

DOT1292

REPORT NOS. 208-TRC-89-004

212-TRC-89-004

301-TRC-89-004

VEHICLE SAFETY COMPLIANCE TESTING  
FOR OCCUPANT CRASH PROTECTION,  
WINDSHIELD MOUNTING, WINDSHIELD ZONE  
INTRUSION, AND FUEL SYSTEM INTEGRITY

FUJI HEAVY INDUSTRIES, LTD.

1989 SUBARU GL

4-DOOR SEDAN

NHTSA NO. CK5501

TRC TEST NO. 890320.

THE TRANSPORTATION RESEARCH CENTER OF OHIO

U.S. RT. 33, LOGAN COUNTY

EAST LIBERTY, OHIO 43319



APRIL 6, 1989

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
400 SEVENTH STREET, S.W.  
ROOM NO. 6115 (NEF-31)  
WASHINGTON, DC 20590

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                             |                                                                                                                                                                                                                                               |                                                                                                   |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--|
| 1. Report No. <b>208-TRC-89-004</b><br><b>212-TRC-89-004</b><br><b>301-TRC-89-004</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | 2. Government Accession No.                                 |                                                                                                                                                                                                                                               | 3. Recipient's Catalog No.                                                                        |  |
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| 16. Abstract<br><p>A 30 mph flat frontal barrier impact compliance test was conducted on a 1989 Subaru GL 4-door sedan, VIN JF1AC4322KC208193, NHTSA No. CK5501, at the Transportation Research Center of Ohio on March 20, 1989. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards:</p> <p>FMVSS No. 208, "Occupant Crash Protection"<br/>FMVSS No. 212, "Windshield Mounting"<br/>FMVSS No. 219, (Partial), "Windshield Zone Intrusion"<br/>FMVSS No. 301, "Fuel System Integrity"</p> <p>The barrier impact velocity was 29.6 mph.<br/>The ambient temperature was 71° F.<br/>The vehicle appears to comply with the applicable requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.</p> |  |                                                             |                                                                                                                                                                                                                                               |                                                                                                   |  |
| 17. Key Words <b>Frontal Impact</b><br><b>30 mph Vehicle Safety Compliance Testing:</b><br><b>FMVSS 208, "Occupant Crash Protection"</b><br><b>FMVSS 212, "Windshield Mounting"</b><br><b>FMVSS 219, "Windshield Zone Intrusion"</b><br><b>FMVSS 301, "Fuel System Integrity"</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                             | 18. Distribution Statement <b>Available from:</b><br><b>Technical Reference Division</b><br><b>National Highway Traffic Safety Admin</b><br><b>Nassif Building, Room 5108</b><br><b>400 Seventh Street, SW</b><br><b>Washington, DC 20590</b> |                                                                                                   |  |
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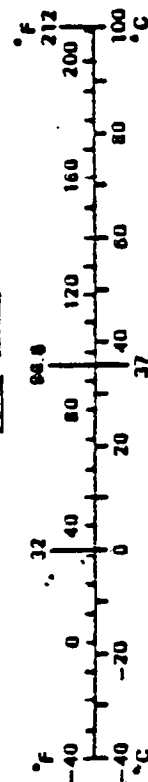
# METRIC CONVERSION FACTORS

## 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                         | centimeters        | cm              |
| yd                         | yards              | 0.9                        | meters             | m               |
| mi                         | miles              | 1.6                        | kilometers         | km              |
| <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                        | metric ton         | t               |
| <b>VOLUME</b>              |                    |                            |                    |                 |
| tsp                        | teaspoons          | 5                          | milliliters        | ml              |
| Tbsp                       | tablespoons        | 15                         | milliliters        | ml              |
| in <sup>3</sup>            | cubic inches       | 16                         | 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                         | degrees Fahrenheit | 5/9 (after subtracting 32) | degrees Celsius    | °C              |

## 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              |
| m                          | meters             | 1.1               | yards              | yd              |
| km                         | kilometers         | 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           | 2.5               | acres              |                 |
| <b>MASS (weight)</b>       |                    |                   |                    |                 |
| g                          | grams              | 0.035             | ounces             | oz              |
| kg                         | kilograms          | 2.2               | pounds             | lb              |
| t                          | metric ton         | 1.1               | short tons         |                 |
| <b>VOLUME</b>              |                    |                   |                    |                 |
| ml                         | milliliters        | 0.03              | fluid ounces       | fl oz           |
| ml                         | milliliters        | 0.06              | cubic inches       | in <sup>3</sup> |
| 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                         | degrees Celsius    | 9/5 (then add 32) | degrees Fahrenheit | °F              |



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SECTION 1.0

PURPOSE AND TEST SUMMARY

#### PURPOSE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (Partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center of Ohio (TRC) under Contract No. DTNH22-88-C-11038. The purpose of this test was to determine if the subject vehicle, a 1989 Subaru GL 4-door sedan, NHTSA No. CK5501, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity." The test was conducted in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-07.

### TEST SUMMARY

The 1989 Subaru GL 4-door sedan, NHTSA No. CK5501, was equipped with a 1.8 liter, transverse engine, automatic transmission, power steering, and power brakes. The test weight of the vehicle was 2770 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS test Nos. 208, 212, 219 (partial), and 301. The Head Injury Criteria (HIC) calculations were less than 1000, the resultant accelerations of the thorax did not exceed 60 g's and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the driver's and right front passenger's seats. There was 100 percent windshield retention. There was no intrusion into the windshield. There was no fluid spillage from the fuel system following the impact or during the static rollover test.

Two Part 572 B adult male anthropomorphic test devices (ATDs) were seated in the front outboard designated seating positions. The dummies were positioned according to the dummy placement procedures specified in Appendices B and C of Laboratory Procedure TP-208-07.

Both ATDs were instrumented with head and chest accelerometers oriented to measure accelerations in the longitudinal, lateral, and vertical directions, and with right and left femur load cells.

The vehicle was instrumented with eleven (11) accelerometers oriented to measure longitudinal axis acceleration.

The crash event was recorded by one (1) real-time panning camera and fourteen (14) high-speed motion picture cameras operating at approximately 500 frames per second. One (1) real-time camera was used for pre-test and post-test documentation.

The twenty-seven (27) channels of data were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per second and digitally processed per sections 12.8 and 12.9 of the Laboratory Procedure.

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on March 20, 1989. The test vehicle's impact speed was 29.6 mph. The vehicle sustained 14.3 inches of static crush.

The FMVSS 208, 212, 219 (partial) and 301 compliance data is presented in Section 2.0. The camera information is presented in Section 3.0. Appendix A contains the still photographic prints. Appendix B contains the vehicle and dummy data plots.

TABLE 1 CRASH TEST SUMMARY

|                               |                             |                      |                       |
|-------------------------------|-----------------------------|----------------------|-----------------------|
| NHTSA NO.:                    | CK5501                      | PROJECT:             | 208 Compliance        |
| DATE:                         | 3/20/89                     | TIME:                | 1402      TEMP: 71° F |
| VEHICLE:                      | 1989 Subaru GL 4-door sedan |                      |                       |
| TEST WEIGHT (LBS):            | 2770                        |                      |                       |
| IMPACT ANGLE (DEG)*:          | 0                           |                      |                       |
| IMPACT VELOCITY (MPH)**:      | PRIMARY = 29.6              | SECONDARY = 29.6     |                       |
| MAXIMUM STATIC CRUSH (IN):    | 14.3                        |                      |                       |
| VEHICLE REBOUND (IN):         | 30.3                        |                      |                       |
| DUMMIES:                      | Driver #354                 | Passenger #690       |                       |
| TYPE:                         | Part 572 B                  | Part 572 B           |                       |
| LOCATION:                     | Left front                  | Right front          |                       |
| RESTRAINT:                    | 2-point passive belt        | 2-point passive belt |                       |
| NUMBER OF DATA CHANNELS:      | 27                          |                      |                       |
| NUMBER OF HIGH SPEED CAMERAS: | HIGH-SPEED: 14              | REAL-TIME: 2         |                       |

\*With respect to tow track centerline.

\*\*Speed trap measurement ( $\pm$  .05 mph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Fuji Heavy Industries, Ltd.

MAKE/MODEL: Subaru GL

VIN: JF1AC4322KC208193

BODY STYLE: 4-door sedan

MODEL YEAR: 1989

NHTSA NO.: CK5501

COLOR: red

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 1.8 liter

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

DATE VEHICLE RECEIVED: 2/10/89

ODOMETER READING: 101.0

DEALER'S NAME AND ADDRESS: Subaru North  
6500 North High St.  
Worthington, OH 43085

ACCESSORIES:

POWER STEERING Yes

POWER BRAKES Yes

POWER SEATS No

POWER WINDOWS Yes

TINTED GLASS Yes

RADIO Yes

CLOCK Yes

OTHER None

AUTOMATIC TRANSMISSION Yes

AUTOMATIC SPEED CONTROL No

TILTING STEERING WHEEL Yes

TELESCOPING STEERING WHEEL No

AIR CONDITIONING No

ANTI-SKID BRAKE No

REAR WINDOW DEFROSTER Yes

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

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Fuji Heavy Industries, Ltd.

DATE OF MANUFACTURE: 8/88

GVWR: 3430 LBS

GAWR: FRONT 1860 LBS., REAR 1570 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 28 psi; REAR 28 psi

RECOMMENDED TIRE SIZE: 175/70SR13 LOAD RANGE X B,      C,      D

TIRES ON VEHICLE (MFR., LINE, SIZE): Bridgestone SF402 steel 175/70SR13

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS: FRONT: Bucket  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manual Adjustable

NUMBER OF OCCUPANTS 2 FRONT 3 REAR 5 TOTAL

CARGO LOAD 60 LBS. TOTAL 810 LBS.

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

RIGHT FRONT 690 lbs. RIGHT REAR 484 lbs.

LEFT FRONT 736 lbs. LEFT REAR 482 lbs.

TOTAL FRONT WEIGHT 1426 lbs. (59.6% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 966 lbs. (40.4% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2392 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2392 LBS)

VCW = VEHICLE CAPACITY WEIGHT (810 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

$RCLW = VCW - 150 (DCS) = 810 - (150)(5) = 60 \text{ LBS}$

$TARGET \text{ TEST WEIGHT} = UDW + RCLW + (2 \text{ DUMMIES} \times 164 \text{ LBS/DUMMY})$

$= 2392 + 60 + 328 \text{ LBS}$

TARGET TEST WEIGHT = 2780 LBS

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 50 LBS. CARGO

|                    |           |                                 |          |
|--------------------|-----------|---------------------------------|----------|
| RIGHT FRONT        | 748 lbs.  | RIGHT REAR                      | 611 lbs. |
| LEFT FRONT         | 803 lbs.  | LEFT REAR                       | 608 lbs. |
| TOTAL FRONT WEIGHT | 1551 lbs. | (56.0% OF TOTAL VEHICLE WEIGHT) |          |
| TOTAL REAR WEIGHT  | 1219 lbs. | (44.0% OF TOTAL VEHICLE WEIGHT) |          |
| TOTAL TEST WEIGHT  | 2770 lbs. | (0.4% UNDER TARGET WEIGHT)      |          |

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: None

COMPONENTS REMOVED TO MEET TARGET WEIGHT: Rear bumper, rt. rear taillight, rear speakers, rear seat belts, rear interior trim, upper brake light.

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

|                     |             |          |          |         |
|---------------------|-------------|----------|----------|---------|
| DELIVERED ATTITUDE: | LF 24.9;    | RF 24.9; | LR 23.1; | RR 23.6 |
| PRE-TEST ATTITUDE:  | LF 24.1;    | RF 24.1; | LR 22.2; | RR 22.2 |
| POST-TEST ATTITUDE: | LF 26.8;    | RF 26.4; | LR 22.3; | RR 21.6 |
| WHEELBASE:          | 98.0 INCHES |          |          |         |

CG = 43.1 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TABLE 3 TEST CONDITIONS

TEST NUMBER: 890320

DATE OF TEST: 3/20/89

TIME OF TEST: 1402

TYPE OF TEST: Frontal barrier impact

IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA:

71° F

TEMPERATURE IN OCCUPANT COMPARTMENT:

71° F

IMPACT VELOCITY: PRIMARY = 29.6 MPH

SECONDARY = 29.6 MPH

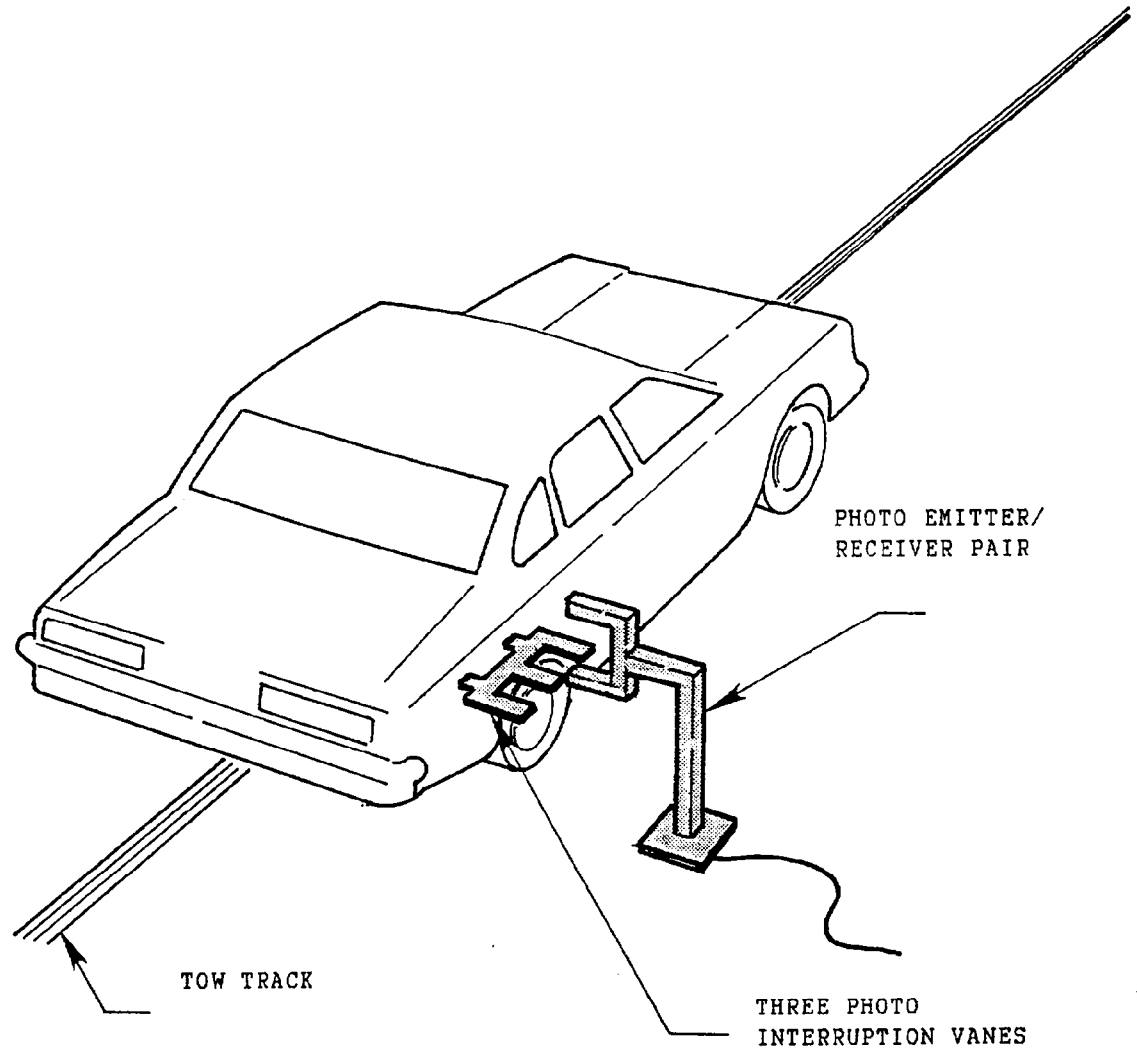
(SPECIFIED RANGE = 28.9 TO 29.9 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

|                                 |              |          |          |         |
|---------------------------------|--------------|----------|----------|---------|
| OVERALL LENGTH OF TEST VEHICLE: | PRE-TEST:    | L 170.9; | C 172.4; | R 170.9 |
|                                 | POST-TEST:   | L 157.0; | C 158.1; | R 156.8 |
|                                 | TOTAL CRUSH: | L 13.9;  | C 14.3;  | R 14.1  |

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: L: 31.0; C: 29.4; R: 30.4; AVG: 30.3

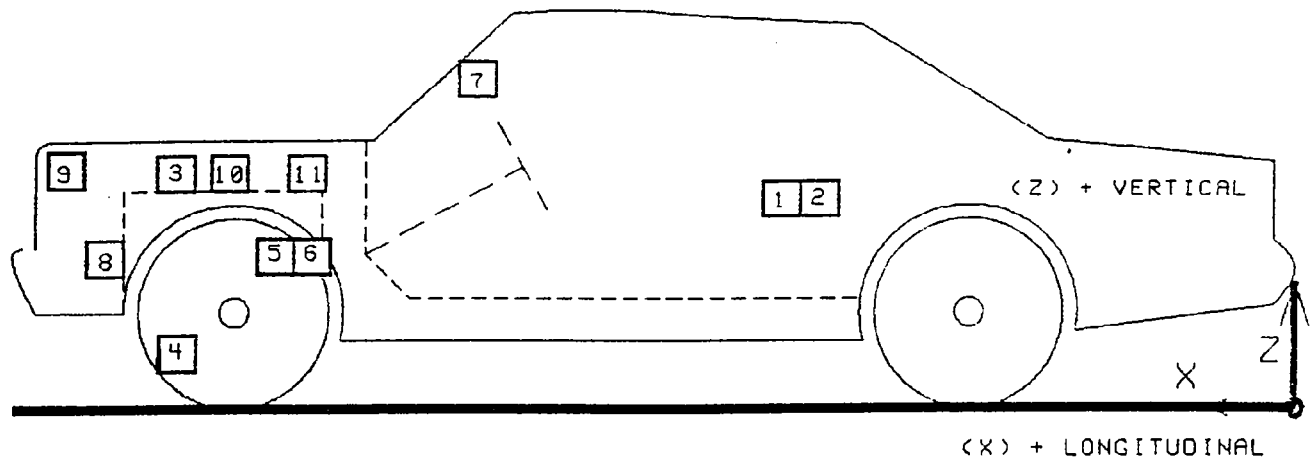
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



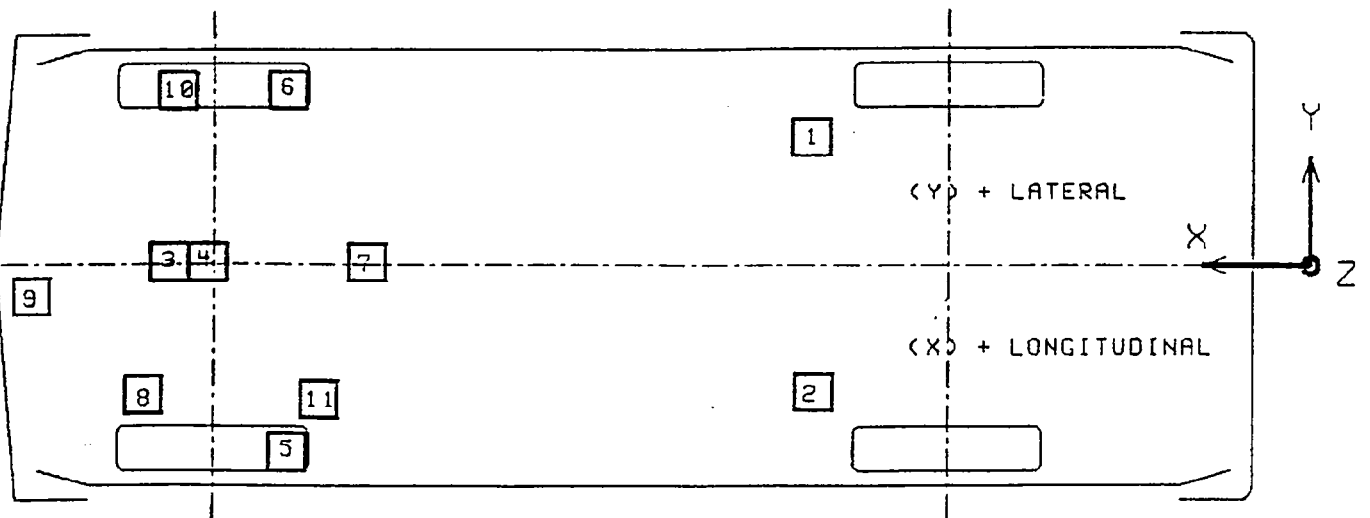
The final vane clears emitter/receiver two inches before impact.

The vanes have one foot spacing.

FIGURE 2  
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4  
TEST NUMBER 890320

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

| No. | LOCATION                                               |      | X*    | Y*    | Z*   | POSITIVE<br>DIRECTION |        | NEGATIVE<br>DIRECTION |        |
|-----|--------------------------------------------------------|------|-------|-------|------|-----------------------|--------|-----------------------|--------|
|     |                                                        |      |       |       |      | MAX                   | G MSEC | MAX                   | G MSEC |
| 1   | REAR SEAT CROSSMEMBER<br>AT LEFT SIDE<br>LONGITUDINAL  | PRE  | 66.1  | 21.5  | 12.0 |                       |        |                       |        |
|     |                                                        | POST | 65.9  | 21.4  | 12.9 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 1.3                   | 165.0  | 29.8                  | 46.9   |
| 2   | REAR SEAT CROSSMEMBER<br>AT RIGHT SIDE<br>LONGITUDINAL | PRE  | 65.8  | -21.4 | 12.0 |                       |        |                       |        |
|     |                                                        | POST | 65.6  | -21.4 | 12.6 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 1.8                   | 126.8  | 27.4                  | 40.3   |
| 3   | TOP OF ENGINE BLOCK<br>LONGITUDINAL                    | PRE  | 153.5 | 13.0  | 23.2 |                       |        |                       |        |
|     |                                                        | POST | 145.8 | 13.3  | 21.9 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 16.3                  | 41.5   | 99.7                  | 23.6   |
| 4   | BOTTOM OF ENGINE BLOCK<br>LONGITUDINAL                 | PRE  | 149.4 | -1.8  | 8.7  |                       |        |                       |        |
|     |                                                        | POST | 146.9 | 0.0   | 10.1 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 21.6                  | 42.5   | 85.0                  | 31.6   |
| 5   | BRAKE CALIPER<br>AT RIGHT SIDE<br>LONGITUDINAL         | PRE  | 131.0 | -25.9 | 8.1  |                       |        |                       |        |
|     |                                                        | POST | 133.1 | -25.9 | 7.4  |                       |        |                       |        |
|     |                                                        |      |       |       |      | 26.5                  | 81.4   | 45.8                  | 56.3   |
| 6   | BRAKE CALIPER<br>AT LEFT SIDE<br>LONGITUDINAL          | PRE  | 131.4 | 25.9  | 8.4  |                       |        |                       |        |
|     |                                                        | POST | 133.1 | 25.9  | 7.9  |                       |        |                       |        |
|     |                                                        |      |       |       |      | 35.1                  | 76.8   | 59.6                  | 61.4   |
| 7   | DASH PANEL<br>LONGITUDINAL                             | PRE  | 114.5 | -1.4  | 32.9 |                       |        |                       |        |
|     |                                                        | POST | 112.8 | -1.4  | 33.8 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 20.8                  | 61.8   | 56.9                  | 54.6   |
| 8   | FRONT FRAME RAIL<br>LONGITUDINAL                       | PRE  | 157.0 | -16.6 | 14.1 |                       |        |                       |        |
|     |                                                        | POST | 155.9 | -18.1 | 15.8 |                       |        |                       |        |
|     |                                                        |      |       |       |      | ---                   | ---    | ---                   | ---    |
| 9   | FRONT FRAME<br>CROSSMEMBER<br>LONGITUDINAL             | PRE  | 163.8 | -6.9  | 28.6 |                       |        |                       |        |
|     |                                                        | POST | 152.1 | -7.4  | 29.9 |                       |        |                       |        |
|     |                                                        |      |       |       |      | 108.6                 | 24.3   | 139.8                 | 17.6   |

TABLE 4 CONTINUED  
TEST NUMBER 890320

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

| No. | LOCATION          | X*         | Y*    | Z*   | POSITIVE<br>DIRECTION |       | NEGATIVE<br>DIRECTION |      |
|-----|-------------------|------------|-------|------|-----------------------|-------|-----------------------|------|
|     |                   |            |       |      | MAX G MSEC            |       | MAX G MSEC            |      |
| 10  | LEFT FENDER       | PRE 150.2  | 25.7  | 29.5 |                       |       |                       |      |
|     | WELL INSIDE       | POST 147.6 | 22.9  | 31.5 |                       |       |                       |      |
|     | LONGITUDINAL      |            |       |      | 3.4                   | 160.0 | 50.2                  | 46.6 |
| 11  | RIGHT SHOCK TOWER | PRE 141.5  | -20.5 | 30.2 |                       |       |                       |      |
|     |                   | POST 139.6 | -17.8 | 30.9 |                       |       |                       |      |
|     | LONGITUDINAL      |            |       |      | 4.8                   | 79.5  | 43.4                  | 56.0 |

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

Y See DATA ACQUISITION EXPLANATIONS

FIGURE 3 ACCIDENT INVESTIGATION DIVISION DATA  
FOR 30 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Subaru/GL/4-door sedan  
 VEH. NHTSA NO.: CK5501; VIN: JF1AC4322KC208193  
 MODEL YEAR: 1989; BUILD DATE: 8/88; TEST DATE: 3/20/89  
 VEH. SIZE CATEGORY: Compact; TEST WEIGHT: 2770  
 VEH. WHEELBASE: 98.0  
 MAX. WIDTH: 65.6  
 FRONT OVERHANG: 36.2

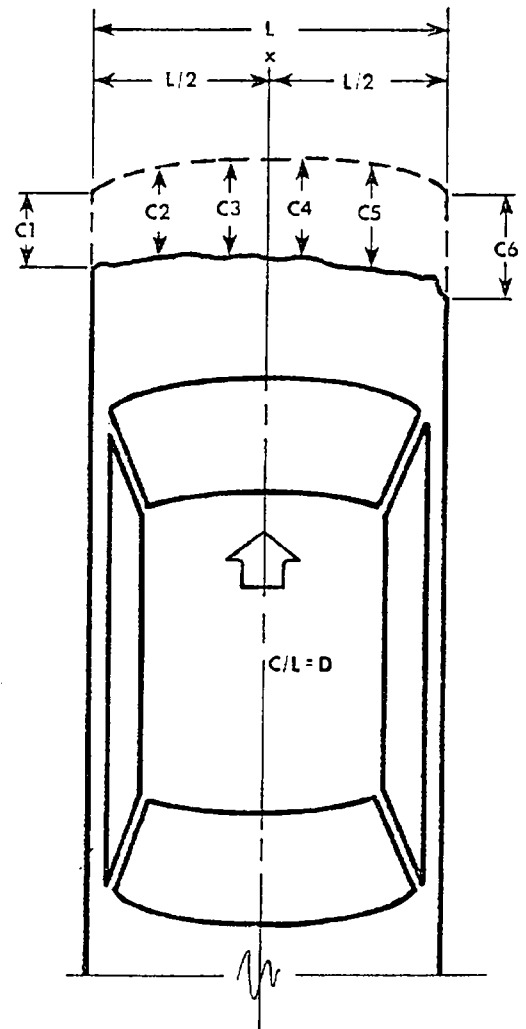
COLLISION DEFORMATION  
 CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)  
 CRUSH DEPTH  
 DIMENSIONS:

C1 = 13.9 inches  
 C2 = 13.4 inches  
 C3 = 13.1 inches  
 C4 = 14.2 inches  
 C5 = 14.3 inches  
 C6 = 14.1 inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline  
(Longitudinal)

LENGTH OF DAMAGED  
 REGION: L = 57.8 inches



**FIGURE 4**  
PRE-TEST AND POST-TEST MEASUREMENT POINTS

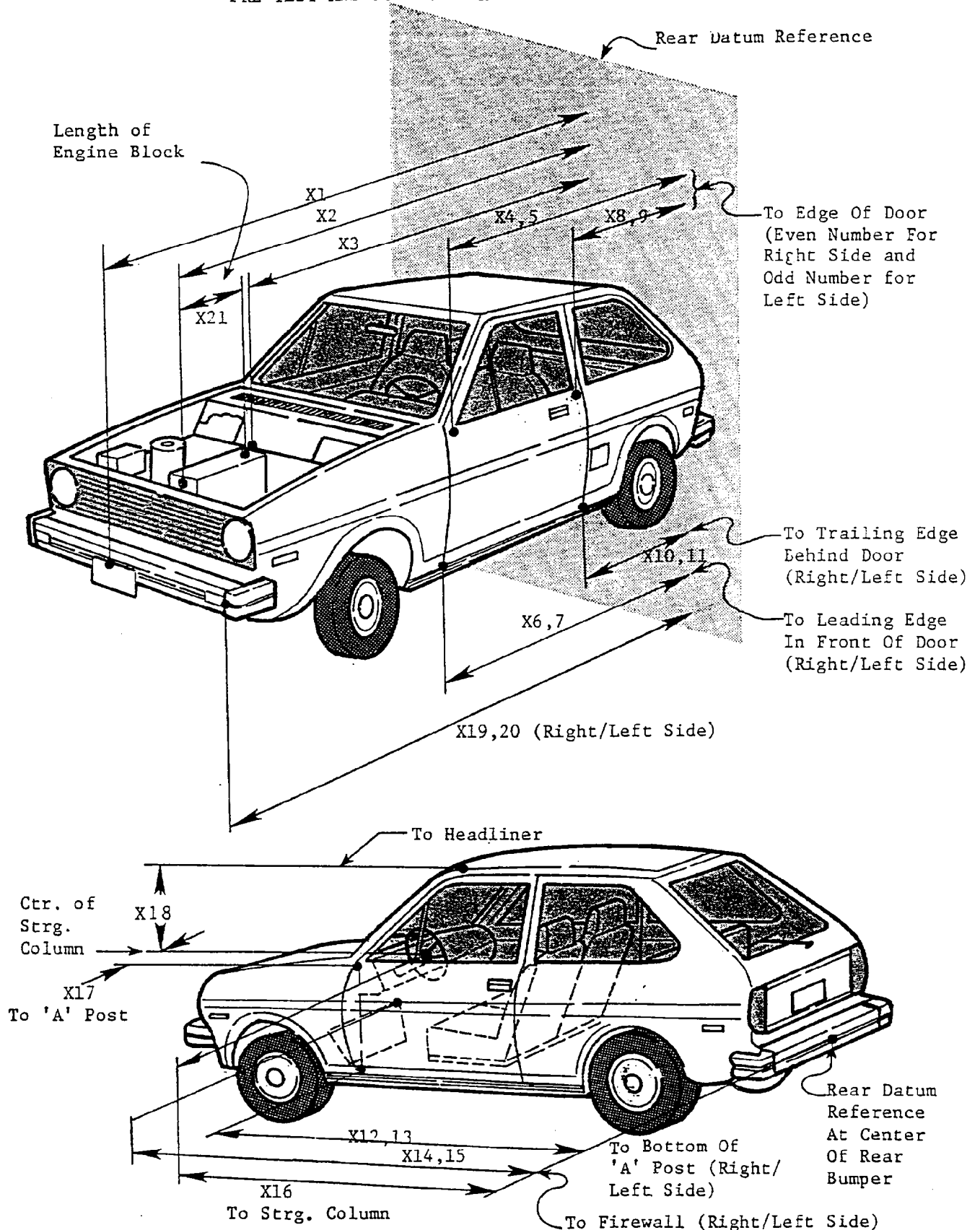
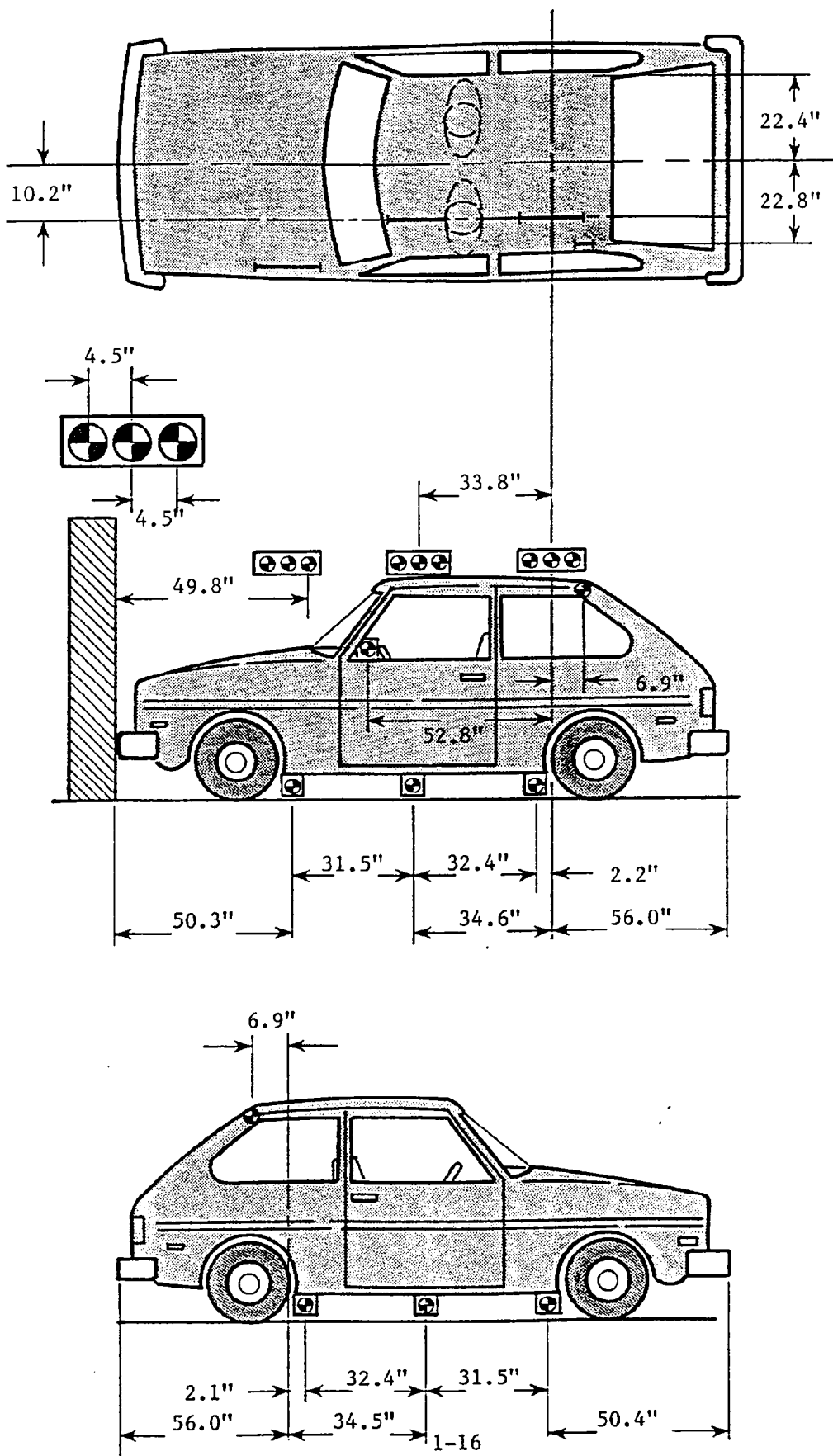


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

| VEHICLE MAKE/MODEL: Subaru GL |                                                              | TEST NUMBER: 890320 |  | DIMENSIONS IN INCHES |           |       |
|-------------------------------|--------------------------------------------------------------|---------------------|--|----------------------|-----------|-------|
| NO.                           | TYPE OF MEASUREMENT                                          |                     |  | PRE-TEST             | POST-TEST | DIFF. |
|                               |                                                              |                     |  |                      |           |       |
| X1                            | TOTAL LENGTH OF VEHICLE AT CENTERLINE                        |                     |  | 172.4                | 158.1     | 14.3  |
| X2                            | REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK             |                     |  | 155.2                | 150.1     | 5.1   |
| X3                            | REAR SURFACE OF VEHICLE TO FIREWALL                          |                     |  | 123.0                | 120.2     | 2.8   |
| X4                            | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR  |                     |  | 119.5                | 119.4     | 0.1   |
| X5                            | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR   |                     |  | 119.5                | 119.4     | 0.1   |
| X6                            | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR  |                     |  | 120.1                | 119.9     | 0.2   |
| X7                            | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR   |                     |  | 120.2                | 120.1     | 0.1   |
| X8                            | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR |                     |  | 81.1                 | 81.1      | 0.0   |
| X9                            | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR  |                     |  | 81.1                 | 81.0      | 0.1   |
| X10                           | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR |                     |  | 82.0                 | 81.8      | 0.2   |
| X11                           | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR  |                     |  | 82.0                 | 82.0      | 0.0   |
| X12                           | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE  |                     |  | 120.2                | 119.9     | 0.3   |
| X13                           | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE   |                     |  | 120.0                | 120.0     | 0.0   |
| X14                           | REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE             |                     |  | 127.5                | 126.8     | 0.7   |
| X15                           | REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE              |                     |  | 127.8                | 126.9     | 0.9   |
| X16                           | REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER             |                     |  | 103.0                | 100.2     | 2.8   |
| X17                           | CENTER OF STEERING COLUMN TO "A" POST                        |                     |  | 15.5                 | 15.0      | 0.5   |
| X18                           | CENTER OF STEERING COLUMN TO HEADLINER                       |                     |  | 16.2                 | 17.5      | -1.3  |
| X19                           | REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER        |                     |  | 170.9                | 156.8     | 14.1  |
| X20                           | REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER         |                     |  | 170.9                | 157.0     | 13.9  |
| X21                           | LENGTH OF ENGINE BLOCK                                       |                     |  | 15.0                 | 15.0      | 0.0   |

FIGURE 5  
VEHICLE TARGET LOCATIONS



DATA ACQUISITION EXPLANATIONS

The right front frame rail X-axis accelerometer, FFRXG, lost data after 29 milliseconds due to the vehicle's crush destroying the accelerometer.

