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

SATURN CORPORATION
1993 SATURN SL
4-DOOR SEDAN

NHTSA NUMBER: CP0103

CALSPAN TEST NUMBER: 8056-8

NOVEMBER 20, 1992

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225



FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, S.W.
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*Rec'd
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Prepared: David J. Travale
David J. Travale, Project Engineer

Approved: Walter E. Levan
Walter E. Levan, Program Manager
Transportation Sciences Center

FINAL REPORT ACCEPTED BY:

Charles R. Case
Contracting Office's Technical Representative
(COTR), NHTSA, Office of Vehicle Safety Compliance

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16. Abstract <p>A 30 mph vehicle safety compliance test was conducted on a 1993 Saturn SL 4-Door Sedan.</p> <p>This test was performed at the Calspan Advanced Technology Center in Buffalo, New York on November 20, 1992. The purpose of this test was to determine compliance with the performance requirements of the following Federal Motor Vehicle Safety Standards:</p> <ol style="list-style-type: none">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" <p>The test mode was perpendicular (0°) and the impact velocity was 29.8 mph. The ambient temperature at the impact face was 52°F.</p> <p>The subject test vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial) and 301.</p> <p><u>Type of Restraint System:</u> The test vehicle was equipped with a driver side supplemental restraint device. The driver and right-front passenger were also equipped with an automatic torso belt. The lap belts were not used in this test.</p>					
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 Saturn SL 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 CPO103

A frontal barrier was impacted by a 1993 Saturn SL 4-door Sedan at a velocity of 29.8 mph. The test was performed at the Calspan Corporation Advanced Technology Center on November 20, 1992. 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 572E, 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, chest displacement potentiometers and left/right femur load cells. These ATDs had been certified prior to the test.

The 25 channels of data were recorded on two 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces.

The driver's HIC was 317. The maximum chest deceleration over 3 milliseconds was 34.9 g's with 2.0 inches of deflection. The maximum force on the driver's left femur was 1192 pounds and 955 pounds on the right femur.

The right front passenger's HIC was 311. The maximum chest deceleration over 3 milliseconds was 35.1 g's with 1.4 inches of chest deflection. Loads were 1385 and 1138 on the left and right femurs respectively.

Table 1
CRASH TEST SUMMARY

Vehicle NHTSA No.: CP0103 Test Mode: 30 mph Frontal Barrier

Test Date: November 20, 1992 Time: 13:35 Temperature: 52°F

Vehicle Make/Model/Body Style: 1993 Saturn SL 4-Door Sedan

Vehicle Test Weight: 2755 lbs.

Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.8 mph

Maximum Static Crush: 19.0 inches

Vehicle Rebound: 33.2 inches

<u>DUMMIES:</u>	<u>DRIVER</u>	<u>PASSENGER</u>
Type:	<u>Part 572E</u>	<u>Part 572E</u>
Restraint System:	<u>Airbag-Automatic Torso Belt</u>	<u>Automatic Torso Belt</u>

Number of Data Channels: 25

Number of Cameras: 1 Real Time
14 High Speed

DOOR OPENING DATA: Closed - Left Front
Closed - Right Front

Front Seat(s) Data:	<u>DRIVER</u>	<u>PASSENGER</u>
Seat Track Failure:	<u>0.0</u>	<u>0.0</u>
	inches of shift	

Seat Back Failure:	<u>None</u>	<u>None</u>
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<u>VISIBLE DUMMY CONTACT POINTS:</u>	<u>DRIVER</u>	<u>PASSENGER</u>
Head:	<u>Face with airbag. Rear of head with head rest</u>	<u>Right top of head with roof rail</u>
Abdomen:	<u>Airbag</u>	<u>-</u>
Chest:	<u>Airbag</u>	<u>-</u>
Knees:	<u>Lower dash</u>	<u>Lower dash</u>

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1993 Saturn SL 4-Door Sedan
NHTSA No.: CP0103; VIN: 1G8ZF5596PZ116071; Color: Red
Engine Data: 4 cylinders; - CID; 1.9 Liters; - cc
Placement: - Longitudinal or In-Line; X Transverse or Lateral
Transmission Data: 5 speeds; X Manual; - Automatic; X Overdrive
Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive
Major Options: X A/C; - Pwr.Strg.; X Pwr.Brakes
- Pwr.Windows; - Pwr.Door Locks; - Tilt Wheel
Date Received: 10/6/92; Odometer Reading 137 miles
Selling Dealer: Saturn of Auburn
& Address Grant Avenue, Route 5 Auburn, New York 13021

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Saturn Corporation
Date of Manufacture: 9/92
GVWR: 3243 lbs.; GAWR: 1659 lbs. FRONT; 1583 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 30 psi FRONT
26 psi REAR
Recommended Tire Size: P175/70R14
* Recommended Cold Tire Pressure: 30 psi FRONT; 26 psi REAR
Size of Tires on Test Vehicle: P175R1484S; Manufacturer: Firestone
Vehicle Capacity Data:
Type of Front Seats: - Bench; ✓ Bucket; - Split Bench
Number of Occupants: 2 Front; 3 Rear; 5 Total
Vehicle Capacity Weight (VCW) = 864 lbs.
No. of Occupants x 150 lbs. = 750 lbs.
Rated Cargo/Luggage Weight (RCLW) = 114 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 = 670 lbs. Right Rear = 450 lbs.
 Left Front = 740 lbs. Left Rear = 460 lbs.
 TOTAL FRONT = 1410 lbs. TOTAL REAR = 910 lbs.
 % of Total Vehicle Weight = 60.8 % of Total Weight = 39.2 %
 TOTAL DELIVERED WEIGHT = 2320 lbs.

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 2320 lbs.
 Rated Cargo/Luggage Weight (RCLW) = 114 lbs.
 Weight of 2 P.572E Dummies @ 167 ea. = 334 lbs.
 TARGET TEST WEIGHT = 2768 lbs. (sum)

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 101 POUNDS OF CARGO WEIGHT:

Right Front = 775 lbs. Right Rear = 630 lbs.
 Left Front = 750 lbs. Left Rear = 600 lbs.
 TOTAL FRONT = 1525 lbs. TOTAL REAR = 1230 lbs.
 % of Total Weight = 55.4 % % of Total Weight = 44.6 %
 TOTAL TEST WEIGHT = 2755 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 26-7/16" LF 26-7/16" RR 26-5/16" LR 26-1/8"
 FULLY LOADED: RF 25.25" LF 25-3/16" RR 23-11/16" LR 23-9/16"
 AS TESTED: RF 25.6" LF 25.7" RR 24.5" LR 24.5"

Vehicle's Wheel Base: 102.5 in.

Location of Vehicle's C.G.: 45.8 inches rearward of front wheel center

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 12.8 gallons
 Usable Capacity Figure Furnished by COTR = 12.7 gallons
 Test Volume Range (92 to 94% of Usable Capacity) = 11.7 to 11.9 gallons
 ACTUAL TEST VOLUME = 11.8 gallons (with entire fuel system filled)

Table 3
POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°
 Test Date: November 20, 1992 Time: 13:35 Temperature: 52°F
 Vehicle NHTSA No.: CPO103
 Required Impact Velocity Range: 28.9 to 29.9 mph

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

Trap No. 1 = 29.8 mph; Trap No. 2 = 29.8 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 = 170.2; C/L = 177.1; Left = 171.0
 Post-Test Right = 157.1; C/L = 158.1; Left = 158.5
 Crush Right = 13.2; C/L = 19.0; Left = 12.5
 AVERAGE = 14.9 inches

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:

Right = 33.9; C/L = 33.9; Left = 31.9
 AVERAGE = 33.2 inches

DOOR OPENING:

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

SEAT MOVEMENT:

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

Table 3

POST IMPACT DATA (cont.)

GLAZING DAMAGE: Windshield cracked throughout

OTHER NOTABLE IMPACT FEATURES: None

Section 3
OCCUPANT AND VEHICLE DATA

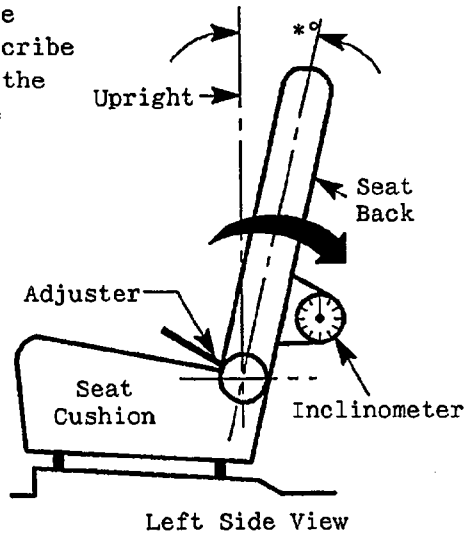
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year: 1993 Vehicle Model: Saturn SL 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 was positioned according to manufacturer specifications

Seat back angle for driver's seat: *

Measurement instructions: Measure from the headrest post-10° from vertical

Seat back angle for passenger's seat: *

Measurement instructions: Same as driver

2. Seat Fore and Aft Positioning

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat: Place seat in 10th detent from front
(mid-position) from a total of 18 detents

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

3. Fuel Tank Capacity Data

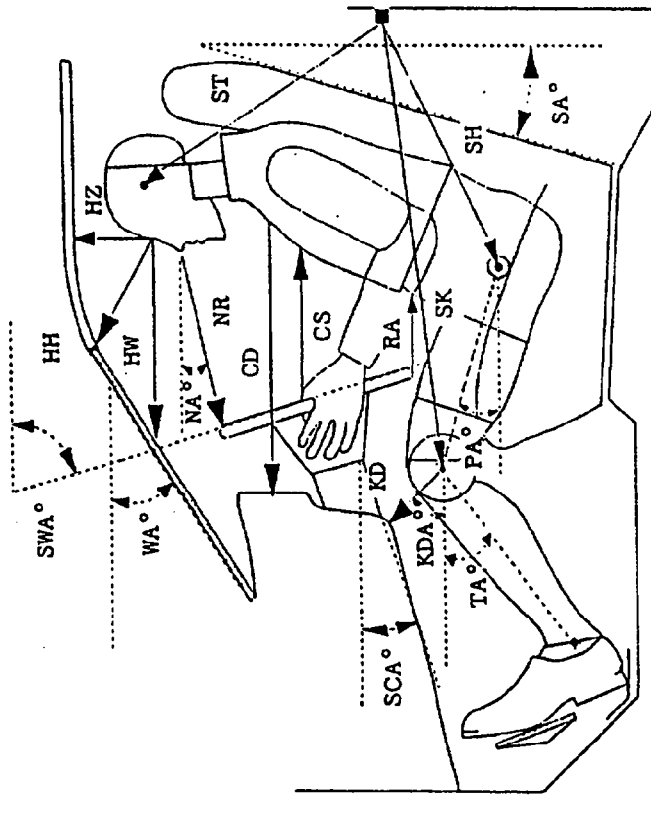
A. "Usable Capacity" of the standard equipment fuel tank is 12.7 gallons

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

Additional Instructions: None

Figure 2

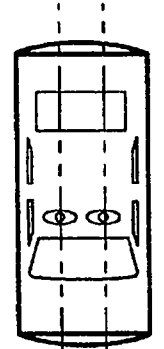
PART 572 DUMMY IN-VEHICLE POSITION



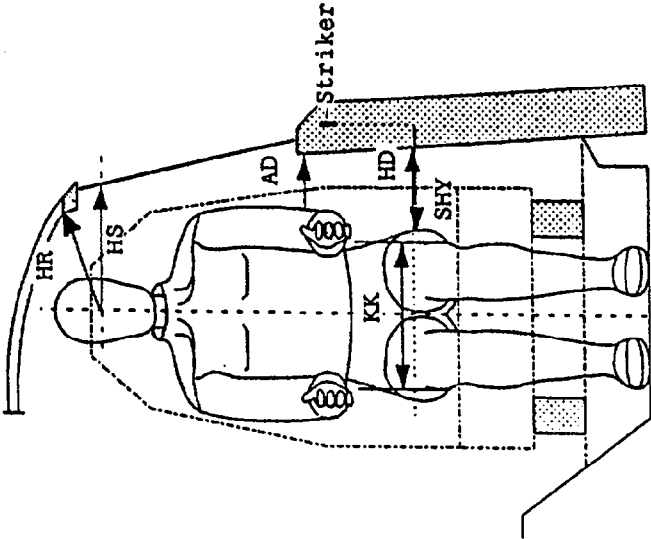
- HH - Head to Header
- HW - Head to Windshield
- HZ - Head to Roof
- NR - Nose to Rim
- CS - Chest to Dash
- CD - Chest to Abdomen
- RA - Rime to Abdomen
- KDL/KDR - Knee to Dash
- KDA - Knee to Dash Angle
- SH - Striker to H-Point

- 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



- HR - Head to 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

Vertical Transverse Plane

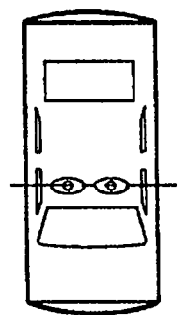


Table 4

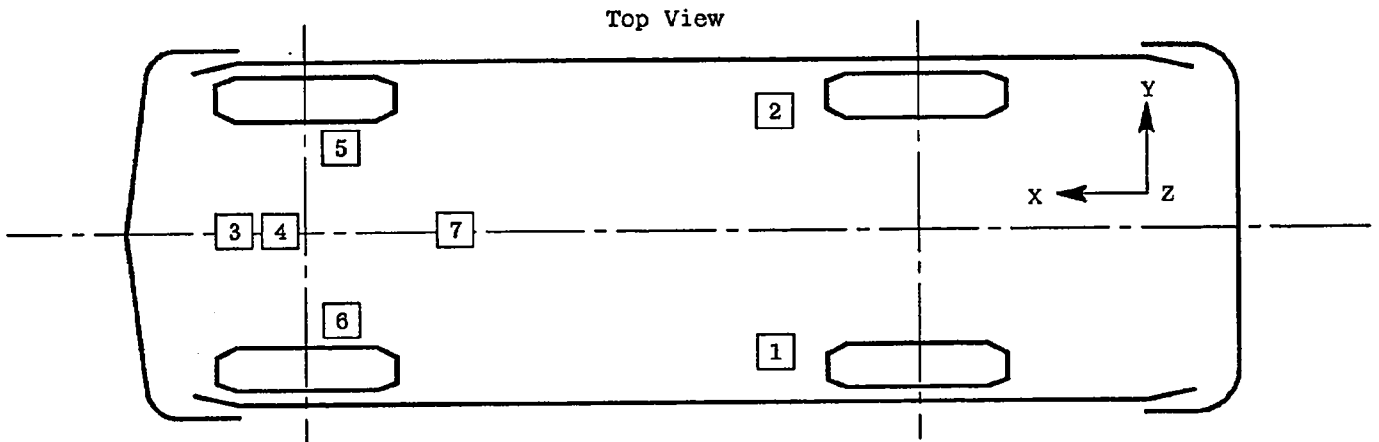
FRONT SEAT OCCUPANT MEASUREMENTS

(all dimensions in inches unless otherwise specified)

	DRIVER (Serial #290)	PASS (Serial #313)
WA°	26	-
SWA°	71	-
SCA°	19	-
SA°	See Note	See Note
HZ	6.4	6.2
HH	13.7	13.3
HW	23.5	23.4
HR	7.3	7.3
NR	14.3 Angle (NA) 12°	-
CD	19.5	20.0
CS	10.3	-
RA	7.5	-
KDL	7.5 Angle (KDA) 50°	6.2 to curve in dash
KDR	7.0	6.4 Angle (KDA) 58°
PA°	23°	24°
TA°	34°	35°
KK	11.5	10.0
ST	18.9 Angle 12°	18.6 Angle 15°
SK	22.9 Angle 101°	23.3 Angle 100°
SH	10.3 Angle 138°	10.3 Angle 135°
SHY	8.5	8.3
HS	12.7	12.7
HD	5.0 to door pocket	4.9 to door pocket
AD	4.6	3.1

Note: Seat back was positioned as specified by manufacturer at 10°

Figure 3
 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:	62.6	20.5	11.8				
		POST:	62.6	20.5	11.8				
	LONGITUDINAL ACCELERATION				2	161	-21	25	
2	REAR SEAT X-MEMBER AT RIGHT SIDE	PRE:	63.1	-21.5	11.8				
		POST:	63.1	-21.5	11.7				
	LONGITUDINAL ACCELERATION				2	158	-22	52	
3	TOP OF ENGINE BLOCK	PRE:	150.6	-10.5	28.2				
		POST:	141.6	-10.5	25.8				
	LONGITUDINAL ACCELERATION				23	63	-66	29	
4	BOTTOM OF ENGINE	PRE:	140.1	-5.0	10.3				
		POST:	133.1	-5.0	6.2				
	LONGITUDINAL ACCELERATION				37	59	-138	78	
5	BRAKE CALIPER AT RIGHT SIDE	PRE:	137.1	-22.5	19.5				
		POST:	134.0	-22.5	19.5				
	LONGITUDINAL ACCELERATION				23	154	-47	52	
6	BRAKE CALIPER AT LEFT SIDE	PRE:	137.1	22.5	18.8				
		POST:	133.7	22.5	18.8				
	LONGITUDINAL ACCELERATION				22	75	-62	56	
7	DASH PANEL	PRE:	106.0	-2.5	24.5				
		POST:	106.0	-2.5	23.5				
	LONGITUDINAL ACCELERATION				30	55	-56	72	

** POSITIVE DIRECTION: FORWARD, LEFTWARD, UPWARD
 NEGATIVE DIRECTION: REARWARD, RIGHTWARD, DOWNWARD

*X + Forward from rear bumper
 Y + Left from vehicle centerline
 Z + Up from ground

LONGITUDINAL:
 LATERAL:
 VERTICAL:

DISTANCE MEASUREMENTS IN INCHES

Figure 4
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5.

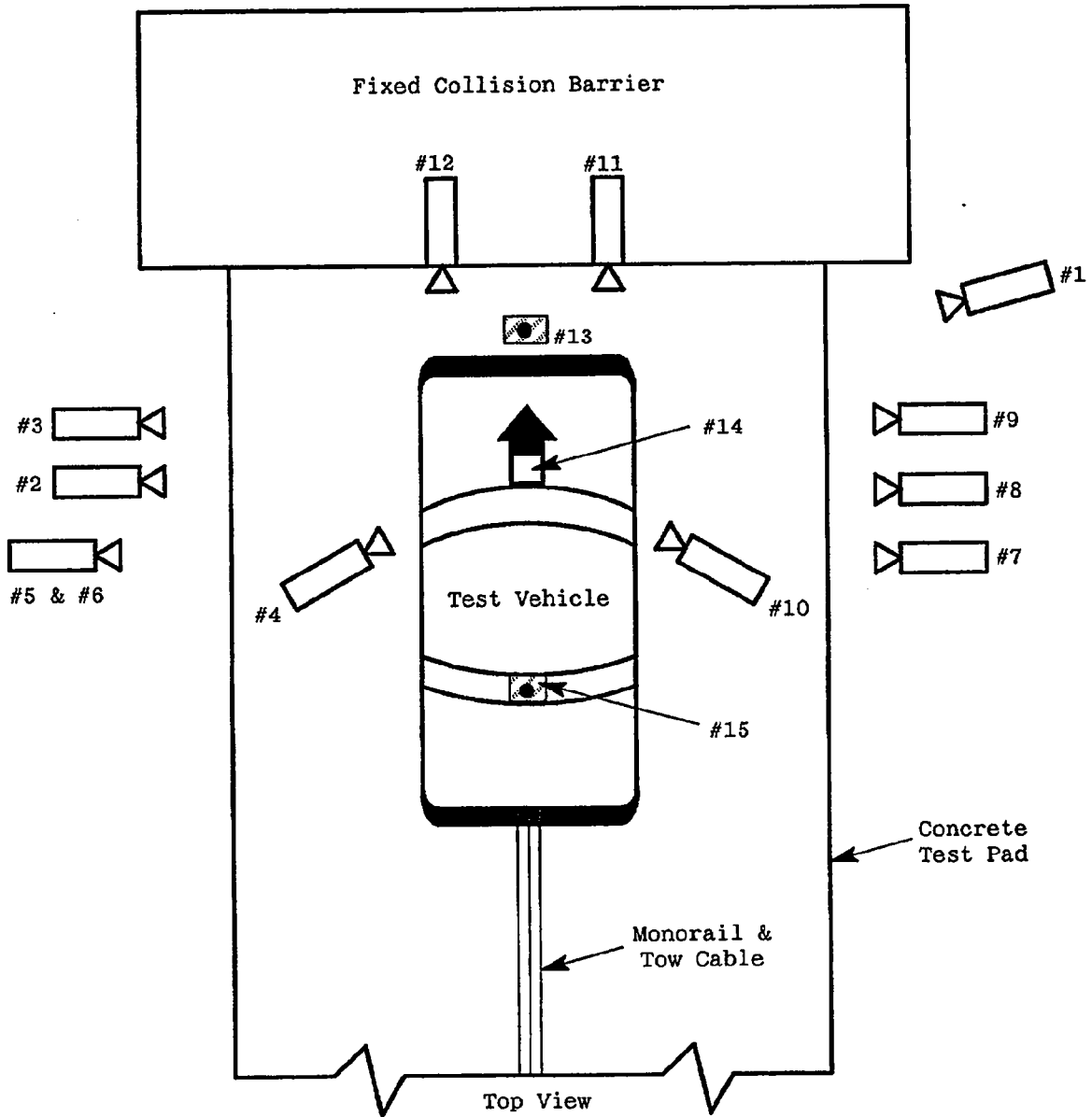


Table 6

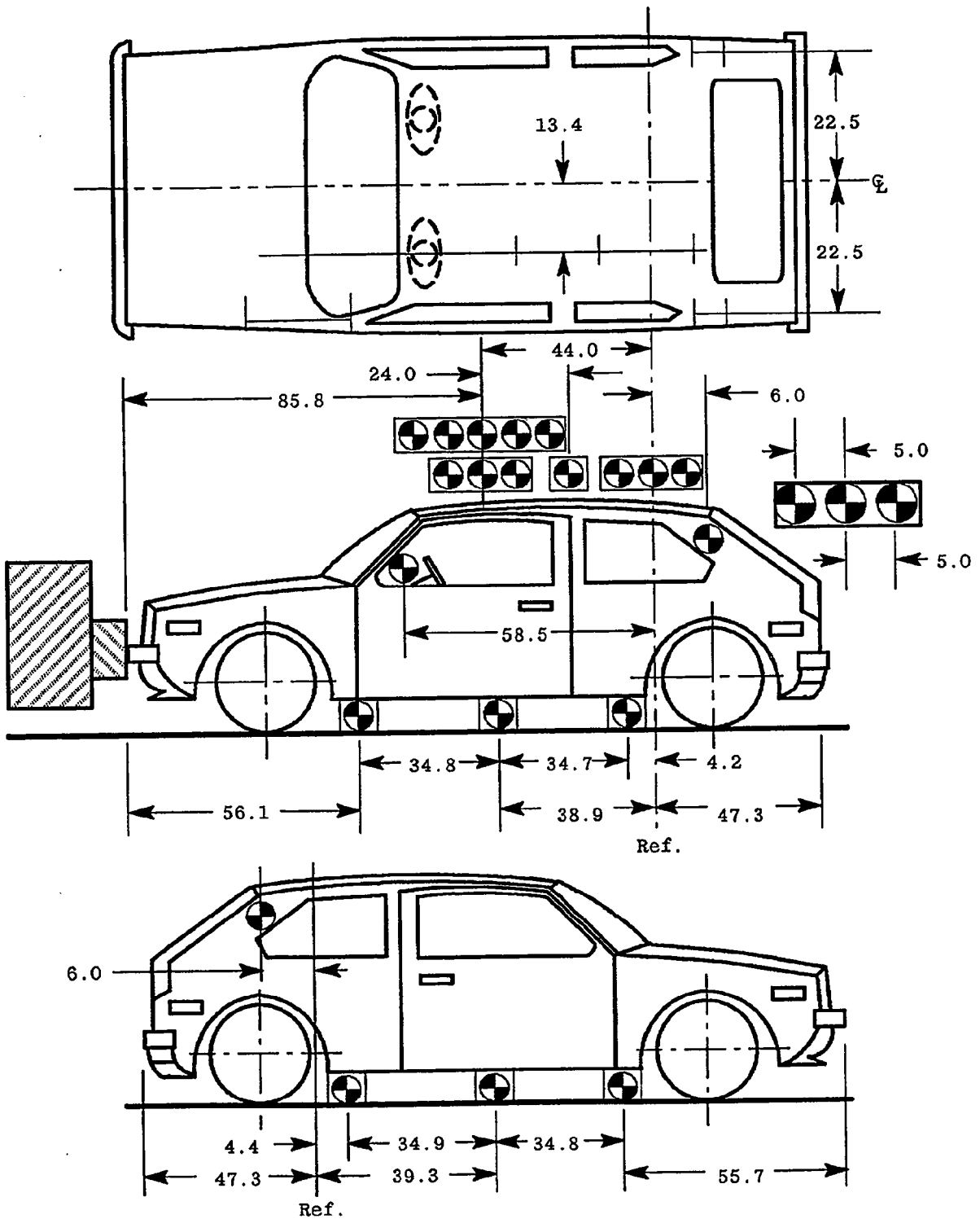
HIGH-SPEED CAMERA LOCATIONS

Test No. CP0103 Vehicle: 1993 Saturn SL 4-Door Sedan

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	236	65	41	-4	220	550	
3	Left Side View	303	45	41	-2	287	610	
4	Driver and Interior View	109	106	65	-16	-	565	
5	Steering Column (Bottom)	265	76	46	-3	249	590	
6	Steering Column (Top)	265	76	70	-8	249	575	
7	Overall Right Side	228	82	42	-2	212	565	
8	Right Side View	300	62	41	-2	284	590	
9	Right Passenger View	296	81	56	-4	280	560	
10	Passenger and Interior View	107	108	64	-15	-	560	
11	Passenger Front View	22	19	78	-44	-	615	
12	Driver Front View	22	19	78	-42	-	600	
13	Windshield View	0	0	126	-60	-	600	
14	Pit View of Engine	0	24	-90	90	-	650	
15	Pit View of Fuel Tank	0	139	-90	90	-	750	

*X = film plane to monorail centerline
 Y = film plane to impact location
 Z = film plane to ground
 ** = referenced to horizontal plane

Figure 5
VEHICLE TARGET LOCATIONS



(Dimensions in inches)

Figure 6
TEST VEHICLE MEASUREMENTS

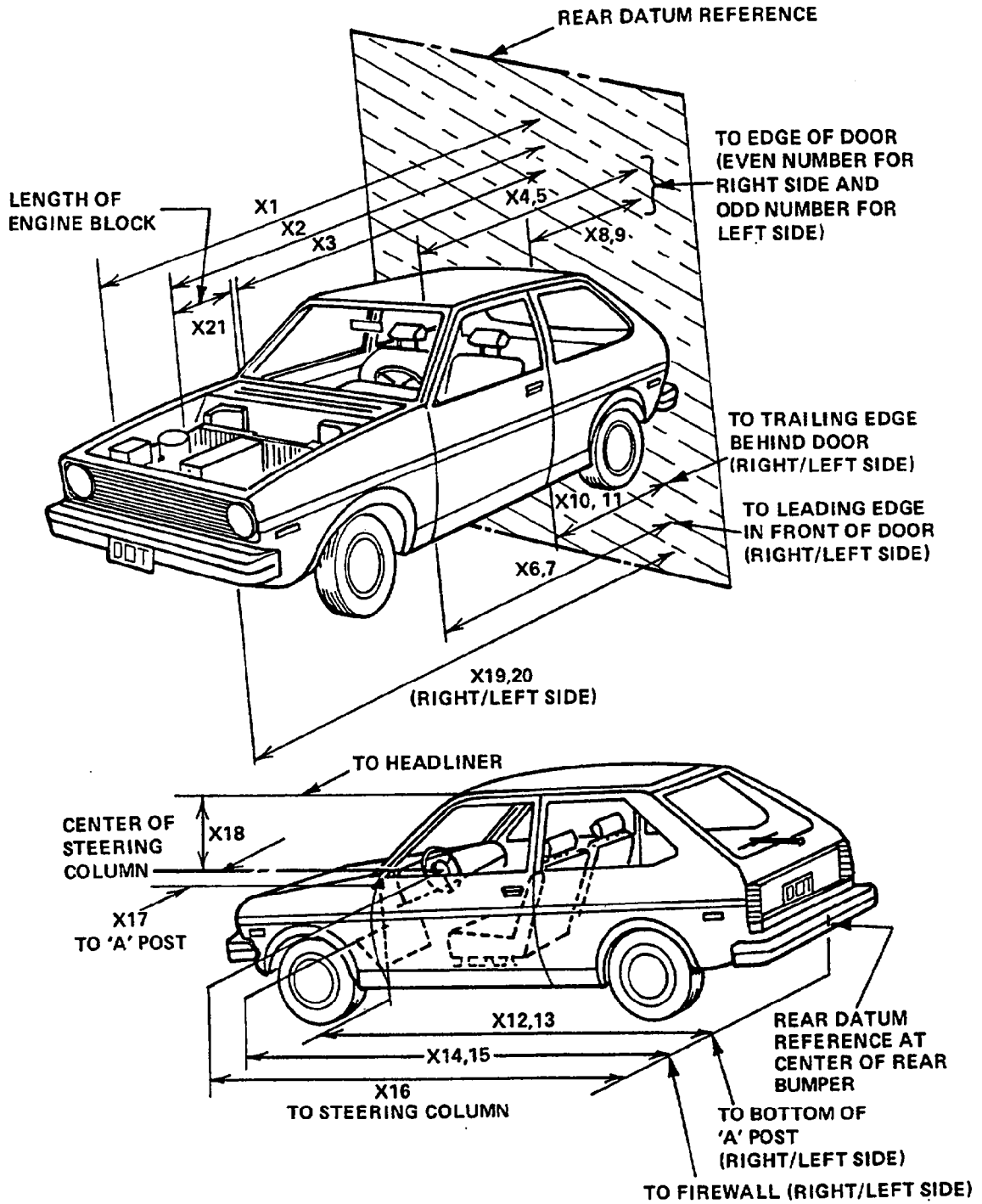


Table 7

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	177.1	158.1	19.0
X2	Rear Surface of Vehicle to Front of Engine	148.5	140.5	8.0
X3	Rear Surface of Vehicle to Firewall	132.2	130.6	1.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	116.6	116.5	0.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	116.4	116.4	0.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	116.6	116.3	0.3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	116.8	116.5	0.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	76.2	75.9	0.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	76.0	75.6	0.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	77.6	77.4	0.2
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	77.6	77.3	0.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	117.0	116.5	0.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	117.4	116.9	0.5
X14	Rear Surface of Vehicle to Firewall, Right Side	131.7	129.0	1.2
X15	Rear Surface of Vehicle to Firewall, Left Side	131.7	130.5	1.2
X16	Rear Surface of Vehicle to Steering Column	97.8	97.8	0.0
X17	Center of Steering Column to "A" Post	13.9	13.2	0.7
X18	Center of Steering Column to Headliner	15.8	14.8	1.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	170.2	157.1	13.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	171.0	158.5	12.5
X21	Length of Engine Block	14.8	14.8	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 VALUES

NHTSA No.: CP0103 Vehicle: 1993 Saturn SL 4-Door Sedan

	MAXIMUM ACCELERATION (g's)								
	HEAD				CHEST				Displacement
	X	Y	Z	R	X	Y	Z	R*	
Dummy (1)	-44	-9	25	47	-36	-6	-10	34.9	2.0"
Dummy (2)	-33	-13	36	41	-36	-13	-11	35.1	1.4"

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Dummy (1)	1192	955
Dummy (2)	1385	1138

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond Maximum		Avg. Acc. (g) t ₁ TO t ₂
		t ₁ (msec)	t ₂ (msec)	
Dummy (1)	316.83	51.360	85.800	38.50
Dummy (2)	310.87	67.080	102.960	37.59

* 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 sec.

Log time duration of reminder light operation = continuous 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 = 3 sec.

Note wording of visual warning:

Fasten Seat Belt -

Lap Belt X

Symbol 101-80 X

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:

Located on driver side sunvisor

The manufacturer states, "REGULAR MAINTENANCE OF THE AIRBAG SYSTEM IS NOT REQUIRED. If the airbag readiness light comes on while you are driving, or doesn't come on when you first start your vehicle, see your retailer for service.

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: Readiness indicator is located on the left side of the instrument cluster

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.: CP0103
Make/Model: 1993 Saturn 4-Door Sedan
Date of Comfort/Convenience Check: 11/19/92
Technician Performing Check: D.J.T.
GVWR: 3243 lbs

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 X

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

YES X 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.

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 0.5 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 X NO -
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 X NO -

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 torso 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 7

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET

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

Windshield is bonded in place with 0.6" rubber trim covering top of windshield and 0.5" rubber trim covering both sides of windshield. A plastic shroud covers the bottom of windshield.

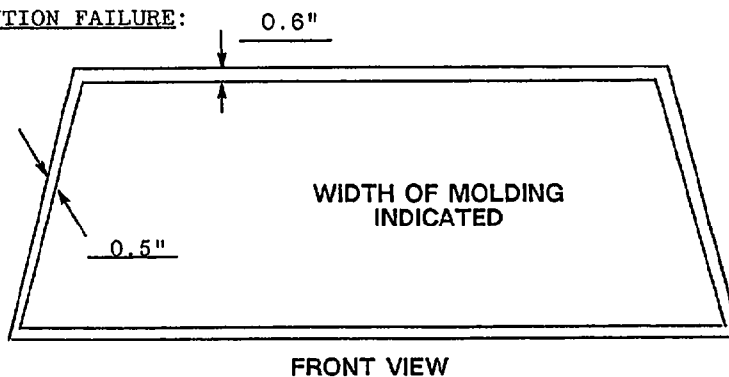
FMVSS 212 REQUIREMENTS:

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	90.0	90.0	100%
LEFT SIDE	90.0	90.0	100%
TOTAL	180.0	180.0	100%

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

None

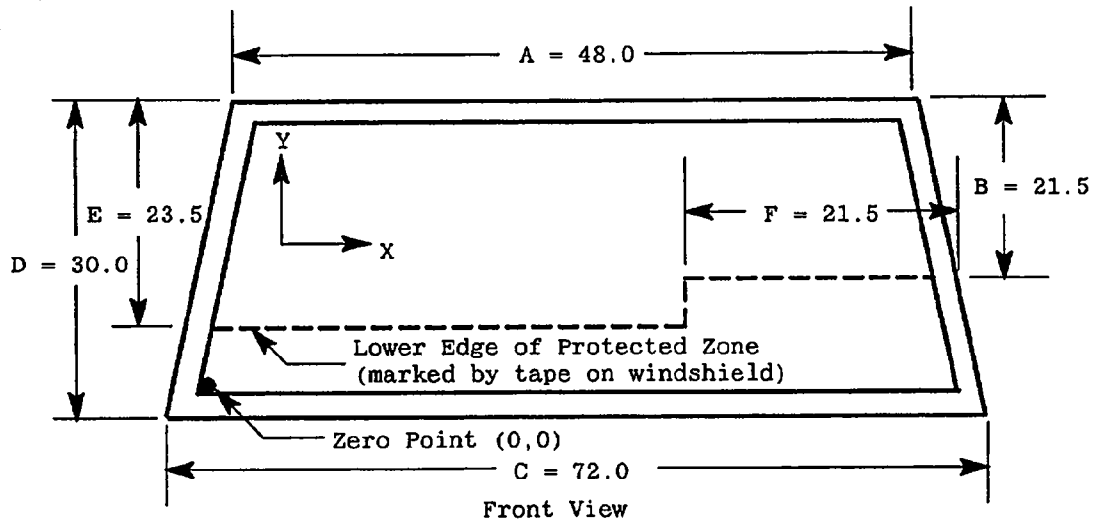
Figure 8

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.		

