

V2194

Report Numbers: 208-TRC-95-003  
212-TRC-95-003  
301-TRC-95-003

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

General Motors Corporation  
1995 Pontiac Grand Am  
NHTSA Number: CS0103  
TRC Test Number: 941123

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



December 9, 1994

Final Report

Prepared For:

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

Rec'd  
1/9/95

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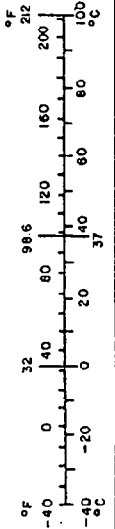
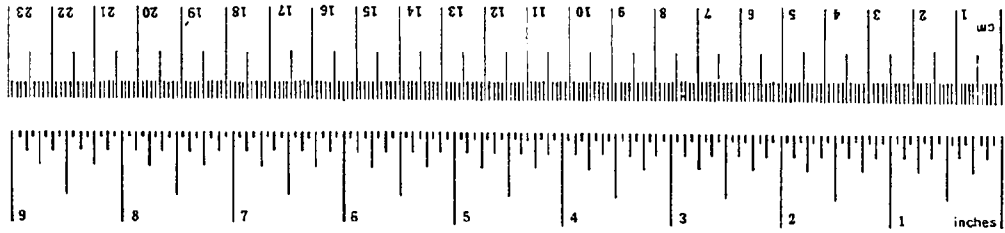
### METRIC CONVERSION FACTORS

#### Approximate Conversions to Metric Measures

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

#### Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
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
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
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 <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
*C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	*F



\*1 m = 2.54 (exact) inches. For other exact conversions, and more detailed tables, see NIST Misc. Publ. 289, Units of Weights and Measures, Page 32-39, SD Catalog No. C1310-289.

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<p>15. Supplemental Notes</p>			
<p>16. Abstract</p> <p>A 30 mph flat frontal barrier impact test was conducted on a 1995 Pontiac Grand Am, NHTSA No. CS0103, at Transportation Research Center Inc. on November 23, 1994. 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 29.6 mph. The vehicle's maximum static crush was 12.9 inches. The ambient temperature was 70° F.</p> <p>The driver's head injury criteria (HIC) was 554. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.2 g. The driver's chest maximum deflection was 1.6 inches. The driver's left and right femur maximum axial forces were 1550 pounds and 1314 pounds, respectively.</p> <p>The passenger's HIC was 672. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 42.2 g. The passenger's chest maximum deflection was 1.9 inch. The passenger's left and right femur maximum axial forces were 792 pounds and 1091 pounds, respectively.</p> <p>The vehicle appears to comply with the applicable requirements of FMVSS 208, 212, 219 (partial), and 301.</p>			
<p>17. Key Words</p> <p>Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"</p>		<p>18. Distribution Statement</p> <p>Available from: NHTSA Technical Reference Division Room 5108, (NAD-52) 400 Seventh Street, S.W. Washington, DC 20590 Attn: Mr. Robert Hornickle</p>	
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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 1995 Pontiac Grand Am 2-door coupe, NHTSA No. CS0103, 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 E 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 C 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. Each Part 572 E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection.

The twenty-six (26) data channels were multiplexed and recorded on a 14-track tape drive. The data was 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 November 23, 1994.

The test vehicle, a 1995 Pontiac Grand Am 2-door coupe, NHTSA No. CS0103, 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 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy the chest deflection did not exceed 3.0 inches. 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 a driver's airbag and passive three-point belts at the driver's and right front passenger's seating positions. The vehicle's test weight was 3413 pounds. The vehicle's impact speed was 29.6 mph. The vehicle's maximum static crush was 12.9 inches.

The driver's HIC was 554. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.2 g. The driver's chest maximum deflection was 1.6 inches. The driver's left and right femur maximum compressive forces were 1550 pounds and 1314 pounds, respectively.

The right front passenger's HIC was 672. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 42.2 g. The right front passenger's chest maximum deflection was 1.9 inches. The right front passenger's left and right femur maximum compressive forces were 792 pounds and 1091 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:	CS0103
Test type:	Frontal barrier impact
Test date:	11/23/94
Test time:	1331
Ambient temperature at impact area:	70° F
Vehicle year/make/ model/body style:	1995/Pontiac/Grand Am/2-door coupe
Vehicle test weight:	3413 lb
Impact angle <sup>1</sup> :	0°
Impact velocity <sup>2</sup> :	
Primary:	29.6 mph
Secondary:	29.6 mph
Maximum static crush:	12.9 in
Average rebound:	9.4 in
Number of cameras:	
Real-time:	2
High-speed:	14
Door opening data:	
Left-front:	Easy
Right-front:	Easy

<sup>1</sup> With respect to tow track centerline.

<sup>2</sup> Speed trap measurement ( $\pm .05$  mph accuracy)

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #314</u>	<u>Passenger #229</u>
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag & passive 3-point belt	Passive 3-point belt
Number of data channels:	9	9
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag & head restraint	Chest & head restraint
Chest:	Airbag	None
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: 1995/Pontiac/Grand Am/2-door coupe

Color: Red

VIN: 1G2NE15M0SM501933

NHTSA number: CS0103

Engine data:  
Placement: Lateral/transverse  
Cylinders: 6  
Displacement: 3.1 liters

Transmission data: 4 speed,    manual,    X automatic,    overdrive

Final drive:    X fwd,    rwd,    4wd

Date vehicle received: 09/12/94

Odometer reading: 70

Dealer's name  
and address: Dave Gill Pontiac-GMC Truck, Inc.  
4700 E. Broad Street  
Columbus, OH 43213-1303

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	Yes
Power windows	No	Telescoping steering wheel	No
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: General Motors Corporation

Date of manufacture: 8/94

VIN: 1G2NE15M0SM501933

GVWR: 3871 lb

GAWR: Front: 2179 lb  
Rear: 1692 lb

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P205/55R16

Tire pressure with maximum capacity vehicle load:

Front: 44 psi

Rear: 44 psi

Spare tire: Space saver

Type of front seats: Bucket

Tire & capacity data from vehicle's label:

Recommended tire size: P205/55R16

Recommended cold tire pressure:

Front: 30 psi

Rear: 30 psi

Designated seating capacity:

Front 2

Rear 3

Total 5

Vehicle capacity weight: 882 lbs.