SECTION 2.0

SUMMARY OF RESULTS FOR:

FMVSS 208, "Occupant Crash Protection"

FMVSS 212, "Windshield Mounting"

FMVSS 219, (Partial), "Windshield Zone Intrusion"

FMVSS 301, "Fuel System Integrity"

#### COMPLIANCE DATA SUMMARY

The test vehicle, a 1989 Subaru GL 4-door sedan, NHTSA No. CK5501, appeared to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.

The driver's Head Injury Criteria (HIC) was 496. The driver's maximum chest deceleration over three milliseconds was 47.6 g. The driver's right and left compressive femur loads were 1034 pounds and 1270 pounds, respectively.

The right front passenger's Head Injury Criteria (HIC) was 720. The right front passenger's maximum chest deceleration over three milliseconds was 43.9 g. The right front passenger's right and left compressive femur loads were 821 pounds and 634 pounds, respectively.

The vehicle's restraint system met the comfort and convenience requirements of FMVSS 208.

The windshield retention was 91.3 percent.

There was no intrusion into the inner surface of the windshield below the protected zone.

There was no Stoddard fluid spillage following the crash test event or during any phase of the post-test static rollover.

TABLE 6 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION ('G')

|           | HEAD  |       |       |      | CHEST |      |      |      |
|-----------|-------|-------|-------|------|-------|------|------|------|
|           | X     | Y     | Z     | R    | X     | Y    | Z    | R*   |
| DRIVER    | -36.7 | 11.1  | -53.5 | 56.5 | -48.2 | 6.1  | 9.9  | 47.6 |
| PASSENGER | -41.6 | -15.9 | -65.4 | 66.8 | -43.5 | -5.8 | 14.6 | 43.9 |

MAXIMUM FORCE-FEMUR LOAD (LBS)

|           | LEFT FEMUR | RIGHT FEMUR |
|-----------|------------|-------------|
| DRIVER    | 1270       | 1034        |
| PASSENGER | 634        | 821         |

HEAD INJURY CRITERIA\*\*

|           | HIC | TIME $t_1$<br>(MSEC) <sup>1</sup> | TIME $t_2$<br>(MSEC) <sup>2</sup> |
|-----------|-----|-----------------------------------|-----------------------------------|
| DRIVER    | 496 | 66.6                              | 102.6                             |
| PASSENGER | 720 | 72.5                              | 108.5                             |

\*Defined as exceeding 0.003 sec. duration

\*\*As defined in FMVSS No. 208

## 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 head rotated forward contacting the steering wheel and the dummy's chest. The dummy's chest was restrained by the two-point passive belt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the two-point passive belt.

### 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 forward contacting the dummy's chest, as the dummy's chest was restrained by the two-point passive belt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the right front passenger's seat restrained by the two-point passive belt.

VISIBLE DUMMY CONTACT POINTS:

|            | DRIVER #354                   | PASSENGER #690   |
|------------|-------------------------------|------------------|
| Head       | Chest & Steering<br>wheel hub | Chest            |
| Chest      | None                          | None             |
| Abdomen    | None                          | None             |
| Left knee  | Instrument panel              | Instrument panel |
| Right knee | Instrument panel              | Instrument panel |

DOOR OPENING:

|       | LEFT | RIGHT |
|-------|------|-------|
| Front | Easy | Easy  |
| Rear  | Easy | Easy  |

SEAT MOVEMENT:

|       | SEAT BACK FAILURE | SEAT SHIFT |
|-------|-------------------|------------|
| Front | None              | None       |
| Rear  | NA                | NA         |

GLAZING DAMAGE:

The entire windshield was cracked upon impact.

\_\_\_\_\_

\_\_\_\_\_

OTHER NOTABLE IMPACT EFFECTS:

None

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**FIGURE 6 DUMMY POSITIONING DATA FOR 30 MPH FRONTAL BARRIER IMPACT TEST**

**PRE-IMPACT DATA:**

Make/Model: Subaru GL  
 Body Style: 4-door sedan Model Year: 1989  
 NHTSA No.: CK5501 Color: Red

**DATA FROM CERTIFICATION LABEL:**

Vehicle Manufacturer: Fuji Heavy Industries, Ltd.  
 Date of Manufacture: 8/88 VIN: JF1AC4322KC208193  
 GVWR: 3430 lb; GAWR: Front = 1860 lb; Rear = 1570 lb

**POST-IMPACT DATA:**

Date of Test: 3/20/89 Time: 1402 Temperature: 71° F  
 Required Impact Velocity Range: 28.9 to 29.9 mph  
 Impact Velocity: Primary = 29.6 mph Secondary = 29.6 mph  
 Seat Type: Bucket Adjuster Type: Manual  
 Bucket Seat Back Type: Adjustable  
 Technicians: B. Crabtree, R. Cribley, P. Cummins

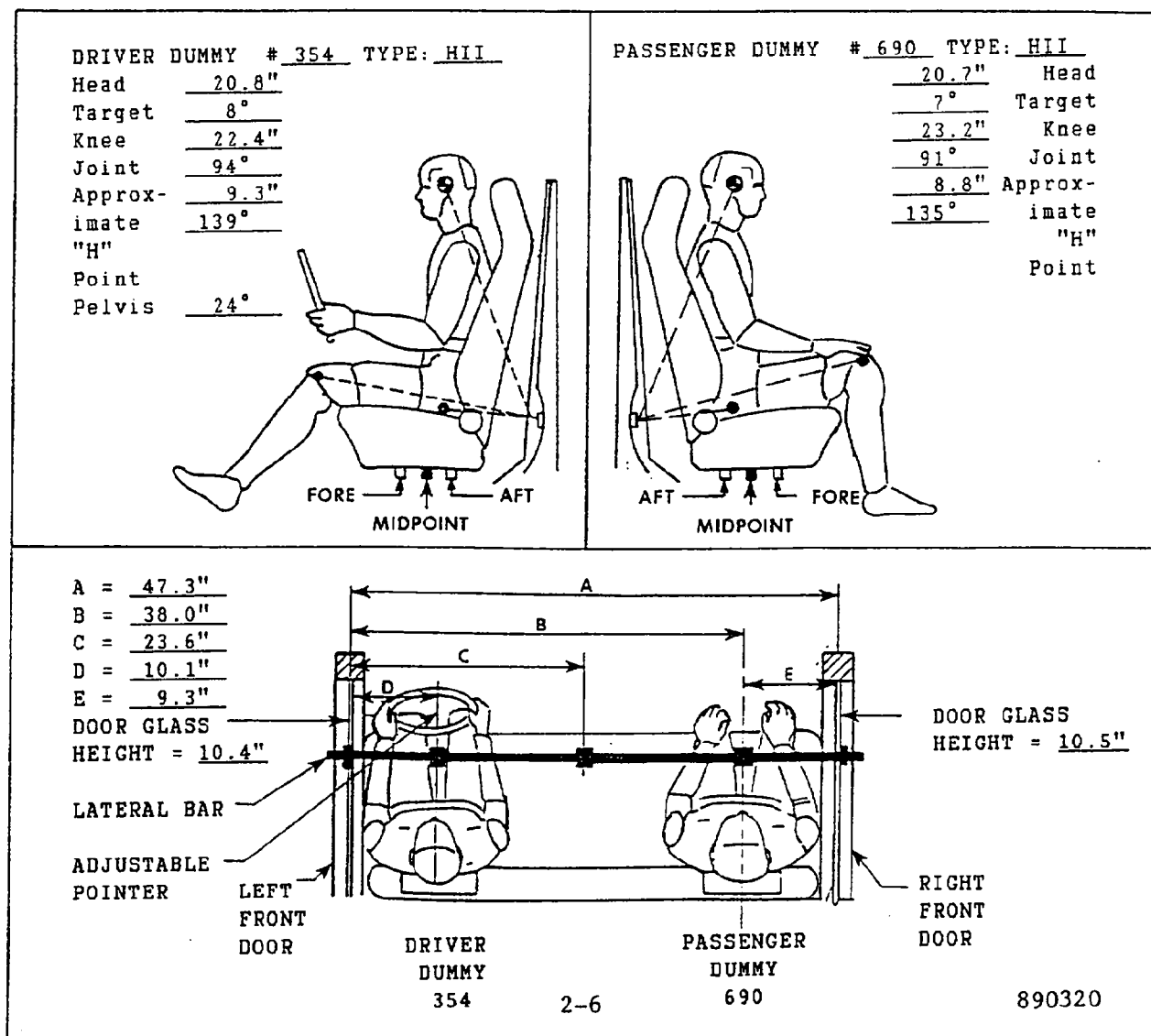
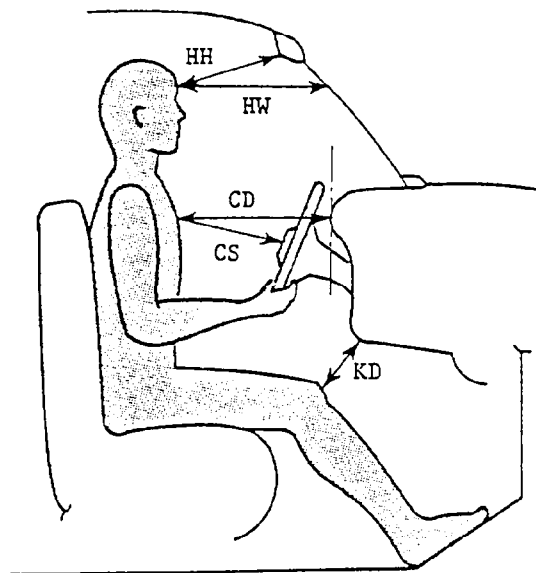
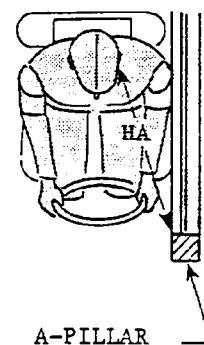
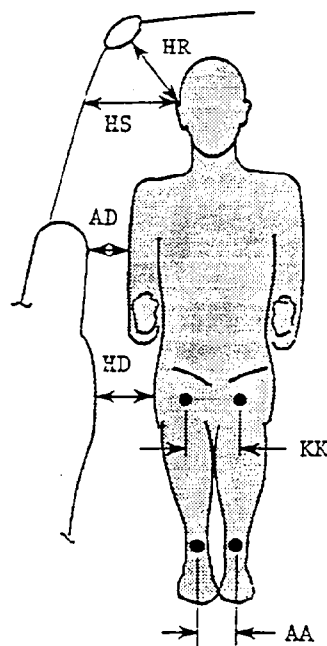


FIGURE 7 DUMMY IN-VEHICLE POSITION RECORDING SHEET

|     | DRIVER | PASSENGER |
|-----|--------|-----------|
| HH  | 16.8   | 16.7      |
| HW  | 21.8   | 20.7      |
| CD  | 21.4   | 22.4      |
| CS  | 14.1   | NA        |
| KDL | 4.0    | 3.2       |
| KDR | 3.8    | 2.8       |
| TA  | 25°    | 28°       |
| SA  | 25°    | 25°       |
| HA  | 12.6   | 16.6      |



|    | DRIVER | PASSENGER |
|----|--------|-----------|
| HR | 4.9    | 5.3       |
| HS | 7.4    | 6.9       |
| AD | 4.0    | 3.9       |
| HD | 6.7    | 6.4       |
| KK | 7.9    | 7.2       |
| AA | 9.5    | 6.6       |



Knee outer bolt head to outer bolt head spacing:

Driver = 14.5

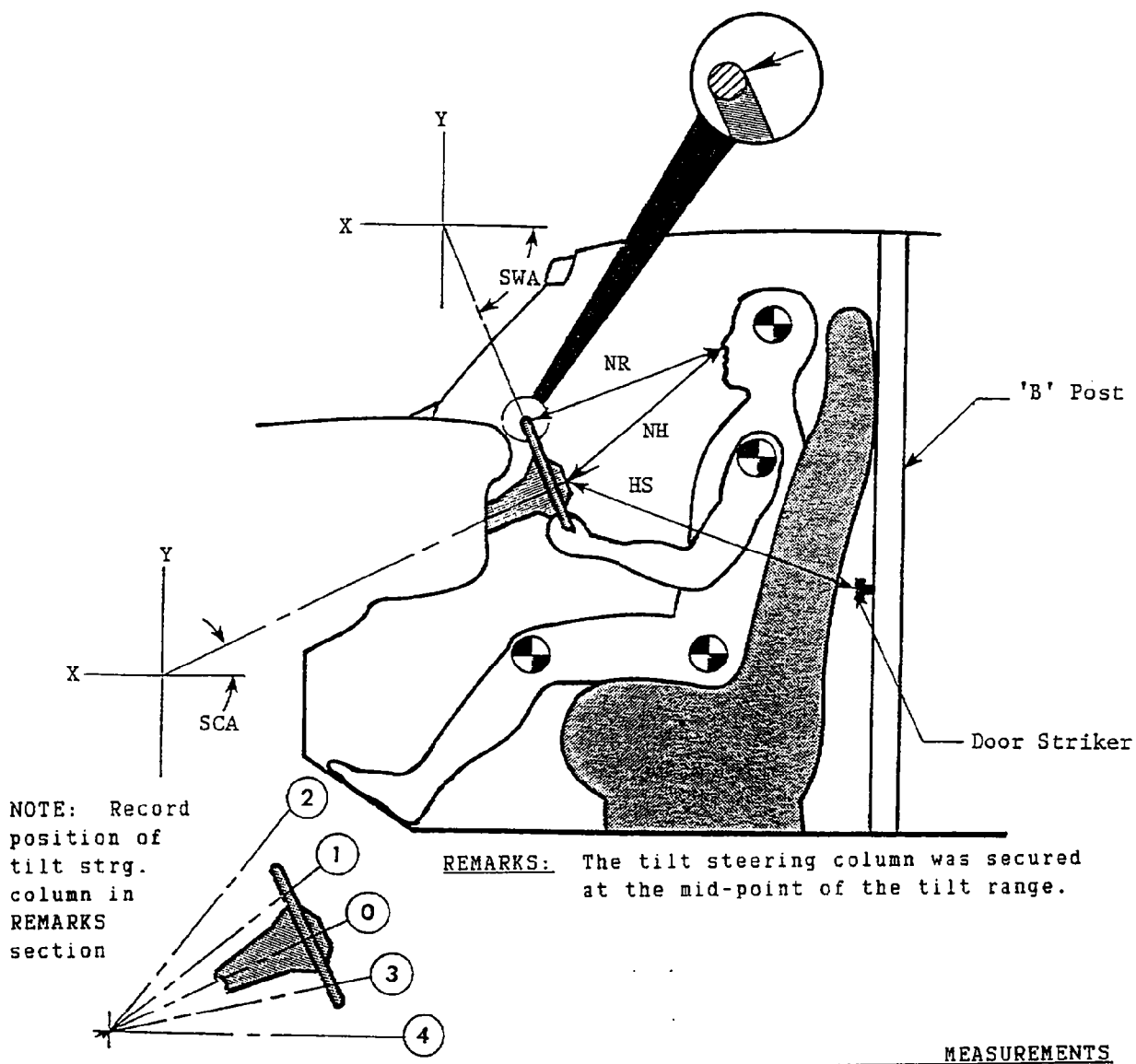
Passenger = 11.8

HH = Head to Windshield Header    HR = Head to Side Roof  
 HW = Head to Windshield    HS = Head to Side Window  
 CD = Chest to Dash    AD = Arm to Door  
 CS = Chest to Steering Wheel    HD = Hip to Door  
 KD = Knee to Dash    KK = Knee to Knee  
 TA = Torso Angle    AA = Ankle to Ankle  
 SA = Seat Back Angle    HA = Head to A-Pillar

Torso and seat back angles are relative to vertical.

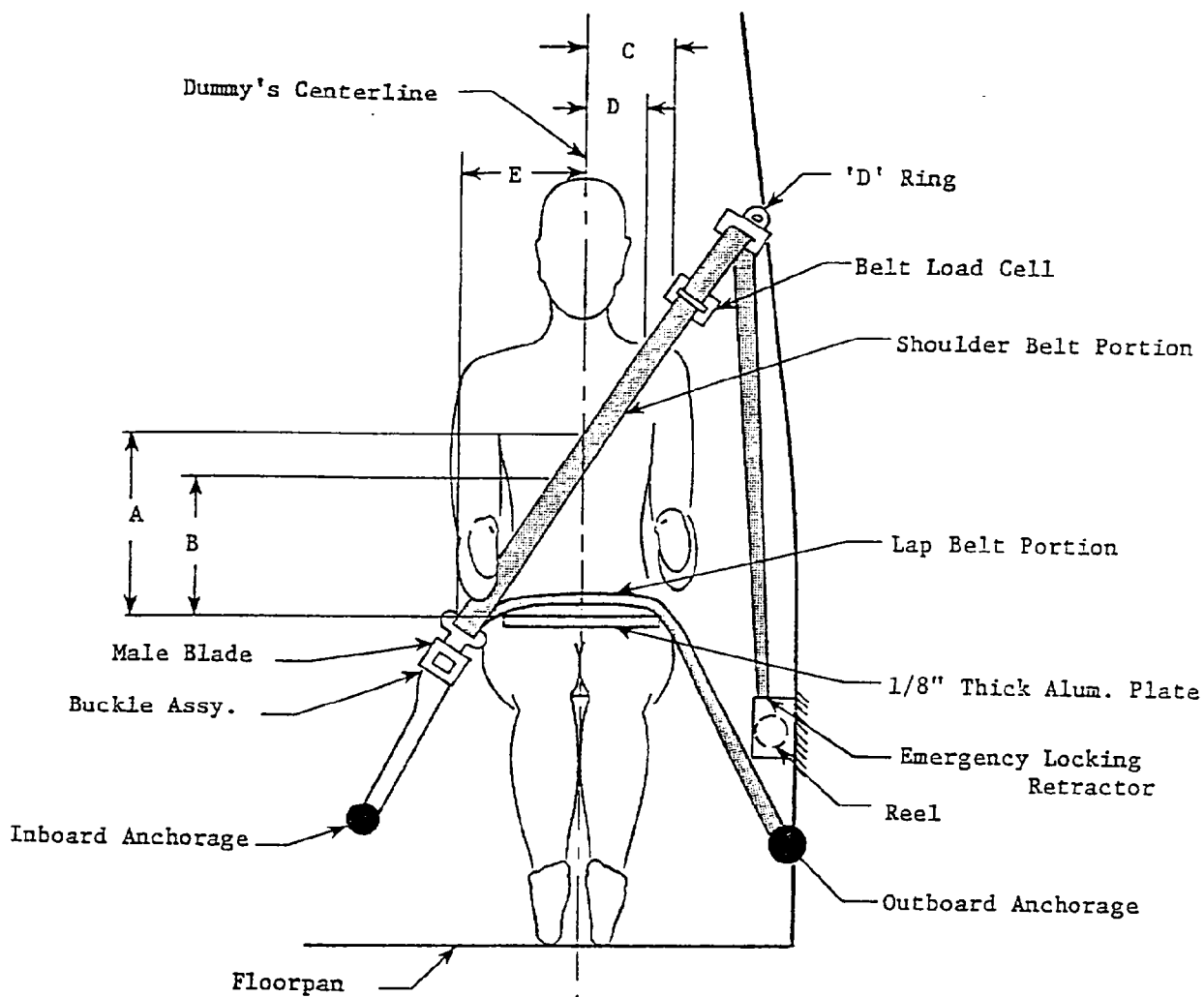
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 8 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



|     |                                                                                                          |      |
|-----|----------------------------------------------------------------------------------------------------------|------|
| NR  | - Distance from tip of dummy's nose to top rear surface of steering wheel rim. (in.)                     | 18.6 |
| NH  | - Distance from tip of dummy's nose to center of steering column hub. (in.)                              | 19.6 |
| HS  | - Distance from center of steering column hub to the forward surface of the door lock striker pin. (in.) | 21.0 |
| SCA | - Angle of steering column relative to the horizontal X axis                                             | 24°  |
| SWA | - Angle of steering wheel relative to the horizontal X axis                                              | 66°  |

FIGURE 9 SEAT BELT POSITIONING DATA



|                                                                            | DRIVER<br>DUMMY | PASSENGER<br>DUMMY |
|----------------------------------------------------------------------------|-----------------|--------------------|
| A - Top surface of alum. plate to belt upper edge (in)                     | 14.0            | 14.1               |
| B - Top surface of alum. plate to belt lower edge (in)                     | 11.0            | 11.1               |
| C - Dummy centerline to outer edge of belt at chest flesh top (in)         | 6.6             | 7.1                |
| D - Dummy centerline to inner edge of belt at chest flesh top (in)         | 3.9             | 4.0                |
| E - Dummy centerline to intersection of upper torso belt and lap belt (in) | NA              | NA                 |

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN: JF1AC4322KC208193 NHTSA NO: CK5501  
MAKE: Subaru MODEL: GL  
VEHICLE BUILD DATE: 8/88 VEHICLE TYPE: 4-door sedan  
FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:  
(check one): X Automatic belts  
       Type 2 lap/shoulder belts  
       Other

CONVENIENCE HOOKS:

DEVICE AUTOMATICALLY RELEASES WHEN IGNITION IS TURNED TO "ON" OR "START"  
AND (check one):

       Vehicle's drivetrain is engaged  
       Vehicle's parking brake is in the released mode  
X Not applicable, vehicle's restraint system does not  
include convenience hooks

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION BELTS HAVE TENSION-RELIEVING DEVICES?  
No

BELT CONTACT FORCE:

FOR BELTS WITHOUT TENSION-RELIEVING DEVICES: BELT CONTACT FORCE:  
.1 POUNDS

LATCHPLATE ACCESS: NA

RETRACTION: NA

ASSESSIBILITY: NA

LATCH MECHANISM: NA

TABLE 8 FMVSS NO. 208 - SEAT BELT WARNING SYSTEM DATA

WITH OCCUPANT IN DRIVER'S POSITION AND LAP BELT IN STOWED POSITION AND  
IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 7 sec.

Duration of reminder light operation = 7 sec.

WITH OCCUPANT IN DRIVER'S POSITION AND LAP BELT IN USE AND THE IGNITION  
SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 7 sec.

Wording of visual warning:

Fasten Seat Belt       

Fasten Belt       

Symbol 101-80   X

TABLE 9 FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL DATA

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR  
REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTION SYSTEM:

NA, vehicle did not contain a crash-deployed occupant protection system.

TABLE 10 FMVSS NO. 208 - READINESS INDICATOR DATA

AN OCCUPANT RESTRAINT SYSTEM THAT DEPLOYS IN THE EVENT OF A CRASH SHALL HAVE A MONITORING SYSTEM WITH A READINESS INDICATOR. A TOTALLY MECHANICAL SYSTEM IS EXEMPT FROM THIS REQUIREMENT.

NA, vehicle did not contain a crash-deployed occupant protection system.

TABLE 11 SUMMARY OF FMVSS 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Subaru/GL

BODY STYLE: 4-door sedan

MODEL YEAR: 1989

NHTSA NO.: CK5501

COLOR: red

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: Fuji Heavy Industries, Ltd.

DATE OF MANUFACTURE: 8/88

VIN: JF1AC4322KC208193

GVWR: 3430 LBS., GAWR: FRONT 1860 LBS., REAR 1570 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Barrier Impact

DATE OF TEST: 3/20/89

TIME: 1402

TEMP: 71° F

REQUIRED IMPACT VELOCITY RANGE: 28.9 MPH TO 29.9 MPH

IMPACT VELOCITY: PRIMARY = 29.6 MPH, SECONDARY = 29.6 MPH

TEST WEIGHT = 2770 LBS., STATIC CRUSH MAX. = 14.3 IN., REBOUND = 30.3 IN.

FUEL SYSTEM DATA

TEST FLUID TYPE: PURPLE SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY\*: 15.9 GALLONS (FURNISHED BY COTR)

TEST VOLUME: 14.8 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 15.9 GALLONS

DETAILS OF FUEL SYSTEM: The fuel tank is located behind the rear axle.

The fuel filler neck is located on the right side.

ELECTRIC FUEL PUMP: Yes

FUEL INJECTOR: Yes

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

\*WITH ENTIRE FUEL SYSTEM FILLED.

FIGURE 10 FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

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

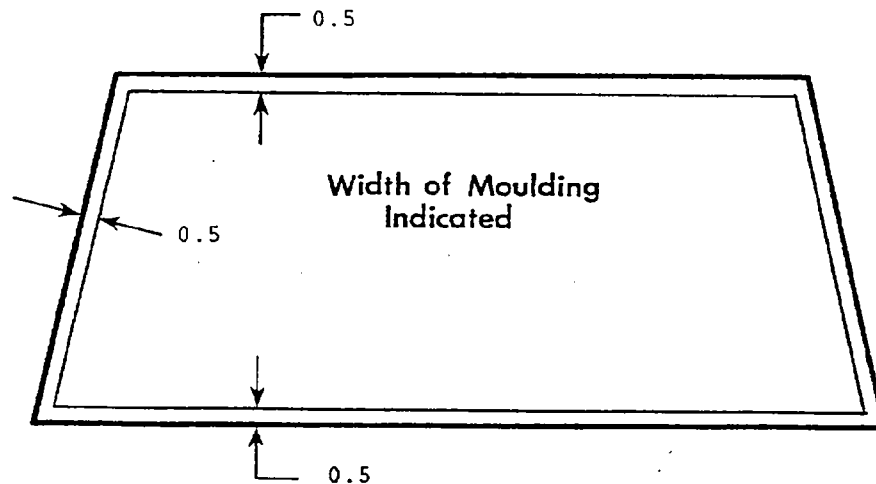
FMVSS 212 REQUIREMENTS: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

WINDSHIELD PERIPHERY

|            | PRE-TEST (in) | POST-TEST (in) | PERCENT RETENTION |
|------------|---------------|----------------|-------------------|
| RIGHT SIDE | 75.0          | 75.0           | 100%              |
| LEFT SIDE  | 75.0          | 62.0           | 82.7%             |
| TOTAL      | 150.0         | 137.0          | 91.3%             |

AREA OF RETENTION FAILURE:



FAILURE DETAILS: Lower left corner of windshield retention was lost upon impact.

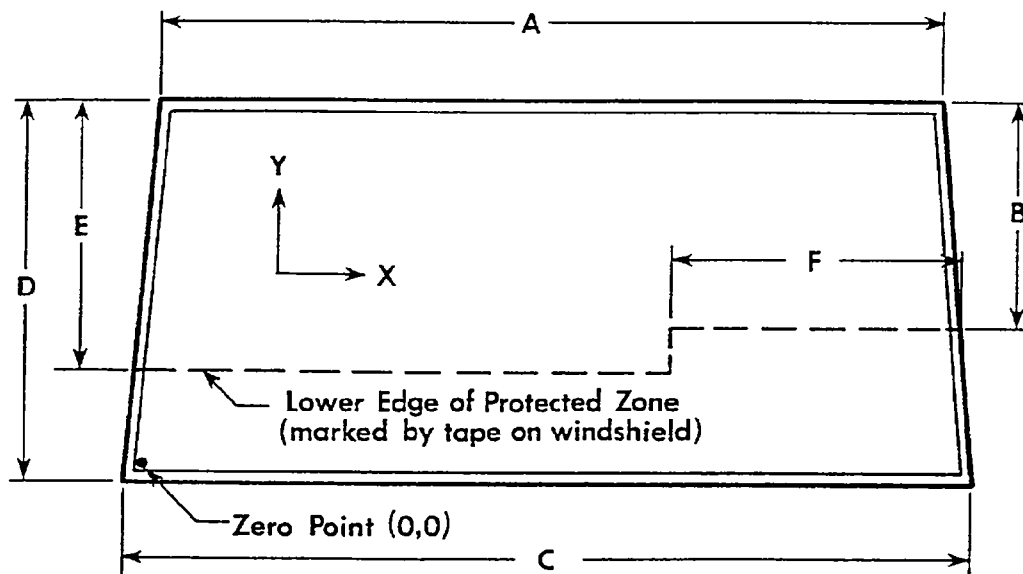
Windshield Temperature: 71° F

FIGURE 11 FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds 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 1/2" 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.

FMVSS 219 TEST DATA:



**FRONT VIEW**

|                 |                 |                 |
|-----------------|-----------------|-----------------|
| A = <u>42.8</u> | C = <u>59.2</u> | E = <u>19.5</u> |
| B = <u>15.5</u> | D = <u>26.5</u> | F = <u>26.2</u> |

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":  
(Show location of penetration on above sketch)

COORDINATES  
X Y

None

1.

2.

3.

ALL MEASUREMENTS ARE IN INCHES.

4.

