

REPORT NO.: 208-MGA-95-002
212-MGA-95-002
301-MGA-95-002

VEHICLE SAFETY COMPLIANCE TESTING
FOR
FMVSS 208, OCCUPANT CRASH PROTECTION

FMVSS 212, WINDSHIELD MOUNTING

FMVSS 219, WINDSHIELD INTRUSION (PARTIAL)

FMVSS 301, FUEL SYSTEM INTEGRITY

FUJI HEAVY INDUSTRIES LTD.
1995 Subaru Legacy 4 Door Sedan
NHTSA NO. CS5501

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: September 7, 1994

Report Date: September 29, 1994

FINAL REPORT

Prepared For:

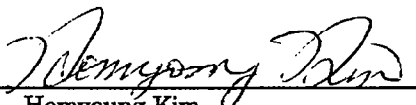
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NEF-30
400 SEVENTH STREET, SW ROOM 6115
WASHINGTON, D.C. 20590

*Rec'd
2/22/95*

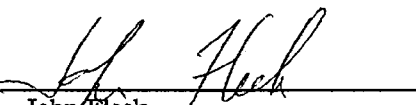
TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 208-MGA-95-002 212-MGA-95-002 301-MGA-95-002		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report for FMVSS 208 Compliance Testing of a 1995 Subaru Legacy 4 Door Sedan NHTSA NO. CS5501				5. Report Date September 29, 1994	
				6. Performing Organization Code MGA	
7. Author(s) Homyoung Kim				8. Performing Organization Report No. MGA-DOT-208-02	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105				10. Work Unit No.	
				11. Contract or Grant No. DTNH22-93-D-21089	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (Mail Code: NEF-30) 400 Seventh St., S.W., Room 6115 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report August - September 1994	
				14. Sponsoring Agency Code NEF-30	
15. Supplementary Notes					
16. Abstract Compliance tests were conducted on the subject 1995 Subaru Legacy 4 Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-208-09 on September 7, 1994 for the determination of FMVSS 208 compliance. Test failures identified were as follows: None					
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"				18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division, Room 5108 (NAD-52), 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 Attn: Robert Hornickle	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 140	
				22. Price	

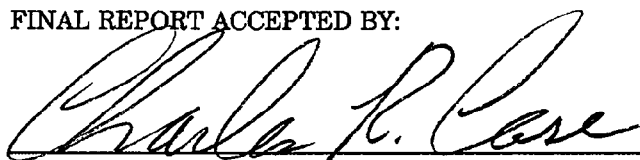
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

PREPARED BY: 
Homyoung Kim
MGA Research Corporation

DATE: 09/27/94

APPROVED BY: 
John Fleck
MGA Research Corporation

DATE: 9-27-94

FINAL REPORT ACCEPTED BY:

Contracting Officer's Technical Representative (COTR)
NHTSA, Office of Vehicle Safety Compliance

DATE: 3/1/95

TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1	Purpose and Test Procedure	1-1
2	Summary of Frontal Barrier Impact Test	2-1
3	Summary of Results for FMVSS 208, 212, 219 (Partial), & 301	3-1
4	Occupant, Vehicle, and Camera Information	4-1
APPENDIX A	Photographs	
APPENDIX B	Data Plots	
APPENDIX C	Manufacturer's Vehicle Information	

LIST OF TABLES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1	Crash Test Summary	2-4
2	General Test and Vehicle Parameter Data	2-5
3	Post Impact Data	2-7
4	Accident Investigation Division Data	2-8
5	Post Test Airbag Data	2-9
6	Vehicle Accelerometer Location and Data Summary	2-10
7	Report of Vehicle Condition at the Completion of Testing	2-11
8	FMVSS 208 Occupant Injury Criteria	3-2
9	Dummy Kinematic Summary	3-3
10	FMVSS 208 Seat Belt Comfort and Convenience Test Summary	3-4
11	FMVSS 208 Equipment Data	3-7
12	FMVSS 212 "Windshield Mounting" Data Summary	3-9
13	FMVSS 219 "Windshield Zone Intrusion" Data Summary	3-10
14	Fuel System Data	3-11
15	FMVSS 301 Post Impact Test Data	3-12
16	FMVSS 301 Static Rollover Test Data	3-13
17	Seat and Steering Column Positioning Data	4-2
18	Dummy Measurement Data for Front Seat Occupants	4-4
19	Camera Locations	4-7

LIST OF FIGURES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1	Dummy Measurement Locations for Front Seat Occupants	4-3
2	Vehicle Target Locations	4-5
3	Camera Positions	4-6
4	Test Dummy Temperature	4-8

SECTION 1
PURPOSE AND TEST PROCEDURE

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 Subaru Legacy 4 Door Sedan, NHTSA No. CS5501, 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 572 B 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 B 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-four (24) 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 September 7, 1994.

The test vehicle, a 1995 Subaru Legacy 4 Door Sedan, NHTSA No. CS5501, 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 572 B 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 only by the airbag during the test. The vehicle's test weight was 3096 pounds. The vehicle's impact speed was 29.4 mph. The vehicle's maximum static crush was 17.9 inches.

The driver's HIC was 267. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 47.4 g's. The driver's left and right femur maximum compressive forces were 1070 pounds and 1496 pounds, respectively.

The right front passenger's HIC was 426. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 46.8 g's. The right front passenger's left and right femur maximum compressive forces were 1352 pounds and 1264 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

The X-axis accelerometer on the top of the engine block lost data after 62 milliseconds as a result of the accelerometer's cable being cut by the vehicle's crush on impact.

The high speed pit camera for fuel tank view (camera #15) did not run during the test due to a shorted power cord.

TABLE 1 CRASH TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Type: Frontal Barrier Impact

Test Date: 09/07/94 Time: 12:33 Temp: 72°F

Vehicle Test Weight: 3096 lbs. Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.4 mph Maximum Static Crush: 17.9 inches

Vehicle Rebound: 43.1 inches

Dummies:	Driver	Passenger
Dummy Type	<u>Part 572B</u>	<u>Part 572B</u>
Serial Number	<u>466</u>	<u>465</u>
Restraint System	<u>Airbag</u>	<u>Airbag</u>
No. of Data Channels	<u>8</u>	<u>8</u>

Number of Cameras: 1 Real Time
14 High Speed

Door Opening Data: Left Front: Easy
Right Front: Easy

Front Seat(s) Data:	Driver	Passenger
Seat Track Failure	<u>None</u>	<u>None</u>
Seat Back Failure	<u>None</u>	<u>None</u>

Visible Dummy Contact Points:	Driver	Passenger
Head	<u>Airbag</u>	<u>Airbag</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Left Knee	<u>Instrument Panel</u>	<u>Instrument Panel</u>
Right Knee	<u>Instrument Panel</u>	<u>Instrument Panel</u>

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

NHTSA No: CS5501 VIN: 4S3BD6352S9214140 Body Color: Taupe Metallic

Engine: 4 Cylinders; C.I.D.; 2.2 liters; CC

X Gas; Diesel; Turbocharged

X Longitudinal (Horizontally Opposed); 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;

 P/seats; X Tilt Wheel; Anti-skid Brakes; X Cruise Control; Other

Date Received: 07/28/94 ; Odometer Reading: 144 miles

Dealer's Name/Address: Capitol Subaru
9301 West Brown Deer Road
Milwaukee, WI 53224

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Fuji Heavy Industries LTD.

Date of Manufacture: 06/94 ; VIN: 4S3BD6352S9214140

GVWR: 3930 lbs; GAWR Front: 2065 lbs. GAWR Rear: 1865 lbs.

DATA FROM TIRE PLACARD:

Recommended Tire Size: P185/70R14

Recommended Cold Tire Pressure: Front 32 Psi; Rear 30 Psi

Tires on Vehicle: P185/70R14 ; Manufacturer: Bridgestone

Type of Spare Tire: Space Saver

Number of Occupants: 2 Front; 3 Rear; 3rd Seat; 5 TOTAL

Type of Front Seats: X Bucket; Bench; 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 = 763 lbs Right Rear = 551 lbs
Left Front = 818 lbs Left Rear = 551 lbs
TOTAL FRONT WEIGHT = 1581 lbs (58.9% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1102 lbs (41.1% of Total Vehicle Weight)
TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 2683 lbs

CALCULATION FOR TARGET TEST WEIGHT:

UDW (Unloaded Delivered Weight) = 2683 lbs
VCW (Vehicle Capacity Weight) = 850 lbs
DSC (Designated Seating Capacity) = 5
RCLW*(Rated Cargo/Luggage Weight) = VCW - 150 (DSC) = 850 - 150 (5) = 100 lbs
Target Test Weight = UDW + RCLW + (2 Dummies x Dummy Weight)
Target Test Weight = 2683 + 100 + 328 = 3111 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO WEIGHT:

Right Front = 845 lbs Right Rear = 674 lbs
Left Front = 893 lbs Left Rear = 684 lbs
TOTAL FRONT WEIGHT = 1738 lbs (56.1% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1358 lbs (43.9% of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3096 lbs
Weight of ballast secured in vehicle = 15 lbs
Vehicle components removed to meet target weight: None

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.2 LF 27.3 RR 27.3 LR 27.0
Fully Loaded Attitude: RF 26.3 LF 26.3 RR 26.0 LR 25.7
Test Attitude: RF 26.7 LF 26.7 RR 26.0 LR 25.7

Wheel Base: 103.7 in; C.G. = 45.5 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 3000 pounds, whichever is less.

TABLE 3 POST-IMPACT DATA

Type of Test: Frontal Barrier Impact Impact Angle: 0°
Test Date: 09/07/94 Time: 12:33 Temperature: 72° F
Vehicle NHTSA No.: CS5501 VIN: 4S3BD6352S9214140

BARRIER IMPACT VELOCITY

Required Impact Velocity Range: 28.9 to 29.9 mph
Impact Velocity: Primary = 29.4 mph; Secondary = 29.5 mph
Distance From Front Bumper to Barrier Face When
Entering Speed Trap: 51.4 inches
Exiting Speed Trap: 12.0 inches

VEHICLE STATIC CRUSH AND REBOUND (inches):

Vehicle Length:	Pre-test	= R	<u>172.8</u>	C _L	<u>180.6</u>	L	<u>172.7</u>
	Post-test	= R	<u>160.3</u>	C _L	<u>162.7</u>	L	<u>159.8</u>
	Crush	= R	<u>12.5</u>	C _L	<u>17.9</u>	L	<u>12.9</u>
	Average	=	<u>15.6</u>				

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

R 43.2 in C_L 43.1 in L 40.7 in

TABLE 4 ACCIDENT INVESTIGATION DIVISION DATA

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Veh. NHTSA No.: CS5501;

VIN: 4S3BD6352S9214140

Build Date: 06/94;

Test Date: 09/07/94

Veh. Size Category: Mid;

Test Weight: 3096 lbs

Veh. Wheelbase: 103.7 in;

Front Overhang: 36.0 in;

Overall Width: 68.0 in

ACCELEROMETER DATA:

Location: As per measurements on pages 2-10

Calibration Procedure: As per MGA Calibration Procedure

Linearity: >99.9%; Integration Algorithm: Trapezoidal

Veh. Impact Speed: 29.4 mph;

Time of Separation: 81.0 msec;

Velocity Change: 33.0 mph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

Impact Mode: Frontal Barrier

Crush Depth C1 = 12.9 inches

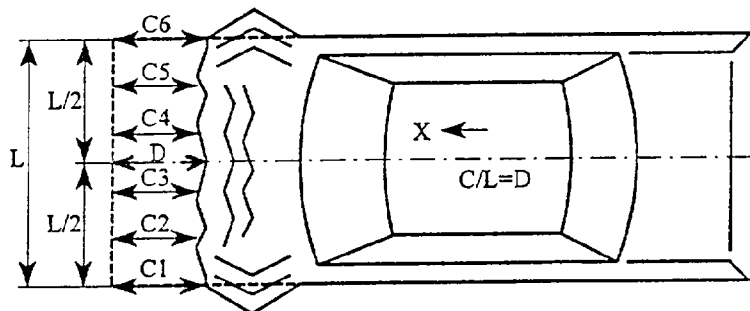
Dimensions: C2 = 16.8 inches

C3 = 17.8 inches

C4 = 17.6 inches

C5 = 16.0 inches

C6 = 12.5 inches



Midpoint of Damage: D = Vehicle Longitudinal Centerline

Length of Damaged Region: L = 62.1 inches

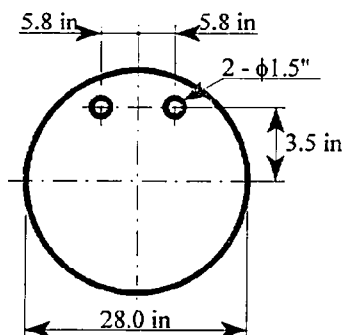
TABLE 5 POST TEST AIRBAG DATA

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

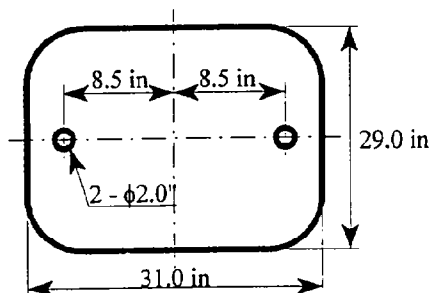
NHTSA No: CS5501; Test Date: 09/07/94; Technician: Homyoung Kim

- A. No of Vent Holes: Driver 2; Passenger 2
- B. Size of Vent Holes: Driver 1.5 in. dia.; Passenger 2.0 in. dia.
- C. Total Vent Area: Driver 3.53 in²; Passenger 6.28 in²
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
 Driver; Length in; Width in; Diameter 28.0 in
 Passenger; Length 31.0; Width 29.0; Diameter in
- E. Is the Airbag Tethered?
 Driver; X Yes; No; If yes, record length of tether 9.0 in
 Passenger; Yes; X No; If yes, record length of tether in

Driver Airbag



Passenger Airbag



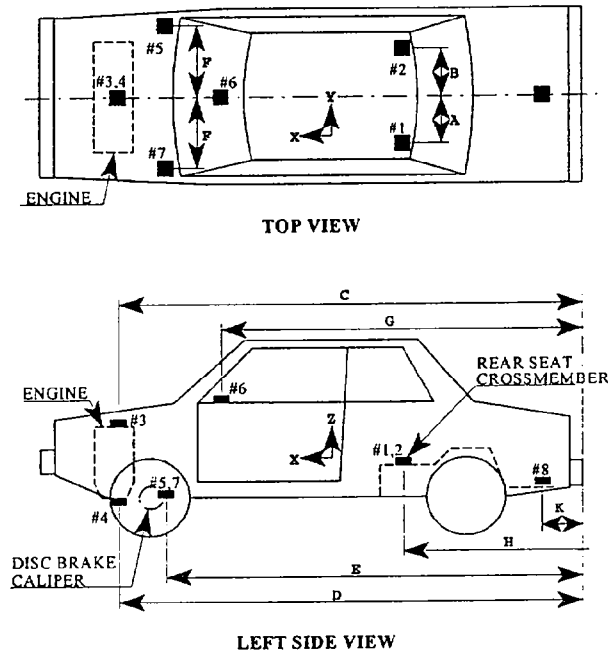
There were four (4) tethers in each airbag. One end of each tether was attached to the front face center of the airbag and the other end to the rear face center.

- F. Part Numbers and Manufacture Name of Airbag and Gas Generator
 Driver; Mfr N/A; Airbag 98211AC160; Gen N/A
 Passenger; Mfr N/A; Airbag 98211AC620; Gen ES005-H4401

TABLE 6 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501; Test Date: 09/07/94



ACCELEROMETER LOCATION (inches)		
	PRE-TEST	POST-TEST
A	20.4	20.4
B	20.6	20.6
C	155.8	147.6
D	155.9	155.1
E	137.4	136.9
F	24.2	24.3
G	121.8	121.8
H	67.8	67.8
K	7.5	7.5

ACCELEROMETER DATA SUMMARY					
No.	DESCRIPTION	MAXIMUM (g's)	TIME (msec)	MINIMUM (g's)	TIME (msec)
1	Left Rear Seat Crossmember	1.5	152	-35.6	44
2	Right Rear Seat Crossmember	0.7	102	-35.6	45
3	Top of Engine Block	23.9	44	-83.4	32
4	Bottom of Engine	12.0	45	-87.4	35
5	Right Disc Brake Caliper	39.5	63	-69.1	44
6	Instrument Panel	11.4	24	-156.4	78
7	Left Disc Brake Caliper	11.8	94	-48.3	70
8	Trunk	7.0	92	-7.7	49

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. The vehicle was again inspected after the above test had been conducted, and all changes were noted below. The final condition of the vehicle was also noted in detail.

Vehicle Year/Make/Model/Body Style: 1995/Mitsubishi/Eclipse/3 Door

Vehicle NHTSA No.: CS5600 Body Color: Everett Green

VIN: 4A3AK34Y8SE008768 Cost: \$15,000.00

Odometer: Arrival Date: 08/30/94 Reading: 96 miles

Completion Date: 09/06/94 Reading: 96 miles

Engine: 4 Cylinders; 2.0 Liters; X Gas; Diesel

Transmission: 5 Speed; X Manual; Automatic

Final Drive: X Front Wheel; Rear Wheel; Four Wheel

Tire Size: P195/70R14; Manufacturer: Bridgestone

Air Conditioner	<u>Yes</u>	Console	<u>Yes</u>	Brakes	<u>Power</u>
Tinted Glass	<u>Yes</u>	Tachometer	<u>Yes</u>	Front	<u>Disc</u>
Power Steering	<u>Yes</u>	Cruise Control	<u>No</u>	Rear	<u>Drum</u>
Power Windows	<u>No</u>	Rear Window Def.	<u>Yes</u>	Front Seats	<u>Manual</u>
Power Door Locks	<u>No</u>	Sun/Moon Roof	<u>No</u>	Seat Type	Front <u>Bucket</u>
Radio	<u>Yes</u>	T-Top	<u>No</u>		Rear <u>Bench</u>
Clock	<u>No</u>	Tilt Steering Wheel	<u>Yes</u>		
Roof Rack	<u>No</u>	Other Options:	<u>No</u>	No. of Seats	<u>Three</u>

TABLE 7 REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING, (Cont'd)

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

Rear Seat

Spare Tire

Trunk Trim and Carpet

Muffler

Explanation:

Items removed to allow installation of data acquisition system and to reduce test weight.

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.

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/Subaru/Legacy/4 Door Sedan

Veh. NHTSA No.: CS5501 Test Date: 09/07/94

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #466	PASSENGER DUMMY #465
Head Channel X	-44.0	-69.0
Head Channel Y	-8.7	-24.9
Head Channel Z	29.7	36.3
HEAD RESULTANT	46.1	70.7
Chest Channel X	-48.9	-46.6
Chest Channel Y	-5.5	19.1
Chest Channel Z	-8.3	23.4
CHEST RESULTANT	49.3	47.8

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	266.6	425.7
t_1 = (msec)	70.8	79.3
t_2 = (msec)	106.7	115.3

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

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

CLIP	47.4	46.8
t^1 = (msec)	87.5	91.3
t^2 = (msec)	90.6	94.4
CHEST DEFLECTION (in)	N/A	N/A

MAX. COMPRESSIVE FEMUR FORCES: (lbs)

Left Side	1070	1352
Right Side	1496	1264

TABLE 9 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 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 with the dummy's head contacting the head restraint. 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 instrument panel. 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 with the dummy's head contacting the head restraint. The right front passenger dummy came to rest on 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/Subaru/Legacy/4 Door Sedan

NHTSA No.: CS5501 ; Date of Comfort/Convenience Check: 09/02/94

Technician Performing Check: Homyoung Kim

GVWR: 3930 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 was 0.2 pounds.

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 not removable so that the seat back served as 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 webbing 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 buckle) were accessible under normal conditions.

The latchplate and buckle did not pass through the guides provided 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/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Date of Check: 09/02/94

Technician Performing Check: Homyoung Kim

GVWR: 3930 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 and the reminder light were 5.5 and 5.5 seconds, respectively.

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 audible warning signal was 0 second and the duration of the reminder light operation was 5.5 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.

The airbag system is required to be inspected ten (10) years after the date of manufacture shown on the certification label.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on pages 2-26.

A description of the functional operation of the system was provided in the owner's manual on pages 2-23 through 2-25.

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 2-22 through 2-26.

FMVSS 208 READINESS INDICATOR DATA

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was located on the left lower corner of the instrument cluster.

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 2-25.

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

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

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

Rubber trim with glue retention

CLIPS OR BRACKETS USED TO RETAIN WINDSHIELD: None

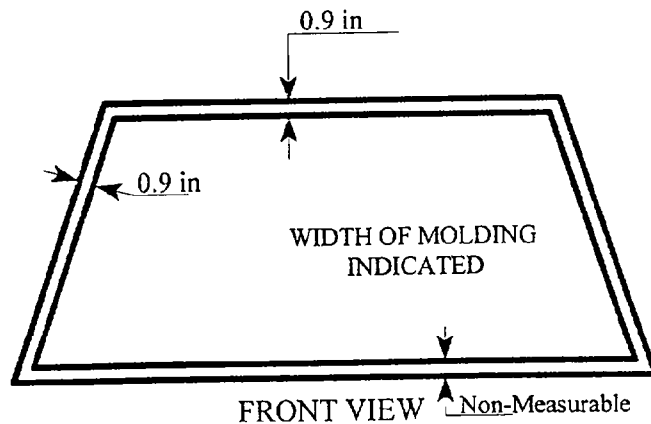
FMVSS 212 REQUIREMENTS:

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)		PERCENT RETENTION
	PRE-TEST	POST-TEST	
RIGHT SIDE	82.8	82.8	100%
LEFT SIDE	82.8	82.8	100%
TOTAL	165.6	165.6	100%

Pre-Test Windshield Mounting Material Temperature: 72°F



FAILURE DETAILS: None

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

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

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= 44.1 in

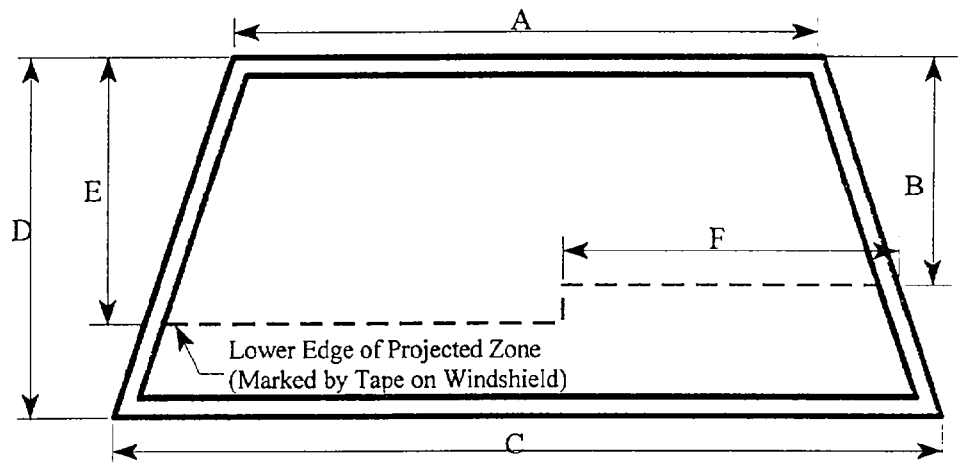
B= 21.3 in

C= 60.0 in

D= 30.8 in

E= 21.1 in

F= 23.0 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/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

Fuel System Capacity from Owner's Manual = 15.9 gallons

Usable Capacity Figure Furnished by COTR = 15.9 gallons

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

= 14.6 to 14.9 gallons

Actual Test Volume = 14.8 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 was located in front of the rear axle. The fuel filler pipe
was located on the right side. The fuel lines ran along the left side to
the front.

TABLE 15 FMVSS 301 POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

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 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/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

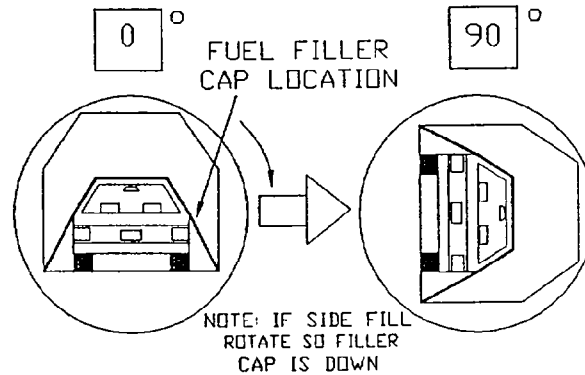
FUEL SPILLAGE LOCATION(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 51 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 51 seconds

Next Whole Minute Interval = 8 minutes

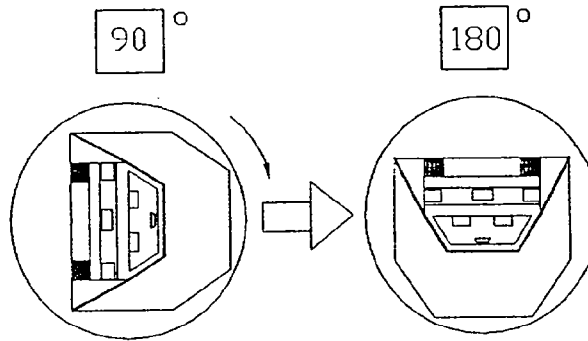
FUEL SPILLAGE MEASUREMENT:

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 28 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 28 seconds

Next Whole Minute Interval = 8 minutes

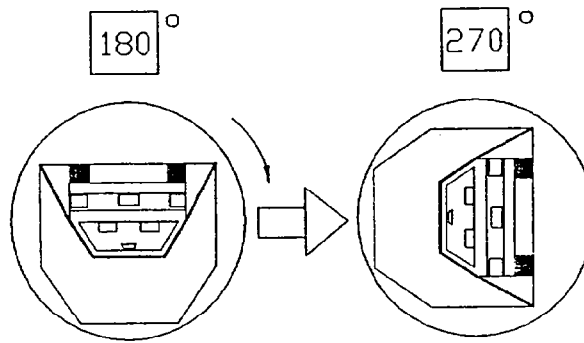
FUEL SPILLAGE MEASUREMENT:

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 11 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 11 seconds

Next Whole Minute Interval = 8 minutes

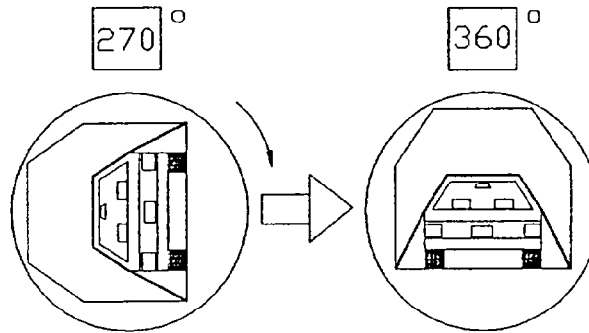
FUEL SPILLAGE MEASUREMENT:

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

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 35 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds
TOTAL TIME = 7 minutes 35 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/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

NOMINAL DESIGN RIDING POSITION:

Driver Seat: Seat Back Angle = 25°

The seat back angle was adjustable and was positioned at the 4th notch in accordance with the seat back set procedure in 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 18 detents and was positioned at the 10th notch rearward from the foremost position.

Passenger Seat: Same as driver's seat.

STEERING COLUMN ADJUSTMENTS:

The steering column was adjustable and was positioned at the mid point of its swing. The steering column angle was 28° .

