

V2374

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212-TRC-96-005
301-TRC-96-005

Vehicle Safety Compliance Testing
for Occupant Crash Protection,
Windshield Mounting, Windshield Zone Intrusion,
and Fuel System Integrity

Saab Automobile AB
1996 Saab 900S
3-door hatchback
NHTSA Number: CT0504
TRC Test Number: 960126

Transportation Research Center Inc.
10820 State Route 347
East Liberty, OH 43319



February 16, 1996

Final Report

Prepared For:
U.S. Department of Transportation
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Washington, DC 20590

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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1996 Saab 900S 3-door hatchback, NHTSA No. CT0504, at Transportation Research Center Inc. on January 26, 1996. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS 208, "Occupant Crash Protection"; 212, "Windshield Mounting"; 219 (partial), "Windshield Zone Intrusion"; and 301 "Fuel System Integrity." The barrier impact velocity was 29.3 mph. The vehicle's maximum static crush was 18.9 inches. The ambient temperature was 72° F. The driver's Head Injury Criteria (HIC) was 277. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 44.4 g. The driver's left and right femur maximum axial forces were 1462 pounds and 1416 pounds, respectively. The passenger's HIC was 456. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 49.7 g. The passenger's left and right femur maximum axial forces were 1489 pounds and 1063 pounds, respectively.			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 exactly. For other exact conversions and more detailed tables, see NIST Misc. Publ. 286, Units of Weight and Measures, Price \$2.25, SD Catalog No. C13.10-286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

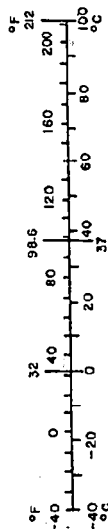


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Section 1.0

Purpose and Test Procedure

Purpose

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standards (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-93-D-01089. The purpose of this test was to determine if the subject vehicle, a 1996 Saab 900S 3-door hatchback, NHTSA No. CT0504, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," in the flat frontal barrier impact mode.

Test Procedure

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

The test vehicle was instrumented with seven (7) accelerometers to measure longitudinal axis accelerations and one (1) accelerometer to measure vertical axis acceleration. The vehicle's specified impact velocity range was 28.9 to 29.9 mph. The vehicle impacted a flat frontal barrier.

The test vehicle contained two (2) Part 572 B 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedure specified in Appendix B of the Laboratory Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces.

The twenty-four (24) data channels were digitally sampled at 12,500 samples per second and processed per Sections 11.13 through 11.15 of the Laboratory Test Procedure.

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

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 208, 212, 219 (partial) and 301 data are presented in Section 3.0. The vehicle, occupant, and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the manufacturer's vehicle information.

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This flat frontal barrier test was conducted at TRC on January 26, 1996.

The test vehicle, a 1996 Saab 900S 3-door hatchback, NHTSA No. CT0504, appeared to comply with the performance requirements of FMVSS 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the front outboard designated seating positions. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with airbags at the driver's and right front passenger's seating position. The vehicle's test weight was 3386 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 18.9 inches.

The driver's HIC was 277. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 44.4 g. The driver's left and right femur maximum compressive forces were 1462 pounds and 1416 pounds, respectively.

The right front passenger's HIC was 456. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 49.7 g. The right front passenger's left and right femur maximum compressive forces were 1489 pounds and 1063 pounds, respectively.

There was no loss of windshield periphery retention and no penetration through the windshield. Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test or during any portion of the static rollover test.

Table 1 Crash Test Summary

NHTSA number:	CT0504
Test type:	Frontal barrier impact
Test date:	01/26/96
Test time:	1232
Ambient temperature at impact area:	72° F
Vehicle year/make/ model/body style:	1996/Saab/900S/3-door hatchback
Vehicle test weight:	3386 lb
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	29.3 mph
Secondary:	29.3 mph
Maximum static crush:	18.9 in
Average rebound:	31.0 in
Number of cameras:	
Real-time:	2
High-speed:	14
Door opening data:	
Left-front:	Easy
Right-front:	Easy

¹ With respect to tow track centerline.

² Speed trap measurement ($\pm .05$ mph accuracy)

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #353</u>	<u>Passenger #354</u>
Type:	Part 572 B	Part 572 B
Location:	Left front	Right front
Restraint:	Airbag	Airbag
Number of data channels:	8	8
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag, sun visor, and head restraint	Airbag and head restraint
Chest:	Airbag	Airbag
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1996/Saab/900S/3-door hatchback
Color: Gold
VIN: YS3DD35B0T2012166
NHTSA number: CT0504
Engine data:
Placement: Transverse/Lateral
Cylinders: 4
Displacement: 2.3 liters
Transmission data: 5 speed, X manual, ___automatic, ___overdrive
Final drive: X fwd, ___rwd, ___4wd
Date vehicle received: 01/17/96
Odometer reading: 24
Dealer's name and address: Harmon Cadillac - Saab - Alfa
530 North Maint St.
Dayton, OH 45405

Accessories:

Power steering	Yes	Automatic transmission	No
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	No
Power windows	Yes	Telescoping steering wheel	Yes
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Power door locks	Yes	Other:	None

Certification data from vehicle's label:

Vehicle manufactured by: Saab Automobile AB
Date of manufacture: 10/95
VIN: YS3DD35B0T2012166
GVWR: 3870 lb
GAWR: Front: 2272 lb
Rear: 1930 lb

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P195/60VR15

Spare tire: Space saver

Type of front seats: Bucket

Tire & capacity data from vehicle's label:

Recommended tire size: P195/60VR15

Recommended cold tire pressure:

Front: 35 psi

Rear: 35 psi

Designated Seating Capacity:

Front 2

Rear 3

Total 5

Vehicle Capacity Weight: 880 lbs.

Test vehicle attitudes:

Delivered attitude: LF: 26.6 in. RF: 26.6 in LR: 26.8 in RR: 26.8 in

Fully loaded attitude: LF: 25.7 in RF: 25.6 in LR: 25.6 in RR: 25.6 in

Pre-test attitude: LF: 25.9 in RF: 26.0 in LR: 25.8 in RR: 25.8 in

Table 2. Test Vehicle Information, Cont'd.

Weight of test vehicle as received (with maximum fluids):

Right front	926	lb	Right rear	538	lb
Left front	919	lb	Left rear	565	lb
Total front weight	1845	lb	(62.6% of total vehicle weight)		
Total rear weight	1103	lb	(37.4% of total vehicle weight)		
Total delivered weight	2948	lb			

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (2948 lb)

VCW¹ = Vehicle Capacity Weight = 880 lb

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 130

Target test weight = UDW + RCLW¹ + (Number of Hybrid II dummies x 164 lb per dummy)

Target test weight = 2948 + 130 + 328 = 3406 lb

Weight of test vehicle with required dummies and 110 lb of cargo weight:

Right front	1014	lb	Right rear	653	lb
Left front	992	lb	Left rear	727	lb
Total front weight	2006	lb	(59.2% of total vehicle weight)		
Total rear weight	1380	lb	(40.8% of total vehicle weight)		
Total test weight	3386	lb	(0.6% under target test weight)		

Weight of ballast secured in vehicle cargo area: 100 lb

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 41.7 in

Vehicle Wheelbase: 102.4 in

¹ From vehicle's tire load label.

Table 3 Post-Impact Data

Test number: 960126
NHTSA number: CT0504
Test date: 01/26/96
Test time: 1232
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature
at impact area: 72° F
Temperature in
occupant compartment: 72° F
Impact velocity:
Primary: 29.3 mph
Secondary: 29.3 mph
Specified range: 28.9 to 29.9 mph

Distance from vehicle to barrier:

Entering velocity trap: 14.0 in
Exiting velocity trap: 2.0 in

Test vehicle static crush:

Overall length of test vehicle:

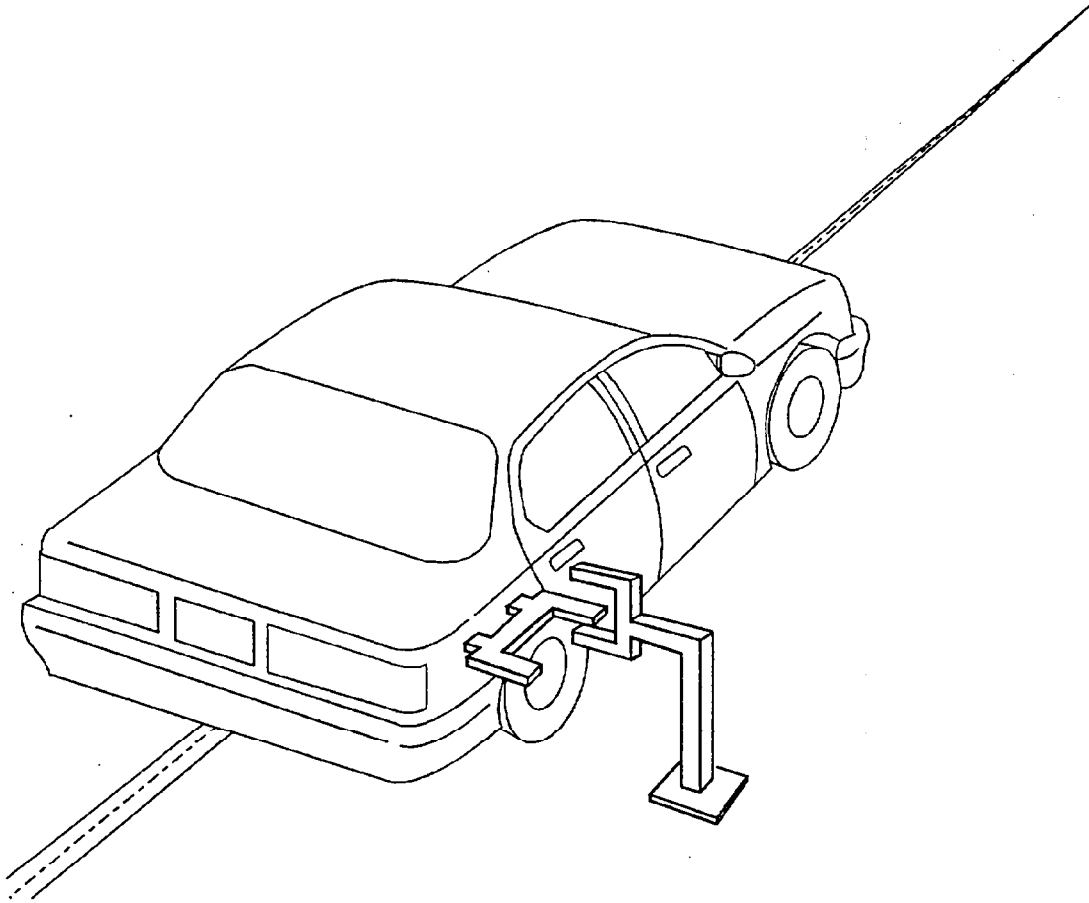
Pre-test:	L:	178.4 in	C:	183.4 in	R:	178.8 in
Post-test:	L:	161.5 in	C:	164.5 in	R:	161.2 in
Total crush:	L:	16.9 in	C:	18.9 in	R:	17.6 in
Average crush:		17.8 in				

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	34.5 in	C:	28.9 in	R:	29.5 in
Average rebound:		31.0 in				

Figure 1 Impact Velocity Measurement System



The final vane clears emitter/receiver two inches before impact.

The vanes have a one-foot spacing.

Figure 2 Accident Investigation Division Data for 30 mph Frontal Barrier Impact

NHTSA number: CT0504
 Test date: 01/26/96
 Vehicle year/make/
 model/body style: 1996/Saab/900S/3-door hatchback
 Vehicle size category: Mid-size
 VIN: YS3DD35B0T2012166
 Build date: 10/95
 Test weight: 3386 lb
 Vehicle wheelbase: 102.4 in
 Maximum width: 67.8 in
 Front overhang: 40.0 in

Collision Deformation

Classification (CDC) Code: 12FDEW2

Crush depth
 measurements:

C1:	16.9 in
C2:	18.6 in
C3:	18.5 in
C4:	18.6 in
C5:	18.7 in
C6:	17.6 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged
 region:

L:	52.0 in
----	---------

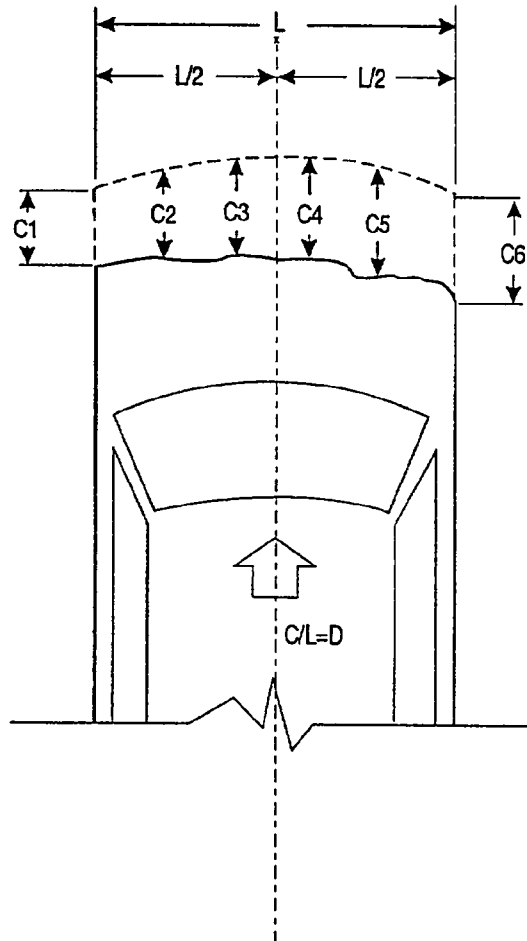


Table 4 Post-test Airbag Data

NHTSA number: CT0504
Test date: 01/26/96
Technician: Markusic
Vehicle year/make/
model/body style: 1996/Saab/900S/3-door hatchback

A. Number of airbag vent holes:

Driver: 2
Passenger: NA

B. Size of airbag vent holes:

Driver: 1.0 in dia.
Passenger: NA

C. Total airbag vent area:

Driver: 1.6 in²
Passenger: NA

D. Deflated airbag length and width dimensions or, if round, diameter

Driver:	Length	NA
	Width	NA
	Diameter	26.2 in
Passenger:	Length:	32.0 in
	Width:	32.0 in
	Diameter:	NA

Table 4 Post-test Airbag Data, Cont'd.

E. Is the airbag tethered?

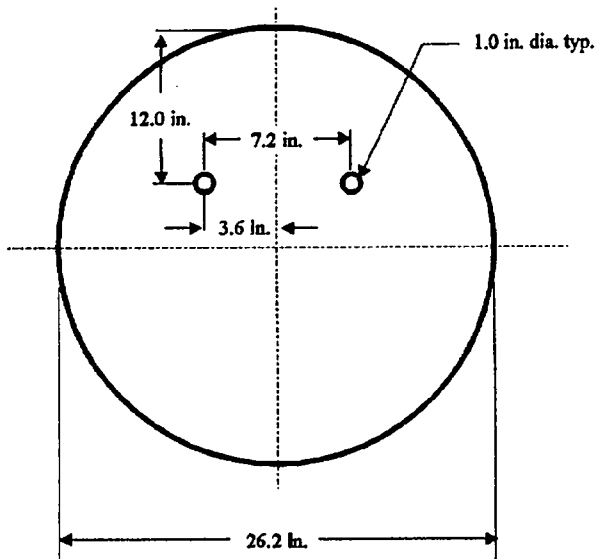
Driver: Yes

If yes, record length of tether: 3 tethers, 13 inches each

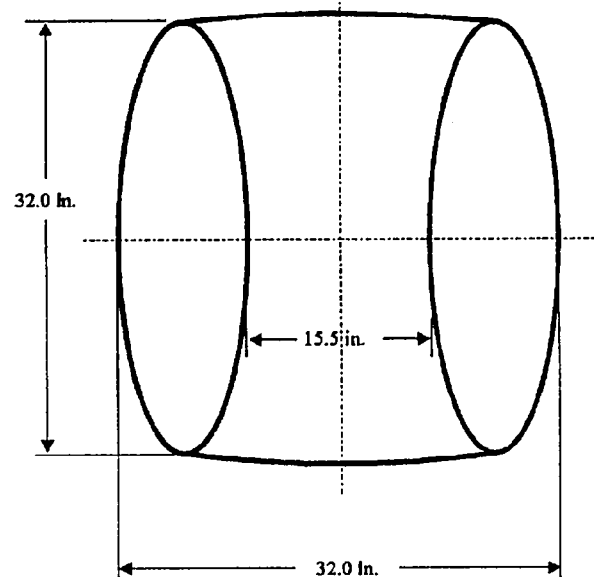
Passenger: No

If yes, record length of tether: NA

Driver's airbag:



Passenger's airbag:



F. Airbag and gas generator part numbers and manufacturer's names.

Driver: Manufacturer: Temic

Airbag: 12175252680321

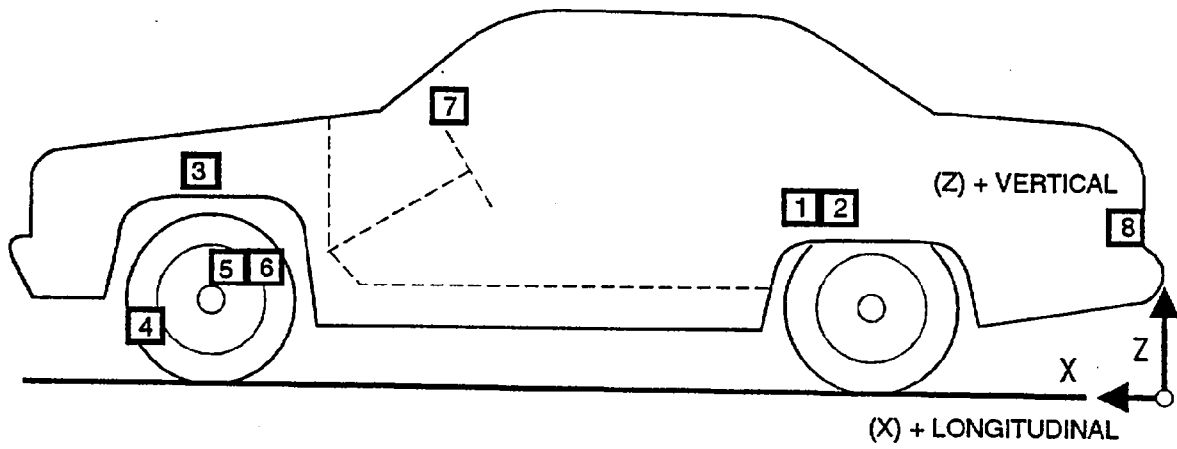
Inflator: 1217615279401422

Passenger: Manufacturer: Autoliv

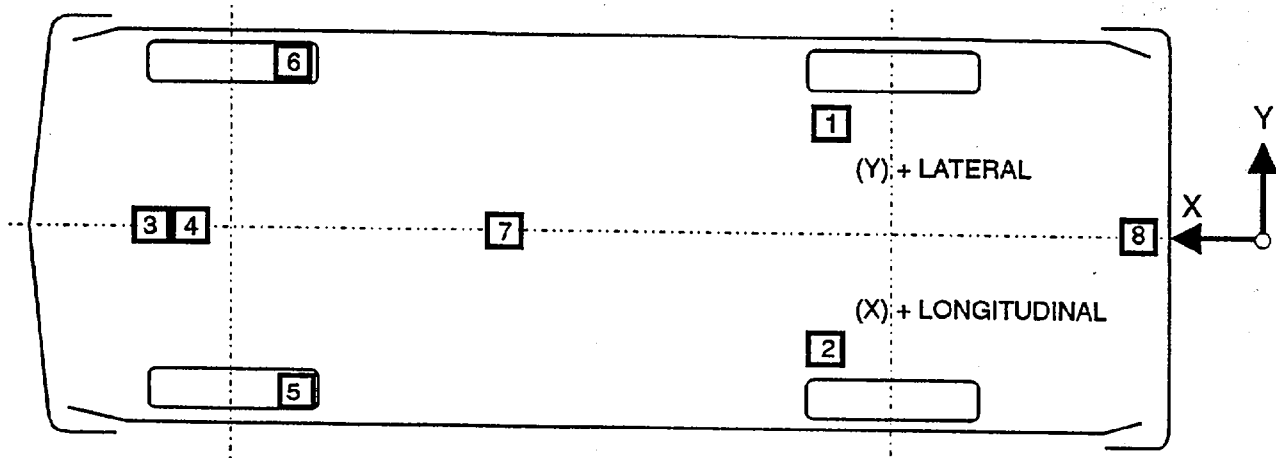
Airbag: 10258952970330

Inflator: 025952980298

Figure 3 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 960126 No. LOCATION	X		Y		Z		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	PRE	POST								
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	66.0 in	66.0 in	26.0 in	26.0 in	11.8 in	11.8 in	1.2 g	@ 116.0 ms	28.4 g	@ 51.0 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	66.7 in	66.7 in	-26.0 in	-26.0 in	11.4 in	11.8 in	0.6 g	@ 151.5 ms	32.4 g	@ 51.4 ms
3 ENGINE TOP LONGITUDINAL	151.9 in	143.0 in	-5.0 in	-5.2 in	31.7 in	31.7 in	44.3 g	@ 55.4 ms	126.8 g	@ 39.8 ms
4 ENGINE BOTTOM LONGITUDINAL	146.5 in	142.6 in	-8.5 in	-8.7 in	5.2 in	3.2 in	45.7 g	@ 52.0 ms	123.3 g	@ 37.8 ms
5 RIGHT BRAKE CALIPER LONGITUDINAL	148.8 in	146.5 in	-25.0 in	-25.6 in	10.1 in	9.4 in	11.8 g	@ 43.0 ms	51.2 g	@ 38.1 ms
6 LEFT BRAKE CALIPER LONGITUDINAL	148.8 in	146.5 in	25.0 in	25.6 in	10.0 in	9.4 in	7.5 g	@ 91.0 ms	73.0 g	@ 53.0 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	128.0 in	125.5 in	0.0 in	0.0 in	37.5 in	37.0 in	7.2 g	@ 36.2 ms	53.5 g	@ 62.3 ms
8 VEHICLE REAR CENTER VERTICAL	9.0 in	9.0 in	-1.5 in	-1.5 in	18.1 in	18.1 in	6.7 g	@ 27.6 ms	7.8 g	@ 46.2 ms

REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

Section 3.0

FMVSS 208, 212, 219 (partial), and 301 Data

Table 6 Dummy Injury Criteria

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-29.9 g	-4.6 g	-41.2 g	48.2 g	-44.4 g	-5.1 g	8.7 g
Passenger	-56.7 g	-19.6 g	-27.7 g	60.9 g	-49.7 g	-3.9 g	-9.0 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	1462 lbf	1416 lbf
Passenger	1489 lbf	1063 lbf

	<u>Head Injury Criteria¹</u>		
	HIC	Time t ₁	Time t ₂
Driver	277	70.64 ms	114.64 ms
Passenger	456	81.84 ms	110.16 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Driver	44.4 g	84.9 ms	87.8 ms
Passenger	49.7 g	90.2 ms	93.1 ms

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head impacted the sun visor and airbag rotating downward. The dummy's chest impacted the airbag. The dummy's head and chest were restrained by the airbag. The dummy rebounded rearward. The driver dummy came to rest seated in the driver's seat.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag with the dummy's head rotating slightly forward. The dummy's head and chest were restrained by the passenger's airbag. The dummy's head rotated slightly rearward contacting the head restraint as the dummy rebounded rearward into the seat back. The dummy came to rest seated in the right front passenger's seat.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary

Front Outboard Designated Seating Positions

NHTSA number: CT0504

Vehicle model year/make/model/body style: 1996/Saab/900S/3-door hatchback

Date of comfort/convenience check: 01/26/96

Technician performing check: Markusic

GVWR: 3870 lb

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

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

Vehicle Equipment:

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

Convenience Hooks (S7.4.1):

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

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary
Front Outboard Designated Seating Positions, Cont'd.

NHTSA number: CT0504

Vehicle model year/make/model/body style: 1996/Saab/900S/3-door hatchback

Date of comfort/convenience check: 01/26/96

Technician performing check: Markusic

GVWR: 3870 lb

Webbing Tension-Relieving Device (S7.4.2):

The front outboard seating position assemblies do not have webbing tension-relieving devices.

Belt Contact Force (S7.4.3):

The belt contact force on the chest of the test dummy is 0.2 pound.

Latchplate Access (S7.4.4):

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

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

Retraction (S7.4.5):

The seat belt automatically retracts when the seat belt latchplate is released.

The stowed seat belt webbing and hardware are not pinched when the door is closed.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary
Front Outboard Designated Seating Positions, Cont'd.

NHTSA number: CT0504

Vehicle model year/make/model/body style: 1996/Saab/900S/3-door hatchback

Date of comfort/convenience check: 01/26/96

Technician performing check: Markusic

GVWR: 3870 lb

Seat Belt Guides and Hardware (S7.4.6):

The seat cushion is not removable.

The seat back does not serve a function other than seating.

The seat is not removable.

The seat is movable but the space formerly occupied by the seat cannot be used for a secondary function.

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

The webbing is not designed to pass through the seat cushion or between the cushion and seat back.

The restraint system does not include webbing guides.

The seat belt receptacles were accessible without moving the center arm rest for access.

Table 8 FMVSS 208 Equipment Data

FMVSS 208 Seat Belt Warning System Data

With an occupant in the driver's position and the unbelt in stowed position and ignition switch placed in the "start/on" position, the duration of the audible warning signal and the reminder light is 6 s.

With an occupant in the driver's position and the unbelt in use and the ignition switch placed in the "start/on" position the duration of audible warning signal is 0 s and the duration of the reminder light operation is 6 s.

NOTE: the audible warning should not operate.

The visual seat belt warning is the words "Fasten Belt", and the symbol from Table 2 of FMVSS 101.

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Labeling and Driver's Manual Data

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

The manufacturer's recommended airbag maintenance is to have the airbag system serviced immediately if the SRS light does not come on, stays on, or comes on while driving.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on pages 60 and 62.

A description of the functional operation of the system was provided in the owner's manual on pages 61 and 62.

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

An owner's manual was provided.

The owner's manual contained appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems on pages 60 through 62.

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Readiness Indicator Data

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was a light stating "SRS" located on the left side of the instrument cluster.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator was provided in the owner's manual on page 62.

FMVSS 208 Rear Outboard Seating Position Seat Belts

All rear outboard seating positions had Type 2 seat belts.

Figure 4 FMVSS 212 Test Data

Details of windshield mounting such as retention method, trim type, etc.:

Plastic trim around outer perimeter and adhesive around inner perimeter.

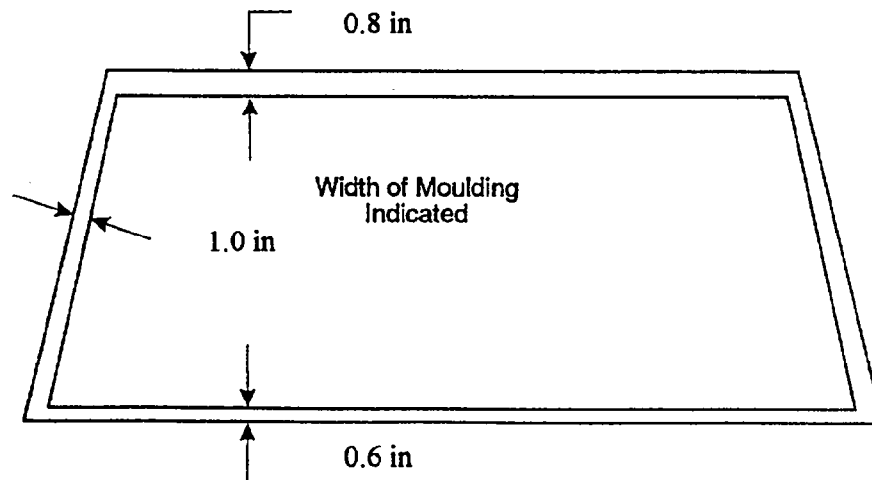
Clips or brackets used to retain windshield: None

FMVSS 212 requirements: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

	Pre-test	Post-test	Percent Retention
Right side	77.0 in	77.0 in	100.0
Left side	77.0 in	77.0 in	100.0
Total	154.0 in	154.0 in	100.0

Pre-test windshield mounting material temperature: 72° F



Front view of windshield¹

Loss of windshield retention lengths: None

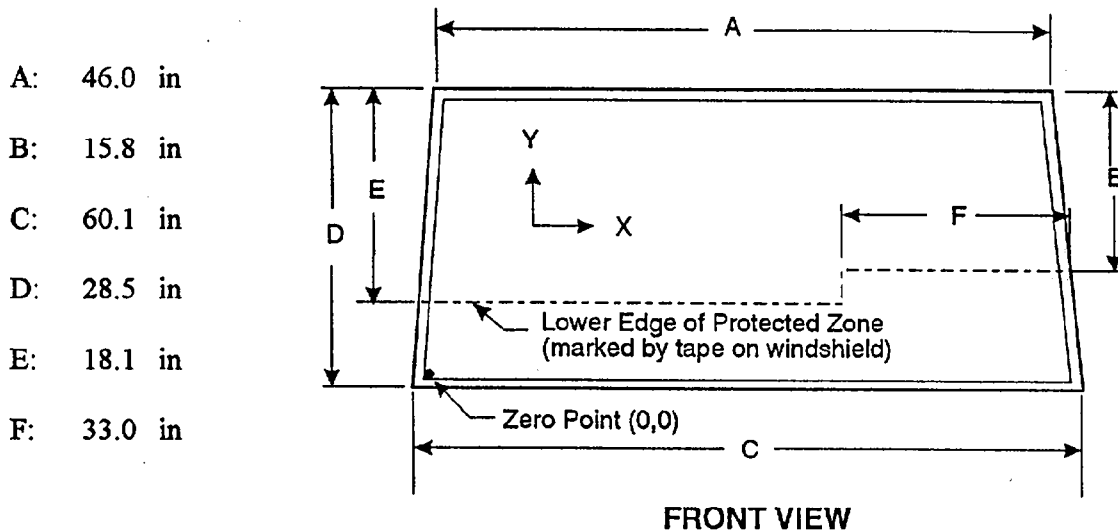
¹ Indicate areas of loss of retention, if any, on windshield diagram.

Figure 5 FMVSS 219 Test Data

Protected zone lower edge requirement:

The lower edge of the protected zone is determined by placing a 6.5-inch diameter rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable 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 0.5 inch from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

Windshield measurements:



Method of adhering protected zone template to windshield:

NA

Areas of windshield template penetration greater than 0.25 in:

NA

Coordinates

	X	Y
1.		
2.		
3.		

Areas of windshield penetration, below the protected zone, through the inner surface of the windshield:

None

1.
2.
3.

Table 9 Fuel System Data

Vehicle year/make/ model/body style:	1996/Saab/900S/3-door hatchback
NHTSA number:	CT0504
Fuel system capacity:	18.0 gal (from owner's manual)
Usable capacity:	16.9 gal (furnished by COTR)
Test volume range:	15.5 gal to 15.9 gal (92-94% of usable)
Actual test volume:	15.7 gal (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	purple
Type of fuel pump:	electric

The electric fuel pump did not operate with ignition switch "on" and the engine not operating.

