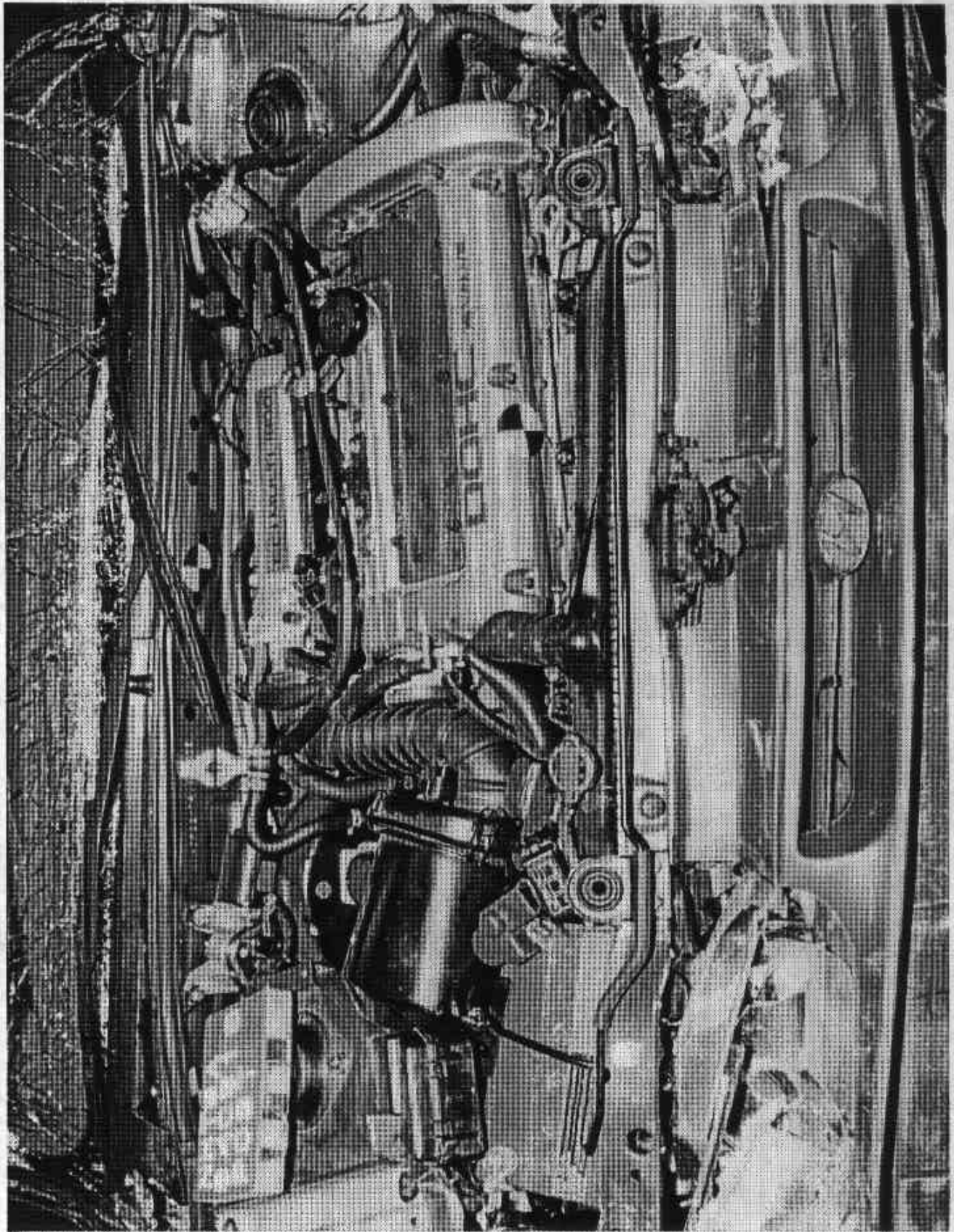


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW
A-17

940518



Figure A-17. PRE-TEST FUEL FILLER CAP VIEW
A-18

940518

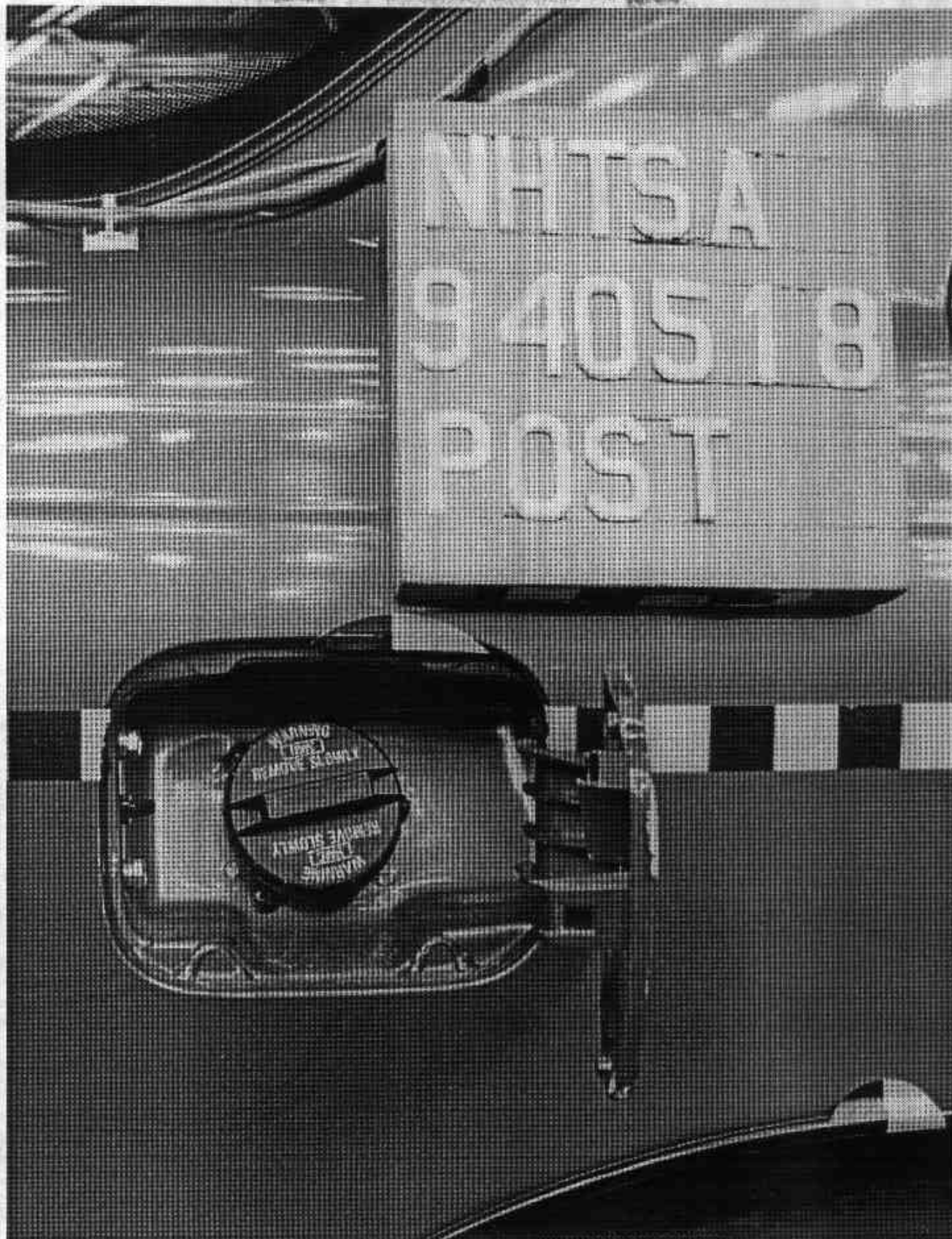


Figure A-18. POST-TEST FUEL FILLER CAP VIEW

A-19

940518

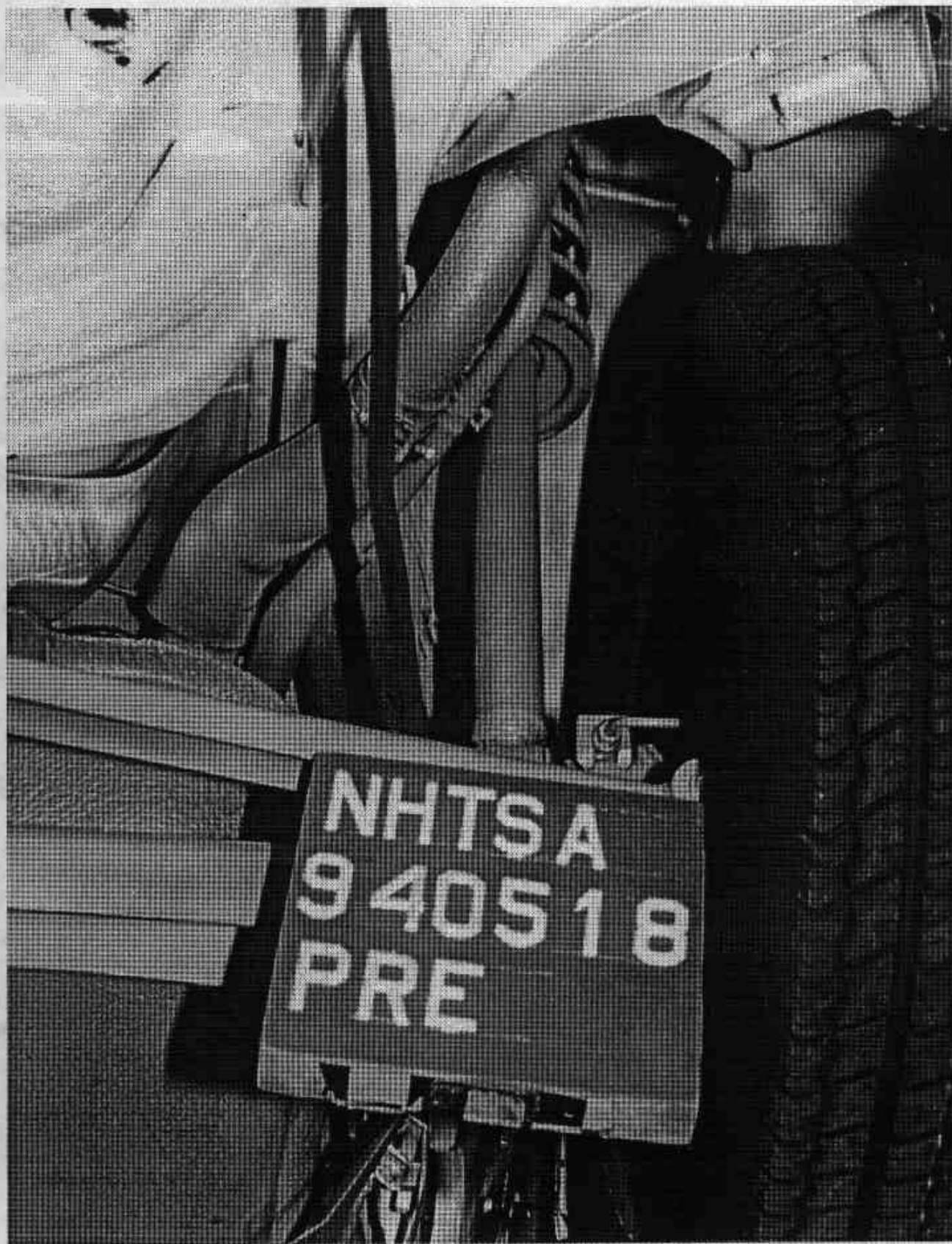


Figure A-19. PRE-TEST FUEL FILLER NECK VIEW
A-20

940518



Figure A-20. POST-TEST FUEL FILLER NECK VIEW
A-21

940518



Figure A-21. PRE-TEST FUEL FILLER NECK AND TANK VIEW



Figure A-22. POST-TEST FUEL FILLER NECK AND TANK VIEW

A-23

940518

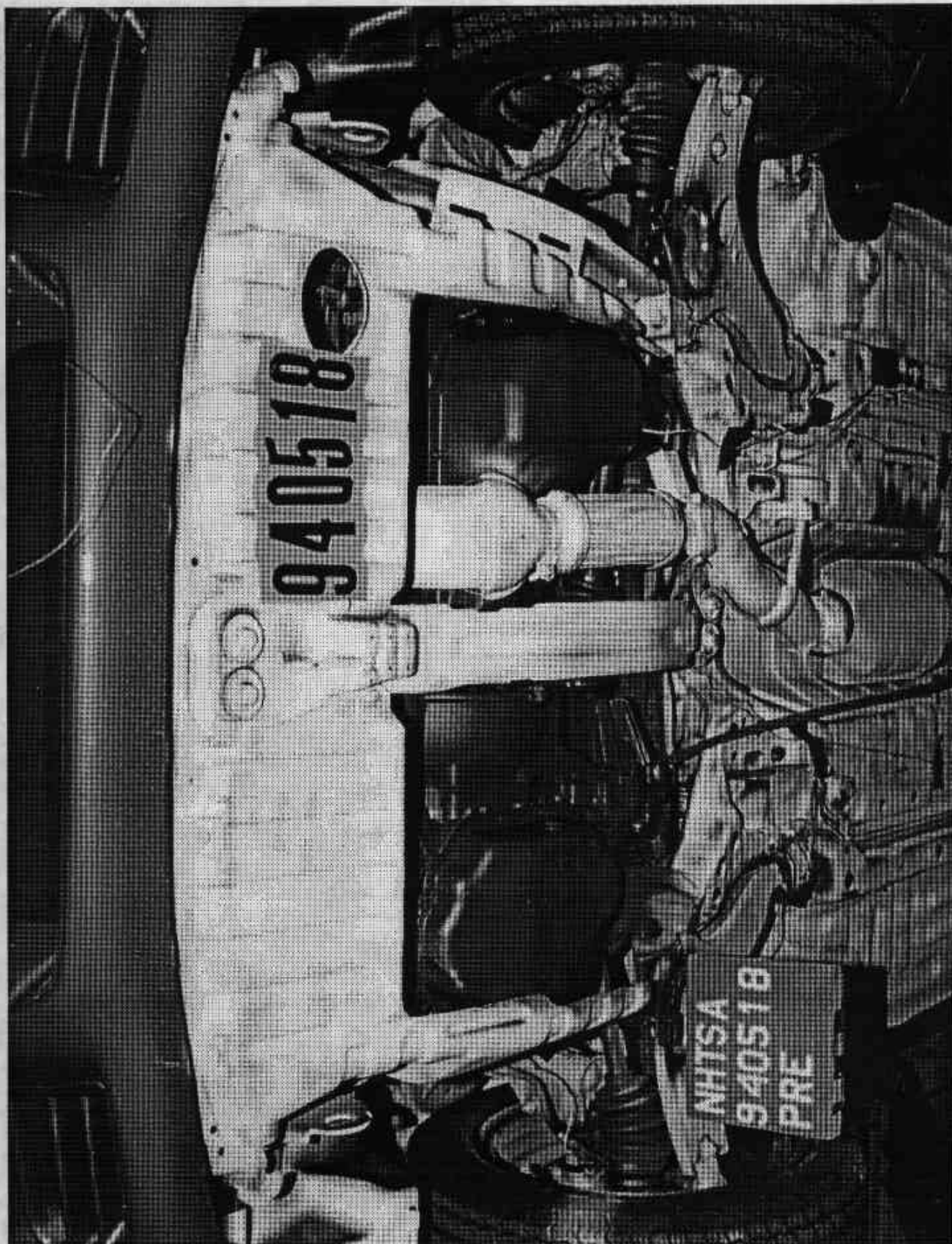


Figure A-23. PRE-TEST FRONT UNDERBODY VIEW
A-24

940518



Figure A-24. POST-TEST FRONT UNDERBODY VIEW
A-25

940518

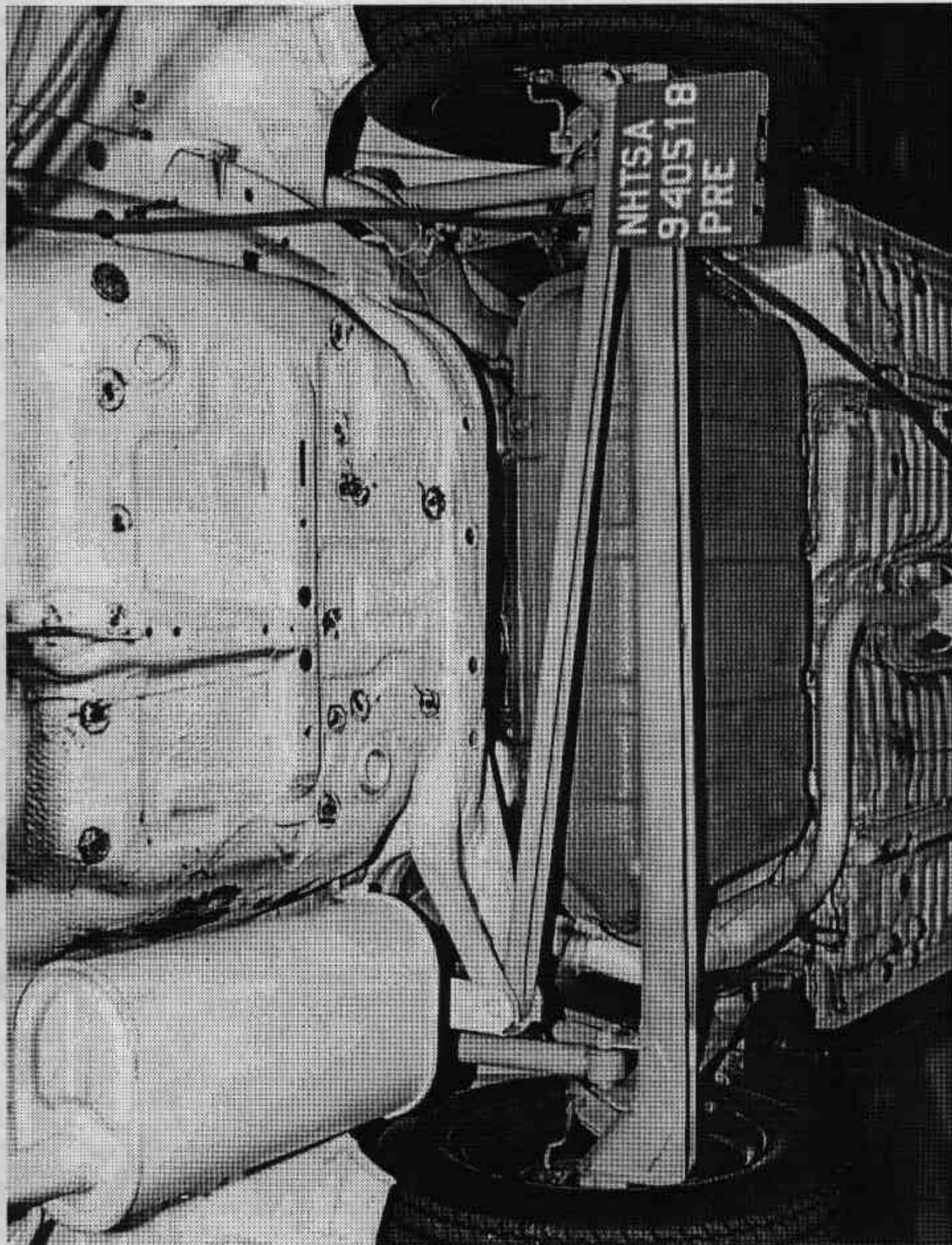


Figure A-25. PRE-TEST REAR UNDERBODY VIEW

A-26

940518

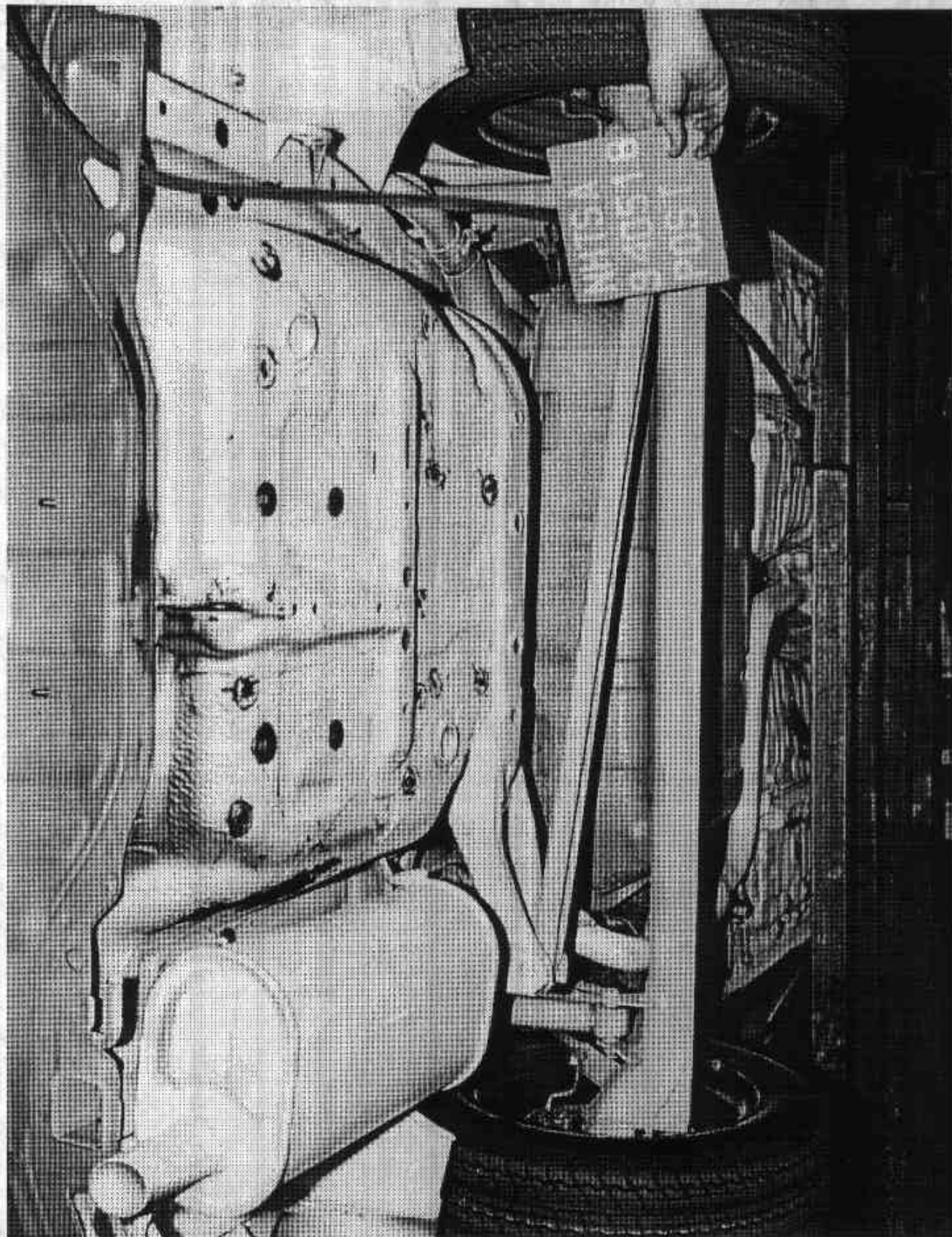


Figure A-26. POST-TEST REAR UNDERBODY VIEW
A-27

940518

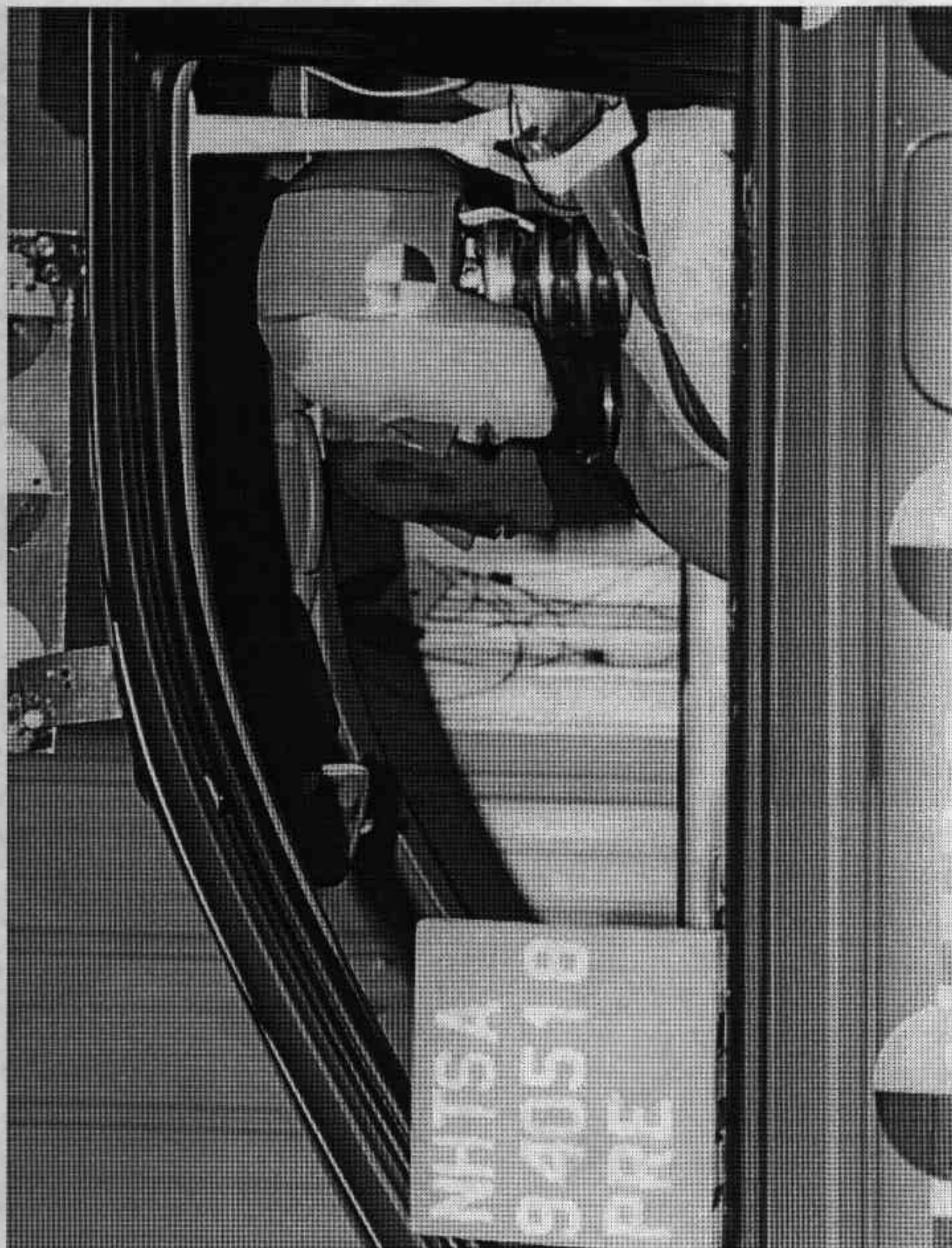


Figure A-27. PRE-TEST DRIVER DUMMY POSITION VIEW

A-28

940518

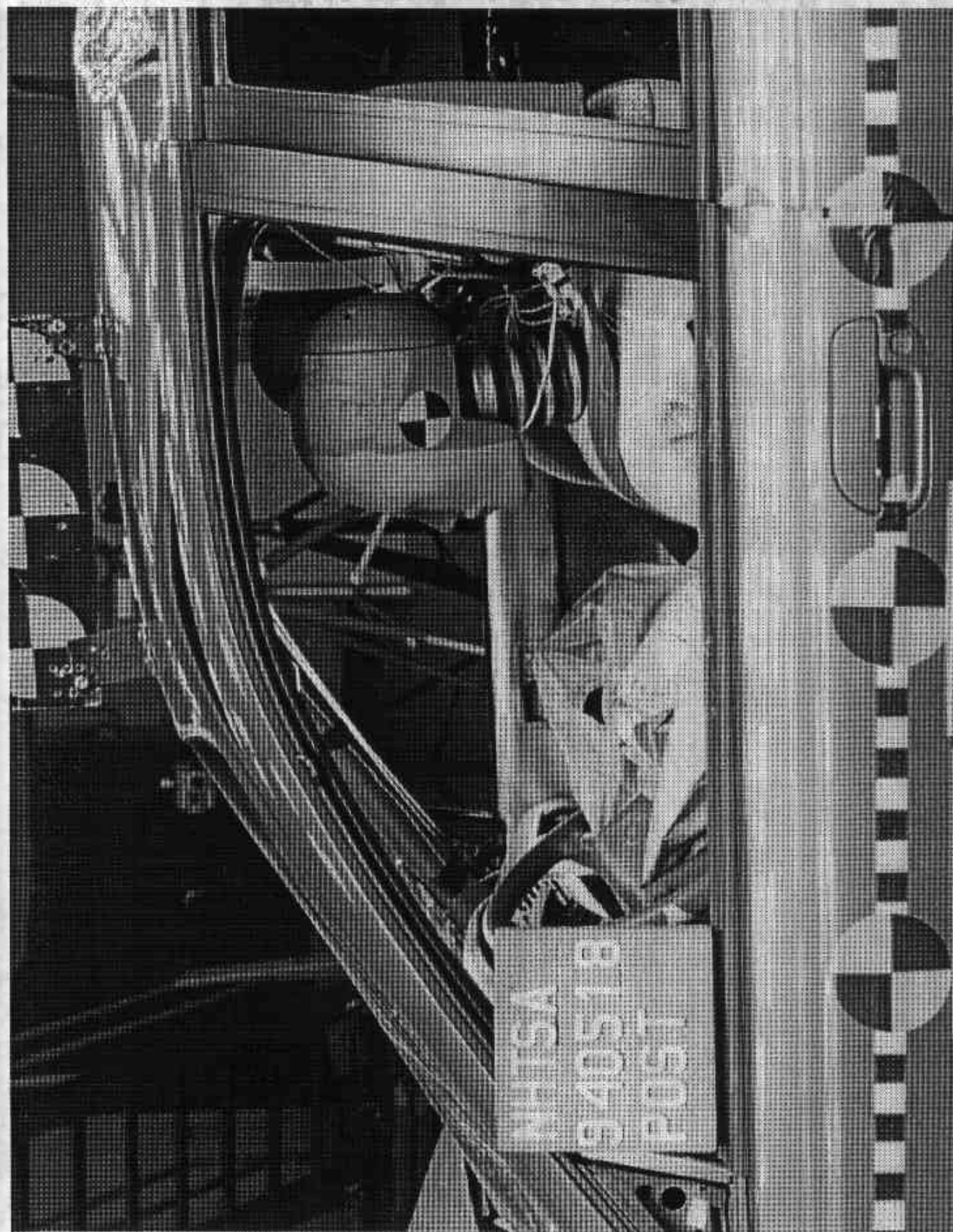


Figure A-28. POST-TEST DRIVER DUMMY POSITION VIEW

A-29

940518

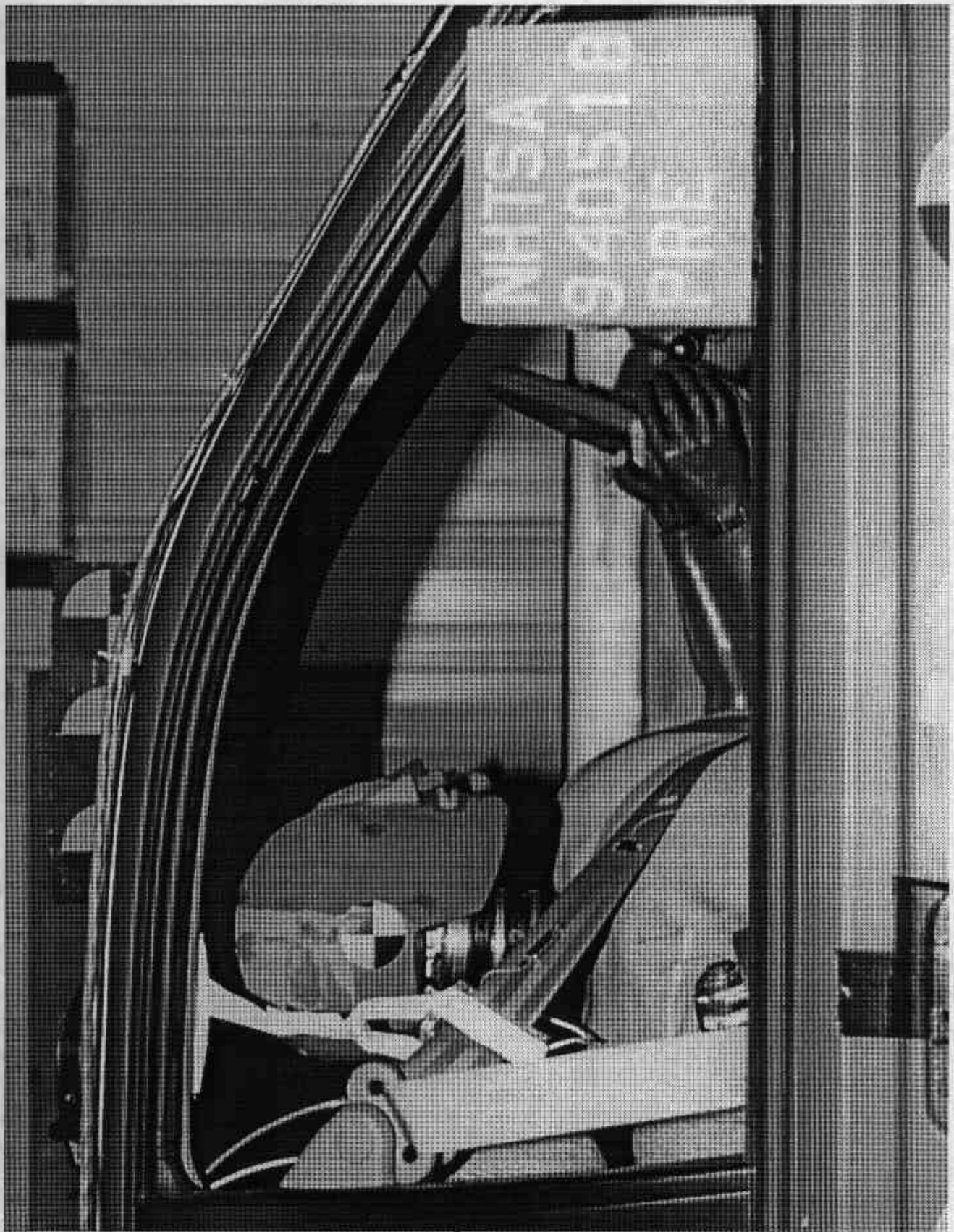


Figure A-29. PRE-TEST PASSENGER DUMMY POSITION VIEW

A-30

940518



Figure A-30. POST-TEST PASSENGER DUMMY POSITION VIEW

A-31

940518



Figure A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-32

940518



Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
A-33 940518



Figure A-33. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-34 940518



Figure A-34. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-35 940518



Figure A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-36 940518



Figure A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-37 940518

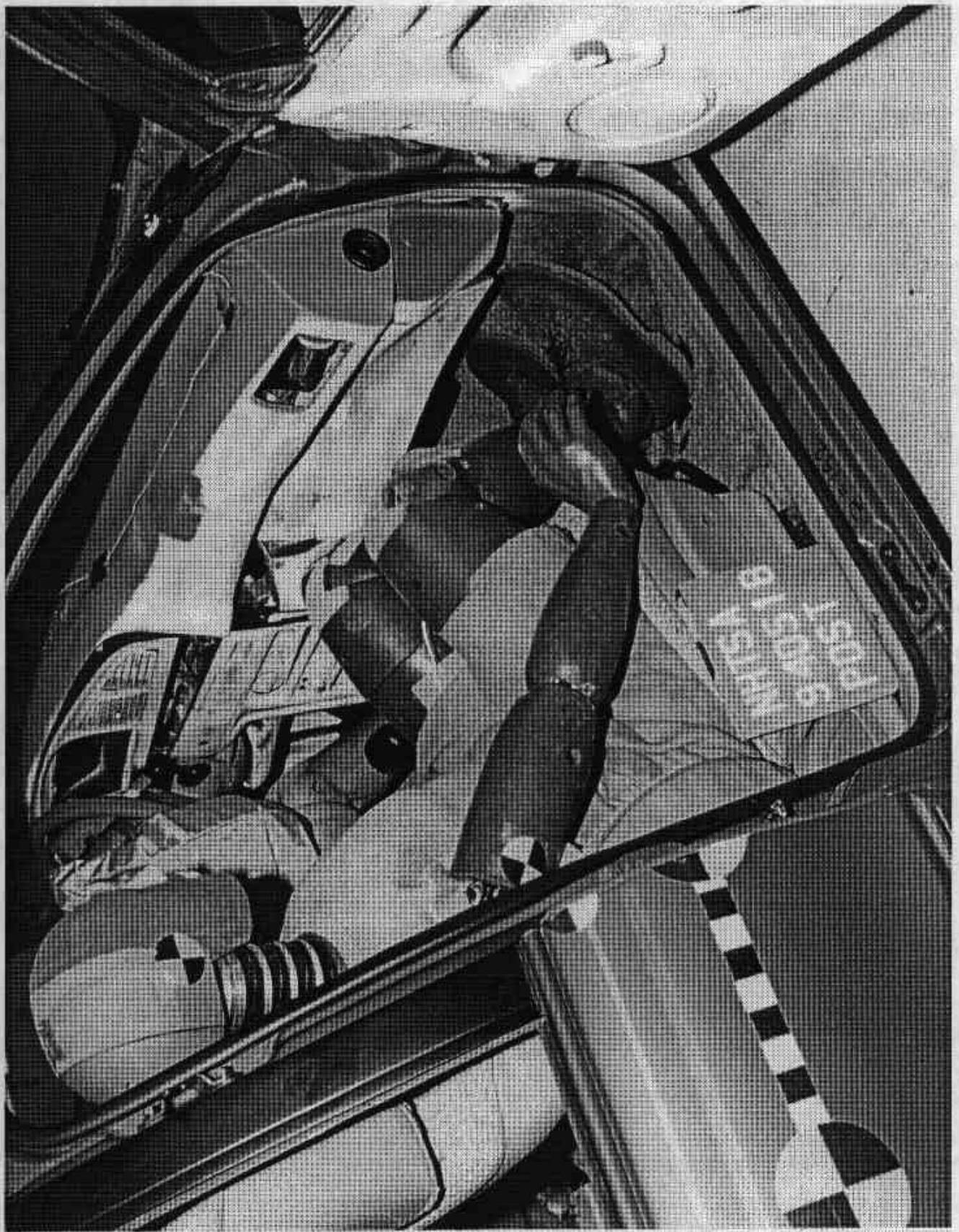


Figure A-37. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

A-38

940518

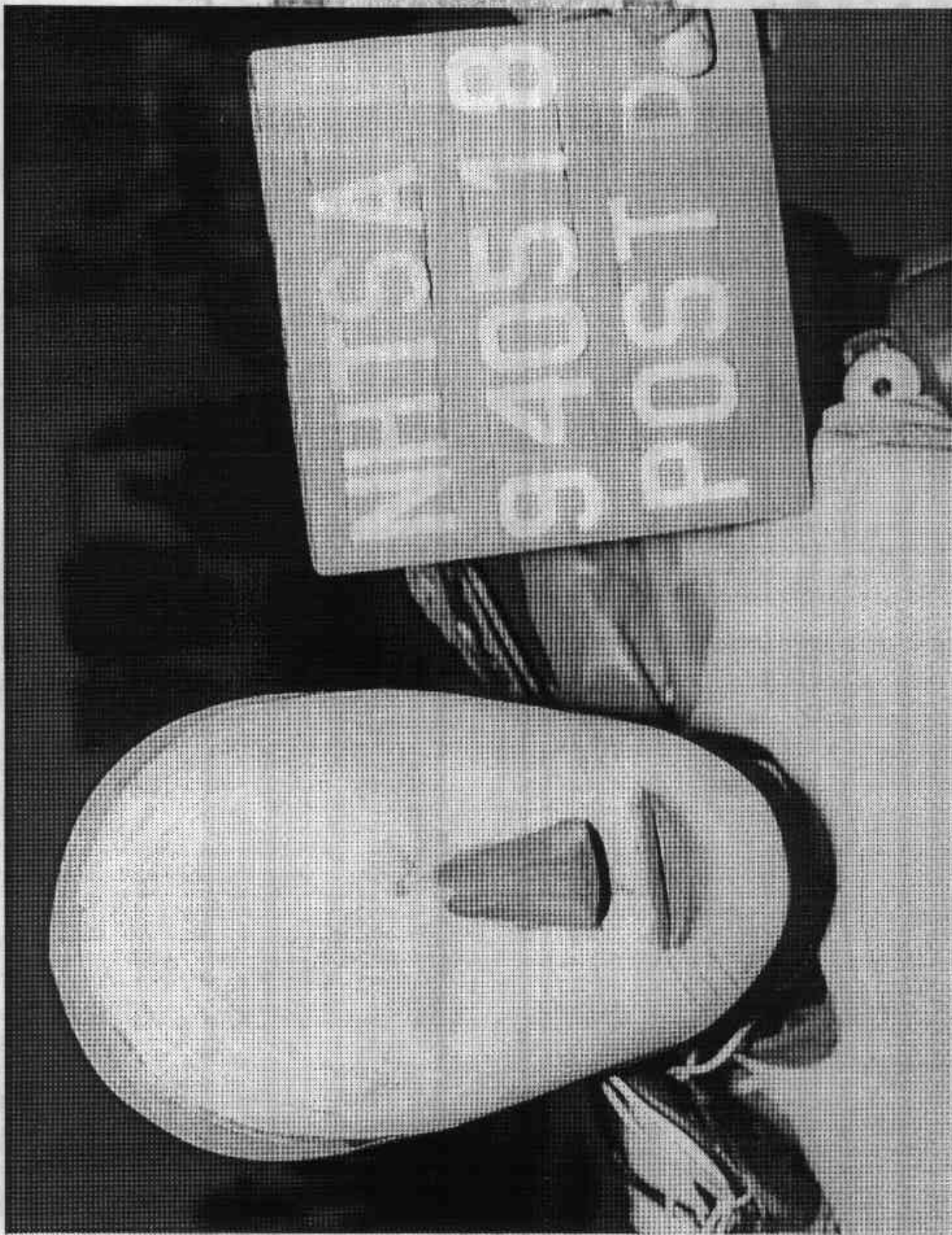


Figure A-38. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1
A-39 940518



Figure A-39. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

A-40

940518



Figure A-41. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

A-42

940518



Figure A-42. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 3

A-43

940518

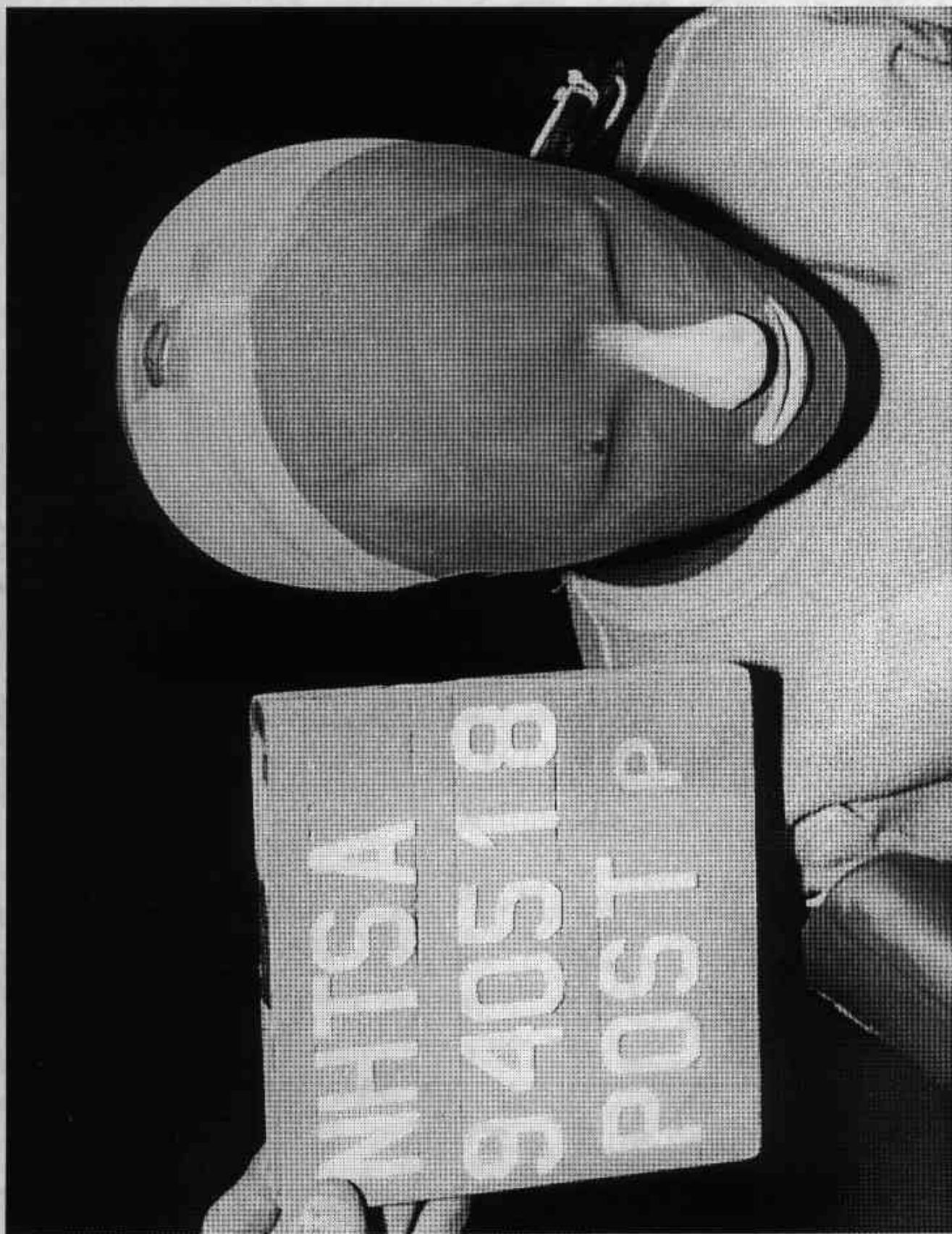


Figure A-43. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

A-44

940518

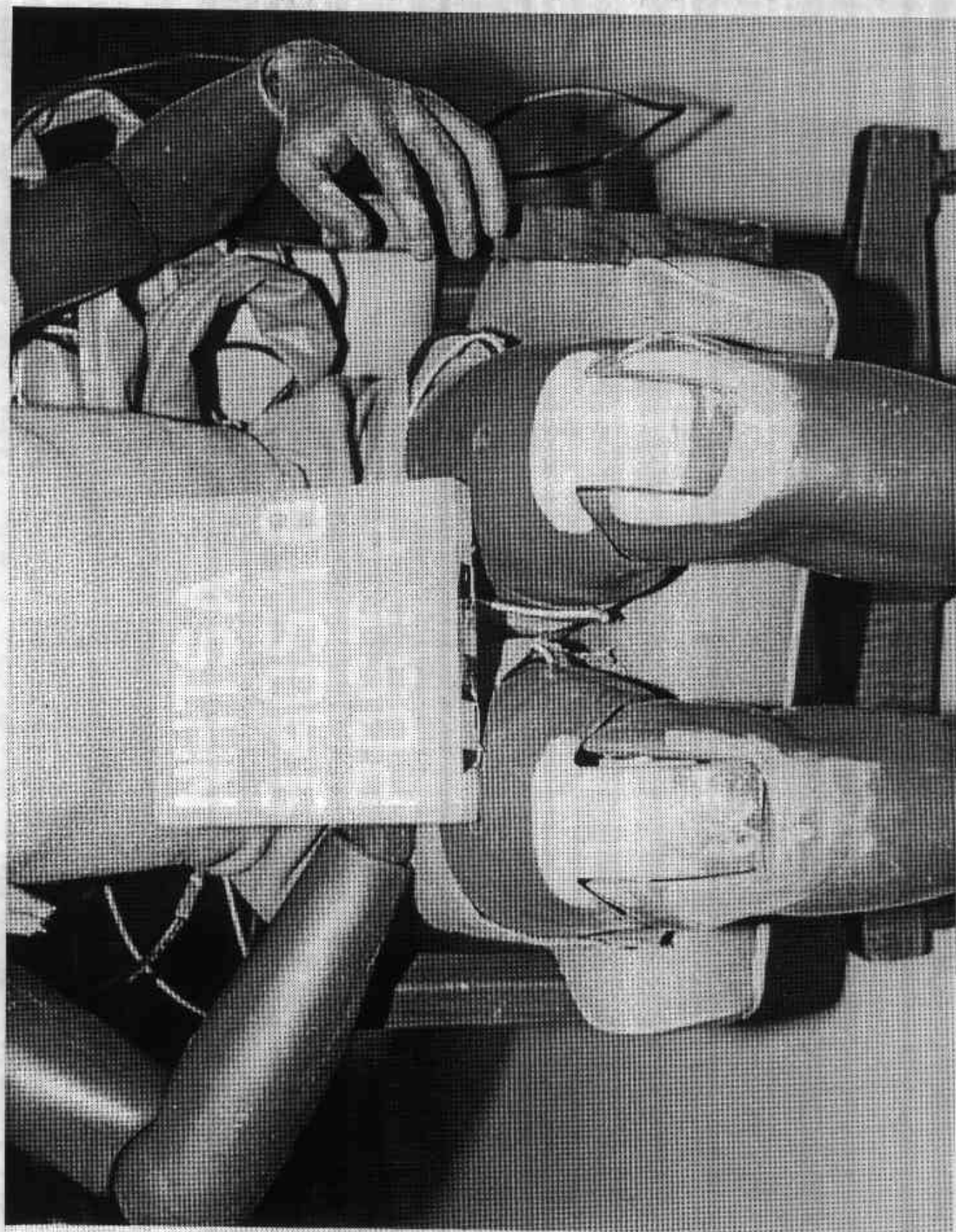


Figure A-44. POST-TEST PASSENGER DUMMY KNEE CONTACT VIEW

A-45

940518

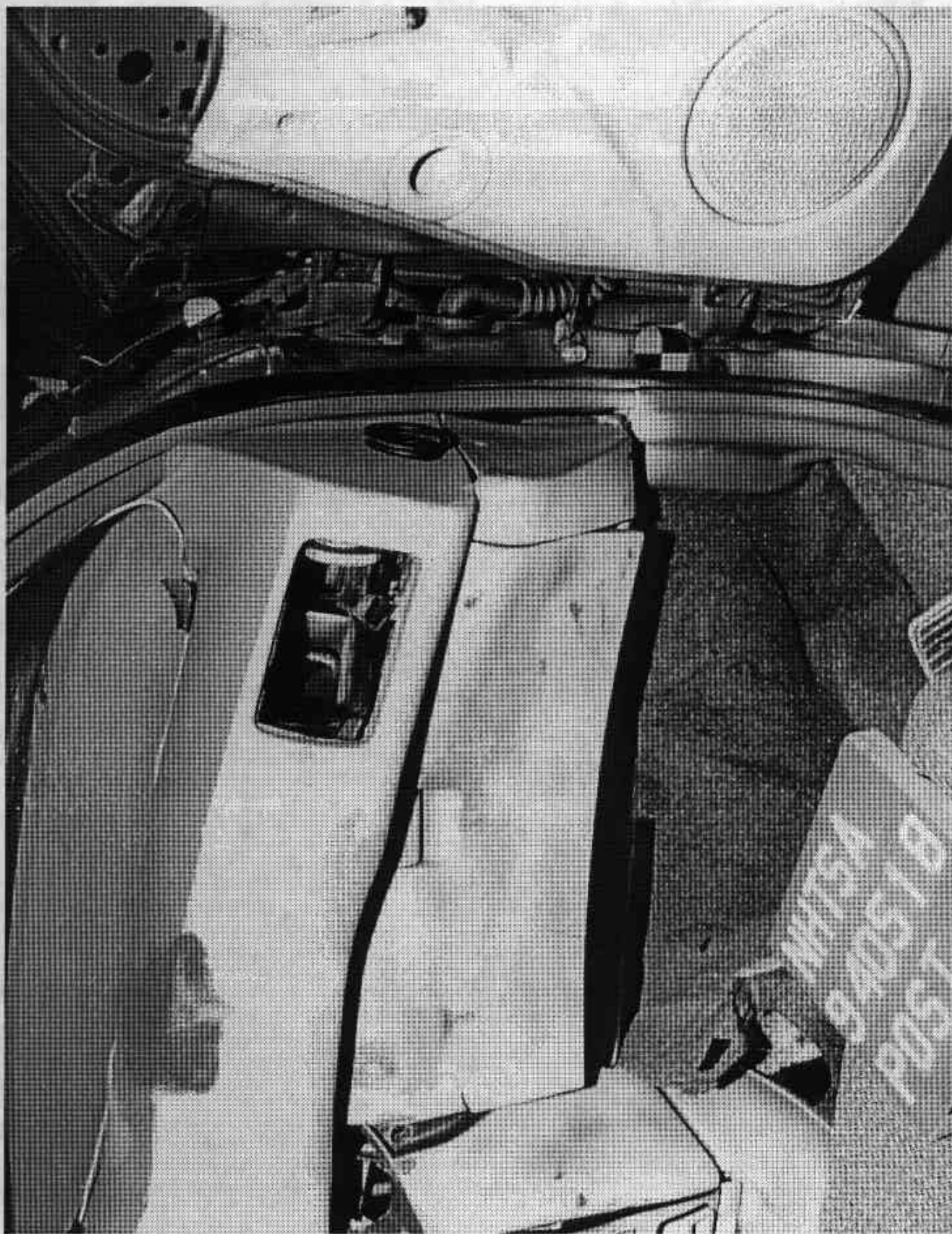


Figure A-45. POST-TEST PASSENGER DUMMY HEAD & KNEE CONTACT VIEW

A-46

940518

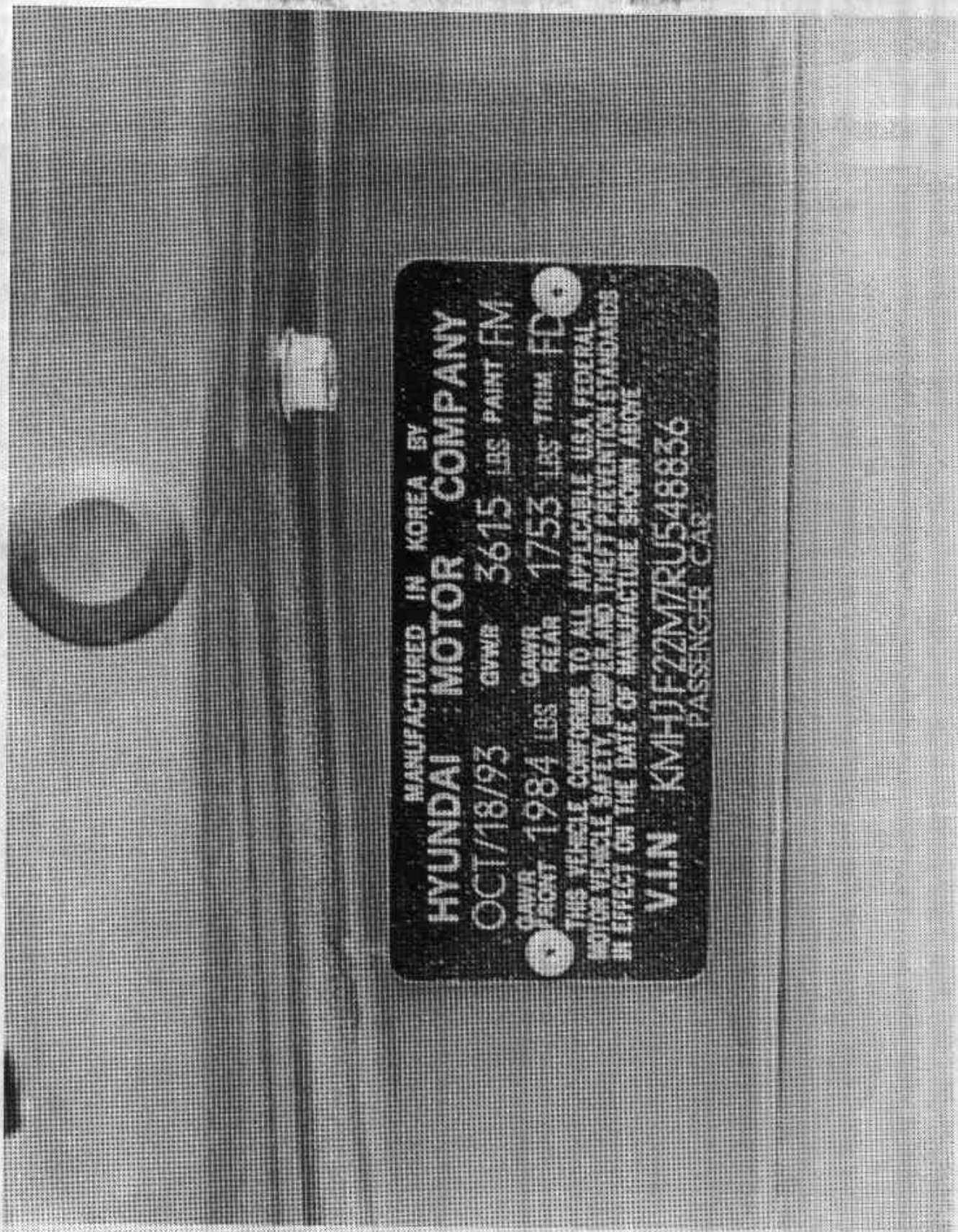


Figure A-46. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

TIRE INFLATION PRESSURE					
VEHICLE CAPACITY WEIGHT: LBS: 860					
SEATING CAPACITY: TOTAL 5 FRONT 2 REAR 3					
TIRE PRESSURES COLD: KPA. (PSI):					
TIRE SIZE	LOAD UP TO 4 PERSONS		MAX. VEHICLE WEIGHT LIMIT		
	FRT	RR	FRT	RR	
P17S 65 R14	200 (29)	200 (29)	220 (32)	220 (32)	220 (32)
P185 60 R14	200 (29)	200 (29)	220 (32)	220 (32)	220 (32)
T125 70D15	420 (60)	420 (60)	420 (60)	420 (60)	420 (60)

Figure A-47. PRE-TEST RECOMMENDED TIRE PRESSURE LABEL VIEW

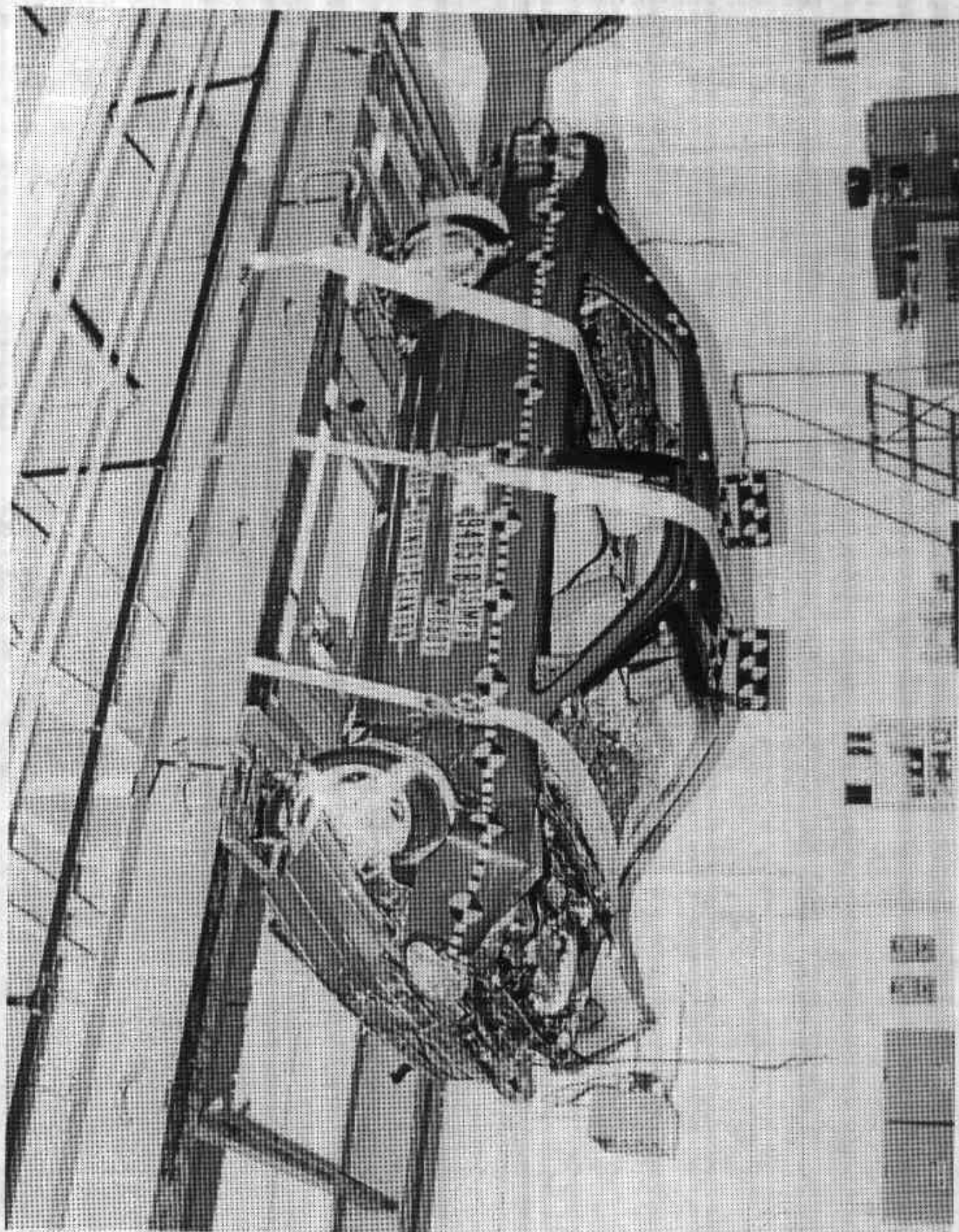


Figure A-48. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW
A-49 940518

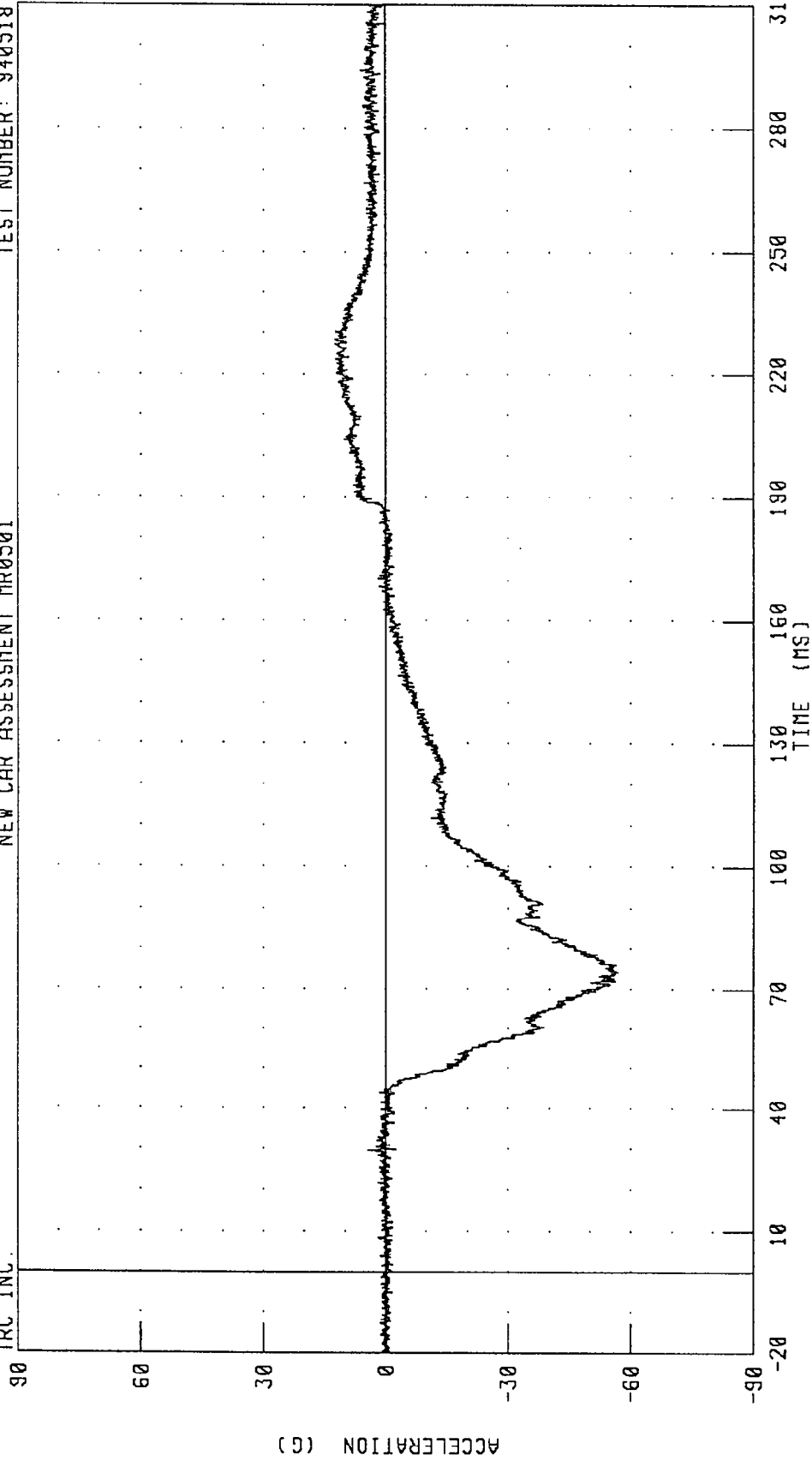
APPENDIX B

DATA PLOTS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



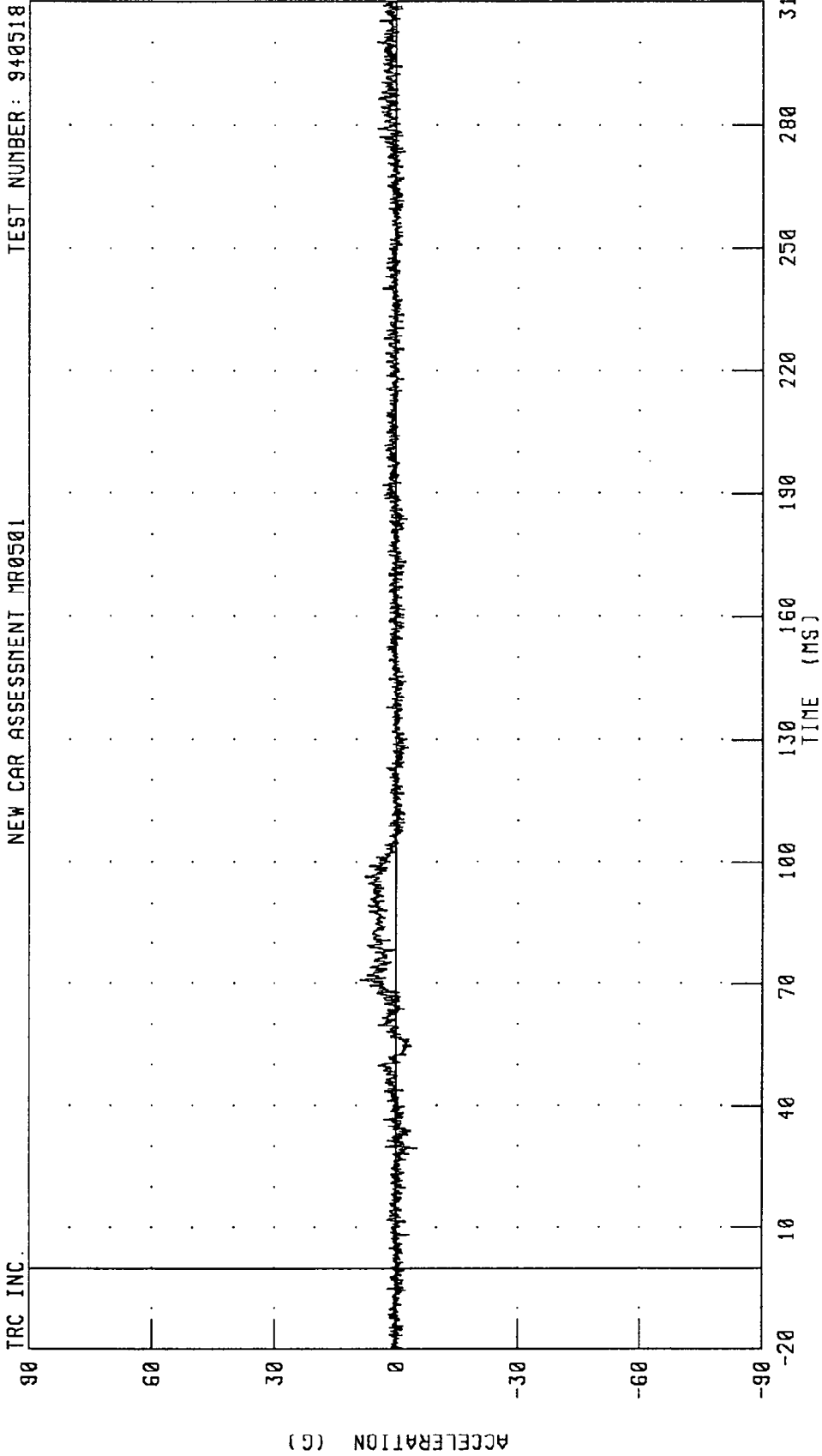
CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 12.46 G @ 227.52 MS; -56.98 G @ 74.32 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



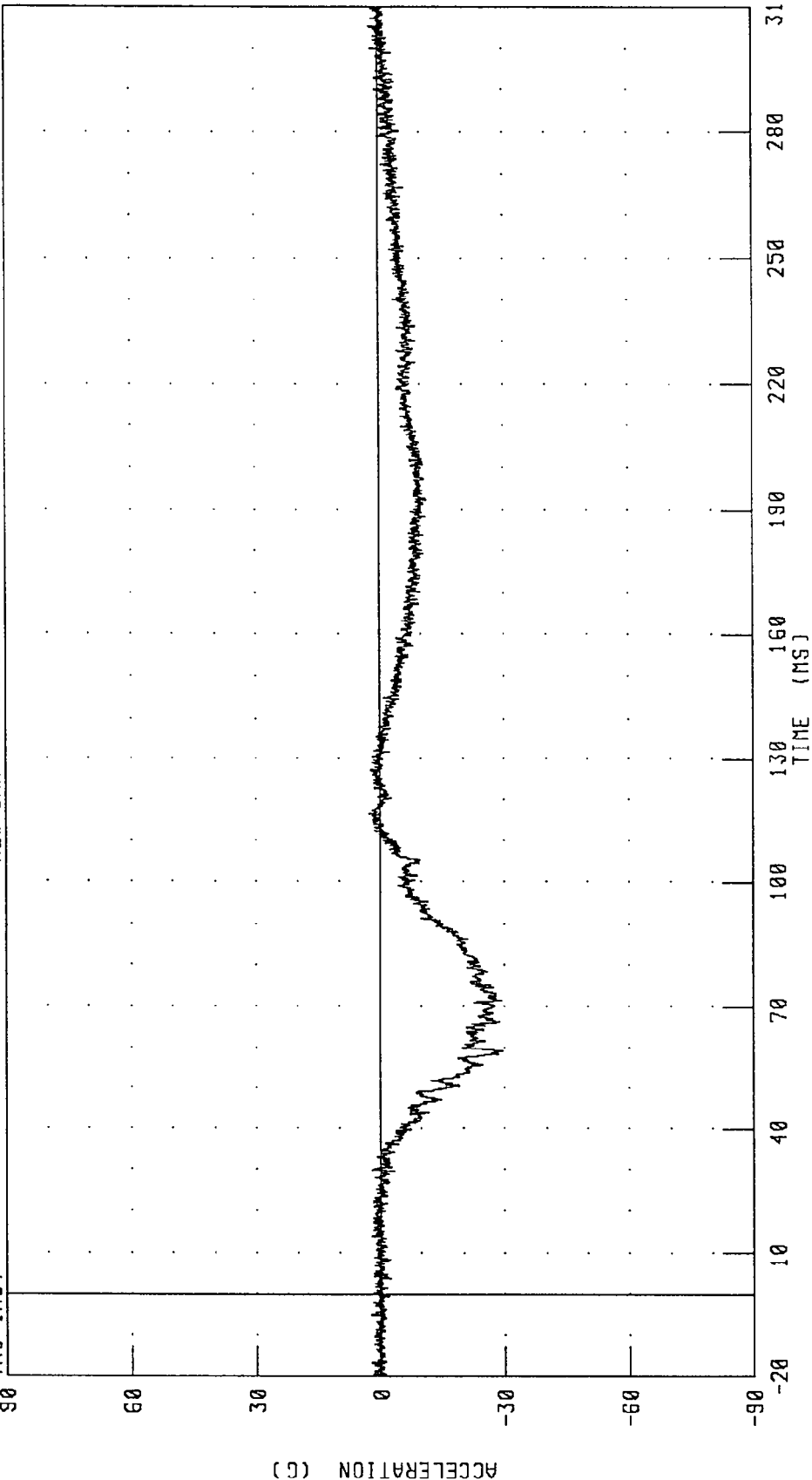
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 8.88 G @ 70.96 MS; -5.14 G @ 29.60 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

IRC INC.

