

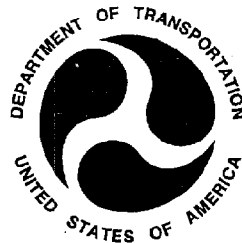
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REPORT NO. 208-MGA-98-003

SAFETY COMPLIANCE TESTING FOR FMVSS 208
OCCUPANT CRASH PROTECTION
(SLED TEST)

Toyota Motor Corporation
1998 Toyota Camry 4 Door
NHTSA NO. CW5103

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: February 19, 1998

Report Date: February 27, 1998

Final Report

Prepared For:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY ASSURANCE
OFFICE OF VEHICLE SAFETY COMPLIANCE
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NHTSA, Office of Vehicle Safety Compliance

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TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1	Purpose of Compliance Test	1-1
2	Compliance Data Summary	2-1
3	Summary of Results for FMVSS 208	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	Sled Test Summary	2-5
2	General Test and Vehicle Parameter Data	2-6
3	Vehicle Accelerometer Location and Data Summary	2-8
4	Report of Vehicle Condition at the Completion of Testing	2-9
5	FMVSS 208 Occupant Injury Criteria	3-2
6	Dummy Kinematic Summary	3-5
7	FMVSS 208 Seat Belt Comfort and Convenience Test Summary	3-6
8	Lap Belt Lockability	3-12
9	Airbag Labels	3-15
10	Seat and Steering Column Positioning Data	4-2
11	Dummy Measurement Data for Front Seat Occupants	4-4
12	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	Temperature	4-8

SECTION 1
PURPOSE AND TEST PROCEDURE

PURPOSE

This sled test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No. DTNH22-93-D-21089. The purpose of this test was to determine whether the subject vehicle, a 1998 Toyota Camry 4 Door, NHTSA No. CW5103, meets the performance requirements of FMVSS 208, "Occupant Crash Protection". The compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-208S-00 dated June 17, 1997.

TEST PROCEDURE

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208S-00 dated June 17, 1997. Data was obtained relative to FMVSS 208, "Occupant Crash Protection".

The test vehicle was instrumented with four (4) accelerometers to measure longitudinal axis accelerations.

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (ATDs). The dummies were positioned in the front outboard 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; a chest potentiometer to measure longitudinal deflection; an upper neck load cell to measure longitudinal, lateral, and vertical neck forces and moments; and left and right femur load cells to measure axial forces.

The thirty-seven (37) data channels were multiplexed and recorded on five IBM PC compatible computers with Metrabyte DAS-16F A/D converter boards. The data was digitally sampled at 10,000 samples per second and processed per Section 11.7 through 11.9 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and six (6) 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 data is 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
COMPLIANCE DATA SUMMARY

TEST RESULTS SUMMARY

This sled test was conducted at MGA Research Corporation on February 19, 1998.

The test vehicle, a 1998 Toyota Camry 4 Door, NHTSA No. CW5103, appeared to comply with the performance requirements of FMVSS 208. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's. The compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy, the chest deflection did not exceed 3.0 inches. For each Part 572E dummy, the maximum peak flexion bending moment about the occipital condyle did not exceed 190 N-m. The maximum peak extension bending moment did not exceed 57 N-m. The maximum peak axial tension did not exceed 3300 N. The maximum peak axial compression did not exceed 4000 N. The maximum peak fore and aft shear did not exceed 3100 N. The vehicle's restraint system met the applicable comfort and convenience requirements.

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 driver's HIC was 199. The maximum peak flexion bending moment about the occipital condyle was 48.9 N-m, the maximum peak extension bending moment was 19.8 N-m, the maximum peak axial tension was 1385.5 N, the maximum peak axial compression was 1182.1 N, the maximum peak fore/aft shear was 854.7 N. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 42 g's. The driver's chest maximum deflection was 1.4 inches. The driver's left and right femur maximum compressive forces were 1325 pounds and 1317 pounds, respectively.

The right front passenger's HIC was 272. The maximum peak flexion bending moment about the occipital condyle was 36.6 N-m, the maximum peak extension bending moment was 15.6 N-m, the maximum peak axial tension was 520.3 N, the maximum peak axial compression

was 1043.8 N, the maximum peak fore/aft shear was 1196.5 N. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41 g's. The right front passenger's chest maximum deflection was 0.4 inches. The right front passenger's left and right femur maximum compressive forces were 1087 pounds and 852 pounds, respectively.

TEST NOTES

TABLE 1 SLED TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103 Test Type: Sled Test

Test Date: February 19, 1998 Time: 1:36 p.m. Temp: 71°F

Vehicle Test Weight: 3596 lbs.

Sled Velocity Change: 29.4 mph

Airbag Fire Time: 19 msec

Dummies:	Driver	Passenger
Dummy Type	<u>Part 572E</u>	<u>Part 572E</u>
Serial Number	<u>401</u>	<u>403</u>
Restraint System	<u>Airbag</u>	<u>Airbag</u>
No. of Data Channels	<u>15</u>	<u>15</u>

Number of Cameras: 1 Real Time
6 High Speed

Door Opening Data: Left Front: Opened Left Rear: Opened
Right Front: Opened Right Rear: Opened

Front Seat(s) Data:	Driver	Passenger
Seat Track Failure	<u>0 in.</u>	<u>0 in.</u>
Seat Back Failure	<u>None</u>	<u>None</u>

Visible Dummy

Contact Points:	Driver	Passenger
Head	<u>Visor, headliner, windshield, airbag</u>	<u>Airbag, visor, headliner, headrest</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Left Knee	<u>Instrument panel, steering column</u>	<u>Instrument panel, glovebox</u>
Right Knee	<u>Instrument panel, steering column</u>	<u>Instrument panel, glovebox</u>

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No: CW5103 VIN: 4T1BG22K2WU241778 Body Color: Green

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

X Gas; Diesel; Turbocharged

 Longitudinal; X Transverse

Transmission: 4 Speed; Manual; X Automatic; X Overdrive

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

Major Option: X A/C; X P/S; X P/B; P/wdo; P/door locks;
 P/seats; X Tilt Wheel; Anti-skid Brakes; X Cruise Control

Date Received: 12/04/97; Odometer Reading: 41 miles

Dealer's Name/Address: Mauro Toyota
8200 120th Street
Kenosha, WI 53142

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Toyota Motor Corporation

Date of Manufacture: 11/97; VIN: 4T1BG22K2WU241778

GVWR: 4180 lbs; GAWR Front: 2400 lbs. GAWR Rear: 2400 lbs.

DATA FROM TIRE PLACARD:

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

Recommended Tire Size: P195/70R14

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

Tires on Vehicle: P195/70R14; Manufacturer: Dunlop

Type of Spare Tire: Standard

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 Power

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA (Cont.)

VEHICLE CAPACITY WEIGHT (VCW) = 900 lbs.
No. Of Occupants x 150 lbs = 750 lbs.
Rated Cargo/Luggage Weight (RCWL) = 150 lbs.

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER

(WITH MAXIMUM FLUIDS) = UDW:

Right Front = 942 lbs Right Rear = 599 lbs
Left Front = 948 lbs Left Rear = 607 lbs
TOTAL FRONT WEIGHT = 1890 lbs (61 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1206 lbs (39 % of Total Vehicle Weight)
TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 3096 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO WEIGHT:

Right Front = 1036 lbs Right Rear = 759 lbs
Left Front = 1031 lbs Left Rear = 770 lbs
TOTAL FRONT WEIGHT = 2067 lbs (57 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1529 lbs (43 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3596 lbs

VEHICLE ATTITUDE:

Delivered Door Sill Angle: 0.3°
Fully Loaded Door Sill Angle: -0.1°
Test Door Sill Angle: 0.0°
Wheel Base: 2670 in

Fuel System Capacity From Owner's Manual = 18.5 gallons
Usable Capacity Figure Furnished by COTR = 18.5 gallons

TABLE 3 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103; Test Date: February 19, 1998

ACCELEROMETER LOCATION (inches)				
	Description	X	Y	Z
1	Engine	22.0	1.2	30.9
2	Left B-Post	87.6	27.2	12.6
3	Right B-Post	93.1	27.2	13.0
4	Rear Axle	139.0	1.7	11.2

Reference: X = Front of Sled Carriage
 Y = Centerline of Sled Carriage
 Z = Top of Sled Carriage

ACCELEROMETER DATA SUMMARY					
No.	DESCRIPTION	MAXIMUM (g's)	TIME (msec)	MINIMUM (g's)	TIME (msec)
1	Engine	4.2	123	19.5	43
2	Left B-Post	3.2	121	19.0	54
3	Right B-Post	2.4	121	18.8	49
4	Rear Axle	2.2	119	18.6	49

TABLE 4 REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

Contract Number: DTNH22-93-D-21089

From: MGA Research Corporation To: Mr. Charles Case, COTR
5000 Warren Road Office of Vehicle Safety Compliance
Burlington, WI 53105

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: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103 Body Color: Green

VIN: 4T1BG22K2WU241778 Cost: \$19,274

Odometer: Arrival Date: 12/04/97 Reading: 38 miles

Completion Date: 2/19/98 Reading: 41 miles

Engine: 4 Cylinders; 2.2 Liters; Gas; Diesel

Transmission: Speed; Manual; X Automatic

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

Tire Size: P195/70R14; Manufacturer: Dunlop

Air Conditioner	<u>X</u>	Console	<u>X</u>	Brakes	<u>Power</u>
Tinted Glass	<u> </u>	Tachometer	<u>X</u>	Front	<u>Disc</u>
Power Steering	<u>X</u>	Cruise Control	<u>X</u>	Rear	<u>Drum</u>
Power Windows	<u> </u>	Rear Window Def.	<u>X</u>	Front Seats	<u>Bucket</u>
Power Door Locks	<u> </u>	Sun/Moon Roof	<u> </u>	Seat Type	
Radio	<u>X</u>	T-Top	<u> </u>	Front	<u>Manual</u>
Clock	<u>X</u>	Tilt Steering Wheel	<u>X</u>	Rear	<u>Non-adjustable</u>
Roof Rack	<u> </u>	Other Options:	<u> </u>	No. of Seats	<u>5</u>

Equipment that is no longer on the vehicle as noted above: Spare tire, jack, rear seats, rear speakers, rear tire, rear decklid

Explanation:

Items removed to allow installation of data acquisition system.

Vehicle Condition:

The vehicle was subjected to a sled test. The engine, suspension, and exhaust system have been fixed and have numerous beams and brackets welded to them. A steel framework is attached to the vehicle. 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. THE VEHICLE IS FOR SALVAGE ONLY AND IS NOT TO BE REPAIRED FOR HIGHWAY USE.

SECTION 3
SUMMARY OF RESULTS FOR FMVSS 208

TABLE 5 FMVSS 208 OCCUPANT INJURY CRITERIA

Veh. Yr./Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Veh. NHTSA No.: CW5103 Test Date: February 19, 1998

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #401	PASSENGER DUMMY #403
Head Channel X	-30.2	-51.7
Head Channel Y	6.6	-33.2
Head Channel Z	33.9	19.0
HEAD RESULTANT	42.8	62.0
Chest Channel X	-40.7	-37.4
Chest Channel Y	5.0	-5.3
Chest Channel Z	10.9	19.9
CHEST RESULTANT	42.1	41.9

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	199	272
t_1 = (msec)	89.5	82.5
t_2 = (msec)	125.5	115.5

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

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

CLIP	42	41
t^1 = (msec)	94.1	98.3
t^2 = (msec)	97.2	101.4
CHEST DEFLECTION (in)	1.4	0.4

TABLE 5 FMVSS 208 OCCUPANT INJURY CRITERIA (Cont.)

Veh. Yr./Make/Model/Body Style:1998/Toyota/Camry/4 Door

Veh. NHTSA No.:CW5103 Test Date:February 19, 1998

MAX. COMPRESSIVE FEMUR FORCES:	Units (lbs)	
	DRIVER DUMMY #401	PASSENGER DUMMY #403
Left Side (lbs)	1325	1087
Right Side (lbs)	1317	852

NECK FORCES:

Neck Force X (N)	854.7	1196.5
Neck Force Y (N)	-189.8	934.1
Neck Force Z (N)	1385.5	-1043.8

NECK MOMENTS:

Neck Moment X (N-m)	-11.7	-33.9
Neck Moment Y (N-m)	63.6	56.5
Neck Moment Z (N-m)	3.1	54.9

TABLE 5 FMVSS 208 OCCUPANT INJURY CRITERIA (Cont.)

NECK INJURY CRITERIA:	DRIVER DUMMY #401	PASSENGER DUMMY #403
Peak Flexion Bending Moment (N-m) about the occipital condyle	48.9	36.6
Peak Extension Bending Moment (N-m) about the occipital condyle	19.8	15.6
Peak Axial Tension (N)	1385.5	520.3
Peak Axial Compression (N)	1182.1	1043.8
Peak Fore Shear (N)	854.7	1196.5
Peak Aft Shear (N)	184.9	207.2

TABLE 6 DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel and steering column. The dummy's head impacted the airbag, visor, headliner, and windshield with the dummy's head rotating rearward. The driver dummy was restrained by the airbag. The dummy rebounded rearward. 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 dashboard. The dummy's head impacted the airbag, visor, and headliner 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 in the seat.

TABLE 7 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No.: CW5103; Technician: Doug Miller Date: 2/09/98

GVWR: 4180 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 on the front outboard seating positions did not have webbing tension-relieving devices.

TABLE 7 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS. (Cont.)

BELT CONTACT FORCE (S7.4.3)

The belt contact force on the chest of the test dummy was 0.4 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 movable, but the seat back did not serve 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 7 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS. (Cont.)

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

The webbing was not 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 7 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY

FRONT OUTBOARD DESIGNATED SEATING POSITIONS (Cont.)

FMVSS 208 SEAT BELT WARNING SYSTEM CHECK

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No.: CW5103; Technician: Doug Miller Date: 2/18/98

Complete the following to determine which seat belt warning system option (S7.3(a)(1) or S7.3(a)(2)) is used. (Manufacturers may use either option.)

A. With occupant in driver's position and lap belt in stowed position and ignition switch placed in "Start/On" position:

- A.1 S7.3(a)(1)
Time duration of audible warning signal = 5 seconds
(4 to 8 seconds)

Time duration of reminder light operation = 80 seconds
(no less than 60 seconds)
- A.2 S7.3(a)(2)
Time duration of audible warning signal = seconds
(4 to 8 seconds)(see 49 USCS @ 30124)

Time duration of reminder light operation = seconds
(4 to 8 seconds)

B. With occupant in driver's position and lap belt in use and ignition switch placed in "Start/On" position:

- B.1 S7.3(a)(1)
Time duration of audible warning signal = 0 seconds
(audible warning not required)

Time duration of reminder light operation = 0 seconds
(reminder light not required)
- B.2 S7.3(a)(2)
Time duration of audible warning signal = seconds
(audible warning not required)

Time duration of reminder light operation = seconds
(4 to 8 seconds)

A. Note wording of visual warning: ()Fasten seat belt ()Fasten Belt
(X)Symbol 101

FMVSS 208 READINESS INDICATOR (S4.5.2)

NHTSA No.: CW5103; Technician: Doug Miller Date: 2/18/98

1. Is the system totally mechanical? ()Yes (X)No
(If YES this Data Sheet is complete.)

3. Is the readiness indicator clearly visible to the driver?
(X)Yes-Pass ()No-FAIL

4. Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided?

(X)Yes-Pass ()No-**FAIL**

TABLE 7 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS (Cont.)

FMVSS 208 REAR OUTBOARD SEATING POSITION SEAT BELTS

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No.: CW5103; Technician: Doug Miller Date: 2/18/98

1. Do all rear outboard seating positions have type 2 seat belts?
(X)Yes ()No

If NO, describe the seat belt installed, the seat location, and any other information about the seat that would explain why a type 2 belt was not installed.

TABLE 8 LAP BELT LOCKABILITY

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats, other than the driver's seat, or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic locking retractors. (S7.1.1.5(c))

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No.: CW5103; Technician: Doug Miller Date: 2/18/98

Designated Seating Position Tested: Right Front Outboard

1. Record the seating position. Right Front Outboard
(Any position is acceptable.)
2. Buckle the seat belt.
3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature.
4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part of the vehicle.
(X) Yes-Pass () No-FAIL
5. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing.
(X) Yes-Pass () No-FAIL
6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing?
(X) Yes, go to 6.1 () No, go to 7.
 - 6.1 If yes, does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system.
(X) Yes-Pass () No-FAIL
7. Locate a reference point A on the seat belt buckle.

TABLE 8 LAP BELT LOCKABILITY (Cont.)

8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly.
9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system.
Measured distance between A and B is 31.5 inches.
10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly.
Measured distance between A and B is 31.5 inches.
11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing.
12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal.
The measured force application angle = 12 degrees.

Webbing Tension Pull Device

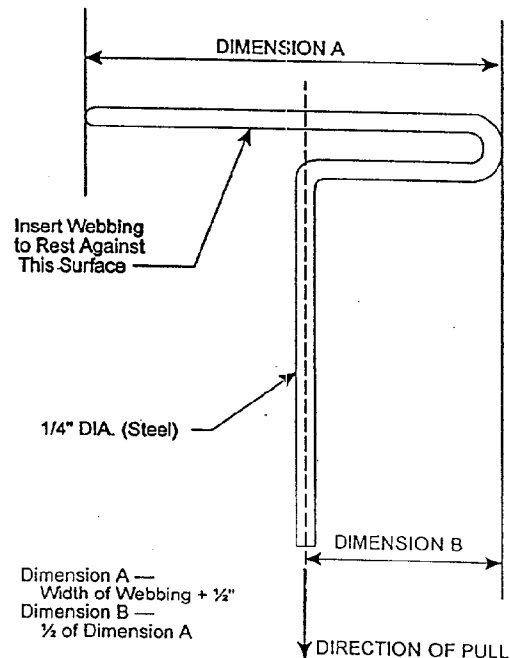


FIGURE 5

TABLE 8 LAP BELT LOCKABILITY (Cont.)

13. The length between points A and B along the longitudinal centerline of the webbing while the preload is being applied.
Measured distance between A and B is 39 inches.
14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing.
Record onset rate: 10 lb/sec.
Record the distance between points A and B: 40.25 inches
15. Subtract the measurement in 14 from the measurement in 13. Is the difference 2 inches or less? $14-13 = \underline{1.25 \text{ inches}}$ (X)Yes-Pass () No-FAIL
16. Subtract the measurement in 10 from the measurement in 14. Is the difference 3 inches or more? $10-14 = \underline{8.75 \text{ inches}}$ (X)Yes-Pass () No-FAIL

TABLE 9 AIR BAG LABELS

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

NHTSA No.: CW5103;

Technician: Doug Miller

Date: 2/18/98

1. Air bag maintenance label and owner's manual instructions:
 - 1.1. Does the manufacturer recommend periodic maintenance or replacement of the airbag? ☐ Yes, go to 1.2 ☒ No, go to 2
 - 1.2. Does the vehicle have a maintenance or replacement label?
☐ Yes-Pass ☐ No-FAIL
 - 1.3. Does the label contain one of the following?
☐ Yes-Pass ☐ No-FAIL
Schedule on label specifies month and year
Schedule on label specifies vehicle mileage
Schedule on label specifies interval measured from date on certification label
 - 1.4. Is the label permanently affixed within the passenger compartment?
☐ Yes-Pass ☐ No-FAIL
 - 1.5. Is the label lettered in English?
☐ Yes-Pass ☐ No-FAIL
 - 1.6. Is the label in block capitals and numerals?
☐ Yes-Pass ☐ No-FAIL
 - 1.7. Are the letters and numerals at least 3/32 inches high?
☐ Yes-Pass ☐ No-FAIL
 - 1.8. Does the owner's manual set forth the recommended schedule for maintenance or replacement? ☐ Yes-Pass ☐ No-FAIL
2. Does the owner's manual:
 - 2.1 Include a description of the vehicle's airbag system in an easily understandable format? ☒ Yes-Pass ☐ No-FAIL
 - 2.2 Include a statement that the vehicle is equipped with an airbag and a lap/shoulder belt at the front outboard seating positions?
☒ Yes-Pass ☐ No-FAIL

TABLE 9 AIR BAG LABELS (Cont.)

- 2.3 Include a statement that the air bag is a supplemental restraint at the front outboard seating positions?
(X) Yes-Pass () No-FAIL
- 2.4 Emphasize that all occupants, including the driver, should always wear their seat belts whether or not an airbag is also provided at their seating positions to minimize the risk of severe injury or death in the event of a crash?
(X) Yes-Pass () No-FAIL
- 2.5 Provide any necessary precautions regarding the proper positioning of occupants, including children, at seating positions equipped with air bags to insure maximum safety protection for those occupants?
(X) Yes-Pass () No-FAIL
- 2.6 Explain that no objects should be placed over or near the air bag on the steering wheel or on the instrument panel, because any such objects could cause harm if the vehicle is in a crash severe enough to cause the air bag to inflate?
(X) Yes-Pass () No-FAIL
3. Does the vehicle:
- 3.1. Provide an automatic means to ensure that the airbag does not deploy when a child seat or child with a total mass of 30 kg or less is present on the front outboard passenger? () Yes (X) No
- 3.2. Incorporate sensors, other than or in addition to weight sensors, which automatically prevent the passenger air bag from deploying in situations in which is might have an adverse effect on infants in rear-facing child seats, and unbelted or improperly belted children? () Yes-Pass (X) No
- 3.3. have a passenger air bag designed to deploy in a manner that does not create a risk of serious injury to infants in rear-facing child seats, and unbelted or improperly belted children? () Yes (X) No

TABLE 9 AIR BAG LABELS (Cont.)

If yes to 3.1, or 3.2, or 3.3, the vehicle is not required to have a sunvisor warning label, an airbag alert label or a label on the dash and this check sheet is complete. If no to 3.1, 3.2, and 3.3, go to 4.

4. Sun Visor Warning Label

- 4.1. Is the label permanently affixed (may be permanent marking or molding) to either side of the sunvisor at each front outboard seating position with an airbag?

Driver Side - ☒ Yes-Pass ☐ No-FAIL

Passenger Side - ☒ Yes-Pass ☐ No-FAIL

- 4.2. Does the label conform in content (vehicles without back seats may omit the statement: "The back seat is the safest place for children.") to either label shown on the next page as appropriate at each front outboard seating position with an air bag?

- 4.2.1 **Dual air bags:** ☐ Not Applicable

Driver Side - ☒ Yes ☐ No-FAIL

Passenger Side - ☒ Yes ☐ No-FAIL

- 4.2.2 **Vehicle with driver air bag ONLY - either 3.2.1 or 3.2.2 is applicable, not both.**

- 4.2.2.1 Does the label conform in content to either label shown on the following page as appropriate?

☒ Not Applicable

Driver Side - ☐ Yes-Pass ☐ No-FAIL

- 4.2.2.2 Does the label conform in content to the first label shown on the following page where the label can be modified to omit the pictogram and the message text may read:

TABLE 9 AIR BAG LABELS (Cont.)

DEATH or SERIOUS INJURY can occur.

- Sit as far back as possible from the air bag.
- ALWAYS use SEAT BELTS and CHILD RESTRAINTS
- The BACK SEAT is the SAFEST place for children.

(X) Not Applicable

Driver Side - () Yes-Pass () No-FAIL

SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

ARTWORK BLACK WITH
WHITE BACKGROUND

BOTTOM TEXT BLACK
WITH RED BULLETS ON
WHITE BACKGROUND

CIRCLE AND LINE RED WITH
WHITE BACKGROUND

TOP TEXT AND SYMBOL
BLACK WITH YELLOW
BACKGROUND

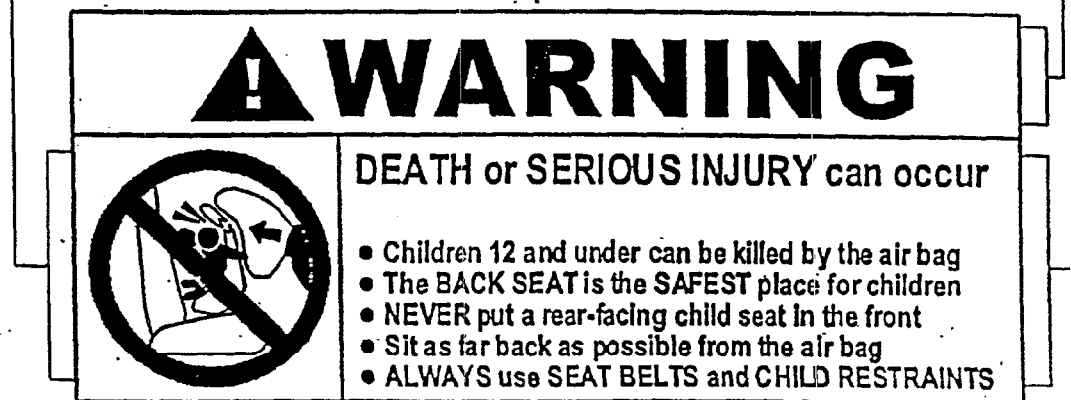


TABLE 9 AIR BAG LABELS (Cont.)

- 4.3 Is the label heading area yellow with the word “warning” and the alert symbol in black?
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.4 Is the message white with black text?
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.5 Is the message area at least 30 cm²? Actual message area: 32 cm²
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.6 Is the pictogram black with a red circle and slash on a white background?
 For vehicles with driver side air bag ONLY () Not Applicable
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.7 Is the pictogram at least 30 mm in diameter? Actual diameter: 30 mm
 For vehicles with driver side air bag ONLY () Not Applicable
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.8 Is the same side of the sun visor to which the sun visor label is affixed free of other information with the exception of an air bag maintenance label?
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**
- 4.9 Is the sun visor free of other information about air bags or the need to wear seat belts with the exception of the air bag alert label or the utility vehicle label?
 Driver Side - (X)Yes-Pass () **No-FAIL**
 Passenger Side - (X)Yes-Pass () **No-FAIL**

TABLE 9 AIR BAG LABELS (Cont.)

5. Air Bag Alert Label

5.1 Is the Sun Visor Warning Label visible when the sunvisor is in the stowed position?

Driver Side - ☒ Yes, go to 6 ☐ No

Passenger Side - ☐ No air bag ☒ Yes ☐ No

5.2 Does the label conform in content to the label shown below?

Driver Side - ☐ Yes ☐ **No-FAIL**

Passenger Side - ☐ No air bag ☐ Yes-Pass ☐ **No-FAIL**

5.3 Is the message area black with yellow text?

Driver Side - ☐ Yes-Pass ☐ **No-FAIL**

Passenger Side - ☐ No air bag ☐ Yes-Pass ☐ **No-FAIL**

5.4 Is the message area at least 20 cm²? Actual message area: _____ cm²

Driver Side - ☐ Yes-Pass ☐ **No-FAIL**

Passenger Side - ☐ No air bag ☐ Yes-Pass ☐ **No-FAIL**

5.5 Is the pictogram black with a red circle and slash on a white background?

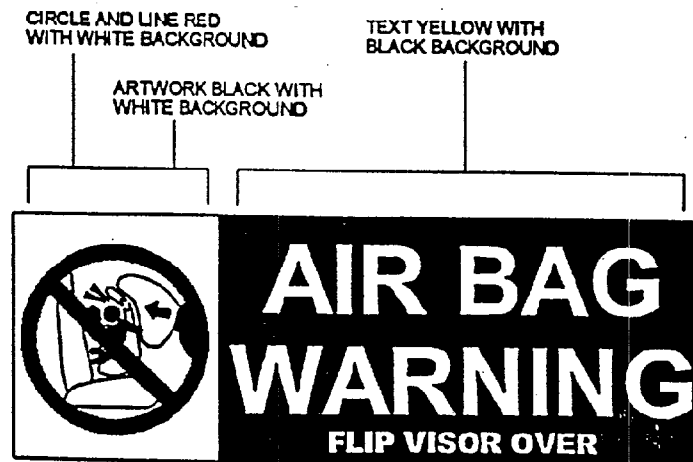
For vehicles with driver side air bag ONLY ☐ Not Applicable

☐ Yes-Pass ☐ **No-FAIL**

TABLE 9 AIR BAG LABELS (Cont.)

- 5.6 Is the pictogram at least 20 mm in diameter? Actual diameter _____ mm
For vehicles with driver side air bag ONLY () Not Applicable
() Yes-Pass () No-FAIL

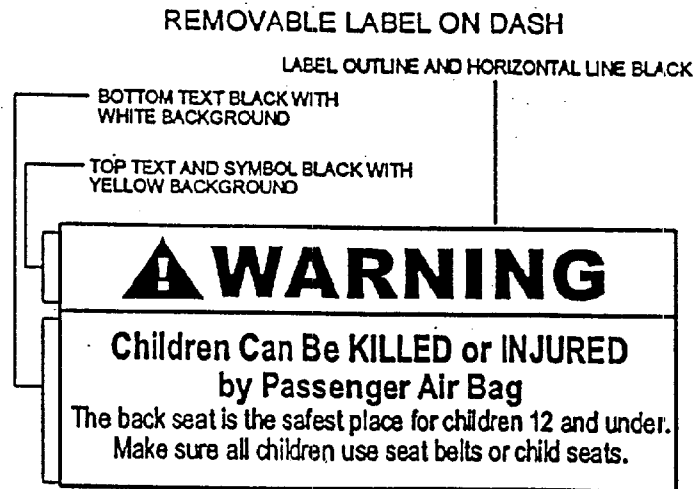
SUN VISOR LABEL VISIBLE WHEN VISOR IS IN UP POSITION



6. Label On the Dash
- 6.1 Does the vehicle have a passenger side air bag?
(X)Yes () No, check sheet is complete.
- 6.2 Does the vehicle have a label on the dash or steering wheel hub?
(X)Yes-Pass () No-FAIL
- 6.3 Does the label conform in content (vehicles without back seats may omit the statement: "The back seat is the safest place for children 12 and under." to the label shown below. (X)Yes-Pass () No-FAIL
- 6.4 Is the heading area yellow with the word "warning" and the alert symbol in black?
(X)Yes-Pass () No-FAIL

TABLE 9 AIR BAG LABELS (Cont.)

- 6.5 Is the message white with black text? (X)Yes-Pass () No-FAIL
- 6.6 Is the message area at least 30 cm²? Actual message area: 83 cm²
(X)Yes-Pass () No-FAIL



SECTION 4
OCCUPANT, VEHICLE, AND CAMERA INFORMATION

TABLE 10 SEAT AND STEERING COLUMN POSITIONING DATA

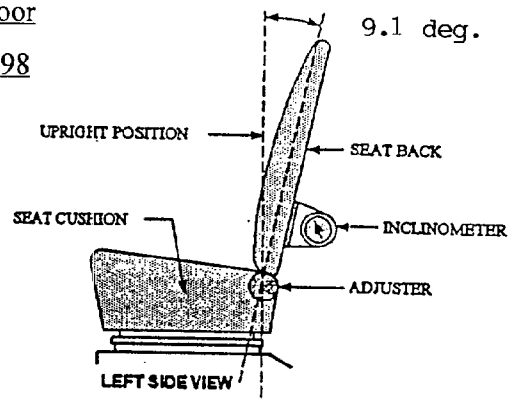
Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103 Test Date: February 19, 1998

NOMINAL DESIGN RIDING POSITION:

Driver Seat: Seat Back Angle = 9.1°

Passenger Seat: Seat Back Angle = 9.1°



SEAT FORE AND AFT POSITIONS:

Driver Seat: The seat track had a total position movement of 16 notches and was positioned 9 notches rearward from the foremost position with the forward most locking position as zero.

Passenger Seat: The seat track had a total position movement of 16 notches and was positioned 9 notches rearward from the foremost position with the forward most locking position as zero.

STEERING COLUMN ADJUSTMENTS:

The steering column was placed in the mid-position.

FIGURE 1 DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS

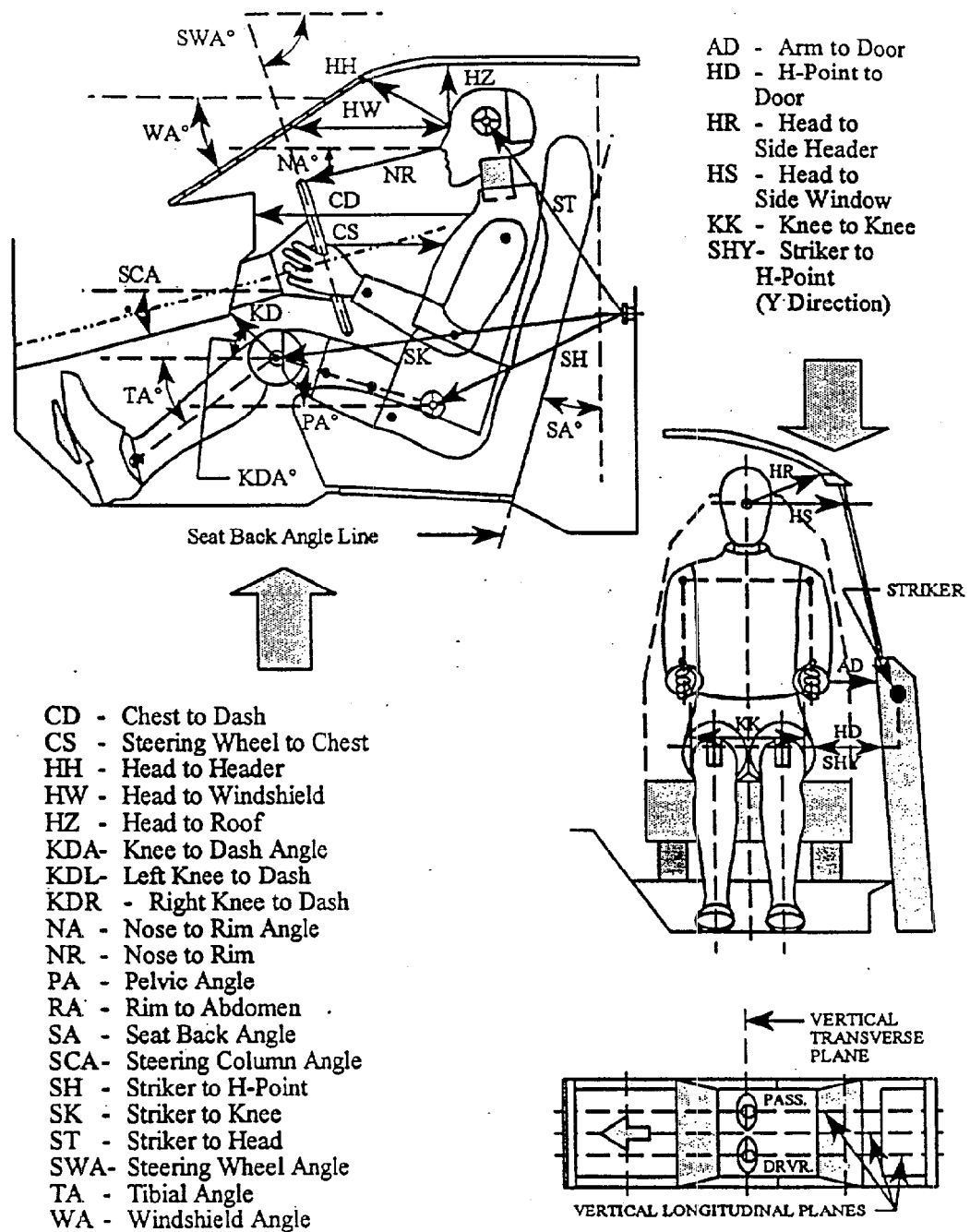


TABLE 11 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103 Test Date: February 19, 1998

	DRIVER (Serial #401)	PASSENGER (Serial #403)
WA°	29.1°	
SWA°	67.3°	N/A
SCA°	22.8°	N/A
SA°	9.1°	9.1°
HZ	6.5 in.	5.9 in.
HH	13.5 in.	13.3 in.
HW	22.6 in.	20.9 in.
HR	9.2 in.	9.5 in.
NR	16.1 in. Angle (NA) 13.7°	N/A
CD	23.7 in.	21.7 in.
CS	13.1 in.	N/A
RA	7.8 in.	N/A
KDL	6.2 in Angle (KDA) 31.8°	7.1 in.
KDR	6.4 in.	6.9 in. Angle (KDA) 26.1°
PA°	24.7°	23.7°
TA°	41.2°	36.8°
KK	12.1 in.	9.5 in.
ST	18.7 in. Angle 10.5°	18.5 in. Angle 7.4°
SK	23.9 in. Angle 96.5°	24.4 in. Angle 99.7°
SH	10.6 in. Angle 129.4°	10.6 in. Angle 127.5°
SHY	10.4 in.	10.1 in.
HS	12.3 in.	12.8 in.
HD	5.6 in.	5.2 in.
AD	3.9 in.	4.1 in.