TABLE 12 "FUEL SYSTEM INTEGRITY" POST-IMPACT

TEST DATA, FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CK5501; TEST DATE: 3/20/89

VEH. MFR./MAKE/MODEL: Fuji Heavy Industries, Ltd./Subaru/GL

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

TEST VEHICLE IMPACT TYPE:

- ☒ Frontal (30 mph)  
☐ Oblique (30 mph) with ☐ barrier face  
first contacting ☐ (driver/pass.) side.  
☐ Rear Moving Barrier (30 mph)  
☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

|                                                   | <u>ACTUAL</u> | <u>MAX. ALLOW.</u> |
|---------------------------------------------------|---------------|--------------------|
| 1. From impact until vehicle motion ceases - - -  | 0             | 1 oz.              |
| 2. For 5 min. period after veh. motion ceases - - | 0             | 5 oz.              |
| 3. For next 25 minutes - - - - -                  | 0             | 1 oz./1 min.       |

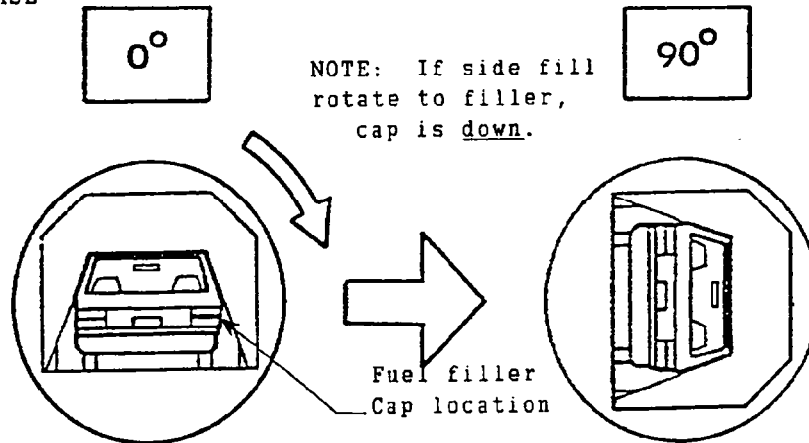
SOLVENT SPILLAGE DETAILS:

None

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

NHTSA NO.: CK5501

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

FMVSS 301 REQUIREMENTS

|                                        | First 5 minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum allowable solvent spillage - - | <u>5 oz.</u>                              | <u>1 oz.</u>  | <u>1 oz.</u>  |
| 0 to 90° (filler cap down) - - - - -   | <u>0 oz.</u>                              | <u>0 oz.</u>  | <u>0 oz.</u>  |

SOLVENT SPILLAGE LOCATION(S)

None

\_\_\_\_\_

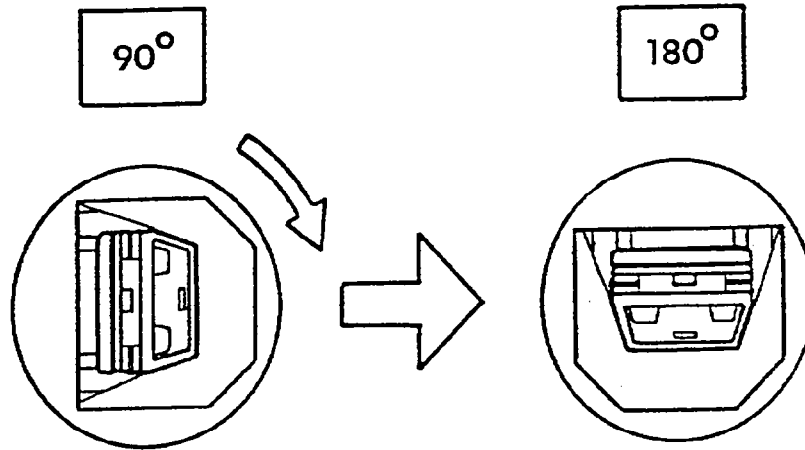
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FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D

NHTSA NO.: CK5501

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

FMVSS 301 REQUIREMENTS

|                                        | First 5 minutes        | 6th          | 7th          |
|----------------------------------------|------------------------|--------------|--------------|
|                                        | FROM ONSET OF ROTATION | Minute       | Minute       |
| Maximum allowable solvent spillage - - | <u>5 oz.</u>           | <u>1 oz.</u> | <u>1 oz.</u> |
| 90° to 180° - - - - -                  | <u>0 oz.</u>           | <u>0 oz.</u> | <u>0 oz.</u> |

SOLVENT SPILLAGE LOCATION(S)

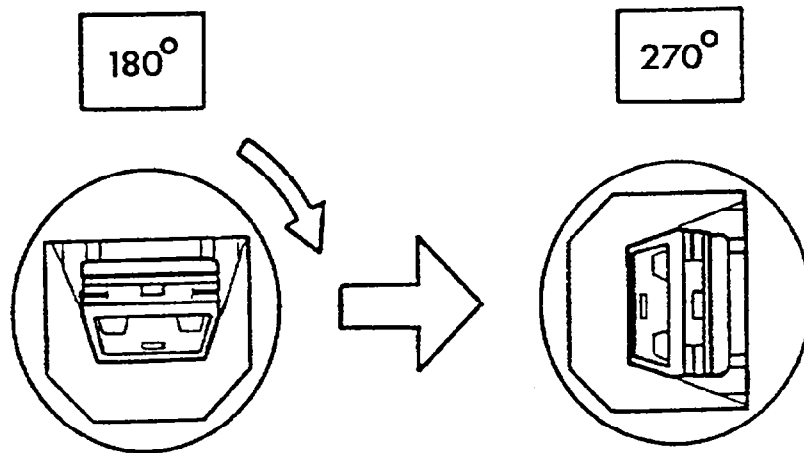
None

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D  
 NHTSA NO.: CK5501  
 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

FMVSS 301 REQUIREMENTS

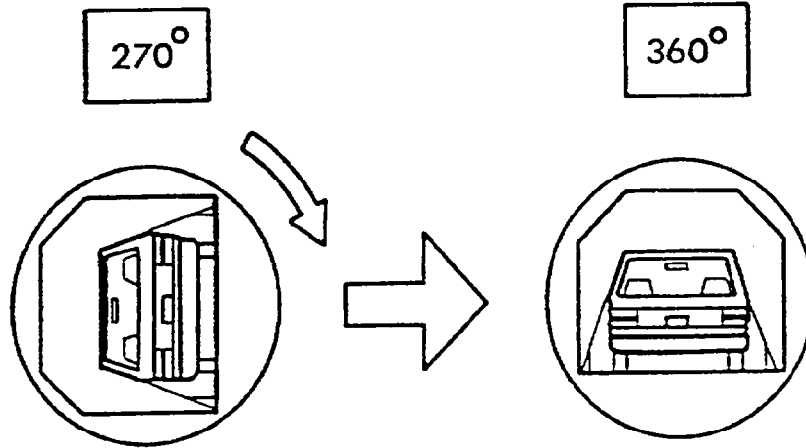
|                                        | First 5 minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum allowable solvent spillage - - | <u>5 oz.</u>                              | <u>1 oz.</u>  | <u>1 oz.</u>  |
| 180° to 270° - - - - -                 | <u>0 oz.</u>                              | <u>0 oz.</u>  | <u>0 oz.</u>  |

SOLVENT SPILLAGE LOCATION(S)

None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D

NHTSA NO.: CK5501  
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

FMVSS 301 REQUIREMENTS

|                                        | First 5 minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum allowable solvent spillage - - | <u>5 oz.</u>                              | <u>1 oz.</u>  | <u>1 oz.</u>  |
| 270° to 360° - - - - -                 | <u>0 oz.</u>                              | <u>0 oz.</u>  | <u>0 oz.</u>  |

SOLVENT SPILLAGE LOCATION(S)

None  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SECTION 3.0

CAMERA INFORMATION

FIGURE 13 CAMERA POSITIONS

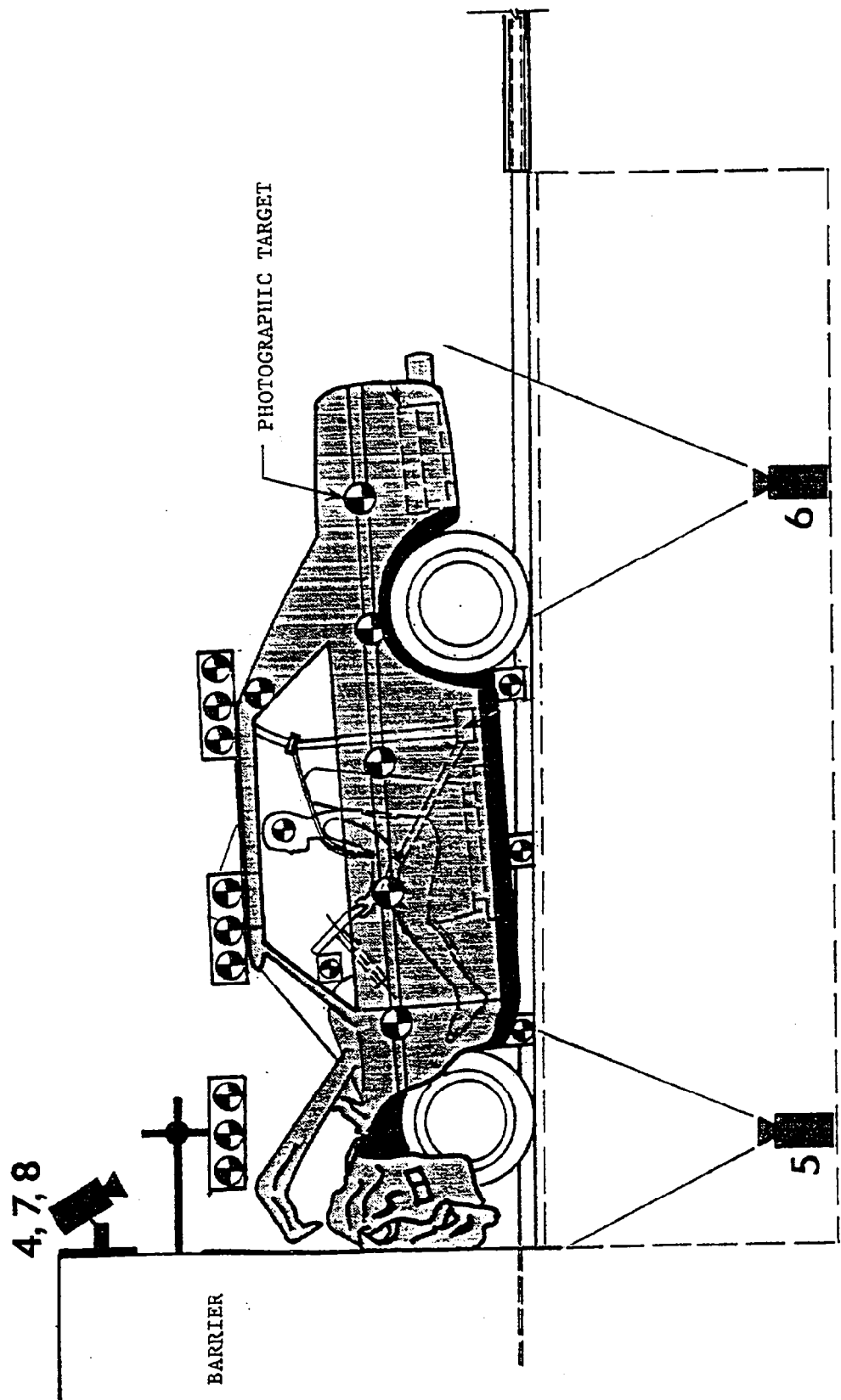


FIGURE 13 CAMERA POSITIONS CONTINUED

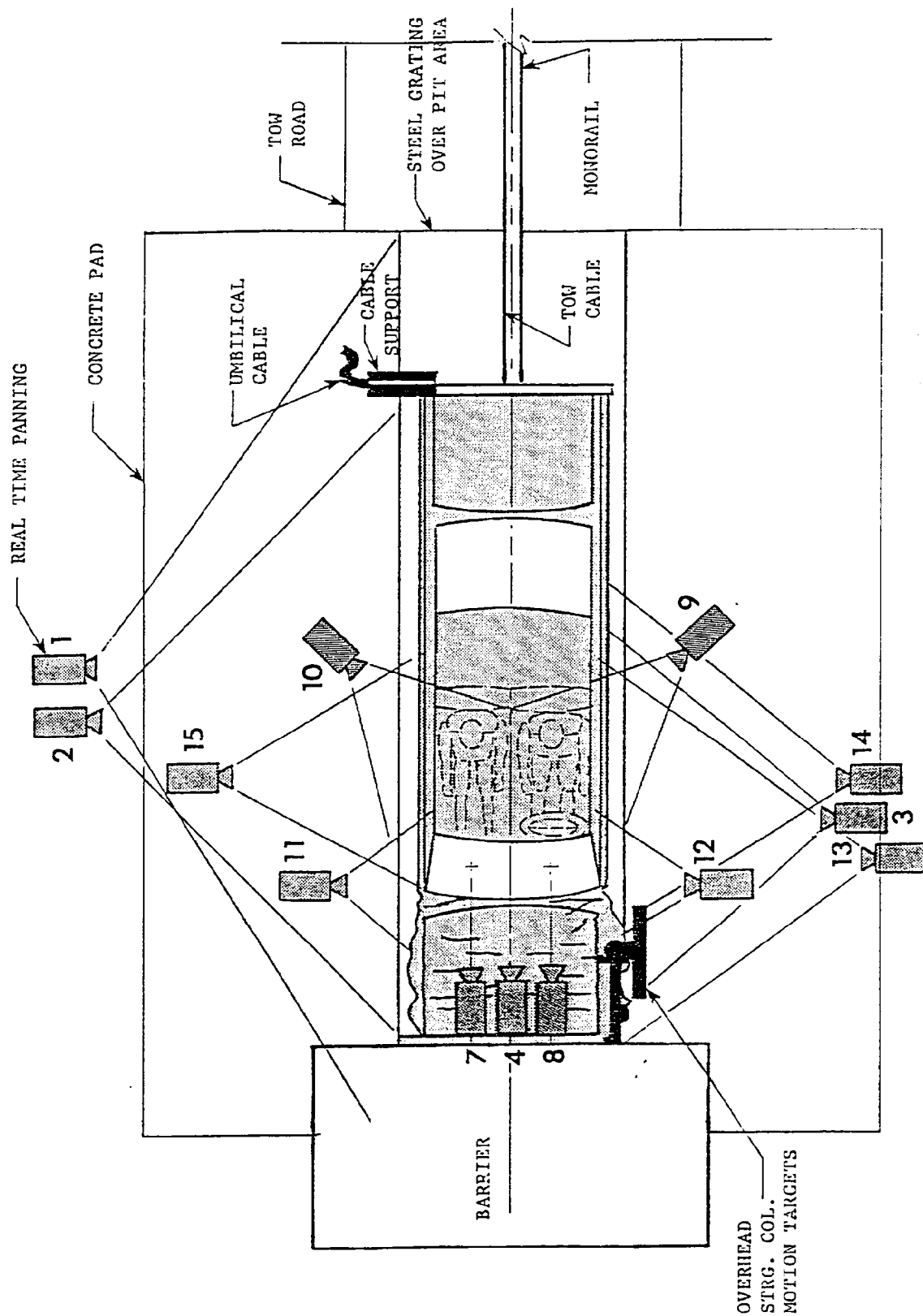


TABLE 13 HIGH SPEED CAMERA LOCATIONS

| TEST NO.: 890320 |                        | VEHICLE: 1989 Subaru GL 4-door sedan |        |       |               | FILM PLANE     |           |             |
|------------------|------------------------|--------------------------------------|--------|-------|---------------|----------------|-----------|-------------|
| CAMERA NO.       | VIEW                   | CAMERA POSITIONS (IN)*               |        |       | ANGLE** (DEG) | TO HEAD TARGET | LENS (MM) | SPEED (FPS) |
|                  |                        | X                                    | Y      | Z     |               |                |           |             |
| 1                | Real time panning      | -142.0                               | -504.0 | 61.0  | NA            | NA             | 16        | 24          |
| 2                | Vehicle crush          | -81.3                                | -266.4 | 37.1  | -2            | NA             | 13        | 495         |
| 3                | Dummy kinematics       | -41.5                                | 295.0  | 44.0  | -4            | 216.0          | 25        | 505         |
| 4                | Windshield damage      | -6.0                                 | 0.0    | 93.0  | -40           | NA             | 13        | 495         |
| 5                | Crush & fluid spillage | -50.5                                | 0.0    | -92.4 | 90            | NA             | 13        | 1005        |
| 6                | Fluid spillage         | -99.3                                | 0.0    | -99.0 | 90            | NA             | 13        | 1005        |
| 7                | Passenger kinematics   | -4.5                                 | -13.8  | 93.0  | -50           | NA             | 17        | 495         |
| 8                | Driver kinematics      | -6.8                                 | 14.5   | 93.0  | -50           | NA             | 17        | 493         |
| 9                | Driver kinematics      | -157.3                               | 116.0  | 87.0  | -27           | 126.0          | 25        | 498         |
| 10               | Passenger kinematics   | -152.1                               | -116.0 | 87.0  | -26           | 113.5          | 25        | 495         |
| 11               | Windshield intrusion   | -38.1                                | -306.1 | 44.0  | 0             | NA             | 50        | 500         |
| 12               | Windshield intrusion   | -53.0                                | 309.4  | 42.3  | 0             | NA             | 50        | 502         |
| 13               | Column movement        | -117.0                               | 286.0  | 103.0 | -14           | NA             | 25        | 500         |
| 14               | Column movement        | -117.0                               | 286.0  | 75.1  | -9            | NA             | 25        | 500         |
| 15               | Passenger kinematics   | -38.8                                | -293.0 | 45.3  | -4            | 225.0          | 25        | 512         |