Table 13
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.:

C	P	0	1	0	3
---	---	---	---	---	---

 TEST DATE: November 20, 1992

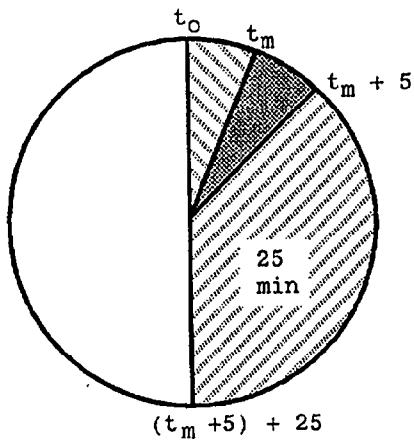
Vehicle Mfr./Make/Model: 1993 Saturn SL 4-Door Sedan

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.

.....

TEST VEHICLE IMPACT TYPE: X Frontal (30 mph)
 - Oblique (30 mph) with - ° barrier face first contacting _____
 (driver/passenger) side
 - Rear Moving Barrier (30 mph)
 - Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:



1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

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

SOLVENT SPILLAGE DETAILS:

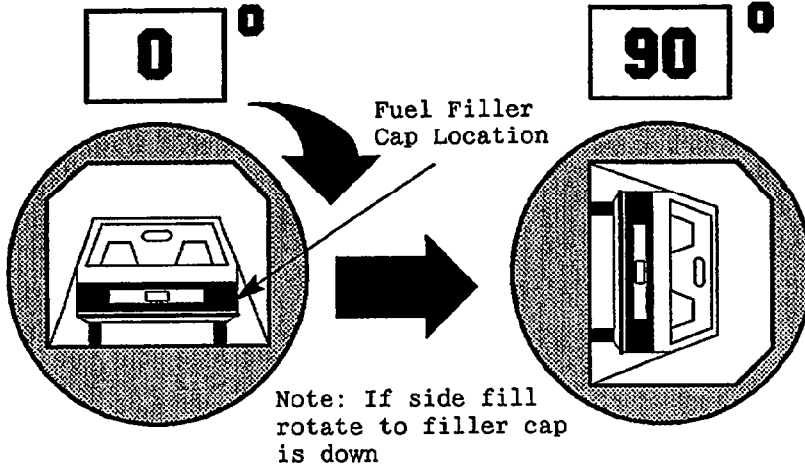
None

Table 14
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

Vehicle NHTSA ID No.:

CP0103



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):

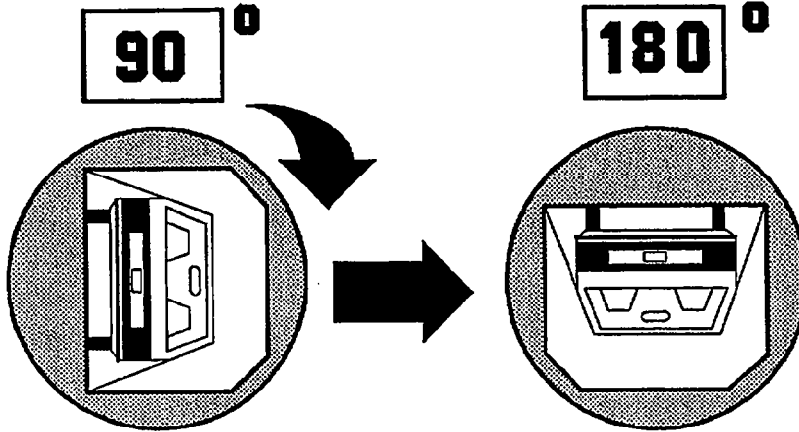
None

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

TEST PHASE:

Vehicle NHTSA ID No.:

CP0103



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 2 _____ minutes _____ 01 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 01 _____ seconds
TOTAL	_____ 7 _____ minutes _____ 01 _____ 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

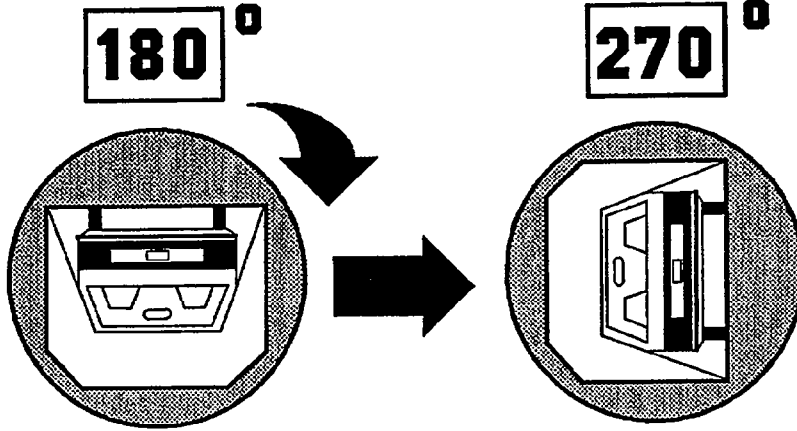
Table 13

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

TEST PHASE:

Vehicle NHTSA ID No.:

CP0103



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 1 _____ minutes _____ 45 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 00 _____ seconds
TOTAL	_____ 6 _____ minutes _____ 45 _____ 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.

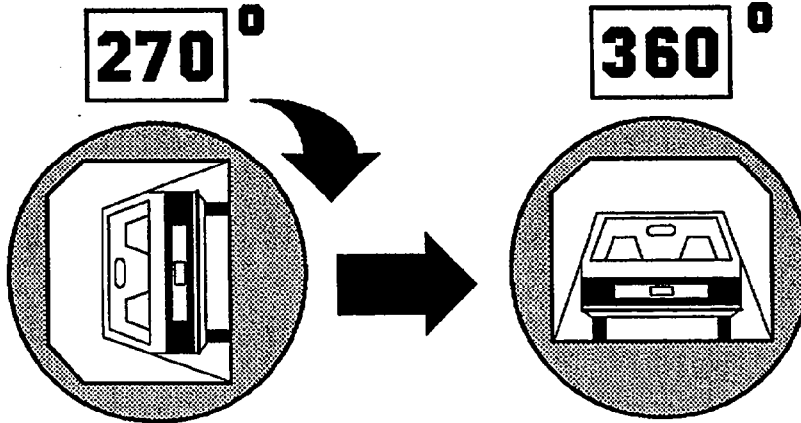
IV. SOLVENT SPILLAGE LOCATION(S):

None

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

TEST PHASE:

Vehicle NHTSA ID No.:



CP0103

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 2 _____ minutes _____ 10 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 00 _____ seconds
TOTAL	_____ 7 _____ minutes _____ 10 _____ 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: November 20, 1992 Vehicle NHTSA No.: CP0103

Vehicle Manufacturer: Saturn Corporation

Model Year: 1993 VIN: 1G8ZF5596PZ116071

Model: Saturn SL Body Style: 4-Door Sedan Build Date: 9/92

Dummy Stabilized Temperature at Time of Test: 70 °F (Spec. = 69-72°F)

Impact Velocity: 29.8 mph Time of Test: 13:35

Type of Automatic Restraint System: Driver side airbag; 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

LIST OF PHOTOGRAPHS

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1120'92

Figure A-1 PRE-TEST FRONT VIEW

A-3

8056-8

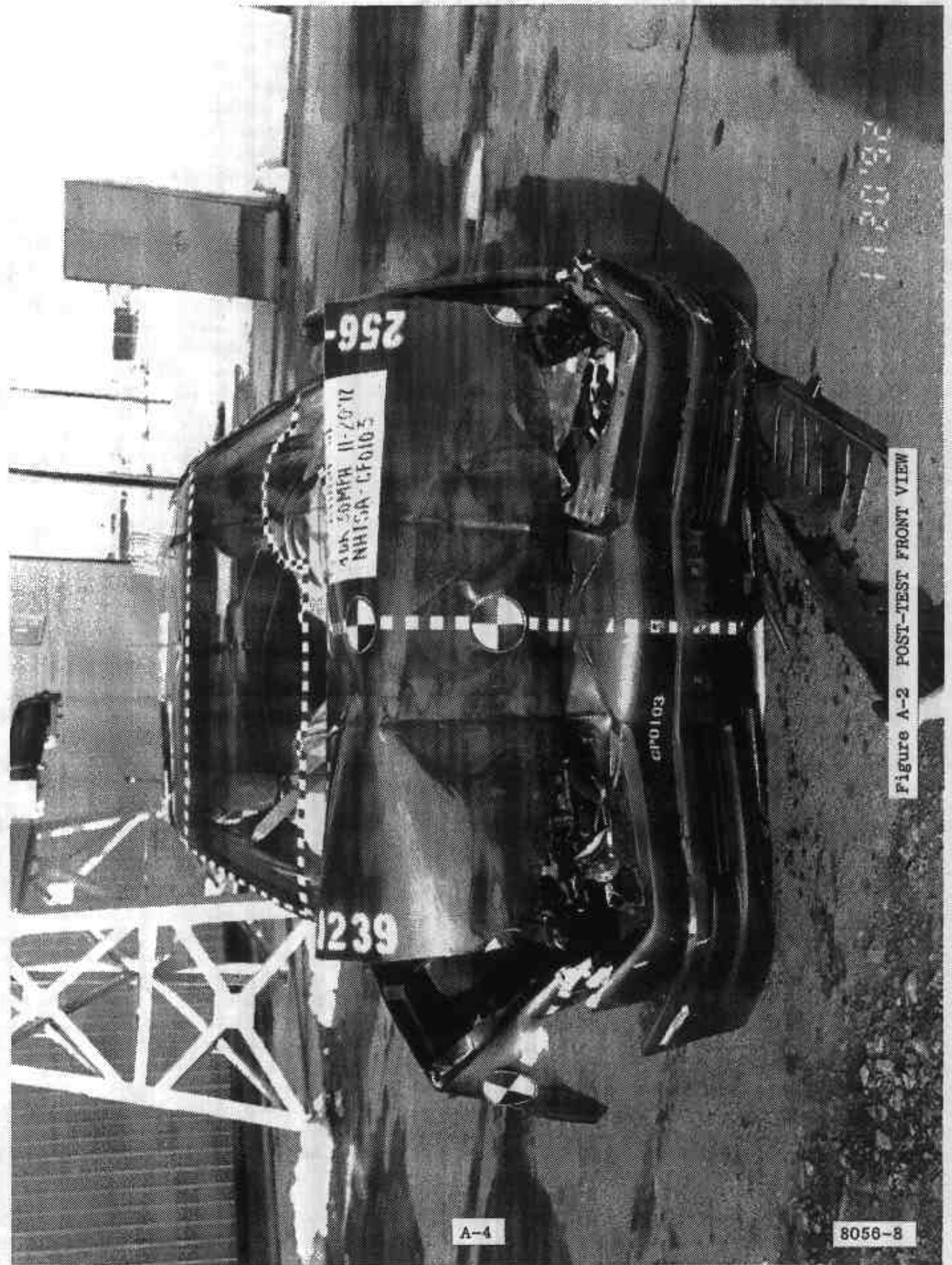


Figure A-2 POST-TEST FRONT VIEW

A-4

8056-8

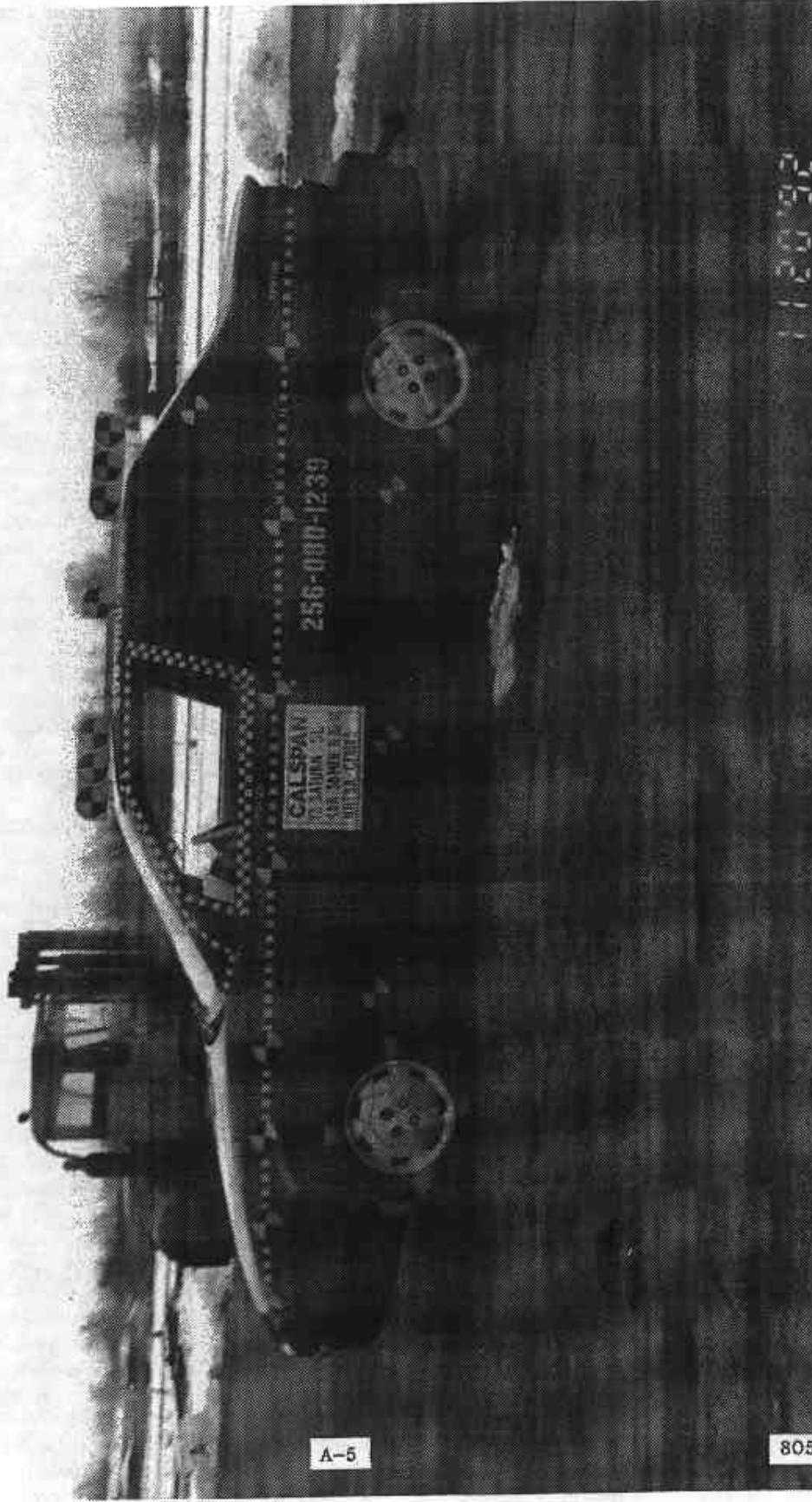


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-5

8056-8

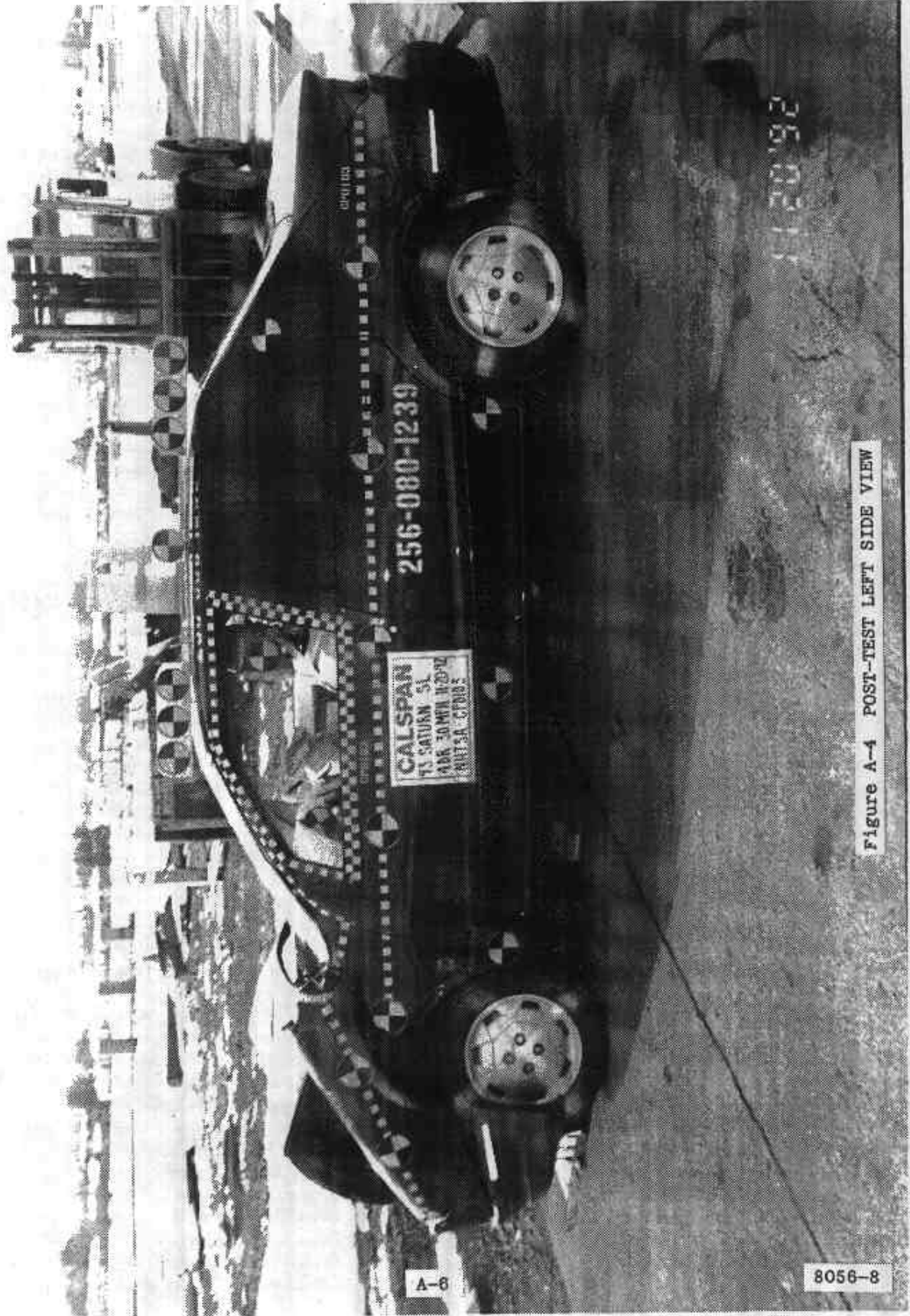


Figure A-4 POST-TEST LEFT SIDE VIEW

A-8

8056-8



Figure A-5 PRE-TEST RIGHT SIDE VIEW

1120'92

A-7

8056-8

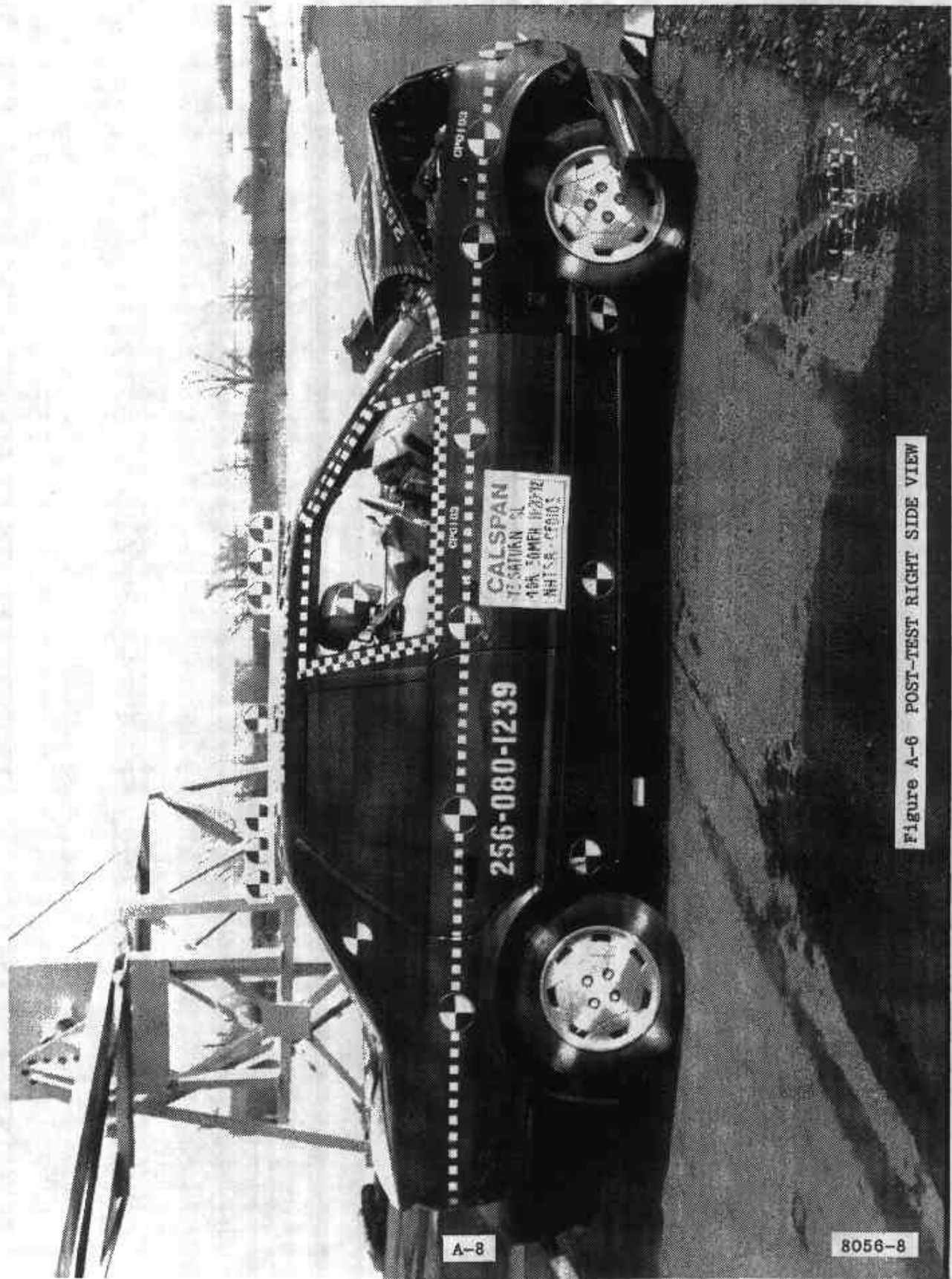


Figure A-6 POST-TEST RIGHT SIDE VIEW

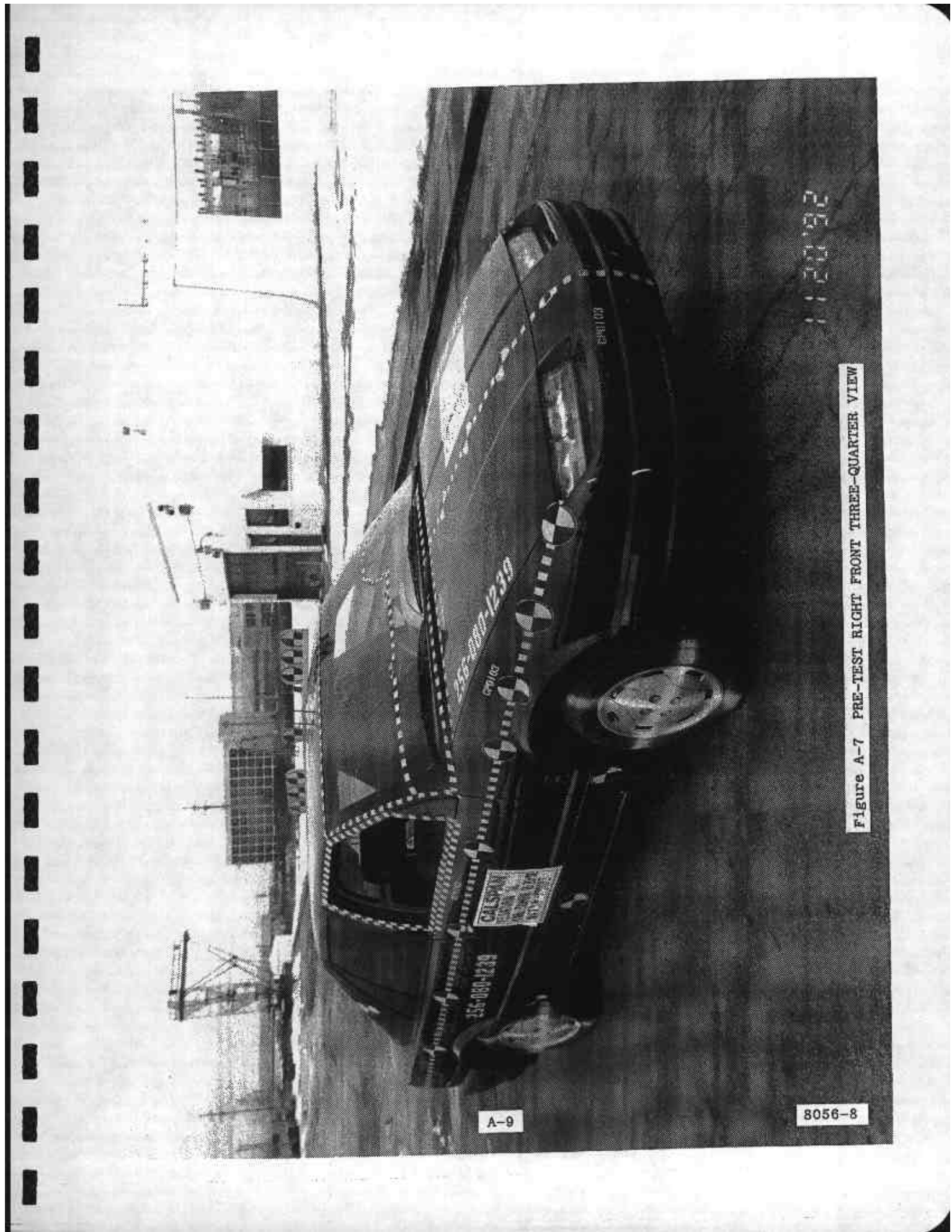


Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

8056-8



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

A-10

8056-8



Figure A-8 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-11

8056-8



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

A-12

8056-8

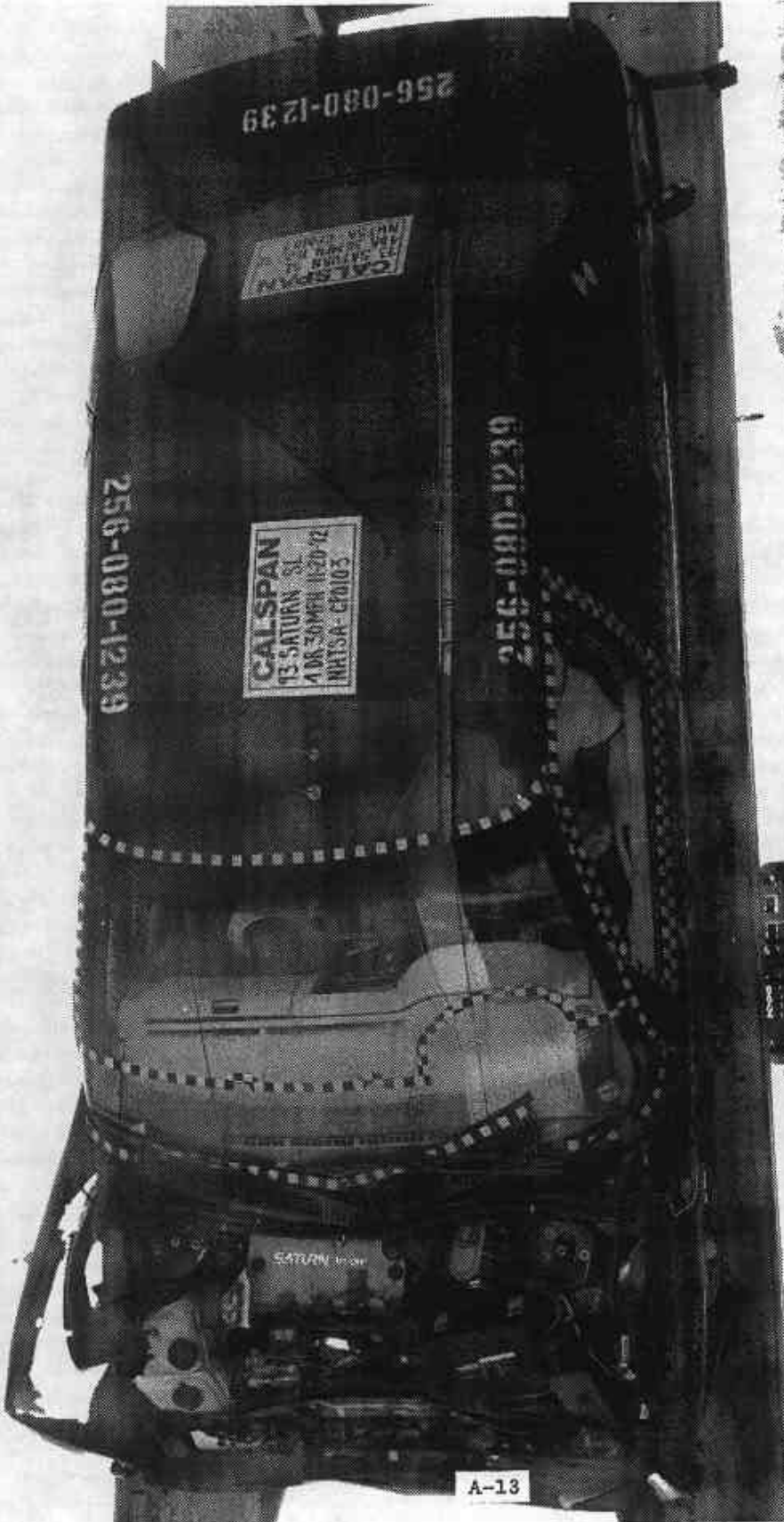
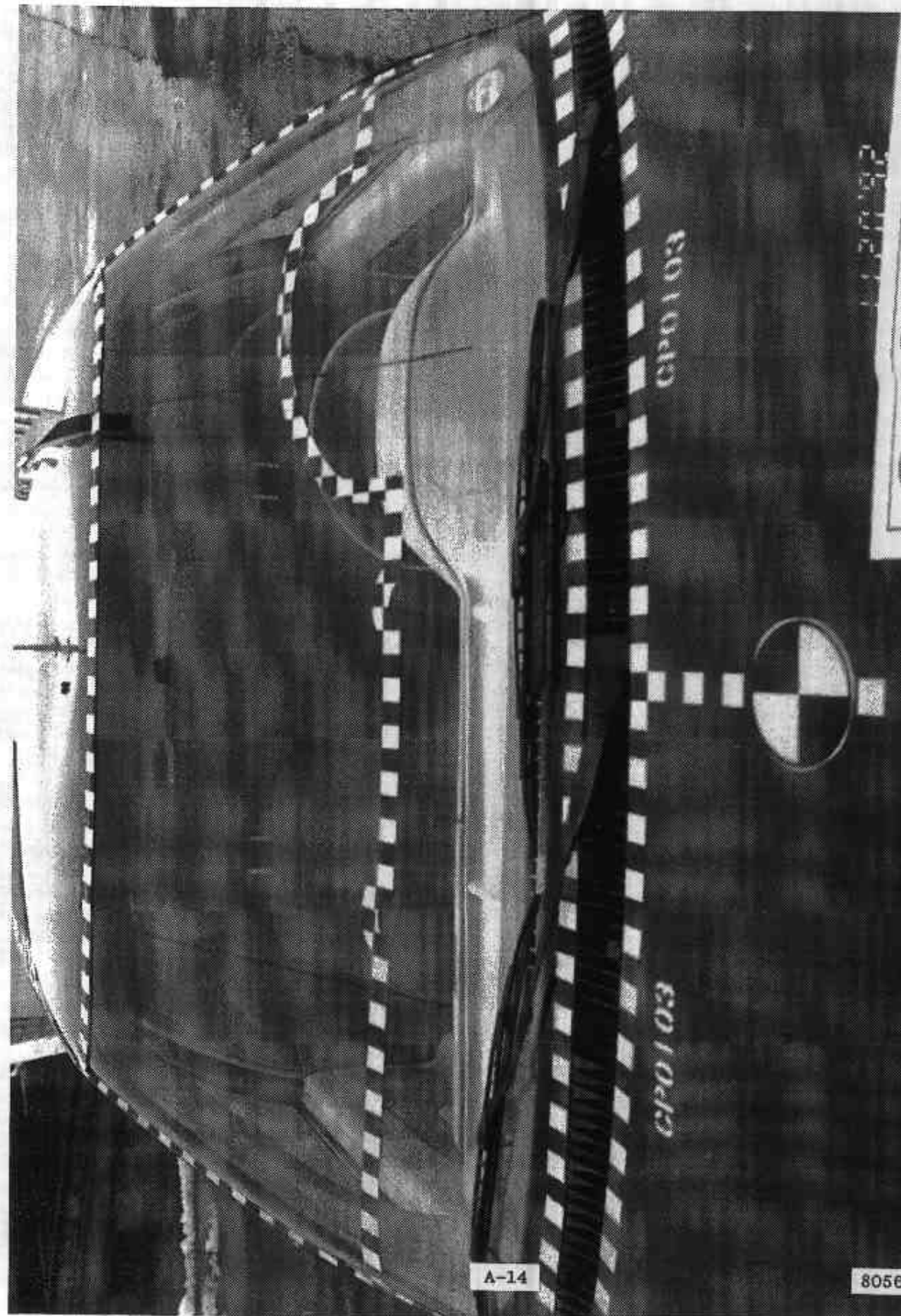