Test vehicle attitudes:

Delivered attitude: LF: 26.9 in. RF: 26.8 in LR: 28.0 in RR: 27.9 in

Fully loaded attitude: LF: 26.2 in RF: 26.4 in LR: 26.5 in RR: 26.5 in

Pre-test attitude: LF: 26.5 in RF: 26.3 in LR: 26.8 in RR: 26.5 in

Table 2 Test Vehicle Information, Cont'd.

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

Right front	974 lb	Right rear	501 lb
Left front	980 lb	Left rear	509 lb
Total front weight	1954 lb	(65.9% of total vehicle weight)	
Total rear weight	1010 lb	(34.1% of total vehicle weight)	
Total delivered weight	2964 lb		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (2964 lb)

VCW<sup>1</sup> = Vehicle Capacity Weight (882 lb)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 882 - 150(5) = 132 lb

Target test weight = UDW + RCLW + (Number of Hybrid III dummies  
x 167 lb per dummy)

Target test weight = 2964 + 132 + 334 = 3430 lb

Weight of test vehicle with required dummies and 115 lb of cargo weight:

Right front	1038 lb	Right rear	670 lb
Left front	1042 lb	Left rear	663 lb
Total front weight	2080 lb	(60.9% of total vehicle weight)	
Total rear weight	1333 lb	(39.1% of total vehicle weight)	
Total test weight	3413 lb	(0.5% under target test weight)	

Weight of ballast secured in vehicle cargo area: 35 lb

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 40.4 in

Vehicle Wheelbase: 103.5 in

<sup>1</sup> From vehicle's tire load label.

Table 3 Post-Impact Data

Test number: 941123  
NHTSA number: CS0103  
Test date: 11/23/94  
Test time: 1331  
Test type: Frontal barrier impact  
Impact angle: 0°  
Ambient temperature  
at impact area: 70° F  
Temperature in  
occupant compartment: 69° F  
Impact velocity:  
Primary: 29.6 mph  
Secondary: 29.6 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:

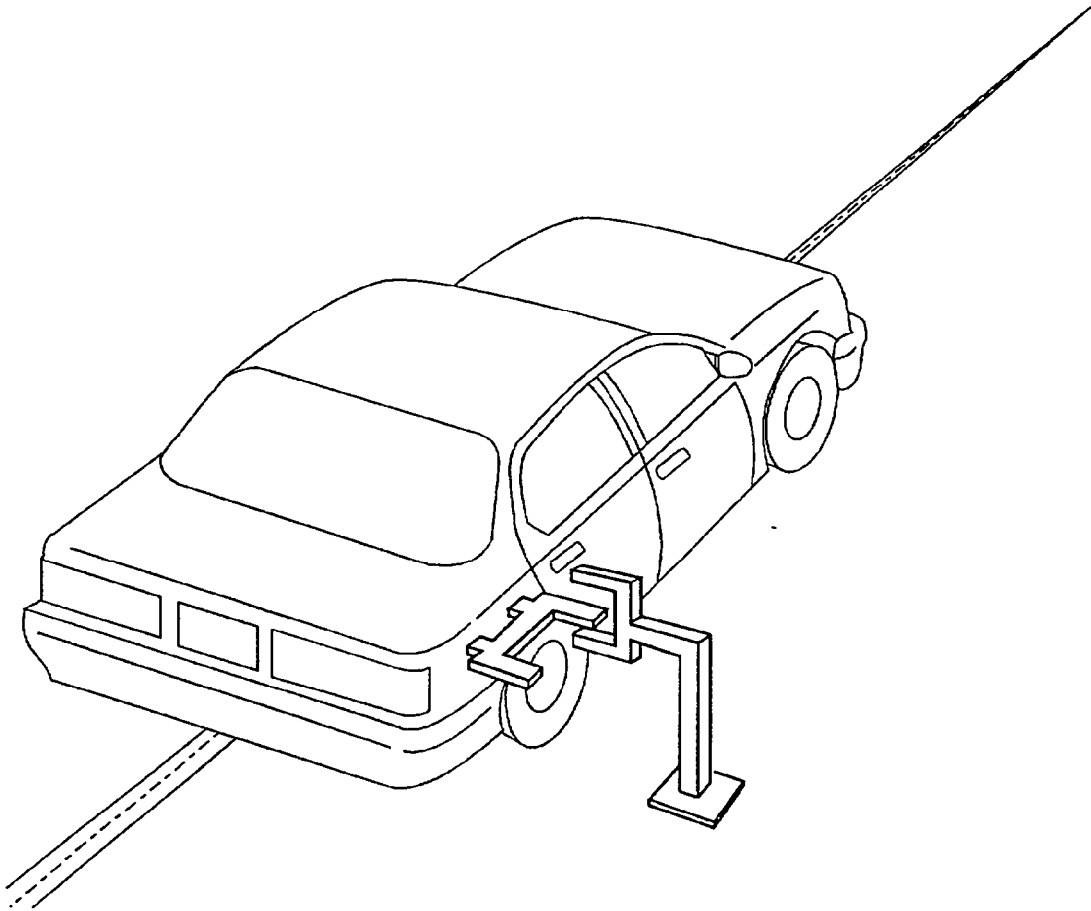
Pre-test:	L: 179.8 in	C: 186.9 in	R: 179.9 in
Post-test:	L: 173.2 in	C: 176.0 in	R: 167.0 in
Total crush:	L: 6.6 in	C: 10.9 in	R: 12.9 in
Average crush:	10.1 in		