Details of fuel system:

The fuel tank was located in front of the rear axle. The fuel filler neck was located on the right side. The fuel lines run along the right side to the front.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CT0504
Test date: 01/26/96
Vehicle year/make/
model/body style: 1996/Saab/900S/3-door hatchback

Test requirements:

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:

- ☒ Frontal (30 mph)
☐ Oblique (30 mph) with ___° barrier face first contacting (driver's/passenger's) side
☐ Rear moving barrier (30 mph)
☐ Lateral moving barrier (20 mph)

Fuel system fluid spillage measurements:

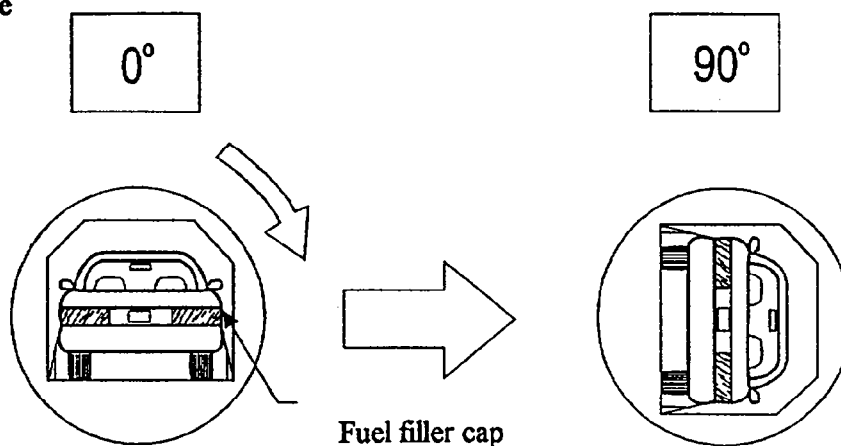
	Test Results	Maximum Allowable
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-Minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CT0504

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90° = 2 minutes, 0 seconds

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

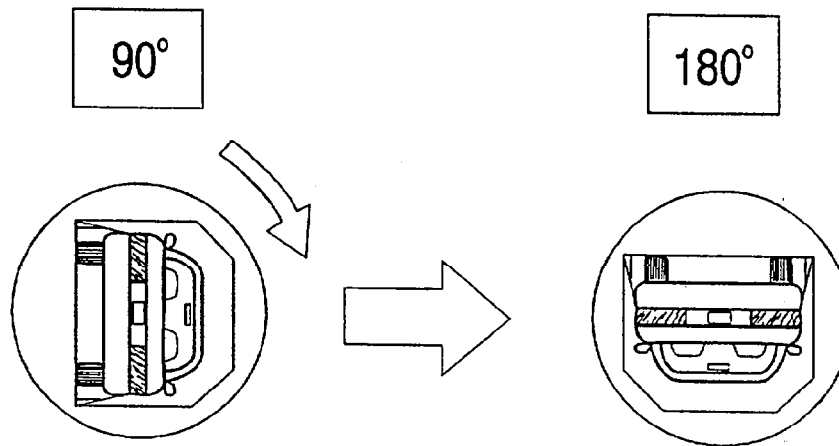
Fuel system fluid spillage measurements:

	Test Results	Maximum Allowable
<u>0° to 90° rotation (fuel filler cap down)</u>		
1. First five minutes from onset of rotation	0 oz	5 oz
2. Sixth minute from onset of rotation	0 oz	1 oz
3. Seventh minute from onset of rotation	0 oz	1 oz

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	14	minutes		

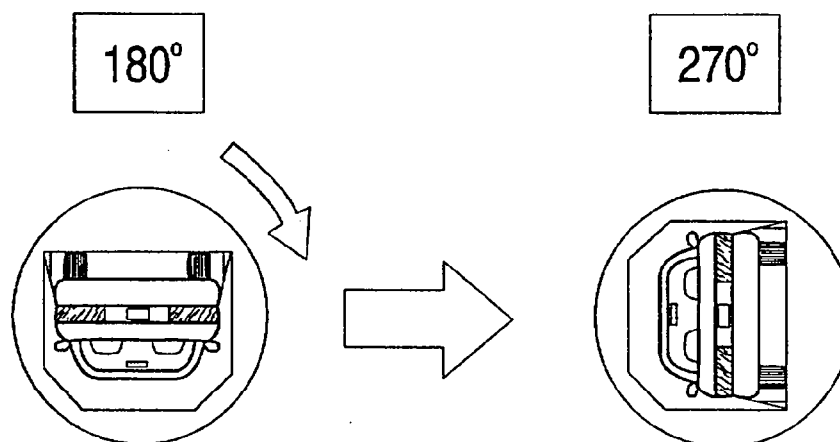
Fuel system fluid spillage measurements:

<u>90° to 180° rotation</u>	<u>Test Results</u>	<u>Maximum Allowable</u>
1. First five minutes from onset of rotation	0 oz	5 oz
2. Sixth minute from onset of rotation	0 oz	1 oz
3. Seventh minute from onset of rotation	0 oz	1 oz

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	21	minutes		

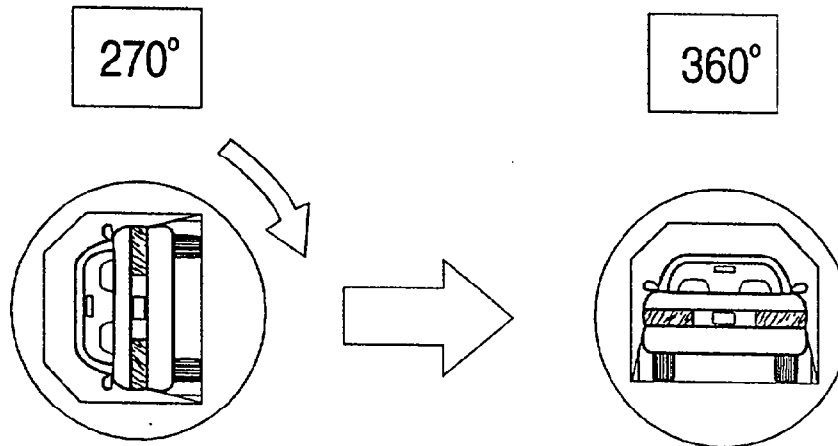
Fuel system fluid spillage measurements:

180 to 270° rotation	Test Results	Maximum Allowable
1. First five minutes from onset of rotation	0 oz	5 oz
2. Sixth minute from onset of rotation	0 oz	1 oz
3. Seventh minute from onset of rotation	0 oz	1 oz

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data, Cont'd.

Test phase



Static rollover machine rotation time information: (specified range is 1-3 minutes)

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	28	minutes		

Fuel system fluid spillage measurements:

<u>270° to 360° rotation</u>	<u>Test Results</u>	<u>Maximum Allowable</u>
1. First five minutes from onset of rotation	0 oz	5 oz
2. Sixth minute from onset of rotation	0 oz	1 oz
3. Seventh minute from onset of rotation	0 oz	1 oz

Fuel system fluid spillage location(s): None

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 7 Pre-test and Post-test Measurement Points

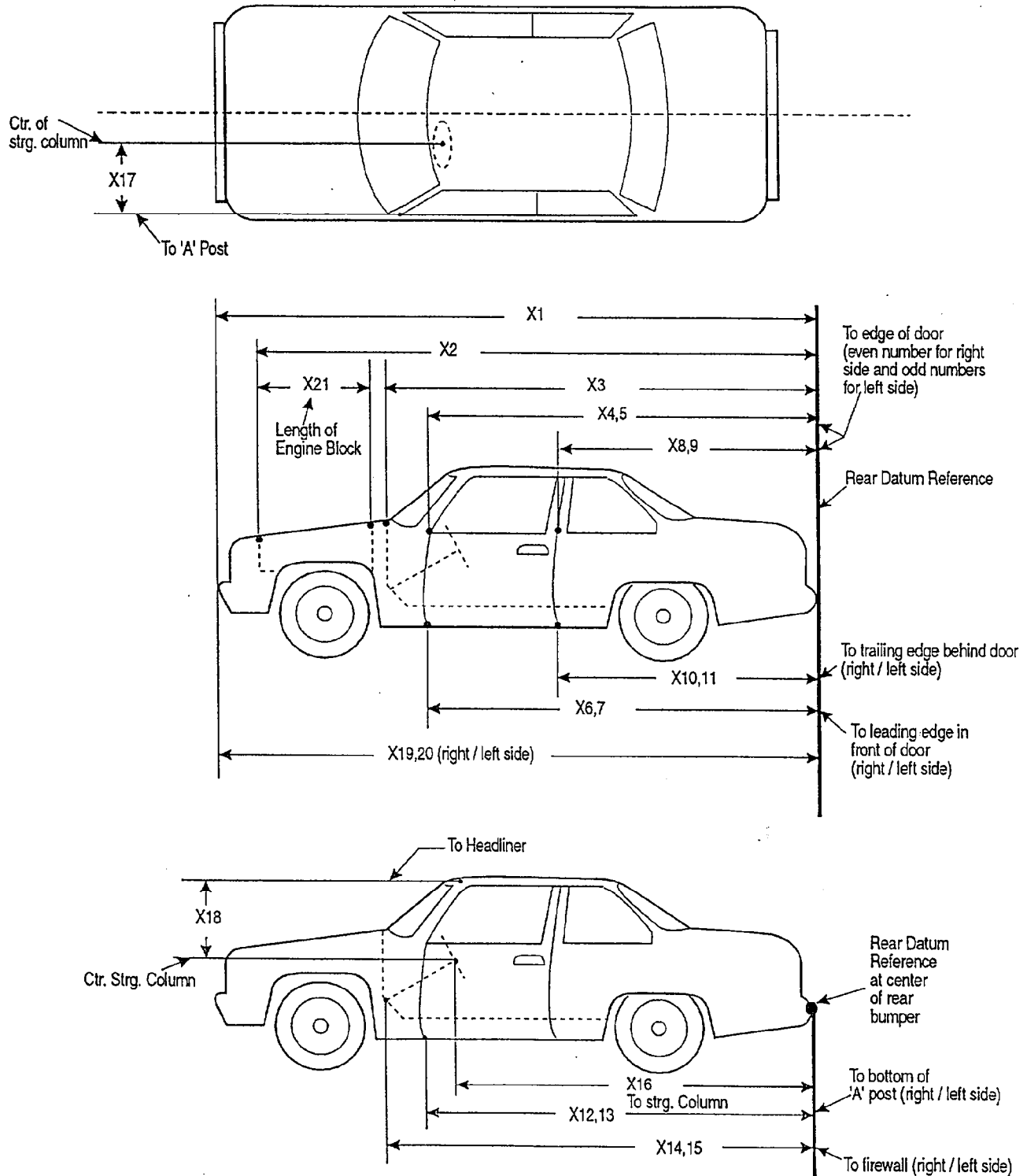


Table 11 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1996/Saab/900S/3-door hatchback

Test Number: 960126

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	183.4 in	164.5 in	18.9 in
X2	Rear surface of vehicle to front of engine block	158.8 in	151.5 in	7.3 in
X3	Rear surface of vehicle to firewall	138.7 in	134.9 in	3.8 in
X4	Rear surface of vehicle to upper leading edge of right door	125.2 in	125.2 in	0.0 in
X5	Rear surface of vehicle to upper leading edge of left door	125.1 in	125.0 in	0.1 in
X6	Rear surface of vehicle to lower leading edge of right door	125.0 in	124.6 in	0.4 in
X7	Rear surface of vehicle to lower leading edge of left door	125.0 in	124.6 in	0.4 in
X8	Rear surface of vehicle to upper trailing edge of right door	74.8 in	74.5 in	0.3 in
X9	Rear surface of vehicle to upper trailing edge of left door	74.8 in	74.6 in	0.2 in
X10	Rear surface of vehicle to lower trailing edge of right door	77.2 in	76.8 in	0.4 in
X11	Rear surface of vehicle to lower trailing edge of left door	77.2 in	76.8 in	0.4 in
X12	Rear surface of vehicle to bottom of "A" post on right side	121.6 in	120.9 in	0.7 in
X13	Rear surface of vehicle to bottom of "A" post on left side	121.6 in	121.0 in	0.6 in
X14	Rear surface of vehicle to firewall - right side	135.1 in	131.3 in	3.8 in
X15	Rear surface of vehicle to firewall - left side	136.9 in	134.1 in	2.8 in
X16	Rear surface of vehicle to steering wheel center	105.2 in	105.8 in	-0.6 in
X17	Center of steering column to "A" post	11.8 in	12.9 in	-1.1 in
X18	Center of steering column to headliner	17.3 in	19.0 in	-1.7 in
X19	Rear surface of vehicle to right side of front bumper	178.8 in	161.2 in	17.6 in
X20	Rear surface of vehicle to left side of front bumper	178.4 in	161.5 in	16.9 in
X21	Length of engine block	20.0 in	20.0 in	0.0 in

Figure 8 Vehicle Target Locations

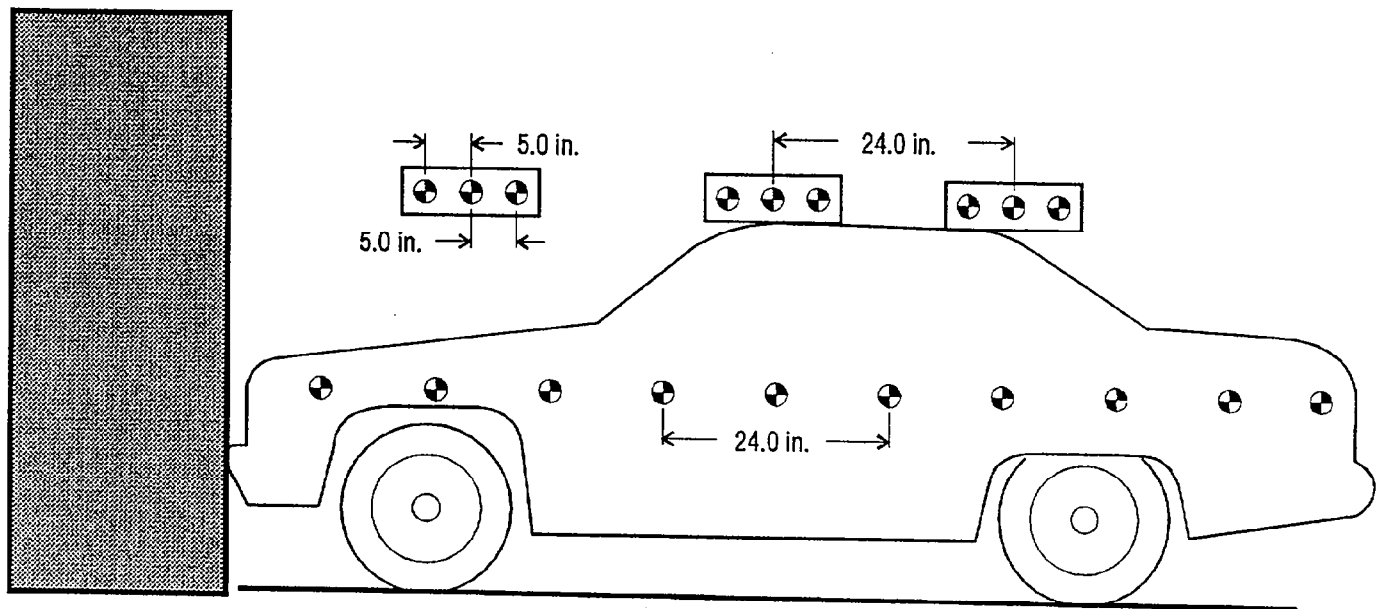


Figure 9 Dummy Measurement Locations for Front Seat Occupants

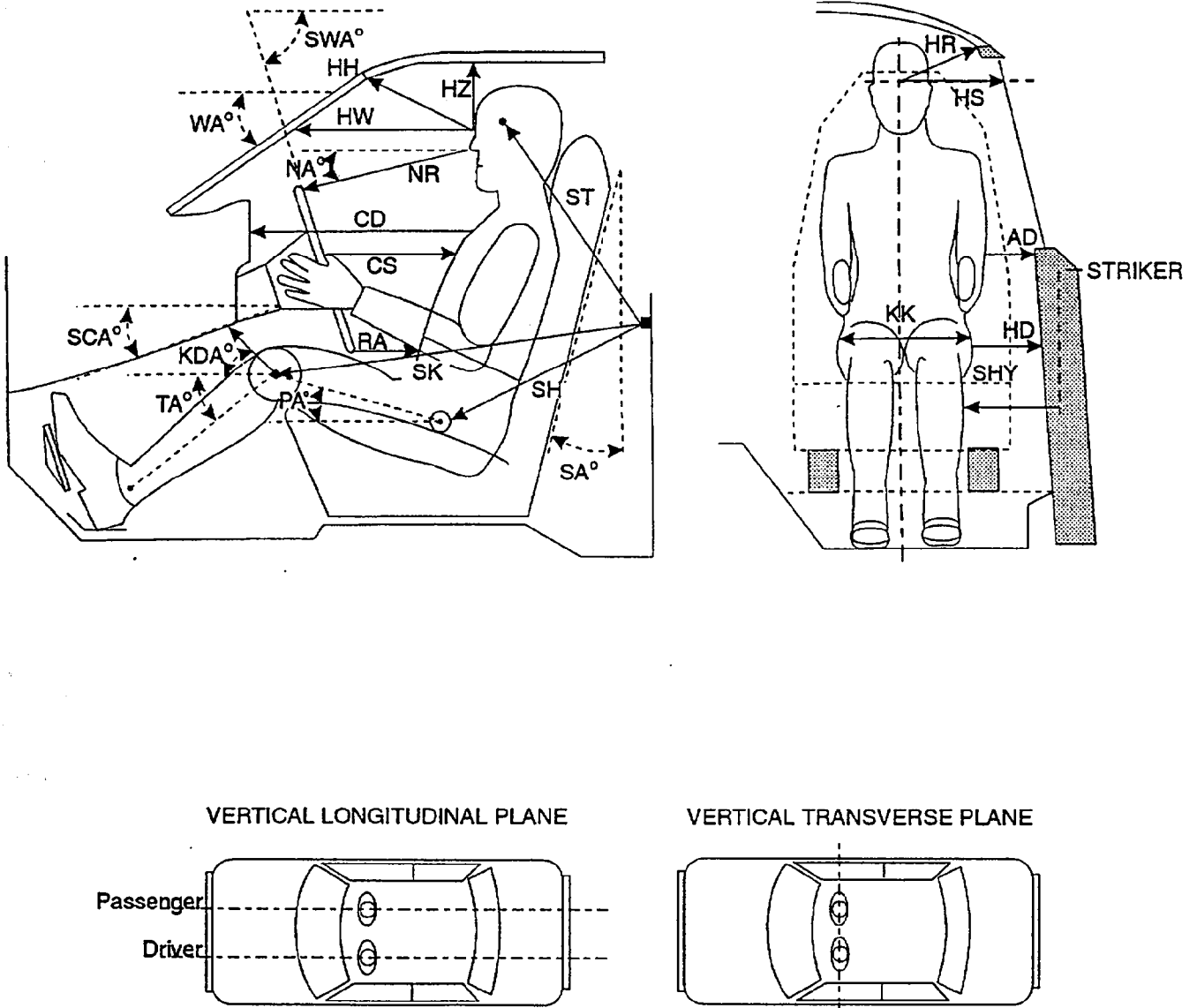


Table 12 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial 353)	Passenger (Serial #354)
WA	Windshield angle	34°	NA
SWA	Steering wheel angle	13°	NA
SCA	Steering column angle	77°	NA
SA	Seat back angle	16°	16°
HZ	Head to roof	6.7 in	6.7 in
HH	Head to header	20.0 in	20.7 in
HW	Head to windshield	23.5 in	24.8 in
HR	Head to side header	7.5 in	7.5 in
NR	Nose to rim	19.9 in	NA
NA	Nose to rim angle	15°	NA
CD	Chest to dash	24.6 in	24.4 in
CS	Steering wheel to chest	15.8 in	NA
RA	Rim to abdomen	10.1 in	NA
KDL	Left knee to dash	7.4 in	6.1 in
KDR	Right knee to dash	7.2 in	7.1 in
KDA	Outboard knee to dash angle	15°	24°
PA	Pelvic angle	12°	14°
TA	Tibial angle	38°	41°
KK	Knee to knee	14.5 in	11.7 in
ST ¹	Striker to head	18.7 in	18.2 in
	Striker to head angle	-62°	-68°
SK ¹	Striker to knee	30.1 in	30.8 in
	Striker to knee angle	-11°	8°
SH ¹	Striker to H-point	16.3 in	17.1 in
	Striker to H-point angle	32°	27°
SHY	Striker to H-point (Y dir.)	10.0 in	9.6 in
HS	Head to side window	10.7 in	10.8 in
HD	H-point to door	5.5 in	5.3 in
AD	Arm to door	3.3 in	1.5 in

The seat back angle (SA°) is measured relative to vertical, all other angles are measured relative to horizontal.

¹ A negative angle indicates the measurement point was located above the striker.

Figure 10 Camera Positions

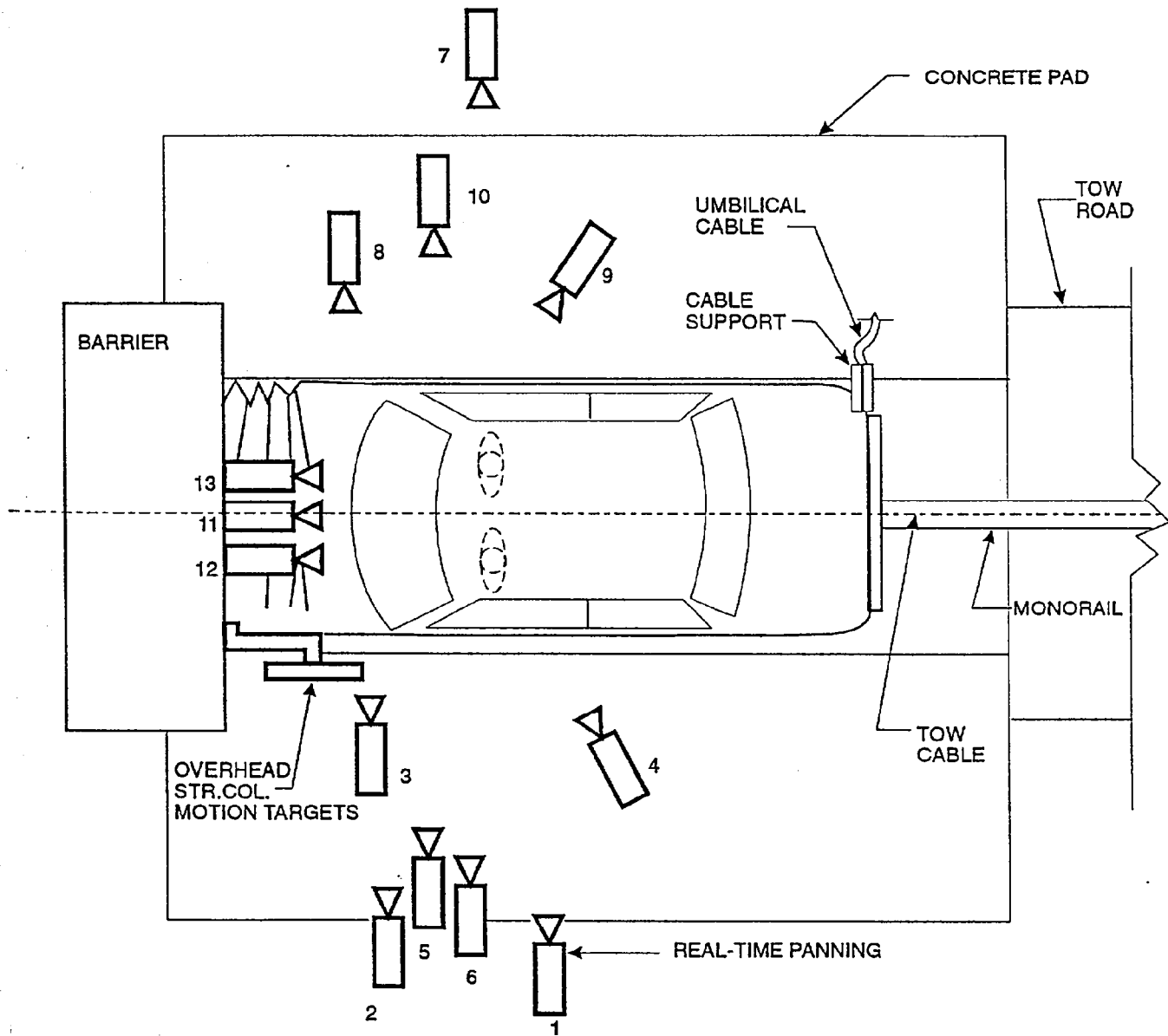


Figure 10 Camera Positions, Cont'd.

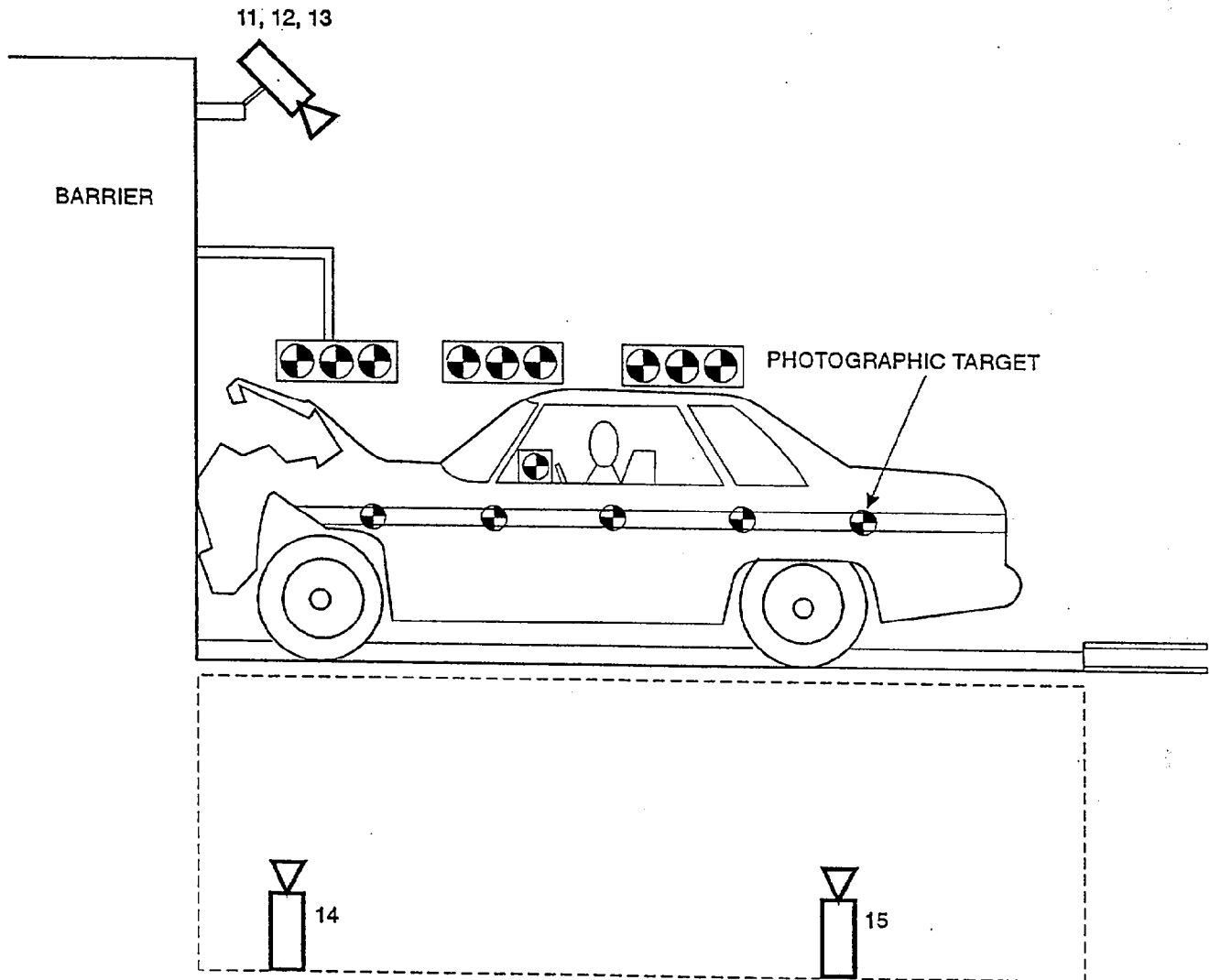


Table 13 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1996/Saab/900S/3-door hatchback

Test number: 960126

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Real-time panning	-142.0 in	504.0 in	61.0 in	NA	NA	16 mm	24 frames/s
2	Left vehicle crush	-41.5 in	295.0 in	44.0 in	-4°	271.0 in	25 mm	995 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1000 frames/s
4	Driver kinematics	-157.3 in	116.0 in	87.0 in	-27°	106.0 in	25 mm	995 frames/s
5	Steering column motion	-80.0 in	286.0 in	103.0 in	-14°	NA	25 mm	998 frames/s
6	Steering column motion	-80.0 in	286.0 in	75.1 in	-9°	NA	25 mm	1002 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	1008 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	1005 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	101.0 in	25 mm	990 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	219.0 in	25 mm	1000 frames/s
11	Windshield front view	-6.0 in	0.0 in	88.0 in	-40°	NA	13 mm	1005 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	1002 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	1008 frames/s
14	Pit - front position	-50.5 in	0.0 in	-92.4 in	90°	NA	13 mm	995 frames/s
15	Pit - rear position	-99.3 in	0.0 in	-99.0 in	90°	NA	13 mm	1000 frames/s
16	Real-time documentation	NA	NA	NA	NA	NA	12-120 mm	24 frames/s