Figure A-11 POST-TEST TOP VIEW

A-13

8056-8



A-14

8056-8

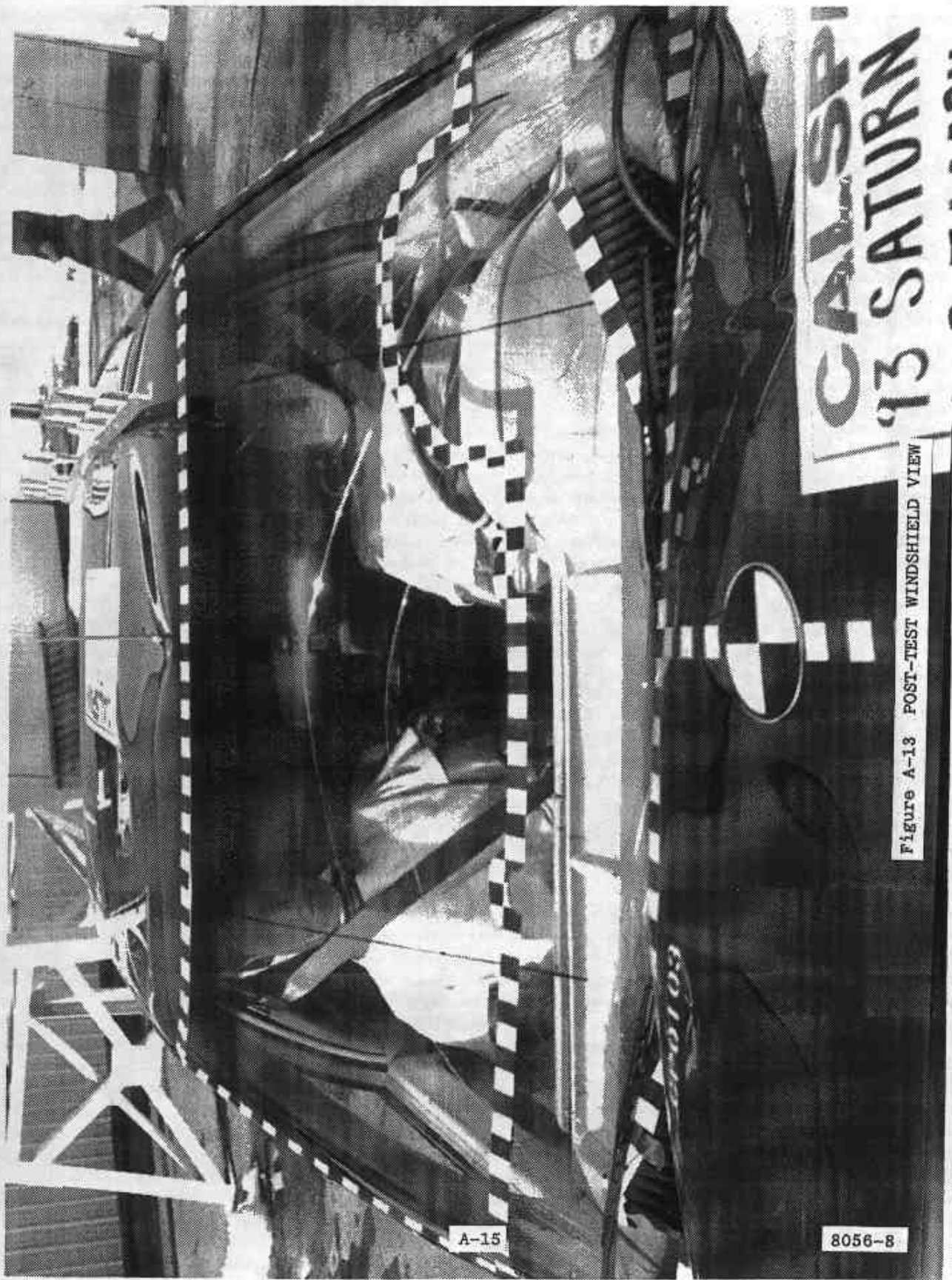
Figure A-12 PRE-TEST WINDSHIELD VIEW

CALSPAN

CP0103

CP0103



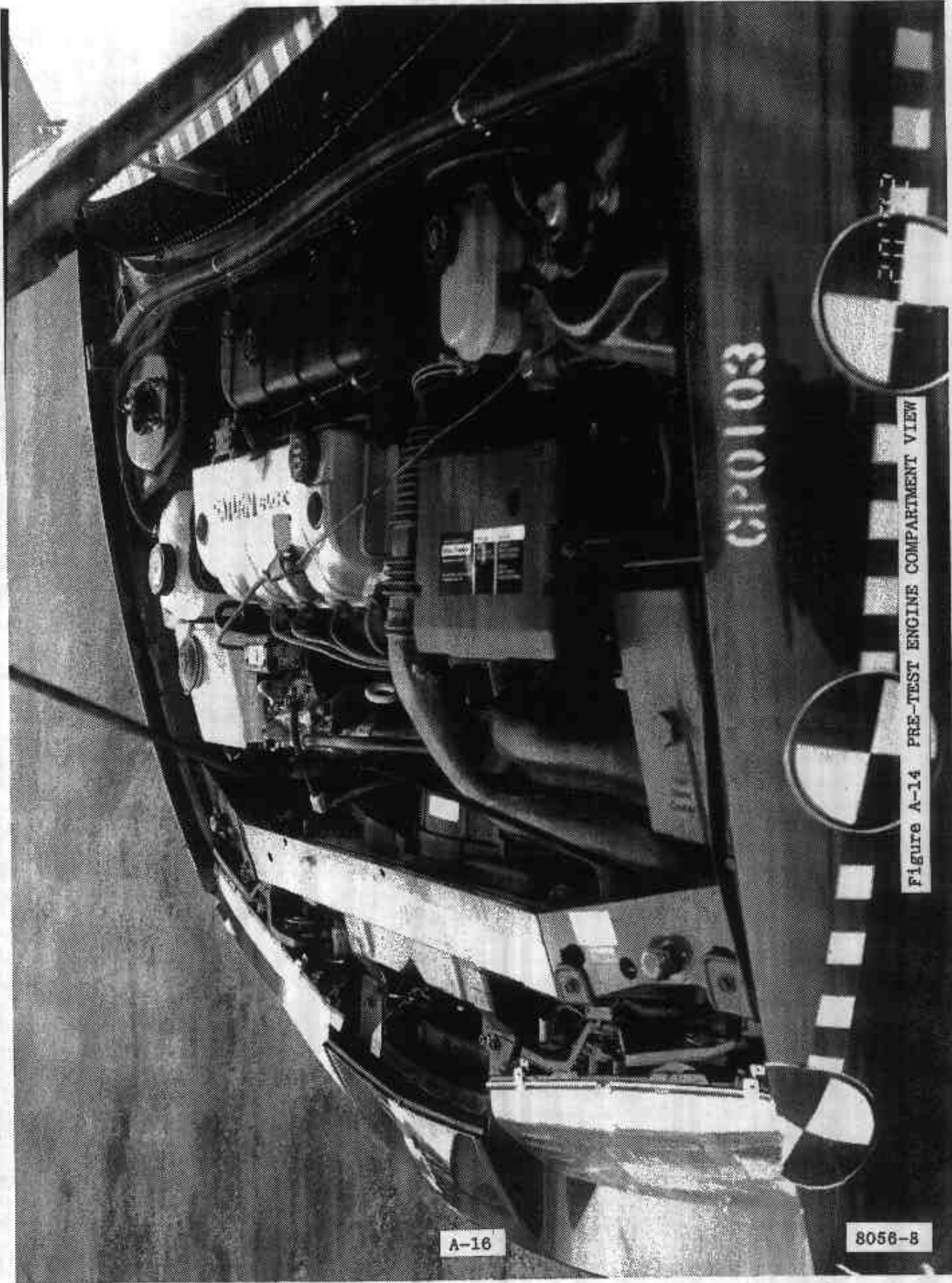


CALSP
'93 SATURN

Figure A-13 POST-TEST WINDSHIELD VIEW

A-15

8056-8



A-16

8056-8

CP-0103

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW



Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

A-17

8056-8

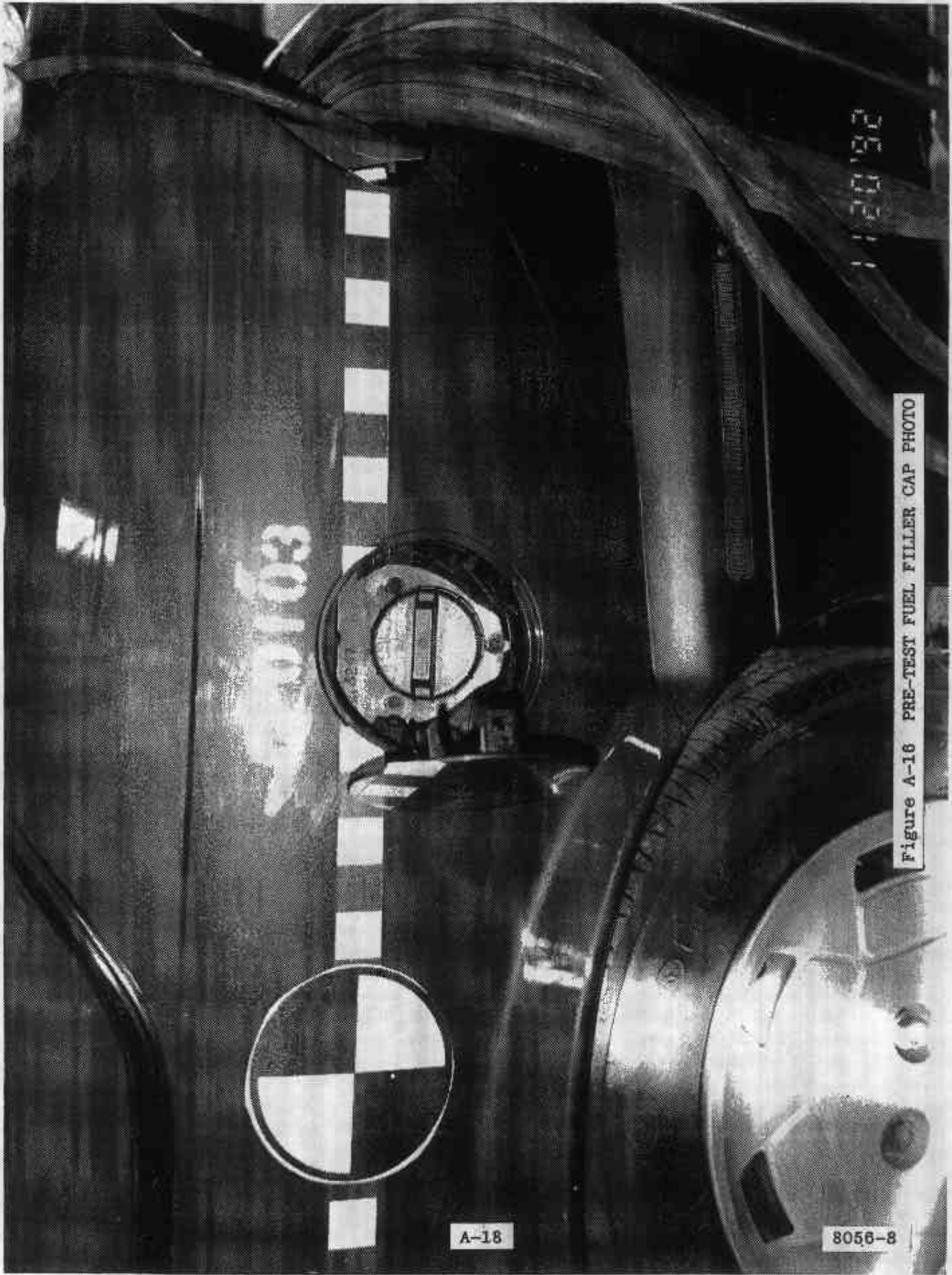
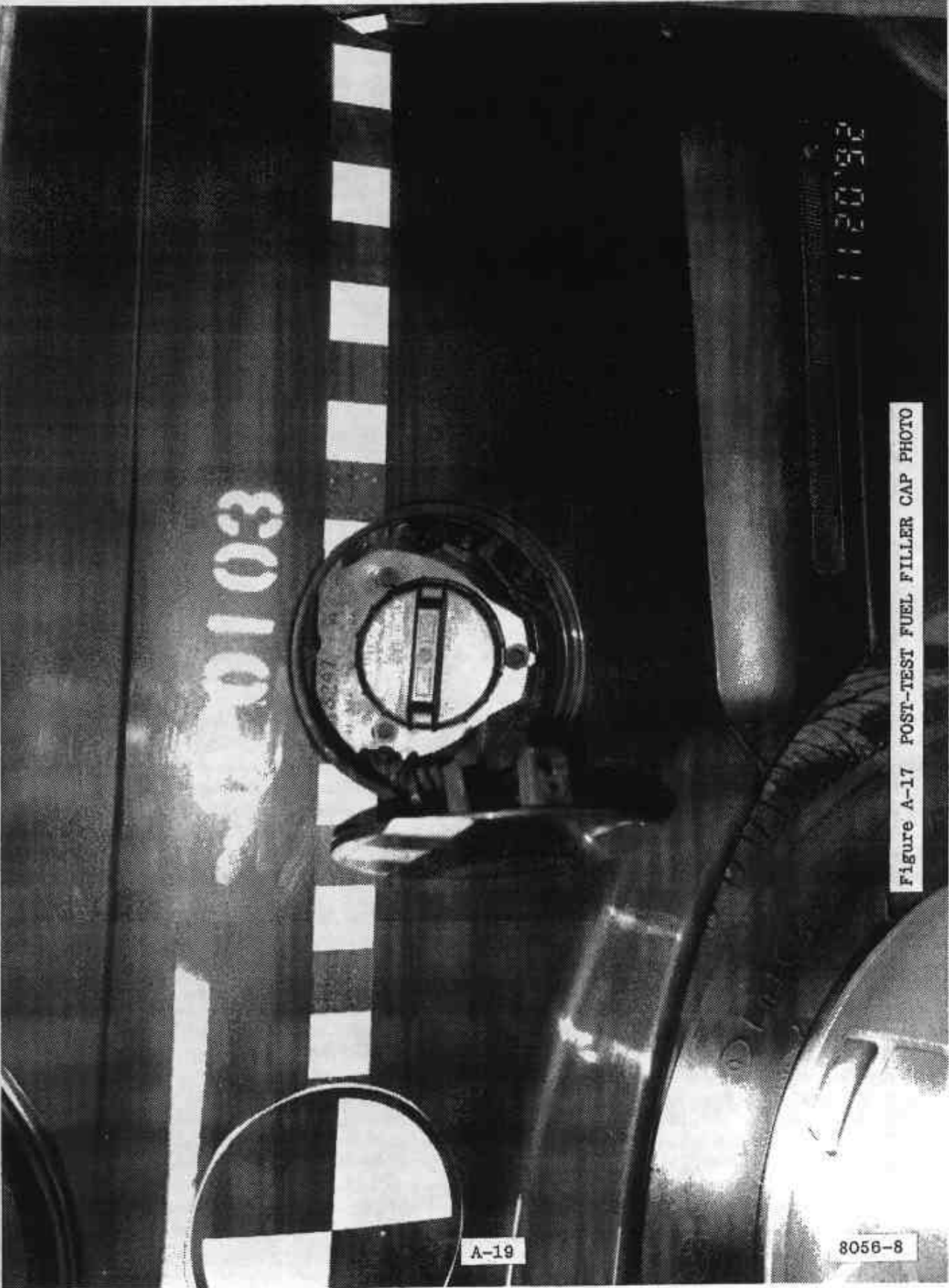


Figure A-16 PRE-TEST FUEL FILLER CAP PHOTO

A-18

8056-8



30103

1120'92

Figure A-17 POST-TEST FUEL FILLER CAP PHOTO

A-19

8056-8

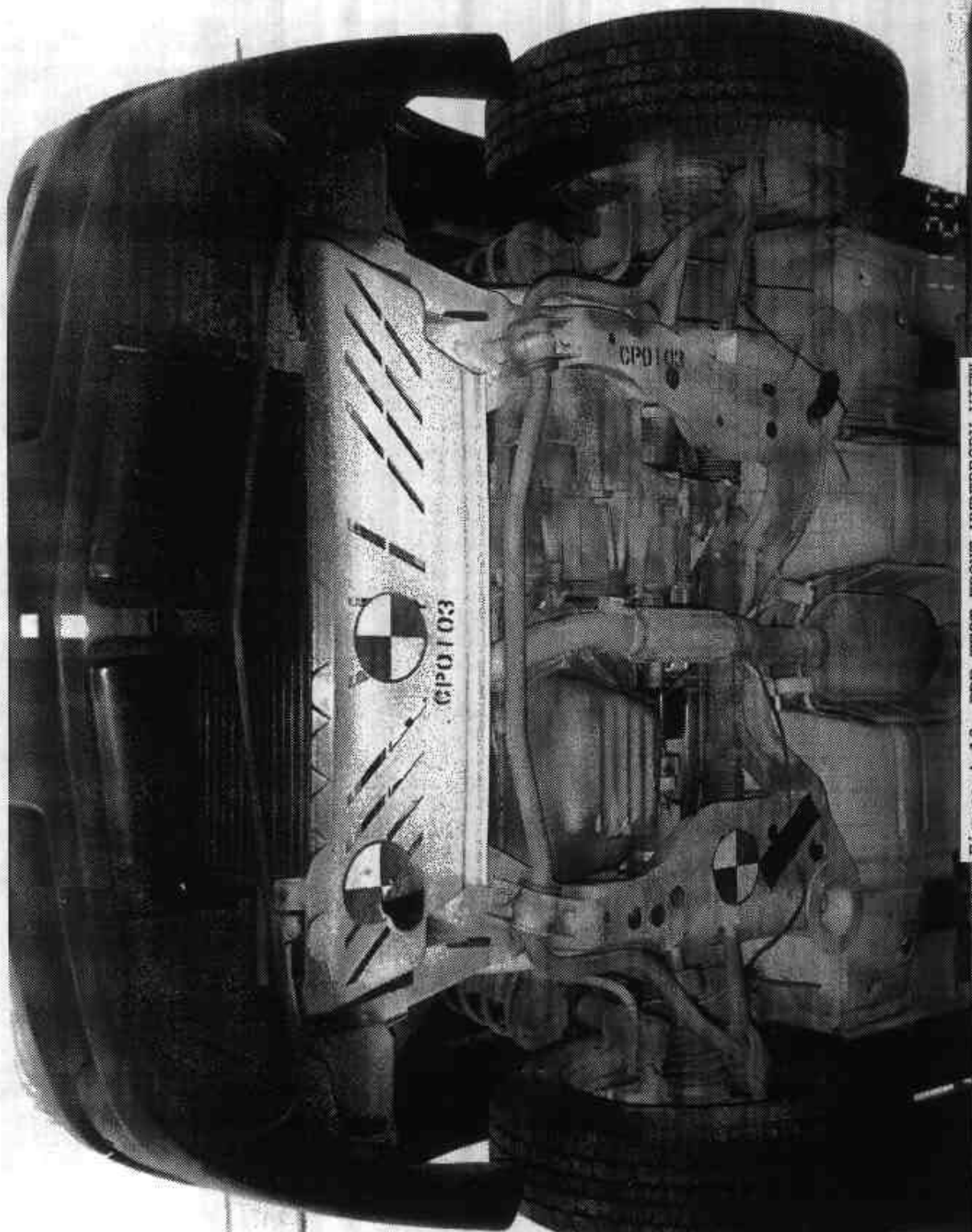


Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

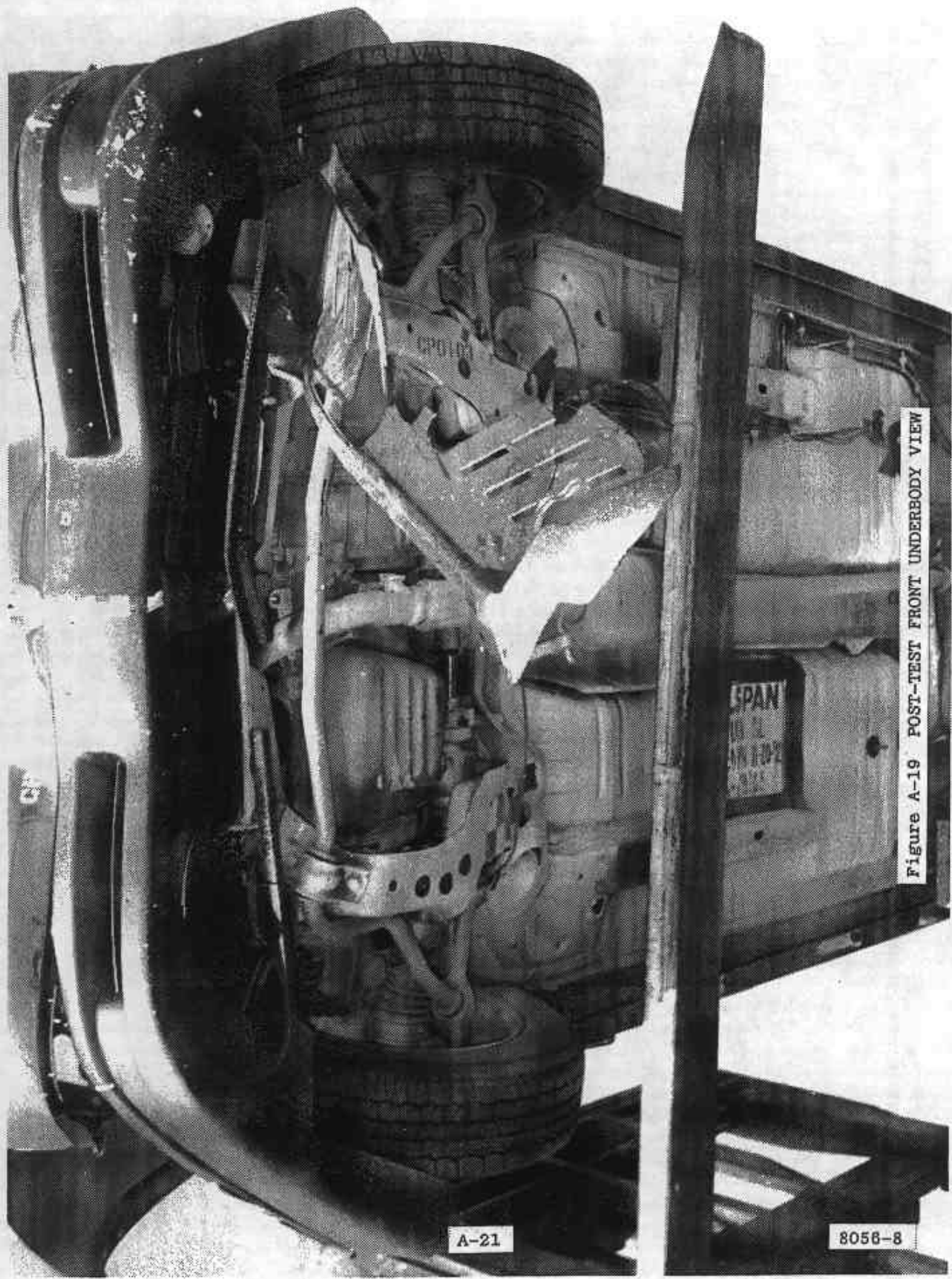


Figure A-19 POST-TEST FRONT UNDERBODY VIEW

A-21

8056-8

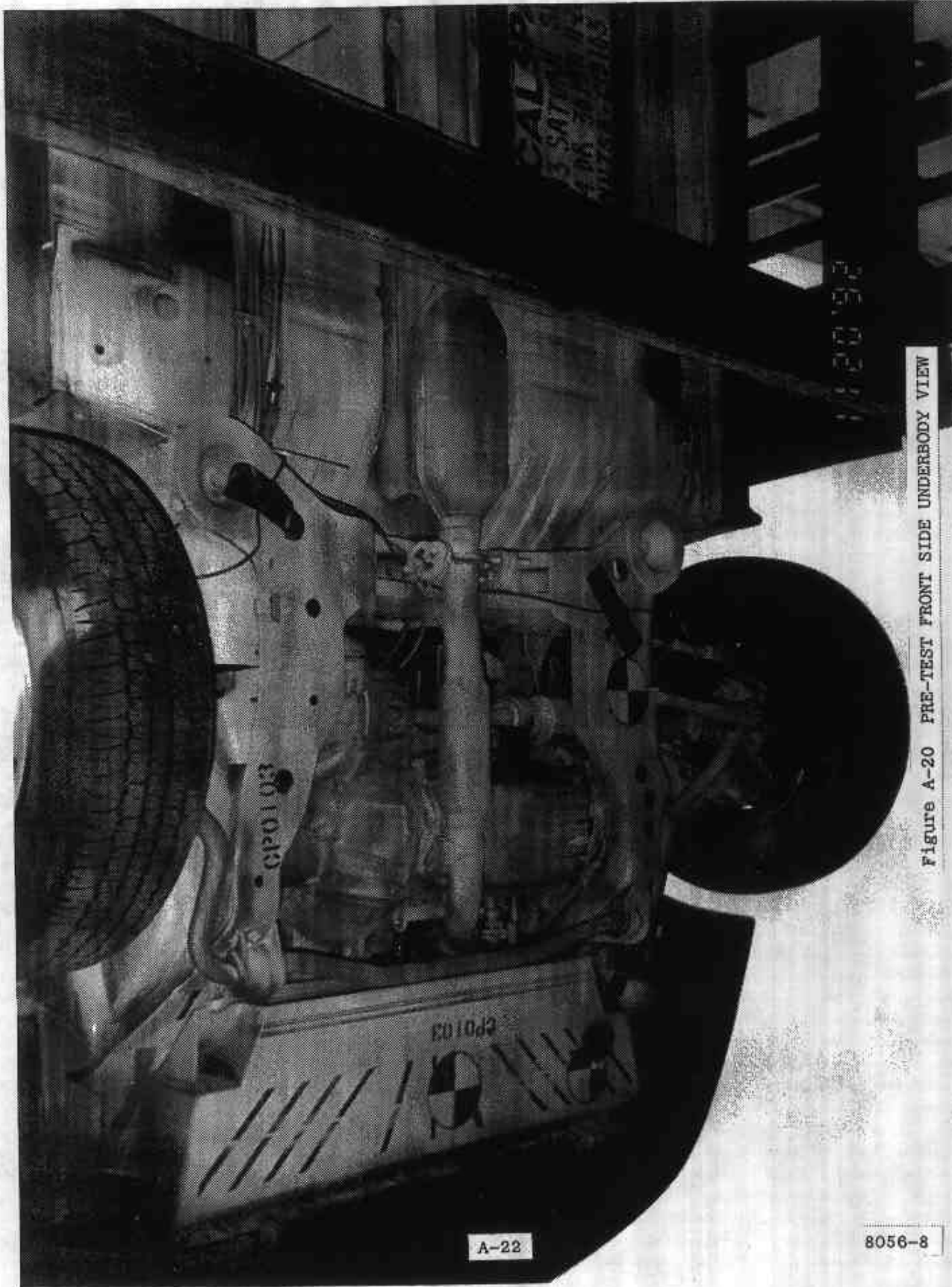


Figure A-20 PRE-TEST FRONT SIDE UNDERBODY VIEW

A-22

8056-8

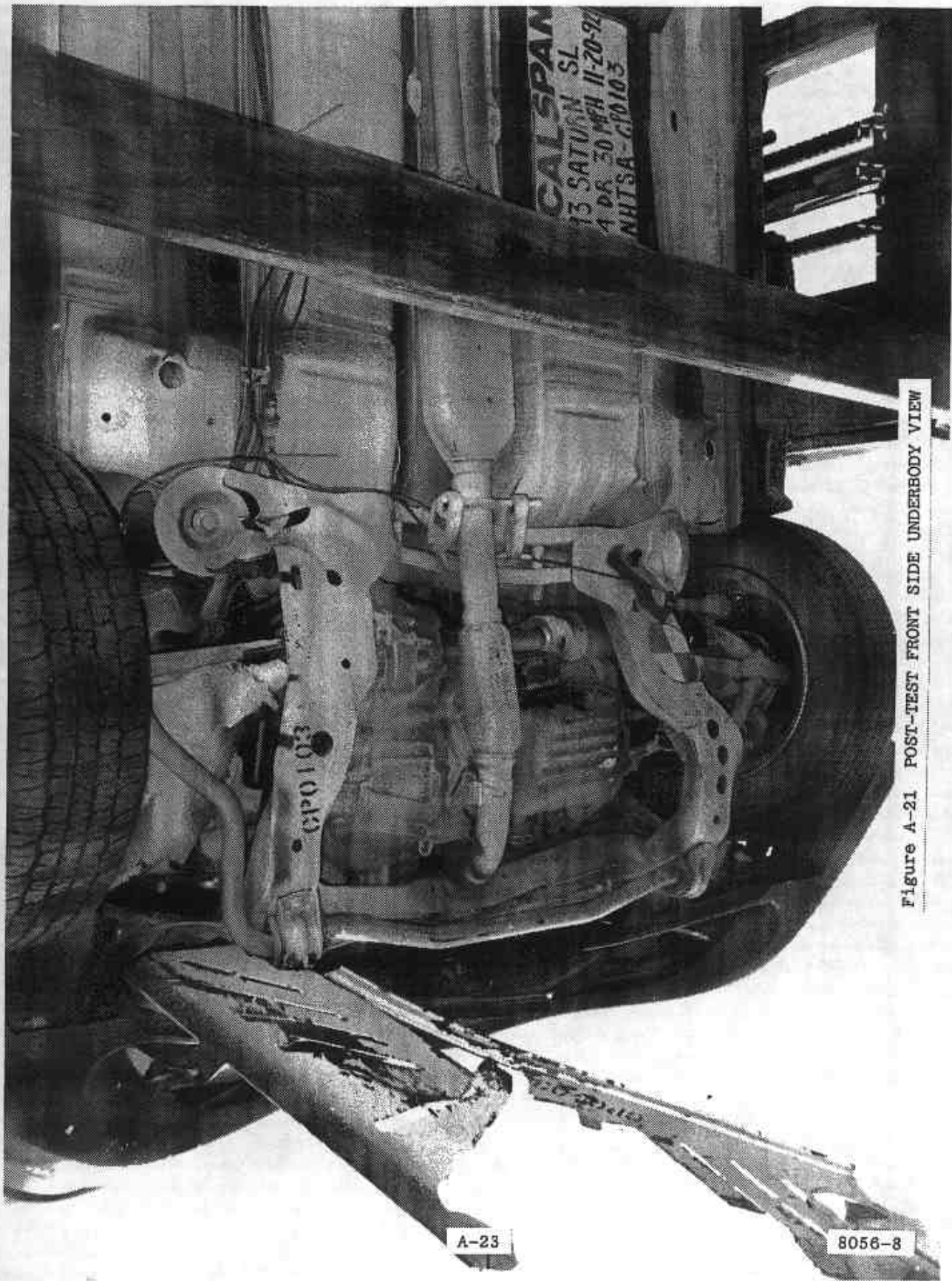


Figure A-21 POST-TEST FRONT SIDE UNDERBODY VIEW

A-23

8056-8

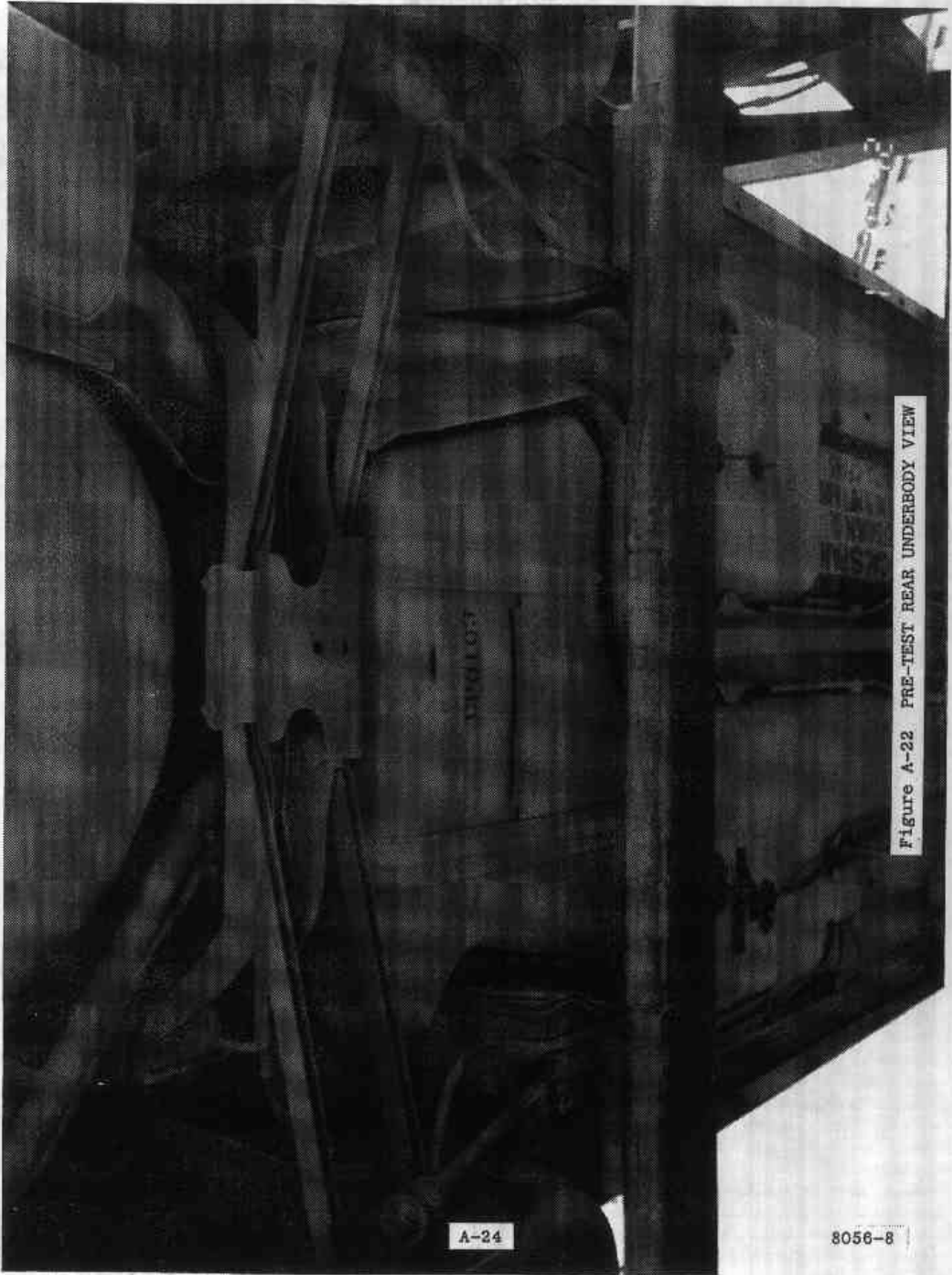


Figure A-22 PRE-TEST REAR UNDERBODY VIEW

A-24

8056-8

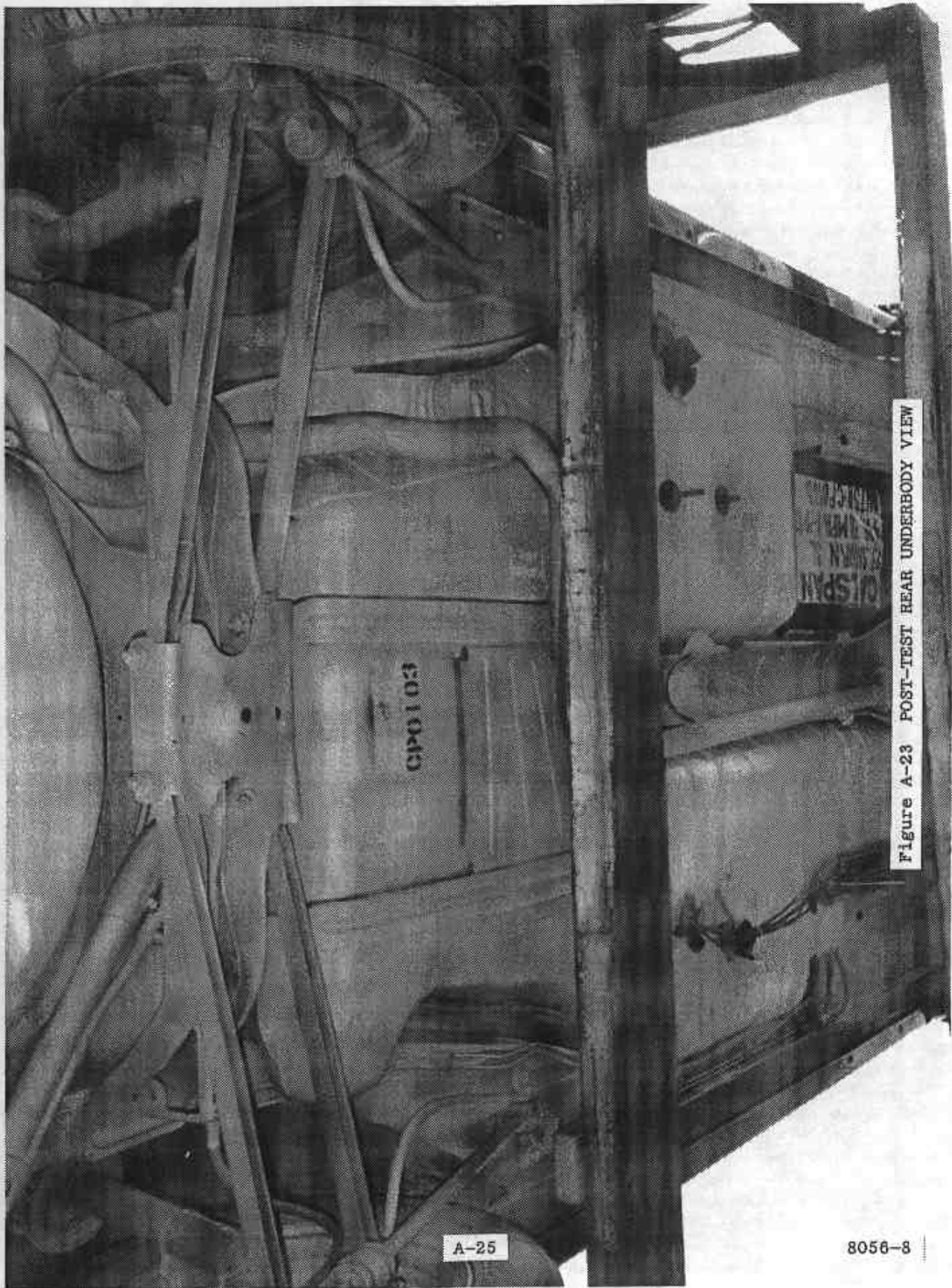


Figure A-23 POST-TEST REAR UNDERBODY VIEW

A-25

8056-8

TIRE-LOADING INFORMATION

OCCUPANTS VEHICLE CAPACITY WT.