\* +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

\*\* +Angle = Film plane angled upward from horizontal plane

APPENDIX A

PHOTOGRAPHS



Figure A-1. PRE-TEST FRONT VIEW



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

890320



Figure A-3. PRE-TEST LEFT SIDE VIEW



Figure A-4. POST-TEST LEFT SIDE VIEW  
A-3

890320



Figure A-5. PRE-TEST RIGHT SIDE VIEW

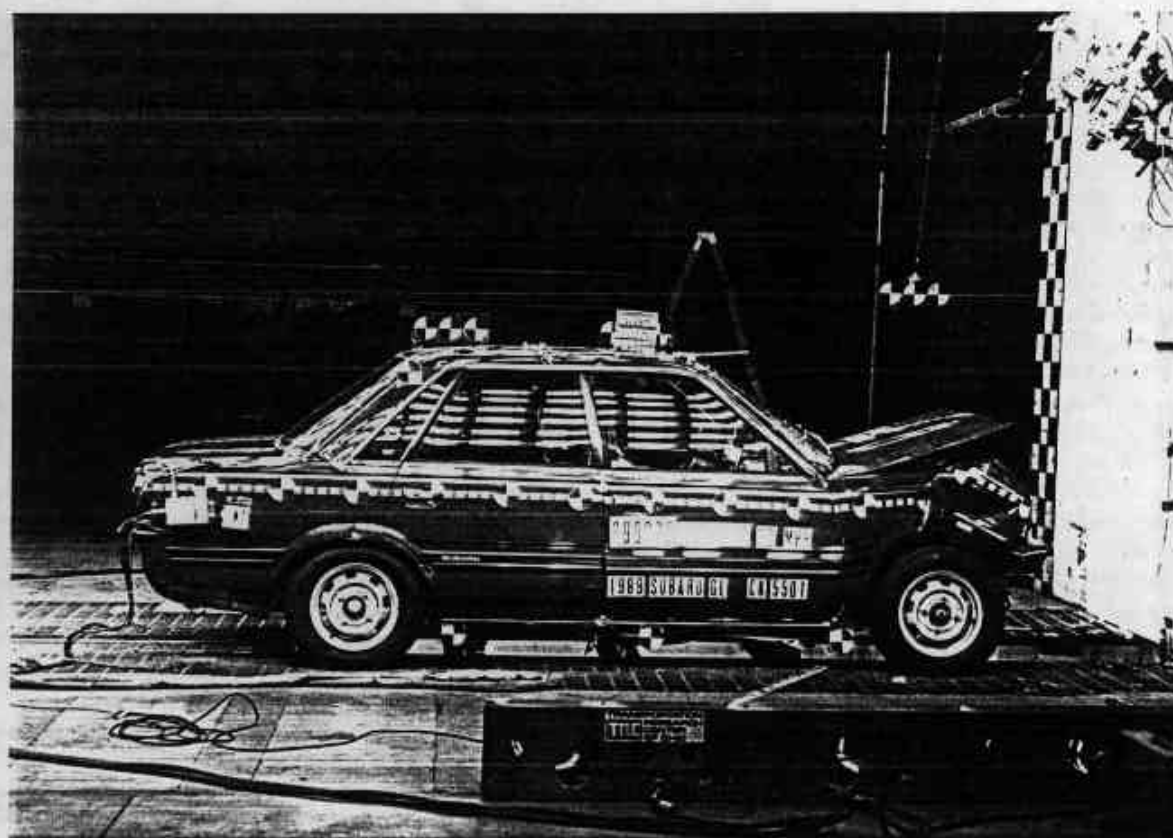


Figure A-6. POST-TEST RIGHT SIDE VIEW



Figure A-7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW  
A-5

890320

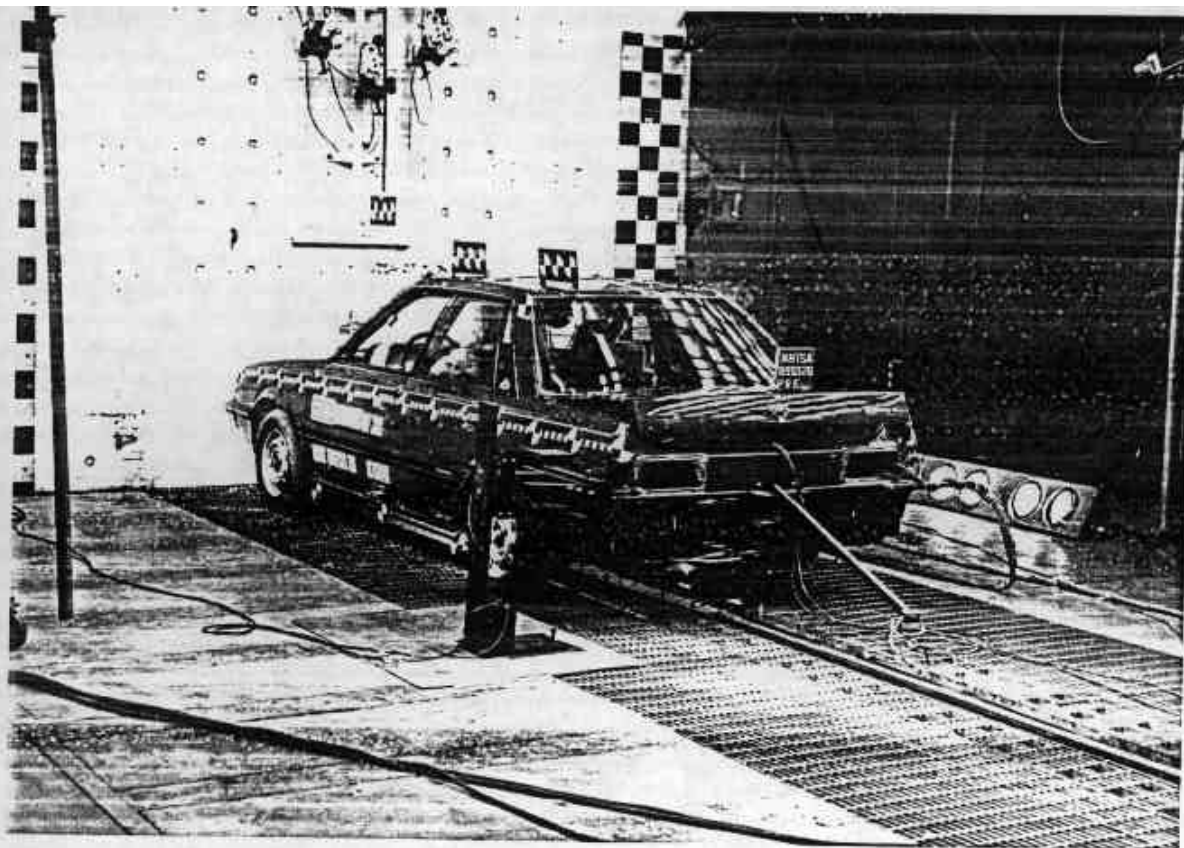


Figure A-9. PRE-TEST LEFT REAR THREE-QUARTER VIEW

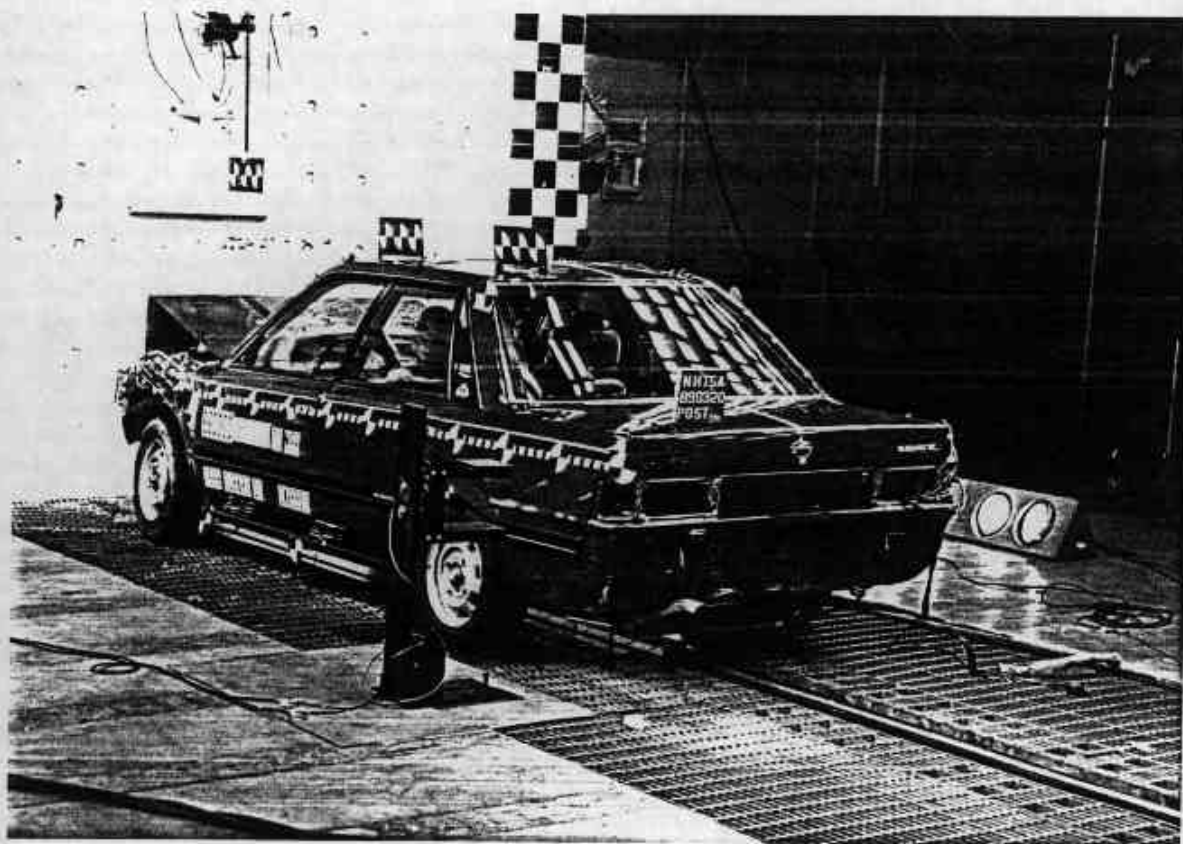


Figure A-10. POST-TEST LEFT REAR THREE-QUARTER VIEW

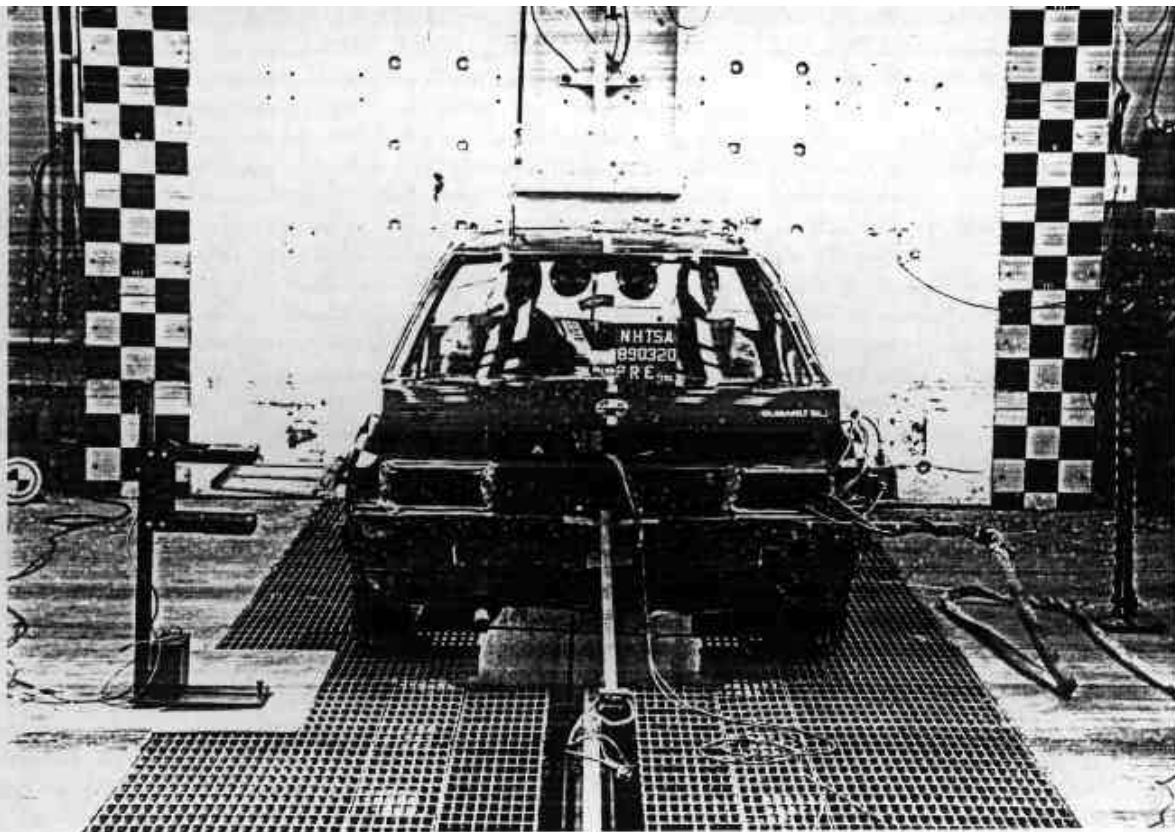


Figure A-11. PRE-TEST REAR VIEW



Figure A-12. POST-TEST REAR VIEW  
A-7

890320

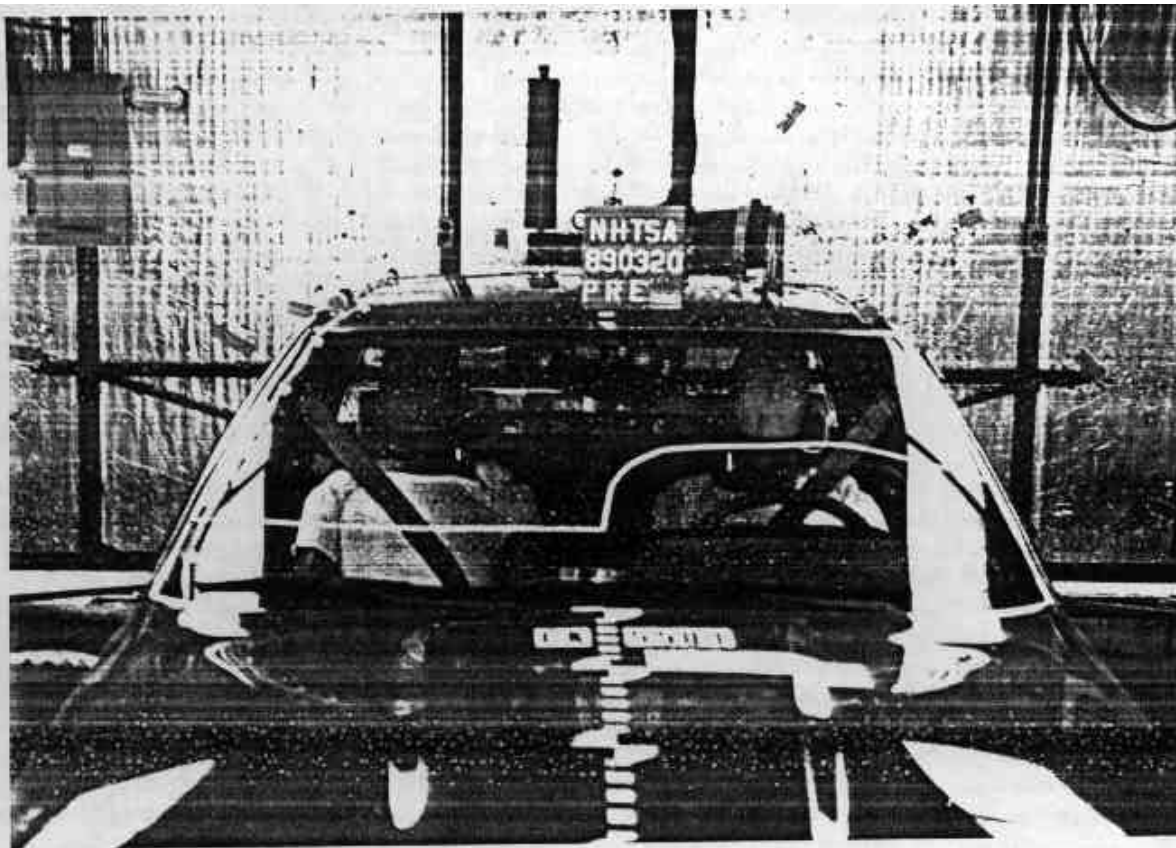


Figure A-13. PRE-TEST WINDSHIELD VIEW



Figure A-14. POST-TEST WINDSHIELD - VIEW 1  
A-8

890320



Figure A-15. POST-TEST WINDSHIELD - VIEW 2

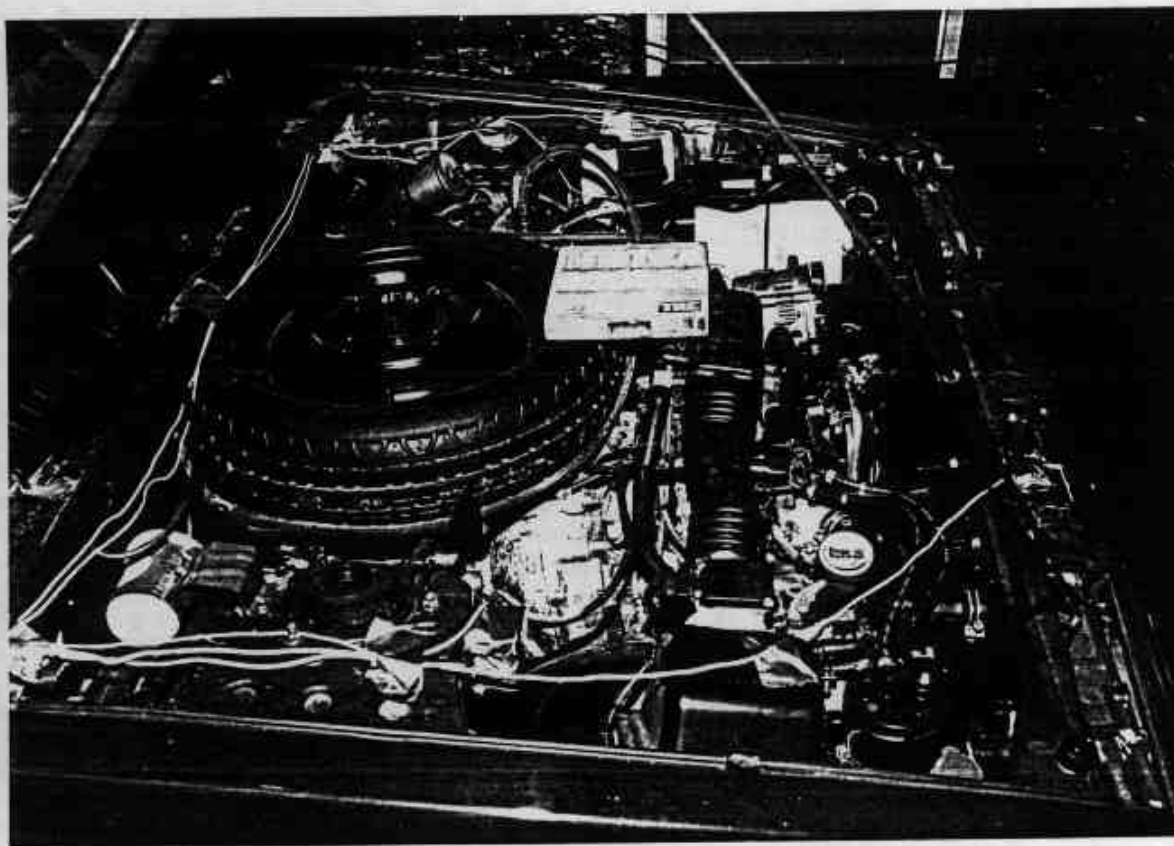


Figure A-16. PRE-TEST ENGINE COMPARTMENT VIEW  
A-9

890320

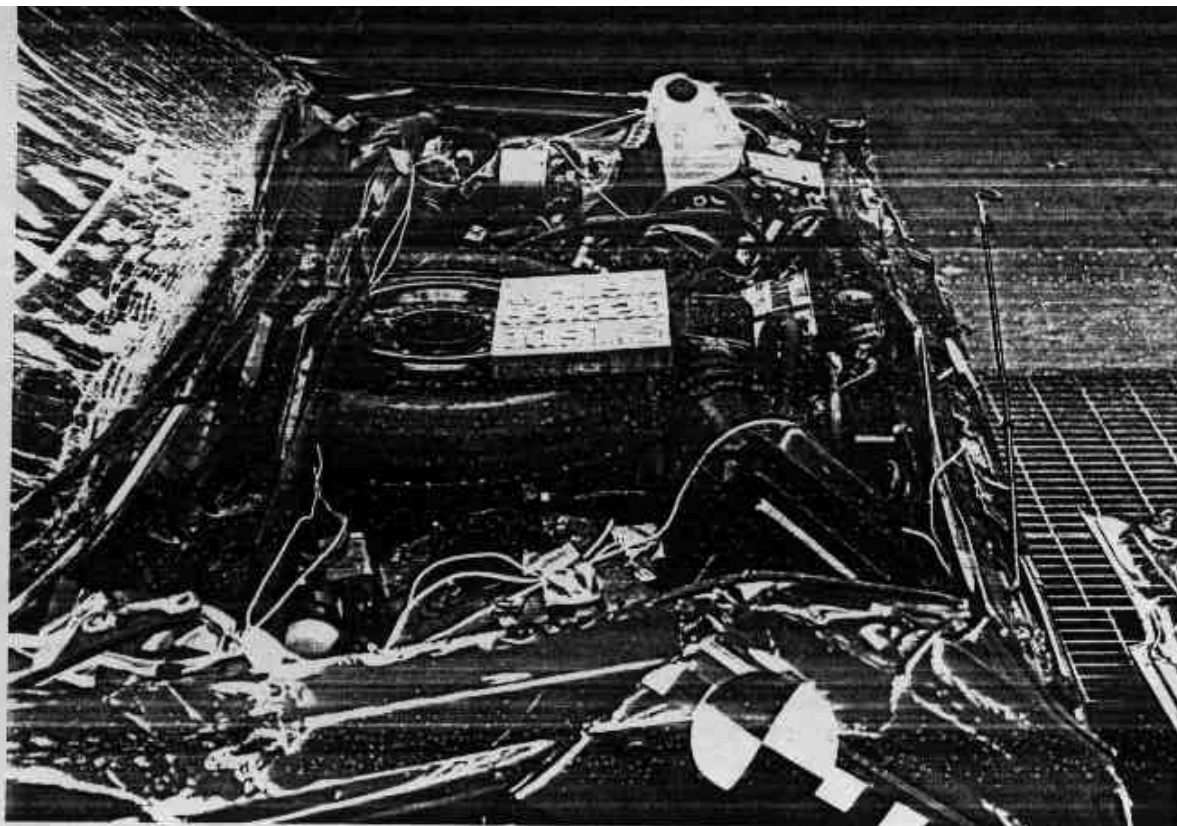


Figure A-17. POST-TEST ENGINE COMPARTMENT VIEW



Figure A-18. PRE-TEST FUEL FILLER CAP VIEW  
A-10

890320

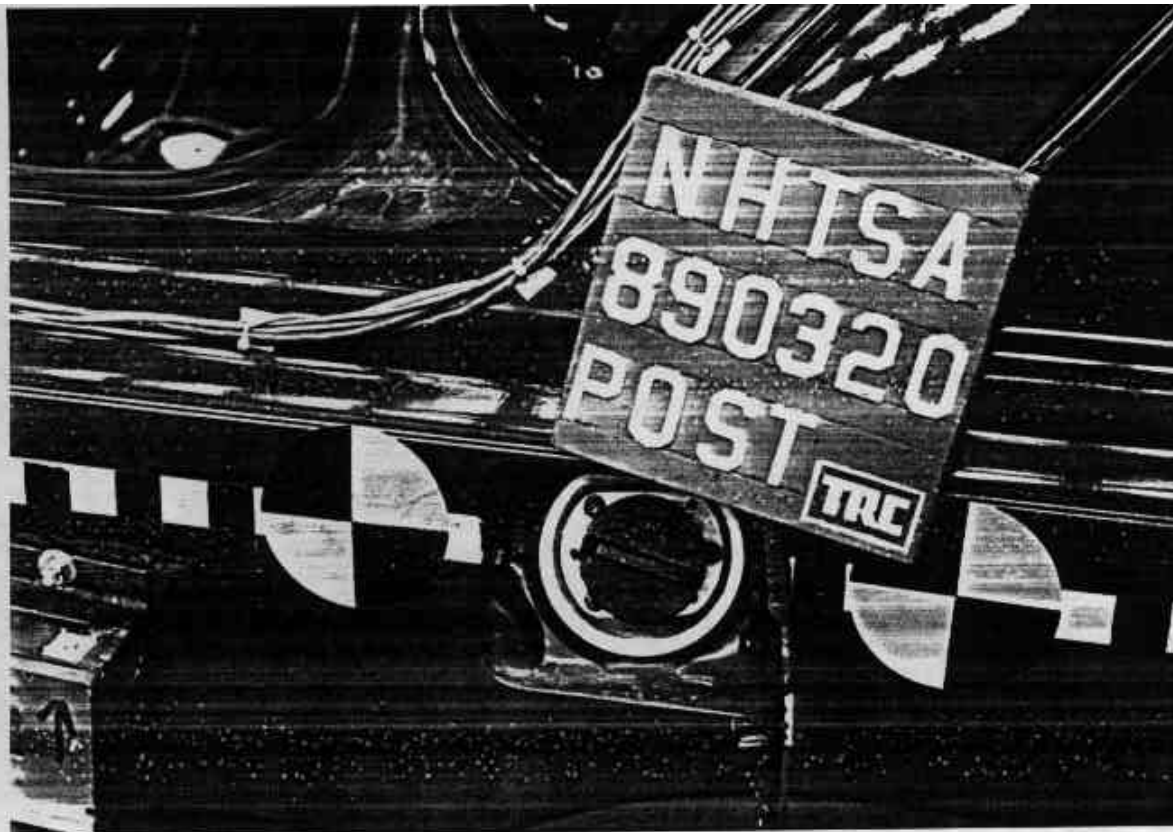


Figure A-19. POST-TEST FUEL FILLER CAP VIEW

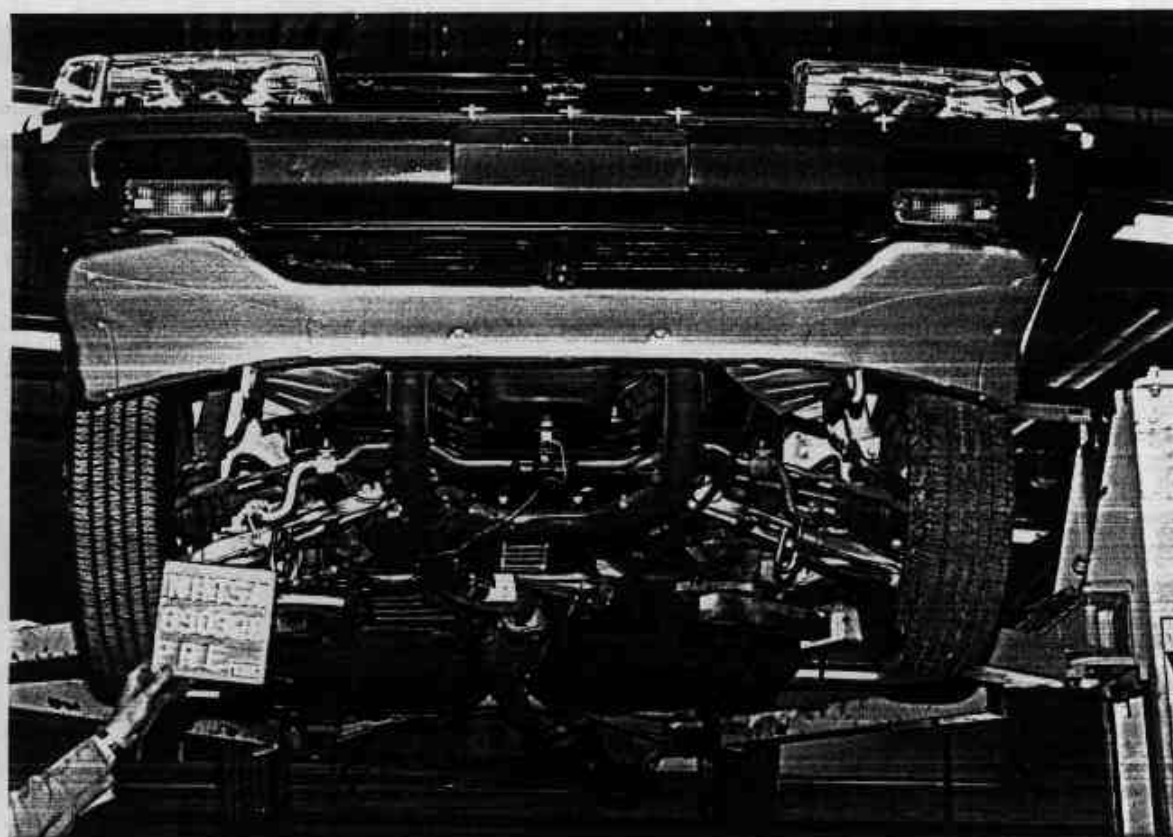


Figure A-20. PRE-TEST FRONT UNDERBODY VIEW  
A-11

890320

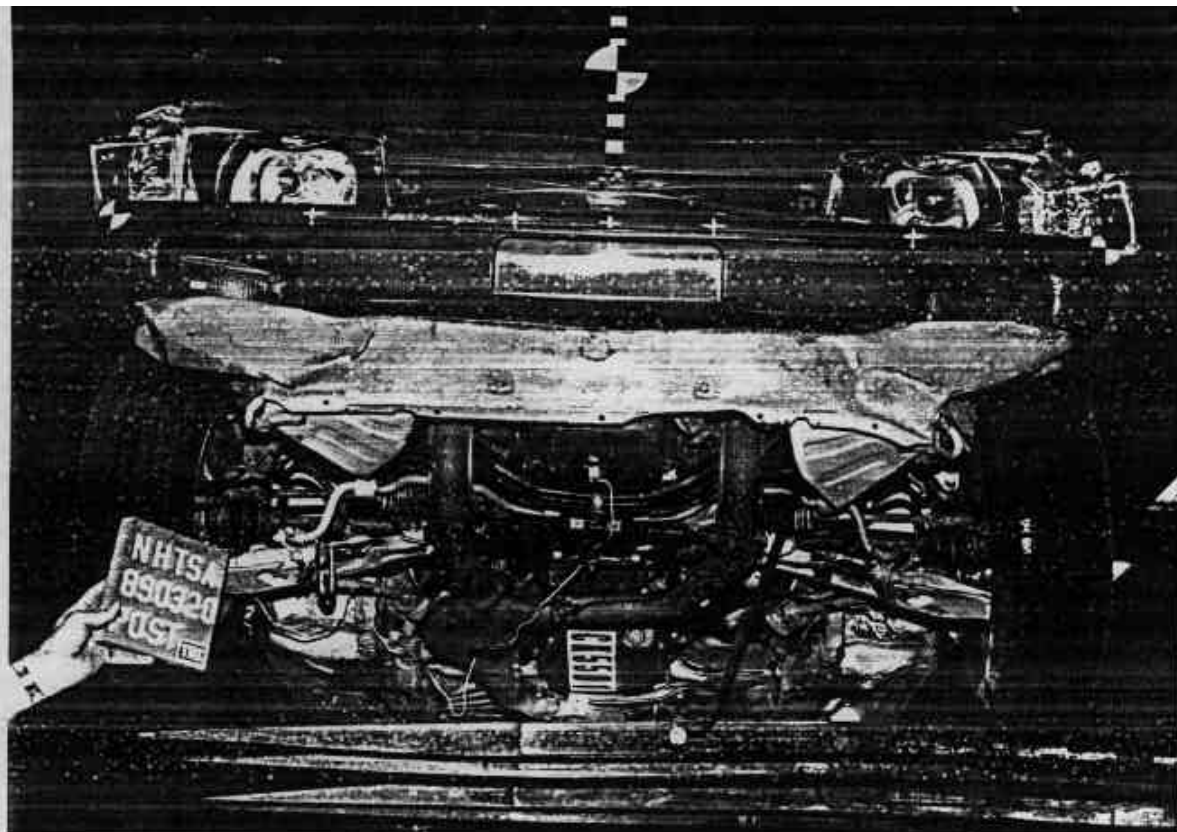


Figure A-21. POST-TEST FRONT UNDERBODY VIEW

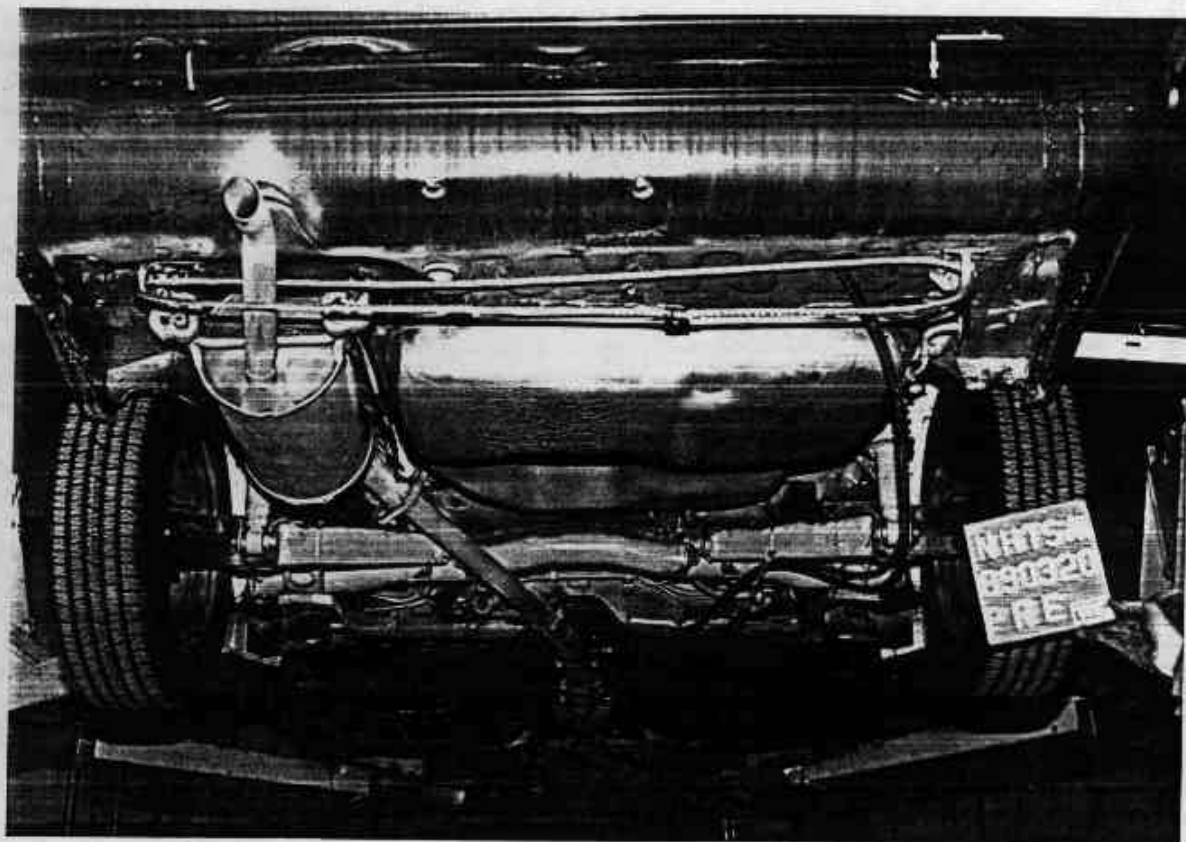


Figure A-22. PRE-TEST REAR UNDERBODY VIEW

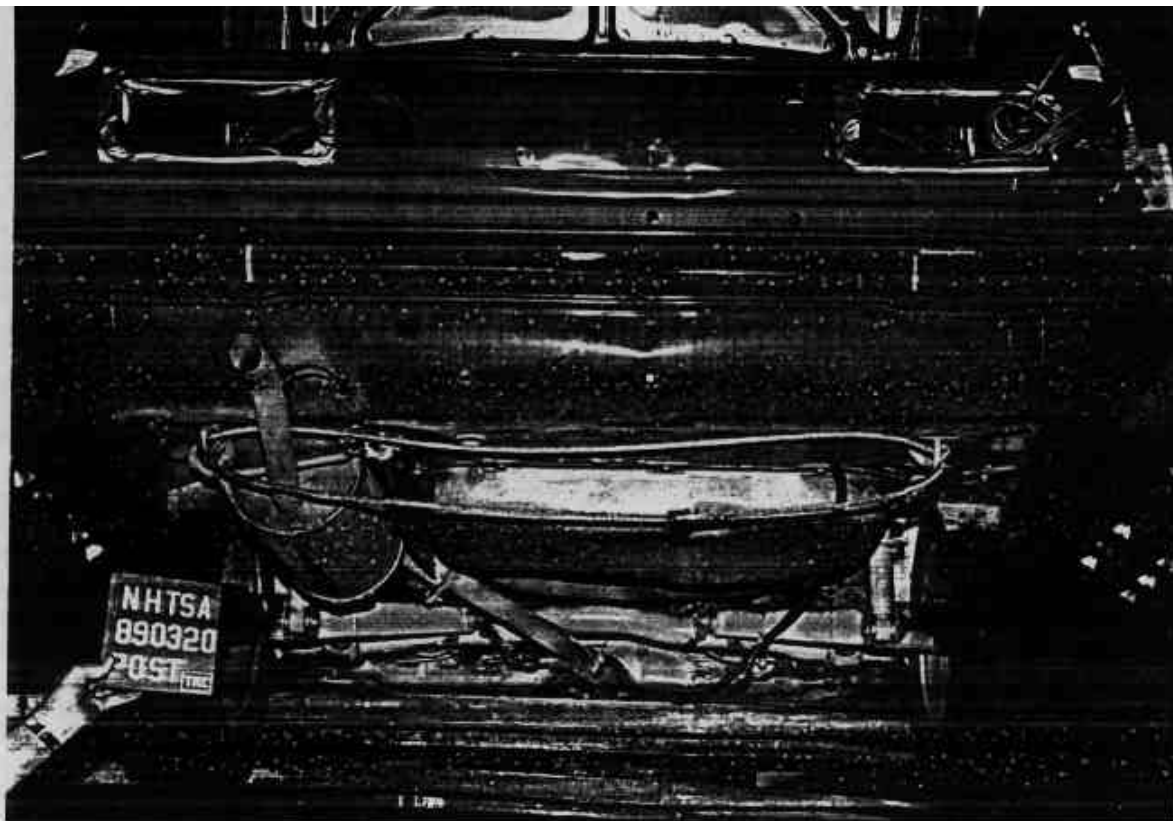


Figure A-23. POST-TEST REAR UNDERBODY VIEW

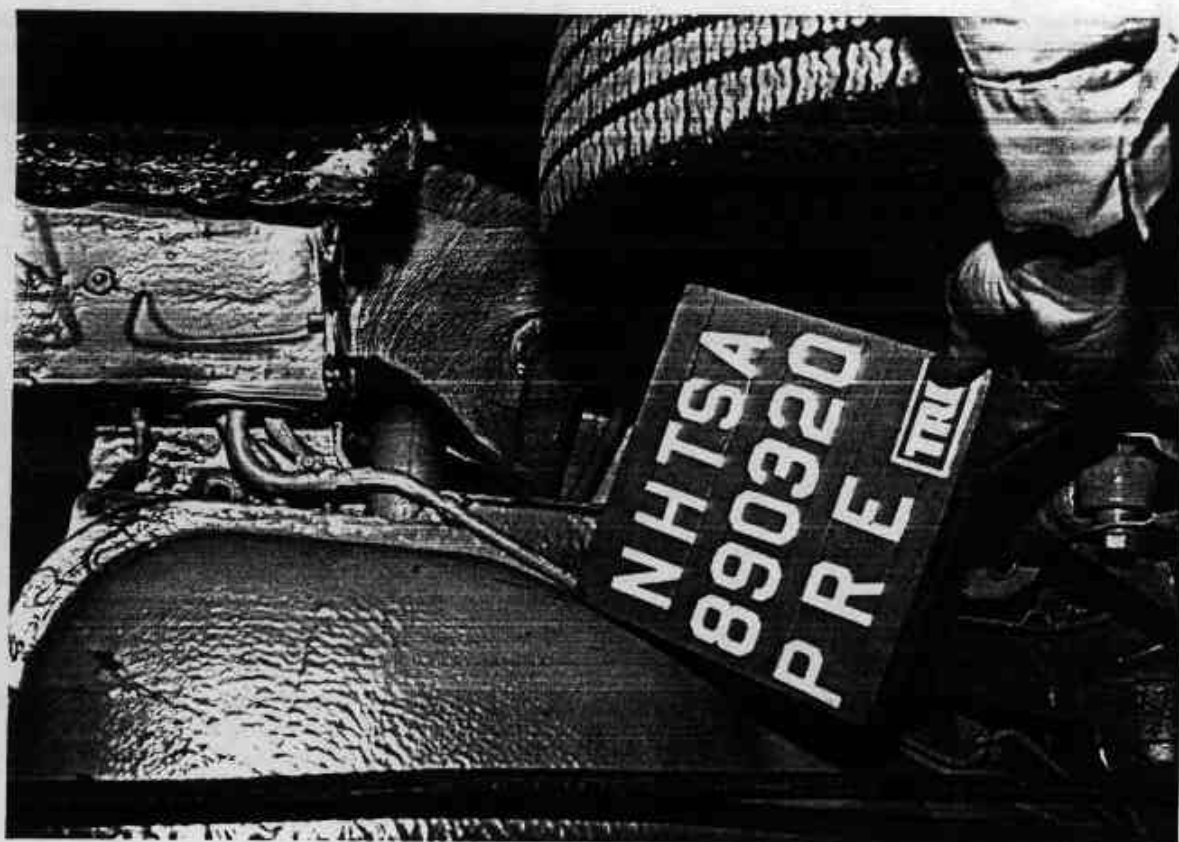


Figure A-24. PRE-TEST FUEL FILLER NECK VIEW  
A-13

890320



Figure A-25. PRE-TEST FUEL TANK VIEW



Figure A-26. PRE-TEST DRIVER DUMMY POSITION VIEW  
A-14

890320



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



Figure A-28. PRE-TEST PASSENGER DUMMY POSITION VIEW  
A-15

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



Figure A-30. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW

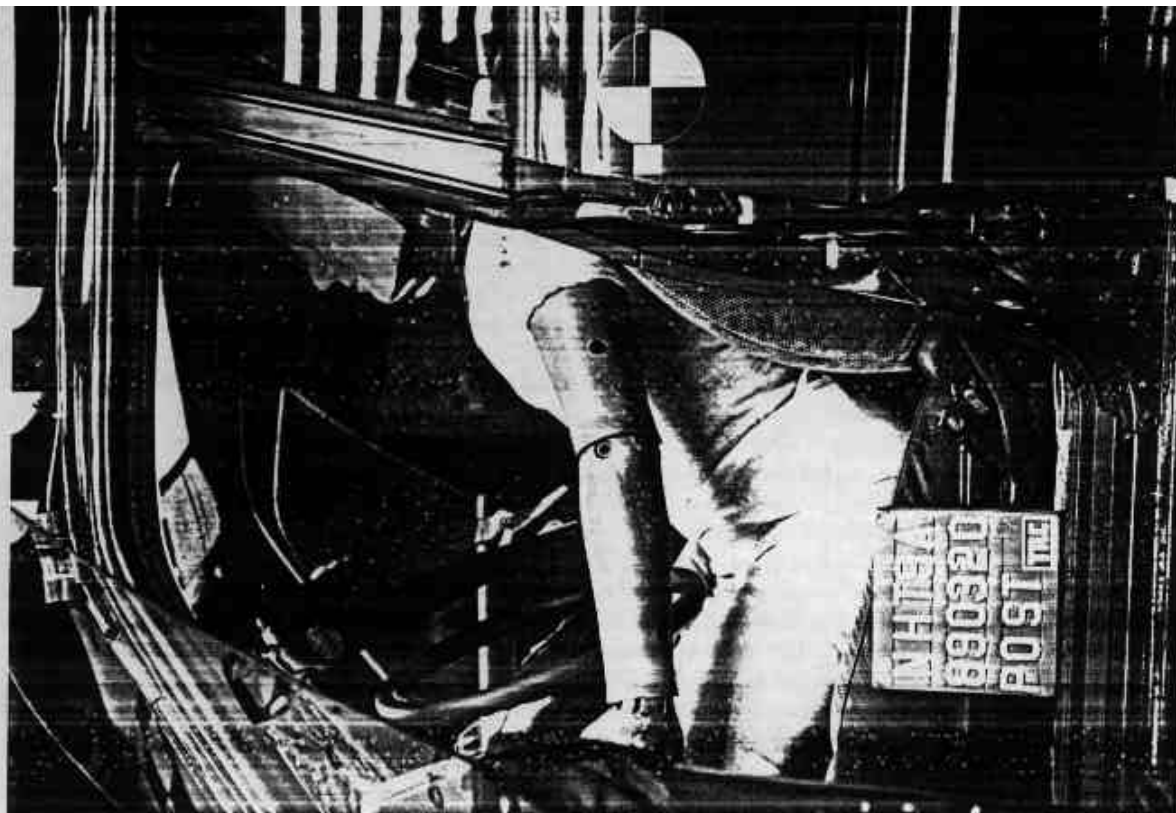


Figure A-31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

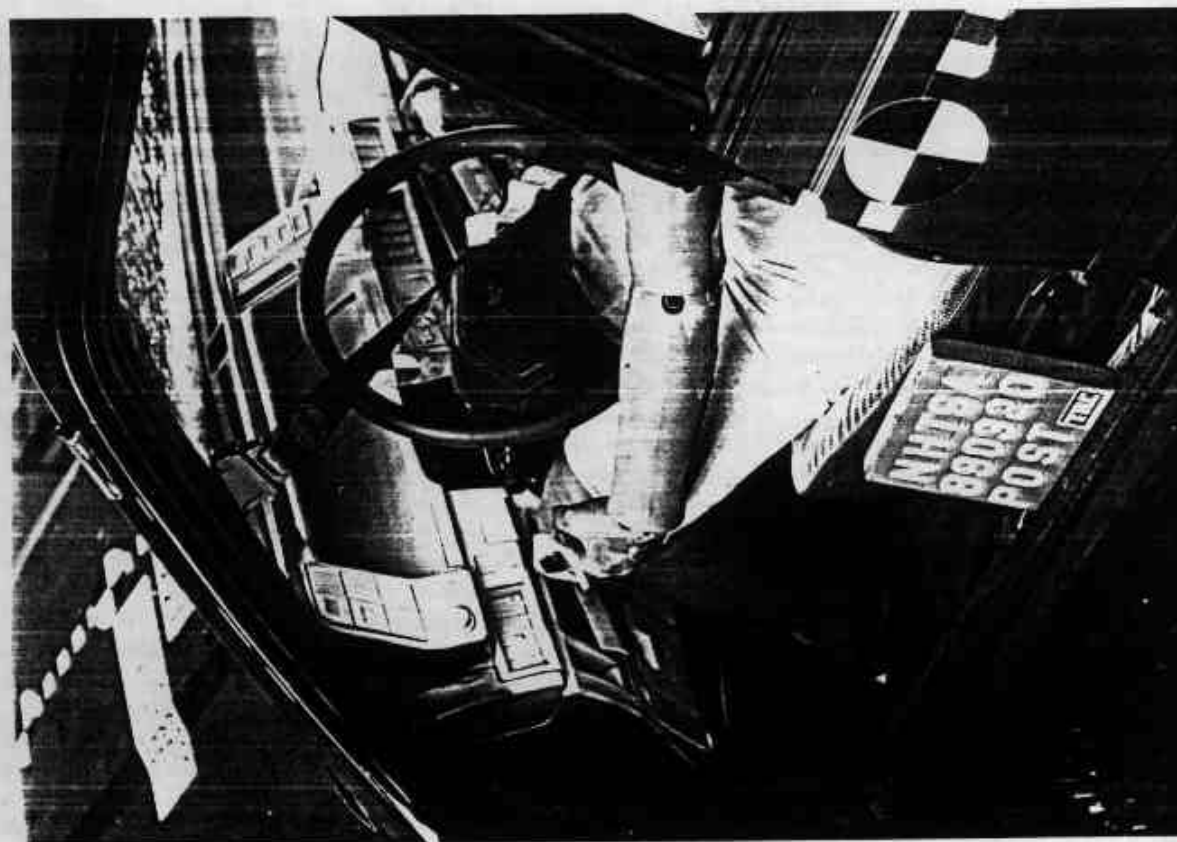


Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-17

890320

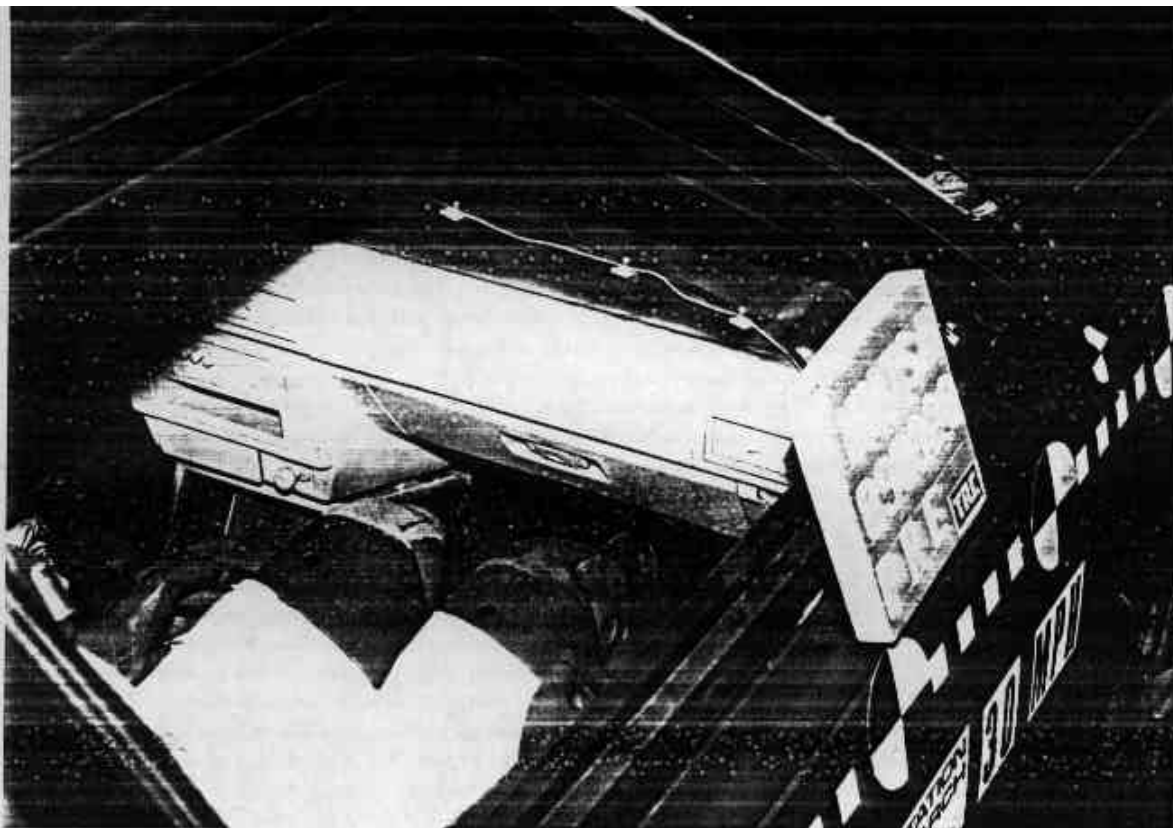


Figure A-33. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW

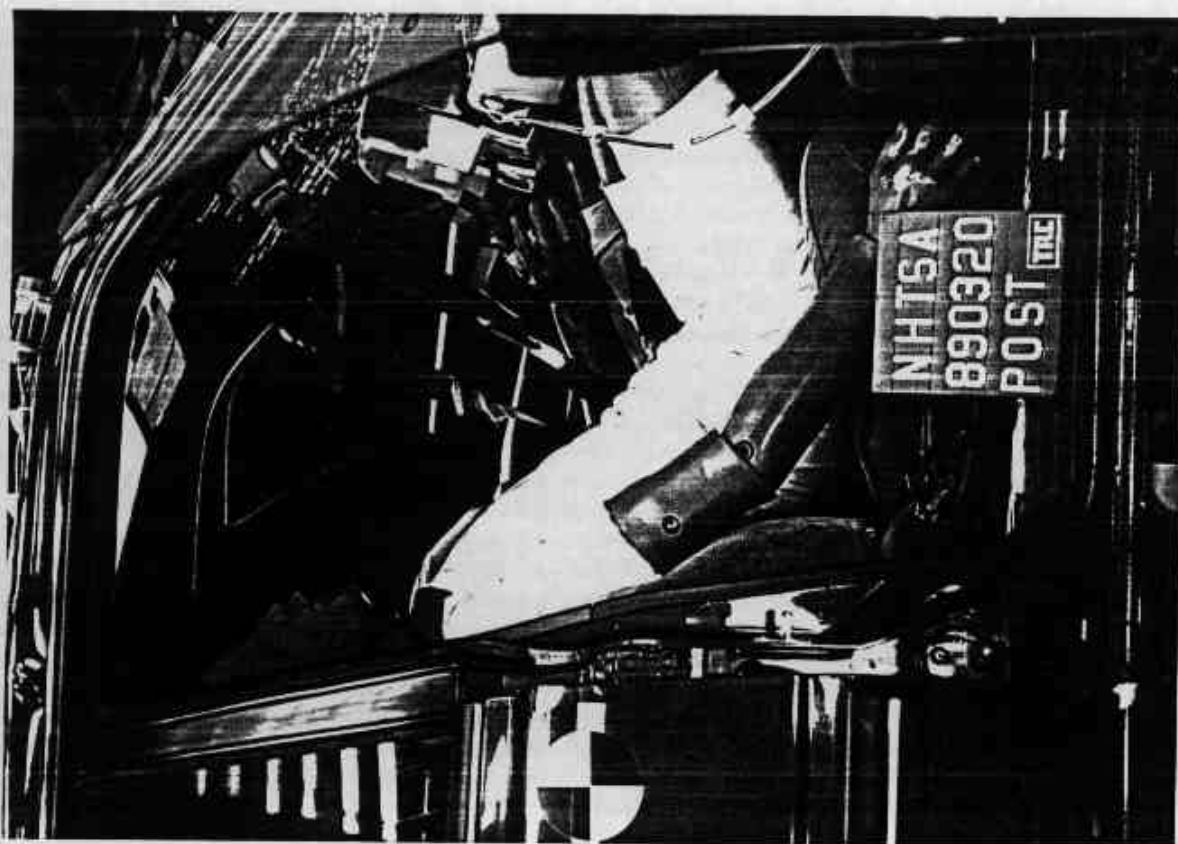


Figure A-34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1  
