

REPORT NO. TRC-93-N03

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

CHRYSLER CORPORATION

1994 DODGE SPIRIT

4-DOOR SEDAN

NHTSA NO. MR0304

TRC TEST NO. 931020

PREPARED BY:

TRANSPORTATION RESEARCH CENTER INC.

10820 STATE ROUTE 347

EAST LIBERTY, OHIO 43319



NOVEMBER 12, 1993

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

ROOM NO. 5313 (NRM-22)

400 SEVENTH STREET, S.W.

WASHINGTON, D.C. 20590

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| 16. Abstract<br><br>A 56 kph (35 mph) frontal load cell barrier impact test was conducted on a 1994 Dodge Spirit, NHTSA No. MR0304, at Transportation Research Center Inc. on October 20, 1993. 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 656 millimeters. The ambient temperature was 22° C.<br><br>The driver's Head Injury Criteria (HIC) was 778. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 43.9 g. The driver's chest maximum deflection was 42 millimeters. The driver's left and right femur maximum axial forces were 6379 N and 2780 N, respectively.<br><br>The passenger's HIC was 807. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 51.0 g. The passenger's chest maximum deflection was 52 millimeters. The passenger's left and right femur maximum axial forces were 2600 N and 4599 N, respectively. |  |                                                      |  |                                                                                                                                                                                                                                     |  |
| 17. Key Words<br>56.3 KPH (35 MPH) Frontal Barrier Impact Test:<br><br>New Car Assessment Program (NCAP)<br>FMVSS 208, "Occupant Crash Protection"<br>FMVSS 212, "Windshield Retention"<br>FMVSS 219, "Windshield Zone Intrusion"<br>FMVSS 301, "Fuel System Integrity"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                                                      |  | 18. Distribution Statement<br>Copies of this report are available from:<br>National Highway Traffic Safety Admin.<br>Technical Reference Division<br>Nassif Building, Room 5108<br>400 Seventh Street, S.W.<br>Washington, DC 20590 |  |
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# METRIC CONVERSION FACTORS

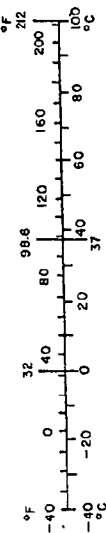
## Approximate Conversions to Metric Measures

| Symbol                     | When You Know          | Multiply by                | To Find             | Symbol          |
|----------------------------|------------------------|----------------------------|---------------------|-----------------|
| <b>LENGTH</b>              |                        |                            |                     |                 |
| in                         | inches                 | 2.5                        | centimeters         | cm              |
| ft                         | feet                   | 30                         | meters              | m               |
| yd                         | yards                  | 0.9                        | kilometers          | km              |
| mi                         | miles                  | 1.6                        |                     |                 |
| <b>AREA</b>                |                        |                            |                     |                 |
| in <sup>2</sup>            | square inches          | 6.5                        | square centimeters  | cm <sup>2</sup> |
| ft <sup>2</sup>            | square feet            | 0.09                       | square meters       | m <sup>2</sup>  |
| yd <sup>2</sup>            | square yards           | 0.8                        | square meters       | m <sup>2</sup>  |
| mi <sup>2</sup>            | square miles           | 2.6                        | square kilometers   | km <sup>2</sup> |
|                            | acres                  | 0.4                        | hectares            | ha              |
| <b>MASS (weight)</b>       |                        |                            |                     |                 |
| oz                         | ounces                 | 28                         | grams               | g               |
| lb                         | pounds                 | 0.45                       | kilograms           | kg              |
|                            | short tons             | 0.9                        | tonnes              | t               |
|                            | (2000 lb)              |                            |                     |                 |
| <b>VOLUME</b>              |                        |                            |                     |                 |
| 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 <sup>3</sup>            | cubic feet             | 0.03                       | cubic meters        | m <sup>3</sup>  |
| yd <sup>3</sup>            | cubic yards            | 0.76                       | cubic meters        | m <sup>3</sup>  |
| <b>TEMPERATURE (exact)</b> |                        |                            |                     |                 |
| °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 NBS Misc. Publ. 285, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10.285.

## Approximate Conversions from Metric Measures

| Symbol                     | When You Know                     | Multiply by       | To Find                | Symbol          |
|----------------------------|-----------------------------------|-------------------|------------------------|-----------------|
| <b>LENGTH</b>              |                                   |                   |                        |                 |
| mm                         | millimeters                       | 0.04              | inches                 | in              |
| cm                         | centimeters                       | 0.4               | inches                 | in              |
| m                          | meters                            | 3.3               | feet                   | ft              |
| km                         | kilometers                        | 1.1               | yards                  | yd              |
|                            |                                   | 0.6               | miles                  | mi              |
| <b>AREA</b>                |                                   |                   |                        |                 |
| cm <sup>2</sup>            | square centimeters                | 0.16              | square inches          | in <sup>2</sup> |
| m <sup>2</sup>             | square meters                     | 1.2               | square yards           | yd <sup>2</sup> |
| km <sup>2</sup>            | square kilometers                 | 0.4               | square miles           | mi <sup>2</sup> |
| ha                         | hectares (10,000 m <sup>2</sup> ) | 2.5               | acres                  |                 |
| <b>MASS (weight)</b>       |                                   |                   |                        |                 |
| g                          | grams                             | 0.035             | ounces                 | oz              |
| kg                         | kilograms                         | 2.2               | pounds                 | lb              |
| t                          | tonnes (1000 kg)                  | 1.1               | short tons             |                 |
| <b>VOLUME</b>              |                                   |                   |                        |                 |
| ml                         | milliliters                       | 0.03              | fluid ounces           | fl oz           |
| l                          | liters                            | 2.1               | pints                  | pt              |
| l                          | liters                            | 1.06              | quarts                 | qt              |
| l                          | liters                            | 0.26              | gallons                | gal             |
| m <sup>3</sup>             | cubic meters                      | 35                | cubic feet             | ft <sup>3</sup> |
| m <sup>3</sup>             | cubic meters                      | 1.3               | cubic yards            | yd <sup>3</sup> |
| <b>TEMPERATURE (exact)</b> |                                   |                   |                        |                 |
| °C                         | Celsius temperature               | 9/5 (then add 32) | Fahrenheit temperature | °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 Dodge Spirit 4-door sedan, NHTSA No. MR0304, 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, two (2) string potentiometers to measure shoulder belt displacement, and two (2) linear potentiometers to measure shoulder belt stretch. 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 is the third use for both dummies which were used previously in NHTSA Test Numbers MR0100 and MR0301.

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 fifteen (15) 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 October 20, 1993.

The test vehicle, a 1994 Dodge Spirit 4-door sedan, NHTSA No. MR0304, was equipped with a 2.5-liter transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 1494 KG. The vehicle's impact speed was 56.3 kph. The vehicle sustained 656 mm of static crush during the impact.

The driver's Head Injury Criteria (HIC) was 778. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 43.9 g. The driver's chest maximum deflection was 42 mm. The driver's left and right femur maximum axial forces were 6379 N and 2780 N, respectively.

The passenger's HIC was 807. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 51.0 g. The passenger's chest maximum deflection was 52 mm. The passenger's left and right femur maximum axial forces were 2600 N and 4599 N, respectively.

The loss of windshield periphery retention length was 117 mm extending from 418 to 535 mm from the lower left corner, and 53 mm extending from 672 to 725 mm from the lower left corner.

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 right brake caliper X-axis accelerometer, BCRXG1, lost data at 77 milliseconds as a result of the accelerometer cable being cut by the vehicle's crush on impact.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: MRO304 TEST TYPE: Frontal Load Cell Barrier

TEST DATE: 10/20/93 TEST TIME: 1441 AMBIENT TEMP.: 22° C

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1994/Dodge/Spirit/4-door sedan

VEHICLE TEST WEIGHT (KG): 1494

IMPACT ANGLE (DEG)<sup>1</sup>: 0

IMPACT VELOCITY (KPH)<sup>2</sup>: PRIMARY = 56.3 SECONDARY = 56.3

MAXIMUM STATIC CRUSH (MM): 656

AVERAGE REBOUND (MM): 708

DUMMIES: Driver #142 Passenger #192

TYPE: Part 572 E Part 572 E

LOCATION: Left front Right front

RESTRAINT: 3-point unbelt and airbag 2-point passive belt and lap belt

NUMBER OF DATA CHANNELS: 83

NUMBER OF CAMERAS: HIGH-SPEED 15 REAL-TIME 2

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

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Chrysler Corporation

MAKE/MODEL: Dodge/Spirit

VIN: 3B3AA46K2RT212885

BODY STYLE: 4-door sedan

MODEL YEAR: 1994

NHTSA NO.: MR0304

COLOR: White

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 2.5-liter

TRANSMISSION DATA: 3 SPEED,     MANUAL, X AUTOMATIC, X FWD,     RWD,     4WD

DATE VEHICLE RECEIVED: 09/27/93

ODOMETER READING: 56

DEALER'S NAME AND ADDRESS: Spitzer - Columbus, Inc.  
5100 East Main St.  
Columbus, OH 43213

ACCESSORIES:

|                |      |                            |     |
|----------------|------|----------------------------|-----|
| POWER STEERING | Yes  | AUTOMATIC TRANSMISSION     | Yes |
| POWER BRAKES   | Yes  | AUTOMATIC SPEED CONTROL    | Yes |
| 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          | None |                            |     |

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: Chrysler Corporation

DATE OF MANUFACTURE: 08/93 VIN: 3B3AA46K2RT212885

GVWR: 1814 KG

GAWR: FRONT: 1001 KG, REAR: 836 KG

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Goodyear, Invicta GA, P185/70R14

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

SPARE TIRE (MFR., LINE, SIZE): Goodyear, Invicta GA, P185/70D14

TYPE OF SEATS: FRONT: Split bench  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Electronically-adjustable

MAXIMUM WIDTH: 1740 MM

WHEELBASE: 2635 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: P185/70R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 240 kPa; REAR: 240 kPa

DESIGNATED SEATING CAPACITY: 3 FRONT 3 REAR 6 TOTAL

VEHICLE CAPACITY WEIGHT: 460 KG

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE: LF 708; RF 712; LR 696; RR 695

PRE-TEST ATTITUDE: LF 698; RF 695; LR 653; RR 647

POST-TEST ATTITUDE: LF 639; RF 689; LR 635; RR 655

TABLE 2 TEST VEHICLE INFORMATION, CONT'D.

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

|                        |         |                                 |        |
|------------------------|---------|---------------------------------|--------|
| RIGHT FRONT            | 400 KG  | RIGHT REAR                      | 233 KG |
| LEFT FRONT             | 422 KG  | LEFT REAR                       | 236 KG |
| TOTAL FRONT WEIGHT     | 822 KG  | (63.7% OF TOTAL VEHICLE WEIGHT) |        |
| TOTAL REAR WEIGHT      | 469 KG  | (36.3% OF TOTAL VEHICLE WEIGHT) |        |
| TOTAL DELIVERED WEIGHT | 1291 KG |                                 |        |

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW<sup>1</sup> = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (1291 KG)

VCW = VEHICLE CAPACITY WEIGHT (460 KG)

DSC = DESIGNATED SEATING CAPACITY (6)

RCLW<sup>1</sup> = VCW - 68 (DSC) = 460 - 68(6) = 52 KG

TARGET TEST WEIGHT=UDW + RCLW<sup>1</sup> + (NO. OF HYBRID III DUMMIES X 76 KG/DUMMY)

TARGET TEST WEIGHT = 1291 + 52 + 152

TARGET TEST WEIGHT = 1495 KG

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 51 KG OF CARGO WEIGHT:

|                    |         |                                 |        |
|--------------------|---------|---------------------------------|--------|
| RIGHT FRONT        | 428 KG  | RIGHT REAR                      | 308 KG |
| LEFT FRONT         | 446 KG  | LEFT REAR                       | 312 KG |
| TOTAL FRONT WEIGHT | 874 KG  | (58.5% OF TOTAL VEHICLE WEIGHT) |        |
| TOTAL REAR WEIGHT  | 620 KG  | (41.5% OF TOTAL VEHICLE WEIGHT) |        |
| TOTAL TEST WEIGHT  | 1494 KG | (0.1% UNDER TARGET TEST WEIGHT) |        |

WEIGHT OF BALLAST SECURED IN VEHICLE: 0 KG

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

CG = 1094 MM REARWARD OF FRONT WHEEL CENTERLINE

<sup>1</sup>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: 931020 NHTSA NO.: MR0304  
TEST DATE: 10/20/93 TEST TIME: 1441  
TEST TYPE: Frontal load cell barrier IMPACT ANGLE: 0°  
AMBIENT TEMPERATURE AT IMPACT AREA: 22° 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 4486; C 4625; R 4490

POST-TEST: L 3927; C 3969; R 3941

TOTAL CRUSH: L 559; C 656; R 549

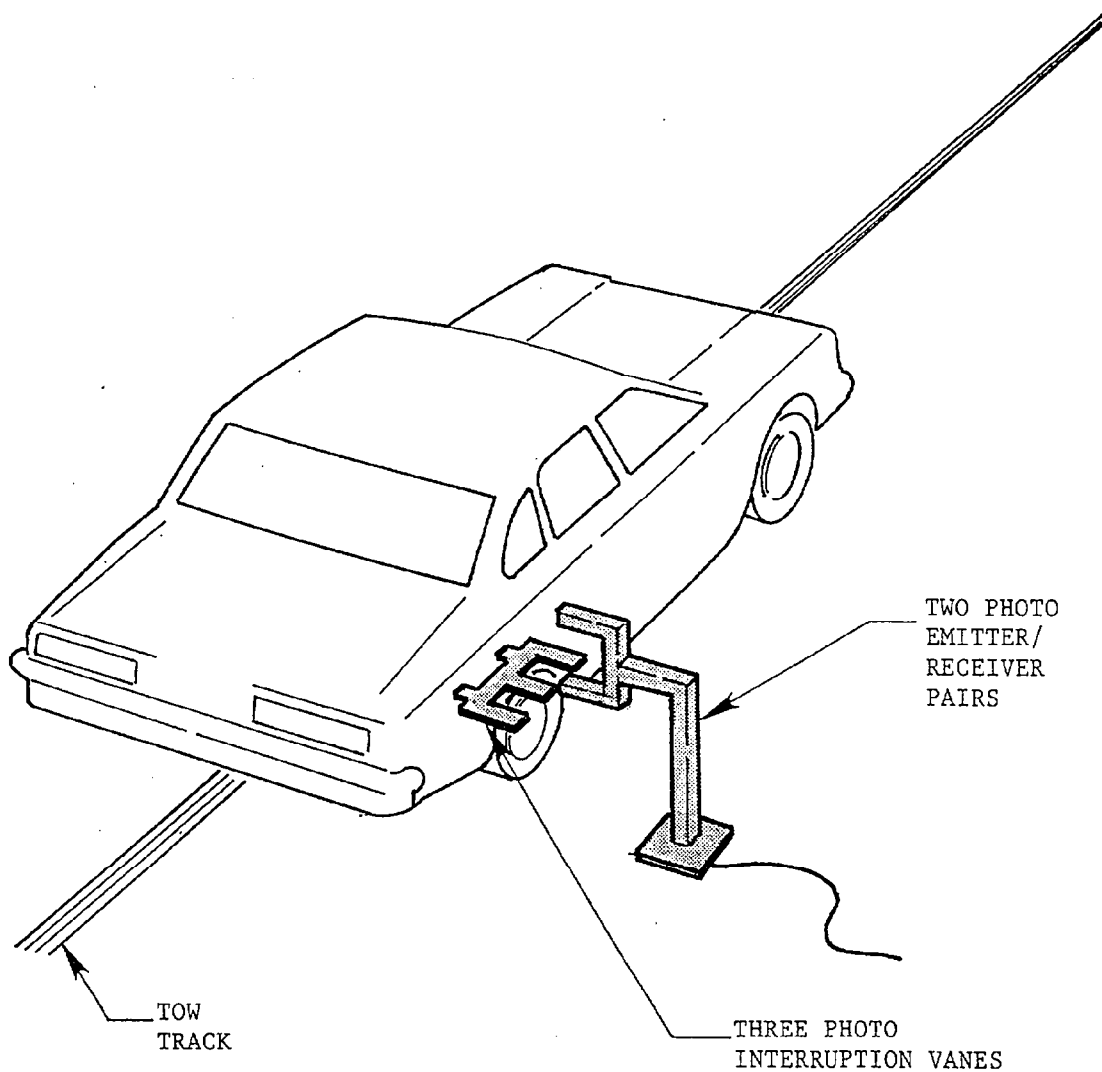
AVERAGE CRUSH: 588

TEST VEHICLE REBOUND FROM FLAT BARRIER

(ALL MEASUREMENTS ARE IN MILLIMETERS):

DISTANCE FROM TEST VEHICLE TO BARRIER: L 746; C 667; R 711; AVG. 708

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: Dodge/Spirit/4-door sedan

VEHICLE NHTSA NO.: MR0304; VIN: 3B3AA46K2RT212885

MODEL YEAR: 1994; BUILD DATE: 08/93; TEST DATE: 10/20/93

VEHICLE SIZE CATEGORY: Mid-size; TEST WEIGHT: 1494 KG

VEHICLE WHEELBASE: 2635 MM

MAXIMUM WIDTH: 1740 MM

FRONT OVERHANG: 990 MM

COLLISION DEFORMATION  
 CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH  
 MEASUREMENTS:

|      |            |    |
|------|------------|----|
| C1 = | <u>559</u> | MM |
| C2 = | <u>640</u> | MM |
| C3 = | <u>644</u> | MM |
| C4 = | <u>640</u> | MM |
| C5 = | <u>635</u> | MM |
| C6 = | <u>549</u> | MM |

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

LENGTH OF DAMAGED  
 REGION: L = 1427 MM

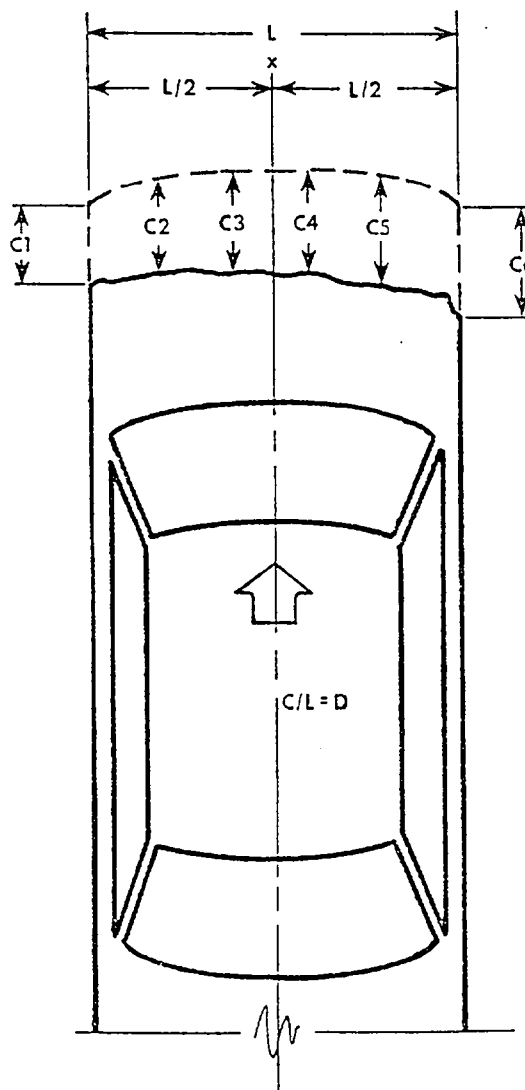
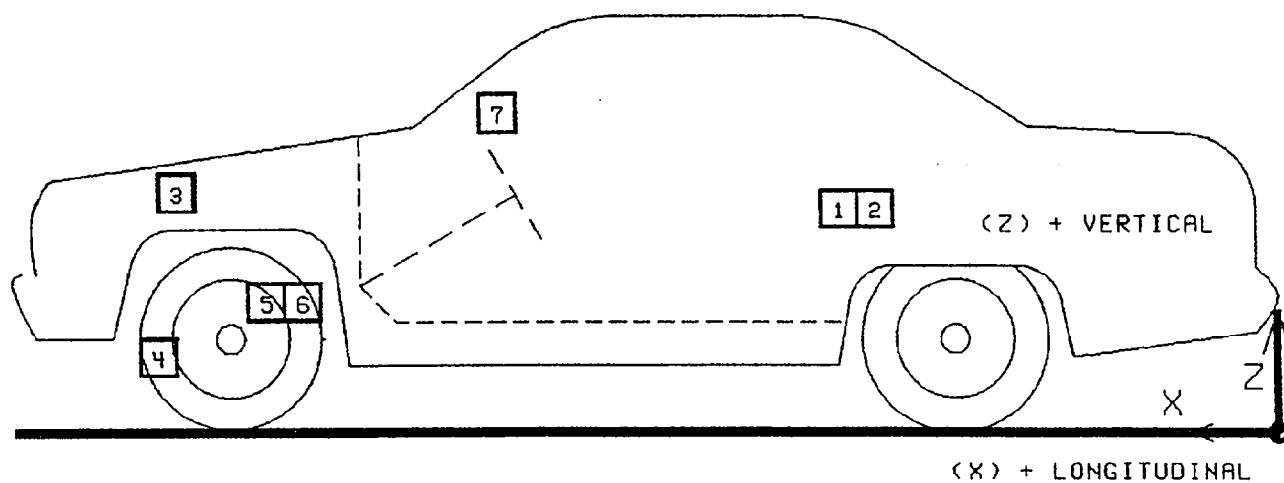
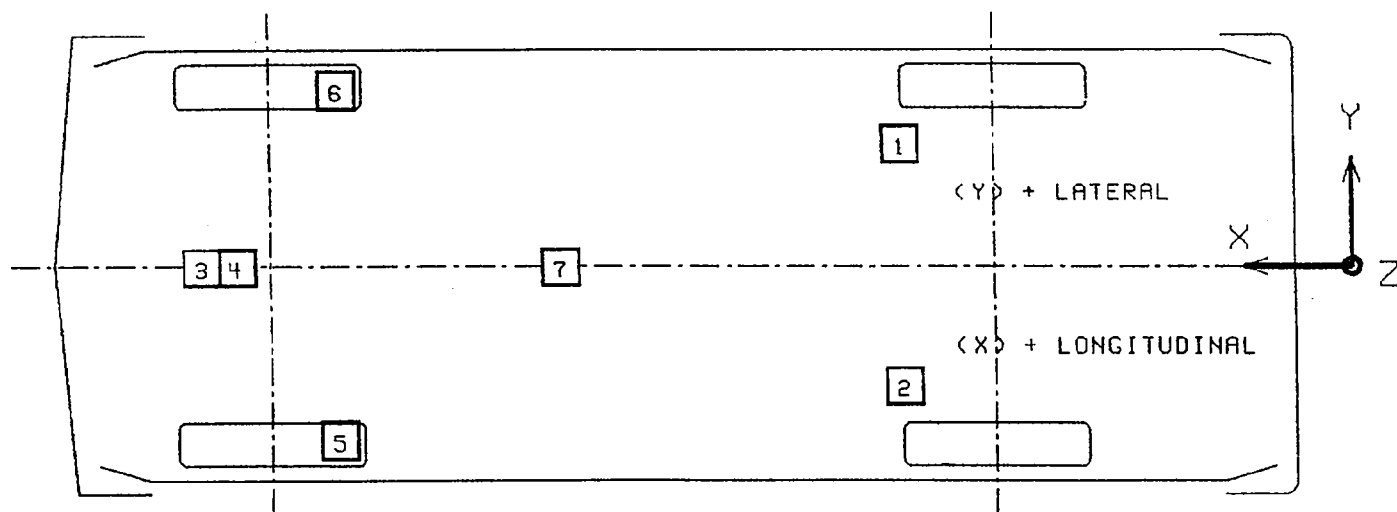


FIGURE 3 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

## VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931020

| No. LOCATION                                                  | X*   | Y*   | Z*  | POSITIVE   |                | NEGATIVE     |              |
|---------------------------------------------------------------|------|------|-----|------------|----------------|--------------|--------------|
|                                                               |      |      |     | DIRECTION  | MAX G MSEC     | DIRECTION    | MAX G MSEC   |
| 1 LEFT REAR SEAT<br>CROSSMEMBER<br>LONGITUDINAL<br>REDUNDANT  | 3011 | 580  | 319 | 2.2<br>2.5 | 165.9<br>151.8 | 36.8<br>36.6 | 63.0<br>63.0 |
| 2 RIGHT REAR SEAT<br>CROSSMEMBER<br>LONGITUDINAL<br>REDUNDANT | 3067 | -618 | 309 | 8.6<br>3.8 | 244.9<br>135.0 | 36.0<br>36.2 | 43.3<br>43.3 |
| 3 ENGINE TOP<br>LONGITUDINAL                                  | 835  | -50  | 833 | 11.4       | 49.5           | 106.3        | 41.9         |
| 4 ENGINE BOTTOM<br>LONGITUDINAL                               | 855  | -130 | 241 | 46.1       | 44.0           | 157.6        | 36.7         |
| 5 RIGHT BRAKE CALIPER<br>LONGITUDINAL <sup>1</sup>            | 860  | -636 | 330 | 1367.6     | 83.9           | ----         | ----         |

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

TEST NUMBER 931020

| No. LOCATION                                 | X*   | Y*  | Z*  | POSITIVE  |            | NEGATIVE  |            |
|----------------------------------------------|------|-----|-----|-----------|------------|-----------|------------|
|                                              |      |     |     | DIRECTION | MAX G MSEC | DIRECTION | MAX G MSEC |
| 6 LEFT BRAKE CALIPER<br>LONGITUDINAL         | 895  | 636 | 303 | 74.4      | 67.4       | 169.0     | 46.3       |
| 7 INSTRUMENT PANEL<br>CENTER<br>LONGITUDINAL | 1460 | 0   | 983 | 32.8      | 40.1       | 72.2      | 50.4       |

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

<sup>1</sup> See DATA ACQUISITION EXPLANATIONS

TABLE 5 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

|            | DRIVER #142             | PASSENGER #192          |
|------------|-------------------------|-------------------------|
| HEAD       | <u>Airbag</u>           | <u>Chest and knees</u>  |
| CHEST      | <u>Airbag</u>           | <u>None</u>             |
| ABDOMEN    | <u>None</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 upon impact.

\_\_\_\_\_

OTHER NOTABLE IMPACT EFFECTS:

The left front tire deflated on impact.

\_\_\_\_\_

TABLE 6 FMVSS 208 DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1994/Dodge/Spirit/4-door sedan

VEH. NHTSA NO.: MR0304; TEST DATE: 10/20/93

|                                                            | DRIVER<br>DUMMY #142 | PASSENGER<br>DUMMY #192 |
|------------------------------------------------------------|----------------------|-------------------------|
| <u>MAXIMUM ACCELERATIONS (G):</u>                          |                      |                         |
| HEAD X-AXIS                                                | -64.5                | -49.8                   |
| HEAD Y-AXIS                                                | 22.7                 | -6.3                    |
| HEAD Z-AXIS                                                | 19.1                 | -54.8                   |
| HEAD RESULTANT                                             | 68.9                 | 62.9                    |
|                                                            |                      |                         |
| CHEST X-AXIS                                               | -43.4                | -51.6                   |
| CHEST Y-AXIS                                               | 6.8                  | 7.4                     |
| CHEST Z-AXIS                                               | 13.4                 | -13.7                   |
| CHEST RESULTANT <sup>1</sup>                               | 43.9                 | 51.0                    |
| CHEST RESULTANT TIME INTERVAL (SEC.) <sup>1</sup>          | .003                 | .003                    |
| <u>HEAD INJURY CRITERIA (HIC) VALUES:</u>                  |                      |                         |
| HIC <sup>2</sup>                                           | 778                  | 807                     |
| HIC STARTING TIME (SEC.)                                   | .061                 | .078                    |
| HIC ENDING TIME (SEC.)                                     | .094                 | .114                    |
| AVG. HEAD RESULTANT ACCEL. DURING<br>HIC TIME INTERVAL (G) | 55.7                 | 55.0                    |
| <u>MAXIMUM CHEST DEFLECTIONS (MM):</u>                     |                      |                         |
| CHEST X-AXIS                                               | 42                   | 52                      |
| MAXIMUM CHEST DEFLECTION TIME (SEC)                        | .071                 | .099                    |
| <u>MAXIMUM COMPRESSIVE FEMUR FORCES (N):</u>               |                      |                         |
| LEFT FEMUR                                                 | 6379                 | 2600                    |
| RIGHT FEMUR                                                | 2780                 | 4599                    |
| <u>MAXIMUM SEAT BELT FORCES (N):</u>                       |                      |                         |
| LAP BELT                                                   | 4023                 | 6466                    |
| SHOULDER BELT                                              | 6240                 | 9131                    |

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

<sup>1</sup>0.003 SEC. MINIMUM DURATION.

<sup>2</sup>THE MAXIMUM HIC TIME INTERVAL IS 36 MILLISECONDS.



TABLE 7 HYBRID III NECK DATA SUMMARY

VEH. YR./MAKE/MODEL/BODY STYLE: 1994/Dodge/Spirit/4-door sedan

VEHICLE NHTSA NO.: MR0304; TEST DATE: 10/20/93

| <u>MAXIMUM VALUES:</u>         | <u>DRIVER<br/>DUMMY #142</u> | <u>PASSENGER<br/>DUMMY #192</u> |
|--------------------------------|------------------------------|---------------------------------|
| NECK X-AXIS FORCE (N)          | 845                          | 1659                            |
| NECK Y-AXIS FORCE (N)          | 283                          | -286                            |
| NECK Z-AXIS FORCE (N)          | 3154                         | 2393                            |
| NECK MOMENT ABOUT X AXIS (N-M) | 16                           | 15                              |
| NECK MOMENT ABOUT Y AXIS (N-M) | -55                          | 102                             |
| NECK MOMENT ABOUT Z AXIS (N-M) | 26                           | 5                               |

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 chest impacted the airbag. The dummy's head impacted the airbag and rotated rearward. The driver dummy was restrained by the airbag and three-point unbelt. The dummy rebounded rearward into the seat back. The dummy's head contacted the seat back and head restraint and then rotated forward. 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 head rotated downward impacting both knees. The right front passenger dummy was restrained by the two-point passive shoulder belt and lap 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 two-point passive shoulder belt and lap belt.

TABLE 8 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

|                                                                                                  | <u>DRIVER</u> | <u>PASSENGER</u> |
|--------------------------------------------------------------------------------------------------|---------------|------------------|
| <u>BELT LENGTH DATA:</u>                                                                         |               |                  |
| BELT LENGTH FROM TRIM PANEL<br>EXIT TO BOLT HOLE ANCHOR POINT<br>FOR CONTINUOUS WEBBING SYSTEMS. | 2860          | NA               |
| SHOULDER BELT LENGTH AS MEASURED<br>ON PART 572 DUMMY.                                           | 890           | 940              |
| LAP BELT LENGTH AS MEASURED ON<br>PART 572 DUMMY.                                                | 755           | 770              |
| <u>SHOULDER BELT SPOOL-OFF LENGTH:</u>                                                           |               |                  |
| AS DETERMINED BY FILM ANALYSIS                                                                   | 81            | NA <sup>1</sup>  |
| AS DETERMINED MECHANICALLY                                                                       | 71            | 49               |
| AS DETERMINED ELECTRONICALLY                                                                     | 102           | 164              |
| <u>BELT STRETCH LENGTH (MM/M):</u>                                                               |               |                  |
| AS MEASURED MECHANICALLY                                                                         | 3             | NA <sup>2</sup>  |
| AS MEASURED ELECTRONICALLY                                                                       | 12            | 8                |
| <u>RETRACTOR LOCK-UP TIME (MS):</u>                                                              |               |                  |
| AS DETERMINED BY SHOULDER<br>BELT SPOOL-OFF                                                      | 74            | NA <sup>1</sup>  |

ALL MEASUREMENTS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

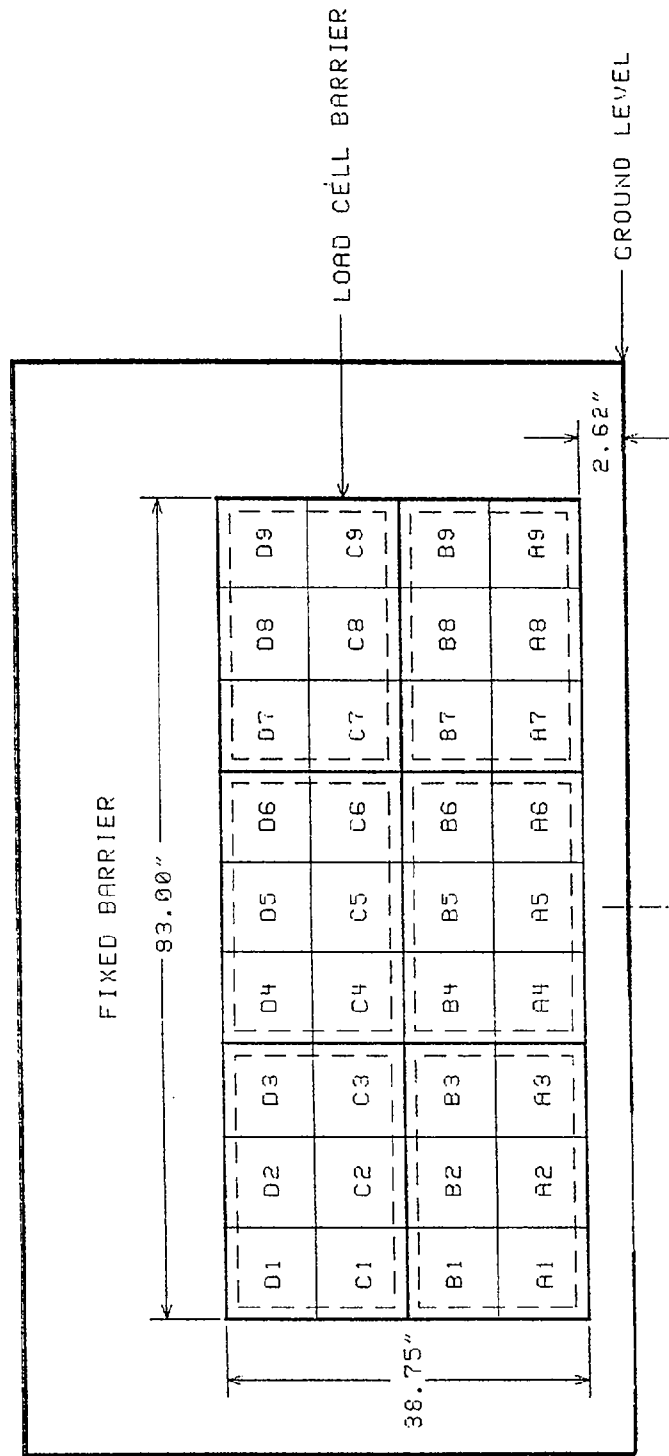
<sup>1</sup>No high-speed film of the right front passenger's seat belt was taken as a result of the center armrest blocking the seat belt from view.

<sup>2</sup>The stretch indication string pulled out of the belt on impact.

FIGURE 4

LOAD CELL BARRIER CONFIGURATION  
FRONT VIEW

36 LOAD CELLS  
4 ROWS  
9 COLUMNS



GROUP 1: A1 THRU B3  
GROUP 2: A4 THRU B6  
GROUP 3: A7 THRU B9  
GROUP 4: C1 THRU D3  
GROUP 5: C4 THRU D6  
GROUP 6: C7 THRU D9

TRACK C/L

TABLE 9

## LOAD CELL BARRIER DATA SUMMARY

TEST NUMBER 931020

| LOCATION      | POSITIVE<br>DIRECTION<br>KN | MSEC  | NEGATIVE<br>DIRECTION<br>KN | MSEC |
|---------------|-----------------------------|-------|-----------------------------|------|
| TOTAL GROUP 1 | 1.2                         | 276.1 | 82.8                        | 26.2 |
| TOTAL GROUP 2 | 1.2                         | 176.7 | 196.6                       | 38.2 |
| TOTAL GROUP 3 | 0.8                         | 276.2 | 89.5                        | 25.8 |
| TOTAL GROUP 4 | 1.0                         | 225.1 | 45.2                        | 52.1 |
| TOTAL GROUP 5 | 1.2                         | 309.4 | 81.7                        | 54.5 |
| TOTAL GROUP 6 | 1.4                         | 156.1 | 49.3                        | 41.7 |

TABLE 9

LOAD CELL BARRIER DATA SUMMARY CONTINUED

TEST NUMBER 931020

| LOCATION              | POSITIVE  |       | NEGATIVE  |      |
|-----------------------|-----------|-------|-----------|------|
|                       | DIRECTION | MSEC  | DIRECTION | MSEC |
|                       | KN        |       | KN        |      |
| TOTAL LOAD CELL FORCE | 5.1       | 276.2 | 457.7     | 37.8 |

TENSION IS POSITIVE  
COMPRESSION IS NEGATIVE

SECTION 3.0

FMVSS 212, 219 (PARTIAL), AND 301 DATA

FIGURE 5 FMVSS 212 TEST DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

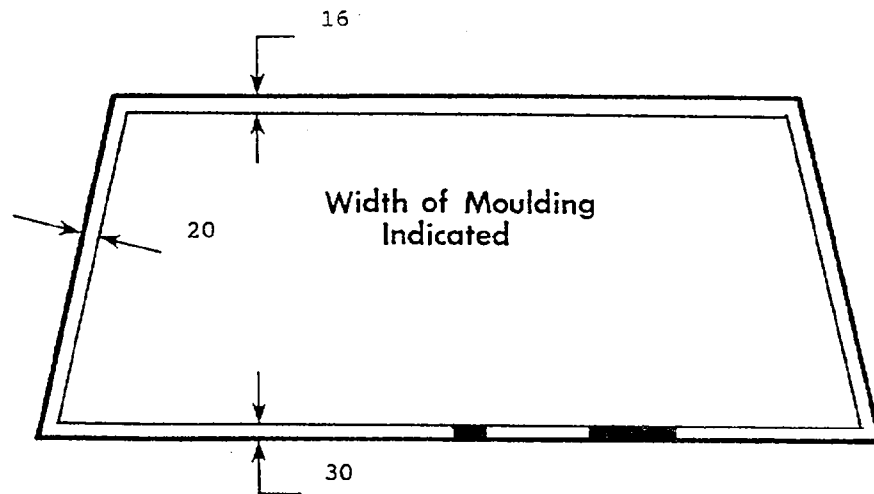
Plastic trim around outer perimeter, adhesive around inner perimeter.

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

WINDSHIELD PERIPHERY MEASUREMENTS:

|            | PRE-TEST | POST-TEST | PERCENT RETENTION |
|------------|----------|-----------|-------------------|
| RIGHT SIDE | 2000     | 2000      | 100               |
| LEFT SIDE  | 2000     | 1830      | 91.5              |
| TOTAL      | 4000     | 3830      | 95.8              |

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 21° C



FRONT VIEW OF WINDSHIELD<sup>1</sup>

LOSS OF WINDSHIELD RETENTION LENGTHS: 117 mm extending from 418 to 535 mm from the lower left corner, and 53 mm extending from 672 to 725 mm from the lower left corner.

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

<sup>1</sup>INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.



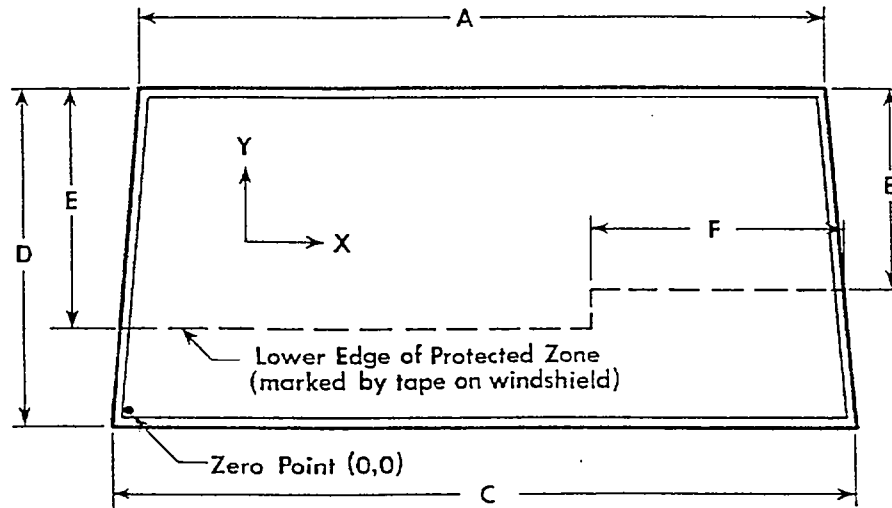
FIGURE 6 FMVSS 219 TEST DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

WINDSHIELD MEASUREMENTS:

A = 1155  
 B = 360  
 C = 1460  
 D = 760  
 E = 530  
 F = 840



**FRONT VIEW**

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: Dodge/Spirit

NHTSA NO.: MR0304

FUEL SYSTEM CAPACITY: 60.8 LITERS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 60.8 LITERS (FURNISHED BY COTR)

TEST VOLUME RANGE: 55.9 LITERS TO 57.2 LITERS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 56.4 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 is on the right. The fuel lines run along the  
right frame rail 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.: MR0304; TEST DATE: 10/20/93

VEHICLE MAKE/MODEL/BODY STYLE: Dodge/Spirit/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:

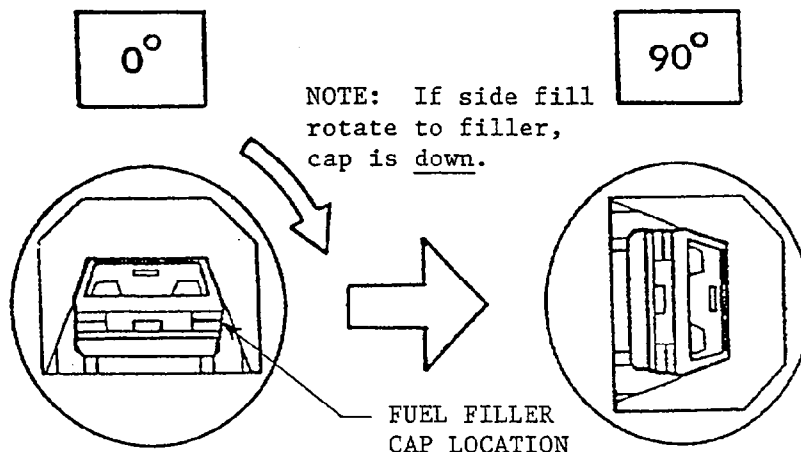
|                                                  | <u>TEST</u><br><u>RESULTS</u> | <u>MAXIMUM</u><br><u>ALLOWABLE</u> |
|--------------------------------------------------|-------------------------------|------------------------------------|
| 1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - - | 0 G                           | 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.: MR0304  
TEST PHASE



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

TIME REQ. 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

\_\_\_\_\_

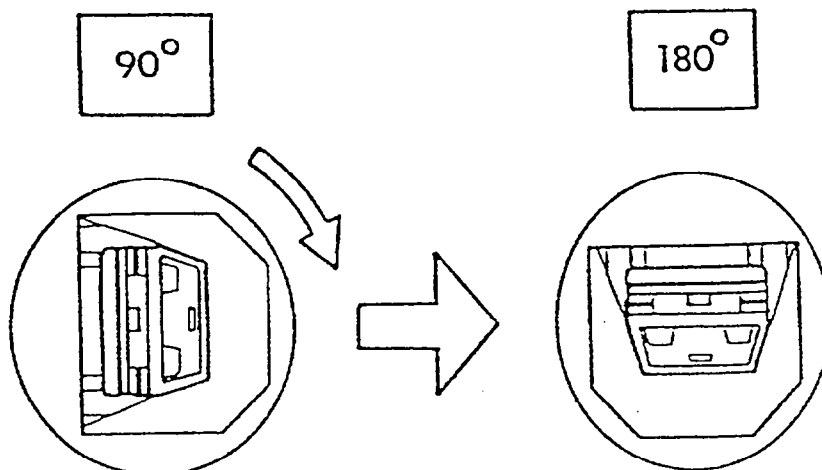
\_\_\_\_\_

\_\_\_\_\_

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

NHTSA NO.: MR0304

TEST PHASE



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

TIME REQ. 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

---



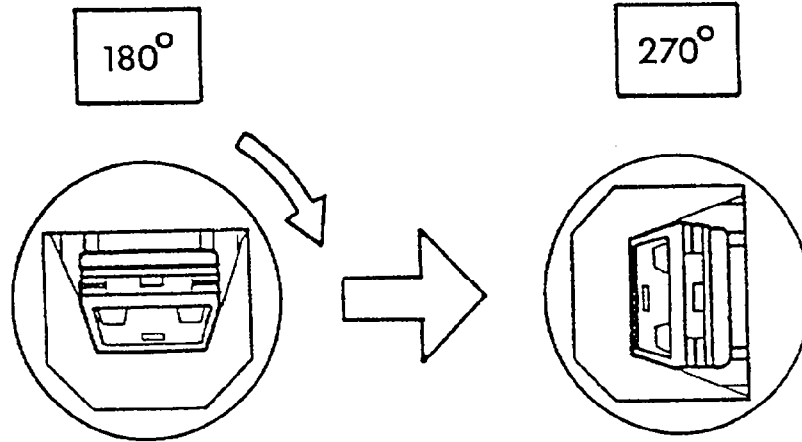
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FIGURE 7 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: MR0304  
TEST PHASE



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

TIME REQ. 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:

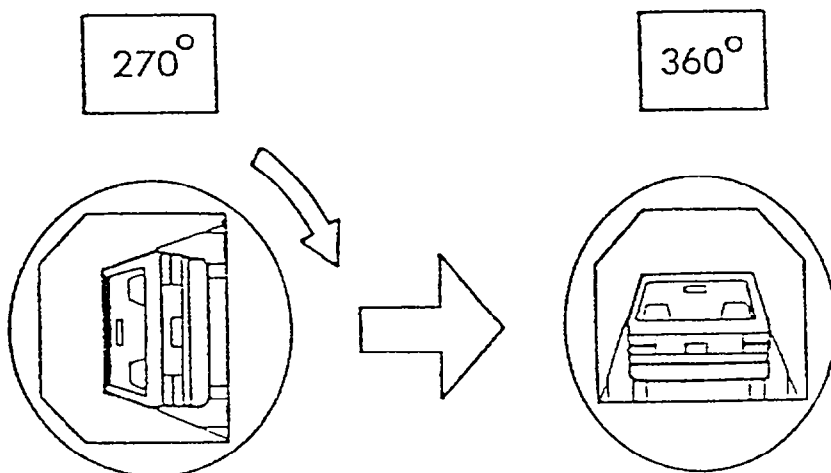
| <u>180° TO 270° ROTATION</u>                        | <u>TEST RESULTS</u> | <u>MAXIMUM ALLOWABLE</u> |
|-----------------------------------------------------|---------------------|--------------------------|
| 1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - - | 0 G                 | 142 G                    |
| 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.: MR0304  
TEST PHASE



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

TIME REQ. 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  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

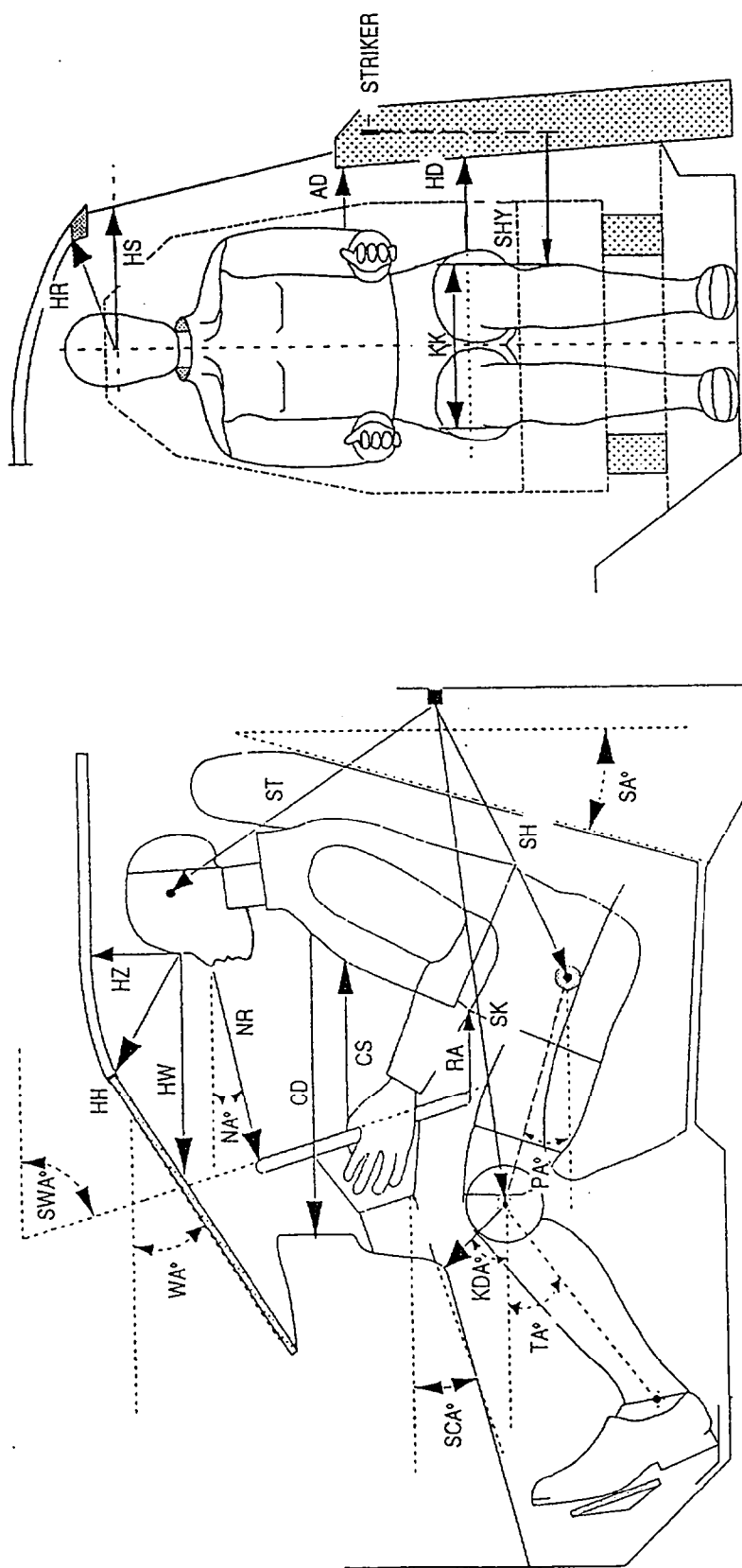
SECTION 4.0

VEHICLE, OCCUPANT, AND CAMERA INFORMATION

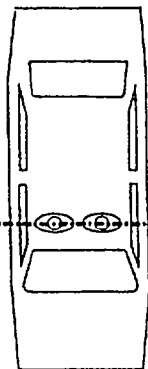


FIGURE 8

# DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS



VERTICAL TRANSVERSE PLANE



VERTICAL LONGITUDINAL PLANE

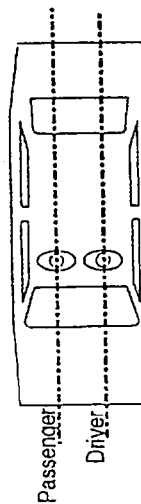
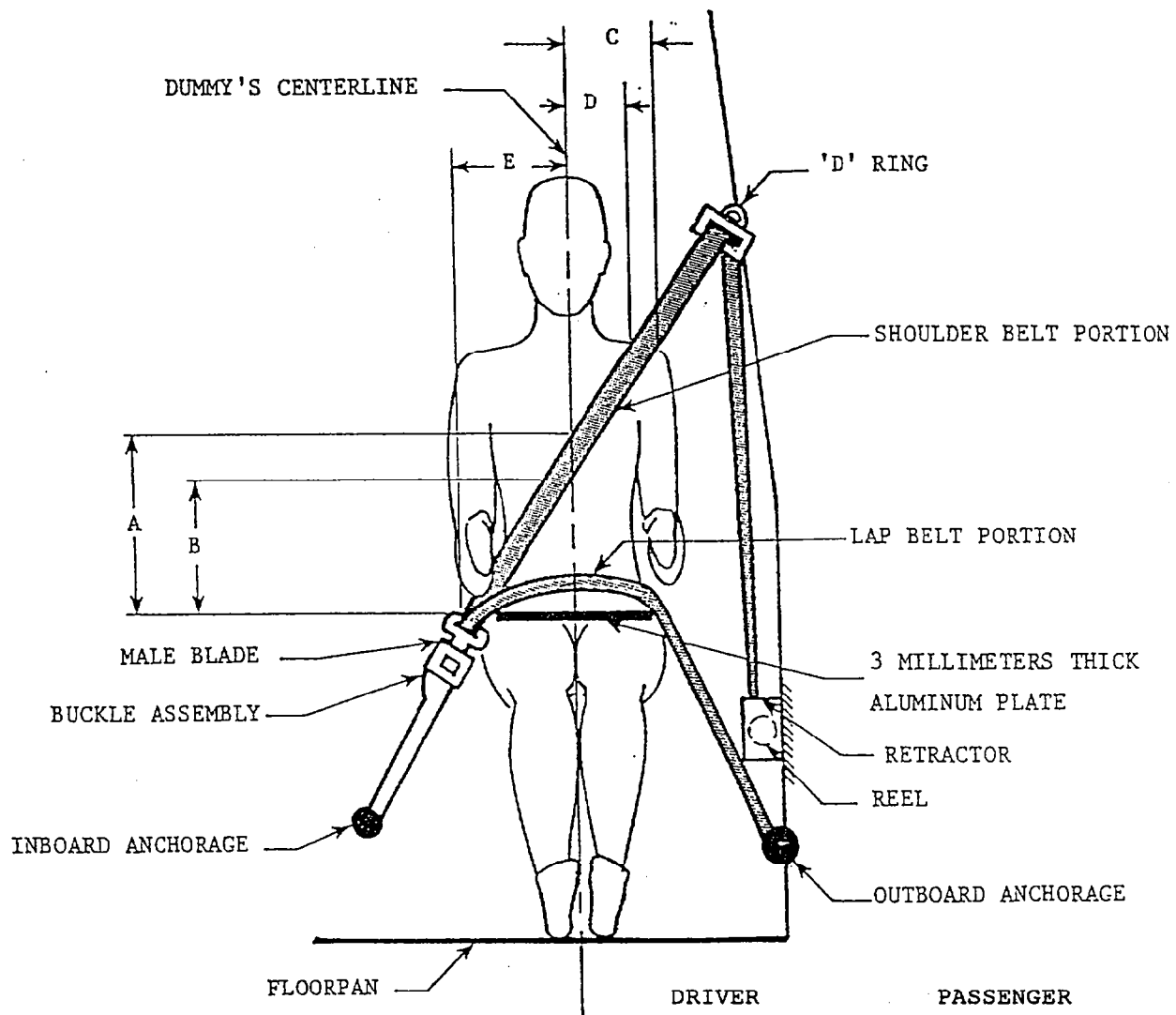


TABLE 12 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

| DESIGNATION | TYPE OF MEASUREMENT         | DRIVER<br>(SERIAL #142) | PASSENGER<br>(SERIAL #192) |
|-------------|-----------------------------|-------------------------|----------------------------|
| WA°         | WINDSHIELD ANGLE            | 32                      | NA                         |
| SWA°        | STEERING WHEEL ANGLE        | 66                      | NA                         |
| SCA°        | STEERING COLUMN ANGLE       | 24                      | NA                         |
| SA°         | SEAT BACK ANGLE             | 18                      | 18                         |
| HZ          | HEAD TO ROOF                | 180                     | 165                        |
| HH          | HEAD TO HEADER              | 330                     | 323                        |
| HW          | HEAD TO WINDSHIELD          | 538                     | 484                        |
| HR          | HEAD TO SIDE HEADER         | 205                     | 170                        |
| NR          | NOSE TO RIM                 | 358                     | NA                         |
| NA          | NOSE TO RIM ANGLE           | 15                      | NA                         |
| CD          | CHEST TO DASH               | 479                     | 548                        |
| CS          | STEERING WHEEL TO CHEST     | 273                     | NA                         |
| RA          | RIM TO ABDOMEN              | 153                     | NA                         |
| KDL         | LEFT KNEE TO DASH           | 182                     | 197                        |
| KDR         | RIGHT KNEE TO DASH          | 152                     | 172                        |
| KDA         | OUTBOARD KNEE TO DASH ANGLE | 29                      | 34                         |
| PA°         | PELVIC ANGLE                | 24                      | 21                         |
| TA°         | TIBIAL ANGLE                | 32                      | 35                         |
| KK          | KNEE TO KNEE                | 269                     | 252                        |
| ST          | STRIKER TO HEAD             | 466                     | 487                        |
|             | STRIKER TO HEAD ANGLE       | -82                     | -87                        |
| SK          | STRIKER TO KNEE             | 650                     | 628                        |
|             | STRIKER TO KNEE ANGLE       | 10                      | 4                          |
| SH          | STRIKER TO H-POINT          | 287                     | 284                        |
|             | STRIKER TO H-POINT ANGLE    | 43                      | 36                         |
| SHY         | STRIKER TO H-POINT (Y DIR.) | 238                     | 237                        |
| HS          | HEAD TO SIDE WINDOW         | 323                     | 284                        |
| HD          | H-POINT TO DOOR             | 180                     | 169                        |
| AD          | ARM TO DOOR                 | 108                     | 106                        |

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.

**FIGURE 9 SEAT BELT POSITIONING DATA**



|                                                                  | DRIVER         | PASSENGER      |
|------------------------------------------------------------------|----------------|----------------|
| A - TOP SURFACE OF ALUMINUM PLATE<br>TO BELT UPPER EDGE          | 365            | 351            |
| B - TOP SURFACE OF ALUMINUM PLATE<br>TO BELT LOWER EDGE          | 282            | 270            |
| C - DUMMY CENTERLINE TO OUTER EDGE OF<br>BELT AT CHEST FLESH TOP | 105            | 136            |
| D - DUMMY CENTERLINE TO INNER EDGE OF<br>BELT AT CHEST FLESH TOP | 52             | 79             |
| LAP BELT TENSION (N)                                             | 13             | 18             |
| SHOULDER BELT TENSION (N)                                        | 9              | NA             |
| SEAT BELT ANCHORAGE POSITION                                     | Non-adjustable | Non-adjustable |

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10  
CAMERA POSITIONS

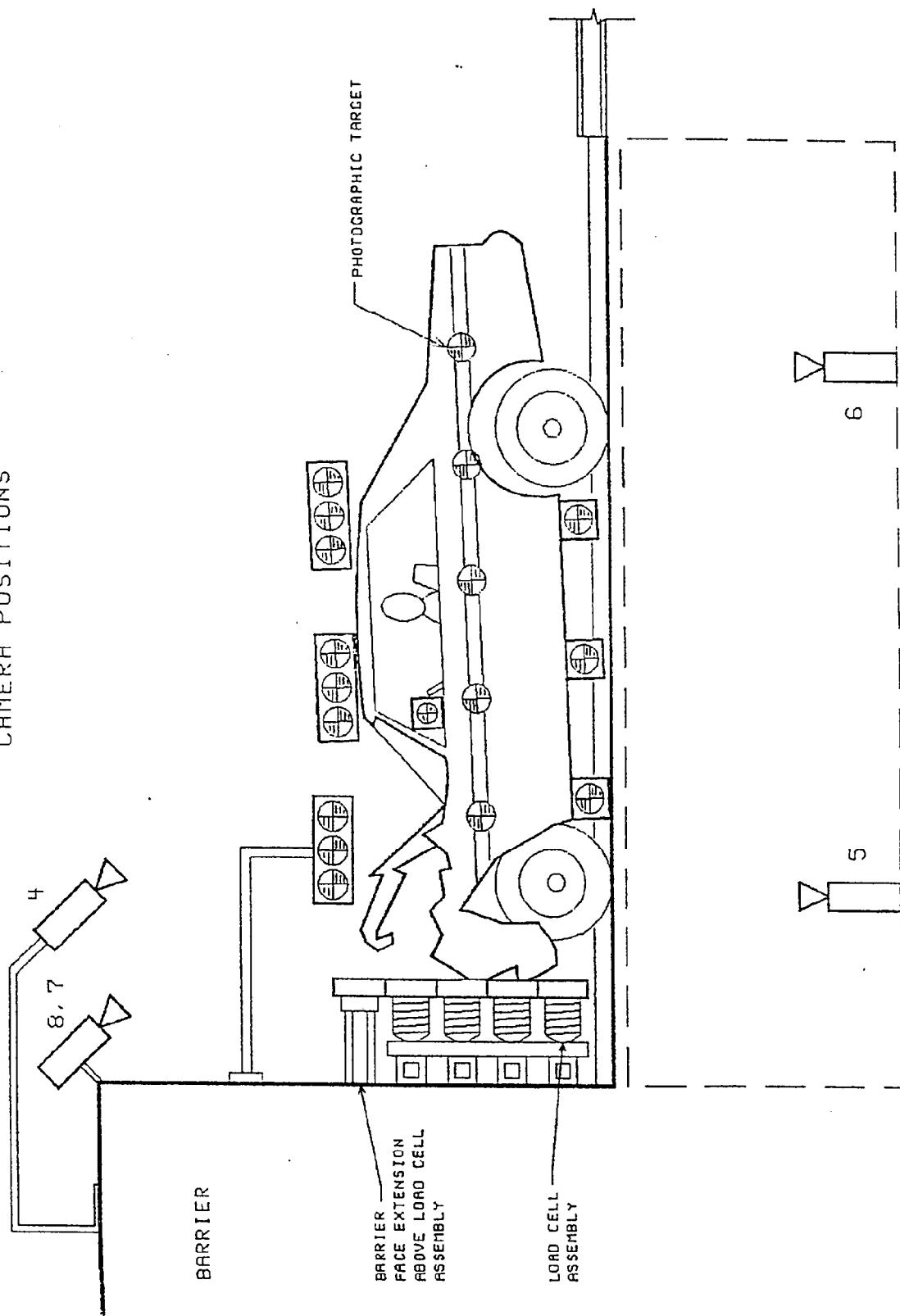


FIGURE 10  
CAMERA POSITIONS, CONTINUED

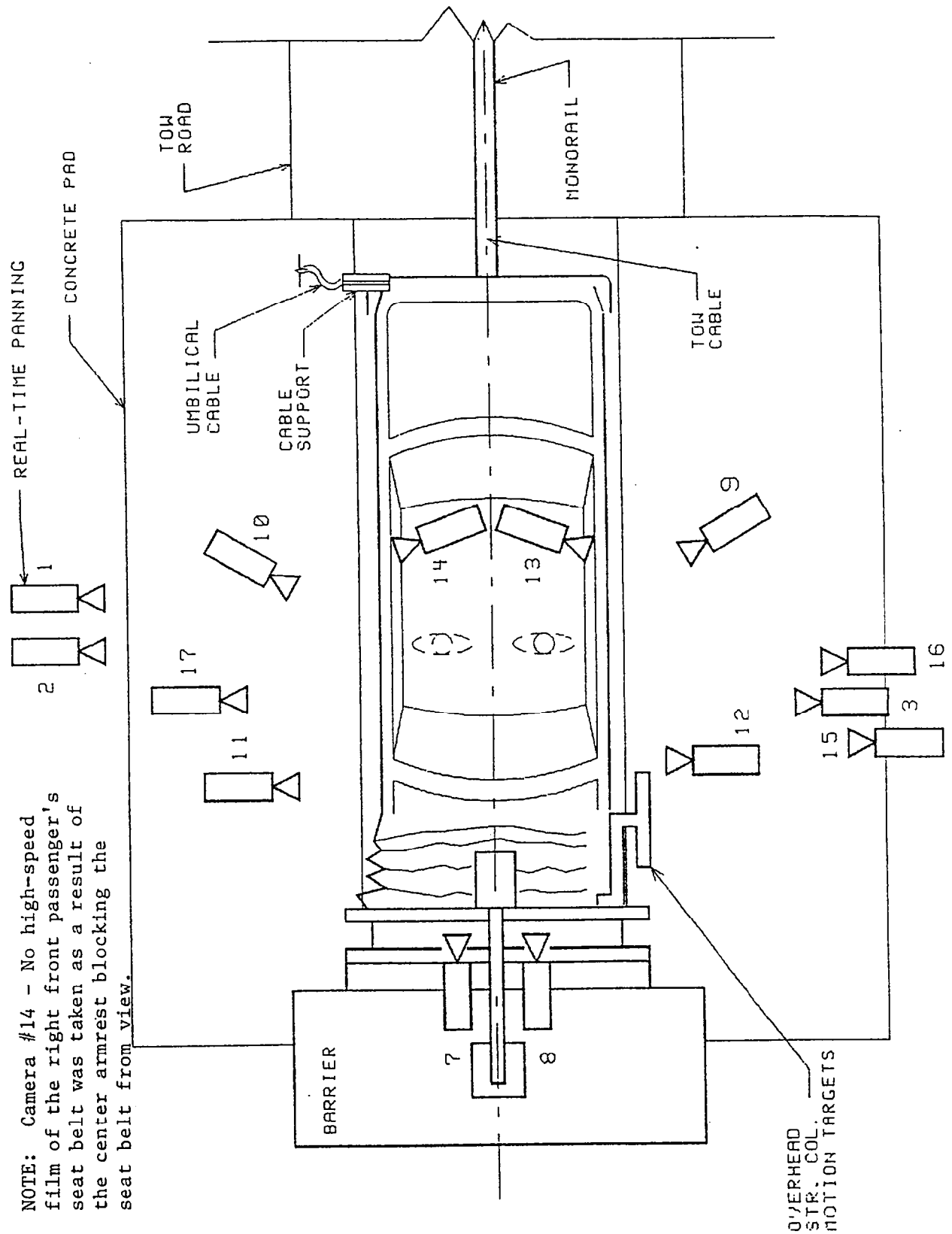


TABLE 13 MOTION PICTURE CAMERA LOCATIONS

| CAMERA<br>NO. | VIEW                                      | CAMERA POSITIONS (CM) <sup>1</sup> |        |       | ANGLE <sup>2</sup><br>(DEG) | FILM PLANE                |              | FILM<br>SPEED<br>(FPS) |
|---------------|-------------------------------------------|------------------------------------|--------|-------|-----------------------------|---------------------------|--------------|------------------------|
|               |                                           | X                                  | Y      | Z     |                             | TO HEAD<br>TARGET<br>(MM) | LENS<br>(MM) |                        |
| 1             | Real-time panning                         | -3607                              | -12802 | 1549  | NA                          | NA                        | 16           | 24                     |
| 2             | Vehicle crush                             | -2065                              | -6767  | 942   | -2                          | NA                        | 13           | 495                    |
| 3             | Dummy kinematics                          | -1054                              | 7493   | 1118  | -12                         | 6147                      | 25           | 1000                   |
| 4             | Windshield damage                         | -925                               | 0      | 2489  | -40                         | NA                        | 13           | 495                    |
| 5             | Crush & fluid spillage                    | -1283                              | 0      | -2347 | 90                          | NA                        | 13           | 998                    |
| 6             | Fluid spillage                            | -2522                              | 0      | -2515 | 90                          | NA                        | 13           | 1000                   |
| 7             | Passenger kinematics                      | -114                               | -351   | 2159  | -40                         | NA                        | 17           | 508                    |
| 8             | Driver kinematics                         | -173                               | 368    | 2159  | -41                         | NA                        | 17           | 505                    |
| 9             | Driver kinematics                         | -4572                              | 1854   | 2591  | -27                         | 2794                      | 25           | 498                    |
| 10            | Passenger kinematics                      | -4674                              | -1880  | 2540  | -26                         | 2413                      | 25           | 490                    |
| 11            | Windshield intrusion                      | -968                               | -7775  | 1118  | 0                           | NA                        | 50           | 505                    |
| 12            | Windshield intrusion                      | -1346                              | 7859   | 1074  | 0                           | NA                        | 50           | 502                    |
| 13            | Driver seat belt movement                 | NA                                 | NA     | NA    | NA                          | NA                        | 13           | 1000                   |
| 14            | Passenger seat belt movement <sup>3</sup> | NA                                 | NA     | NA    | NA                          | NA                        | 13           | NA                     |
| 15            | Column movement                           | -2794                              | 7264   | 2616  | -14                         | NA                        | 25           | 970                    |
| 16            | Column movement                           | 2794                               | 7264   | 1908  | -9                          | NA                        | 25           | 1005                   |
| 17            | Passenger kinematics                      | -986                               | -5354  | 1151  | 7                           | 5842                      | 25           | 1018                   |

<sup>1</sup> +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

<sup>2</sup> +Angle = Film plane angled upward from horizontal plane<sup>3</sup> No high-speed film of the right front passenger's seat belt was taken as a result of the center armrest blocking the seat belt from view.

FIGURE 11 VEHICLE TARGET LOCATIONS

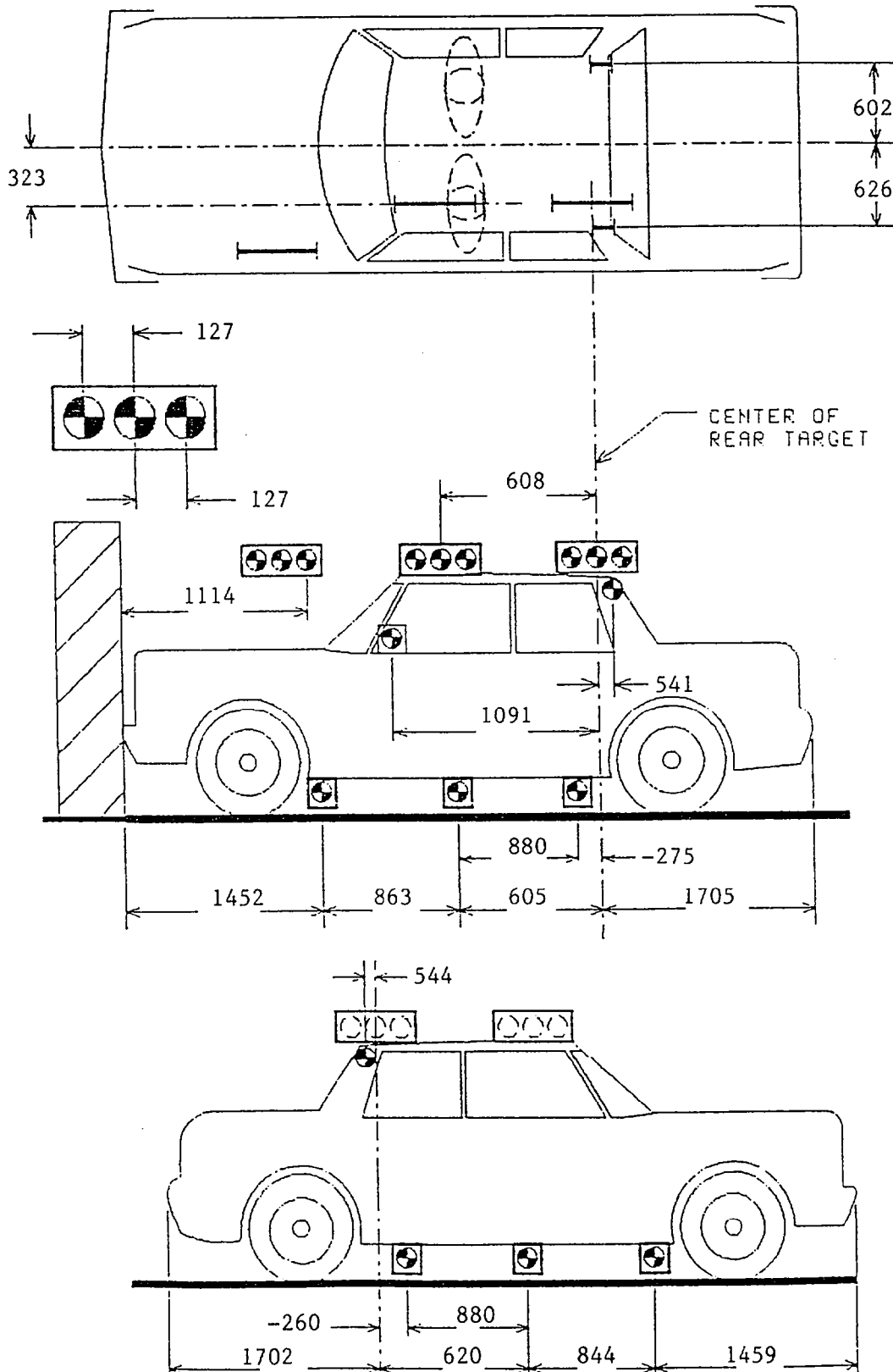


FIGURE 12 PRE-TEST AND POST-TEST MEASUREMENT POINTS

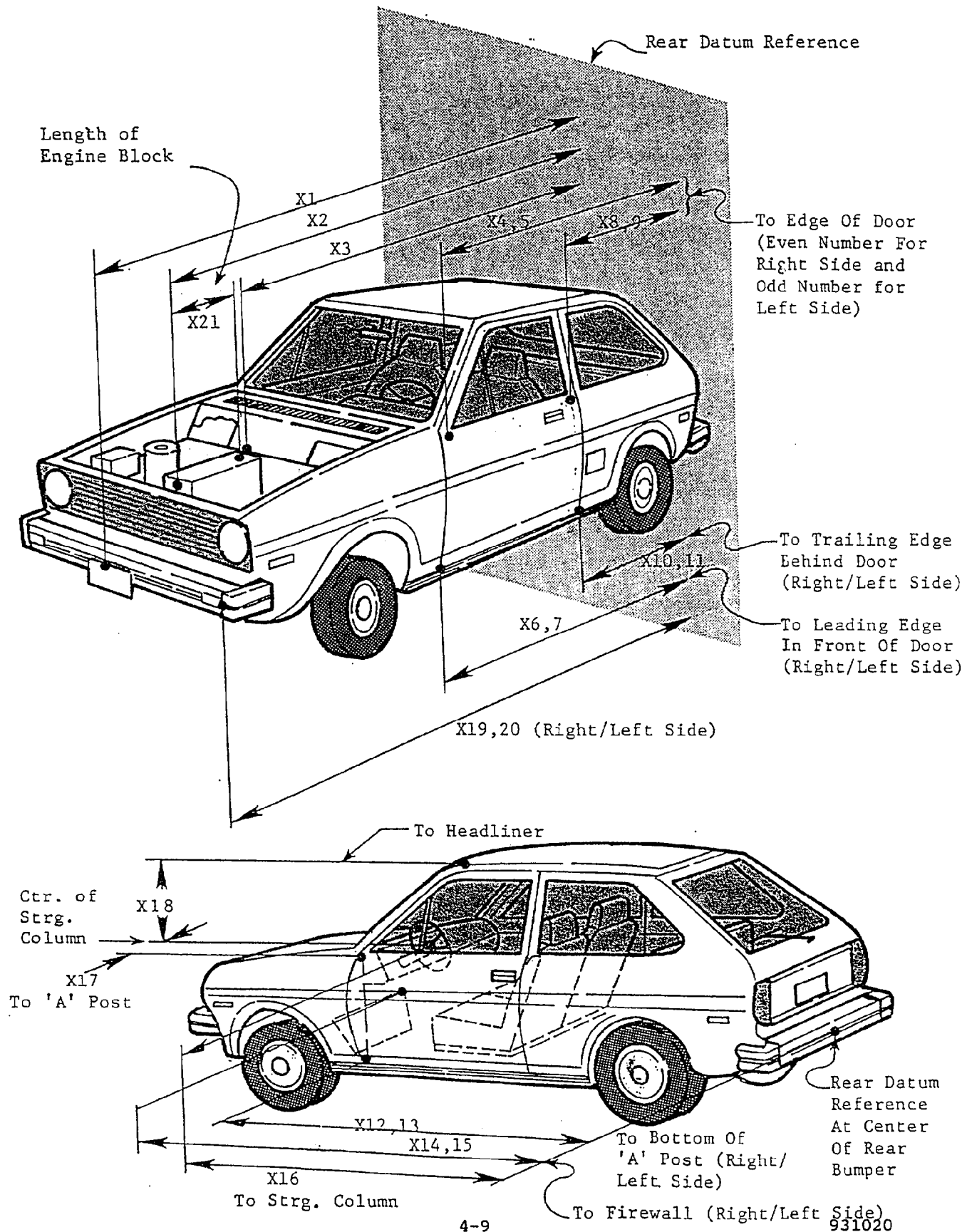




TABLE 14 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Dodge/Spirit TEST NUMBER: 931020

| NO. | TYPE OF MEASUREMENT                                          | PRE-TEST | POST-TEST | DIFF. |
|-----|--------------------------------------------------------------|----------|-----------|-------|
| X1  | TOTAL LENGTH OF VEHICLE AT CENTERLINE                        | 4625     | 3969      | 656   |
| X2  | REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK             | 3972     | 3659      | 313   |
| X3  | REAR SURFACE OF VEHICLE TO FIREWALL                          | 3456     | 3289      | 167   |
| X4  | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR  | 3153     | 3149      | 4     |
| X5  | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR   | 3155     | 3147      | 8     |
| X6  | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR  | 3139     | 3100      | 39    |
| X7  | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR   | 3137     | 3099      | 38    |
| X8  | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR | 2149     | 2135      | 14    |
| X9  | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR  | 2145     | 2132      | 13    |
| X10 | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR | 2165     | 2130      | 35    |
| X11 | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR  | 2165     | 2120      | 45    |
| X12 | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE  | 3080     | 3060      | 20    |
| X13 | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE   | 3073     | 3061      | 12    |
| X14 | REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE             | 3435     | 3376      | 59    |
| X15 | REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE              | 3430     | 3427      | 3     |
| X16 | REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER             | 2700     | 2720      | -20   |
| X17 | CENTER OF STEERING COLUMN TO "A" POST                        | 315      | 274       | 41    |
| X18 | CENTER OF STEERING COLUMN TO HEADLINER                       | 445      | 369       | 76    |
| X19 | REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER        | 4490     | 3941      | 549   |
| X20 | REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER         | 4486     | 3927      | 559   |
| X21 | LENGTH OF ENGINE BLOCK                                       | 440      | 440       | 0     |

All measurements are in millimeters.