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L: 9.5 in	C: 7.3 in	R: 11.4 in
Average rebound:	9.4 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: CS0103  
 Test date: 11/23/94  
 Vehicle year/make/model/body style: 1995/Pontiac/Grand Am/2-door coupe  
 Vehicle size category: Compact  
 VIN: 1G2NE15M0SM501933  
 Build date: 8/94  
 Test weight: 3413 lb  
 Vehicle wheelbase: 103.5 in  
 Maximum width: 68.2 in  
 Front overhang: 42.1 in

**Collision Deformation**

Classification (CDC) Code: 12FDEW2

Crush depth measurements:

C1:	6.6 in
C2:	9.5 in
C3:	9.5 in
C4:	12.1 in
C5:	11.3 in
C6:	12.9 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 56.0 in

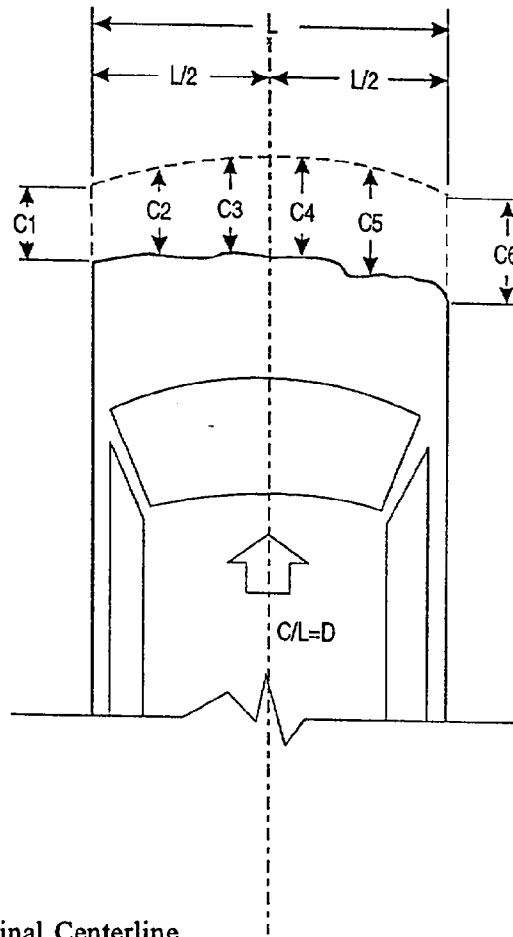


Table 4 Post-test Airbag Data

NHTSA number: CS0103  
Test date: 11/23/94  
Technician: Markusic  
Vehicle year/make/  
model/body style: 1995/Pontiac/Grand Am/2-door coupe

A. Number of airbag vent holes:

Driver: 2  
Passenger: NA

B. Size of airbag vent holes:

Driver: 0.4 in dia.  
Passenger: NA

C. Total airbag vent area:

Driver: 0.3 in<sup>2</sup>  
Passenger: NA

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

Driver:	Length	NA
	Width	NA
	Diameter	26.0 in
Passenger:	Length:	NA
	Width:	NA
	Diameter:	NA

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

E. Is the airbag tethered?

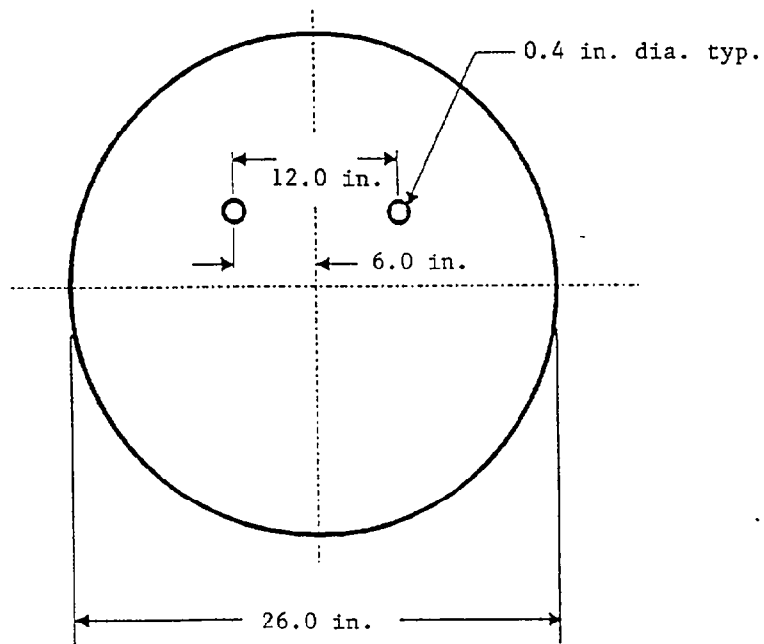
Driver: No

If yes, record length of tether: NA

Passenger: No

If yes, record length of tether: NA

Driver's airbag:



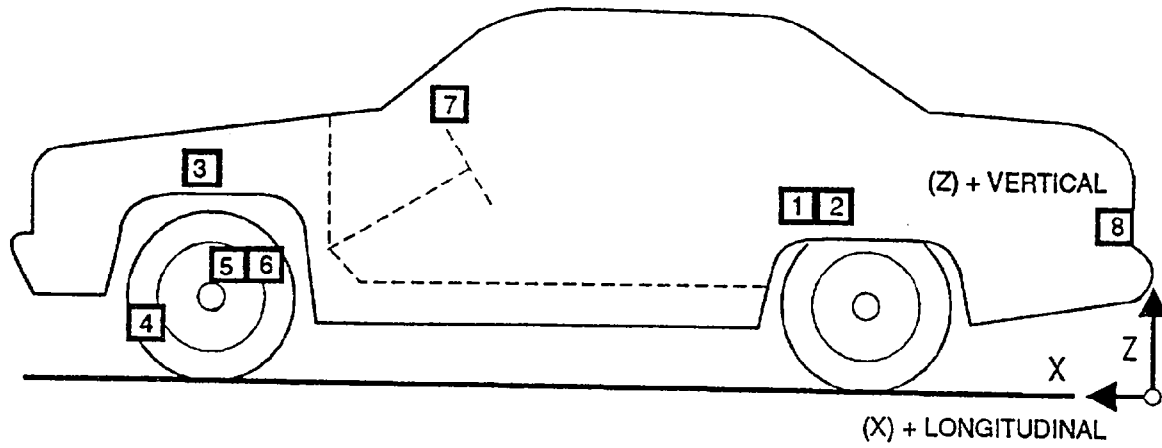
F. Airbag and gas generator part numbers and manufacturer's names.