A-18 890320



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

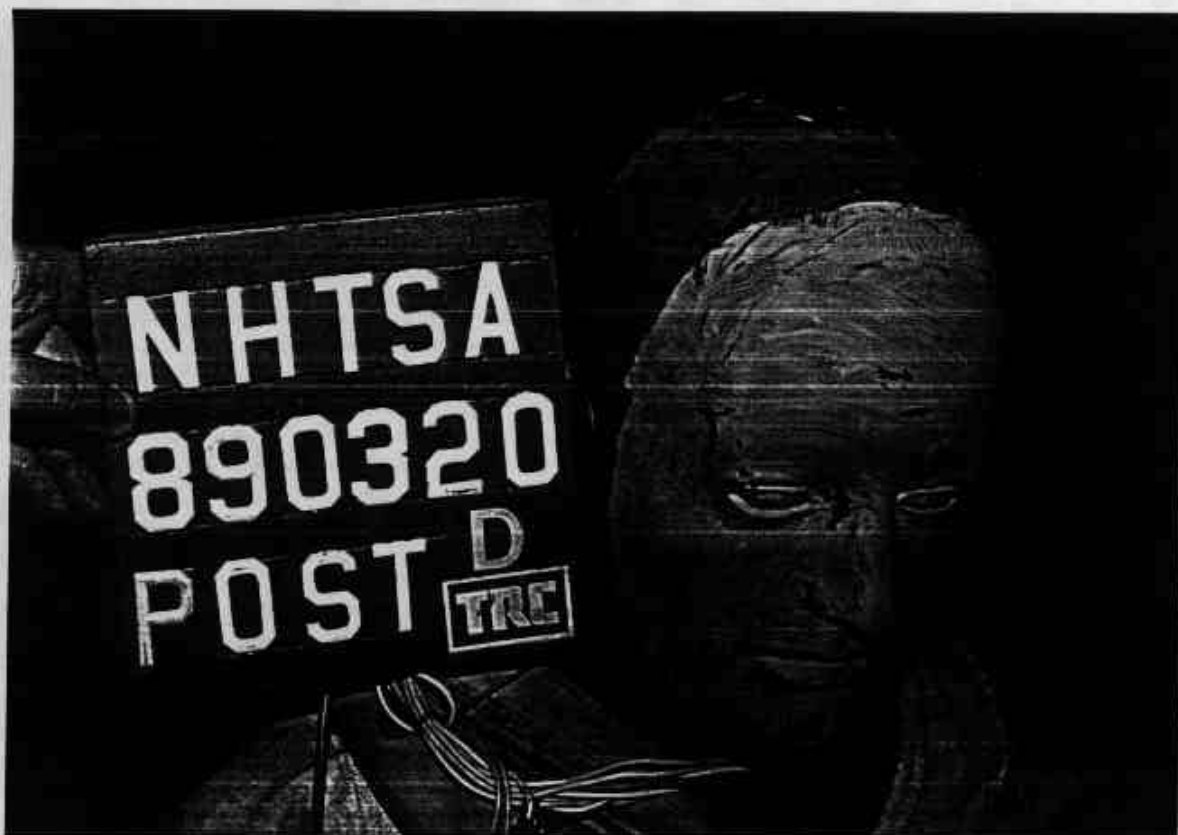


Figure A-36. POST-TEST DRIVER DUMMY HEAD CONTACT VIEW



Figure A-37. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1



Figure A-38. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

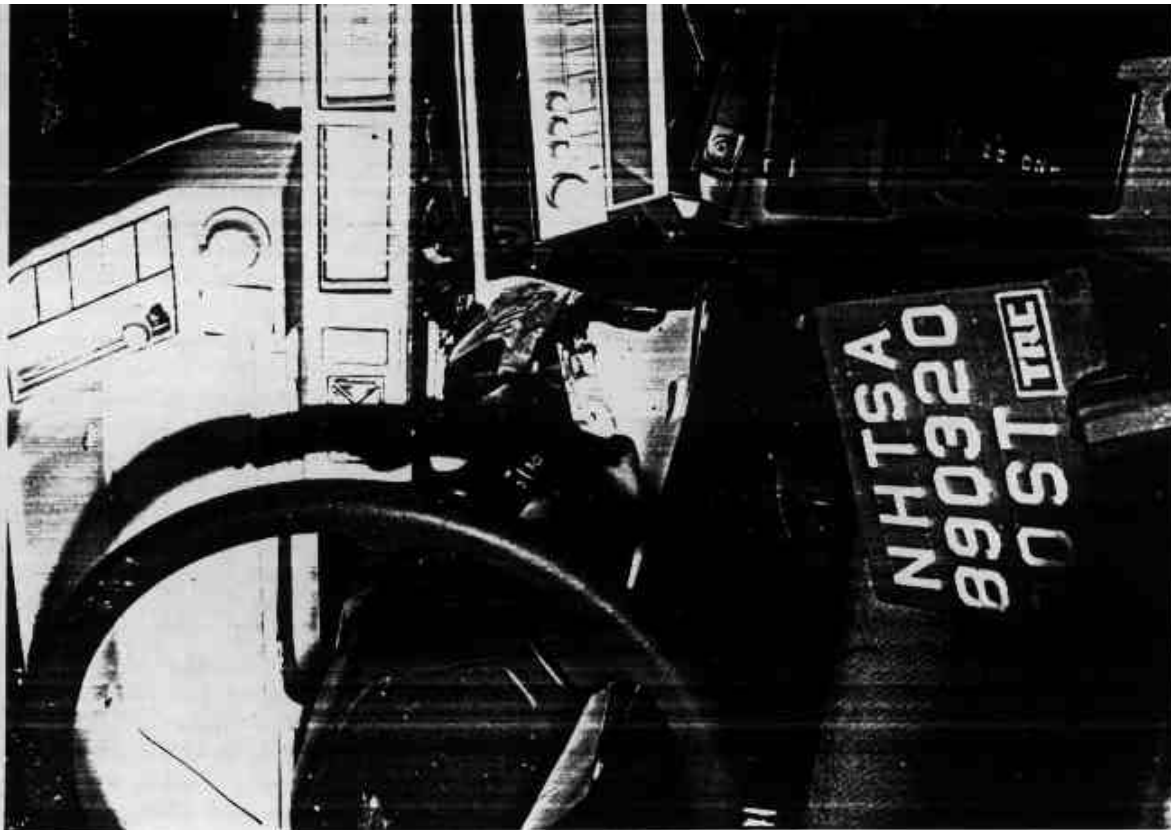


Figure A-39. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 3



Figure A-40. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

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Figure A-41. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1



Figure A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

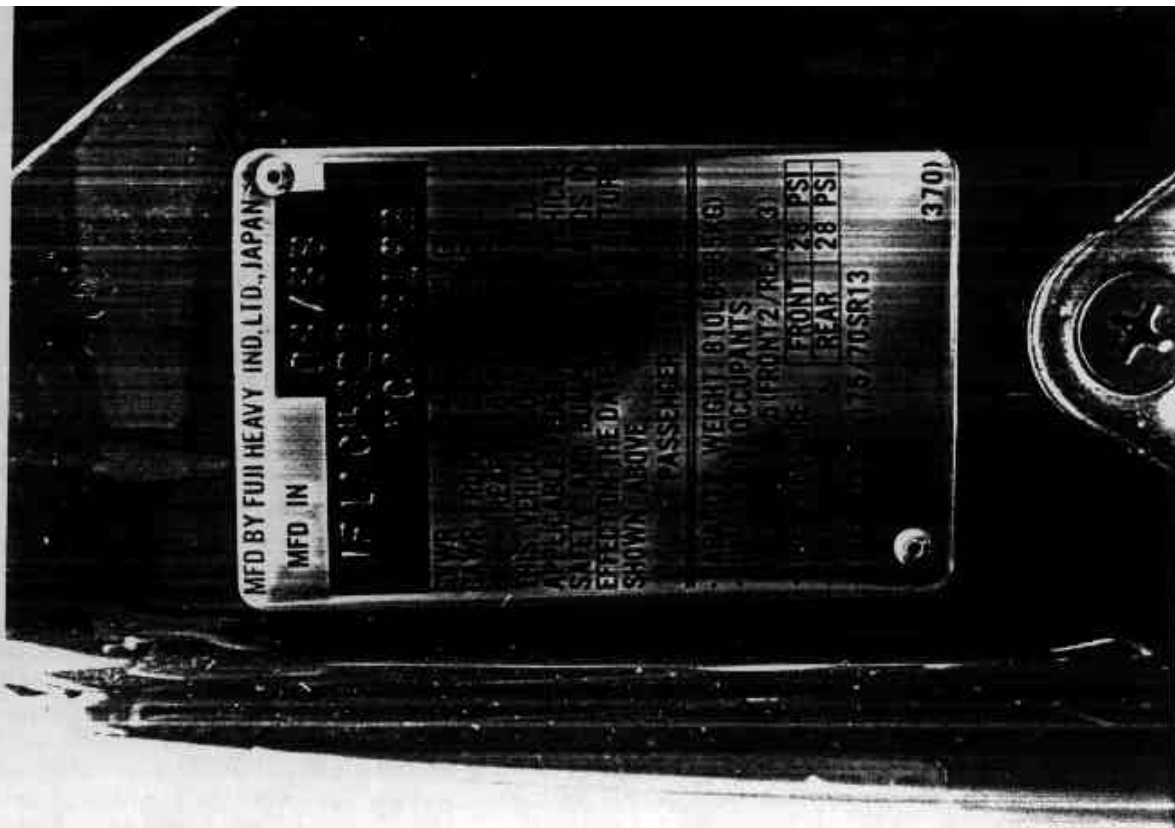


Figure A-43. PRE-TEST VEHICLE CERTIFICATION AND TIRE LOAD LABEL VIEW

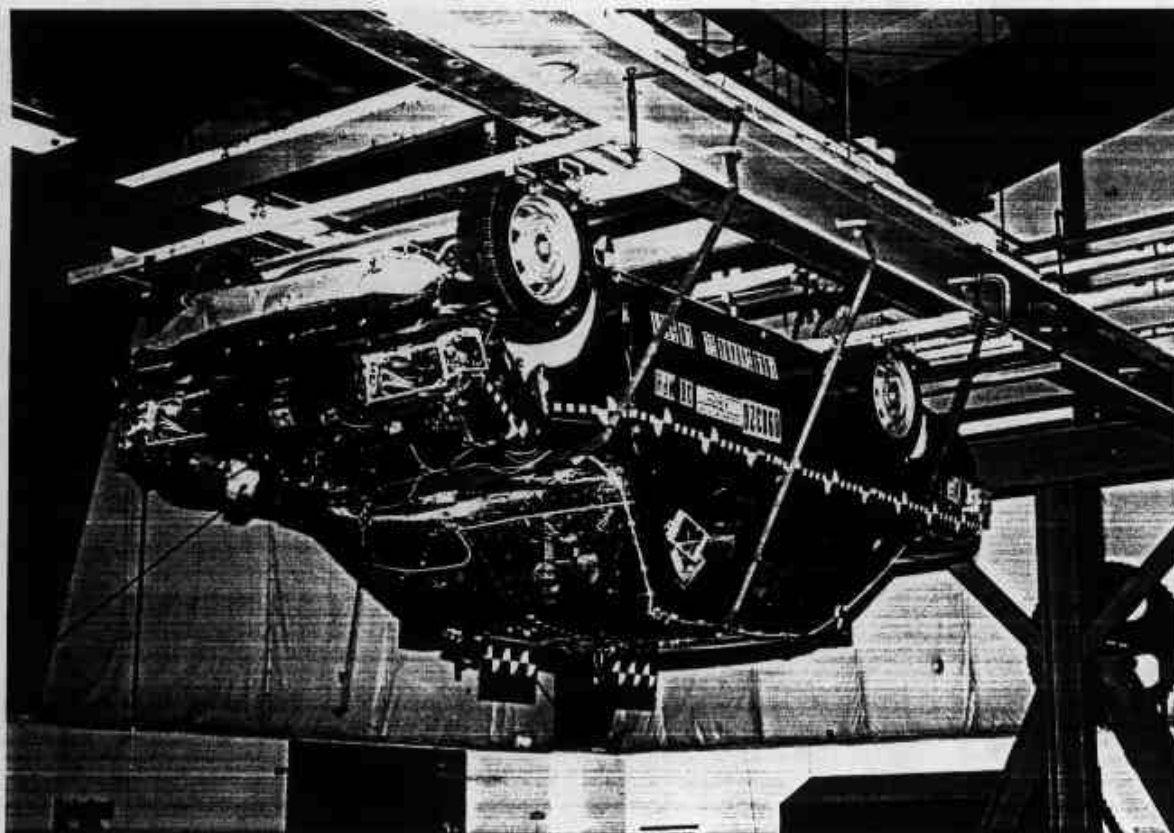


Figure 44. POST-TEST VEHICLE ON STATIC ROLLOVER VIEW

APPENDIX B

DATA PLOTS

DUMMY AND VEHICLE AXES: X: FRONT/REAR  
Y: LEFT/RIGHT  
Z: UP/DOWN

TRC 320

208 COMPLIANCE TEST

89079

HEDXG1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -36.67% 96.88, 18.48 @ 197.25

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

-240.00

ACCELERATION (G)

TIME (SEC)

20.00

40.00

60.00

80.00

100.00

120.00

140.00

160.00

180.00

200.00

220.00

240.00

260.00

280.00

300.00

320.00

340.00

360.00

380.00

400.00

420.00

440.00

460.00

480.00

500.00

520.00

540.00

890320

B-2

TRC 890326

208 COMPLIANCE TEST

89079

HEDY61

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -5.458 100.00, 11.10 94.38

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

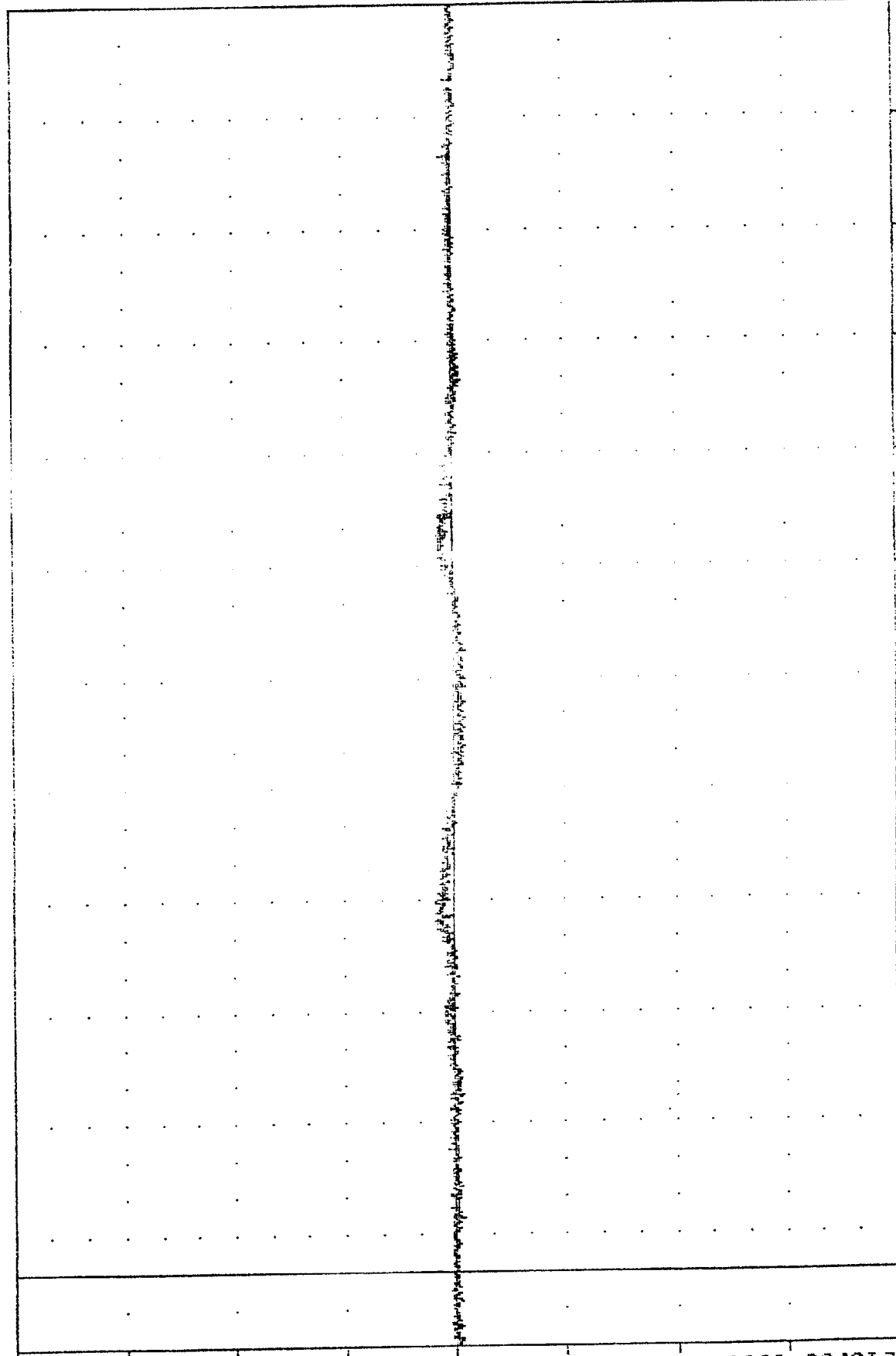
-240.00

-240.00

-240.00

B-3

890320



20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (SECS)

1989 SUBARU GL INTO FRONTAL BARRIER

DRIVER HEAD Y AXIS ACCELERATION

TRC 030320

200 COMPLIANCE TEST

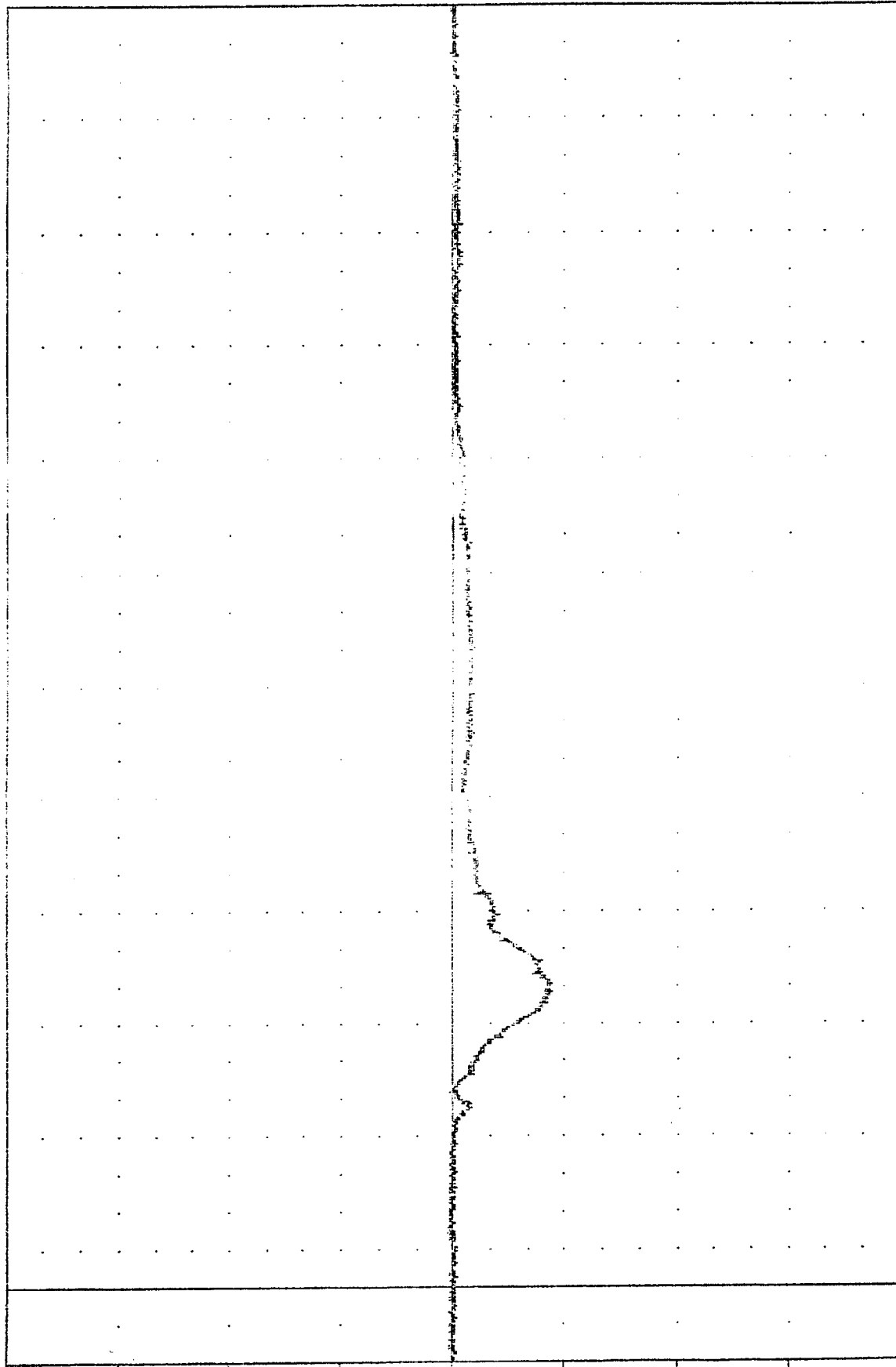
89079

HE0261

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -53.47e 78.50 2.82 e 14.13

ACCELERATION (G)



20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1989 SUBARU GL 1.60 FRONTAL BARRIER  
DRIVER HEAD Z AXIS ACCELERATION

TRC 890320

200 COMPLIANCE TEST

89079

HEADG1

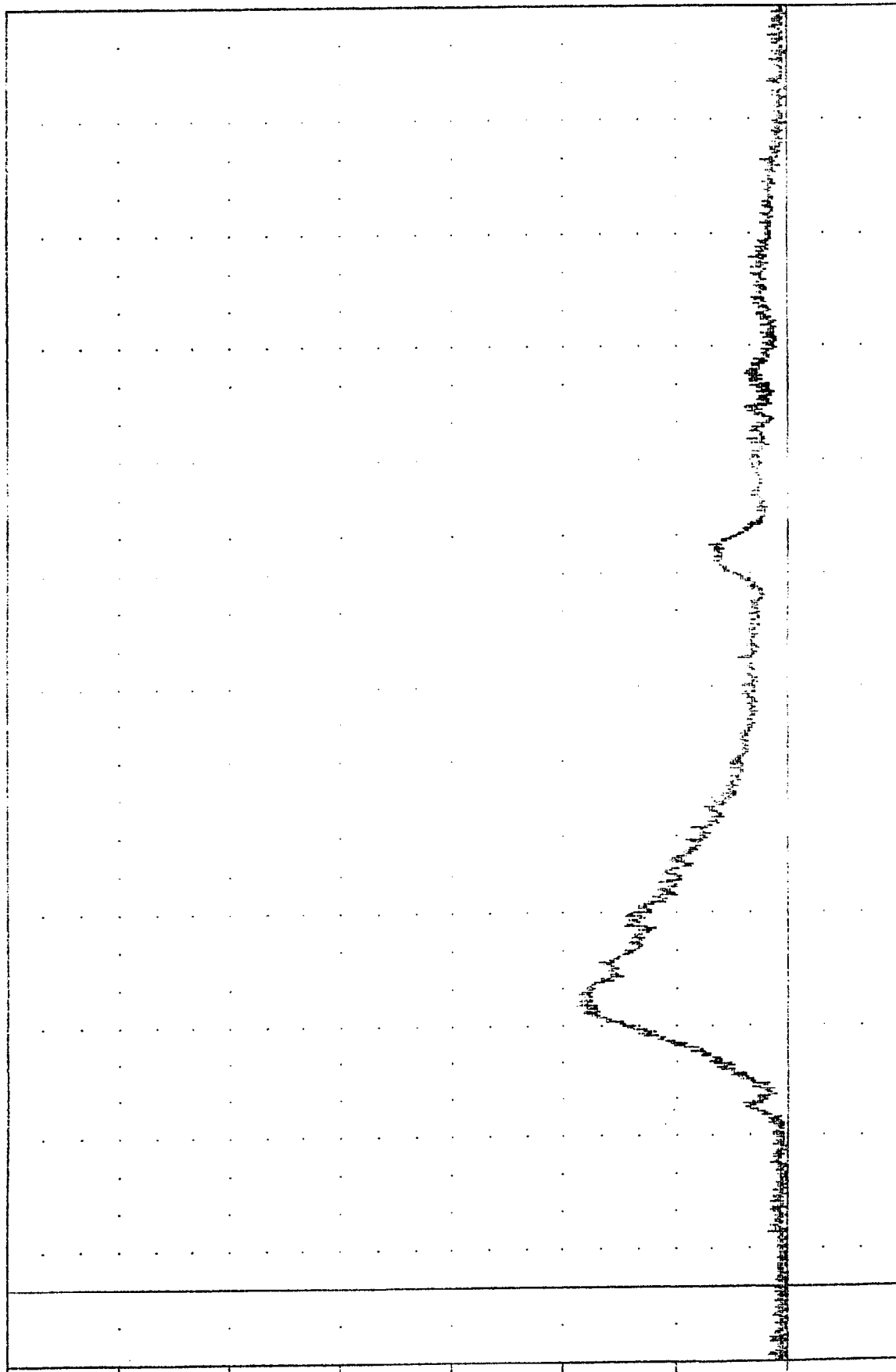
FILTER = OLFF 1650/ 5214/ -40

MIN, MAX VALUES = 0.10e -1.13, 56.50 e 75.25

ACCELERATION (G)

B-5

890320



1989 SUBARU GL INTO FRONTAL BARRIER  
DRIVER HEAD RESULTANT ACCELERATION

TRC 89079 890320

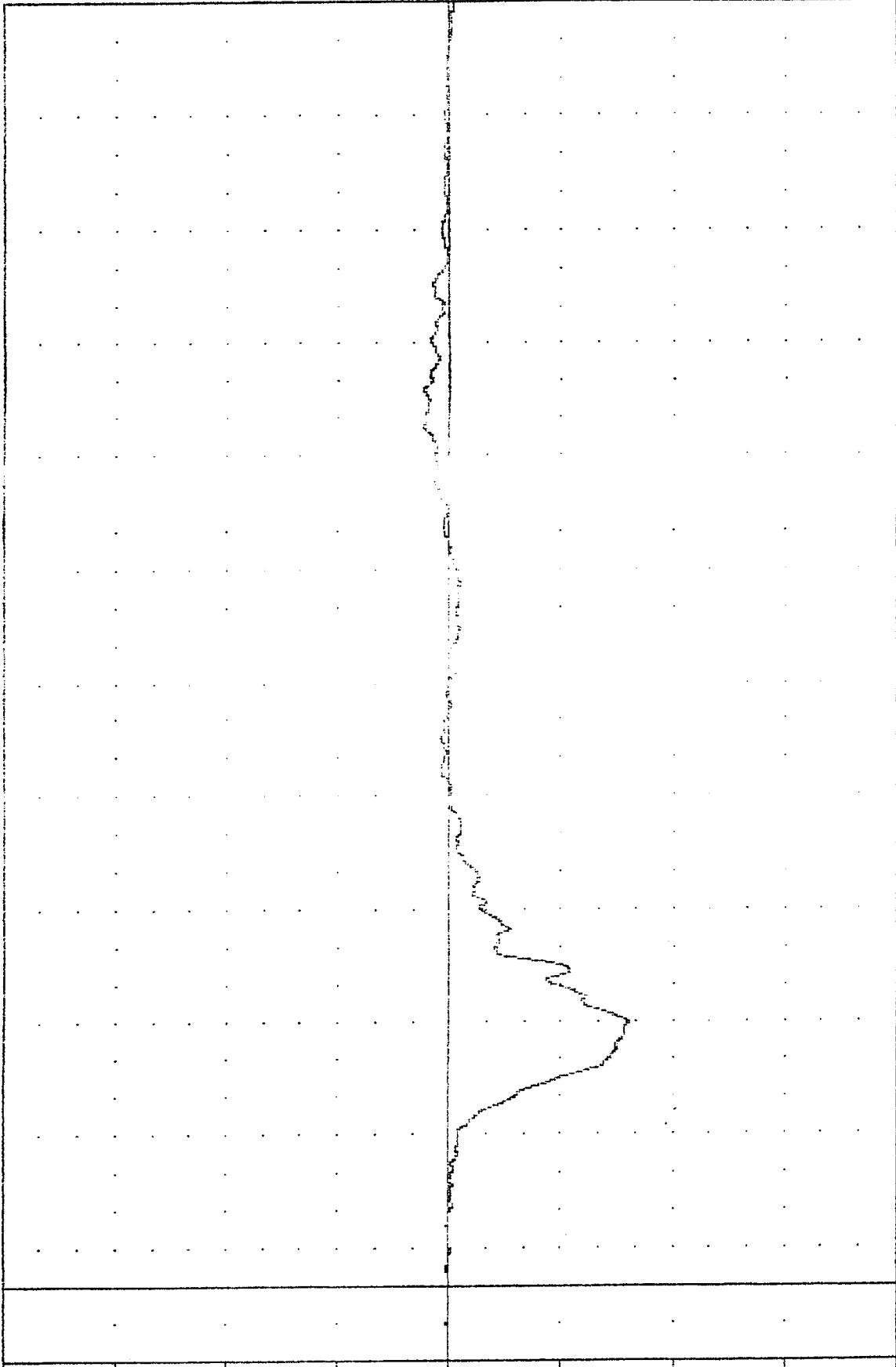
208 COMPLIANCE TEST

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -48.17 69.50 7.05 237.63

CSTXG1

120.00



ACCELERATION (G)