APPENDIX A

PHOTOGRAPHS

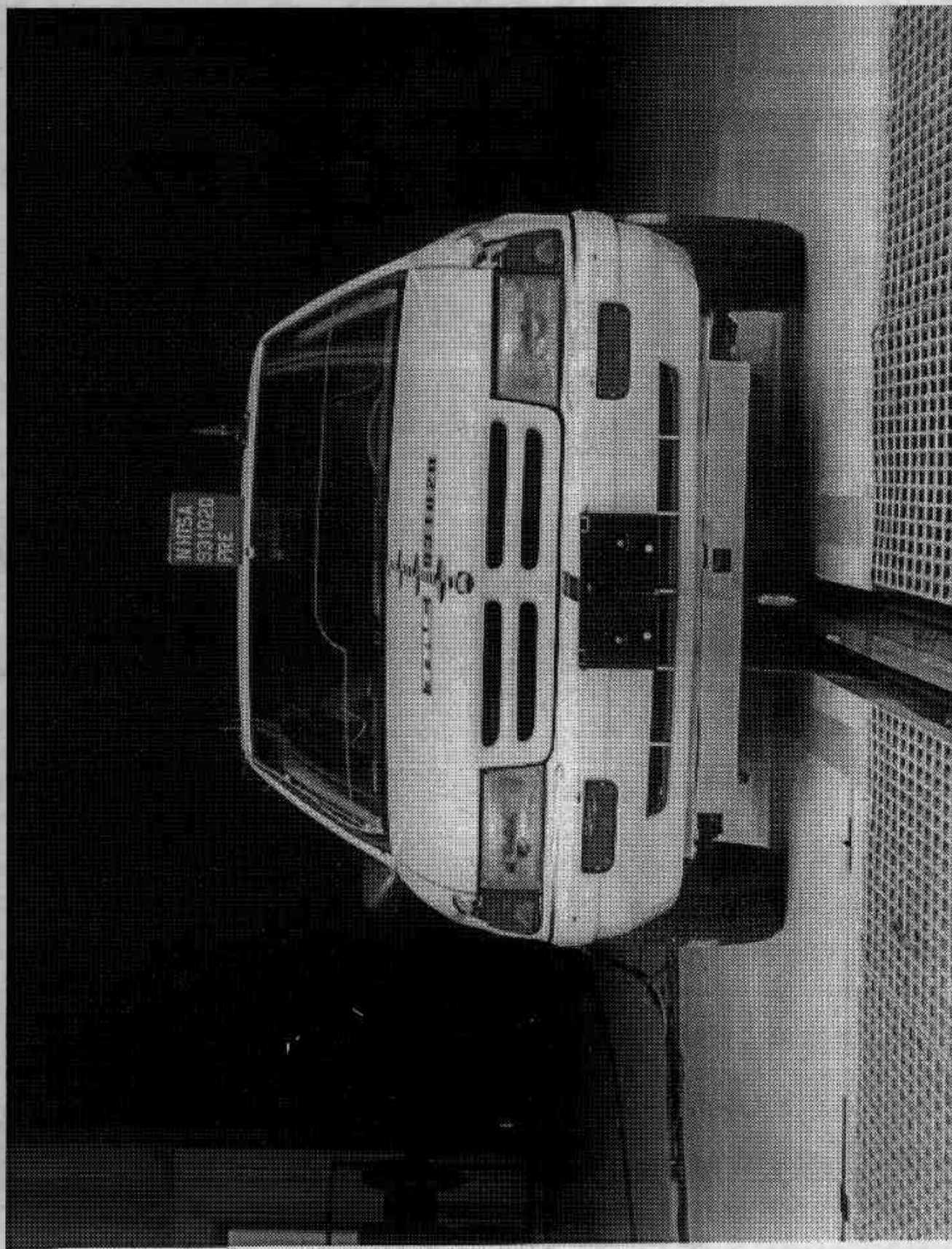


Figure A-1. PRE-TEST FRONT VIEW

A-2

931020

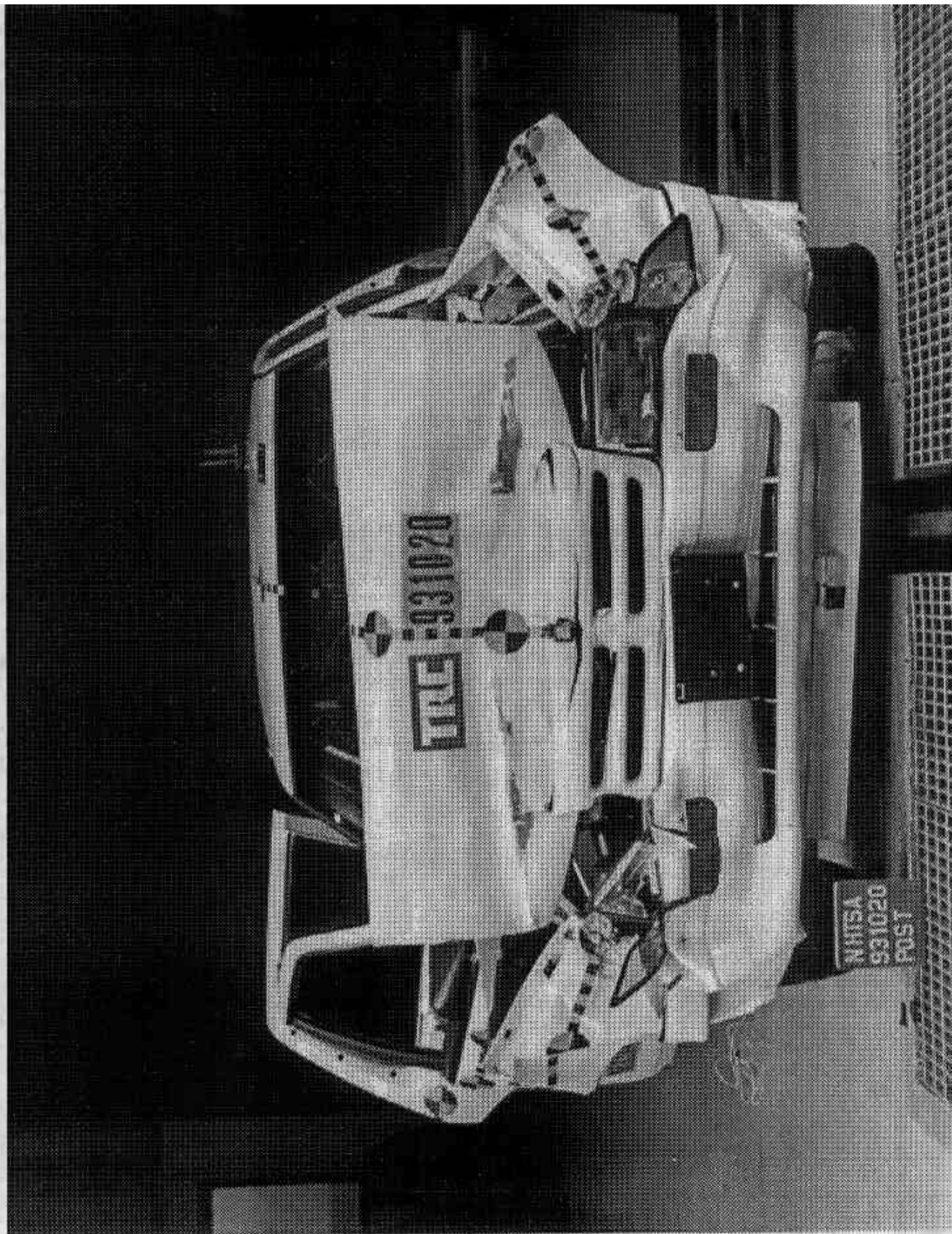


Figure A-2. POST-TEST FRONT VIEW  
A-3

931020



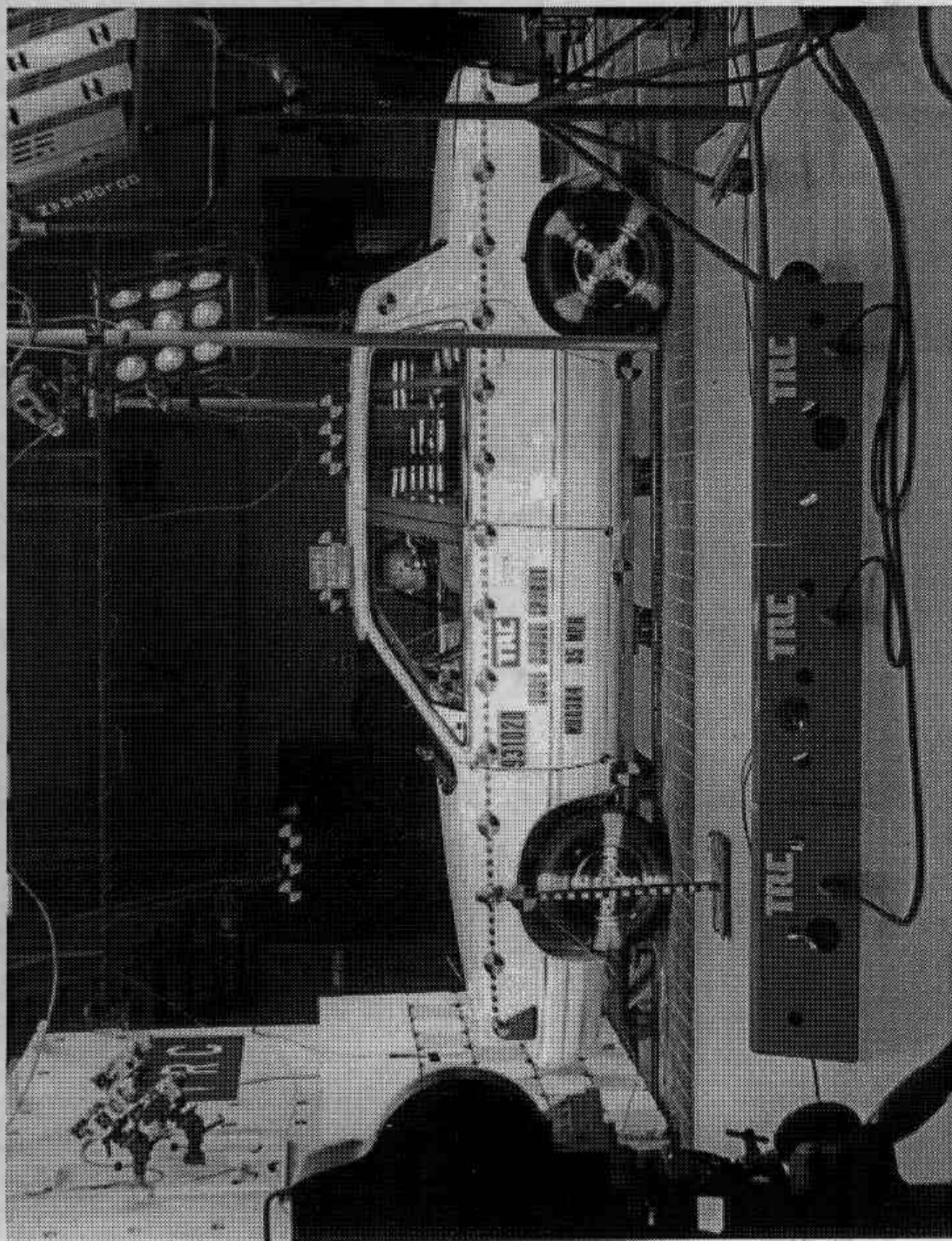


Figure A-3. PRE-TEST LEFT SIDE VIEW

A-4

931020

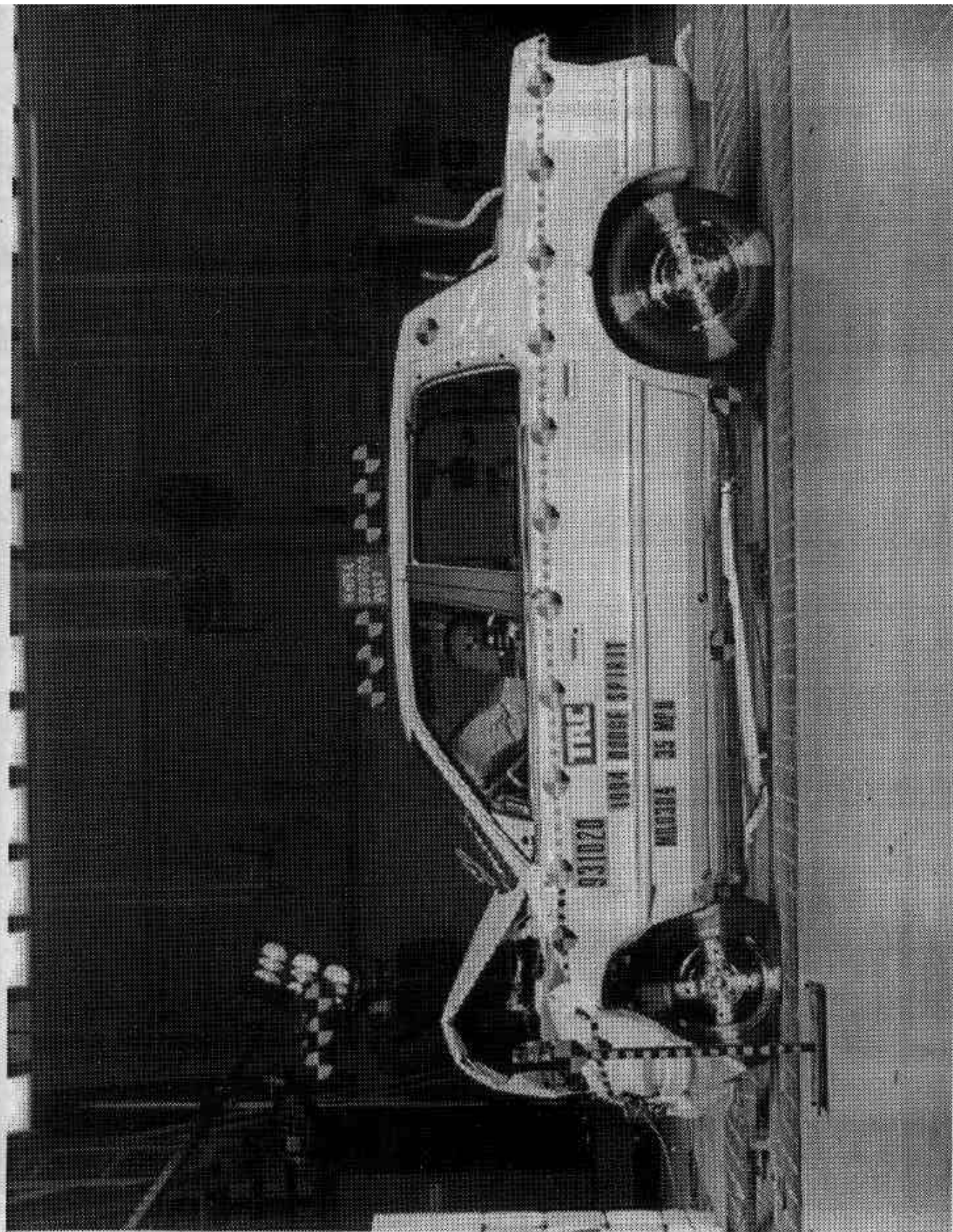


Figure A-4. POST-TEST LEFT SIDE VIEW

A-5

931020



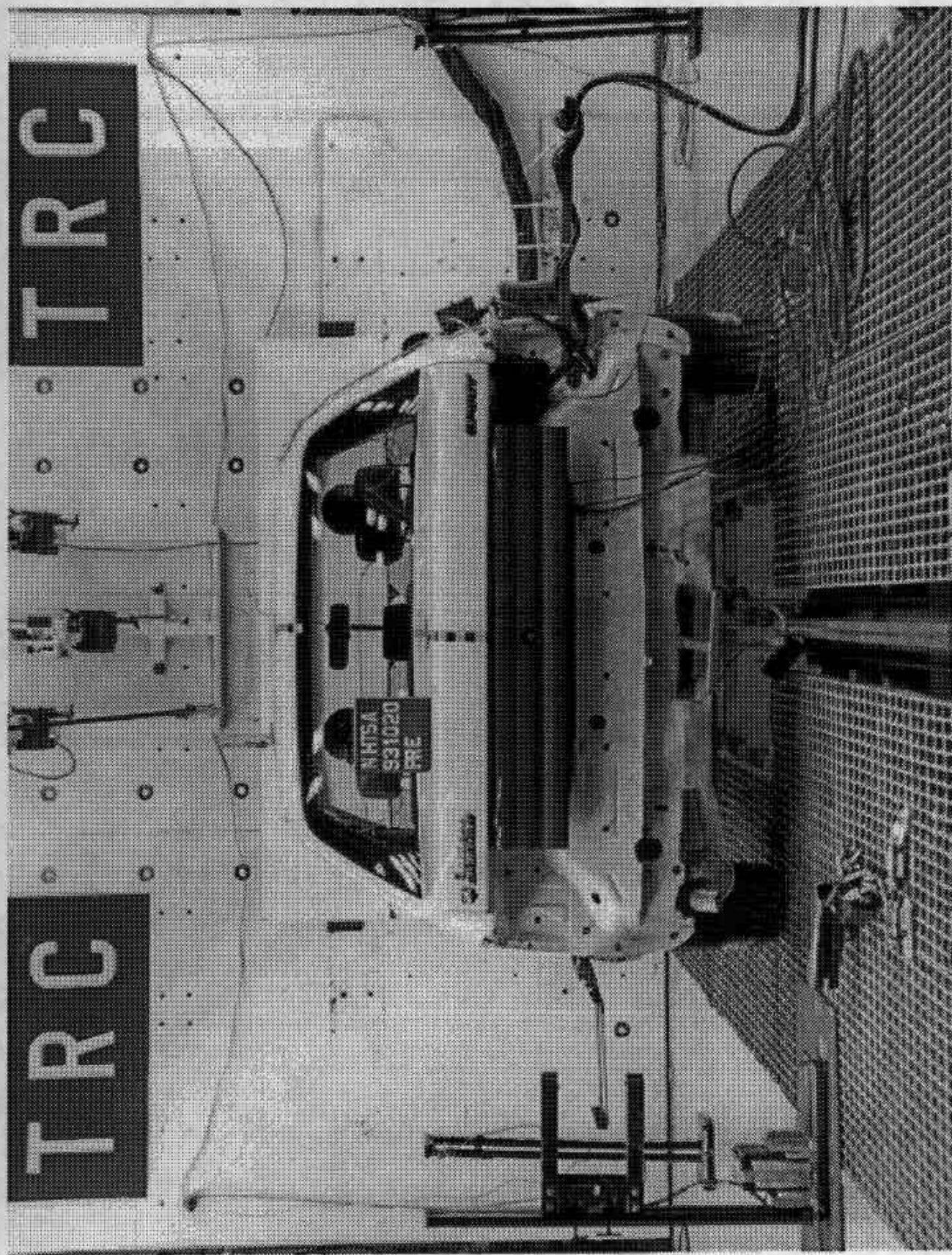


Figure A-5. PRE-TEST REAR VIEW

A-6

931020

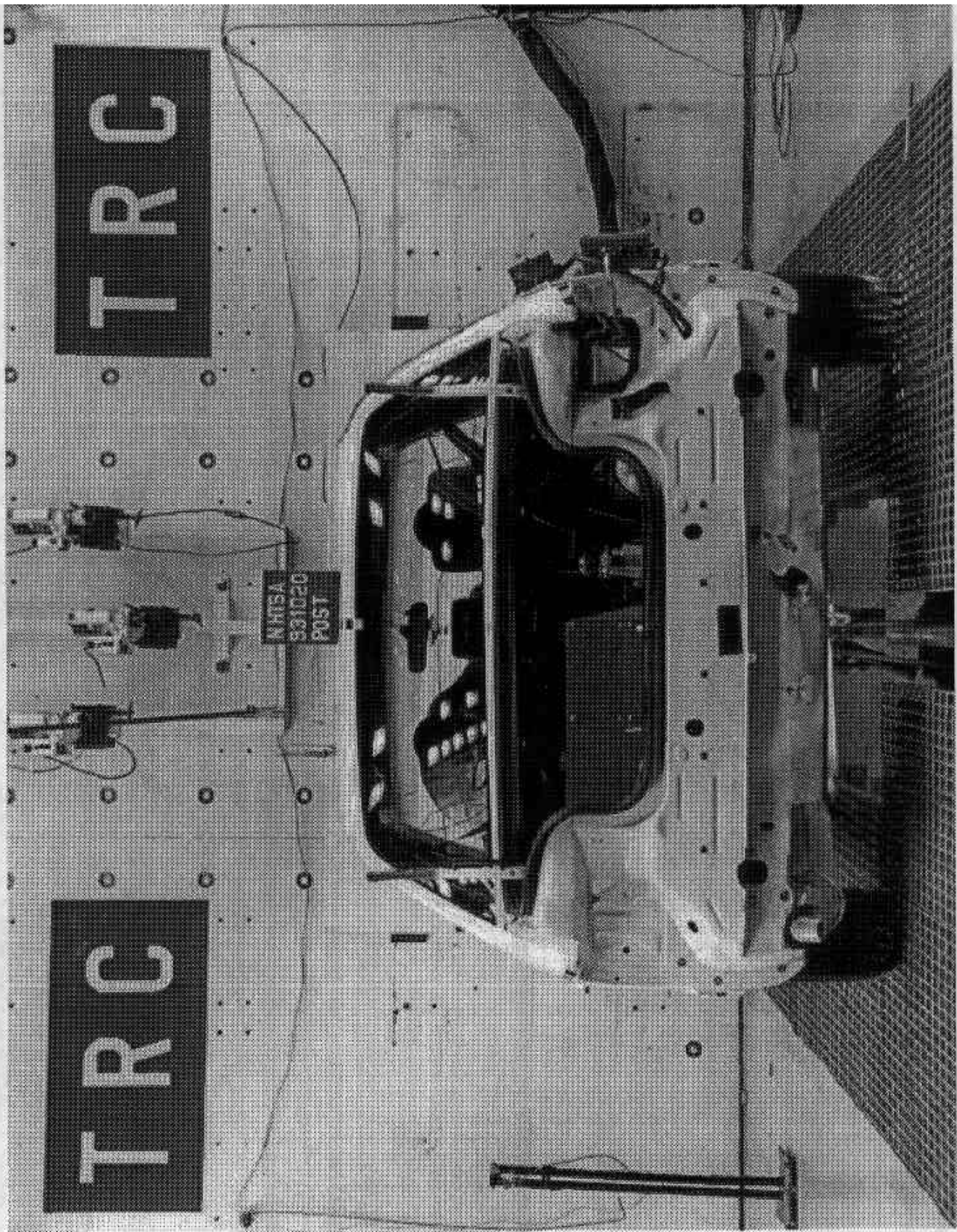


Figure A-6. POST-TEST REAR VIEW

A-7

931020



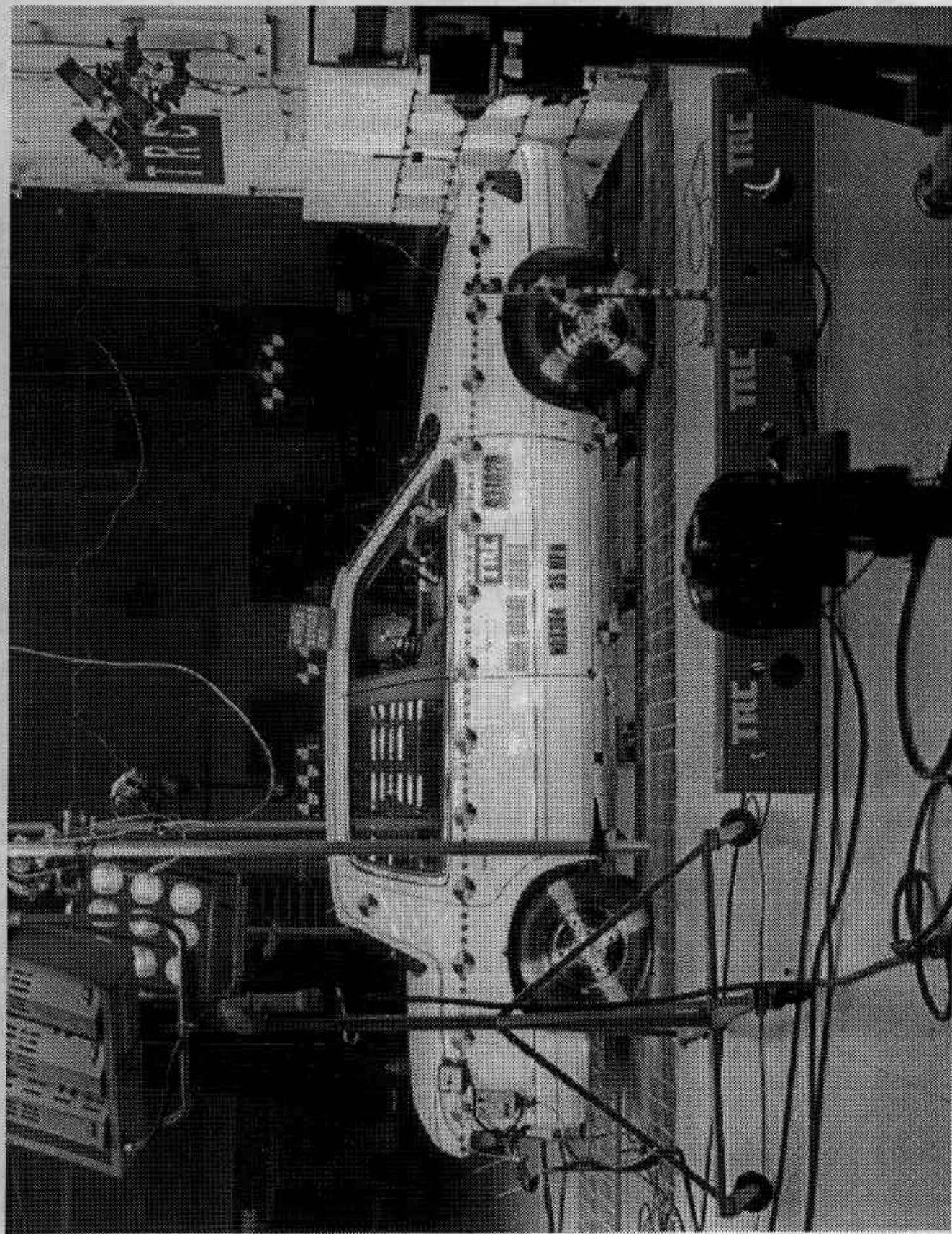


Figure A-7. PRE-TEST RIGHT SIDE VIEW

A-8

931020

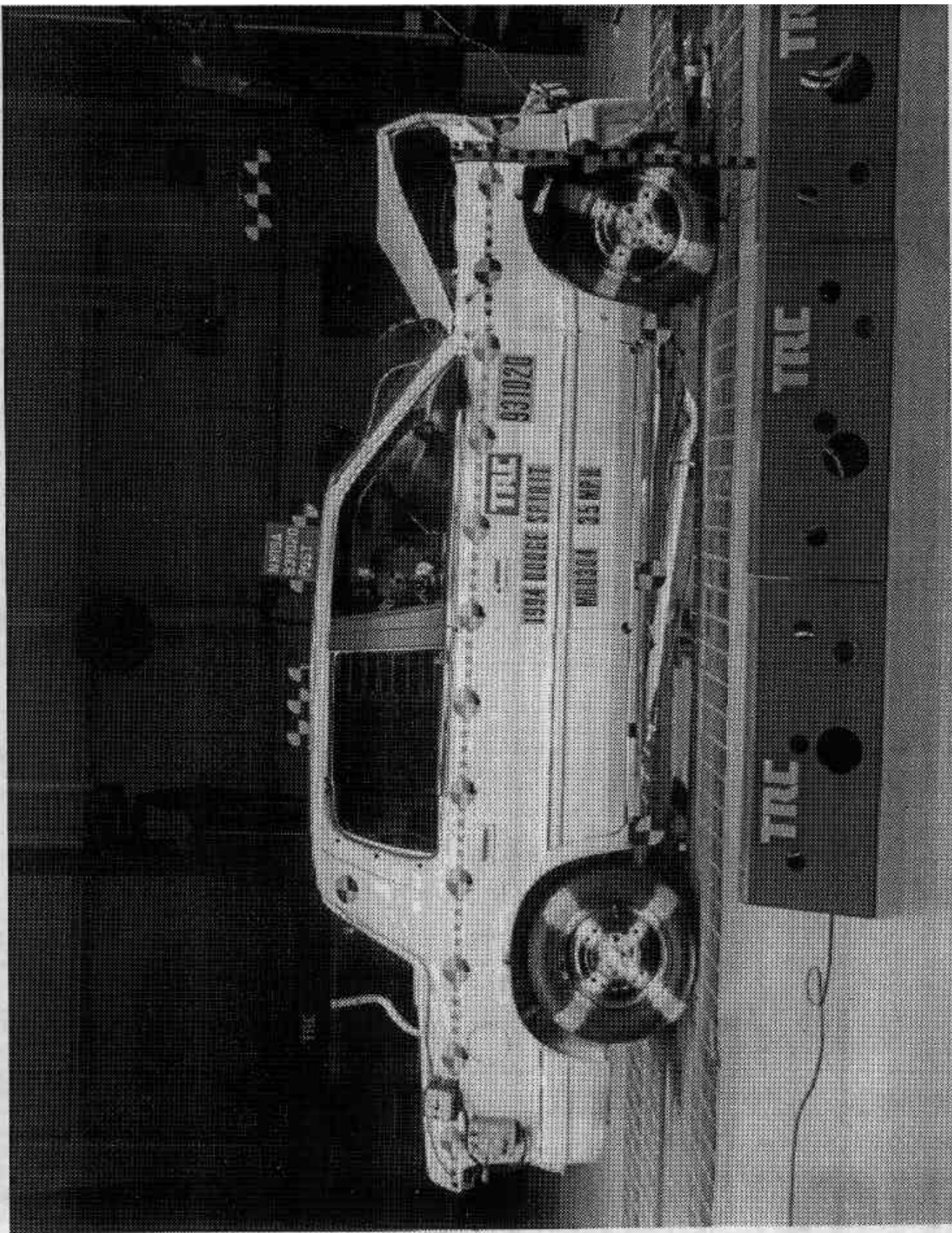


Figure A-8. POST-TEST RIGHT SIDE VIEW

A-9

931020



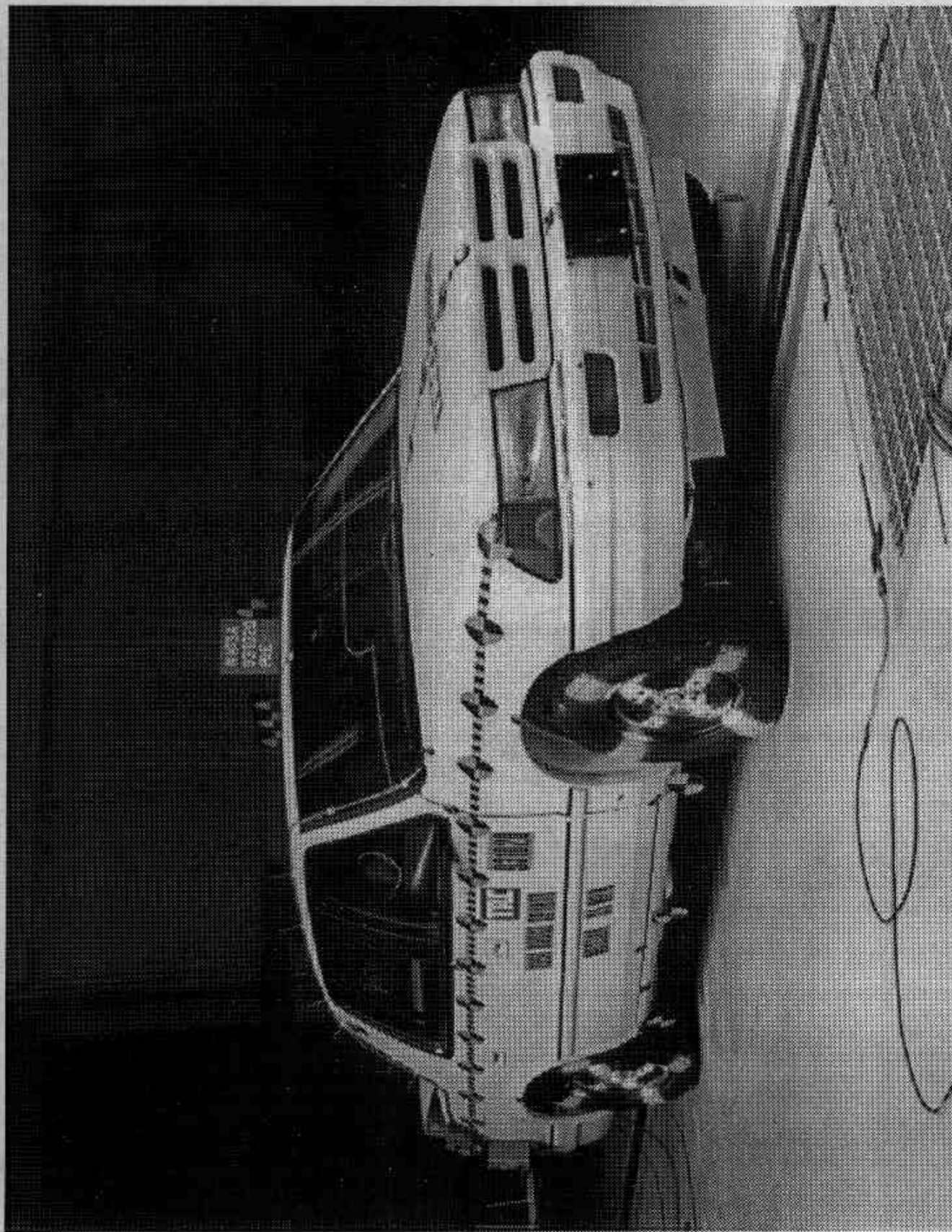


Figure A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

931020

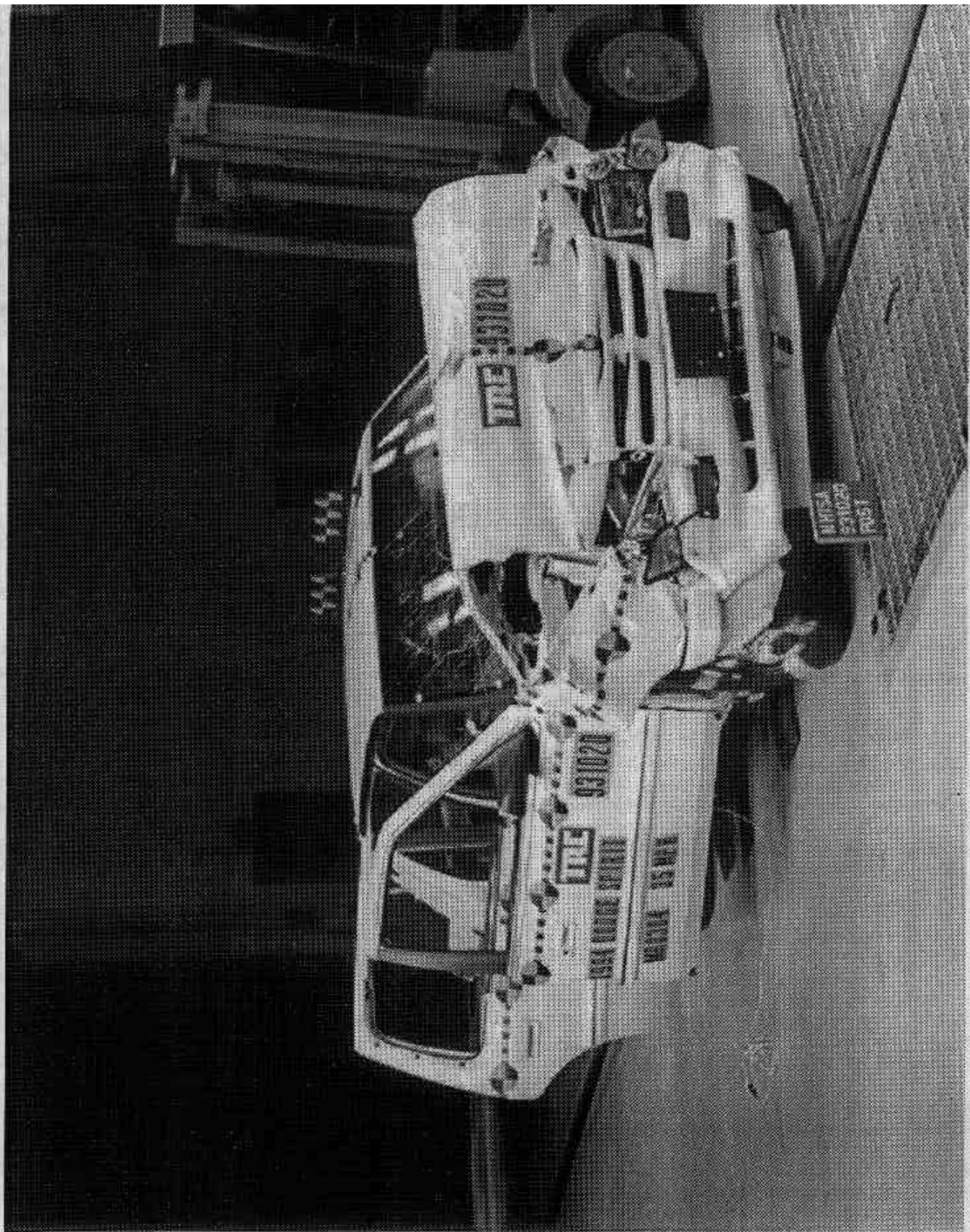


Figure A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

931020



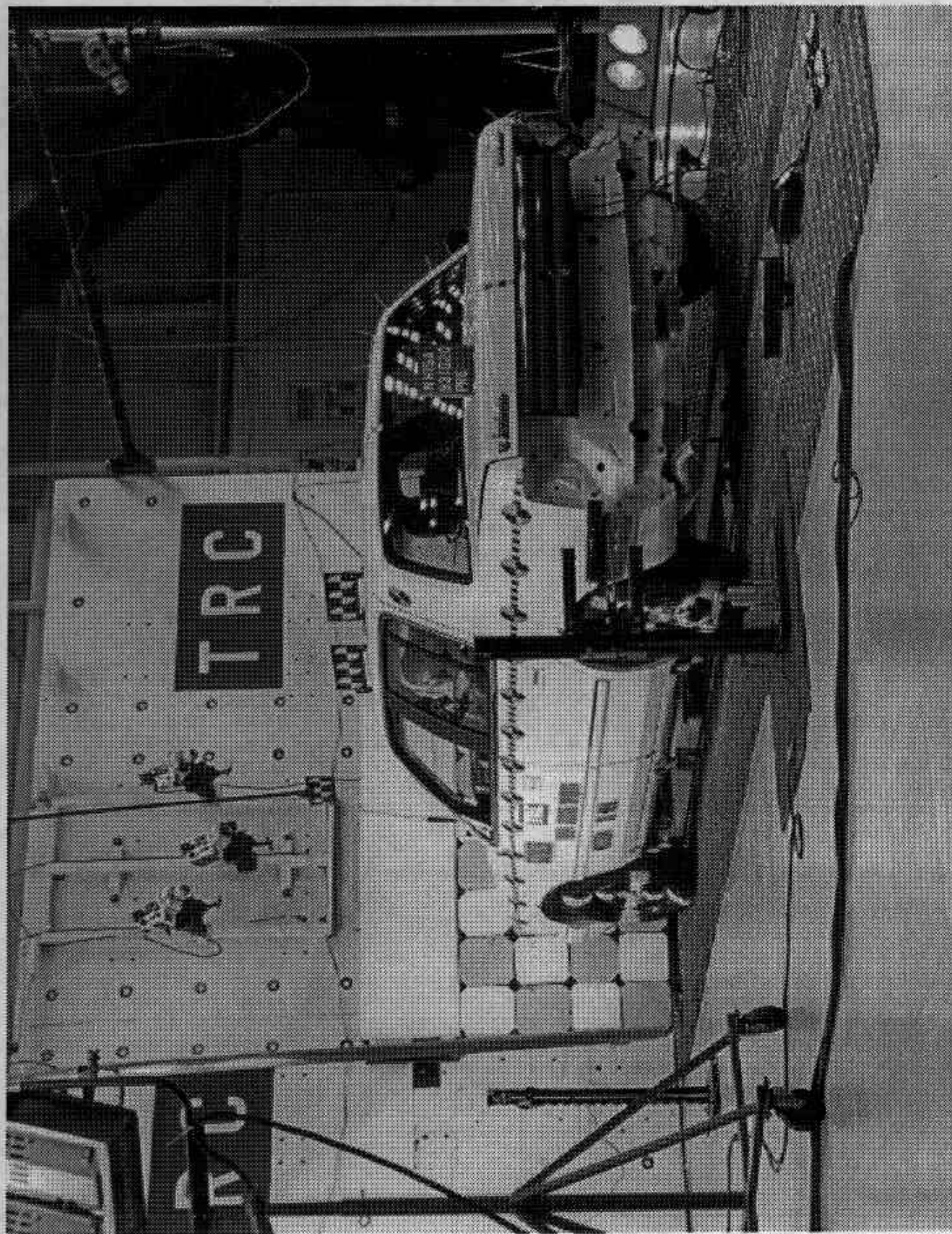


Figure A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-12

931020



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

A-13

931020



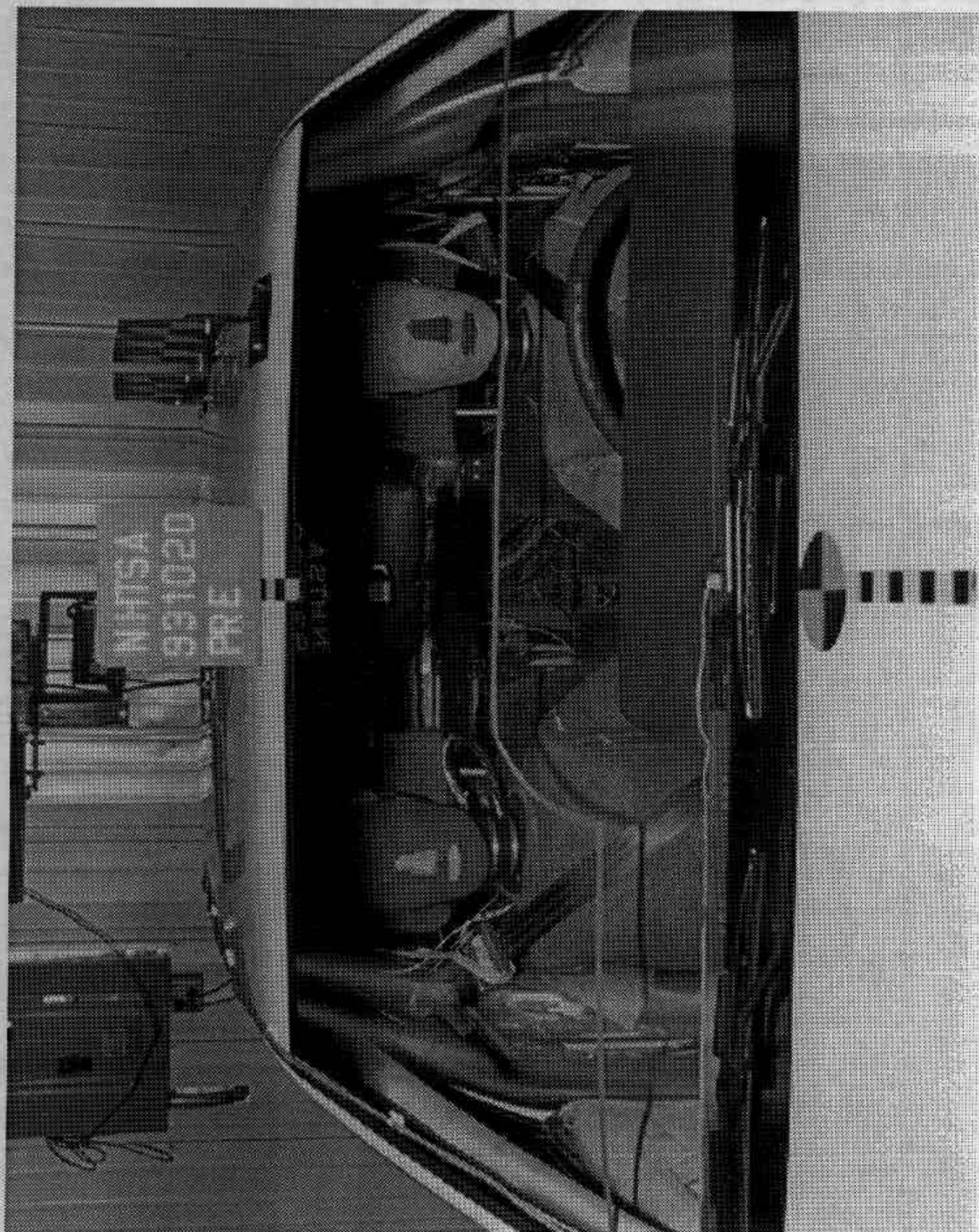


Figure A-13. PRE-TEST WINDSHIELD VIEW

A-14

931020

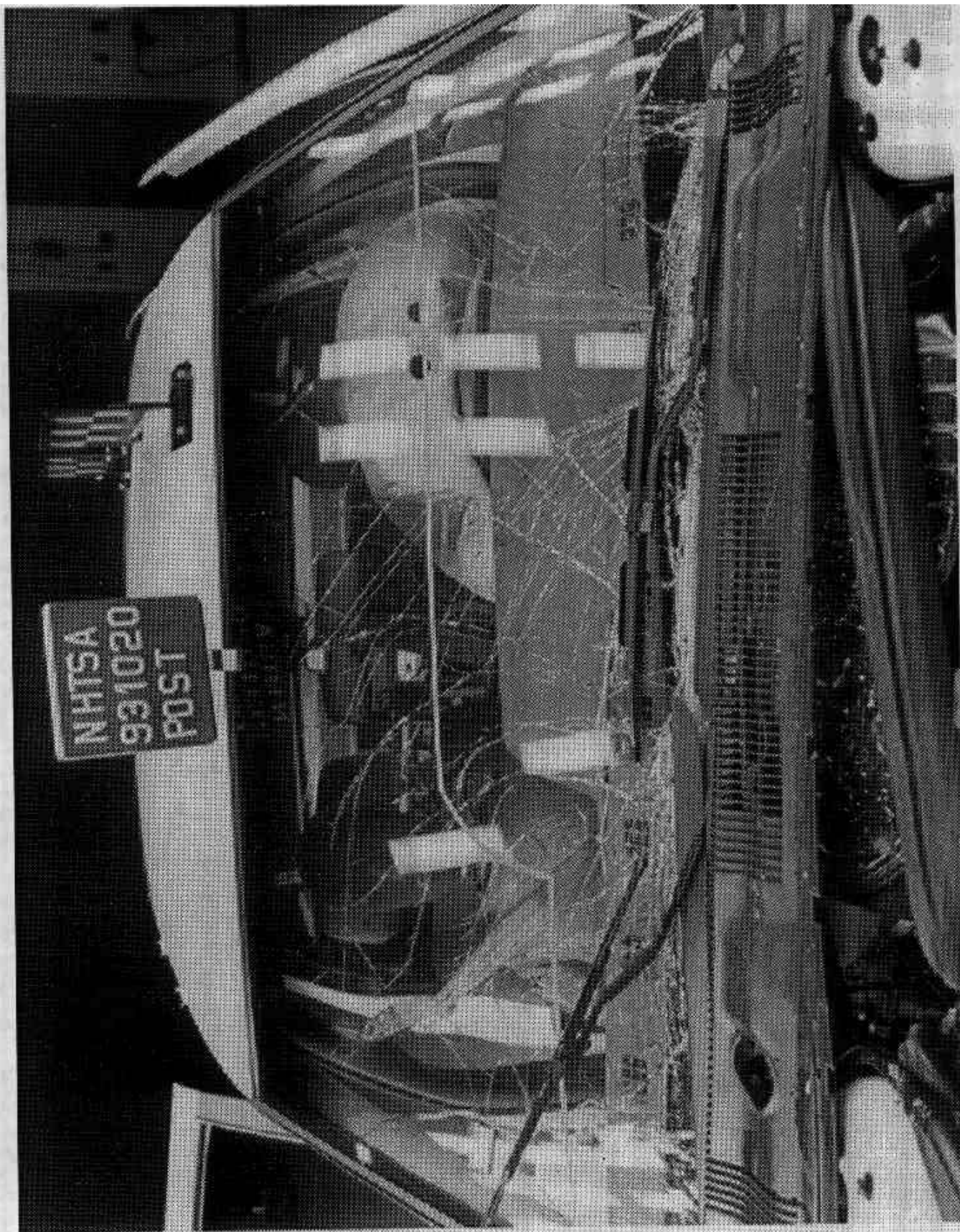


Figure A-14. POST-TEST WINDSHIELD VIEW  
A-15

931020



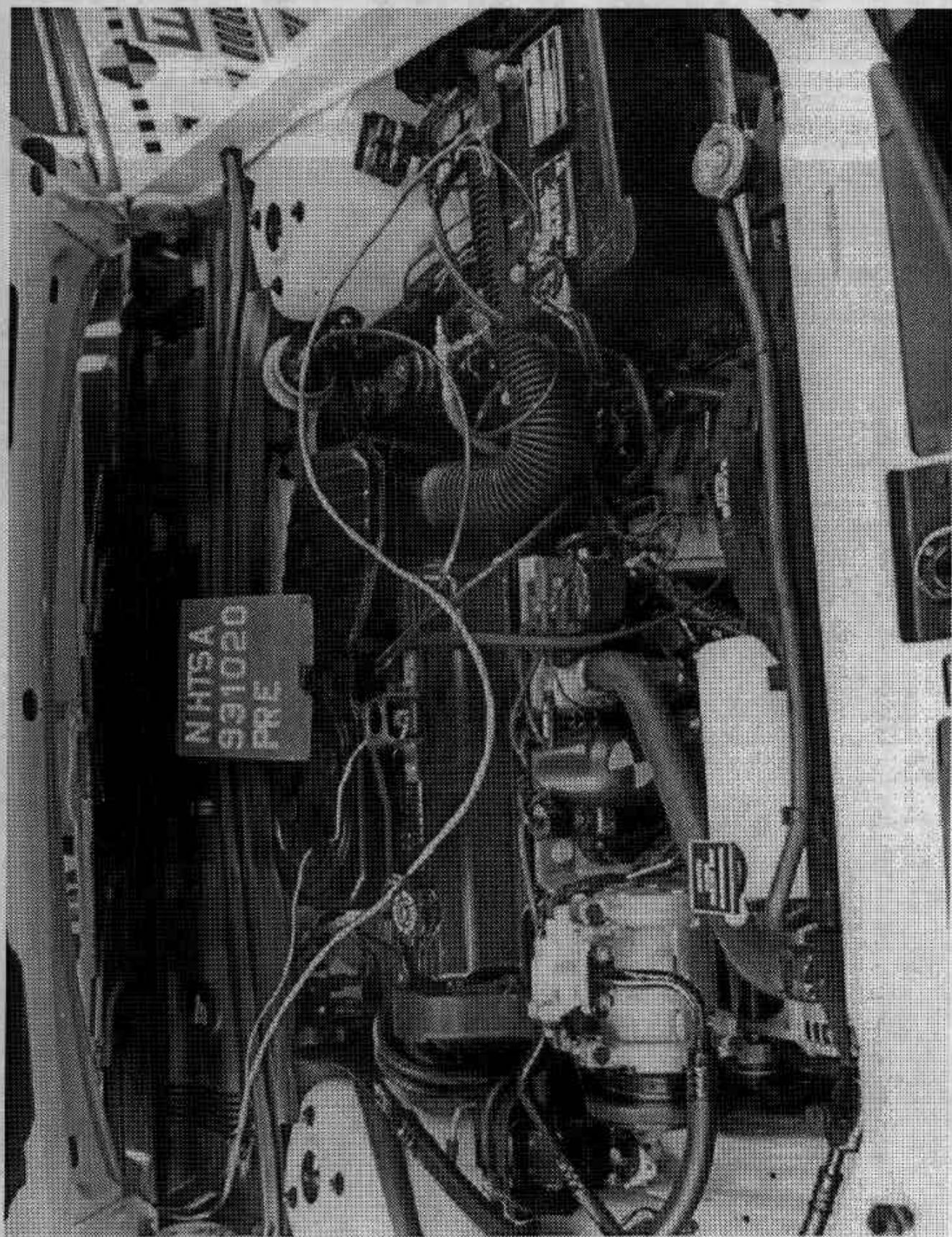


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

A-16

931020

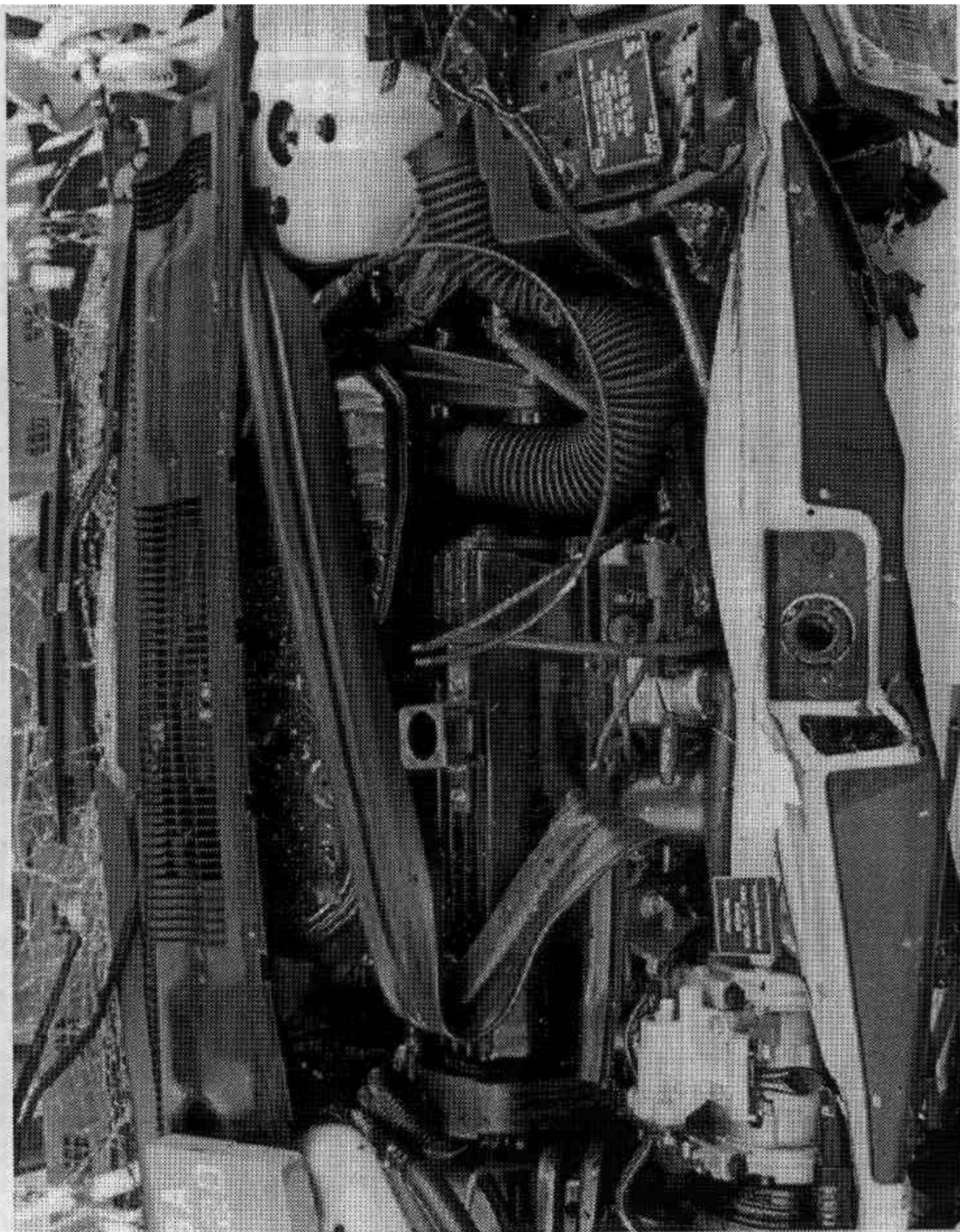


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

A-17

931020



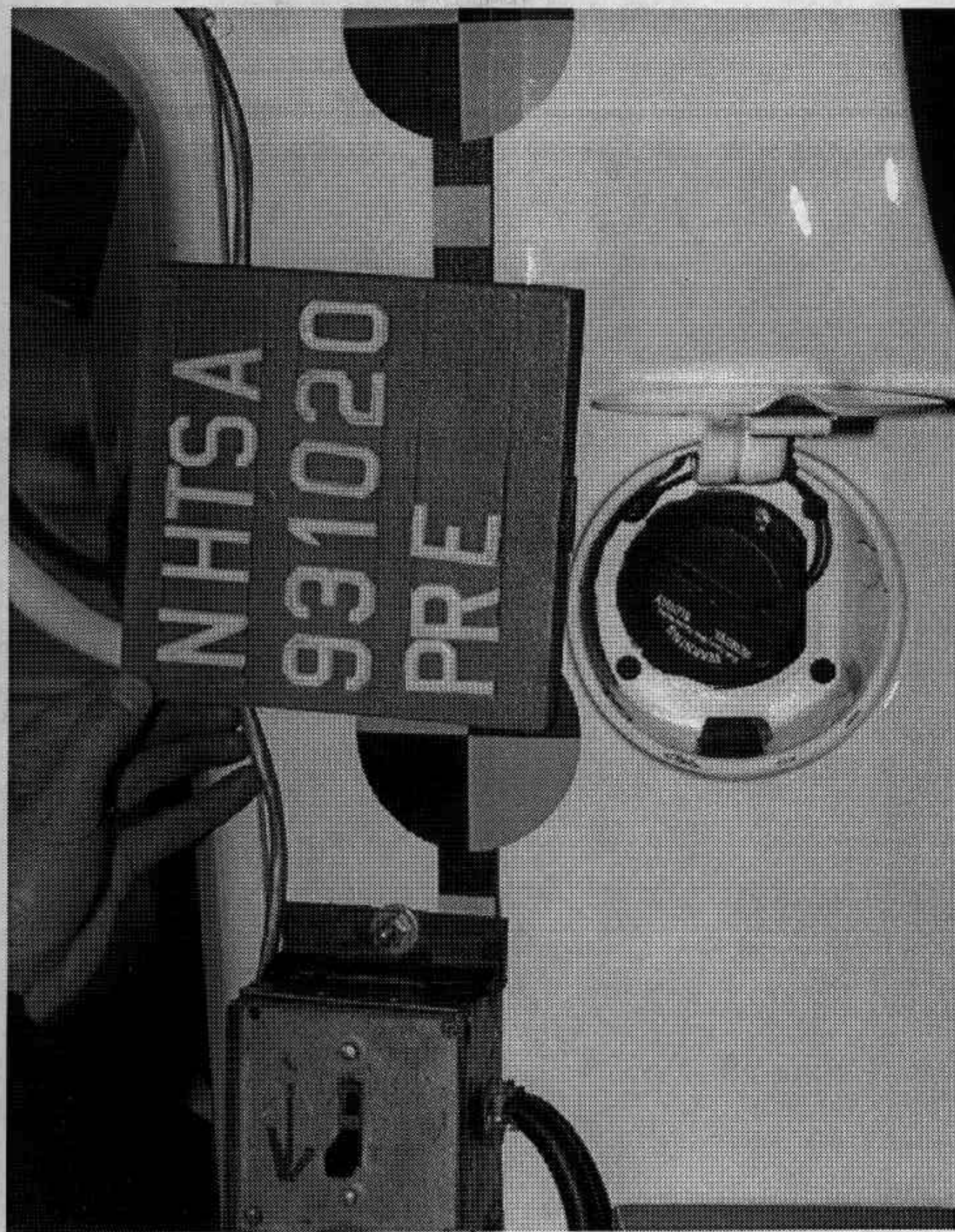


Figure A-17. PRE-TEST FUEL FILLER CAP VIEW

A-18

931020



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

A-19

931020



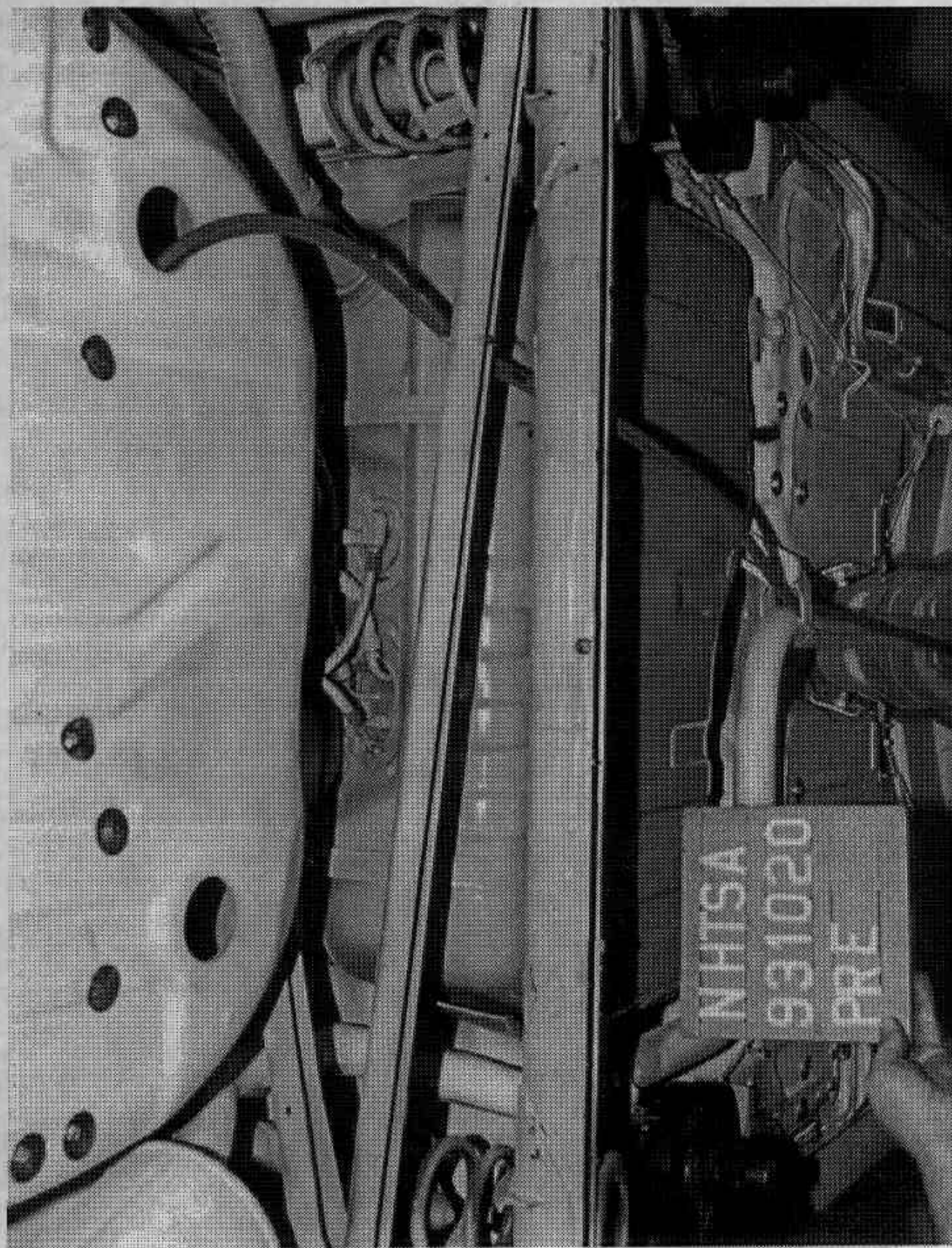


Figure A-19. PRE-TEST FUEL FILLER NECK AND FUEL TANK VIEW

A-20

931020



Figure A-20. POST-TEST FUEL FILLER NECK AND FUEL TANK VIEW

A-21

931020



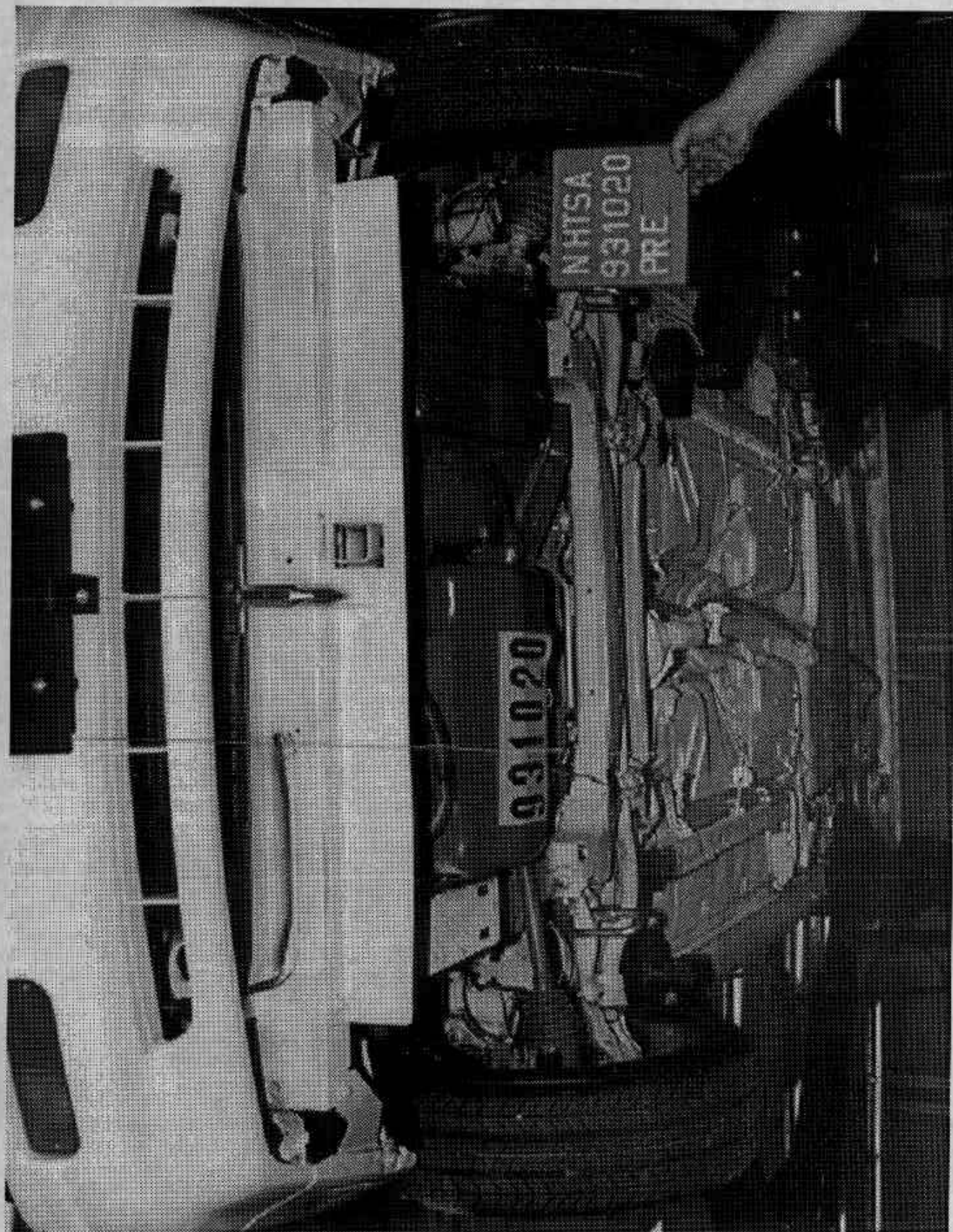


Figure A-21. PRE-TEST FRONT UNDERBODY VIEW

A-22

931020



Figure A-22. POST-TEST FRONT UNDERBODY VIEW

A-23

931020



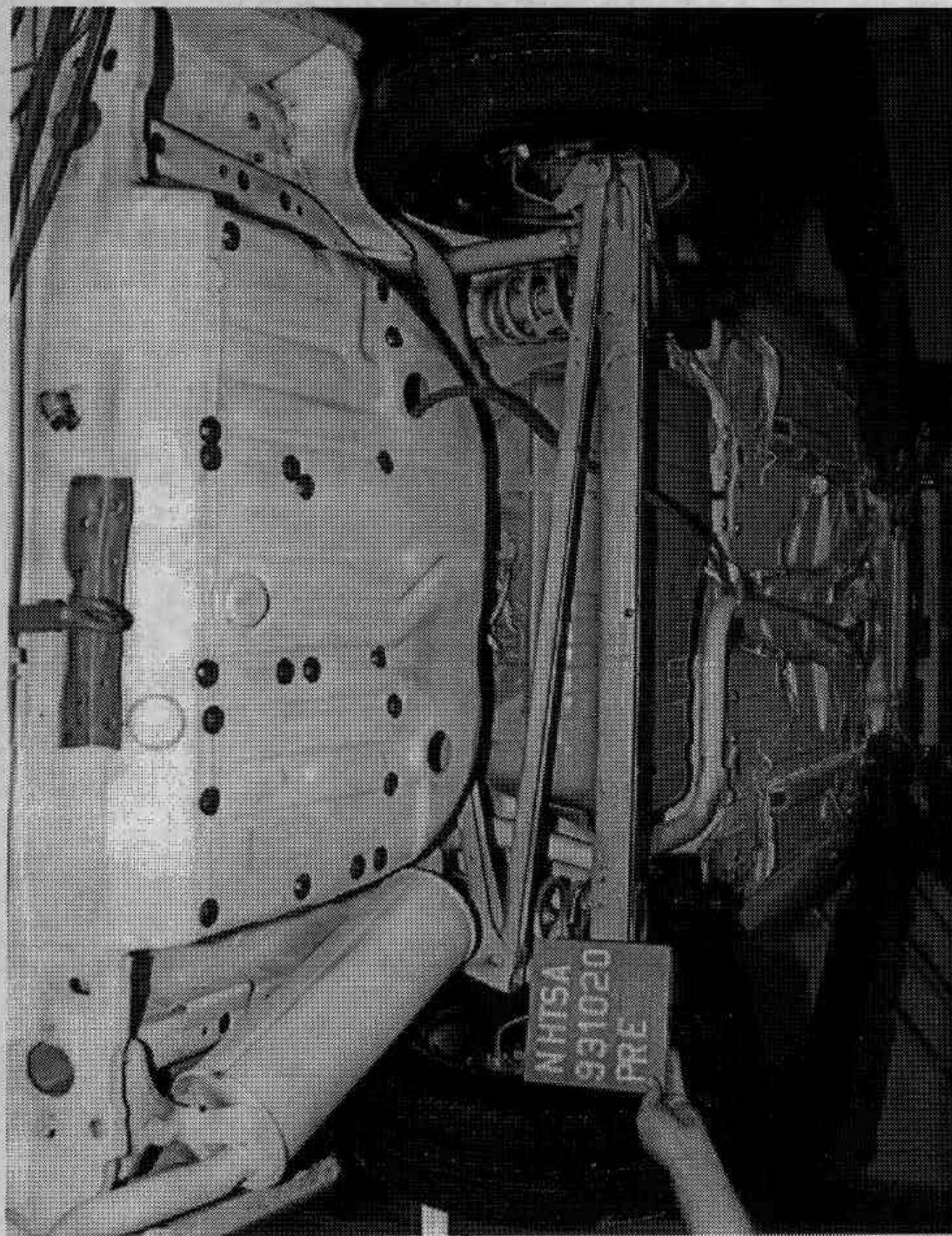


Figure A-23. PRE-TEST REAR UNDERBODY VIEW

A-24

931020

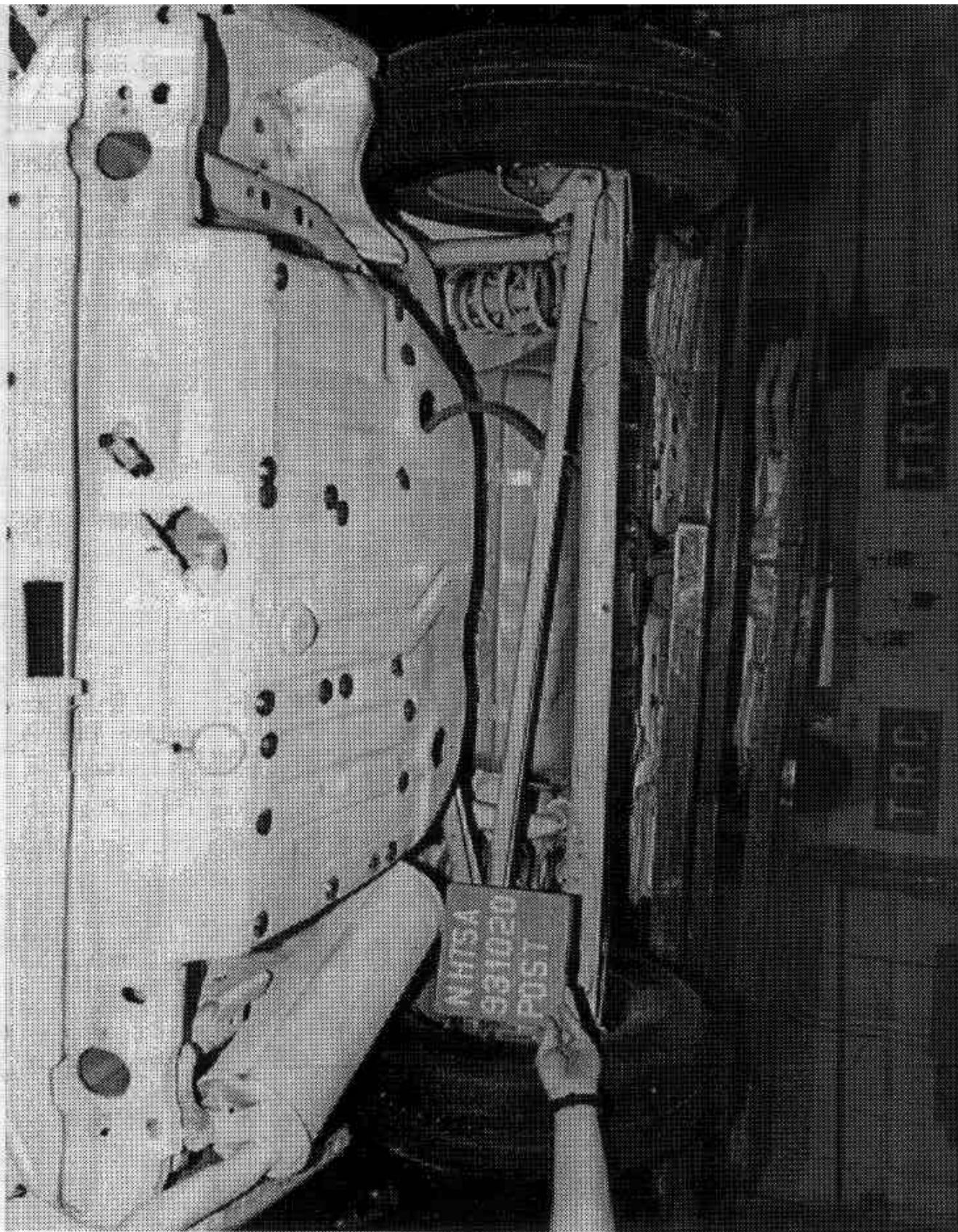


Figure A-24. POST-TEST REAR UNDERBODY VIEW

A-25

931020



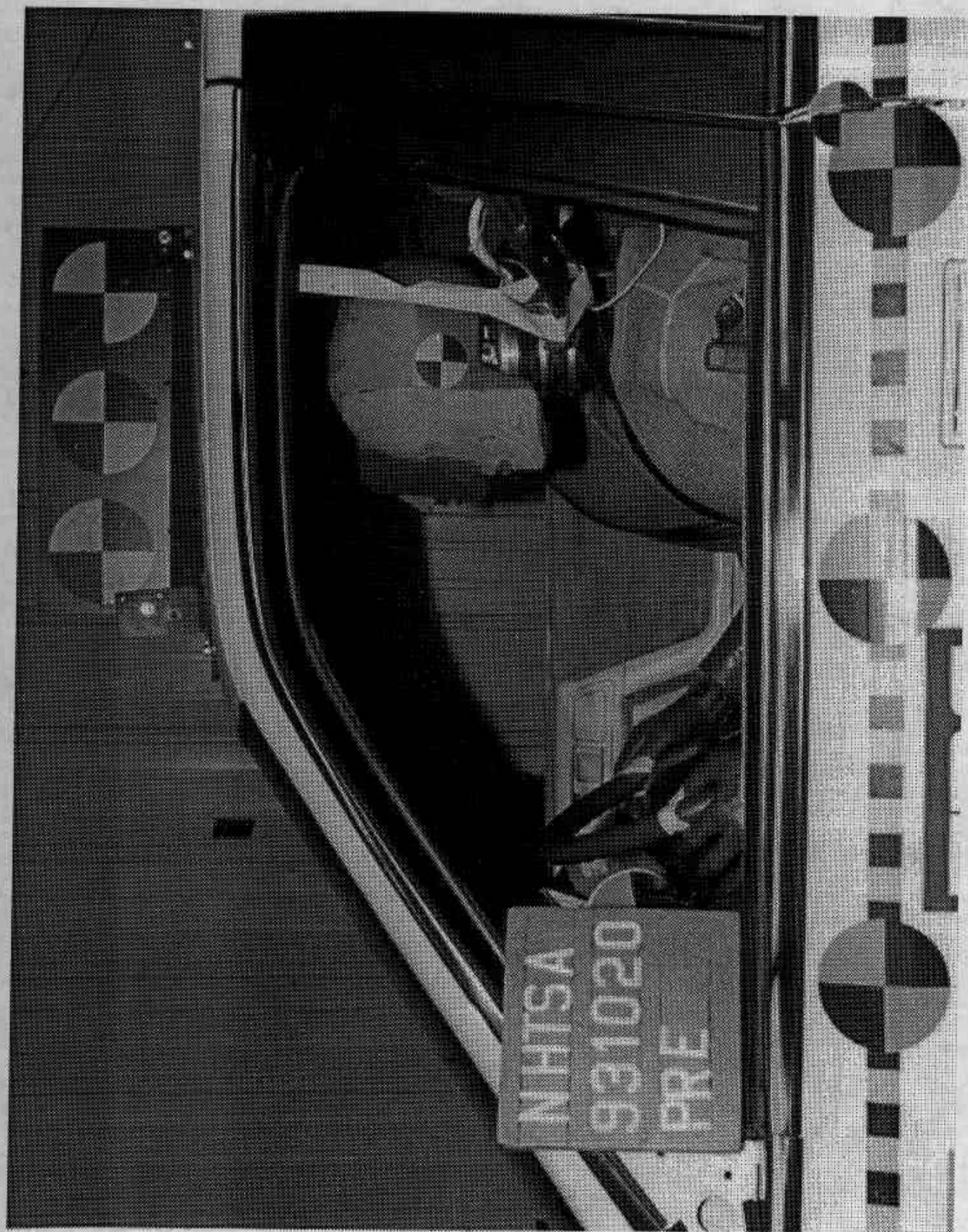


Figure A-25. PRE-TEST DRIVER DUMMY POSITION VIEW

A-26

931020

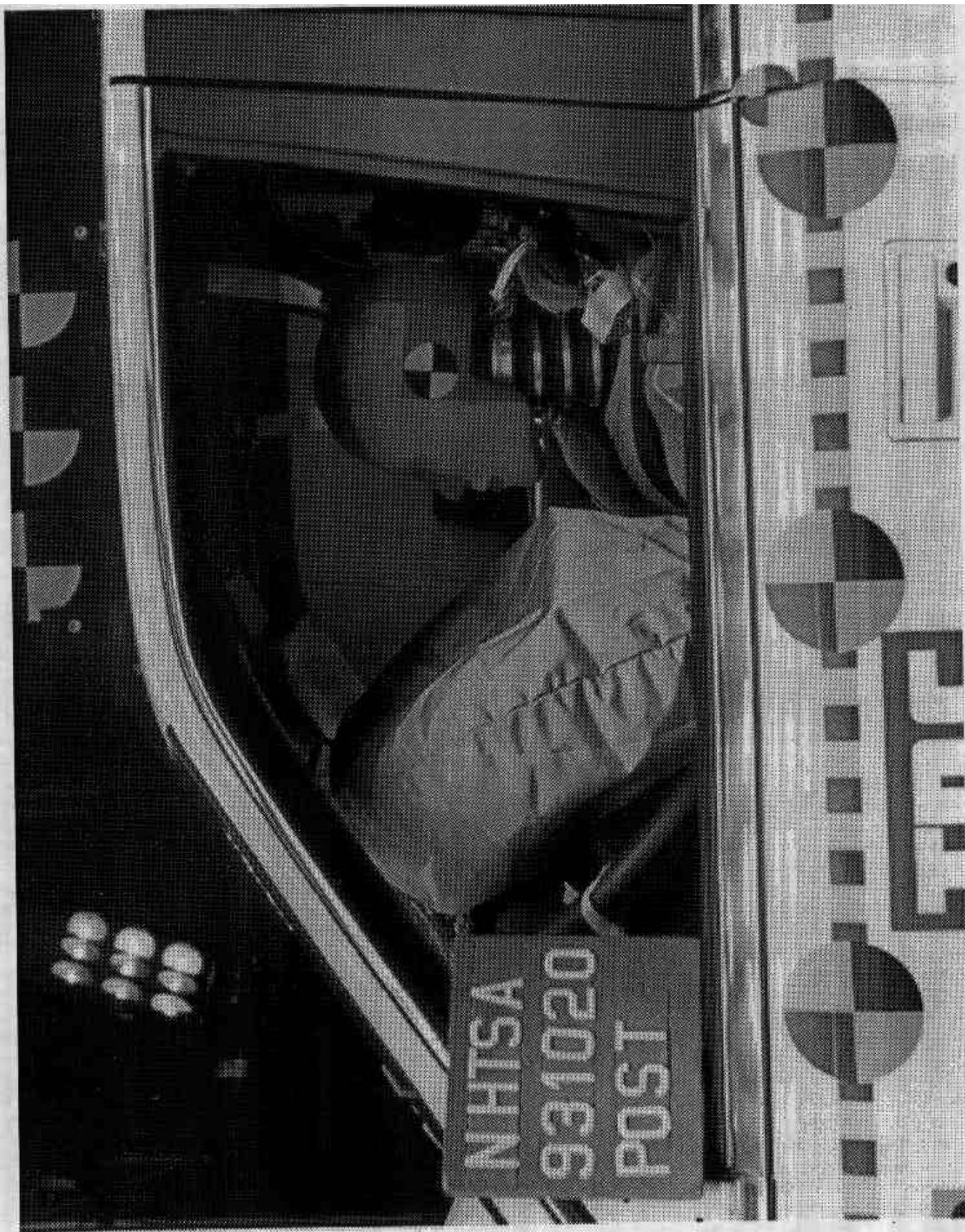


Figure A-26. POST-TEST DRIVER DUMMY POSITION VIEW

A-27

931020



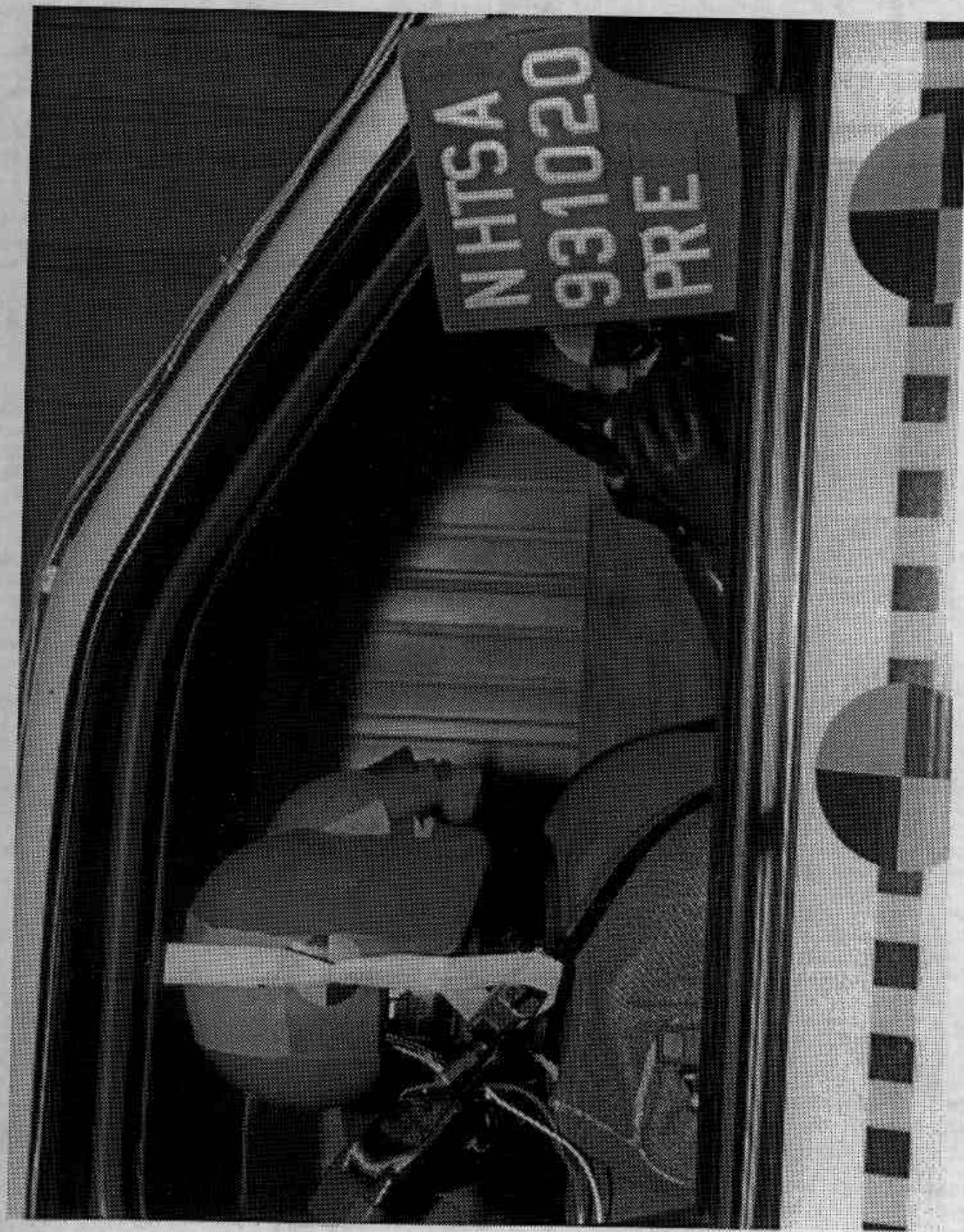


Figure A-27. PRE-TEST PASSENGER DUMMY POSITION VIEW

A-28

931020

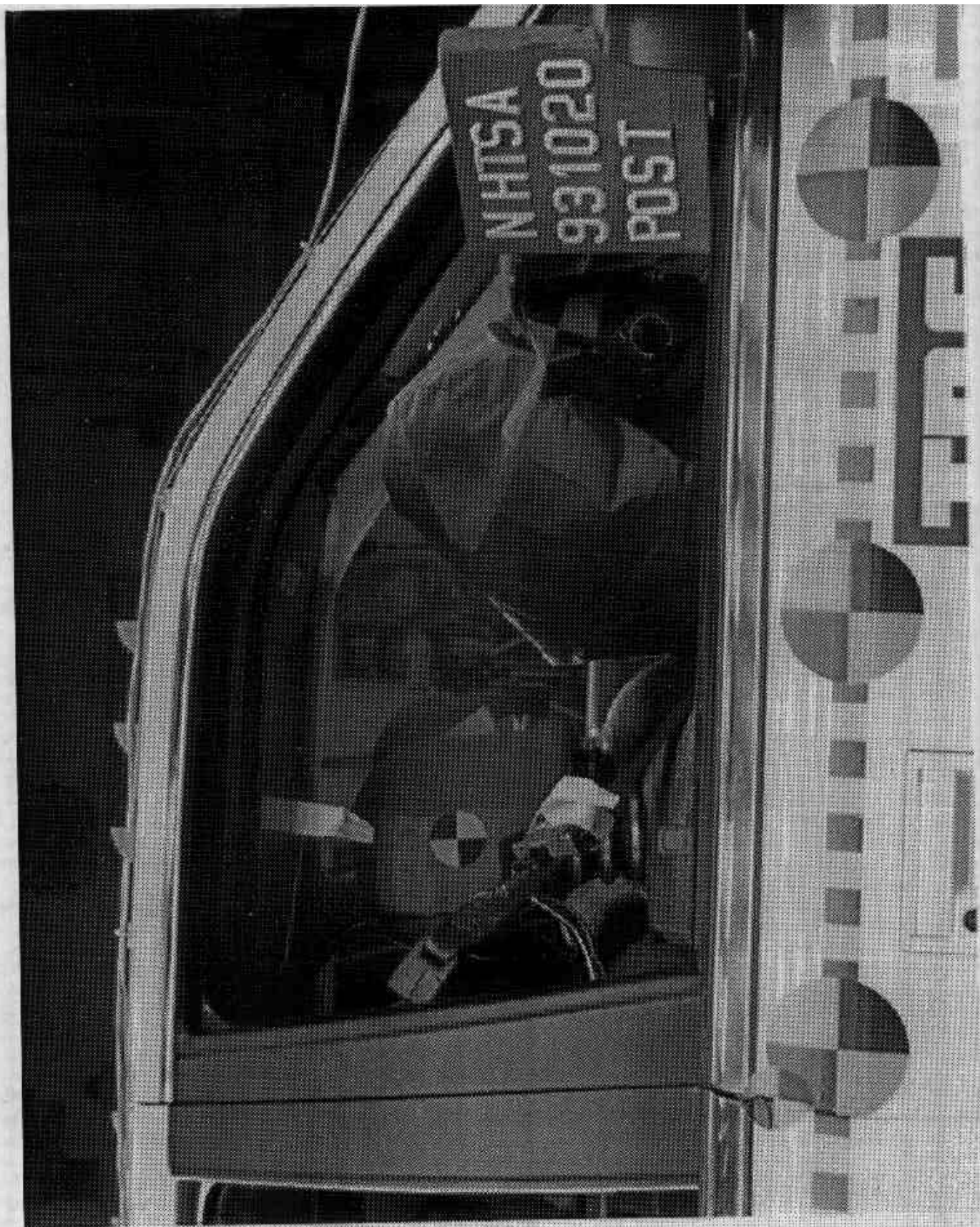


Figure A-28. POST-TEST PASSENGER DUMMY POSITION VIEW

A-29

931020



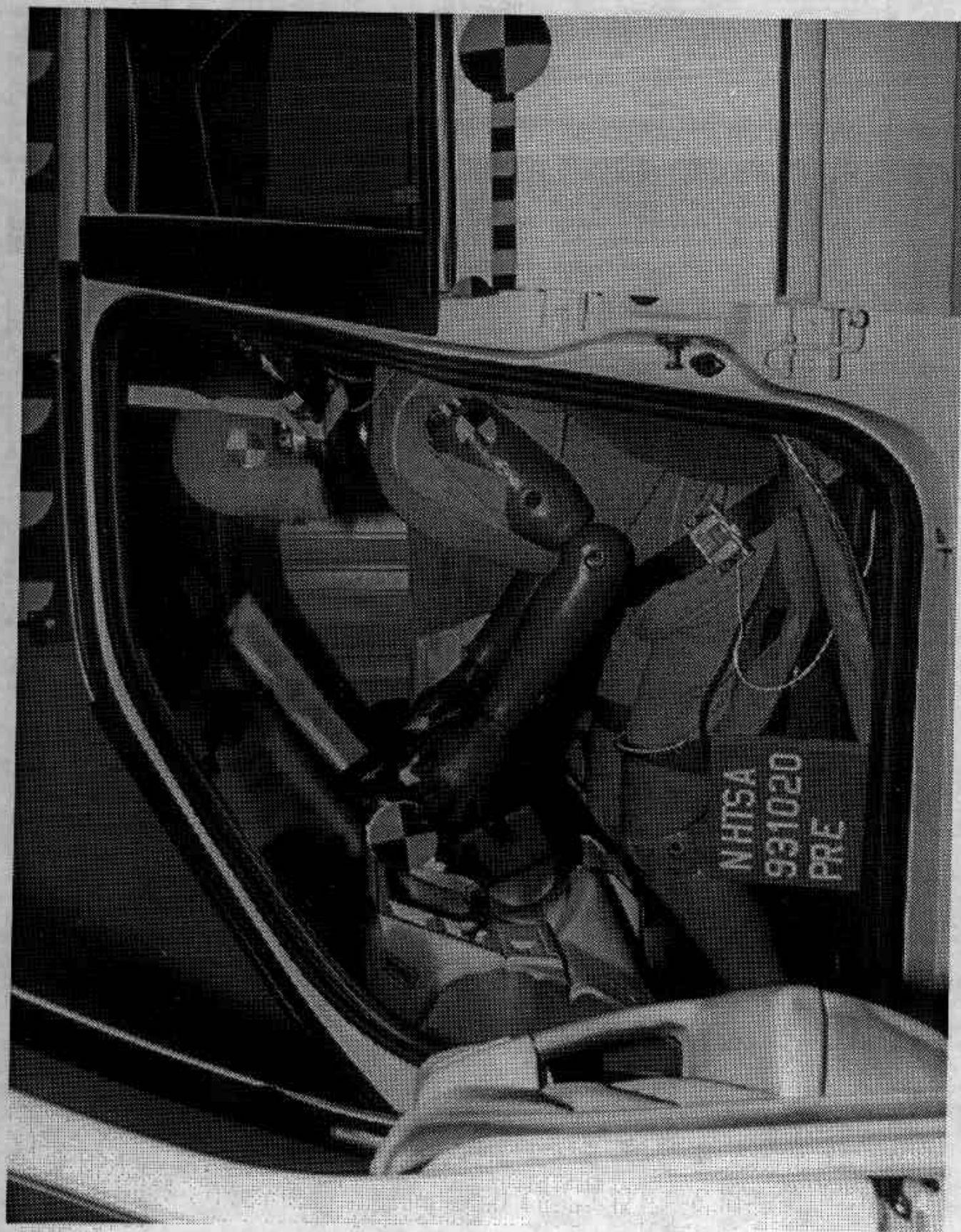


Figure A-29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-30

931020

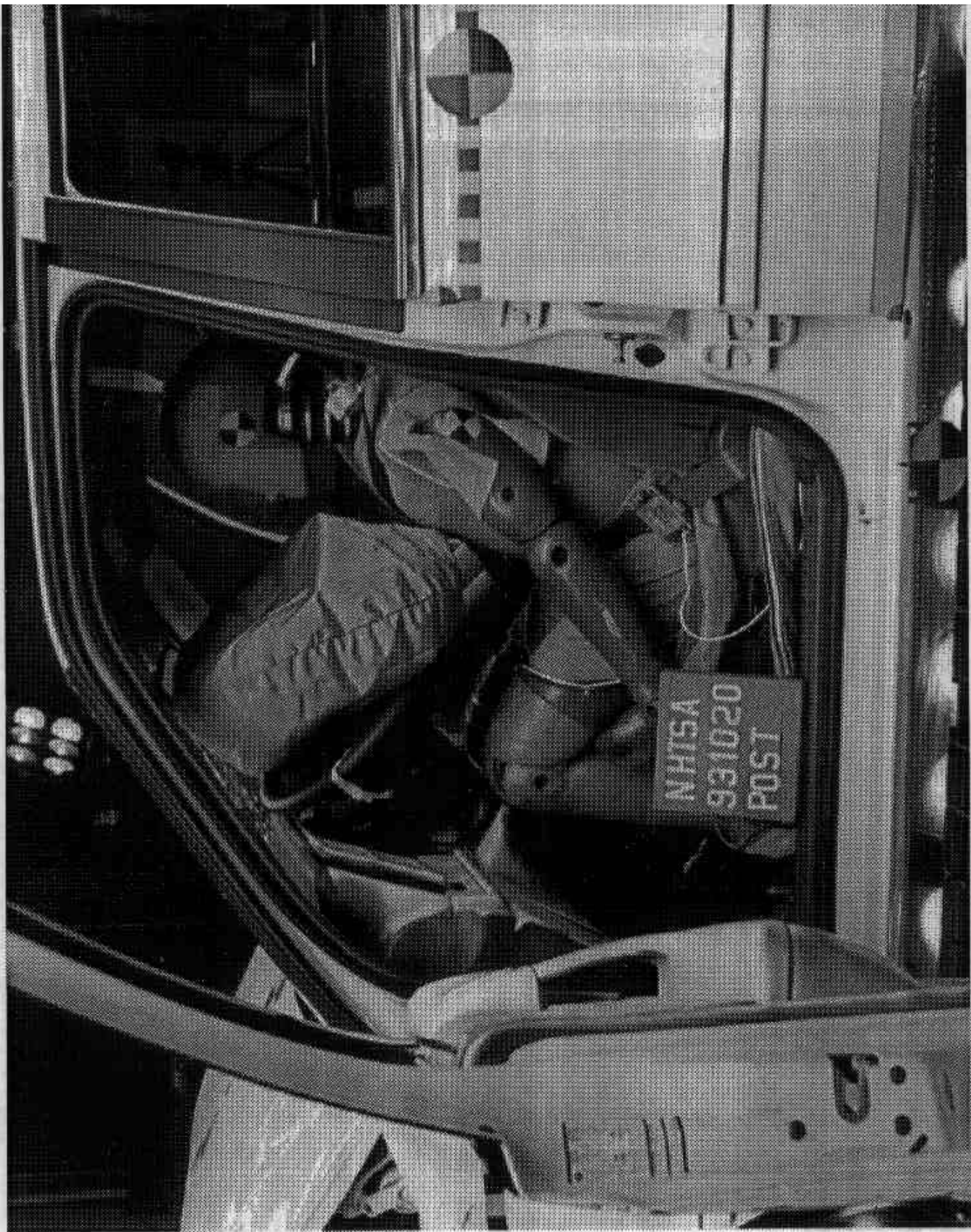


Figure A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1  
A-31 931020





Figure A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2  
A-32 931020



Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-33

931020



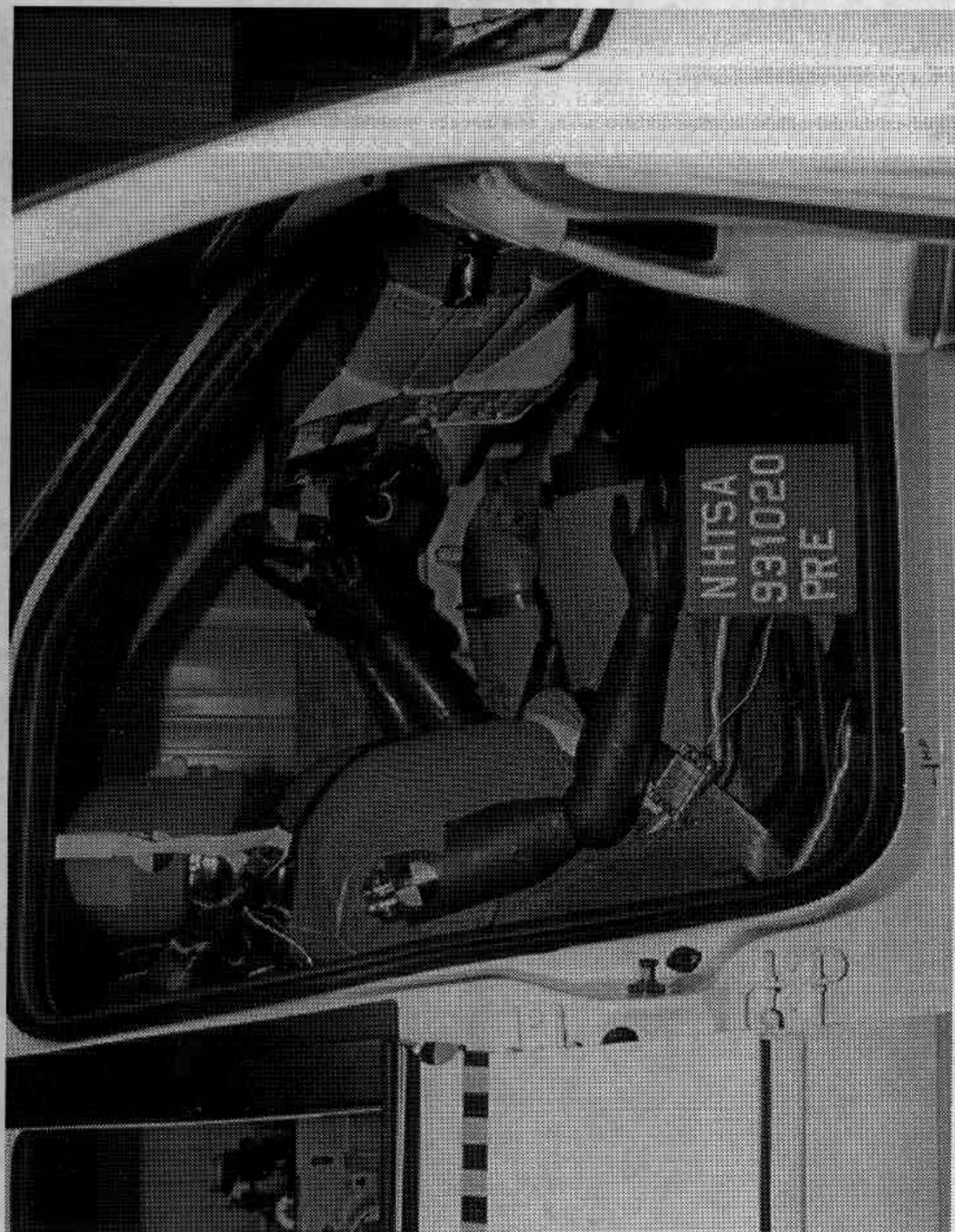


Figure A-33. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

A-34

931020





Figure A-34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1  
A-35 931020



Figure A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

A-36

931020



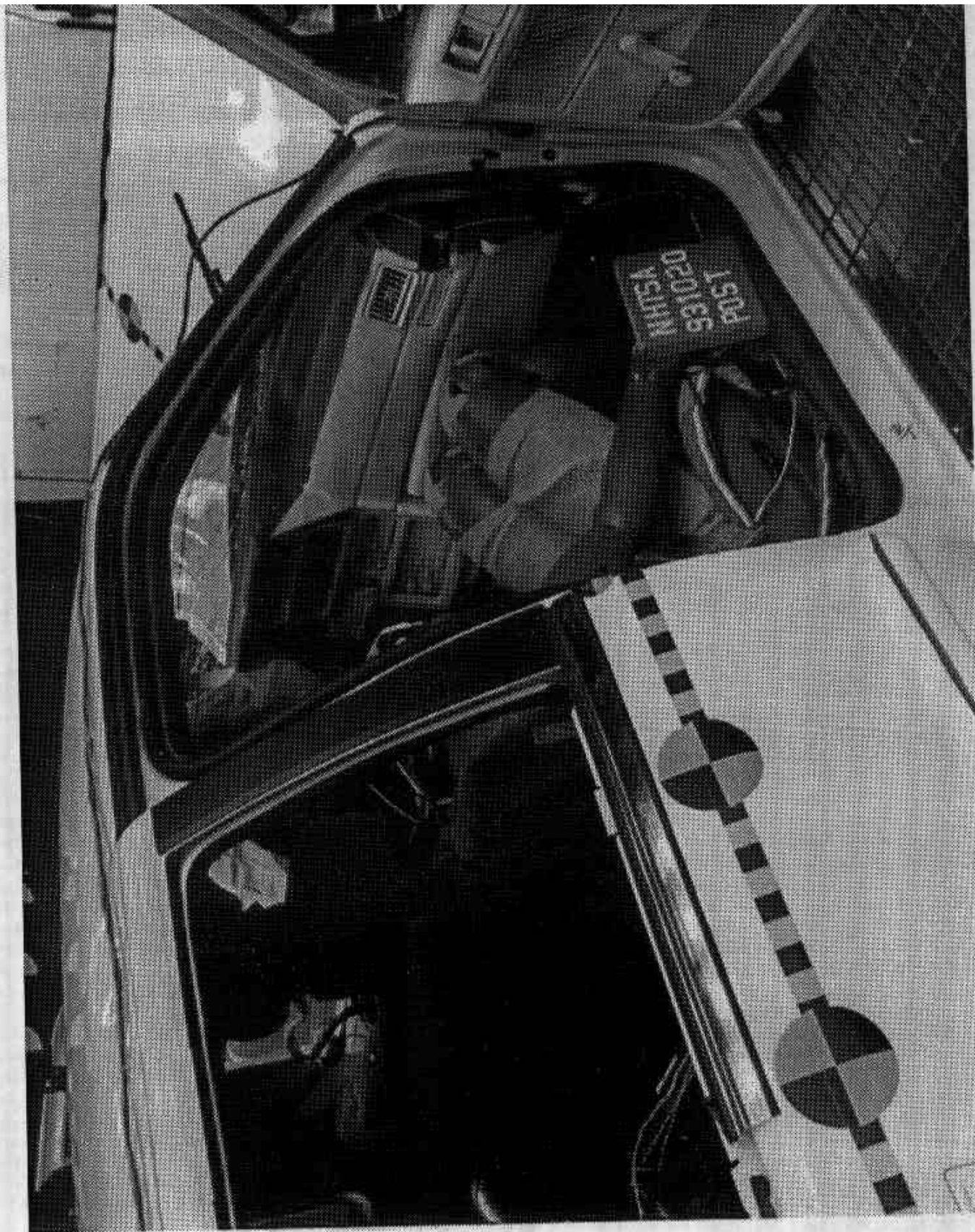


Figure A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2  
A-37 931020

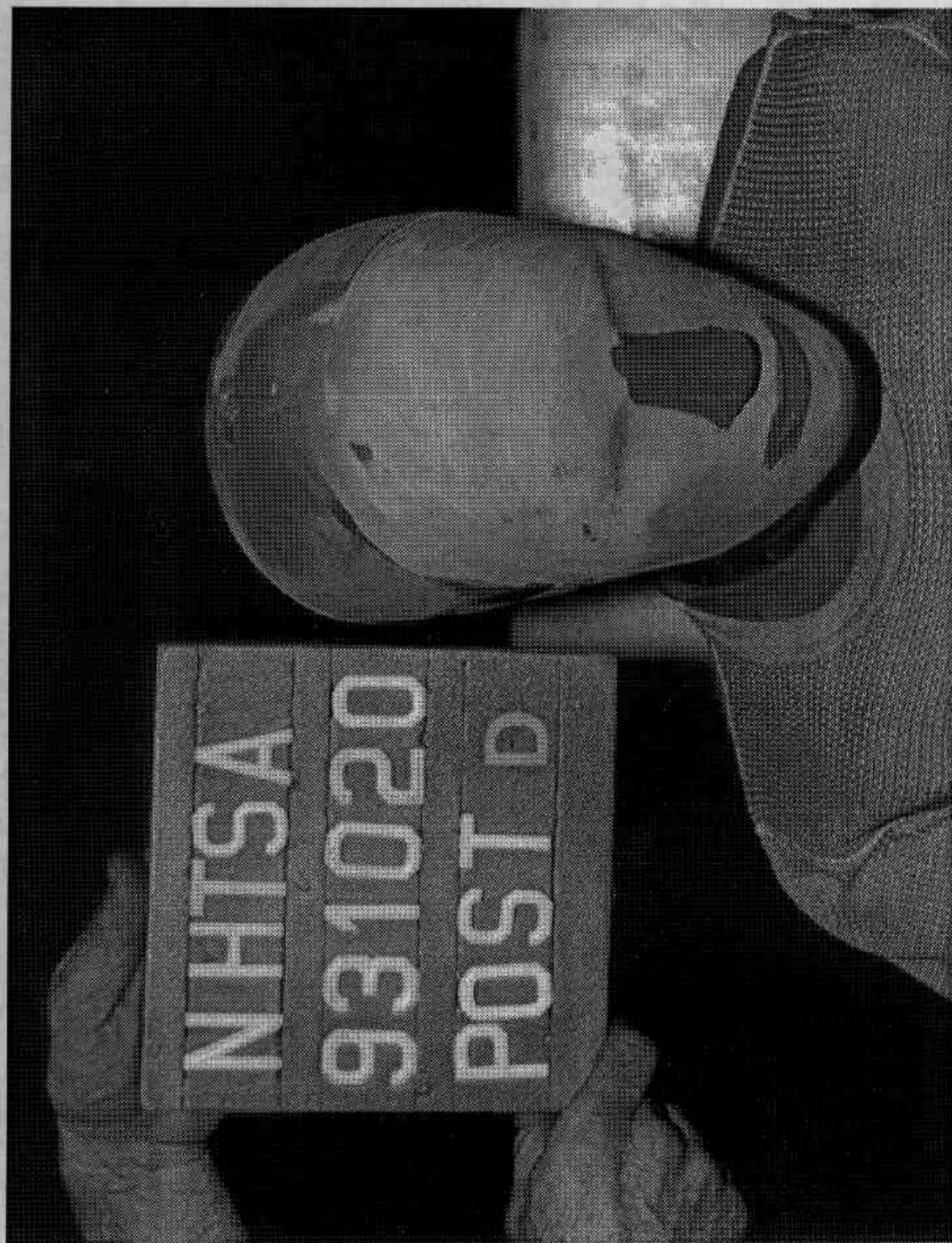


Figure A-37. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1  
A-38 931020



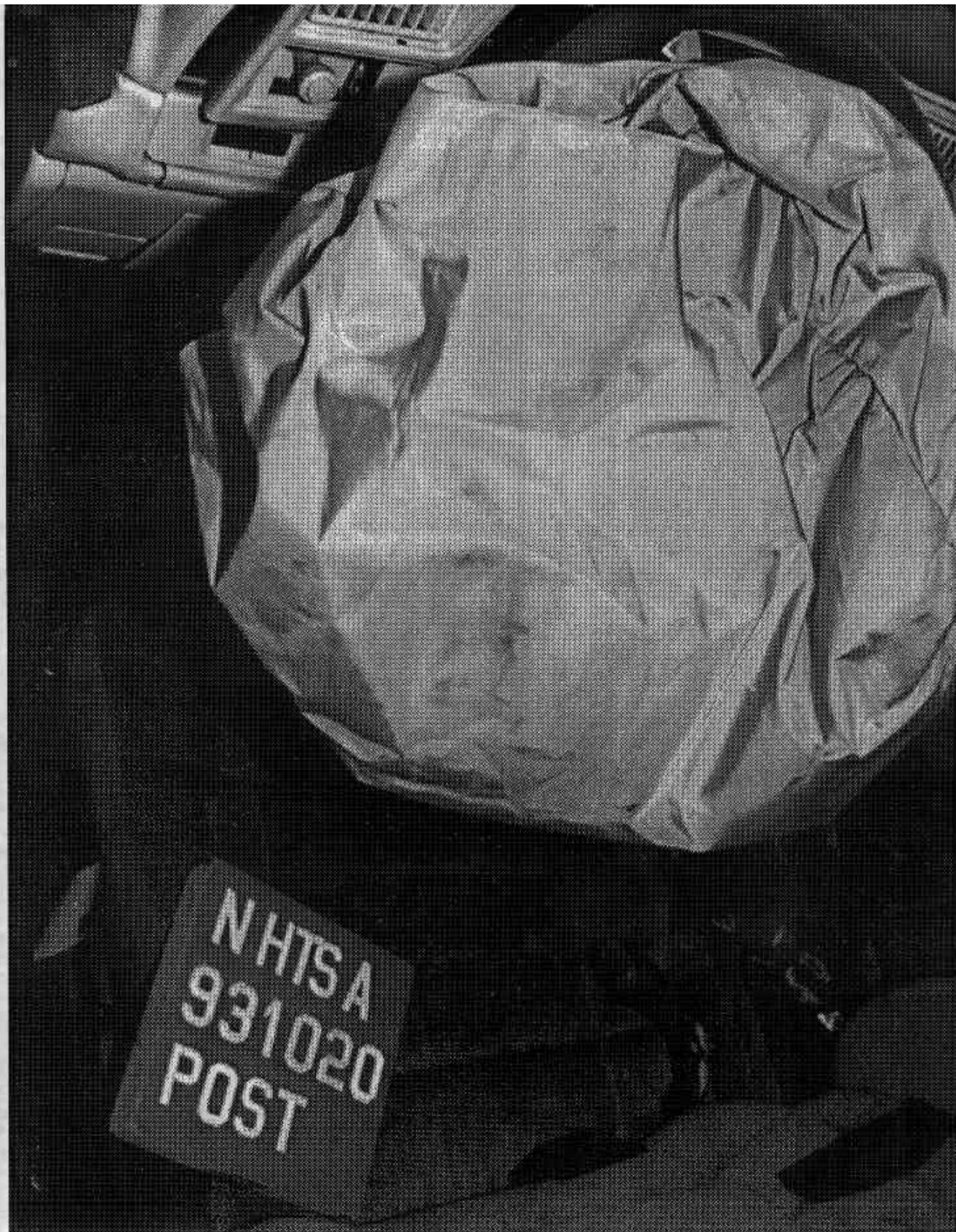


Figure A-38. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2  
A-39 931020



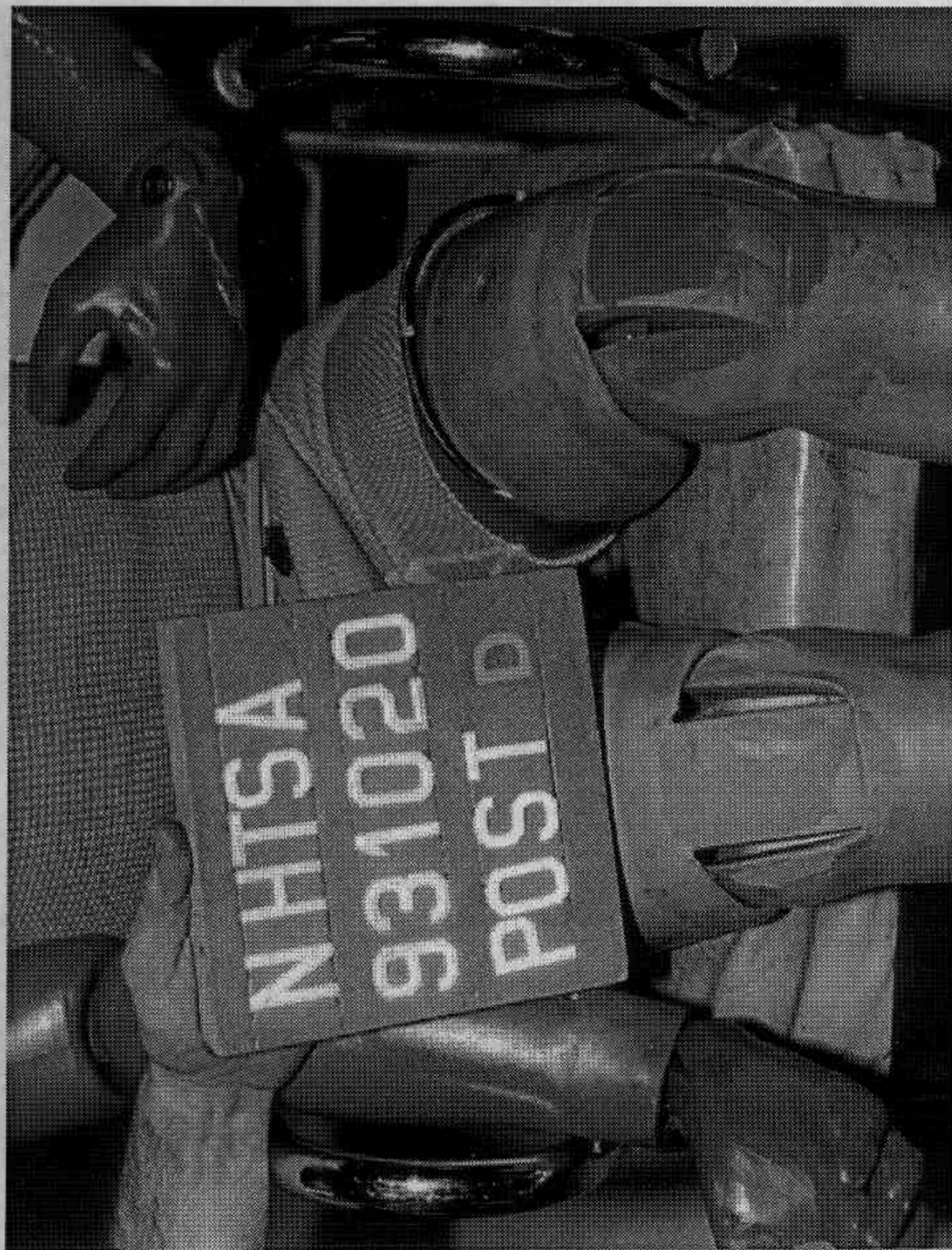


Figure A-39. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

A-40

931020



Figure A-40. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2  
A-41 931020



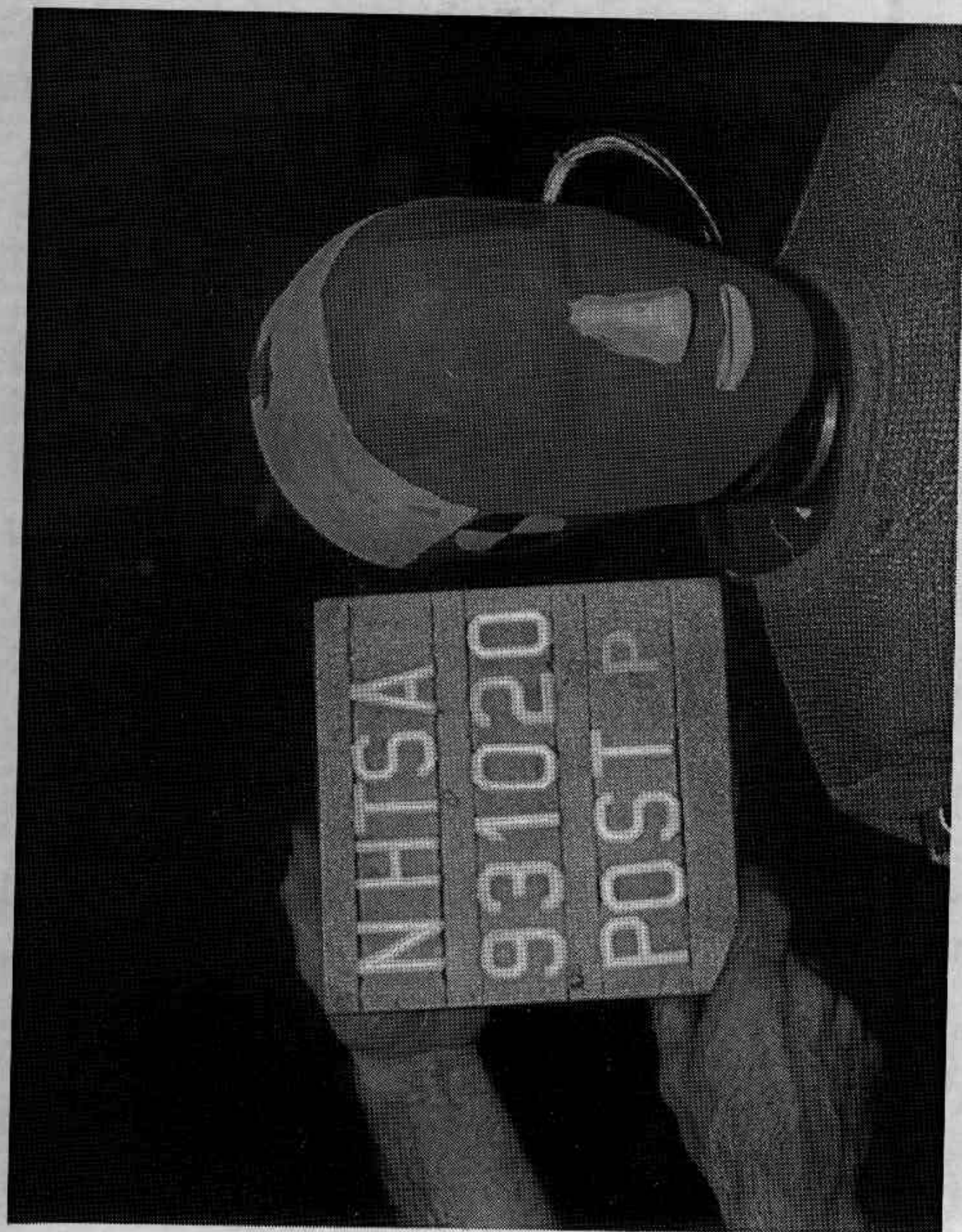


Figure A-41. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW  
A-42 931020

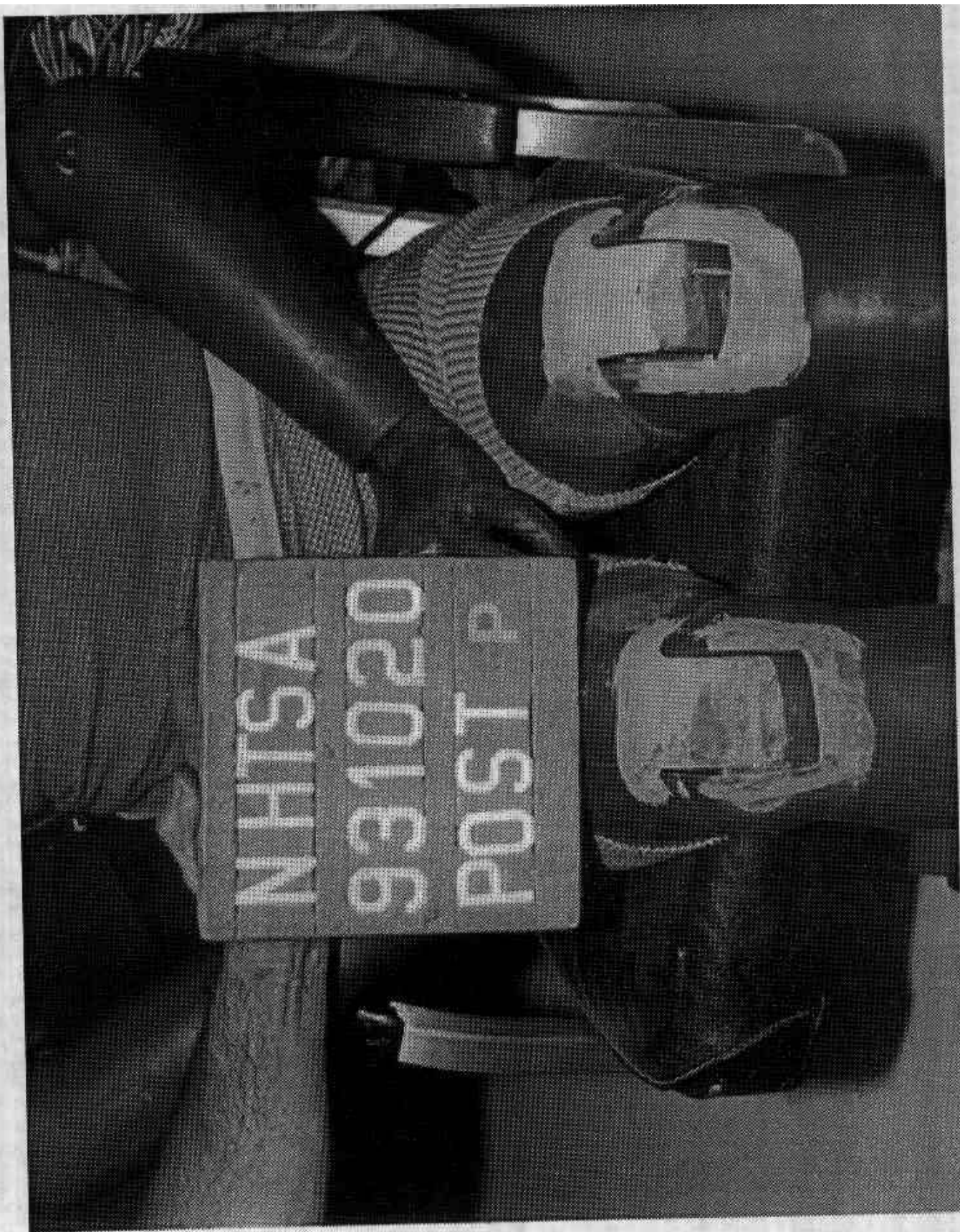


Figure A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1  
A-43 931020





Figure A-43. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

A-44

931020



MFD BY CHRYSLER CORPORATION

DATE OF MFD: 8-93

GWR 03999 LB  
1814 KG

GWR 2206 LB  
FRONT 1001 KG

GWR 1843 LB  
REAR 0835 KG

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

VIN: 3B3AA46X2RT212885

TYPE: PASSENGER CAR



MOI: 083016 653

VEHICLE MADE IN MEXICO

4049105

Figure A-44. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

|                                                                     | REDUCED<br>LOADING<br>(IMPROVED<br>RIDE) | VEHICLE<br>CAPACITY<br>OR LESS       |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------|
| 1ST SEAT                                                                                                                                             | 2 PASS.                                  | ≈3 PASS.                             |
| 2ND SEAT                                                                                                                                             | 2 PASS.                                  | 3 PASS.                              |
| LOORAGE                                                                                                                                              | 0                                        | 116 LB-52 kg                         |
| TOTAL                                                                                                                                                | 4 PASS.                                  | ≈6 PASS.                             |
| TOTAL<br>WEIGHT                                                                                                                                      | 600 LB<br>272 kg                         | ≈1015 LB<br>460 kg                   |
| TIRE<br>PRESSURE<br>COLD                                                                                                                             | 32 PSI<br>220 kPa<br>FRONT &<br>REAR     | 35 PSI<br>240 kPa<br>FRONT &<br>REAR |
| * REDUCE VEHICLE CAPACITY TO<br>2 PASSENGERS IN 1ST SEAT-<br>1865 LBS-847 kg-5 PASS. TOTAL<br>WHEN EQUIPPED WITH BUCKET<br>SEATS WITHOUT CENTER SEAT |                                          |                                      |
| <b>MINIMUM TIRE SIZE</b><br><b>P185/70R14</b><br>STANDARD LOAD                                                                                       |                                          |                                      |
| SEE OWNERS MANUAL FOR<br>OPTIONAL TIRES, HIGH SPEED<br>OPERATION & ADDITIONAL DATA                                                                   |                                          |                                      |
| PRINTED IN USA                                                                                                                                       |                                          | 4284 946                             |

Figure A-45. PRE-TEST RECOMMENDED TIRE PRESSURE LABEL VIEW



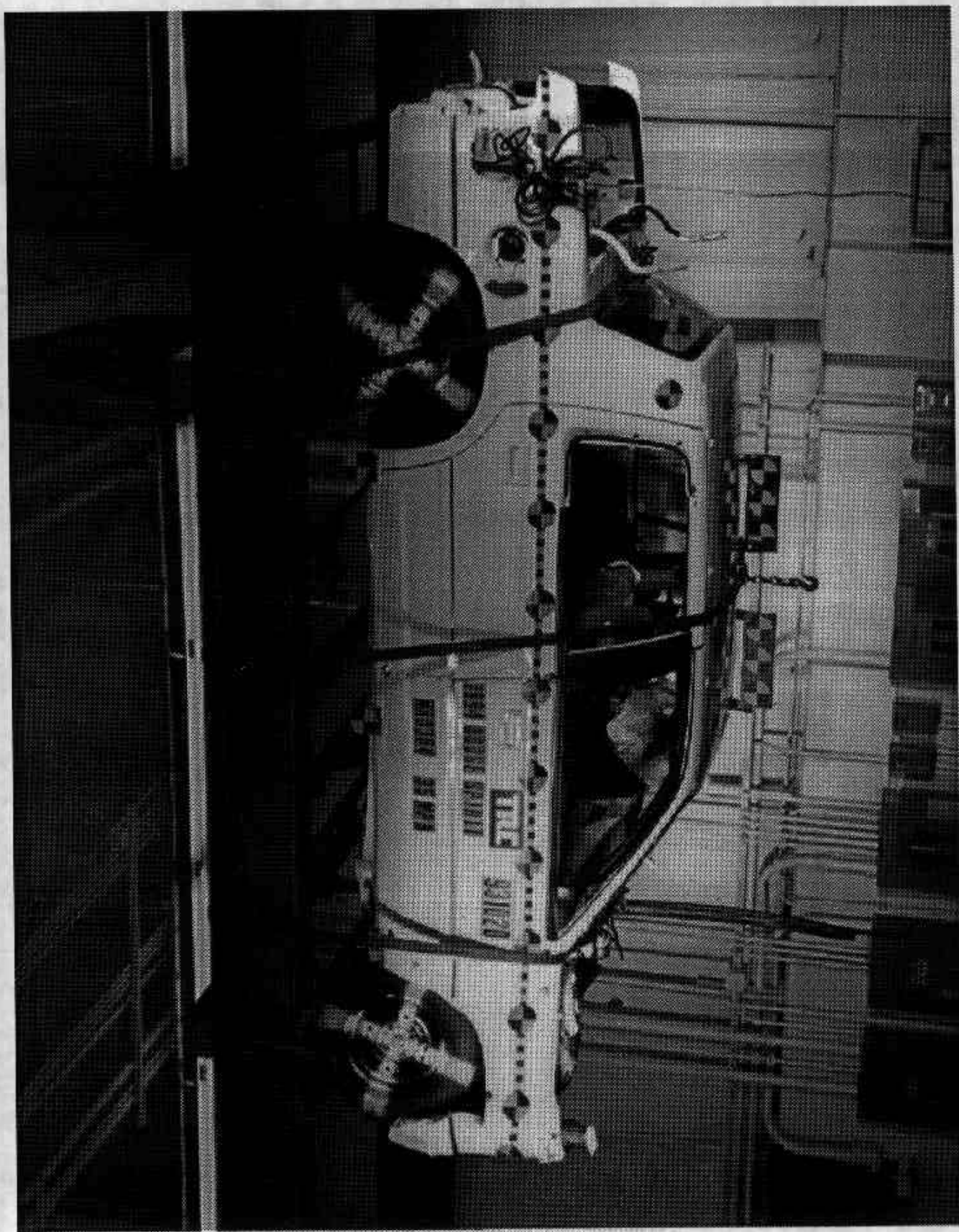


Figure A-46. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW

A-47

931020

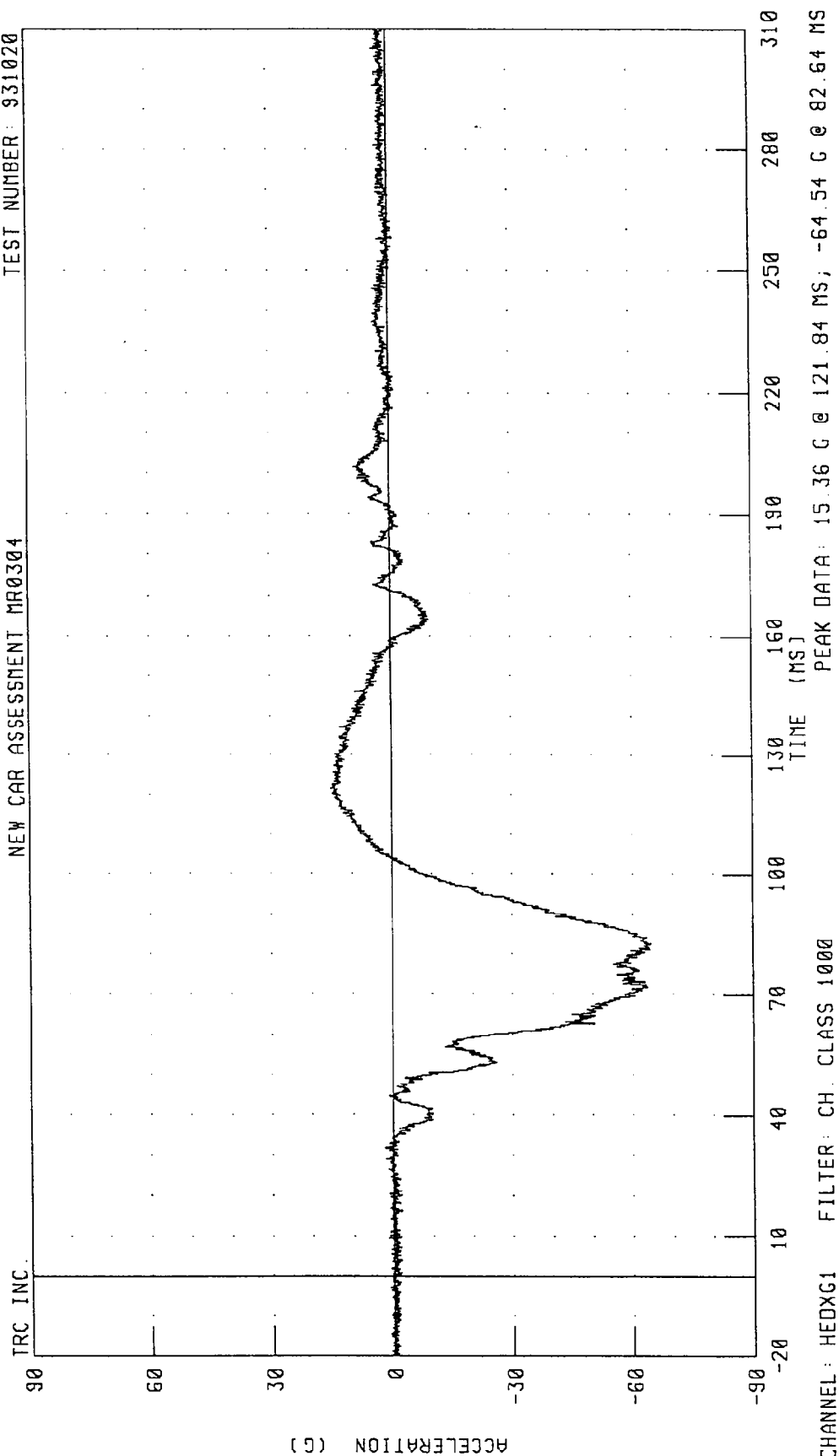
APPENDIX B

DATA PLOTS



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER HEAD X-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

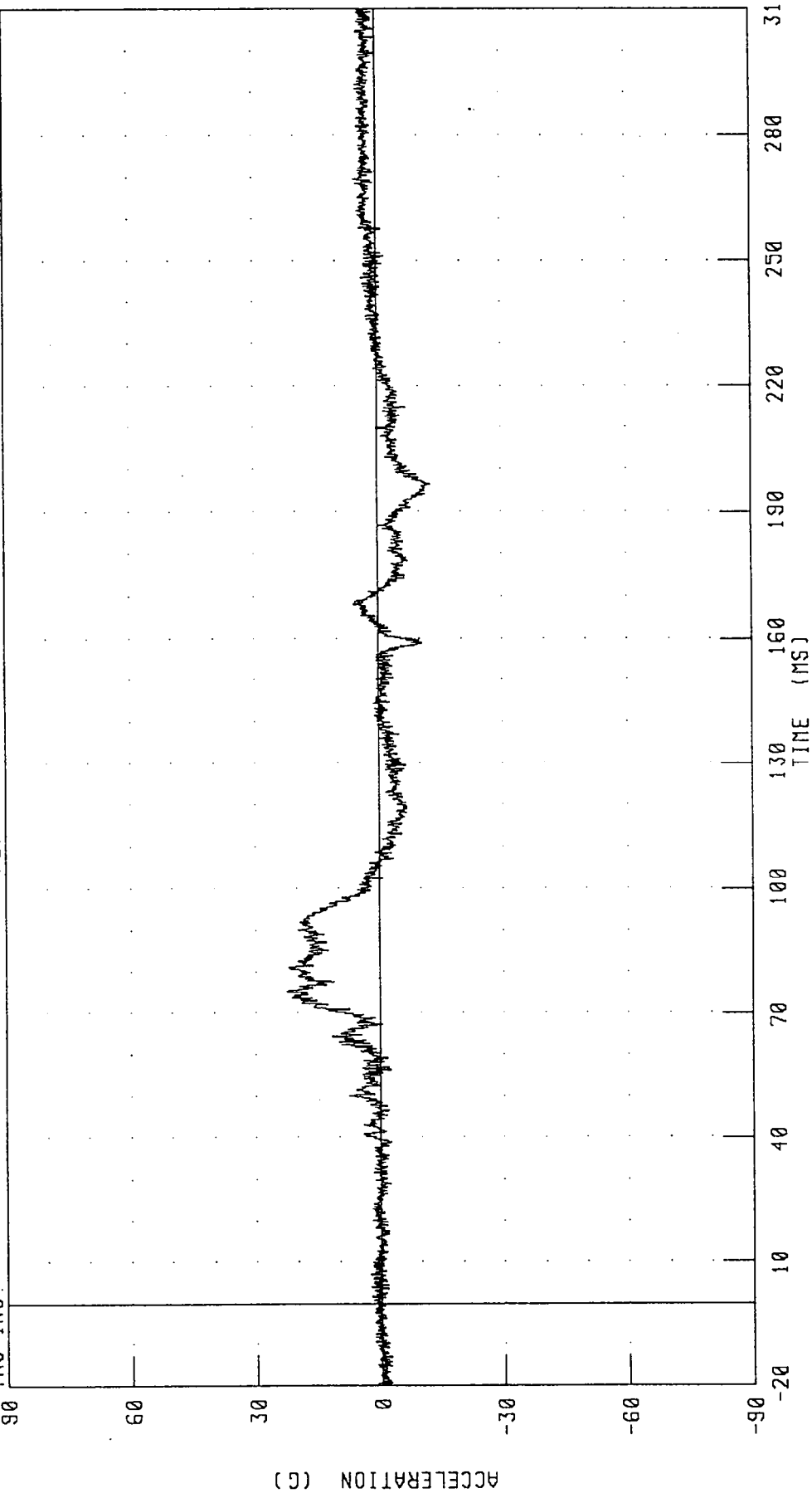
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER HEAD Y-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.