FIGURE 1 DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS

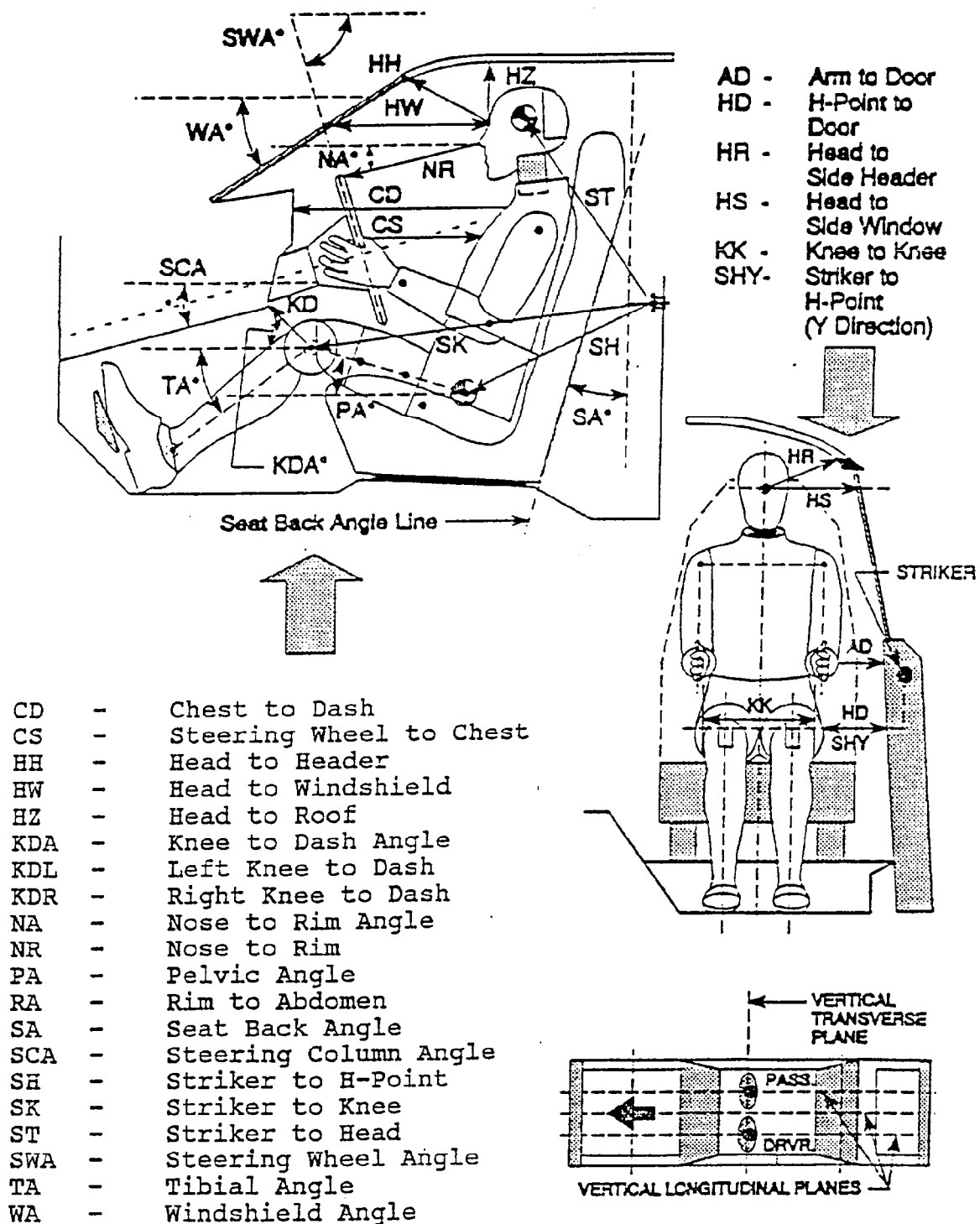


TABLE 18 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

Vehicle Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 Test Date: 09/07/94

	DRIVER (Serial #466)	PASSENGER (Serial #465)
WA°	29.2°	
SWA°	66.2°	N/A
SCA°	28.4°	N/A
SA°	N/A	N/A
HZ	6.1 in	6.1 in
HH	13.9 in	14.1 in
HW	22.3 in	23.0 in
HR	8.0 in	7.6 in
NR	18.8 in	N/A
CD	21.6 in	24.0 in
CS	13.8 in	N/A
RA	8.3 in	N/A
KDL	8.6 in Angle (KDA) 29.5°	8.1 in
KDR	8.3 in	8.1 in Angle (KDA) 16.1°
PA°	N/A	N/A
TA°	35.8°	43.9°
KK	14.0 in	12.8 in
ST	21.3 in Angle 93.2°	21.4 in Angle 91.3°
SK	21.6 in Angle -0.6°	21.9 in Angle 2.7°
SH	7.6 in Angle -31.3°	7.9 in Angle -34.8°
SHY	9.8 in	10.1 in
HS	11.0 in	11.1 in
HD	7.3 in	7.0 in
AD	4.0 in	3.8 in

N/A = Not Applicable

FIGURE 2 VEHICLE TARGET LOCATIONS

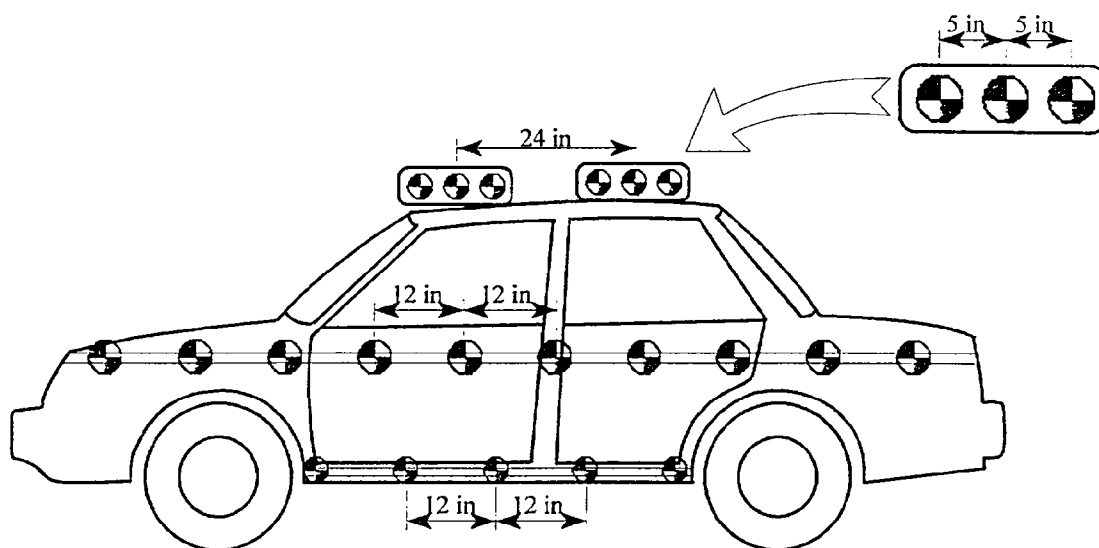
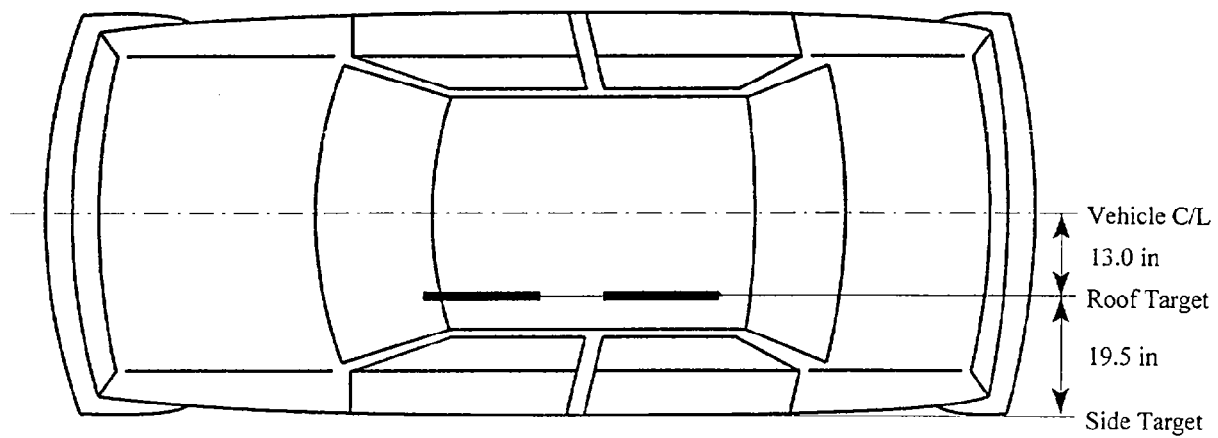


FIGURE 3 CAMERA POSITIONS

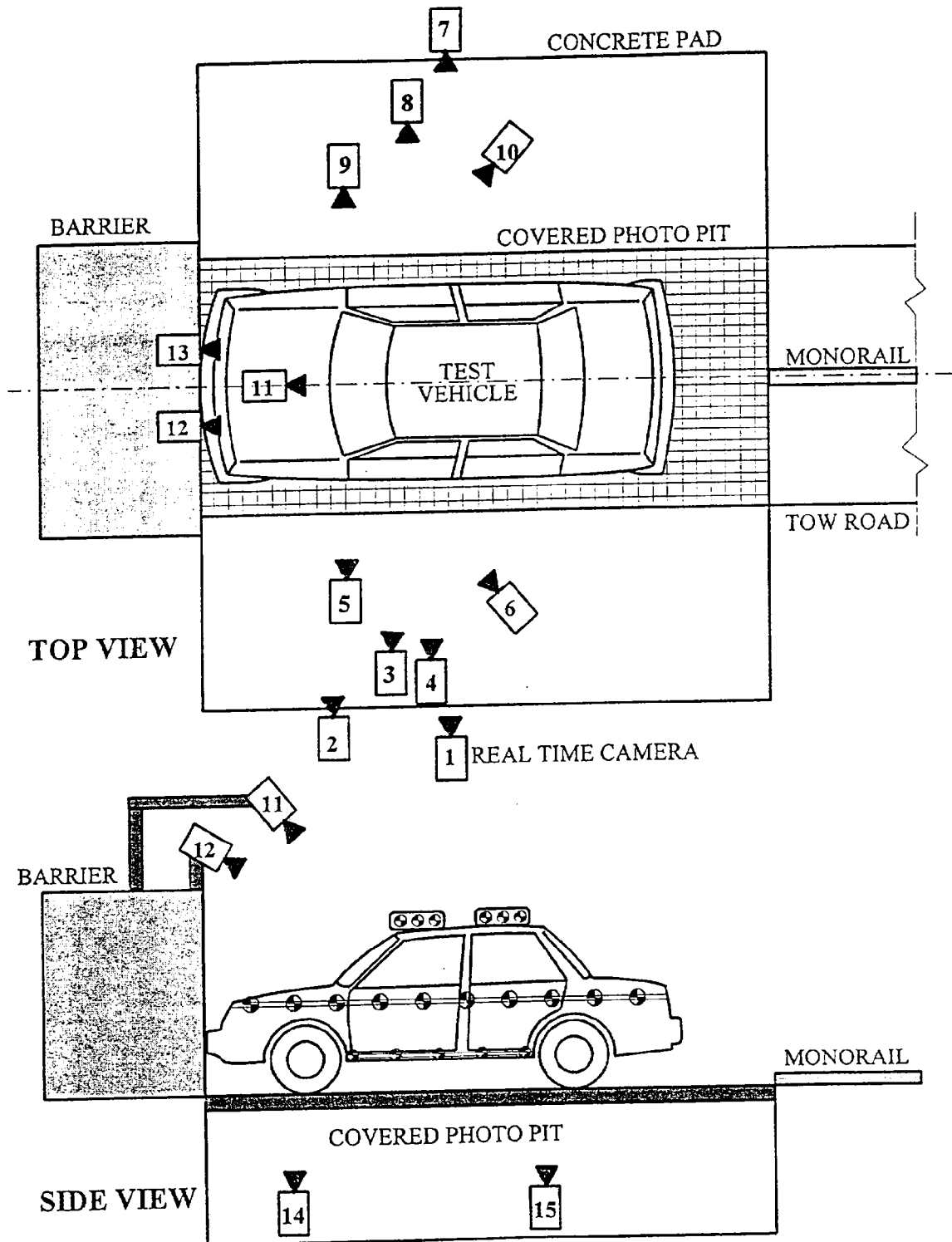


TABLE 19 CAMERA LOCATIONS

Veh. Year/Make/Model/Body Style: 1995/Subaru/Legacy/4 Door Sedan

Vehicle NHTSA No.: CS5501 ; Test Date: 09/07/94

	VIEW	CAMERA POSITIONS (inches) *			ANGLE (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View						10	24
2	Left Vehicle Crush	31.9	300.0	46.3	90°	287.0	25	1015
3	Left Steering Column Motion	42.1	298.0	61.4	90°	285.0	25	585
4	Left Steering Column Motion	42.9	297.2	40.6	90°	284.2	25	1000
5	Left Windshield Intrusion	54.3	243.3	39.0	90°	230.3	35	939
6	Left Driver Kinematics	169.7	196.9	72.0	50°	183.9	50	1020
7	Right Overall View	92.5	-297.6	39.4	90°	284.6	13	1136
8	Right Vehicle Crush	30.3	-281.1	40.4	90°	268.1	25	1000
9	Right Windshield Intrusion	52.0	-260.2	39.8	90°	247.2	50	1156
10	Right Passenger Kinematics	157.9	-207.1	85.2	50°	194.1	35	1031
11	Front View Windshield	13.8	-0.4	172.2			13	1325
12	Front View Driver	-13.0	15.0	94.9			13	1005
13	Front View Passenger	-12.2	-16.1	95.7			13	948
14	Pit Camera Engine View	44.5	3.1	-125.4			13	1010
15	Pit Camera Fuel Tank View	84.6	3.5	-125.4			13	N/A**

* + X = Film plane rearward of barrier
+ Y = Film plane to left of monorail centerline
+ Z = Film plane to above ground level

** This camera did not run during test.

TEST VEHICLE : 1995 SUBARU LEGACY 4 DOOR SEDAN (CS5501)
TEST DATE : SEPTEMBER 7, 1994
STARTING TIME OF TEMPERATURE RECORD = SEPTEMBER 6 @ 17:56

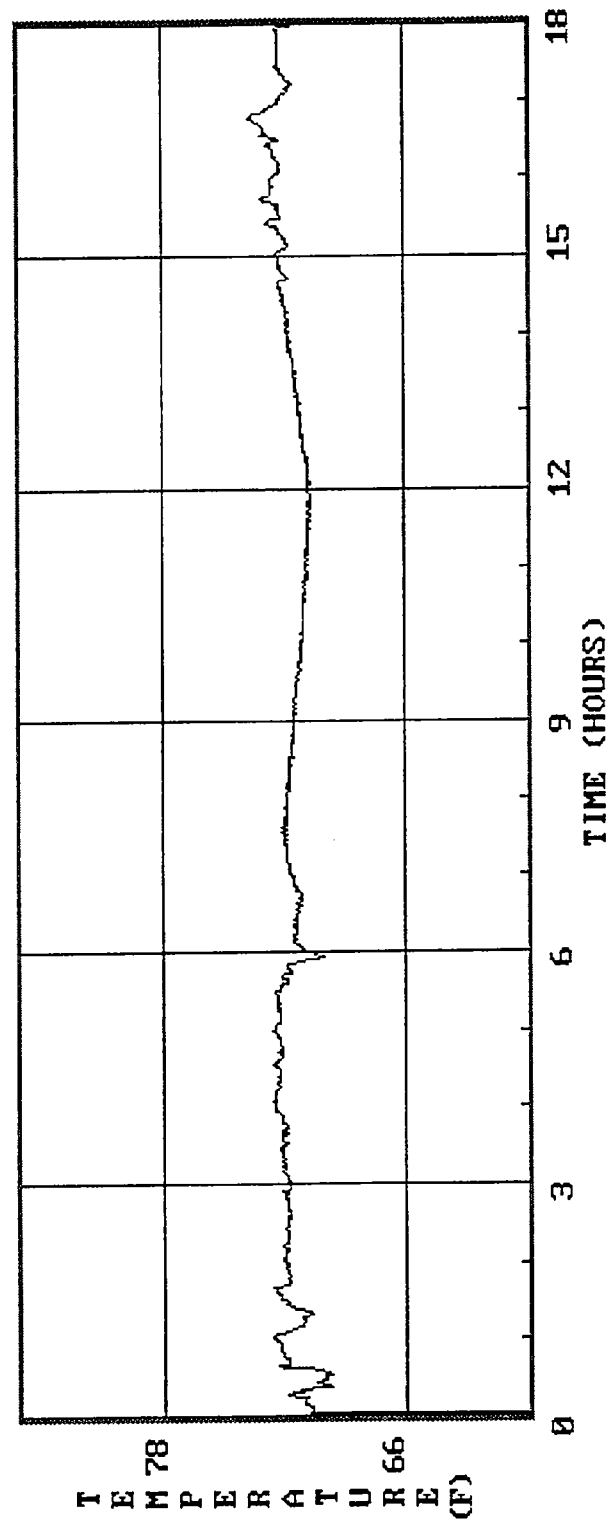


FIGURE 4 TEST DUMMY TEMPERATURE

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

<u>Description</u>	<u>Page No.</u>
Photo No. A-1 - Pre-Test Front View	A-1
Photo No. A-2 - Post-Test Front View	A-2
Photo No. A-3 - Pre-Test Left Side View	A-3
Photo No. A-4 - Post-Test Left Side View	A-4
Photo No. A-5 - Pre-Test Right Side View	A-5
Photo No. A-6 - Post-Test Right Side View	A-6
Photo No. A-7 - Pre-Test Front Underbody View	A-7
Photo No. A-8 - Post-Test Front Underbody View	A-8
Photo No. A-9 - Pre-Test Driver Dummy Position View	A-9
Photo No. A-10 - Post-Test Driver Dummy Position View	A-10
Photo No. A-11 - Pre-Test Driver Dummy Position View (Door Open)	A-11
Photo No. A-12 - Post-Test Driver Dummy Position View (Door Open)	A-12
Photo No. A-13 - Pre-Test Driver Seat Position View	A-13
Photo No. A-14 - Post-Test Driver Seat Position View	A-14
Photo No. A-15 - Pre-Test Passenger Dummy Position View	A-15
Photo No. A-16 - Post-Test Passenger Dummy Position View	A-16
Photo No. A-17 - Pre-Test Passenger Dummy Position View (Door Open)	A-17
Photo No. A-18 - Post-Test Passenger Dummy Position View (Door Open)	A-18
Photo No. A-19 - Pre-Test Passenger Seat Position View	A-19
Photo No. A-20 - Post-Test Passenger Seat Position View	A-20
Photo No. A-21 - Pre-Test Driver Dummy Knee Bolster View	A-21
Photo No. A-22 - Post-Test Driver Dummy Knee Bolster View	A-22
Photo No. A-23 - Pre-Test Passenger Dummy Knee Bolster View	A-23
Photo No. A-24 - Post-Test Passenger Dummy Knee Bolster View	A-24
Photo No. A-25 - Driver Head Contact View	A-25
Photo No. A-26 - Driver Knee Contact View	A-26
Photo No. A-27 - Post-Test Driver Dummy View	A-27
Photo No. A-28 - Passenger Head Contact View	A-28
Photo No. A-29 - Passenger Knee Contact View	A-29
Photo No. A-30 - Post-Test Passenger Dummy View	A-30
Photo No. A-31 - Pre-Test Steering Column at Firewall View - Engine Room	A-31
Photo No. A-32 - Vehicle Certification Label	A-32
Photo No. A-33 - Tire Placard	A-33

