V2243

REPORT NO.: 208-MGA-95-008
212-MGA-95-008
301-MGA-95-008

# VEHICLE SAFETY COMPLIANCE TESTING FOR FMVSS 208, OCCUPANT CRASH PROTECTION

# FMVSS 212, WINDSHIELD MOUNTING

# FMVSS 219, WINDSHIELD INTRUSION (PARTIAL)

# FMVSS 301, FUEL SYSTEM INTEGRITY

GENERAL MOTOR COMPANY
1995 Pontiac Grand Prix SE
NHTSA NO. CS0123

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: January 20, 1995

Report Date: February 2, 1995

FINAL REPORT

Prepared For:

**U. S. DEPARTMENT OF TRANSPORTATION**
**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**
**ENFORCEMENT**
**OFFICE OF VEHICLE SAFETY COMPLIANCE**
**MAIL CODE: NEF-30**
**400 SEVENTH STREET, SW ROOM 6115**
**WASHINGTON, D.C. 20590**

Rec'd 4/16/96

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| 7. Author(s)<br>Nicole Walter | | 8. Performing Organization Report No.<br>MGA-DOT-208-08 |
| 9. Performing Organization Name and Address<br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105 | | 10. Work Unit No.<br><br>11. Contract or Grant No.<br>DTNH22-93-D-21089 |
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| 15. Supplementary Notes | | |
| 16. Abstract<br><br>Compliance tests were conducted on the subject 1995 Pontiac Grand Prix SE in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-208-09 on January 20, 1995 for the determination of FMVSS 208 compliance. Test failures identified were as follows:<br><br>None | | |
| 17. Key Words<br><br>Frontal Impact<br>30 mph Vehicle Safety Compliance Testing:<br>FMVSS 208, "Occupant Crash Protection"<br>FMVSS 212, "Windshield Mounting"<br>FMVSS 219 (partial), "Windshield Zone Intrusion"<br>FMVSS 301, "Fuel System Integrity" | | 18. Distribution Statement<br><br>Copies of this report are available from: NHTSA Technical Reference Division, Room 5108 (NAD-52),<br>400 Seventh Street, S.W.<br>Washington, D.C. 20590<br>Telephone No. (202) 366-4946<br>Attn: Robert Hornickle |
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PREPARED BY: Nicole Walter DATE: Feb. 15th, 1995
Nicole Walter
MGA Research Corporation

APPROVED BY: John Fleck DATE: 2-16-95
John Fleck
MGA Research Corporation

FINAL REPORT ACCEPTED BY:
Charles R. Cure DATE: 5/17/96
Contracting Officer's Technical Representative (COTR)
NHTSA, Office of Vehicle Safety Compliance

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## PURPOSE

This 30 mph flat 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 MGA Research Corporation (MGA) under Contract No. DTNH22-93-D-21089. The purpose of this test was to determine whether the subject vehicle, a 1995 Pontiac Grand Prix SE, NHTSA No. CS0123, 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," in the flat frontal barrier impact mode.

## TEST PROCEDURE

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-09 dated March 15, 1993. Data was obtained relative to FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with seven (7) accelerometers to measure longitudinal axis accelerations and one (1) accelerometer to measure vertical axis acceleration. The vehicle's specified impact velocity range was 28.9 to 29.9 mph. The vehicle impacted a fixed flat barrier of which face was covered with a sheet of 3/4 inch thick plywood.

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 Appendix C of the Laboratory Test Procedure.

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.

The twenty-six (26) data channels were multiplexed and recorded on three IBM PC compatible computers with Metrobyte DAS-16F A/D converter boards. The data was digitally sampled at 8170 samples per second and processed per Section 11.13 through 11.15 of the Laboratory Test Procedure.

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

The vehicle and occupant data are summarized in Section 2. The FMVSS 208, 212, 219 (partial) and 301 data are presented in Section 3. The vehicle, occupant, and camera measurements are presented in Section 4. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the manufacturer's vehicle information.

# SECTION 2

# SUMMARY OF FRONTAL BARRIER IMPACT TEST

## TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at MGA Research Corporation on January 20, 1995.

The test vehicle, a 1995 Pontiac Grand Prix, NHTSA No. CS0123, appeared to comply with the performance requirements of FMVSS 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations 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 572E dummies seated in the front outboard designated seating positions. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention on each side of the vehicle centerline was greater than 50 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with an airbag and a Type 2 seat belt in the front outboard designated seating positions. Both dummies were restrained by the airbag during the test. The vehicle's test weight was 3822 pounds. The vehicle's impact speed was 29.5 mph. The vehicle's maximum static crush was 13.1 inches.

The driver's HIC was 164. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 40 g's. The driver's chest maximum deflection was 0.9 inch. The driver's left and right femur maximum compressive forces were 1491 pounds and 1741 pounds, respectively.

The right front passenger's HIC was 148. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 38 g's. The right front passenger's chest maximum deflection was 0.5 inches. The right front passenger's left and right femur maximum compressive forces were 1323 pounds and 876 pounds, respectively.

There was no loss of windshield periphery retention and 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.

## TEST NOTES

1) Due to confusion on the definition of a seatbelt webbing tension relieving device, the belt contact force on the chest of the test dummy was not measured.

2) The manufaturer of both the driver and passenger airbag could not be found. The part number of the passenger airbag also could not be found.

3) Both driver and passenger ATD's did not pass the post-test dummy calibration requirements. Both the driver and passenger failed the Neck Flexion Test of the post-test dummy calibration procedure. Due to this failure the post-test Neck Extension Test was not performed on the driver or passenger.

## TABLE 1 CRASH TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Type: Frontal Barrier Impact

Test Date: 1/20/95 Time: 2:56 Temp: 70°F

Vehicle Test Weight: 3822 lbs. Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.5 mph Maximum Static Crush: 13.1 inches

Vehicle Rebound: 54.0 inches

| Dummies: | Driver | Passenger |
|---|---|---|
| Dummy Type | Part 572E | Part 572E |
| Serial Number | 403 | 401 |
| Restraint System | Airbag | Airbag |
| No. of Data Channels | 9 | 9 |

Number of Cameras: 1 Real Time

14 High Speed

Door Opening Data: Left Front: Yes ; Right Front: Yes

Left Rear: Yes ; Right Rear: Yes

| Front Seat(s) Data: | Driver | Passenger |
|---|---|---|
| Seat Track Failure | None | None |
| Seat Back Failure | None | None |

| Visible Dummy Contact Points: | Driver | Passenger |
|---|---|---|
| Head | Airbag | Airbag |
| Chest | Airbag | Airbag |
| Left Knee | Left side of steering column | Dash |
| Right Knee | Instrument Panel | Dash |

## TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

NHTSA No: CS0123 VIN: 1G2WJ52MXSF201686 Body Color: Teal

Engine: 6 Cylinders; ___C.I.D.; 3.1 liters; ___CC

X Gas; __Diesel; __Turbocharged

__Longitudinal X Transverse

Transmission: 4 Speed; __Manual; X Automatic; __Overdrive

Final Drive: X Front Wheel; __Rear Wheel; __Four Wheel

Major Option: X A/C; X P/S; X P/B; X P/wdo; X P/door locks;

X P/seats; X Tilt Wheel; __Anti-skid Brakes; X Cruise Control; __Other

Date Received: 1/19/95 ; Odometer Reading: 60 miles

Dealer's Name/Address: Slocum Pontiac, Inc.
3615 So. 108th
Milwaukee, WI 53228

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: General Motor Company

Date of Manufacture: 10/94 ; VIN: 1G2WJ52MXSF201686

GVWR: 4416 lbs; GAWR Front: 2466 lbs. GAWR Rear: 1950 lbs.

DATA FROM TIRE PLACARD:

Tire Pressure with maximum capacity vehicle load: Front 30 psi; Rear 30 psi

Recommended Tire Size: P205/70R15

Recommended Cold Tire Pressure: Front 30 psi; Rear 30 psi

Tires on Vehicle: P205/70R15 ; Manufacturer: BF Goodrich

Type of Spare Tire: Goodyear

Number of Occupants: 3 Front; 3 Rear; __3rd Seat; 6 TOTAL

Type of Front Seats: __Bucket; __Bench; X Split Bench

Type of Front Seat Back: __Fixed; X Adj. With; X Lever; __Rot. Knob

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 1066 lbs Right Rear = 581 lbs

Left Front = 1090 lbs Left Rear = 595 lbs

TOTAL FRONT WEIGHT = 2156 lbs (65% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1176 lbs (35% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 3332 lbs

CALCULATION FOR TARGET TEST WEIGHT:

UDW (Unloaded Delivered Weight) = 3332 lbs

VCW (Vehicle Capacity Weight) = 1058 lbs

DSC (Designated Seating Capacity) = 6

RCLW*(Rated Cargo/Luggage Weight) = VCW - 150 (DSC) = 1058 - 150 (6) = 158 lbs

Target Test Weight = UDW + RCLW + (2 Dummies x Dummy Weight)

Target Test Weight = 3332 + 158 + 344 = 3834 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO WEIGHT:

Right Front = 1153 lbs Right Rear = 752 lbs

Left Front = 1164 lbs Left Rear = 753 lbs

TOTAL FRONT WEIGHT = 2317 lbs (61% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1505 lbs (39% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3822 lbs

Weight of ballast secured in vehicle = 20 lbs

Vehicle components removed to meet target weight: Right tail light, jack, spare tire, rear seat

VEHICLE ATTITUDE (all dimensions in inches):

| | | | | |
|---|---|---|---|---|
| Delivered Attitude: | RF 29.0 | LF 28.8 | RR 29.2 | LR 29.0 |
| Fully Loaded Attitude: | RF 28.2 | LF 28.0 | RR 27.6 | LR 27.6 |
| Test Attitude: | RF 28.3 | LF 28.2 | RR 27.4 | LR 27.3 |

Wheel Base: 107.6 in; C.G. = 42.4 in rearward of front wheel centerline

* Cargo weight for multi-purpose passenger vehicles, truck, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

## TABLE 3 POST-IMPACT DATA

Type of Test: Frontal Barrier Impact  Impact Angle: Ø°

Test Date: 1/2Ø/95  Time: 2:56  Temperature: 7Ø°F

Vehicle NHTSA No.: CSØ123  VIN: 1G2WJ52MXSF2Ø1686

### BARRIER IMPACT VELOCITY

Required Impact Velocity Range: 28.9 to 29.9 mph

Impact Velocity: Primary = 29.5 mph; Secondary = 29.5 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 51.4 inches

Exiting Speed Trap: 12.Ø inches

### VEHICLE STATIC CRUSH AND REBOUND (inches):

| | | | | |
|---|---|---|---|---|
| Vehicle Length: | Pre-test | = R 186.1 | $C_L$ 193.7 | L 186.4 |
| | Post-test | = R 173.Ø | $C_L$ 181.9 | L 177.8 |
| | Crush | = R 13.1 | $C_L$ 11.8 | L 8.6 |
| | Average | = 11.2 | | |

Distance from front of test vehicle to point of impact (rebound):

R 55.8 in  $C_L$ 54.Ø in  L 5Ø.4 in

TABLE 4 ACCIDENT INVESTIGATION DIVISION DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Veh. NHTSA No.: CS0123 ; VIN: 1G2WJ52MXSF201686

Build Date: 10/94 ; Test Date: 1/20/95

Veh. Size Category: Compact; Test Weight: 3822 lbs

Veh. Wheelbase: 107.6 in ; Front Overhang: 45.0 in ;

Overall Width: 71.7 in

ACCELEROMETER DATA:

Location: As per measurements on pages 2-10

Calibration Procedure: As per MGA Calibration Procedure

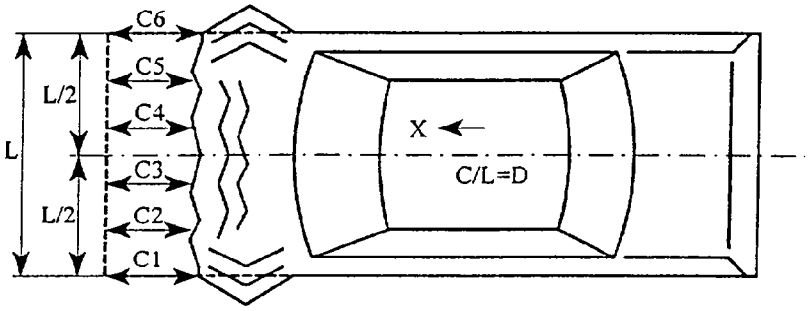
Linearity: >99.9% ; Integration Algorithm: Trapezoidal

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

Impact Mode: Frontal Barrier

Crush Depth Dimensions:

C1 = 8.6 inches
C2 = 9.5 inches
C3 = 11.1 inches
C4 = 9.3 inches
C5 = 12.5 inches
C6 = 13.1 inches




Midpoint of Damage: D = Vehicle Longitudinal Centerline

Length of Damaged Region:

L = 59.8 inches (Pre-Test)

L = 59.5 inches (Post-Test)

## TABLE 5 POST TEST AIRBAG DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

NHTSA No: CS0123 ; Test Date: 1/20/95 ; Technician: Nicole Walter

A. No of Vent Holes: Driver 2 ; Passenger 2

B. Size of Vent Holes: Driver 1.1 in. dia.; Passenger 1.9 in. dia.

C. Total Vent Area: Driver 2.0 $in^2$ ; Passenger 5.4 $in^2$

D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter

Driver; Length ___; Width ___; Diameter 25.4 in.

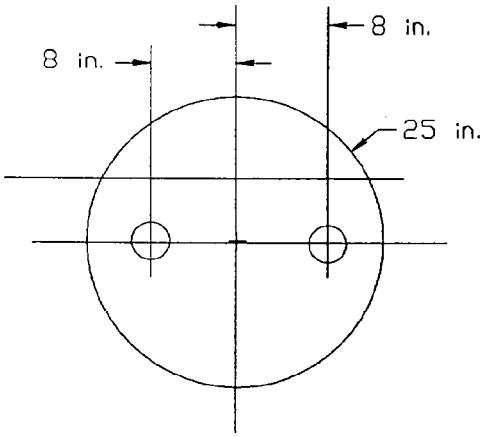
Passenger; Length 31.5 ; Width 28.0 ; Diameter ____

E. Is the Airbag Tethered?

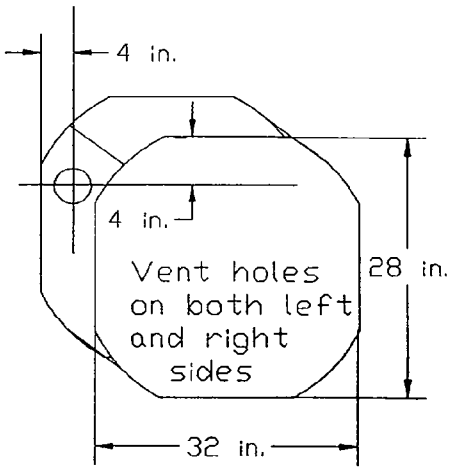
Driver; __ Yes; X No; If yes, record length of tether ___in

Passenger; X Yes; __ No; If yes, record length of tether 7.9in

Driver Airbag




Passenger Airbag




F. Part Numbers and Manufacture Name of Airbag and Gas Generator

Driver; Mfr *; Airbag TTM000197998/P16756616; Gen AB652015O0VC61

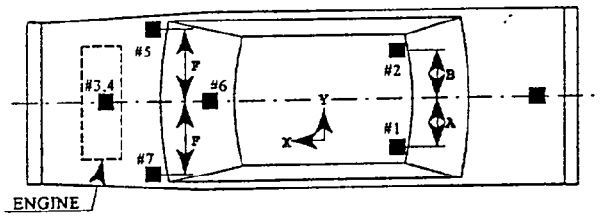
Passenger; Mfr *; Airbag *_____; Gen AL7205IA269C2027

* Not Available

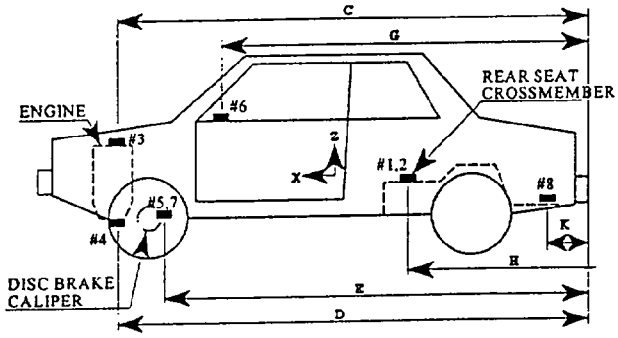
## TABLE 6 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 ; Test Date: 1/20/95




TOP VIEW




LEFT SIDE VIEW

| ACCELEROMETER LOCATION (inches) | | |
|---|---|---|
| | PRE-TEST | POST-TEST |
| A | 26.2 | 25.8 |
| B | 26.2 | 25.8 |
| C | 158.5 | 151.4 |
| D | 154.4 | 153.2 |
| E | 156.5 | 152.9 |
| F | 28.0 | 26.0 |
| G | 130.5 | 129.7 |
| H | 74.2 | 74.7 |
| K | 8.0 | 7.2 |

| ACCELEROMETER DATA SUMMARY (Filtered at 100 hertz cutoff) | | | | | |
|---|---|---|---|---|---|
| No. | DESCRIPTION | MAXIMUM (g's) | TIME (msec) | MINIMUM (g's) | TIME (msec) |
| 1 | Left Rear Seat Crossmember | 1.1 | 138 | -26.0 | 26 |
| 2 | Right Rear Seat Crossmember | 0.9 | 136 | -24.0 | 82 |
| 3 | Top of Engine Block | 34.0 | 65 | -49.8 | 36 |
| 4 | Bottom of Engine | 16.9 | 66 | -50.6 | 46 |
| 5 | Right Disc Brake Caliper | 13.1 | 92 | -64.2 | 64 |
| 6 | Instrument Panel | 20.9 | 60 | -72.5 | 75 |
| 7 | Left Disc Brake Caliper | 12.5 | 86 | 58.4 | 69 |
| 8 | Trunk | 22.5 | 53 | 16.8 | 78 |

TABLE 7 REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

Contract Number: DTNH22-93-D-21089

From: MGA Research Corporation
5000 Warren Road
Burlington, WI 53105

To: Mr. Charles Case
COTR
Office of Vehicle Safety Compliance

The following vehicle has been subjected to testing for FMVSS 208. The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrail Property Manager/NAD-30, with a carbon copy of the responsible testing office. The vehicle is again inspected and all changes are noted below. The final condition of the vehicle is also noted in detail.

---

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE
Vehicle NHTSA No.: CS0123 Body Color: Bright Aqua
VIN: 1G2WJ52MXSF201686 Cost: $16,800.00
Odometer: Arrival Date: 1/19/95 Reading: * miles
Completion Date: 1/20/95 Reading: 60 miles
Engine: 6 Cylinders; 3.1 Liters; X Gas; __ Diesel
Transmission: 4 Speed; ___ Manual; X Automatic
Final Drive: X Front Wheel; __ Rear Wheel; __ Four Wheel
Tire Size: P205/70R15 ; Manufacturer: BF Goodrich

| | | | | | |
|---|---|---|---|---|---|
| Air Conditioner | Yes | Console | Yes | Brakes | Power |
| Tinted Glass | No | Tachometer | Yes | Front | Disc |
| Power Steering | Yes | Cruise Control | Yes | Rear | Disc |
| Power Windows | Yes | Rear Window Def. | Yes | Front Seats | Manual |
| Power Door Locks | No | Sun/Moon Roof | No | Seat Type | Front Split Bench |
| Radio:AM/FM Tape | Yes | T-Top | No | | Rear Bench |
| Clock | Yes | Tilt Steering Wheel | Yes | | |
| Roof Rack | No | Other Options: | Yes | No. of Seats | 6 |

50-state emissions

Equipment that is no longer on the vehicle as noted above:
Rear Seat

Explanation:
Items removed to allow installation of data acquisition system.

Vehicle Condition:
The vehicle was subjected to a 30 mph frontal crash test. There is severe structural damage on the front body. Various interior and exterior portions of the vehicle have been painted and have had holes drilled to facilitate attachment of instrumentation. Various body parts have been removed. Stoddard solvent replaced the fuel in the fuel system and engine. THE VEHICLE IS FOR SALVAGE ONLY AND IS NOT TO BE REPAIRED FOR HIGHWAY USE.

* Not Available

# SECTION 3
# SUMMARY OF RESULTS FOR FMVSS 208 212, 219 (PARTIAL), AND 301

## TABLE 8 FMVSS 208 OCCUPANT INJURY CRITERIA

Veh. Yr./Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Veh. NHTSA No.: CS0123 Test Date: 1/20/95

| MAXIMUM ACCELERATION VALUES: (g's) | DRIVER DUMMY #403 | PASSENGER DUMMY #401 |
|---|---|---|
| Head Channel X | -31.6 | -36.3 |
| Head Channel Y | 6.9 | -7.4 |
| Head Channel Z | -12.9 | 13.5 |
| HEAD RESULTANT | 34.8 | 36.4 |
| Chest Channel X | -39.2 | -40.2 |
| Chest Channel Y | -6.5 | -5.7 |
| Chest Channel Z | 9.9 | 13.1 |
| CHEST RESULTANT | 40.8 | 40.3 |

HEAD INJURY CRITERIA (HIC) VALUES:

| | | |
|---|---|---|
| HIC | 163.8 | 148.1 |
| $t_1$ = (msec) | 67.0 | 63.7 |
| $t_2$ = (msec) | 103.0 | 99.7 |

[The maximum time interval from $t_1$ to $t_2$ is 36 milliseconds.]

CHEST INJURY CRITERIA (CLIP) VALUES: (g's)

| | | |
|---|---|---|
| CLIP | 39.8 | 37.9 |
| $t^1$ = (msec) | 94.0 | 70.5 |
| $t^2$ = (msec) | 97.0 | 73.4 |
| CHEST DEFLECTION (in) | -0.9 | -0.5 |

MAX. COMPRESSIVE FEMUR FORCES: (lbs)

| | | |
|---|---|---|
| Left Side | -1490.9 | -1322.7 |
| Right Side | -1740.6 | -876.4 |

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting the left knee into the left side of steering column and instrument panel. The right knee impacted only the instrument panel. The dummy's head and chest impacted the airbag with the dummy's head rotating rearward. The driver dummy was restrained by the airbag. The dummy rebounded rearward into the seat back. The driver dummy came to rest in the seat.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the dash. The dummy's head and chest impacted the airbag with the dummy's head rotating rearward. The right front passenger dummy was restrained by the airbag. The dummy rebounded rearward into the seat back. The right front passenger dummy came to rest in the seat.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS

Vehicle Year/Make/Model/Body Style: 1995/Pontiac Grand Prix SE
NHTSA No.: CS0123 ; Date of Comfort/Convenience Check: 1/20/95
Technician Performing Check: Nicole Walter
GVWR: 4416 lbs

Automatic seat belts installed in any vehicle, other than a walk-in van-type vehicle which has a gross vehicle weight rating of 10,000 pounds or less, and is manufactured on or after September 1, 1986, shall meet the requirements for convenience hooks, webbing tension relieving devices, and belt contact force.

Manual seat belts installed for compliance with this standard in front outboard designated seating positions of any vehicle, other than a walk-in van-type vehicle which has a gross vehicle rating of 10,000 pounds or less, and is manufactured on or after September 1, 1989, shall meet the requirements for belt contact force, plate access, retraction and seat belt guides, and hardware.

VEHICLE EQUIPMENT:

The vehicle's front outboard seating positions were equipped with manual Type 2 seat belts which must comply with the dynamic test requirements of S5.1; requirements for webbing tension-relieving devices (S7.4.2), belt contact force (S7.4.3), latchplate access (S7.4.4), retraction (S7.4.5), and seat belt guides and hardware (S7.4.6) apply.

CONVENIENCE HOOKS (S7.4.1):

Not applicable, the vehicle was not equipped with automatic seat belts.

WEBBING TENSION-RELIEVING DEVICE (S7.4.2)

The seat belt assembly in the front outboard seating positions did not have webbing tension-relieving devices.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS, (Cont'd)

BELT CONTACT FORCE (S7.4.3)

The belt contact force on the chest of the test dummy is not available.

LATCHPLATE ACCESS (S7.4.4)

The seat belt latchplates, in their normal stowed position, were within the reach envelope.

The clearance test block moved unhindered to the latchplate or buckle.

RETRACTION (S7.4.5):

The seat belt automatically retracted when the seat belt latchplate was released.

The stowed seat belt webbing and hardware were not pinched when the door was closed.

SEAT BELT GUIDES AND HARDWARE (S7.4.6)

The seat cushion was movable, but the seat back did not serve a function other than seating.

The seat was not removable.

The seat was not movable so that the space formerly occupied by the seat could be used for a secondary function.

Note: If the seat or seat cushion is removable or if the seat is movable so that the space formerly occupied by the seat can be used for a secondary function, the seat belt guides and hardware requirements do not apply.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS, (Cont'd)

SEAT BELT GUIDES AND HARDWARE (S7.4.6)(Cont'd)

The buckle was designed to pass through the seat cushion or between the cushion and seat back.

The remaining two parts (the seat belt latchplate and the webbing) were accessible under normal conditions.

The latchplate and buckle did not pass through the guides and fall behind the seat when the belt was completely retracted (or detached if not retractable) and the seat was moved to any position.

## TABLE 11 FMVSS 208 EQUIPMENT DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Date of Check: 1/20/95

Technician Performing Check: Nicole Walter

GVWR: 4416 lbs

### FMVSS 208 SEAT BELT WARNING SYSTEM DATA

With an occupant in the driver's position and the lap belt/unibelt in stowed position and the ignition switch placed in the "start/on" position, the duration of audible warning signal was 5.0 seconds and the reminder light stayed on for 7 seconds.

With an occupant in the driver's position and the lap belt/unibelt in use and the ignition switch placed in the "start/on" position, the duration of the audible warning signal was 0 seconds. The duration of the reminder light operation was 8 seconds.

Note: The audible warning should not operate.

The wording of the visual seat belt warning was the symbol from Table 2 of FMVSS 101.

### FMVSS 208 LABELING AND DRIVER'S MANUAL DATA

The labels which describe manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system were located on the driver and passenger sunvisors.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 1-28.

A description of the functional operation of the system was provided in the owner's manual on page 1-25 through 1-28.

A reference to the instructions and description of the system was included on the label.

TABLE 11 FMVSS 208 EQUIPMENT DATA, (Cont'd)

FMVSS 208 LABELING AND DRIVER'S MANUAL DATA (Cont'd)

An owner's manual was provided.

The owner's manual contained appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems on pages 1-25 through 1-28.

FMVSS 208 READINESS INDICATOR DATA

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was located in the center of the instrument panel between the tachometer and speedometer.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator, was provided in the owner's manual on page 1-24.

TABLE 12 FMVSS 212, "WINDSHIELD MOUNTING", DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

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

Rubber molding with glue retention

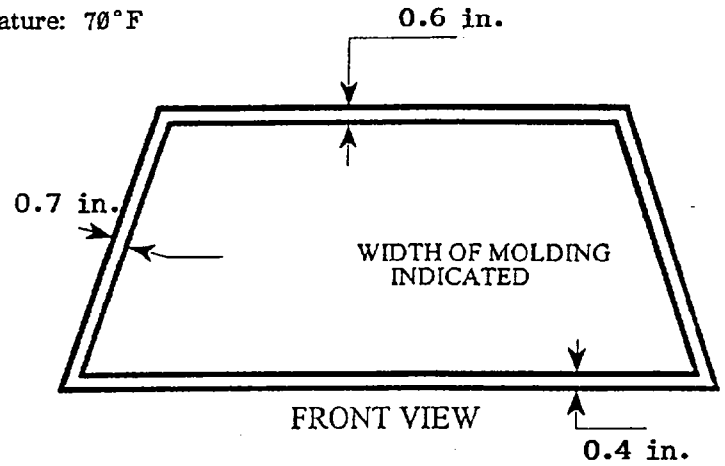
CLIPS OR BRACKETS USED TO RETAIN WINDSHIELD: None

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 (inches) | | |
|---|---|---|---|
| | PRE-TEST | POST-TEST | PERCENT RETENTION |
| RIGHT SIDE | 87.3 | 87.3 | 100% |
| LEFT SIDE | 87.3 | 87.3 | 100% |
| TOTAL | 174.6 | 174.6 | 100% |

Pre-Test Windshield Mounting Material Temperature: 70°F




FAILURE DETAILS: None

TABLE 13 FMVSS 219, "WINDSHIELD ZONE INTRUSION", DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CSØ123 Test Date: 1/2Ø/95

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 contacted by the sphere across the width of the instrument panel. From the outermost contact 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" distant 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= 49.2 in

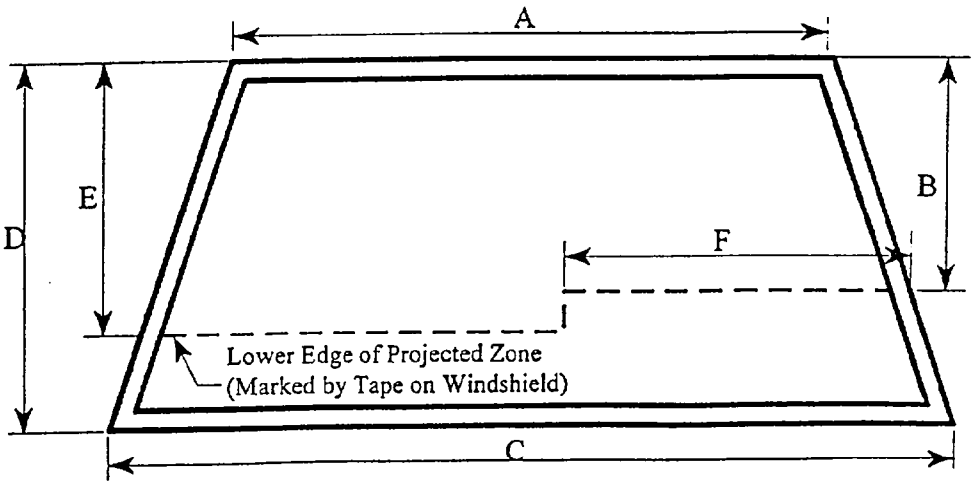
B= 16.9 in

C= 69.3 in

D= 28.Ø in

E= 21.3 in

F= 34.6 in




FRONT VIEW

AREAS OF WINDSHIELD TEMPLATE PENETRATION GREATER THAN 1/4 IN:

None

AREAS OF WINDSHIELD PENETRATION, BELOW THE PROTECTED ZONE, THROUGH THE INNER SURFACE OF THE WINDSHIELD:

None

## TABLE 14 FUEL SYSTEM DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

Fuel System Capacity from Owner's Manual = 16.4 gallons

Usable Capacity Figure Furnished by COTR = 15.6 gallons

Test Volume Range (92 to 94% of Usable Capacity)

= 15.0 to 15.4 gallons

Actual Test Volume = 15.3 gallons

Test Fluid Type: Stoddard Solvent ; Spec. Grav. = 0.77

Kinematic Viscosity = 1.788 centistokes; Color = Purple

Type of Fuel Pump: X Electric; ___ Mechanical

Does electric pump operate with ignition switch "On" and engine "Off"?

__ Yes; X No

Details of Fuel System:

The fuel tank system was an electronic fuel injected system

TABLE 15 FMVSS 301 POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

TEST REQUIREMENTS:

Test vehicle's 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 572E test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

_X_ Frontal (30 mph)

____ Oblique (30 mph) with __° barrier face first contacting (driver/passenger) side

____ Rear Moving Barrier (30 mph)

____ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

| POST IMPACT TEST | TEST RESULTS | MAXIMUM ALLOWABLE |
|---|---|---|
| 1. From impact until vehicle motion ceases | 0 oz | 1 oz |
| 2. For 5 minute period after vehicle motion ceases | 0 oz | 5 oz |
| 3. For next 25 minutes | 0 oz | 1 oz./1 min |

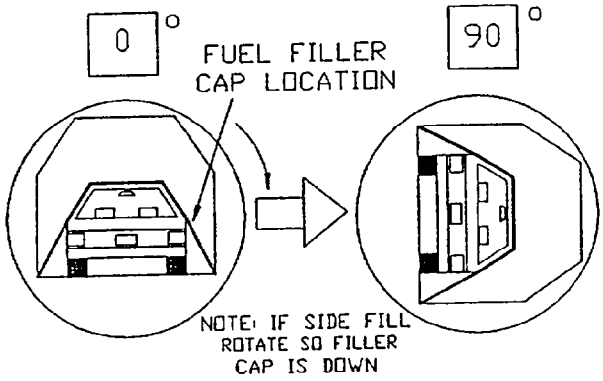
FUEL SPILLAGE LOCATION(S): None

## TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

TEST PHASE: 0° - 90°




DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 55 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 55 seconds

Next Whole Minute Interval = 8 minutes

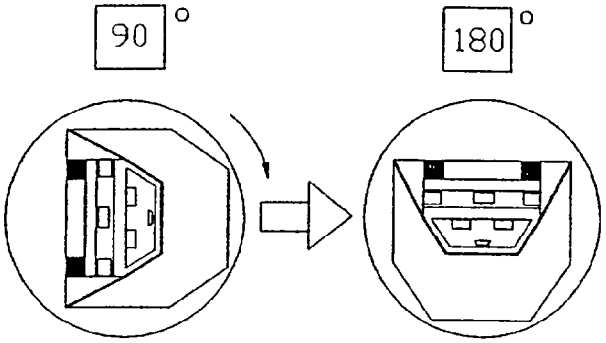
FUEL SPILLAGE MEASUREMENT:

| 0° TO 90° ROTATION (FILLER CAP DOWN) | TEST RESULTS | MAXIMUM ALLOWABLE |
|---|---|---|
| 1. First 5 Minutes From Onset of Rotation | 0 oz | 5 oz |
| 2. Sixth Minute From Onset of Rotation | 0 oz | 1 oz |
| 3. Seventh Minute From Onset of Rotation | 0 oz | 1 oz |
| 4. Eighth Minute if Required | N/A | 1 oz |

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

TEST PHASE: 90° - 180°




DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 29 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 29 seconds

Next Whole Minute Interval = 8 minutes

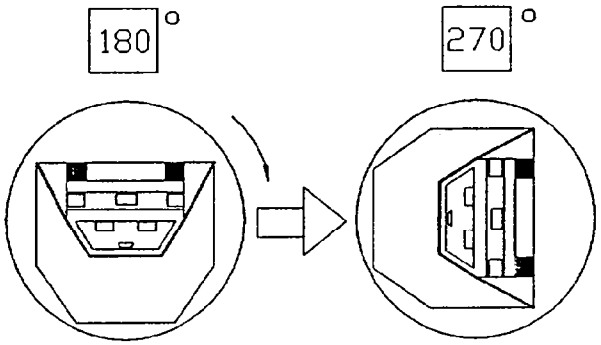
FUEL SPILLAGE MEASUREMENT:

| 90° TO 180° ROTATION | TEST RESULTS | MAXIMUM ALLOWABLE |
|---|---|---|
| 1. First 5 Minutes From Onset of Rotation | 0 oz | 5 oz |
| 2. Sixth Minute From Onset of Rotation | 0 oz | 1 oz |
| 3. Seventh Minute From Onset of Rotation | 0 oz | 1 oz |
| 4. Eighth Minute if Required | N/A | 1 oz |

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

TEST PHASE: 180° - 270°




DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 16 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 16 seconds

Next Whole Minute Interval = 8 minutes

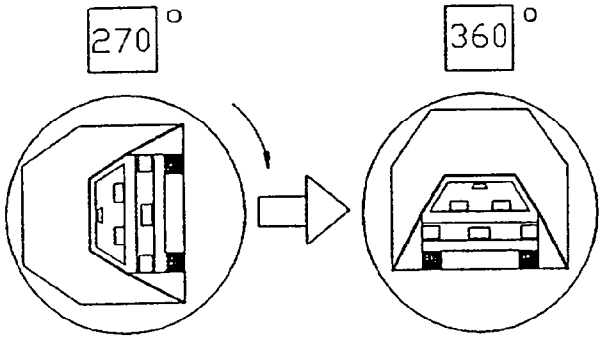
FUEL SPILLAGE MEASUREMENT:

| 180° TO 270° ROTATION | TEST RESULTS | MAXIMUM ALLOWABLE |
|---|---|---|
| 1. First 5 Minutes From Onset of Rotation | 0 oz | 5 oz |
| 2. Sixth Minute From Onset of Rotation | 0 oz | 1 oz |
| 3. Seventh Minute From Onset of Rotation | 0 oz | 1 oz |
| 4. Eighth Minute if Required | N/A | 1 oz |

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

TEST PHASE: 270° - 360°




DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 24 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 24 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

| 270°TO 360°ROTATION | TEST RESULTS | MAXIMUM ALLOWABLE |
|---|---|---|
| 1. First 5 Minutes From Onset of Rotation | 0 oz | 5 oz |
| 2. Sixth Minute From Onset of Rotation | 0 oz | 1 oz |
| 3. Seventh Minute From Onset of Rotation | 0 oz | 1 oz |
| 4. Eighth Minute if Required | N/A | 1 oz |

FUEL SPILLAGE LOCATIONS(S): None

# SECTION 4

# OCCUPANT, VEHICLE, AND CAMERA INFORMATION

TABLE 17 SEAT AND STEERING COLUMN POSITIONING DATA

Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

NOMINAL DESIGN RIDING POSITION:

Driver Seat: Seat Back Angle = 26°

The seat back angle was adjustable and was positioned in accordance with the manufacturer's information. The seat back angle was measured on the seat back frame with the inclinometer.