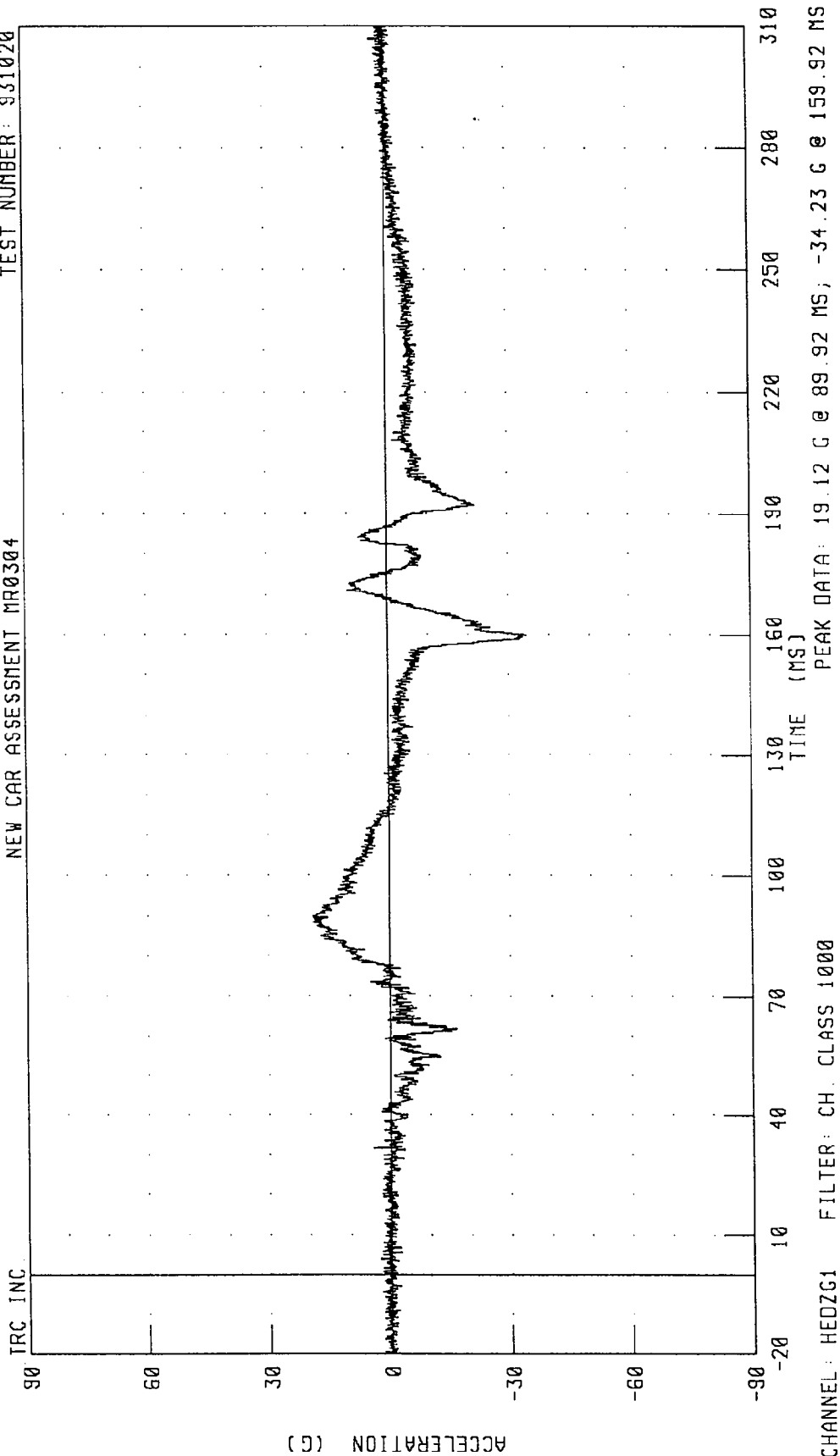


PEAK DATA: 22.70 G @ 75.20 MS; -12.65 G @ 196.56 MS

CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER HEAD Z-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

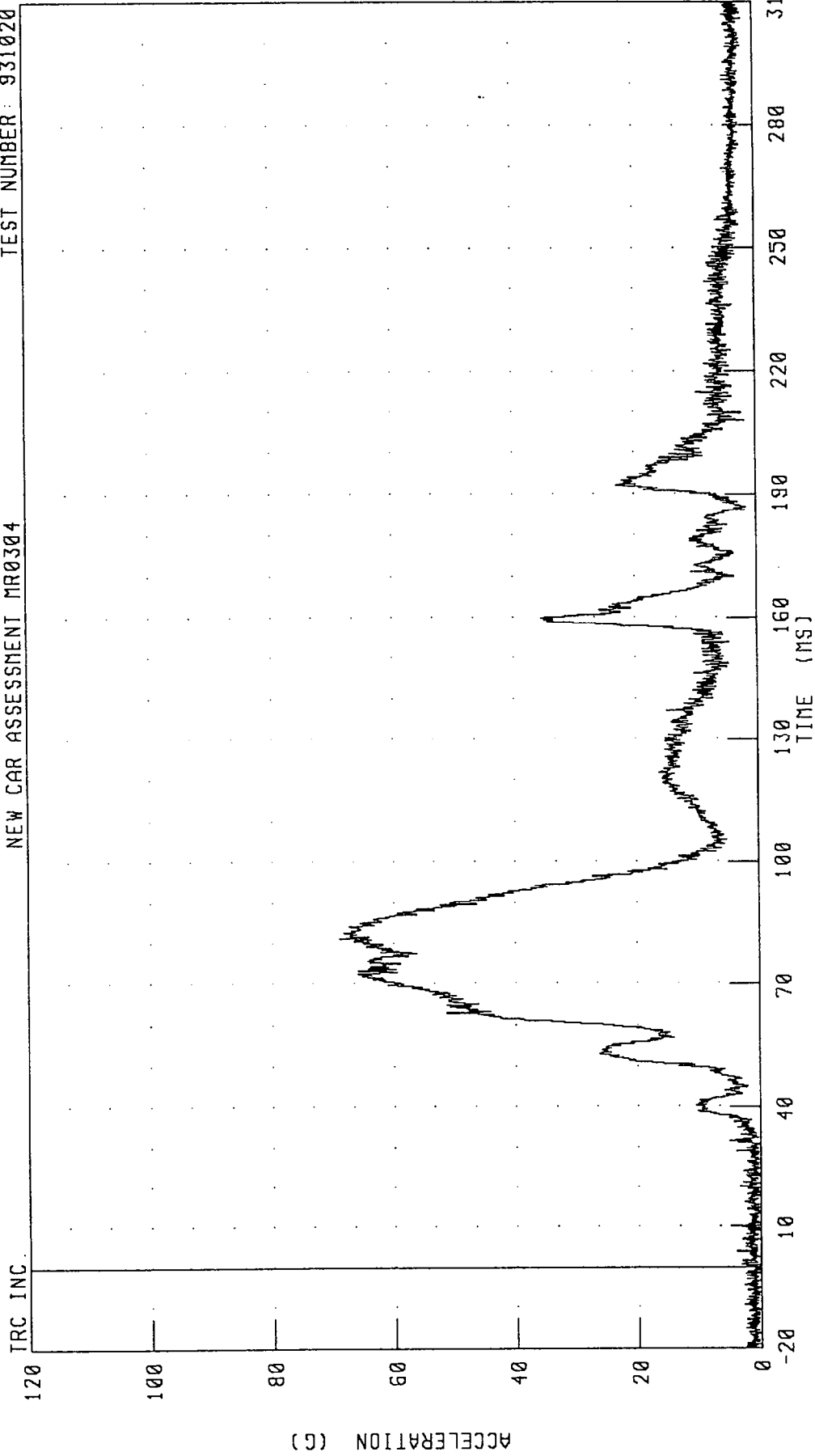
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



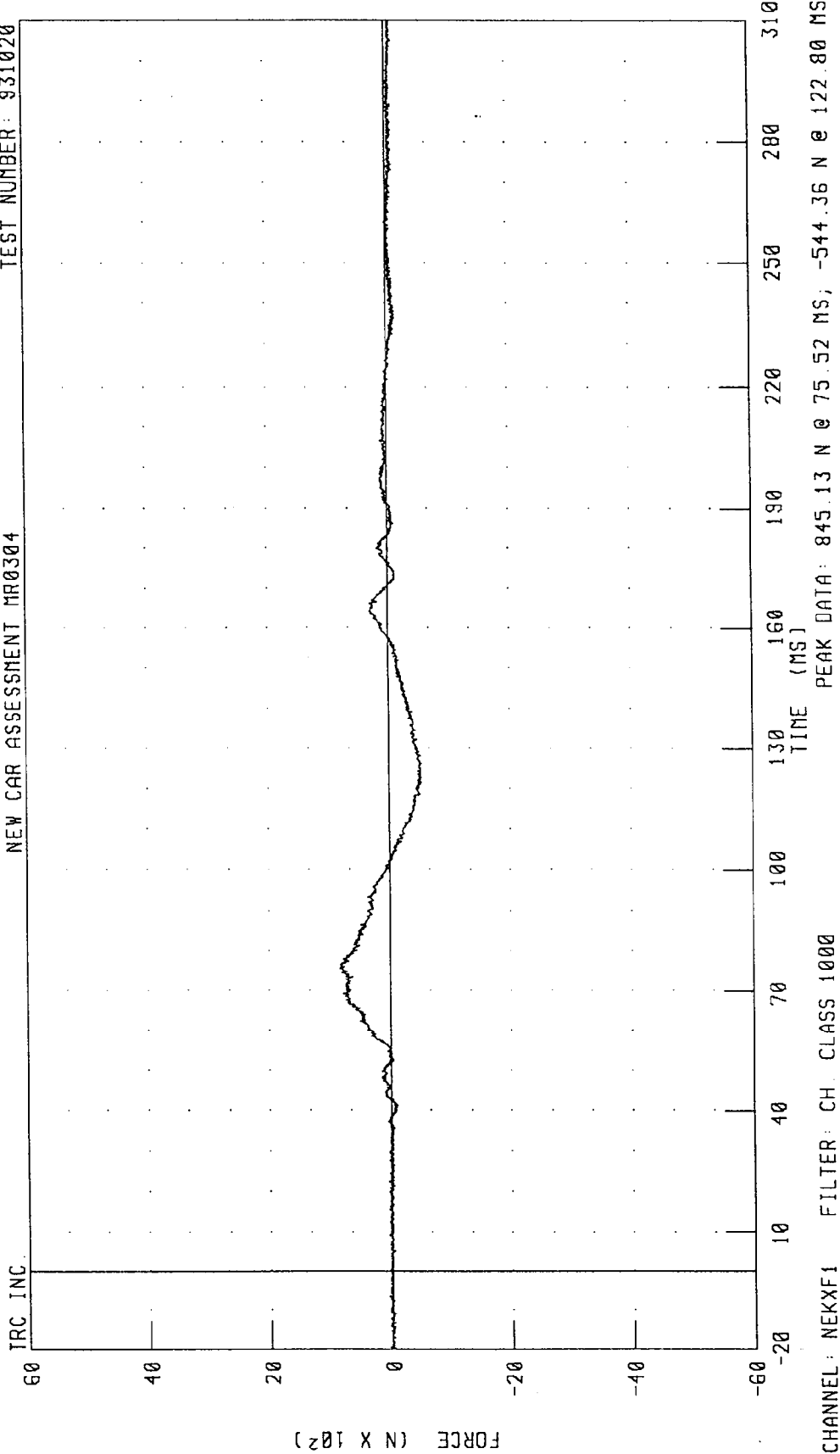
CHANNEL: HEDRG1 FILTER: CH CLASS 1000

PEAK DATA: 68.91 G @ 81.20 MS; 0.13 G @ -18.96 MS



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER NECK X-AXIS SHEAR FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

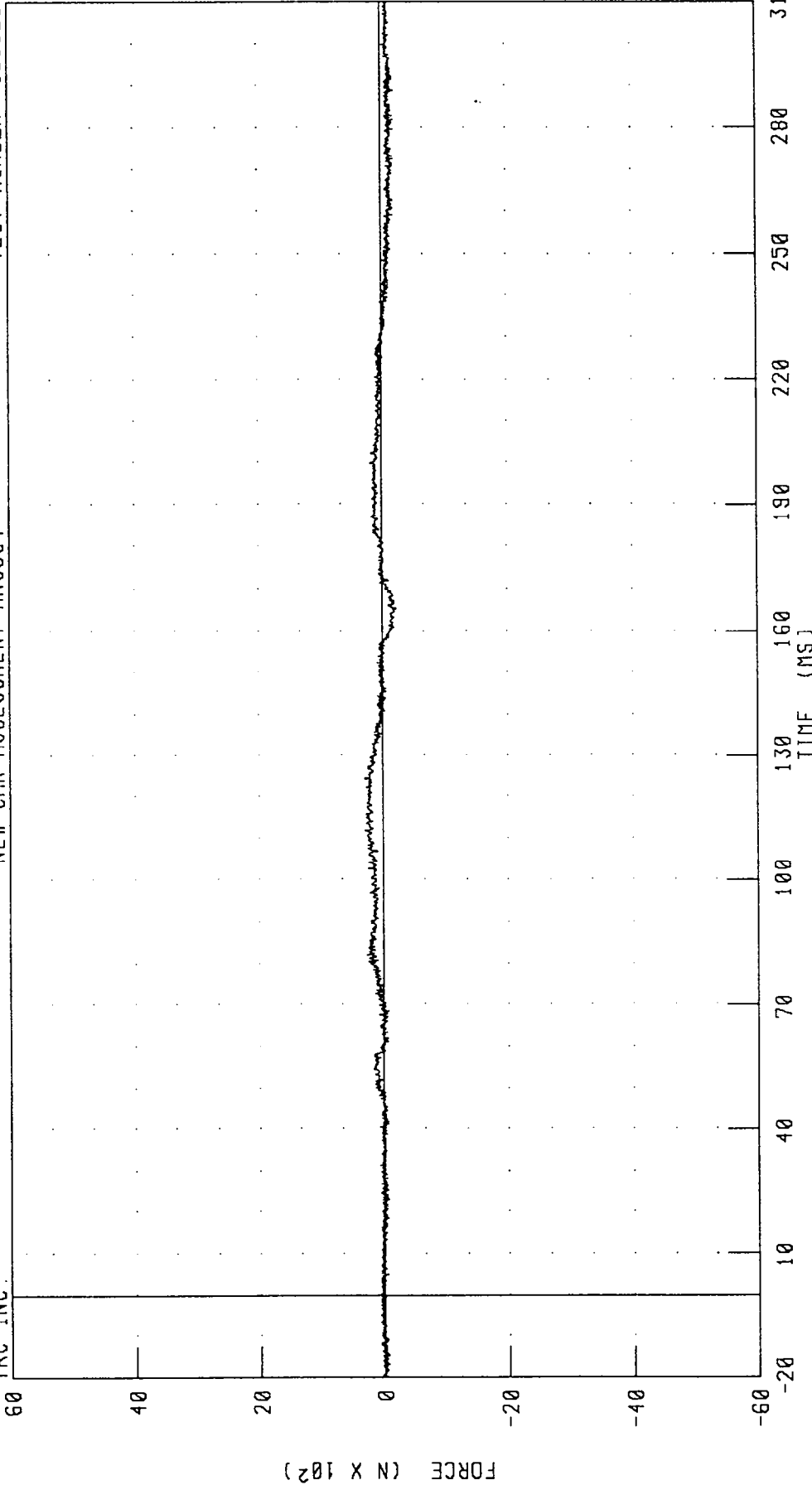


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

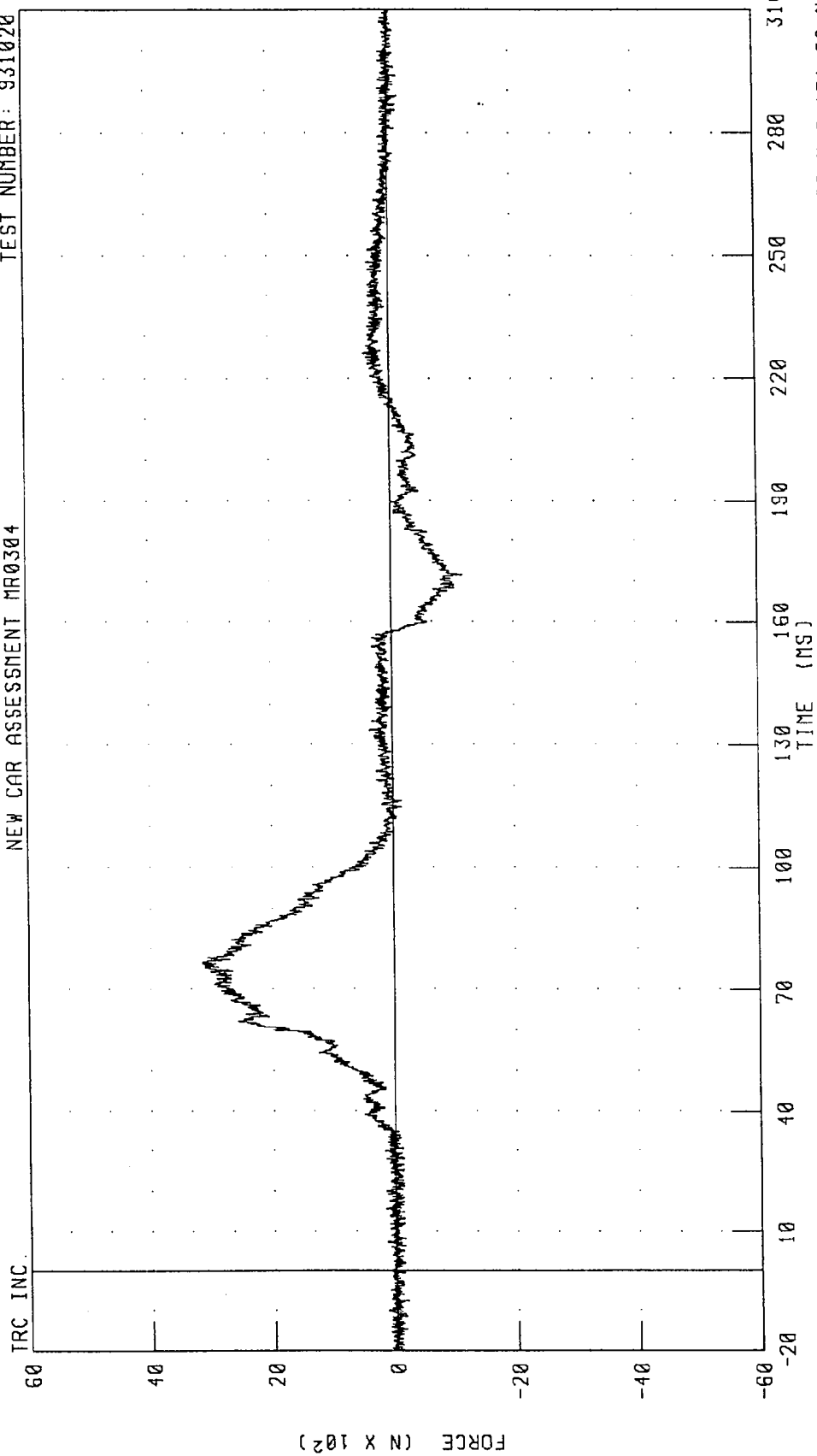


PEAK DATA: 283.48 N @ 111.68 MS; -215.09 N @ 165.36 MS

CHANNEL: NEKYF1 FILTER: CH CLASS 1000

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER NECK Z-AXIS AXIAL FORCE  
NEW CAR ASSESSMENT MR0304

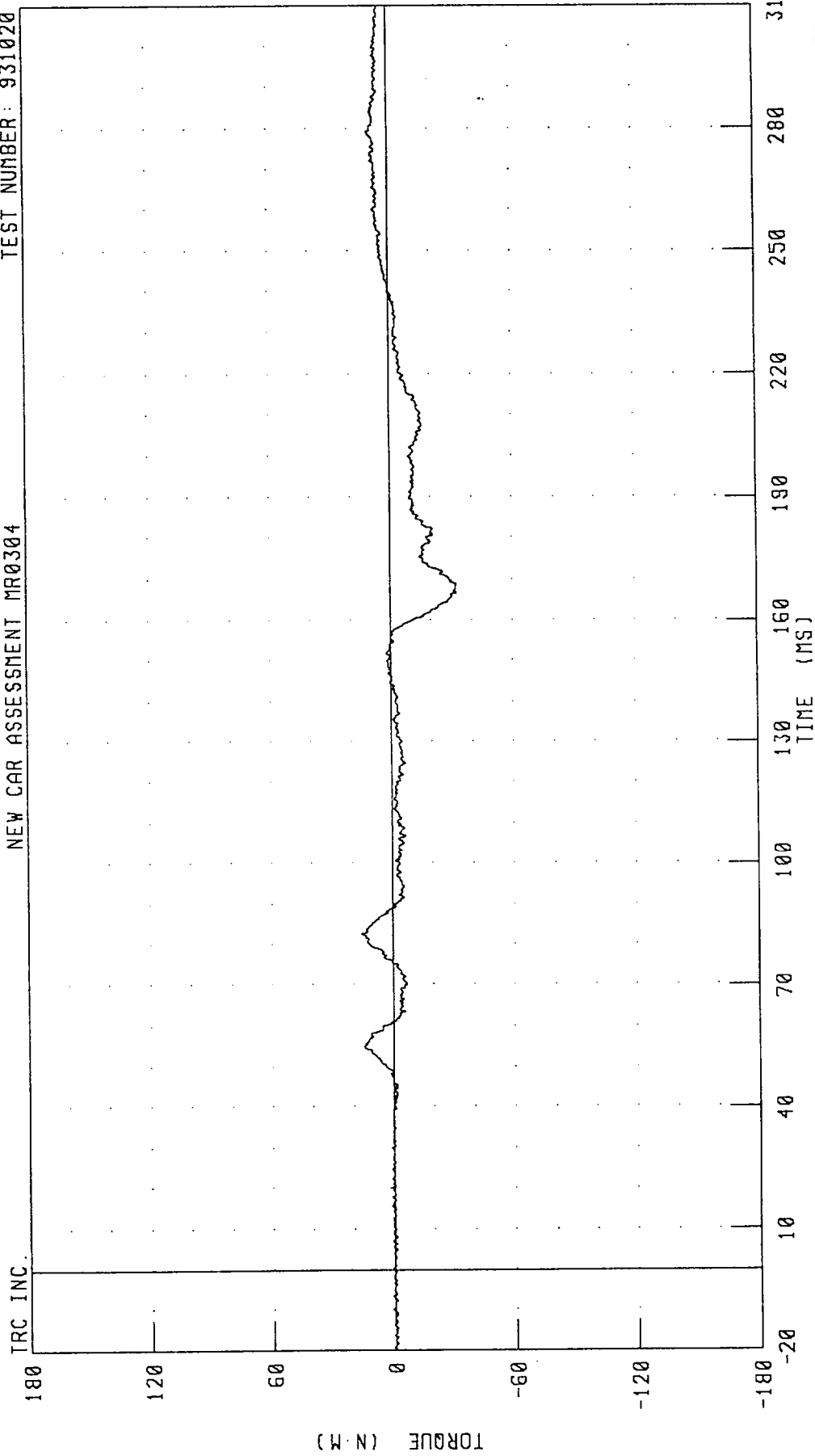
TEST NUMBER: 931020



CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER NECK MOMENT ABOUT X AXIS  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



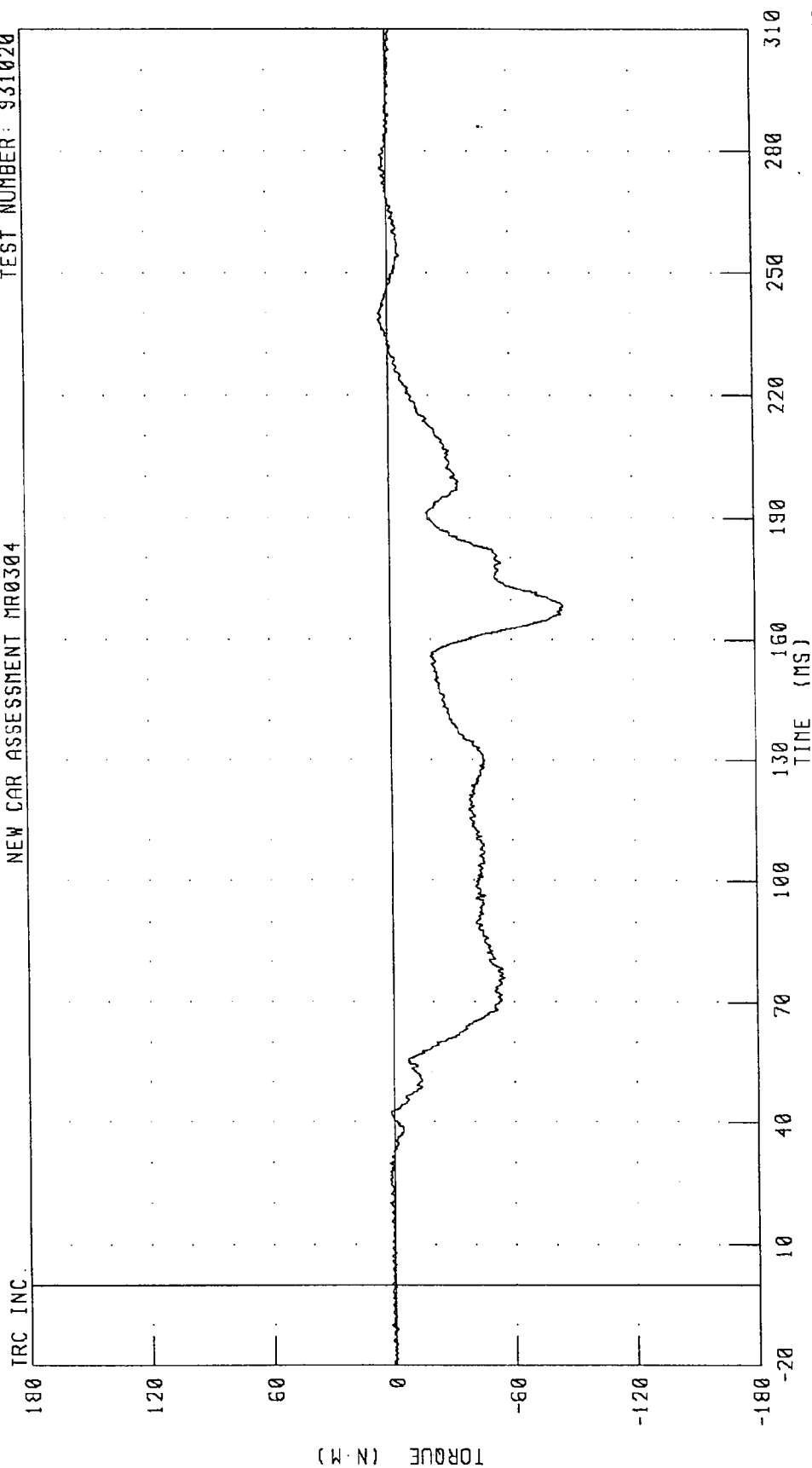
PEAK DATA: 15.57 N.M @ 82.48 MS; -32.66 N.M @ 168.80 MS

CHANNEL: NEKX1 FILTER: CH. CLASS 600



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER NECK MOMENT ABOUT Y AXIS  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 4.64 N·M @ 238.32 MS; -85.42 N·M @ 168.40 MS

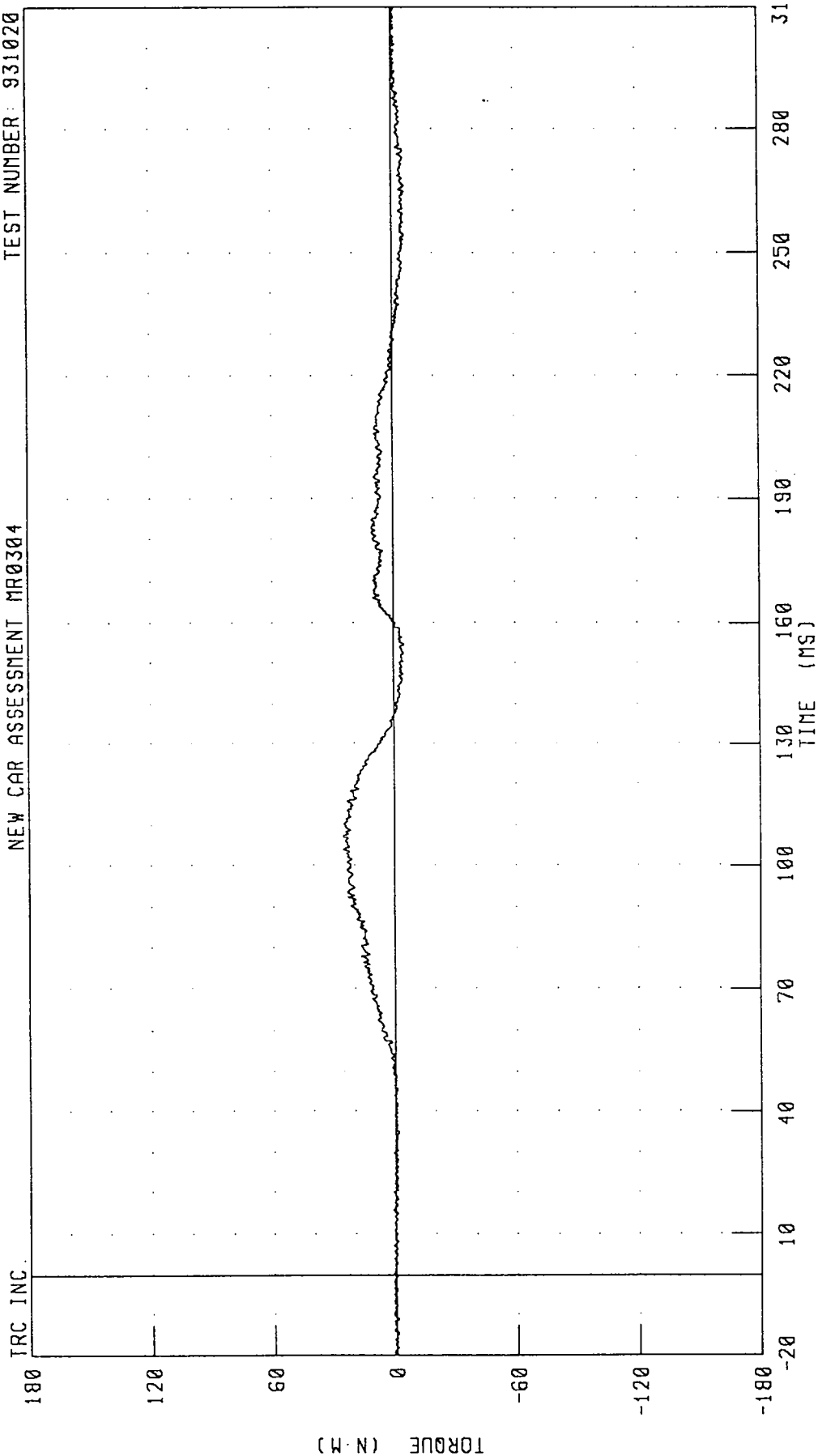
CHANNEL: NEKYMI FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER

DRIVER NECK MOMENT ABOUT Z AXIS

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

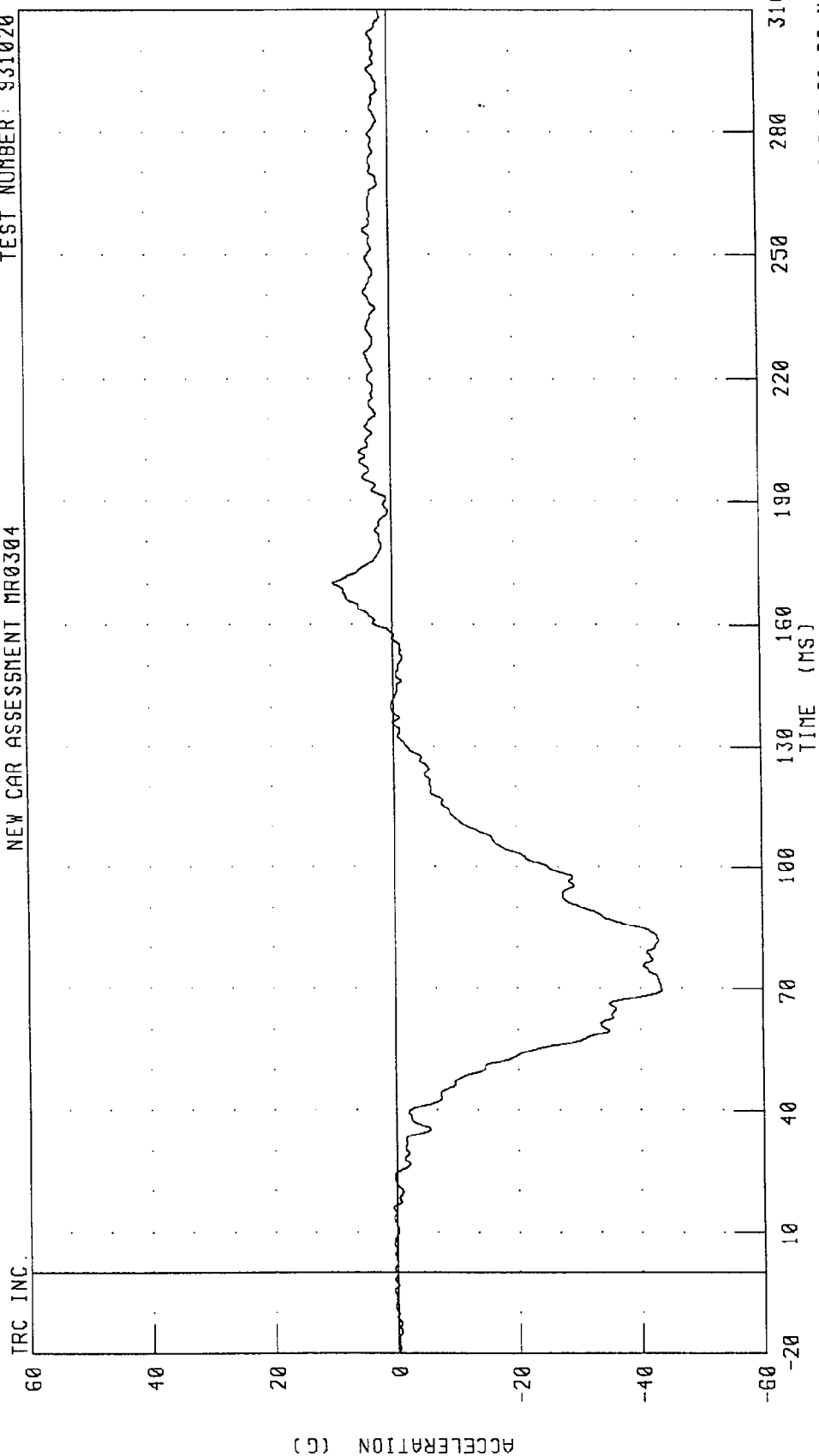


PEAK DATA: 25.62 N·M @ 107.36 MS; -6.25 N·M @ 254.16 MS

CHANNEL: NEKZM1 FILTER: CH CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER CHEST X-AXIS ACCELERATION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 9.59 G @ 170.16 MS; -43.45 G @ 69.60 MS

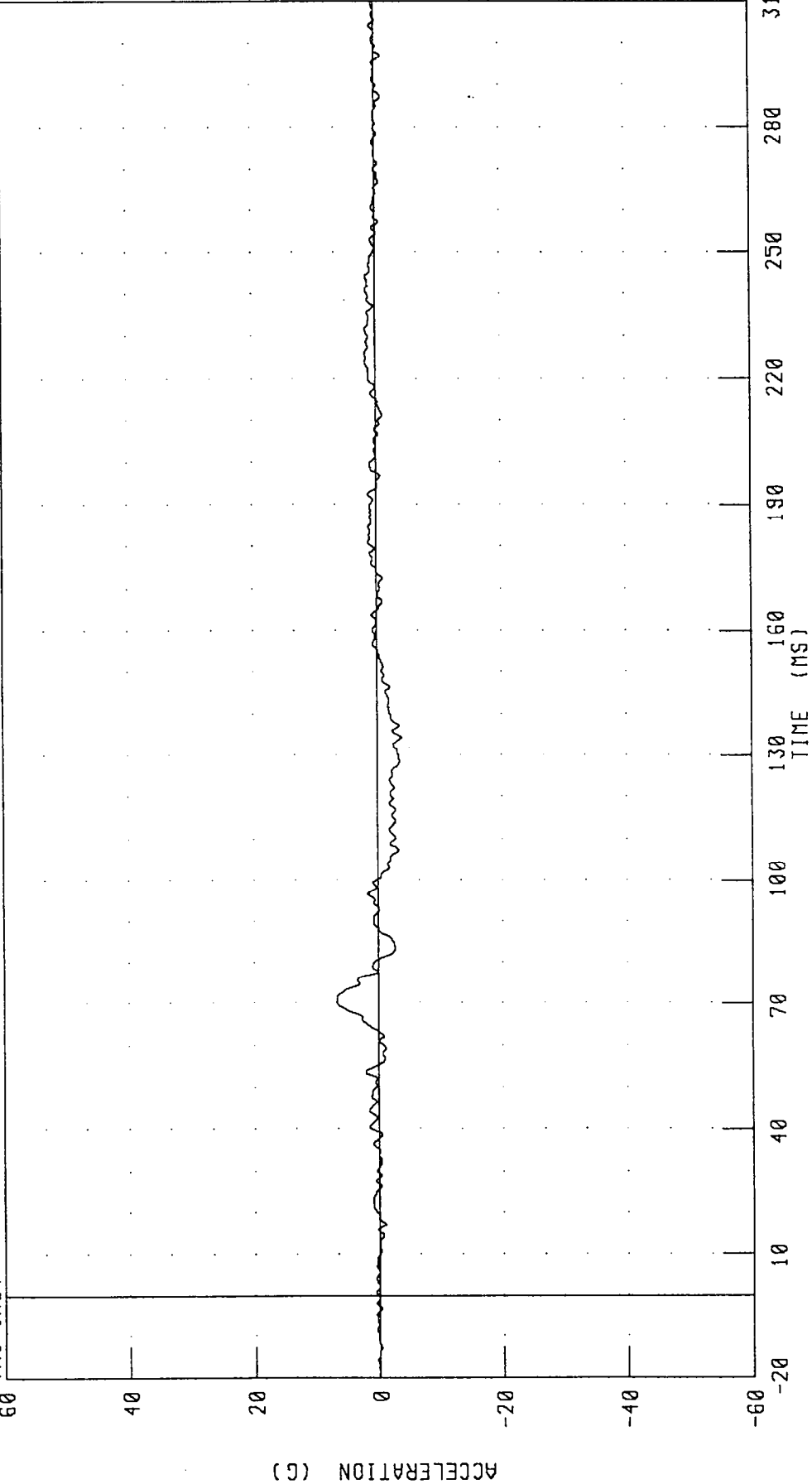
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

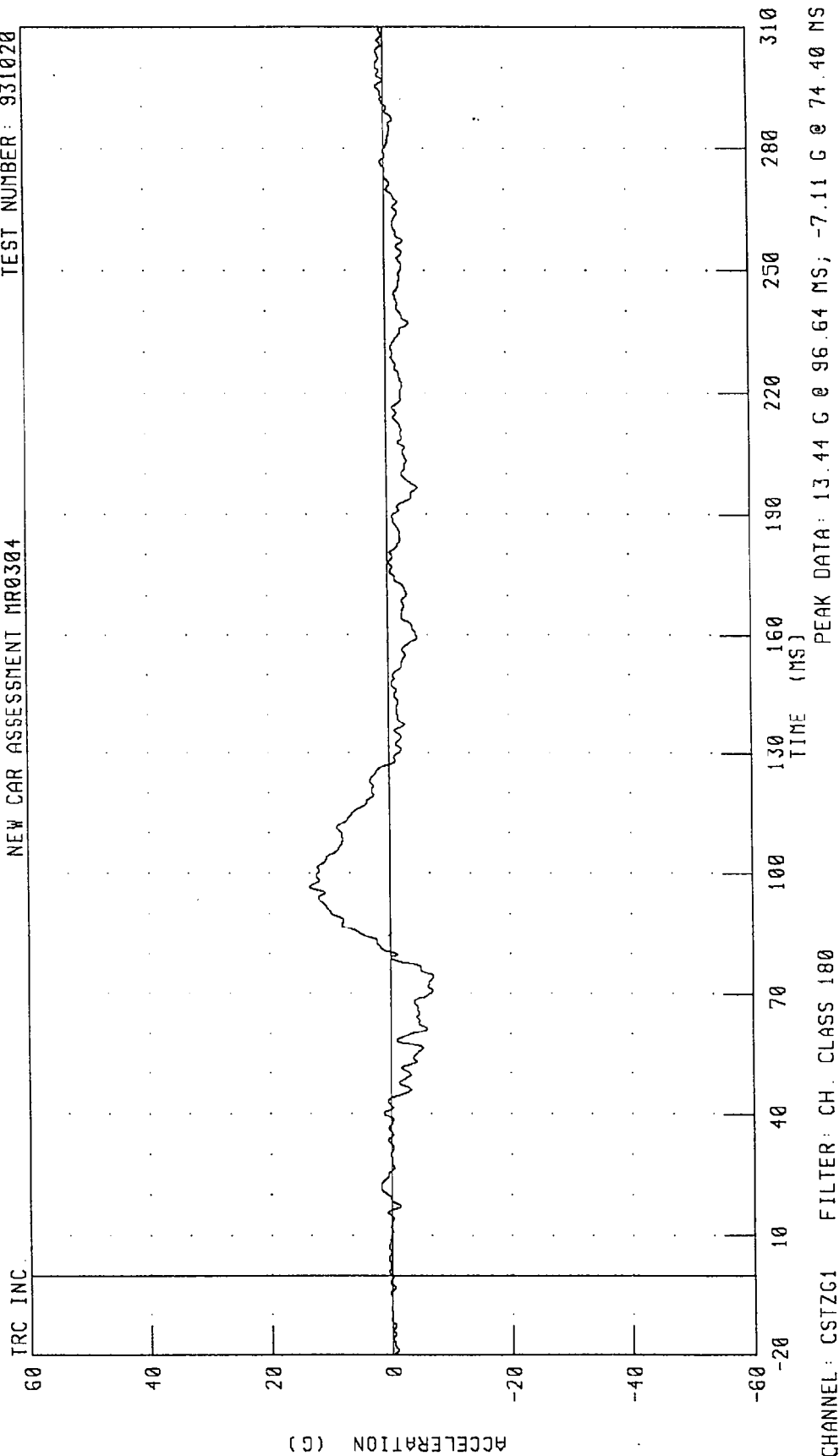


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 6.78 G @ 70.16 MS; -3.81 G @ 134.32 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER CHEST Z-AXIS ACCELERATION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



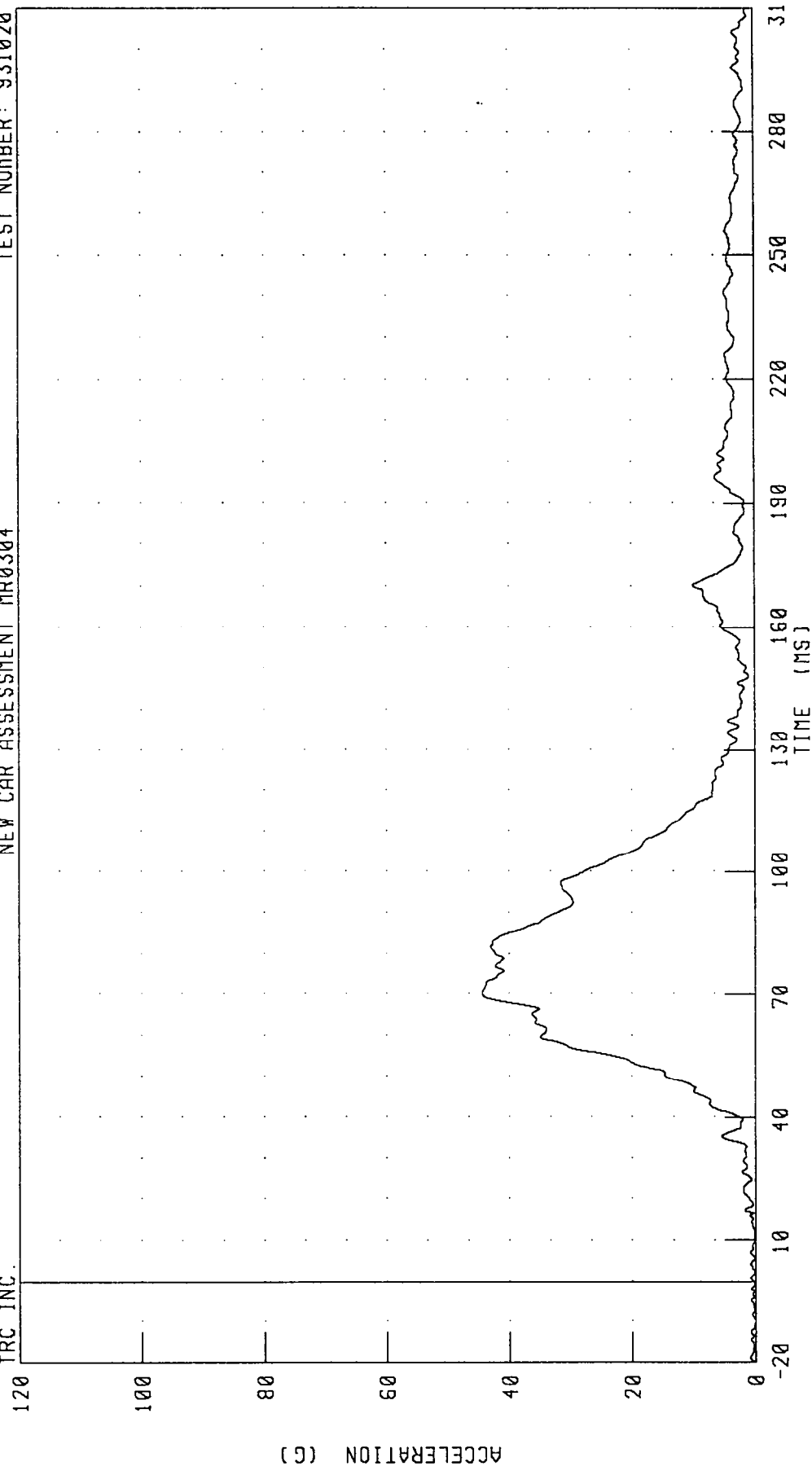


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER CHEST RESULTANT ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

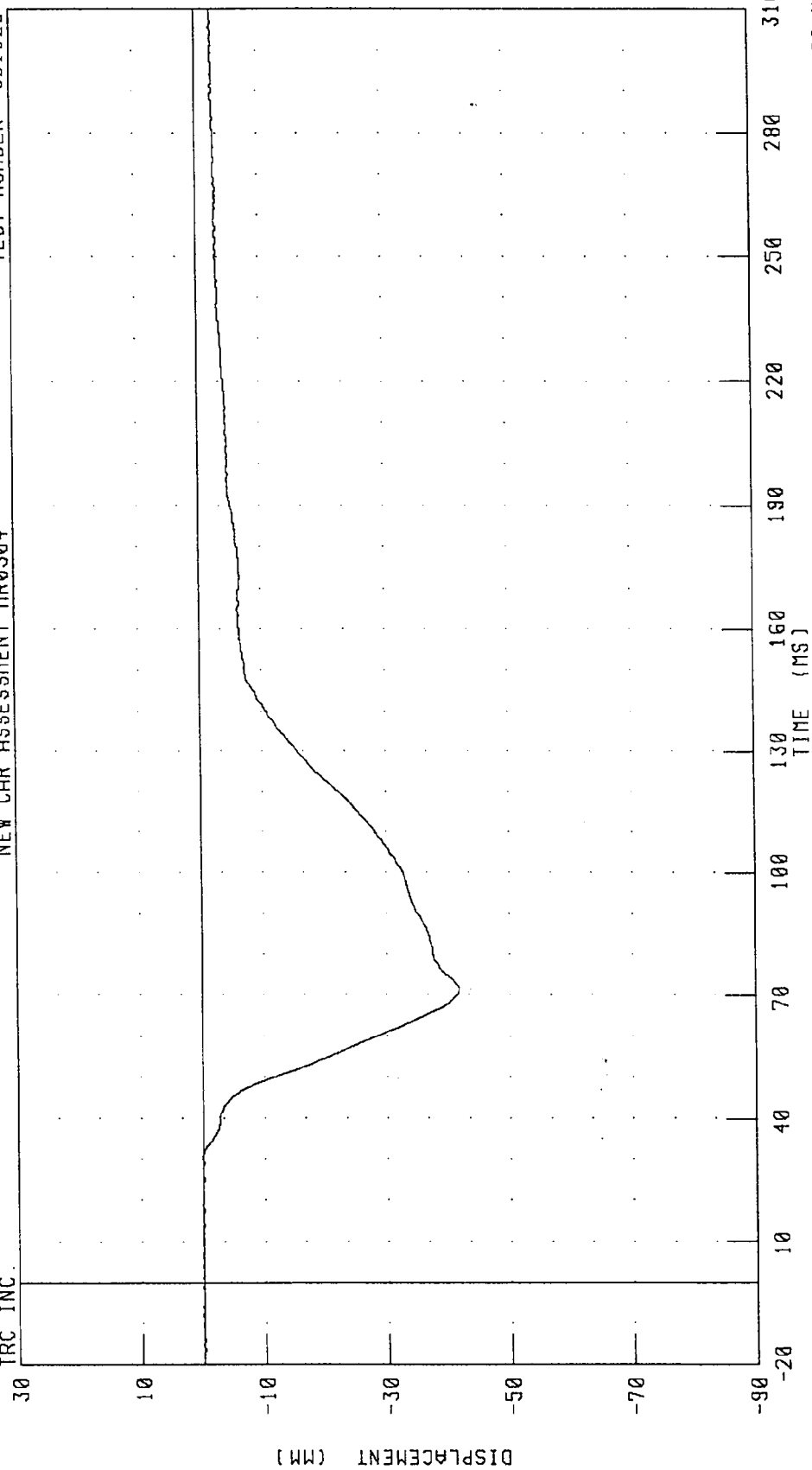


CHANNEL: CSTRG1 FILTER: CH. CLASS 180 PEAK DATA: 44.38 G @ 70.00 MS; 0.09 G @ -20.00 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER CHEST DEFLECTION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



PEAK DATA: 0.14 MM @ 3.84 MS; -41.65 MM @ 71.20 MS

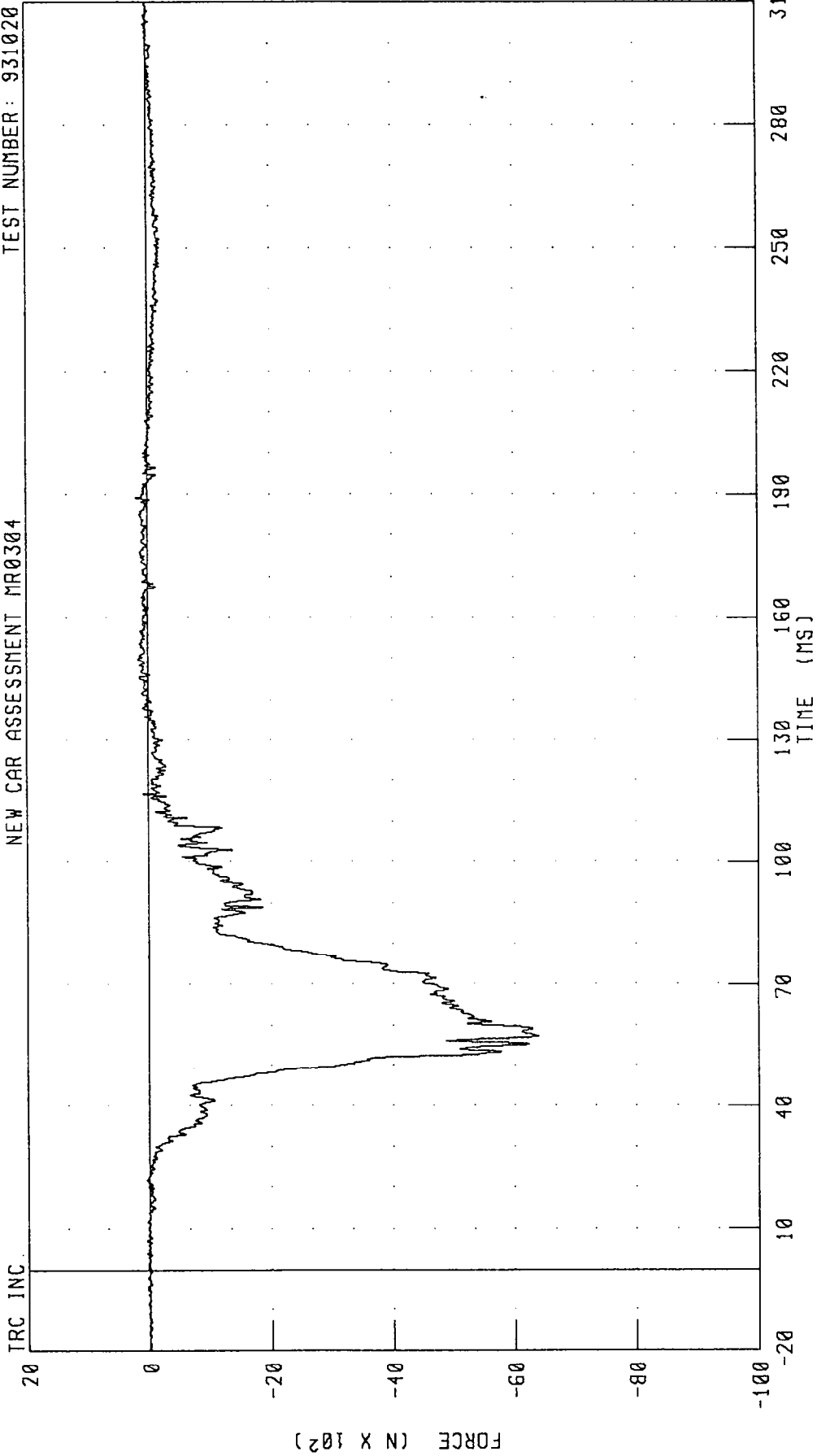
CHANNEL: CSTXD1 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER

DRIVER LEFT FEMUR FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



CHANNEL: LFMF1 FILTER: CH. CLASS 600

PEAK DATA: 190.80 N @ 189.20 MS; -6379.37 N @ 57.36 MS

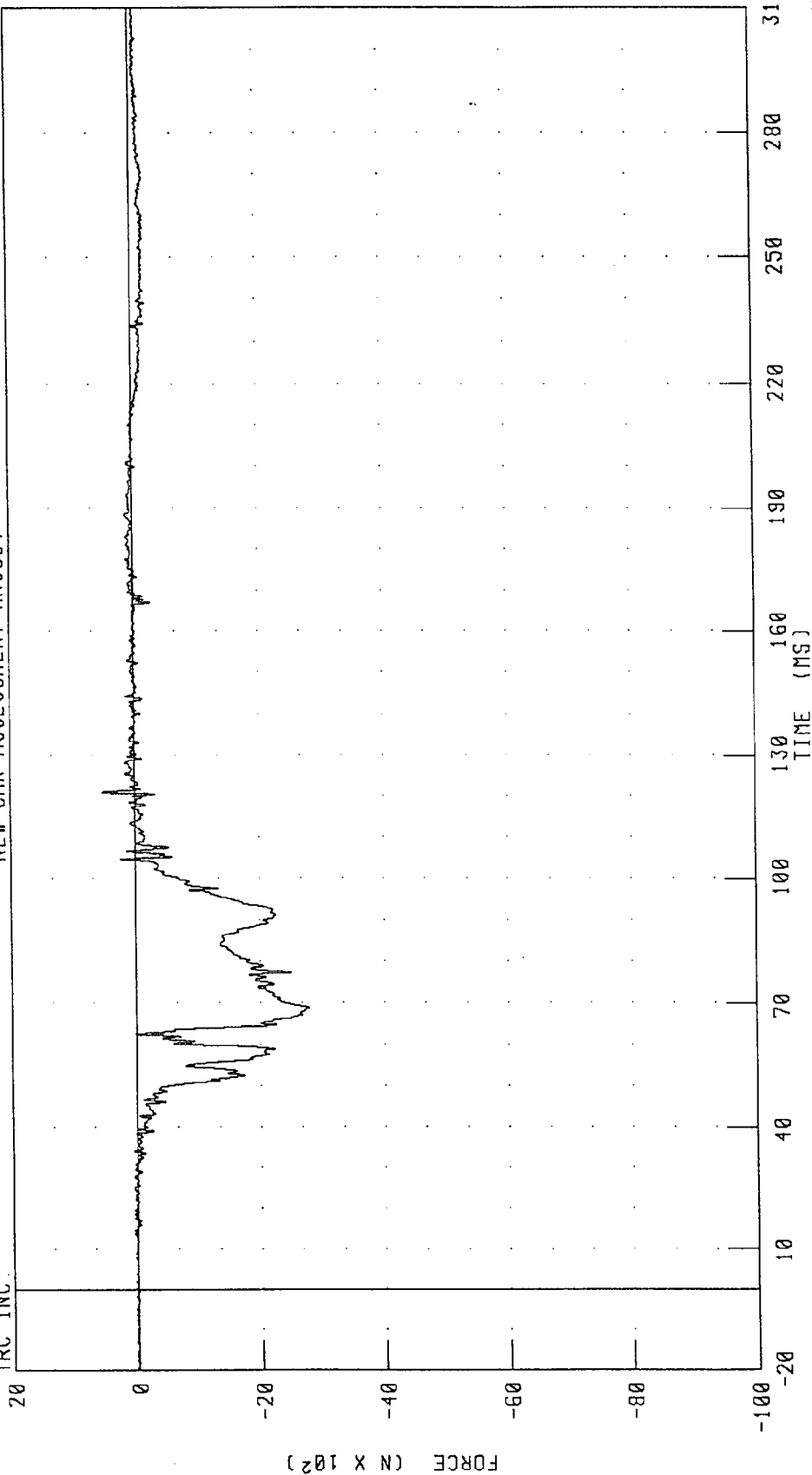
# 1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER

DRIVER RIGHT FEMUR FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.

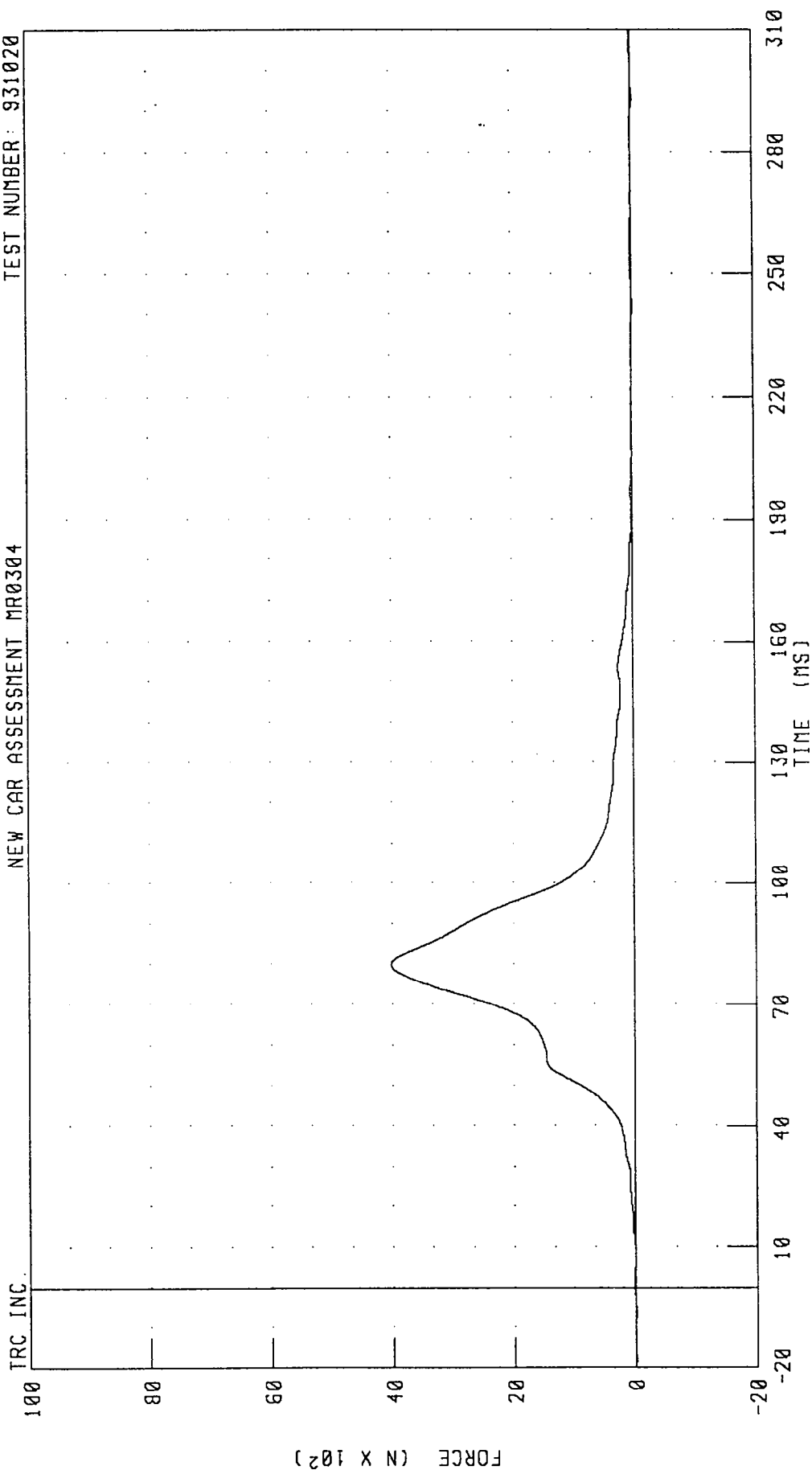


CHANNEL: RFMFI FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER LAP BELT OUTBOARD FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



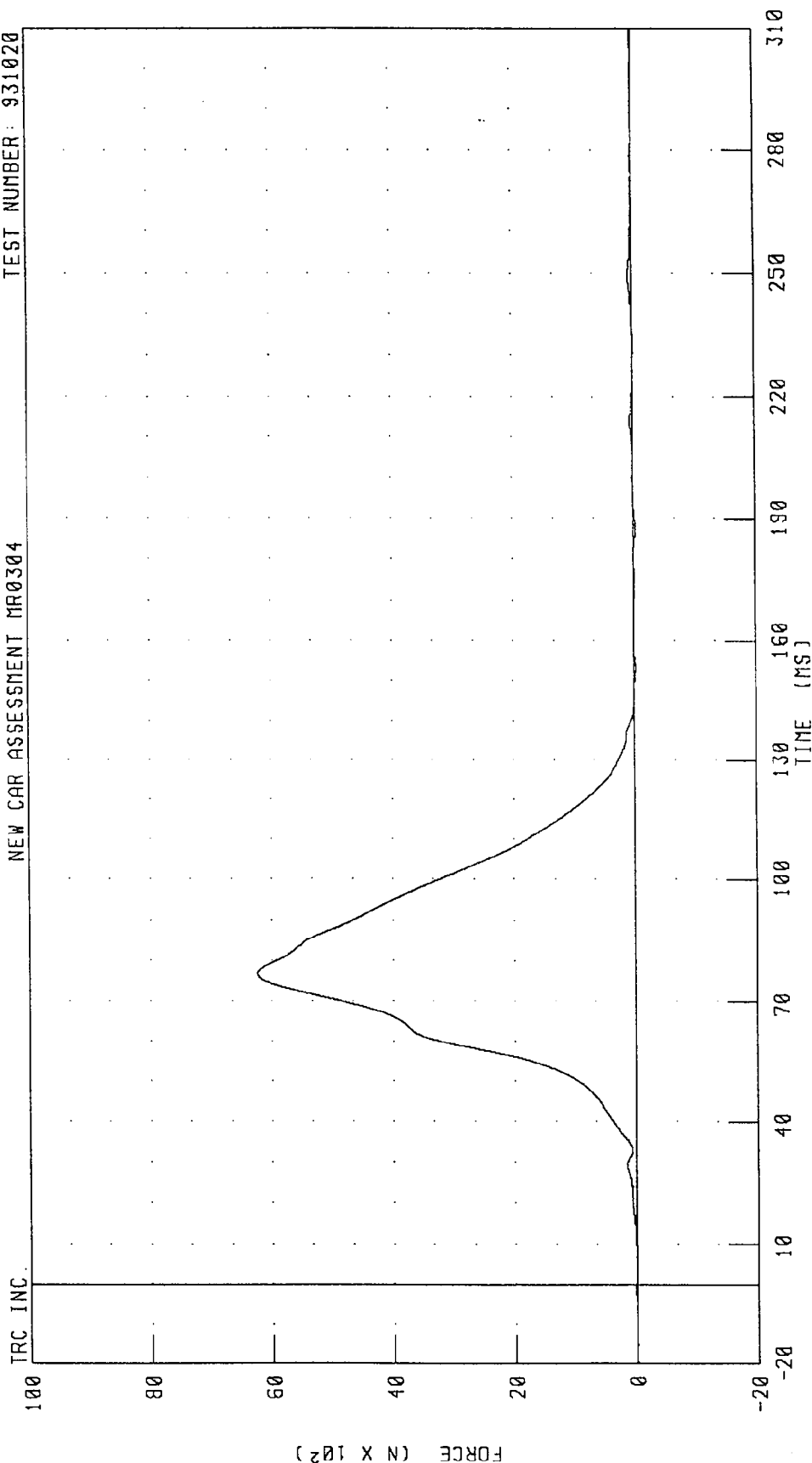
PEAK DATA: 4022.97 N @ 79.84 MS; -21.50 N @ 293.36 MS

CHANNEL: LBOF1 FILTER: CH. CLASS 60



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER SHOULDER BELT FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



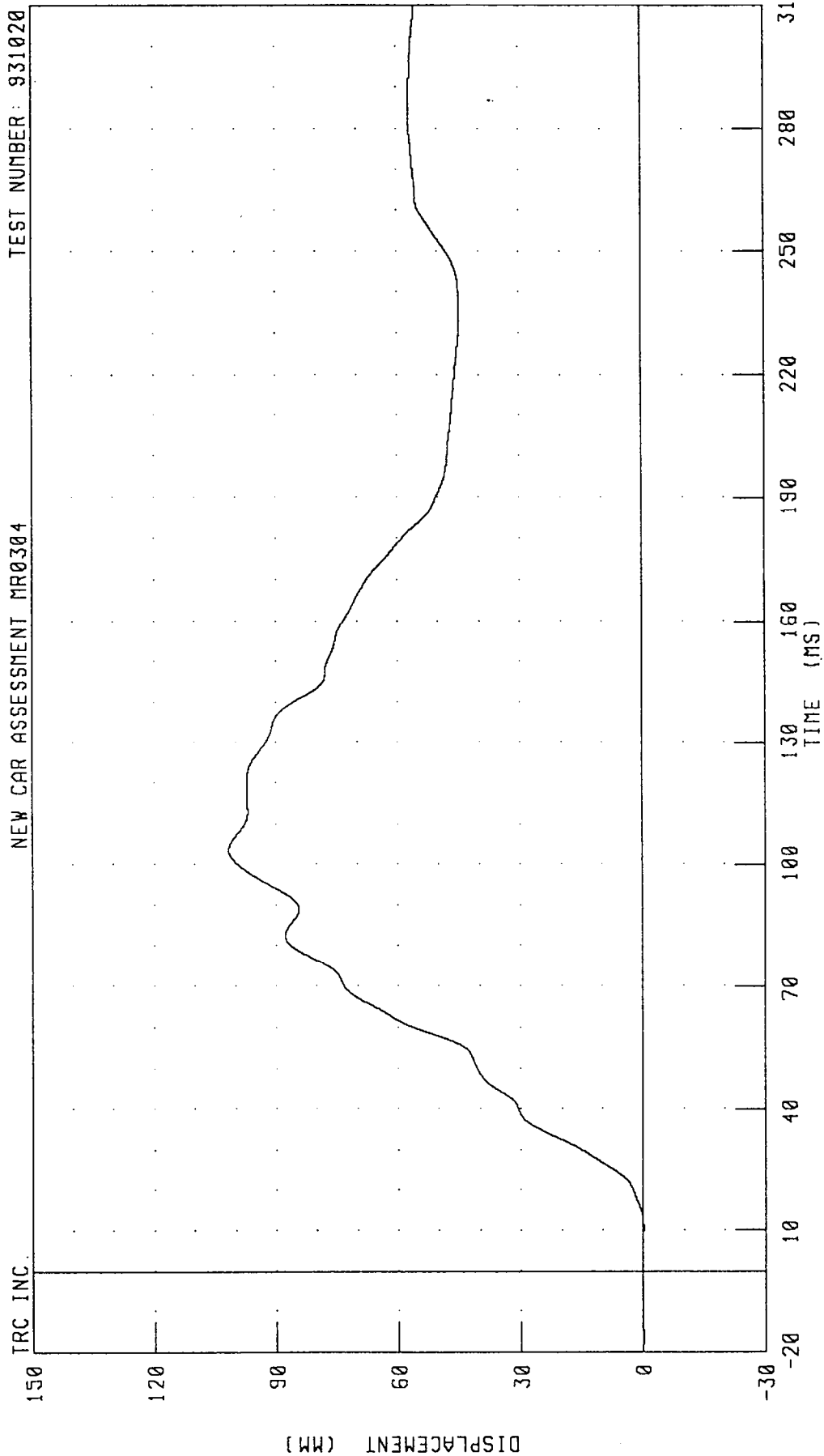
PEAK DATA: 6240.03 N @ 76.72 MS; -25.58 N @ 188.00 MS

CHANNEL: SHBF1 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
DRIVER SHOULDER BELT DISPLACEMENT

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

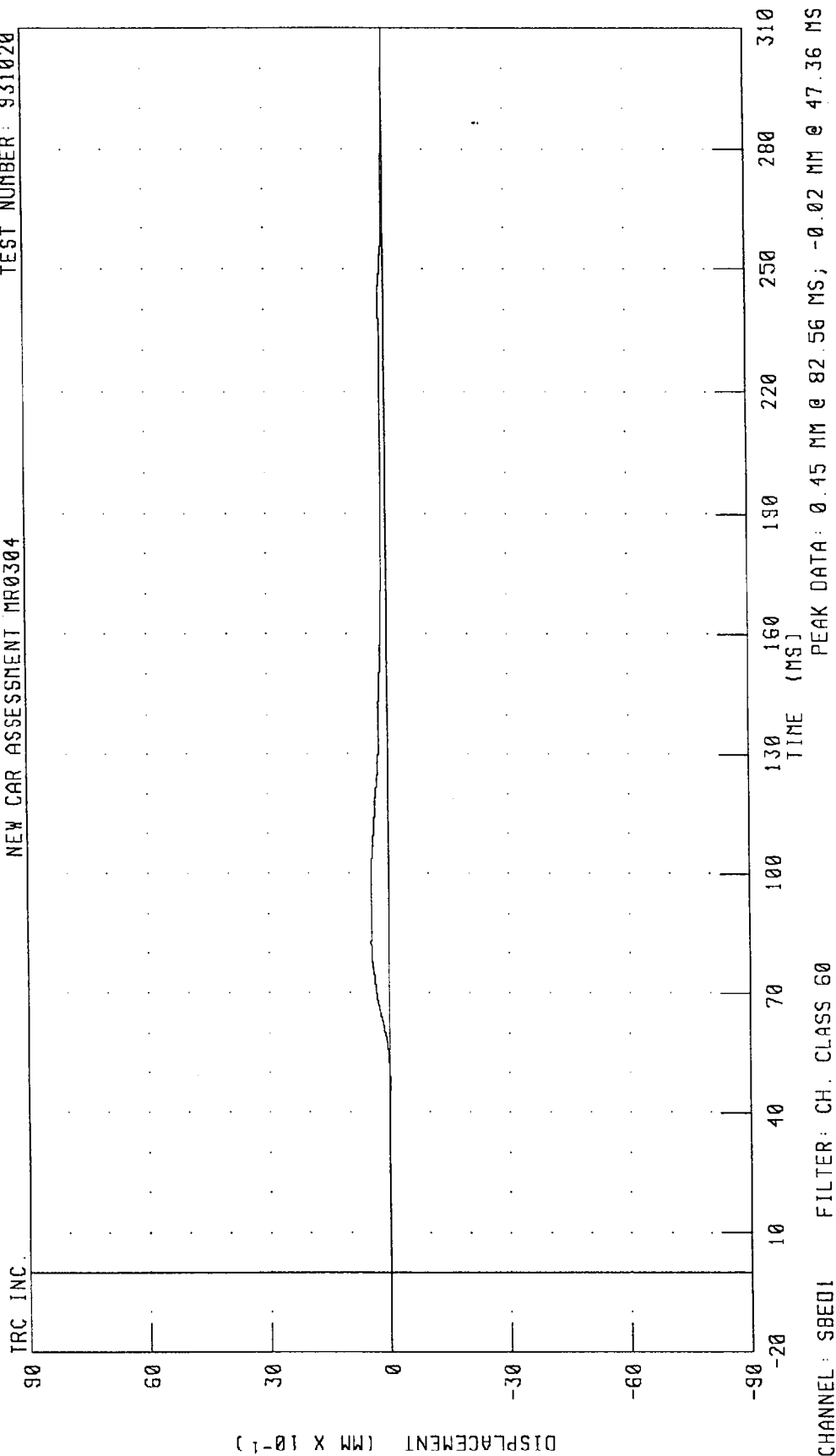


PEAK DATA: 101.71 MM @ 103.60 MS; -0.09 MM @ -16.16 MS

CHANNEL: SH001 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 DRIVER SEAT BELT EXTENSION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



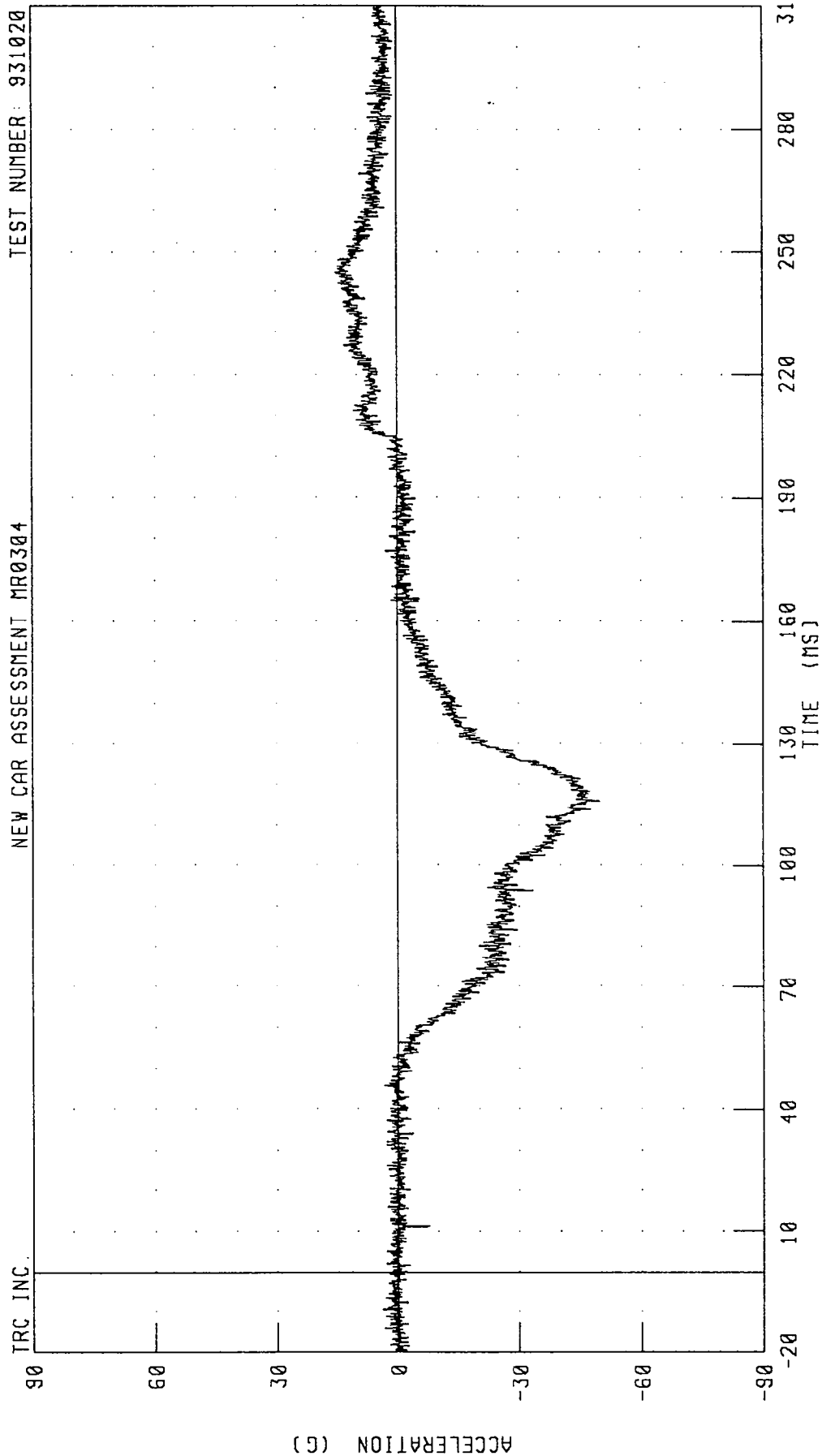
CHANNEL: SBED1 FILTER: CH. CLASS 60

PEAK DATA: 0.45 NM @ 82.56 MS; -0.02 NM @ 47.36 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER HEAD X-AXIS ACCELERATION

TEST NUMBER: 931020

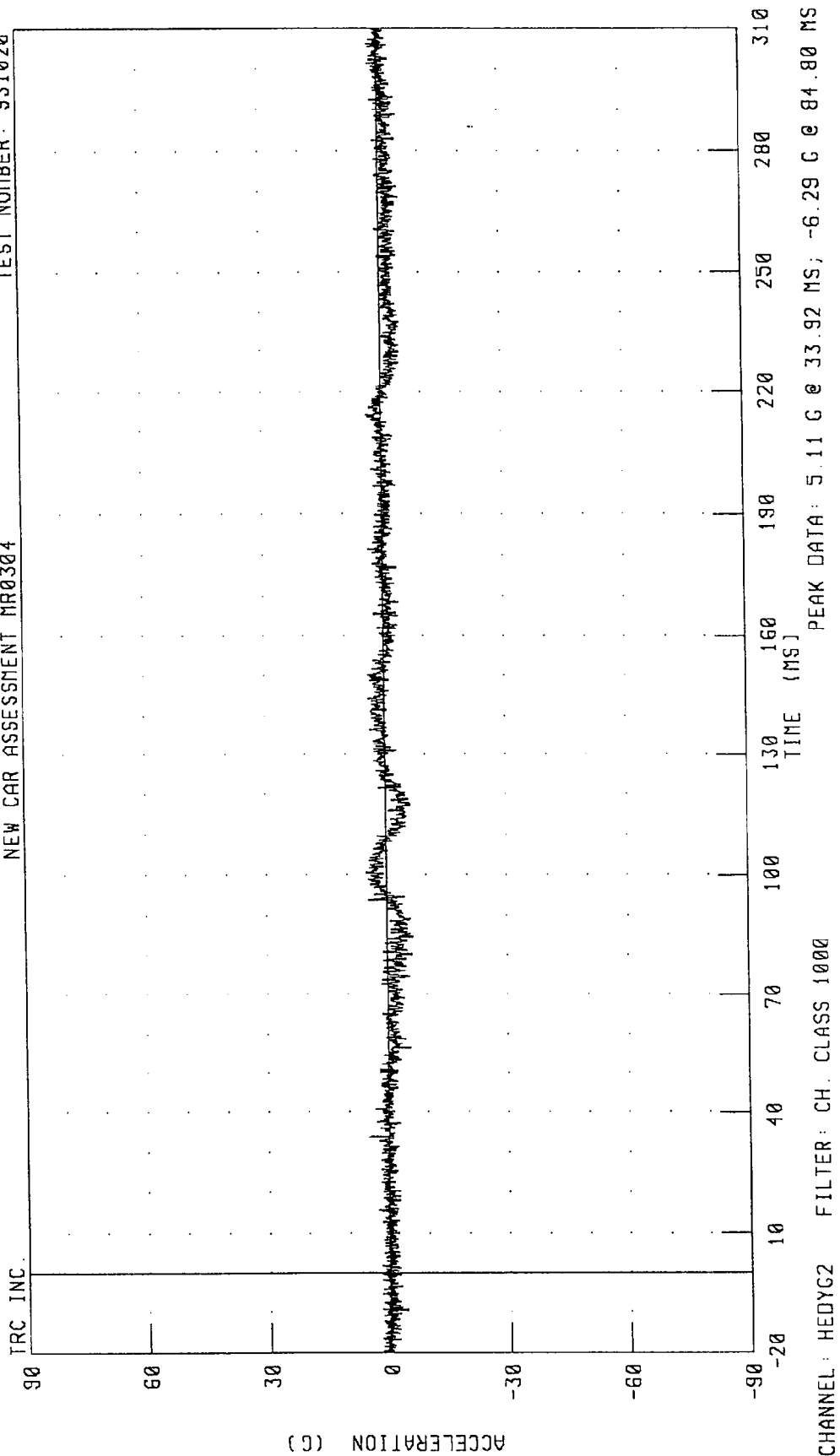
NEW CAR ASSESSMENT MR0304



CHANNEL: HEDXG2 FILTER: CH. CLASS 1000 PEAK DATA: 15.27 G @ 244.96 MS; -49.82 G @ 116.00 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER HEAD Y-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



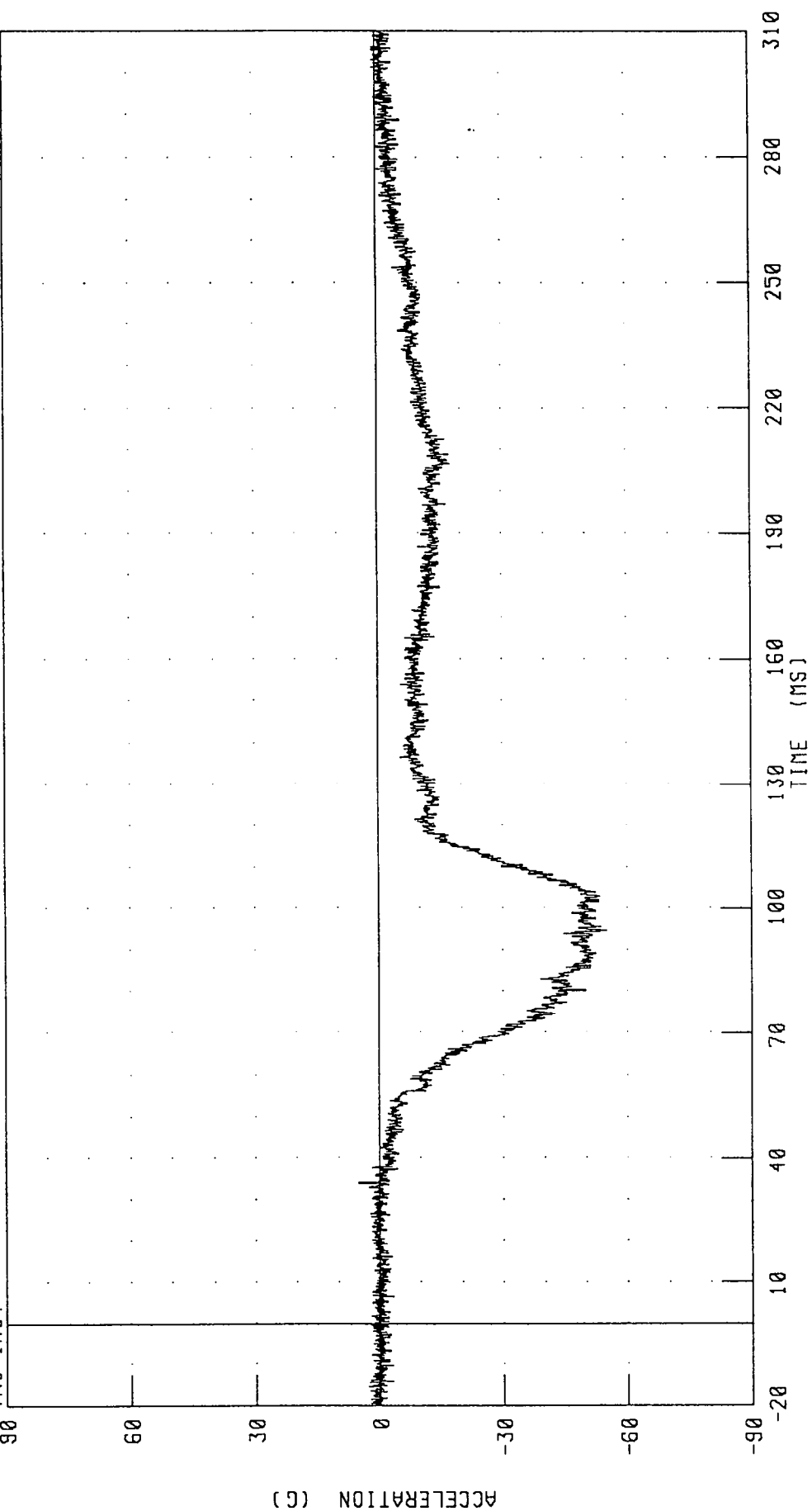


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



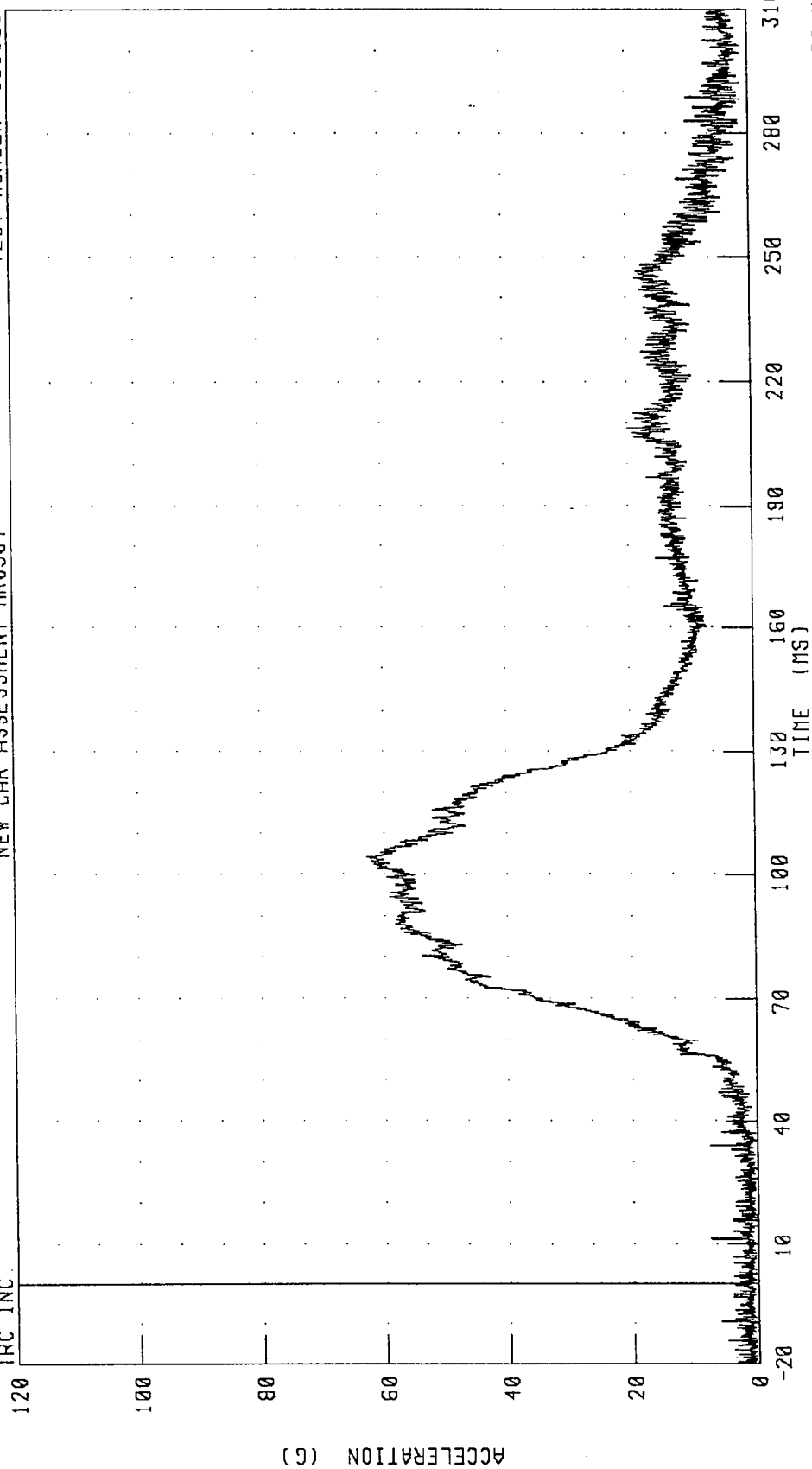
CHANNEL: HEADZG2 FILTER: CH. CLASS 1000

PEAK DATA: 5.01 G @ 34.00 MS; -54.77 G @ 94.64 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER HEAD RESULTANT ACCELERATION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



CHANNEL: HEORC2 FILTER: CH. CLASS 1000

PEAK DATA: 62.87 G @ 104.24 MS; 0.11 G @ 14.32 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

60

40

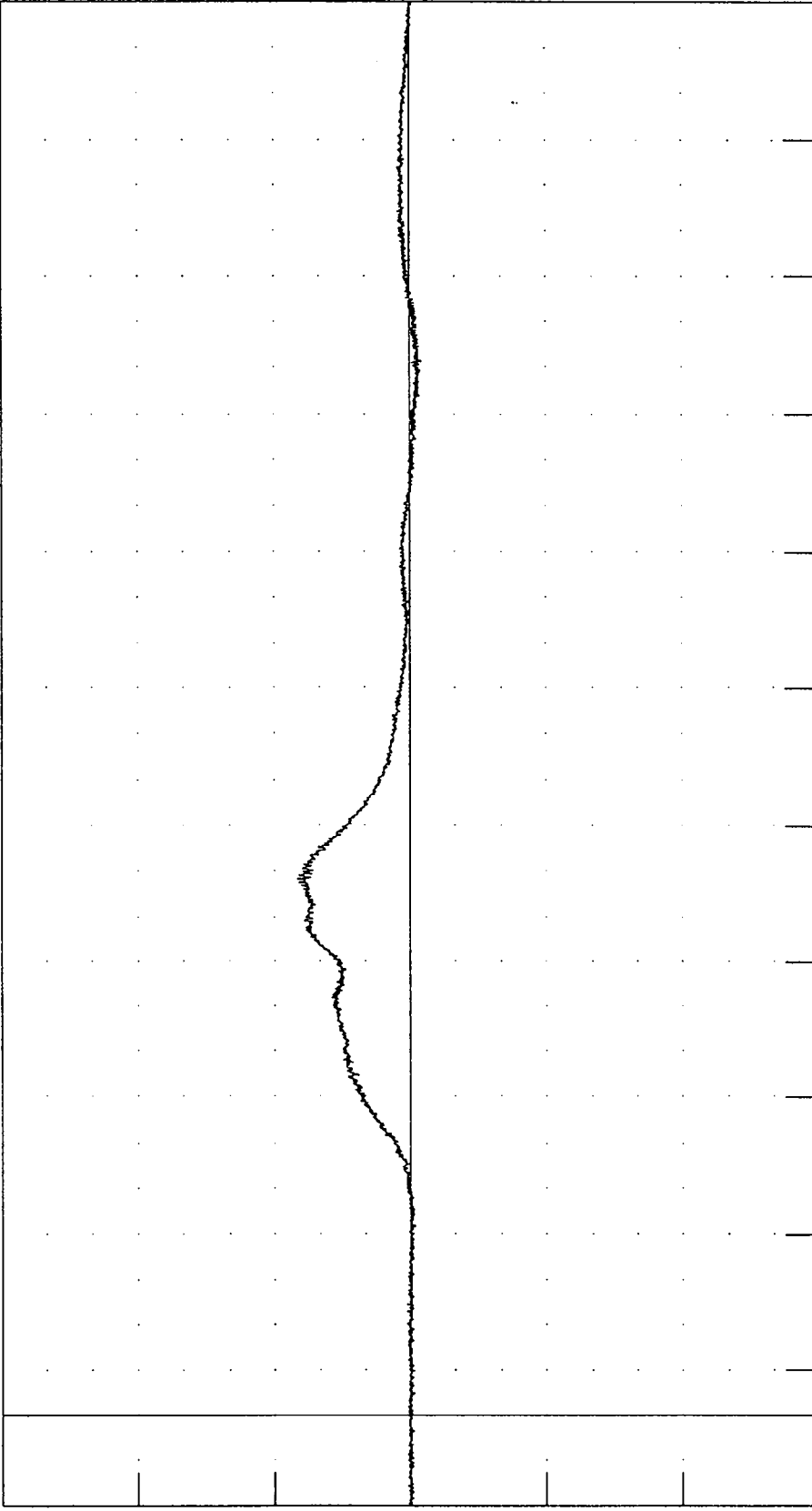
20

FORCE (N X 10<sup>2</sup>)

-20

-40

-60



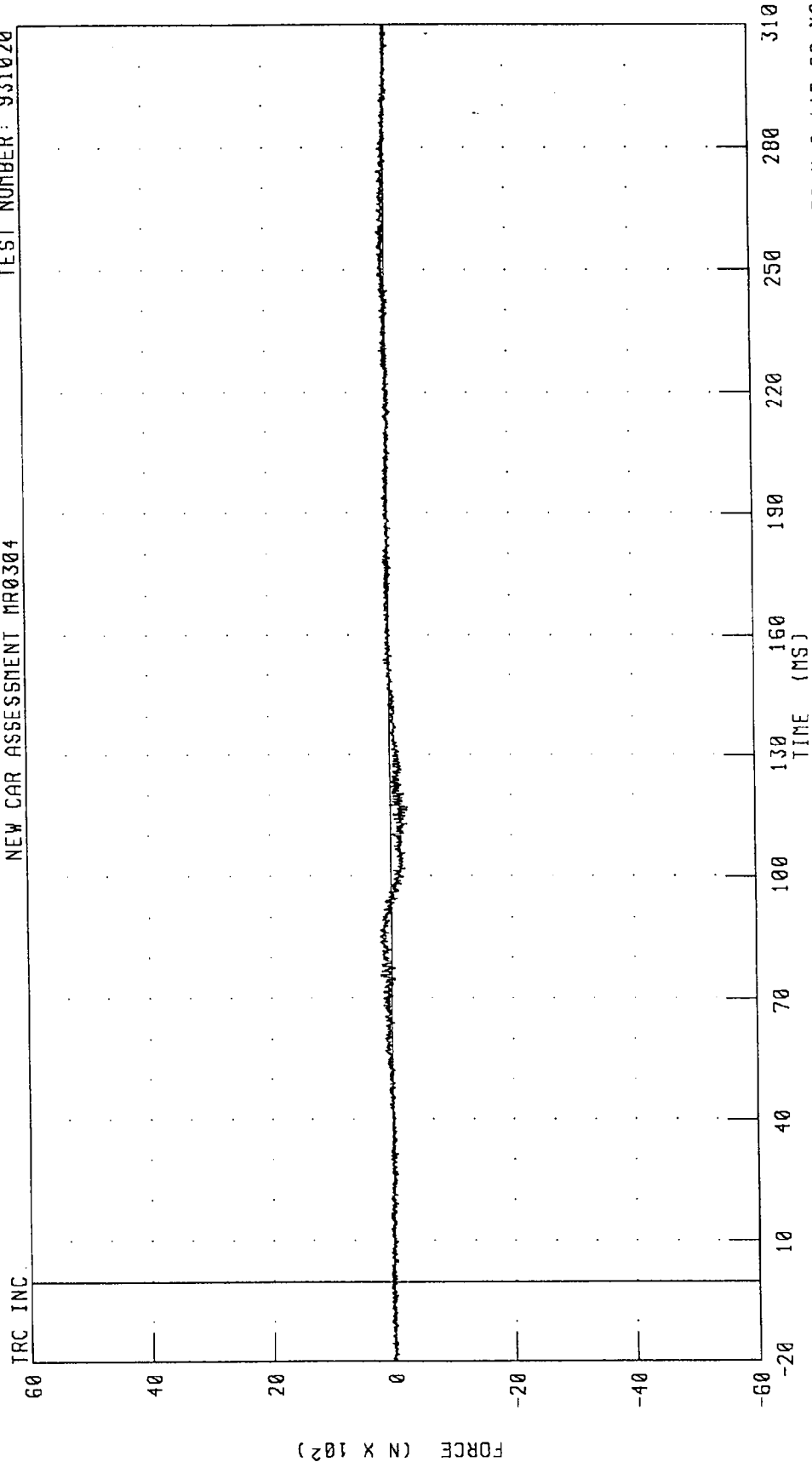
TIME (MS)

PEAK DATA: 1658.91 N @ 118.32 MS; -168.48 N @ 231.36 MS

CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER NECK Y-AXIS SHEAR FORCE  
NEW CAR ASSESSMENT MR0304

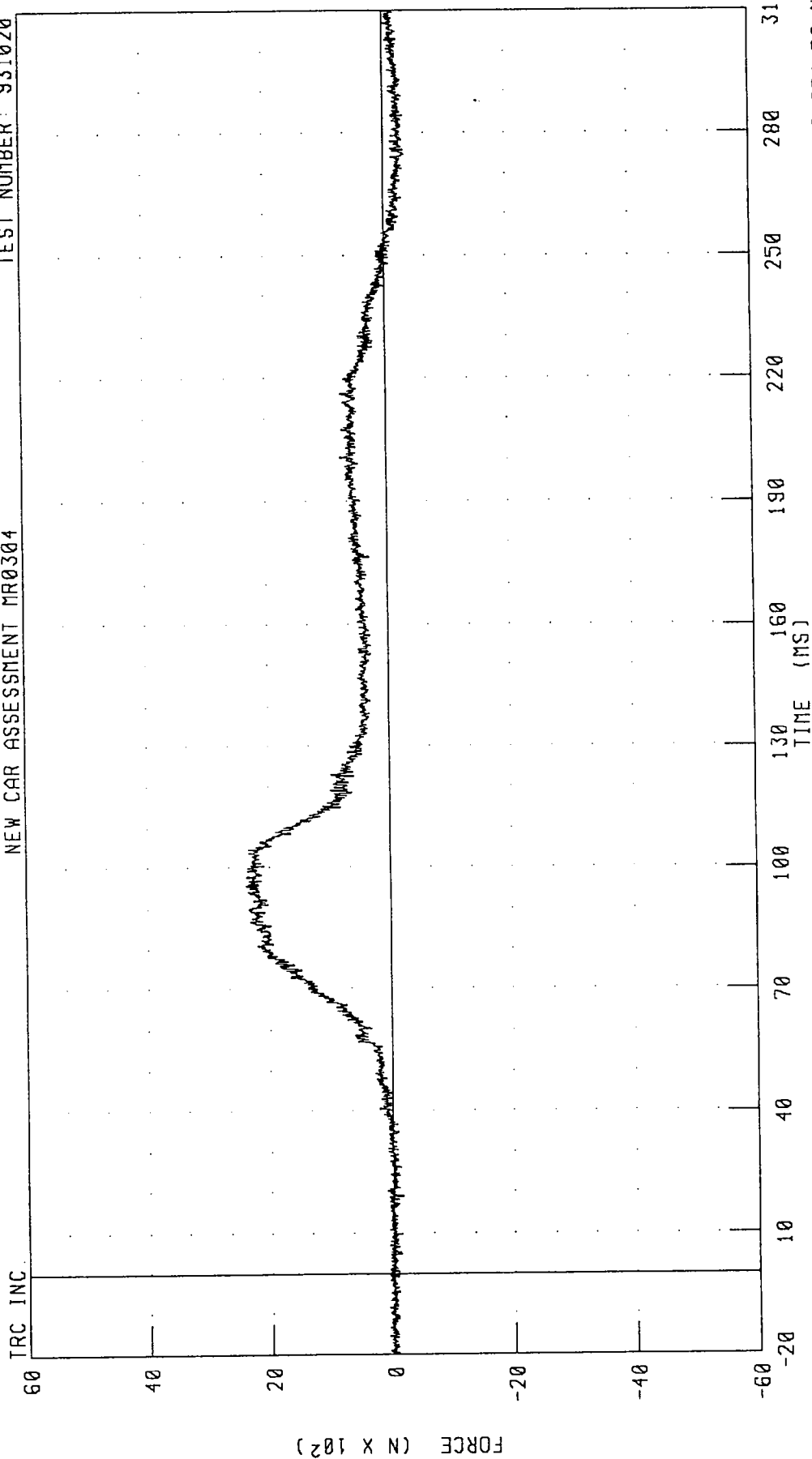
TEST NUMBER: 931020



CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER NECK Z-AXIS AXIAL FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