¹ +X: Film plane forward of barrier face

+Y: Film plane to left of monorail centerline

+Z: Film plane above ground level

² +Angle: Film plane angled upward from horizontal plane

Appendix A

Photographs

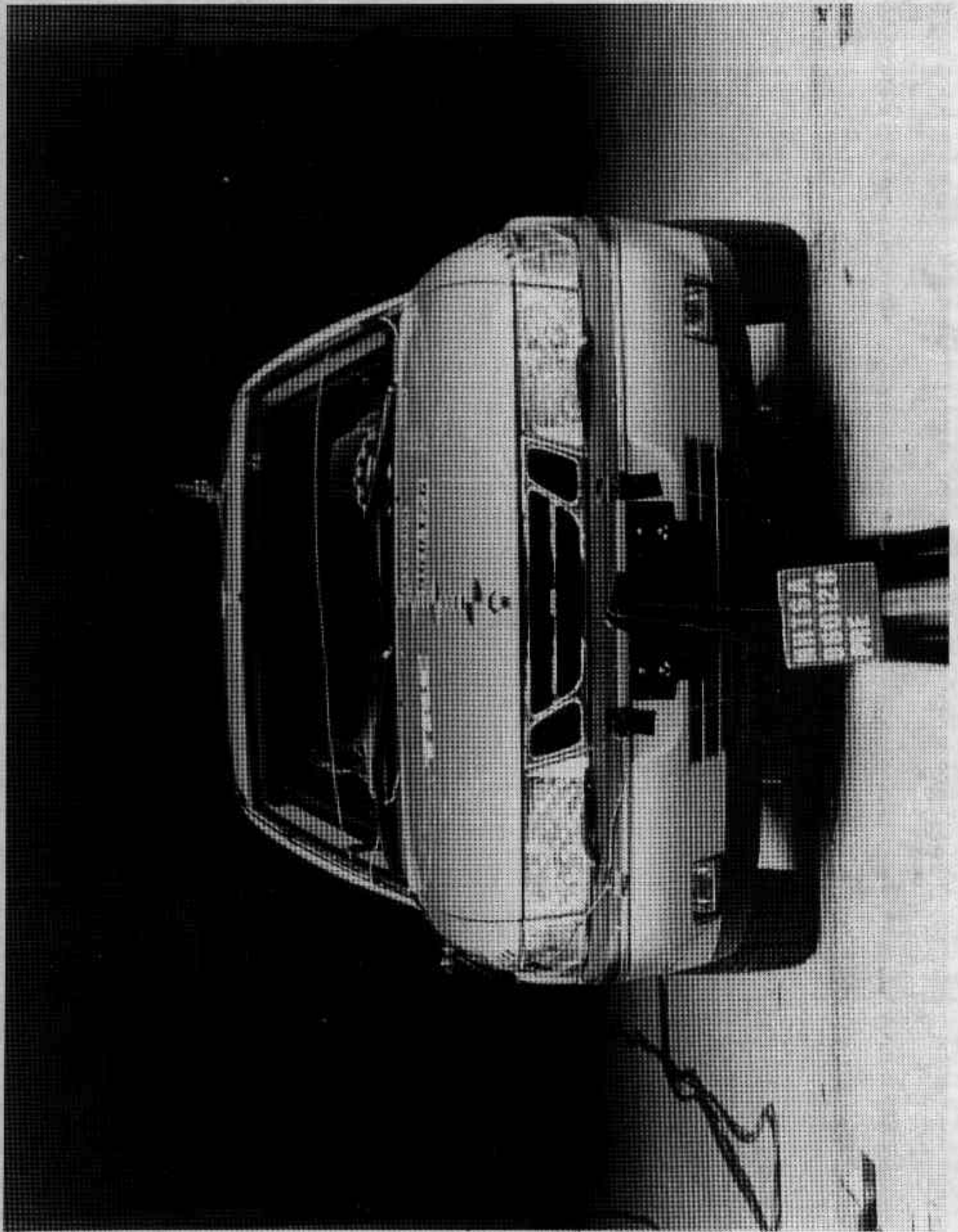


Figure A-1. Pre-Test Front View

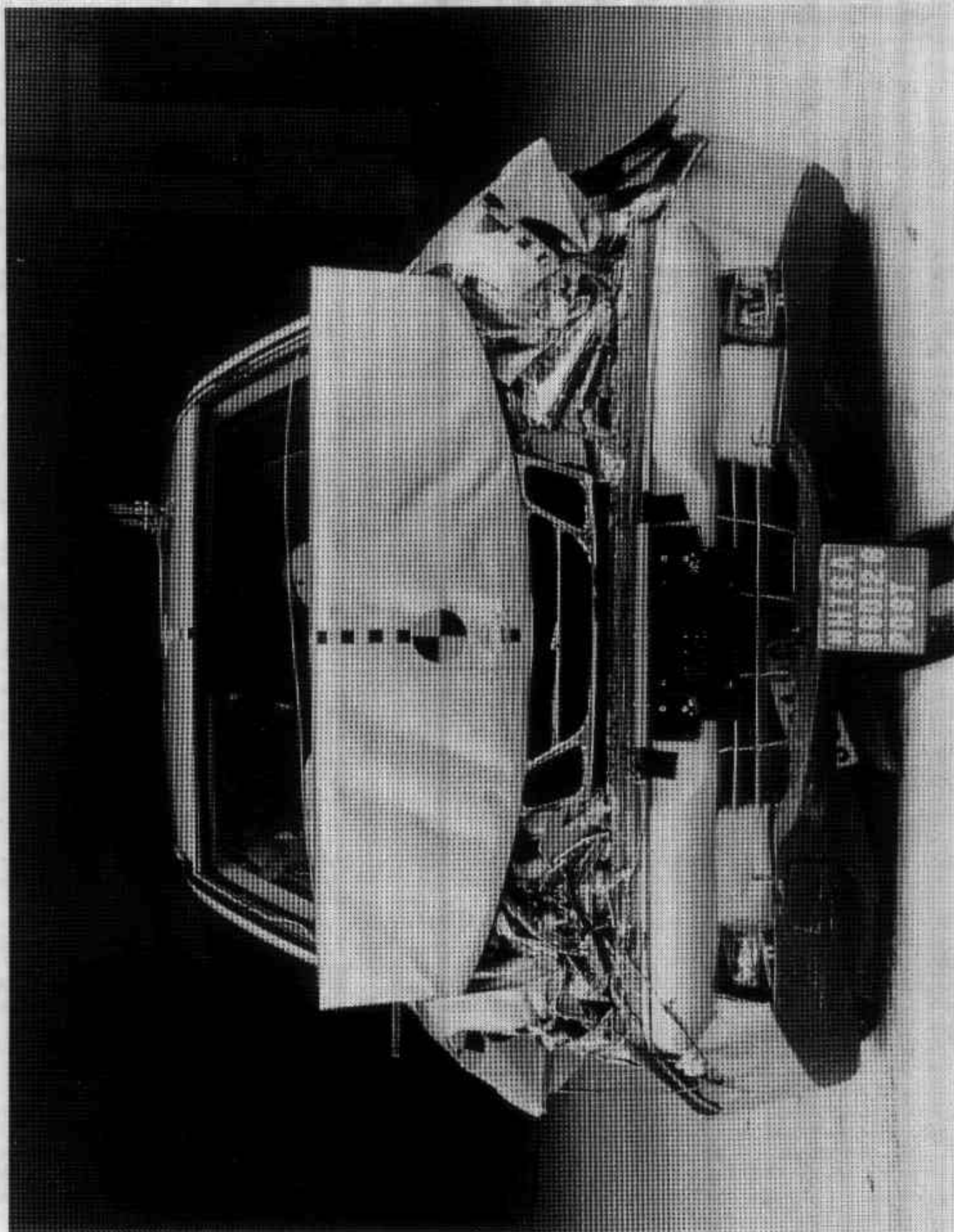


Figure A-2. Post-Test Front View

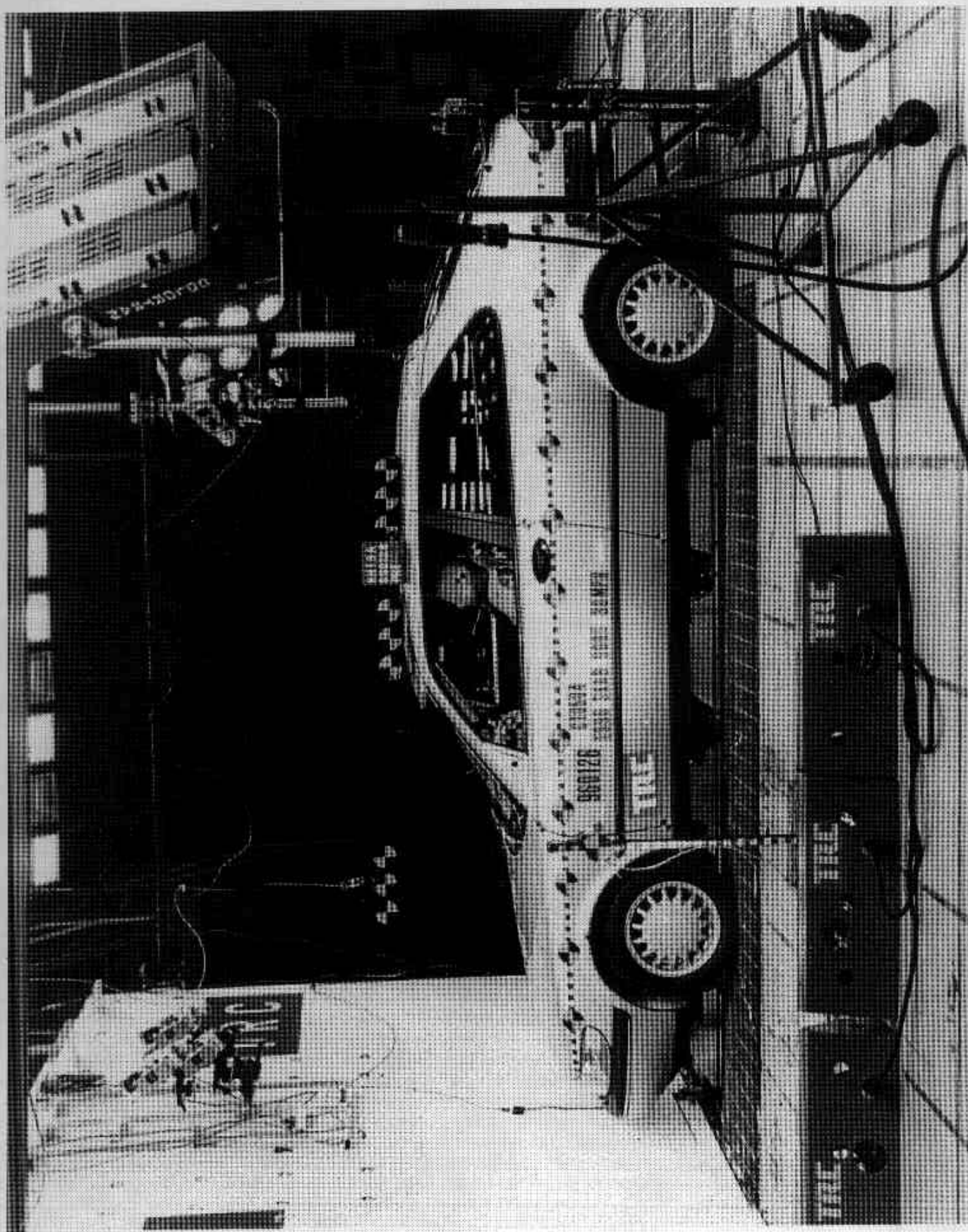


Figure A-3. Pre-Test Left Side View

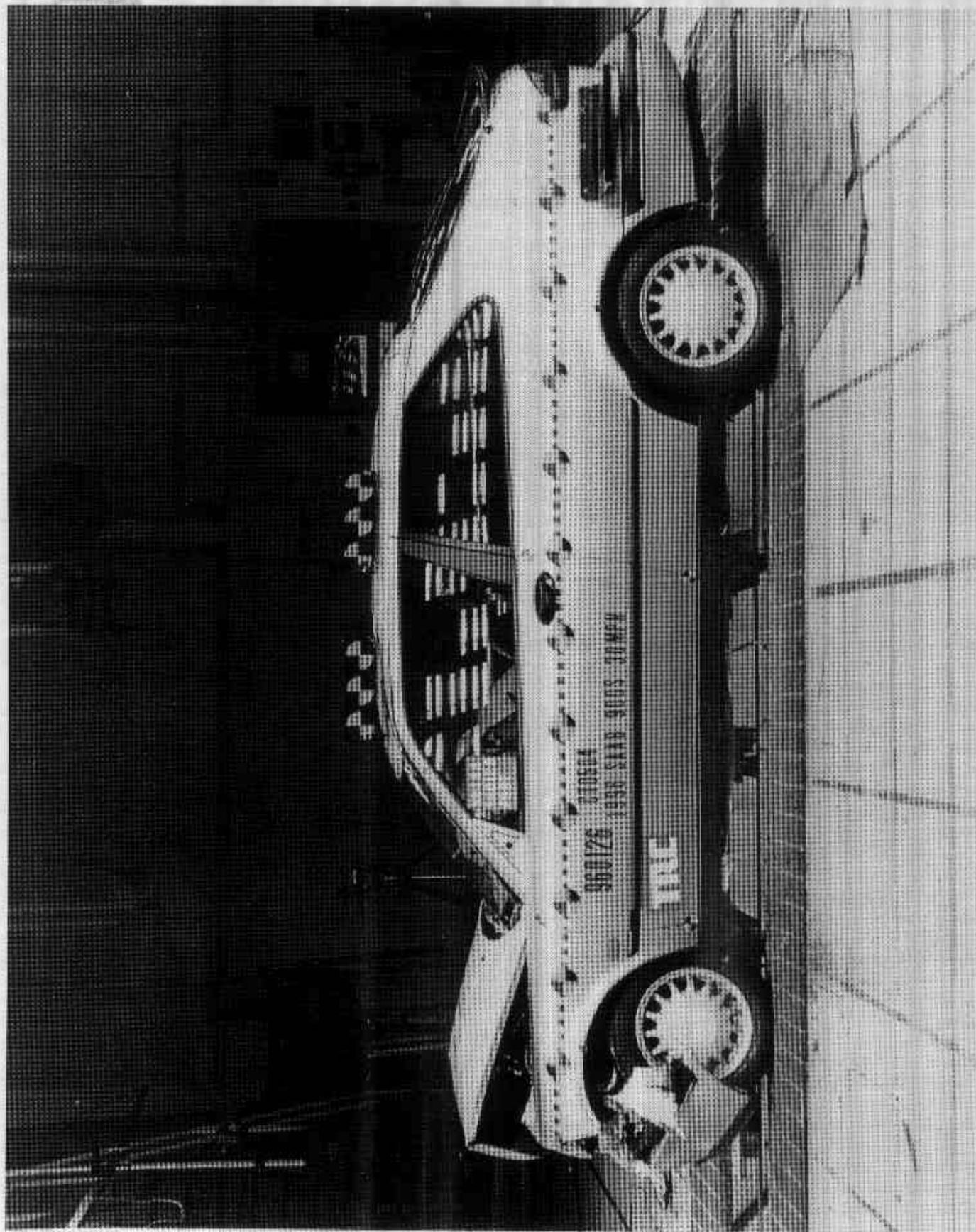


Figure A-4. Post-Test Left Side View

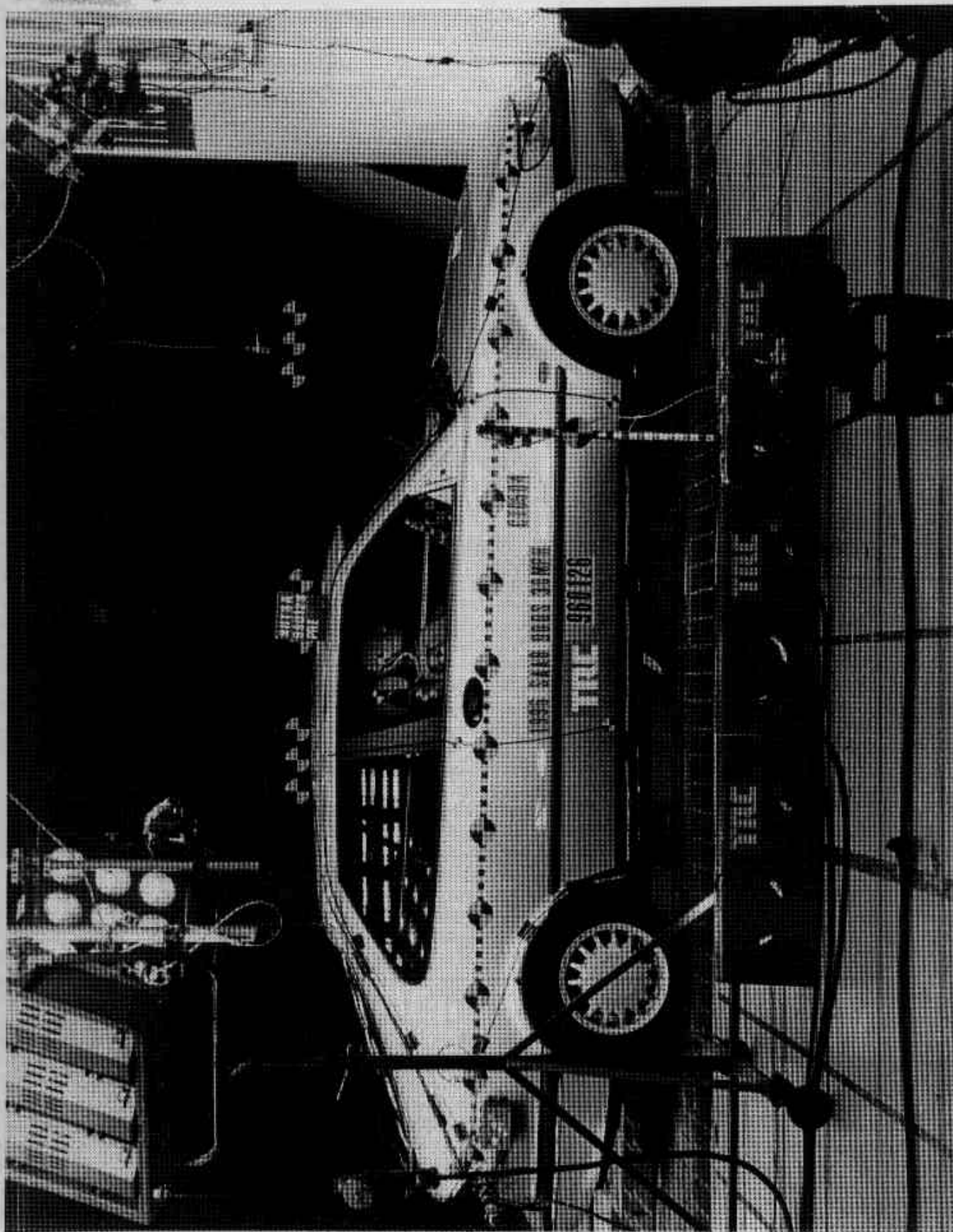


Figure A-5. Pre-Test Right Side View

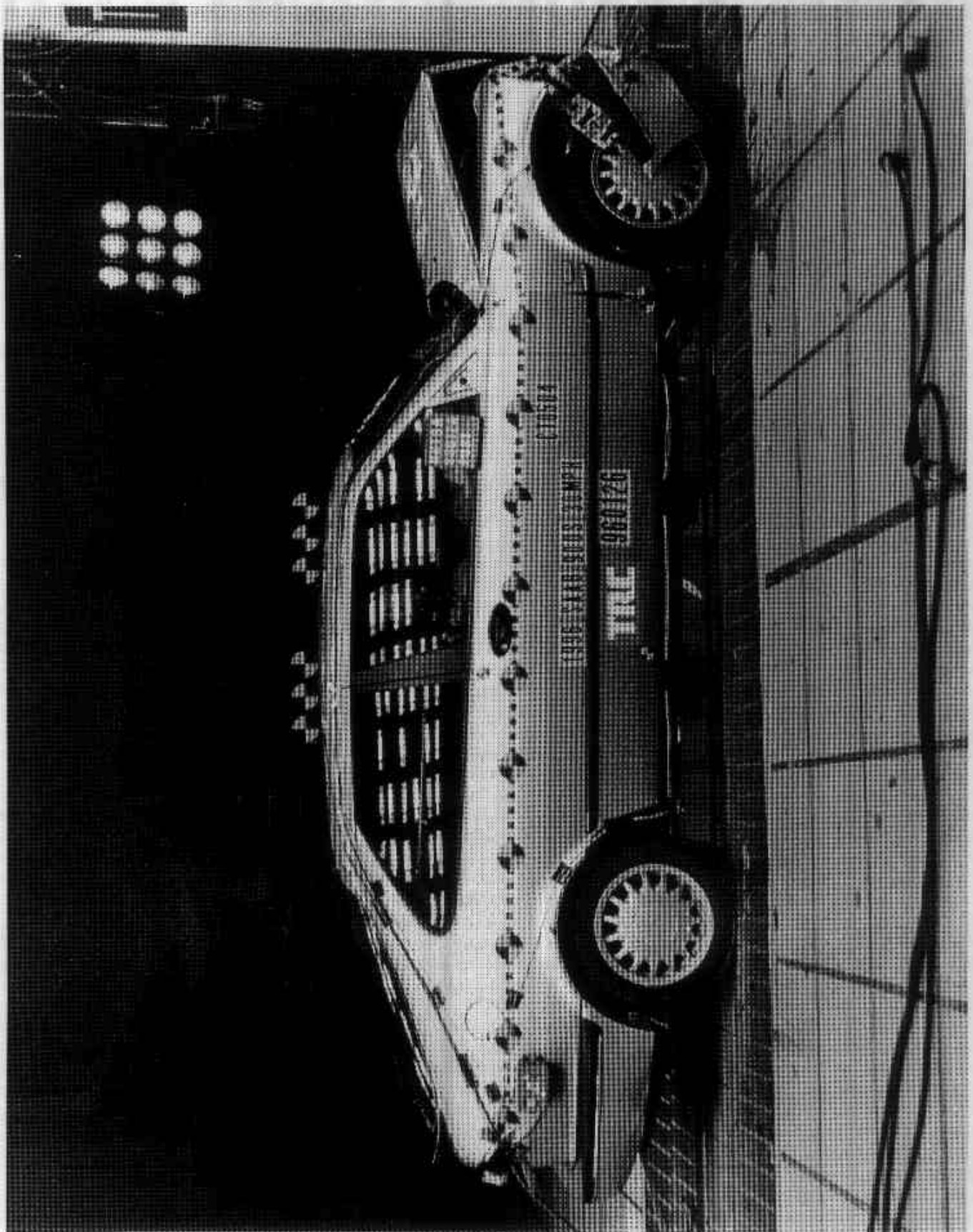


Figure A-6. Post-Test Right Side View

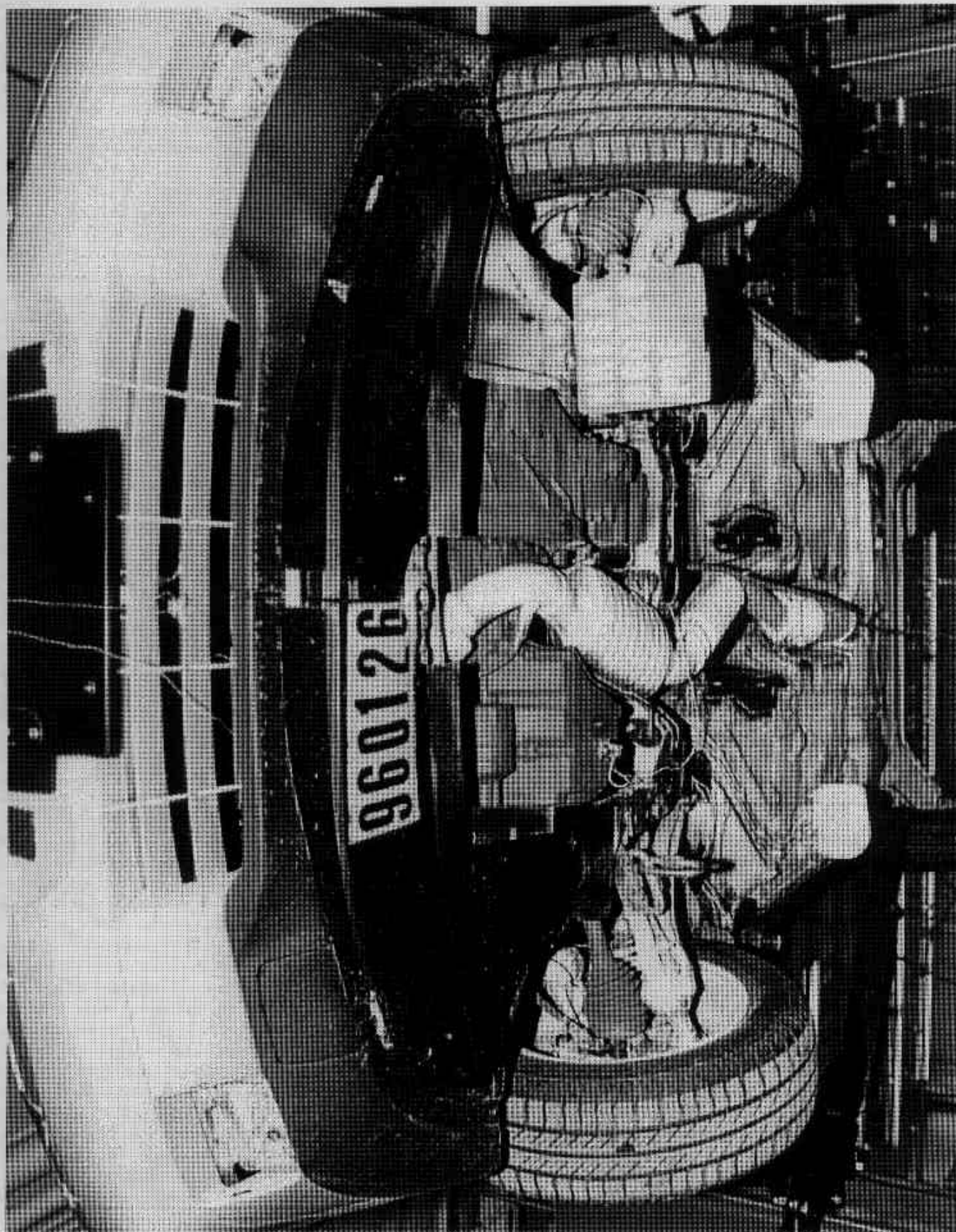


Figure A-7. Pre-Test Front Underbody View

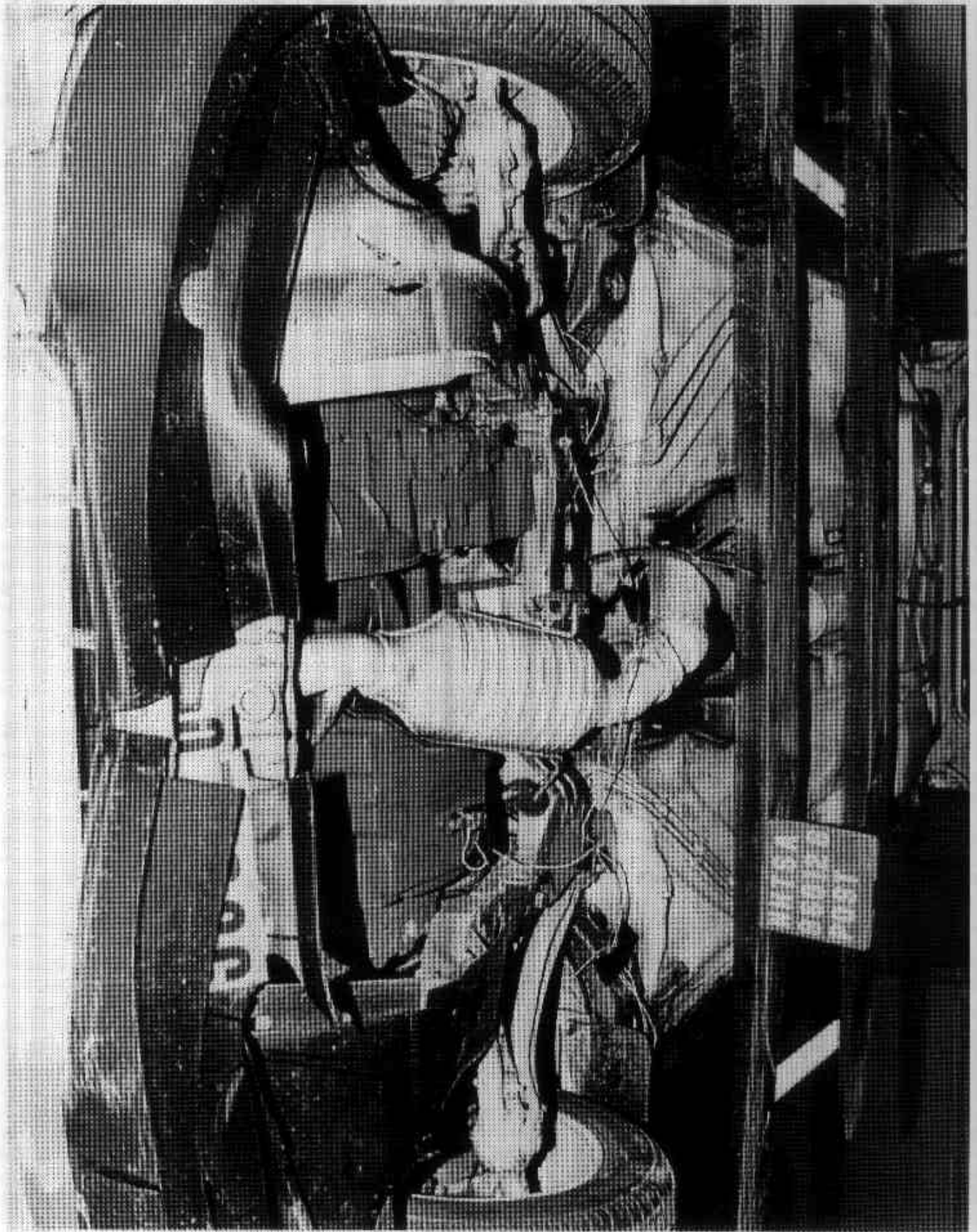


Figure A-8. Post-Test Front Underbody View

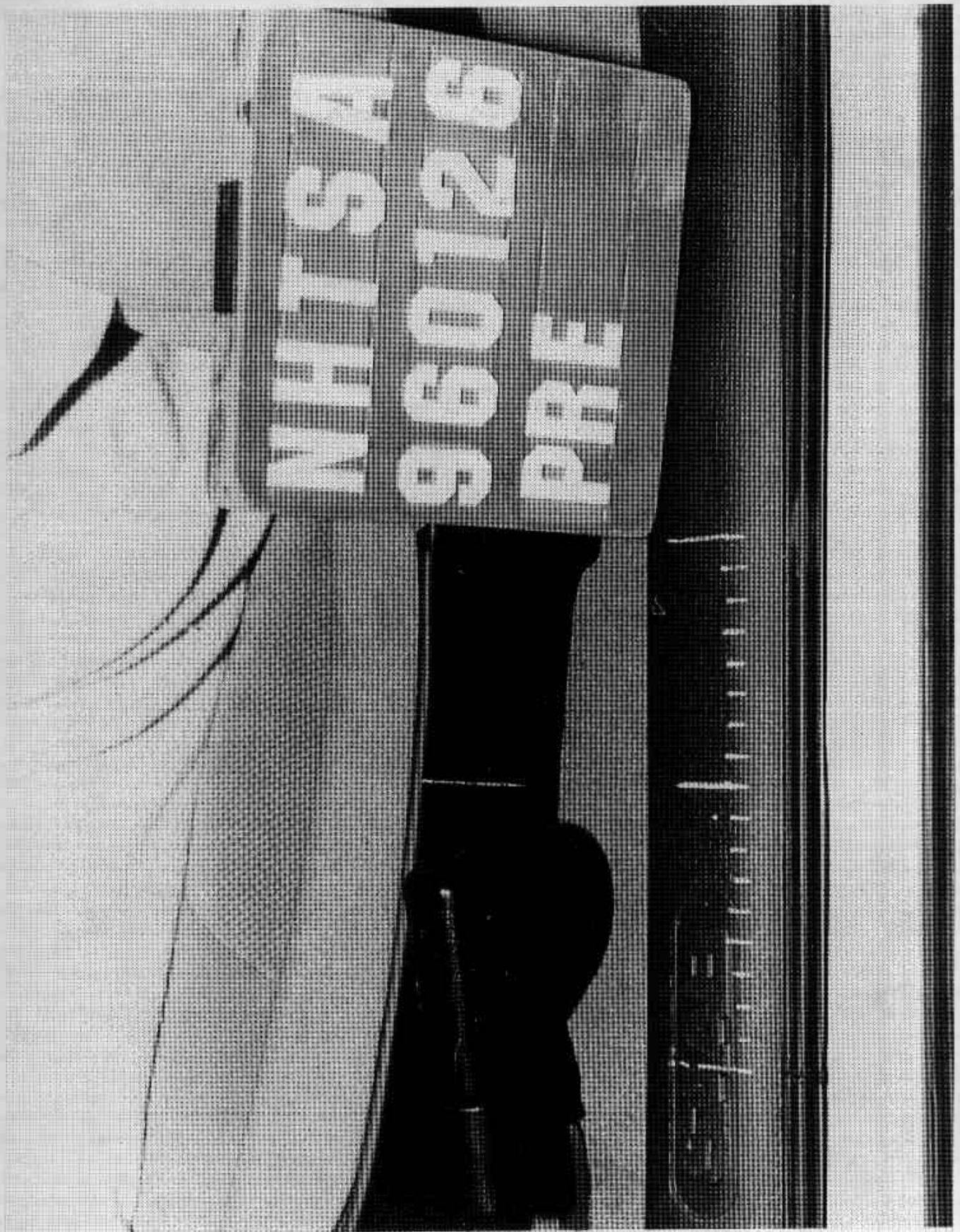


Figure A-9. Pre-Test Driver's Seat Location View

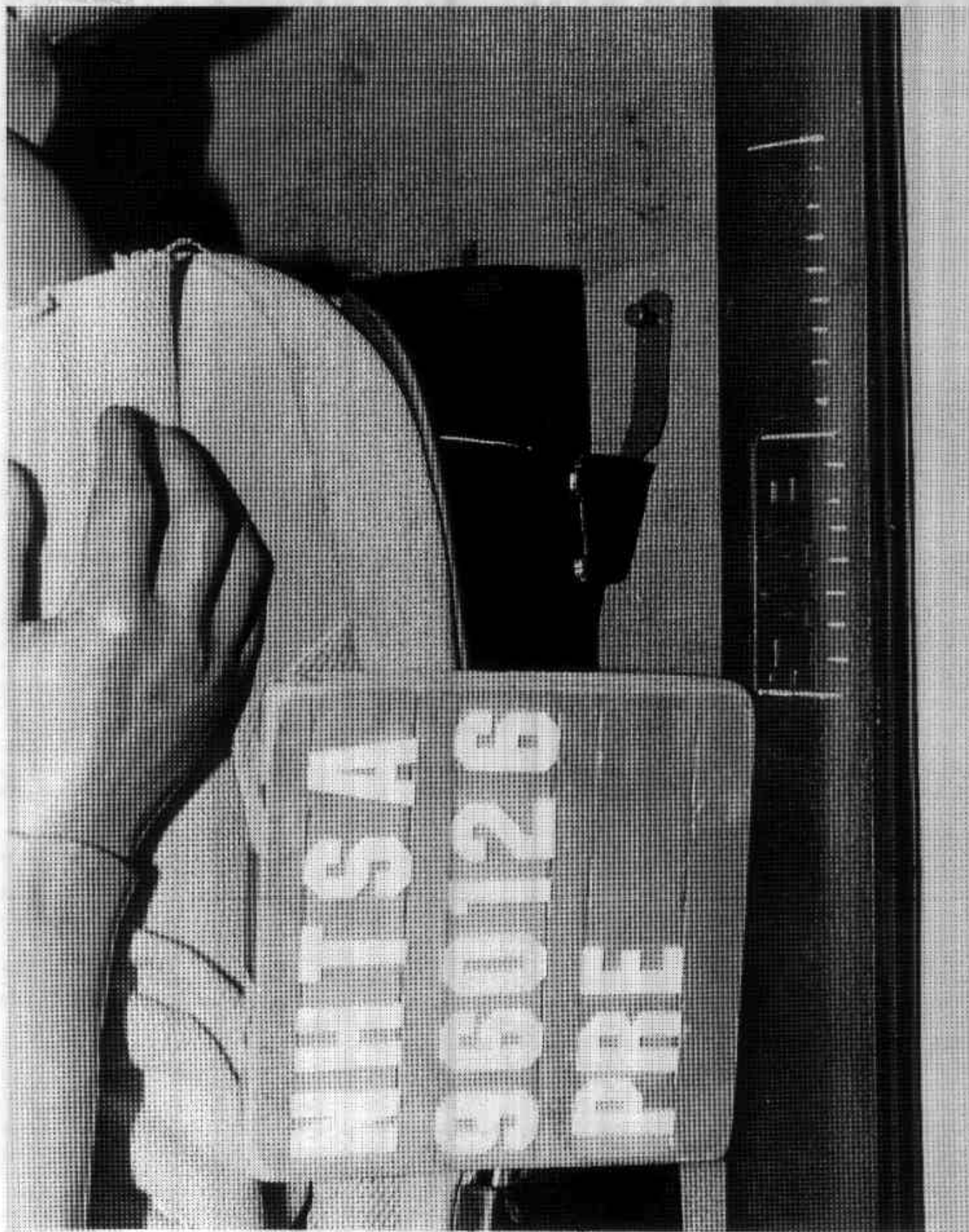


Figure A-10. Pre-Test Passenger's Seat Location View

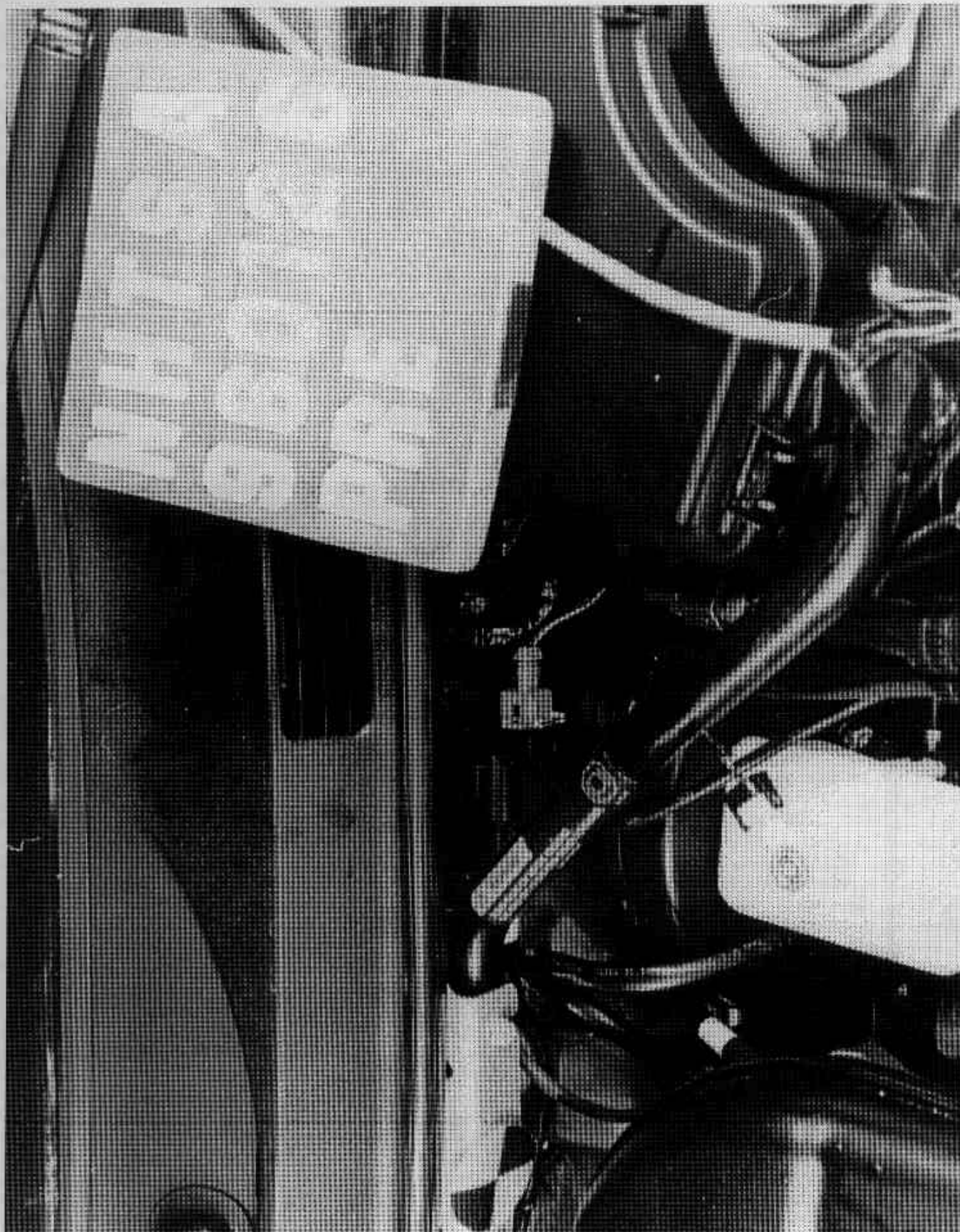


