

1887

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

FUJI HEAVY INDUSTRIES, LTD.
1993 SUBARU LEGACY
4-DOOR SEDAN

NHTSA NUMBER: CP5501

CALSPAN TEST NUMBER: 8056-14

MARCH 11, 1993

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
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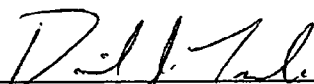
FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
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Room No. 6115 (NEF-30)
Washington, DC 20590

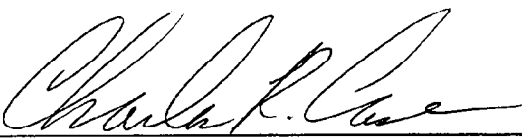
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16. Abstract A 30 mph vehicle safety compliance test was conducted on a 1993 Subaru Legacy 4-Door Sedan. This test was performed at the Calspan Advanced Technology Center in Buffalo, New York on March 11, 1993. The purpose of this test was to determine compliance with the performance requirements of the following Federal Motor Vehicle Safety Standards: 1. FMVSS No. 208, "Occupant Crash Protection" 2. FMVSS No. 212, "Windshield Mounting" 3. FMVSS No. 219 (partial), "Windshield Zone Intrusion" 4. FMVSS No. 301, "Fuel System Integrity" The test mode was perpendicular (0°) and the impact velocity was 29.5 mph. The ambient temperature at the impact face was 33°F. The subject test vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial) and 301. <u>Type of Restraint System:</u> The test vehicle was equipped with a driver airbag and driver and right front passenger automatic torso belt restraints. Manual lap belts were not used for this test.					
17. Key Words 30 mph Vehicle Safety Compliance Testing FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity" Frontal Impact			18. Distribution Statement <u>Copies of this report are available from:</u> Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 (NAD-52) 400 Seventh St., S.W., Washington, DC 20590		
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Section 1
PURPOSE AND TEST PROCEDURE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial) and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by Calspan Advanced Technology Center under Contract No. DTNH22-90-C-01003. The purpose of this test was to determine if the subject vehicle, a 1993 Subaru Legacy 4-door sedan, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS No. 212, "Windshield Mounting"; FMVSS No. 219 (partial), "Windshield Zone Intrusion"; and FMVSS No. 301, "Fuel System Integrity". This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-208-08, dated September 8, 1989.

Section 2

SUMMARY OF TEST NUMBER CP5501

A frontal barrier was impacted by a 1993 Subaru Legacy 4-Door Sedan at a velocity of 29.5 mph. The test was performed at the Calspan Corporation Advanced Technology Center on March 11, 1993. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 14 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572B, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right front passenger seating positions according to dummy placement instructions specified in the OVSC Laboratory Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers, and left/right femur load cells. These ATDs had been certified prior to the test.

The 23 channels of data were recorded on PC based data acquisition system. Appendix B contains the vehicle and dummy response data traces. A data wire was cut on the left brake caliper accelerometer and thus no data was recorded.

The driver's HIC was 617. The maximum chest deceleration over 3 milliseconds was 50.2 g's. The maximum force on the driver's left femur was 1546 pounds and 1646 pounds on the right femur.

The right front passenger's HIC was 441. The maximum chest deceleration over 3 milliseconds was 42.0 g's. Loads of 1067 and 1035 were recorded on the left and right femurs respectively.

Table 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: CP5501 Test Mode: 30 mph Frontal Barrier

Test Date: March 11, 1993 Time: 12:15 Temperature: 33°F

Vehicle Make/Model/Body Style: 1993 Subaru Legacy 4-Door Sedan

Vehicle Test Weight: 3100 lbs.

Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.5 mph

Maximum Static Crush: 14.5 inches

Vehicle Rebound: 21.5 inches

DUMMIES:

DRIVER

PASSENGER

Type: Part 572B Part 572B

Restraint System: Airbag, Automatic Automatic Torso Belt
Torso Belt

Number of Data Channels: 23

Number of Cameras: 1 Real Time

14 High Speed

DOOR OPENING DATA: Closed-operable - Left Front

Closed-operable - Right Front

Front Seat(s) Data: DRIVER PASSENGER

Seat Track Failure: 0.0" 0.0"

inches of shift

Seat Back Failure: None None

VISIBLE DUMMY CONTACT POINTS: DRIVER PASSENGER

Head: Top of head with Top of head with sunvisor.
sunvisor. Airbag Chin with chest

Abdomen: No contact No contact

Chest: Airbag No contact

Knees: Dashpanel Glove Box Door

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1993 Subaru Legacy 4-Door Sedan
 NHTSA No.: CP5501; VIN: 4S3BC6331P1648282; Color: Maroon
 Engine Data: 4 cylinders; - CID; 2.2 Liters; - cc
 Placement: X Longitudinal or In-Line; - Transverse or Lateral
 Transmission Data: 5 speeds; X Manual; - Automatic; - Overdrive
 Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive
 Major Options: X A/C; X Pwr.Strg.; X Pwr.Brakes
X Pwr.Windows; X Pwr.Door Locks; X Tilt Wheel
 Date Received: 1/28/93; Odometer Reading 20 miles
 Selling Dealer: Northtown Hyundai-Subaru
 & Address 3675 Sheridan Drive Amherst, NY 14226

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Fuji Heavy Industries Ltd.
 Date of Manufacture: 10/92
 GVWR: 3930 lbs.; GAWR: 1865 lbs. FRONT; 2065 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 35 psi FRONT
35 psi REAR

Recommended Tire Size: P185/75R/4

* Recommended Cold Tire Pressure: 30 psi FRONT; 29 psi REAR

Size of Tires on Test Vehicle: P185/75R14; Manufacturer: Bridge Stone

Vehicle Capacity Data:

Type of Front Seats: - Bench; X Bucket; - Split Bench
 Number of Occupants: 2 Front; 3 Rear; 5 Total
 Vehicle Capacity Weight (VCW) = 810 lbs.
 No. of Occupants x 150 lbs. = 750 lbs.
 Rated Cargo/Luggage Weight (RCLW) = 60 lbs. (Difference)

*Tire pressure used for test

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

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

Right Front = 790 lbs. Right Rear = 570 lbs.
 Left Front = 810 lbs. Left Rear = 560 lbs.
 TOTAL FRONT = 1600 lbs. TOTAL REAR = 1130 lbs.
 % of Total Vehicle Weight = 58.6 % of Total Weight = 41.4 %
 TOTAL DELIVERED WEIGHT = 2730 lbs.

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 2730 lbs.
 Rated Cargo/Luggage Weight (RCLW) = 60 lbs.
 Weight of 2 P.572 Dummies @ 164 ea. = 328 lbs.
 TARGET TEST WEIGHT = 3118 lbs. (sum)

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 0 POUNDS OF CARGO WEIGHT:

Right Front = 850 lbs. Right Rear = 670 lbs.
 Left Front = 890 lbs. Left Rear = 690 lbs.
 TOTAL FRONT = 1740 lbs. TOTAL REAR = 1360 lbs.
 % of Total Weight = 56.1 % % of Total Weight = 43.9 %
 TOTAL TEST WEIGHT = 3100 lbs.

Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED: RF 27.1 LF 26.9 RR 26.4 LR 26.1
 FULLY LOADED: RF 25.9 LF 25.9 RR 24.1 LR 23.7
 AS TESTED: RF 27.0 LF 26.7 RR 25.4 LR 25.3

Vehicle's Wheel Base: 101.6 in.

Location of Vehicle's C.G.: 44.6 inches rearward of front wheel center

FUEL SYSTEM DATA:

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 (with entire fuel system filled)

Table 3
POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°
 Test Date: March 11, 1993 Time: 12:15 Temperature: 33°F
 Vehicle NHTSA No.: CP5501
 Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 29.5 mph; Trap No. 2 = 29.5 mph
 Distance from vehicle to barrier: (1) entering trap = 52 inches
 (2) exiting trap = 12 inches

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test Right = 175.2; C/L = 178.1; Left = 174.8
 Post-Test Right = 162.6; C/L = 163.6; Left = 162.9
 Crush Right = 12.6; C/L = 14.5; Left = 11.9
 AVERAGE = 13.0 inches

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:
 Right = 21.5; C/L = 20.9; Left = 22.6
 AVERAGE = 21.5 inches

DOOR OPENING:

	Left	Right
Front	<u>Closed-operable</u>	<u>Closed-operable</u>
Rear	<u>Closed-operable</u>	<u>Closed-operable</u>

SEAT MOVEMENT:

	Seat Back Failure	Seat Shift
Front	<u>None</u>	<u>0.0</u>
Rear	<u>None</u>	<u>0.0</u>

Table 3
POST IMPACT DATA (cont.)

GLAZING DAMAGE: Windshield cracked

OTHER NOTABLE IMPACT FEATURES: None

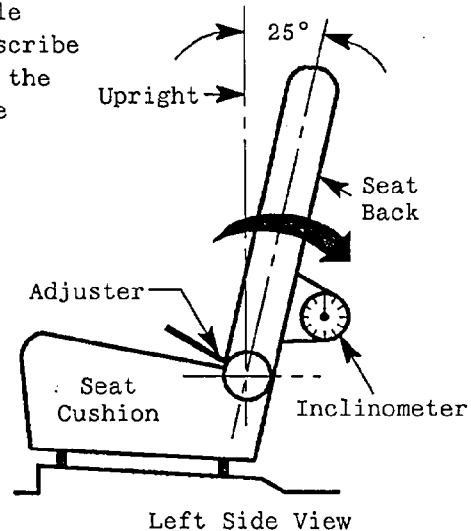
Section 3
OCCUPANT AND VEHICLE DATA

Figure 1
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year: 1993 Vehicle Model: Subaru Legacy Body Style: 4-Door Sedan

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.



Seat back angle for driver's seat: 25°

Measurement instructions: Place seat back in 4th notch from first locking position (first locking position = 1st notch)

Seat back angle for passenger's seat: 25°

Measurement instructions: Same as driver

2. Seat Fore and Aft Positioning

Positioning of the driver's seat: Place seat in 9th detent (mid-position) from a total of 17 detents

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

3. Fuel Tank Capacity Data

A. "Usable Capacity" of the standard equipment fuel tank is 15.9 gallons

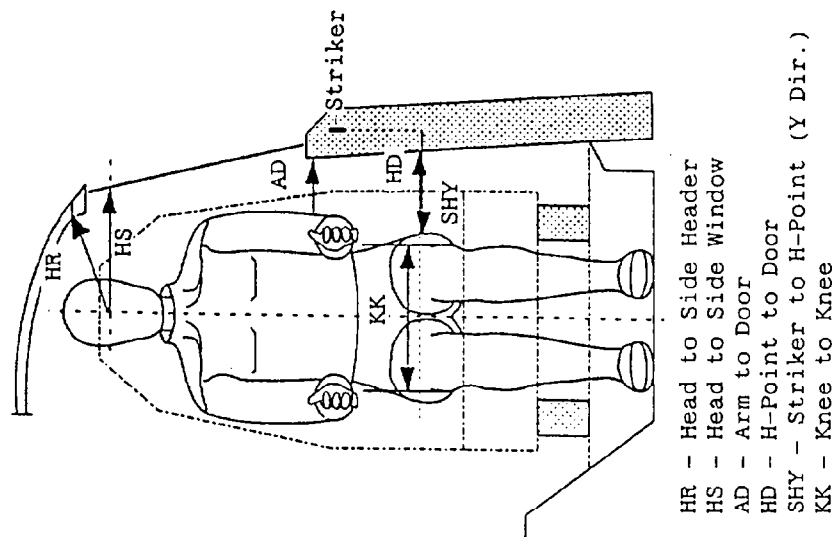
B. "Usable Capacity" of the optional equipment fuel tank is - gallons

4. Steering Column Position: Mid Position

5. Other: None

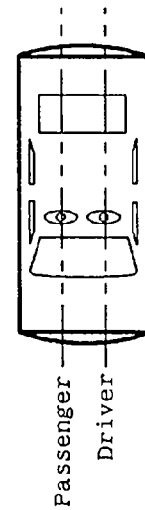
Figure 2

PART 572 DUMMY IN-VEHICLE POSITION



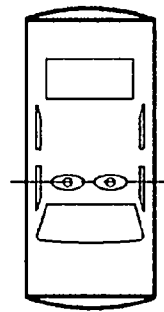
- HH - Head to Header
- HW - Head to Windshield
- HZ - Head to Roof
- NR - Nose to Rim
- CS - Chest to Dash
- CD - Chest to Abdomen
- RA - Rime to Abdomen
- KDL/KDR - Knee to Dash
- KDA - Knee to Dash Angle
- SH - Striker to H-Point
- SK - Striker to Knee
- ST - Striker to Head
- NA - Nose to Rim Angle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

Vertical Longitudinal Planes



Passenger
Driver

Vertical Transverse Plane



- HR - Head to Side Header
- HS - Head to Side Window
- AD - Arm to Door
- HD - H-Point to Door
- SHY - Striker to H-Point (Y Dir.)
- KK - Knee to Knee

Table 4

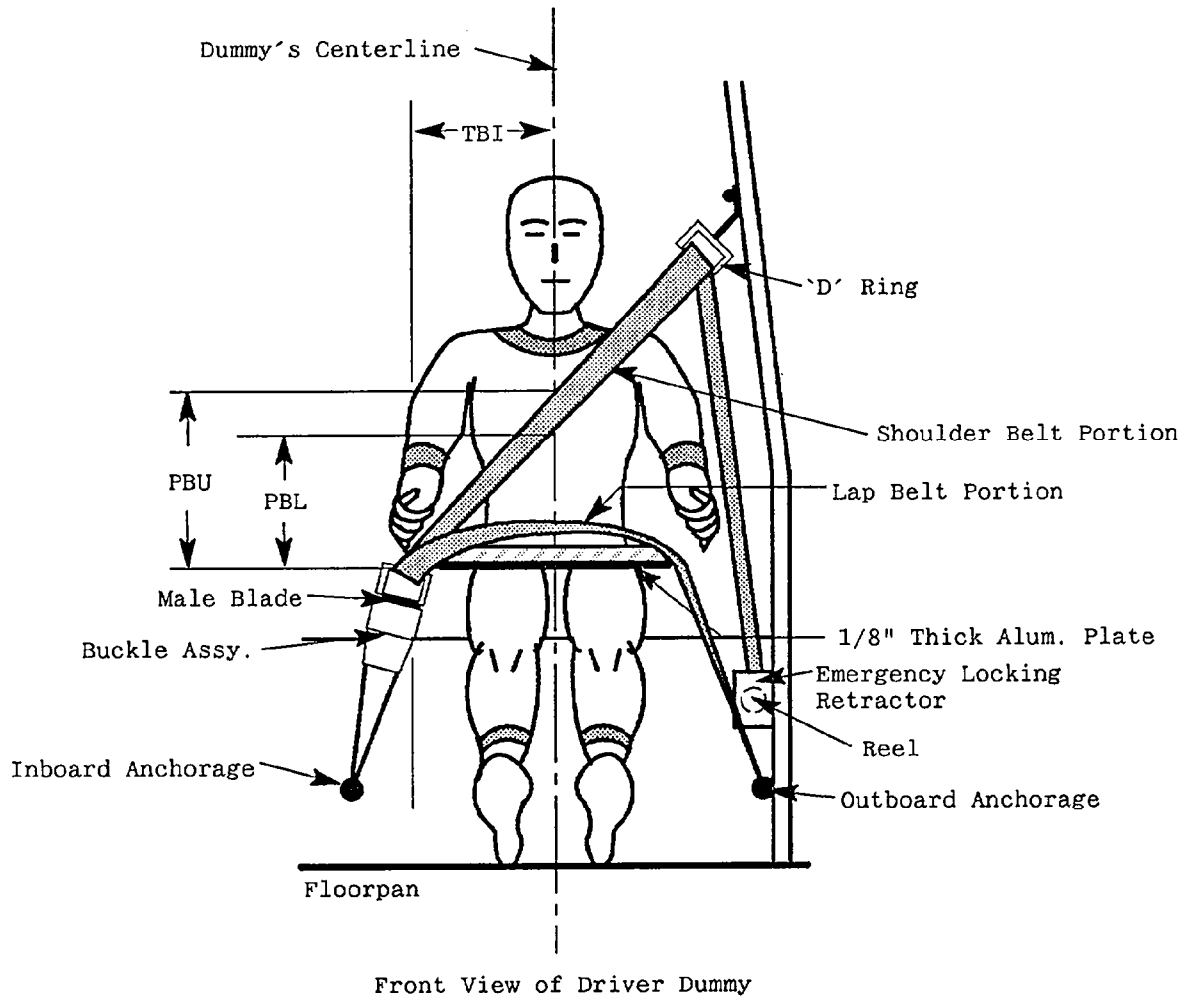
FRONT SEAT OCCUPANT MEASUREMENTS

(all dimensions in inches unless otherwise specified)

	DRIVER (Serial #1022)	PASS (Serial #1019)
WA°	30°	-
SWA°	66°	-
SCA°	24°	-
SA°	See Note	See Note
HZ	4.5	4.5
HH	13.1	13.5
HW	17.7	18.1
HR	6.3	5.3 structures on this side
NR	18.1 Angle (NA) 16°	-
CD	21.3	24.1
CS	14.2	-
RA	7.2	-
KDL	6.6 Angle (KDA) 36°	7.7
KDR	7.7	7.5 Angle (KDA) 27°
FA°	18°	14°
TA°	36°	43°
KK	14.3	11.8
ST	22.3 Angle 87°	22.8 Angle 87°
SK	21.8 Angle 4°	22.0 Angle 2°
SH	7.3 Angle 43°	7.5 Angle 41°
SHY	8.9	8.6
HS	8.0	7.5
HD	6.7	6.9
AD	3.6	3.4

Note: Seat back set as specified by manufacturer.

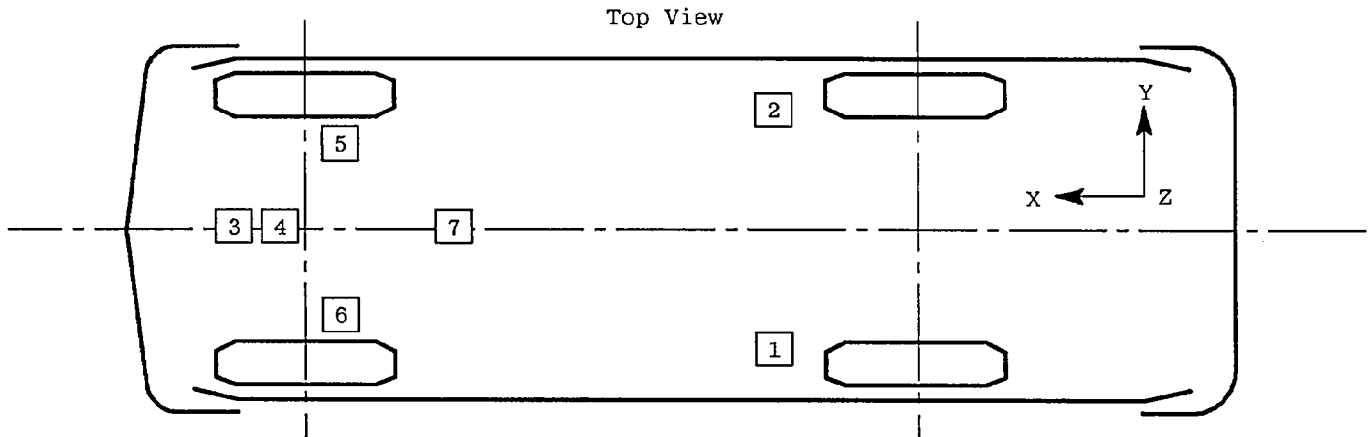
Figure 3
SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	13.0	13.0
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	10.3	10.3
<u>TBI</u> -- Distance from torso centerline to buckle	*	*

* - Manual lap belt not used for this test.

Figure 4
VEHICLE ACCELEROMETER LOCATIONS



ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Left Disc Brake Caliper	X		
7	Instrument Panel	X		

*The accelerometer pack number can be correlated with the vehicle response data traces found in Appendix B.

Table 5
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION**		NEGATIVE DIRECTION**	
						MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	REAR SEAT X-MEMBER AT LEFT SIDE	PRE:	69.5	19.0	16.2				
		POST:	69.5	19.0	16.0				
	LONGITUDINAL ACCELERATION					3	135	-37	46
2	REAR SEAT X-MEMBER AT RIGHT SIDE	PRE:	69.6	-19.0	16.6				
		POST:	69.6	-19.0	16.4				
	LONGITUDINAL ACCELERATION					3	129	-32	44
3	TOP OF ENGINE BLOCK	PRE:	157.3	4.0	31.8				
		POST:	151.1	3.8	32.7				
	LONGITUDINAL ACCELERATION					41	43	-80	20
4	BOTTOM OF ENGINE	PRE:	155.1	-4.5	12.5				
		POST:	152.0	-4.0	11.4				
	LONGITUDINAL ACCELERATION					21	42	-74	29
5	BRAKE CALIPER AT RIGHT SIDE	PRE:	139.5	-22.8	19.5				
		POST:	137.2	-22.8	19.5				
	LONGITUDINAL ACCELERATION					6	77	-43	41
6	BRAKE CALIPER AT LEFT SIDE	PRE:	139.5	22.8	20.0				
		POST:	139.3	22.8	19.6				
	LONGITUDINAL ACCELERATION					-	-	-	-
7	DASH PANEL	PRE:	111.7	-2.0	29.8				
		POST:	108.6	-2.5	27.5				
	LONGITUDINAL ACCELERATION					22	78	-68	53

*X + Forward from rear bumper Y + Left from vehicle centerline Z + Up from ground	** LONGITUDINAL: LATERAL: VERTICAL:	<u>POSITIVE</u> FORWARD LEFTWARD UPWARD	<u>NEGATIVE</u> REARWARD RIGHTWARD DOWNWARD
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DISTANCE MEASUREMENTS IN INCHES

Figure 5
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5.

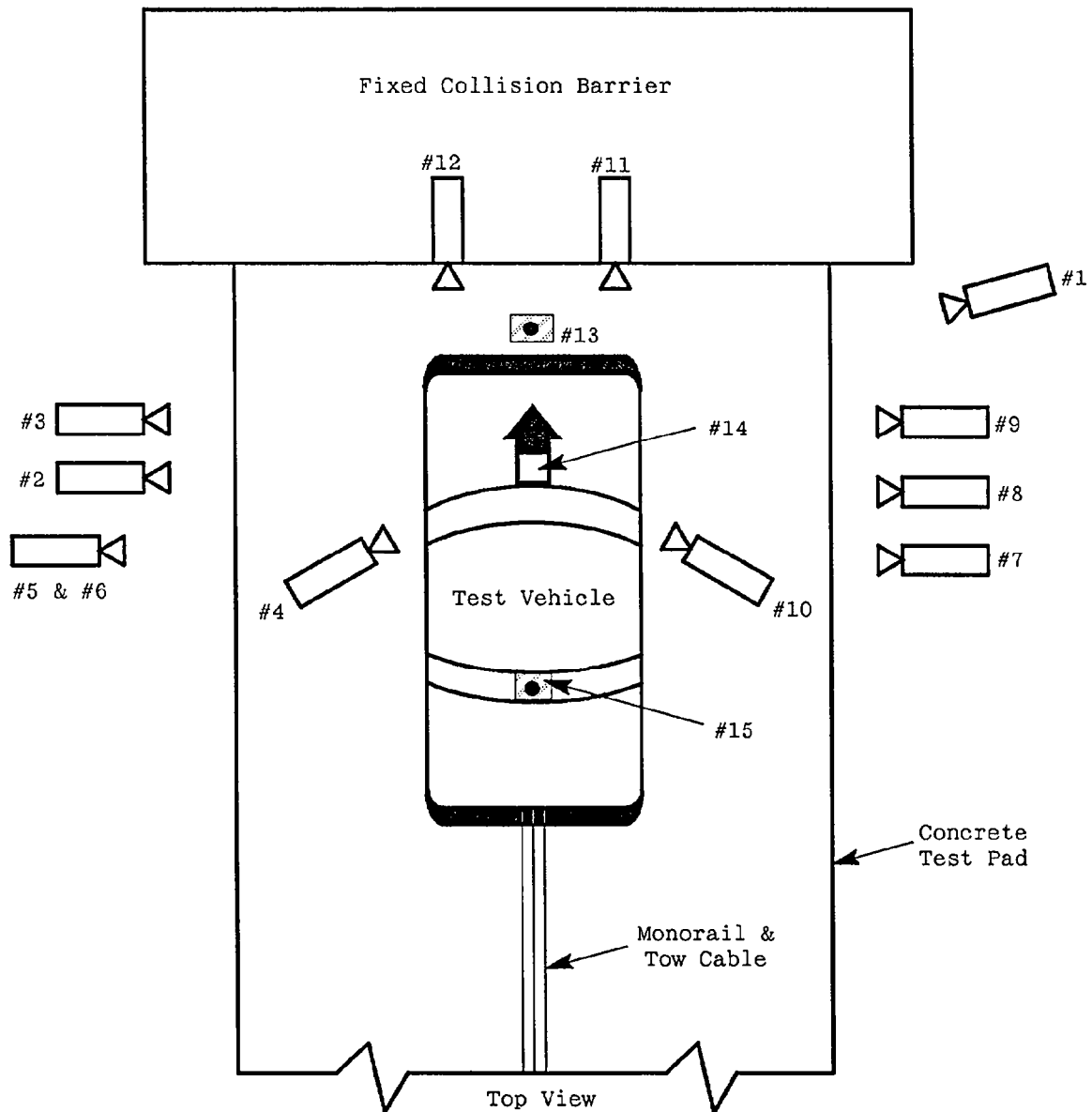


Table 6

HIGH-SPEED CAMERA LOCATIONS

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	228	55	42	3	211	13	550
3	Left Side View	306	34	41	-3	289	25	620
4	Driver and Interior View	108	103	65	-18	-	13	575
5	Steering Column (Bottom)	275	68	46	-4	258	25	850
6	Steering Column (Top)	275	68	70	-10	258	25	770
7	Overall Right Side	230	69	42	-5	213	13	560
8	Right Side View	303	48	40	-2	286	25	560
9	Right Passenger View	310	76	56	-4	293	35	520
10	Passenger and Interior View	108	105	64	-17	-	13	575
11	Passenger Front View	23	19	76	-38	-	13	600
12	Driver Front View	23	19	76	-36	-	13	640
13	Windshield View	0	0	126	-50	-	13	600
14	Pit View of Engine	0	40	-84	90	-	13	710
15	Pit View of Fuel Tank	0	126	-84	90	-	13	900

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

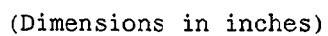


Figure 7
TEST VEHICLE MEASUREMENTS

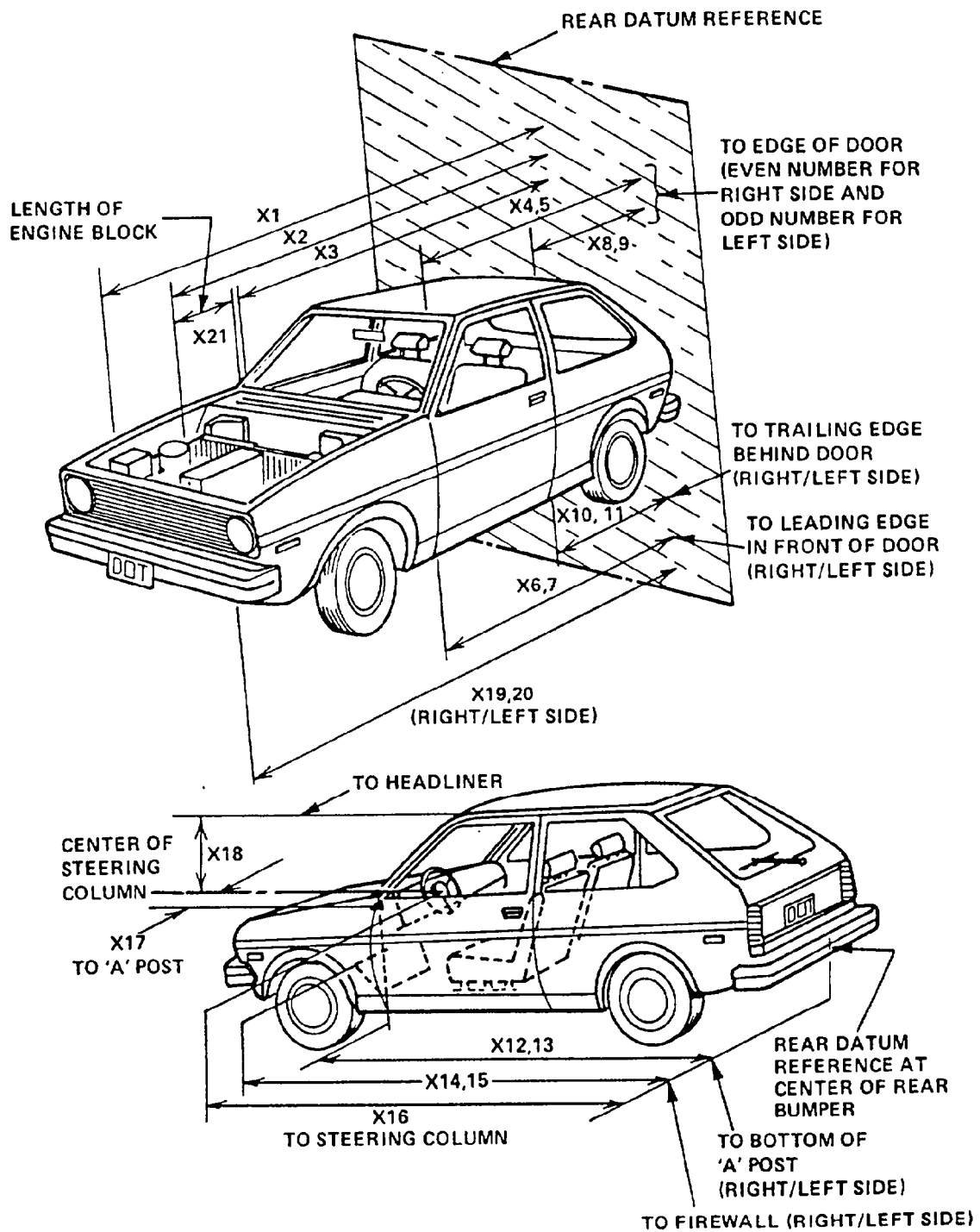


Table 7

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	178.1	163.6	14.5
X2	Rear Surface of Vehicle to Front of Engine	159.8	152.8	7.0
X3	Rear Surface of Vehicle to Firewall	134.8	135.2	-0.4
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	120.1	120.4	-0.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	120.2	120.9	-0.7
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	122.0	122.1	-0.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	122.4	122.5	-0.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	82.0	82.3	-0.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	82.4	83.0	-0.6
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	82.1	82.3	-0.2
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	82.5	82.6	-0.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	121.7	121.9	-0.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	122.2	122.6	-0.4
X14	Rear Surface of Vehicle to Firewall, Right Side	133.9	133.2	0.7
X15	Rear Surface of Vehicle to Firewall, Left Side	133.1	133.2	-0.1
X16	Rear Surface of Vehicle to Steering Column	104.1	104.6	-0.5
X17	Center of Steering Column to "A" Post	15.4	15.4	0.0
X18	Center of Steering Column to Headliner	17.3	15.6	1.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	175.2	162.6	12.6
X20	Rear Surface of Vehicle to Left Side of Front Bumper	174.8	162.9	11.9
X21	Length of Engine Block	16.5	16.5	0.0

Section 4

SUMMARY OF RESULTS OF FMVSS NOS. 208, 212, 219 AND 301-75

- "Occupant Crash Protection," FMVSS No. 208 Data
- "Windshield Mounting," FMVSS No. 212 Data
- "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- "Fuel System Integrity," FMVSS No. 301-75

Table 8

DUMMY INJURY CRITERIA VALUESNHTSA No.: CP5501 Vehicle: 1993 Subaru Legacy 4-Door Sedan

	MAXIMUM ACCELERATION (g's)								
	HEAD				CHEST				
	X	Y	Z	R	X	Y	Z	R*	Displacement
Dummy (1)	-45	-12	52	67.9	-50	-14	-7	50.2	N/A
Dummy (2)	42	17	51	54.0	-43	-23	17	42.0	N/A

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Dummy (1)	1546	1646
Dummy (2)	1067	1035

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond Maximum		Avg. Acc. (g) t ₁ TO t ₂
		t ₁ (msec)	t ₂ (msec)	
Dummy (1)	617	58.200	91.320	51.06
Dummy (2)	441	61.440	97.320	43.23

* Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Table 9

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM CHECK

With occupant in driver's position, the lap belt in stowed position, and ignition switch placed in "Start/On" position: ✓

Log time duration of audible warning signal = 6.0 sec.