FRY. CRT. RR. TOTAL LBS. KG.
2 0 3 5 864 392

MAXIMUM LOADING AT GUMR: SAME AS VEHICLE CAPACITY WEIGHT

ZZ06 COLD TIRE PRESSURE

SPEED RATING PSI/KPA
S 38/210
S 26/180
M 60/420

TIRE SIZE

FRONT P175/70R14

REAR P175/70R14

SPARE T115/70R14

**IF TIRES ARE HOT, ADD 4 PSI (28 KPA)
SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION**

Figure A-25 TIRE PLACARD



Figure A-26 PRE-TEST DRIVER DUMMY POSITION

A-28

8056-8



Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

A-29

8056-8



Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

A-30

8056-8



Figure A-29 POST-TEST PASSENGER DUMMY POSITION

A-31

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CP0103

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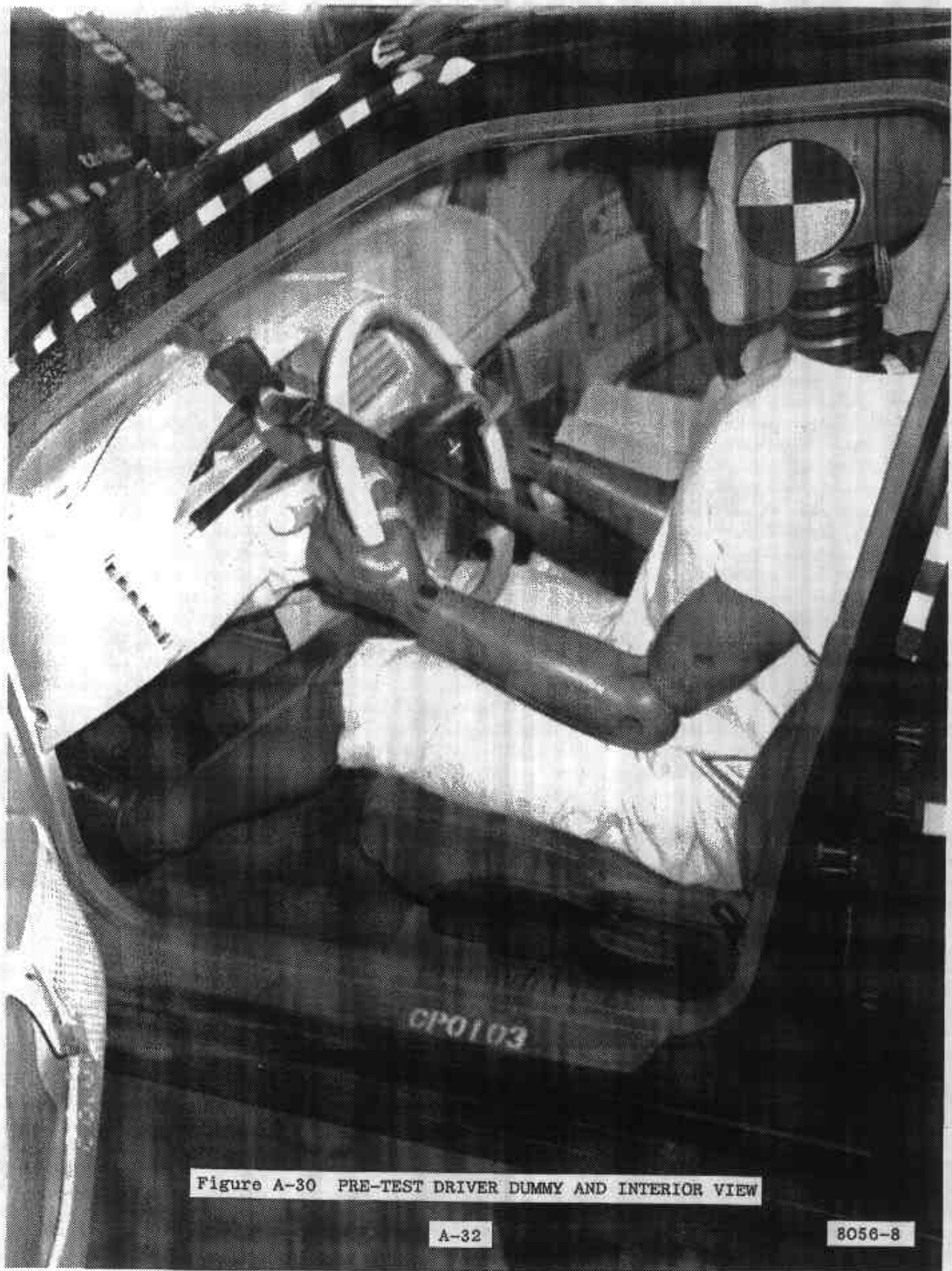


Figure A-30 PRE-TEST DRIVER DUMMY AND INTERIOR VIEW

A-32

8056-8



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

A-33

8056-8



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

A-34

8056-8



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

A-35

8056-8



Figure A-34 POST-TEST DRIVER AIRBAG VIEW

A-36

8056-8

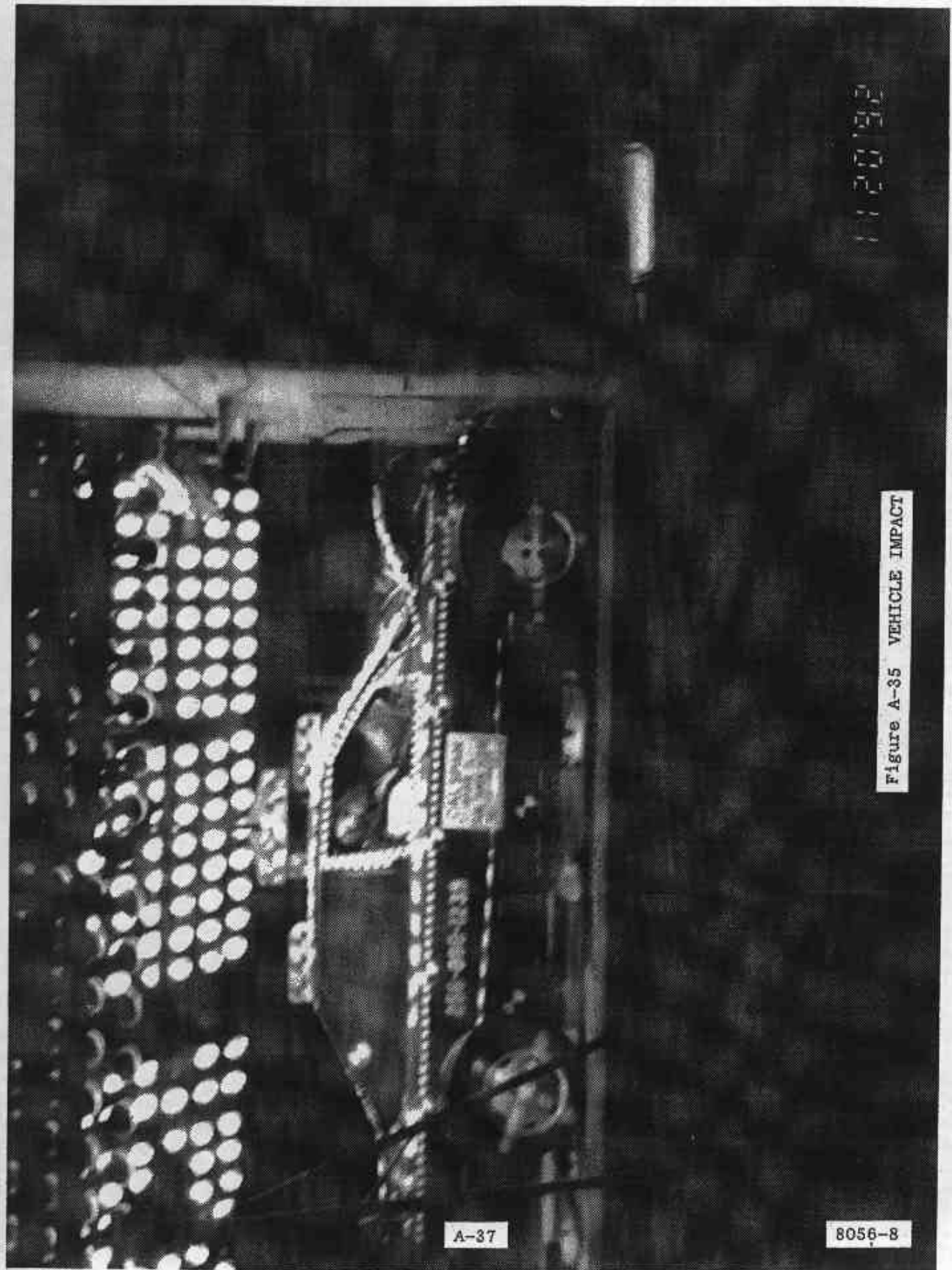


Figure A-35 VEHICLE IMPACT

A-37

8056-8

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. CP0103

VEHICLE DATA

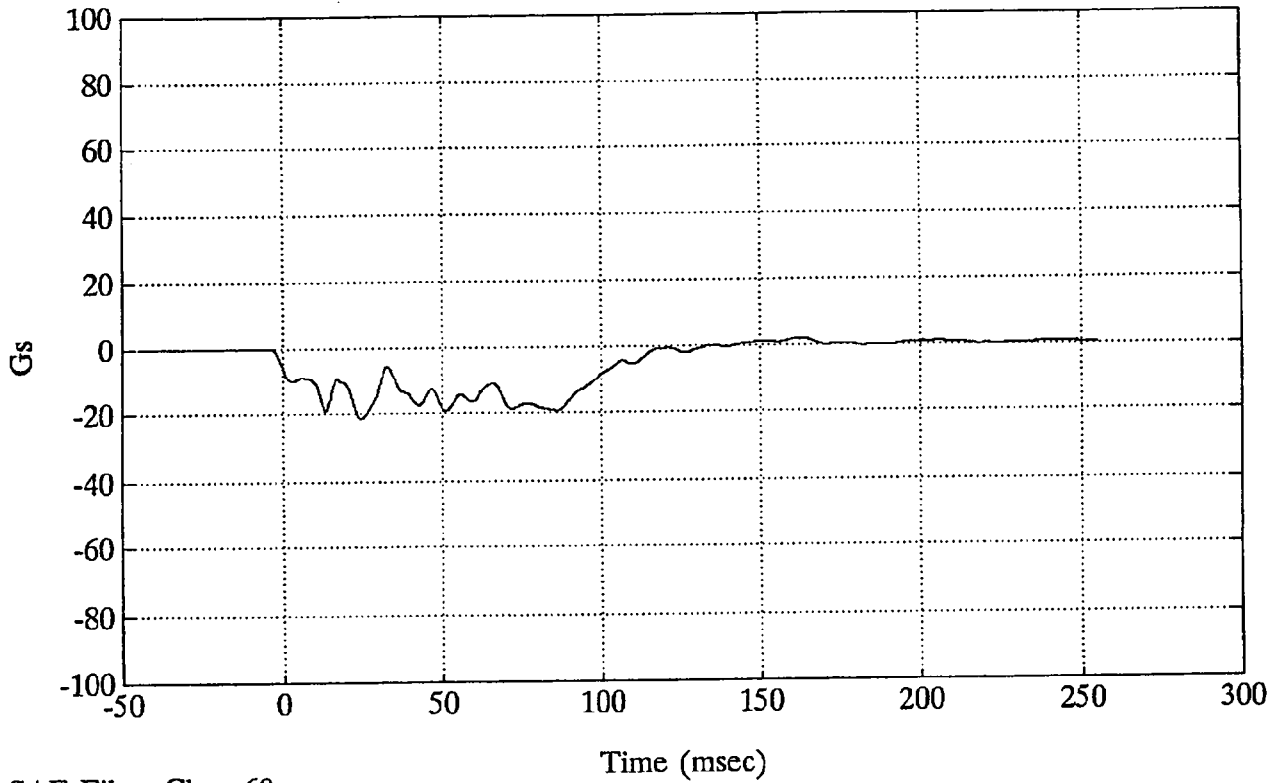
SAE FILTER CHANNEL CLASS

60

FMVSS 208 - 1993 SATURN SL

L. Rear X-member X (#1)

Max = 2.06 Gs @ 161.04 msec
Min = -21.31 Gs @ 24.60 msec

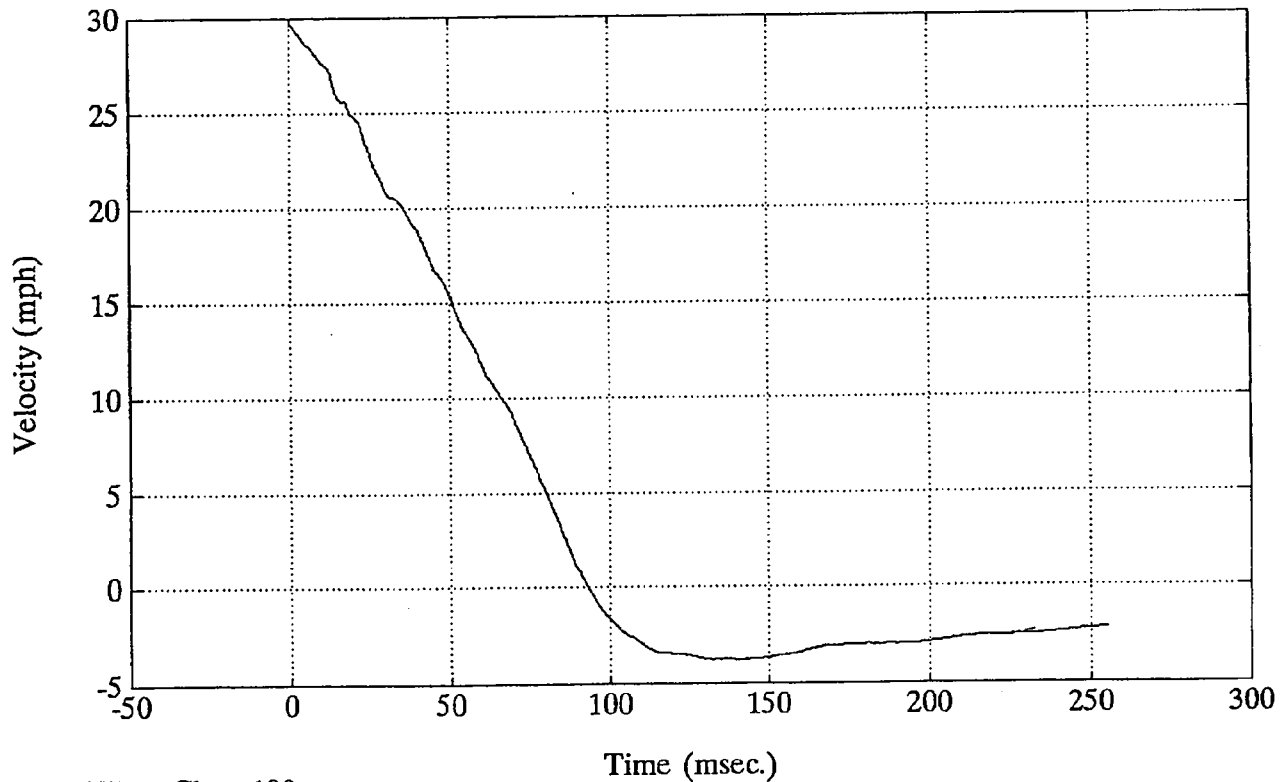


SAE Filter Class 60

FMVSS 208 - 1993 SATURN SL

L. Rear X-member X (#1)

Max = 29.80 mph @ -0.00 msec
Min = -3.78 mph @ 141.60 msec

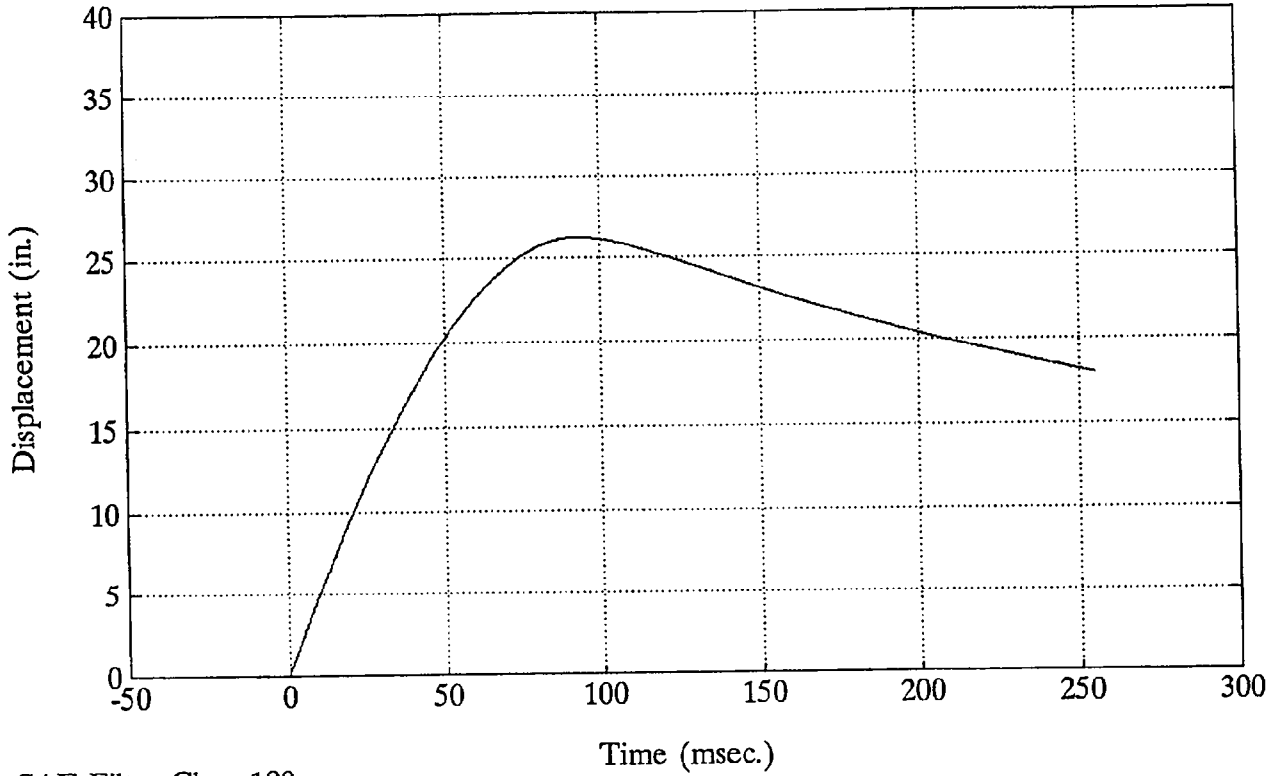


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

L. Rear X-member X (#1)

Max = 26.20 in. @ 94.56 msec
Min = 0.00 in. @ -0.00 msec

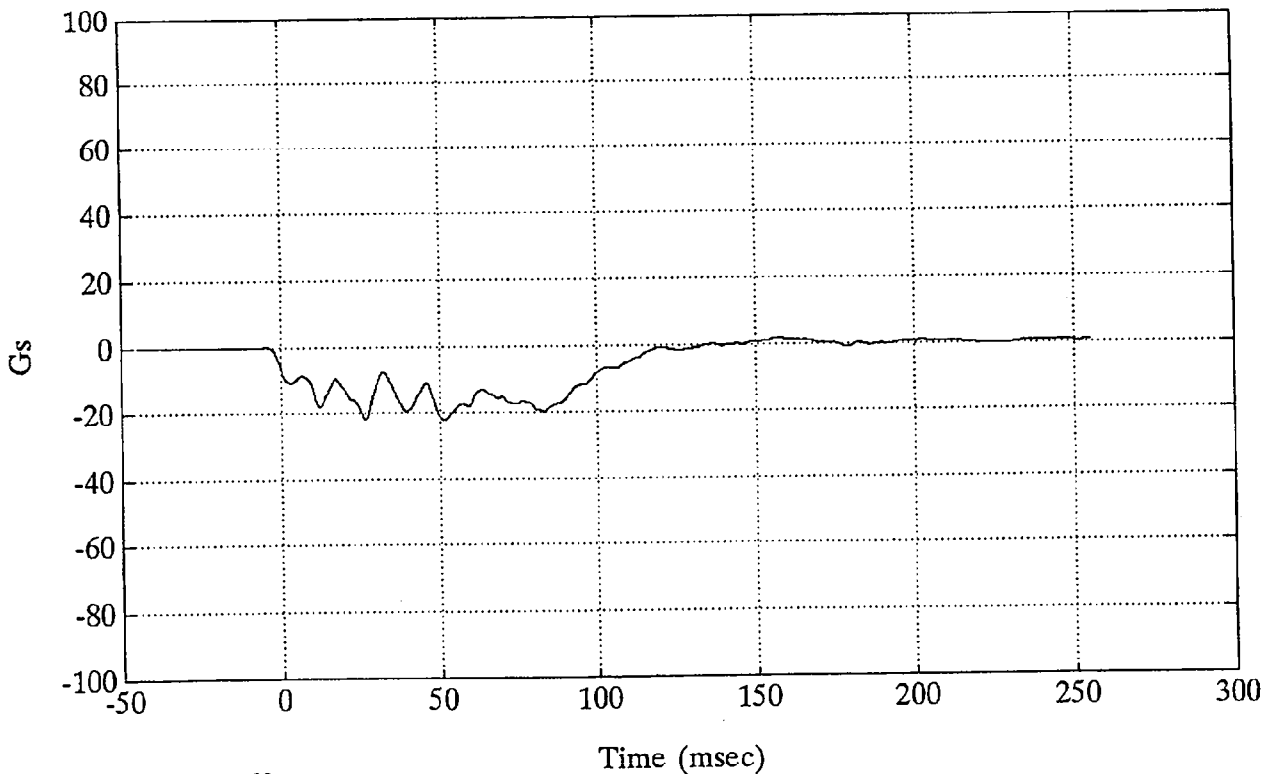


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

R. Rear X-member X (#2)

Max = 2.01 Gs @ 157.56 msec
Min = -21.99 Gs @ 51.48 msec

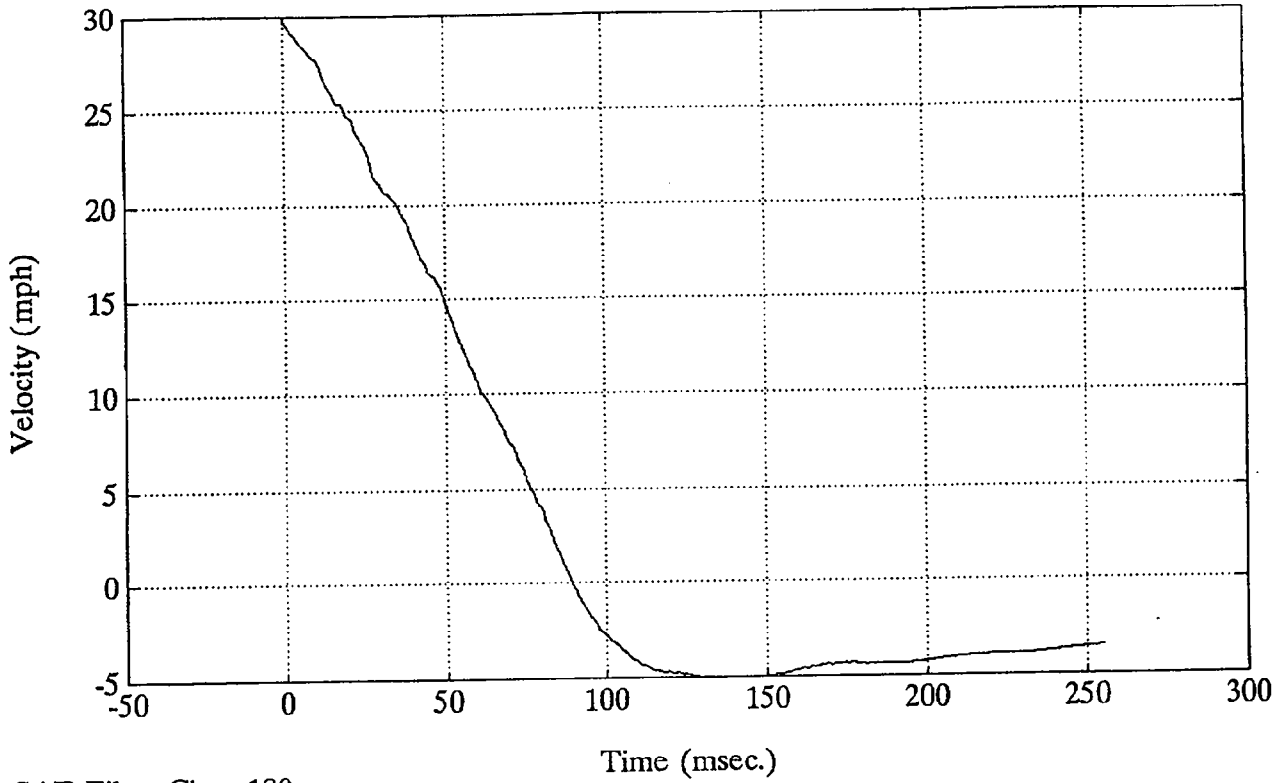


SAE Filter Class 60

FMVSS 208 - 1993 SATURN SL

R. Rear X-member X (#2)

Max = 29.80 mph @ -0.00 msec
Min = -5.05 mph @ 135.84 msec

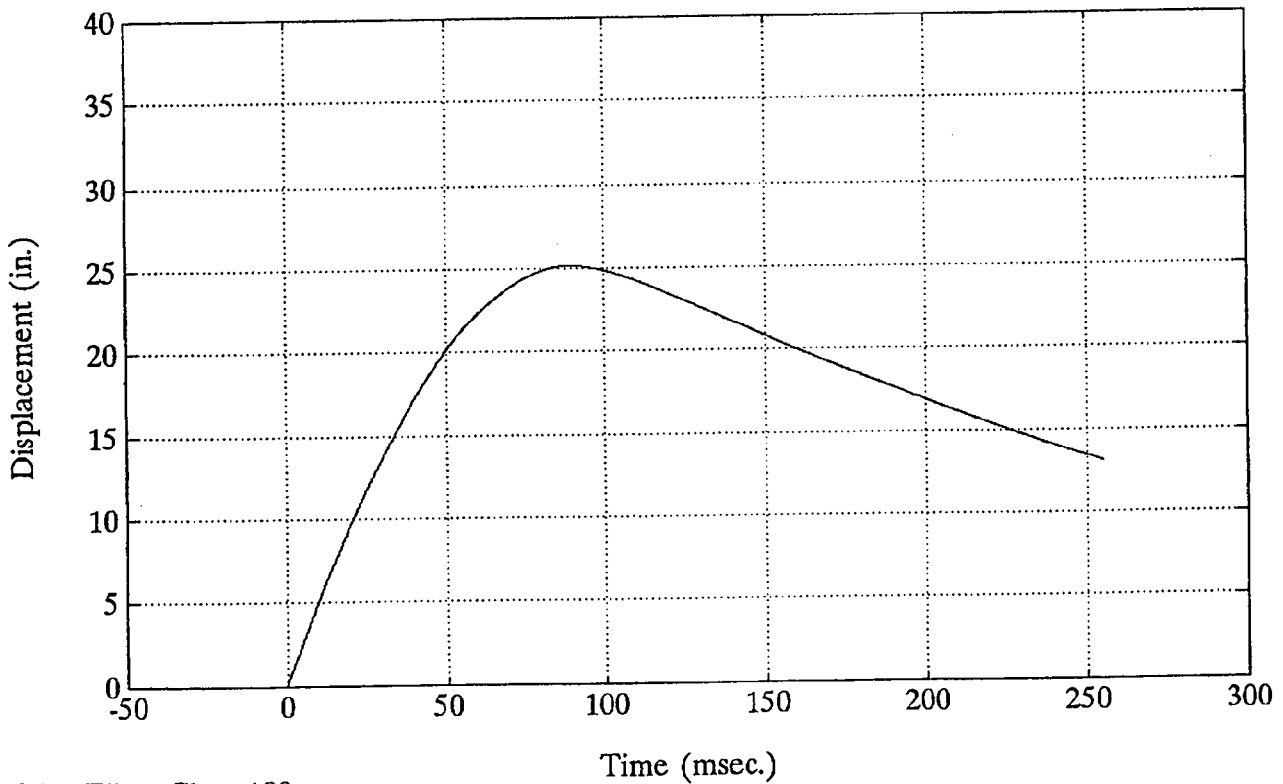


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

R. Rear X-member X (#2)

Max = 25.17 in. @ 90.48 msec
Min = 0.00 in. @ -0.00 msec

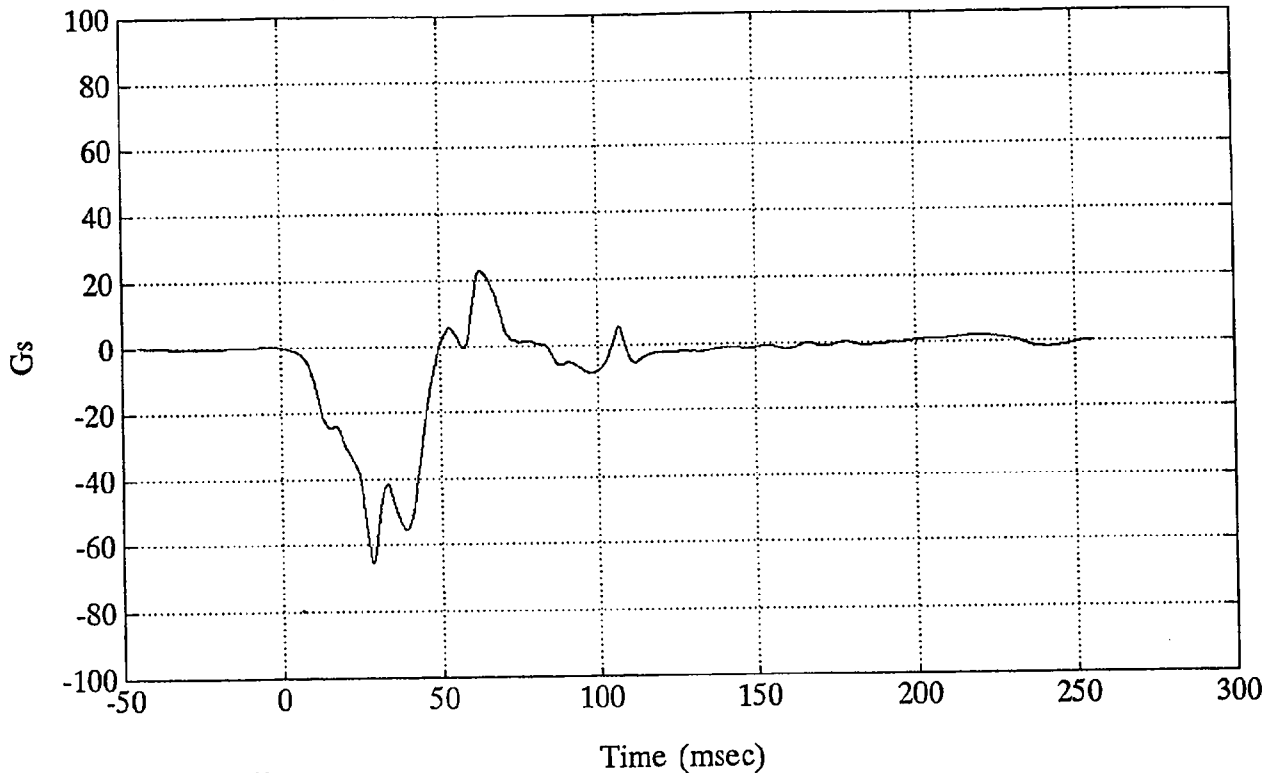


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Engine Top X (#3)

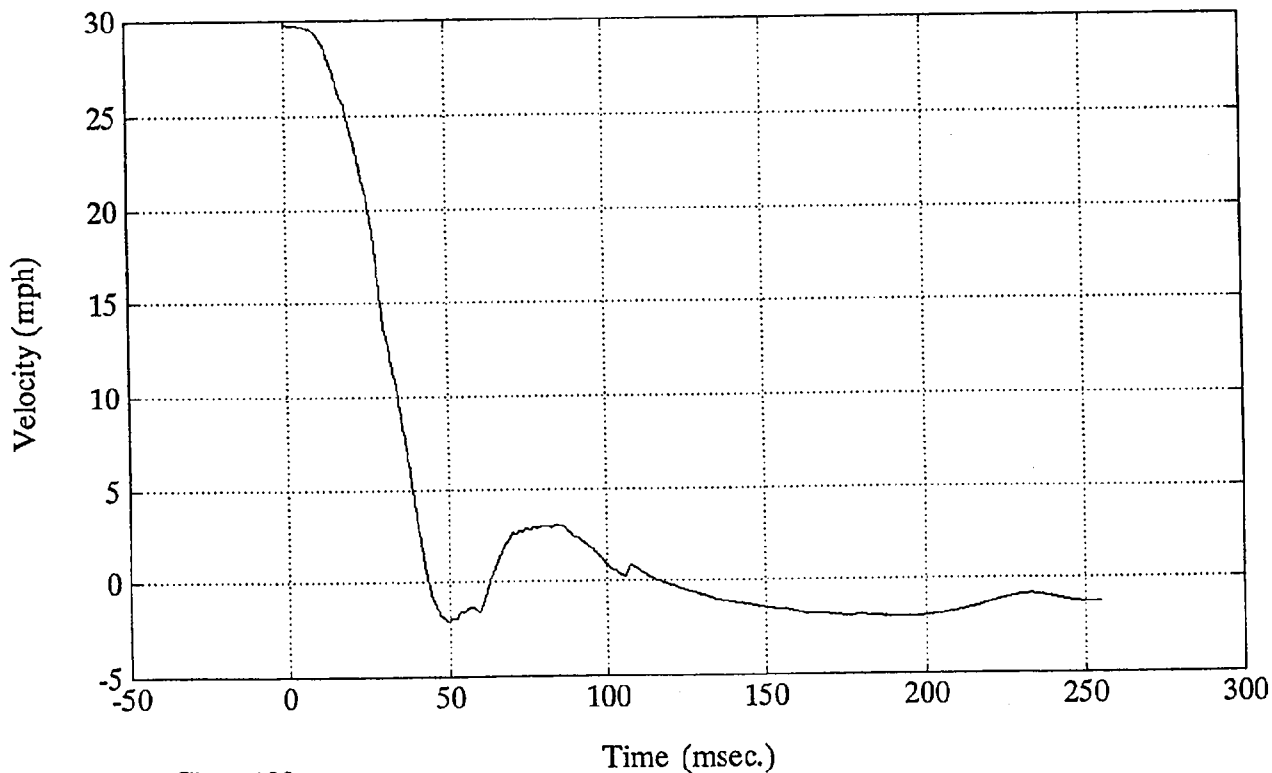
Max = 23.02 Gs @ 62.76 msec
Min = -65.50 Gs @ 28.56 msec



FMVSS 208 - 1993 SATURN SL

Engine Top X (#3)