FIGURE 2 VEHICLE TARGET LOCATIONS

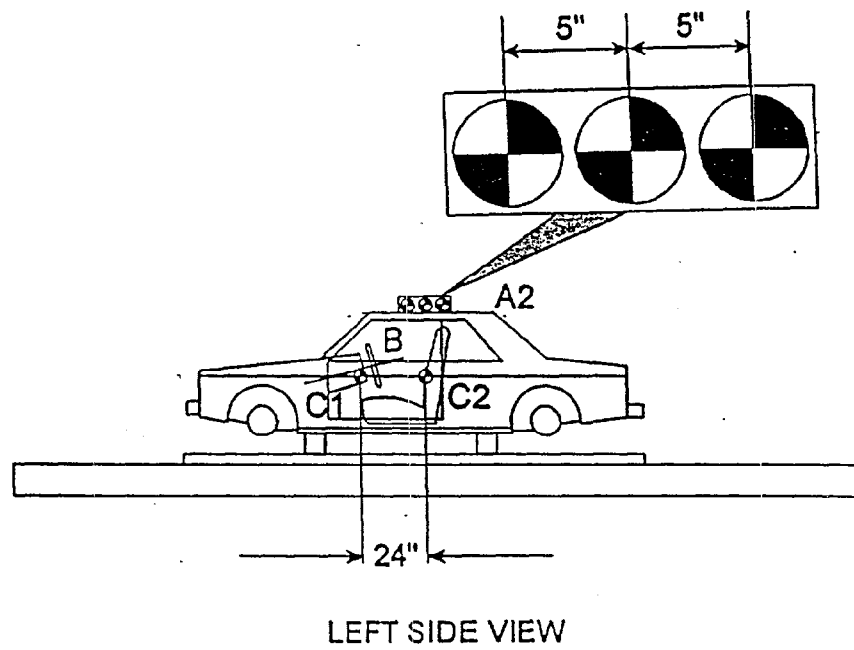
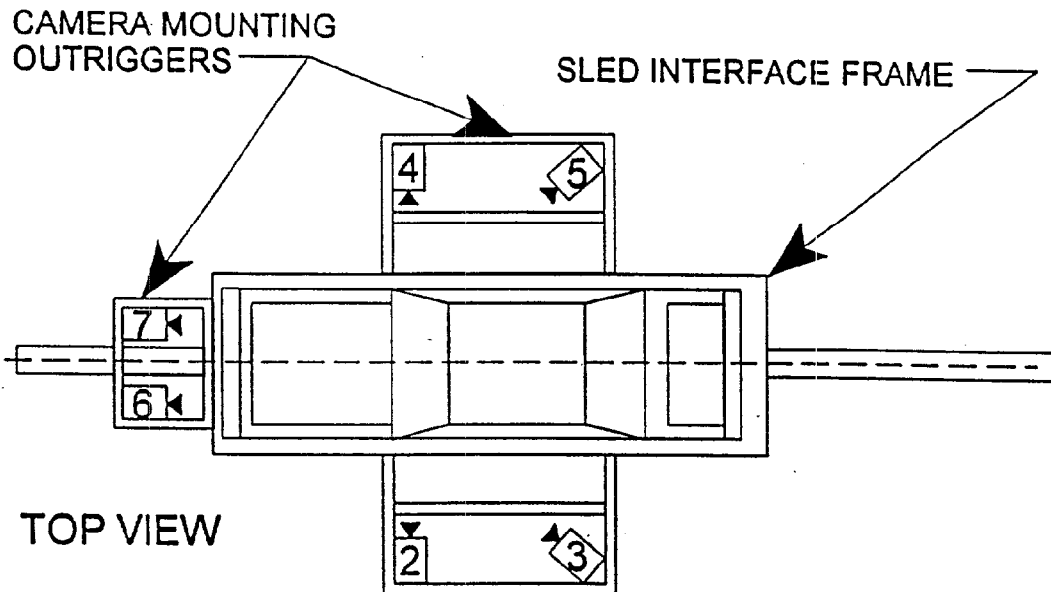


FIGURE 3 CAMERA POSITIONS



CAMERA FRAME RATES:

#1 = 24 fps

All Others = 1,000 fps

1 REAL TIME CAMERA

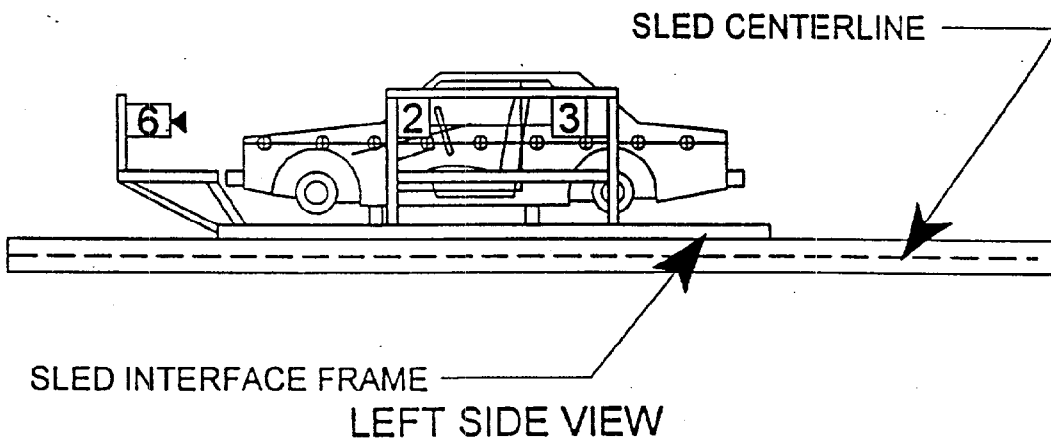


TABLE 12 CAMERA LOCATIONS

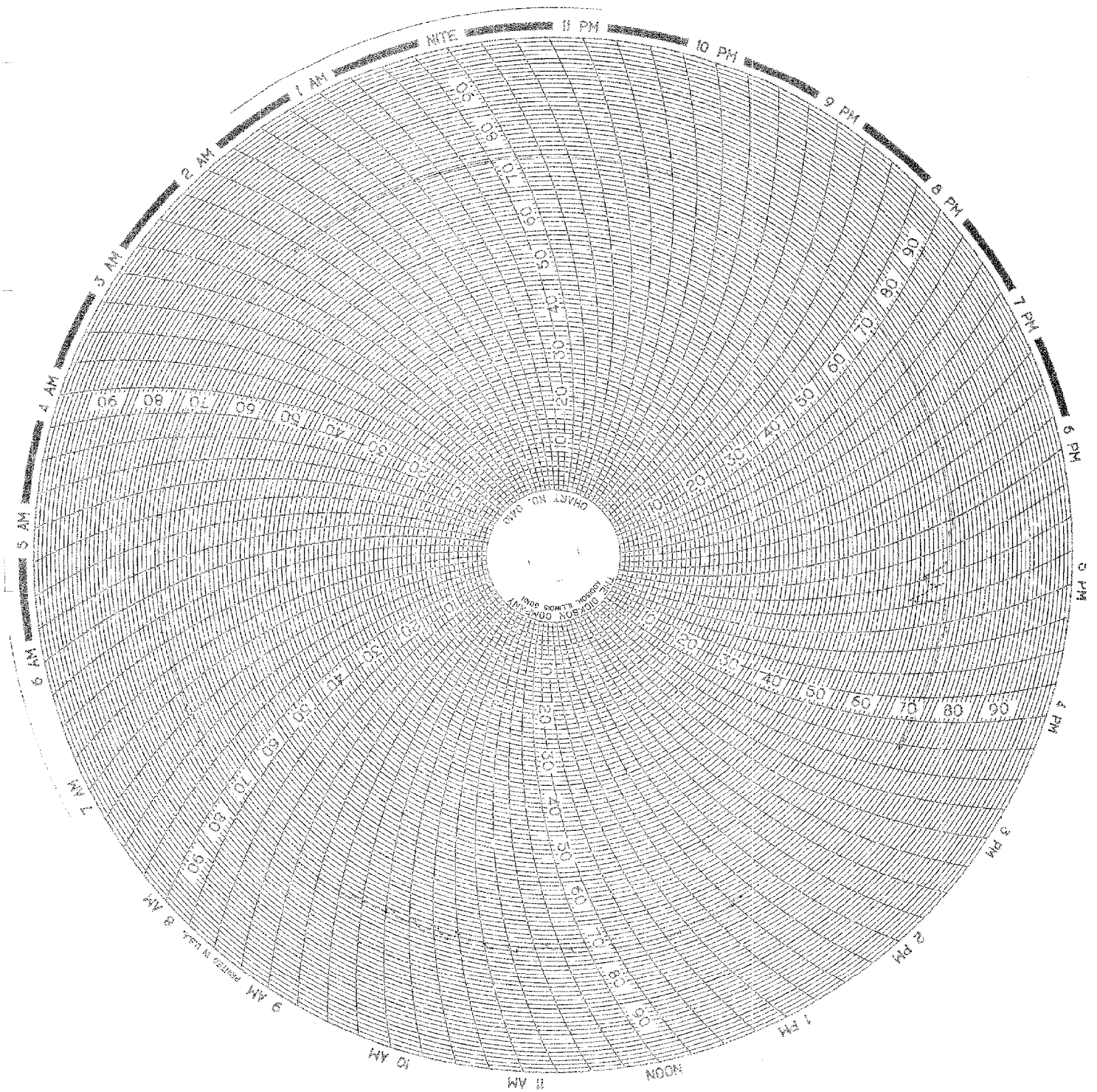
Veh. Year/Make/Model/Body Style: 1998/Toyota/Camry/4 Door

Vehicle NHTSA No.: CW5103; Test Date: February 19, 1998

	VIEW	CAMERA POSITIONS (inches)*			ANGLE (deg)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time (Pre and Post)					10	24
2	Onboard Driver	77.0	78.0	39.0	90	13	1010
3	Onboard Driver Angle	144.3	83.1	47.6		13	1020
4	Onboard Passenger	74.0	87.2	38.6	90	13	1026
5	Onboard Passenger Angle	146.7	88.1	48.2		13	1026
6	Onboard Windshield Driver	23.6	11.8	43.7		13	1020
7	Onboard Windshield Passenger	31.9	14.8	43.7		13	1015

- * +X = Rearward of the front of the sled carriage
 +Y = Right of the sled carriage longitudinal centerline
 +Z = Above the top of the sled carriage

FIGURE 4 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 3/4 Left Rear View	A-7
Photo No. A-8 - Post-Test 3/4 Left Rear View	A-8
Photo No. A-9 - Pre-Test 3/4 Right Front View	A-9
Photo No. A-10 - Post-Test 3/4 Right Front View	A-10
Photo No. A-11 - Pre-Test Rear View	A-11
Photo No. A-12 - Post-Test Rear View	A-12
Photo No. A-13 - Post-Test Engine Compartment View	A-13
Photo No. A-14 - Pre-Test Windshield View	A-14
Photo No. A-15 - Post-Test Windshield View	A-15
Photo No. A-16 - Pre-Test Driver Dummy Position View	A-16
Photo No. A-17 - Post-Test Driver Dummy Position View	A-17
Photo No. A-18 - Pre-Test Driver Dummy Position View (Door Open)	A-18
Photo No. A-19 - Post-Test Driver Dummy Position View (Door Open)	A-19
Photo No. A-20 - Pre-Test Driver Windshield View	A-20
Photo No. A-21 - Post-Test Driver Windshield View	A-21
Photo No. A-22 - Pre-Test Driver Seat Position View	A-22
Photo No. A-23 - Post-Test Driver Seat Position View	A-23
Photo No. A-24 - Pre-Test Driver Knee Bolster View	A-24
Photo No. A-25 - Post-Test Driver Knee Bolster View	A-25
Photo No. A-26 - Post-Test Driver Airbag View	A-26
Photo No. A-27 - Post-Test Driver Head Contact View (sunvisor)	A-27
Photo No. A-28 - Post-Test Driver Head Contact View (windshield)	A-28

TABLE OF PHOTOGRAPHS (Cont.)

<u>Description</u>	<u>Page No.</u>
Photo No. A-29 - Pre-Test Passenger Dummy Position View	A-29
Photo No. A-30 - Post-Test Passenger Dummy Position View	A-30
Photo No. A-31 - Pre-Test Passenger Dummy Position View (Door Open)	A-31
Photo No. A-32 - Post-Test Passenger Dummy Position View (Door Open)	A-32
Photo No. A-33 - Pre-Test Passenger Windshield View	A-33
Photo No. A-34 - Post-Test Passenger Windshield View	A-34
Photo No. A-35 - Pre-Test Passenger Seat Position View	A-35
Photo No. A-36 - Post-Test Passenger Seat Position View	A-36
Photo No. A-37 - Pre-Test Passenger Dummy Knee Bolster View	A-37
Photo No. A-38 - Post-Test Passenger Dummy Knee Bolster View	A-38
Photo No. A-39 - Post-Test Passenger Dummy Airbag View	A-39
Photo No. A-40 - Post-Test Passenger Dummy Head Contact View (visor)	A-40
Photo No. A-41 - Vehicle Certification Label	A-41
Photo No. A-42 - Vehicle Tire Placard	A-42