Log time duration of reminder light operation = * sec.

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

Log time duration of audible warning signal = 0 sec.
(audible warning should not operate)

Log time duration of reminder light operation = 0 sec.

Note wording of visual warning:

Fasten Seat Belt -

Fasten Belt -

Symbol 101-80 X

*Continuous

Table 10

FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL INFORMATION

Locate label which describes manufacturers maintenance or replacement schedule for crash-deployed occupant protection system.

Describe location: Driver side sunvisor

The manufacturers recommended schedule "ten years after the date of vehicle manufacture, as noted on the certificaion plate, the SRS airbag system must be inspected by a Subaru dealer".

Were appropriate instructions concerning maintenance and/or replacement of this system provided?

YES X NO -

Was a description of the functional operation of the system provided?

YES X NO -

Is there a reference to the instructions and description of the system on the label?

YES X NO -

Was an owner's manual provided?

YES X NO -

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems?

YES X NO -

Table 11

FMVSS NO. 208 - READINESS INDICATOR

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement.

Is the system totally mechanical? YES - NO X

Describe the location of the readiness indicator:

Upper left side of instrument panel

Is the readiness indicator clearly visible to the driver?
YES X NO -

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided?
YES X NO -

Table 12

FMVSS NO. 208 - COMFORT AND CONVENIENCE TEST SUMMARY

Test Vehicle NHTSA No.:	<u>CP5501</u>
Make/Model:	<u>1993 Subaru Legacy</u>
Date of Comfort/Convenience Check:	<u>3/10/93</u>
Technician Performing Check:	<u>VMP</u>
GVWR:	<u>3930 lbs</u>

Seat belt comfort and convenience requirements cover vehicles manufactured on or after September 1, 1986, which have a gross vehicle weight rating of 10,000 pounds or less. Exemptions to this rule are belts installed in a walk-in, van-type vehicle and manual Type 2 belt systems installed in the front outboard seating positions of passenger automobiles. On or after September 1, 1989, the exemption of the type 2 manual seat belts installed in the front outboard seating positions of passenger automobiles will change depending on the states' enactment of mandatory usage laws.

Was vehicle built after or on September 1, 1986, and is it equipped with:

1. Automatic seat belts YES X NO -

If yes, go to requirements D1, D2 and D3

2. Manual seat belts* YES *** NO -

a. The seat belts, other than Type 2 lap/shoulder belts, are located in the front outboard seating positions of a passenger automobile.

YES - NO -

(Go to requirements D3, D4, D5, and D6)

b. The seat belt system is Type 2 lap/shoulder belt in the front outboard seating positions or the seat belts are located in a walk-in van.

STOP

*If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

**Manual seat belts not used for this test.

Table 12 (cont.)

D1

CONVENIENCE HOOKS

A convenience hook or other device is provided to stow seat belt webbing to facilitate entering or exiting the vehicle.

YES - NO X

Check the option which applies to this test vehicle:

1. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's drivetrain is engaged.

YES N/A NO N/A

2. A convenience hook or other device automatically releases the webbing when the automatic belt system is operational and remains in the released mode as long as the vehicle's ignition switch is moved to the "on" or "start" position and the vehicle's parking brake is in the released mode (nonengaged).

YES N/A NO N/A

D2

WEBBING TENSION - RELIEVING DEVICE

The seat belt assembly installed in the outboard designated seating position has either manual or automatic tension relieving devices permitting the introduction of slack in the webbing of the shoulder belt ("comfort clips" or "window shade" devices).

YES - NO X

Check the owner's manual and determine the maximum amount of slack recommended by the manufacturer in inches. The recommended slack is - inches. Introduce this slack into the shoulder belt before testing the vehicle to comply with the requirements of FMVSS 208 S5.1. A warning is included in the owner's manual that introducing slack beyond the amount specified can significantly reduce the effectiveness of the shoulder belt.

YES N/A NO N/A

(If NO, provide explanation.)

Check the option which applies to this test vehicle:

1. This vehicle is equipped with automatic seat belts and the tension relieving device is cancelled each time the adjacent door is opened.

YES N/A NO N/A

(If NO, provide explanation.)

Table 12 (cont.)

2. This vehicle is equipped with manual belts, required to meet FMVSS 208 S4.6, and the tension relieving device is cancelled each time one of the following options occurs:

a. The adjacent door is opened. YES N/A NO N/A

b. The latch plate is released from the buckle. YES N/A NO N/A

3. This is an open-body vehicle, without doors. Does the manual mean to cancel any shoulder belt slack introduced by a tension relieving device to operate properly?

YES N/A NO N/A

(If NO, provide explanation.)

D3

BELT CONTACT FORCE

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in this vehicle incorporate a webbing tension relieving device. Does the vehicle incorporate a tension relieving device?

YES - NO X

2. Seats are adjusted according to instructions in Appendix B.

YES X NO -

3. The test dummies are positioned according to dummy position placement instructions in Appendix B and Appendix C.

YES X NO -

4. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest, then fasten the latch. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point, pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. Measure the contact force exerted by the belt webbing on the dummy's chest. The contact force is 0.3 pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

Table 12 (cont.)

D4

LATCHPLATE ACCESSIBILITY

1. Position the test dummy in the driver's seat or passenger's seat in its forward most adjustment position.
YES X NO -
2. Attach the inboard and outboard reach string. YES X NO -
3. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. With the latchplate in the normal stowed position, check to assure that the latchplates are within the reach envelope.
YES X NO -
4. Using the clearance test block, determine if there is sufficient clearance between the vehicle seat and the side of vehicle interior to allow the test block to move unhindered to the latchplate or buckle.
YES X NO -

D5

RETRACTION

1. Seats and seat backs are adjusted according to instructions in Appendix B "General Test Conditions" in TP-208-8.
YES X NO -
2. Use anthropomorphic test dummies whose arms have been removed and position the dummies in the front outboard designated seating positions according to instructions in Appendix B and restrain the dummies, using the belt systems for the positions being tested.
YES X NO -
3. Outboard armrests which are capable of being stowed on vehicle seats shall be placed in their stowed positions.
YES N/A NO N/A
4. Check the option which applies to this test vehicle:
 - a. The torso and lap belt webbing of the seat belt system automatically retract to a stowed position when the adjacent vehicle door is in an open position and the seat belt latch plate is released.
YES X NO -

Table 12 (cont.)

- b. The torso and lap belt webbing of the seat belt system automatically retract when the seat belt latch plate is released.

YES X NO -

5. With the webbing and hardware in the stowed position, close the door to assure that the webbing and hardware are prevented from being pinched.

YES X NO -

6. If this test vehicle has an open body (without doors) and has a belt system with a tension-relieving device, check to assure that the belt system fully retracts when the tension-relief device is manually deactivated.

YES N/A NO N/A

D6

ACCESSIBILITY

The requirements for accessibility do not apply to:

1. Seats whose seat cushions are removable so that the seat back serves a function other than seating;
2. Seats which are removable;
3. Seats which are movable so that the space formerly occupied by the seat can be used for a secondary function.

If the seats in this vehicle are different than the criteria above, then determine if:

1. Each manual seat belt assembly whose webbing is designed to pass through the seat cushion or between the seat cushion and seat back has one of the following three parts (the seat belt latchplate, the buckle, or the seat belt webbing) on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant).

YES X NO -

2. The remaining two seat belt parts are accessible under normal conditions.

YES X NO -

Table 12 (cont.)

3. The buckle and latchplate pass through the guides or conduits provided and do not fall behind the seat when the following events occur in order:
- a. The belt is completely retracted or, if the belt is nonretractable, the belt is unattached.
YES X NO -
- b. The seat is moved to any position to which it is designed to be adjusted.
YES X NO -
- c. The seat back, if foldable, is folded forward as far as possible and then moved backward into positions.
YES X NO -
4. Is the inboard receptacle end of the seat belt assembly which is installed in the outboard designated seating position accessible with the center arm rest in any position to which it can be adjusted without moving the armrest?
YES N/A NO N/A

D7

LATCH MECHANISM

A seat belt assembly installed in a passenger car, except an automatic belt assembly, shall have a latch mechanism: Vehicle equipped with automatic belts.

1. Whose components are accessible to a seated occupant in both the stowed and operational positions.
YES N/A NO N/A
2. That releases both the upper torso restraint and the lap belt simultaneously, if the assembly has a lap belt and an upper torso restraint that require unlatching for release of the occupant.
YES N/A NO N/A
3. That releases at a single point by a push button action.
YES N/A NO N/A

Figure 8

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET

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

Windshield is bonded in place with 1.0" rubber trim covering upper windshield and 0.2" rubber trim covering both sides of windshield. A plastic shroud and 0.2" rubber trim cover bottom of windshield.

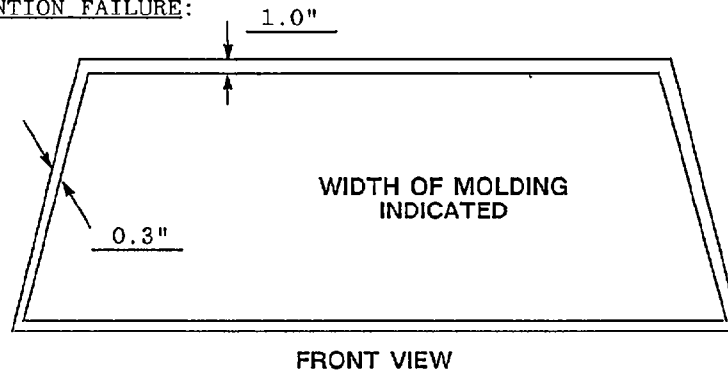
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	83.2	83.2	100
LEFT SIDE	83.2	83.2	100
TOTAL	166.4	166.4	100

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

None

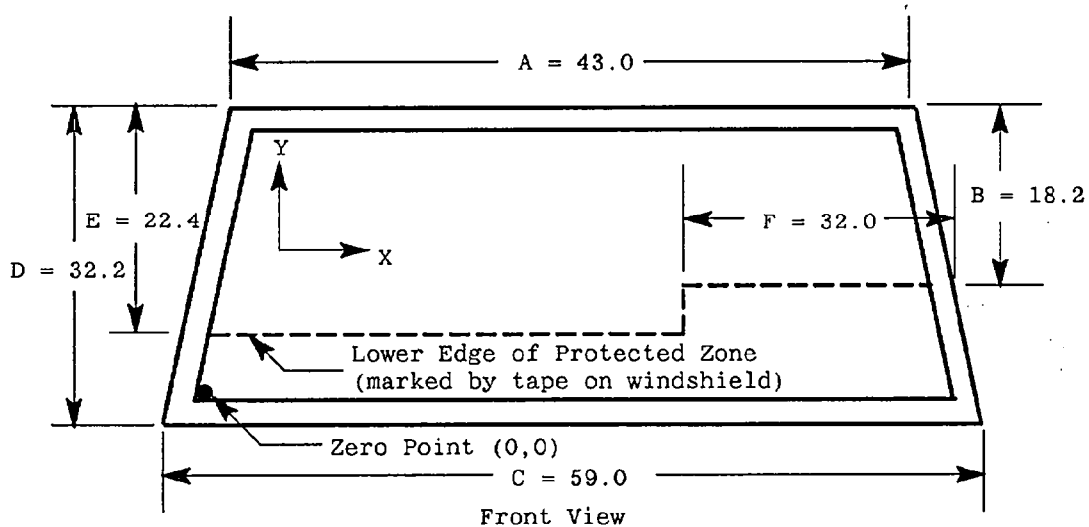
Figure 9

FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA: (Dimensions in inches.)



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":

(Show location of penetration on above sketch)

None

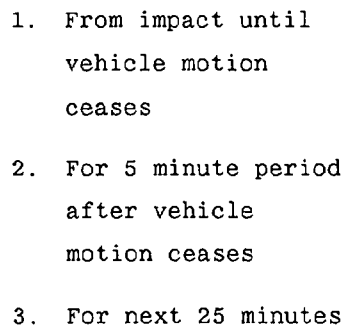
	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

FMVSS NO. 301

TEST DATE: March 11, 1993

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

FUEL SPILLAGE MEASUREMENT:



ACTUAL	MAX. ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./1 min.

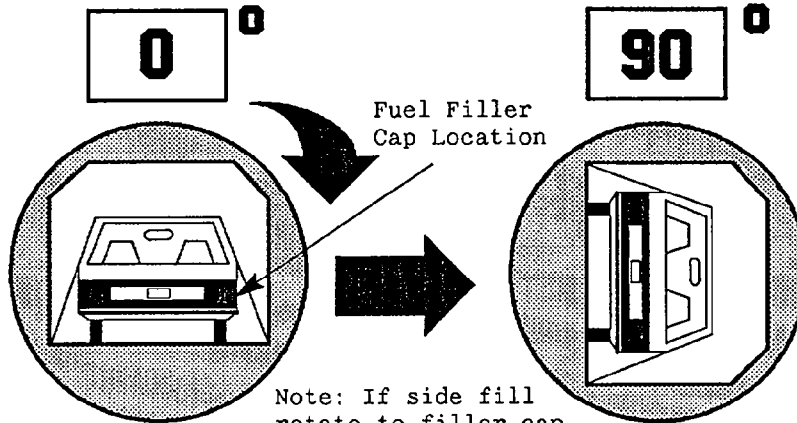
None

Table 14
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

Vehicle NHTSA ID No.:

CP5501



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes) 2 minutes 05 seconds

FMVSS 301 Position Hold Time + 5 minutes 00 seconds

TOTAL 7 minutes 05 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute intervals only as determined above.

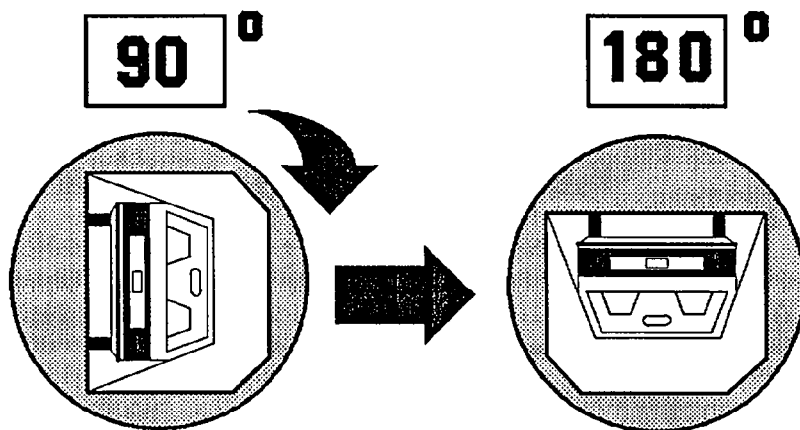
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CP5501

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 1 _____ minutes _____ 50 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 00 _____ seconds
TOTAL	_____ 6 _____ minutes _____ 50 _____ seconds
Next whole minute interval	_____ 7 _____ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

Note: Record spillage for whole minute intervals only as determined above.

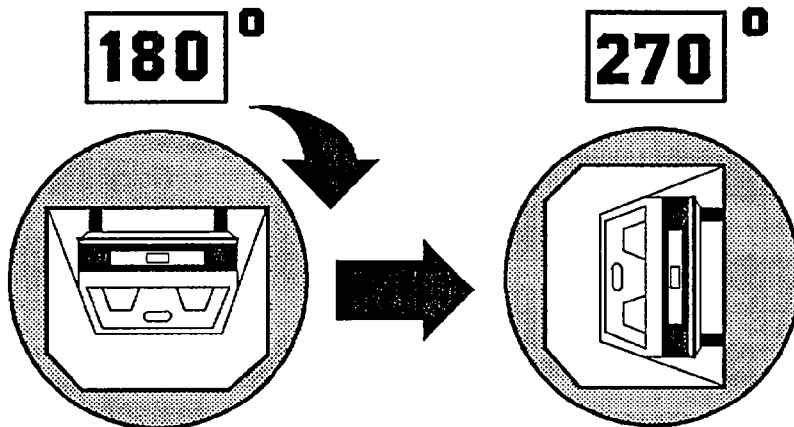
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CP5501

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1 minutes 55 seconds
FMVSS 301 Position Hold Time +	5 minutes 00 seconds
TOTAL	6 minutes 55 seconds
Next whole minute interval	7 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

Note: Record spillage for whole minute
intervals only as determined above.

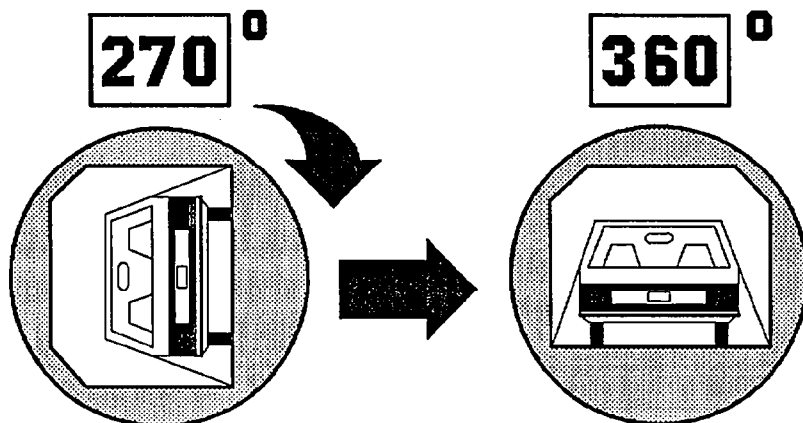
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CP5501

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 2 _____ minutes _____ 05 _____ seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 7 _____ minutes _____ 05 _____ seconds

Next whole minute interval _____ 8 _____ minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute
intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 15

TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab: Calspan Advanced Technology Center
Lab Project Manager & Telephone No.: Walter E. Levan (716) 632-7500
Date of Test: March 11, 1993 Vehicle NHTSA No.: CP5501
Vehicle Manufacturer: Fuji Heavy Industries, Ltd.
Model Year: 1993 VIN: 4⁵3BC6331P1648282
Model: Subaru Legacy Body Style: 4-Door Sedan Build Date: 10/92
Dummy Stabilized Temperature at Time of Test: 70 °F (Spec. = 66-78°F)
Impact Velocity: 29.5 mph Time of Test: 12:15
Type of Automatic Restraint System: Driver airbag. Driver and right front
passenger automatic torso belts.

Failure Details:

The vehicle as tested appears to comply with the requirements of FMVSS
Nos. 208, 212, 219 (partial), and 301.

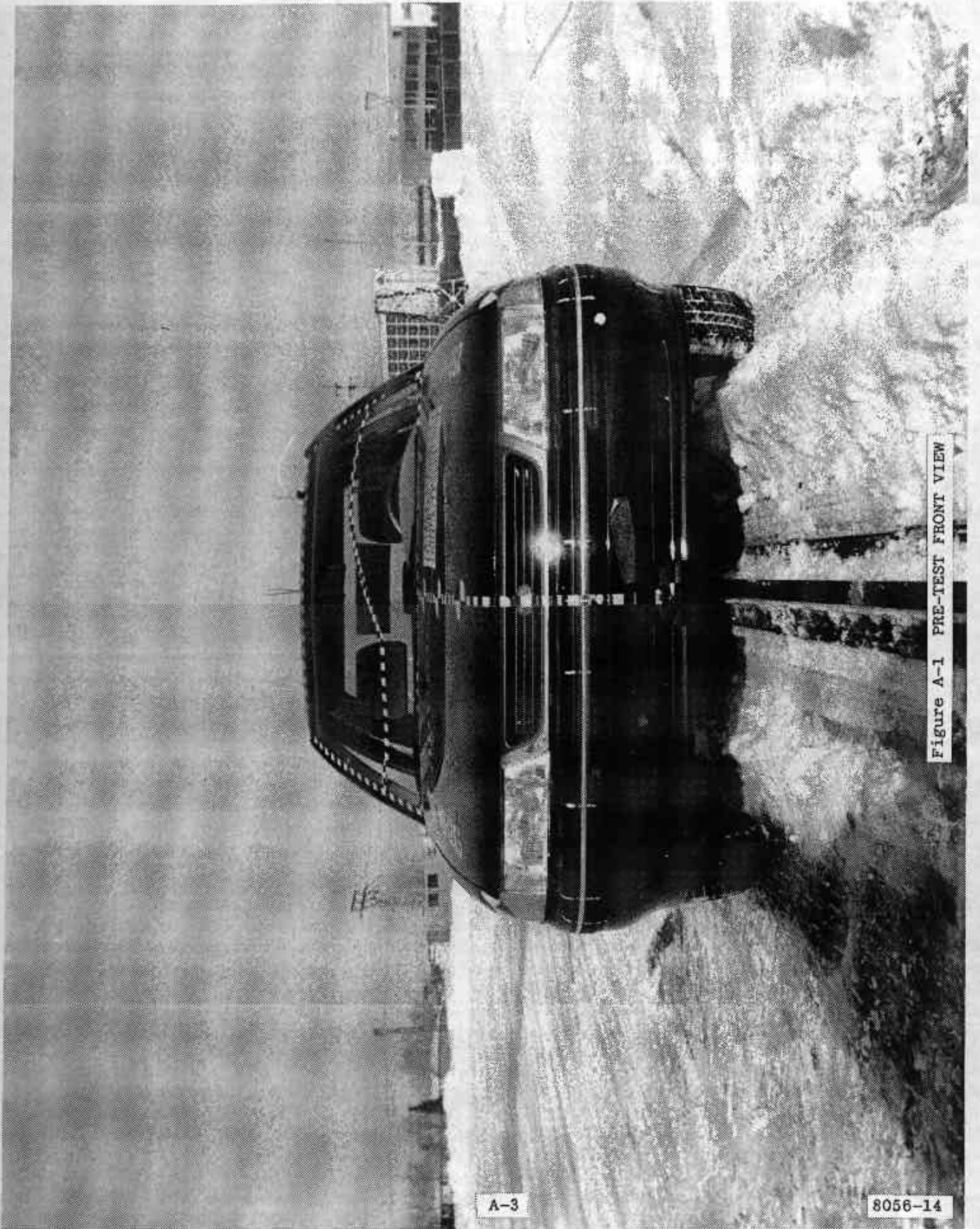
Appendix A

PHOTOGRAPHS

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Figure A-1 PRE-TEST FRONT VIEW