Driver: Mfr.: Morton International; Airbag: TAC179H40993, PUT12323-0IC;

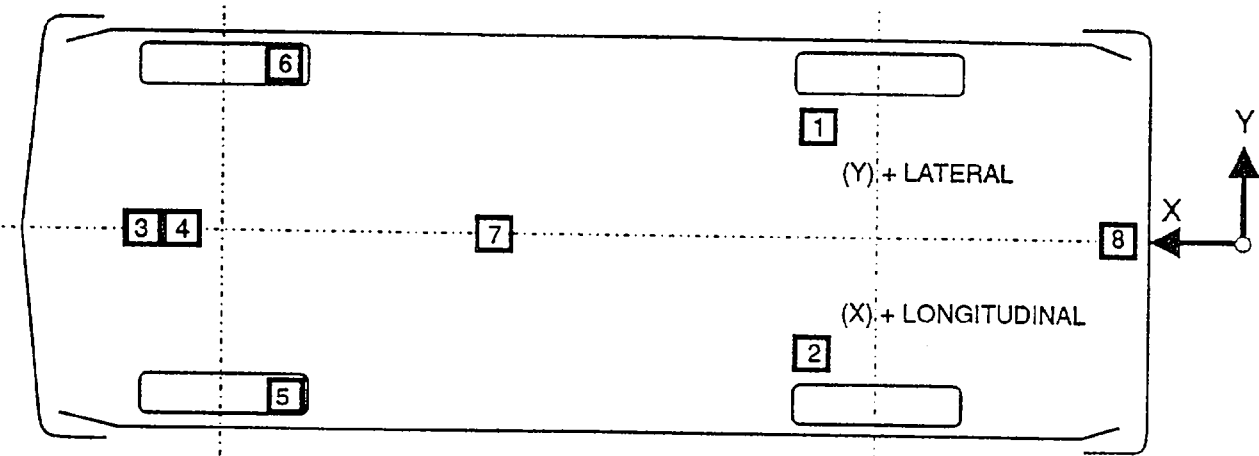
Gen: GBEE6S14AJE

Passenger: Mfr.: NA; Airbag: NA

Figure 3 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: CS0103 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 Right REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 77.6 in POST 77.4 in	24.9 in 24.9 in	11.8 in 12.0 in	1.9 g @ 137.5 ms	29.3 g @ 67.4 ms
2 Left REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 76.6 in POST 76.1 in	-24.9 in -24.9 in	11.7 in 12.5 in	1.8 g @ 137.9 ms	31.0 g @ 59.1 ms
3 ENGINE TOP LONGITUDINAL	PRE 153.6 in POST 147.6 in	-4.4 in -4.5 in	33.0 in 34.7 in	34.5 g @ 53.6 ms	125.2 g @ 43.8 ms
4 ENGINE BOTTOM LONGITUDINAL	PRE 152.0 in POST 147.2 in	-6.5 in -5.6 in	5.6 in 7.2 in	56.8 g @ 58.2 ms	86.7 g @ 47.8 ms
5 Left BRAKE CALIPER LONGITUDINAL	PRE 140.9 in POST 137.5 in	-24.4 in -25.0 in	12.1 in 12.0 in	9.4 g @ 87.7 ms	50.8 g @ 56.2 ms
6 Right BRAKE CALIPER LONGITUDINAL	PRE 140.8 in POST 138.0 in	24.4 in 25.0 in	13.6 in 12.7 in	18.5 g @ 76.8 ms	57.7 g @ 47.4 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	PRE 120.8 in POST 119.2 in	1.0 in 0.0 in	35.6 in 37.6 in	15.3 g @ 73.5 ms	55.2 g @ 83.8 ms
8 VEHICLE REAR CENTER VERTICAL	PRE 7.8 in POST 7.5 in	0.0 in 0.0 in	22.3 in 25.2 in	12.8 g @ 62.5 ms	10.3 g @ 102.8 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**

	Maximum Acceleration						
	X	Head Y	Z	R	X	Chest Y	Z
Driver	-55.6 g	-11.4 g	-22.4 g	56.3 g	-45.0 g	6.0 g	11.8 g
Passenger	55.2 g	-9.8 g	-57.3 g	64.9 g	-41.6 g	7.0 g	15.5 g

	Maximum Femur Compressive Force	
	Left Femur	Right Femur
Driver	1550 lbf	1314 lbf
Passenger	792 lbf	1091 lbf

	Head Injury Criteria <sup>1</sup>		
	HIC	Time $t_1$	Time $t_2$
Driver	554	71.3 ms	107.3 ms
Passenger	672	86.7 ms	122.7 ms

	Chest Maximum Resultant Acceleration <sup>2</sup>		
	Accelerometer	Time $t_1$	Time $t_2$
Driver	45.2 g	74.2 ms	77.2 ms
Passenger	42.2 g	82.3 ms	85.3 ms

Maximum Chest Deflection	
Driver	1.6 in
Passenger	1.9 in

<sup>1</sup> As defined in FMVSS No. 208

<sup>2</sup> 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 and chest impacted the airbag. The driver dummy was restrained by the airbag and the three-point passive belt. The dummy rebounded rearward with the dummy's head rotating rearward contacting the head restraint. The driver dummy came to rest in the driver's seat, restrained by the three-point passive belt.