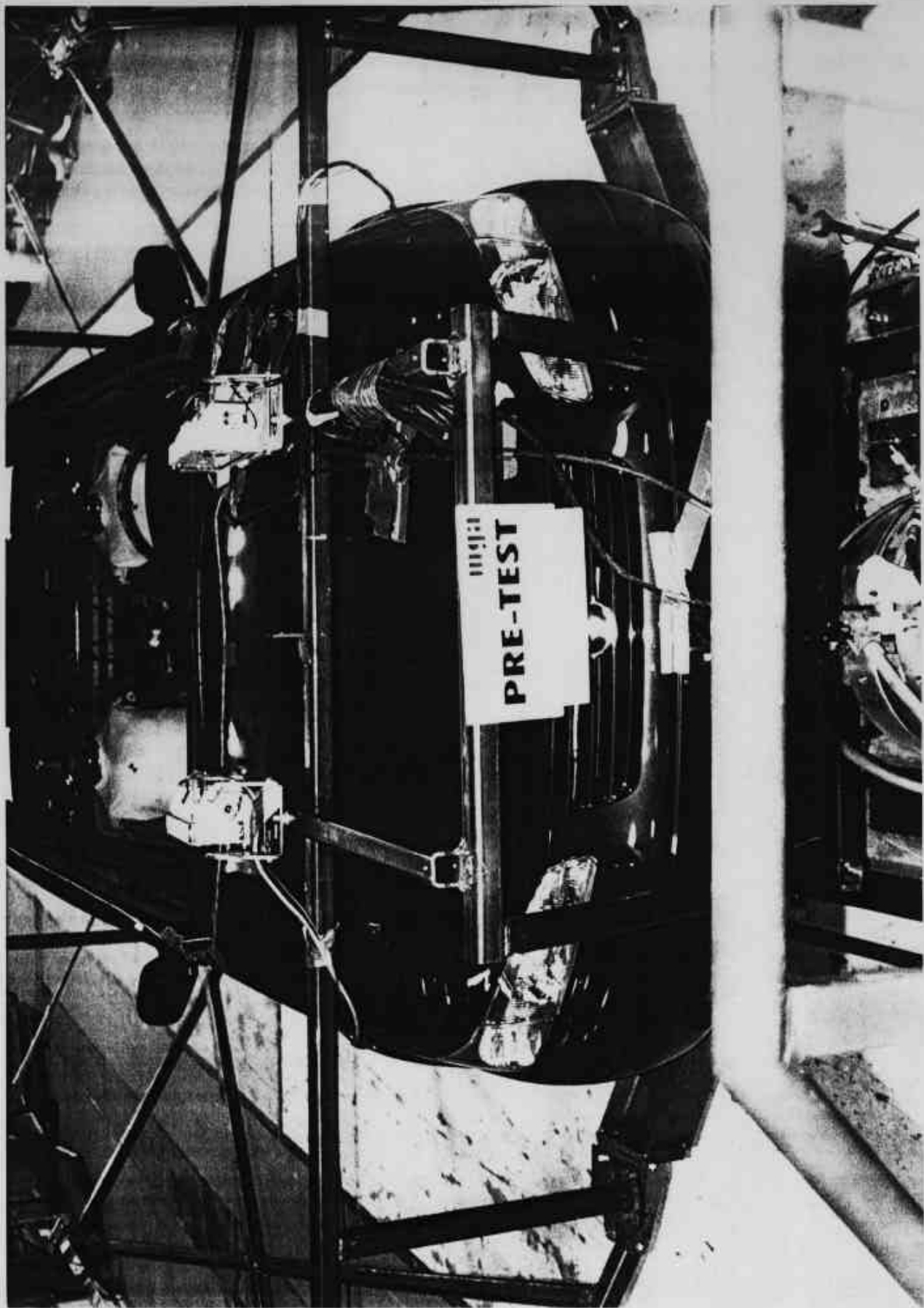


Photo No. A-1 - Pre-Test Front View

A-1

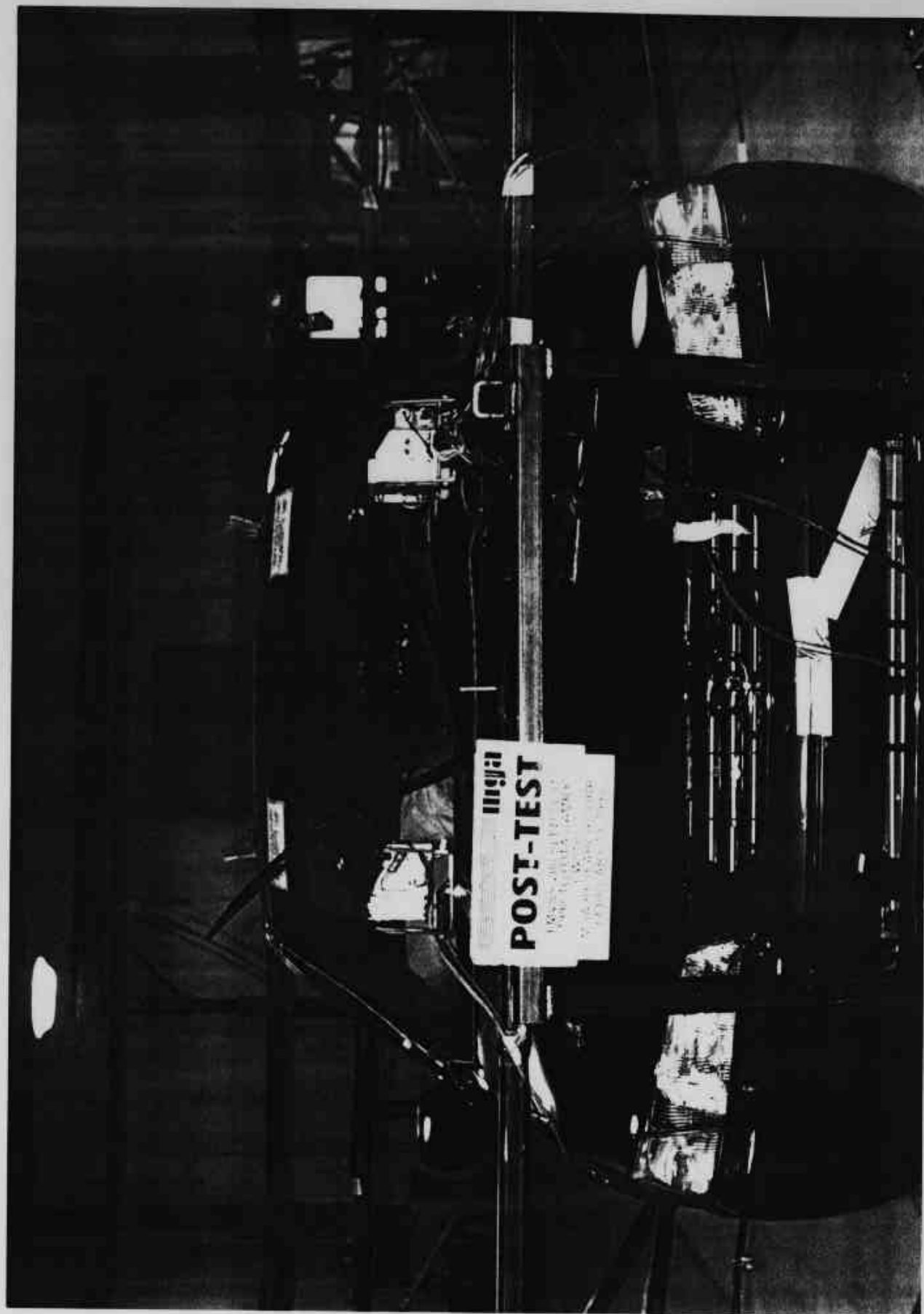


Photo No. A-2 - Post-Test Front View

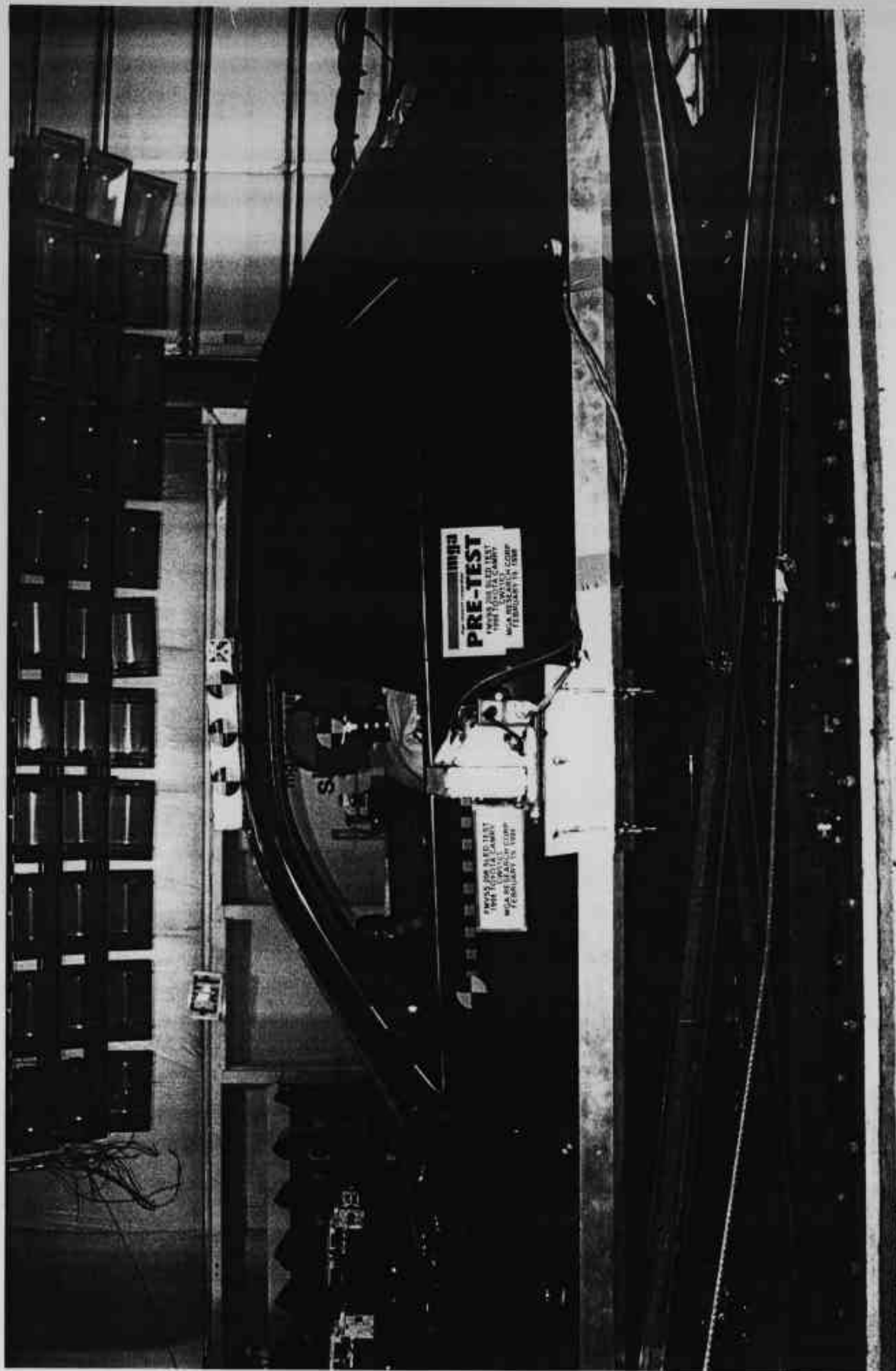


Photo No. A-3 - Pre-Test Left Side View



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

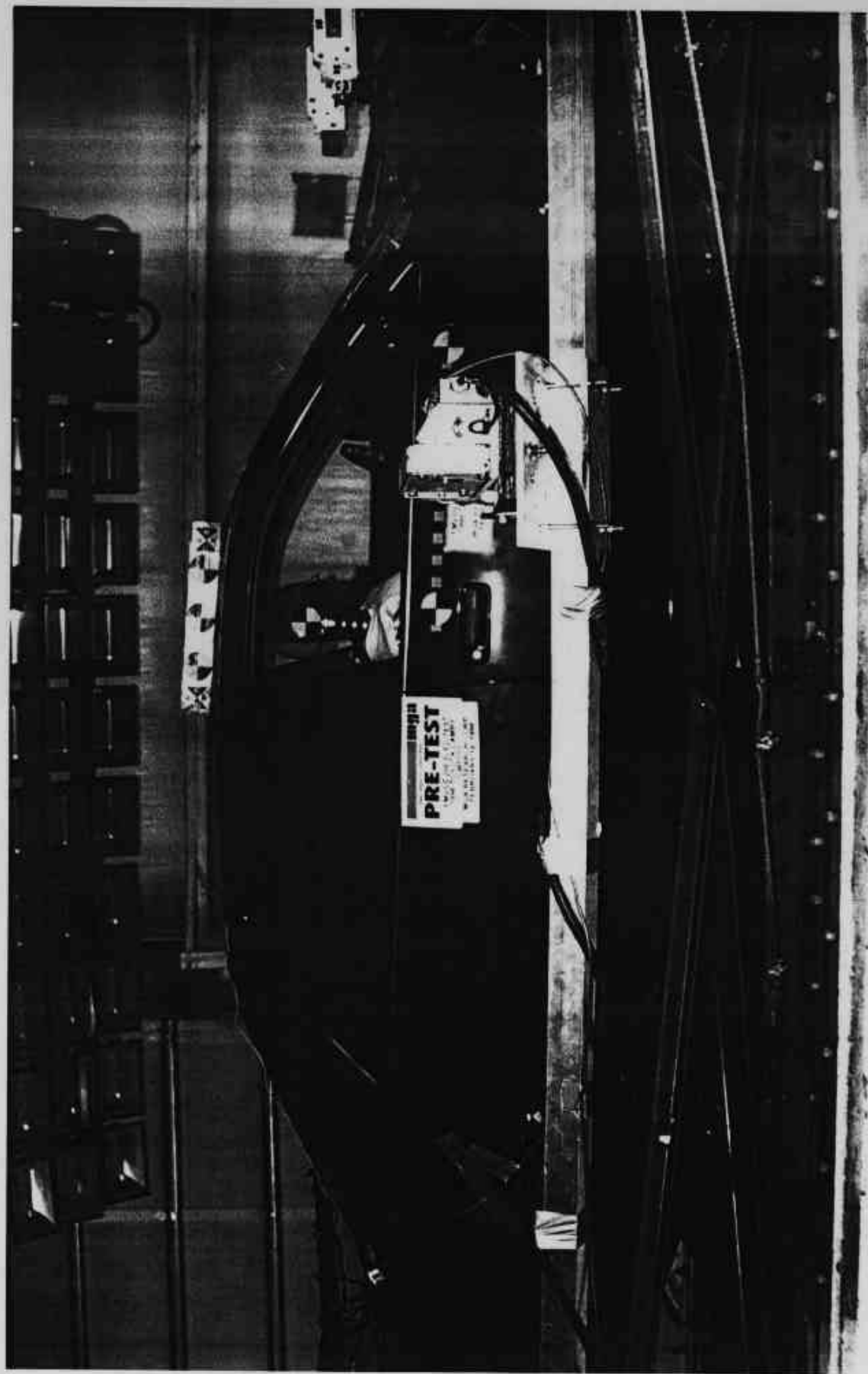


Photo No. A-5 - Pre-Test Right Side View

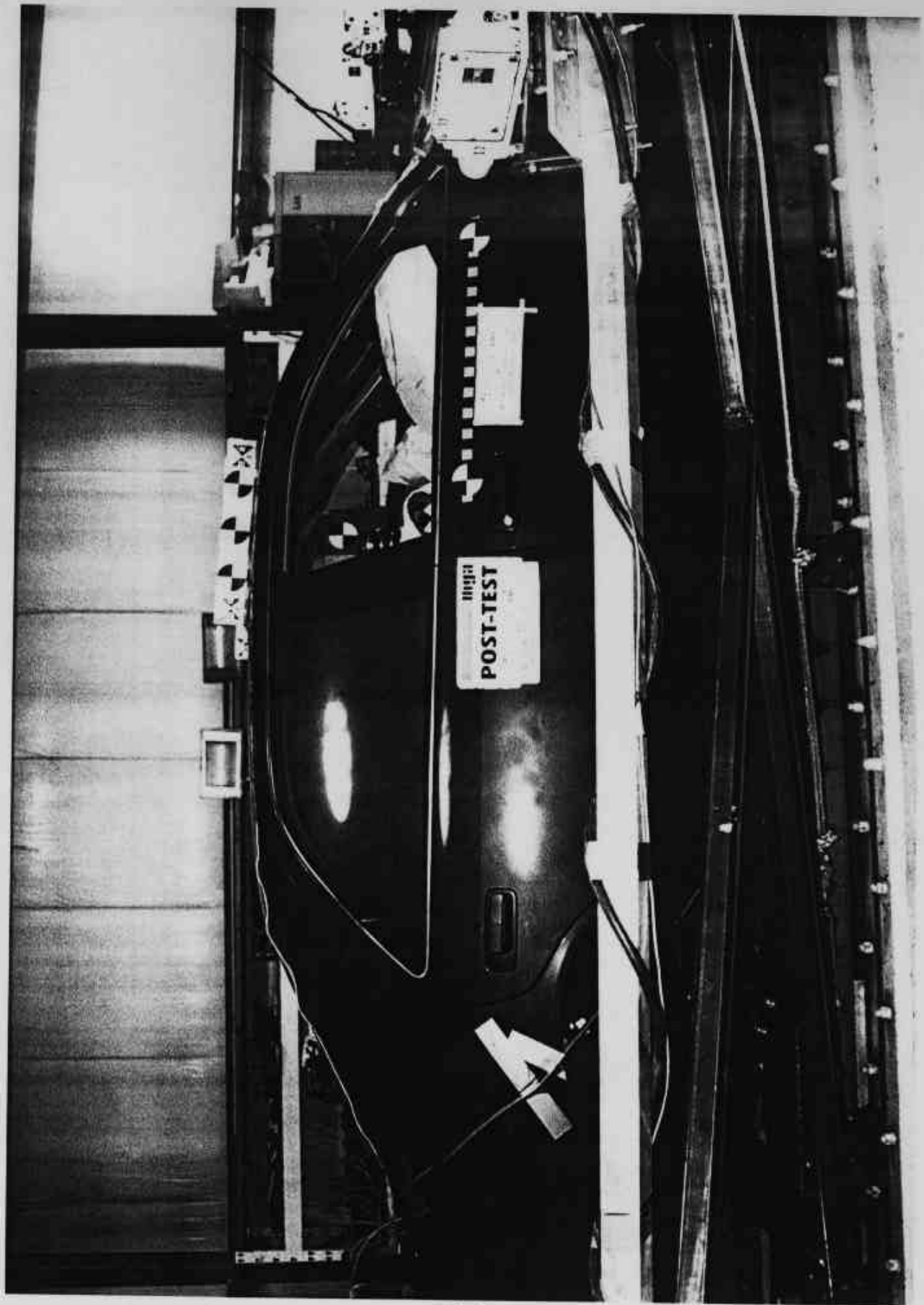


Photo No. A-6 - Post-Test Right Side View

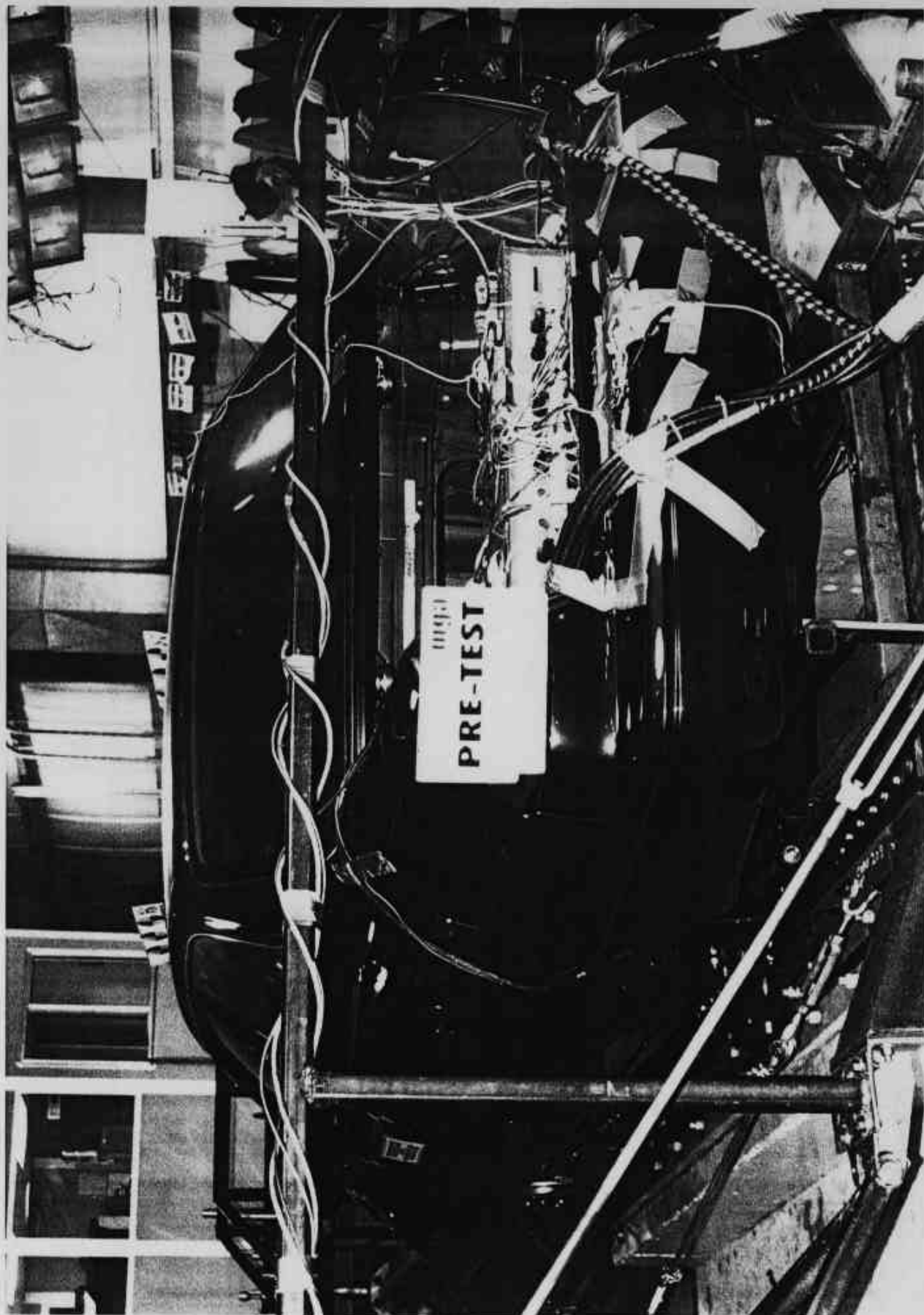


Photo No. A-7 - Pre-Test 3/4 Left Rear View

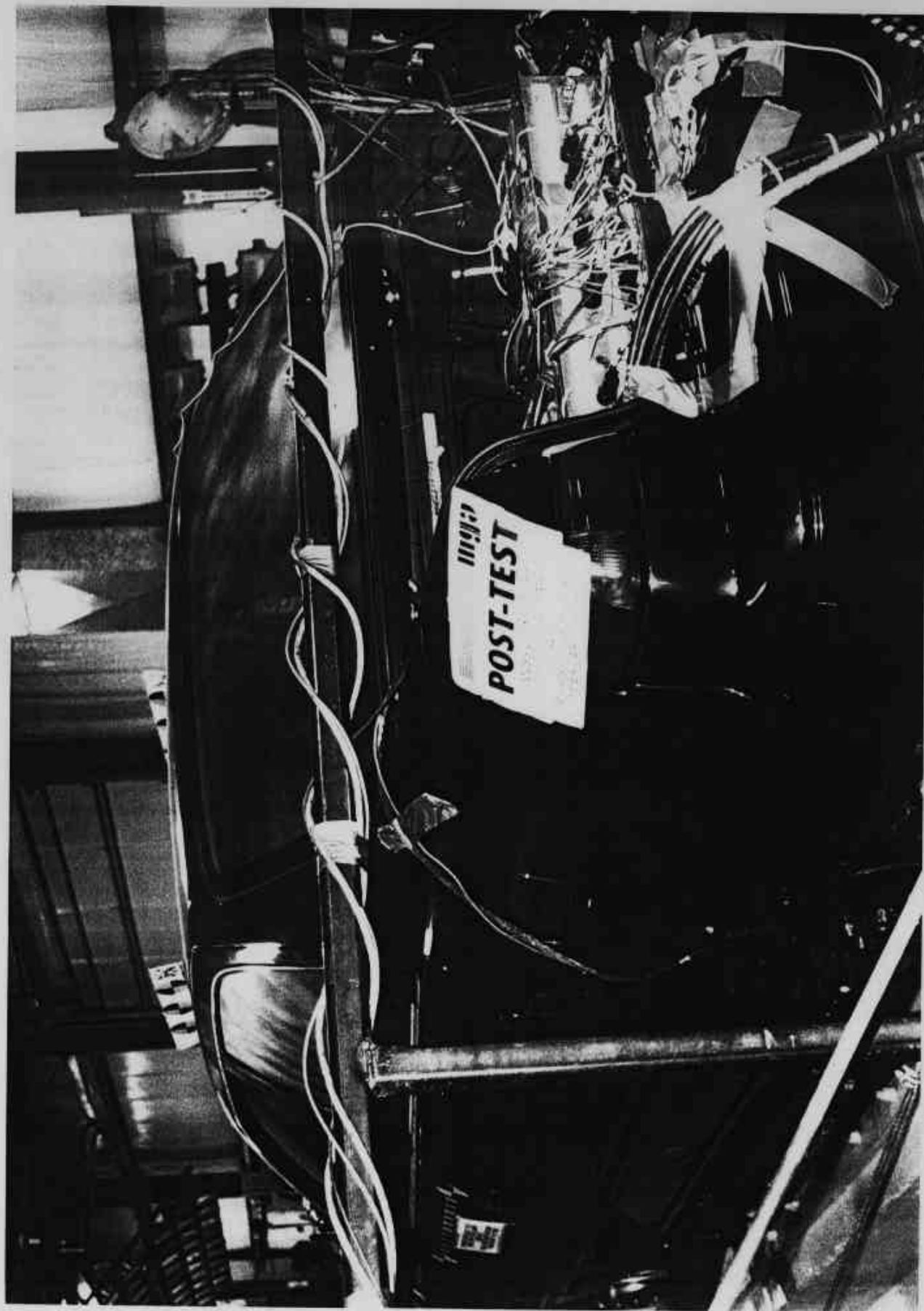


Photo No. A-8 - Post-Test 3/4 Left Rear View

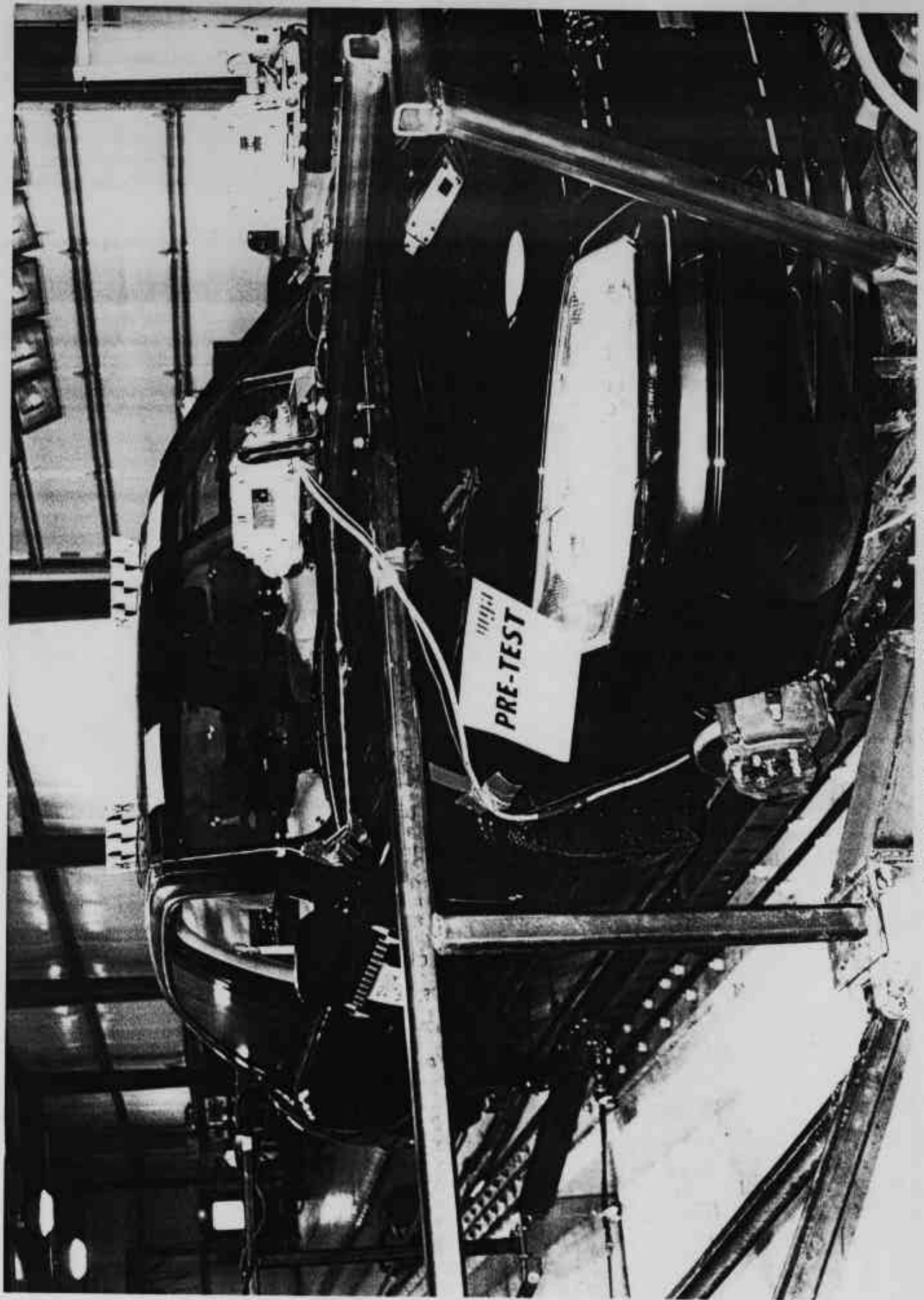


Photo No. A-9 - Pre-Test 3/4 Right Front View

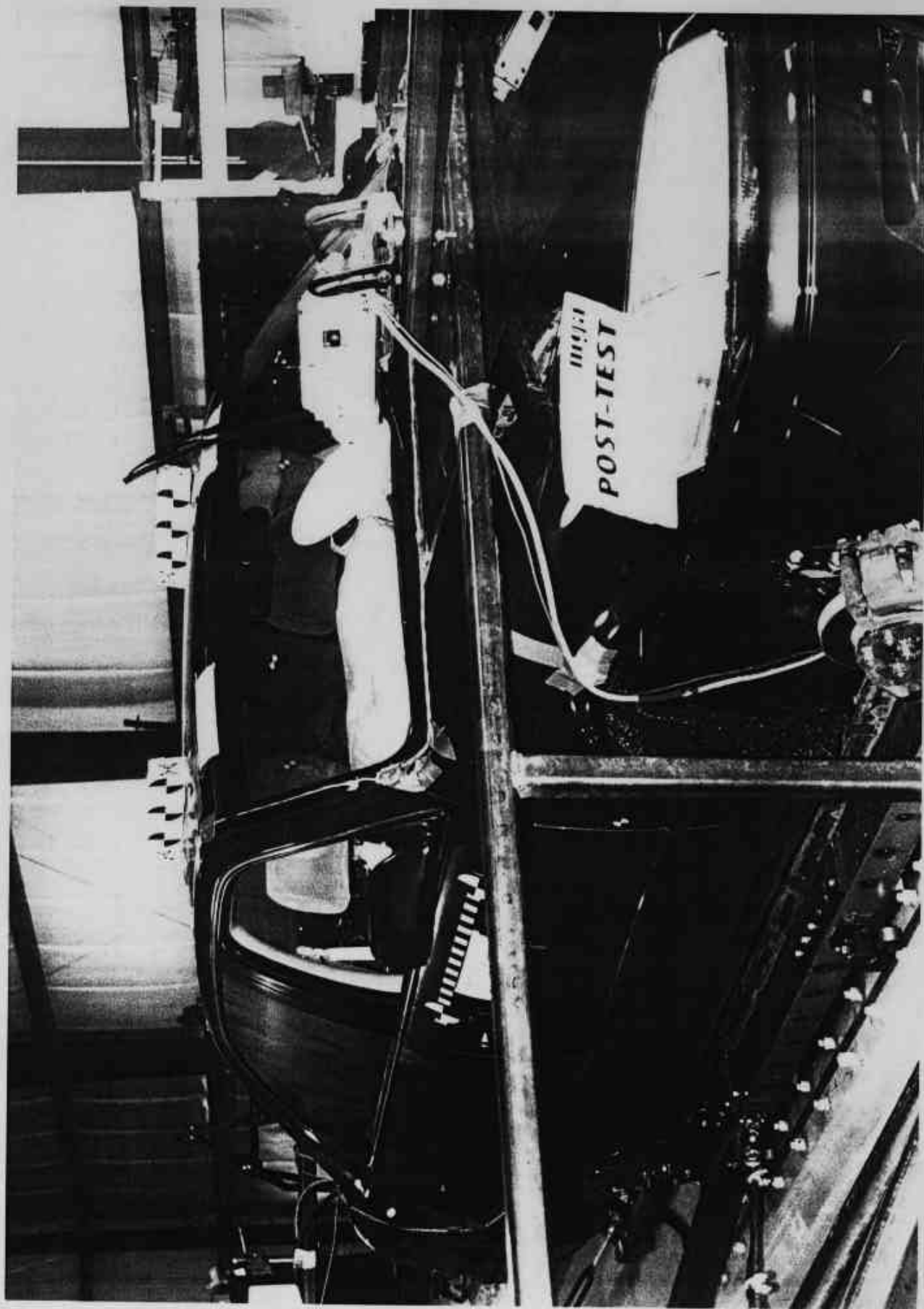


Photo No. A-10 - Post-Test 3/4 Right Front View

A-10

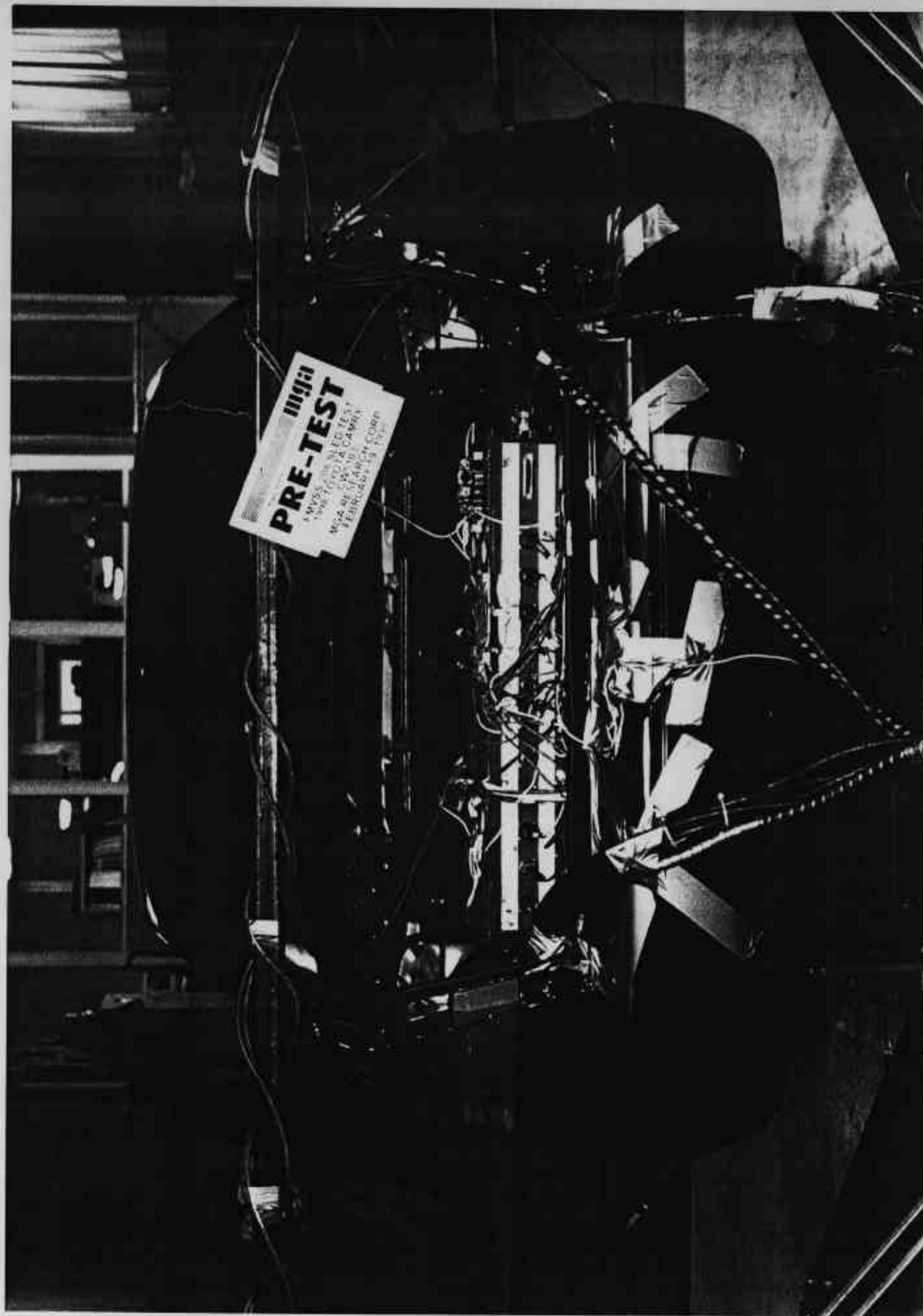


Photo No. A-11 - Pre-Test Rear View

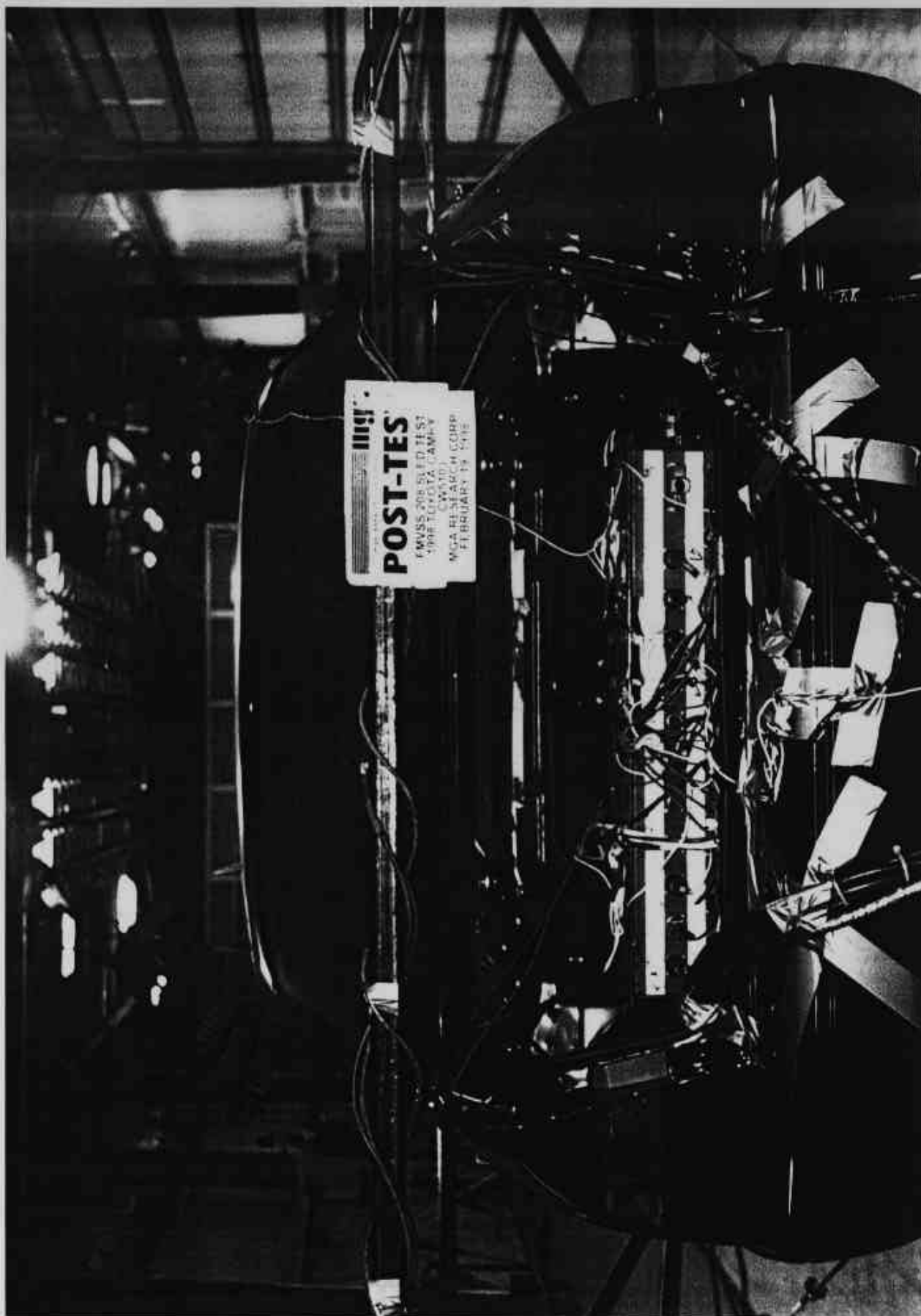


Photo No. A-12 - Post-Test Rear View

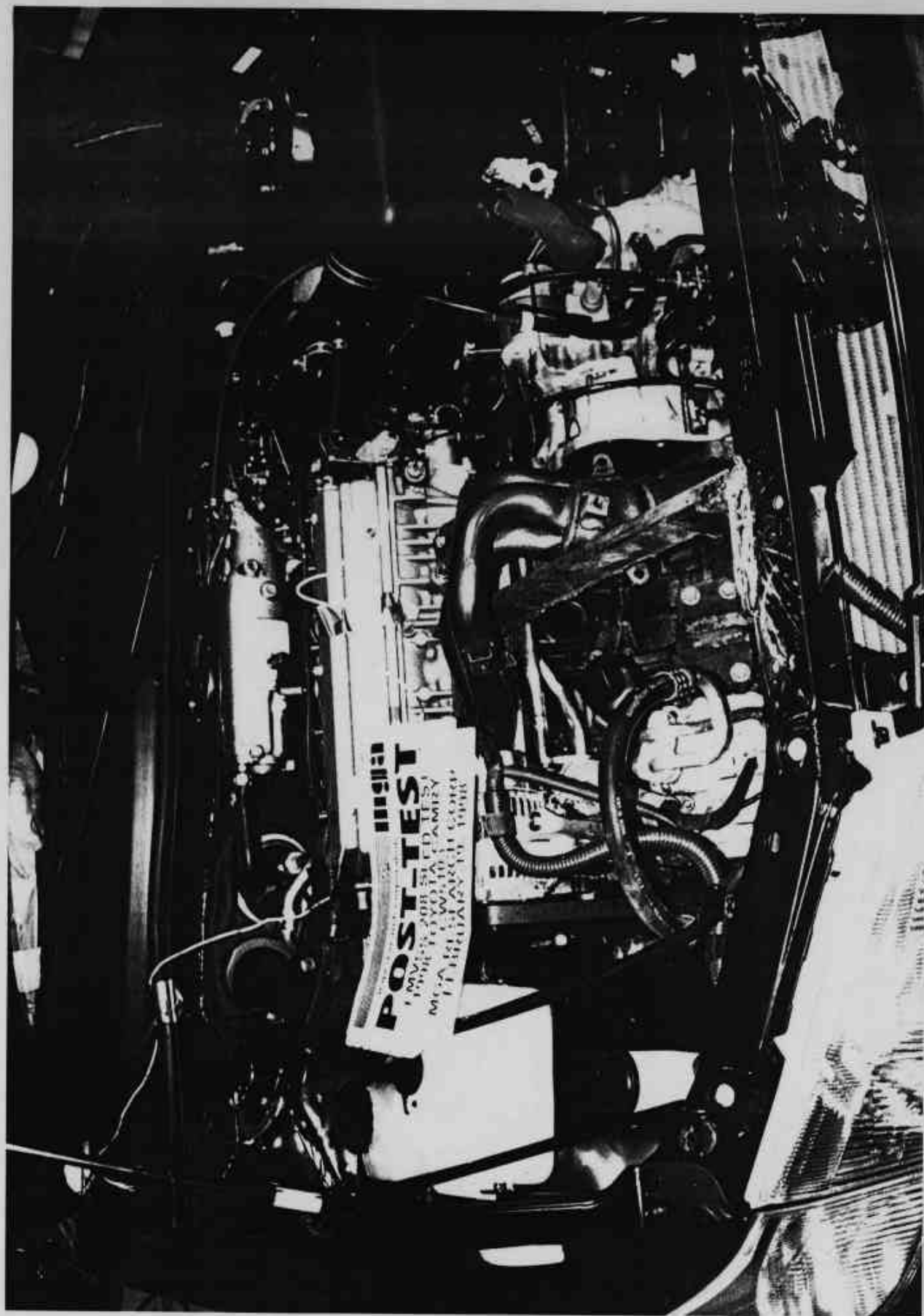
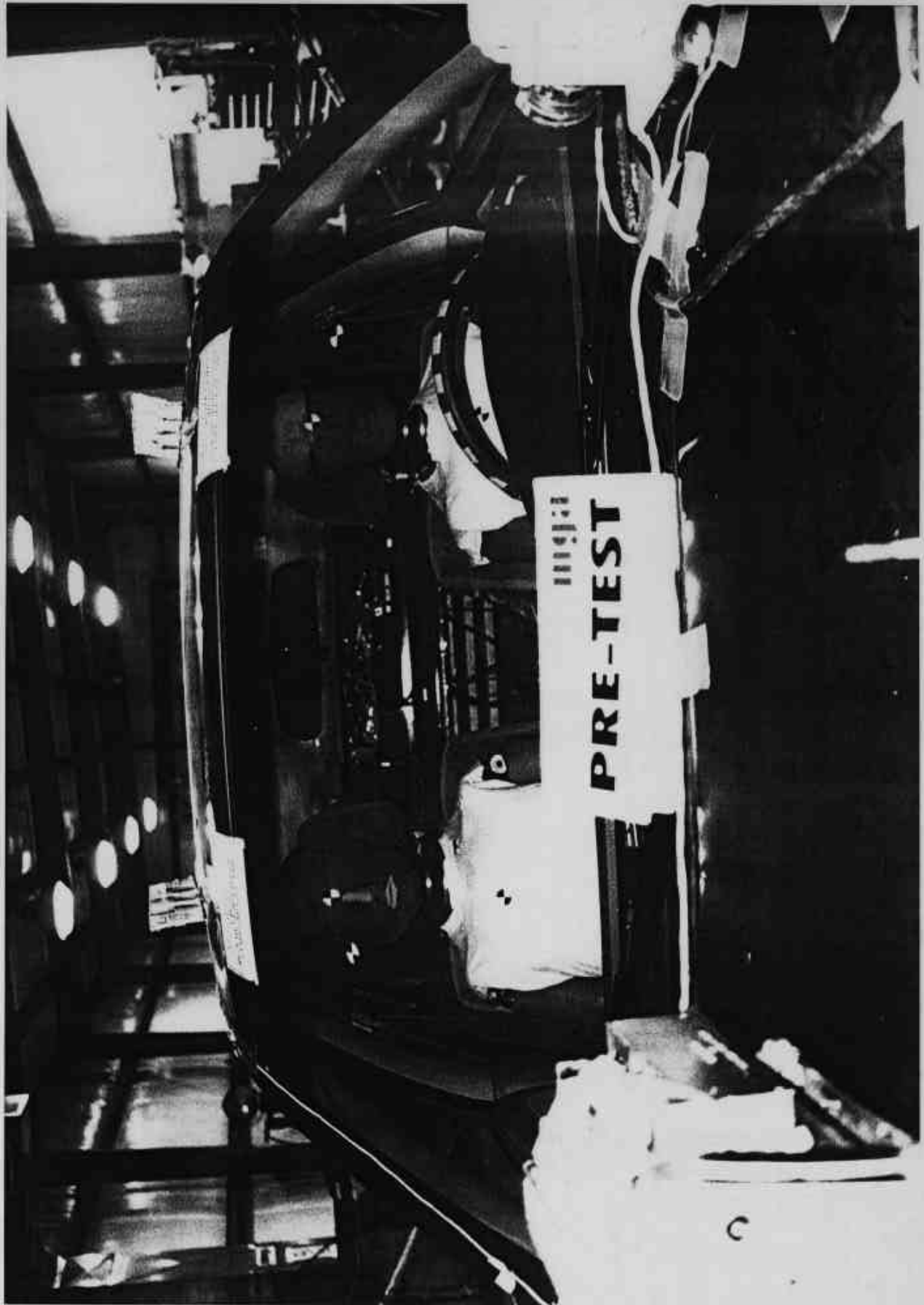


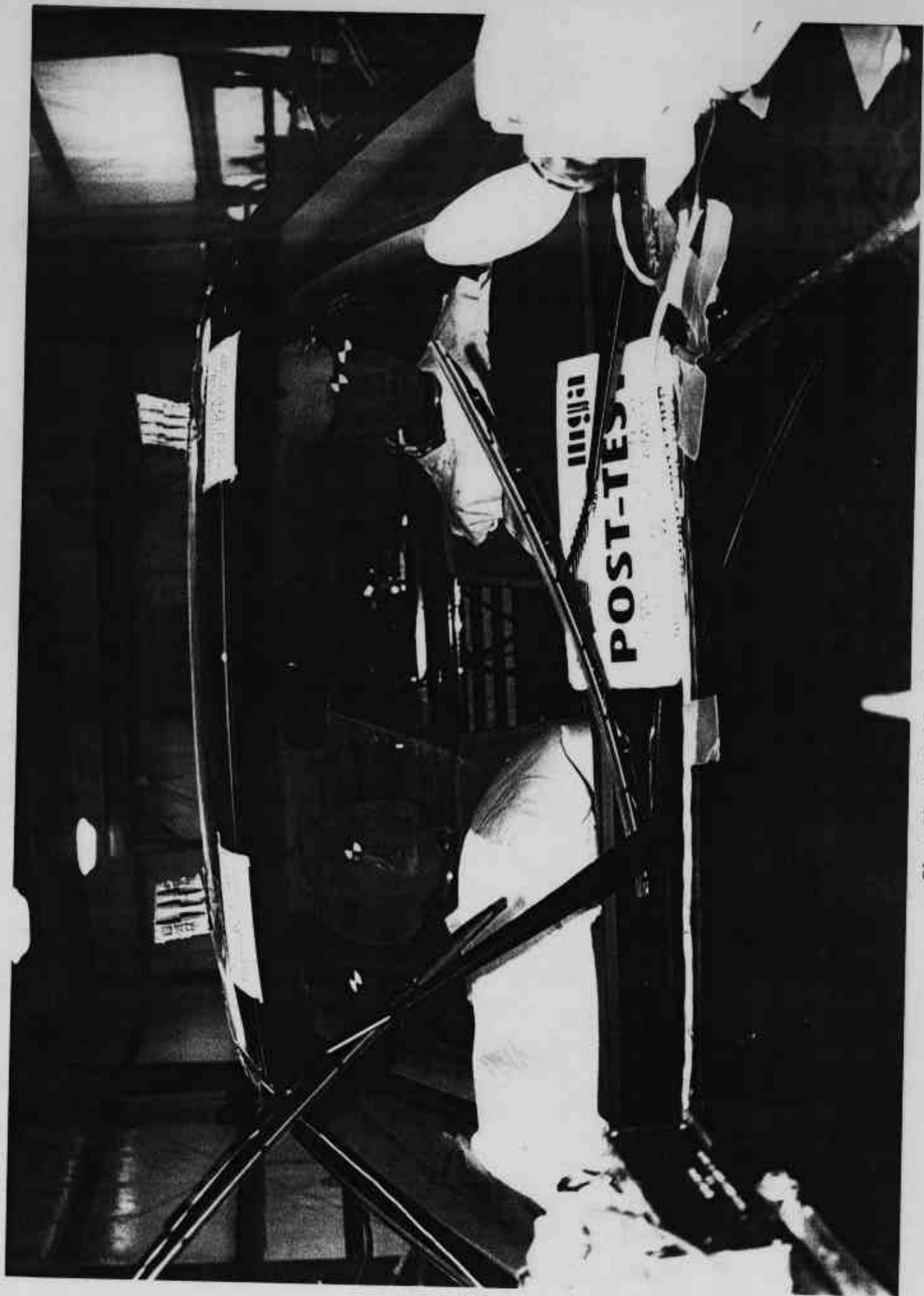
Photo No. A-13 - Post-Test Engine Compartment View

A-13



A-14

Photo No. A-14 - Pre-Test Windshield View



A-15

Photo No. A-15 - Post-Test Windshield View

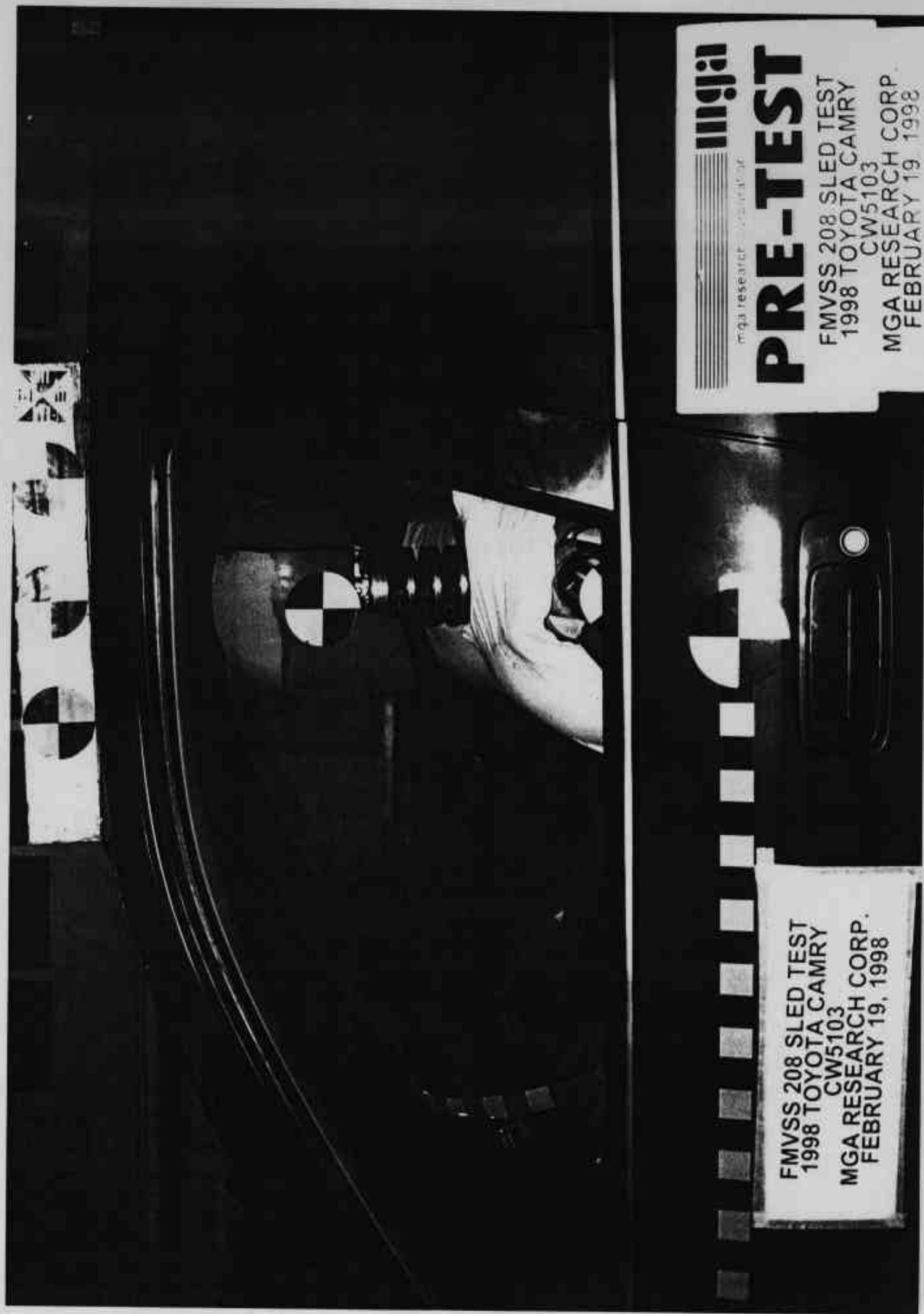


Photo No. A-16 - Pre-Test Driver Dummy Position View



mqg research corporation
POST-TEST
FMVSS 208 SLED TEST
1998 TOYOTA CAMRY
CW5103
MGA RESEARCH CORP.
FEBRUARY 19, 1998

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY
CW5103
MGA RESEARCH CORP.
FEBRUARY 19, 1998

Photo No. A-17 - Post-Test Driver Dummy Position View



Photo No. A-18 - Pre-Test Driver Dummy Position View (Door Open)



Photo No. A-19 - Post-Test Driver Dummy Position View (Door Open)



Photo No. A-20 - Pre-Test Driver Windshield View



Photo No. A-21 - Post-Test Driver Windshield View

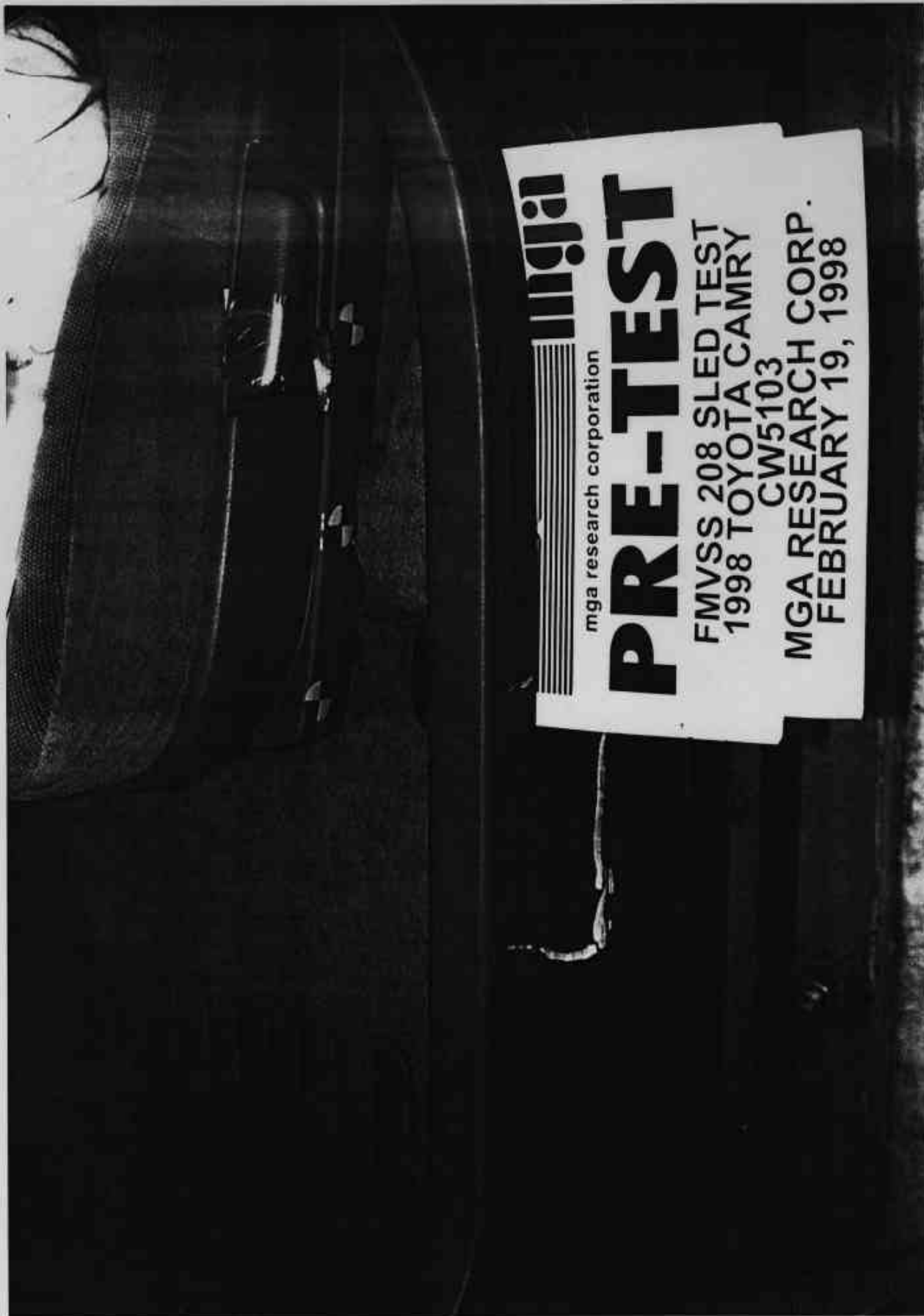


Photo No. A-22 - Pre-Test Driver Seat Position View

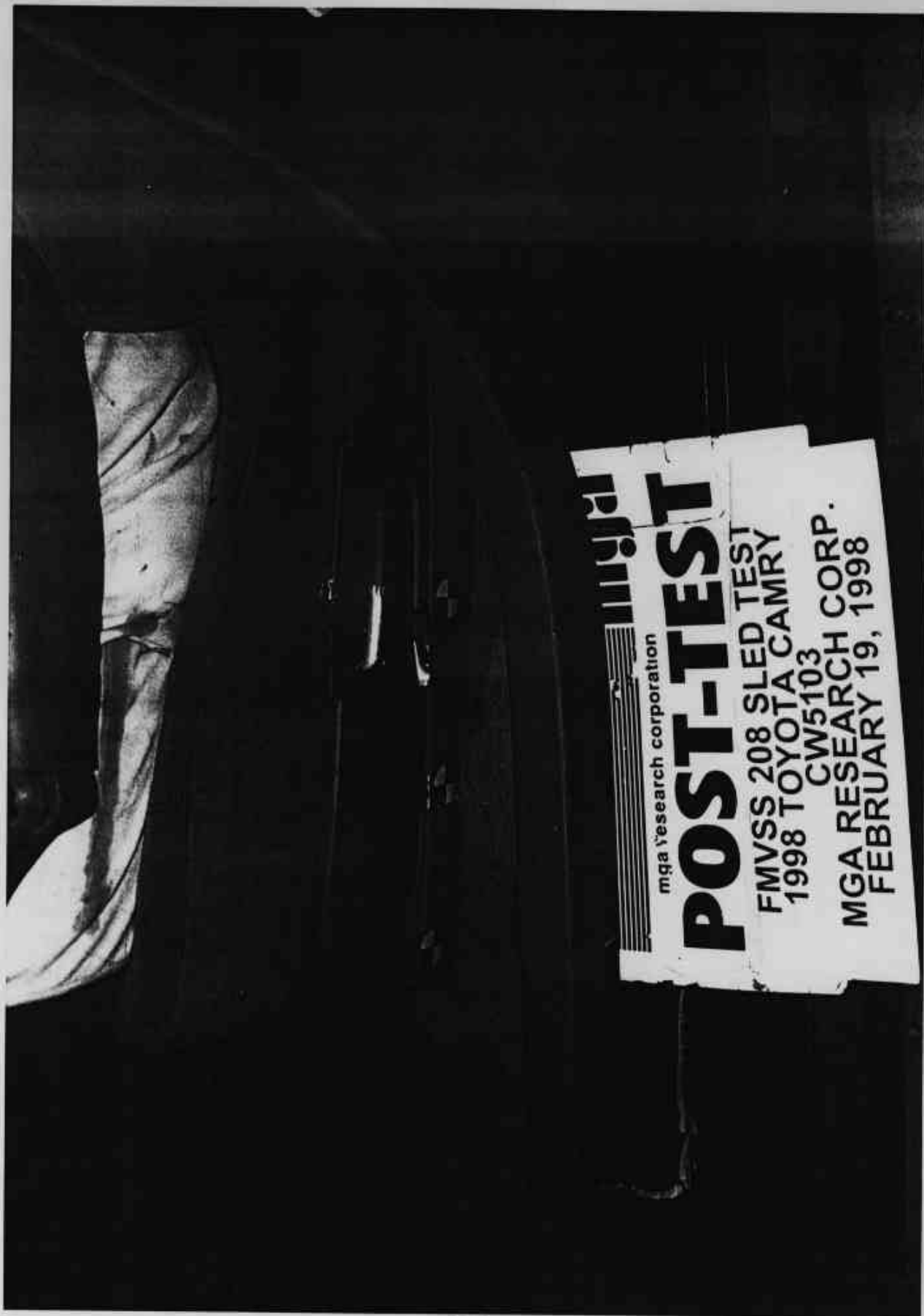


Photo No. A-23 - Post-Test Driver Seat Position View



Photo No. A-24 - Pre-Test Driver Knee Bolster View



Photo No. A-25 - Post-Test Driver Knee Bolster View



Photo No. A-26 - Post-Test Driver Airbag View

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POST-TEST

**FMVSS 208 SLED TEST
1998 TOYOTA CAMRY**

**CW5103
MGA RESEARCH CORP.
FEBRUARY 19, 1998**

Photo No. A-27 - Post-Test Driver Head Contact View (sunvisor)



Photo No. A-28 - Post-Test Driver Head Contact View (windshield)

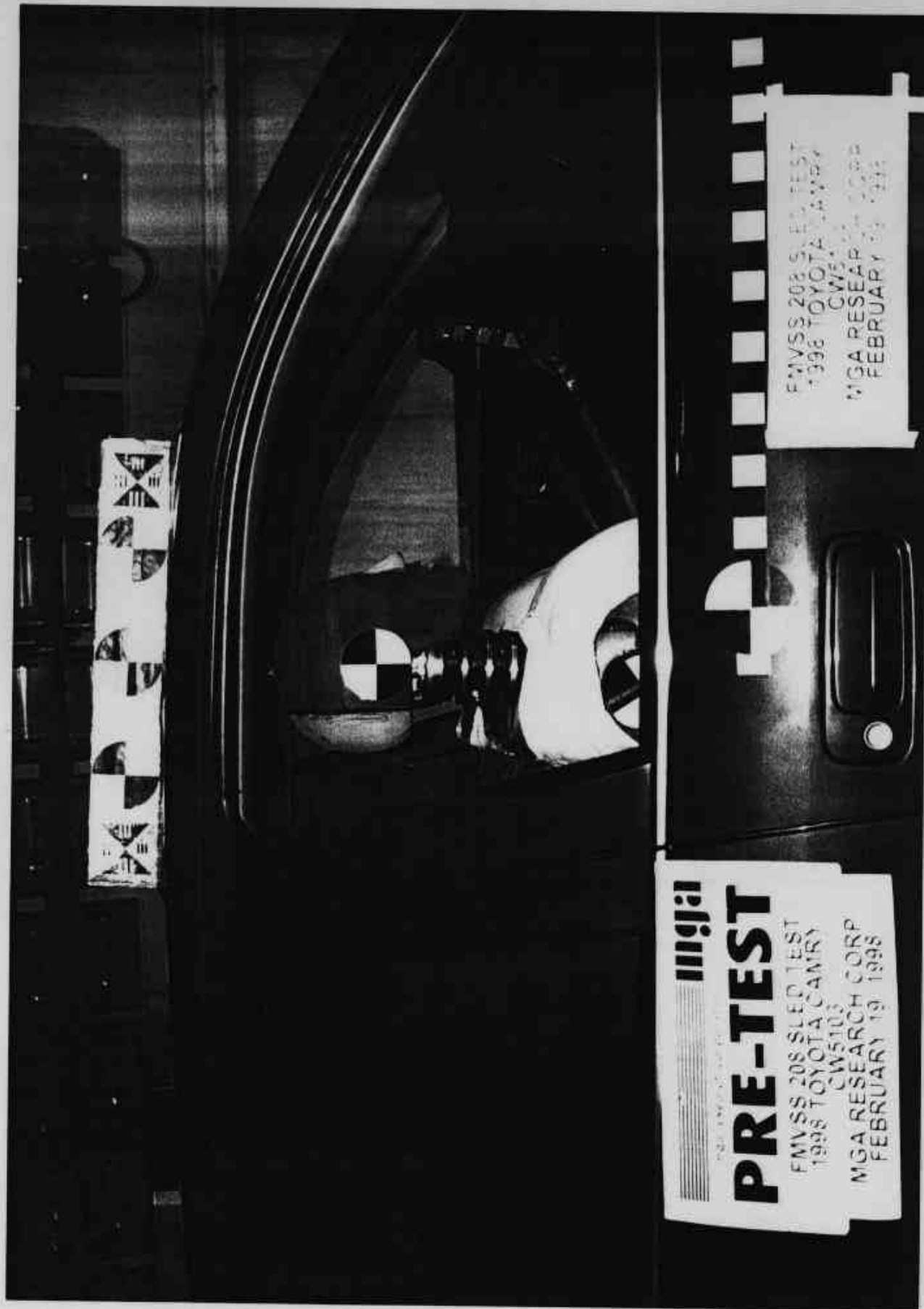


Photo No. A-29 - Pre-Test Passenger Dummy Position View



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POST-TEST

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY
CW5103

MGA RESEARCH CORP.
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1998 TOYOTA CAMRY
CW5103
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Photo No. A-30 - Post-Test Passenger Dummy Position View