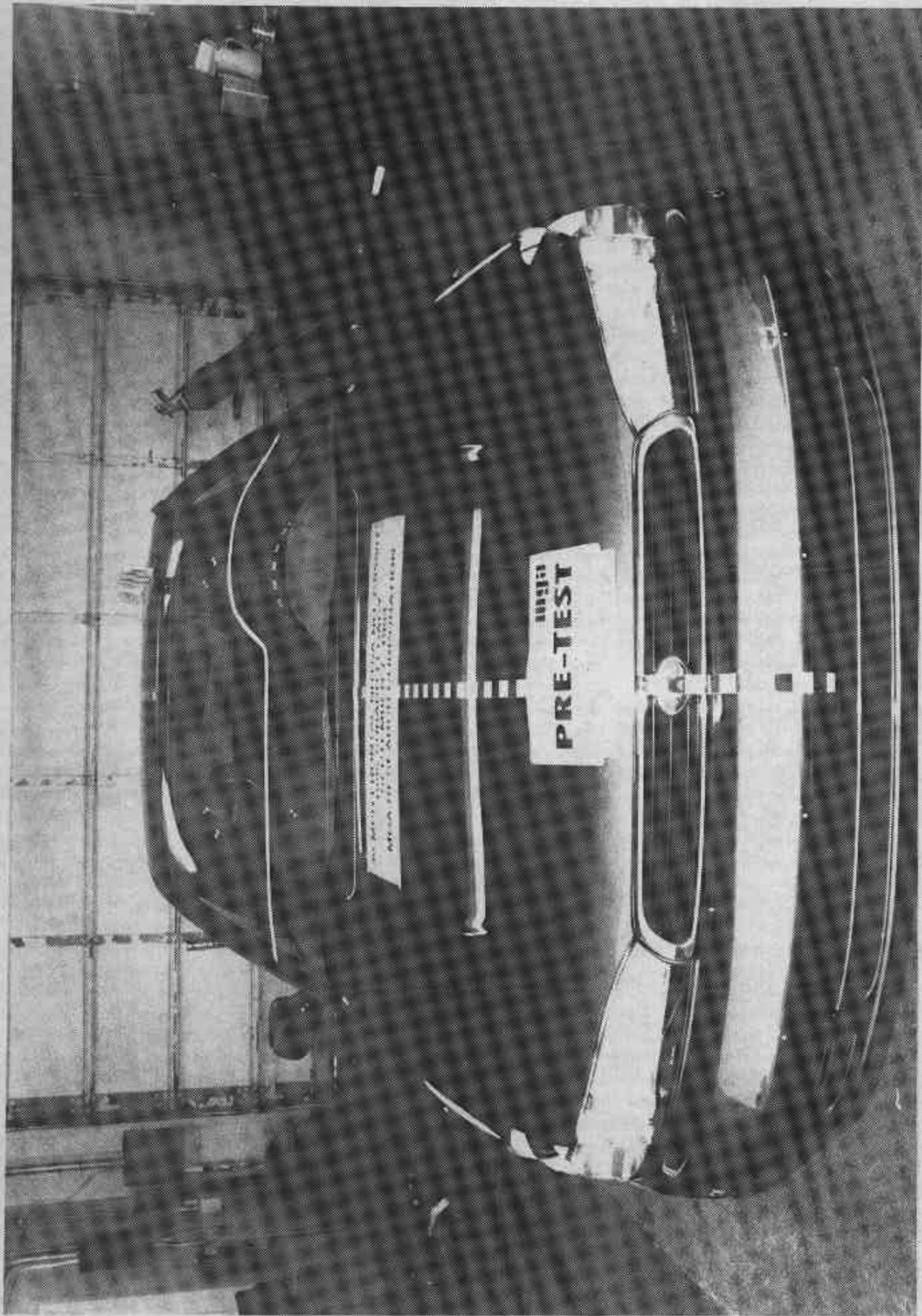


Photo No. A-1 - Pre-Test Front View

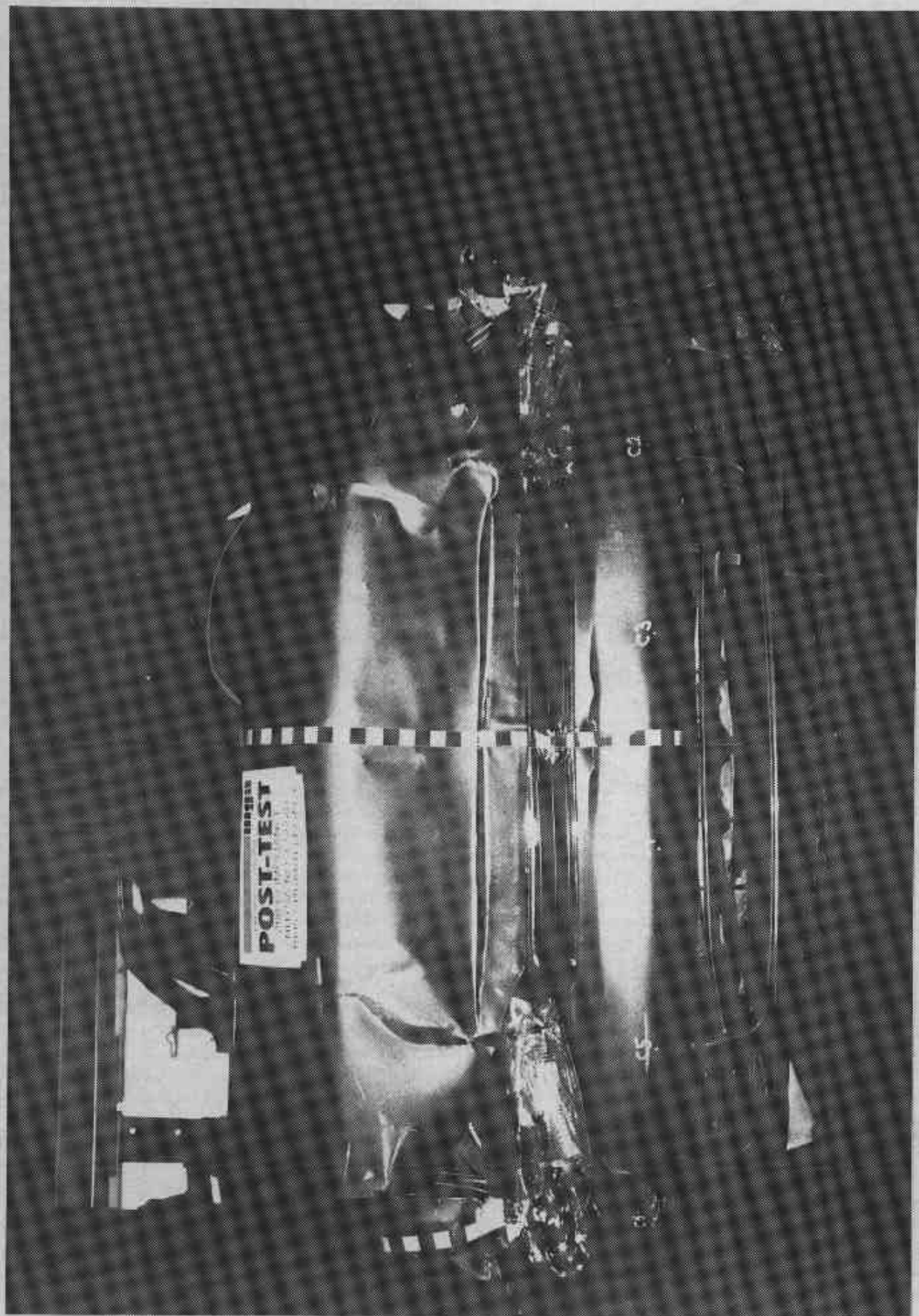


Photo No. A-2 - Post-Test Front View

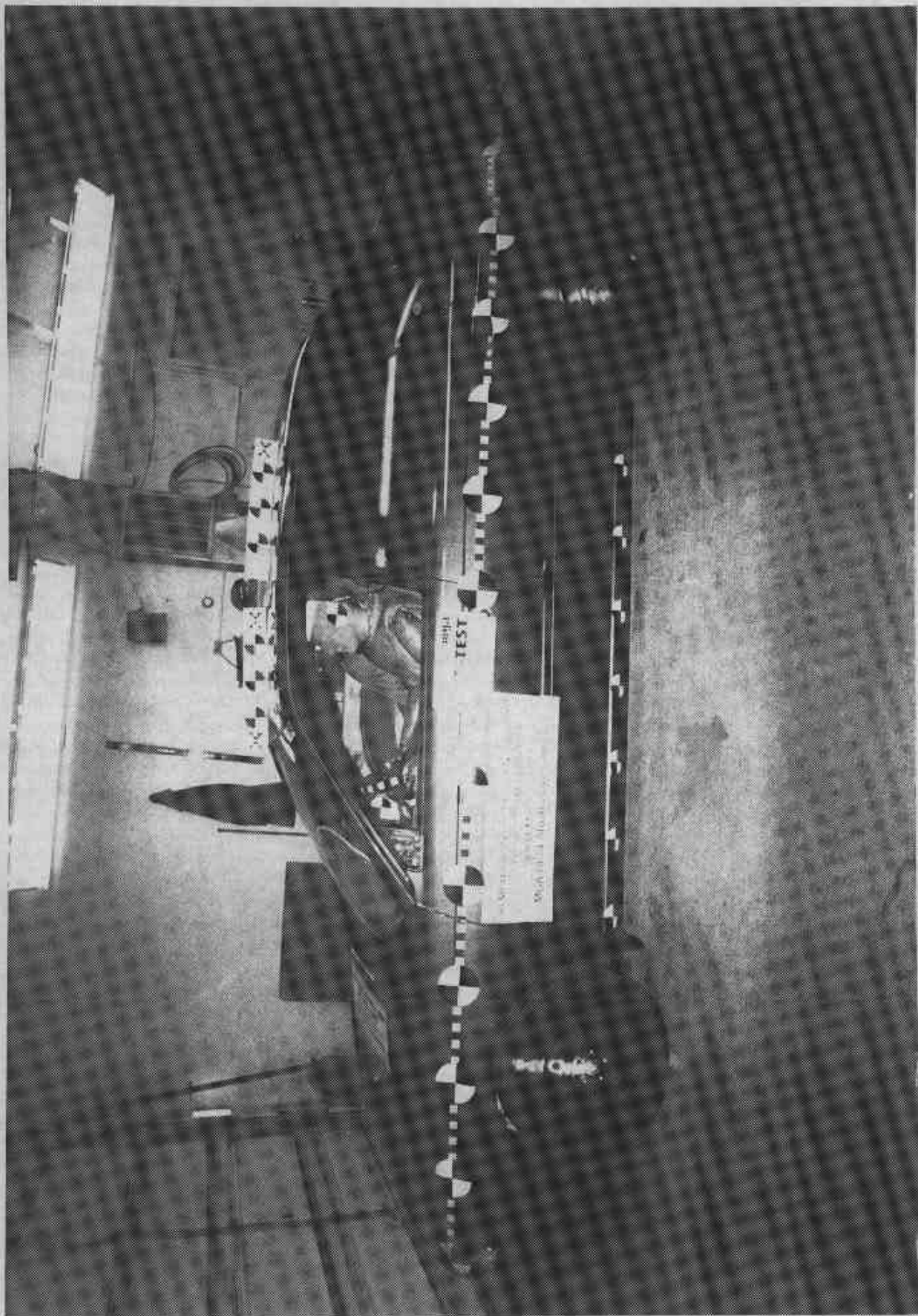


Photo No. A-3 - Pre-Test Left Side View

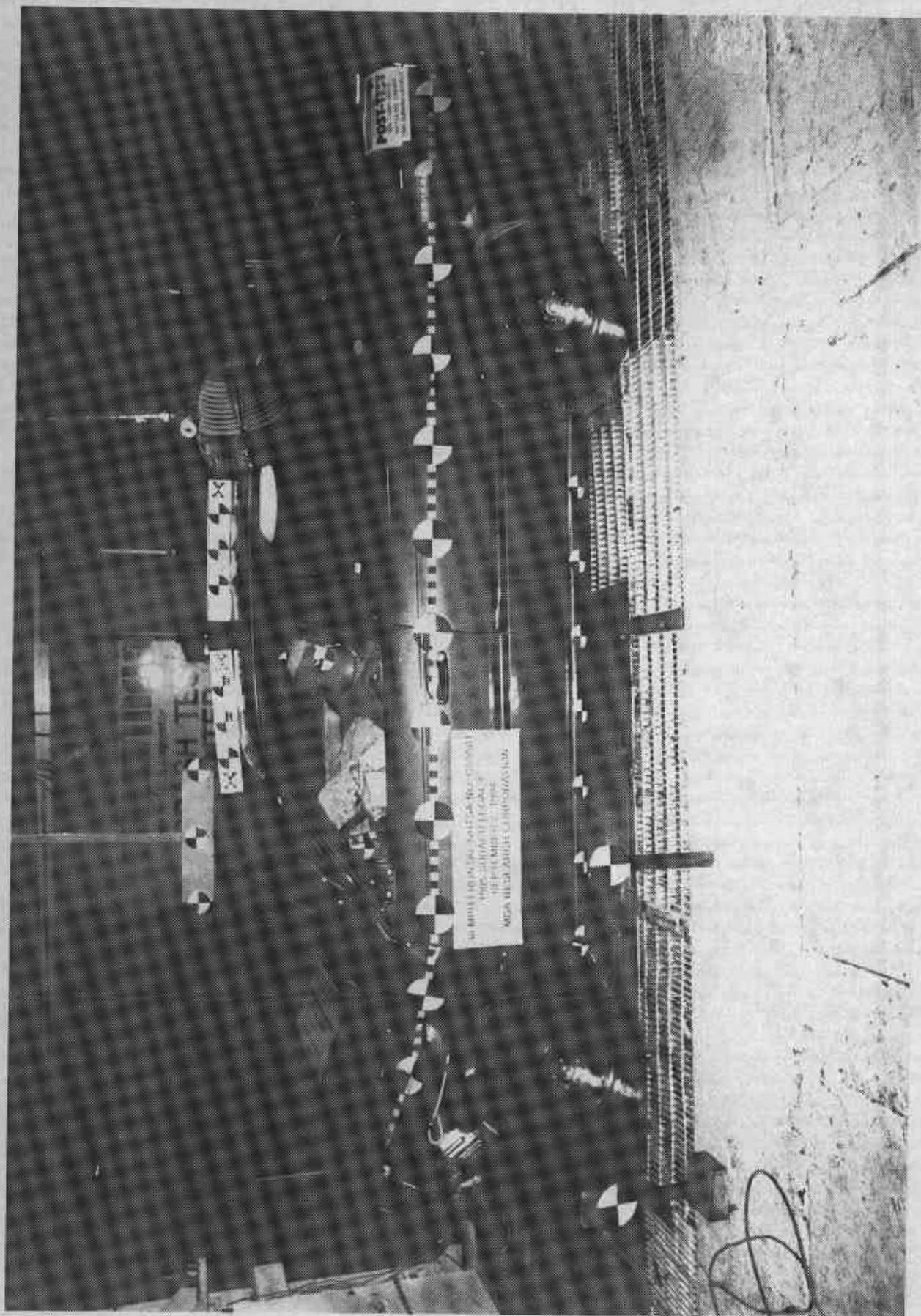


Photo No. A-4 - Post-Test Left Side View



Photo No. A-5 - Pre-Test Right Side View

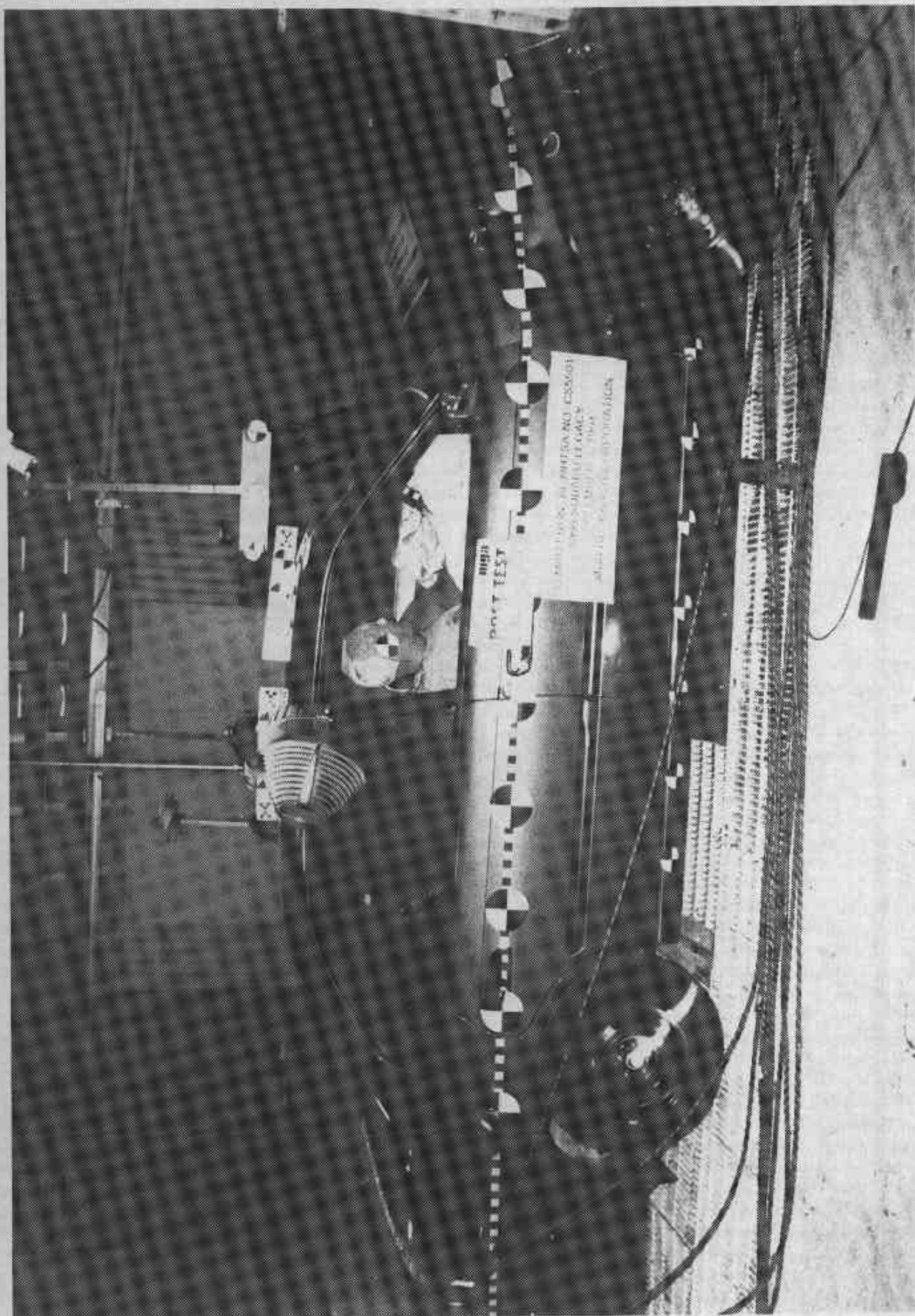


Photo No. A-6 - Post-Test Right Side View

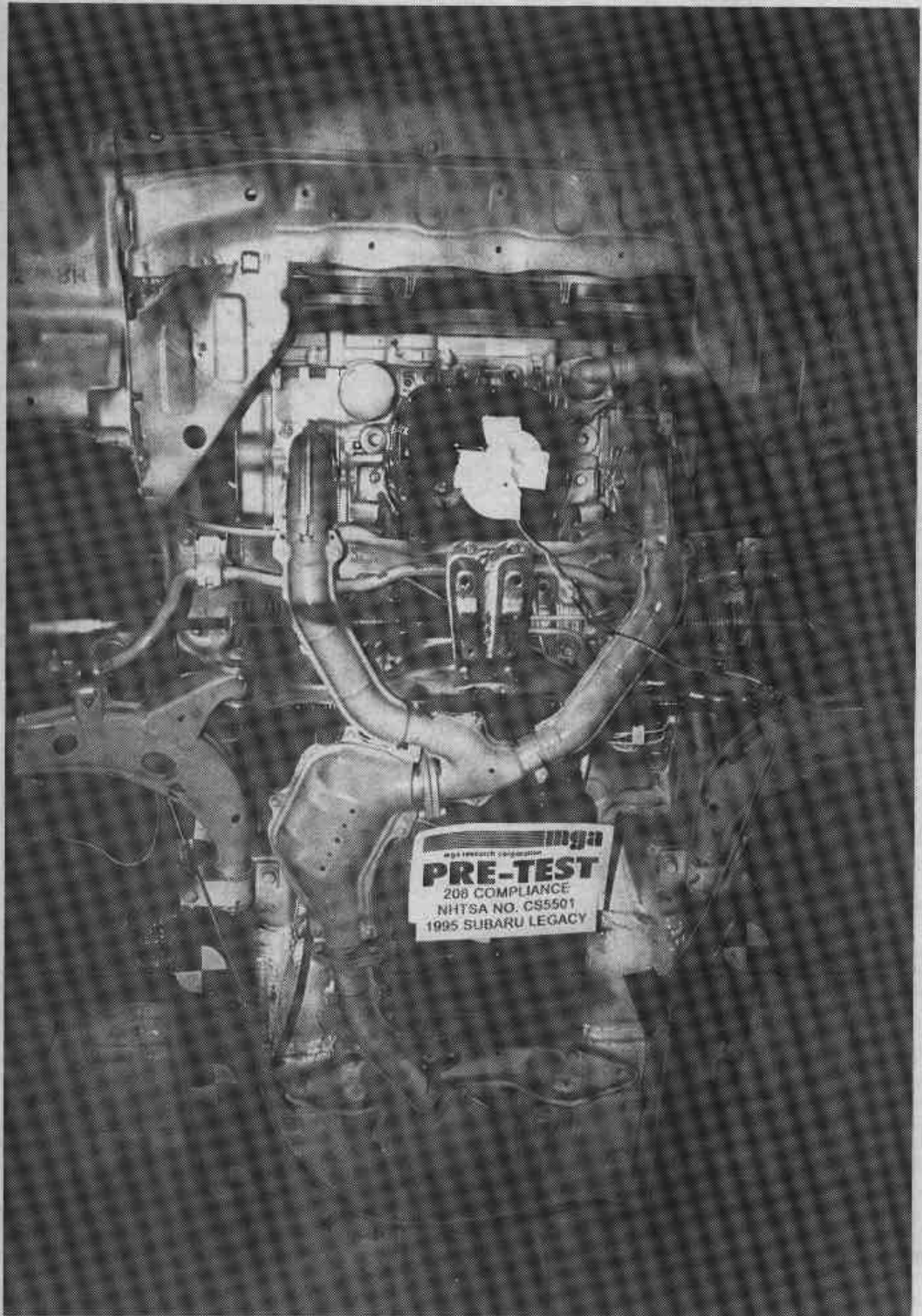


Photo No. A-7 - Pre-Test Front Underbody View

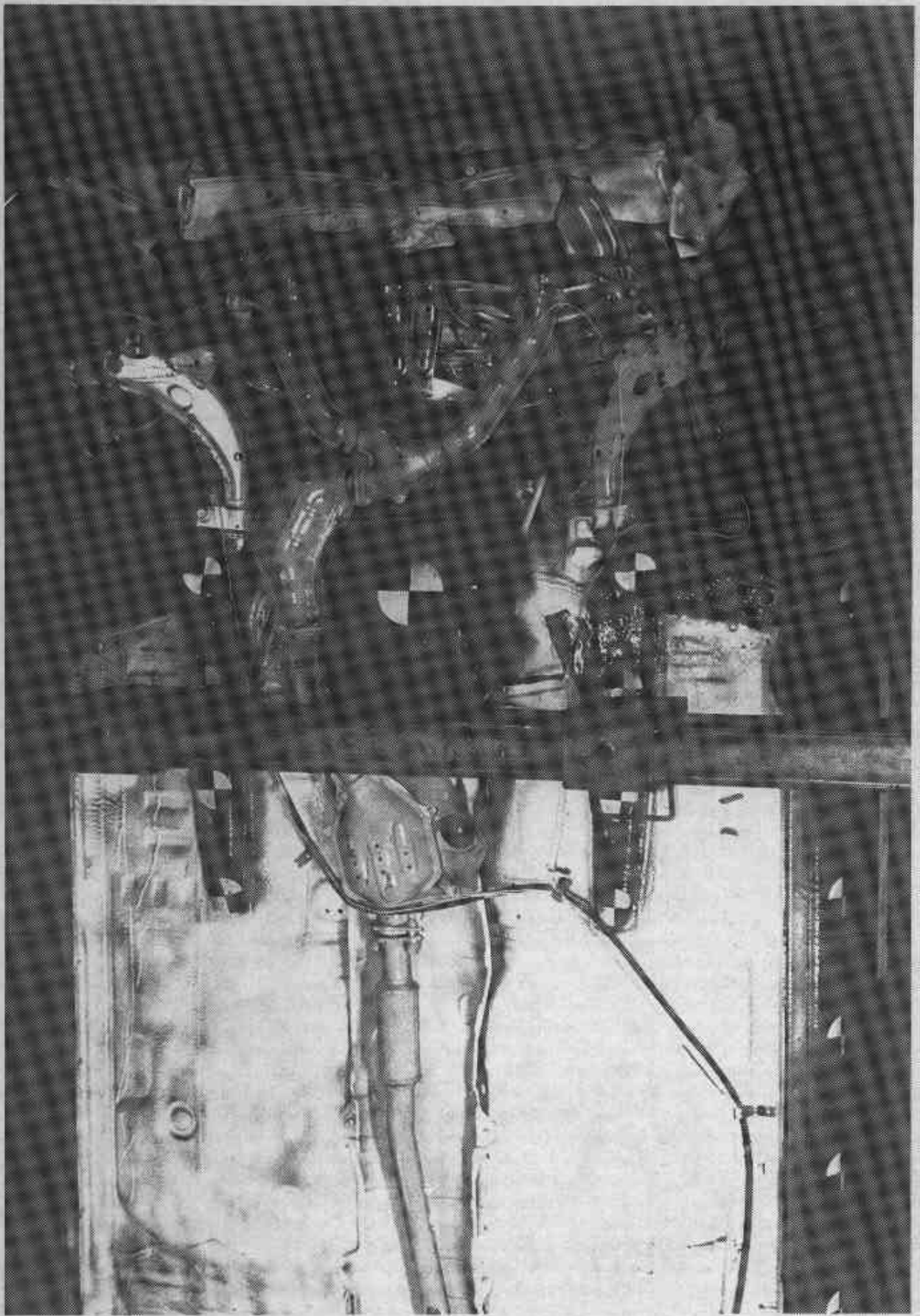
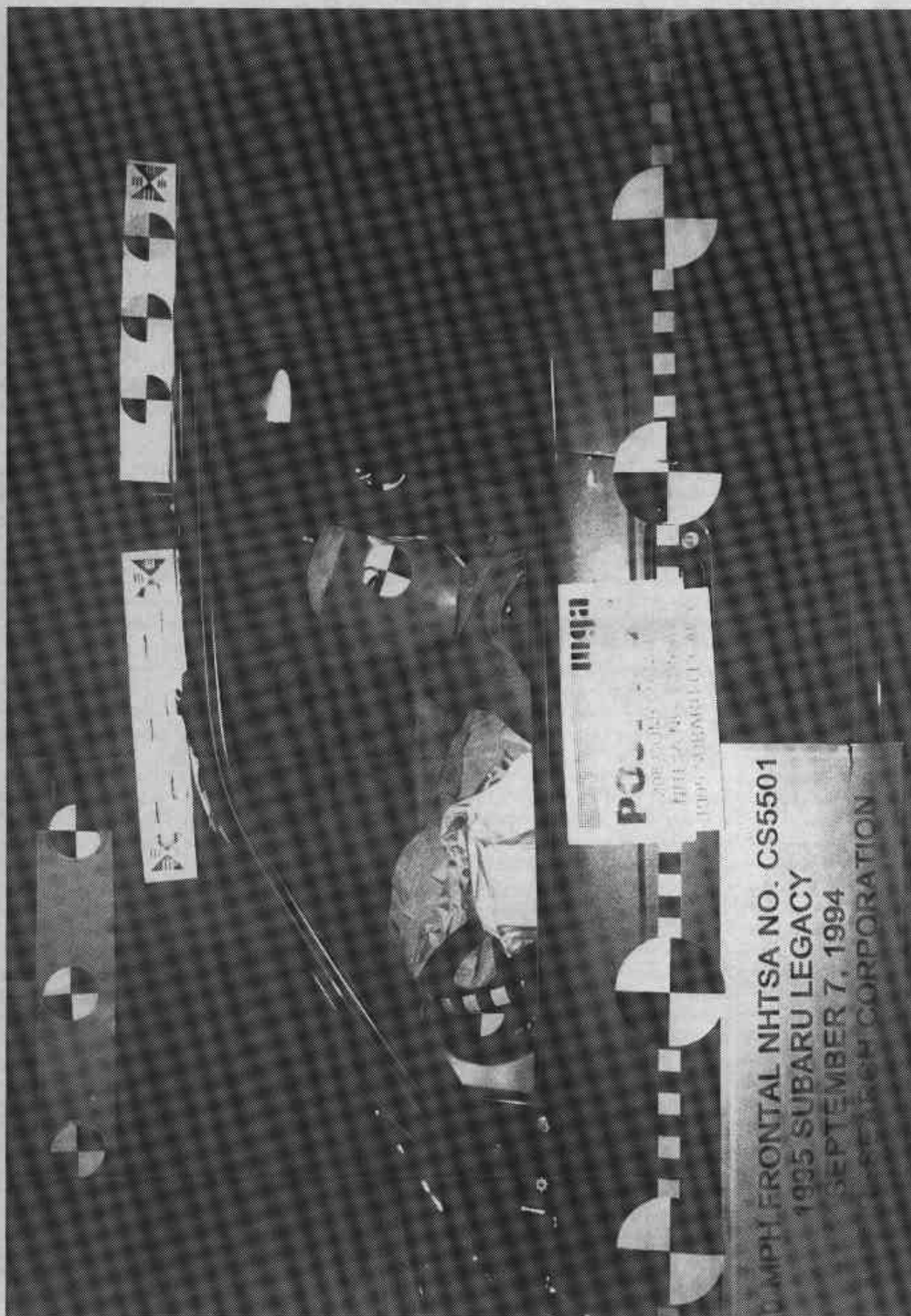


Photo No. A-8 - Post-Test Front Underbody View



Photo No. A-9 • Pre-Test Driver Dummy Position View



A-10

Photo No. A-10 - Post-Test Driver Dummy Position View

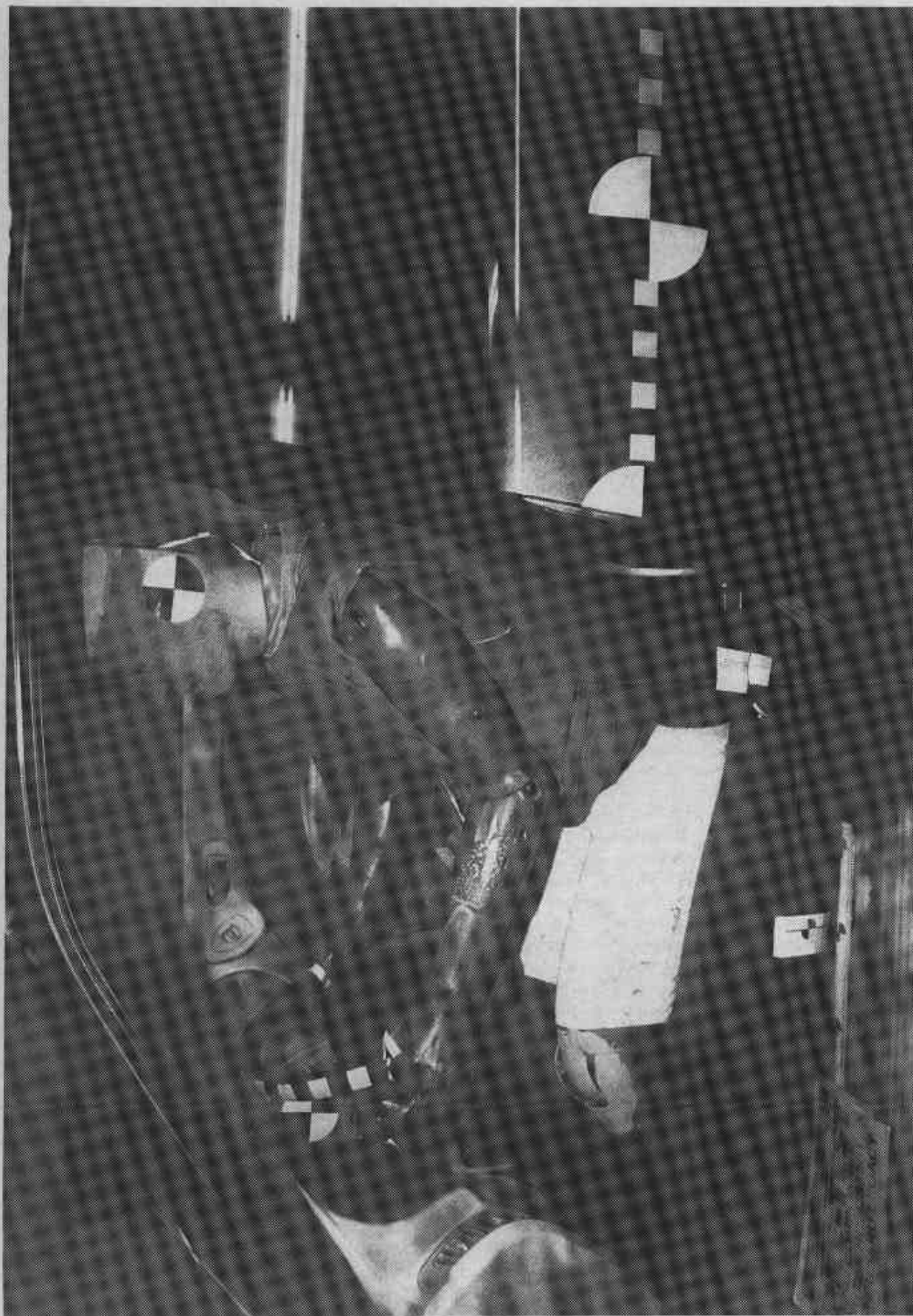


Photo No. A-11 - Pre-Test Driver Dummy Position View (Door Open)



Photo No. A-12 - Post-Test Driver Dummy Position View (Door Open)

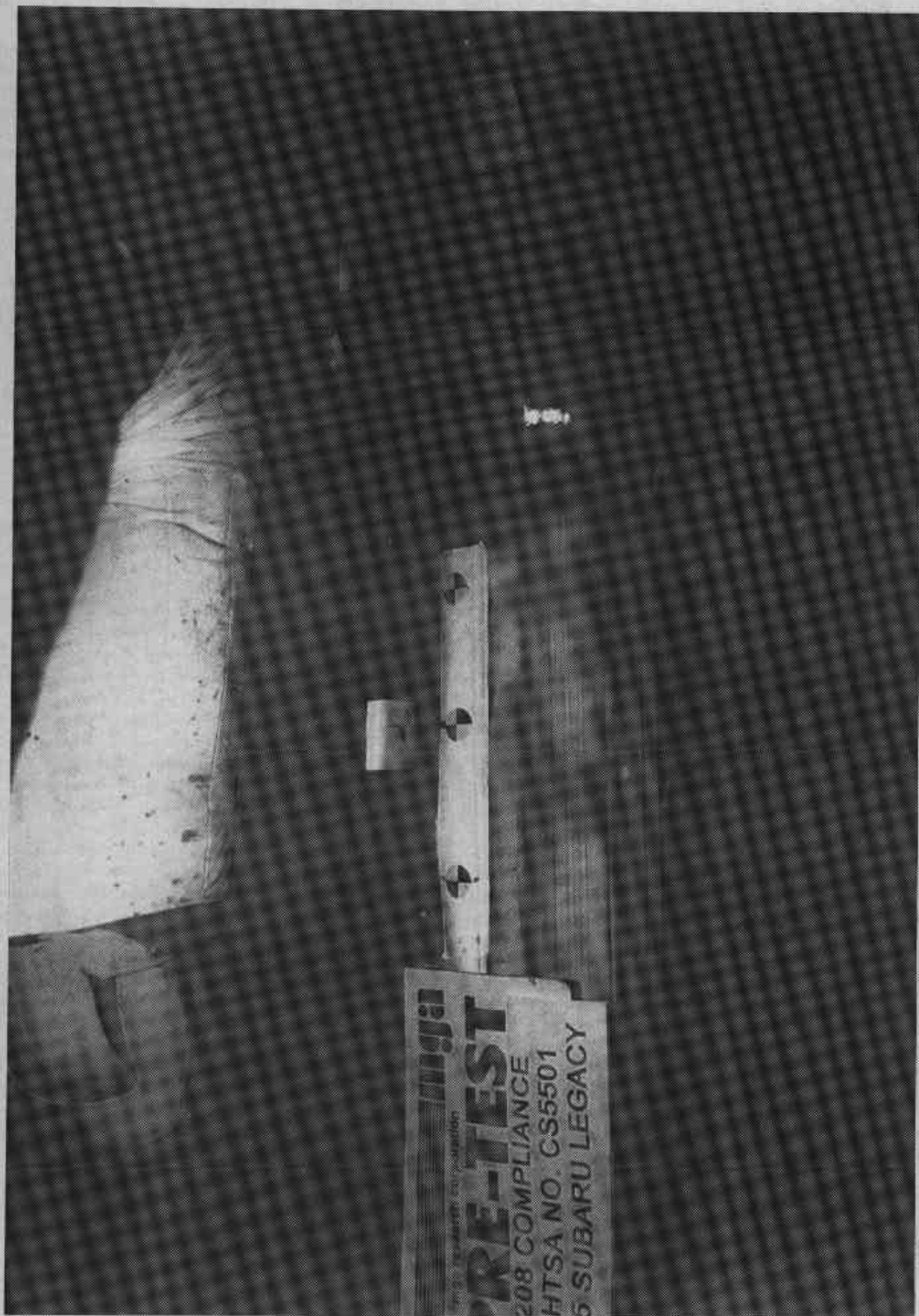


Photo No. A-13 - Pre-Test Driver Seat Position View



Photo No. A-14 - Post-Test Driver Seat Position View



Photo No. A-15 - Pre-Test Passenger Dummy Position View



Photo No. A-16 - Post-Test Passenger Dummy Position View



Photo No. A-17 - Pre-Test Passenger Dummy Position View (Door Open)



Photo No. A-18 - Post-Test Passenger Dummy Position View (Door Open)