### 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 rotated downward impacting the dummy's chest. The right front passenger dummy was restrained by the three-point passive belt. The dummy rebounded rearward into the seat back as the dummy's head rotated rearward contacting the head restraint. The right front passenger dummy came to rest in the right front passenger's seat restrained by the three-point passive belt.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary  
Front Outboard Designated Seating Positions

NHTSA number: CS0103

Vehicle model year/make/model/body style: 1995/Pontiac/Grand Am/2-door coupe

Date of comfort/convenience check: 11/23/94

Technician performing check: Sankey

GVWR: 3871 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 automatic seat belts - requirements for convenience hooks (S7.4.1), webbing tension-relieving devices (S7.4.2), belt contact force (S7.4.3) apply.

Convenience Hooks (S7.4.1):

Not applicable, the vehicle's automatic restraint system does not include a manual convenience hook or other device to stow the seat belt webbing.

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

NHTSA number: CS0103

Vehicle model year/make/model/body style: 1995/Pontiac/Grand Am/4-door sedan

Date of comfort/convenience check: 11/23/94

Technician performing check: Sankey

GVWR: 3871 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 0.4 pounds.

Latchplate Access (S7.4.4):

Not applicable, the vehicle was not equipped with manual belts other than type 2 belts or belts voluntarily installed by the manufacturer.

Retraction (S7.4.5):

Not applicable, the vehicle was not equipped with manual belts other than type 2 belts or belts voluntarily installed by the manufacturer.

Seat Belt Guides and Hardware (S7.4.6):

Not applicable, the vehicle was not equipped with manual belts other than type 2 belts or belts voluntarily installed by the manufacturer.

Table 8 FMVSS 208 Equipment Data

FMVSS 208 Seat Belt Warning System Data

With an occupant in the driver's position and the lap belt/unibelt in stowed position and ignition switch placed in the "start/on" position the duration of audible warning signal is 7 s and the reminder light operates 65 s.

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

NOTE: the audible warning should not operate.

The wording of the visual seat belt warning is 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 label which describes the manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system was located on the driver's sun visor.

Have vehicle serviced if airbag readiness light does not come on when vehicle is started, stays on, or comes on when driving.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 2-59.

A description of the functional operation of the system was provided in the owner's manual on pages 1-21 & 1-22.

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 1-21, 1-22, & 2-59.

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 "airbag" located on the lower left portion of the instrument cluster.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator was provided in the owner's manual on page 2-59.

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.

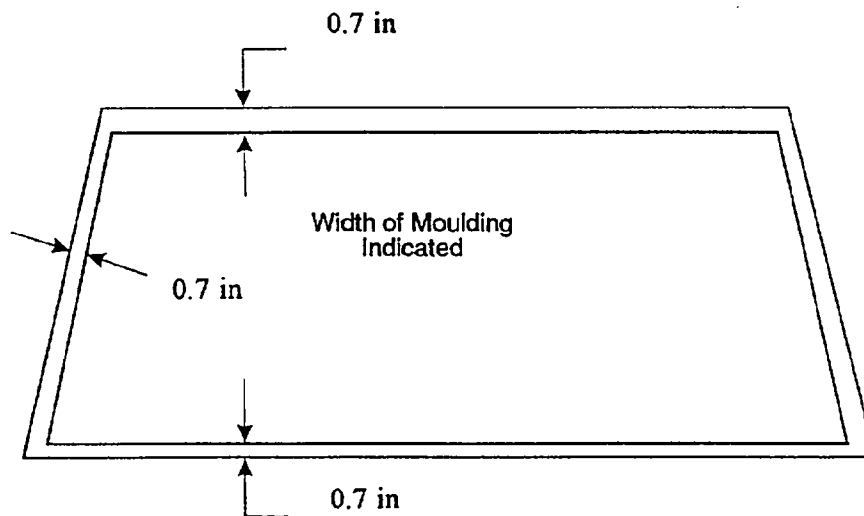
Clips or brackets used to retain windshield: None

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	79.0 in	79.0 in	100.0
Left side	79.0 in	79.0 in	100.0
Total	158.0 in	158.0 in	100.0

Pre-test windshield mounting material temperature: 69° F



Front view of windshield<sup>1</sup>

Loss of windshield retention lengths: None

<sup>1</sup> Indicate areas of loss of retention, if any, on windshield diagram.

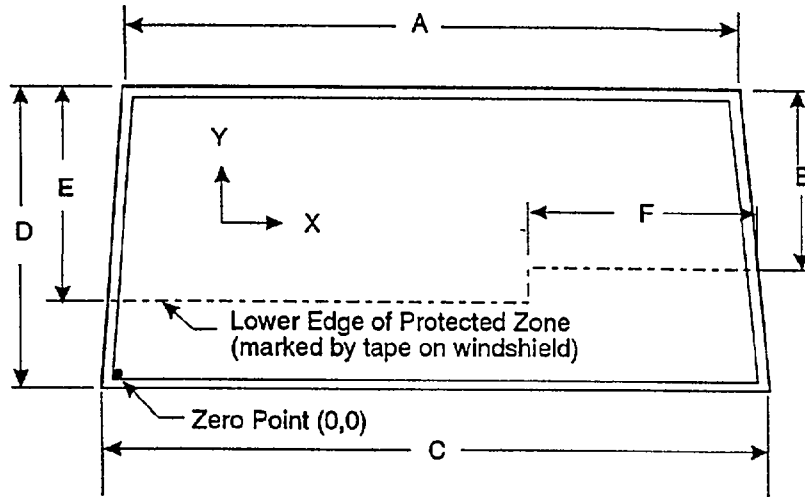
Figure 5 FMVSS 219 Test Data

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:

- A: 42.5 in
- B: 17.9 in
- C: 61.1 in
- D: 31.3 in
- E: 20.8 in
- F: 25.5 in



FRONT VIEW

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:	1995/Pontiac/Grand Am/2-door coupe
NHTSA number:	CS0103
Fuel system capacity:	15.2 gal (from owner's manual)
Usable capacity:	15.2 gal (furnished by COTR)
Test volume range:	14.0 gal to 14.3 gal (92-94% of usable)
Actual test volume:	14.1 gal (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistokes
Test fluid color:	purple
Type of fuel pump:	electric

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

Details of fuel system:

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

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CS0103  
Test date: 11/23/94  
Vehicle year/make/  
model/body style: 1995/Pontiac/Grand Am/2-door coupe

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:

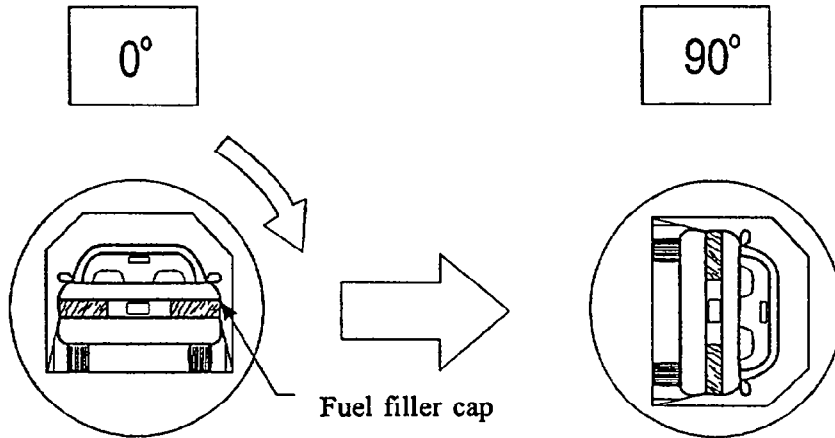
	<u>Test Results</u>	<u>Maximum Allowable</u>
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-Minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

**Figure 6 FMVSS 301 Static Rollover Test Data**

NHTSA number: CS0103

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

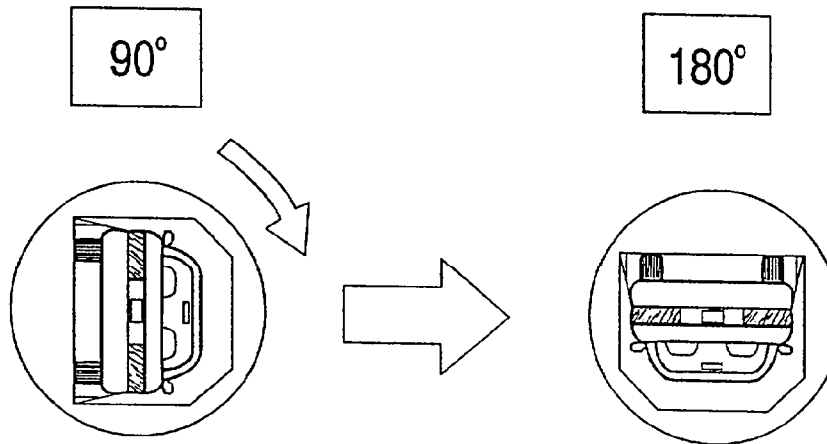
**Fuel system fluid spillage measurements:**

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

**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

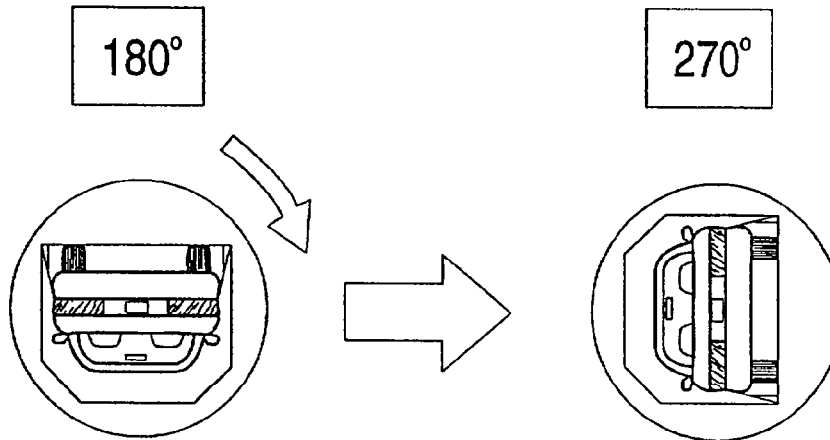
Fuel system fluid spillage measurements:

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

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

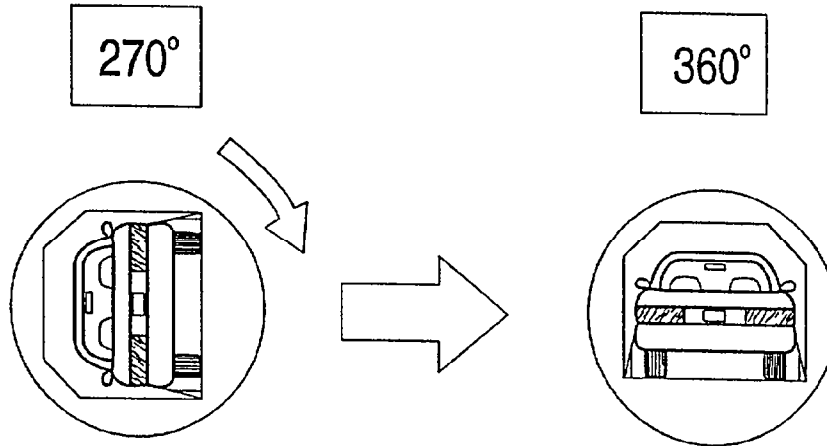
Fuel system fluid spillage measurements:

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

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 5 minutes from onset of rotation	0 oz	5 oz
2. Sixth minute from onset of rotation	0 oz	1 oz
3. Seventh minute from onset of rotation	0 oz	1 oz