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PRE-TEST

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY

CW5103

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Photo No. A-31 - Pre-Test Passenger Dummy Position View (Door Open)



A-32

POST-TEST

POST-TEST

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY
CW5103
MGA RESEARCH CORP.
FEBRUARY 19, 1998

Photo No. A-32 - Post-Test Passenger Dummy Position View (Door Open)

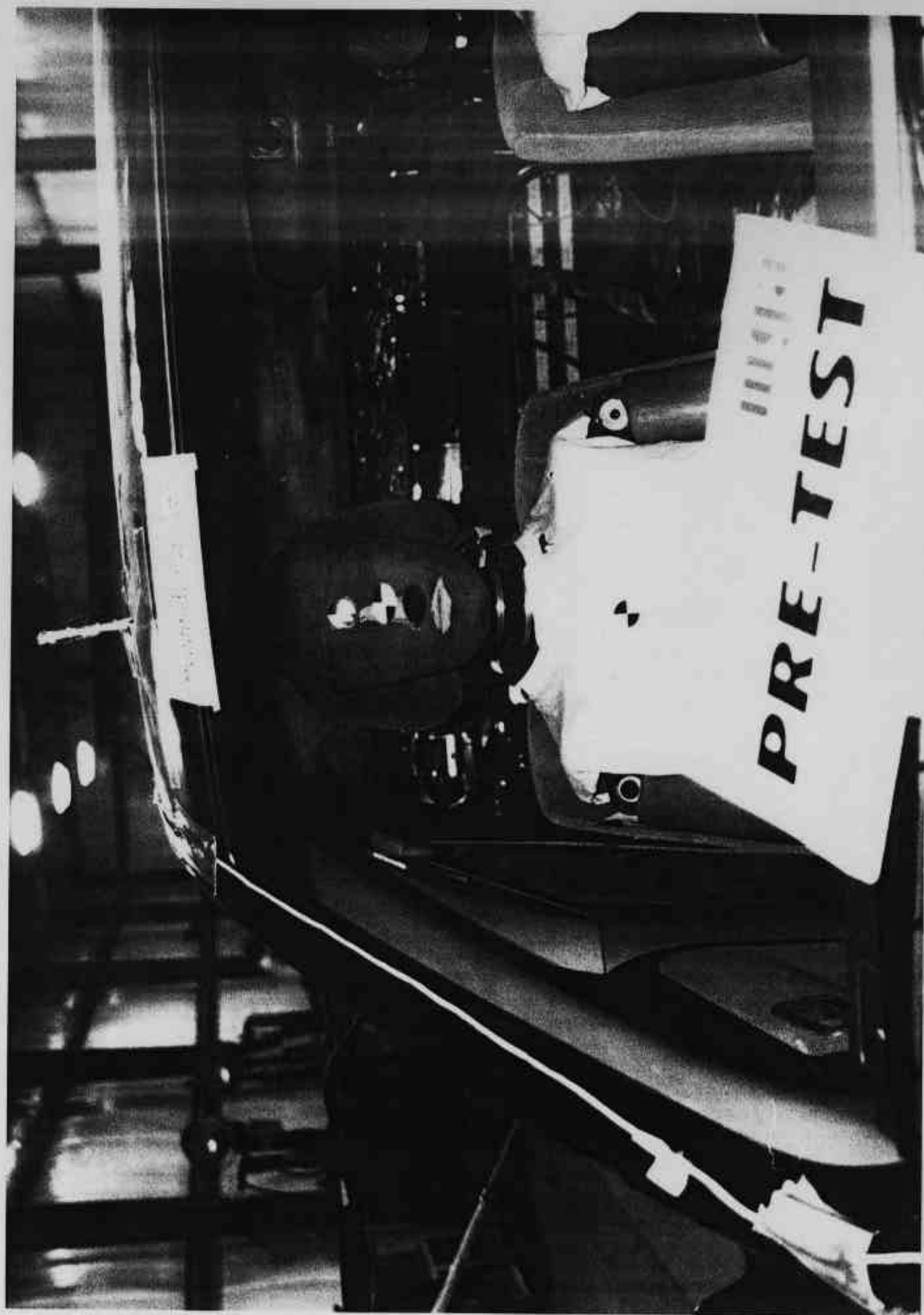


Photo No. A-33 - Pre-Test Passenger Windshield View

A-33

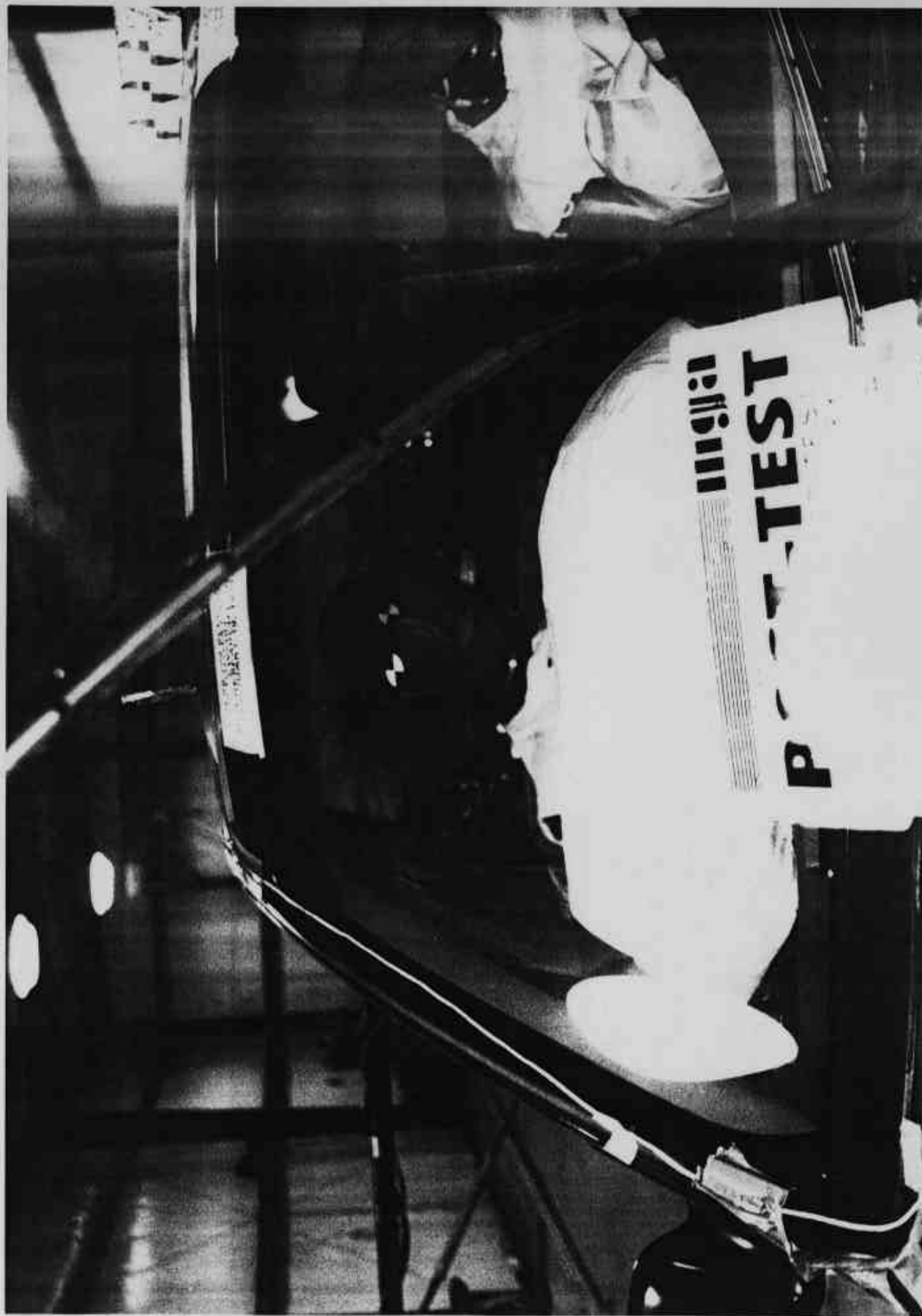


Photo No. A-34 - Post-Test Passenger Windshield View

A-34



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



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POST-TEST

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY
CW5103

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

FMVSS 208 LIFT TEST
1998 TOYOTA CAMRY
CW5103
MGA RESEARCH CORP
FEBRUARY 19, 1998

A-37



Photo No. A-37 - Pre-Test Passenger Dummy Knee Bolster View



Photo No. A-38 - Post-Test Passenger Dummy Knee Bolster View



Photo No. A-39 - Post-Test Passenger Dummy Airbag View

Small, illegible text on a label in the background.



mga research corporation

POST-TEST

FMVSS 208 SLED TEST
1998 TOYOTA CAMRY

MGA RESEARCH CO
FEBRUARY 1998

Photo No. A-40 - Post-Test Passenger Dummy Head Contact View (visor)

MADE BY TOYOTA MOTOR MANUFACTURING,
KENTUCKY, INC. 11/97

OWNER 4180LB CAR FR 2400LB RR 2400LB
THIS VEHICLE CONFORMS TO ALL APPLICABLE
FEDERAL MOTOR VEHICLE SAFETY BUMPER, AND
THEFT PREVENTION STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE
411B022K2N0241778 PASS CAR



BA02799668

Photo No. A-41 - Vehicle Certification Label

TOYOTA

VEHICLE CAPACITY WEIGHT: 410kg (900lbs)

OCCUPANT: TOTAL 5 (FRONT 2, REAR 3)

RECOMMENDED COLD TIRE INFLATION PRESSURE: kPa (psi)

• UP TO 4 OCCUPANTS: Ft 210 (30), Rt 210 (30)

• VEHICLE CAPACITY WEIGHT: Ft 210 (30), Rt 210 (30)

TIRE SIZE: P195/70R14 90S

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

CHARGE MAXIMALE DU VEHICULE: 410kg (900 LIVRES)

PERSONNES: TOTAL 5 (AVANT 2, ARRIERE 3)

PRESSION DE PNEUS: kPa (LB / POI)

• AVEC 4 PERSONNES A BORD: AVANT 210 (30), ARRIERE 210 (30)

• A CHARGE MAXIMALE: AVANT 210 (30), ARRIERE 210 (30)

DIMENSION DES PNEUS: P195/70R14 90S

POUR DE PLUS AMPLES DETAILS, VOIR LE MANUEL DU PROPRIETAIRE

P B

06340

APPENDIX B
DATA PLOTS

TABLE OF DATA PLOTS

<u>Description</u>	<u>Page No.</u>
Figure B-1 - Driver Head X Acceleration vs. Time	B-1
Figure B-2 - Driver Head Y Acceleration vs. Time	B-2
Figure B-3 - Driver Head Z Acceleration vs. Time	B-3
Figure B-4 - Driver Head Resultant Acceleration vs. Time	B-4
Figure B-5 - Driver Neck Force X vs. Time	B-5
Figure B-6 - Driver Neck Force Y vs. Time	B-6
Figure B-7 - Driver Neck Force Z vs. Time	B-7
Figure B-8 - Driver Neck Moment X vs. Time	B-8
Figure B-9 - Driver Neck Moment Y vs. Time	B-9
Figure B-10 - Driver Neck Moment Z vs. Time	B-10
Figure B-11 - Driver Occipital Condyle Moment Y vs. Time	B-11
Figure B-12 - Driver Chest X Acceleration vs. Time	B-12
Figure B-13 - Driver Chest Y Acceleration vs. Time	B-13
Figure B-14 - Driver Chest Z Acceleration vs. Time	B-14
Figure B-15 - Driver Chest Resultant Acceleration vs. Time	B-15
Figure B-16 - Driver Chest Compression vs. Time	B-16
Figure B-17 - Driver Left Femur Force vs. Time	B-17
Figure B-18 - Driver Right Femur Force vs. Time	B-18
Figure B-19 - Passenger Head X Acceleration vs. Time	B-19
Figure B-20 - Passenger Head Y Acceleration vs. Time	B-20
Figure B-21 - Passenger Head Z Acceleration vs. Time	B-21
Figure B-22 - Passenger Head Resultant Acceleration vs. Time	B-22
Figure B-23 - Passenger Neck Force X vs. Time	B-23
Figure B-24 - Passenger Neck Force Y vs. Time	B-24
Figure B-25 - Passenger Neck Force Z vs. Time	B-25
Figure B-26 - Passenger Neck Moment X vs. Time	B-26

TABLE OF DATA PLOTS (Cont.)

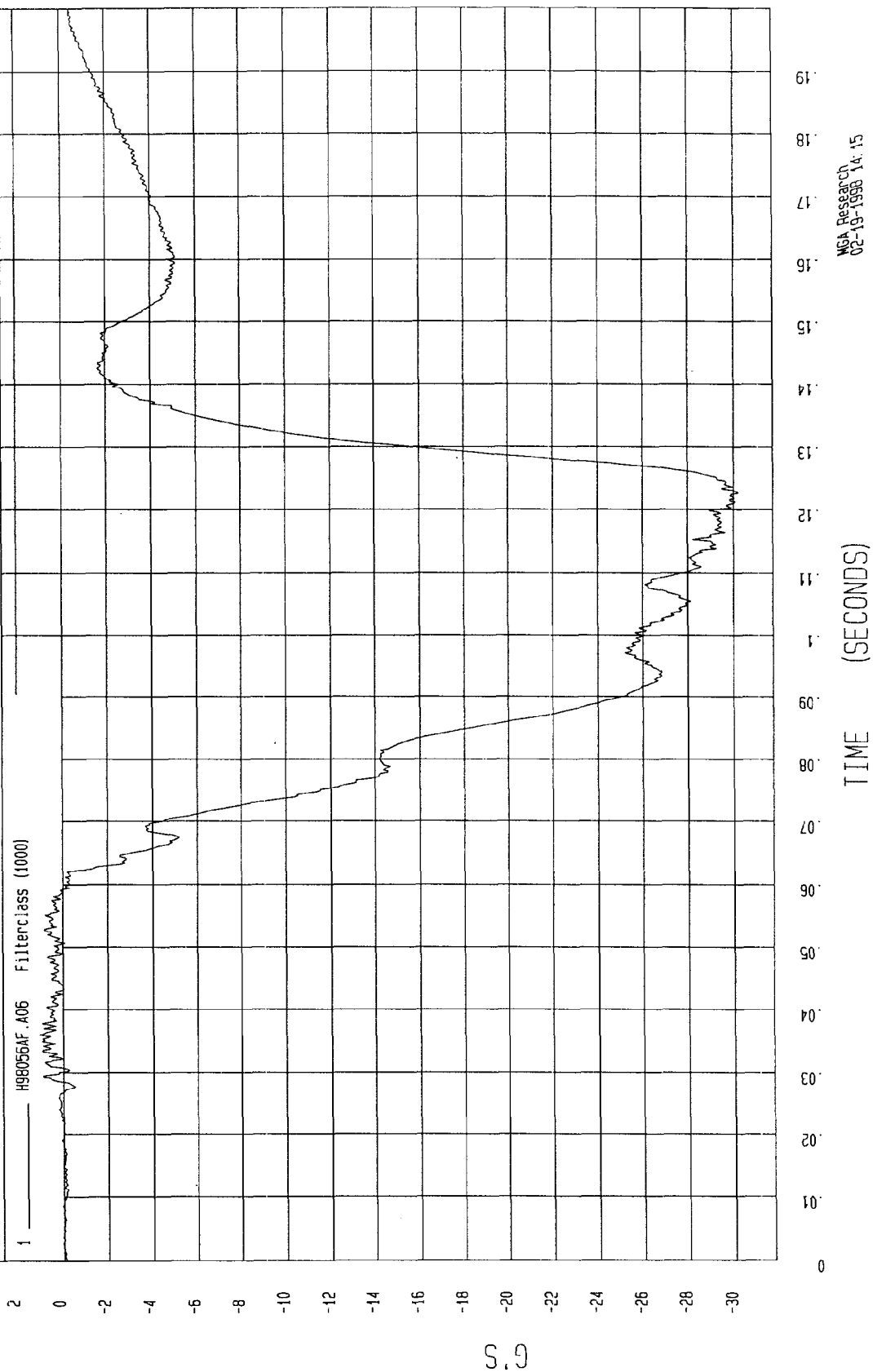
<u>Description</u>	<u>Page No.</u>
Figure B-27 - Passenger Neck Moment Y vs. Time	B-27
Figure B-28 - Passenger Neck Moment Z vs. Time	B-28
Figure B-29 - Passenger Occipital Condyle Moment Y vs. Time	B-29
Figure B-30 - Passenger Chest X Acceleration vs. Time	B-30
Figure B-31 - Passenger Chest Y Acceleration vs. Time	B-31
Figure B-32 - Passenger Chest Z Acceleration vs. Time	B-32
Figure B-33 - Passenger Chest Resultant Acceleration vs. Time	B-33
Figure B-34 - Passenger Chest Compression vs. Time	B-34
Figure B-35 - Passenger Left Femur Force vs. Time	B-35
Figure B-36 - Passenger Right Femur Force vs. Time	B-36
Figure B-37 - Sled X Acceleration vs. Time	B-37
Figure B-38 - Sled X Velocity vs. Time	B-38
Figure B-39 - Sled X Displacement vs. Time	B-39
Figure B-40 - 1 Meter Sled Displacement	B-40
Figure B-41 - Airbag Timing vs. Time	B-41
Figure B-42 - Left B-Post X Acceleration vs. Time	B-42
Figure B-43 - Right B-Post X Acceleration vs. Time	B-43
Figure B-44 - Engine X Acceleration vs. Time	B-44
Figure B-45 - Rear Axle X Acceleration vs. Time	B-45

TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-30.22026 G'S at 122 msec YMAX= 1.045002 G'S at 36 msec

DRIVER HEAD X ACCELERATION



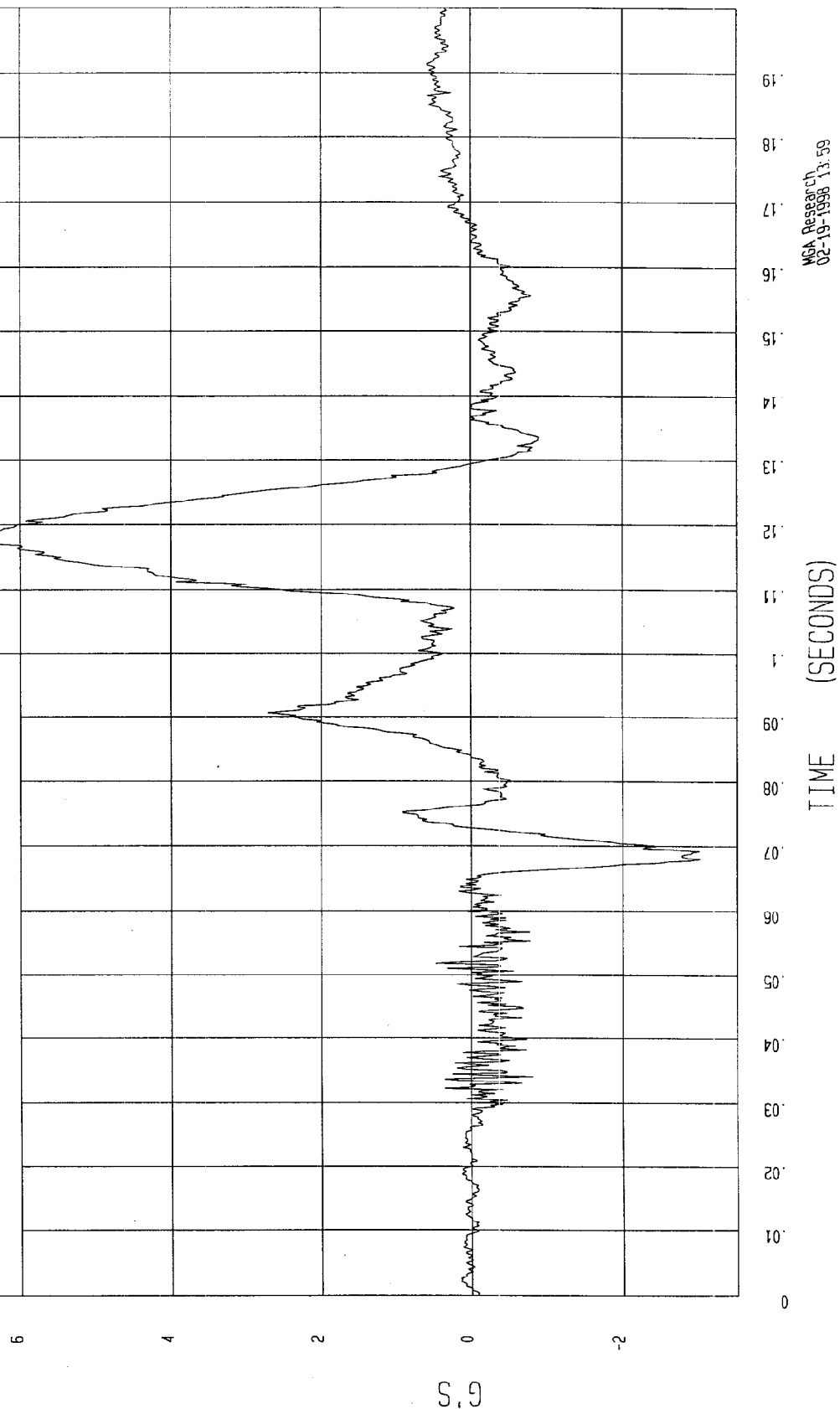
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-3.035474 G'S at 67. msec YMAX= 6.551156 G'S at 118 msec

DRIVER HEAD Y ACCELERATION

1 H98055AF.A08 Filterclass (1000)



MCA Research
02-19-1998 13:59

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

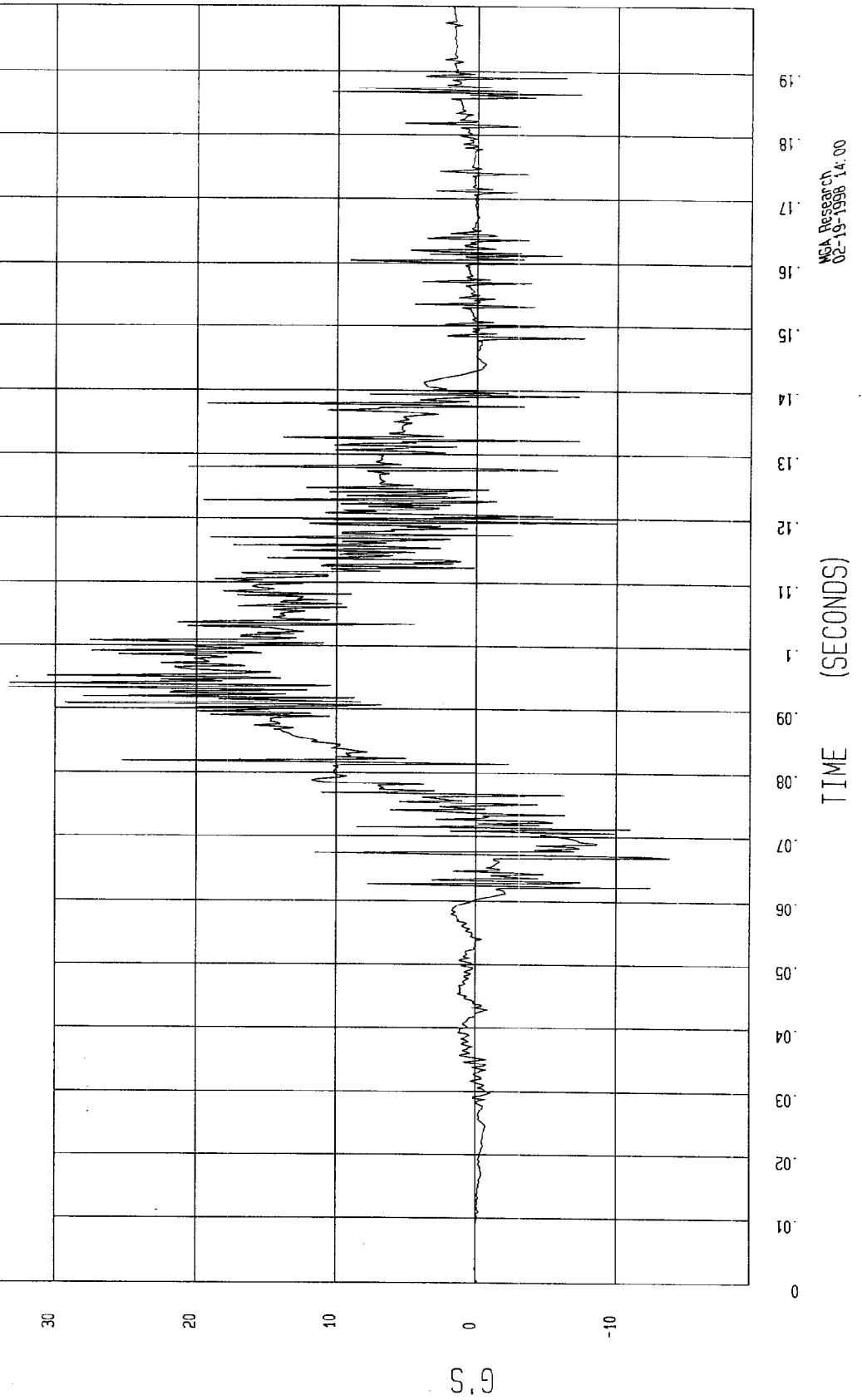
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-16.87041 G'S at 66. msec

YMAX= 33.91221 G'S at 90. msec

DRIVER HEAD Z ACCELERATION

1 H9805GAF.A09 Filterclass (1000)



MCA Research
02-19-1998 14.00

TEST DATE: 02-19-1998

TEST: FMVSS 208 SLED TEST

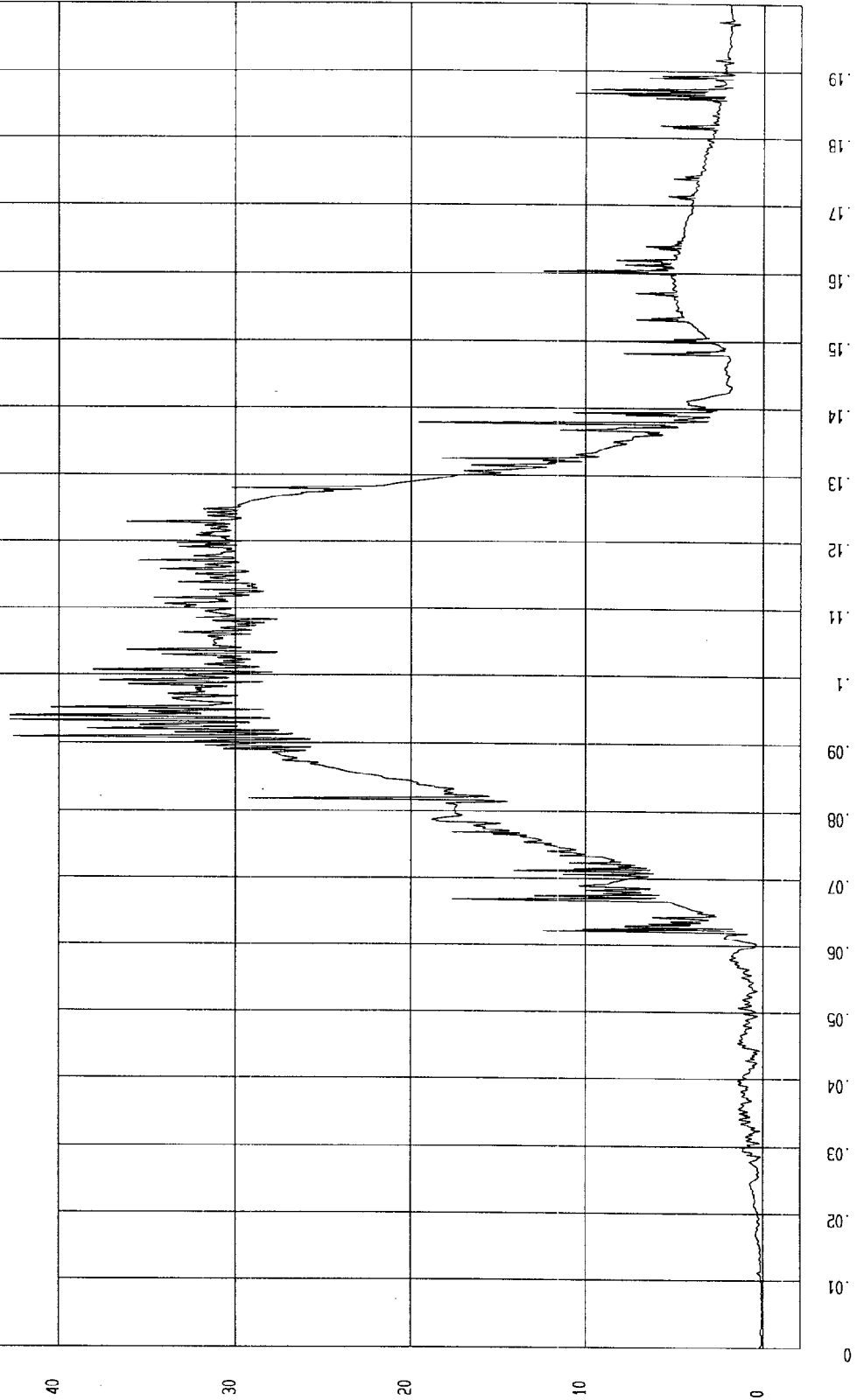
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 1.193095E-02 G'S at 4.5 msec

YMAX= 42.76808 G'S at 93. msec

DRIVER HEAD RESULTANT ACCELERATION

1 H98056AV.A06 Filterclass (1000)



MSA Research
02-19-1998 14.15

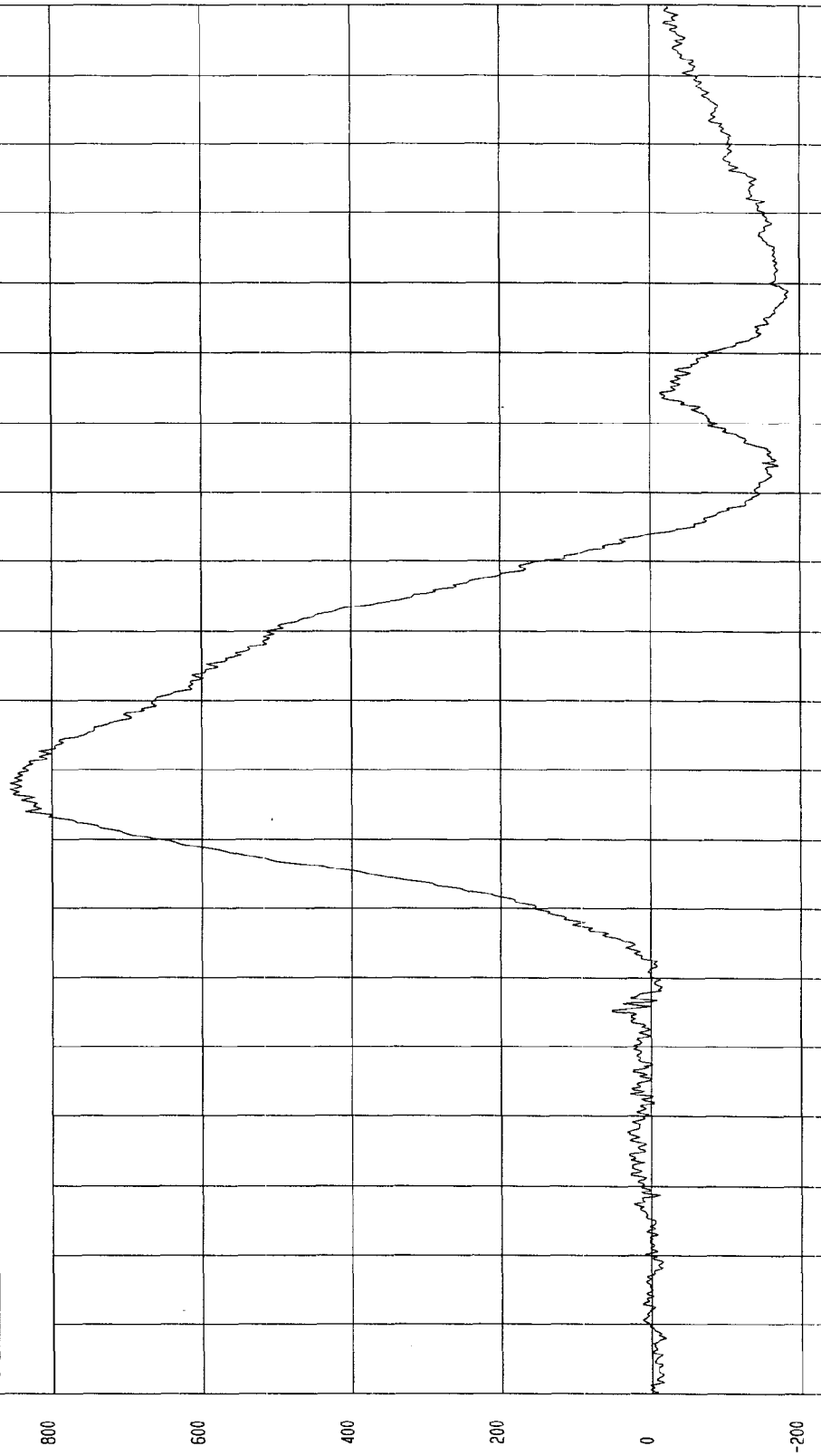
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-184.9074 N at 158 msec YMAX= 854.7357 N at 87. msec

DRIVER NECK FORCE X

1 H98056FF.F21 Filterclass (1000)



TIME (SECONDS)

MGA Research
02-19-1998 14.00

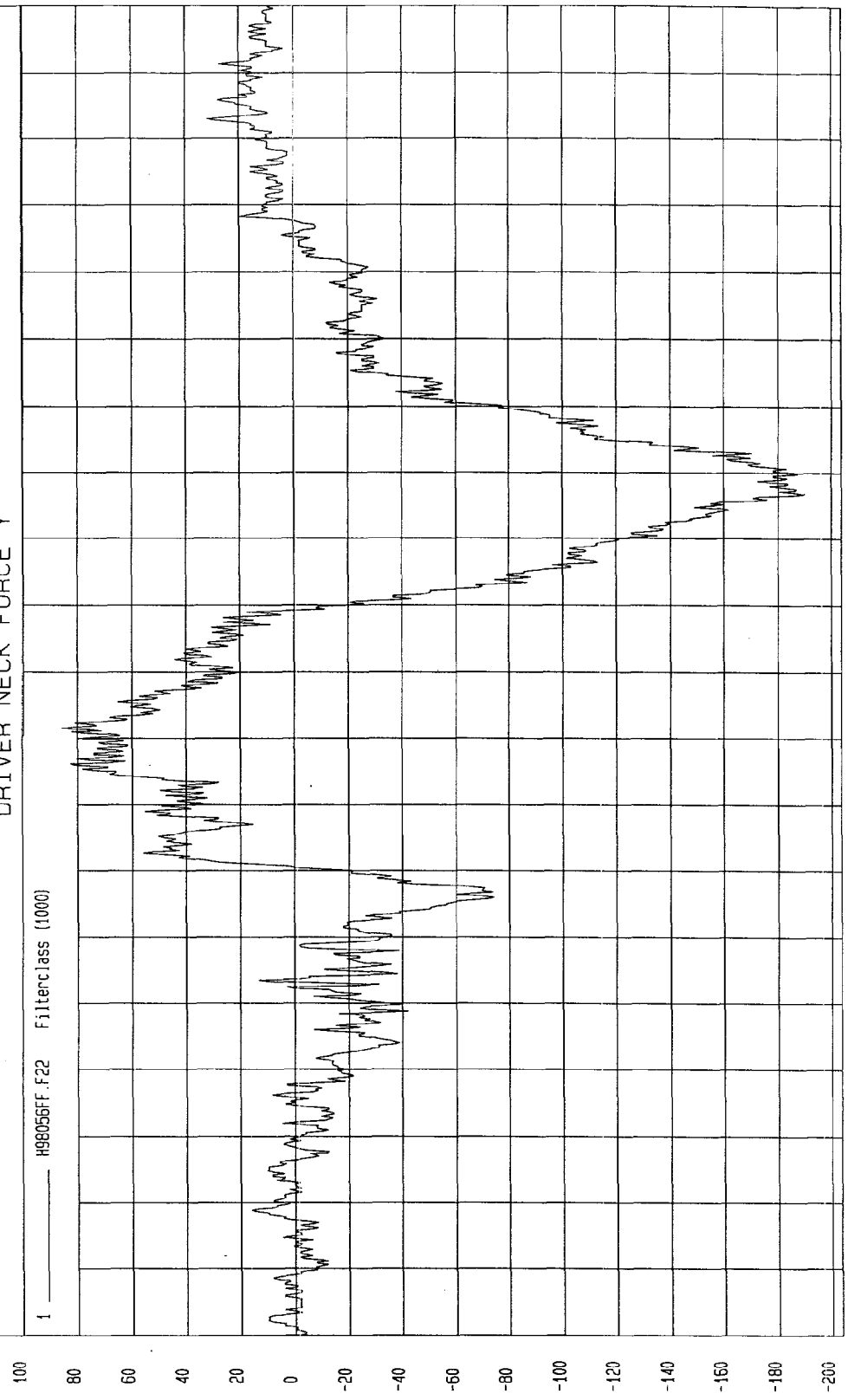
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-189.8298 N at 126 msec YMAX= 86.56519 N at 91. msec