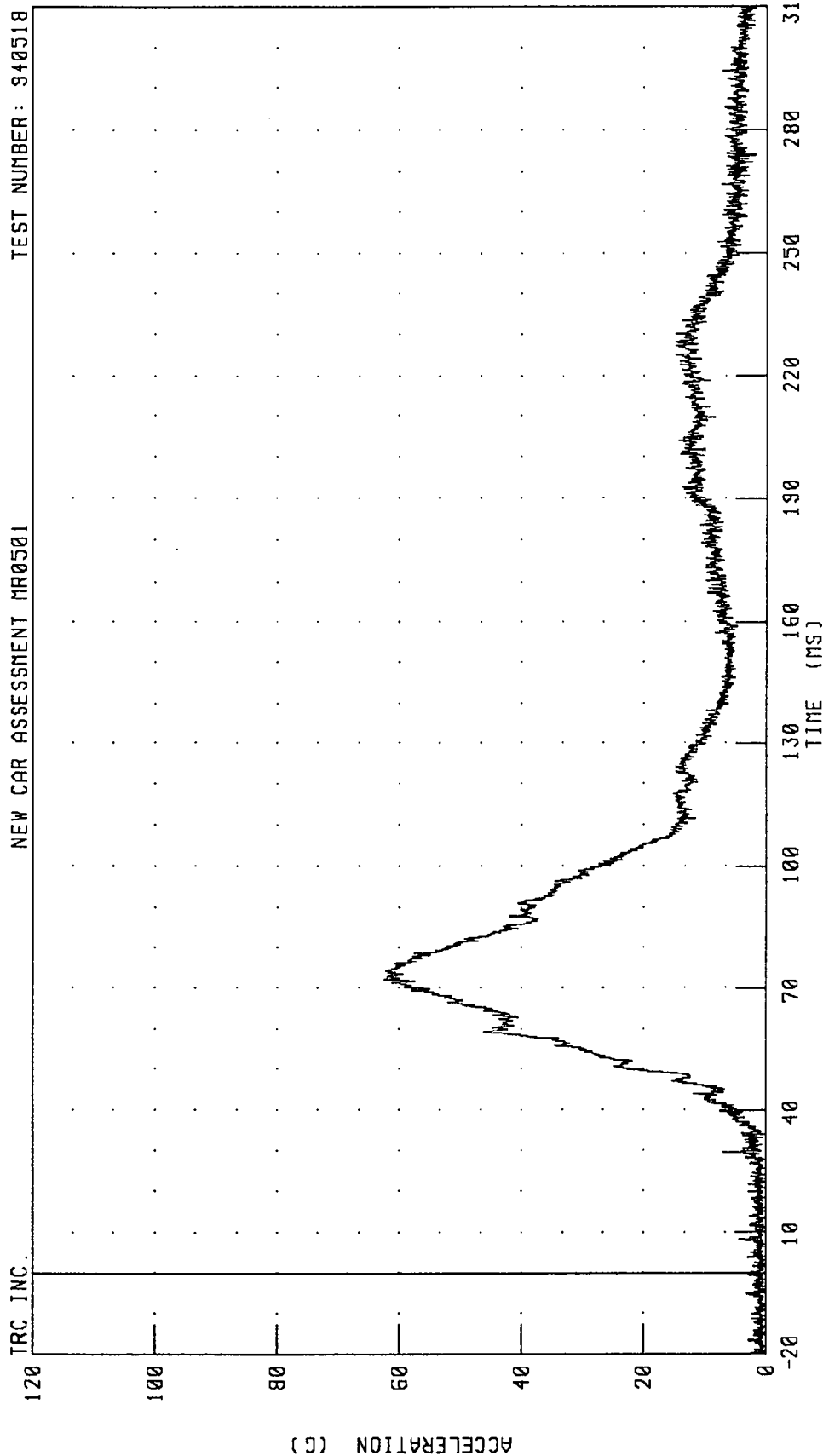


CHANNEL: HDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 2.46 G @ 116.64 MS; -29.63 G @ 59.28 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



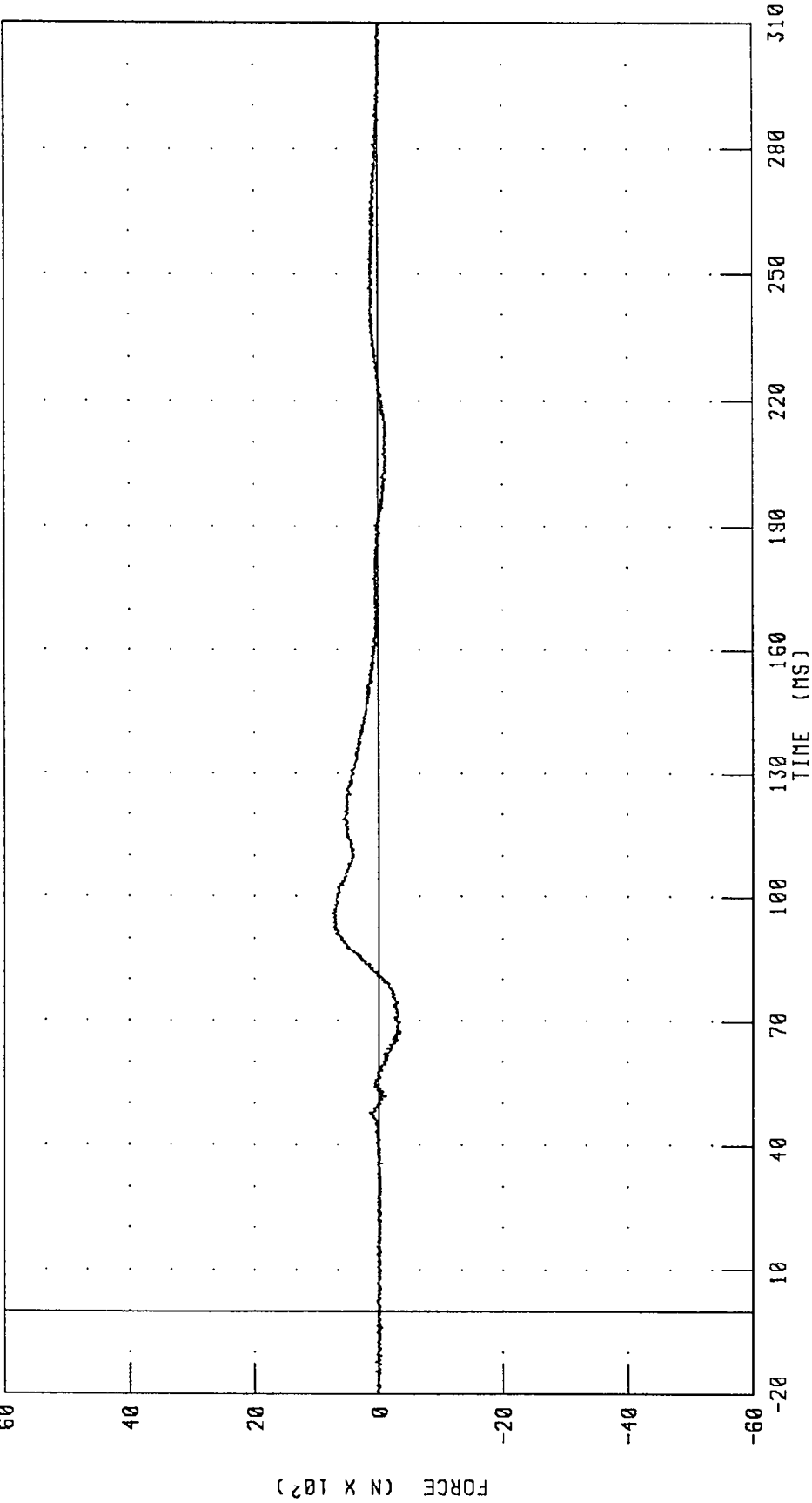
PEAK DATA: 62.47 G @ 72.16 MS; 0.08 G @ -4.32 MS

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK X-AXIS SHEAR FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 762.27 N @ 96.08 MS; -352.10 N @ 67.52 MS

CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

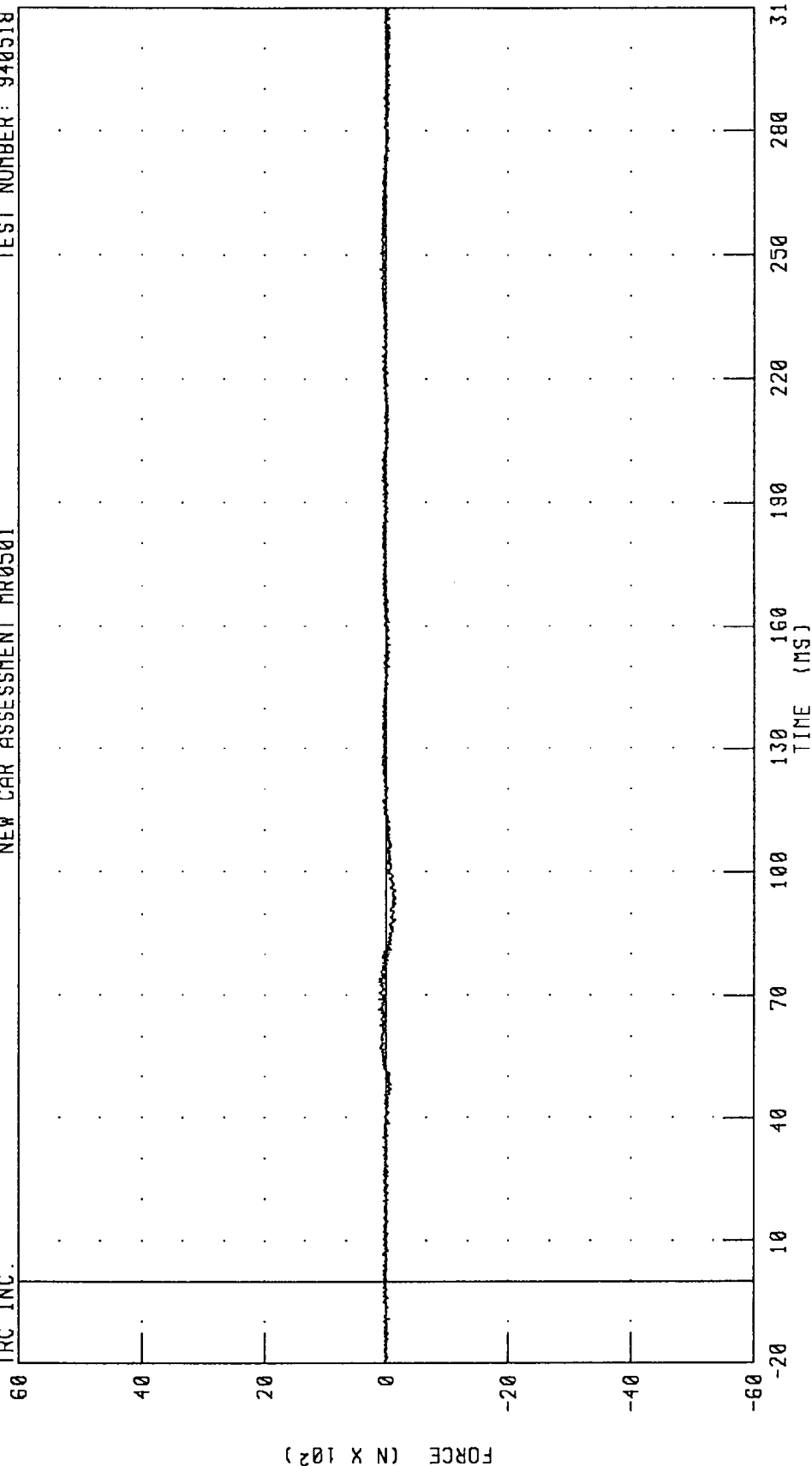
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER NECK Y-AXIS SHEAR FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



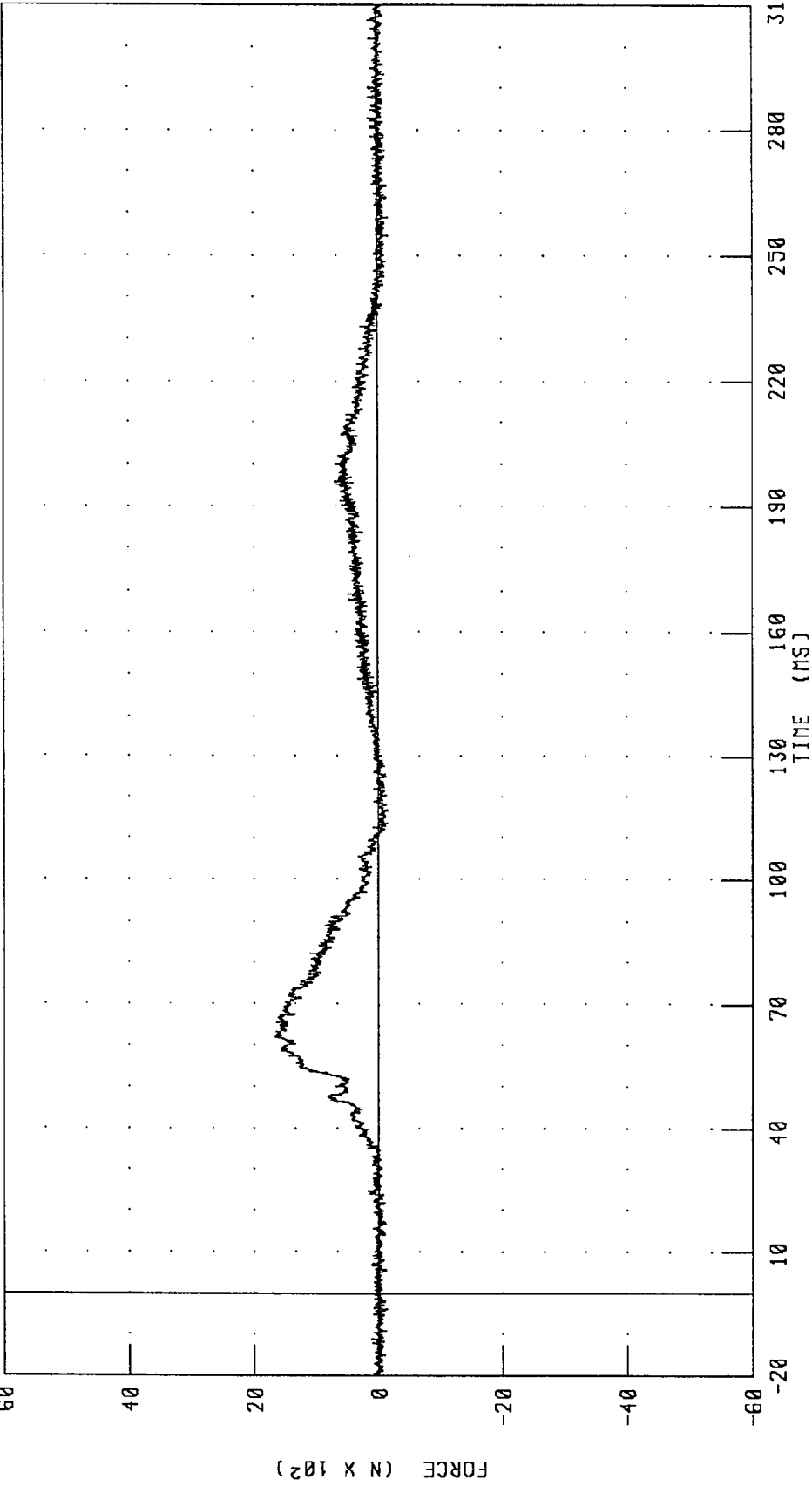
CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

PEAK DATA: 127.12 N @ 73.44 MS; -157.66 N @ 95.36 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK Z-AXIS AXIAL FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

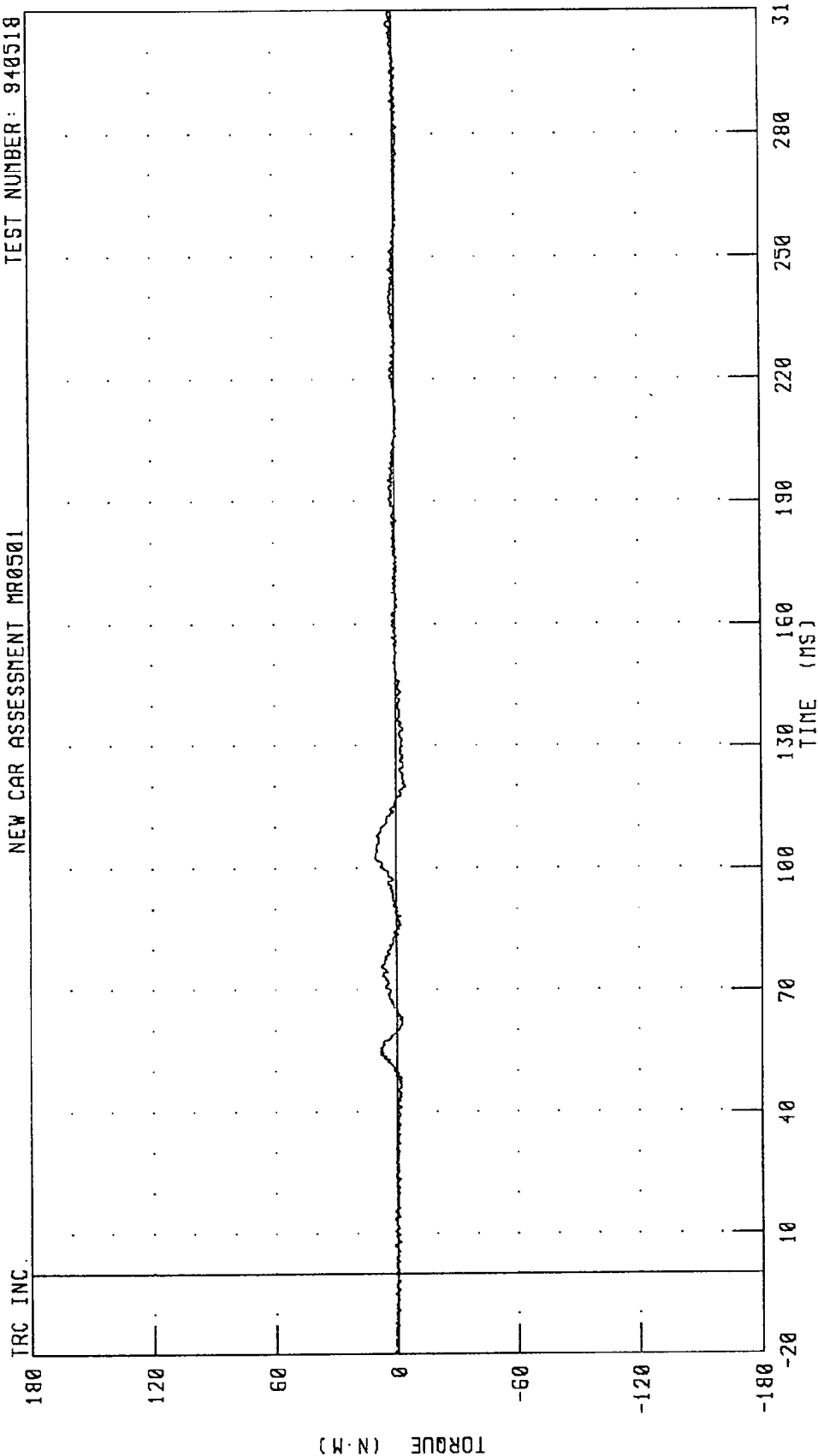


CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

PEAK DATA: 1663.59 N @ 62.08 MS, -164.68 N @ 254.64 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT X AXIS
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



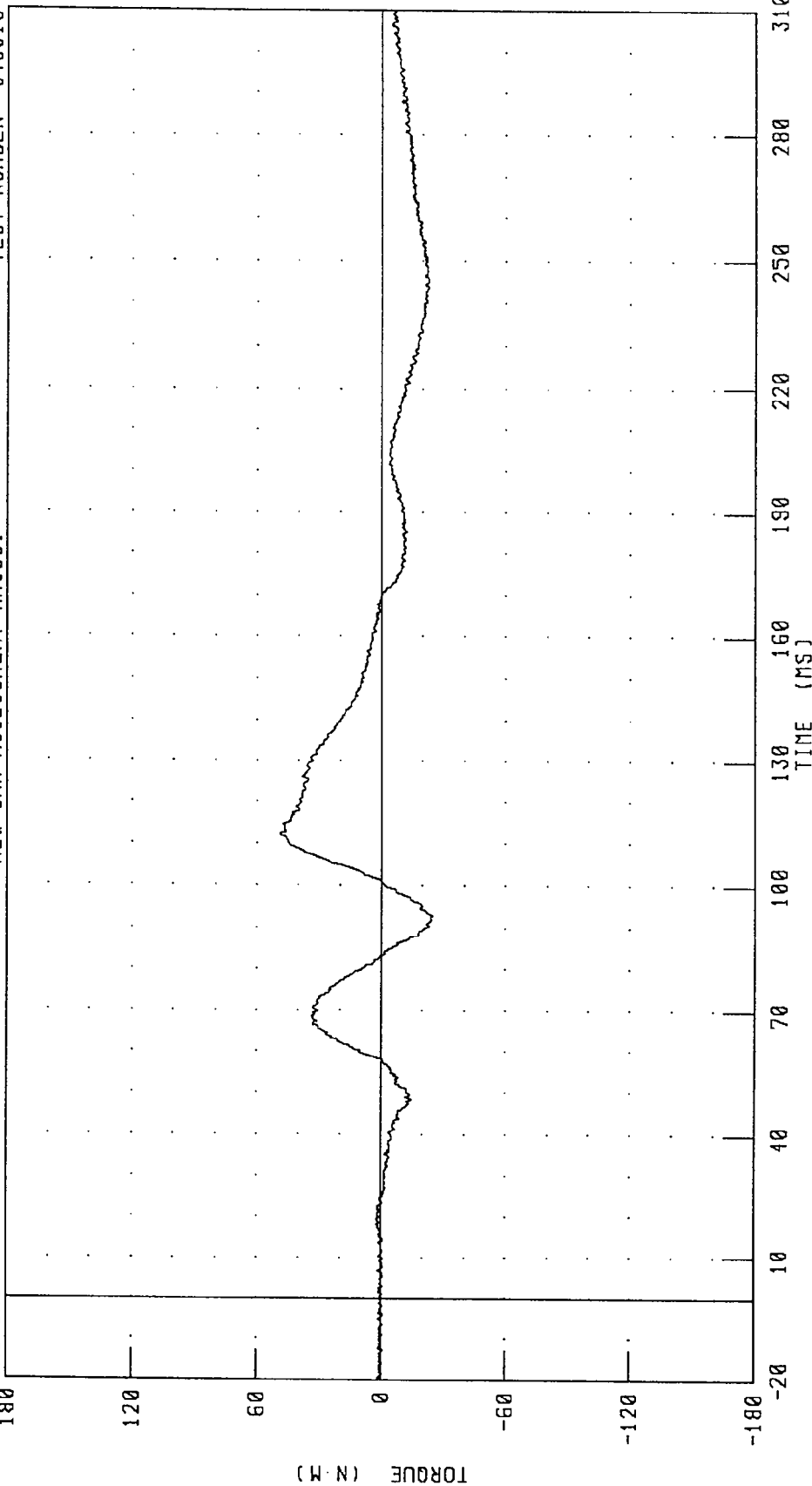
CHANNEL: NEKX11 FILTER: CH. CLASS 600

940518

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



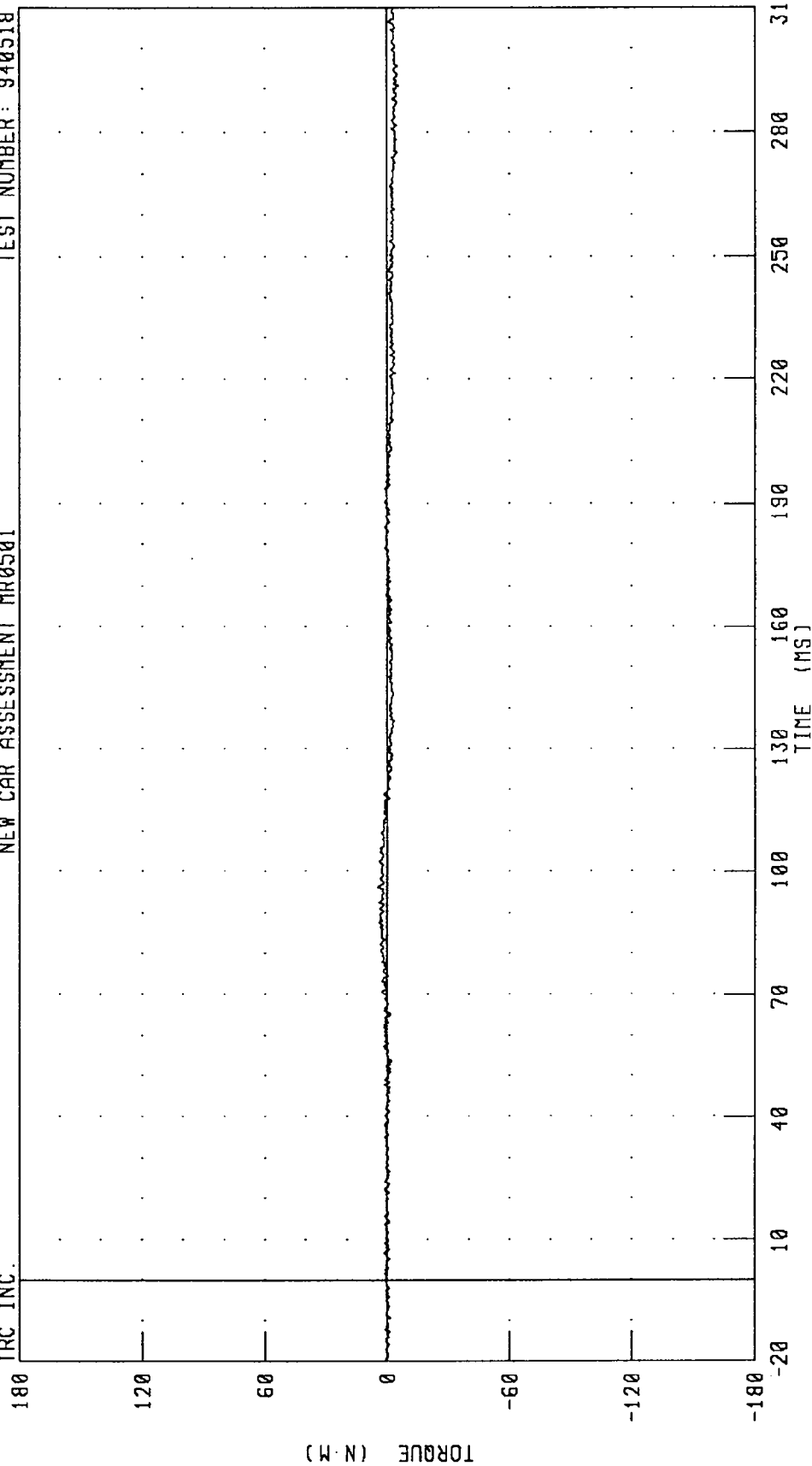
CHANNEL: NEKYM1 FILTER: CH. CLASS 600

PEAK DATA: 49.04 N.M @ 112.24 MS; -24.97 N.M @ 92.96 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



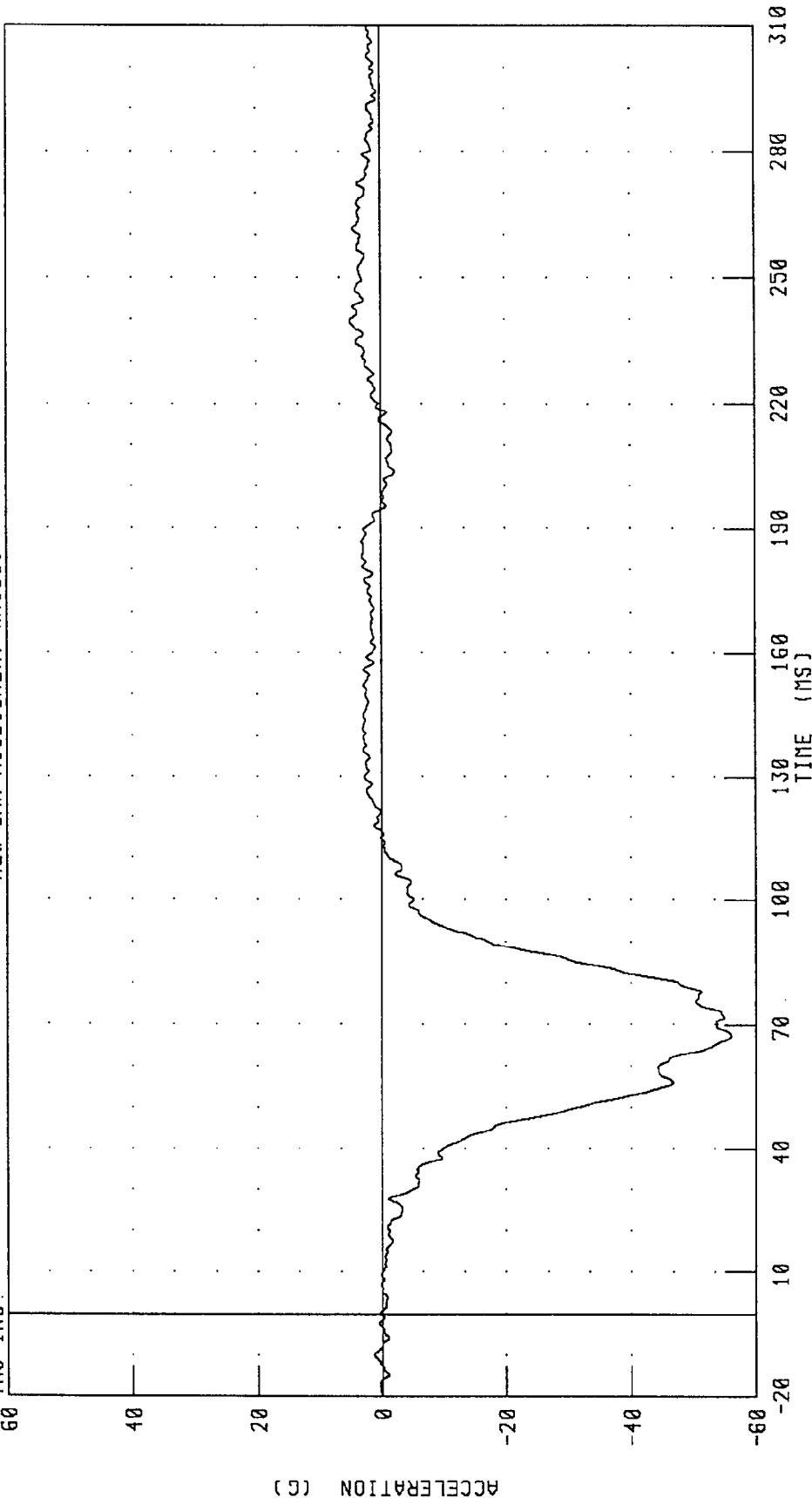
CHANNEL: NEKZM1 FILTER: CH. CLASS 600

PEAK DATA: 4.51 N-M @ 96.24 MS; -5.62 N-M @ 291.12 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



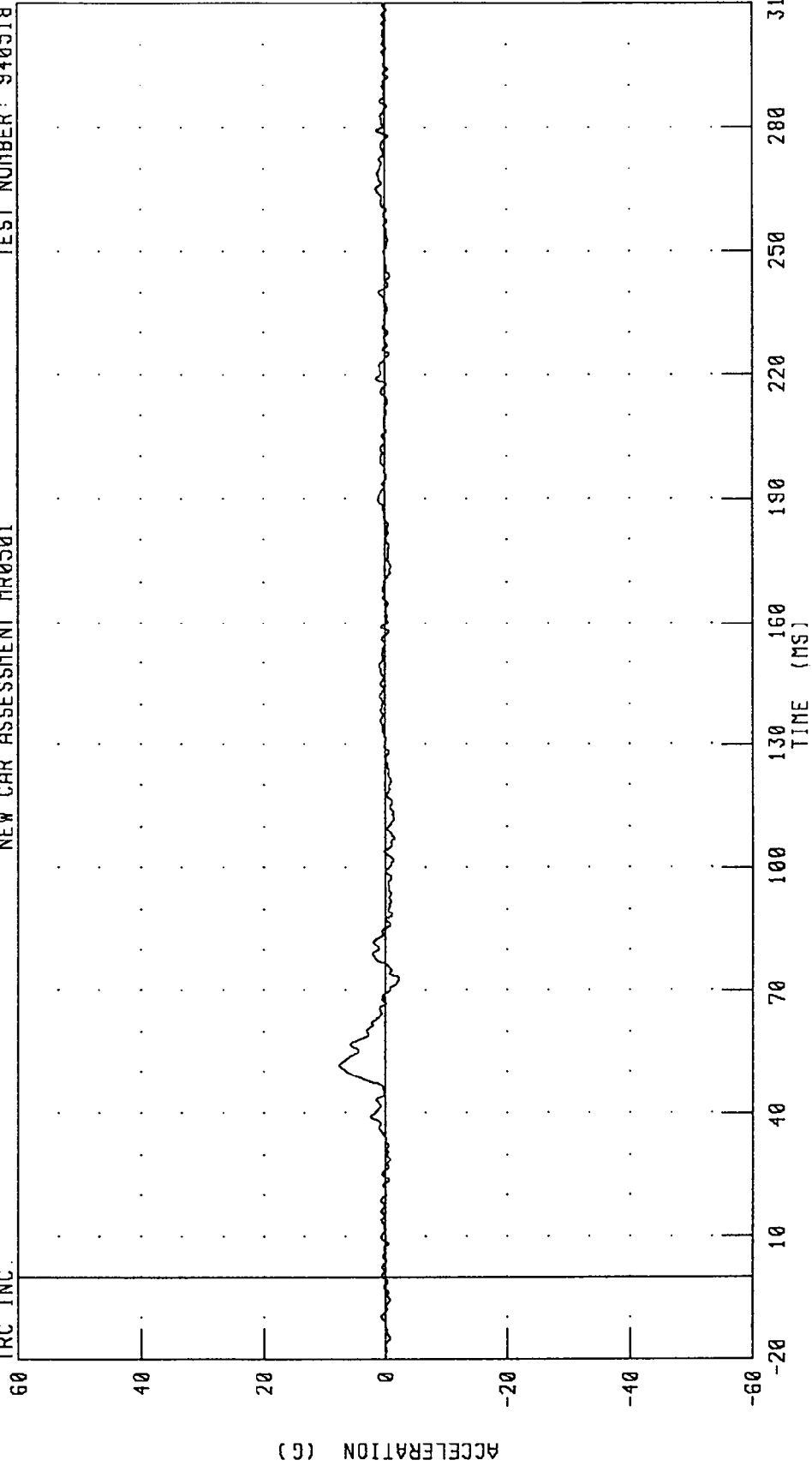
PEAK DATA: 4.96 G @ 239.60 MS; -56.00 G @ 67.20 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



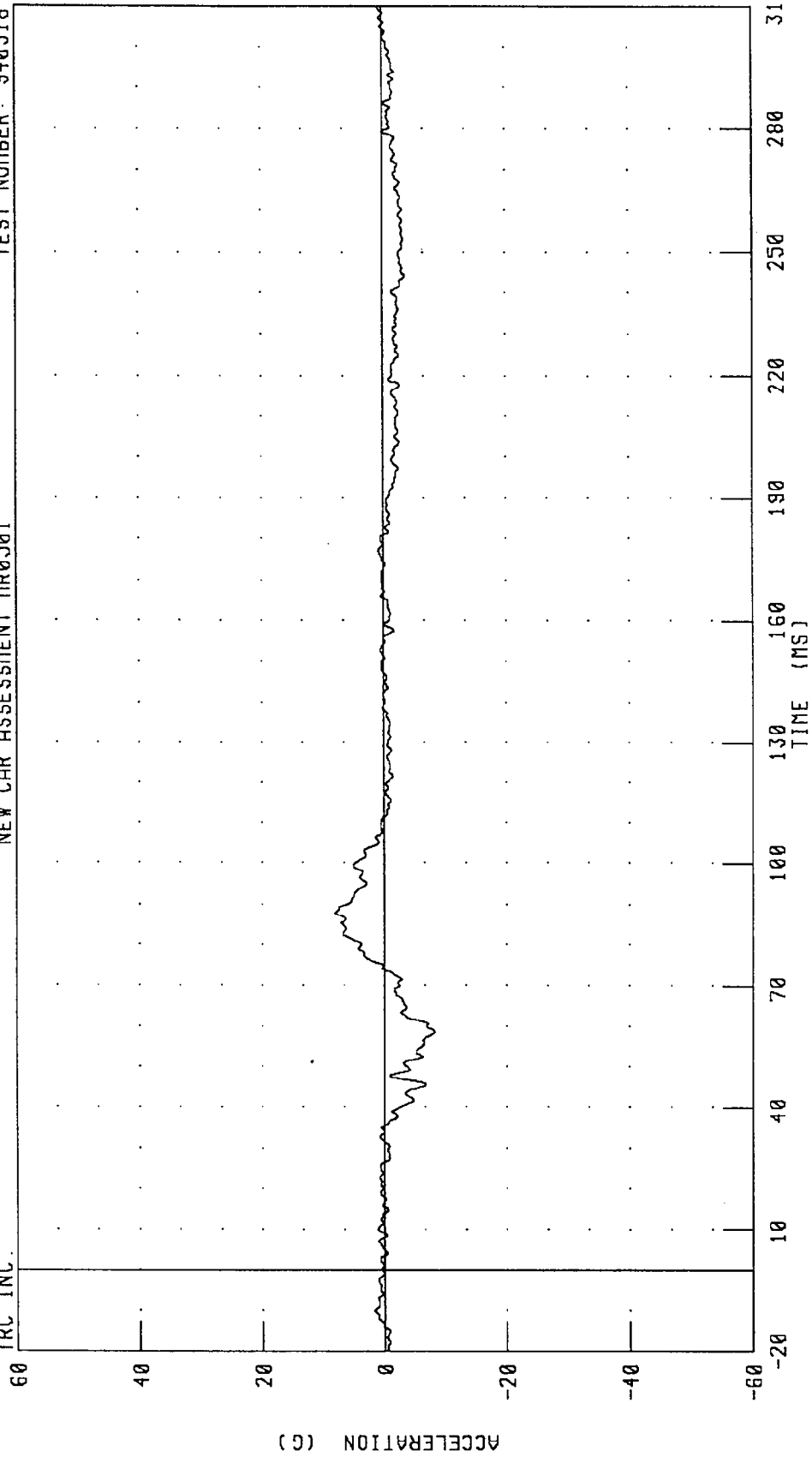
CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 7.57 G @ 51.52 MS; -2.24 G @ 73.04 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

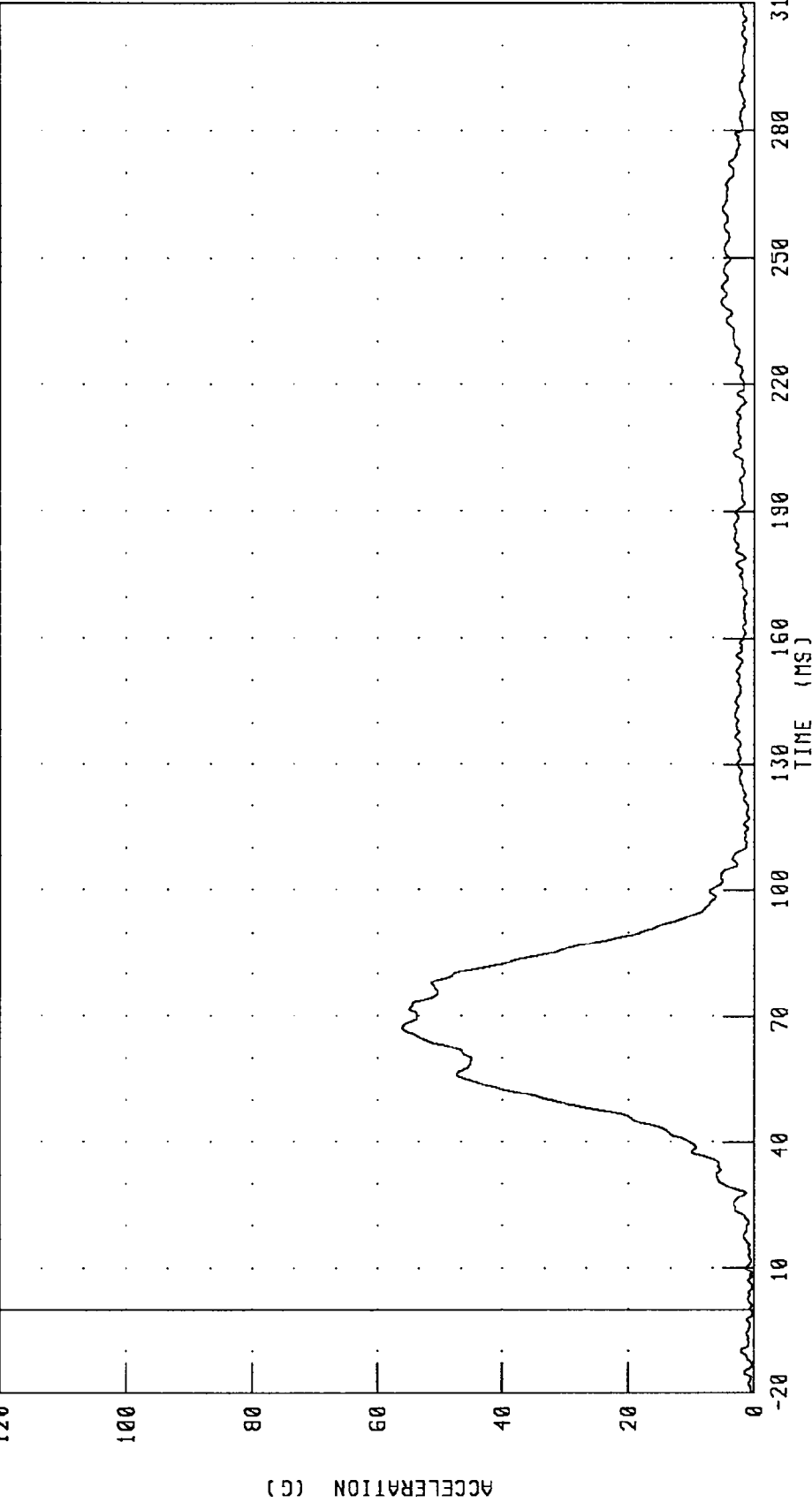
PEAK DATA: 8.06 G @ 87.84 MS; -8.22 G @ 58.72 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

PEAK DATA: 56.06 G @ 67.20 MS; 0.05 G @ -20.00 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER CHEST DEFLECTION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

30

10

DISPLACEMENT (MM)

-10

-30

-50

-70

-90

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

CHANNEL: CSTXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.18 MM @ 9.76 MS; -47.57 MM @ 79.36 MS

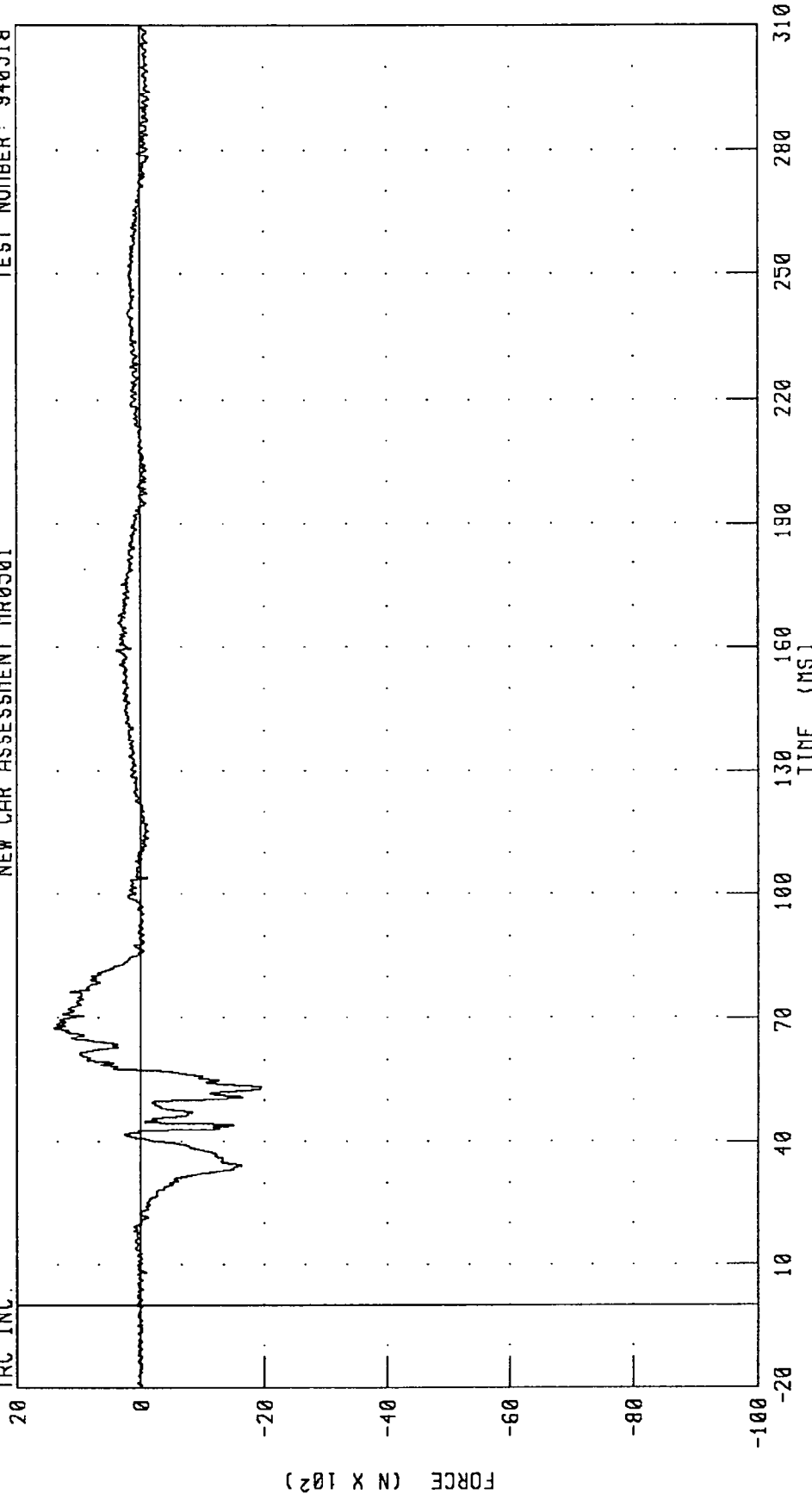
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER LEFT FEMUR FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: LFMF1 FILTER: CH. CLASS 600

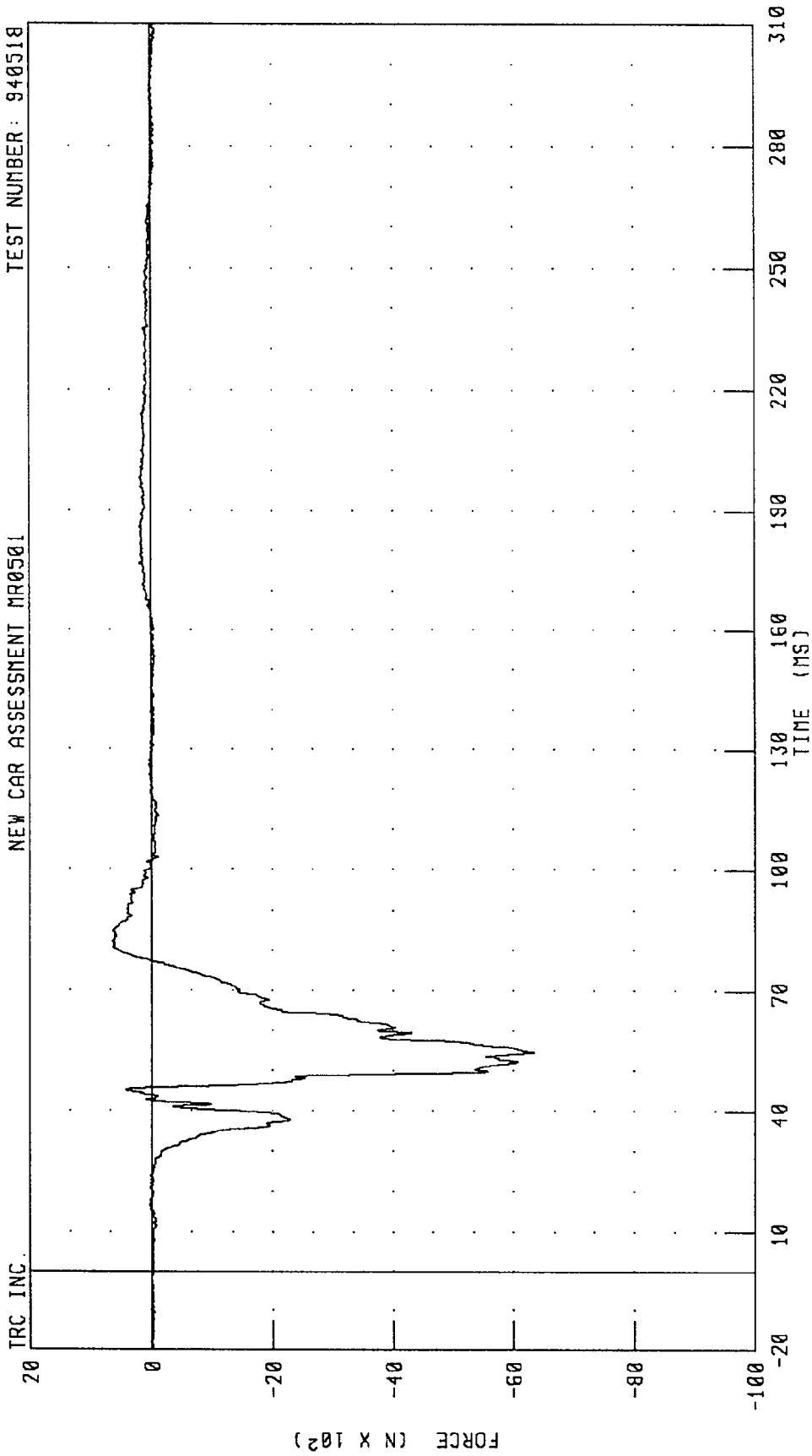
PEAK DATA: 1403.99 N @ 67.68 MS; -1955.59 N @ 53.28 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER RIGHT FEMUR FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



CHANNEL: RFMF1 FILTER: CH. CLASS 600

PEAK DATA: 633.64 N @ 82.24 MS; -6335.82 N @ 54.56 MS

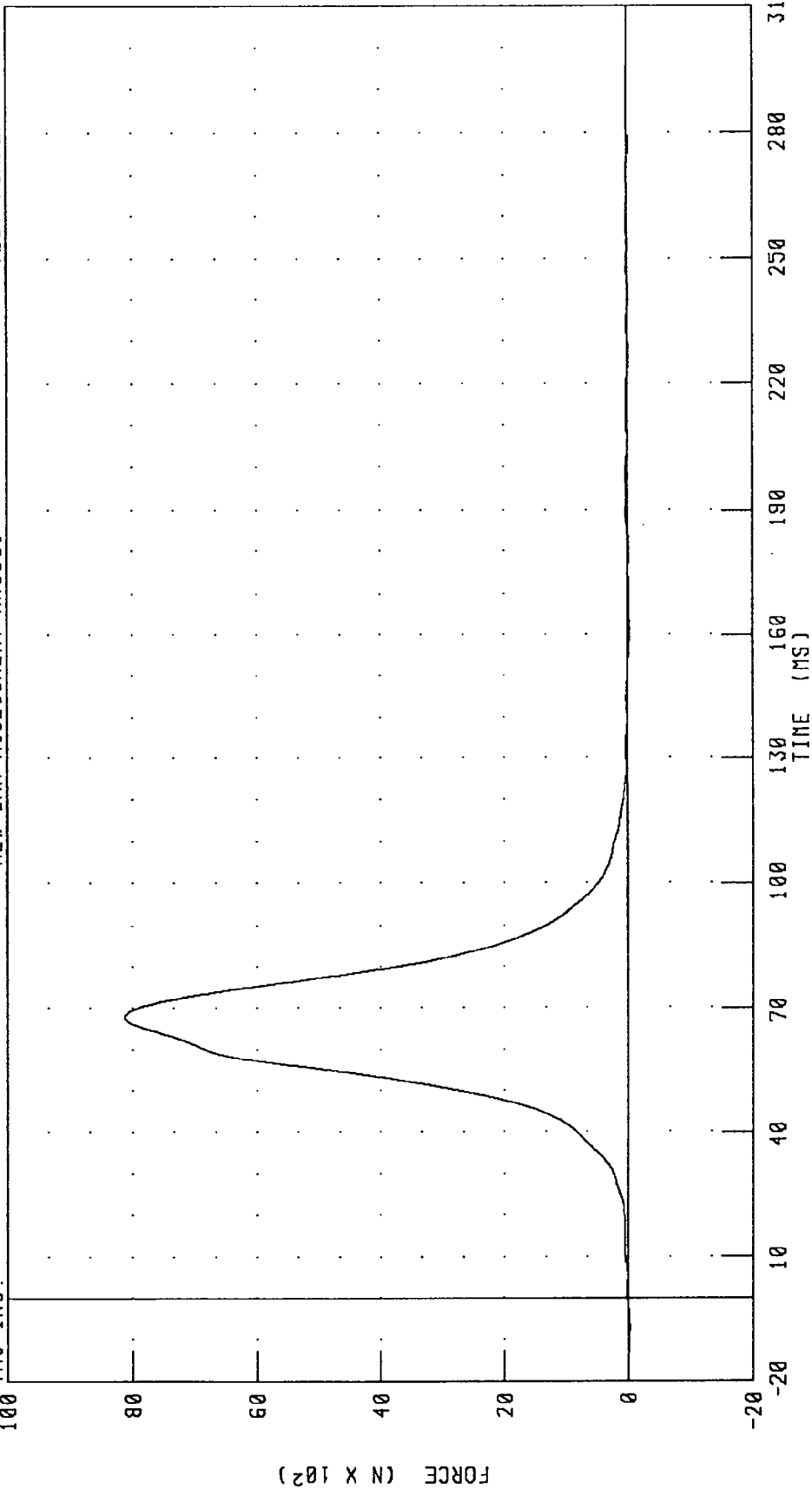
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER LAP BELT OUTBOARD FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: LBOFI FILTER: CH. CLASS 60

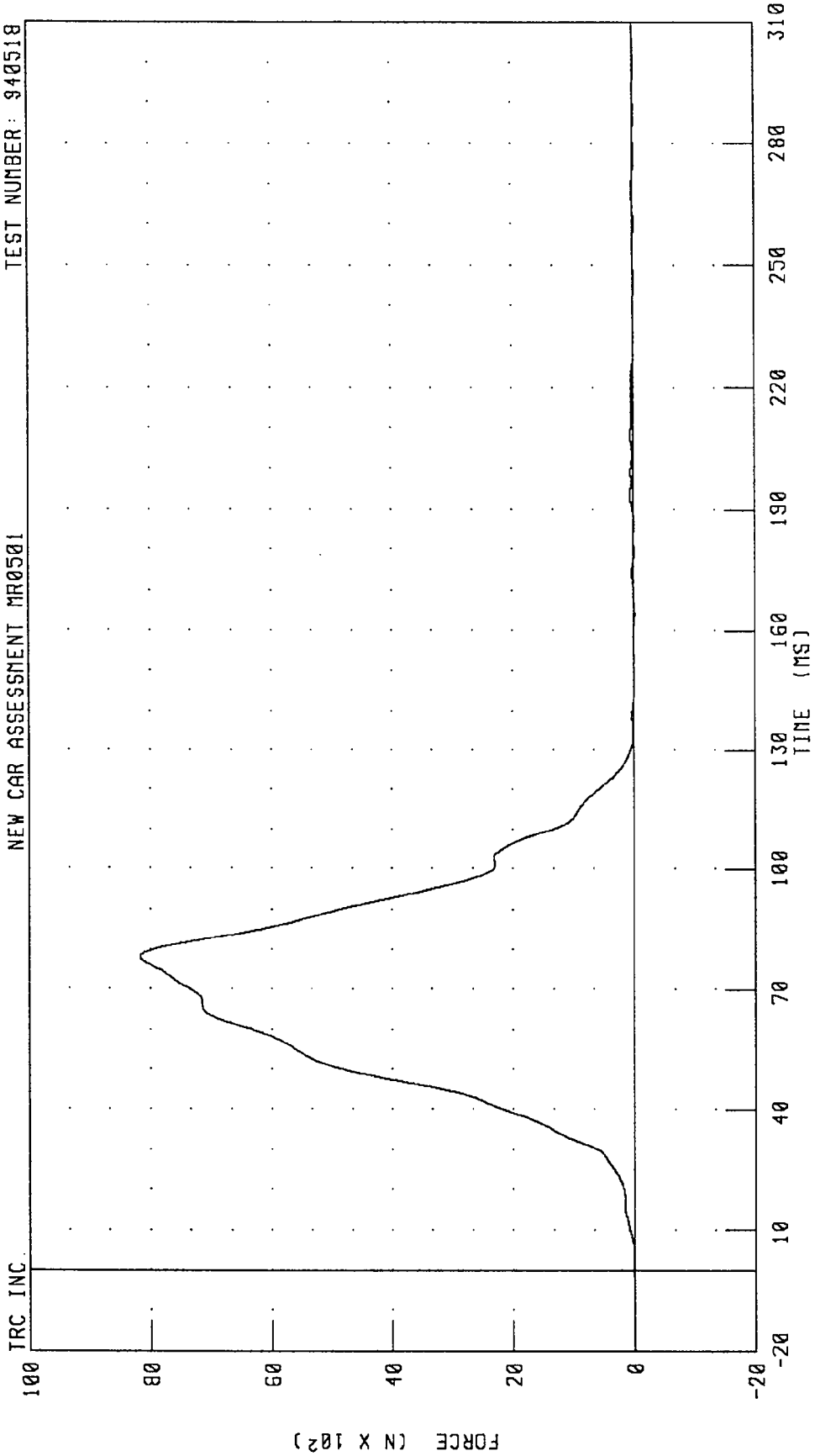
PEAK DATA: 8123.71 N @ 67.92 MS; -25.85 N @ 160.16 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

DRIVER SHOULDER BELT FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



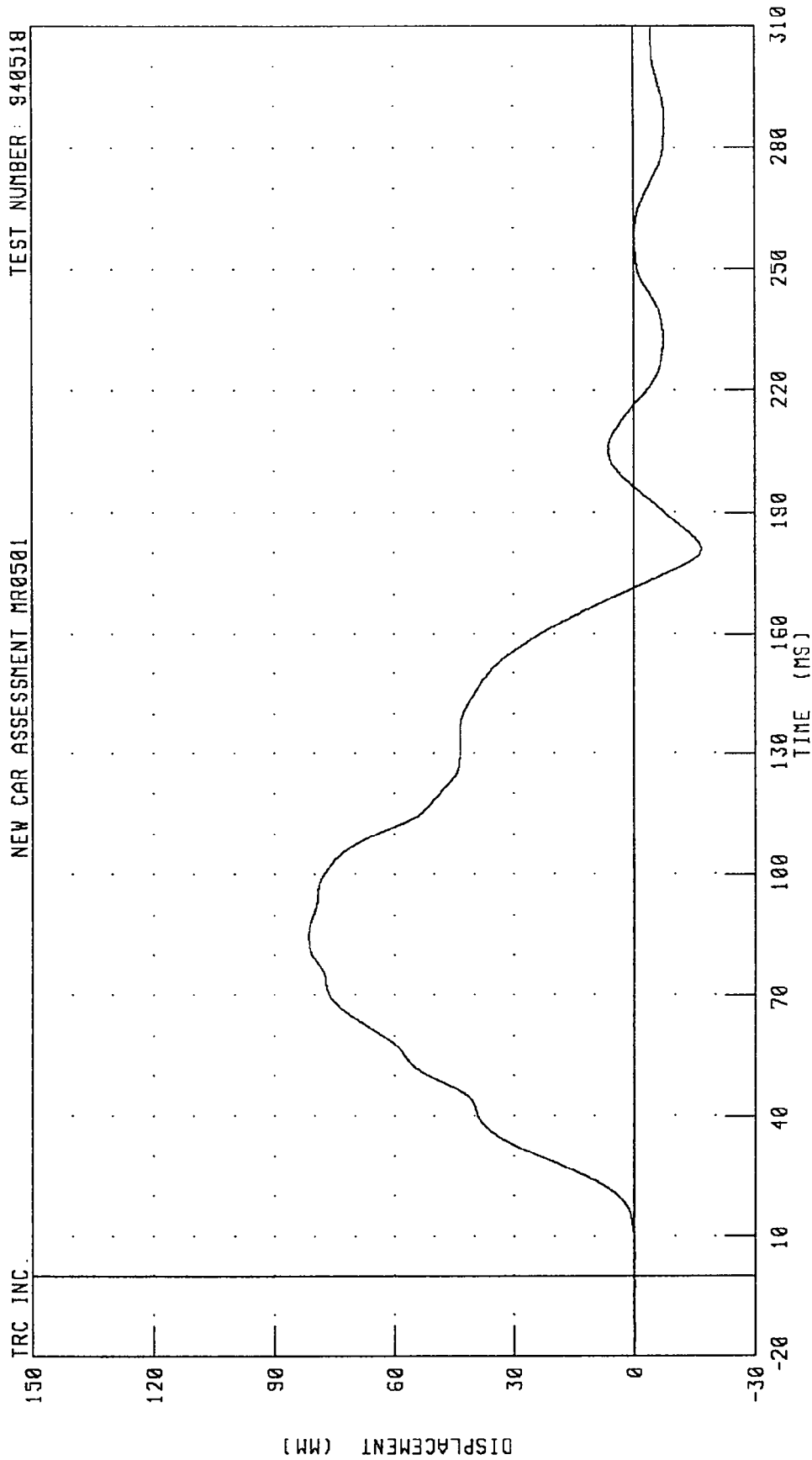
CHANNEL: SHBF1 FILTER: CH. CLASS 60

PEAK DATA: 8169.63 N @ 78.00 MS; -20.70 N @ 164.00 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
DRIVER SHOULDER BELT DISPLACEMENT

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501



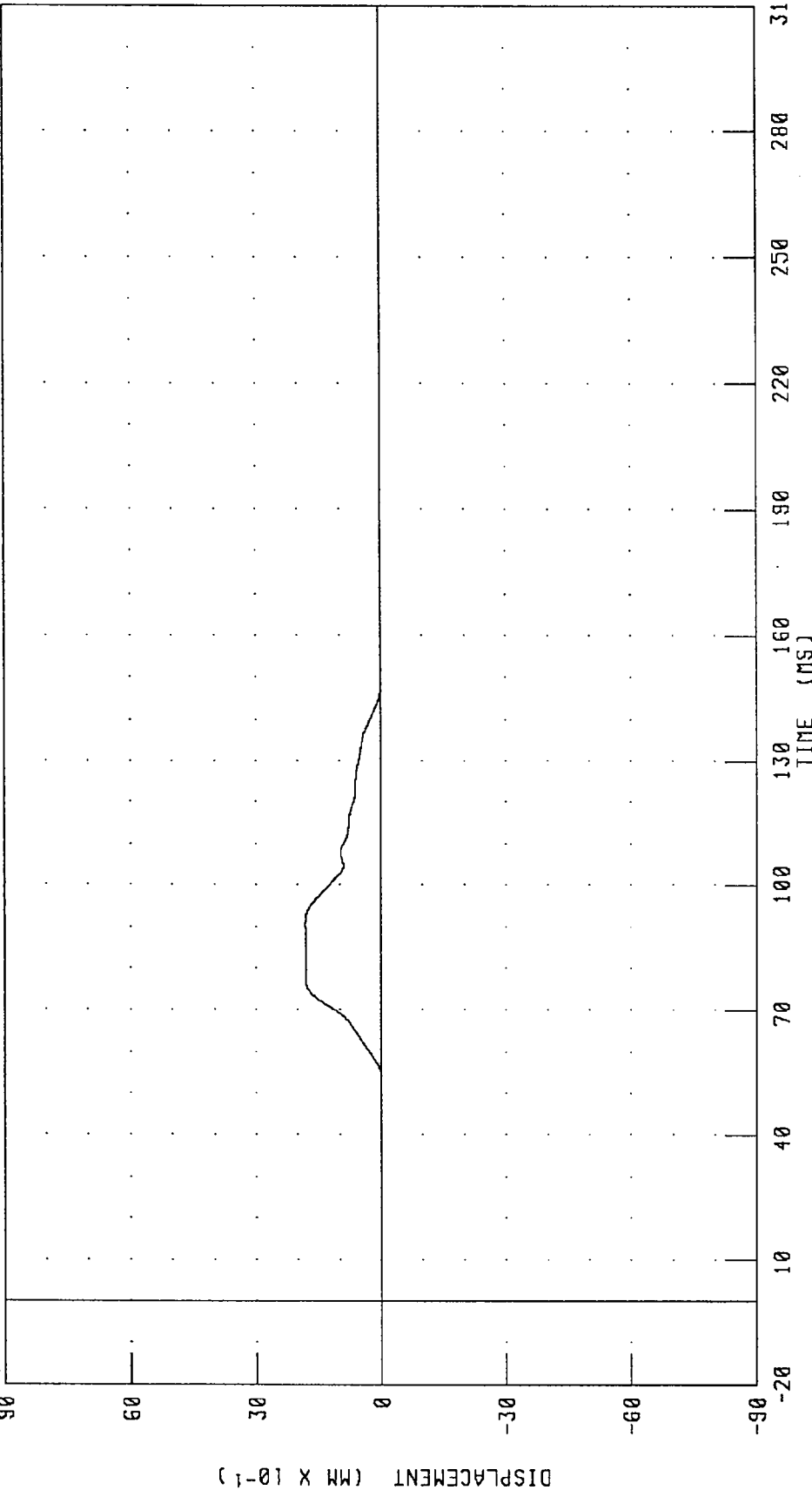
PEAK DATA: 81.52 MM @ 84.80 MS; -16.65 MM @ 180.96 MS

CHANNEL: SHB01 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 DRIVER SEAT BELT EXTENSION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



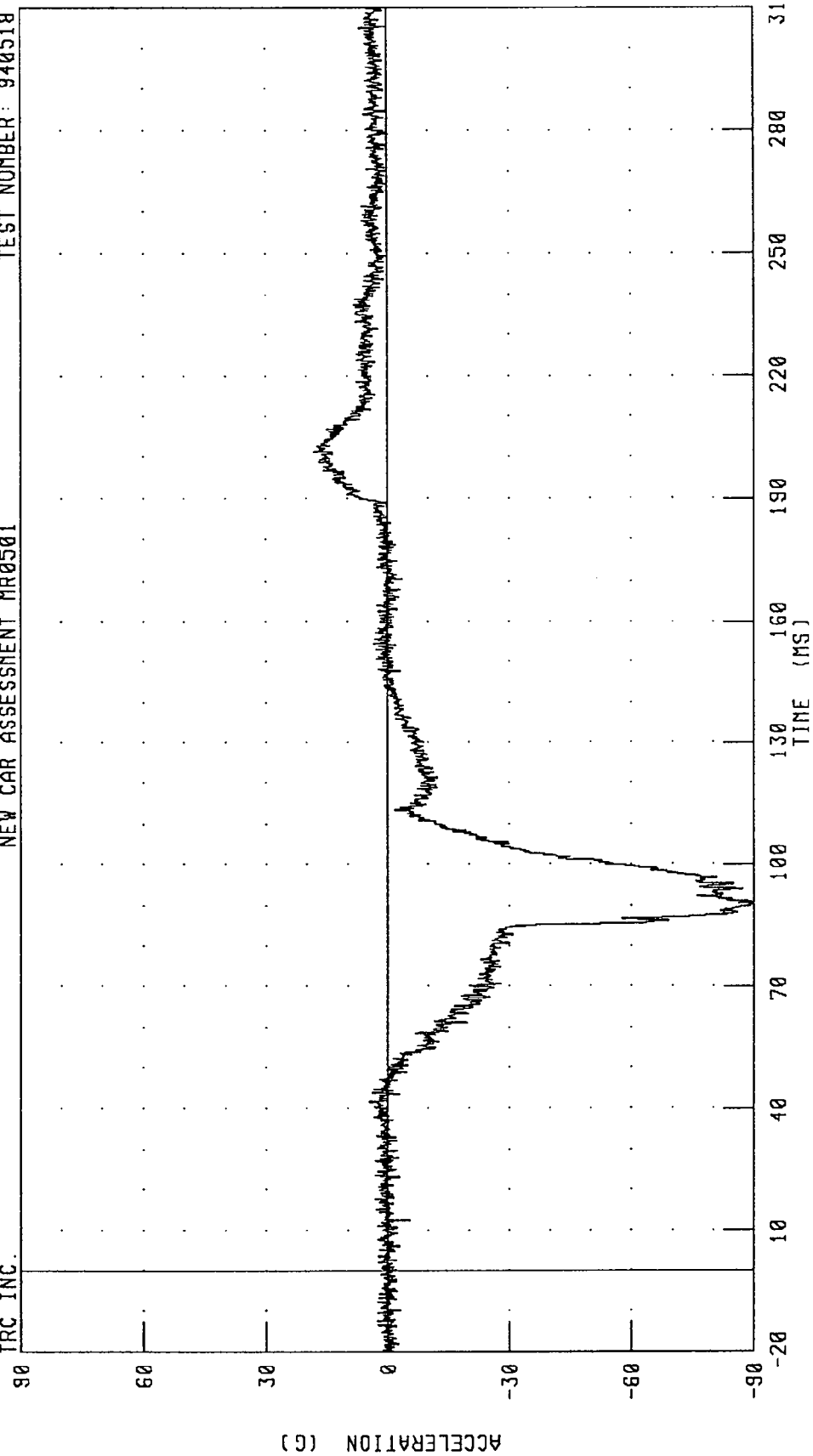
PEAK DATA: 1.82 MM @ 90.48 MS; 0.00 MM @ 52.80 MS

CHANNEL: SBED1 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



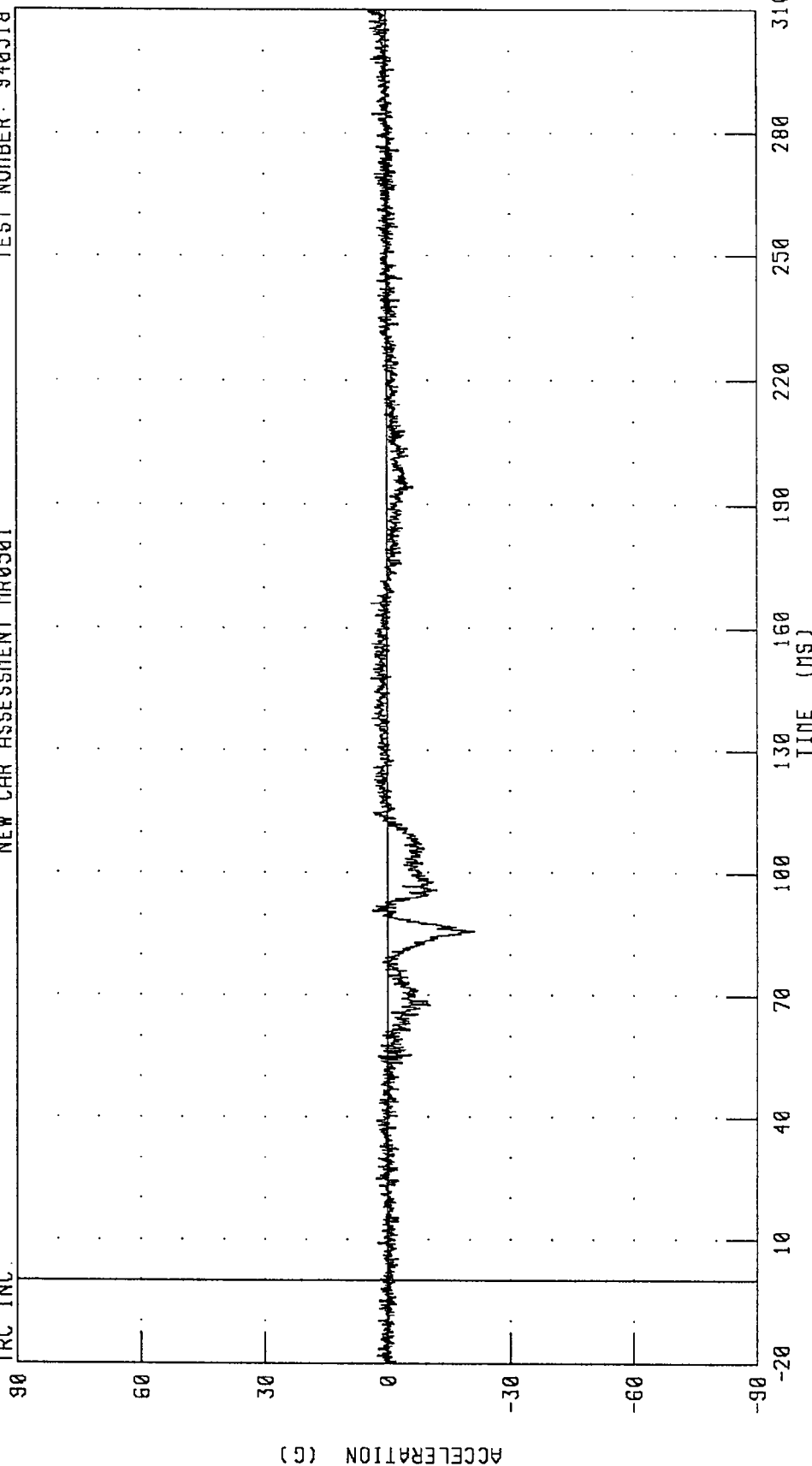
CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

PEAK DATA: 18.23 G @ 201.36 MS; -90.29 G @ 90.24 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Y-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



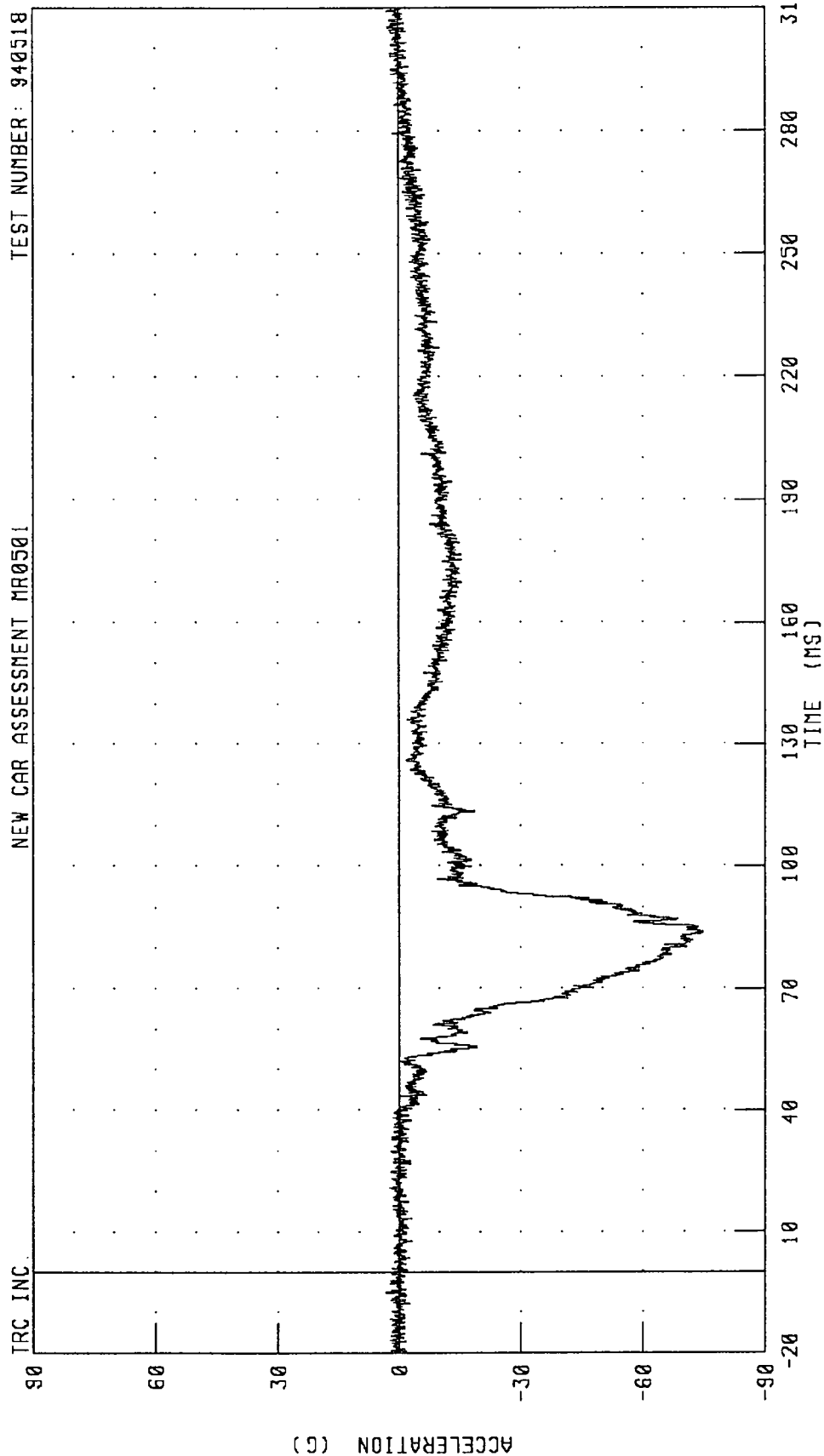
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 4.43 G @ 309.44 MS; -21.36 G @ 85.92 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD Z-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

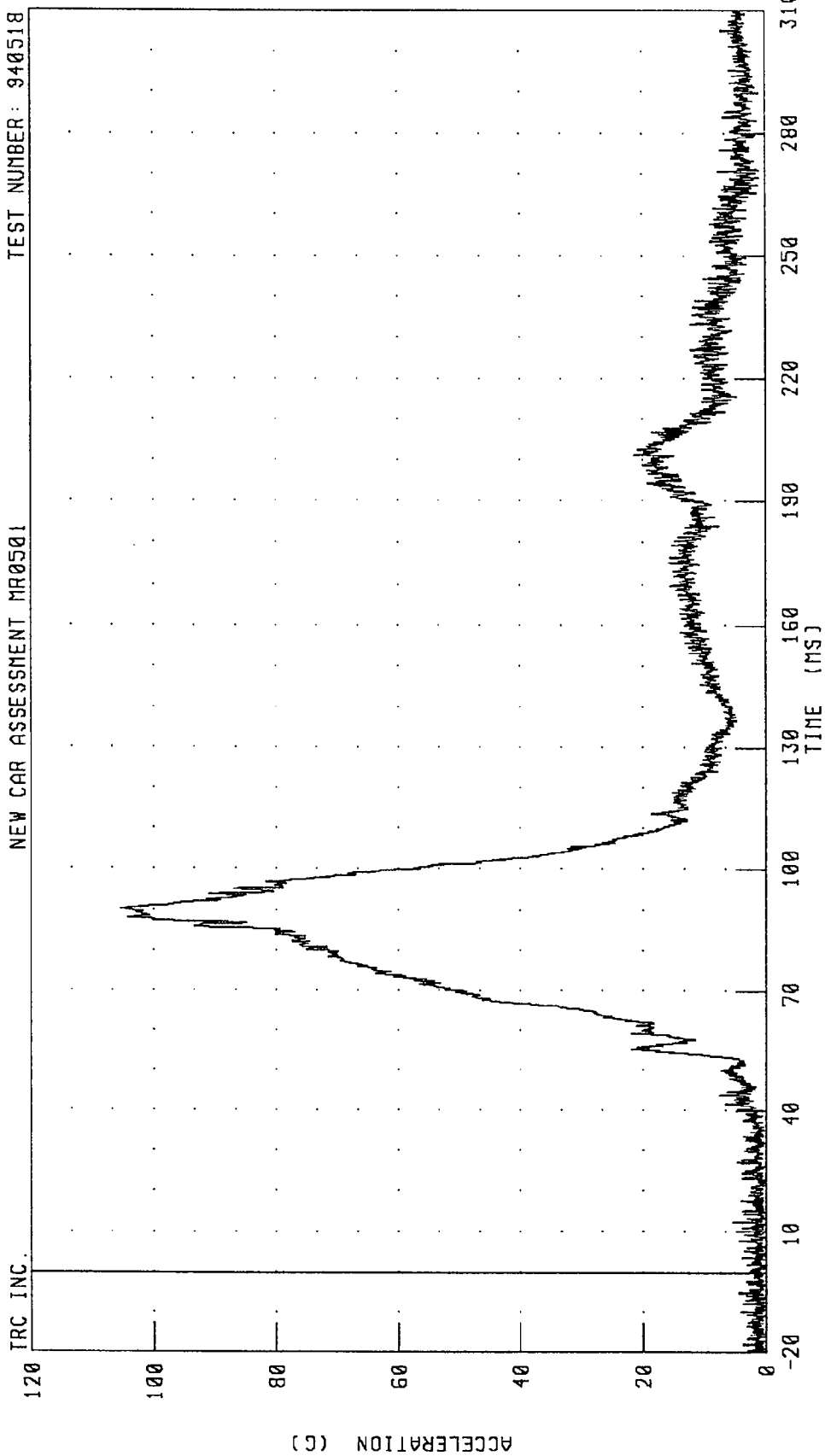


CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 3.39 G @ -5.12 MS; -74.60 G @ 84.08 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



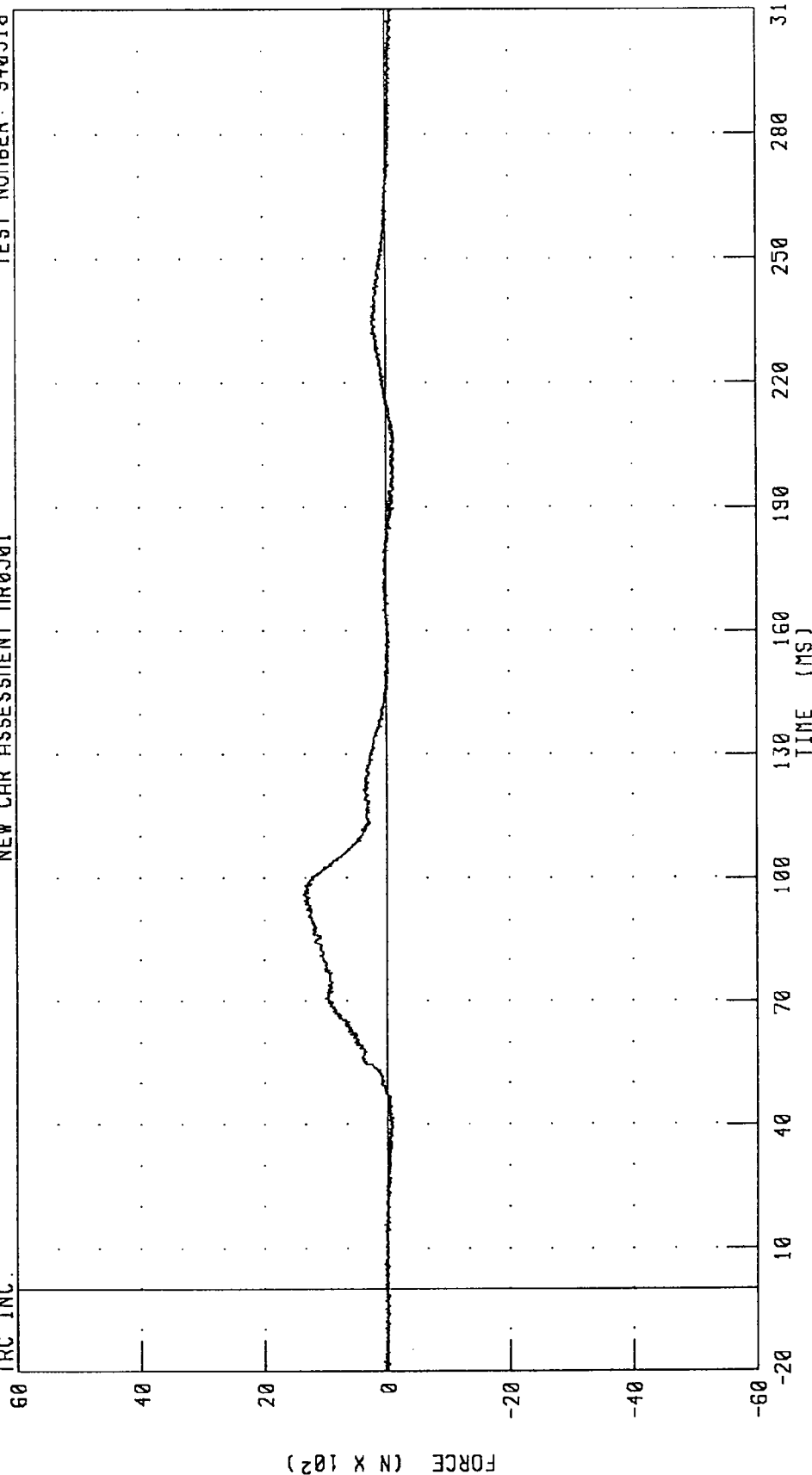
CHANNEL: HEDG2 FILTER: CH. CLASS 1000

PEAK DATA: 105.36 G @ 90.24 MS; 0.09 G @ -10.80 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE
NEW CAR ASSESSMENT NR0501

TEST NUMBER: 940518

TRC INC.