Passenger Seat: Same as driver's seat.

SEAT FORE AND AFT POSITIONS:

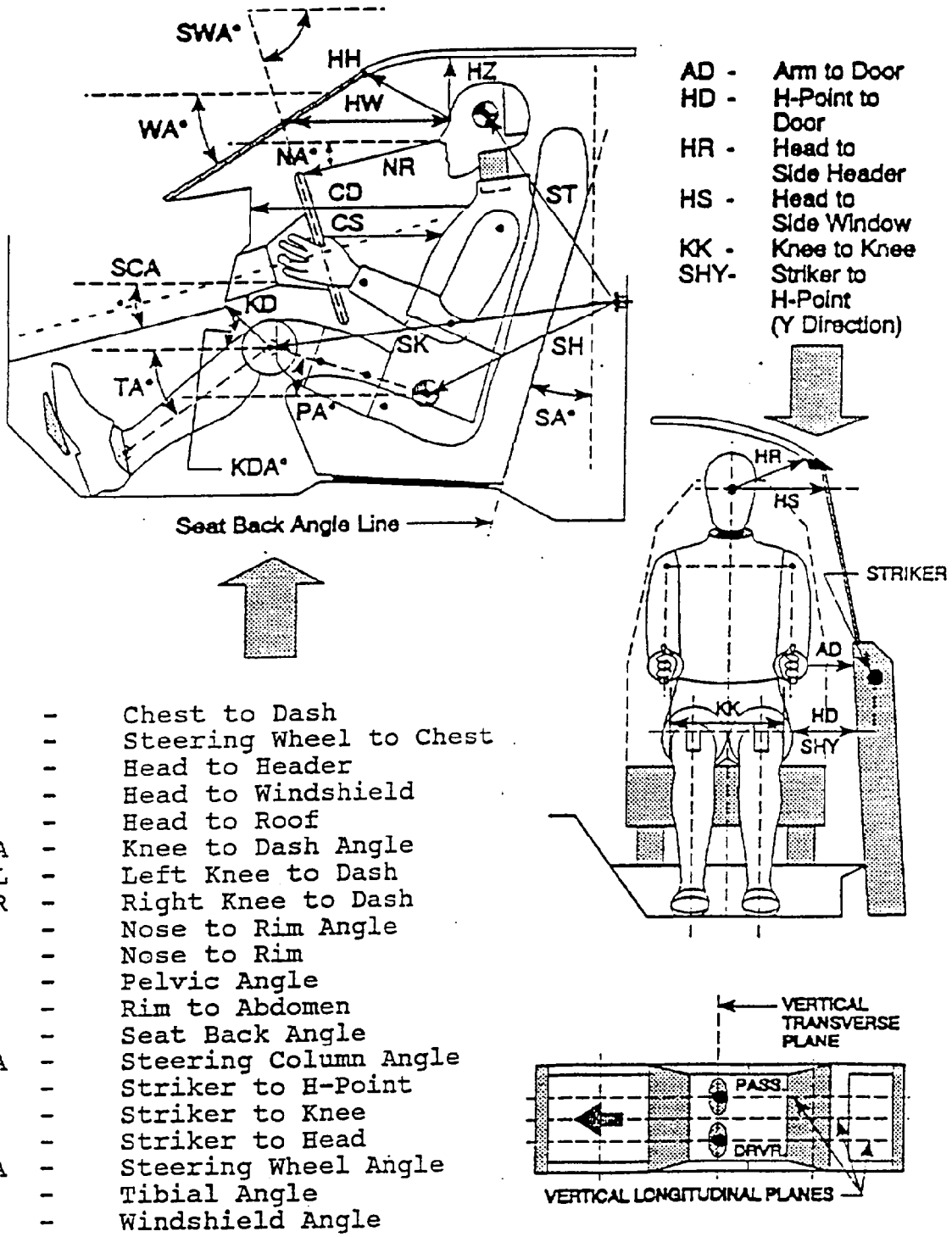
Driver Seat: The seat track had 23 detents and was positioned at the 12th notch rearward from the foremost position which was counted as the first notch.

Passenger Seat: Same as driver's seat.

STEERING COLUMN ADJUSTMENTS:

The steering column was positioned at the mid point of its swing. The angle of the steering column was 21.6°.

FIGURE 1 DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS




| | | |
|---|---|---|
| CD | - | Chest to Dash |
| CS | - | Steering Wheel to Chest |
| HH | - | Head to Header |
| HW | - | Head to Windshield |
| HZ | - | Head to Roof |
| KDA | - | Knee to Dash Angle |
| KDL | - | Left Knee to Dash |
| KDR | - | Right Knee to Dash |
| NA | - | Nose to Rim Angle |
| NR | - | Nose to Rim |
| PA | - | Pelvic Angle |
| RA | - | Rim to Abdomen |
| SA | - | Seat Back Angle |
| SCA | - | Steering Column Angle |
| SH | - | Striker to H-Point |
| SK | - | Striker to Knee |
| ST | - | Striker to Head |
| SWA | - | Steering Wheel Angle |
| TA | - | Tibial Angle |
| WA | - | Windshield Angle |

TABLE 18 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

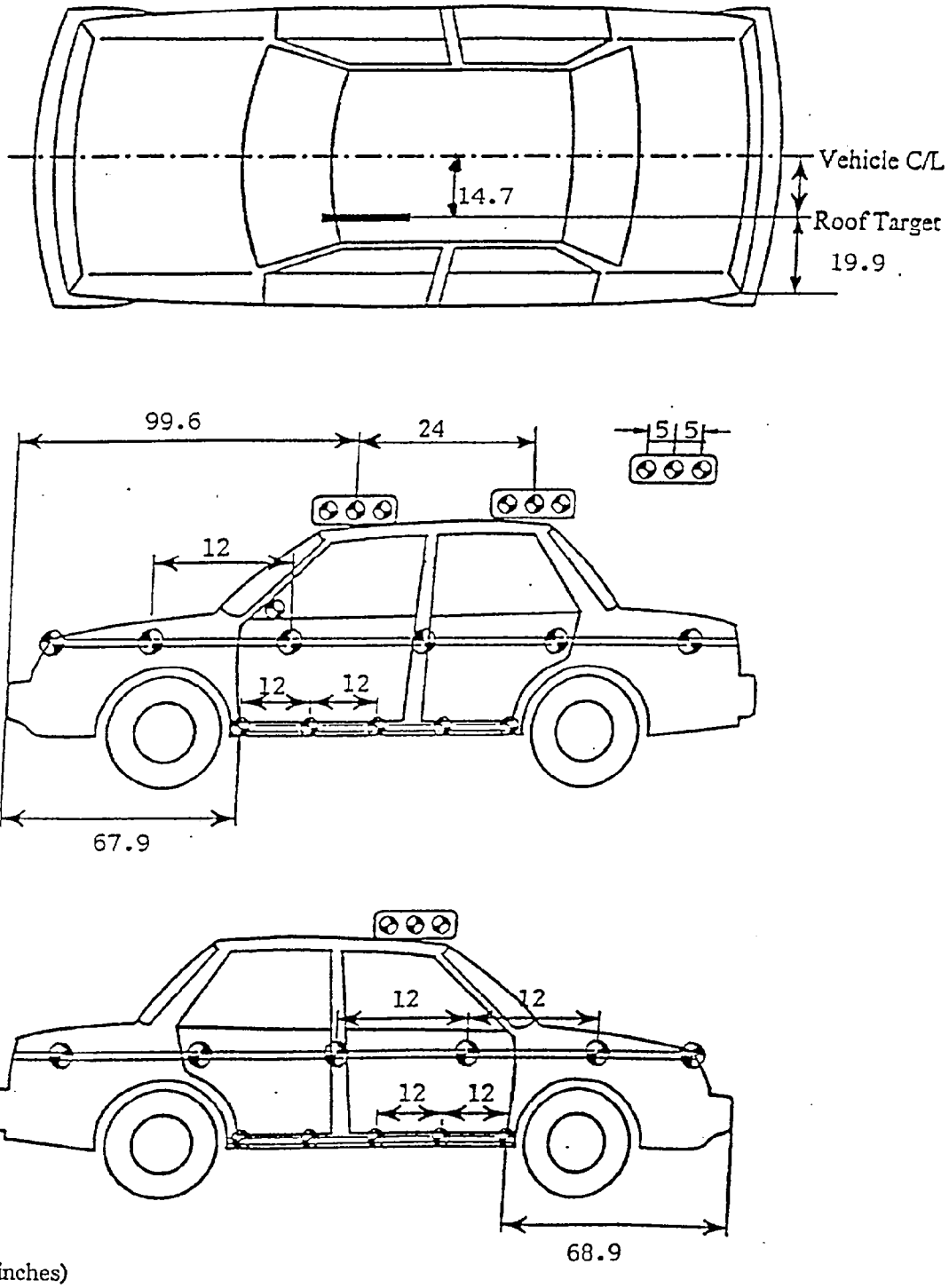
Vehicle Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 Test Date: 1/20/95

| | DRIVER (Serial #403) | PASSENGER (Serial #401) |
|---|---|---|
| WA° | 28.1° | |
| SWA° | 21.6° | N/A |
| SCA° | 21.9° | N/A |
| SA° | 26.4° | 26.4° |
| HZ | 6.9 in | 6.0 in |
| HH | 12.4 in | 11.7 in |
| HW | 22.4 in | 22.0 in |
| HR | 10.8 in | 11.4 in |
| NR | 13.9 angle (NA) 13.5° | N/A |
| CD | 5.9 in | 18.8 in |
| CS | 10.4 in | N/A |
| RA | 6.0 in | N/A |
| KDL | 5.9 in Angle (KDA) 47.4° | 6.3 in |
| KDR | 6.0 in | 5.7 in Angle (KDA) 71° |
| PA° | 24.3 ° | 24.2° |
| TA° | 1.6° | 1.3° |
| KK | 11.0 in | 10.1 in |
| ST | 23.1 in Angle 4.5° | 23.7 in Angle 8.0° |
| SK | 23.3 in Angle 85.9° | 23.4 in Angle 84.4° |
| SH | 8.3 in Angle 101.4° | 8.0 in Angle 103.6° |
| SHY | 10.2 in | 9.9 in |
| HS | 13.9 in | 14.4 in |
| HD | 5.3 in | 5.1 in |
| AD | 4.8 in | 5.3 in |

NR = Not Recorded
N/A = Not Applicable

FIGURE 2 VEHICLE TARGET LOCATIONS




(Dimensions in inches)

FIGURE 3 CAMERA POSITIONS

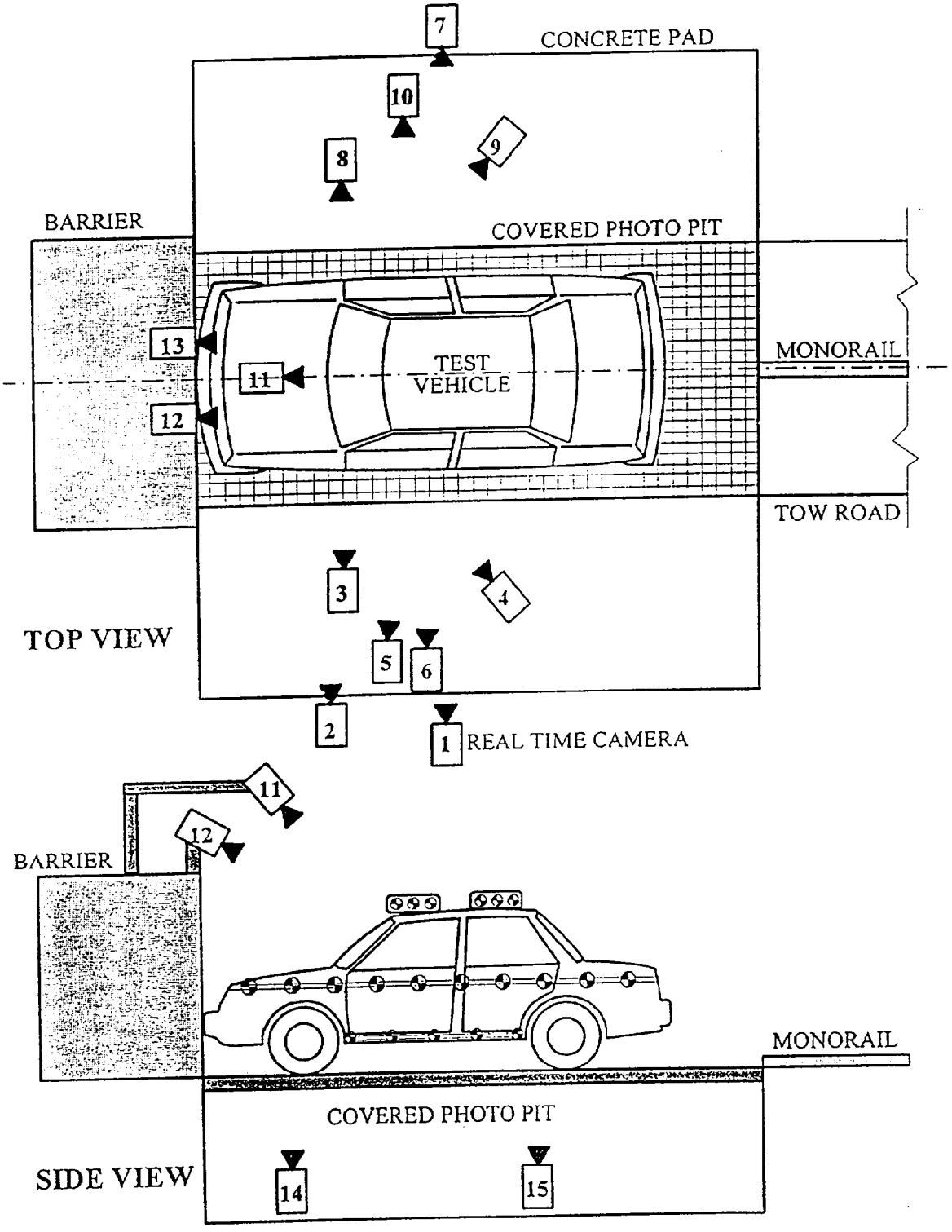


TABLE 19 CAMERA LOCATIONS

Veh. Year/Make/Model/Body Style: 1995/Pontiac/Grand Prix SE

Vehicle NHTSA No.: CS0123 ; Test Date: 1/20/95

| | VIEW | CAMERA POSITIONS (inches)* | | | ANGLE (deg) | FILM PLANE TO HEAD TARGET | LENS (mm) | SPEED (fps) |
|---|---|---|---|---|---|---|---|---|
| | | X | Y | Z | | | | |
| 1 | Real-Time Left Side View | | | | 90° | | 10 | 24 |
| 2 | Left Front | 950 | 8340 | 1240 | 90° | 7890 | 25 | 962 |
| 3 | Driver Close-Up | 1370 | 7890 | 1280 | 90° | 7440 | 50 | 870 |
| 4 | Driver Angle | 4040 | 4500 | 2110 | 50° | | 35 | 1105 |
| 5 | Steering Column Bottom | 2180 | 2600 | 1030 | 90° | 2150 | 25 | 1000 |
| 6 | Steering Column Top | 2200 | 2620 | 1570 | 90° | 2170 | 25 | 1005 |
| 7 | Right Overall View | 1730 | 7750 | 1070 | 90° | 9450 | 13 | 1058 |
| 8 | Right Close-Up | 1240 | 8060 | 1070 | 90° | 8510 | 50 | 1064 |
| 9 | Right Angle | 3700 | 4580 | 2240 | 50° | | 35 | 1198 |
| 10 | Right Passenger | 1730 | 7120 | 1060 | 90° | 7570 | 25 | 1010 |
| 11 | Top Overall | 450 | 0 | 4350 | | | 13 | 1099 |
| 12 | Top Driver | 290 | 350 | 2350 | | | 13 | 1070 |
| 13 | Top Passenger | 280 | 350 | 2420 | | | 13 | 1064 |
| 14 | Pit View Front | 1550 | 0 | 3155 | | | 13 | 1015 |
| 15 | Pit View Rear | 2660 | 0 | 3155 | | | 13 | 1005 |

* +X = Film plane rearward of barrier

+Y = Film plane to left of monorail centerline

+Z = Film plane to above ground level

# APPENDIX A
# PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Continued)


Photo No. A-1 - Pre-Test Front View

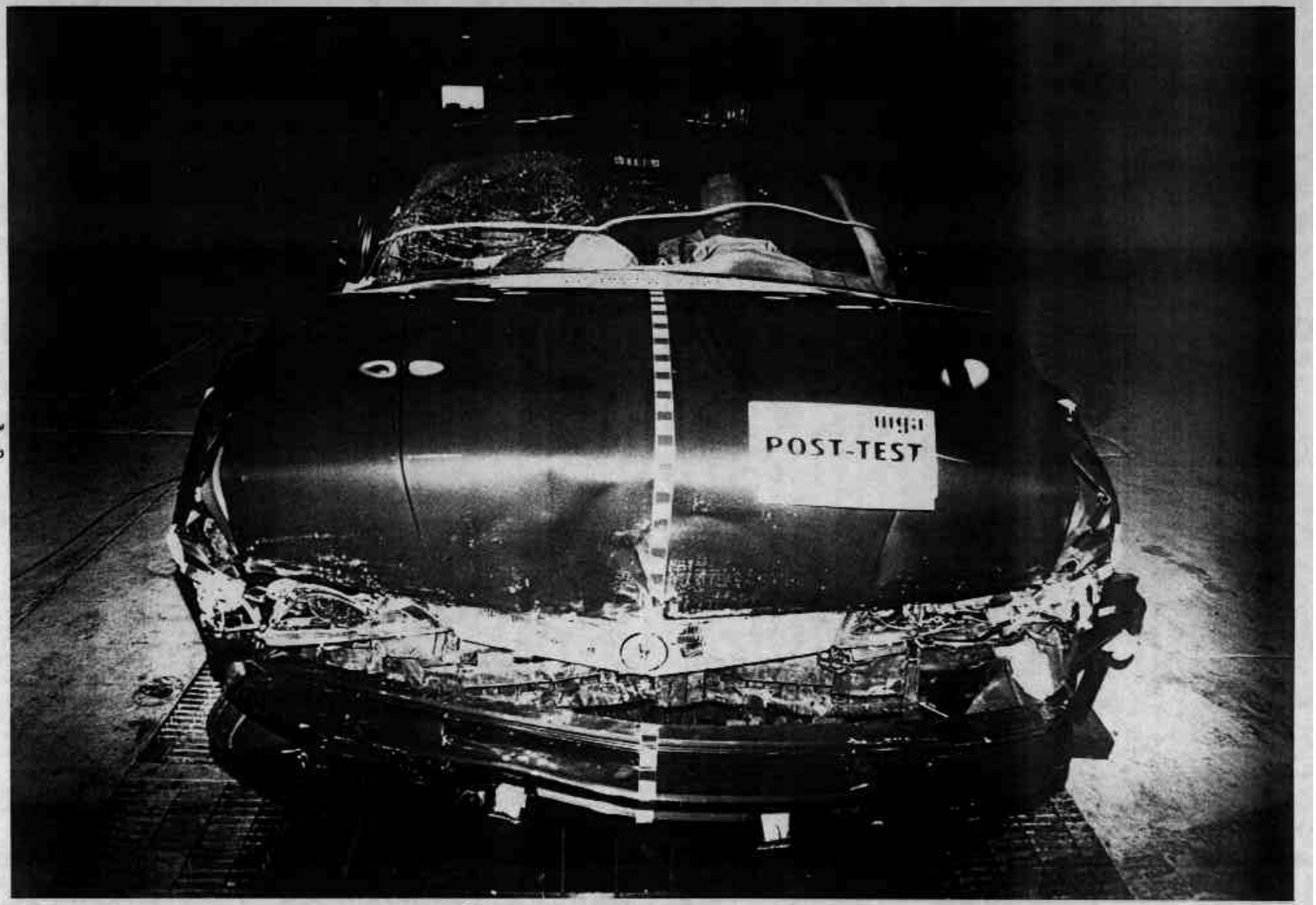



Photo No. A-2 - Post-Test Front View

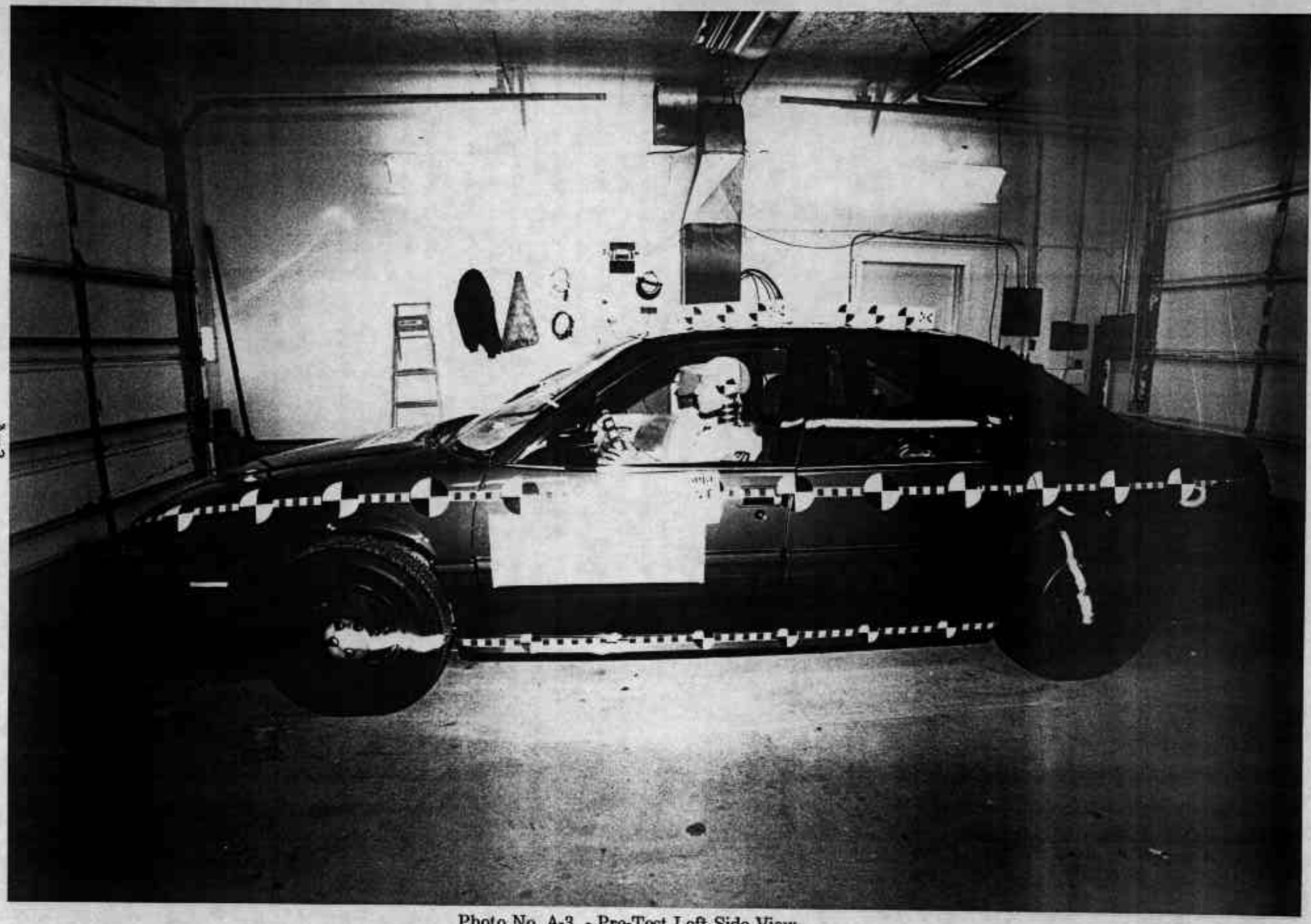


Photo No. A-3 - Pre-Test Left Side View

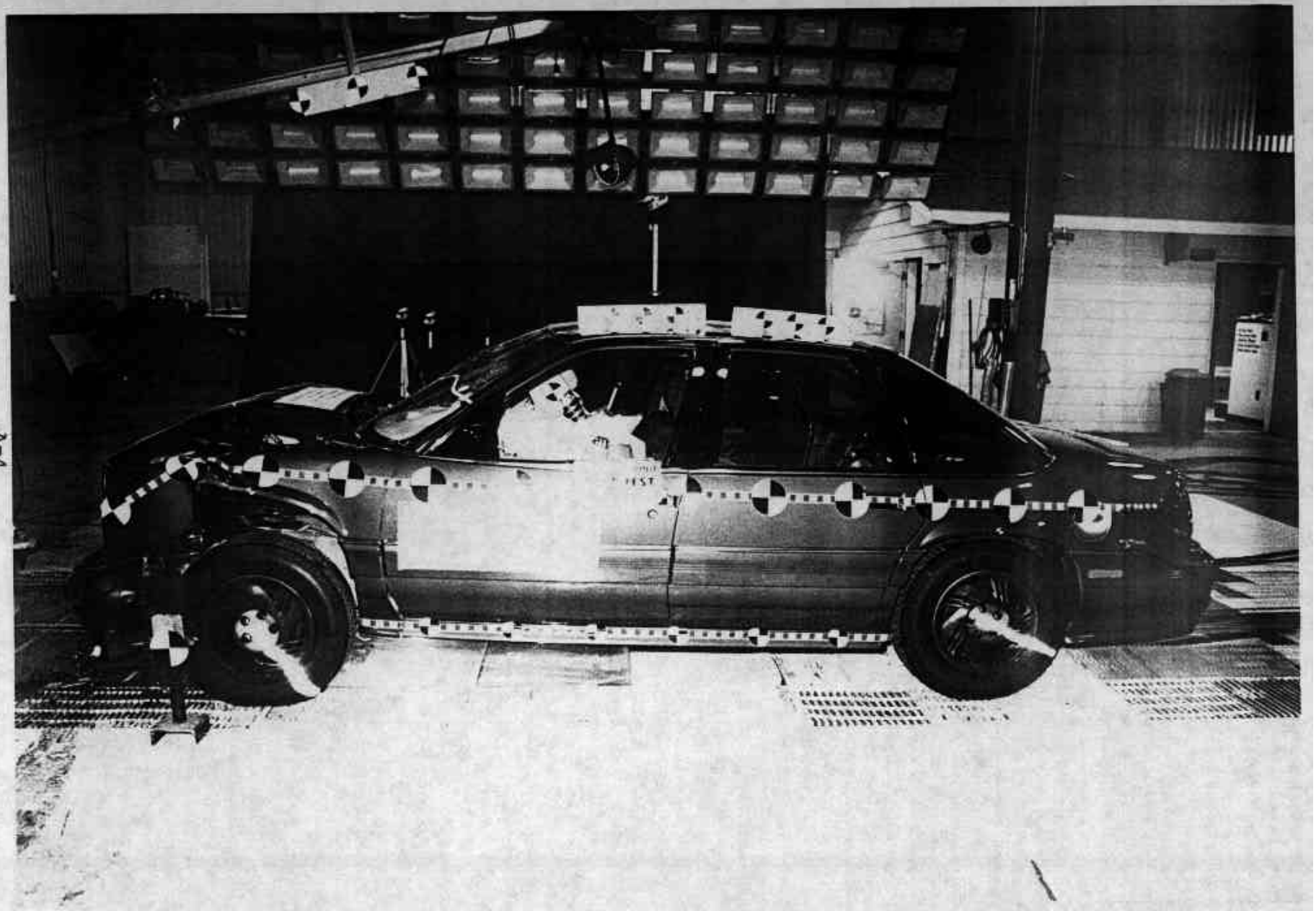
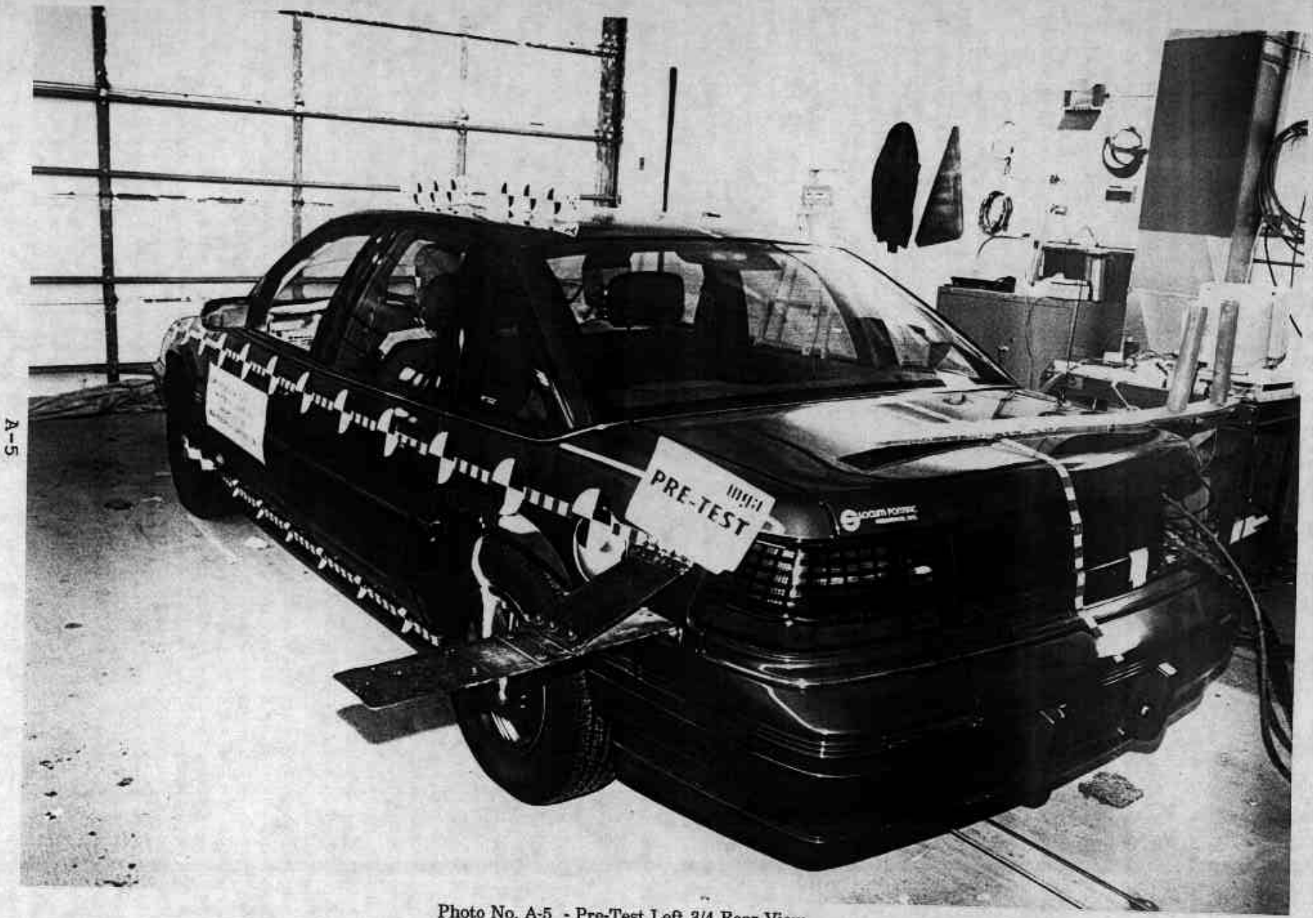
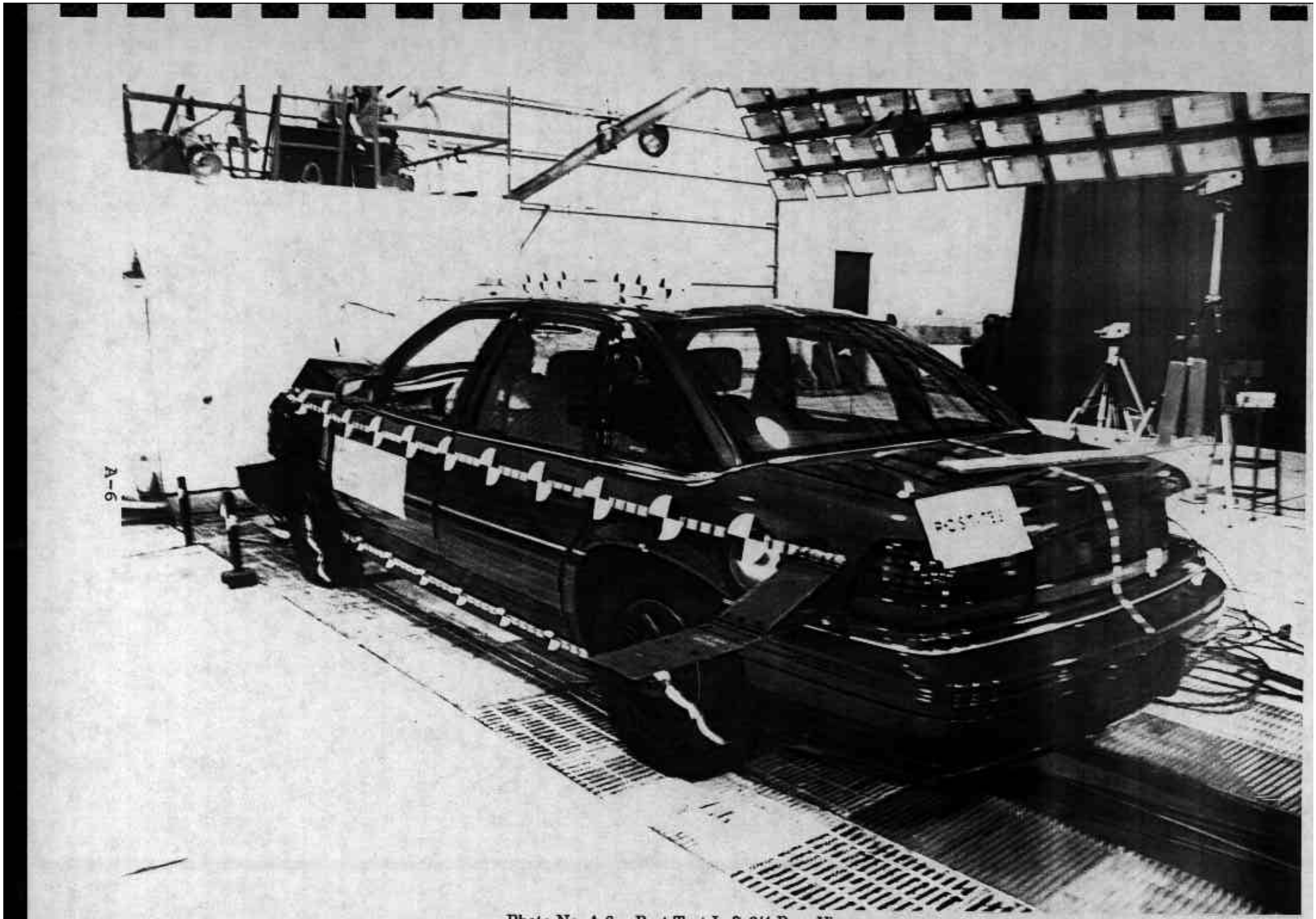