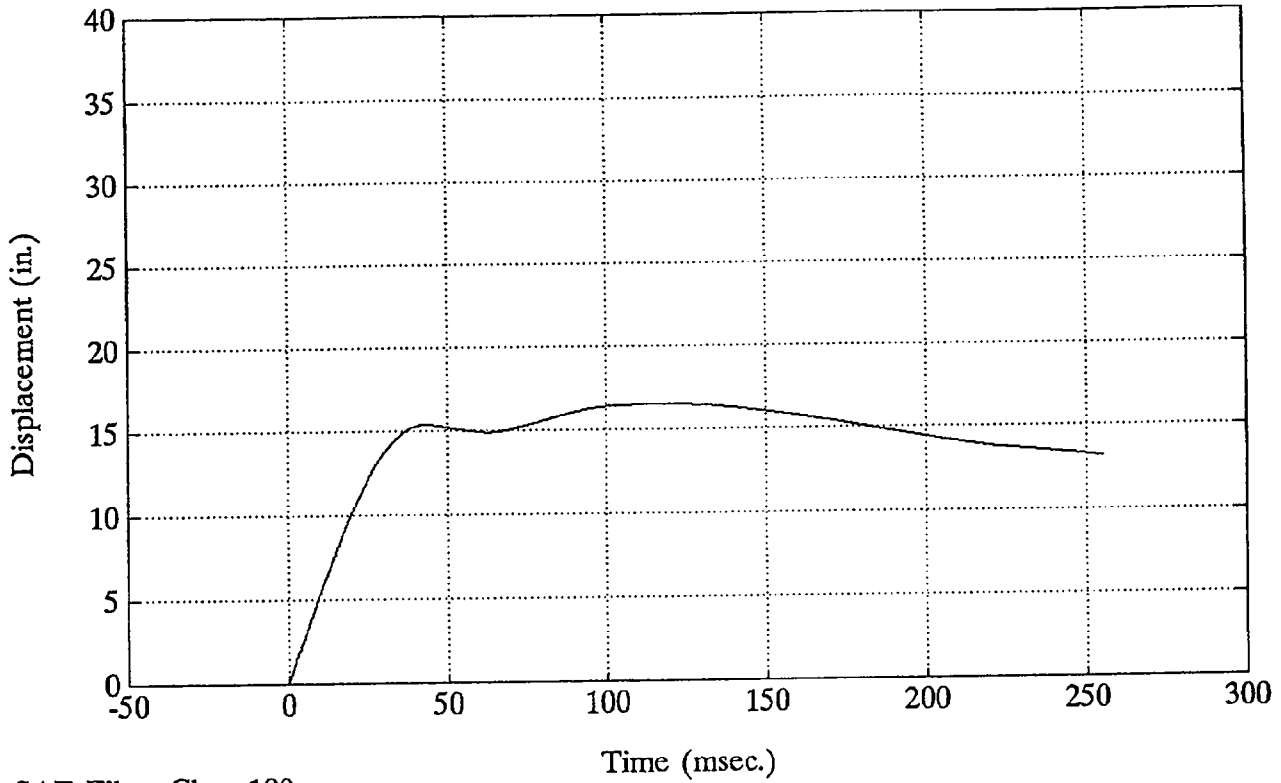
Max = 29.80 mph @ 0.96 msec
Min = -2.06 mph @ 49.68 msec



FMVSS 208 - 1993 SATURN SL

Engine Top X (#3)

Max = 16.50 in. @ 119.52 msec
Min = 0.00 in. @ -0.00 msec

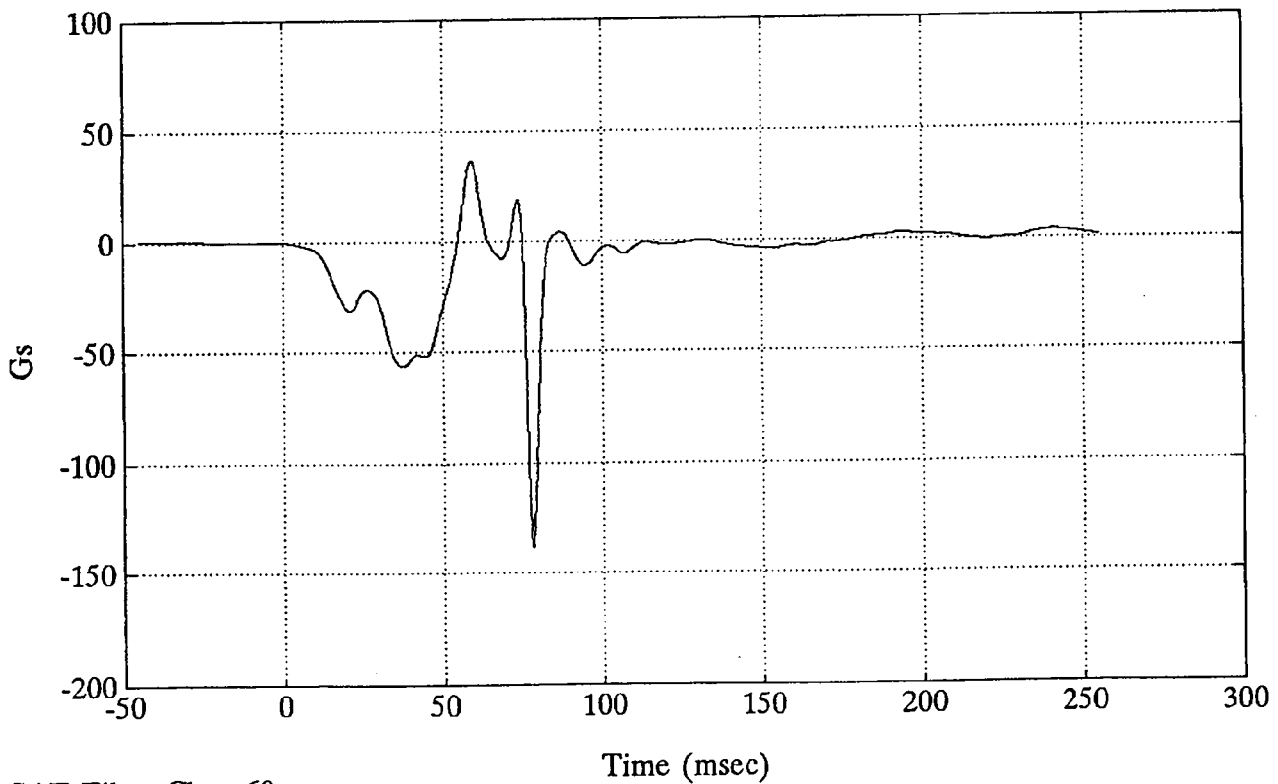


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Engine Bottom X (#4)

Max = 36.78 Gs @ 59.16 msec
Min = -137.96 Gs @ 77.88 msec

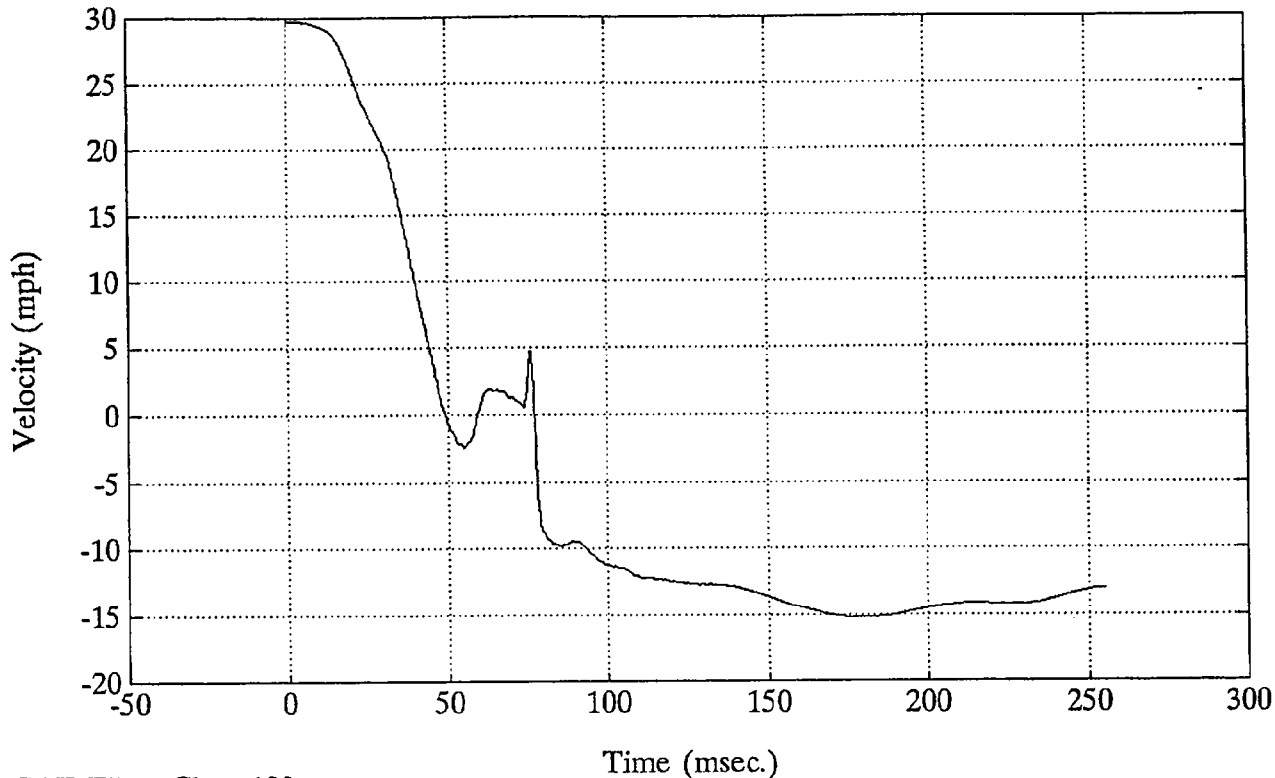


SAE Filter Class 60

FMVSS 208 - 1993 SATURN SL

Engine Bottom X (#4)

Max = 29.80 mph @ -0.00 msec
Min = -15.27 mph @ 179.28 msec

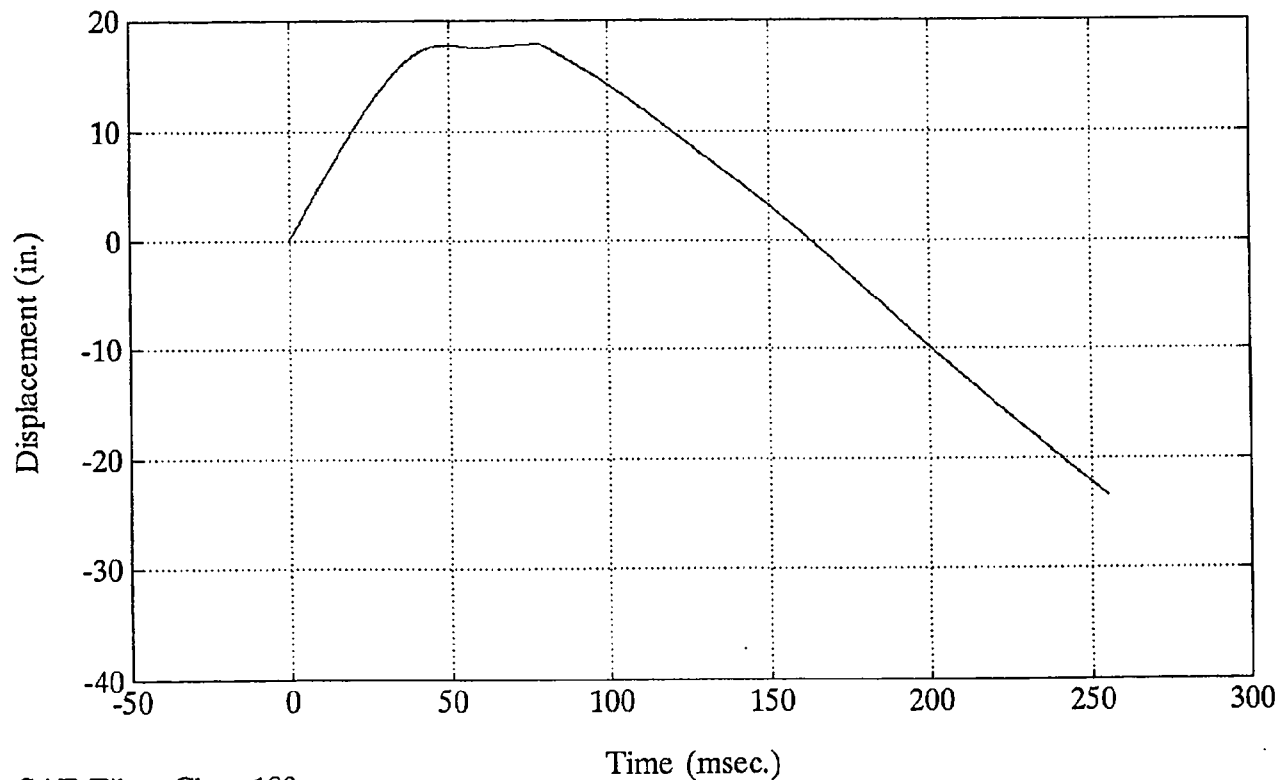


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Engine Bottom X (#4)

Max = 17.98 in. @ 77.52 msec
Min = -23.33 in. @ 254.88 msec

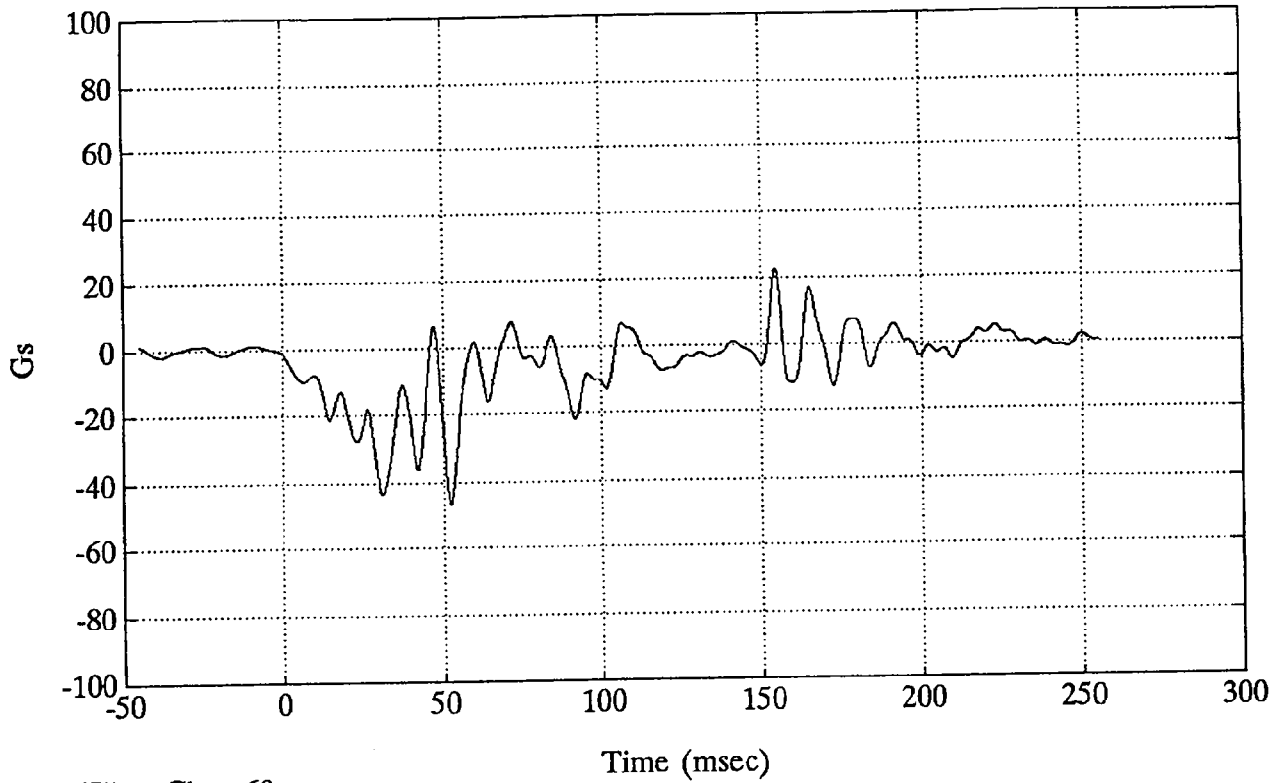


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

R. Brake Caliper X (#5)

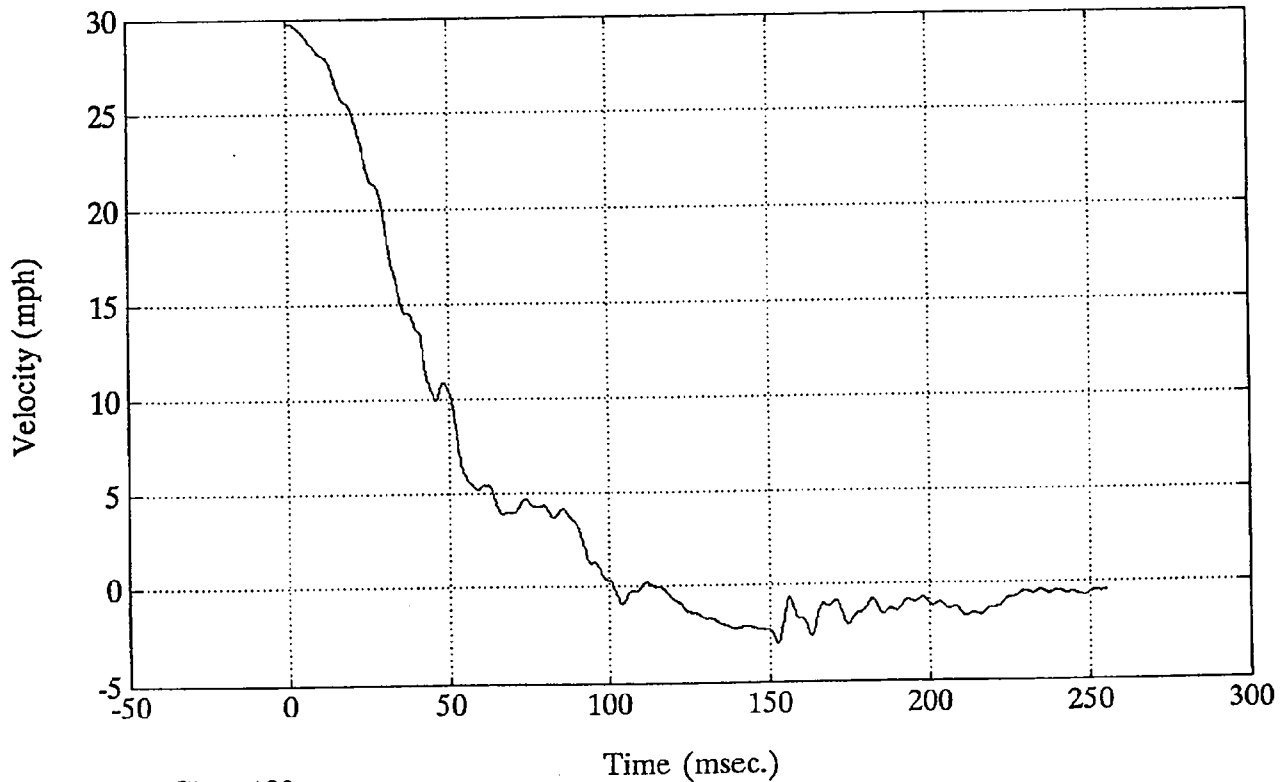
Max = 22.62 Gs @ 154.20 msec
Min = -46.55 Gs @ 52.44 msec



FMVSS 208 - 1993 SATURN SL

R. Brake Caliper X (#5)

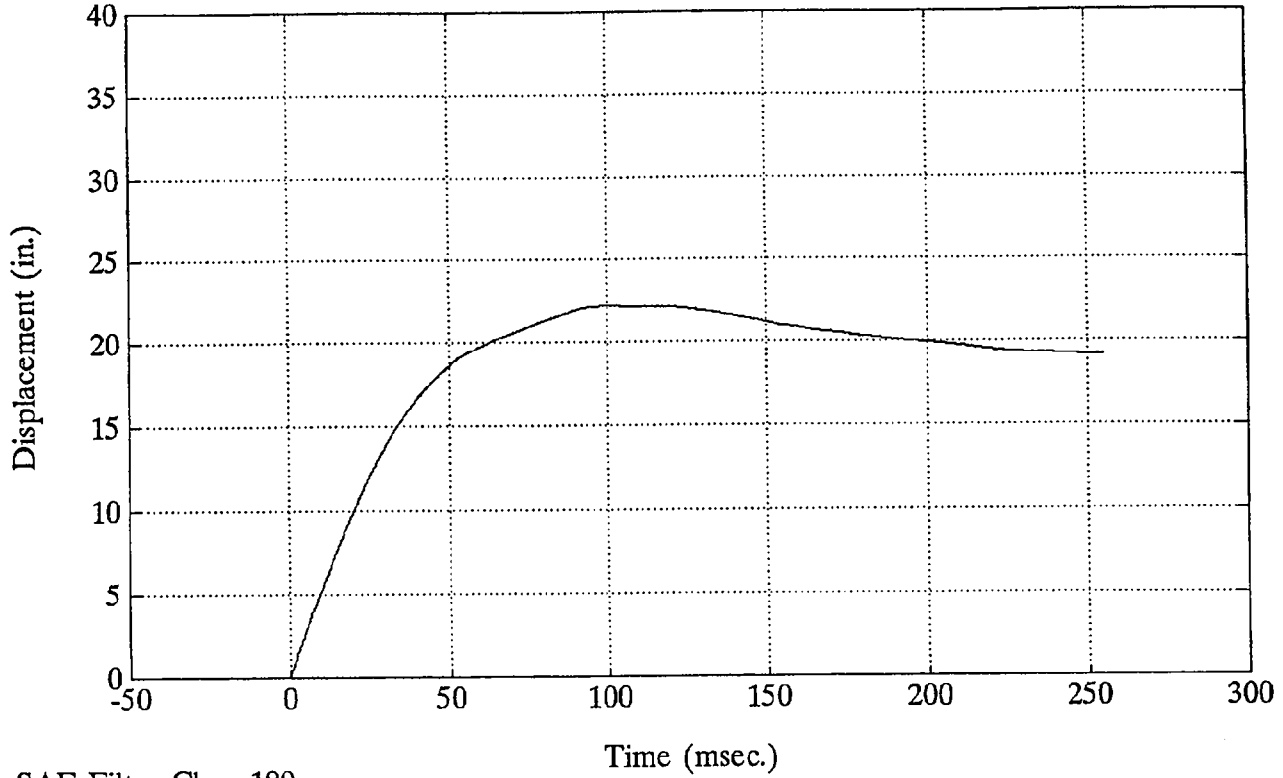
Max = 29.80 mph @ -0.00 msec
Min = -3.00 mph @ 152.40 msec



FMVSS 208 - 1993 SATURN SL

R. Brake Caliper X (#5)

Max = 22.21 in. @ 102.48 msec
Min = 0.00 in. @ -0.00 msec

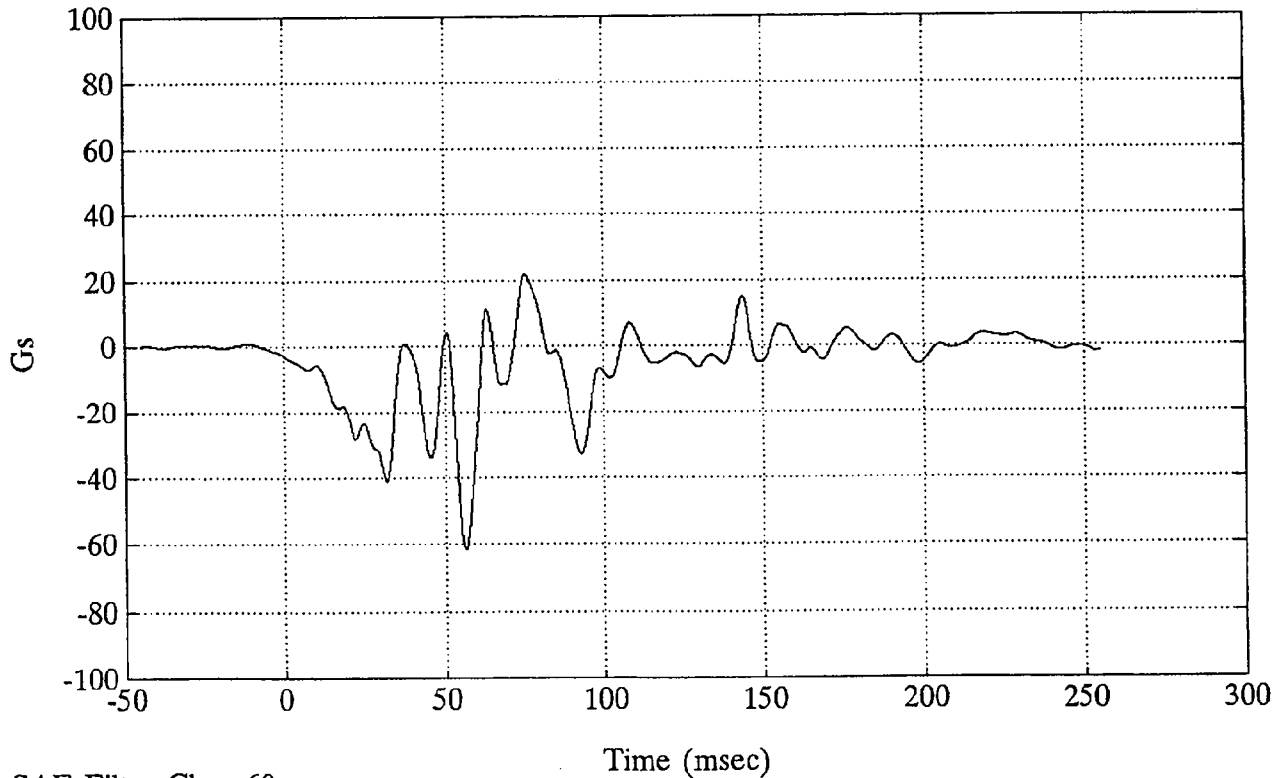


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

L. Brake Caliper X (#6)

Max = 21.77 Gs @ 75.24 msec
Min = -61.75 Gs @ 56.40 msec

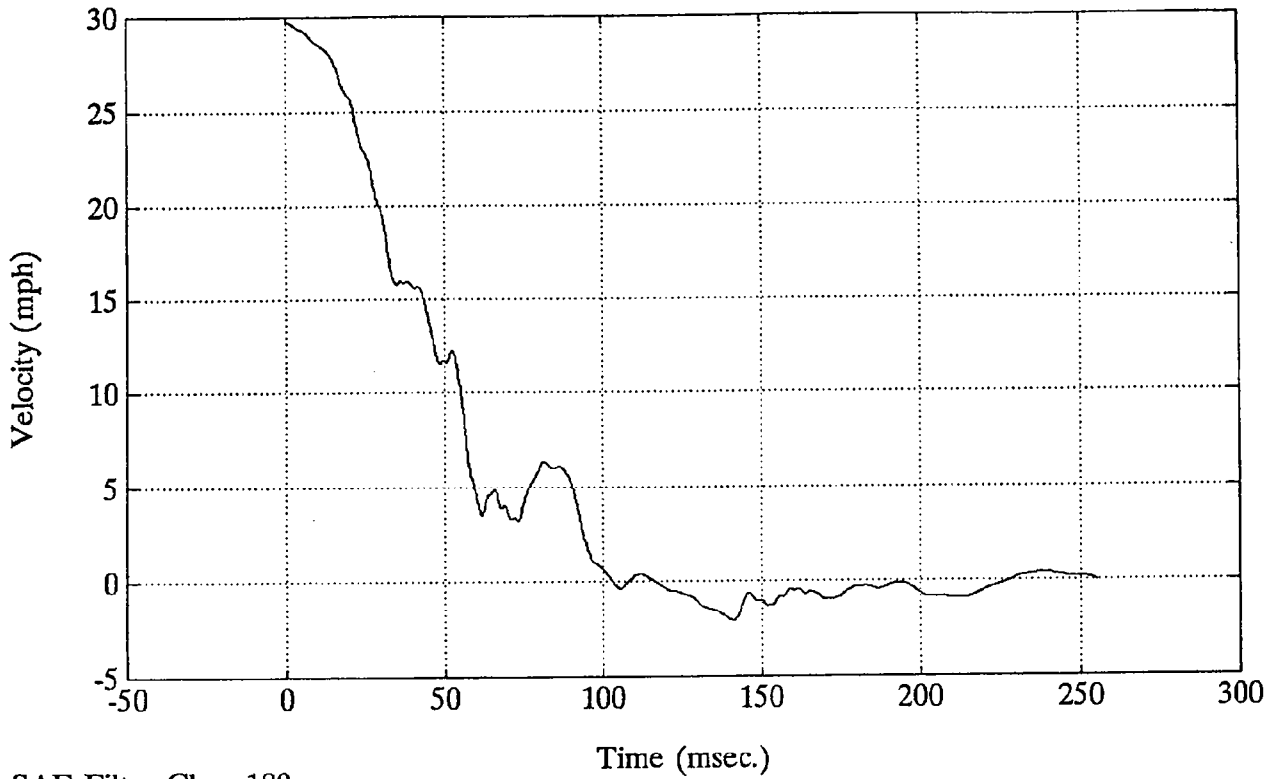


SAE Filter Class 60

FMVSS 208 - 1993 SATURN SL

L. Brake Caliper X (#6)

Max = 29.80 mph @ -0.00 msec
Min = -2.09 mph @ 141.12 msec

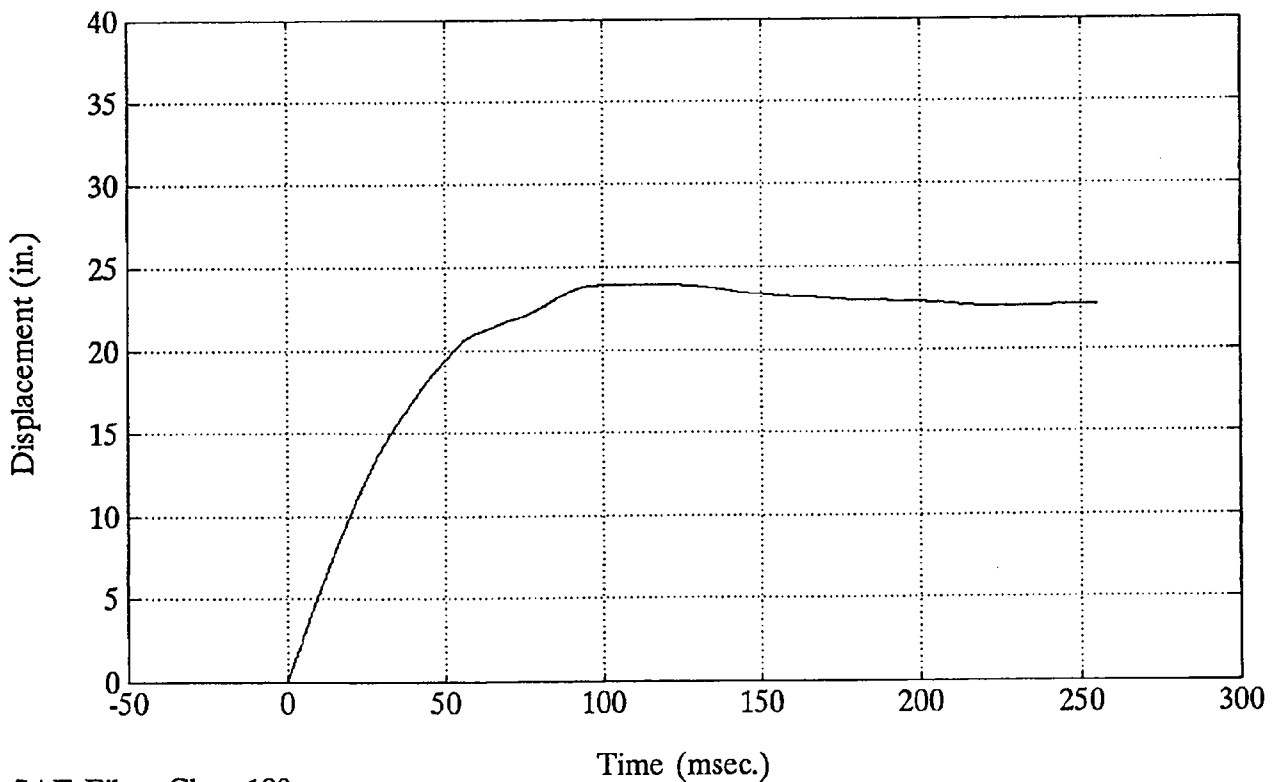


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

L. Brake Caliper X (#6)

Max = 24.00 in. @ 118.56 msec
Min = 0.00 in. @ -0.00 msec

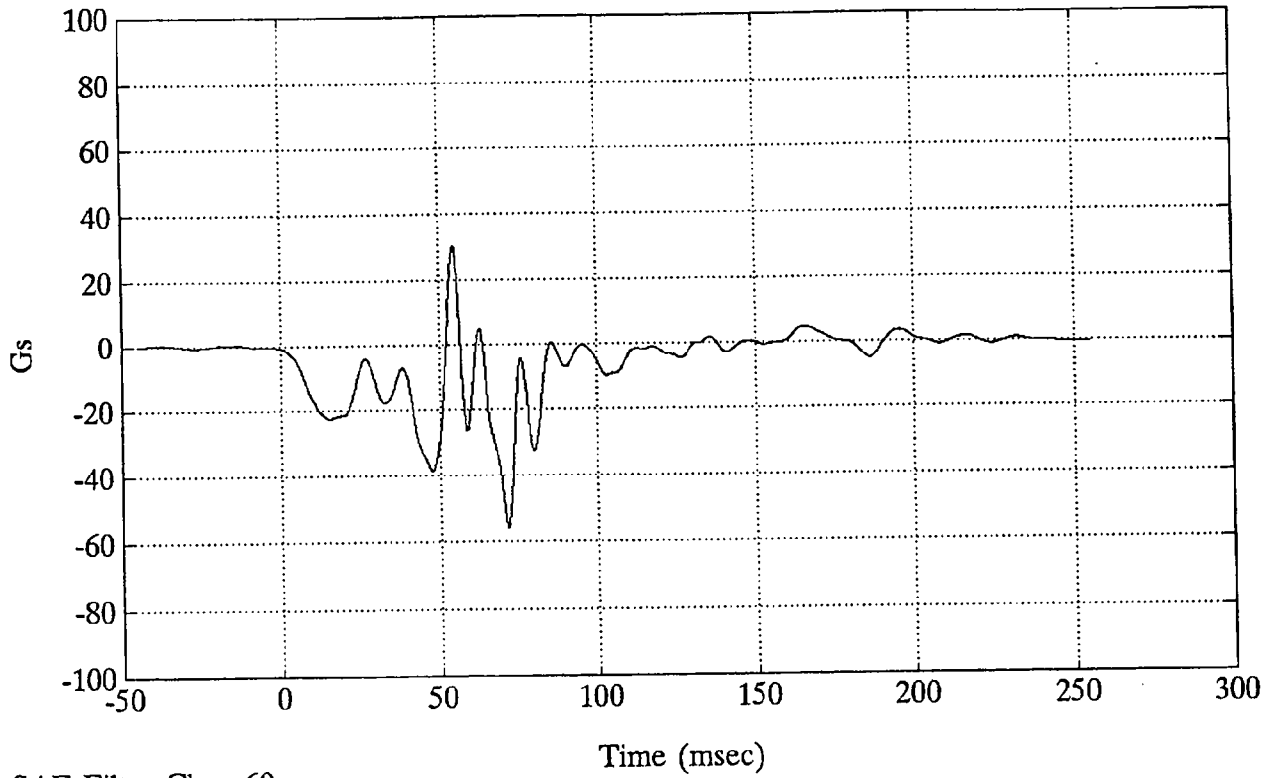


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Instrument Panel X (#7)