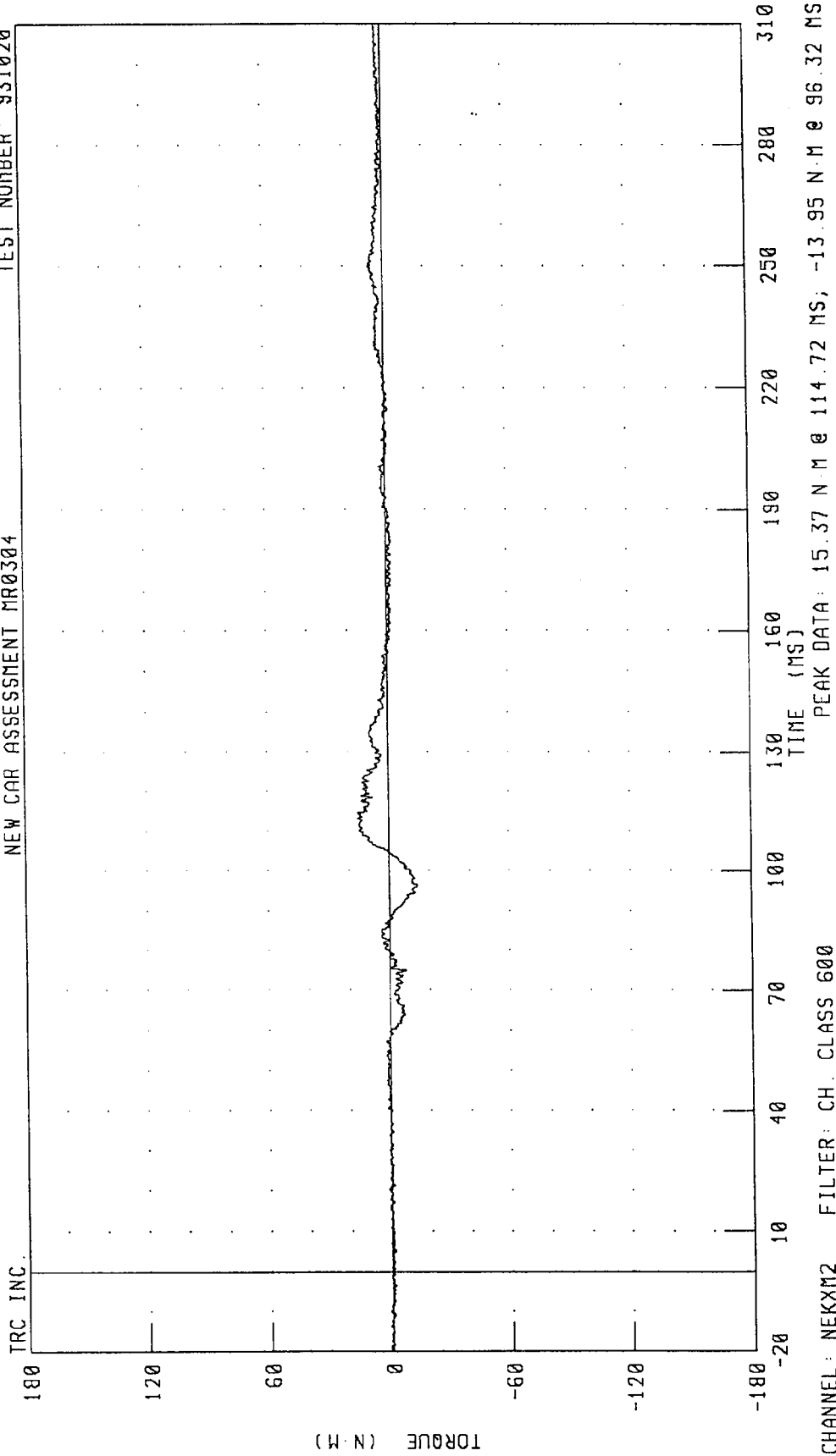
PEAK DATA: 2392.78 N @ 95.60 MS; -341.72 N @ 274.72 MS

CHANNEL: NEKZF2 FILTER: CH. CLASS 1000



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER NECK MOMENT ABOUT X AXIS  
NEW CAR ASSESSMENT MR0304

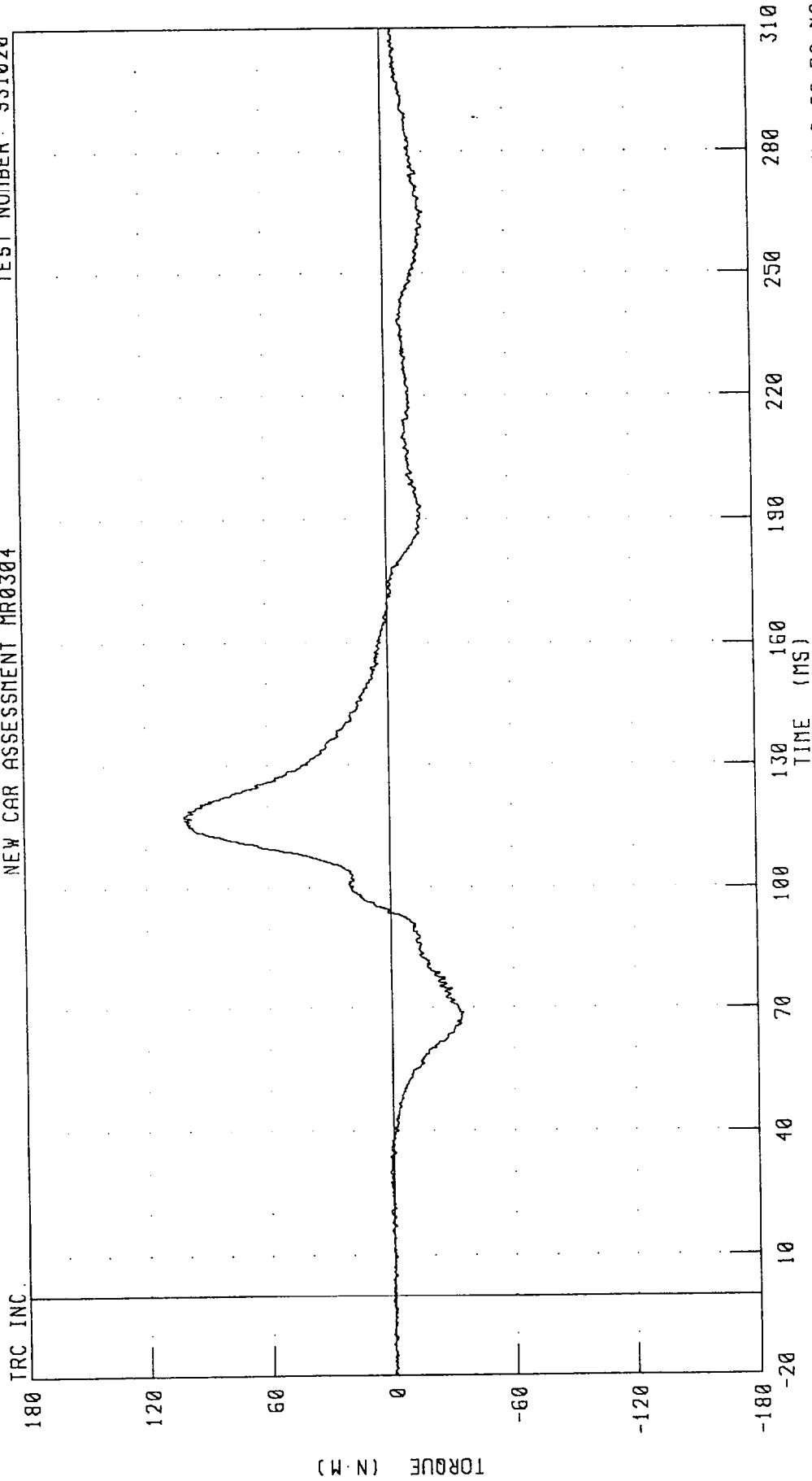
TEST NUMBER 931020



CHANNEL: NEKX2 FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 PASSENGER NECK MOMENT ABOUT Y AXIS  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

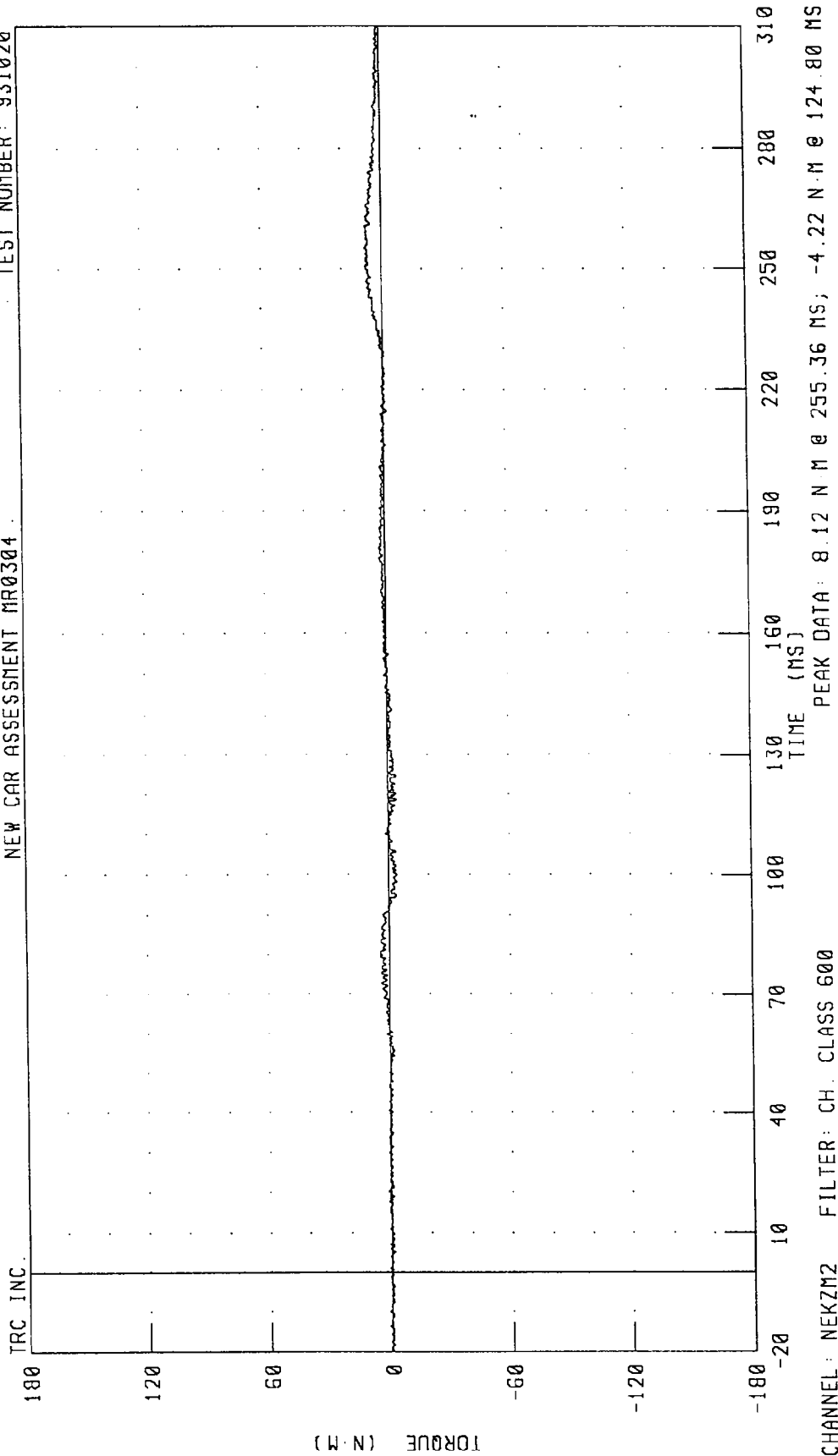


PEAK DATA: 101.67 N M @ 117.68 MS, -35.13 N M @ 68.72 MS

CHANNEL: NEKYM2 FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER NECK MOMENT ABOUT Z AXIS  
NEW CAR ASSESSMENT MR0304

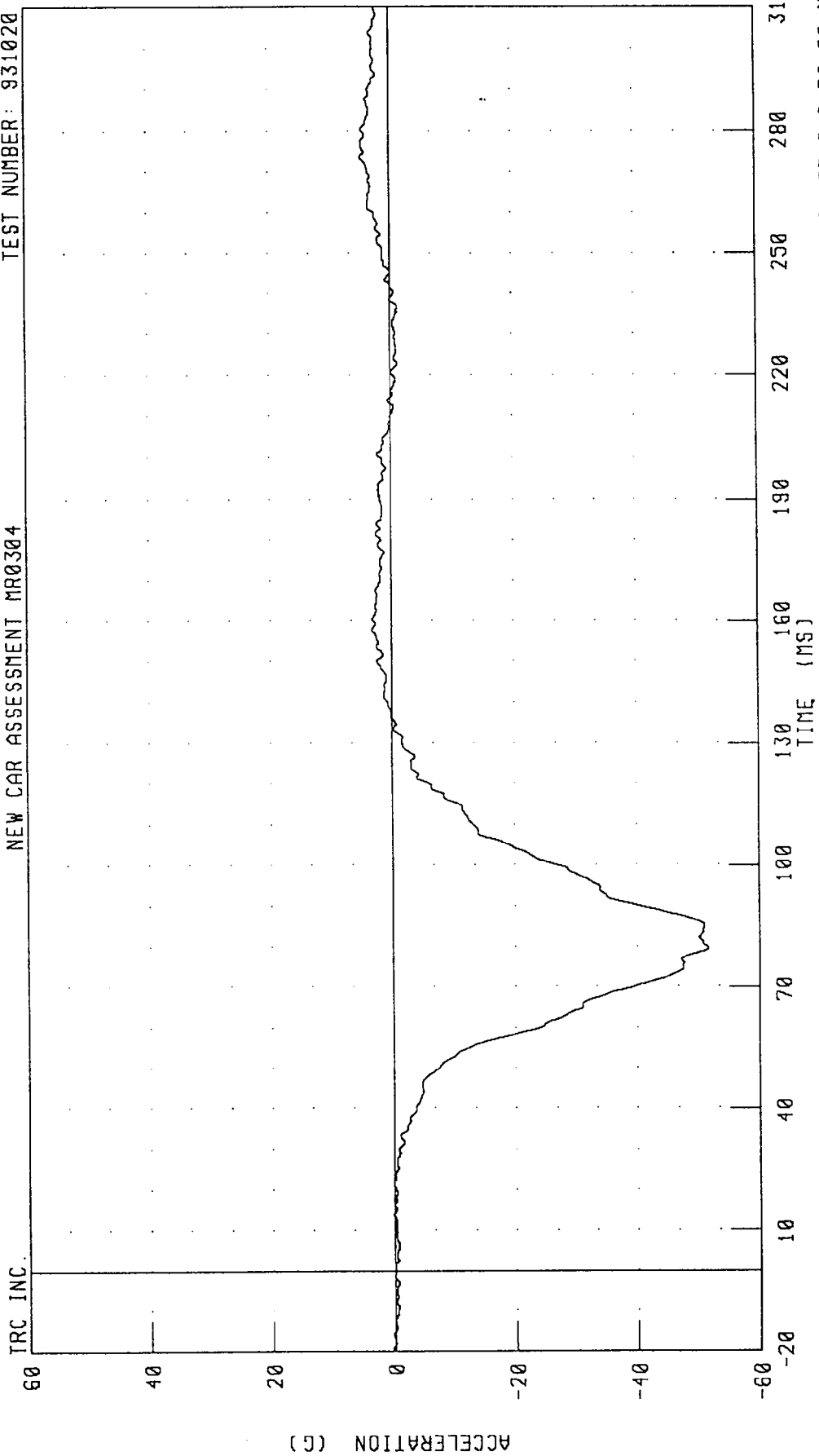
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER CHEST X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

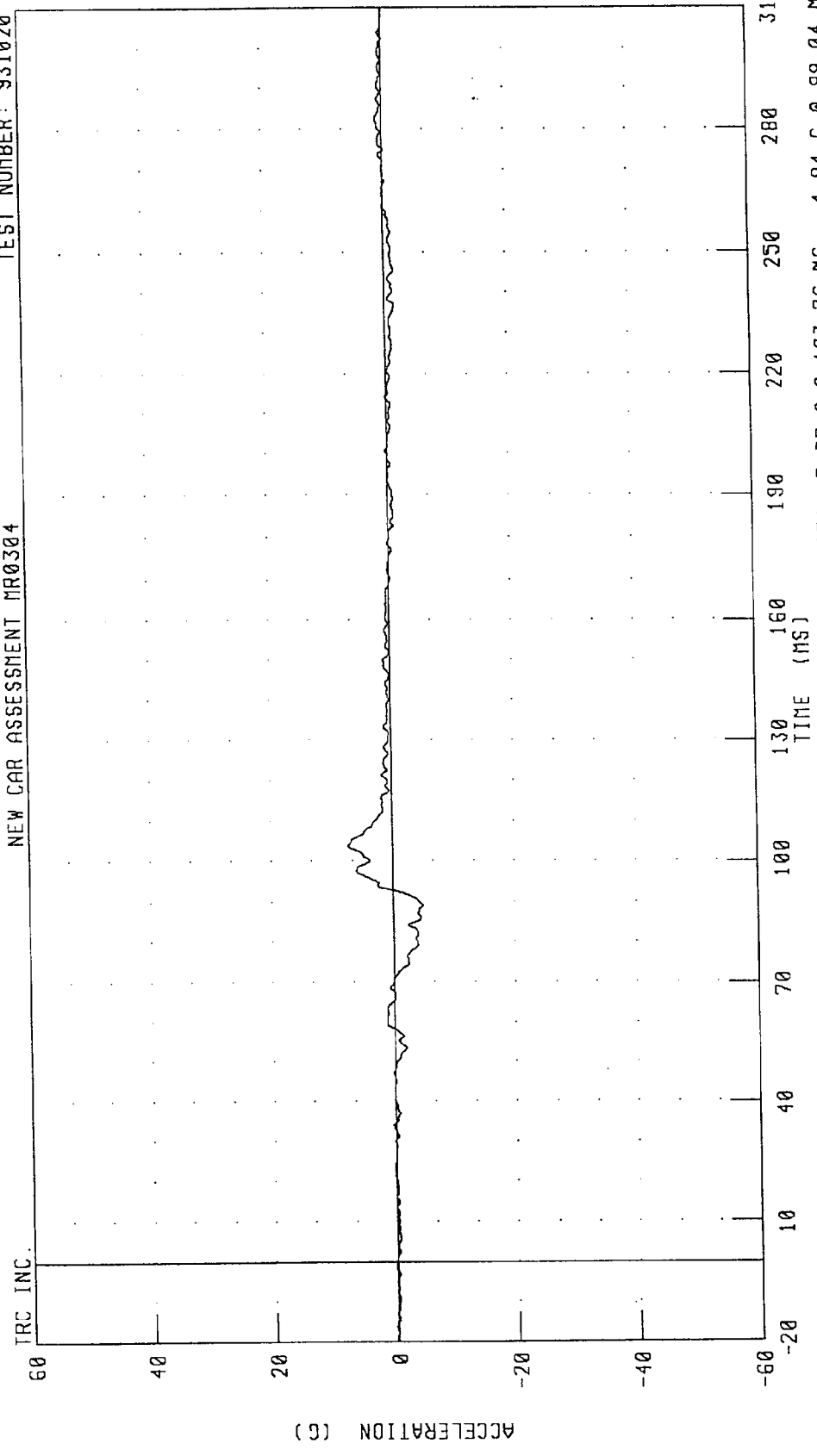


CHANNEL: CSTXG2 FILTER: CH. CLASS 180

PEAK DATA: 4.82 G @ 273.84 MS; -51.63 G @ 79.60 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER CHEST Y-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

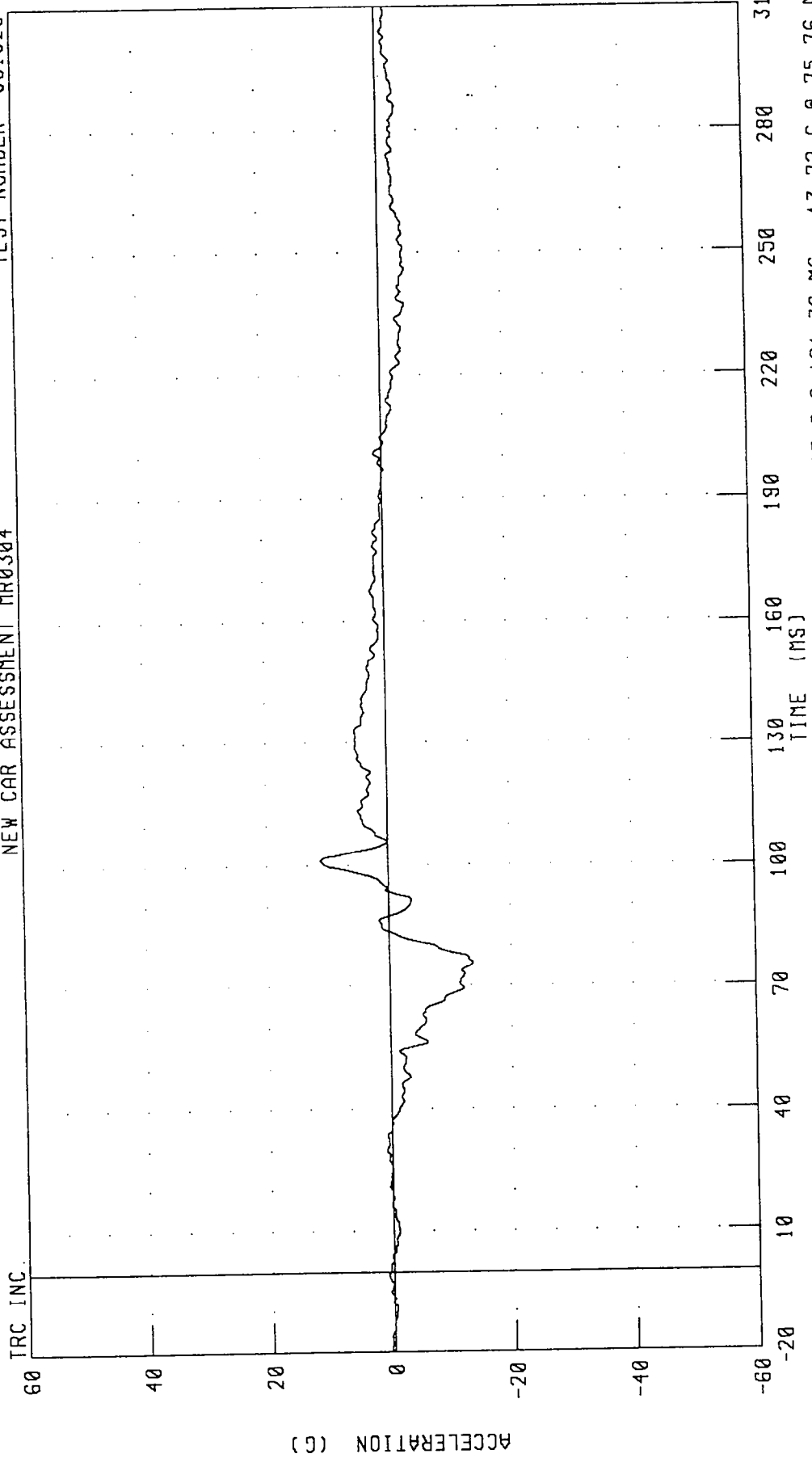


CHANNEL: CSTYG2 FILTER: CH. CLASS 180



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER CHEST Z-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

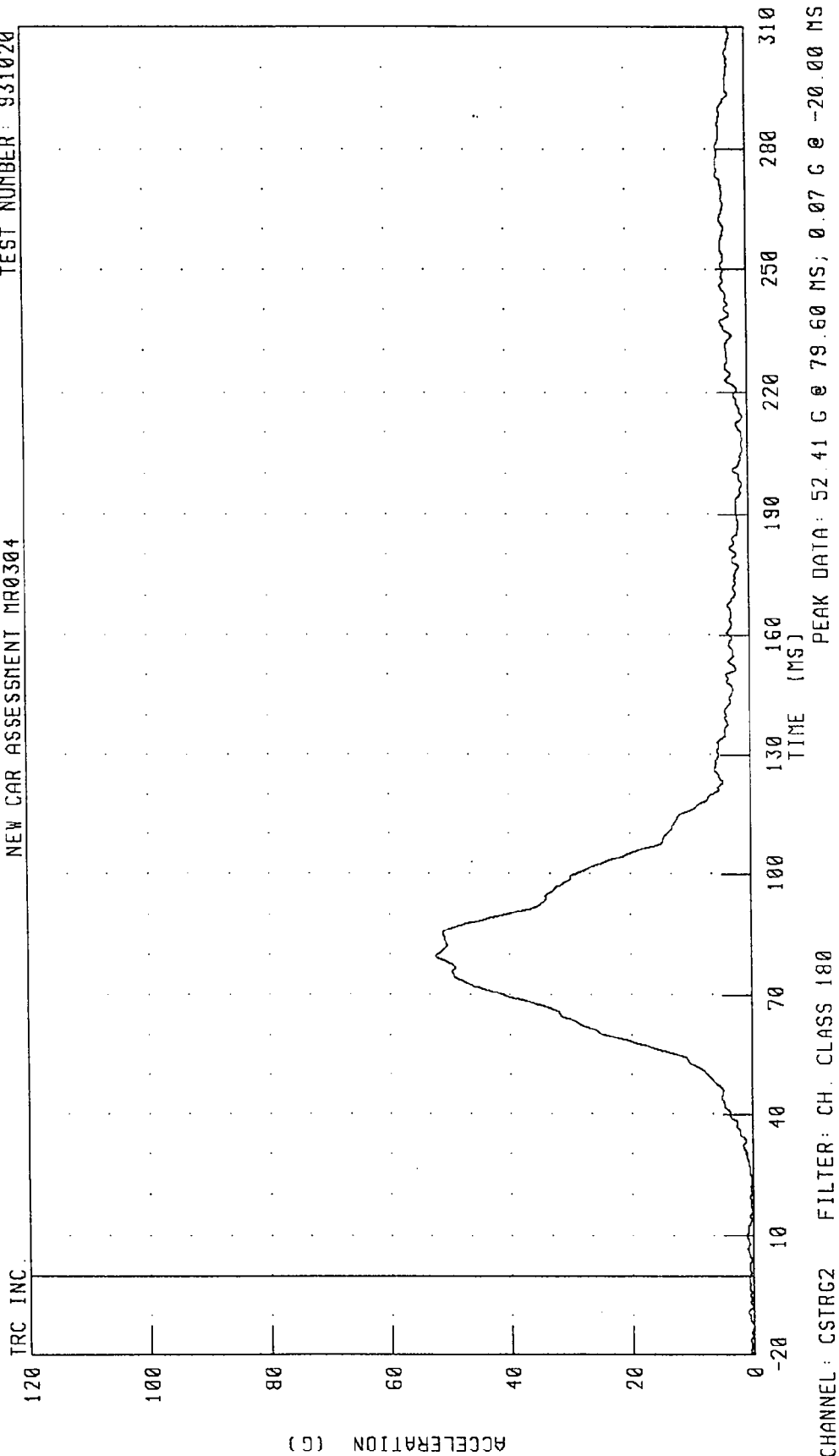
TEST NUMBER: 931020



CHANNEL: CST2G2 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER CHEST RESULTANT ACCELERATION  
NEW CAR ASSESSMENT MR0304

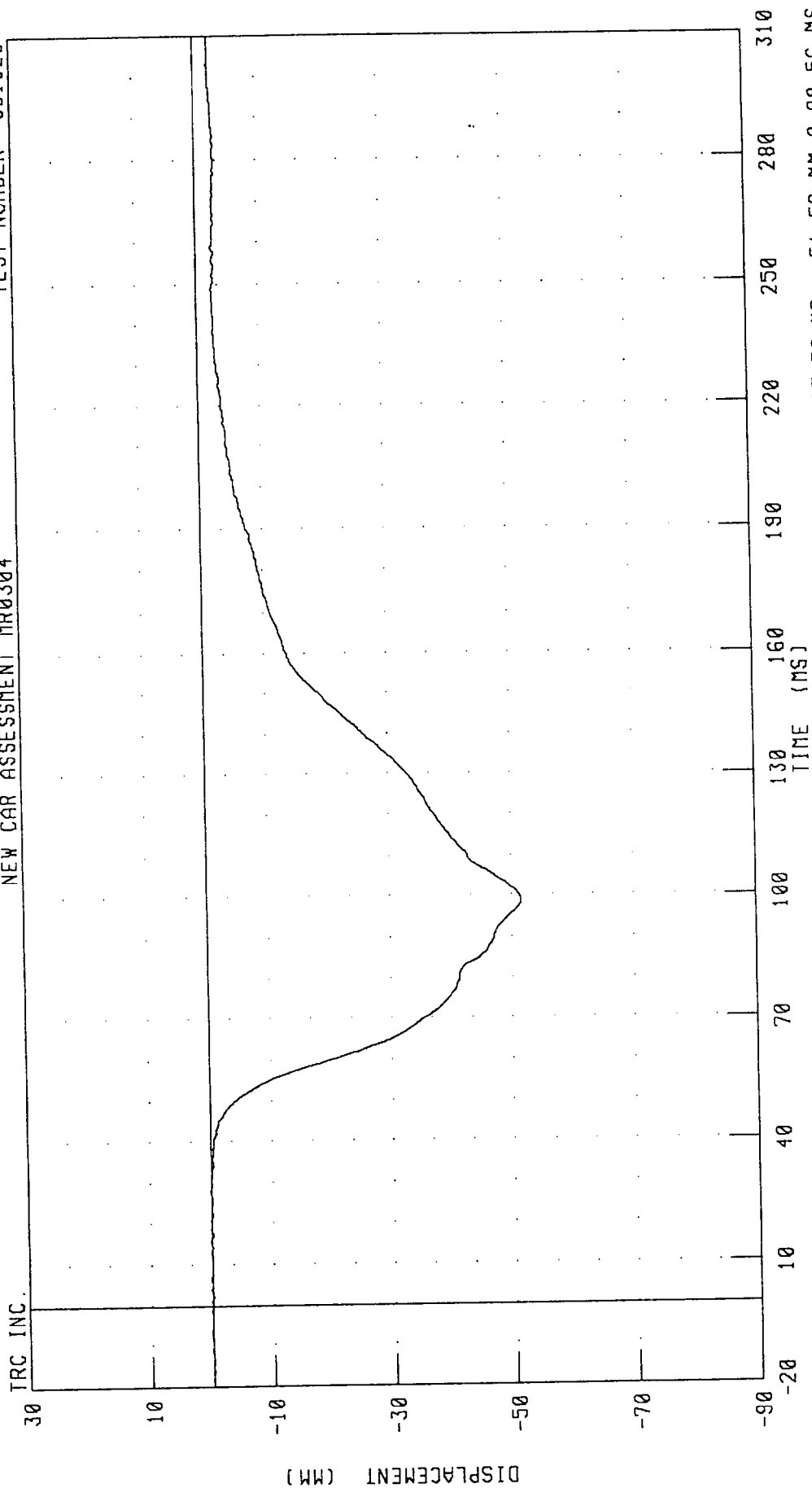
TEST NUMBER: 931020



CHANNEL: CSTRG2 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER CHEST DEFLECTION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

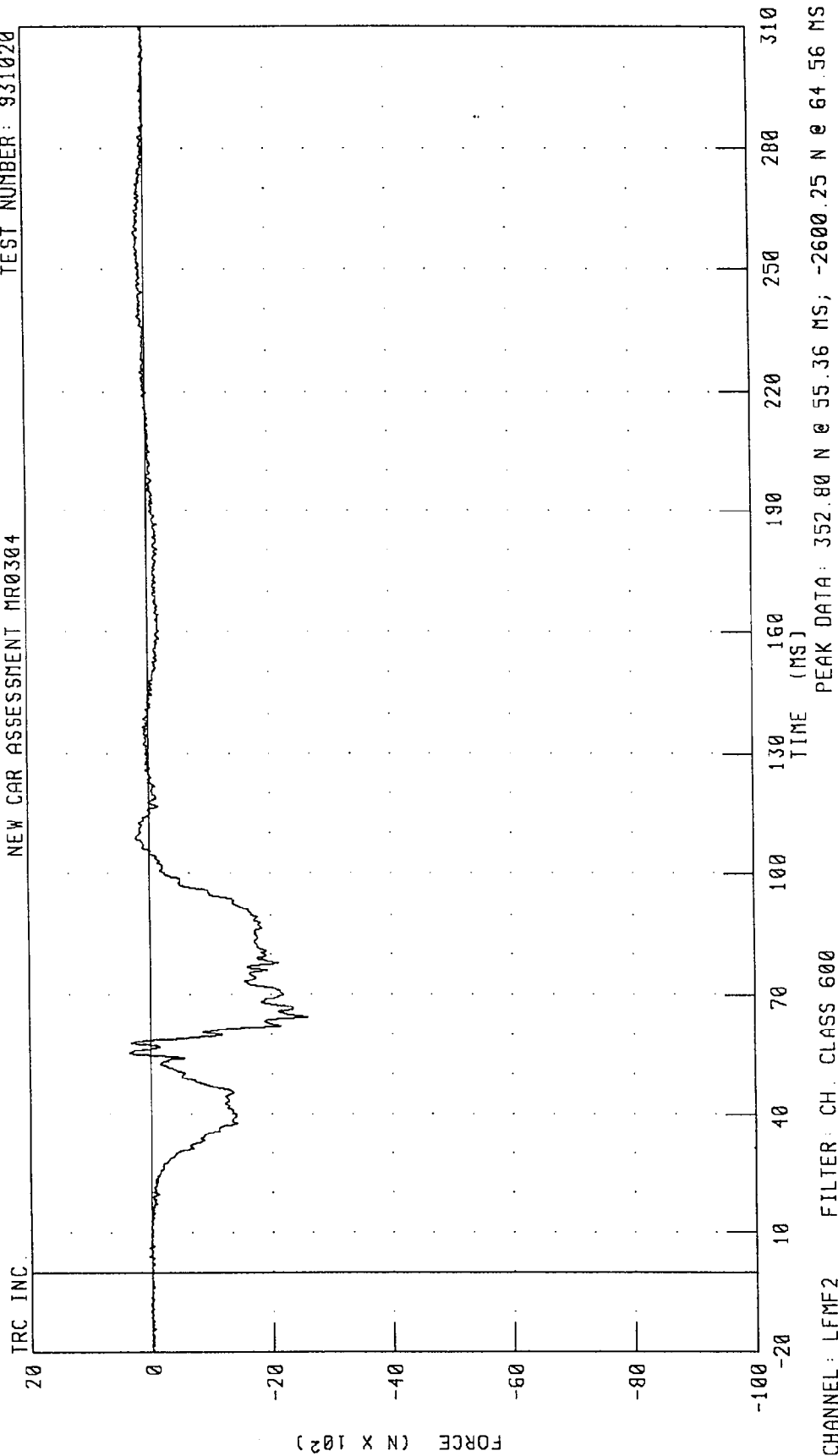


CHANNEL: CSTXD2 FILTER: CH. CLASS 180

PEAK DATA: 0.18 MM @ 15.52 MS, -51.58 MM @ 98.56 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER LEFT FEMUR FORCE  
NEW CAR ASSESSMENT MR0304

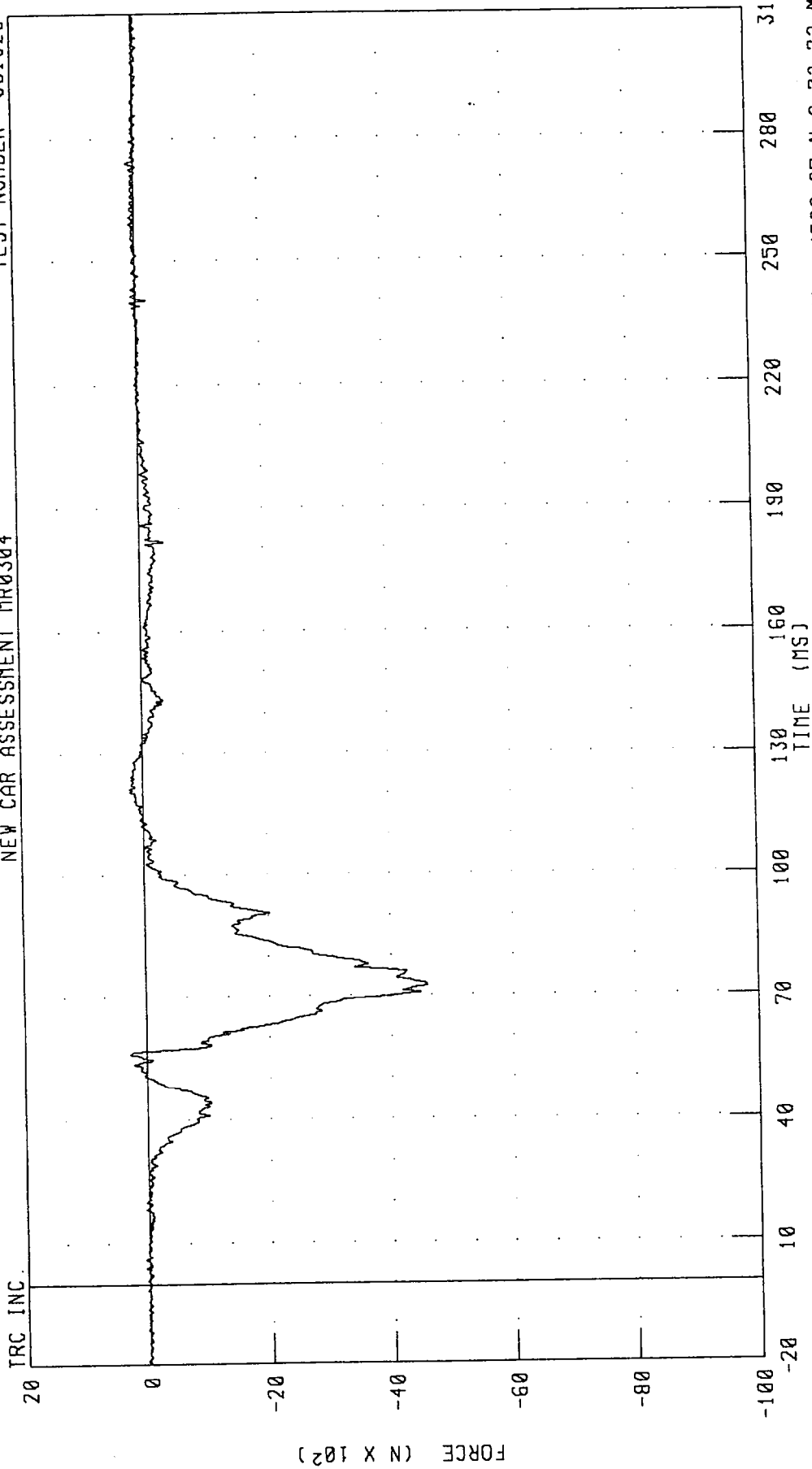
TEST NUMBER: 931020



CHANNEL: LFMF2 FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 PASSENGER RIGHT FEMUR FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

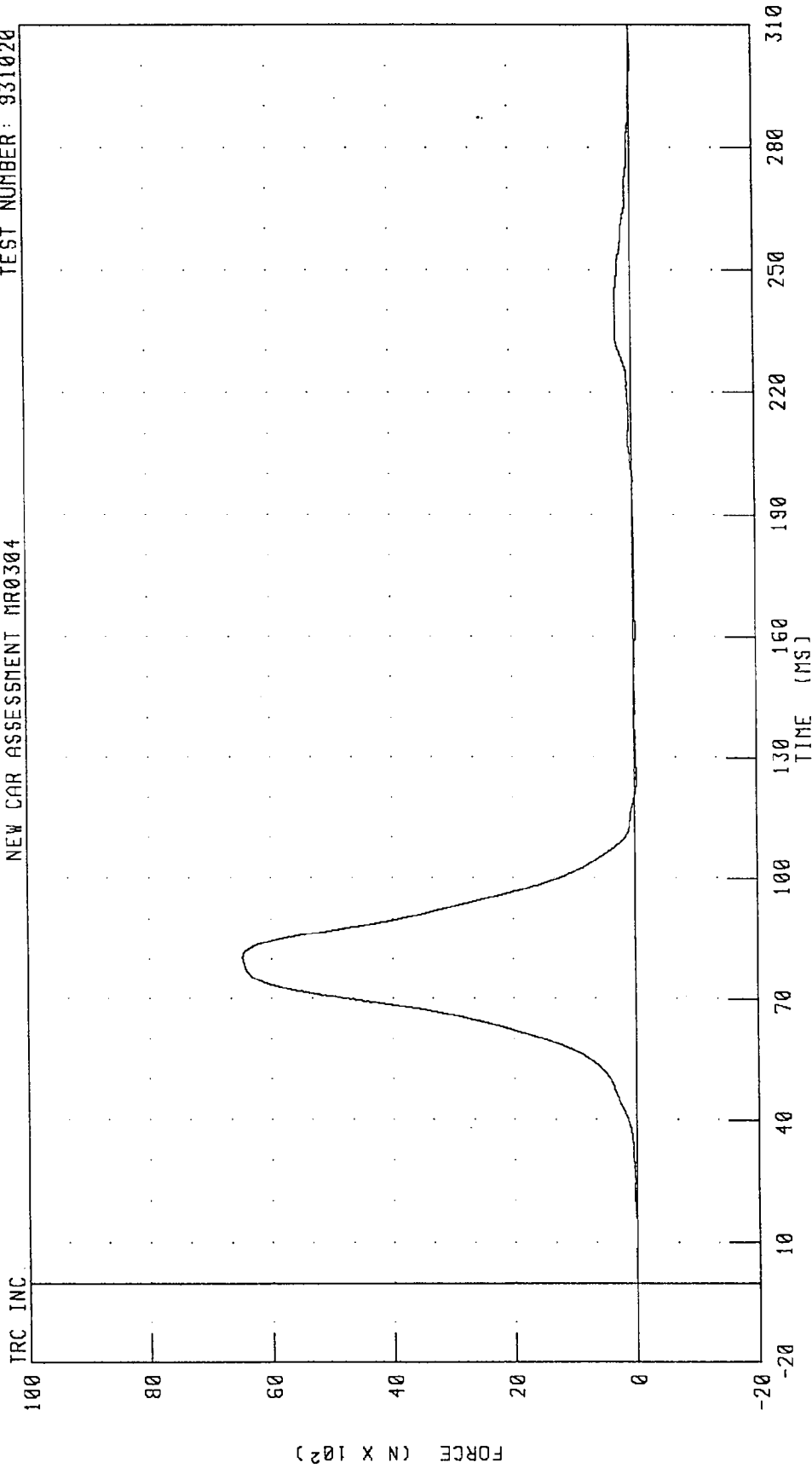


PEAK DATA: 263.76 N @ 56.24 MS; -4599.07 N @ 72.72 MS

CHANNEL: RFMF2 FILTER: CH. CLASS 600

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER LAP BELT OUTBOARD FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



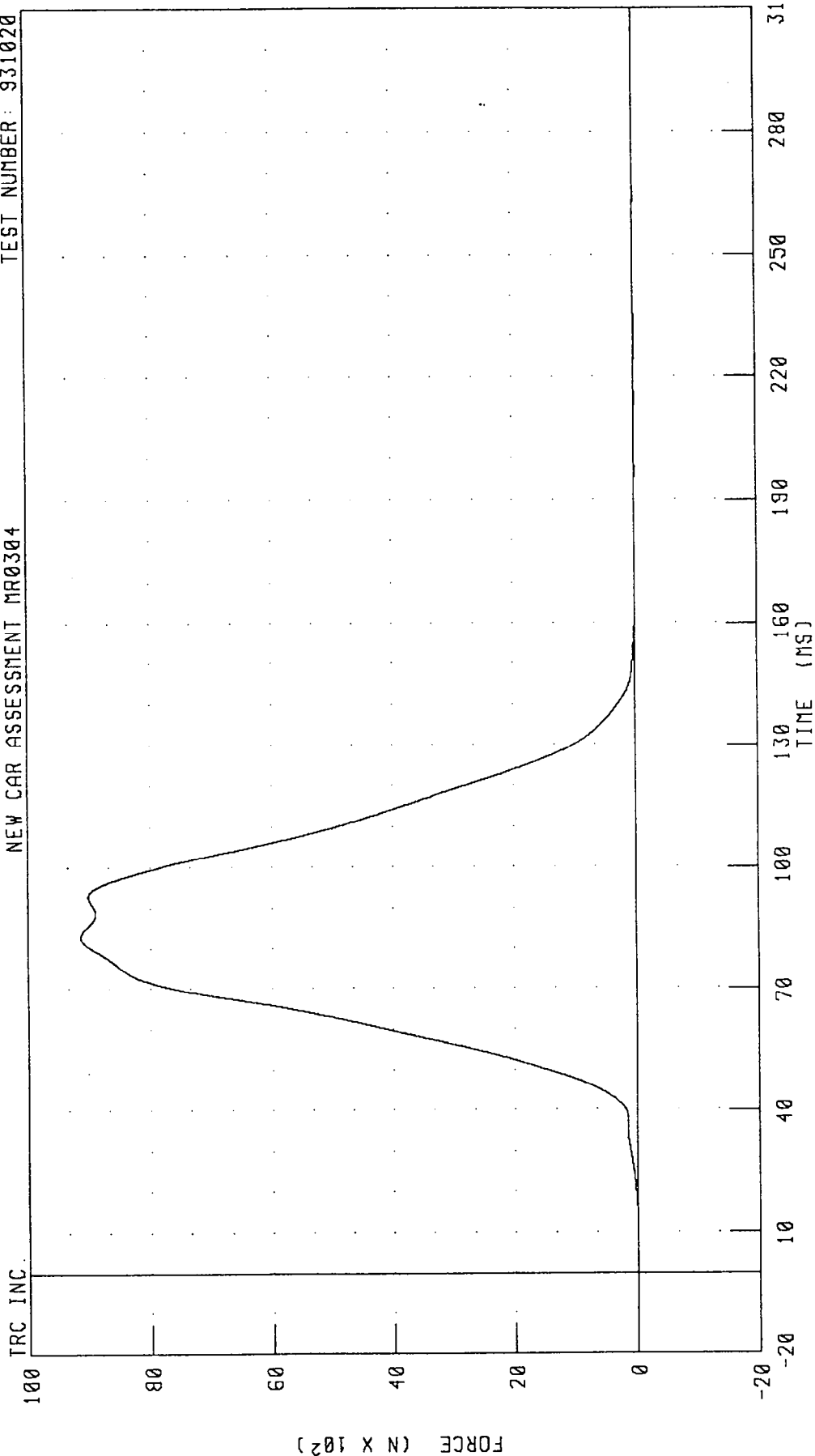
PEAK DATA: 6465.56 N @ 80.48 MS, -28.52 N @ 125.44 MS

CHANNEL: LBOF2 FILTER: CH. CLASS 60



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 PASSENGER SHOULDER BELT FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



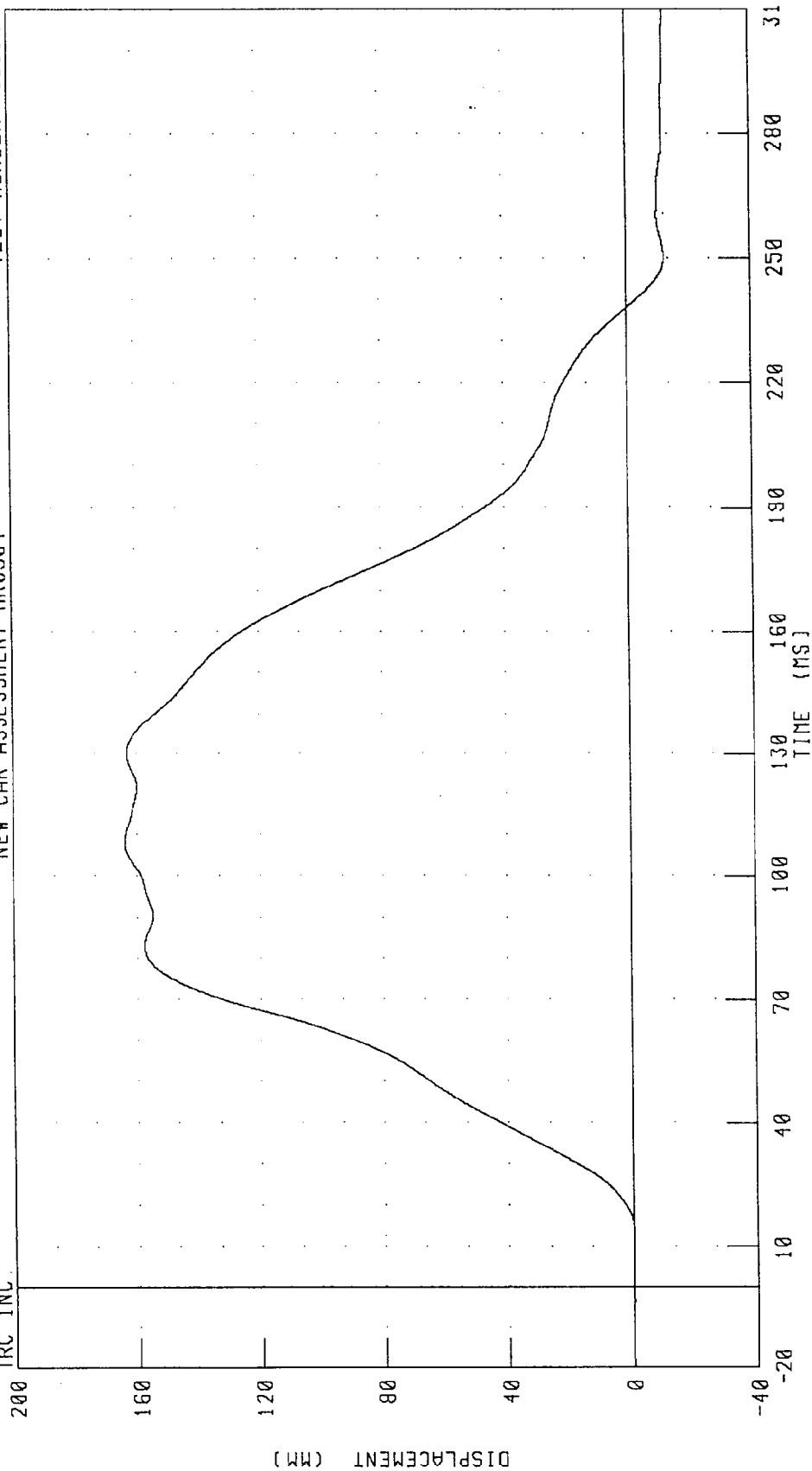
PEAK DATA: 9131 01 N @ 82.96 MS; -10.44 N @ 229.68 MS

CHANNEL: SHBF2 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
PASSENGER SHOULDER BELT DISPLACEMENT  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



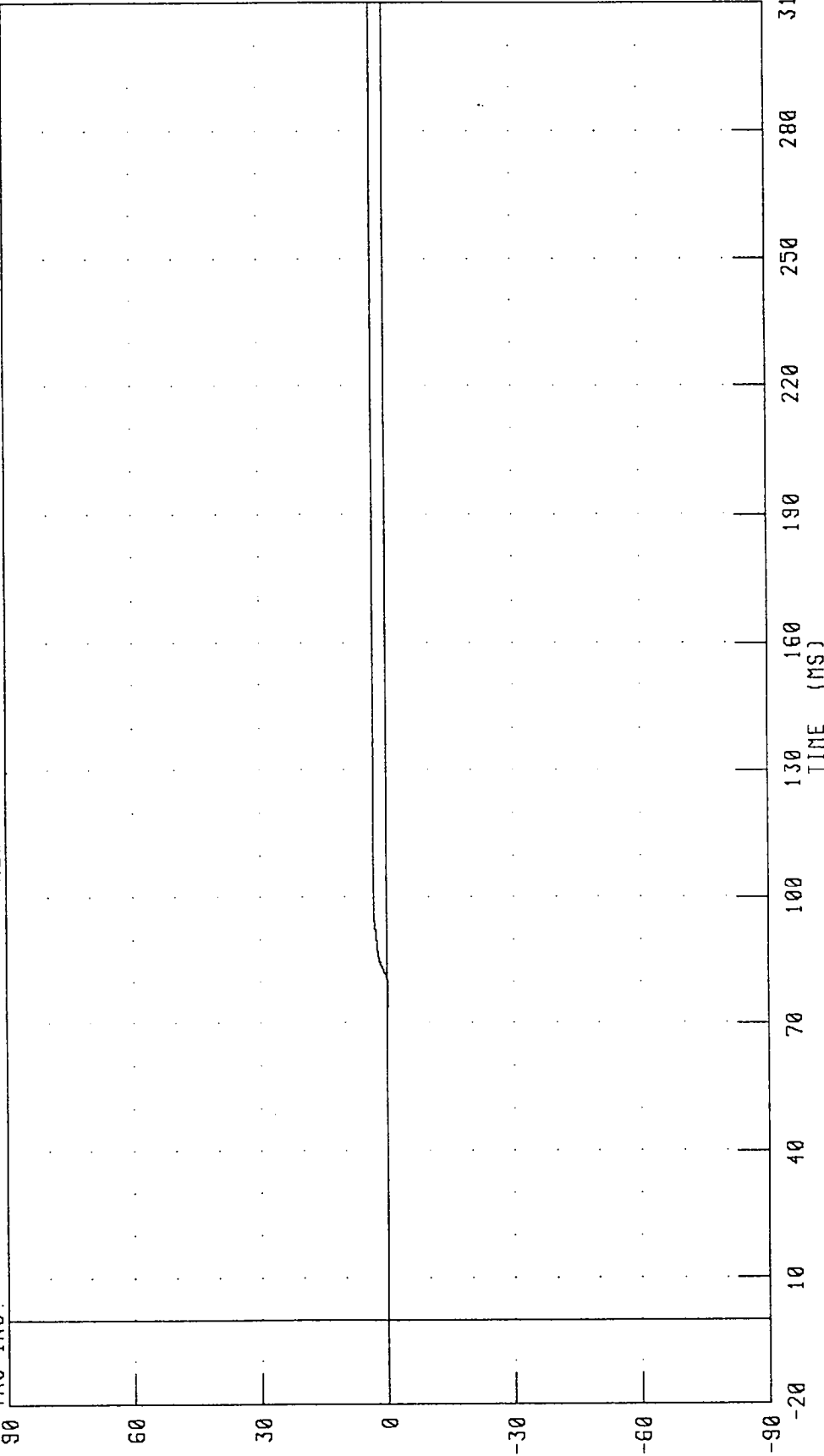
PEAK DATA: 163.80 MM @ 107.84 MS; -12.05 MM @ 250.16 MS

CHANNEL: SHBD2 FILTER: CH CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 PASSENGER SEAT BELT EXTENSION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.

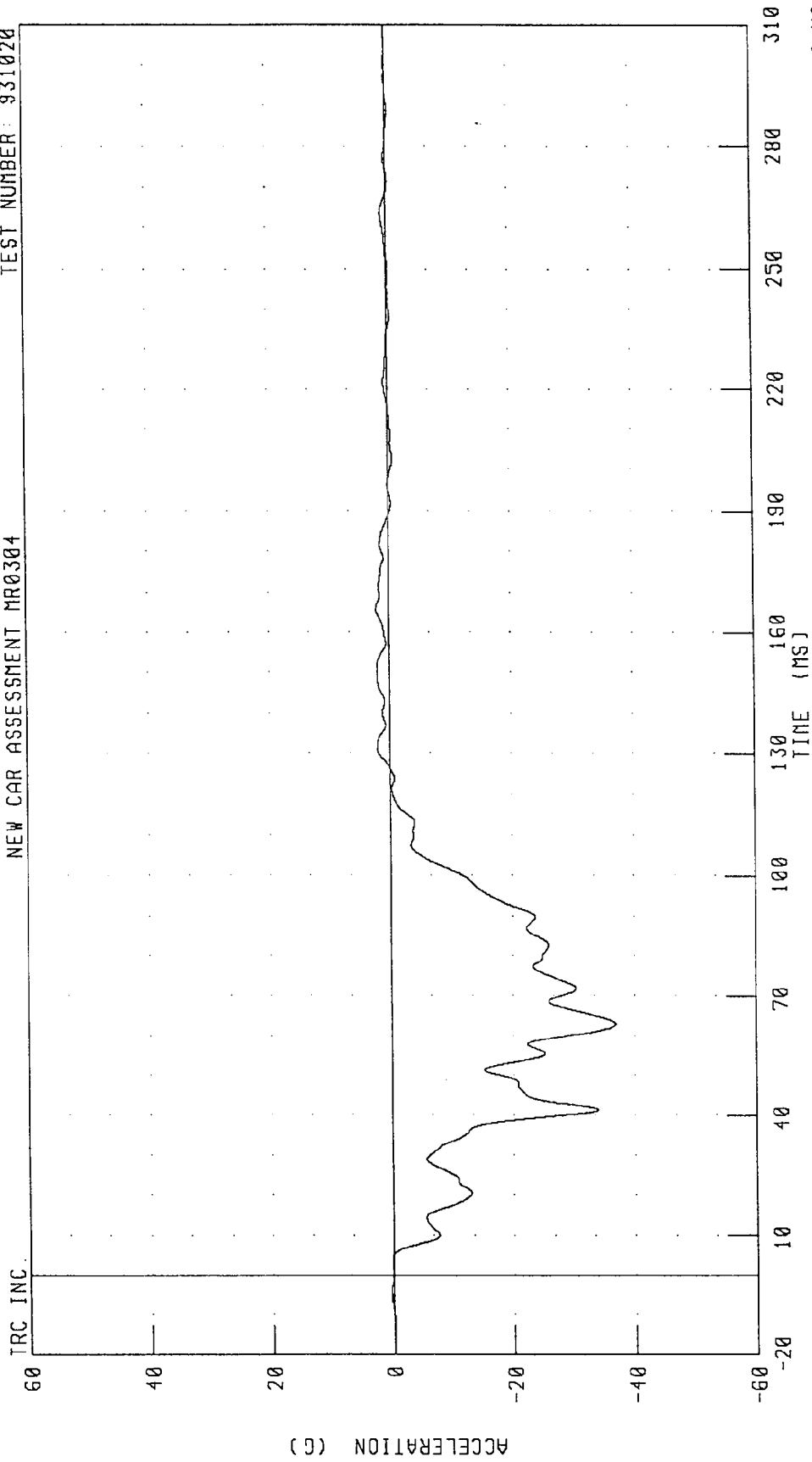


PEAK DATA: 0.31 MM @ 97.60 MS; -0.03 MM @ 78.32 MS

CHANNEL: SBED2 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LEFT REAR SEAT X-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

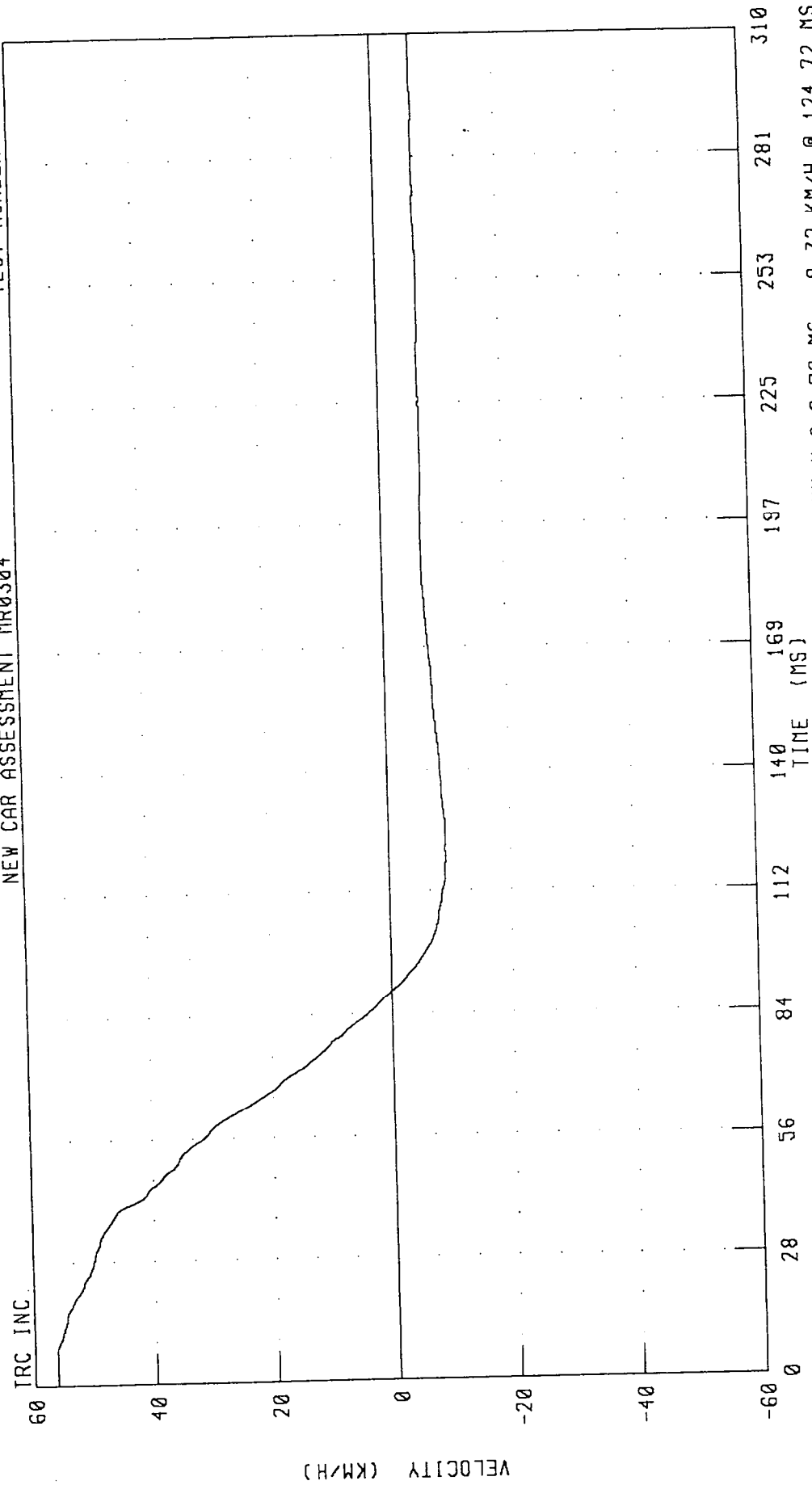
TEST NUMBER: 931020



CHANNEL: TLRXG1 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LEFT REAR SEAT X-AXIS VELOCITY  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



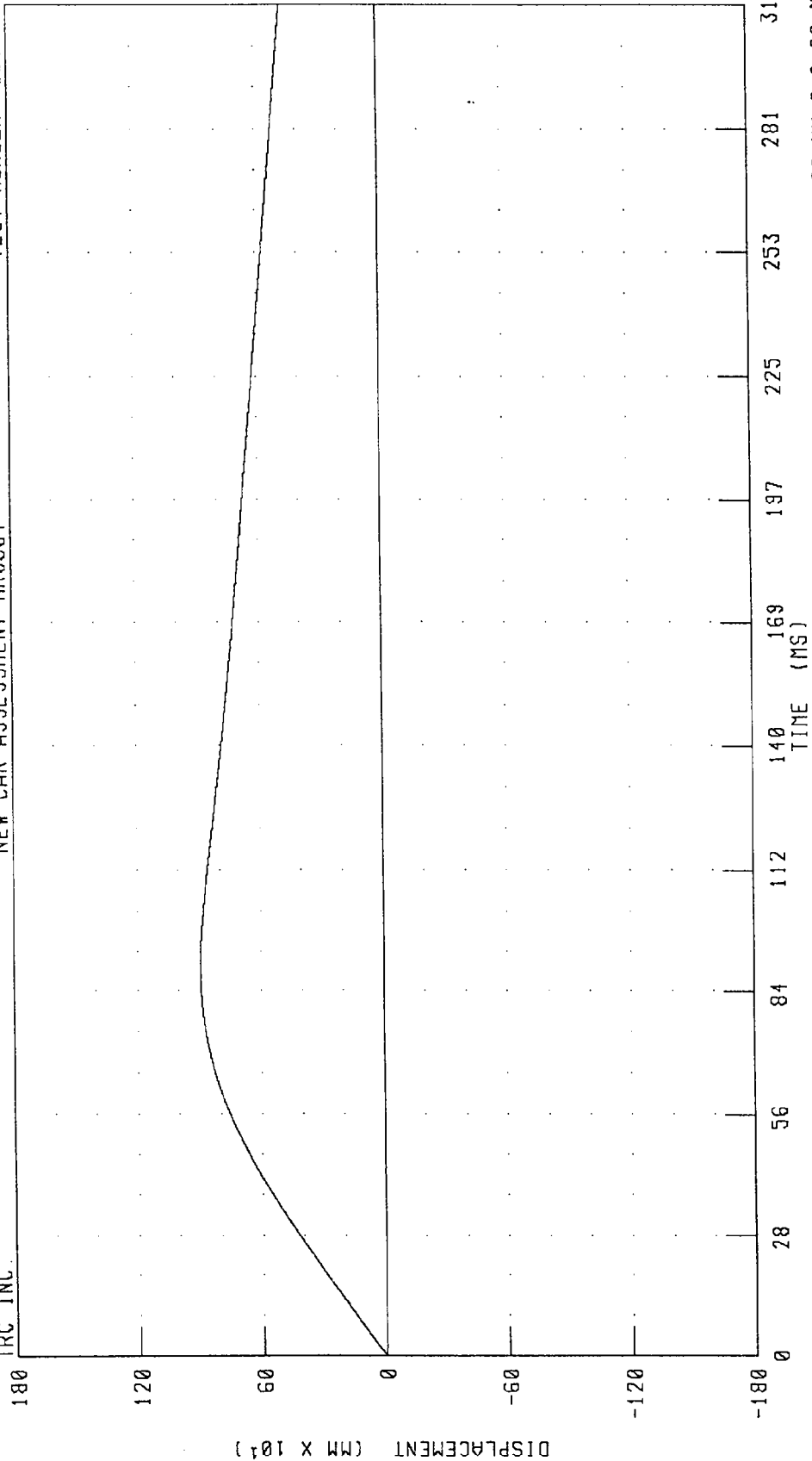
PEAK DATA: 56.31 KM/H @ 2.72 MS, -9.32 KM/H @ 124.72 MS

CHANNEL: TLRXV1 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LEFT REAR SEAT X-AXIS DISPLACEMENT  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



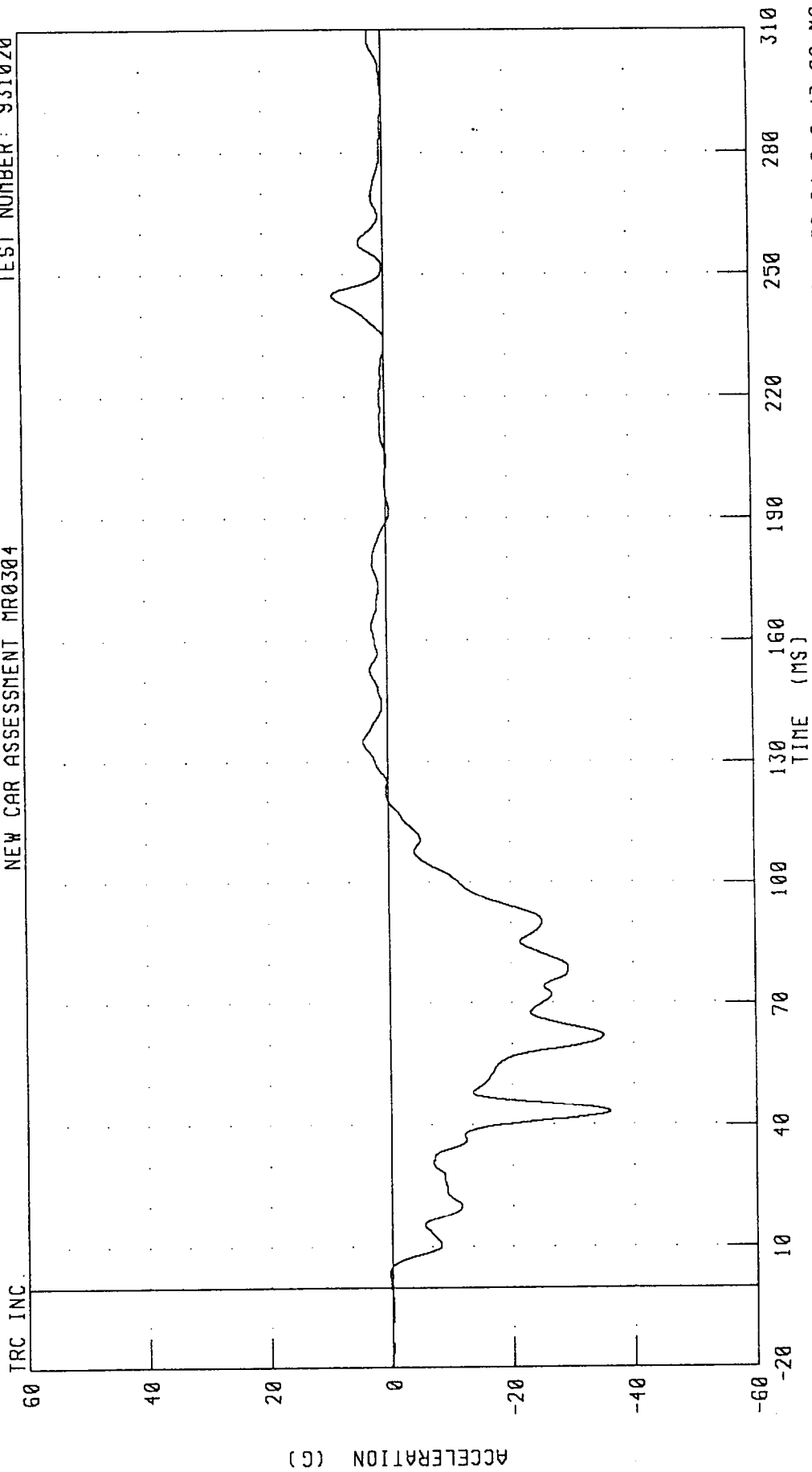
PEAK DATA: 896.24 MM @ 89.84 MS; 0.00 MM @ 0.00 MS

CHANNEL: TLRXD1 FILTER: CH. CLASS 180



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 RIGHT REAR SEAT X-AXIS ACCELERATION  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

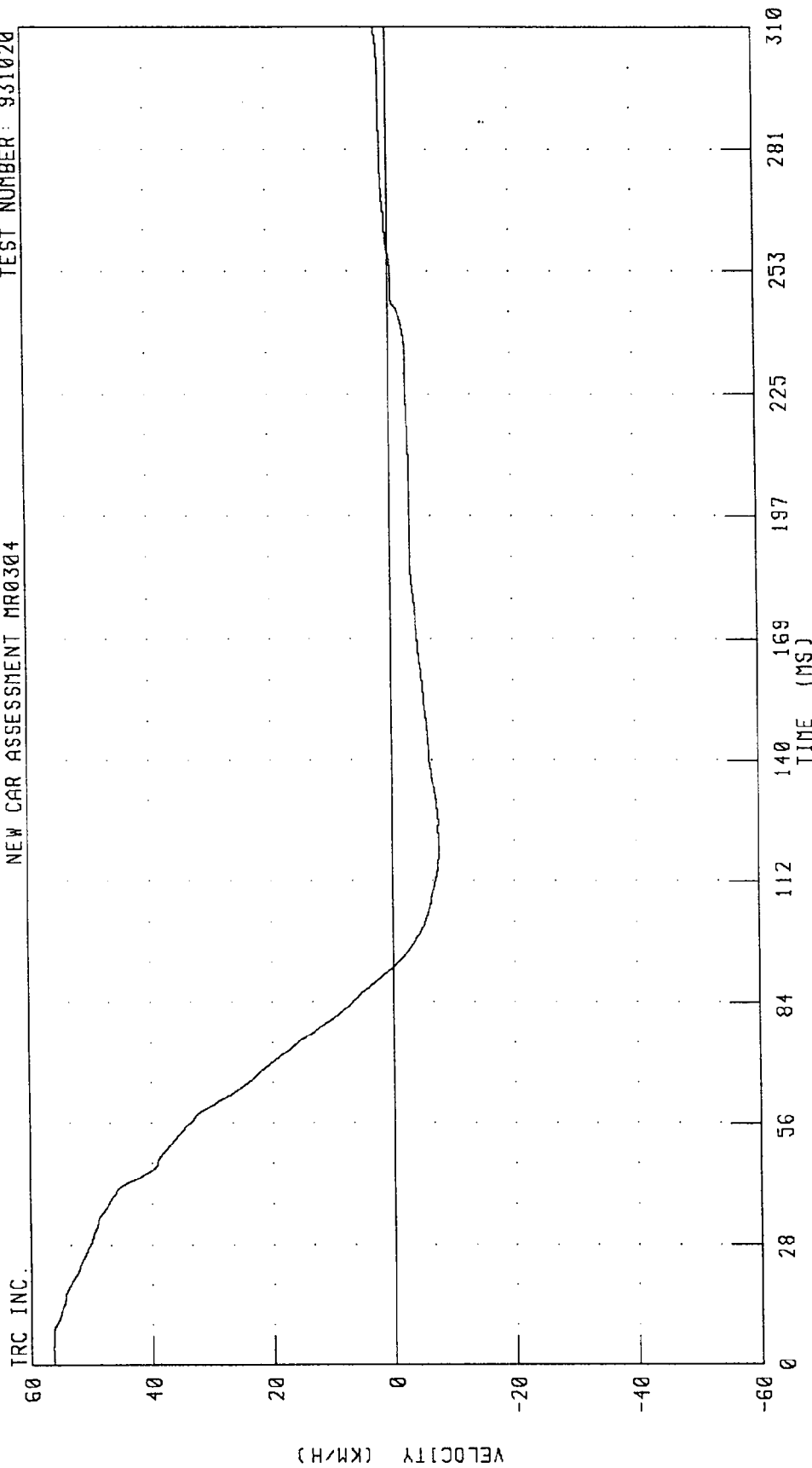


CHANNEL: TRRXG1 FILTER: CH. CLASS 60

PEAK DATA: 8.57 G @ 244.88 MS; -36.04 G @ 43.28 MS

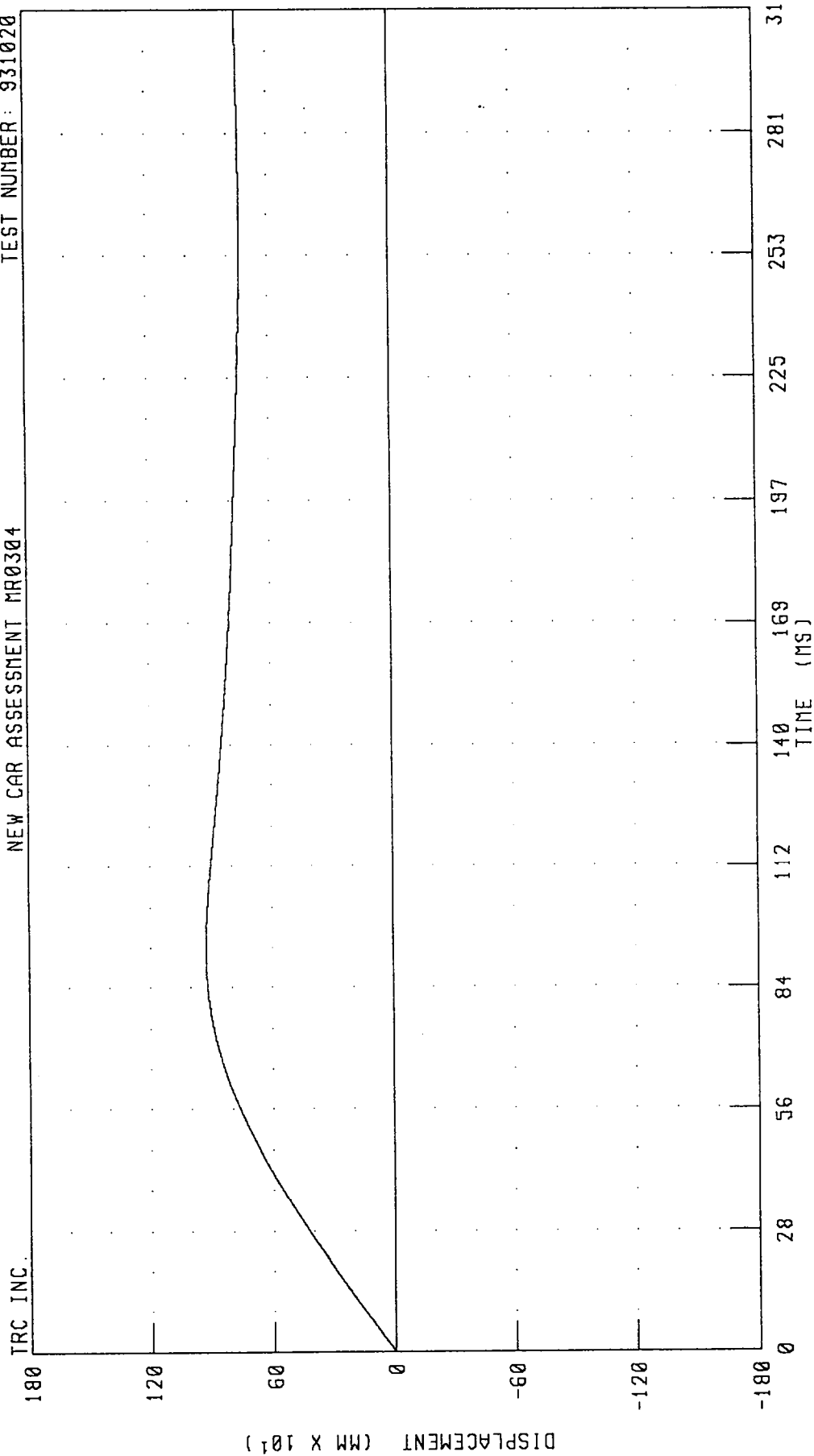
1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 RIGHT REAR SEAT X-AXIS VELOCITY  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 RIGHT REAR SEAT X-AXIS DISPLACEMENT  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

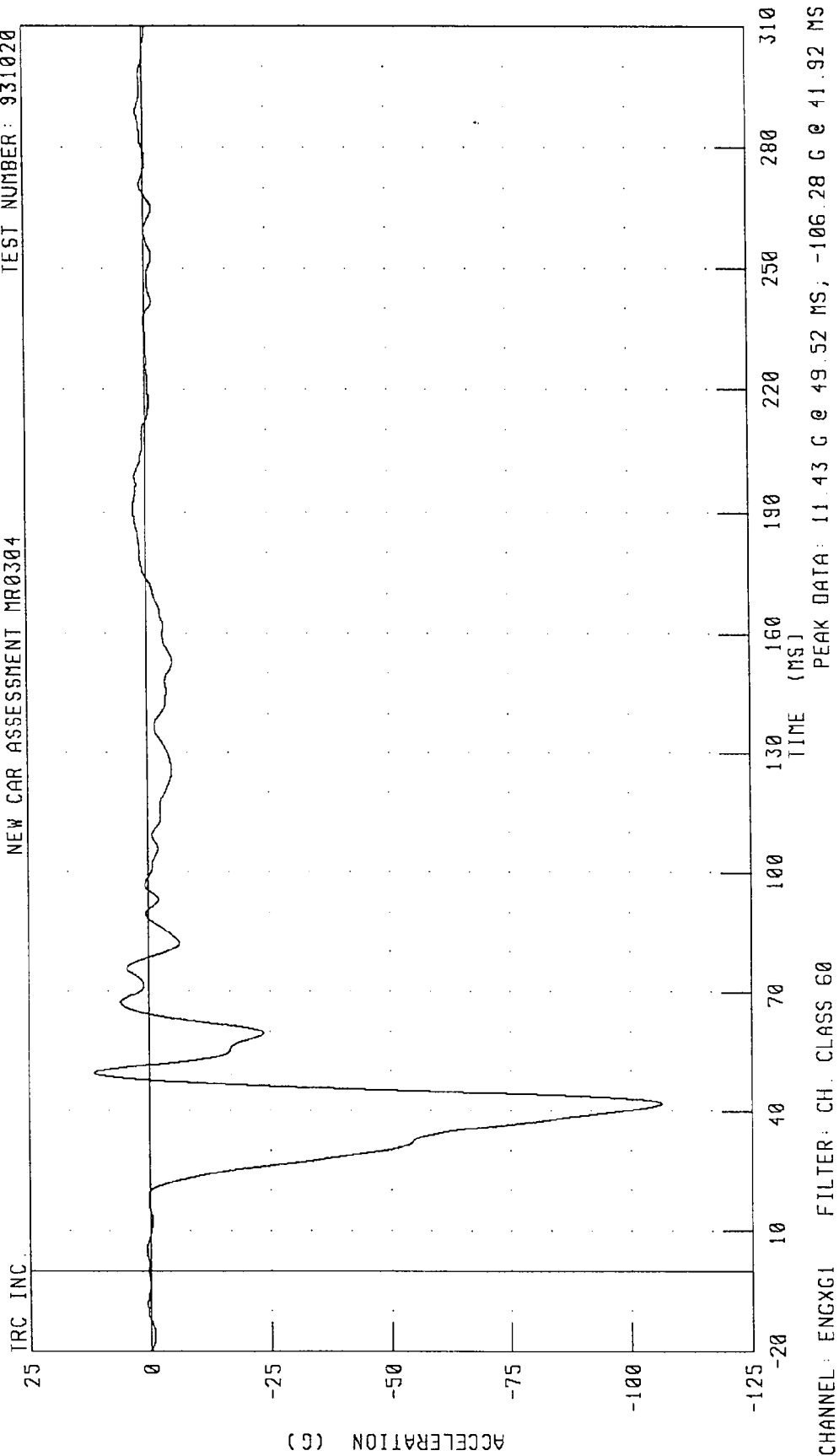


PEAK DATA: 926.60 MM @ 92.64 MS; 0.00 MM @ 0.00 MS

CHANNEL: TRRXD1 FILTER: CH. CLASS 180

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
ENGINE TOP X-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

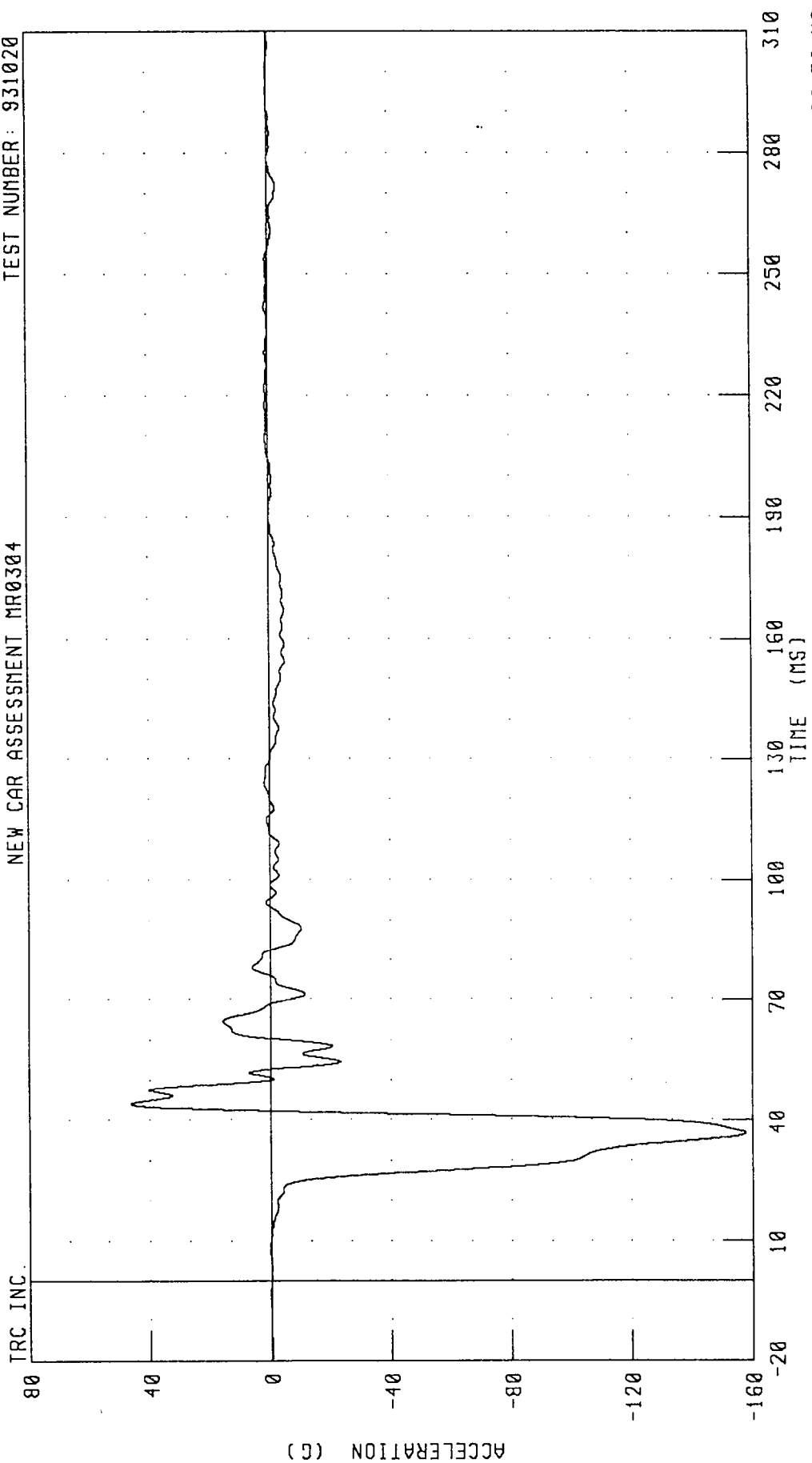
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
ENGINE BOTTOM X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0304

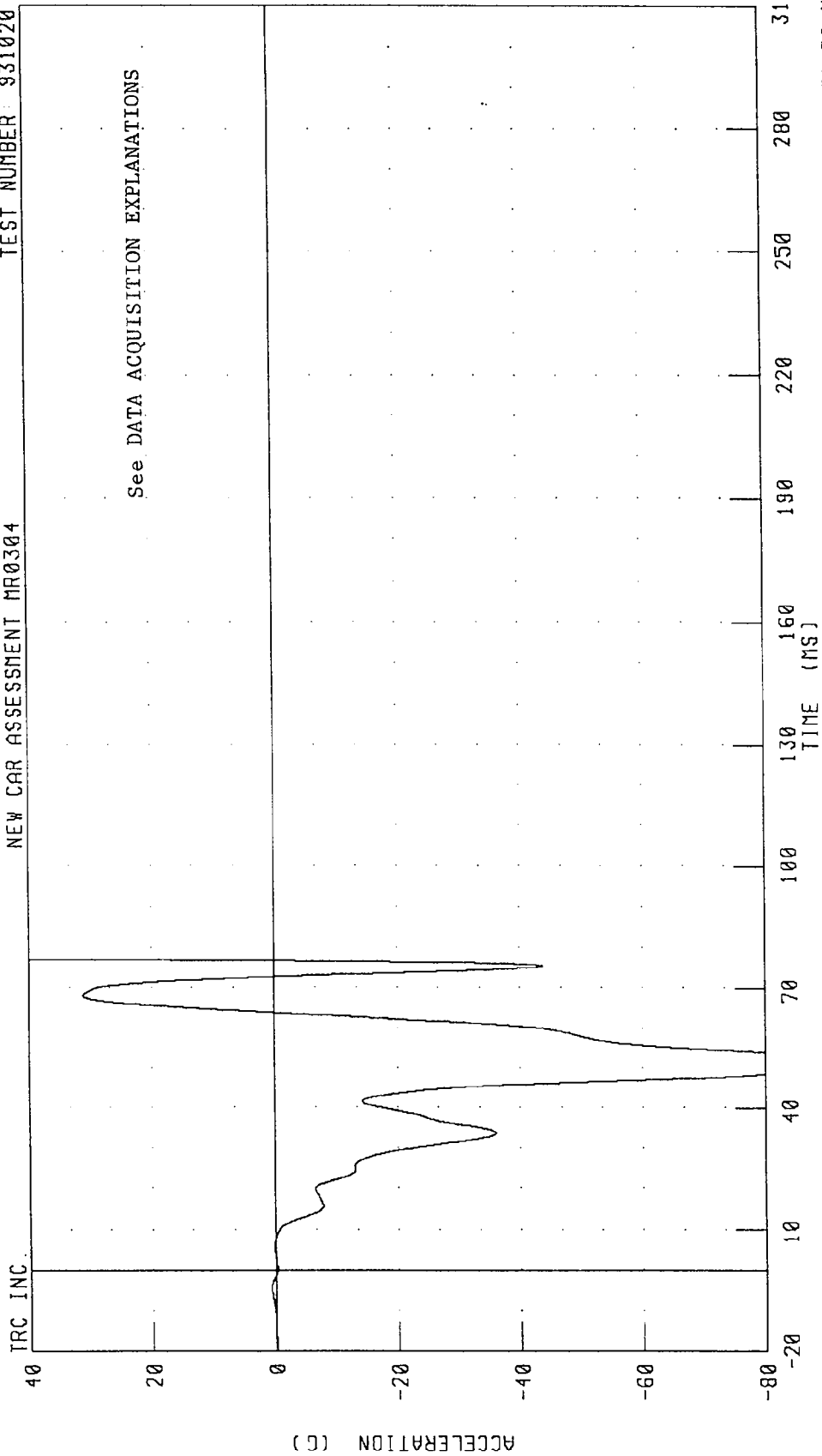
TEST NUMBER: 931020



CHANNEL: ENGXC2 FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
RIGHT BRAKE CALIPER X-AXIS ACCELERATION  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



CHANNEL: BCRXG1 FILTER: CH: CLASS 60

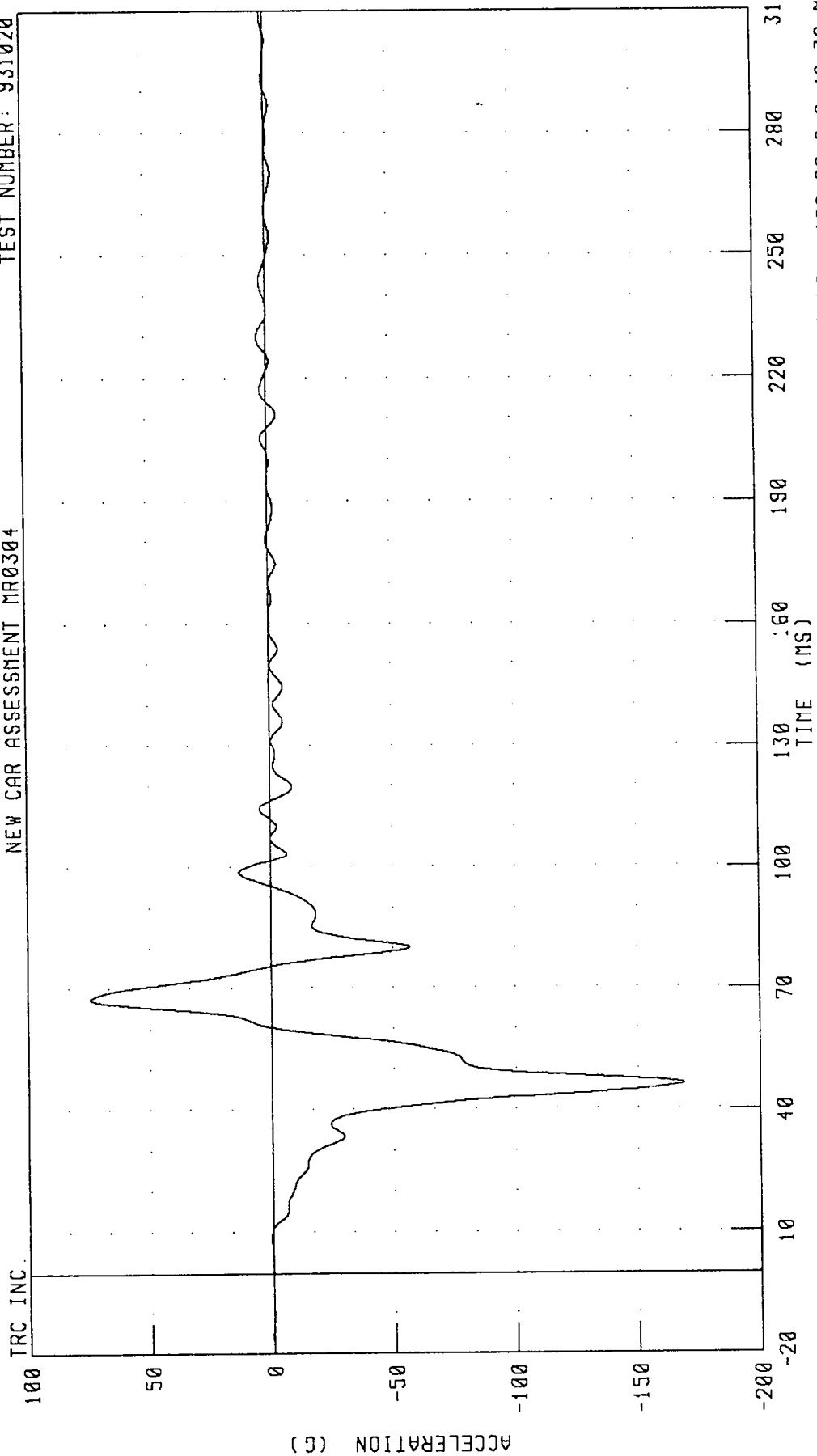
PEAK DATA: 1367.56 G @ 83.92 MS; -97.77 G @ 51.36 MS



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LEFT BRAKE CALIPER X-AXIS ACCELERATION

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



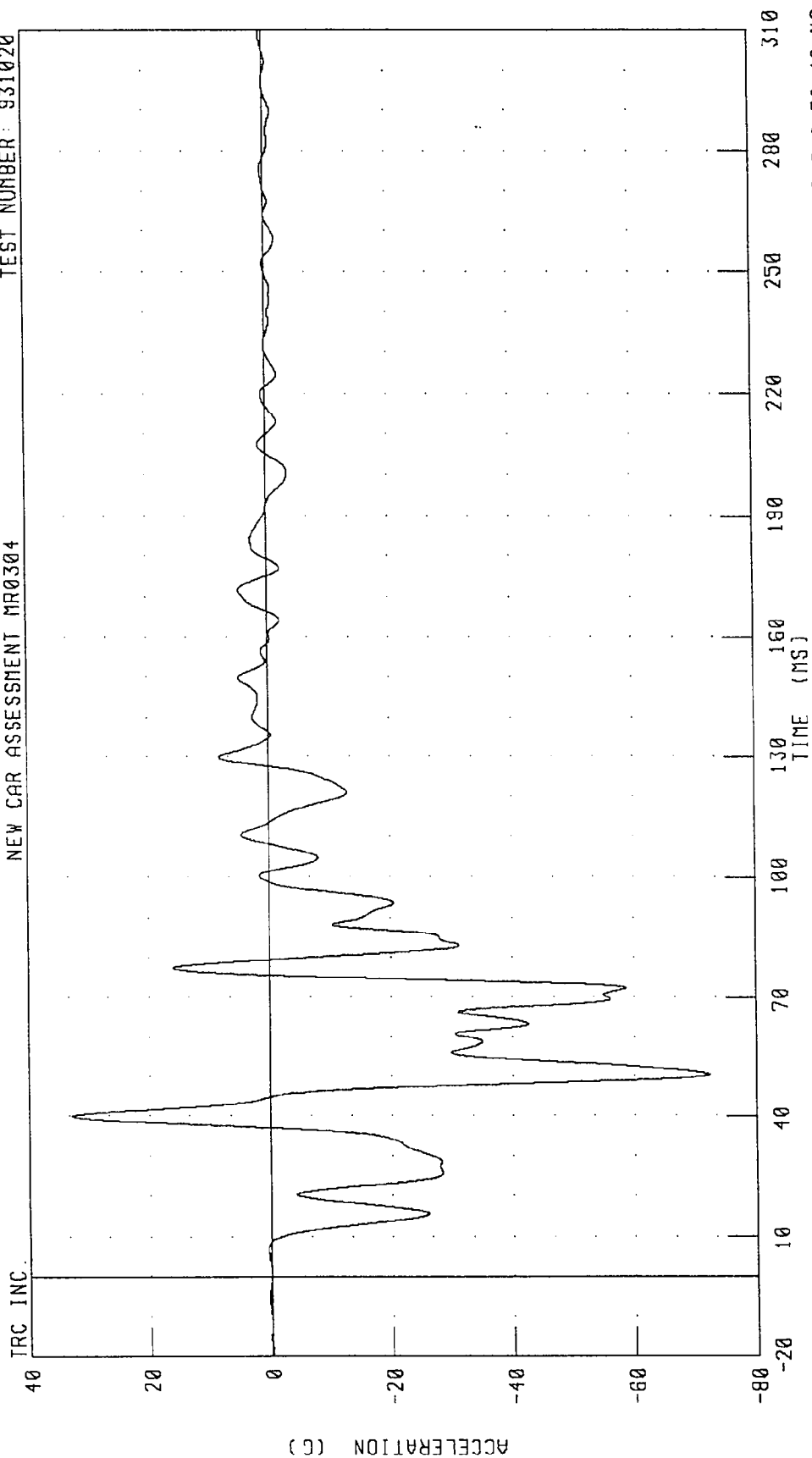
CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 74.42 G @ 67.36 MS; -168.96 G @ 46.32 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



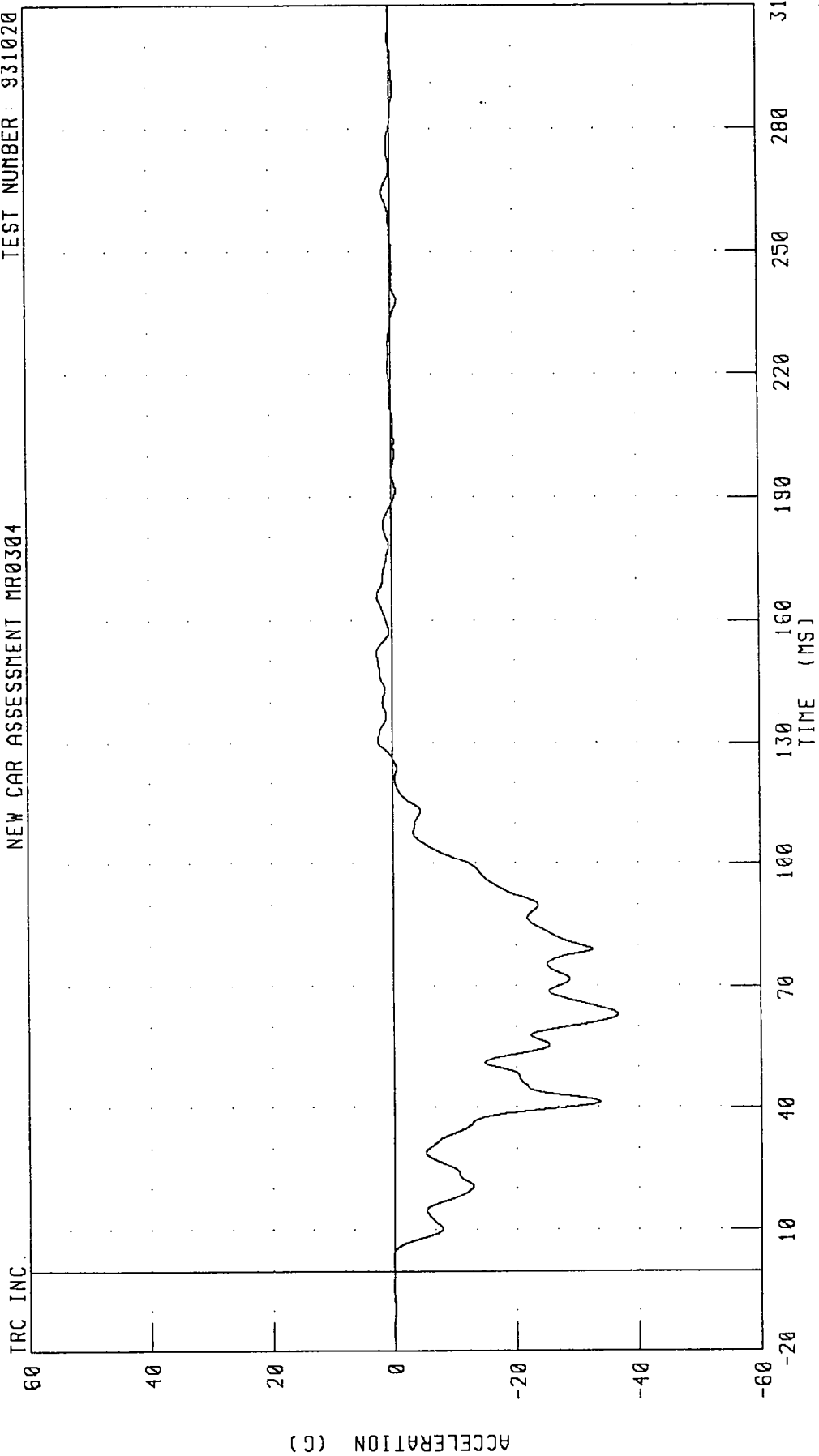
CHANNEL: 0PCXG1 FILTER: CH. CLASS 60

PEAK DATA: 32.81 G @ 40.08 MS, -72.23 G @ 50.40 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LEFT REAR SEAT REDUNDANT X-AXIS ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



CHANNEL: TLRXGA FILTER: CH. CLASS 60

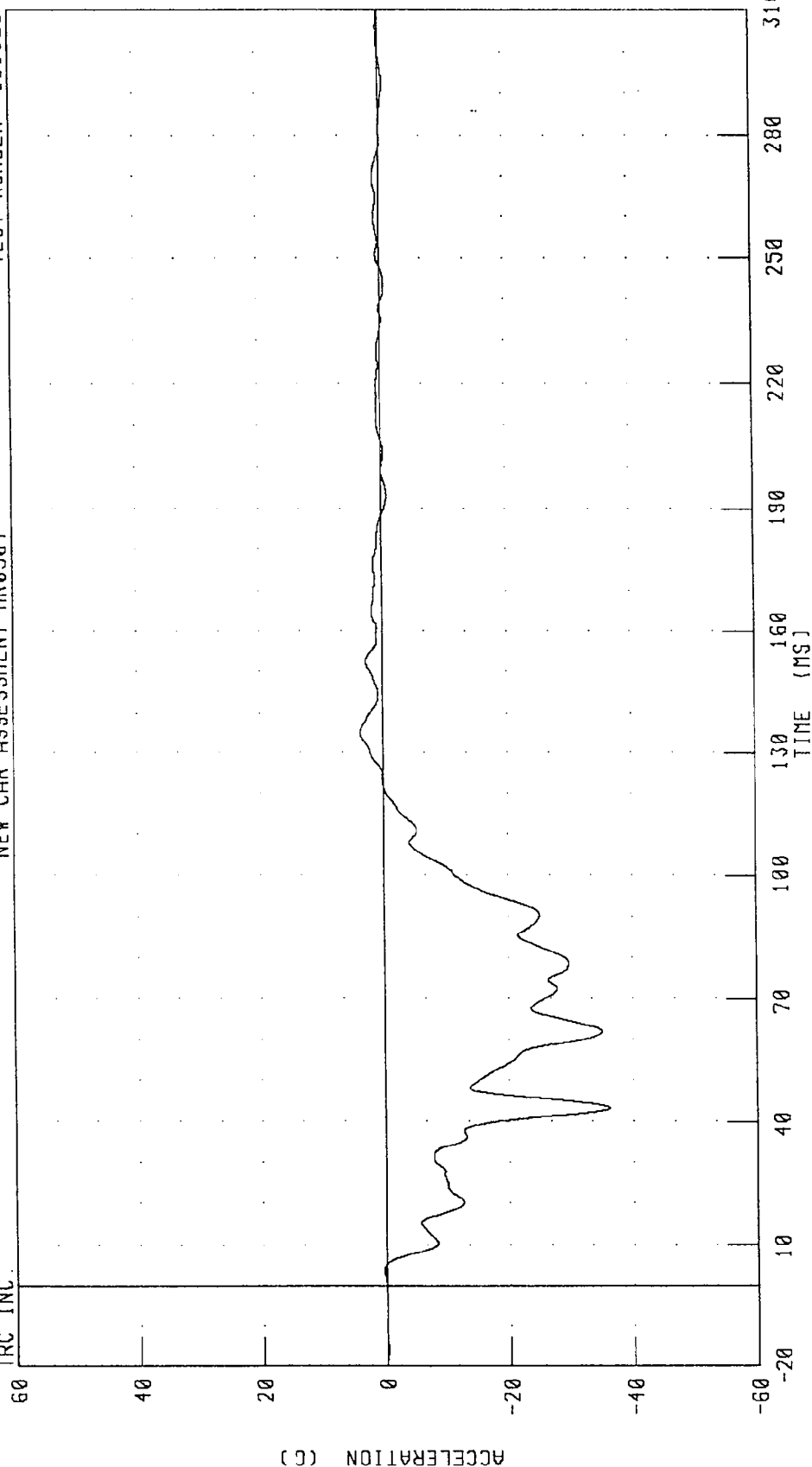
PEAK DATA: 2 54 G @ 151.76 MS; -36.60 G @ 62.96 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
RIGHT REAR SEAT REDUNDANT X-AXIS ACCELERATION

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



CHANNEL: TRRXGA FILTER: CH. CLASS 60

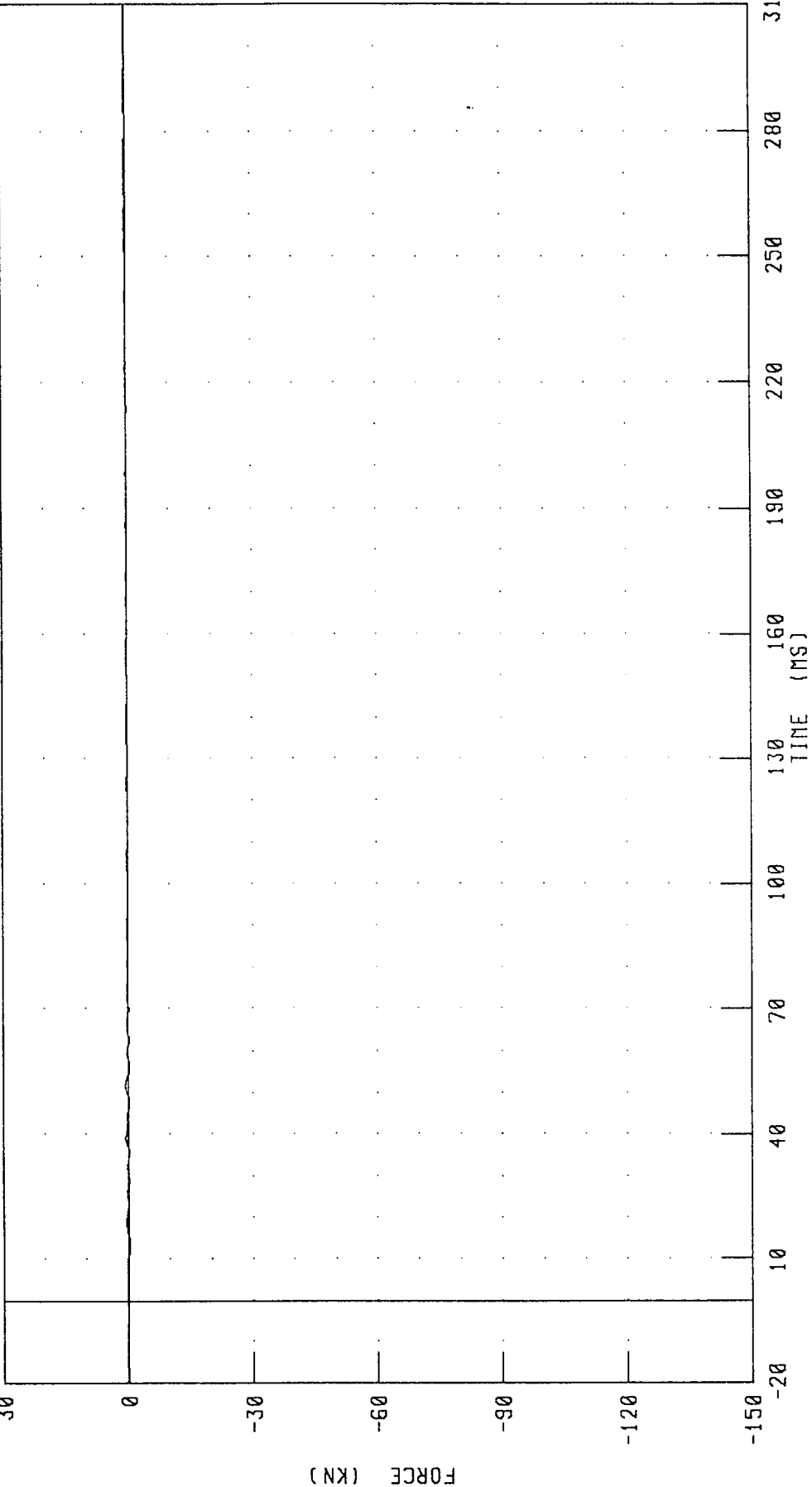
PEAK DATA: 3.81 G @ 135.04 MS; -36.15 G @ 43.28 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A1 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

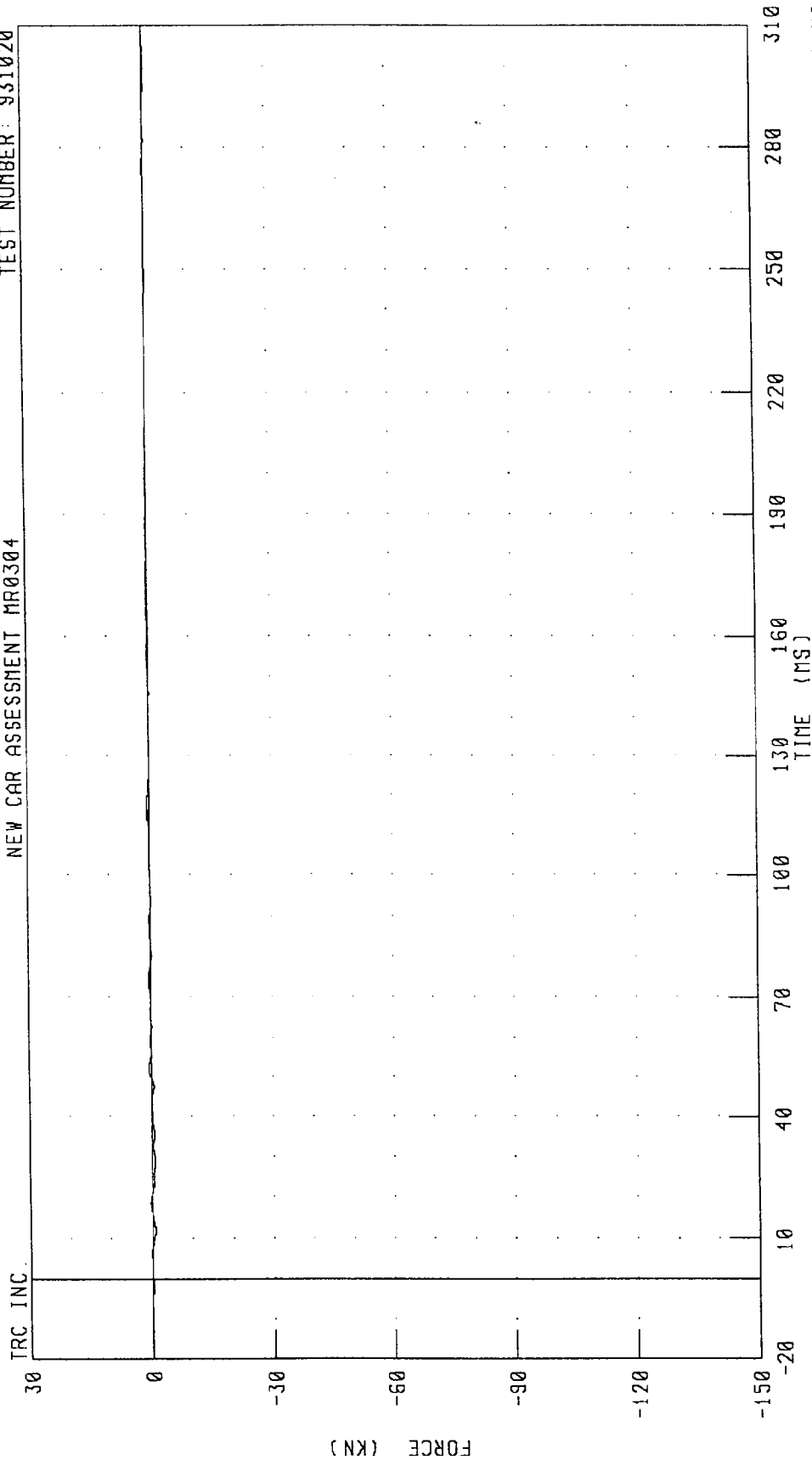


CHANNEL: BA1F FILTER: CH CLASS 60

PEAK DATA: 0.63 KN @ 39.04 MS; -0.42 KN @ 13.12 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A2 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0 56 KN @ 74.16 MS; -0.92 KN @ 28.96 MS

FILTER: CH. CLASS 60

CHANNEL: BA2F

FORCE (KN)

TIME (MS)

TRC INC.