DRIVER NECK FORCE Y

1 H98056FF.F22 Filterclass (1000)



MCA Research
02-19-1998 14:00

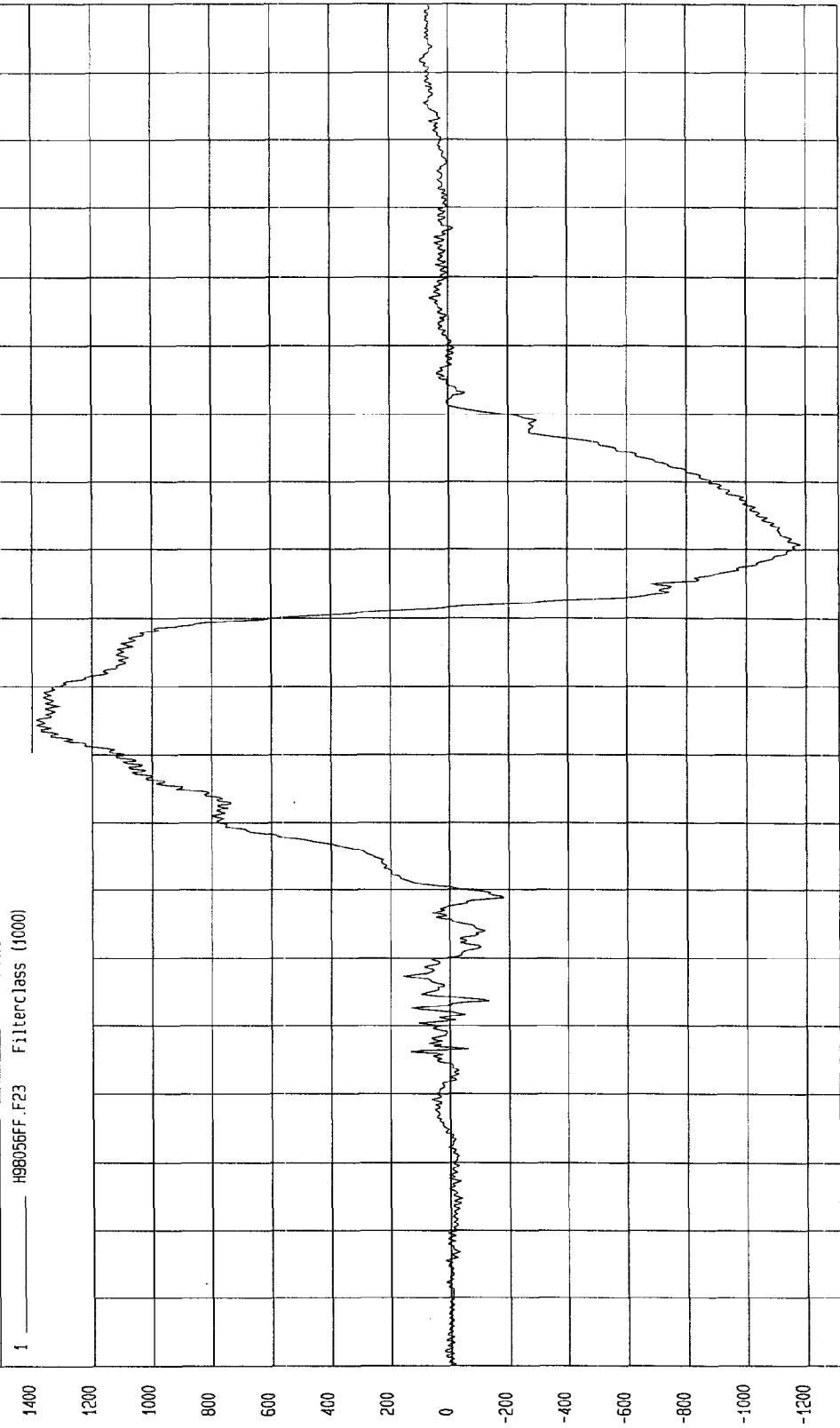
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1182.105 N at 120 msec YMAX= 1385.473 N at 94. msec

DRIVER NECK FORCE Z

1 H98056FF.F23 FilterClass (1000)



MGA Research
02-19-1998 14.01

TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-11.7132 NM at 74 msec YMAX= 6.883093 NM at 130 msec

DRIVER NECK MOMENT X

1 H98056MF.M24 Filterclass (500)

6
4
2
0
-2
-4
-6
-8
-10
-12

NM

0 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

TIME (SECONDS)

MCA Research
02-19-1998 14:01

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

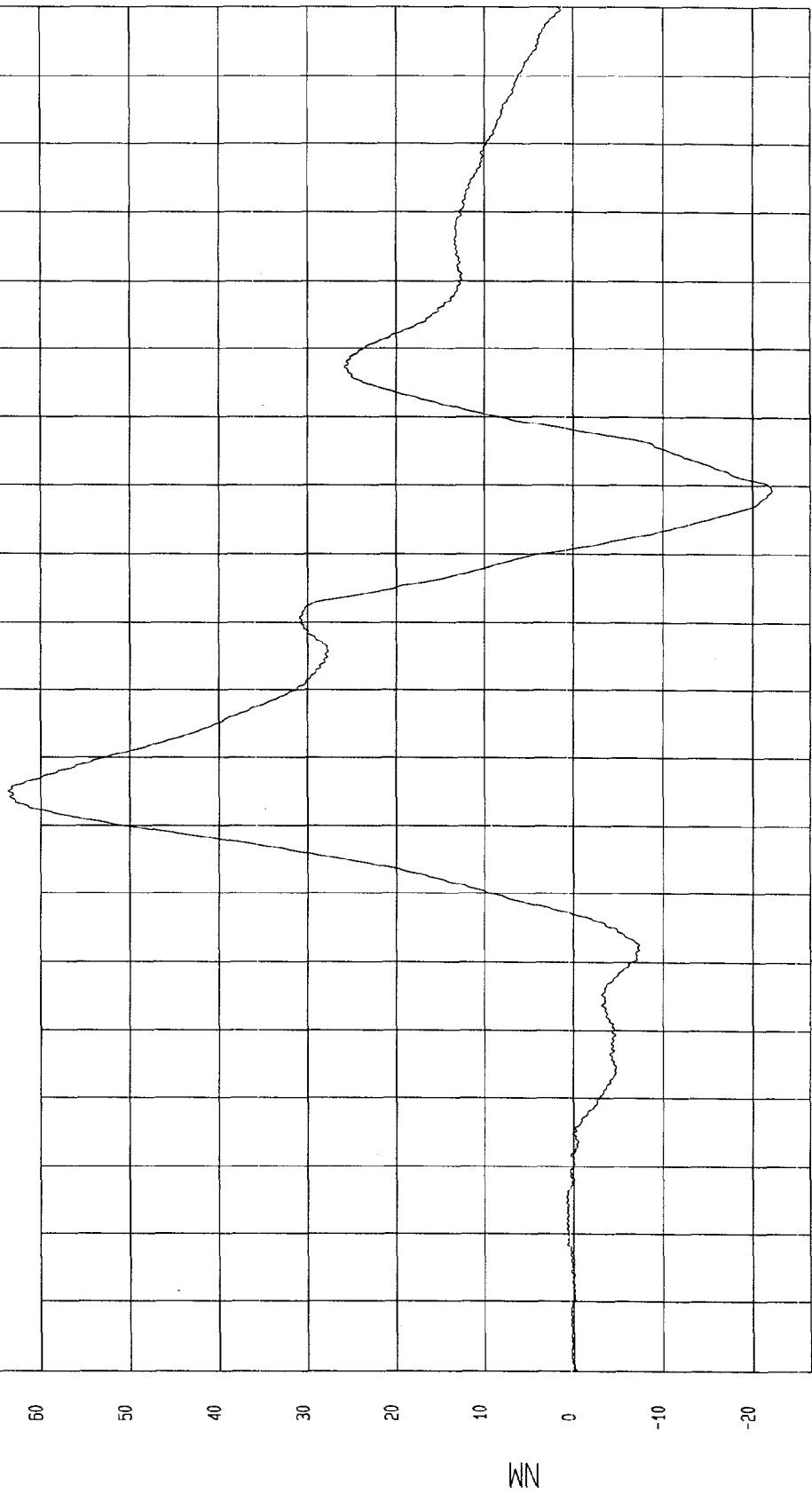
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-22.14952 NM at 129 msec

YMAX= 63.56929 NM at 84. msec

DRIVER NECK MOMENT Y

1 H9805GMF.M25 Filterclass (600)



MGA Research
02-19-1998 14.01

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

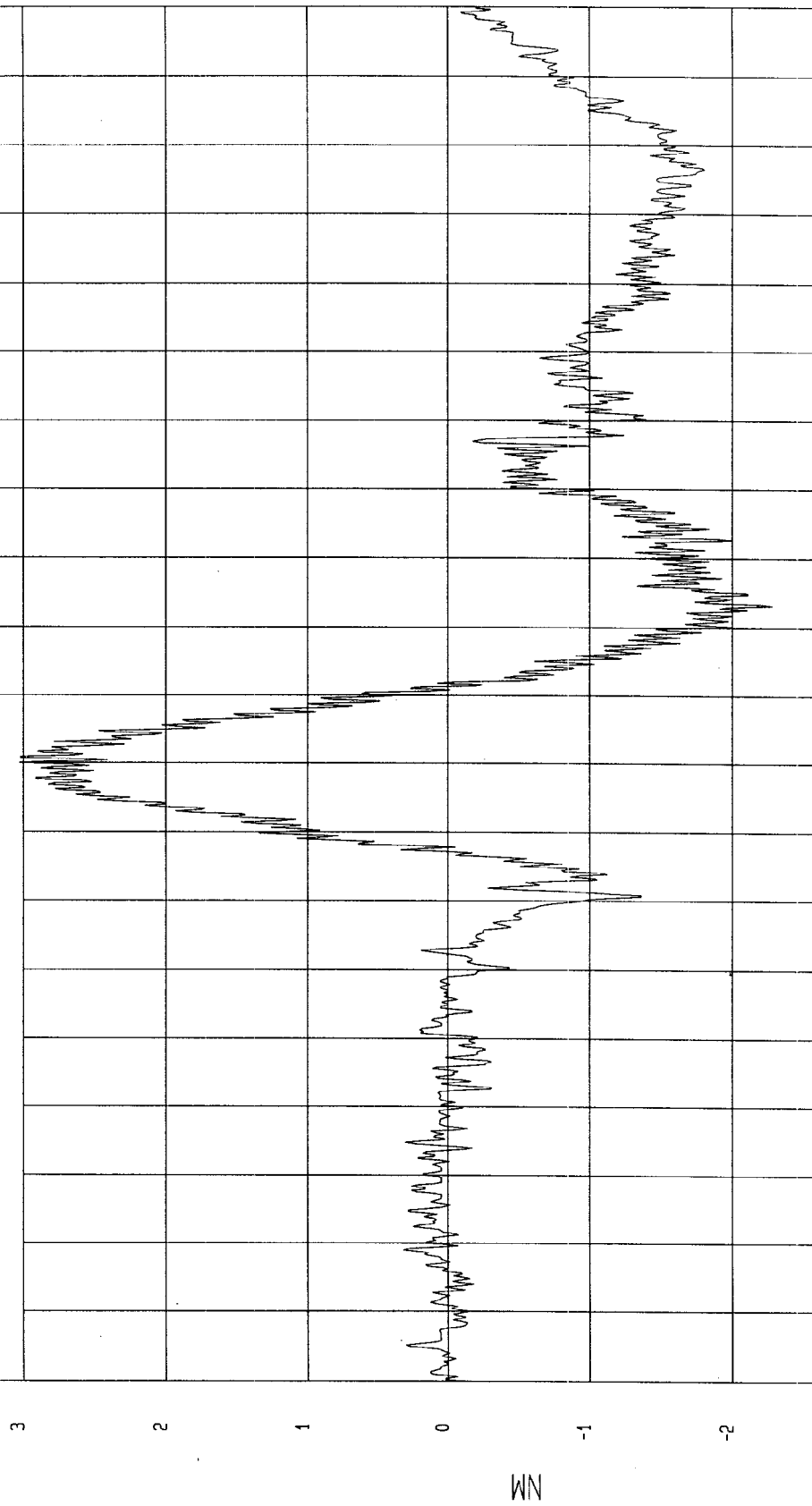
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-2.318223 NM at 113 msec YMAX= 3.105577 NM at 90 msec

DRIVER NECK MOMENT Z

1 H98056MF M26 Filterclass (600)



MCA Research
02-19-1998 14:01

TEST: FMVSS 208 SLED TEST

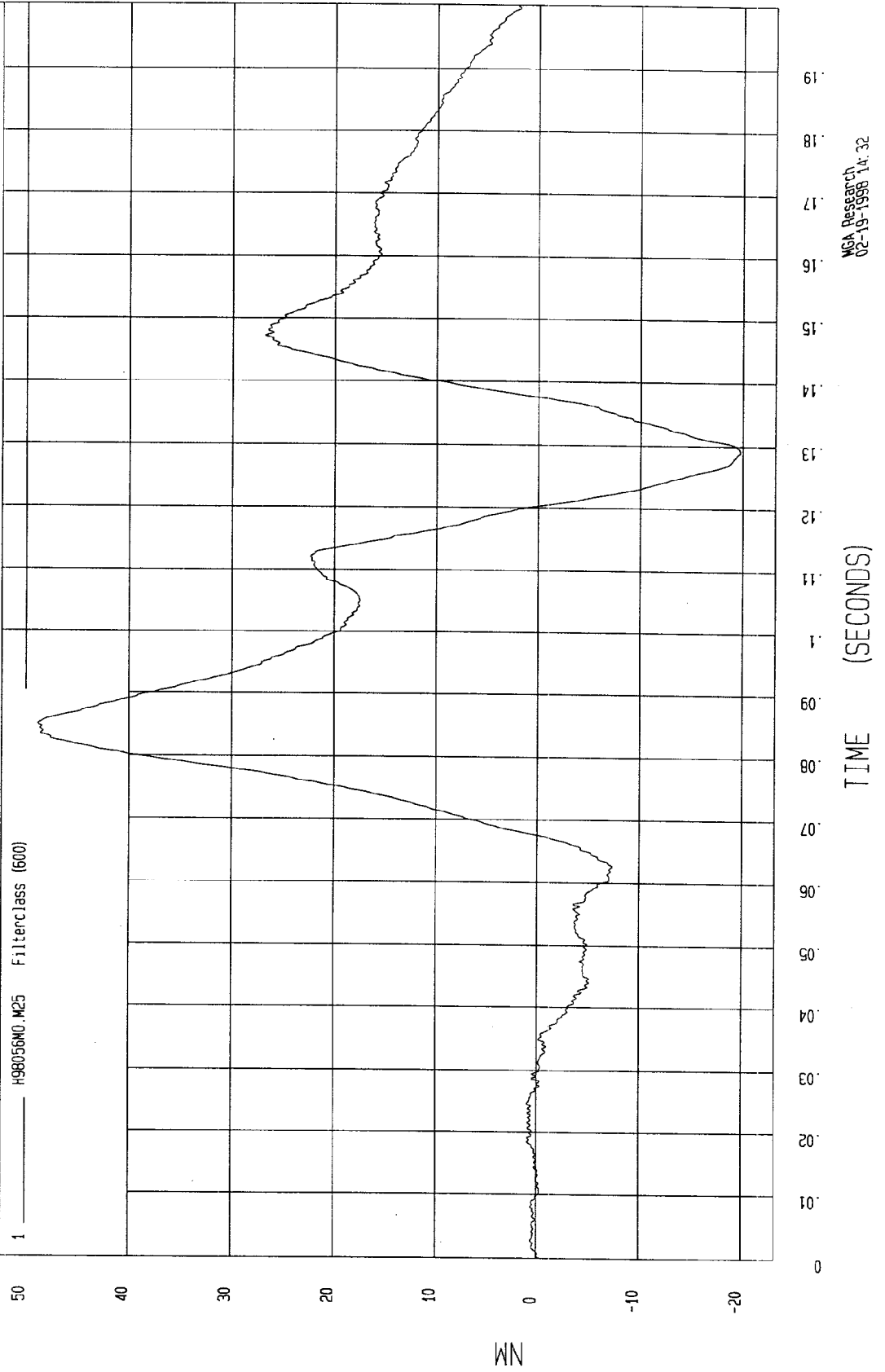
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-19.76761 NM at 129 msec

YMAX= 48.90808 NM at 85 msec

DRIVER OCCIPITAL CONDYLE MOMENT Y



TEST: FMVSS 208 SLED TEST

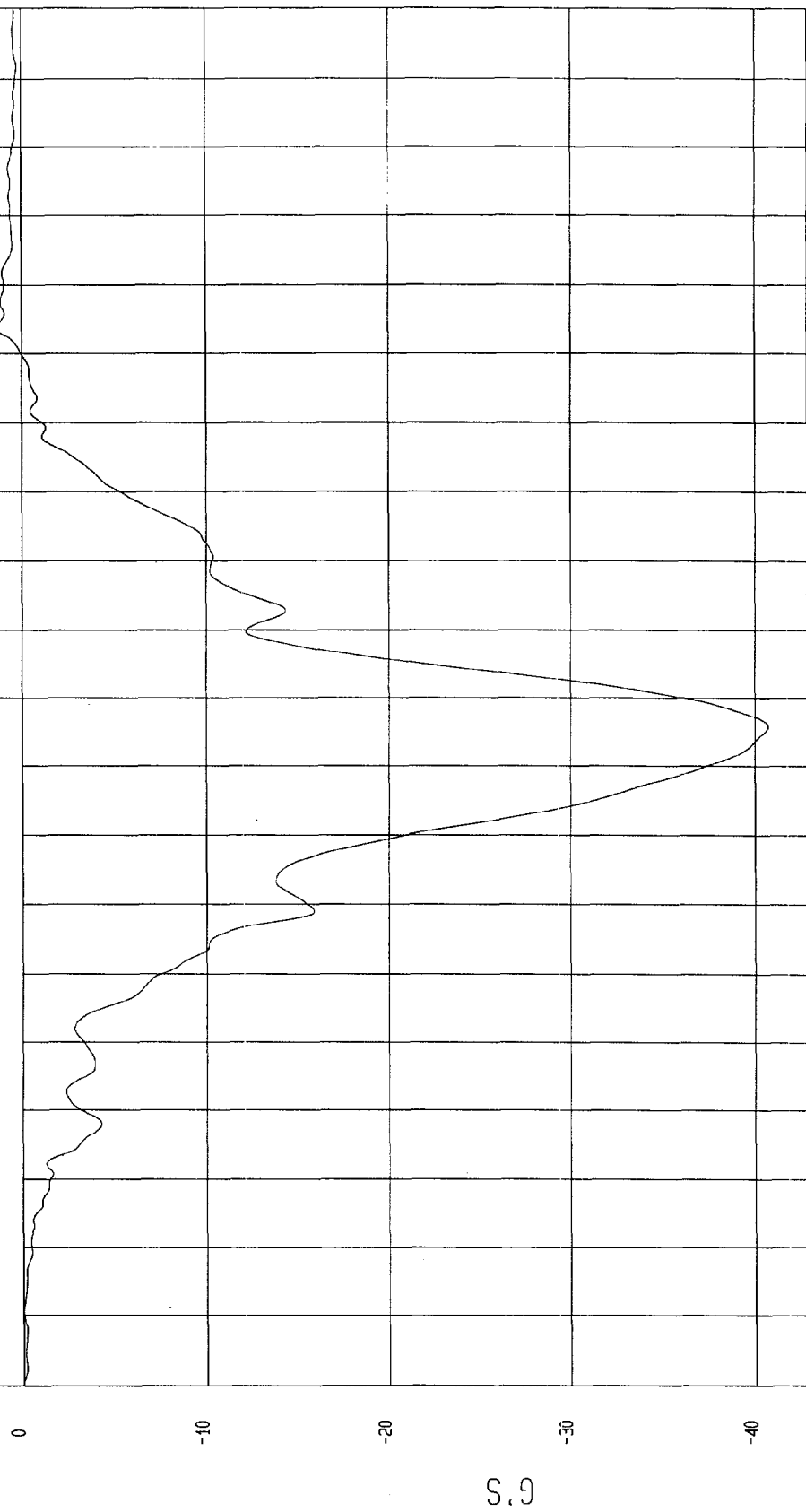
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-40.71405 G'S at 95. msec YMAX= 1.456131 G'S at 153 msec

DRIVER CHEST X ACCELERATION

1 H98056AF.A12 Filterclass (180)



NSA Research
02-19-1998 14:02

TIME (SECONDS)

G.S

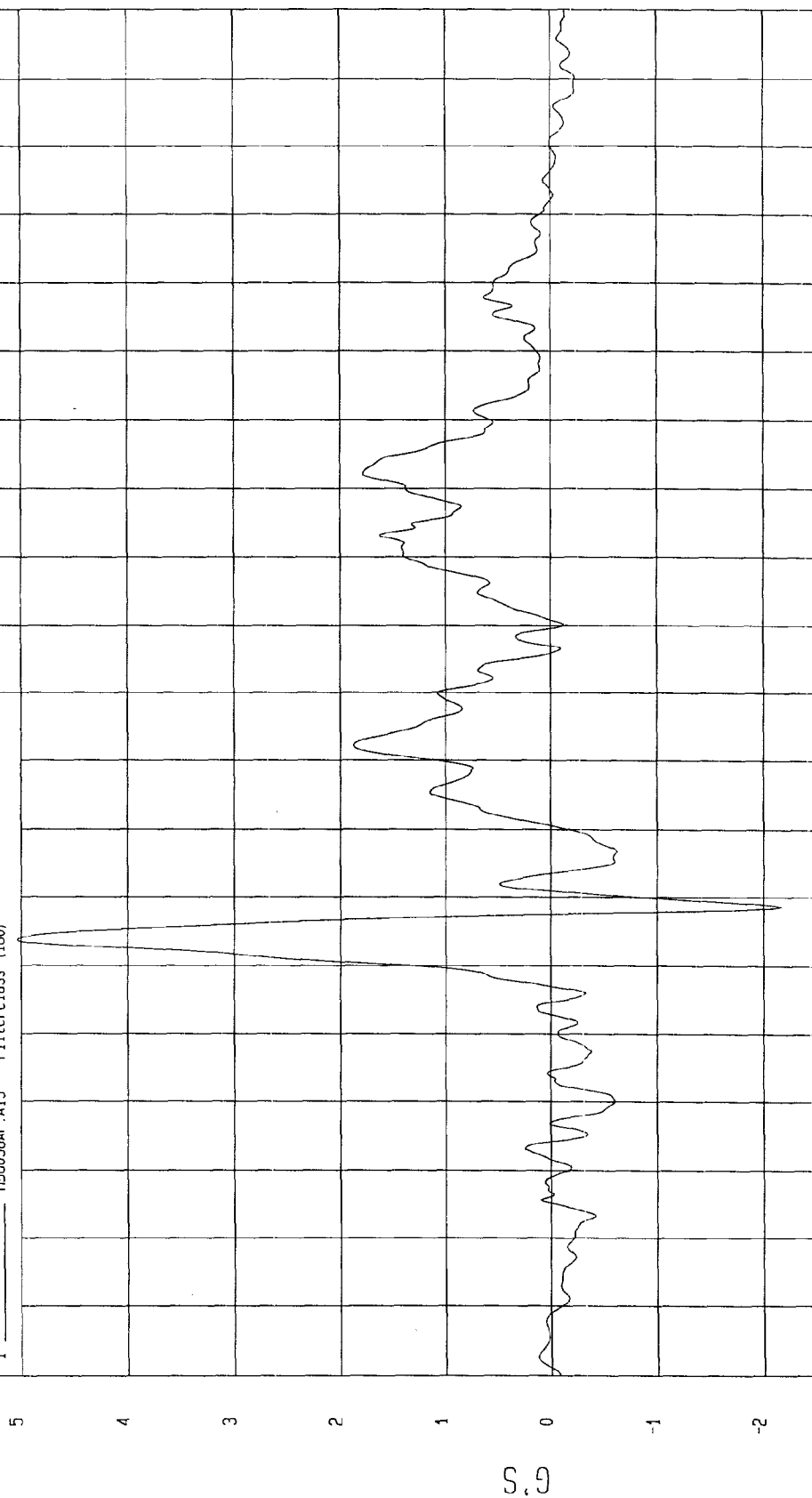
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-2.171537 G'S at 68. msec YMAX= 5.039058 G'S at 63. msec

DRIVER CHEST Y ACCELERATION

1 H98056AF.A13 Filterclass (180)



MSA Research
02-19-1998 14:02

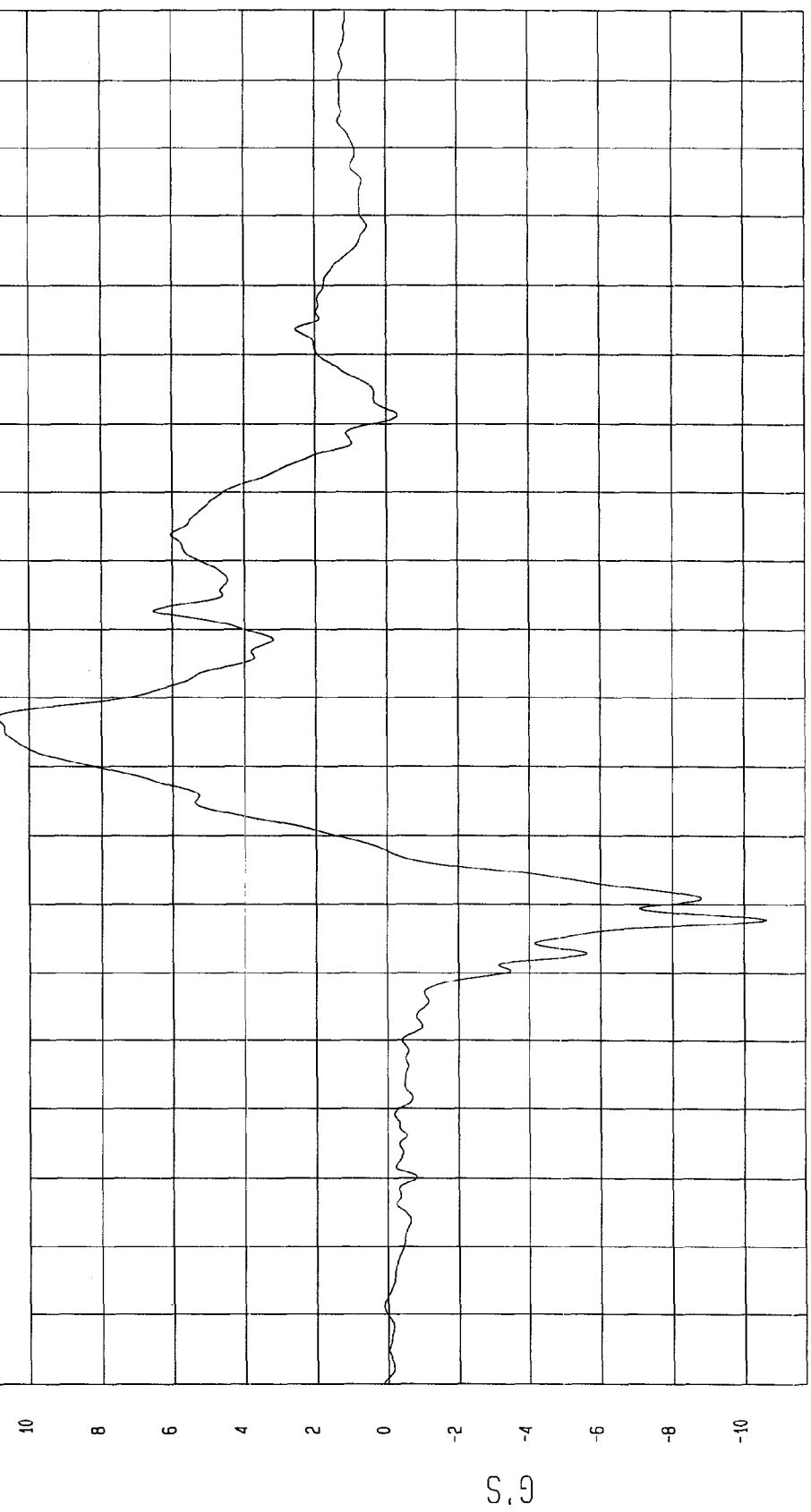
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-10.62183 G'S at 67. msec YMAX= 10.90913 G'S at 97. msec

DRIVER CHEST Z ACCELERATION

1 H98056AF.A14 Filterclass (180)



19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
TIME (SECONDS)
NSA Research
02-19-1998 14.03

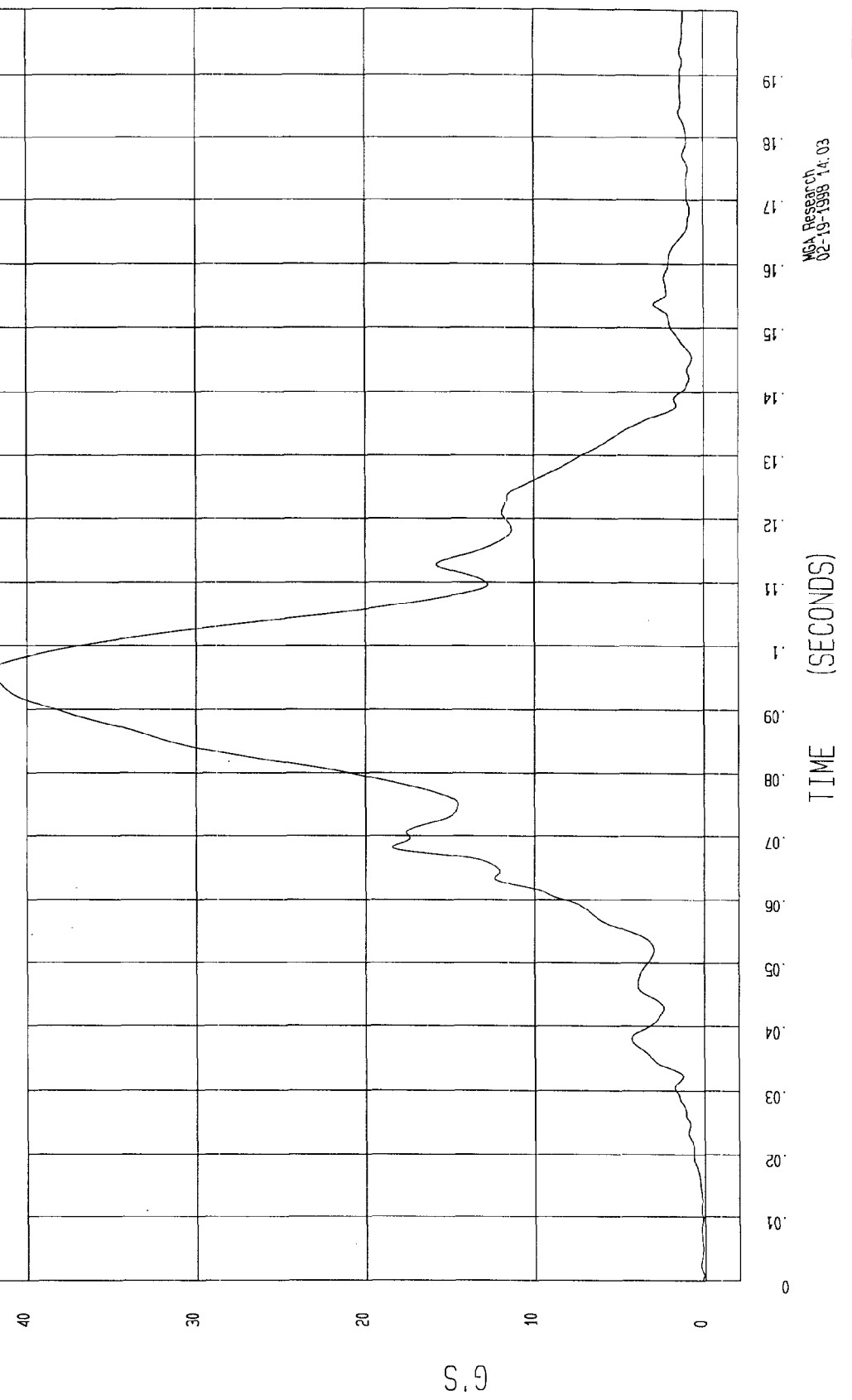
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 5.705573E-02 G'S at .9 msec YMAX= 42.10995 G'S at 95. msec

DRIVER CHEST RESULTANT ACCELERATION

1 H98056AV.A12 Filterclass (180)



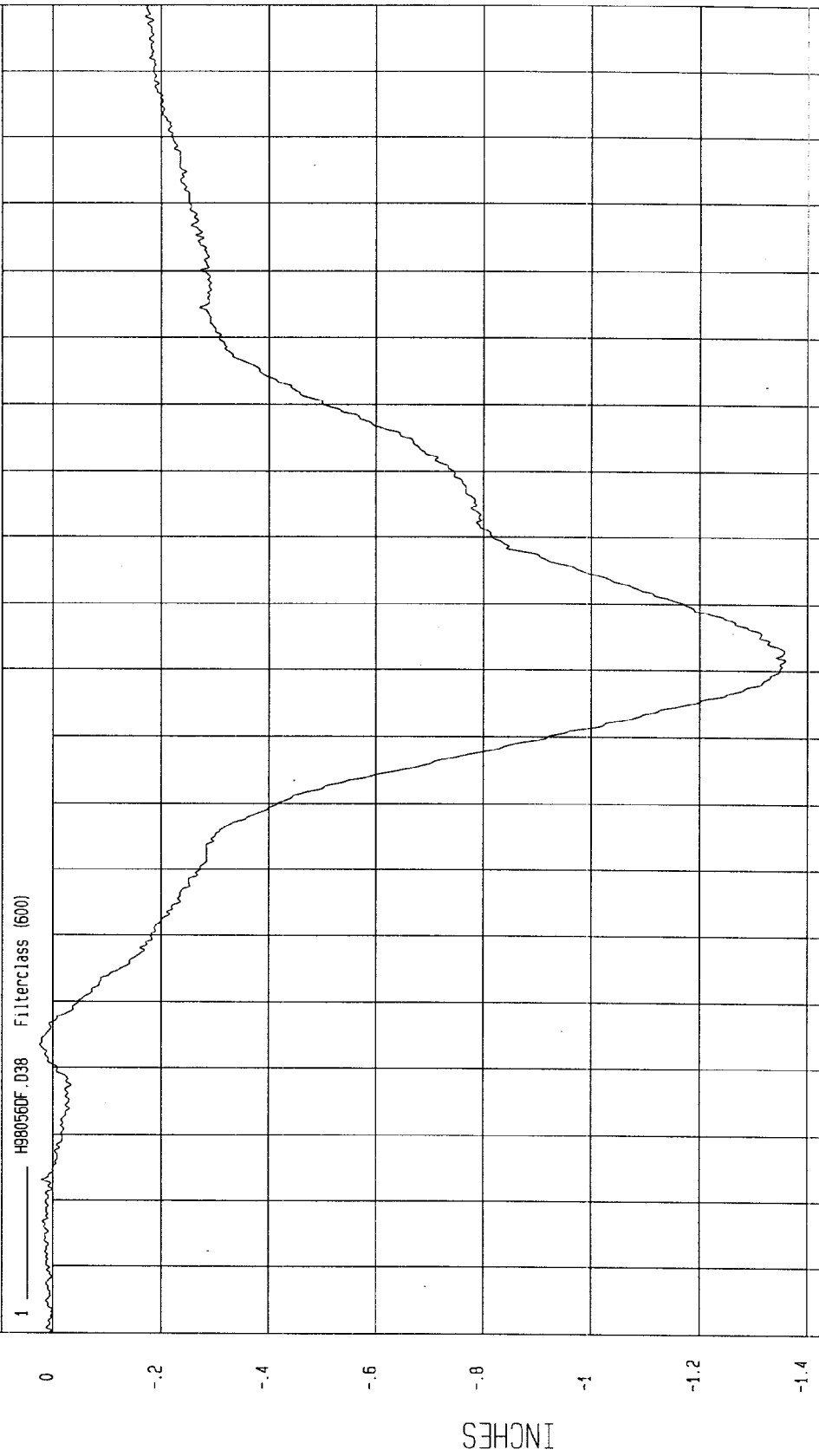
NSA Research
02-19-1998 14.03

TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1.35832 INCHES at 101 msec YMAX= 2.340098E-02 INCHES at 43. msec

DRIVER CHEST COMPRESSION



TIME SECONDS
MGA Research
05-07-1998 08:19

TEST: FMVSS 208 SLED TEST

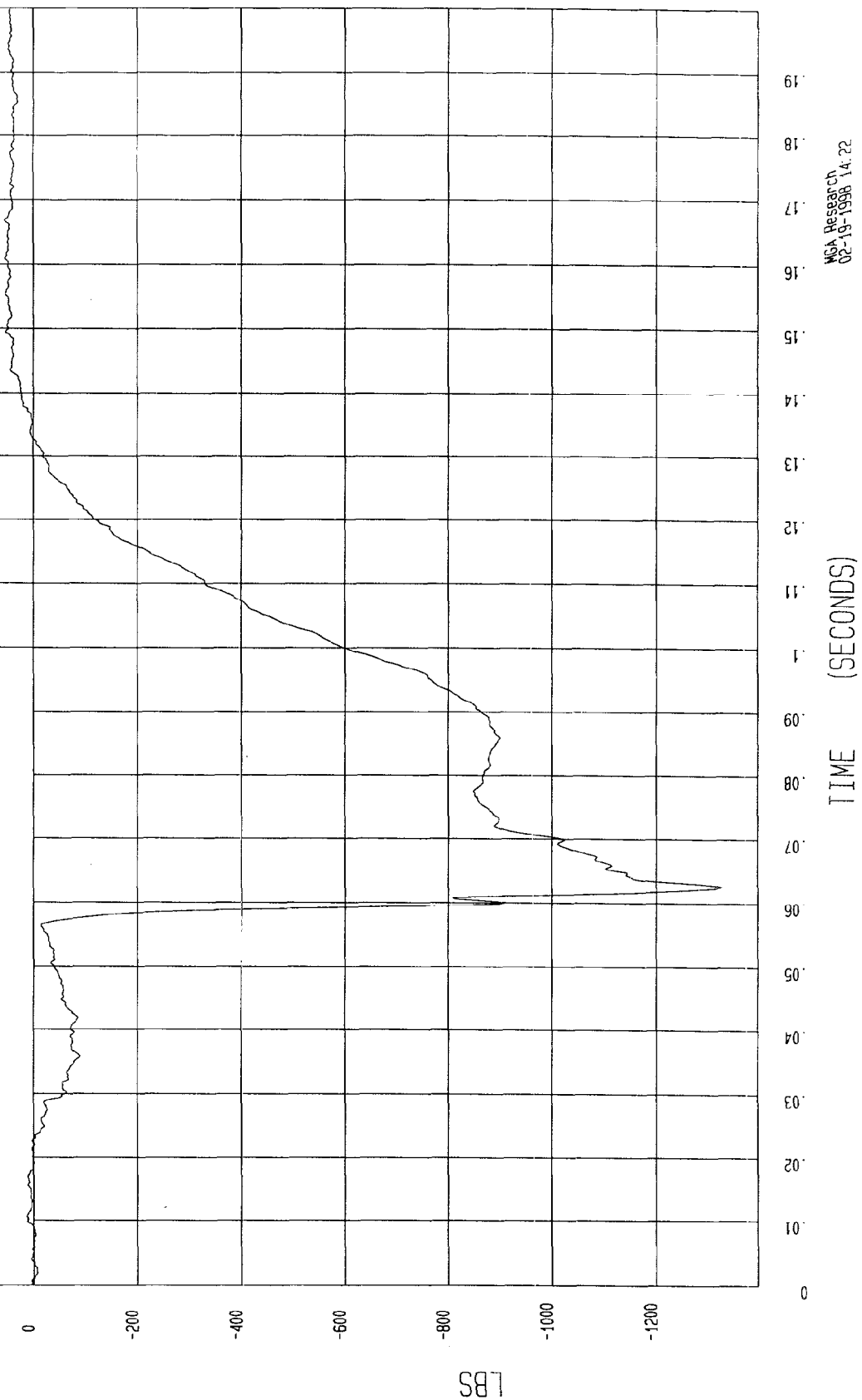
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1325.459 LBS at 62. msec YMAX= 54.78276 LBS at 161 msec