A-3

8056-14

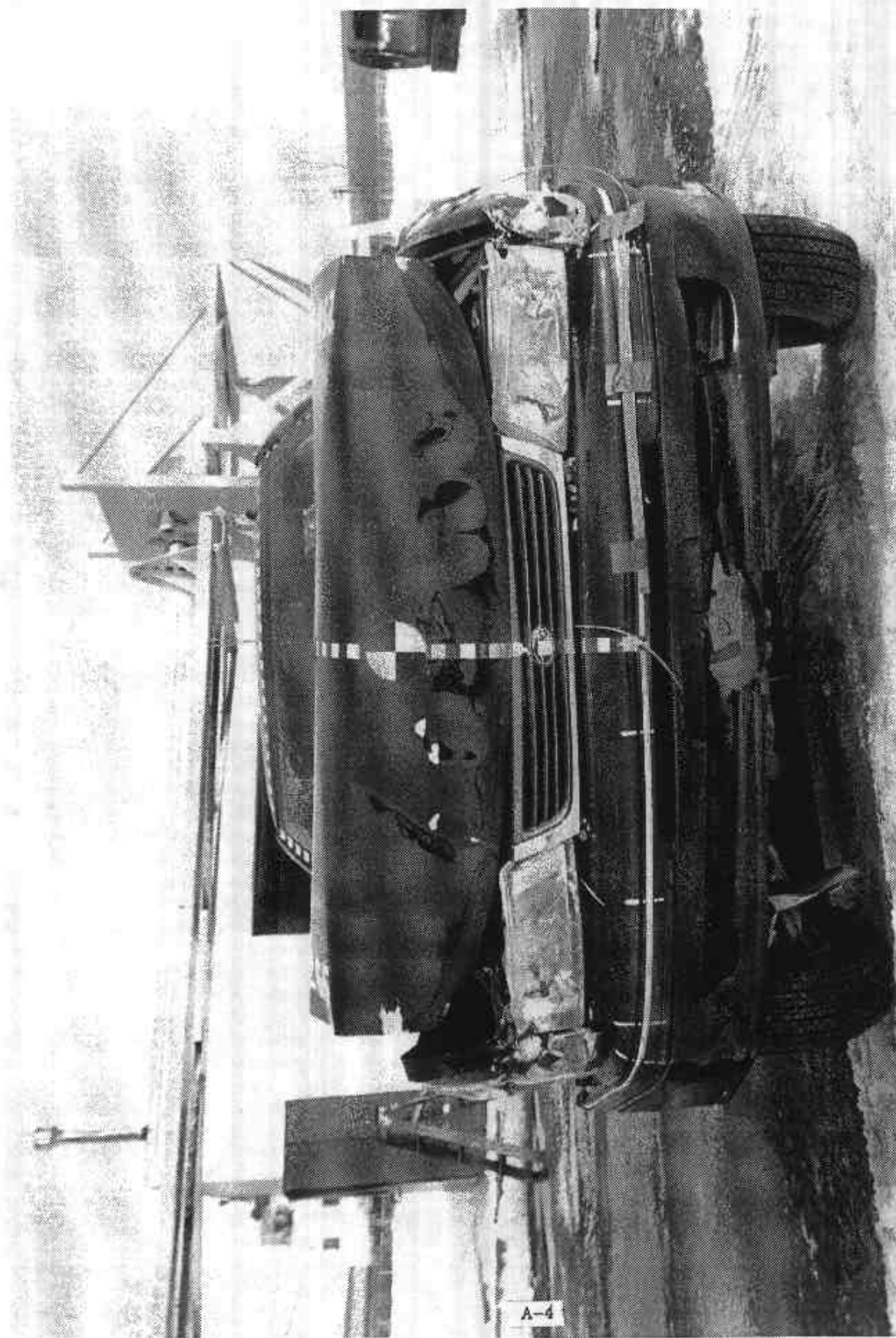


Figure A-2 POST-TEST FRONT VIEW

A-4

8056-14

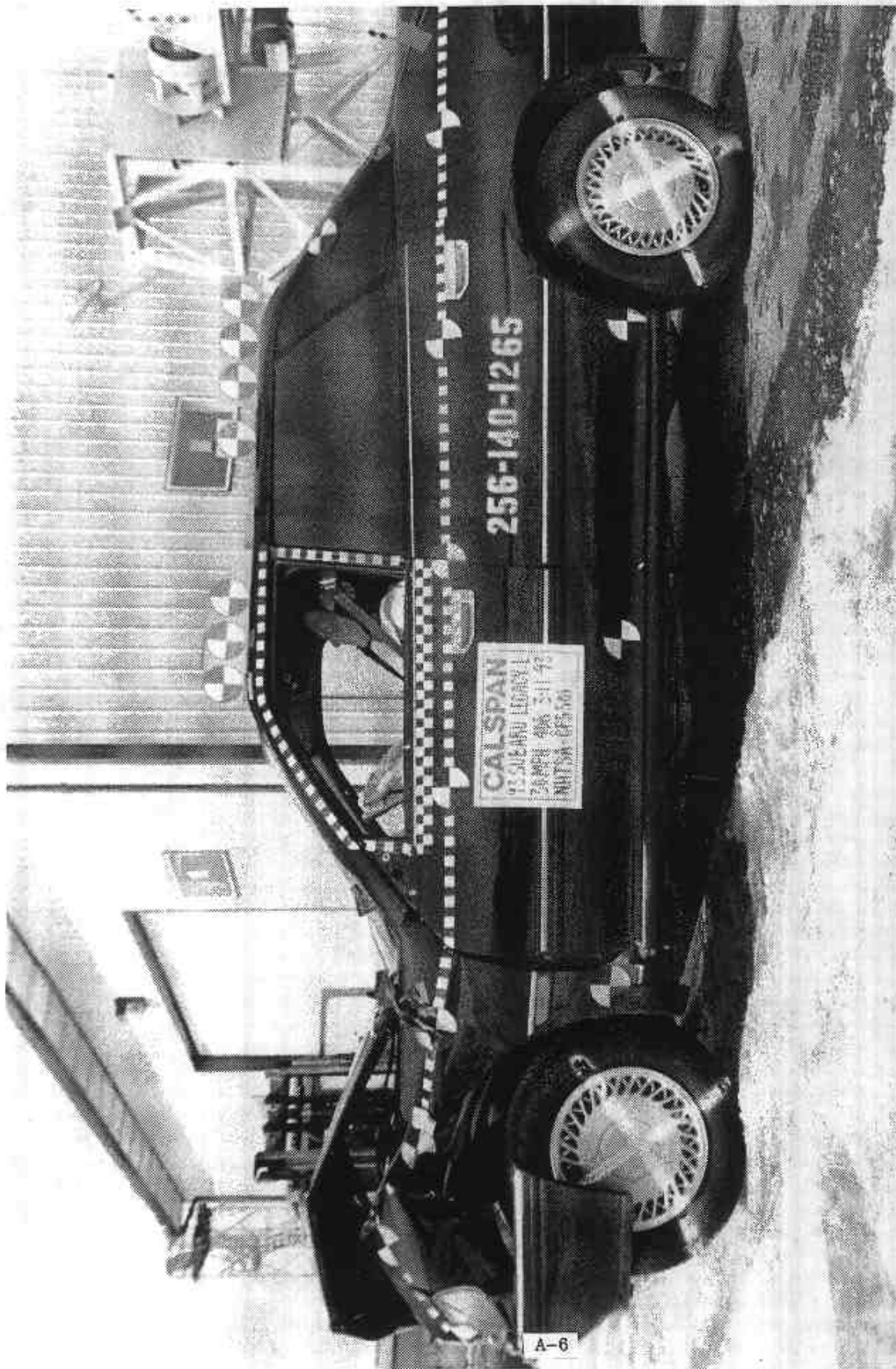


Figure A-4 POST-TEST LEFT SIDE VIEW

8056-14

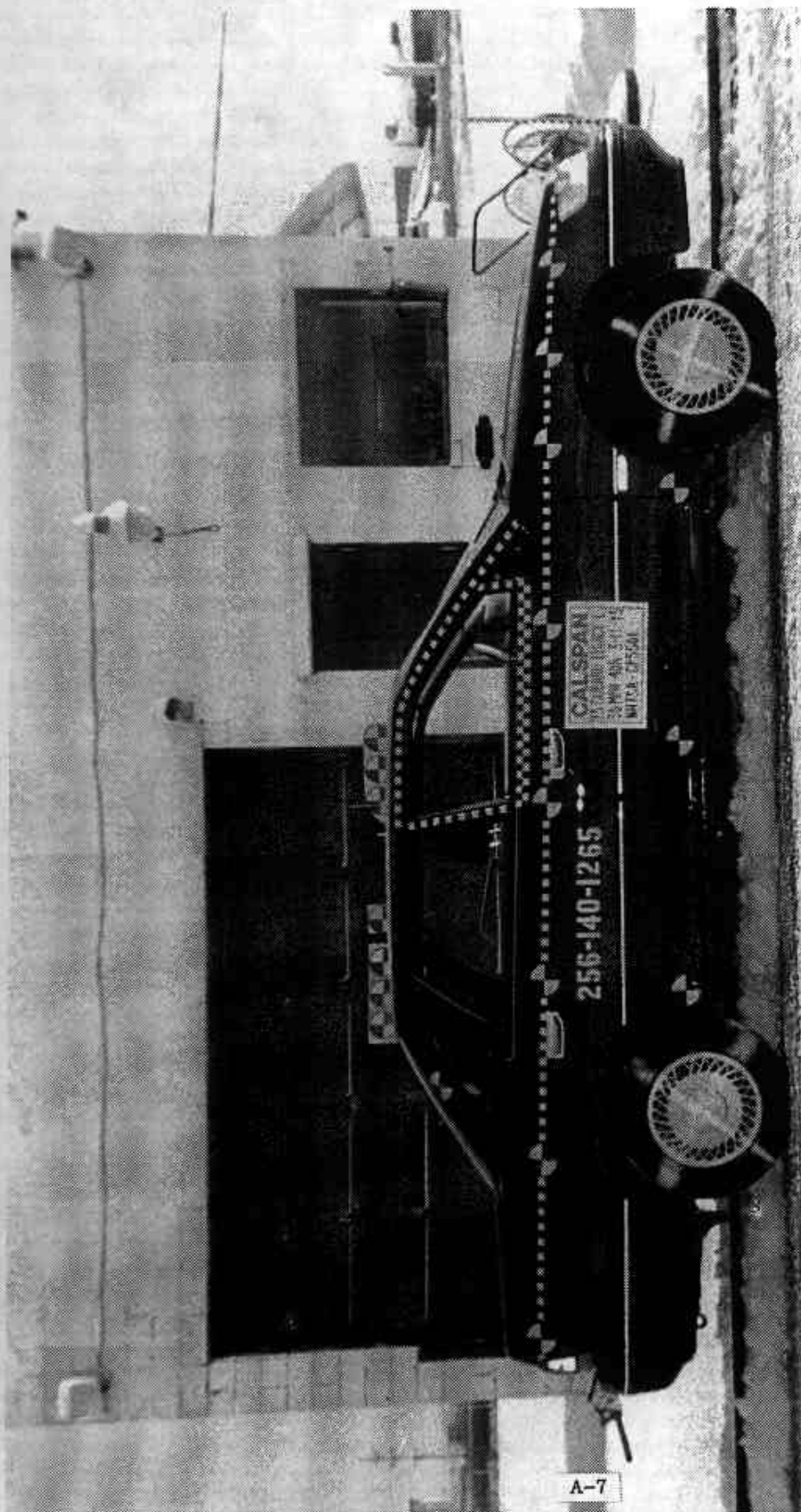


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-7

8056-14

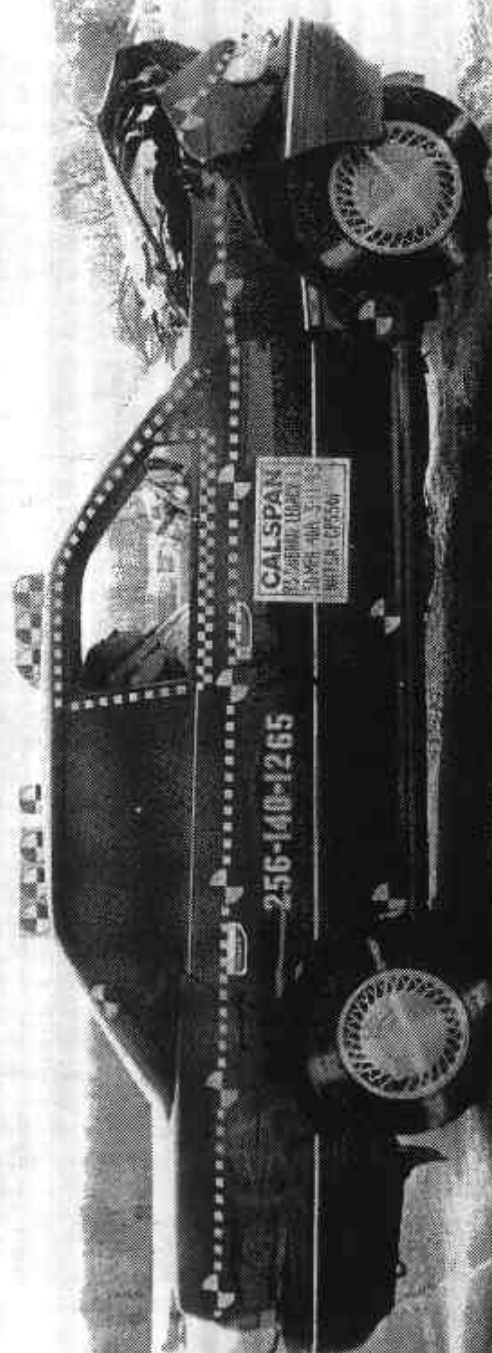


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-8

8056-14



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

A-9

8056-14

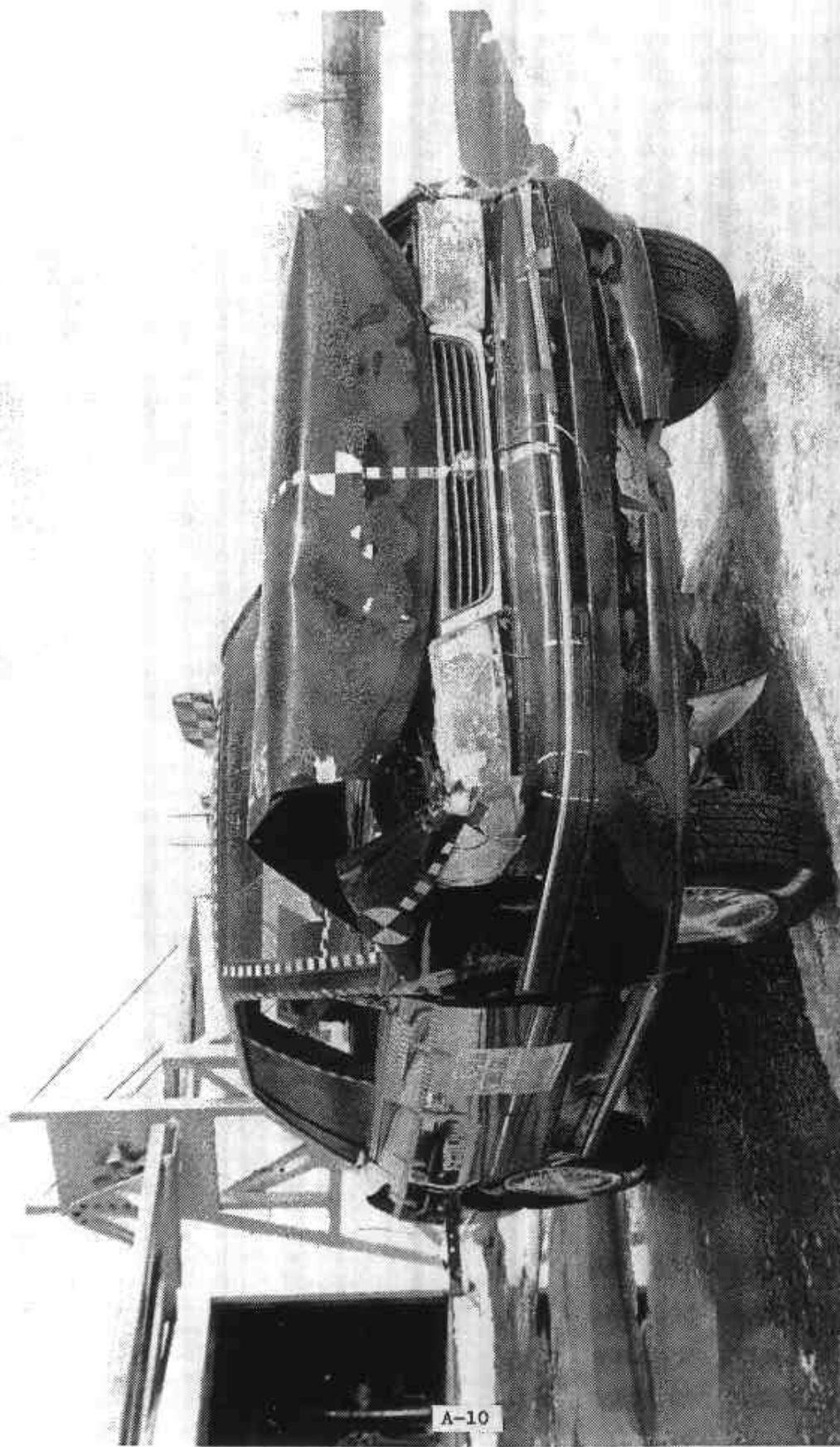


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

8056-14



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

A-11

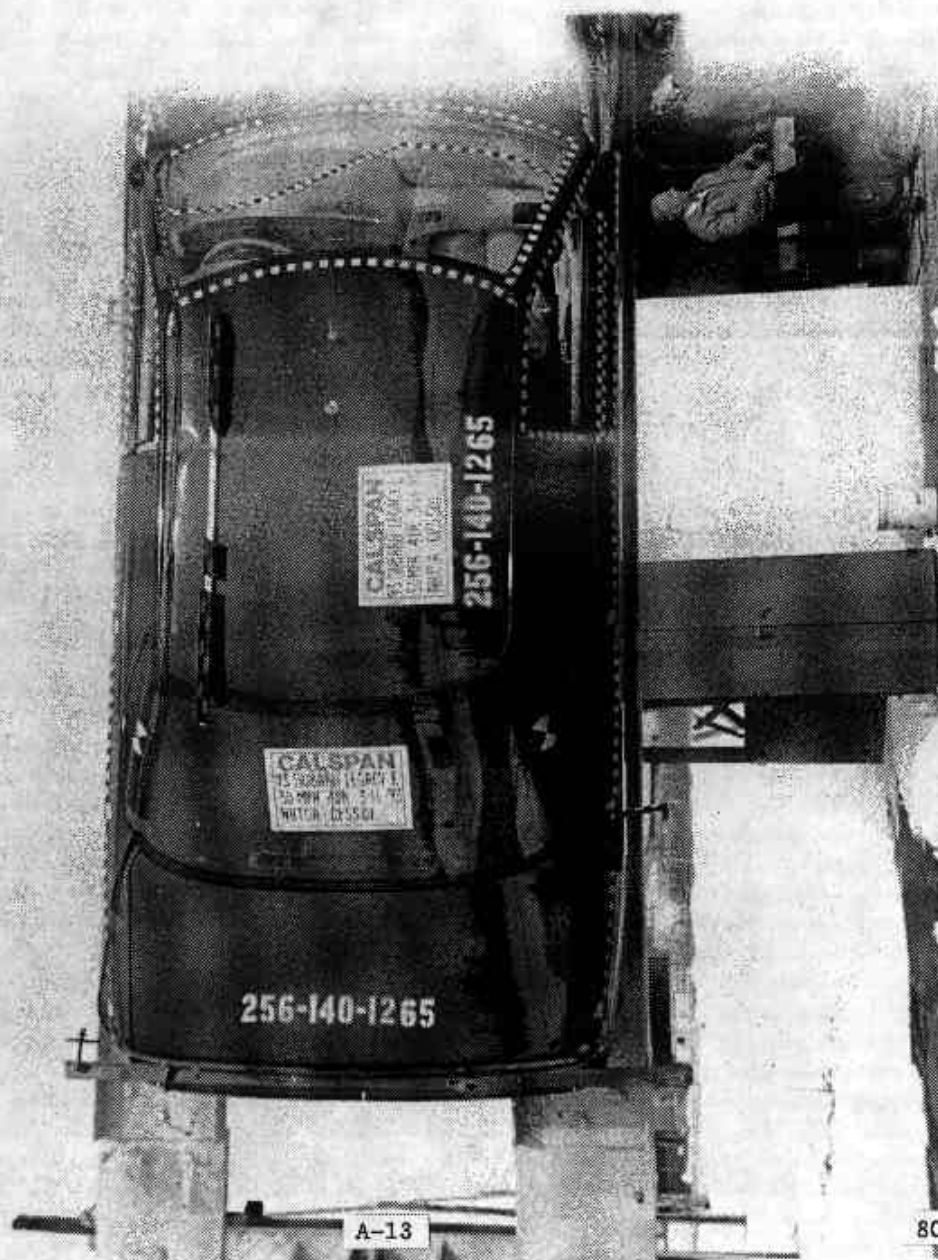
8056-14



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

A-12

8056-14



Film Damaged

Figure A-11 POST-TEST TOP VIEW

A-13

8056-14

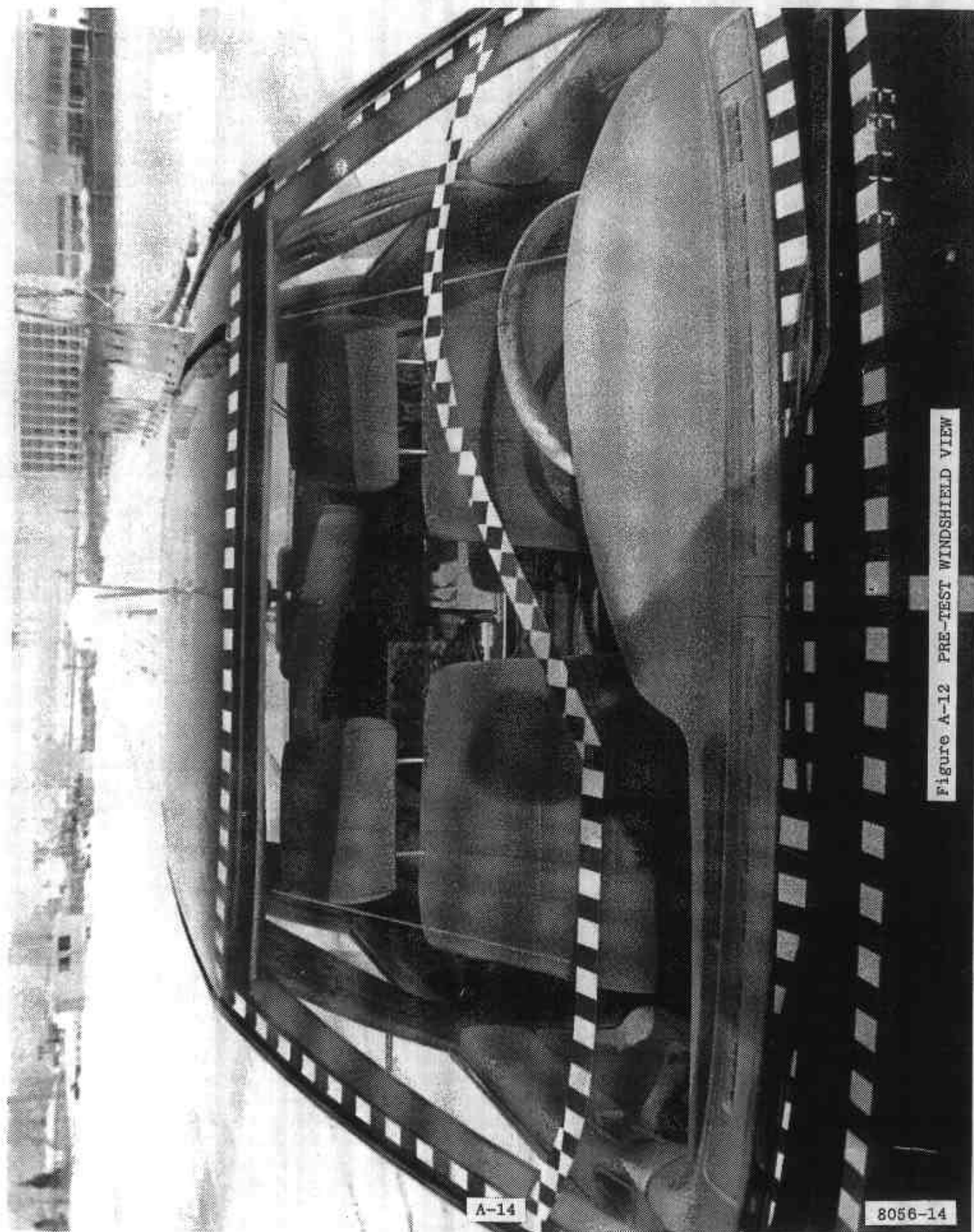


Figure A-12 PRE-TEST WINDSHIELD VIEW

A-14

8056-14

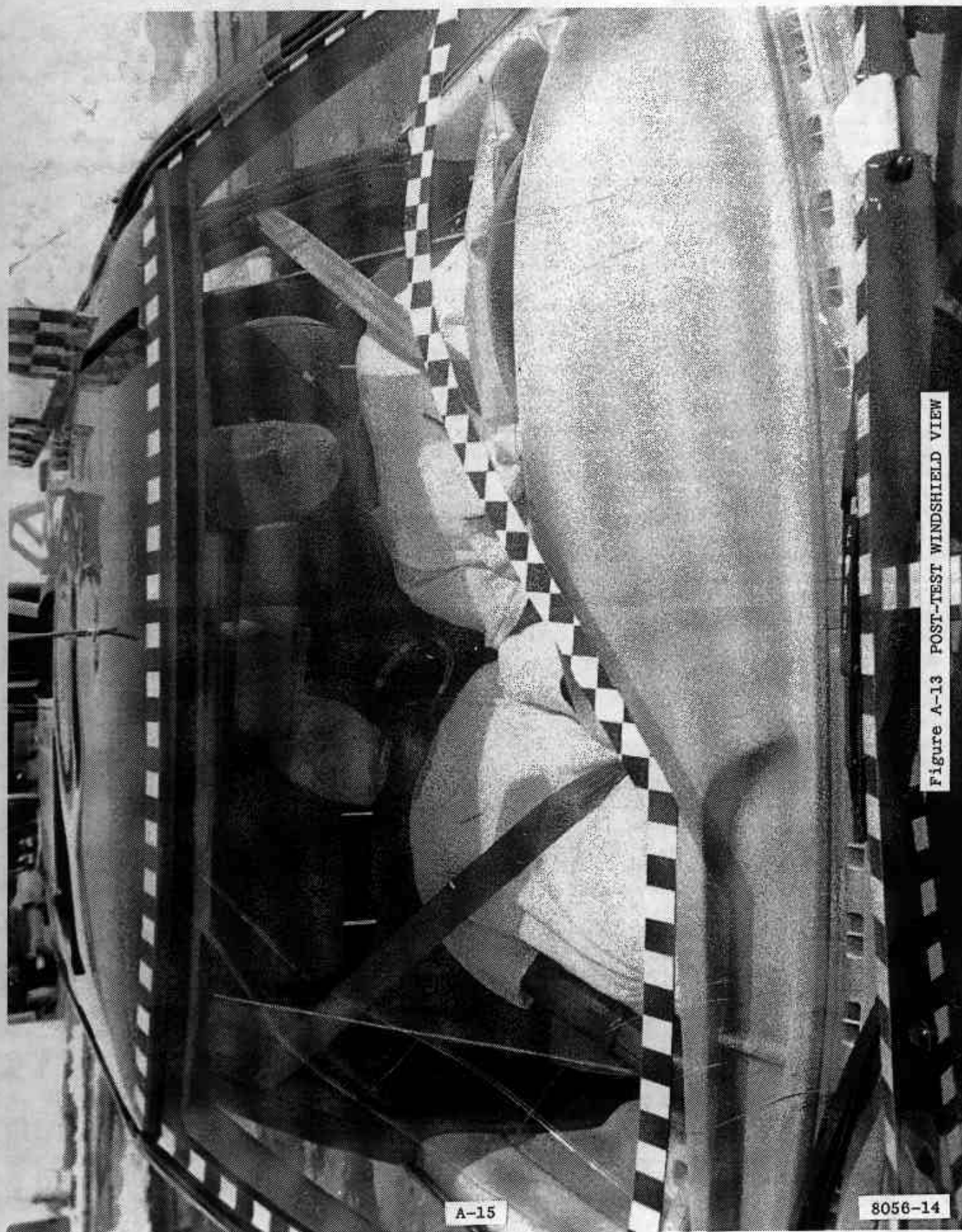


Figure A-13 POST-TEST WINDSHIELD VIEW

A-15

8056-14



Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

8056-14



Film Damaged

Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

A-17

8056-14

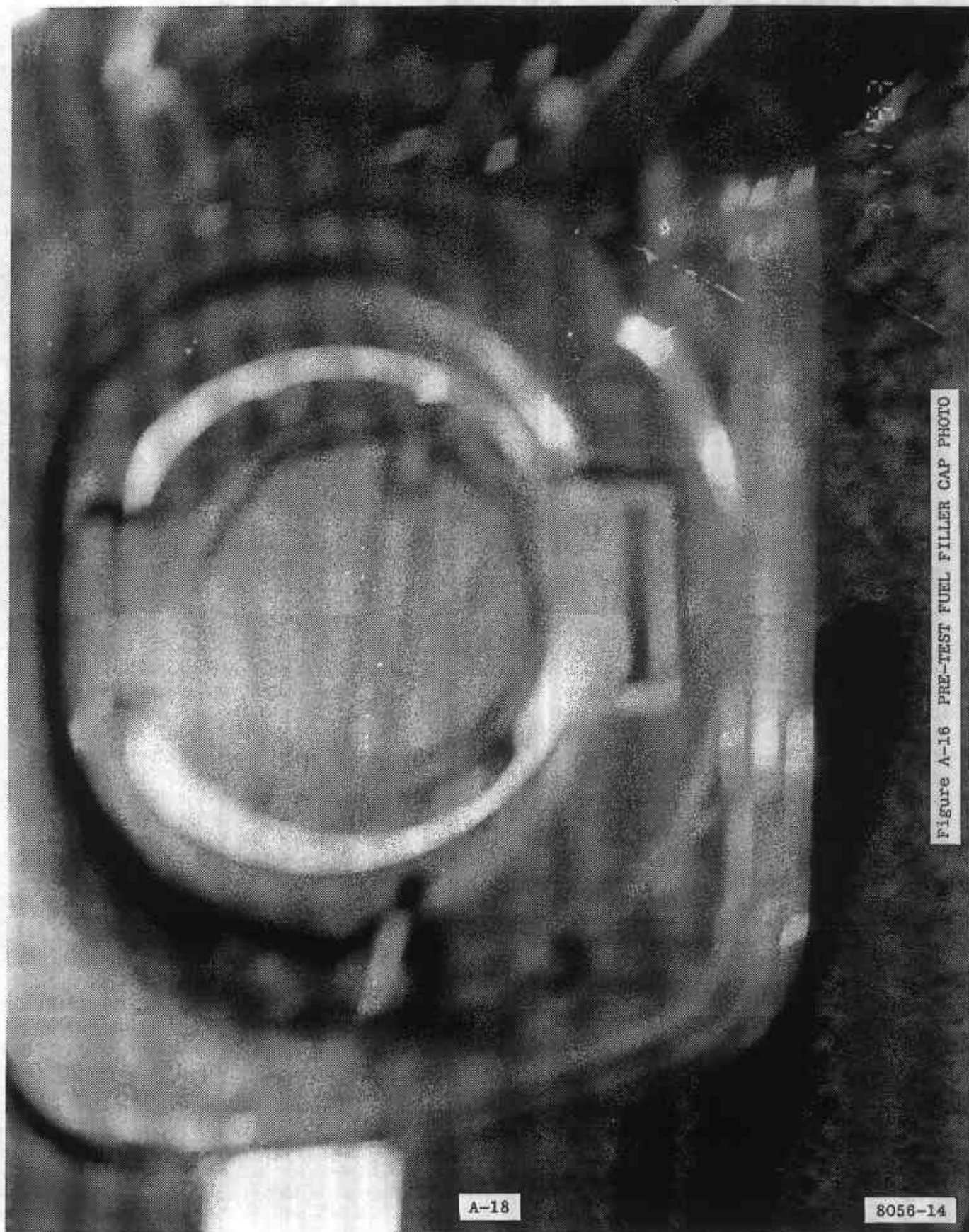


Figure A-16 PRE-TEST FUEL FILLER CAP PHOTO

A-18

8056-14

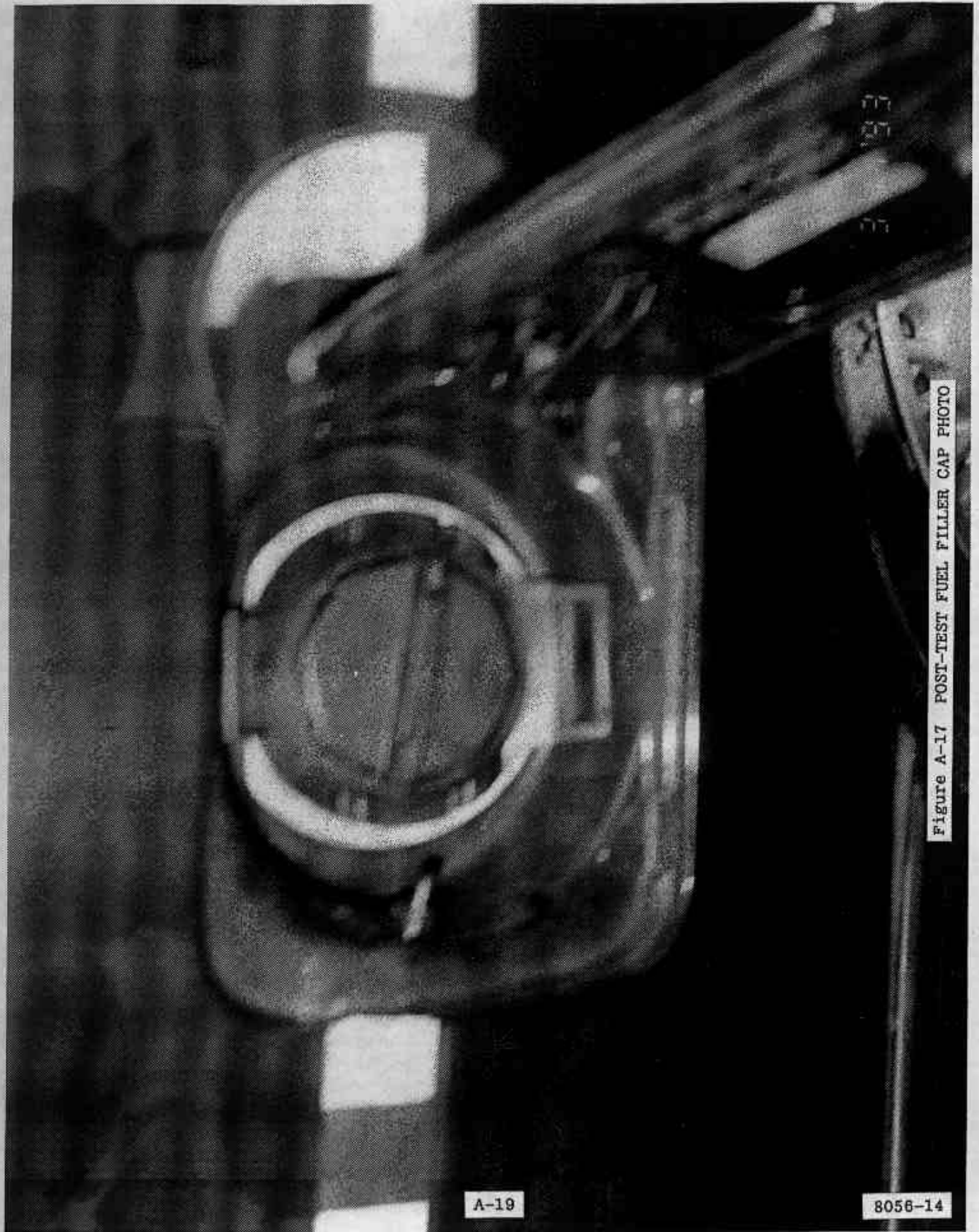


Figure A-17 POST-TEST FUEL FILLER CAP PHOTO

A-19

8056-14

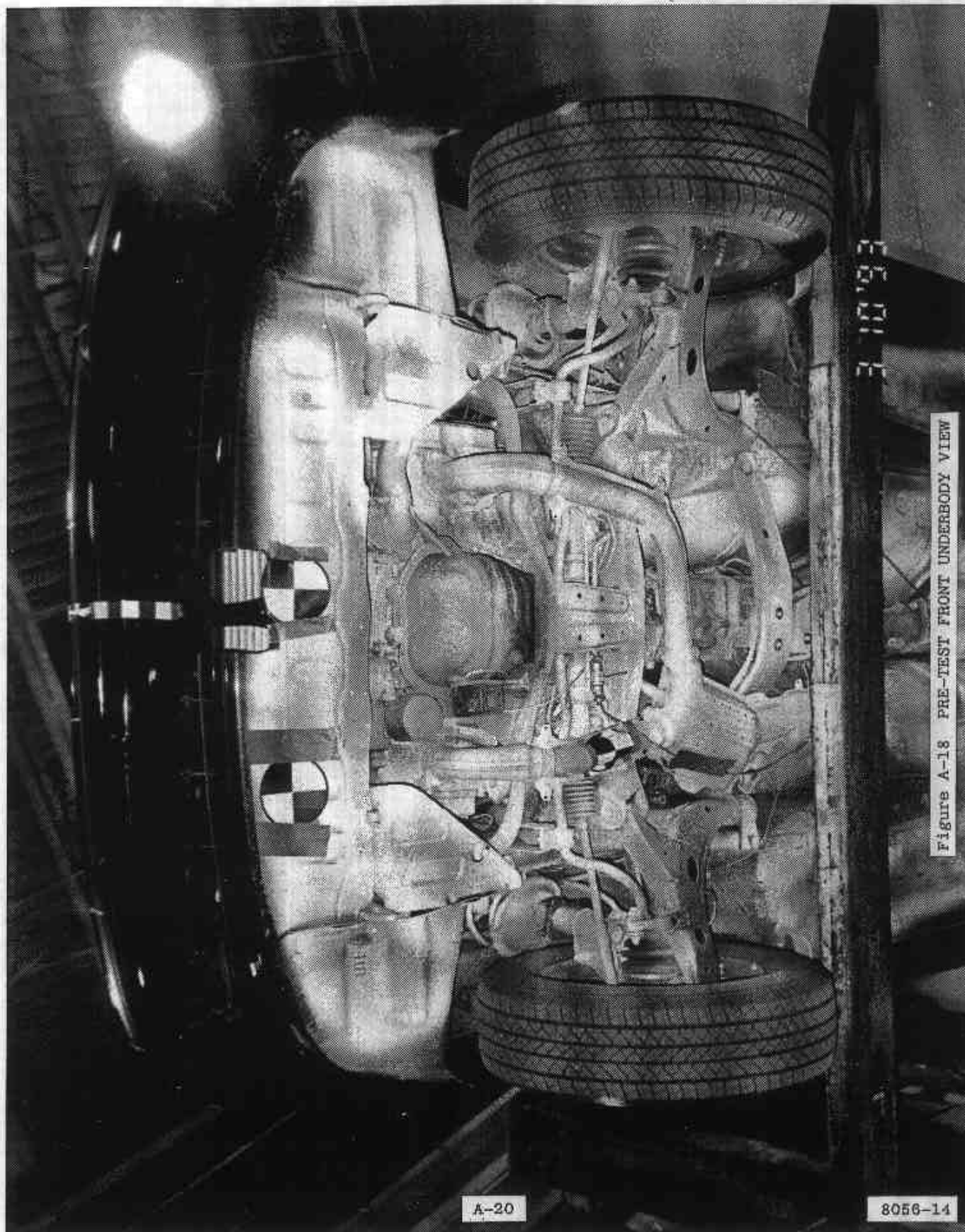


Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

A-20

8056-14

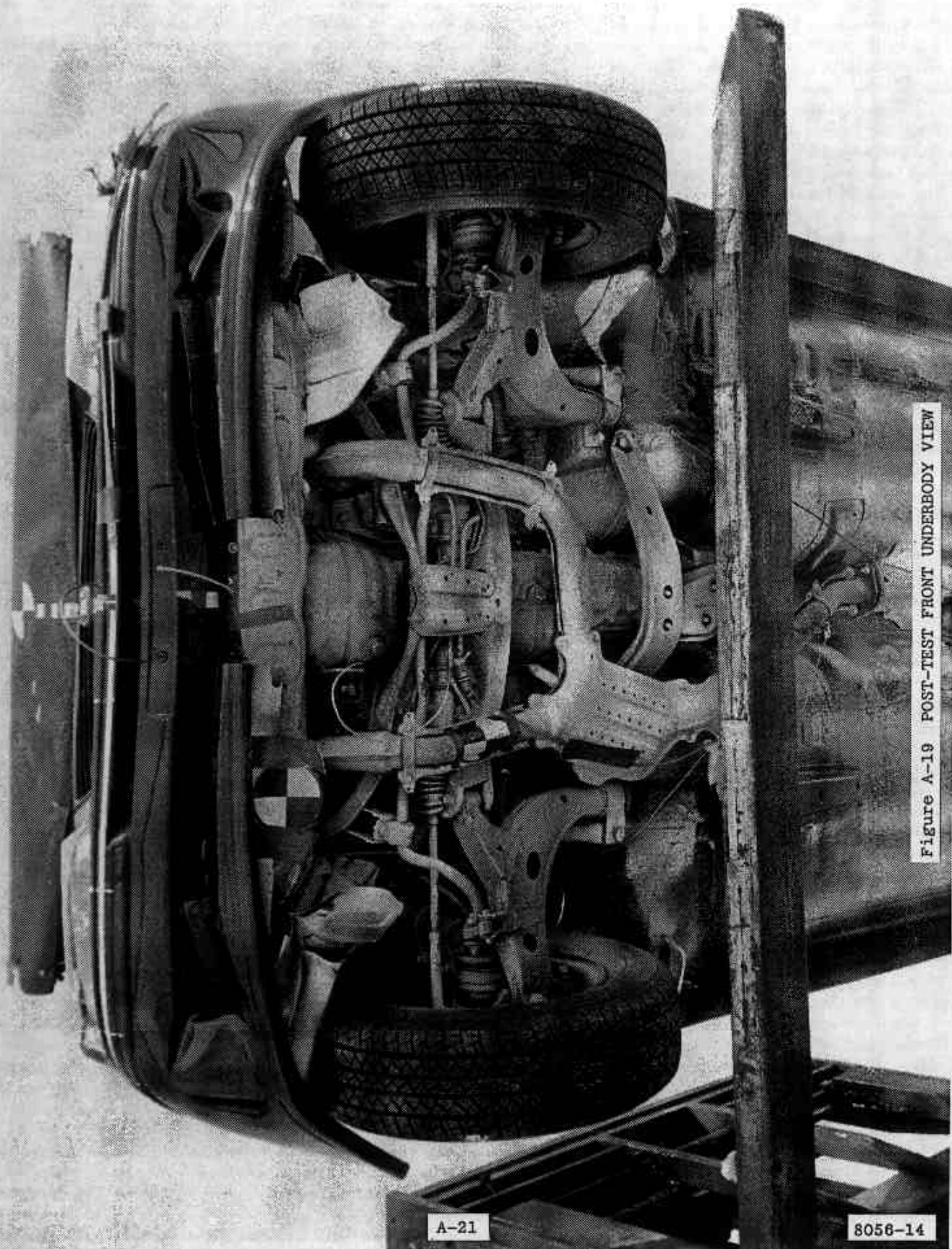


Figure A-19 POST-TEST FRONT UNDERBODY VIEW

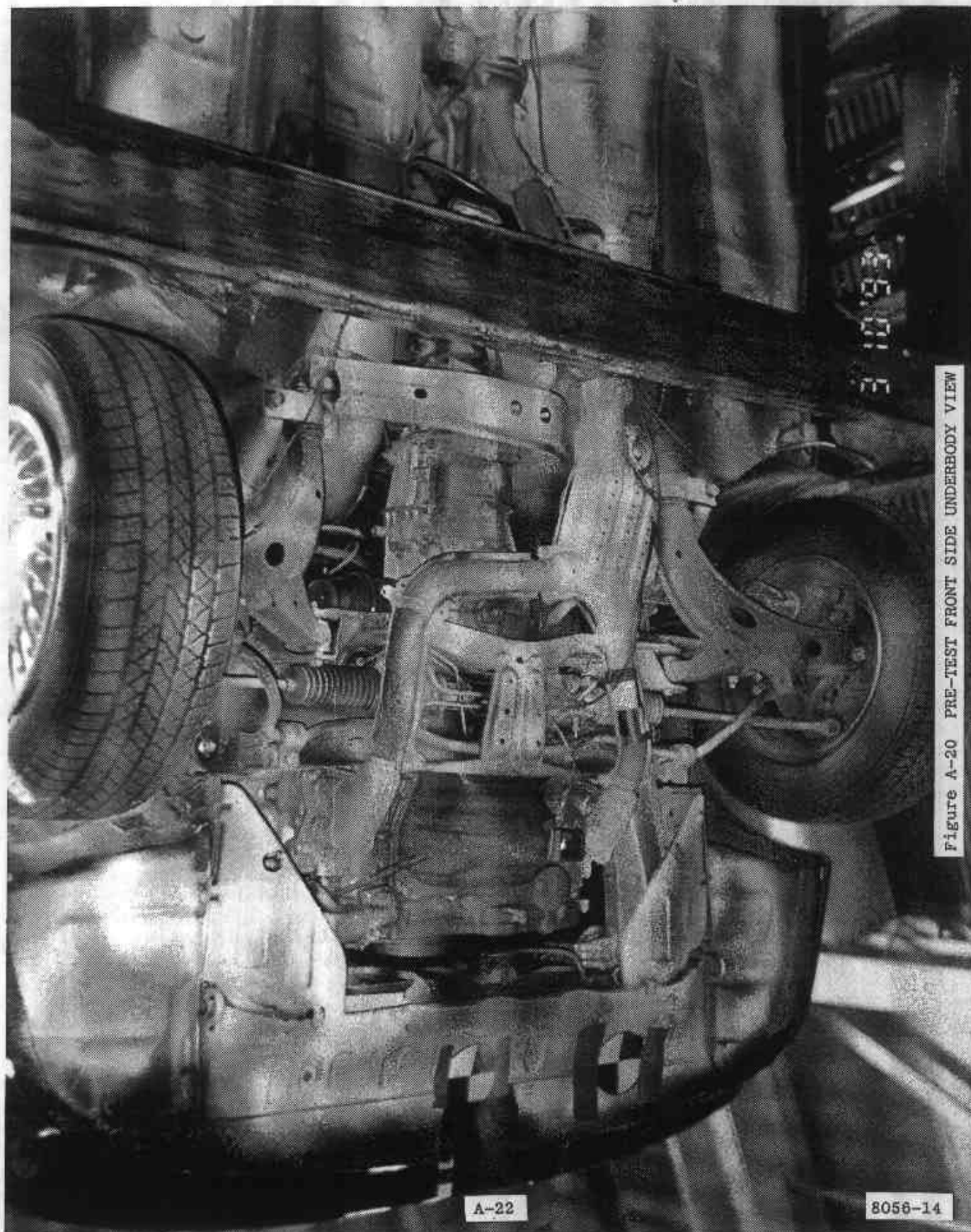


Figure A-20 PRE-TEST FRONT SIDE UNDERBODY VIEW

A-22

8058-14

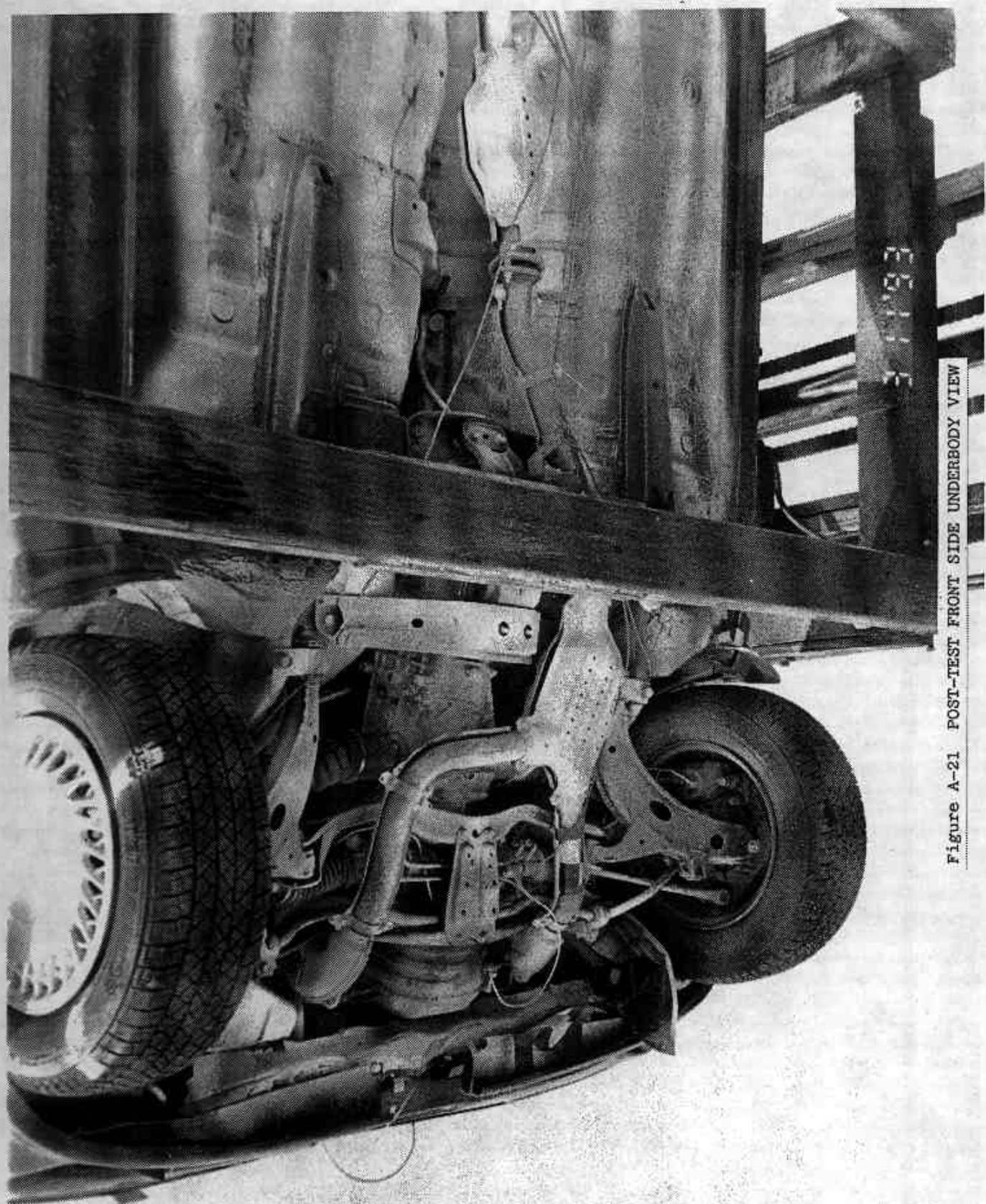
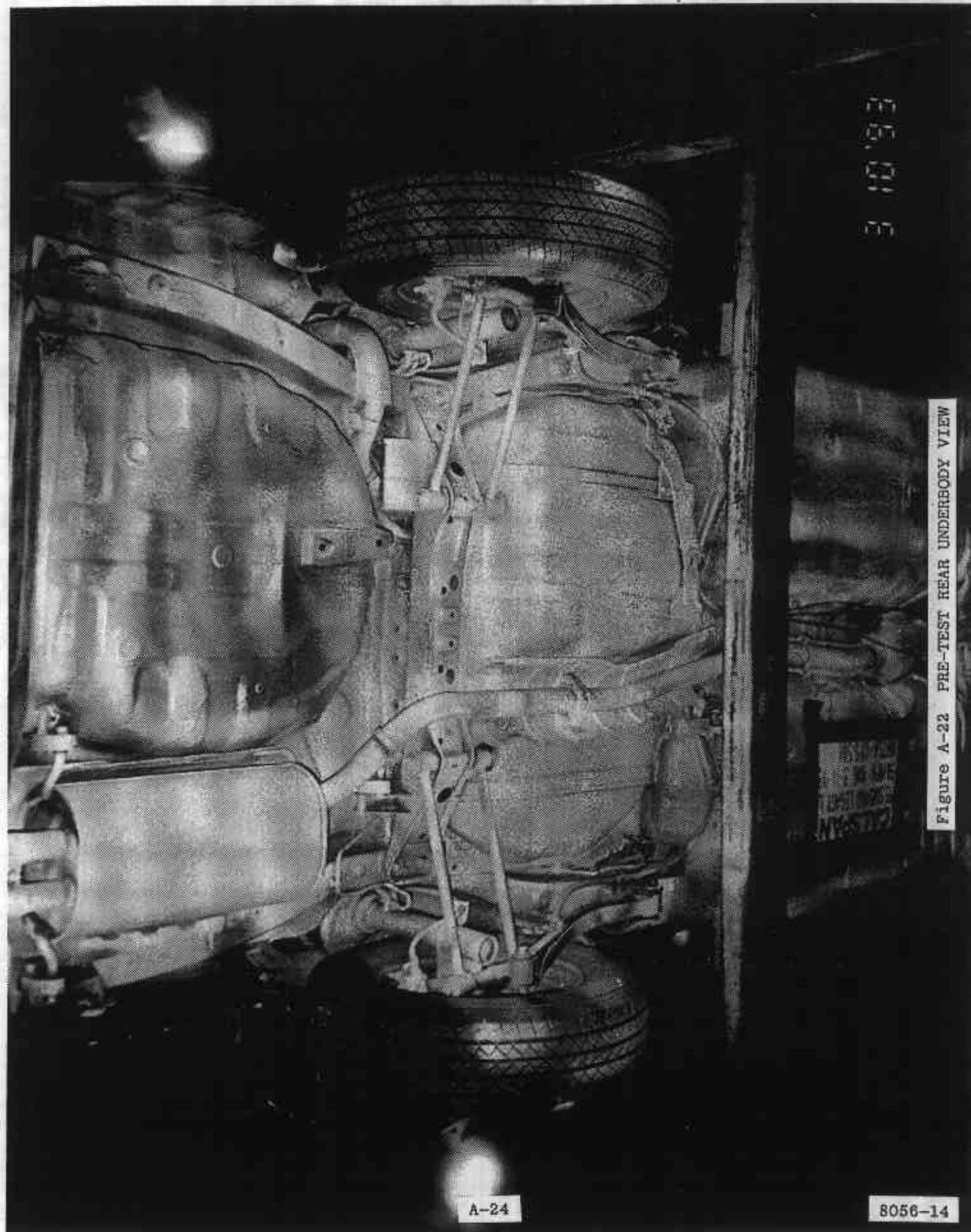


Figure A-21 POST-TEST FRONT SIDE UNDERBODY VIEW

A-23

8056-14



3 10 93

Figure A-22 PRE-TEST REAR UNDERBODY VIEW

A-24

8056-14

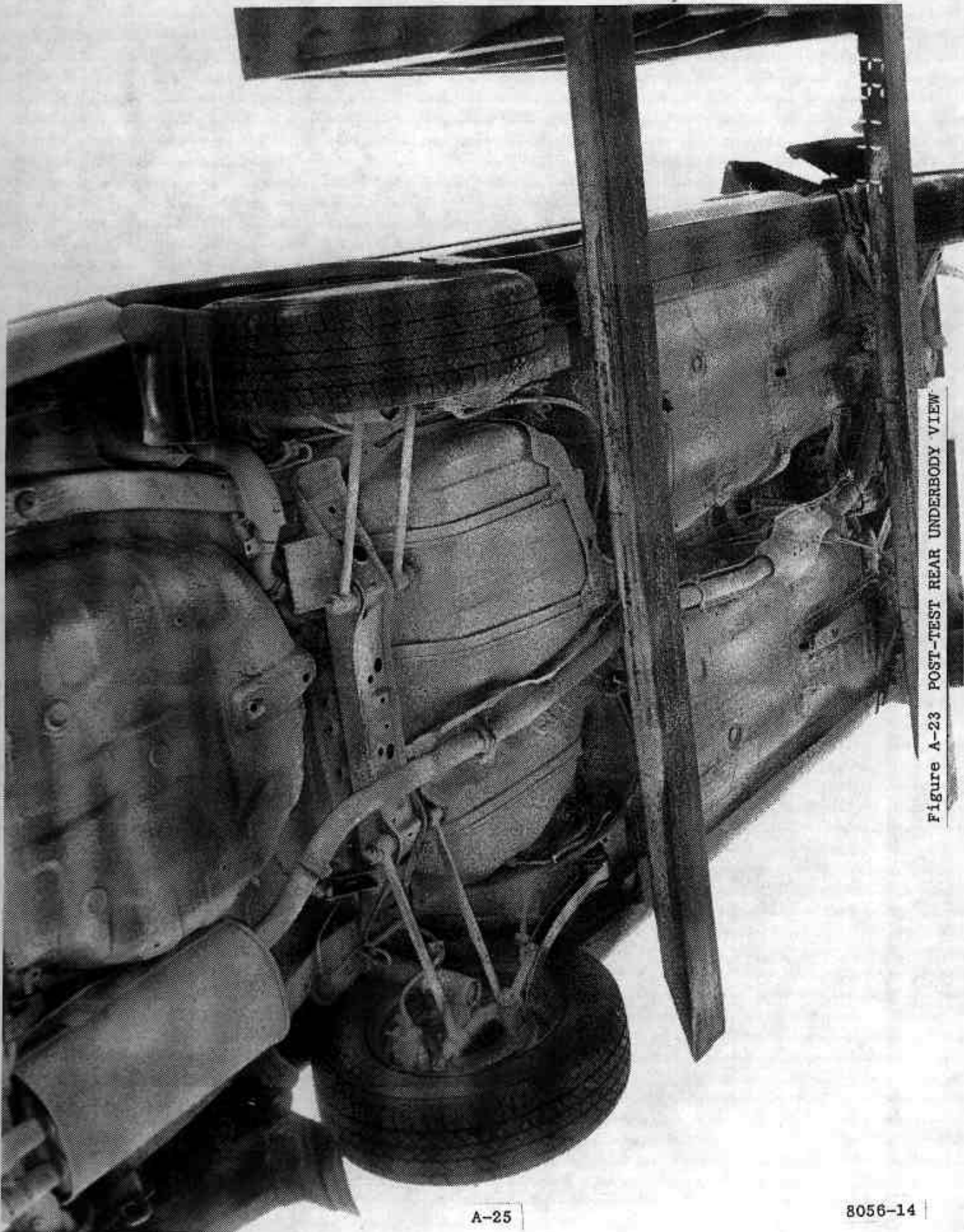


Figure A-23 POST-TEST REAR UNDERBODY VIEW

A-25

8056-14

MANUFACTURED BY FUJI HEAVY INDUSTRIES LTD.

MFD IN

10/92

GVWR: 3930LB(1783KG)

GAWR: FRONT-2065LB(937KG)

REAR -1865 846KG)

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

VIN

PASSENGER CAR

ASSEMBLED BY SUBARU-ISUZU AUTOMOTIVE INC. (160)