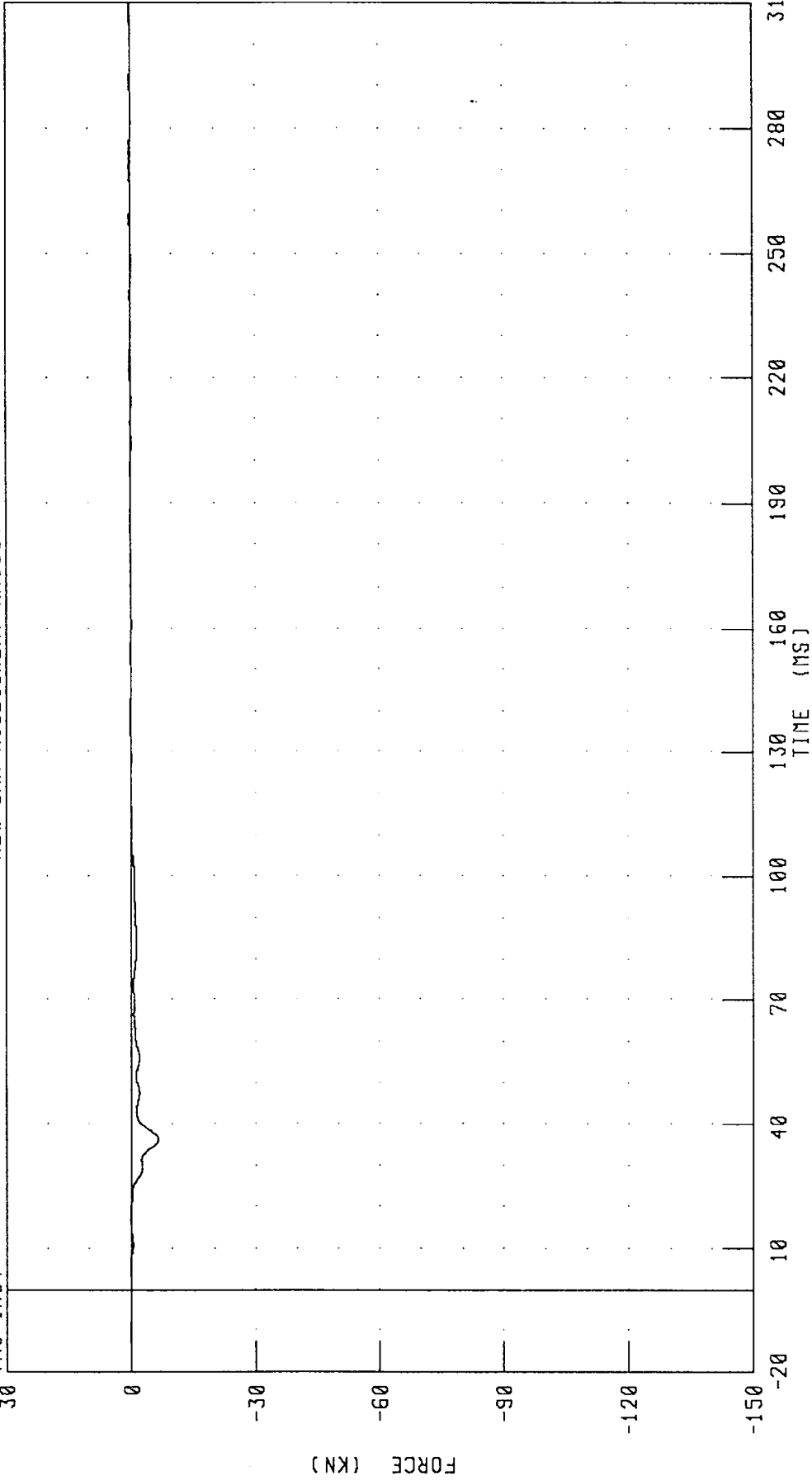


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A3 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



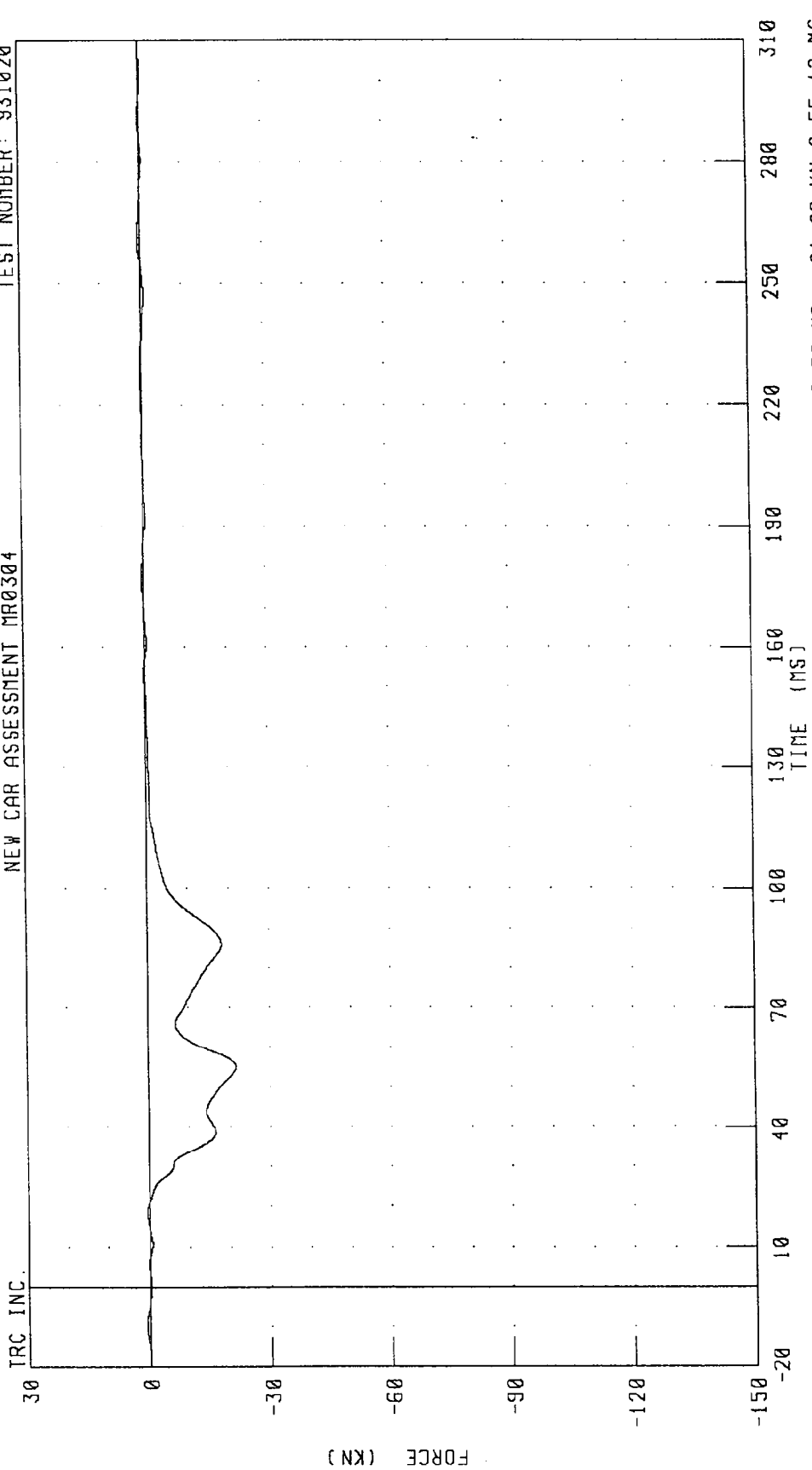
PEAK DATA: 0.33 KN @ 18.48 MS; -6.58 KN @ 36.32 MS

FILTER: CH. CLASS 60

CHANNEL: BA3F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A4 FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



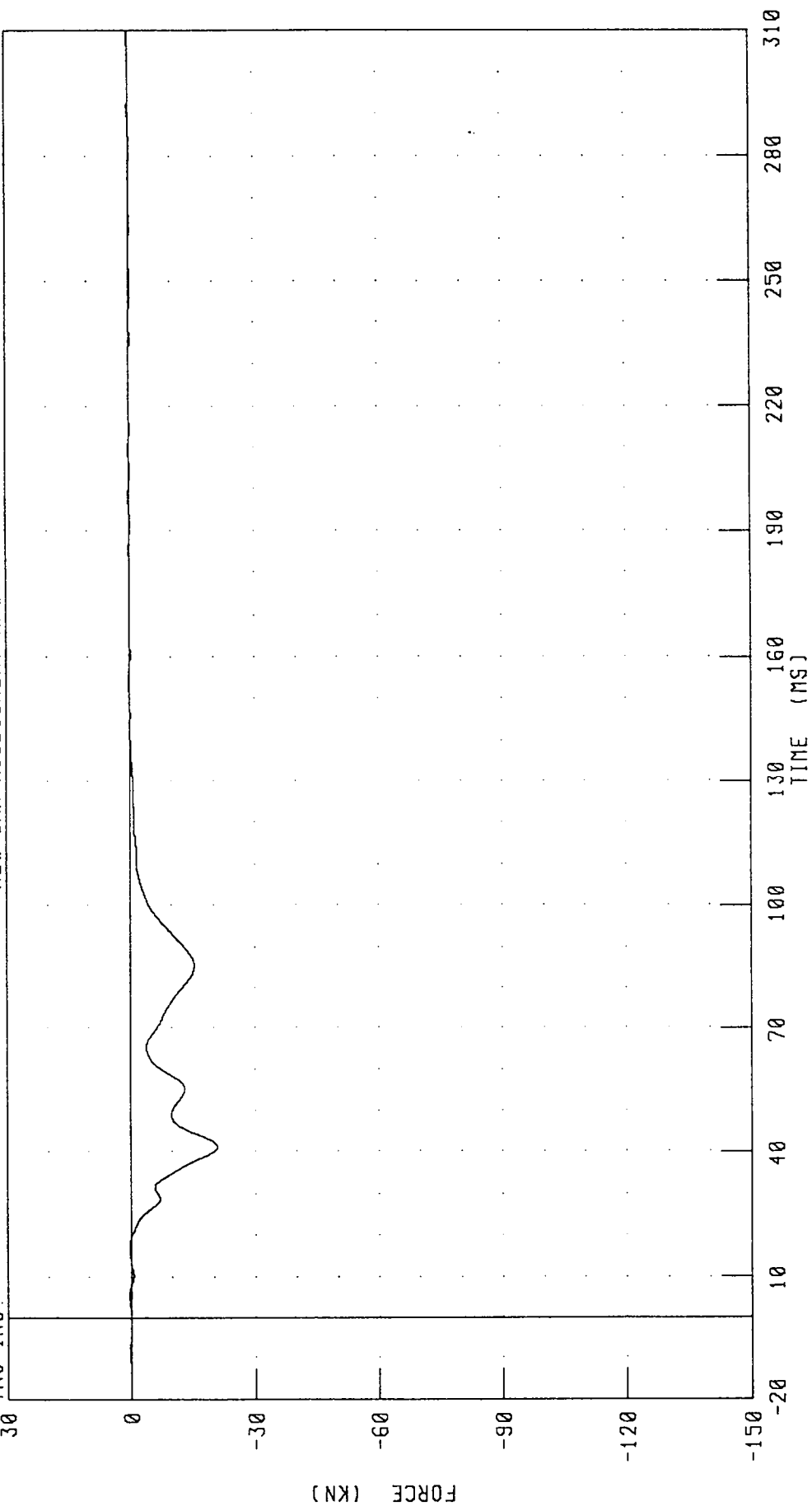
CHANNEL: BA4F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A5 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



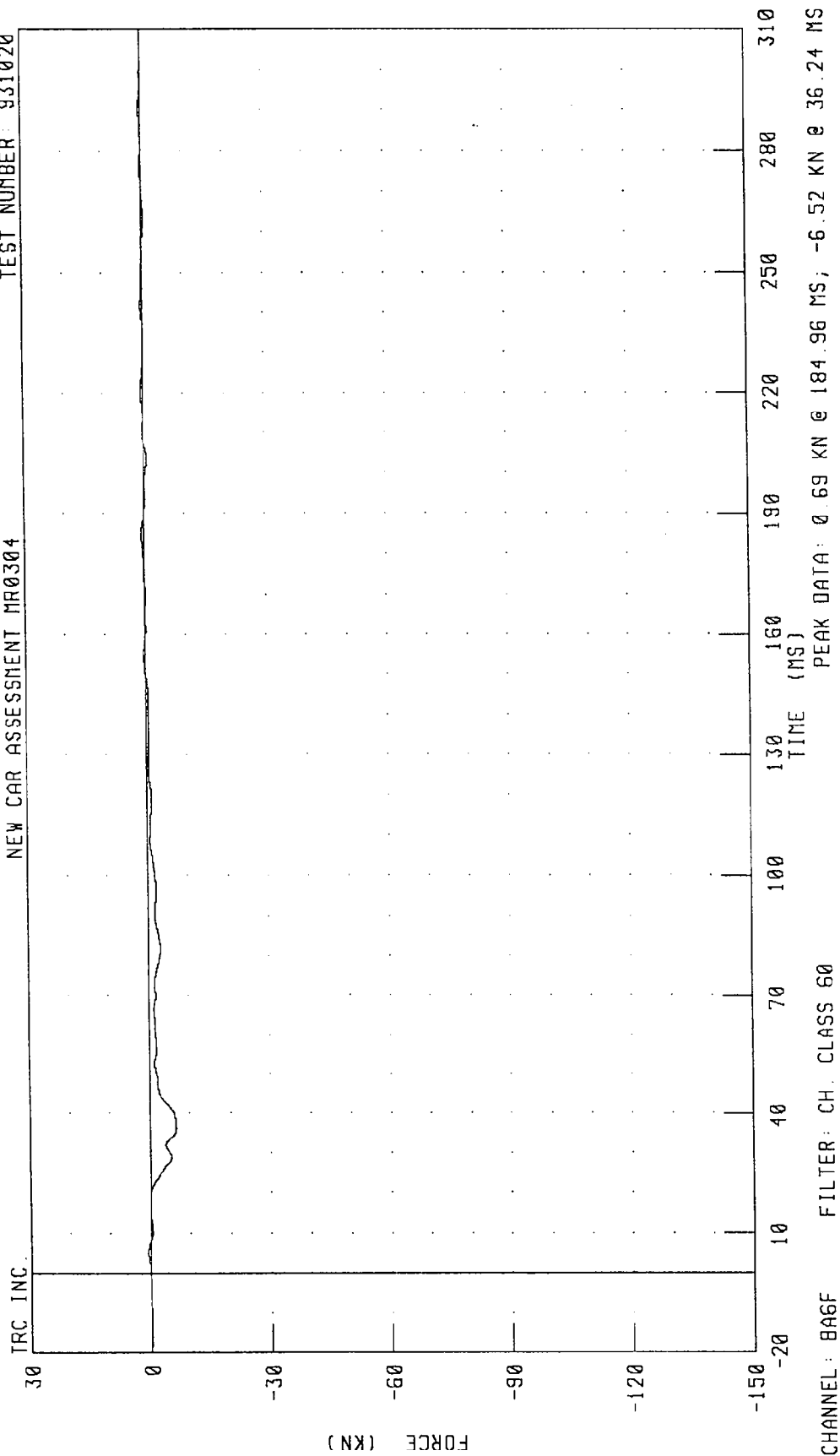
PEAK DATA: 0.40 KN @ 5.44 MS; -20.82 KN @ 41.20 MS

FILTER: CH. CLASS 60

CHANNEL: BASF

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A6 FORCE  
 NEW CAR ASSESSMENT MR0304

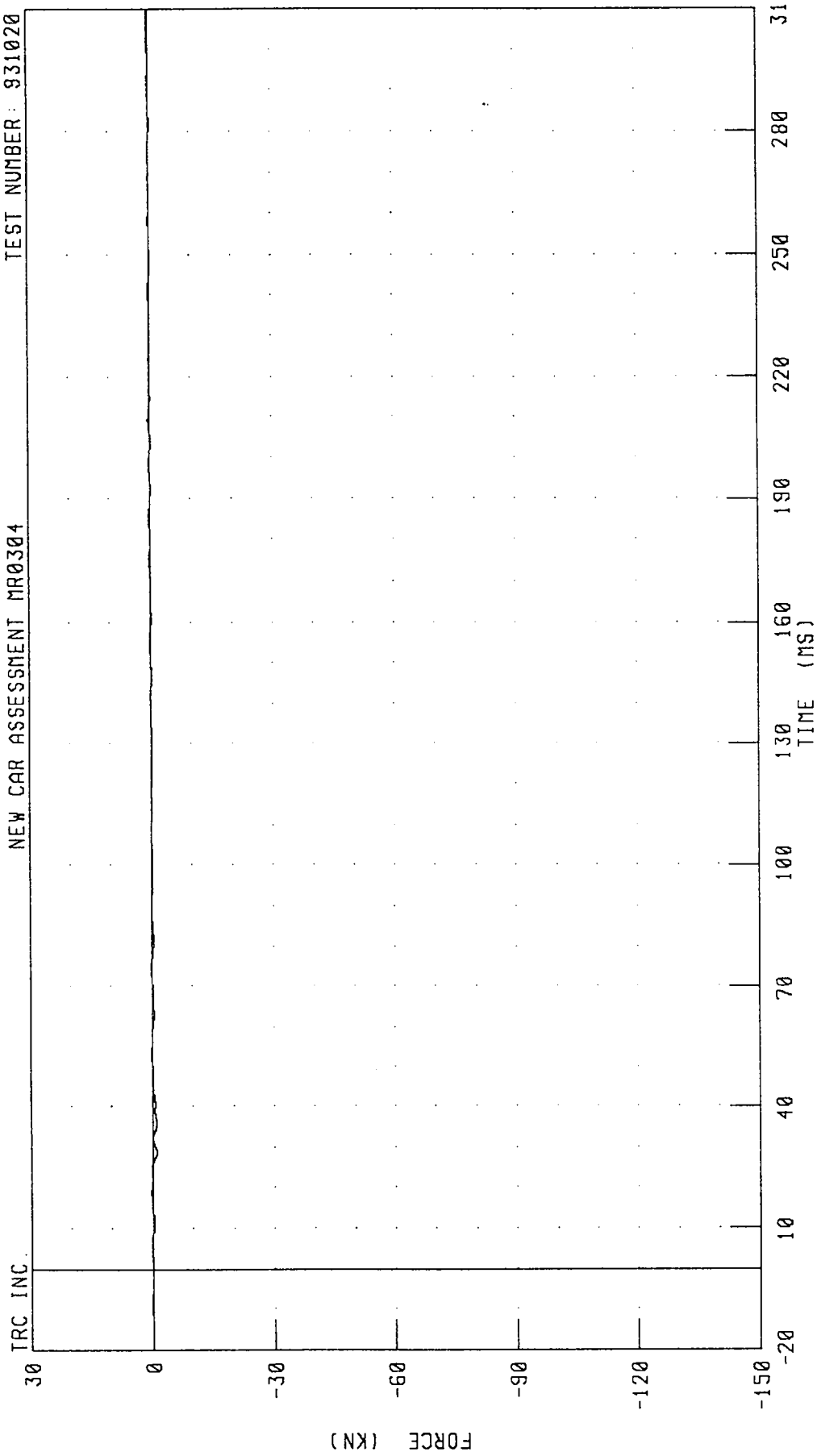
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A7 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



PEAK DATA: 0.35 KN @ 18.80 MS; -1.07 KN @ 35.84 MS

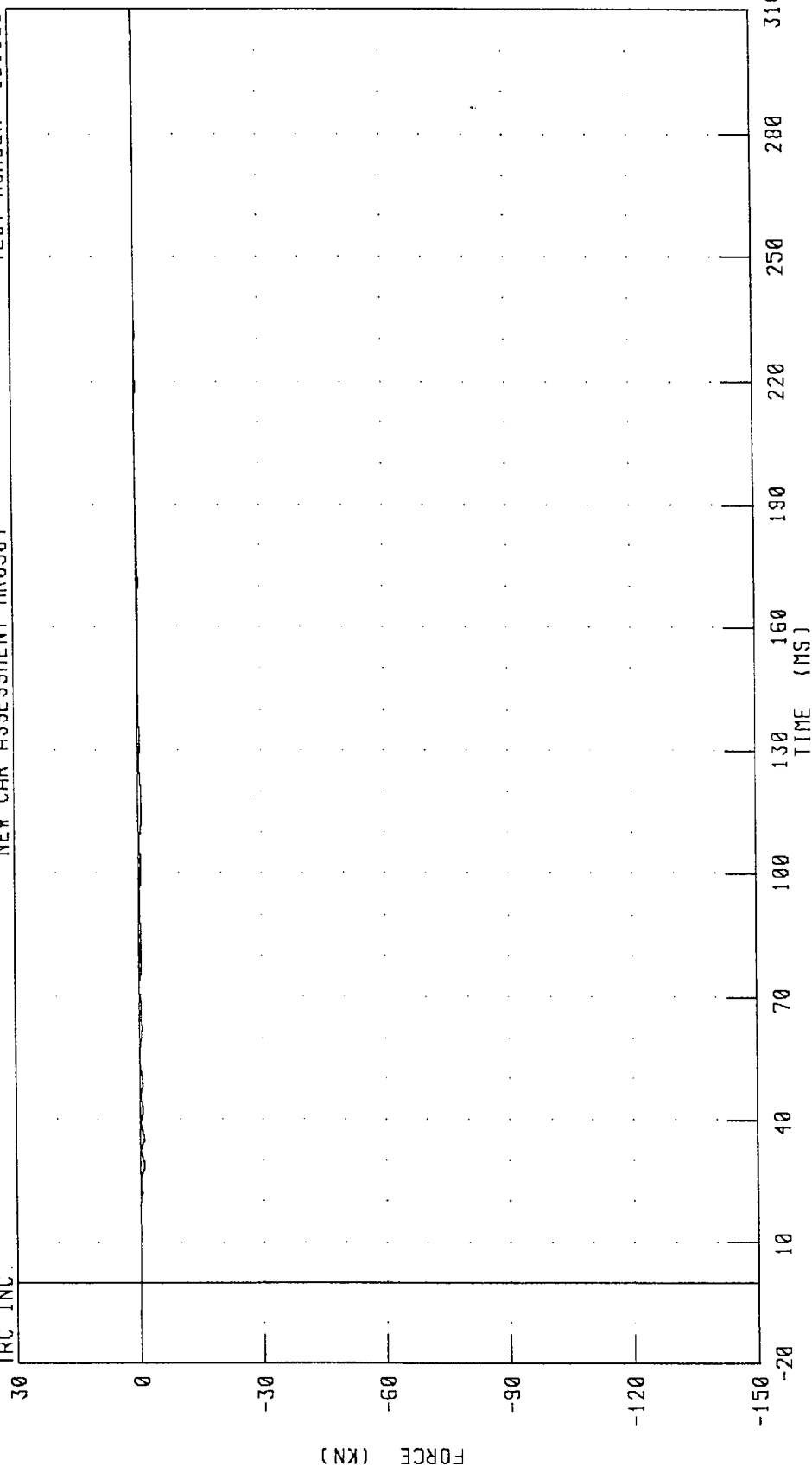
FILTER: CH. CLASS 60

CHANNEL: BA7F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A8 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



CHANNEL: B8BF

FILTER: CH. CLASS 60

PEAK DATA: 0.26 KN @ 290.88 MS, -1.07 KN @ 35.52 MS

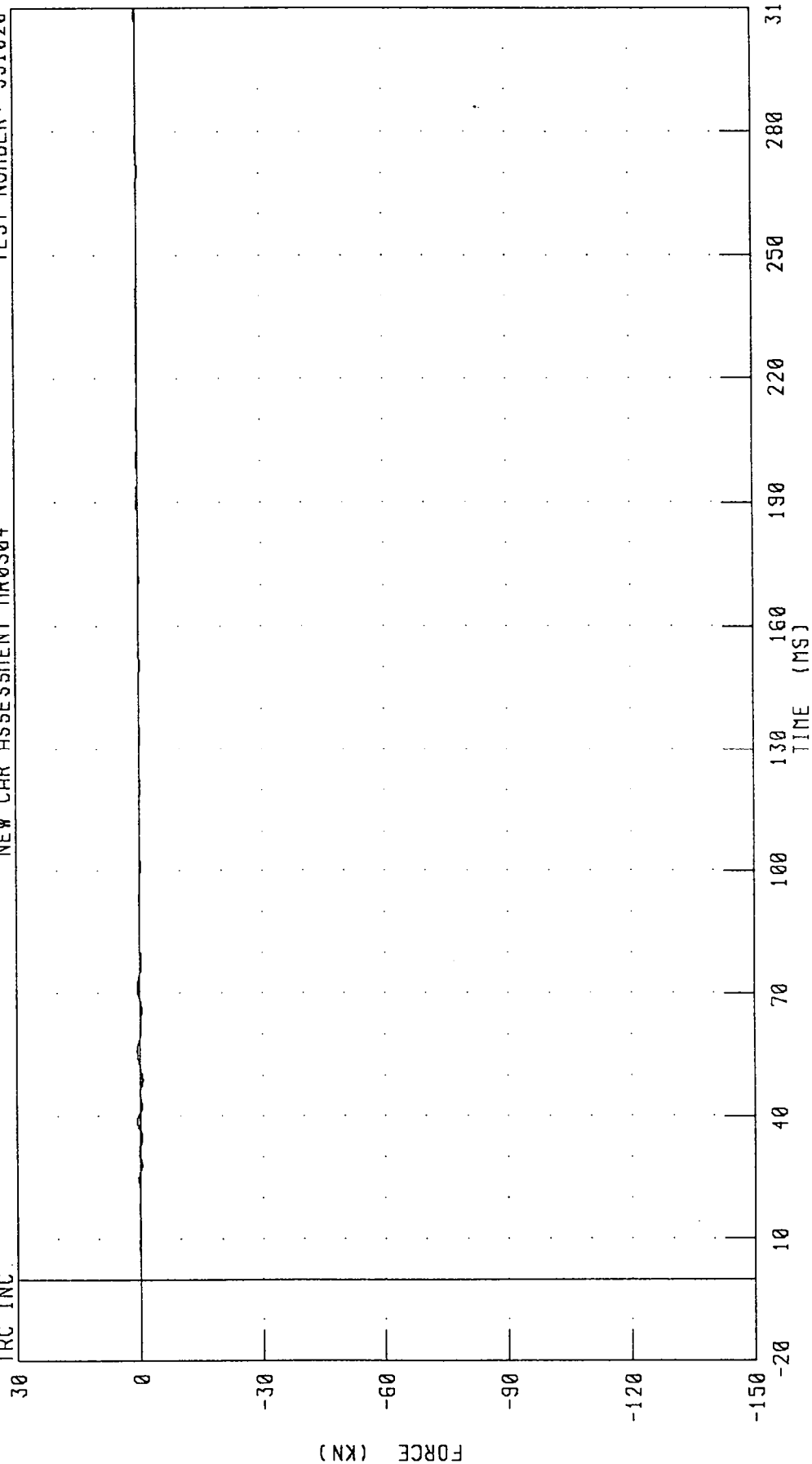


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A9 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



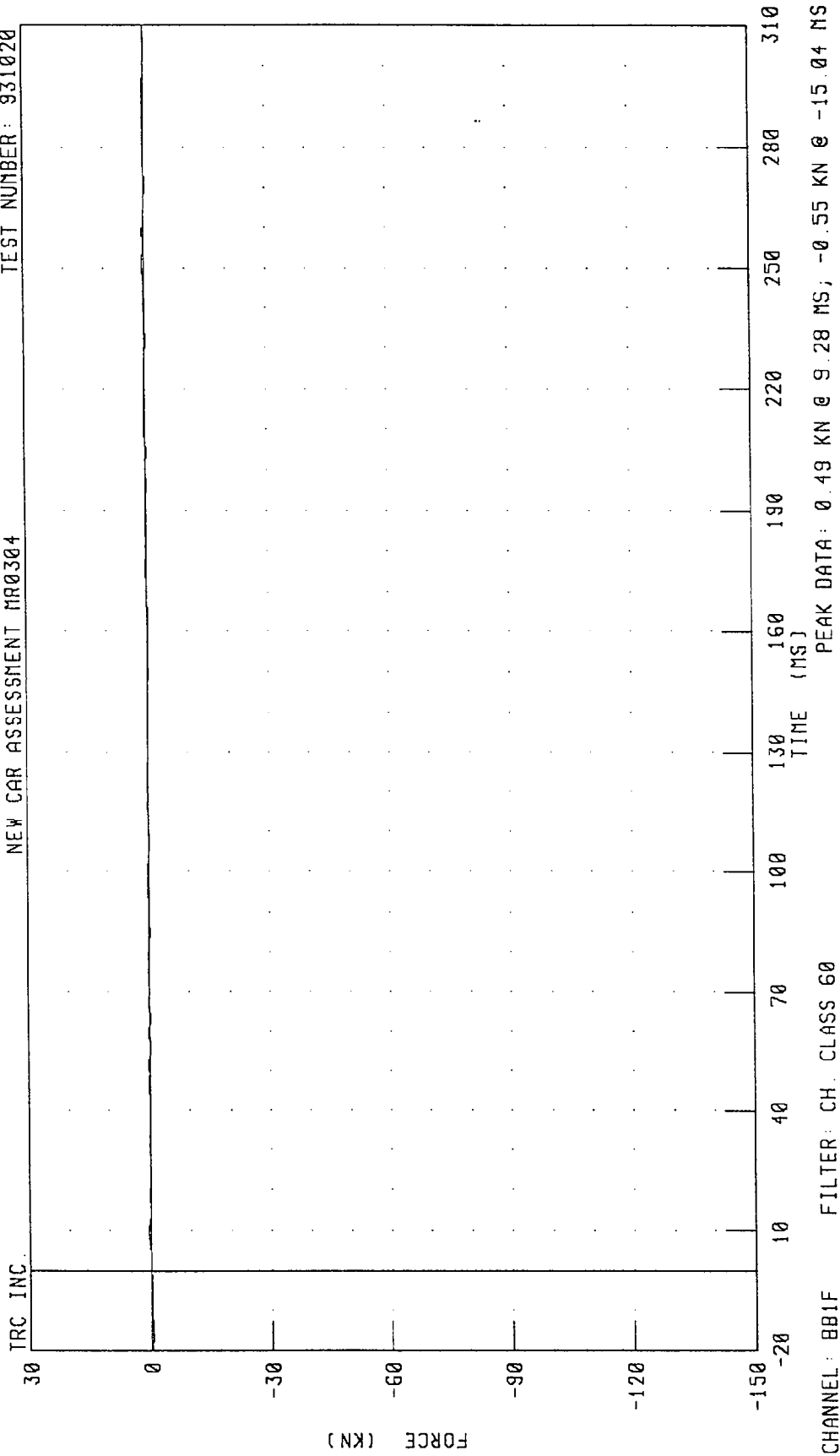
PEAK DATA: 0.75 KN @ 38.80 MS; -0.69 KN @ 49.12 MS

FILTER: CH. CLASS 60

CHANNEL: BA9F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B1 FORCE  
NEW CAR ASSESSMENT MR0304

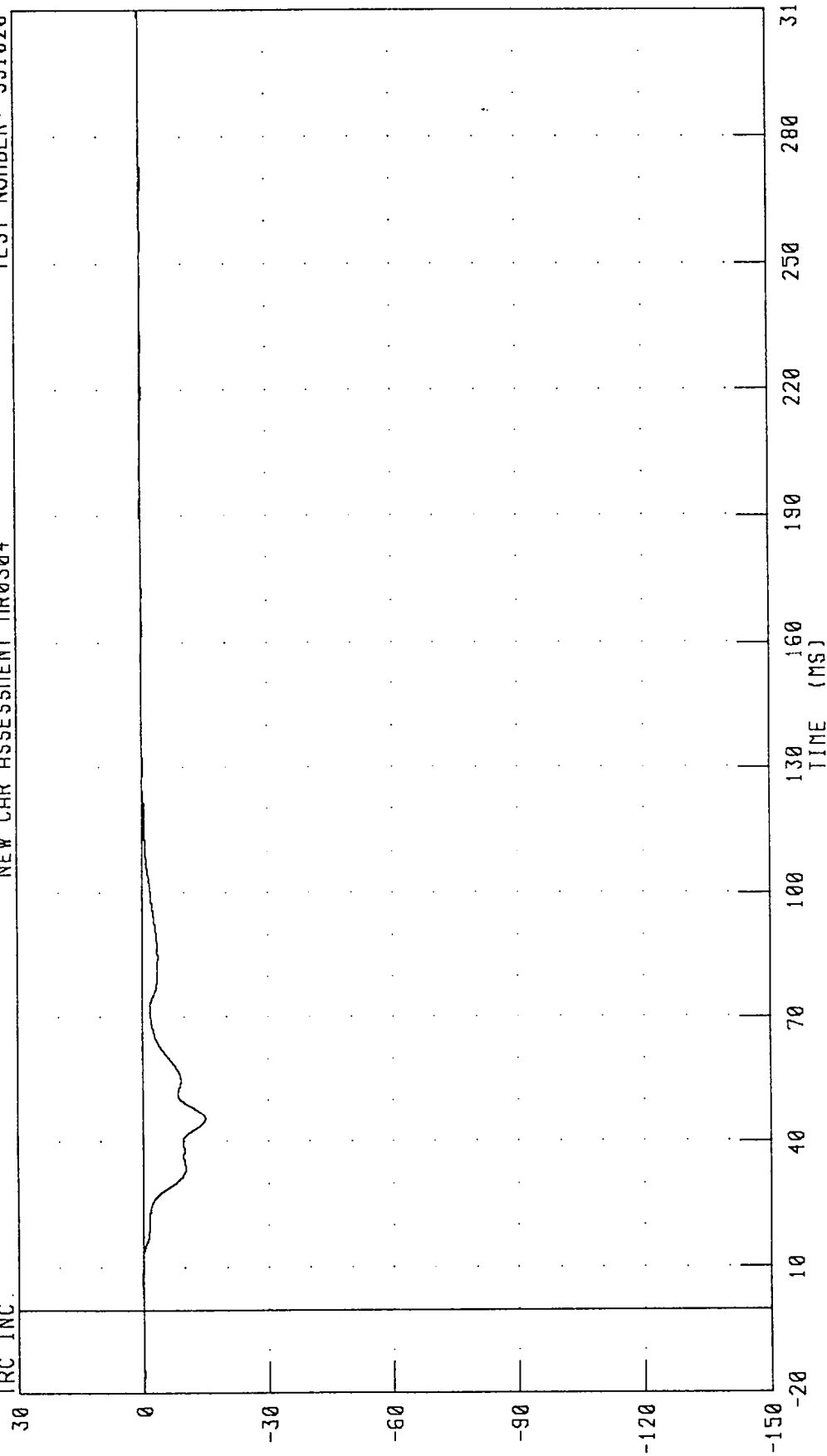
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B2 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



PEAK DATA: 0.18 KN @ 191.68 MS; -14.96 KN @ 45.60 MS

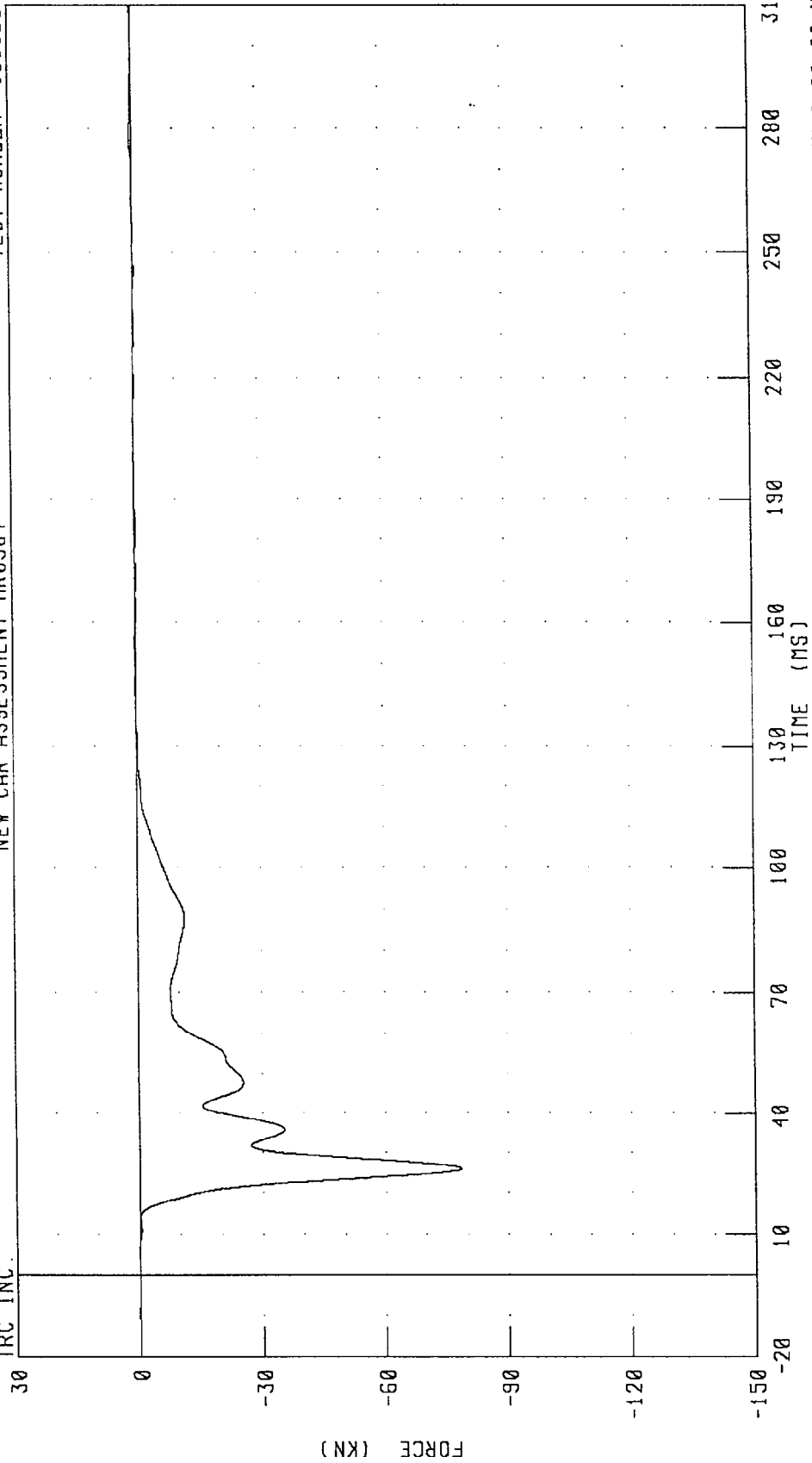
FILTER: CH. CLASS 60

CHANNEL: BB2F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B3 FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



CHANNEL: BB3F

FILTER: CH. CLASS 60

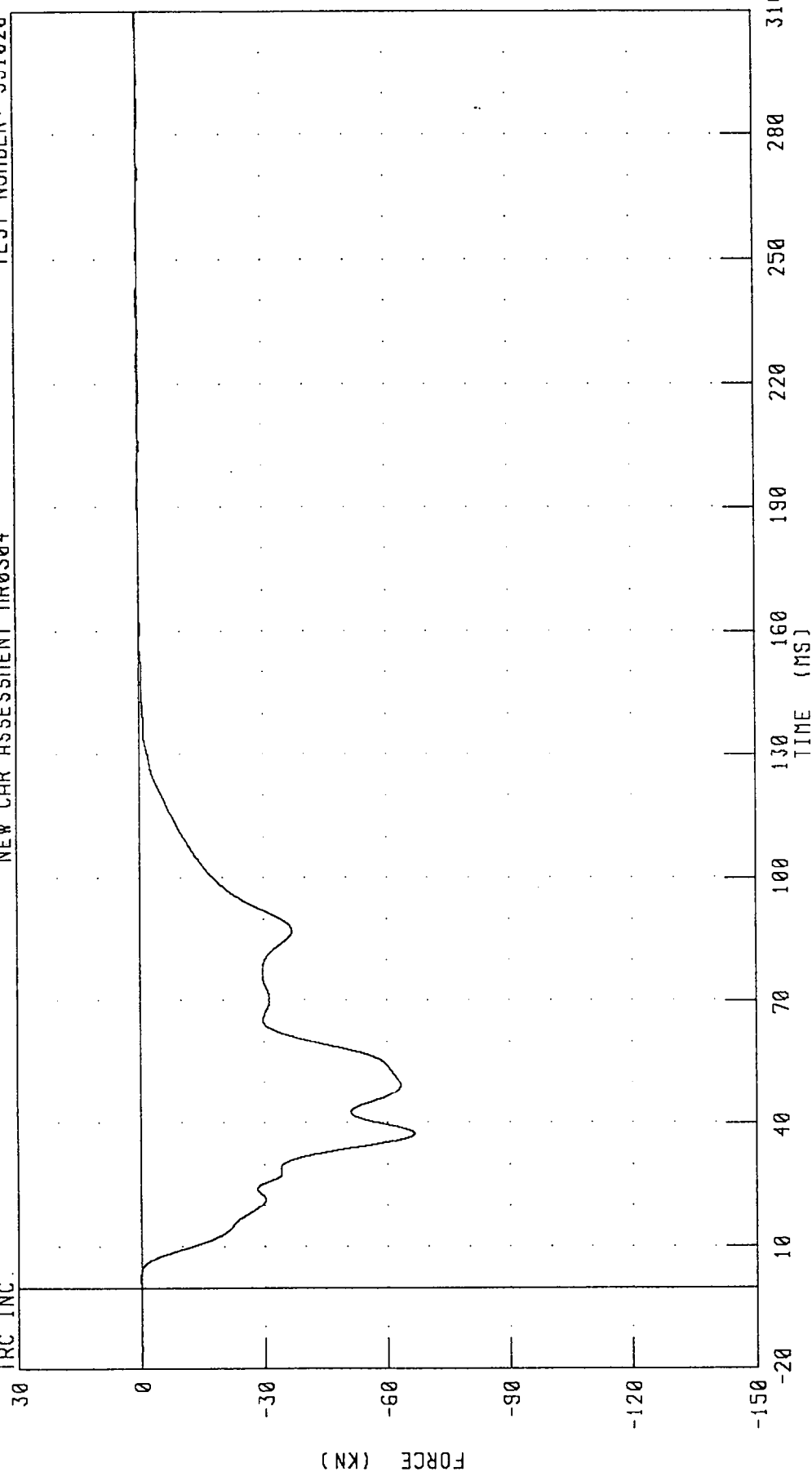
PEAK DATA: 0.44 KN @ 278.96 MS; -78.62 KN @ 26.08 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B4 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.

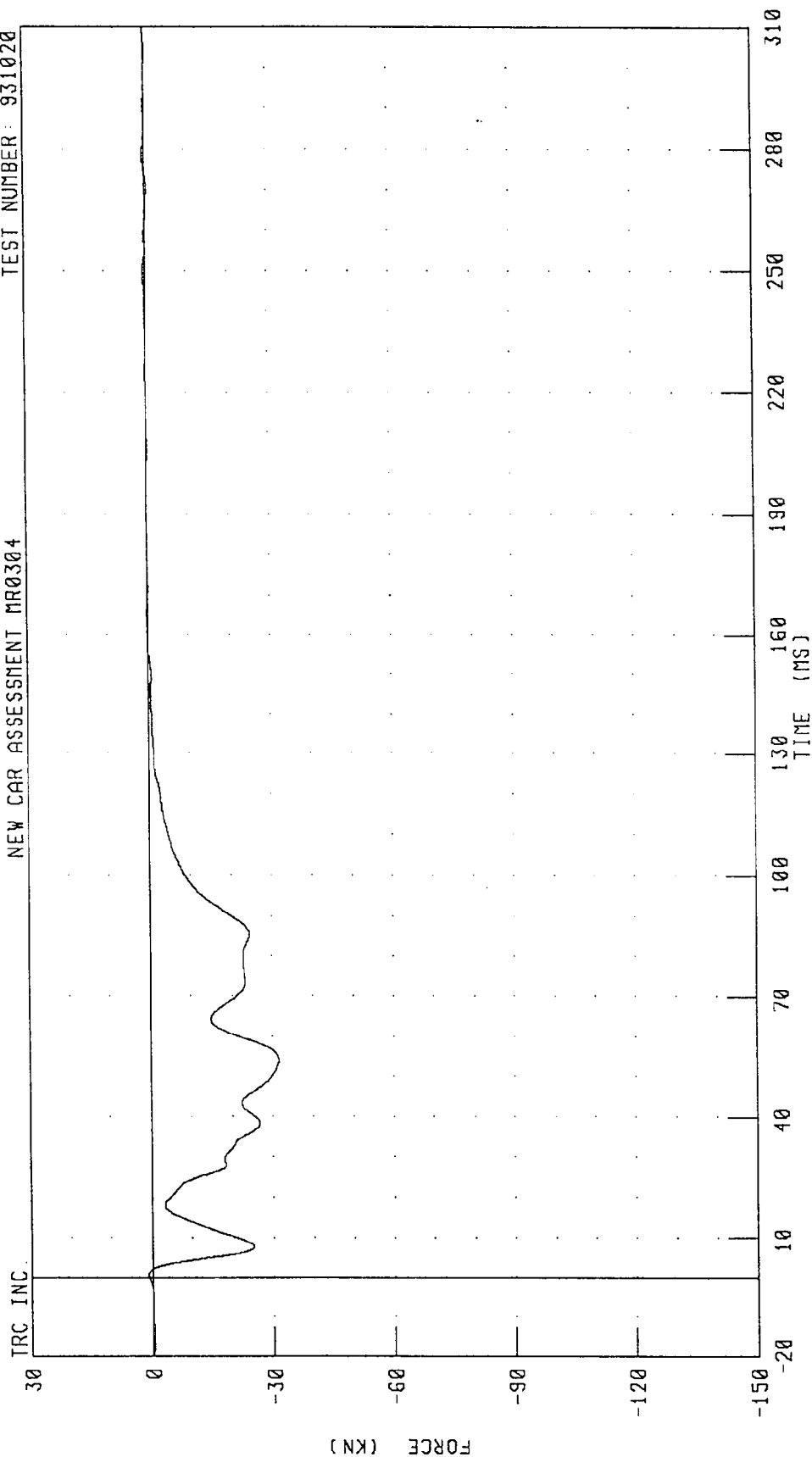


CHANNEL: BB4F FILTER: CH. CLASS 60

PEAK DATA: 0.28 KN @ 240.64 MS, -66.58 KN @ 37.44 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B5 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0.89 KN @ 0.56 MS; -31.45 KN @ 54.08 MS

FILTER: CH CLASS 60

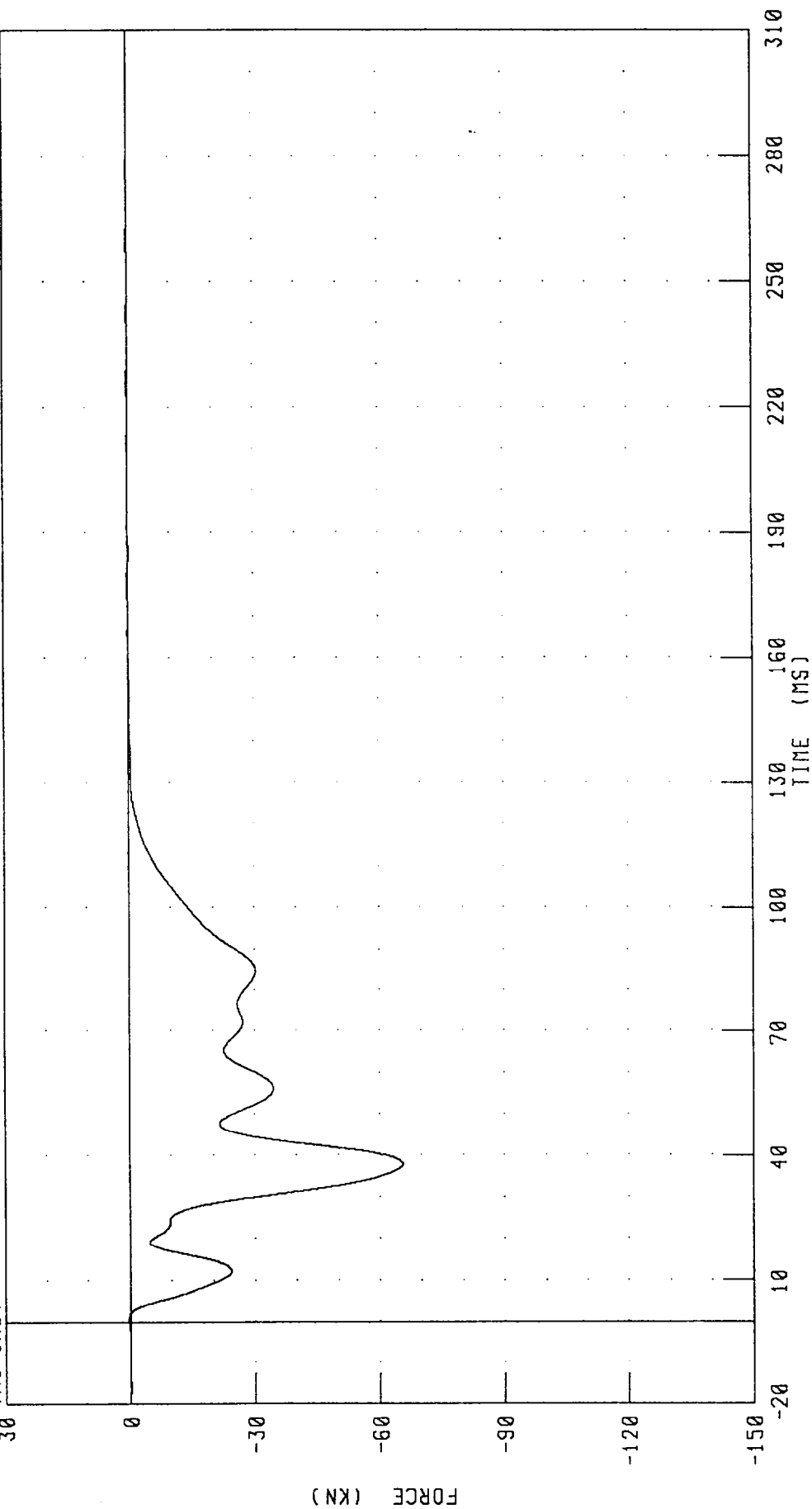
CHANNEL: BB5F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B6 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



PEAK DATA: 0.36 KN @ 0.56 MS; -65.48 KN @ 37.92 MS

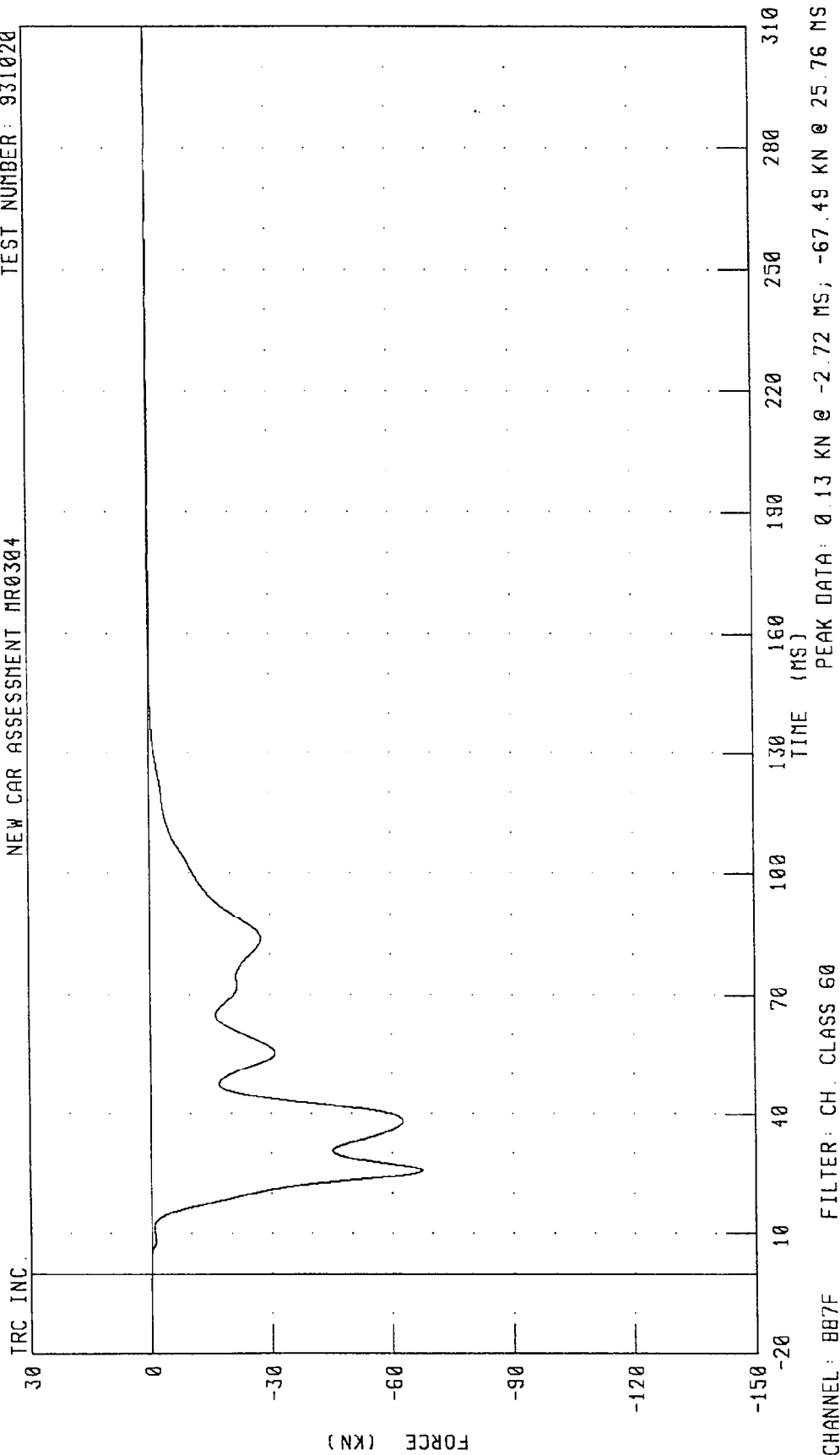
FILTER: CH. CLASS 60

CHANNEL: BB6F



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B7 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



CHANNEL: BB7F

FILTER: CH. CLASS 60

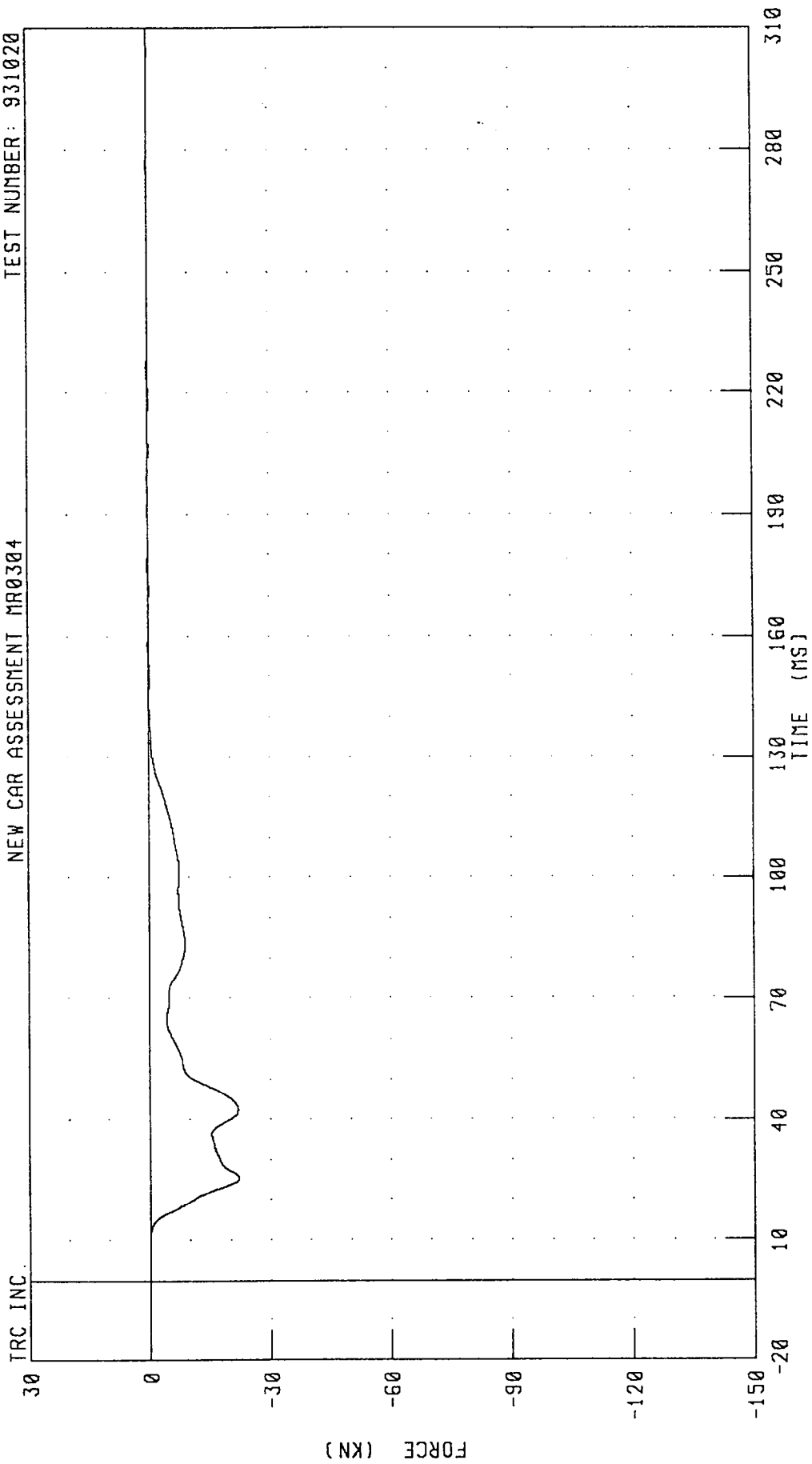
PEAK DATA:

0.13 KN @ -2.72 MS; -67.49 KN @ 25.76 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B8 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



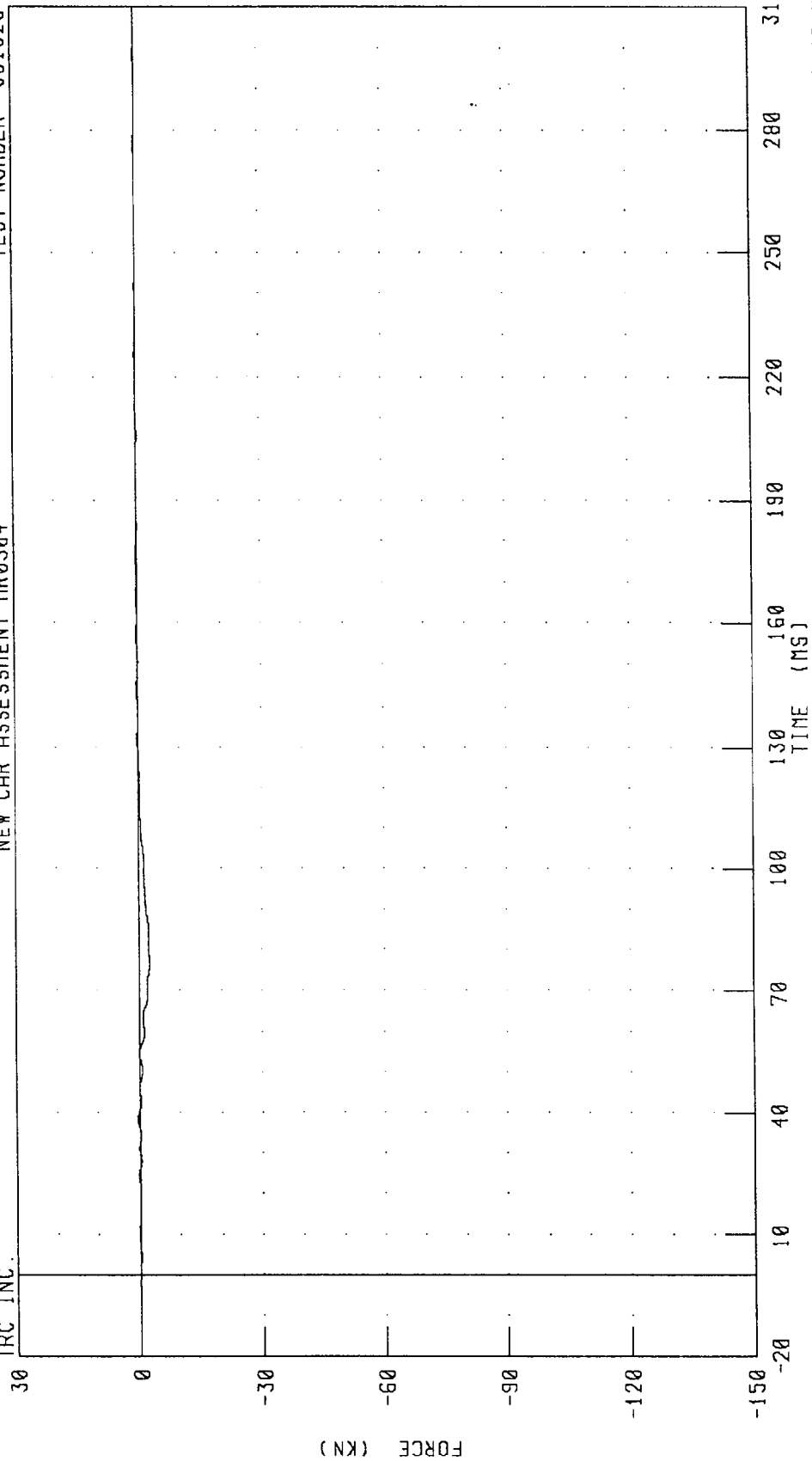
CHANNEL: BB8F FILTER: CH. CLASS 60

PEAK DATA: 0.19 KN @ 225.68 MS; -22.14 KN @ 25.44 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B9 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



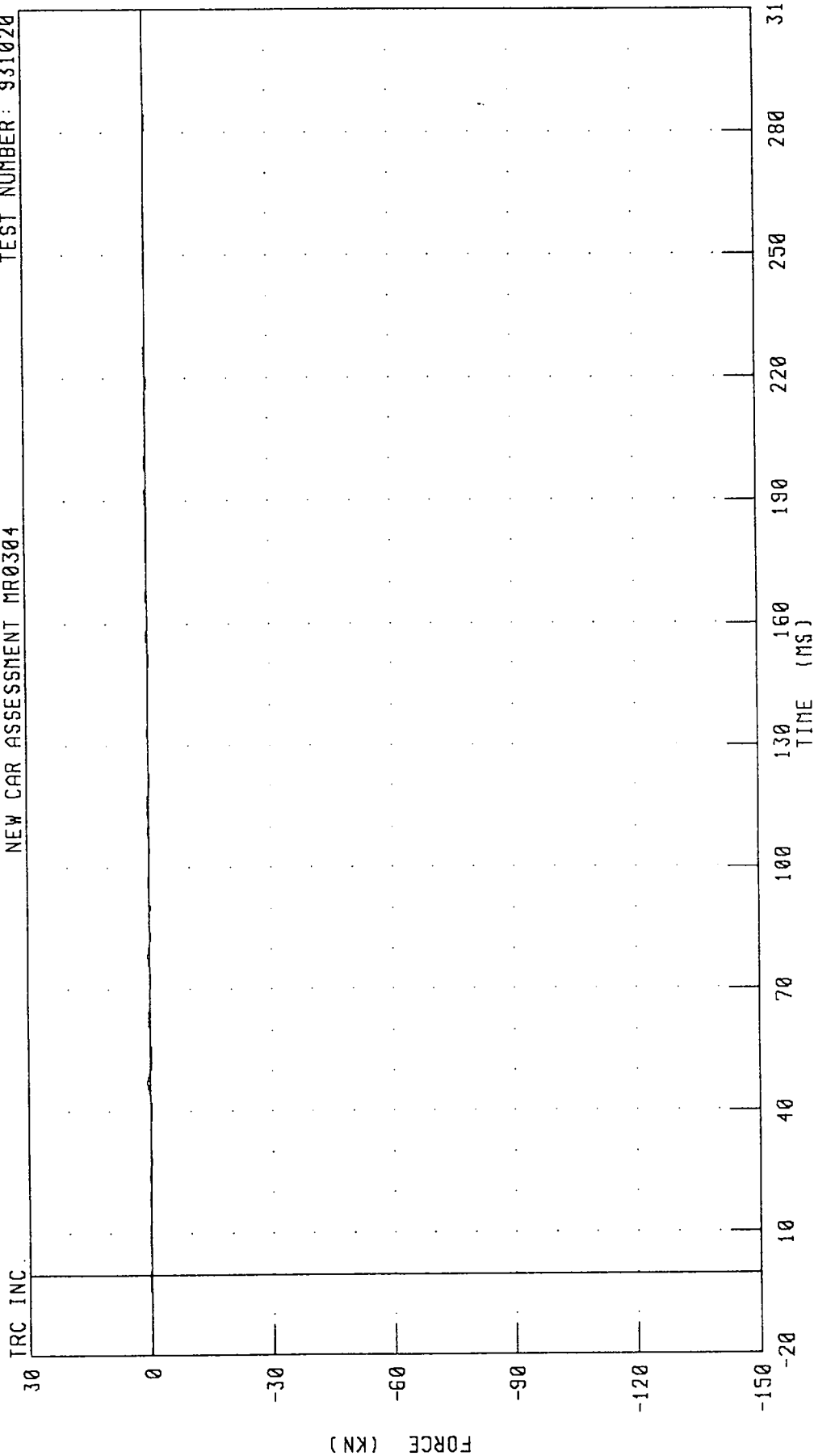
CHANNEL: BB9F

FILTER: CH. CLASS 60

PEAK DATA: 0.44 KN @ 38.56 MS; -2.55 KN @ 76.48 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C1 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



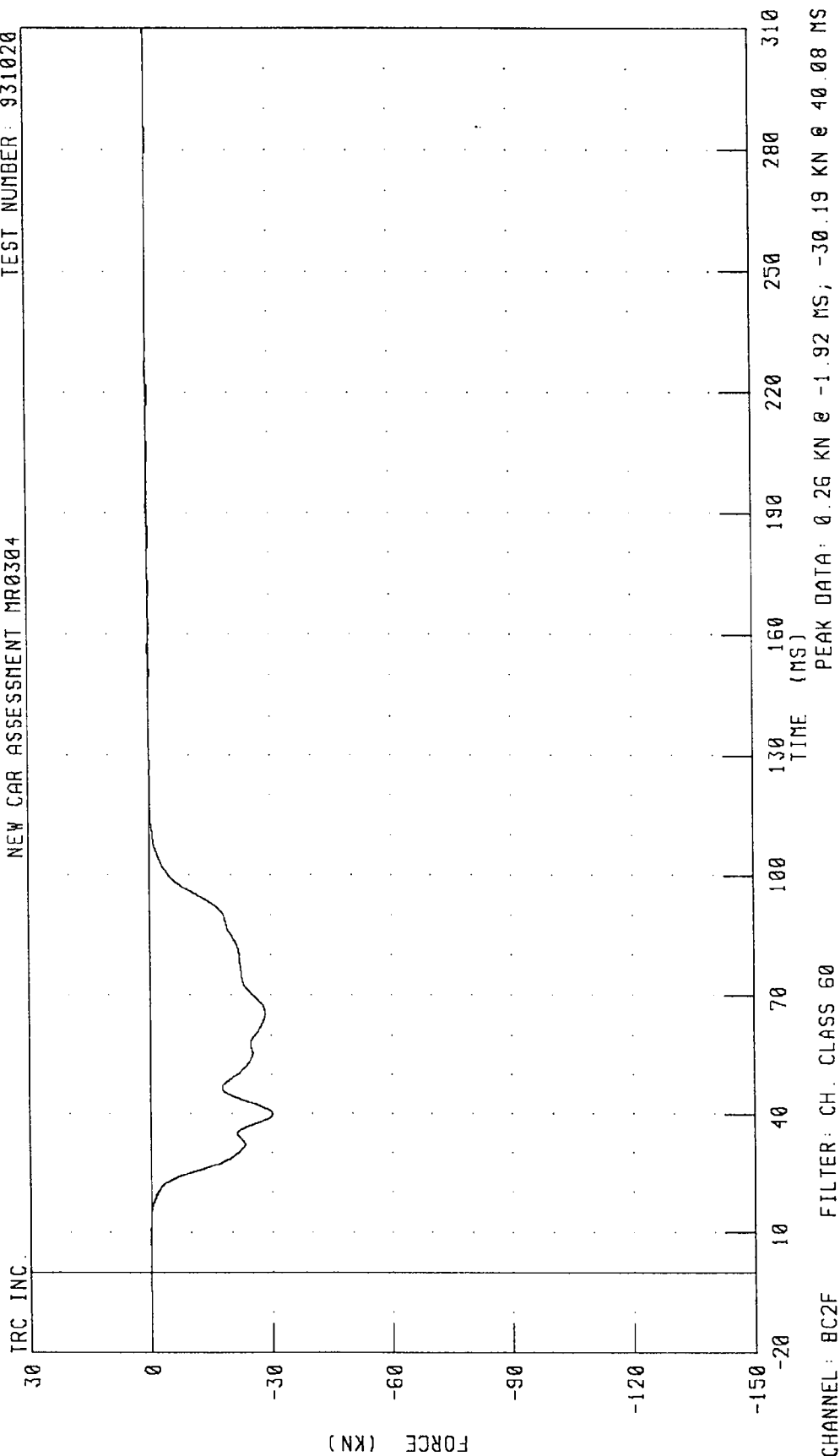
PEAK DATA: 0.64 KN @ 47.28 MS; -0.36 KN @ 39.84 MS

FILTER: CH. CLASS 60

CHANNEL: BC1F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C2 FORCE  
 NEW CAR ASSESSMENT MR0304

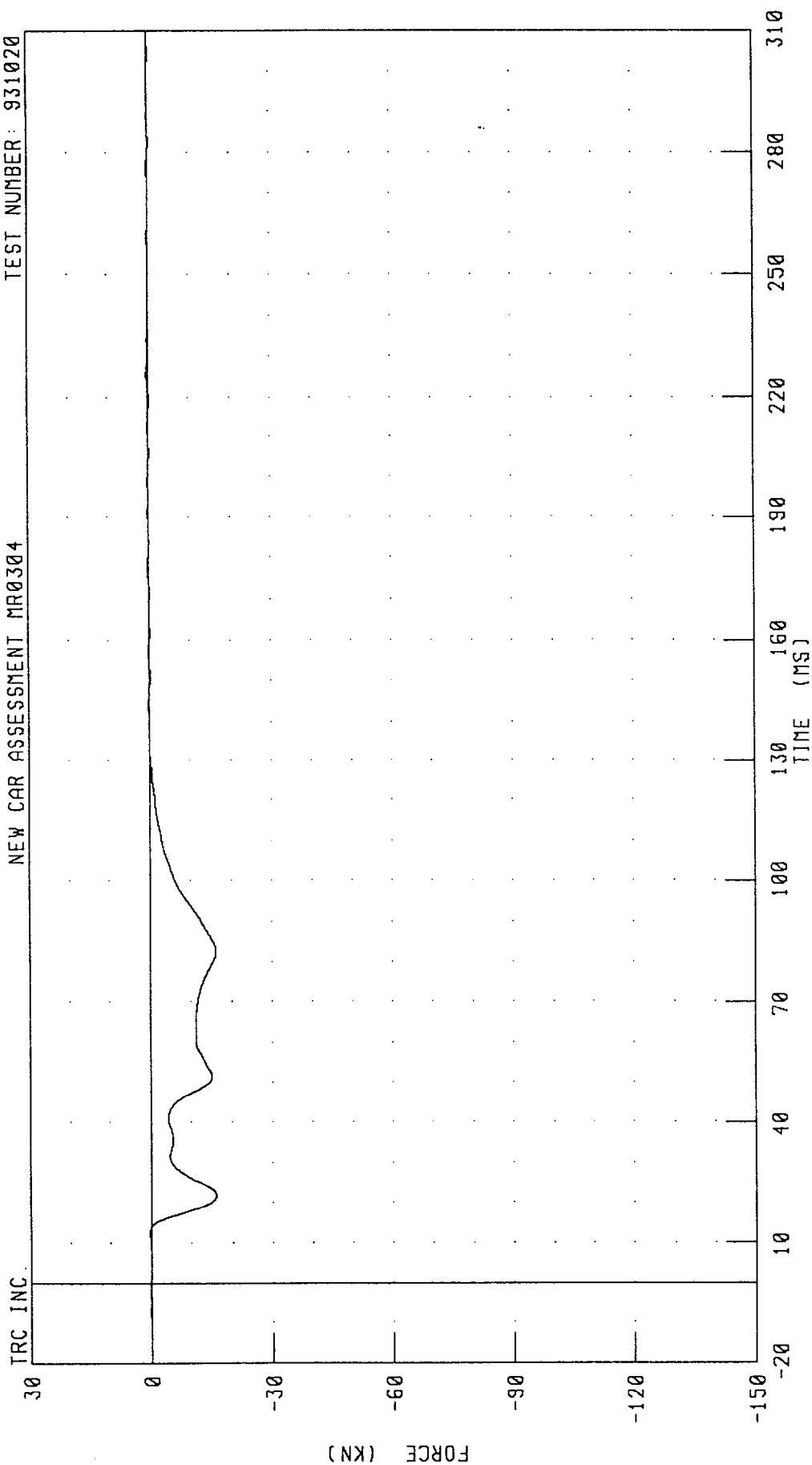
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C3 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



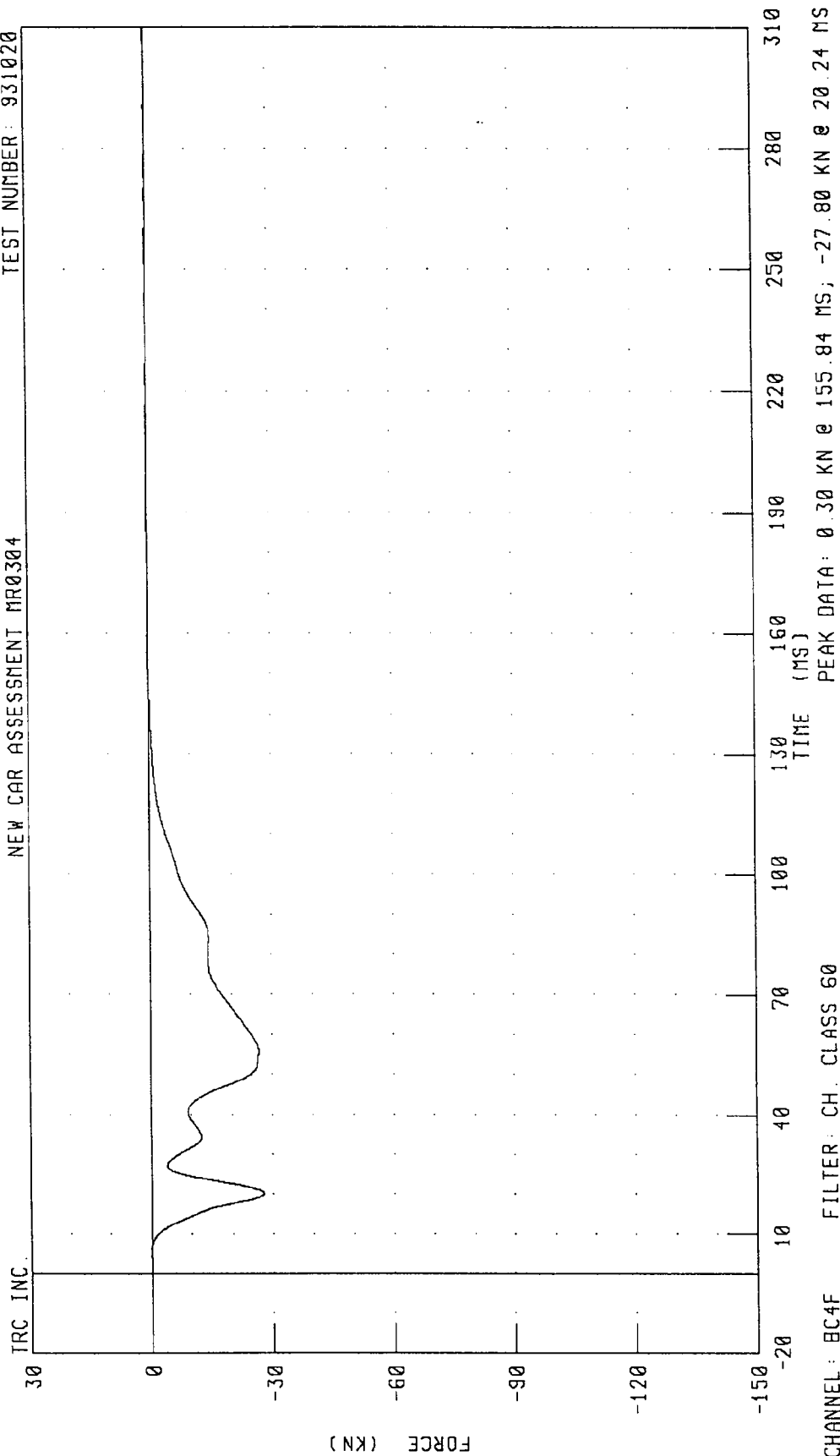
PEAK DATA: 0 39 KN @ 12.40 MS; -16.15 KN @ 82.56 MS

FILTER: CH. CLASS 60

CHANNEL: BC3F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C4 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0.30 KN @ 155.84 MS, -27.80 KN @ 20.24 MS

CHANNEL: BC4F FILTER: CH. CLASS 60

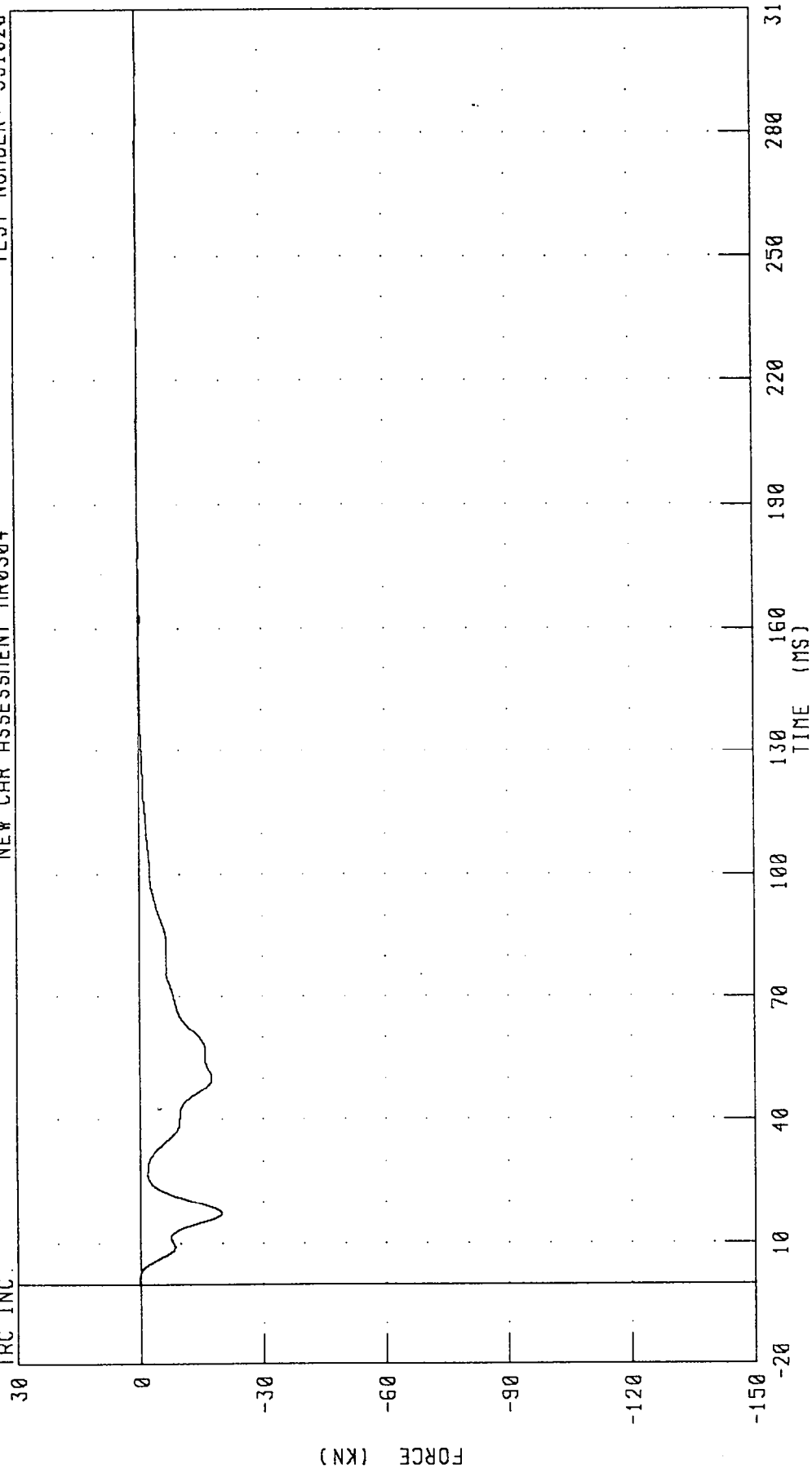


1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C5 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



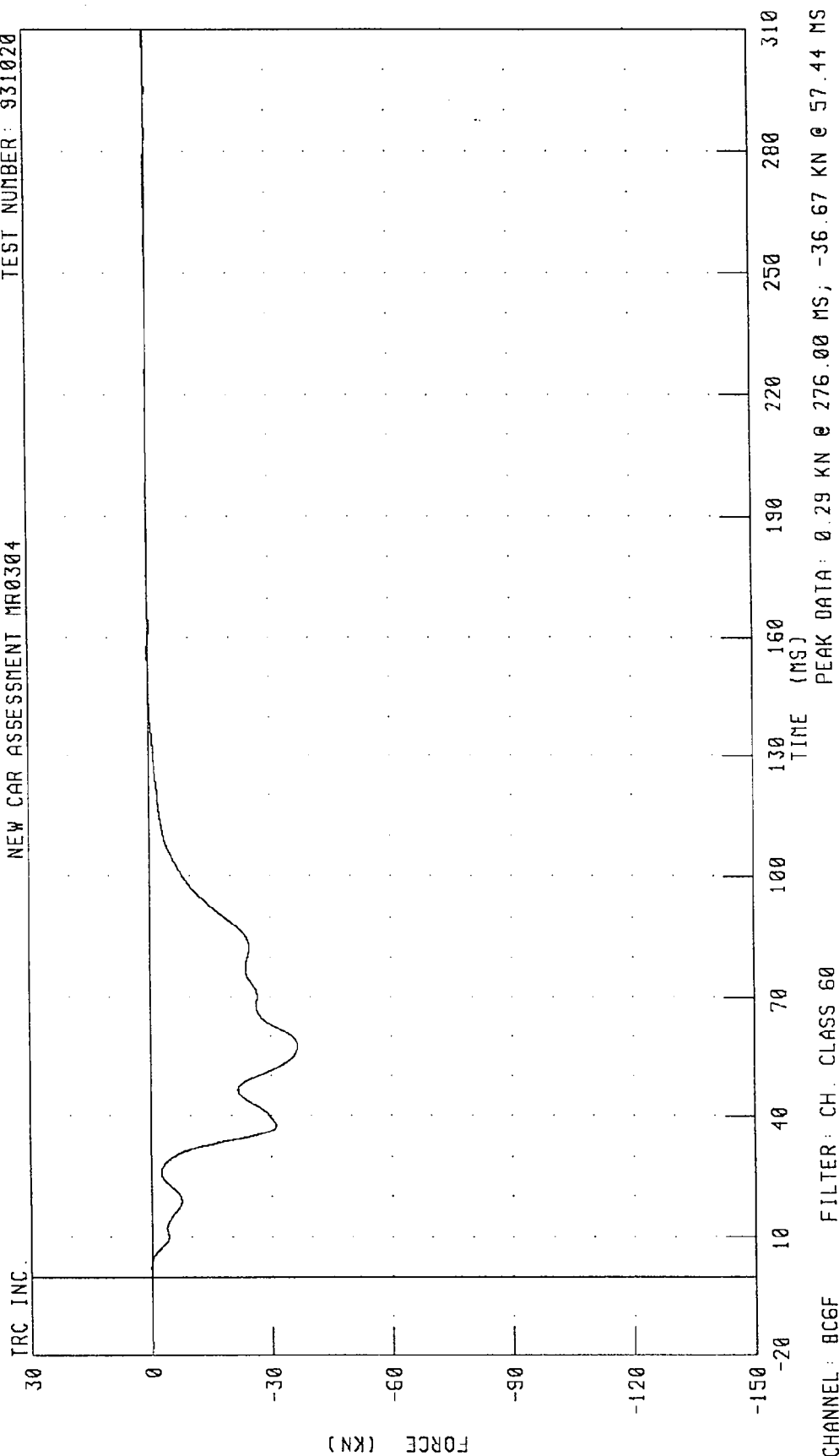
PEAK DATA: 0.19 KN @ 276.16 MS; -19.86 KN @ 17.28 MS

FILTER: CH. CLASS 60

CHANNEL: BC5F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C6 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0.29 KN @ 276.00 MS; -36.67 KN @ 57.44 MS

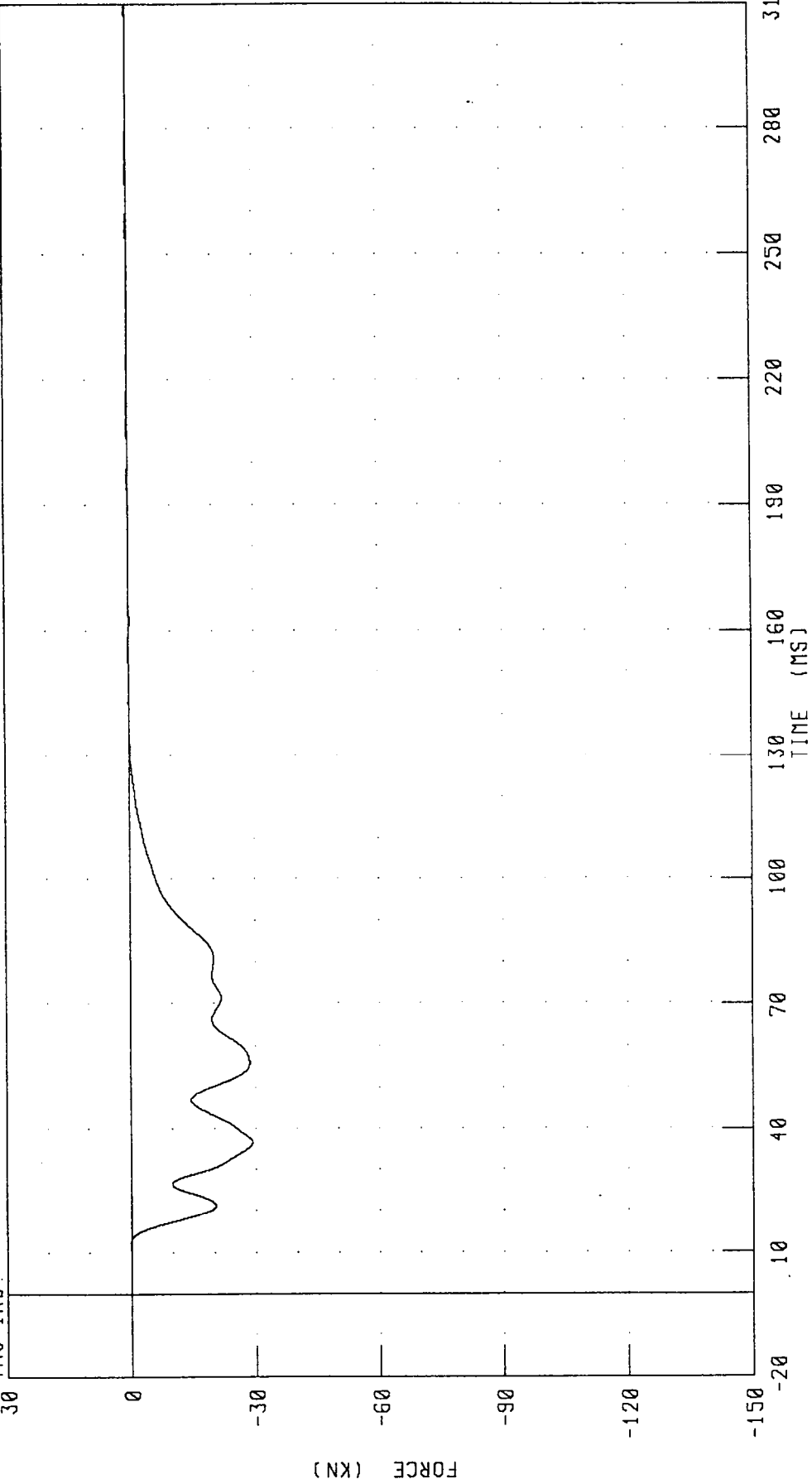
CHANNEL: BC6F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C7 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



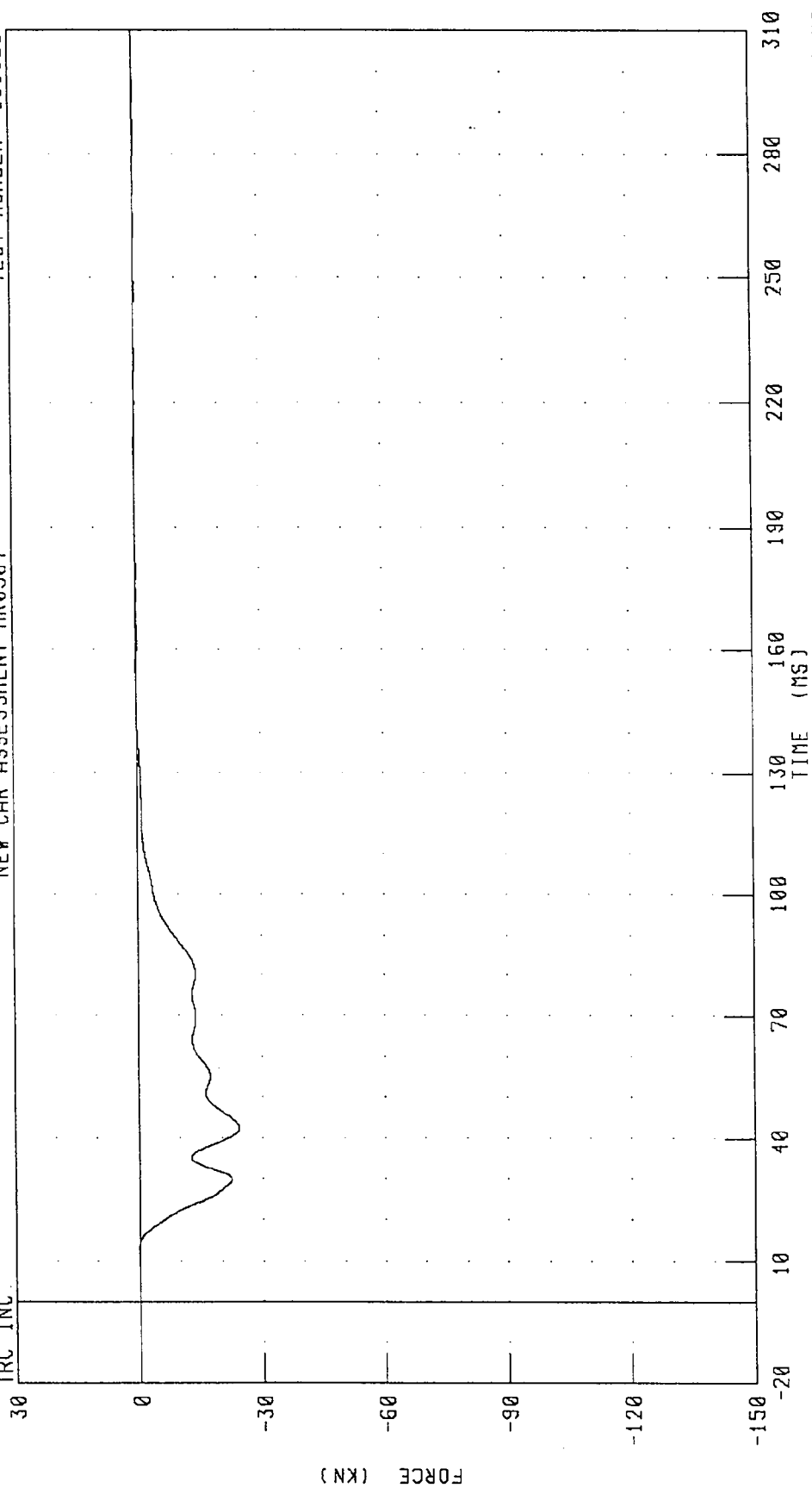
CHANNEL: BC7F FILTER: CH. CLASS 60

PEAK DATA: 0.28 KN @ 276.00 MS; -29.28 KN @ 36.72 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C8 FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



CHANNEL: BC8F

FILTER: CH. CLASS 60

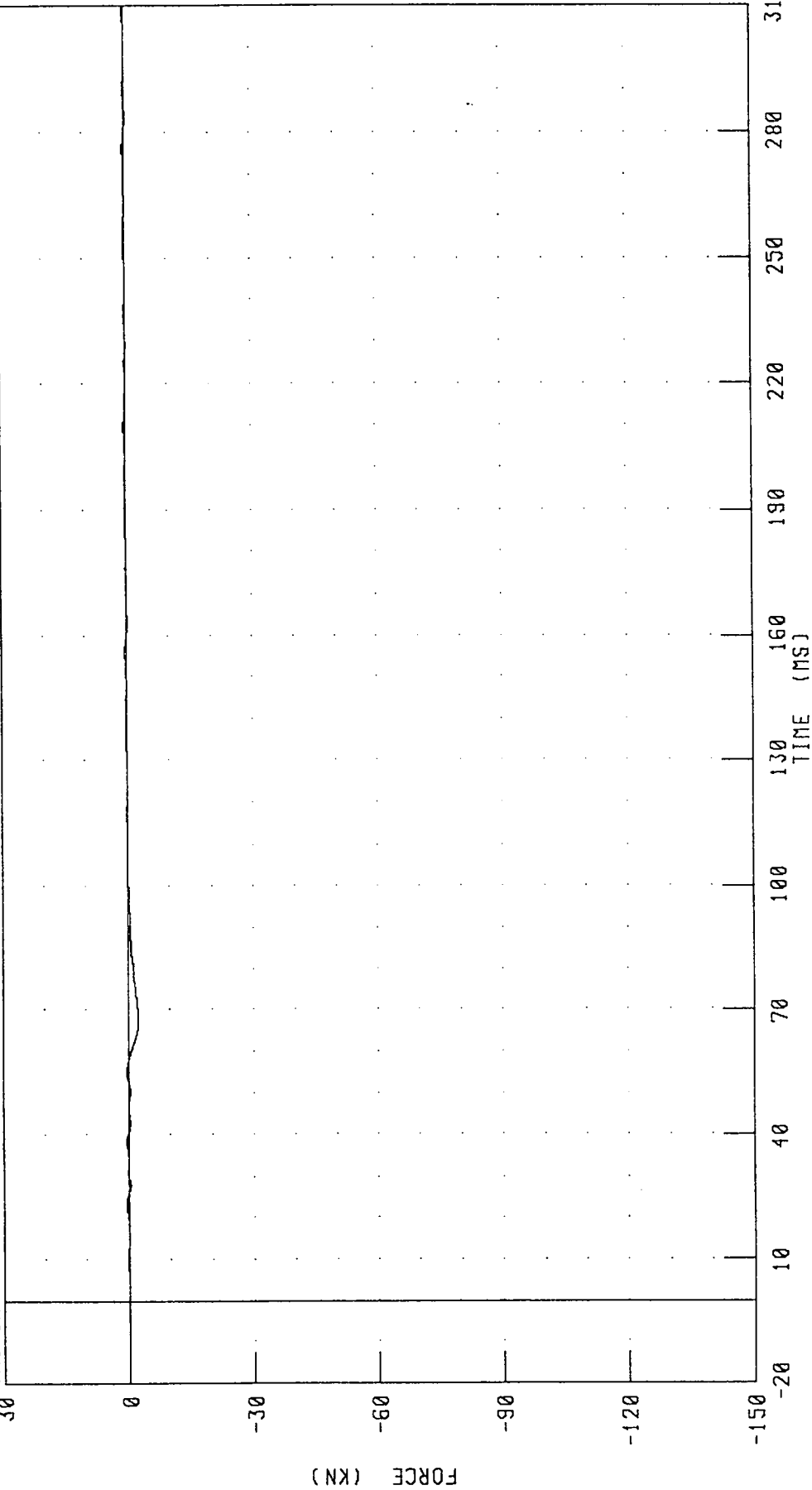
PEAK DATA: 0.15 KN @ 155.92 MS, -24.26 KN @ 42.48 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C9 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



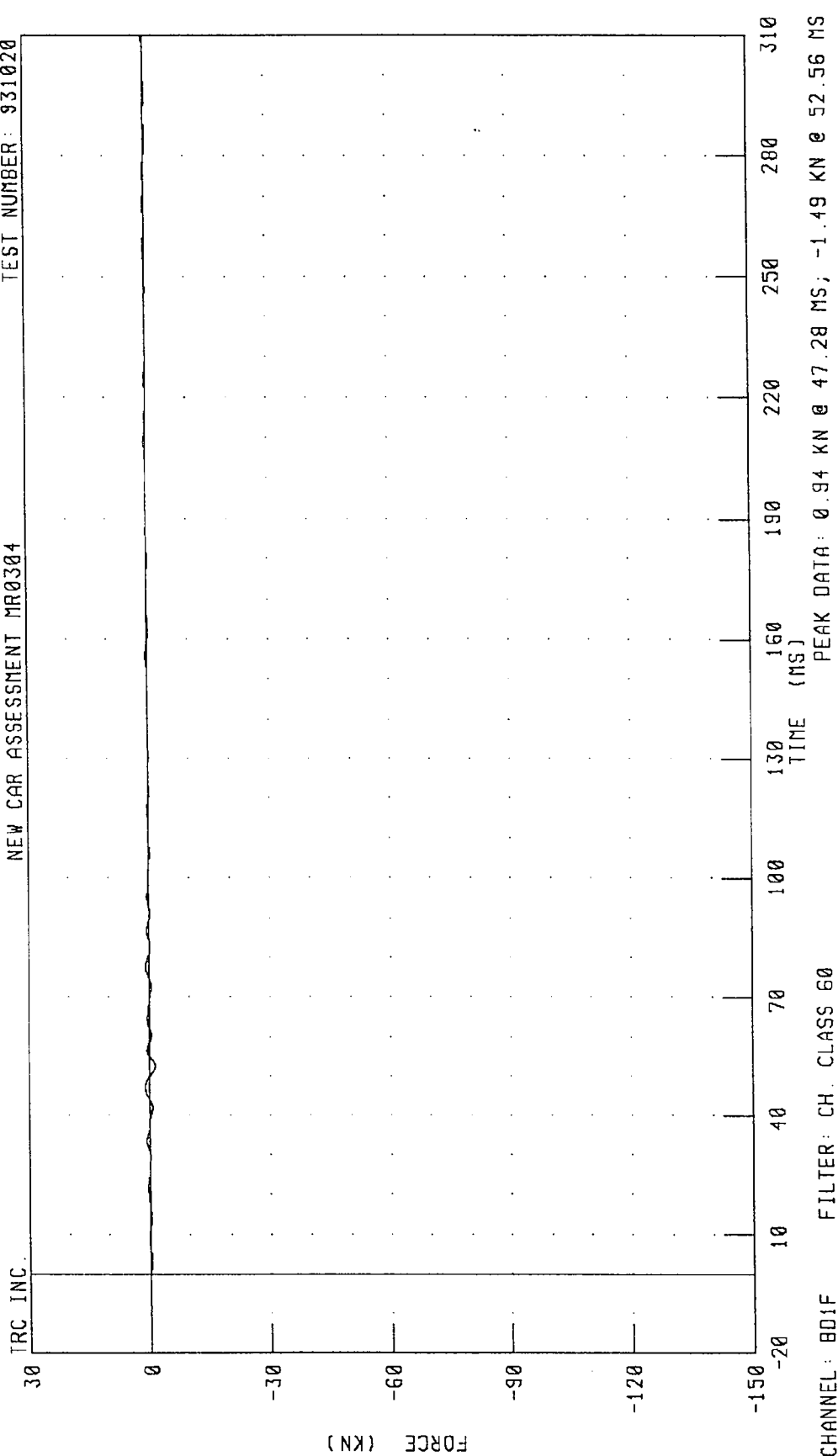
PEAK DATA: 0.52 KN @ 38.48 MS, -2.34 KN @ 66.72 MS

FILTER: CH. CLASS 60

CHANNEL: BC9F

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D1 FORCE  
 NEW CAR ASSESSMENT MR0304

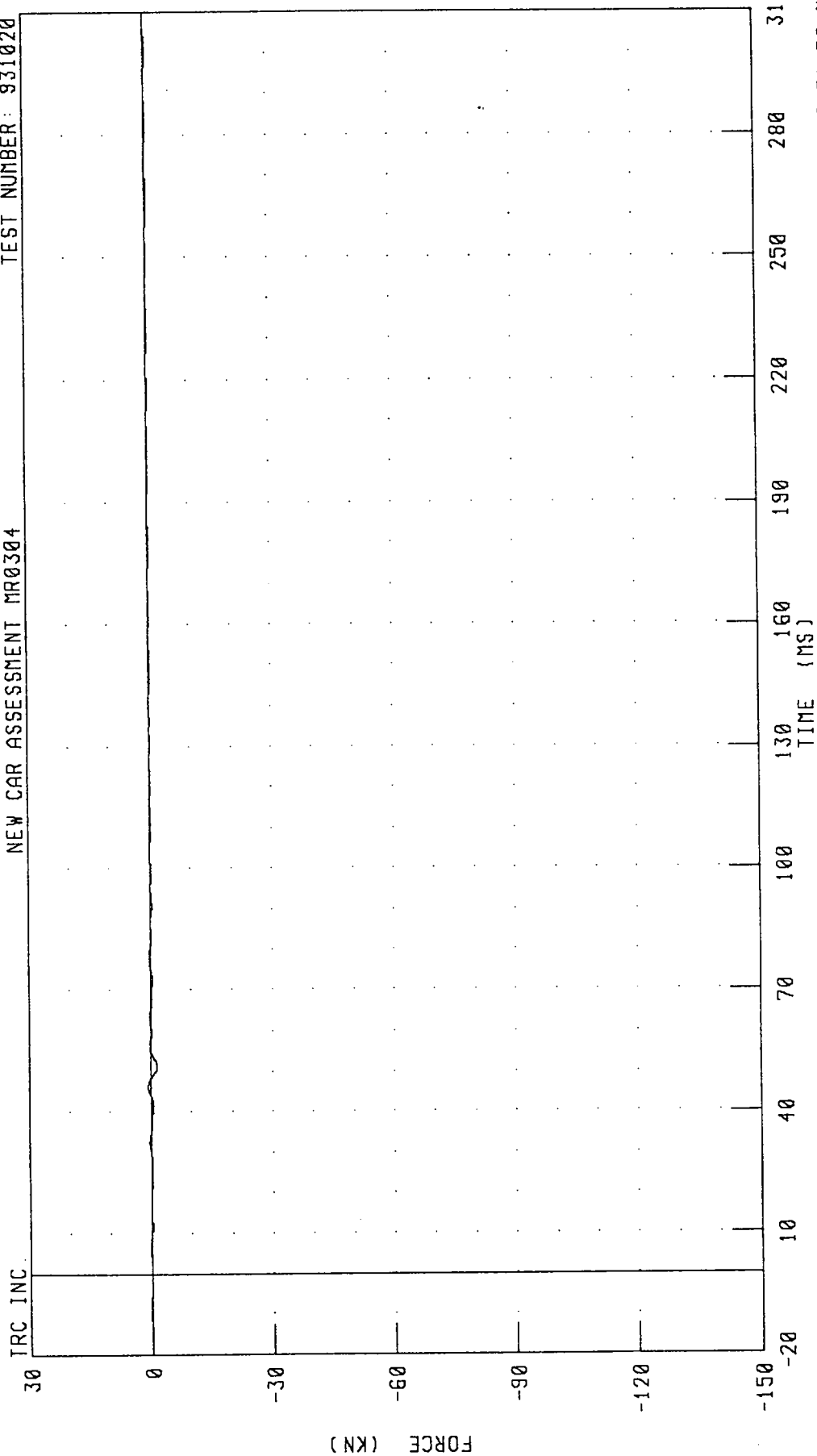
TEST NUMBER: 931020



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION D2 FORCE

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0 70 KN @ 46.32 MS; -1.59 KN @ 51.52 MS

FILTER: CH. CLASS 60

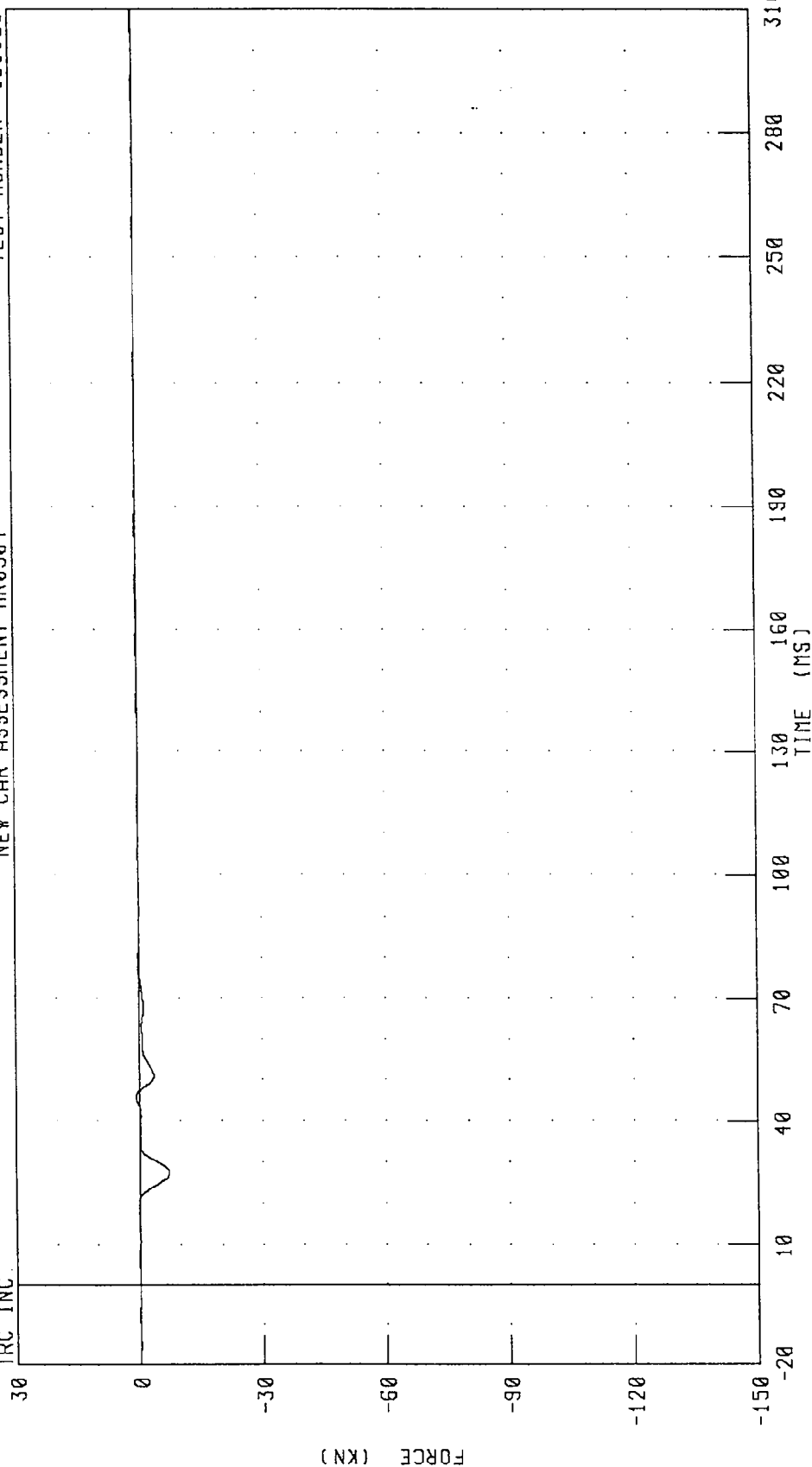
CHANNEL: B02F



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION D3 FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

TRC INC.