DRIVER LEFT FEMUR FORCE

1 H98056FF.F15 Filterclass (600)



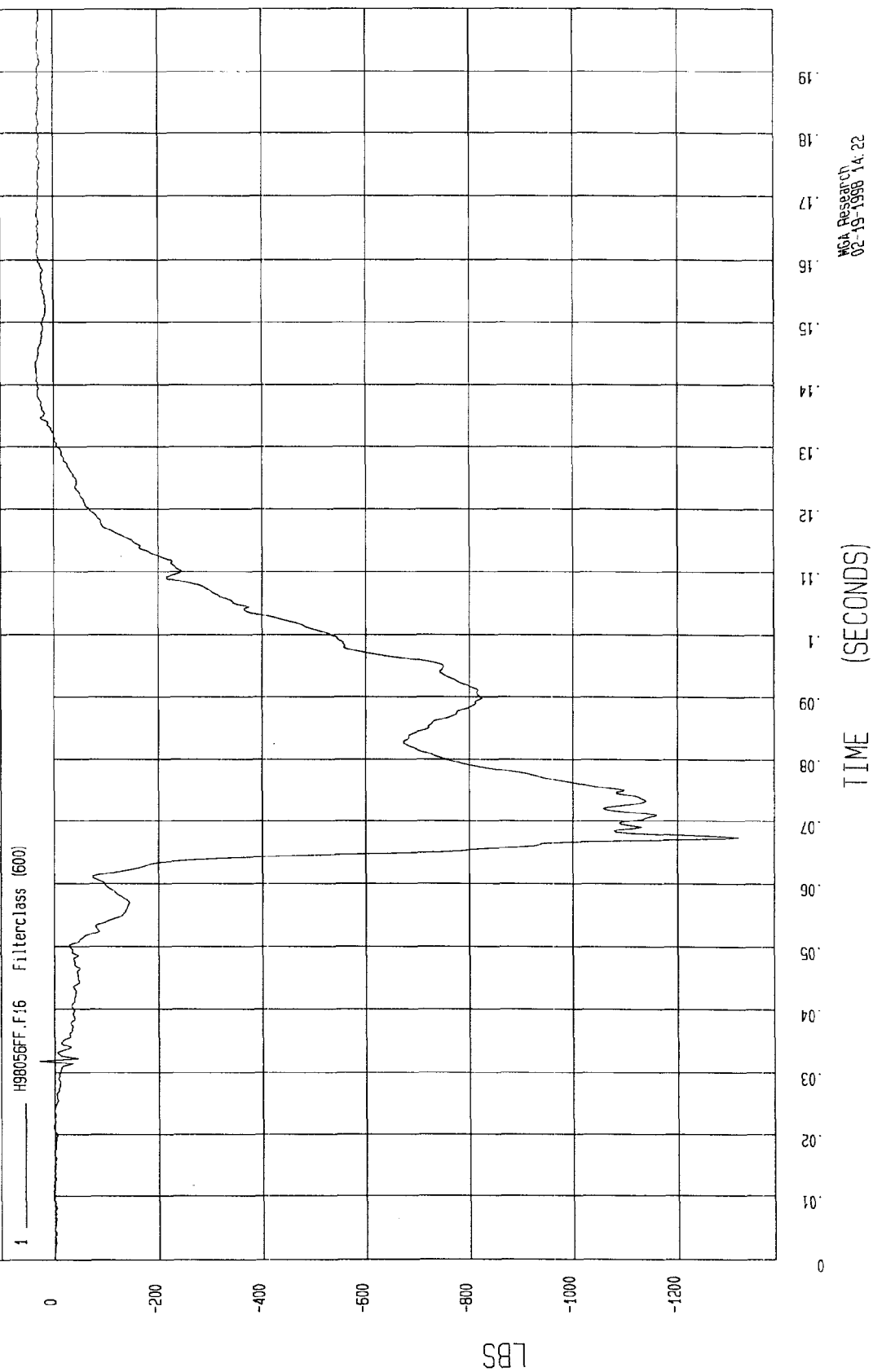
TEST DATE: 02-19-1998

TEST: FMVSS 208 SLED TEST

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1316.707 LBS at 67. msec YMAX= 34.15498 LBS at 143 msec

DRIVER RIGHT FEMUR FORCE



TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=51.66508 G'S at 99. msec YMAX= 3.549518 G'S at 129 msec

PASSENGER HEAD X ACCELERATION

1 ——— H98056AF.A27 Filterclass (1000)



MCA Research
02-19-1998 14:04

TIME (SECONDS)

G.S

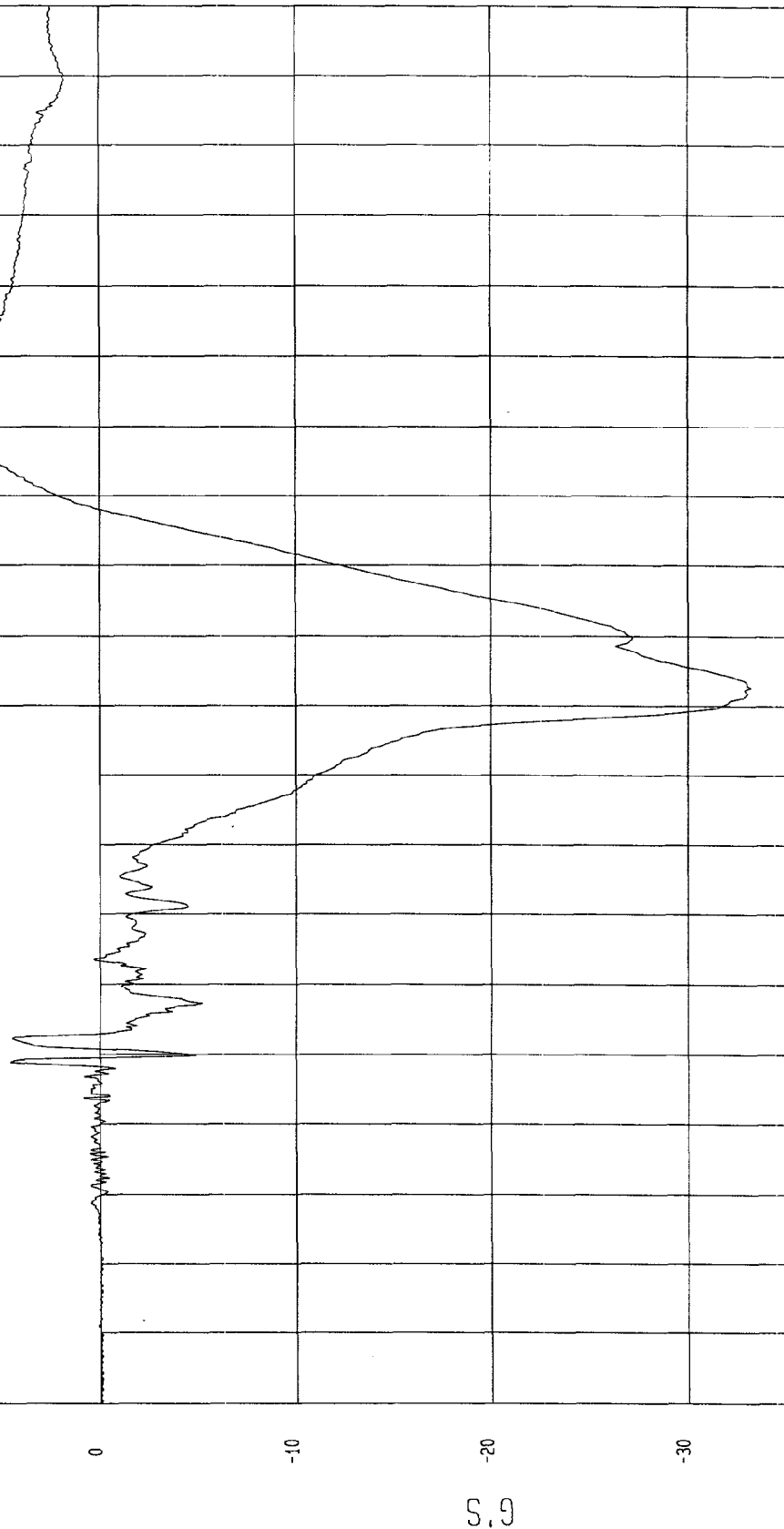
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-33.23833 G'S at 102 msec YMAX= 6.66703 G'S at 140 msec

PASSENGER HEAD Y ACCELERATION

1 H98056AF.A28 Filterclass (1000)



MGA Research
02-19-1998 14.04

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-12.1959 G'S at 122 msec

YMAX= 19.02446 G'S at 98. msec

PASSENGER HEAD Z ACCELERATION

1 H98056AF A29 Filterclass (1000)

20

18

16

14

12

10

8

6

4

2

0

-2

-4

-6

-8

-10

-12

G.S.

0

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

TIME (SECONDS)

WCA Research
02-19-1998 14:04

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

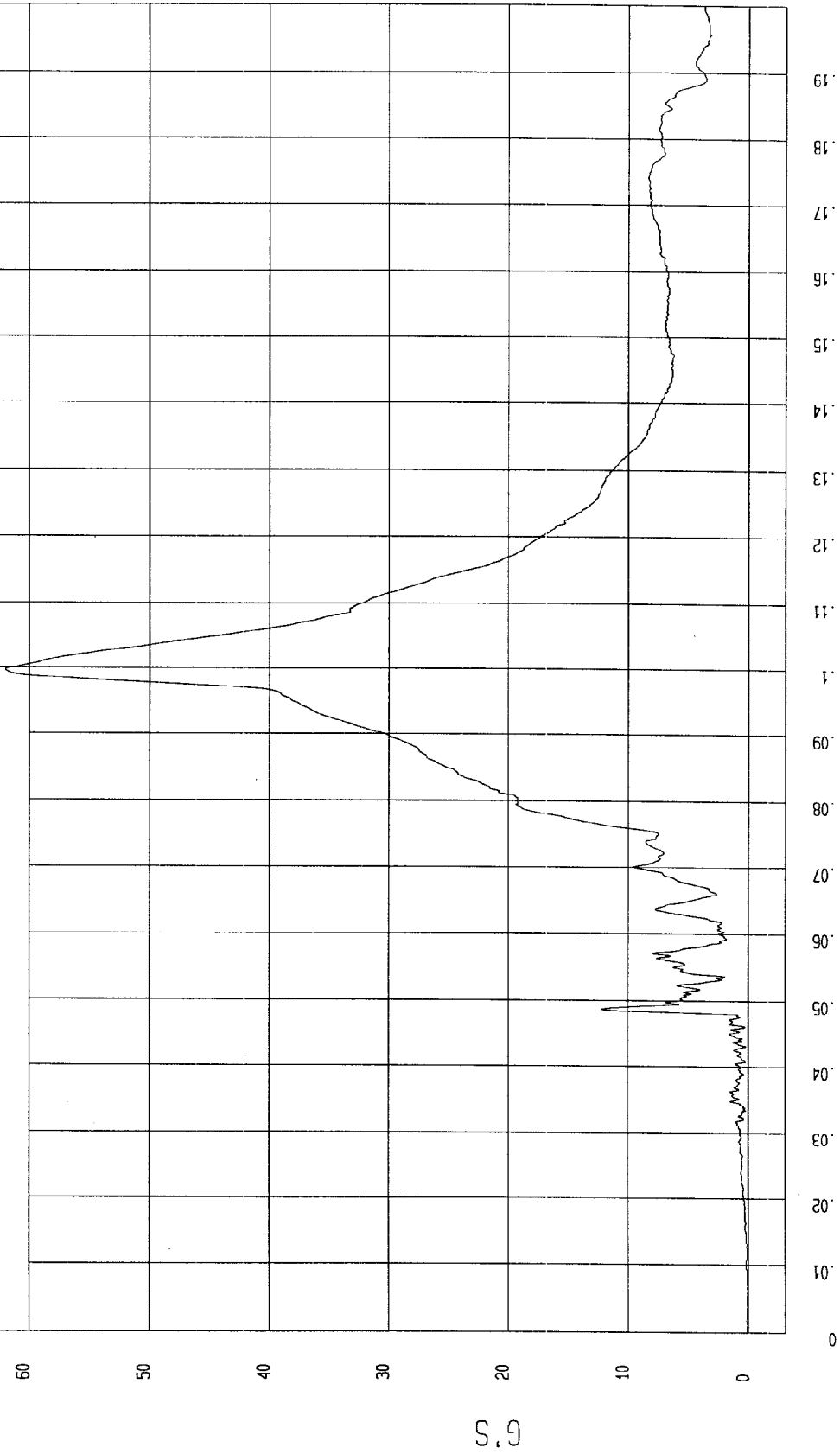
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 3.539916E-02 G'S at 5.6 msec

YMAX= 62.00854 G'S at 99. msec

PASSENGER HEAD RESULTANT ACCELERATION

1 _____ H98056AV.A27 Filterclass (1000)



MGA Research
02-19-1998 14:05

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-207.1913 N at 184 msec

YMAX= 1196.472 N at 101 msec

PASSENGER NECK FORCE X

1 ——— H98056FF.F31 Filterclass (1000)

1200
1000
800
600
400
200
0
-200

N

TIME (SECONDS)

WEA Research
02-19-1998 14:05

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

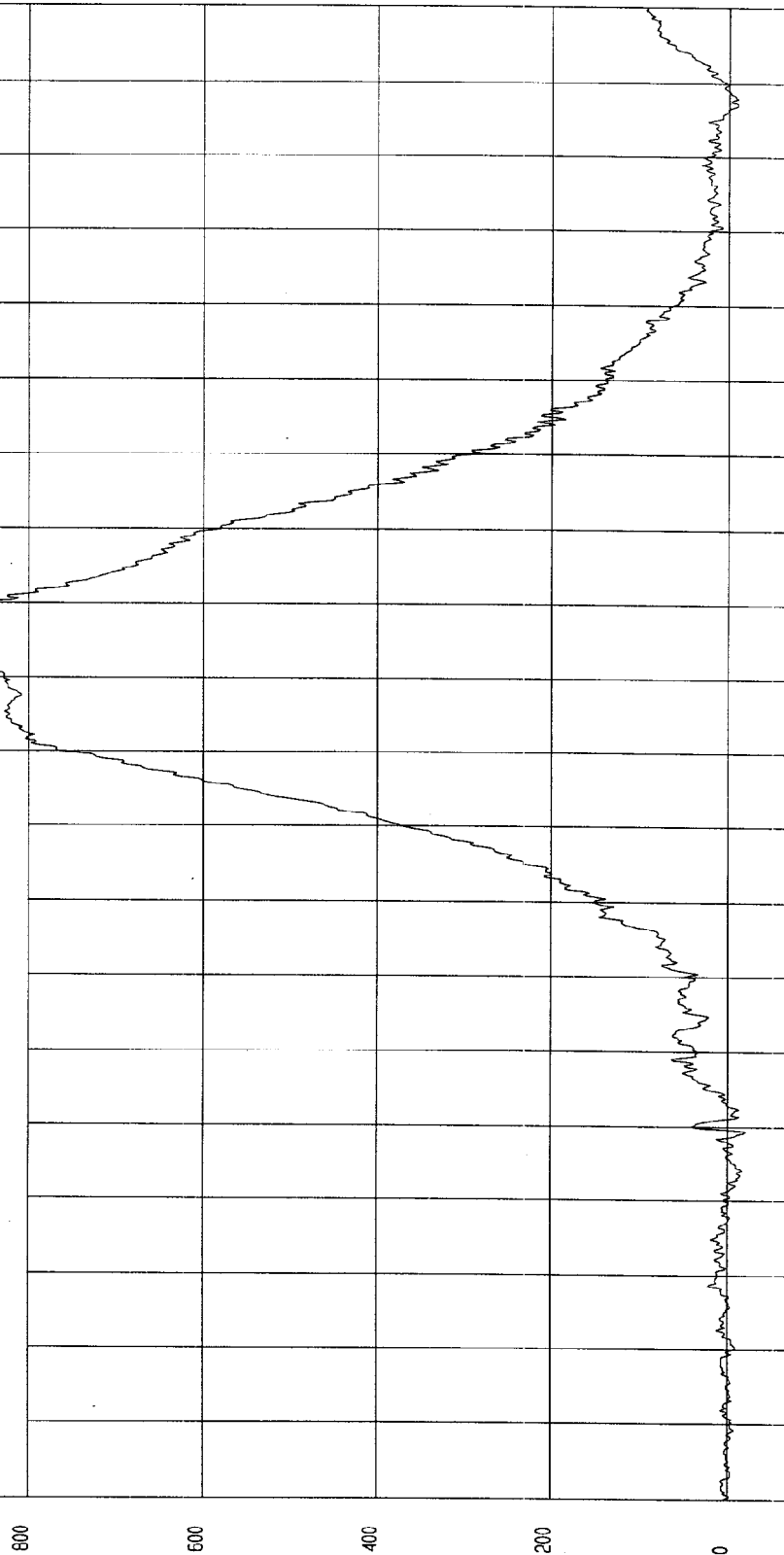
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-21.85631 N at 49. msec

YMAX= 934.1138 N at 116 msec

PASSENGER NECK FORCE Y

1 H98056FF.F32 Filterclass (1000)



WGA Research
02-19-1998 14:05

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

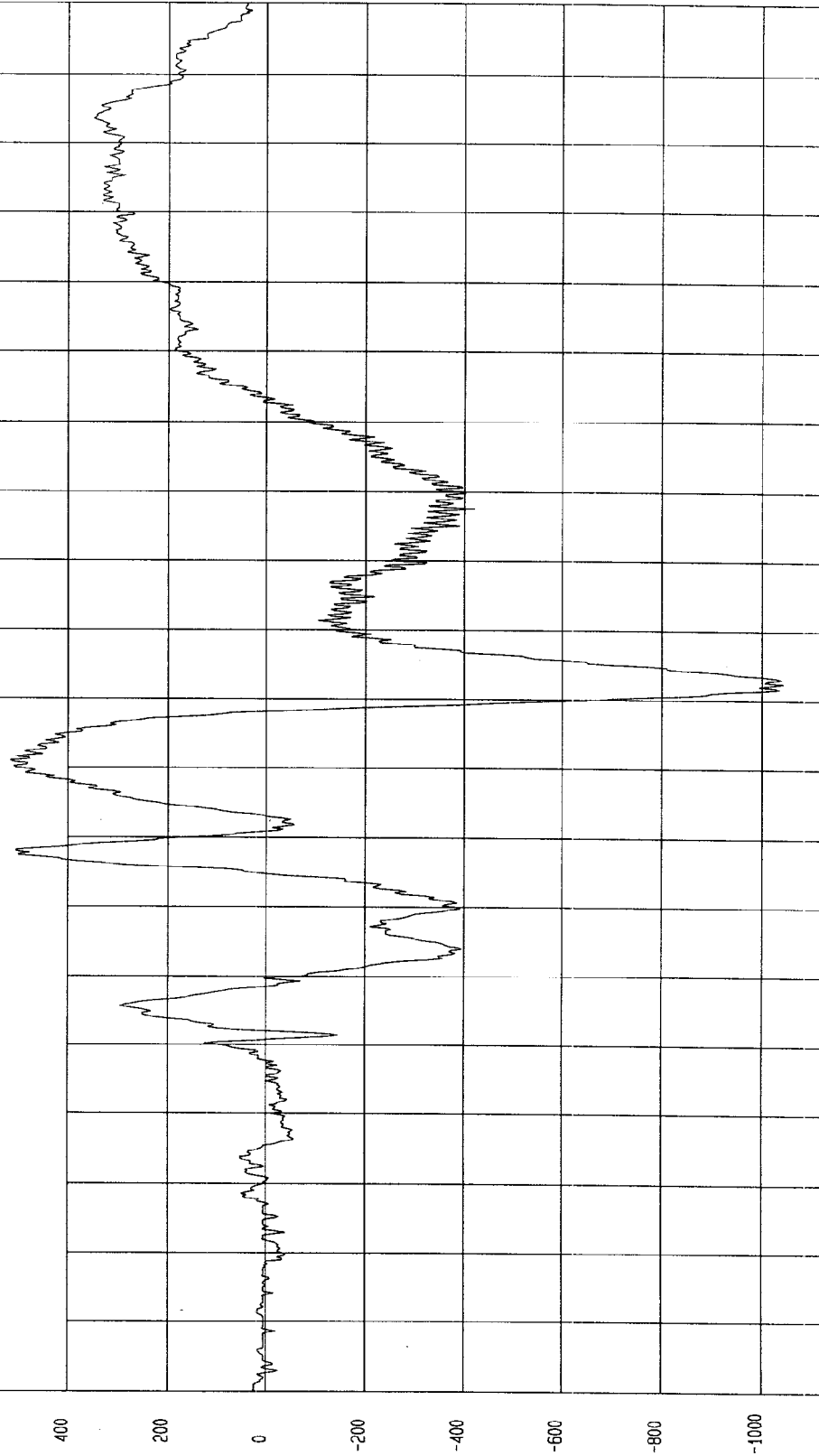
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1043.798 N at 102 msec

YMAX= 520.3492 N at 90. msec

PASSENGER NECK FORCE Z

1 ——— H98056FF.F33 Filterclass (1000)



WCA Research
02-19-1998 14:05

TIME (SECONDS)

N

TEST: FMVSS 208 SLED TEST

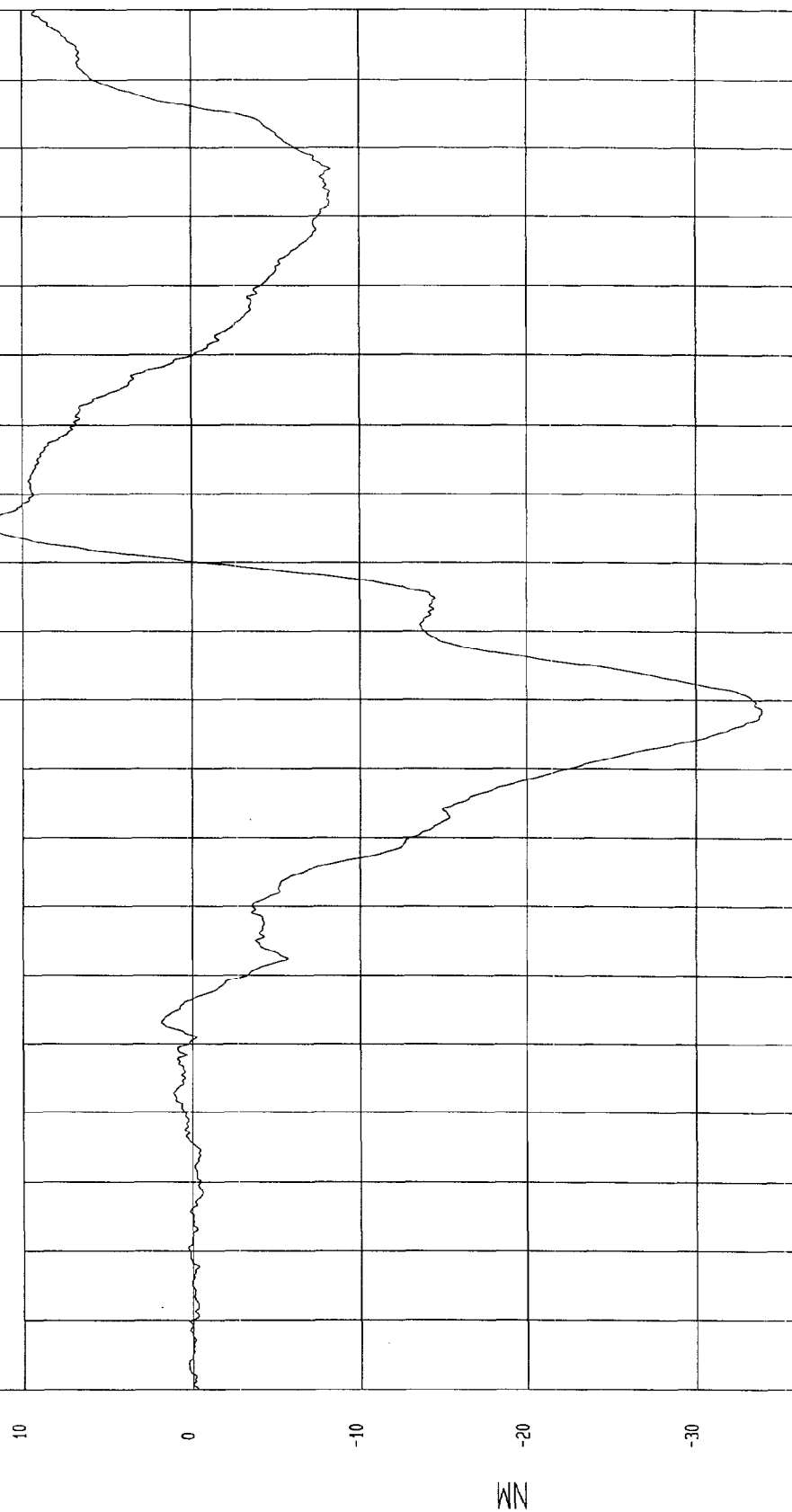
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-33.9411 NM at 98. msec YMAX= 12.09836 NM at 125 msec

PASSENGER NECK MOMENT X

1 ——— H98056MF.M34 Filterclass (600)



TIME (SECONDS)

MCA Research
02-19-1998 14.06

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-16.75826 NM at 161 msec

YMAX= 56.5081 NM at 97. msec

PASSENGER NECK MOMENT Y

1 H9805SHF M35 Filterclass (600)

60

50

40

30

20

10

0

-10

-20

NM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

MCA Research
02-19-1998 14.12

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

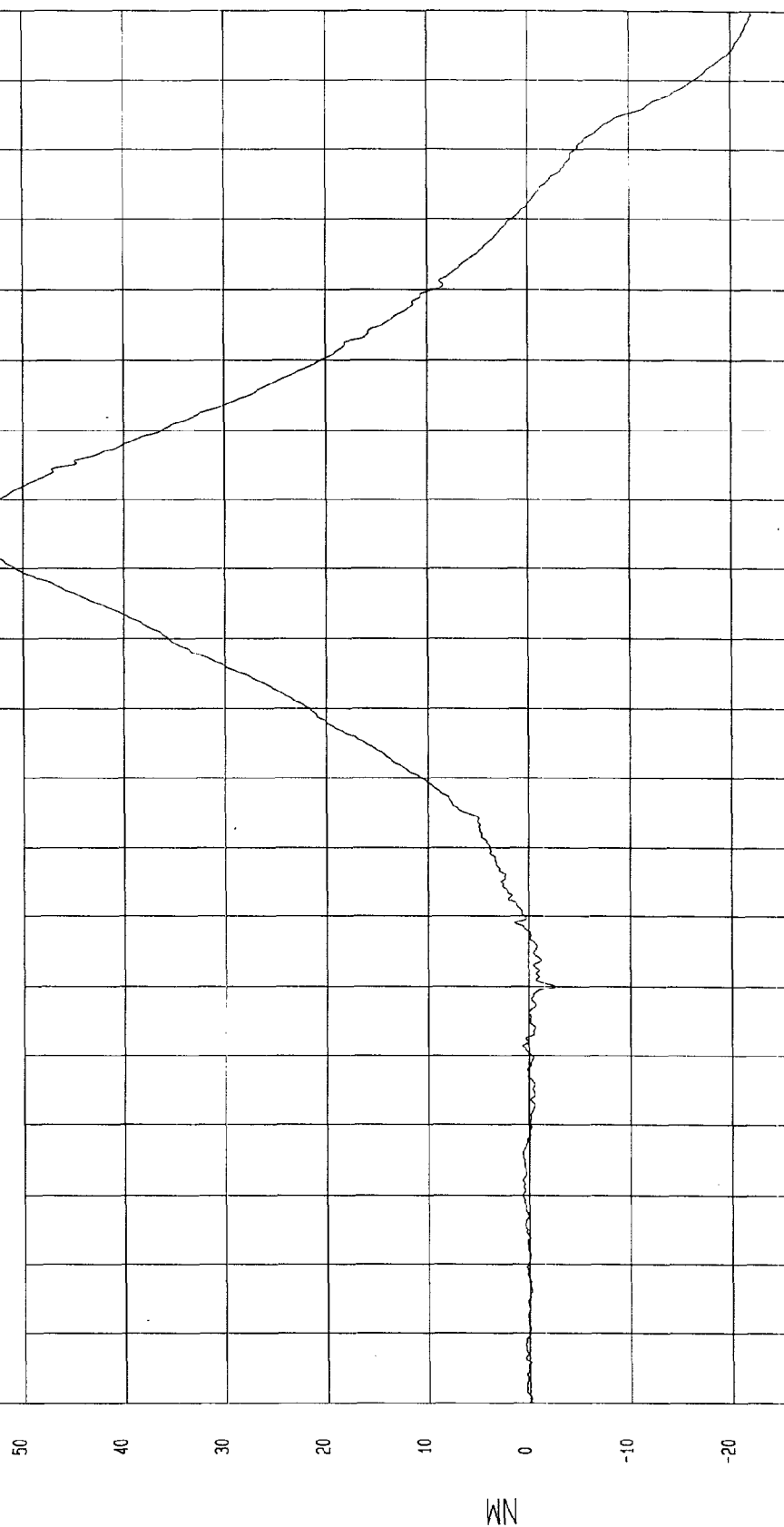
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-22.0486 NM at 199 msec

YMAX= 54.93799 NM at 125 msec

PASSENGER NECK MOMENT Z

1 H98056MF.M36 Filterclass (600)



MGA Research
02-19-1998 14:07

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

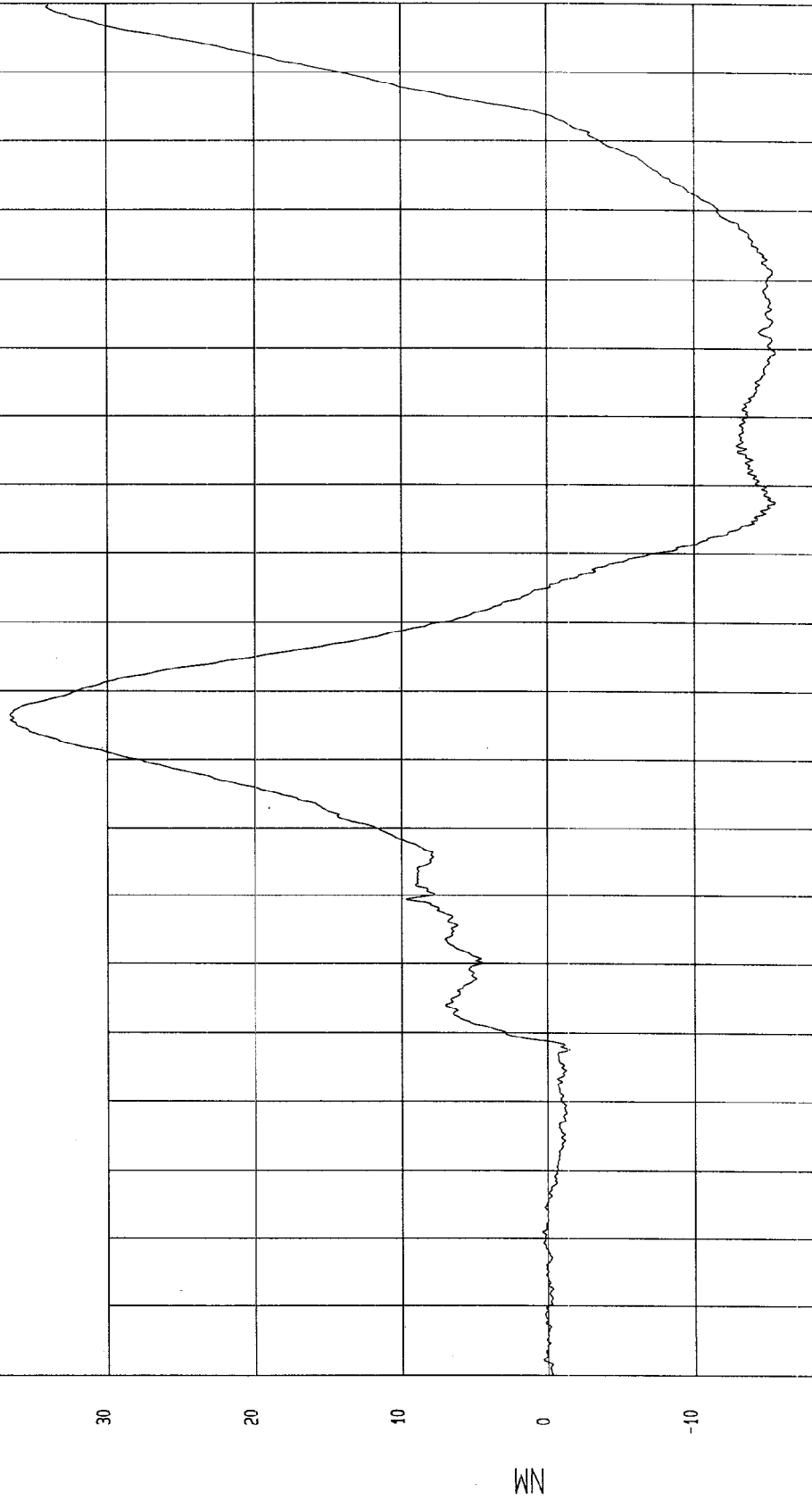
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-15.56792 NM at 127 msec

YMAX= 36.63601 NM at 96 msec

PASSENGER OCCIPITAL CONDYLE MOMENT Y

1 H98056M0.M35 Filterclass (600)



MGA Research
02-19-1998 14:32

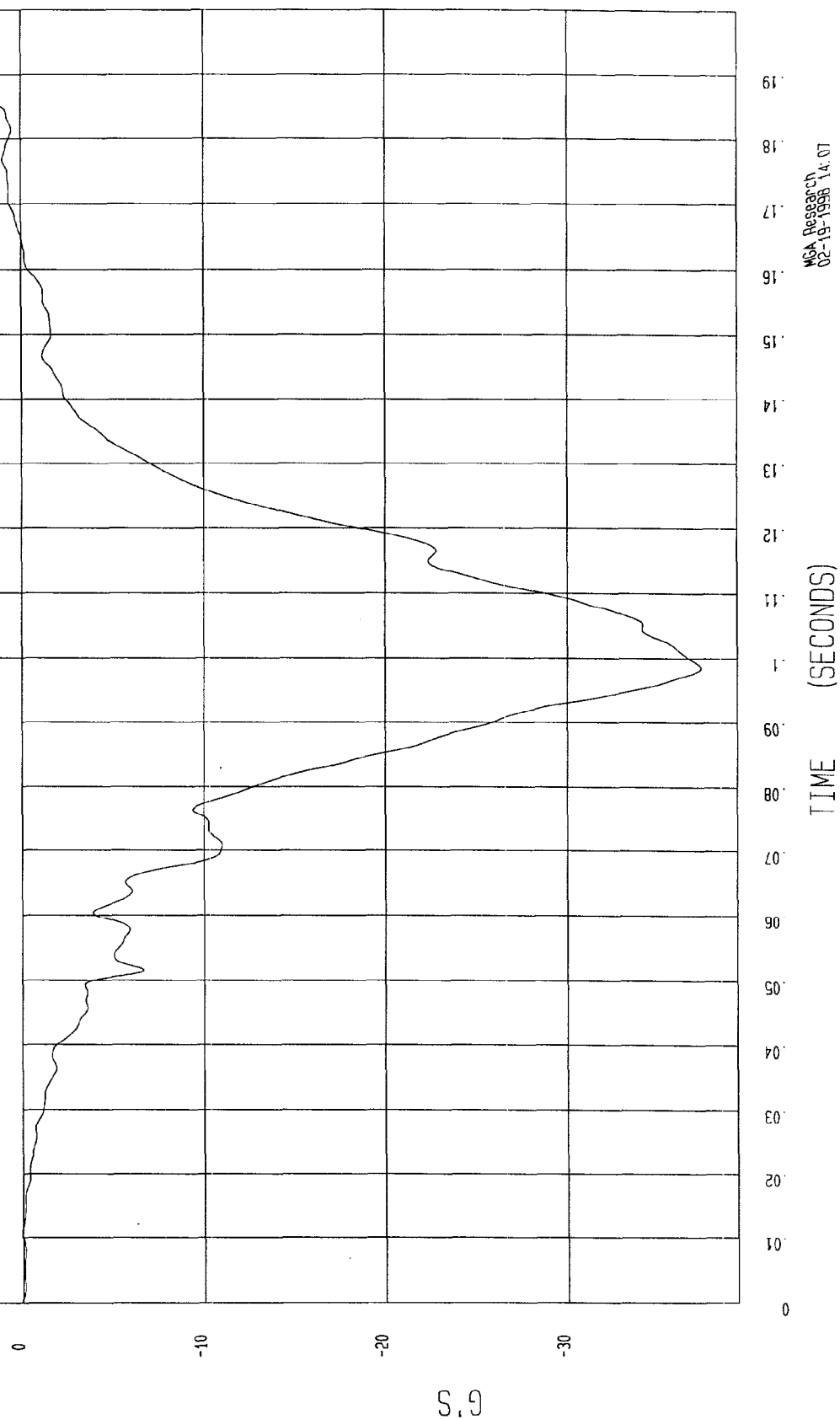
TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-37.37122 G'S at 98. msec YMAX= 2.486169 G'S at 193 msec