Figure A-24 CERTIFICATION LABEL



Figure A-25 TIRE PLACARD

A-27

8056-14



Figure A-26 PRE-TEST DRIVER DUMMY POSITION

A-28

8056-14



Figure A-27 POST-TEST DRIVER DUMMY POSITION

A-29

8056-14



Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

A-30

8056-14



Figure A-29 POST-TEST PASSENGER DUMMY POSITION

A-31

8056-14



Figure A-30 PRE-TEST DRIVER DUMMY AND INTERIOR VIEW

A-32

8056-14



Figure A-31 POST-TEST DRIVER DUMMY AND INTERIOR VIEW

A-33

8056-14



Figure A-32 PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW



Figure A-33 POST-TEST PASSENGER DUMMY AND INTERIOR VIEW

A-35

8056-14

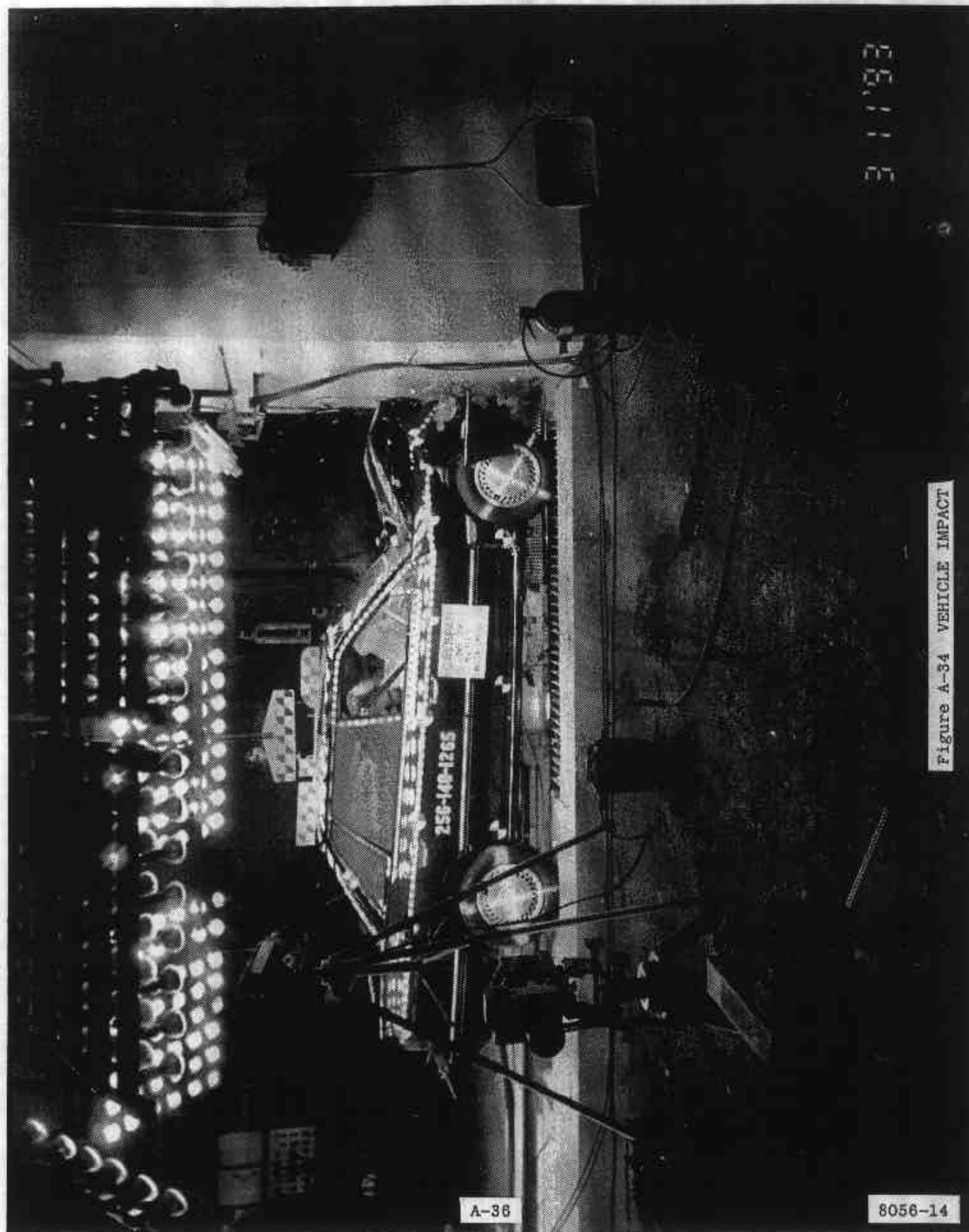


Figure A-34 VEHICLE IMPACT

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. CP5501

VEHICLE DATA

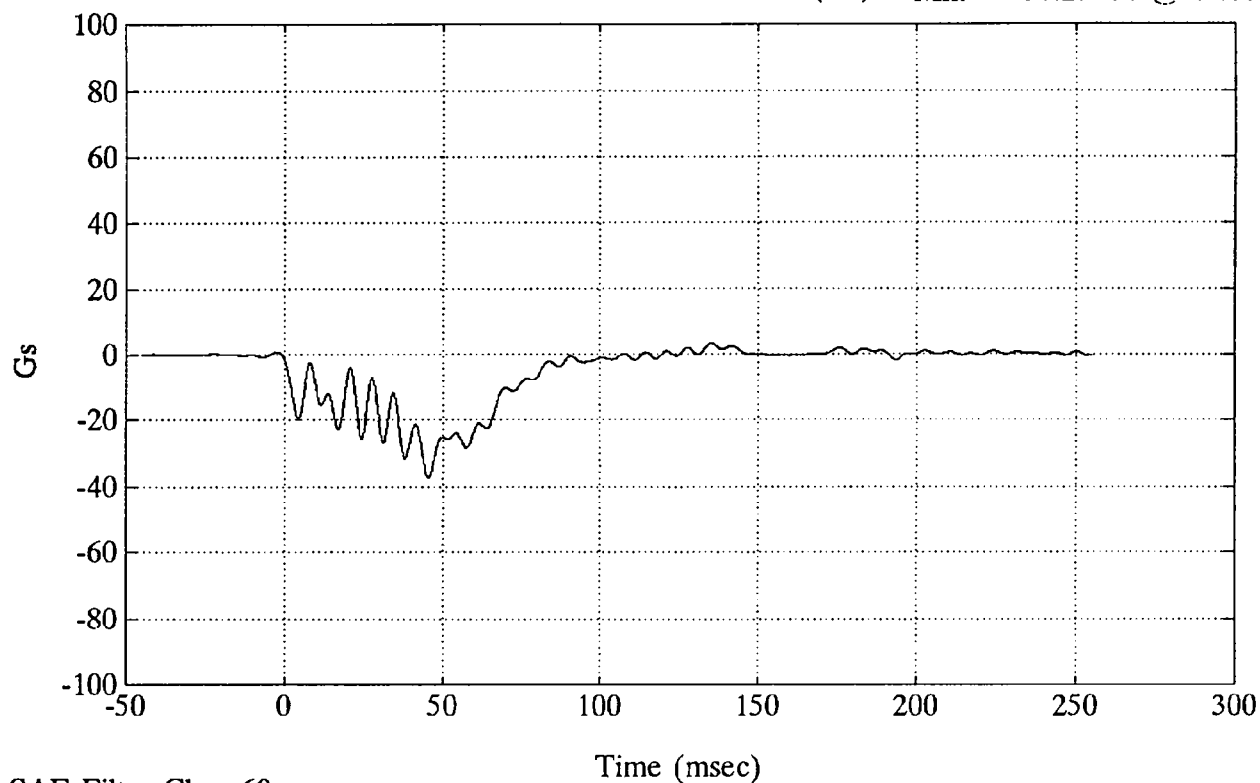
SAE FILTER CHANNEL CLASS

60

FMVSS 208 - 1993 SUBARU LEGACY

L. Rear Crossmember X (#1)

Max = 3.32 Gs @ 135.12 msec
Min = -37.23 Gs @ 45.60 msec

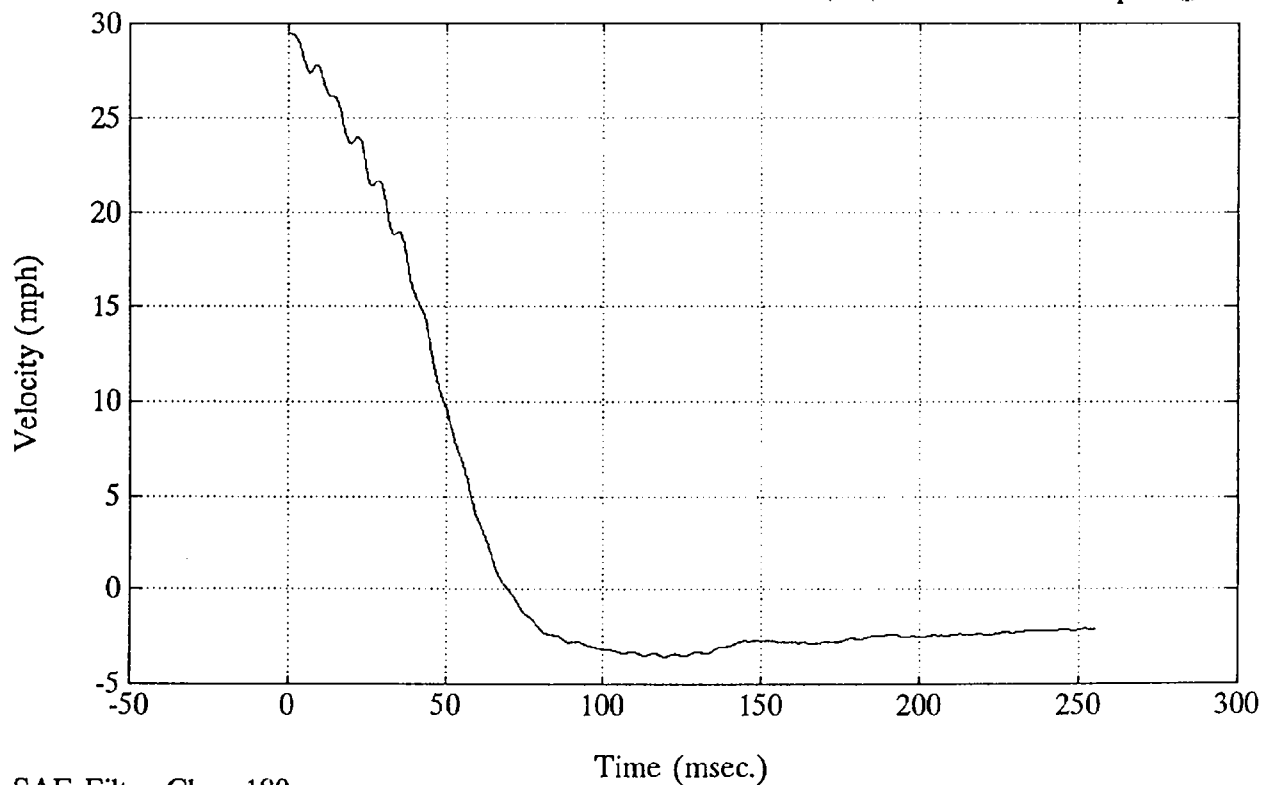


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

L. Rear Crossmember X (#1)

Max = 29.50 mph @ -0.00 msec
Min = -3.51 mph @ 119.28 msec

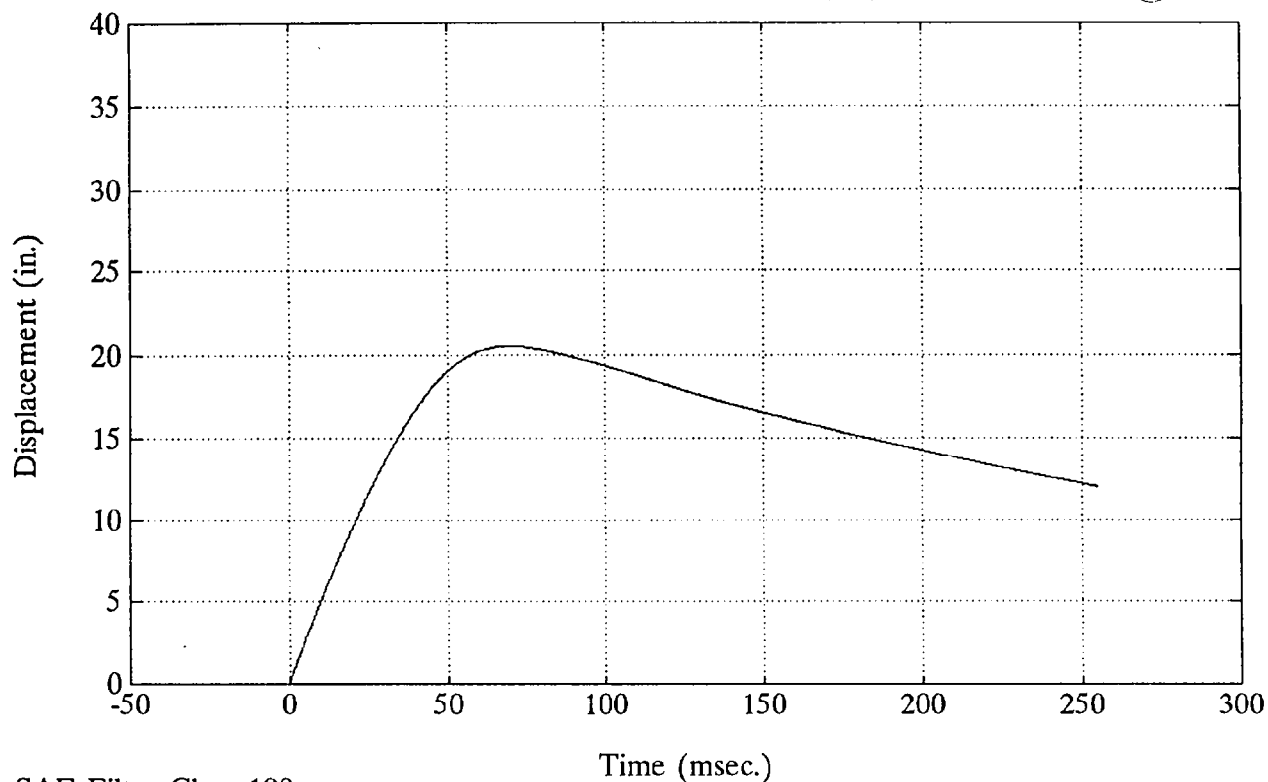


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

L. Rear Crossmember X (#1)

Max = 20.53 in. @ 71.52 msec
Min = 0.00 in. @ -0.00 msec

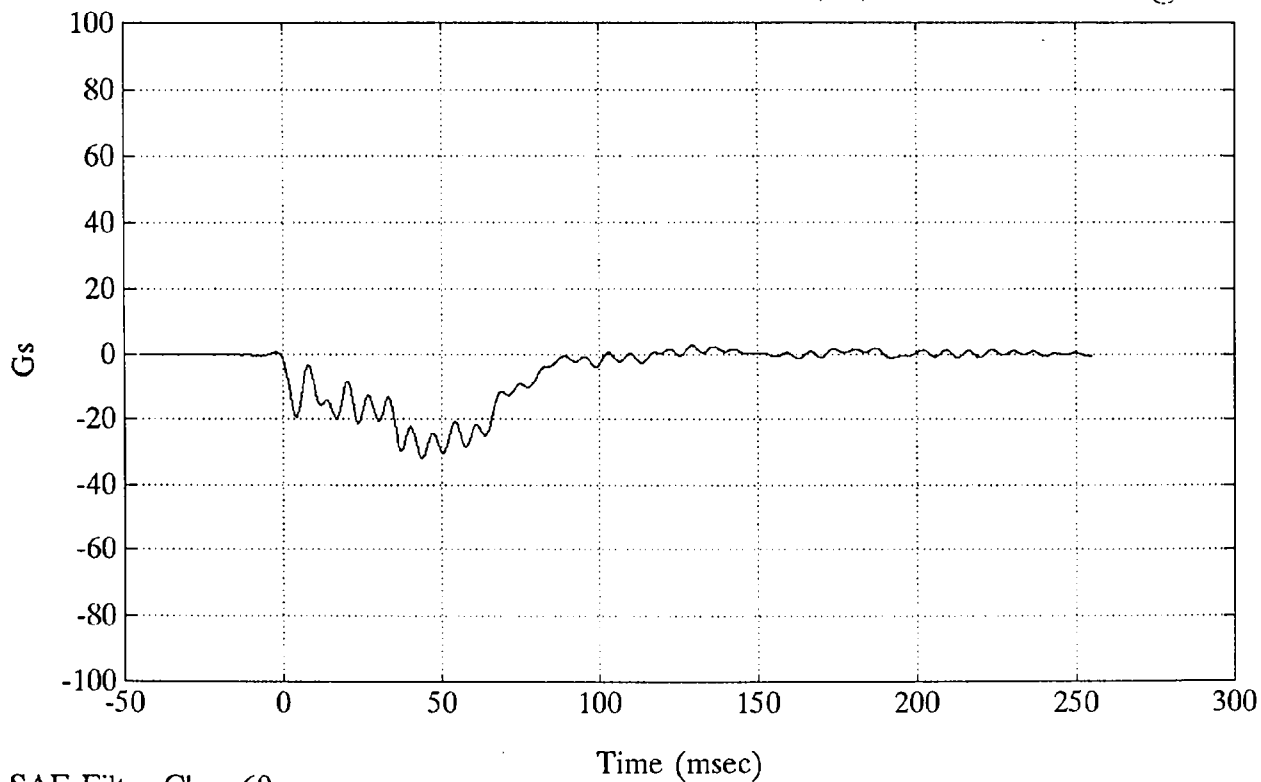


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

R. Rear Crossmember X (#2)

Max = 2.85 Gs @ 129.24 msec
Min = -31.94 Gs @ 43.92 msec

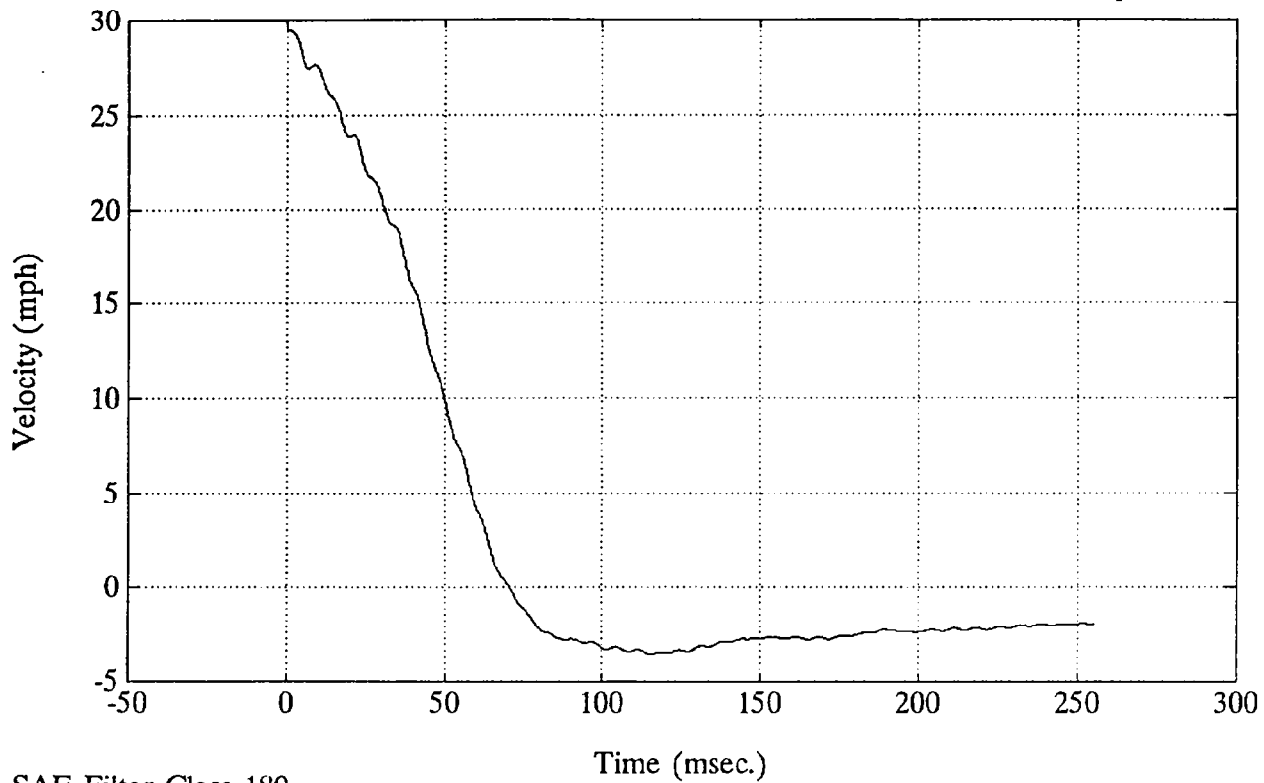


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

R. Rear Crossmember X (#2)

Max = 29.50 mph @ 0.48 msec
Min = -3.61 mph @ 115.44 msec

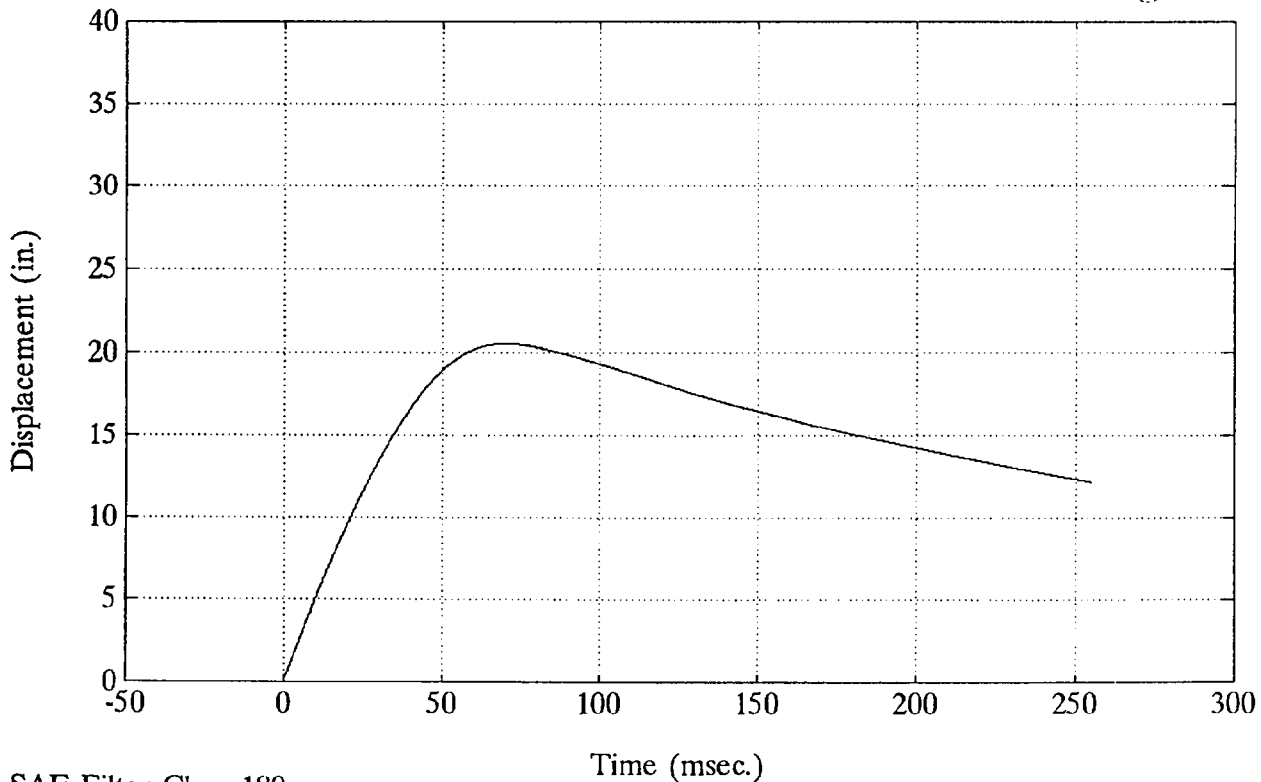


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

R. Rear Crossmember X (#2)

Max = 20.53 in. @ 71.76 msec
Min = 0.00 in. @ -0.00 msec

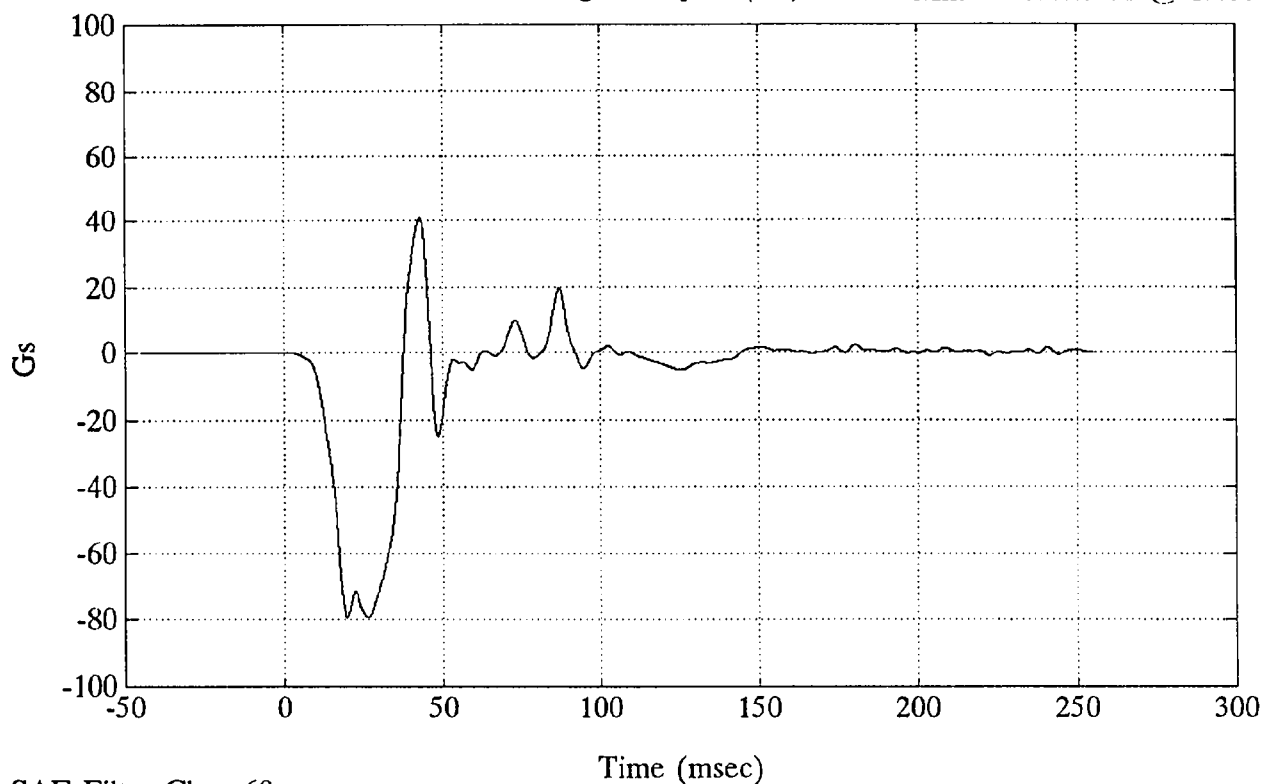


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Engine Top X (#3)

Max = 40.73 Gs @ 42.96 msec
Min = -79.72 Gs @ 19.68 msec

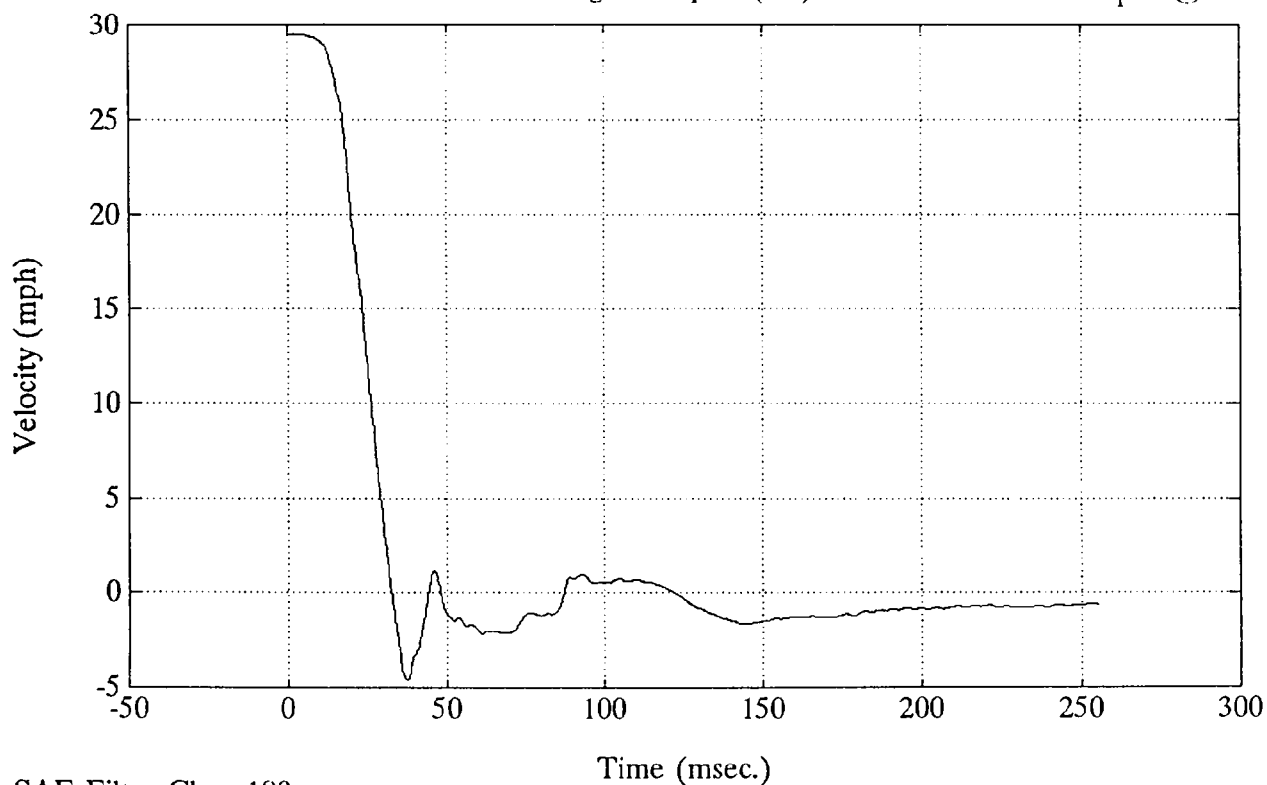


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

Engine Top X (#3)

Max = 29.50 mph @ 4.80 msec
Min = -4.59 mph @ 37.68 msec

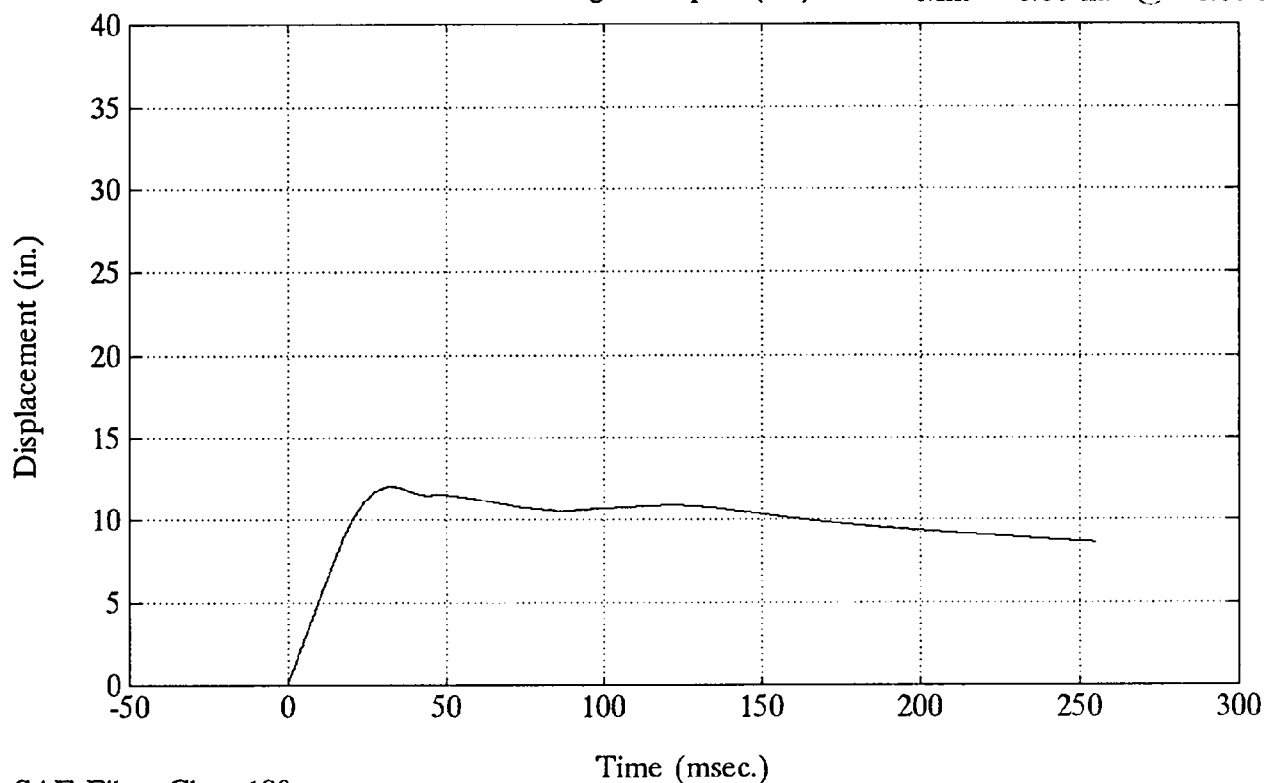


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Engine Top X (#3)

Max = 12.05 in. @ 33.36 msec
Min = 0.00 in. @ -0.00 msec

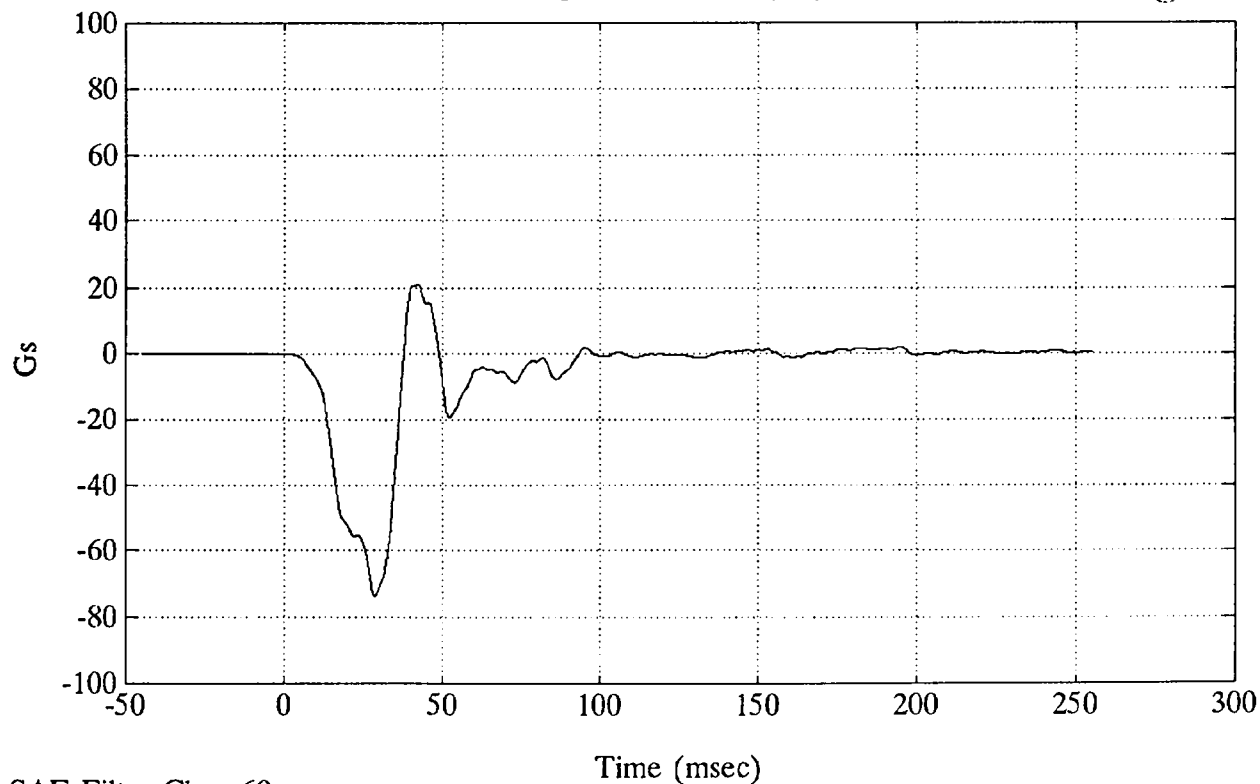


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Engine Bottom X (#4)

Max = 21.20 Gs @ 42.36 msec
Min = -73.87 Gs @ 28.68 msec

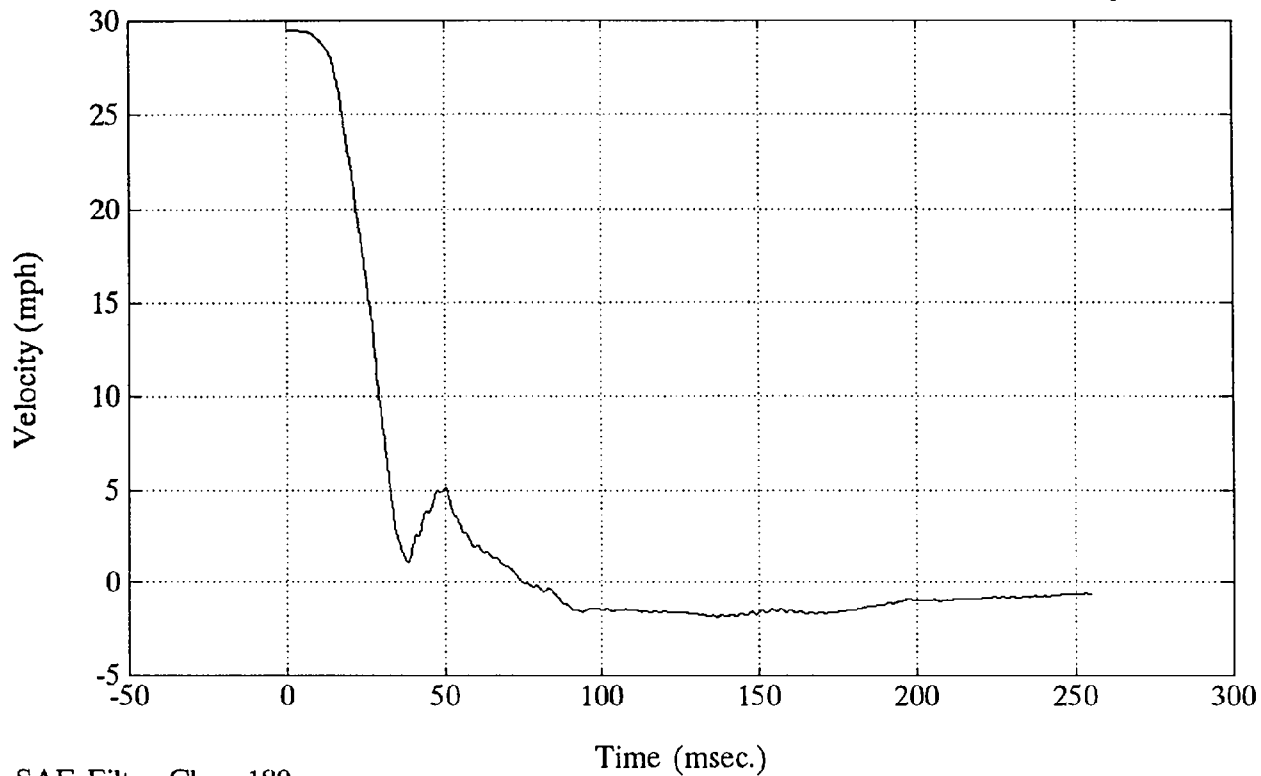


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

Engine Bottom X (#4)

Max = 29.50 mph @ 0.96 msec
Min = -1.83 mph @ 136.56 msec

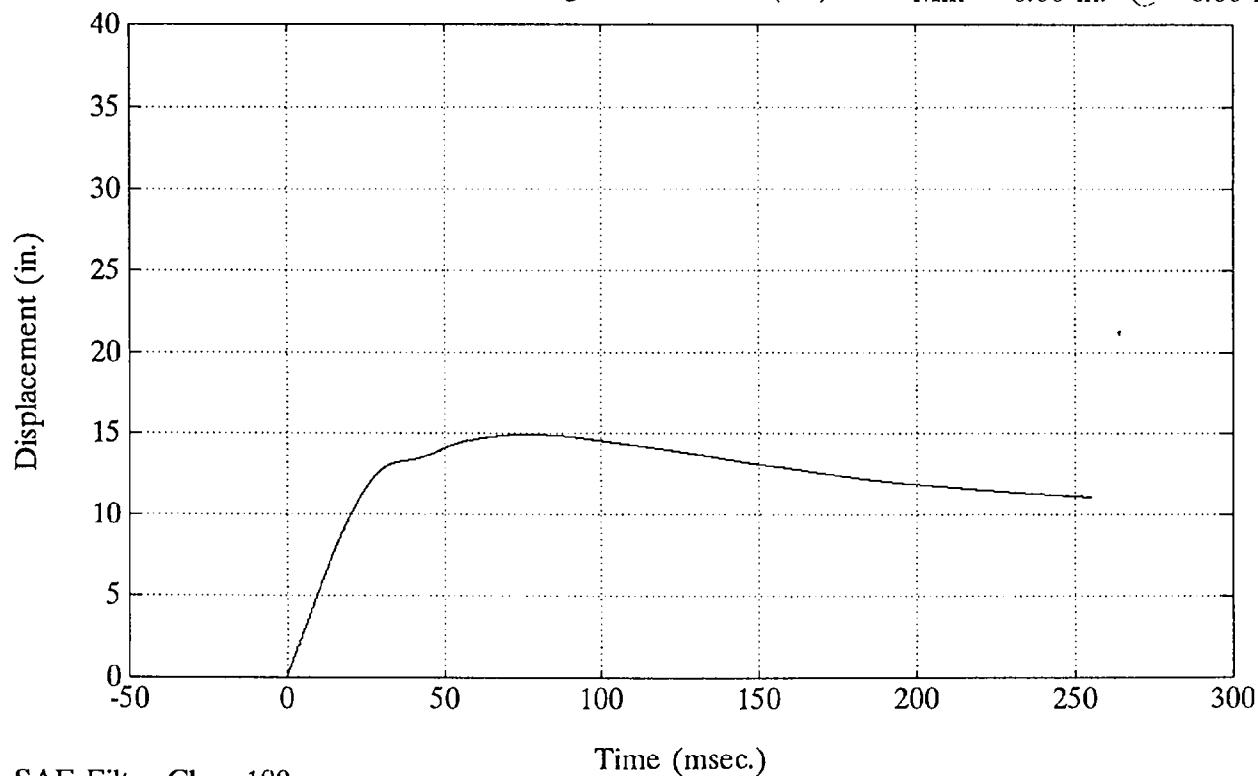


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Engine Bottom X (#4)