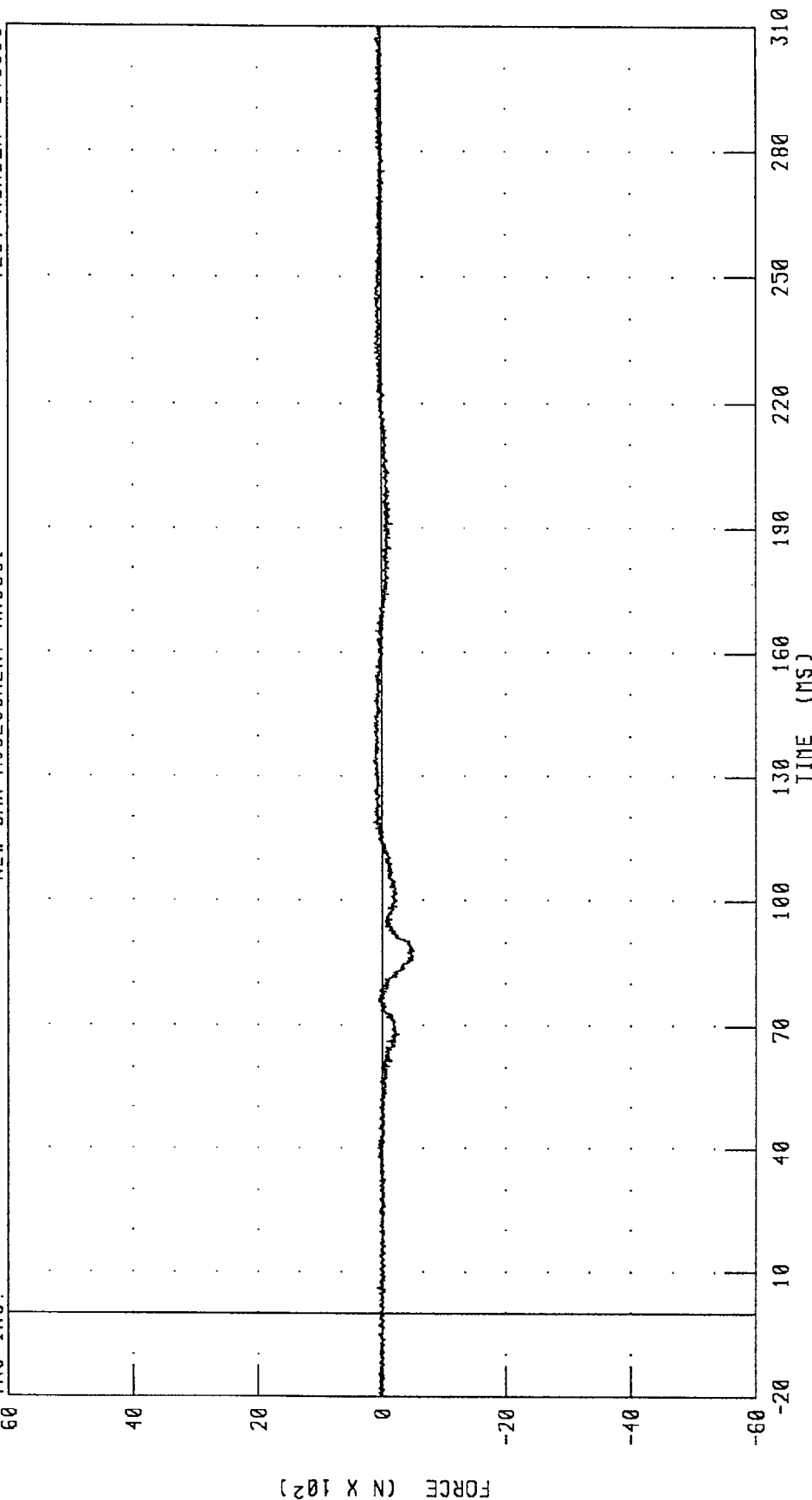
CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

PEAK DATA: 1373.07 N @ 96.08 MS; -142.23 N @ 206.24 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 PASSENGER NECK Y-AXIS SHEAR FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



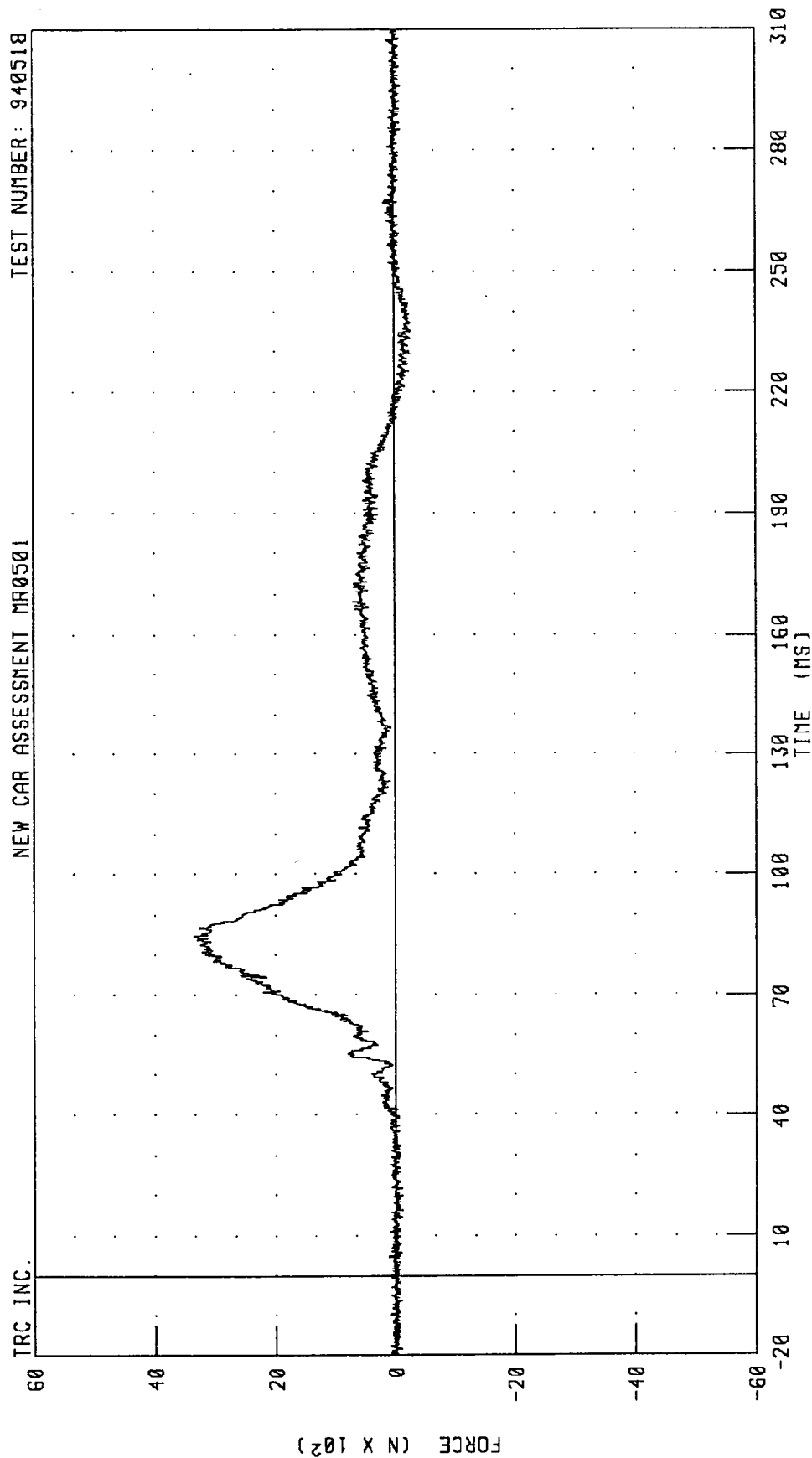
PEAK DATA: 140.75 N @ 118.96 MS; -500.45 N @ 88.16 MS

CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

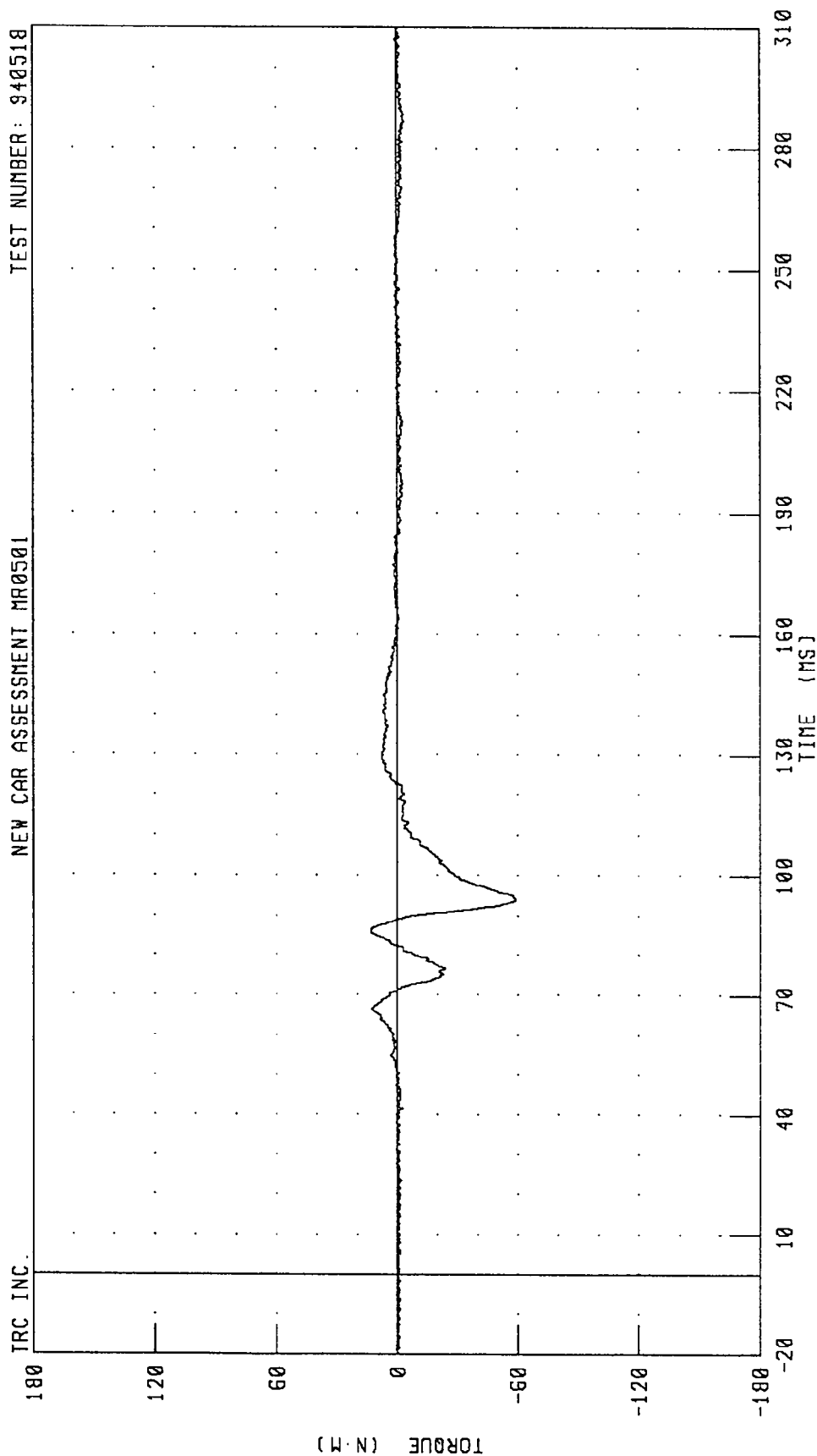


CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

PEAK DATA: 3360.52 N @ 84.80 MS; -287.95 N @ 237.36 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT X AXIS
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



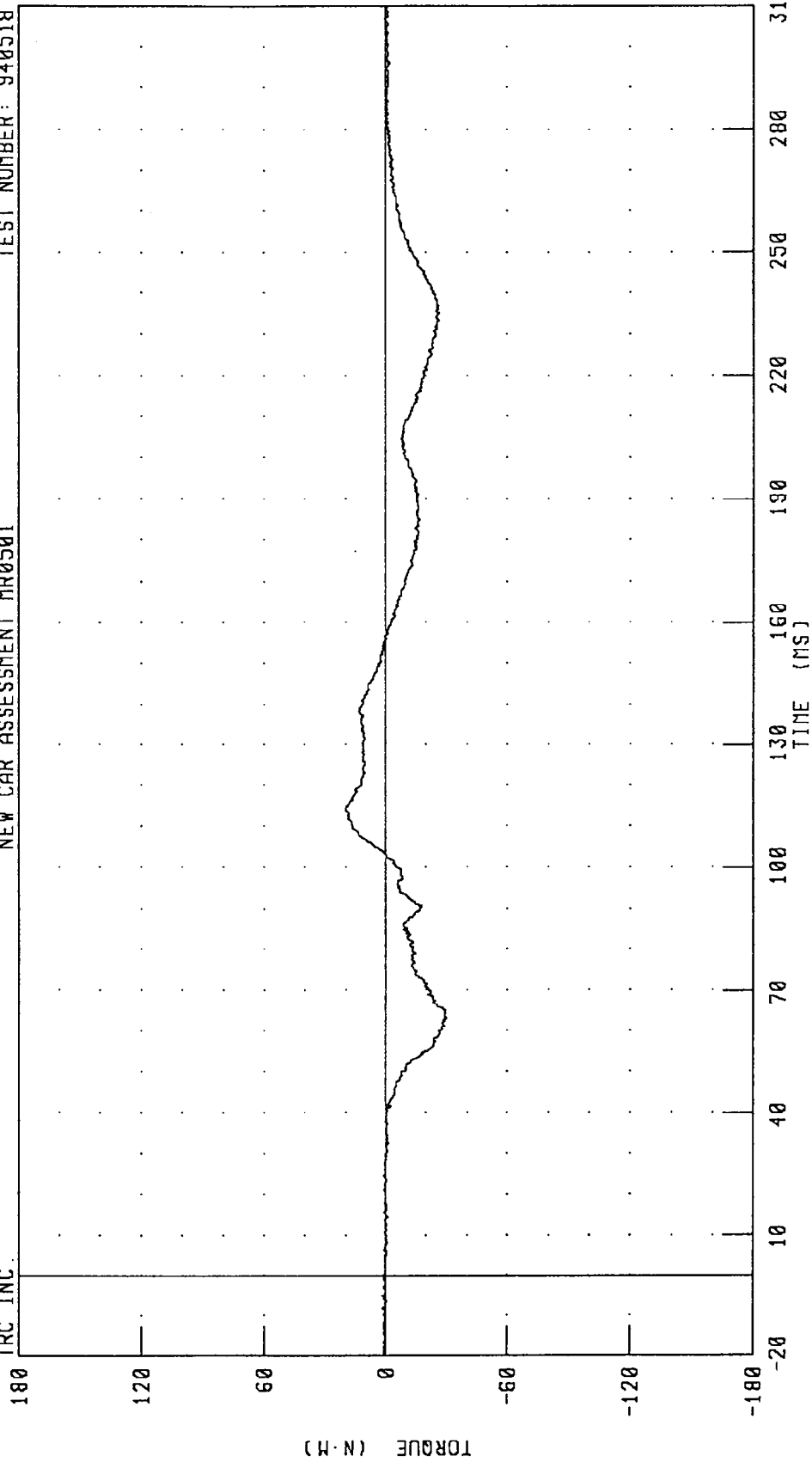
PEAK DATA: 13.43 N.M @ 85.76 MS; -58.89 N.M @ 94.24 MS

CHANNEL: NEKX12 FILTER: CH. CLASS 600

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Y AXIS
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



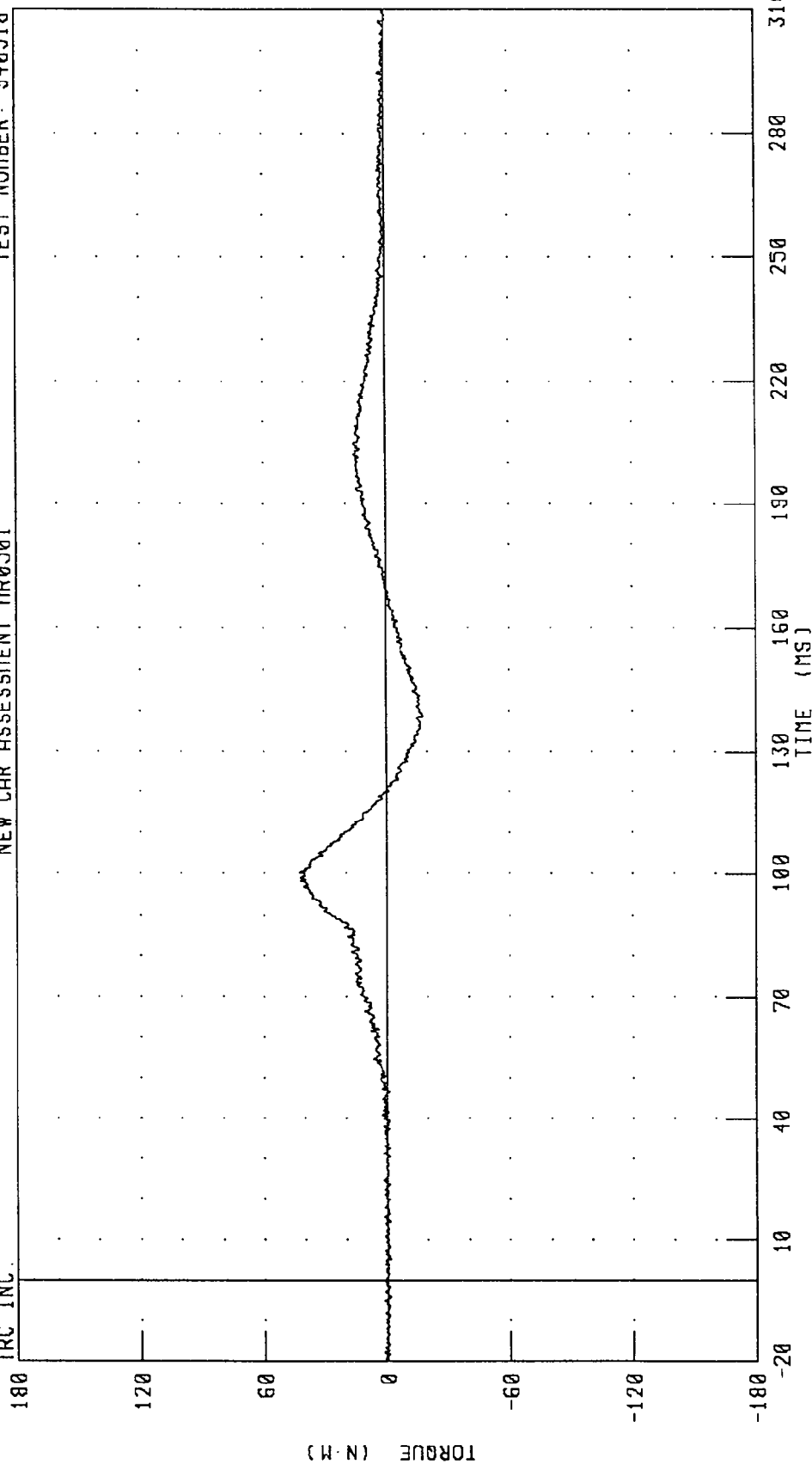
CHANNEL: NEYM2 FILTER: CH. CLASS 600

PEAK DATA: 19.86 N-M @ 114.48 MS; -30.06 N-M @ 63.20 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER NECK MOMENT ABOUT Z AXIS
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



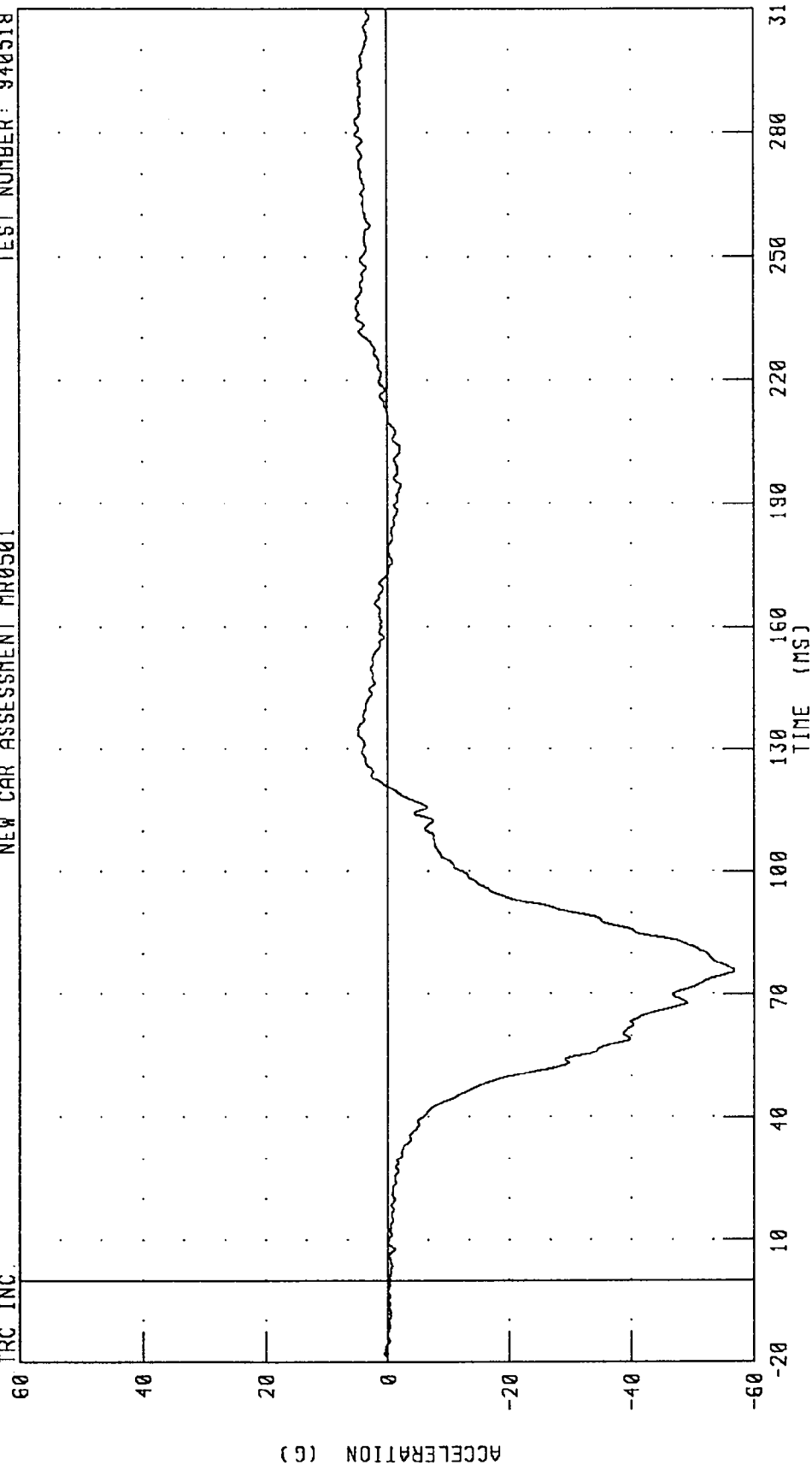
CHANNEL: NEKZM2 FILTER: CH. CLASS 600

PEAK DATA: 42.77 N-M @ 100.40 MS, -17.73 N-M @ 138.72 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



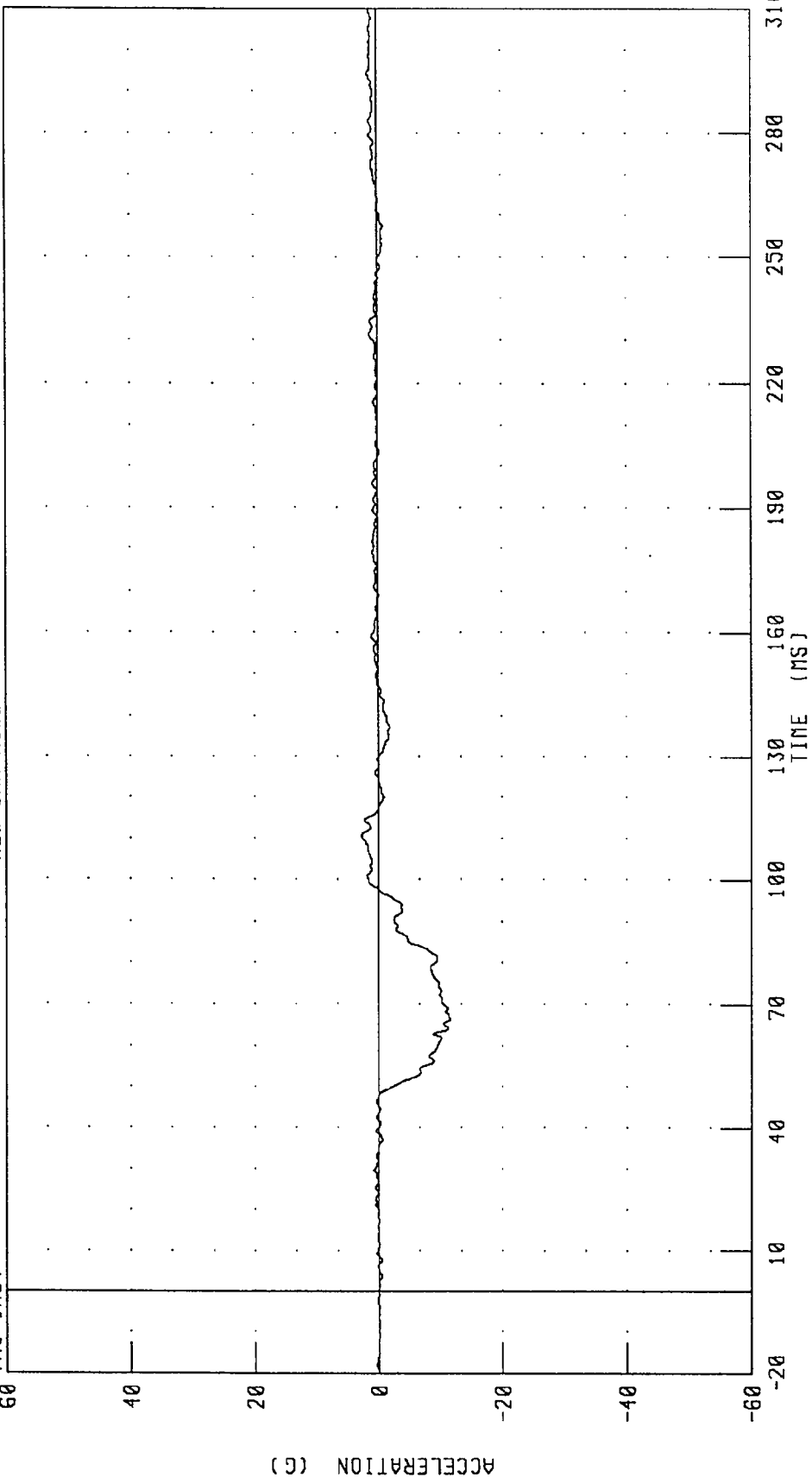
CHANNEL: CSTXG2 FILTER: CH. CLASS 180

PEAK DATA: 5.32 G @ 282.72 MS; -56.76 G @ 75.68 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 PASSENGER CHEST Y-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



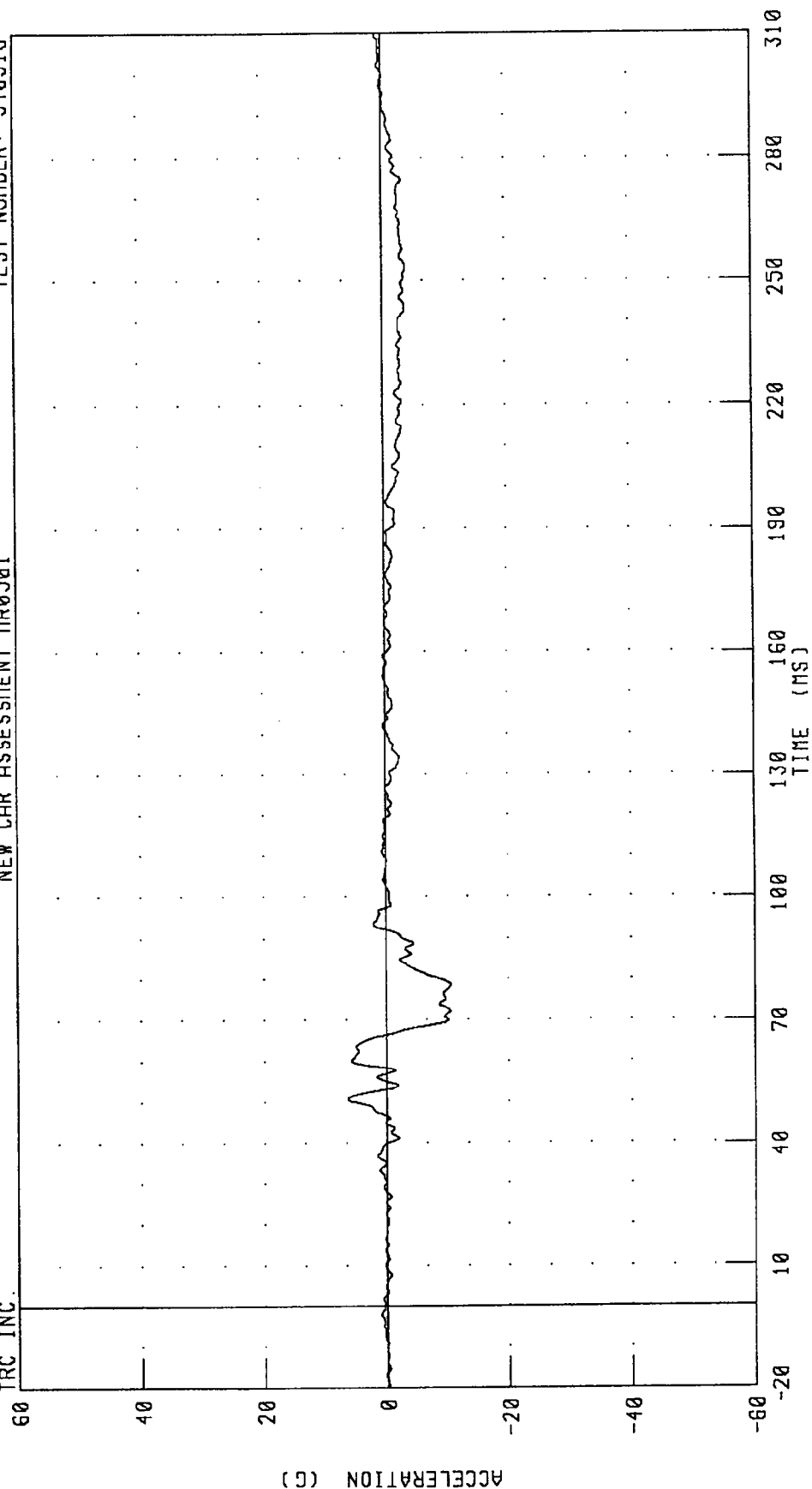
CHANNEL: CSTYG2 FILTER: CH. CLASS 180

PEAK DATA: 2.66 G @ 110.72 MS; -11.46 G @ 86.48 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST Z-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: CSTG2 FILTER: CH. CLASS 180

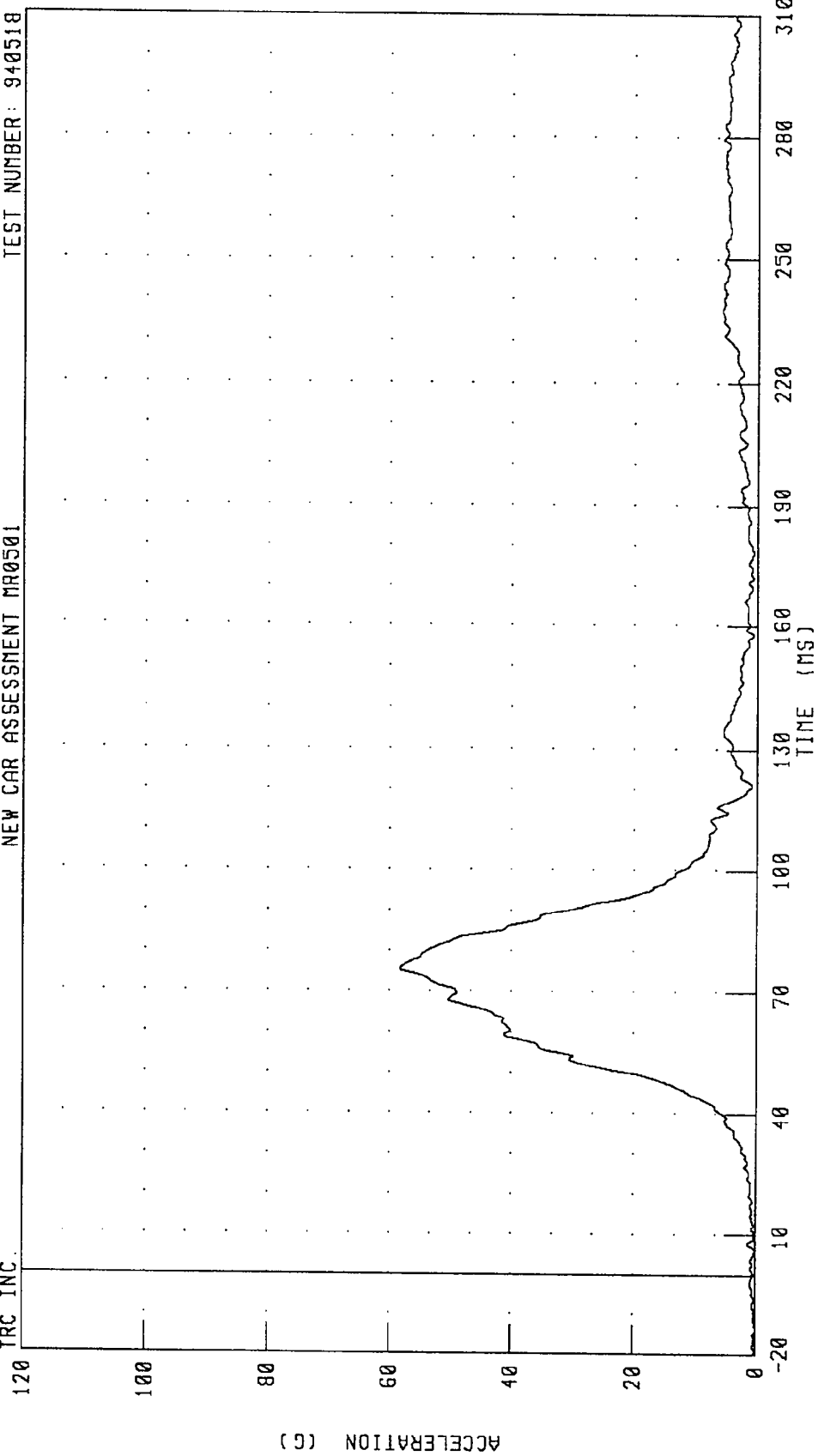
PEAK DATA: 6.31 G @ 50.80 MS; -10.48 G @ 78.64 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



CHANNEL: CSTRG2 FILTER: CH. CLASS 180

PEAK DATA: 58.34 G @ 75.60 MS; 0.04 G @ -20.00 MS

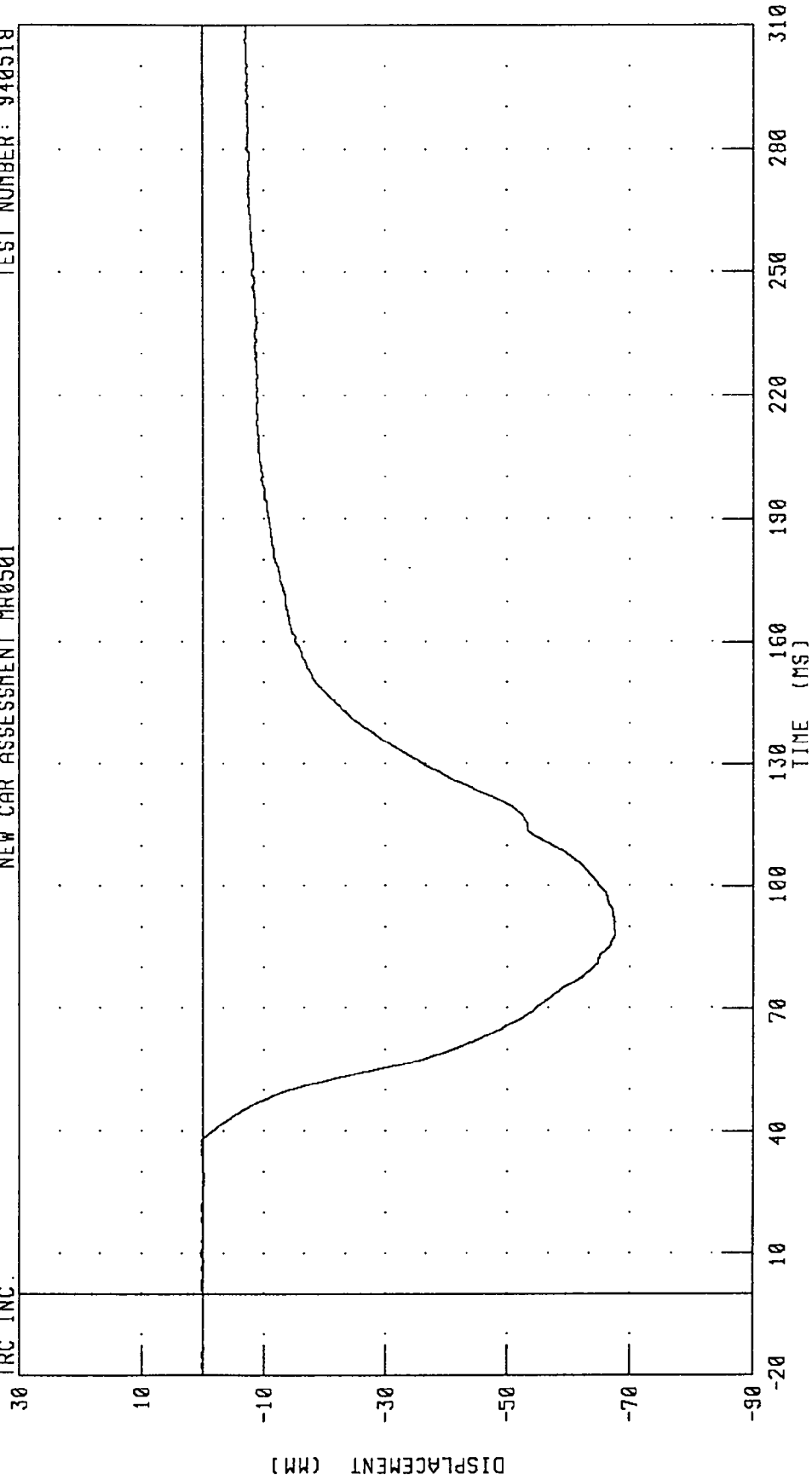
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

PASSENGER CHEST DEFLECTION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: CSTXD2 FILTER: CH. CLASS 180

PEAK DATA: 0.27 MM @ 9.84 MS; -67.59 MM @ 88.32 MS

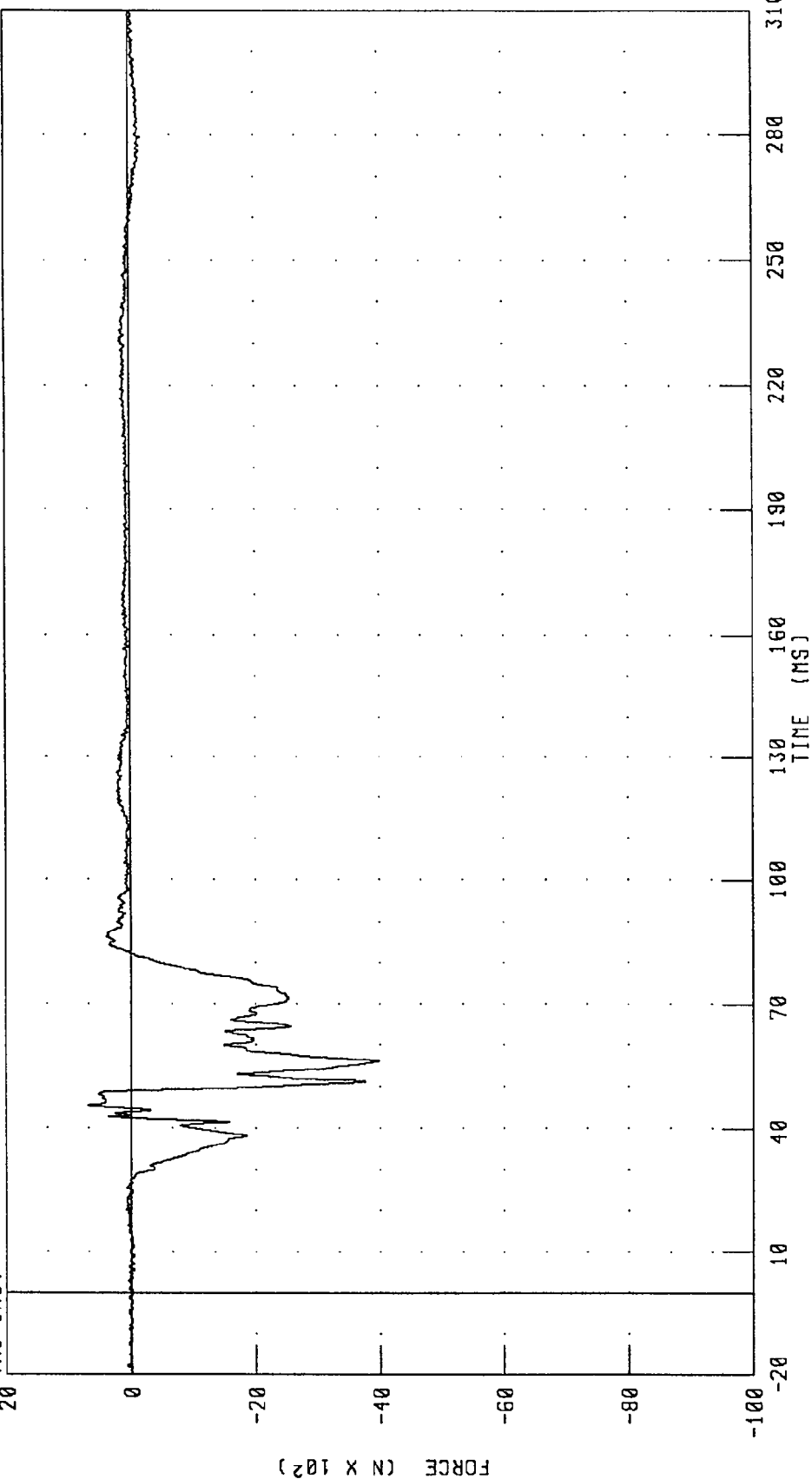
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

PASSENGER LEFT FEMUR FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: LFMF2 FILTER: CH. CLASS 600

PEAK DATA: 689.85 N @ 45.52 MS; -3982.80 N @ 56.16 MS

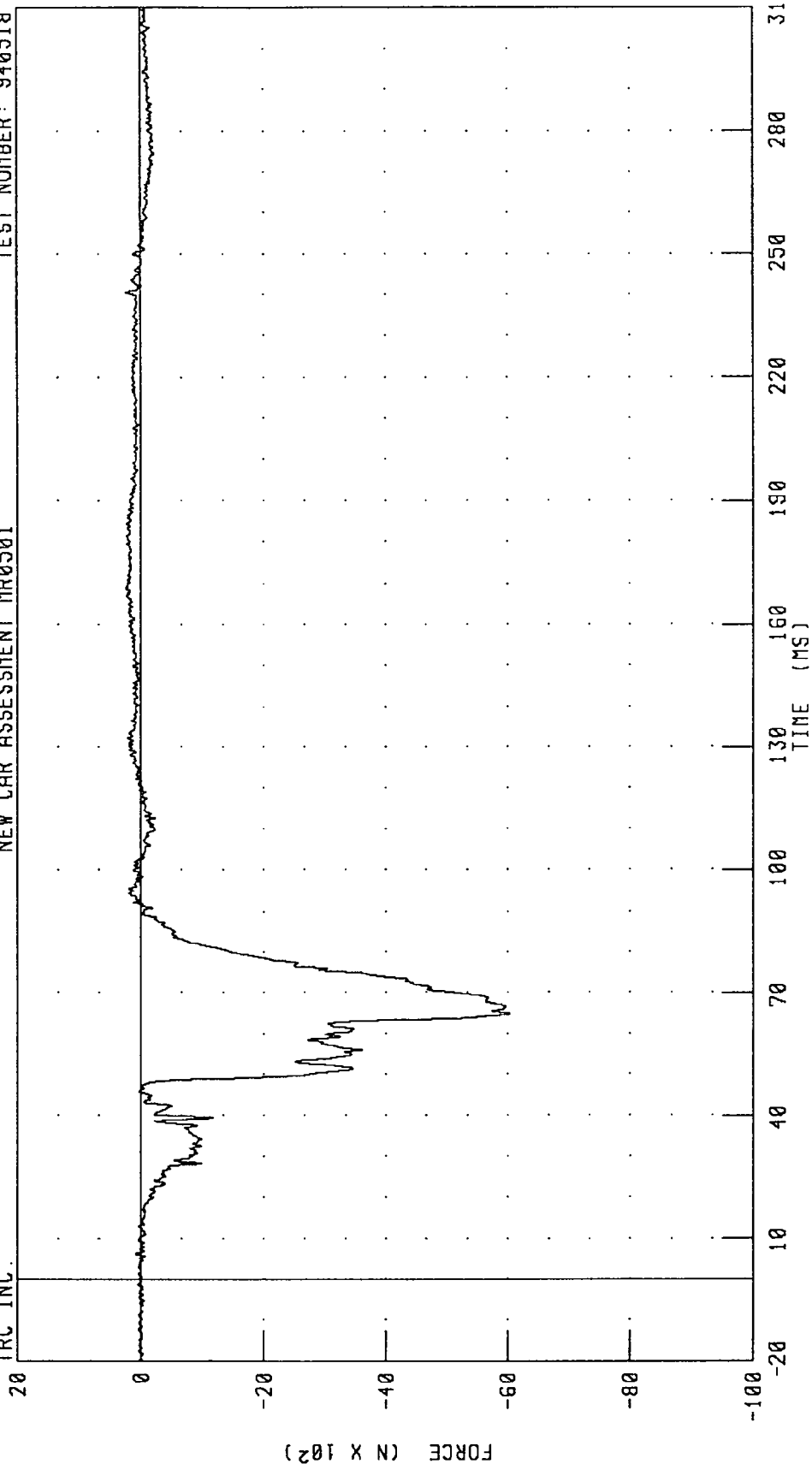
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

PASSENGER RIGHT FEMUR FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



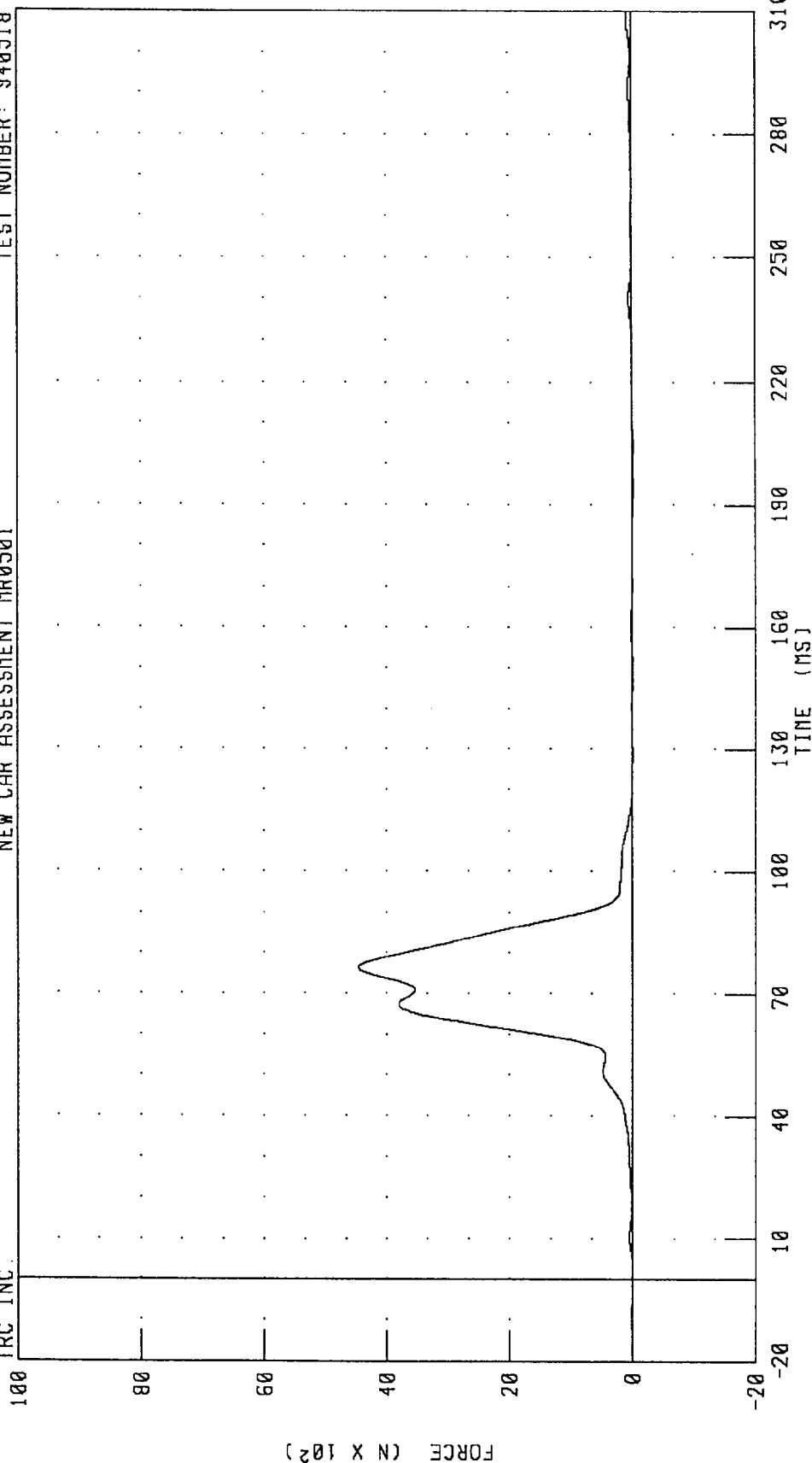
CHANNEL: RFMF2 FILTER: CH. CLASS 600

PEAK DATA: 234.05 N @ 240.64 MS; -6024.52 N @ 64.96 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER LAP BELT OUTBOARD FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



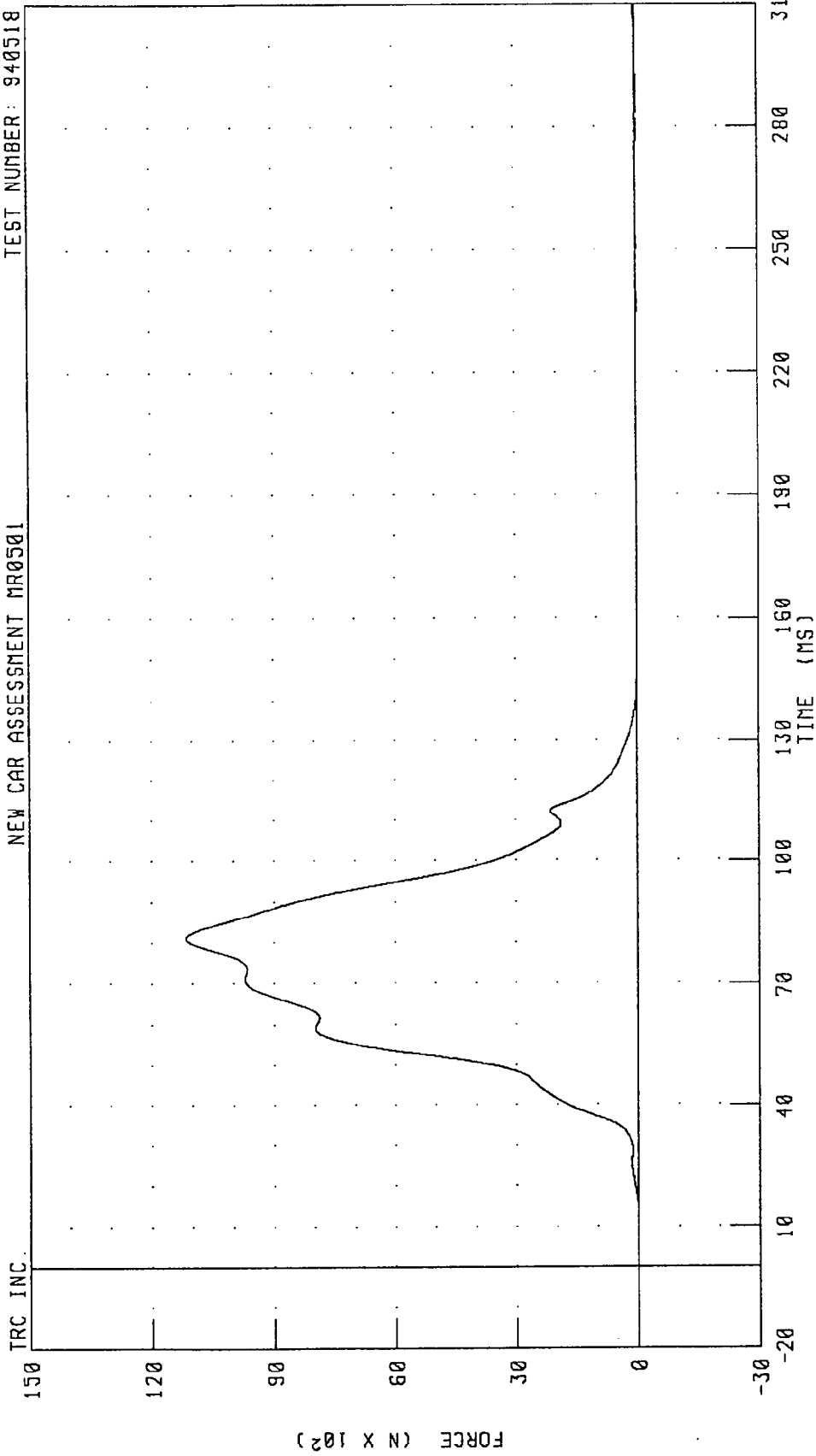
PEAK DATA: 4462.67 N @ 76.40 MS; -24.16 N @ 194.40 MS

FILTER: CH. CLASS 60

CHANNEL: LBOF2

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



PEAK DATA: 11154.43 N @ 81.12 MS; -11.24 N @ 278.72 MS

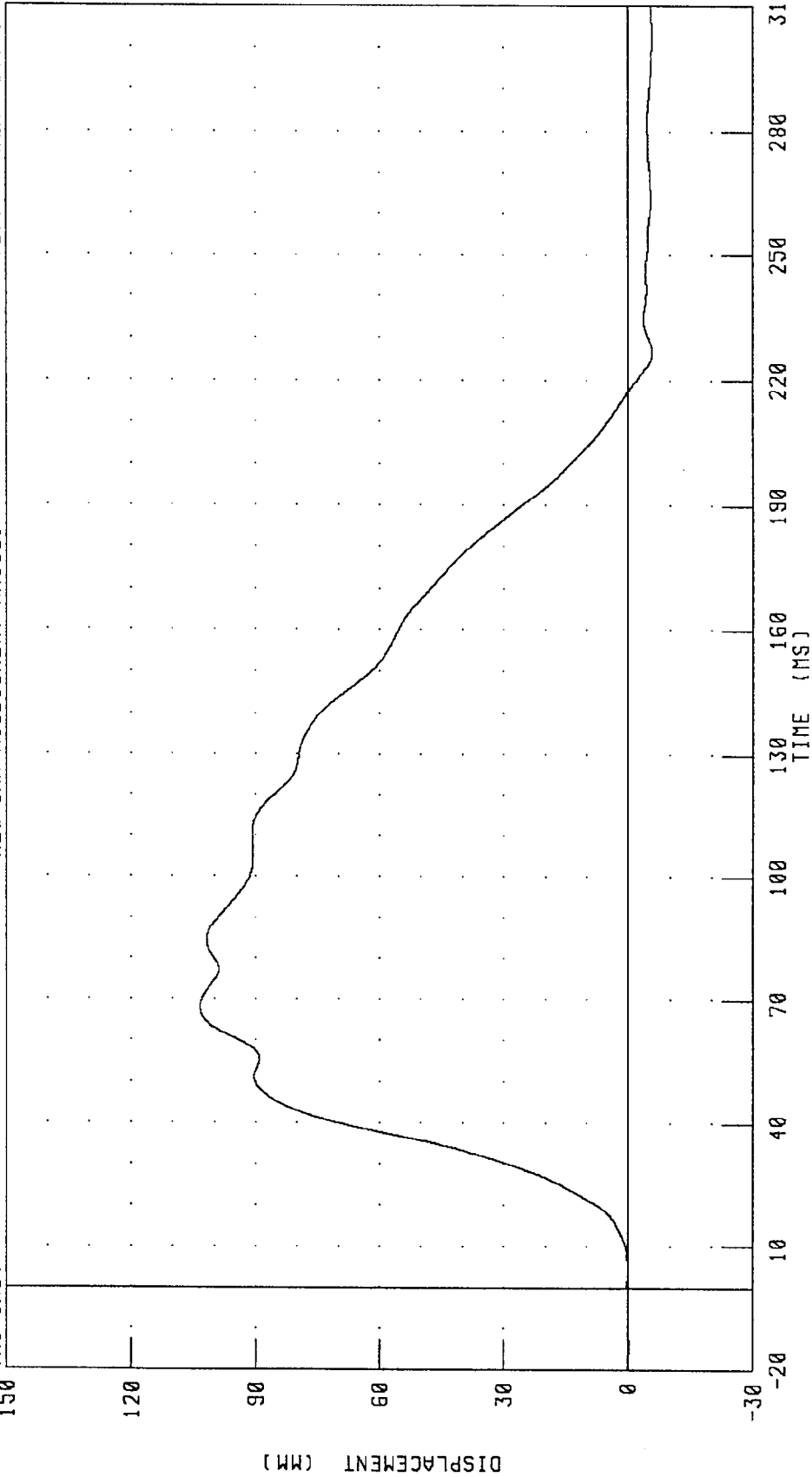
CHANNEL: SHBF2 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SHOULDER BELT DISPLACEMENT

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.

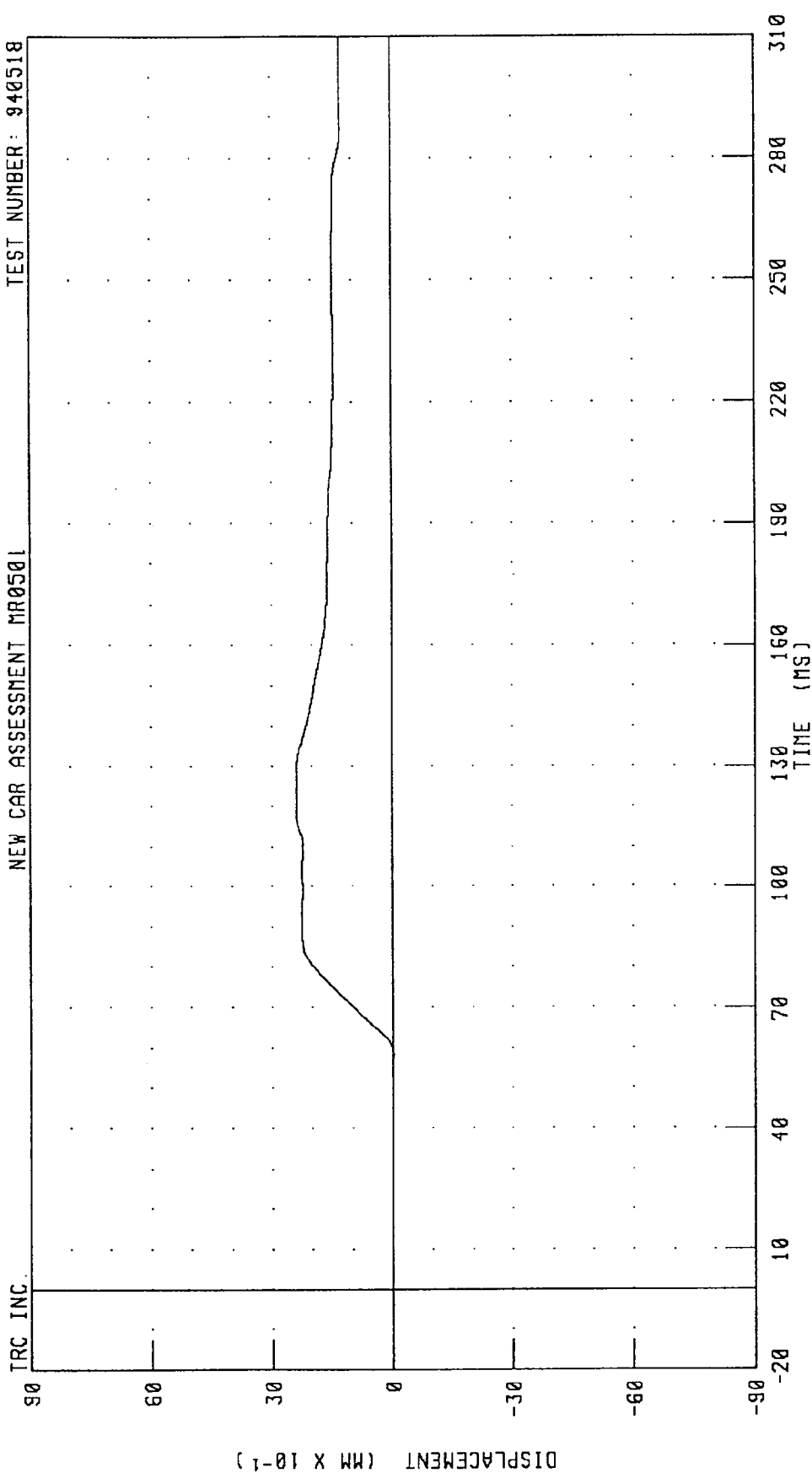


PEAK DATA: 103.40 MM @ 68.08 MS; -5.84 MM @ 226.64 MS

CHANNEL: SHB02 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
PASSENGER SEAT BELT EXTENSION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



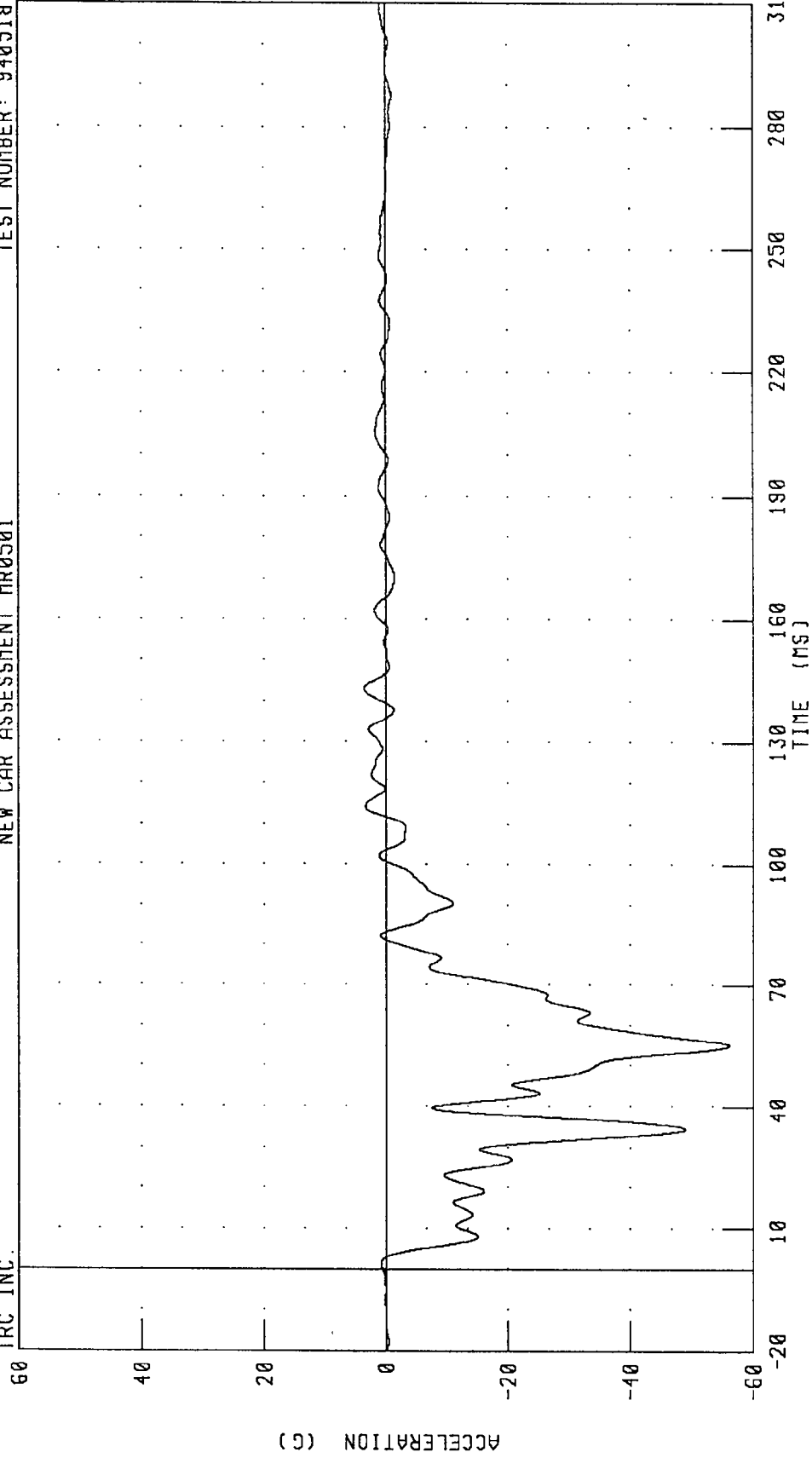
PEAK DATA: 2.39 MM @ 124.08 MS; -0.01 MM @ 58.32 MS

CHANNEL: SBED2 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: TLRXG1 FILTER: CH. CLASS 60

PEAK DATA: 3.63 G @ 143.12 MS; -56.03 G @ 54.96 MS

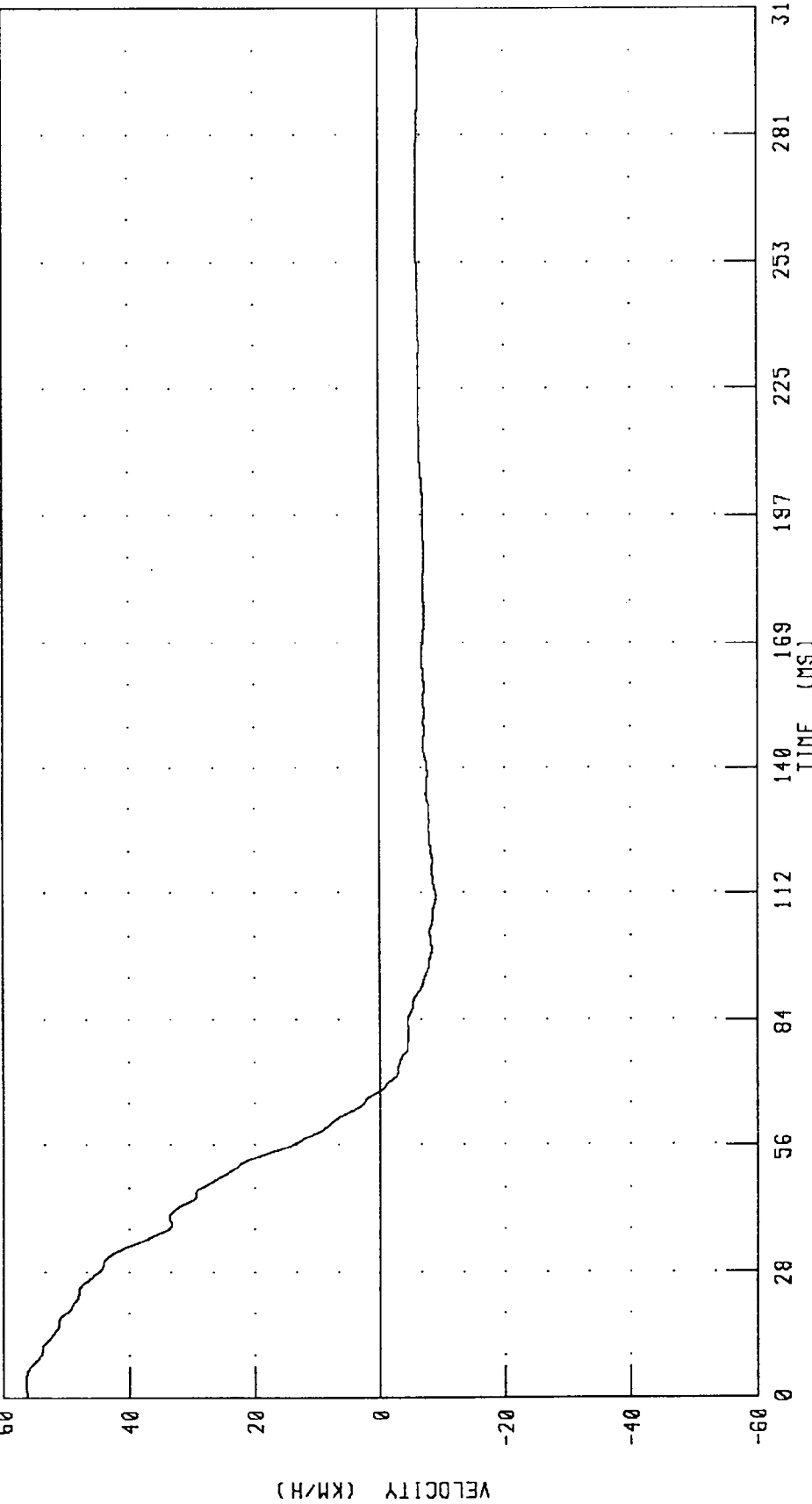
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

LEFT REAR SEAT X-AXIS VELOCITY

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: TLRXV1 FILTER: CH. CLASS 180

PEAK DATA: 56.34 KM/H @ 4.32 MS; -8.93 KM/H @ 111.76 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LEFT REAR SEAT X-AXIS DISPLACEMENT
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

180

120

60

0

-60

-120

-180

DISPLACEMENT (MM X 10¹)

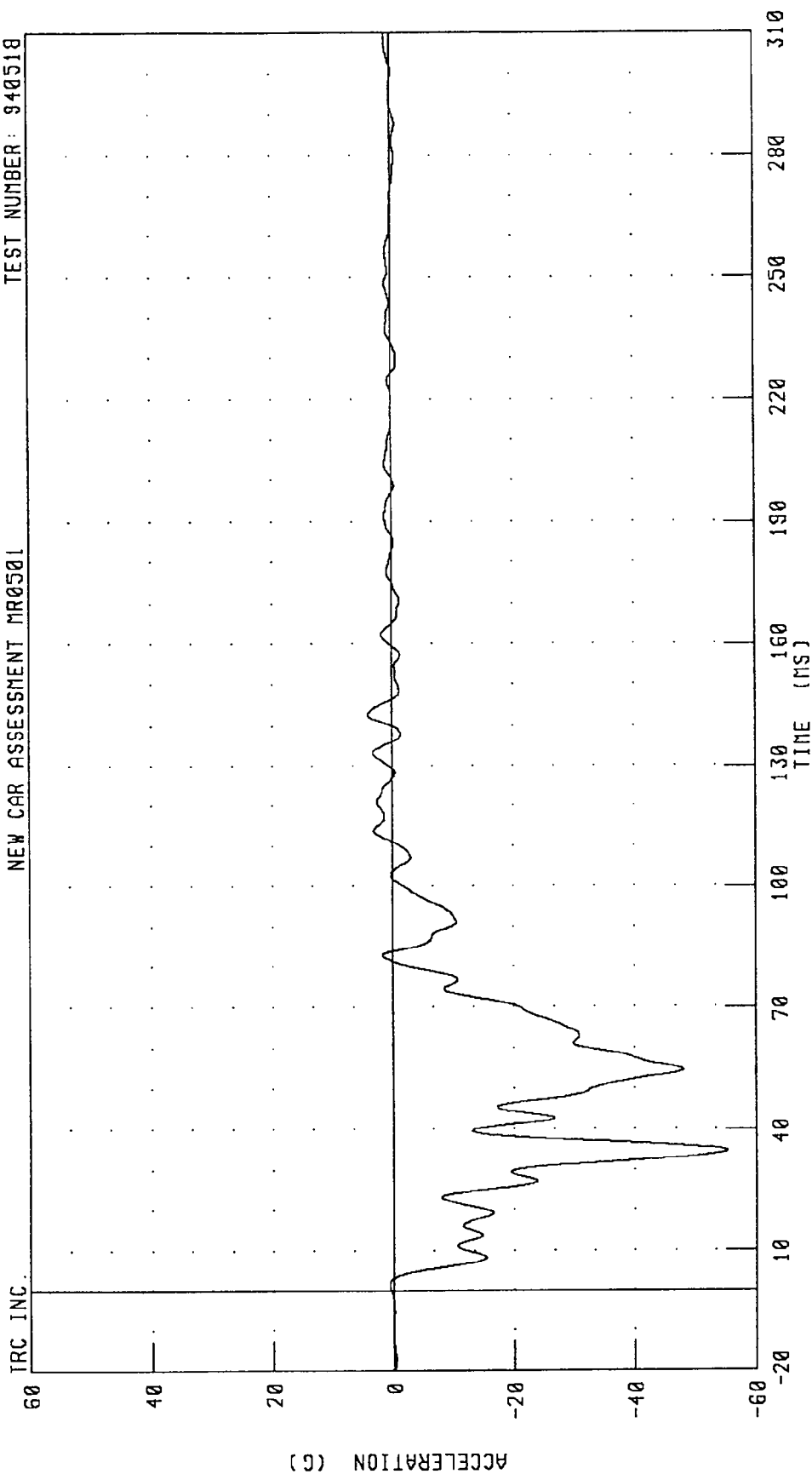
TIME (MS)
 0 28 56 84 112 140 169 197 225 253 281 310

CHANNEL: TLRXD1 FILTER: CH. CLASS 180

PEAK DATA: 675.34 MM @ 68.48 MS; 0.00 MM @ 0.00 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

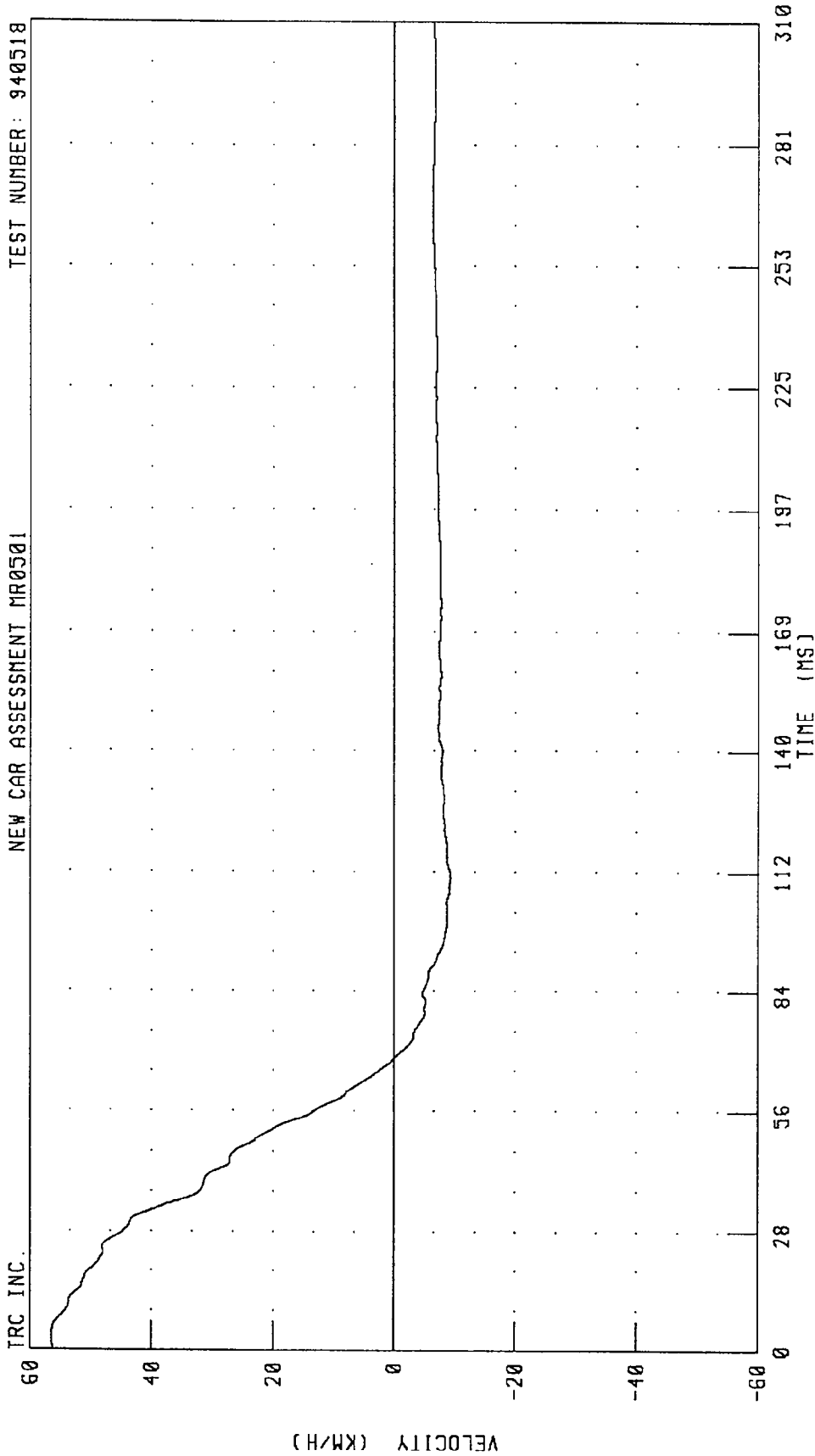


PEAK DATA: 4.11 G @ 142.72 MS; -55.16 G @ 34.80 MS

CHANNEL: TRRXG1 FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT X-AXIS VELOCITY
NEW CAR ASSESSMENT MR0501

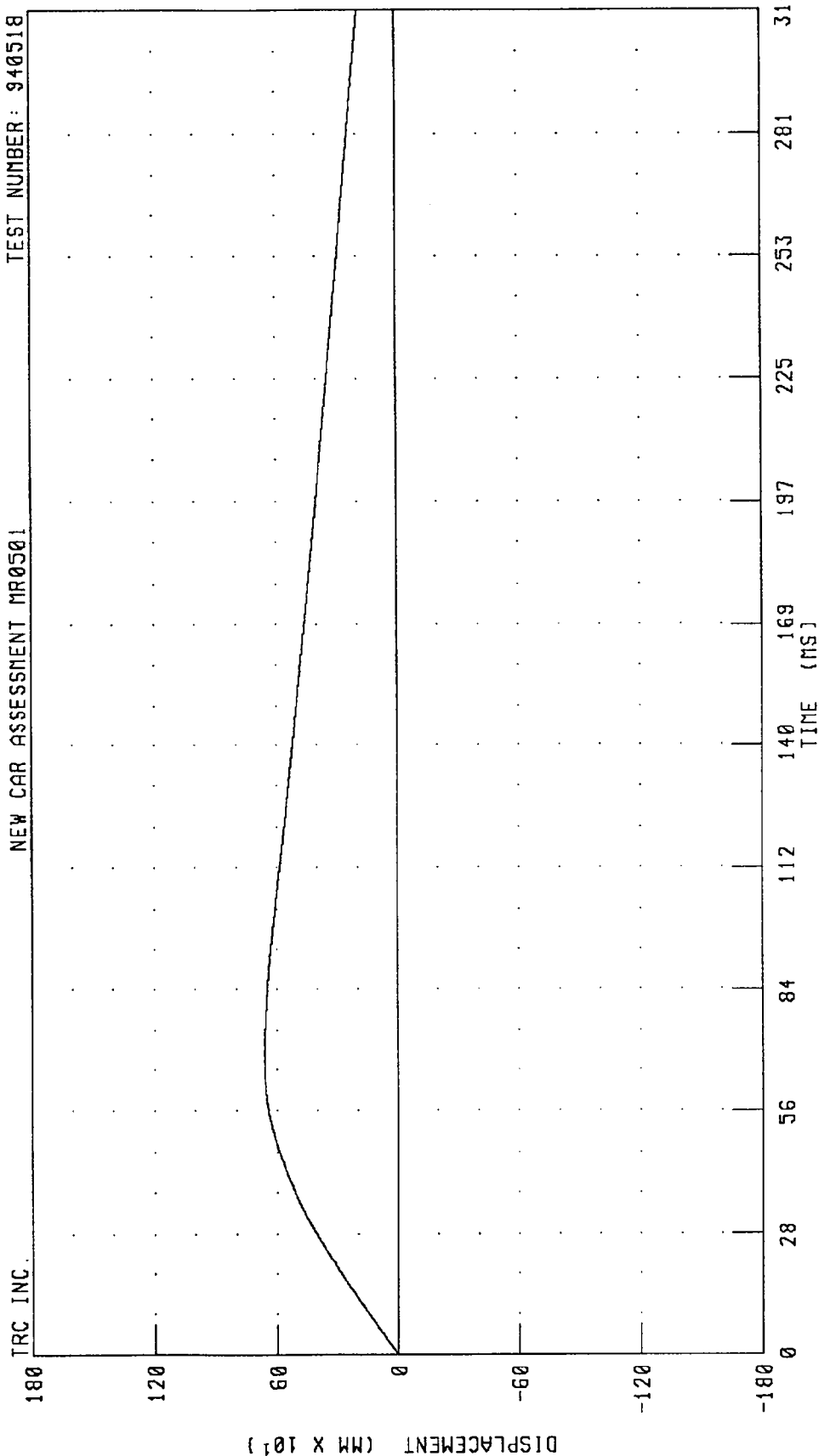
TEST NUMBER: 940518



CHANNEL: TRRXV1 FILTER: CH. CLASS 180

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 RIGHT REAR SEAT X-AXIS DISPLACEMENT
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



PEAK DATA: 662.31 MM @ 68.64 MS; 0.00 MM @ 0.00 MS

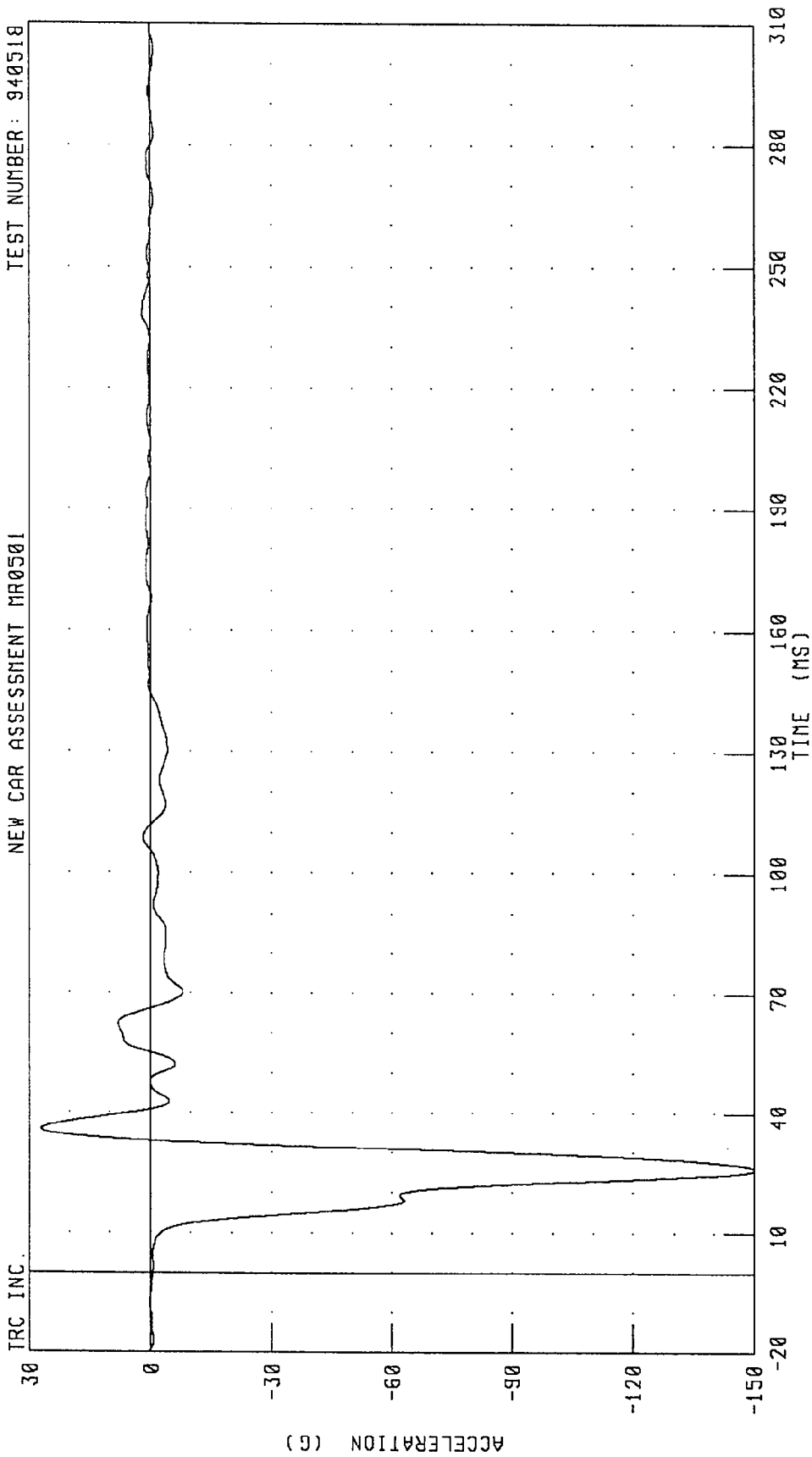
CHANNEL: TRRXD1 FILTER: CH. CLASS 180

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

ENGINE TOP X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



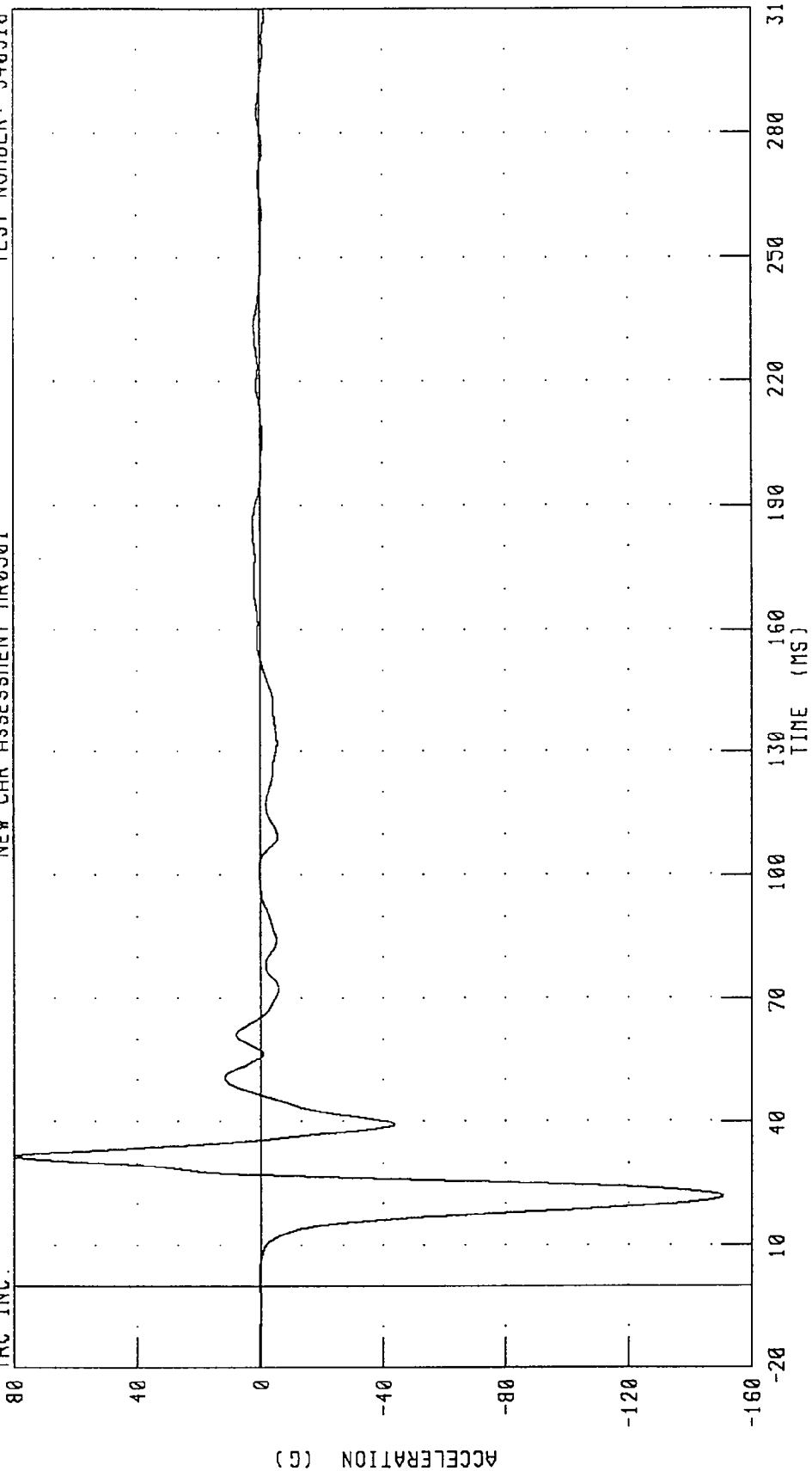
CHANNEL: ENGXC1 FILTER: CH. CLASS 60

PEAK DATA: 27.04 G @ 36.00 MS; -150.11 G @ 25.84 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



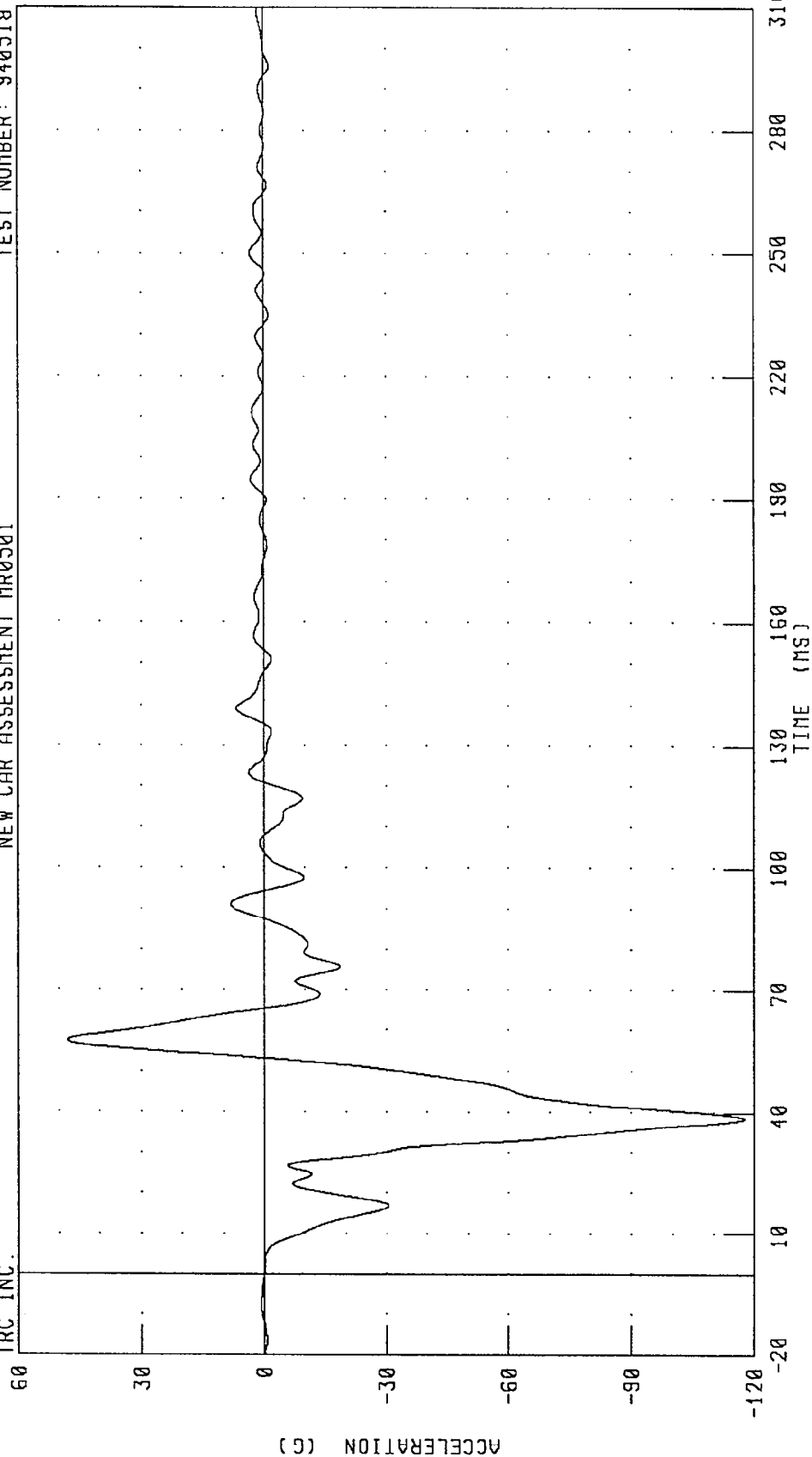
CHANNEL: ENGXC2 FILTER: CH. CLASS 60

PEAK DATA: 80.20 G @ 31.60 MS; -150.38 G @ 21.76 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