Photo No. A-4 - Post-Test Left Side View



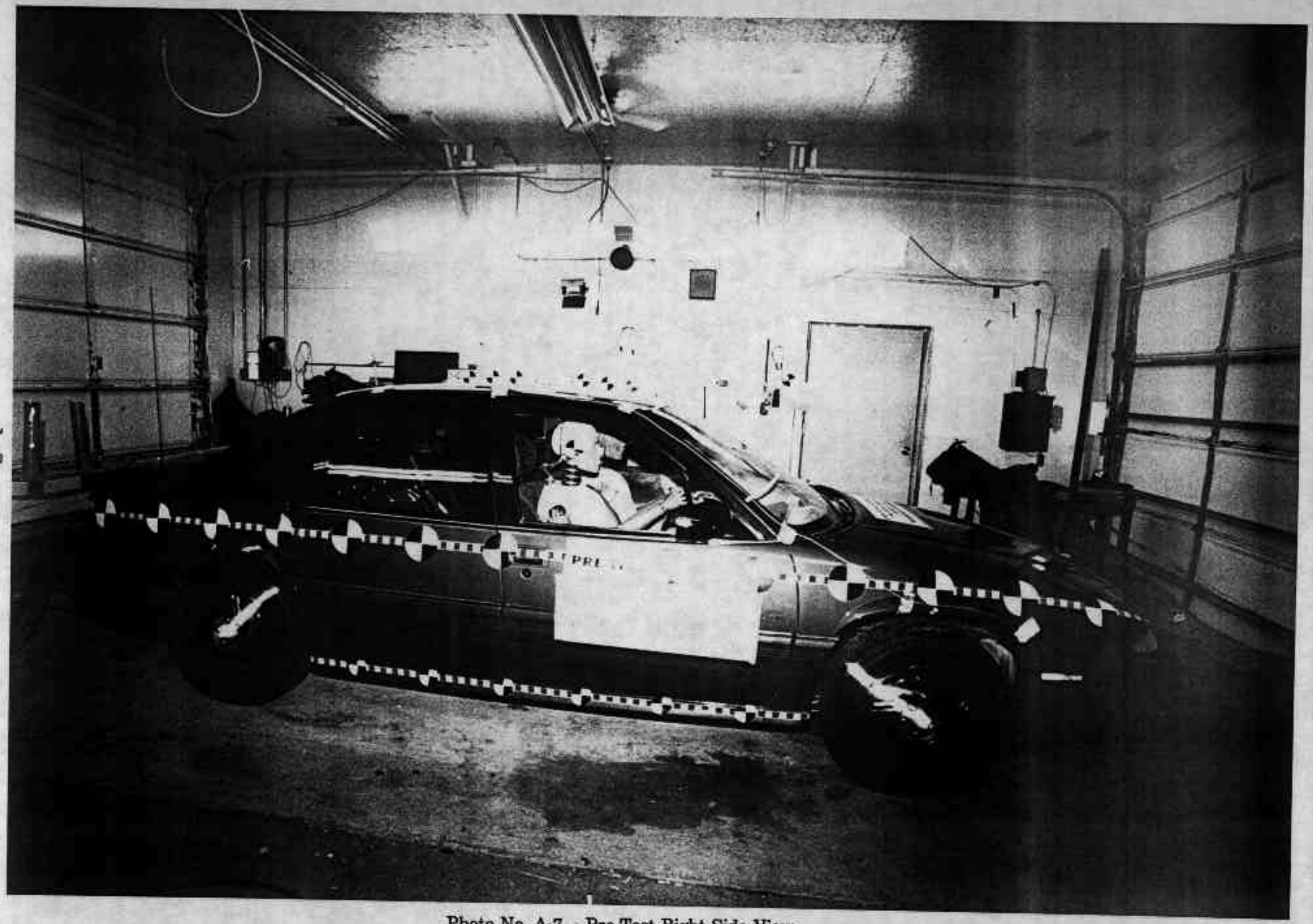

A-5

Photo No. A-5 - Pre-Test Left 3/4 Rear View



A-6

Photo No. A-6 - Post-Test Left 3/4 Rear View



A-7

Photo No. A-7 - Pre-Test Right Side View

Photo No. A-8 - Post-Test Right Side View


Photo No. A-9 - Pre-Test Right 3/4 Front View


Photo No. A-1Ø - Post-Test Right 3/4 Front View

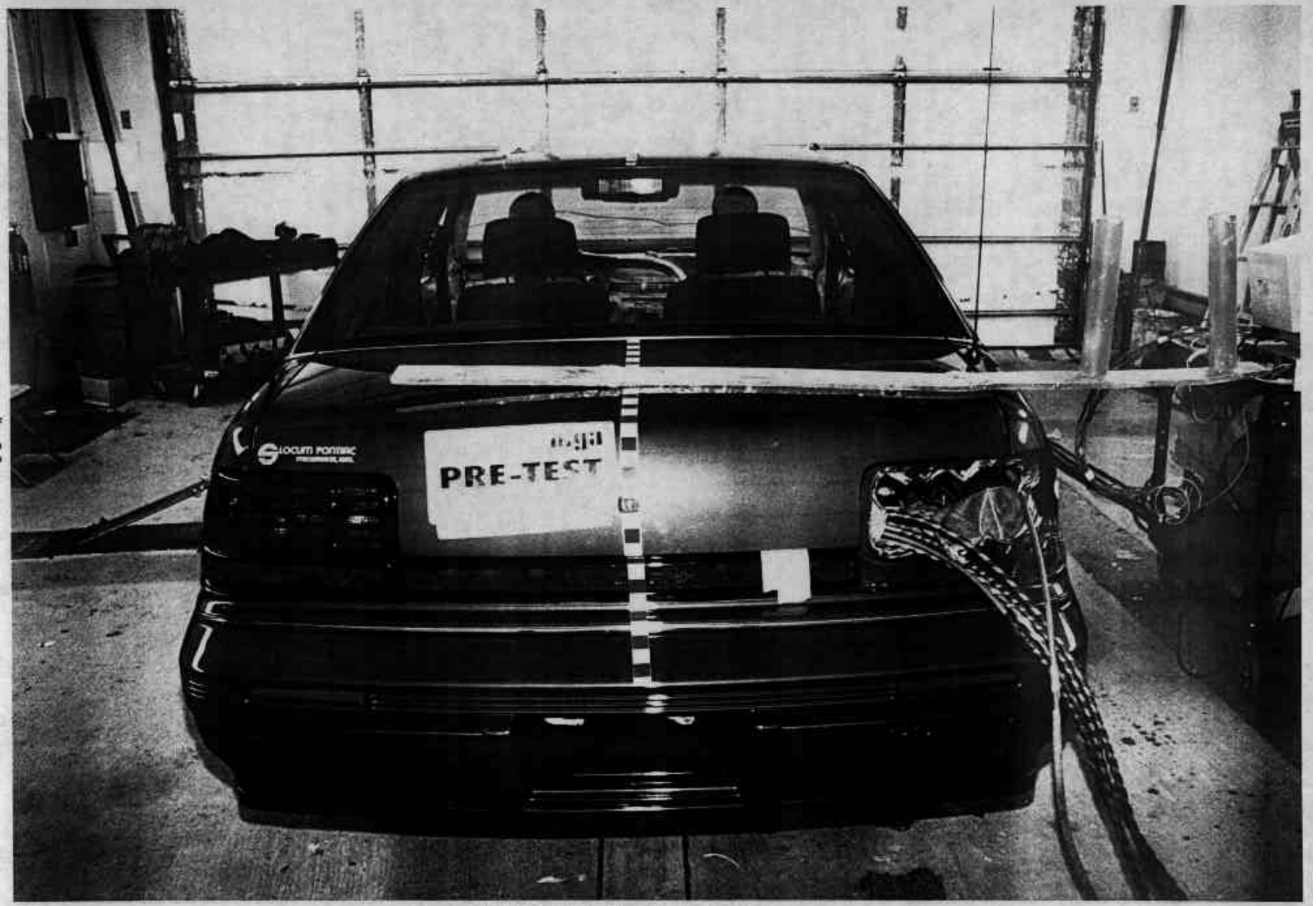



Photo No. A-11 - Pre-Test Rear View


A-12

Photo No. A-12 - Post-Test Rear View

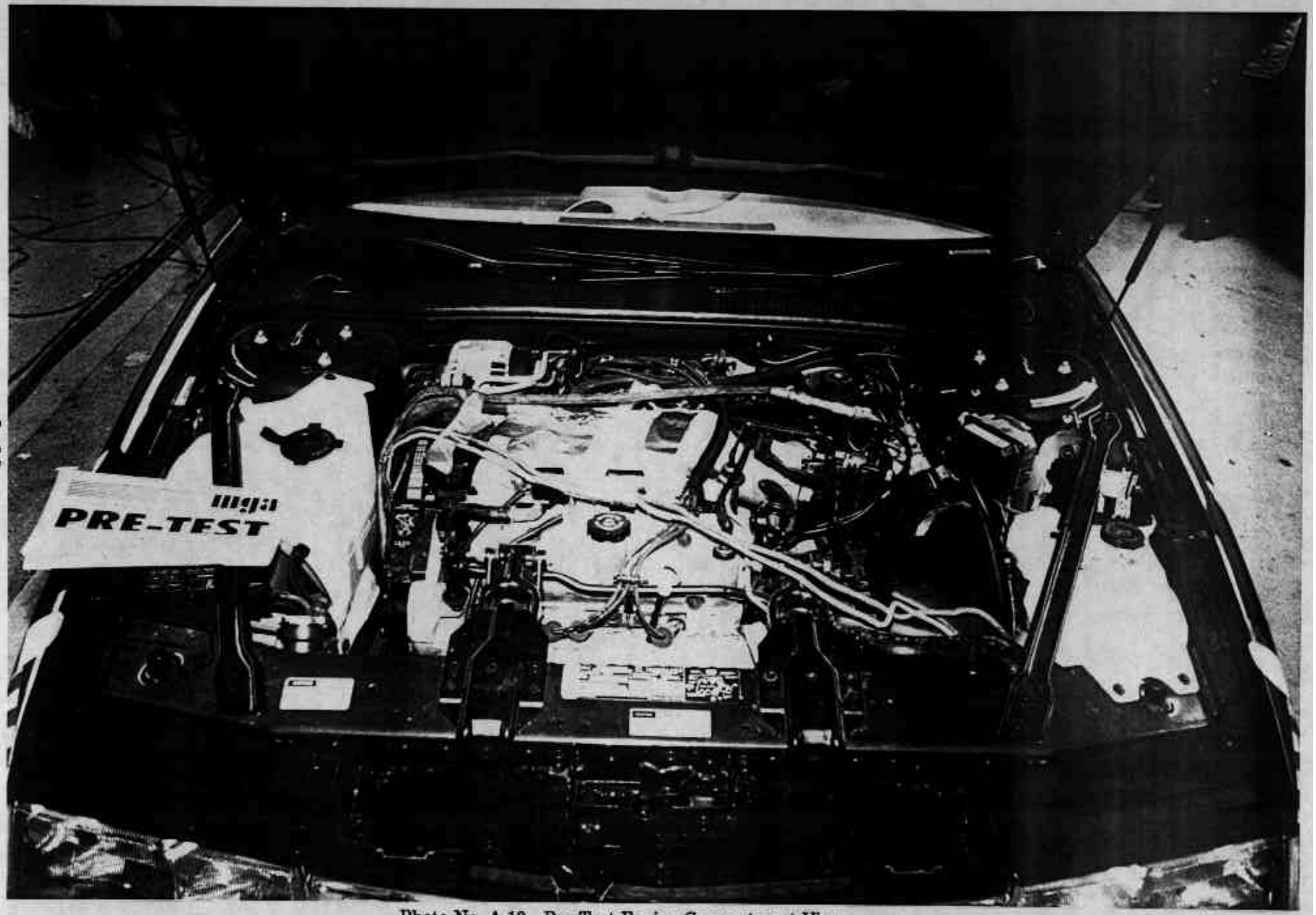



Photo No. A-13 - Pre-Test Engine Compartment View

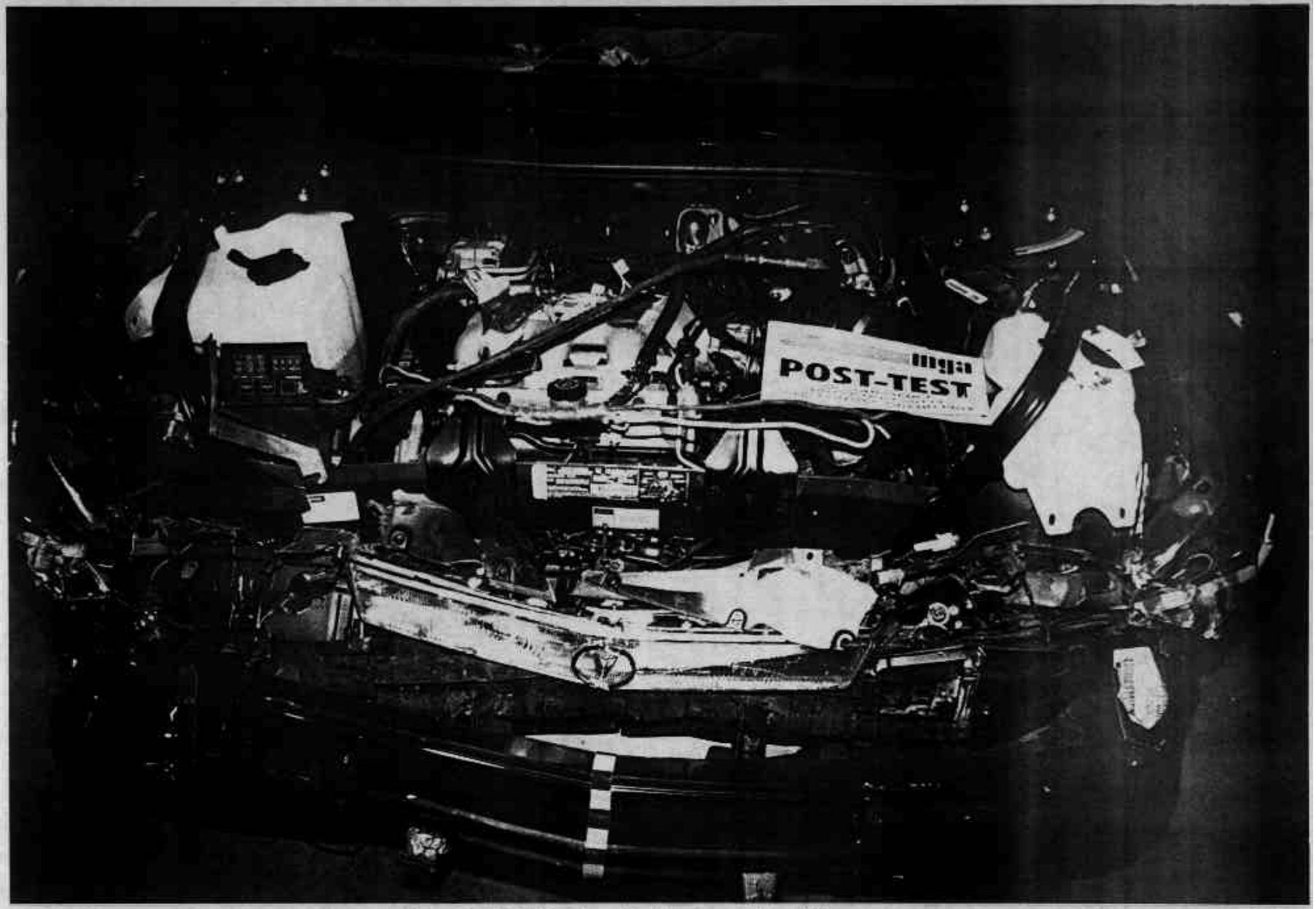



Photo No. A-14 - Post-Test Engine Compartment View


A-15

Photo No. A-15 - Pre-Test Fuel Filler Cap View


Photo No. A-16 - Post-Test Fuel Filler Cap View

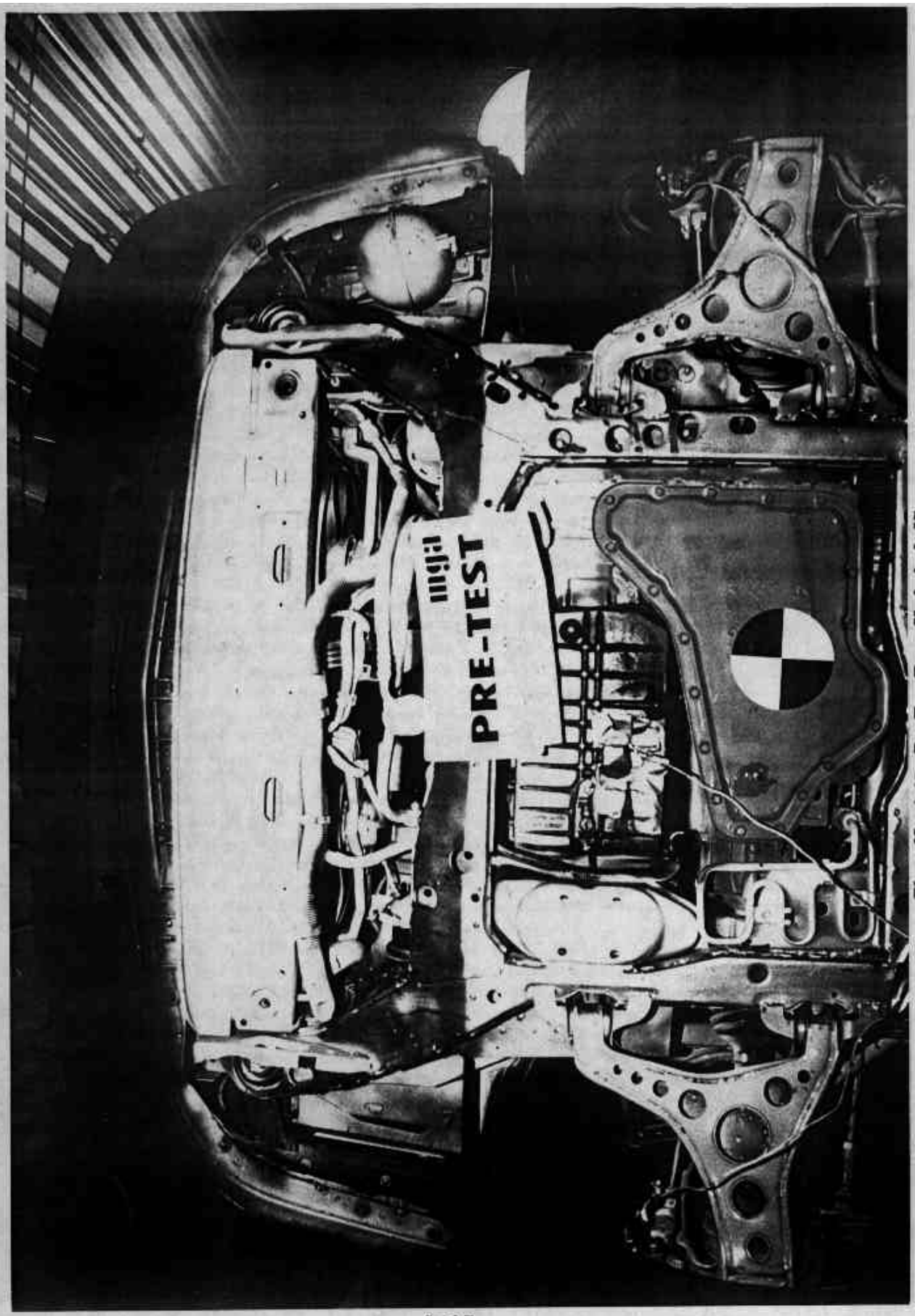



Photo No. A-17 - Pre-Test Front Underbody View

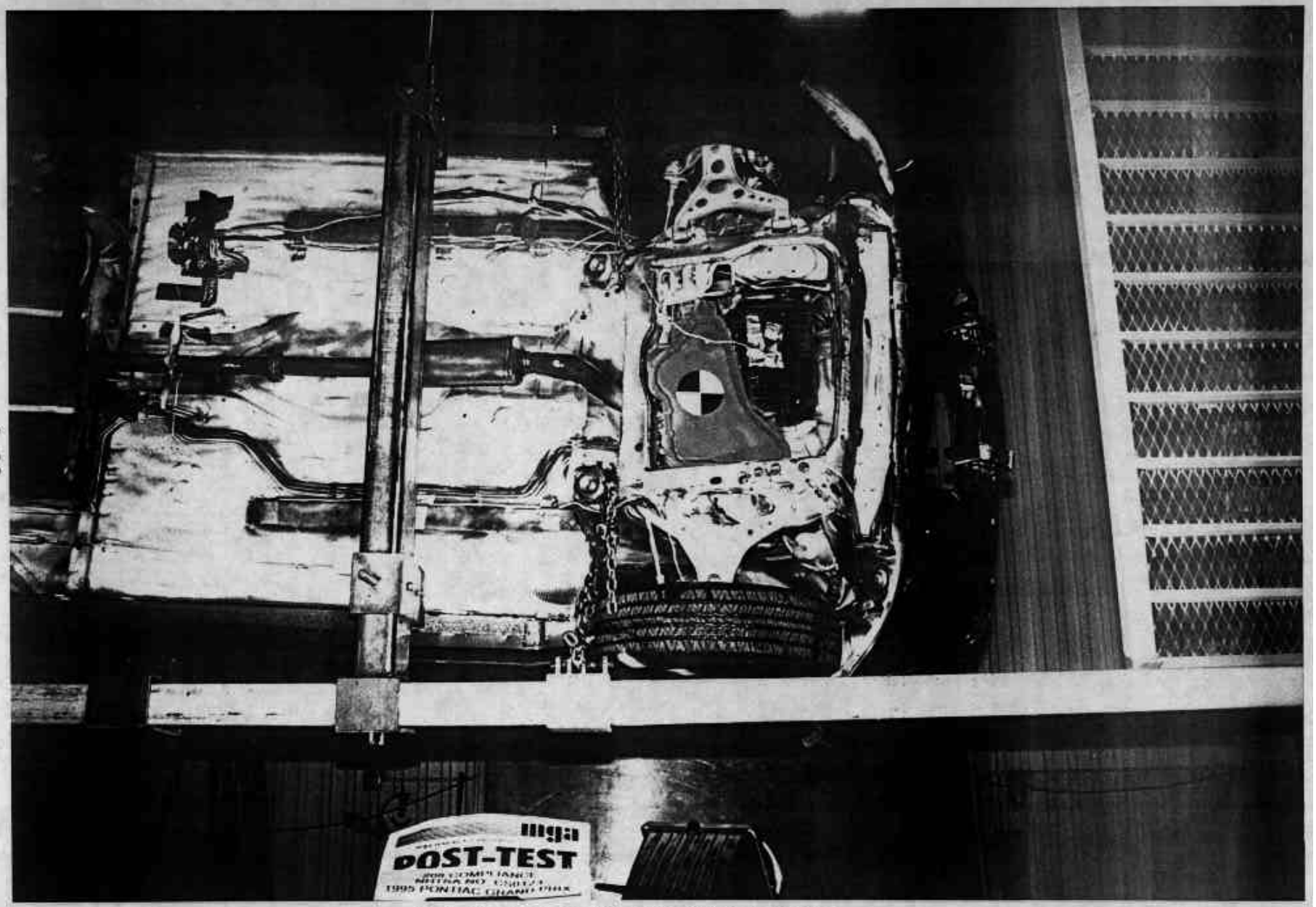



Photo No. A-18 - Post-Test Front Underbody View

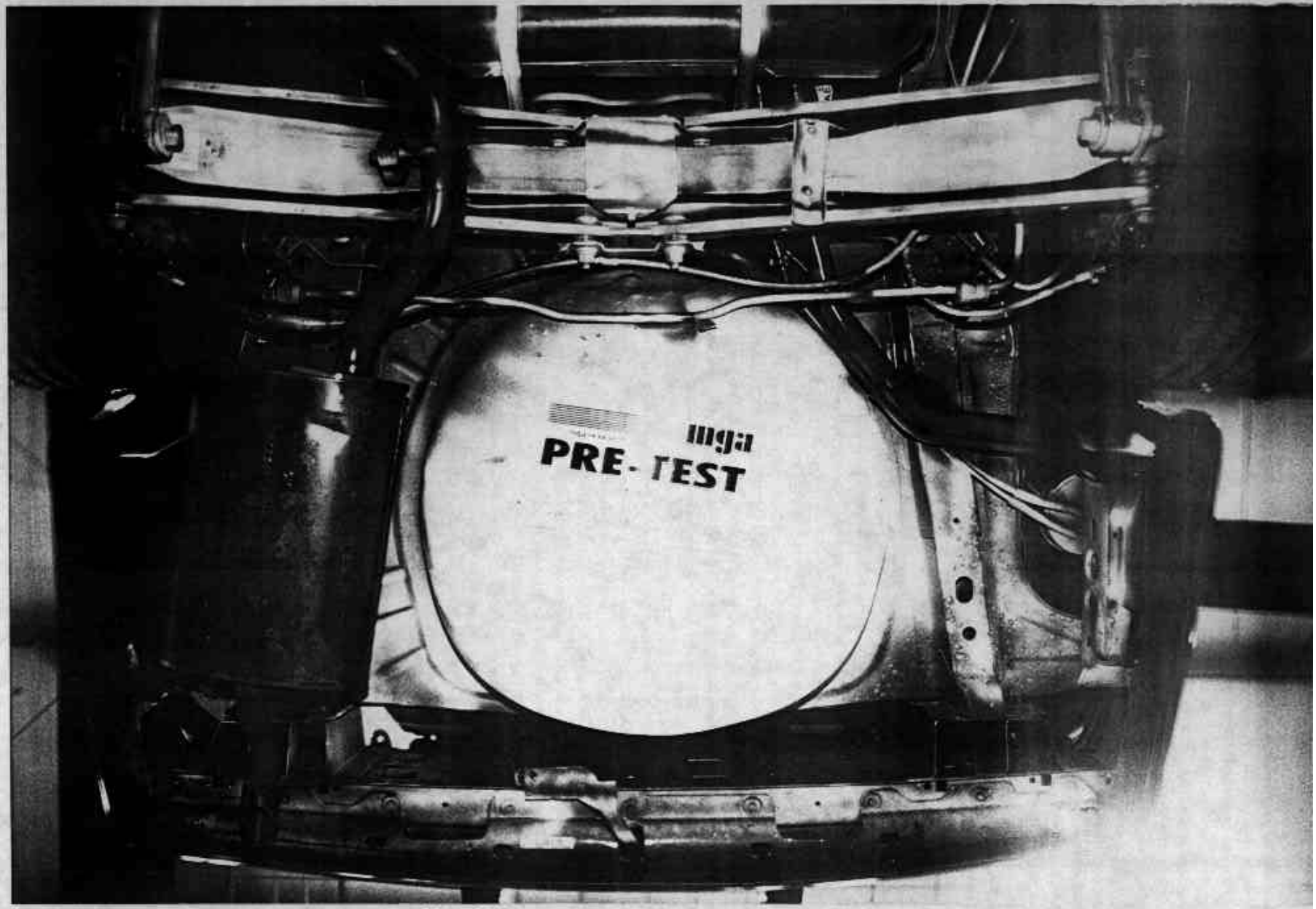



Photo No. A-19 - Pre-Test Rear Underbody View

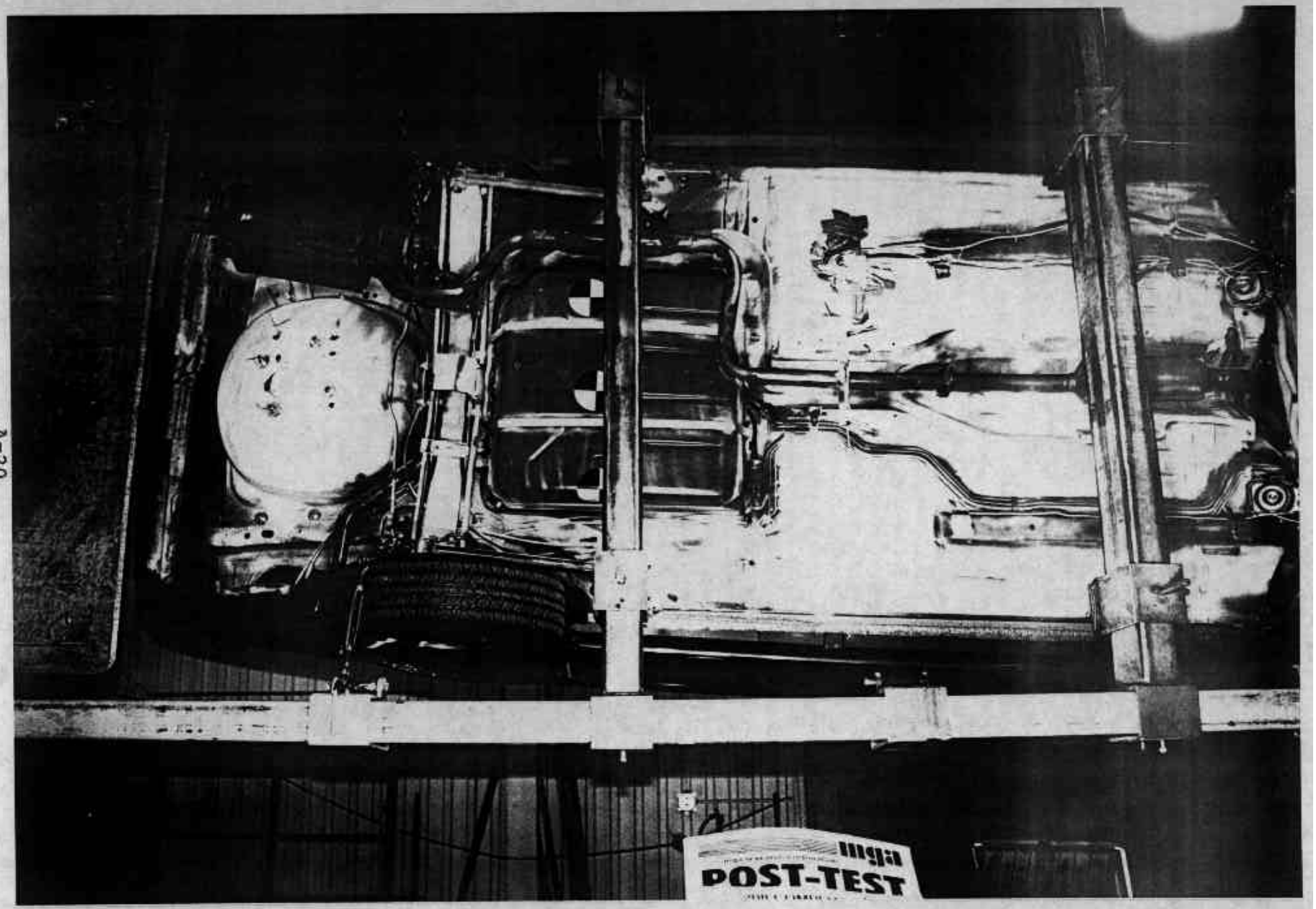
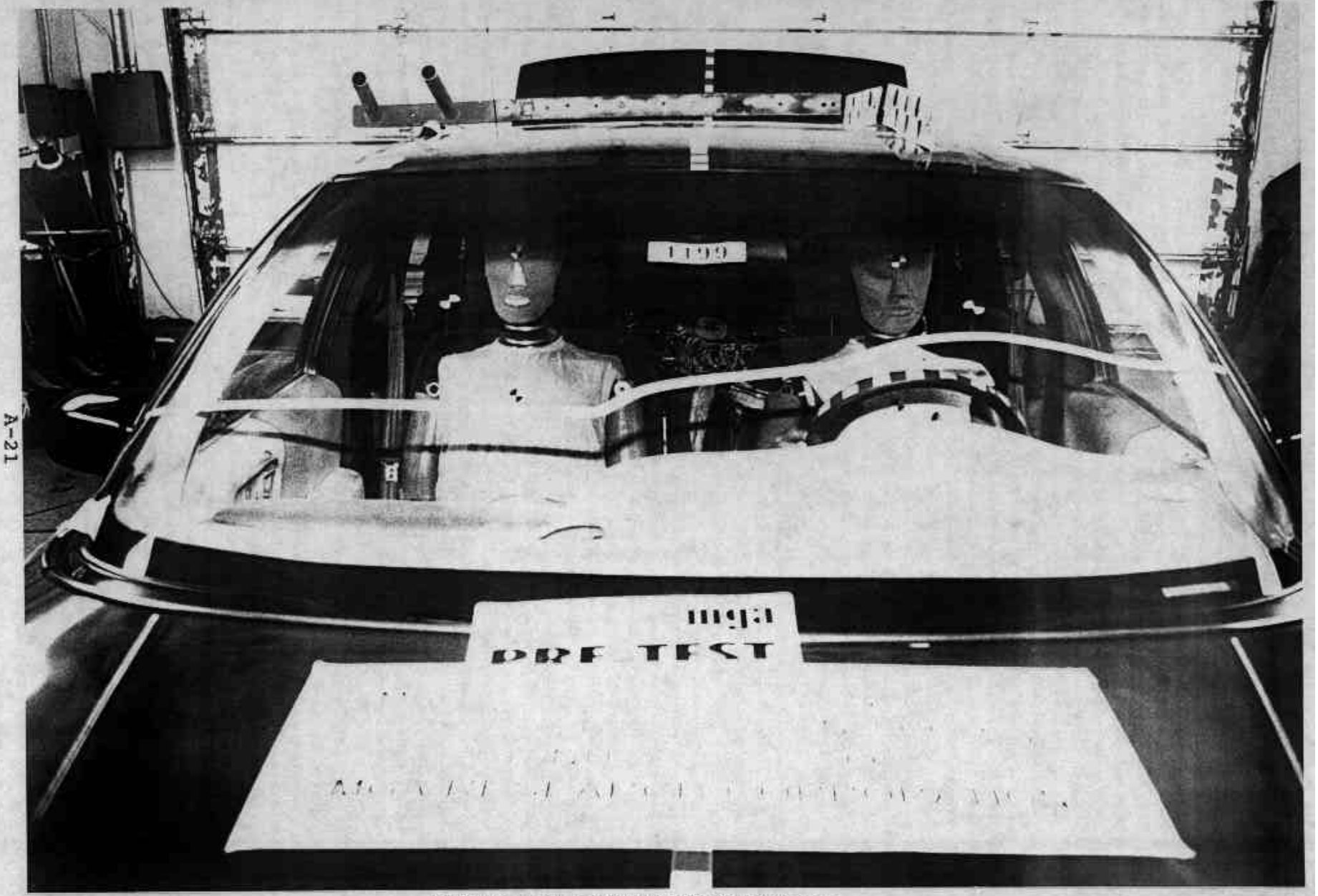
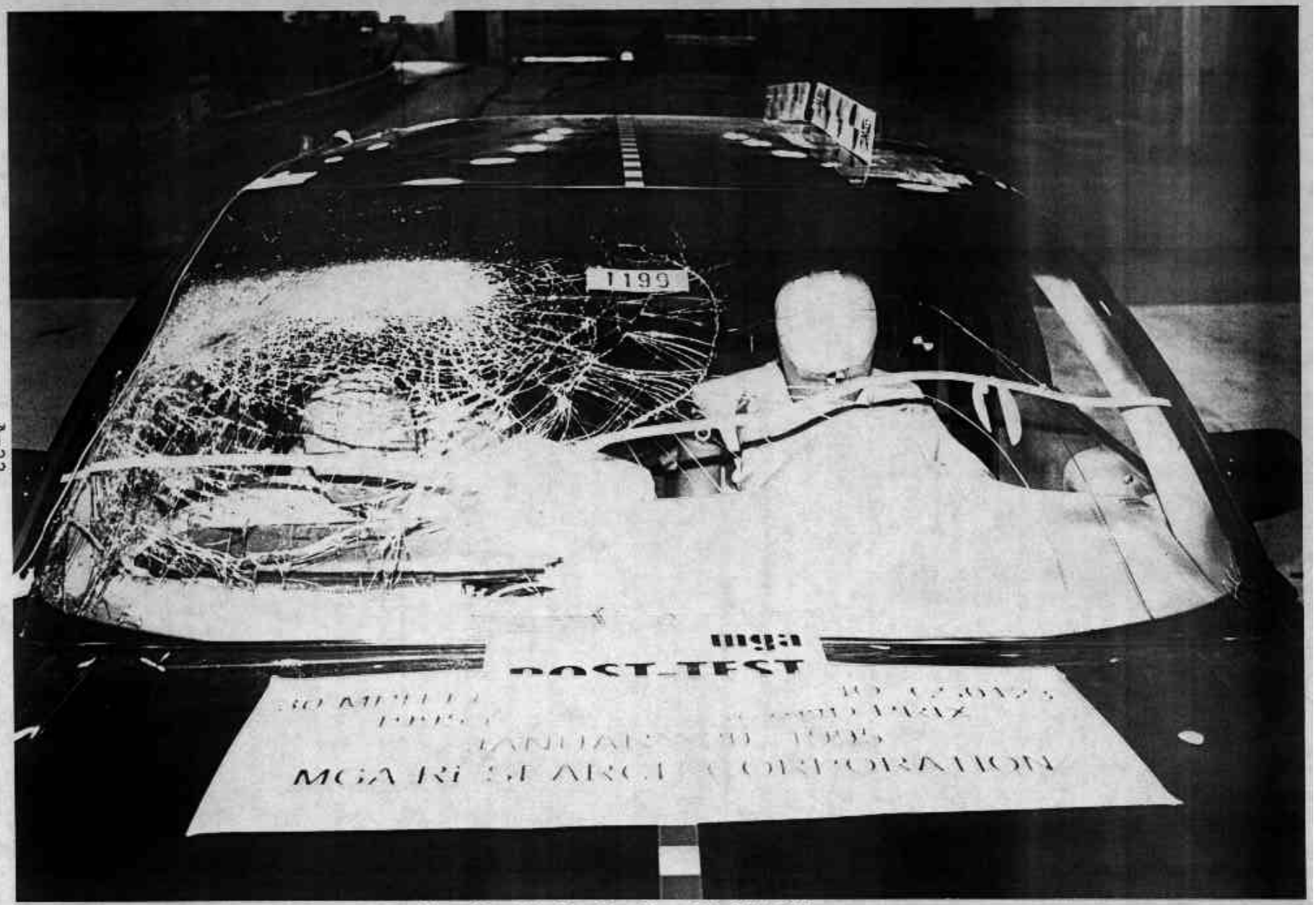



Photo No. A-20 - Post-Test Rear Underbody View




A-21

Photo No. A-21 - Pre-Test Front Windshield View




A-22

Photo No. A-22 - Post-Test Front Windshield View


A-23

Photo No. A-23 - Pre-Test Driver Dummy Position View


Photo No. A-24 - Post-Test Driver Dummy Position View


A-25

Photo No. A-25 - Pre-Test Driver Dummy Position View (Door Open)