Fuel system fluid spillage location(s): None

Section 4.0

**Vehicle, Occupant, and Camera Measurements**

**Figure 7 Pre-test and Post-test Measurement Points**

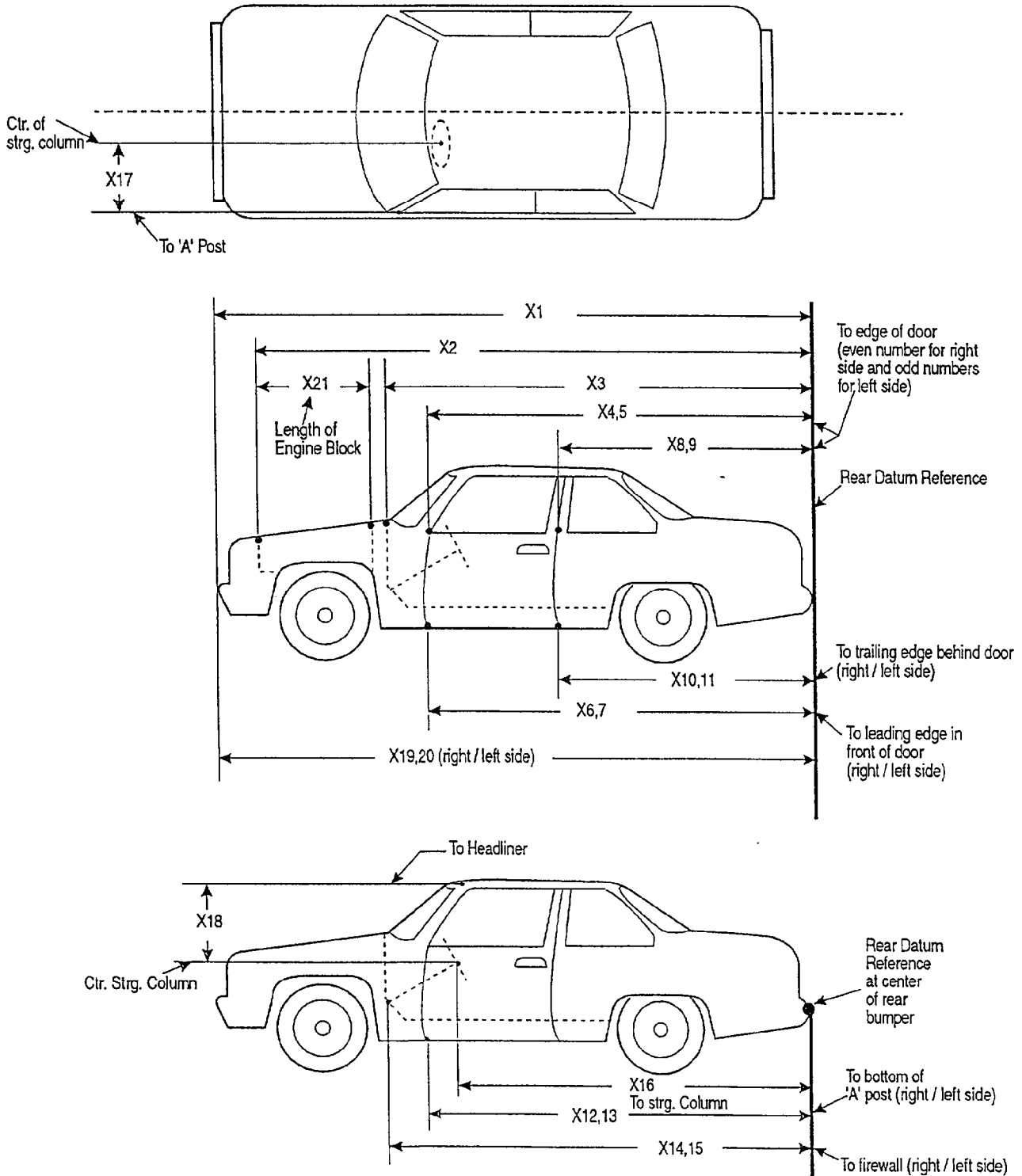


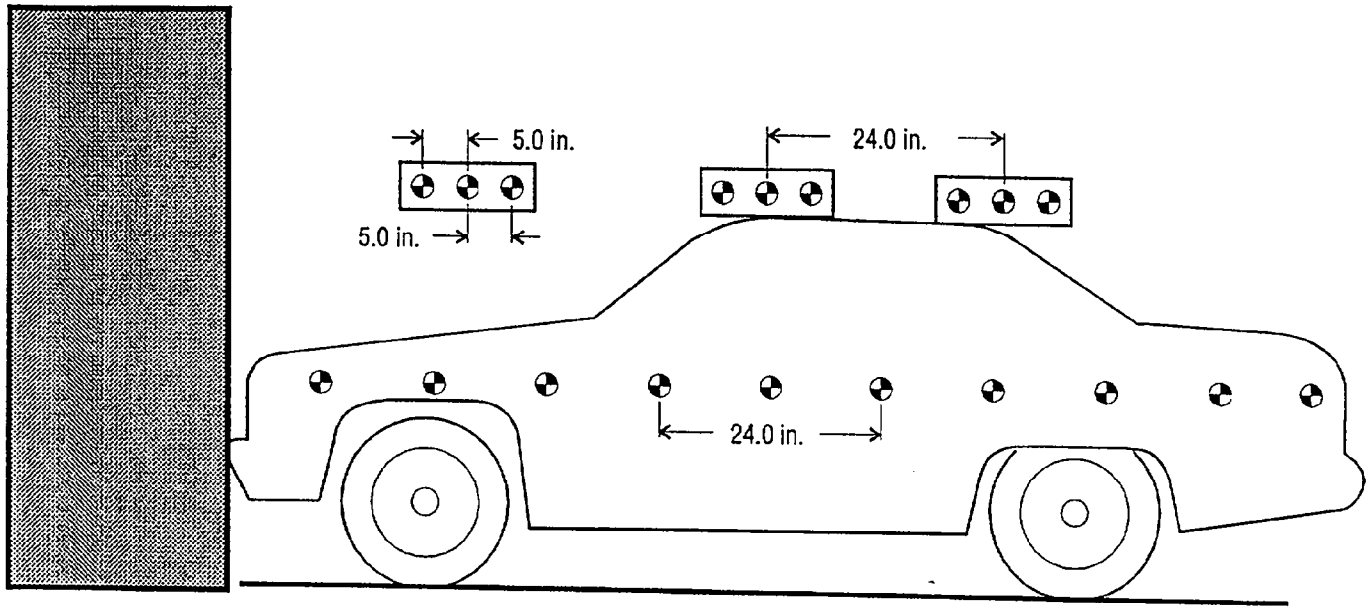
Table 11 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1995/Pontiac/Grand Am/2-door coupe