CHANNEL: B03F

FILTER: CH. CLASS 60

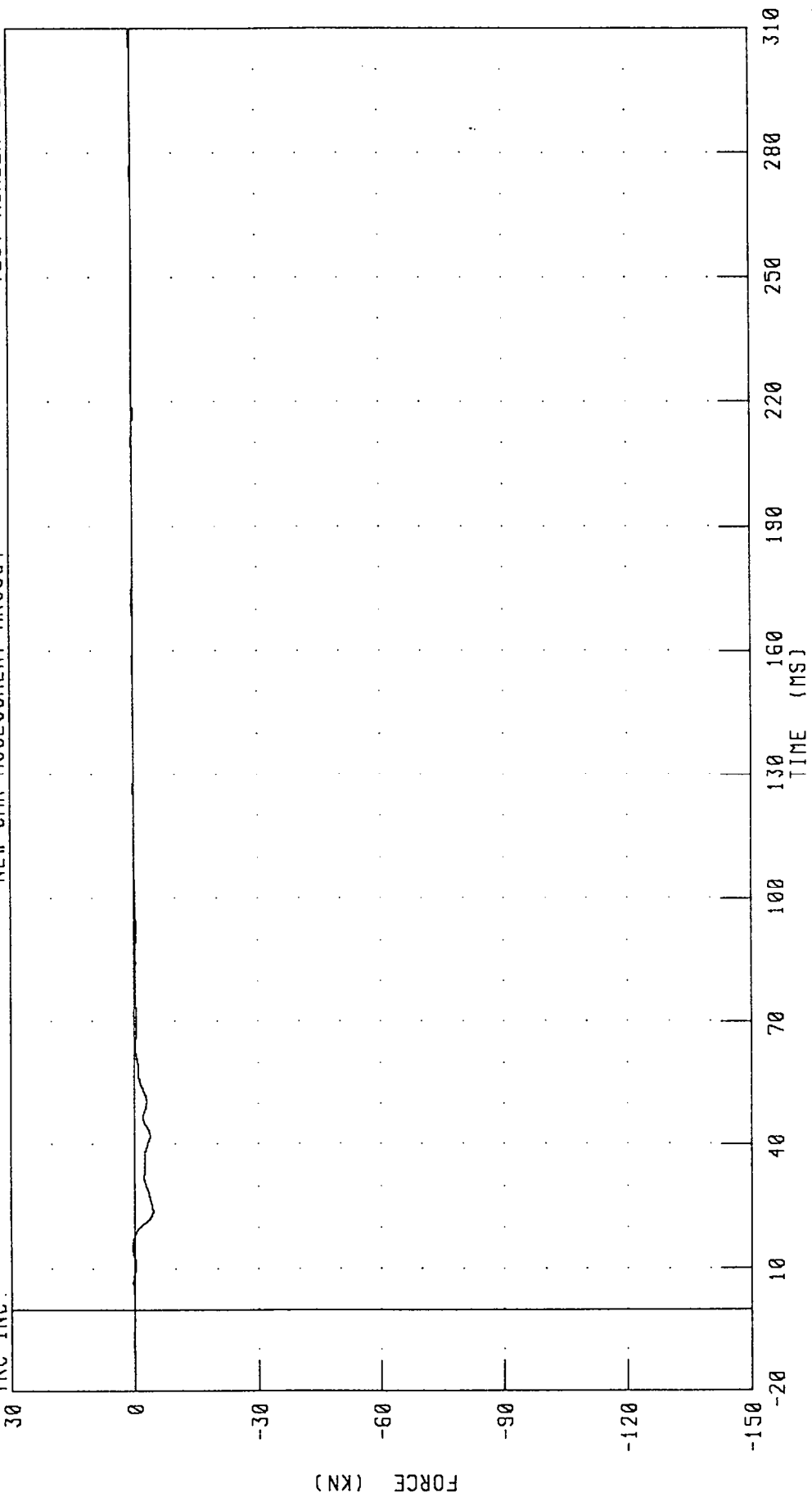
PEAK DATA: 0.78 KN @ 45.84 MS; -7.27 KN @ 27.36 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION D4 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

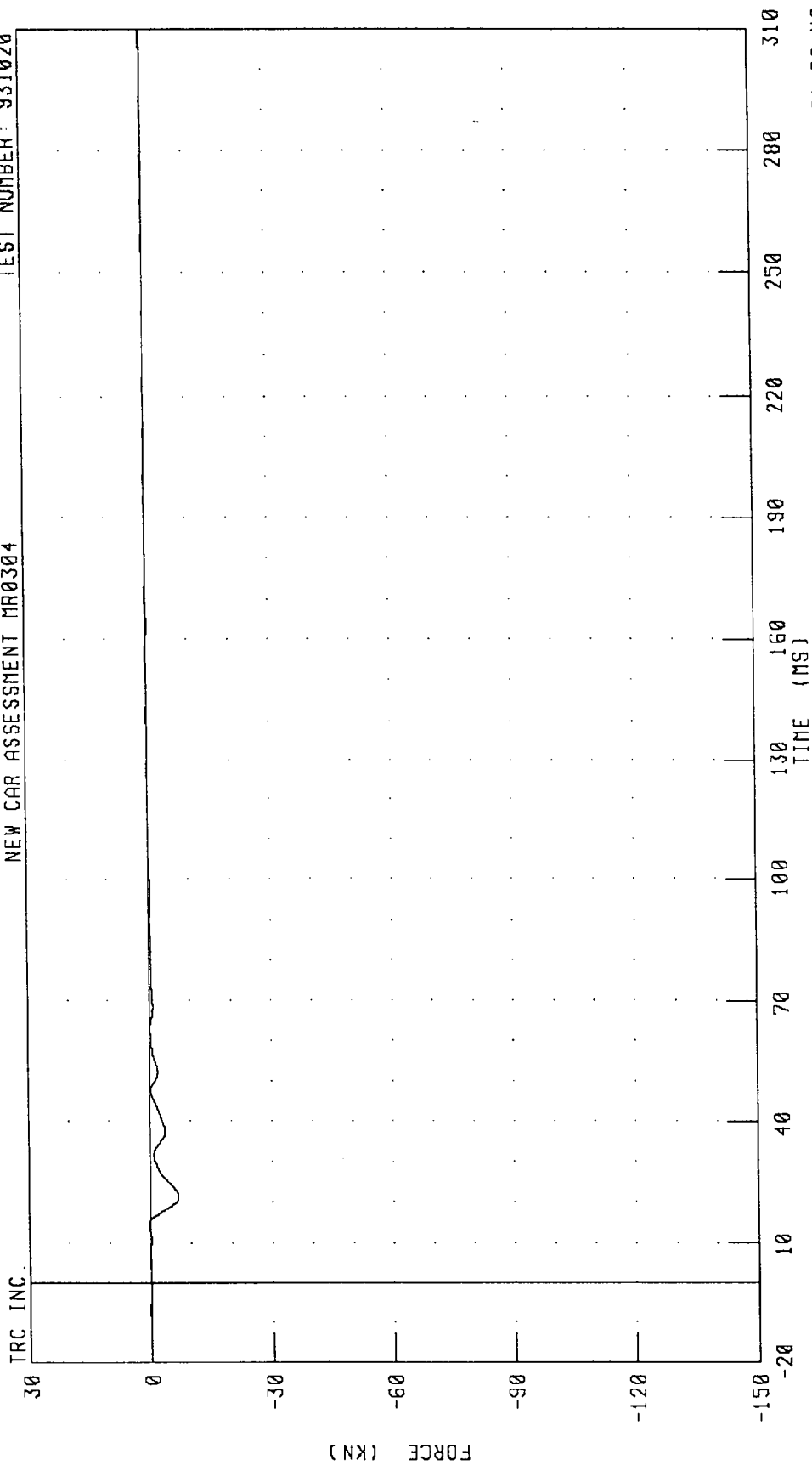


PEAK DATA: 0.47 KN @ 15.20 MS; -4.51 KN @ 24.16 MS

CHANNEL: BD4F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION D5 FORCE  
NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



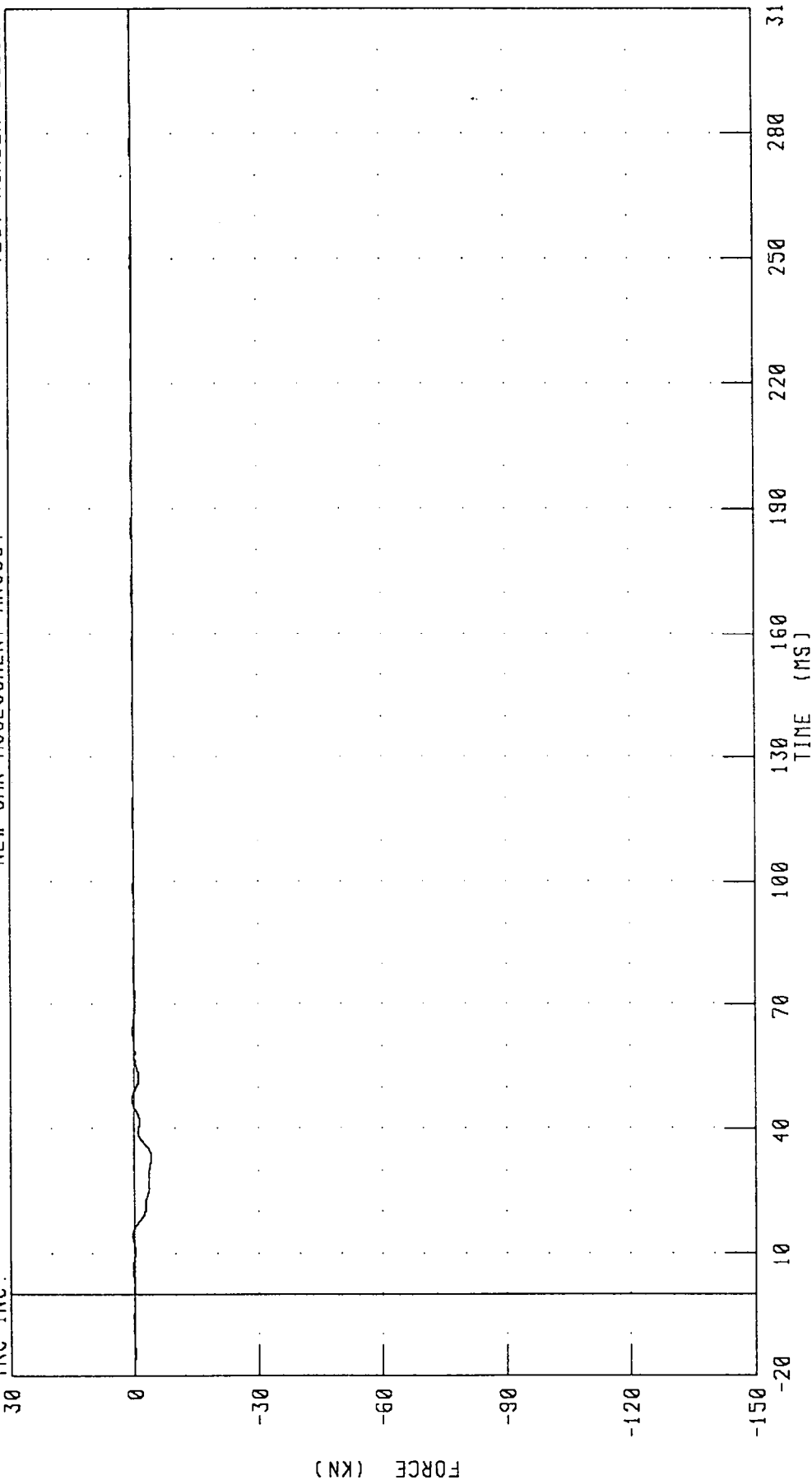
CHANNEL: BD5F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION D6 FORCE

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.

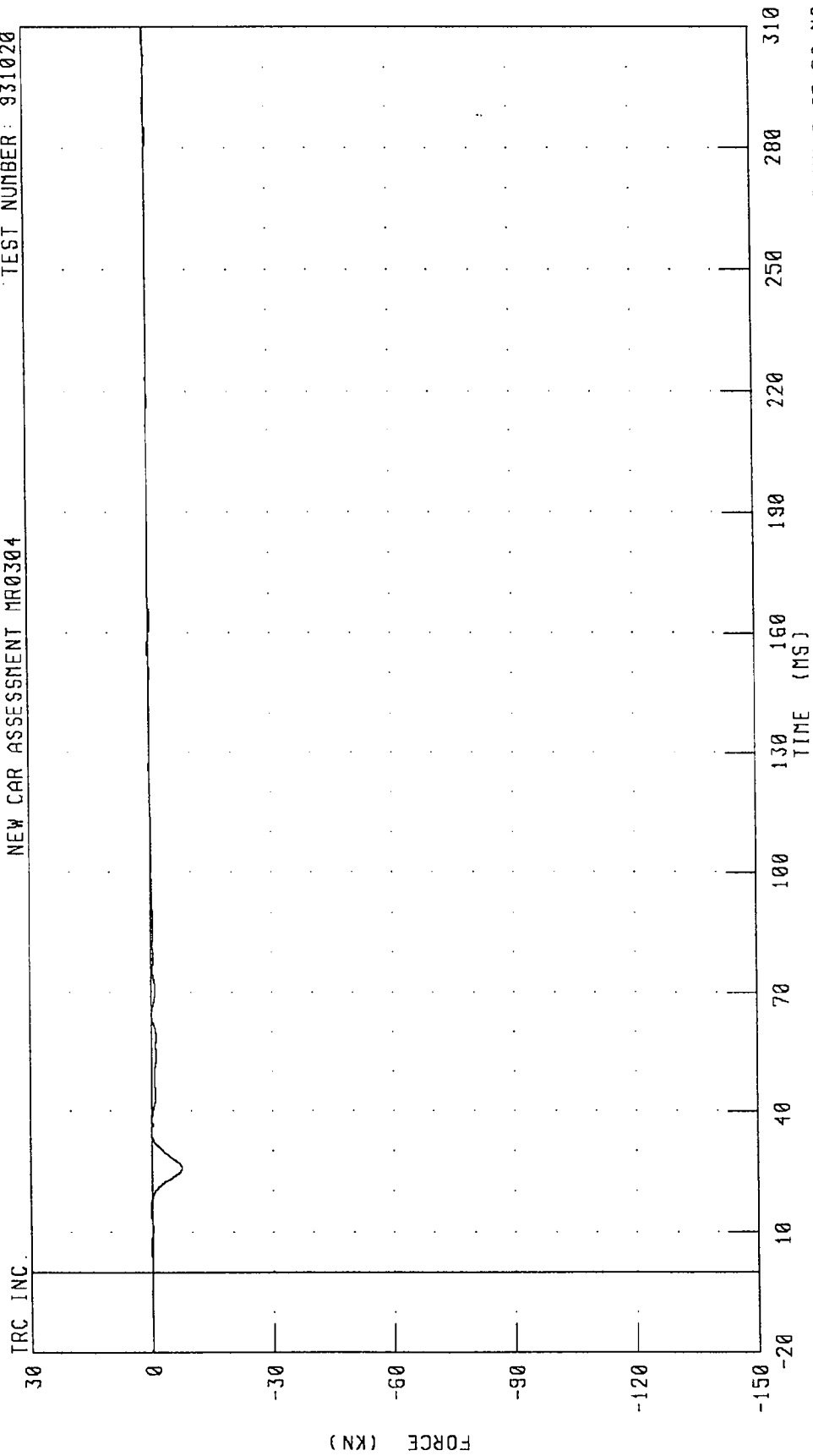


PEAK DATA: -0.42 KN @ 63.60 MS; -4.18 KN @ 33.36 MS

CHANNEL: BD6F FILTER: CH CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D7 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

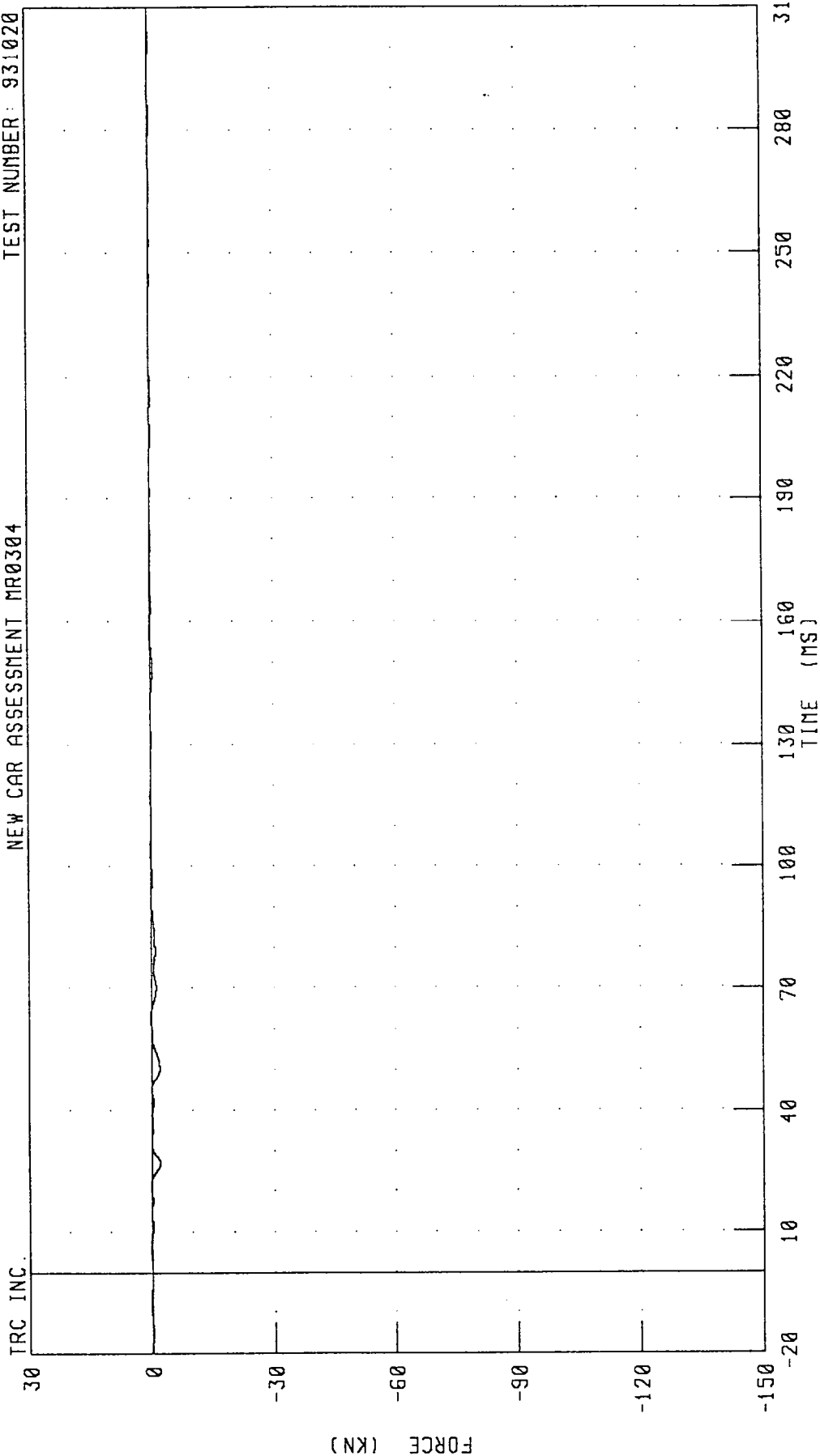


PEAK DATA: 0.31 KN @ 14.96 MS; -7.40 KN @ 25.76 MS

CHANNEL: 807F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D8 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

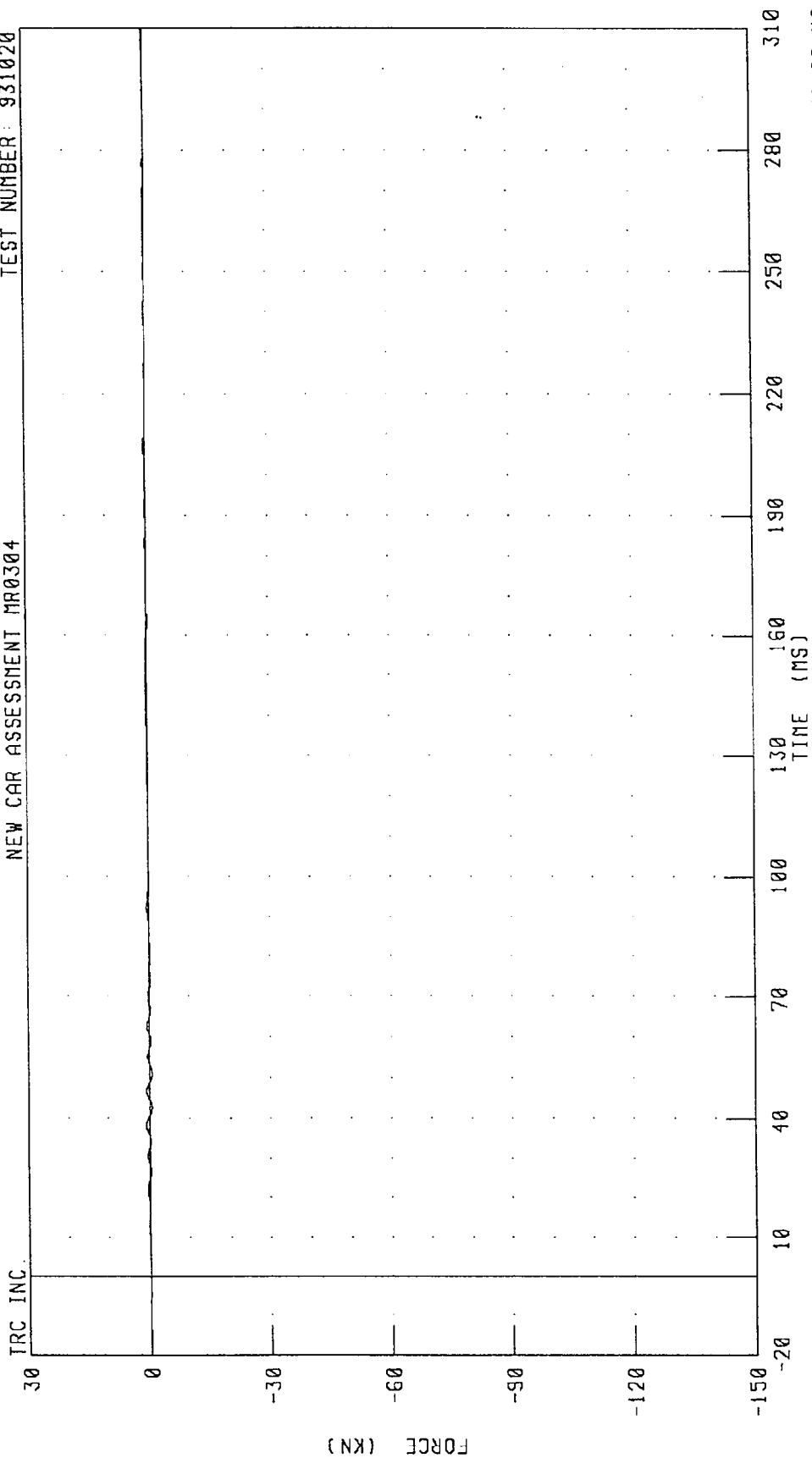


PEAK DATA: 0.29 KN @ -6.88 MS; -2.13 KN @ 26.96 MS

CHANNEL: BD8F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D9 FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 0.71 KN @ 38.48 MS; -0.71 KN @ 50.96 MS

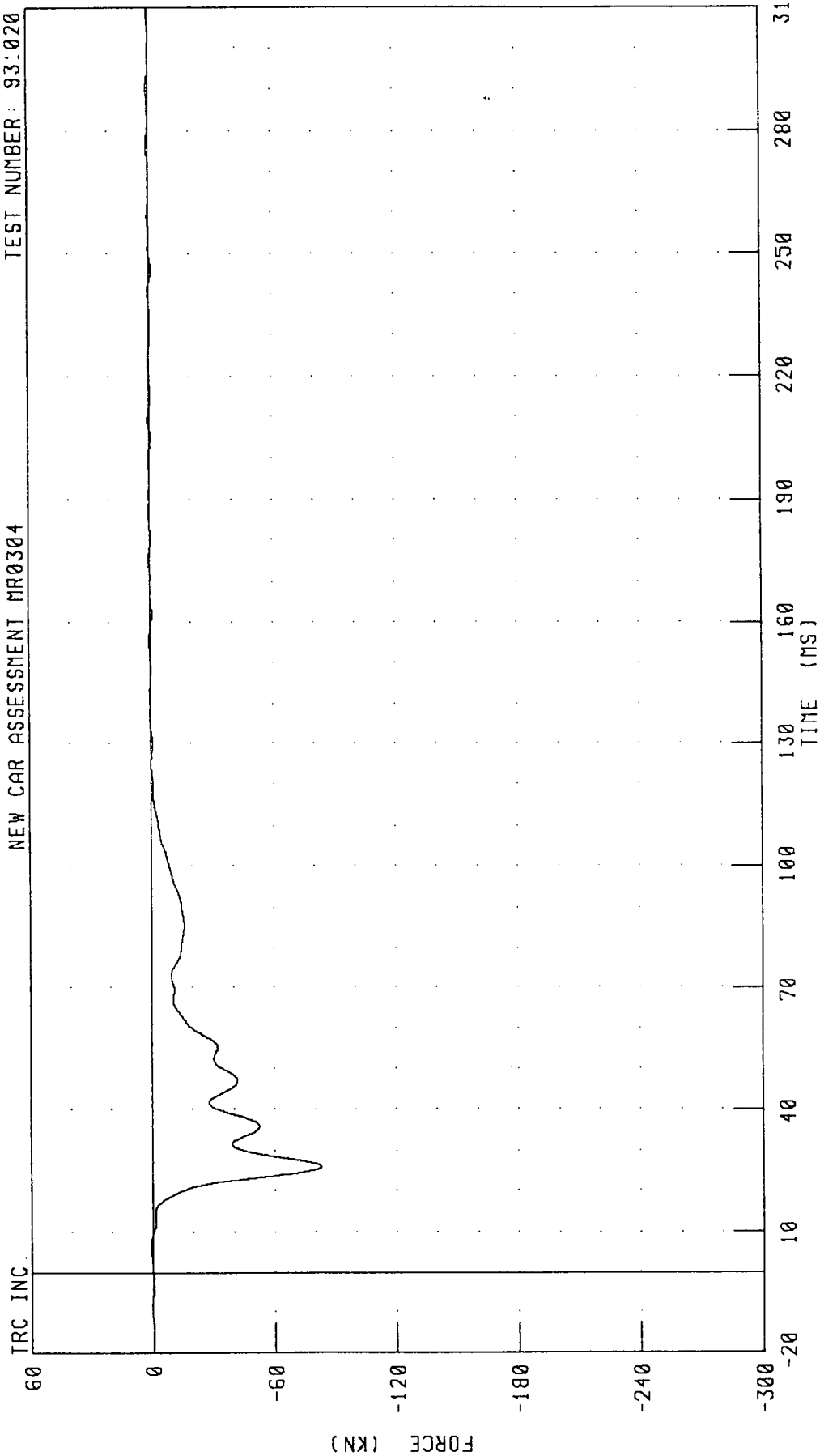
CHANNEL: BD9F FILTER: CH. CLASS 60



1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER GROUP # 1 FORCE TOTAL

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



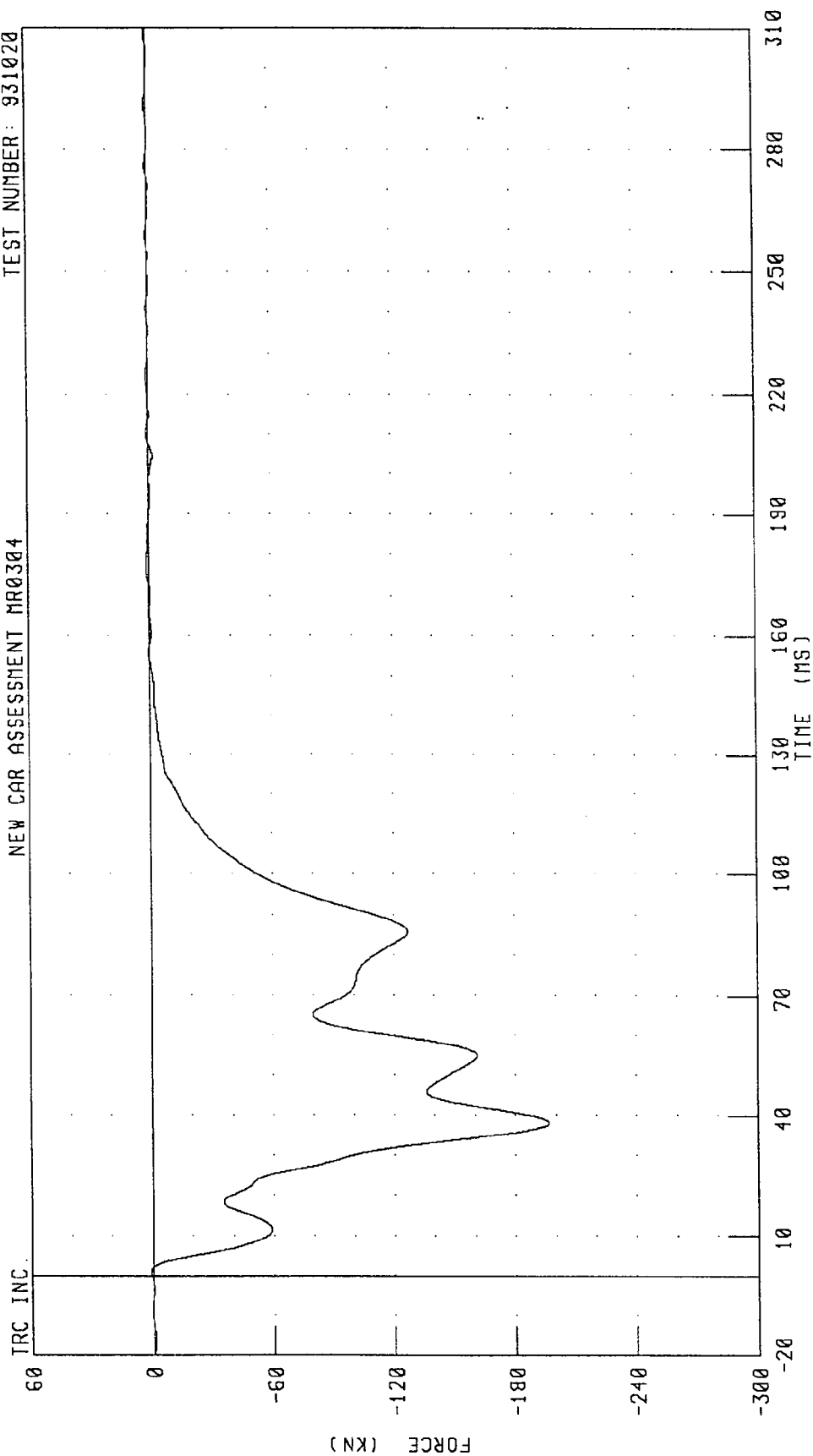
PEAK DATA: 1.18 KN @ 276.08 MS; -82.77 KN @ 26.24 MS

CHANNEL: LCBGIF FILTER: CH CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER GROUP # 2 FORCE TOTAL

NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



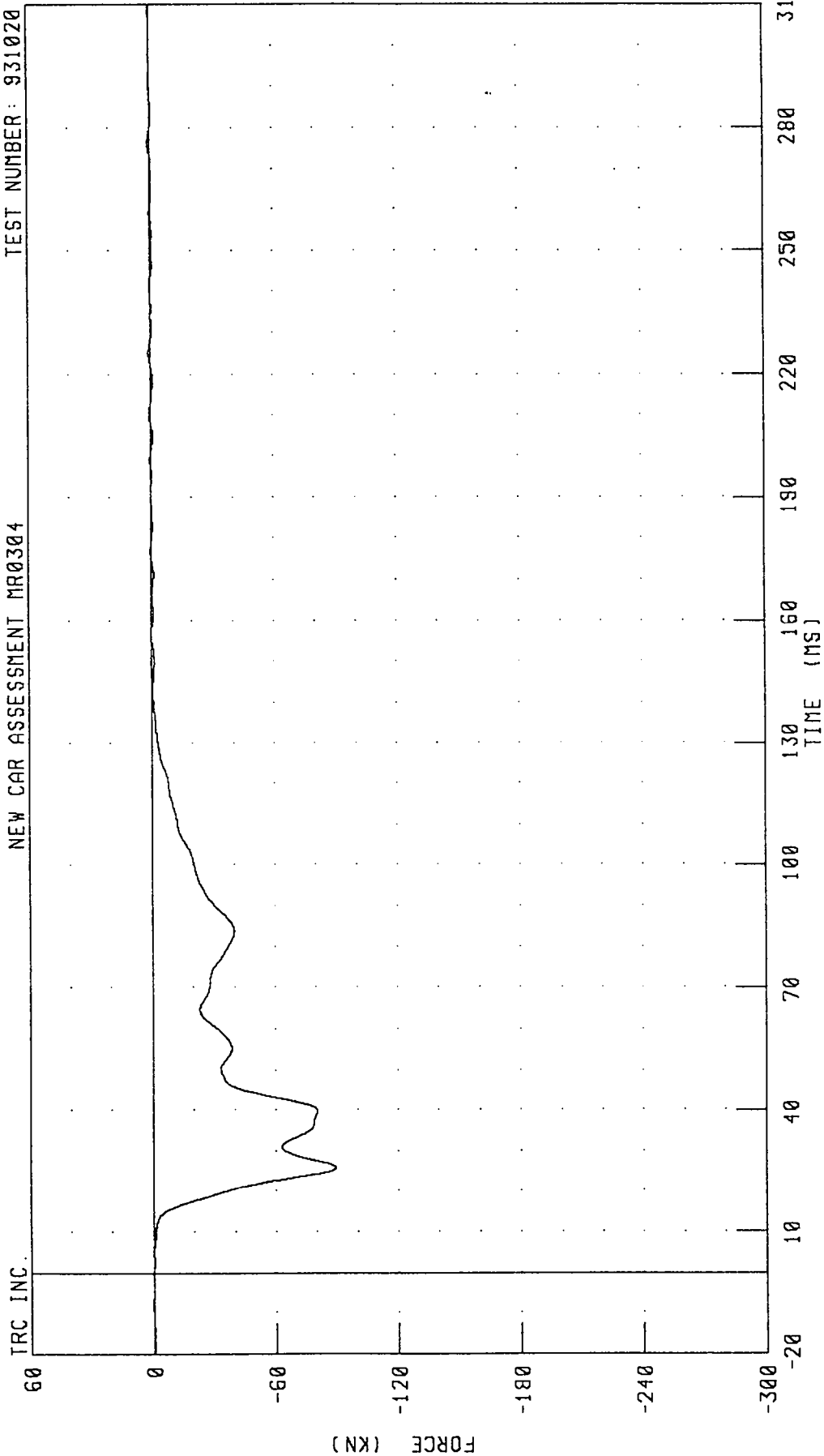
CHANNEL: LCBG2F FILTER: CH. CLASS 60

PEAK DATA: 1.15 KN @ 176.72 MS; -196.61 KN @ 38.24 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER GROUP # 3 FORCE TOTAL

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



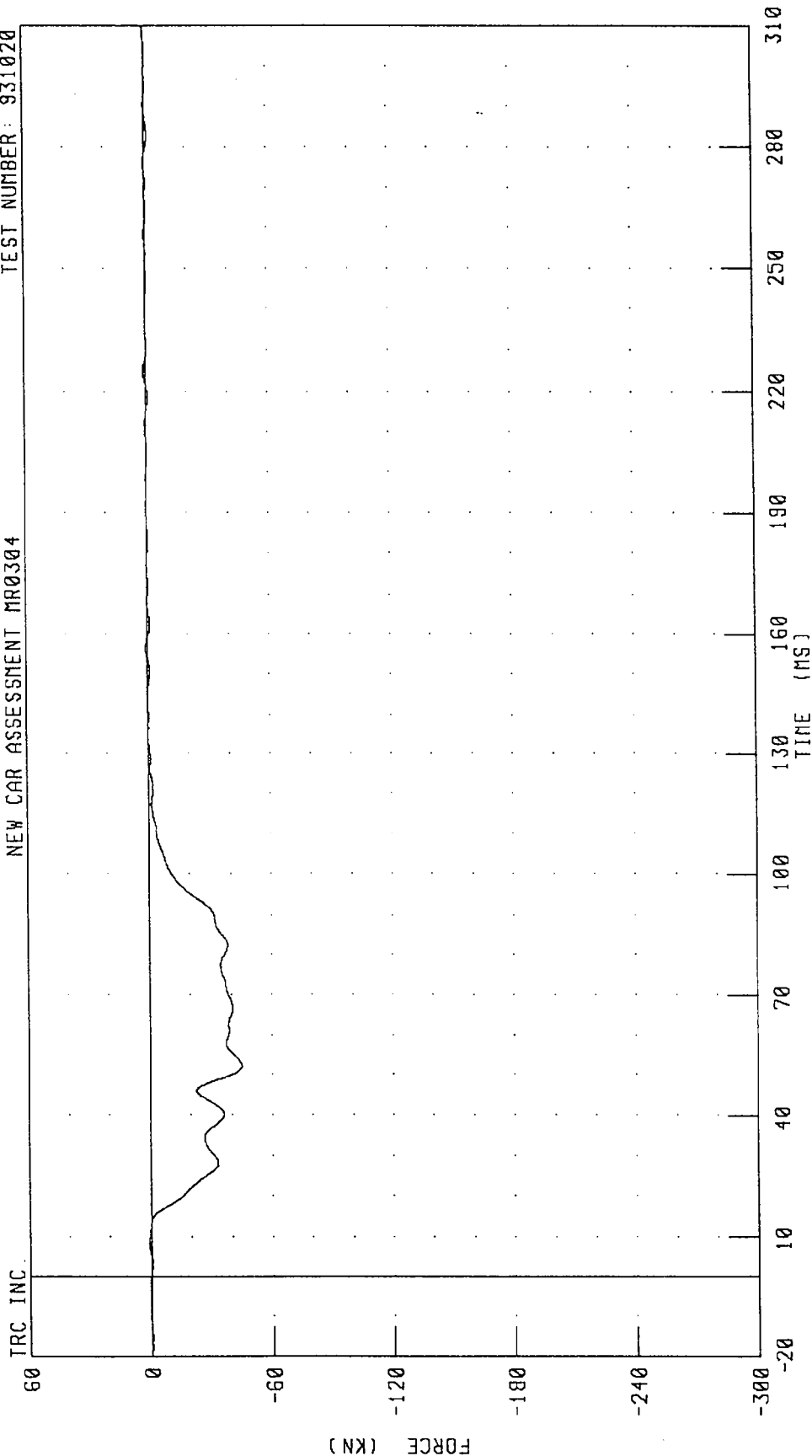
PEAK DATA: 0 82 KN @ 276.16 MS; -89.47 KN @ 25.84 MS

CHANNEL: LCBG3F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER GROUP # 4 FORCE TOTAL

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304



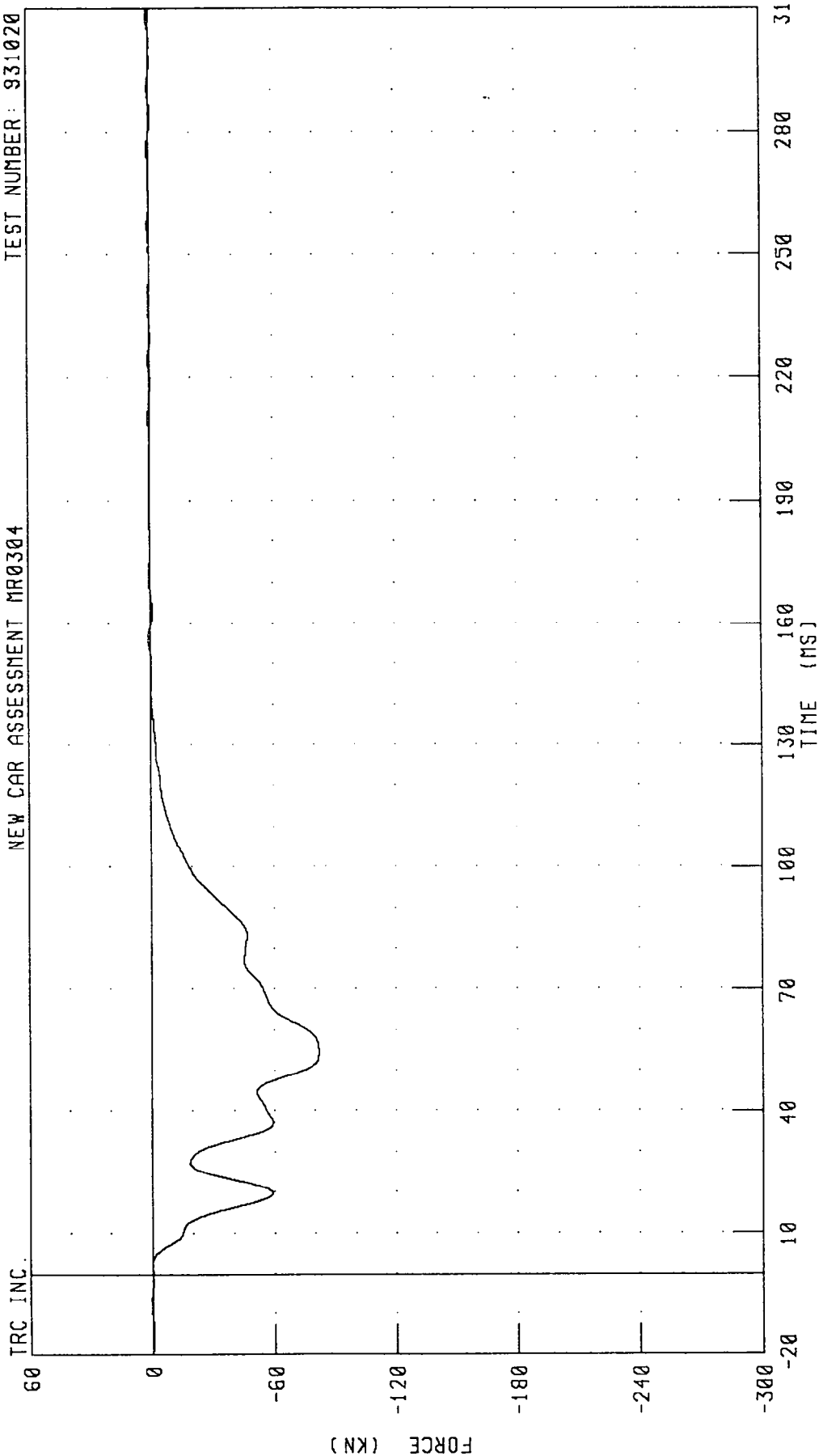
PEAK DATA: 1.04 KN @ 225.12 MS; -45.20 KN @ 52.08 MS

CHANNEL: LCB04F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
LOAD CELL BARRIER GROUP # 5 FORCE TOTAL

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

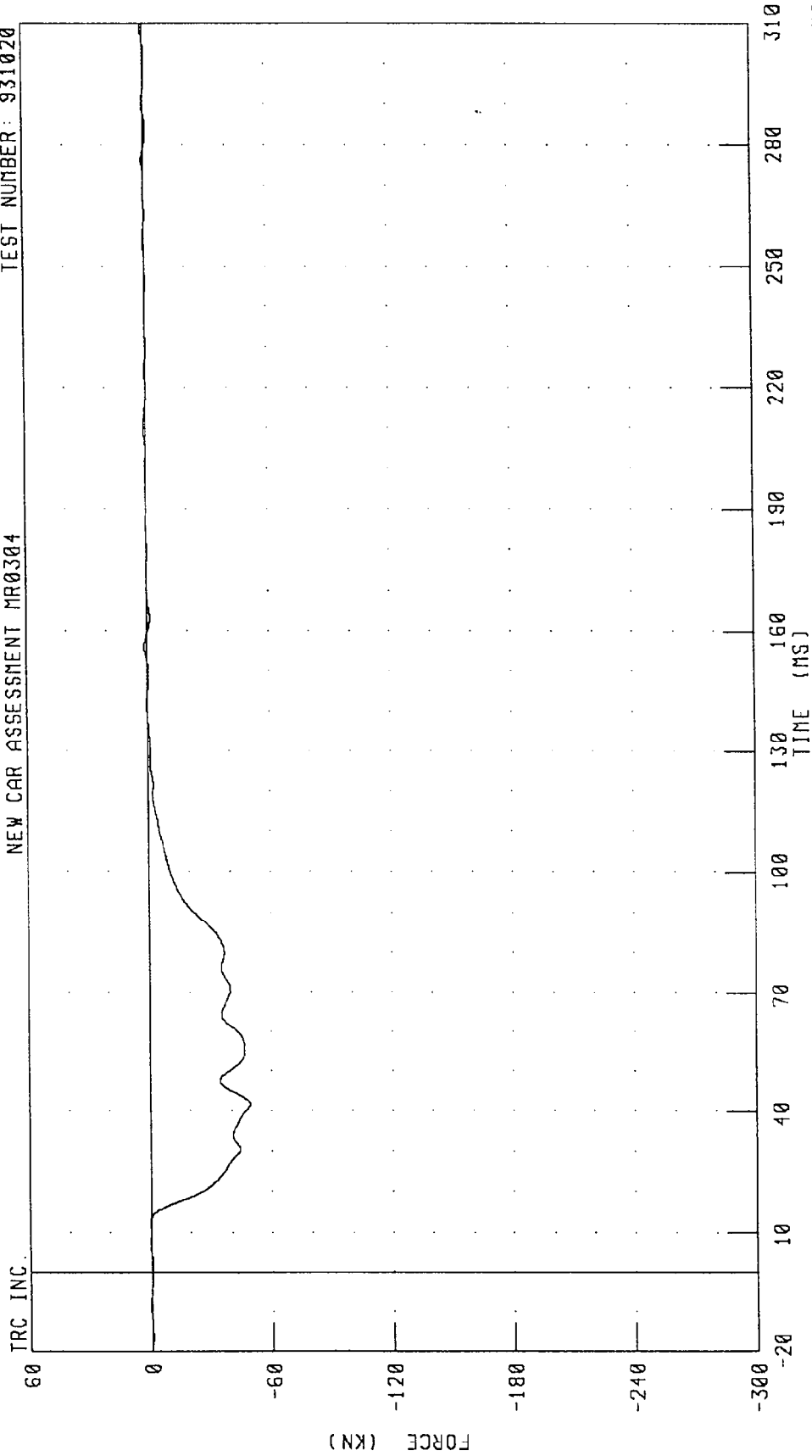


CHANNEL: LCBG5F FILTER: CH. CLASS 60

PEAK DATA: 1.17 KN @ 309.44 MS; -81.71 KN @ 54.48 MS

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 LOAD CELL BARRIER GROUP # 6 FORCE TOTAL  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020

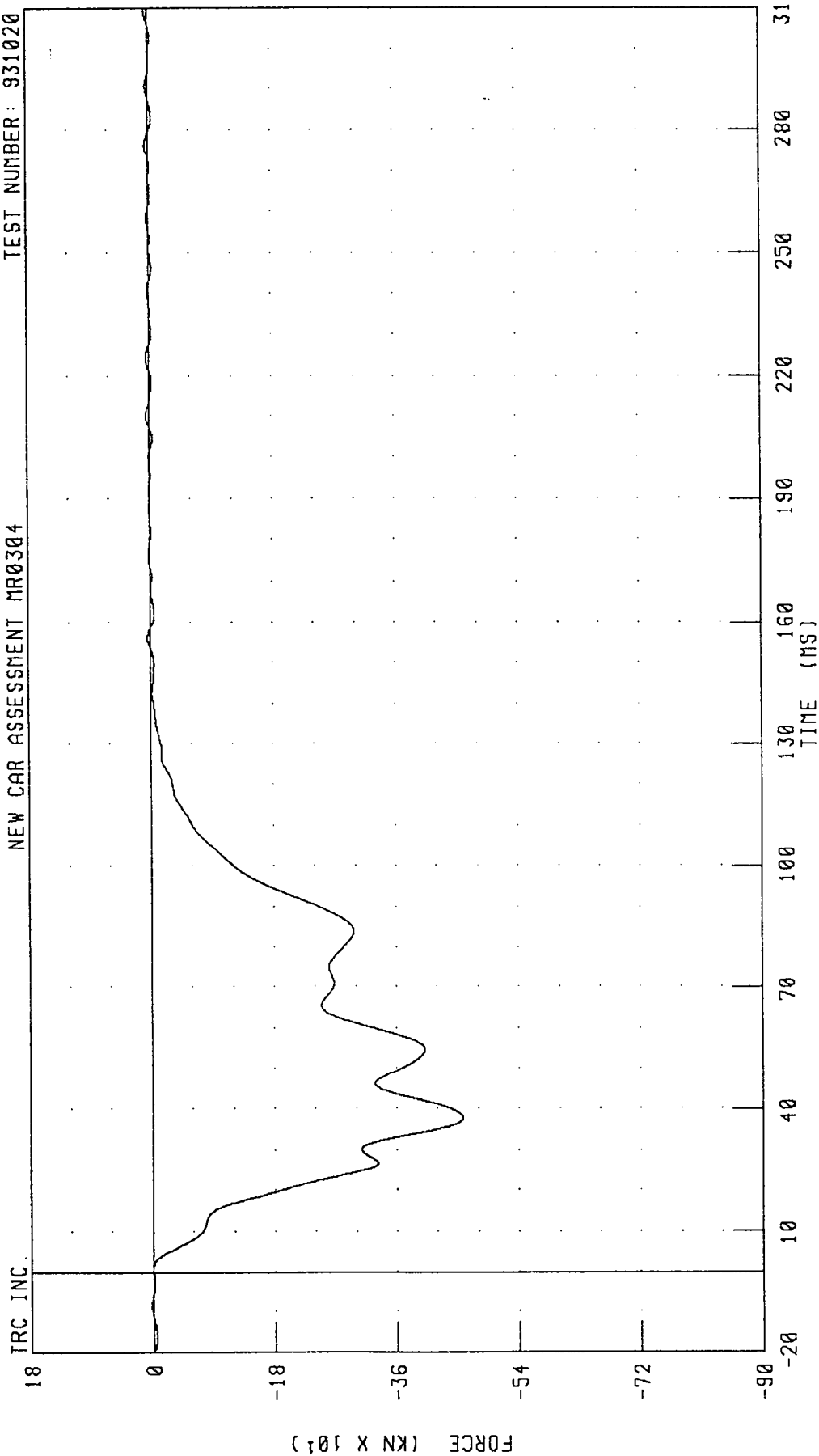


PEAK DATA: 1.35 KN @ 156.08 MS; -49.27 KN @ 41.68 MS

CHANNEL: LCBG6F FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
 TOTAL LOAD CELL BARRIER FORCE  
 NEW CAR ASSESSMENT MR0304

TEST NUMBER: 931020



PEAK DATA: 5.11 KN @ 276.16 MS, -457.74 KN @ 37.76 MS

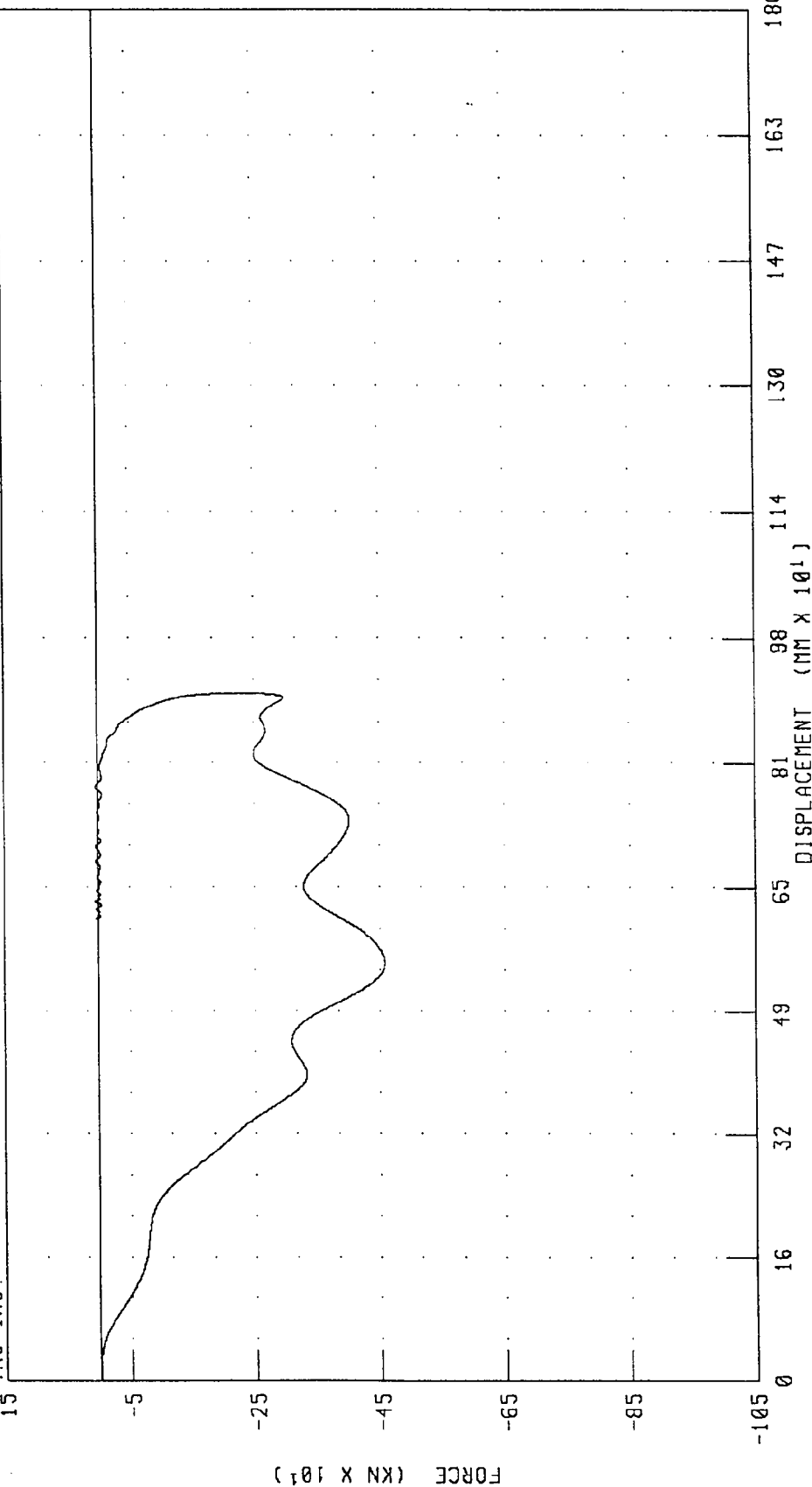
CHANNEL: LCBGT FILTER: CH. CLASS 60

1994 DODGE SPIRIT INTO FRONTAL LOAD CELL BARRIER  
TOTAL LOAD CELL BARRIER FORCE VS AVERAGE VEHICLE X-AXIS DISPLACEMENT

TEST NUMBER: 931020

NEW CAR ASSESSMENT MR0304

TRC INC.



CHANNEL: 0THXD  
LCBGT

FILTER: CH: CLASS 180  
CH: CLASS 60

PEAK DATA: 911.16 MM @ 91.20 MS;  
5.11 KN @ 276.16 MS;  
0.00 MM @ 0.00 MS;  
-457.74 KN @ 37.76 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

23-SEP-93

TRC                      142C16ED1                      572E SN142 EXT.DIMENSION CAL16

| 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      |

TEST MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Miller*

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

27-SEP-93

TRC

142C16HD1

572E SN142 HEAD DROP CAL 16

| TEST PARAMETER                  | SPECIFICATION    | TEST RESULTS |
|---------------------------------|------------------|--------------|
| TEMPERATURE                     | 18.9-25.6 DEG. C | 21.1 DEG. C  |
| RELATIVE HUMIDITY               | 10% - 70%        | 52.0 %       |
| PEAK RESULTANT ACCELERATION     | 225 - 275 G      | 273.31 G     |
| PEAK LATERAL ACCELERATION       | 15 G MAX         | -0.95 G      |
| IS ACCELERATION CURVE UNIMODAL? | YES              | YES          |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

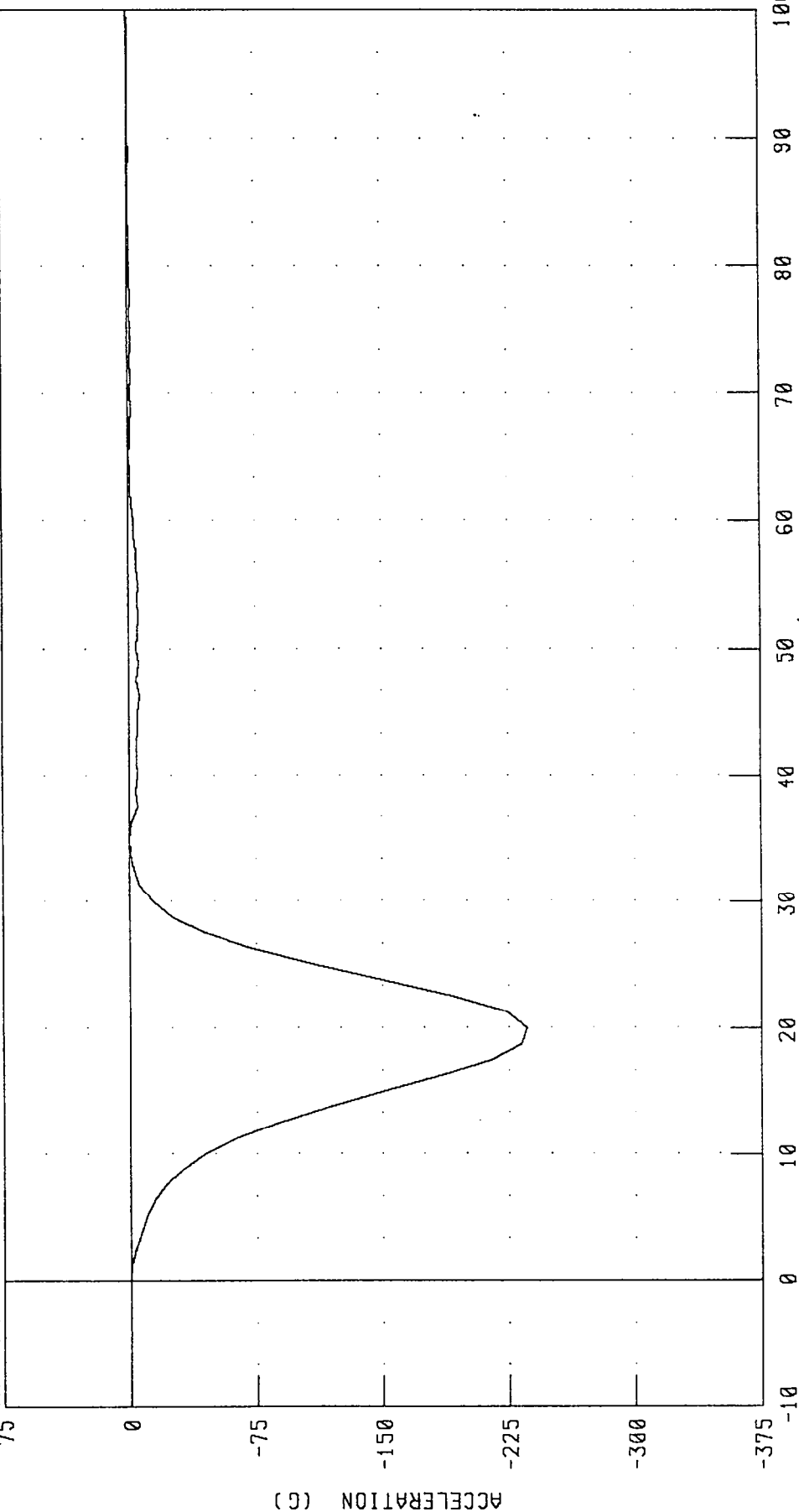
# PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

572E SN142 HEAD DROP CAL 16

RUN NUMBER: 102693.1050;5

TRC TEST NUMBER: 142C16HD1



PEAK DATA: -0.01 G @ -1.00 MS; -235.89 G @ 2.00 MS

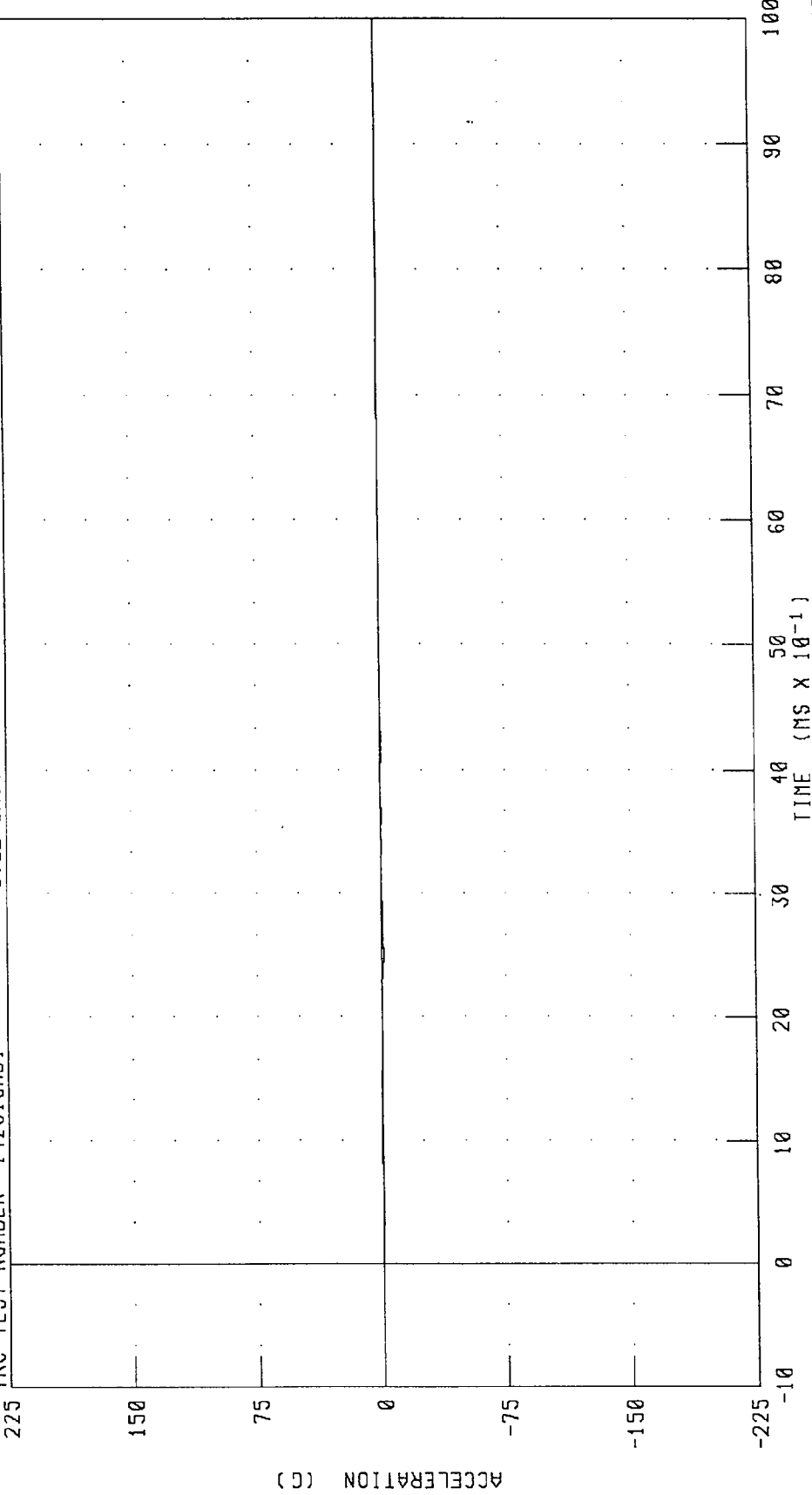
CHANNEL: HEDXC FILTER: CH. CLASS 1000

# PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

572E SNI42 HEAD DROP CAL 16 RUN NUMBER: 102693.1050,5

TRC TEST NUMBER: 142C16H01

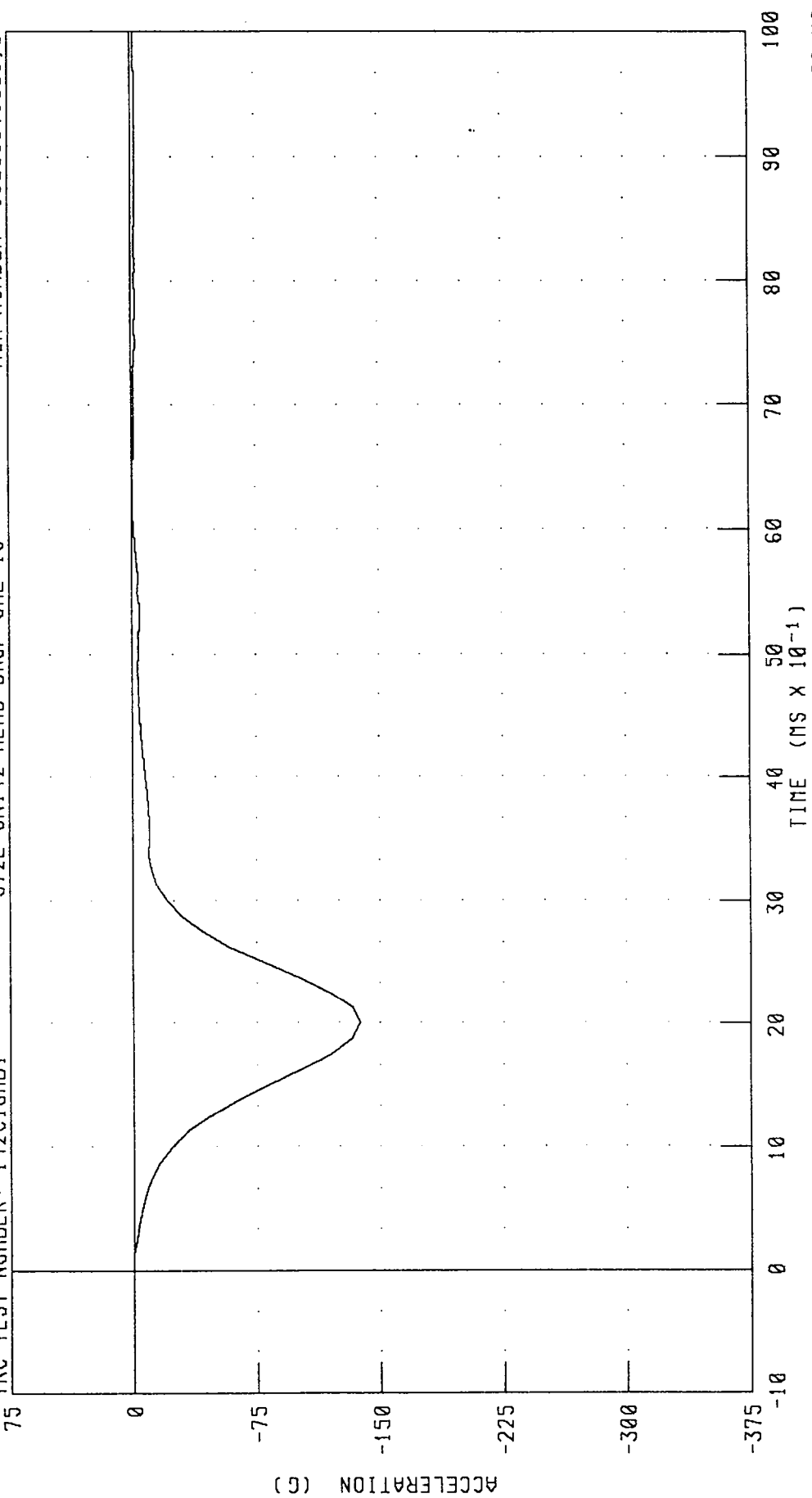


PEAK DATA: 0.48 G @ 1.13 MS; -0.96 G @ 2.50 MS

CHANNEL: HEDYG FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 142C16HD1 572E SN142 HEAD DRQP CAL 16 RUN NUMBER: 102693.1050.5



CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 0.00 G @ -1.00 MS; -138.05 G @ 2.00 MS

# PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN142 HEAD DROP CAL 16

RUN NUMBER: 102693.1050,5

TRC TEST NUMBER: 142C16HD1

375

300

225

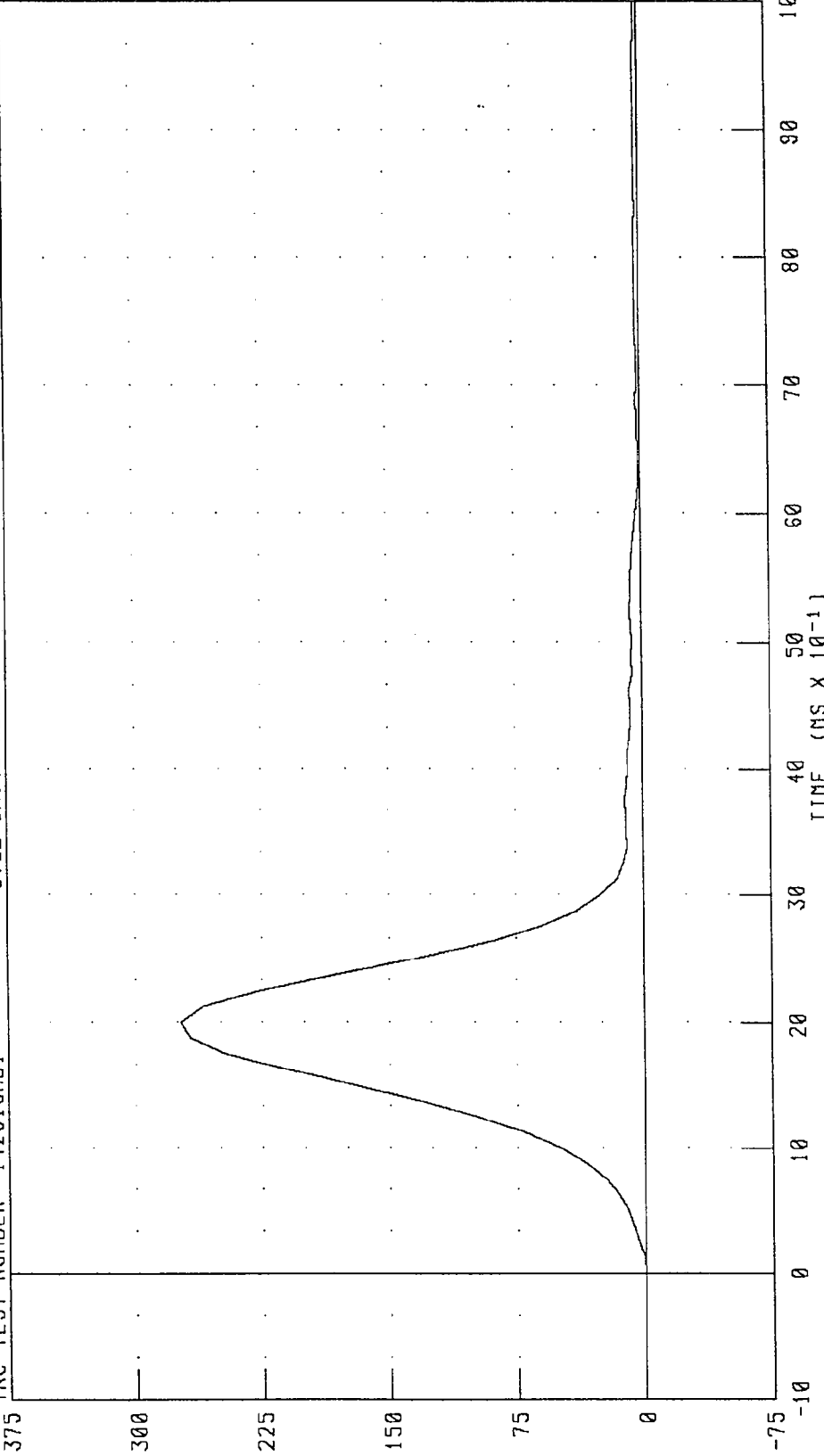
150

75

0

-75

ACCELERATION (G)



CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 273.32 G @ 2.00 MS; 0.03 G @ -0.50 MS

TIME (MS X 10<sup>-1</sup>)



## TRANSPORTATION RESEARCH CENTER INC.

## NECK FLEXION TEST

HYBRID III

27-SEP-93

6 AXIS NECK TRANSDUCER  
TRC 142C16NF1

572E SN142 NECK FLEXION CAL16

| TEST PARAMETER                                   |       | SPECIFICATION     | TEST RESULTS |
|--------------------------------------------------|-------|-------------------|--------------|
| TEMPERATURE                                      |       | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY                                |       | 10% - 70%         | 52.0 %       |
| IMPACT VELOCITY                                  |       | 6.89 - 7.13 M/SEC | 7.03 M/SEC   |
| PENDULUM<br>DECELERATION                         | 10 MS | 22.50 - 27.50 G   | 23.80 G      |
|                                                  | 20 MS | 17.60 - 22.60 G   | 20.94 G      |
|                                                  | 30 MS | 12.50 - 18.50 G   | 16.52 G      |
| MAX PENDULUM G                                   |       | 29 G MAX          | 24.68 G      |
| MAX PENDULUM G ABOVE 30 MS                       |       | 29 G MAX          | 16.45 G      |
| DECELERATION-TIME CURVE<br>DECAY TIME TO 5 G     |       | 34 - 42 MS        | 37.25 MS     |
| D PLANE                                          | MAX   | 64 - 78 DEG.      | 73.05 DEG.   |
| ROTATION                                         | TIME  | 57 - 64 MS        | 59.25 MS     |
| MOMENT ABOUT<br>OCCIPITAL<br>CONDYLE             | MAX   | 88.2 - 108.5 NM   | 92.04 NM     |
|                                                  | TIME  | 47 - 58 MS        | 50.88 MS     |
| ROTATION ANGLE-TIME CURVE<br>DECAY TIME TO ZERO  |       | 113 - 128 MS      | 115.38 MS    |
| POSITIVE MOMENT-TIME CURVE<br>DECAY TIME TO ZERO |       | 97 - 107 MS       | 102.38 MS    |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

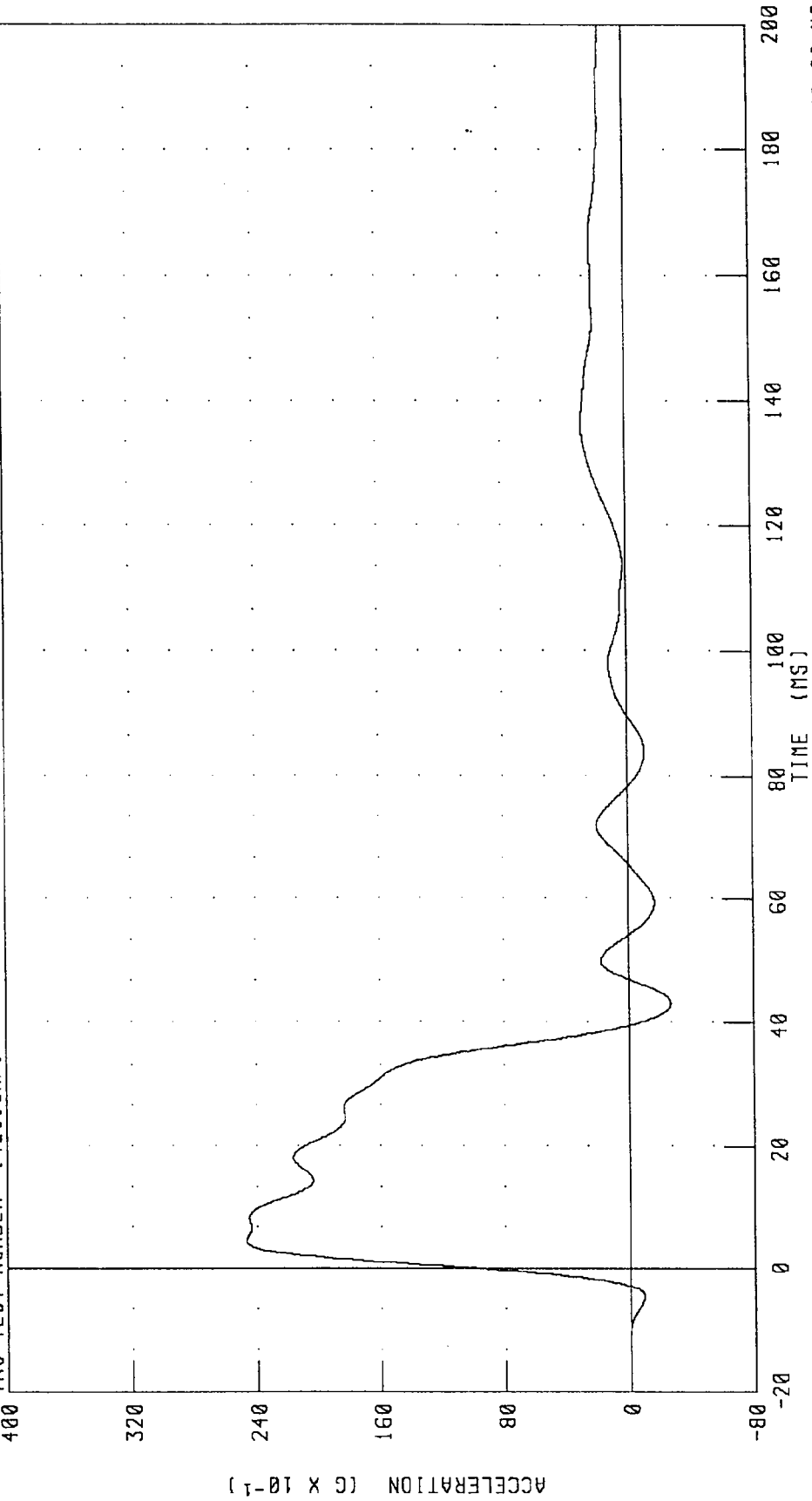
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 142C16NF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050;1



CHANNEL: PENXG FILTER: CH. CLASS 60

PEAK DATA: 24.68 G @ 4.38 MS; -2.66 G @ 42.88 MS

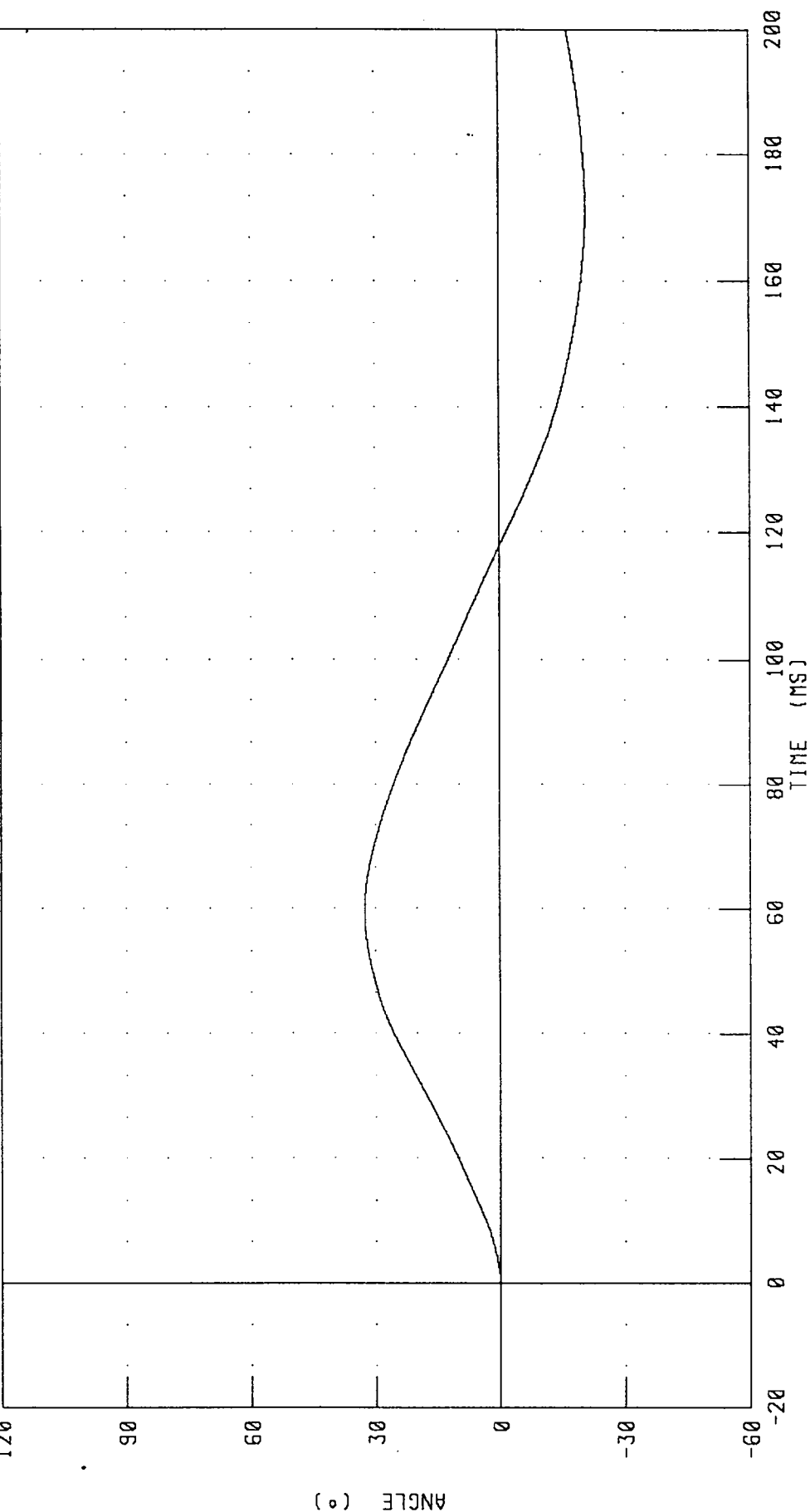
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 142C16NF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050;1



CHANNEL: BETA FILTER: CH. CLASS 60

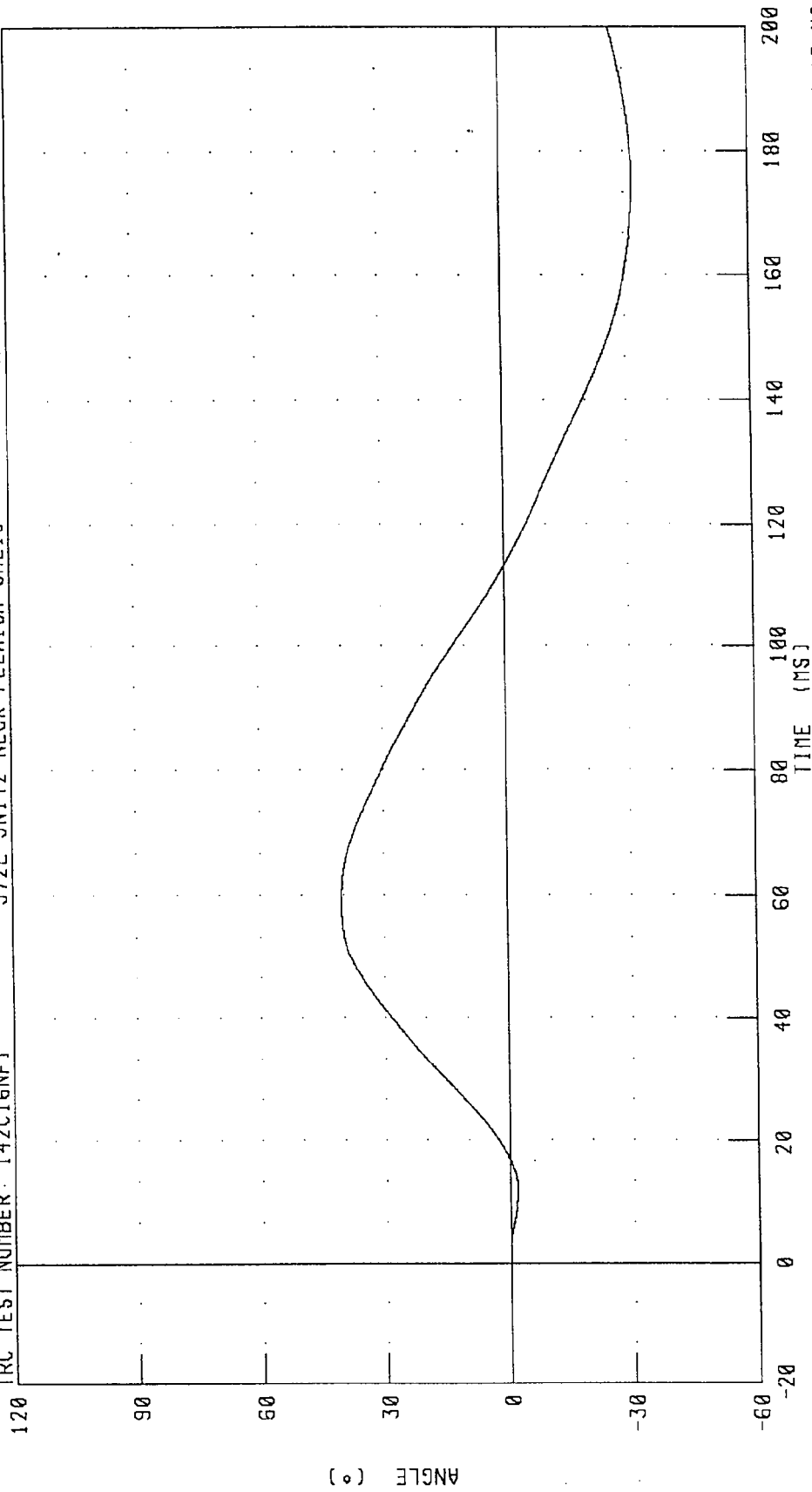
PEAK DATA: 32.67 ° @ 59.63 MS; -20.71 ° @ 171.38 MS

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

TRC TEST NUMBER: 142C16NF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050;1



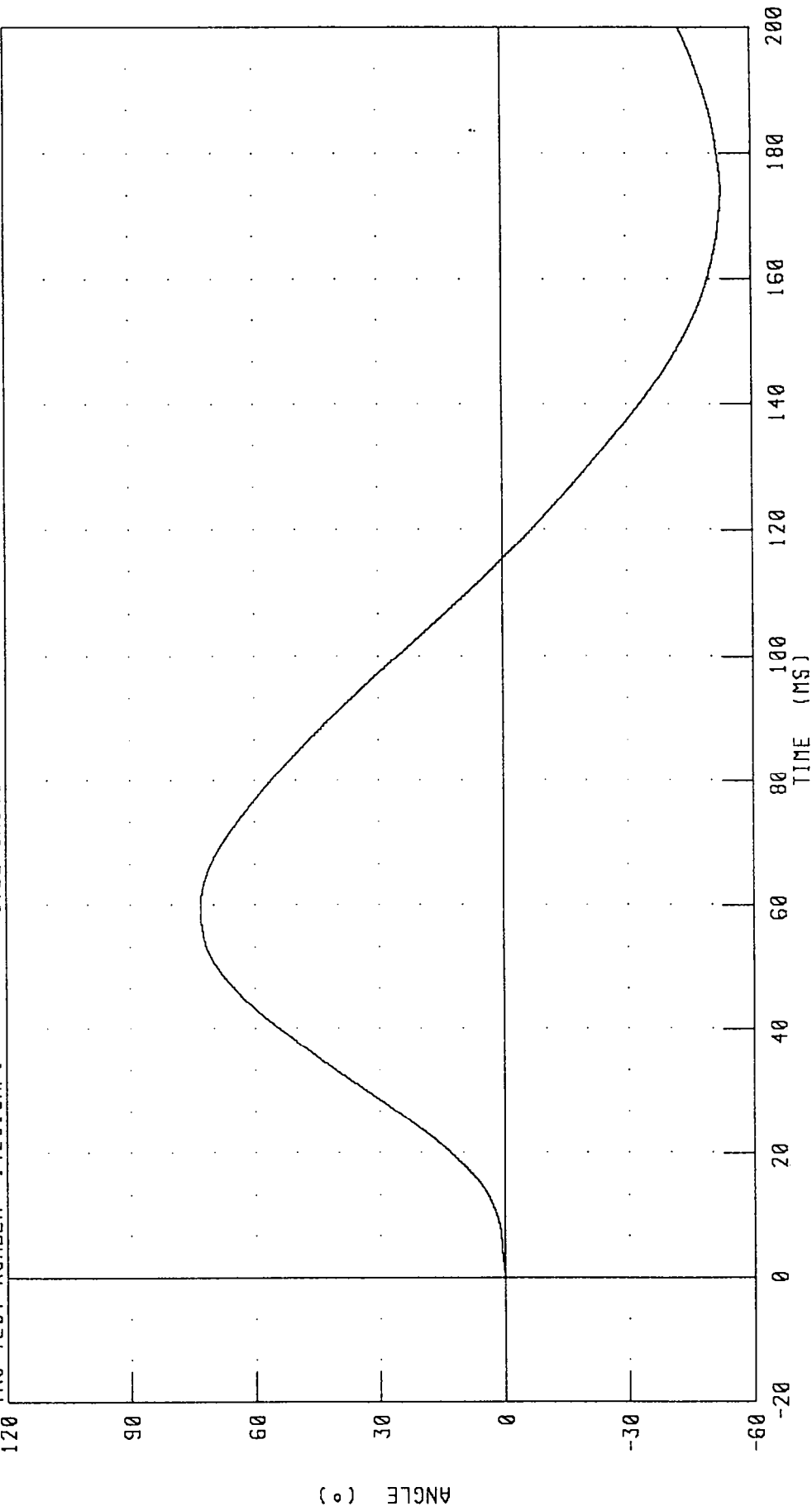
PEAK DATA: 40.40 ° @ 58.88 MS; -32.04 ° @ 175.13 MS

CHANNEL: THETA FILTER: CH. CLASS 60

# PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 142C16NF1 572E SN142 NECK FLEXION CAL16 RUN NUMBER: 102693 1050;1



PEAK DATA: 73.06 ° @ 59.25 MS; -52.69 ° @ 174.13 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

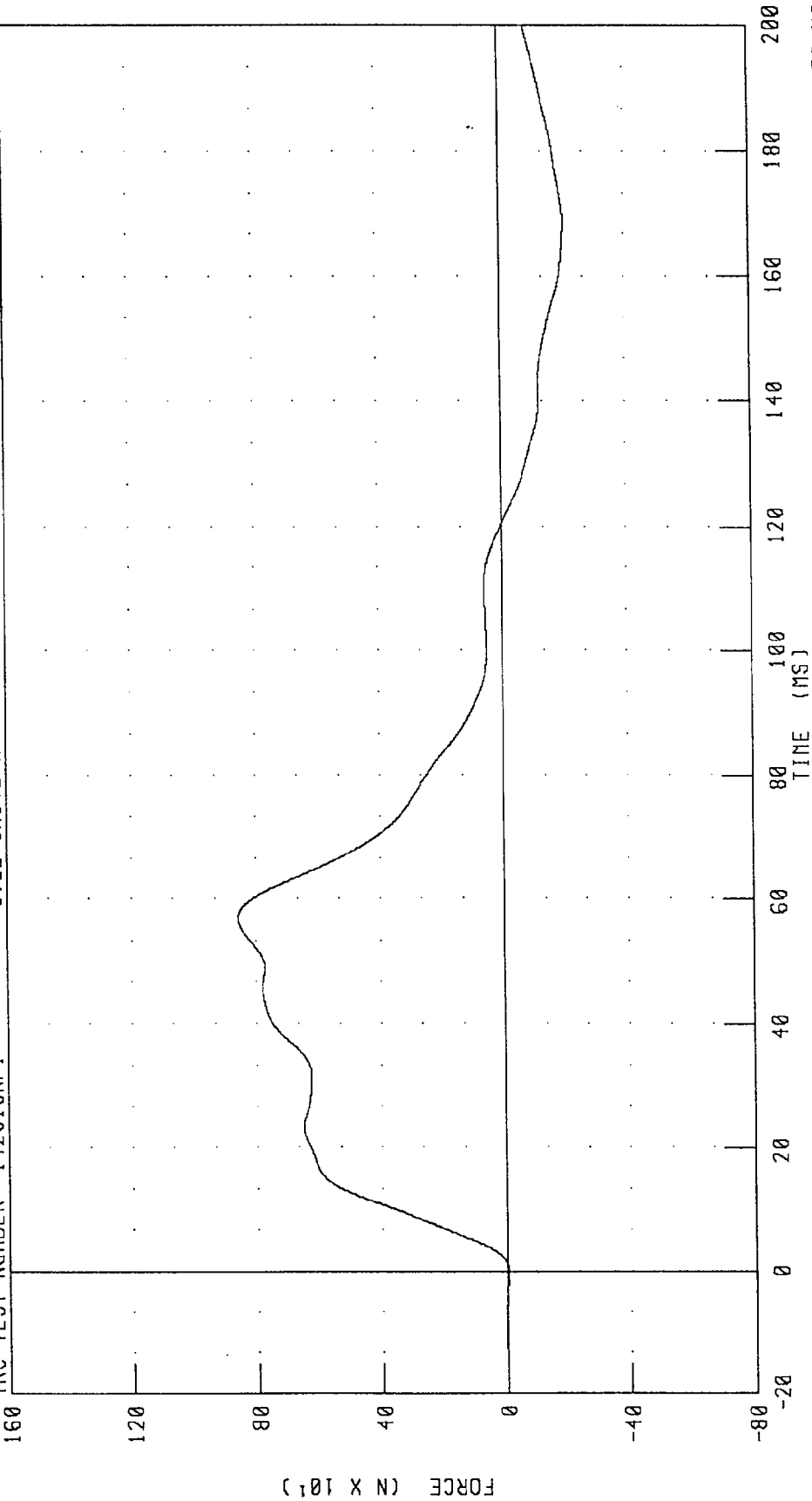
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C1GNF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050,1



PEAK DATA: 857.22 N @ 56.88 MS; -204.93 N @ 168.50 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

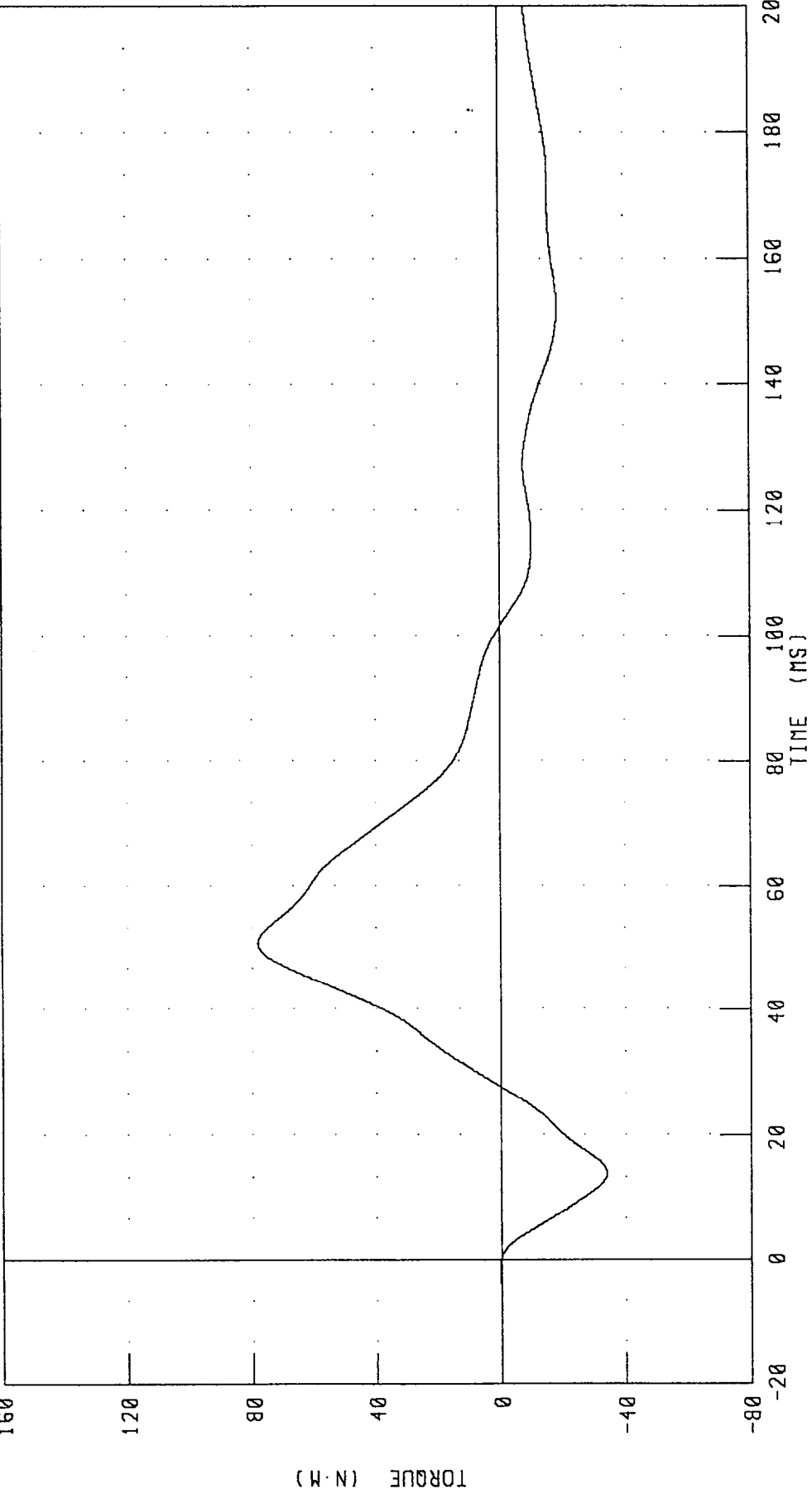
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 142C16NF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050;1