Photo No. A-19 - Pre-Test Passenger Seat Position View



A-20

Photo No. A-20 - Post-Test Passenger Seat Position View



Photo No. A-21 - Pre-Test Driver Dummy Knee Bolster View

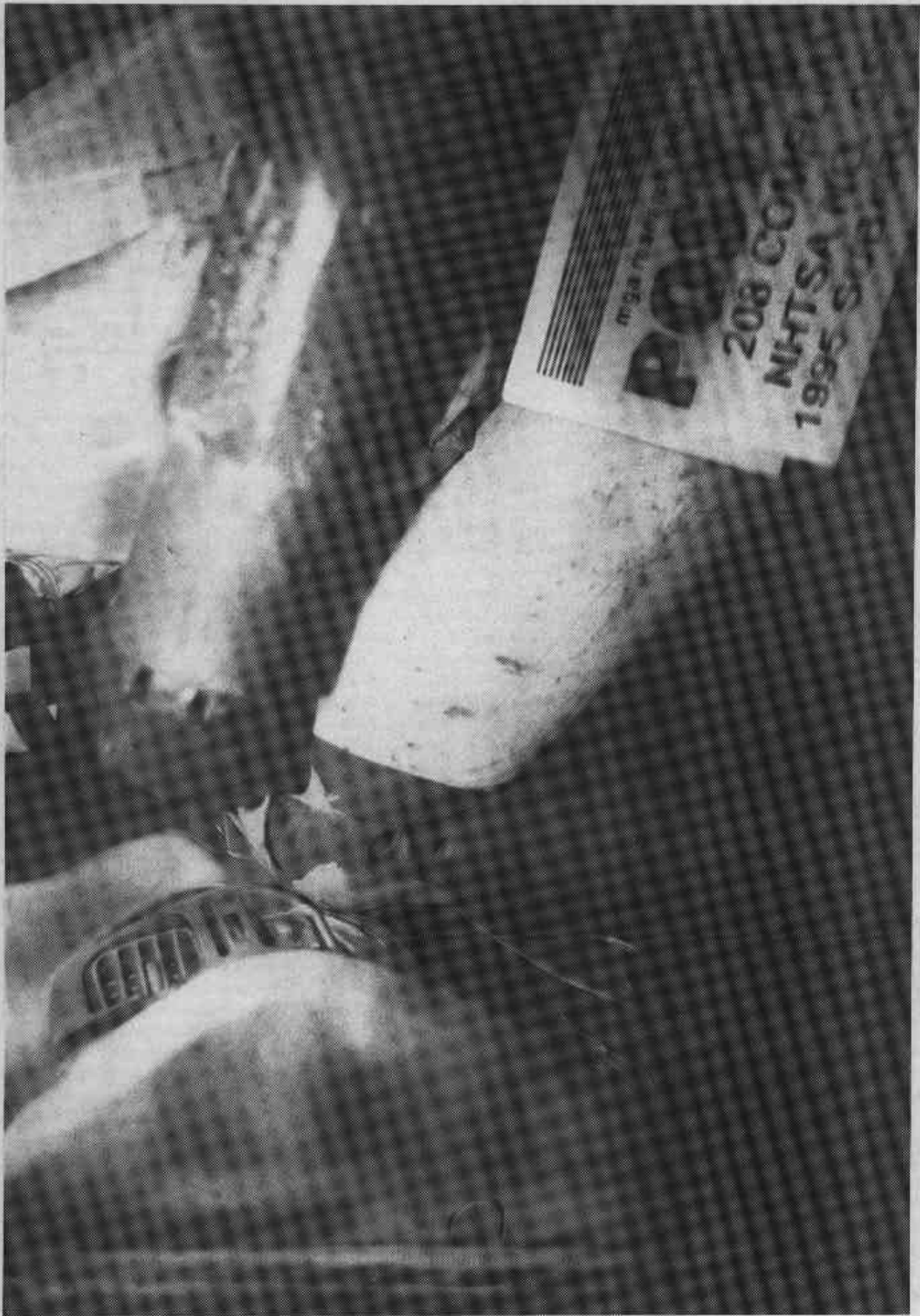


Photo No. A-22 - Post-Test Driver Dummy Knee Bolster View



Photo No. A-23 - Pre-Test Passenger Dummy Knee Bolster View



Photo No. A-24 - Post-Test Passenger Dummy Knee Bolster View



Photo No. A-25 - Driver Head Contact View



Photo No. A-26 - Driver Knee Contact View

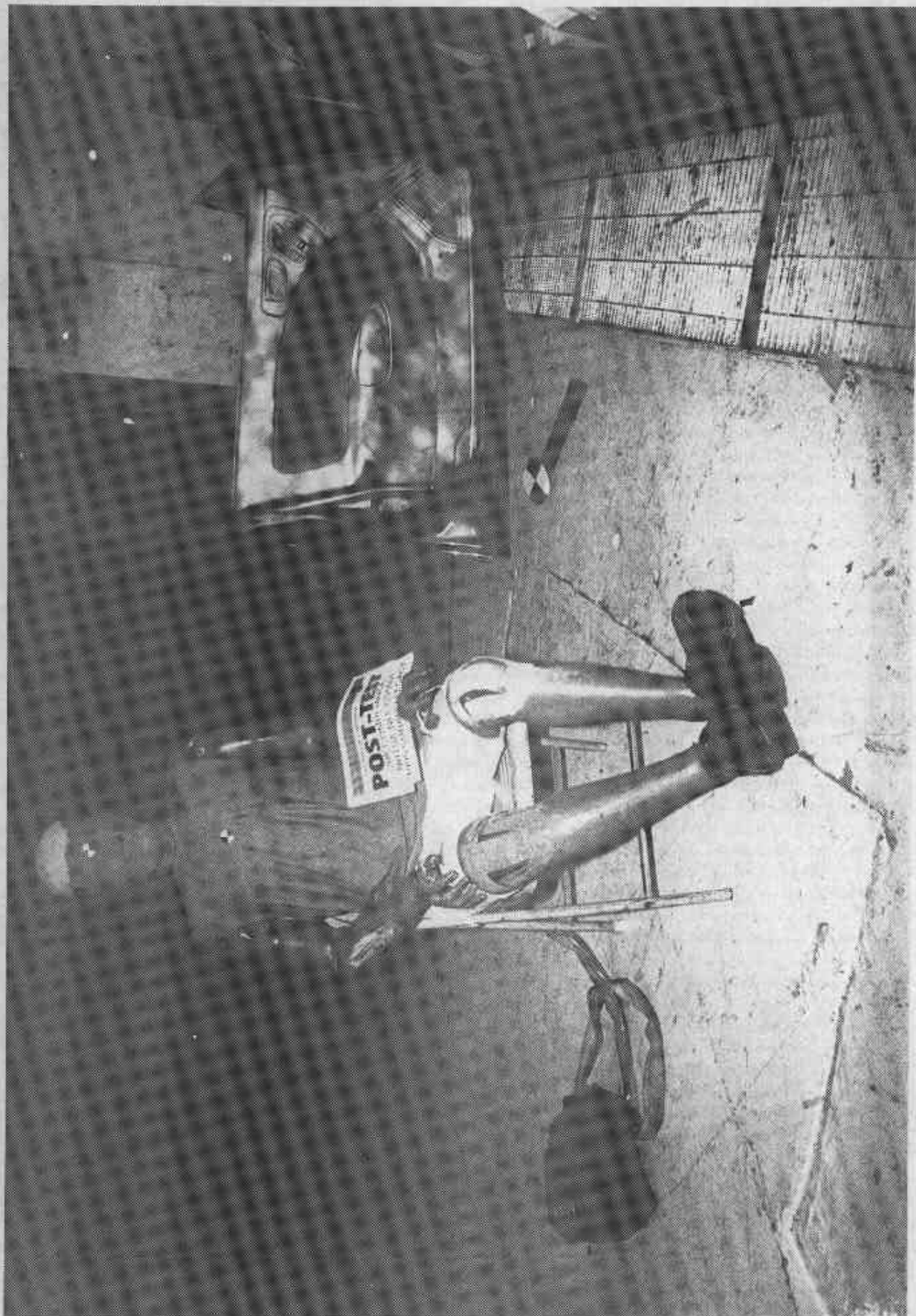


Photo No. A-27 - Post-Test Driver Dummy View

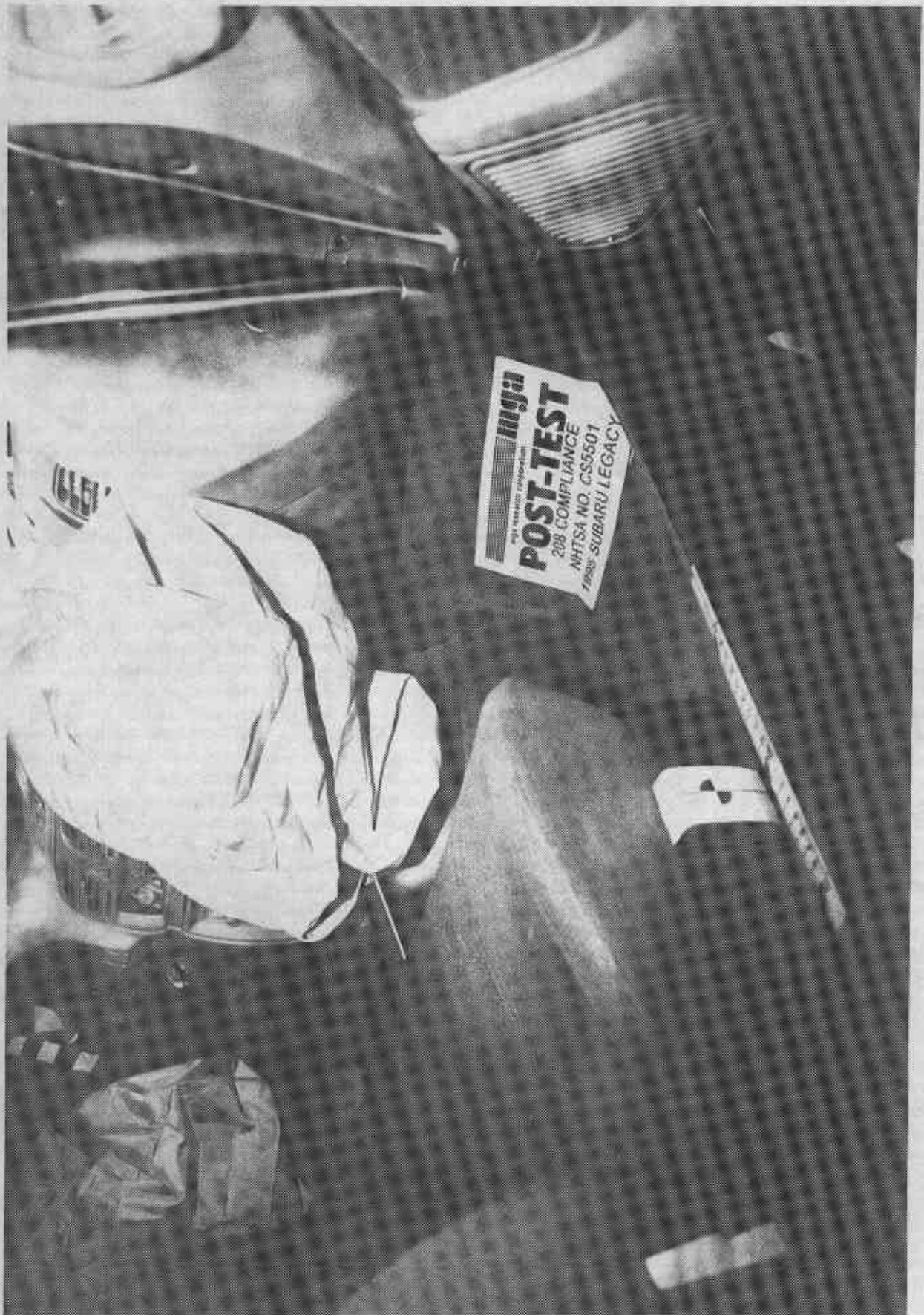


Photo No. A-28 - Passenger Head Contact View

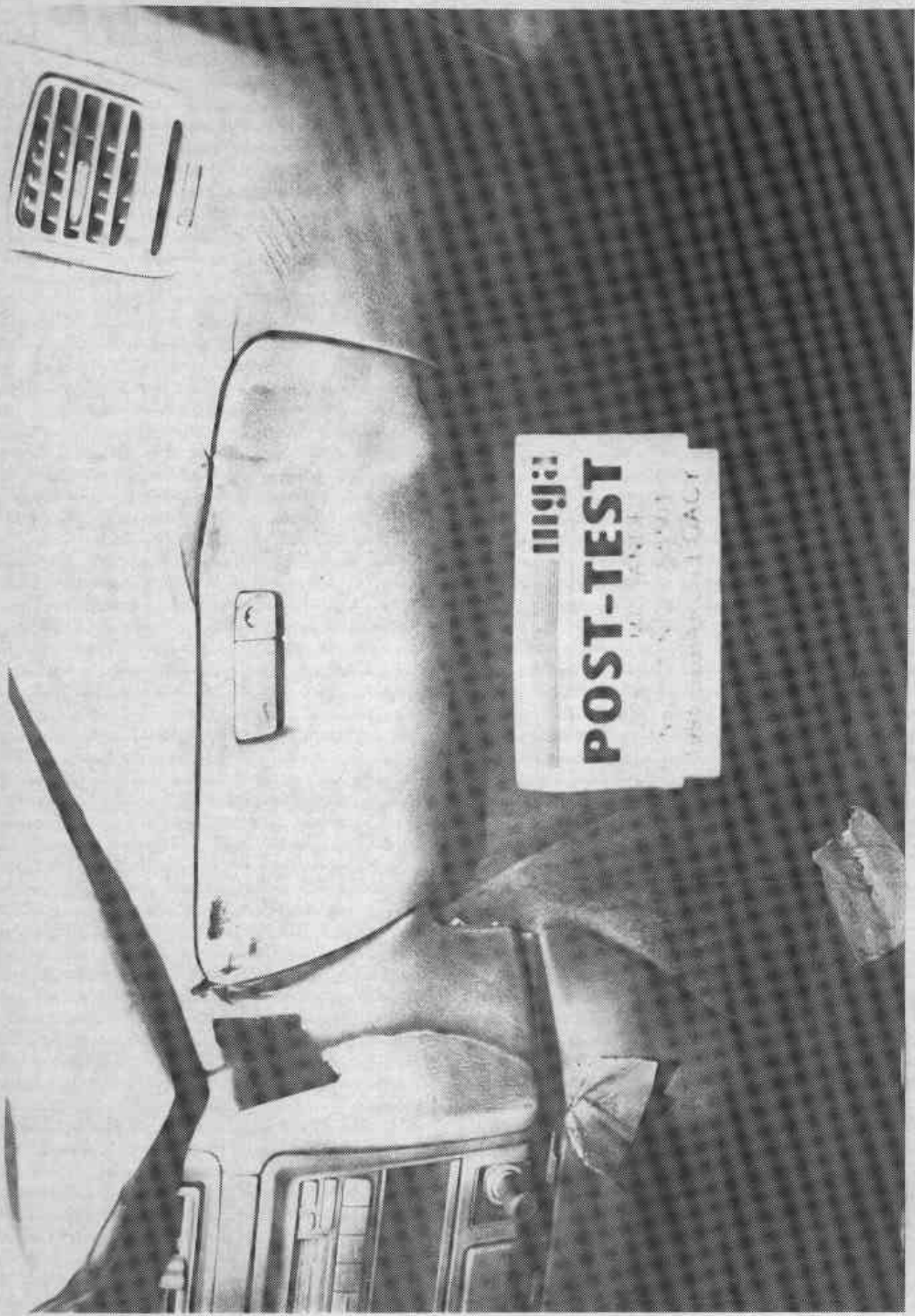


Photo No. A-29 - Passenger Knee Contact View

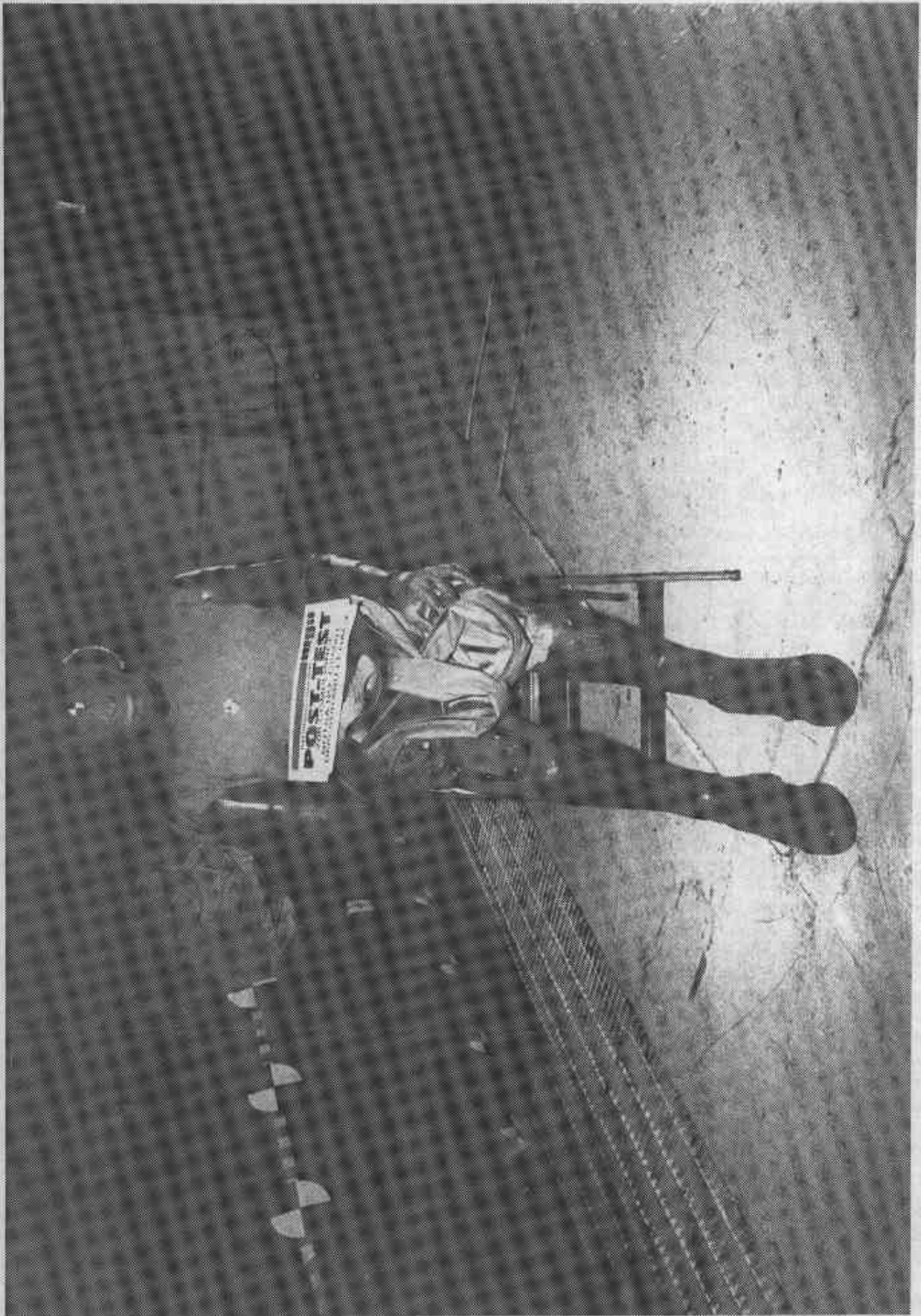


Photo No. A-30 - Post-Test Passenger Dummy View

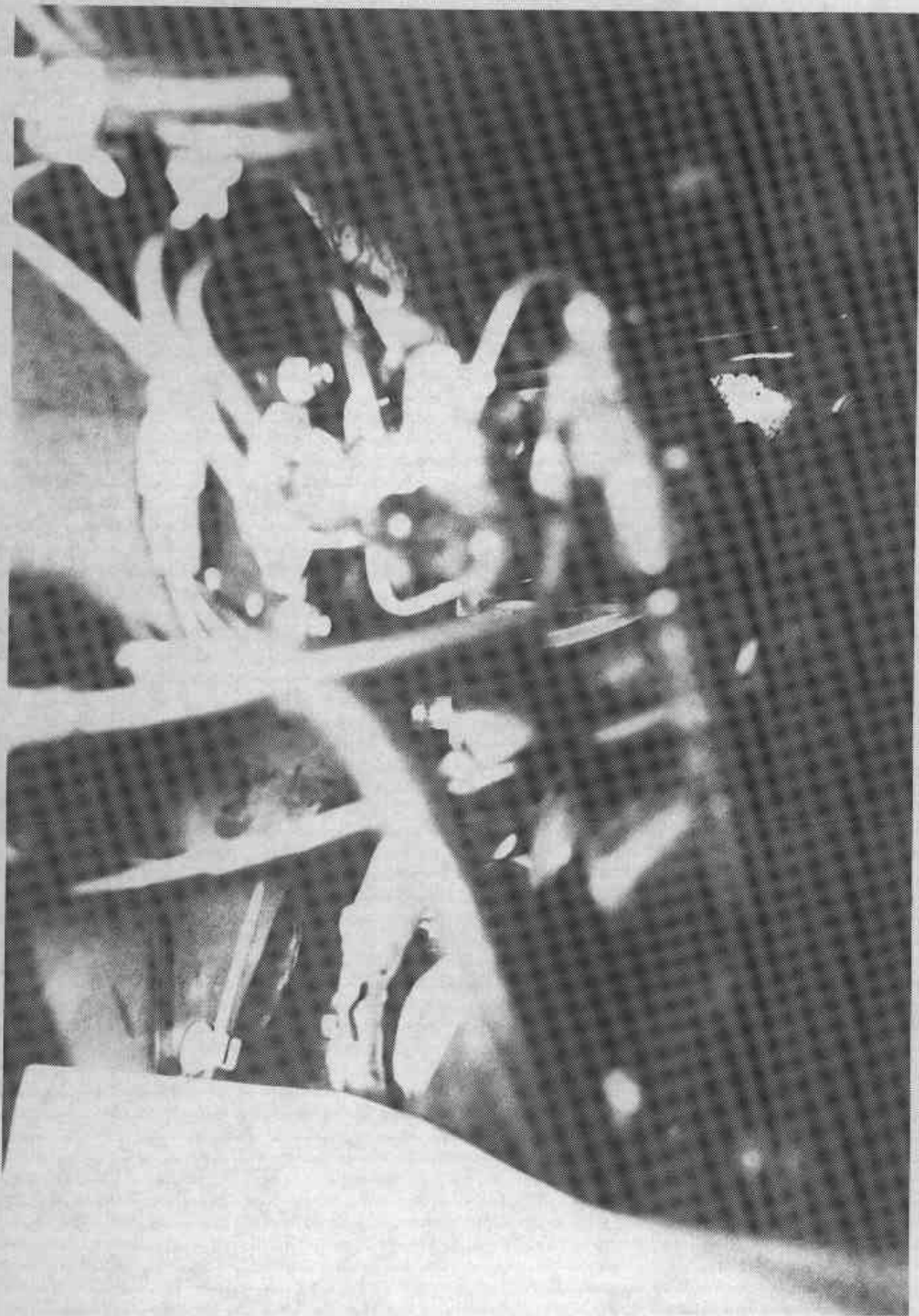


Photo No. A-31 - Pre-Test Steering Column at Firewall View - Engine Room

A-31

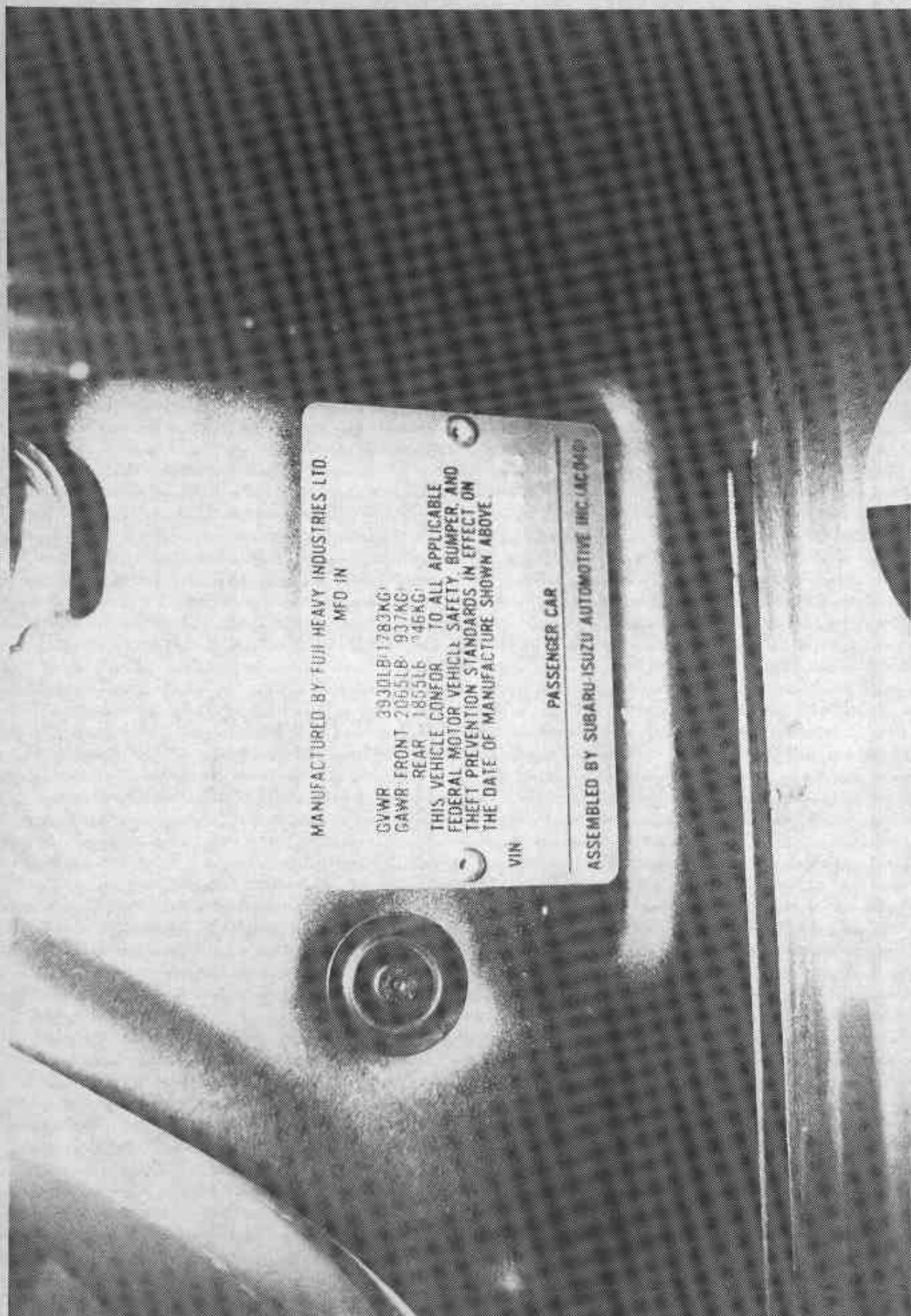


Photo No. A-32 - Vehicle Certification Label

SUBARU	
VEHICLE CAPACITY WEIGHT:	
850LB (383KG)	
NUMBER OF OCCUPANTS:	
TOTAL 5 (FRONT 2 REAR 3)	
RECOMMENDED TIRE INFLATION	
PRESSURE (psi/kgf/cm ²)	
TIRE SIZE	FRONT REAR
F185 70R14 81S	32(2.2) 30(2.1)
TEMPORARY SPARE TIRE	
FWD	T125 70D15 90(4.2)
AWD	T135 70D16
SEDAN NO	

Photo No. A-83 - Tire Placard

APPENDIX B
DATA PLOTS

TABLE OF DATA PLOTS

<u>Description</u>	<u>Filter Class</u>	<u>Page No.</u>
Figure B-1 - Driver Head X Acceleration vs. Time	1000	B-1
Figure B-2 - Driver Head Y Acceleration vs. Time	1000	B-2
Figure B-3 - Driver Head Z Acceleration vs. Time	1000	B-3
Figure B-4 - Driver Head Resultant Acceleration vs. Time	1000	B-4
Figure B-5 - Driver Chest X Acceleration vs. Time	180	B-5
Figure B-6 - Driver Chest Y Acceleration vs. Time	180	B-6
Figure B-7 - Driver Chest Z Acceleration vs. Time	180	B-7
Figure B-8 - Driver Chest Resultant Acceleration vs. Time	180	B-8
Figure B-9 - Driver Left Femur Force vs. Time	600	B-9
Figure B-10 - Driver Right Femur Force vs. Time	600	B-10
Figure B-11 - Passenger Head X Acceleration vs. Time	1000	B-11
Figure B-12 - Passenger Head Y Acceleration vs. Time	1000	B-12
Figure B-13 - Passenger Head Z Acceleration vs. Time	1000	B-13
Figure B-14 - Passenger Head Resultant Acceleration vs. Time	1000	B-14
Figure B-15 - Passenger Chest X Acceleration vs. Time	180	B-15
Figure B-16 - Passenger Chest Y Acceleration vs. Time	180	B-16
Figure B-17 - Passenger Chest Z Acceleration vs. Time	180	B-17
Figure B-18 - Passenger Chest Resultant Acceleration vs. Time	180	B-18
Figure B-19 - Passenger Left Femur Force vs. Time	600	B-19
Figure B-20 - Passenger Right Femur Force vs. Time	600	B-20
Figure B-21 - Top of Engine Block X Acceleration vs. Time	60	B-21
Figure B-22 - Bottom of Engine X Acceleration vs. Time	60	B-22
Figure B-23 - Instrument Panel X Acceleration vs. Time	60	B-23
Figure B-24 - Left Rear Seat Crossmember X Accel. vs. Time	60	B-24
Figure B-25 - Right Rear Seat Crossmember X Accel. vs. Time	60	B-25
Figure B-26 - Left Brake Caliper X Acceleration vs. Time	60	B-26
Figure B-27 - Right Brake Caliper X Acceleration vs. Time	60	B-27
Figure B-28 - Trunk Floor Z Acceleration vs. Time	60	B-28

TEST: 208 COMPLIANCE TEST TEST DATE: 09-07-1994

COMPONENT: 1995 SUBARU LEGACY 4 DOOR (CS5501) Speed: 29.4 MPH 47.3 KPH

YMIN=-43.55662 G'S at 82. msec YMAX= 2.148494 G'S at 199 msec

DRIVER HEAD X ACCELERATION

0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19

0 -10 -20 -30 -40

6.9

WCA Research
09-07-1994 11:00

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

(Filter Class: 1000)

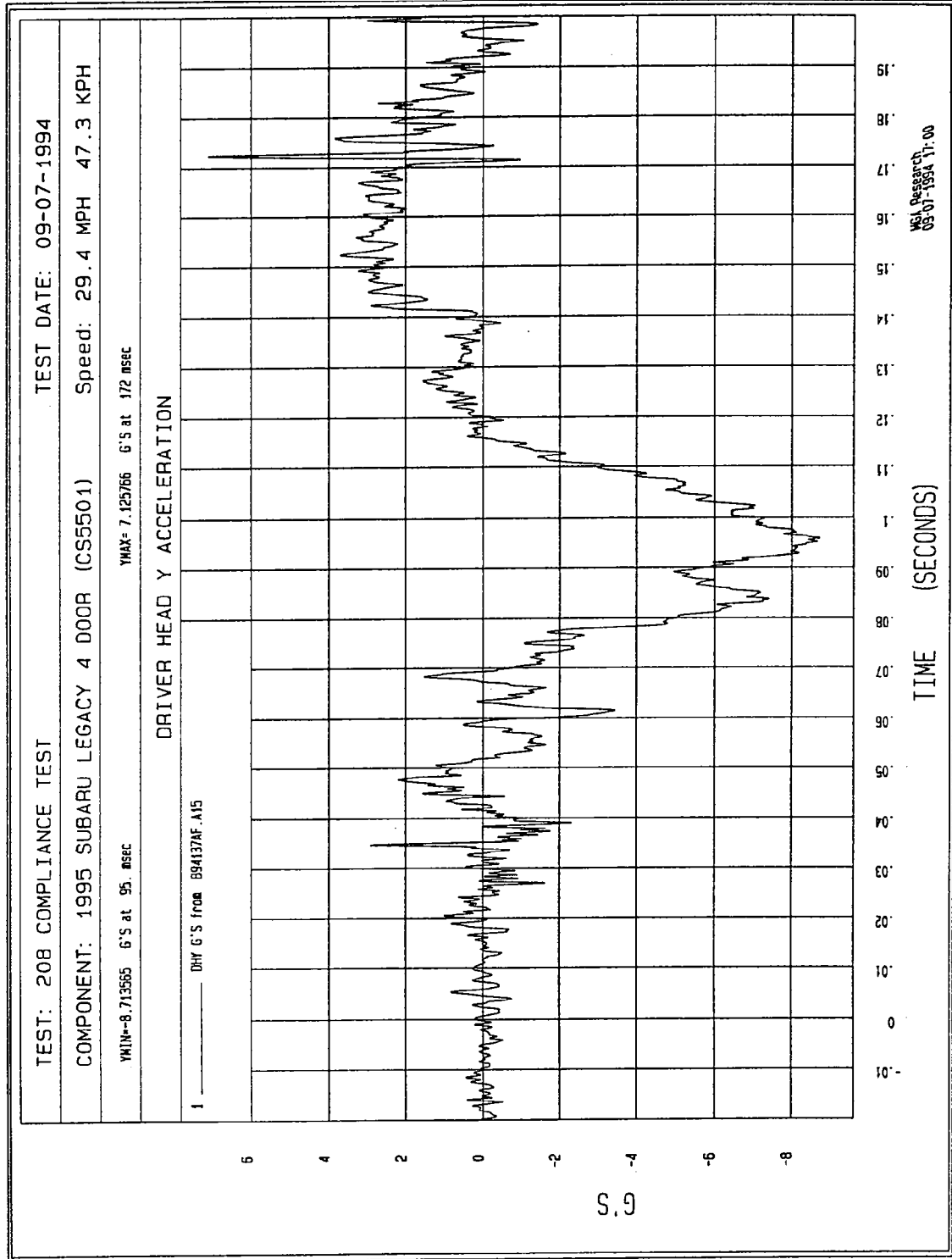


Figure B-2 - Driver Head Y Acceleration vs. Time

(Filter Class: 1000)