Figure A-11. Pre-Test Steering Column at Firewall View - Exterior

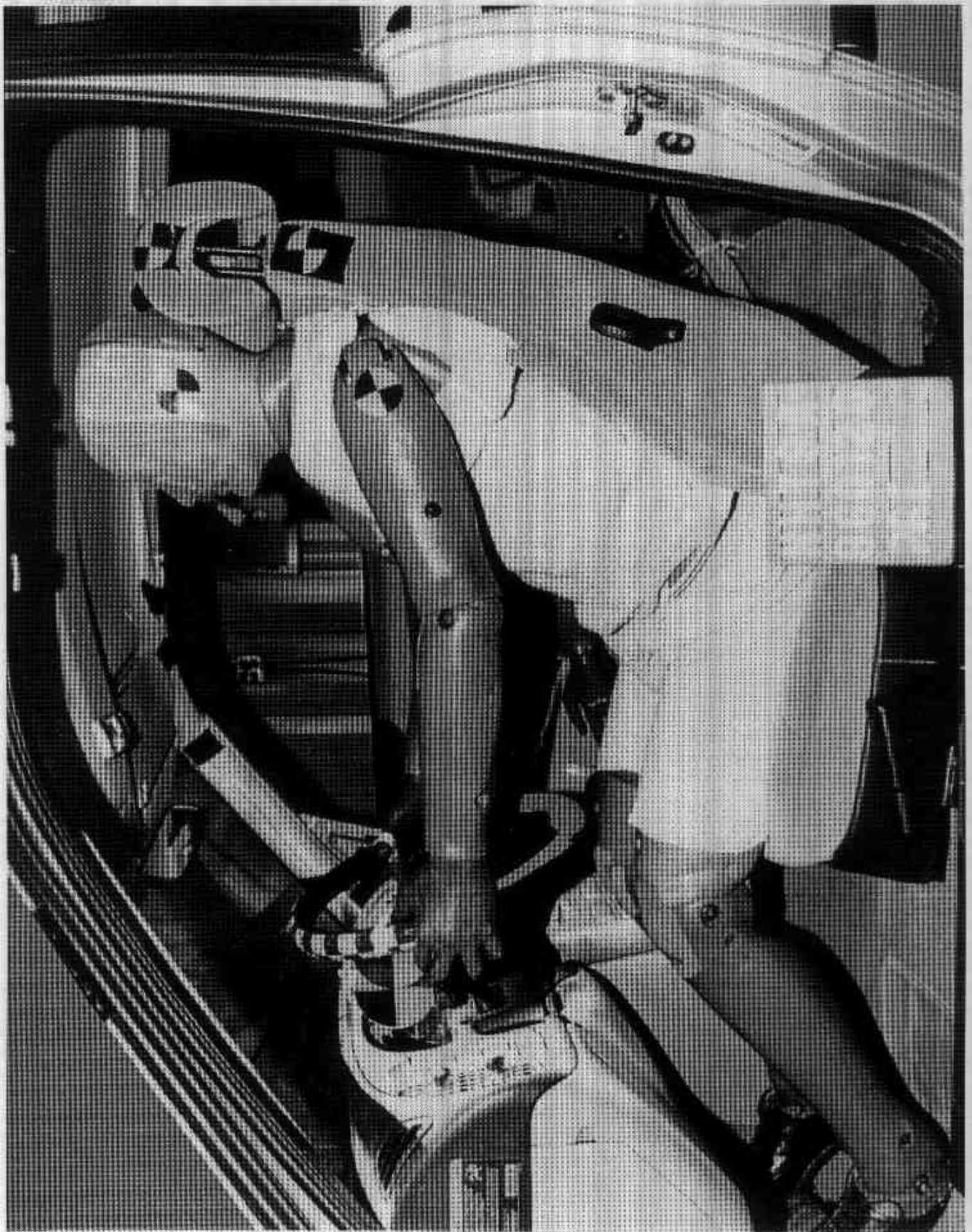


Figure A-12. Pre-Test Driver Dummy & Vehicle Interior View

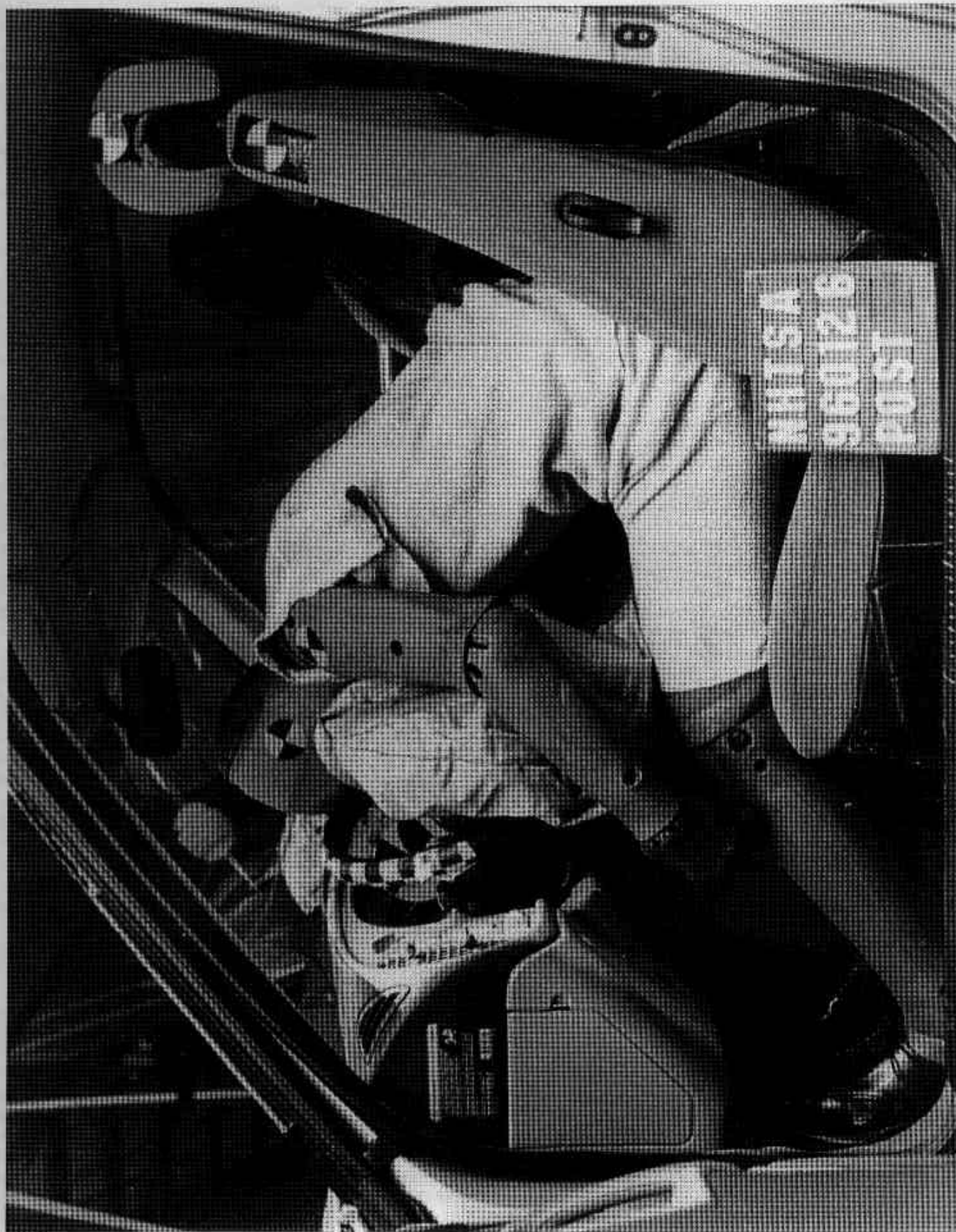


Figure A-13. Post-Test Driver Dummy & Vehicle Interior View

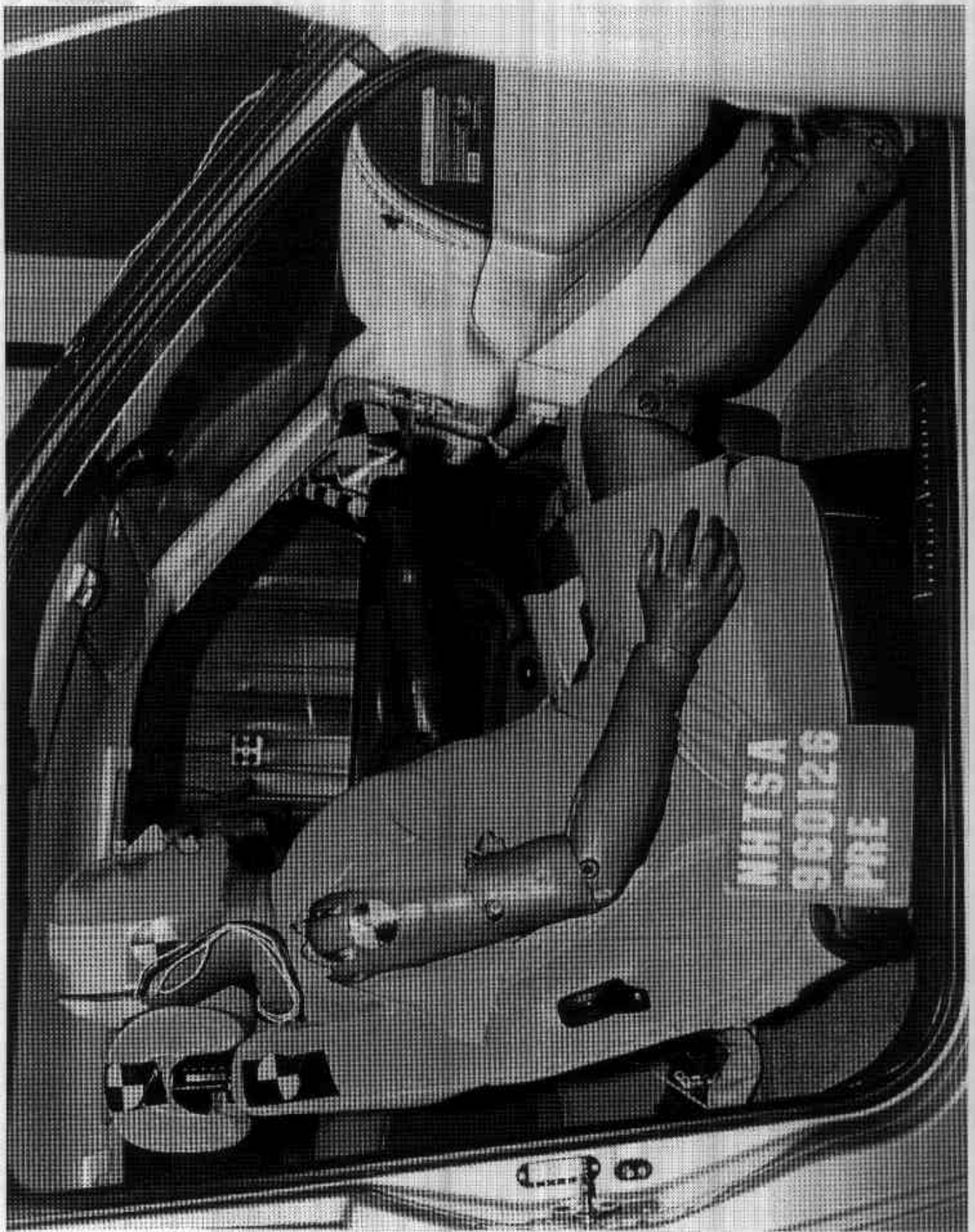


Figure A-14. Pre-Test Passenger Dummy & Vehicle Interior View



Figure A-15. Post-Test Passenger Dummy & Vehicle Interior View

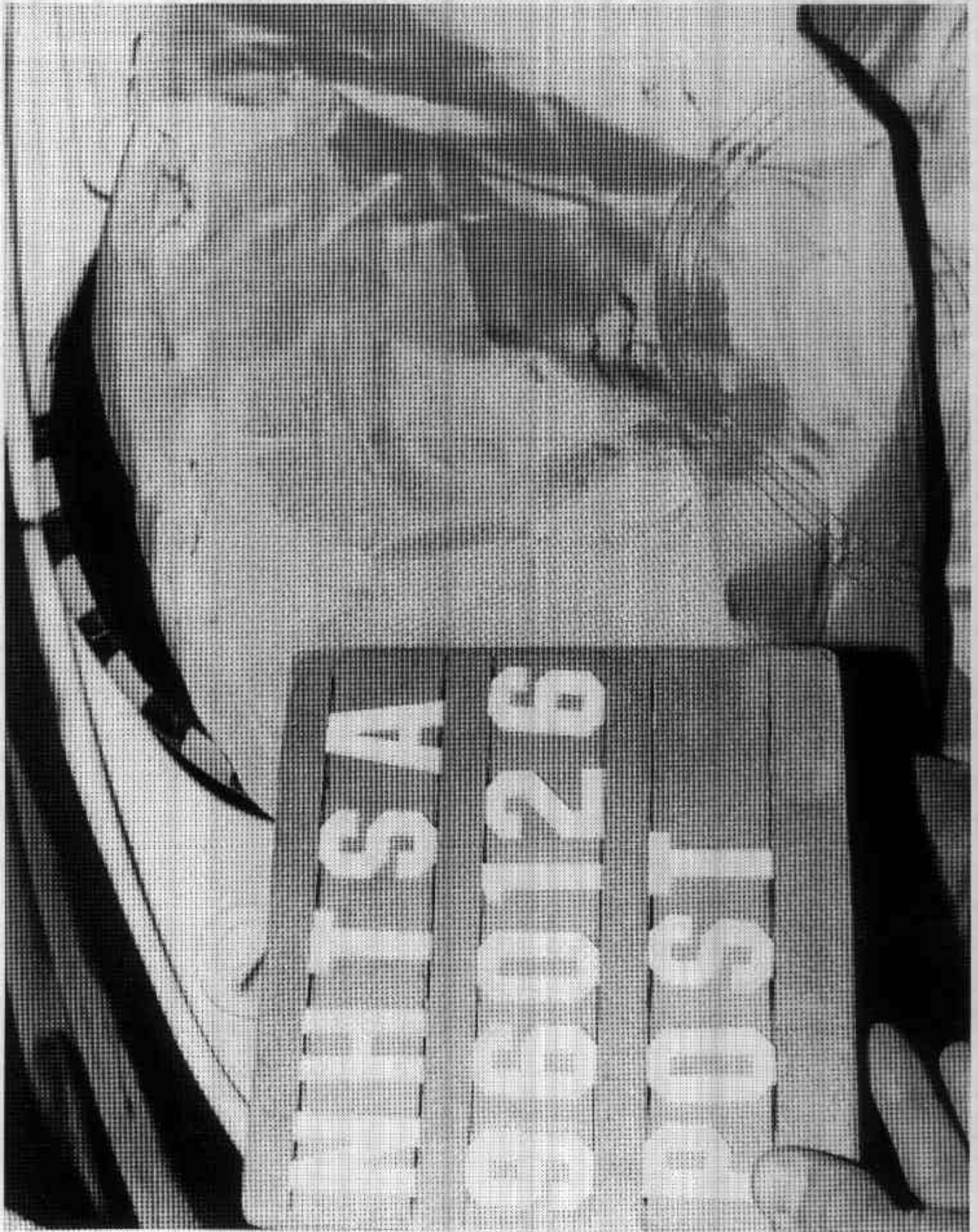


Figure A-16. Post-Test Driver Dummy Head Contact View

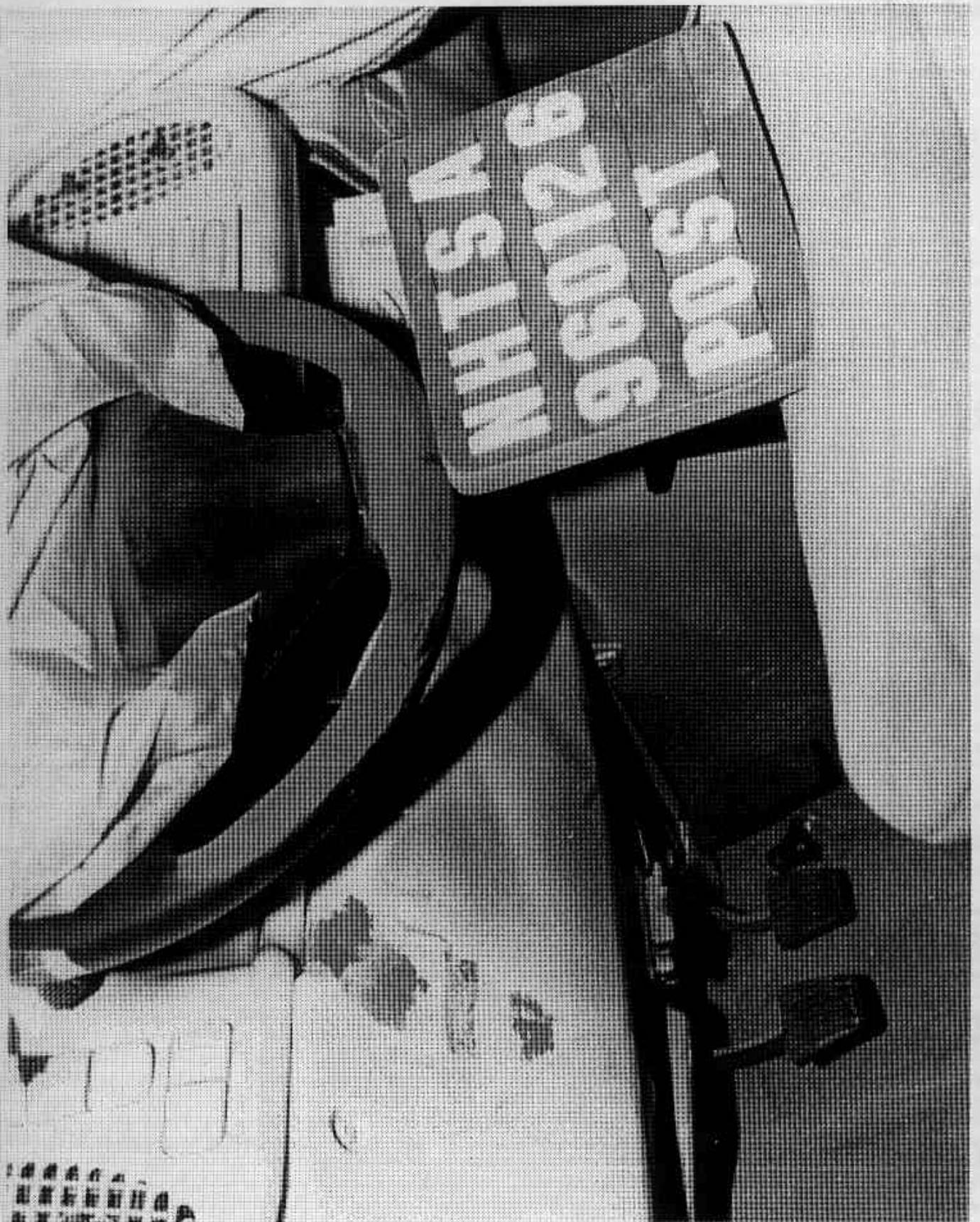


Figure A-17. Post-Test Driver Dummy Knee Contact View



Figure A-18. Post-Test Passenger Dummy Head Contact View

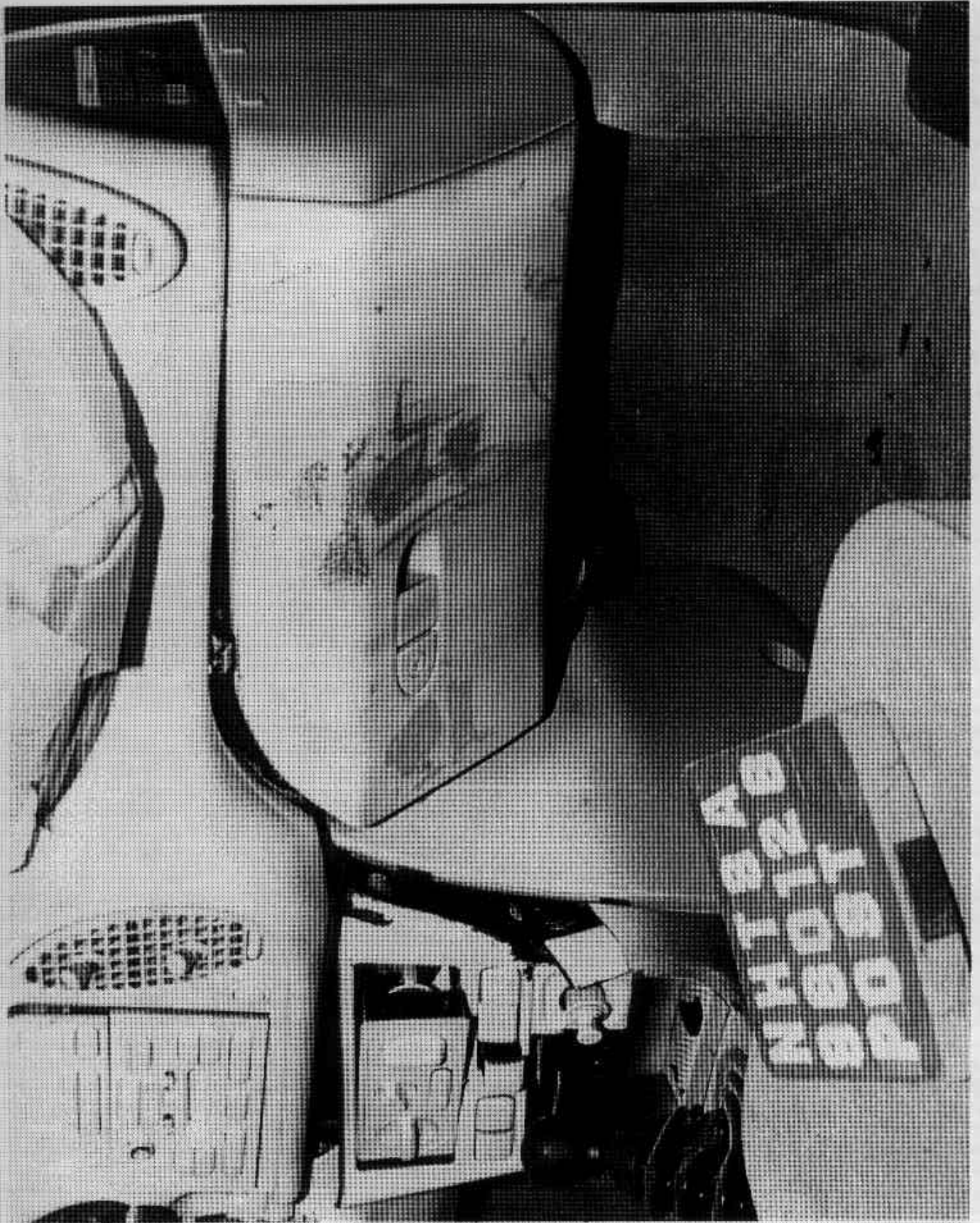


Figure A-19. Post-Test Passenger Dummy Knee Contact View

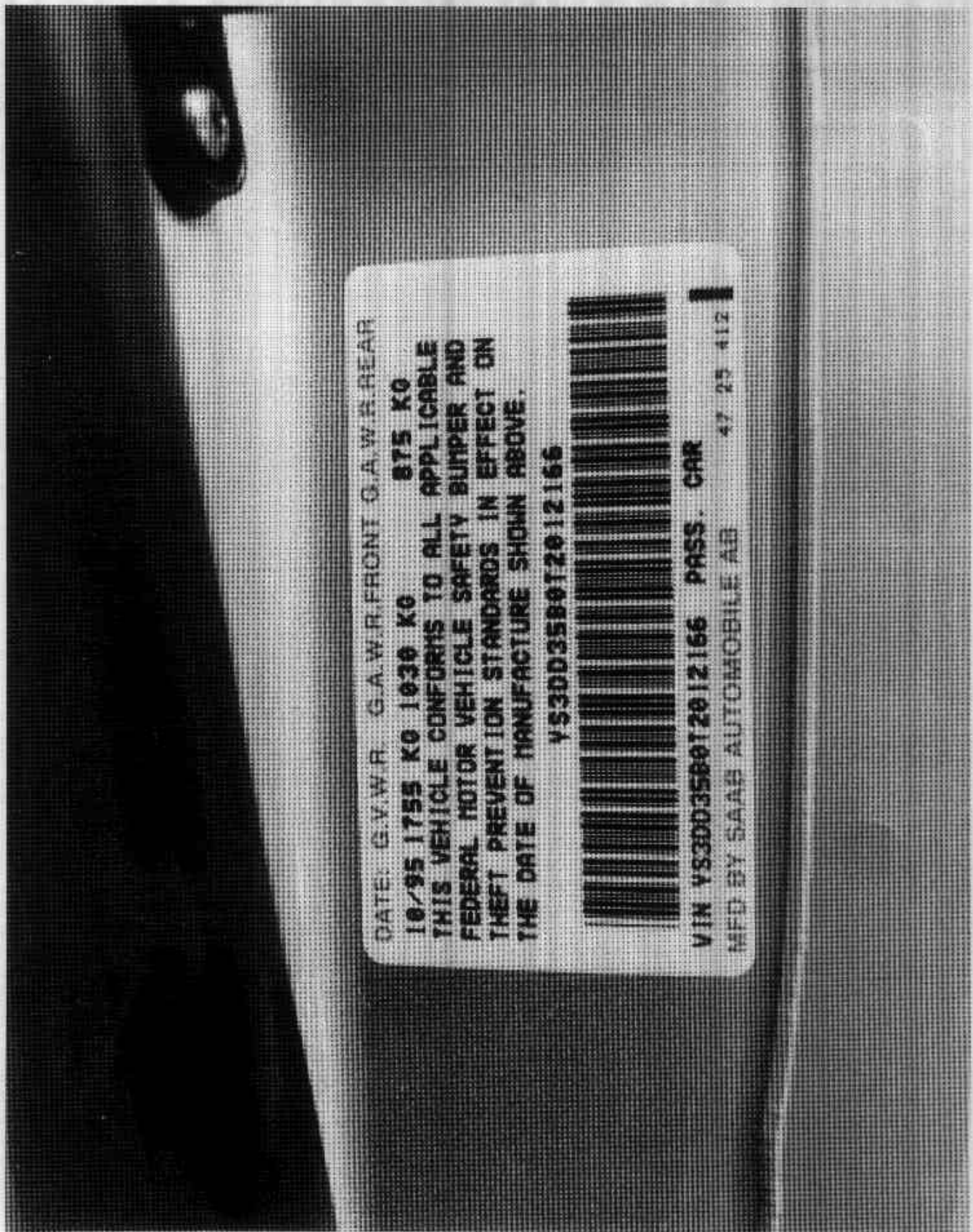


Figure A-20. Pre-Test Vehicle Certification Label View

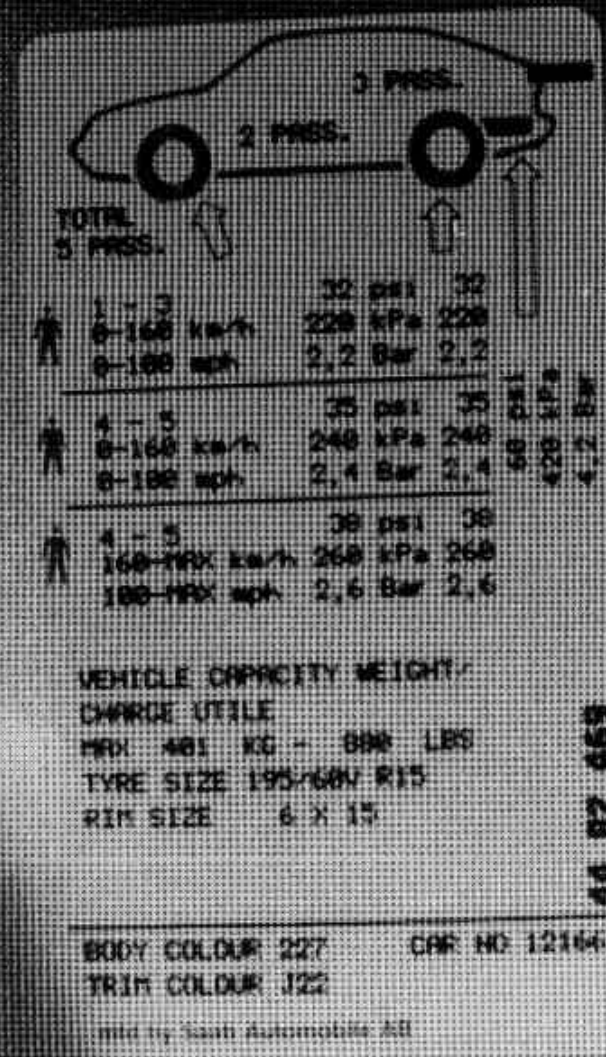


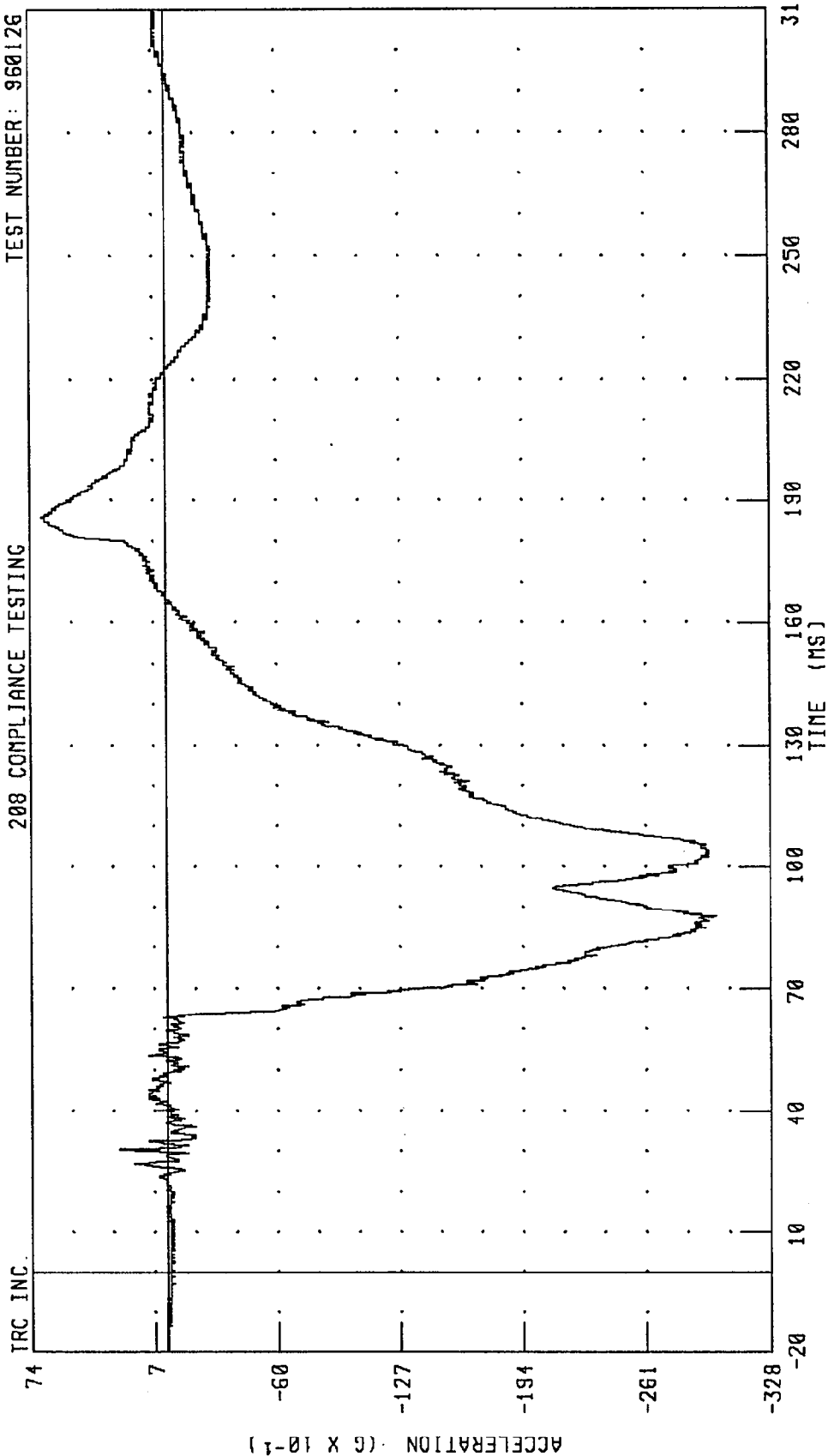
Figure A-21. Pre-Test Vehicle Recommended Tire Pressure Label View