Max = 30.24 Gs @ 54.72 msec
Min = -55.95 Gs @ 71.52 msec

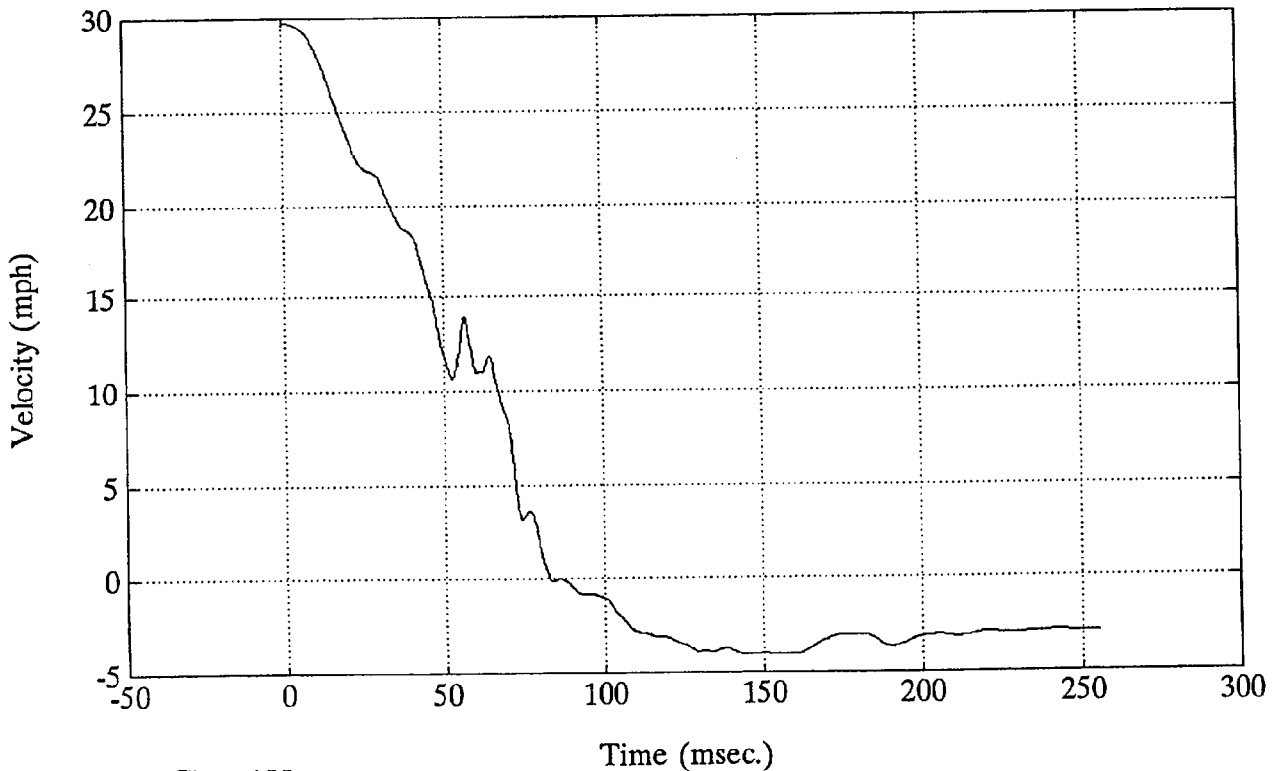


SAE Filter Class 60

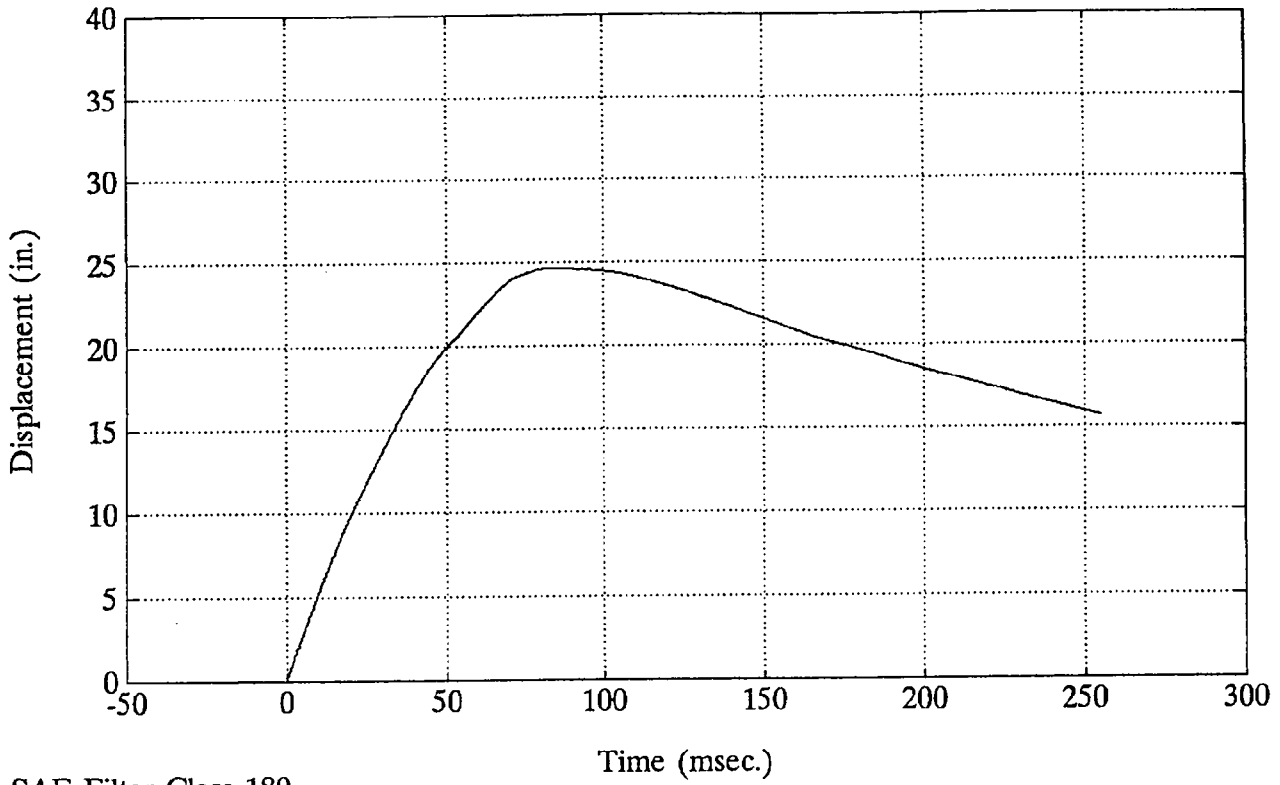
FMVSS 208 - 1993 SATURN SL

Instrument Panel X (#7)

Max = 29.80 mph @ -0.00 msec
Min = -4.06 mph @ 154.80 msec



SAE Filter Class 180



SAE Filter Class 180

TEST NO. CP0103

DUMMY DATA	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	180
Femur Forces	600

FACILITY: TRACK
 RUN #: 1
 SERIES #: 8

TEST DATE: 20 Nov 1992
 TEST TIME: 13:18:29
 BOARD: a

TITLE: NHTSA "208" TEST #8 - 1993 SATURN

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Pos. 1 Head X	Gs	16.3	33.1	-43.7	73.9	1000.0
2	Pos. 1 Head Y	Gs	5.4	33.1	-9.1	67.8	1000.0
3	Pos. 1 Head Z	Gs	25.3	61.0	-3.6	20.8	1000.0
4	Pos. 1 Left Femur	lbs	35.1	207.5	-1191.6	60.0	600.0
5	Pos. 1 Chest X	Gs	1.1	254.2	-35.6	60.4	180.0
6	Pos. 1 Chest Y	Gs	2.3	116.5	-6.0	62.8	180.0
7	Pos. 1 Chest Z	Gs	2.3	43.4	-9.9	85.0	180.0
8	Pos. 1 Right Femur	lbs	44.9	35.5	-955.1	61.0	600.0
9	Pos. 2 Head X	Gs	13.4	206.8	-33.0	100.0	1000.0
10	Pos. 2 Head Y	Gs	5.1	53.2	-13.0	102.7	1000.0
11	Pos. 2 Head Z	Gs	35.8	76.0	-.7	18.2	1000.0
12	Pos. 2 Left Femur	lbs	98.4	107.3	-1384.8	59.6	600.0
13	Pos. 2 Chest X	Gs	2.5	245.8	-36.2	66.1	180.0
14	Pos. 2 Chest Y	Gs	5.7	59.6	-12.6	98.5	180.0
15	Pos. 2 Chest Z	Gs	5.7	209.8	-10.6	100.0	180.0
16	Pos. 2 Right Femur	lbs	24.1	43.0	-1137.6	63.2	600.0
17	Pos. 1 Head Resultant	Gs	46.8	72.6	.1	12.6	1000.0
18	Pos. 1 Chest Resultant	Gs	36.0	60.5	.0	-19.6	180.0
19	Pos. 2 Head Resultant	Gs	41.3	73.9	.0	-6.8	1000.0
20	Pos. 2 Chest Resultant	Gs	36.3	66.1	.0	-23.5	180.0

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 34.911 G's
 Tstart = 59.0400 ms
 Tend = 62.1600 ms
 CSI = 178.809

CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 35.080 G's
 Tstart = 60.4800 ms
 Tend = 63.6000 ms
 CSI = 229.528

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

hic: 316.83
 t1 = 51.360 msec
 t2 = 85.800 msec
 Average G's Over Hic Duration = 38.50

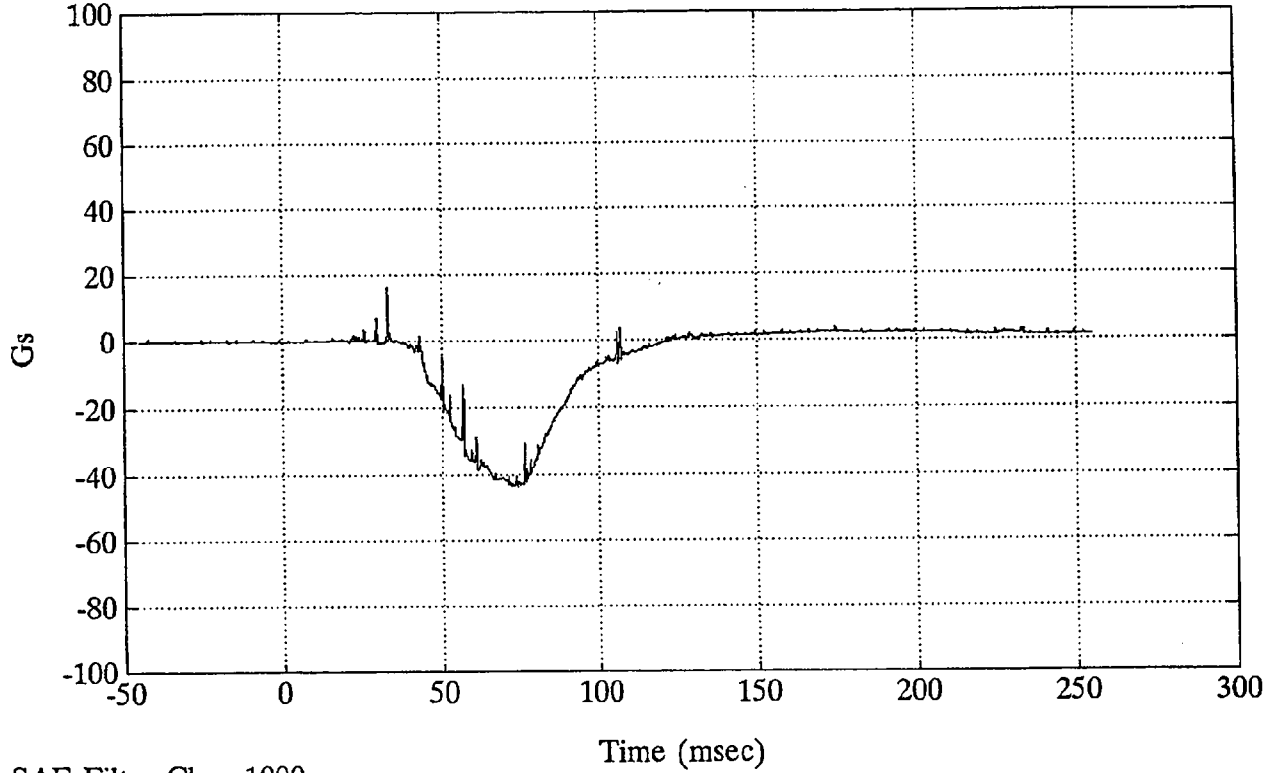
36 ms Fixed Duration HIC SUMMARY: Pos. 2 Head Resultant

hic: 310.87
 t1 = 67.080 msec
 t2 = 102.960 msec
 Average G's Over Hic Duration = 37.59

FMVSS 208 - 1993 SATURN SL

Pos. 1 Head X

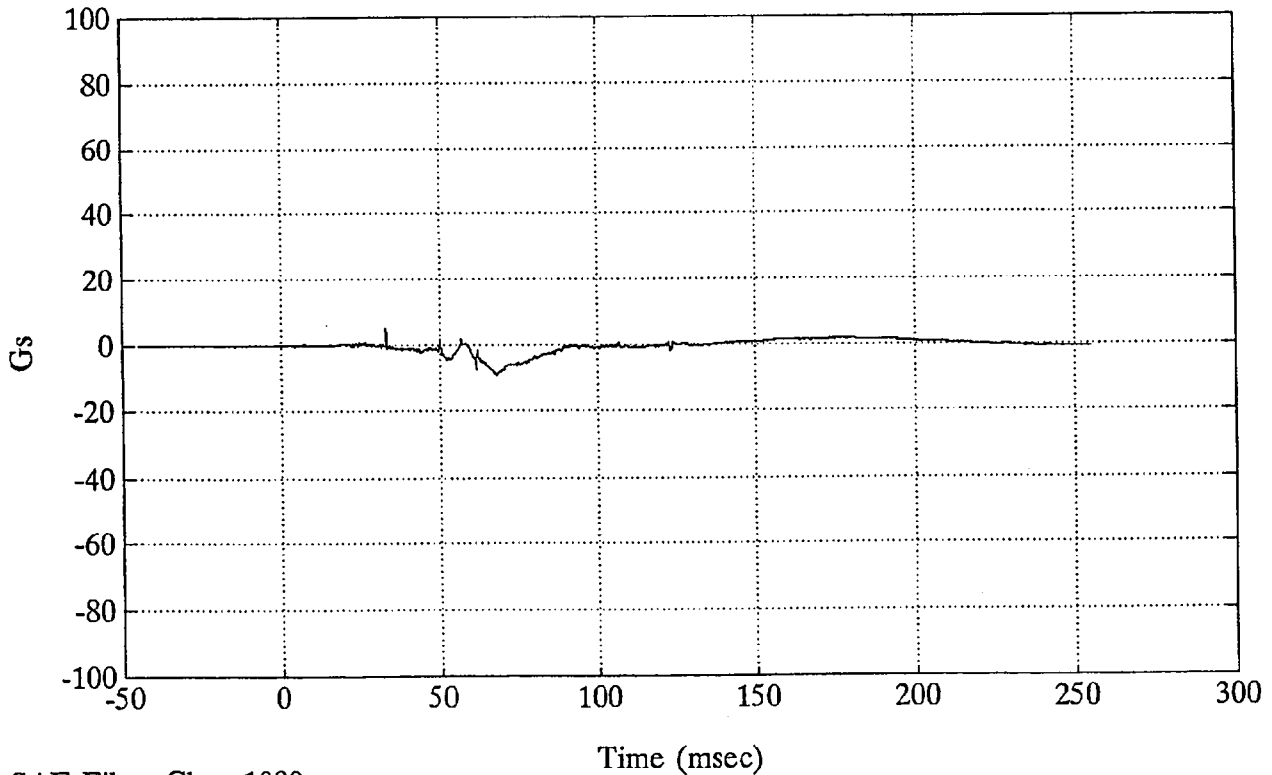
Max = 16.27 Gs @ 33.12 msec
Min = -43.75 Gs @ 73.92 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Head Y

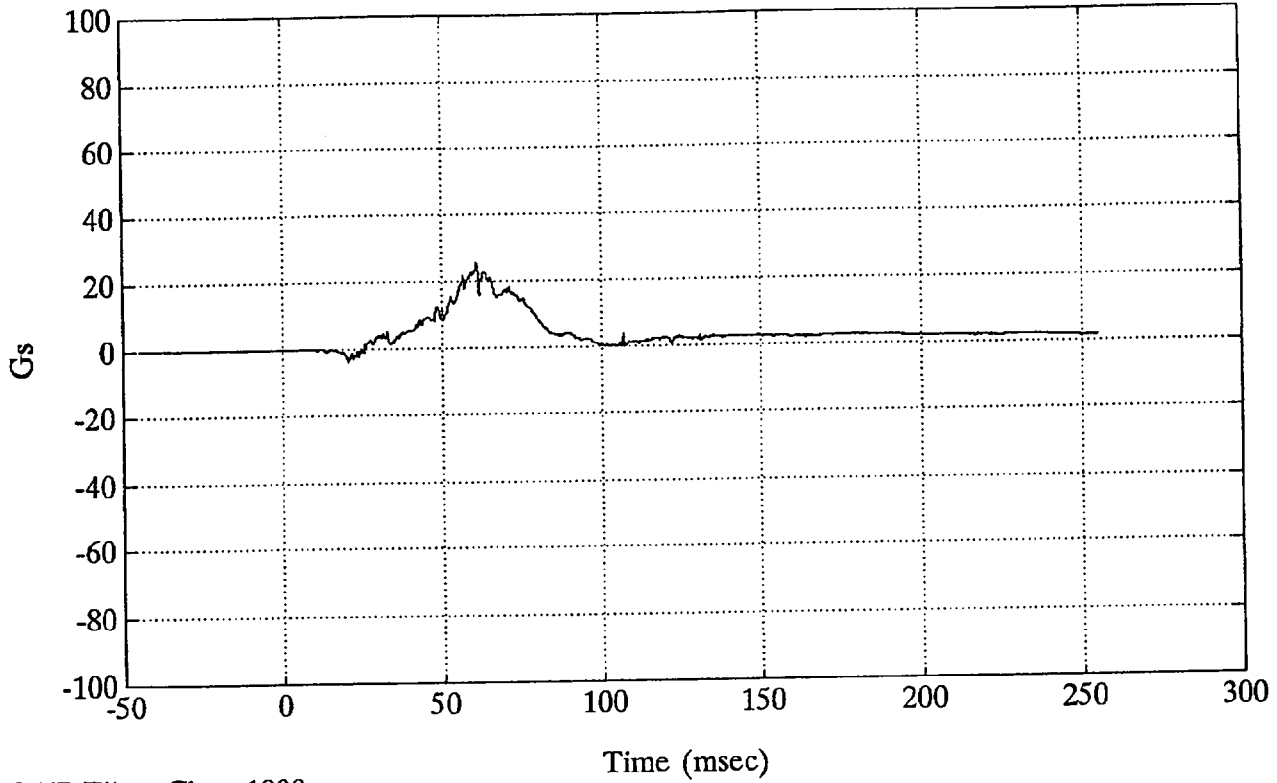
Max = 5.37 Gs @ 33.12 msec
Min = -9.09 Gs @ 67.80 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Head Z

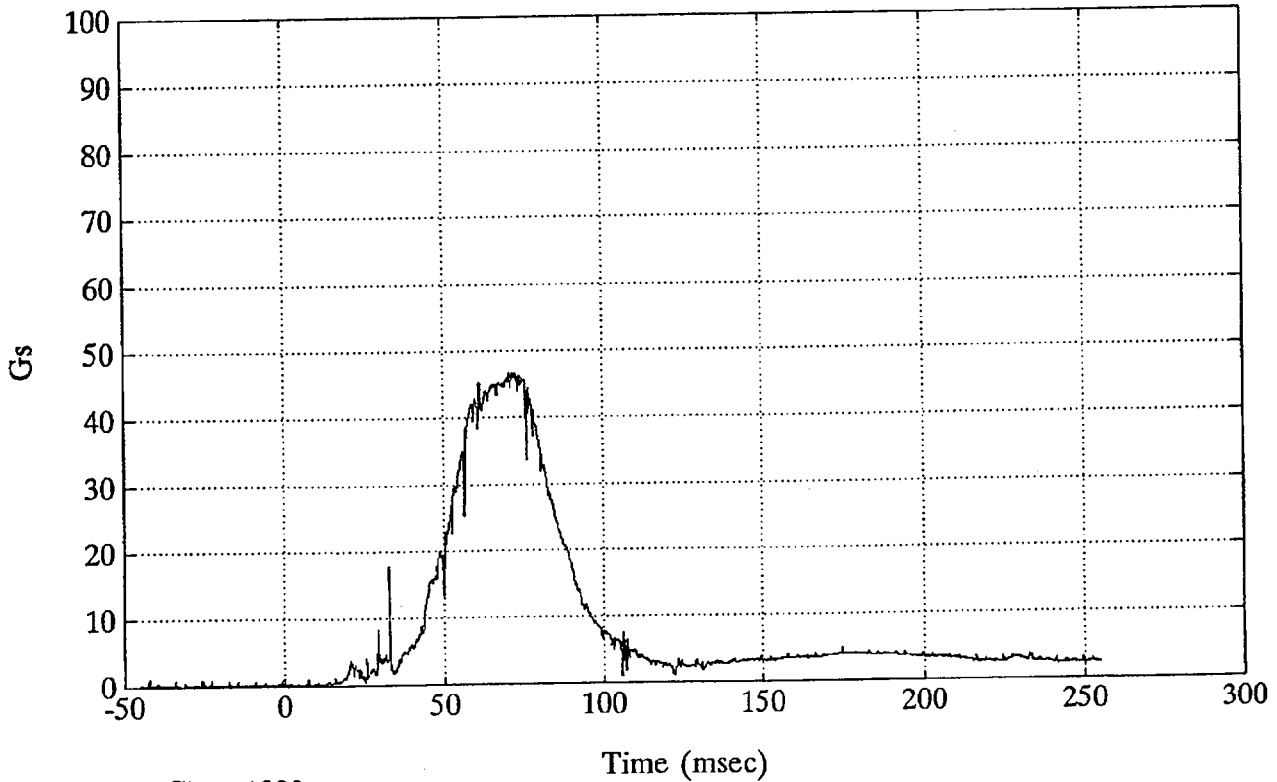
Max = 25.32 Gs @ 60.96 msec
Min = -3.60 Gs @ 20.76 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Head Resultant

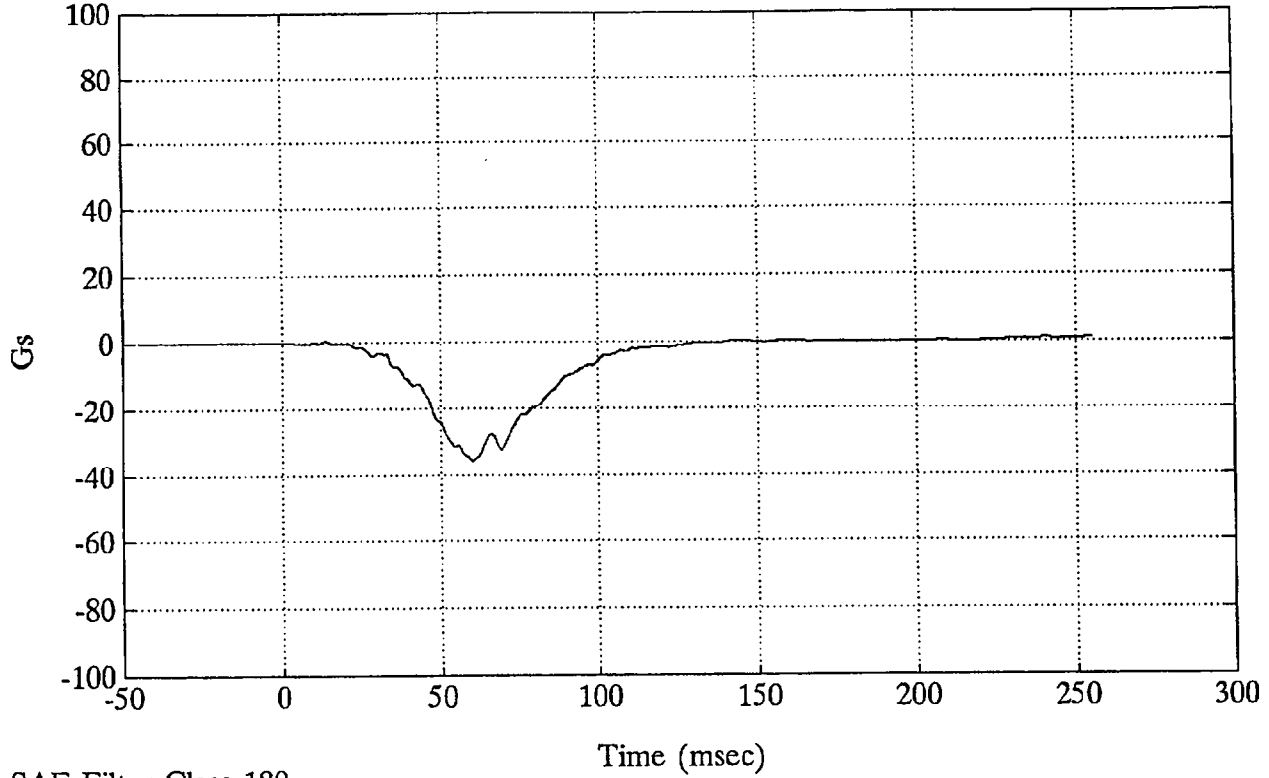
Max = 46.77 Gs @ 72.60 msec
Min = 0.05 Gs @ 12.60 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Chest X

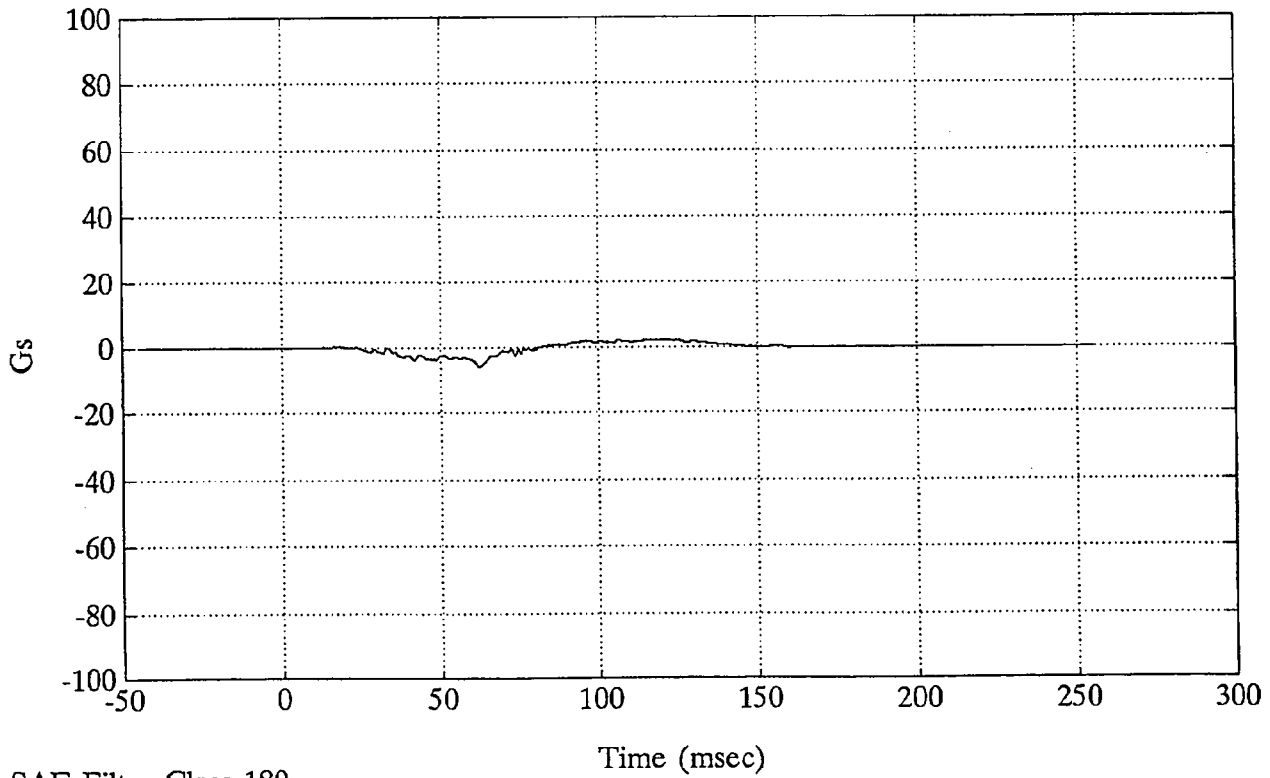
Max = 1.14 Gs @ 254.16 msec
Min = -35.59 Gs @ 60.36 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Chest Y

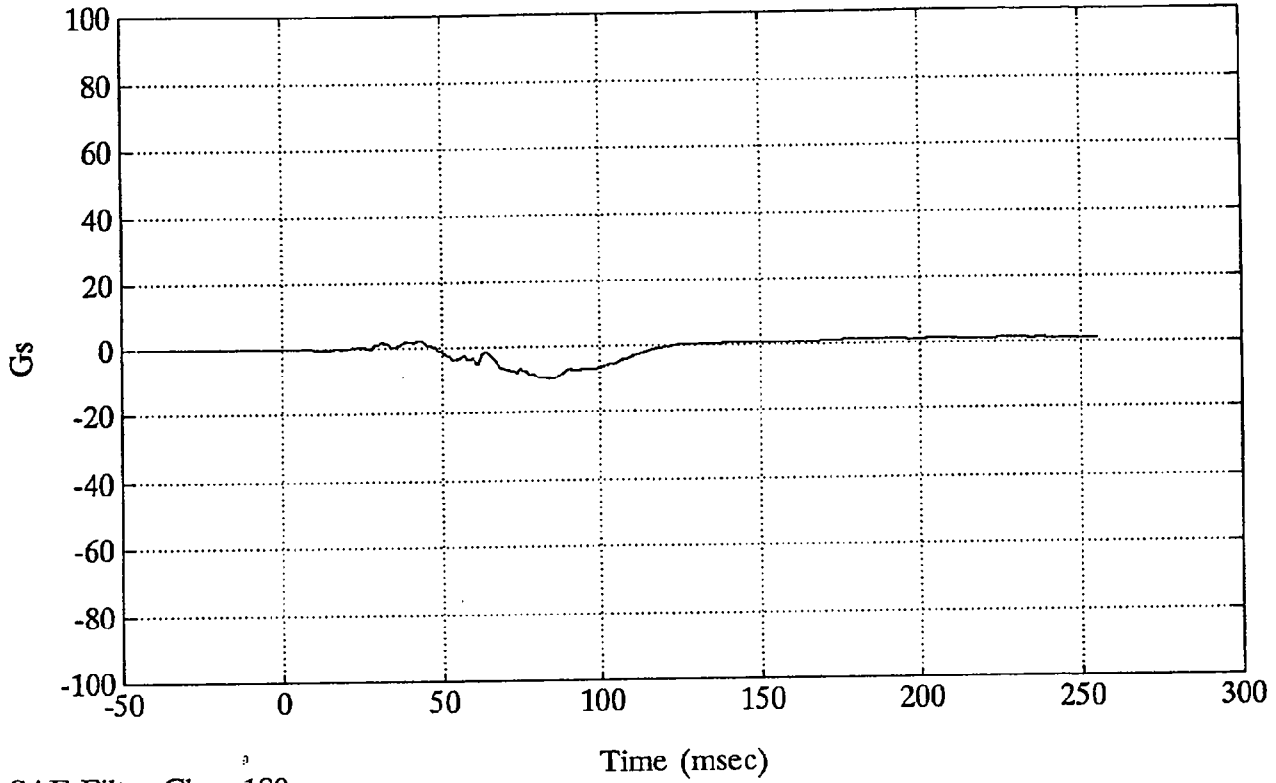
Max = 2.31 Gs @ 116.52 msec
Min = -6.01 Gs @ 62.76 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Chest Z

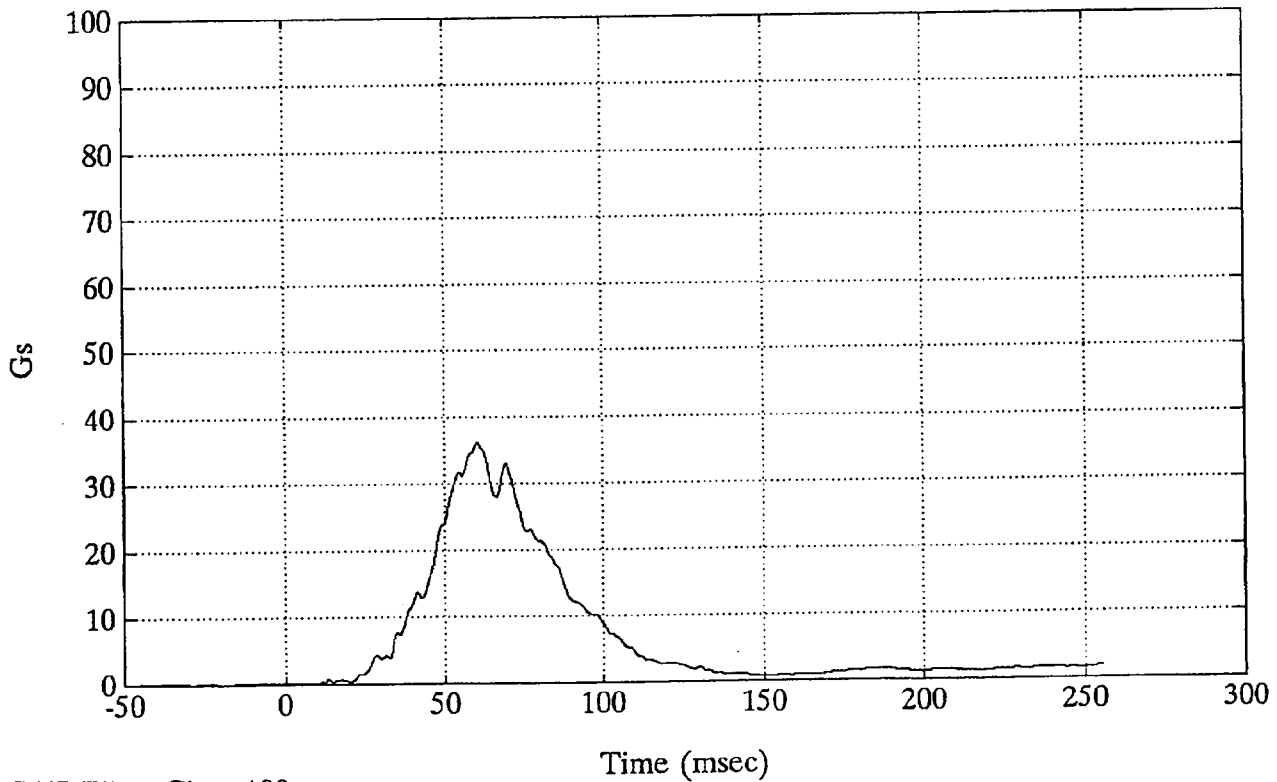
Max = 2.29 Gs @ 43.44 msec
Min = -9.89 Gs @ 84.96 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Chest Resultant

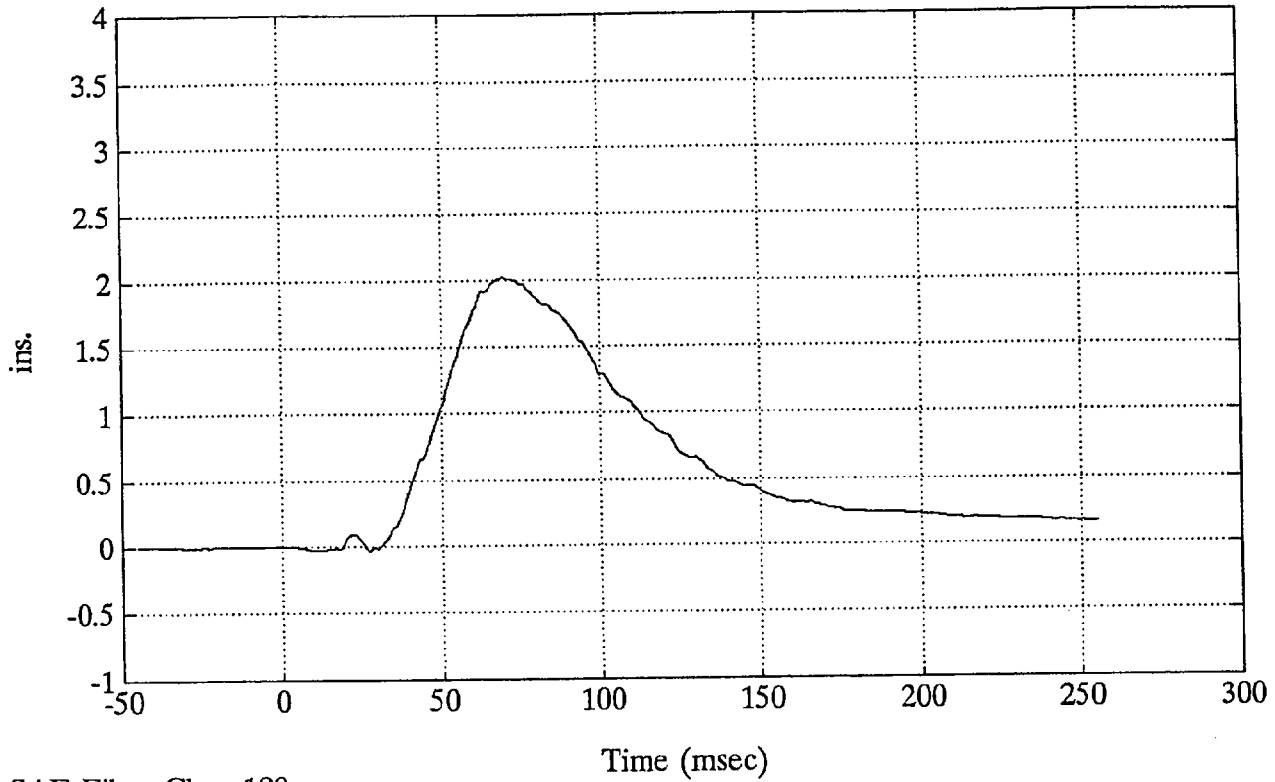
Max = 36.01 Gs @ 60.48 msec
Min = 0.02 Gs @ -19.56 msec



FMVSS 208 - 1993 SATURN SL

Pos. 1 Chest Disp.