PASSENGER CHEST X ACCELERATION

1 H98056AF.A17 Filterclass (180)



MCA Research
02-19-1998 14.07

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-5.33447 G'S at 108 msec

YMAX= 2.003096 G'S at 70. msec

PASSENGER CHEST Y ACCELERATION

1 H98056AF.A42 Filterclass (180)

2

1

0

-1

-2

-3

-4

-5

G'S

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

WCA Research
02-19-1998 14:07

TEST DATE: 02-19-1998

TEST: FMVSS 208 SLED TEST

COMPONENT: 1998 TOYOTA CAMRY CW5103

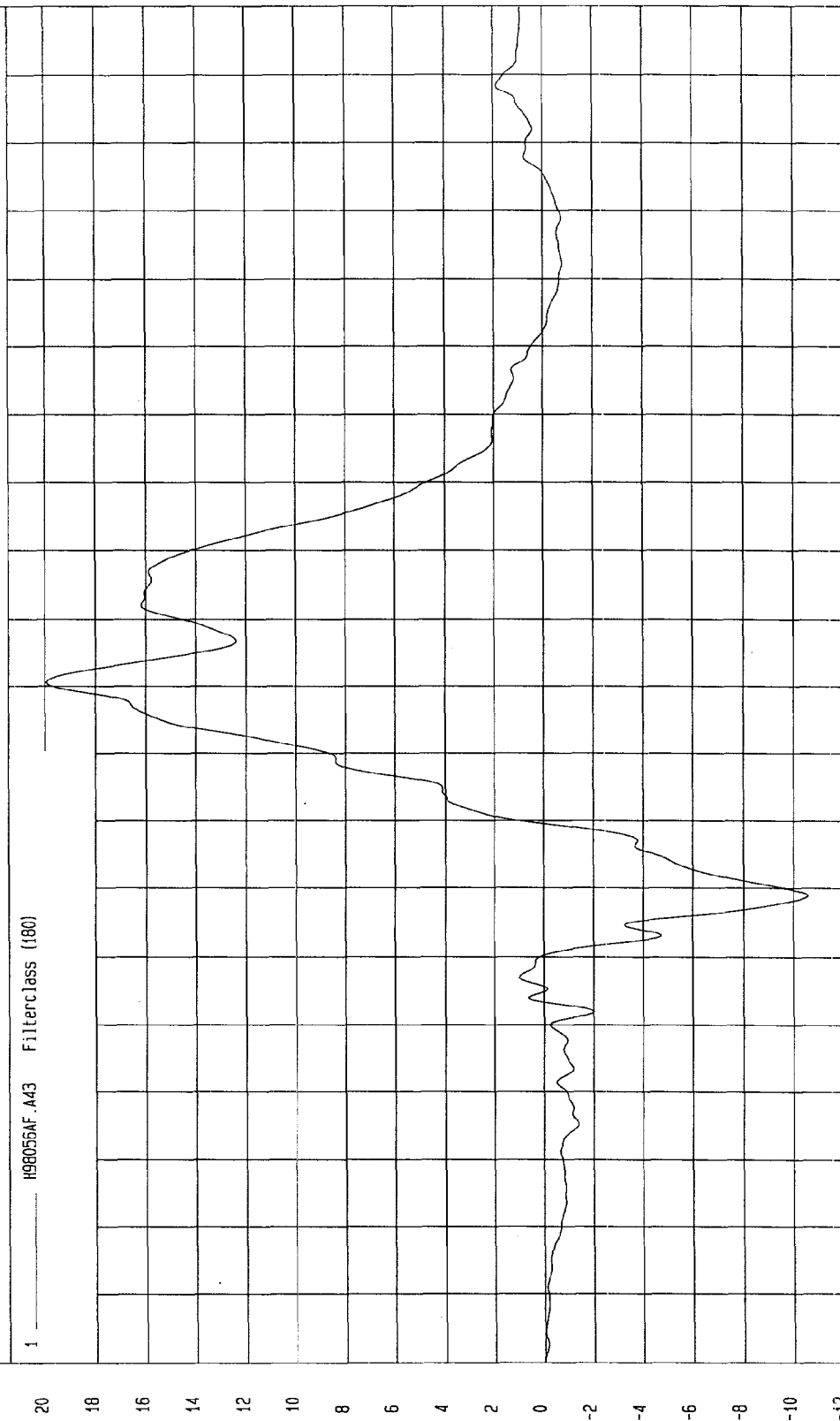
YMIN=-10.5702 G'S at 68. msec

YMAX= 19.93406 G'S at 100 msec

PASSENGER CHEST Z ACCELERATION

1 H98055AF.A43 Filterclass (180)

G.S



MGA Research
02-19-1998 14:08

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

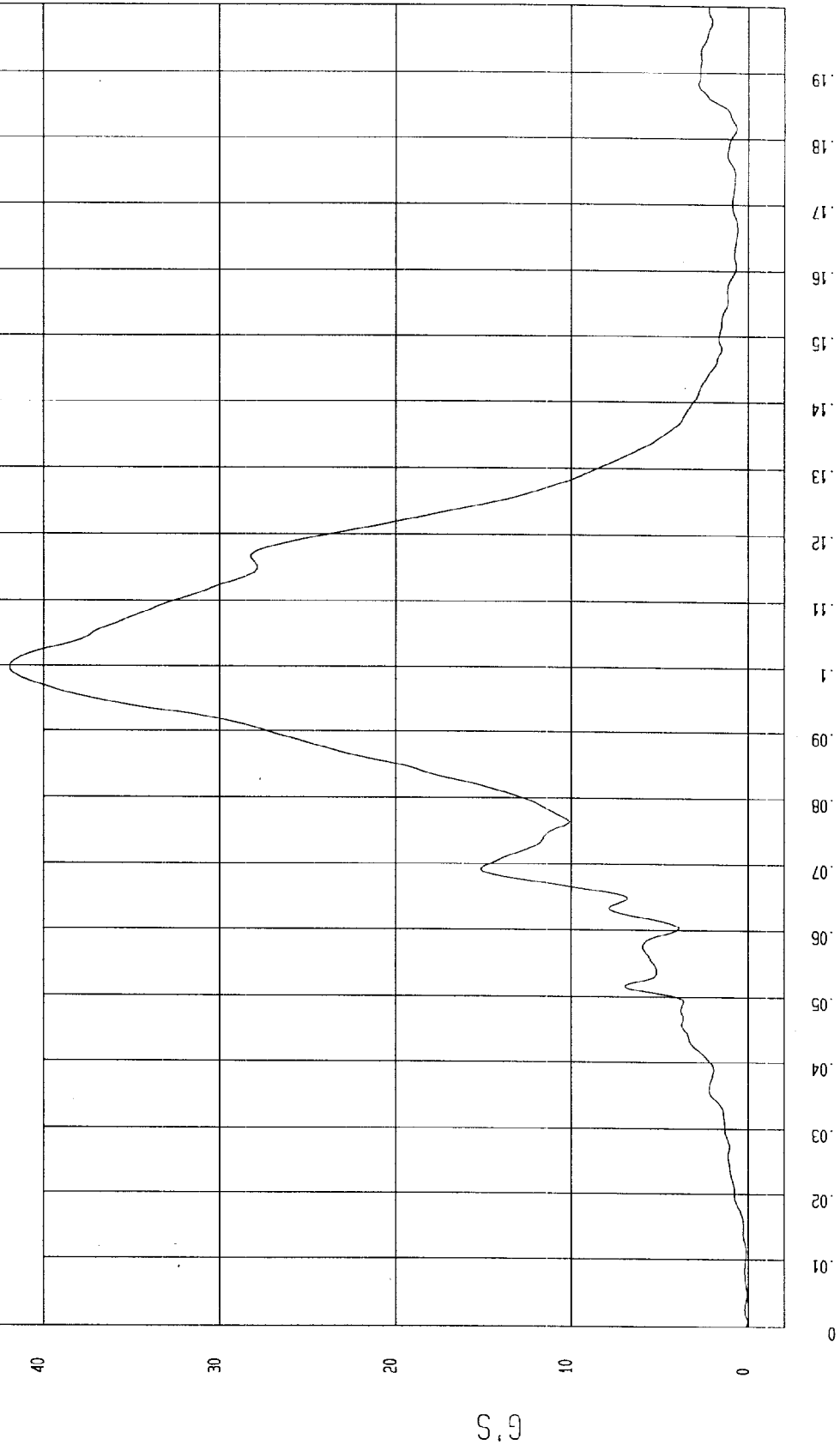
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 2.836423E-02 G'S at .8 msec

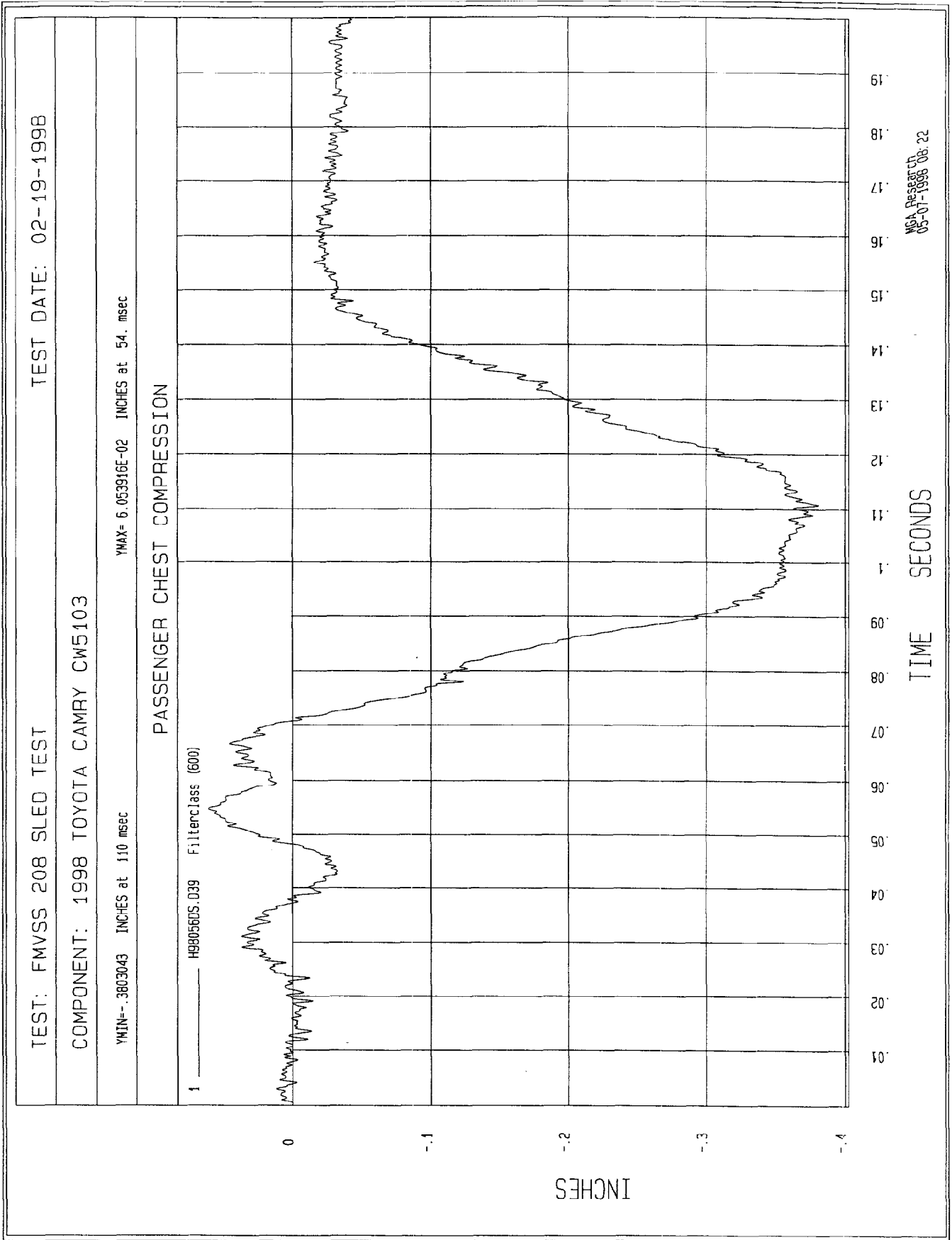
YMAX= 41.86243 G'S at 99. msec

PASSENGER CHEST RESULTANT

1 ——— H98056AV.A17 Filterclass (180)



MCA Research
02-19-1998 14:35



TEST: FMVSS 208 SLED TEST

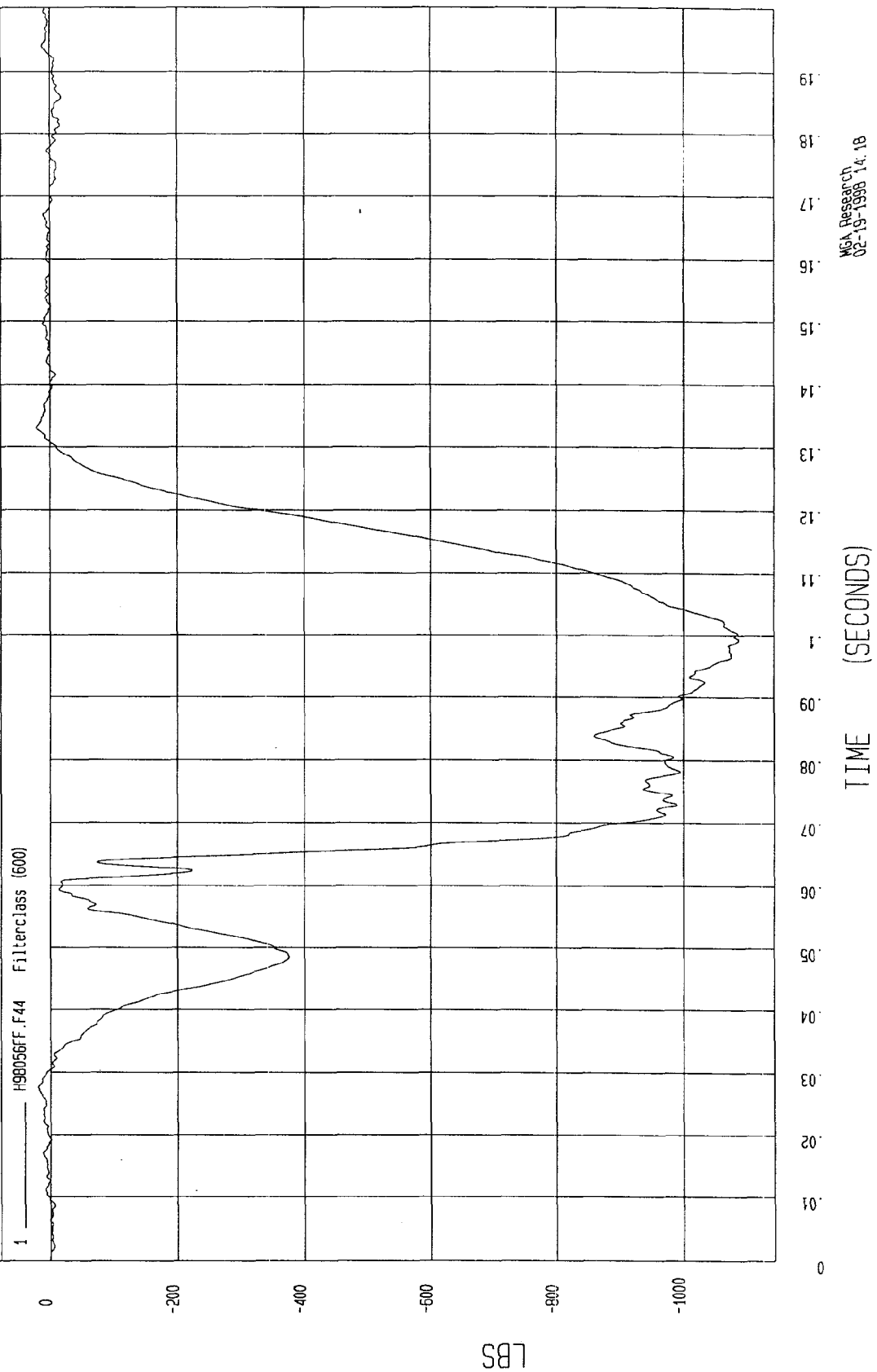
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-1086.999 LBS at 99. msec

YMAX= 21.32683 LBS at 133 msec

PASSENGER LEFT FEMUR FORCE



TEST: FMVSS 208 SLED TEST

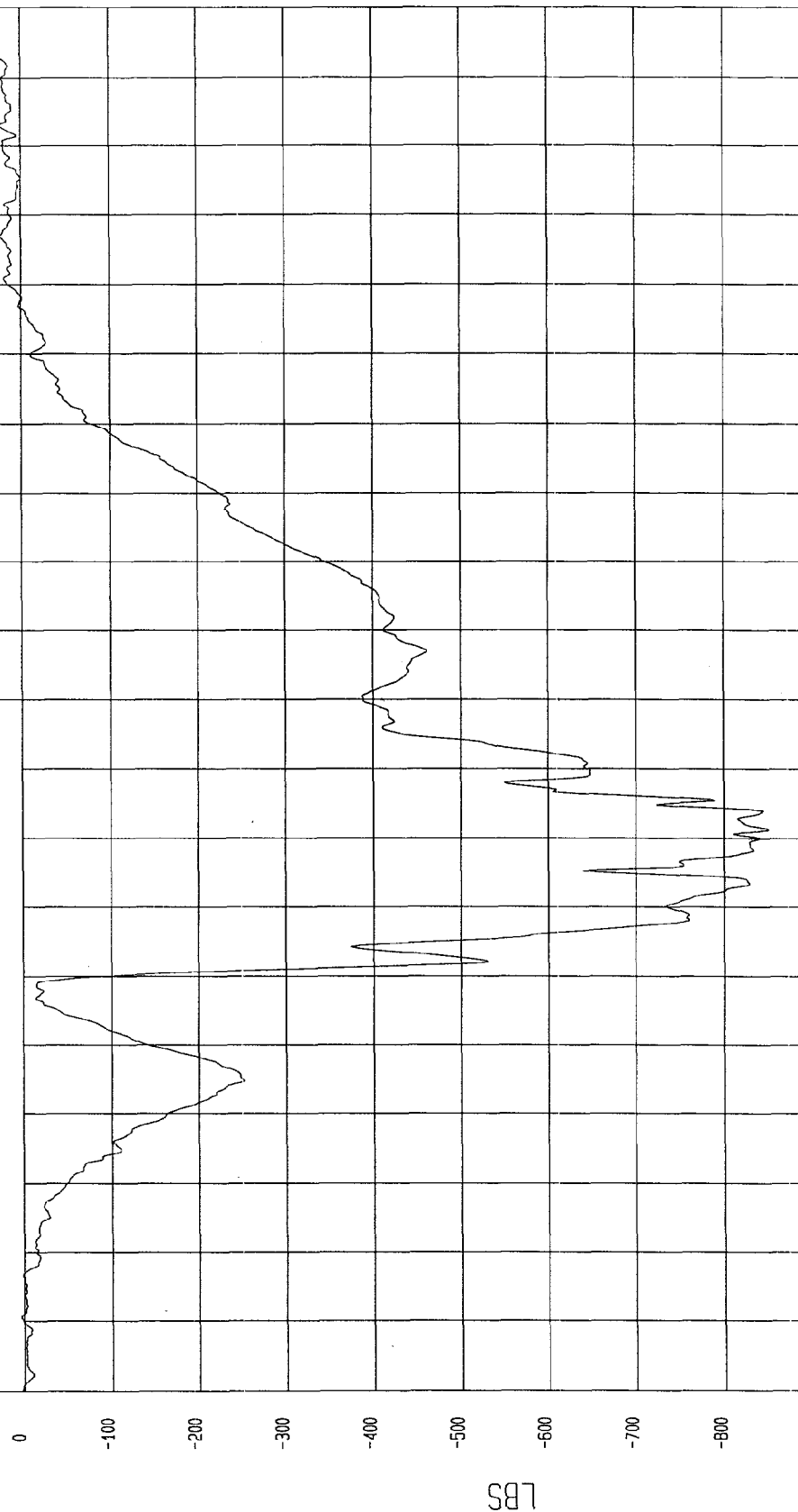
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-651.6772 LBS at 81. msec YMAX= 32.82304 LBS at 194 msec

PASSENGER RIGHT FEMUR FORCE

1 — H98056FF.F45 Filterclass (500)



NCA Research
02-19-1998 14:19

TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998 - 11:52:25

COMPONENT: 1998 TOYOTA CAMRY CW5103

Minimum = -1.41 G's at 119 msec

Maximum = 17.77 G's at 64.8 msec

SLED ACCELERATION

1 _____ H98055AF.A01 Filterclass (60)

20

18

16

14

12

10

8

6

4

2

0

-2

G's

0

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

TIME (SECONDS)

MCA Research
02-19-1998 13:53

TEST: FMVSS 208 SLED TEST TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 0 MPH at 0 msec YMAX= 29.40554 MPH at 131 msec

SLED X VELOCITY

1 H98056A1.V01 FilterClass (60)

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

MPH

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

TIME Seconds

MCA Research
02-19-1998 13:55

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

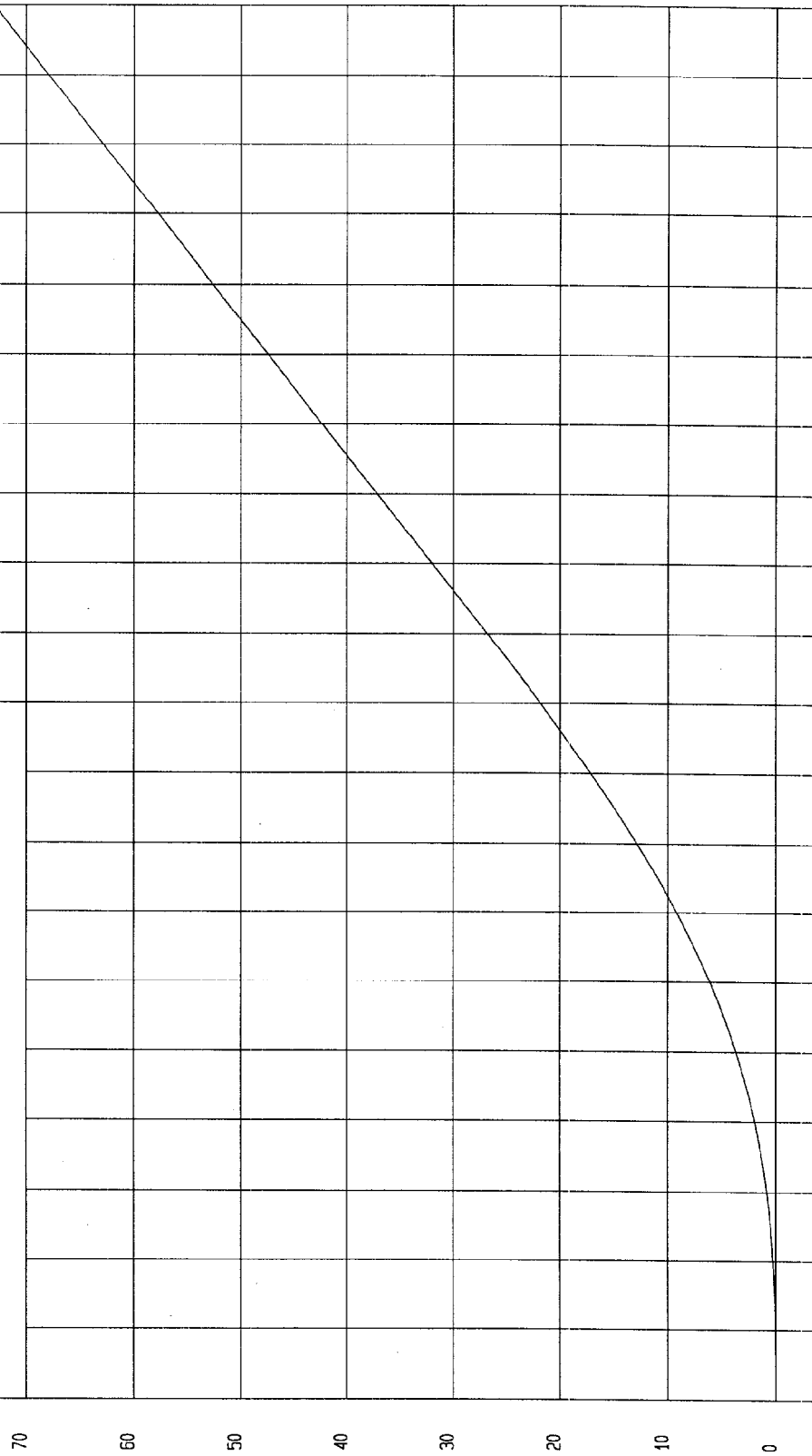
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN= 0 IN at 0 msec

YMAX= 72.94208 IN at 199 msec

SLED X DISPLACEMENT

1 H98056AI.D01 Filterclass (60)



WGA Research
02-19-1998 13:56

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-.2832031 VOLTS at 138 msec

YMAX= 3.999023 VOLTS at 134 msec

1 METER

1 _____ H980560T.010 Filterclass (1000)

4

3

2

1

0

VOLTS

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

MGA Research
02-19-1998 14: 41

TEST: FMVSS 208 SLED TEST

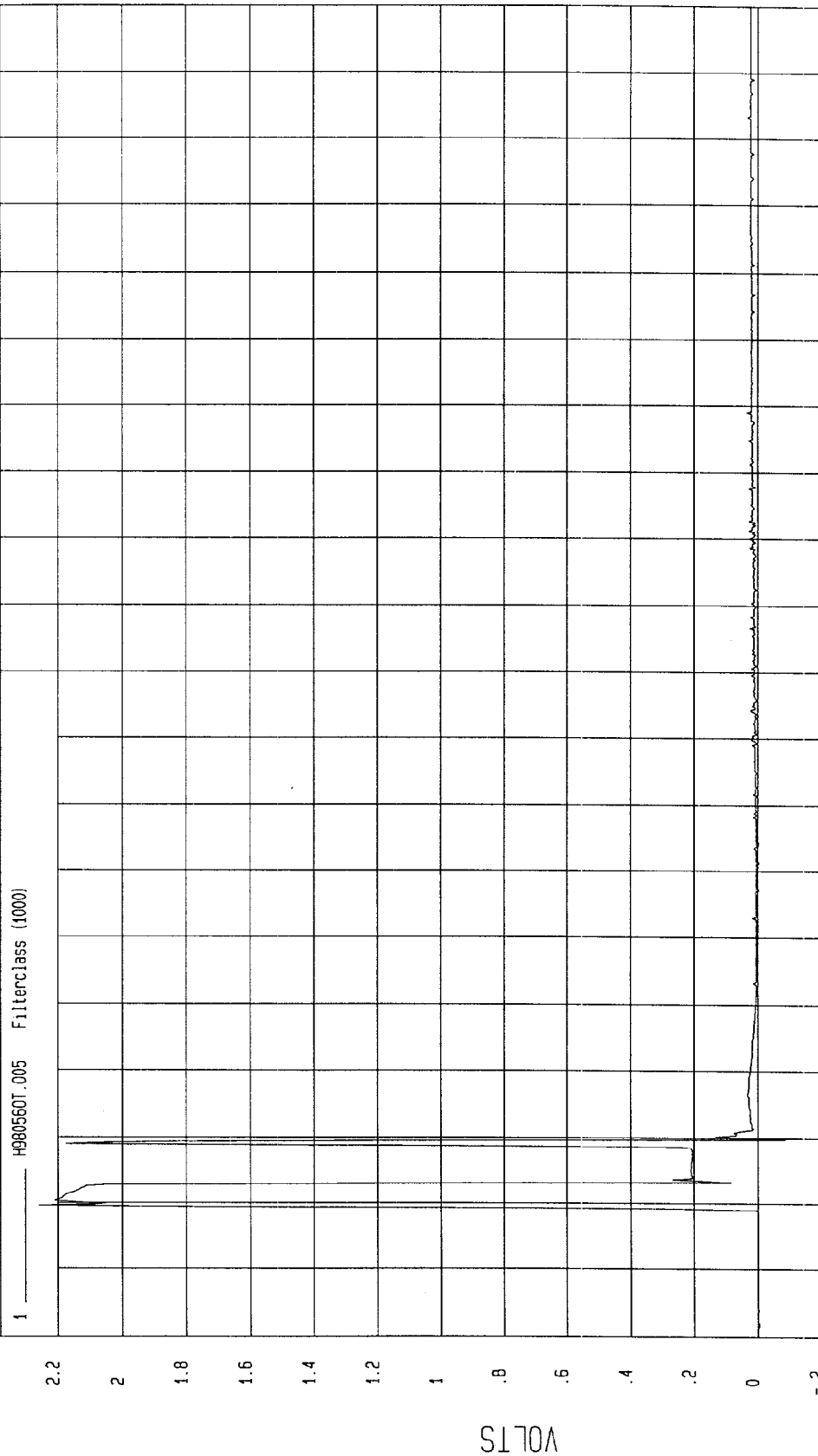
TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-.0853506 VOLTS at 29. msec

YMAX= 2.263283 VOLTS at 19. msec

AIRBAG TIMING



NSA Research
02-19-1998 14.40

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

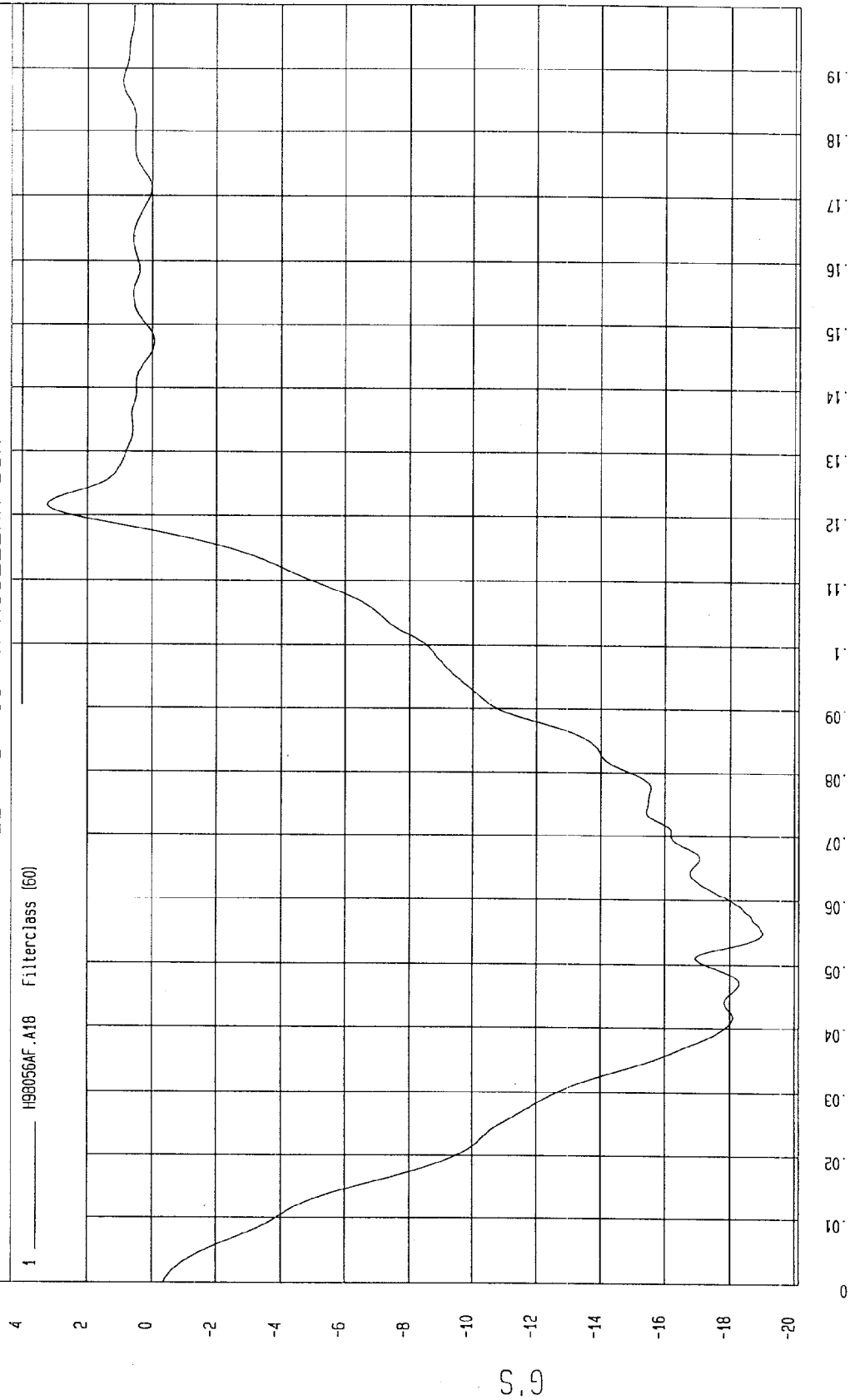
COMPONENT: 1998 TOYOTA CAMRY CW5103

WIN--19.02834 G'S at 54. msec

YMAX= 3.221616 G'S at 121 msec

LEFT B POST X ACCELERATION

1 _____ H98056AF.A18 Filterclass (50)



NSA Research
02-19-1998 14:08

TIME (SECONDS)

G.S

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

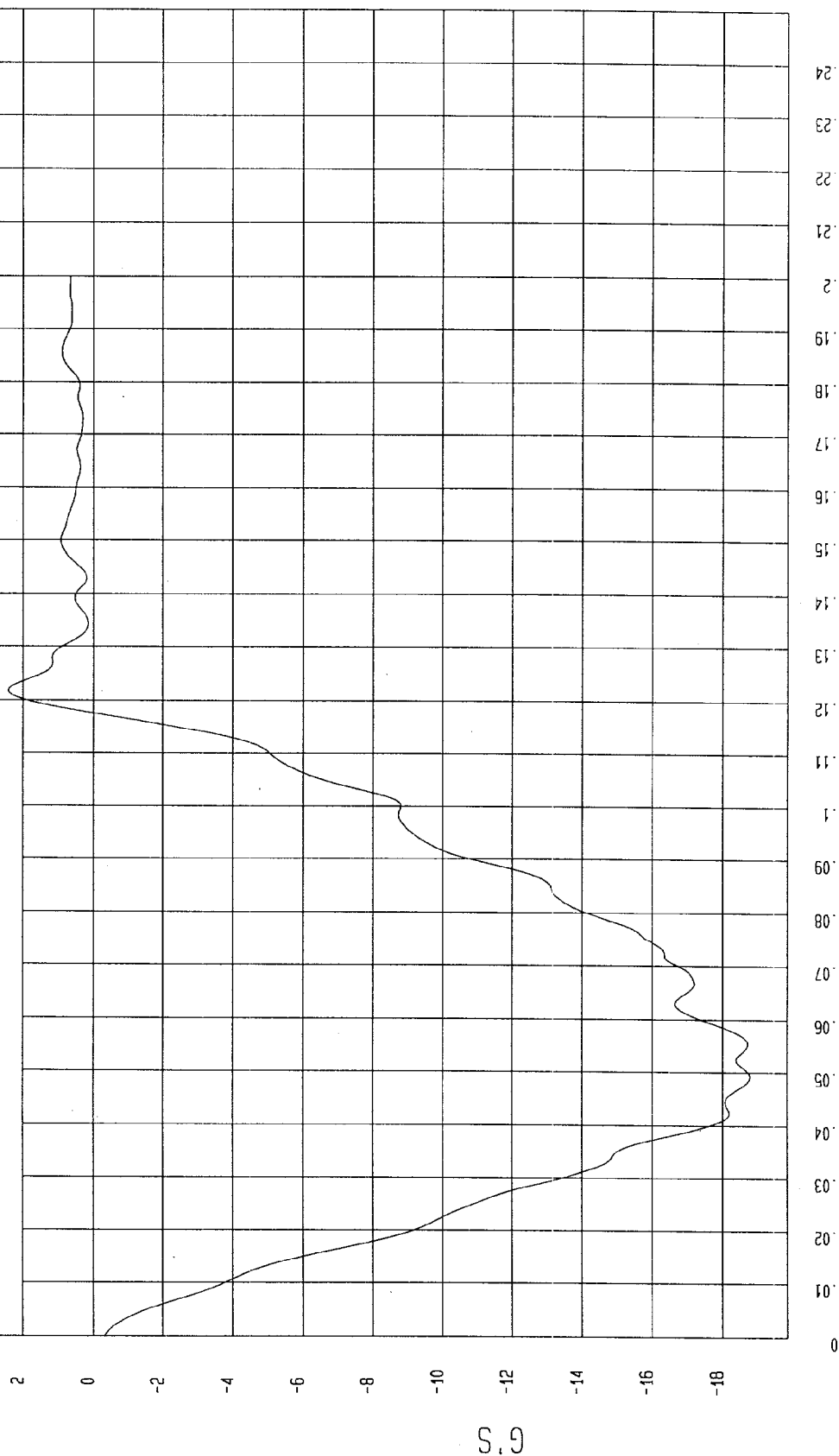
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-18.79264 G'S at 49. msec

YMAX= 2.417352 G'S at 121 msec

RIGHT B POST X ACCELERATION

1 H98056AF.A19 Filterclass (60)



WSA Research
02-19-1998 14:09

TIME (SECONDS)

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

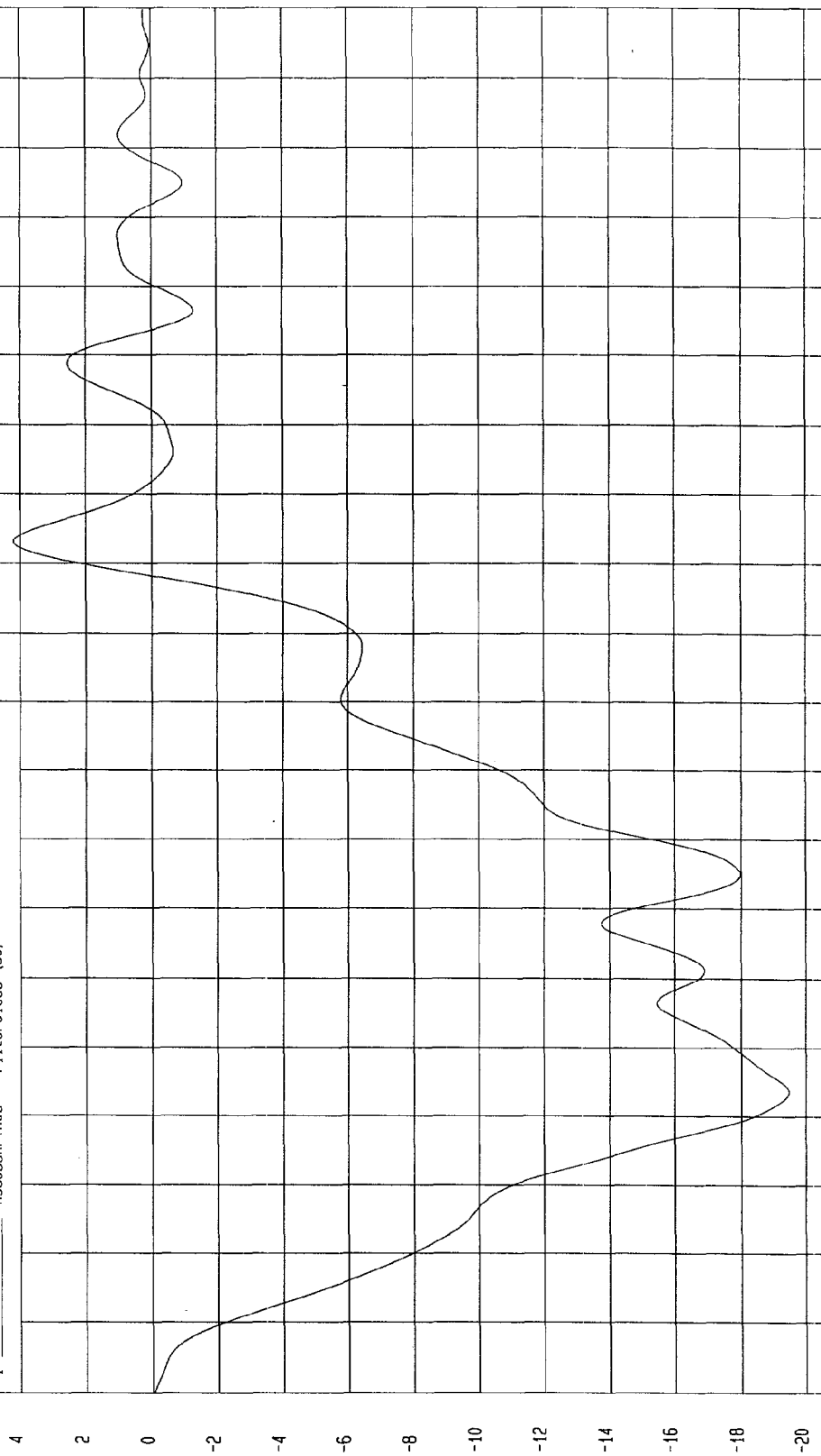
COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-19.47644 G'S at 43. msec

YMAX= 4.199121 G'S at 123 msec

ENGINE X ACCELERATION

1 _____ H98056AF.A03 FilterClass (60)



MGA Research
02-19-1998 14:08

TIME (SECONDS)

G.S

TEST: FMVSS 208 SLED TEST

TEST DATE: 02-19-1998

COMPONENT: 1998 TOYOTA CAMRY CW5103

YMIN=-18.59613 G'S at 49. msec

YMAX= 2.169913 G'S at 119 msec

REAR AXLE X ACCELERATION

1 H98056AF.A46 Filterclass (60)

2

0

-2

-4

-6

-8

-10

-12

-14

-16

-18

G.S

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

MSA Research
02-19-1998 14:09

TIME (SECONDS)

APPENDIX C
MANUFACTURER'S VEHICLE INFORMATION

TOYOTA'S RESPONSE TO
NHTSA'S REQUEST ON FMVSS No. 208 FOR
THE 1998 TOYOTA CAMRY
(NSA-31CCA, OA:208970812K)

Q.1. Please inform OVSC if the air bag restraint system is certified to meet the requirements of S4.1.5.1(a)(1) or S13.