Appendix B

Data Plots

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION
 200 COMPLIANCE TESTING

TEST NUMBER: 960126



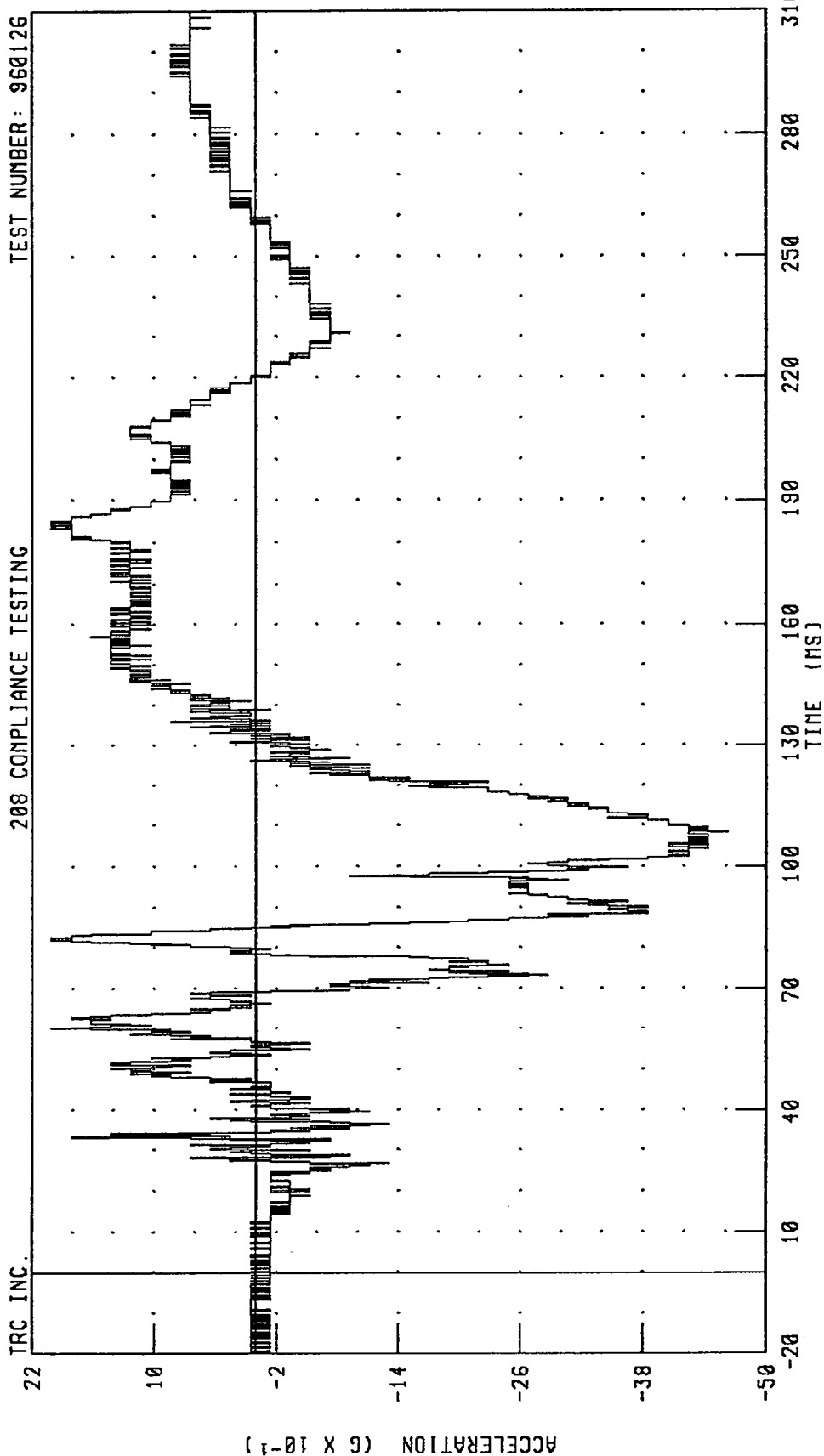
CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 6.76 G @ 185.84 MS; -29.91 G @ 87.68 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING



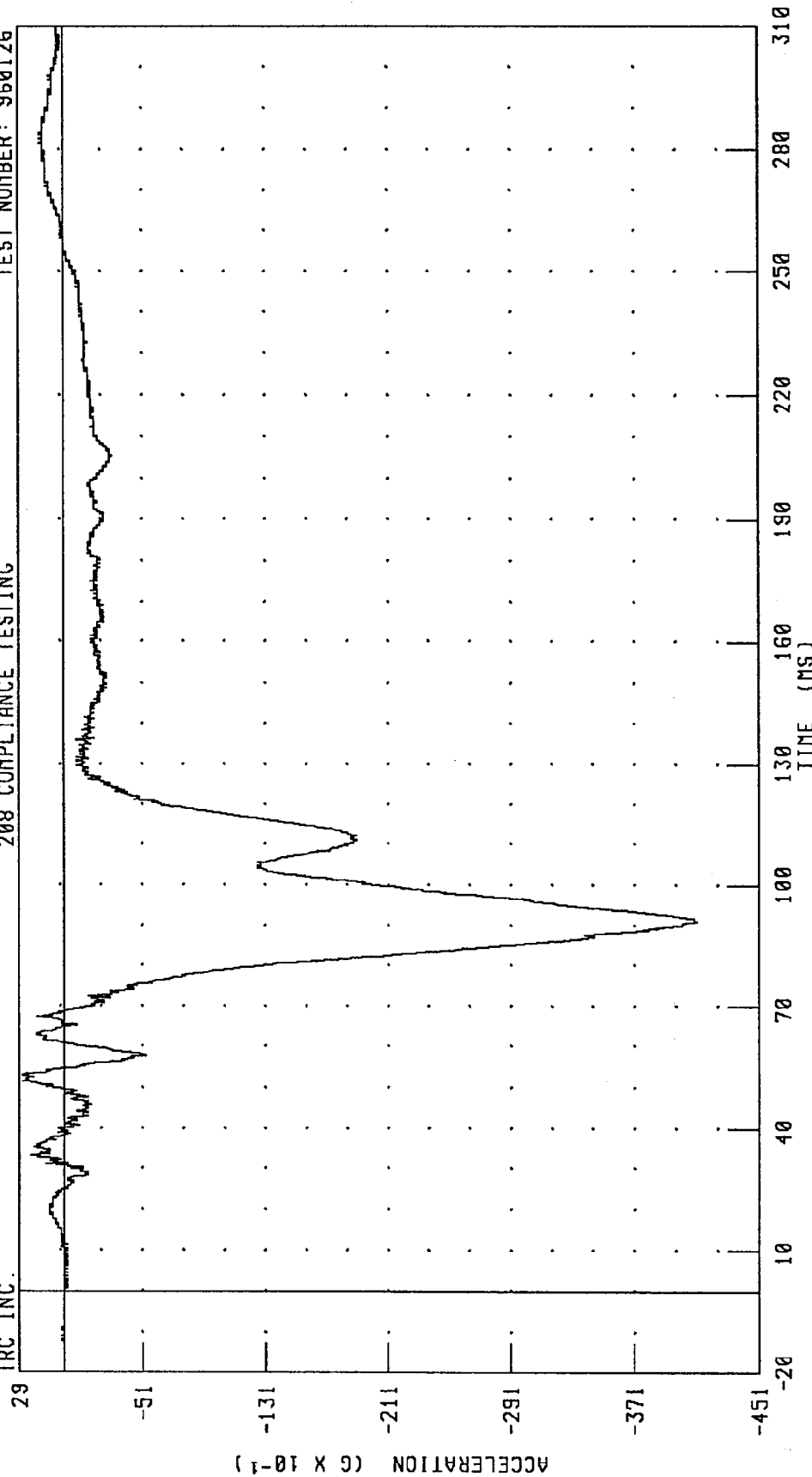
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 2.01 G @ 60.00 MS; -4.63 G @ 100.32 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



PEAK DATA: 2.70 G @ 51.44 MS; -41.15 G @ 91.12 MS

CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

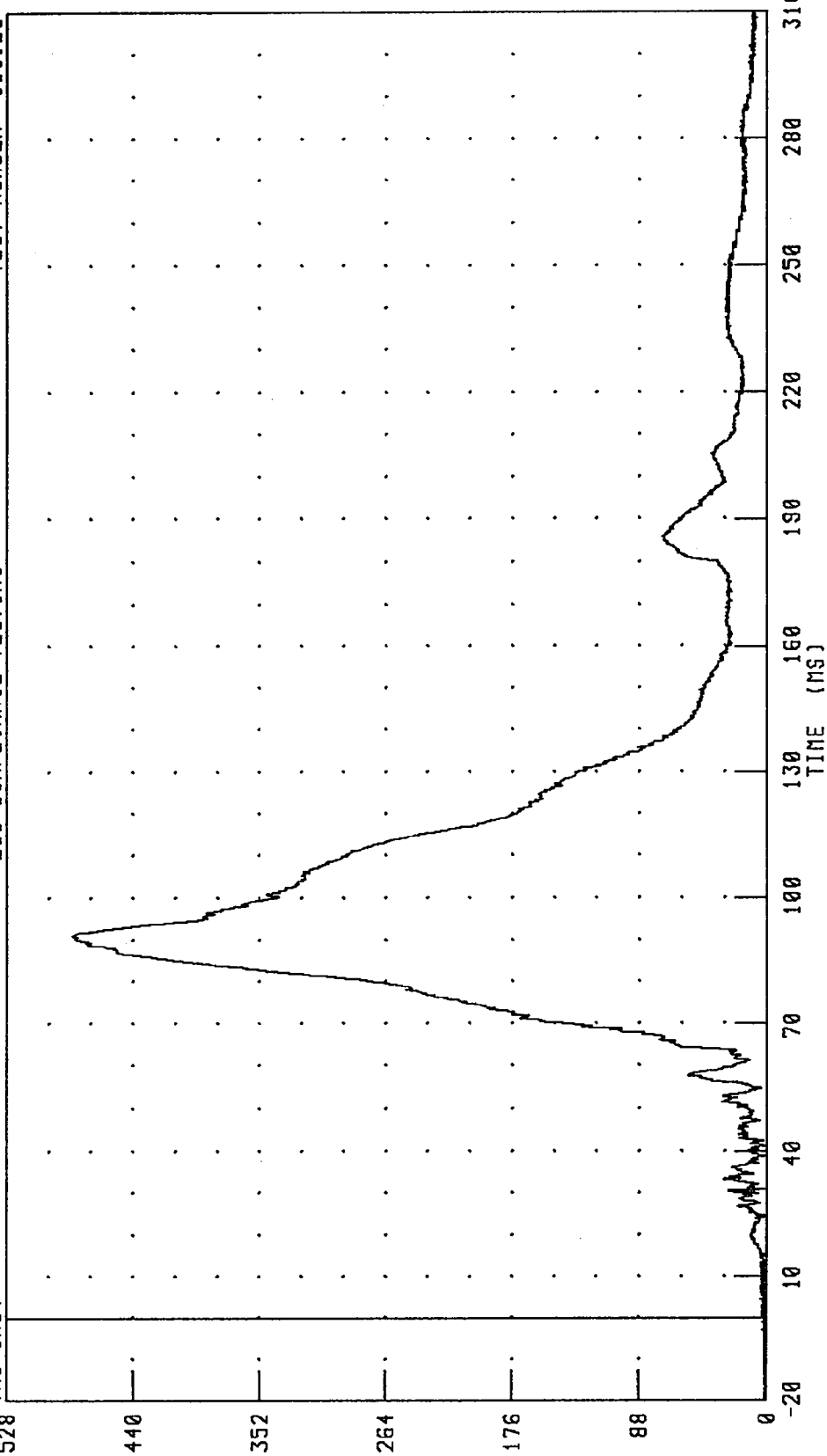
TEST NUMBER: 960126

208 COMPLIANCE TESTING

TRC INC.

528

ACCELERATION ($G \times 10^{-1}$)

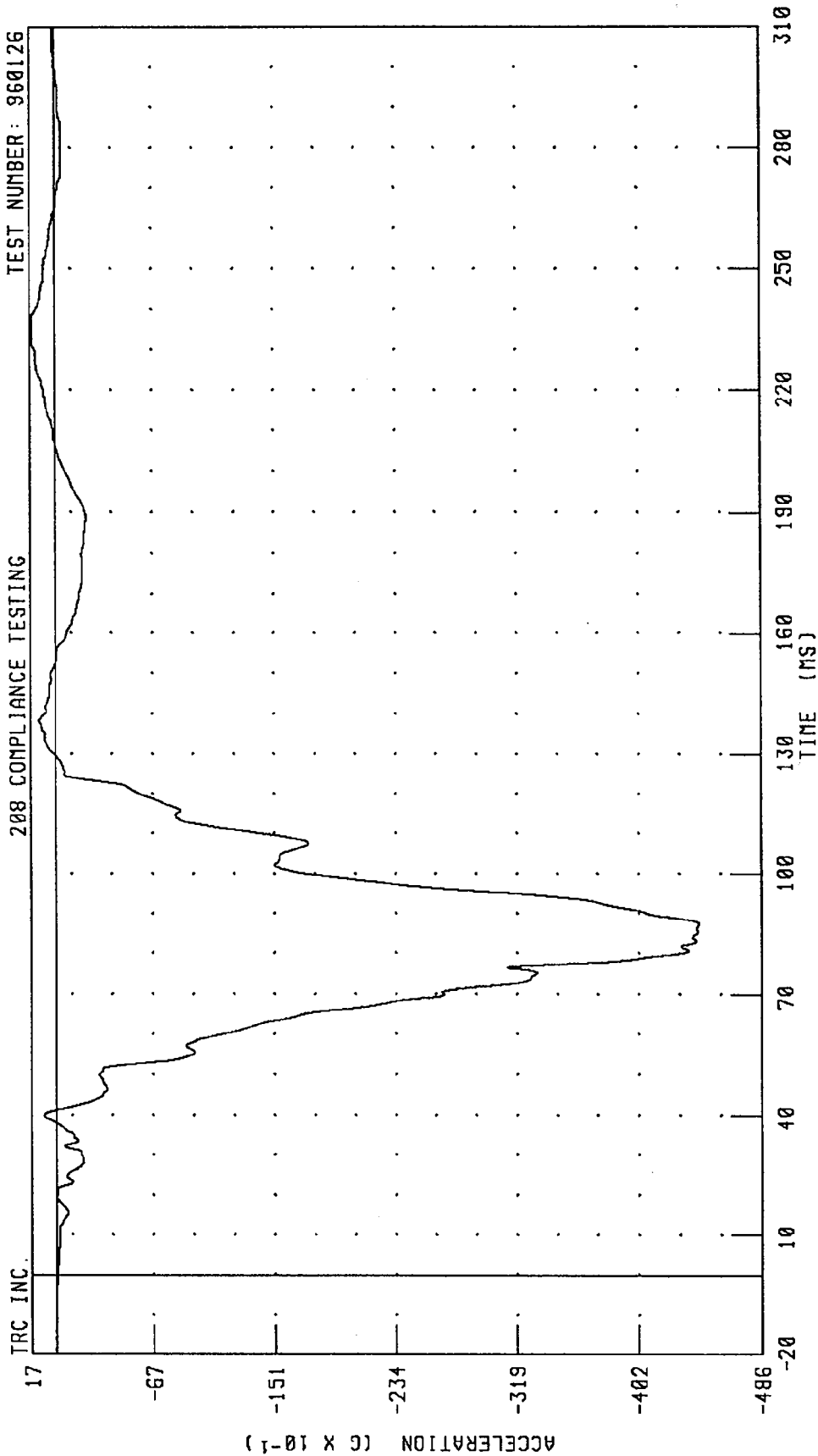


CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

PEAK DATA: 48.25 G @ 91.12 MS; 0.09 G @ -19.84 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126



CHANNEL: CSTXG1 FILTER: CH. CLASS 180

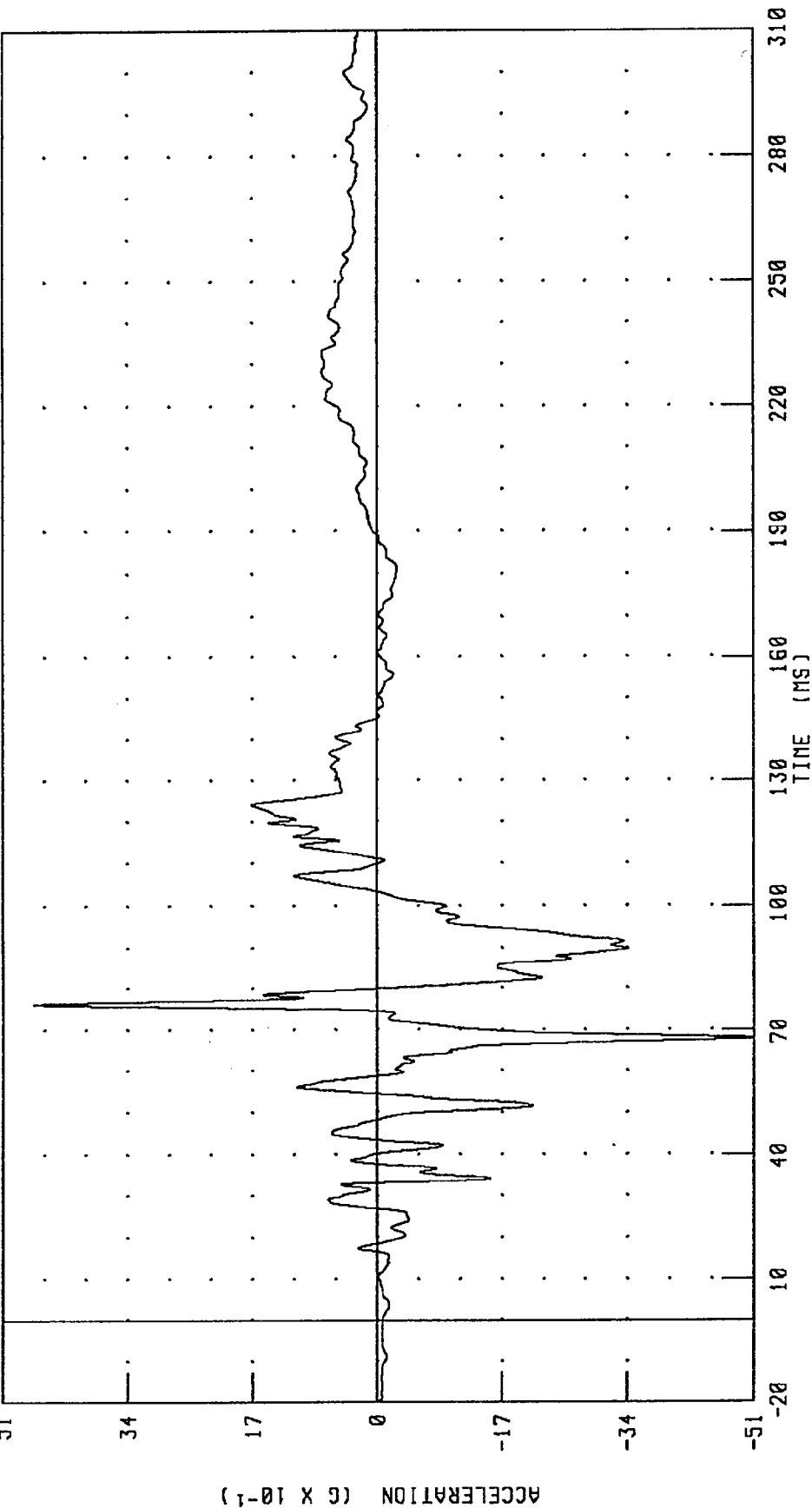
PEAK DATA: 1.55 G @ 237.68 MS; -44.40 G @ 87.28 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING

TRC INC.

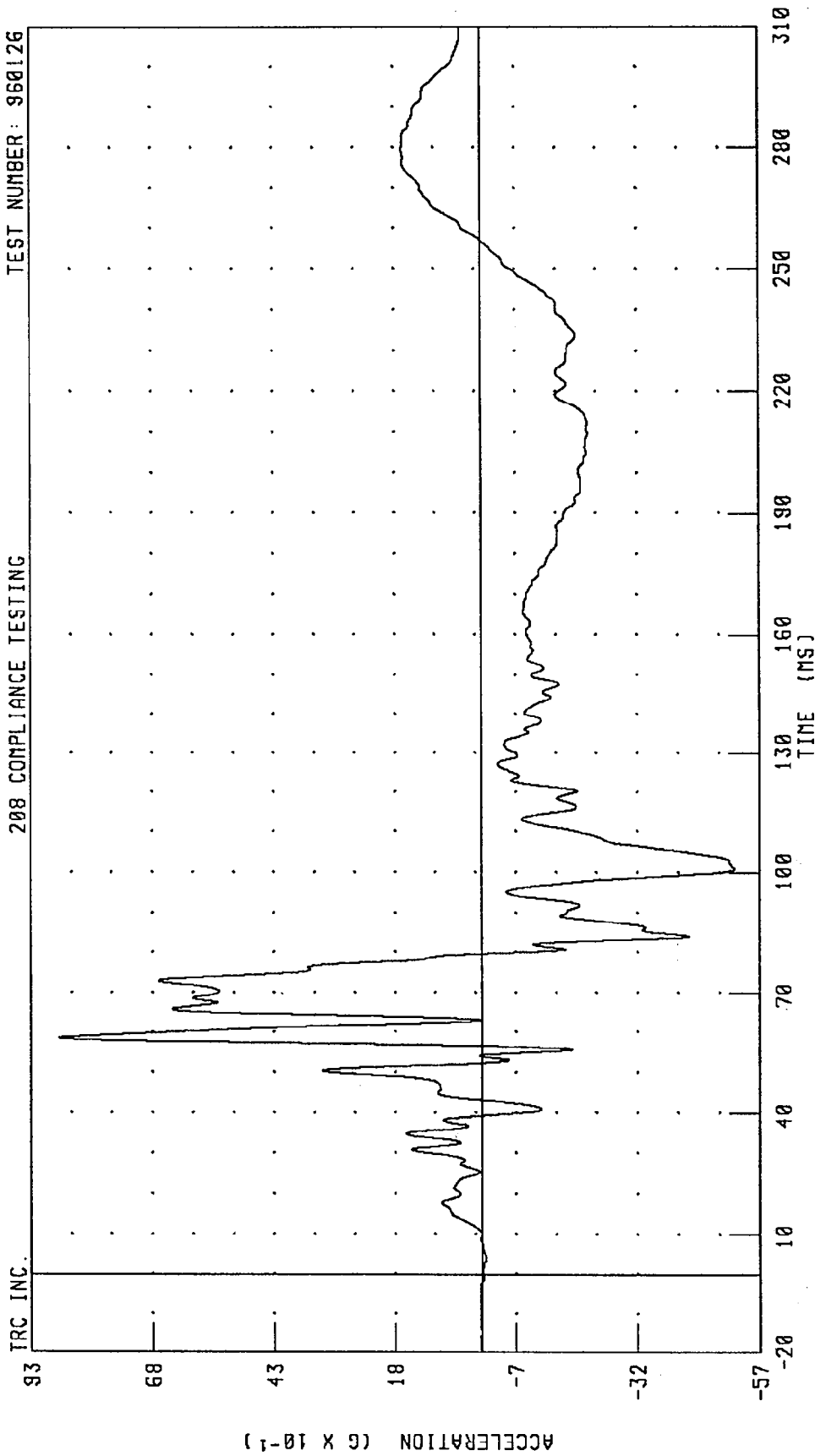


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 4.67 G @ 76.32 MS, -5.11 G @ 67.92 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126



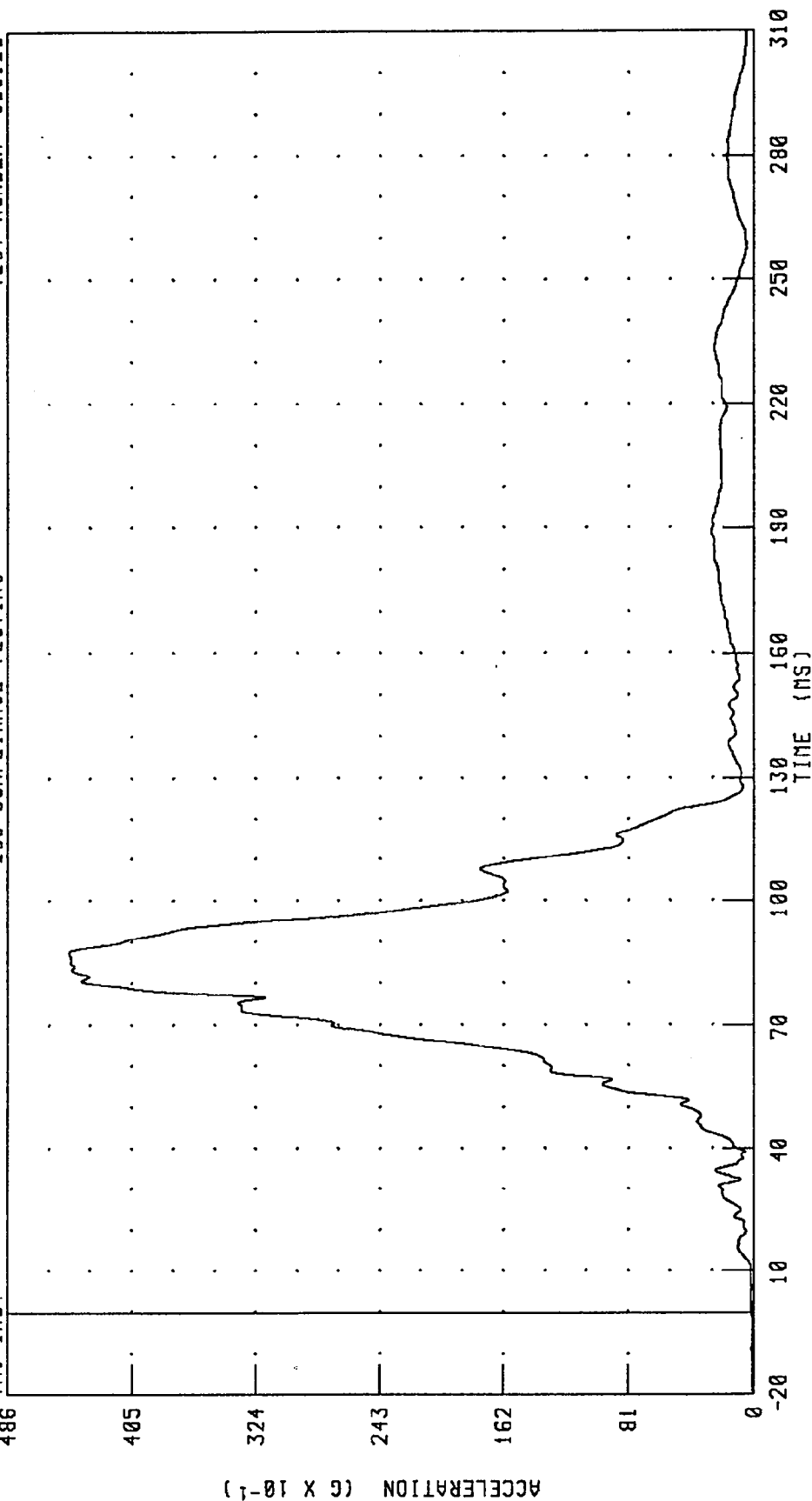
PEAK DATA: 8.71 G @ 58.48 MS; -5.19 G @ 100.88 MS

CHANNEL: CSTZG1 FILTER: CH. CLASS 180

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.

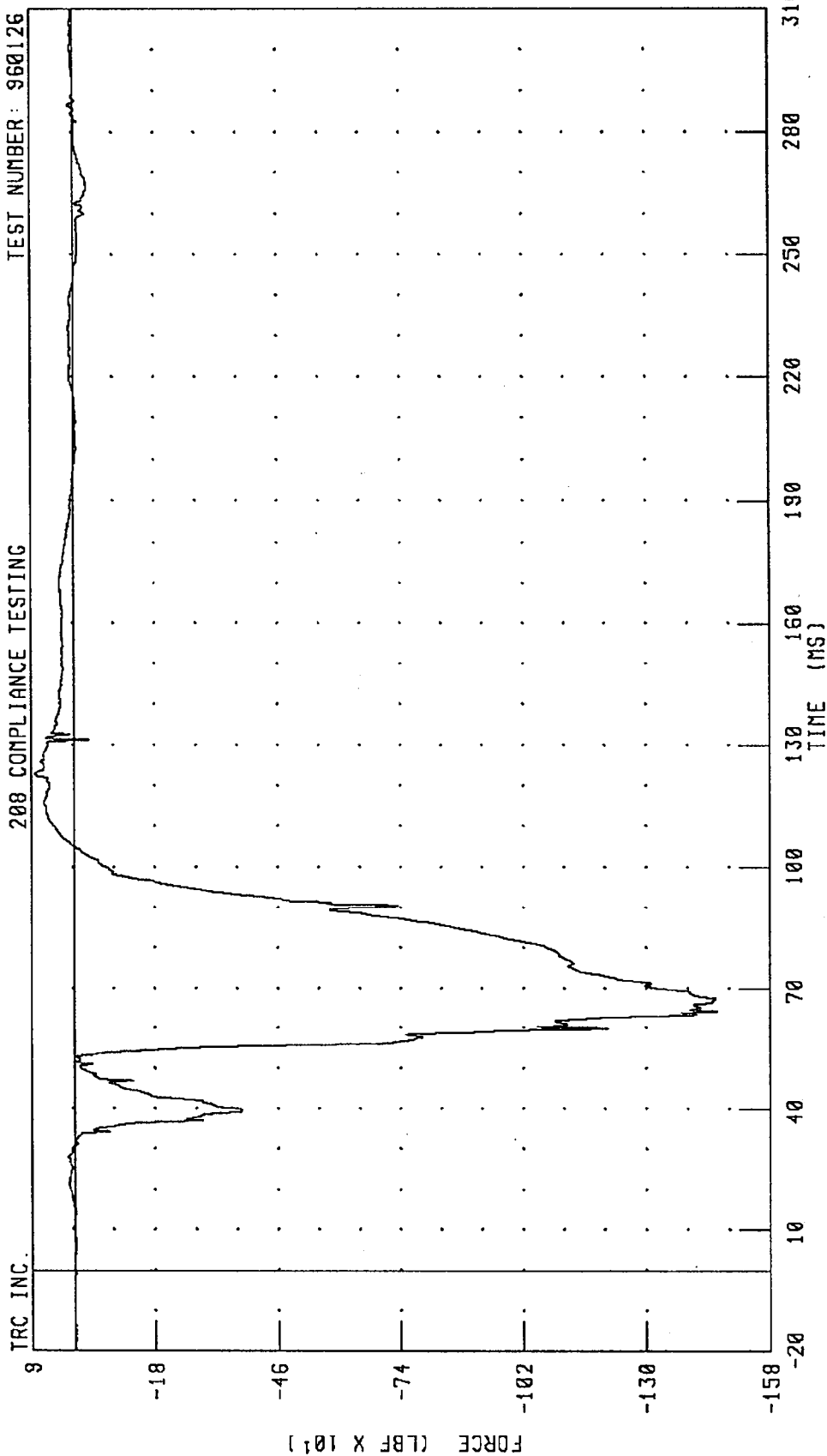


PEAK DATA: 44.57 G @ 87.28 MS; 0.01 G @ -20.00 MS

CHANNEL: CSTRG1 FILTER: CH. CLASS 180

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER LEFT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960126



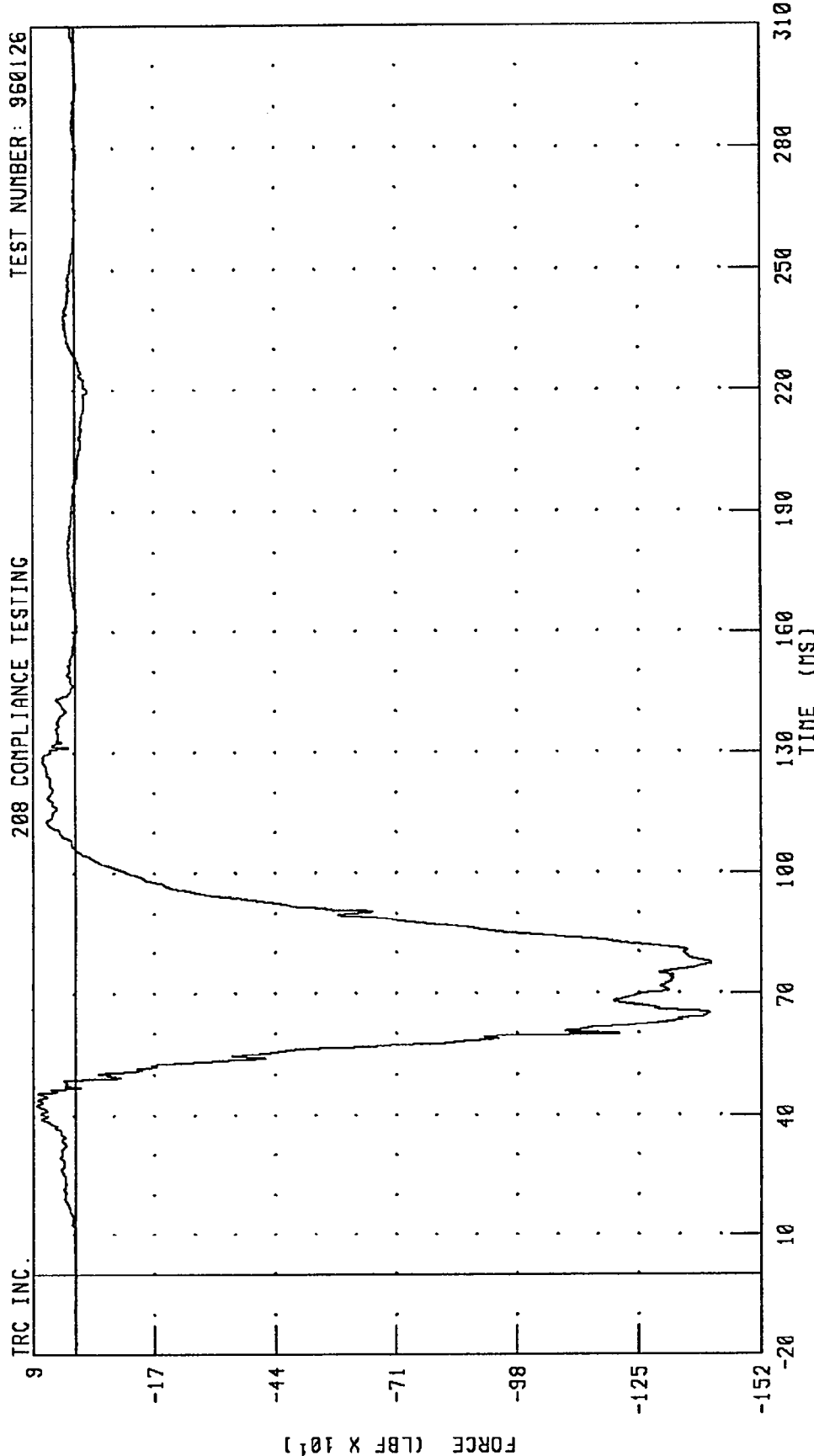
PEAK DATA: 89.70 LBF @ 123.04 MS; -1462.40 LBF @ 64.24 MS