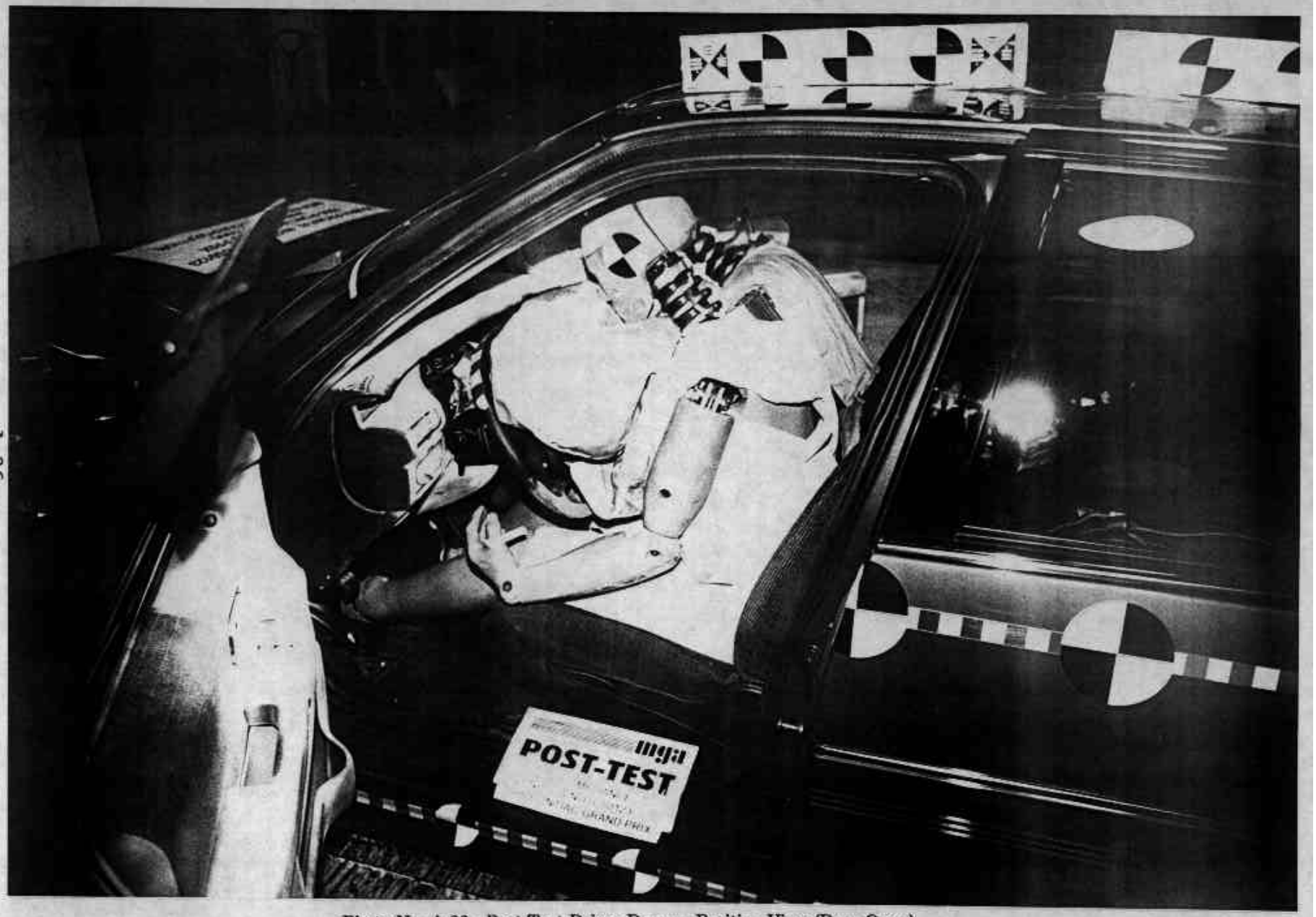



Photo No. A-26 - Post-Test Driver Dummy Position View (Door Open)

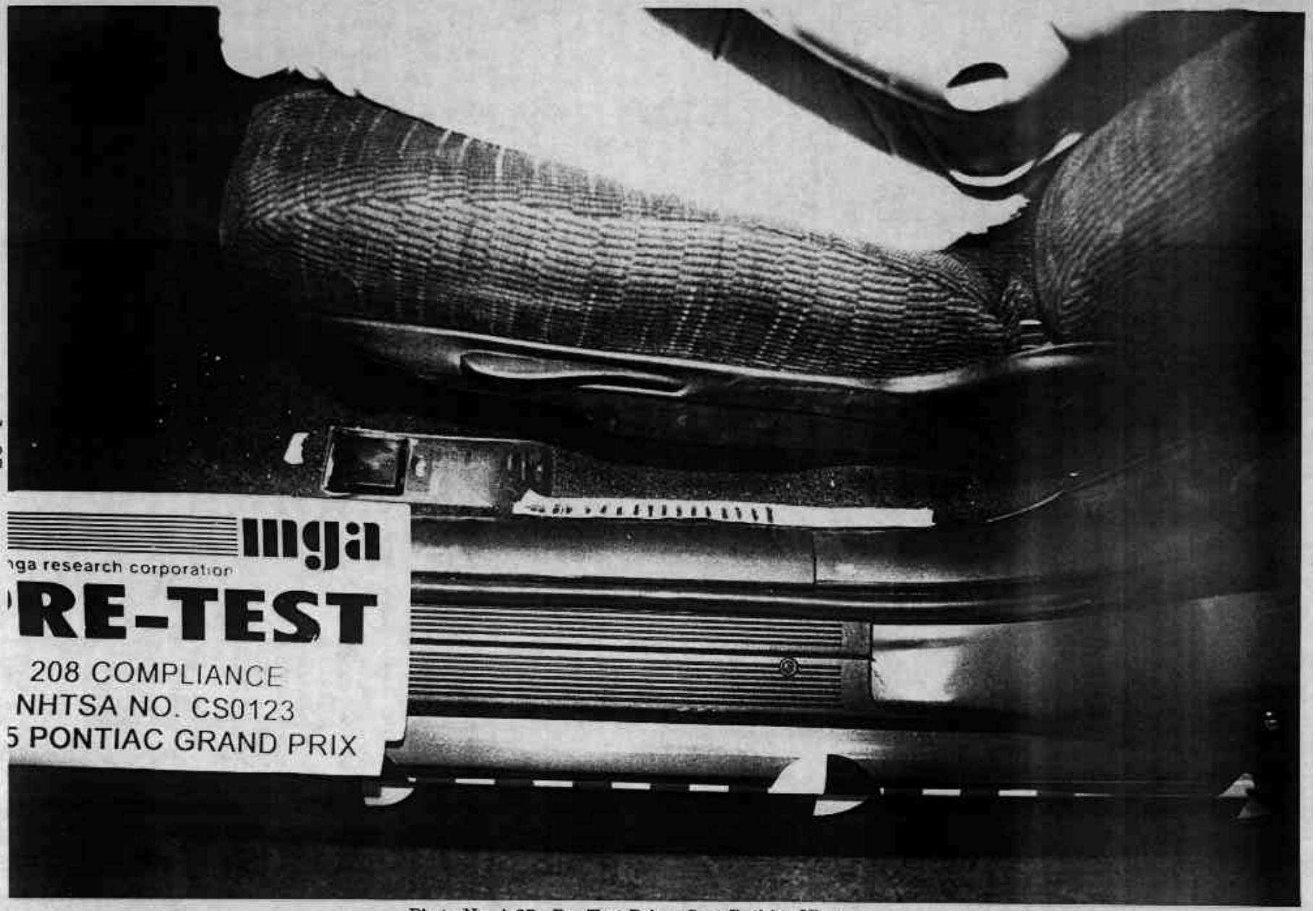



Photo No. A-27 - Pre-Test Driver Seat Position View

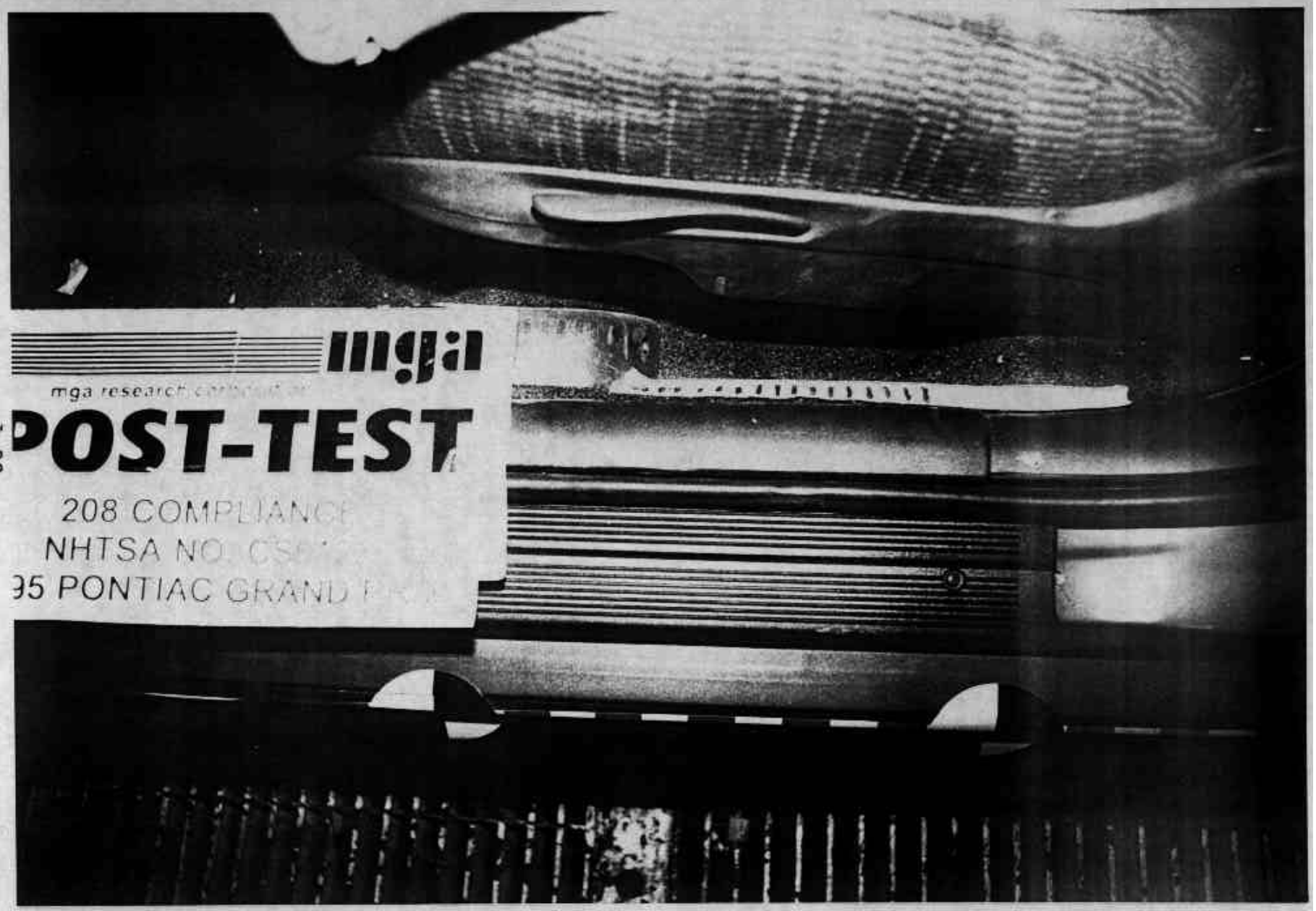



Photo No. A-28 - Post-Test Driver Seat Position View


A-29

Photo No. A-29 - Pre-Test Driver Windshield View

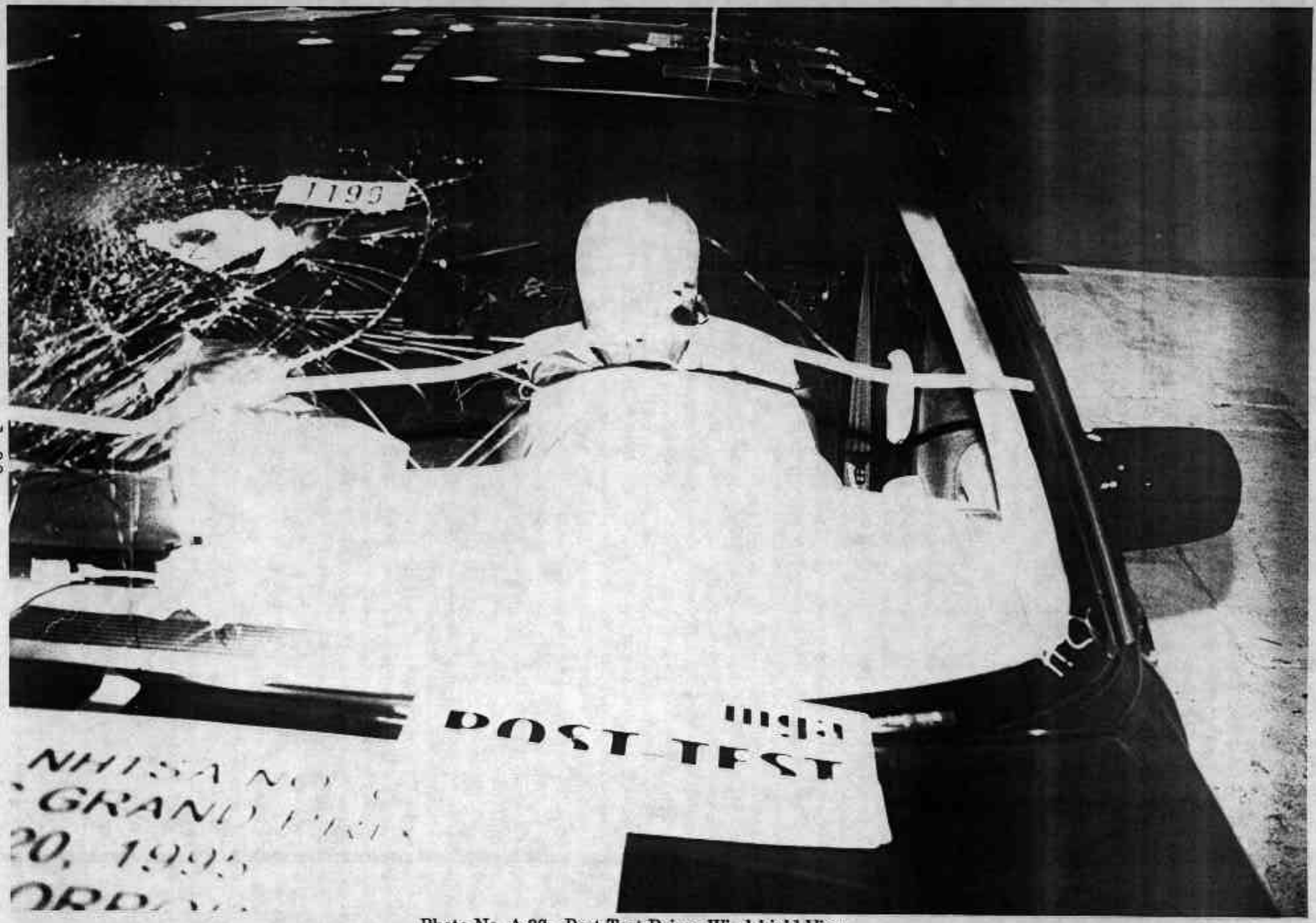



Photo No. A-30 - Post-Test Driver Windshield View


Photo No. A-31 - Pre-Test Driver Dummy Knee Bolster View




Photo No. A-32 - Post-Test Driver Dummy Knee Bolster View

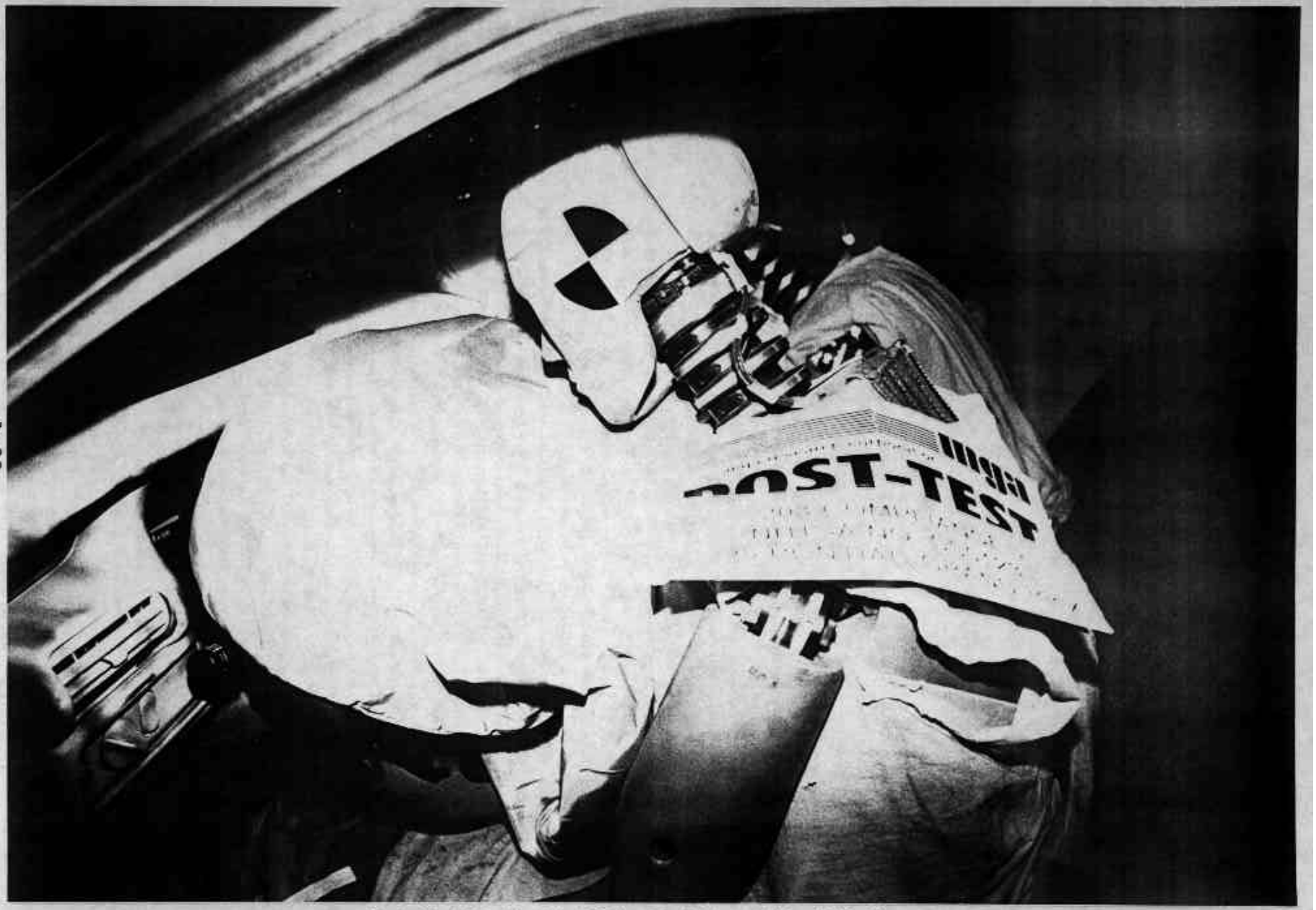



Photo No. A-33 - Post-Test Driver Head Contact View (Airbag)


Photo No. A-34 - Post-Test Driver Knee Contact View


Photo No. A-35 - Pre-Test Passenger Dummy Position View


Photo No. A-36 - Post-Test Passenger Dummy Position View


Photo No. A-37 - Pre-Test Passenger Dummy Position View (Door Open)


Photo No. A-38 - Post-Test Passenger Dummy Position View (Door Open)

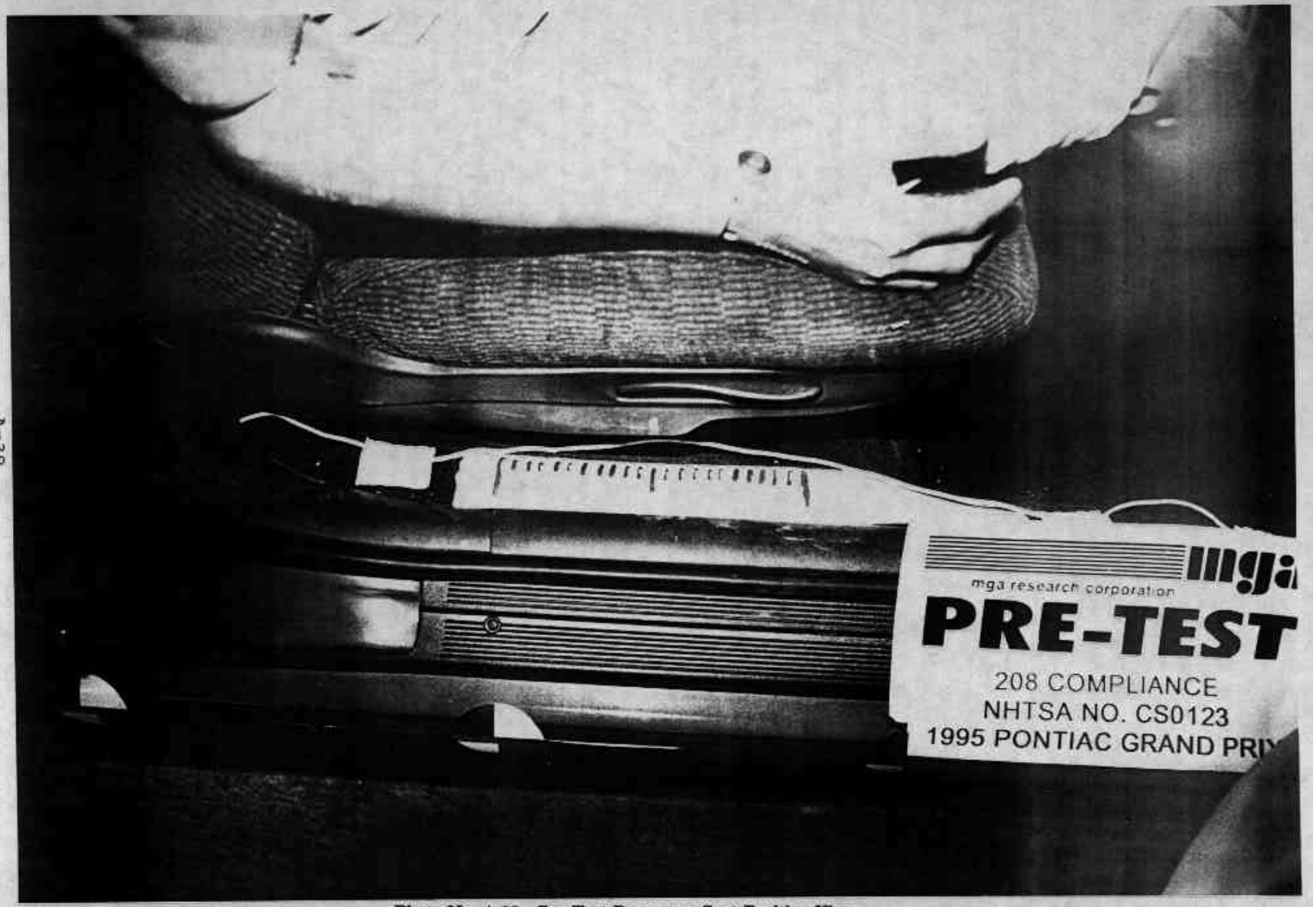



Photo No. A-39 - Pre-Test Passenger Seat Position View


Photo No. A-49 - Post-Test Passenger Seat Position View

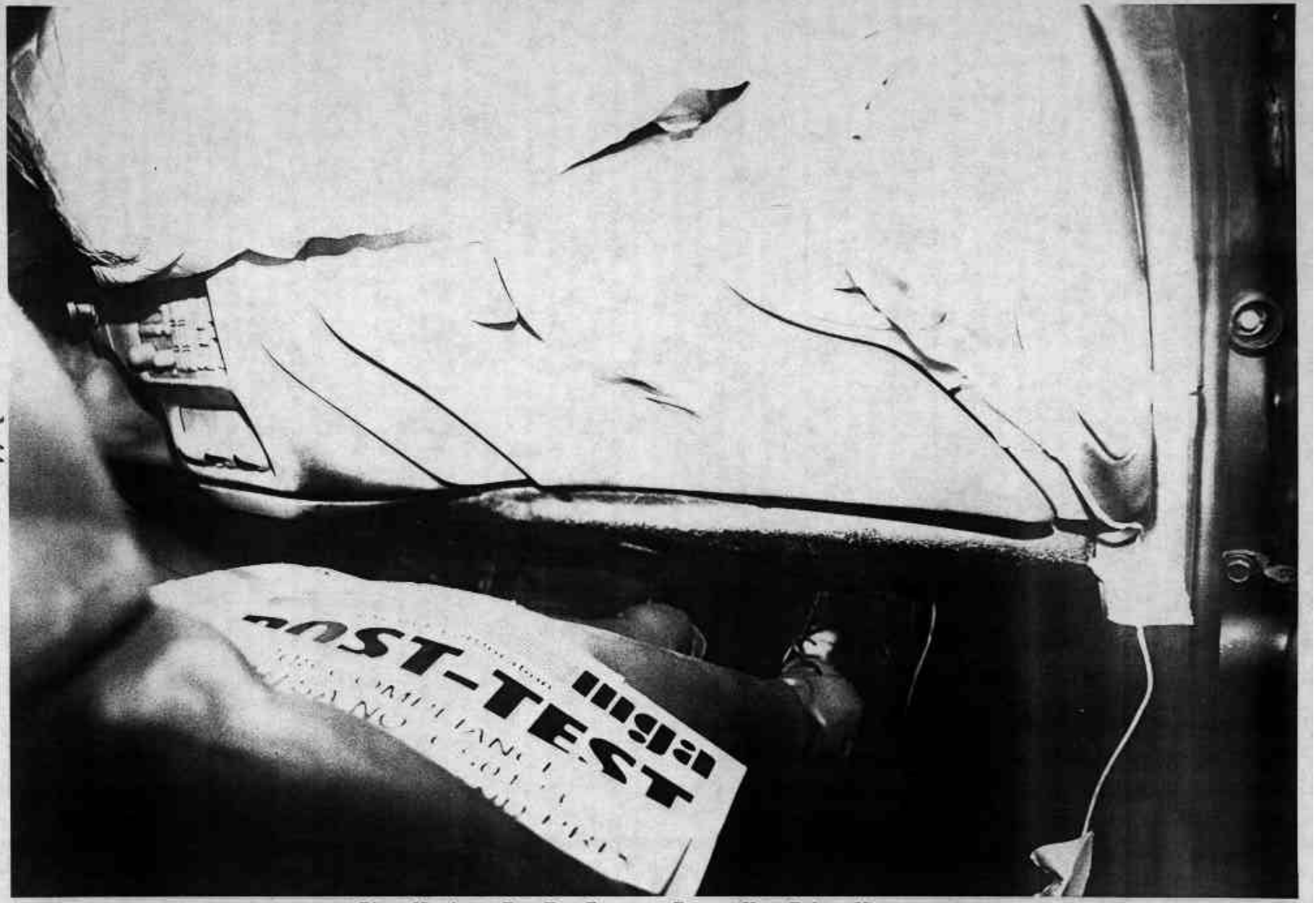

A-41

Photo No. A-41 - Pre-Test Passenger Windshield View


Photo No. A-42 - Post-Test Passenger Windshield View


A-43

Photo No. A-43 - Pre-Test Passenger Dummy Knee Bolster View




A-44

Photo No. A-44 - Post-Test Passenger Dummy Knee Bolster View

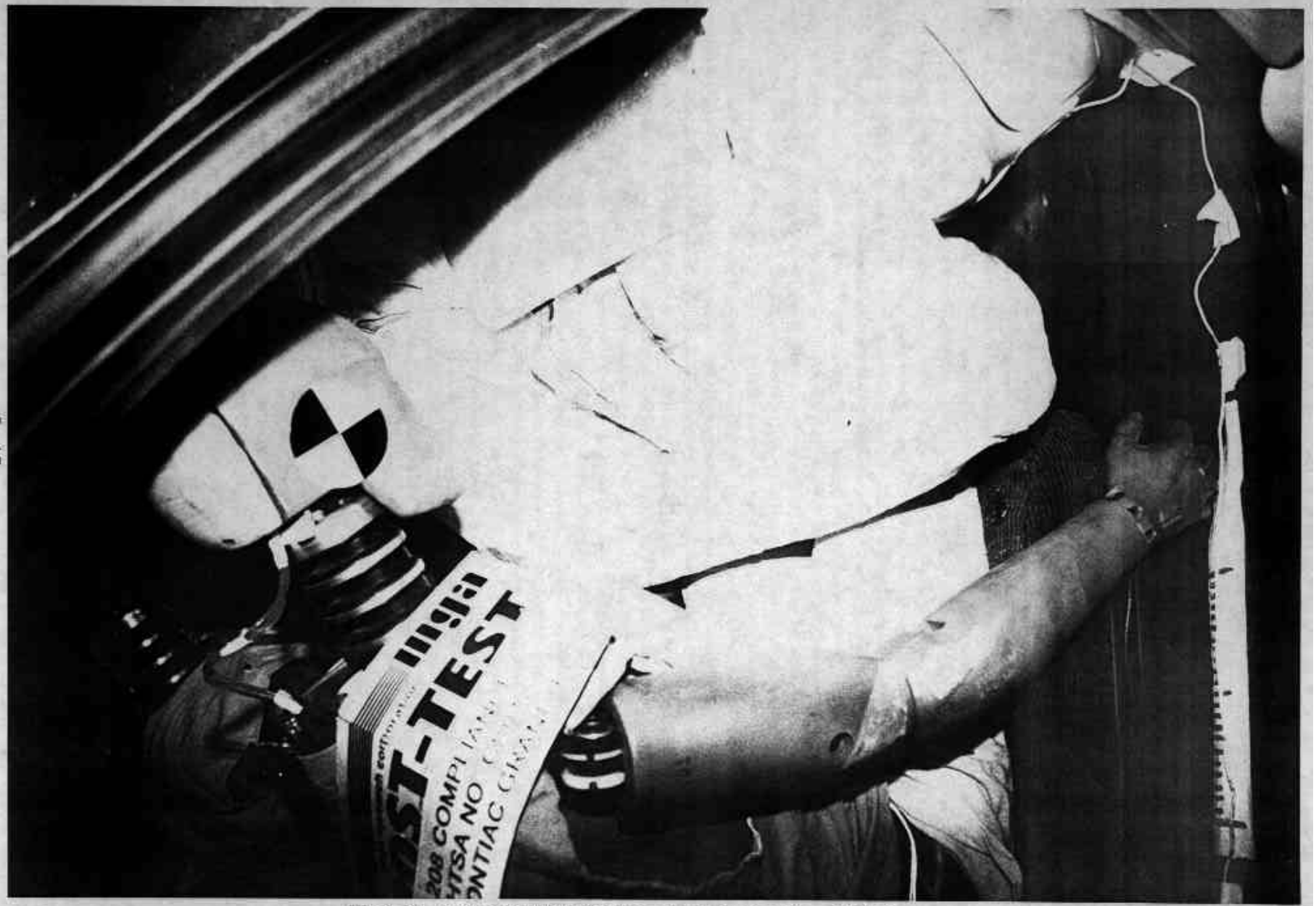



Photo No. A-45 - Post-Test Passenger Head Contact View (Airbag)


Photo No. A-46 - Post-Test Passenger Knee Contact View

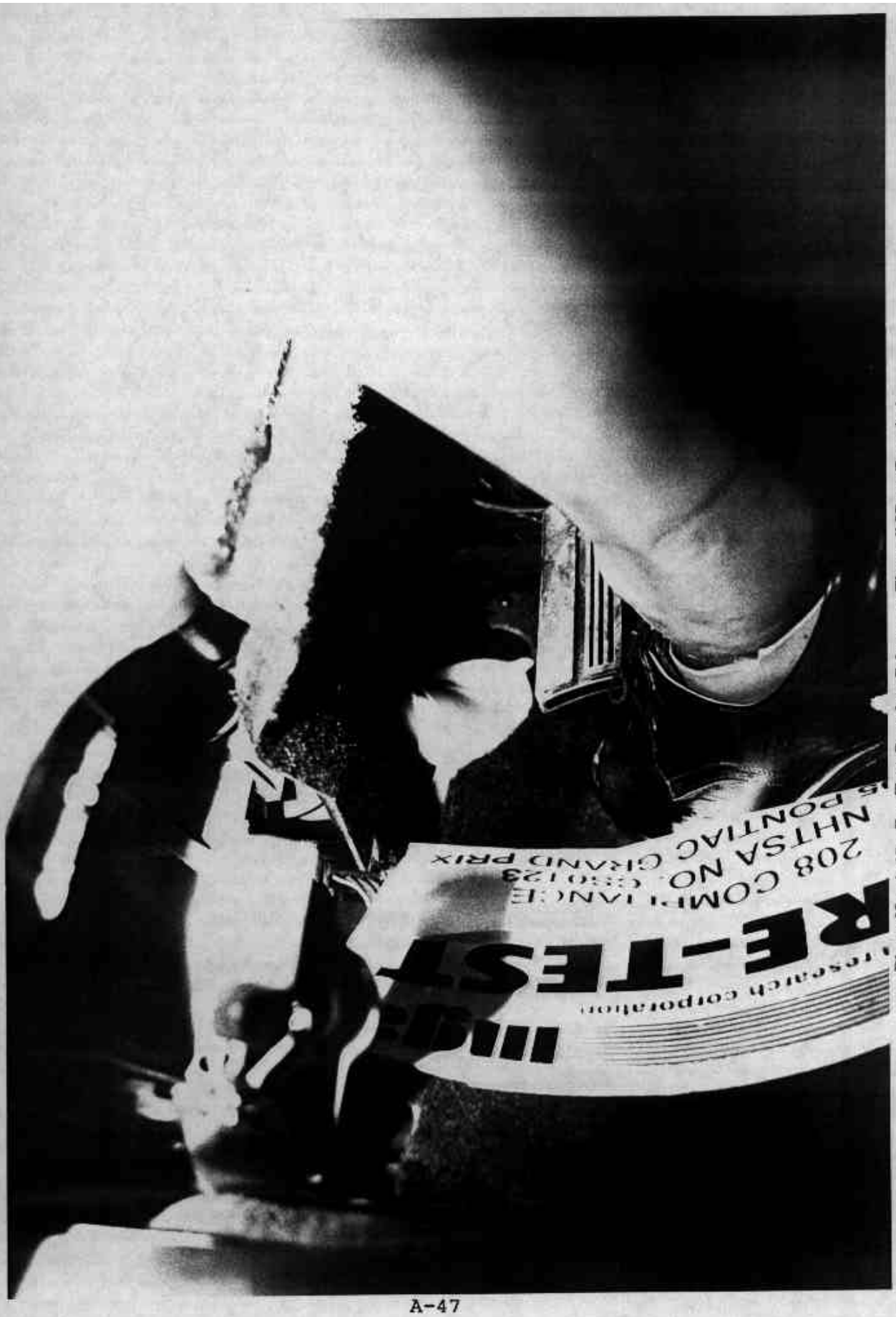



Photo No. A-47 - Pre-Test Steering Column at Firewall View (Interior)


A-48

Photo No. A-48 - Post-Test Steering Column at Firewall View (Interior)