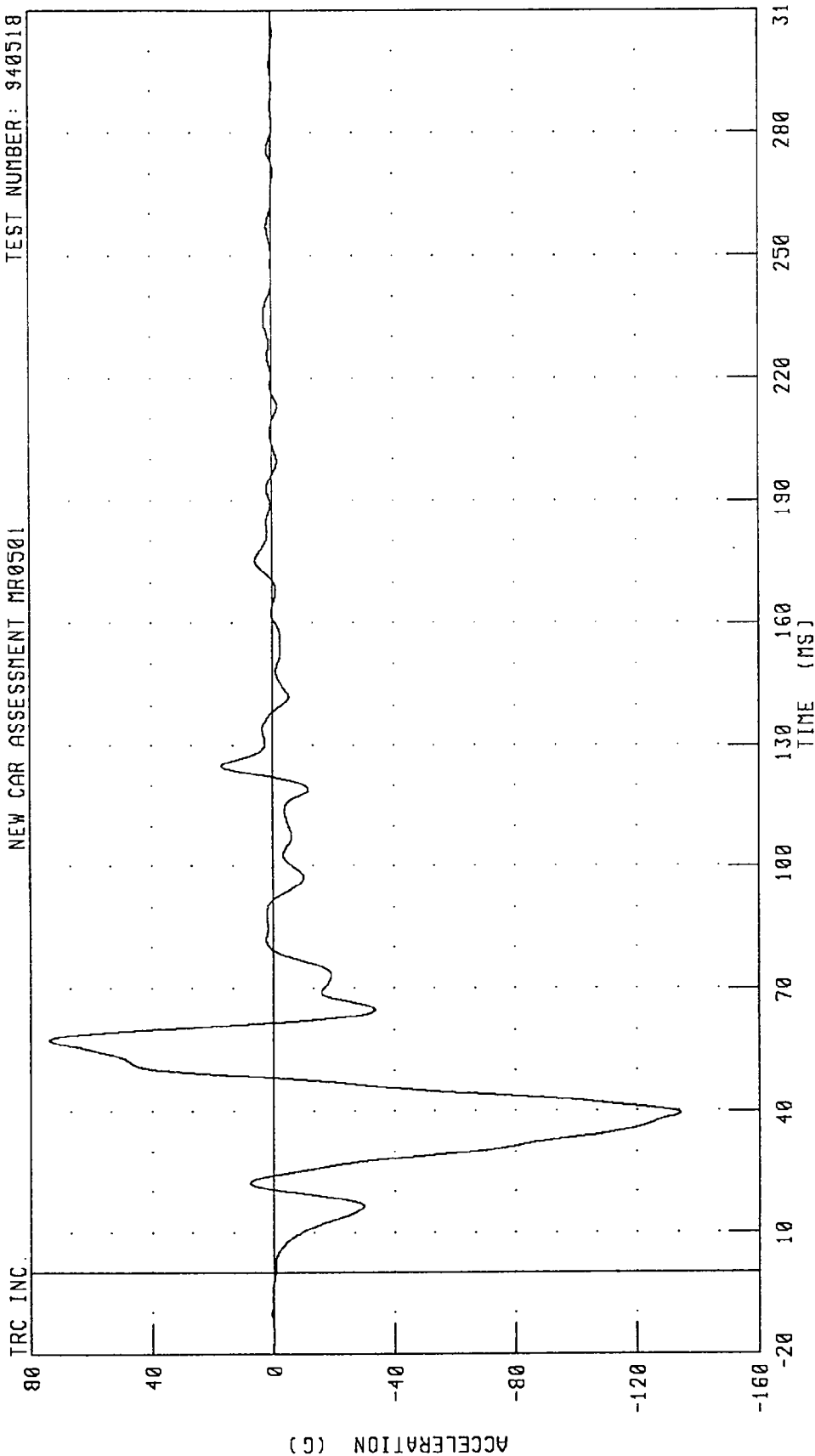


CHANNEL: BCRXG1 FILTER: CH. CLASS 60

PEAK DATA: 48.09 G @ 57.36 MS; -117.69 G @ 38.64 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



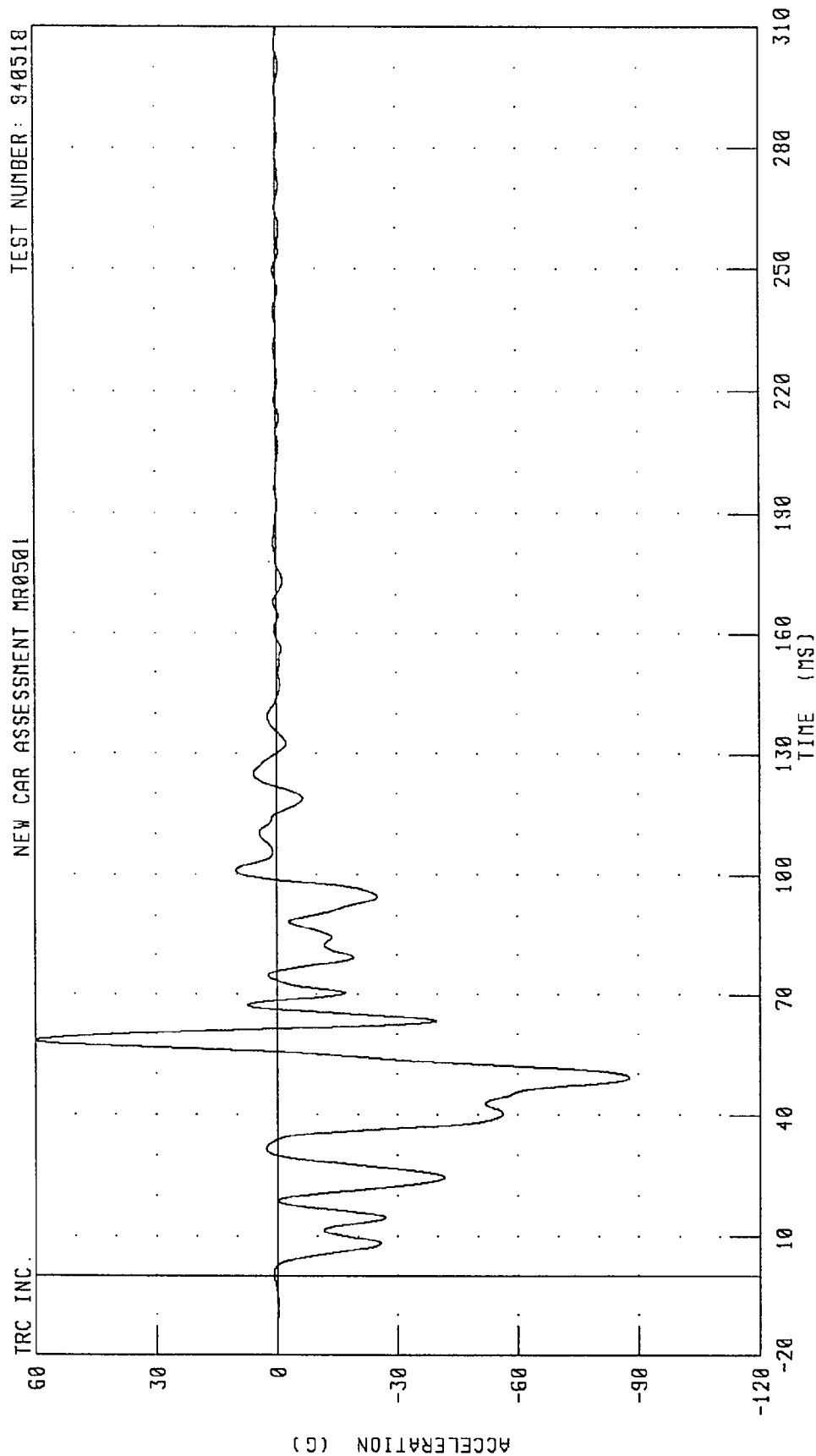
CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 73.69 G @ 57.60 MS, -133.99 G @ 39.60 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



CHANNEL: DPCXG1 FILTER: CH. CLASS 60

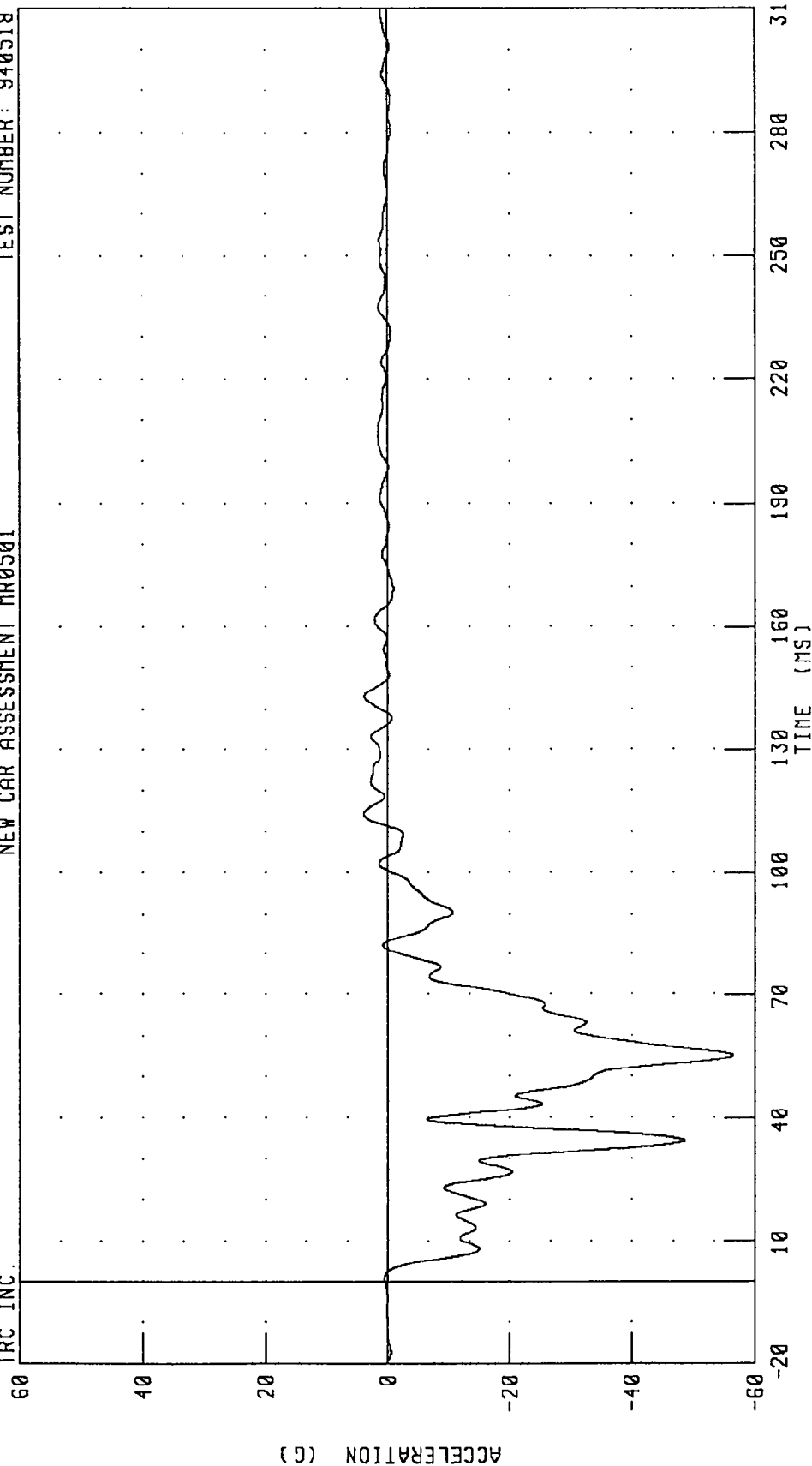
PEAK DATA: 59.82 G @ 58.32 MS; -87.65 G @ 49.20 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LEFT REAR SEAT REDUNDANT X-AXIS ACCELERATION

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



CHANNEL: TLRXCA FILTER: CH. CLASS 60

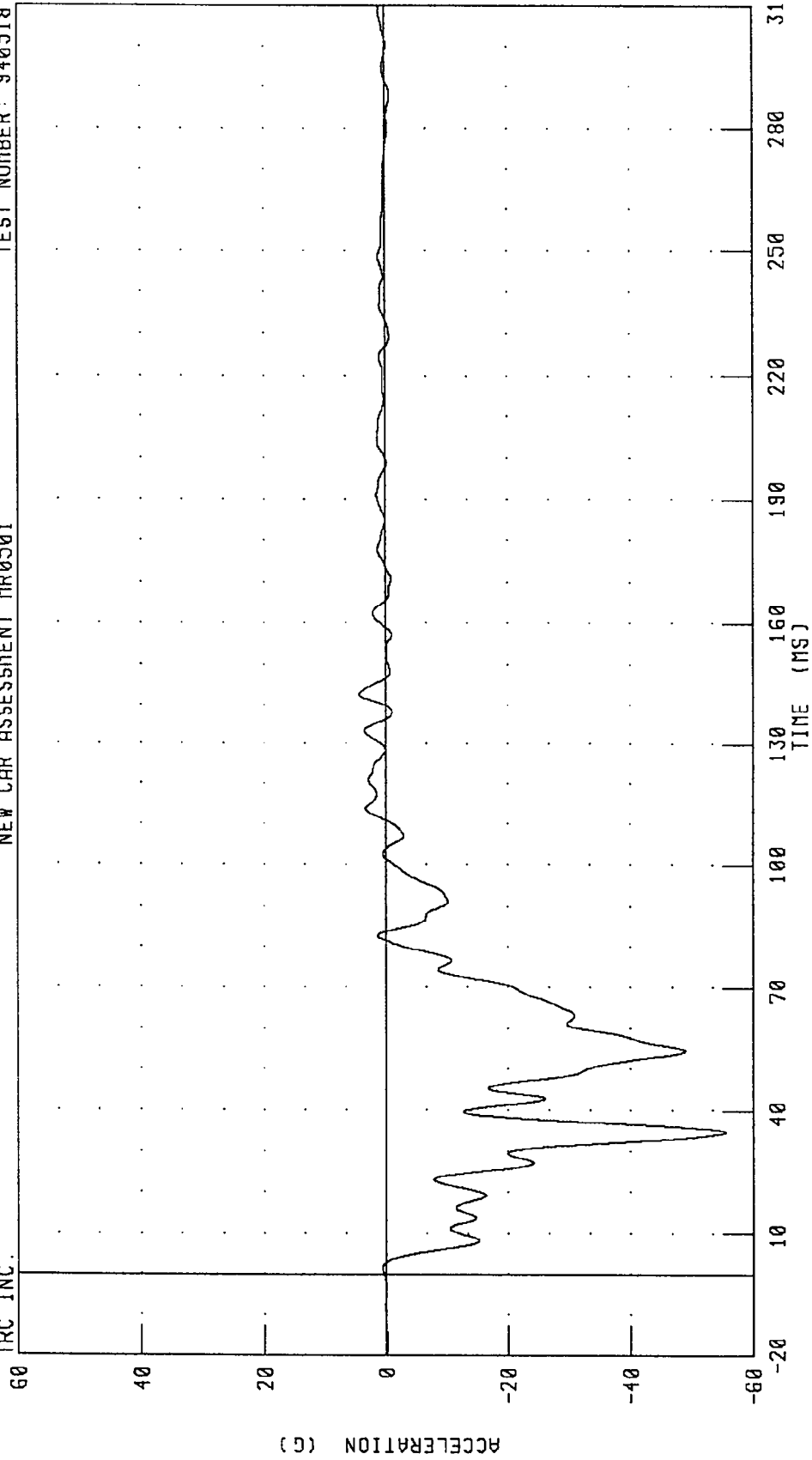
940518

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
RIGHT REAR SEAT REDUNDANT X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



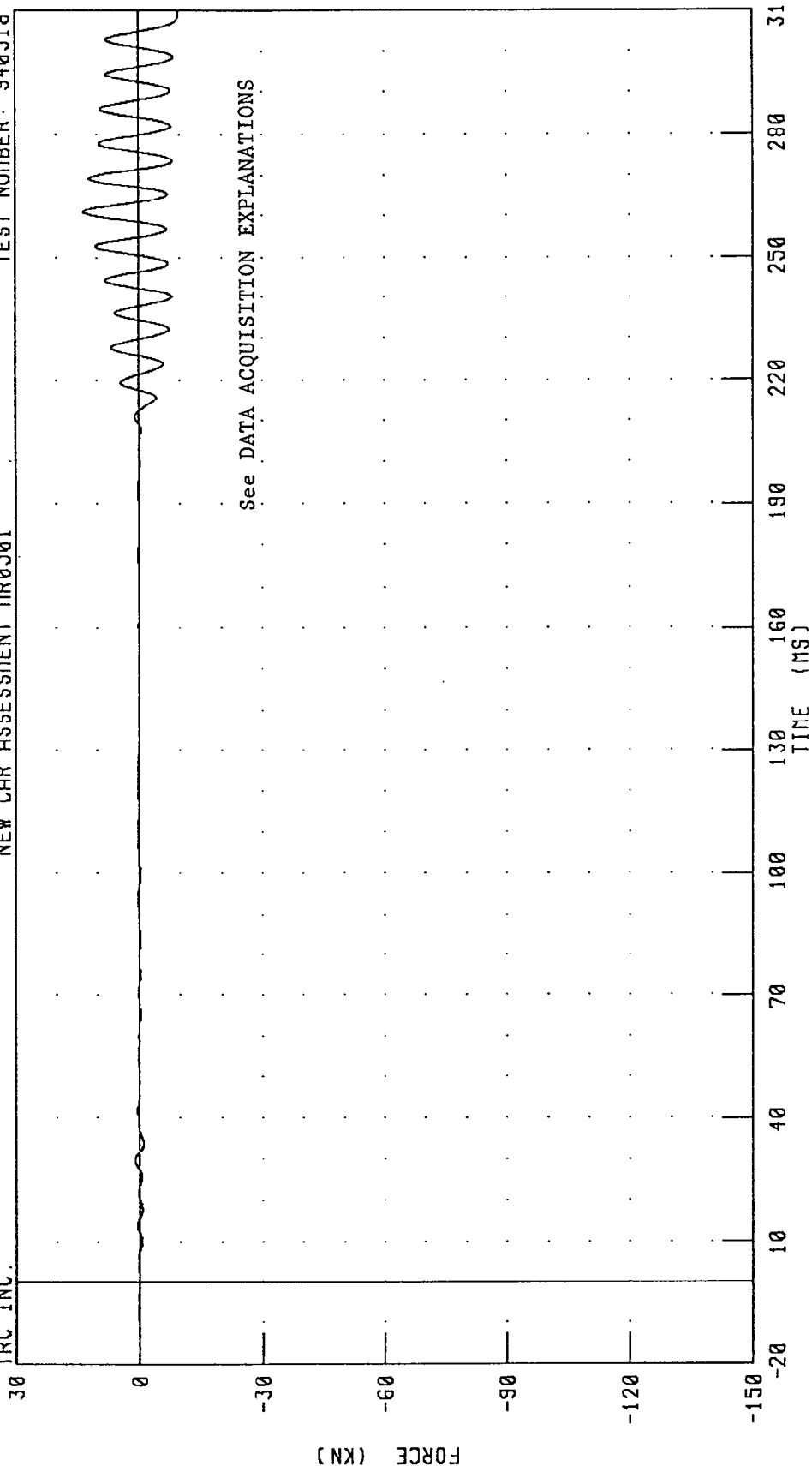
CHANNEL: TRRXGA FILTER: CH. CLASS 60

PEAK DATA: 4.42 G @ 142.72 MS; -55.50 G @ 34.80 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A1 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 13.51 KN @ 261.12 MS; -9.61 KN @ 308.72 MS

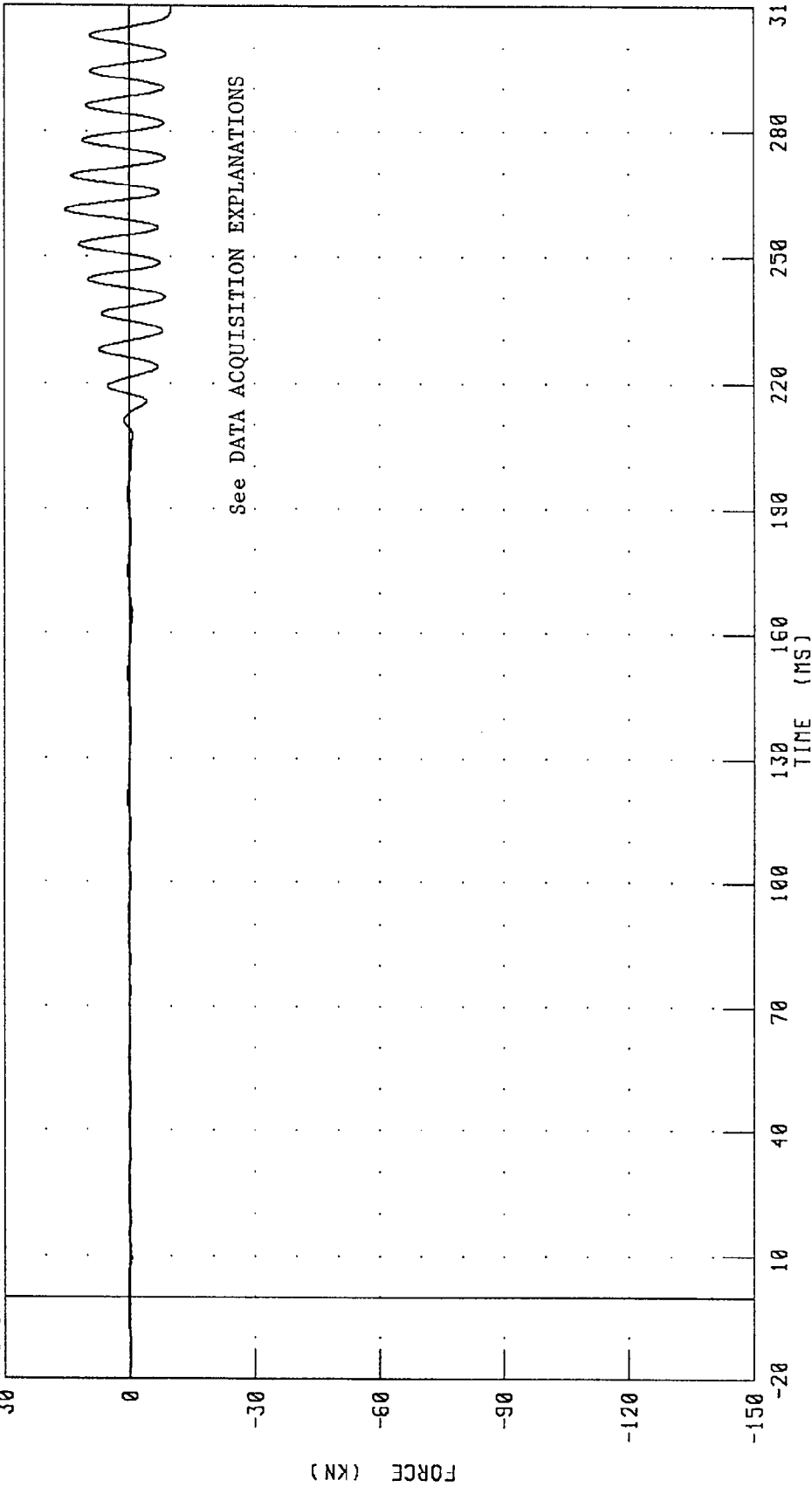
FILTER: CH. CLASS 60

CHANNEL: BA1F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A2 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 15.26 KN @ 261.12 MS; -9.90 KN @ 308.72 MS

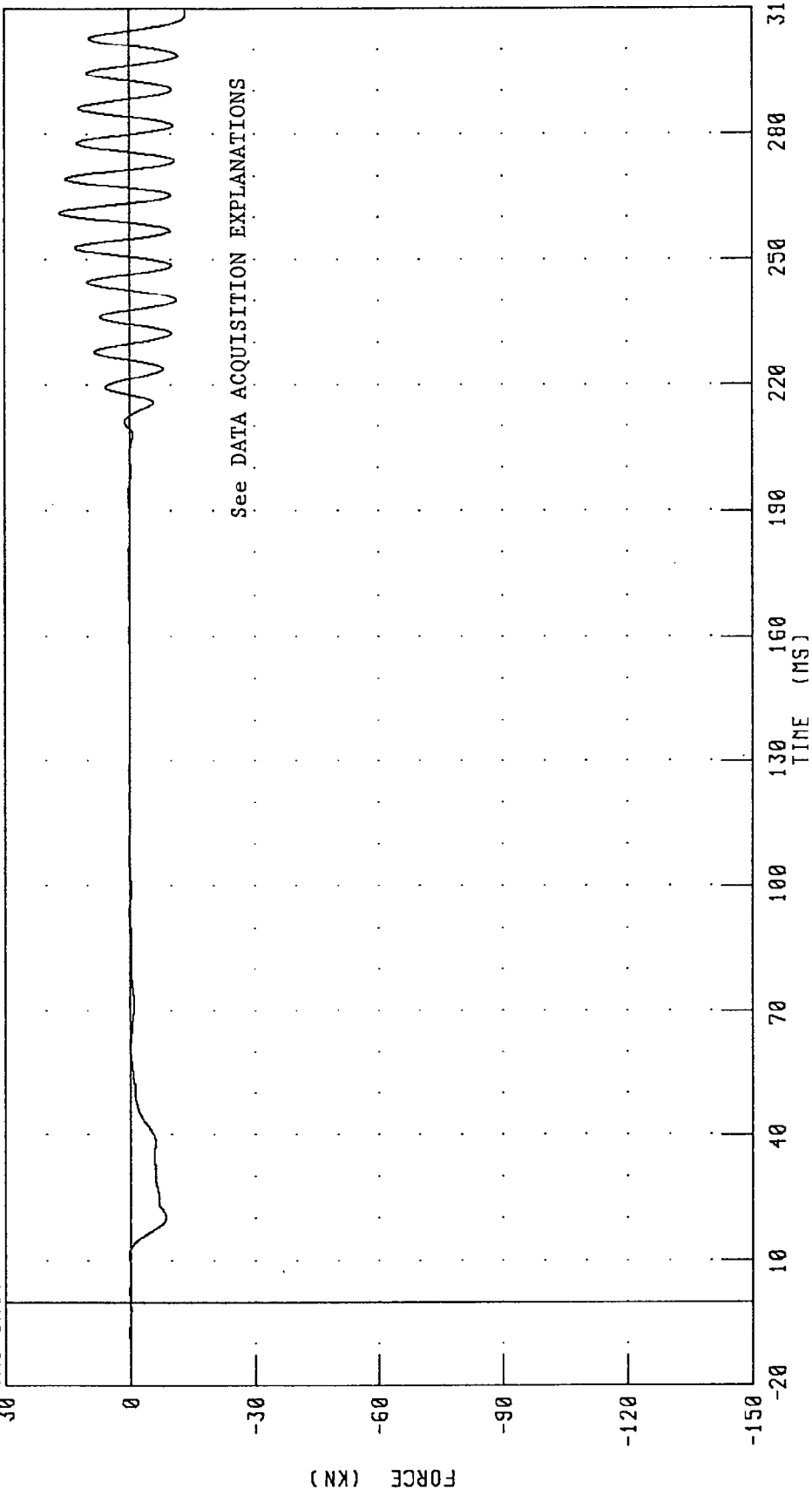
FILTER: CH. CLASS 60

CHANNEL: BA2F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A3 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: BA3F

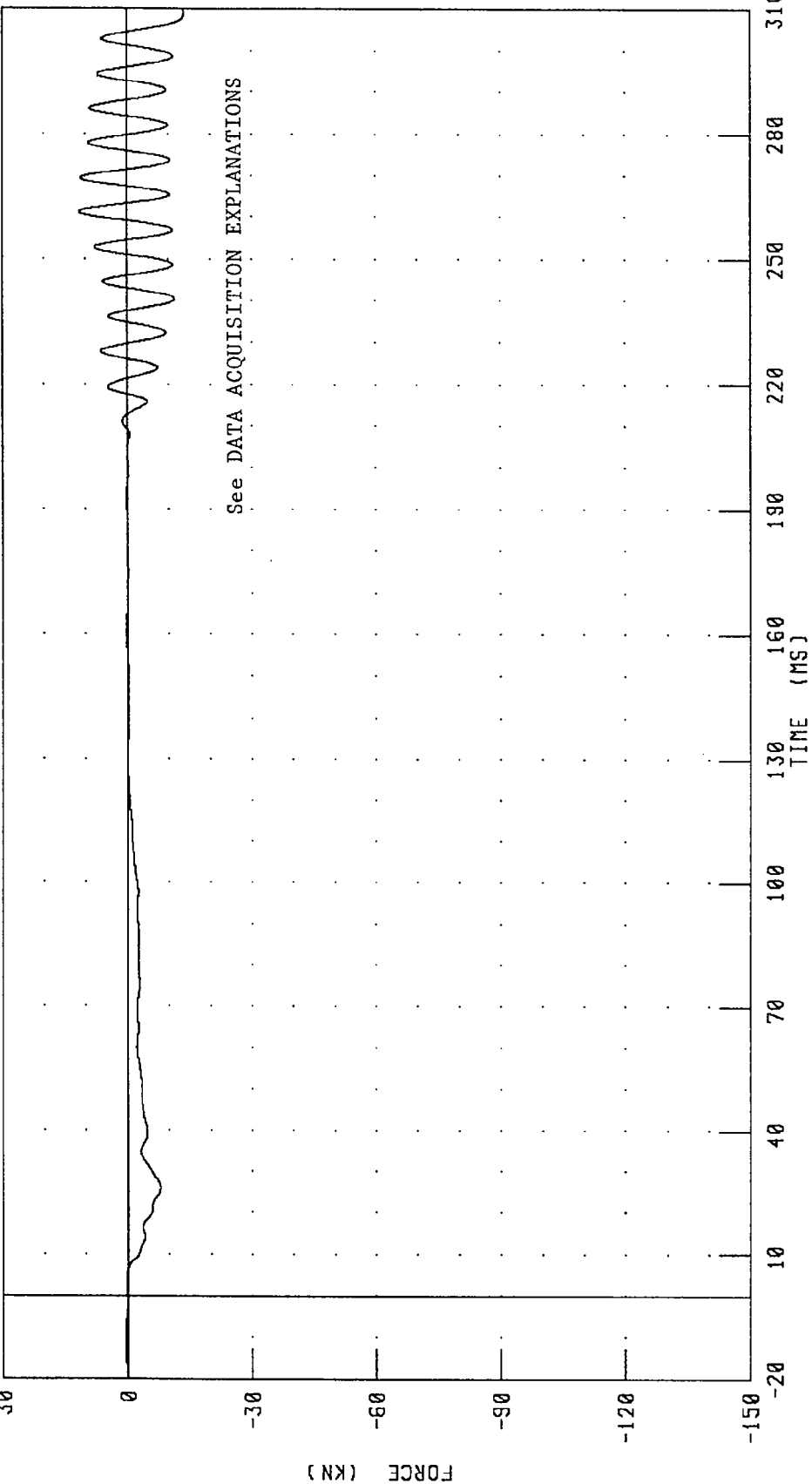
FILTER: CH. CLASS 60

PEAK DATA: 16.82 KN @ 261.12 MS; -13.60 KN @ 308.80 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A4 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

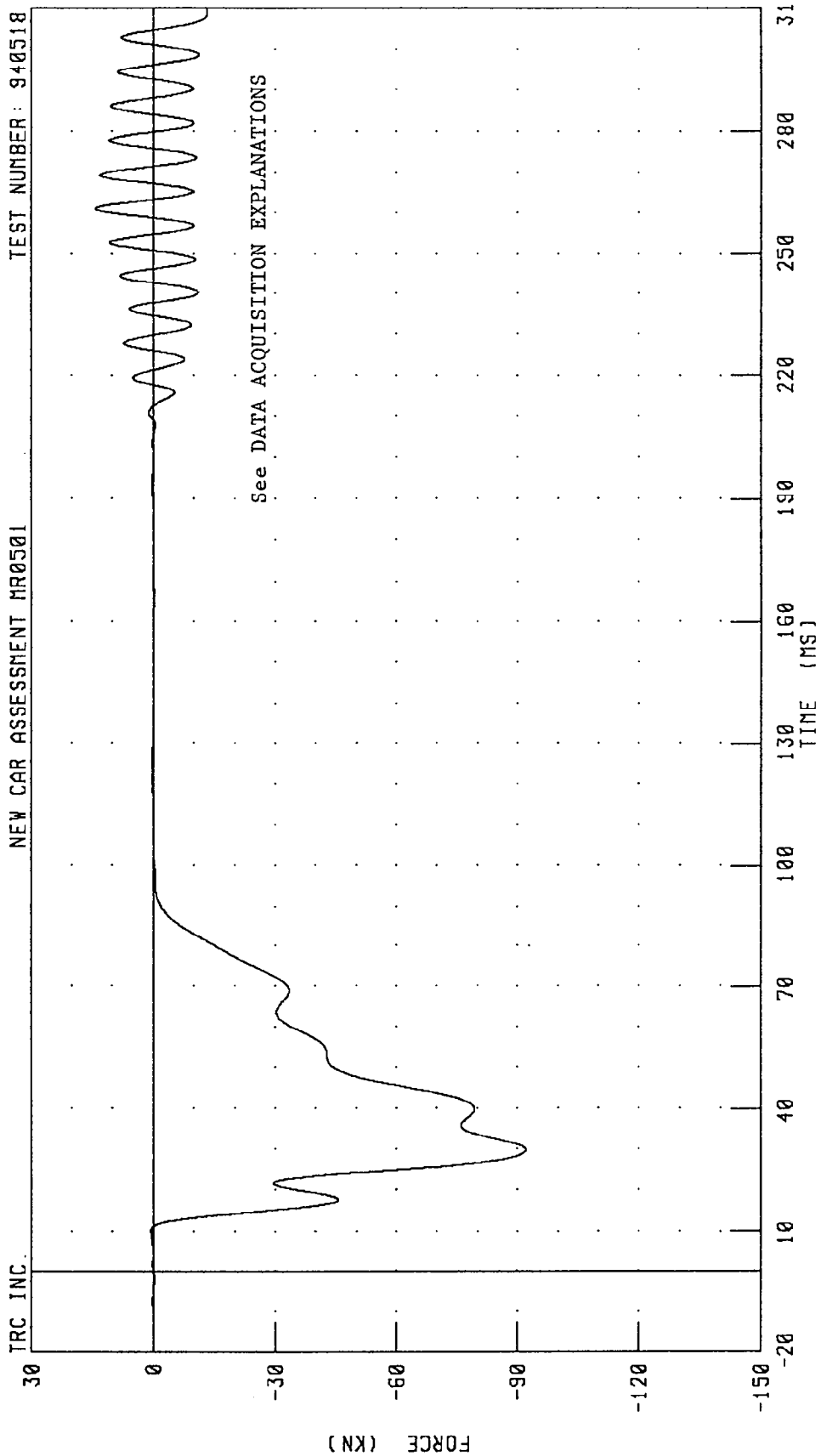


PEAK DATA: 11.57 KN @ 261.20 MS; -13.86 KN @ 309.04 MS

CHANNEL: BA4F FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A5 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

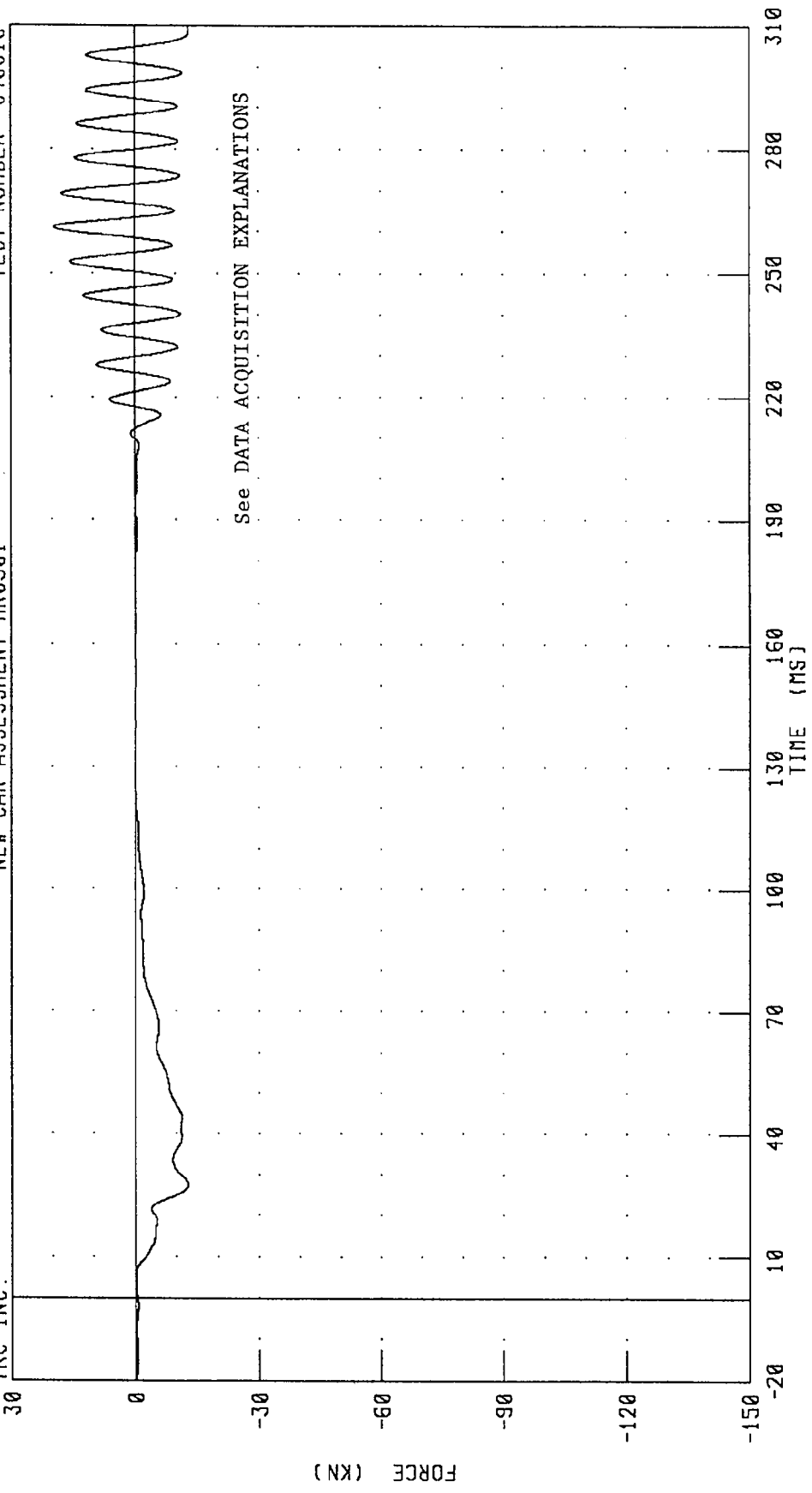


CHANNEL: BASF FILTER: CH. CLASS 60
 PEAK DATA: 14.22 KN @ 261.12 MS; -92.15 KN @ 29.76 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A6 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

IRC INC.



PEAK DATA: 19.47 KN @ 261.04 MS; -13.01 KN @ 308.48 MS

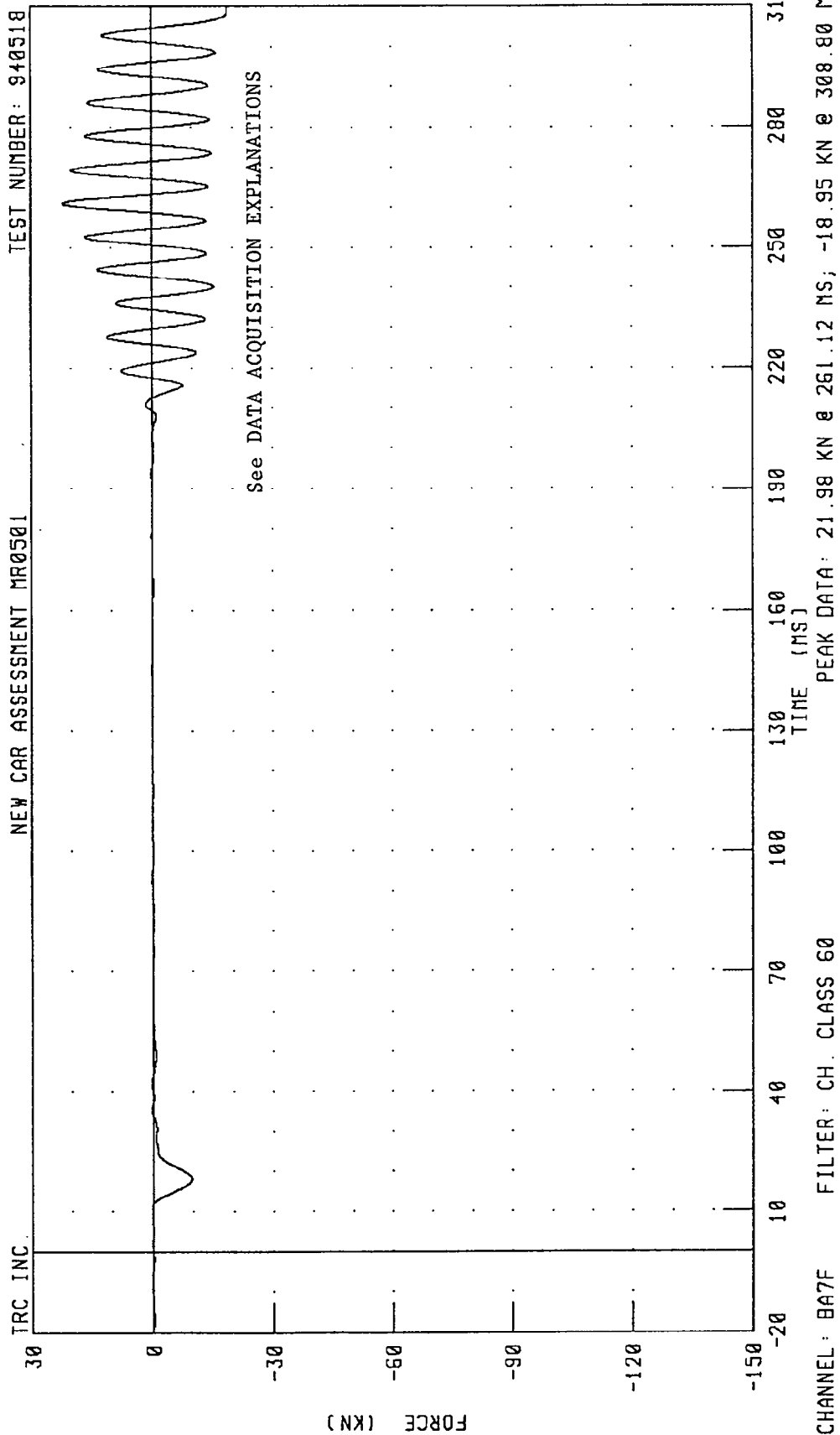
FILTER: CH. CLASS 60

CHANNEL: B6GF

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION A7 FORCE

NEW CAR ASSESSMENT MR0501

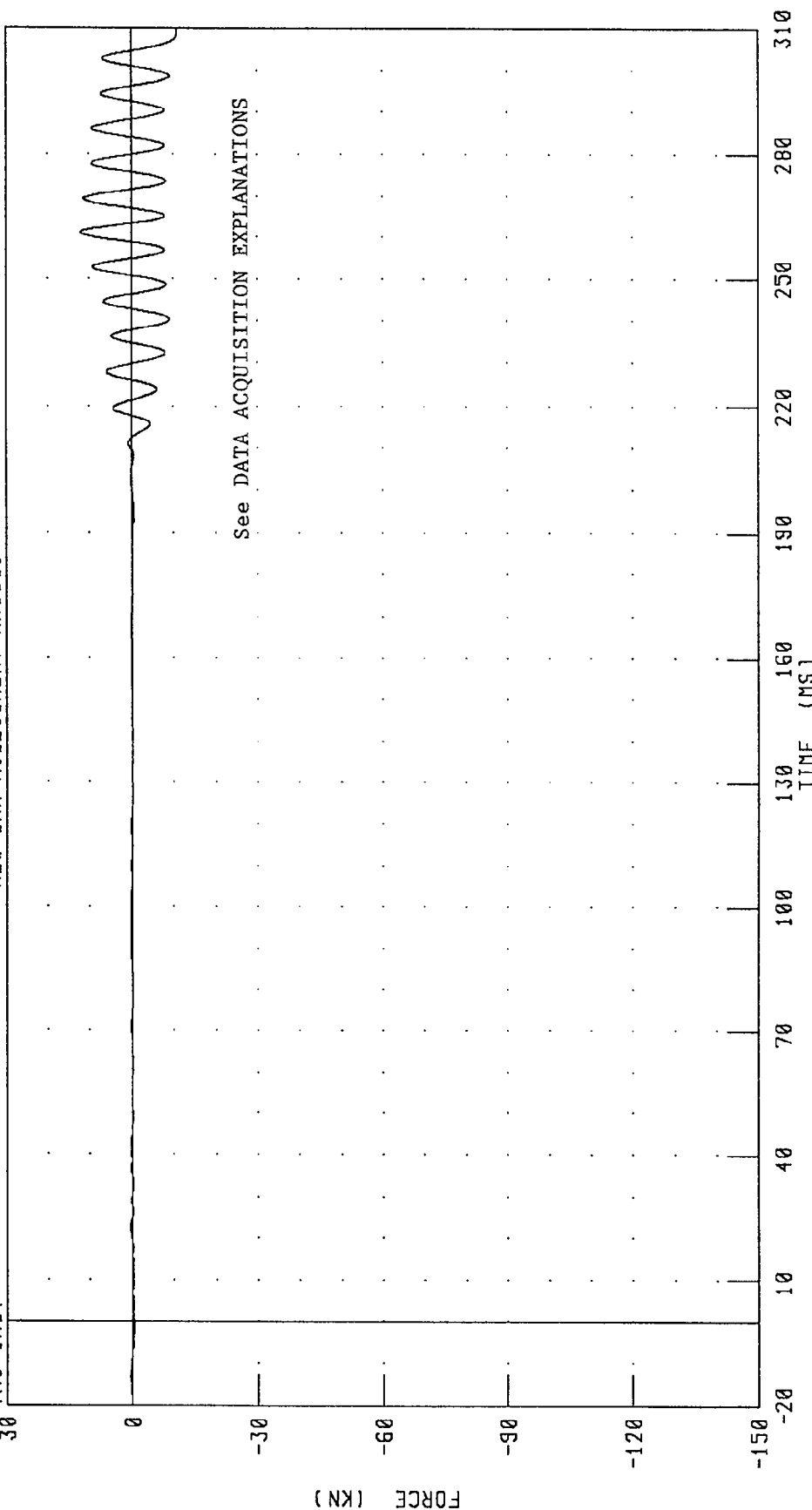
TEST NUMBER: 940518



1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION A8 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: BA8F

FILTER: CH. CLASS 60

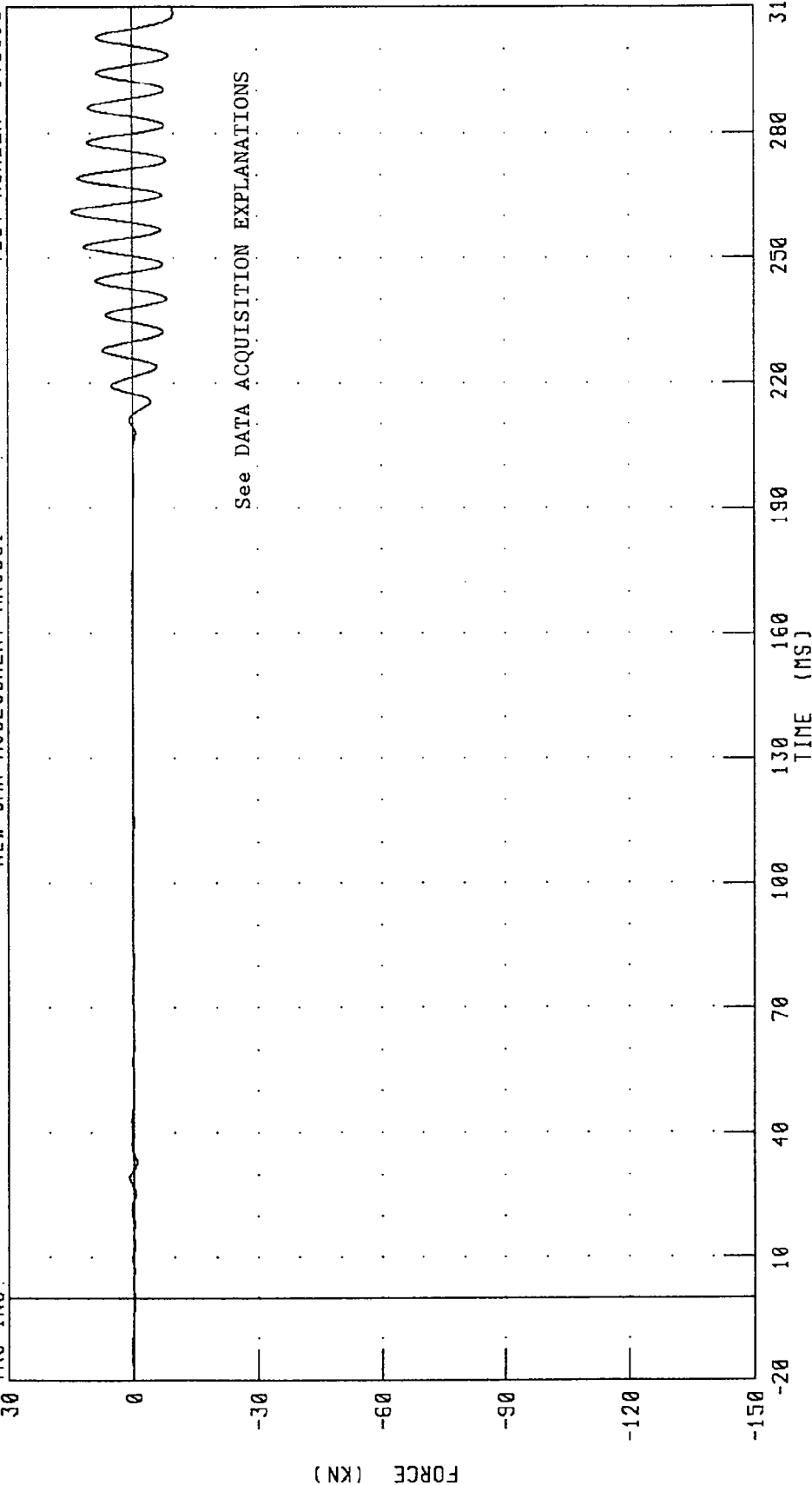
PEAK DATA: 12.13 KN @ 261.12 MS; -10.94 KN @ 308.80 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION AS FORCE

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



CHANNEL: BASF

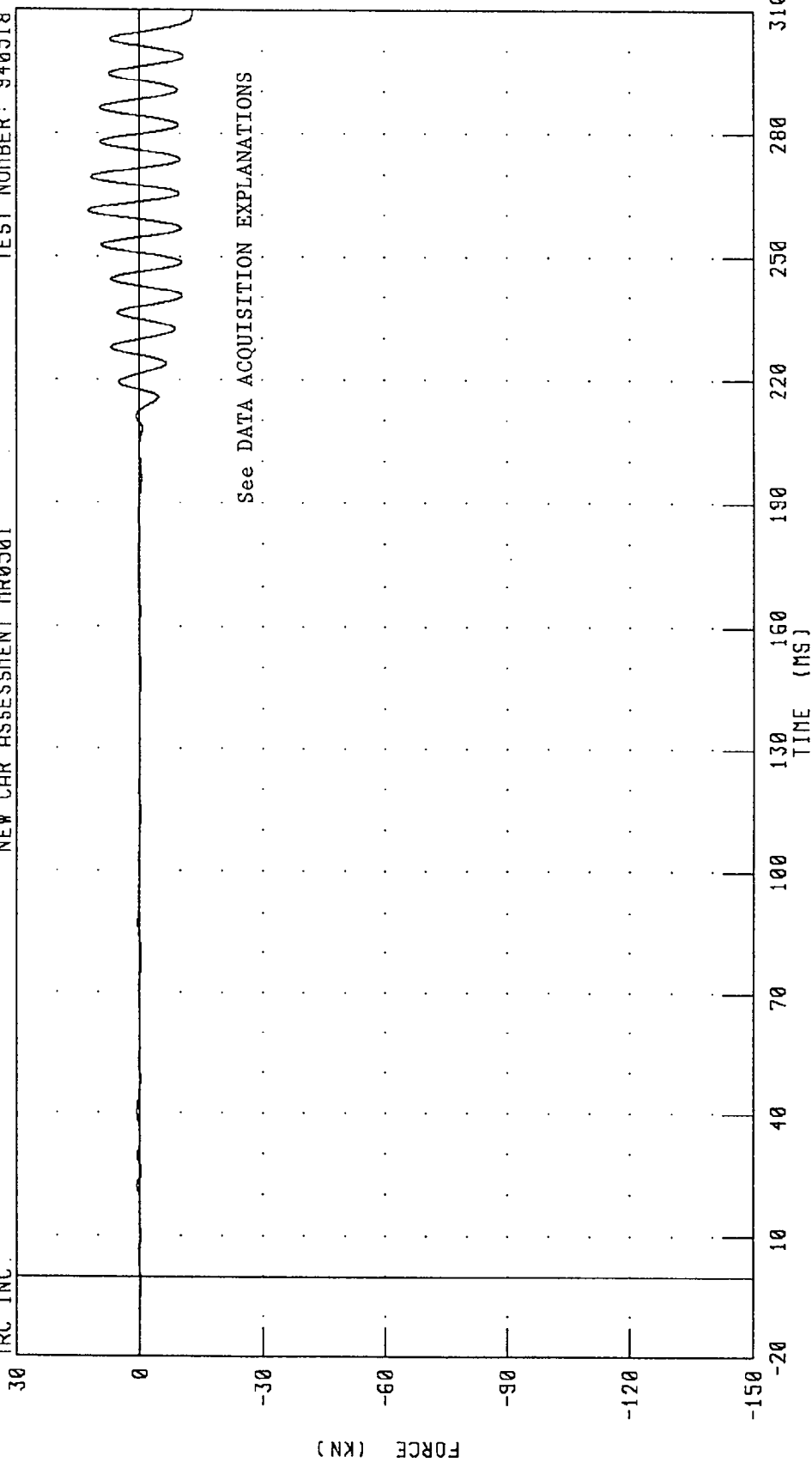
FILTER: CH. CLASS 60

PEAK DATA: 14.54 KN @ 261.04 MS, -9.83 KN @ 308.48 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B1 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: BB1F FILTER: CH. CLASS 60

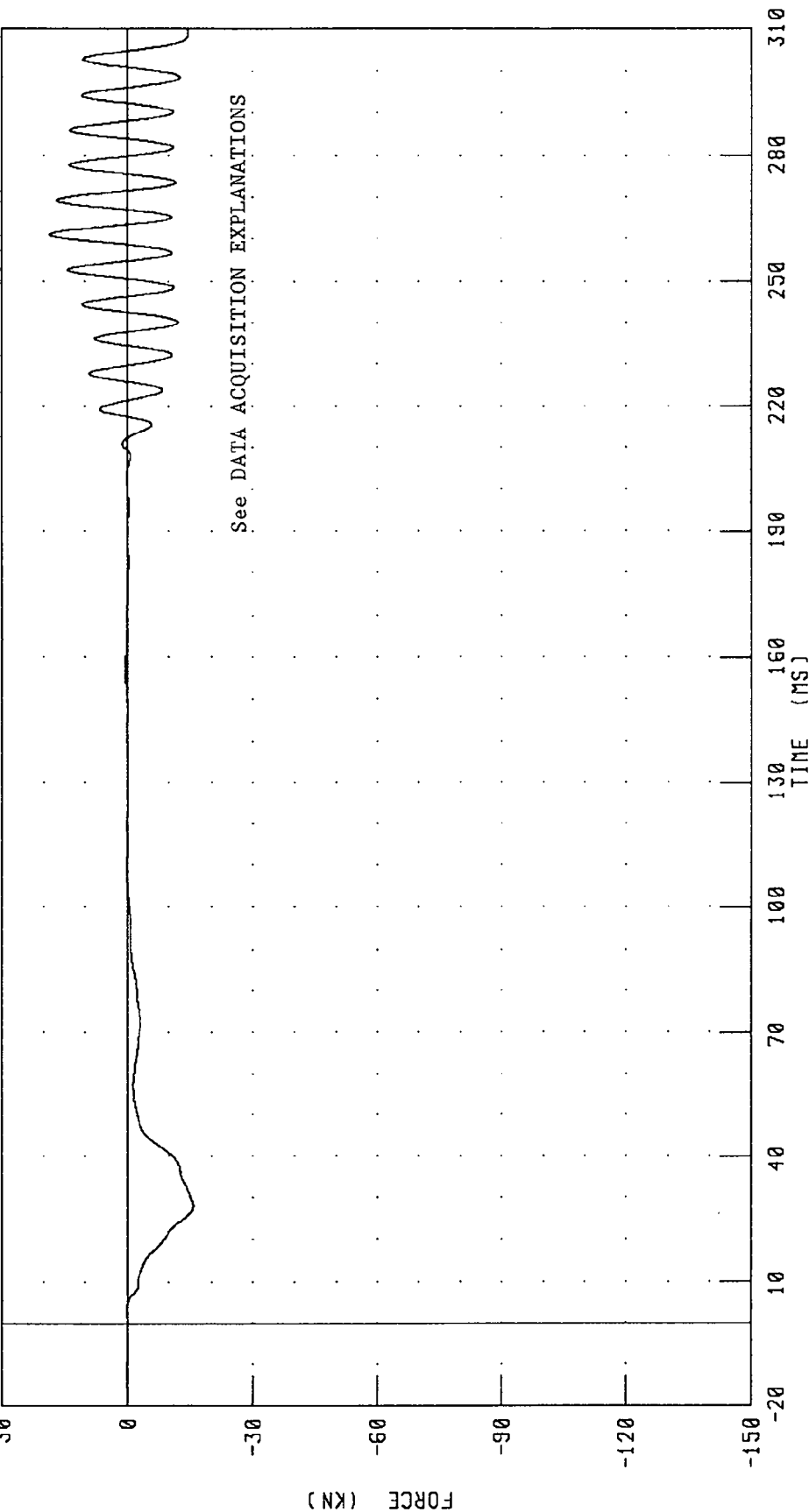
PEAK DATA: 12.45 KN @ 261.12 MS, -12.90 KN @ 308.88 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B2 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



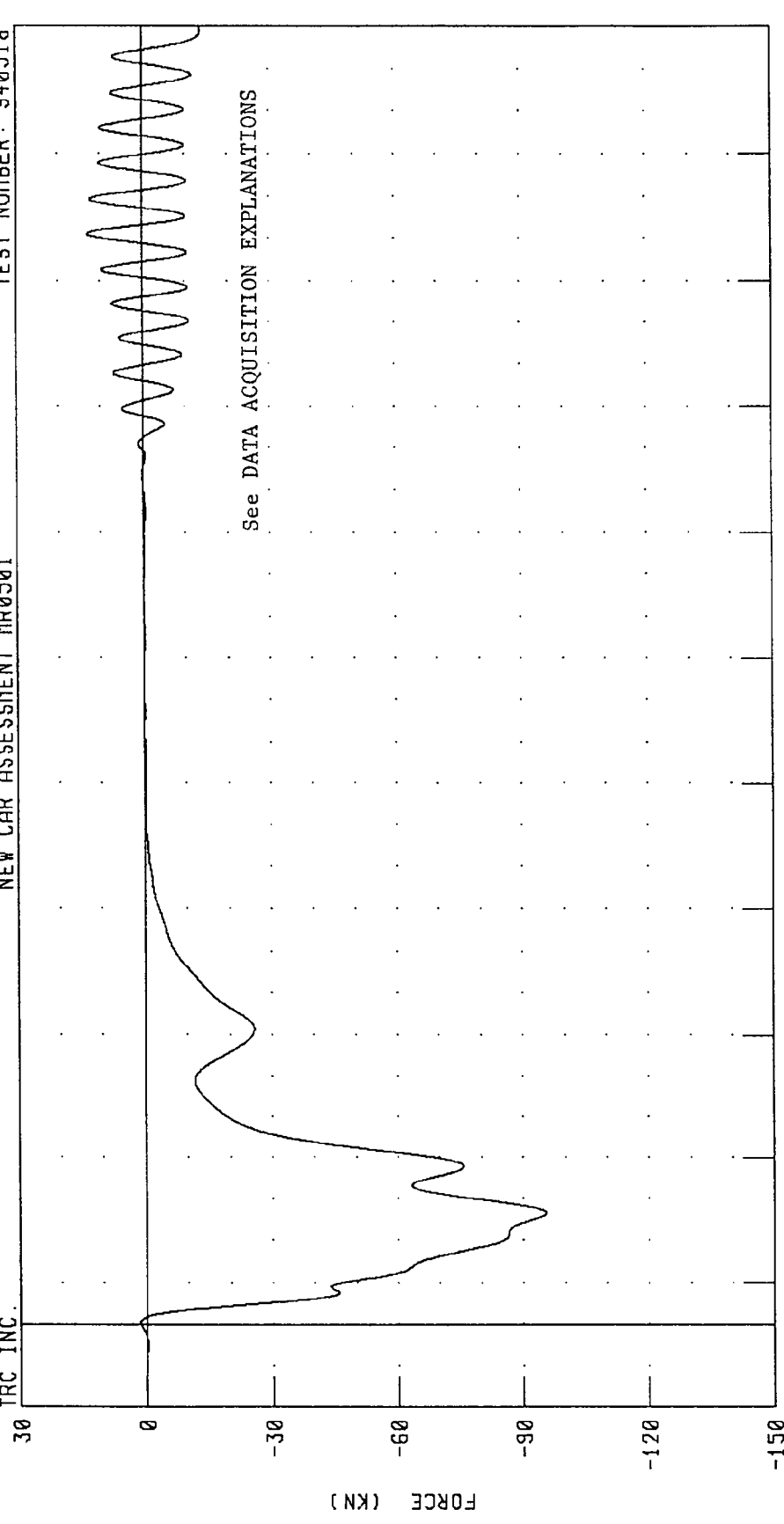
CHANNEL: BB2F FILTER: CH. CLASS 60

PEAK DATA: 18.40 KN @ 261.12 MS; -15.68 KN @ 28.00 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B3 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



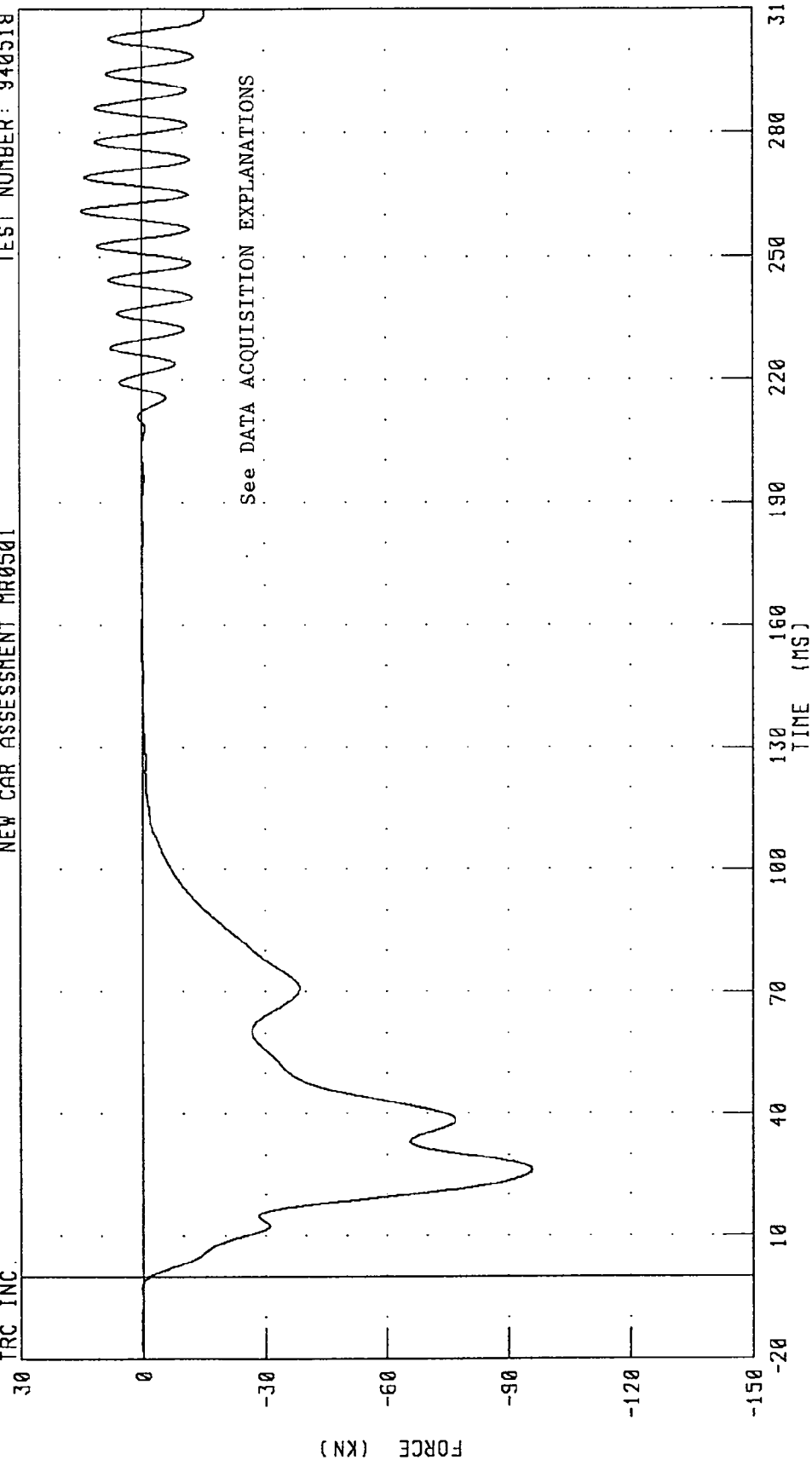
CHANNEL: BB3F FILTER: CH. CLASS 60 PEAK DATA: 13.02 KN @ 261.04 MS, -95.43 KN @ 26.56 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B4 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



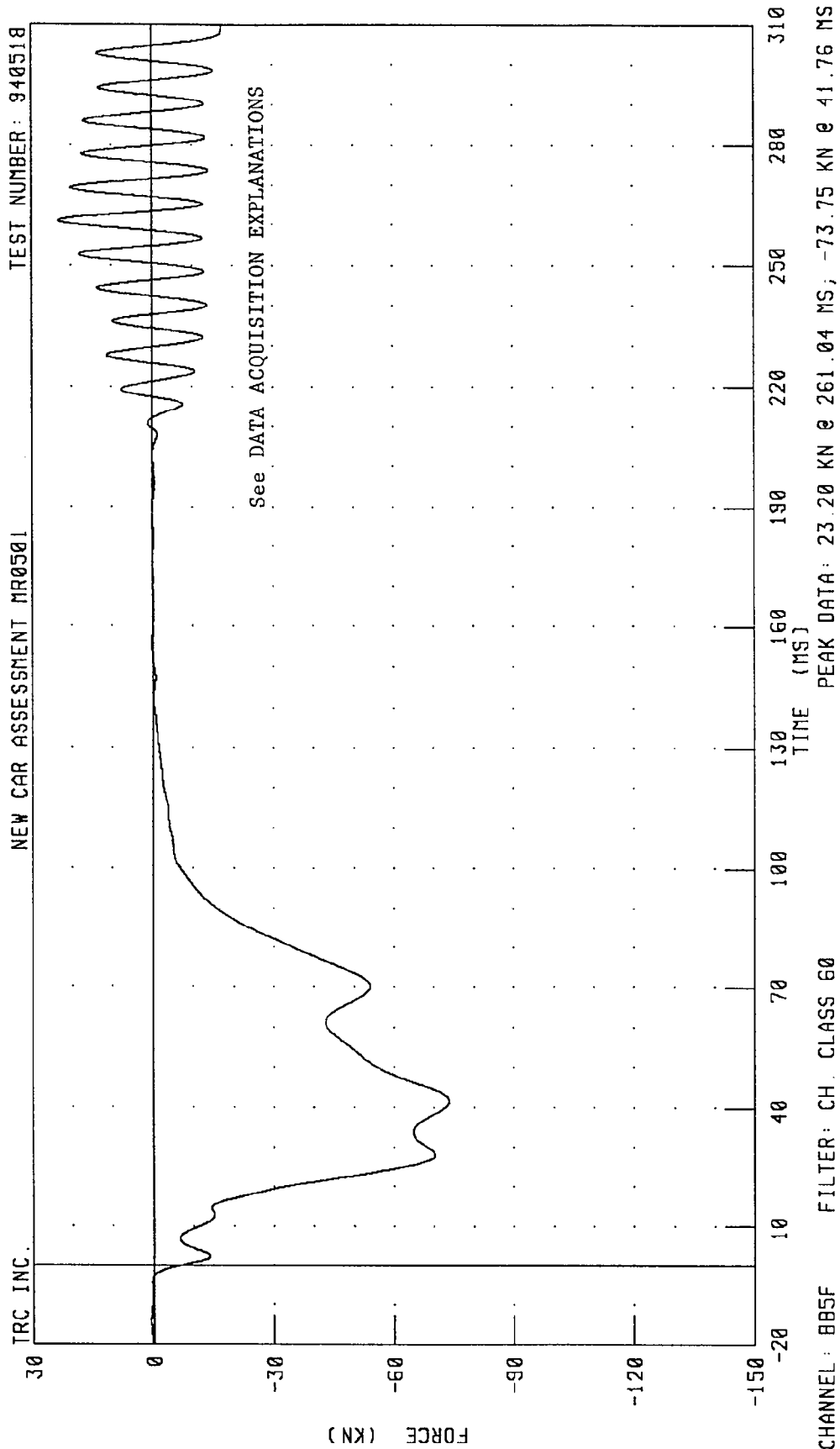
CHANNEL: BB4F

FILTER: CH. CLASS 60

PEAK DATA: 14.73 KN @ 261.04 MS; -95.72 KN @ 26.16 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B5 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

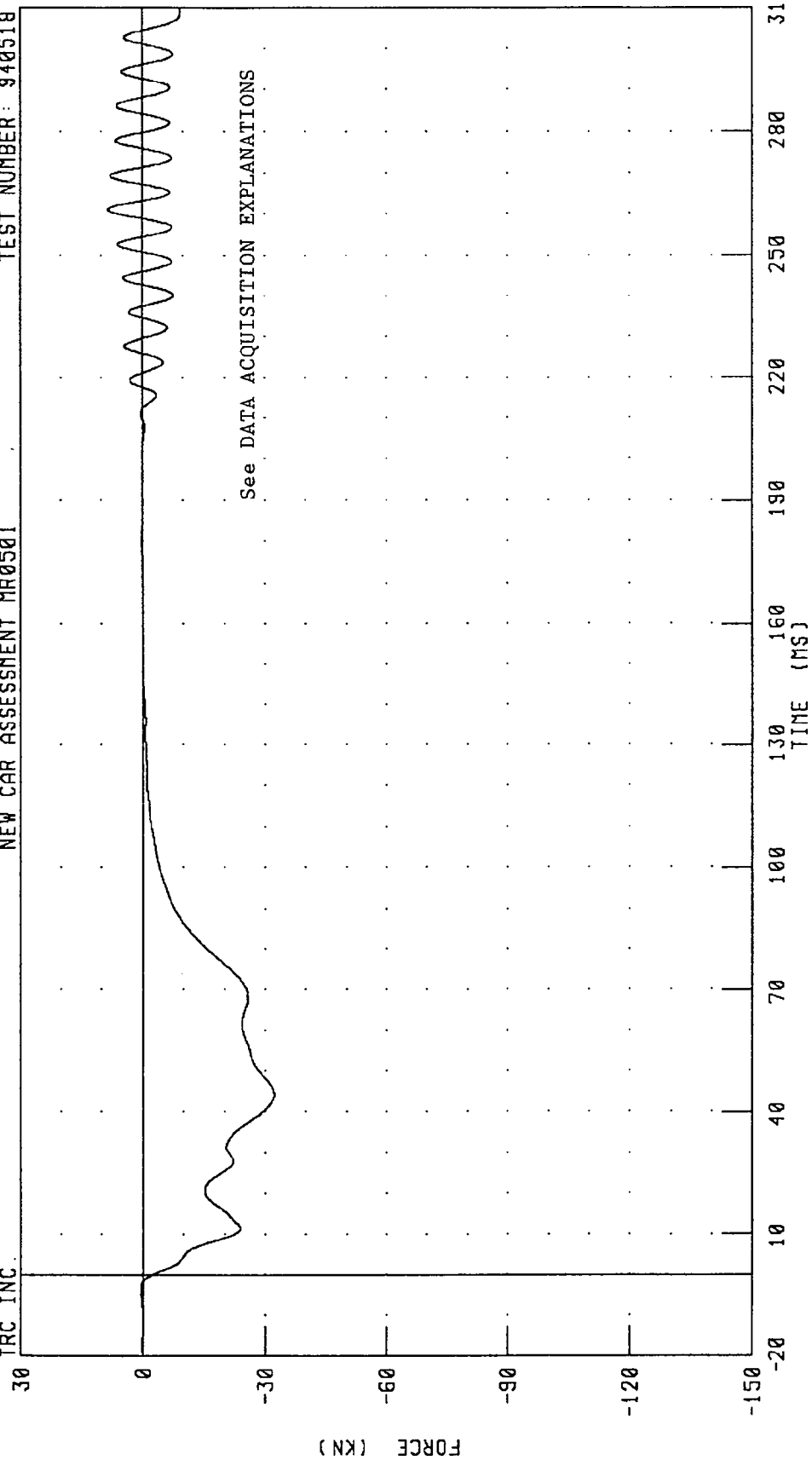


1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B6 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



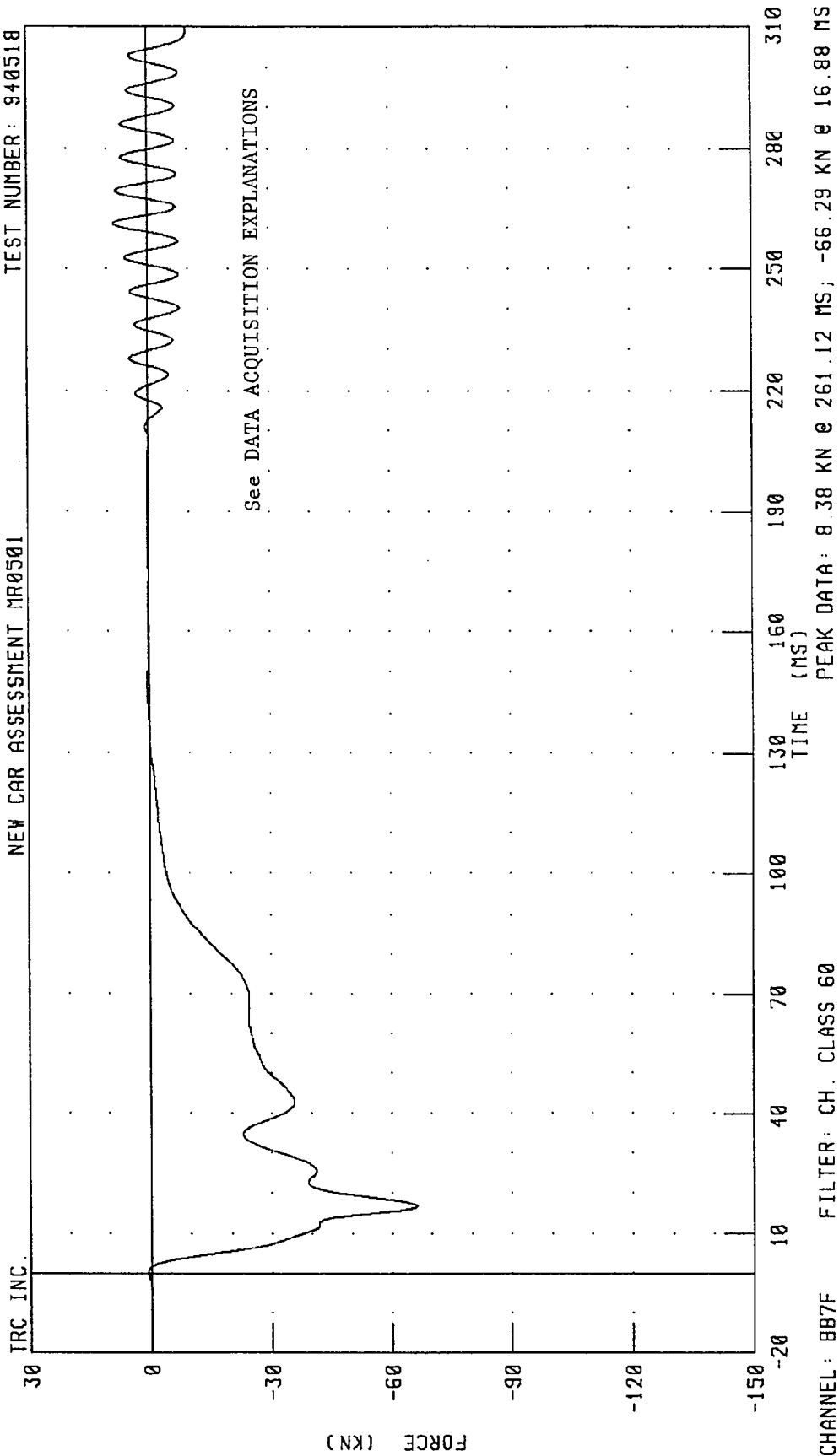
PEAK DATA: 8.54 KN @ 261.12 MS; -32.23 KN @ 44.40 MS

FILTER: CH. CLASS 60

CHANNEL: 886F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B7 FORCE
 NEW CAR ASSESSMENT MR0501

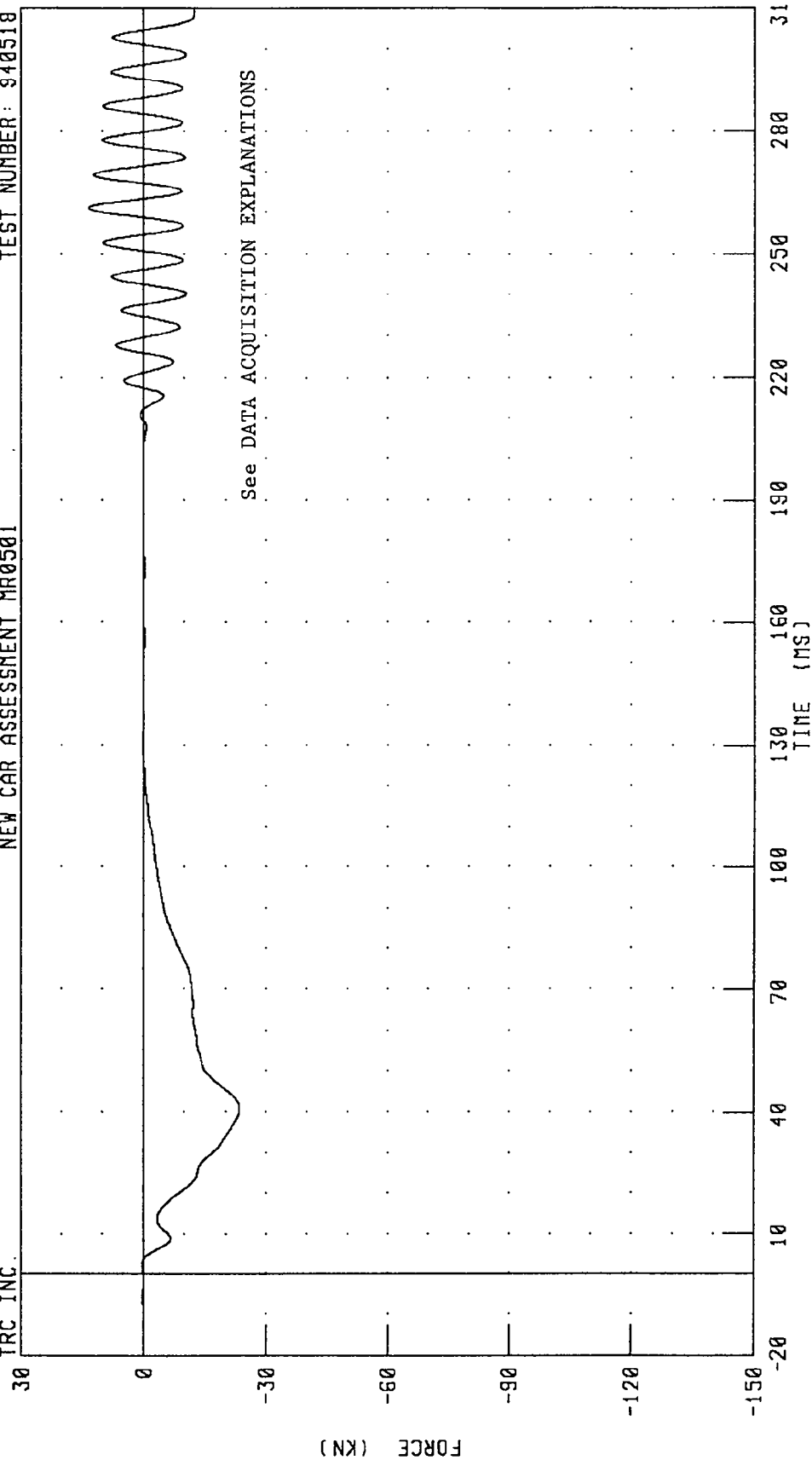
TEST NUMBER: 940518



1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION B8 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



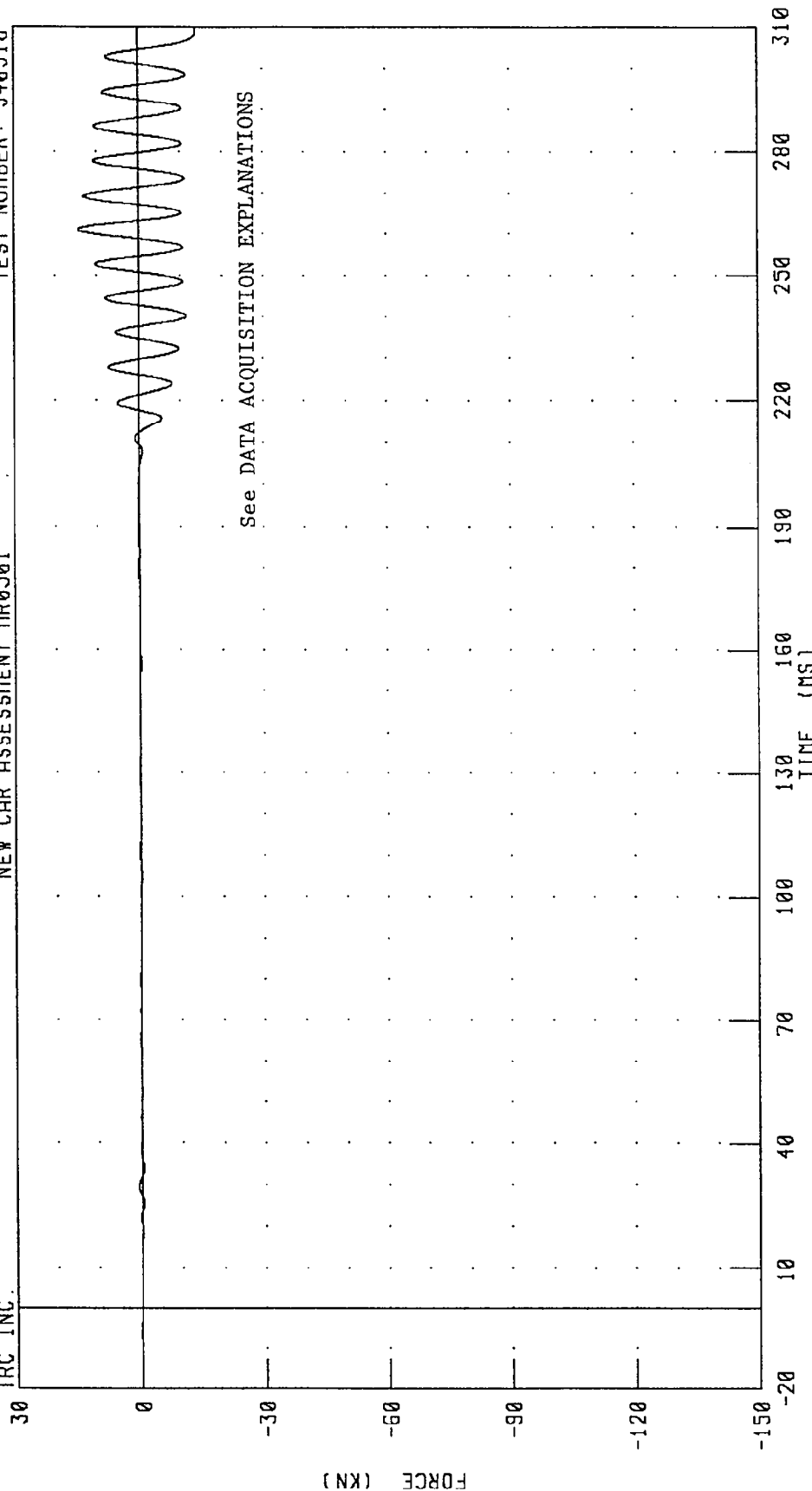
PEAK DATA: 13.41 KN @ 261.04 MS; -23.49 KN @ 40.88 MS

CHANNEL: BB8F FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION B9 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

IRC INC.