20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

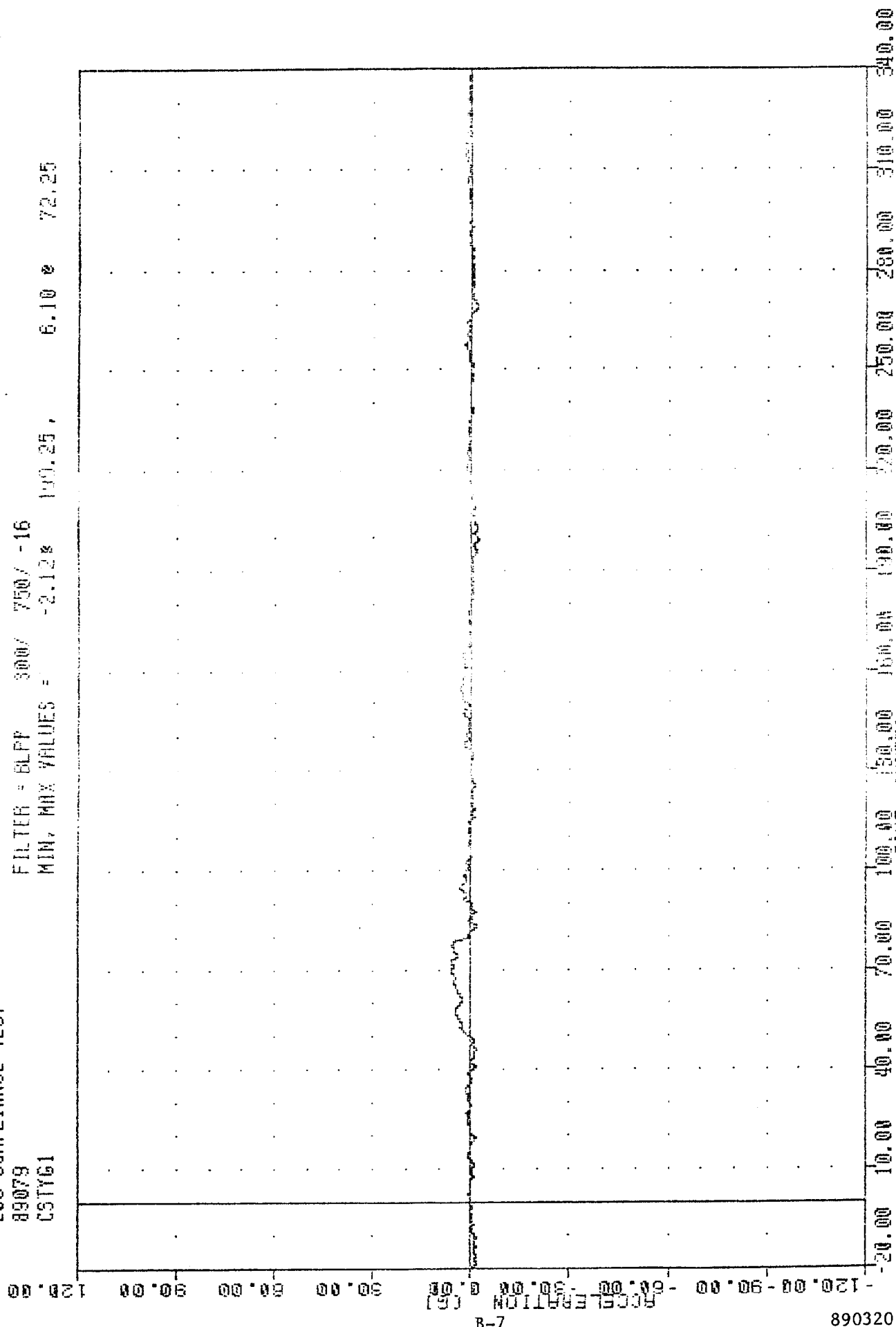
TIME (SECS)

1989 SUBARU GL 1.8i HORIZONTAL BARRIER

DRIVER CHEST X AXIS ACCELERATION

TRC 320  
 208 COMPLIANCE TEST  
 89079  
 CSTY61

FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -2.12% 100.25, 6.10 0 72.25



1989 SUBARU GL INTO FRONTAL BARRIER  
 DRIVER CHEST Y AXIS ACCELERATION

TRC 890320

208 COMPLIANCE TEST

89079

CST261

FILTER = HLP 300/ 750/ -16

MIN. MAX VALUES = -6.700

15.25, 9.93 0 72.38

120.00

90.00

60.00

30.00

0.00

B-8

ACCELERATION (G)

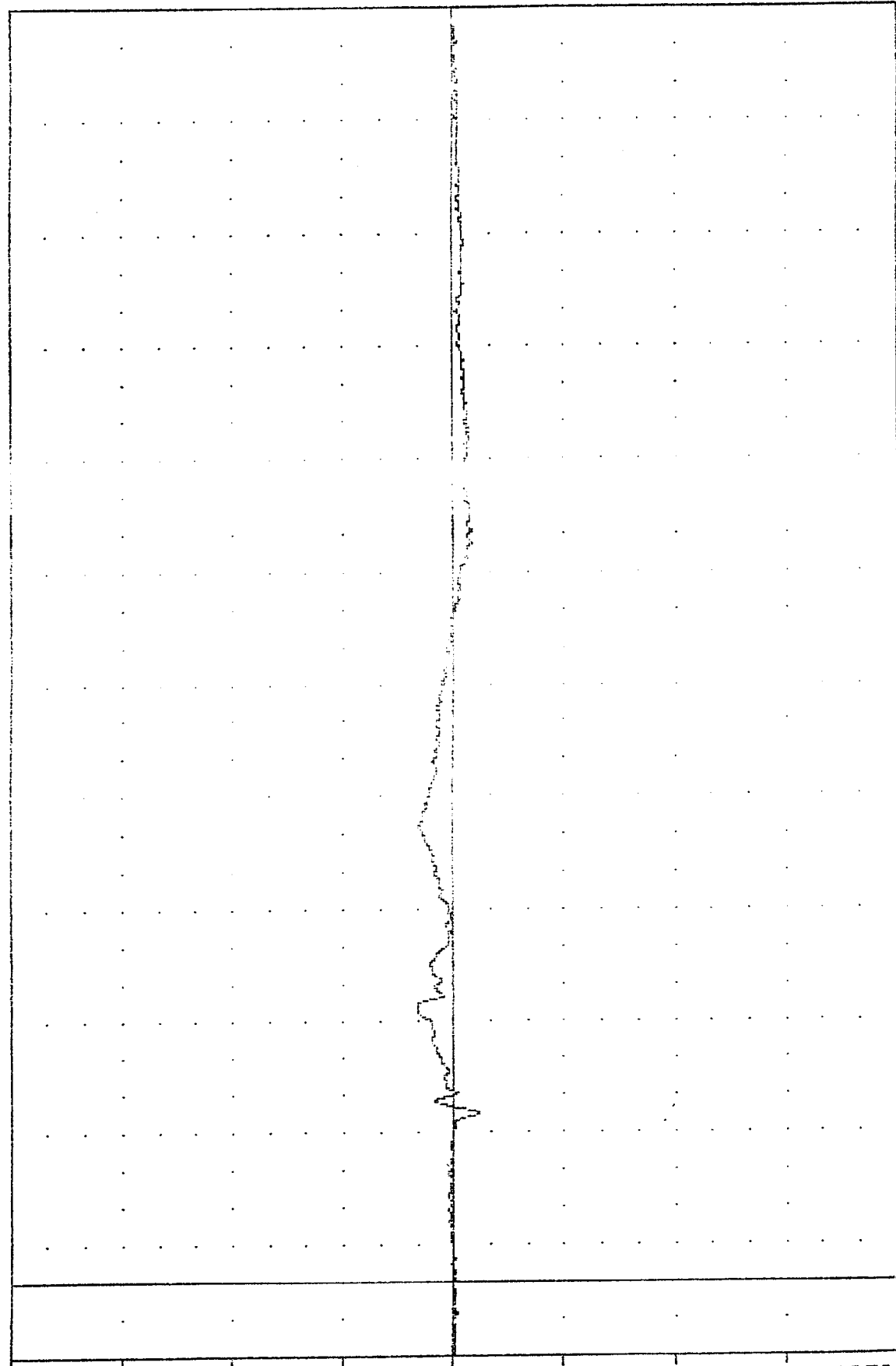
-30.00

-60.00

-90.00

-120.00

890320



0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

1989 SUBARU GL 1.6L HORIZONTAL BARRIER  
DRIVER CHEST Z AXIS ACCELERATION

TRC 890320

208 COMPLIANCE TEST

89079

CSTR61

FILTER = RLFF 300/ 750/ -16

MIN, MAX VALUES = 0.13e

20.00, 48.92 e 69.50

90.00

75.00

60.00

45.00

30.00

15.00

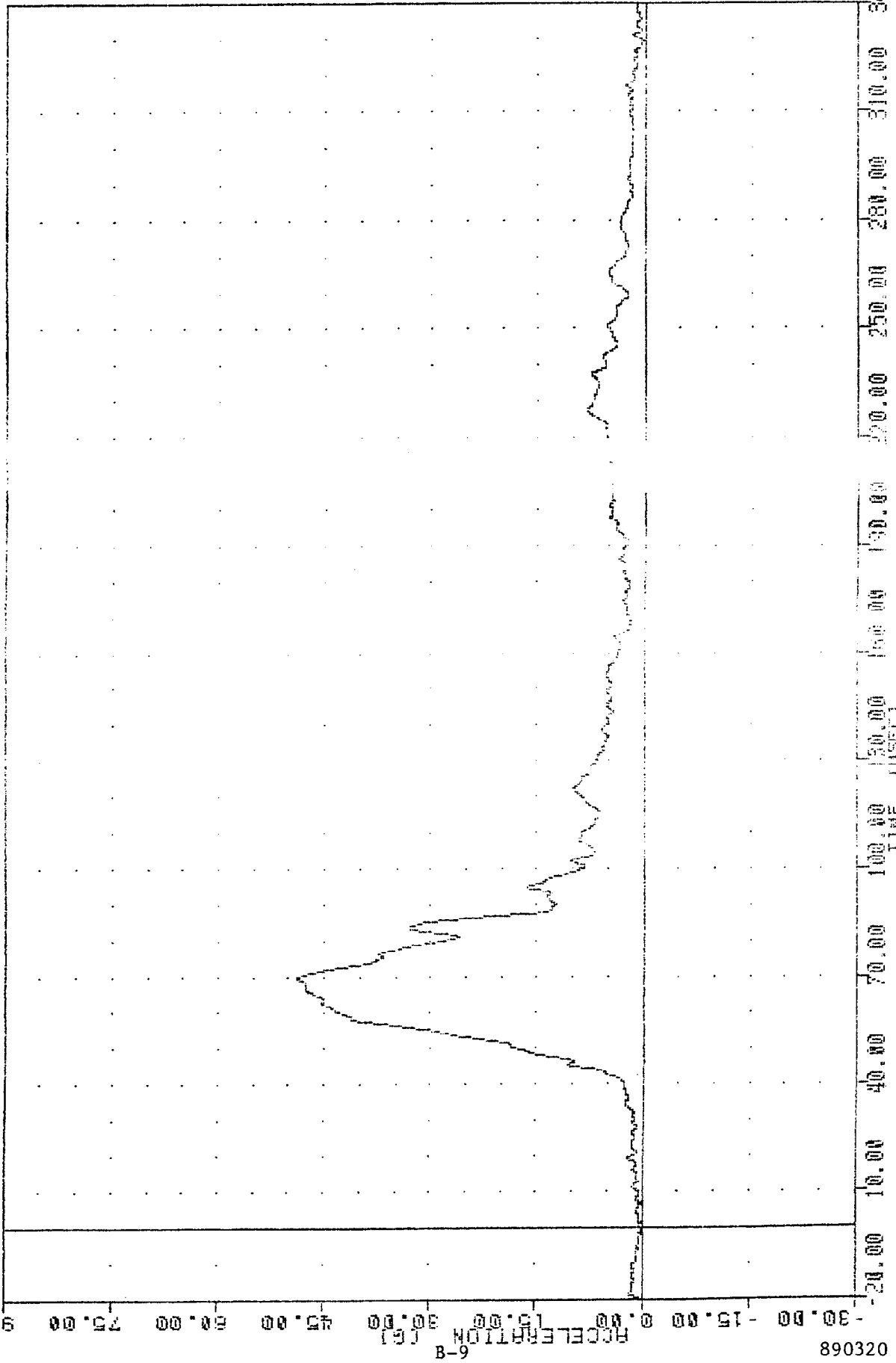
0.00

-15.00

-30.00

B-9

890320



1989 SUBARU GL INTO FRONTAL BARRIER  
DRIVER CHEST RESULTANT ACCELERATION

TAC 890320

208 COMPLIANCE TEST

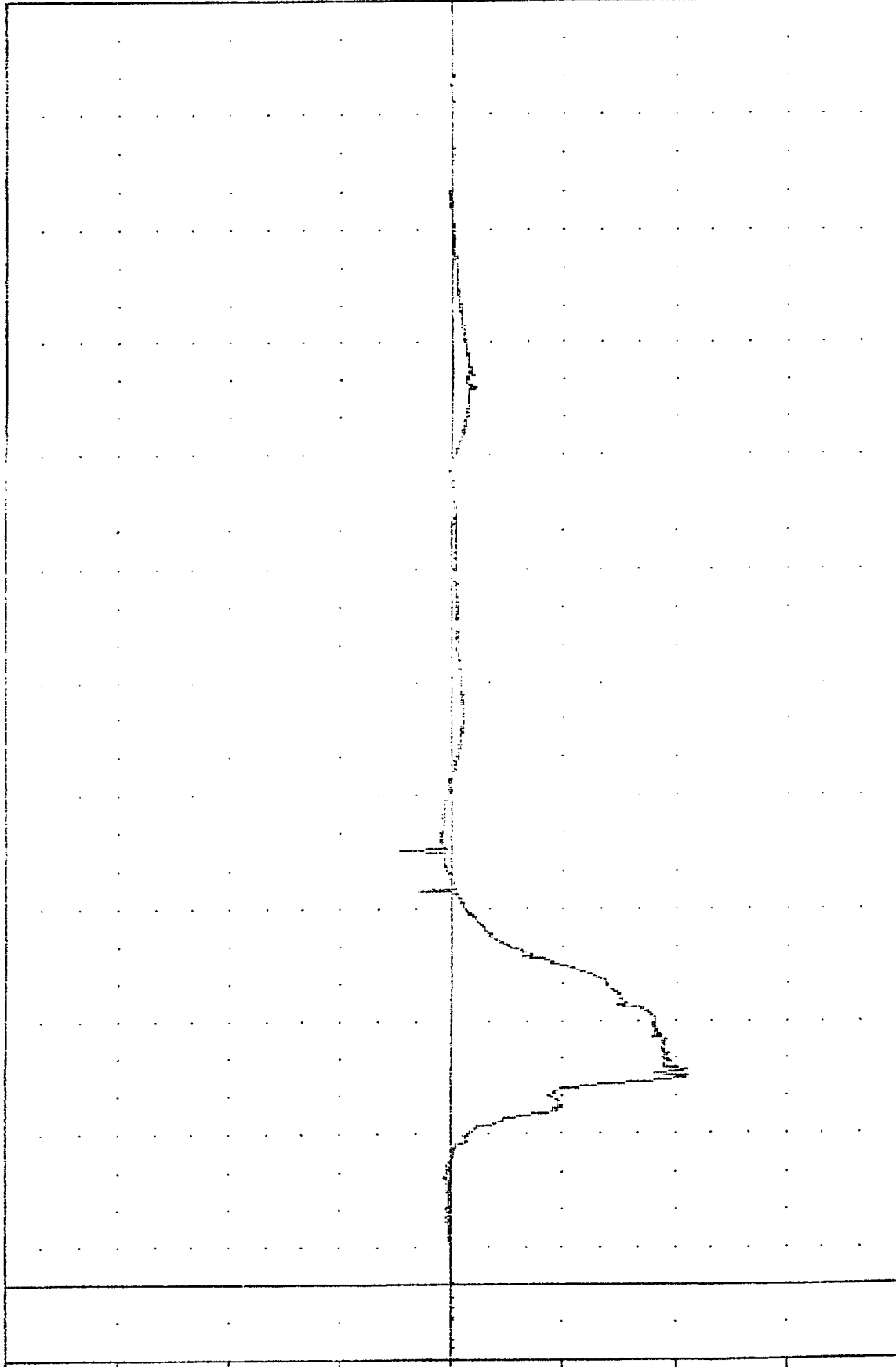
89079

LFMF1

FILTER = BLPP 1000/ 2500/ -16

MIN, MAX VALUES = -1270.30 87.00, 277.74 115.38

FORCE (LB) (x10<sup>3</sup>)



890320

1989 SUBARU GL 1.310 FRONTAL BARRIER  
DRIVER LEFT FEMUR FORCE

TRC 890320

208 COMPLIANCE TEST

89079

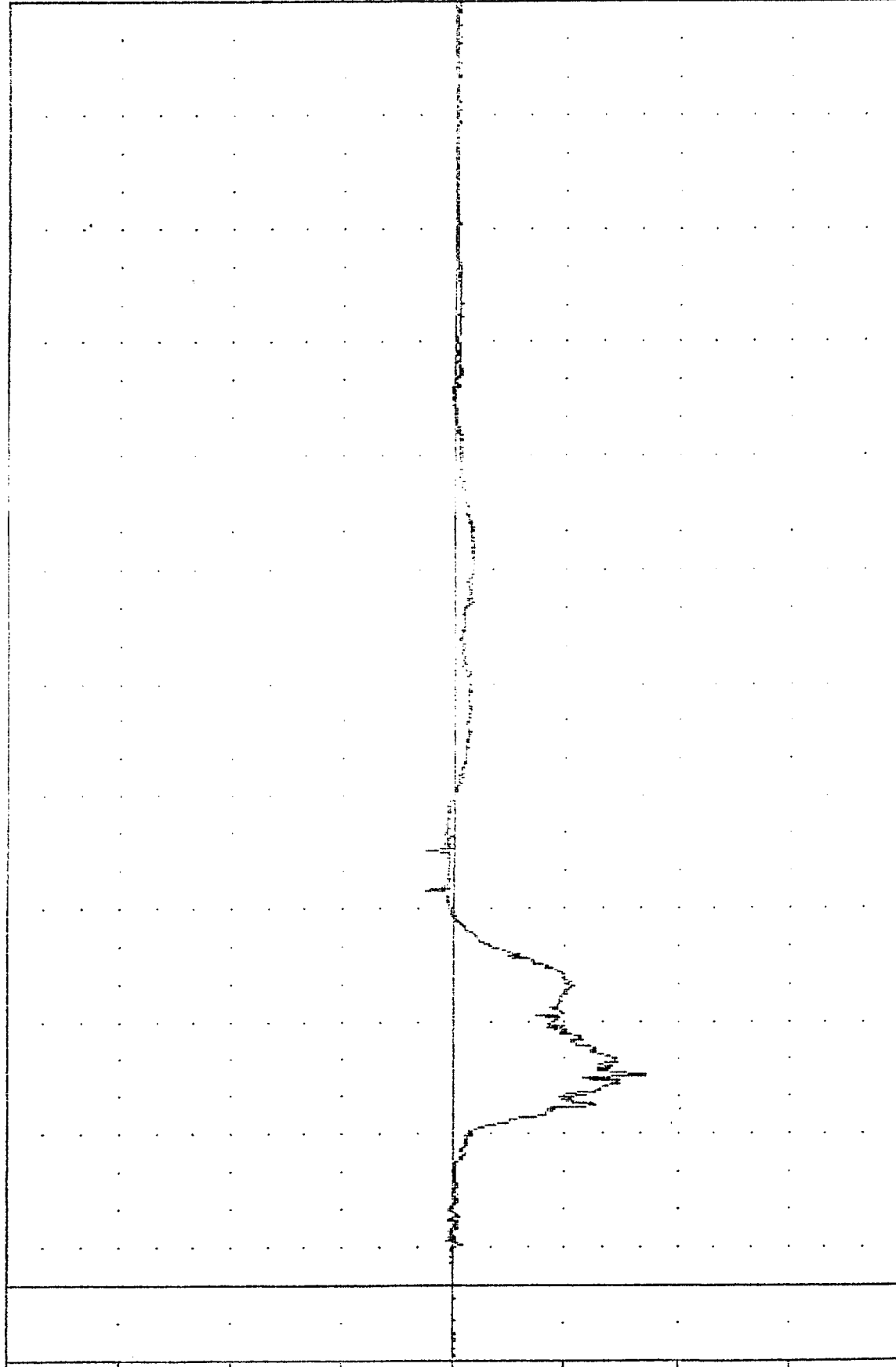
AFMF1

FILTER = BLPP 1000/ 2500/ -16

MIN, MAX VALUES = -1033.66 95.80

157.74 8 115.38

240.00 180.00 120.00 60.00 0.00 -60.00 -120.00 -180.00 -240.00  
TIME (MSEC)



340.00 310.00 280.00 250.00 220.00 190.00 160.00 130.00 100.00 70.00 40.00 10.00 -20.00

1989 SUBARU GL INTO FRONTAL BARRIER  
DRIVER RIGHT FEMUR FORCE

890320

208 COMPLIANCE TEST

89079

HEDX62

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -41.62 104.80

26.59 161.38

240.00

160.00

120.00

80.00

40.00

0.00

-40.00

-80.00

-120.00

-160.00

-200.00

-240.00

-280.00

-320.00

-360.00

-400.00

-440.00

-480.00

-520.00

-560.00

-600.00

-640.00

-680.00

-720.00

-760.00

-800.00

-840.00

-880.00

-920.00

-960.00

-1000.00

-1040.00

-1080.00

-1120.00

-1160.00

-1200.00

-1240.00

-1280.00

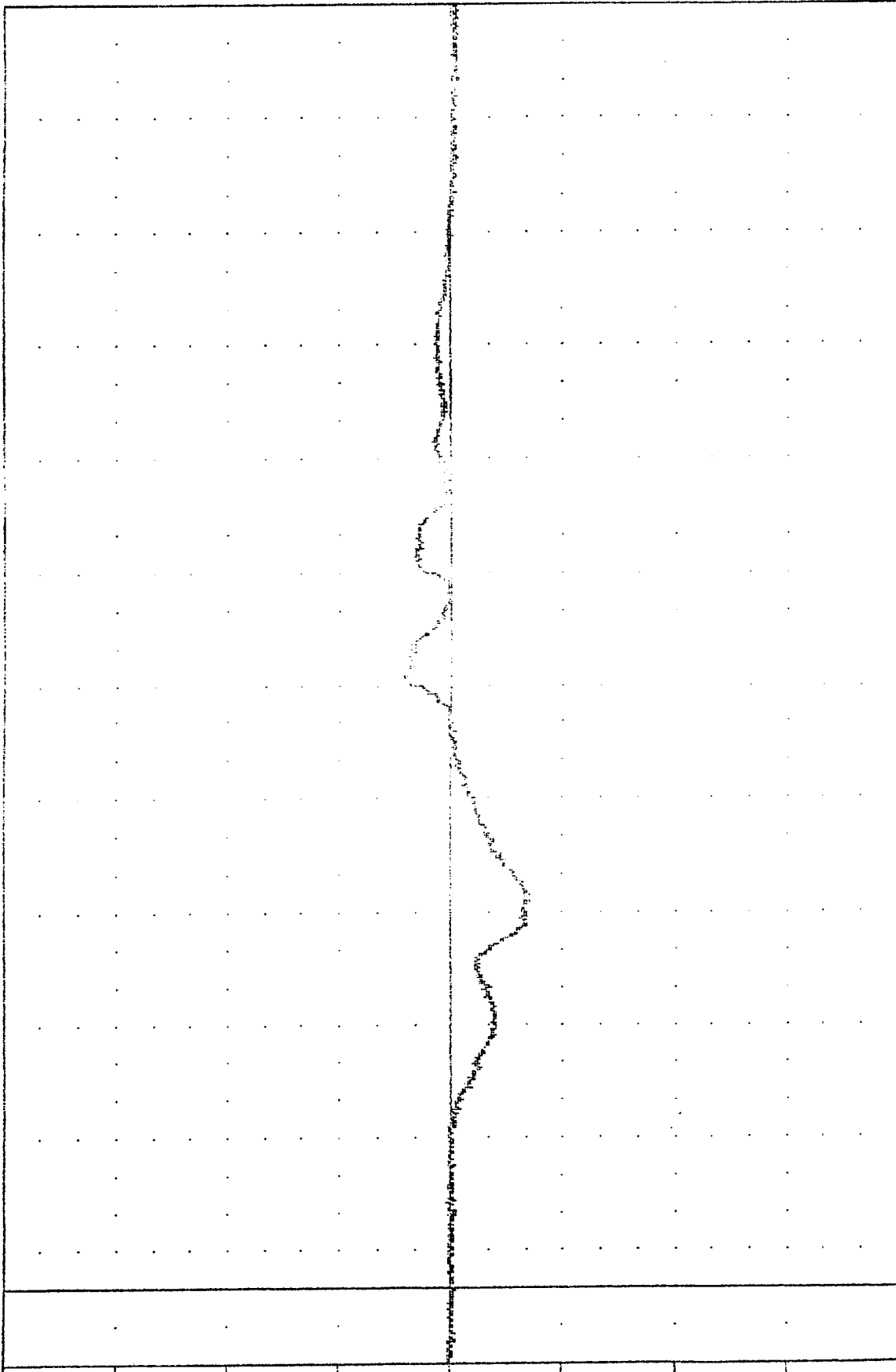
-1320.00

-1360.00

-1400.00

B-12

890320



0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

1989 SUBHAW GL 1410 FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD X AXIS ACCELERATION

TRC 890320

208 COMPLIANCE TEST

89079

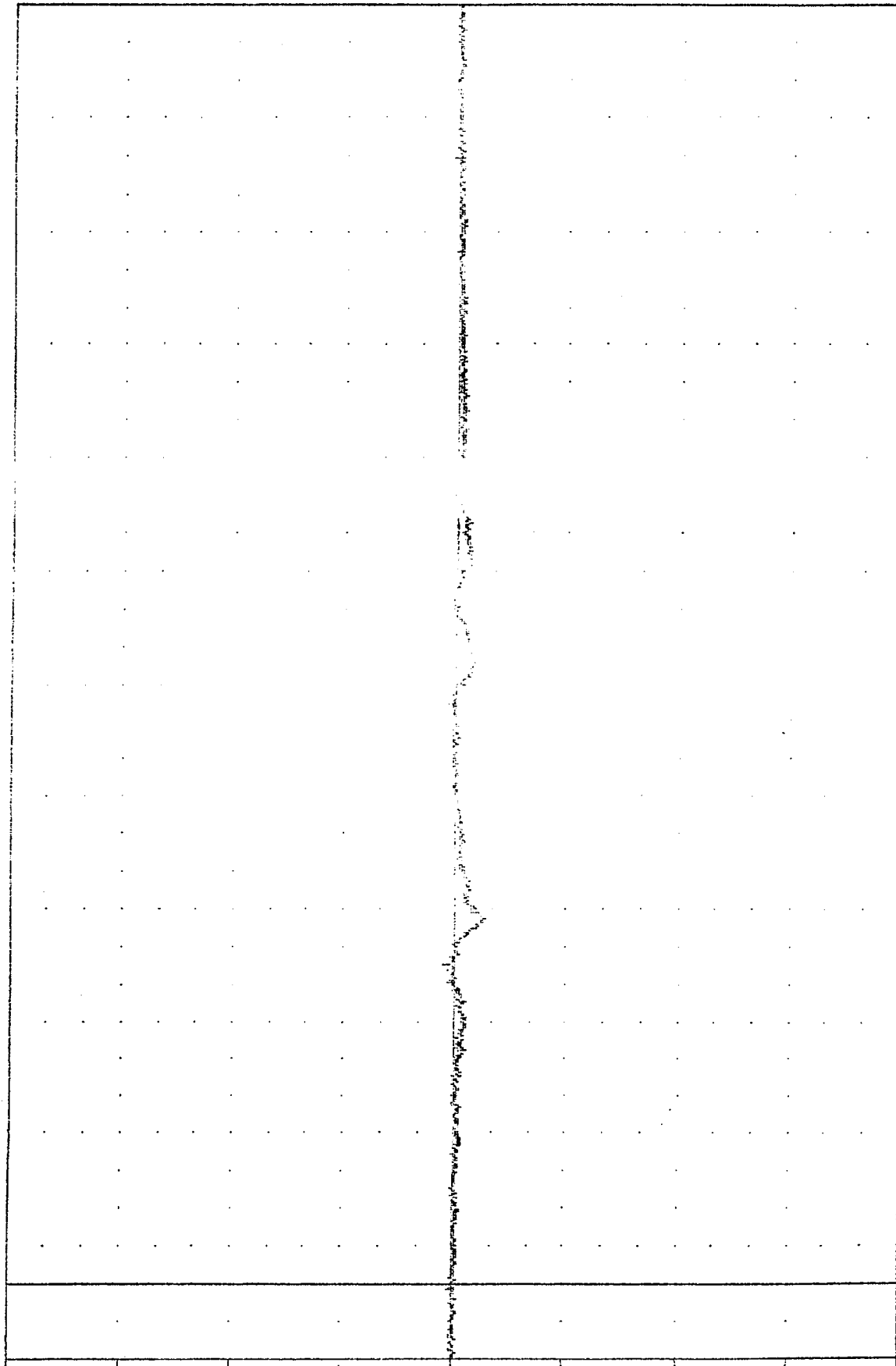
HEDY62

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -15.928

97.19, 6.47 e 85.00

-240.00 240.00



ACCELERATION (G)  
B-13

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

890320

1989 SUBURBU EL. INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD Y AXIS ACCELERATION

TRC 890320

200 COMPLIANCE TEST

89079

HEDIG2

FILTER = ALFF 1650/ 5214/ -40

MIN, MAX VALUES = -65.35%

114.00, 4.24 \* 207.63

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

-240.00

ACCEL

ERR

11110

0.00

-60.00

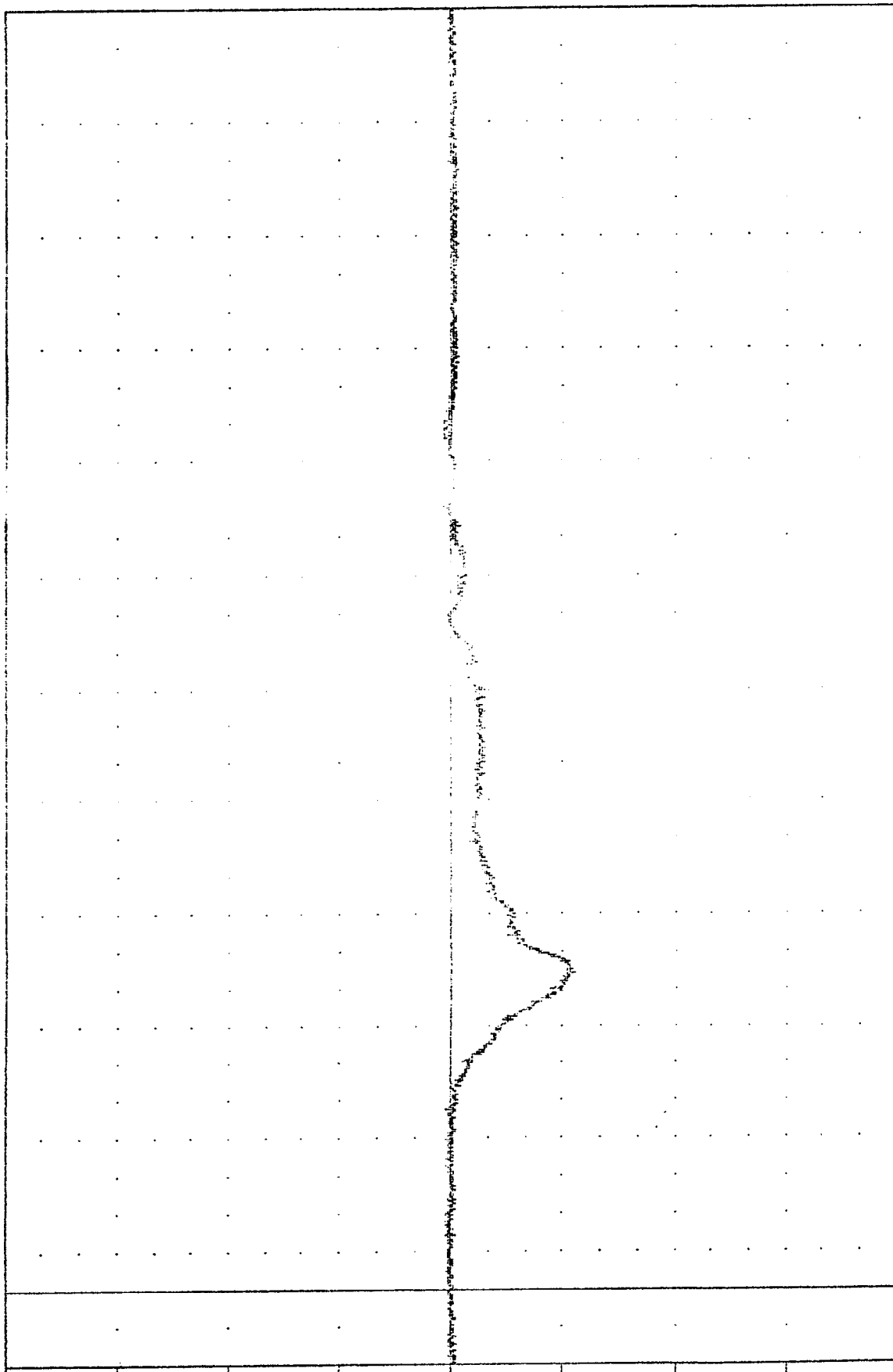
-120.00

-180.00

-240.00

B-14

890320



1989 SUBARU GL INTO FRONTIAR BARRIER  
RIGHT FRONT PASSENGER HEAD Z AXI. ACCELERATION

TRC 890320

206 COMPLIANCE TEST

89079

HEADG62

FILTER = ALPF 1650/ 5214/ -40

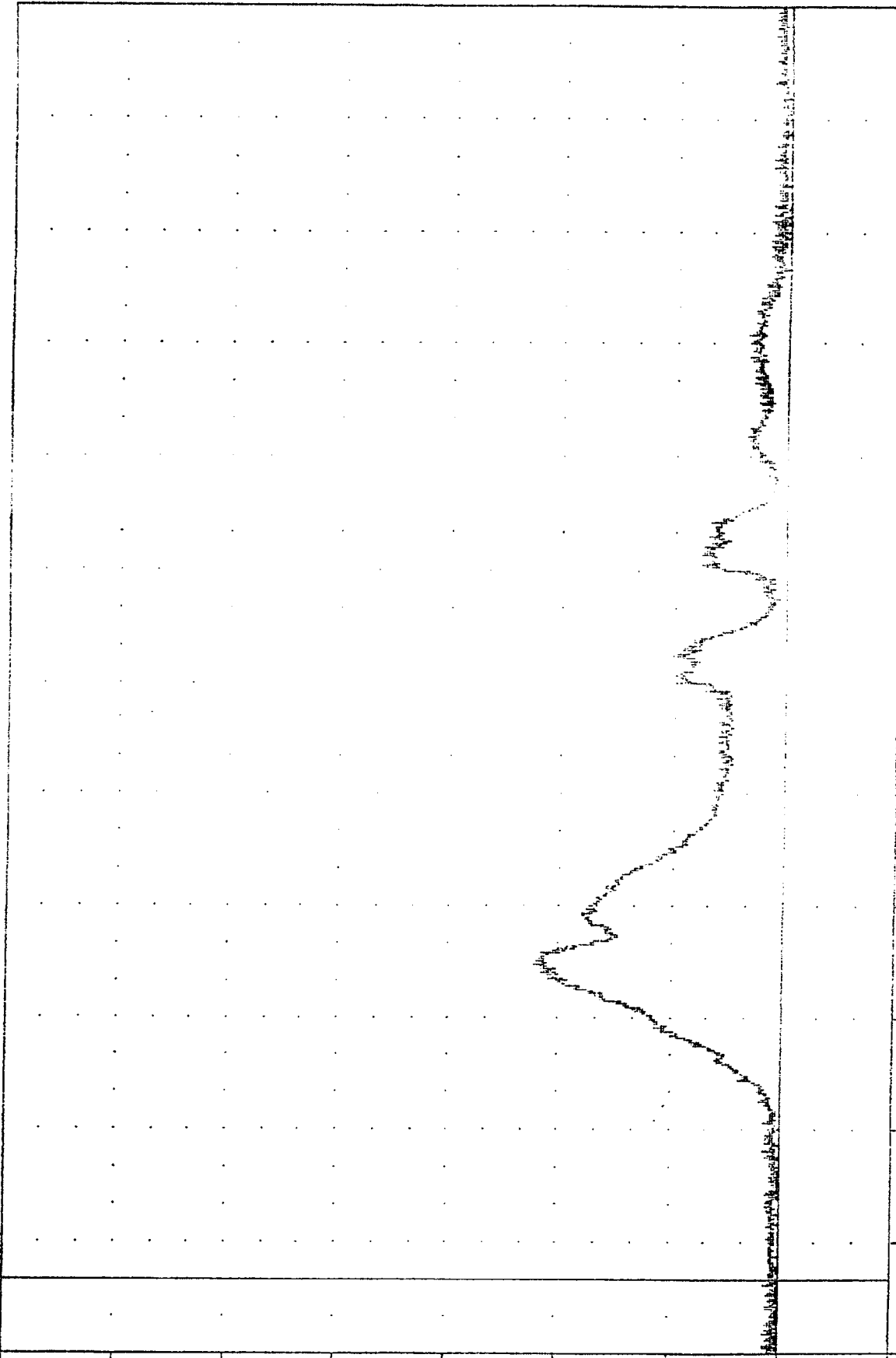
MIN. MAX VALUES = 0.14g

0.75, 66.85 g 84.00

ACCELERATION (g)