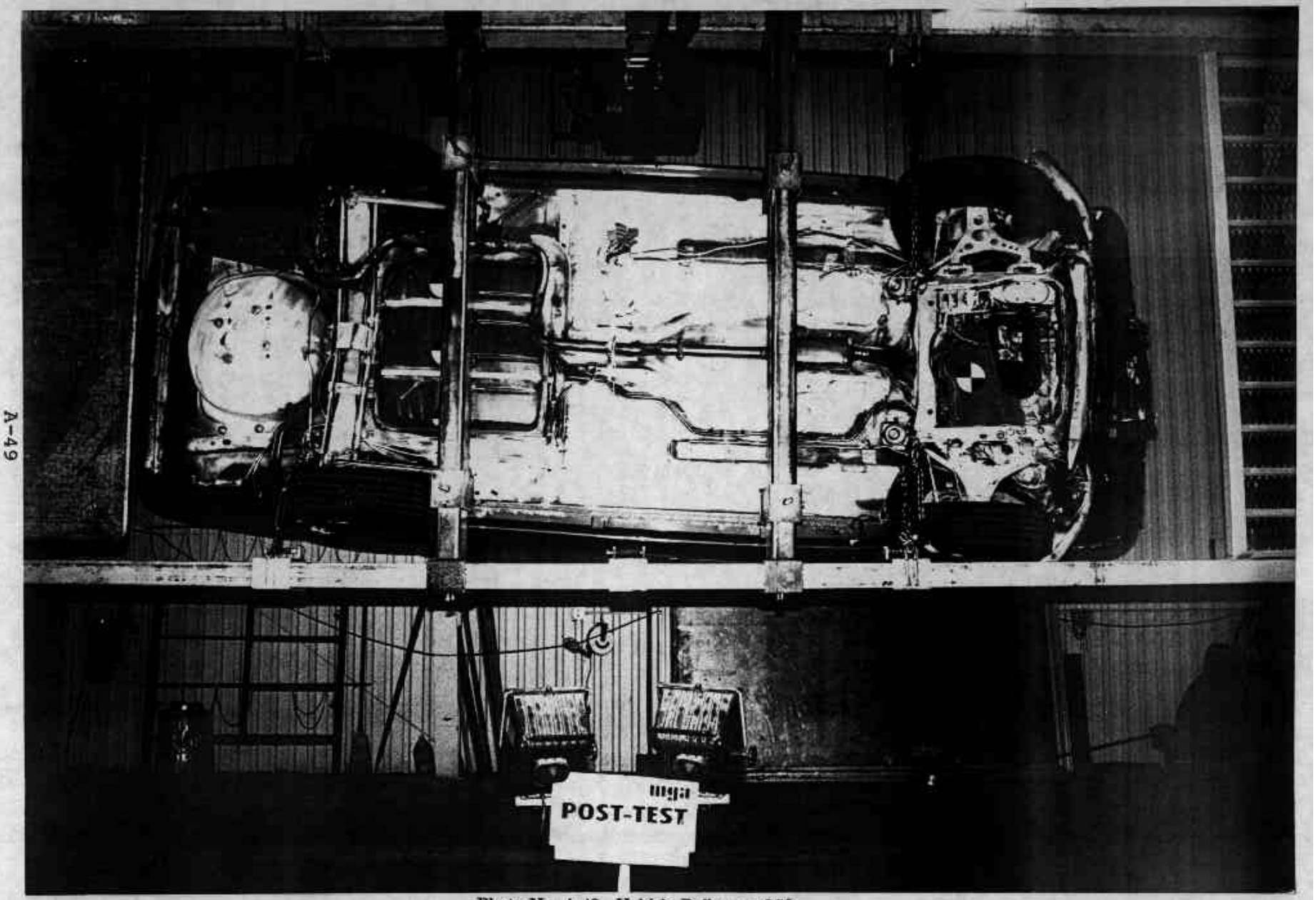



Photo No. A-49 - Vehicle Rollover - 90°

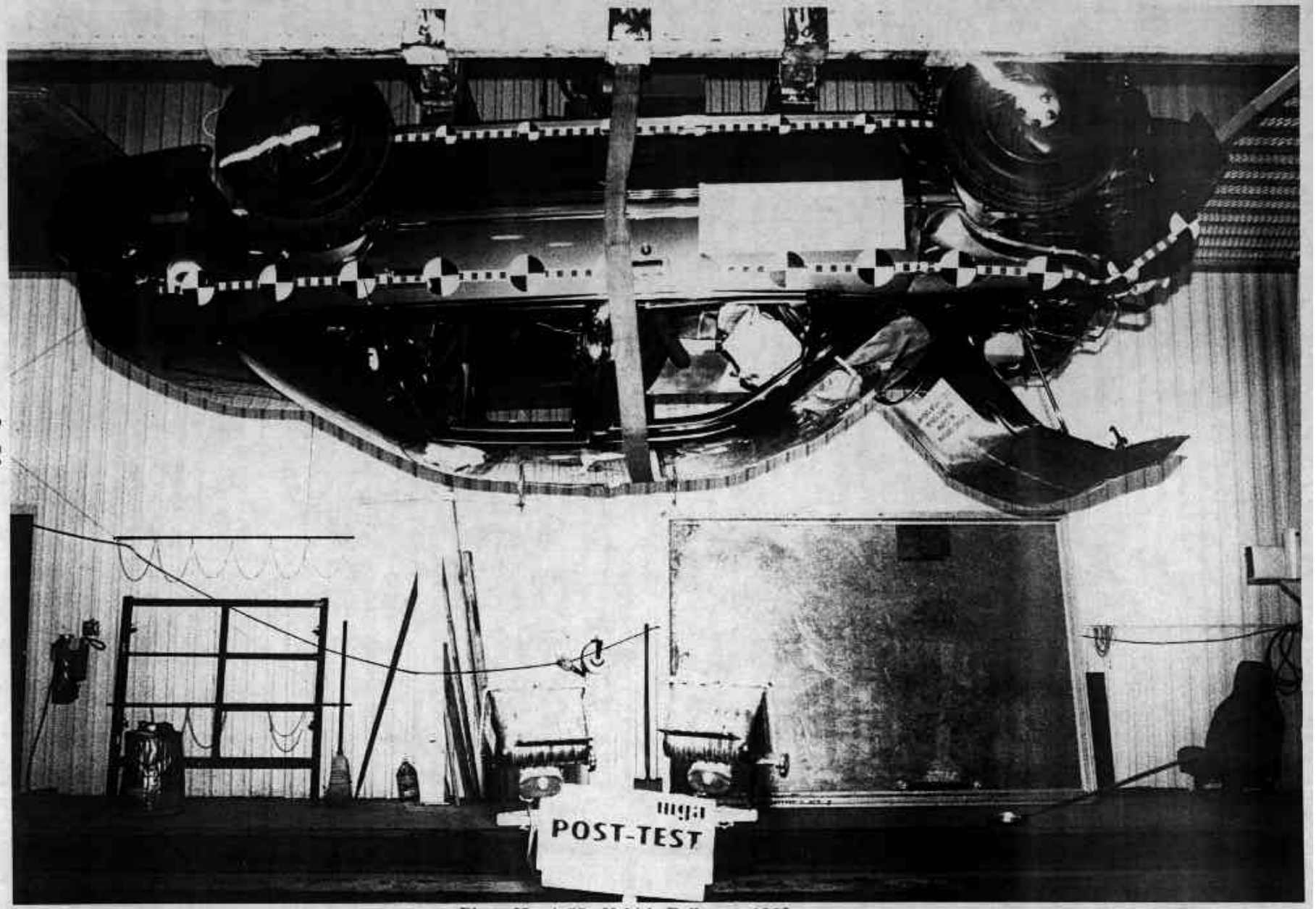



Photo No. A-5Ø - Vehicle Rollover - 18Ø°

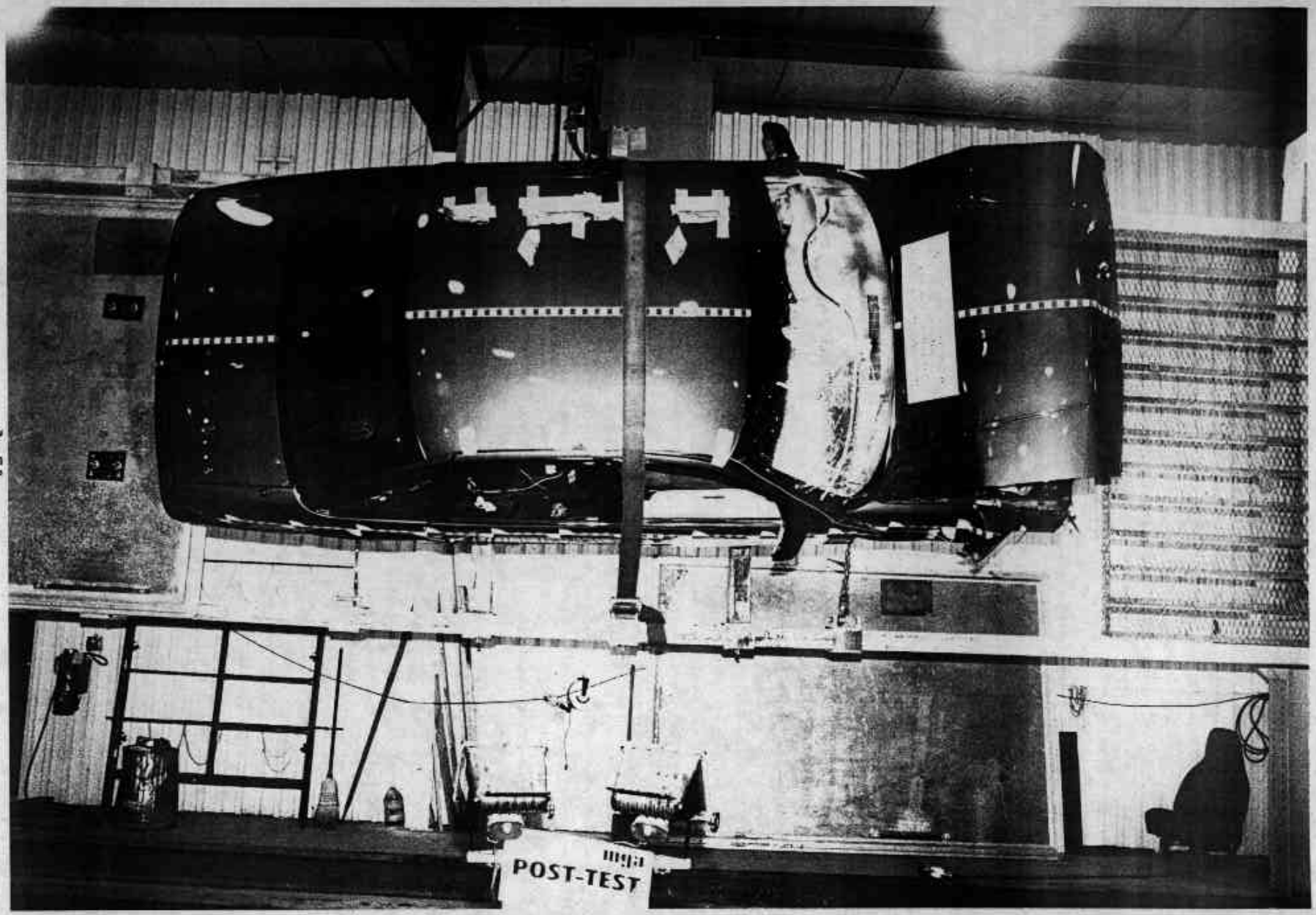



Photo No. A-51 - Vehicle Rollover - 270°

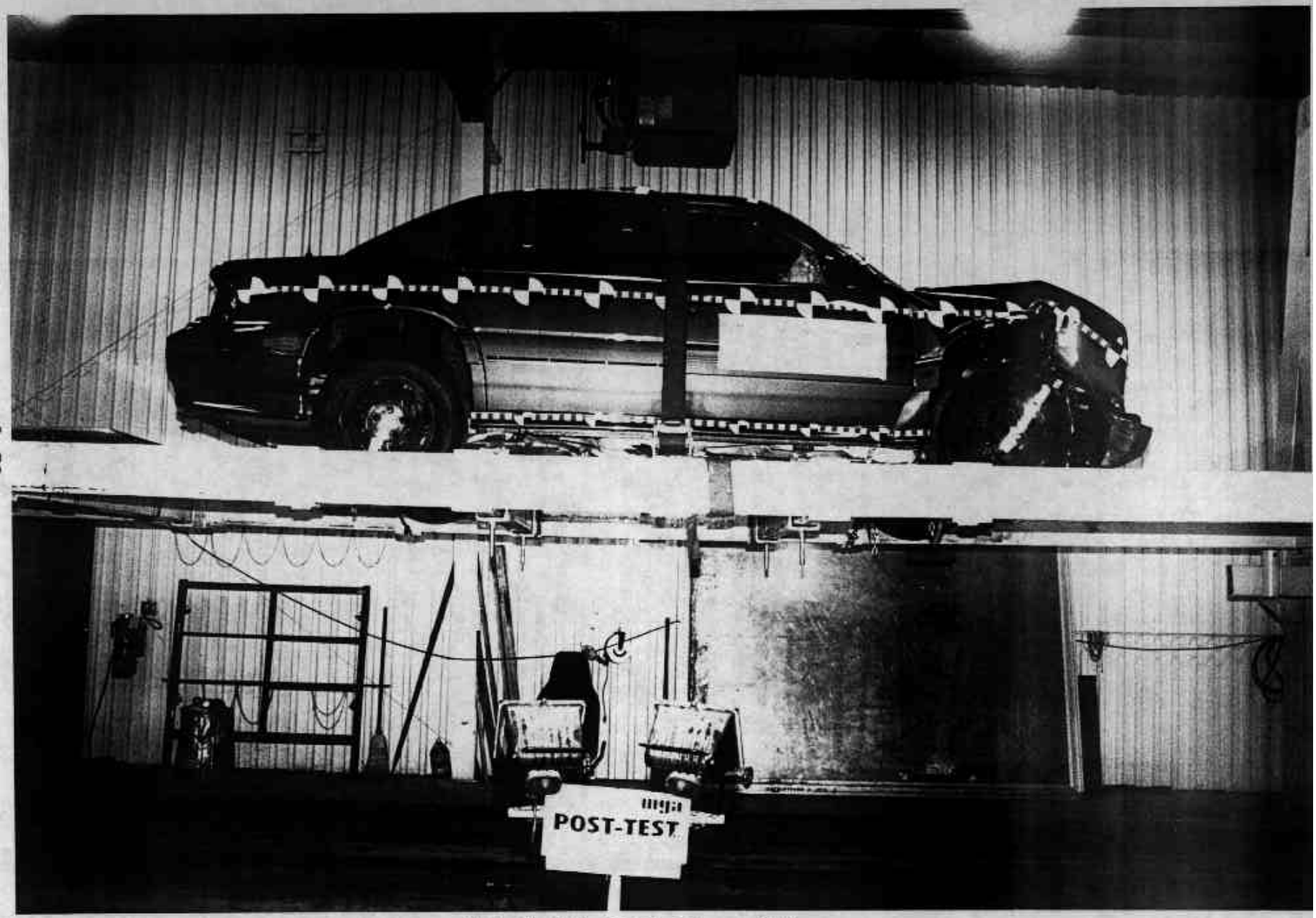



Photo No. A-52 - Vehicle Rollover - 360°

Photo No. A-53 - Vehicle Certification Label

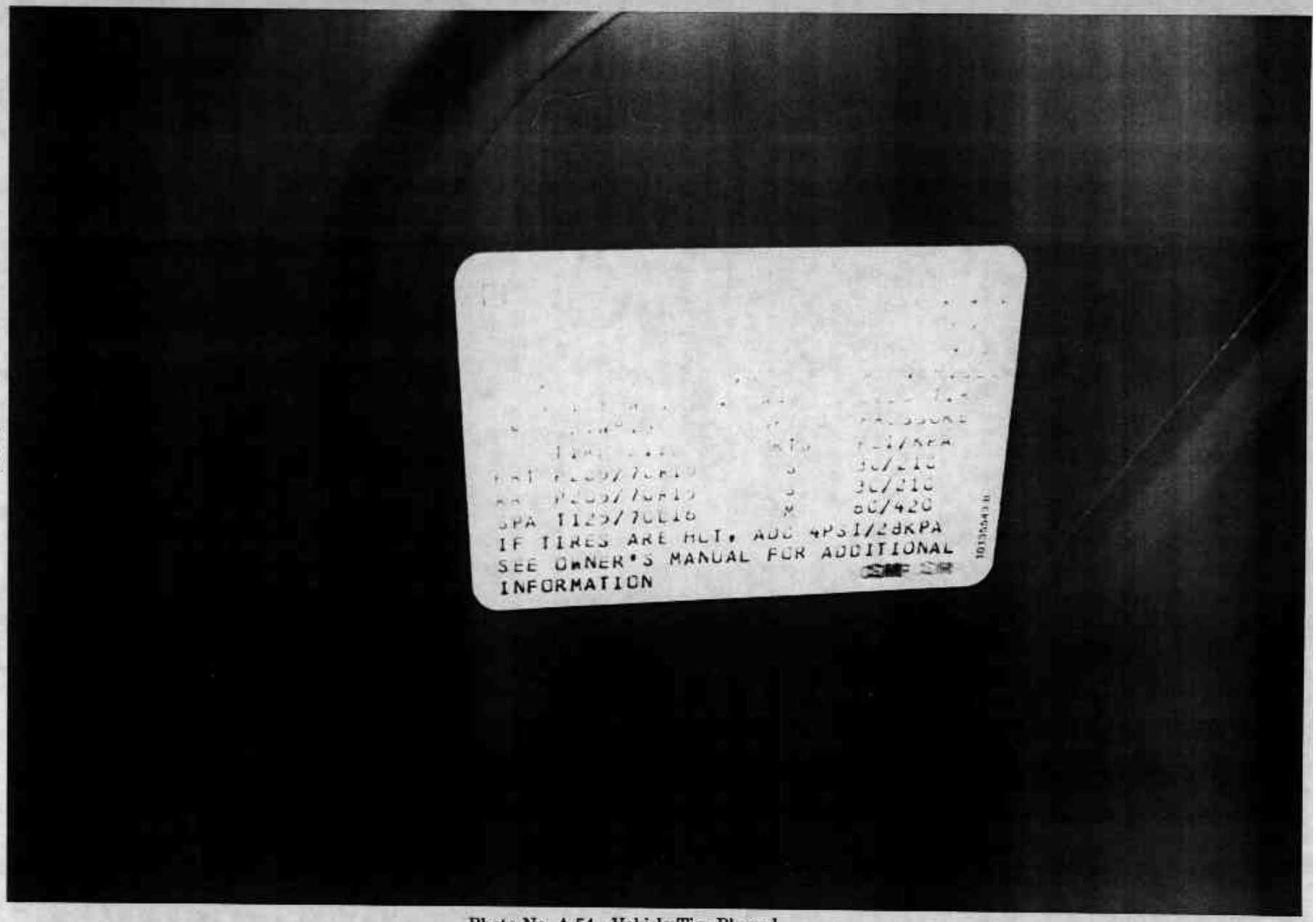
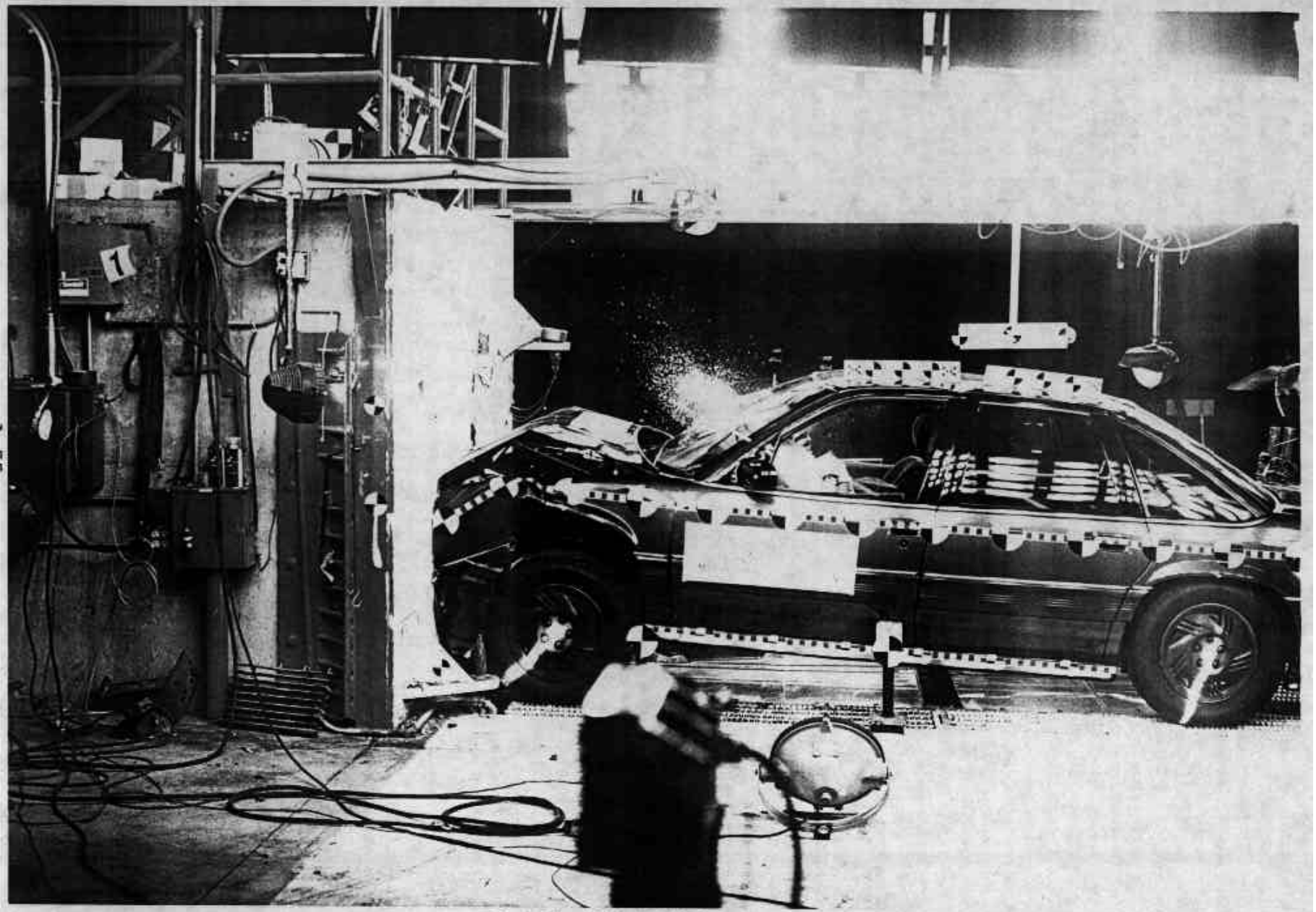