Max = 14.93 in. @ 77.52 msec
Min = 0.00 in. @ -0.00 msec

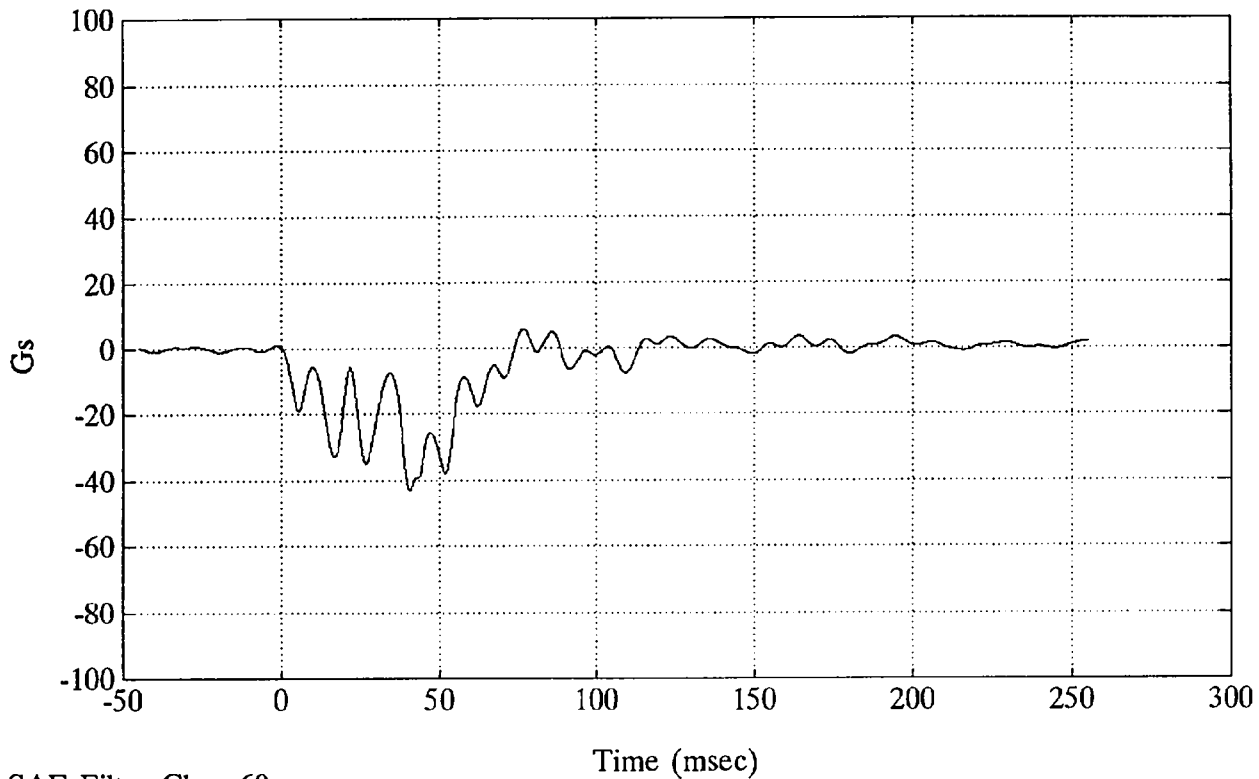


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

R. Brake Caliper X (#5)

Max = 5.69 Gs @ 76.92 msec
Min = -42.99 Gs @ 40.68 msec

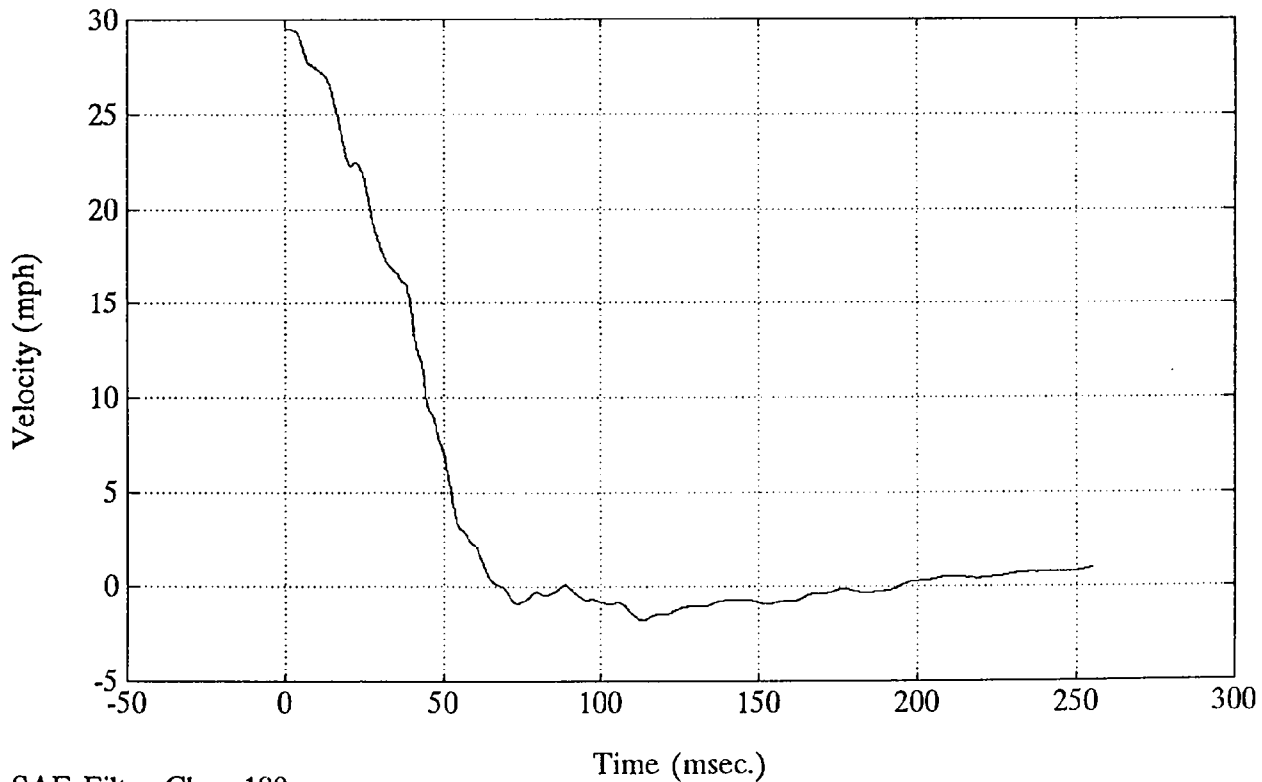


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

R. Brake Caliper X (#5)

Max = 29.50 mph @ 1.44 msec
Min = -1.75 mph @ 113.28 msec

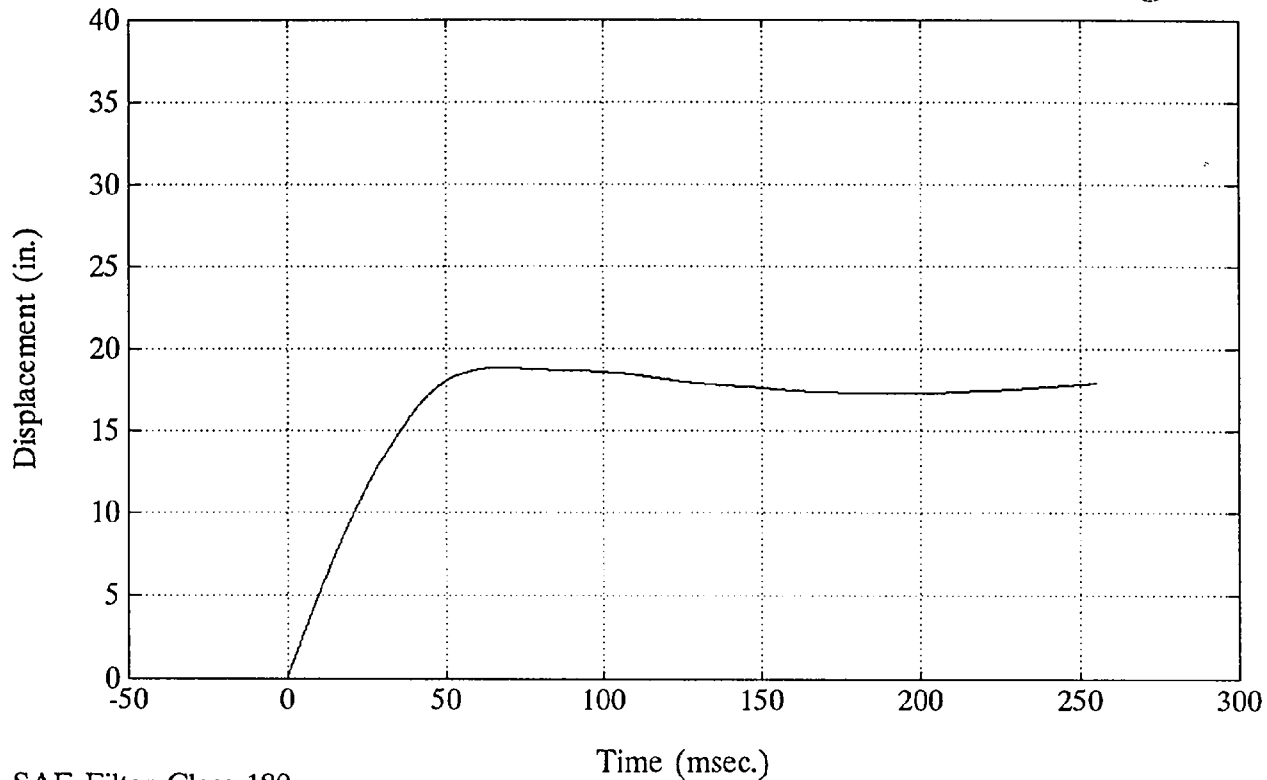


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

R. Brake Caliper X (#5)

Max = 18.77 in. @ 70.32 msec
Min = 0.00 in. @ -0.00 msec

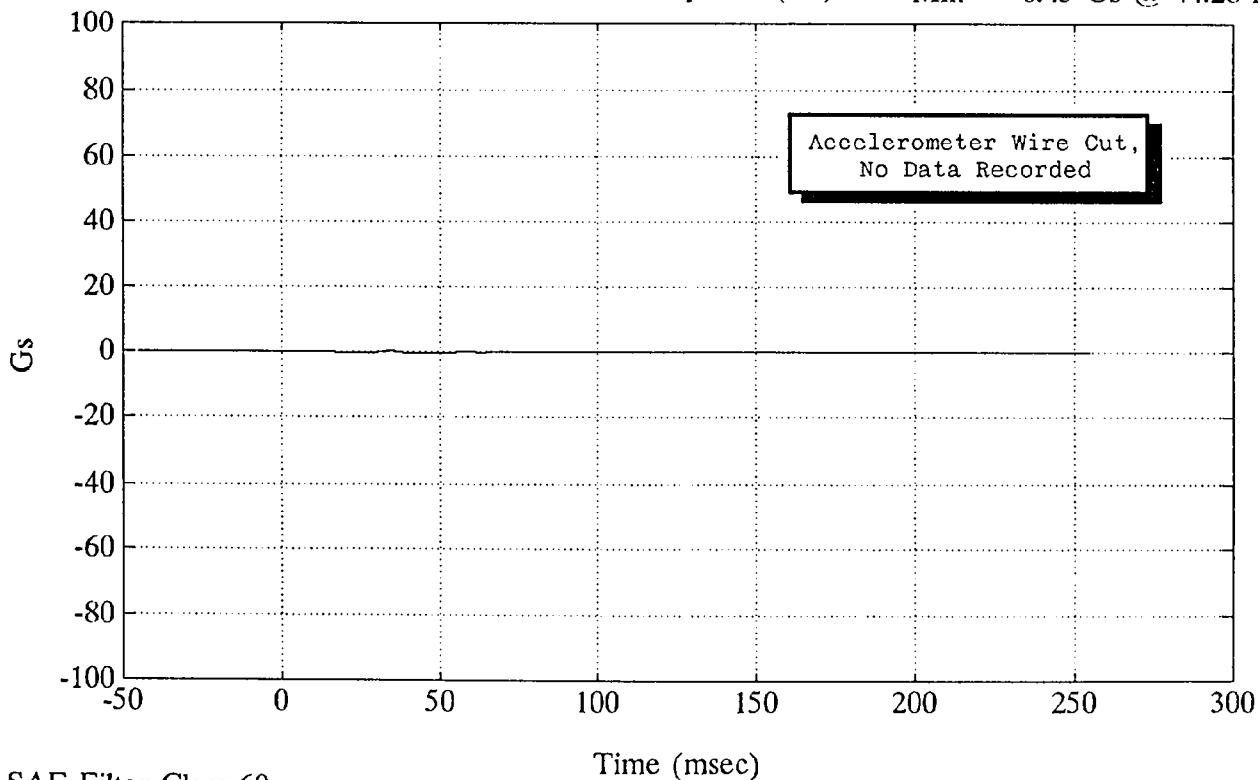


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

L. Brake Caliper X (#6)

Max = 0.31 Gs @ 34.56 msec
Min = -0.45 Gs @ 44.28 msec

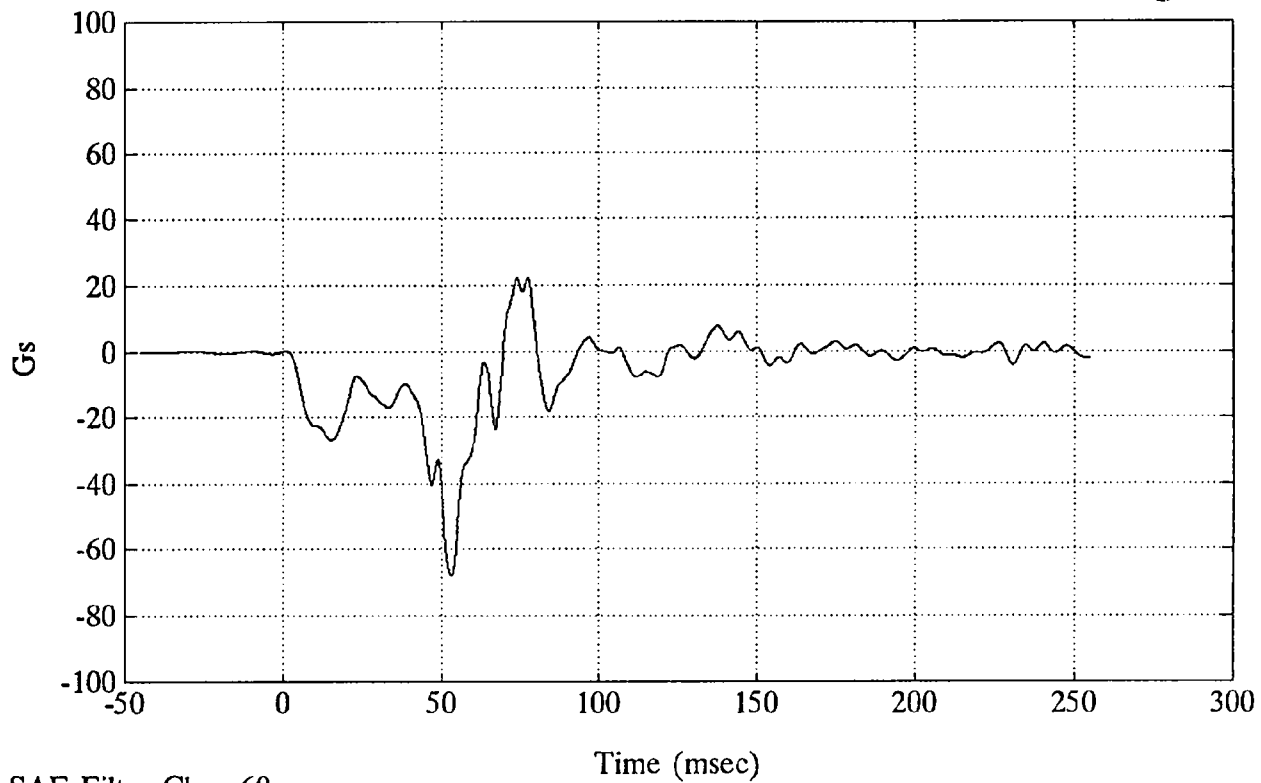


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

Instrument Panel X (#7)

Max = 22.25 Gs @ 77.52 msec
Min = -67.93 Gs @ 53.28 msec

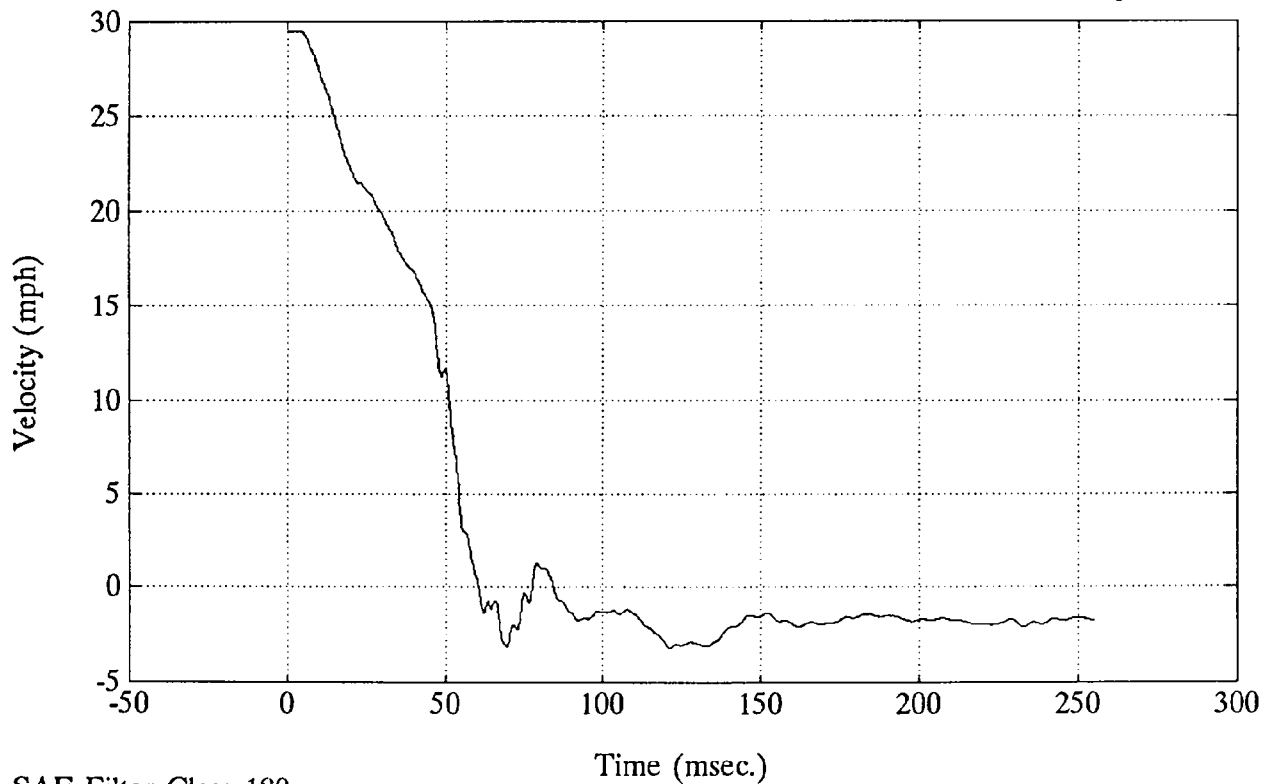


SAE Filter Class 60

FMVSS 208 - 1993 SUBARU LEGACY

Instrument Panel X (#7)

Max = 29.50 mph @ -0.00 msec
Min = -3.15 mph @ 121.20 msec

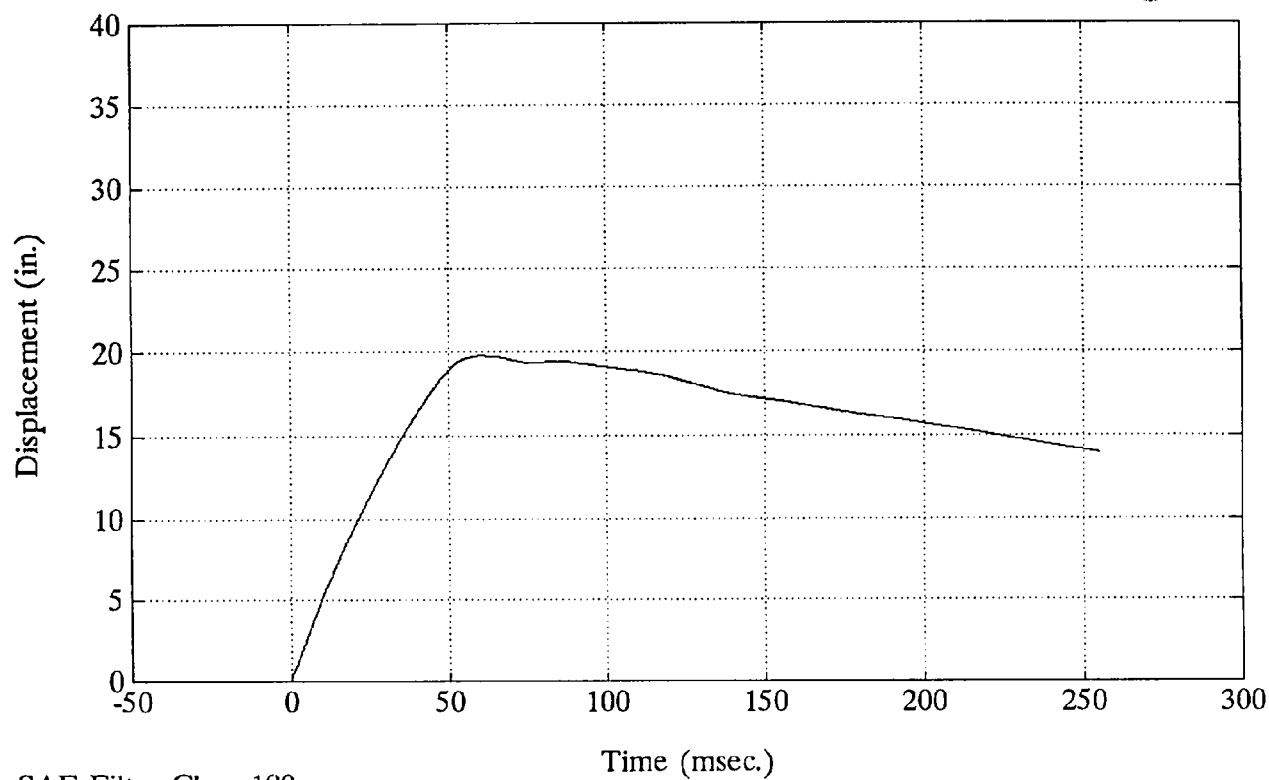


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Instrument Panel X (#7)

Max = 19.77 in. @ 60.72 msec
Min = 0.00 in. @ -0.00 msec



SAE Filter Class 180

TEST NO. CP5501

DUMMY DATA

SAE FILTER CHANNEL CLASS

Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600

FACILITY: TRACK
RUN #: 1265
SERIES #: 14

TEST DATE: 11 Mar 1993

TITLE: NHTSA "208" TEST #14 - 1993 SUBARU LEGACY

36 ms Fixed Duration HIC SUMMARY: Pos. 1 Head Resultant

hic: 617.00
t1 = 58.200 msec
t2 = 91.320 msec
Average G's Over Hic Duration = 51.06

36 ms Fixed Duration HIC SUMMARY: Pos. 2 Head Resultant

hic: 441.00
t1 = 61.440 msec
t2 = 97.320 msec
Average G's Over Hic Duration = 43.23

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 50.212 G's
Tstart = 66.6000 ms
Tend = 69.7200 ms
CSI = 432.789

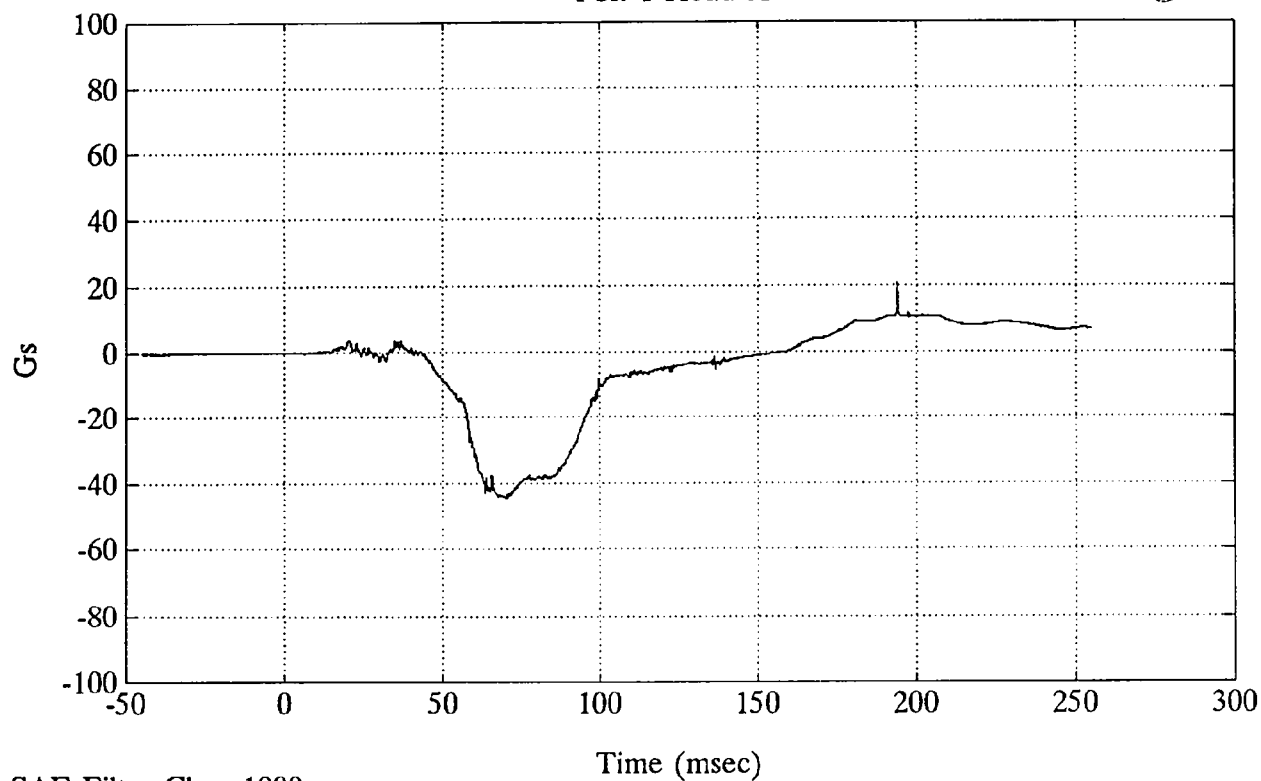
CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 42.029 G's
Tstart = 58.8000 ms
Tend = 61.8000 ms
CSI = 317.171