CHANNEL: NEKYM FILTER: CH. CLASS 60

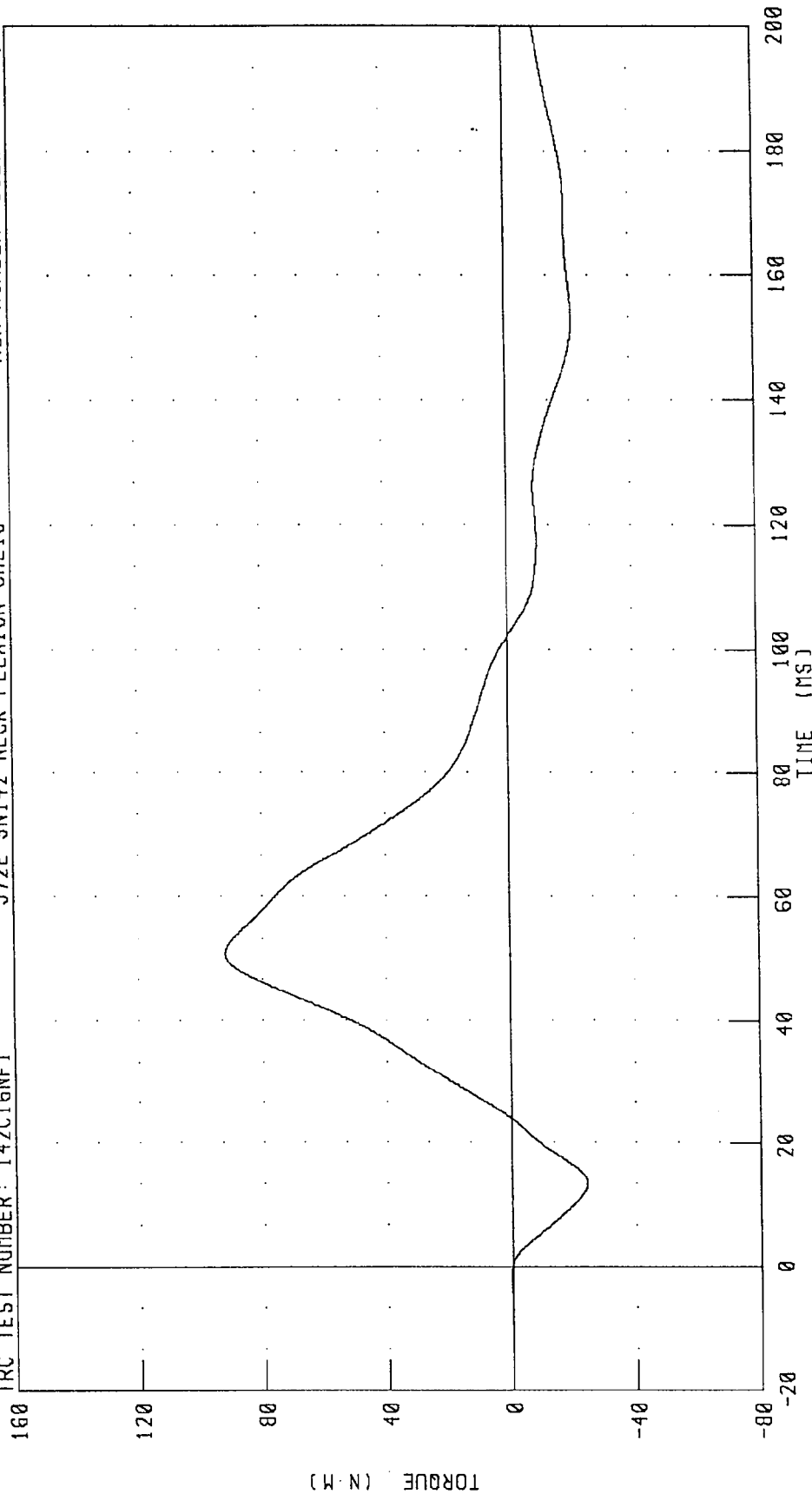
PEAK DATA: 78.13 N·M @ 50.75 MS; -33.76 N·M @ 13.88 MS

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

TRC TEST NUMBER: 142C16NF1

572E SN142 NECK FLEXION CAL16

RUN NUMBER: 102693.1050.1



PEAK DATA: 92.04 N·M @ 50.88 MS; -24.09 N·M @ 13.38 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60



## TRANSPORTATION RESEARCH CENTER INC.

## NECK EXTENSION TEST

HYBRID III

27-SEP-93

6 AXIS NECK TRANSDUCER  
TRC 142C16NE1

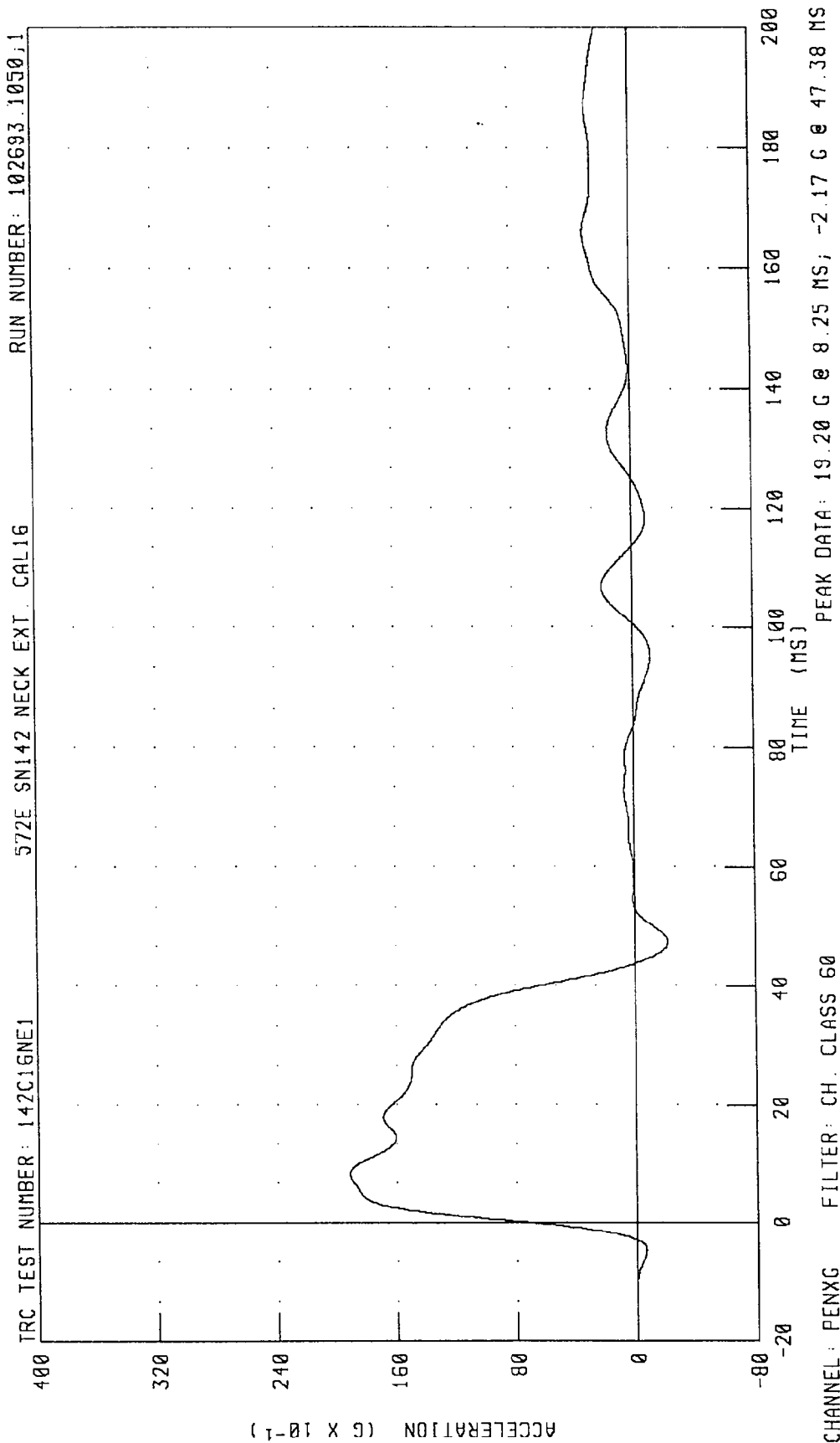
572E SN142 NECK EXT. CAL16

| TEST PARAMETER                                   |       | SPECIFICATION     | TEST RESULTS |
|--------------------------------------------------|-------|-------------------|--------------|
| TEMPERATURE                                      |       | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY                                |       | 10% - 70%         | 52.0 %       |
| IMPACT VELOCITY                                  |       | 5.95 - 6.19 M/SEC | 6.05 M/SEC   |
| PENDULUM<br>DECELERATION                         | 10 MS | 17.20 - 21.20 G   | 18.54 G      |
|                                                  | 20 MS | 14.00 - 19.00 G   | 16.35 G      |
|                                                  | 30 MS | 11.00 - 16.00 G   | 14.00 G      |
| MAX PENDULUM G                                   |       | 22 G MAX          | 19.20 G      |
| MAX PENDULUM G ABOVE 30 MS                       |       | 22 G MAX          | 13.96 G      |
| DECELERATION-TIME CURVE<br>DECAY TIME TO 5 G     |       | 38 - 46 MS        | 40.63 MS     |
| D PLANE                                          | MAX   | 81 - 106 DEG.     | 96.59 DEG.   |
| ROTATION                                         | TIME  | 72 - 82 MS        | 74.38 MS     |
| MOMENT ABOUT<br>OCCIPITAL<br>CONDYLE             | MIN   | -80.0/-52.9 NM    | -71.29 NM    |
|                                                  | TIME  | 65 - 79 MS        | 70.00 MS     |
| ROTATION ANGLE-TIME CURVE<br>DECAY TIME TO ZERO  |       | 147 - 174 MS      | 152.88 MS    |
| NEGATIVE MOMENT-TIME CURVE<br>DECAY TIME TO ZERO |       | 120 - 148 MS      | 139.25 MS    |

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
 PENDULUM DECELERATION



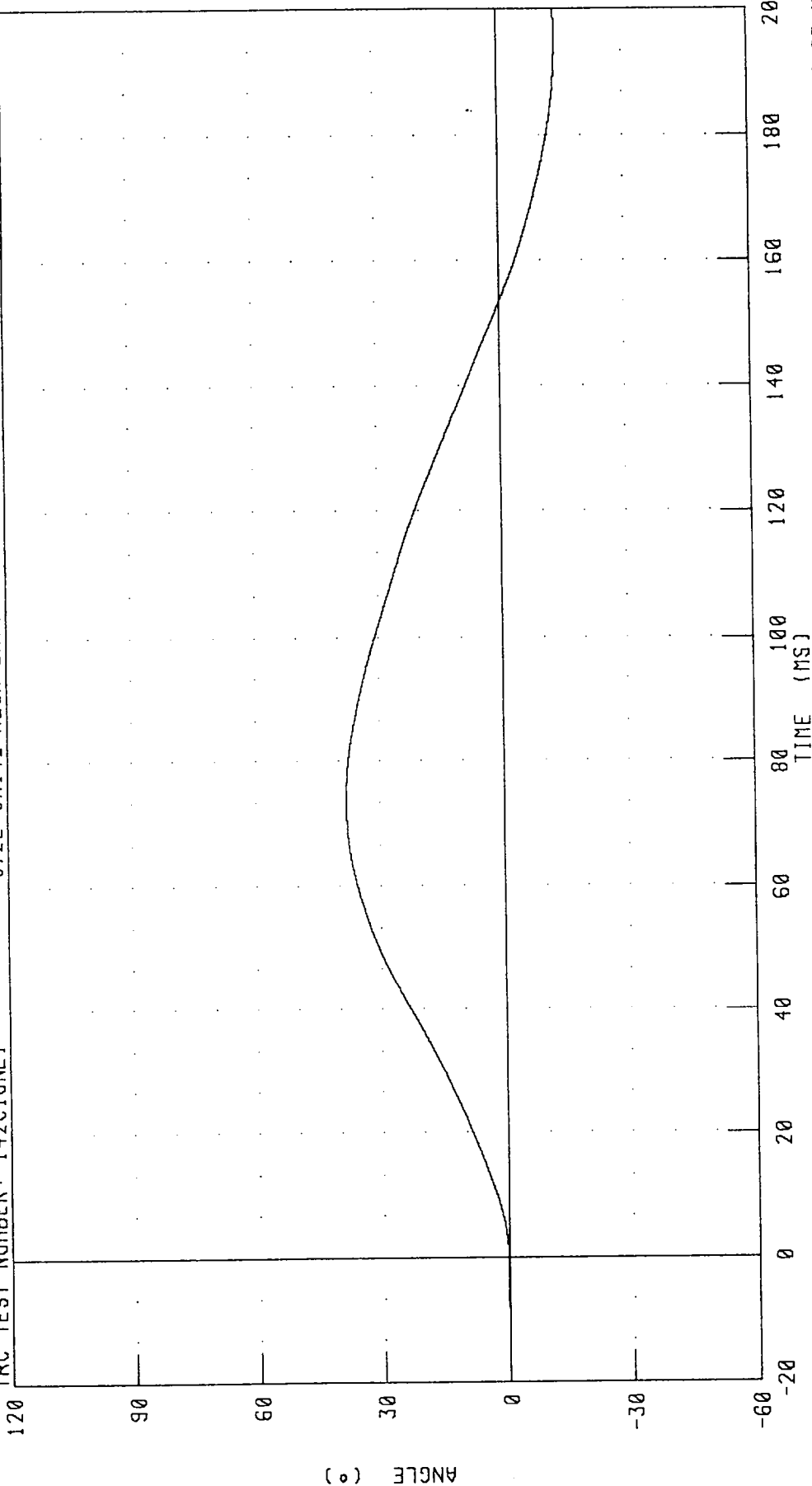
# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN142 NECK EXT. CAL16

RUN NUMBER: 102693.1050;1

TRC TEST NUMBER: 142C16NE1



PEAK DATA: 38 09 ° @ 73.75 MS, -13.83 ° @ 195.63 MS

CHANNEL: BETA FILTER: CH. CLASS 60

# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

RUN NUMBER: 102693.1050;1

IRC TEST NUMBER: 142C16NE1

572E SN142 NECK EXT. CAL16

120

90

60

30

0

-30

-60

ANGLE (°)

TIME (MS)

PEAK DATA: 58.51 ° @ 74.75 MS; -20.72 ° @ 195.88 MS

CHANNEL: THETA FILTER: CH. CLASS 60

C-20

931020

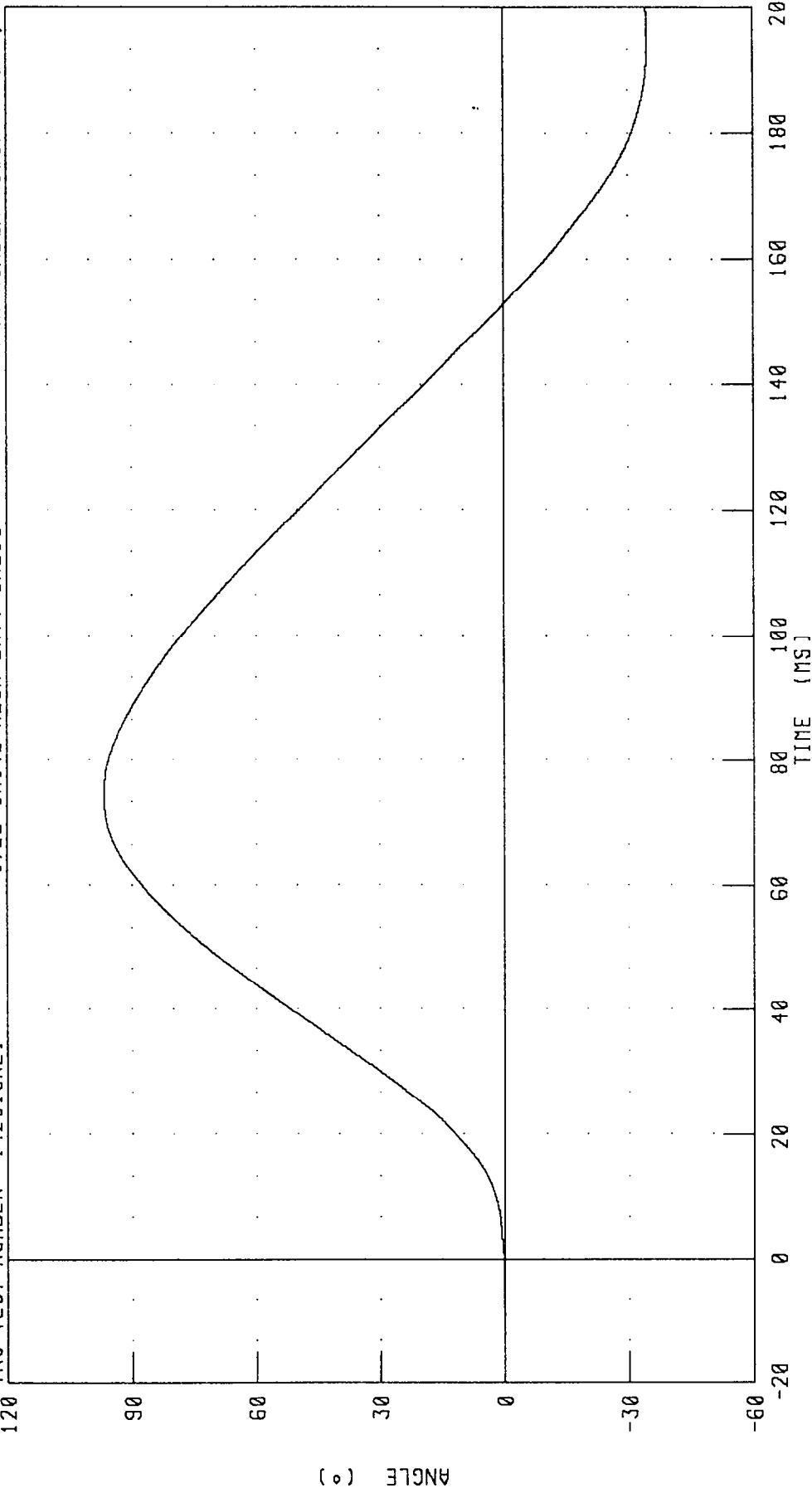
# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 142C16NE1

572E SN142 NECK EXT. CAL16

RUN NUMBER: 102693.1050;1



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 96.59 ° @ 74.38 MS; -34.55 ° @ 195.75 MS

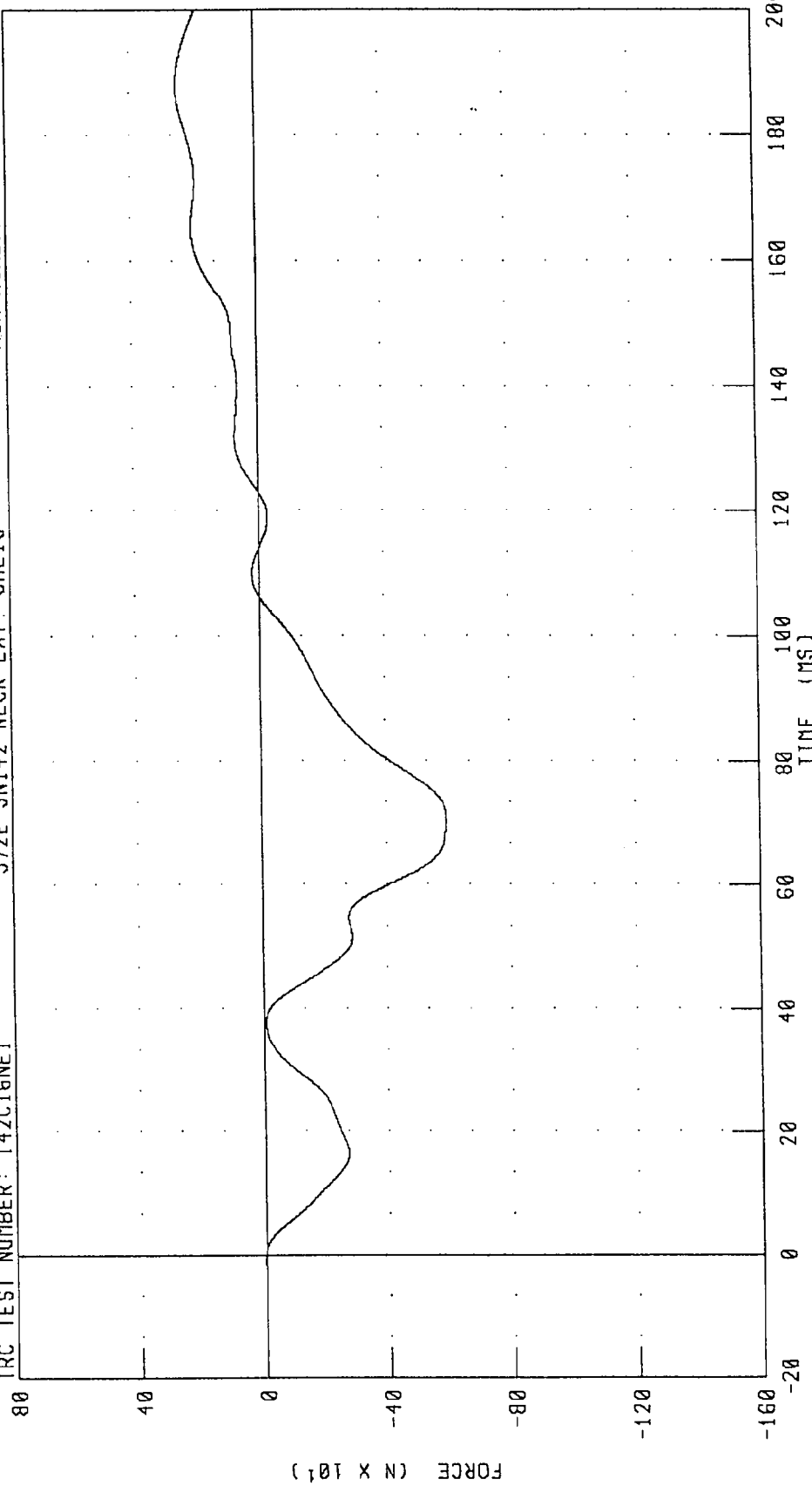
# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 142C16NE1

572E SN142 NECK EXT. CAL16

RUN NUMBER: 102693.1050,1



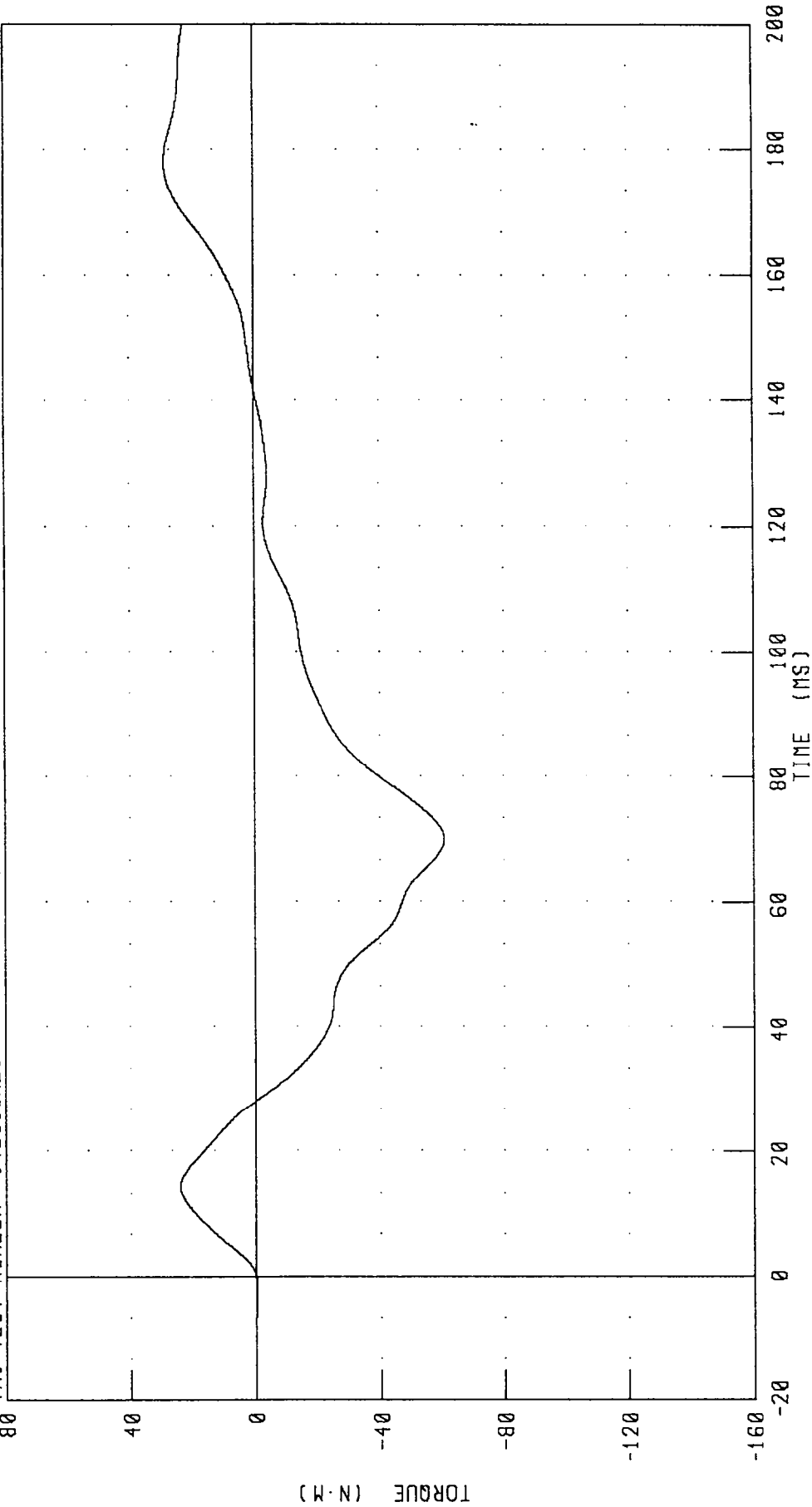
PEAK DATA: 250.58 N @ 187.88 MS; -593.99 N @ 70.63 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60

# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 142C16NE1      572E SN142 NECK EXT. CAL16      RUN NUMBER: 102693.1050.1



PEAK DATA: 28.40 N·M @ 178.00 MS; -60.74 N·M @ 70.00 MS

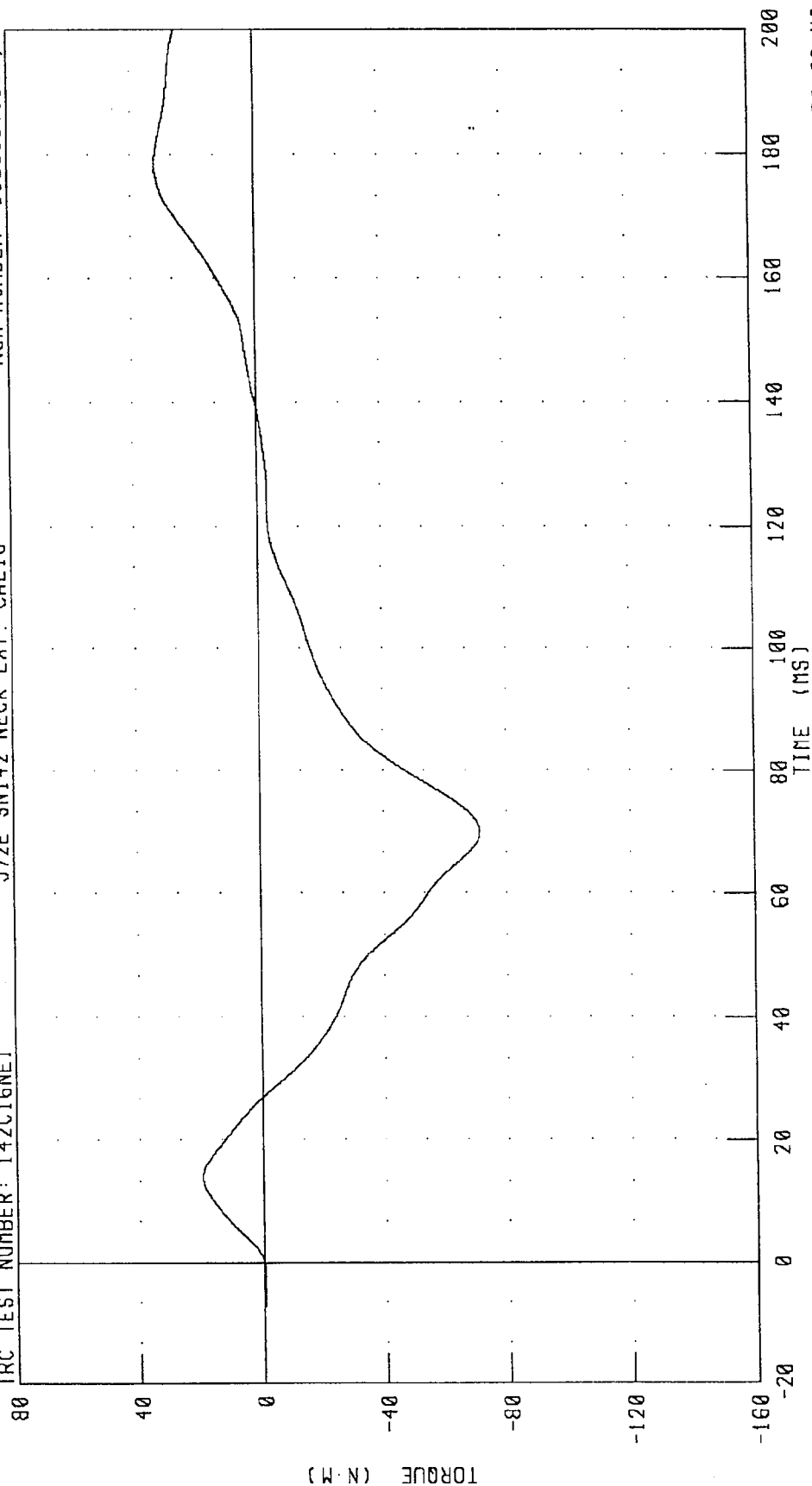
CHANNEL: NEKYM      FILTER: CH. CLASS 60

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

RUN NUMBER: 102693.1050;1

572E SN142 NECK EXT. CAL16

TRC TEST NUMBER: 142C16NE1



PEAK DATA: 32.13 N·M @ 178.50 MS; -71.29 N·M @ 70.00 MS

FILTER: CH. CLASS 60

CHANNEL: NEKOM



TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

28-SEP-93

TRC

142C16TH2

572E SN142 H.S.THORAX CAL16

| TEST PARAMETER          | HIGH SPEED TEST   | TEST RESULTS |
|-------------------------|-------------------|--------------|
|                         | SPECIFICATION     |              |
| TEMPERATURE             | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY       | 10% - 70%         | 52.0 %       |
| PENDULUM VELOCITY       | 6.59 - 6.83 M/SEC | 6.68 M/SEC   |
| MAXIMUM DEFLECTION      | 63.5 - 72.6 MM    | 68.6 MM      |
| MAXIMUM RESISTIVE FORCE | 5159 - 5894 N     | 5381. N      |
| INTERNAL HYSTERESIS     | 69% - 85%         | 75.4%        |

TEST MEETS SPECIFICATIONS

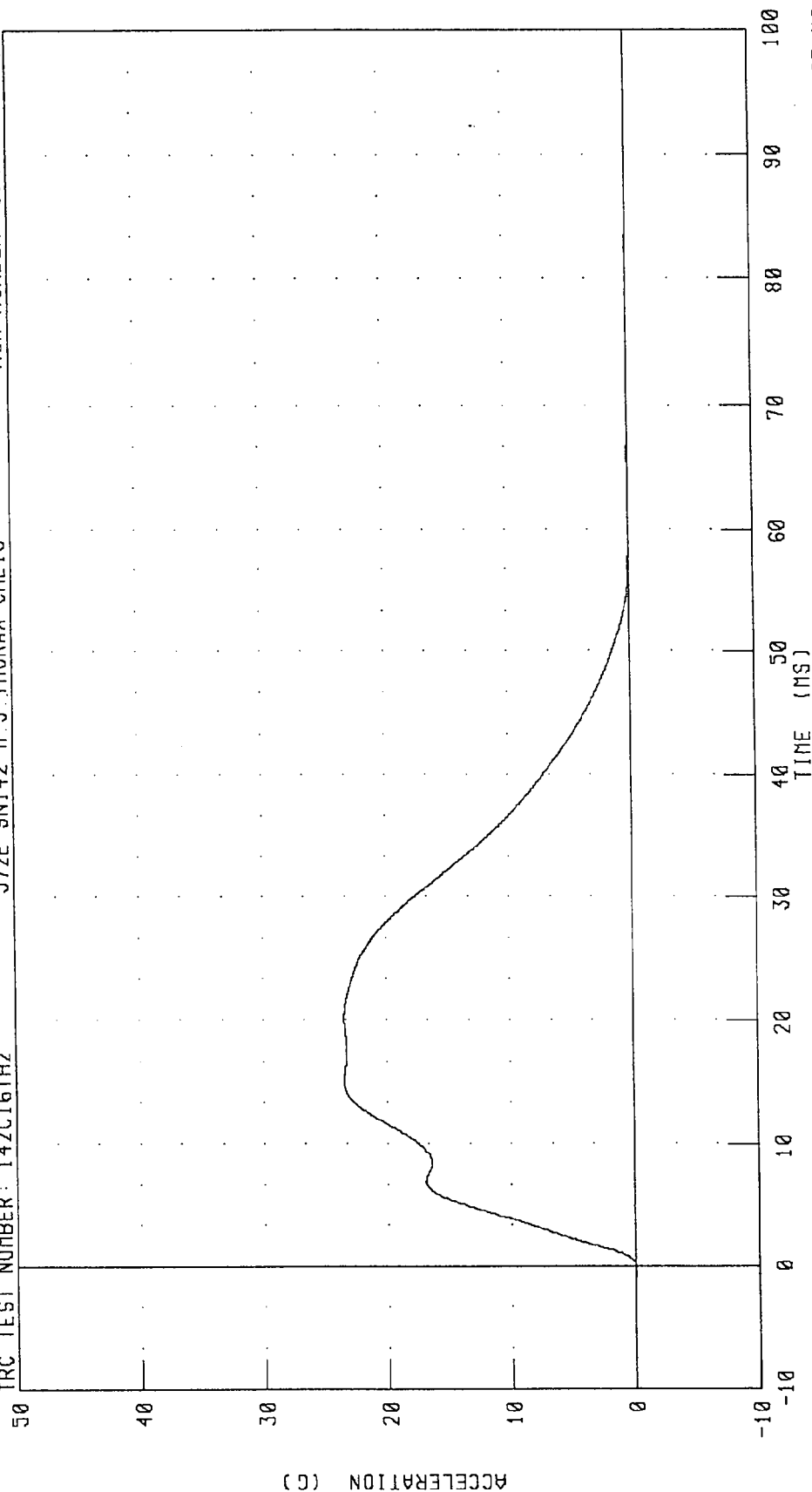
TECHNICIAN Chas. Middleton

PART 572-E HYBRID III THORAX CALIBRATION  
 PENDULUM DECELERATION

TRC TEST NUMBER: 142C16TH2

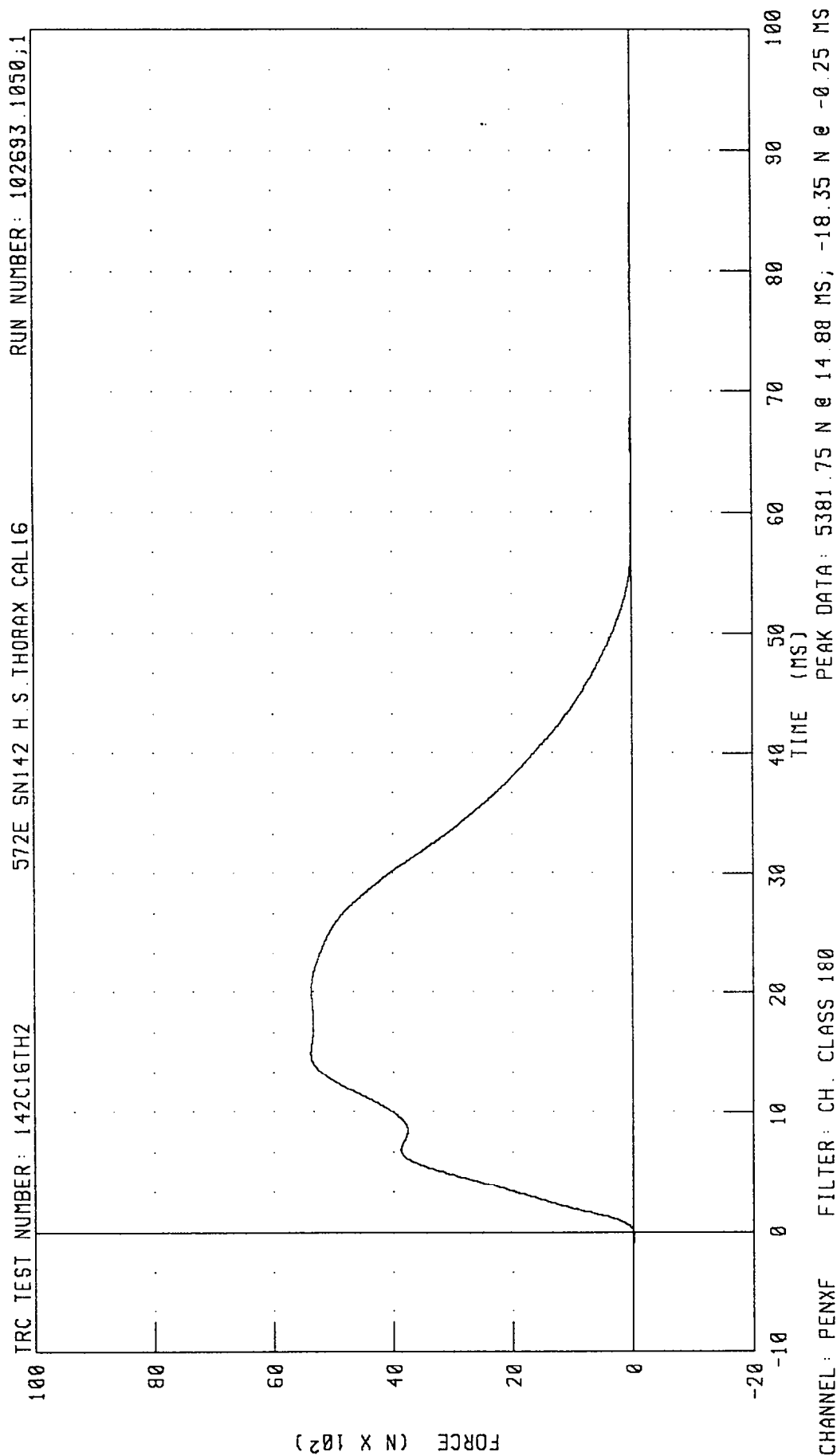
572E SN142 H S THORAX CAL16

RUN NUMBER: 102693.1050;1



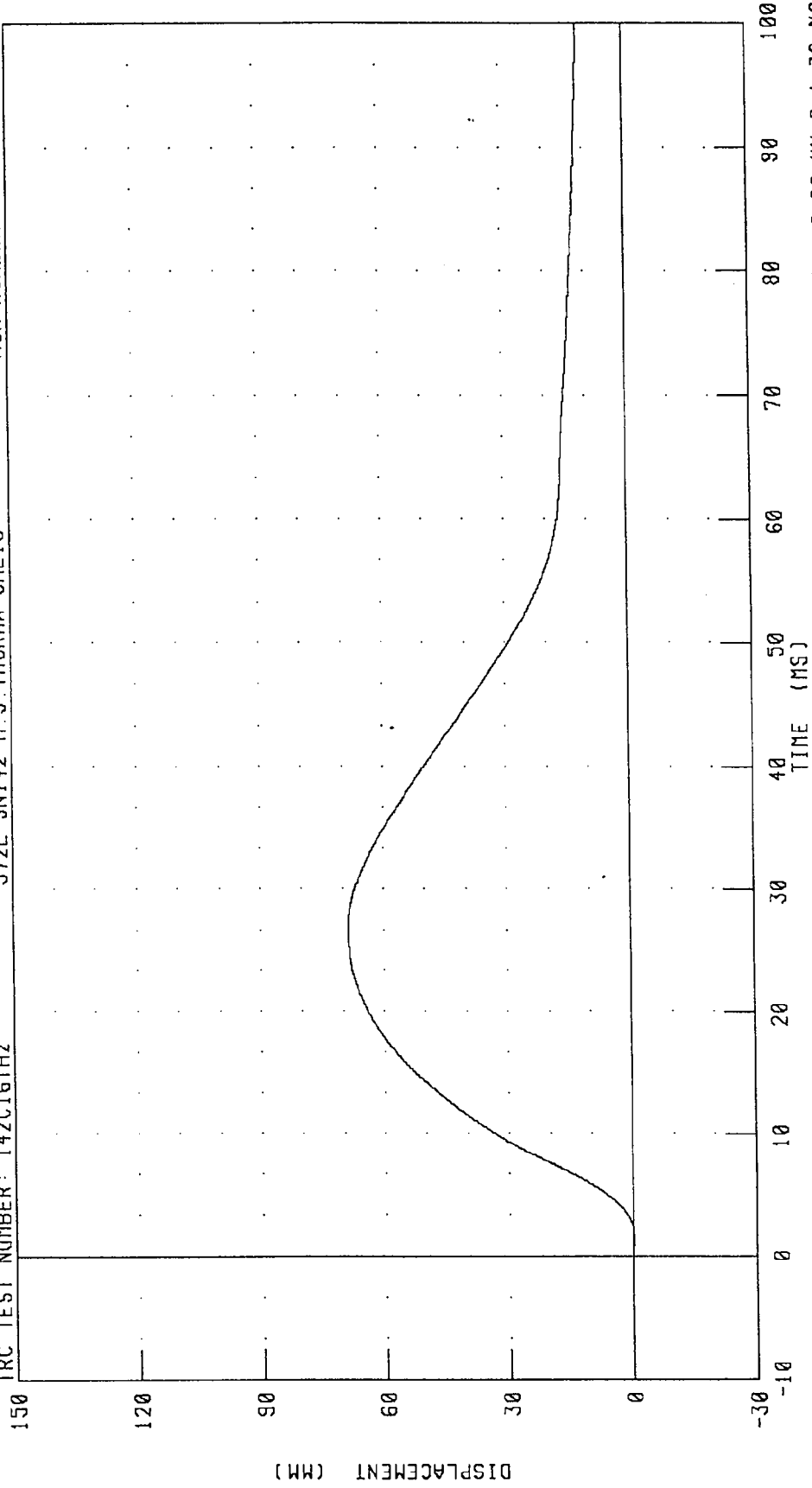
CHANNEL: PENXG FILTER: CH. CLASS 180

# PART 572-E HYBRID III THORAX CALIBRATION PENDULUM FORCE



PART 572-E HYBRID III THORAX CALIBRATION  
 STERNUM DISPLACEMENT

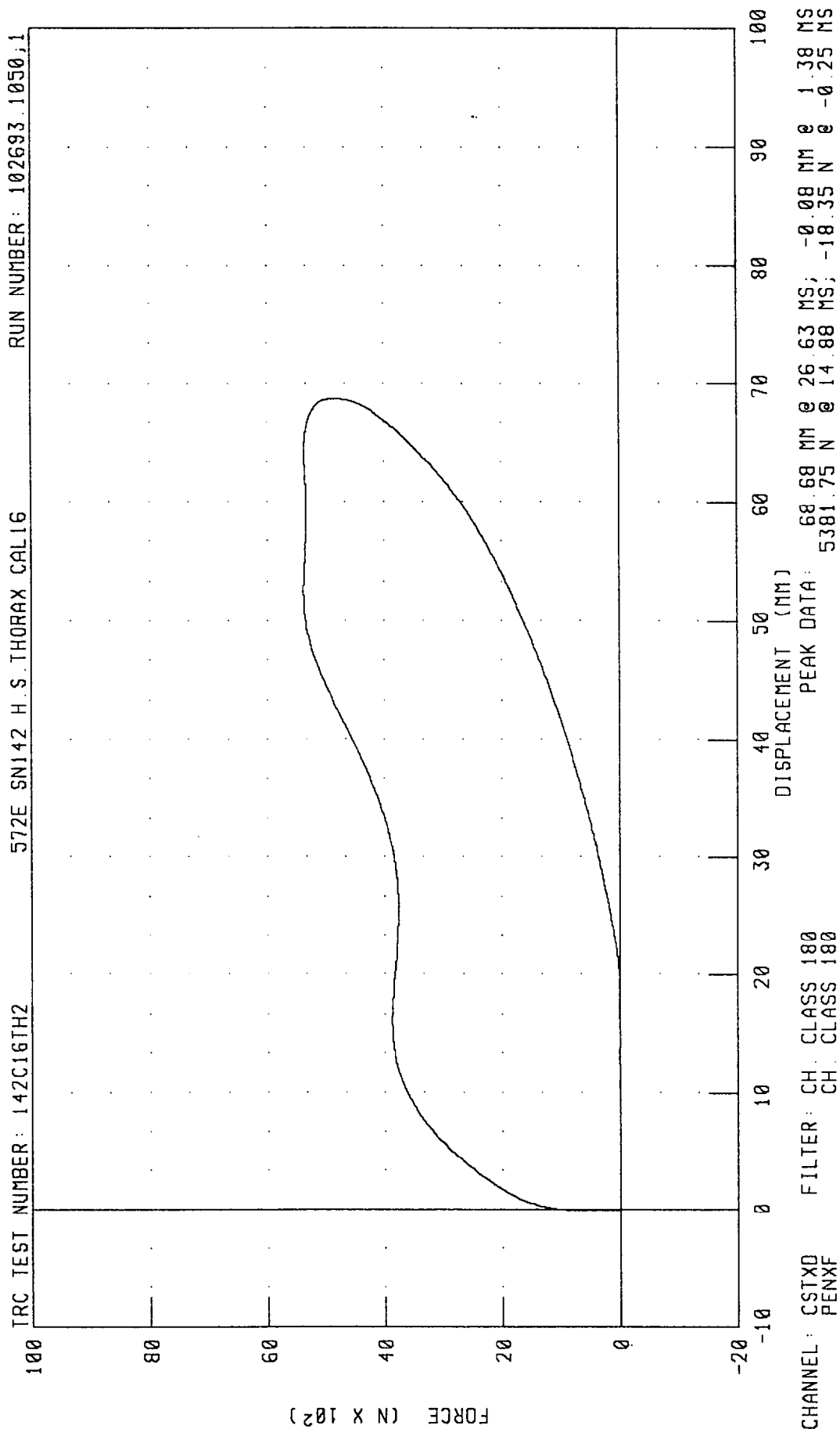
TRC TEST NUMBER: 142C16TH2 572E SN142 H.S. THORAX CAL16 RUN NUMBER: 102693.1050.1



PEAK DATA: 68.68 MM @ 26.63 MS; -0.08 MM @ 1.38 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180

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



TRANSPORTATION RESEARCH CENTER INC.

KNEE IMPACT TEST

HYBRID III

23-SEP-93

RIGHT KNEE

TRC

142C16RK1

572E SN142 RIGHT KNEE CAL 16

| TEST PARAMETER                         | SPECIFICATION           | TEST RESULTS |
|----------------------------------------|-------------------------|--------------|
| TEMPERATURE                            | 18.9-25.6 DEG. C        | 20.6 DEG. C  |
| RELATIVE HUMIDITY                      | 10% - 70%               | 64.0 %       |
| PROBE VELOCITY                         | 2.07 - 2.13 M/SEC       | 2.09 M/SEC   |
| PEAK KNEE IMPACT FORCE<br>PROBE WEIGHT | 4714 - 5783 N<br>5.0 KG | 5349.3 N     |

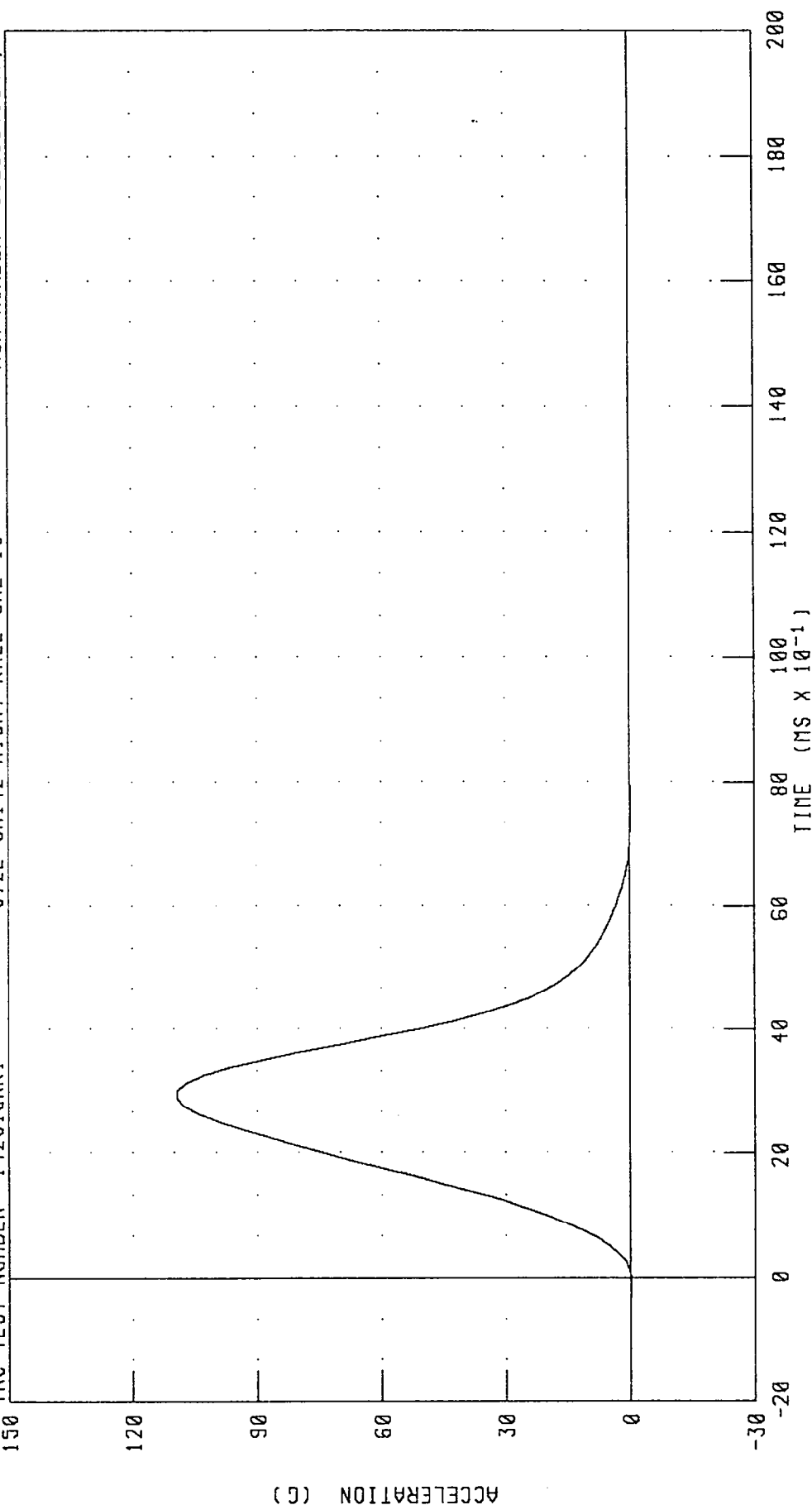
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middle Z

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

TRC TEST NUMBER: 142C16RK1 572E SN142 RIGHT KNEE CAL 16 RUN NUMBER: 102693.1050;1



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 109.33 G @ 2.88 MS; -0.15 G @ 7.50 MS

# PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN142 RIGHT KNEE CAL 16

RUN NUMBER: 102693.1050;1

TRC TEST NUMBER: 142C16RK1

75

60

45

30

15

0

-15

FORCE (N X 10<sup>2</sup>)

-20

0

20

40

60

80

100

120

140

160

180

200

TIME (MS X 10<sup>-1</sup>)

200

PEAK DATA: 5349.33 N @ 2.88 MS; -7.14 N @ 7.50 MS

CHANNEL: PENXF

FILTER: CH. CLASS 600



TRANSPORTATION RESEARCH CENTER INC.

KNEE IMPACT TEST

HYBRID III

23-SEP-93

LEFT KNEE

TRC

142C16LK1

572E SN142 LEFT KNEE CAL 16

| TEST PARAMETER         | SPECIFICATION     | TEST RESULTS |
|------------------------|-------------------|--------------|
| TEMPERATURE            | 18.9-25.6 DEG. C  | 20.6 DEG. C  |
| RELATIVE HUMIDITY      | 10% - 70%         | 64.0 %       |
| PROBE VELOCITY         | 2.07 - 2.13 M/SEC | 2.09 M/SEC   |
| PEAK KNEE IMPACT FORCE | 4714 - 5783 N     | 5622.0 N     |
| PROBE WEIGHT           | 5.0 KG            |              |

TEST MEETS SPECIFICATIONS

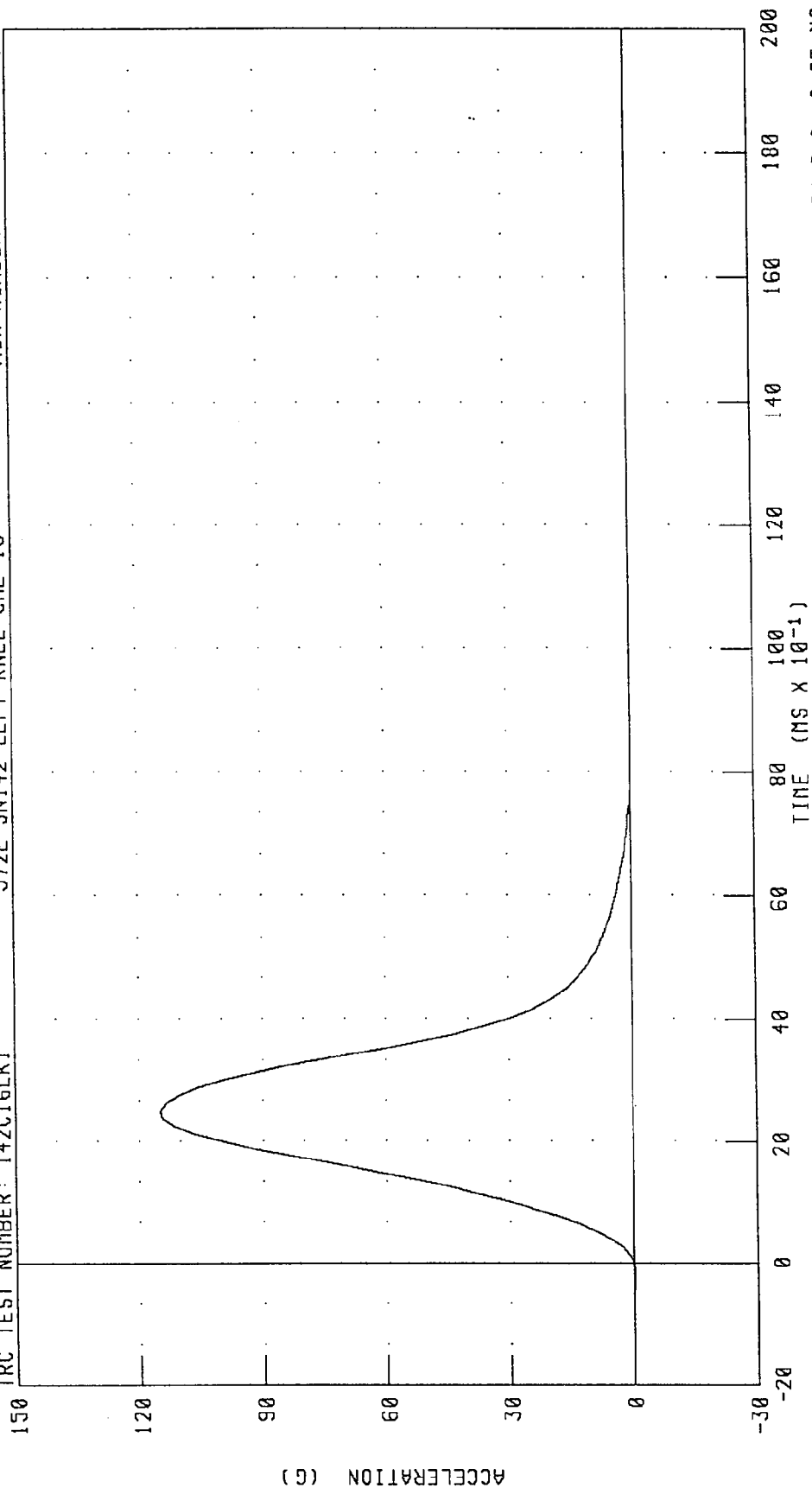
TECHNICIAN Chas. Middleton

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

TRC TEST NUMBER: 142C16LK1

572E SN142 LEFT KNEE CAL 16

RUN NUMBER: 102693.1050.1

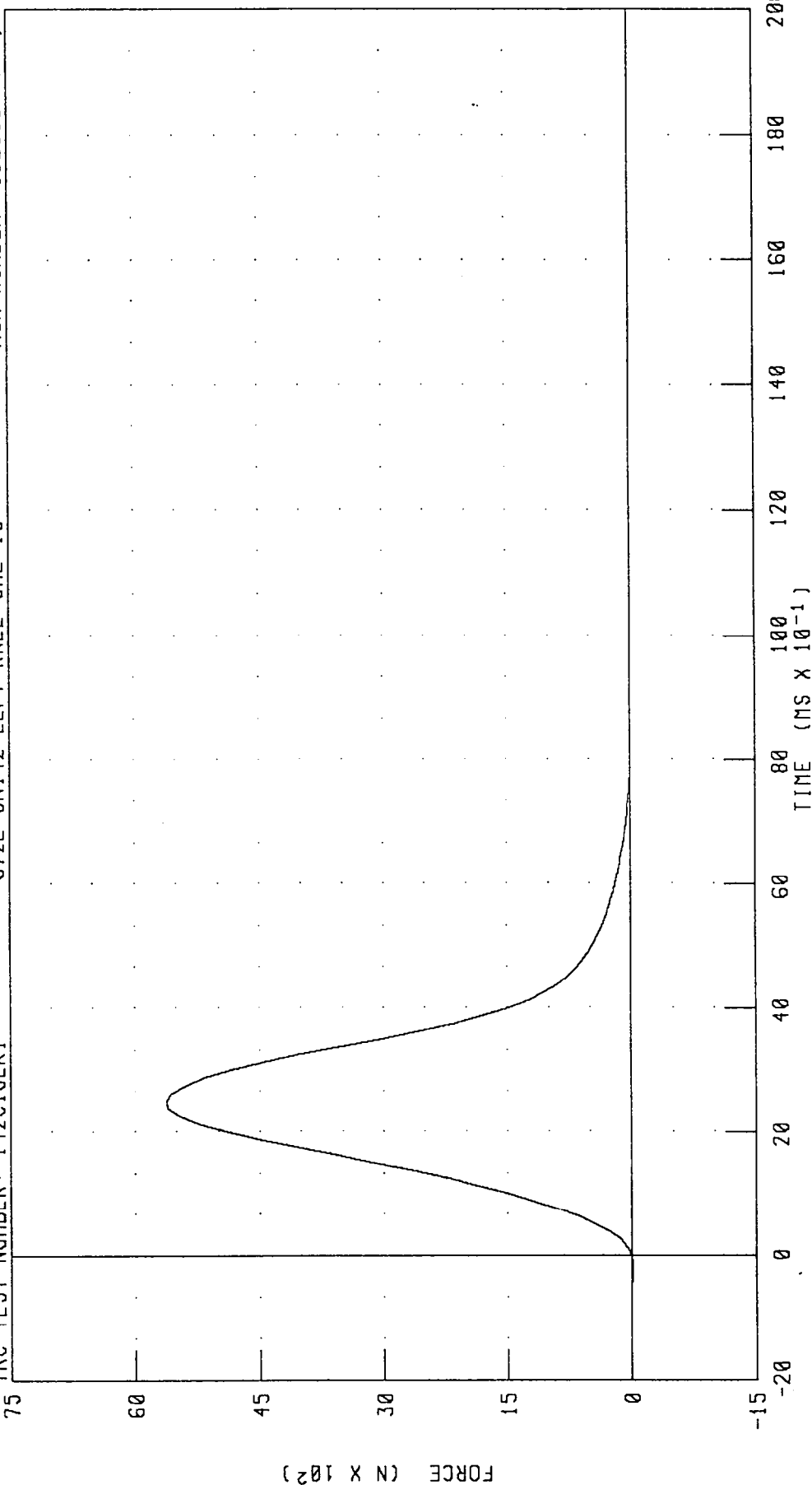


PEAK DATA: 114.90 G @ 2.50 MS; -0.24 G @ -0.25 MS

CHANNEL: PENXC FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 142C16LK1      572E SN142 LEFT KNEE CAL 16      RUN NUMBER: 102693 1050;1



CHANNEL: PENXF      FILTER: CH. CLASS 600      PEAK DATA: 5622.03 N @ 2.50 MS; -11.70 N @ -0.25 MS

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 192

TRANSPORTATION RESEARCH CENTER INC.  
HYBRID III EXTERNAL DIMENSIONS  
192 ARL

23-SEP-93

TRC 192C15ED1 572E SN192 EXT.DIMENSION CAL15

| 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      |

TEST MEETS SPECIFICATIONS

TECHNICIAN

*Chas. M. Hiddell*

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

27-SEP-93

TRC

192C15HD1

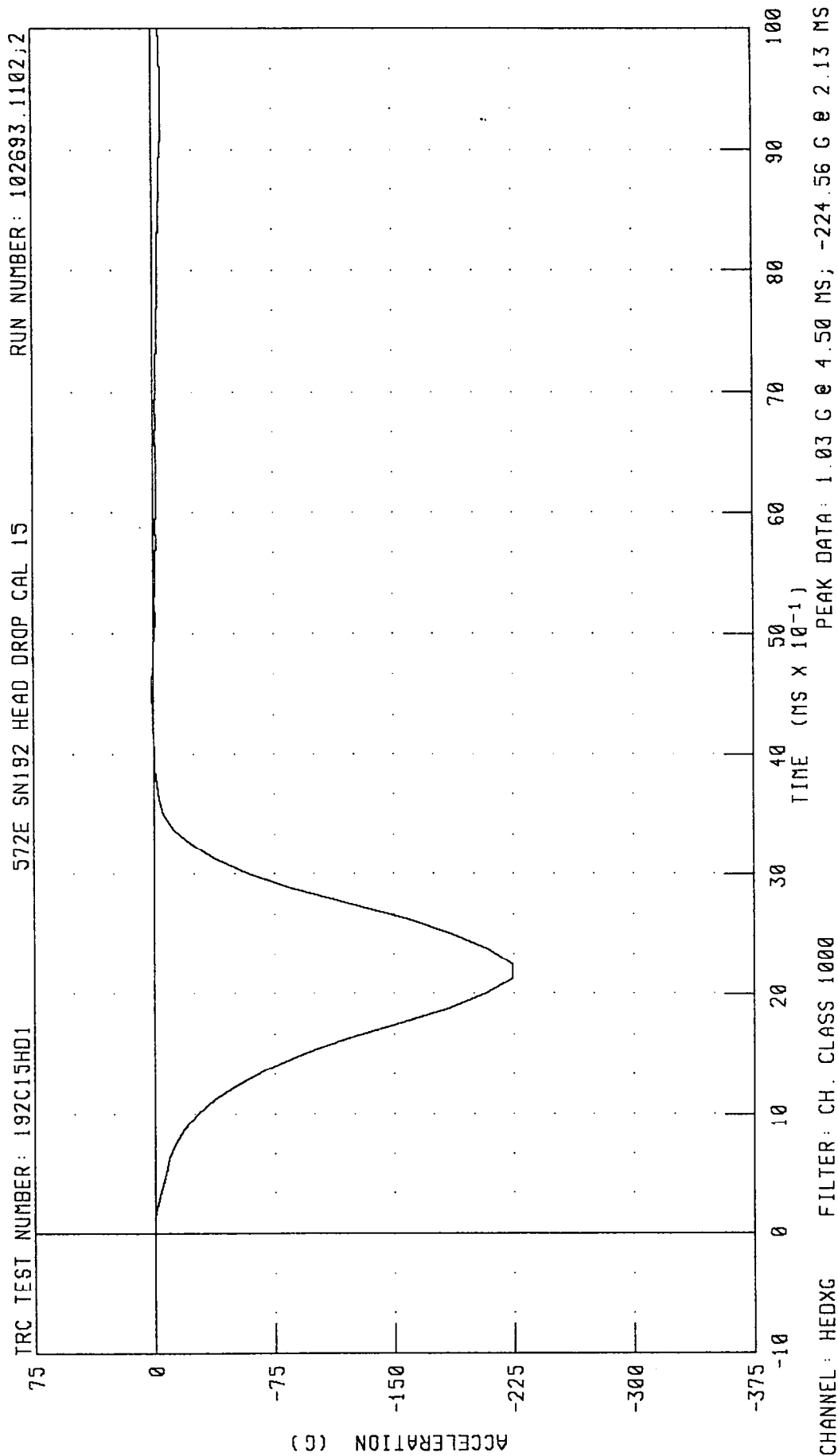
572E SN192 HEAD DROP CAL 15

| TEST PARAMETER                  | SPECIFICATION    | TEST RESULTS |
|---------------------------------|------------------|--------------|
| TEMPERATURE                     | 18.9-25.6 DEG. C | 21.1 DEG. C  |
| RELATIVE HUMIDITY               | 10% - 70%        | 52.0 %       |
| PEAK RESULTANT ACCELERATION     | 225 - 275 G      | 259.59 G     |
| PEAK LATERAL ACCELERATION       | 15 G MAX         | -5.88 G      |
| IS ACCELERATION CURVE UNIMODAL? | YES              | YES          |

TEST MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

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





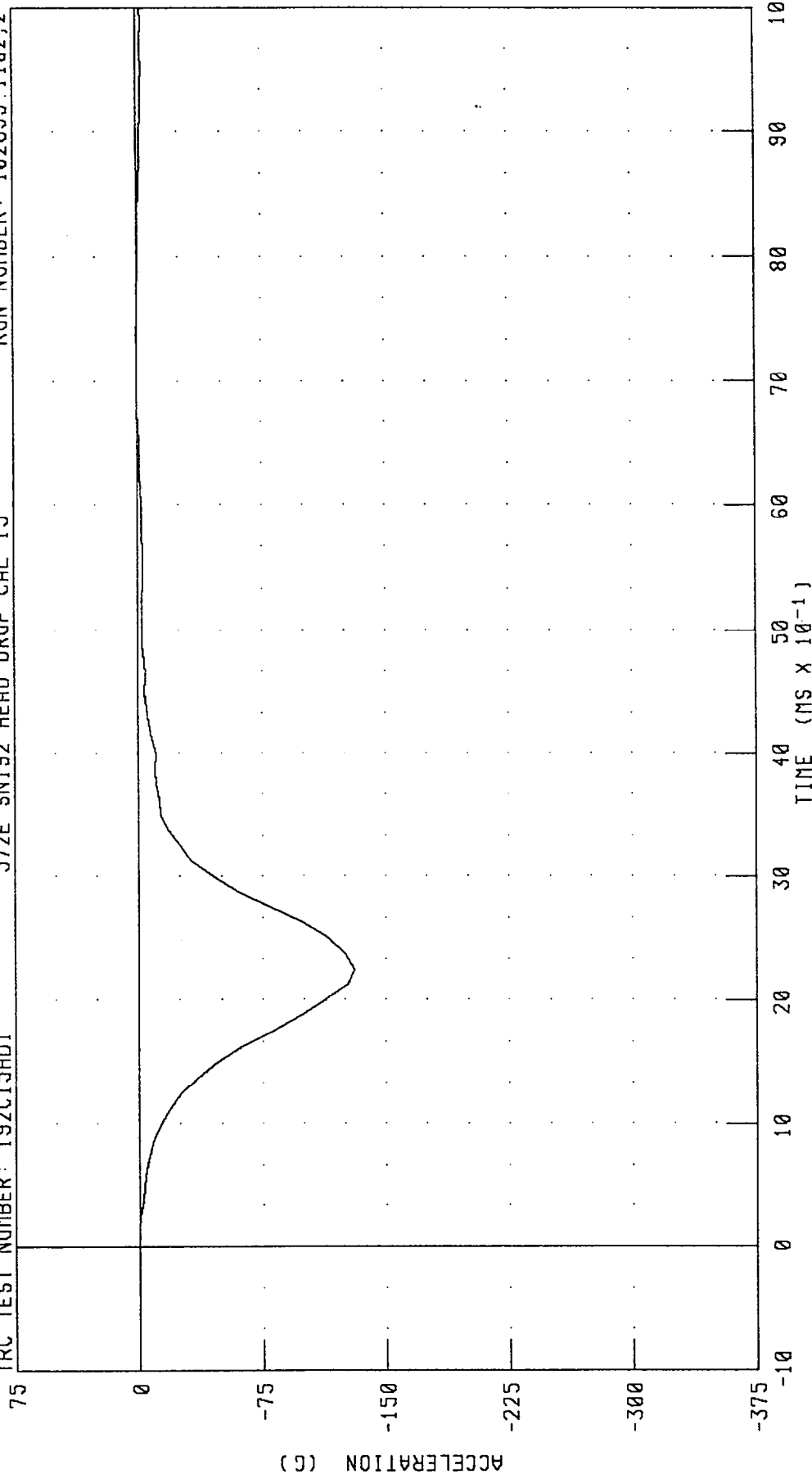


PART 572-E HYBRID III HEAD CALIBRATION  
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 192C15HD1

572E SN192 HEAD DROP CAL 15

RUN NUMBER: 102693.1102;2



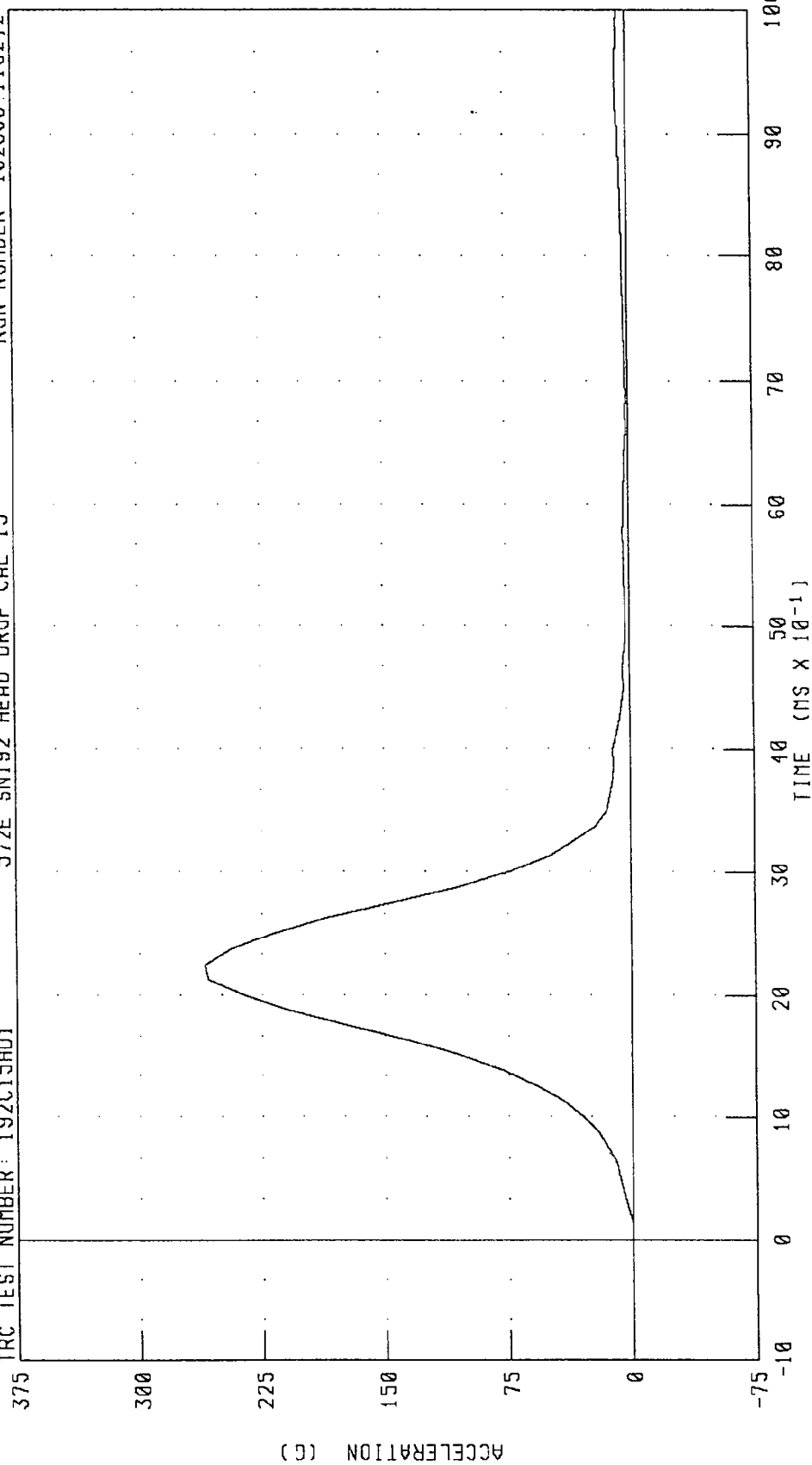
CHANNEL: HEDZG FILTER: CH. CLASS 1000

PEAK DATA: 0.26 G @ 7.38 MS; -131.07 G @ 2.25 MS

PART 572-E HYBRID III HEAD CALIBRATION  
 HEAD RESULTANT ACCELERATION  
 572E SN192 HEAD DROP CAL 15

RUN NUMBER: 102693.1102.2

TRC TEST NUMBER: 192C15HD1



PEAK DATA: 259.60 G @ 2.25 MS; 0.02 G @ -0.75 NS

CHANNEL: HEORG FILTER: CH. CLASS 1000

## TRANSPORTATION RESEARCH CENTER INC.

## NECK FLEXION TEST

HYBRID III

27-SEP-93

6 AXIS NECK TRANSDUCER  
TRC 192C15NF1

572E SN192 NECK FLEXION CAL15

| TEST PARAMETER                                   |       | SPECIFICATION     | TEST RESULTS |
|--------------------------------------------------|-------|-------------------|--------------|
| TEMPERATURE                                      |       | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY                                |       | 10% - 70%         | 52.0 %       |
| IMPACT VELOCITY                                  |       | 6.89 - 7.13 M/SEC | 6.97 M/SEC   |
| PENDULUM<br>DECELERATION                         | 10 MS | 22.50 - 27.50 G   | 25.31 G      |
|                                                  | 20 MS | 17.60 - 22.60 G   | 20.48 G      |
|                                                  | 30 MS | 12.50 - 18.50 G   | 17.42 G      |
| MAX PENDULUM G                                   |       | 29 G MAX          | 26.08 G      |
| MAX PENDULUM G ABOVE 30 MS                       |       | 29 G MAX          | 17.32 G      |
| DECELERATION-TIME CURVE<br>DECAY TIME TO 5 G     |       | 34 - 42 MS        | 36.00 MS     |
| D PLANE                                          | MAX   | 64 - 78 DEG.      | 69.98 DEG.   |
| ROTATION                                         | TIME  | 57 - 64 MS        | 57.88 MS     |
| MOMENT ABOUT<br>OCCIPITAL<br>CONDYLE             | MAX   | 88.2 - 108.5 NM   | 90.38 NM     |
|                                                  | TIME  | 47 - 58 MS        | 48.63 MS     |
| ROTATION ANGLE-TIME CURVE<br>DECAY TIME TO ZERO  |       | 113 - 128 MS      | 114.88 MS    |
| POSITIVE MOMENT-TIME CURVE<br>DECAY TIME TO ZERO |       | 97 - 107 MS       | 103.63 MS    |

TEST MEETS SPECIFICATIONS

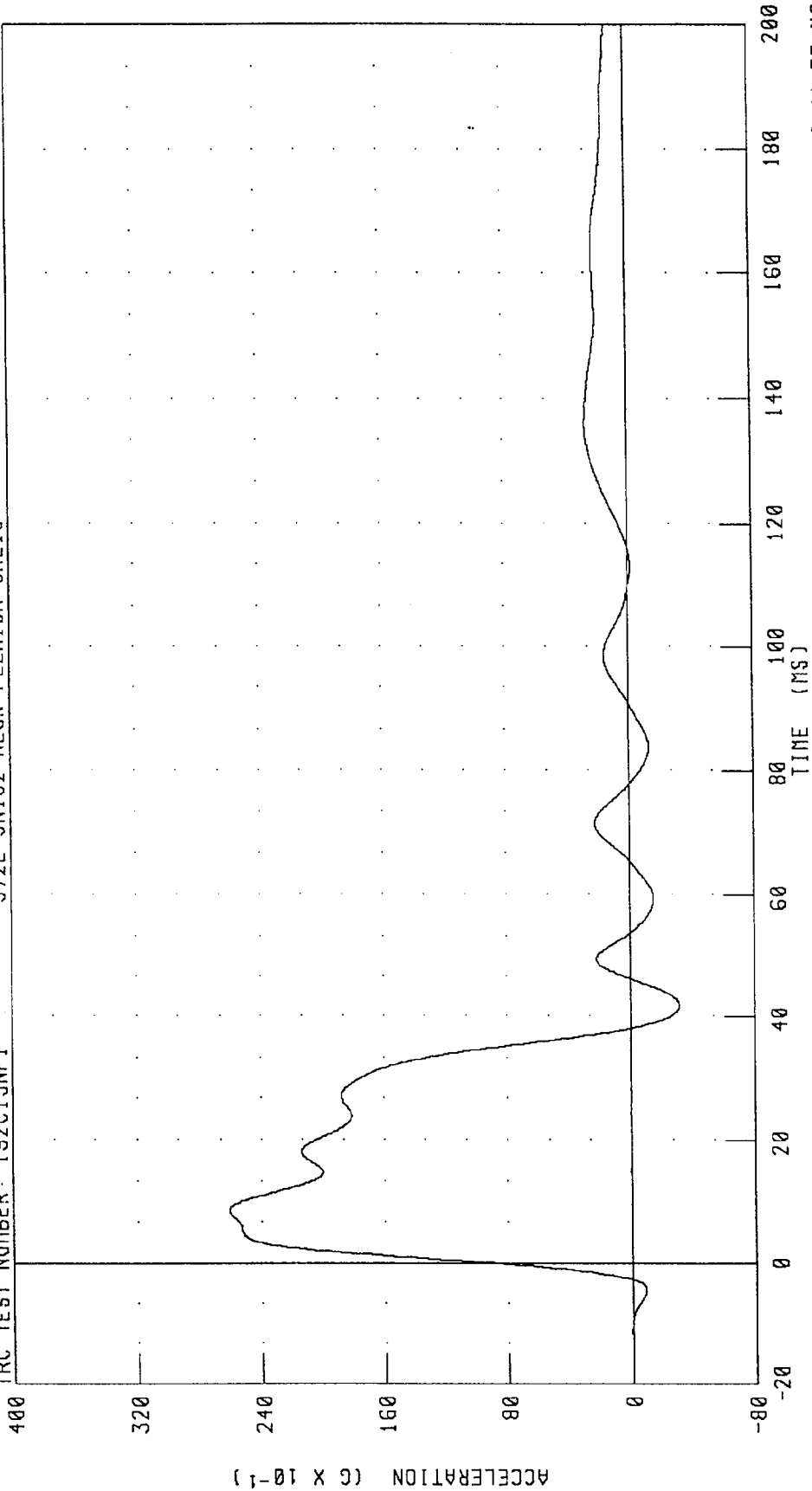
TECHNICIAN

Chas. Middleton

# PART 572-E HYBRID III NECK FLEXION CALIBRATION

## PENDULUM DECELERATION

TRC TEST NUMBER: 192C15NF1 572E SN192 NECK FLEXION CAL15 RUN NUMBER: 102693.1102.2



PEAK DATA: 26.08 G @ 8.63 MS; -3.12 G @ 41.75 MS

CHANNEL: PENXG FILTER: CH. CLASS 60

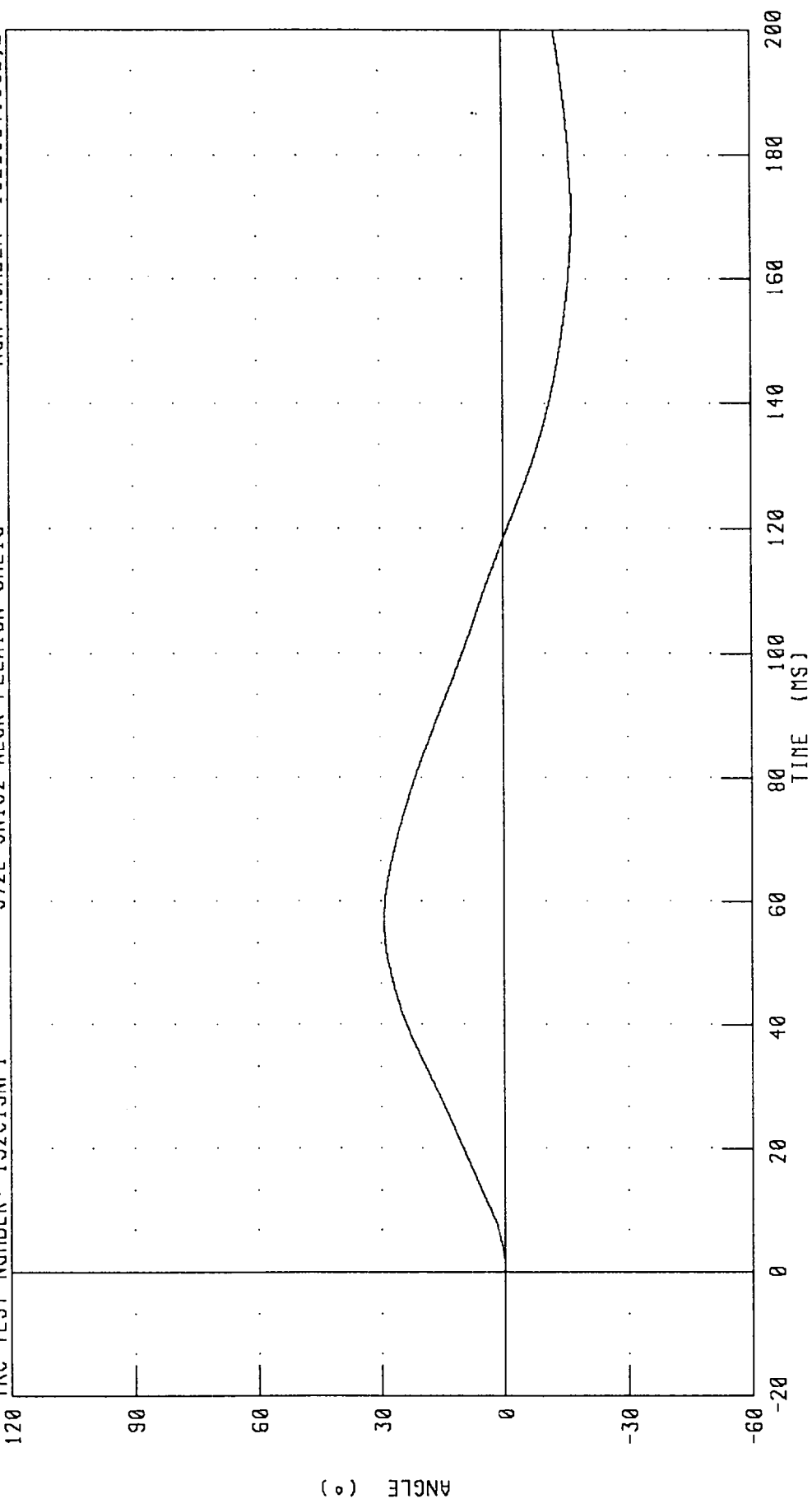
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 192C15NF1

572E SN192 NECK FLEXION CAL15

RUN NUMBER: 102693.1102;2



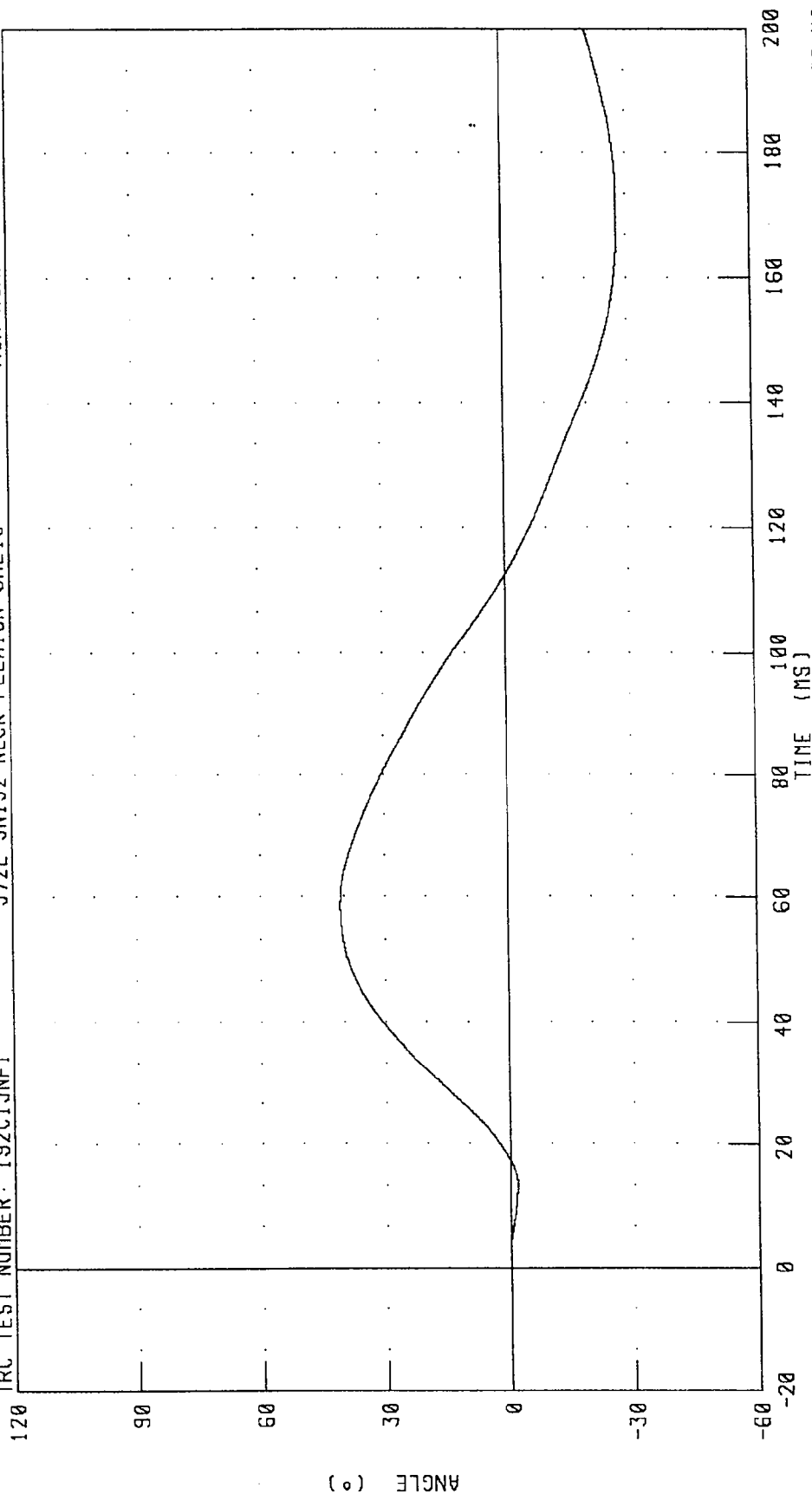
CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 29.19 ° @ 57.00 MS; -16.70 ° @ 170.25 MS

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

TRC TEST NUMBER: 192C15NF1 RUN NUMBER: 102693.1102;2

572E SNI92 NECK FLEXION CAL15



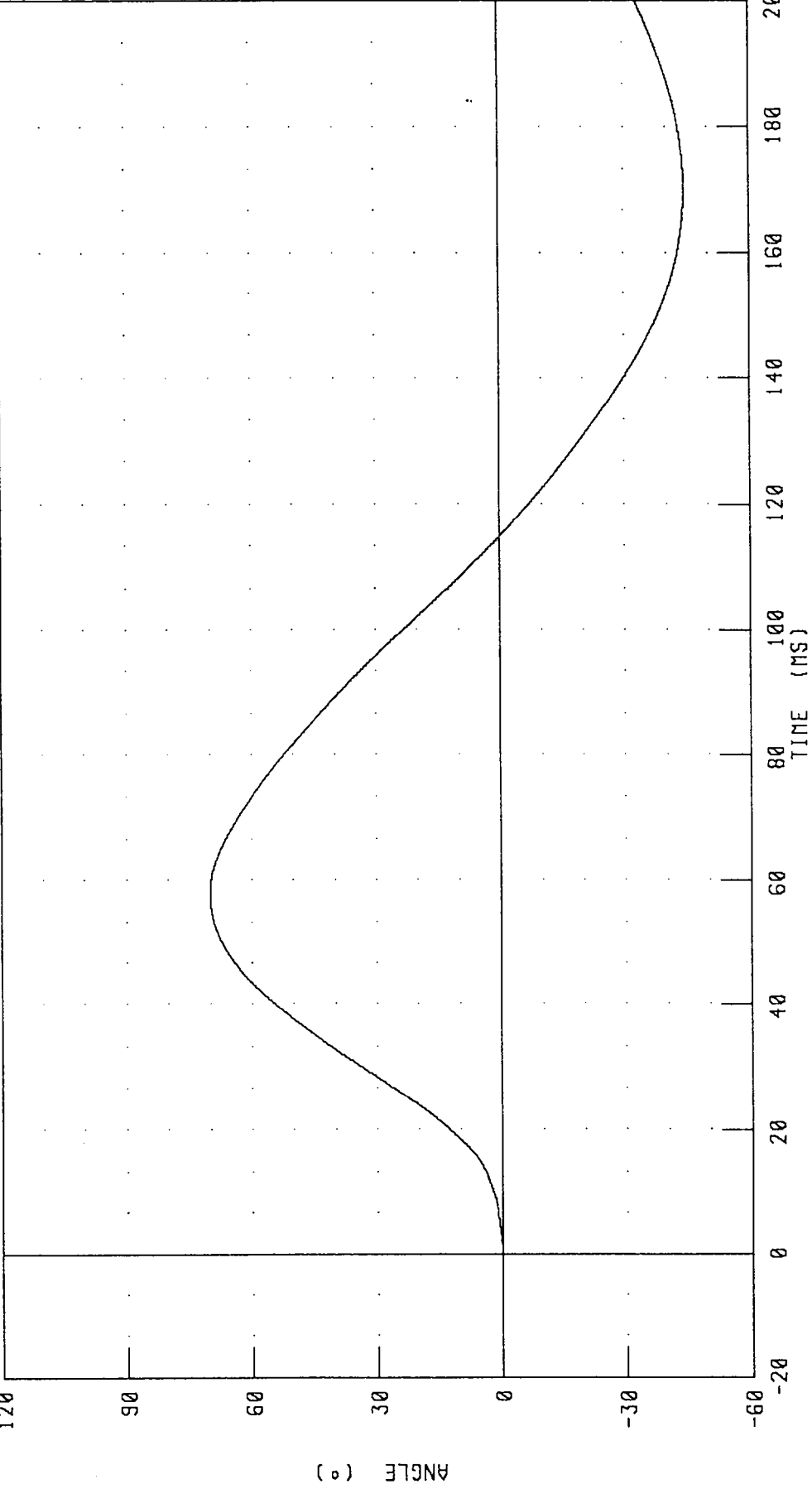
PEAK DATA: 40.82 ° @ 58.50 MS; -27.67 ° @ 172.75 MS

CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 192C15NF1 572E SN192 NECK FLEXION CAL15 RUN NUMBER: 102693.1102;2



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 69.99 ° @ 57.88 MS; -44.36 ° @ 170.38 MS

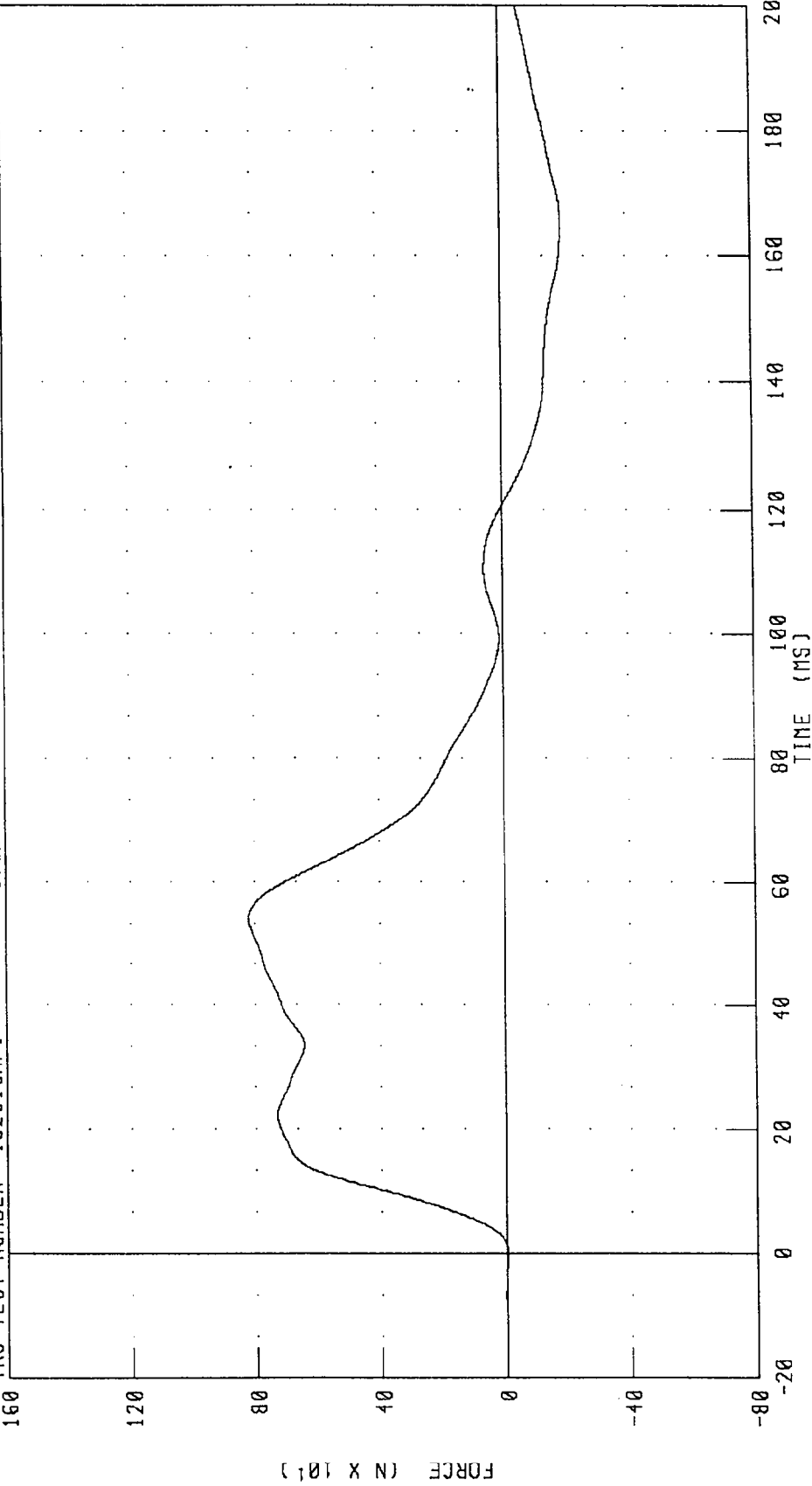
# PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

RUN NUMBER: 102693.1102;2

572E SN192 NECK FLEXION CAL15

TRC TEST NUMBER: 192C15NF1



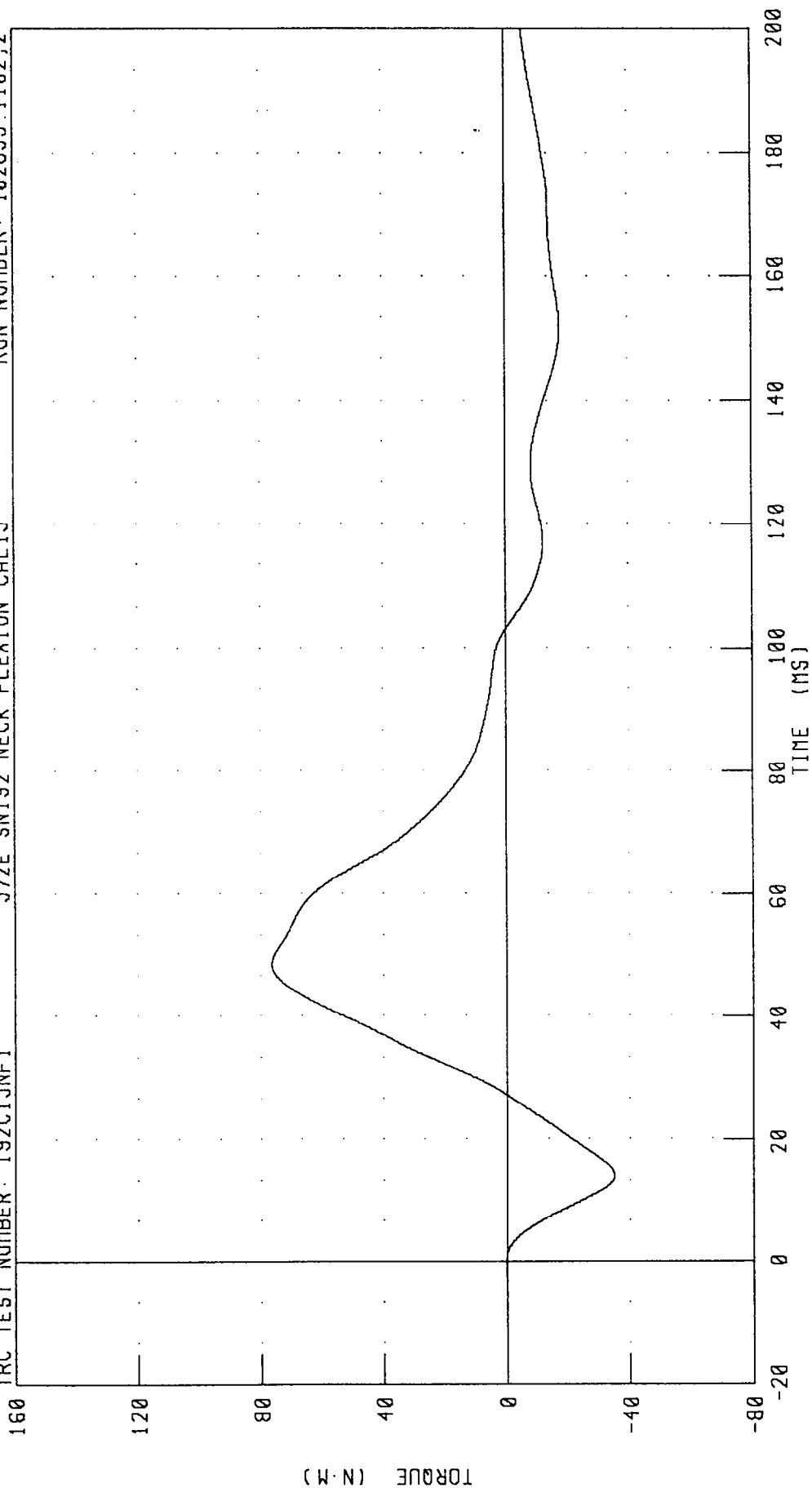
PEAK DATA: 820.38 N @ 54.00 MS; -192.22 N @ 165.13 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60



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

TRC TEST NUMBER: 192C15NF1 572E SN192 NECK FLEXION CAL15 RUN NUMBER: 102693.1102;2



PEAK DATA: 76.44 N·M @ 48.50 MS; -34.83 N·M @ 14.00 MS

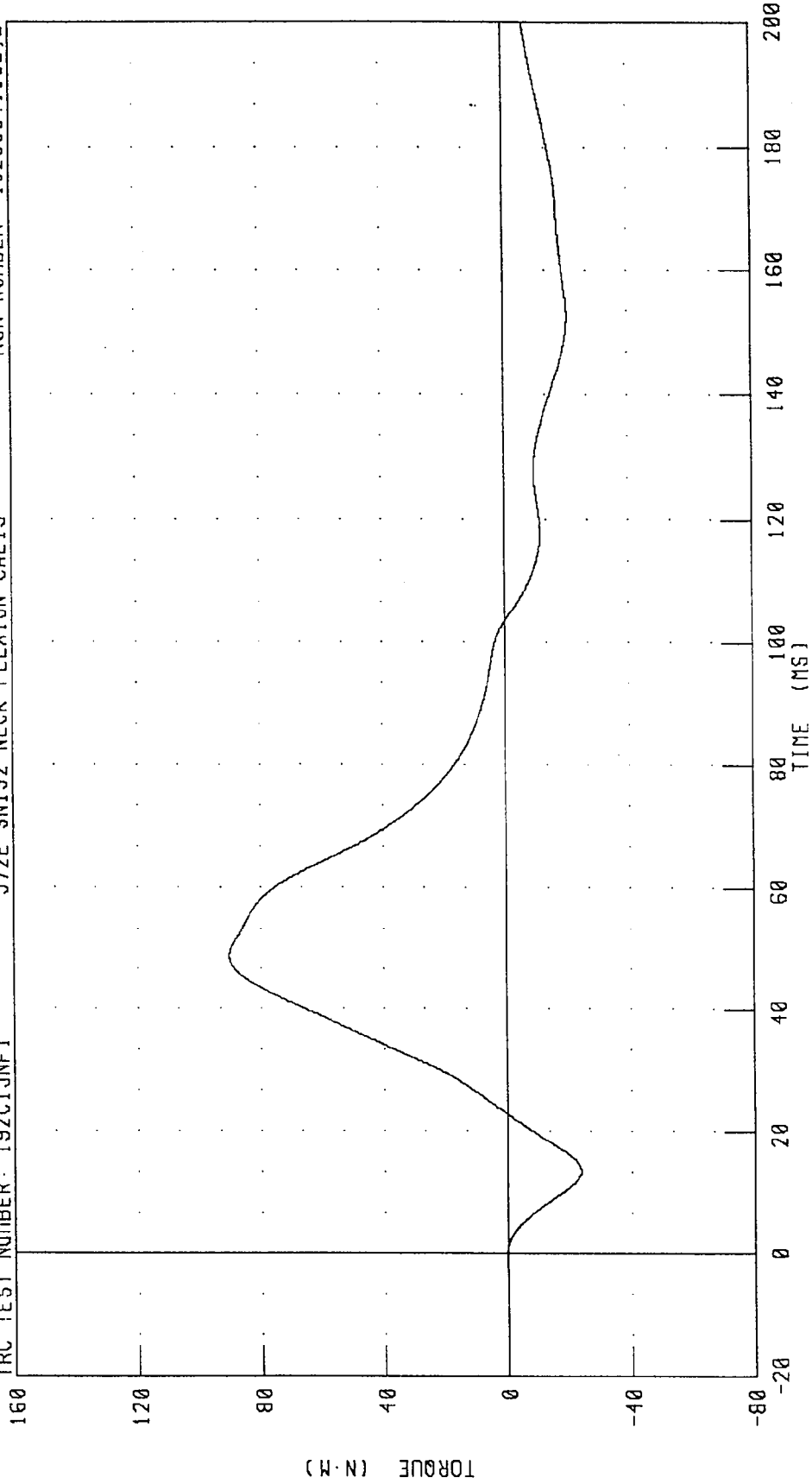
CHANNEL: NEKYM FILTER: CH. CLASS 60

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

RUN NUMBER: 102693.1102,2

TRC TEST NUMBER: 192C15NF1

572E SN192 NECK FLEXION CAL15



PEAK DATA: 90.38 N·M @ 48.63 MS; -23.59 N·M @ 13.50 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

## TRANSPORTATION RESEARCH CENTER INC.

## NECK EXTENSION TEST

HYBRID III

27-SEP-93

6 AXIS NECK TRANSDUCER  
TRC 192C15NE1

572E SN192 NECK EXT. CAL15

| TEST PARAMETER                                   |       | SPECIFICATION     | TEST RESULTS |
|--------------------------------------------------|-------|-------------------|--------------|
| TEMPERATURE                                      |       | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY                                |       | 10% - 70%         | 52.0 %       |
| IMPACT VELOCITY                                  |       | 5.95 - 6.19 M/SEC | 6.00 M/SEC   |
| PENDULUM<br>DECELERATION                         | 10 MS | 17.20 - 21.20 G   | 18.54 G      |
|                                                  | 20 MS | 14.00 - 19.00 G   | 16.28 G      |
|                                                  | 30 MS | 11.00 - 16.00 G   | 13.38 G      |
| MAX PENDULUM G                                   |       | 22 G MAX          | 19.28 G      |
| MAX PENDULUM G ABOVE 30 MS                       |       | 22 G MAX          | 13.34 G      |
| DECELERATION-TIME CURVE<br>DECAY TIME TO 5 G     |       | 38 - 46 MS        | 41.25 MS     |
| D PLANE                                          | MAX   | 81 - 106 DEG.     | 90.41 DEG.   |
| ROTATION                                         | TIME  | 72 - 82 MS        | 75.38 MS     |
| MOMENT ABOUT<br>OCCIPITAL<br>CONDYLE             | MIN   | -80.0/-52.9 NM    | -56.79 NM    |
|                                                  | TIME  | 65 - 79 MS        | 71.13 MS     |
| ROTATION ANGLE-TIME CURVE<br>DECAY TIME TO ZERO  |       | 147 - 174 MS      | 156.63 MS    |
| NEGATIVE MOMENT-TIME CURVE<br>DECAY TIME TO ZERO |       | 120 - 148 MS      | 138.00 MS    |