CHANNEL: LFMF1 FILTER: CH. CLASS 600

1996 SAB 900S INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.

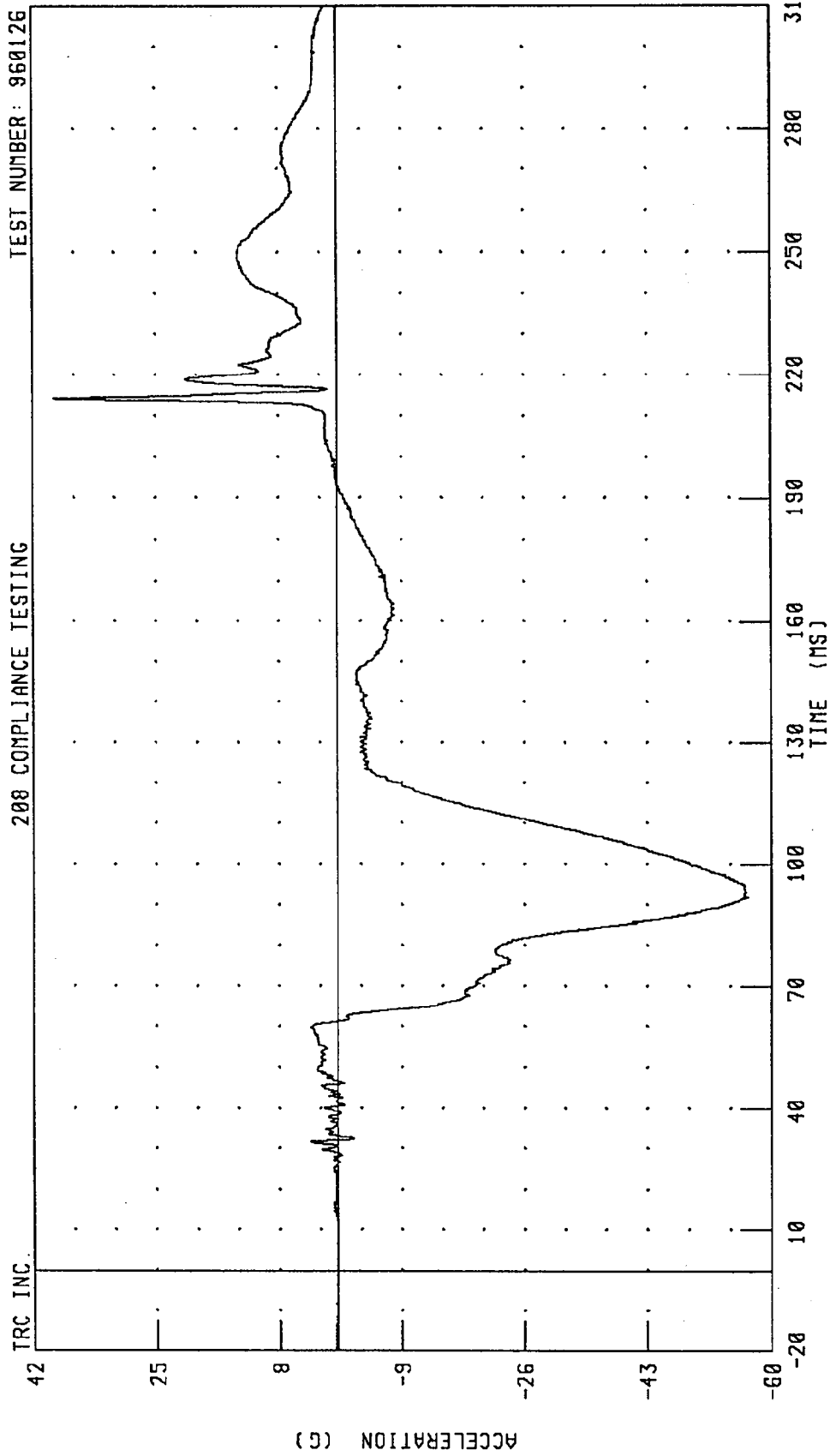


PEAK DATA: 86.17 LBF @ 42.72 MS; -1415.61 LBF @ 77.28 MS

CHANNEL: RFMF1 FILTER: CH. CLASS 600

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
 200 COMPLIANCE TESTING

TEST NUMBER: 960126



CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

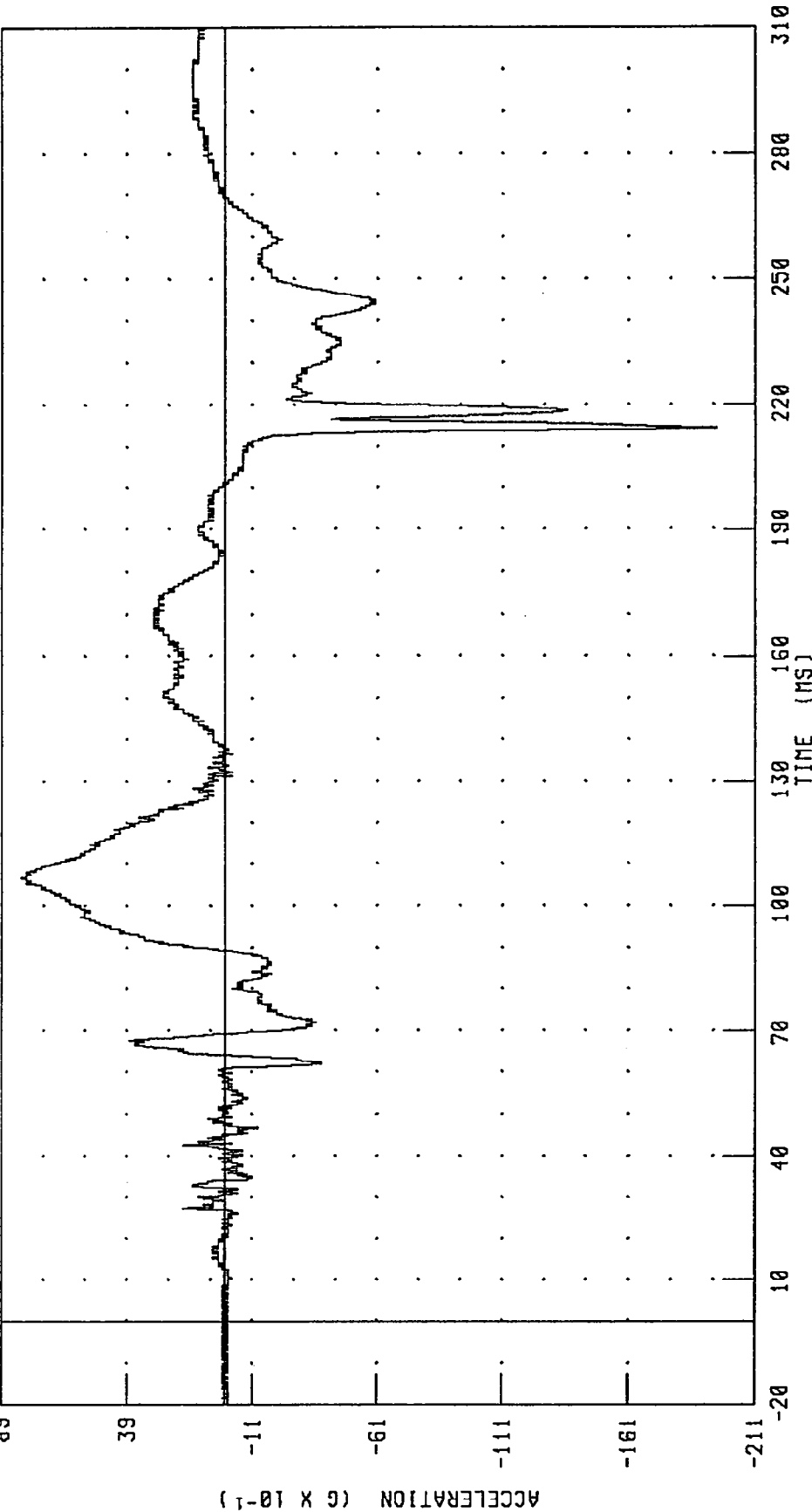
PEAK DATA: 39.03 G @ 214.16 MS; -56.72 G @ 92.00 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING

TRC INC.

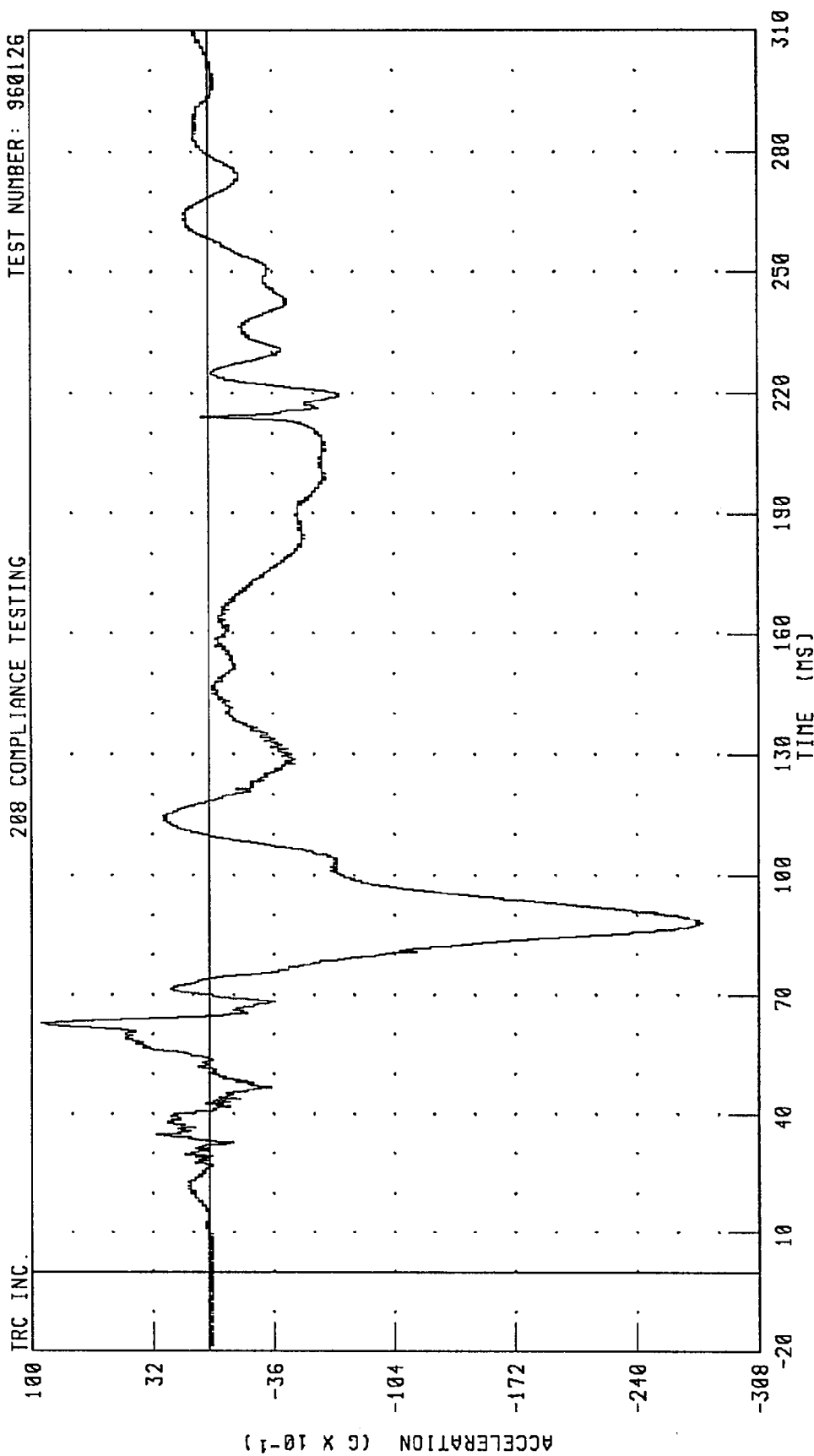


PEAK DATA: 8.13 G @ 106.64 MS; -19.55 G @ 214.32 MS

CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

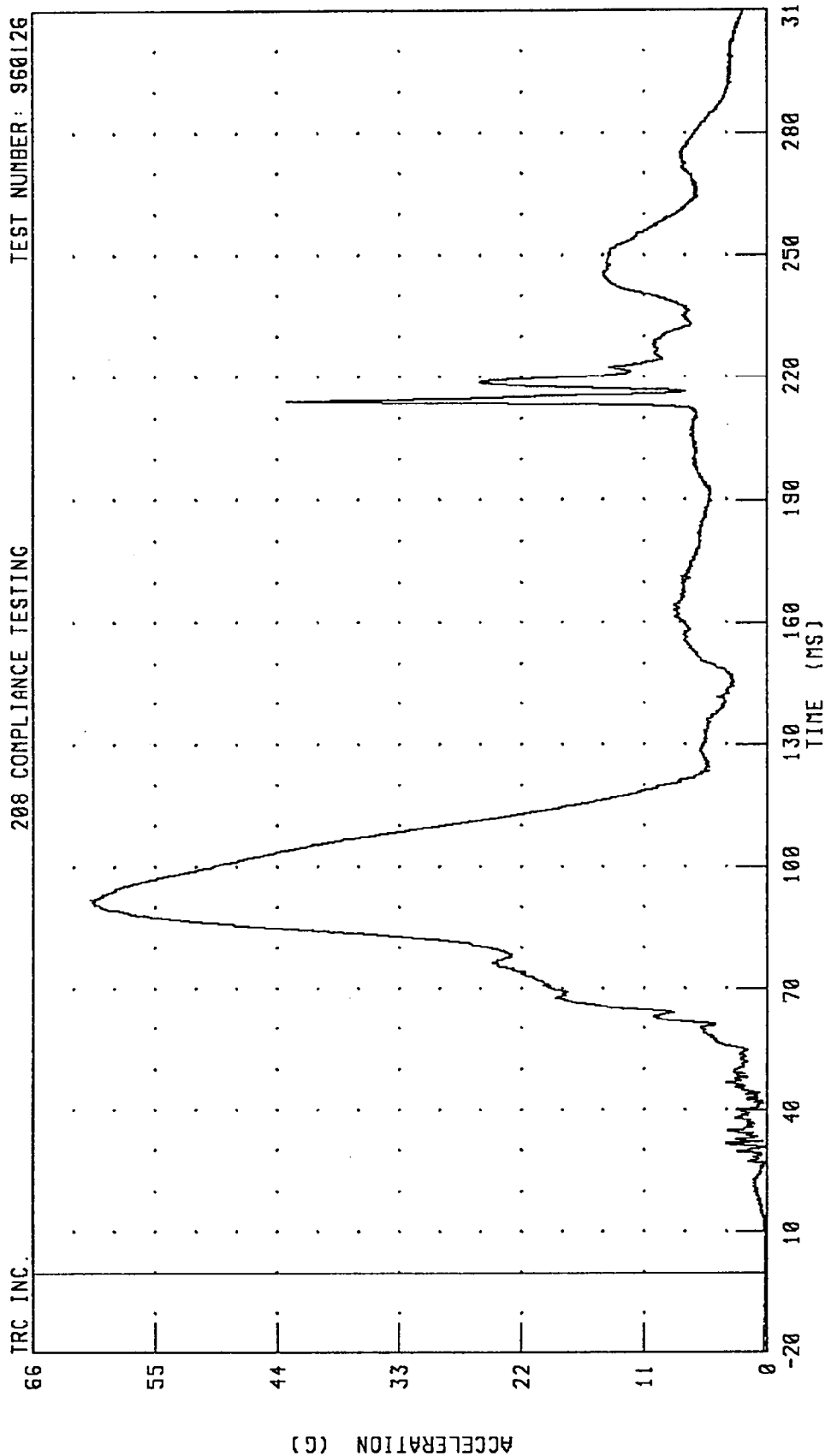


CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 9.44 G @ 62.88 MS; -27.67 G @ 88.00 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126



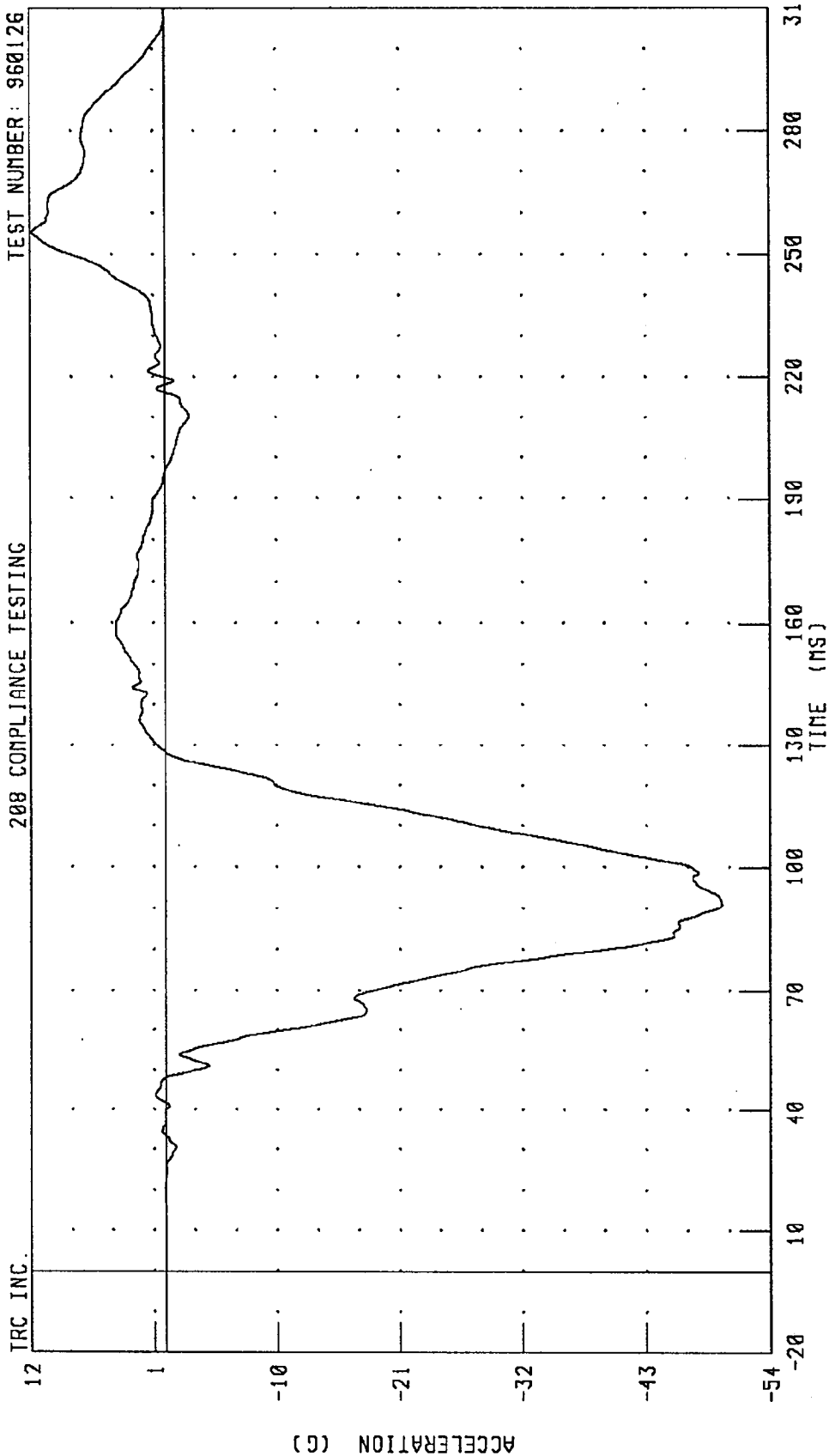
PEAK DATA: 60.86 G @ 92.00 MS; 0.14 G @ -18.40 MS

CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



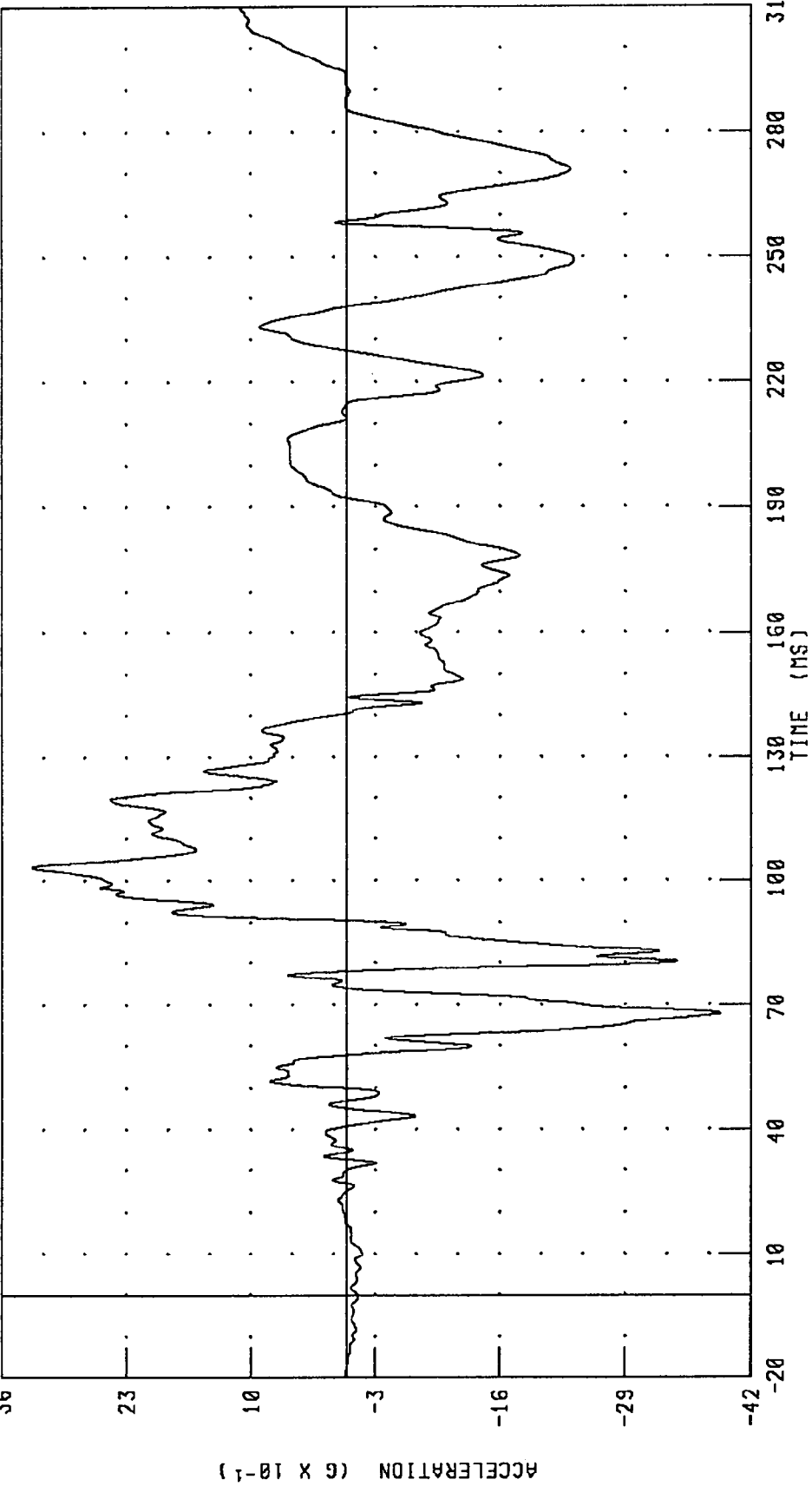
PEAK DATA: 11.77 G @ 255.36 MS; -49.72 G @ 91.04 MS

CHANNEL: CSTXC2 FILTER: CH. CLASS 180

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



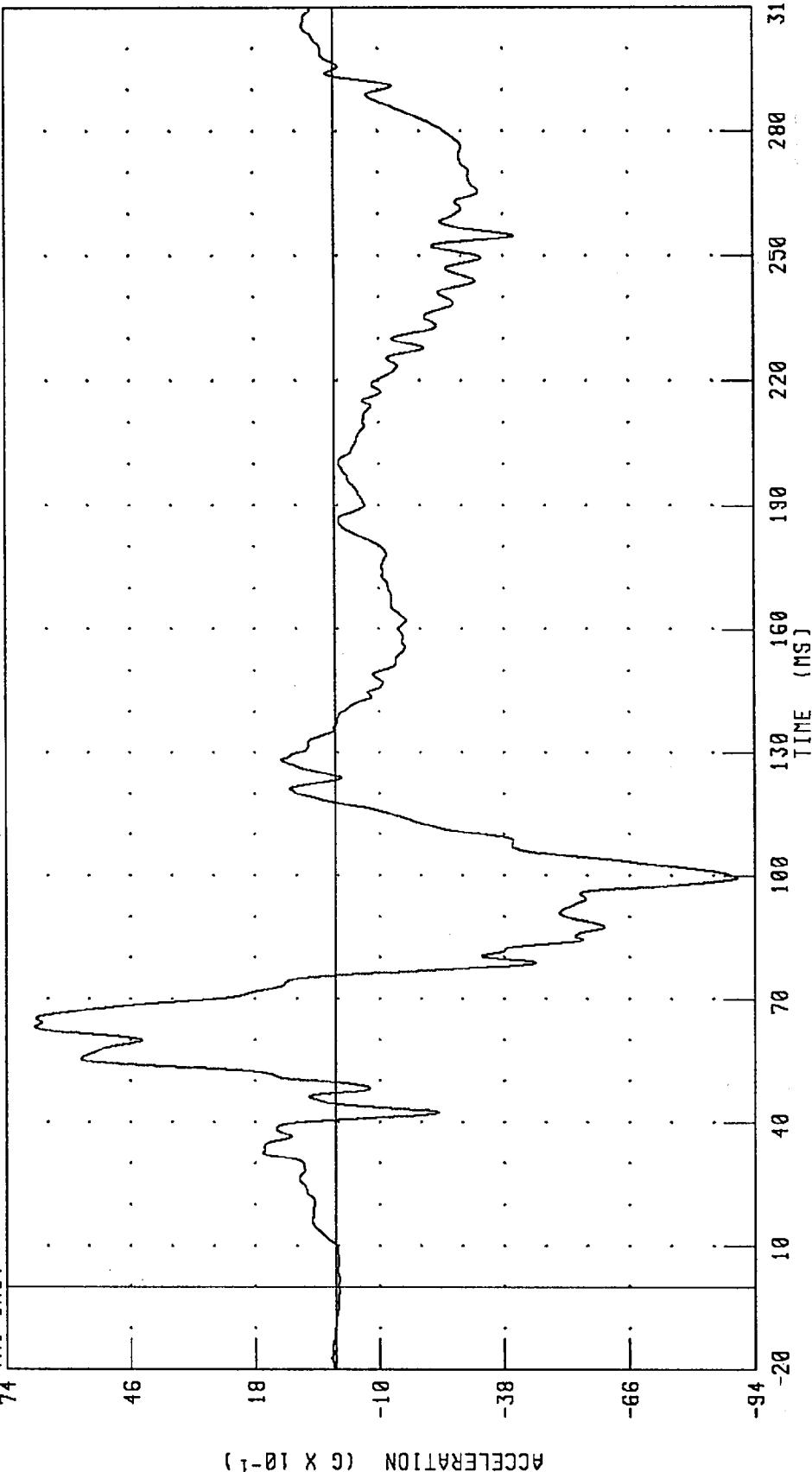
CHANNEL: CSTYG2 FILTER: CH. CLASS 180

PEAK DATA: 3.29 G @ 103.20 MS; -3.88 G @ 67.92 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



CHANNEL: CSTZG2 FILTER: CH. CLASS 180

PEAK DATA: 6.75 G @ 63.20 MS; -9.00 G @ 99.44 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING

TRC INC.

546

455

364

273

182

91

0

ACCELERATION ($G \times 10^{-1}$)

TIME (MS)

310

280

250

220

190

160

130

100

70

40

10

-20

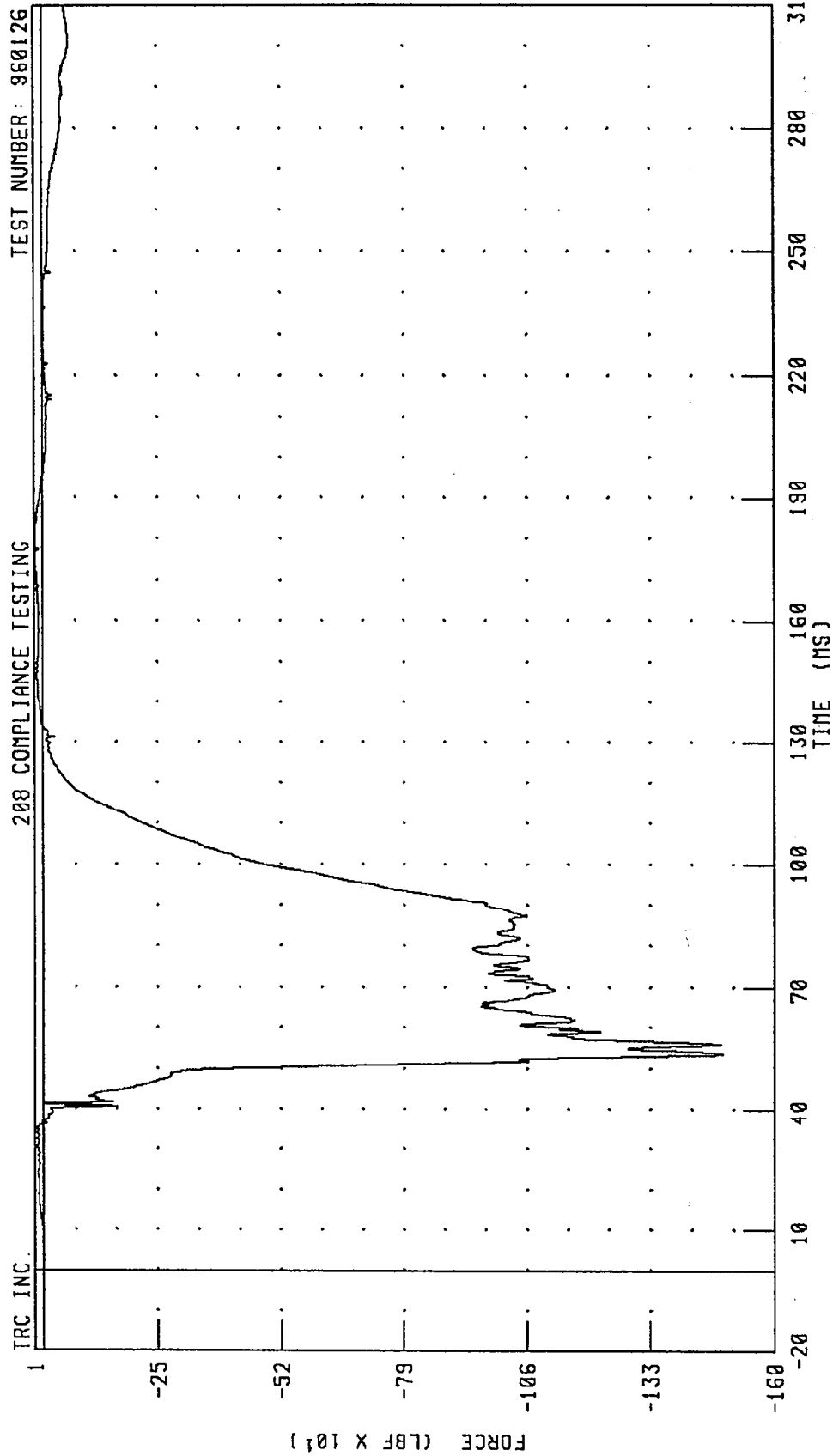
CHANNEL: CSTRG2 FILTER: CH. CLASS 180

PEAK DATA: 49.98 G @ 91.12 MS; 0.00 G @ -20.00 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



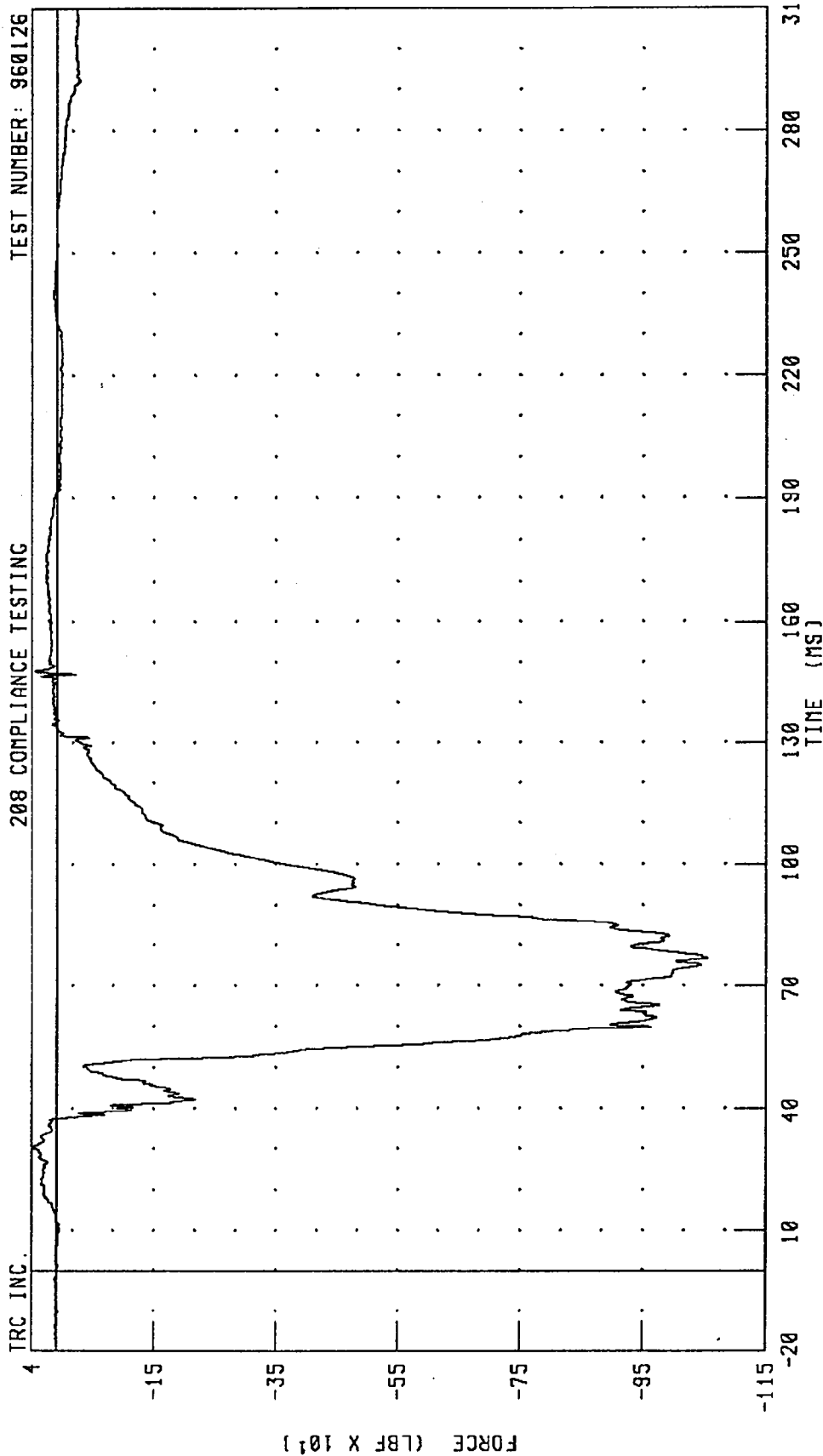
PEAK DATA: 17.43 LBF @ 180.96 MS; -1489.09 LBF @ 53.52 MS