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Head X

Max = 20.77 Gs @ 193.80 msec
Min = -44.46 Gs @ 70.20 msec

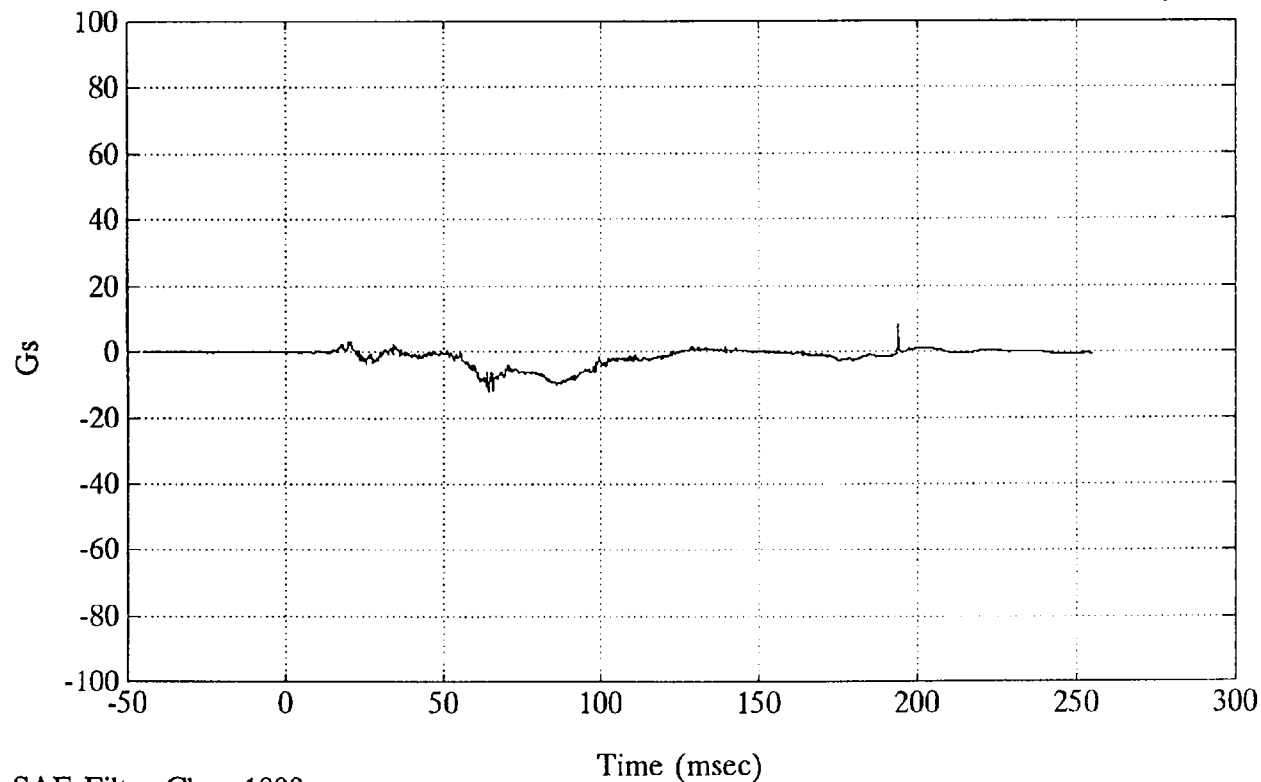


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Head Y

Max = 8.09 Gs @ 193.80 msec
Min = -11.82 Gs @ 64.20 msec

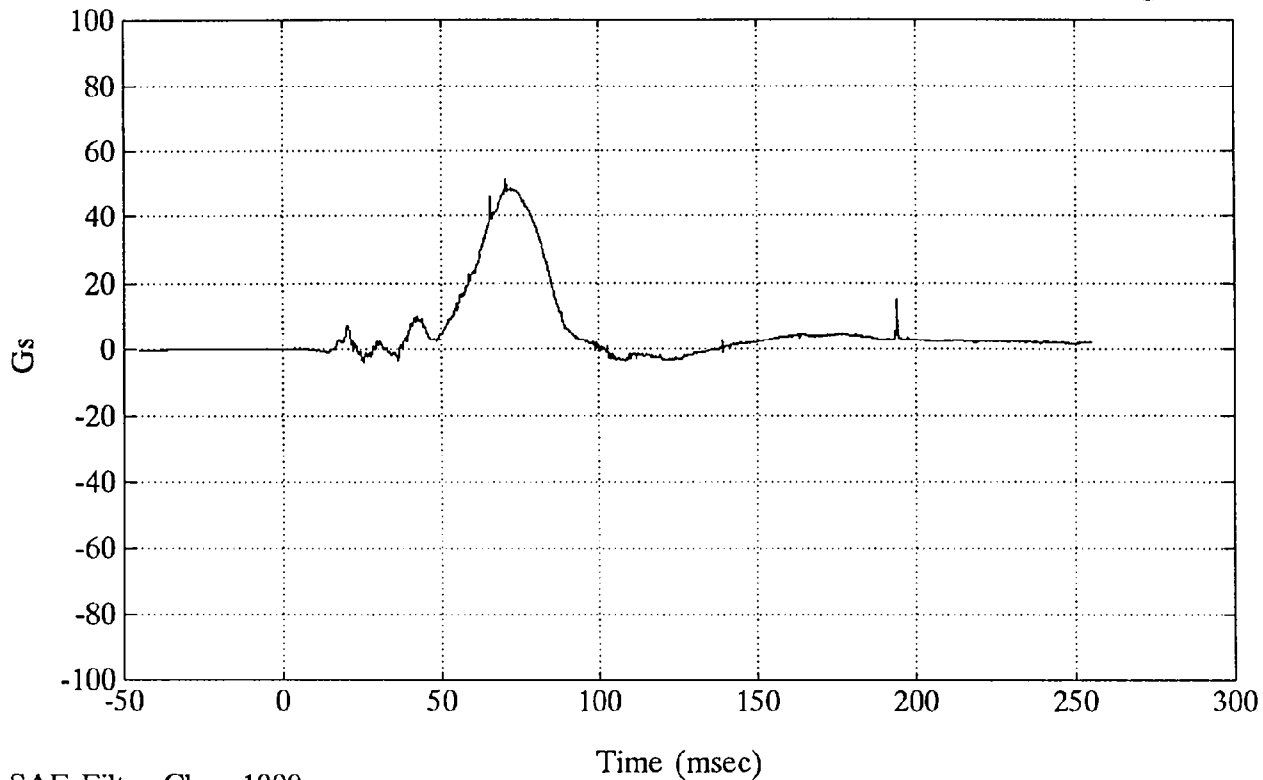


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Head Z

Max = 51.65 Gs @ 70.44 msec
Min = -4.17 Gs @ 25.68 msec

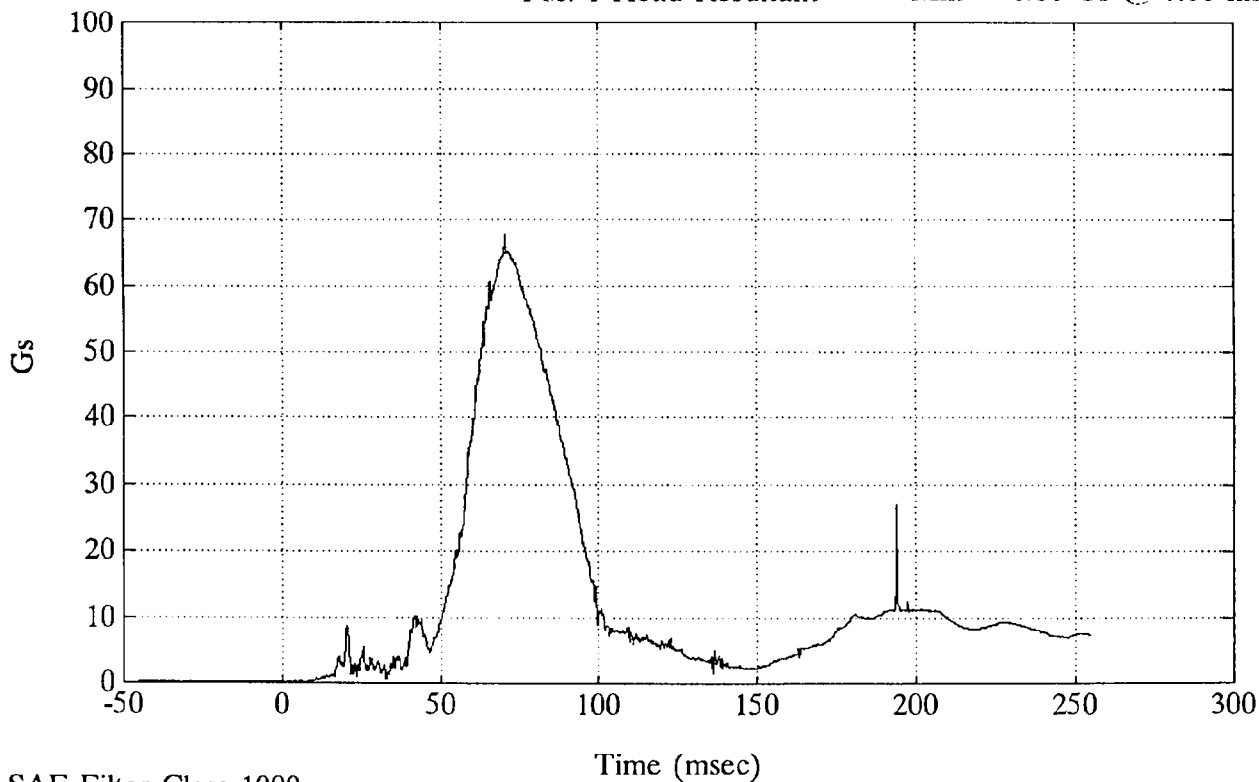


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Head Resultant

Max = 67.91 Gs @ 70.44 msec
Min = 0.06 Gs @ 7.80 msec

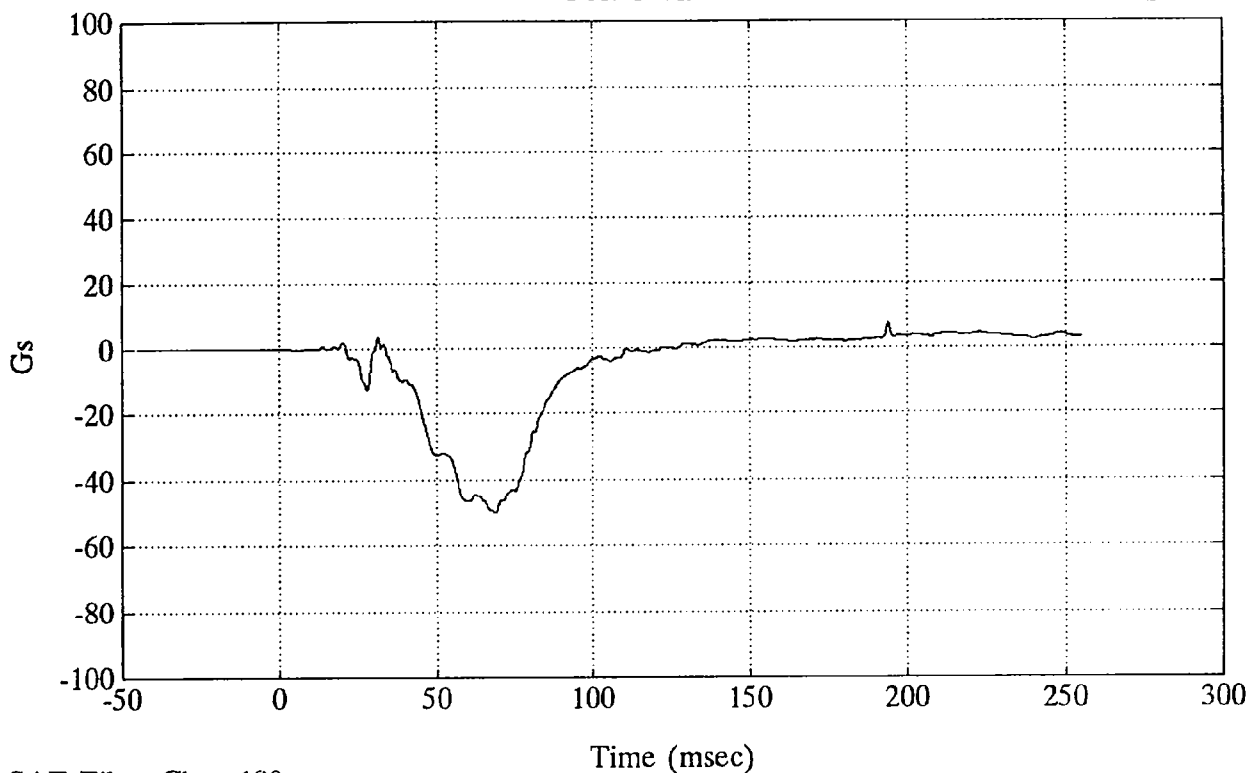


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Chest X

Max = 7.80 Gs @ 193.80 msec
Min = -50.10 Gs @ 68.76 msec

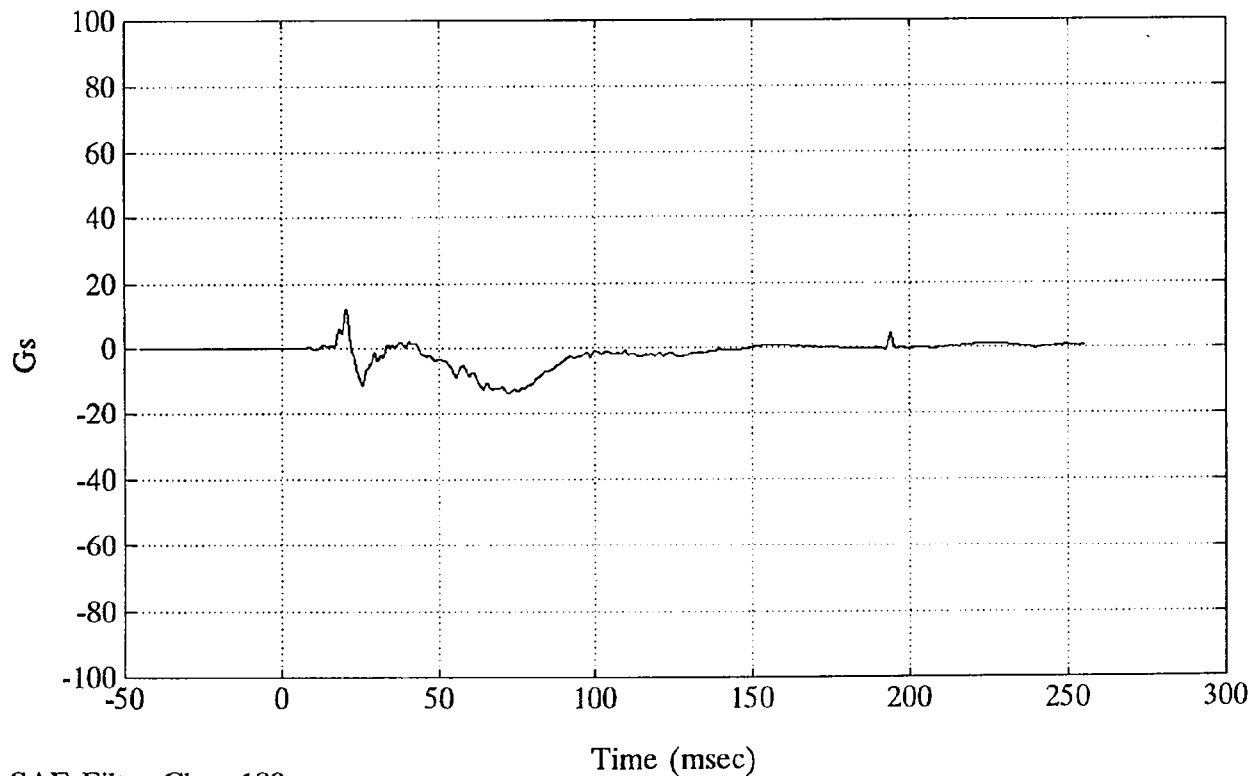


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Chest Y

Max = 11.96 Gs @ 20.52 msec
Min = -13.72 Gs @ 72.36 msec

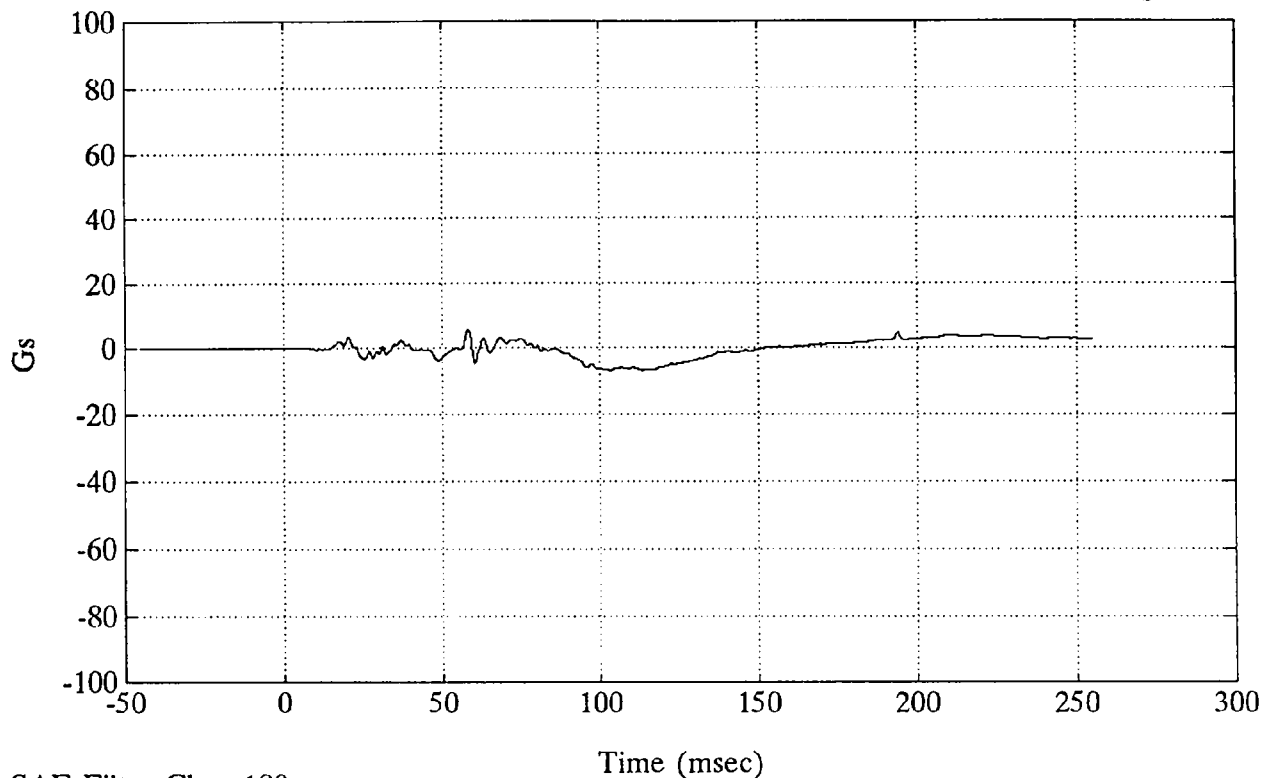


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Chest Z

Max = 5.80 Gs @ 58.32 msec
Min = -6.98 Gs @ 103.20 msec

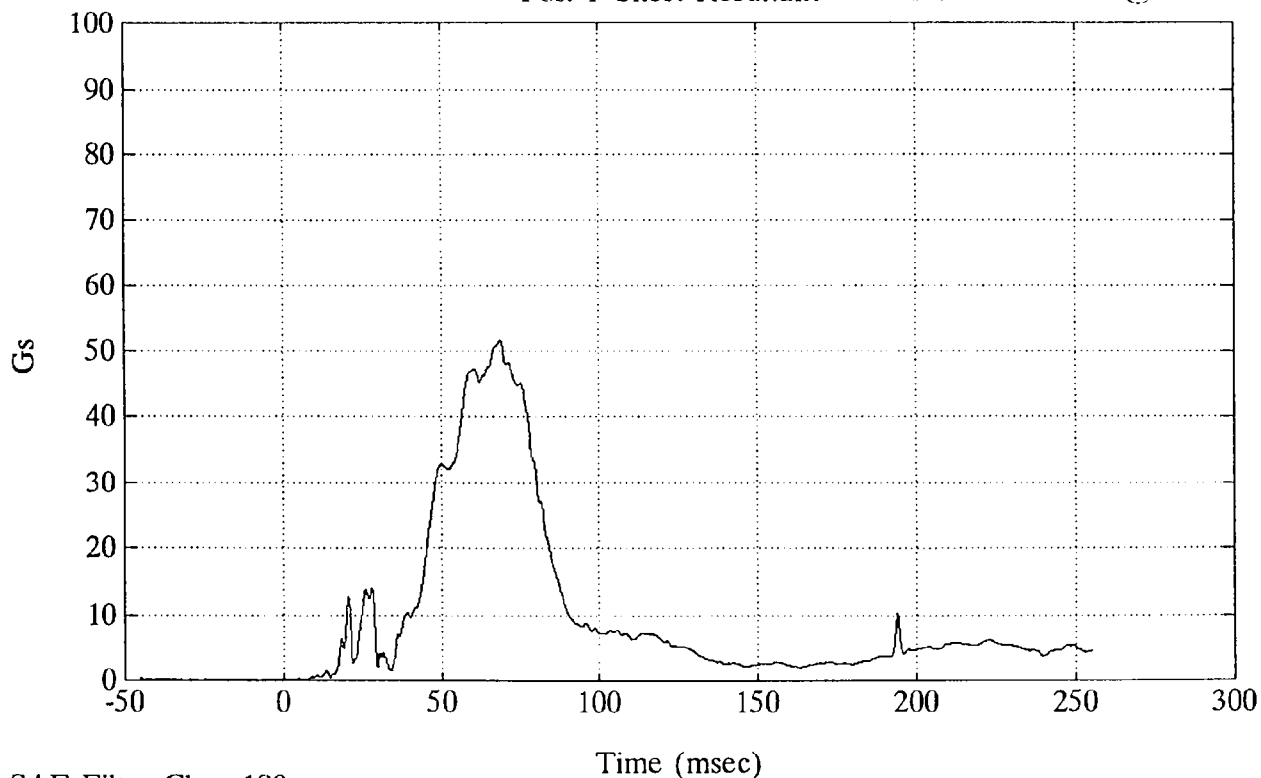


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Chest Resultant

Max = 51.64 Gs @ 68.76 msec
Min = 0.03 Gs @ -25.68 msec

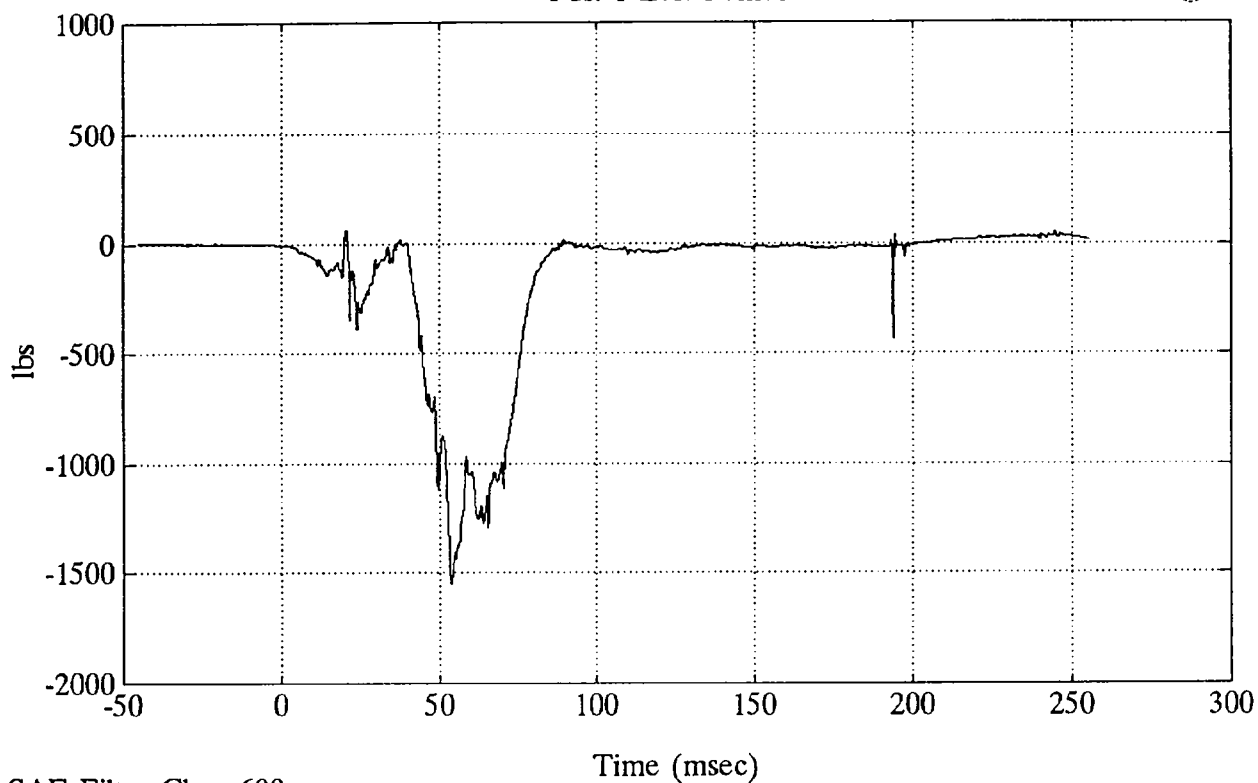


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Left Femur

Max = 60.92 lbs @ 20.52 msec
Min = -1546.00 lbs @ 53.88 msec

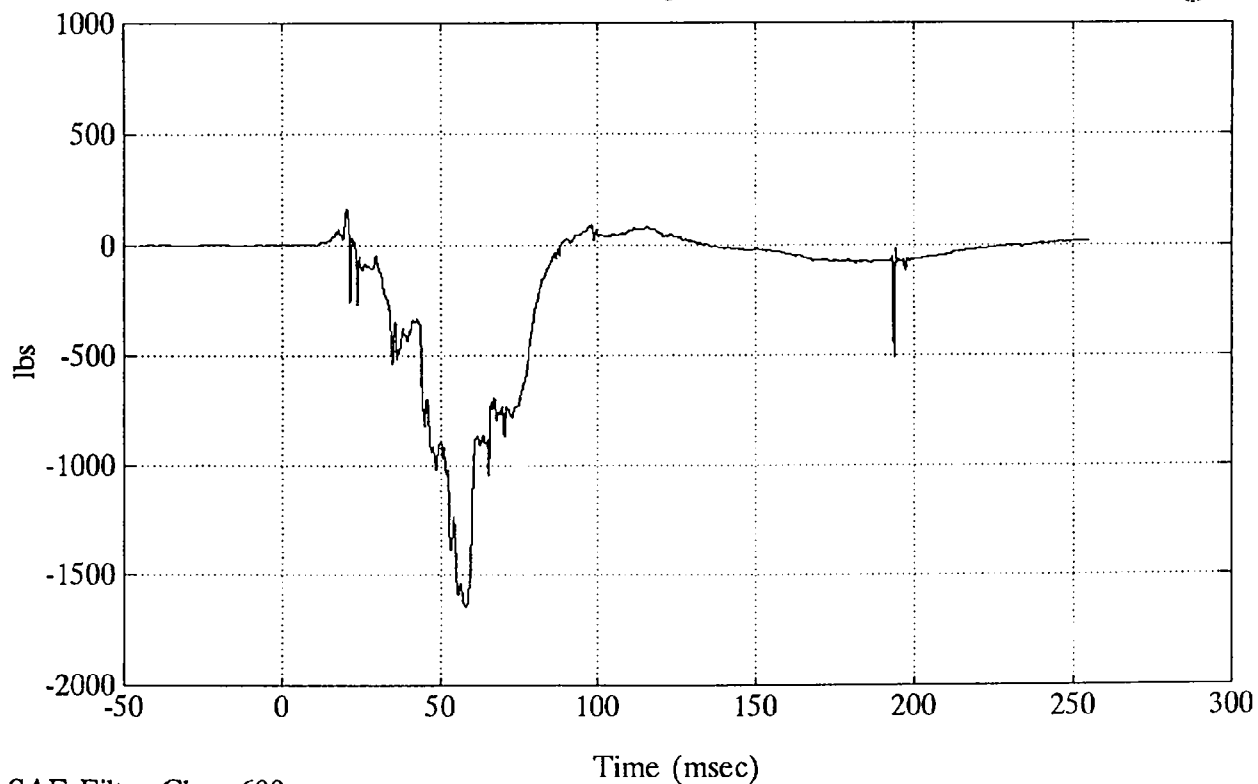


SAE Filter Class 600

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 1 Right Femur

Max = 163.64 lbs @ 20.52 msec
Min = -1645.90 lbs @ 58.08 msec

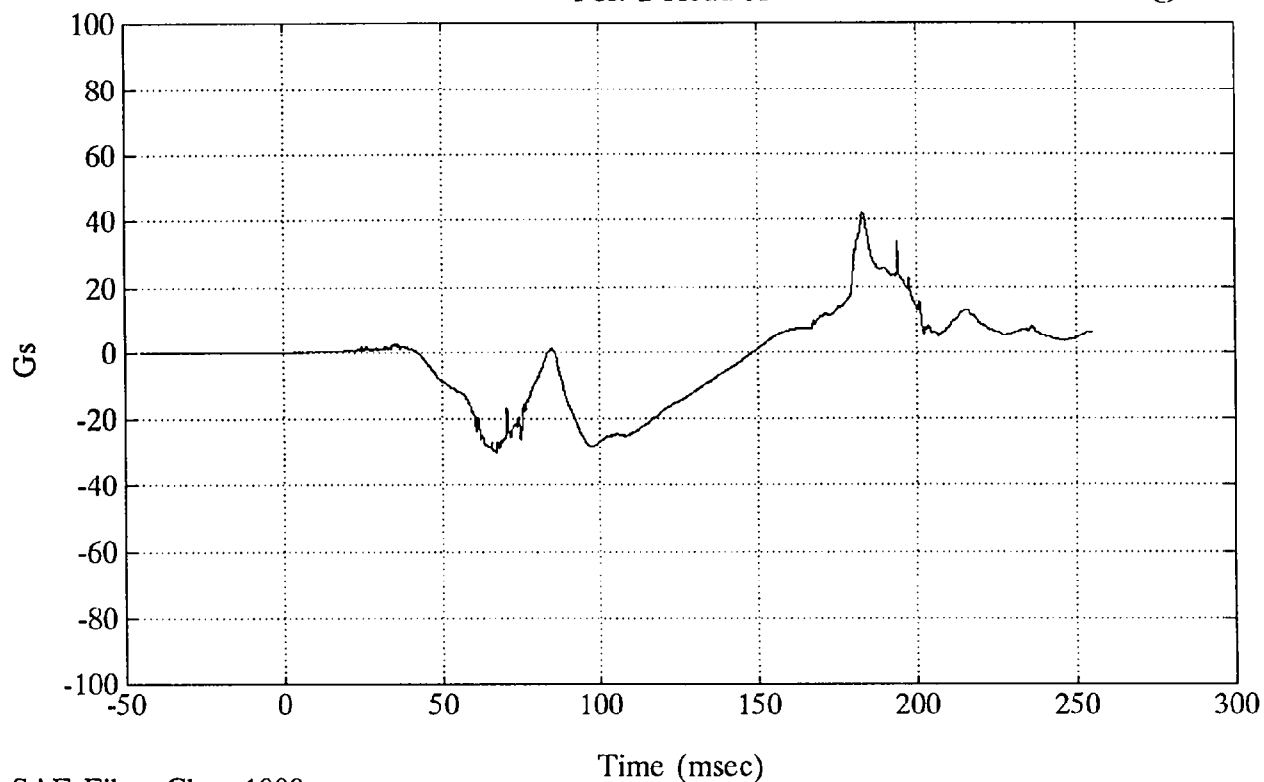


SAE Filter Class 600

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Head X

Max = 42.29 Gs @ 182.76 msec
Min = -29.84 Gs @ 67.20 msec

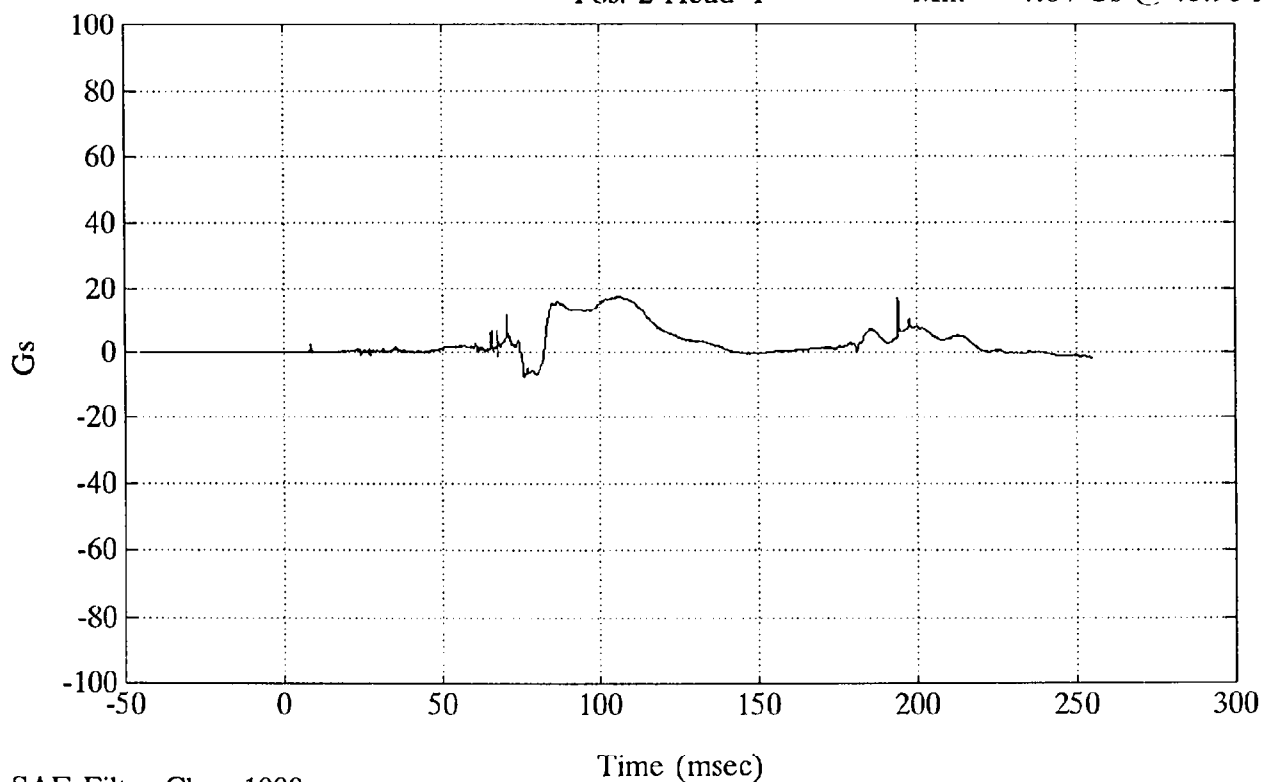


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Head Y

Max = 17.40 Gs @ 105.96 msec
Min = -7.64 Gs @ 75.96 msec

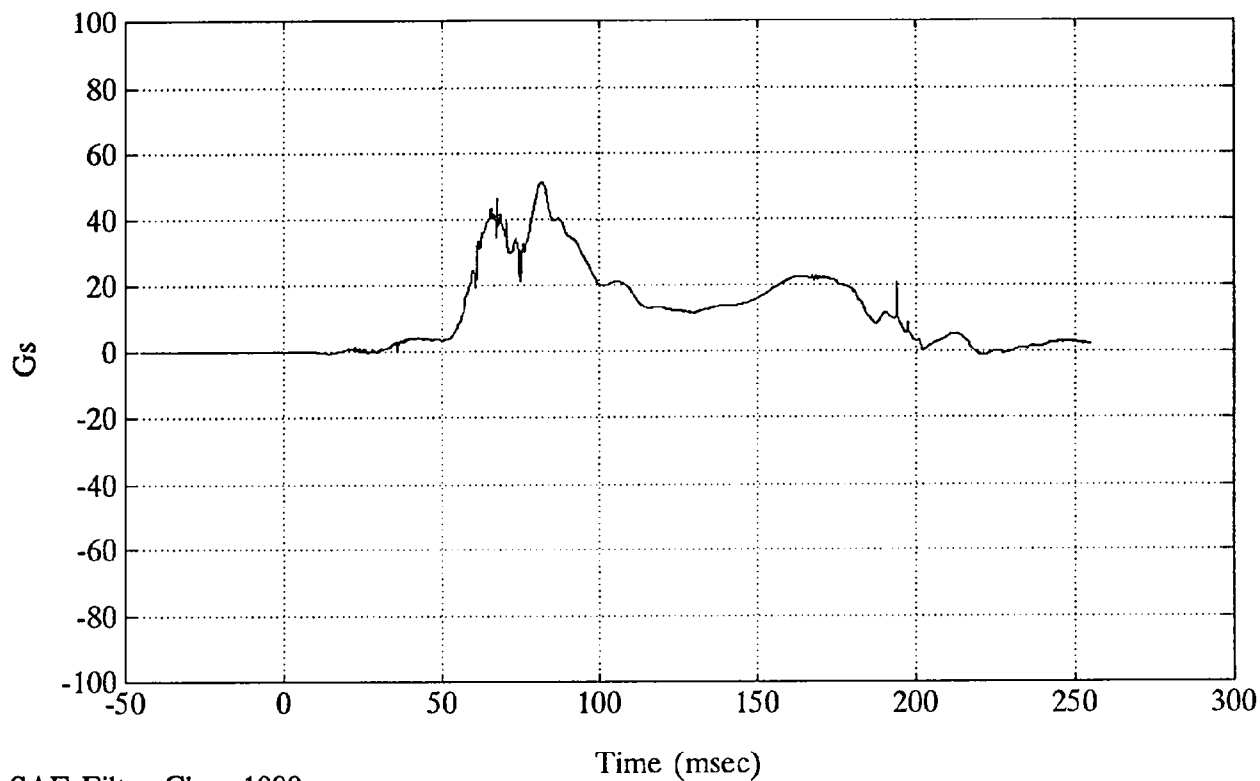


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Head Z

Max = 51.19 Gs @ 81.96 msec
Min = -1.07 Gs @ 220.80 msec

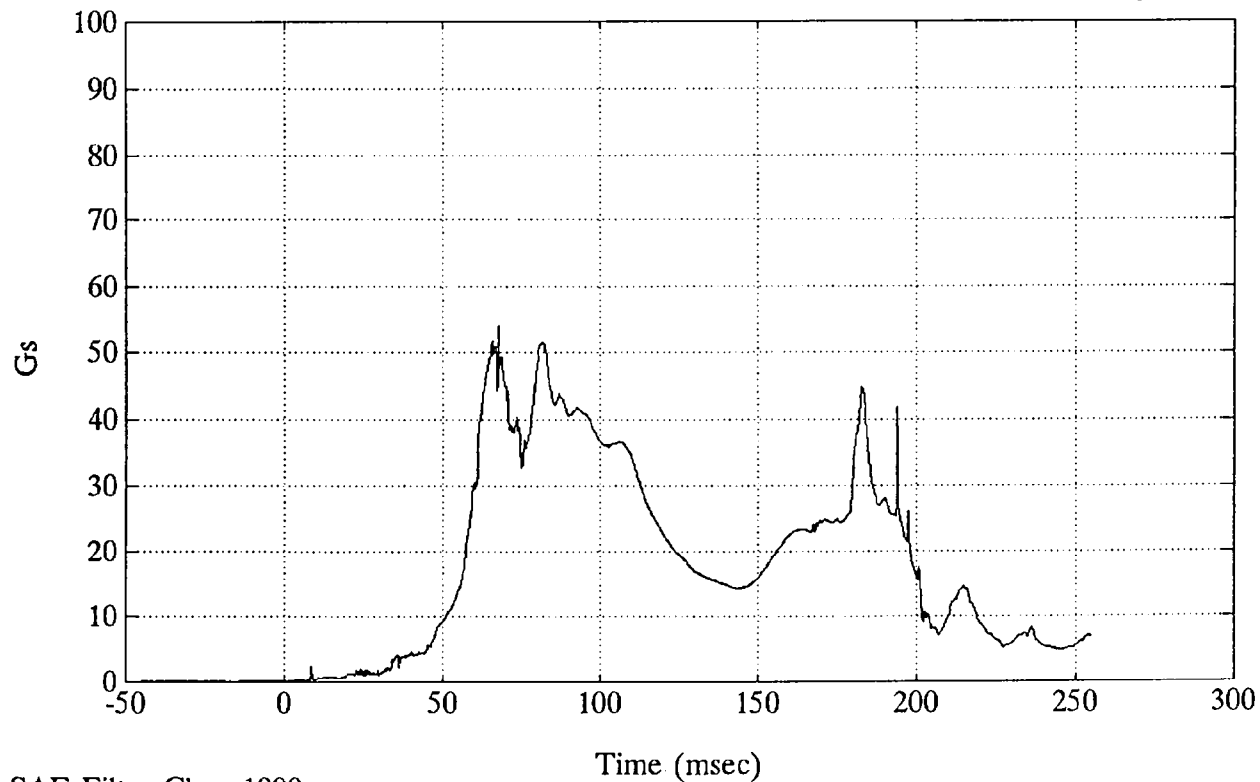


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Head Resultant

Max = 53.97 Gs @ 67.68 msec
Min = 0.02 Gs @ -6.72 msec

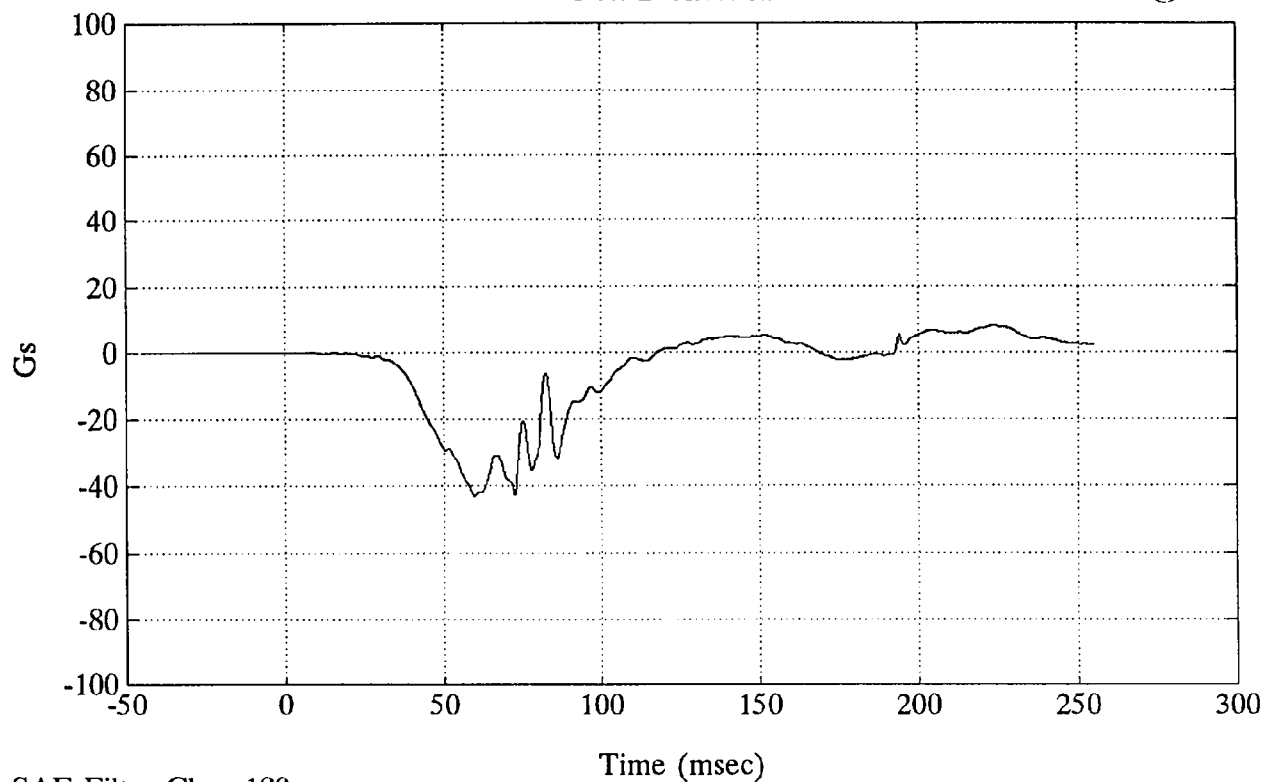


SAE Filter Class 1000

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Chest X

Max = 8.18 Gs @ 223.32 msec
Min = -43.00 Gs @ 59.76 msec

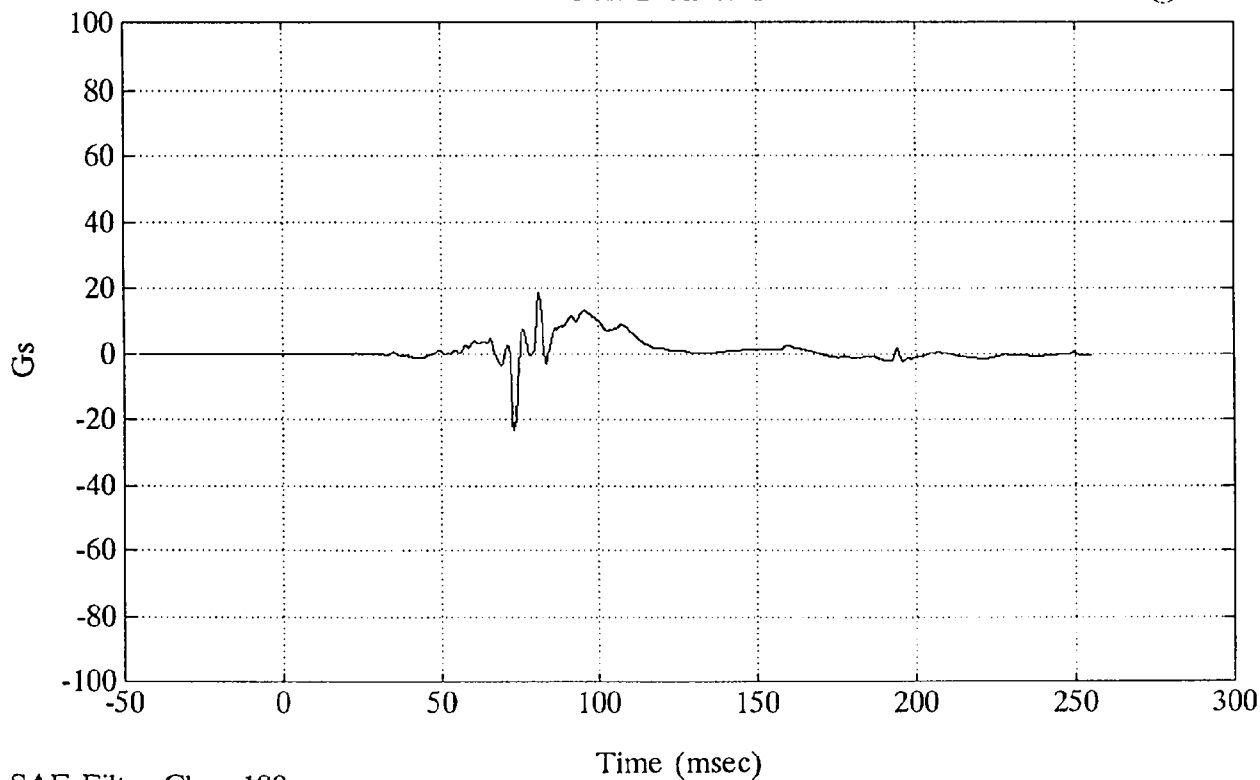


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Chest Y

Max = 18.36 Gs @ 81.00 msec
Min = -23.20 Gs @ 73.08 msec

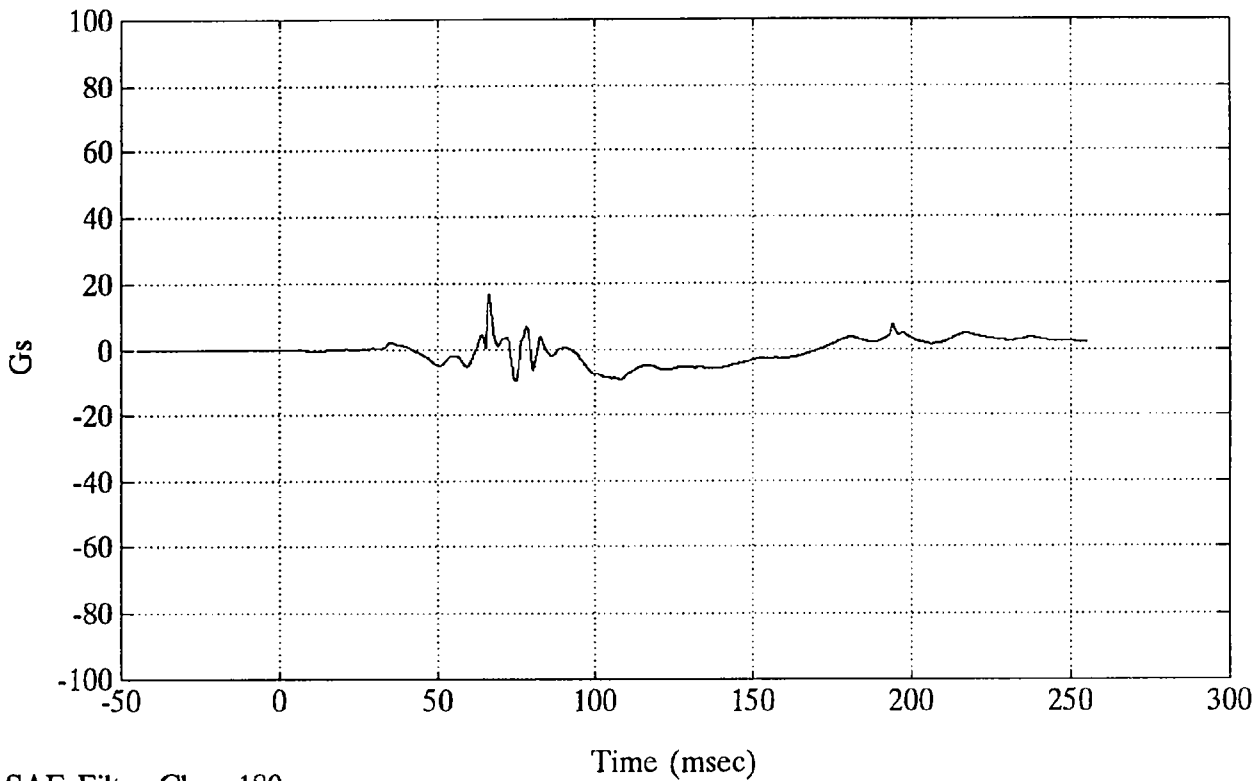


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Chest Z

Max = 16.69 Gs @ 66.36 msec
Min = -9.59 Gs @ 74.76 msec

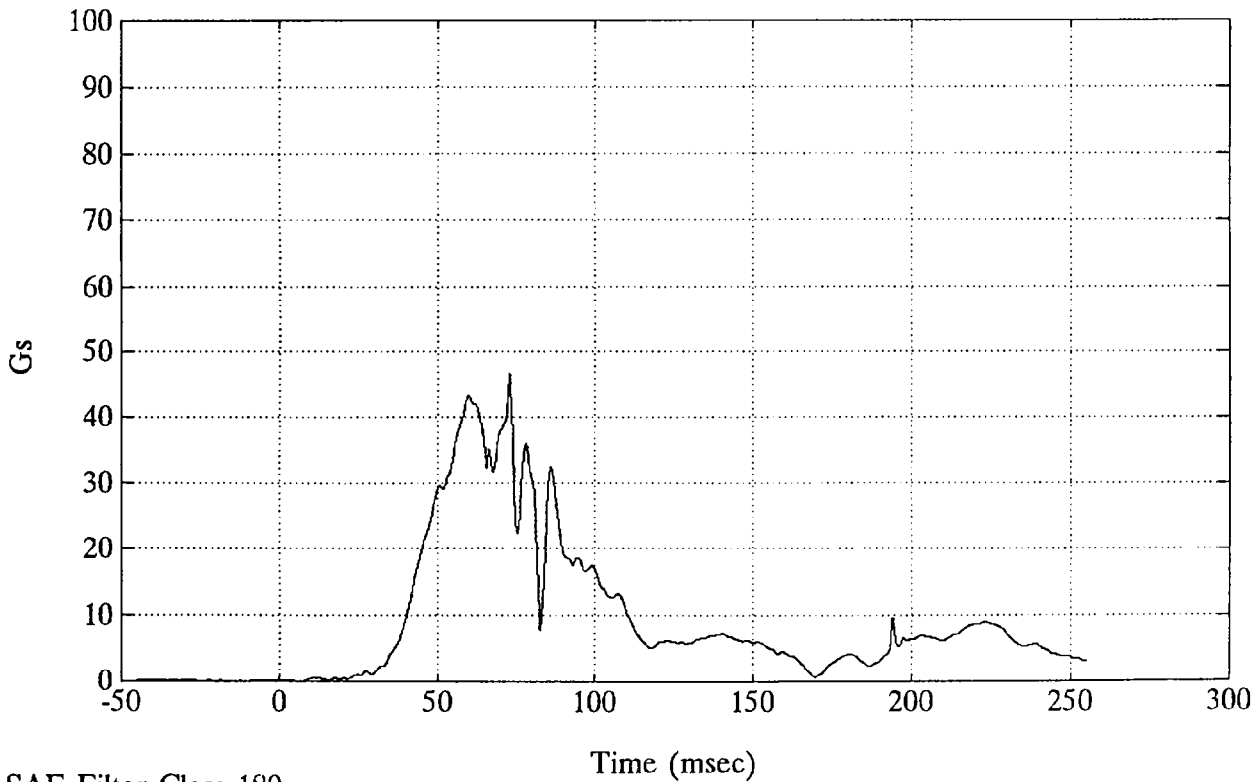


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Chest Resultant

Max = 46.80 Gs @ 72.84 msec
Min = 0.01 Gs @ -24.60 msec

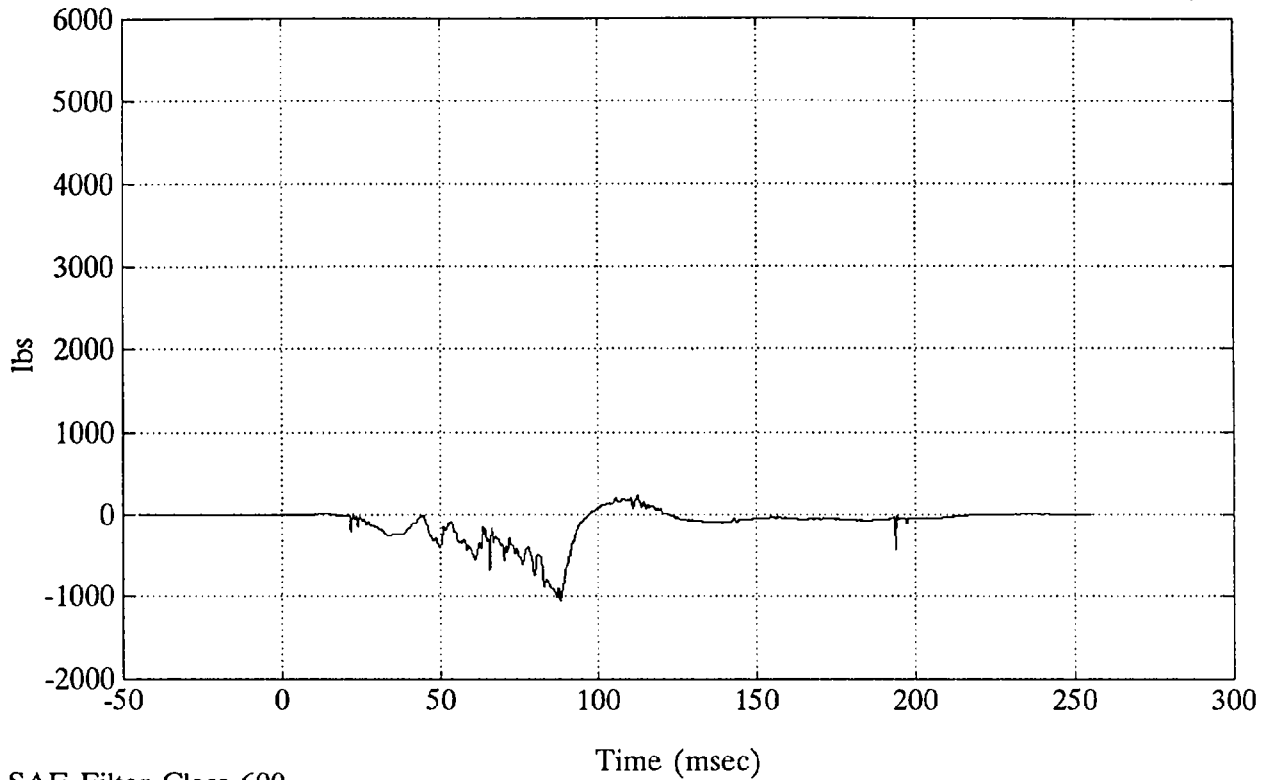


SAE Filter Class 180

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Left Femur

Max = 233.78 lbs @ 112.32 msec
Min = -1066.70 lbs @ 87.96 msec

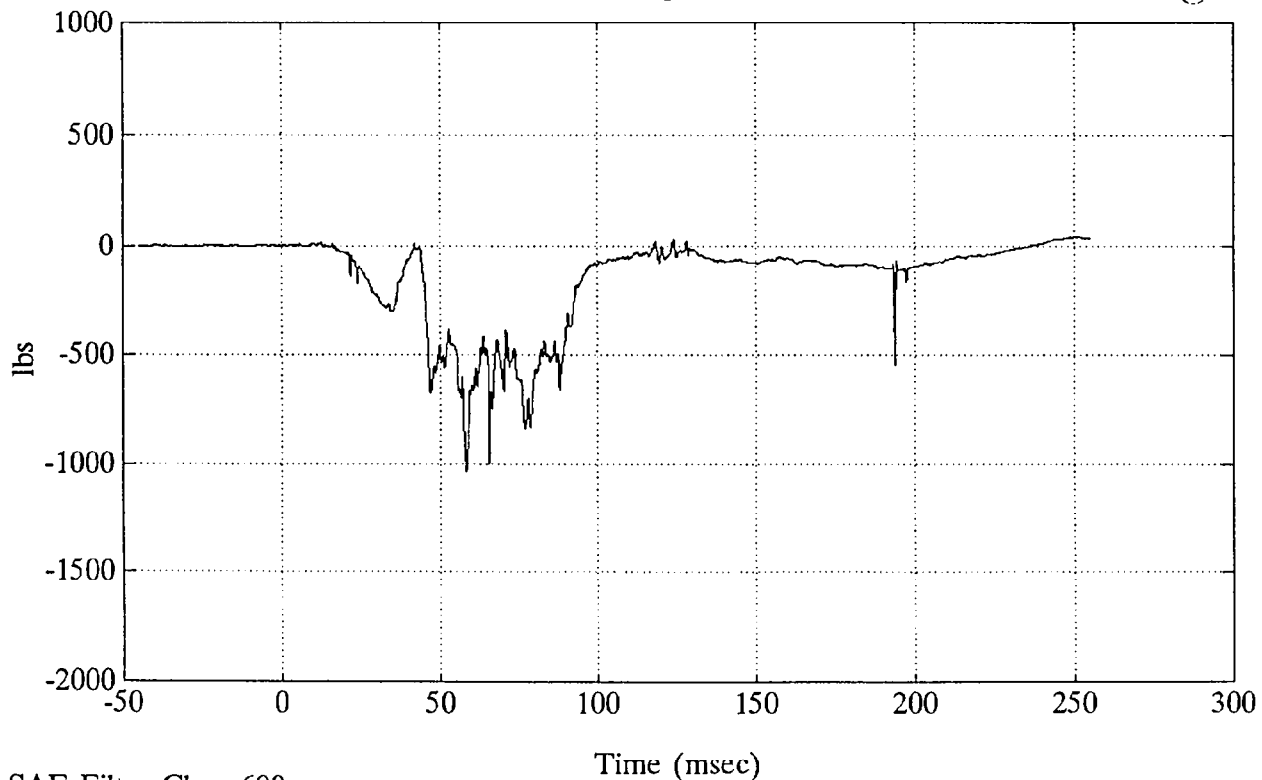


SAE Filter Class 600

FMVSS 208 - 1993 SUBARU LEGACY

Pos. 2 Right Femur

Max = 41.58 lbs @ 250.92 msec
Min = -1034.90 lbs @ 58.32 msec



SAE Filter Class 600

Appendix C

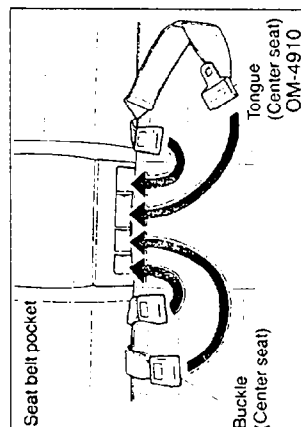
VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

WARNING!

- Never stack luggage or other cargo higher than the top of the seatback because it could tumble forward and injure passengers in the event of a sudden stop or an accident.
- Firmly secure skis and other long items in position to prevent them from shooting forward during a sudden stop and causing injury.
- Never permit anyone to ride in the cargo area of the wagon because this area is designed only for carrying luggage and other miscellaneous items.

CAUTION:

- Do not place luggage or other articles on the floor under the seat cushion.
- When folding down the back seat in a wagon, put the seat belts in the seat belt pocket to prevent them from falling beneath the seat cushion.



To return the rear seat to its original position, raise the seatback and push it till it locks. Then pull the rear cushion down to its normal position. Move the seat back and forth to confirm that it is securely locked in position. Place the head restraints (if so equipped) back in their normal position.

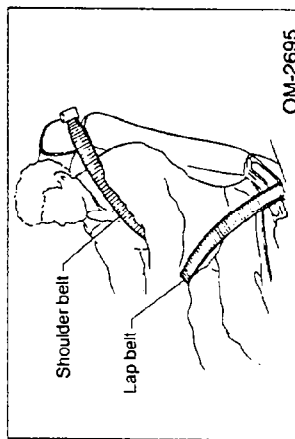
WARNING!

- After returning the rear seatback to its upright position, make sure the seat belts and seat conversion strap are properly located on top of the rear seat cushion.
- Also make certain that the shoulder belts are in front of rather than behind the rear seatback.

D13KE

Front Seat Belts (Automatic Belts)

Your vehicle (except Canada model) has an automatic shoulder belt and a manual lap belt for both front seat. The automatic shoulder belt restrains the upper torso. When the ignition switch is turned "ON", the shoulder belt responds automatically to the opening and closing of the door to allow easy entry into and egress from the vehicle. A knee panel is also located below the instrument panel to restrain the lower torso.



WARNING!

- All passengers must wear the manual lap belts for full restraint. Shoulder belts alone are not sufficient.
- Never open the door while the vehicle is moving as this will cause the automatic shoulder belt to move forward and away from you.

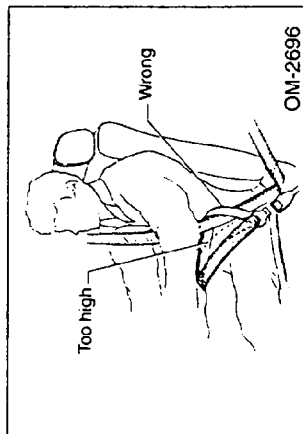
To use your automatic shoulder belt, first close the door and adjust the seat. When the ignition switch is turned "ON", the shoulder belt automatically moves to restrain the upper half of your body. The shoulder belt moves freely to allow normal body movement but automatically locks during a sudden stop or impact. When the door is opened, the shoulder belt moves forward, allowing you to get out easily.

If the ignition switch is turned "OFF", the seat belt will move forward only when the door is opened for the first time. If the door is closed again, the seat belt will remain in its current position and will not move until the ignition is again turned "ON".

If the ignition is turned "ON" while the seat belt is moving backward, turning the ignition "OFF" will cause the seat belt to stop.

If the seat belt is moving forward while the ignition is turned "OFF", closing the door will cause the seat belt to stop at its current position. A seat belt which stops under any of these conditions moves normally again when the ignition switch is turned "ON" or when the door is opened.

If the shoulder belt slide anchor becomes stuck or cannot be moved, see the section entitled "In Case of Emergency".



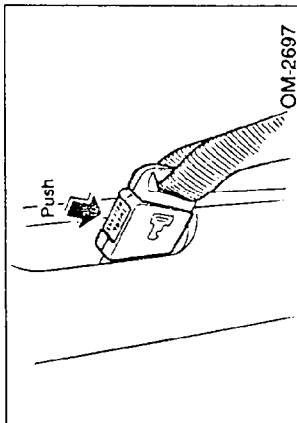
WARNING!

- To avoid personal injury and damage to property that may result from normal movement of the shoulder belt slide anchor in its track, keep all parts of your body (especially fingers and hands) and all objects away from the shoulder belt slide anchor when it is moving.
- For correct placement of the shoulder belt, keep your body still and your arms down while the system is operating.
- Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.
- Never position the shoulder belt under your arm. In an accident, this can increase the risk or severity of injury.
- Let the shoulder belt position itself around you first before fastening the manual lap belt. Fastening the lap belt first may cause the shoulder belt to get caught beneath the lap belt.