B-15

890320



1989 SUBARU GL 1.00 L HUNTER HARRIER

RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TRC 890320

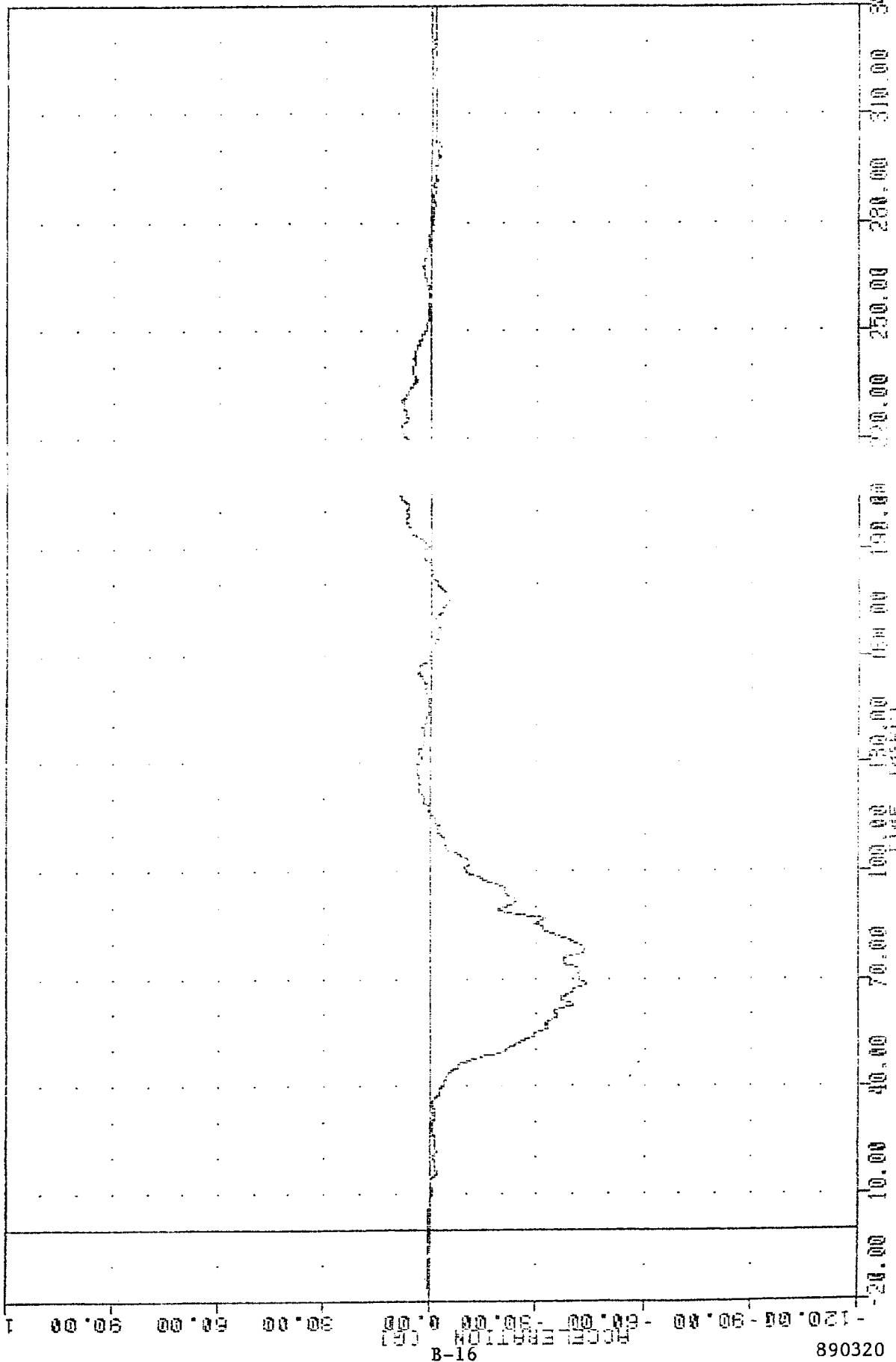
208 COMPLIANCE TEST

89079

CSTX62

FILTER = BLPP 8007 7507 -16

MIN, MAX VALUES = -43.46 88.50, 9.72 212.88



890320

B-16

1989 SUBURBAN GL 1910 FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST X AXIS ACCELERATION

TRC 890320

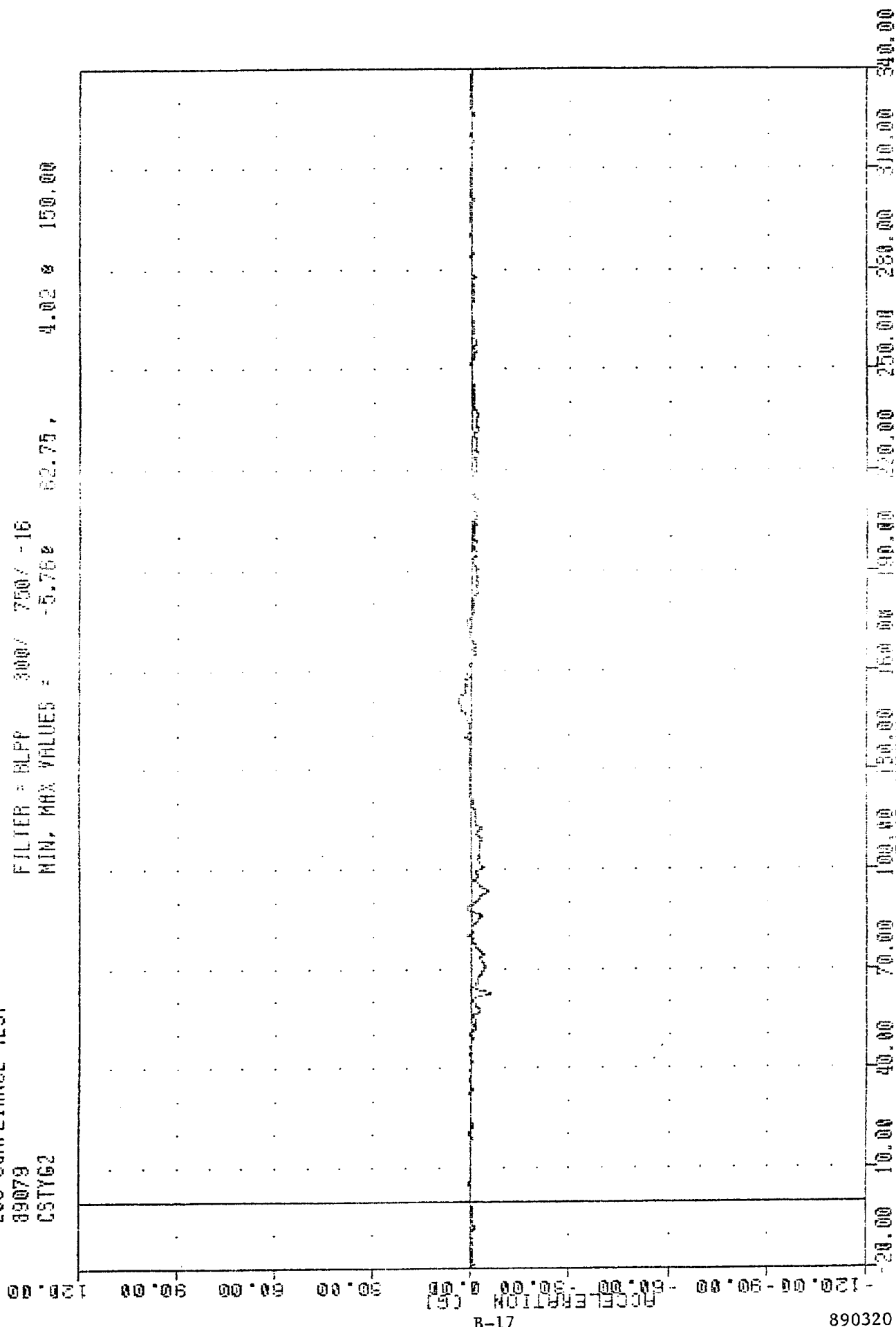
200 COMPLIANCE TEST

89079

CSTY62

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -5.75 62.75, 4.02 150.00



1989 SUBARU GL INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST Y AXIS ACCELERATION

TRC 890320

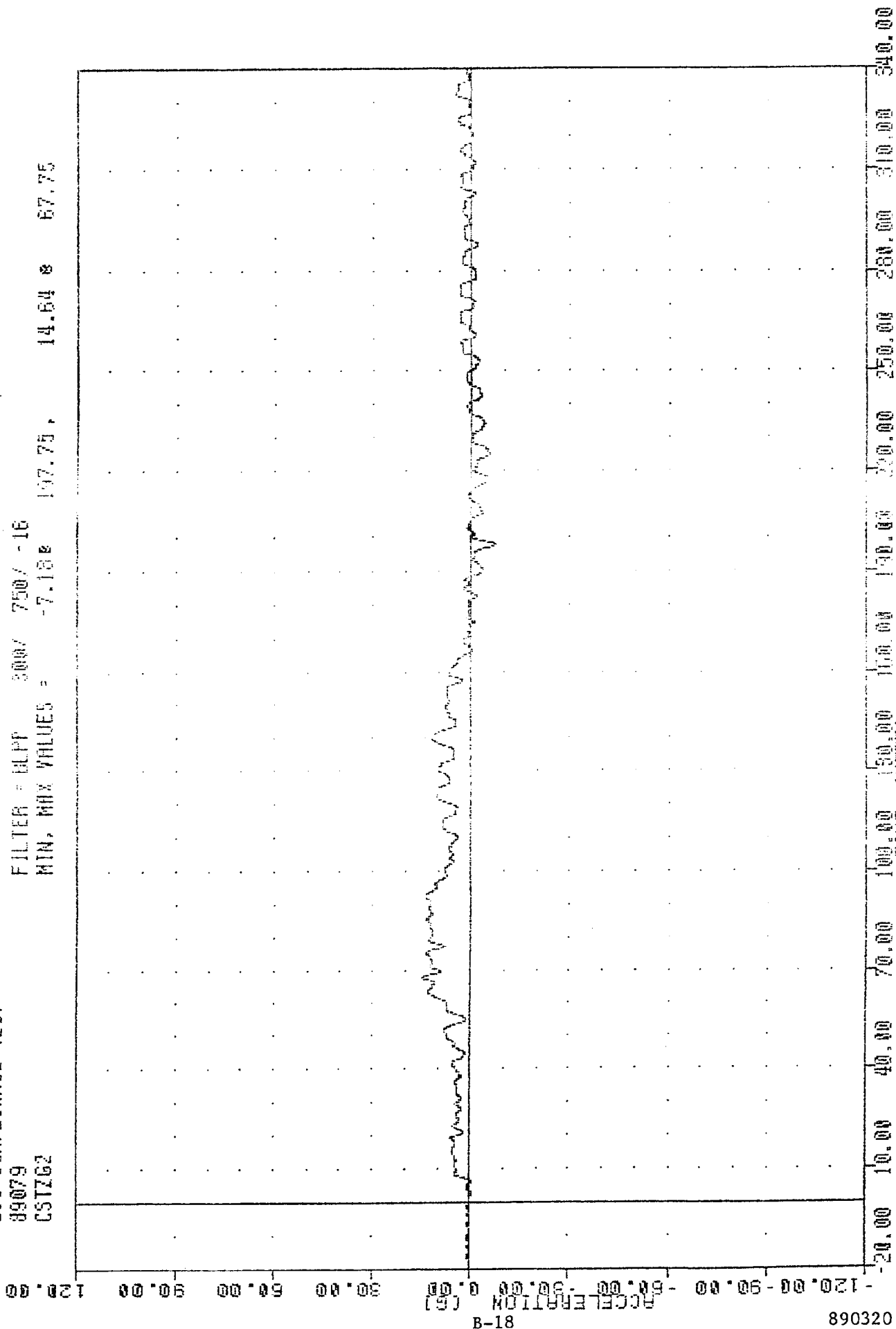
206 COMPLIANCE TEST

89079

CSTZ62

FILTER = HPP 300/ 750/ -16

MIN. MAX VALUES = -7.18% 197.75, 14.64 & 67.75



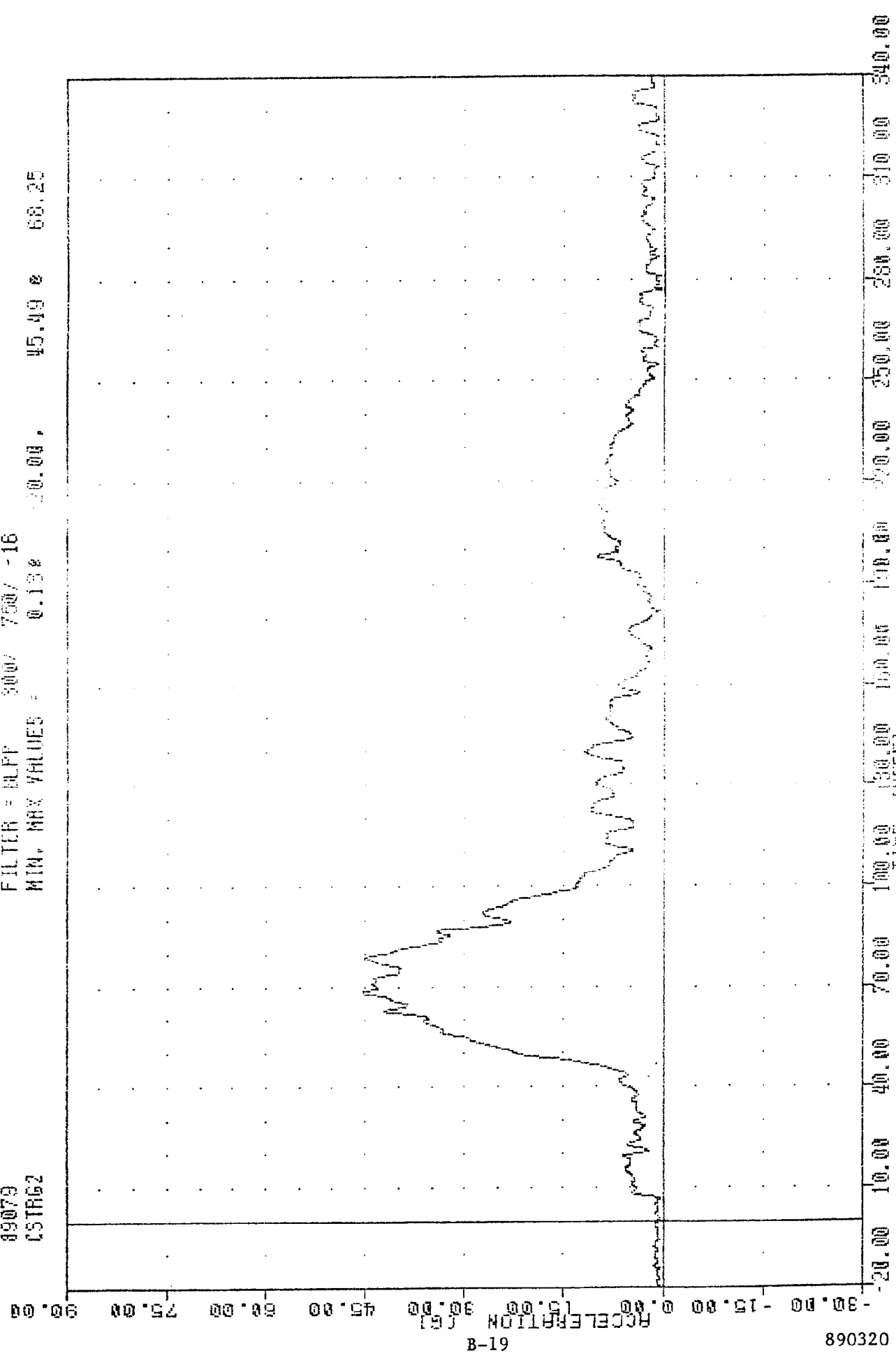
B-18

890320

1989 SUBARU GL 1.10 FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST Z AXIS ACCELERATION

TRC 890320  
 200 COMPLIANCE TEST  
 89079  
 CSTR62

FILTER = BLFF 3000 7500 -16  
 MIN. MAX VALUES = 0.13% 20.00, 45.49 & 68.25



TRC 050320

200 COMPLIANCE TEST

89079

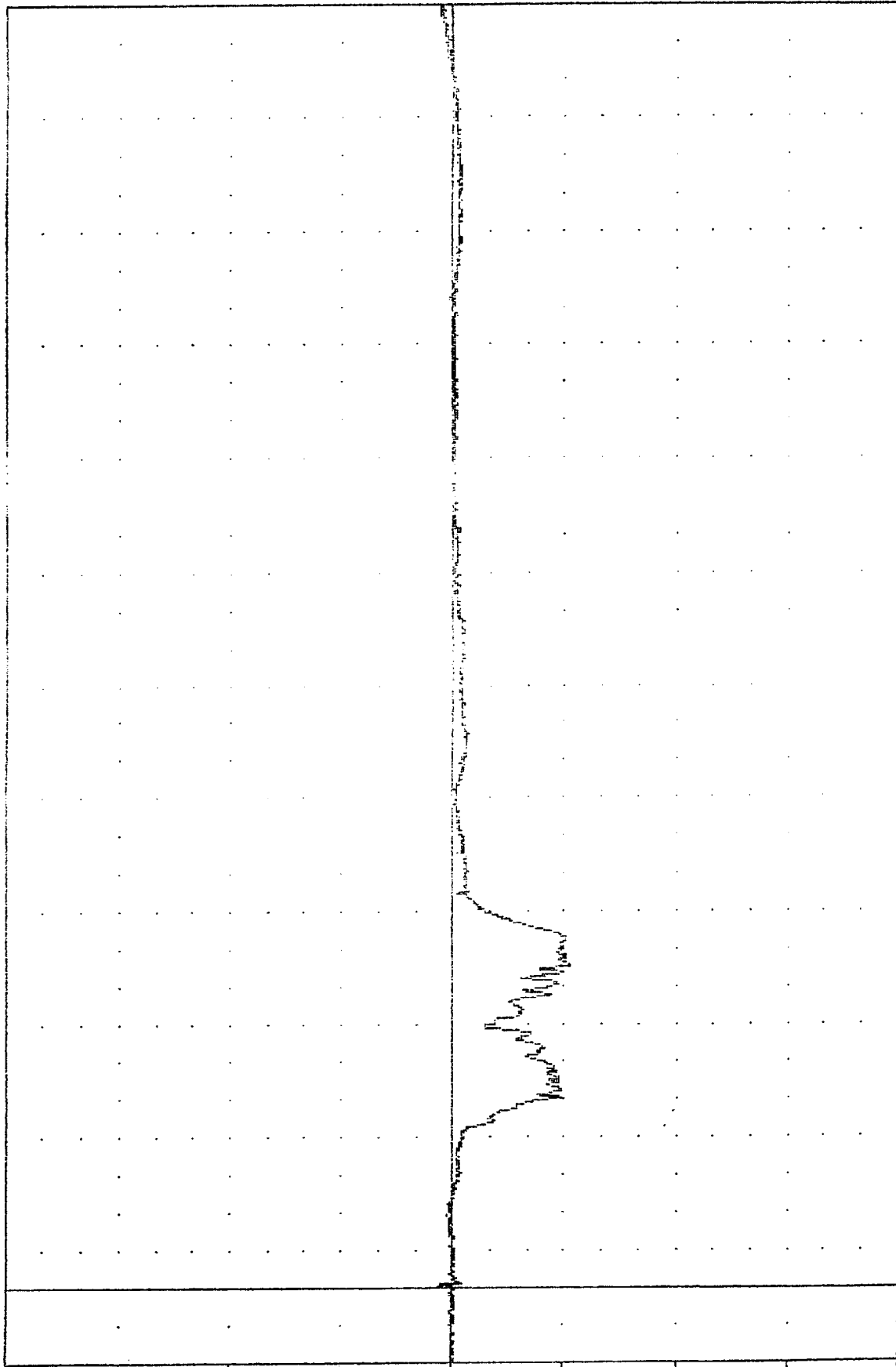
LFMF2

FILTER = SLPP 1000/2500/-10

MIN. MAX VALUES = -634.18 85.58

85.84 0.63

890320  
B-20  
FORCE (LBS)  
(X10<sup>3</sup>)  
-240.00 -180.00 -120.00 -60.00 0.00 60.00 120.00 180.00 240.00



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1989 SUBARU GL INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TRC 890320

200 COMPLIANCE TEST

89079

BFMF2

FILTER = OLFP 1000/ 25007 -16

MIN, MAX VALUES = -820.848 92.00, 58.56 \* 338.38

240.00 180.00 120.00 60.00 0.00 60.00 120.00 180.00 240.00  
FORCE (LB)  
10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00  
Time msec

B-21

890320

1989 SUBARU GL INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

TRC 890320

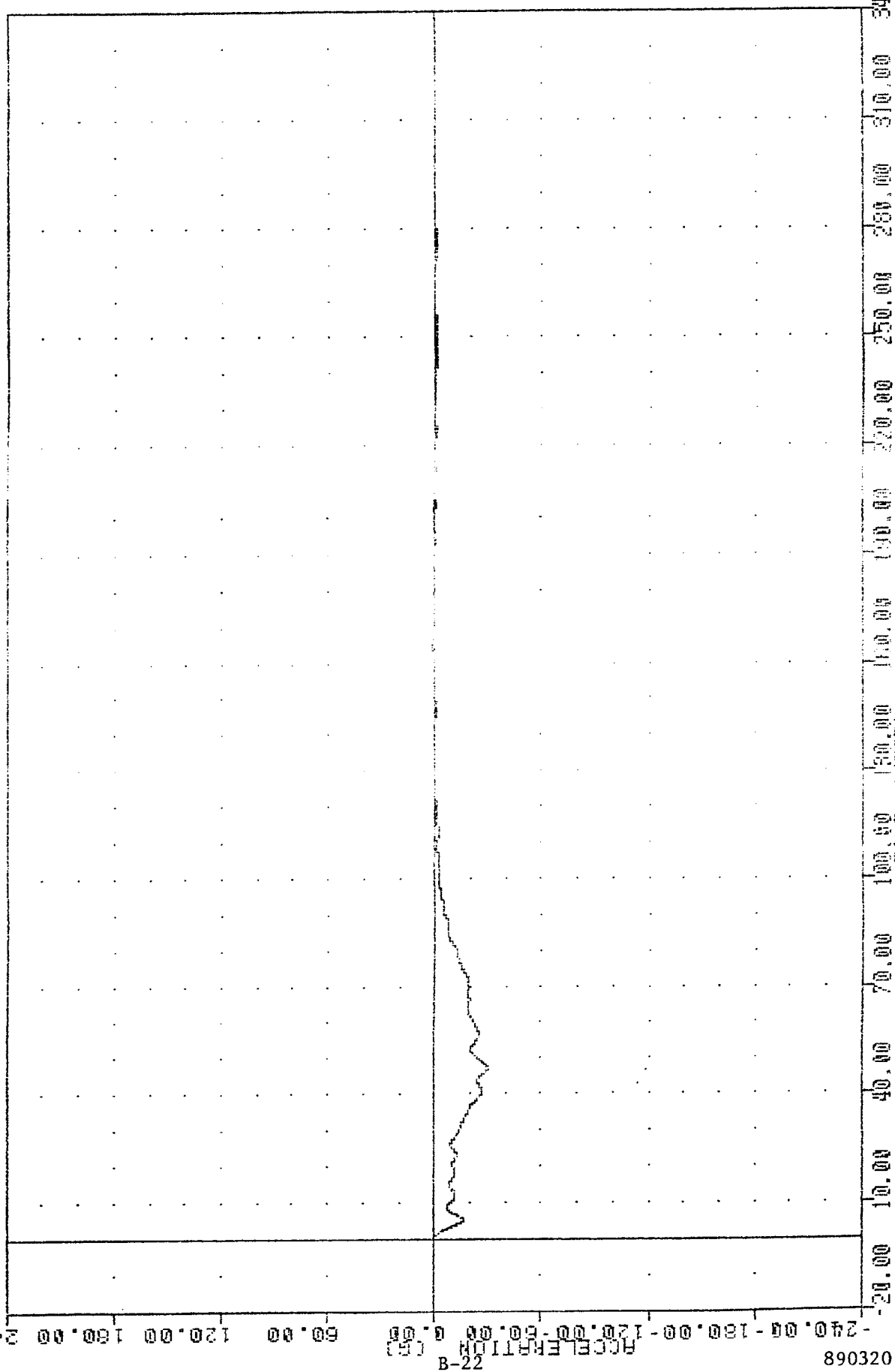
200 COMPLIANCE TEST

89079

TLRXG1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -29.84% 45.88, 1.25% 165.00



1989 SUBARU GL INTO FRONTAL BARRIER  
LEFT REAR SEAT X AXIS ACCELERATION

TAC , 890320

208 COMPLIANCE TEST

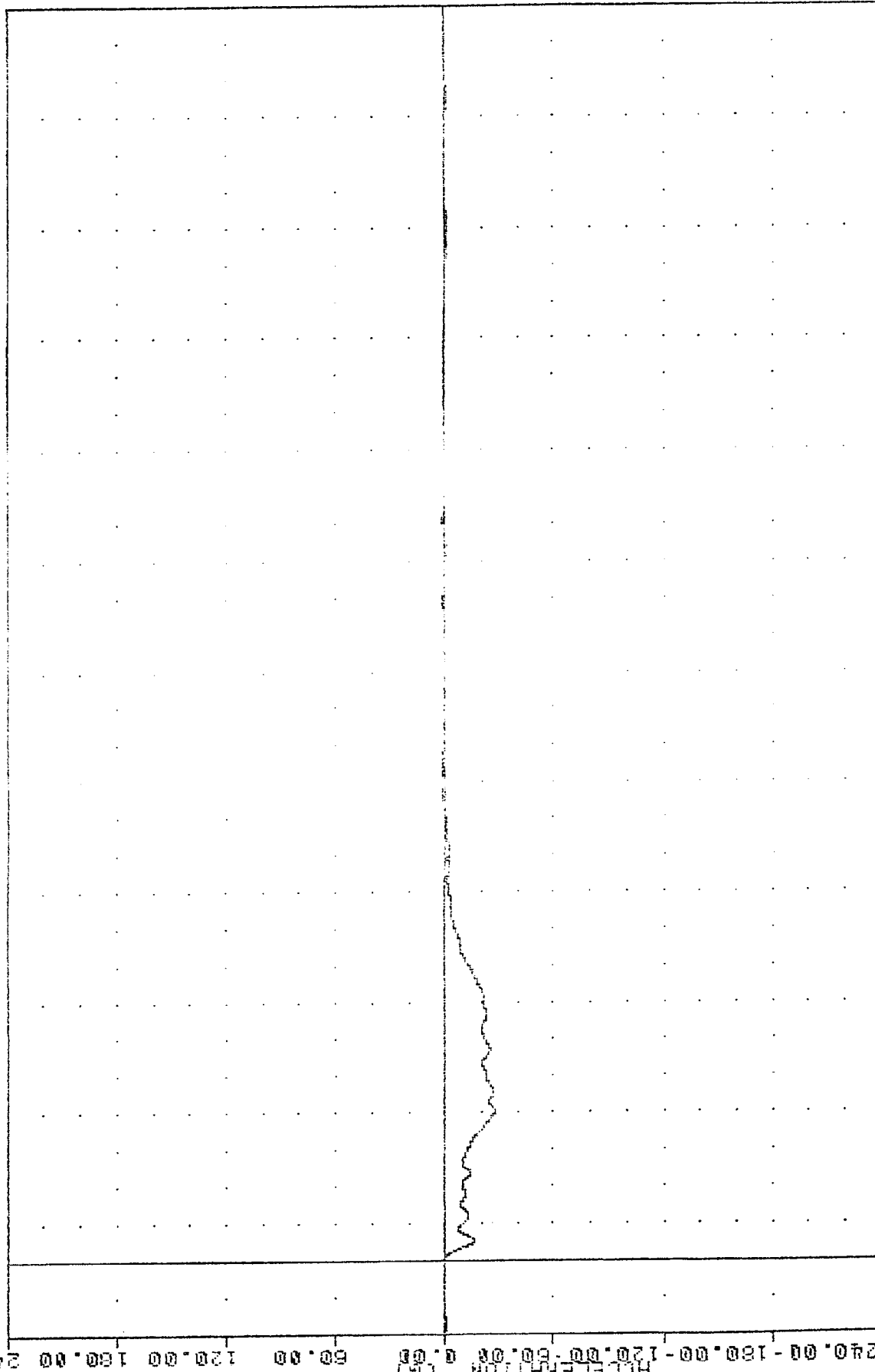
09079

TRRXG1

FILTER : BLPF 100/ 250/ -16

MIN. MAX VALUES : -27.40% 40.25, 1.79 e 126.75

240.00



ACCELERATION (G)

B-23

890320

-240.00 -180.00 -120.00 -60.00 0.00 60.00 120.00 160.00 200.00 240.00 280.00 310.00 340.00

TIME (msec)