If the air bags were installed to meet the requirements of S4.1.5.1(a)(1), please provide a copy of the certification test reports for the frontal/angular barrier impact tests of the automatic restraint system with the manual safety belts unfastened and fastened.

If the air bags were installed to meet the requirements of S13, please provide a copy of the certification test reports for the frontal/angular barrier impact tests of the automatic restraint system with the manual safety belts fastened and the certification test reports for the sled test with only the automatic restraint system.

Response 1.

The air bag restraint system of the 1998 Toyota Camry meets the requirements of S13 of FMVSS No. 208.

We provide the summary reports for frontal barrier impact test with the safety manual belts fastened at 35mph as Attachment I-1 and frontal & angular impact test with the belts unfastened at 30mph as Attachment I-2 through I-5. These reports are to estimate 30mph belted test results. We provide the technical analysis reports for estimation of 30mph belted test results as Attachment I-6 and I-7.

And the summary reports of our certification tests for the sled test with only the automatic restraint system are provided as Attachment I-8 and I-9.

RECEIVED NSA-30
97 SEP 26 AM 11:04

Q.2. If the air bags are or will be depowered or changed from the previous model year, explain the changes.

Response 2:

We depowered and changed both driver and passenger side air bag from previous model year.

a. Depower : Both of air bags were depowered to the level in which they can be certified to meet the injury criteria in the sled test specified in FMVSS No. 208, S13.
Also see Attachment I-8 and I-9.

b. Changes : Changes are the followings:

- (a) Driver side : (1) Inflator configuration
(2) Propellant ; from Azide type to Non-Azide type
(3) Bag folding pattern
- (b) Passenger side: (1) Bag cloth material

Q.3. If the air bag has been depowered or changed, explain how it can be determined, prior to purchase, that a particular vehicle has a depowered air bag.

Response 3:

All 1998 Toyota Carry has depowered air bags.

Q.4. If the vehicle was certified with unrestrained dummies to meet the requirements S13, describe how to disconnect the air bags from the vehicle sensors and connect them to the triggering mechanism used in the sled test. Describe the method used in certification to determine when to trigger the air bag and the system used to trigger the air bag.

Response 4:

We provide the illustration which shows the location of the air bag connector to disconnect the air bag as Attachment II-1.

And we describe the air bag triggering system used in certification test in Attachment II-2.

- Q.5. 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.

Response 5:

Tension-relieving device is not used in the 1998 Toyota Camry.

- Q.6. 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.

Response 6:

All windows and vents were opened during the tests.

- Q.7. 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.

Response 7:

The dummy placement measurement data including our diagrams is provided in Attachment III and the section 10 of Attachment IV.

A foot rest is provide for the driver.

- Q.8. 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.

Response 8:

We provide above information as Attachment IV

Q.9. If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant.

Response 9:

See section 9 of the Attachment IV.

Q.10. For barrier tests provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression, and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.5.1(a)(1). For sled tests, provide the resulting injury criteria (i.e., HIC, chest acceleration, chest compression, femur loads, and neck moments and forces) recorded for all certification tests conducted to meet the requirements of S13.

Response 10:

We provide the speed at impact, vehicle test weight, and resulting injury criteria recorded for each certification test in Attachment I-1 through I-9 in response to your request No.1.

Q.11. When vehicle components must be removed to obtain the proper test weight for the barrier test, what components do you recommend for removal and in what priority order do you recommend removal?

Response 11:

The recommended parts for vehicle weight adjustment are listed in the Attachment V

Q.12. 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 S9.1.

Response 12:

The 1998 Toyota Camry uses a pressure vessel to inflate the passenger side air bag.

The inflator in the passenger's air bag of the 1998 Toyota Camry was approved for shipment by the Research and Special Programs Administration of the Department of Transportation.

This approval means that the air bag inflator meets all requirements of S9.1.

We provide the approval letter of Research and Program Administration as Attachment VI-1.

Q.13. If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test report or engineering analysis to demonstrate that it meets all the requirements of S9.2

Response 13:

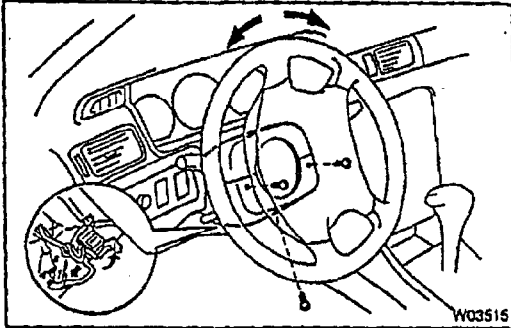
The 1998 Toyota Camry uses an explosive device to inflate the driver side air bag.

The inflator in the driver's air bag was approved for shipment by the Research and Special Programs Administration of the Department of Transportation.

This approval means that the air bag inflators meets all the requirements of S9.2.

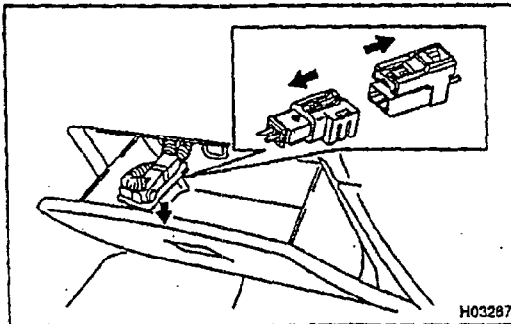
We provide the approval letters of Research and Program Administration as Attachment VI-2.

LOCATION AND DISCONNECTION OF THE AIR BAG CONNECTOR



DRIVER SIDE AIR BAG

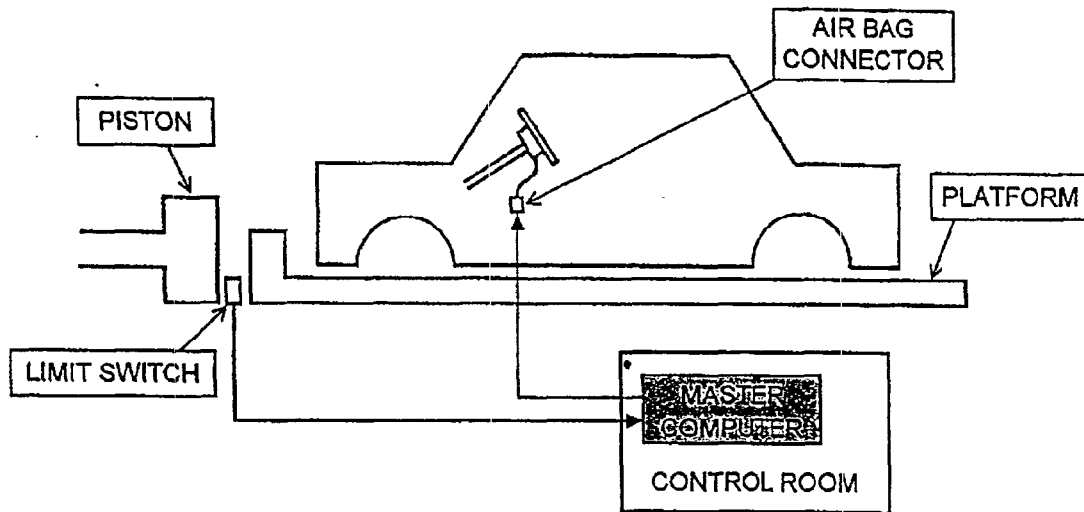
- (1) Remove the steering column lower cover as shown in the illustration.
- (2) Disconnect the air bag connector of the spiral cable.



PASSENGER SIDE AIR BAG

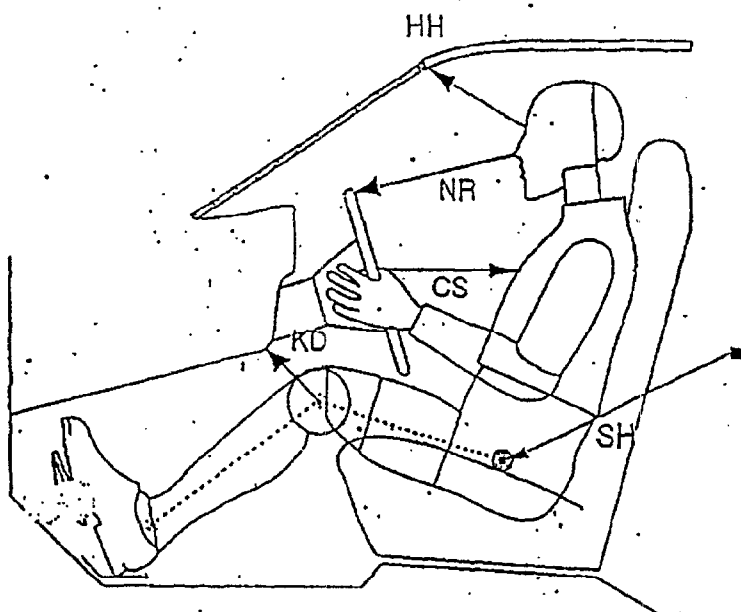
- (1) Remove the glove compartment door finish plate inside the glove compartment box.
- (2) Pull up the connector.
- (3) Disconnect the air bag connector.

AIR BAG TRIGGERING SYSTEM FOR SLED TEST



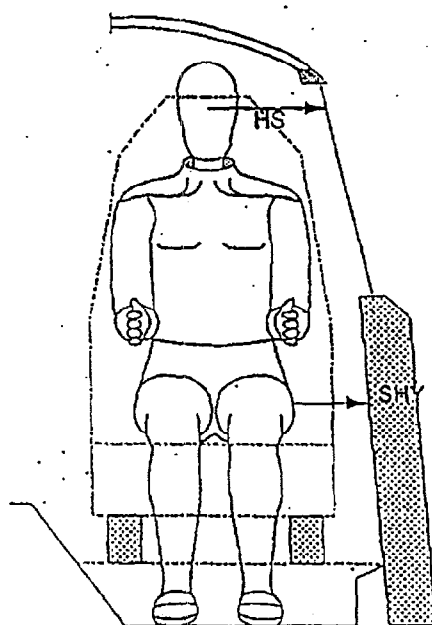
1. The limit switch, which is installed between the piston and the platform, detects the beginning of the platform acceleration.
2. The limit switch, air bag and master computer, which controls the trigger time for firing the air bag, are connected.
3. When the platform acceleration begins, the limit switch sends an electric signal to the master computer.
4. The master computer controls the trigger time for firing the air bag by the signal from the limit switch.
5. At 20ms after the acceleration of the platform comes up to 0.5G, the master computer send a trigger signal to fire the air bag.

DUMMY MEASUREMENTS FOR FRONT SEAT PASSENGERS



	Driver (inch)	Passenger (inch)
NH	14.0	12.8
NR	15.7	Not measured
CS	11.4	Not measured
KDL	Not measured	Not measured
KDR	Not measured	Not measured
SH	Not measured	Not measured

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

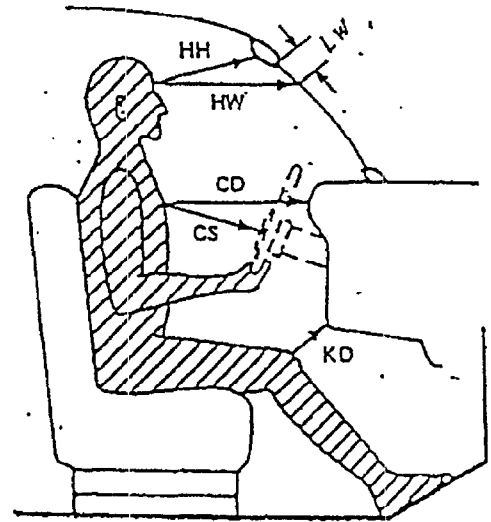


	Driver (inch)	Passenger (inch)
HS	Not measured	Not measured
SHY	Not measured	Not measured

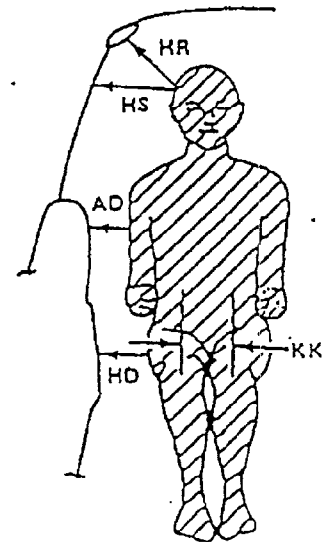
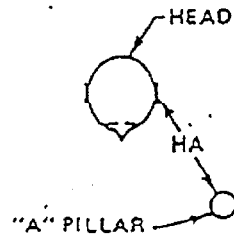
- SHY - Striker to H-Point (Y Dir.)
- HS - Head to Side Window

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER (inch)	PASSENGER (inch)
HH	13.2	10.2
HW	24.6	21.3
CD	20.9	21.3
CS	12.2	—
KDL	4.72	4.72
KDR	4.72	4.72
SA	Not measured	Not measured
TA	21°	21°
LW	14.4	10.0

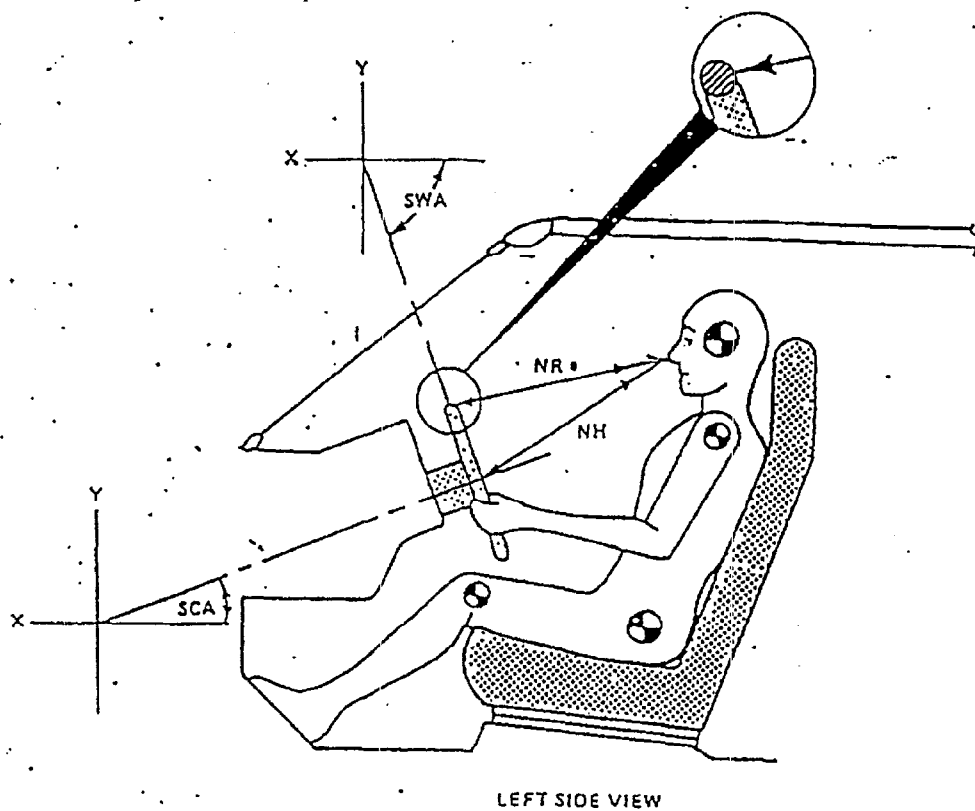


HH: Head to Windshield Header
 HW: Head to Windshield
 CD: Chest to Dash
 CS: Chest to Steering Wheel
 KD(L/R): Knee to Dash (Left/Right)
 SA: Seat Back Angle
 TA: Torso Angle
 HA: Head Target to "A" Pillar
 HR: Head to Side Roof
 HS: Head to Side Window
 AD: Arm to Door
 HD: Hip to Door
 KK: Knee to Knee



	DRIVER (inch)	PASSENGER (inch)
HR	4.9	4.1
HS	9.4	7.9
AD	4.1	4.3
HD	5.7	5.5
KK	10.6	7.9
HA	20.5	18.3

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



	MEASUREMENTS (inch)
<u>NR</u> -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	15.7
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	15.7
<u>SCA</u> -- angle of steering column relative to the horizontal X axis	24°
<u>SWA</u> -- angle of steering wheel relative to the horizontal X axis	24°

Information for NHTSA Regarding The 1998 TOYOTA CAMRY
(Test Conditions for Barrier Crash Test)

1. Useable fuel tank volume : 18.5 gallons

92% of useable volume : 17.0 gallons

94% of useable volume : 17.4 gallons

2. Vehicle Capacity Weight : 905 lbs

Rated Cargo & Luggage Weight : 155 lbs

Designated Seating Capacity : 5

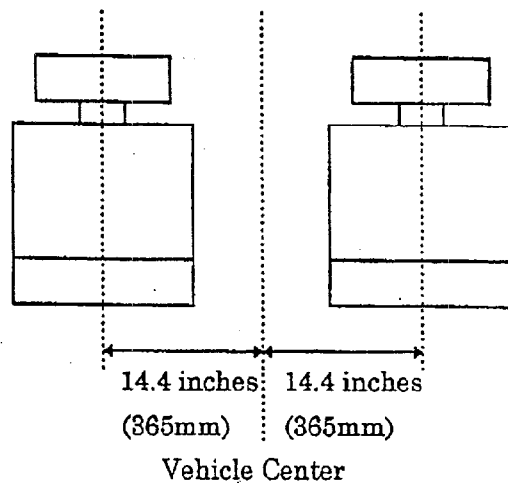
3. Tire Inflation Pressure : 195/70R14 Fr. & Rr. 29.9psi (2.1kgf/cm²)

: 205/65R15 Fr. & Rr. 28.4 psi (2.0kgf/cm²)

4. Outboard Designated Seating Position :

Fr Seat

14.4 inches (365mm) outboard of the vertical plane which include vehicle center.



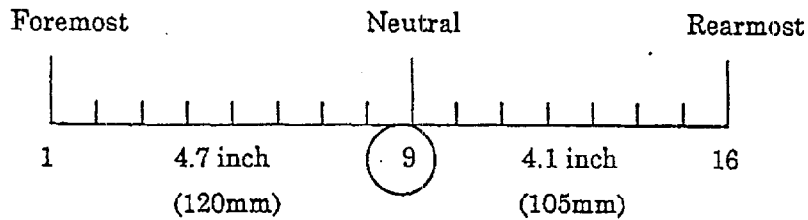
Designated Seating Position
=Center of Head Restraint

5. Front Seat Adjustment (Driver & Passenger Side)

Driver's Seat

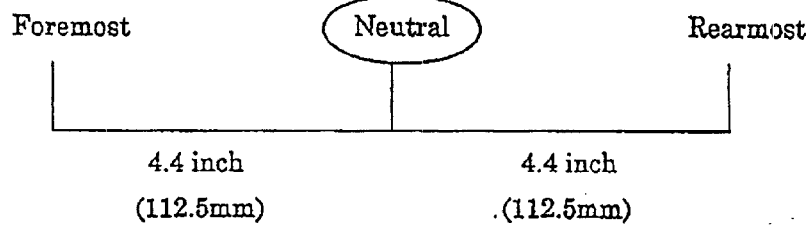
(1) Manual Seat

Move the seat nine notches rearward from the foremost position.



(2) Power Seat

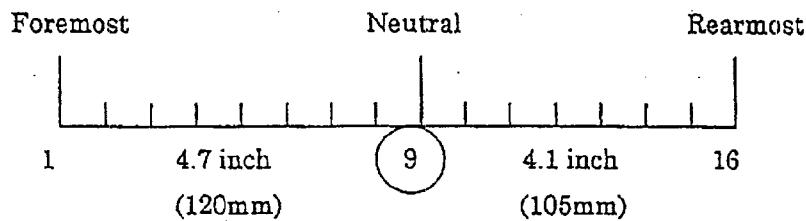
4.4 inch rearward from the foremost position



Passenger's Seat

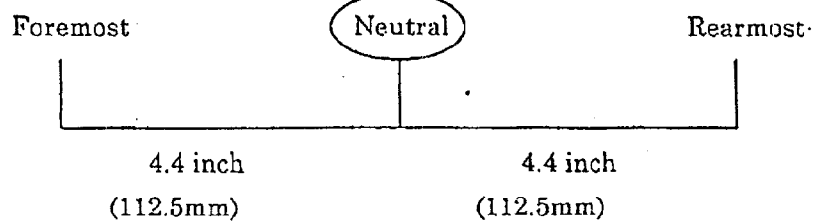
(1) Manual Seat

Move the seat nine notches rearward from the foremost position.

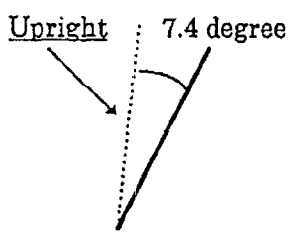
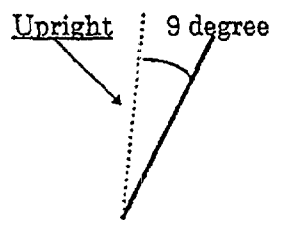


(2) Power Seat

4.4 inch rearward from the foremost position



6.Designated Seat Back Positions

Driver's Seat	Passenger's Seat
(1)With Vertical Adjustment Seat (Manual & Power Seat) Recline <u>7.4 degree</u> rearward from the most upright position. <u>Upright</u> 7.4 degree 	(1)With Vertical Adjustment Seat (Manual & Power Seat) Same as driver's seat
(2)Without Vertical Adjustment Seat (Manual & Power Seat) Recline <u>9 degree</u> rearward from the most upright position. <u>Upright</u> 9 degree 	(2)Without Vertical Adjustment Seat (Manual & Power Seat) Same as driver's seat

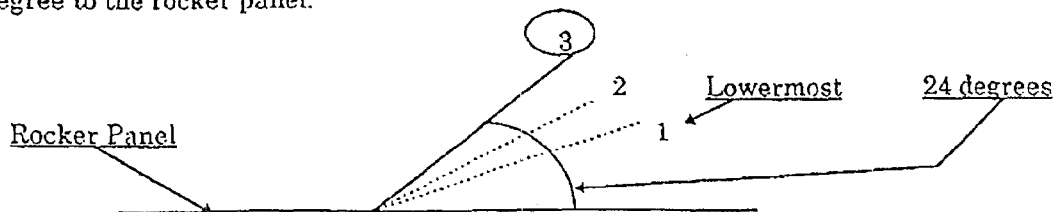
7.Other Seat Adjustment

Lumbar Support : Rearmost

Vertical Adjuster : Lowermost

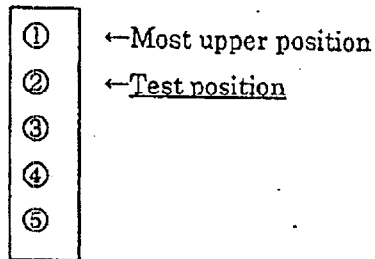
8.Steering Column Angle

Tilt third notches upward from the Lowermost position. Steering column angle is 24.0 degree to the rocker panel.



9. Shoulder Belt Anchor Position

Lock on the second position from the most upper position.

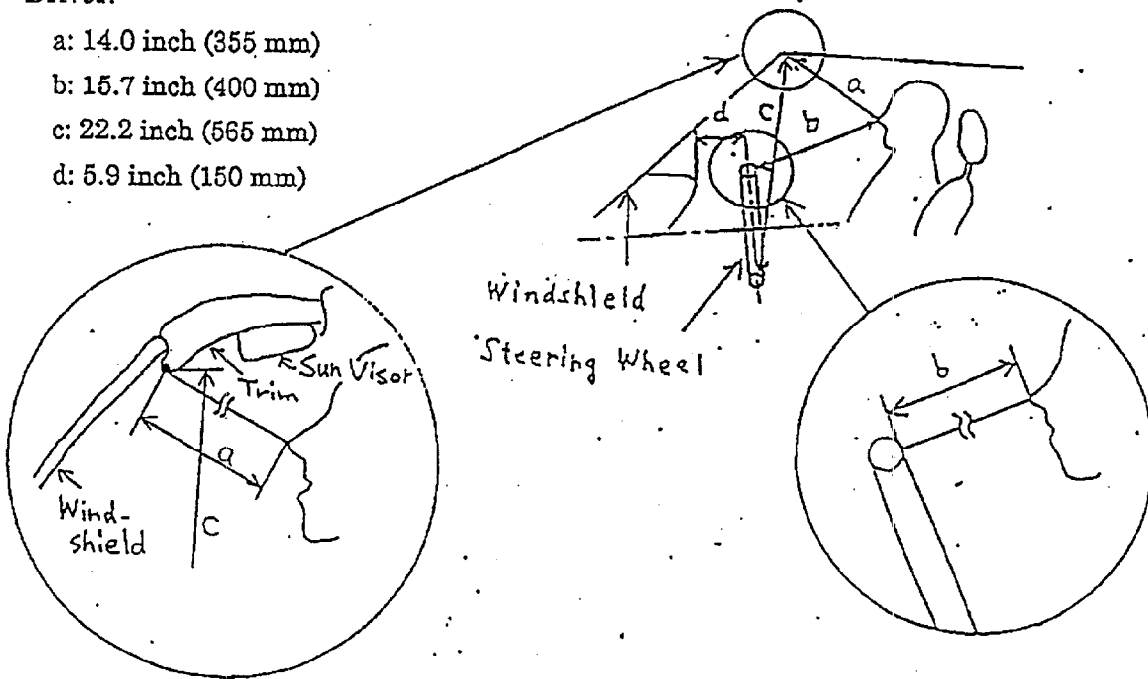


10. Dummy Clearance Dimensions

If the dummy are properly position on the seat, the dimensions are as follows:

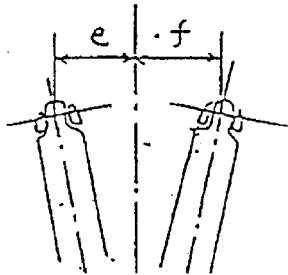
Driver:

- a: 14.0 inch (355 mm)
- b: 15.7 inch (400 mm)
- c: 22.2 inch (565 mm)
- d: 5.9 inch (150 mm)



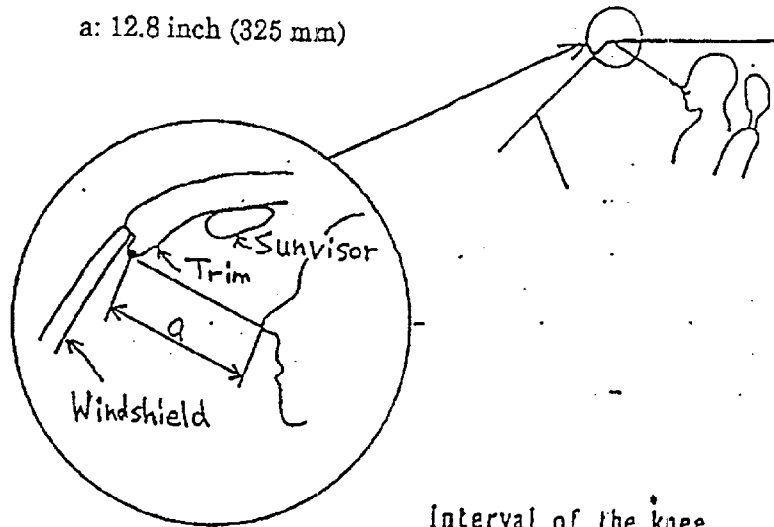
Interval of the knee

- e: 5.9 inch (150 mm)
- f: 4.7 inch (120 mm)



Passenger:

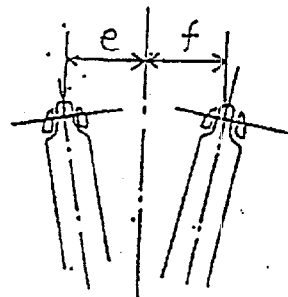
a: 12.8 inch (325 mm)



Interval of the knee

e: 3.9 inch (100 mm)

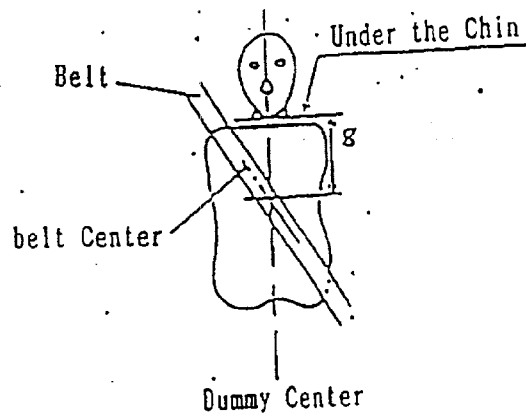
f: 3.9 inch (100 mm)



Seat center

11. Belt Position

g: 6.3 inch (160 mm)



12. Reconfirmation of test procedure

Please assure following procedures in order to avoid test procedure problem which may affect test result.

(1) Dummy center position

Adjust dummy center position in the following manner.

- ① Scribe a line for dummy center position 14.4 inches apart from the vehicle center line in each side (right & left) as illustrated below.
- ② Place dummies with its center line described in ①.
- ③ Scribing portions are on the windshield, seat cushions, seat backs, roof, and rear window.

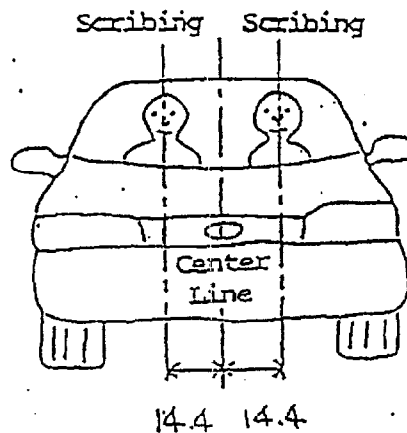


Figure 1. Center line scribing portion

(2) Dummy H-point

Adjust dummy's H-point as close as possible with the H-point obtained by using a three dimensional dummy. If differs, take record of the gap between the position of the three dimensional dummy and that of the actual set position.

(3) Hands

The palms of driver side test dummy shall be contacted with the outer part of the steering wheel rim. The thumbs shall be over the steering wheel rim and shall be lightly taped to the steering rim so that if the hand of test dummy is pushed upward by a force of not less than 2 pounds and not more than 5 pounds, the tape shall release the hand from the steering wheel rim. The tape shall be 0.5 inch width and thumb taping shall be one round.

(4) Limb joints

The dummy limb joints shall be set at 1G, barely restraining the weight of the limb when it is extended horizontally. The force required to move a limb segment shall not exceed 2Gs throughout the range of limb motion.

(5) Abdomen assy

A extremely worn abdomen assembly which had seemed to fail with the calibration requirements was used in a compliance test. If any abnormal condition can be seen on dummy, please assure that the abdomen complies with the calibration requirements.

(6) Ribs

Assure that the ribs of the dummies are not deformed. If any deformation can be seen on ribs, please exchange it to an undeformed one.

(7) Leg positioning

Please set the legs in accordance with the following manner.

- ① Put driver's feet on the accelerator pedal and foot rest.
- ② After the feet are positioned, adjust the knee position so that the legs stand perpendicularly.

(8) Shoulder belt

The shoulder belt shall be straightly fastened on the upper torso.

(9) Steering column target

In some NHTSA's vehicle impact tests, steering column target made from metal plate was fixed onto the steering column cover.

The metal plate fixed on the steering column cover may contact with the speed meter has a possibility of preventing normal steering column stroke.

Therefore, we propose following countermeasures:

<Proposed countermeasures>

- ① Use any breakable materials like plastics as a substitution for metal plate.
- ② Take sufficient distance (at least, not less than 40mm) between bracket of target and speed meter.

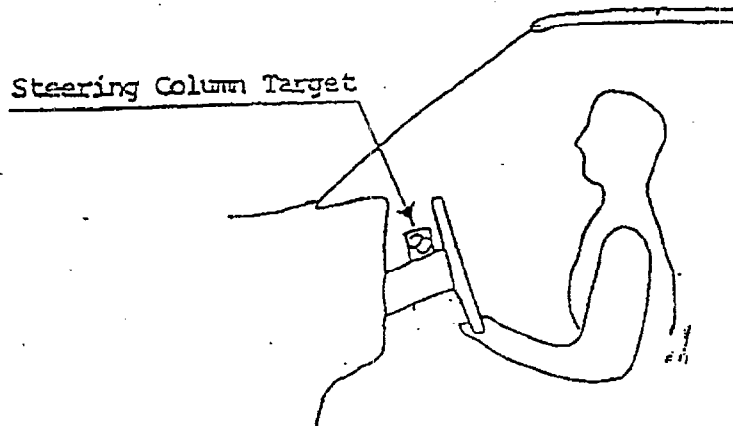


Figure 2. Steering column target

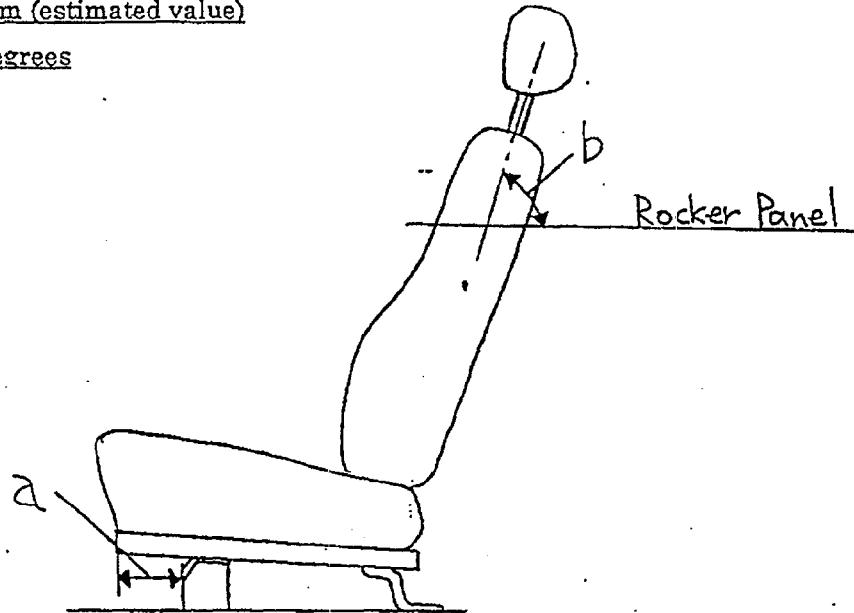
SUPPLEMENTALY EXPLANATION FOR FRONT SEAT ADJUSTMENT

1. Manual Seat (without vertical adjuster: Driver, Passenger)

If the seat slide is at the ninth notch rearward from the foremost position and the seat back is 9 degrees rearward from the most upright position ,the relationship of the locations are as follows.

a: 90 mm (estimated value)

b: 69 degrees

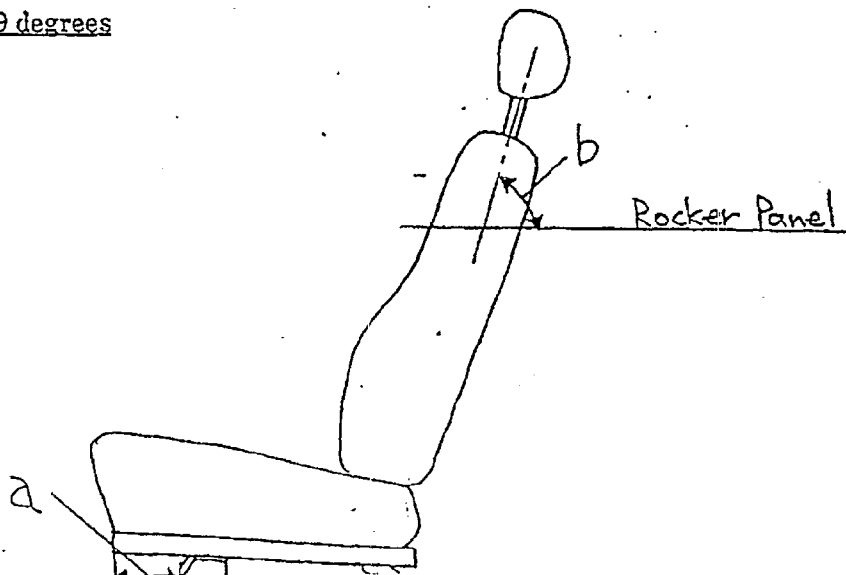


2. Manual Seat (with vertical adjuster: Driver, Passenger)

If the seat slide is at the ninth notch rearward from the foremost position , the seat back is 7.4 degrees rearward from the most upright position and the vertical adjuster is the lowermost ,the relationship of the locations are as follows.

a: 90 mm (estimated value)

b: 69 degrees

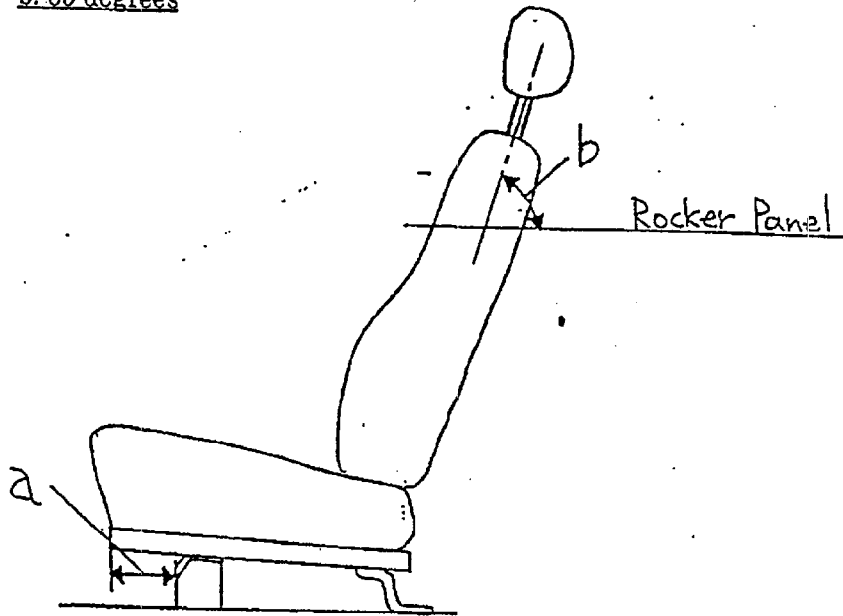


3. Power Seat (with vertical adjuster: Driver, Passenger)

If the seat slide is at 4.4 inch rearward from the foremost position, the seat back is 7.4 degrees rearward from the most upright position and the vertical adjuster is the lowermost, the relationship of the locations are as follows.

a: 83 mm (estimated value)

b: 69 degrees



RECOMENDED REMOVAL PARTS FOR WEIGHT ADJUSTMENT

Following is the list of the vehicle components that may be removed in order to adjust the test vehicle weight.

No	Parts Name	Estimated Weight (lbs)
1	Rear Bumper Assy.	23.85
2	Rear Combination Lamp	2.05×2
3	Outside Mirror Manual Power	1.92×2 $1.62 \sim 2.13 \times 2$
4	Inner Mirror	0.66
5	Rear Seat Back Leather Fabric	41.38 38.40
6	Rear Seat Cushion Leather Fabric	12.41 11.68