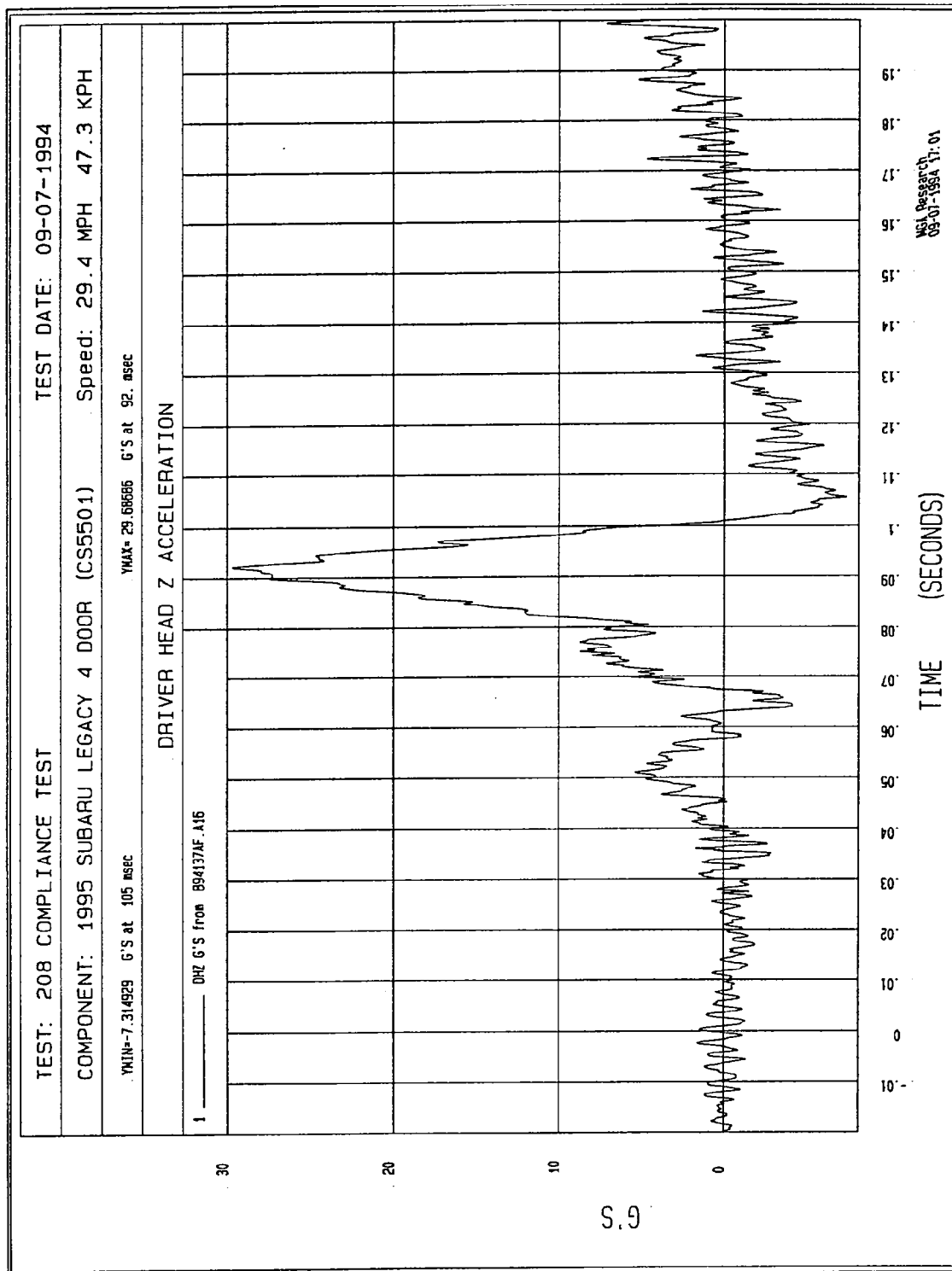


Figure B-3 - Driver Head Z Acceleration vs. Time

(Filter Class: 1000)

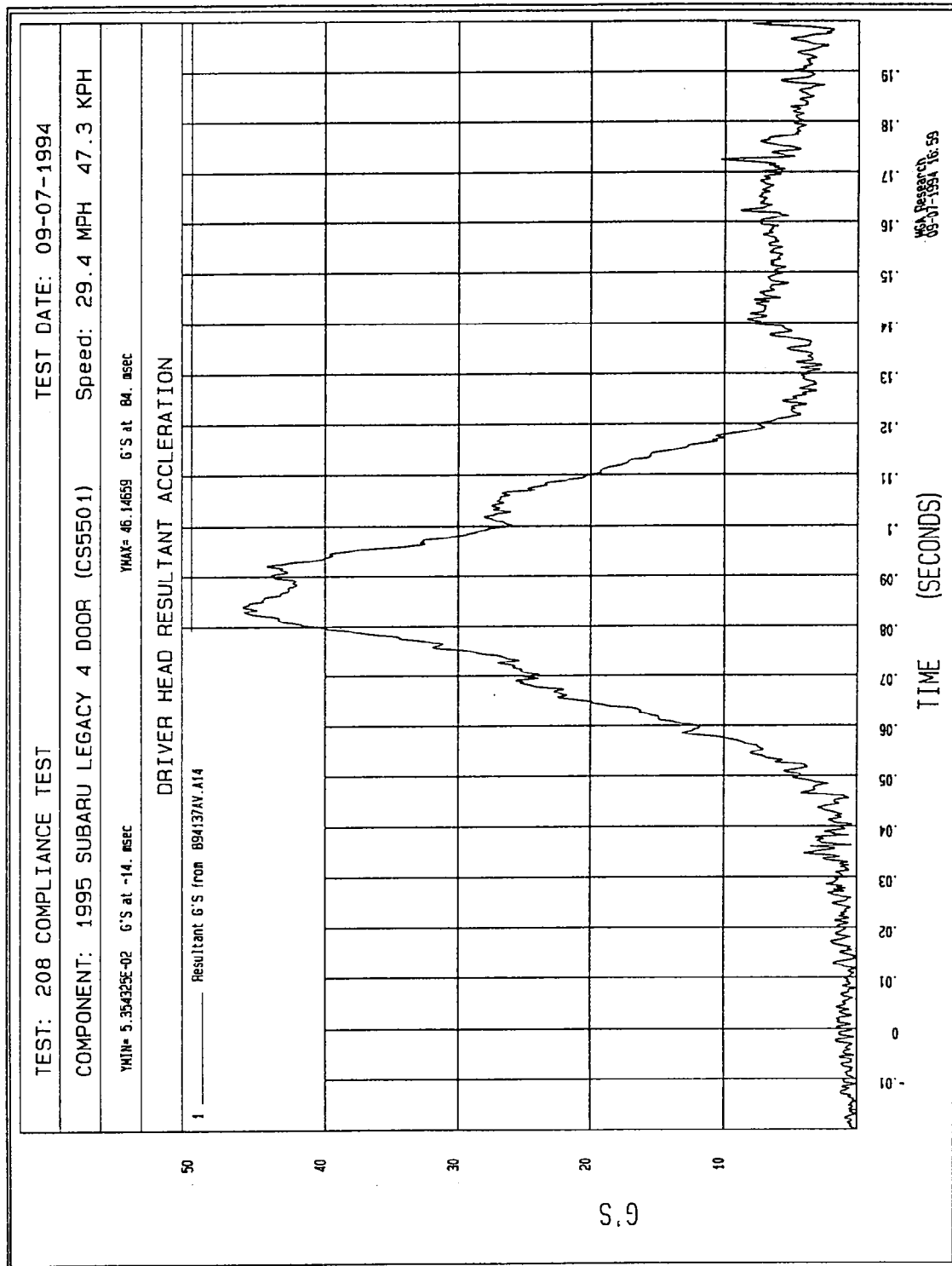


Figure B-4 - Driver Head Resultant Acceleration vs. Time

(Filter Class: 180)

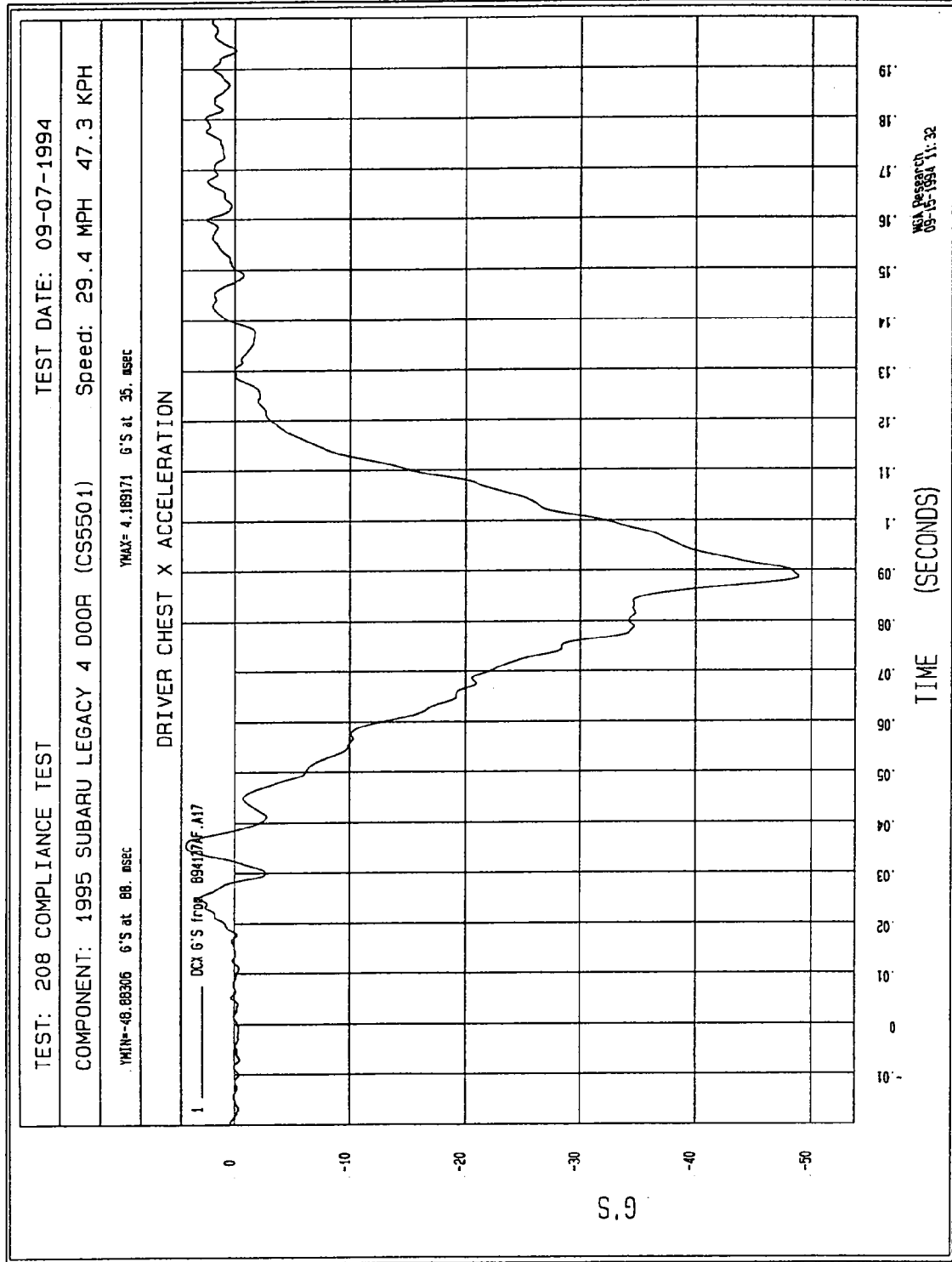


Figure B-5 • Driver Chest X Acceleration vs. Time

(Filter Class: 180)

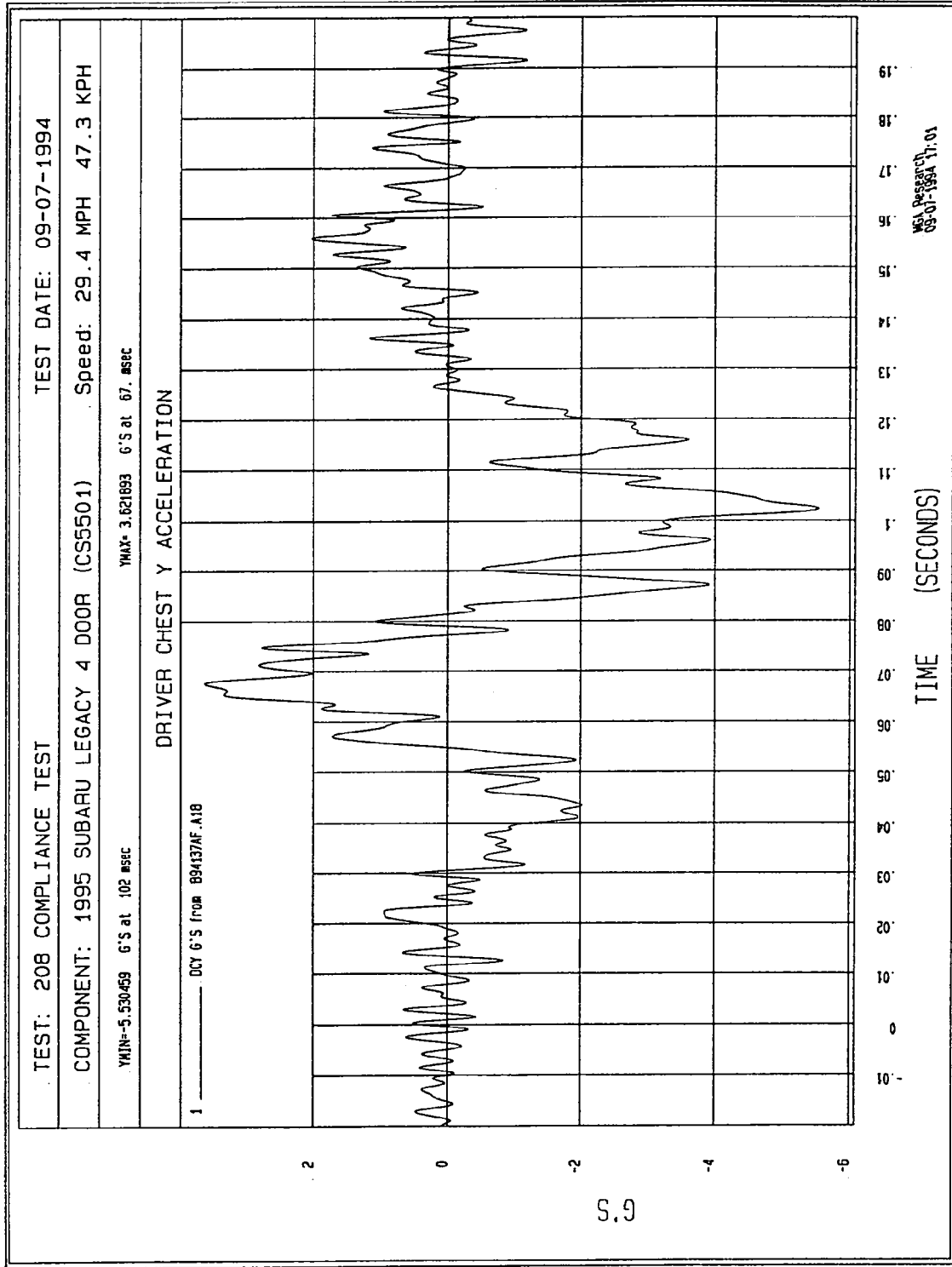


Figure B-6 - Driver Chest Y Acceleration vs. Time

(Filter Class: 180)

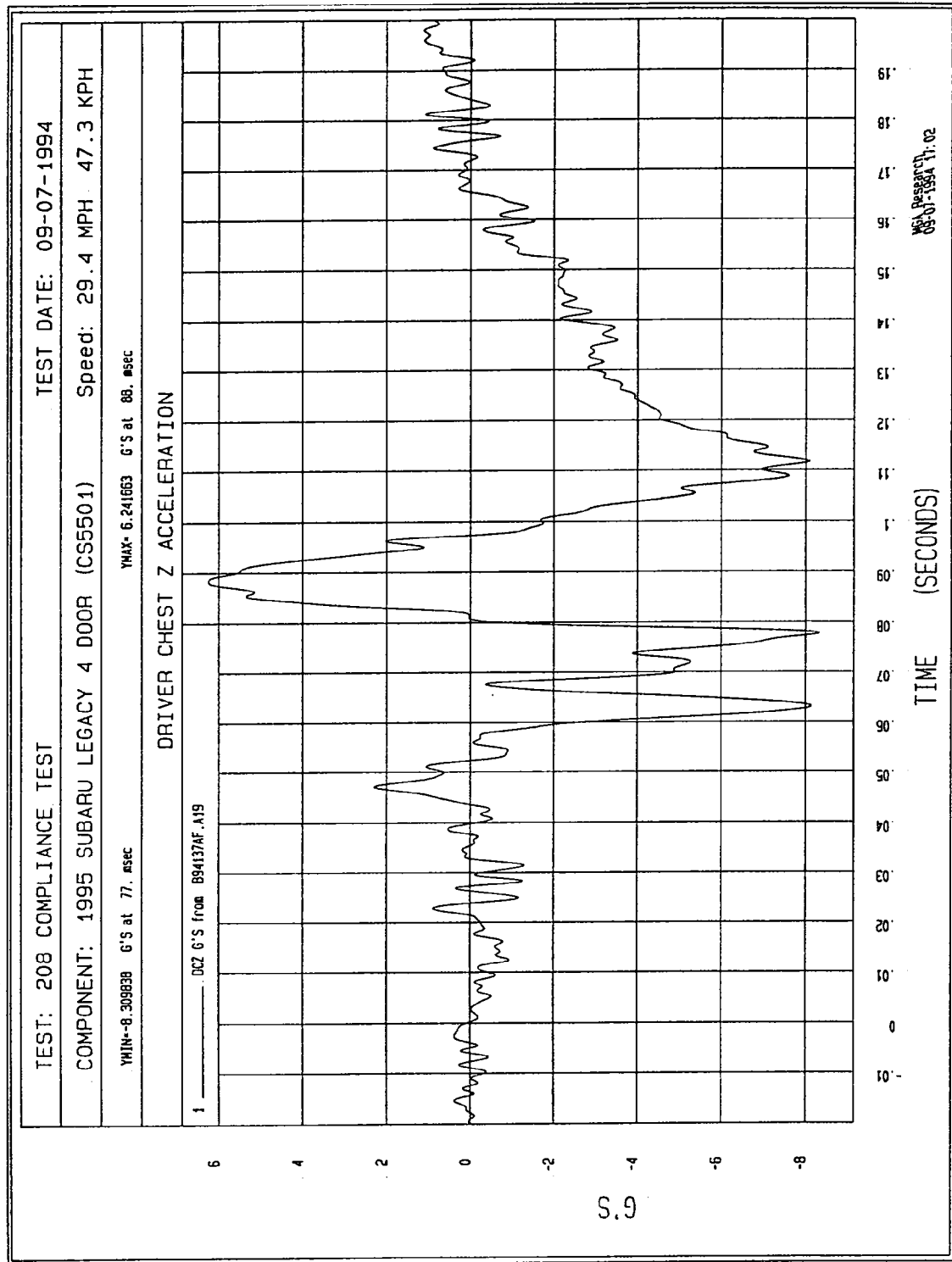


Figure B-7 - Driver Chest Z Acceleration vs. Time

(Filter Class: 180)

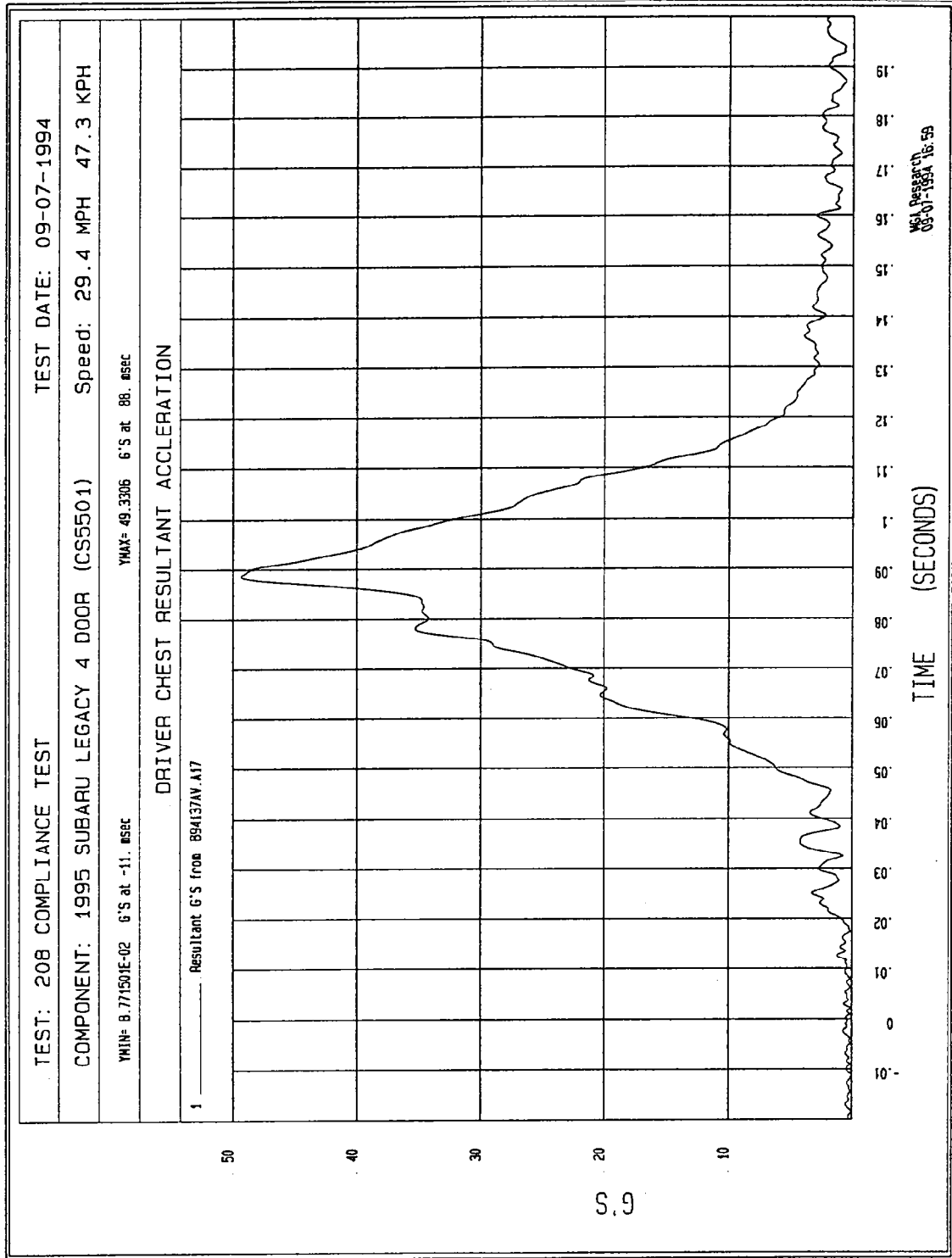


Figure B-8 - Driver Chest Resultant Acceleration vs. Time

(Filter Class: 600)

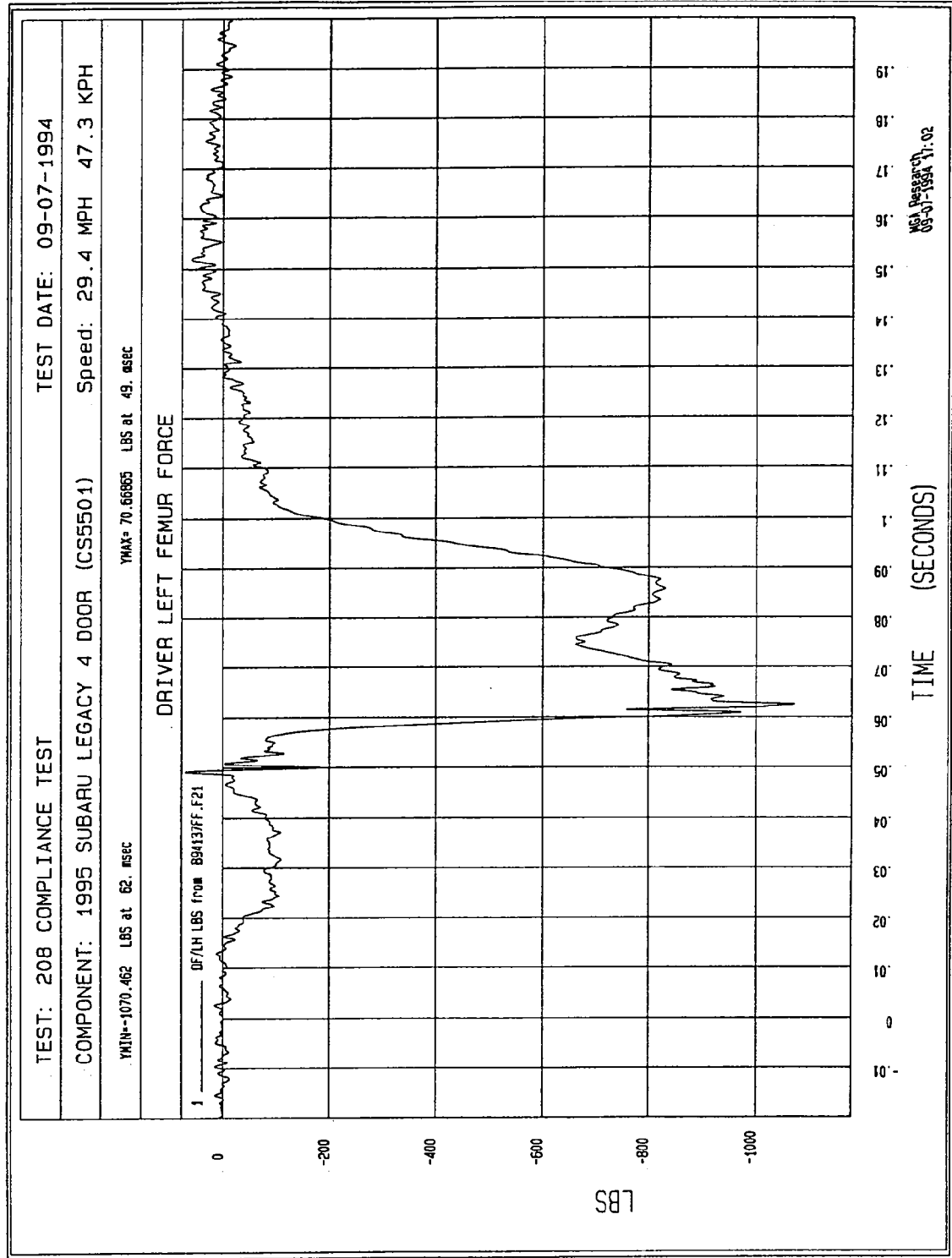


Figure B-9 - Driver Left Femur Force vs. Time

(Filter Class: 600)