Max = 2.02 ins. @ 69.60 msec
Min = -0.03 ins. @ 27.36 msec

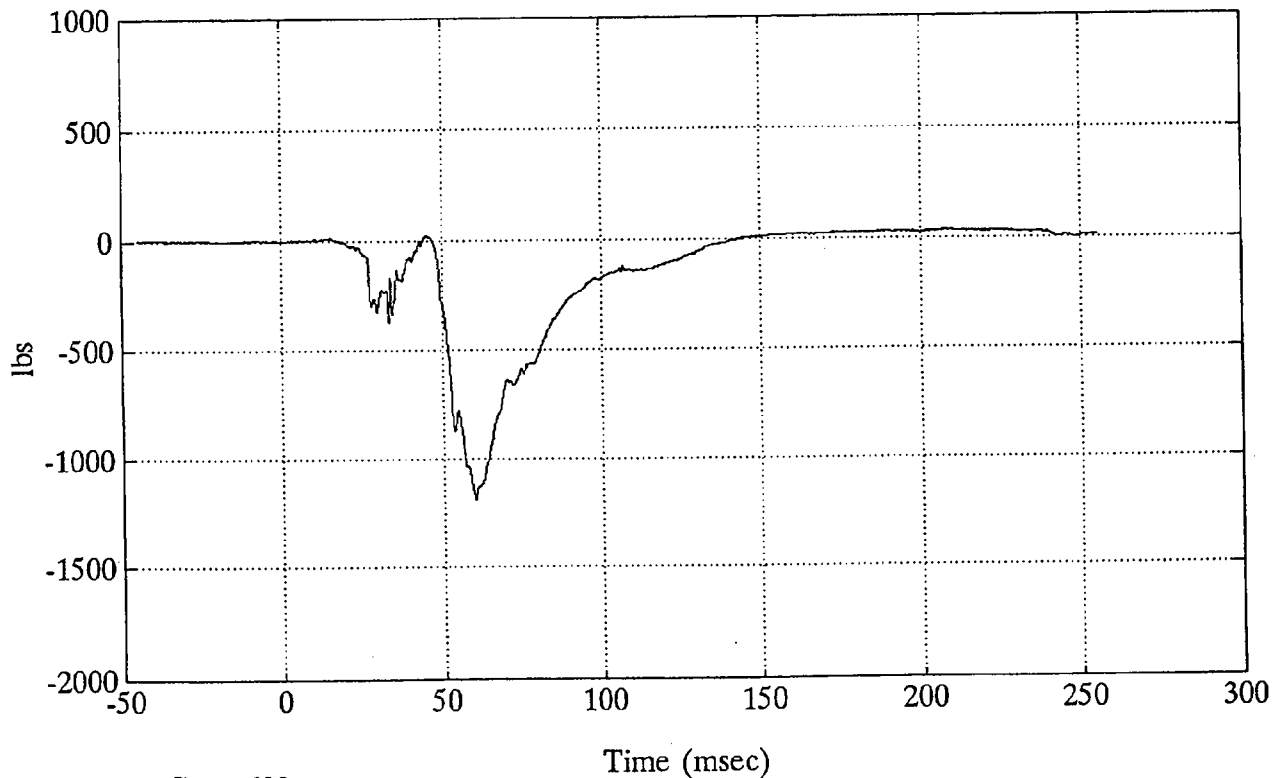


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 1 Left Femur

Max = 35.10 lbs @ 207.48 msec
Min = -1191.60 lbs @ 60.00 msec

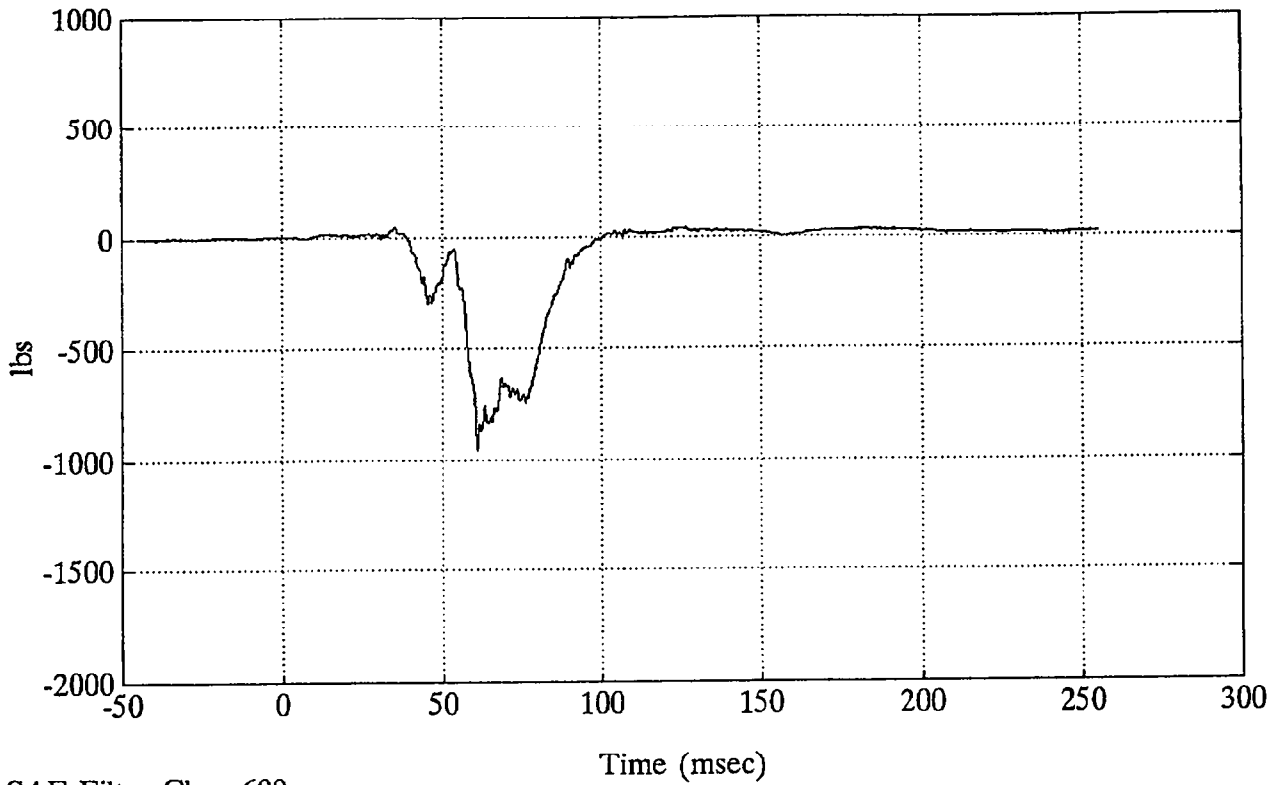


SAE Filter Class 600

FMVSS 208 - 1993 SATURN SL

Pos. 1 Right Femur

Max = 44.89 lbs @ 35.52 msec
Min = -955.09 lbs @ 60.96 msec

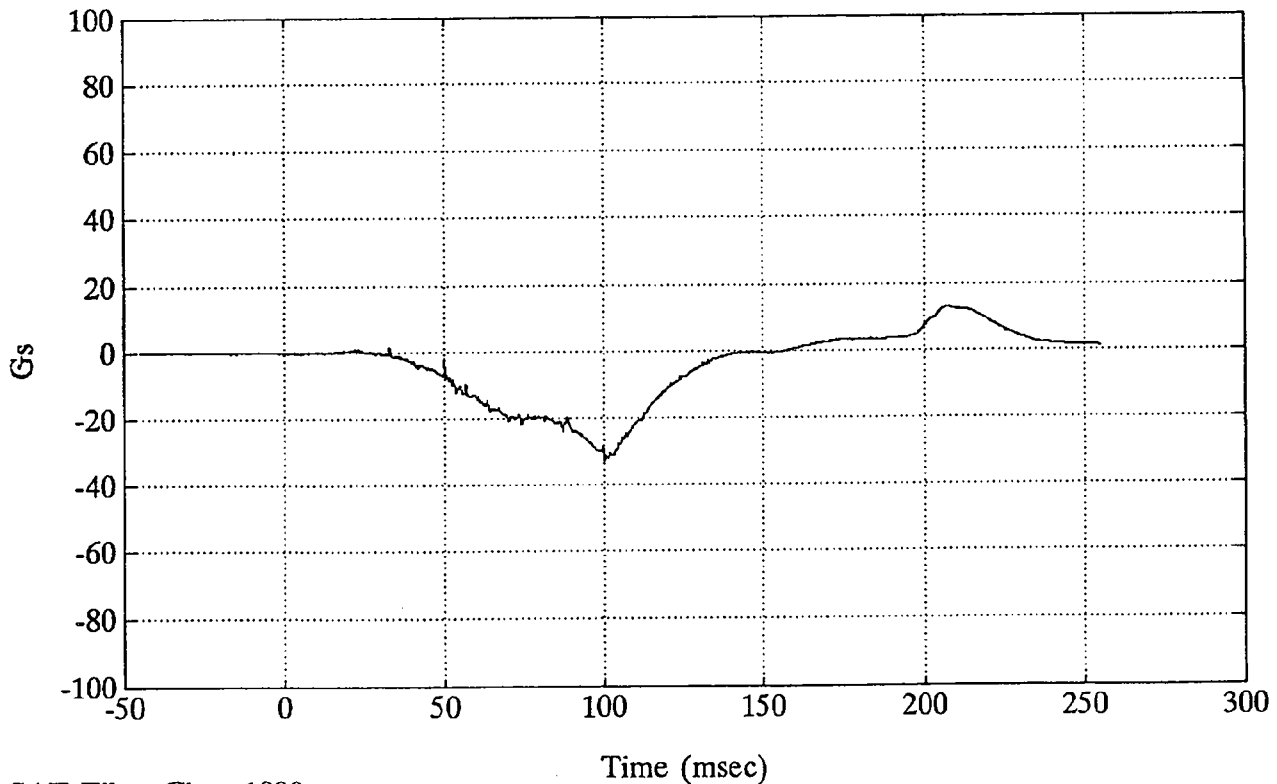


SAE Filter Class 600

FMVSS 208 - 1993 SATURN SL

Pos. 2 Head X

Max = 13.36 Gs @ 206.76 msec
Min = -33.02 Gs @ 99.96 msec

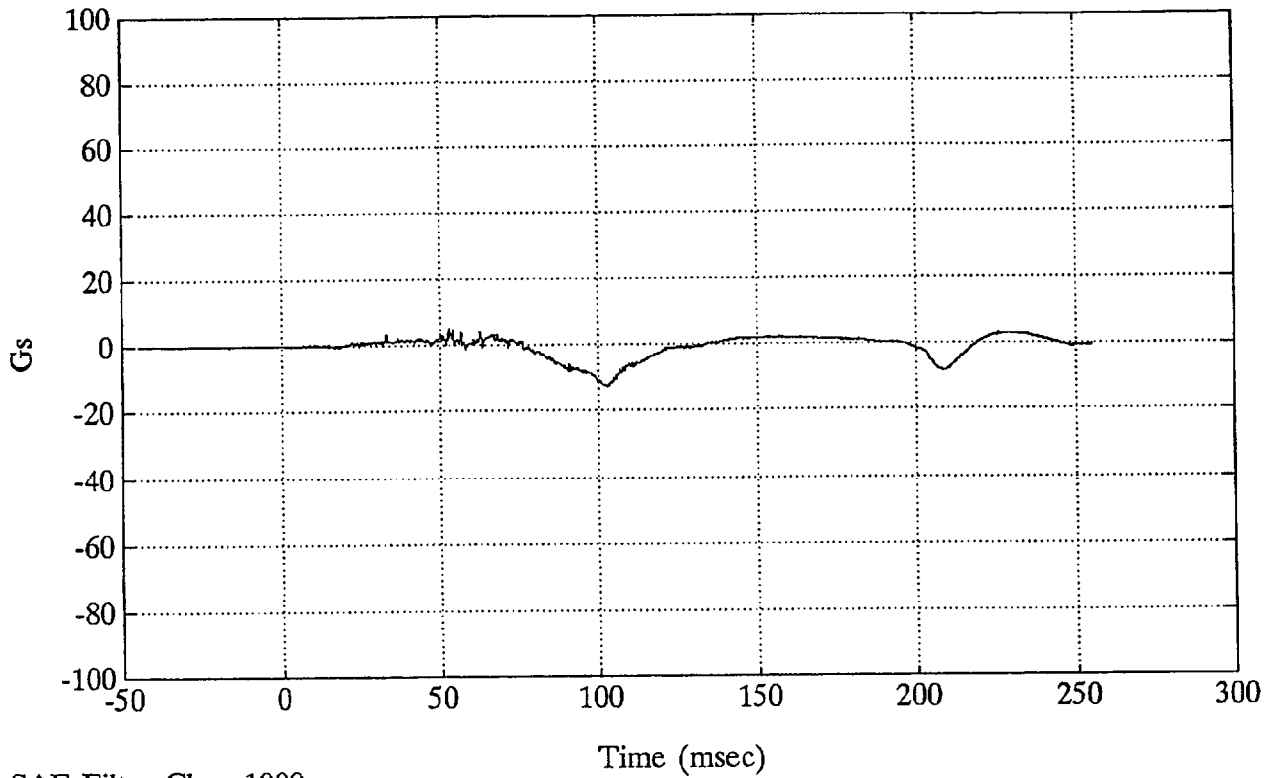


SAE Filter Class 1000

FMVSS 208 - 1993 SATURN SL

Pos. 2 Head Y

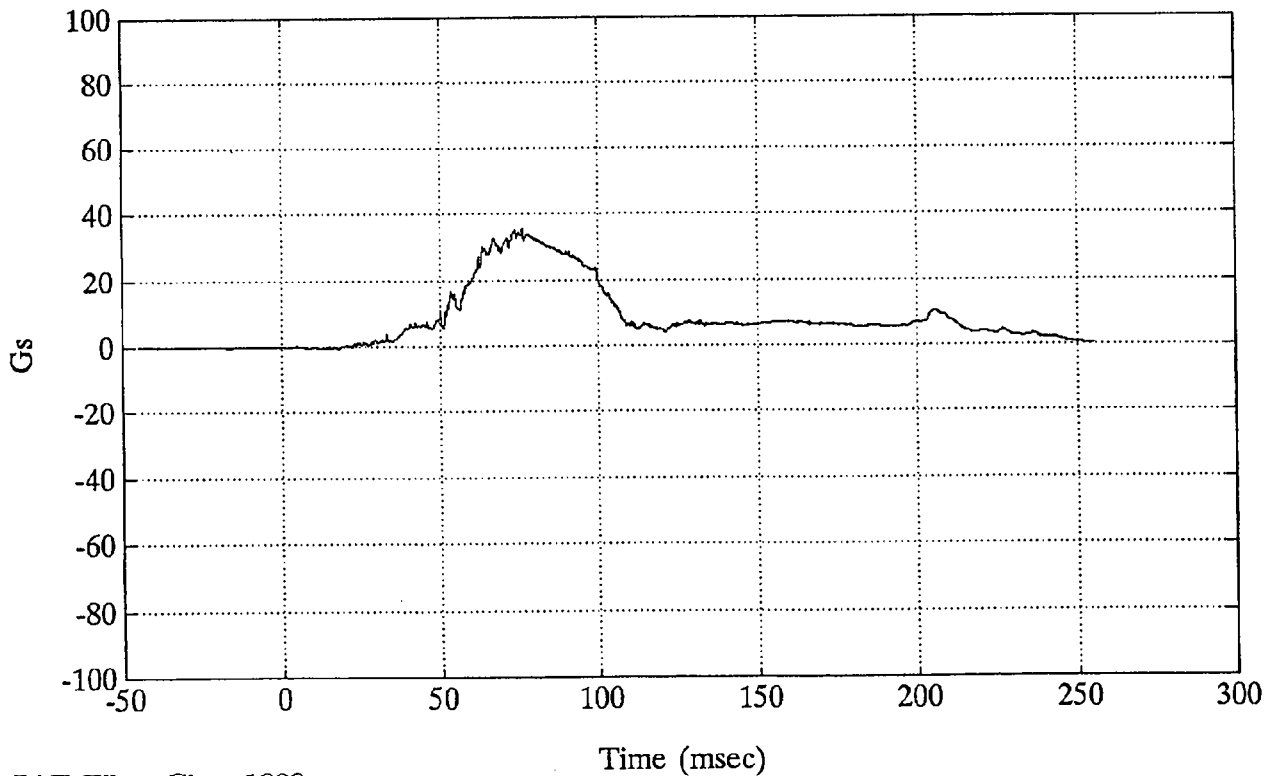
Max = 5.08 Gs @ 53.16 msec
Min = -12.99 Gs @ 102.72 msec



FMVSS 208 - 1993 SATURN SL

Pos. 2 Head Z

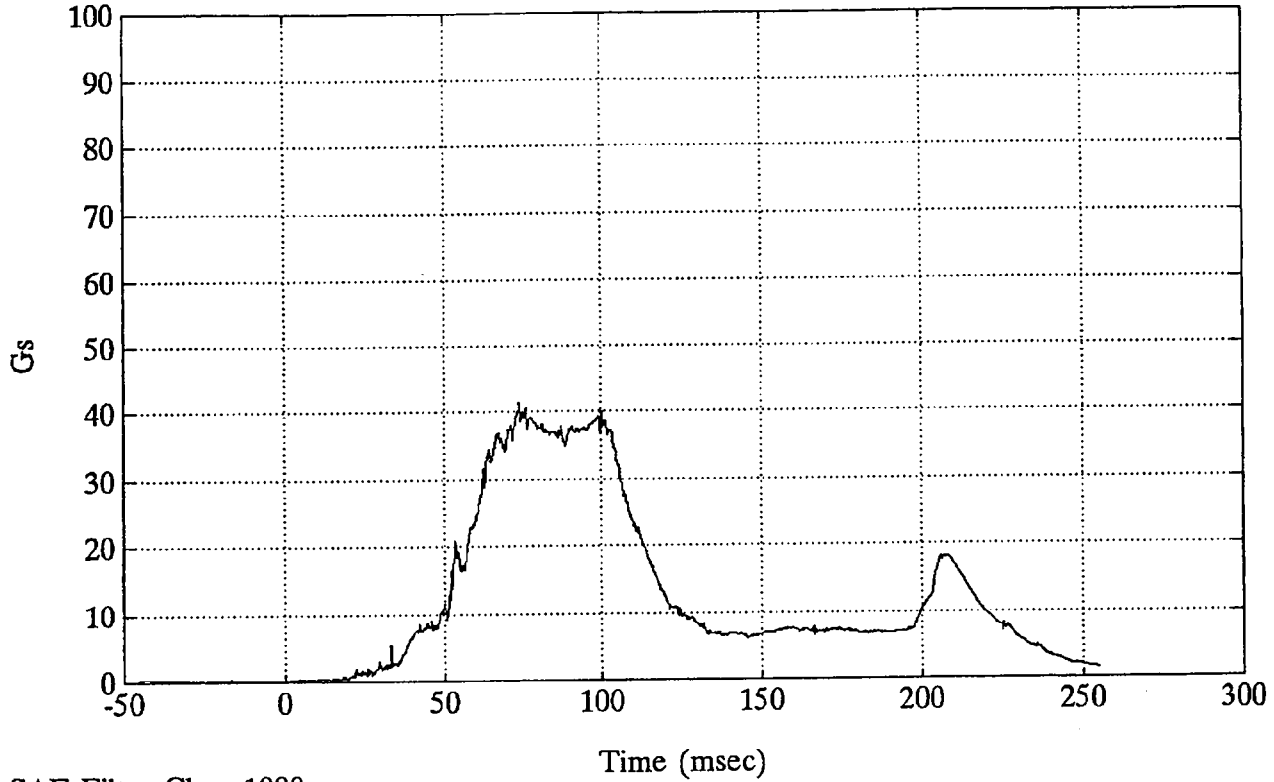
Max = 35.85 Gs @ 75.96 msec
Min = -0.70 Gs @ 18.24 msec



FMVSS 208 - 1993 SATURN SL

Pos. 2 Head Resultant

Max = 41.33 Gs @ 73.92 msec
Min = 0.05 Gs @ -6.84 msec

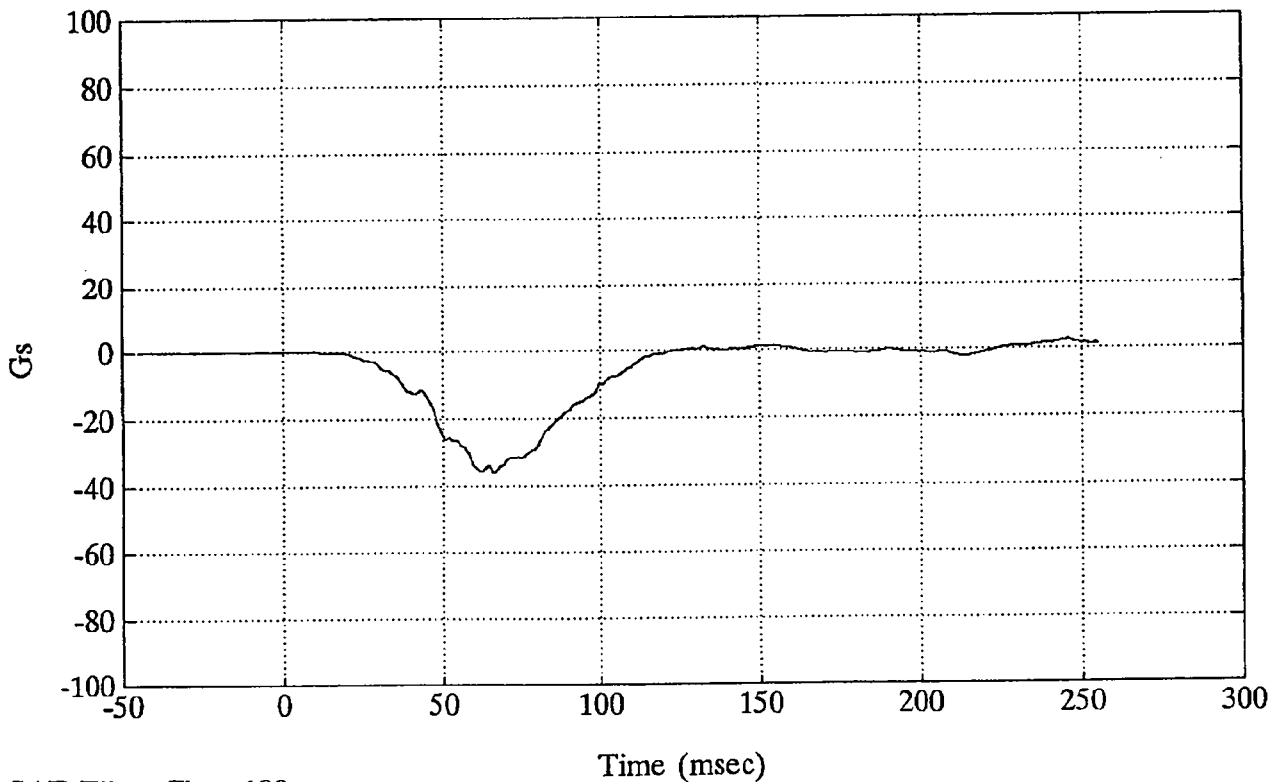


SAE Filter Class 1000

FMVSS 208 - 1993 SATURN SL

Pos. 2 Chest X

Max = 2.48 Gs @ 245.76 msec
Min = -36.18 Gs @ 66.12 msec

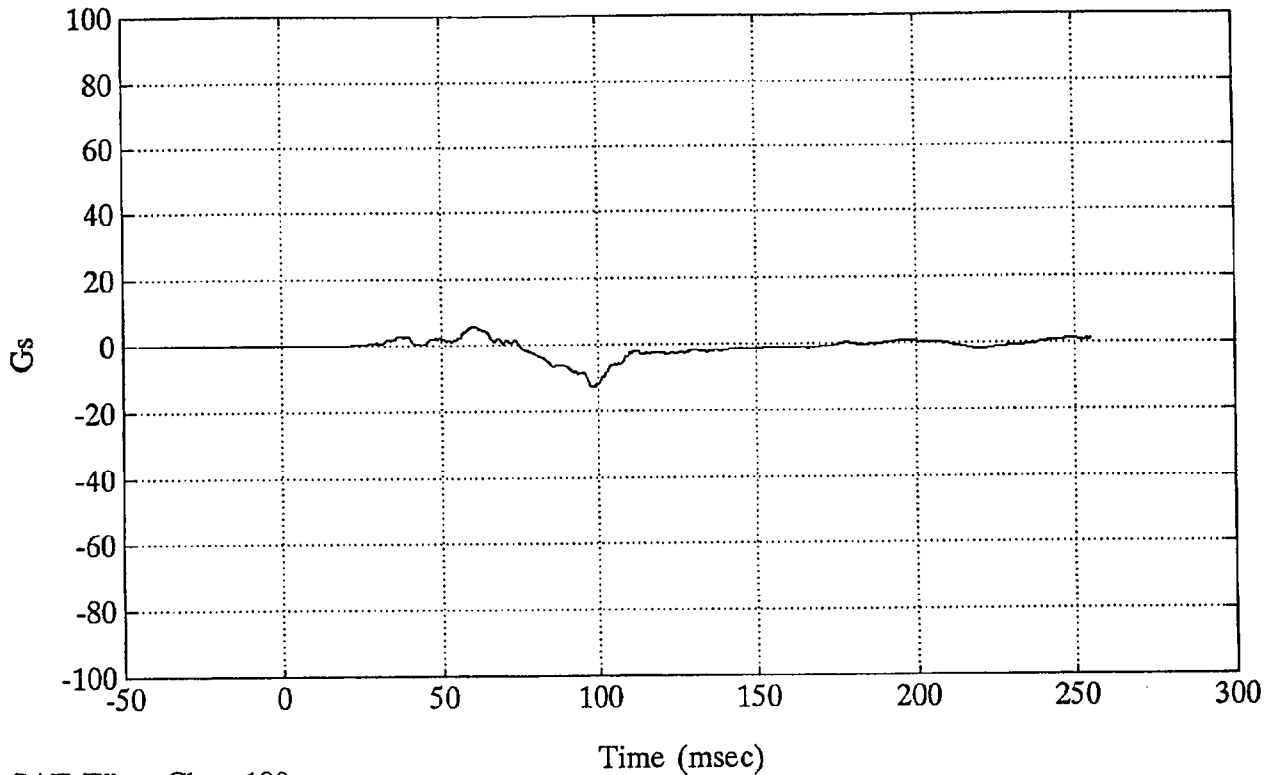


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 2 Chest Y

Max = 5.72 Gs @ 59.64 msec
Min = -12.58 Gs @ 98.52 msec

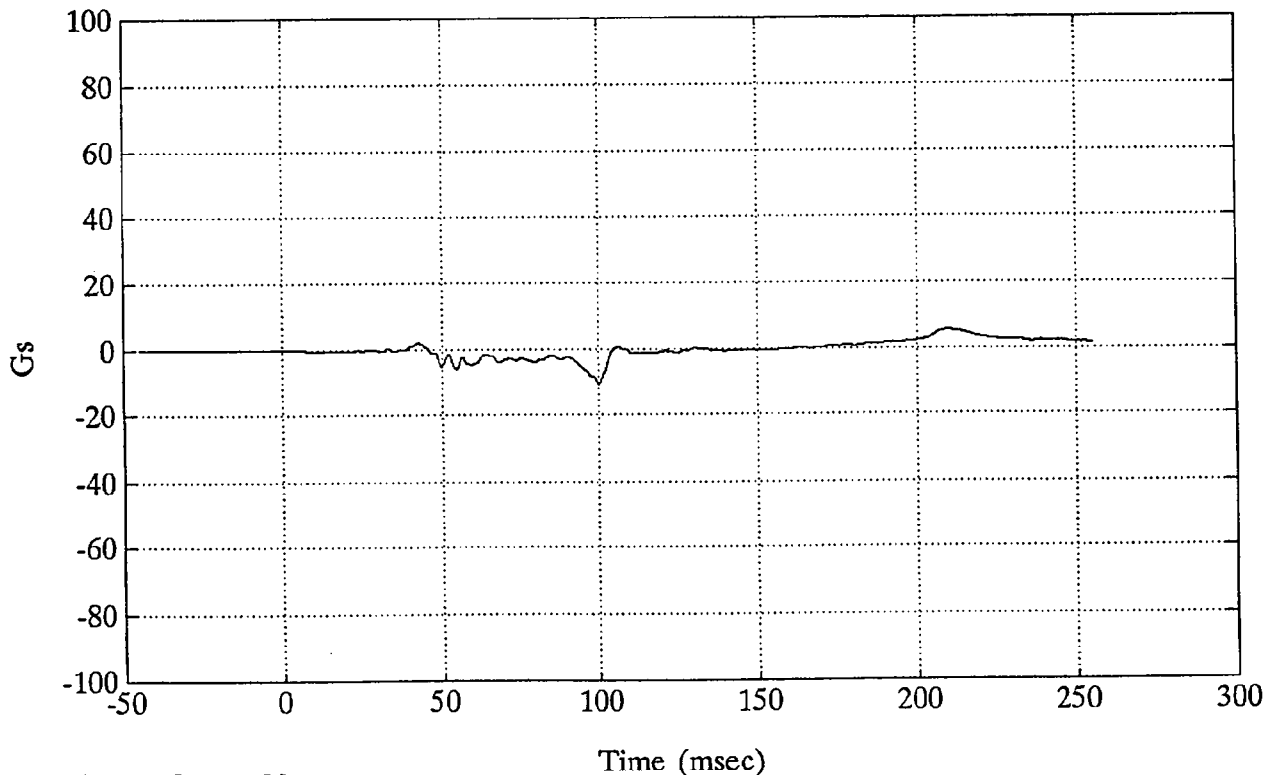


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 2 Chest Z

Max = 5.71 Gs @ 209.76 msec
Min = -10.55 Gs @ 99.96 msec

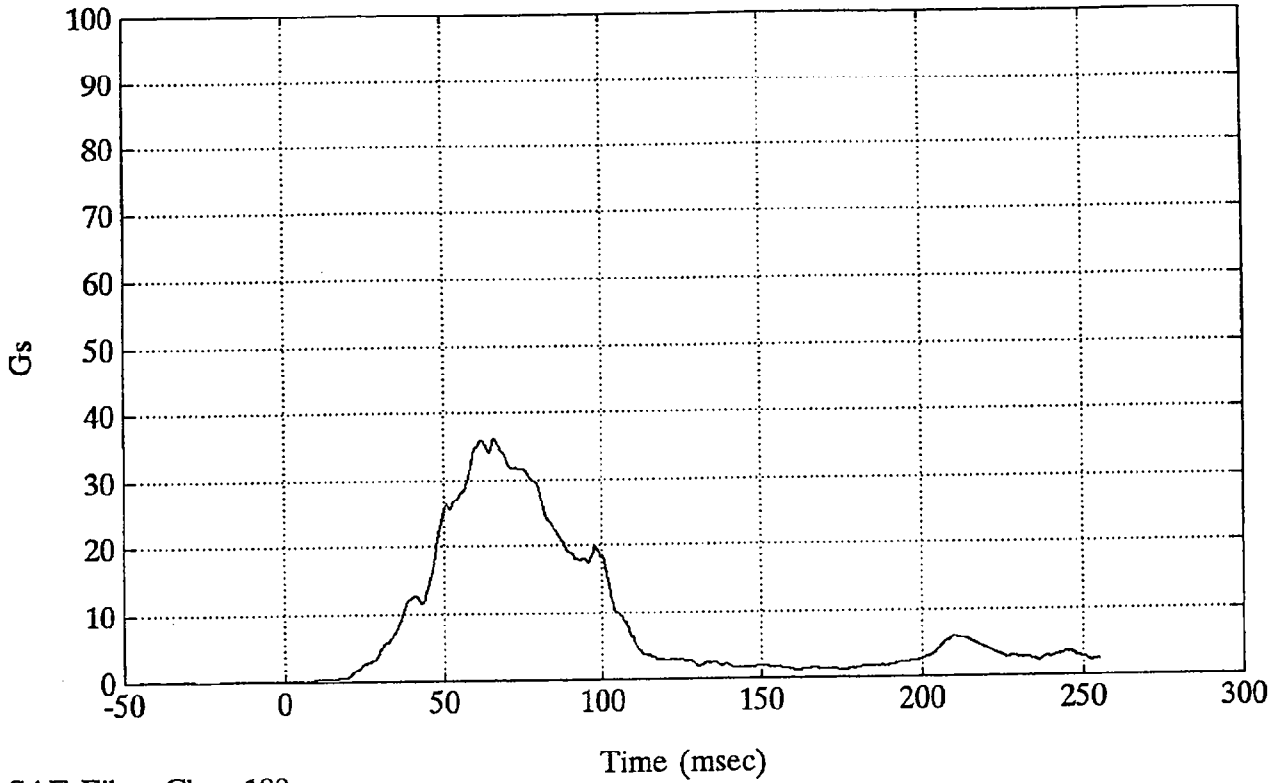


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 2 Chest Resultant

Max = 36.27 Gs @ 66.12 msec
Min = 0.01 Gs @ -23.52 msec

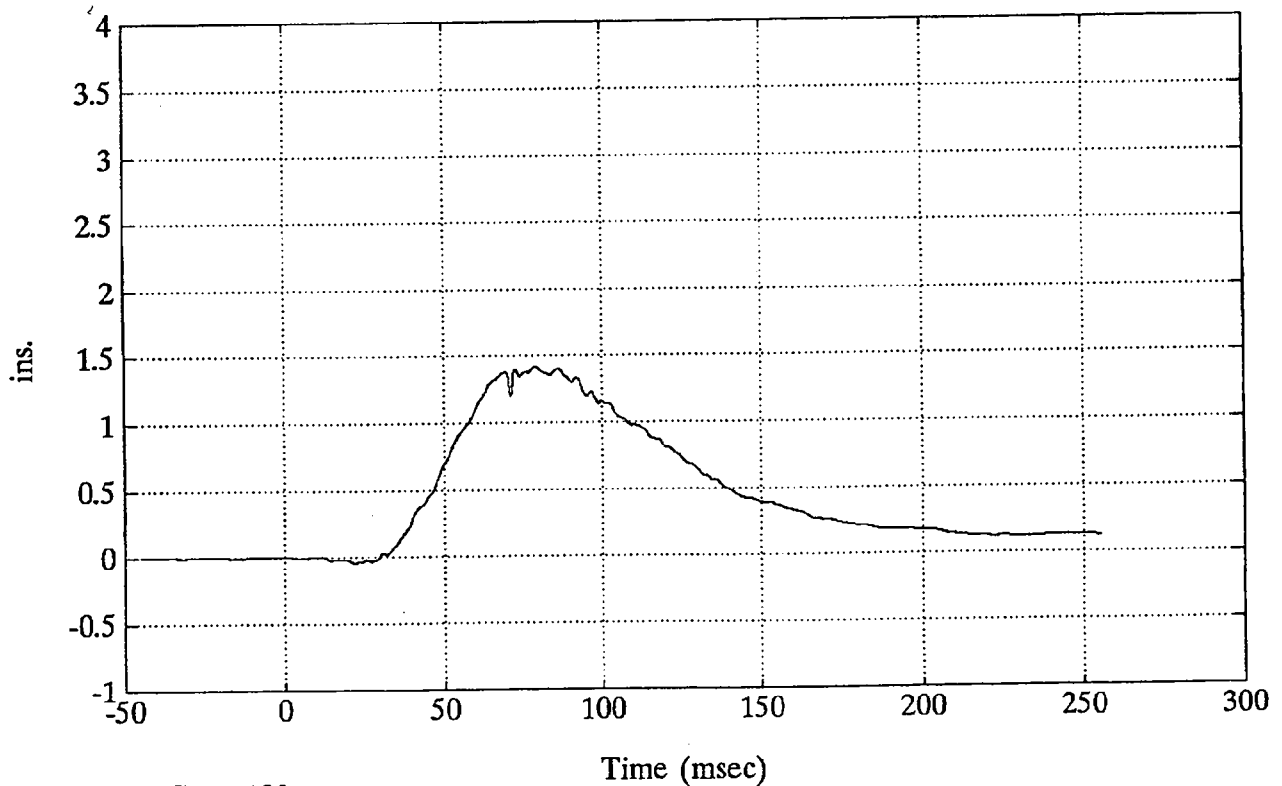


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 2 Chest Disp.