1989 SUBARU GL INTO FRONTAL BARRIER  
RIGHT REAR SEAT X AXIS ACCELERATION

THE 890320

208 COMPLIANCE TEST

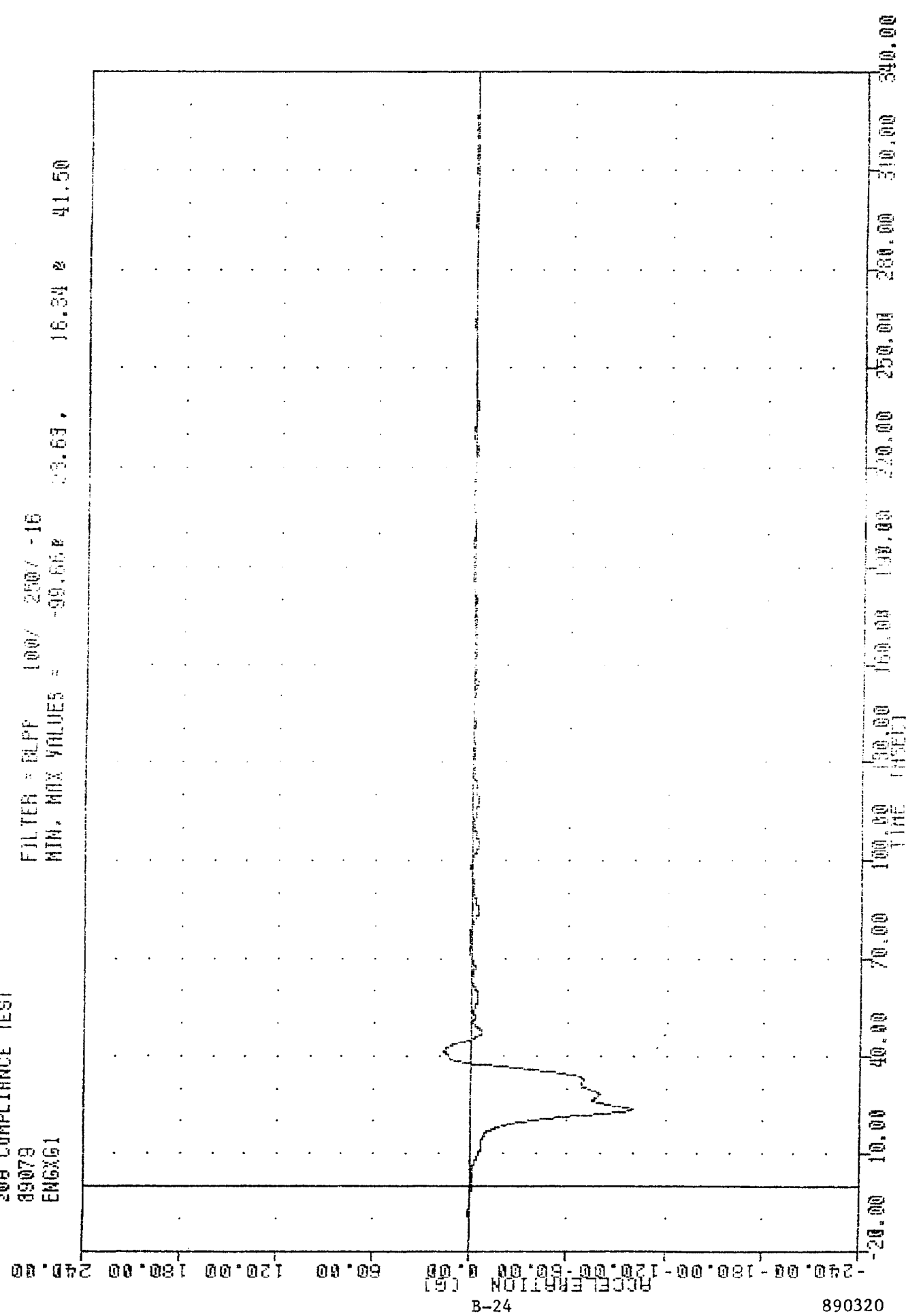
89079

ENGX61

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -99.66 99.63

16.34 41.50



1989 SUBARU GL INTO FRONTAL BARRIER  
ENGINE UPPER BLOCK X AXIS ACCELERATION

TRC 890320

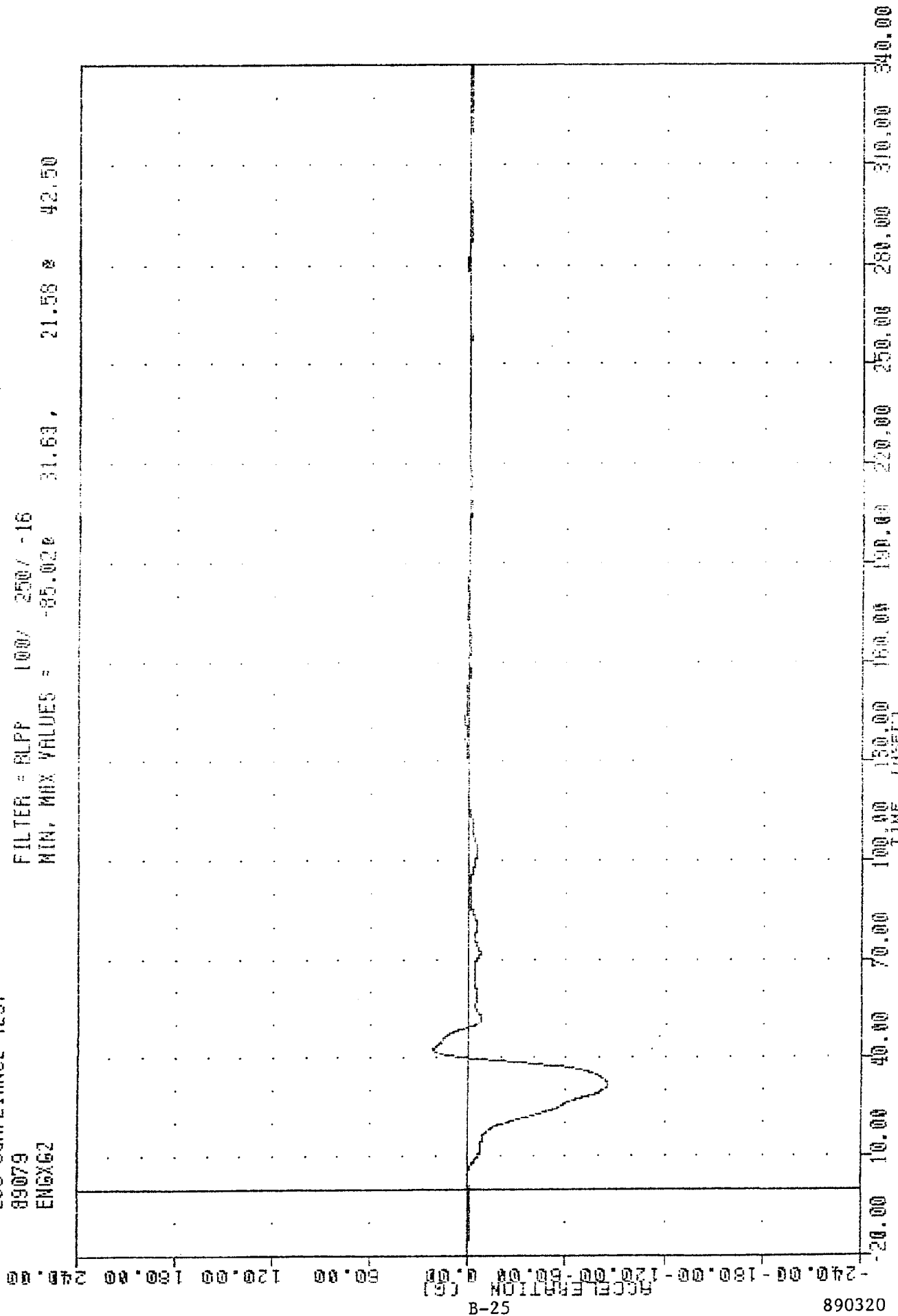
200 COMPLIANCE TEST

89079

ENGX62

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -85.028 31.63, 21.58 42.50



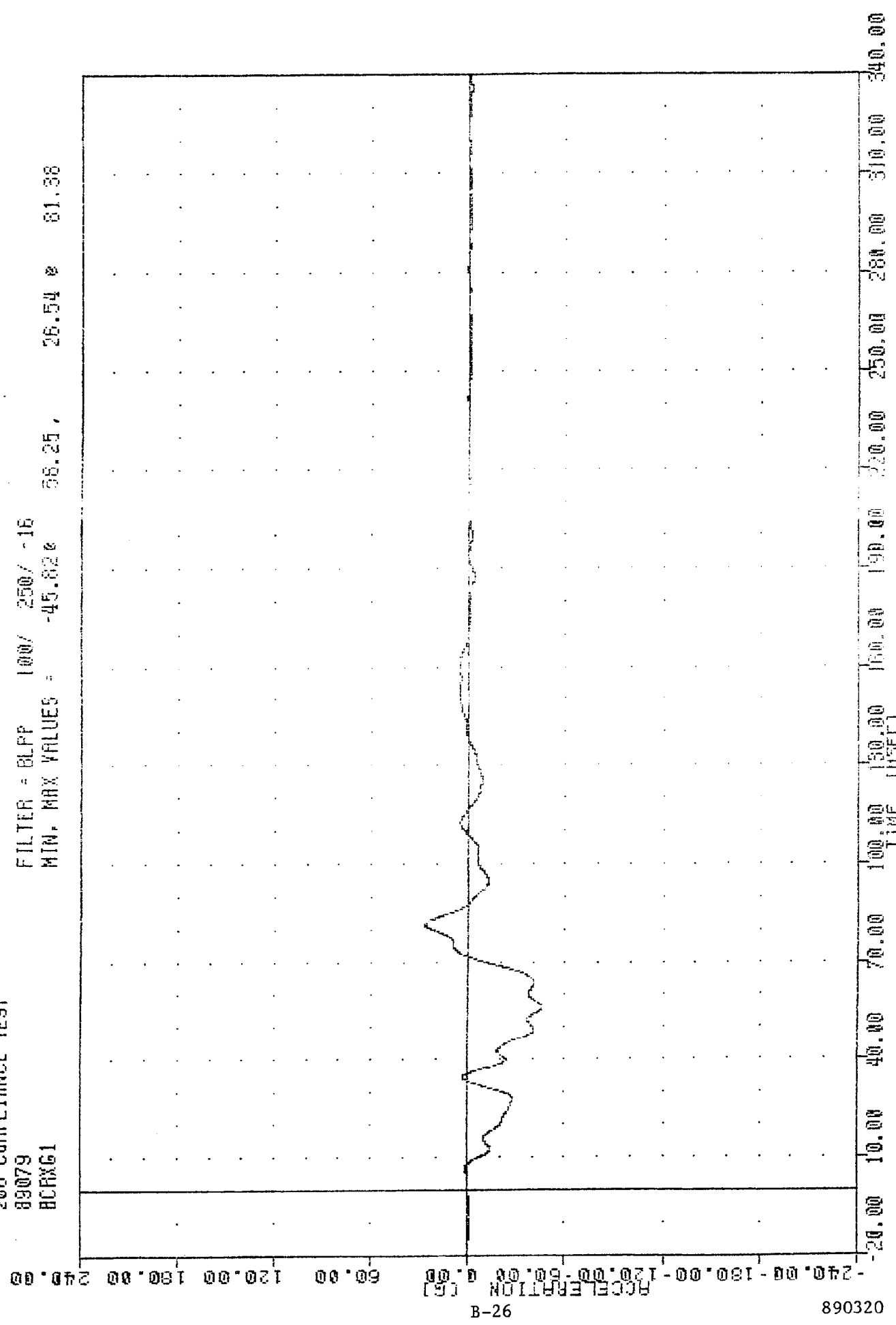
B-25

890320

1989 SUBARU GL INTO FRONTAL BARRIER  
ENGINE BOTTOM BLOCK X AXIS ACCELERATION

TRC 890320  
 200 COMPLIANCE TEST  
 89079  
 BCRXG1

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -45.82 58.25, 26.54 81.38



1989 SUBARU GL INTO FRONTAL BARRIER  
 RIGHT BRAKE CALIPER X AXIS ACCELERATION

TRC 890320

208 COMPLIANCE TEST

89079

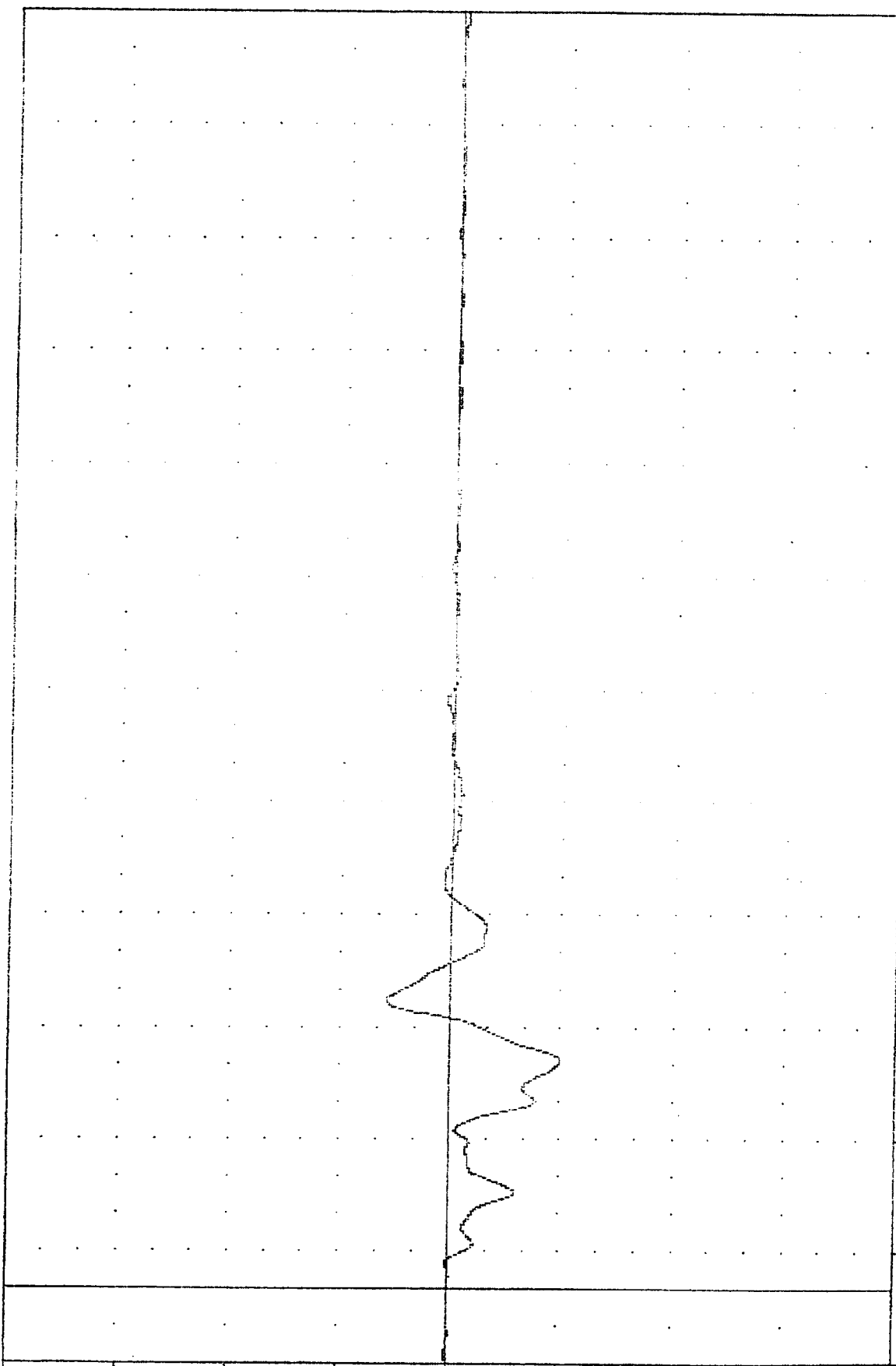
BCLXG1

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -59.658

61.38 35.13 0 76.75

ACCELERATION (G)



20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

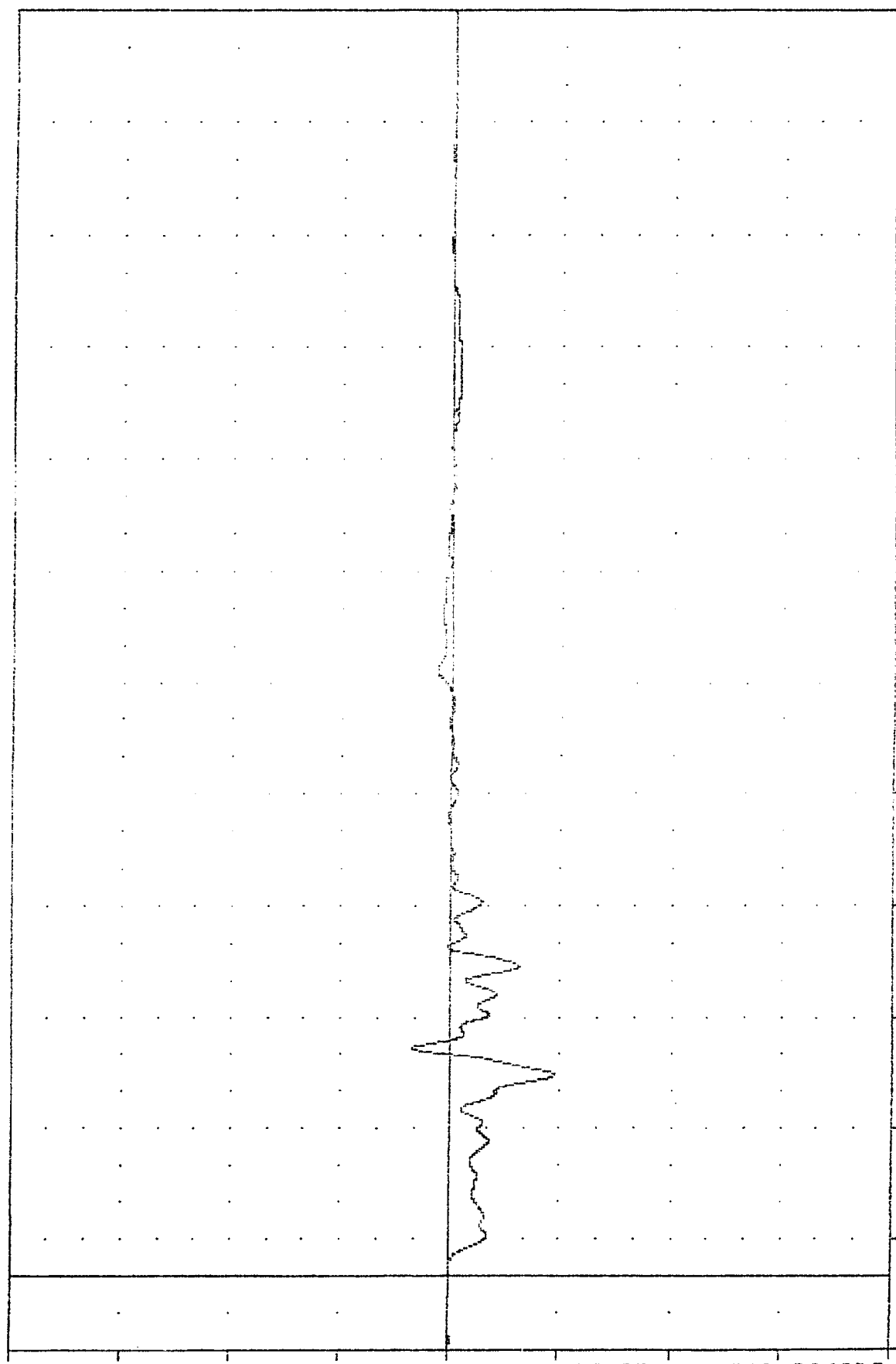
1989 SUBARU GL IN10 FRONTAL BARRIER  
LEFT BRAKE CALIPER X AXIS ACCELERATION

TR 320  
 208 COMPLIANCE TEST  
 89079  
 DPCX61

FILTER = 8LPP 100/ 250/-16  
 MIN. MAX VALUES = -56.86 54.63, 20.81 2 61.75

240.00 180.00 120.00 60.00 0.00

ACCELERATION (G)  
 82-B



890320

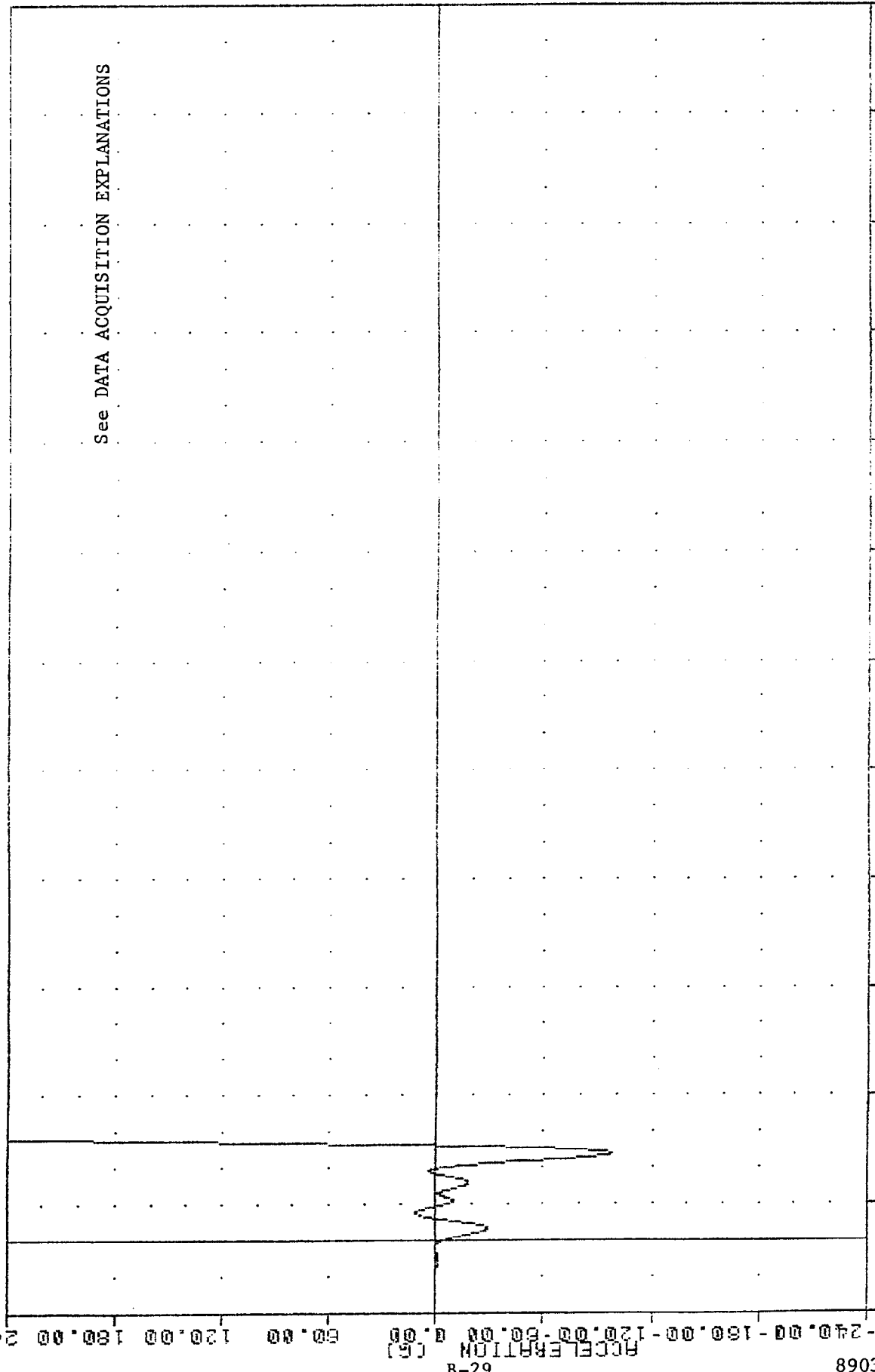
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)

1989 SUBRAID GL INTO FRONTAL BARRIER  
 DASH PANEL CENTER X AXIS ACCELERATION

TR 320  
208 COMPLIANCE TEST

89079  
FFRXG

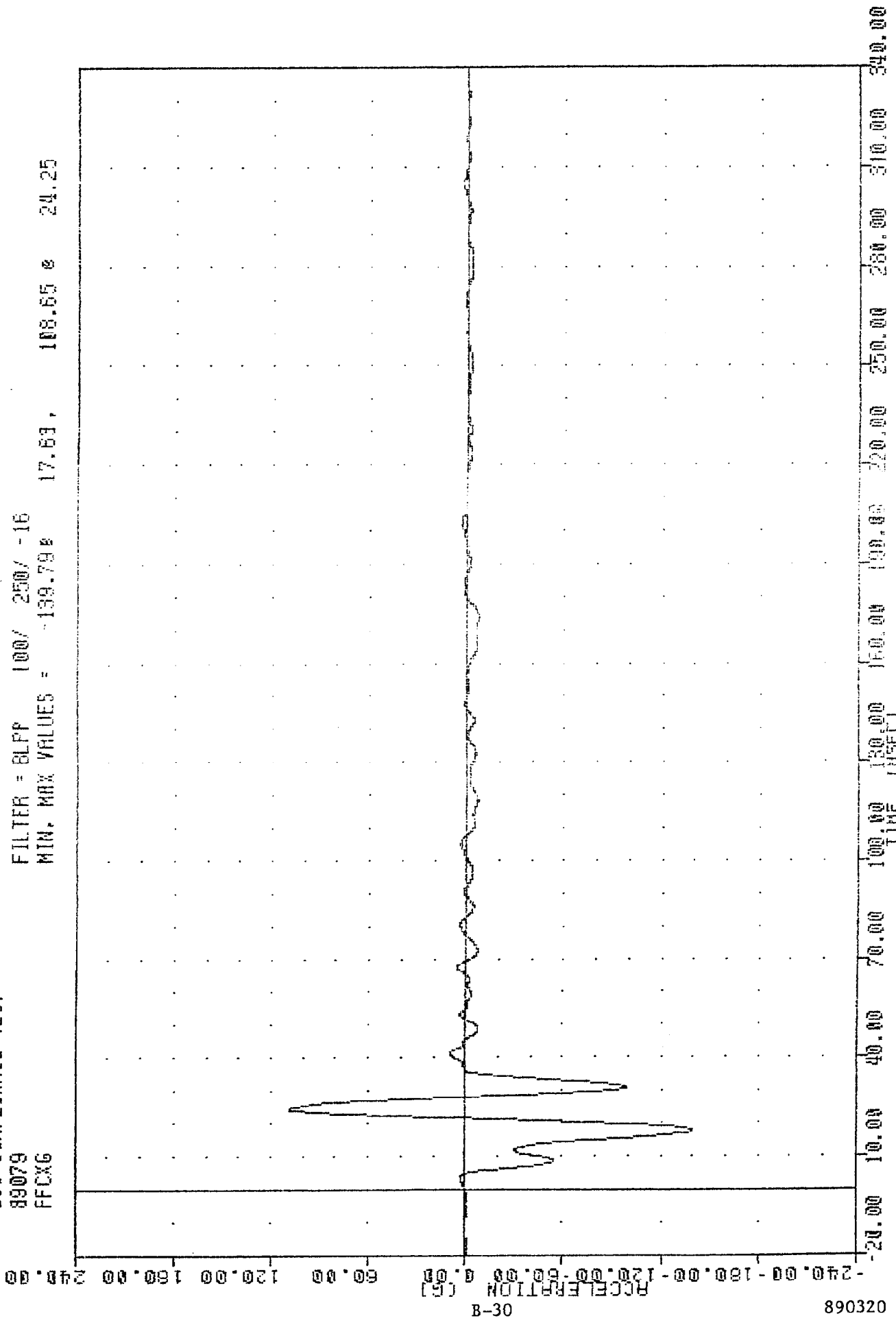
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -98.07 23.63, 1356.88 2 106.63



250.00 260.00 280.00 310.00 340.00  
1989 SUBARU GL INTO FRONTAL BARRIER  
FRONT FRAME RAIL X AXIS ACCELERATION

IP 320  
200 COMPLIANCE TEST  
89079  
FFCX6

FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -139.79 17.63, 108.65 24.25



890320

B-30

1989 SUBARU GL INTO FRONTAL BARRIER  
FRONT FRAME CROSSMEMBER X AXIS ACCELERATION

TRC 890320

208 COMPLIANCE TEST

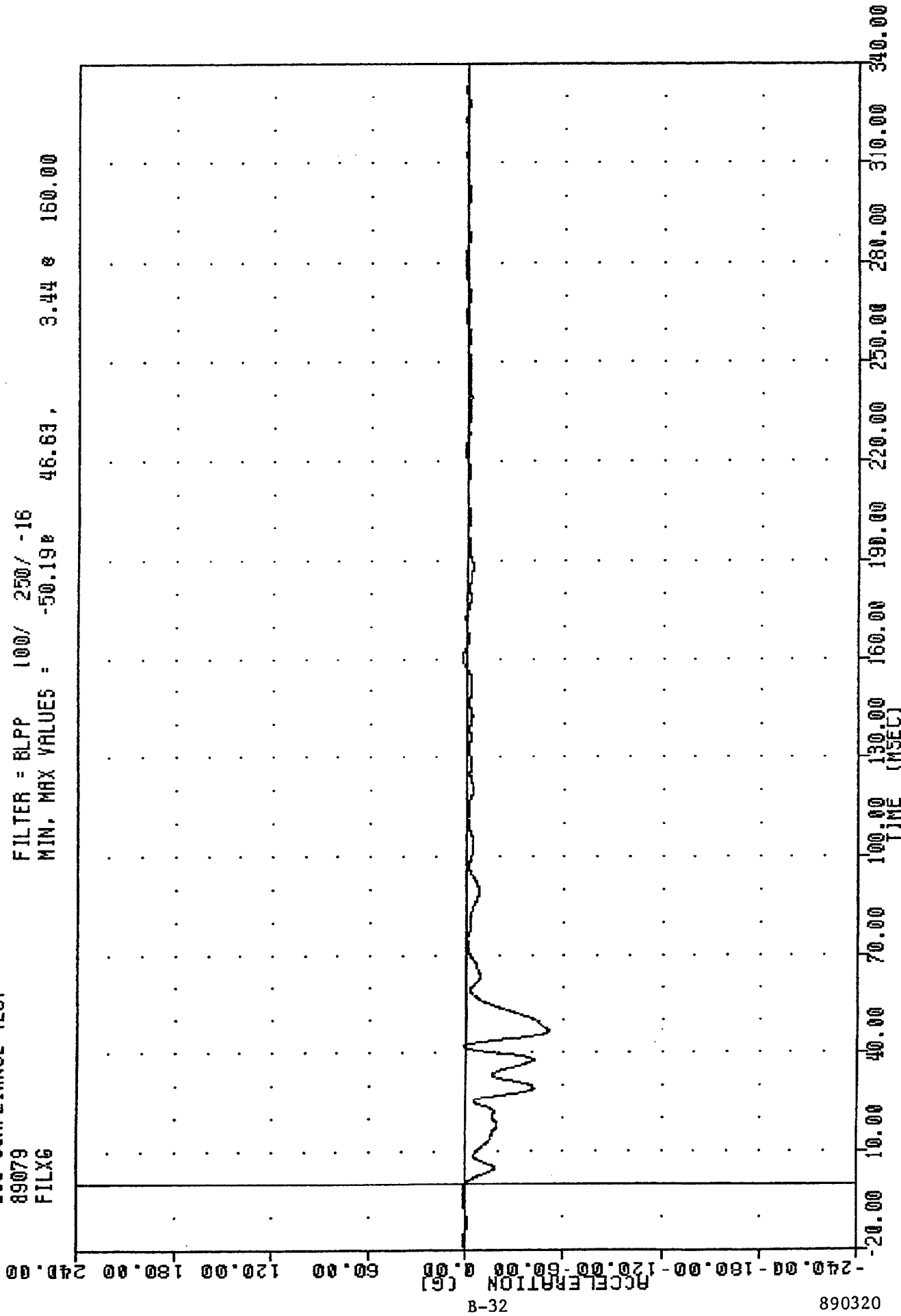
89079

FILXG

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -50.19 46.63

3.44 160.00



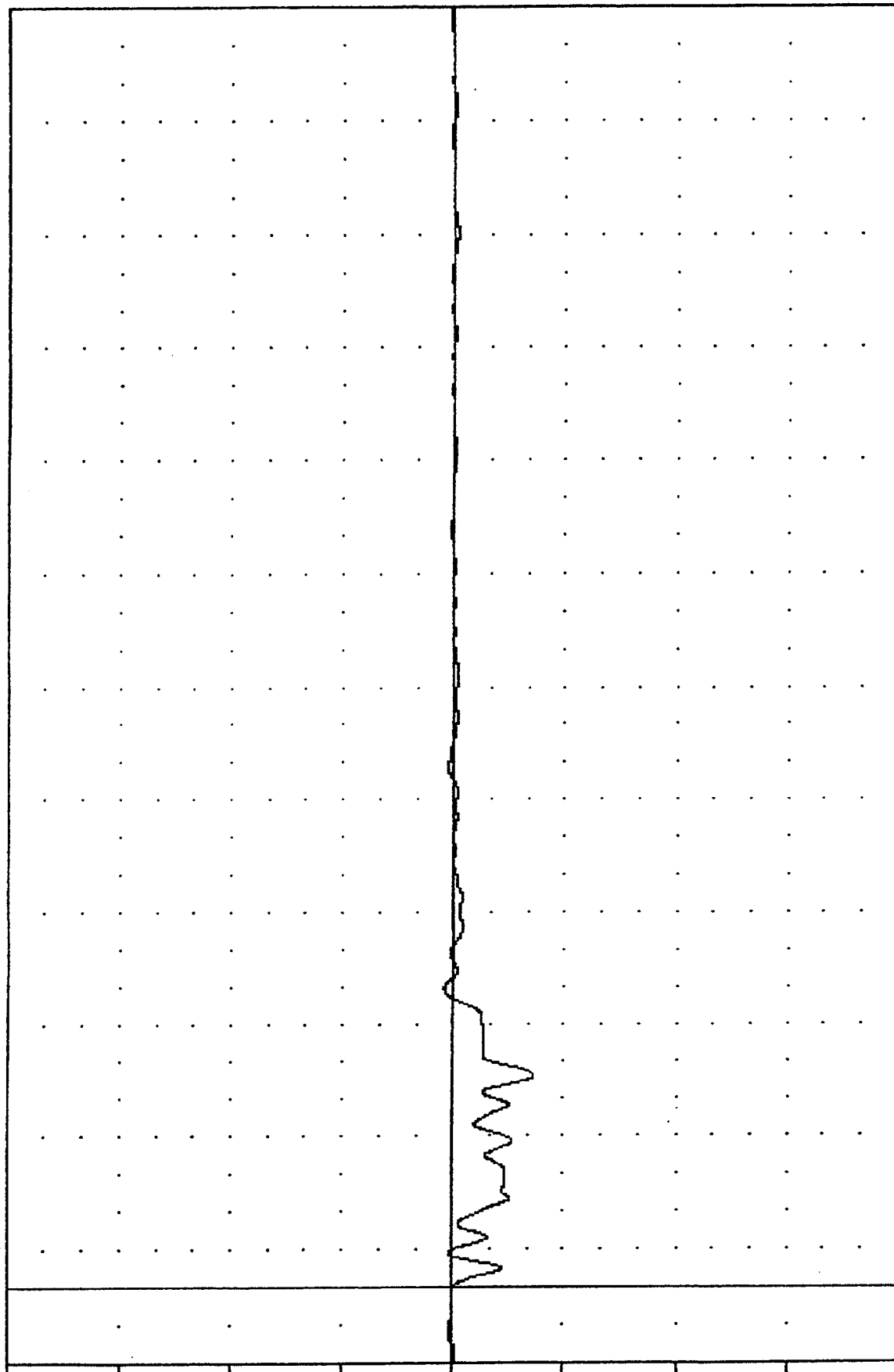
1989 SUBARU GL INTO FRONTAL BARRIER  
LEFT FENDER WELL INSIDE X AXIS ACCELERATION

TRC 89079  
 200 COMPLIANCE TEST  
 FIRXG

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -43.44 56.00

4.84 s 79.50

ACCELERATION (G)  
 240.00 180.00 120.00 60.00 0.00 -60.00 -120.00 -180.00 -240.00



20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1989 SUBARU GL INTO FRONTAL BARRIER  
 RIGHT SHOCK TOWER X AXIS ACCELERATION

B-31

890320