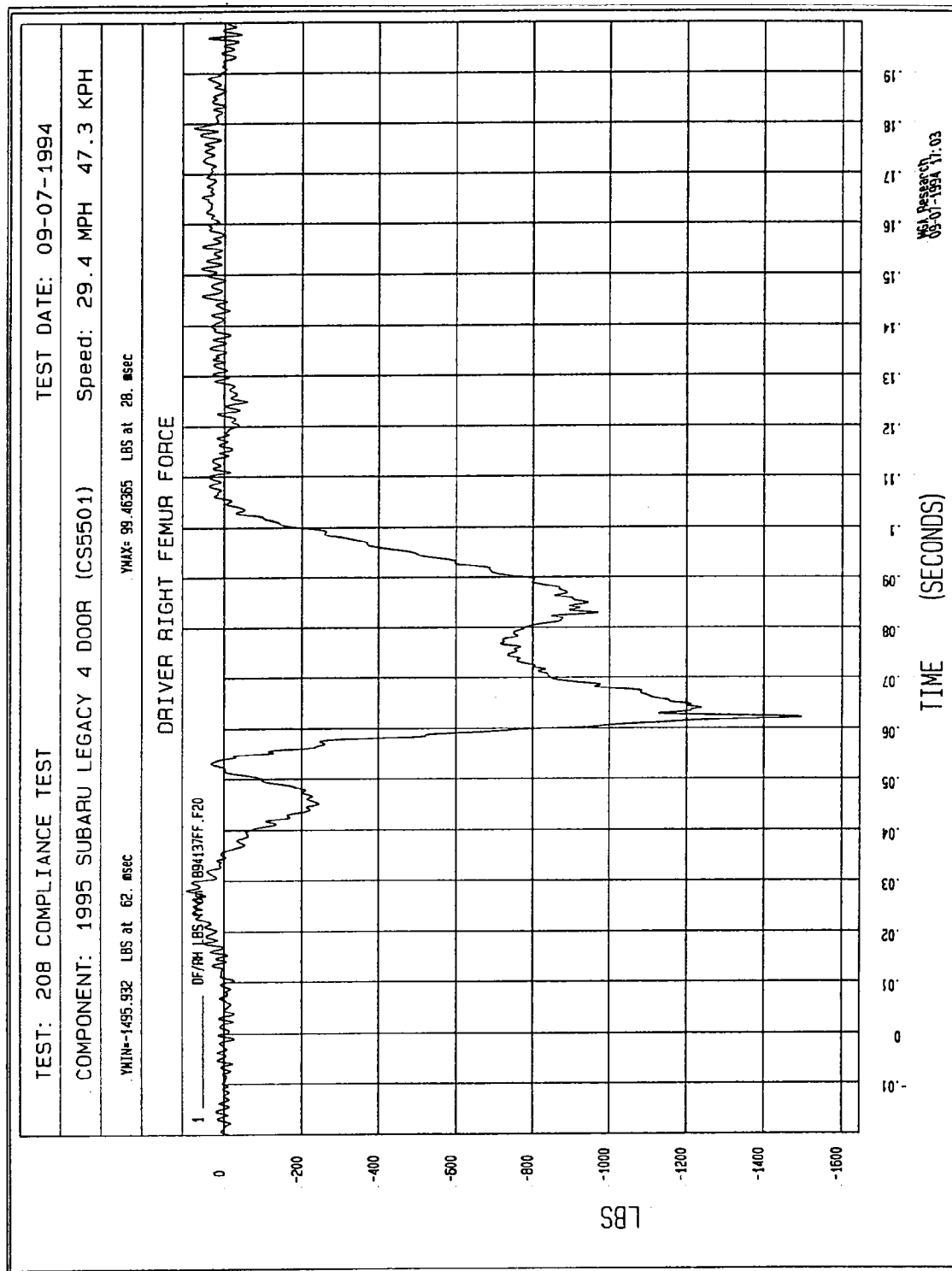


Figure B-10 - Driver Right Femur Force vs. Time

(Filter Class: 1000)

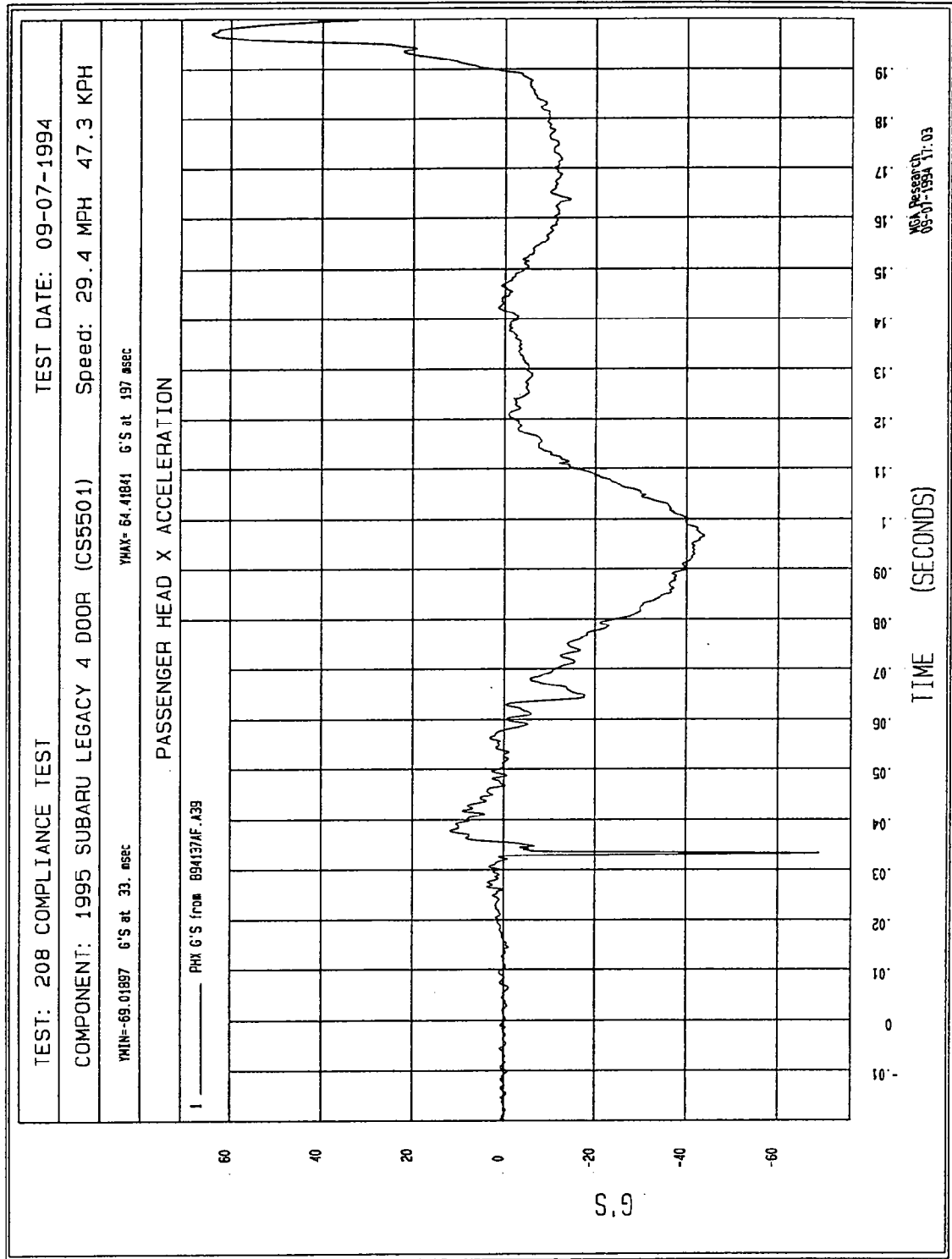


Figure B-11 - Passenger Head X Acceleration vs. Time

(Filter Class: 1000)

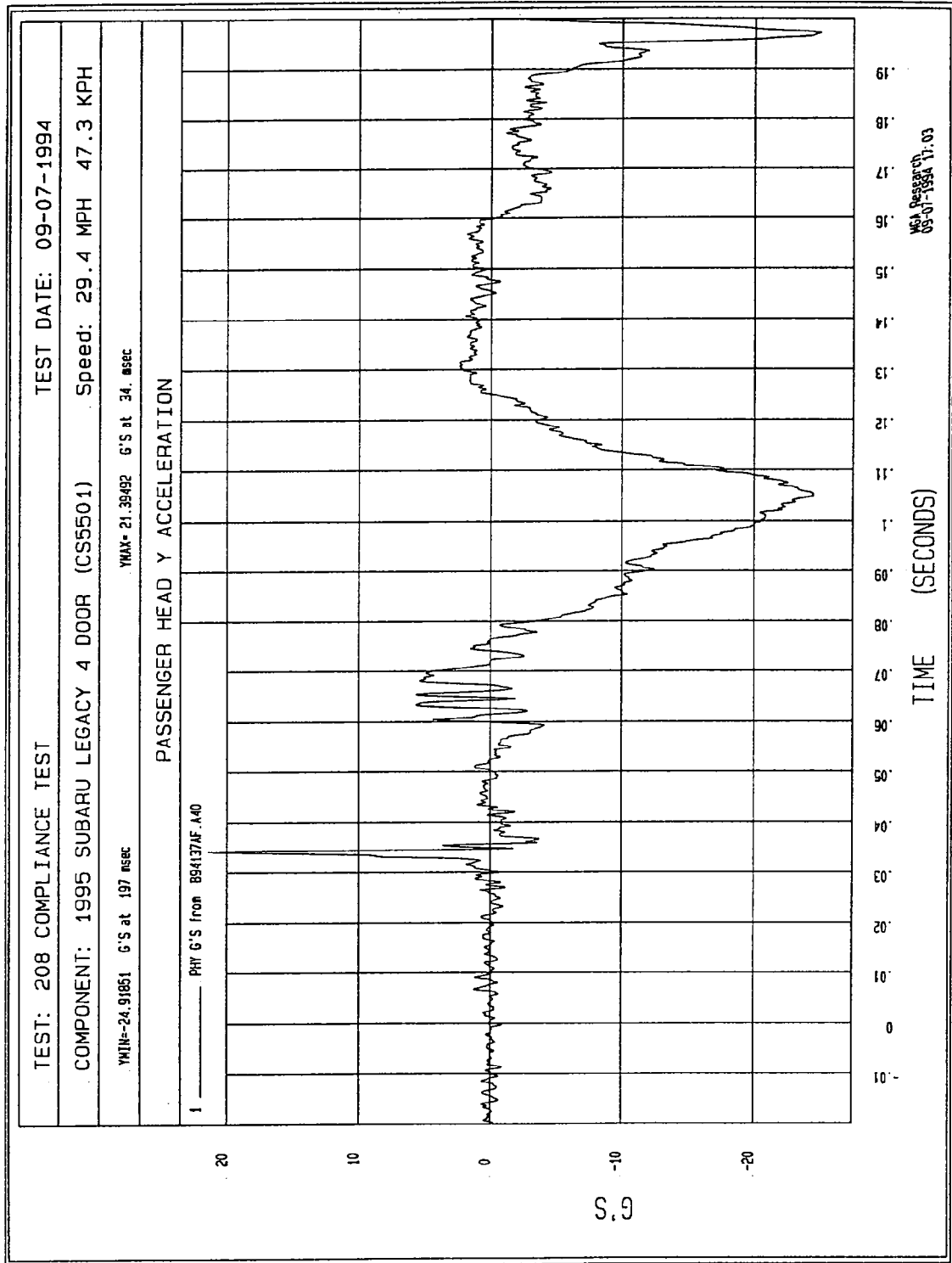


Figure B-12 - Passenger Head Y Acceleration vs. Time

(Filter Class: 1000)

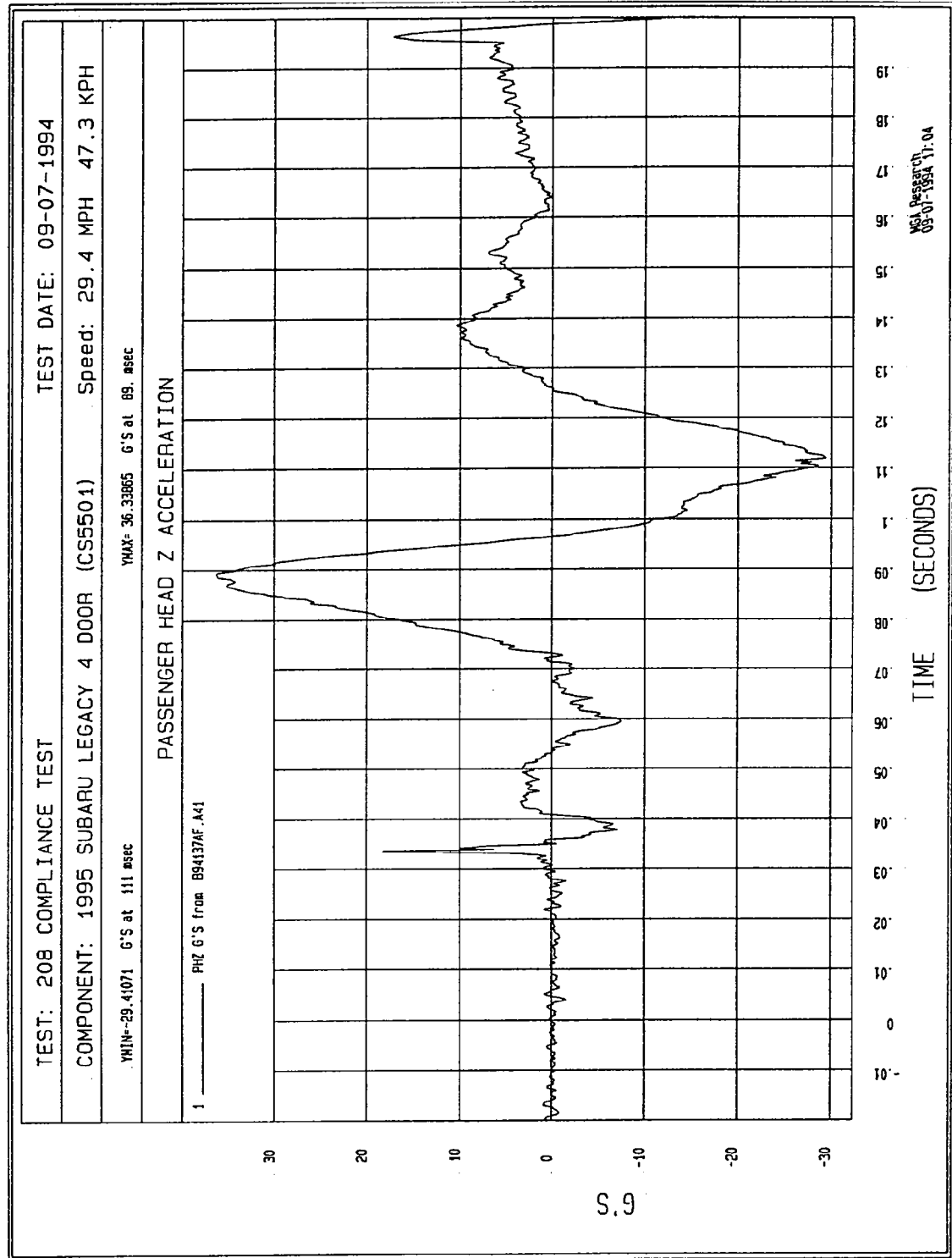


Figure B-13 - Passenger Head Z Acceleration vs. Time

(Filter Class: 1000)

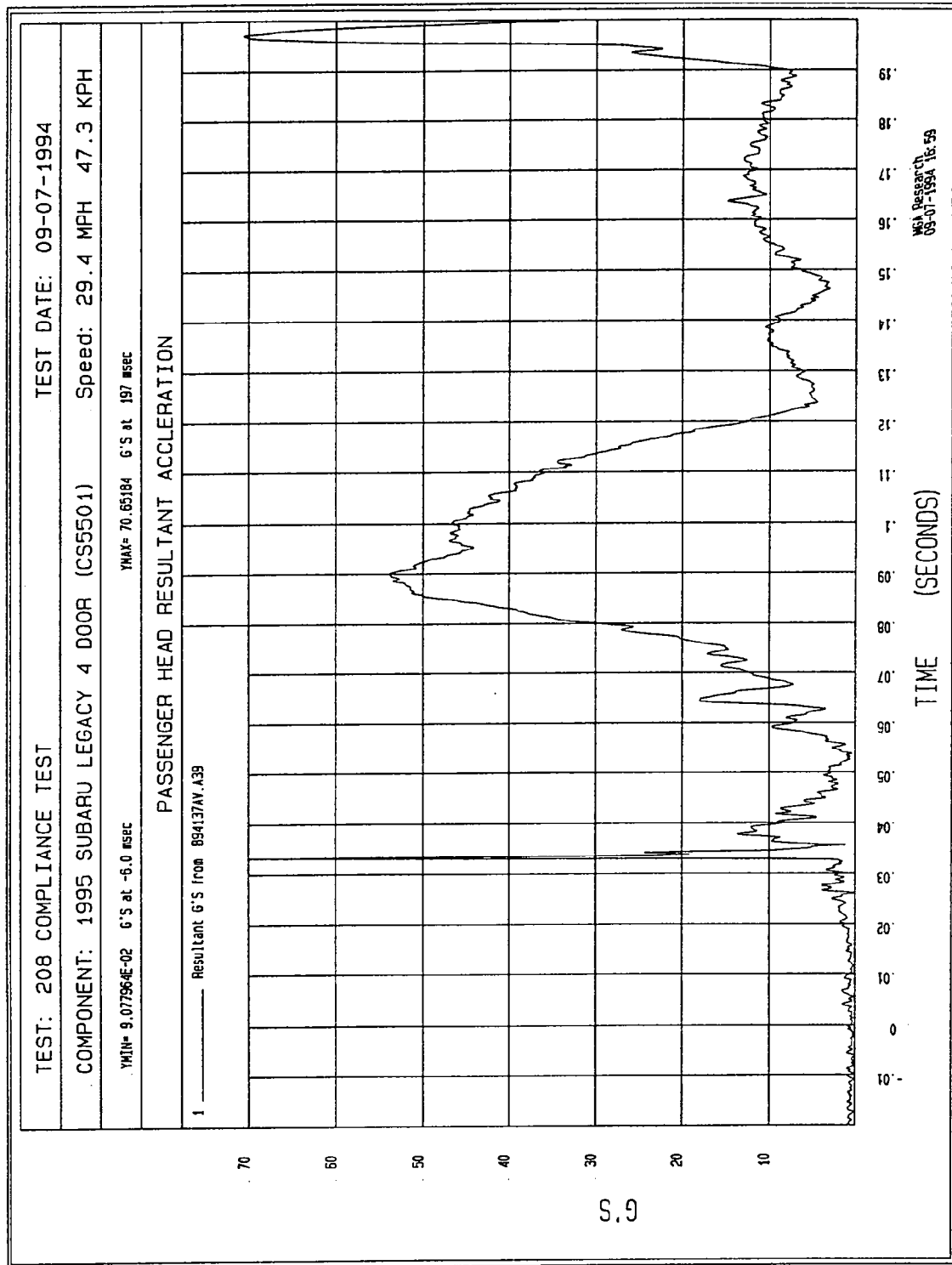


Figure B-14 - Passenger Head Resultant Acceleration vs. Time

(Filter Class: 180)

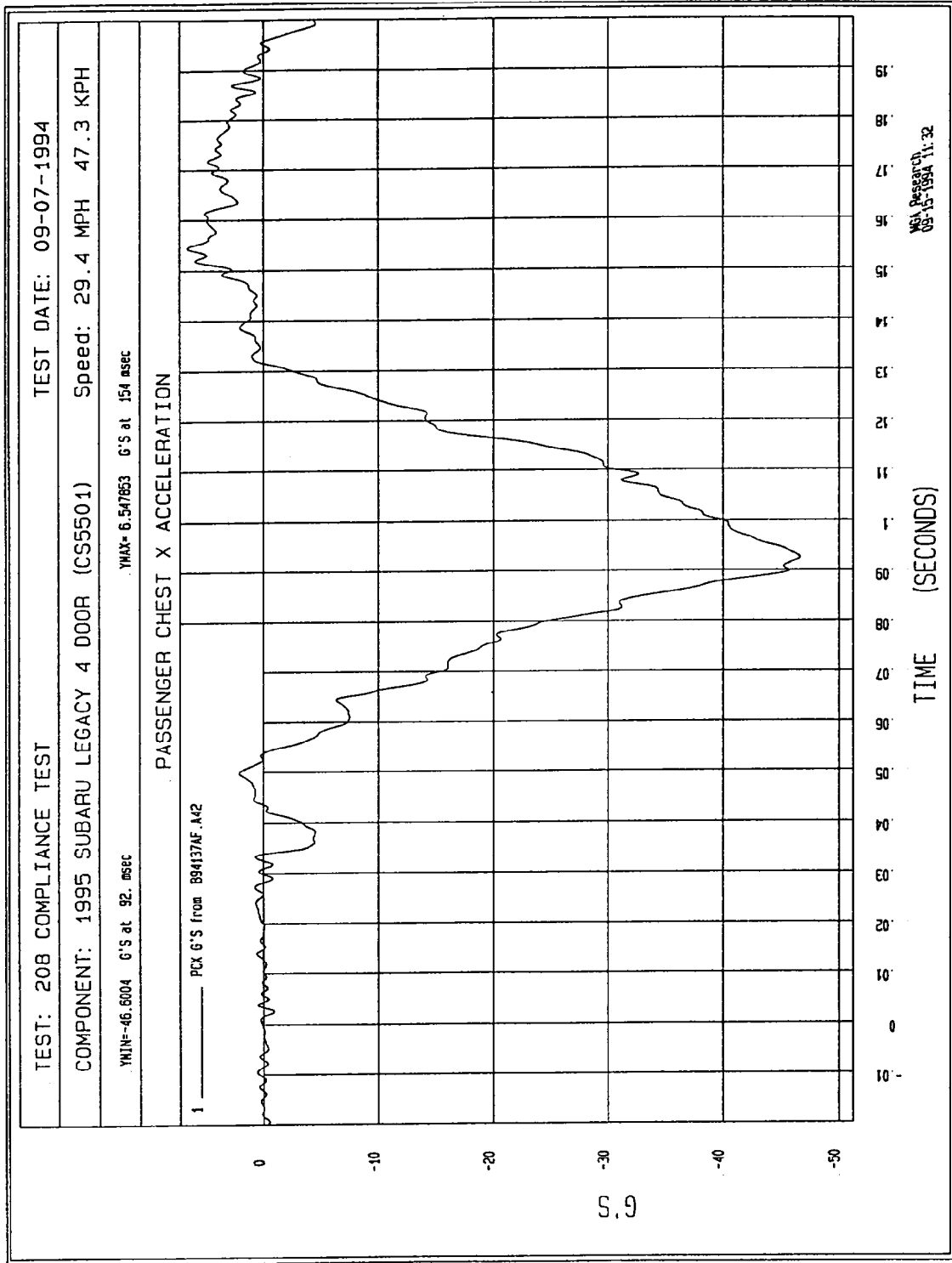


Figure B-15 - Passenger Chest X Acceleration vs. Time

(Filter Class: 180)

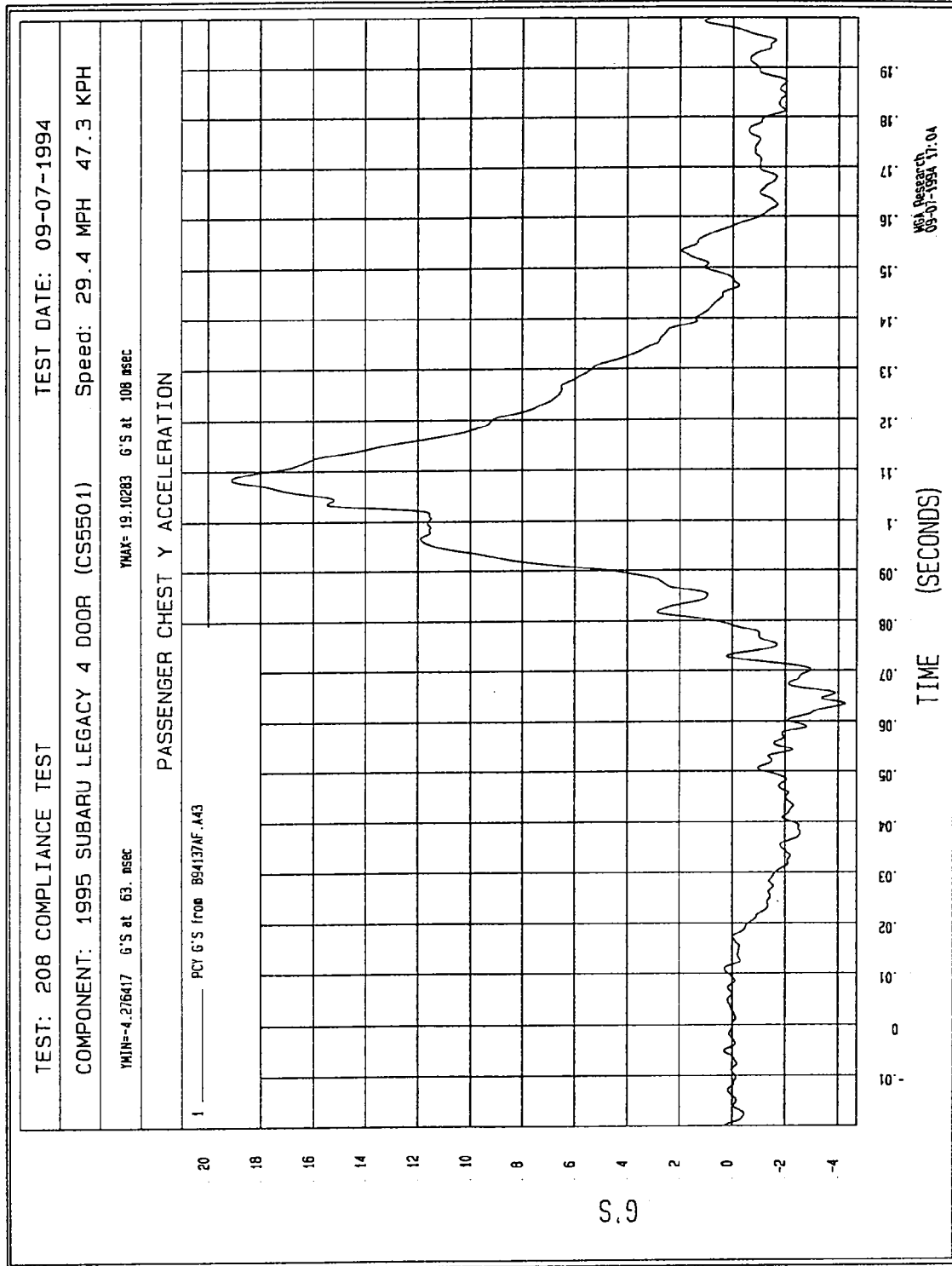


Figure B-16 - Passenger Chest Y Acceleration vs. Time

(Filter Class: 180)

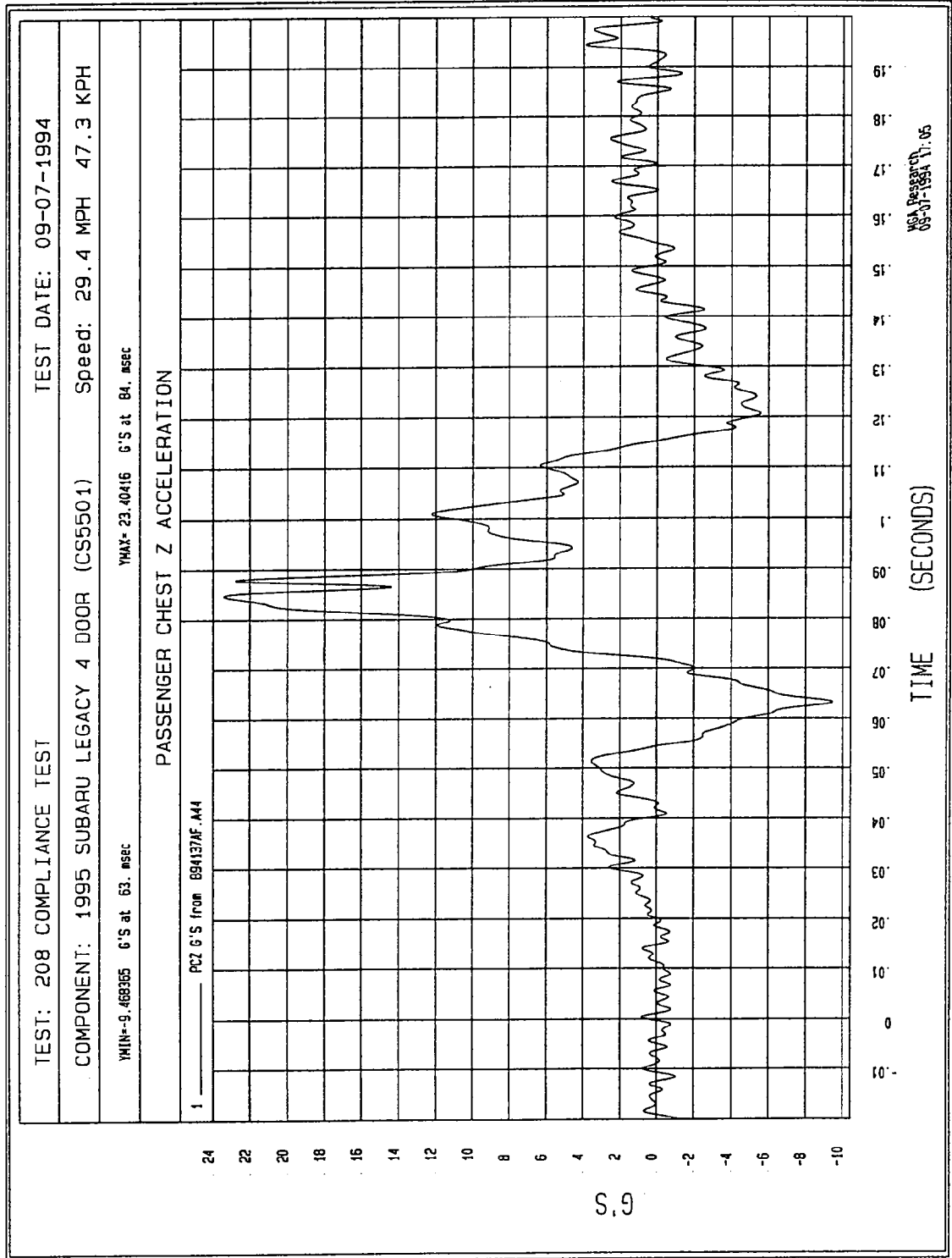


Figure B-17 - Passenger Chest Z Acceleration vs. Time

(Filter Class: 180)