CHANNEL: LFMF2 FILTER: CH. CLASS 600

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

TEST NUMBER: 960126

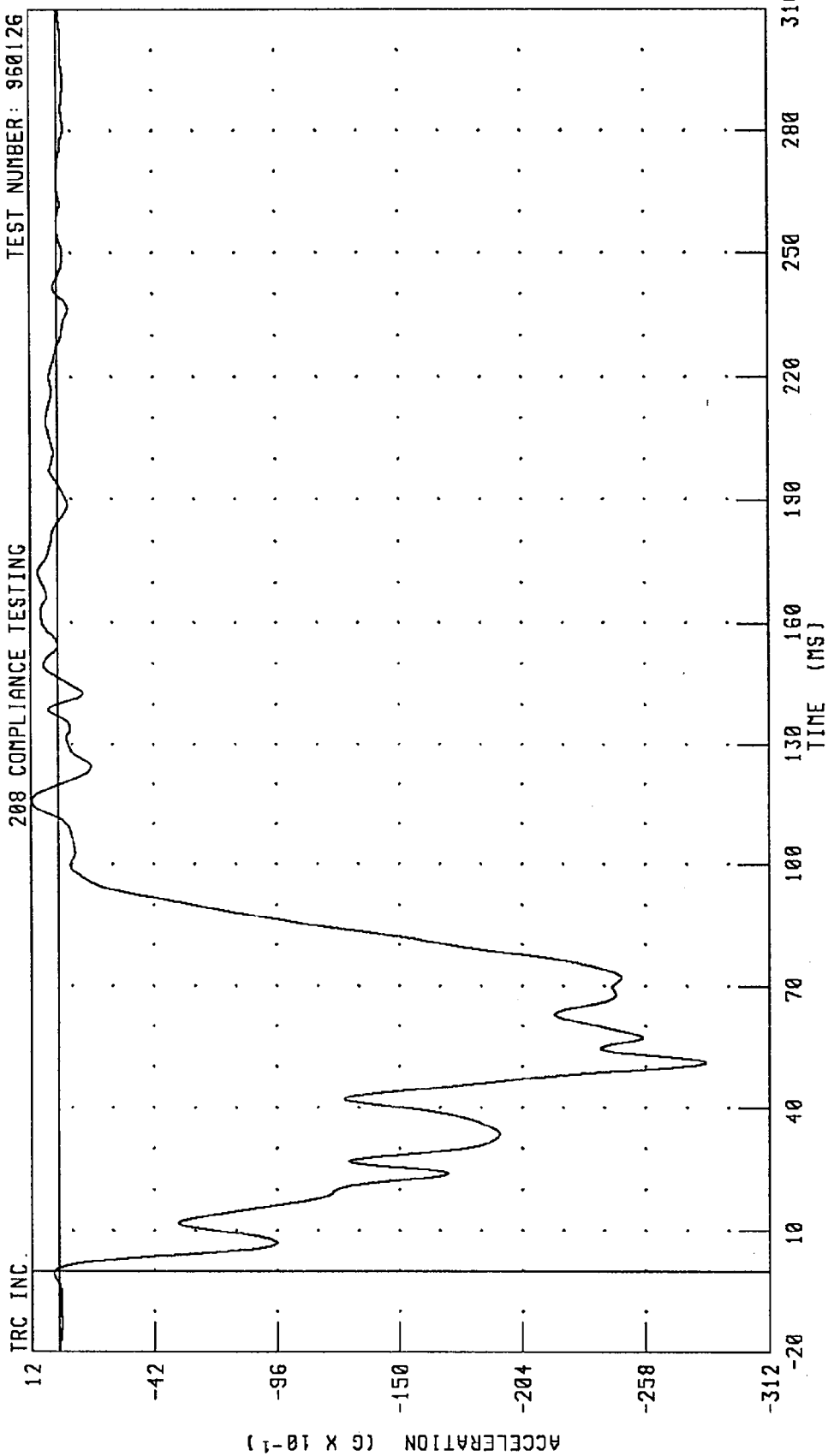
208 COMPLIANCE TESTING



CHANNEL: RFMF2 FILTER: CH. CLASS 600

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126

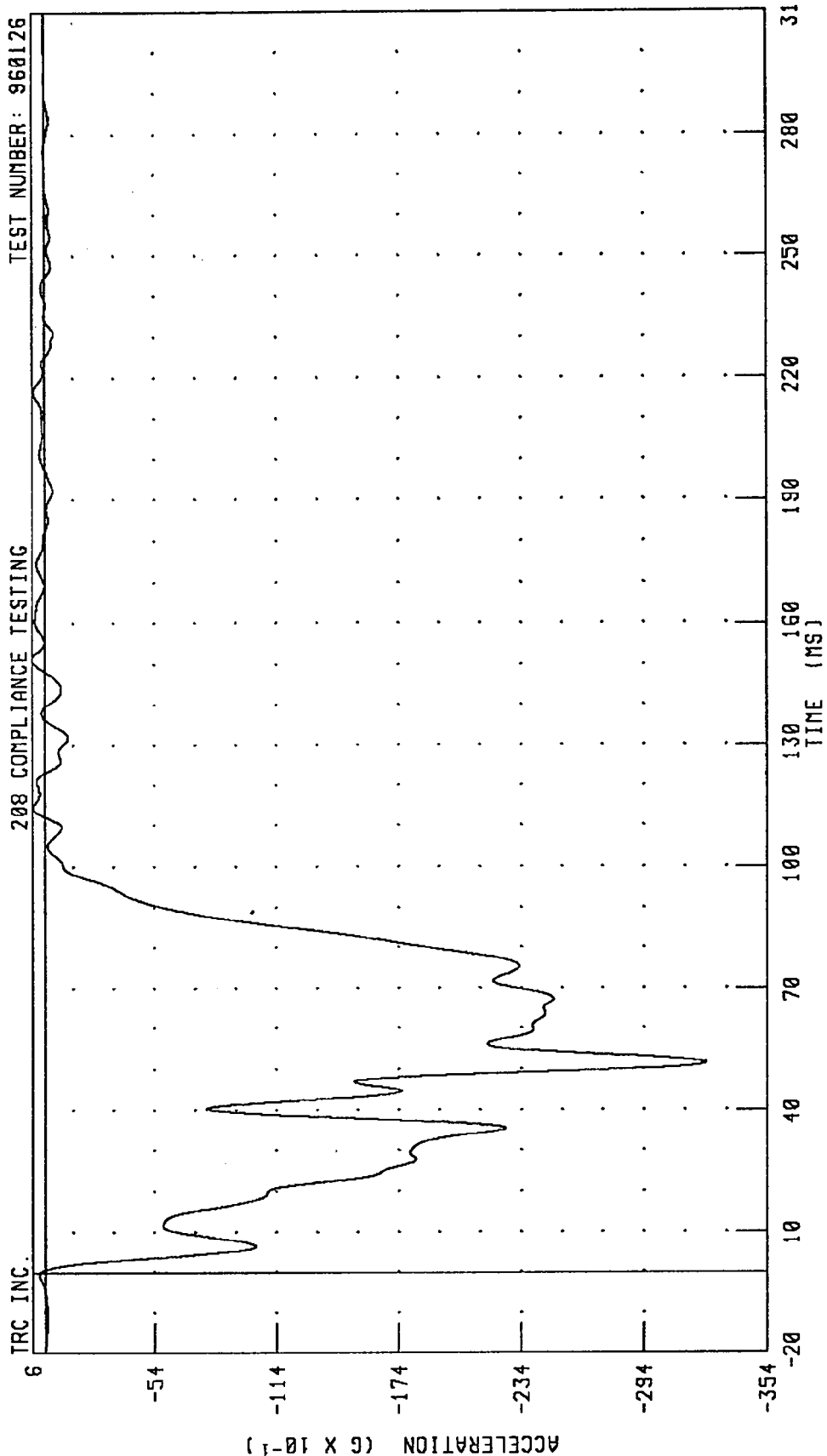


CHANNEL: TLRXG1 FILTER: CH. CLASS 60

PEAK DATA: 1.16 G @ 116.00 MS; -28.42 G @ 51.04 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960126

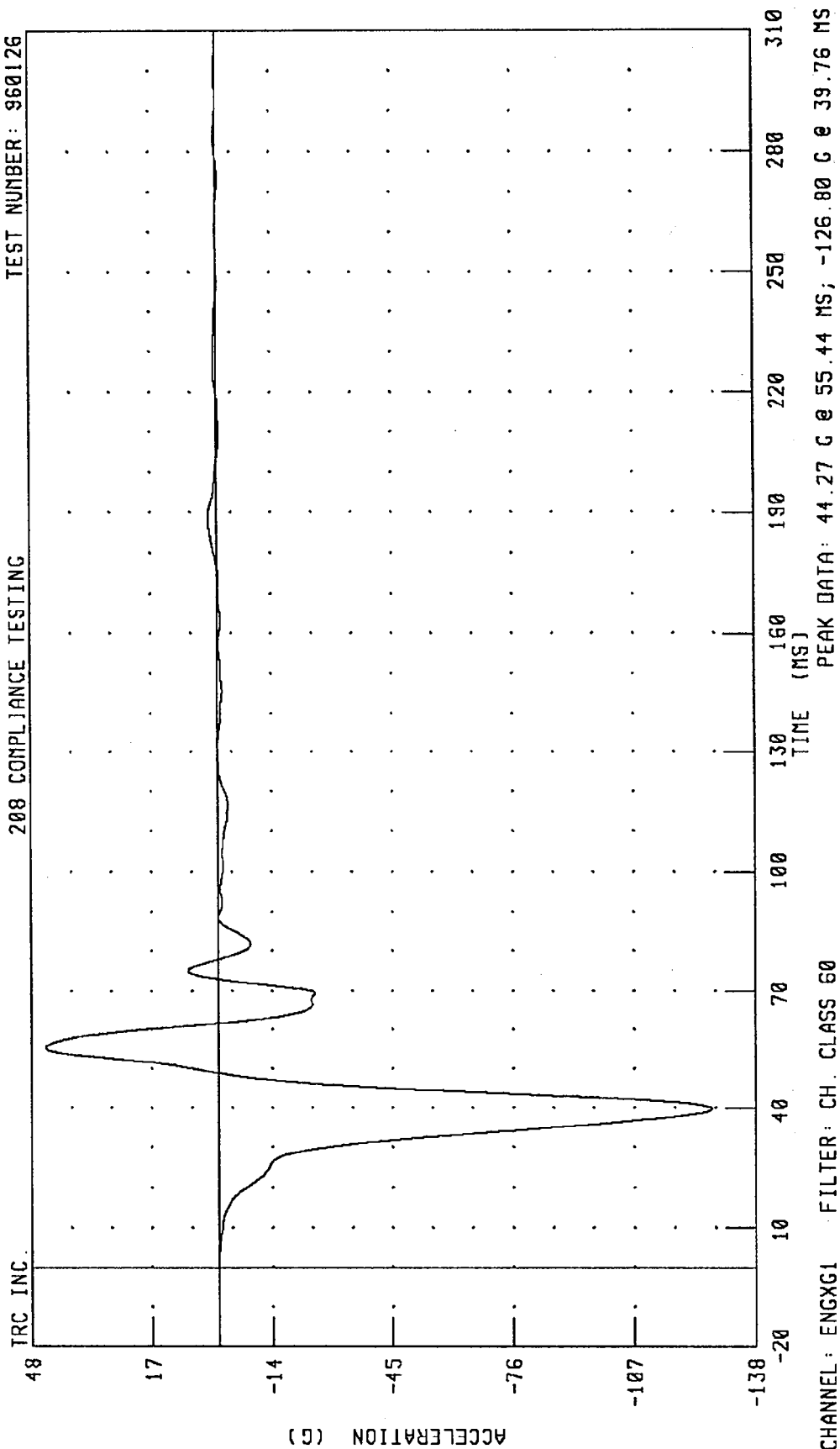


PEAK DATA: 0.61 G @ 151.52 MS; -32.44 G @ 51.44 MS

CHANNEL: TRRXG1 FILTER: CH. CLASS 60

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126

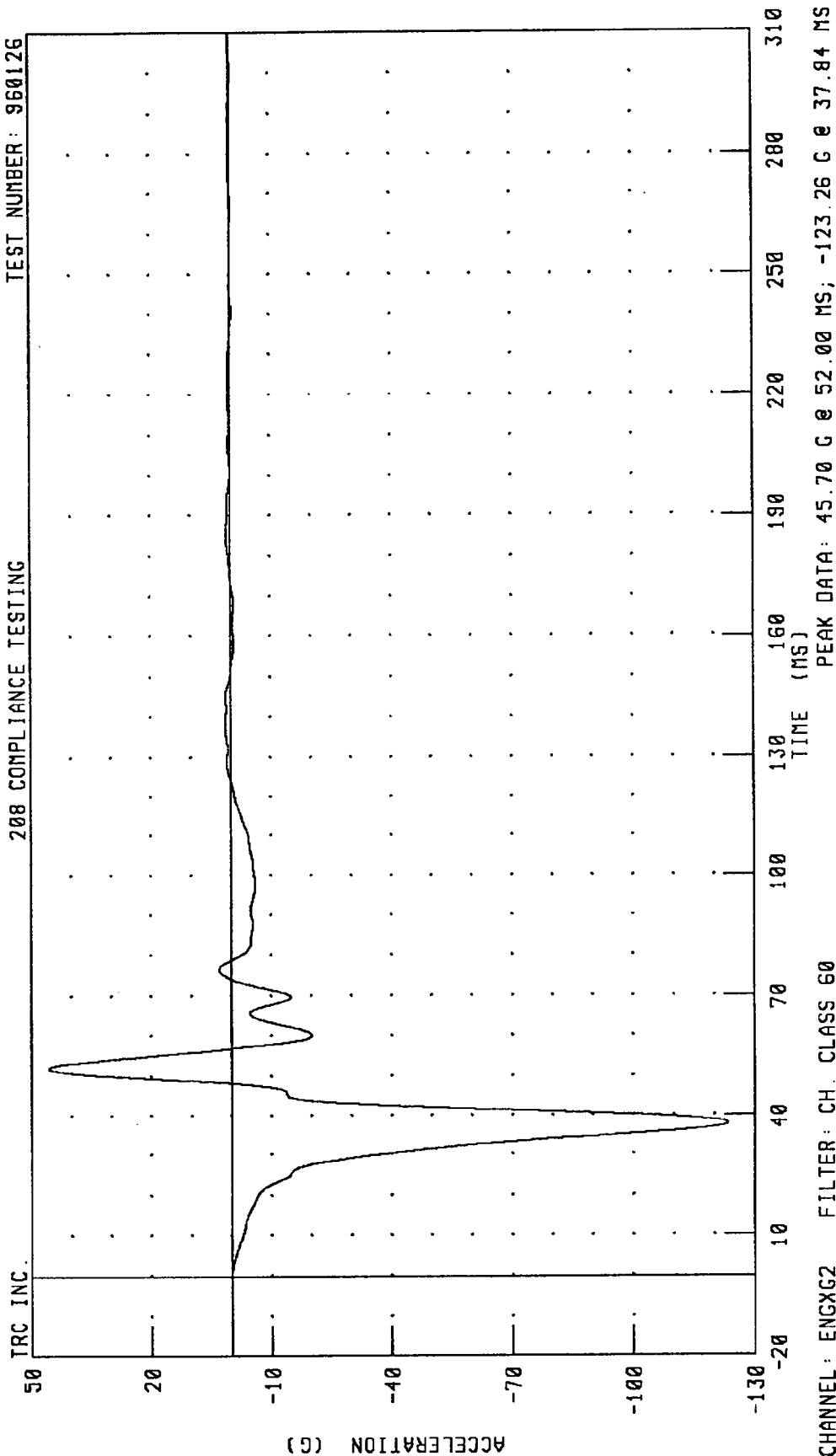


CHANNEL: ENGXG1 FILTER: CH. CLASS 60

1996 SARB 900S INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING

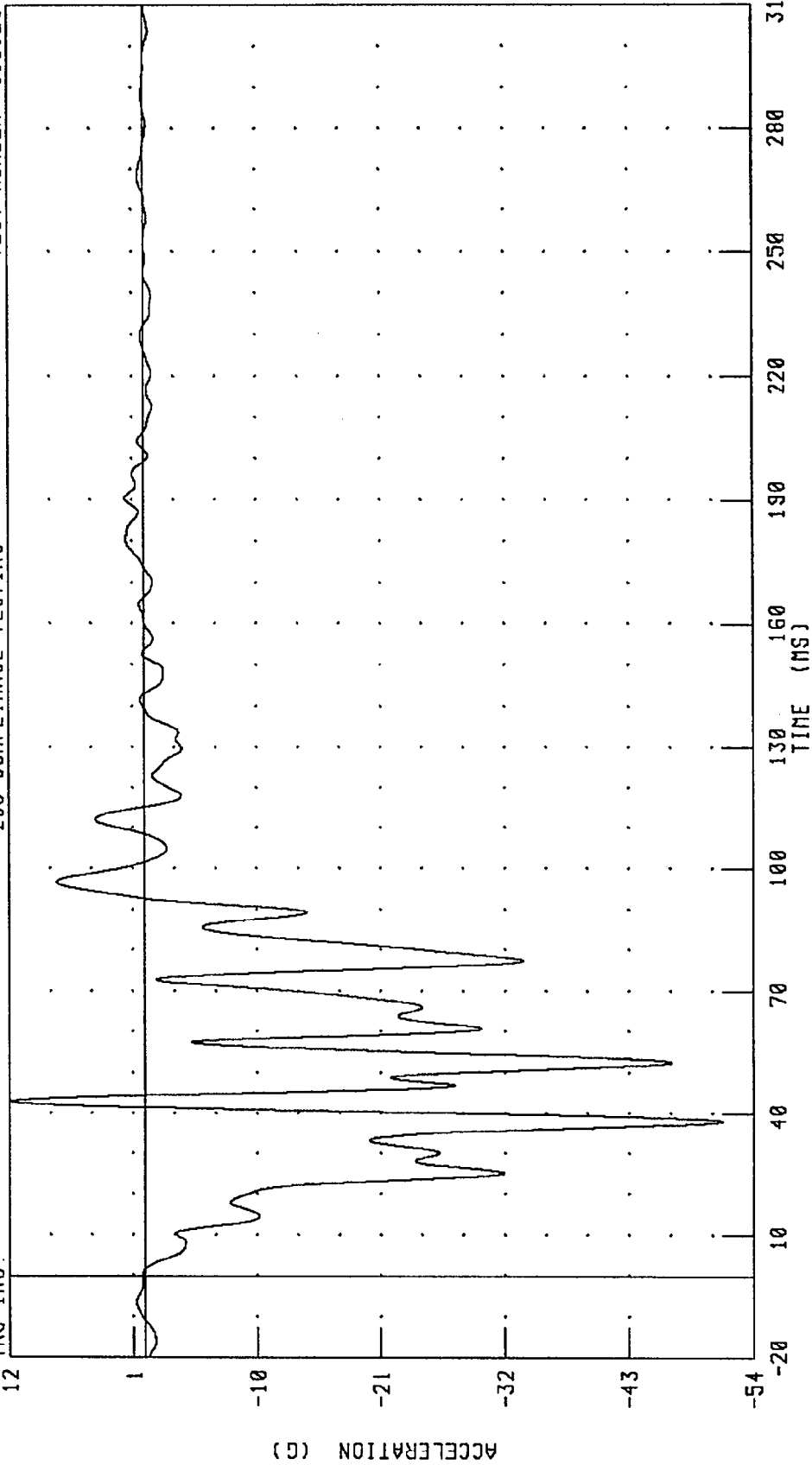


CHANNEL: ENGXG2 FILTER: CH. CLASS 60

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126

TRC INC.



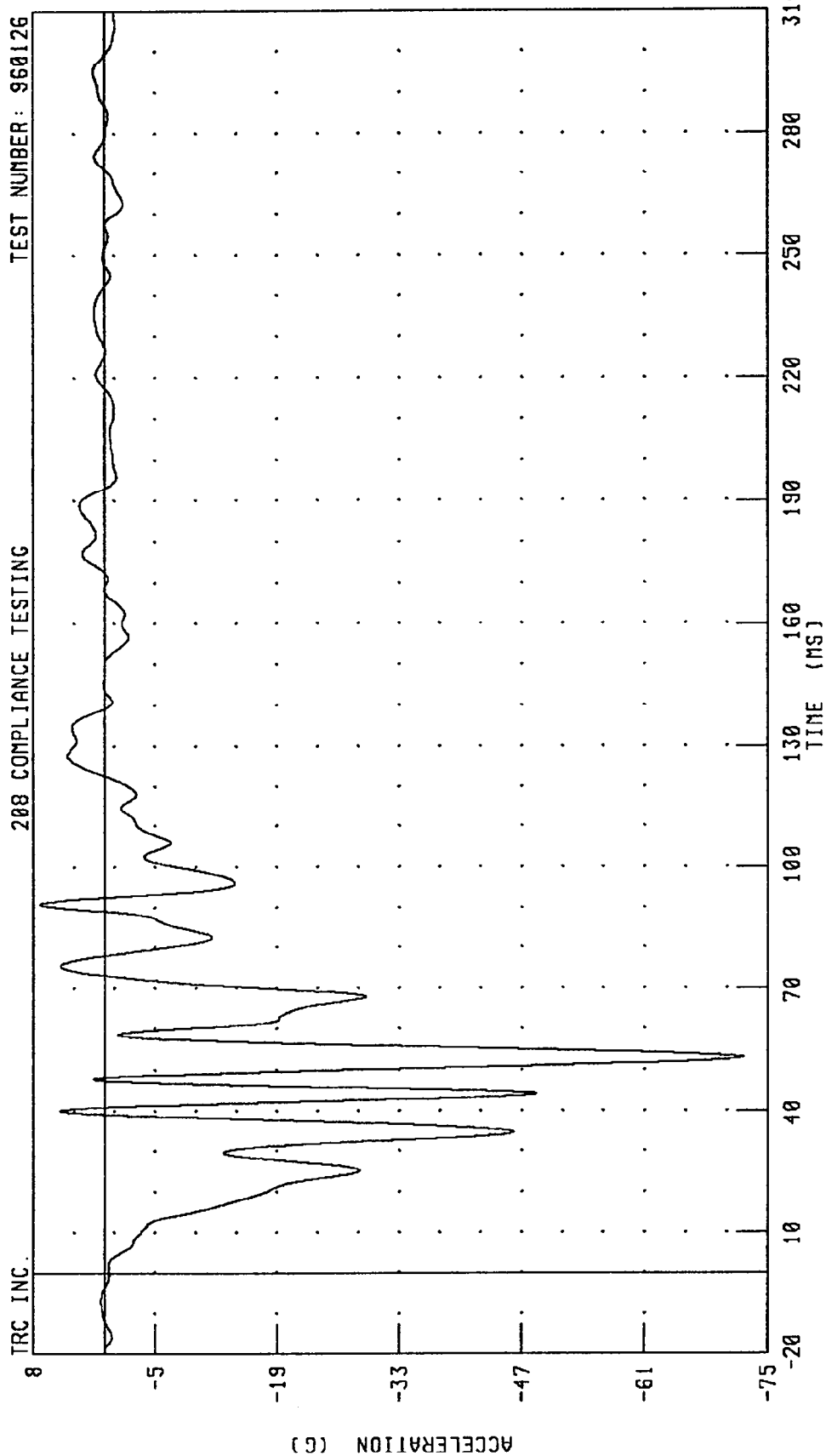
CHANNEL: BCRXG1 FILTER: CH. CLASS 60

PEAK DATA: 11.77 G @ 42.96 MS; -51.25 G @ 38.08 MS

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING

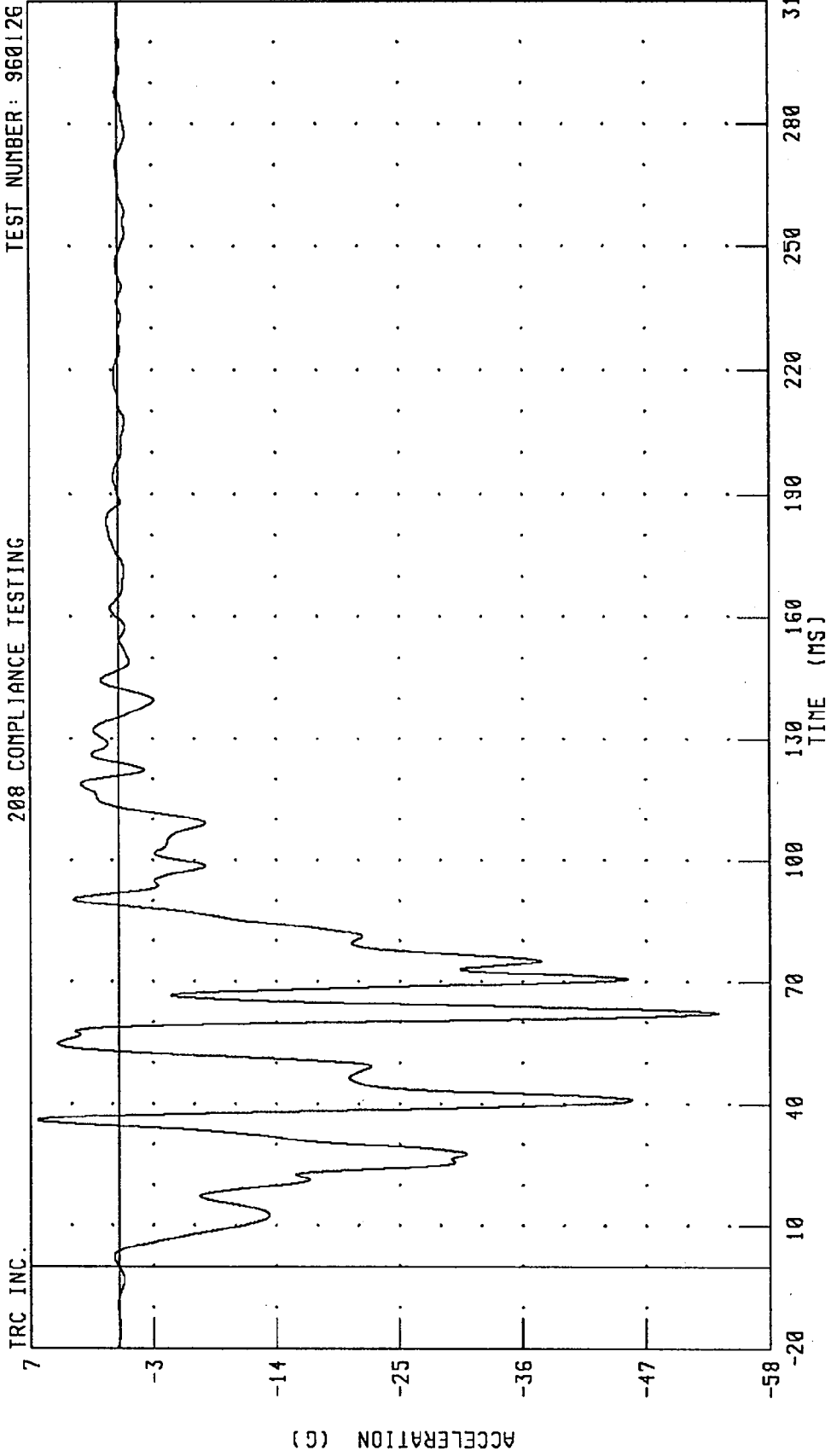


PEAK DATA: 7.49 G @ 90.96 MS; -72.99 G @ 53.04 MS

CHANNEL: BCLXG1 FILTER: CH. CLASS 60

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960126

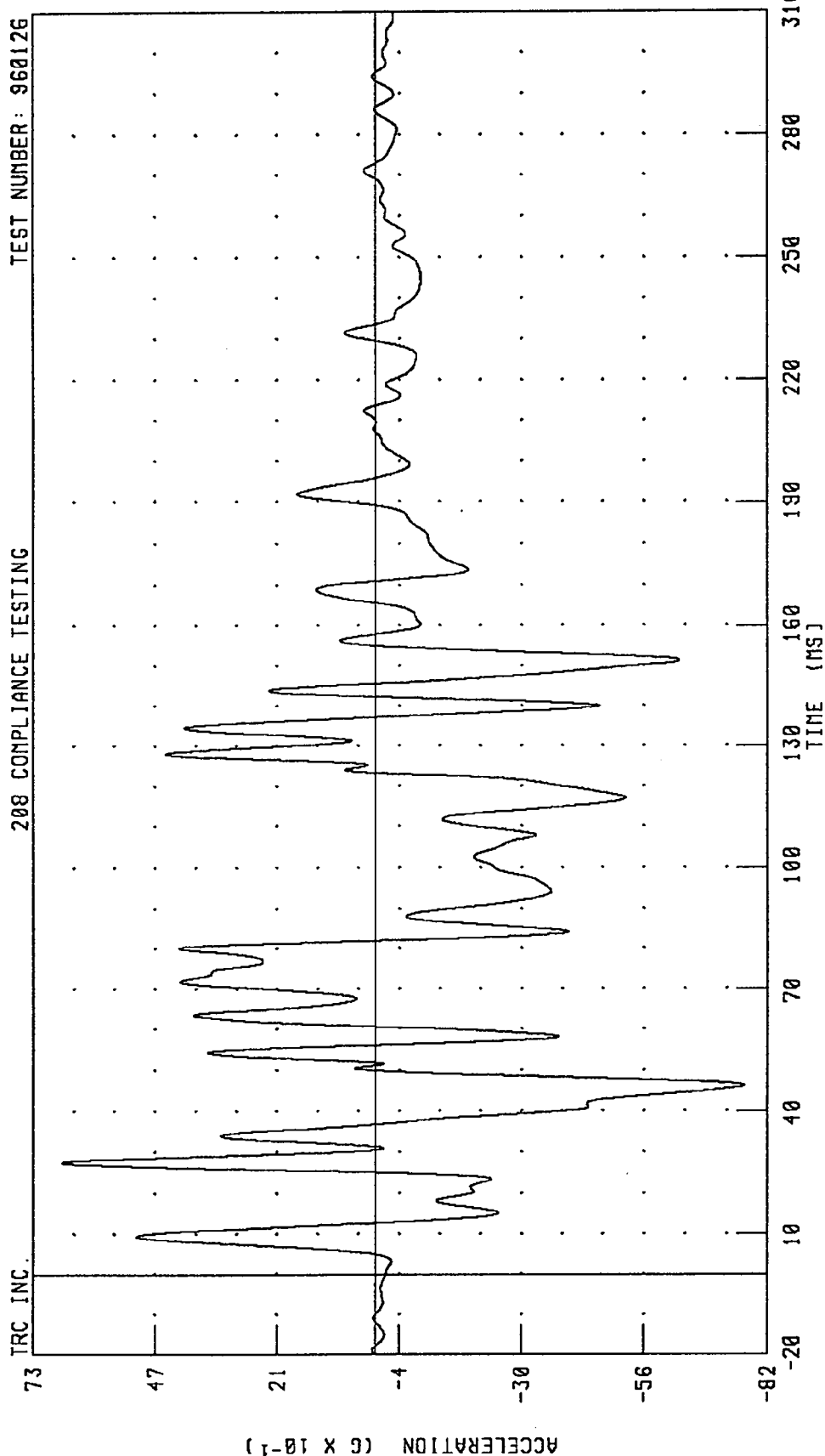


CHANNEL: DPCXG1 FILTER: CH. CLASS 60

1996 SAAB 900S INTO FLAT FRONTAL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

TEST NUMBER: 960126

208 COMPLIANCE TESTING



PEAK DATA: 6.68 G @ 27.60 MS; -7.80 G @ 46.24 MS

CHANNEL: TFC2G1 FILTER: CH. CLASS 60

Appendix C

Manufacturer's Vehicle Information



U.S. Department
of Transportation

National Highway
Traffic Safety
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

JUL 31 1995

CERTIFIED MAIL

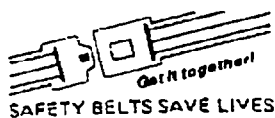
JUL 31 1995
Mr. James P. Crumlish
President and Chief Executive Office
Saab Cars USA, Inc.
4405-A Saab Drive
Norcross, GA 30091

NSA-31CCa
IR 1652

Dear Mr. Crumlish:

The Office of Vehicle Safety Compliance (OVSC) will conduct compliance tests to the requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208, "Occupant Crash Protection." The 1996 Saab 900 (all models) equipped with a driver and passenger air bag restraint system has potentially been selected for crash testing. The following information is requested:

1. Please inform OVSC whether the air bag automatic restraint systems provided at the driver's and passenger's seating positions in your vehicle are certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1(c)(2) for FMVSS No. 208.
2. If the automatic restraint systems provided at the driver's and passenger's seating positions in the subject vehicle was installed to meet the requirements of S4.1.2.1(c)(1), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., moving barrier lateral impact and dynamic rollover) and a copy of the certification reports for the frontal/angular barrier impact test required by S4.1.2.1.
3. If a manual 3-point safety belt is provided with the driver's automatic restraint system in order to meet the requirements of S4.1.2.1(c)(2), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., frontal/angular barrier impact test of the automatic restraint system with the manual safety belt unfastened and frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened).
4. If the manual safety belt provided at the driver's and passenger's seating positions was not installed to meet the requirements of S4.1.2.1(c)(2), please provide a copy of a crash test report or engineering analysis showing that the use of the manual safety belt



AUTO SAFETY HOTLINE
(800) 424-9393
Wash D C Area (202) 366-0123

with the automatic restraint system does not affect the ability of the vehicle to meet the requirements of FMVSS No. 208.