CHANNEL: 8B9F

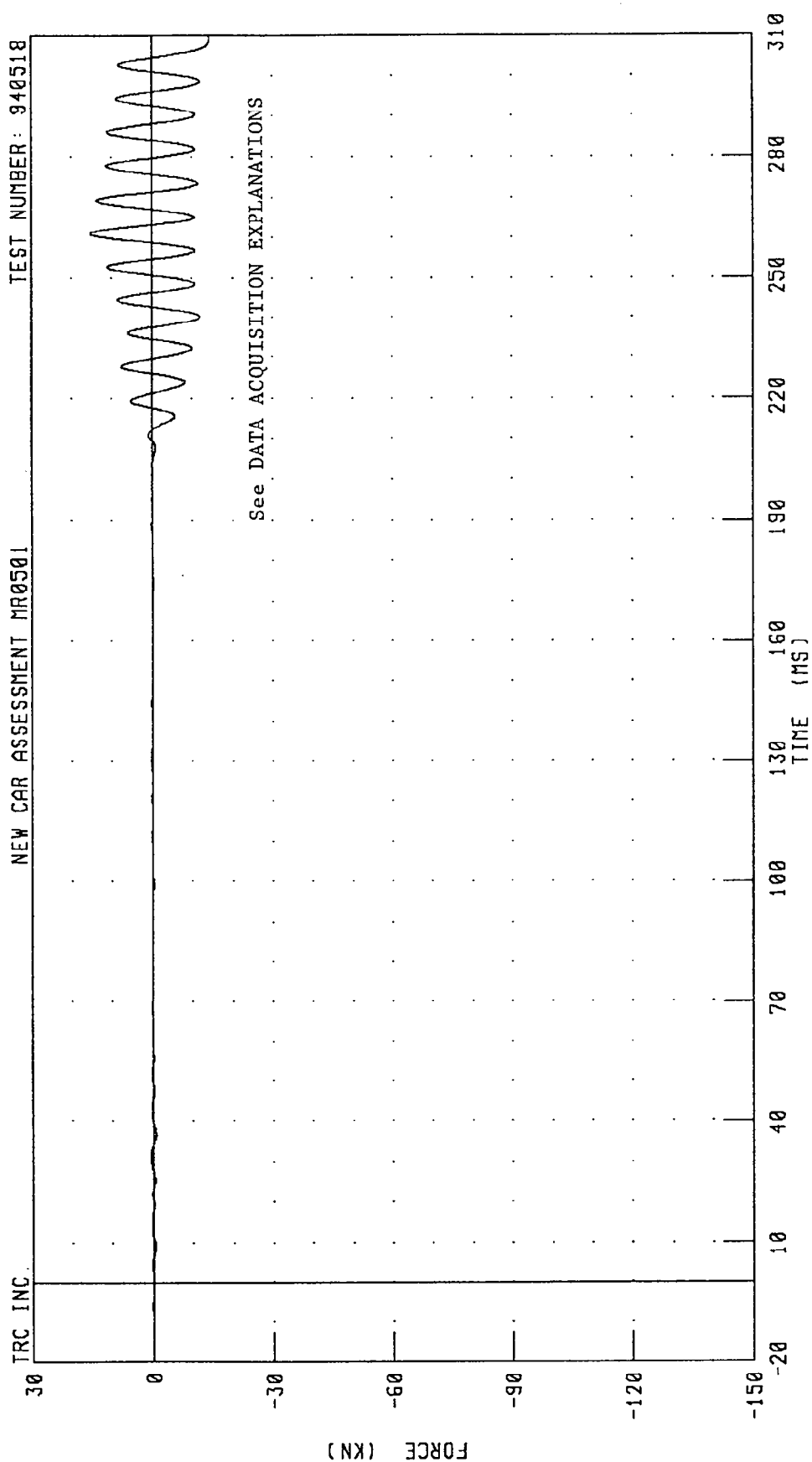
FILTER: CH. CLASS 60

PEAK DATA: 14.48 KN @ 261.04 MS; -13.78 KN @ 308.64 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C1 FORCE

NEW CAR ASSESSMENT NR0501

TEST NUMBER: 940518



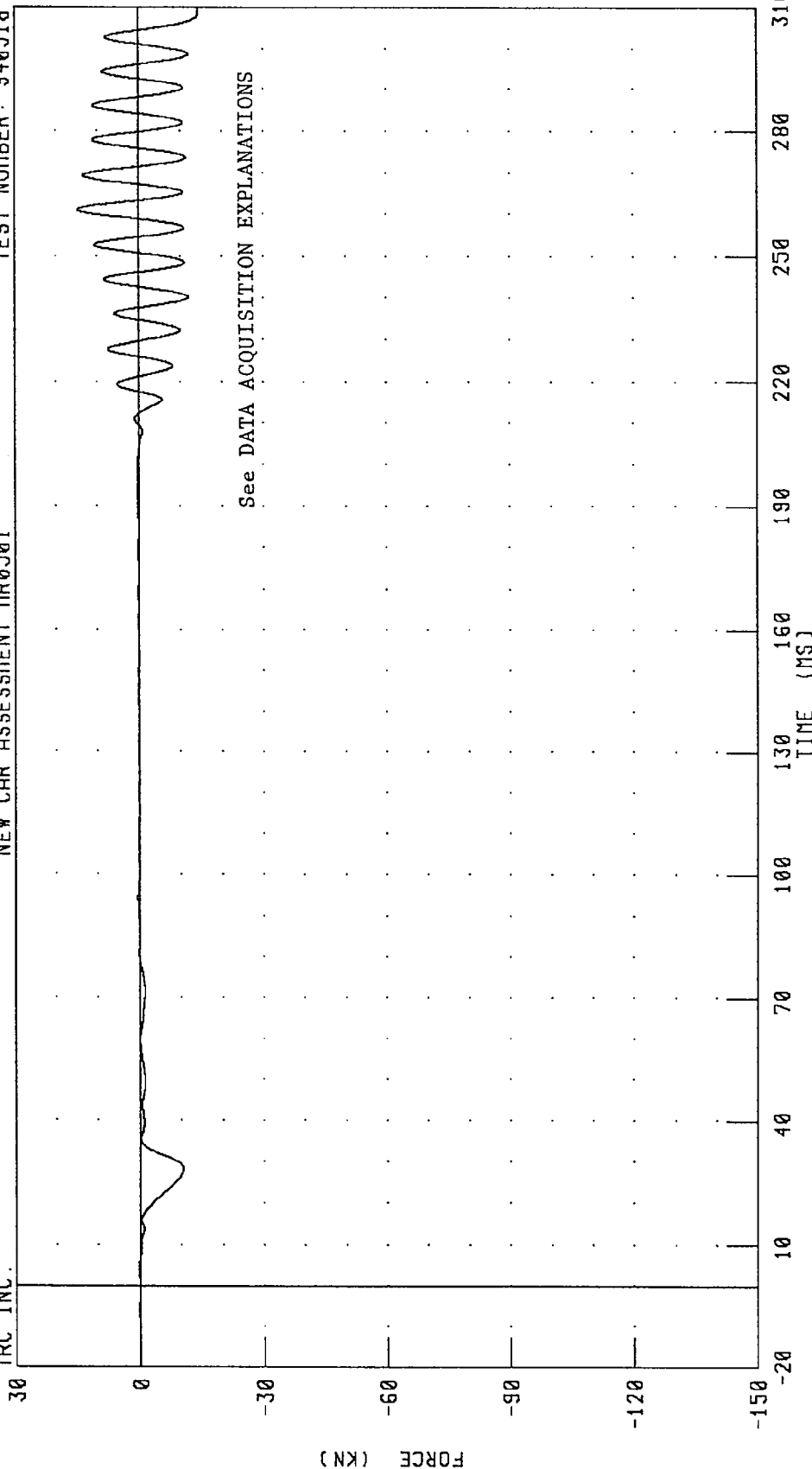
CHANNEL: BC1F FILTER: CH. CLASS 60

940518

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION C2 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 14.81 KN @ 261.04 MS; -14.30 KN @ 308.64 MS

FILTER: CH. CLASS 60

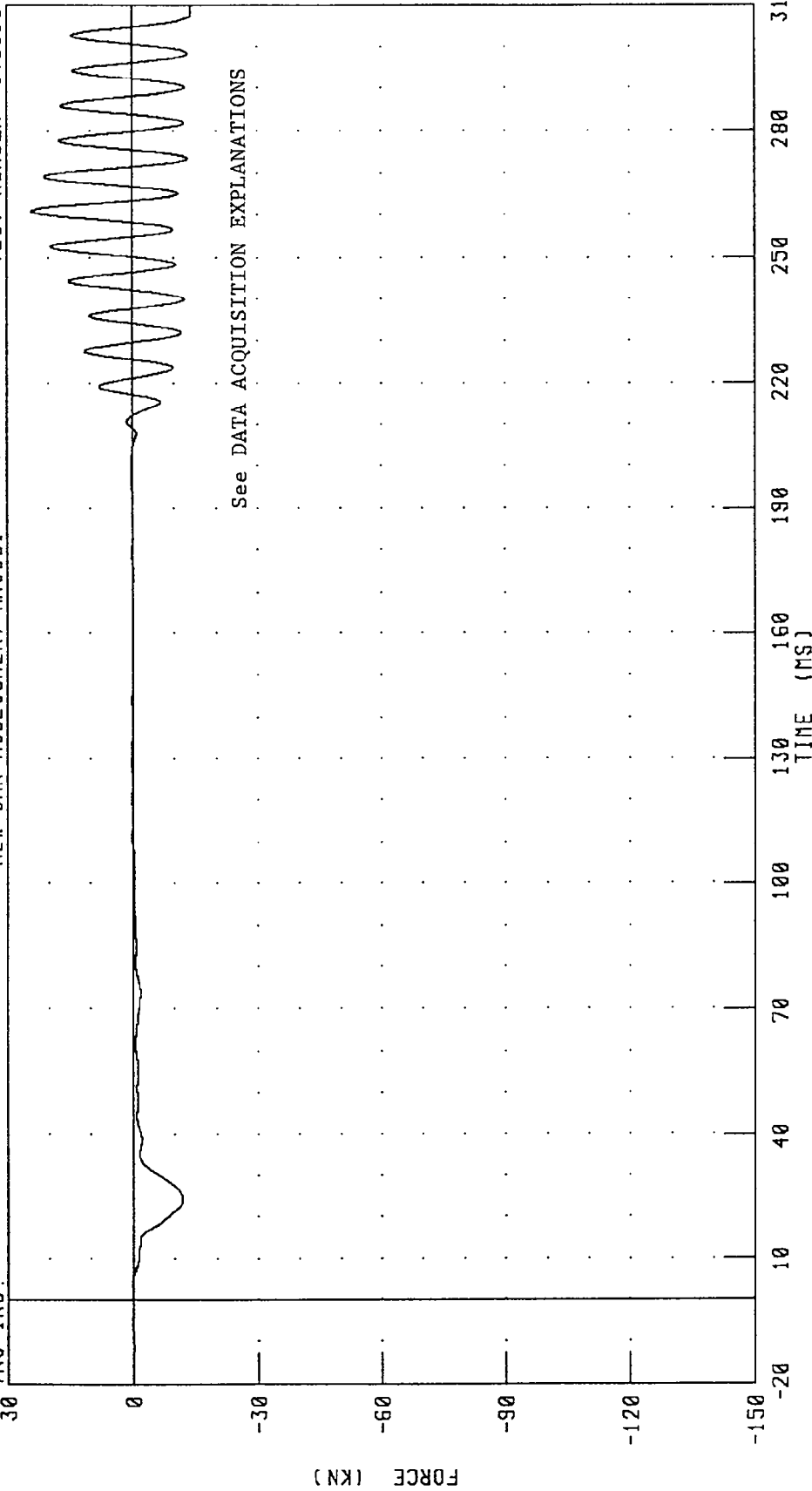
CHANNEL: BC2F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C3 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



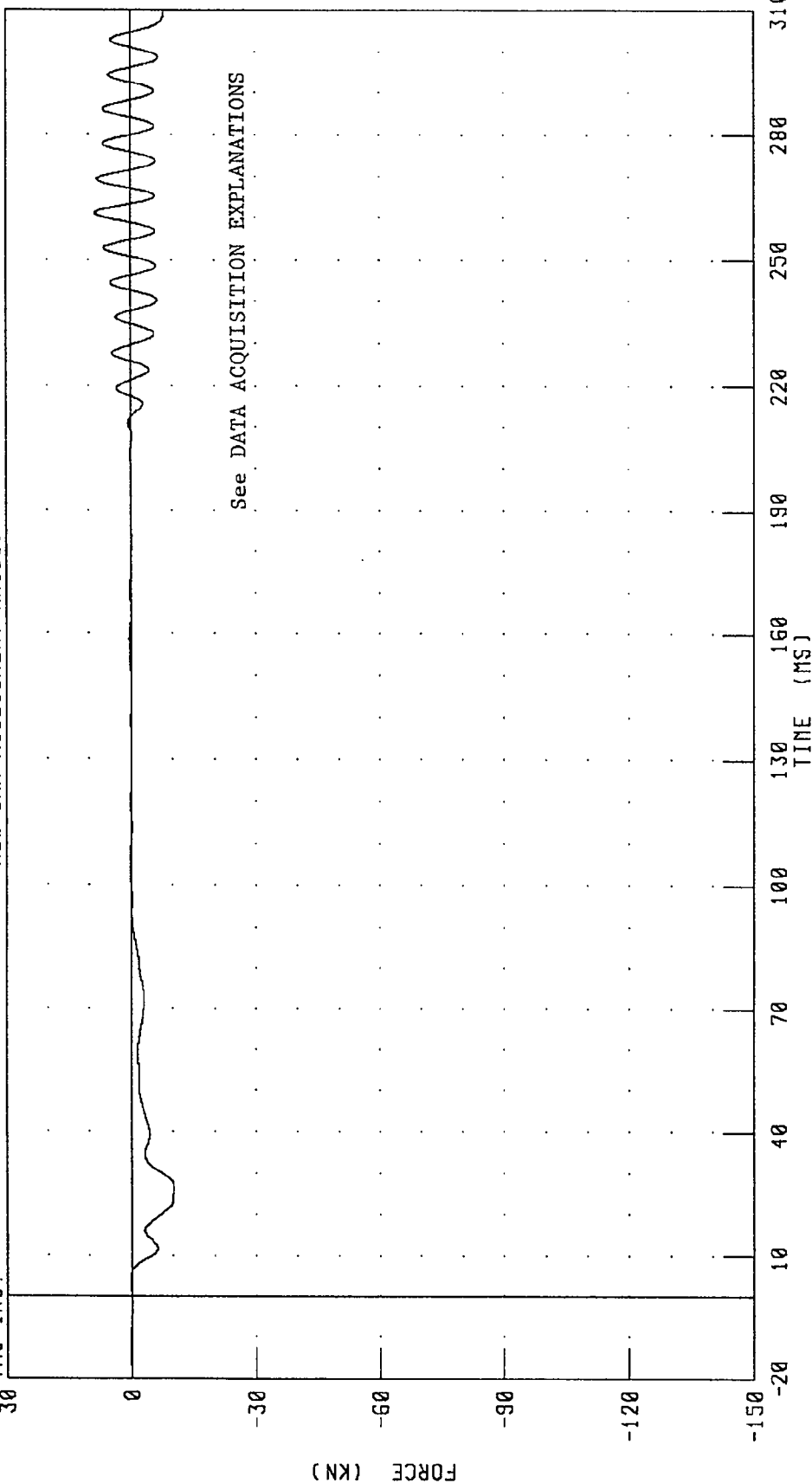
PEAK DATA: 24.13 KN @ 260.96 MS; -14.08 KN @ 308.16 MS

CHANNEL: BC3F FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C4 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



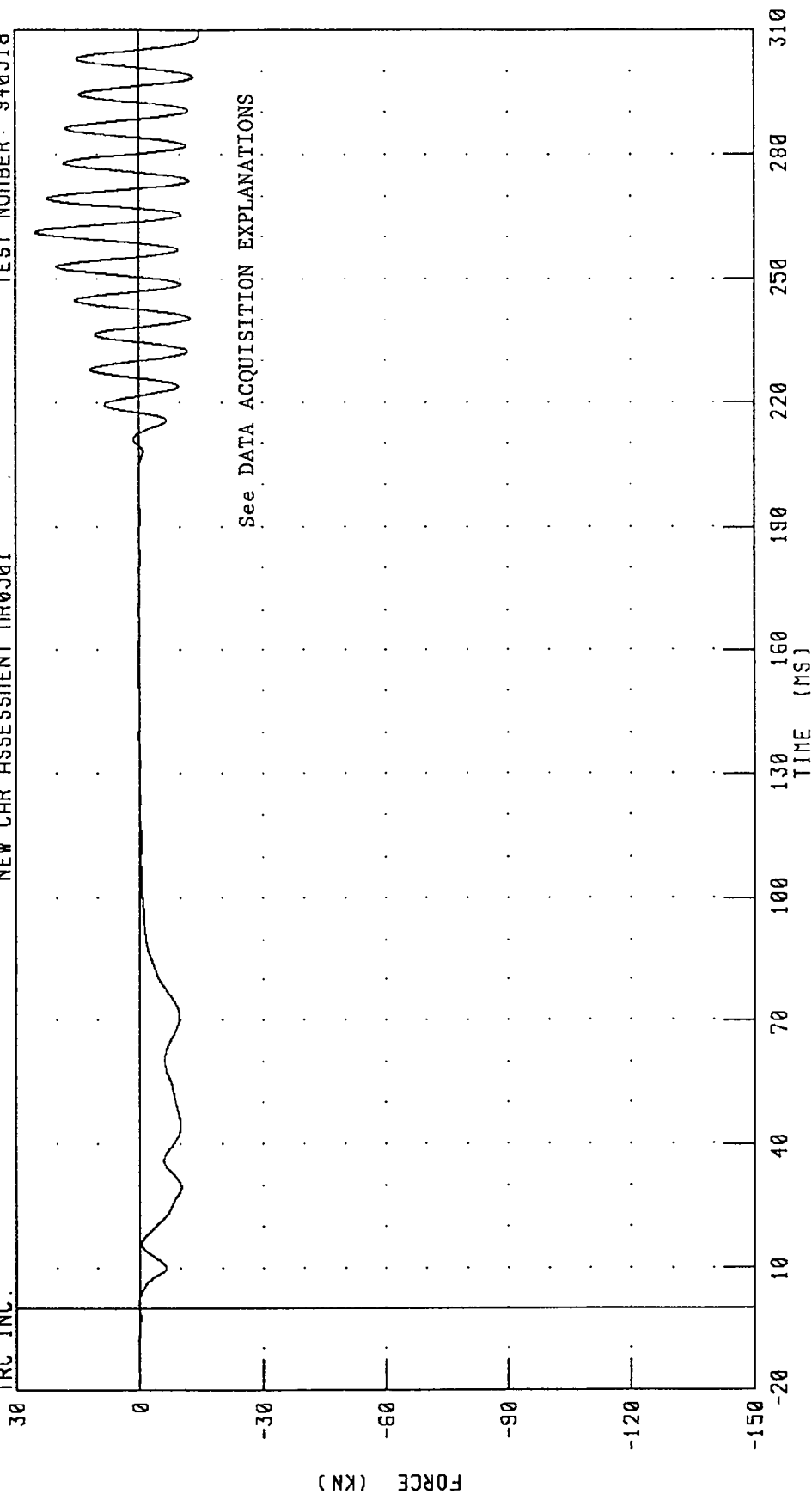
See DATA ACQUISITION EXPLANATIONS

CHANNEL: BC4F FILTER: CH. CLASS 60
PEAK DATA: 8.53 KN @ 261.12 MS; -10.26 KN @ 26.64 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C5 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



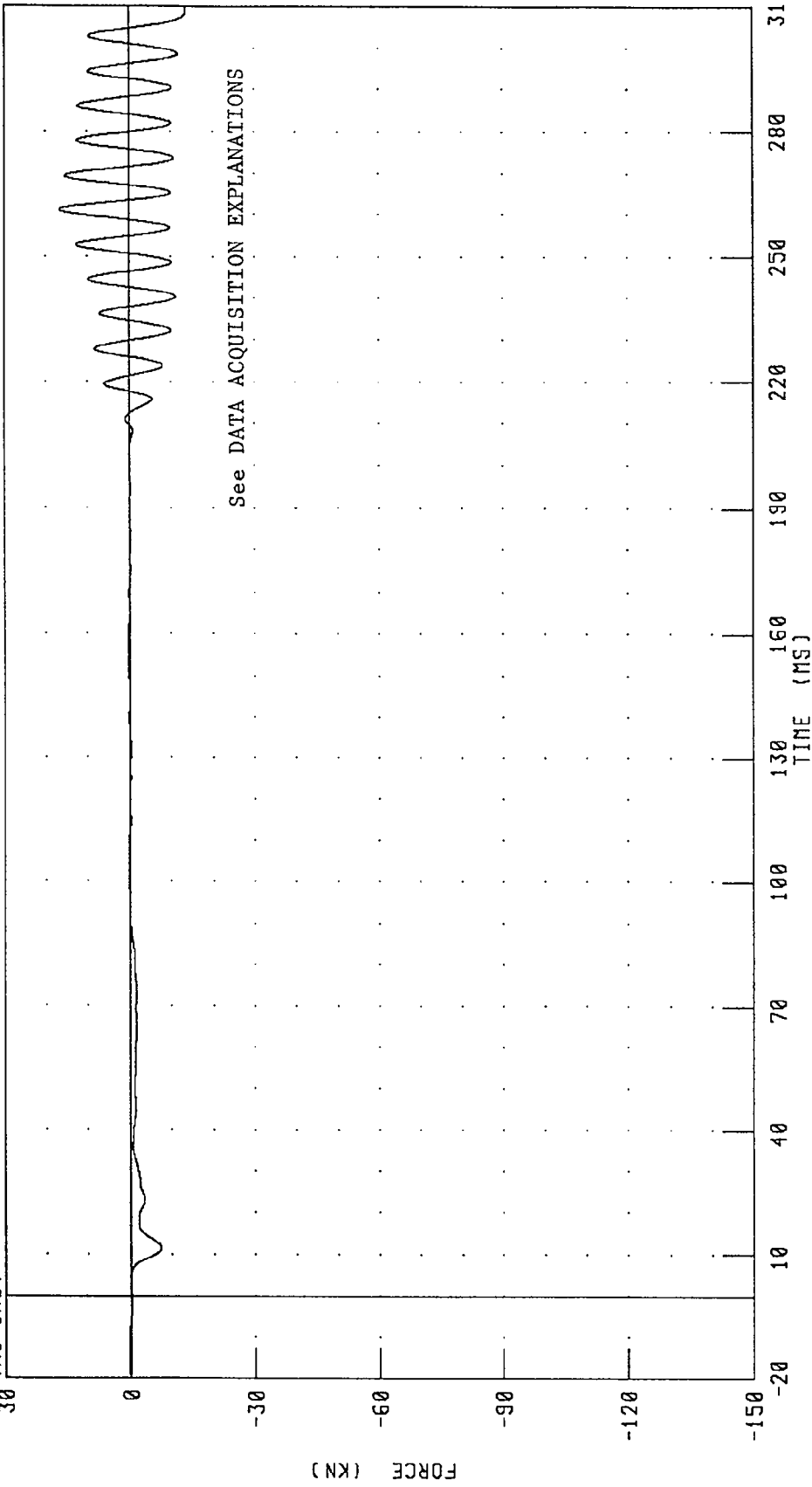
CHANNEL: BC5F FILTER: CH. CLASS 60

PEAK DATA: 25.06 KN @ 261.20 MS; -14.84 KN @ 308.96 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C6 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 16.74 KN @ 261.12 MS; -13.57 KN @ 308.80 MS

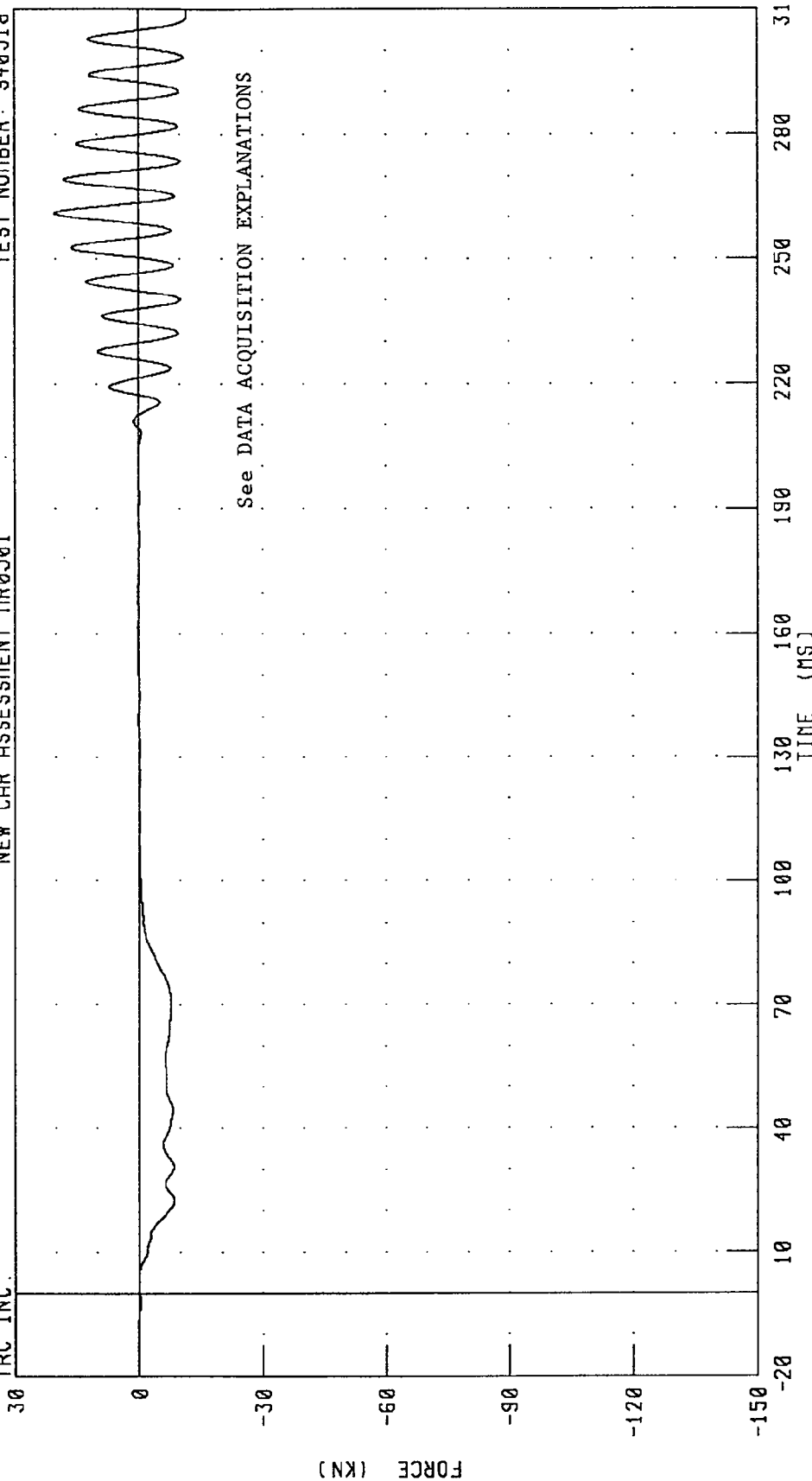
FILTER: CH. CLASS 60

CHANNEL: BC6F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C7 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 20.30 KN @ 261.04 MS; -11.55 KN @ 308.40 MS

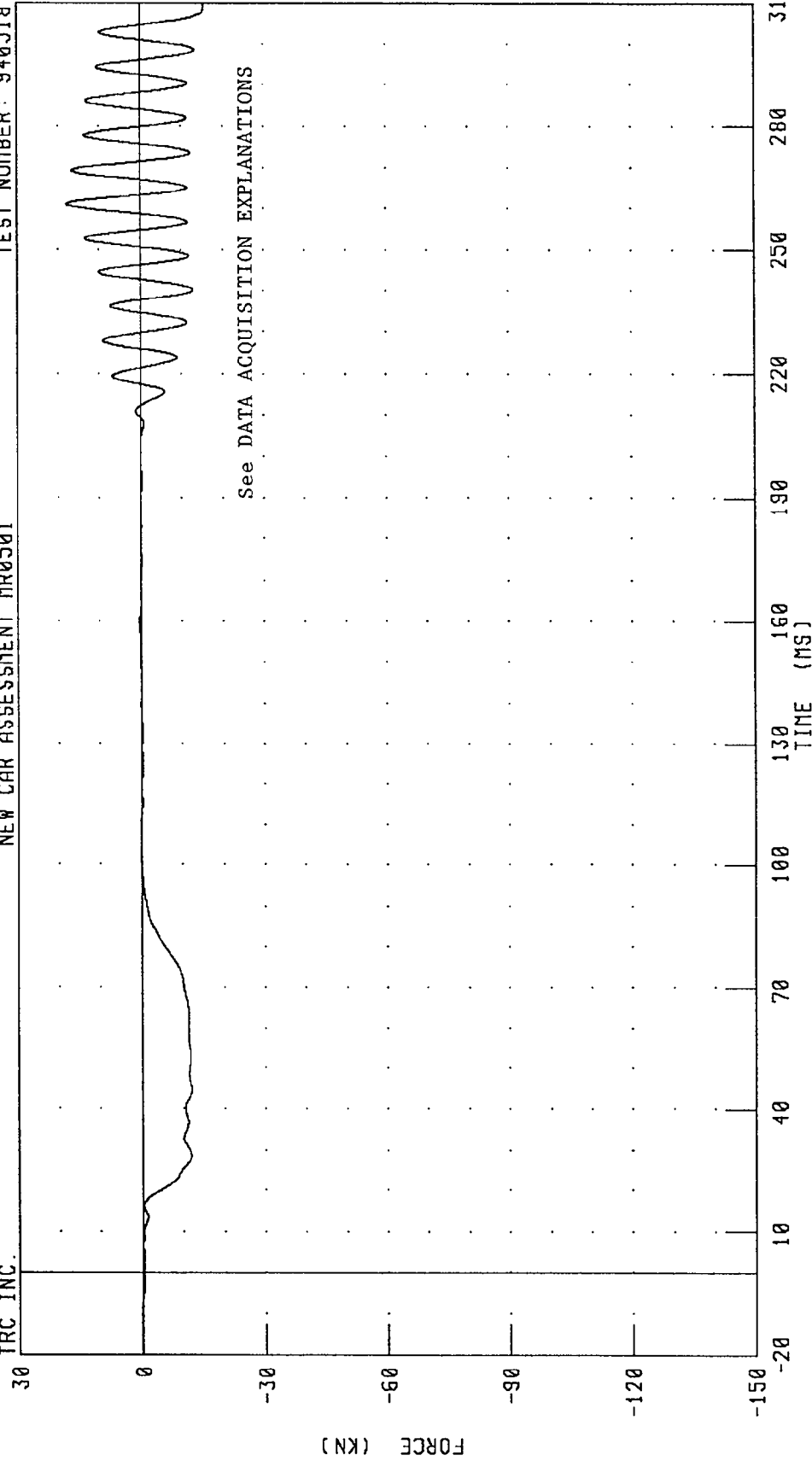
FILTER: CH. CLASS 60

CHANNEL: BC7F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C8 FORCE
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 17.89 KN @ 261.12 MS; -15.50 KN @ 308.80 MS

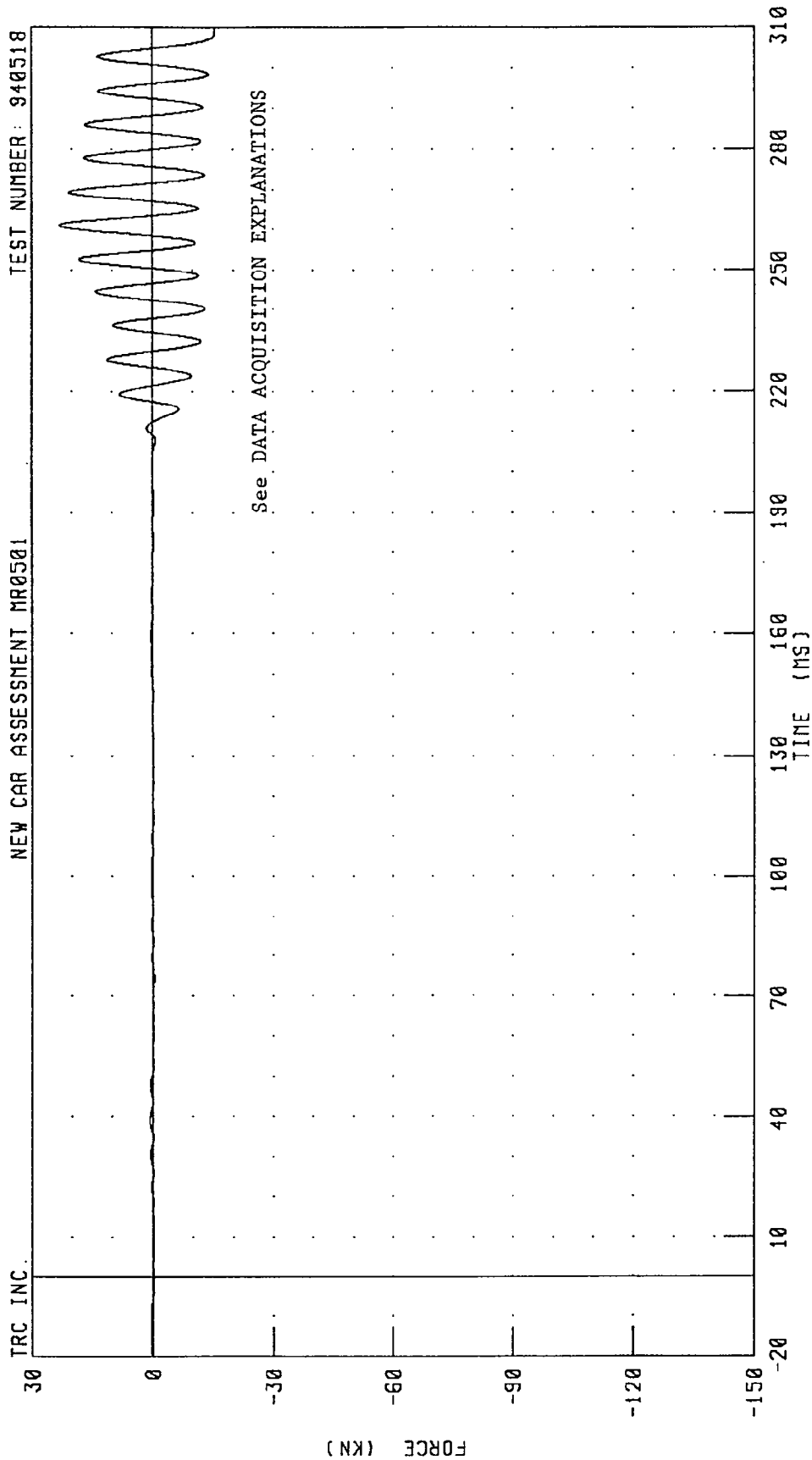
FILTER: CH. CLASS 60

CHANNEL: BC8F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION C9 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

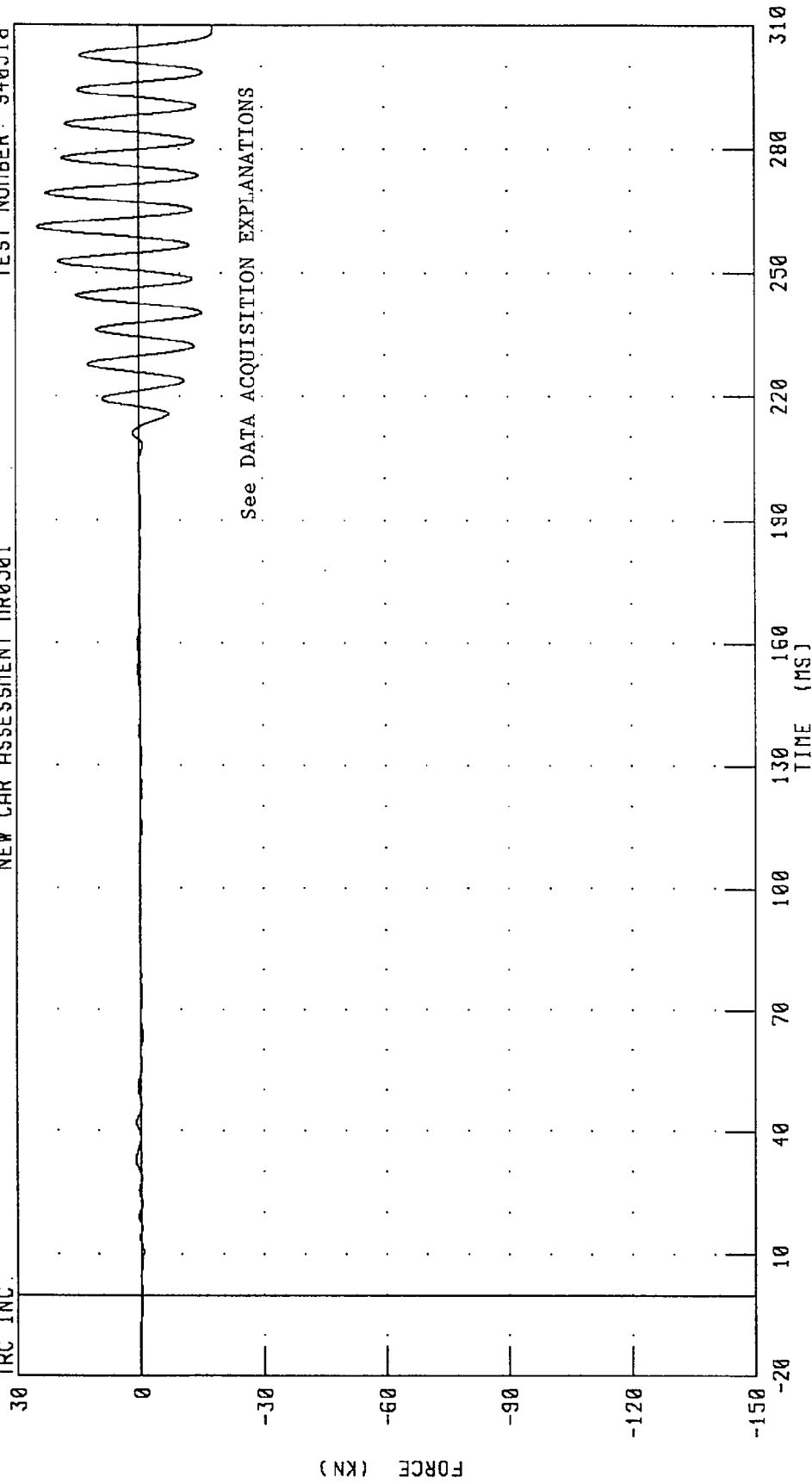


CHANNEL: BC9F FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D1 FORCE
 NEW CAR ASSESSMENT NR0501

TEST NUMBER: 940518

TRC INC.



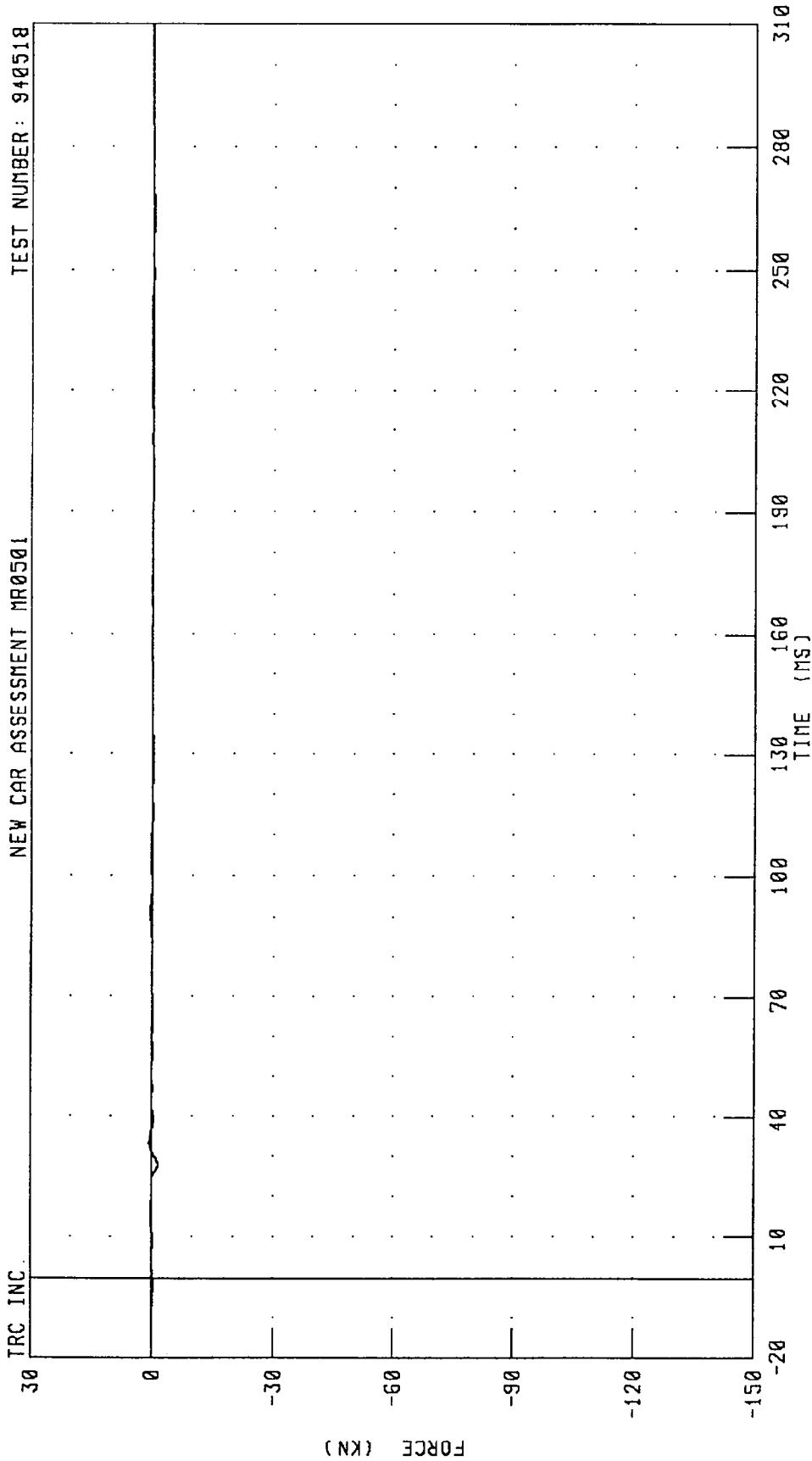
PEAK DATA: 24.49 KN @ 261.04 MS; -18.12 KN @ 308.64 MS

FILTER: CH. CLASS 60

CHANNEL: BD1F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D2 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



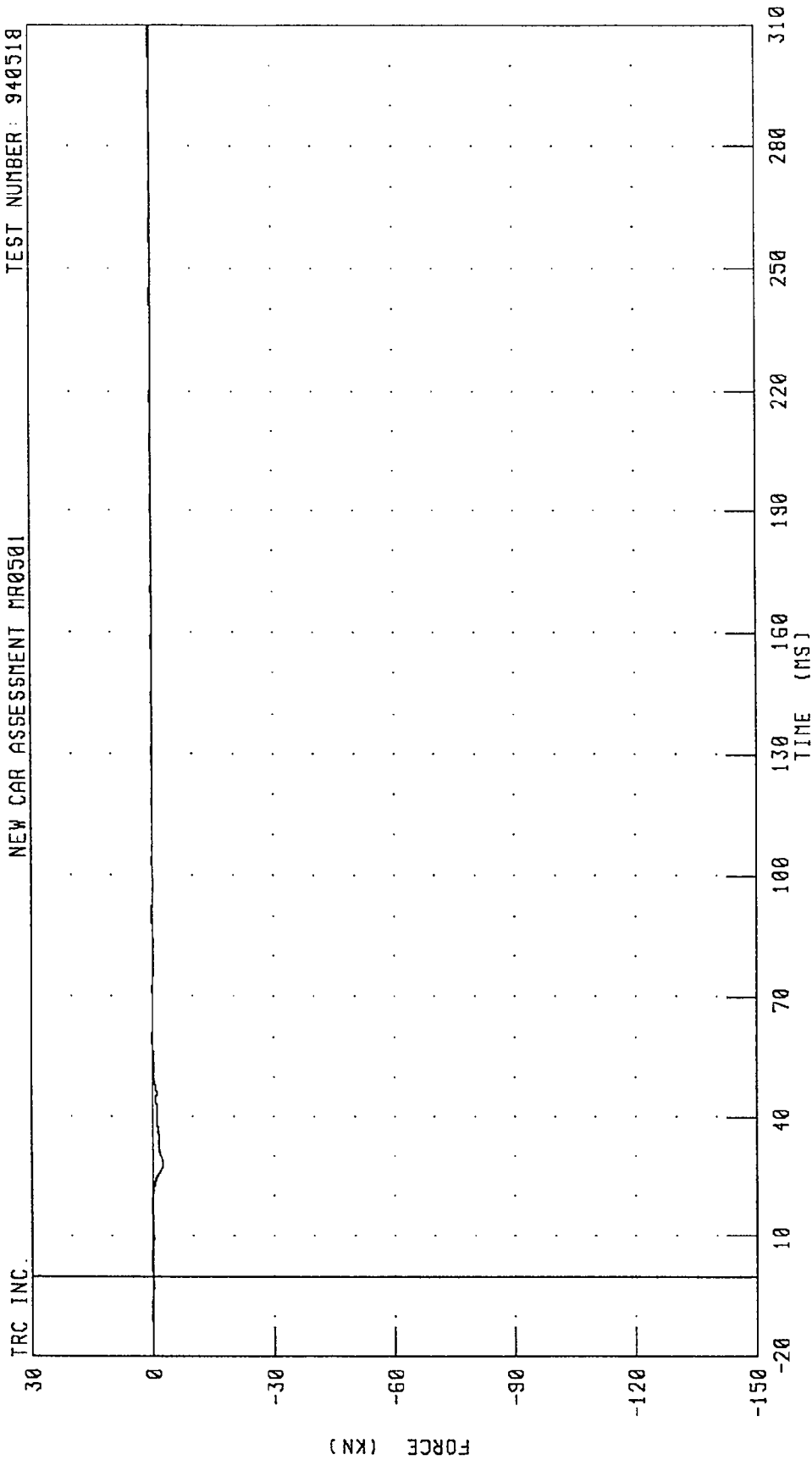
CHANNEL: BD2F

FILTER: CH. CLASS 60

PEAK DATA: 0.60 KN @ 33.44 MS; -1.51 KN @ 27.84 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D3 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



CHANNEL: B03F

FILTER: CH. CLASS 60

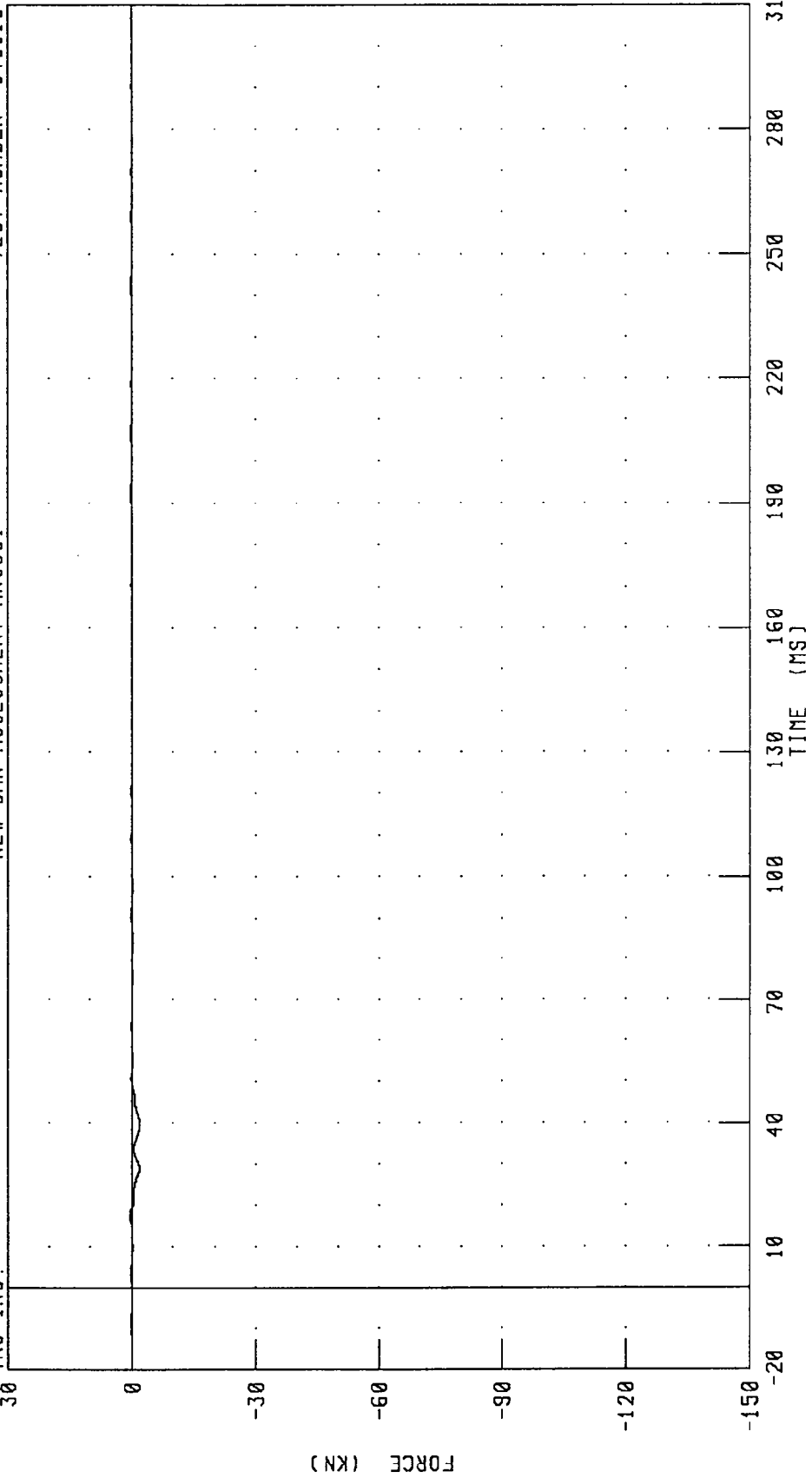
940518

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D4 FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: BD4F FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D5 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.

30

0

-30

-60

-90

-120

-150

FORCE (KN)

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

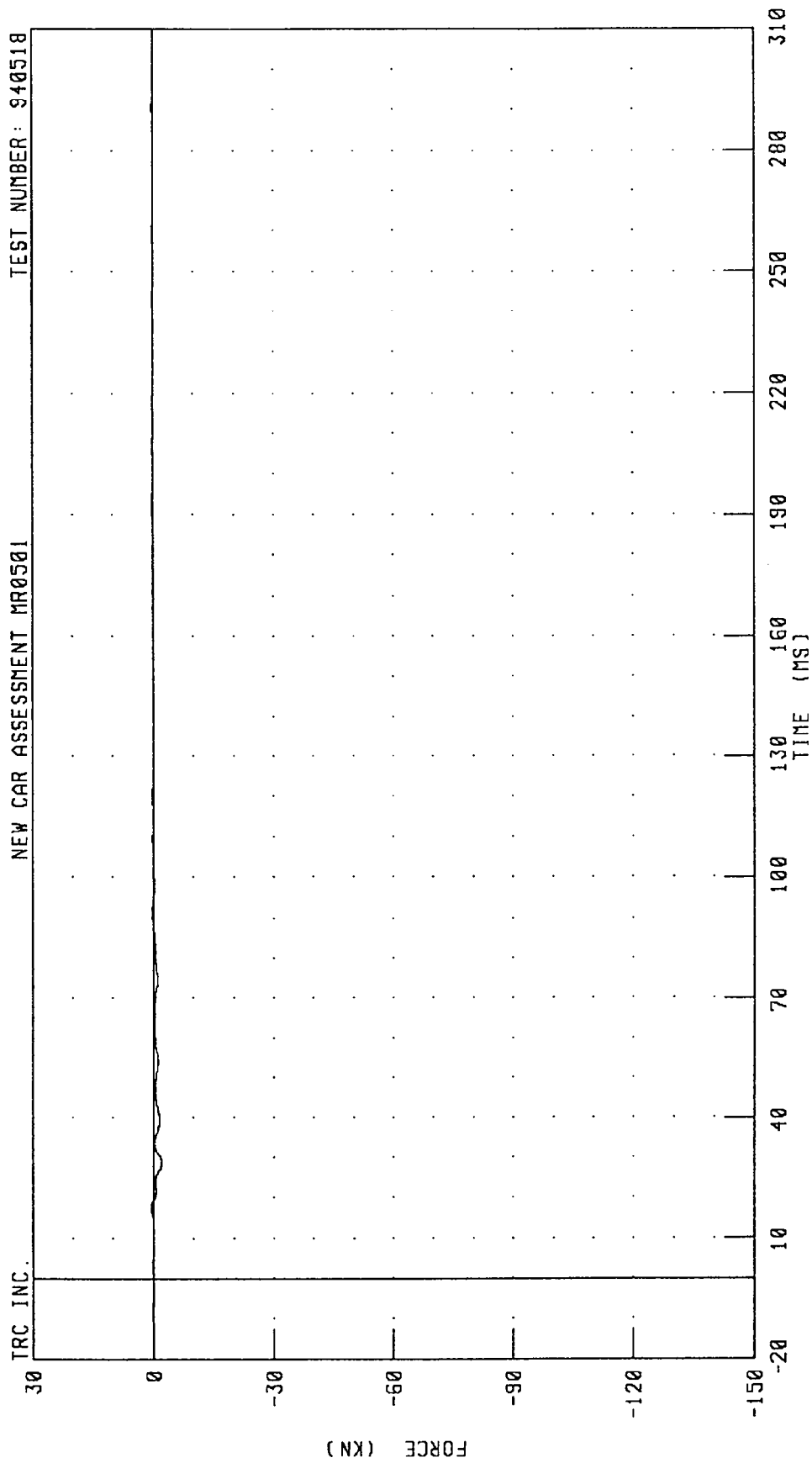
CHANNEL: 805F

FILTER: CH. CLASS 60

PEAK DATA: 0.51 KN @ 17.68 MS; -1.81 KN @ 29.20 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D6 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



PEAK DATA: 0.52 KN @ 17.60 MS; -2.07 KN @ 28.72 MS

FILTER: CH. CLASS 60

CHANNEL: BD6F

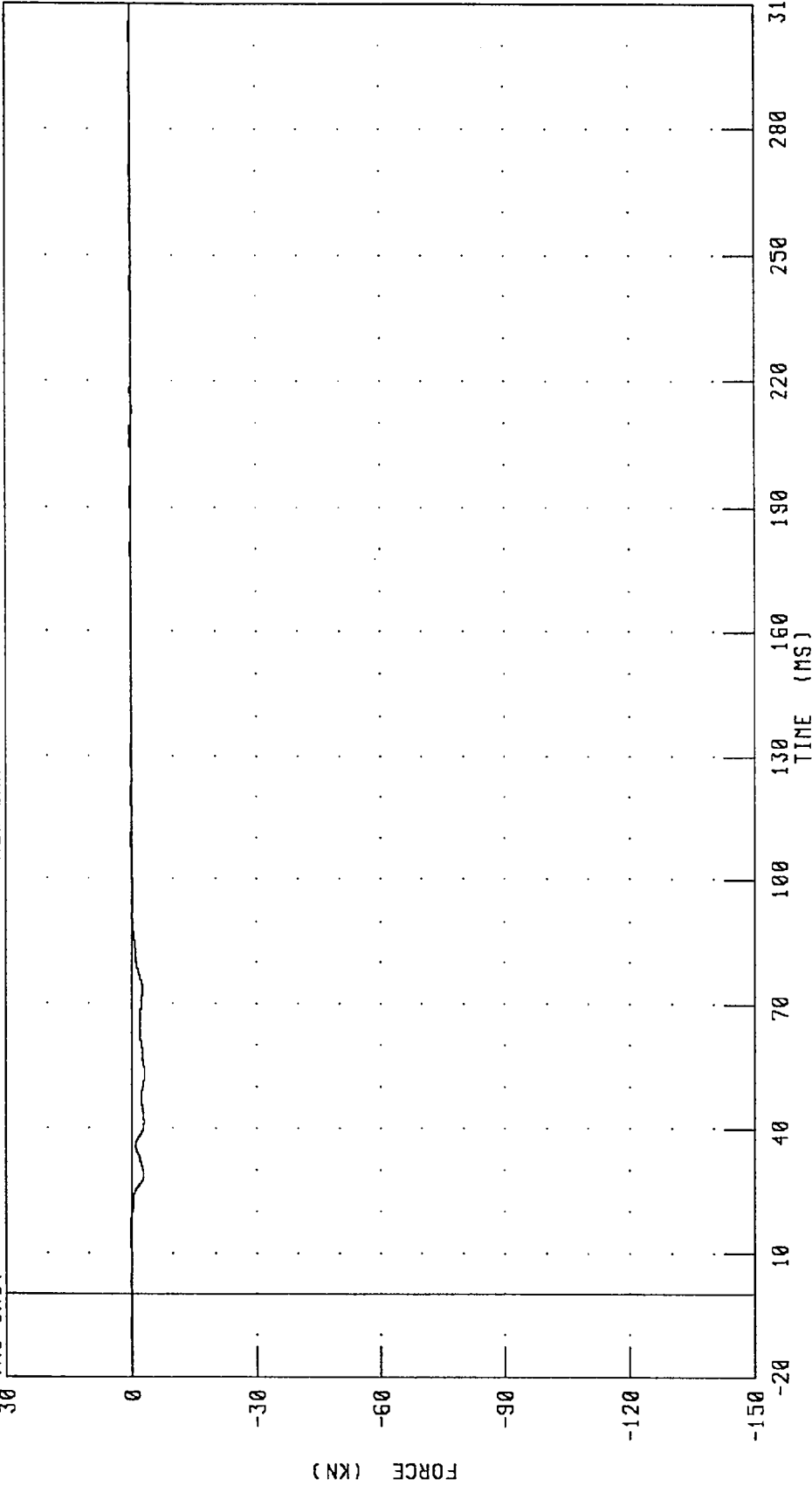
FORCE (KN)

TIME (MS)

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D7 FORCE
 NEW CAR ASSESSMENT NR0501

TEST NUMBER: 940518

TRC INC.



PEAK DATA: 0.25 KN @ 16.72 MS; -3.07 KN @ 52.80 MS

FILTER: CH. CLASS 60

CHANNEL: B07F

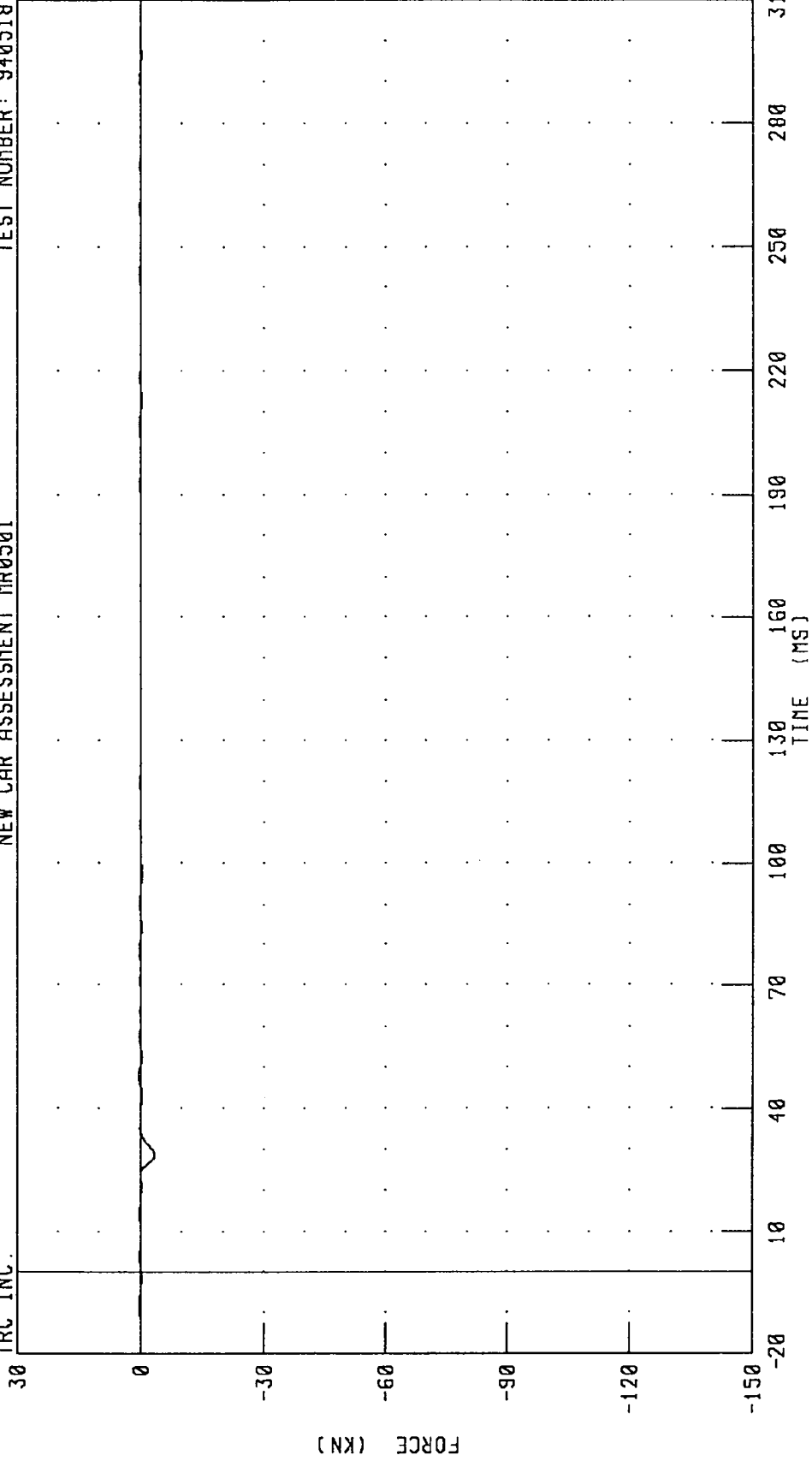
FORCE (KN)

TIME (MS)

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER POSITION D8 FORCE
 NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

TRC INC.



CHANNEL: 808F

FILTER: CH. CLASS 60

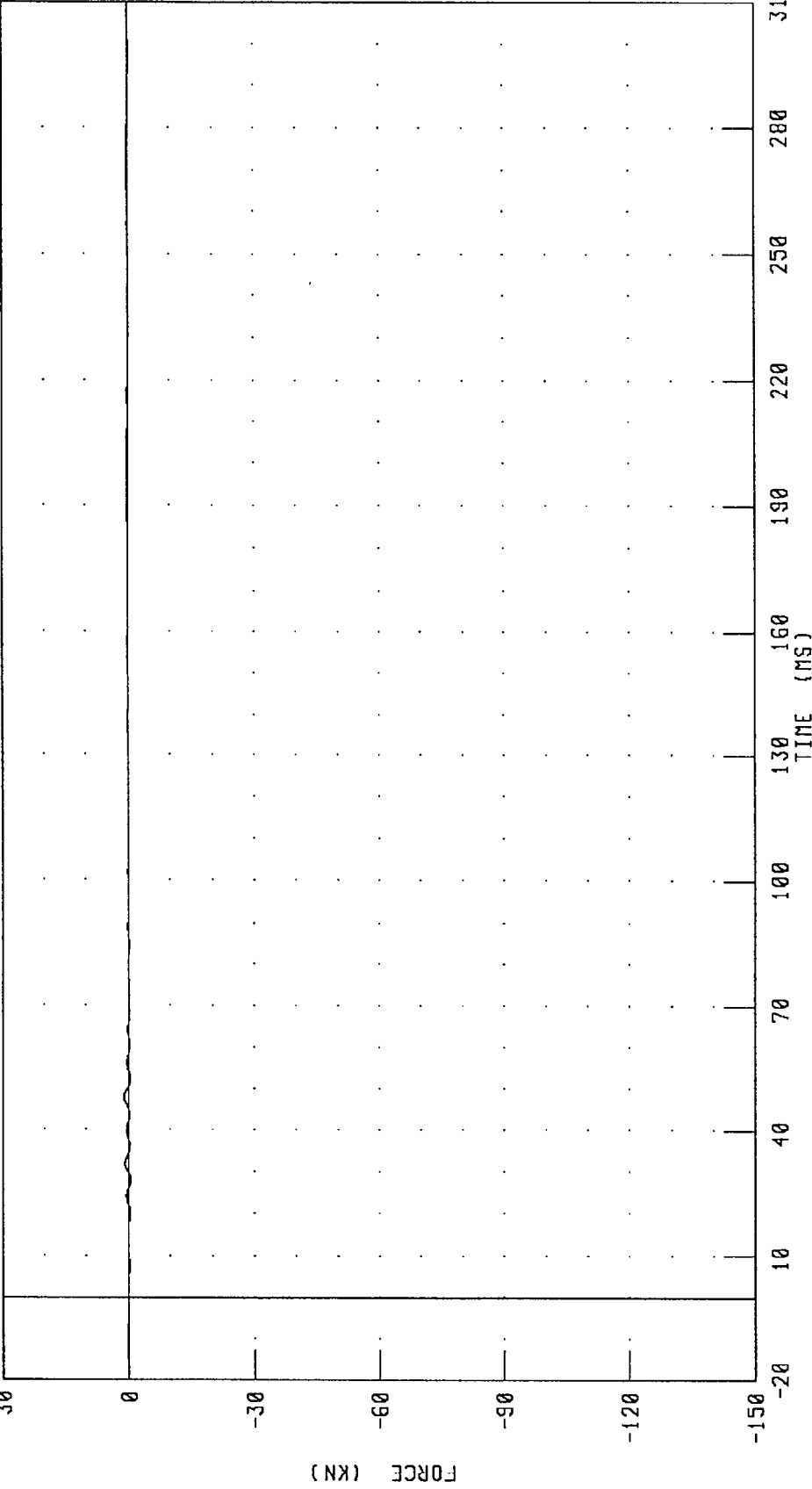
PEAK DATA: 0.41 KN @ 47.76 MS; -3.39 KN @ 28.56 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER POSITION D9 FORCE

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



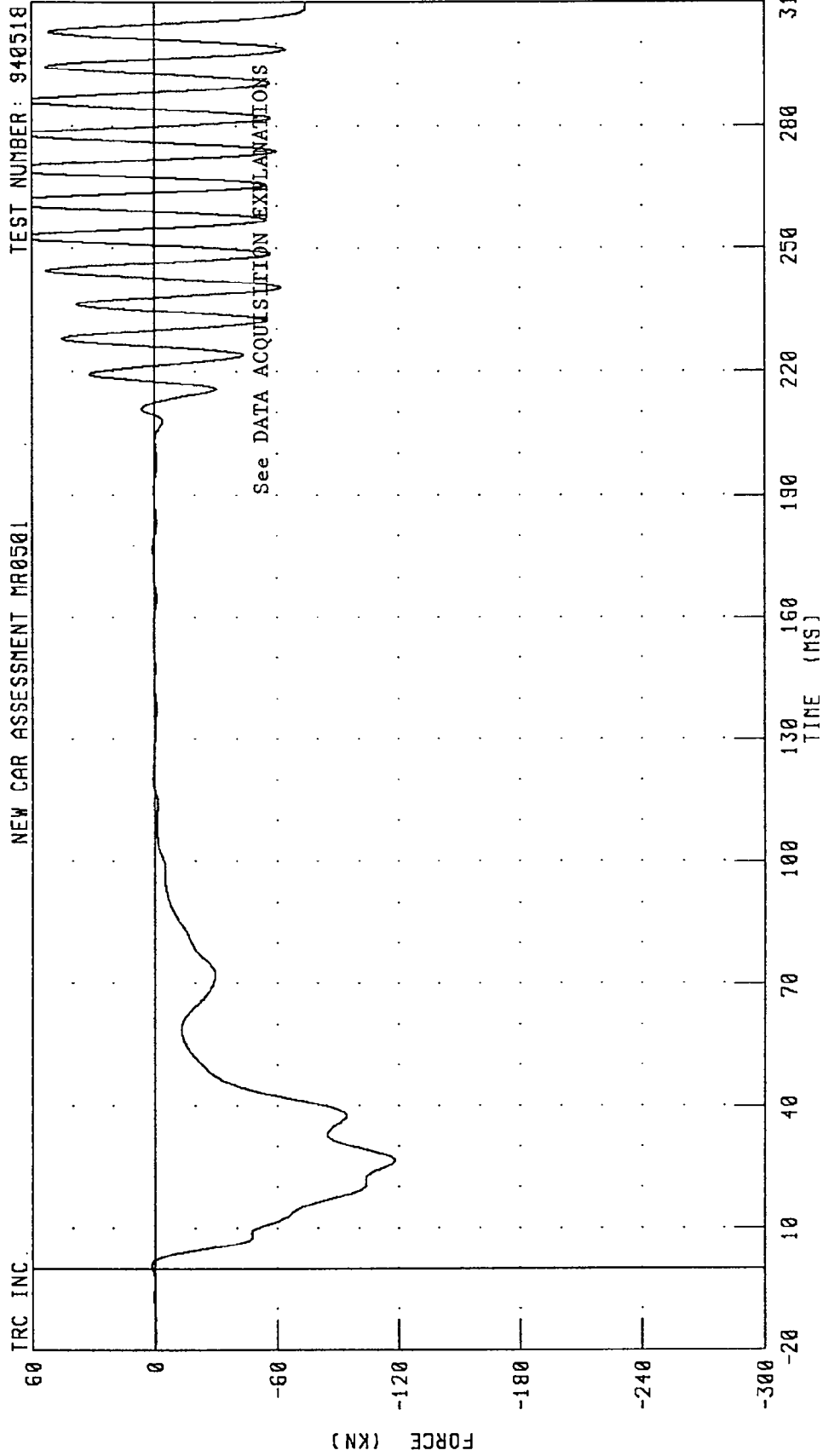
PEAK DATA: 1.04 KN @ 47.84 MS; -0.65 KN @ 27.92 MS

FILTER: CH. CLASS 60

CHANNEL: B09F

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
 LOAD CELL BARRIER GROUP # 1 FORCE TOTAL
 NEW CAR ASSESSMENT MR0501

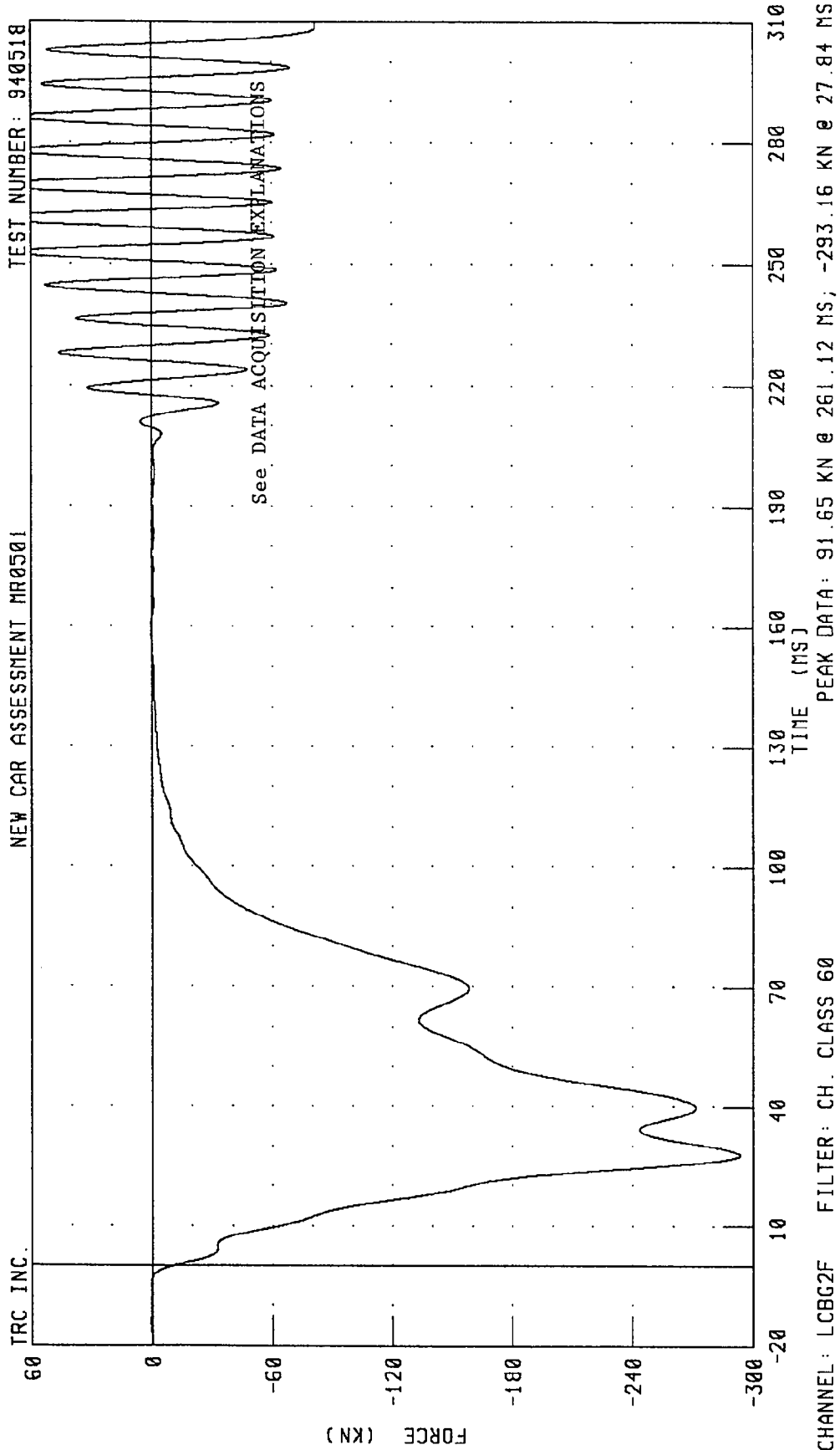
TEST NUMBER: 940518



CHANNEL: LCBG1F FILTER: CH. CLASS 60

PEAK DATA: 89.46 KN @ 261.12 MS; -118.06 KN @ 26.56 MS

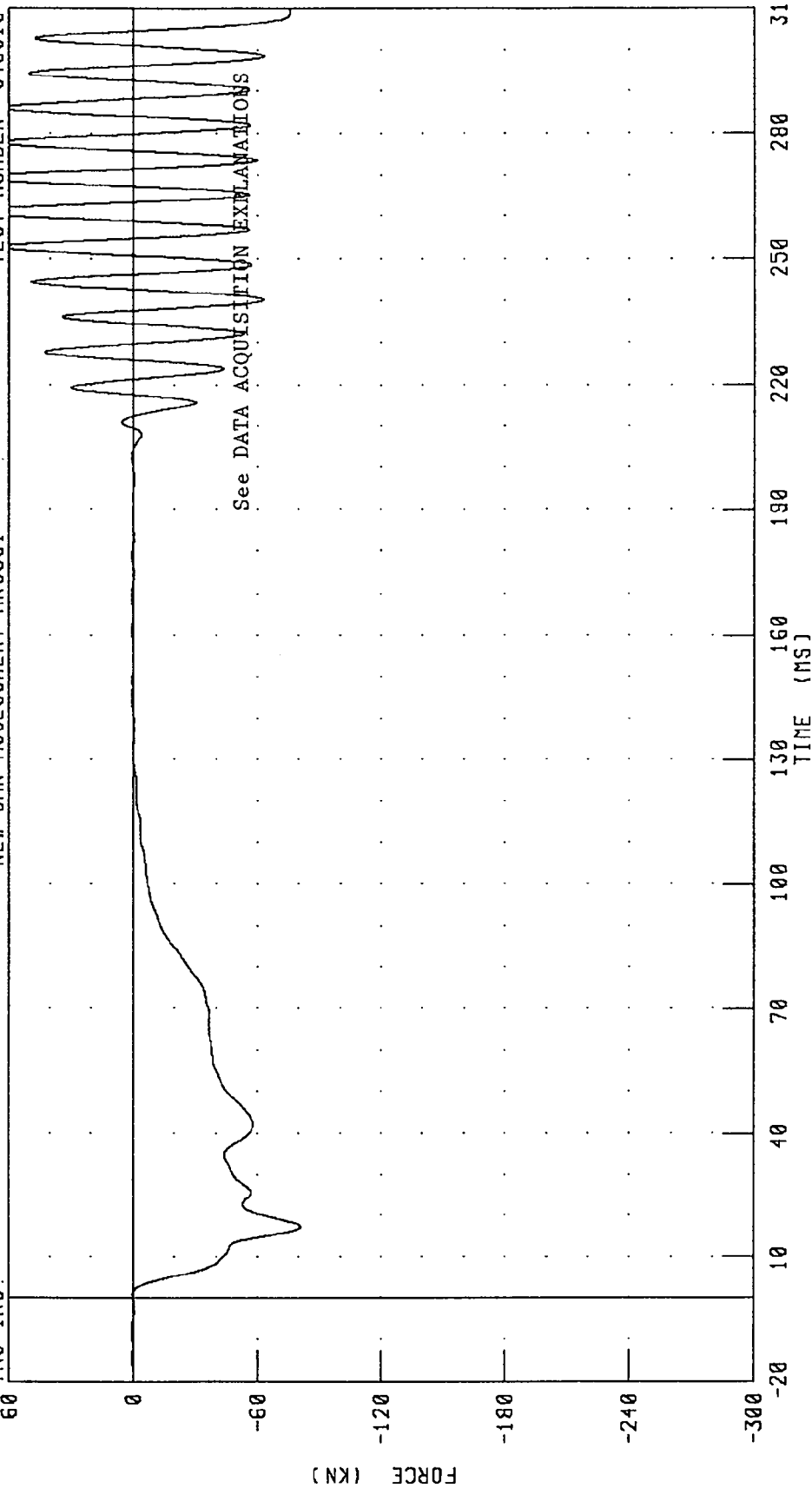
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 2 FORCE TOTAL
NEW CAR ASSESSMENT MR0501



1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 3 FORCE TOTAL
NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518

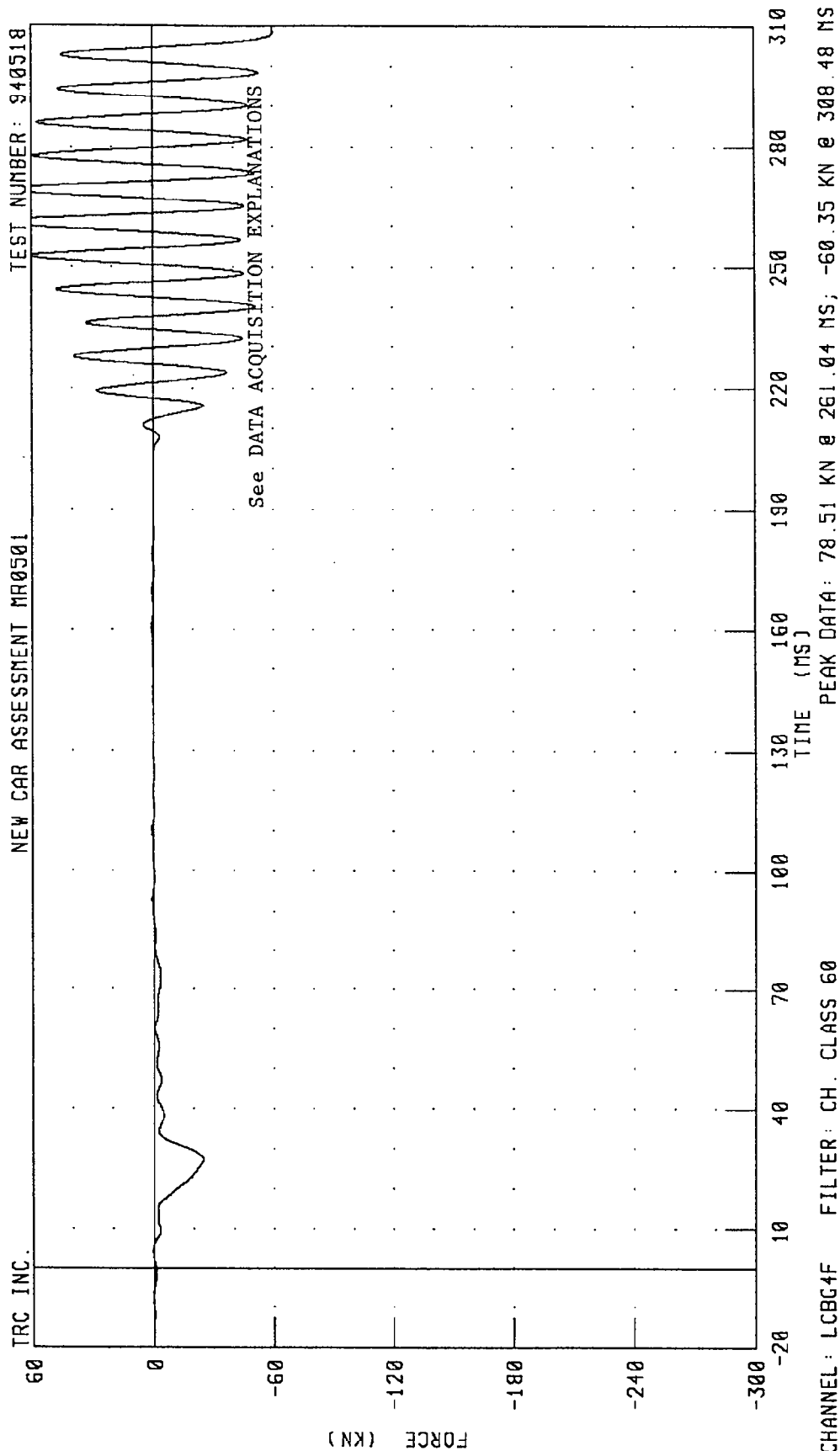
TRC INC.