Photo No. A-54 - Vehicle Tire Placard

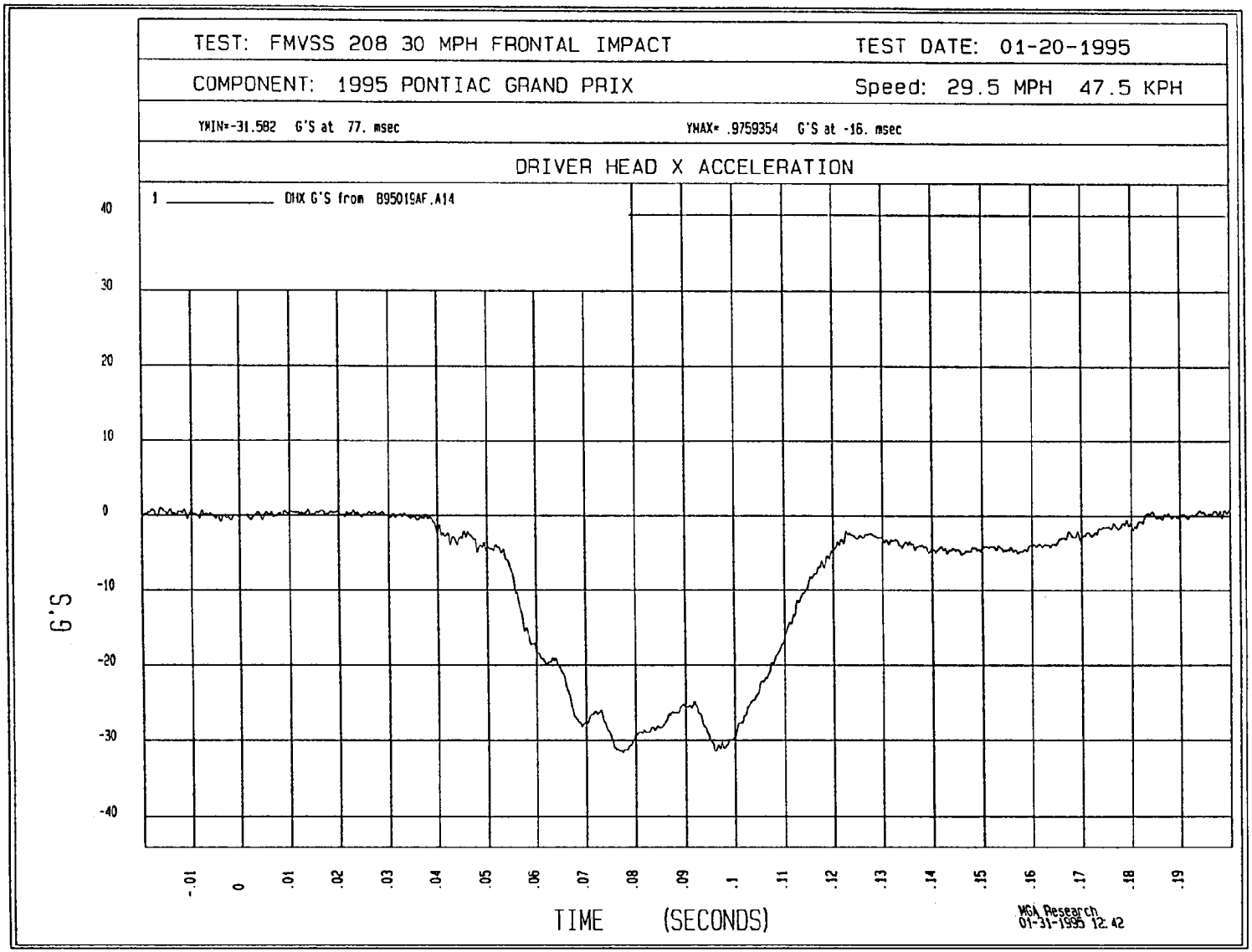



A-55

Photo No. A-55 - Vehicle Impact

# APPENDIX B
# DATA PLOTS

## TABLE OF DATA PLOTS




B-1

Figure B-1 - Driver Head X Acceleration vs. Time

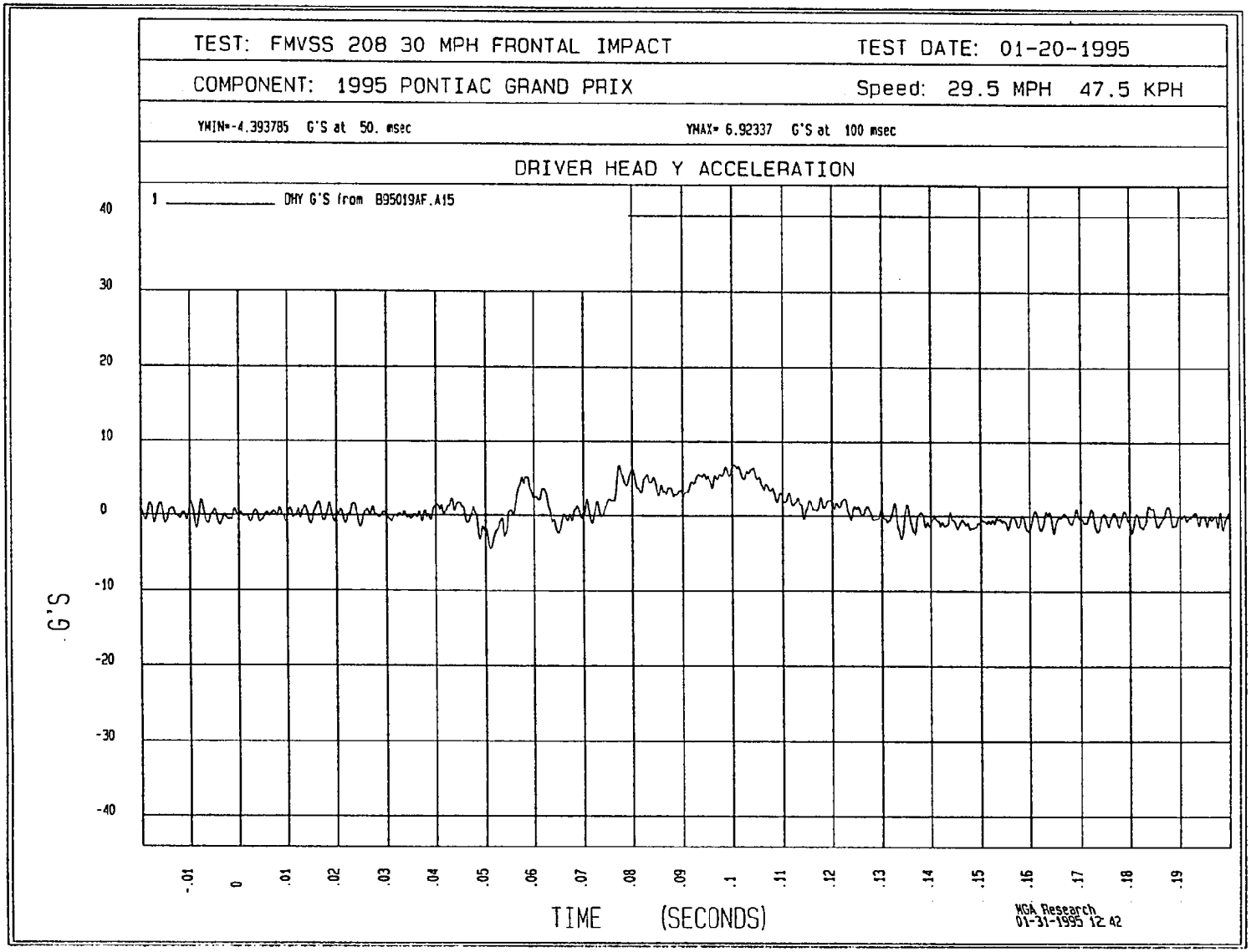



Figure B-2 - Driver Head Y Acceleration vs. Time

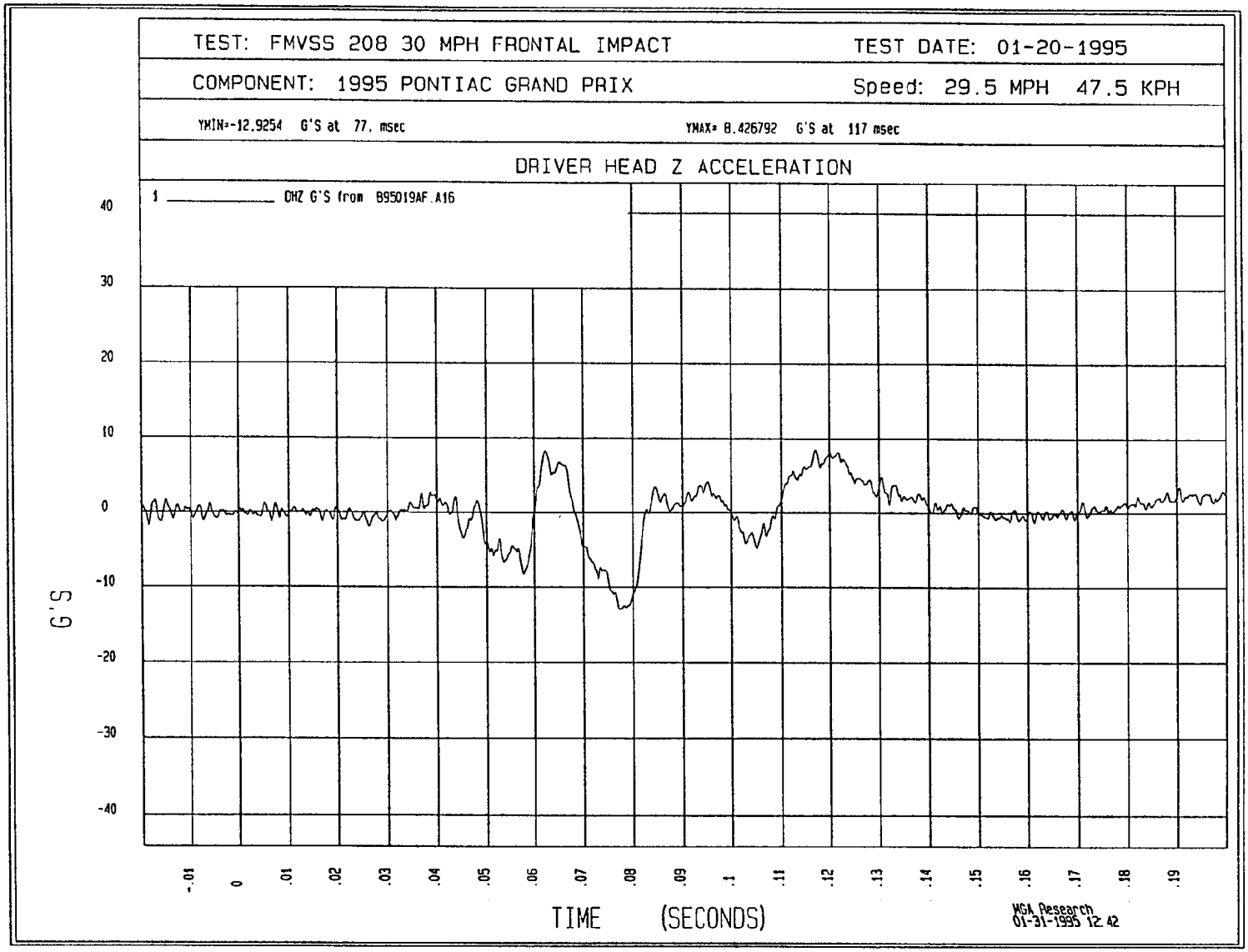



Figure B-3 - Driver Head Z Acceleration vs. Time

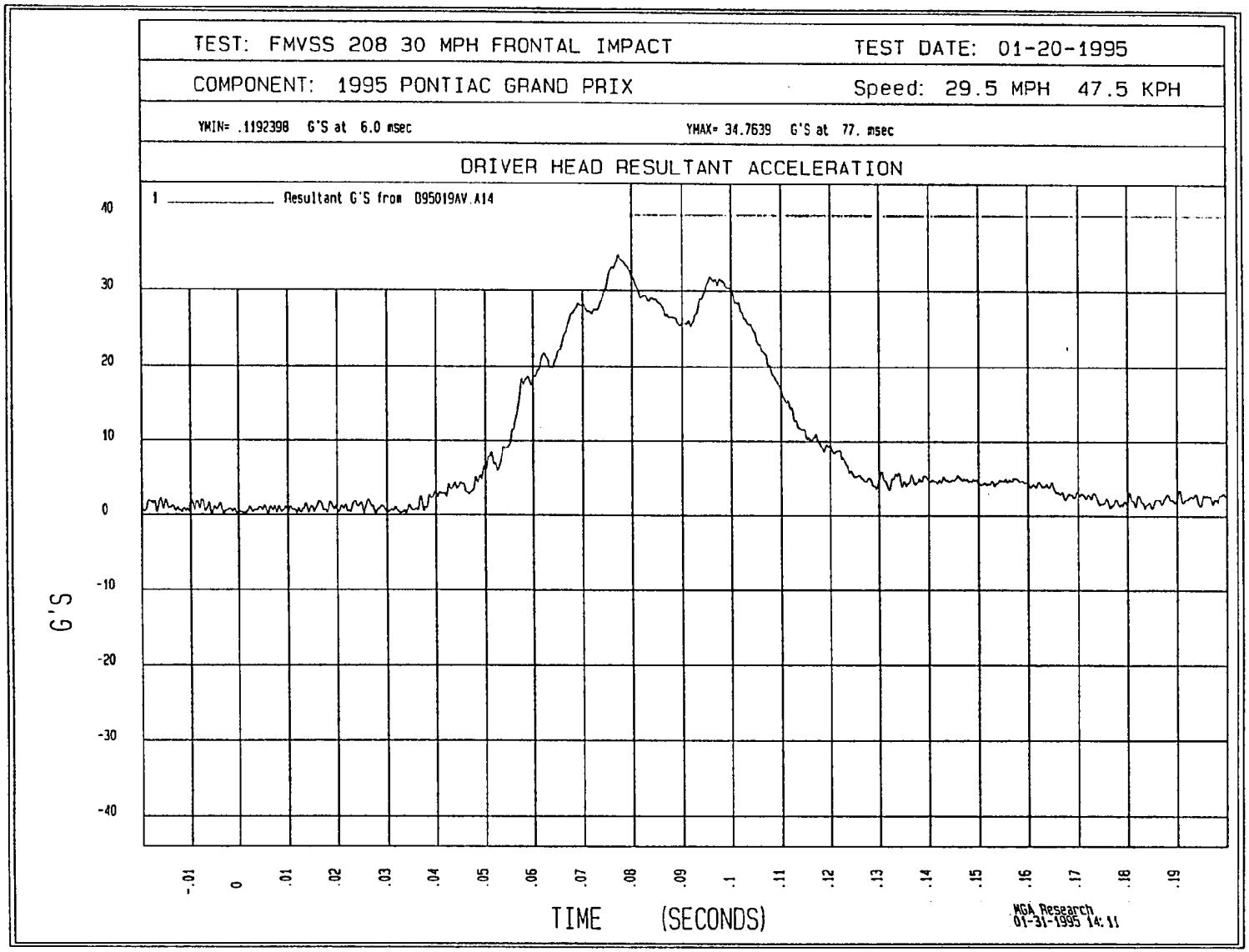



Figure B-4 - Driver Head Resultant Acceleration vs. Time

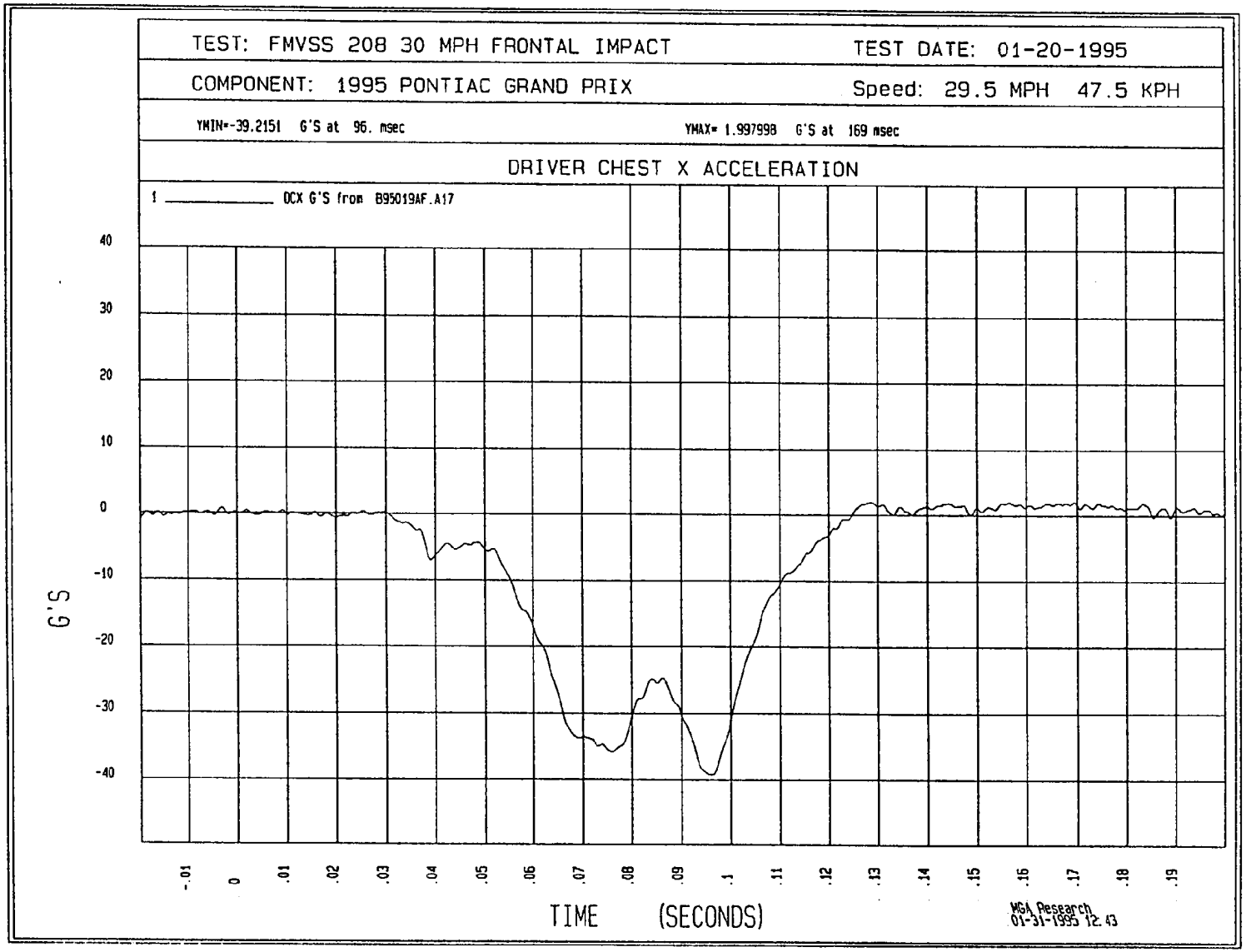



Figure B-5 - Driver Chest X Acceleration vs. Time

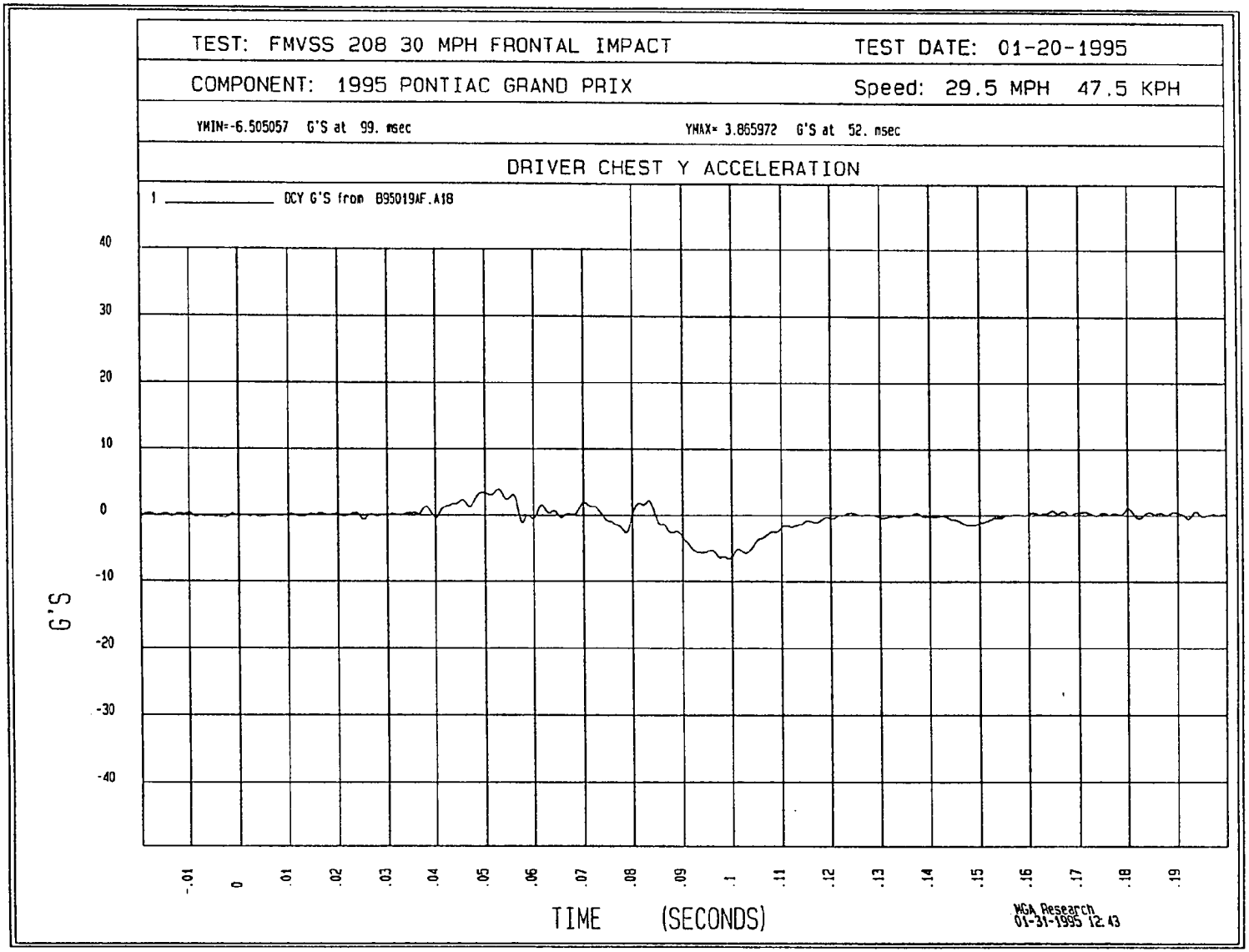



Figure B-6 - Driver Chest Y Acceleration vs. Time

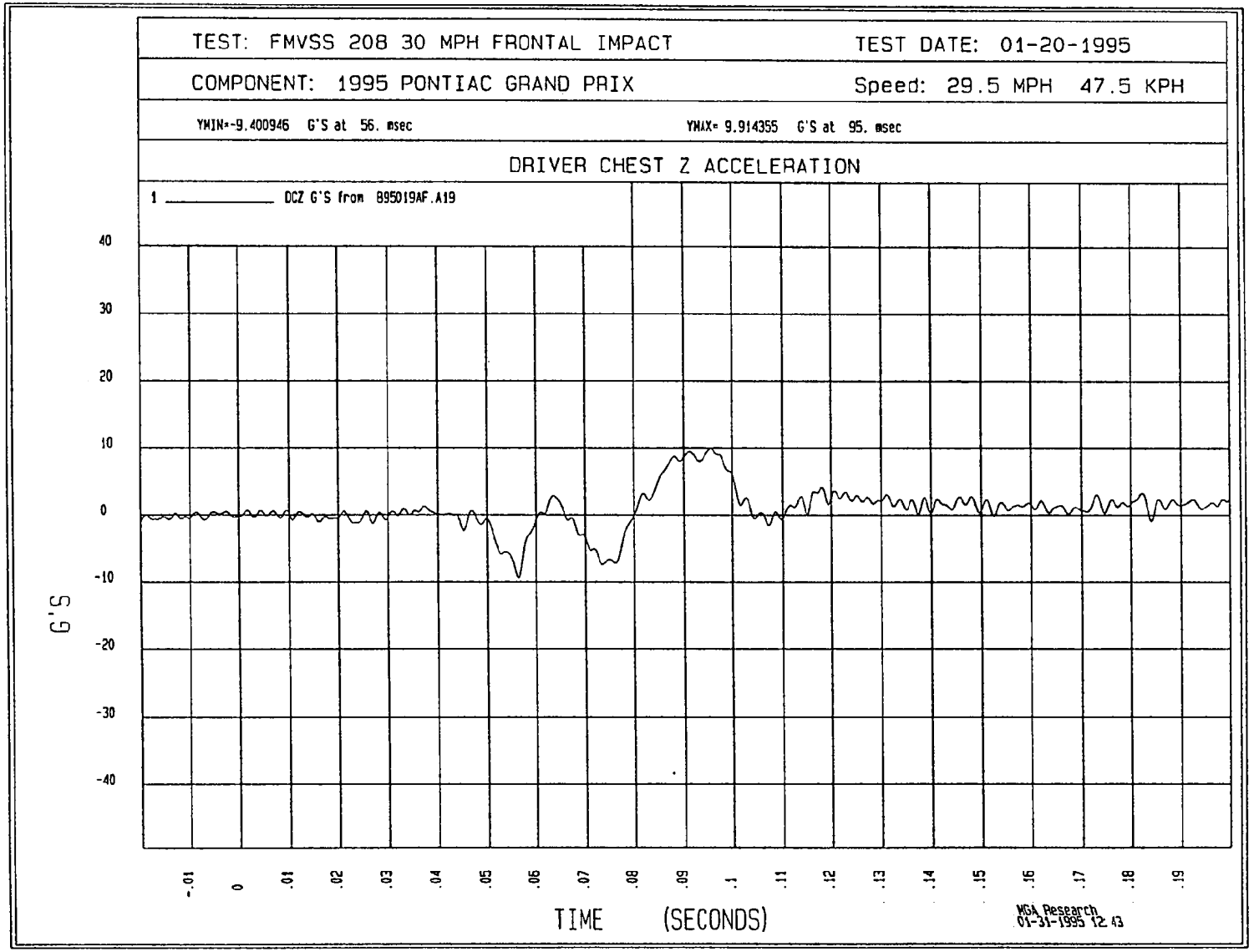



Figure B-7 - Driver Chest Z Acceleration vs. Time

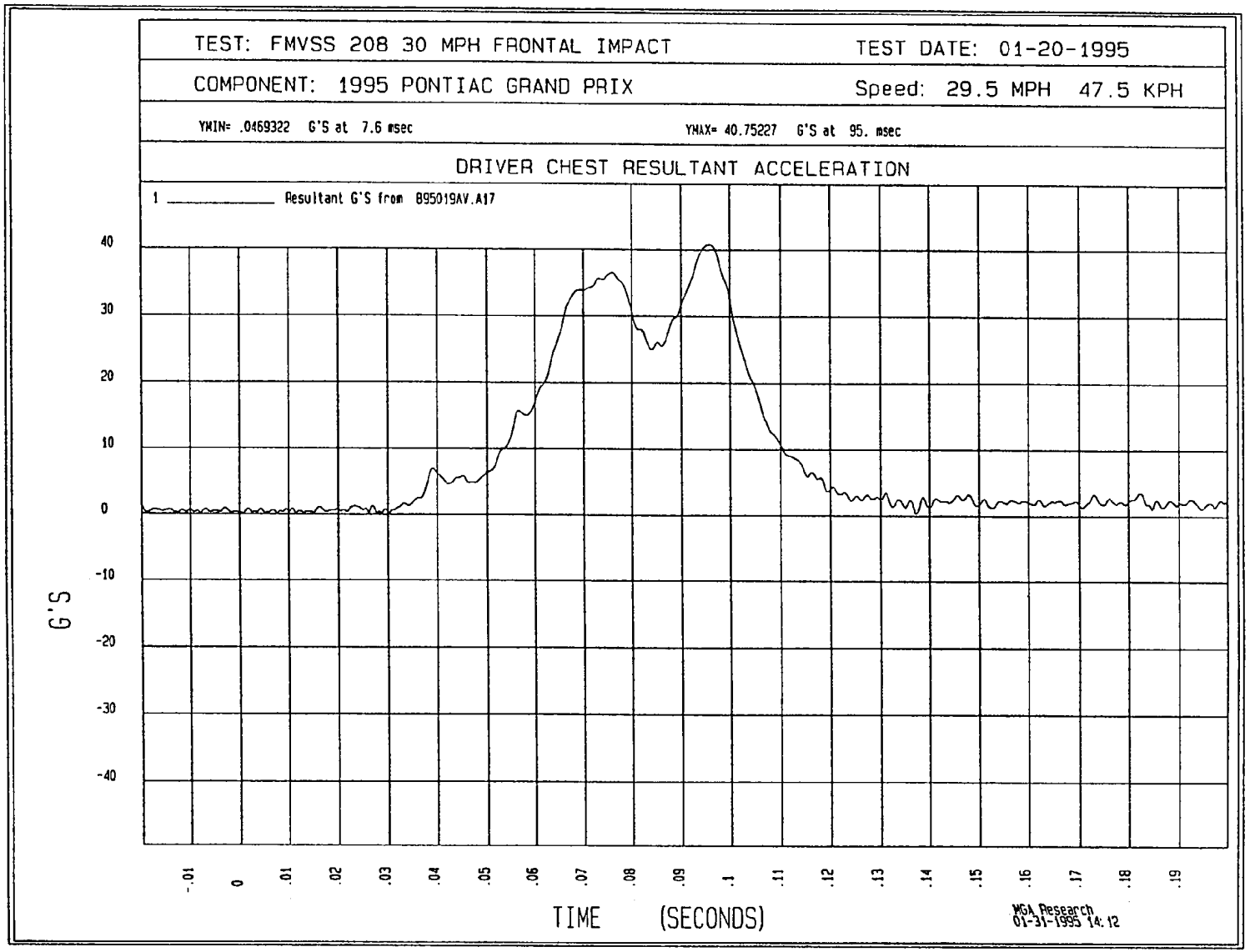



Figure B-8 - Driver Chest Resultant Acceleration vs. Time

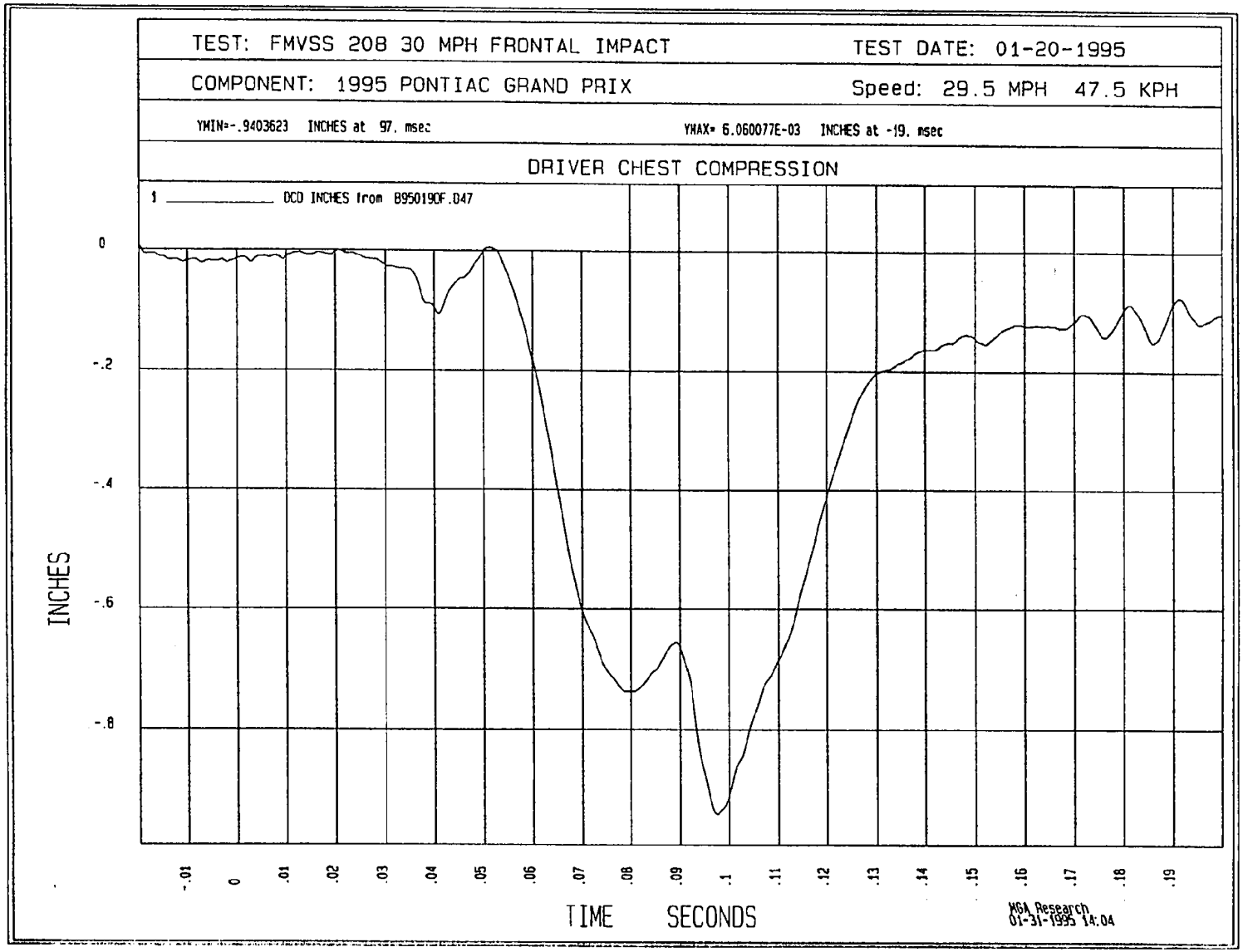



Figure B-9 - Driver Chest Compression

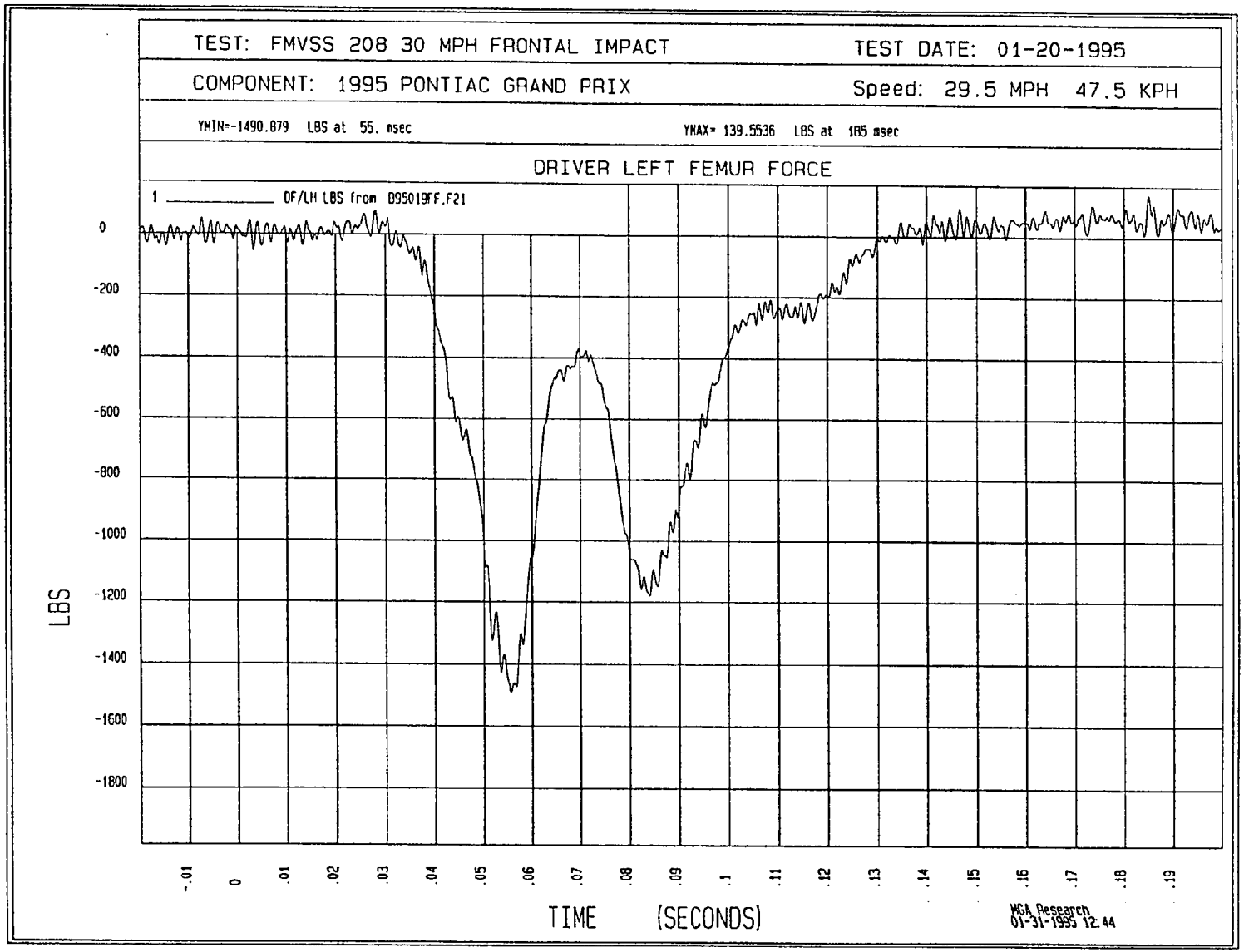



**Figure B-1Ø - Driver Left Femur Force vs. Time**

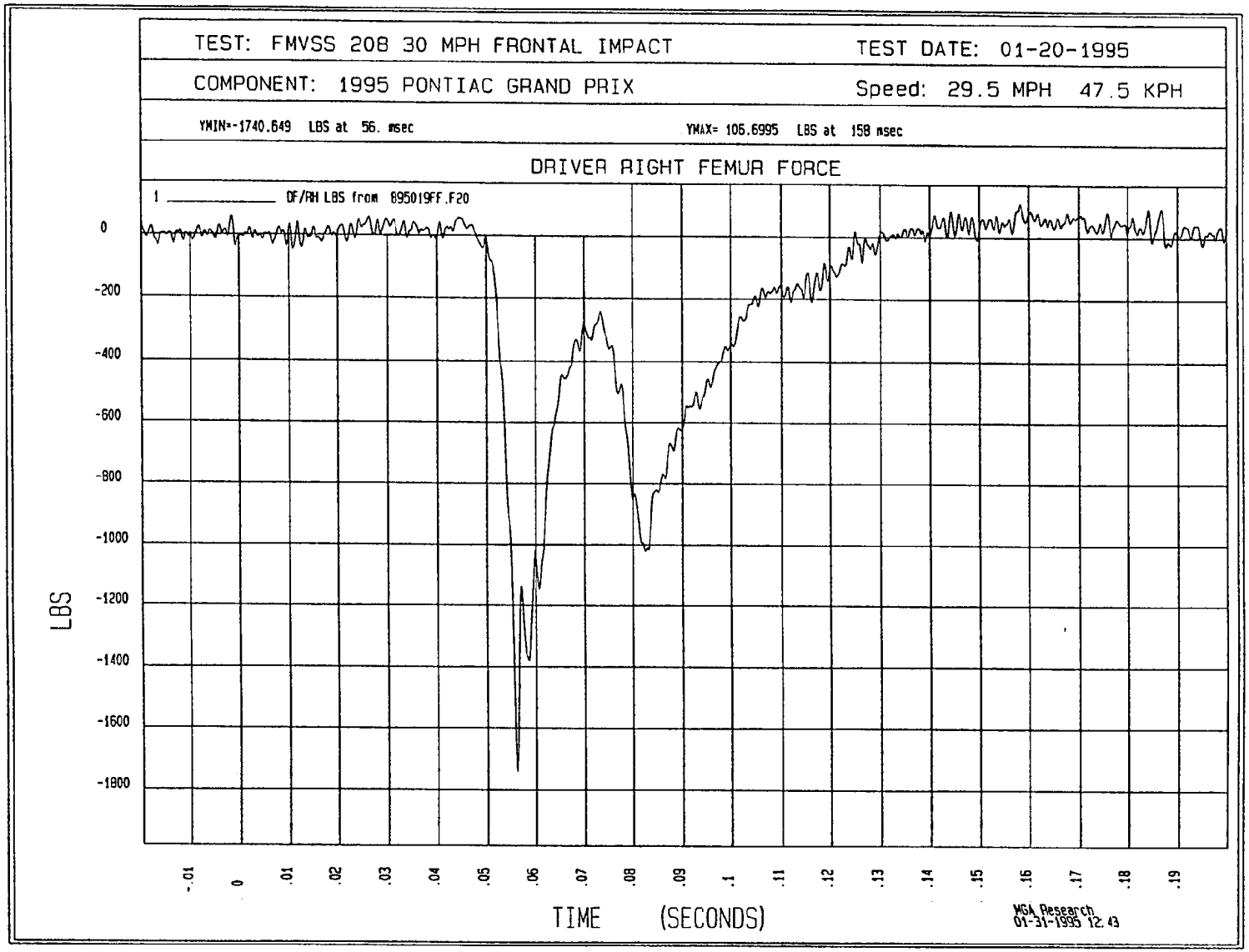



Figure B-11 - Driver Right Femur Force vs. Time

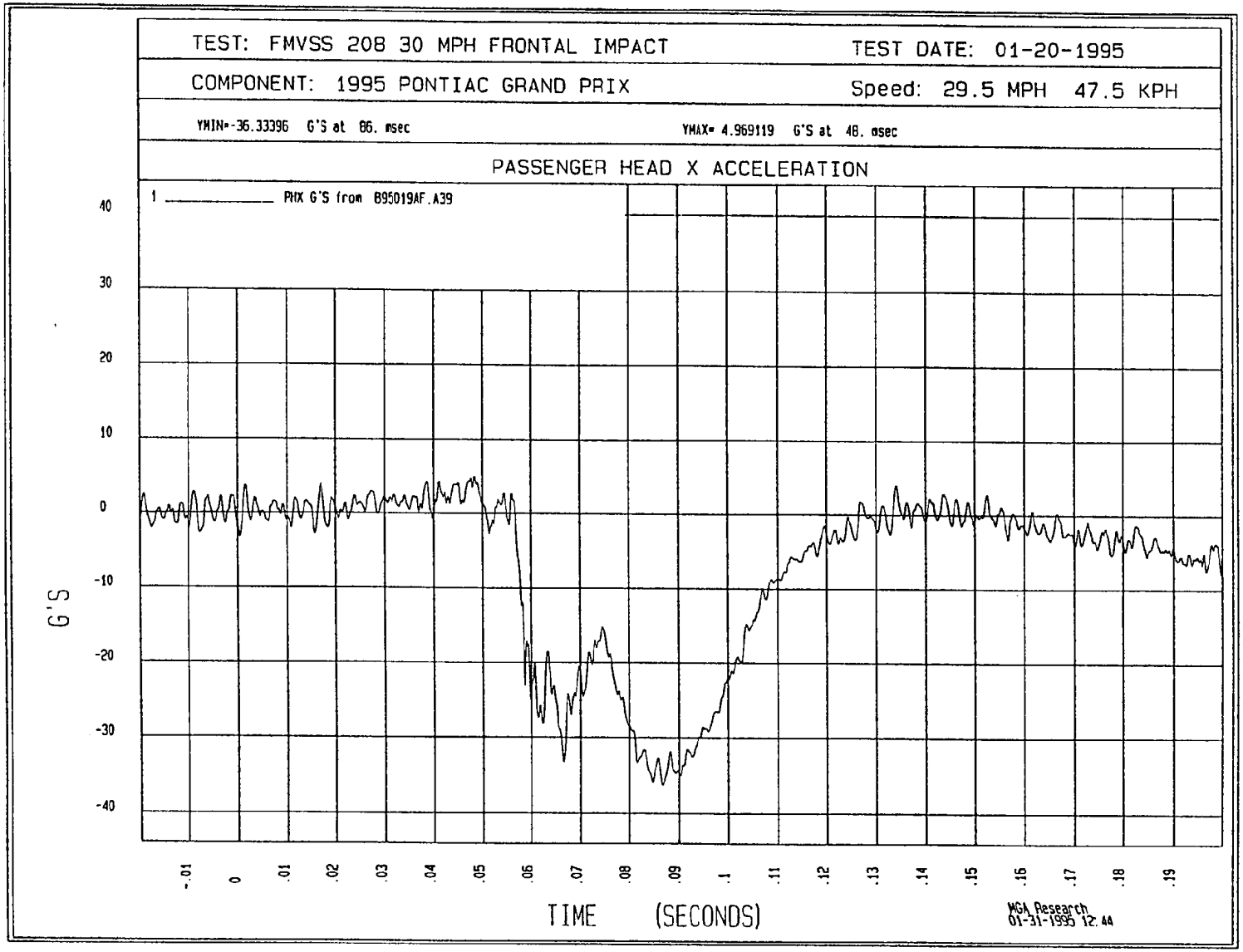



Figure B-12 - Passenger Head X Acceleration vs. Time

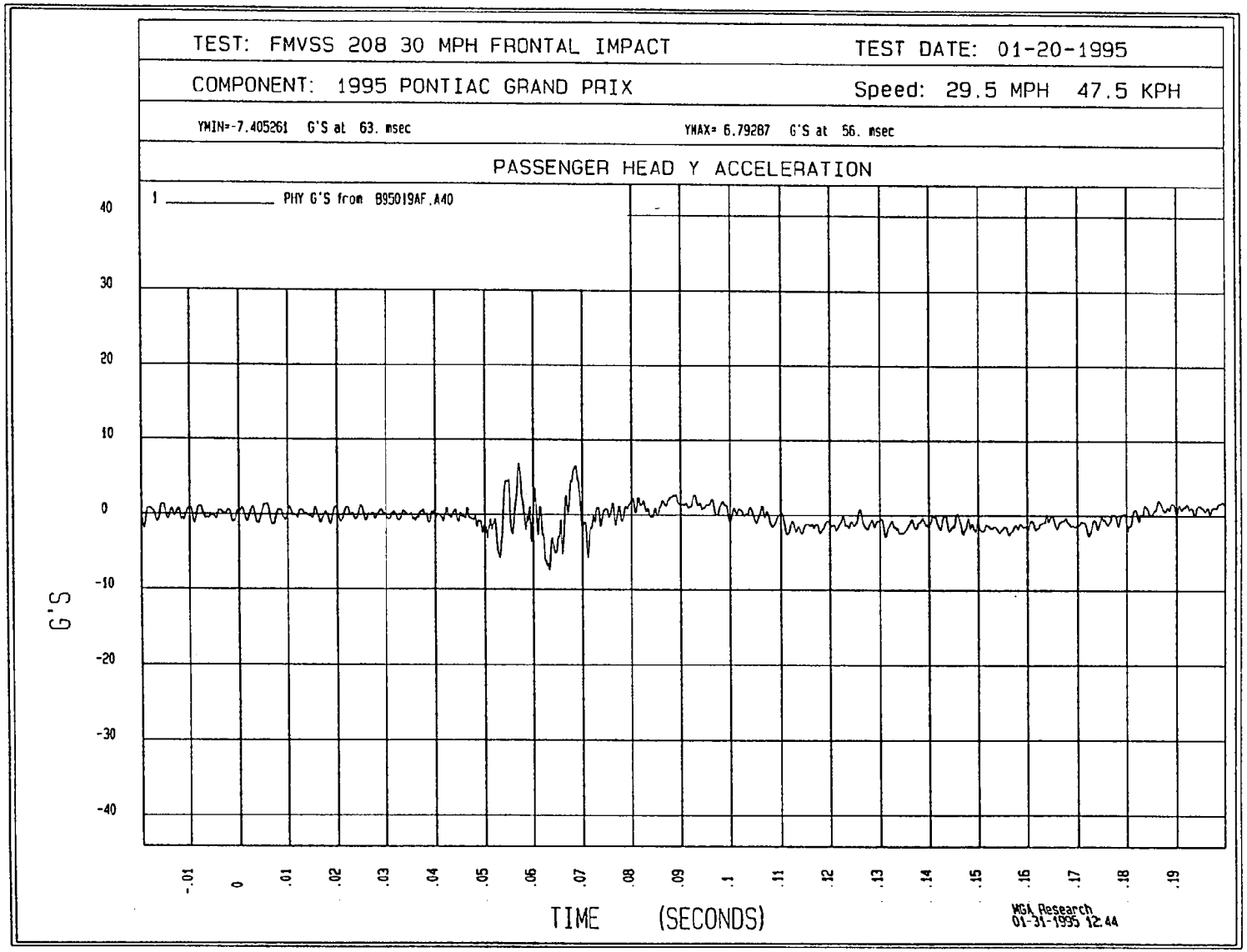



Figure B-13 - Passenger Head Y Acceleration vs. Time

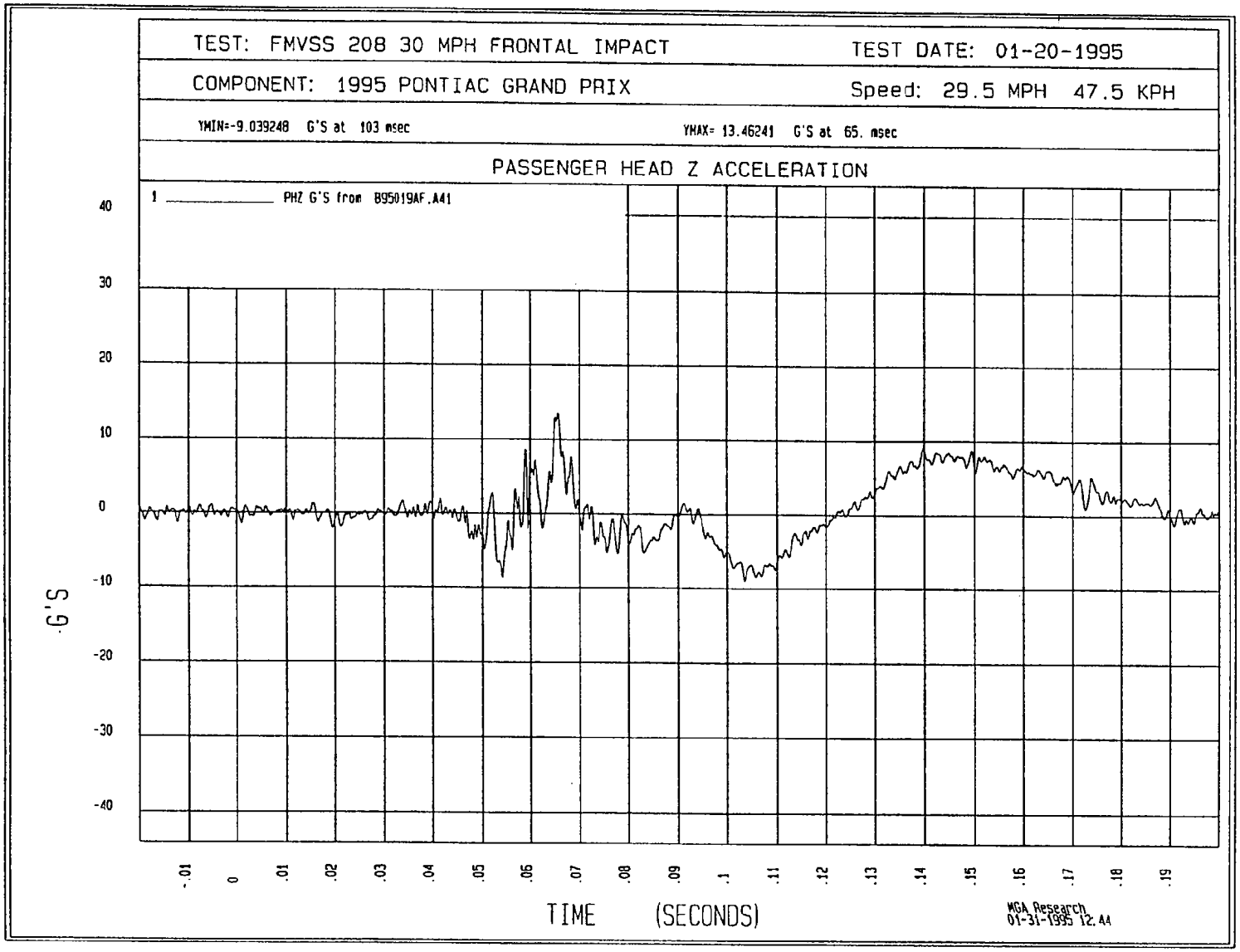



Figure B-14 - Passenger Head Z Acceleration vs. Time

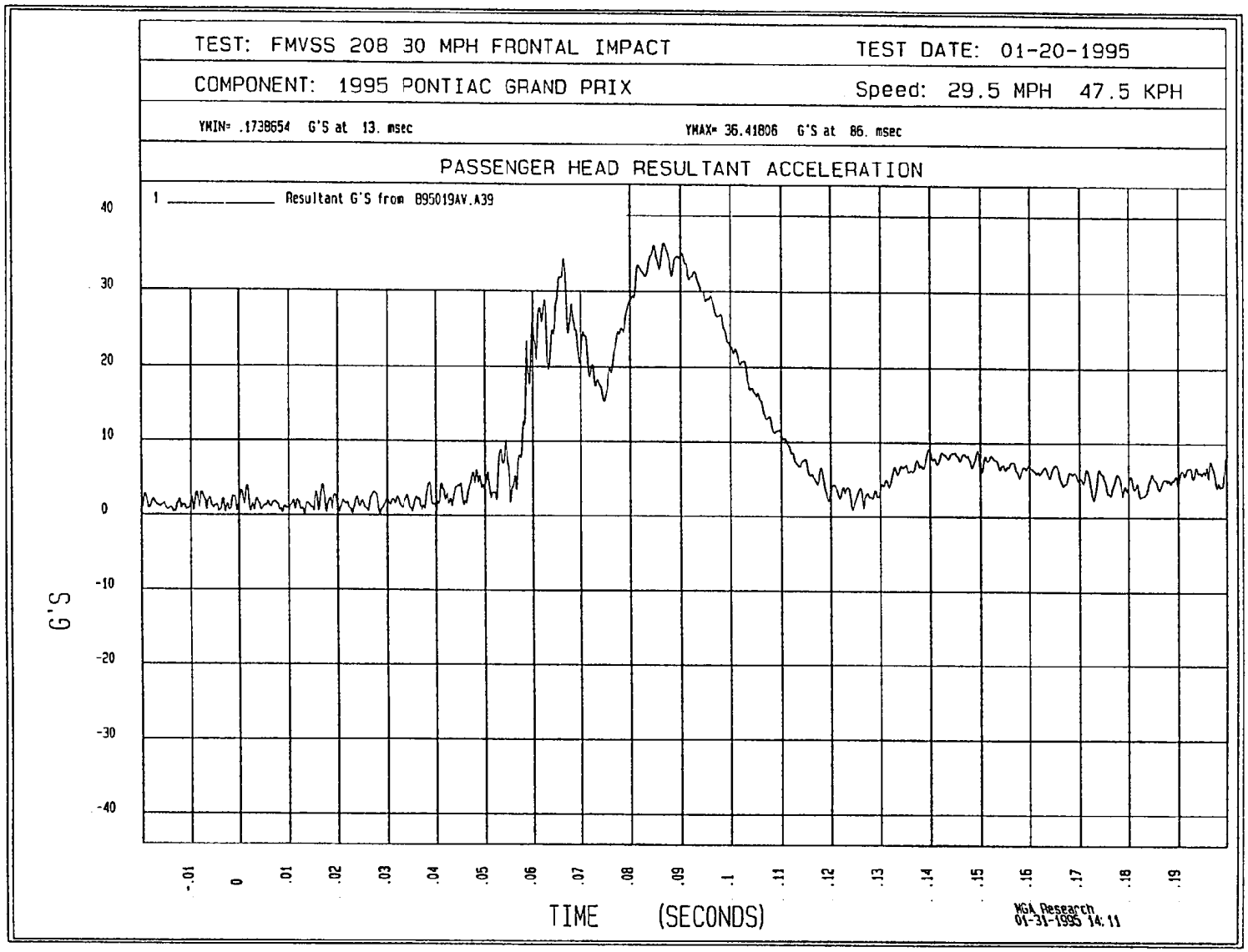



Figure B-15 - Passenger Head Resultant Acceleration vs. Time

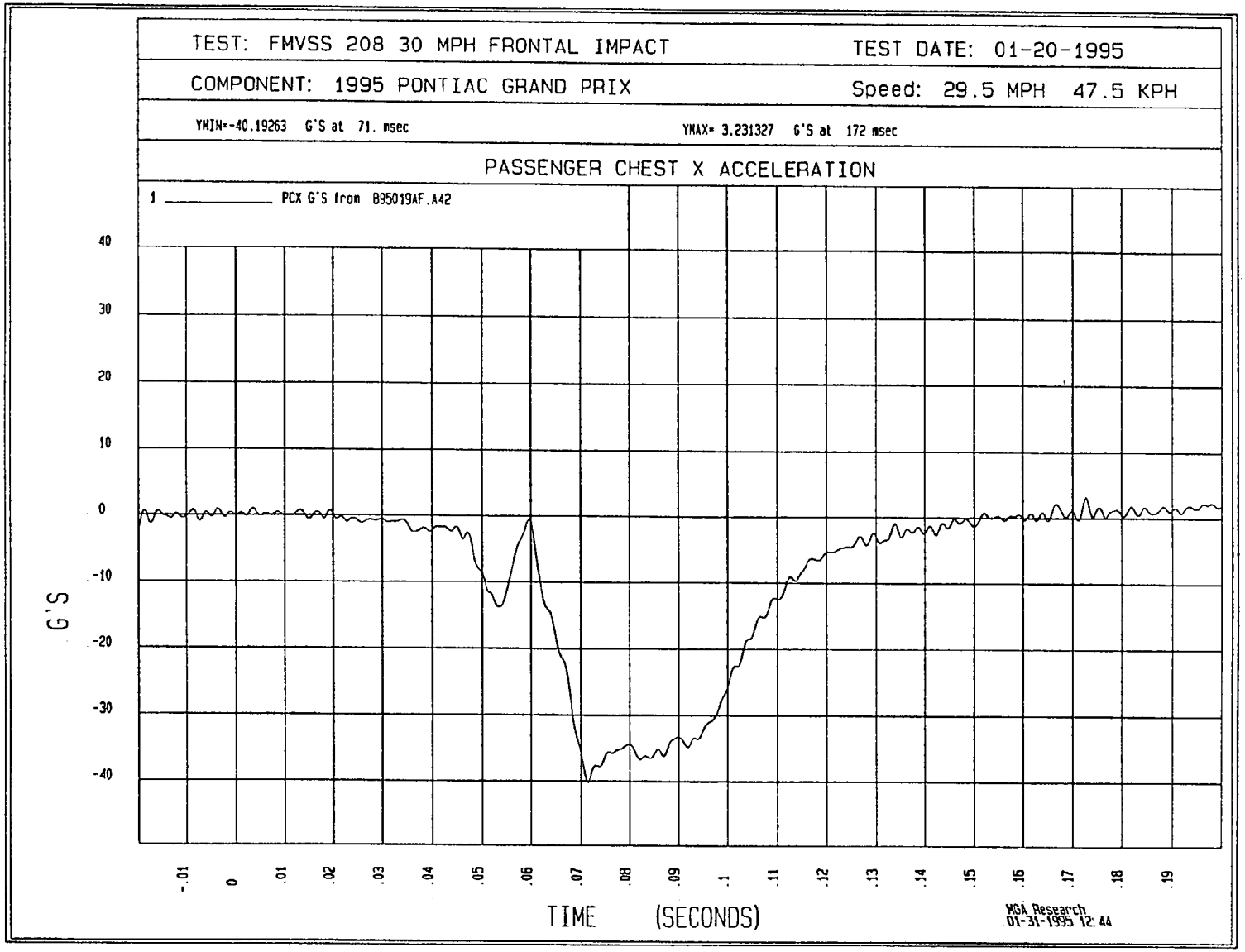



Figure B-16 - Passenger Chest X Acceleration vs. Time

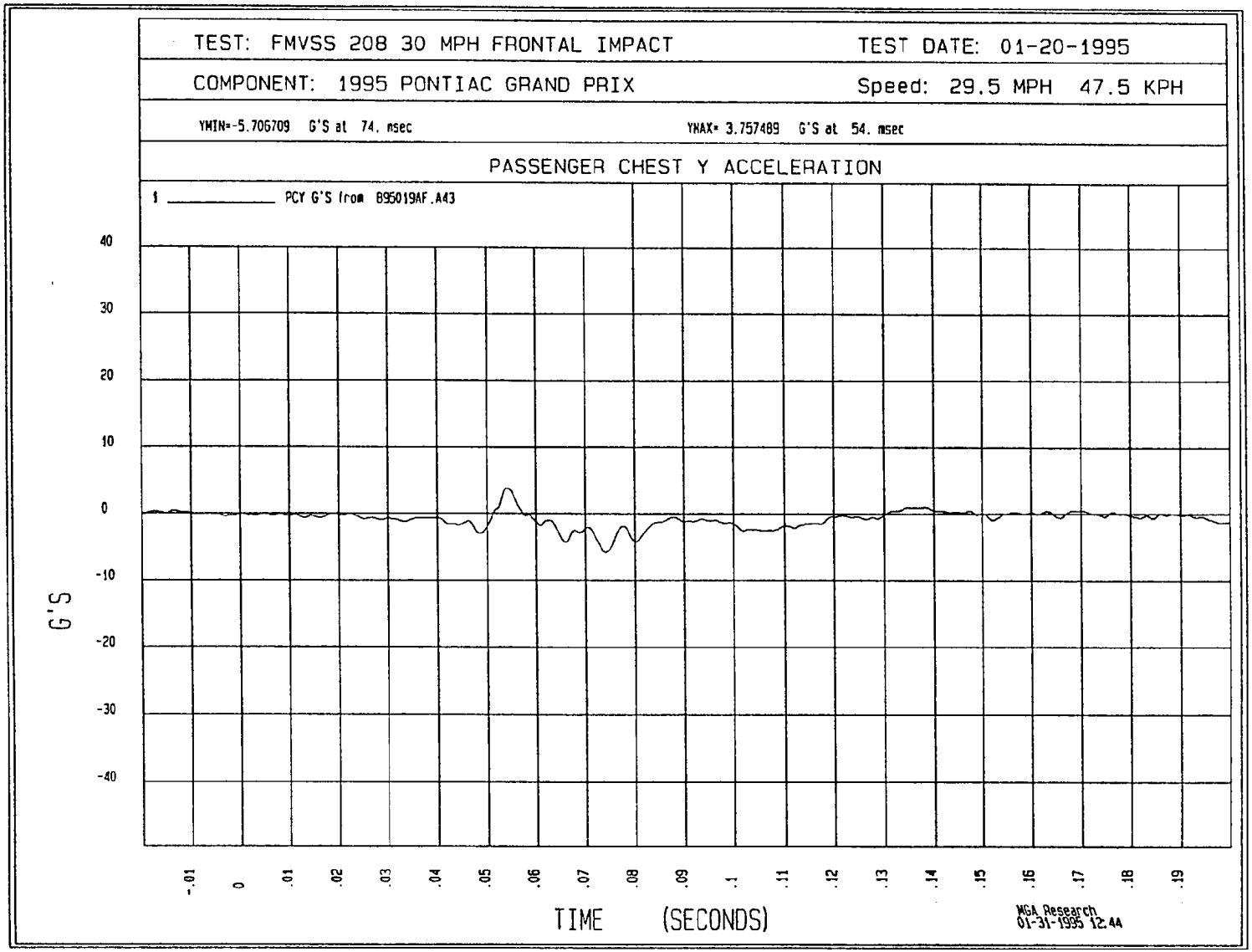



Figure B-17 - Passenger Chest Y Acceleration vs. Time

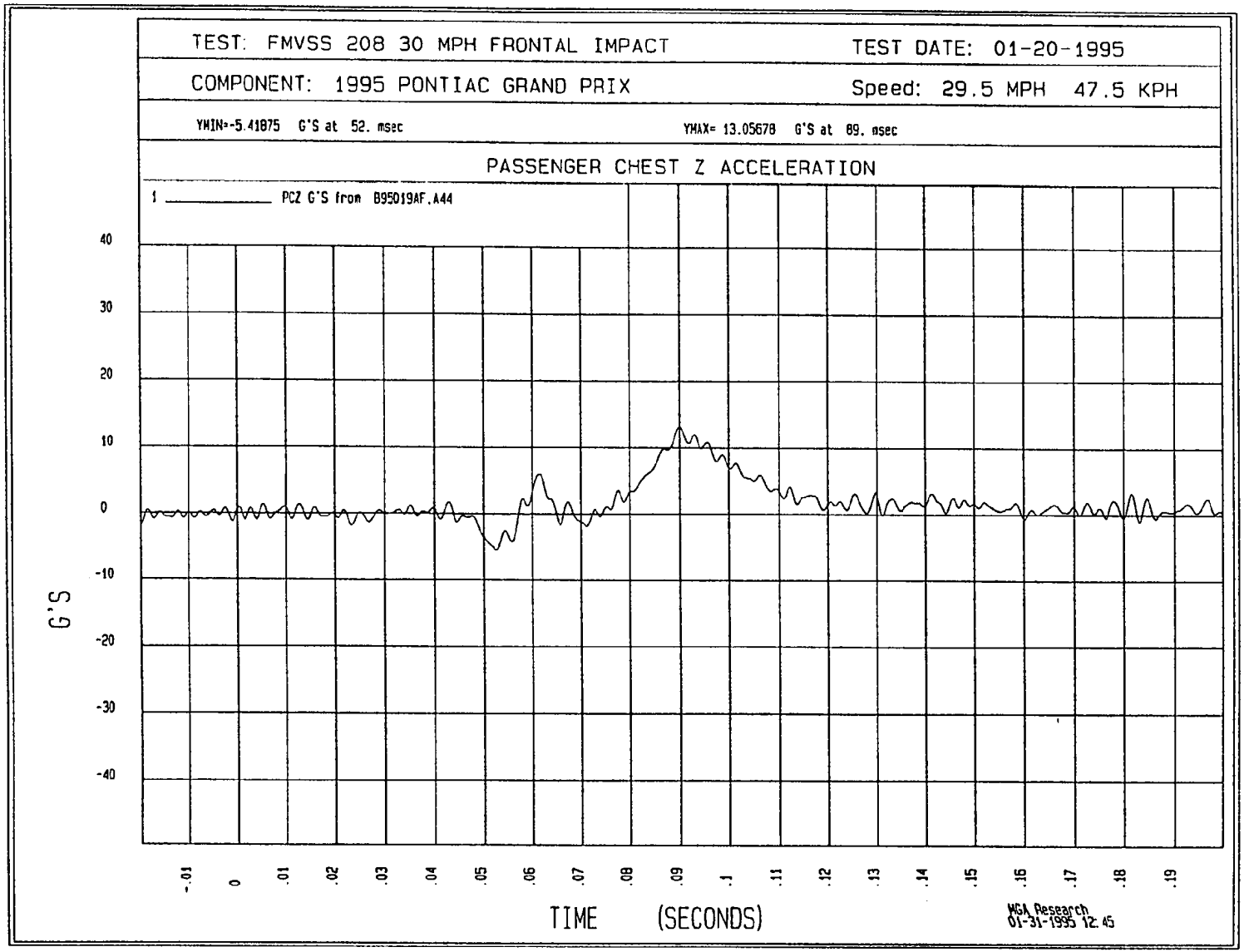



Figure B-18 - Passenger Chest Z Acceleration vs. Time

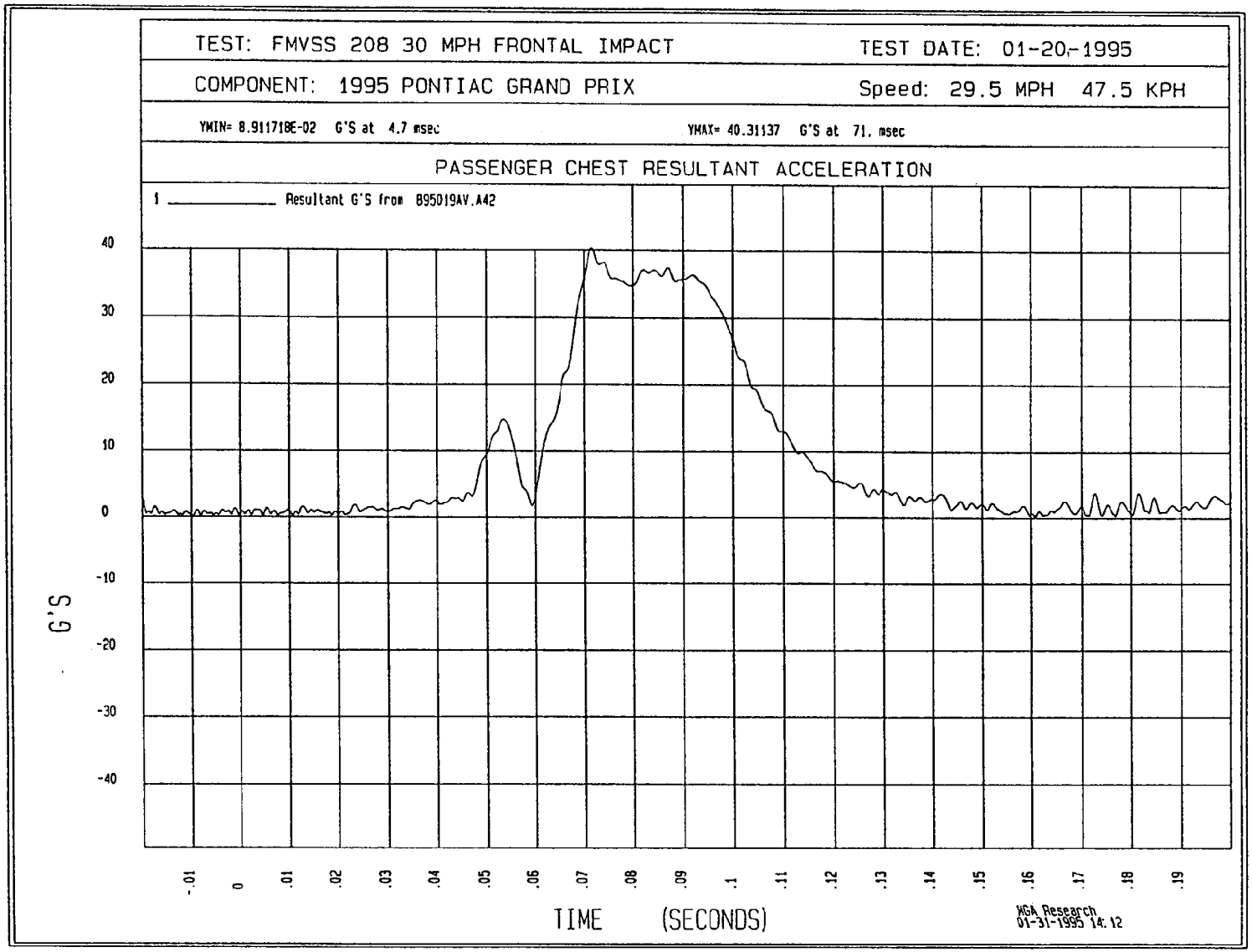



Figure B-19 - Passenger Chest Resultant Acceleration vs. Time

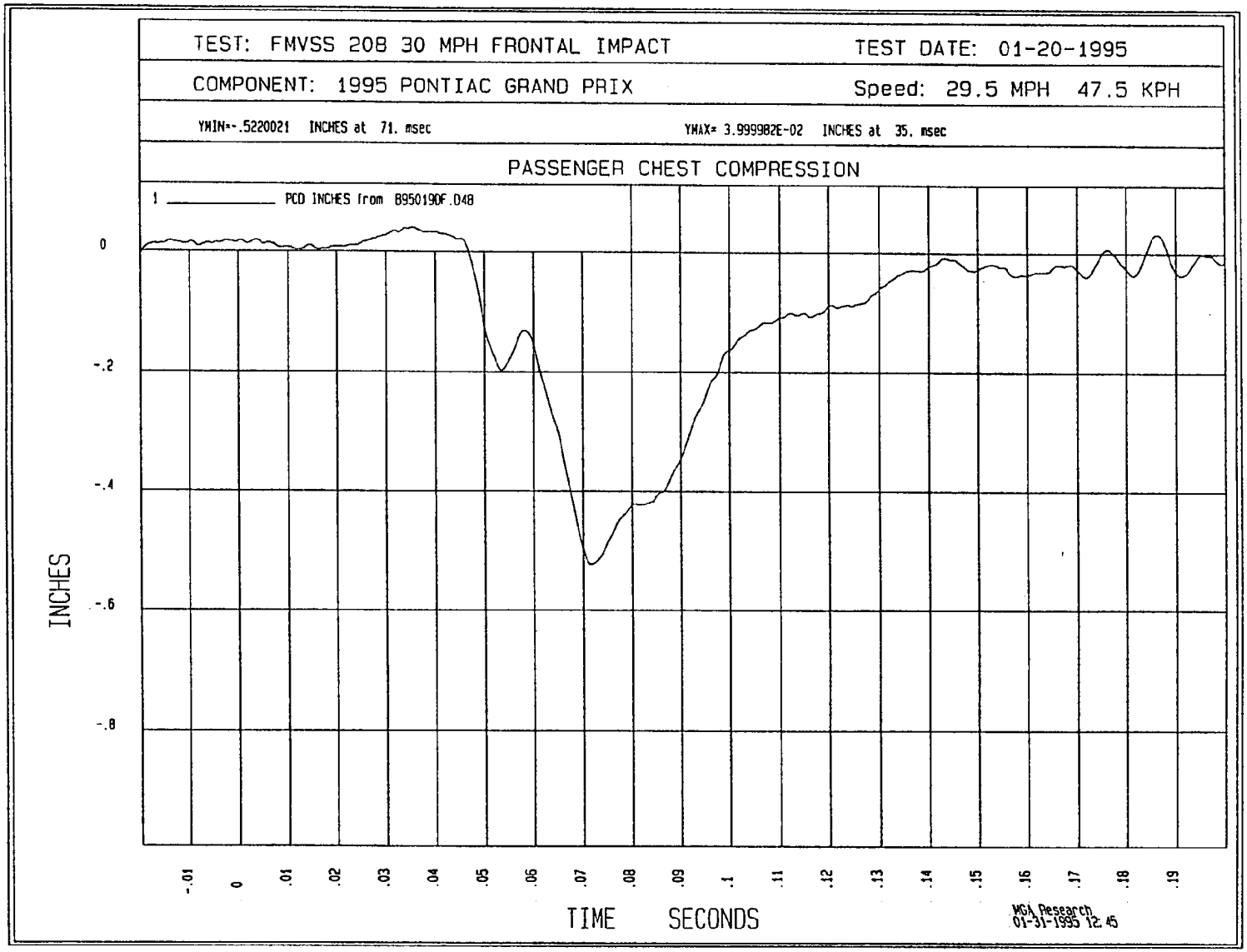



Figure B-2Ø - Passenger Chest Compression

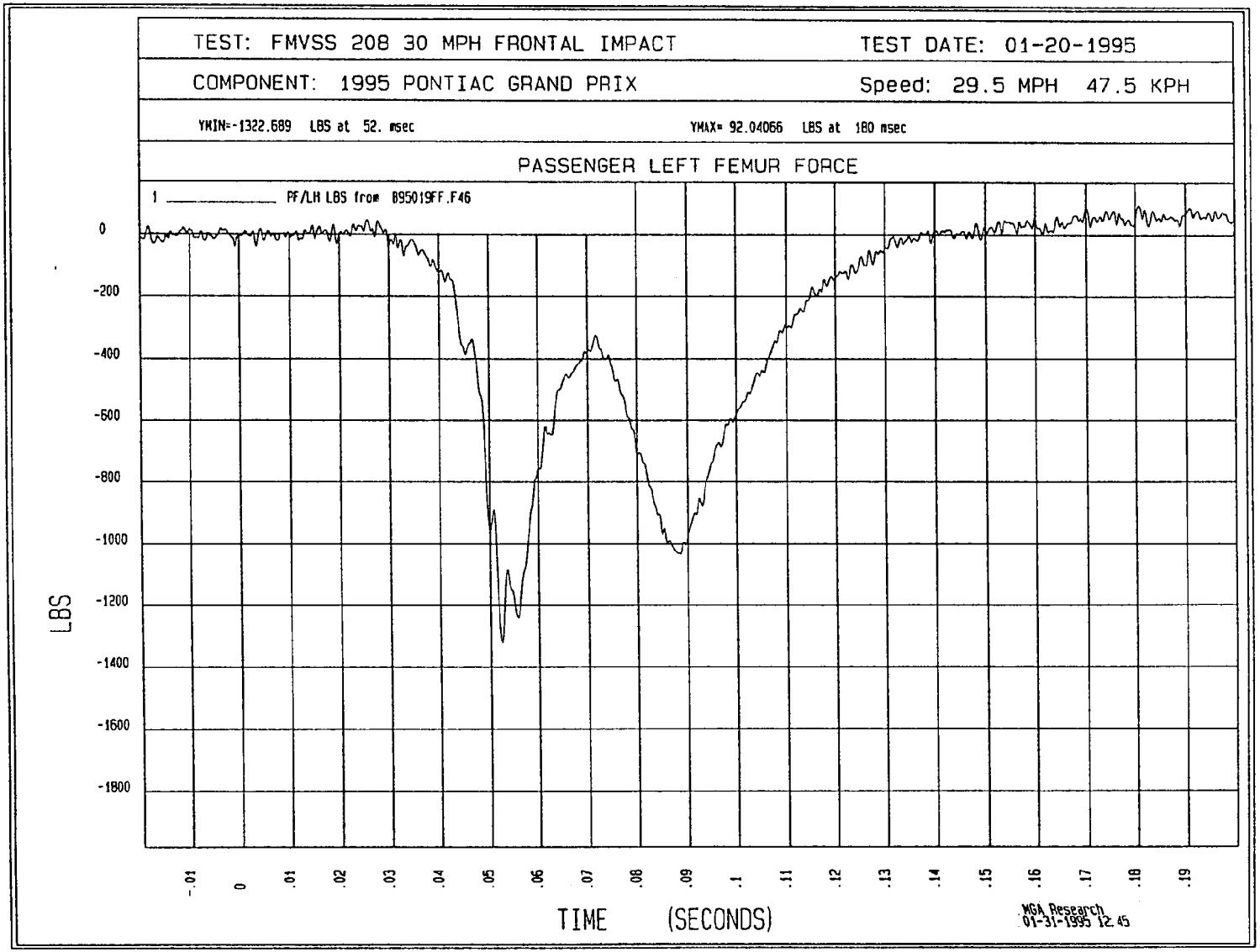



Figure B-21 - Passenger Left Femur Force vs. Time

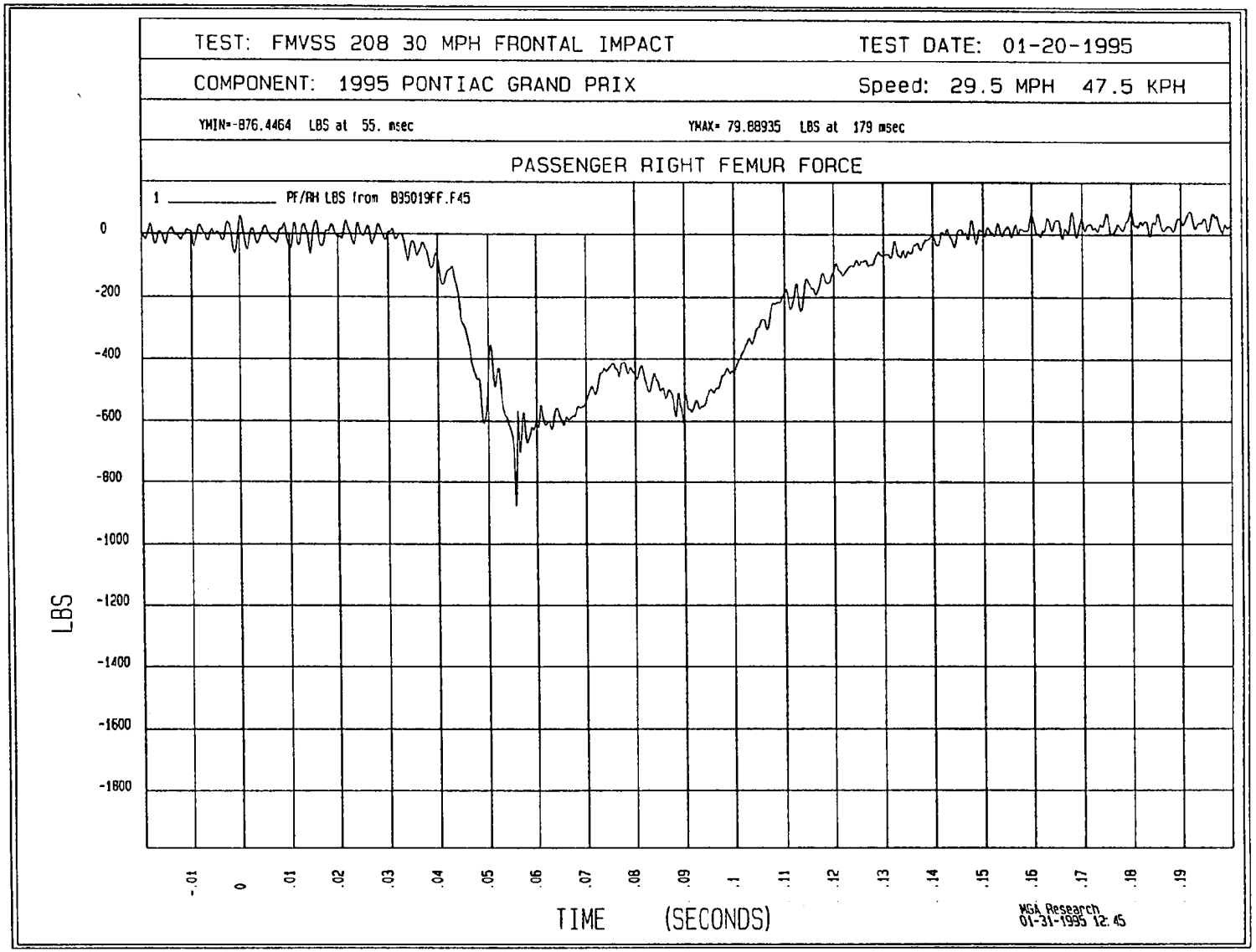



Figure B-22 - Passenger Right Femur Force vs. Time

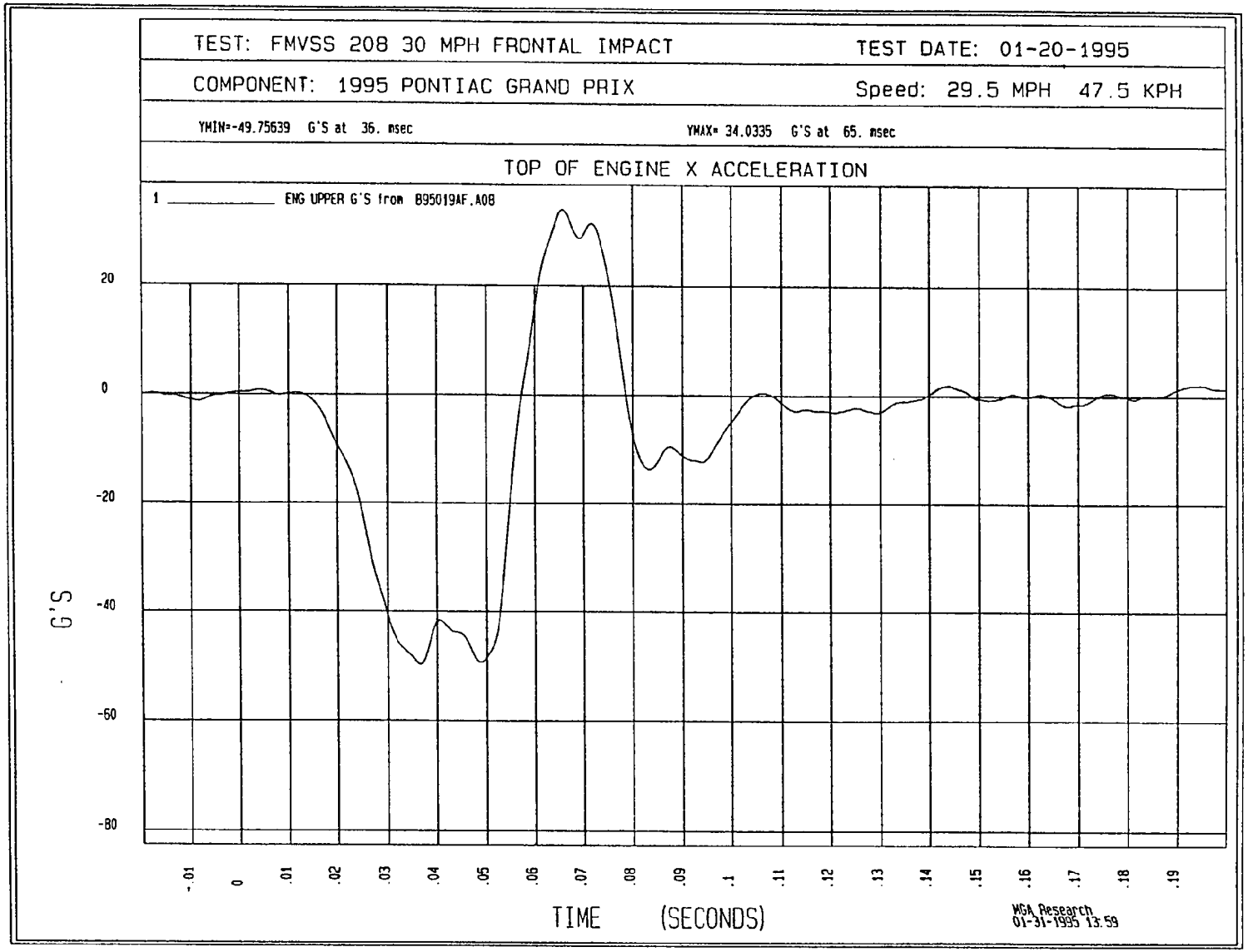



Figure B-23 - Top of Engine Block X Acceleration vs. Time

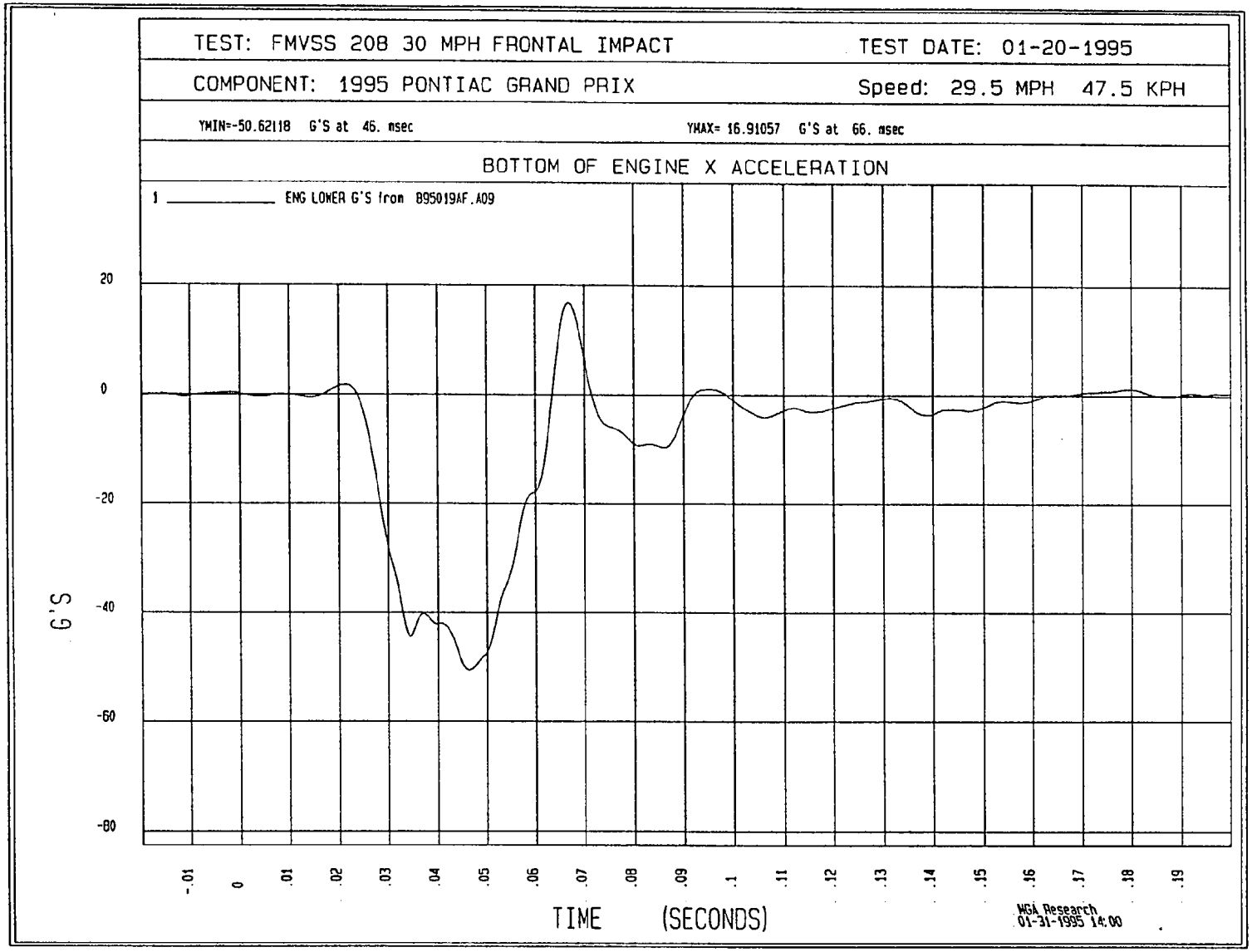



Figure B-24 - Bottom of Engine Block X Acceleration vs. Time

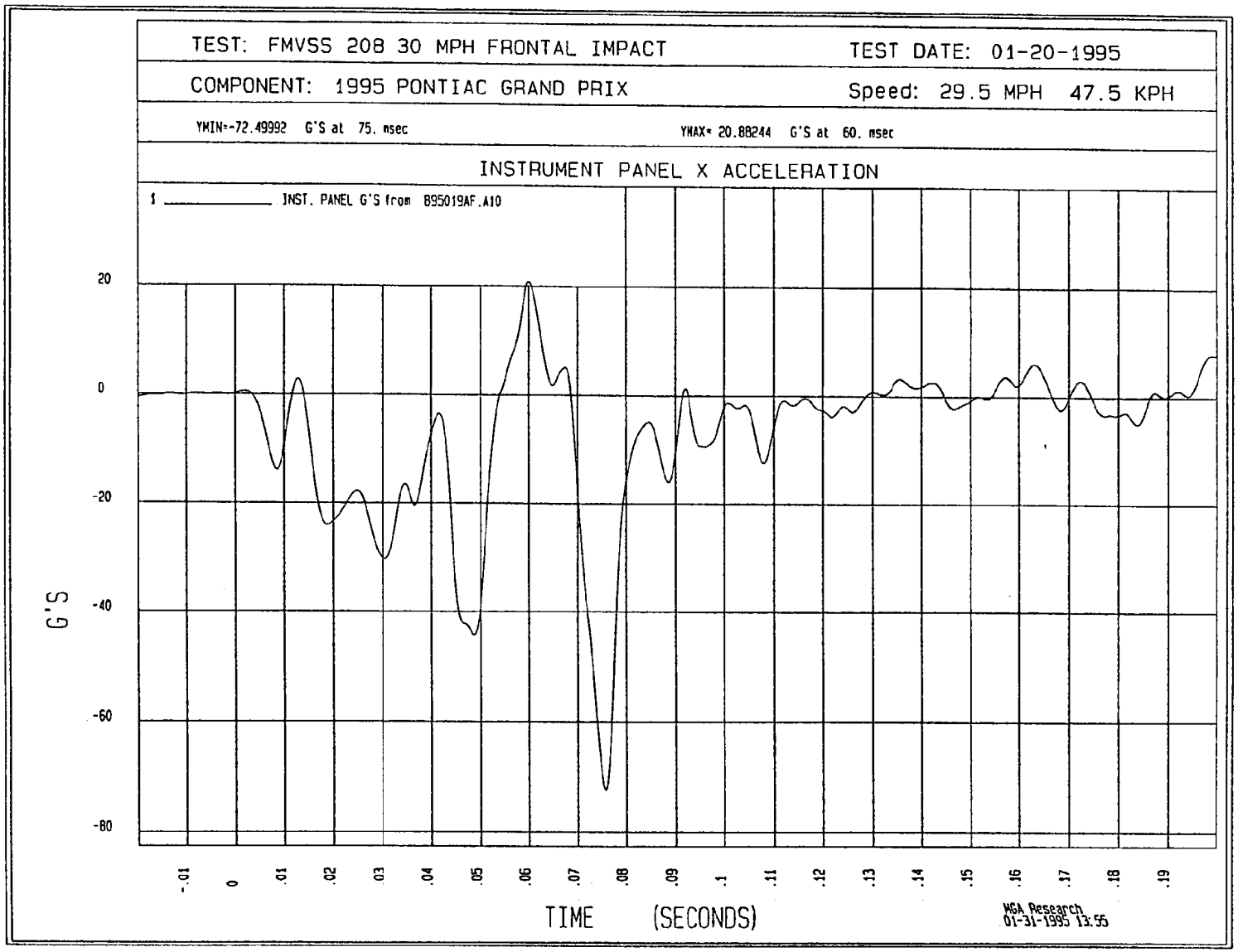



Figure B-25 - Instrument Panel X Acceleration vs. Time

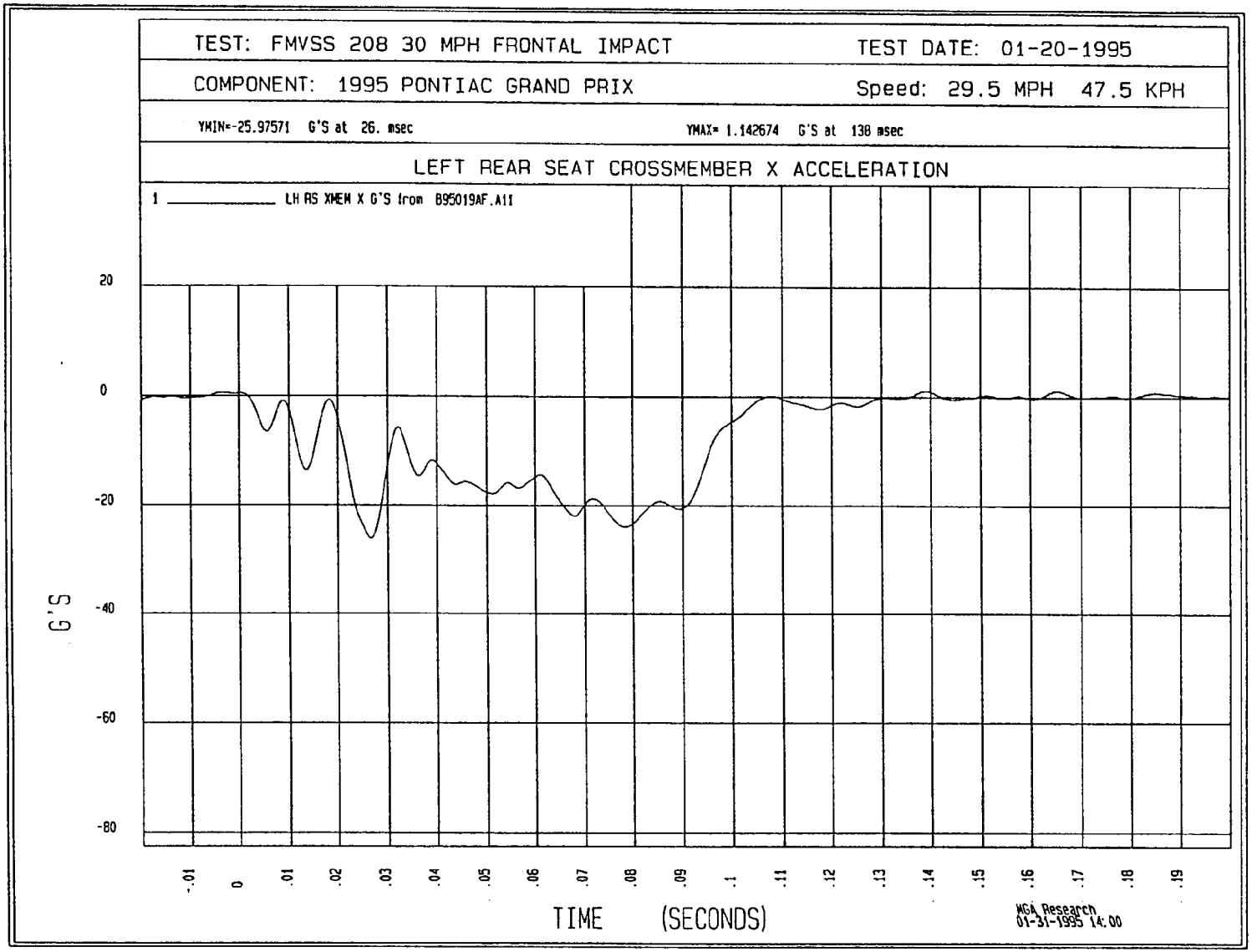



Figure B-26 - Left Rear Seat Crossmember X Acceleration vs. Time

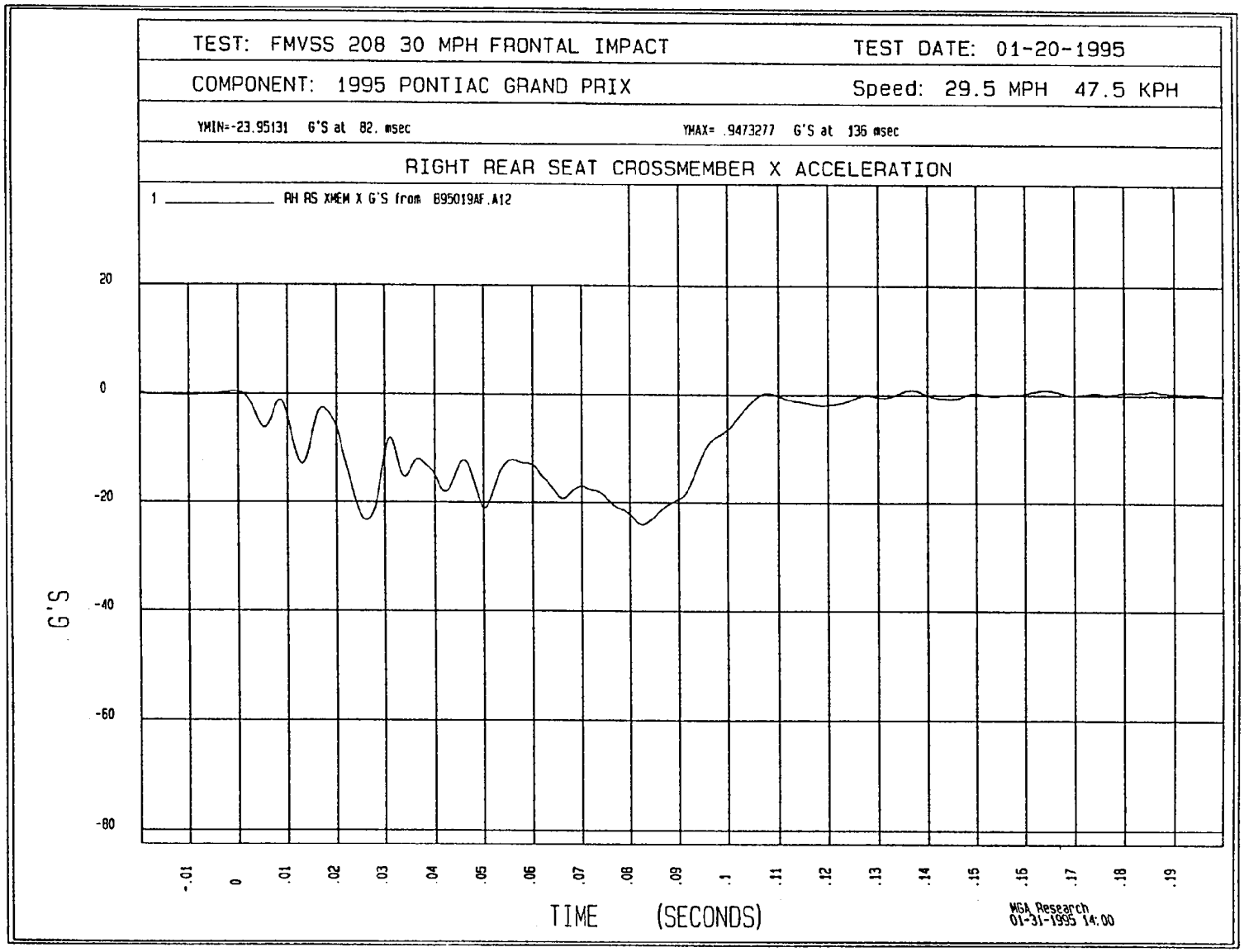



Figure B-27 - Right Rear Seat Crossmember X Acceleration vs. Time

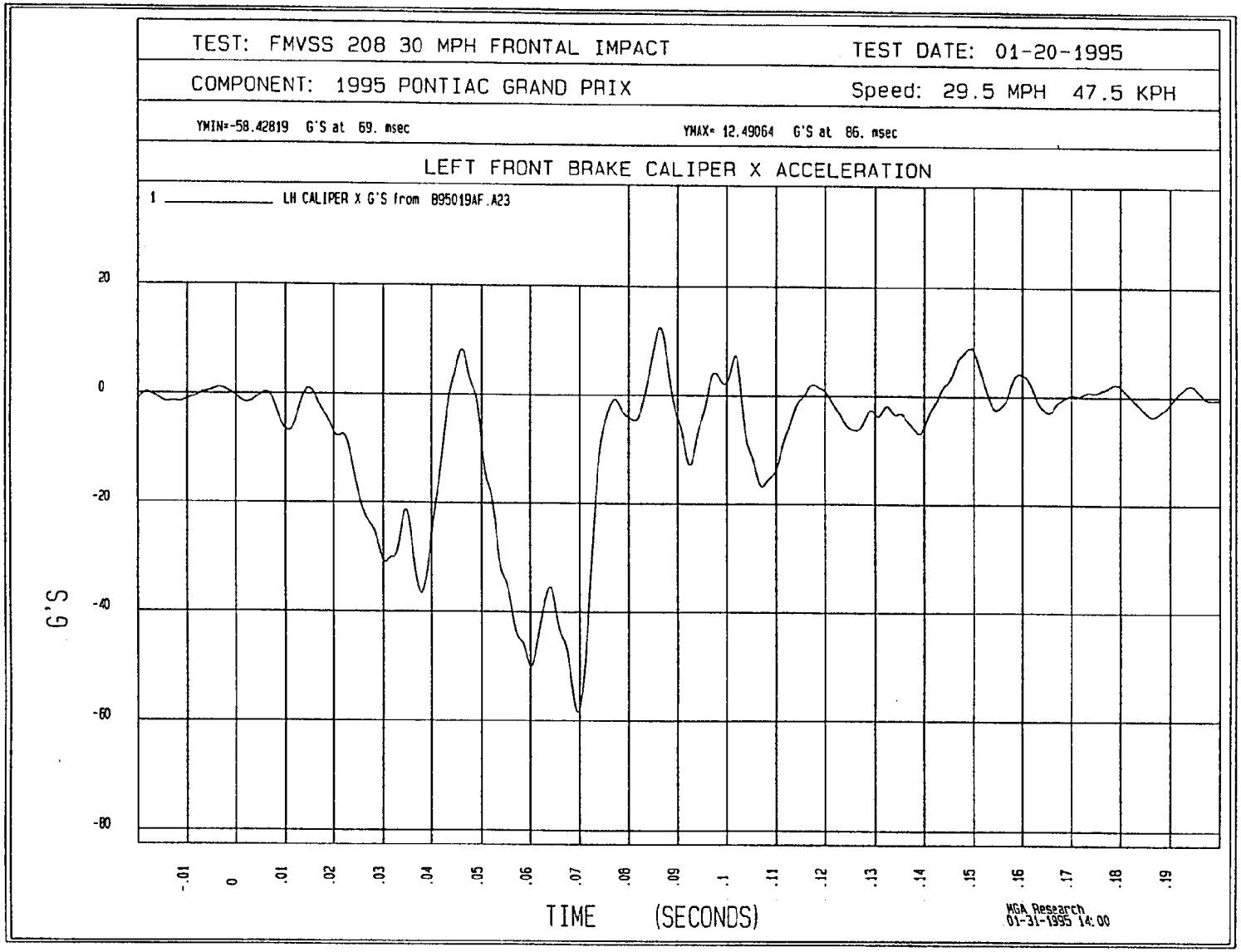



Figure B-28 - Left Brake Caliper X Acceleration vs. Time

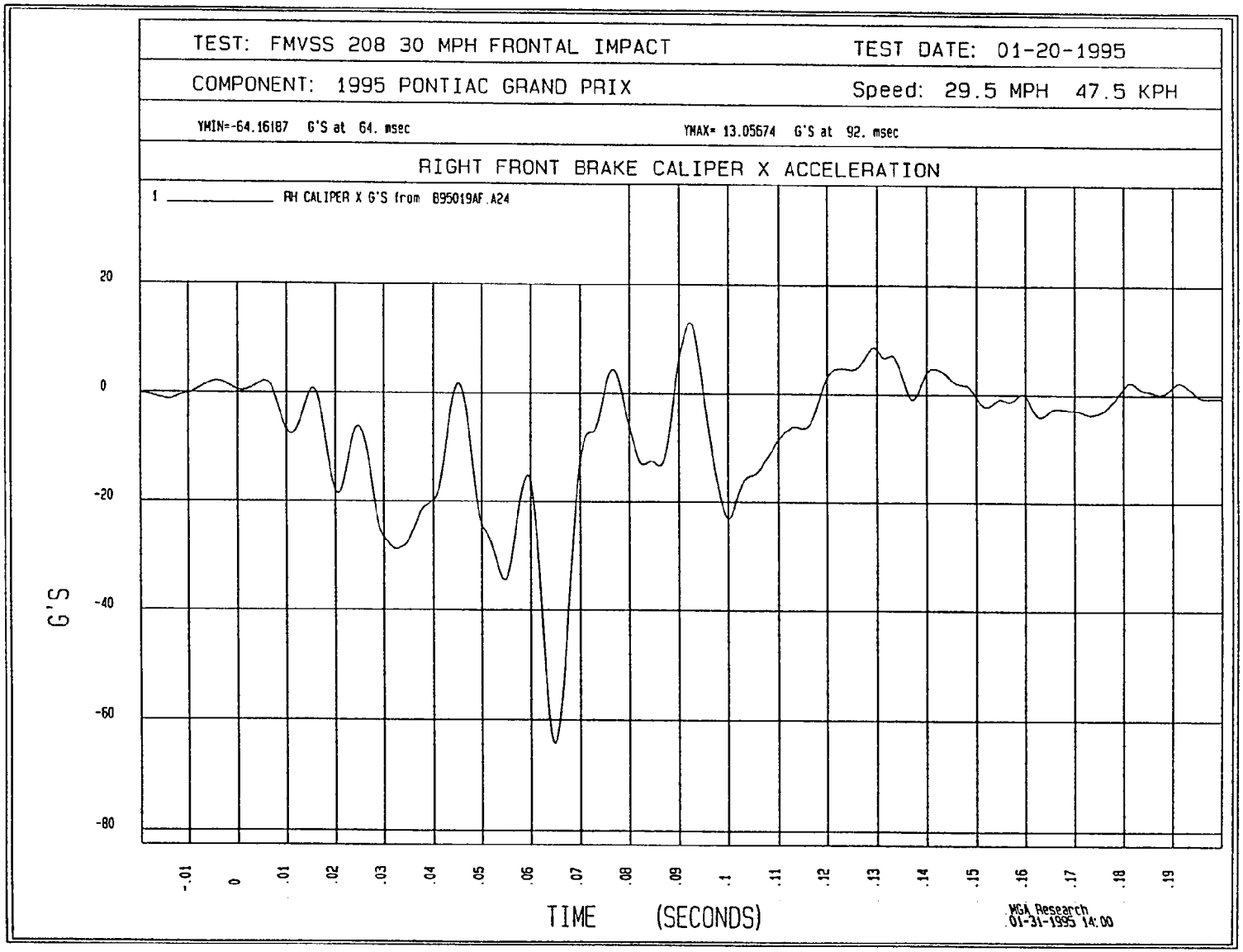



Figure B-29 - Right Brake Caliper X Acceleration vs. Time

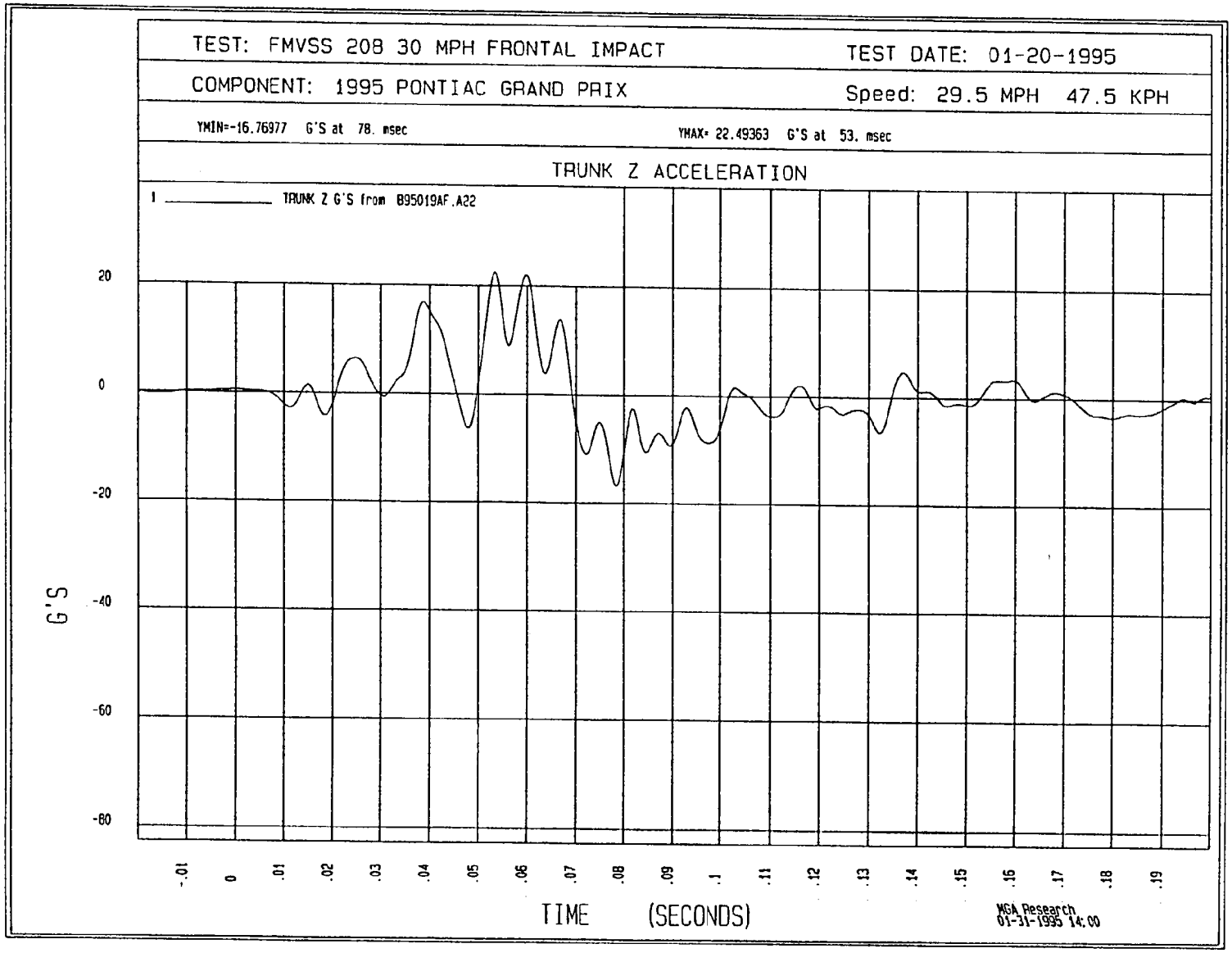



Figure B-30 - Trunk Floor Z Acceleration vs. Time

APPENDIX C

MANUFACTURER'S VEHICLE INFORMATION

# OVSC QUESTIONS & GM RESPONSES

## REGARDING FMVSS 208 INFORMATION REQUEST

**1995 Pontiac Grand Prix (all models)**

**NEF-31CCa/IR-1533**

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Item 1

Please inform OVSC whether the air bag automatic restraint system provided at the driver's and passenger's seating positions in your vehicle is certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1(c)(2) for FMVSS No. 208.

GM Response

The air bags provided at the driver's and passenger's designated seating positions in the subject vehicle, along with the manual 3-point safety belt, were installed to meet the requirements of paragraphs S4.1.2.1(a) and S4.1.2.1(c)(2) of FMVSS 208.

Item 2

If the automatic restraint system provided at the driver's and passenger's seating positions in the subject vehicle was installed to meet the requirements of S4.1.2.1(c)(1), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., moving barrier lateral impact and dynamic rollover) and a copy of the certification reports for the frontal/angular barrier impact test required by S4.1.2.1.

GM Response

Since the subject vehicle's front outboard restraint systems are installed to meet the requirements of S4.1.2.1(c)(2), no response is required.

Item 3

If a manual 3-point safety belt is provided with the driver's and passenger's automatic restraint system in order to meet the requirements of S4.1.2.1(c)(2), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., frontal/angular barrier impact test of the automatic restraint system with the manual safety

belt unfastened and frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened).

GM Response