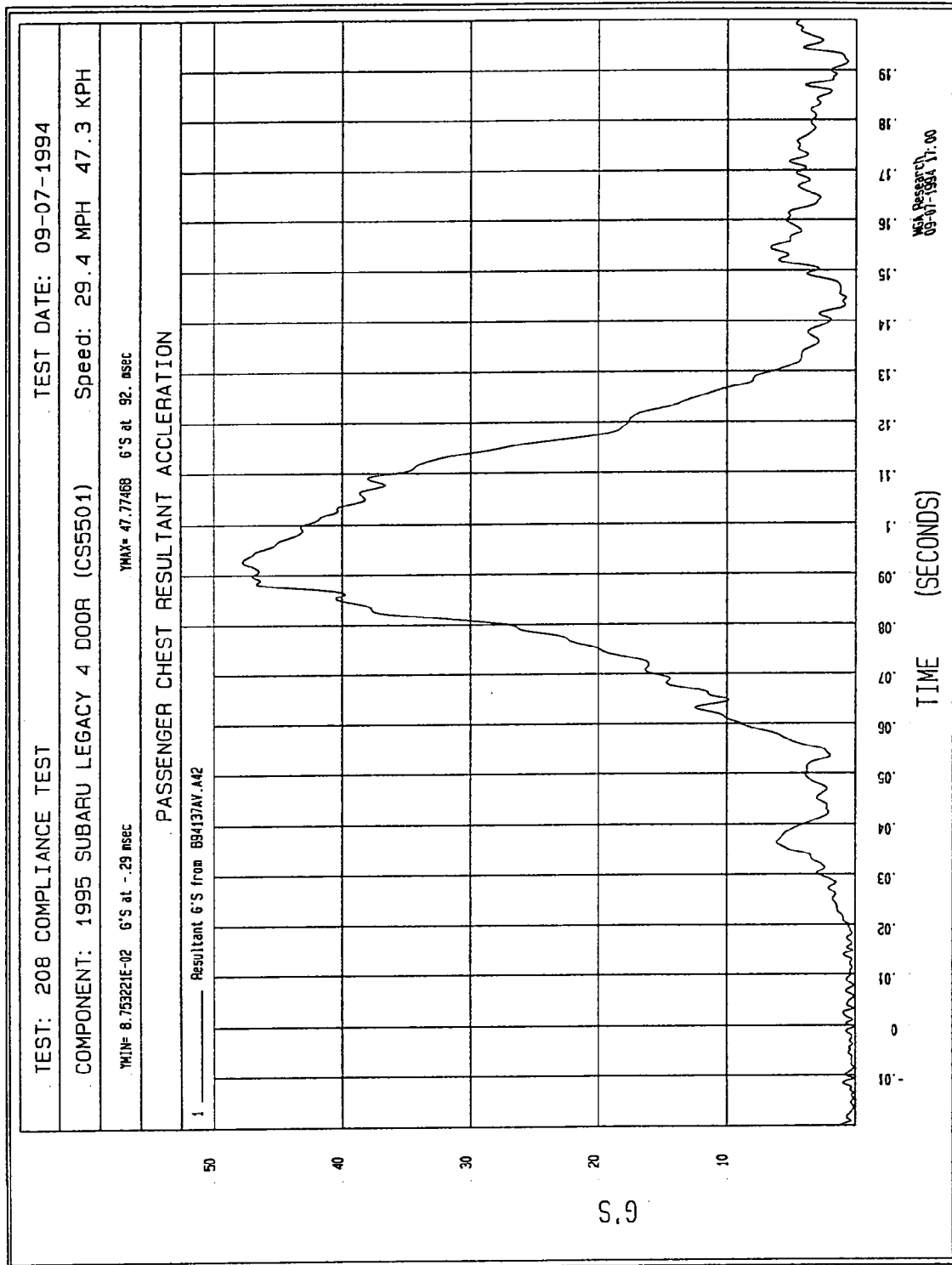


Figure B-18 - Passenger Chest Resultant Acceleration vs. Time

(Filter Class: 600)

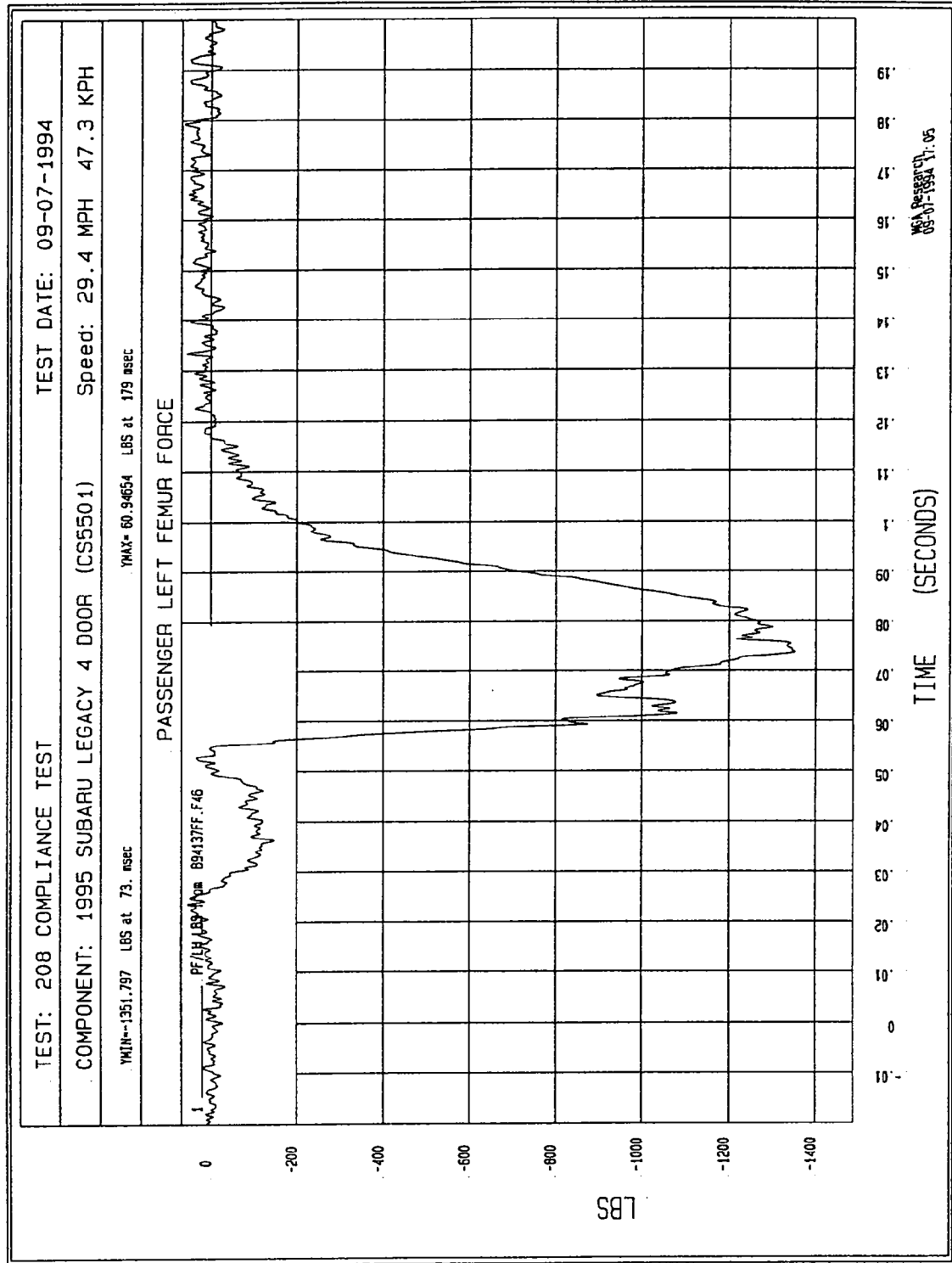


Figure B-19 - Passenger Left Femur Force vs. Time

(Filter Class: 600)

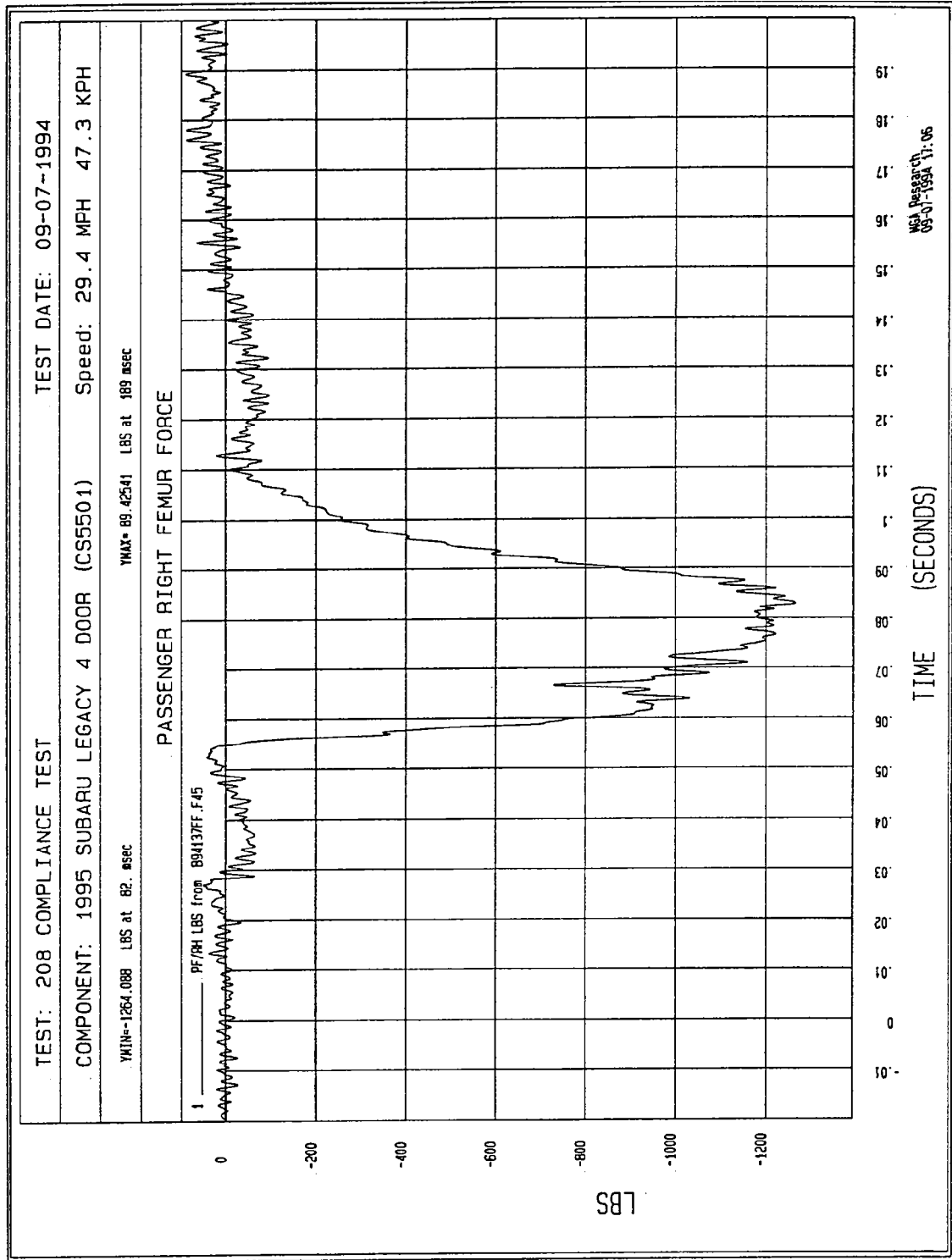


Figure B-20 - Passenger Right Femur Force vs. Time

(Filter Class: 60)

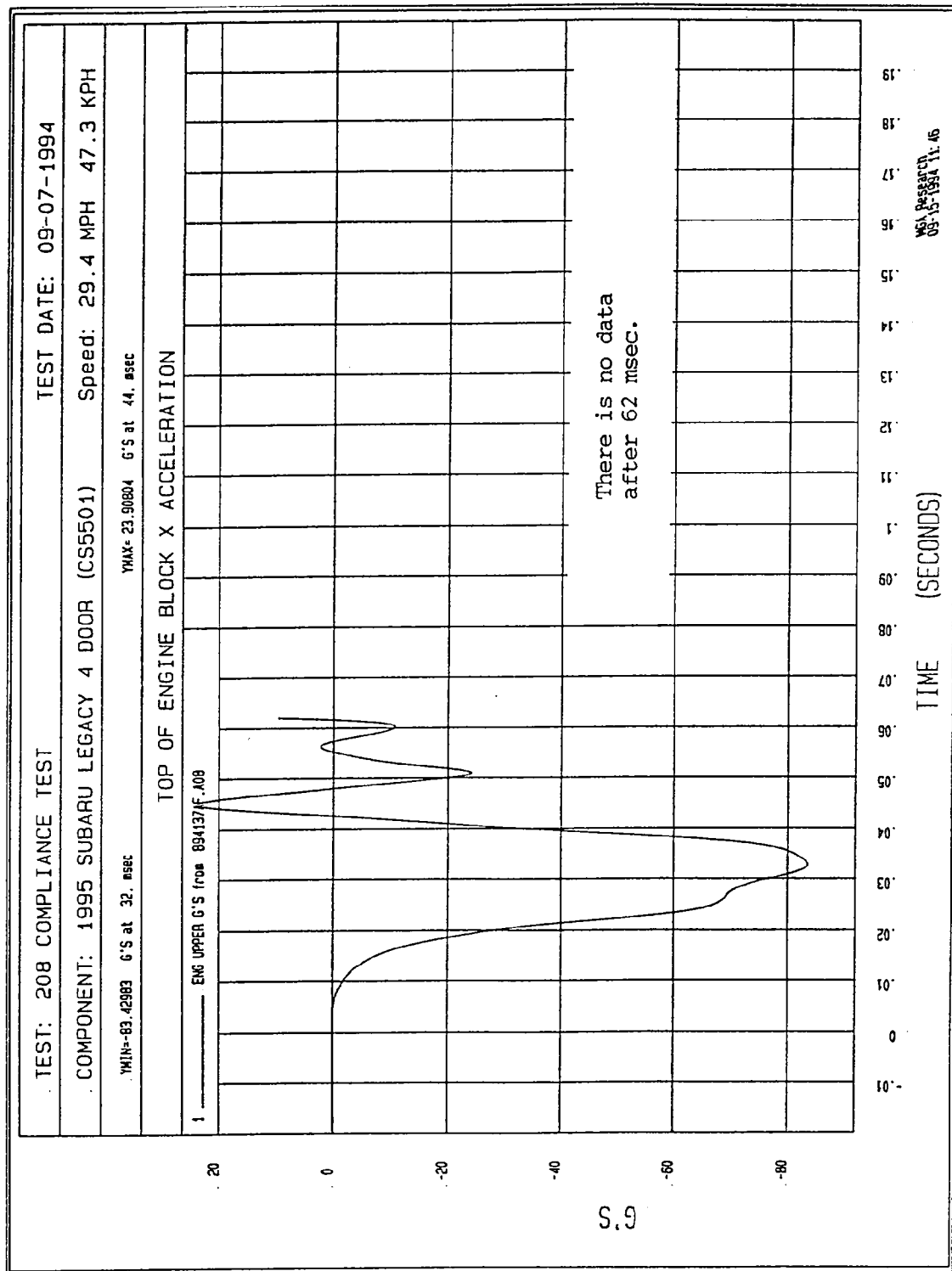


Figure B-21 - Top of Engine Block X Acceleration vs. Time

(Filter Class: 60)

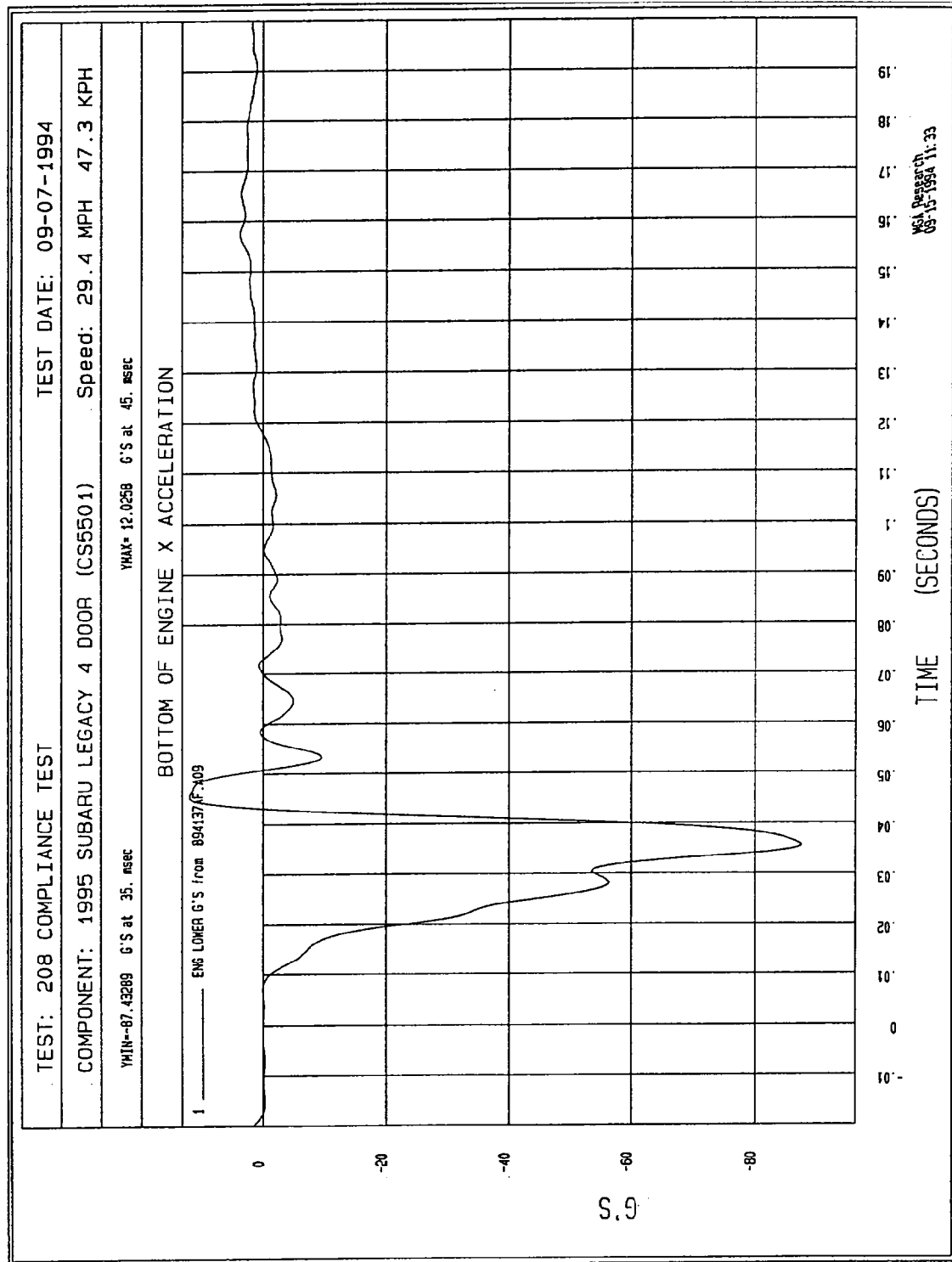


Figure B-22 - Bottom of Engine X Acceleration vs. Time

(Filter Class: 60)

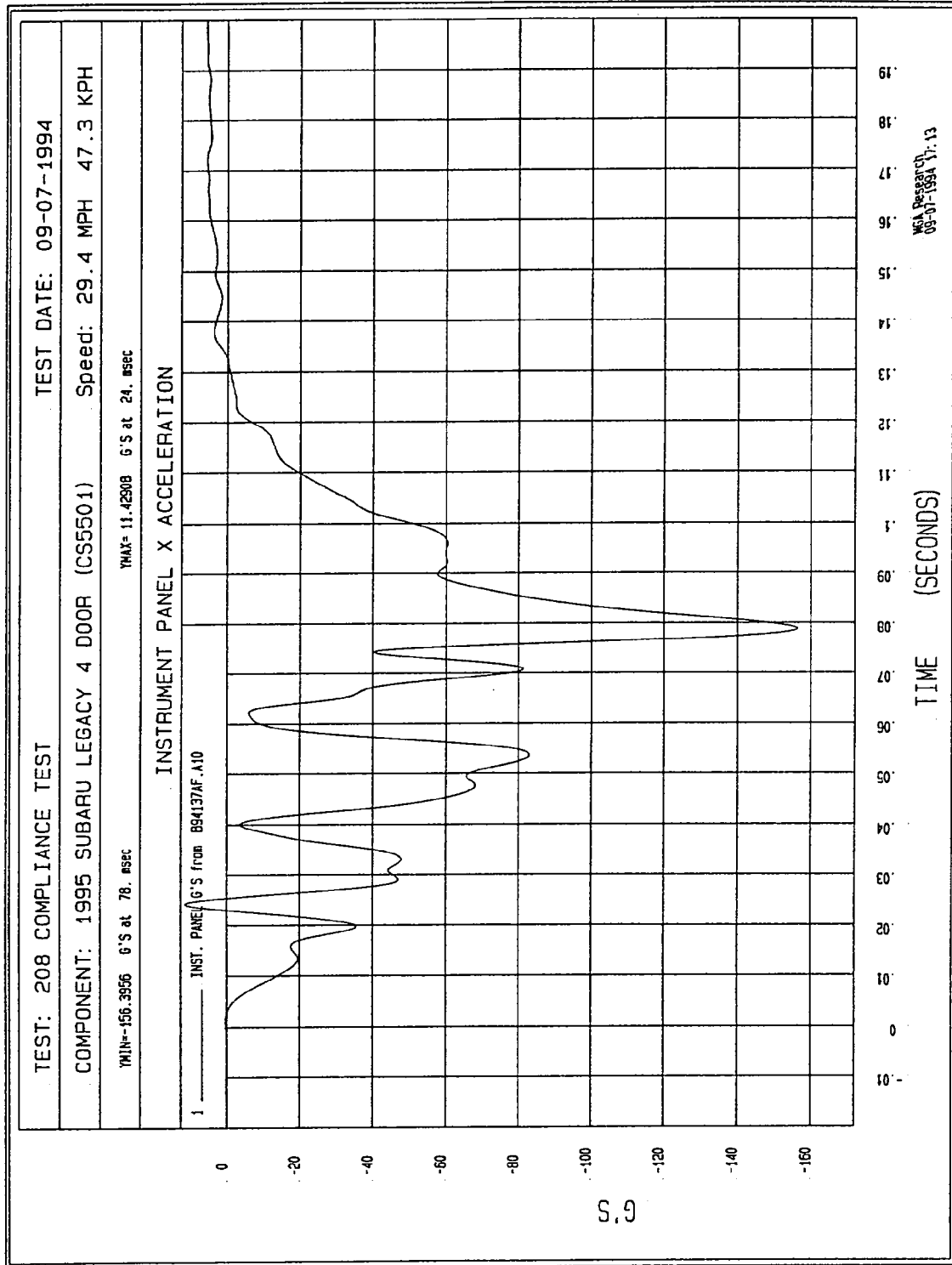


Figure B-23 - Instrument Panel X Acceleration vs. Time

(Filter Class: 60)

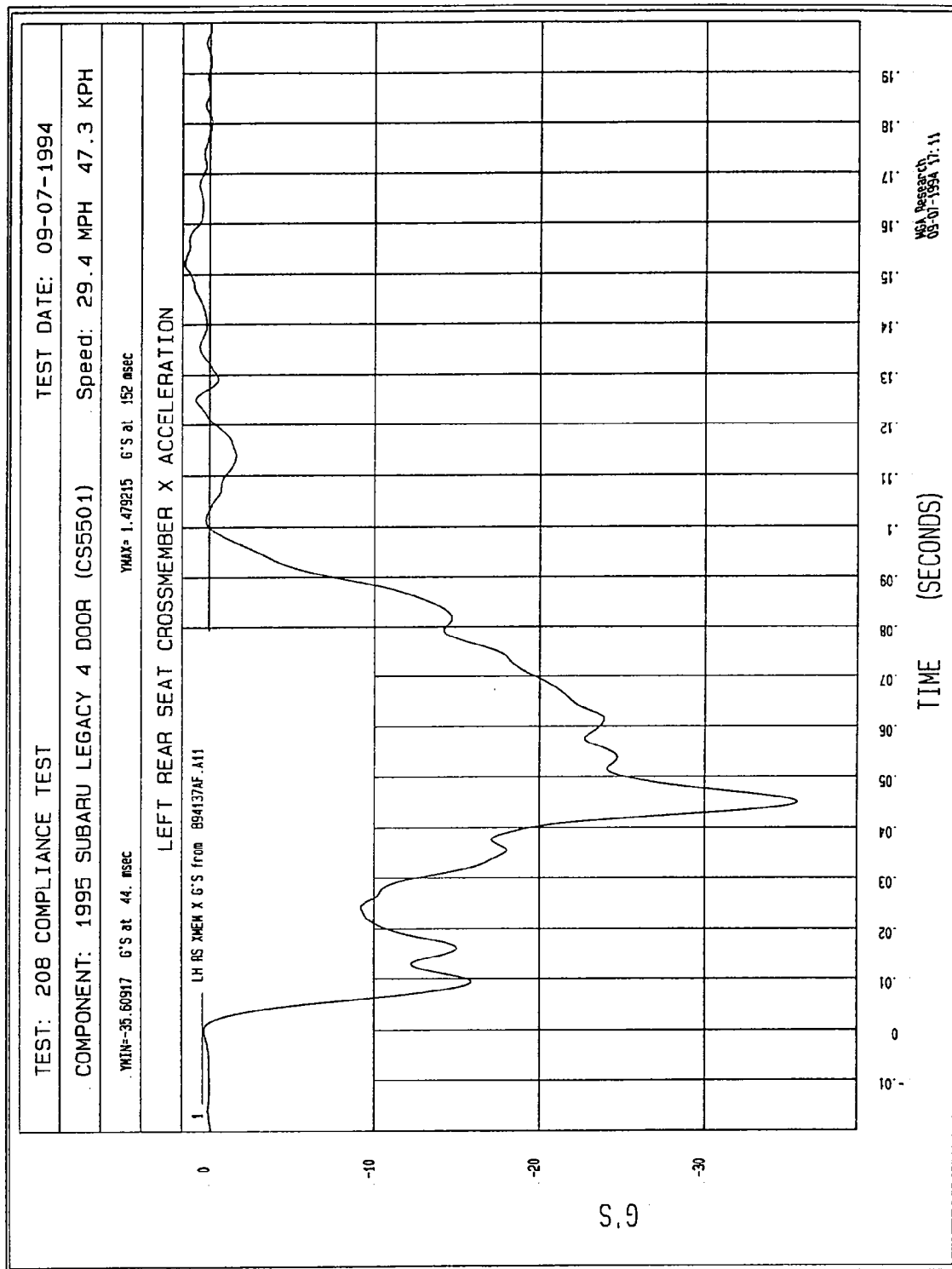


Figure B-24 - Left Rear Seat Crossmember X Acceleration vs. Time

(Filter Class: 60)

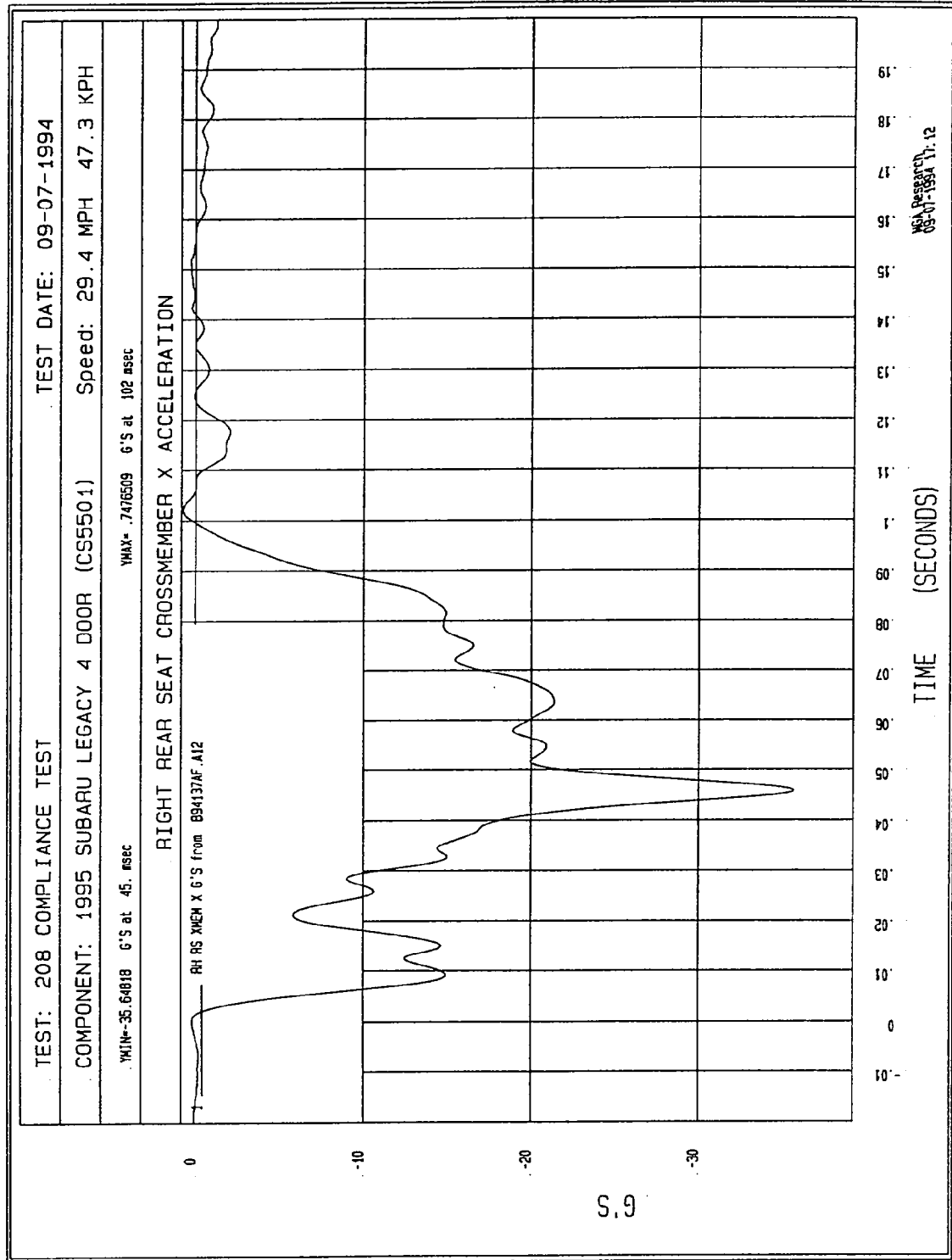


Figure B-25 - Right Rear Seat Crossmember X Acceleration vs. Time

(Filter Class: 60)