TEST MEETS SPECIFICATIONS

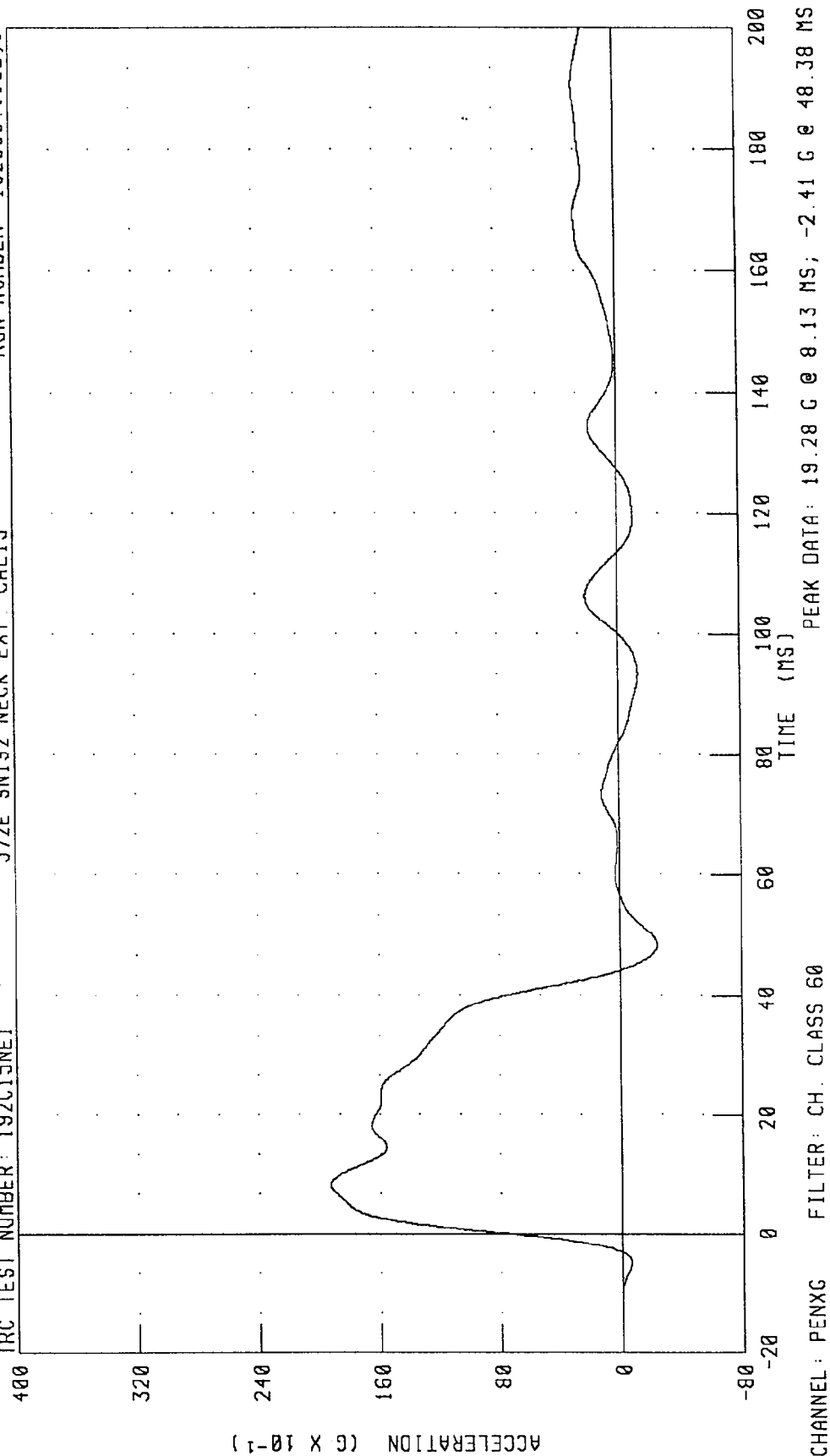
TECHNICIAN

Chas. Middleton

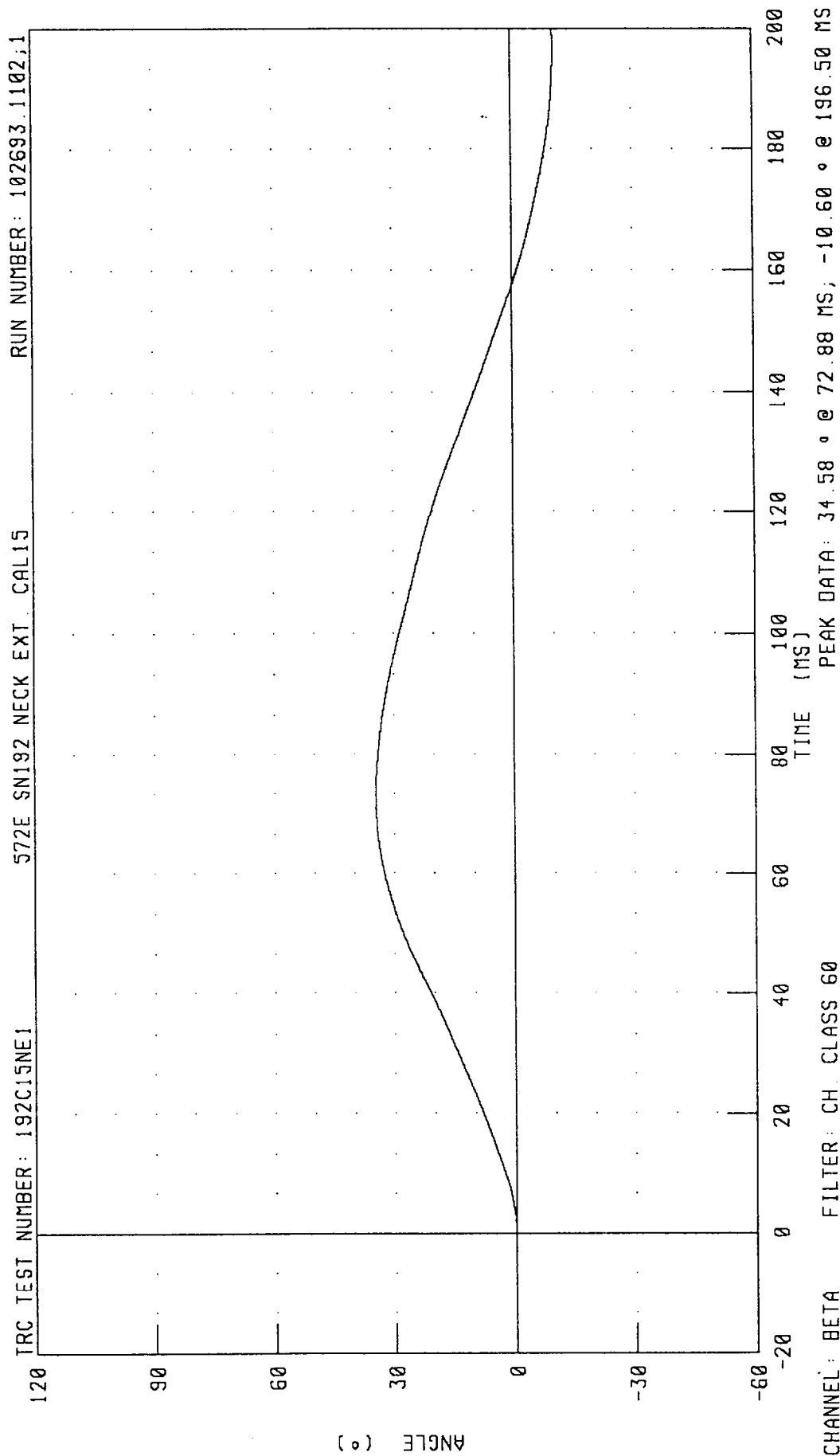
# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

## PENDULUM DECELERATION

TRC TEST NUMBER: 192C15NE1 572E SN192 NECK EXT. CAL15 RUN NUMBER: 102693.1102;1

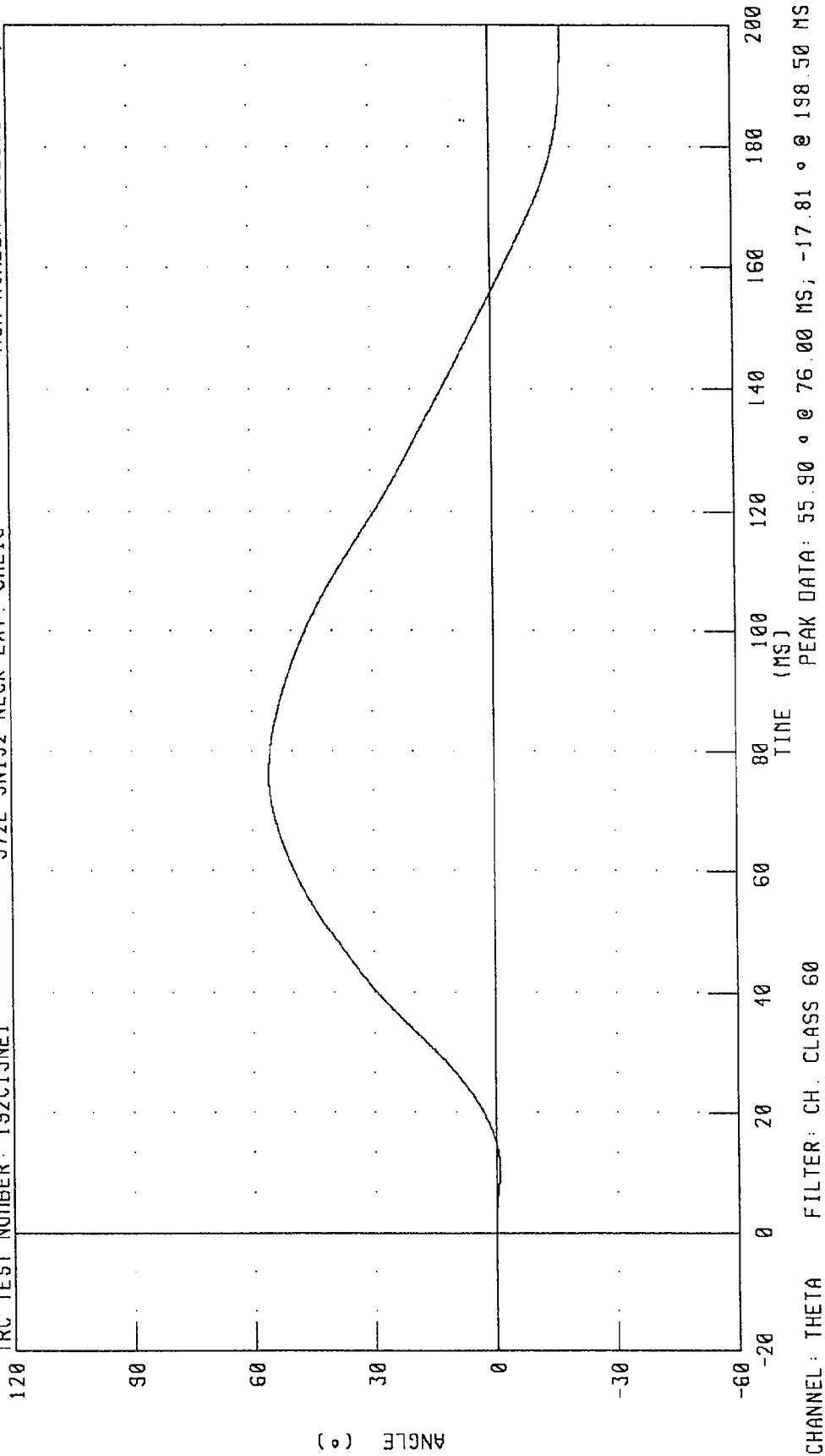


PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
 ROTATION ABOUT BASE OF NECK



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

TRC TEST NUMBER: 192C15NE1      572E SN192 NECK EXT. CAL15      RUN NUMBER: 102693.1102;1

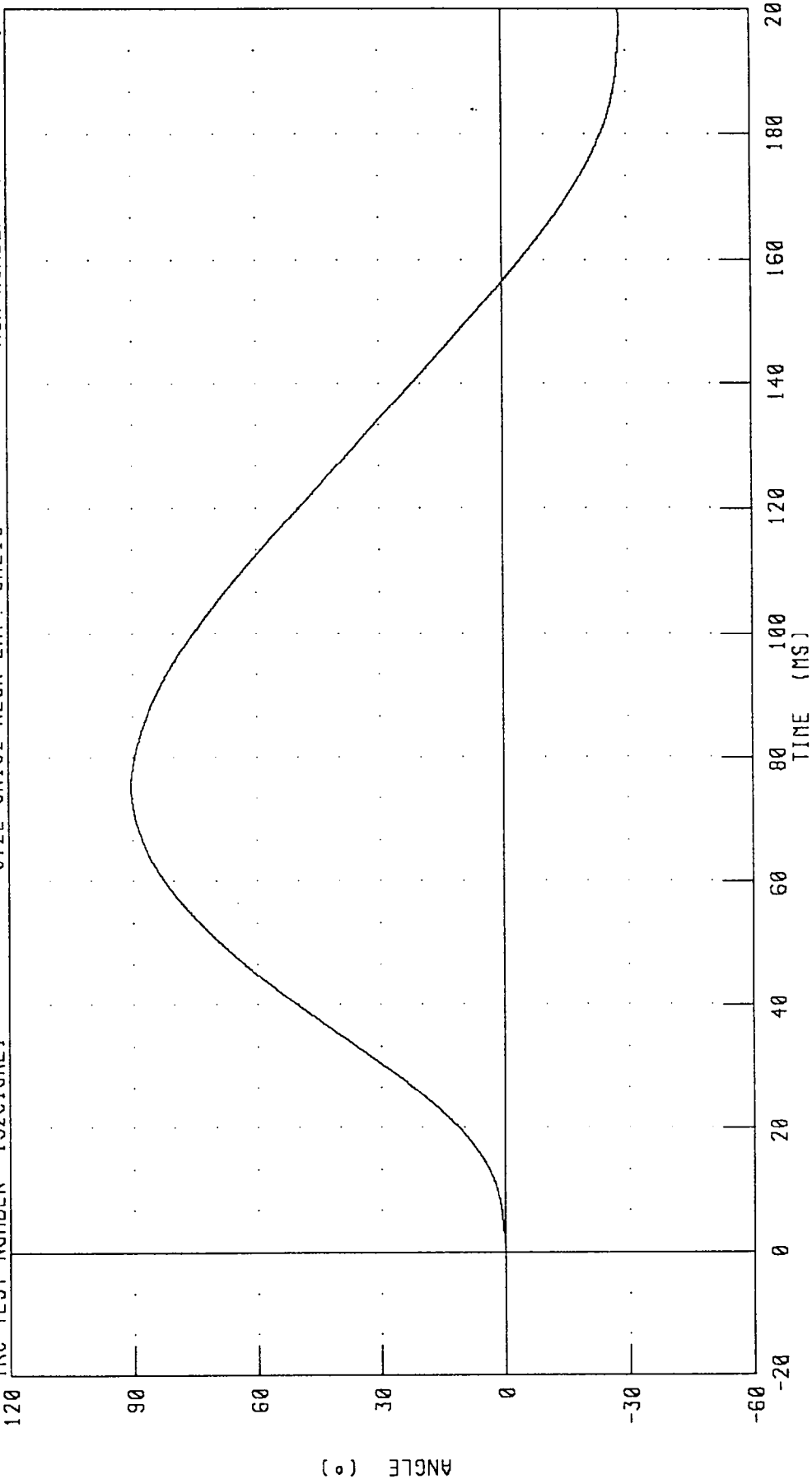


CHANNEL: THETA      FILTER: CH. CLASS 60      PEAK DATA: 55.90 ° @ 76.00 MS; -17.81 ° @ 198.50 MS

# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 192C15NE1 572E SN192 NECK EXT. CAL15 RUN NUMBER: 102693.1102.1



PEAK DATA: 90.41 ° @ 75.38 MS; -28.37 ° @ 197.63 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

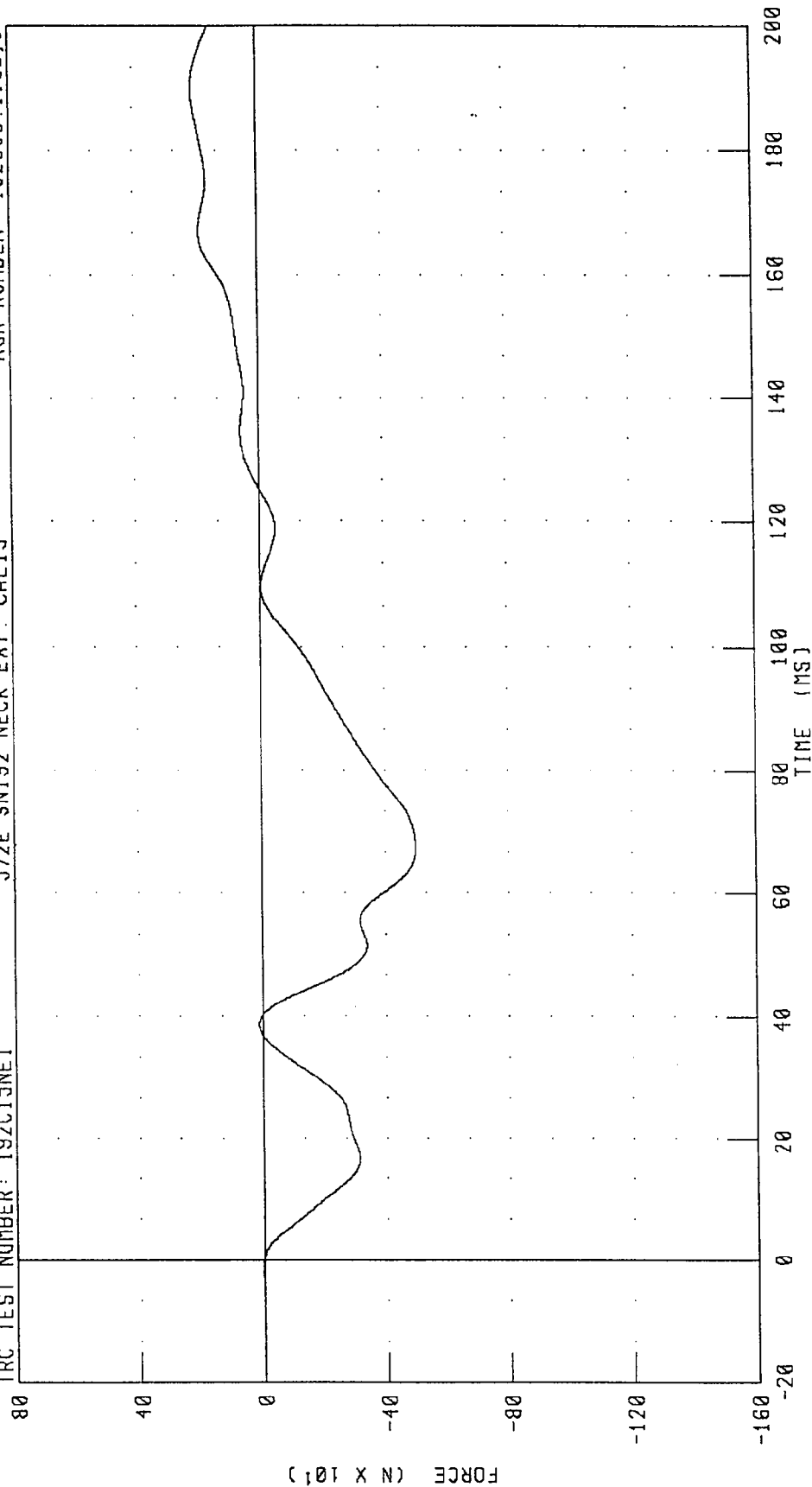
# PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

RUN NUMBER: 102693.1102;1

572E SN192 NECK EXT. CAL15

TRC TEST NUMBER: 192C15NE1



PEAK DATA: 210.47 N @ 189.88 MS; -497.71 N @ 67.25 MS

CHANNEL: NEKXF FILTER: CH. CLASS 60



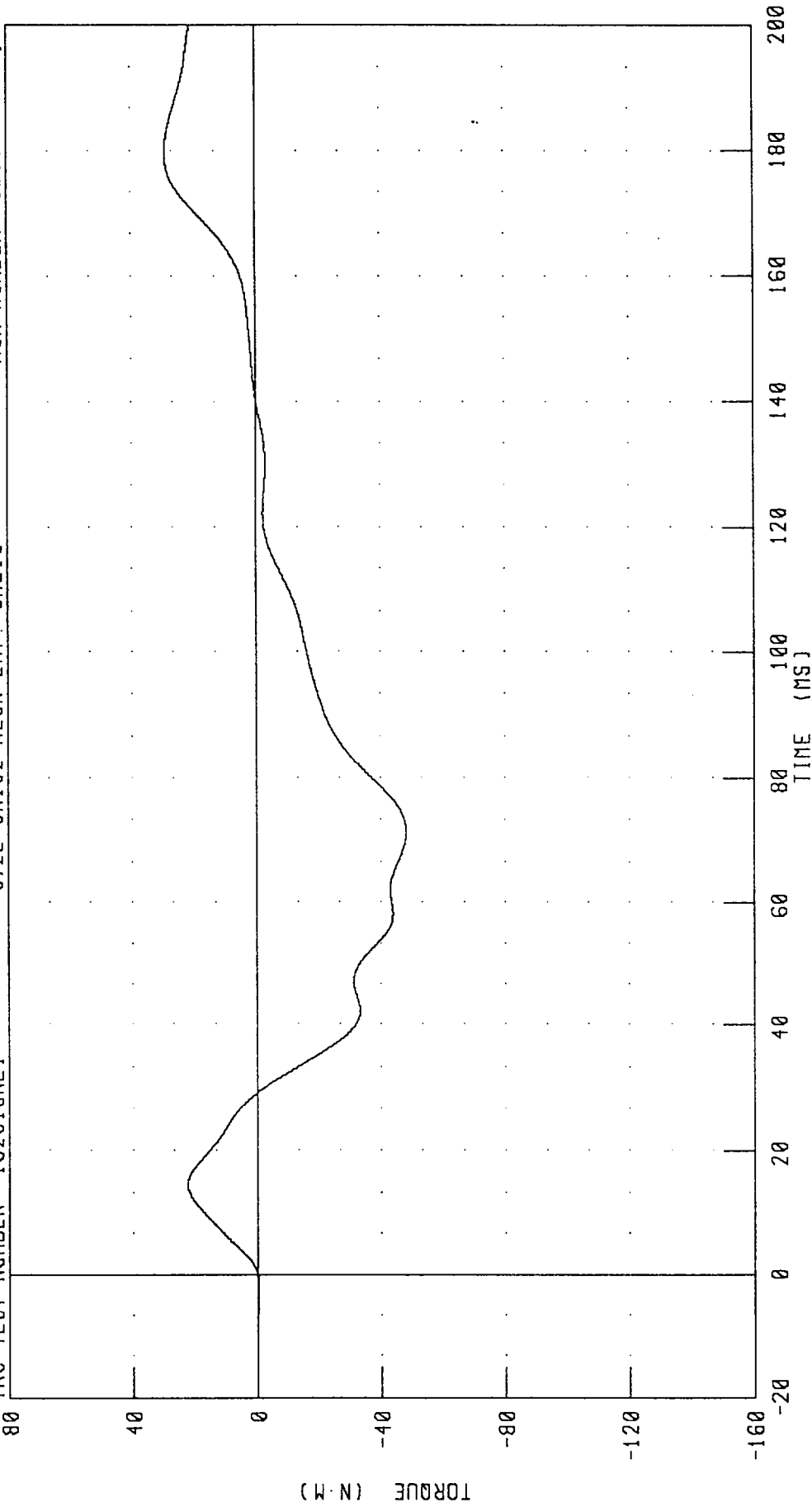
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 192C15NE1

572E SN192 NECK EXT. CAL15

RUN NUMBER: 102693.1102;1



PEAK DATA: 28.93 N·M @ 179.50 MS, -48.15 N·M @ 71.50 MS

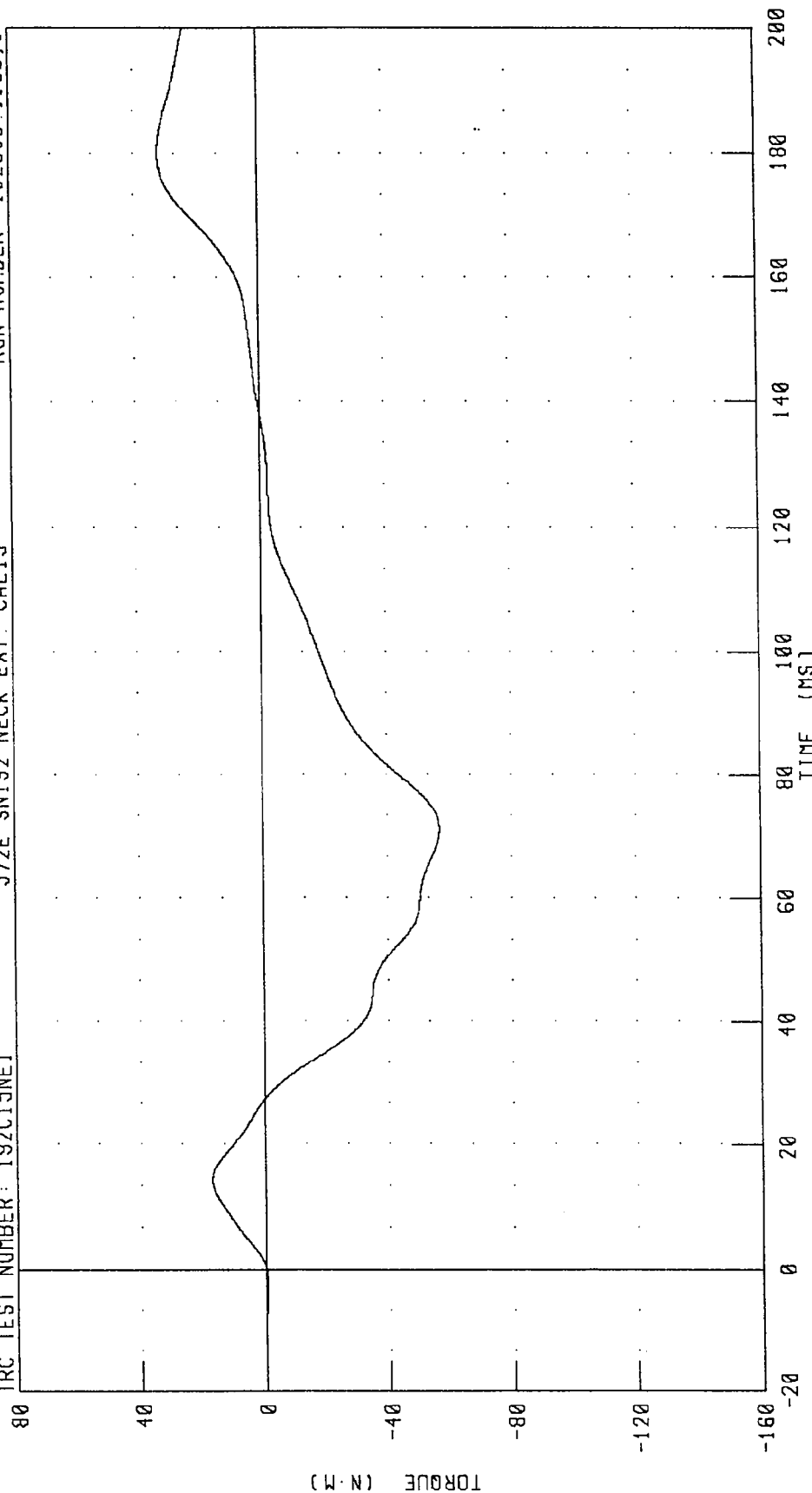
CHANNEL: NEKYM FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 192C15NE1

572E SN192 NECK EXT. CAL15

RUN NUMBER: 102693.1102;1



PEAK DATA: 32.07 N·M @ 180.13 MS, -56.79 N·M @ 71.13 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

## TRANSPORTATION RESEARCH CENTER INC.

## THORAX IMPACT TEST

HYBRID III

27-SEP-93

TRC

192C15TH1

572E SN192 H.S.THORAX CAL15

| TEST PARAMETER          | HIGH SPEED TEST   | TEST RESULTS |
|-------------------------|-------------------|--------------|
|                         | SPECIFICATION     |              |
| TEMPERATURE             | 20.6-22.2 DEG. C  | 21.1 DEG. C  |
| RELATIVE HUMIDITY       | 10% - 70%         | 52.0 %       |
| PENDULUM VELOCITY       | 6.59 - 6.83 M/SEC | 6.68 M/SEC   |
| MAXIMUM DEFLECTION      | 63.5 - 72.6 MM    | 71.7 MM      |
| MAXIMUM RESISTIVE FORCE | 5159 - 5894 N     | 5426. N      |
| INTERNAL HYSTERESIS     | 69% - 85%         | 71.9%        |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM DECELERATION

TRC TEST NUMBER: 192C15TH1

572E SN192 H.S. THORAX CAL15

RUN NUMBER: 102693.1102;1

50

40

30

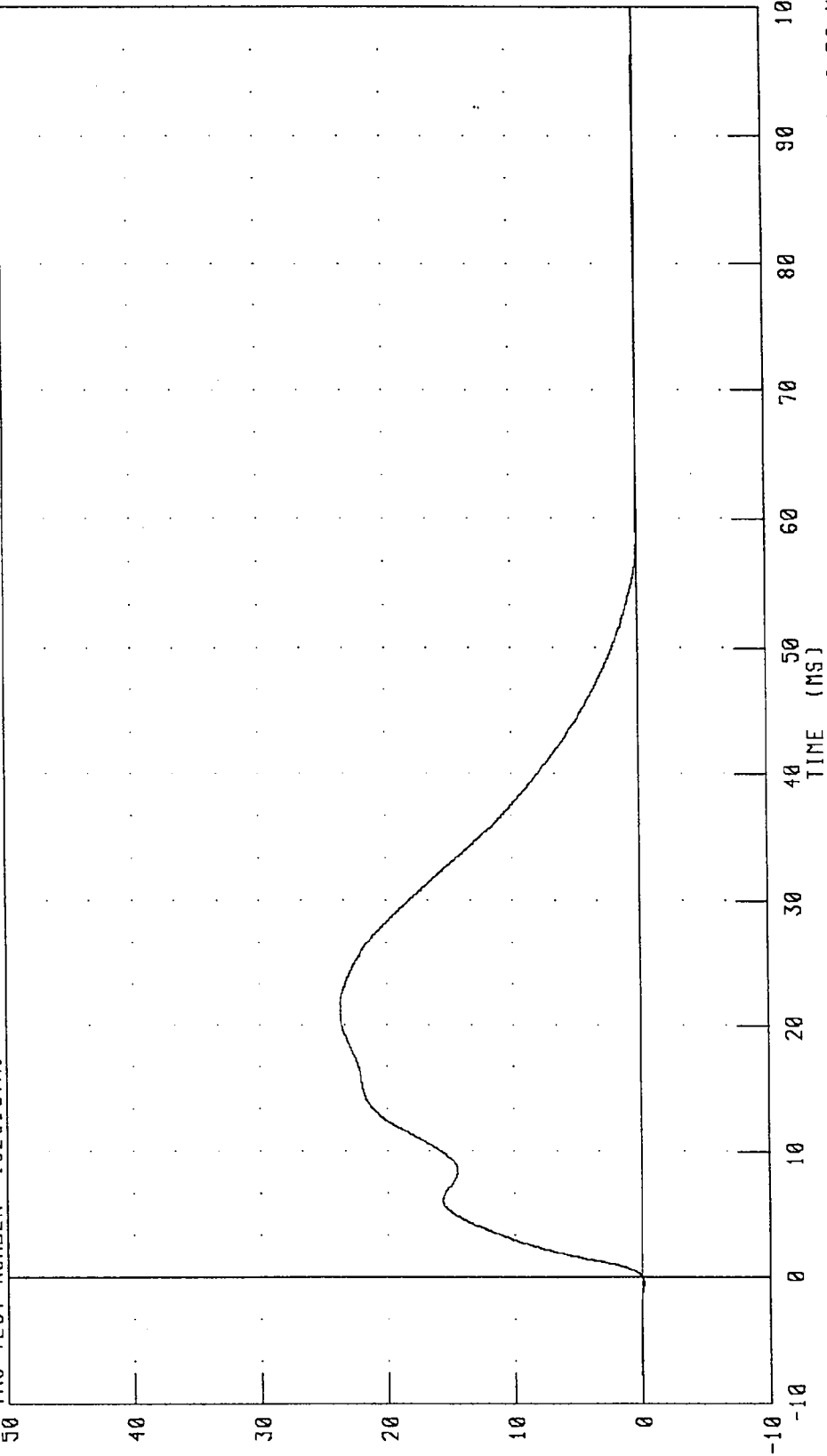
20

10

0

-10

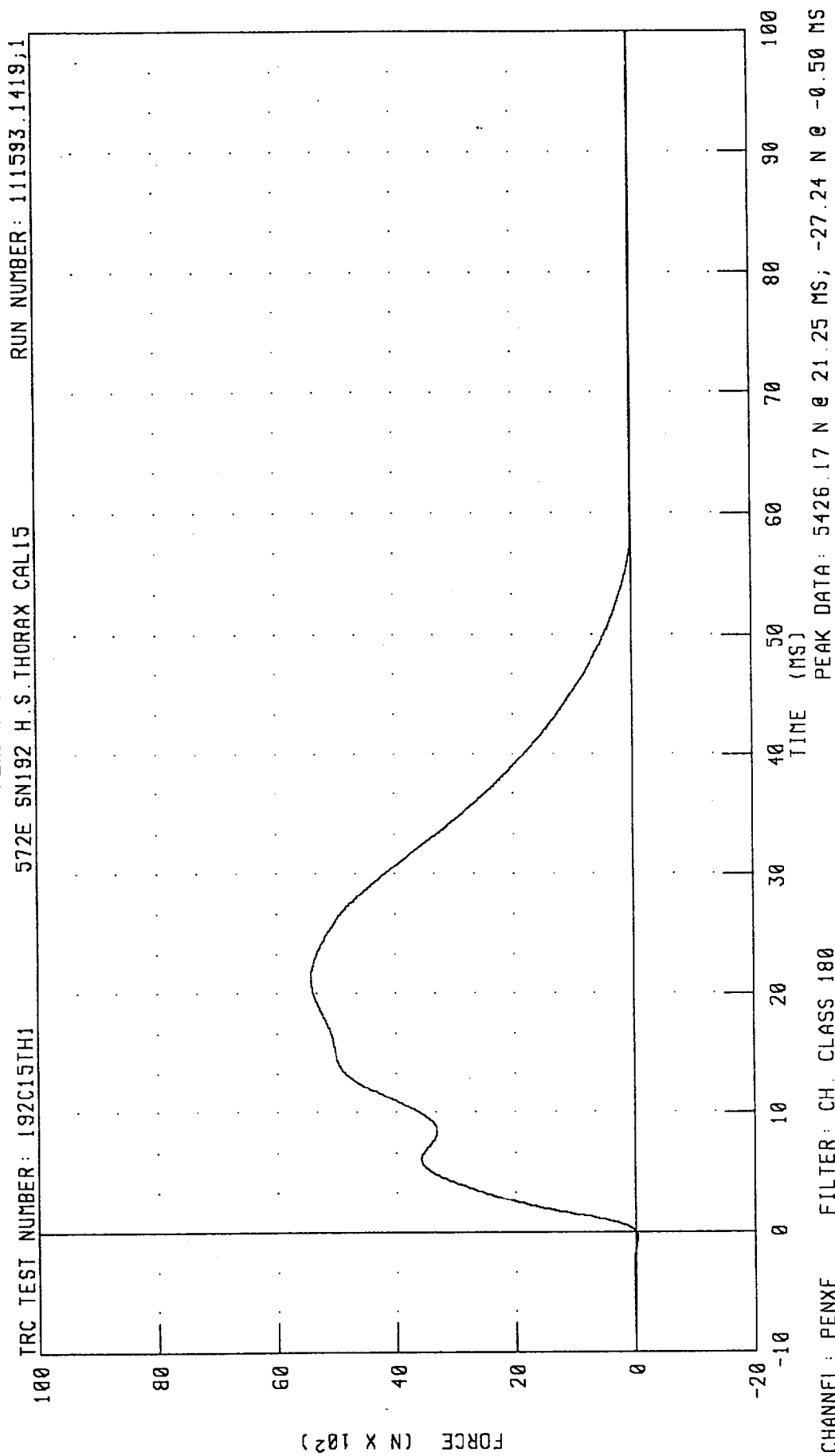
ACCELERATION (G)



PEAK DATA: 23.69 G @ 21.25 MS; -0.12 G @ -0.50 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM FORCE



PART 572-E HYBRID III THORAX CALIBRATION  
STERNUM DISPLACEMENT

TRC TEST NUMBER: 192C15TH1

572E SN192 H.S. THORAX CAL15

RUN NUMBER: 102693.1102;1

150

120

90

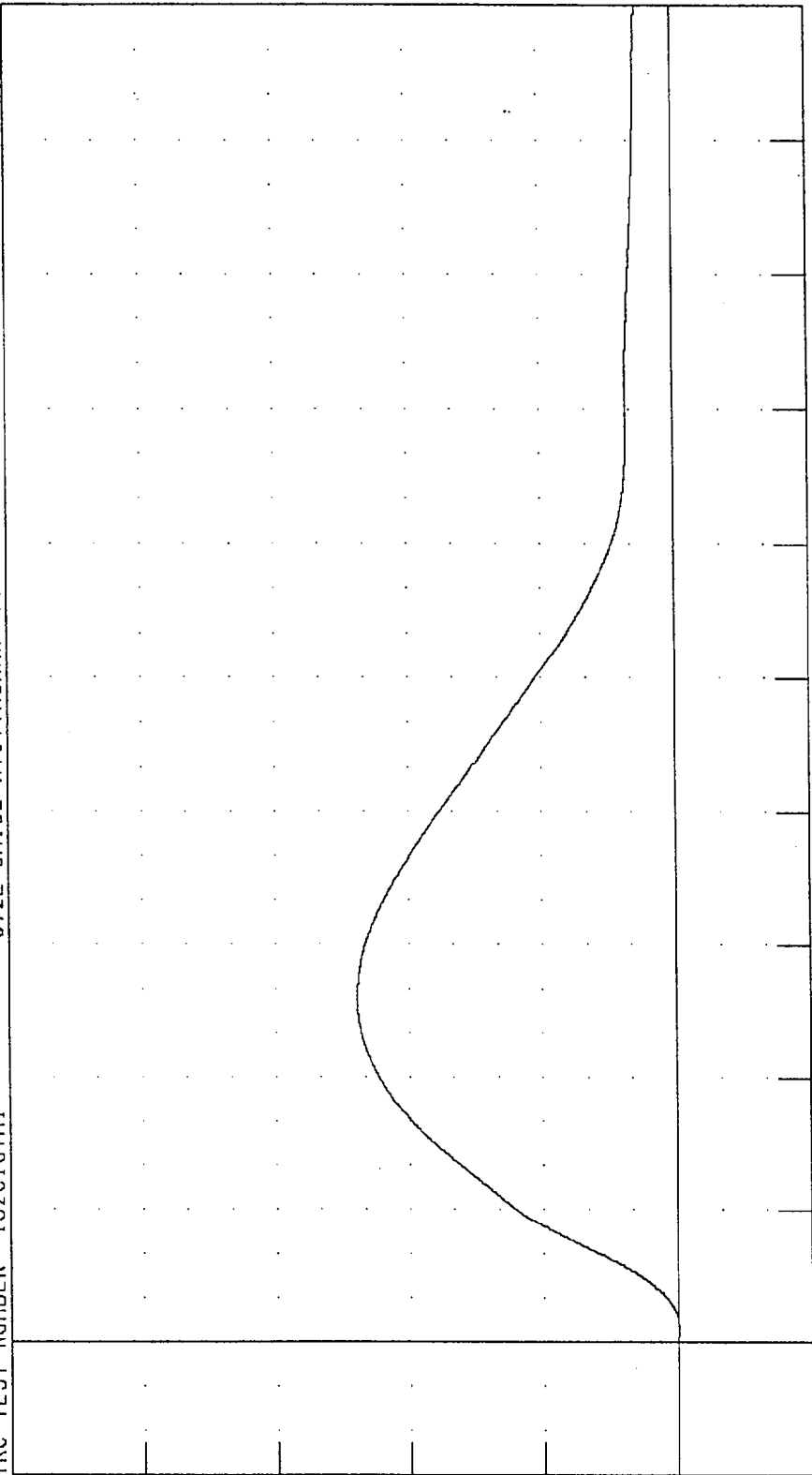
60

30

0

-30

DISPLACEMENT (MM)

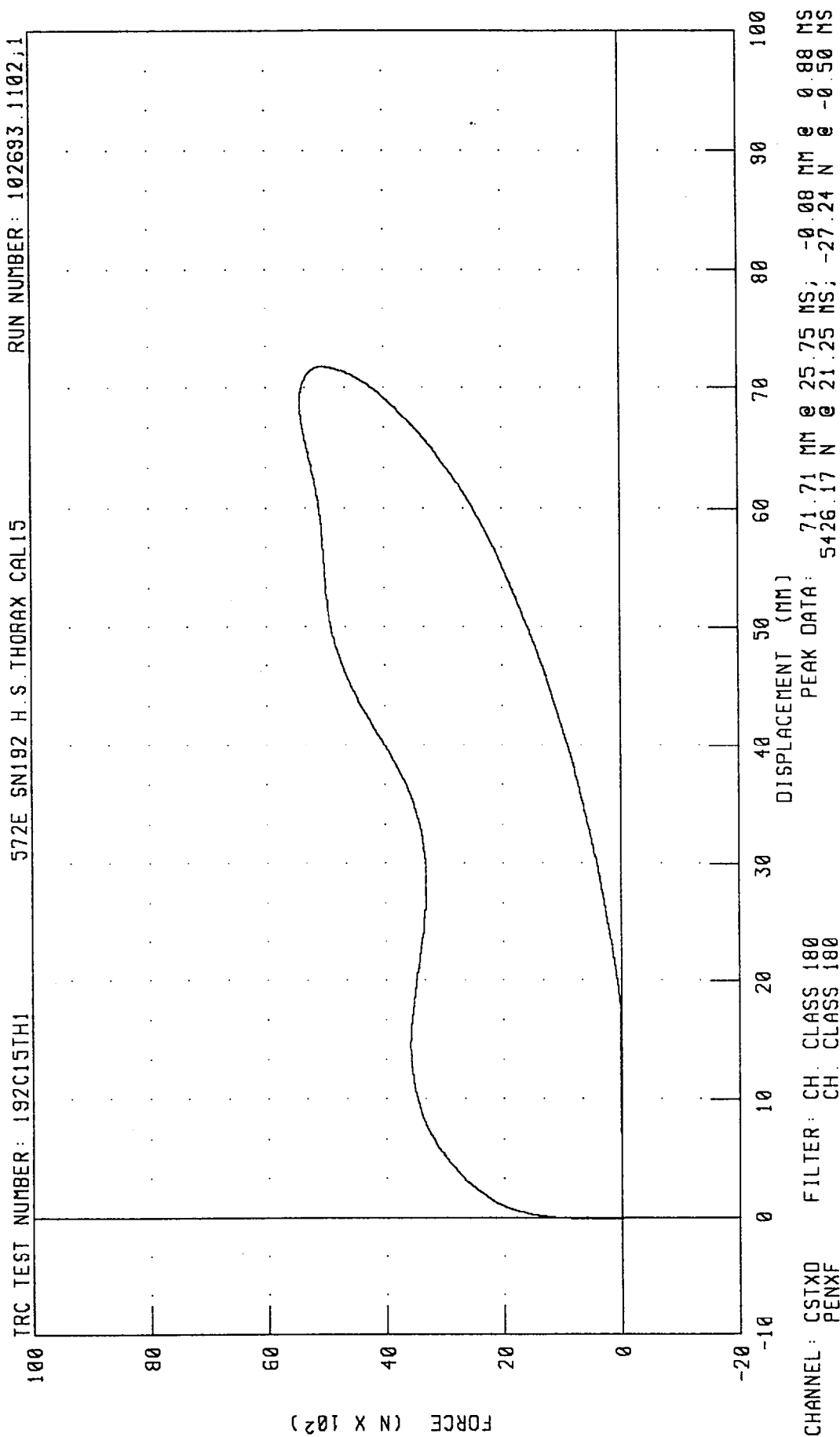


TIME (MS)

PEAK DATA: 71.71 MM @ 25.75 MS; -0.08 MM @ 0.88 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180

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



TRANSPORTATION RESEARCH CENTER INC.

KNEE IMPACT TEST

HYBRID III

23-SEP-93

RIGHT KNEE  
TRC

192C15RK1

572E SN192 RIGHT KNEE CAL 15

| TEST PARAMETER                         | SPECIFICATION           | TEST RESULTS |
|----------------------------------------|-------------------------|--------------|
| TEMPERATURE                            | 18.9-25.6 DEG. C        | 20.6 DEG. C  |
| RELATIVE HUMIDITY                      | 10% - 70%               | 64.0 %       |
| PROBE VELOCITY                         | 2.07 - 2.13 M/SEC       | 2.10 M/SEC   |
| PEAK KNEE IMPACT FORCE<br>PROBE WEIGHT | 4714 - 5783 N<br>5.0 KG | 4910.6 N     |

TEST MEETS SPECIFICATIONS

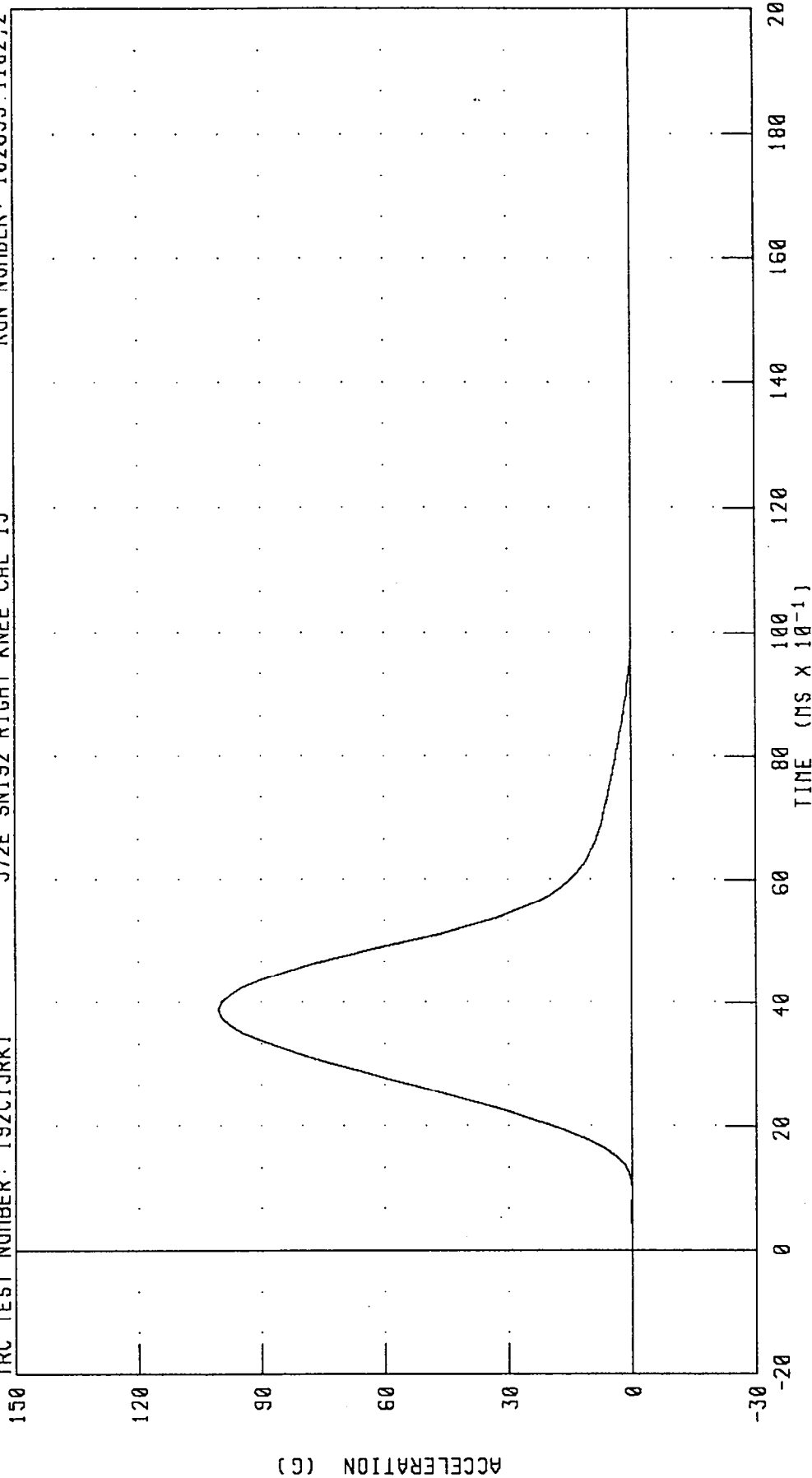
TECHNICIAN

*Chas. Maddaloz*



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

TRC TEST NUMBER: 192C15RK1 572E SN192 RIGHT KNEE CAL 15 RUN NUMBER: 102693.1102;2



PEAK DATA: 100.36 G @ 3.88 MS; -0.01 G @ -0.38 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

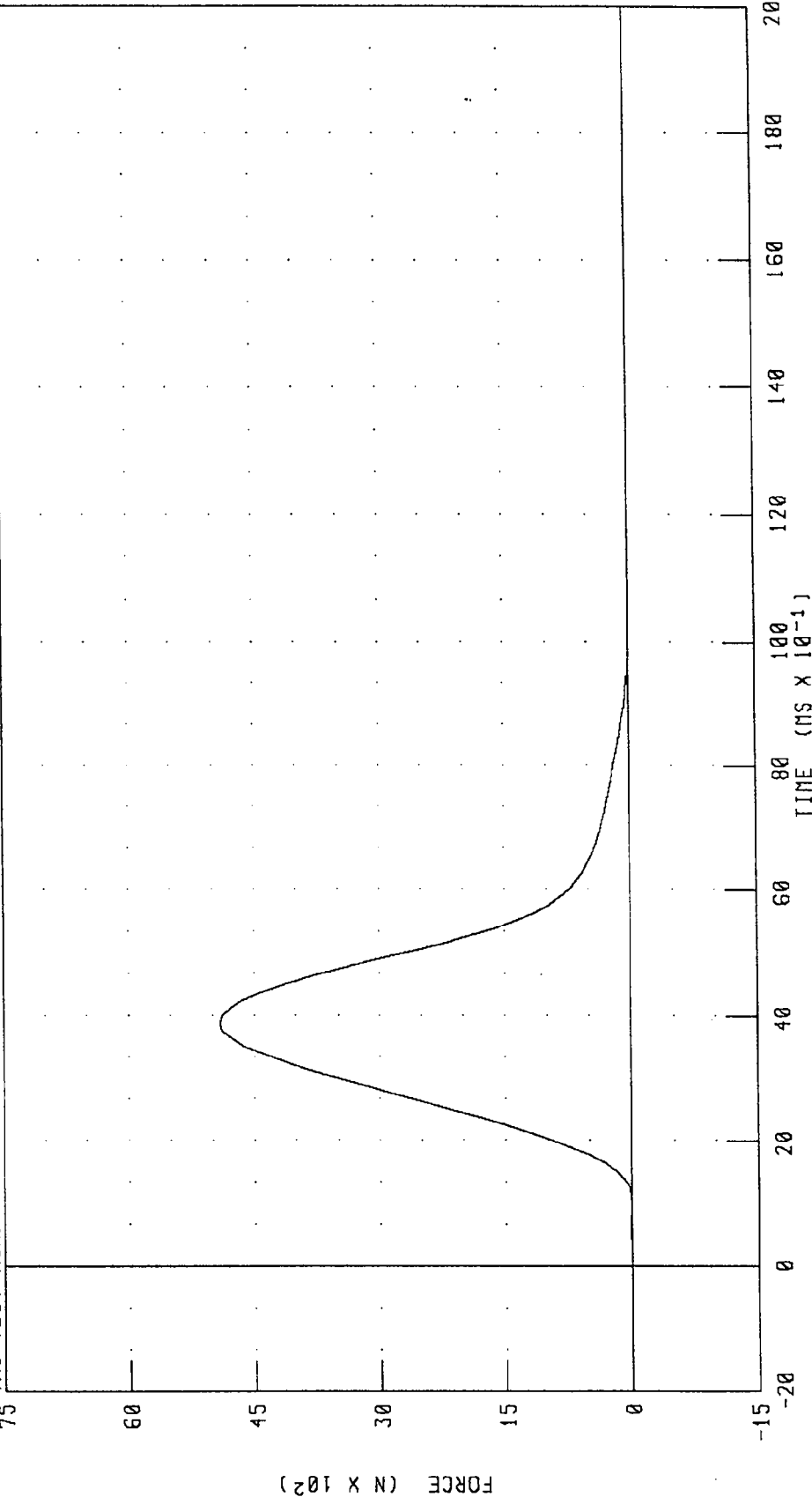
# PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN192 RIGHT KNEE CAL 15

TRC TEST NUMBER: 192C15RK1

RUN NUMBER: 102693.1102;2



PEAK DATA: 4910.61 N @ 3.88 MS; -0.35 N @ -0.38 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

## TRANSPORTATION RESEARCH CENTER INC.

## KNEE IMPACT TEST

HYBRID III

23-SEP-93

LEFT KNEE  
TRC

192C15LK1

572E SN192 LEFT KNEE CAL 15

| TEST PARAMETER                         | SPECIFICATION           | TEST RESULTS |
|----------------------------------------|-------------------------|--------------|
| TEMPERATURE                            | 18.9-25.6 DEG. C        | 20.6 DEG. C  |
| RELATIVE HUMIDITY                      | 10% - 70%               | 64.0 %       |
| PROBE VELOCITY                         | 2.07 - 2.13 M/SEC       | 2.09 M/SEC   |
| PEAK KNEE IMPACT FORCE<br>PROBE WEIGHT | 4714 - 5783 N<br>5.0 KG | 5491.4 N     |

TEST MEETS SPECIFICATIONS

TECHNICIAN

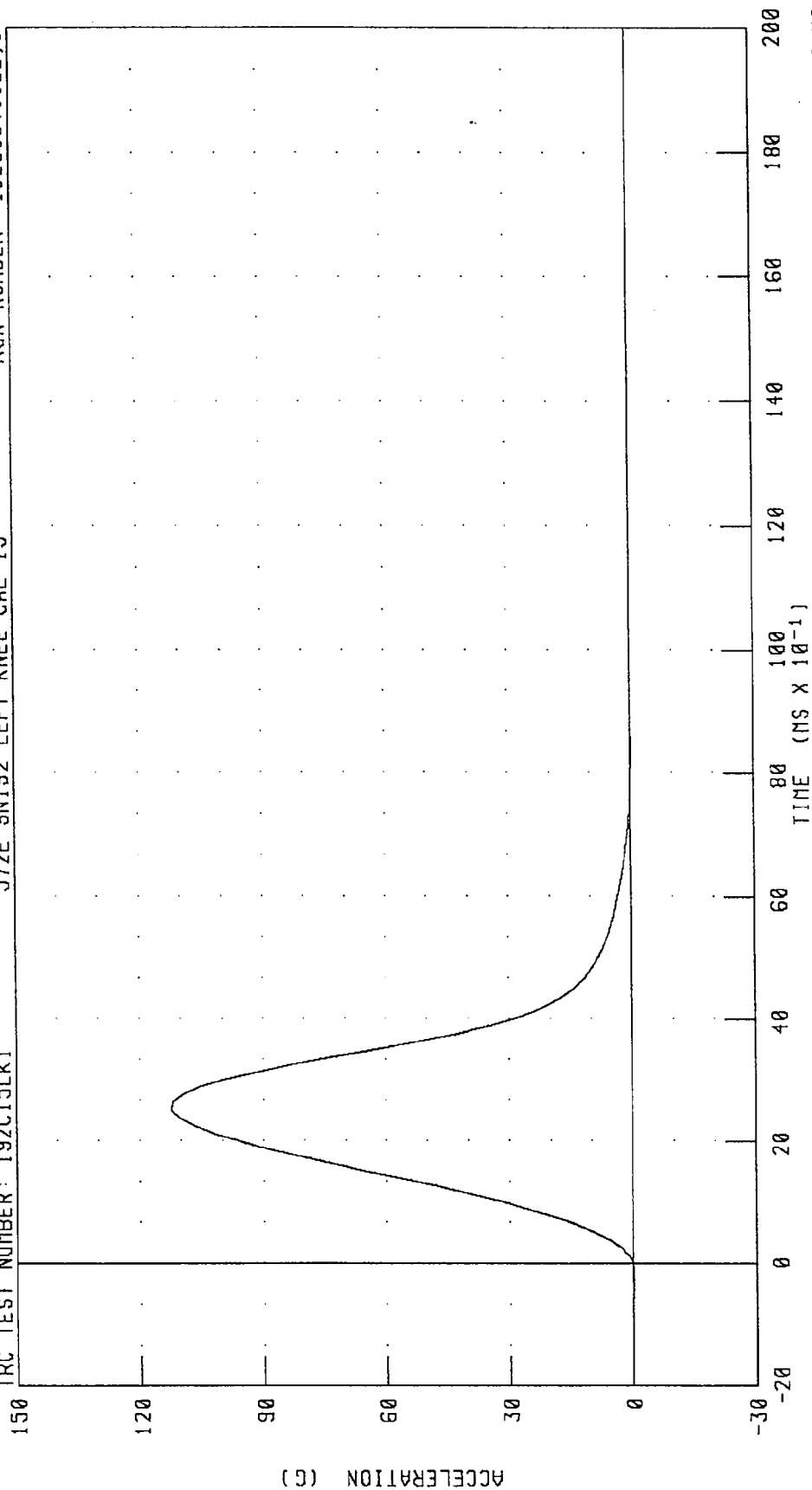
Chas. Middleton

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

TRC TEST NUMBER: 192C15LK1

572E SN192 LEFT KNEE CAL 15

RUN NUMBER: 102693.1102.1



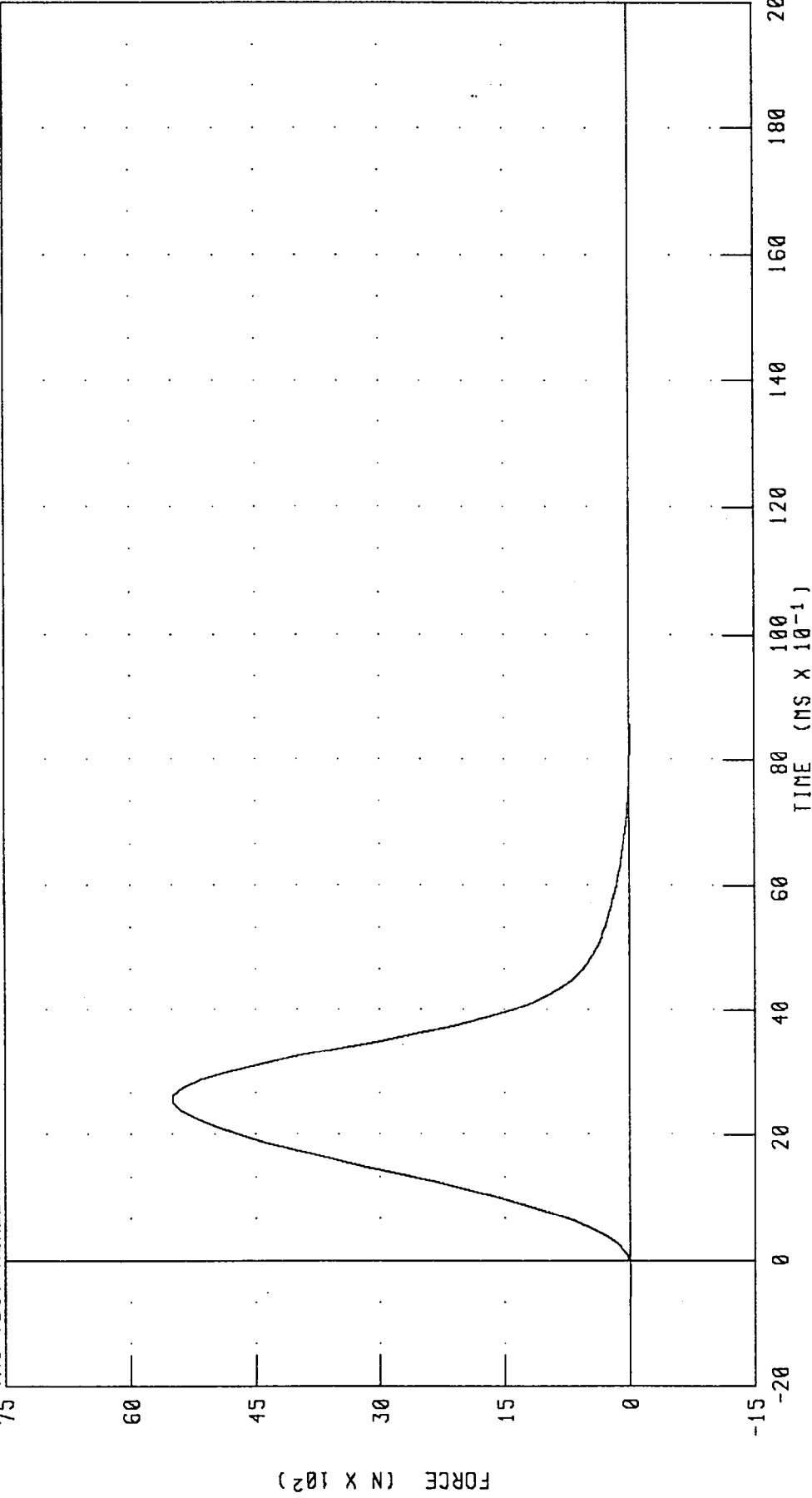
PEAK DATA: 112.24 G @ 2.50 MS; -0.27 G @ -0.25 MS

CHANNEL: PENXG FILTER: CH. CLASS 600

# PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 192C15LK1      572E SN192 LEFT KNEE CAL 15      RUN NUMBER: 102693.1102,1



CHANNEL: PENXF      FILTER: CH. CLASS 600      PEAK DATA: 5491.48 N @ 2.50 MS; -13.44 N @ -0.25 MS

APPENDIX D

MISCELLANEOUS TEST INFORMATION

# DUMMY INSTRUMENT CALIBRATIONS

## PASSENGER DUMMY #192

|                                       | SERIAL NO. | MODEL NO.  | MFR.      | CALIBRATION DATE |          |
|---------------------------------------|------------|------------|-----------|------------------|----------|
|                                       |            |            |           | LAST             | DUE      |
| HEAD X-AXIS ACCEL.                    | AAL82      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Y-AXIS ACCEL.                         | A84JJ      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Z-AXIS ACCEL.                         | A62JJ      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| CHEST X-AXIS ACCEL.                   | ACCJ0      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Y-AXIS ACCEL.                         | AC708      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Z-AXIS ACCEL.                         | CW59H      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| LEFT FEMUR FORCE LOAD CELL            | 986        | 2430       | GSE       | 09/23/93         | 03/23/94 |
| RIGHT FEMUR FORCE LOAD CELL           | 987        | 2430       | GSE       | 09/23/93         | 03/23/94 |
| *NECK X-AXIS FORCE LOAD CELL          | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| Y-AXIS FORCE LOAD CELL                | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| X-AXIS FORCE LOAD CELL                | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| *NECK MOMENT ABOUT X-AXIS LOAD CELL   | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| MOMENT ABOUT Y-AXIS LOAD CELL         | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| MOMENT ABOUT Z-AXIS LOAD CELL         | 085        | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| *CHEST DEFLECTION POTENTIOMETER       | 87313-96   | 81422A     | VERNITECH | 09/24/93         | 03/24/94 |
| LAP BELT FORCE LOAD CELL              | 673        | 3419       | LEBOW     | 08/23/93         | 02/23/94 |
| SHOULDER BELT FORCE LOAD CELL         | 236        | 3419       | LEBOW     | 08/23/93         | 02/23/94 |
| SHOULDER BELT SPOOL-OUT POTENTIOMETER | A02465     | PT-101-40A | CELESCO   | 09/23/93         | 03/23/94 |
| SHOULDER BELT STRETCH POTENTIOMETER   | 1291       | 2051414101 | BOURNES   | 09/23/93         | 03/23/94 |

\*HYBRID III USE ONLY.

VEHICLE AND CALIBRATION LABORATORY INSTRUMENT CALIBRATIONS

VEHICLE ACCELEROMETERS

|                                          | SERIAL NO. | MODEL NO. | MFR.    | CALIBRATION DATE |          |
|------------------------------------------|------------|-----------|---------|------------------|----------|
|                                          |            |           |         | LAST             | DUE      |
| LEFT REAR SEAT CROSSMEMBER X-AXIS        | CT72H      | 7264      | ENDEVCO | 09/01/93         | 03/01/94 |
| LEFT REAR SEAT CROSSMEMBER X-AXIS REDUN  | CR26H      | 7264      | ENDEVCO | 09/01/93         | 03/01/94 |
| RIGHT REAR SEAT CROSSMEMBER X-AXIS       | BK96J      | 7264      | ENDEVCO | 07/06/93         | 01/06/94 |
| RIGHT REAR SEAT CROSSMEMBER X-AXIS REDUN | BW77J      | 7264      | ENDEVCO | 07/22/93         | 01/22/94 |
| ENGINE TOP X-AXIS                        | CP34H      | 7264      | ENDEVCO | 08/13/93         | 02/13/94 |
| ENGINE BOTTOM X-AXIS                     | CK87H      | 7264      | ENDEVCO | 10/12/93         | 04/12/94 |
| RIGHT BRAKE CALIPER X-AXIS               | CW63H      | 7264      | ENDEVCO | 07/06/93         | 01/06/94 |
| LEFT BRAKE CALIPER X-AXIS                | BM06J      | 7264      | ENDEVCO | 04/28/93         | 10/28/93 |
| INSTRUMENT PANEL CENTER X-AXIS           | CL83H      | 7264      | ENDEVCO | 10/12/93         | 04/12/94 |

CALIBRATION LABORATORY INSTRUMENTS

|                                     | SERIAL NO.  | MODEL NO.        | MFR.      | CALIBRATION DATE   |          |
|-------------------------------------|-------------|------------------|-----------|--------------------|----------|
|                                     |             |                  |           | LAST               | DUE      |
| NECK BENDING PENDULUM ACCEL.        | CB27        | 7232             | ENDEVCO   | 10/04/93           | 04/04/94 |
| NECK BENDING ROTARY POTENTIOMETER   | NA          | 35435-1-102      | BOURNES   | MFR. SPECIFICATION |          |
| NECK BENDING LINEAR POTENTIOMETER   | NA          | 5184-2051846003  | BOURNES   | 10/06/93           | 04/06/94 |
| THORAX/HYBRID II FEMUR PEND. ACCEL. | CC64        | 7232             | ENDEVCO   | 10/06/93           | 04/06/94 |
| 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 DISPL. GAUGE    | 4075-175    | 80294-2051941504 | BOURNES   | 10/06/93           | 04/06/94 |
| ABDOMEN COMPRESSION FORCE GAUGE     | 3443        | 3167             | LEBOW     | 10/06/93           | 04/06/94 |
| HYBRID III FEMUR PEND. ACCEL.       | CG83        | 7232             | ENDEVCO   | 10/06/93           | 04/06/94 |



SIGN CONVENTION  
NHTSA DATA TAPE REFERENCE GUIDE

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

POTENTIOMETERS:    +CHEST LONGITUDINAL DEFLECTION:    OUTWARD  
                      +CHEST LATERAL DEFLECTION:    LEFTWARD  
                      +SEAT BELT DISPLACEMENT:    OUTWARD  
                      +SEAT BELT EXTENSION:    ELONGATION  
                      +KNEE SLIDER DISPLACEMENT:    DISTANCE BETWEEN FEMUR  
                                                          AND TIBIA INCREASED  
                                                          (IN RELATION TO A  
                                                          SEATED DUMMY)

LOAD CELLS:        +FEMUR FORCE:        TENSION  
                      +SEAT BELT FORCE:    TENSION  
                      +BARRIER FORCE:    TENSION

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

TIBIA LOAD CELLS:    +X FORCE:    TENSION  
                      +Y FORCE:    TENSION  
                      +Z FORCE:    TENSION  
                      +X MOMENT:    BOTTOM OF TIBIA MOVING LEFTWARD  
                      +Y MOMENT:    BOTTOM OF TIBIA MOVING REARWARD

FREQUENCY RESPONSE CLASSES

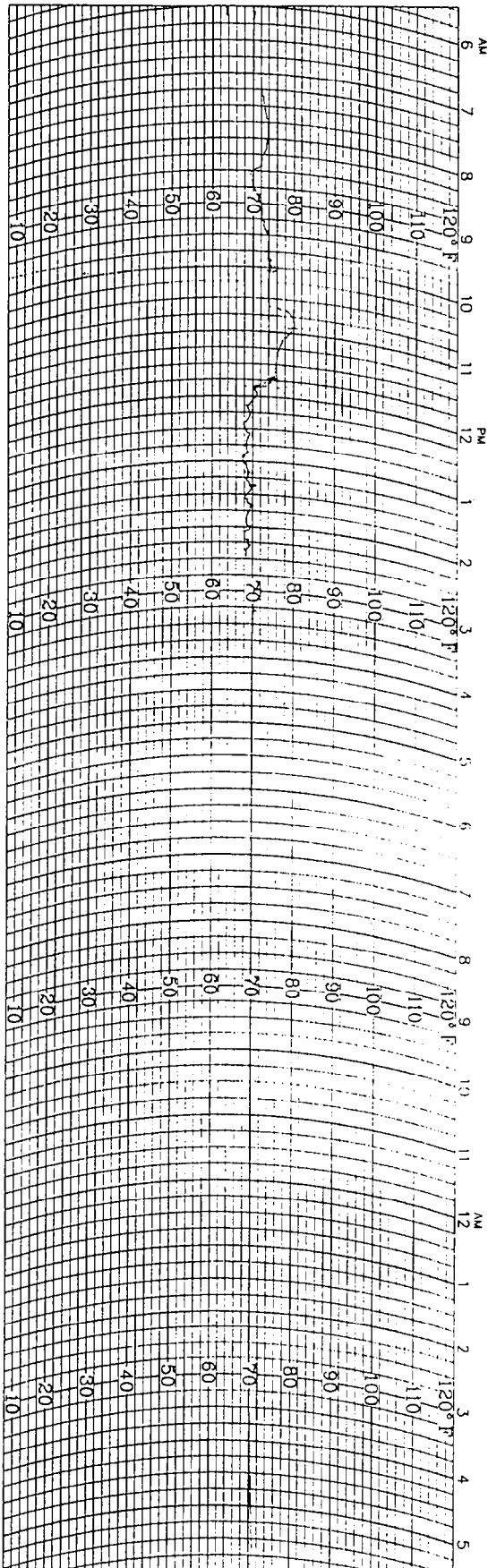
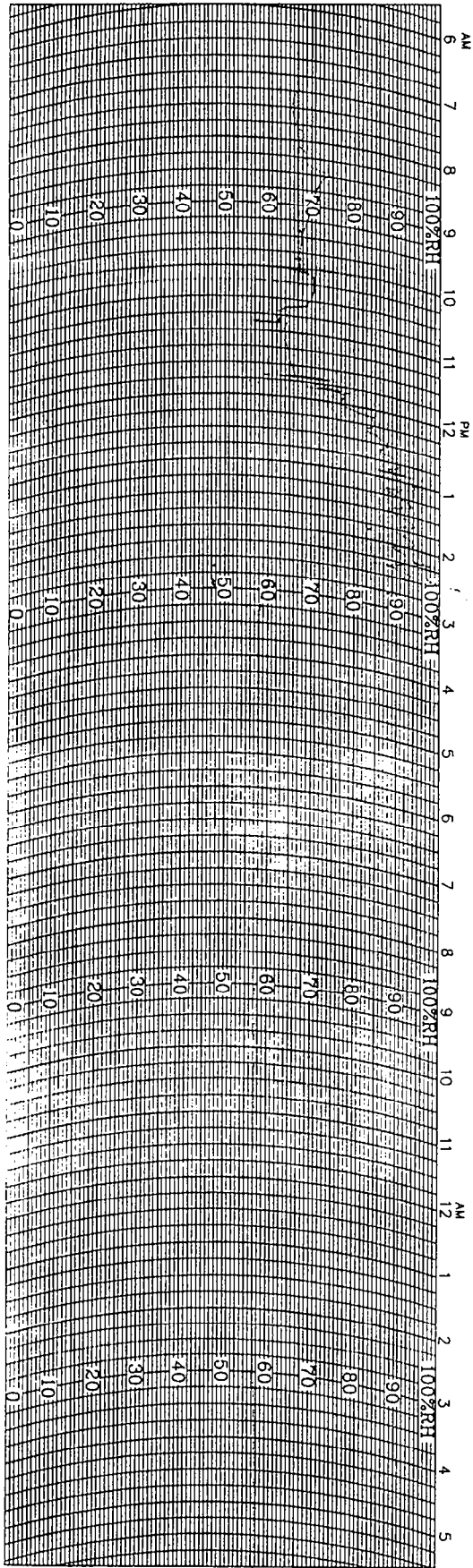
SAE J211 OCT88

TYPICAL TEST MEASUREMENTS

CHANNEL CLASS

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**  
**WEATHERtronic**  
 Division of **QUALIMETRICS, Inc.**

P.O. BOX 41039  
 SACRAMENTO, CA 95841  
 PHONE: (916) 923-0055

HYGROTHERMOGRAPH  
 1 DAY

CHART NO. M699123  
 C311-D-HF  
 ECN 2717  
 6-9-87

STATION \_\_\_\_\_ DATE ON \_\_\_\_\_ DATE OFF \_\_\_\_\_

APPENDIX E

RESTRAINT SYSTEM INSTRUCTIONS FROM OWNER'S MANUAL

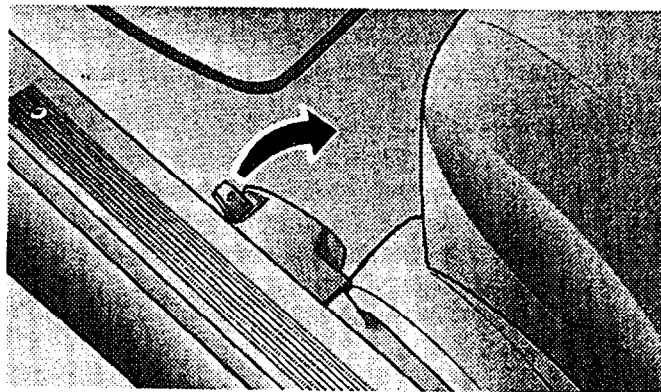
**NOTE:** On vehicles with power door locks, the doors cannot be locked by pressing the power door lock switch if the key is in the ignition and the driver's door is open.

#### **POWER WINDOWS (If so equipped)**

Window controls on the armrest give the driver control of all door windows. There is an individual window control on each door. A window LOCK switch allows the driver to lock all windows when small children are passengers in the vehicle.

#### **TRUNK LID REMOTE RELEASE (if so equipped)**

The trunk lid lock is operated from outside the vehicle with the master key. From inside the vehicle the trunk can be released by lifting the remote cable release lever. The lever is located just outboard of the driver's seat riser, adjacent to the sill trim.



As a security measure, a remote release override lever is built into the trunk latching mechanism. Move the lever inward before closing the trunk, and the remote release will not function.

#### **OCCUPANT RESTRAINTS**

One of the most important safety features in your vehicle is the restraint system. This system includes the front and rear seat belts and the driver's side airbag.

Your seat belts can hold infant and child restraint systems if you will be carrying children too small for adult-size belts.

Please pay close attention to the information in this section. It tells you how to use your restraint system properly to keep you and your passengers as safe as possible.

The right front passenger seat of your vehicle is equipped with either a Unibelt or the Automatic Belt System. Use the instructions for the system installed in your vehicle.

#### **WARNING!**

In a collision, you and your passengers can suffer much greater injuries if you are not properly buckled up. You can strike parts of the inside of your vehicle or other passengers, or you can be thrown out of the vehicle. Always be sure you and others in your vehicle are buckled up properly.

Buckle up even though you are an excellent driver. Even on short trips. Someone on the road may be a poor driver and cause a collision which includes you. And this can happen far away from home or on your street.

Research has shown that seat belts save lives. And they can reduce the seriousness of injuries in a collision. Some of the worst injuries happen when people are thrown from the vehicle. Seat belts provide protection from that, and they reduce the risk of injury caused by striking the inside of the vehicle. **Everyone** in a motor vehicle needs to be buckled up **all the time**.

**UNIBELTS (if so equipped)**

The seats next to the front and rear doors of your vehicle have UNIBELTS.

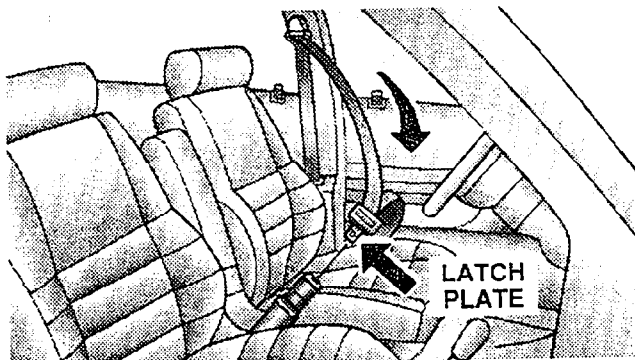
A unibelt is a combined lap/shoulder belt system. The webbing retractor will lock only during very sudden stops or impacts. This feature allows the shoulder part of the belt to move freely with you under normal conditions. But in a collision, the belt will lock and reduce the risk of your striking the inside of the vehicle or being thrown out.

**WARNING!**

- Wearing a seat belt incorrectly is dangerous. Seat belts are designed to go around the large bones of your body. These are the strongest parts of your body and can take the forces of a collision the best. Wearing your belt in the wrong place could make your injuries in a collision much worse. You might suffer internal injuries, or you could even slide out of part of the belt. Follow these instructions to wear your seat belt safely and to keep your passengers safe, too.
- Belting two people into one seat belt can lead to greater injury. People belted together can crash into one another in an accident, hurting one another badly. Never use a unibelt or a lap belt for more than one person, no matter what their size.

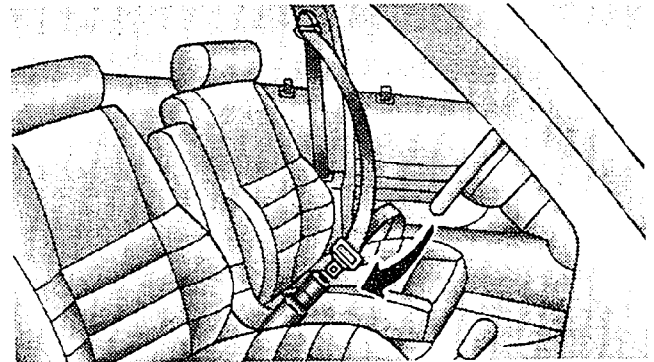
**UNIBELT OPERATING INSTRUCTIONS**

1. Enter the vehicle and close the door. Sit back and



adjust the seat.

2. The seat belt latch plate is above the back of your seat. Grasp the latch plate and pull out the belt. Slide the latch plate up the webbing as far as necessary to make the belt go around your lap.



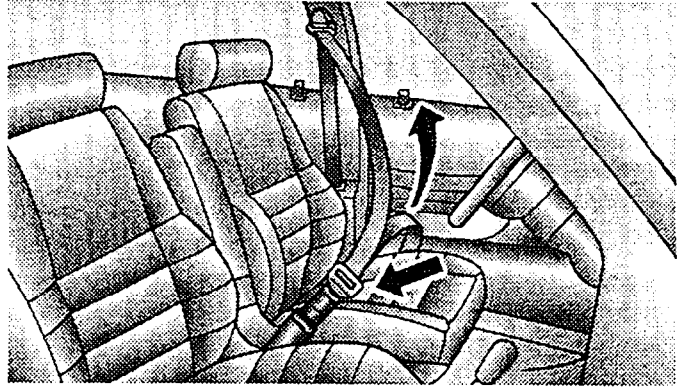
3. When the belt is long enough to fit, insert the latch plate into the buckle until you hear a "click."

**WARNING!**

A belt that is buckled into the wrong buckle will not protect you properly. The lap portion could ride too high on your body, possibly causing internal injuries. Always buckle your belt into the buckle nearest you.

A belt that is too loose will not protect you as well. In a sudden stop you could move too far forward, increasing the possibility of injury. Wear your seat belt snugly.

A belt that is worn under your arm is very dangerous. Your body could fall into the inside surfaces of the vehicle in a collision, increasing head and neck injury. And a belt worn under the arm can cause internal injuries. Ribs aren't as strong as shoulder bones. Wear the belt over your shoulder so that your strongest bones will take the force in a collision.



4. Position the lap belt across your thighs, below your abdomen. To remove slack in the lap belt portion, pull up a bit on the shoulder belt, as shown. To loosen the lap belt if it's too tight, tilt the latch plate and pull on the lap belt. The cinching latch plate will keep the lap belt tight. A snug belt reduces the risk of sliding under the belt in a collision.

**WARNING!**

A lap belt worn too high can increase the risk of internal injury in a collision. The belt forces won't be at the strong hip and pelvic bones, but across your abdomen. Always wear the lap belt as low as possible and keep it snug.

5. Position the shoulder belt on your chest so that it is comfortable and not resting on your neck. The retractor will withdraw any slack in the belt.

**WARNING!**

A twisted belt can't do its job as well. In a collision it could even cut into you. Be sure that the belt is straight. If you can't straighten a belt in your vehicle, or if a belt is not working properly, take it to your dealer and have it fixed.

If your driver's seat belt is not working properly, you could be seriously injured in a collision because your seat belt is not there to restrain you. Don't drive your vehicle until after your seat belt has been repaired. Have your vehicle towed to a dealer for repair.

6. To release the belt, push the red button marked PRESS on the buckle. The belt will automatically retract to its stowed position. If necessary, slide the latch plate down the webbing to allow it to retract fully.

**AUTOMATIC BELT SYSTEM (if so equipped)**

An automatic shoulder belt is installed for the right front seat passenger. The automatic belt moves out of the way when the door is opened and eliminates the need to buckle and unbuckle the shoulder belt. An emergency release is located at the upper end, should the need arise to manually release the shoulder belt.

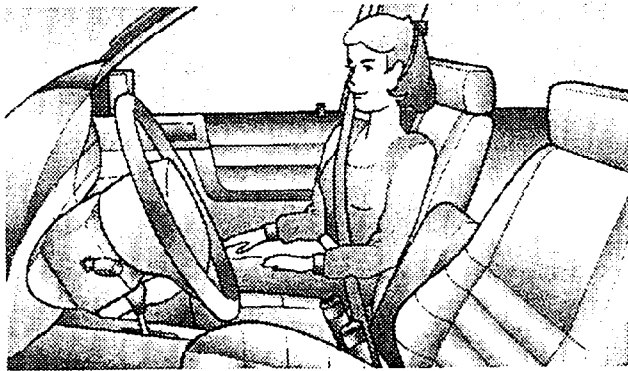
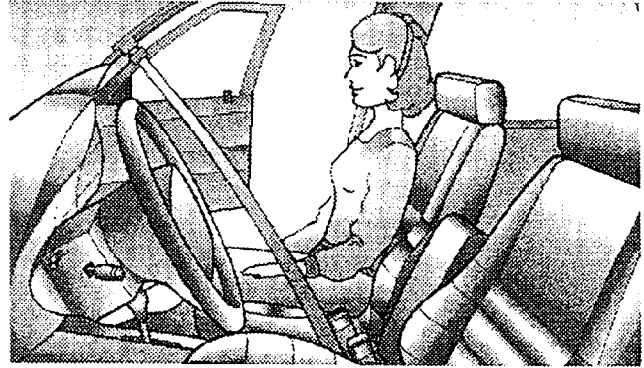
A manual lap belt is also provided at this seating position. The lap belt must be worn in addition to the automatic shoulder belt in order to obtain the maximum amount of protection afforded by seat belts. The lap belt is equipped with an automatic locking retractor which will lock if the webbing is pulled or jerked after it is first withdrawn from the retractor. Withdraw the belt from the retractor in a continuous motion until the belt is extended as far as possible.

The automatic shoulder belt has an inertia sensitive webbing retractor which is designed to lock during very sudden stops or impacts. This feature allows the belt to move freely with the wearer under normal conditions, and locks the retractor only when the whole vehicle is tipped or jolted.

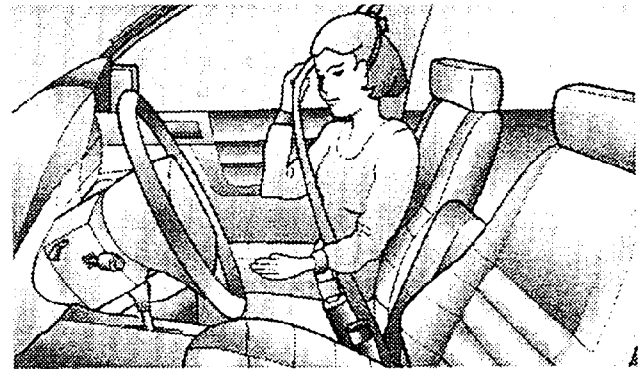
14

**AUTOMATIC BELT OPERATING INSTRUCTIONS**

The outboard end of the shoulder belt is attached to a carrier which travels in a track extending from the windshield pillar, across the top of the door opening, and part way down the lock pillar. When the door is first opened, the carrier is at the windshield pillar or moves immediately to that position.



1. Enter the vehicle, sit back and erect in the seat and close the door. When the ignition is turned ON, a motor moves the carrier to the lock pillar and positions the shoulder belt against your body.



2. Adjust the shoulder belt, if necessary so that it is positioned properly and comfortably across your chest and shoulder, as shown in the illustration. If the belt is too loose, pull it towards the console (or center retractor) and the retractor will take up the slack.

The shoulder belt will allow unrestricted movement of the upper body under normal conditions. The retractor will lock in the event of a collision.





3. Grasp the latch plate of the lap belt and pull the belt toward the buckle. Insert the latch plate into the buckle until a "click" is heard. Snug the belt against your hips and assure that it is not twisted. If the belt is too loose, pull it toward the door and the retractor will take up the excess webbing.

4. To release the lap belt, press the red button marked "press" on the buckle. The belt will automatically retract to its stowed position.

5. When the door is opened, the upper end of the shoulder belt will return to the windshield pillar to permit easy exit.

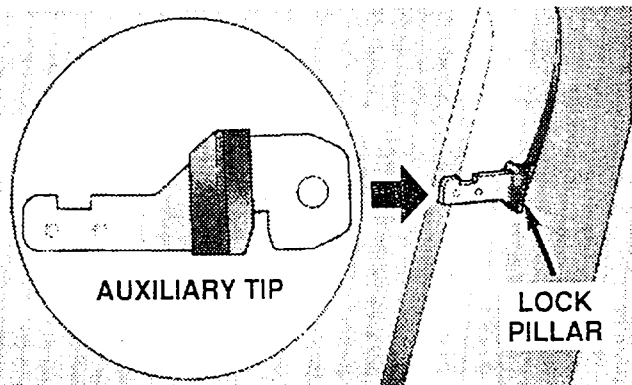
#### WARNING!

The lap belt must be used in addition to the shoulder belt to provide full restraint. Both belts must be worn properly for maximum effectiveness. The shoulder belt must be positioned midway on the shoulder and should not touch or cross the neck. The lap belt should be positioned across the hips, not the stomach.

Failure to follow these instructions could increase the chance of severe or fatal injury in the event of a collision.

#### Automatic Belt General Information

- If the door is opened and the vehicle is moving more than 3 mph, the carrier holding the upper end of the shoulder belt will remain at the lock pillar.
- If anything blocks movement of the carrier in either direction, it will stop at the obstruction. If the obstruction is removed promptly, the carrier will continue its motion. If not, the carrier will stay at the position where it stopped. Cycling the ignition switch ON-OFF-ON or OFF-ON-OFF, depending on its initial position, will then cause the carrier to resume its motion to the correct position.
- If the shoulder belt emergency release buckle is disconnected and the belt is retracted, the carrier will move to the lock pillar and stay there.

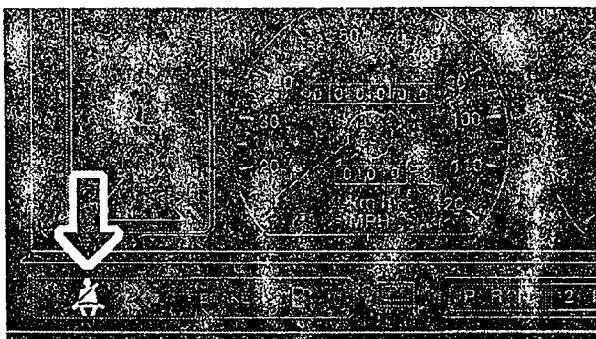


- If the carrier holding the upper end of the shoulder belt stops at any position other than the lock pillar, and will not move when the ignition switch is cycled, the shoulder belt can still be used. Place the Auxiliary Tip Insert, provided in glove compartment, into the track end position as shown. Press the red button on the buckle to release the belt from the carrier and connect the buckle to the Auxiliary Tip. Have the system serviced by an authorized dealer.

## BEFORE DRIVING YOUR VEHICLE

### SEAT BELT WARNING LIGHT

The seat belt warning symbol will remain lighted if the carrier does not lock in place in the door lock pillar. If this occurs, have the system serviced by an authorized dealer.



### FRONT CENTER AND REAR CENTER LAP BELTS (if so equipped)

Center seating positions have a lap belt only. To fasten a lap belt, slip the latch plate into the buckle.

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To lengthen a lap belt, tilt the latch plate and pull. To shorten a belt, pull the loose end of the webbing. Wear the belt snug against the hips. Sit back and erect in the seat, then adjust the belt as tightly as is comfortable.

### WARNING!

A lap belt worn too loose or too high is dangerous.

A belt worn too loose can allow you to slip down and under the belt in a collision.

A belt that is too high will apply crash forces to the abdomen, not to the stronger hip bones.

In either case, the risk of internal injuries is greater. Wear the lap belt low and snug.

## BEFORE DRIVING YOUR VEHICLE

### WARNING!

A frayed or torn belt could rip apart in a collision and leave you with no protection. Inspect the belt system periodically, checking for cuts, frays, or loose parts. Damaged parts must be replaced immediately. Do not disassemble or modify the system. Seat belt assemblies must be replaced after an accident if they have been damaged (bent retractor, torn webbing, etc).

### SEAT BELTS AND PREGNANT WOMEN

We recommend that pregnant women use the seat belts throughout their pregnancy. Keeping the mother safe is the best way to keep the baby safe.

Pregnant women should wear the lap part of the belt across the thighs and as snug across the hips as possible. Keep the belt low so that it does not come across the abdomen. That way the strong bones of the hips will take the force if there is a collision.

### SEAT BELT EXTENDER

If a seat belt is too short, even when fully extended, your dealer can provide you with a seat belt extender. This extender should be used only if the existing belt is not long enough. When it is not required, remove the extender and stow it in a secure place.

### CHILD RESTRAINT

Everyone in your vehicle needs to be buckled up all the time, babies and children, too.

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**WARNING!**

In a collision, an unrestrained child, even a tiny baby, can become a missile inside the vehicle. The force required to hold even an infant on your lap could become so great that you could not hold the child, no matter how strong you are. The child and others could be badly injured. Any child riding in your vehicle should be in a proper restraint for the child's size.

All states and Canadian provinces require small children to ride in proper restraint systems. This is the law, and you can be prosecuted for ignoring it.

#### Child Restraint With Automatic Belts (if so equipped)

The automatic shoulder belt at the right front seat cannot be used to secure a child restraint, however, the lap belt at that location can be used for this purpose. First, disconnect the automatic shoulder belt at the emergency release at the upper end and allow the belt to

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store on its retractor. Next, install the child restraint according to the manufacturer's instructions. Feed any excess belt material into the retractor.

#### Infants and Small Children

There are different sizes and types of restraints for children from newborn size to the bigger child almost large enough for an adult safety belt. Use the restraint that is correct for your child.

Two different child restraint systems are generally available:

- The infant carrier for babies weighing up to 20 lbs. (9kg.)
- The child seat for small children over 20 lbs.

In addition, some manufacturers make systems that can be first used as an infant carrier, and then converted to a child seat as the child grows.

Here are some tips on getting the most out of your child restraint:

- Before buying any restraint system, make sure that it has a label certifying that it meets Motor Vehicle Safety Standard 213. Chrysler also recommends that before you buy a child restraint, you try it in the vehicle seats where you will use it.
- The restraint must be appropriate for your child's weight and height. Check the label on the restraint for this too.
- If possible, install the restraint in the rear seat. According to accident statistics, children are safer when properly restrained in the rear seats than in the front.
- Carefully follow the instructions that come with the restraint. If you install the restraint improperly, it may not work when you need it.

**WARNING!**

Improper installation can lead to failure of an infant or child restraint. It could come loose in a collision. The child could be badly injured or killed. Follow the manufacturer's directions exactly when installing an infant or child restraint.

- Infant and child restraints are secured in the vehicle seats by the lap belt or the lap part of the lap/shoulder belt. In the rear seats, you may have trouble tightening the belt on the child restraint because the buckle or latch plate interferes with the belt path opening on the restraint. Disconnect the latch plate from the buckle end and twist the short buckle-end belt several turns to shorten it. Reassemble the latch plate to the buckle with the release button so that it is facing out.

In the front seat, move the seat forward to reposition the buckle against the side of the child restraint.

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#### BEFORE DRIVING YOUR VEHICLE

In the center rear seat if the belt still can't be tightened, or if by pulling and pushing on the restraint loosens the belt, you may need to do something more. Disconnect the latch plate from the buckle, turn it over, and reconnect it to the buckle. If you still can't make the child restraint secure, try a different seating position.

- Some child seat manufacturers recommend the use of a top anchorage (tether) strap in addition to the lap belt. Your vehicle has tether strap anchorages behind the rear seating positions for use with these child seats. Your dealer can provide you with anchorage hardware and installation instructions.
- Buckle the child into the seat exactly as the seat manufacturer's directions tell you. The cinching latch plate will keep the belt tight.
- When your infant carrier or child seat is not in use, secure it with the seat belt or remove it from the

vehicle. Don't leave it loose in the vehicle. In a sudden stop or collision, it could strike occupants and injure them.

#### Children Too Large For Child Seats

Children who are too large for child seats and who can sit upright by themselves should use the available lap/shoulder belts for best protection.

- Make sure that the child is seated upright in the seat.
- The lap belt should be fastened low on the hips and as snug as possible.
- Check belt fit periodically. A child's squirming or slouching can move the belt out of position.

If the shoulder belt contacts the face or neck, move the child closer to the middle of the vehicle. If this doesn't solve the problem, move the child to the center rear seating position and use the lap belt.

Booster seats that may help overcome this problem are also available for use with lap/shoulder belts. Before buying a booster seat, make sure that it has a label

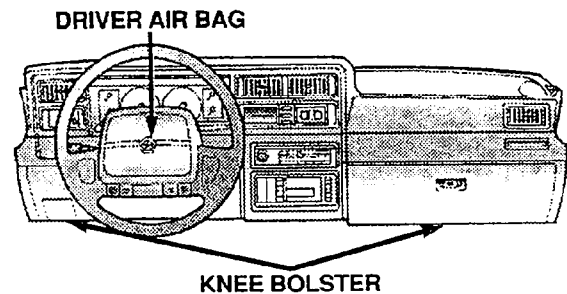
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#### BEFORE DRIVING YOUR VEHICLE

certifying that it meets applicable Motor Vehicle Safety Standards. Make sure that it is satisfactory for use in this vehicle.

#### DRIVER SUPPLEMENTAL RESTRAINT SYSTEM - AIRBAG

This vehicle has an airbag for the driver as a supplement to the seat belt restraint system. The airbag is mounted in the steering wheel. Its job is to inflate in higher speed frontal impacts. It works with the instrument panel knee bolster and the seat belt to provide improved protection for the driver.

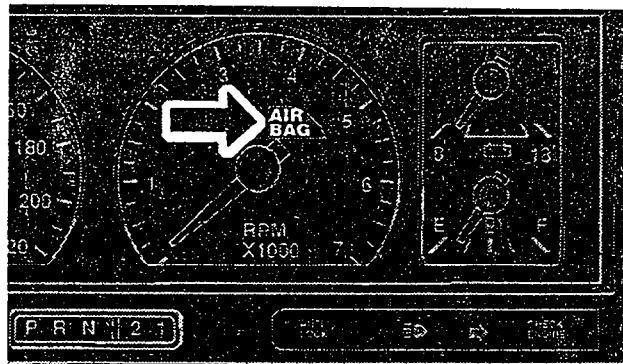


The seat belt is designed to protect you in many types of collisions. The airbag deploys only in frontal collisions. And it will not deploy in collisions at slow speed. But even in collisions where the airbag does work, you need the seat belt to keep you in the right position for the airbag to protect you properly.

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**WARNING!**

- Being too close to the steering wheel or instrument panel during airbag deployment could cause serious injury. Airbags need room to inflate. Sit back, comfortably extending your arms to reach the steering wheel or instrument panel.
- Relying on the airbag alone could lead to more severe injuries in a collision. The airbag works with your seat belt to restrain you properly. In some collisions the airbag won't deploy at all. Wear your seat belt even though you have an airbag.
- Ignoring the AIRBAG light in your instrument panel could mean you won't have the airbag to protect you in a collision. If the light does not come on, stays on after you start the vehicle, or if it comes on as you drive, have the airbag system checked right away.



The airbag system consists of the following:

- Crash Sensors
- Diagnostic Unit
- AIRBAG Readiness Light
- Airbag/inflator Unit
- Unique Steering Wheel and Column
- Interconnecting Wiring

- Knee Impact Bolster

**How The Airbag System Works**

- **Crash Sensors** in the front of the vehicle and in the occupant compartment determine if a frontal impact is severe enough to require the airbag. The sensors will not detect side, rollover, or rear impacts. Switches in the sensors are connected to the diagnostic unit and to the airbag/inflator unit.
- The **Diagnostic Unit** monitors the readiness of the electronic parts of the system whenever the ignition switch is in the START or RUN positions. These include all of the items listed above except the knee bolster and the steering wheel and column. The diagnostic unit also turns on the AIRBAG light in the instrument panel for 6 to 8 seconds when the ignition is first turned on, then turns the light off. If it detects a malfunction in any part of the system, it turns on the light either momentarily or continuously.
- The **Airbag/Inflator Unit** is in the center of the steering wheel. When the crash sensors detect an

impact requiring the airbag, they signal the inflator unit. A large quantity of **non-toxic** nitrogen gas is generated to inflate the airbag. The steering wheel hub trim cover separates and folds out of the way as the bag inflates to its full size. The bag fully inflates in about 50 milliseconds. This is about half of the time it takes to blink your eye. It then quickly deflates by venting the nitrogen gas through holes in the airbag toward the instrument panel. In this way the bag does not interfere with your control of the vehicle.

**If A Deployment Occurs**

The airbag system is designed to deploy when the impact sensors detect a moderate-to-severe frontal collision, and then immediately deflate.

**NOTE:** A frontal collision that is not severe enough to need airbag protection will not activate the system. This does not mean something is wrong with the airbag system.

If you do have a collision which deploys the airbag, any or all of the following may occur:

## BEFORE DRIVING YOUR VEHICLE

- The nylon airbag material may sometimes cause abrasions and/or skin reddening to the driver as the airbag deploys and unfolds itself from the steering wheel.

The abrasions are similar to friction rope burns or those you might get sliding along a carpet or gymnasium floor. They are not caused by contact with chemicals. They are not permanent and normally heal quickly. However, if you haven't healed significantly within a few days, or if you have any blistering, see your doctor immediately.

- As the airbag deflates you may see some smoke-like particles. The particles are a normal by-product of the process that generates the non-toxic nitrogen gas used for airbag inflation. These airborne particles may irritate the skin, eyes, nose, or throat. If you have skin or eye irritation, rinse the area with cool water. For nose or throat irritation, move to fresh air. If the irritation continues, see your doctor.

If these particles settle on your clothing, follow the garment manufacturers instructions for cleaning.

- Your vehicle may be safely driveable after the airbag deploys. If so, you can tuck the deployed airbag inside the opening in the steering wheel hub trim cover to make driving somewhat easier.

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## BEFORE DRIVING YOUR VEHICLE

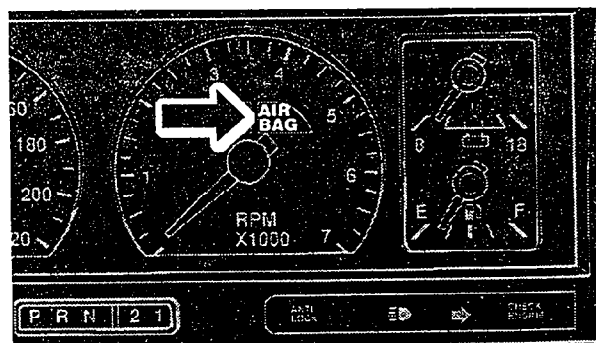
### MAINTAINING YOUR AIRBAG SYSTEM

#### WARNING!

- Modifications to any part of the airbag system could cause it to fail when you need it. You could be injured because the airbag is not there to protect you. Do not modify the components or wiring, including adding any kind of badges or stickers to the steering wheel hub trim cover. Do not modify the front bumper or vehicle body structure.
- You need proper knee impact protection in a collision. Make sure the fuse access panel, in the lower portion of the knee impact bolster, is in place before driving the vehicle. Do not mount or locate any aftermarket equipment on or behind the knee impact bolster.
- You can be injured if you are too close to the steering wheel hub and the airbag inflates. It is dangerous to try to repair any part of the airbag system yourself. Don't try to repair the airbag system. Be sure to tell anyone who works on your vehicle that it has an airbag.

You will want to have the airbag ready to inflate for your protection in an impact. So if any of the following occurs, have an authorized dealer service the system promptly.

- The AIRBAG light does not come on or flickers during the 6 to 8 seconds when the ignition switch is first turned on.



- The light remains on or flickers after the 6 to 8 second interval.

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## BEFORE DRIVING YOUR VEHICLE

- The light flickers or comes on and remains on while driving.

### WARNING!

Deployed airbags can't protect you in another collision. Have the airbags replaced by an authorized dealer as soon as possible.

#### Transporting Pets

Airbags deploying in the front seat could harm your pet. An unrestrained pet will be thrown about and possibly injured, or injure a passenger during panic braking or in a collision.

Pets should be restrained in the rear seat in pet harnesses or pet carriers that are secured by seat belts.

## SEATS

### WARNING!

Adjusting a seat while the vehicle is moving is dangerous. The sudden movement of the seat could cause you to lose control. The seat belt might not be properly adjusted and you could be injured. Adjust the seat only while the vehicle is parked.

#### Manual Seat Adjustment

The adjusting lever is at the front of the seat, near the floor. Pull the lever up and move the seat to the desired position.

Using body pressure, move forward and rearward on the seat to be sure the seat adjusters have latched.

#### Power Seat (if so equipped)

The power seat adjuster, provides six-way adjustment of the driver's seat.

DUMMY INSTRUMENT CALIBRATIONS

DRIVER DUMMY #142

|                                       | SERIAL NO. | MODEL NO.  | MFR.      | CALIBRATION DATE |          |
|---------------------------------------|------------|------------|-----------|------------------|----------|
|                                       |            |            |           | LAST             | DUE      |
| HEAD X-AXIS ACCEL.                    | FH25J      | 7264       | ENDEVCO   | 09/24/93         | 03/24/94 |
| Y-AXIS ACCEL.                         | CY32H      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Z-AXIS ACCEL.                         | AC8K2      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| CHEST X-AXIS ACCEL.                   | DR49J7     | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Y-AXIS ACCEL.                         | AC8W6      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| Z-AXIS ACCEL.                         | CW42H      | 7264       | ENDEVCO   | 09/14/93         | 03/14/94 |
| LEFT FEMUR FORCE LOAD CELL            | 901        | 2430       | GSE       | 09/23/93         | 03/23/94 |
| RIGHT FEMUR FORCE LOAD CELL           | 902        | 2430       | GSE       | 09/23/93         | 03/23/94 |
| *NECK X-AXIS FORCE LOAD CELL          | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| Y-AXIS FORCE LOAD CELL                | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| Z-AXIS FORCE LOAD CELL                | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| *NECK MOMENT ABOUT X-AXIS LOAD CELL   | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| MOMENT ABOUT Y-AXIS LOAD CELL         | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| MOMENT ABOUT Z-AXIS LOAD CELL         | 0280       | 1716       | DENTON    | 09/20/93         | 03/20/94 |
| *CHEST DEFLECTION POTENTIOMETER       | 90320B     | 81422A     | VERNITECH | 09/22/93         | 03/22/94 |
| LAP BELT FORCE LOAD CELL              | 616        | 3419       | LEBOW     | 08/24/93         | 02/24/94 |
| SHOULDER BELT FORCE LOAD CELL         | 610        | 3419       | LEBOW     | 08/23/93         | 02/23/94 |
| SHOULDER BELT SPOOL-OUT POTENTIOMETER | A51809     | PT-101-50A | CELESCO   | 09/23/93         | 03/23/94 |
| SHOULDER BELT STRETCH POTENTIOMETER   | 2590       | 2051414101 | BOURNES   | 09/23/93         | 03/23/94 |

\*HYBRID III USE ONLY.