CHANNEL: LCBG3F FILTER: CH. CLASS 60

PEAK DATA: 84.91 KN @ 261.12 MS, -80.92 KN @ 17.20 MS

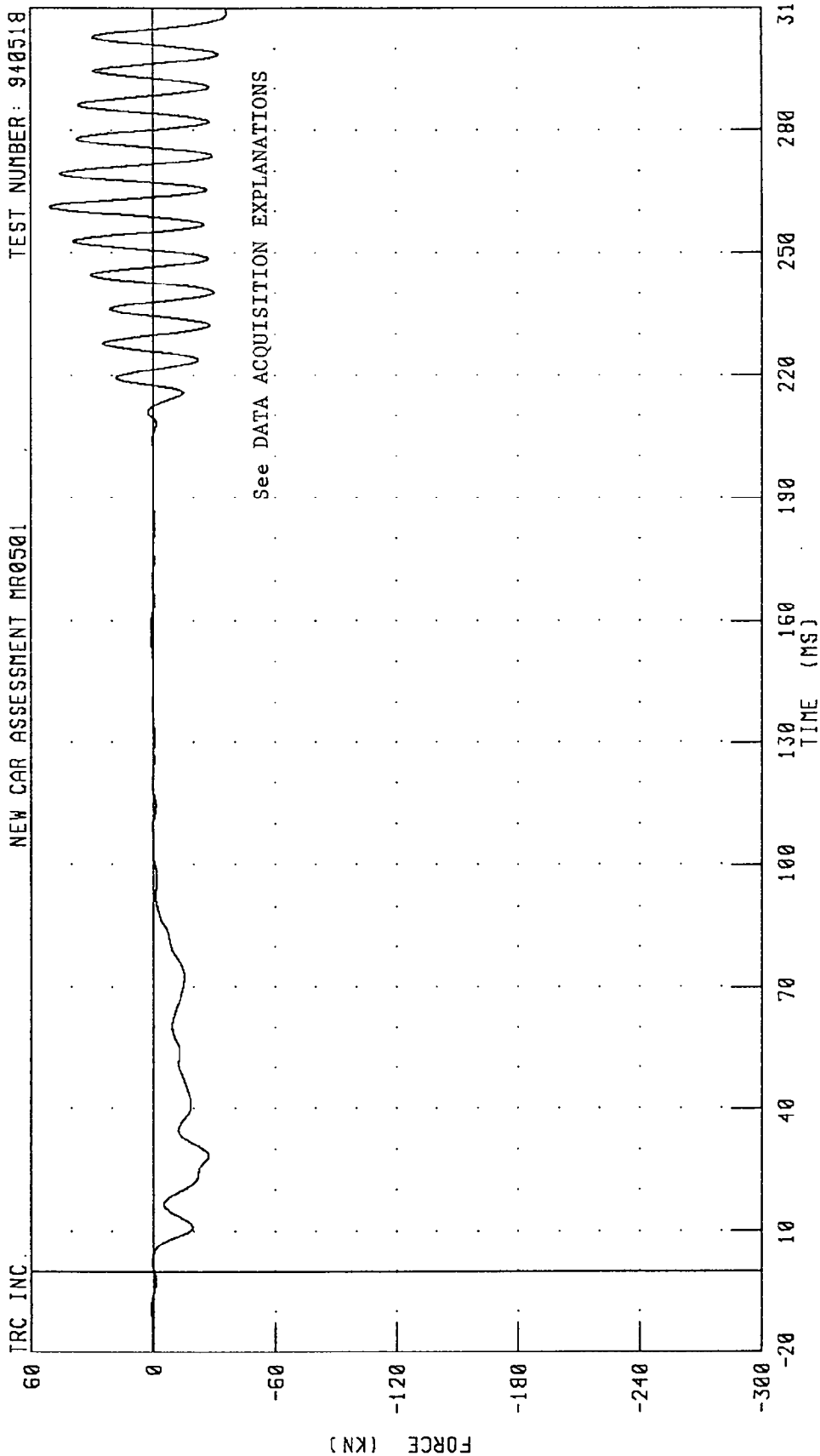
1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 4 FORCE TOTAL
NEW CAR ASSESSMENT MR0501



1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 5 FORCE TOTAL

NEW CAR ASSESSMENT MR0501

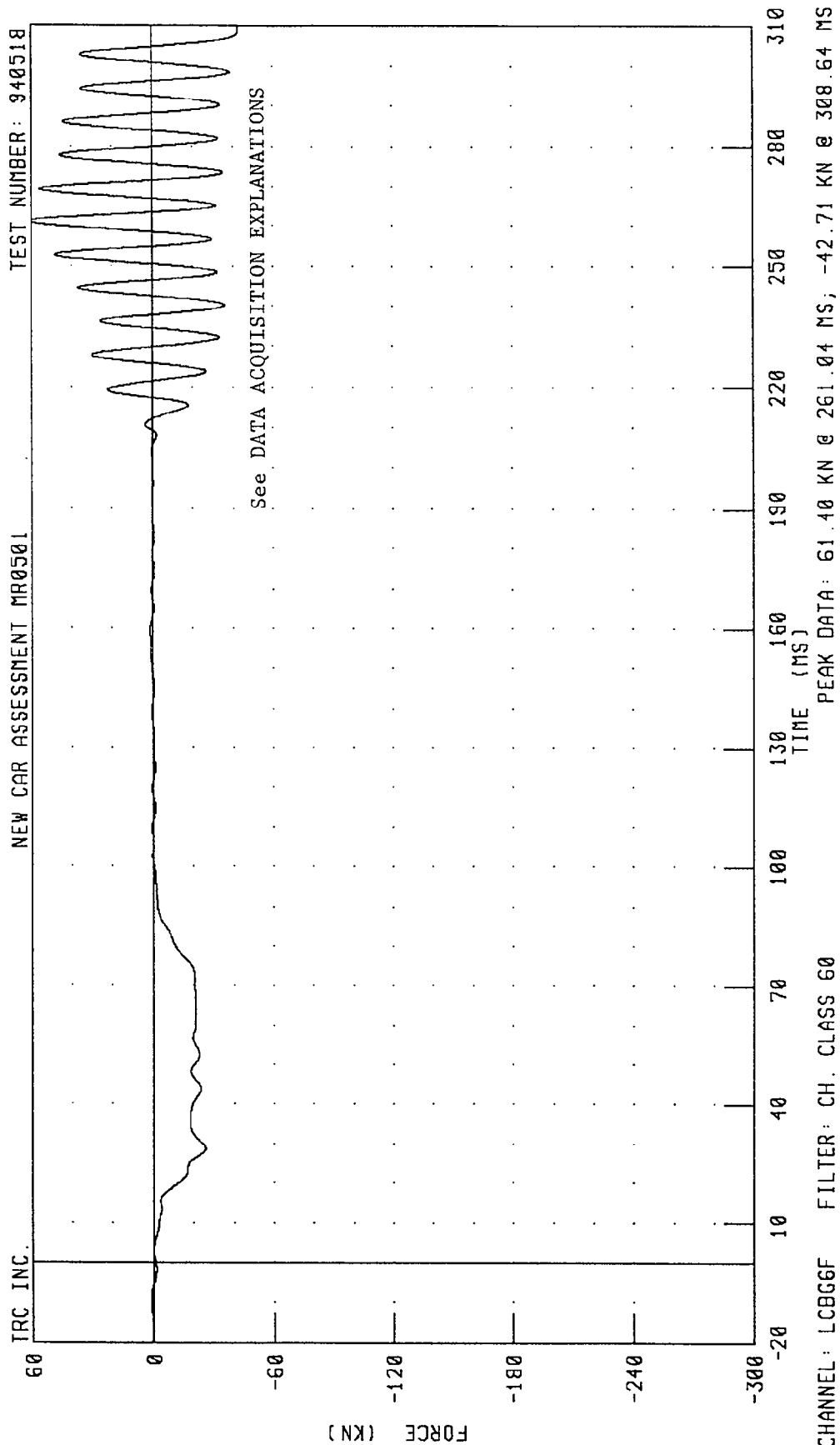
TEST NUMBER: 940518



CHANNEL: LCBG5F FILTER: CH. CLASS 60

PEAK DATA: 50.49 KN @ 261.20 MS; -361.18 KN @ 308.88 MS

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
LOAD CELL BARRIER GROUP # 6 FORCE TOTAL

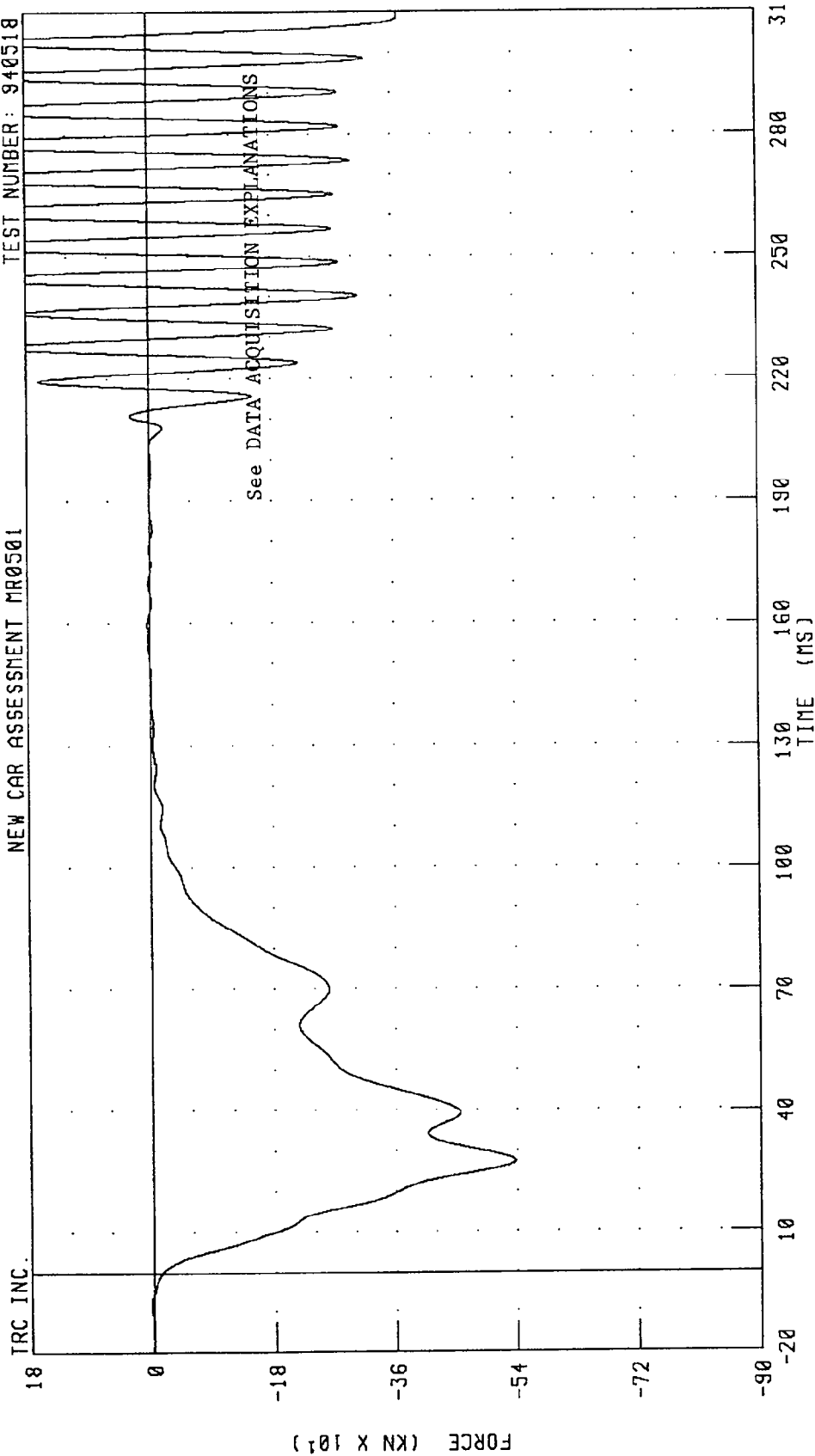


1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER

TOTAL LOAD CELL BARRIER FORCE

NEW CAR ASSESSMENT MR0501

TEST NUMBER: 940518



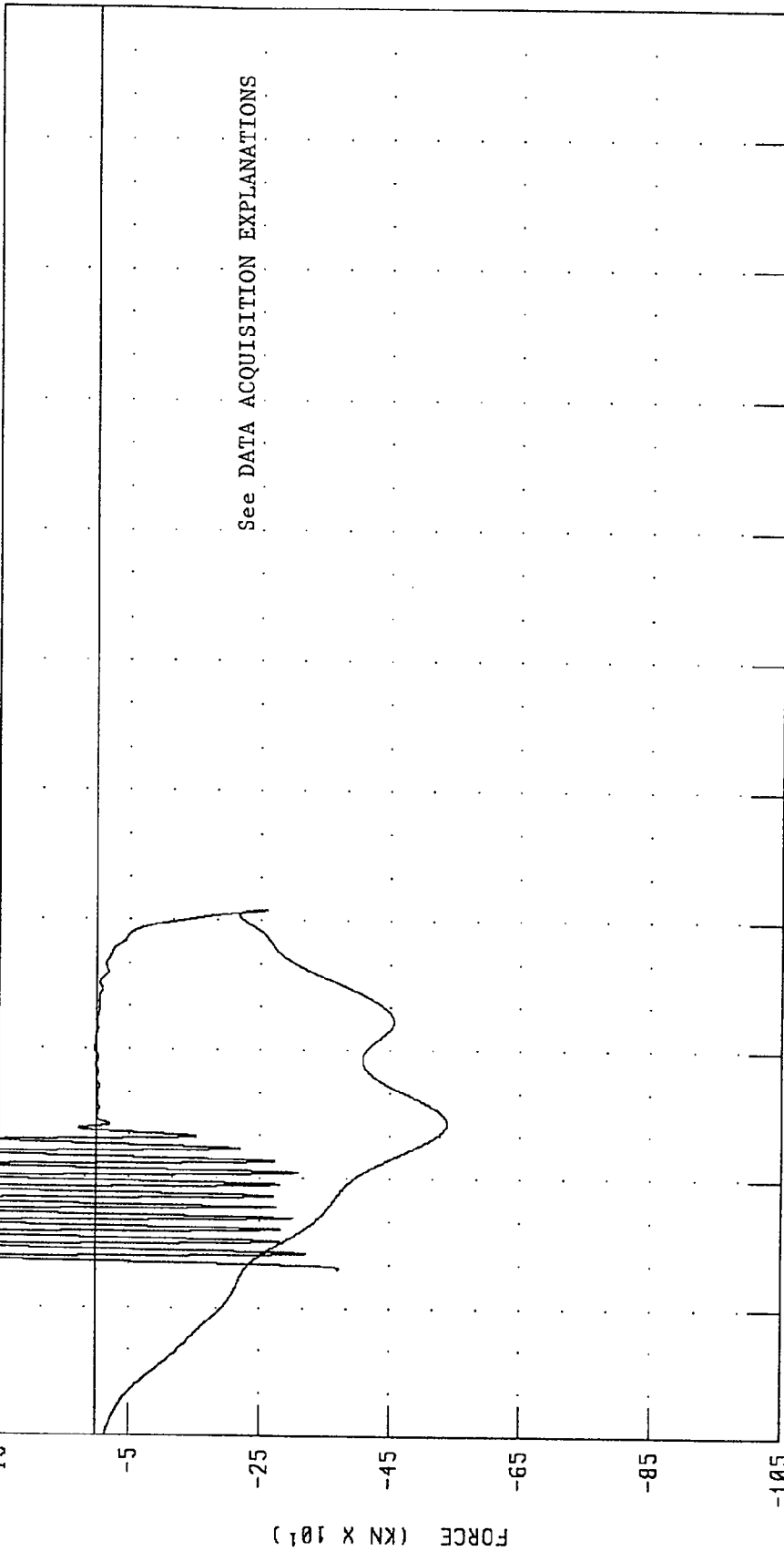
CHANNEL: LCBGT FILTER: CH. CLASS 60

1994 HYUNDAI ELANTRA INTO FRONTAL LOAD CELL BARRIER
TOTAL LOAD CELL BARRIER FORCE VS AVERAGE VEHICLE X-AXIS DISPLACEMENT

TEST NUMBER: 940518

NEW CAR ASSESSMENT MR0501

TRC INC.



CHANNEL: 0THXD
LCBGT
FILTER: CH. CLASS 180
CH. CLASS 60
DISPLACEMENT (MM X 10¹)
PEAK DATA: 668.83 MM @ 68.56 MS;
456.20 KN @ 261.12 MS;
-537.79 KN @ 27.44 MS

APPENDIX C

DUMMY CERTIFICATION DATA

PRE-TEST CERTIFICATION DATA

DRIVER DUMMY S/N: 142

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS

142 HUMANOID

28-MAR-94

TRC INC. TEST NO: 142C21ED1 572E SN142 EXT.DIMENSION CAL21

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	983. MM
WAIST CIRCUMFERENCE (Z)		836 - 866 MM	846. 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	137. MM
SKULL CAP TO BACKLINE (H)		41 - 46 MM	43. MM
TOTAL SITTING HEIGHT (A)		879 - 889 MM	884. MM
THIGH CLEARANCE (F)		140 - 155 MM	145. MM
BUTTOCK KNEE LENGTH (K)		579 - 605 MM	597. MM
BUTTOCK POPLITEAL LENGTH (N)		452 - 478 MM	475. MM
POPLITEAL HEIGHT (L)		429 - 455 MM	452. MM
KNEE PIVOT HEIGHT (M)		485 - 500 MM	490. 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	89. MM
SHOULDER BREADTH (V)		422 - 437 MM	427. MM
SHOULDER PIVOT HEIGHT (B)		506 - 521 MM	508. MM
ELBOW REST HEIGHT (J)		191 - 211 MM	208. 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 Pete Folt

RUN NUMBER: 032994.1056

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

28-MAR-94

TRC INC.

TEST NO: 142C21HD1

572E SN142 HEAD DROP CAL 21

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	51.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	236.49 G
PEAK LATERAL ACCELERATION	15 G MAX	3.48 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN P. J. F. S.

RUN NUMBER: 040694.1512;2

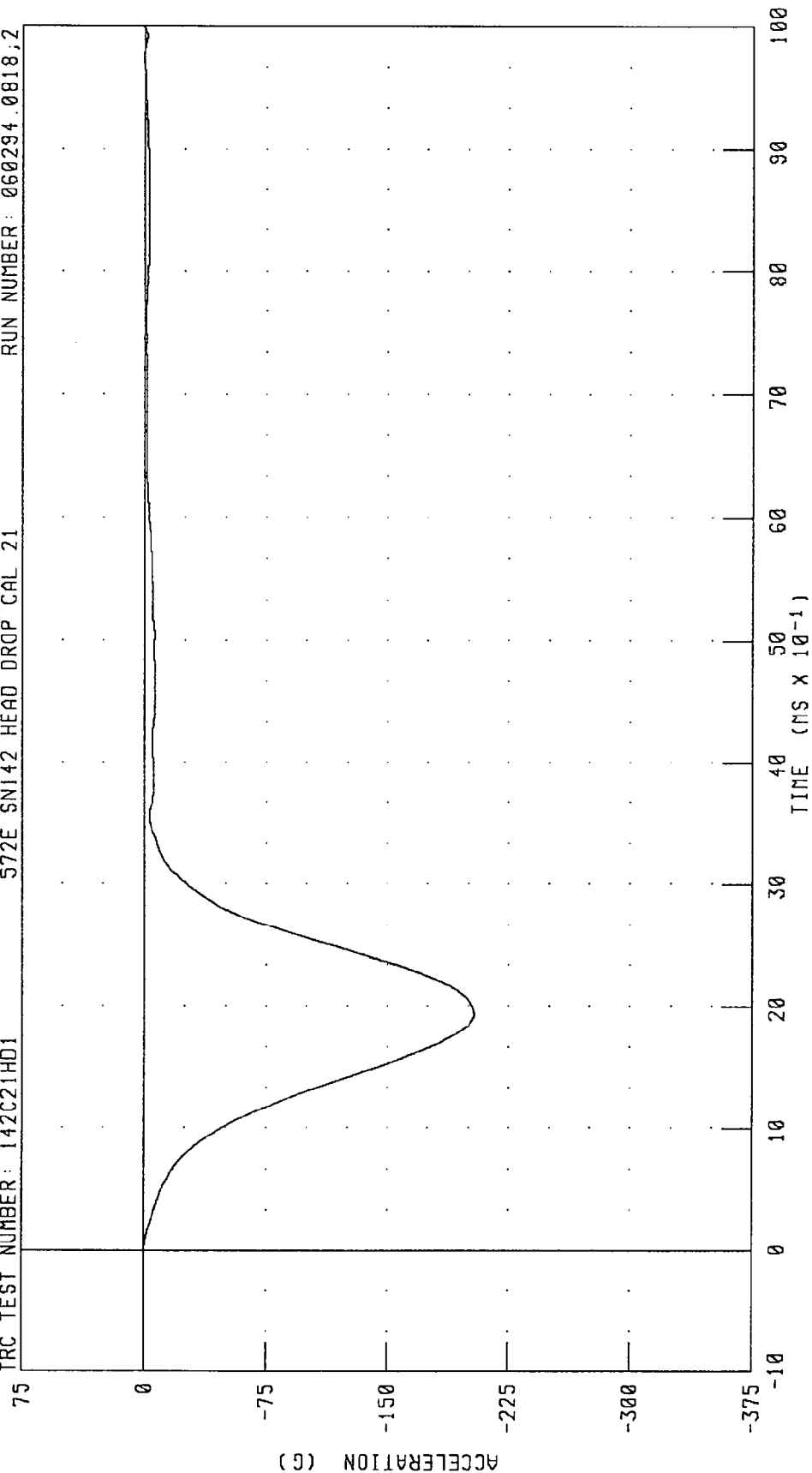
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 142C21HD1

572E SNI42 HEAD DROP CAL 21

RUN NUMBER: 060294.0818;2



PEAK DATA: 0.73 G @ 10.00 MS; -203.66 G @ 1.92 MS

CHANNEL: HEDXG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

572E SN142 HEAD DROP CAL 21 RUN NUMBER: 060294.0818;2

TRC TEST NUMBER: 142C21HD1

225

150

75

0

-75

-150

-225

ACCELERATION (G)

TIME (MS X 10⁻¹)

PEAK DATA: 3.48 G @ 1.76 MS; -0.51 G @ 4.32 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

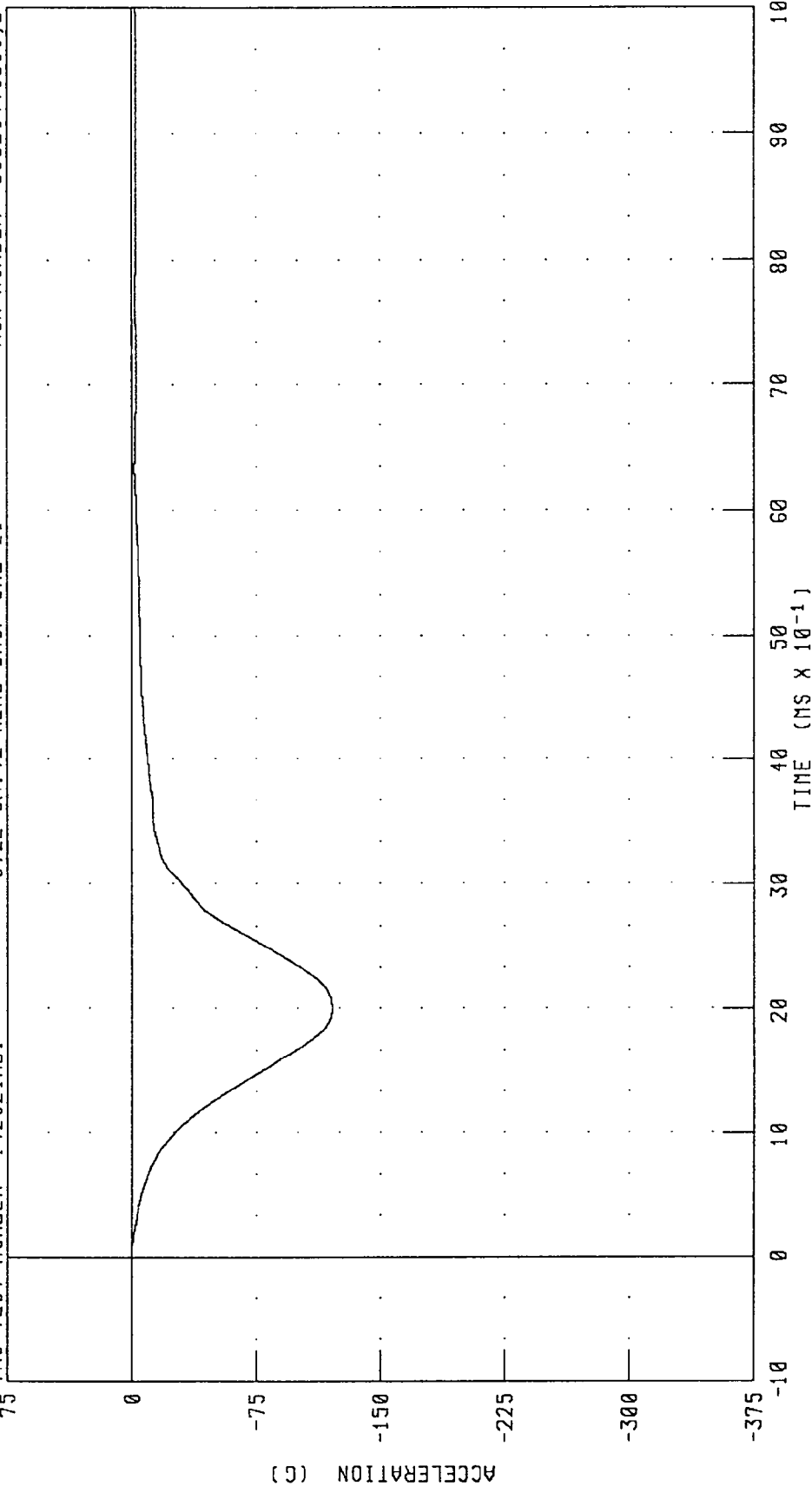
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

572E SN142 HEAD DROP CAL 21

TRC TEST NUMBER: 142C21HD1

RUN NUMBER: 060294.0818,2



PEAK DATA: 0.03 G @ -0.32 MS; -120.99 G @ 2.00 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN142 HEAD DROP CAL 21

RUN NUMBER: 060294.0818,2

TRC TEST NUMBER: 142C21HD1

375

300

225

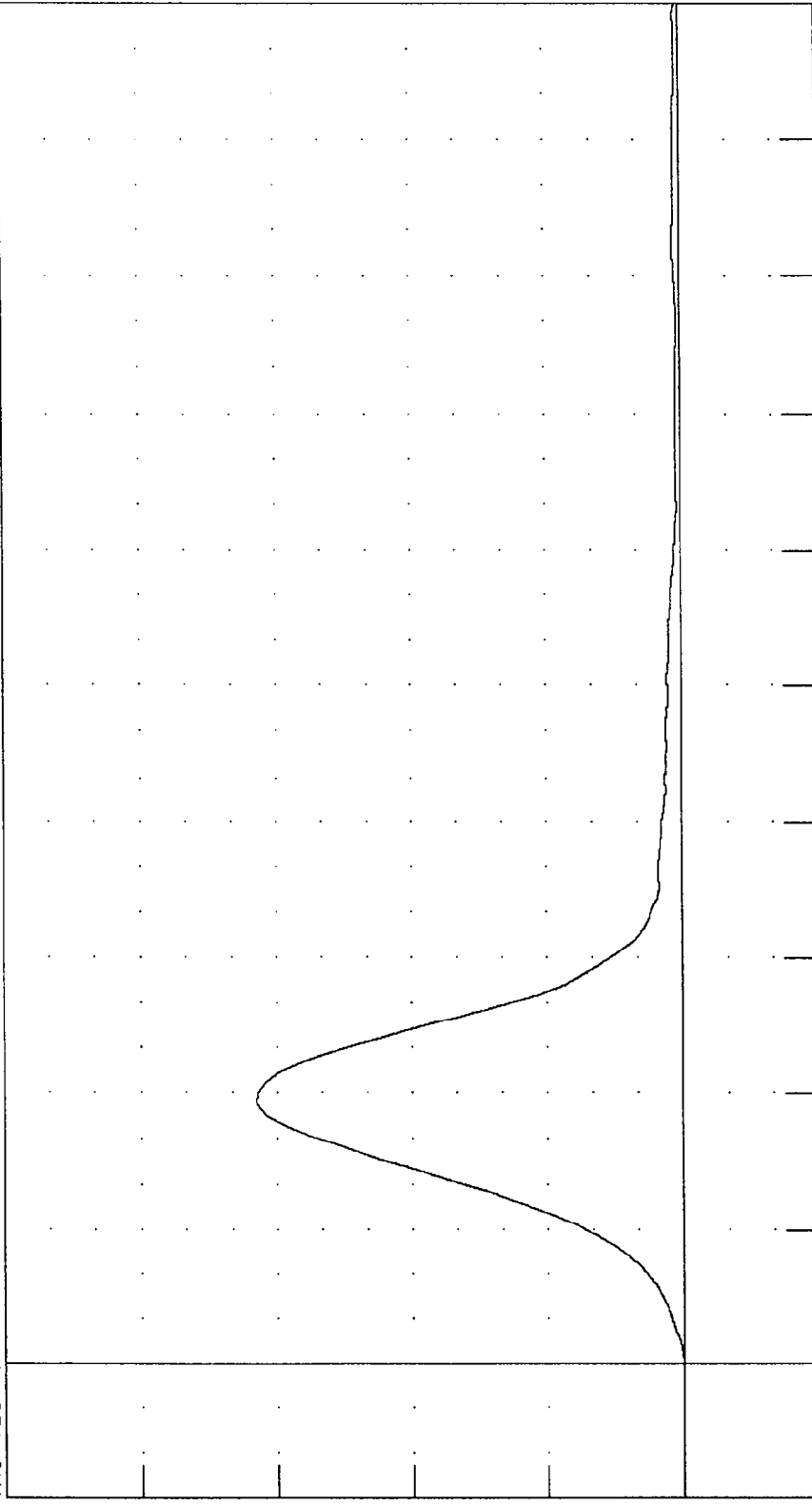
150

75

0

-75

ACCELERATION (G)



TIME (MS X 10⁻¹)

PEAK DATA: 236.49 G @ 1.92 MS; 0.07 G @ -0.40 MS

CHANNEL: HEDRG FILTER: CH. CLASS 1000

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

29-MAR-94

TRC INC. TEST NO: 142C21NF1 572E SN142 NECK FLEXION CAL21

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.17 G
	20 MS	17.60 - 22.60 G	20.66 G
	30 MS	12.50 - 18.50 G	16.34 G
MAX PENDULUM G		29 G MAX	24.86 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.32 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.20 MS
D PLANE	MAX	64 - 78 DEG.	72.39 DEG.
ROTATION	TIME	57 - 64 MS	59.12 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	93.29 NM
	TIME	47 - 58 MS	50.56 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	114.08 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.56 MS

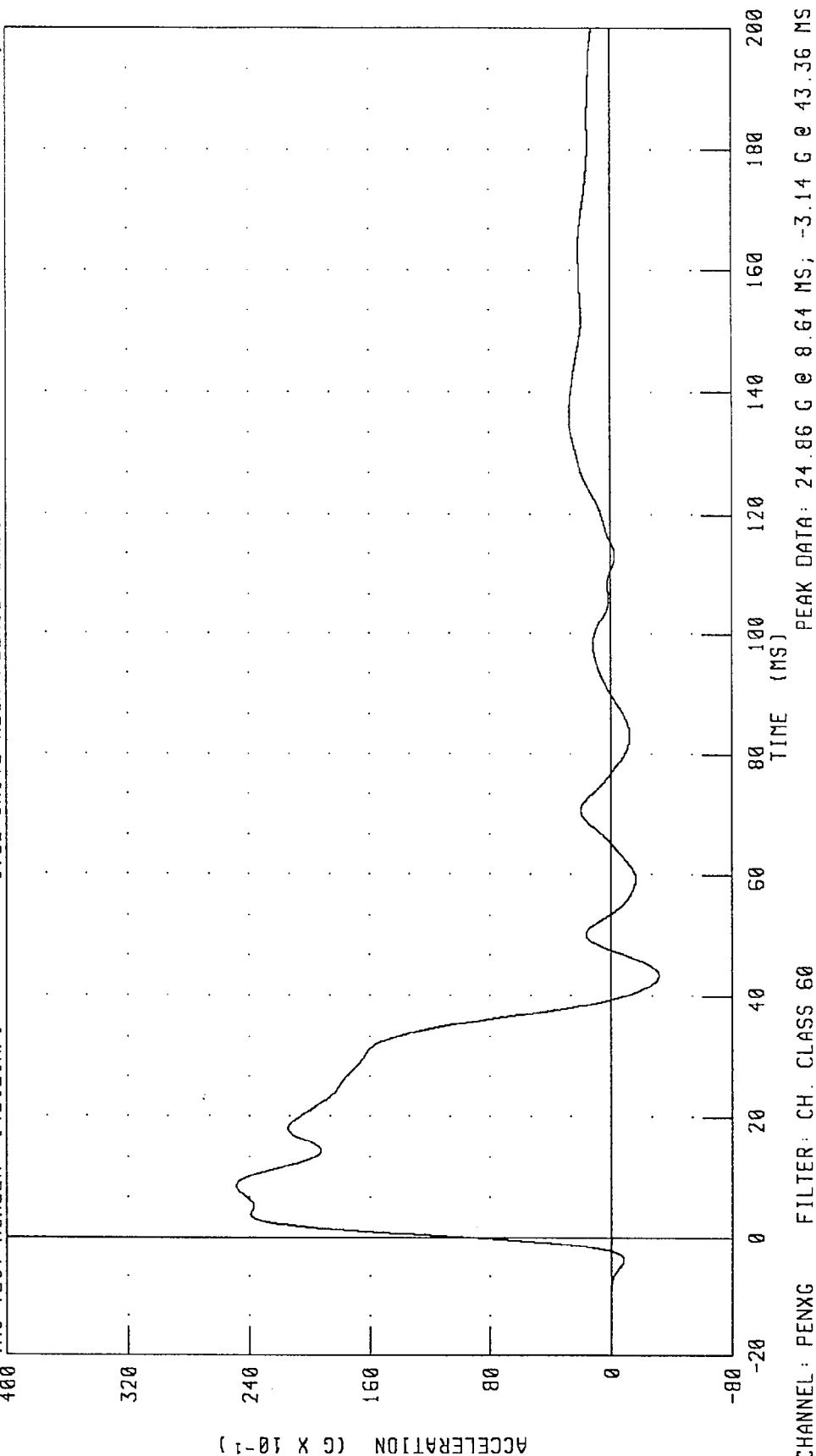
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete F. S.

RUN NUMBER: 032994.0831;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
 PENDULUM DECELERATION

IRC TEST NUMBER: 142C21NF1 572E SN142 NECK FLEXION CAL21 RUN NUMBER: 060294.0818,1



CHANNEL: PENXG FILTER: CH. CLASS 60

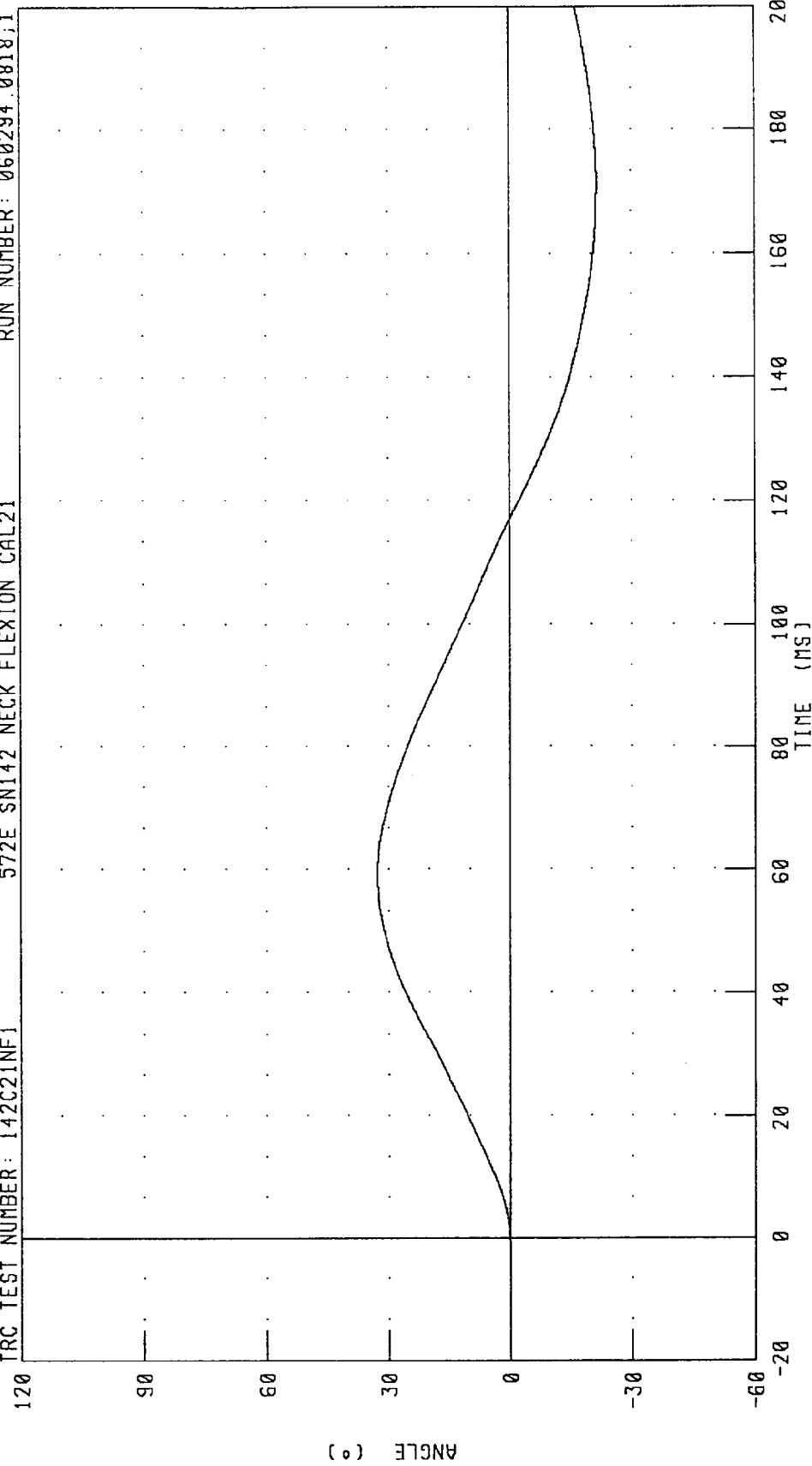
PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 142C21NF1

572E SN142 NECK FLEXION CAL21

RUN NUMBER: 060294.0818;1



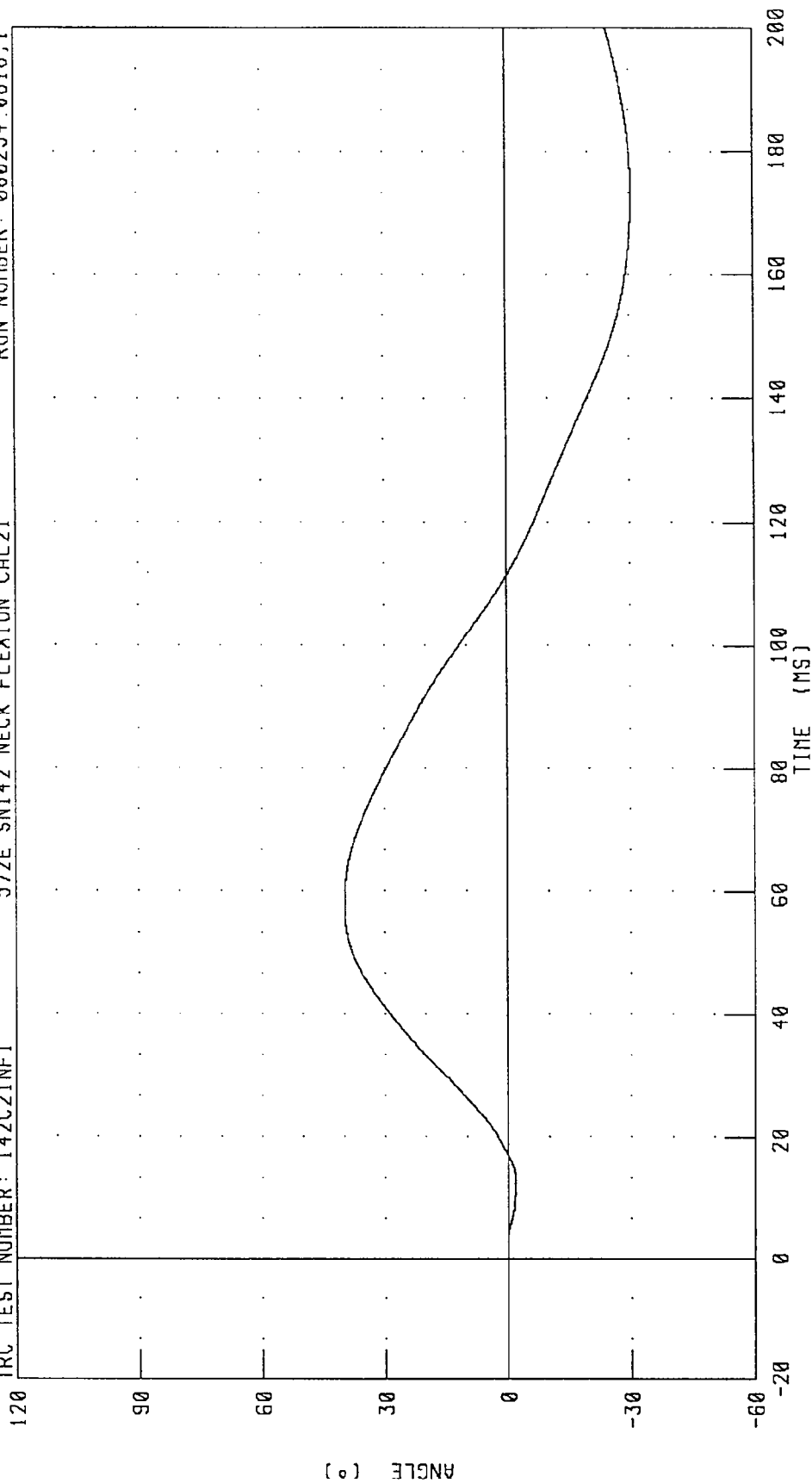
PEAK DATA: 32.73 ° @ 59.28 MS; -21.42 ° @ 172.00 MS

CHANNEL: BETA FILTER: CH. CLASS 60

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

IRC TEST NUMBER: 142C21NF1 RUN NUMBER: 060294.0818,1

572E SNI42 NECK FLEXION CAL21

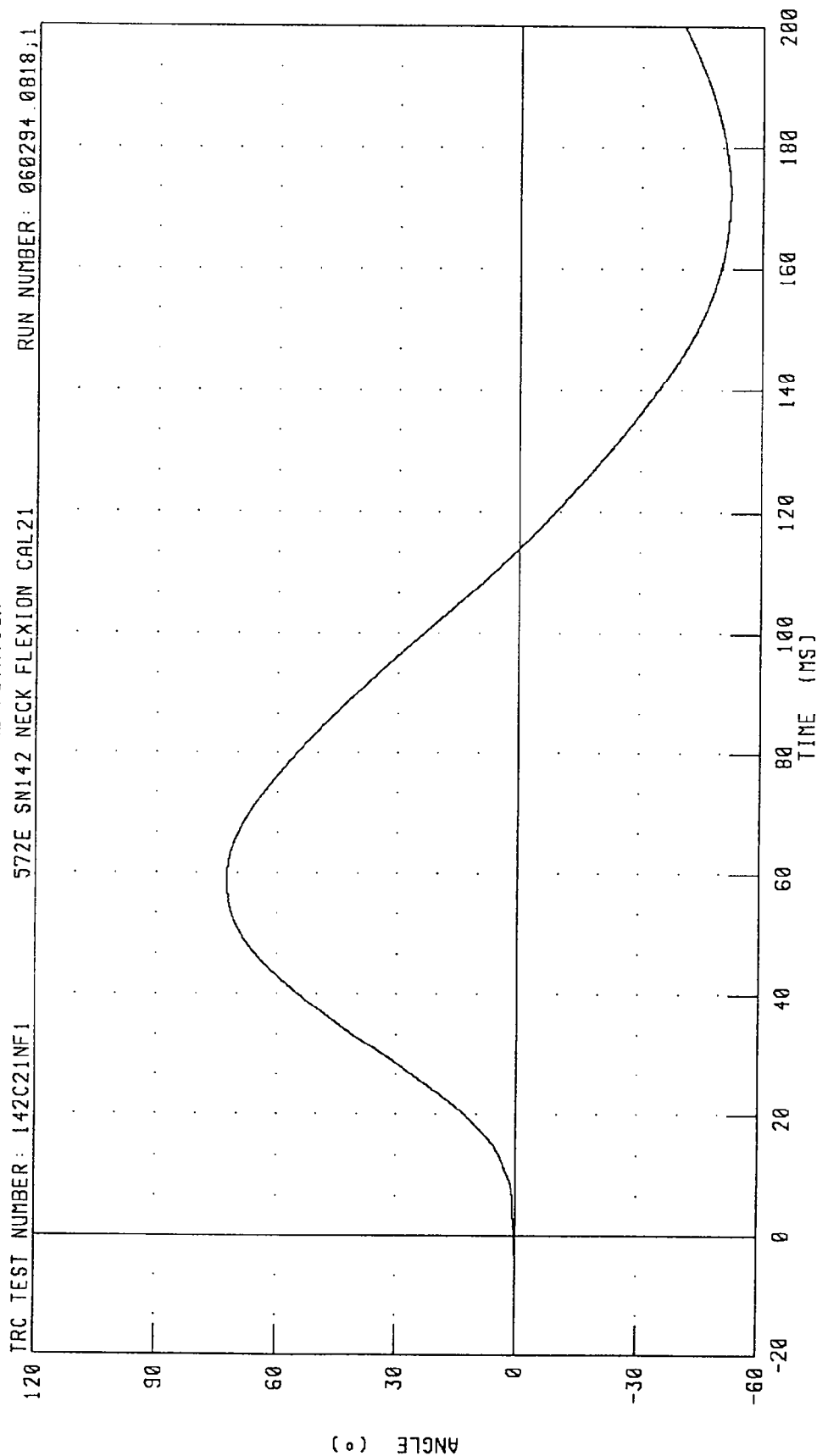


PEAK DATA: 39.66 ° @ 57.28 MS; -30.49 ° @ 173.04 MS

CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION



CHANNEL: TOTAL FILTER: CH. CLASS 60 PEAK DATA: 72.39 ° @ 59.12 MS; -51.91 ° @ 172.64 MS

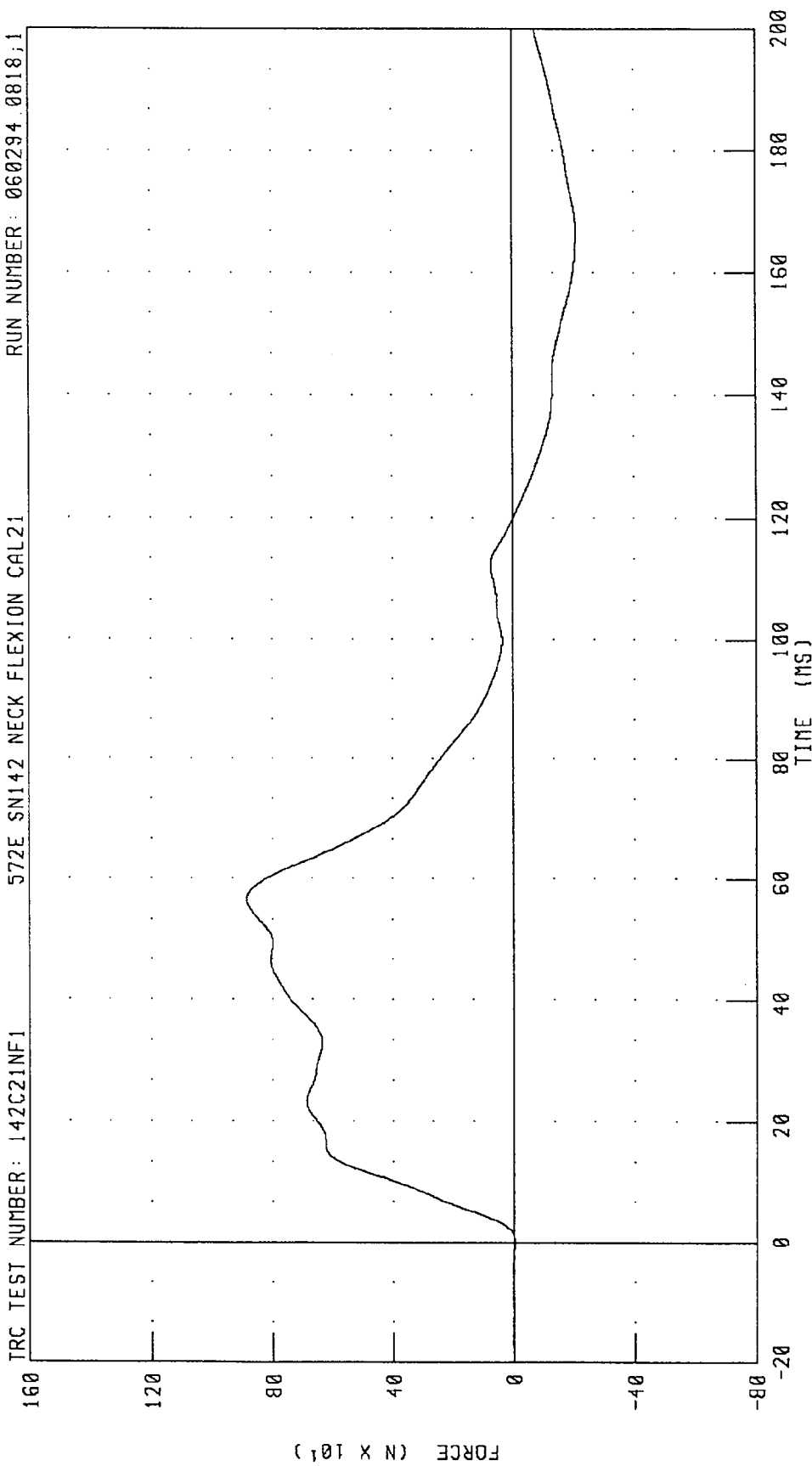
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C21NF1

572E SN142 NECK FLEXION CAL21

RUN NUMBER: 060294.0818;1



PEAK DATA: 884.79 N @ 56.56 MS, -208.84 N @ 166.56 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

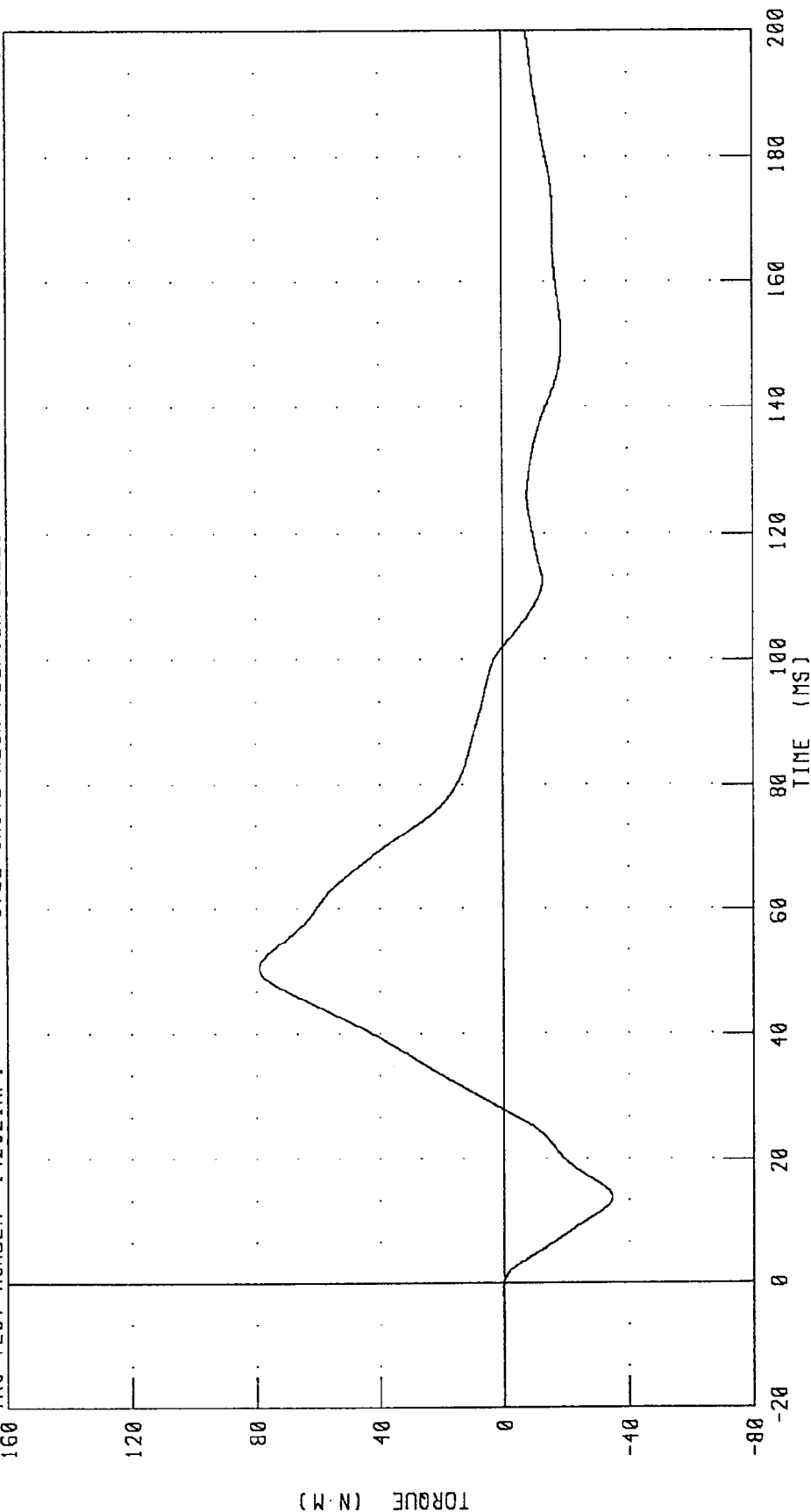
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 142C21NF1

572E SN142 NECK FLEXION CAL21

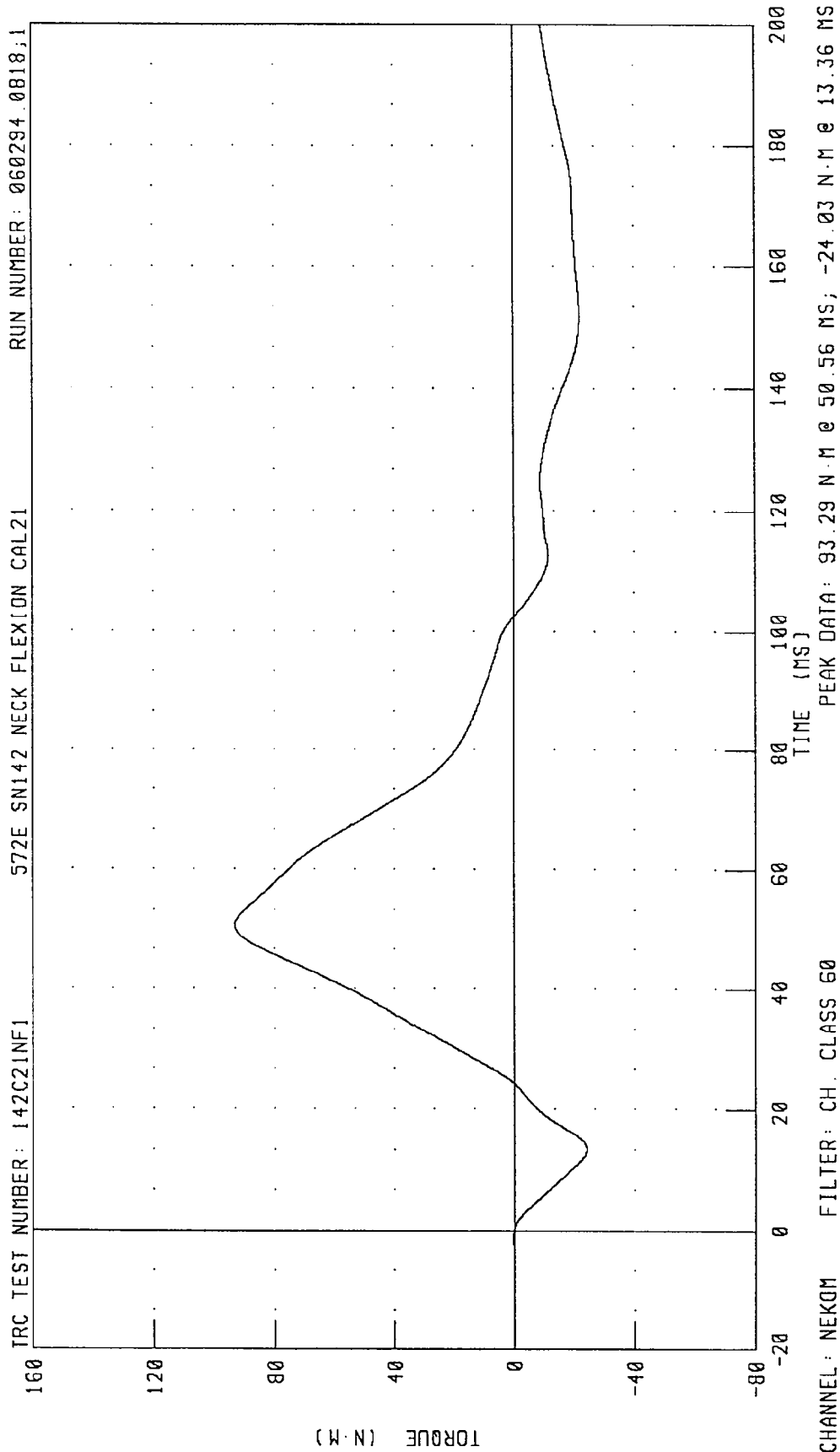
RUN NUMBER: 060294.0818,1



PEAK DATA: 79.00 N·M @ 50.48 MS; -34.50 N·M @ 13.84 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

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



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

HYBRID III

29-MAR-94

TRC INC. TEST NO: 142C21NE1 572E SN142 NECK EXT. CAL21

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	5.98 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.48 G
	20 MS	14.00 - 19.00 G	16.43 G
	30 MS	11.00 - 16.00 G	13.09 G
MAX PENDULUM G		22 G MAX	19.14 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	13.14 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	41.68 MS
D PLANE	MAX	81 - 106 DEG.	95.22 DEG.
ROTATION	TIME	72 - 82 MS	73.76 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-71.60 NM
	TIME	65 - 79 MS	69.68 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	150.16 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.00 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Peter F. J.

RUN NUMBER: 032994.0851;1

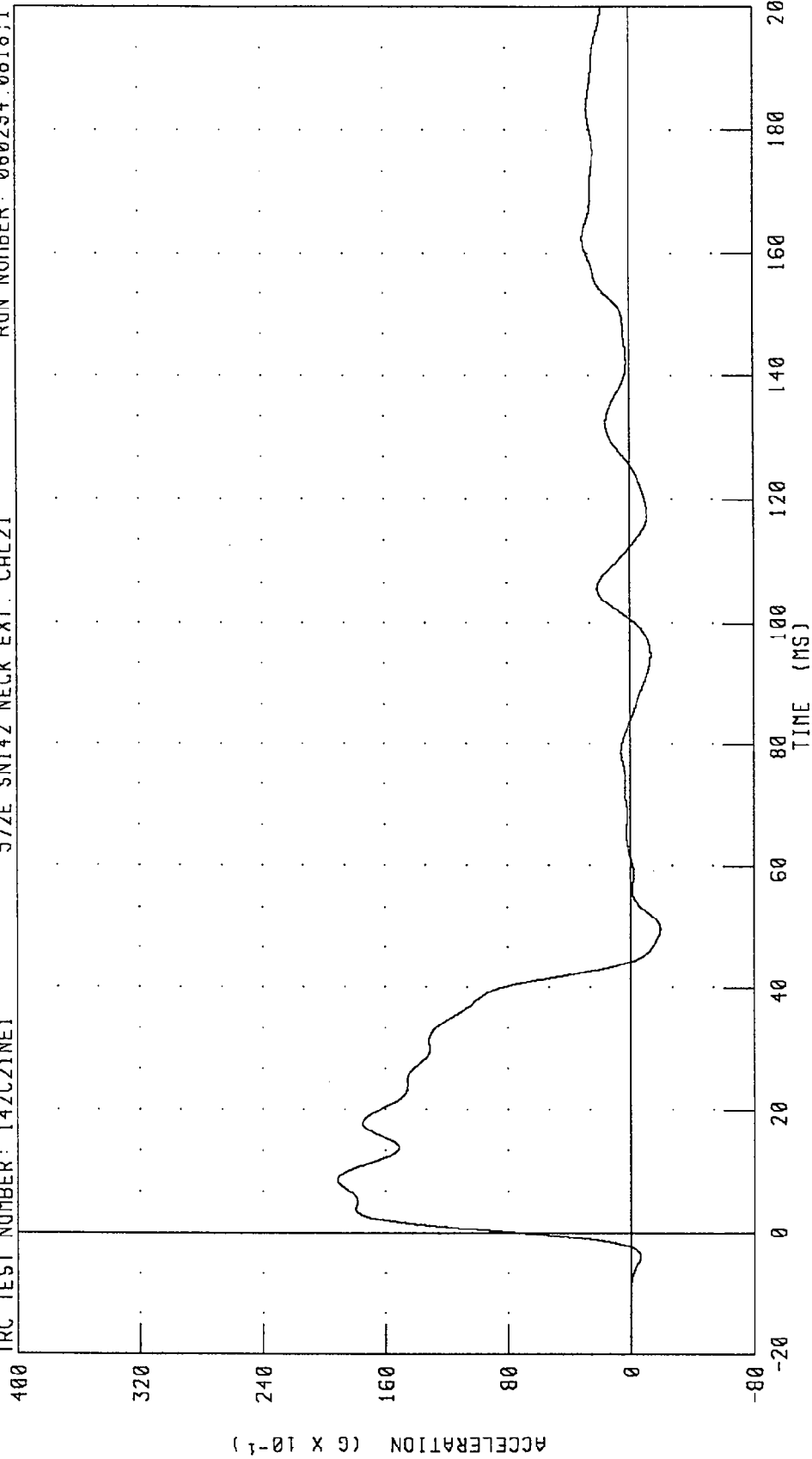
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 142C21NE1

572E SN142 NECK EXT. CAL21

RUN NUMBER: 060294.0818,1



PEAK DATA: 19.15 G @ 8.56 MS; -1.91 G @ 49.68 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

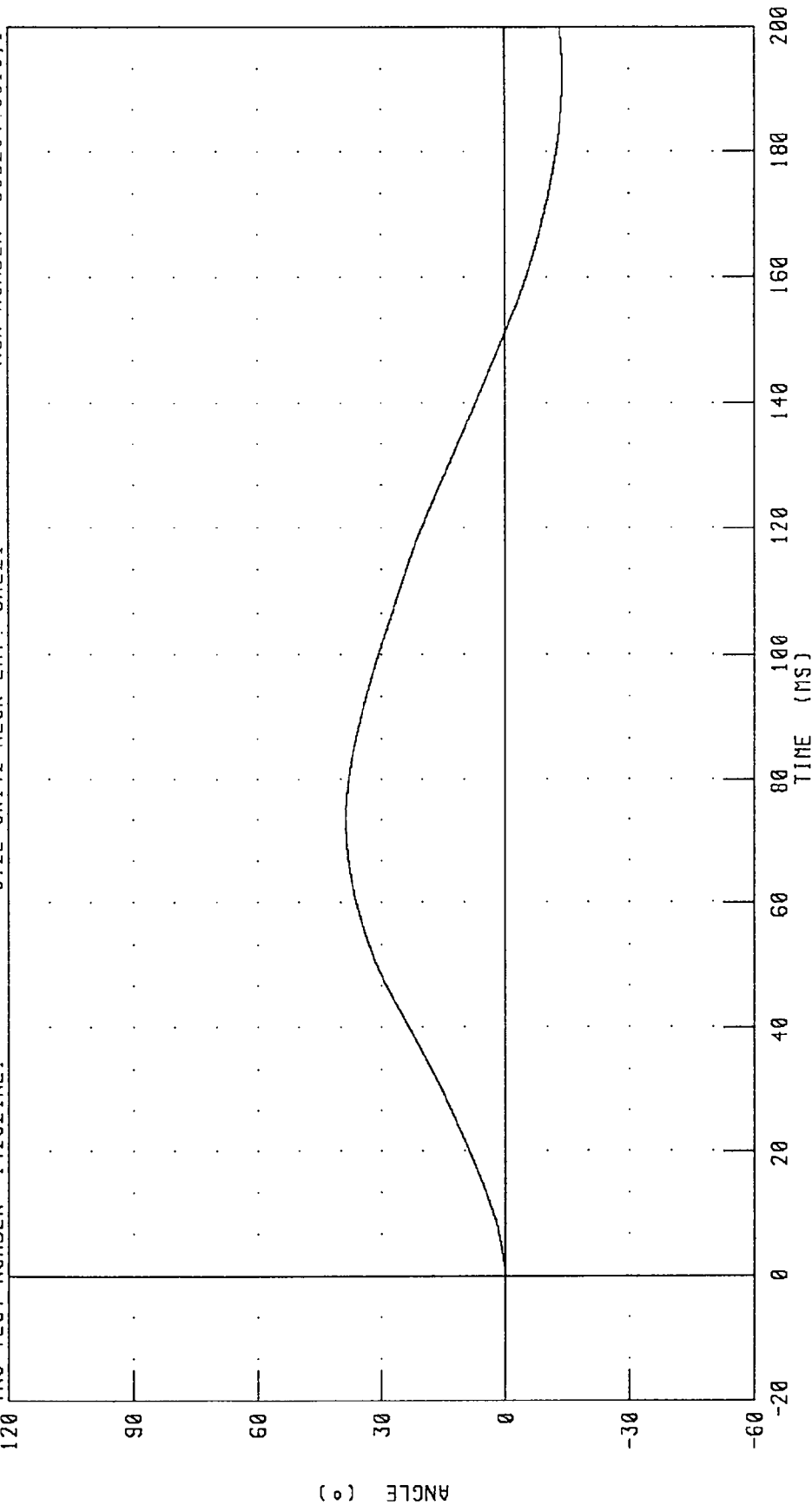
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN142 NECK EXT. CAL21

IRC TEST NUMBER: 142C21NE1

RUN NUMBER: 060294.0818;1



PEAK DATA: 38.64 ° @ 73.68 MS; -13.83 ° @ 193.76 MS

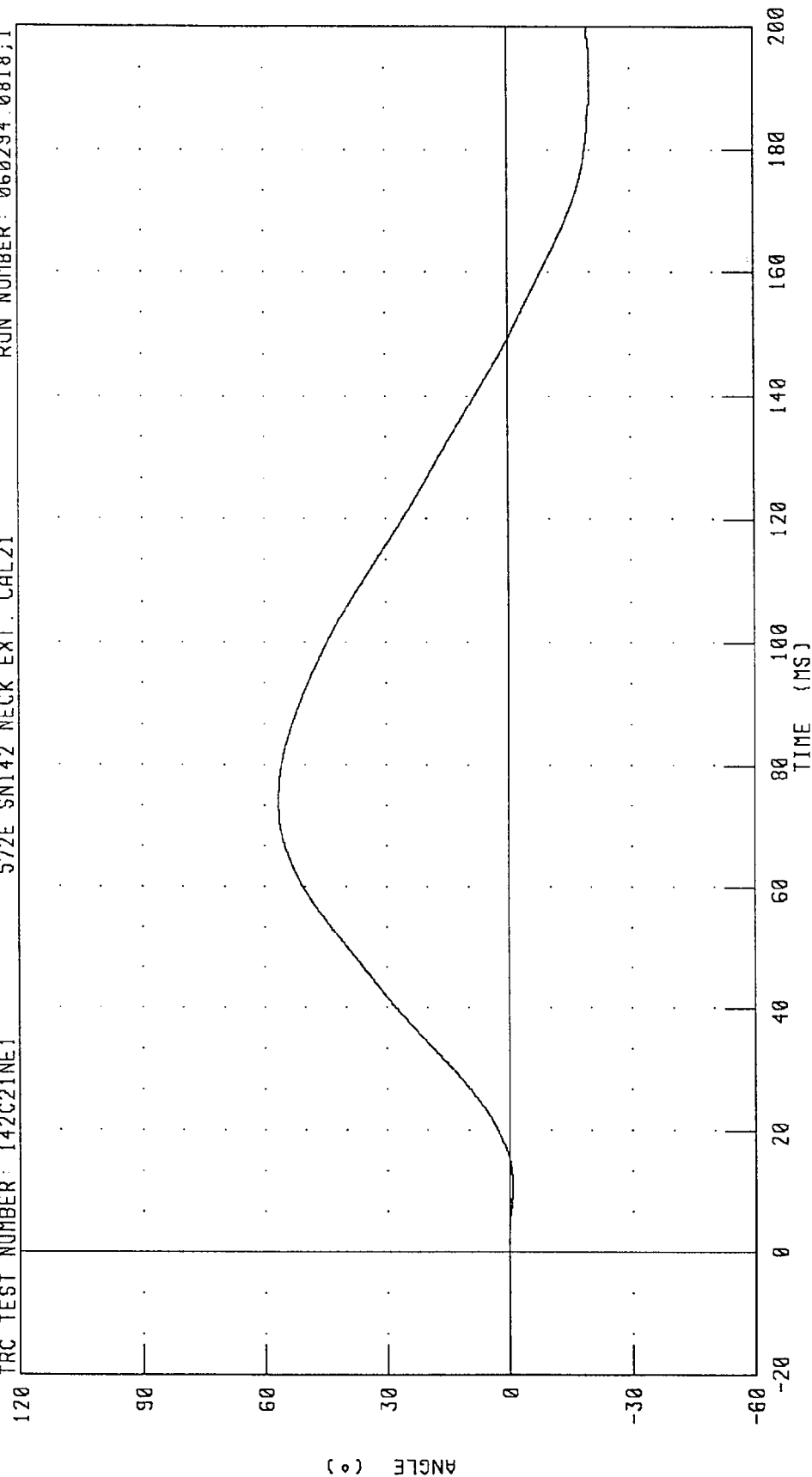
CHANNEL: BETA FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 142C21NE1

572E SNI42 NECK EXT. CAL21

RUN NUMBER: 060294 0818;1



PEAK DATA: 56.58 ° @ 74.08 MS; -20.15 ° @ 192.00 MS

CHANNEL: THETA FILTER: CH. CLASS 60

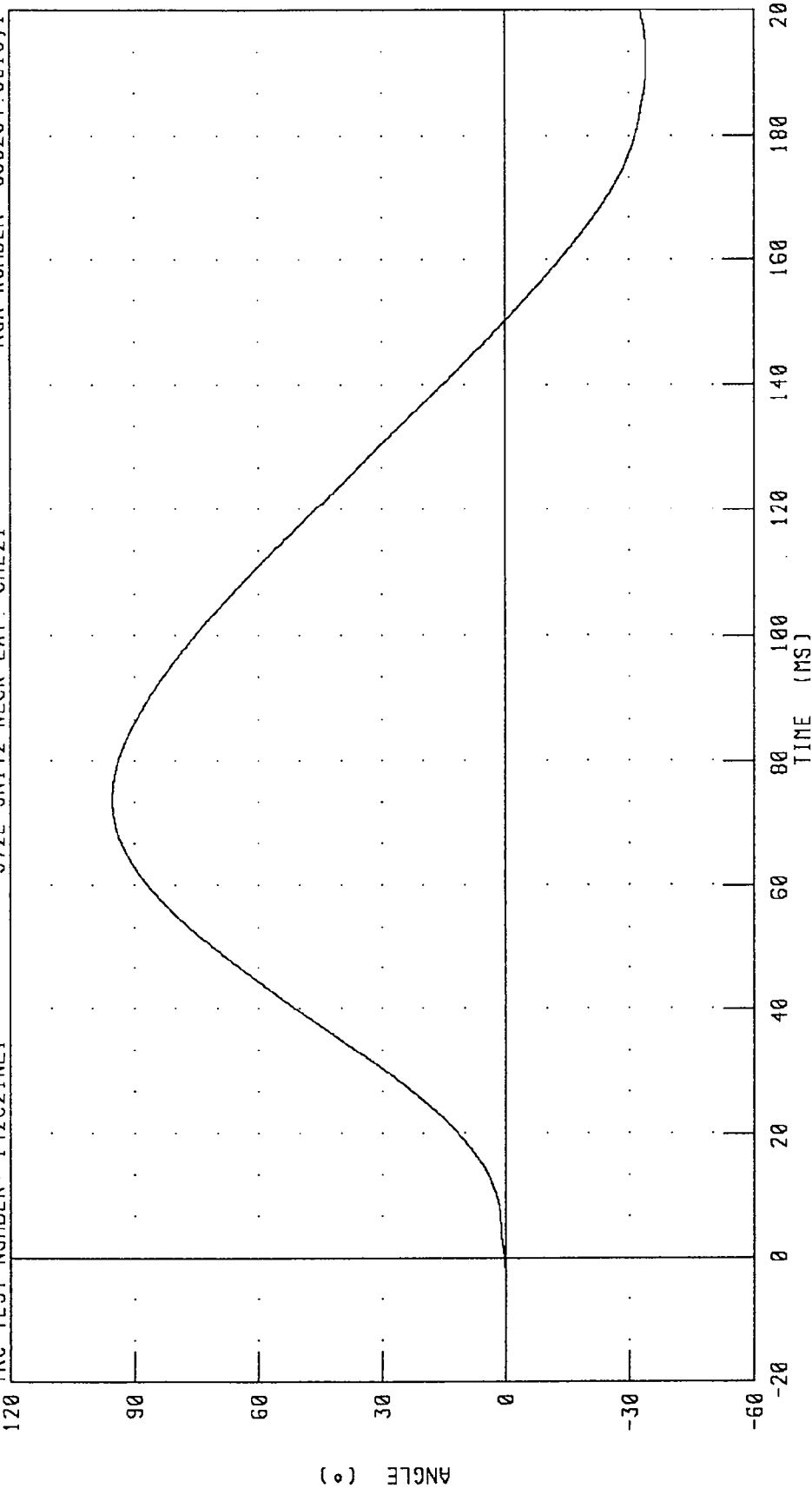
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 142C21NE1

572E SN142 NECK EXT. CAL21

RUN NUMBER: 060294.0818,1



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 95.22 ° @ 73.76 MS; -33.97 ° @ 192.16 MS

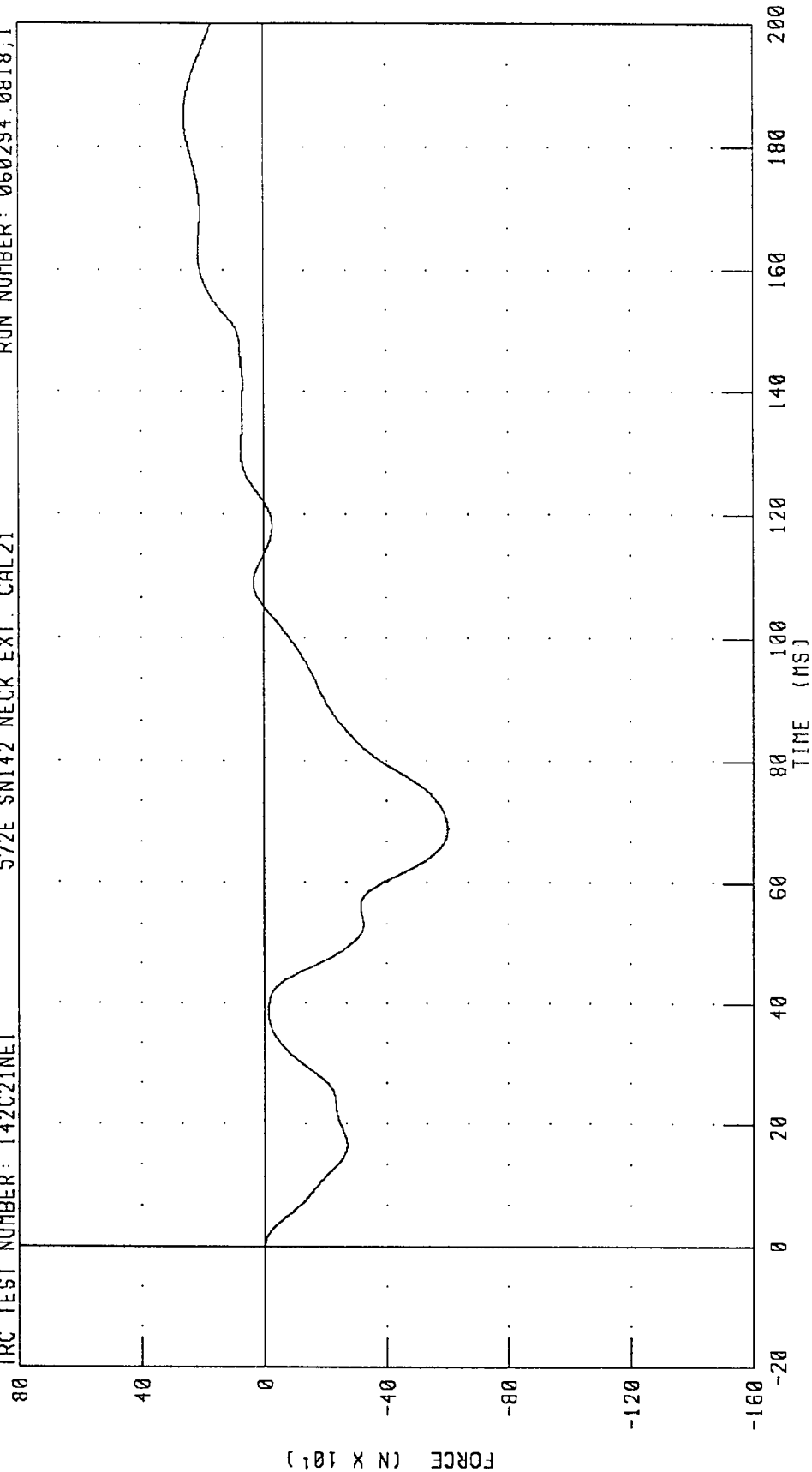
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C21NE1

572E SNI42 NECK EXT. CAL21

RUN NUMBER: 060294 0818,1



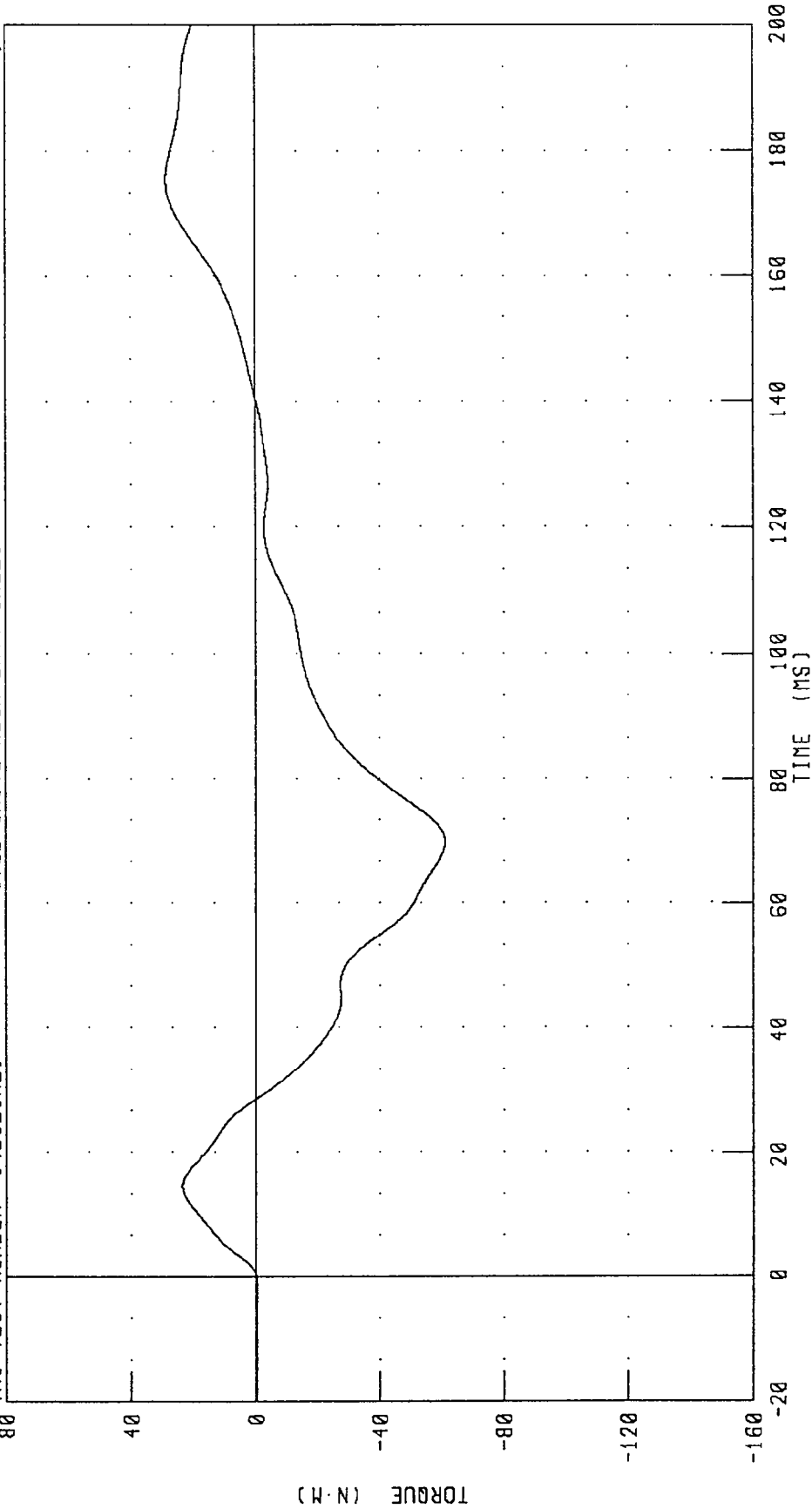
PEAK DATA: 258.07 N @ 184.88 MS; -601.40 N @ 68.80 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 142C21NE1 572E SN142 NECK EXT. CAL21 RUN NUMBER: 060294.0818;1



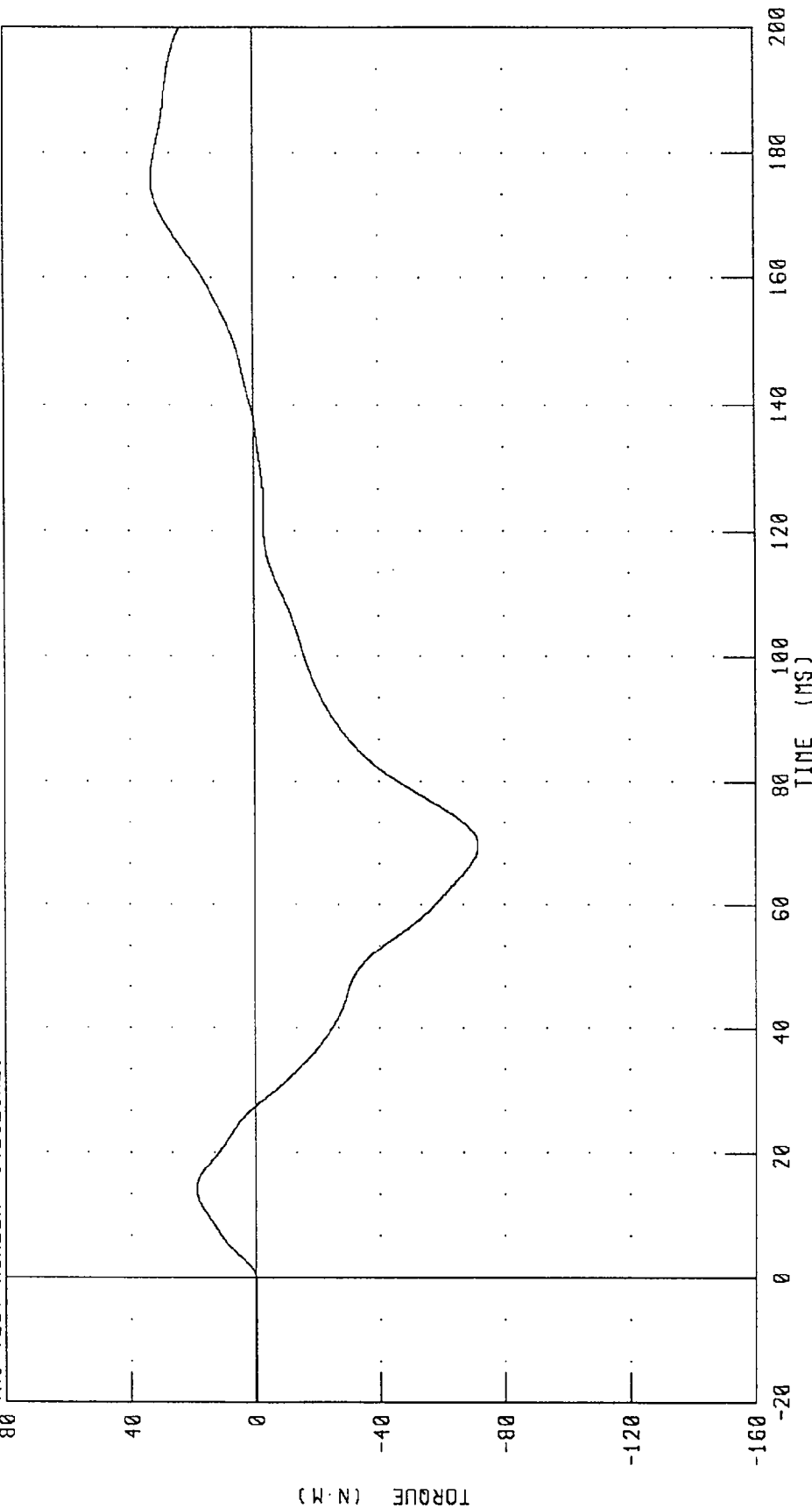
CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 28.66 N·M @ 175.44 MS, -60.93 N·M @ 69.76 MS

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

IRC TEST NUMBER: 142C21NE1

572E SN142 NECK EXT. CAL21

RUN NUMBER: 060294 0818,1



PEAK DATA: 32.61 N.M @ 175.84 MS; -71.60 N.M @ 69.68 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

29-MAR-94

TRC INC.