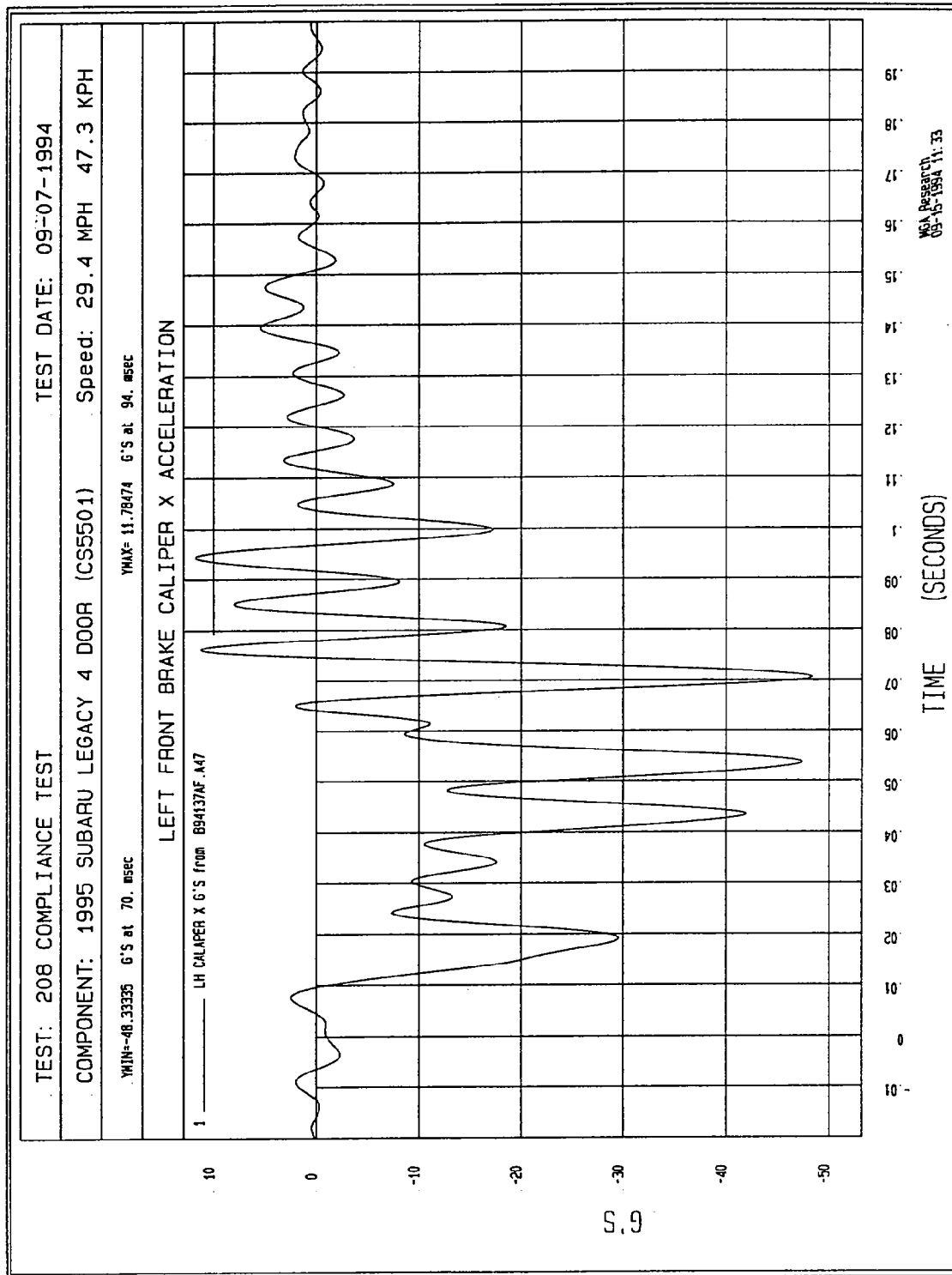


Figure B-26 - Left Brake Caliper X Acceleration vs. Time

(Filter Class: 60)

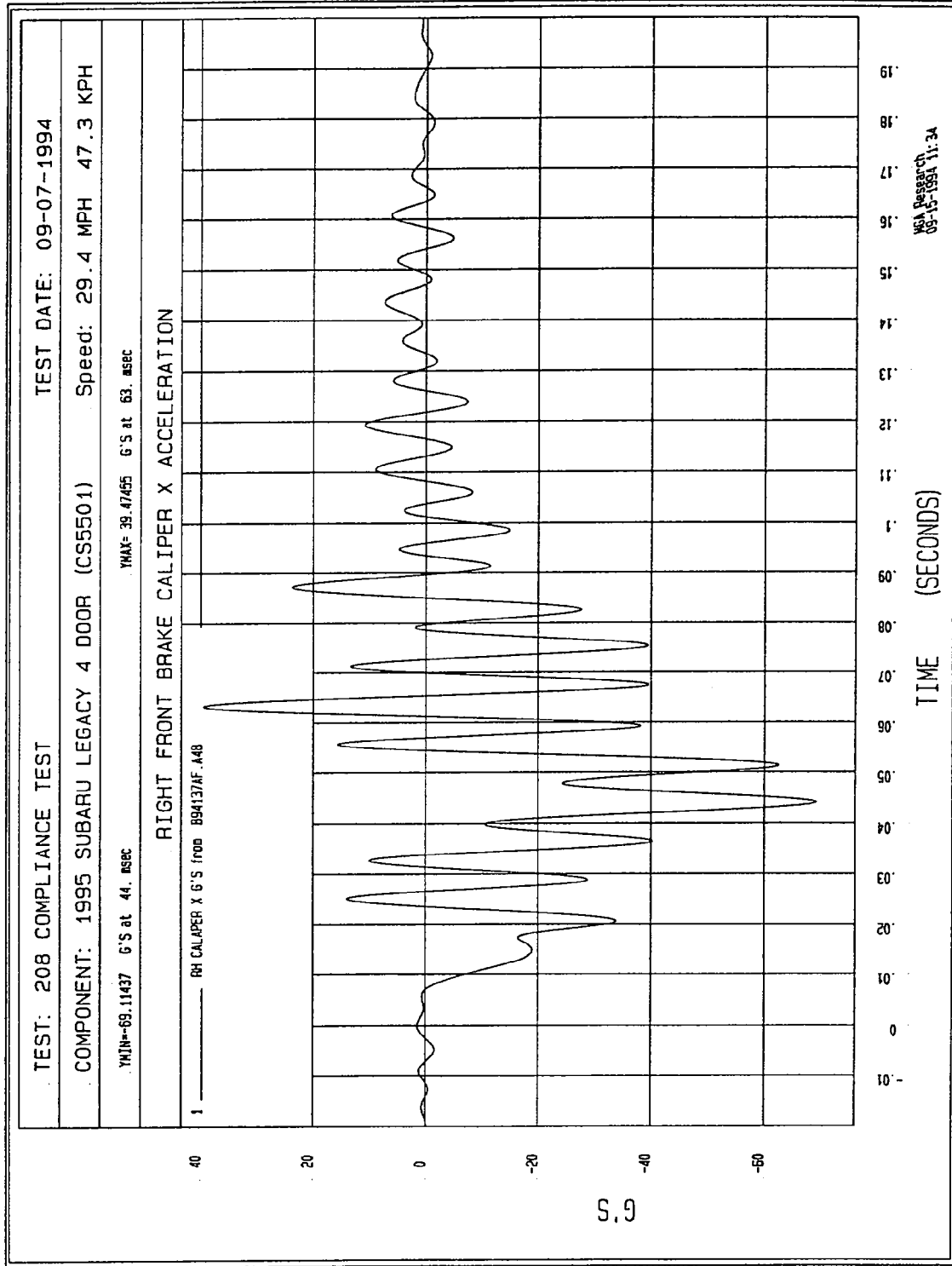


Figure B-27 - Right Brake Caliper X Acceleration vs. Time

(Filter Class: 60)

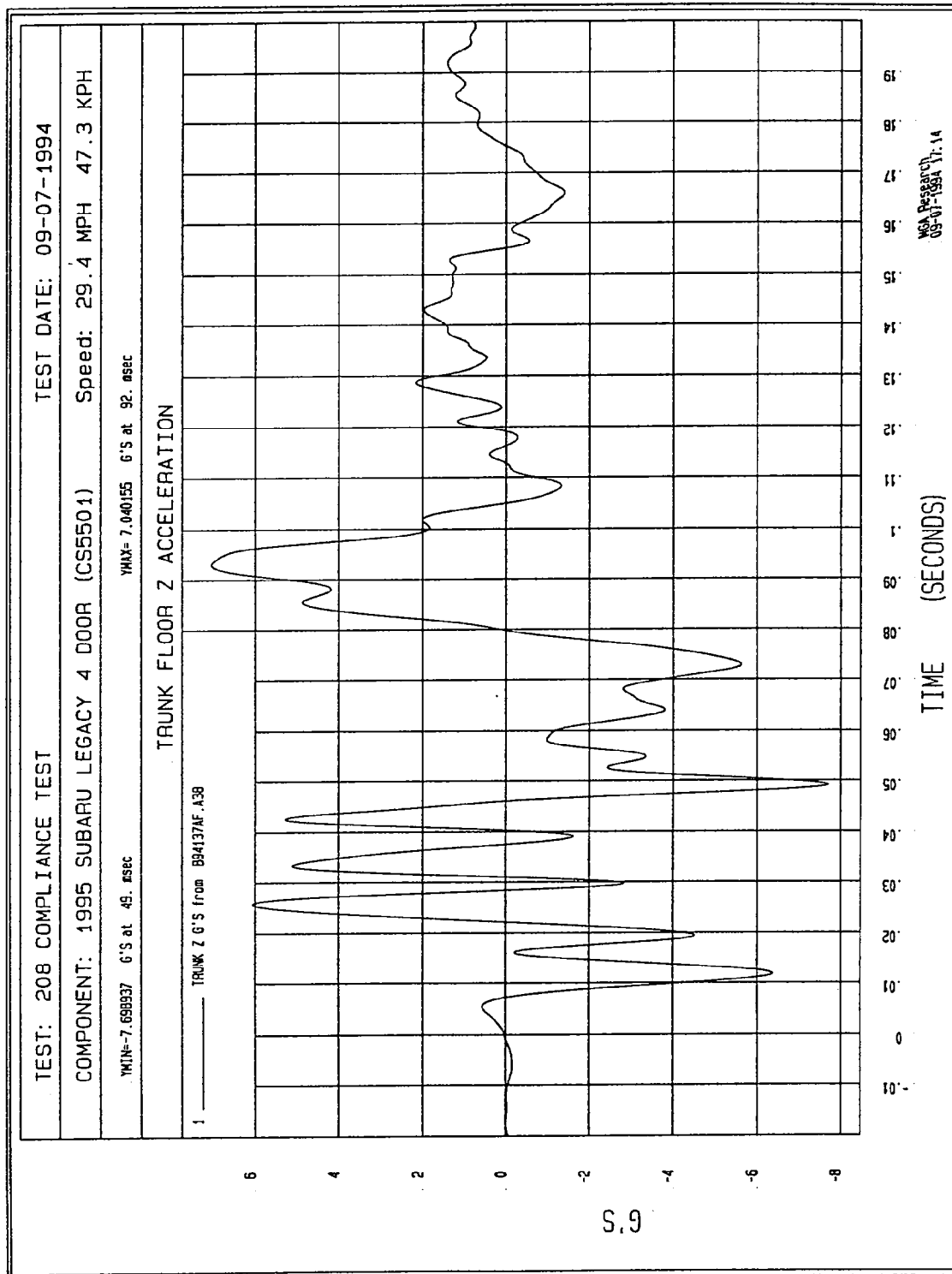


Figure B-28 - Trunk Floor Z Acceleration vs. Time

APPENDIX C
MANUFACTURER'S VEHICLE INFORMATION

Information submitted to NHTSA
for conducting FMVSS 208 Compliance Test
on the 1995MY SUBARU Legacy
[NEF-310Ca/IR 1545]

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.

Answer: Automatic restraint system (air bag) is installed to meet the requirements of S4.1.2.1(c)(2)

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.

Answer: Not applicable

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., one 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).

Answer: The following fourteen (14) test reports are attached.

1) Left Hand Drive

Crash test		Vehicle type	4 Door Sedan & Station Wagon	
		Restraint	FWD	AWD
Frontal		A/B	RS94-452, RS94-1589	RS94-447
		A/B + Belt	---	RS94-445
Angular	Left	A/B	RS94-449	RS94-448
		A/B + Belt	---	RS94-453
	Right	A/B	RS94-450	RS94-1590
		A/B + Belt	---	RS94-451

2) Right Hand Drive

Crash test		Vehicle type	Station Wagon
		Restraint	AWD
Frontal		A/B	RS94-1220
		A/B + Belt	RS94-1221
Angular	Left	A/B	RS94-1223
		A/B + Belt	---
	Right	A/B	RS94-1222
		A/B + Belt	---

A/B: Air bag
Belt: Manual 3-point seat belt

Note: Front structure designs of 4 Door Sedan model are identical with those of Station Wagon model.

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 of FMVSS No. 208.

Answer: Not applicable

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.

Answer: Not applicable

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 the requirements of S9.2.

Answer: Refer to certification letter No. 1520-FY94-044 and the test reports prepared by Morton.

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.

Answer: Not applicable

8. FMVSS 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.

Answer: Refer to each test report.
Basically, front windows were closed at the angular test(restraint:A/B only) only.

9. FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or Part 572(E) test dummy. Please inform OVSC which test dummy was used in each seat for each certification tests.

Answer: Part 572(B) dummy was used in our certification tests.

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.

Answer: Refer to ATTACHMENT 1 for measurement locations.
Measurement data are included in individual test report.

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

Answer: Yes

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 that 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.

Answer: Not applicable (bucket type) C-2

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.

Answer: Refer to ATTACHMENT 2.

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.

Answer: Second detent position from the upper most position

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.

Answer: Refer to ATTACHMENT 3.

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 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 characteristics.

Answer: Refer to each test report.

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?

Answer:	1. Tonneau cover	5. Rear seat back & cushion
	2. Jack	6. Rear quarter trim
	3. Rear floor mat	7. Rear bumper
	4. Rear floor & quarter insulator	8. Sub trunk box

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.

Answer: Refer to test report No. RS94-454.

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

Answer: Refer to test procedure No. TS510-5-2-4 (ATTACHMENT 4)

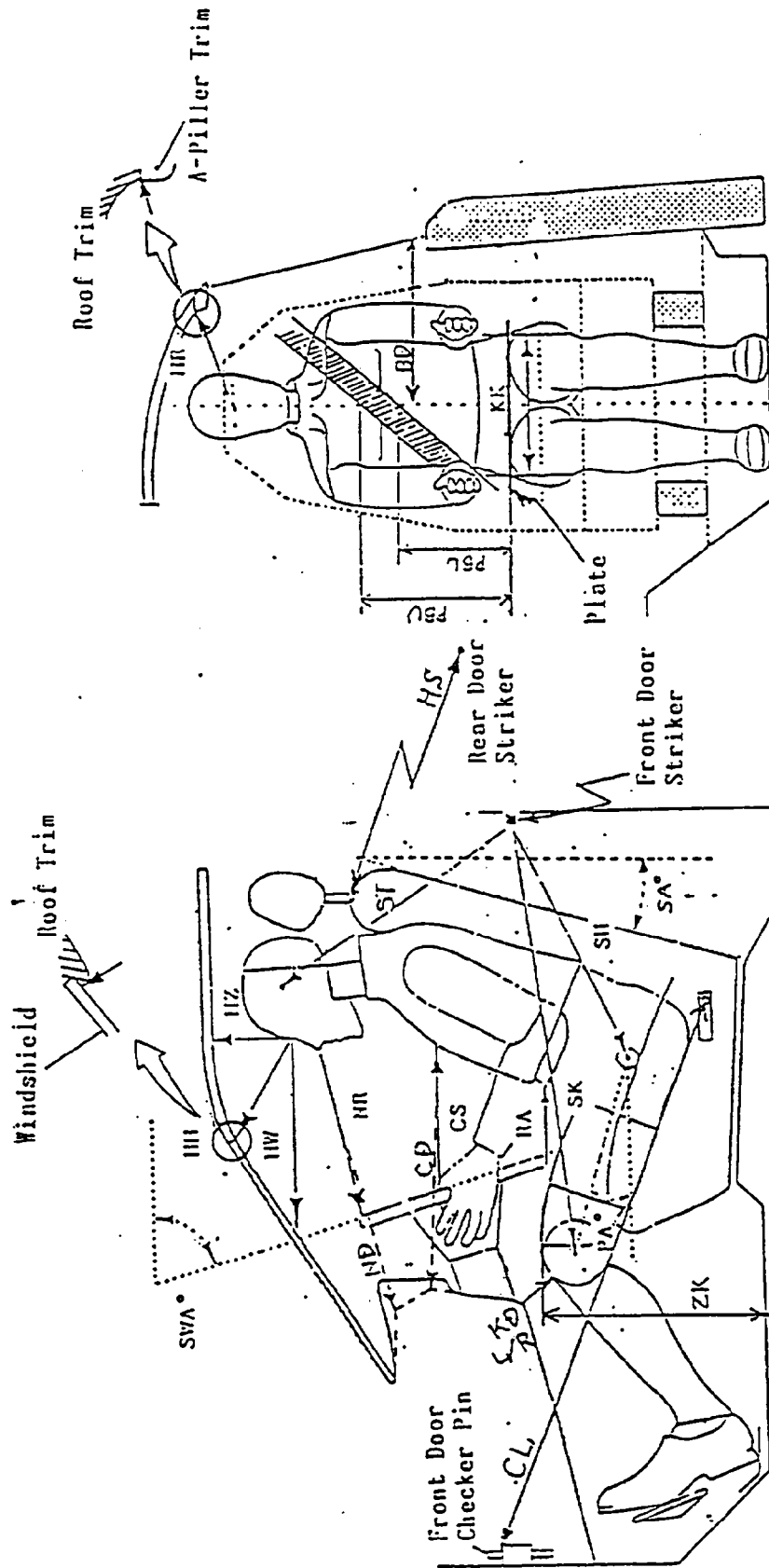
Provide a diagram of the steering control system and describe how the components of the steering control system work to provide energy management in a frontal impact.

Answer: Refer to test report No. RS94-454.

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 System."

Answer: Not applicable

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS ATTACHMENT 1



- | | | |
|------------------------------|--|---|
| III - Head to Header | PA - Rime to Abdomen | ST - Striker to Head |
| IIIV - Head to Windshield | BD - Chest to Side Window | SA - Seat Back Angle |
| IIZ - Head to Roof | KDL/KDR - Knee to Dash | SWA - Steering Wheel Angle |
| NR - Nose to Rim | ZK - Knee to Sidesill Cover (Vertical) | HS - Head to Side Window |
| ND - Nose to Dash | KK - Knee to knee | CL - Checker Pin to Screw (Seat Back Adjuster Lever |
| HR - Head to Side Header | SII - Striker to II-Point | NDC - Nose to Passenger Airbag |
| CS - Steering Wheel to Chest | SK - Striker to Knee | CBS - Chest to Passenger Airbag |
| CD - Chest to Dash | | |

DUMMY POSITIONING DATA (HYBRID II) (mm)

部位 PART	項目 ITEM	DATA (MEAN)
DRIVER-HEAD	NR : NOSE TO RIM	470
	HA : HEAD ANGLE	-
DRIVER-CHEST	CS : CHEST TO STRG.CTR.	320
	CR : CHEST TO STR'G RIM	200
DRIVER-KNEE ANKLE	KDL: KNEE TO DASH (LH)	180
	KDR: KNEE TO DASH (RH)	160
	KK : KNEE TO KNEE	360
DRIVER-ETC	ST : STRIKER TO HEAD	645
	SK : STRIKER TO KNEE	580
	SH : STRIKER TO H-POINT	295
	BD : CHEST TO SD/WINDOW	400
	KDT: KNEE TO DOOR	150
	PA : TORSO ANGLE	-
DRIVER-BELT	PBU: POSITION OF BELT UPPER	350
	PBL: POSITION OF BELT LOWER	260
	BAP: BELT ANCHOR POSITION	25
DIVER-SEAT	HS : HEAD-REST TO STRIKER	890
	CL : CHECKER-PIN TO SCREW	780
TYLT	GB : F-WINDOW/ROOF TO STR'G	453
PASSENGER-HEAD	ND : NOSE TO DASH	730
	HA : HEAD ANGLE	-
PASSENGER-CHEST	CD : CHEST TO DASH	580
PASSENGER-KNEE	KDL: KNEE TO DASH (LH)	170
	KDR: KNEE TO DASH (RH)	170
	KK : KNEE TO KNEE	310
PASSENGER-ETC	ST : STRIKER TO HEAD	645
	SK : STRIKER TO KNEE	595
	SH : STRIKER TO H-POINT	295
	BD : CHEST TO SD/WINDOW	400
	KDT: KNEE TO DOOR	180
	PA : TORSO ANGLE	-
PASSENGER-BELT	PBU: POSITION OF BELT UPPER	350
	PBL: POSITION OF BELT LOWER	260
	BAP: BELT ANCHOR POSITION	25
PASSENGER-SEAT	HS : HEAD-REST TO STRIKER	890
	CL : CHECKER-PIN TO SCREW	780

Vehicle Model Year & Make: 1995 SUBARU
 Vehicle Model & Body Style: Legacy 4 Door Sedan & Station Wagon

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"?). Indicate if the seat back angle is measured with the dummy in the seat.

Seat back angle for driver's seat = 25 degrees.

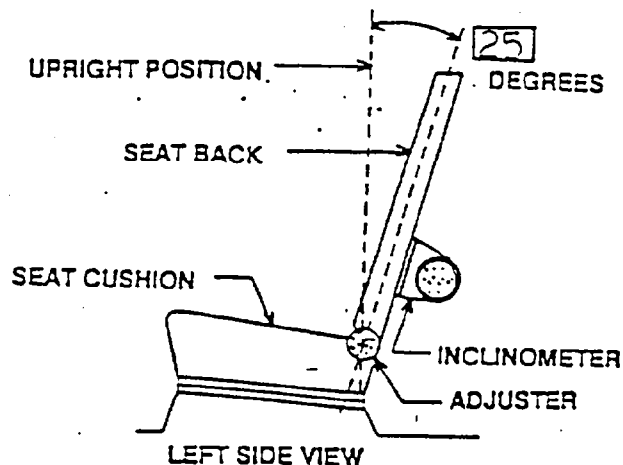
Measurement instructions:

Place seat back to the 4th latch position
from the most upright position
with the first detent "1".

Seat back angle for passenger's seat = 25 degrees.

Measurement instructions:

Same as driver data

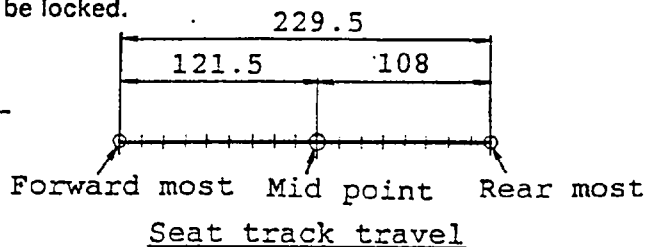


2. SEAT FORE & AFT POSITIONS --

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:

Place seat to the 10th latch position
from the most forward position
with the first detent "1".

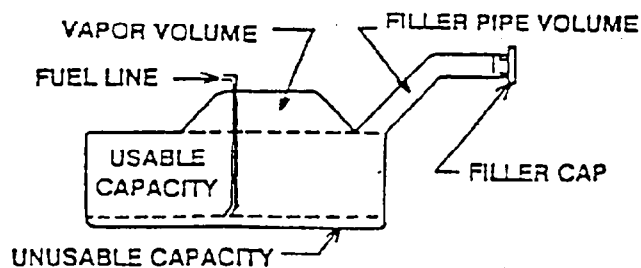


Positioning of the passenger's seat (if applicable):

Same as driver data

3. FUEL TANK CAPACITY DATA --

- 3.1 A. "Usable Capacity" of standard equipment fuel tank = 15.9 gallons.
- B. "Usable Capacity" of optional equipment fuel tank = 0 gallons.
- C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 15.9 gallons.



3.2 Amount of Stoddard solvent added to vehicle for certification test = 14.8 gallons;

3 Is vehicle equipped with electric fuel pump? X YES NO

If YES, does pump normally operate when vehicle's electrical system is activated? YES X NO

Pump operates a few seconds after an ignition key is turned ON.

After that, pump operates while engine is running.

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.

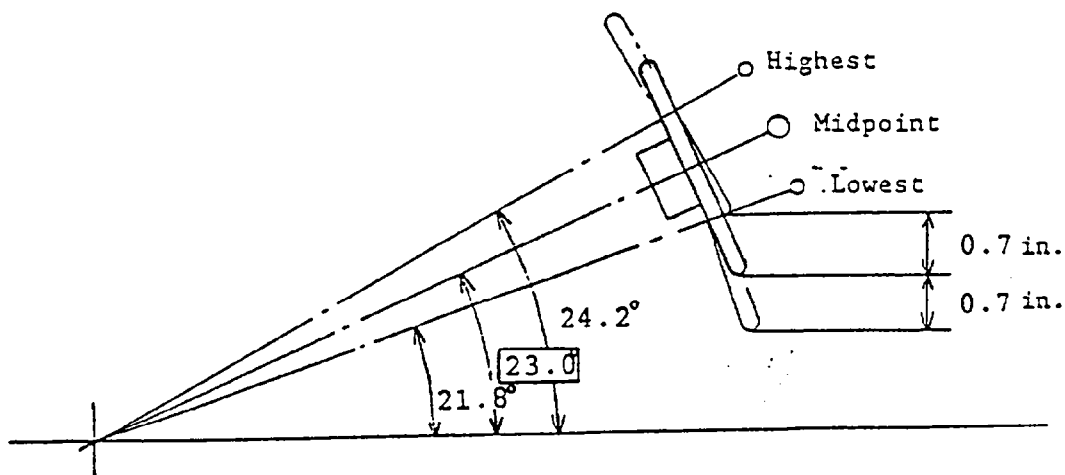
If the tested vehicle has any of these adjustments, does your company use any specific procedure to determine the geometric center.

Operational Instructions:

See below

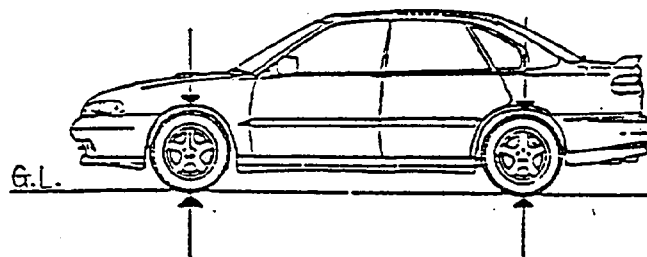
5. Adjustable Upper Anchorage Position

Second detent position from the upper most position



	DRIVER (HB II No. 523)		PASSENGER (HB II No. 529)	
HH	390	mm	381	mm
HW	565	mm	565	mm
HZ	158	mm	161	mm
NR	481	mm	-	mm
ND	-	mm	755	mm
HR	174	mm	180	mm
CS	322	mm	-	mm
CD	-	mm	586	mm
RA	194	mm	-	mm
AD	165	mm	173	mm
BD	400	mm	399	mm
KDL	162	mm	183	mm
KDR	158	mm	180	mm
ZK	298	mm	299	mm
KK	364	mm	323	mm
KDT	145	mm	185	mm
HD	-	mm	-	mm
SH	303	mm	290	mm
SK	584	mm	597	mm
ST	651	mm	645	mm
SA*	0	deg	0	deg
SWA*	68	deg	-	deg
HS	887	mm	891	mm
CL	777	mm	782	mm
NBC	-	mm	837	mm
CBC	-	mm	786	mm
PBU	-	mm	-	mm
PBL	-	mm	-	mm

Posture of Vehicle



Measure Between G. L. And Wheel Arch

	Ft		Rr	
LH	658	mm	629	mm
RH	657	mm	624	mm