Max = 1.42 ins. @ 79.08 msec
Min = -0.04 ins. @ 22.08 msec

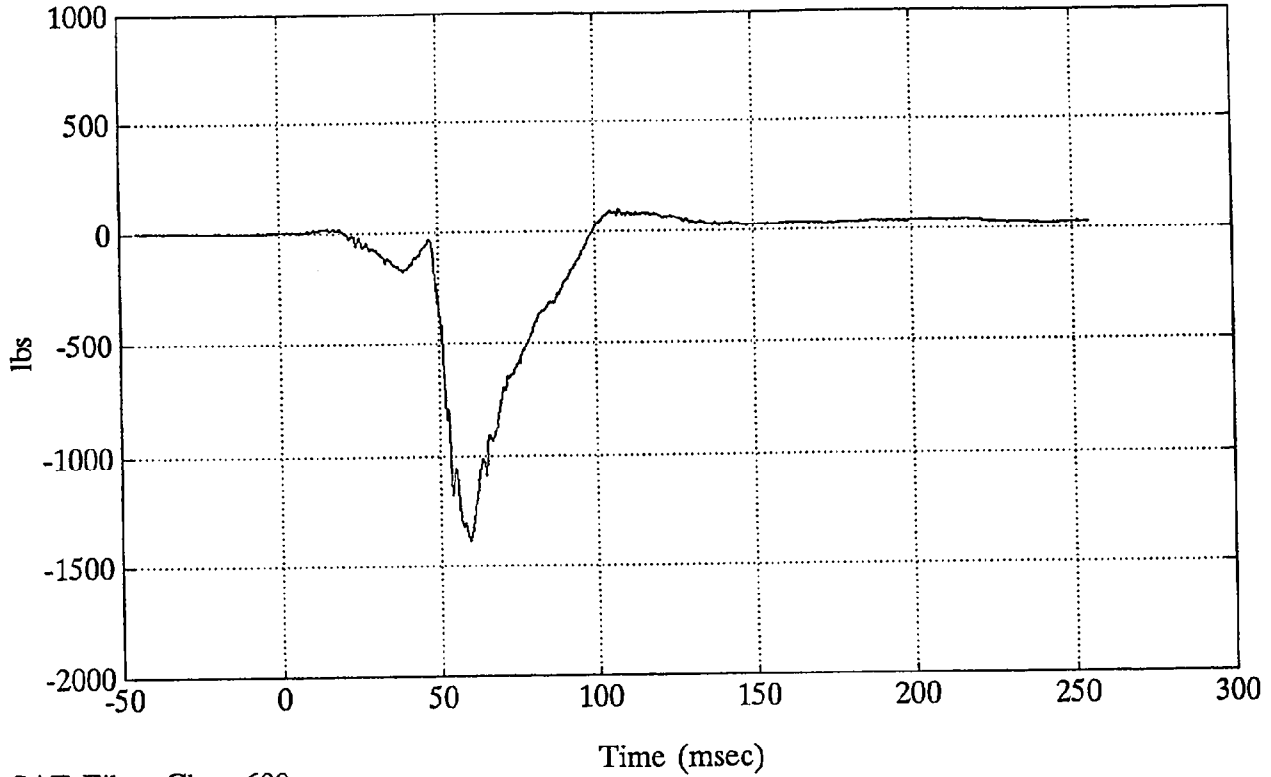


SAE Filter Class 180

FMVSS 208 - 1993 SATURN SL

Pos. 2 Left Femur

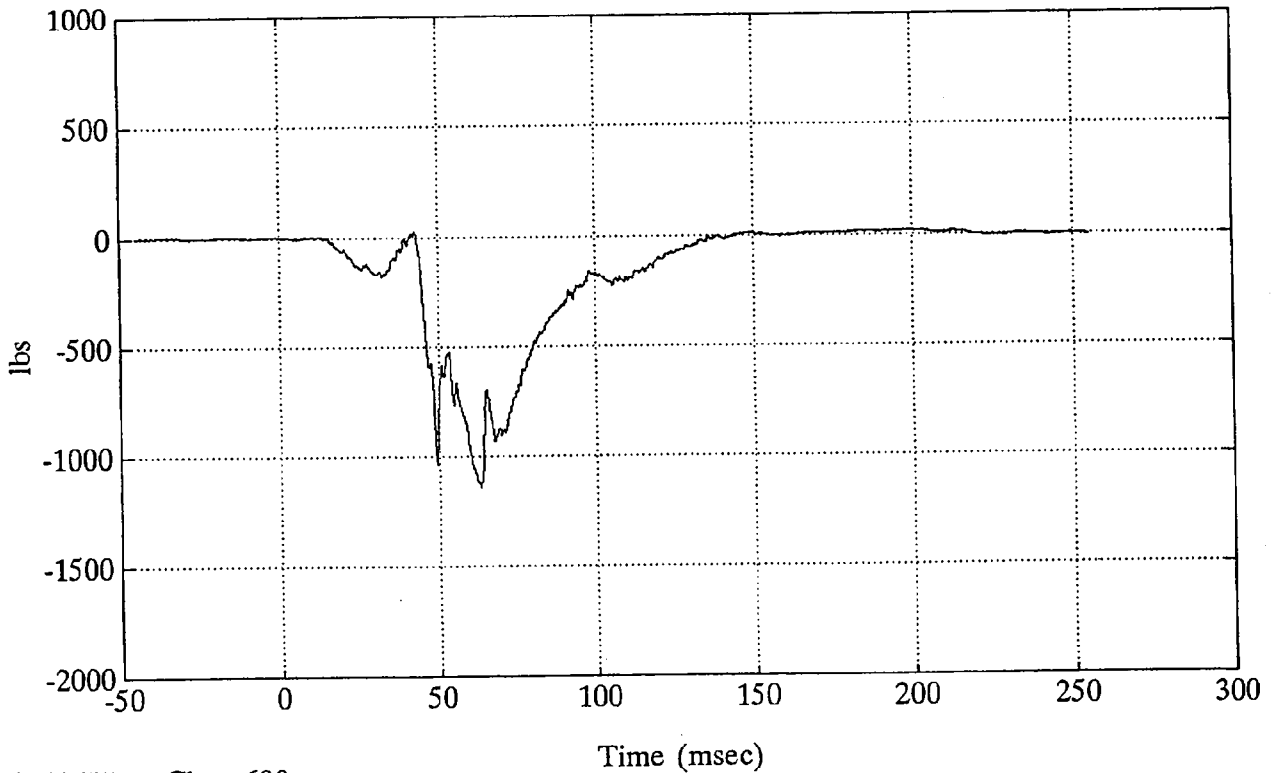
Max = 98.36 lbs @ 107.28 msec
Min = -1384.80 lbs @ 59.64 msec



FMVSS 208 - 1993 SATURN SL

Pos. 2 Right Femur

Max = 24.12 lbs @ 42.96 msec
Min = -1137.60 lbs @ 63.24 msec



Appendix C

VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

SAFETY BELTS: THEY'RE FOR EVERYONE

This section of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts. And it explains the Supplemental Inflatable Restraint, or "air bag" system.



⚠ CAUTION

Don't let anyone ride where they can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be injured or killed if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.

This figure lights up when you turn the key to "RUN" or "START" when your shoulder belt isn't buckled. After a few seconds a tone warning will sound if the belt still isn't buckled and the lap belt warning light will remain illuminated. It's the reminder to buckle up. In many areas of the United States and Canadian provinces, the law says to wear safety belts. Here's why: They work.

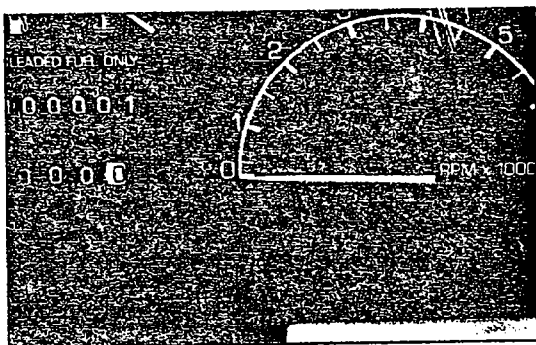
Safety Belts (Cont'd)

You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

After 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter . . . a lot!



Shoulder Belt Warning Light



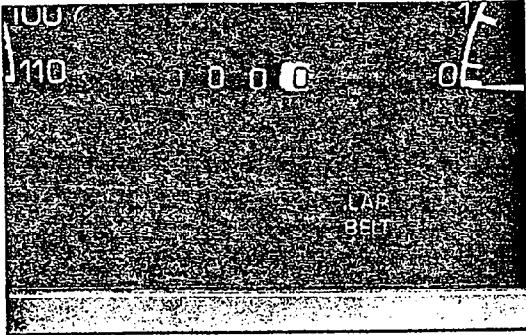
This light might stay on after you start your vehicle. If the light does not turn off when the driver's shoulder belt is buckled, it means that the shoulder belt system may not work properly in a crash. See the Index under "Motorized Shoulder Belt" for what to do.

CAUTION

If your shoulder belt light stays on after the driver's shoulder belt is buckled, it means that your shoulder belt system might not work properly in a crash. If the light stays on, use the temporary latch plate (to see how, see Index under "Motorized Shoulder Belt") and have your vehicle fixed.

The shoulder belt warning light will come on and stay on until the driver's shoulder belt is buckled.

Lap Belt Warning Light

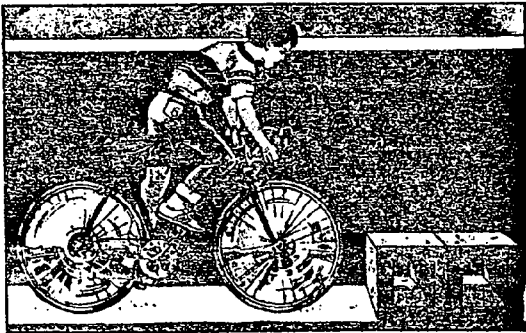


When the key is turned to "RUN" or "START," this light flashes for about ten seconds and then stays on until the driver's lap belt is buckled.

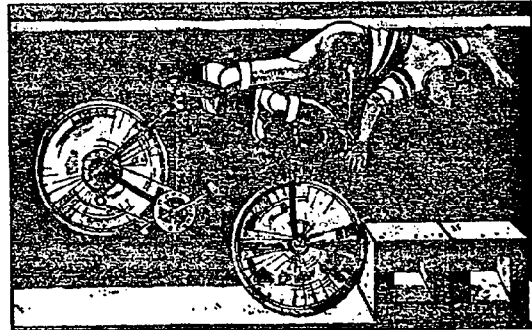
When the key is turned to "RUN" or "START," a tone will come on for about six seconds to remind people to fasten their lap belts, unless the driver's lap belt is buckled.

WHY SAFETY BELTS WORK

When you ride in or on anything, you go as fast as it goes.



For example, if the bike is going 10 mph (16 km/h), so is the child.

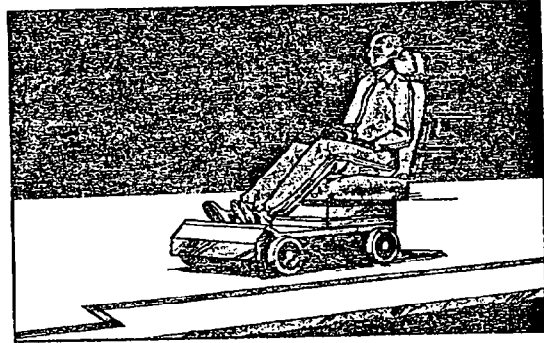


When the bike hits the block, it stops. But the child keeps going!

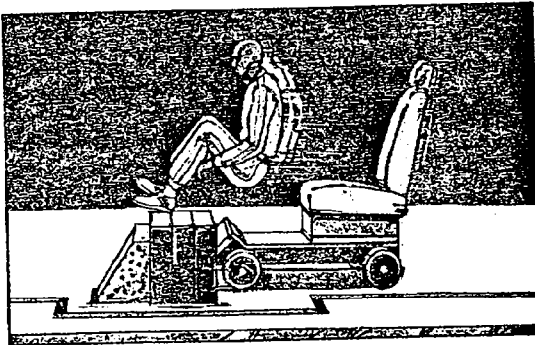
Why Safety Belts Work (Cont'd)



Take the simplest "car." Suppose it's just a seat on wheels.



Put someone on it.

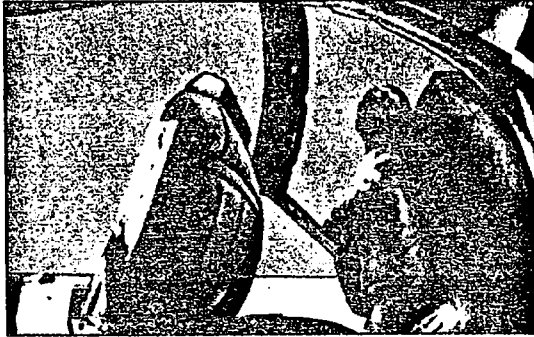


Get it up to speed. Then stop the "car." The rider doesn't stop.

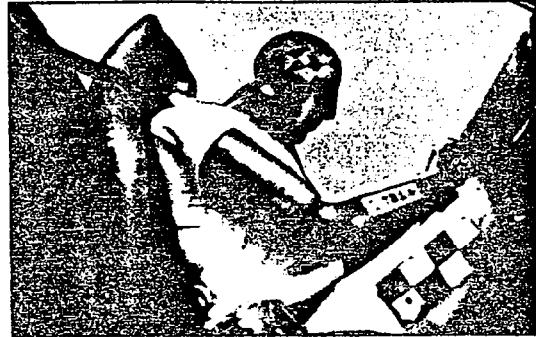


The person keeps going until stopped by something.
In a real vehicle, it could be the windshield ...

Why Safety Belts Work (Cont'd)



or the instrument panel . . .



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts — and the Answers

Q: Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?

A: You could be — whether you're wearing a safety belt or not. But you can easily unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you can unbuckle and get out, is much greater if you are wearing your belt.

Q: Why don't they just put in air bags so people won't have to wear safety belts?

A: "Air Bags," or Supplemental Inflatable Restraint systems, are in some vehicles today and will be in more of them in the future. But they are supplemental systems only — so they work with safety belts, not instead of them. Every "air bag" system ever offered for sale has required the use

of safety belts. Even if you're in a vehicle that has "air bags," you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

Q: If I'm a good driver, and I never drive far from home, why should I wear safety belts?

A: You may be an excellent driver, but if you're in an accident — even one that isn't your fault — you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speed of less than 40 mph (65 km/h).

Safety belts are for everyone.

HOW TO WEAR SAFETY BELTS PROPERLY

Adults

This section is for people of adult size only. If a child will be riding in your Saturn, see the section called "Children."

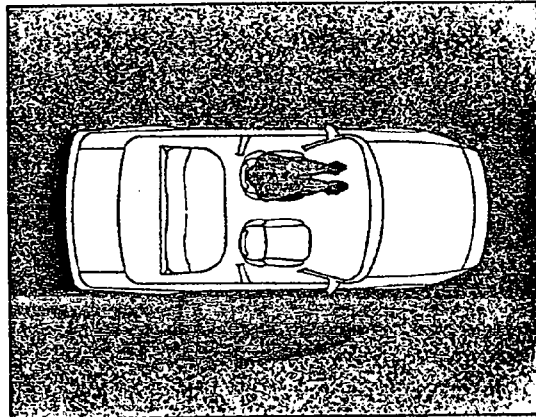
CAUTION

There are special things to know about safety belts and children. And there are different rules for babies and smaller children. If a child will be riding in your Saturn, see the section called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has. We'll start with the driver position.

Driver Position

This section describes the driver's restraint system.



Motorized Shoulder Belt and Manual Lap Belt

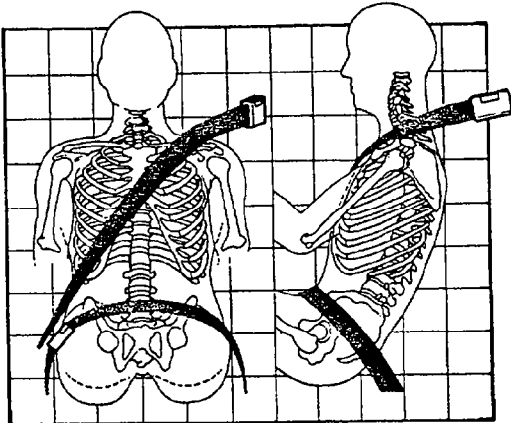


This shoulder belt is motorized. You don't have to buckle up the shoulder belt when you get into your car.



And you don't have to unbuckle the shoulder belt when you get out.

Motorized Shoulder Belt and Manual Lap Belt (Cont'd)



The shoulder belt moves automatically when you get in or out of your car.

⚠ CAUTION

Be careful that you are not in the way of the shoulder belt or hook when it is moving along the track.

Be especially careful to keep your head, hair, arms and hands clear of the shoulder belt track at all times. You could be injured.

The lap belt is not motorized. You must buckle the lap belt yourself when you get into the car. The motorized shoulder belt and the manual lap belt should always be worn together. Here's how to wear them properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see Index under "Seats") so you can sit up straight.
3. Pick up the latch plate and, in a single motion, pull the lap belt across you. Don't let it get twisted.
4. Push the latch plate into the buckle until it clicks. If the belt stops before it reaches the buckle, let it go back all the way and start again.



Motorized Shoulder Belt and Manual Lap Belt (Cont'd)



5. Feed the lap belt back into the retractor to tighten it.

The shoulder belt locks only if there's a sudden stop or a crash. The lap belt remains locked at all times.

You should always keep your motorized shoulder belt buckled. However, you may need to unbuckle it in an emergency.

To unbuckle the motorized shoulder belt, just push the button on the buckle.

⚠ CAUTION

If you aren't wearing your lap belt properly, you will increase your chance of severe or fatal injury in an accident. The shoulder belt alone may not properly restrain you. Always fasten your lap belt in addition to using the motorized shoulder belt.

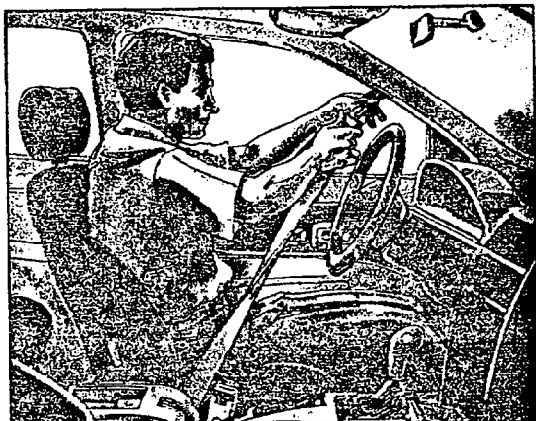
The lap belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.



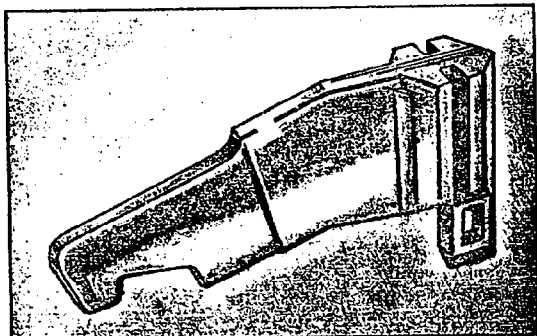
To reattach the motorized shoulder belt:

1. Close and lock the door.
2. Adjust the seat (to see how, see Index under "Seats") so you can sit up straight.

Motorized Shoulder Belt and Manual Lap Belt (Cont'd)

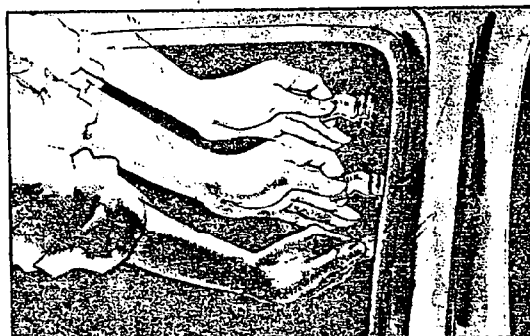


3. Pick up the buckle and pull the shoulder belt across you.
4. Push the buckle onto the latch plate until it clicks.



If the motorized shoulder belt doesn't move into position properly, you can still use the shoulder belt. Your Saturn has a temporary latch plate stowed in the glove box.

Place the plate into the end of the belt track on the door lock pillar. Push it down until you hear a click. Then try to pull it up to make sure it is secure.

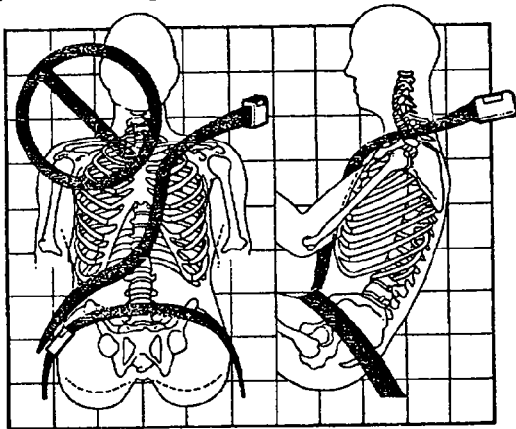


Then, release the shoulder belt and fasten it to the plate. Follow the instructions earlier in this section for unbuckling and reattaching the motorized shoulder belt.

You can now use the shoulder belt, but have the motorized system serviced by your Saturn retailer as soon as possible.

The shoulder belt track should be lubricated periodically. See the "Maintenance Schedule" Booklet.

Q: What's wrong with this?

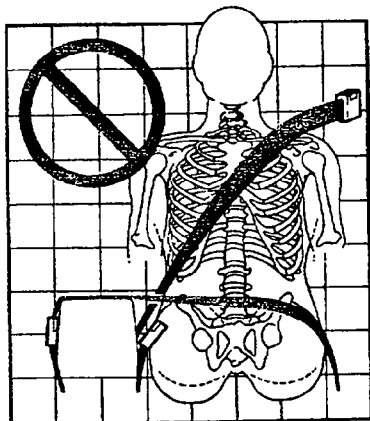


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

CAUTION

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could significantly increase injury. The shoulder belt should fit against your body.

Q: What's wrong with this?



A: The lap belt is buckled in the wrong place.

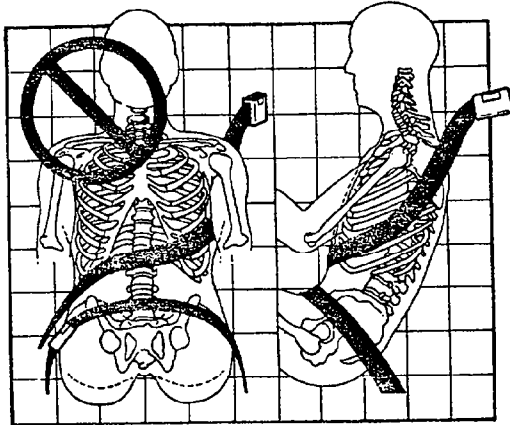
CAUTION

You can be seriously hurt if your lap belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

To unlatch the lap belt, just push the button on the buckle. The lap belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

Q: What's wrong with this?

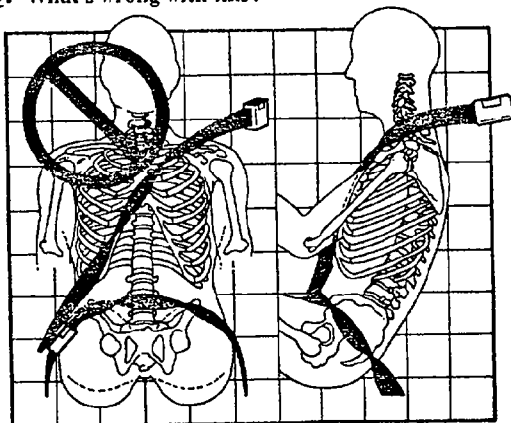


A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

CAUTION

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

Q: What's wrong with this?



A: The belt is twisted across the body.

CAUTION

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your retailer to fix it.

**SUPPLEMENTAL INFLATABLE
RESTRAINT — “AIR BAG”**

This section explains the driver's air bag. Here are the most important things to know:

⚠ CAUTION

Even with an air bag, if you're not wearing a safety belt and you're in a crash, your injuries may be much worse. Air bags are not designed to inflate in rollovers or in rear, side, or low speed frontal crashes. You need to wear your safety belt to reduce the chance of hitting things inside the vehicle or being ejected from it. Always wear your safety belt, even with an air bag.

⚠ CAUTION

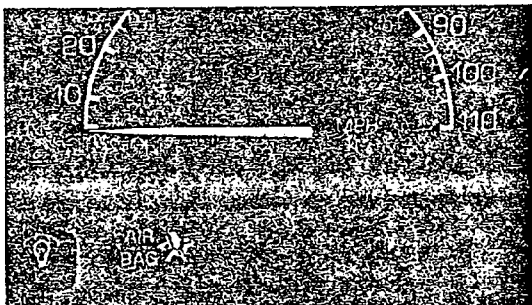
Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, it could seriously injure you. Safety belts help keep you in position for air bag inflation in a crash. Always wear your safety belt, even with an air bag, and sit as far back as you can while still maintaining control of your vehicle.

Air Bag System Light

There is an air bag readiness light on the instrument panel. The system checks itself and the light tells you if there is a problem.

You will see the light flash when you turn your ignition to “RUN” or “START.”

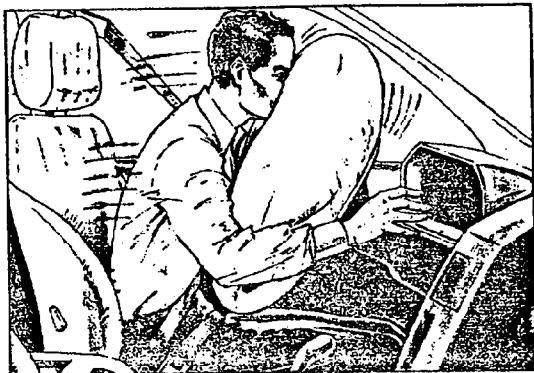
Then the light should go out, which means the system is ready.



⚠ CAUTION

If the air bag readiness light doesn't come on when you start your vehicle, or stays on, or comes on when you are driving, your air bag system may not work properly. Have your vehicle serviced right away.

How the Air Bag System Works



Q: Where is the air bag?

A: The driver's air bag is in the middle of the steering wheel.

Q: When is an air bag expected to inflate?

A: The air bag will only inflate if the velocity of the impact is above the designed threshold level.

Air bags are designed **not** to inflate in a crash unless inflation would be likely to reduce the risk of serious injury. An air bag inflates with great speed and force, and is itself capable of causing injuries to occupants who are too close to it when it inflates. This is why the air bag is designed not to deploy in side, rear, and low-speed frontal crashes.

Q: What makes an air bag inflate?

A: In a frontal or near-frontal impact of sufficient severity, sensors in your vehicle detect how quickly your vehicle slows down. These sensors send an electrical signal that triggers a chemical reaction in the inflator module. This reaction produces nitrogen gas which inflates a cloth bag packed inside the steering wheel. Nitrogen makes up almost 80% of the air we breath and is harmless. The bag inflates much faster than the blink of an eye.

When impacting straight into a wall that does not move or deform, the threshold level for Saturn vehicles is between 11 and 15 mph (17-24 km).

In addition, this threshold velocity will be considerably higher if the vehicle strikes an object such as a parked car which will move and deform on impact. The air bag is also not designed to inflate in rollovers, side impacts, or rear impacts where the inflation would provide no occupant protection benefit.

In any particular crash, the determination of whether the air bag should have inflated cannot be based solely on the level of damage on the vehicle(s). Inflation is determined by the angle of the impact and the vehicle's deceleration, of which vehicle damage is only one indication. Repair cost is not a good indicator of whether an air bag should have deployed.

Q: How does an air bag restrain?

A: In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel. The air bag supplements the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant gradually. But, air bags would not provide protection in many types of collisions, including rollovers, rear, and side impacts, primarily because an occupant's motion is not toward the air bag. Air bags should never be regarded as anything more than a supplement to safety belt protection in these moderate to severe frontal and near-frontal collisions.

How the Air Bag System Works (Cont'd)

Q: What will you see after an air bag inflates?

A: After the air bag has deployed in a crash, it quickly deflates and sometimes there are small amounts of smoke seen coming from the deflated air bag. Some components inside the air bag module may be hot for a short time, but the bag itself will not be hot to touch. As the bag deflates, small particles, consisting mainly of corn starch and by-products of the chemical reaction that inflated the bag, are vented into the passenger compartment. These airborne particles look like smoke, and may accumulate as residue on and around the air bag. Some people have reported watery eyes and mild coughing after their bags inflated, but these conditions have been temporary.

⚠ CAUTION

- Don't attach anything to the steering wheel pad. It might injure the driver if the air bag inflates.
- The air bag is designed to inflate only once. After it inflates you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to protect you in another crash. A new system will include the air bag module and possibly other parts. The 1993 Saturn Service Manual has information about the need to replace other parts.
- Let only qualified technicians work on your air bag system. Improper service could result in accidental deployment of your air bag, or can mean your air bag system won't work properly. See your retailer for service.

Servicing Your Saturn With the Air Bag System

Please tell or remind anyone who works on your Saturn that it has an air bag. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your car. The air bag system does not need regular maintenance. Your Saturn retailer and the 1993 Saturn Service Manual have information about the air bag system, including repair and disposal.

⚠ CAUTION

For up to 10 minutes after the ignition is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Be sure to follow proper service procedures.

Servicing Your Saturn With the Air Bag System (Cont'd)

When electrical work is done under the hood or inside the car, the ignition should be in "LOCK" if possible.

Avoid wires wrapped with yellow tape, or yellow connectors. They are probably part of the air bag system.

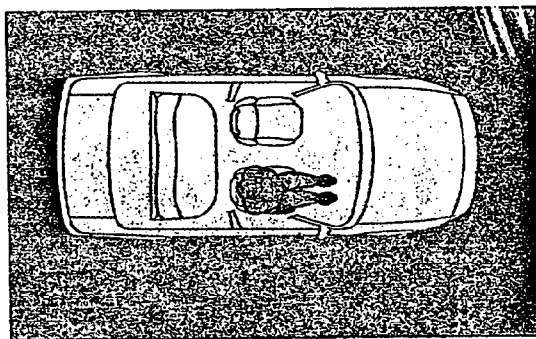
But if the ignition has to be on for electrical work, or if the steering column is to be disassembled, the air bag system must be disconnected. To do this:

- Disconnect the yellow connector at the base of the steering column.
- Remove the air bag fuse (see Index under "Fuses").

NOTE: Remove both the fuse and connector because the air bag can inflate up to 10 minutes after the power is terminated (see Caution on page 41).

When the work is complete, if the air bag system was disconnected, be sure to reattach everything and replace the fuse before turning the ignition on. When you turn the ignition key on, be sure you see the air bag light on the instrument panel. If you don't see this light flash and then go out as usual, have your air bag system repaired.

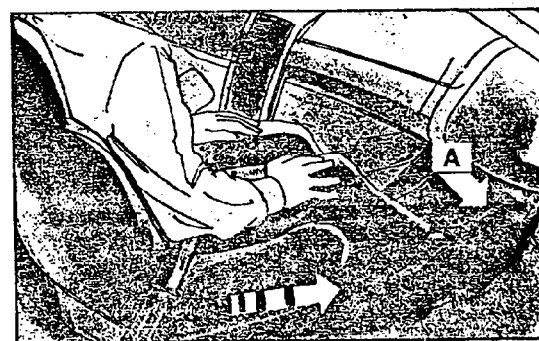
Right Front Passenger Position



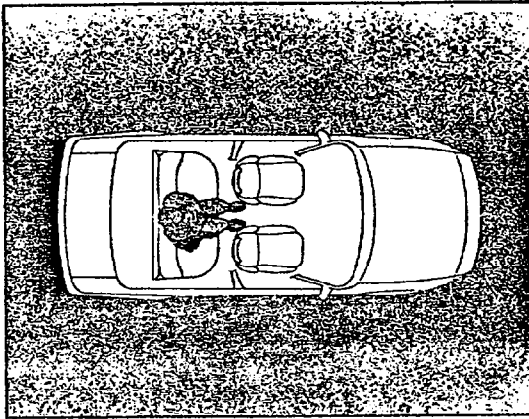
The right front passenger's safety belts work the same way as the driver's safety belts. See "Driver Position," earlier in this section.

When the lap belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

Adjust the seat (to see how, see Index under "Seats") so you can sit up straight. Move your seat far enough forward that your feet touch the part of the car that is called the "toeboard" (A). That way you'd be less likely to slide under the lap belt in a crash.



Center Passenger Position



If your vehicle has a rear bench seat, someone can sit in the center position.



In the center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.

To make the belt shorter, pull its free end as shown until the belt is snug.



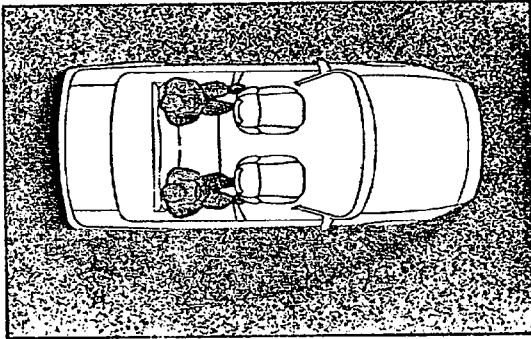
Buckle, position and release it the same way as a front seat lap belt. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.

Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't wearing safety belts can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

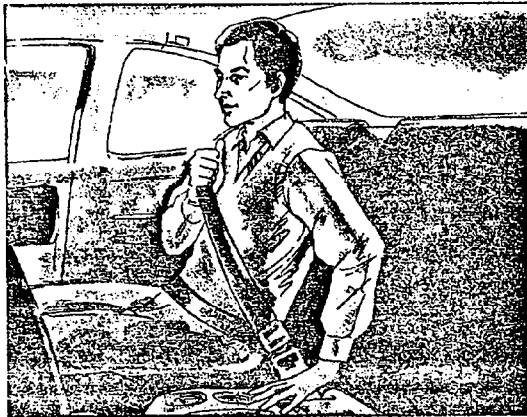
Rear Seat Outside Passenger Positions



The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.


1. Pick up the latch plate and pull it across you. Don't let it get twisted.

2. Push the latch plate into the buckle until it clicks. If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.



The lap part of the belt should be low and snug below the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces. The safety belt locks only if there's a sudden stop or a crash.

3. Pull up on the shoulder belt to tighten the lap belt.

 CAUTION
<p>You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.</p>

Rear Seat Outside Passenger Positions (Cont'd)



4. To unlatch the belt, just push the button on the buckle.

Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear a lap-shoulder belt if at all possible. The lap portion should be worn as low as possible throughout the pregnancy.

The best way to protect the fetus is to protect the mother. when a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. for pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