TEST NO: 142C21TH1

572E SN142 H.S.THORAX CAL21

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.65 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	70.3 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5415. N
INTERNAL HYSTERESIS	69% - 85%	73.5%

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Fust

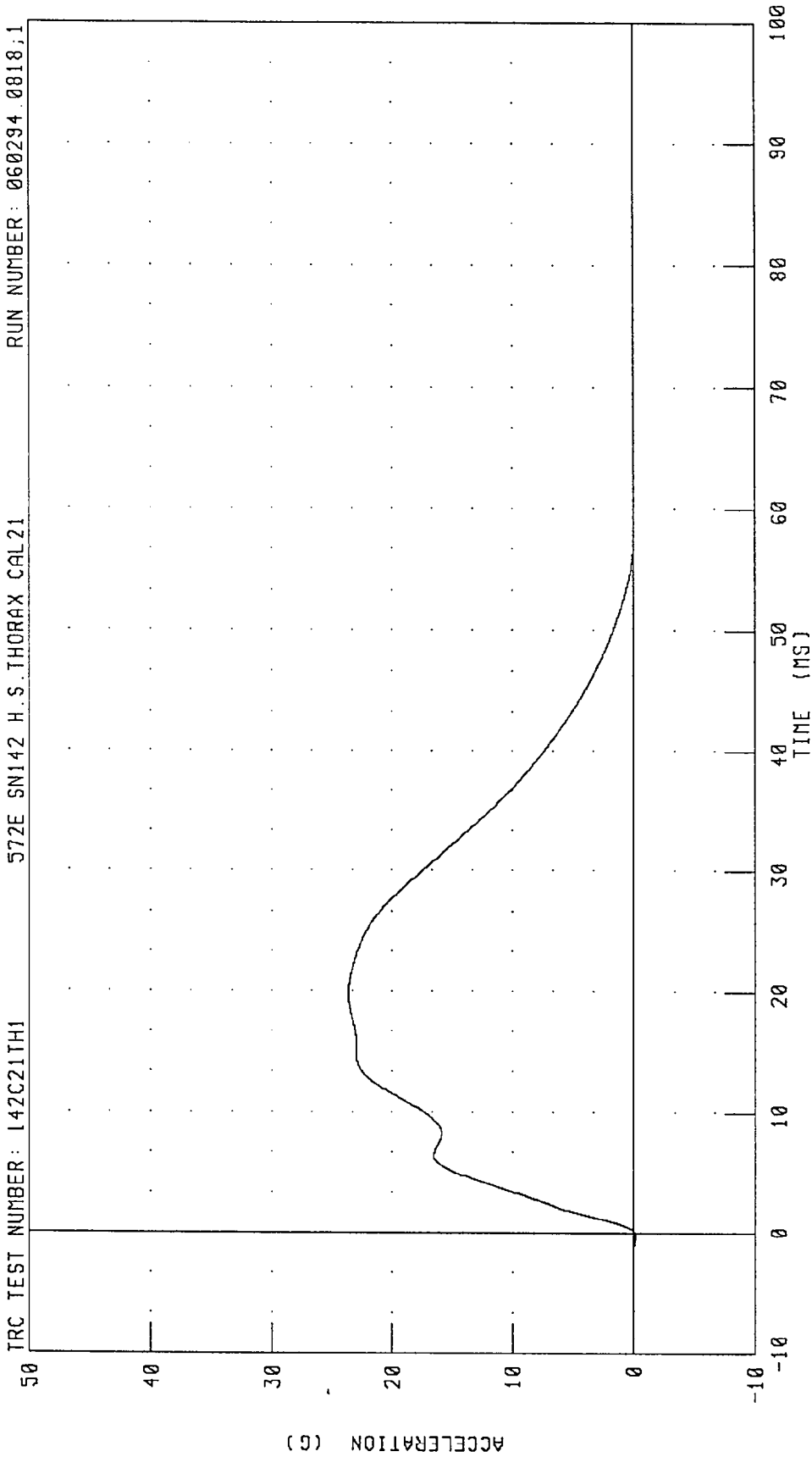
RUN NUMBER: 032994.1011;1

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 142C21TH1

572E SN142 H.S. THORAX CAL21

RUN NUMBER: 060294.0818;1



CHANNEL: PENXG FILTER: CH. CLASS 180

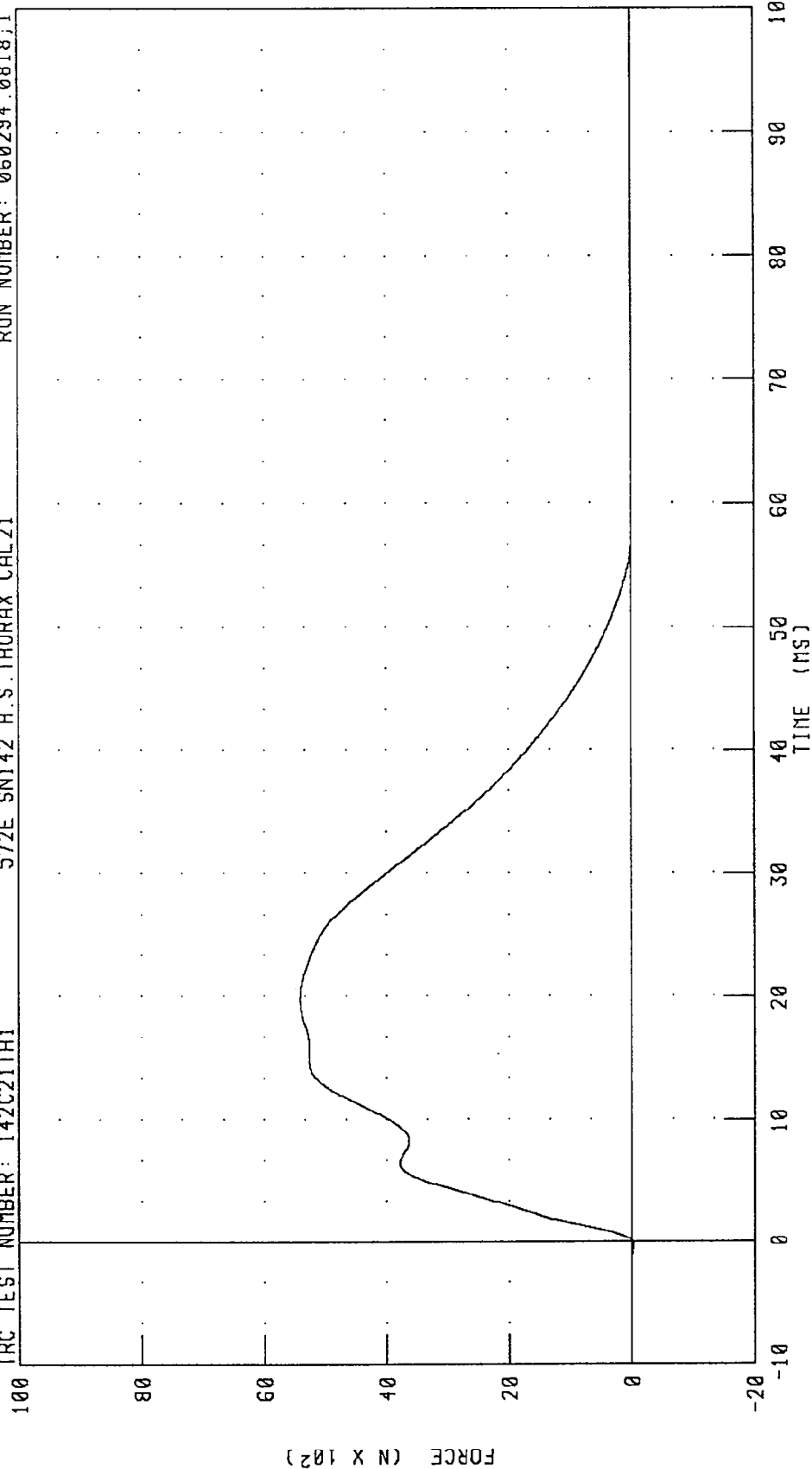
PEAK DATA: 23.64 G @ 19.76 MS; -0.12 G @ -0.32 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 142C21TH1

572E SN142 H.S. THORAX CAL21

RUN NUMBER: 060294.0818;1



CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 5415.68 N @ 19.76 MS; -26.98 N @ -0.32 MS

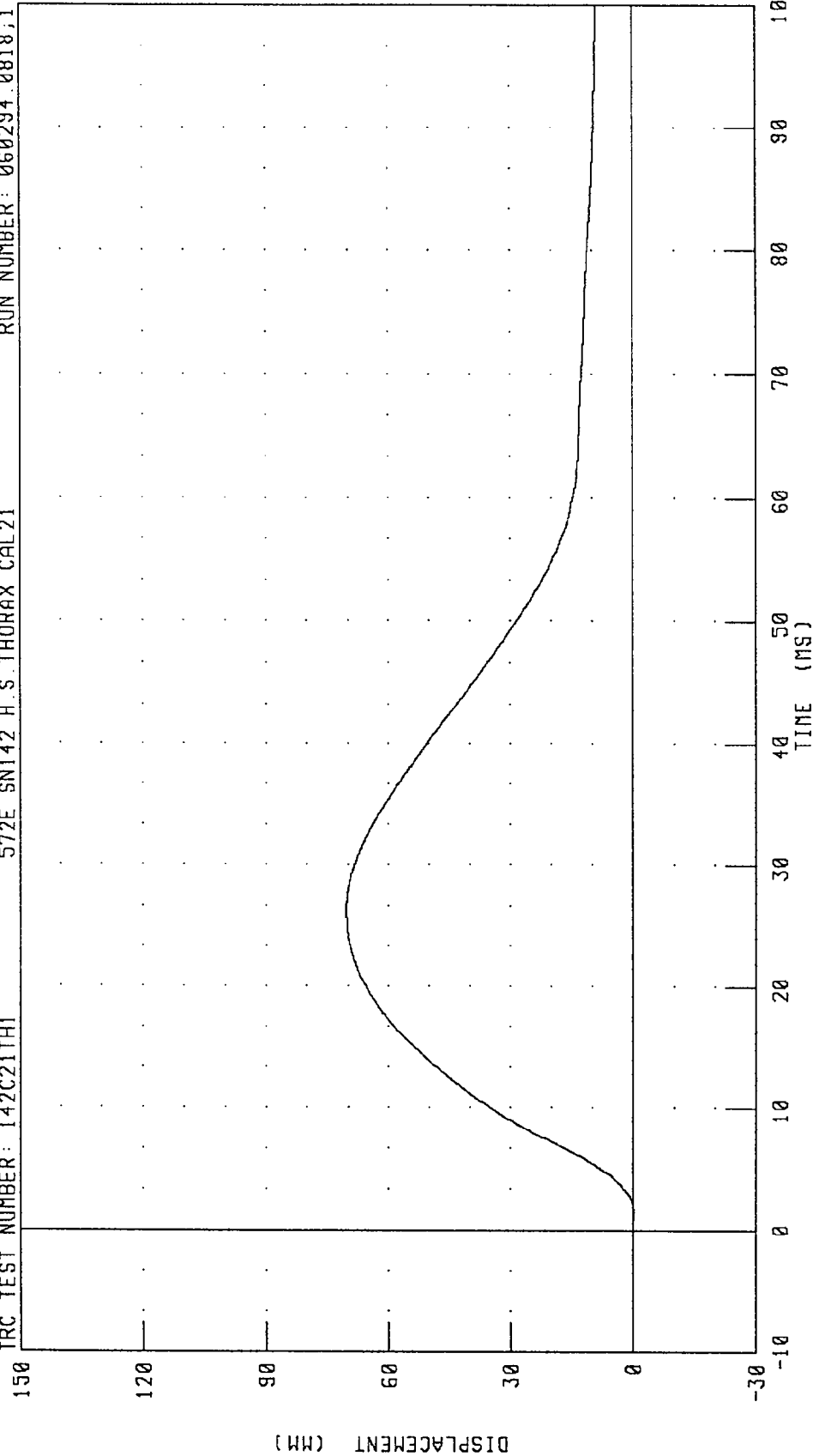
PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 142C21TH1

572E SN142 H.S. THORAX CAL21

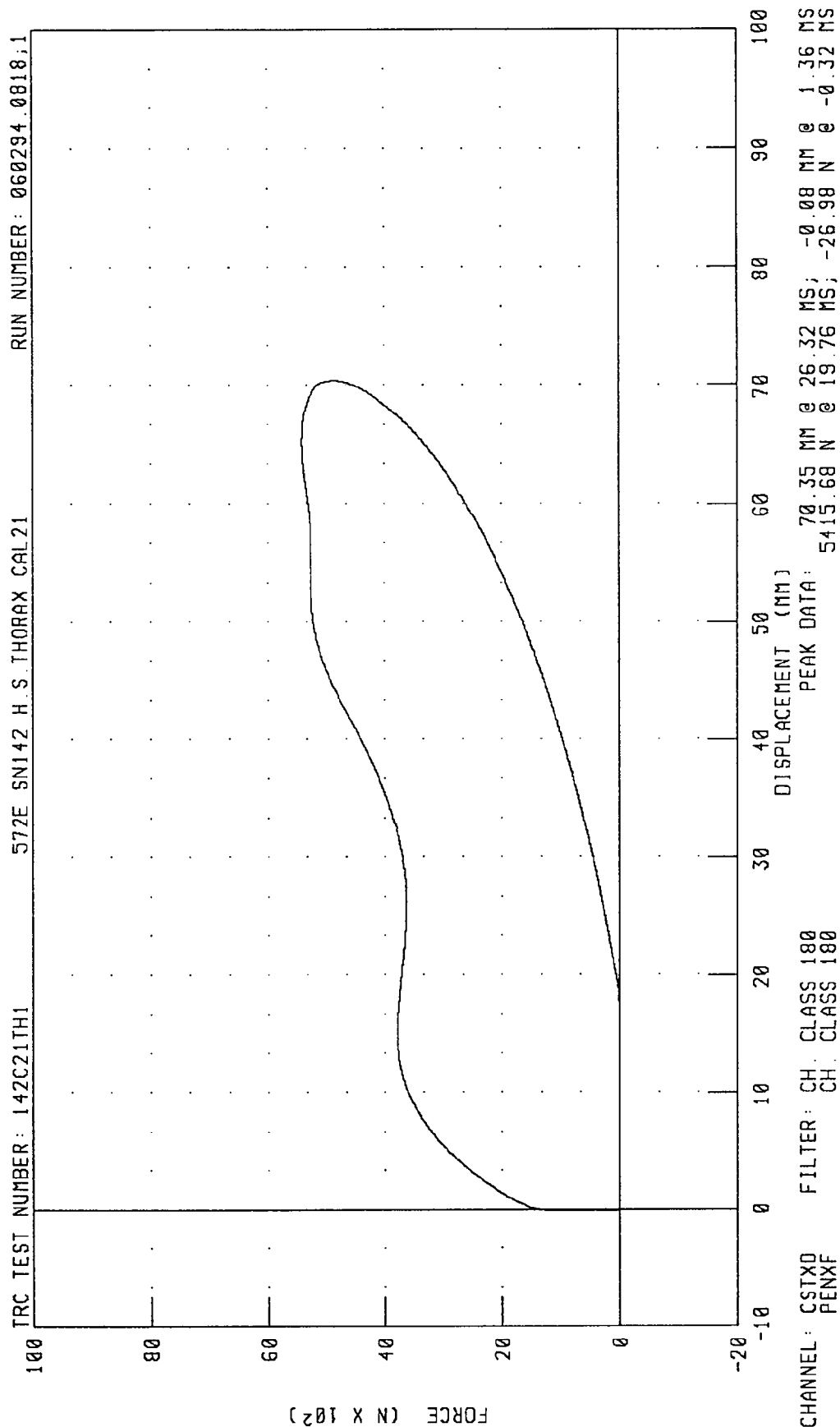
RUN NUMBER: 060294.0818;1



CHANNEL: CSTXD FILTER: CH. CLASS 180

PEAK DATA: 70.35 MM @ 26.32 MS; -0.08 MM @ 1.36 MS

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



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

28-MAR-94

TRC INC.

TEST NO: 142C21RK1

572E SN142 RIGHT KNEE CAL 21

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	51.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.09 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4714 - 5783 N	5576.0 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete F. S.

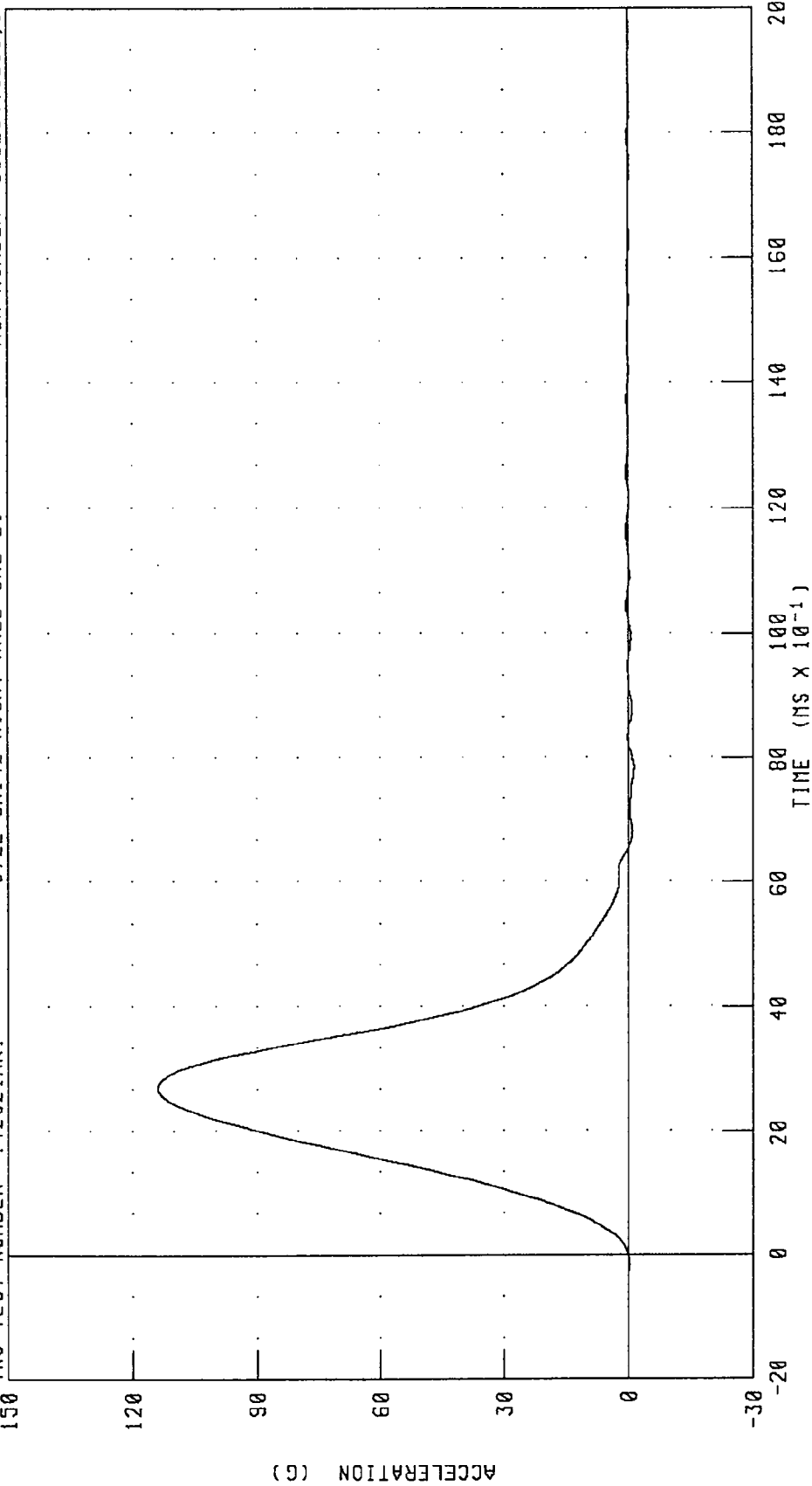
RUN NUMBER: 032894.1309;1

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

TRC TEST NUMBER: 142C21RK1

572E SN142 RIGHT KNEE CAL 21

RUN NUMBER: 060294.0818,1



CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 113.96 G @ 2.72 MS; -1.37 G @ 7.84 MS

PART 572-E HYBRID III RIGHT KNEE CALIBRATION

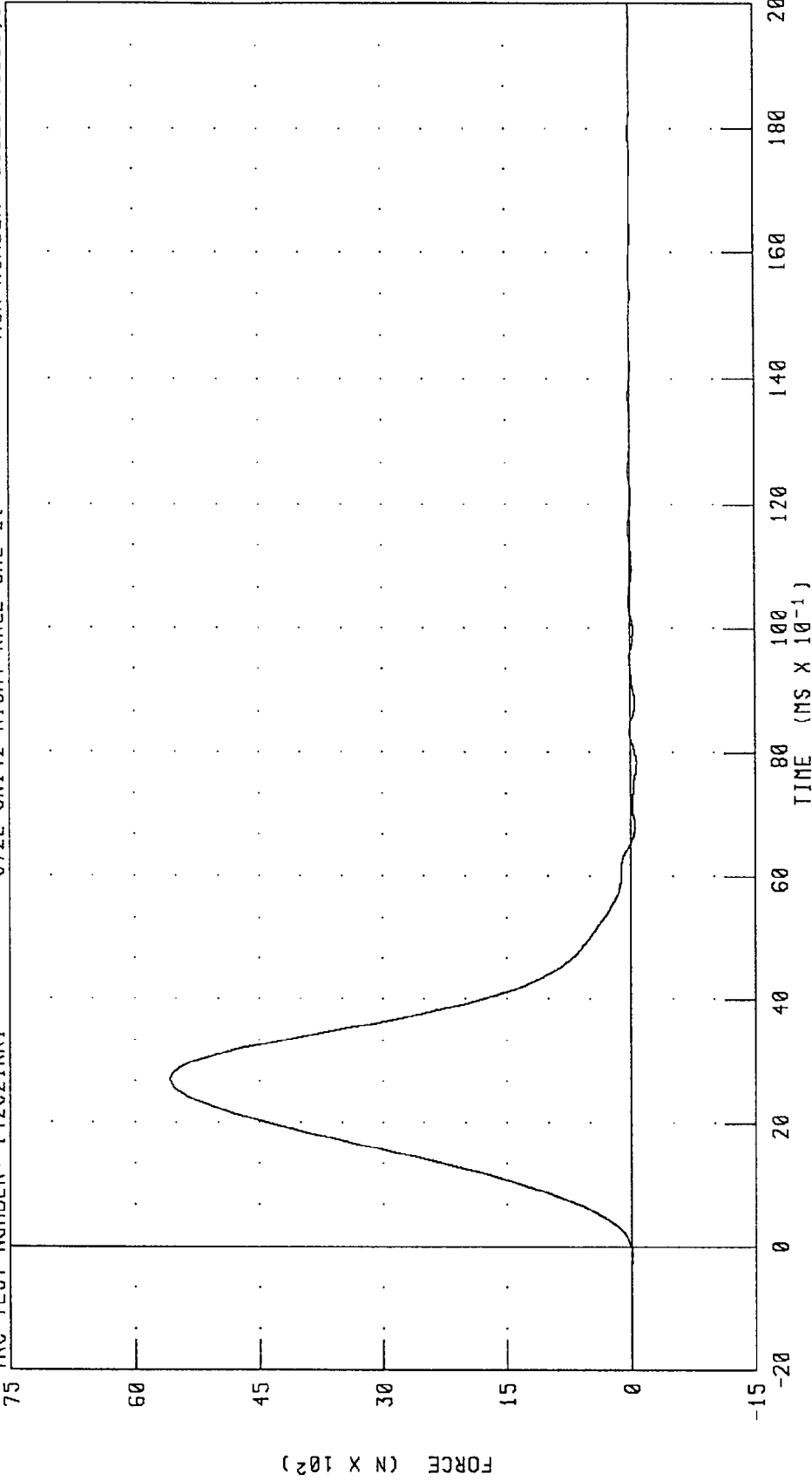
PENDULUM FORCE (5 KG PEND.)

572E SN142 RIGHT KNEE CAL 21

RUN NUMBER: 060294.0818;1

TRC TEST NUMBER: 142C21RK1

75



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5576.01 N @ 2.72 MS; -66.96 N @ 7.84 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

28-MAR-94

TRC INC.

TEST NO: 142C21LK1

572E SN142 LEFT KNEE CAL 21

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	51.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4714 - 5783 N	5272.6 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Font

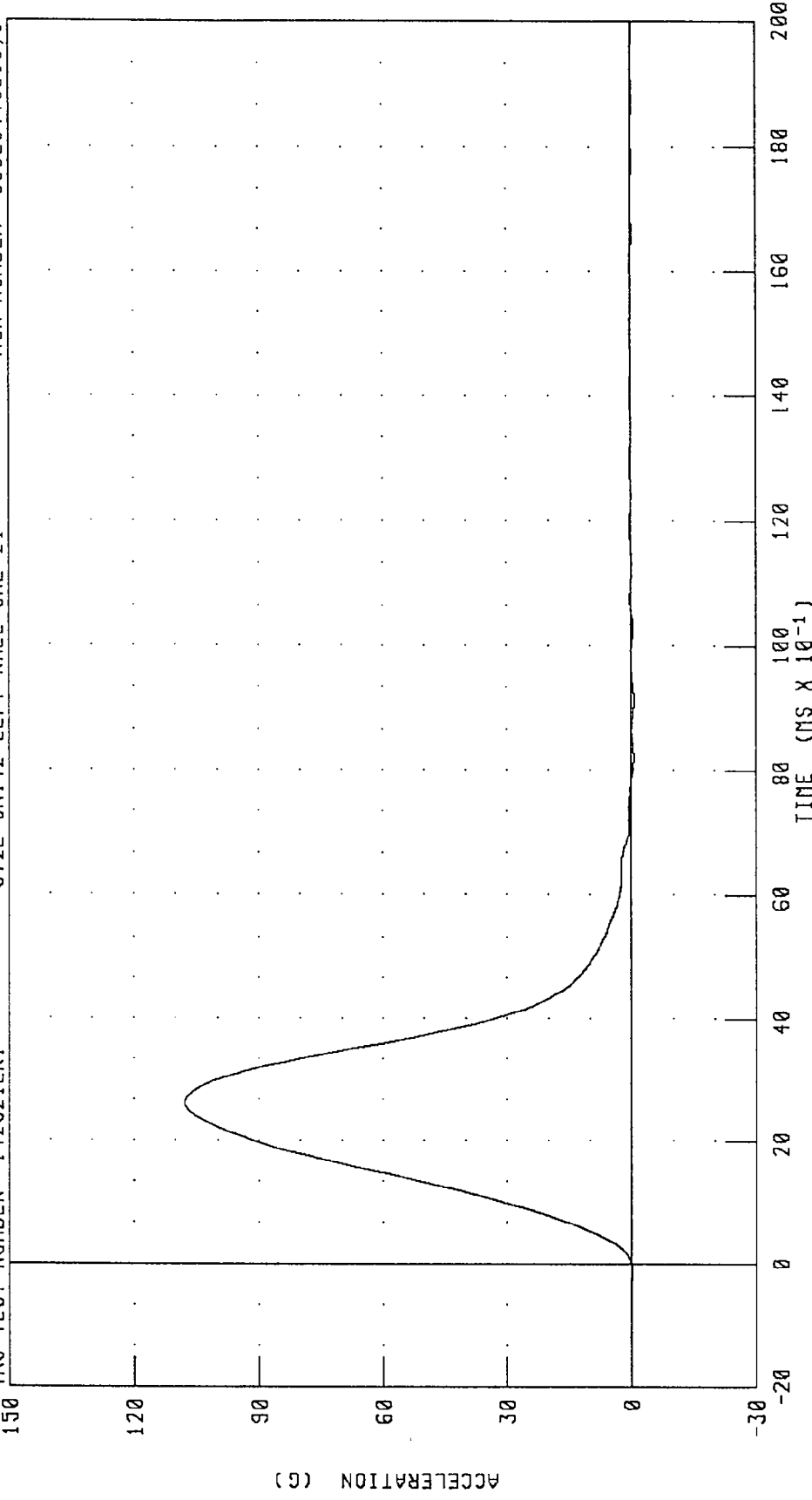
RUN NUMBER: 032894.1304;1

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

TRC TEST NUMBER: 142C21LK1

572E SN142 LEFT KNEE CAL 21

RUN NUMBER: 060294.0818;1



CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 107.76 G @ 2.64 MS; -0.64 G @ 9.12 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN142 LEFT KNEE CAL 21

TRC TEST NUMBER: 142C21LK1

75

60

45

30

15

0

-15

-20

0

20

40

60

80

100

120

140

160

180

200

220

240

260

280

300

320

340

360

380

400

420

440

460

480

500

520

540

560

580

600

620

640

660

680

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720

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760

780

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820

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880

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920

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960

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1000

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1080

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6140

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6180

6200

6220

6240

6260

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6420

6440

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 192

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
192 ALDERSON

17-MAY-94

TRC TEST NO: 192C20ED1 572E SN192 EXT.DIMENSION CAL20

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226 - 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)		970 - 1001 MM	980. MM
WAIST CIRCUMFERENCE (Z)		836 - 866 MM	848. MM
CHEST DEPTH (O)		213 - 229 MM	218. MM
H-POINT HEIGHT (C)		84 - 89 MM	84. MM
H-POINT FROM SEATBACK (D)		135 - 140 MM	136. MM
SKULL CAP TO BACKLINE (H)		41 - 46 MM	43. MM
TOTAL SITTING HEIGHT (A)		879 - 889 MM	884. MM
THIGH CLEARANCE (F)		140 - 155 MM	147. MM
BUTTOCK KNEE LENGTH (K)		579 - 605 MM	602. MM
BUTTOCK POPLITEAL LENGTH (N)		452 - 478 MM	472. MM
POPLITEAL HEIGHT (L)		429 - 455 MM	450. MM
KNEE PIVOT HEIGHT (M)		485 - 500 MM	493. MM
FOOT LENGTH (P)		252 - 267 MM	259. MM
FOOT BREADTH (W)		91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE (E)		84 - 94 MM	91. MM
SHOULDER BREADTH (V)		422 - 437 MM	427. MM
SHOULDER PIVOT HEIGHT (B)		506 - 521 MM	513. MM
ELBOW REST HEIGHT (J)		191 - 211 MM	206. MM
SHOULDER-ELBOW LENGTH (I)		330 - 345 MM	340. MM
BACK OF ELBOW TO WRIST PIVOT (G)		290 - 305 MM	295. MM

DUMMY MEETS SPECIFICATIONS
TECHNICIAN Pete F. J.

RUN NUMBER: 060194.1535

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

17-MAY-94

TRC INC.

TEST NO: 192C20HD1

572E SN192 HEAD DROP CAL 20

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	54.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	263.68 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.67 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

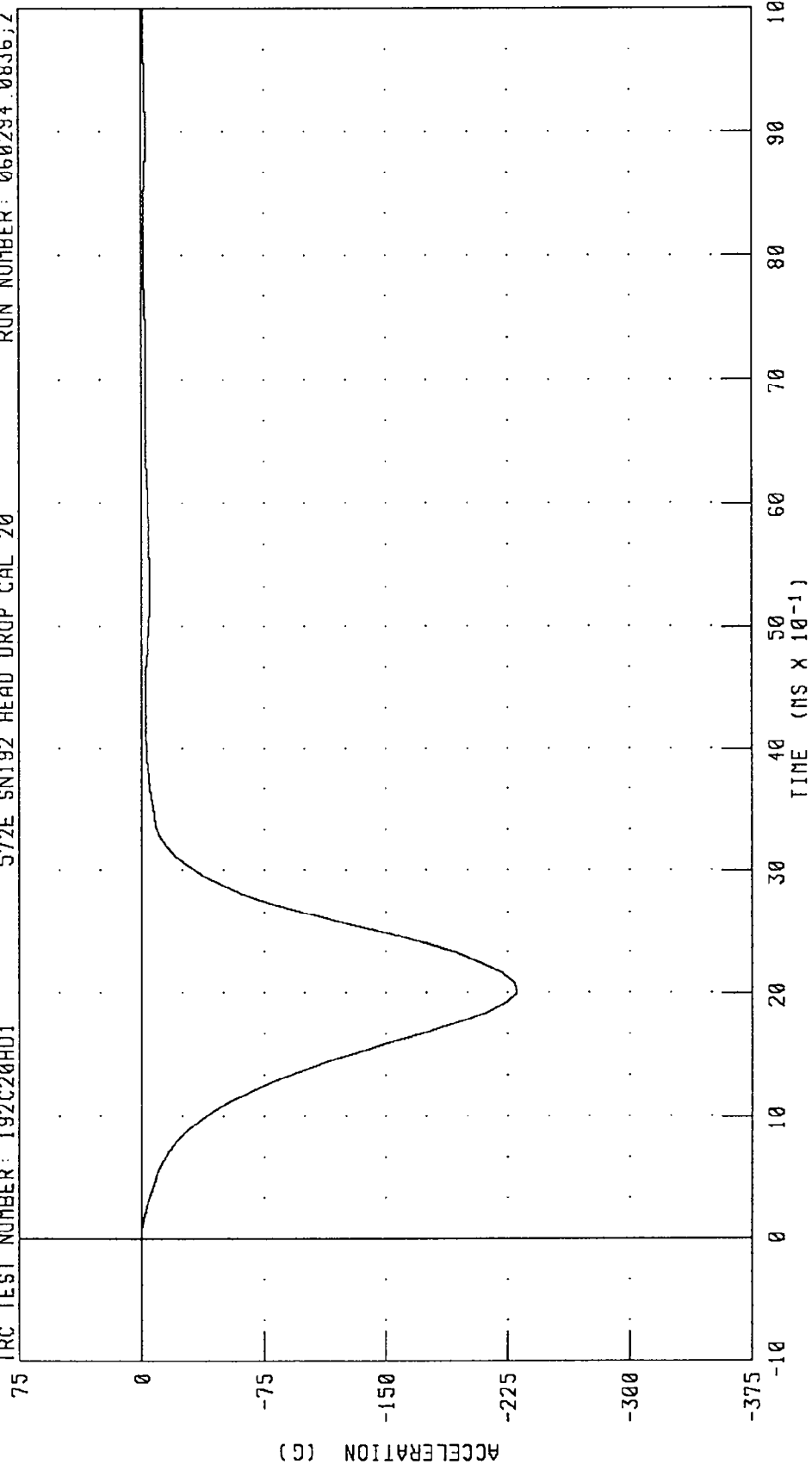
TECHNICIAN *Lita Fort*

RUN NUMBER: 051794.1321;2

PART 572-E HYBRID III HEAD CALIBRATION
 HEAD ACCELERATION X AXIS
 572E SN192 HEAD DROP CAL 20

TRC TEST NUMBER: 192C20HD01

RUN NUMBER: 060294.0836;2



PEAK DATA: 0.03 G @ -0.96 MS; -230.32 G @ 2.00 MS

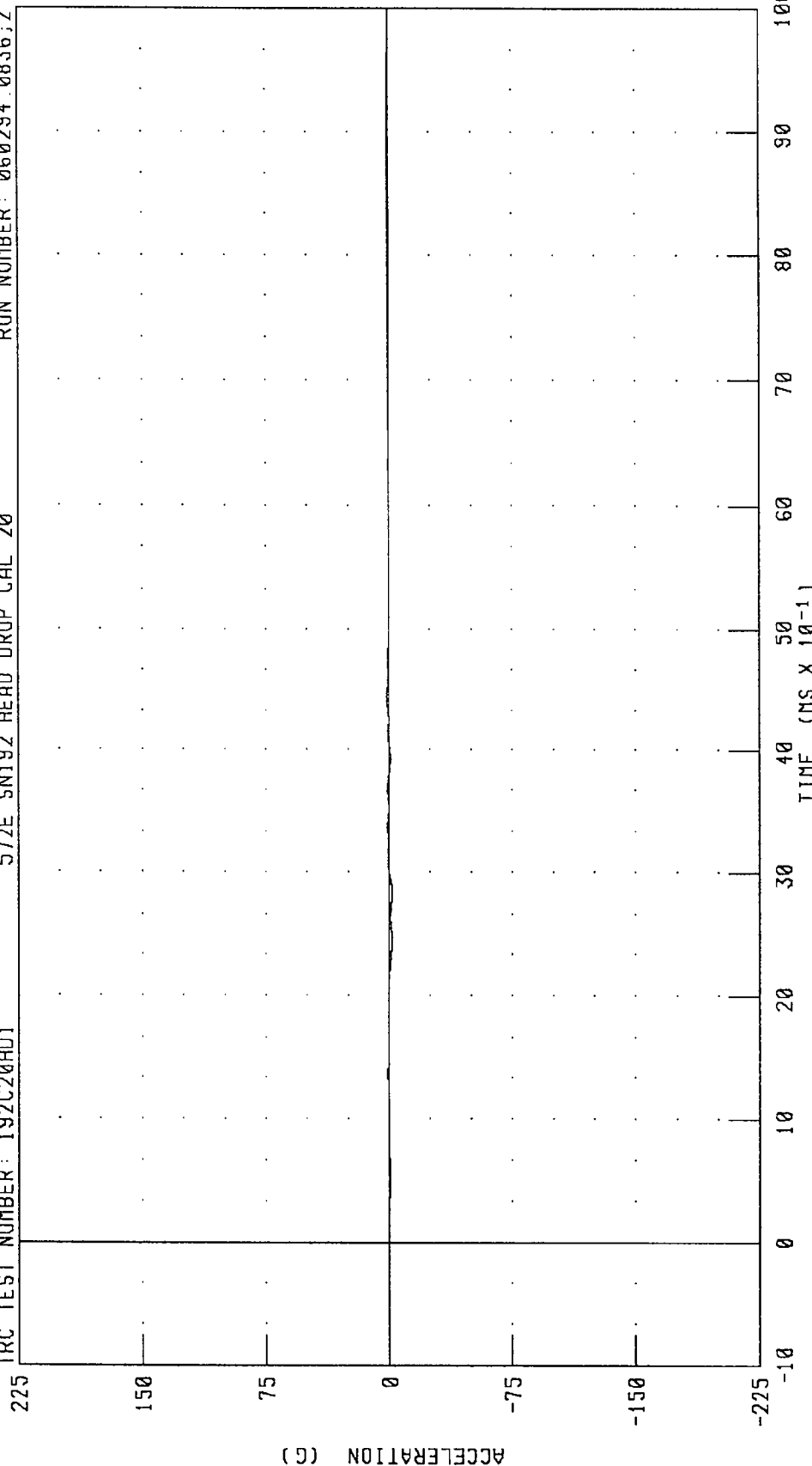
CHANNEL: HEDXC FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 192C20HD1

572E SN192 HEAD DROP CAL 20

RUN NUMBER: 060294.0836;2



PEAK DATA: 1.12 G @ 3.36 MS; -1.68 G @ 2.40 MS

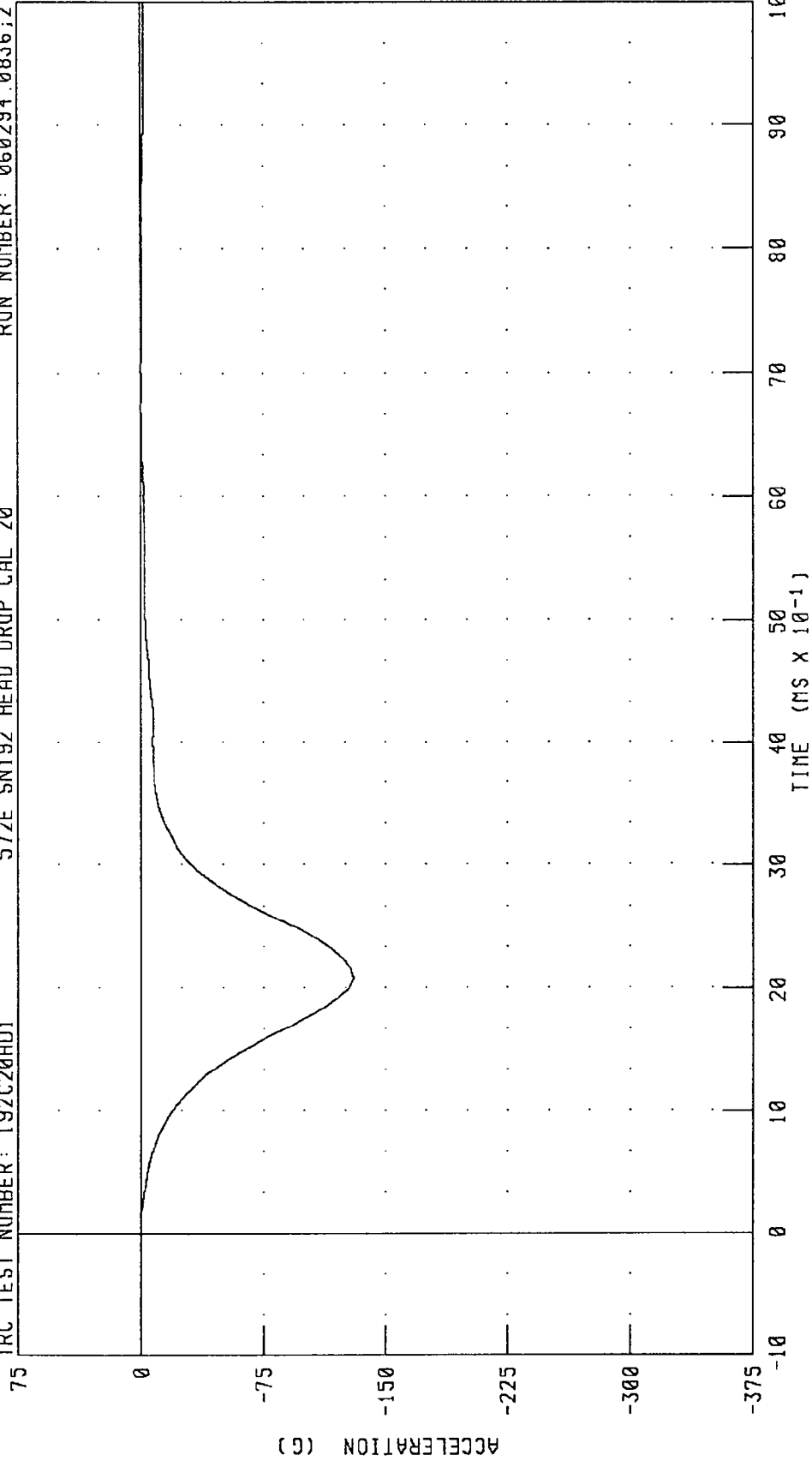
CHANNEL: HEDYG FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 192C20HD1

572E SN192 HEAD DROP CAL 20

RUN NUMBER: 060294 0836.2



PEAK DATA: 0.03 G @ 0.00 MS, -130.16 G @ 2.08 MS

CHANNEL: HEDZG FILTER: CH: CLASS 1000

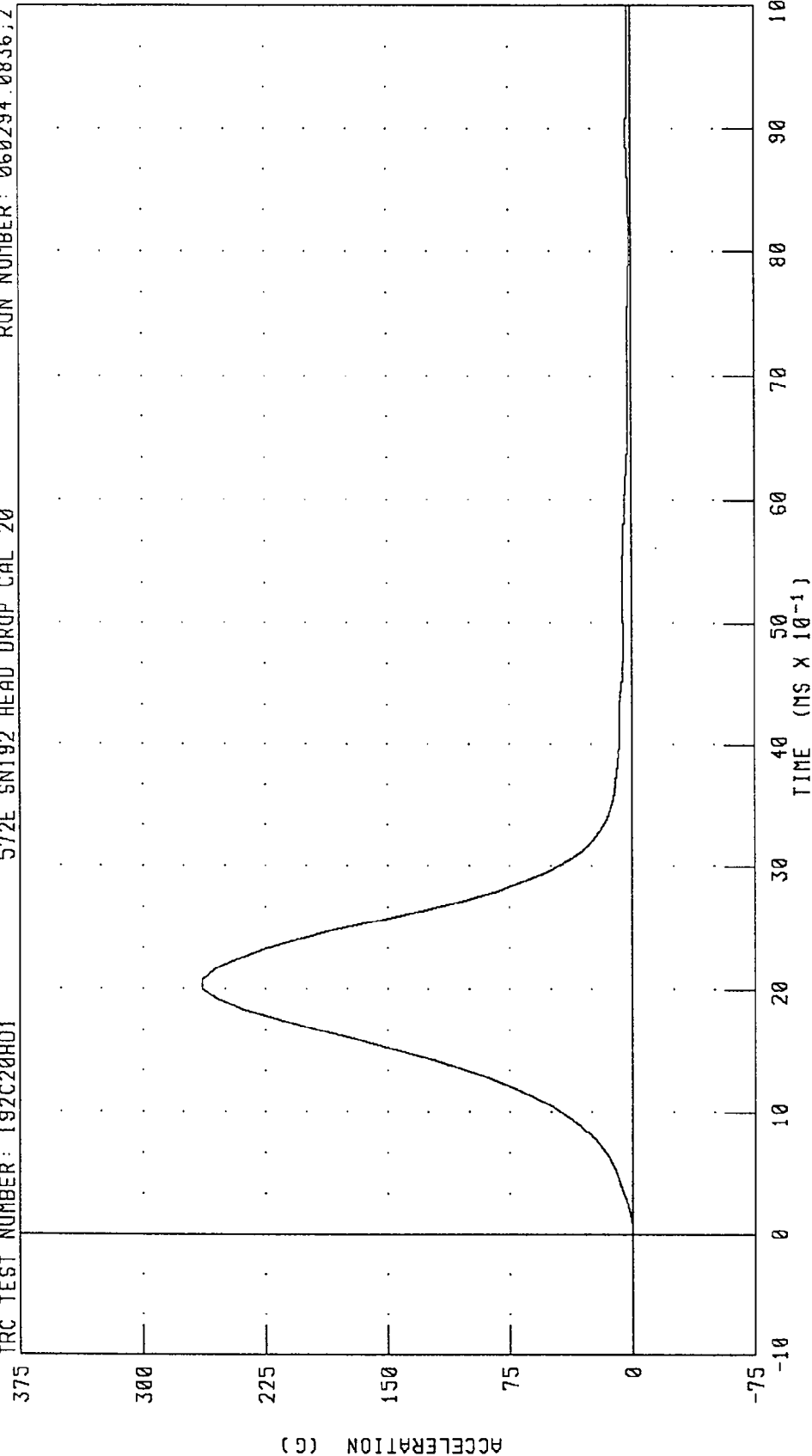
PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN192 HEAD DRGP CAL 20

RUN NUMBER: 060294.0836;2

TRC TEST NUMBER: 192C20HD1



PEAK DATA: 263.68 G @ 2.08 MS; 0.02 G @ -0.88 MS

CHANNEL: HEDRG FILTER: CH. CLASS 1000

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

17-MAY-94

TRC INC. TEST NO: 192C20NF1 572E SN192 NECK FLEXION CAL20

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	54.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.10 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.26 G
	20 MS	17.60 - 22.60 G	20.19 G
	30 MS	12.50 - 18.50 G	16.91 G
MAX PENDULUM G		29 G MAX	25.11 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.90 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.84 MS
D PLANE	MAX	64 - 78 DEG.	68.68 DEG.
ROTATION	TIME	57 - 64 MS	58.48 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	94.18 NM
	TIME	47 - 58 MS	50.72 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	113.68 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.96 MS

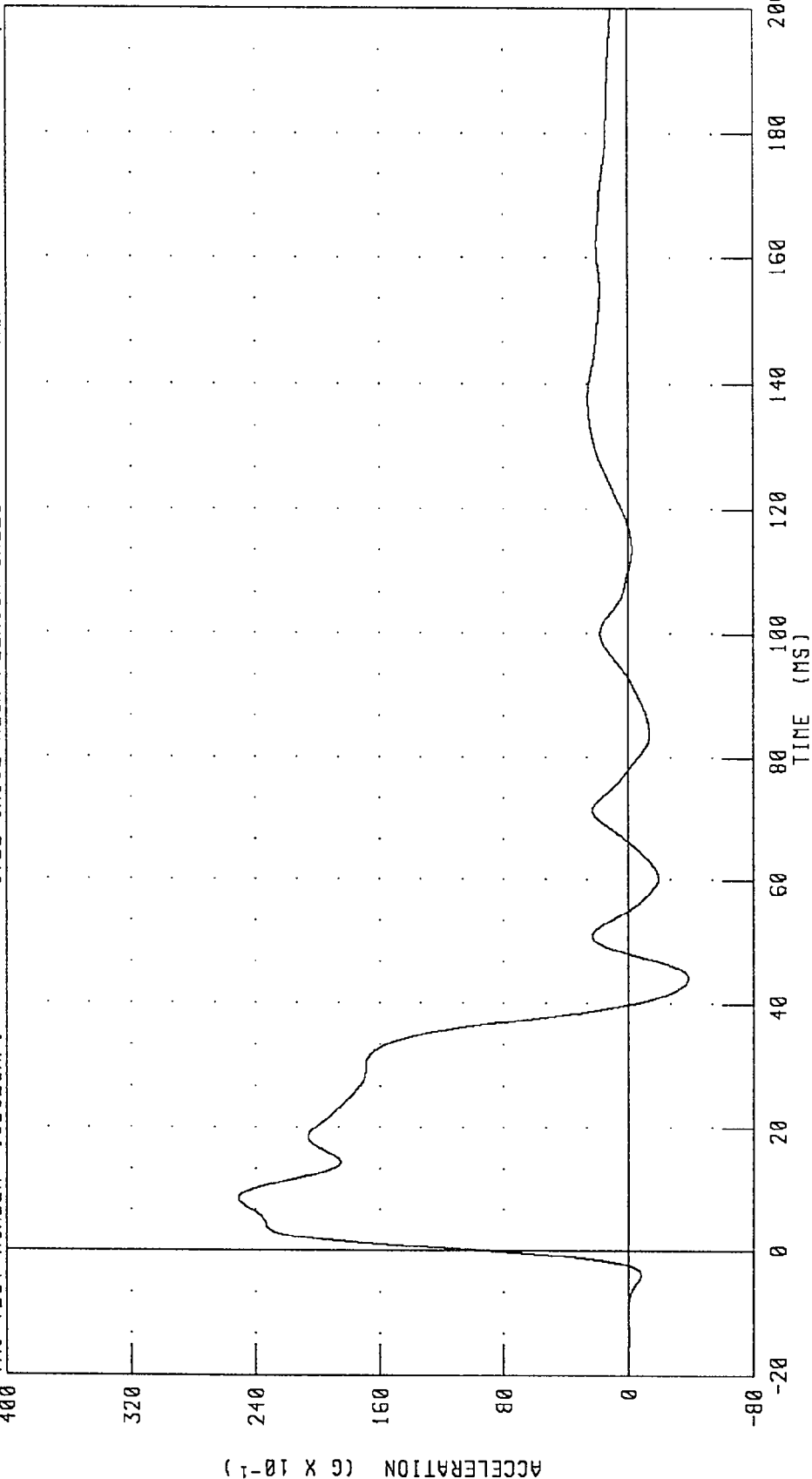
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Ford

RUN NUMBER: 051794.1228;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION PENDULUM DECELERATION

TRC TEST NUMBER: 192C20NF1 572E SN192 NECK FLEXION CAL20 RUN NUMBER: 060294.0836;1



PEAK DATA: 25.11 G @ 8.56 MS; -3.82 G @ 44.08 MS

CHANNEL: PENXC FILTER: CH. CLASS 60

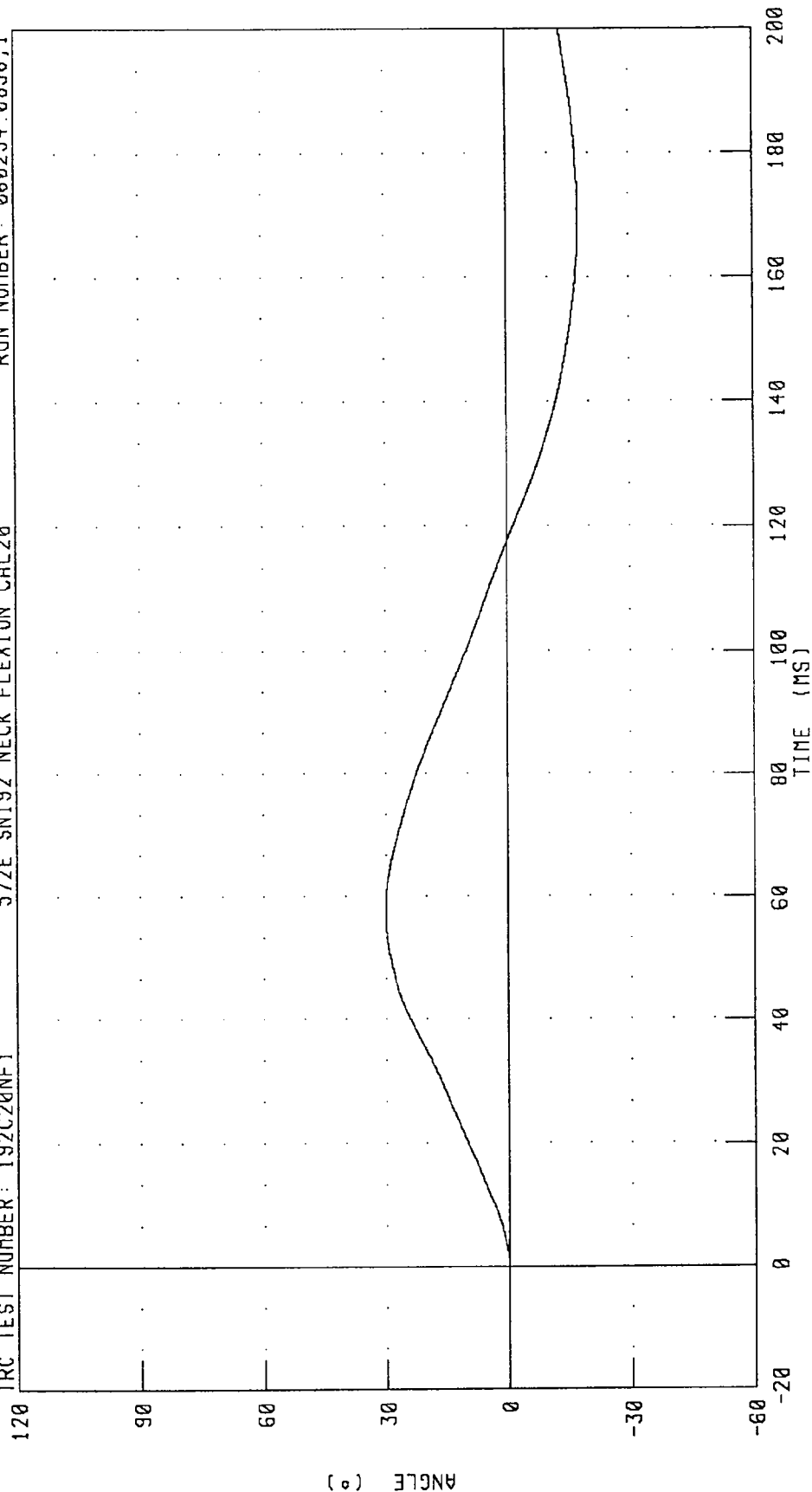
PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 192C20NF1

572E SN192 NECK FLEXION CAL20

RUN NUMBER: 060294.0836,1

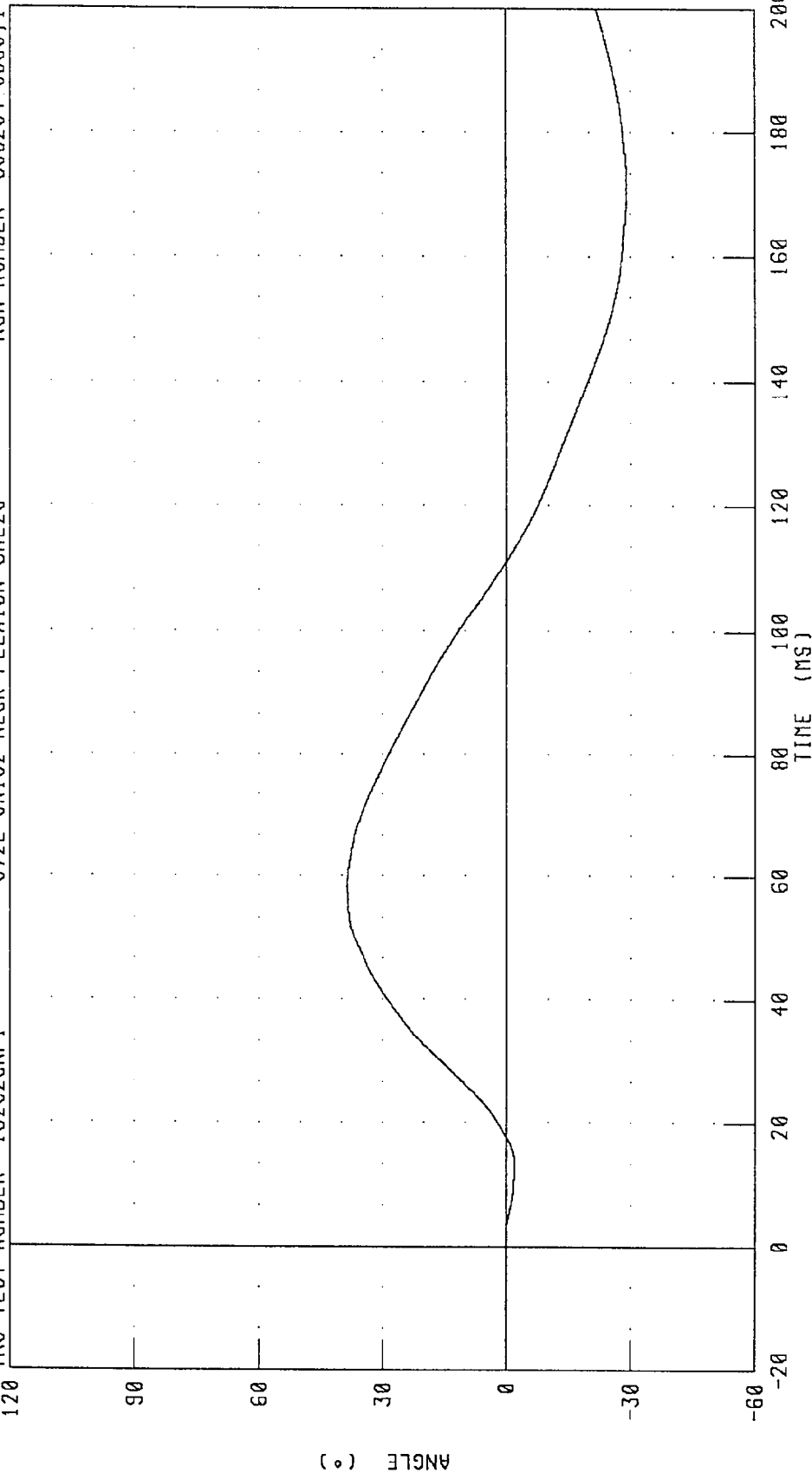


CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 30.13 ° @ 58.24 MS; -17.58 ° @ 167.92 MS

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

TRC TEST NUMBER: 192C20NF1 572E SN192 NECK FLEXION CAL20 RUN NUMBER: 060294 0836;1



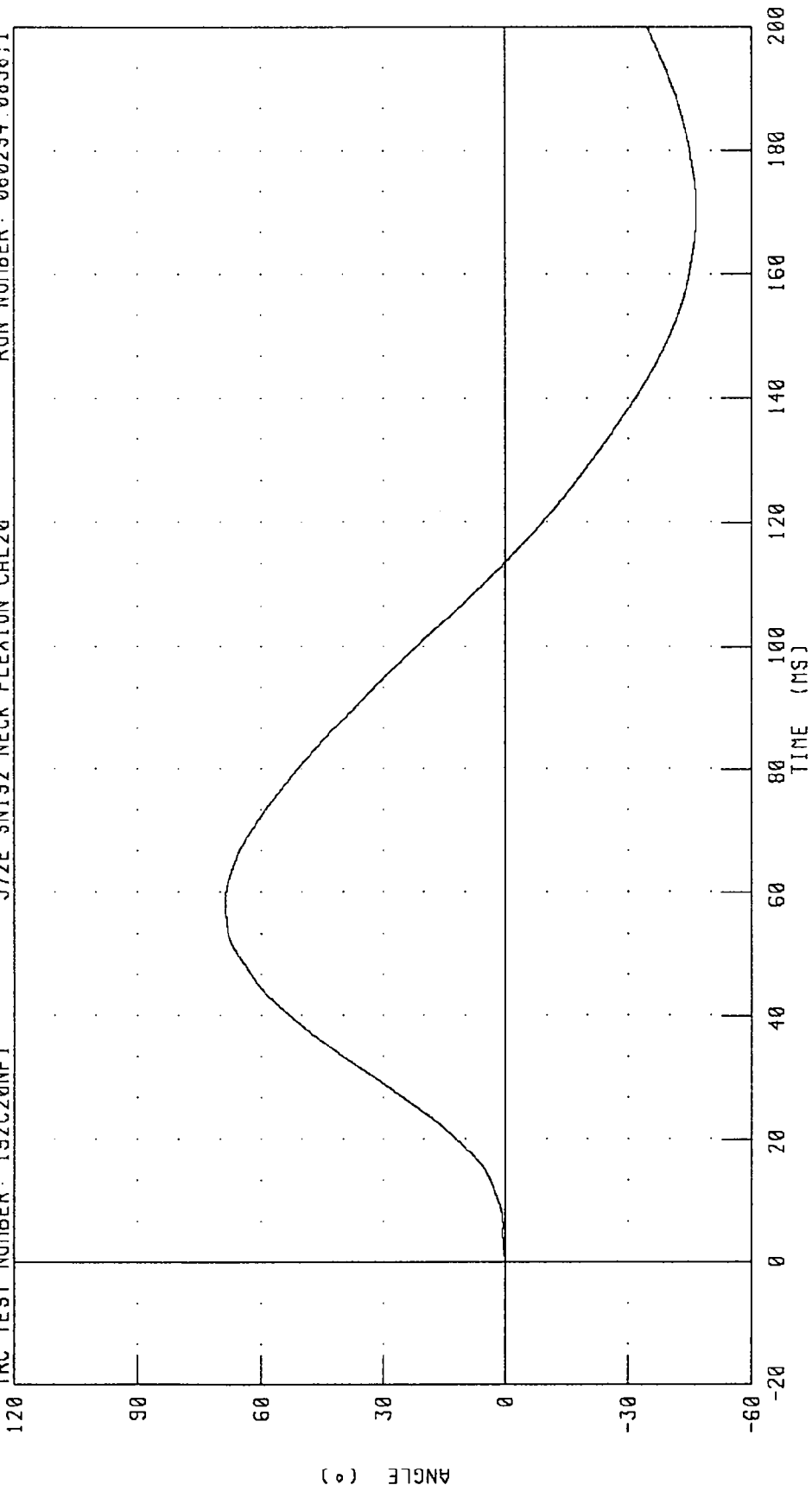
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 38.56 ° @ 58.64 MS; -28.84 ° @ 171.76 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 192C20NF1 572E SNI92 NECK FLEXION CAL20 RUN NUMBER: 060294 0836;1



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 68.69 ° @ 58.48 MS; -46.42 ° @ 169.68 MS

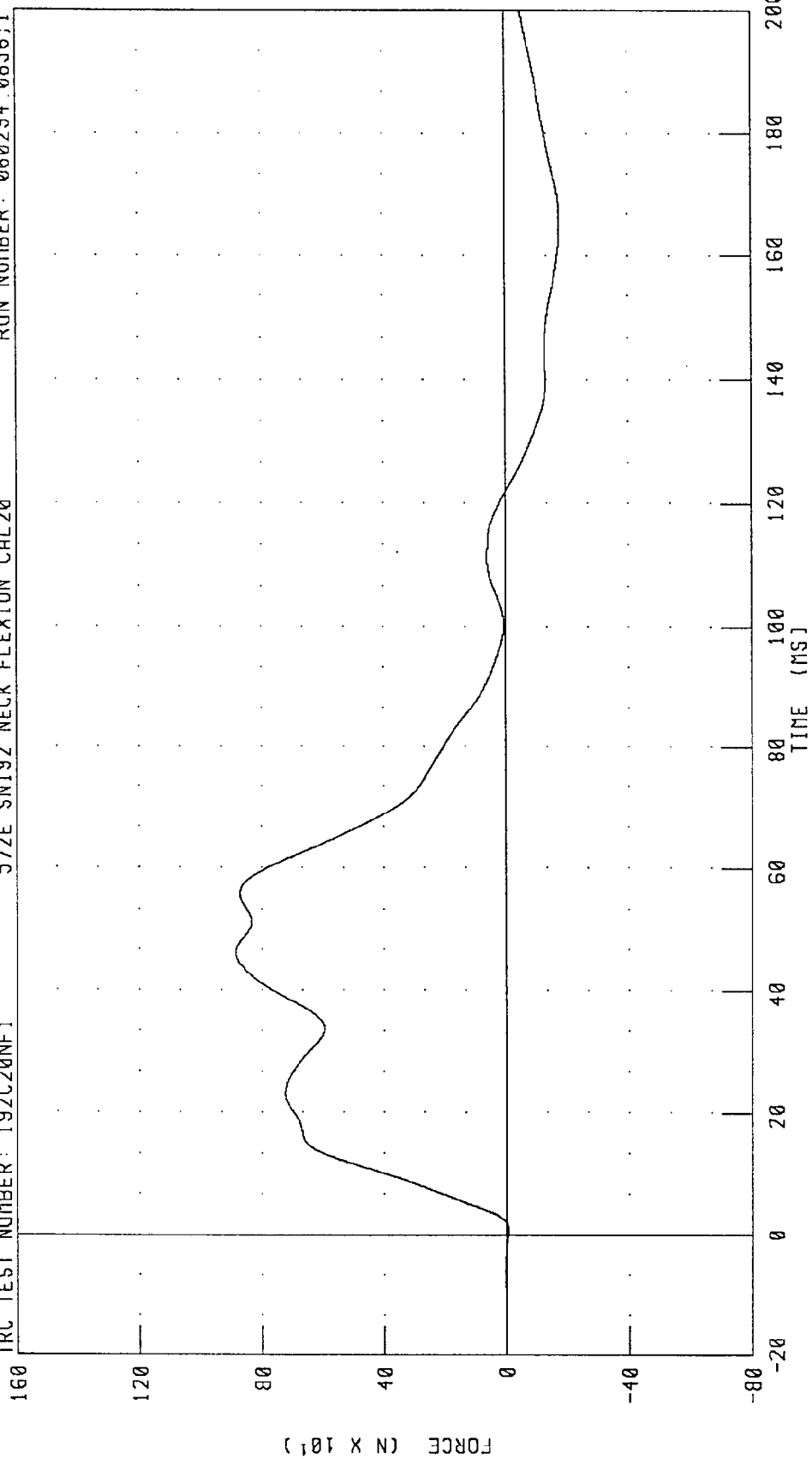
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 192C20NF1

572E SN192 NECK FLEXION CAL20

RUN NUMBER: 060294.0836;1



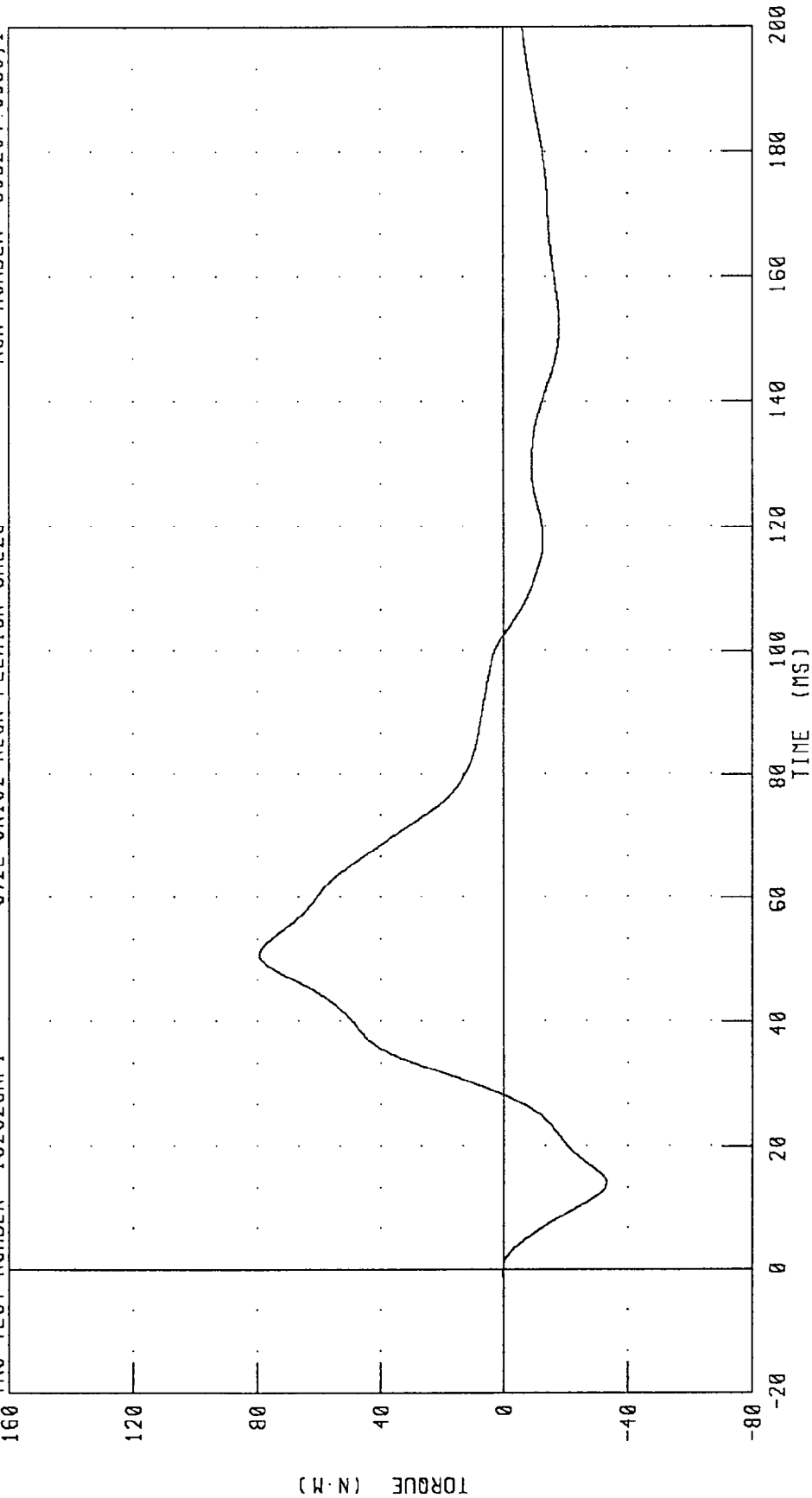
PEAK DATA: 884.79 N @ 46.16 MS; -176.90 N @ 165.28 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 192C20NF1 572E SN192 NECK FLEXION CAL20 RUN NUMBER: 060294.0836;1



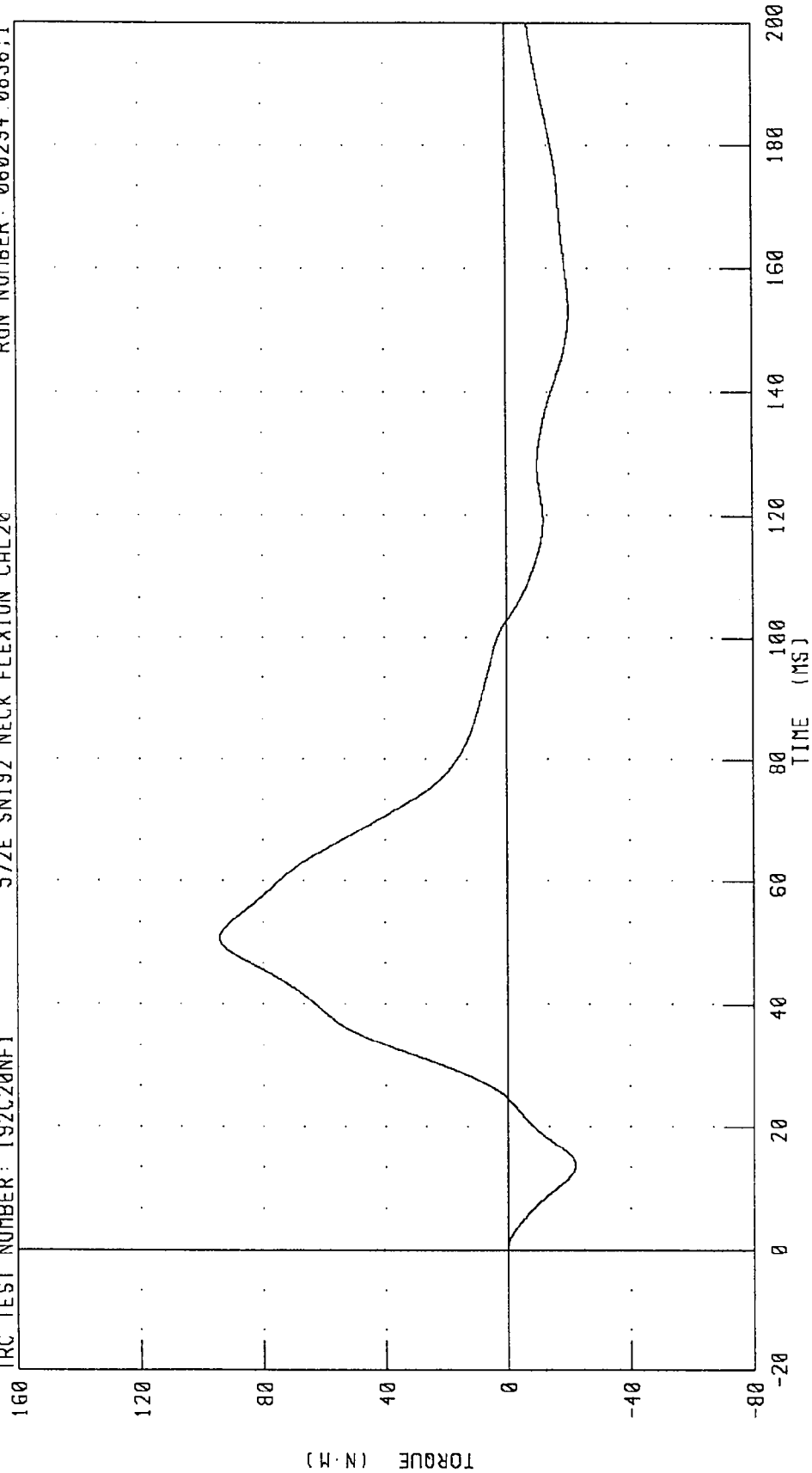
PEAK DATA: 79.37 N.M @ 50.80 MS; -33.15 N.M @ 14.08 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 192C20NF1 RUN NUMBER: 060294 0836;1

572E SN192 NECK FLEXION CAL20



PEAK DATA: 94.18 N·M @ 50.72 MS; -22.03 N·M @ 13.60 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

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

HYBRID III

17-MAY-94

TRC INC. TEST NO: 192C20NE1 572E SN192 NECK EXT. CAL20

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY		10 - 70 %	54.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	18.39 G
	20 MS	14.00 - 19.00 G	16.32 G
	30 MS	11.00 - 16.00 G	13.06 G
MAX PENDULUM G		22 G MAX	18.58 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	13.01 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	43.76 MS
D PLANE	MAX	81 - 106 DEG.	93.05 DEG.
ROTATION	TIME	72 - 82 MS	77.68 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-57.63 NM
	TIME	65 - 79 MS	72.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	158.24 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	140.72 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete F. S.