Attachment A includes those portions of the frontal barrier test reports pertinent to the FMVSS 208 requirements.

Item 4

If the manual safety belt provided at the driver's and passenger's seating positions was not installed to meet the requirements of S4.1.2.1(c)(2), please provide a copy of a crash test report or engineering analysis showing that the use of the manual safety belt with the automatic restraint system does not affect the ability of the vehicle to meet the requirements FMVSS No. 208.

GM Response

Since the manual safety belt is installed to meet the requirements of S4.1.2.1(c)(2) of FMVSS 208, no response is required.

Item 5

If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.1.

GM Response

The air bag installed in this vehicle does not incorporate a pressure vessel to inflate the system. Therefore, no response is required.

Item 6

If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all of the requirements of S9.2.

GM Response

The air bag installed in this vehicle does not incorporate an explosive device to inflate the system. Therefore, no response is required.

Item 7

State, for any safety belt system in this vehicle, whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7.4.2, if the tension-relieving device is used.

GM Response

This vehicle is not equipped with a tension-relieving device on the safety belt systems.

Item 8

FMVSS No. 208, S8.1.5 allows the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were opened or closed for the certification tests.

GM Response

The windows and vents were open during testing.

Item 9

FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or 572(E) test dummy. Please inform OVSC which test dummy was used in each seat for each certification test. Submit dummy placement measurements including diagrams or photographs which show exactly where measurements were taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use the dimension shown in the diagram to provide the individual dummy placement measurements.

State whether the vehicle has a foot rest for the driver.

If the vehicle can be equipped with a split front bench seat, state whether the driver dummy was located so that the midsagittal plane was centered on the steering wheel rim or the center of the seat cushion. Also, state whether the passenger dummy was located so the midsagittal plane was centered the same distance from the longitudinal centerline of the vehicle as the driver dummy or in the center of the seat cushion.

GM Response

The Part 572(E) test dummy was used in each front outboard seat position during certification testing for the subject vehicle. Attachment B includes the available dummy placement information.

The driver position is not equipped with a foot rest.

The vehicle can be equipped with a split front bench seat. However, GM's testing has been conducted with bucket seats. Accordingly, the testing was conducted with the driver and passenger dummy located at the centerline of the seat.

Item 10

Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating configuration, steering column or fuel tank are available on this vehicle, provide separate information for each.

GM Response

Attachment C includes the requested information.

Item 11

If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant.

GM Response

The subject vehicle is not equipped with adjustable seat belt anchorages.

Item 12

Provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression for the Part 572(E) dummy and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.2.1.

In addition, include each dummy's head and chest acceleration versus time plots and femur load versus time plots for the full frontal barrier impact tests. Mark these plots to indicate when the following and any other significant events occur:

12.1 Driver and passenger knee contact with the knee bolster
12.2 Collapse of the driver and passenger knee bolsters
12.3 Steering column stroke (when it starts and when it ends)
12.4 Driver: Contact of the head with the air bag, steering wheel hub, windshield, header and any other contact points
Passenger: Contact of the head with the air bag, instrument panel, windshield, header and any other contact points
12.5 Contact of the driver's torso with the air bag, steering wheel and hub
12.6 Time during event when each air bag starts to deploy and when it is fully deployed
12.7 Mark on the plots any unexpected events, like steering wheel fracture, windshield contact, windshield header contact, that affected the normal loading characterisitics

GM Response

Attachment D includes a summary of the requested injury criteria information and data plots. The requested "marked" reference points on these plots are not determined by GM in the ordinary course of our certification activities. To respond to the agency's request, however, the information marked on the requested plots was estimated by an analysis of the data. Therefore, the specific "marked" locations should be considered our approximation of the requested reference points.