- To eliminate the risk of sliding under the seat belt in a collision, the front seats should not be reclined more than needed for comfort. Seat belts restrain the body most effectively when the occupant sits well back and upright in the seat.

☐ **How to release the shoulder belt in an emergency**

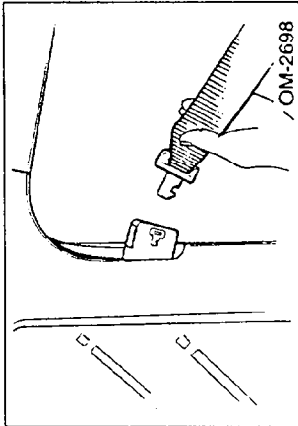
The shoulder belt may be unfastened manually in an emergency by simply pushing the release button on the shoulder belt side anchor buckle. The shoulder belt will drop free and allow you to quickly leave the vehicle.

If the emergency release is disconnected accidentally or is not fastened securely, a warning light will go on and a chime will sound.



☐ **How to reset the emergency release buckle**

1. Close the front door and turn the ignition switch to "ON" to allow the shoulder belt slide anchor to move to the rearmost position.
2. Draw the shoulder belt across your body, making sure that the caution label attached to the webbing faces you and the belt is not twisted.
3. Insert the tongue of the shoulder belt into the slide anchor until it snaps.



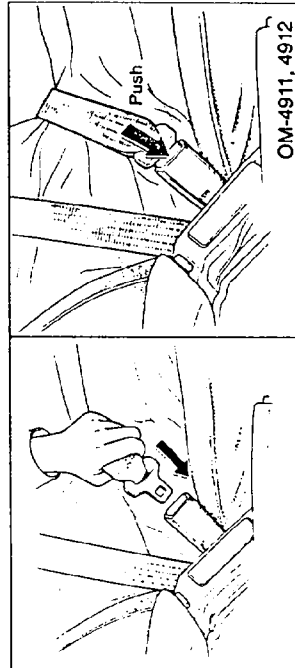
☐ **Manual lap belt (front seats)**

Your lap belt has an emergency locking retractor. To fasten the manual lap belt, pull it from the retractor and insert the tongue into the buckle until it snaps.

The manual lap belt moves freely to allow normal body movement but locks automatically during a sudden stop or impact.

This system can not be made to lock by jerking on the belt.

To unfasten the belt, push the button on the buckle.



Be sure to fasten the lap belt after the automatic shoulder belt is in place. Fastening the lap belt first may cause the shoulder belt to get caught beneath the lap belt.

This device causes the seat belt warning light on the instrument panel to flash for about six seconds when the ignition switch is turned "ON".

1. Driver's lap belt warning chime
When the ignition is turned on, a warning chime sounds if the driver's lap belt has not been fastened.
2. Front shoulder belt warning chime
A warning chime sounds for about six seconds and a warning light illuminates and stays on when the emergency release buckle for either the driver's or passenger's shoulder belt has been unlatched. The warning light also illuminates and stays on when either the driver's or passenger's automatic shoulder belt is incompletely fastened.

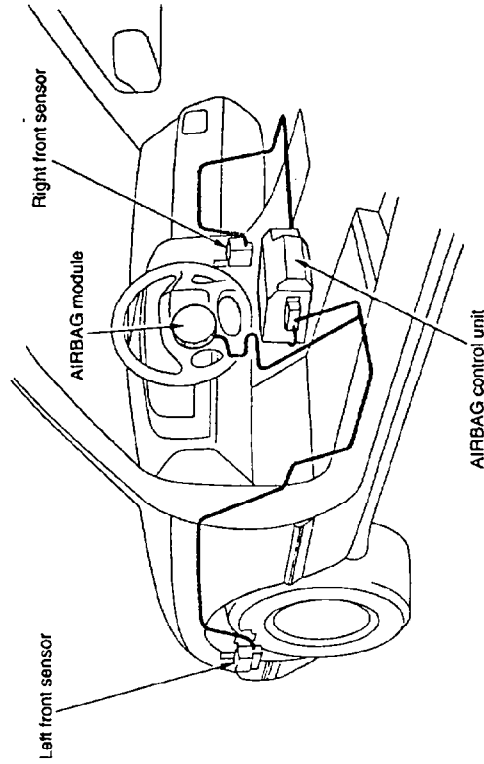
WARNING!
If the warning light does not go off when all shoulder belts have been properly and securely fastened, park the vehicle in a safe place. Refer to the section entitled "In Case of Emergency".

D26DE

SRS AIRBAG (if equipped)

The SRS (Supplemental Restraint System) AIRBAG in your vehicle affords the driver additional protection in a frontal collision. This system is available for the driver only and is designed to supplement the protection provided by the seat belt.

NOTE:
SRS AIRBAG can function only when the ignition switch is in the "ON" position.



OM-4917

WARNING!

To obtain maximum protection in an accident, the driver and all passengers in the vehicle should always wear seat belts when the vehicle is moving. The SRS AIRBAG does not do away with the need to fasten seat belts. In combination with the seat belts, it offers the best combined protection in a serious accident.

For instructions and precautions concerning the seat belt system, see front seat belts on page 2-21 and rear seat belts on page 2-28.

The SRS AIRBAG is designed to deploy in an accident involving a moderate to severe frontal collision. It is not designed to assist the driver in lesser frontal impacts, in side or rear impacts or in roll-over accidents. The SRS AIRBAG is designed to function on a one-time-only basis. In the event that the SRS AIRBAG is deployed, replacement of the system must be performed only by an authorized SUBARU dealer. When the components of SRS AIRBAG are replaced, use only genuine SUBARU parts.

WARNING!

To avoid accidental firing of the system or rendering the system inoperative, which may result in serious injury, no modifications should be made to any components or wiring of the SRS AIRBAG. This includes the installation of "custom" steering wheels or additional trim material, or badges over the steering wheel hub. Installation of additional electrical/electronic equipment on or near SRS AIRBAG components and/or wiring is not advisable.

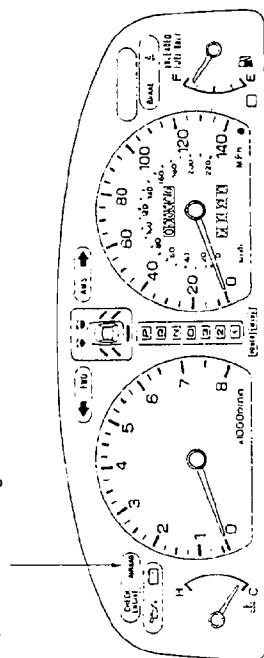
☐ **System Monitors**

A diagnostic system continually monitors the readiness of the SRS AIRBAG while the vehicle is being driven. The AIRBAG indicator light will show normal system operation by lighting for about 8 seconds when the ignition key is first turned to the "ON" position then turning off.

The following components are monitored by the indicator:

- Right front sensor
- Left front sensor
- AIRBAG control unit
- AIRBAG module
- All related wiring

AIRBAG indicator light



OM-5169

In the event of a malfunction indicated by any of following, the vehicle should be taken promptly to your nearest SUBARU dealer to have the system checked. Unless checked and repaired, the SRS AIRBAG will not function reliably:

- Flashing or flickering of the indicator light.
- Failure of the indicator light to illuminate when the ignition switch is first turned to the "ON" position.
- Continuous illumination of the indicator light.
- Illumination of the indicator light while driving.

☐ **Safety Guidelines for the SRS AIRBAG**

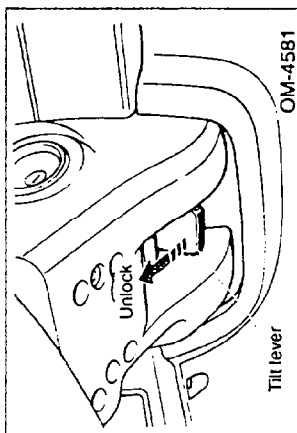
During a severe frontal impact, a sudden, fairly loud inflation noise will be heard and some smoke will be released. These occurrences are normal and not harmful. The smoke does not indicate a fire in the vehicle.

Although it is highly unlikely that the SRS AIRBAG would activate in a non-accident situation, should it occur, the bag will deflate quickly, not obscuring vision and will not interfere with the driver's ability to maintain control of the vehicle.

D20EE

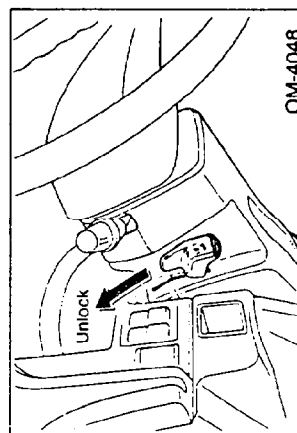
Tilt Steering Wheel

To adjust the steering wheel, grasp the steering wheel and pull the tilt lever. The steering wheel may then be adjusted to the position most suitable to you.



After adjusting the steering wheel, move it up and down to make sure that it is securely locked.

For easier entry and egress from the driver's seat, pull the "LIFT UP" lever located on the steering column upward. The steering wheel will automatically spring up. To return it to its original position, move the wheel downward until it locks securely at the preselected position. Keep a continuous hold on the steering wheel when operating the "LIFT UP" lever.



Note:

When you sell your vehicle, we urge you to explain to the buyer that it is equipped with an SRS AIRBAG by alerting him to the applicable section in this owner's manual.

☐ System Servicing

To ensure its long-term reliability, the SRS AIRBAG must be inspected by a SUBARU dealer ten years after the date of manufacture, which is shown on the certification label attached to the driver's door jamb.

CAUTION:

— The impact sensors are located in both front fenders and under the center console. If you need service or repair in those areas or near the steering wheel and column, we recommend that you have an authorized SUBARU dealer perform the work.

WARNING!

- When scrapping the airbag unit or the entire car damaged by a collision, consult your SUBARU dealer.
- The SRS AIRBAG has no user-serviceable parts. Tampering with or disconnecting the system's wiring could result in accidental inflation of the airbag or could make the system inoperative, which may result in serious injury. For required servicing of the SRS AIRBAG, see your nearest SUBARU dealer.