RUN NUMBER: 051794.1238;1

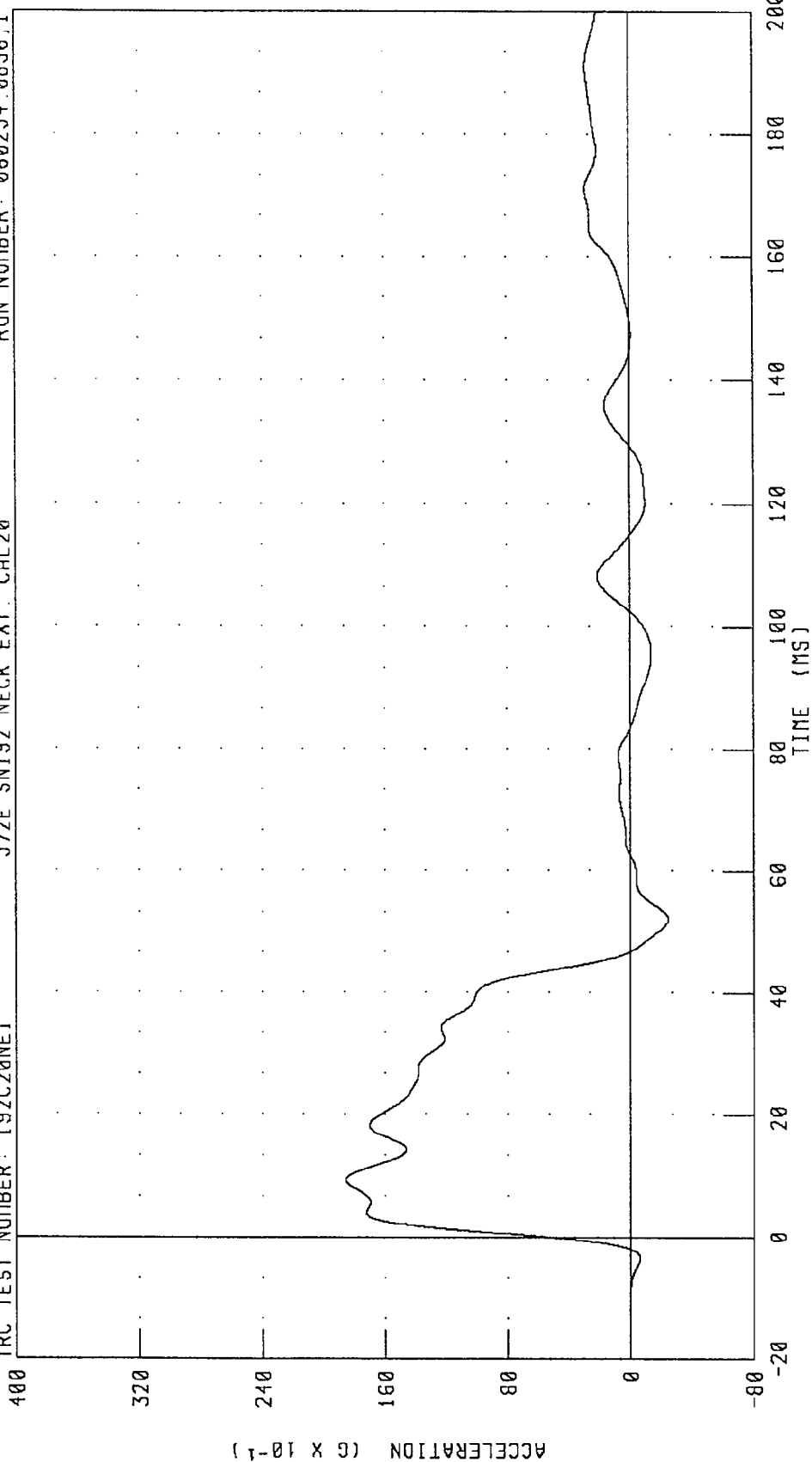
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 192C20NE1

572E SN192 NECK EXT. CAL20

RUN NUMBER: 060294.0836,1



PEAK DATA: 18.58 G @ 9.36 MS; -2.45 G @ 52.08 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

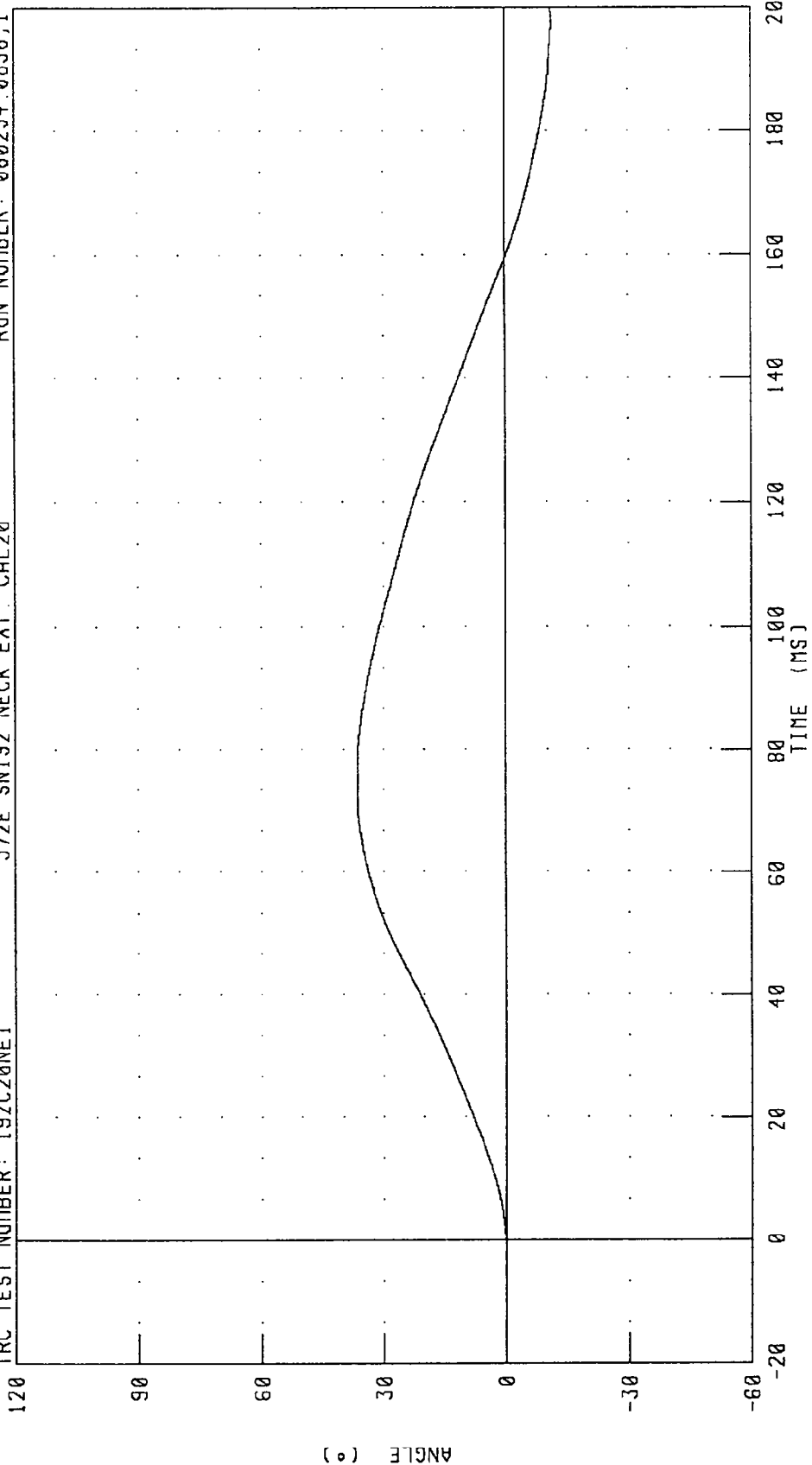
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN192 NECK EXT. CAL20

TRC TEST NUMBER: 192C20NE1

RUN NUMBER: 060294.0836,1



PEAK DATA: 36.48 ° @ 74.00 MS; -11.30 ° @ 197.92 MS

CHANNEL: BETA FILTER: CH. CLASS 60

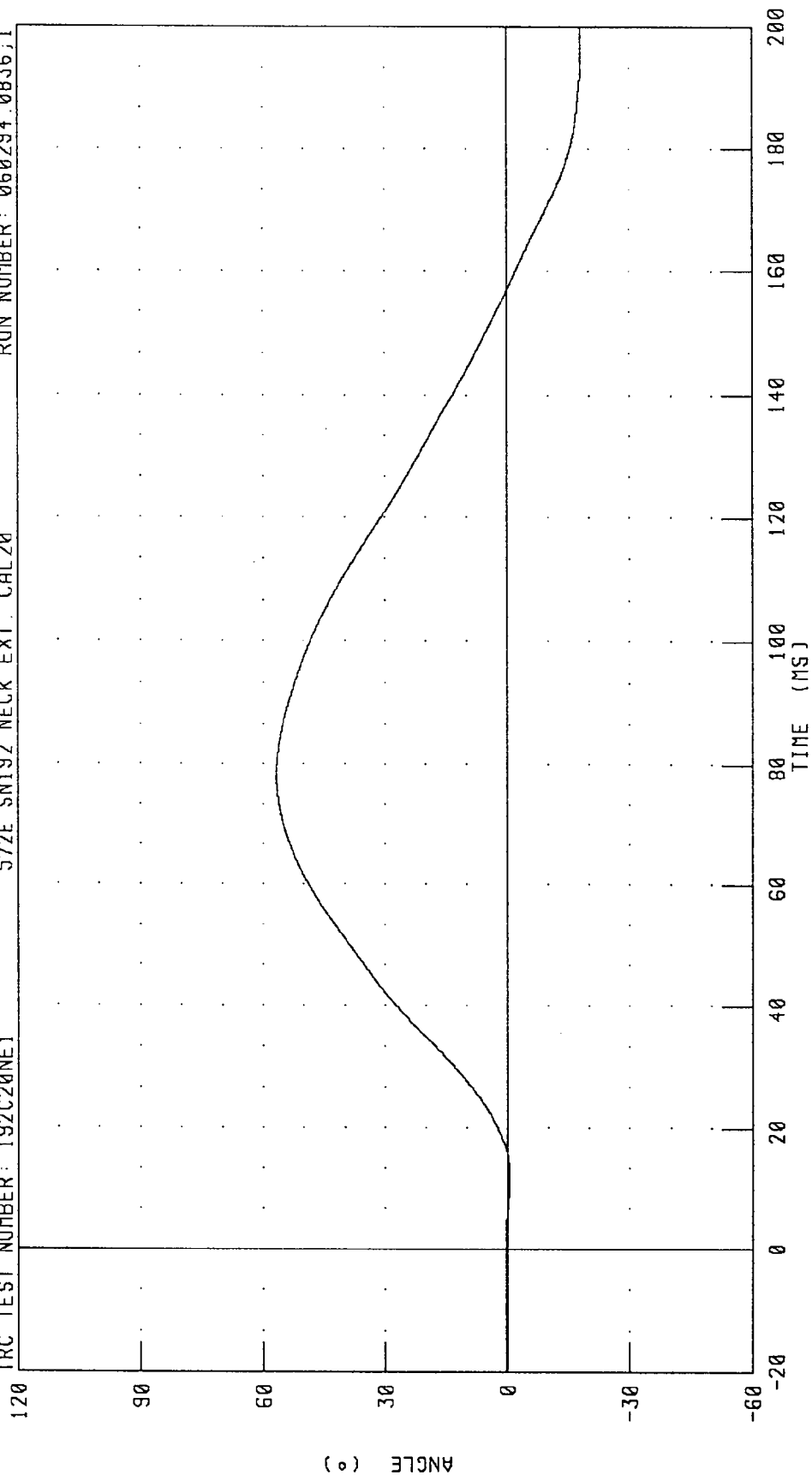
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 192C20NE1

572E SN192 NECK EXT. CAL20

RUN NUMBER: 060294.0836.1



CHANNEL: THETA FILTER: CH. CLASS 60

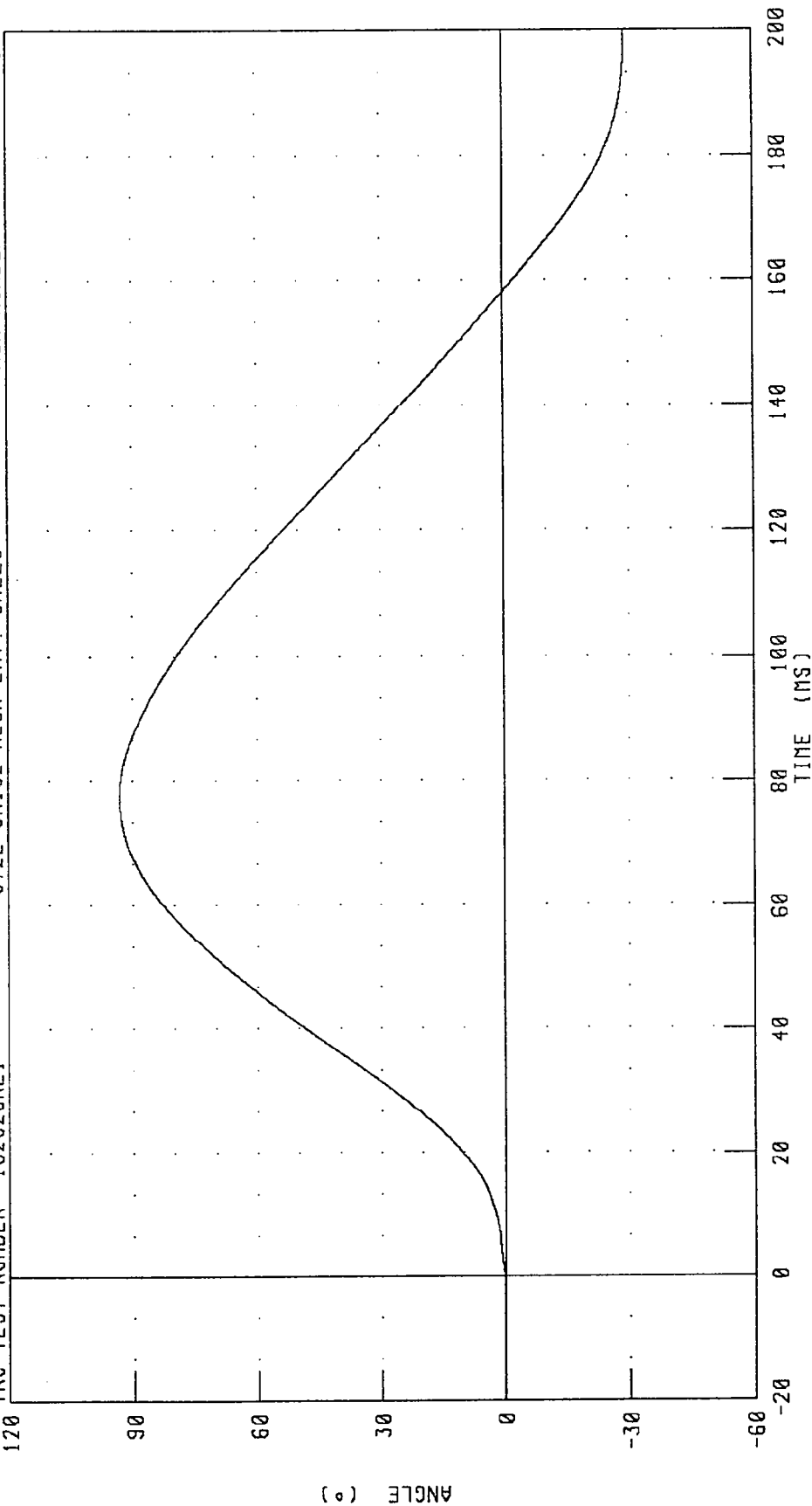
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 192C20NE1

572E SN192 NECK EXT. CAL20

RUN NUMBER: 060294.0836;1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 93.06 ° @ 77.68 MS; -29.25 ° @ 198.08 MS

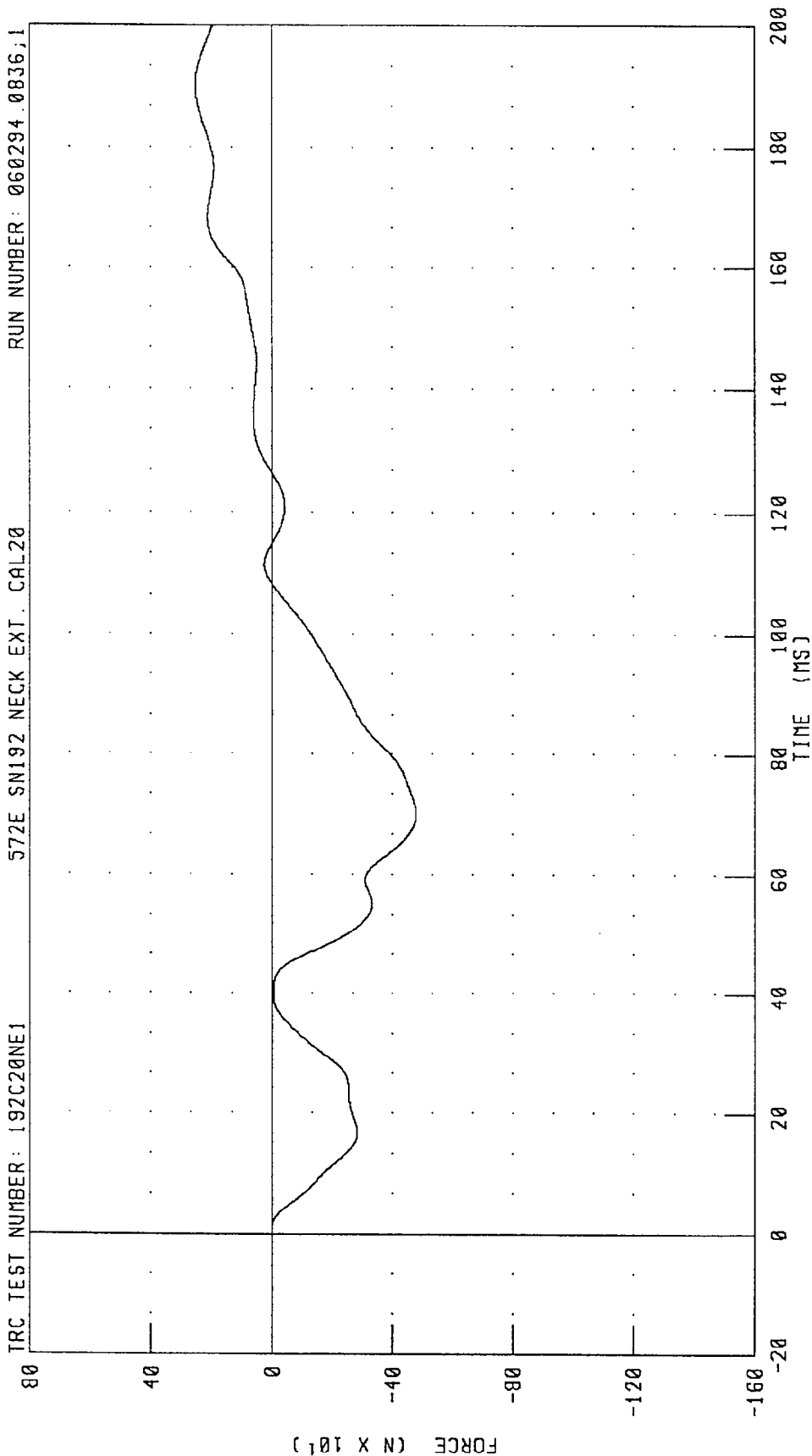
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 192C20NE1

572E SN192 NECK EXT. CAL20

RUN NUMBER: 060294.0836;1



CHANNEL: NEKXF FILTER: CH. CLASS 60

PEAK DATA: 252.05 N @ 190.16 MS; -478.68 N @ 70.08 MS

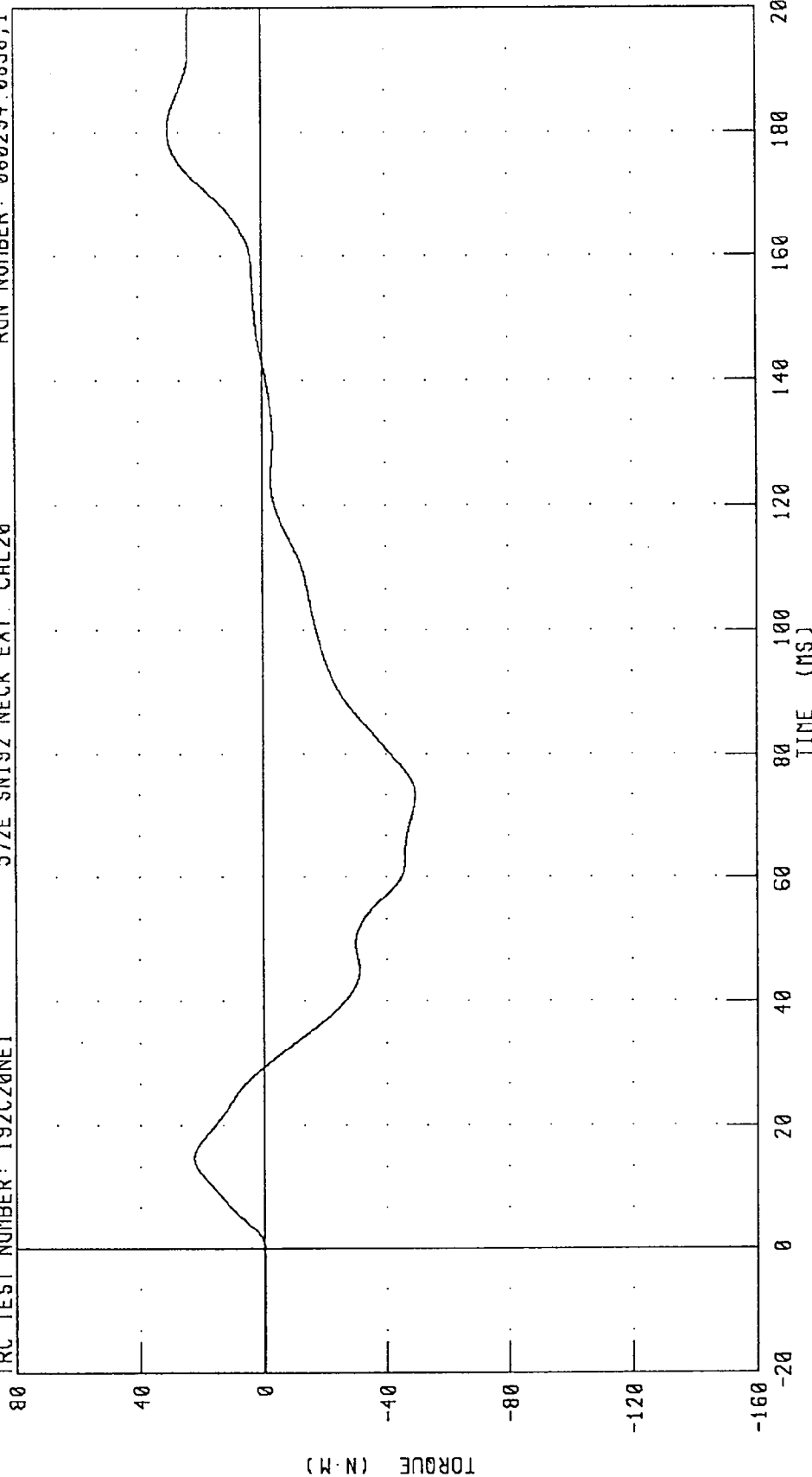
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

RUN NUMBER: 060294.0836;1

572E SN192 NECK EXT. CAL20

TRC TEST NUMBER: 192C20NE1



PEAK DATA: 30.25 N·M @ 180.40 MS; -49.37 N·M @ 73.28 MS

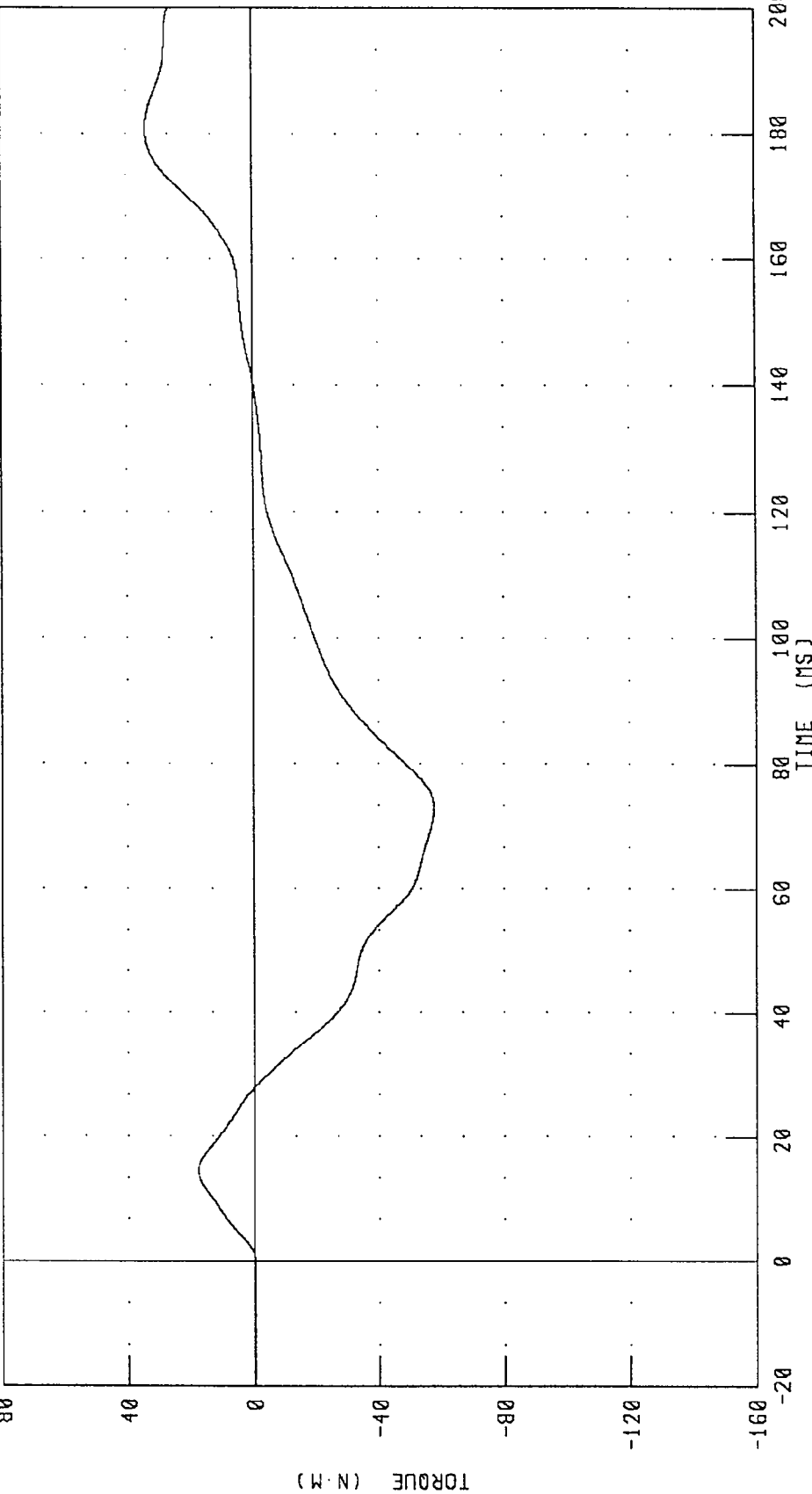
CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 192C20NE1

572E SN192 NECK EXT. CAL20

RUN NUMBER: 060294 0836,1



PEAK DATA: 33.89 N.M @ 180.88 MS, -57.63 N.M @ 72.88 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

18-MAY-94

TRC INC.

TEST NO: 192C20TH2

572E SN192 H.S.THORAX CAL20

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	54.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.65 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	65.7 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5680. N
INTERNAL HYSTERESIS	69% - 85%	74.0%

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete F. J.

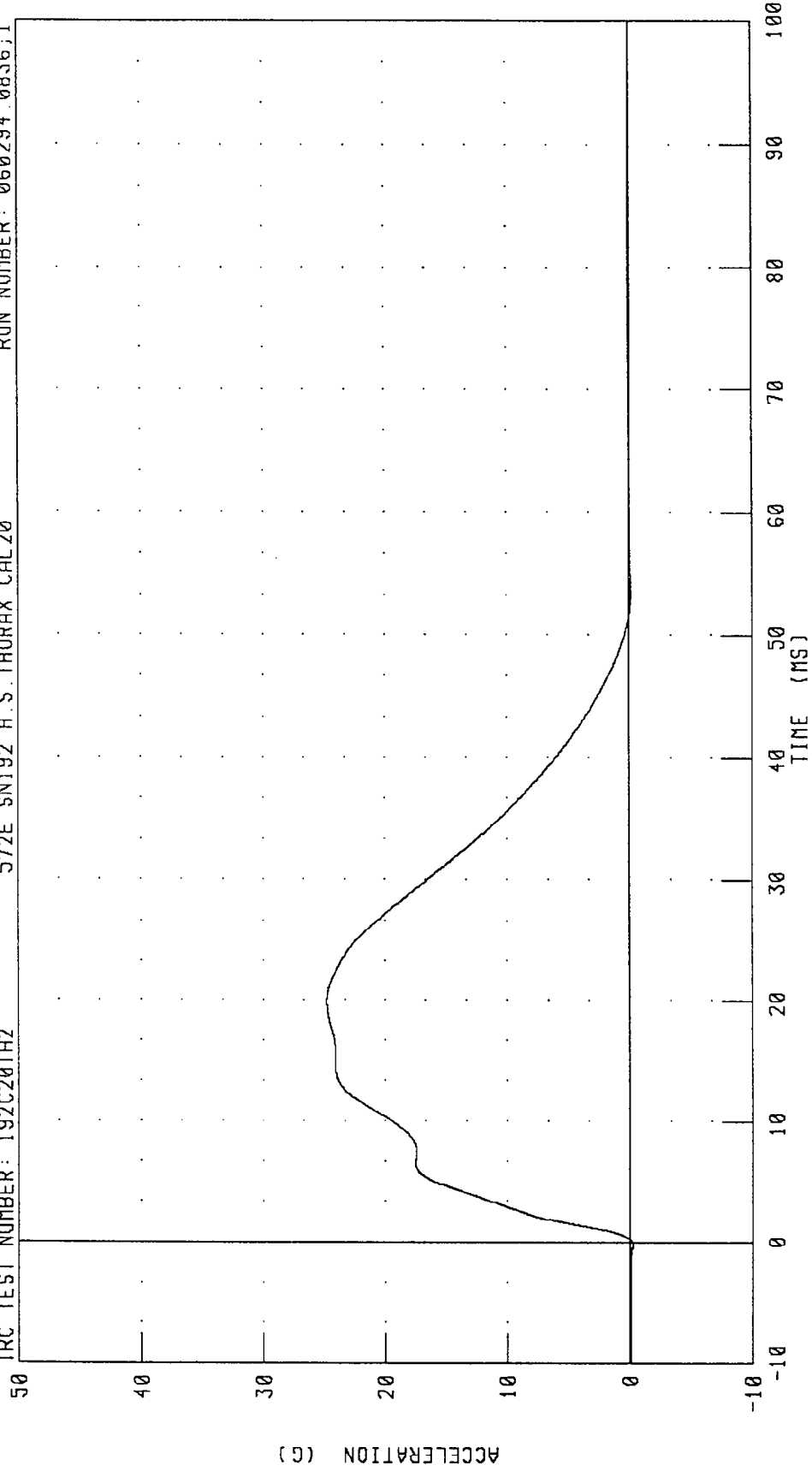
RUN NUMBER: 051894.0732;1

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 192C20TH2

572E SN192 H.S. THORAX CAL20

RUN NUMBER: 060294 0836;1

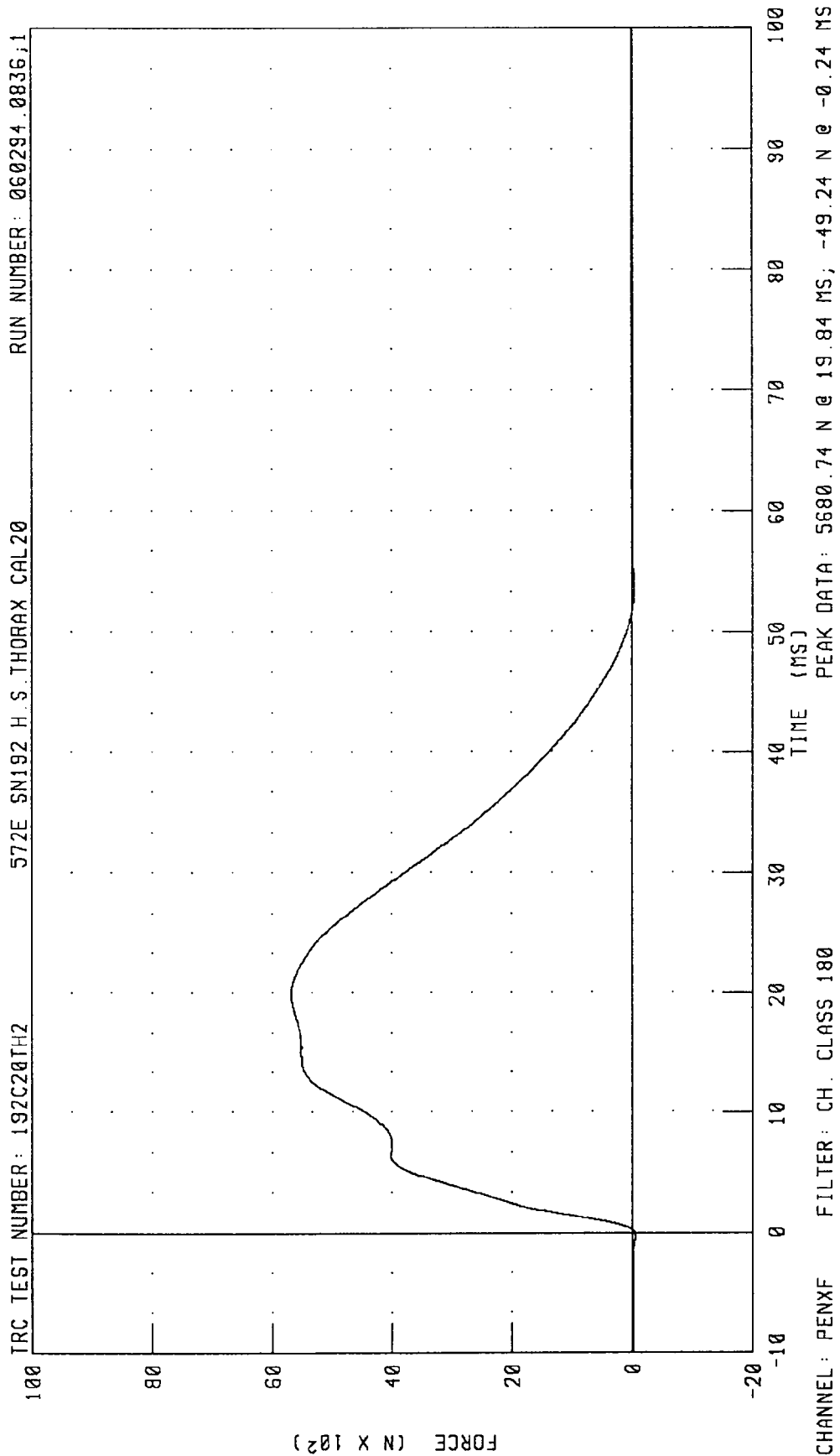


CHANNEL: PENXG

FILTER: CH. CLASS 180

PEAK DATA: 24.80 G @ 19.84 MS; -0.21 G @ -0.24 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE



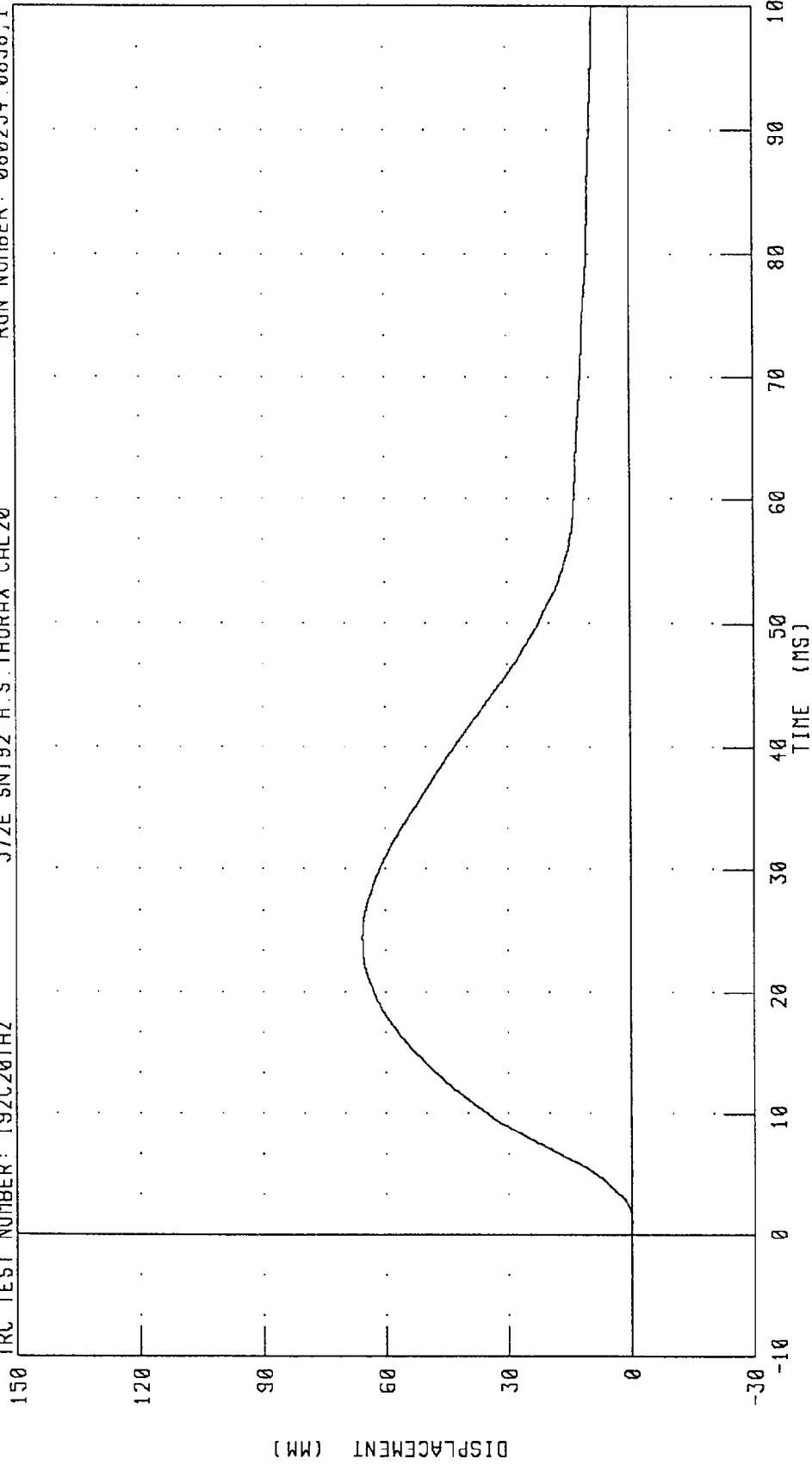
CHANNEL: PENXF FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 192C20TH2

572E SN192 H.S. THORAX CAL20

RUN NUMBER: 060294 0836.1

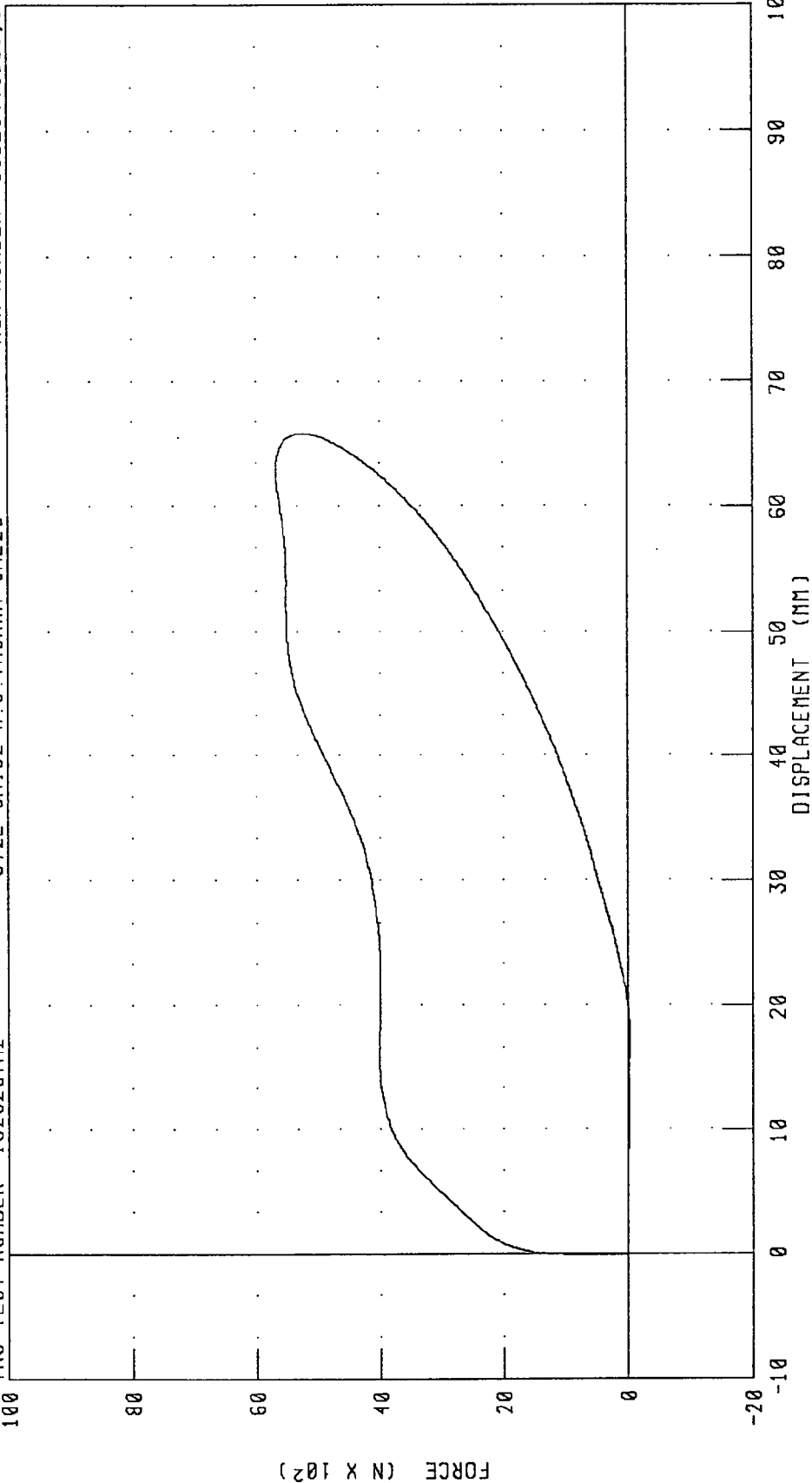


CHANNEL: CSTXD FILTER: CH. CLASS 180

PEAK DATA: 65.73 MM @ 24.32 MS; -0.06 MM @ 1.04 MS

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

TRC TEST NUMBER: 192C20TH2 572E SN192 H.S. THORAX CAL20 RUN NUMBER: 060294.0836;1



CHANNEL: CSTXD
PENXF

FILTER: CH. CLASS 180
CH. CLASS 180

PEAK DATA:

65.73 MM @ 24.32 MS; -0.06 MM @ 1.04 MS
5680.74 N @ 19.84 MS; -49.24 N @ -0.24 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

17-MAY-94

TRC INC.

TEST NO: 192C20RK1

572E SN192 RIGHT KNEE CAL 20

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	54.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4714 - 5783 N	5438.1 N

TEST MEETS SPECIFICATIONS

TECHNICIAN *Pat F. J.*

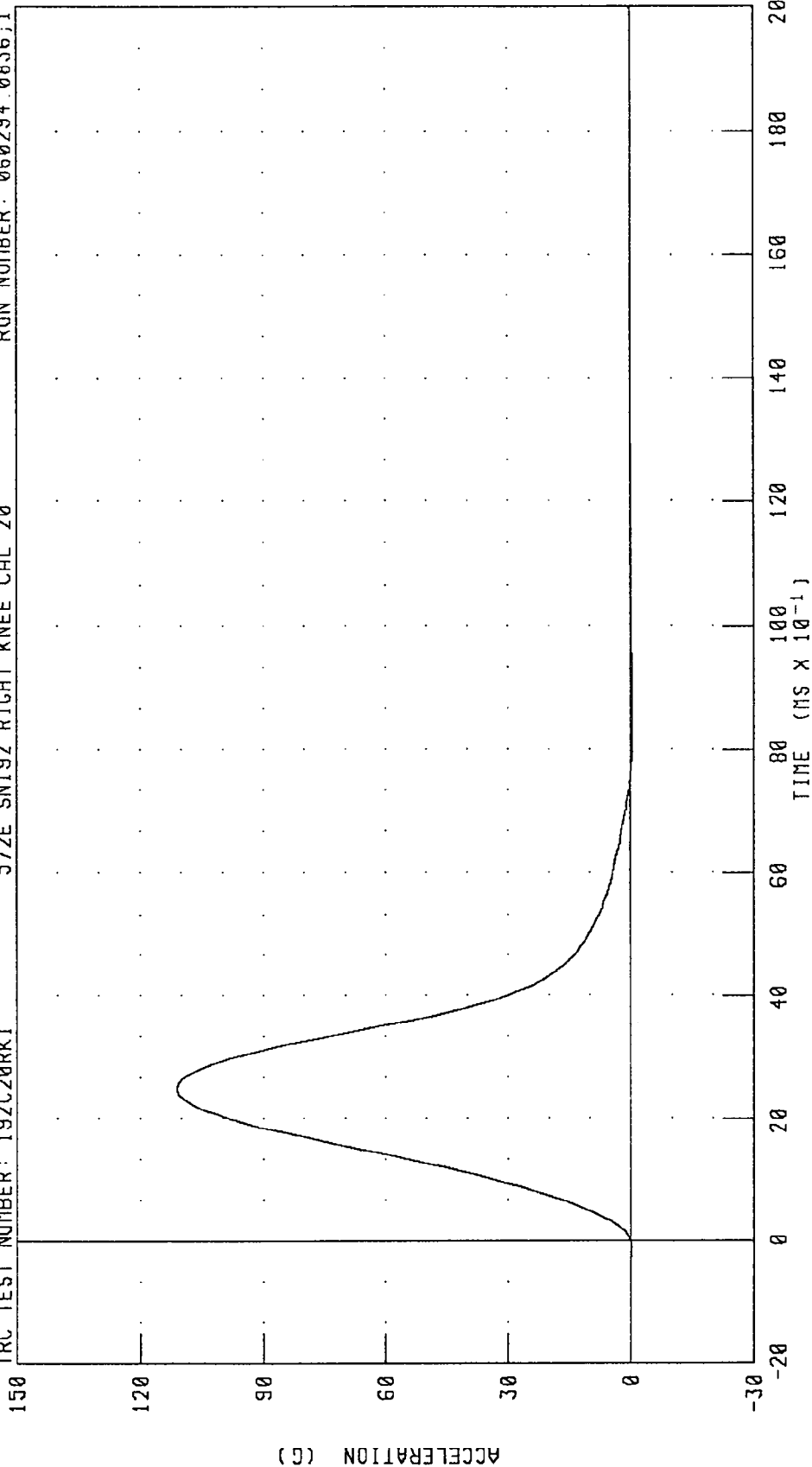
RUN NUMBER: 051794.1222;1

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

RUN NUMBER: 060294.0836;1

572E SN192 RIGHT KNEE CAL 20

TRC TEST NUMBER: 192C20RK1



CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 111.15 G @ 2.48 MS; -0.56 G @ 8.16 MS

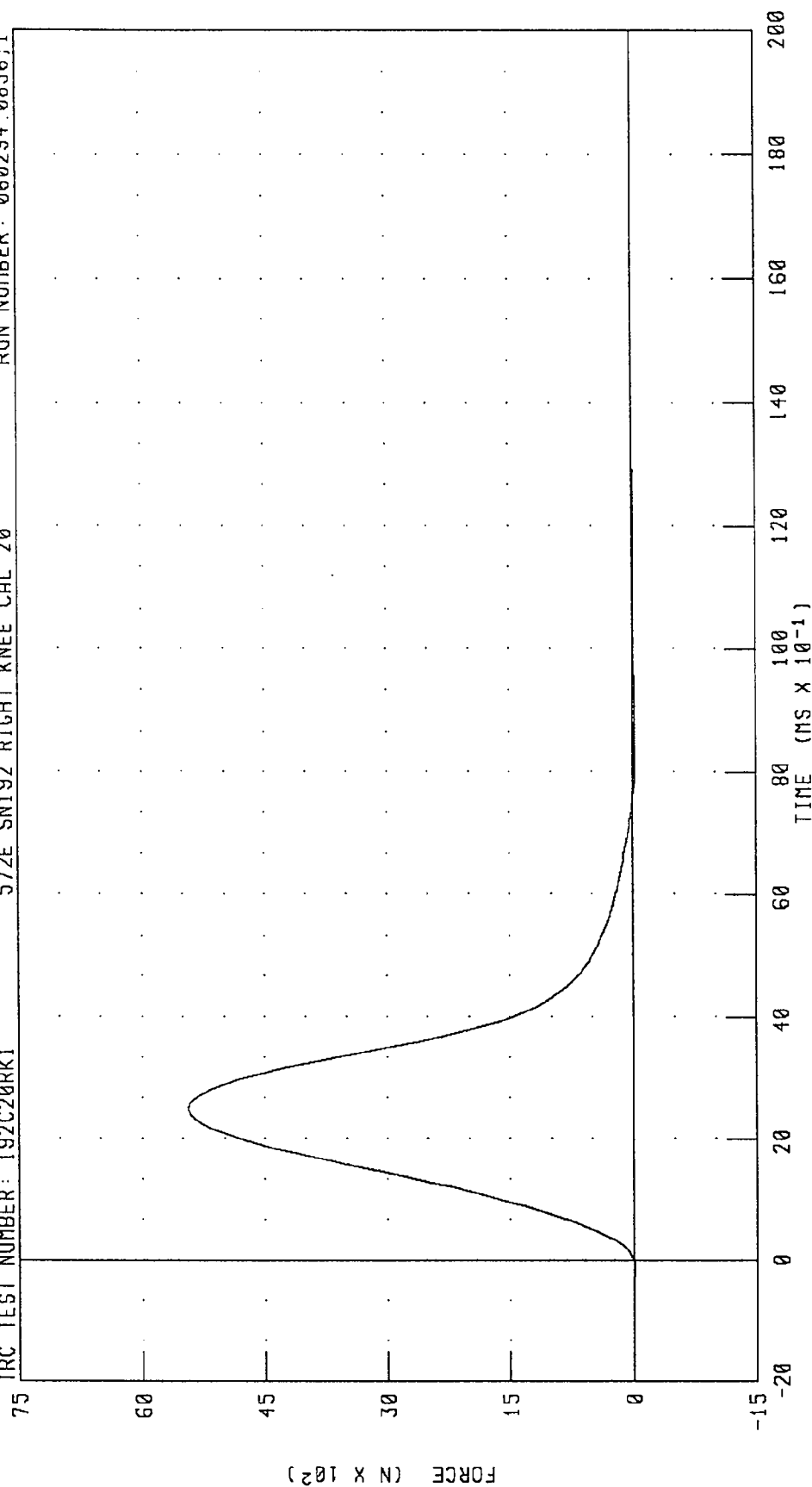
PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KC PEND.)

572E SNI92 RIGHT KNEE CAL 20

TRC TEST NUMBER: 192C20RK1

RUN NUMBER: 060294.0836;1



PEAK DATA: 5438.18 N @ 2.48 MS; -27.44 N @ 8.16 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

17-MAY-94

TRC INC.

TEST NO: 192C20LK1

572E SN192 LEFT KNEE CAL 20

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	54.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4714 - 5783 N	5282.8 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

Pete R. S.

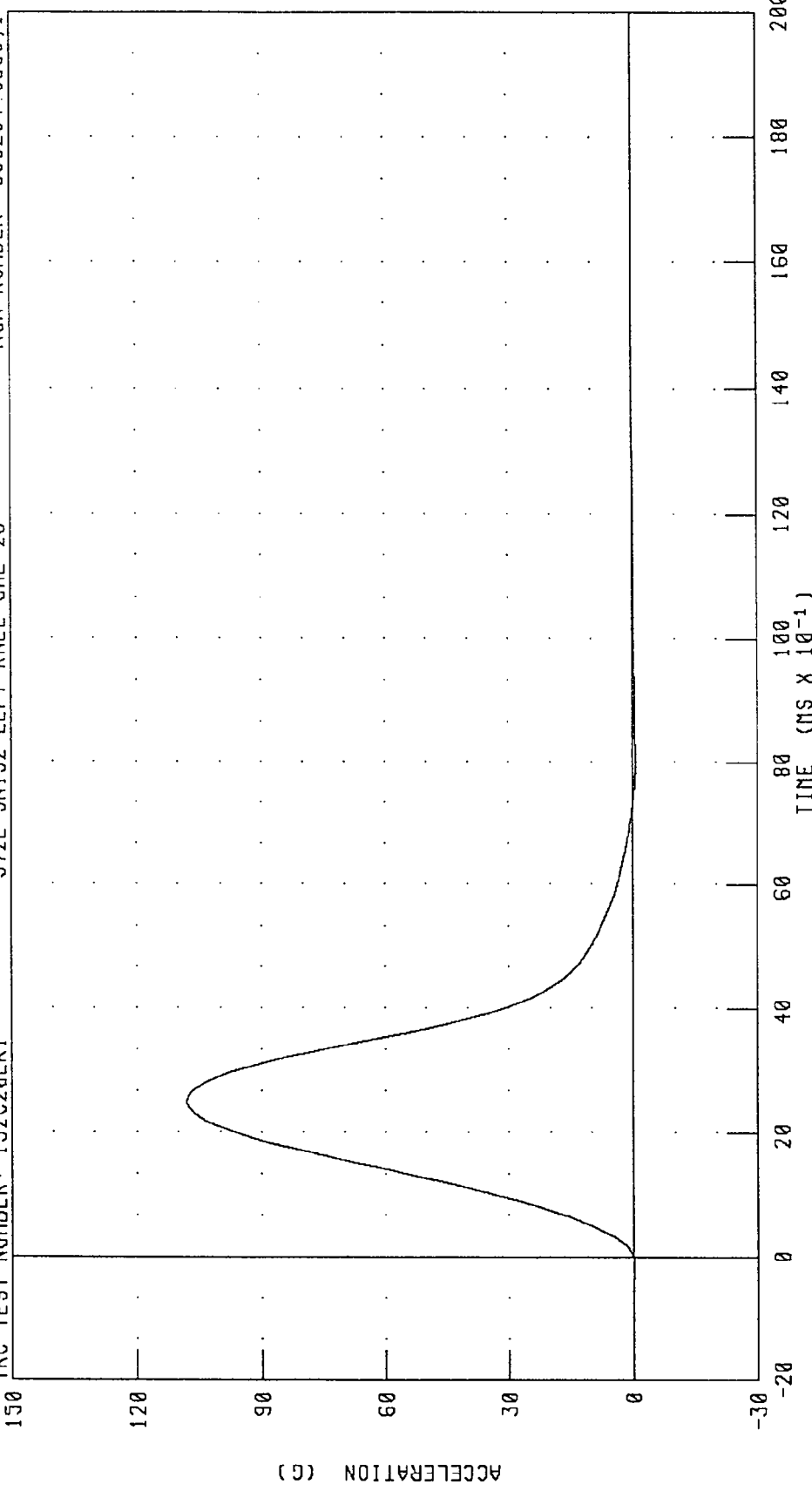
RUN NUMBER: 051794.1219;1

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

TRC TEST NUMBER: 192C20LK1

572E SN192 LEFT KNEE CAL 20

RUN NUMBER: 060294 0836.1



PEAK DATA: 107.97 G @ 2.48 MS; -0.66 G @ 8.00 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

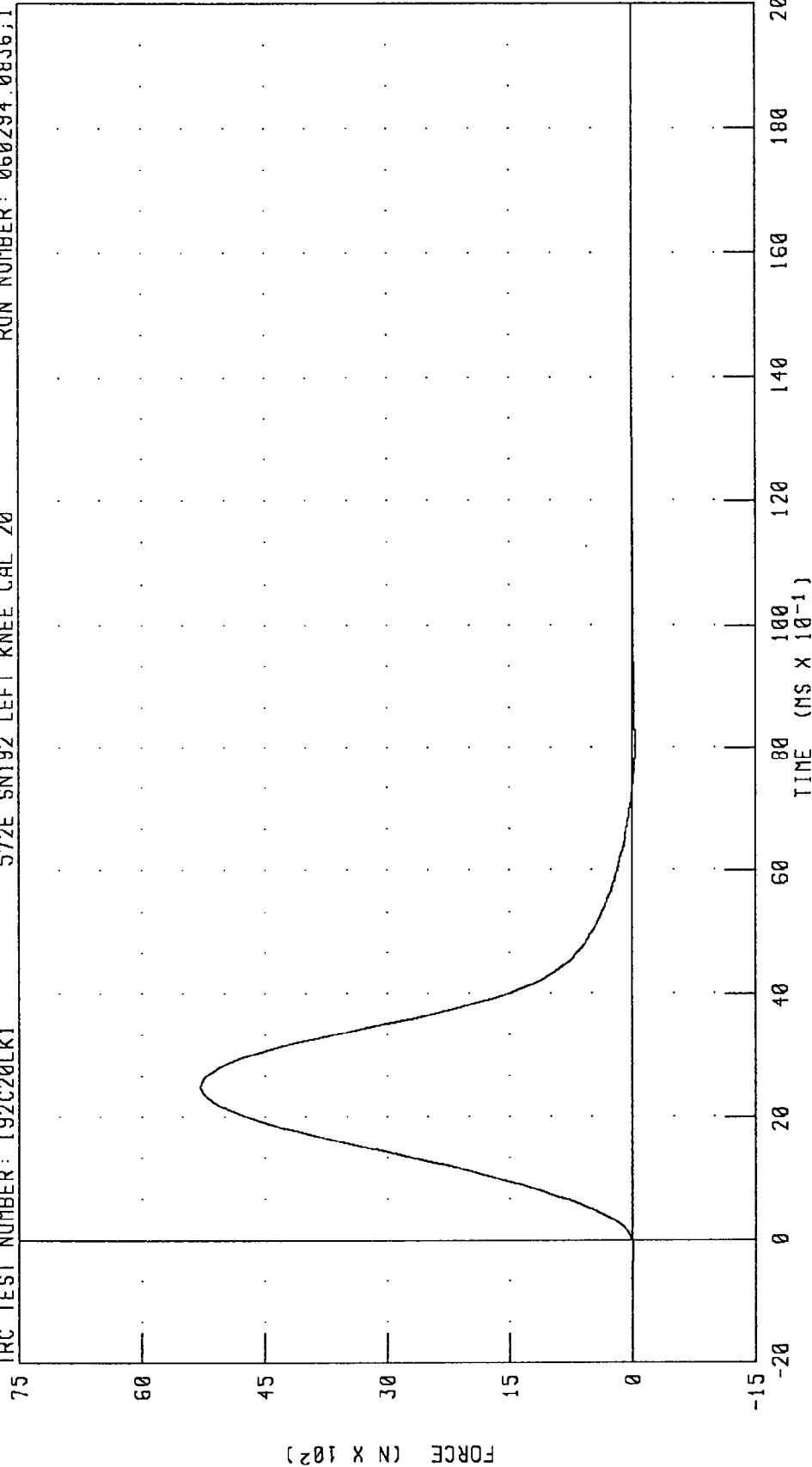
PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KC PEND.)

572E SN192 LEFT KNEE CAL 20

TRC TEST NUMBER: 192C20LK1

RUN NUMBER: 060294.0836.1



PEAK DATA: 5282.86 N @ 2.48 MS; -32.31 N @ 8.00 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #142

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCELEROMETER	FH25J	7264	ENDEVCO	03/28/94	09/28/94
Y-AXIS ACCELEROMETER	CY32H	7264	ENDEVCO	03/28/94	09/28/94
Z-AXIS ACCELEROMETER	DB81H	7264	ENDEVCO	03/28/94	09/28/94
CHEST X-AXIS ACCELEROMETER	DR49J7	7264	ENDEVCO	03/28/94	09/28/94
Y-AXIS ACCELEROMETER	AC8W6	7264	ENDEVCO	03/28/94	09/28/94
Z-AXIS ACCELEROMETER	CW42H	7264	ENDEVCO	03/28/94	09/28/94
LEFT FEMUR FORCE LOAD CELL	901	2430	GSE	03/25/94	09/25/94
RIGHT FEMUR FORCE LOAD CELL	902	2430	GSE	03/25/94	09/25/94
*NECK X-AXIS FORCE LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
Y-AXIS FORCE LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
Z-AXIS FORCE LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
*NECK MOMENT ABOUT X-AXIS LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
MOMENT ABOUT Y-AXIS LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
MOMENT ABOUT Z-AXIS LOAD CELL	0280	1716	DENTON	03/28/94	09/28/94
*CHEST DEFLECTION POTENTIOMETER	90320-B	81422A	VERNITECH	03/28/94	09/28/94
LAP BELT FORCE LOAD CELL	616	3419	LEBOW	02/22/94	08/22/94
SHOULDER BELT FORCE LOAD CELL	674	3419	LEBOW	02/22/94	08/22/94

*HYBRID III USE ONLY.

DUMMY INSTRUMENT CALIBRATIONS

RIGHT FRONT PASSENGER DUMMY #192

	SERIAL NO.	MODEL NO.	MFR.	CALIBRATION DATE	
				LAST	DUE
HEAD X-AXIS ACCELEROMETER	AAL82	7264	ENDEVCO	03/28/94	09/28/94
Y-AXIS ACCELEROMETER	A84JJ	7264	ENDEVCO	03/28/94	09/28/94
Z-AXIS ACCELEROMETER	A62FJ	7264	ENDEVCO	03/28/94	09/28/94
CHEST X-AXIS ACCELEROMETER	ACCJO	7264	ENDEVCO	03/28/94	09/28/94
Y-AXIS ACCELEROMETER	AC708	7264	ENDEVCO	03/28/94	09/28/94
Z-AXIS ACCELEROMETER	CW59H	7264	ENDEVCO	03/28/94	09/28/94
LEFT FEMUR FORCE LOAD CELL	986	2430	GSE	03/25/94	09/25/94
RIGHT FEMUR FORCE LOAD CELL	987	2430	GSE	03/25/94	09/25/94
*NECK X-AXIS FORCE LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
Y-AXIS FORCE LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
Z-AXIS FORCE LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
*NECK MOMENT ABOUT X-AXIS LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
MOMENT ABOUT Y-AXIS LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
MOMENT ABOUT Z-AXIS LOAD CELL	085	1716	DENTON	03/28/94	09/28/94
*CHEST DEFLECTION POTENTIOMETER	87313-96	81422A	VERNITECH	03/28/94	09/28/94
LAP BELT FORCE LOAD CELL	672	3419	LEBOW	02/22/94	08/22/94
SHOULDER BELT FORCE LOAD CELL	127	3419	LEBOW	02/22/94	08/22/94

*HYBRID III USE ONLY.

VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

	SERIAL NUMBER	MODEL NUMBER	MFR.	CALIBRATION DATE	
				LAST	DUE
LEFT REAR SEAT CROSSMEMBER X-AXIS	AGRG8	7264	ENDEVCO	02/10/94	08/10/94
LEFT REAR SEAT CROSSMEMBER X-AXIS REDUNDANT	AGRG5	7264	ENDEVCO	03/07/94	09/07/94
RIGHT REAR SEAT CROSSMEMBER X-AXIS	CR26H	7264	ENDEVCO	12/30/93	06/30/94
RIGHT REAR SEAT CROSSMEMBER X-AXIS REDUNDANT	CK32H	7264	ENDEVCO	03/07/94	09/07/94
ENGINE TOP X-AXIS	CC71H	7264	ENDEVCO	02/09/94	08/09/94
ENGINE BOTTOM X-AXIS	AC861	7264	ENDEVCO	04/28/94	10/28/94
RIGHT BRAKE CALIPER X-AXIS	CR26H	7264	ENDEVCO	12/30/93	06/30/94
LEFT BRAKE CALIPER X-AXIS	AGRG8	7264	ENDEVCO	02/10/94	08/10/94
INSTRUMENT PANEL CENTER X-AXIS	DR87J	7264	ENDEVCO	01/24/94	07/24/94

CALIBRATION LABORATORY INSTRUMENTS

	SERIAL NUMBER	MODEL NUMBER	MFR.	CALIBRATION DATE	
				LAST	DUE
NECK BENDING PENDULUM ACCELEROMETER	CB27	7232	ENDEVCO	04/04/94	10/04/94
NECK BENDING ROTARY POTENTIOMETER	NA	35435-1-102	BOURNES	MFR. SPECIFICATION	
NECK BENDING LINEAR POTENTIOMETER	NA	5184-2051846003	BOURNES	04/05/94	10/05/94
THORAX/HYBRID II FEMUR					
PENDULUM ACCELEROMETER	CC64	7232	ENDEVCO	04/04/94	10/04/94
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	04/05/94	10/05/94
ABDOMEN COMPRESSION FORCE GAUGE	3443	3167	LEBOW	04/05/94	10/05/94
HYBRID III FEMUR					
PENDULUM ACCELEROMETER	CG83	7232	ENDEVCO	04/04/94	10/04/94

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 217. **Figure 209**

+X: FORWARD
+Y: LEFTWARD
+Z: UPWARD

+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)

```
+FEMUR FORCE:      TENSION
+SEAT BELT FORCE:  TENSION
+BARRIER FORCE:   TENSION
```

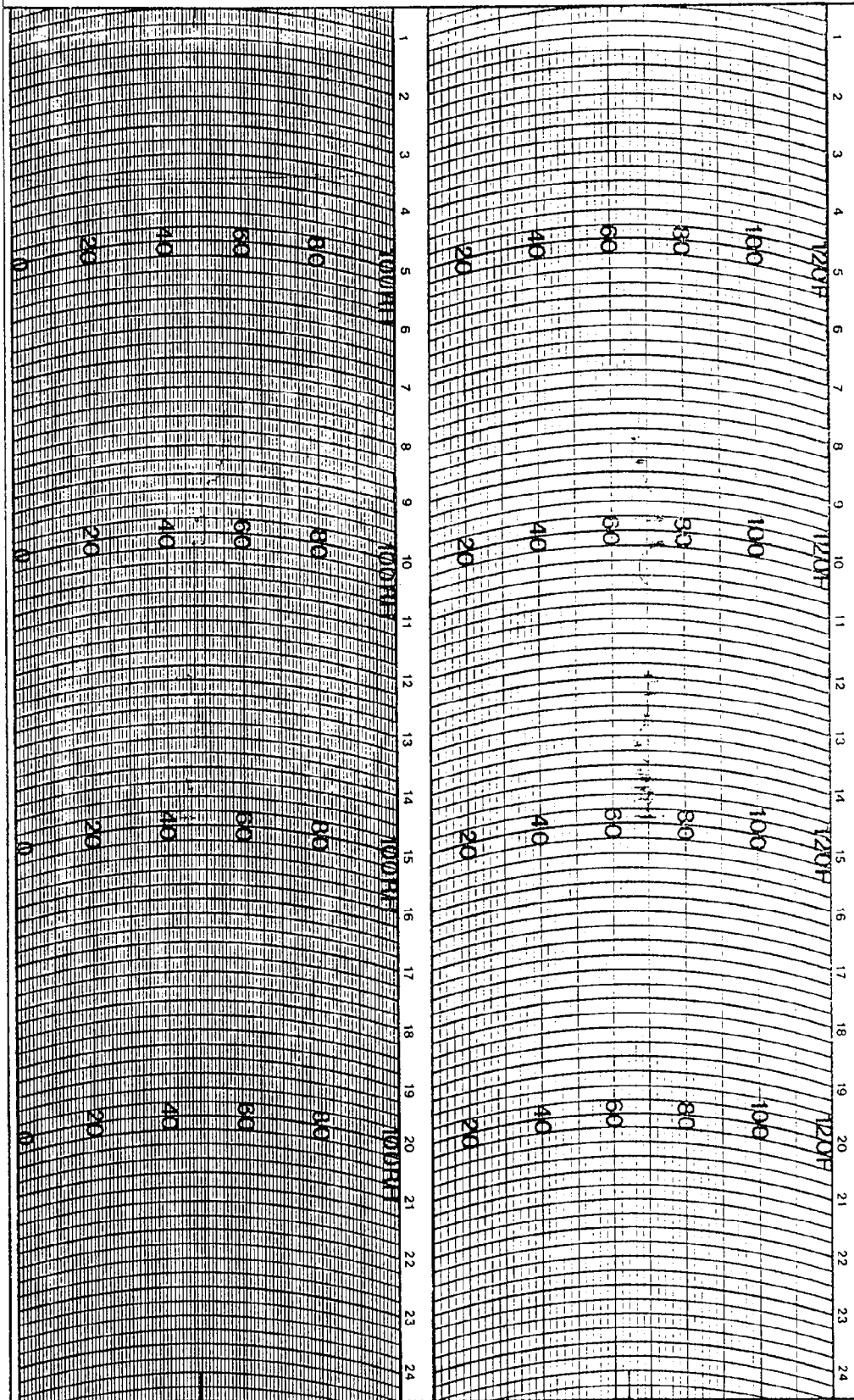
+X FORCE: HEAD PUSHED FORWARD
+Y FORCE: HEAD PUSHED LEFTWARD
+Z FORCE: HEAD PULLED UPWARD (TENSION ON NECK)
+X MOMENT: RIGHT EAR ROTATING TOWARD RIGHT SHOULDER
+Y MOMENT: CHIN ROTATING TOWARD CHEST
+Z MOMENT: CHIN ROTATING TOWARD LEFT SHOULDER

```
+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
Headform Accelerations	1000



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

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # G99123

STATION _____ DATE ON _____ DATE OFF _____

APPENDIX E

RESTRAINT SYSTEM INSTRUCTIONS FROM OWNER'S MANUAL

FEATURES OF YOUR HYUNDAI

ZB09041-A

SEAT BELT PRECAUTIONS

All occupants of the vehicle should wear their seat belts at all times. Your state's 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:

YB09082-A

Infant or Young Child

Some states require the use of child restraint systems for infants and young 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 young children weighing less than 40 pounds. Information about the use of such restraints is included on page 1-14.

NOTE:

Small children are best protected in an accident when properly restrained by an approved child restraint system.

ZB09001-A

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, the 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.

ZB09001-A

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.

ZB09001-A

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.

ZB09001-A

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.

YB09001-A

Do Not Lie Down

For maximum effectiveness, all passengers should be sitting up and the front seats should be in an upright position. 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 the fully reclined position.

ZB09001-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.

ZB09001-A

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.

FEATURES OF YOUR HYUNDAI

ZB090K1-A

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.

ZB090K1-A

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.

JB090Z1-B

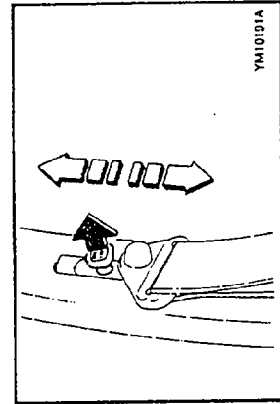
HEIGHT ADJUSTING FRONT SEAT BELT (If Installed)

You can adjust the height of the shoulder belt anchor to one of the 5 positions. If the height of the adjusting seat belt is too near your neck, you will not be getting the most effective protection.

To adjust the height of seat belt anchor, lower or raise the height adjuster into an appropriate position when the height adjuster knob is pulled up.

CAUTION:

The height adjuster must be in the lock position when the vehicle is moving.



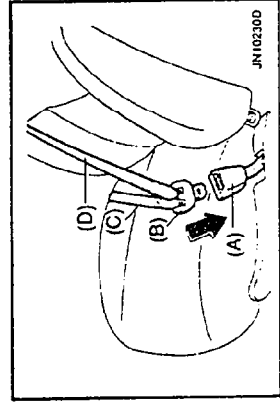
JB090L1-A

PASSIVE SEAT BELT

(Front passenger's seat)

Your Hyundai is equipped with a new restraint belt system for the front seat passenger to be restrained automatically as they sit down and close the door.

Your new safety seat belt system consists of a buckle (A), a tab (B), a lap belt (C), a shoulder belt (D), a lap belt retractor, a shoulder belt retractor, a shoulder belt upper anchor. Always make sure that the metal tab is inserted into the buckle before entering in your vehicle.



FEATURES OF YOUR HYUNDAI

JB090M1-A

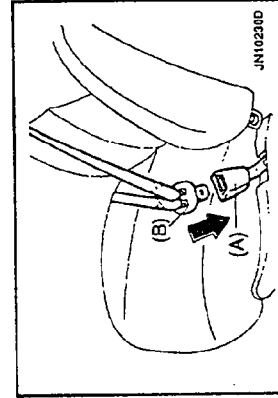
WARNING:

- o Be sure to lock all doors before driving away. Locking the doors, and using the seat belts provided, will minimize the risk of injury or ejection in an accident.
- o For maximum restraint system protection, securely fasten the lap/shoulder belt and close the door whenever the car is moving.
- o Front seat passenger should not ride in a moving vehicle with the seatback reclined. The safety seat belts operate securely only when the seatback is in an upright position.
- o Both arms should not be under or over the shoulder belt. Rather, one should be over and the other under, as shown in the illustration.
- o Do not wear the shoulder portion of the seat belt under your arm as this increases the possibility of serious injury to you in the event of an accident.
- o When wearing the passive seat belt, make sure that the belt is positioned midway over the shoulder-NEVER ACROSS THE NECK.
- o To operate the automatic lap/shoulder belt system, the tab should always remain inserted in the buckle. Release the lap/shoulder belt tab from the buckle only in an emergency.

JB090M1-A

How The Passive Seat Belt System Works

The metal tab (B) is always inserted in the buckle (A) except in an emergency. The other end of the belt is wound automatically on the Retractor inside of the door trim. When you open the front door, it extends the belt from the retractor and provides access to the interior. When the door is closed, the shoulder belt automatically places itself diagonally across the chest and the lap belt automatically places on your hips. You should place the lap belt as low as possible on your hips, not on your waist. The seat belt automatically adjusts to the proper length. 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.



1-11

FEATURES OF YOUR HYUNDAI

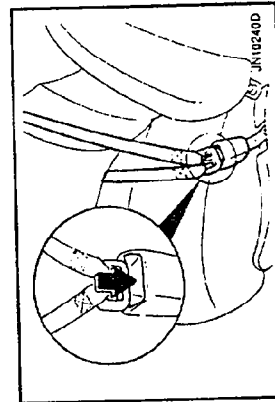
J809001-A

To Release The Seat Belt

If required, press the emergency release button on the buckle (A) marked "PRESS EMERGENCY". When it is released, the belt tab (B) should automatically draw back into the retractor.

NOTE:

For your safety, we recommend that you hold the tab (B) with your hand and allow it to retract slowly.



1-12

ZB00072-A

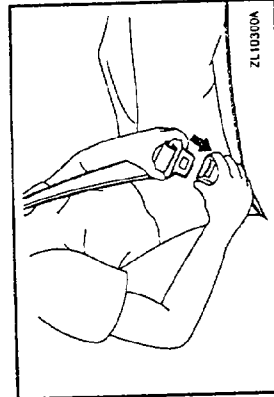
SEAT BELTS (3-Point Type) (Front driver's seat and rear seat outboard)

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 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



ZL10300A

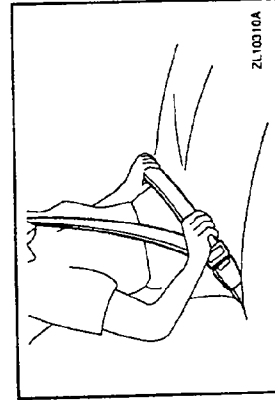
seat belt warning light will flash and the warning chime will sound for approximately six seconds.

ZB090011-B

Adjusting Your Seat Belt

WARNING:

Be sure the lap belt portion is fitted snugly and as low as possible around the hips, not around the waist. Failure to do so 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.



ZL10310A

FEATURES OF YOUR HYUNDAI

ZB050V1-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.

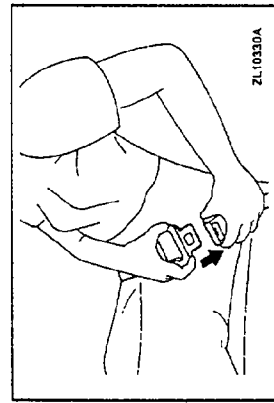


ZB050V1-A

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

To Fasten Your Belt

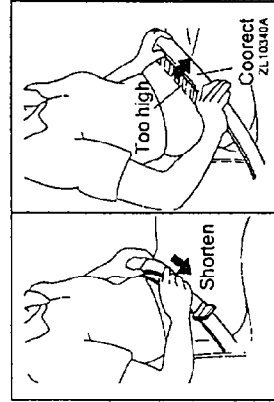
To fasten a 2-point static type belt, insert the metal tab into the locking buckle. There will be an audible "click" when the tab locks into the buckle. Check to make sure the belt is properly locked and that the belt is not twisted.



ZB090X1-A

Adjusting Your Belt

With a 2-point static type, the length must be adjusted manually so it fits snugly around your body. 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.



1-13

FEATURES OF YOUR HYUNDAI

Y3080Y1-A

Releasing the Belt

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

CAUTION:

The center lap belt latching mechanism is different from the those of 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 protection from the seat belt system.

JB100A1-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.

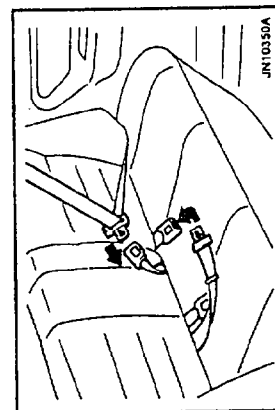
For smaller children, we strongly recommend the use of a commercially available child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards (FMVSS), because it offers the most protection against injury or death. All states now have laws which require that small children below a specified age or weight 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 suffer serious injury or death in an accident, sudden stop or maneuver if their restraints are not properly secured. For small children and infants we strongly recommend an approved 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.

Z3100B2-A

CAUTION:

- 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 accident.
- o On passive restraint vehicles, it is recommended that a child restraint system be placed in the vehicle's rear seat since this can make an important contribution to safety.
- 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.



JN10030A

1-14

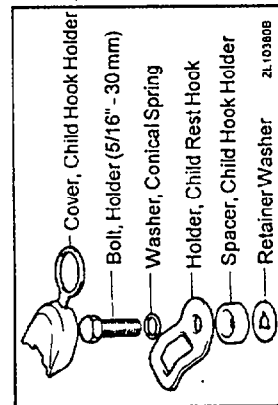
FEATURES OF YOUR HYUNDAI

- 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. This could result in serious injury or death 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.

ZB100C2-A

Using a Child Restraint System

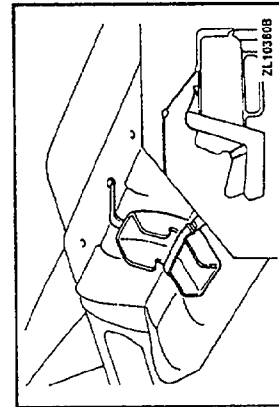
To install a child hook holder, use a 5/16" 18 UNC thread bolt and 11mm spacer as indicated in the illustration below. You can damage the holder nut on your vehicle if you force a bolt with a different thread into the holder nut. In addition to the bolt, you may also need a spacer and a locking clip depending on the vehicle or the position in which the child seat is installed. If these parts do not come with your child seat, you can purchase them from your Hyundai dealer.



YB100D1-A

CHILD HOOK HOLDER NUT LOCATION

The child hook holder nut is located on the rear seat package tray.



1-15

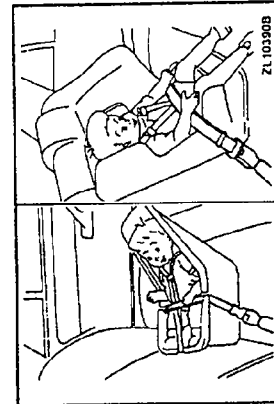
FEATURES OF YOUR HYUNDAI

JB100F1-A

Installation on Rear Seat Center

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 hook restraint tether strap into the child 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.



1-16

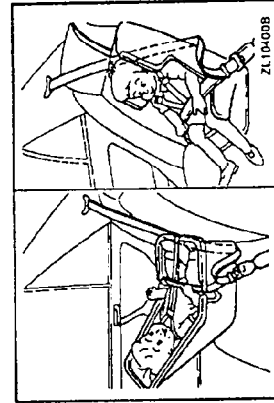
ZB100G1-A

Outboard Shoulder/Lap Belt

Secure the child restraint with the lap belt as illustrated. To prevent slack in the lap belt, it will be necessary to secure the lap/shoulder belt in place with a locking clip. If your child restraint has a top strap, secure the child rest hook holder to the provided anchorage. Secure the child restraint with the outboard lap belt of the rear seat and latch the top strap hook onto the anchor bracket.

NOTE:

- o Before using the locking clip, read the instructions supplied by the manufacturer.
- o Child restraint anchors are designed to withstand only those loads imposed by correctly fitted child restraints. Under no circumstances are they to be used for adult seat belts or harnesses.



JB100H1-A

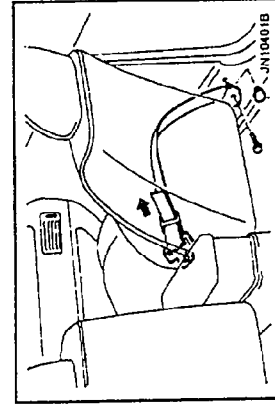
Installation on Front Seat

When using a child restraint system in the front passenger seat, you must install an optional lap belt, because the automatic lap/shoulder belt can't properly hold a child restraint system.

Therefore, in your vehicle there is an anchorage hole on the side sill of the lower center pillar to use when installing a lap belt for the child restraint system.

When installing the optional lap belt and child restraint system, you must install as follows while referencing the USE INSTRUCTIONS supplied by the manufacturer of the child restraint system.

1. Move the front seat, forward.
2. After removing the plug on the side sill of the lower center pillar, install the tab of the lap belt into the anchorage hole.



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3. After placing the child restraint system on the seat, fasten it down with the lap belt, then tighten the belt properly.

CAUTION:

- o It is recommended that you do not use the front passenger seat for a child restraint system if possible.
- o The optional lap belt used to restrain the child restraint system should always satisfy the Federal Motor Vehicle Safety Standards 209 "SEAT BELT ASSEMBLY" requirement. The optional lap belt is for a child seat only. Do not use it for any other purpose.

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SUPPLEMENTAL RESTRAINT (AIRBAG) SYSTEM - DRIVER'S SIDE ONLY

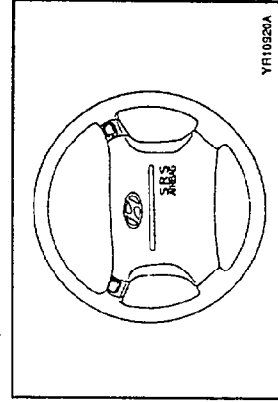
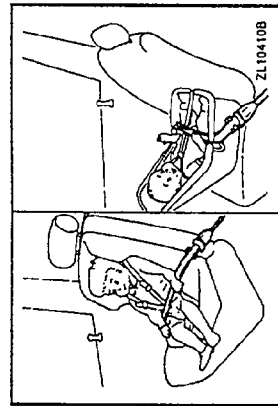
Your Hyundai is equipped with a Supplemental Restraint System (SRS) on the driver's side. The indication of the system's presence is the letters "SRS AIRBAG" embossed on the steering wheel pad.

The Hyundai SRS consists of an airbag installed under the pad cover in the center of the steering wheel.

The purpose of the SRS is to provide a vehicle's driver with greater protection than that offered by the seat-belt system alone, in case of a frontal impact of sufficient severity.

NOTE:

Be sure to read information about SRS on the labels provided on the backside of the sun



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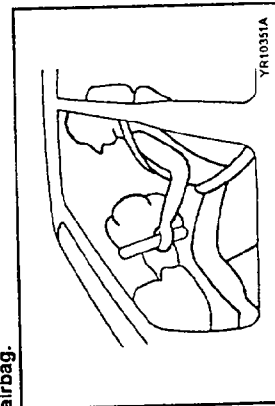
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WARNING:

As its name implies, the SRS is designed to work with, and be supplemental to, the driver's three point seat belt system and is not a substitute for it. In addition, it deploys only in certain frontal impact conditions severe enough to likely cause significant injury to the vehicle occupants.

The SRS does not deploy the airbag when the impact angle is greater than 30° from the forward longitudinal axis of the vehicle such as side, rear or rollover impacts.

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.



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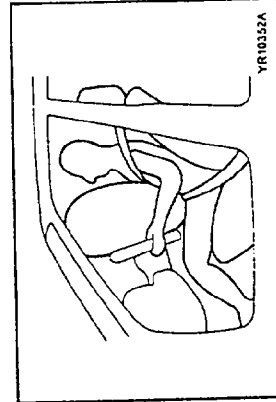
SRS Components and Functions

The SRS consists of the following components:

- Driver'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.

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.

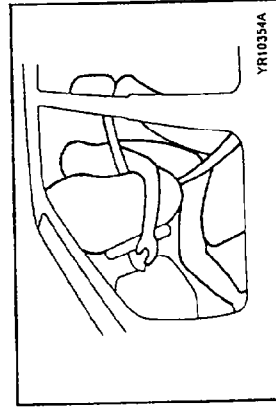


The airbag module is located in the centre of the steering wheel. When the SRSCM detects a considerable impact on the front of the vehicle, it will automatically deploy the airbag.

Upon deployment, tear seams molded directly onto the pad cover will separate under pressure from the expansion of the airbag, further opening of the cover then allows full inflation of the airbag.

A fully inflated airbag in combination with a properly worn seat belt slows the driver'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 and the ability to steer the vehicle.



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WARNING:

- o When the SRS is activated, there may be a loud noise and fine dust will be released. 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 airbag was deployed.
- o The SRS can function only when the ignition key is in the "ON" position. If the 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. You should immediately have it inspected by an authorized 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 first.
- o Never remove or replace fuse No. 15 when the ignition key is in the "ON" position. Failure to heed this warning will cause the SRS SRI to illuminate.

SRS Care

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 car manufacture date.

Any work on the airbag 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 cover or modifications to the body structure, can adversely affect SRS performance and lead to possible injury.
- o For cleaning the horn pad, use only a soft, dry cloth or one which has been moistened with plain water. Solvents or cleaners could adversely affect the airbag cover and proper deployment of the system.

- o No objects should be placed over or near the label identifying the airbag on the steering wheel and instrument panel, because any such object could cause harm if the vehicle is in a crash severe enough to cause the airbag to inflate.
- o If the airbag inflates, it 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 airbag or by rendering the SRS inoperative.
- 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 together with the vehicle.