Item 13

When vehicle components must be removed to obtain the proper test weight, what components do you recommend for removal and in what priority order do you recommend removal?

GM Response

GM does not typically prioritize which components are to be removed from a test vehicle to accommodate test weight. However, components that have been removed during our testing include trunk interior trim, spare tire and jack, rear seats and rear carpeting. Additional components that may have been removed during specific tests include rear door trim, rear bumper facia, rear bumper and the deck lid.

Item 14

Please provide FMVSS No. 204, "Steering Control Rearward Displacement" certification data. Include a copy of the test report and any engineering analysis forming the basis of the certification. The report should document the vehicle test weight, impact velocity, and the

horizontal and vertical displacements of the steering control. Pre and post test photographs are also requested.

Discuss the test procedure detailing the vehicle preparation and the measurement technique used to determine the steering control rearward displacement.

Provide a diagram of the steering control system and describe how the components of the steering control system work to provide energy management in a frontal impact.

GM Response

On September 2, 1993, we responded to IR1293/NEF-31CCa which requested this same FMVSS 204 information for the 1994 Pontiac Grand Prix (all models). The same information provided in that response (USG 3066) responds to this question for the 1995 Pontiac Grand Prix. It is our understanding that a copy of that response is available within your staff.

Item 15

Inform OVSC if these vehicles have built-in child restraints either as standard equipment or optional equipment. If they do, provide a copy of the certification test reports and any engineering analysis forming the basis for certification to FMVSS No. 213, "Child Restraint Systems."

GM Response

The subject vehicle does not incorporate a built-in child restraint.

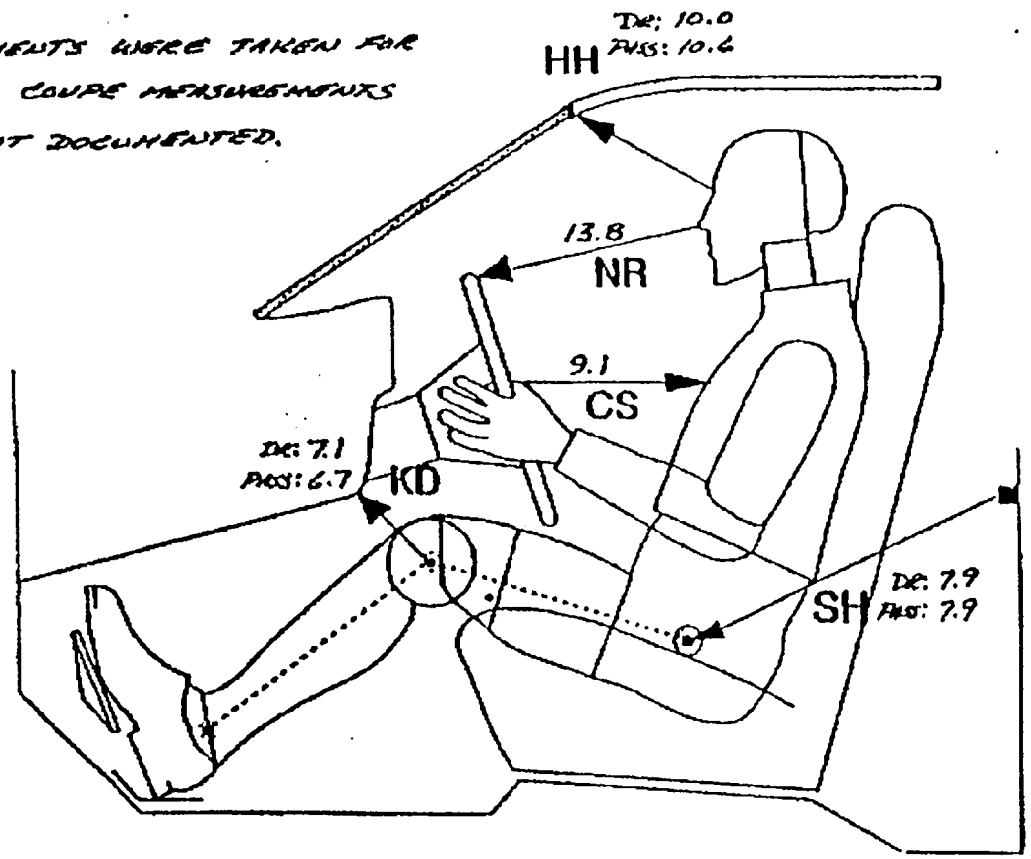
Attachment B

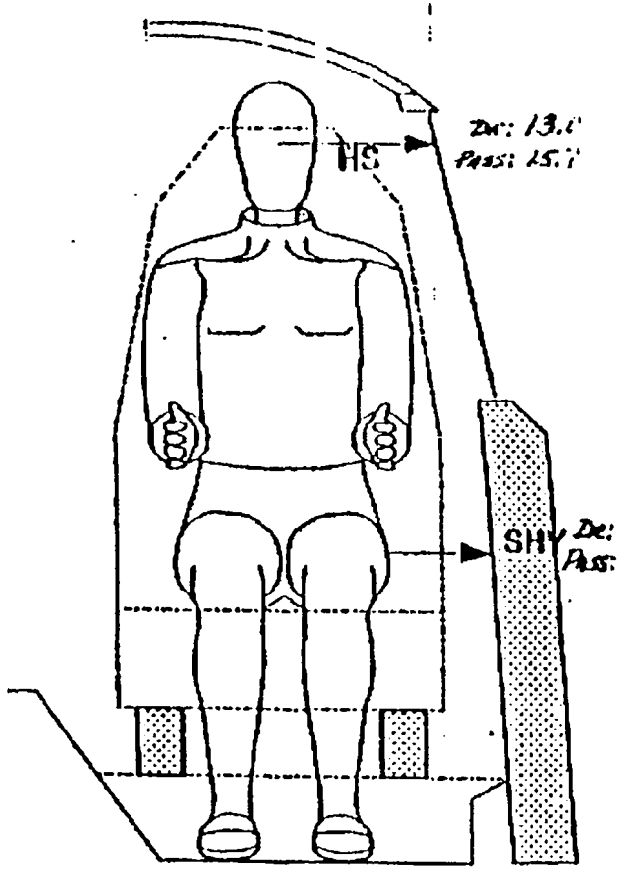
USG 3134

2 pages
(including this cover)

# DUMMY MEASUREMENTS FOR FRONT SEAT PASSENGERS

MEASUREMENTS WERE TAKEN FOR SEDAN. COUPE MEASUREMENTS WERE NOT DOCUMENTED.




HH - Head to Header
NR - Nose to Rim
CS - Steering Wheel to Chest
KDL/KDR - Knee to Dash
SH - Striker to H-Point

SHY - Striker to H-Point (Y Dir.)
HS - Head to Side Window

Attachment C

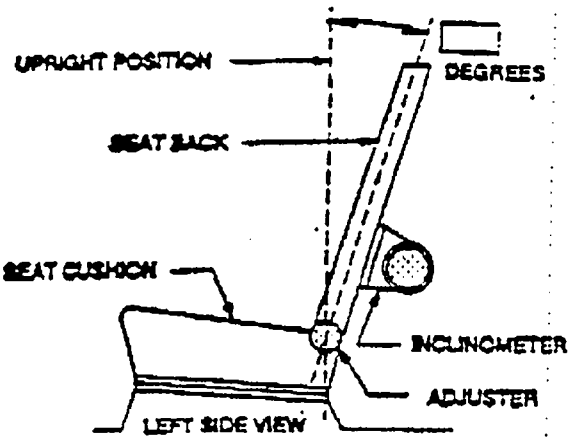
USG 3134

3 pages
(including this cover)

## TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1995 PONTIAC
Vehicle Model & Body Style: GRAND PRIX 2-DOOR & 4-DOOR

1. NOMINAL DESIGN RIDING POSITION - -
For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable. Indicate, if applicable, how the detents are numbered (is the first detent "0" or "1"?).




Seat back angle for driver's seat = 26 degrees.
Measurement instructions:
LOCATE THE SEAT FRAME AT THE OUTBOARD EDGE OF THE SEAT. CUT THE FABRIC OPEN. PLACE INCLINOMETER ON REAR SURFACE OF THE METAL FRAME

Seat back angle for passenger's seat = 26 degrees.
Measurement instructions:
SAME AS DRIVER

2. SEAT FORE & AFT POSITIONS - -
Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, indicate how the detents are numbered (is the first detent "0" or "1"?). Provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat:
POSITION SEAT AT MID-POINT OF FORE/AFT TRACK TRAVEL. FULL DOWN POSITION FOR POWER ADJUSTERS.

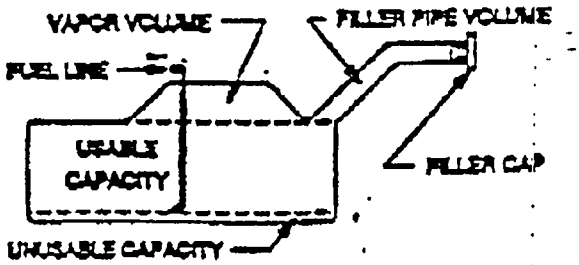
Positioning of the passenger's seat (if applicable):
SAME AS DRIVER

3. FUEL TANK CAPACITY DATA - -

3.1 A. "Usable Capacity" of standard equipment fuel tank = 16.4 gallons. 15.4 16.1

B. "Usable Capacity" of optional equipment fuel tank = — gallons.

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 15.6 gallons.



VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

TEST VEHICLE INFORMATION

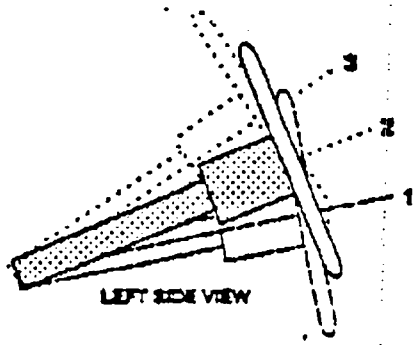
3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 15.6 gallons

3.3 Is vehicle equipped with electric fuel pump? X YES ___ NO
If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.
1. IGNITION KEY 'ON' - FUEL PUMP RUNS MINIMUM OF 2 SECONDS AND STOPS
2. ENGINE RUNNING - FUEL PUMP CONTINUOUS CYCLE

4. STEERING COLUMN ADJUSTMENTS - -

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.
If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions:
FMVSS 208 TESTING WAS CONDUCTED WITH THE STEERING WHEEL ADJUSTED TO THE 3RD POSITION FROM FULL DOWN. SEE SKETCH



STEERING COLUMN ASSEMBLY