5. If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.1.
6. If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.2.
7. State, for any safety belt system in this vehicle, whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7.4.2, if the tension-relieving device is used.
8. FMVSS No. 208, S8.1.5 allows the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were opened or closed for the certification tests.
9. FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or Part 572(E) test dummy. Please inform OVSC which test dummy was used in each seat for each certification test. Submit dummy placement measurements, including diagrams or photographs which show exactly where measurements were taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use the dimension shown in the diagram to provide the individual dummy placement measurements.

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

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

10. Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating configuration, steering column or fuel tank are available on this vehicle, provide separate information for each.
11. If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant.

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

In addition, include each dummy's head and chest acceleration versus time plots and femur load versus time plots for the full frontal barrier impact tests.

13. When vehicle components must be removed to obtain the proper test weight, what components do you recommend for removal and in what priority order do you recommend removal?
14. Please provide FMVSS No. 204, "Steering Control Rearward Displacement" certification data. Include a copy of the test report and any engineering analysis forming the basis of the certification. The report should document the vehicle test weight, impact velocity, and the horizontal and vertical displacements of the steering control. Pre and post test photographs are also requested.

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

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

15. Inform OVSC if these vehicles have built-in child restraints either as standard equipment or optional equipment. If they do, identify the type of restraint (i.e., 5-point harness, T-shield, or other), and provide a copy of the certification test reports and any engineering analysis forming the basis for certification to FMVSS No. 213, "Child Restraint Systems."

Your written response in the English language referencing "NSA-31CCa/IR 1652" must be sent to me within 20 working days after you receive this letter. If you need additional time to complete your response, please call Mr. Charles Case on (202) 366-5319 at least 5 days prior to the due date. You must also submit the request in writing via mail or FAX to (202) 366-3081. You will be notified whether your request has been granted and for how long.

Confidential business information must be sent in a separate enclosure marked confidential. A copy of that material must be sent under separate cover to the agency's Chief Counsel/NCC-01. If you have any questions concerning confidential information, call Ms. Heidi Coleman on (202) 366-1834.

We appreciate your cooperation. If you have any questions concerning this information request, please call Mr. Charles Case.

Sincerely,



Harry Thompson
Chief, Vehicle Division
Office of Vehicle Safety Compliance

2 Enclosures

**SAAB**

Saab Cars USA, Inc.

September 1, 1995

Sent Via Certified Mail

Harry Thompson
Chief, Vehicle Division
Office of Vehicle Safety Compliance
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

RE: NSA-31CCa/ IR 1652, 1996 Saab 900, FMVSS 208 Compliance Testing

Dear Mr. Thompson,

This letter and attachments are a response to your request for information related to the possible FMVSS 208 compliance testing of a 1996 model year Saab 900. The numbers in this response correspond to the request numbers used in your letter.

1. The restraint systems provided meet the requirements of S4.1.2.1(c)(2).
2. Not applicable.
3. Please see the attached test reports referenced below:

<u>Belt/ Unbelted</u>	<u>Test Type</u>	<u>Car Type</u>	<u>Saab Test No.</u>	<u>Report "Reg No"</u>
Unbelted	Perpendicular, 30 mph	4-Door HB	K1329	TKA-UR-R076
Unbelted	Perpendicular, 30 mph	Convertible	K1443	TKFA-UR-S020
Unbelted	Oblique (Left), 30 mph	4-Door HB	K1331	TKA-UR-R080
Unbelted	Oblique (Right), 30 mph	4-Door HB	K1175	TKA-UR-P087
Unbelted	Oblique (Left), 30 mph	Convertible	K1193	TKA-UR-R052
Unbelted	Oblique (Right), 30 mph	Convertible	K1334	TKA-UR-R055
Belted	Perpendicular, 35 mph	4-Door HB	K1370	TKFA-UR-S039

(Note: A three-point safety belt was installed to meet S4.1.2.1(c)(2). The test report for K1370 shows that the Saab 900 meets the FMVSS 208 criteria at 35 mph with both the airbag and safety belt. The use of the manual safety belt with the automatic restraint system does not affect the ability of the vehicle to meet FMVSS 208 requirements.)

page 2

4. Not applicable.
5. Not applicable.
6. With regard to compliance with the requirements of S9.2, please see the engineering information provided by the manufacturer, TEMIC Bayern-Chemie Airbag GmbH.
7. Not applicable.
8. All front side windows and vents should be closed for the certification tests.
9. For perpendicular 30 mph tests, Part 572 (B) test dummies were used.
For oblique 30 mph tests, Part 572 (E) test dummies were used.
For perpendicular 35 mph tests, Part 572 (E) test dummies were used.

The Saab 900 does not have a foot rest for the driver.

Both the driver dummy and passenger dummy are centered on their seat cushion. For specific dummy placement measurements, please see the attachment with "Reg No" TKA-PM-071.

10. For seat positioning and steering column positioning, please see the attachment with "Reg No" TKA-PM-071. For fuel tank data, please see information in section 3. of the "TEST VEHICLE INFORMATION" form attached to each Saab test report. Only one front seating configuration, steering column and fuel tank is available on this vehicle.

11. For positioning of the adjustable seat belt anchorages, please see the attachment with "Reg No" TKA-PM-071.

12. Please see pages 1 and 2 in each individual Saab test report for the speed at impact, vehicle test weight, and resulting injury criteria. The requested plots are also found within each individual Saab test report.

13. In order of priority, the following components are recommended for removal to obtain the proper test weight: 1) spare tire/rim assembly, 2) rear audio speakers, 3) rear bumper assembly, and 4) rear part of the exhaust system.

14. Please see the report ("Reg No" TKA-UR-P083) for Saab test K1073. This report documents the vehicle test weight (page 1), impact velocity (page 1), and the displacements (Appendices 8 & 9). Pre- and post-test photographs are included as Appendices 1-7.

page 3

The preparation and measurement technique is described in Appendix 12. A description of energy management for the steering control system is provided in Appendix 10.

15. Saab provides an optional integrated booster seat for use with the standard three-point safety belts. Please see the report ("Reg No" TKFA-UR-S028) for Saab tests S2672-S2675, which include photographs.

If there are any additional questions or a need for any further information, please contact me directly at (770) 279-6377.

Sincerely,



Gerald Plante
Manager, Compliance
& Technical Liaison

Enclosures

**SAAB**Dokumentnamn/Document name
TEST REPORTInfoklass
F

Godkänd/Approved by

TKFA Per Lenhoff A17-1

Lagringsdata/File

ALL-IN-1

Reg nr/Reg No

TKA-UR-R076

Utfärdare/Issued by

Camilla Varås TKFAE A17-1

Telefon/Phone

5438

Datum/Date

940714

Utgåva/Issue Sida/Page

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Projekt-Objektnr/Project-Object No

Uppdragsnr/Order No

Nyckelord/Keyword

Fördelning/Distribution
TQL TQLB TKFAD

För kännedom/For information

**FMVSS 208 CERTIFICATION FRONTAL 0° IMPACT 48 KM/H 900SE MY95 AIRBAG
DRIVER/PASSENGER****SUMMARY**TEST NUMBER: K1329DATE OF TEST: 940429TEST LABORATORY AND LOCATION: Saab Automobiles crash lab in Trollhättan

PURPOSE: () DEVELOPMENT () VERIFICATION (X) CERTIFICATION

REQUIREMENT: FMVSS 208 RESULTS: Comply with FMVSS 208COMMENTS: FMVSS 208 specifies performance requirements for the
protection of vehicle occupants in crashes**TEST OBJECT**PRODUCT-ID: S US D C H S 5 L O RU A4 153 K32 14824 FMARKET: USMODEL YEAR: 1995VIN: YS3DF58V8S2000048WEIGHT OF TEST : 1643 KGFRONT: 973 KGREAR: 669 KGIMPACT VELOCITY: 48.73 KM/H 30.3 M.P.H.**REMARKS:**

The fuel feed system was filled to 93 per cent of its usable capacity
with stoddard solvent. All other reservoirs were filled, except the oil
in the engine and the gearbox. The test dummies were unbelted.
The front side windows were closed.

Seat positioning and steering column positioning: Appendix 1



SAAB

TESTREPORT

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OTHER RESULTS

TOTAL STATIC DEFORMATION: 462 mm

REMARKS:

TEST RESULTS

MEASURED DUMMY INJURY CRITERIA VALUES

COMMENTS: Hybrid II dummies, part 572(B) were used.

	DRIVER DUMMY	PASSENGER DUMMY	FMVSS 208 REQU.
<u>HEAD</u>			
HIC	273	664	1000
<u>CHEST</u>			
G _{3ms}	44	54	60
<u>FEMUR FORCE</u>			
LEFT (kN)	7.2	5.8	10.0
RIGHT (kN)	6.3	5.5	10.0

APPENDIXES

APPENDIX	1:1-8	Seat and steering column positioning. (TKA-PM-071)
APPENDIX	2:1-4	Photographs
APPENDIX	3:1-12	Dummy measurements and vehicle retardation
APPENDIX	4:1-2	Test vehicle information

**SAAB**Dokumentnamn/Document name
APPENDIX 1Infoklass
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ALL-IN-1Reg nr/Reg No
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Stefan Larsson TKAL AS-2Telefon/Phone Datum/Date
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Fördelning/To

För kända/For information

Internal and external testlabs

REVISION 931116

Seat and dummy adjustments

BACKGROUND

This document is a help to a uniform position of HYBRID II (subpart B) and HYBRID III (subpart E) in the left and right front seat in SAAB 900 from M/94.

SEAT AND STEERING WHEEL ADJUSTMENTS

Seat Length Adjustment, there should be nine free holes in front of latch for manual seats, see appendix 1.
Powerseats, 30mm of inner rail visible in front.

Seat Height Adjustment, should be in lowest position.

Seat Back Angle, should be measured on the flat part of the seatframe on the back side right above the adjuster. The angle should be 16 degree.

Head Rest Adjustment, should be in highest position.

Steering Wheel Adjustment, should be in midposition.

Seat Belt Height Adjustment, should be in midposition. The distance between the tip of the nose and upper edge of the belt should be 200mm.

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APPENDIX 1Insklass
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TKA-PM-071

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8435

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DUMMY POSITION**Driver**

A-pillar to H-point 730mm, see page 4 photo 48028-16.

Sill to H-point 180mm, see page 4 photo 48038-17.

Steering wheel rim to dummy neck, 525mm HII, 540mm HIII. See page 5 photo 48038-24 or photo 48038-23.

Drivers right legs outer skinn to center of gearshift consol 140mm. See page 6 photo 48038-20.

Drivers right and left outside knee clevis flange 290mm. See page 6 photo 48038-19.

Right foot on accelerator.

Left foot 90 degree to tibia.

Distance between hands 390mm, distans between elbowe 370mm. See page 7 photo 48038-21 and photo 48038-22.

Passenger

A-pillar to H-point 730mm, see page 4 photo 48038-16.

Sill to H-point 180mm. See page 4 photo 48038-17.

Splitline i instrument panel to dummy neck, 685mm HII, 700mm HIII. See page 8 photo 48038-18 and page 5 photo 48038-24 or photo 48028-24.

Passenger left legs outer skinn to center of gearshift consol 210mm. See page 6 photo 48038-20.

Passengers right and left knee clevis flange 240mm. Se page 6 photo 48038-19.

Right foot 90 degree to tibia. Left foot 90 degree to tibia.

Elbove touch backest, hands little finger touch seatcover.

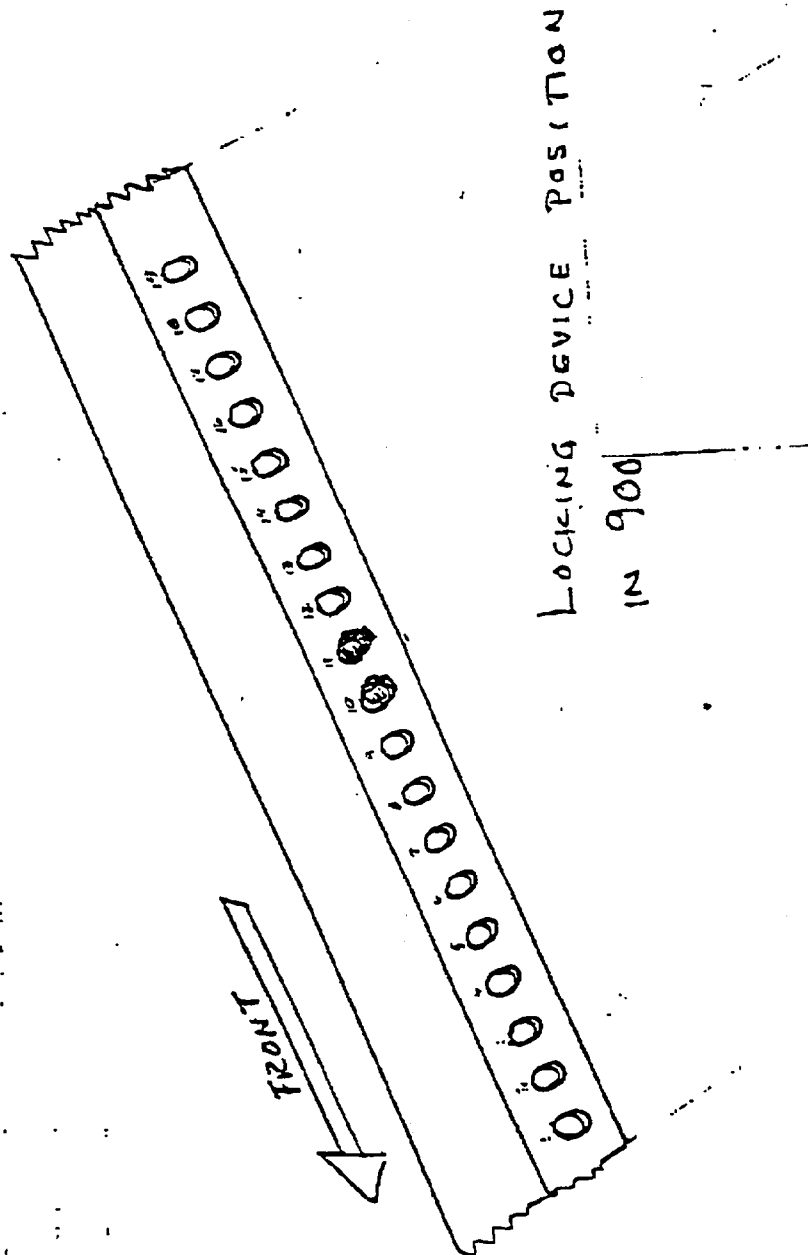
OTHER

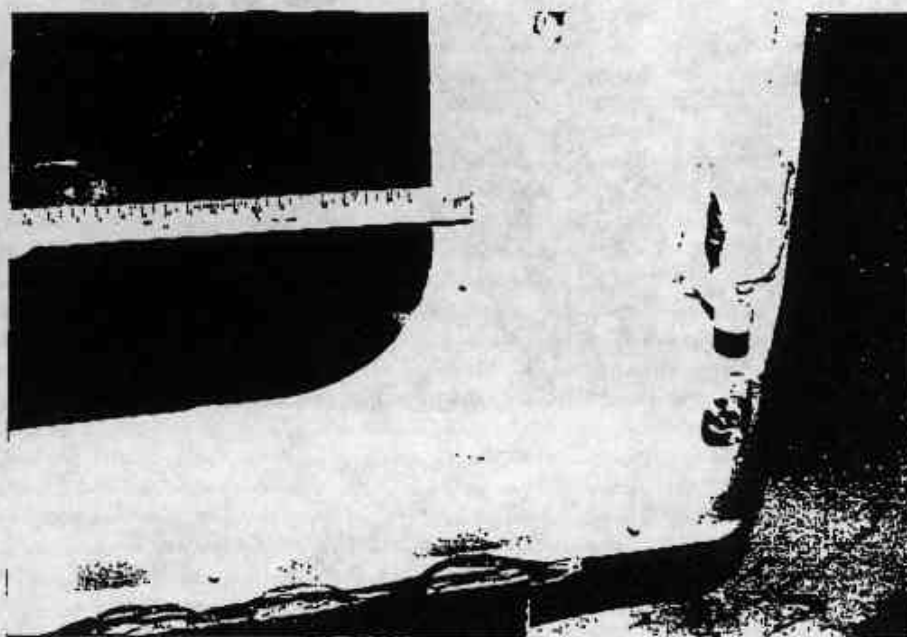
HYBRID II (subpart E).

Pelvic angel is 22.5 degree.

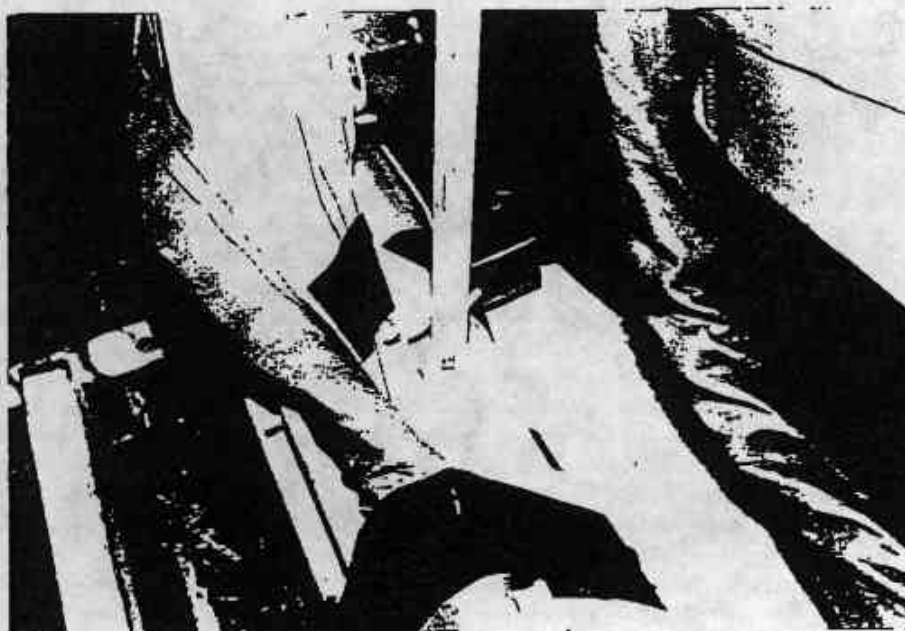
Neck bracket is in "0" position.

SAAB-SCANIA

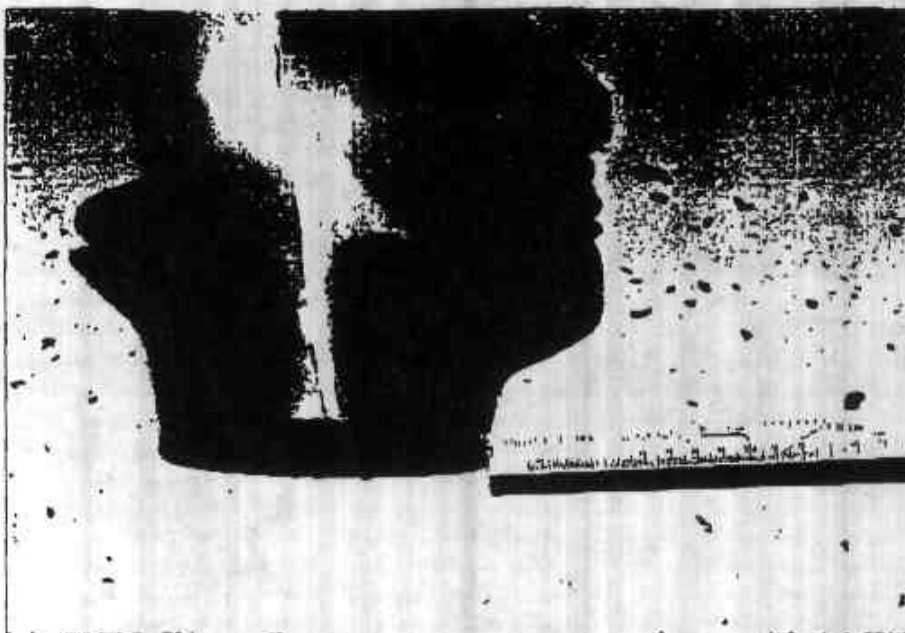




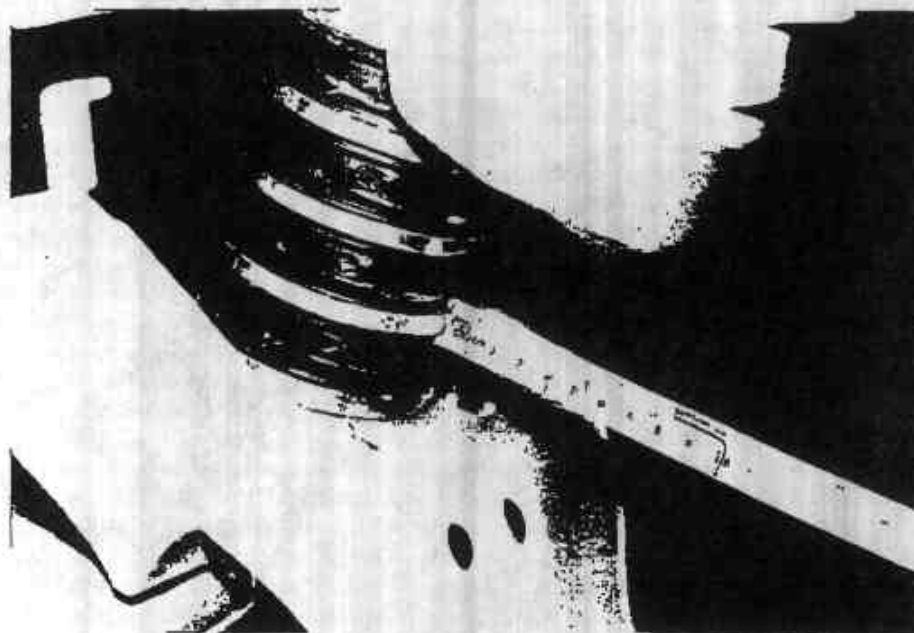
Neg. nr 48038-16
Measuring point
on A-pillar



Neg. nr 48038-17
Measuring point
on sill.



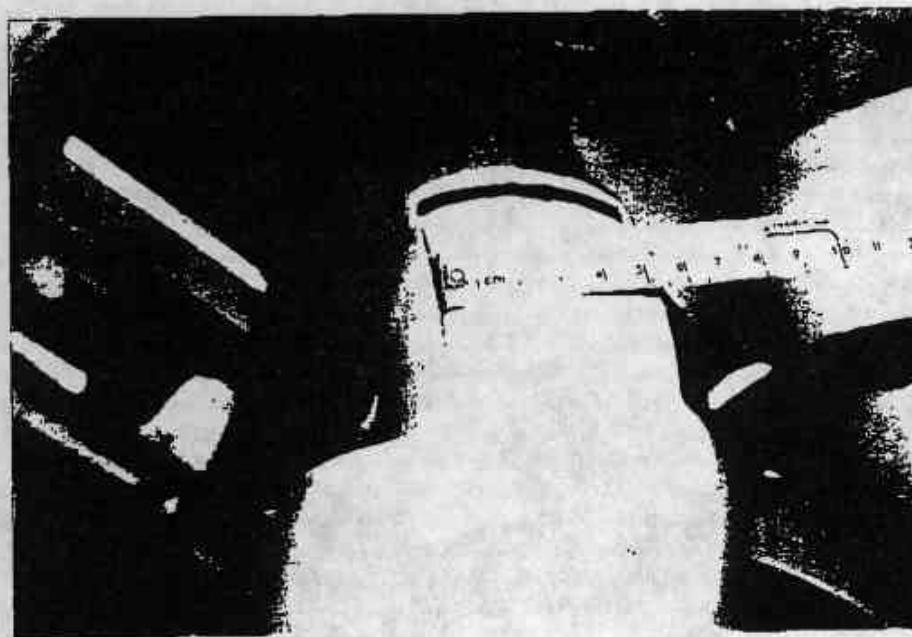
Neg. nr 48038-24
Measuring point
on neck, HYBRID II



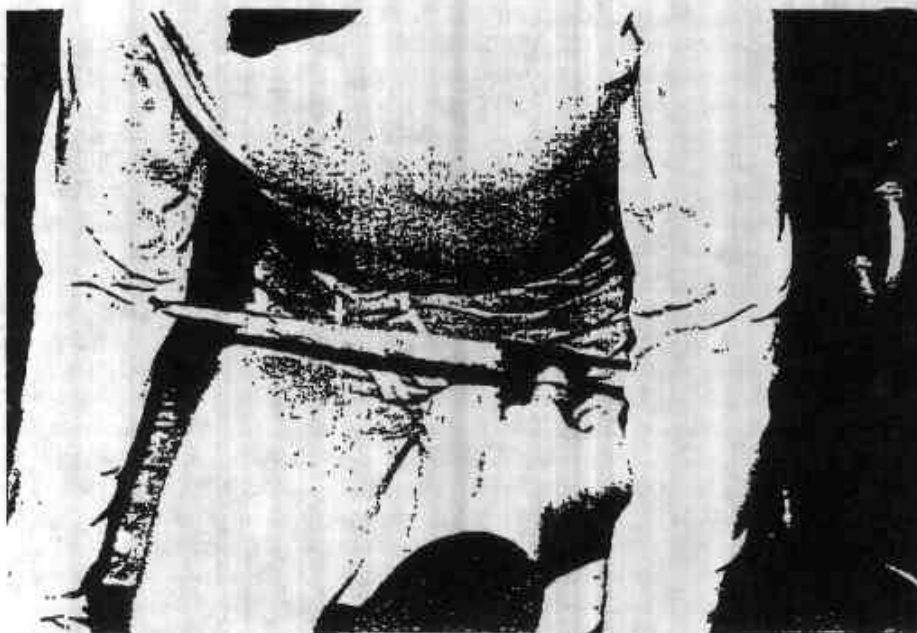
Neg. nr 48038-23
Measuring point
on neck, HYBRID III



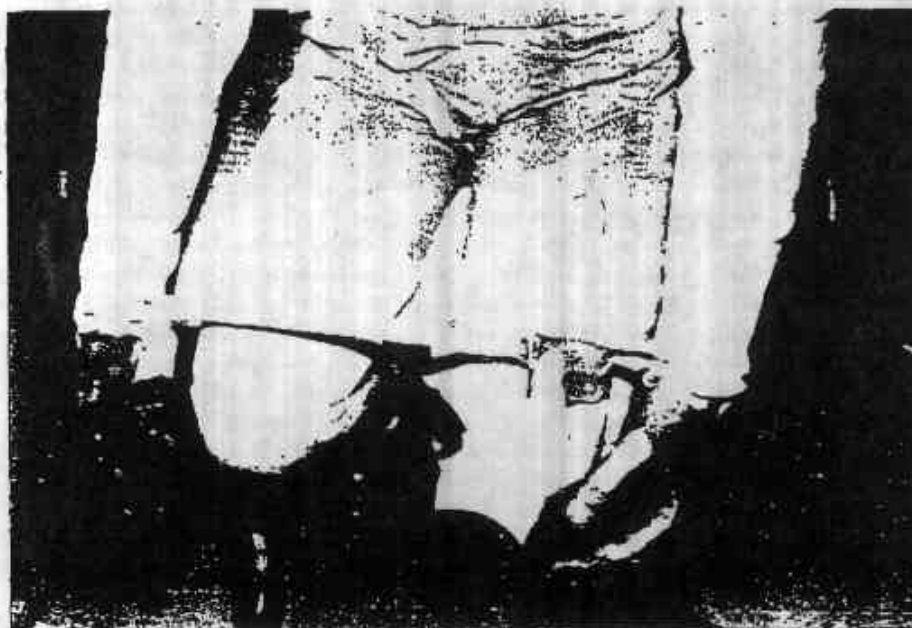
Neg. nr 48038-20
Measuring point
leg outer skinn



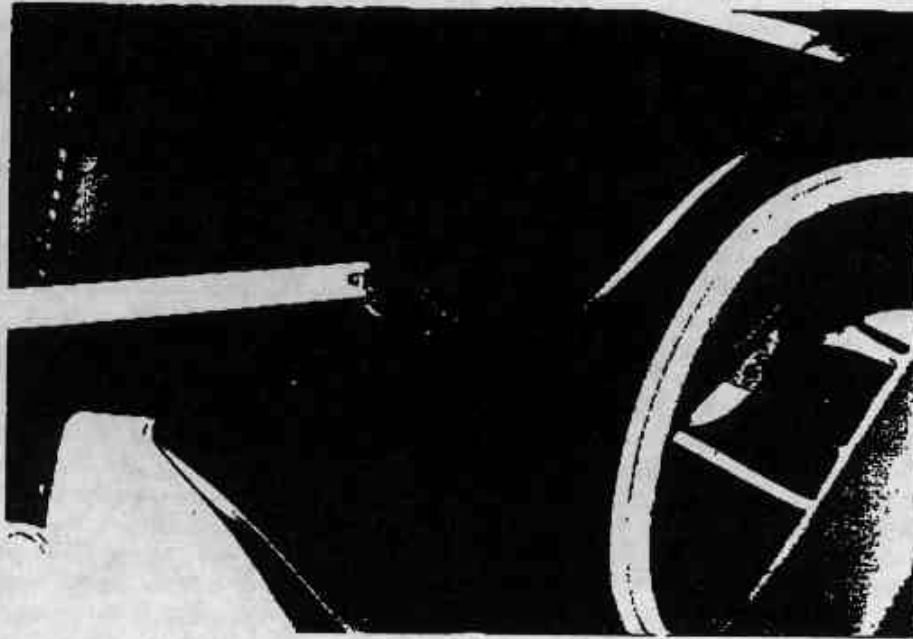
Neg. nr 48038-19
Measuring point
Knee clevis



Neg. nr 48038-21
Measuring point
between elbows



Neg. nr 48038-22
Measuring points
between hands



Neg. nr 48038-18
Measuring point
on instrumentpanel
splitline

Neg. nr

TEST VEHICLE INFORMATION

Page 1 of 2

Vehicle Model Year & Make: M95 Saab Automobile AB
Vehicle Model & Body Style: 900SE

1. NOMINAL DESIGN RIDING POSITION - -

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

Seat back angle for driver's seat = 16 degrees.

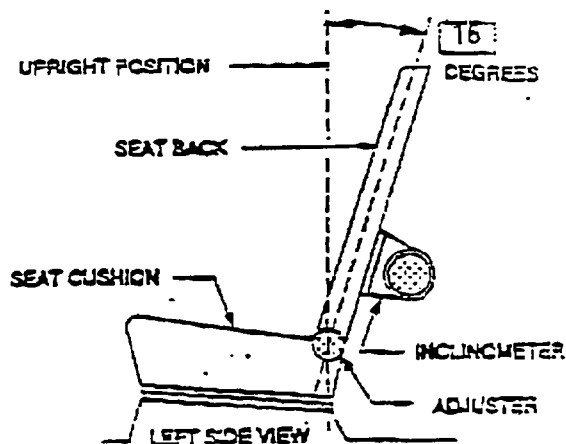
Measurement Instructions:

See appendix TKA-PM-071

Seat back angle for passenger's seat = 16 degrees.

Measurement Instructions:

See appendix TKA-PM-071



2. SEAT FORE & AFT POSITIONS - -

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

Positioning of the driver's seat:

See appendix TKA-PM-071

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

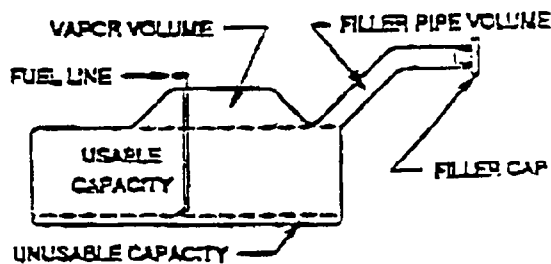
See appendix TKA-PM-071

3. FUEL TANK CAPACITY DATA - -

A. "Usable Capacity" of standard equipment fuel tank = 16.91 gallons.

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

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 15.2 gallons.



VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

TEST VEHICLE INFORMATION

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 15.2 gallons

3.3 Is vehicle equipped with electric fuel pump? X YES NO
 If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.
When the engine is in running condition

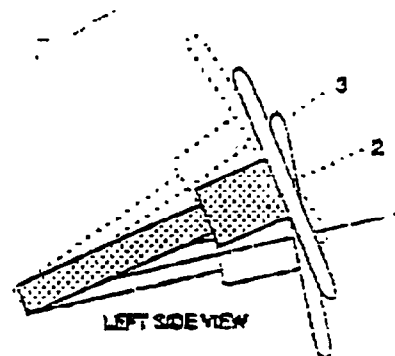
4. STEERING COLUMN ADJUSTMENTS --

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.

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

Operational Instructions:

The steering wheel/column should be adjusted
to its middle position



STEERING COLUMN ASSEMBLY