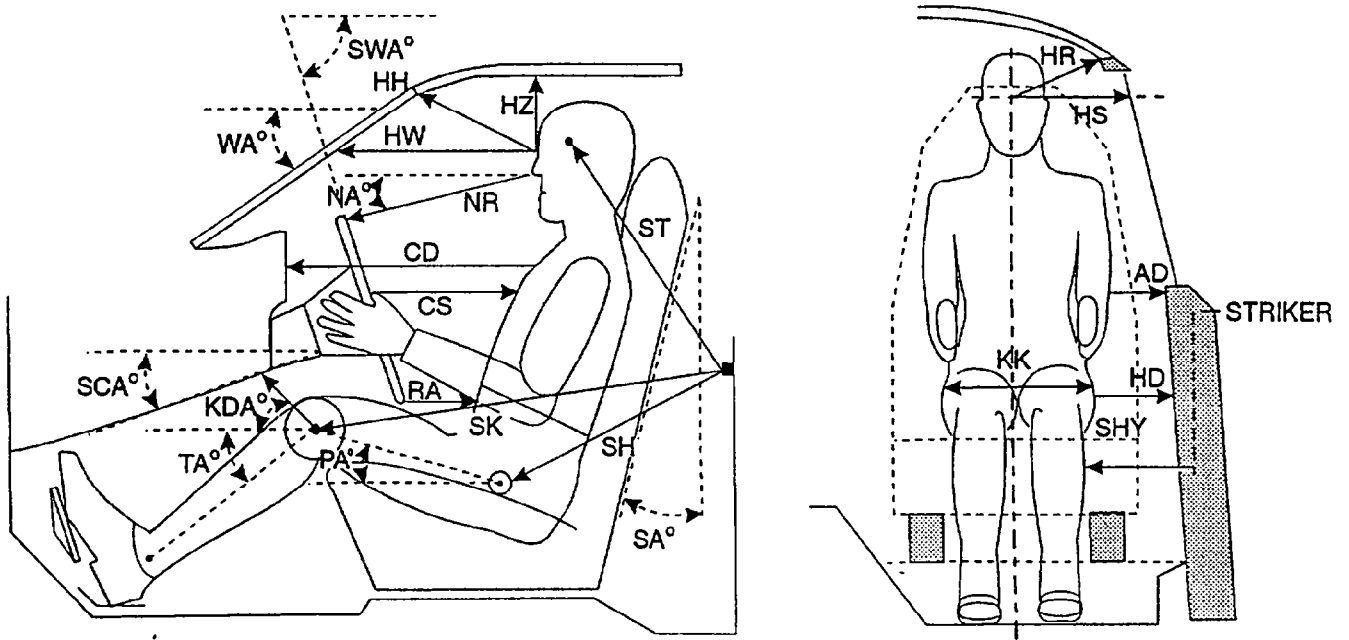
Test number: 941123

No.	Type of Measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	186.9 in	176.0 in	10.9 in
X2	Rear surface of vehicle to front of engine block	161.9 in	155.3 in	6.6 in
X3	Rear surface of vehicle to firewall	135.7 in	134.5 in	1.2 in
X4	Rear surface of vehicle to upper leading edge of right door	124.9 in	124.9 in	0.0 in
X5	Rear surface of vehicle to upper leading edge of left door	124.8 in	125.1 in	-0.3 in
X6	Rear surface of vehicle to lower leading edge of right door	124.0 in	123.0 in	1.0 in
X7	Rear surface of vehicle to lower leading edge of left door	123.9 in	123.8 in	0.1 in
X8	Rear surface of vehicle to upper trailing edge of right door	73.1 in	73.6 in	-0.5 in
X9	Rear surface of vehicle to upper trailing edge of left door	73.0 in	73.5 in	-0.5 in
X10	Rear surface of vehicle to lower trailing edge of right door	71.5 in	71.1 in	0.4 in
X11	Rear surface of vehicle to lower trailing edge of left door	71.4 in	71.1 in	0.3 in
X12	Rear surface of vehicle to bottom of "A" post on right side	123.5 in	123.0 in	0.5 in
X13	Rear surface of vehicle to bottom of "A" post on left side	123.0 in	123.1 in	-0.1 in
X14	Rear surface of vehicle to firewall - right side	136.2 in	132.6 in	3.6 in
X15	Rear surface of vehicle to firewall - left side	135.8 in	135.5 in	0.3 in
X16	Rear surface of vehicle to steering wheel center	105.8 in	110.8 in	-5.0 in
X17	Center of steering column to "A" post	10.8 in	11.8 in	-1.0 in
X18	Center of steering column to headliner	17.5 in	15.1 in	2.4 in
X19	Rear surface of vehicle to right side of front bumper	179.9 in	167.0 in	12.9 in
X20	Rear surface of vehicle to left side of front bumper	179.8 in	173.2 in	6.6 in
X21	Length of engine block	20.0 in	20.0 in	0.0 in

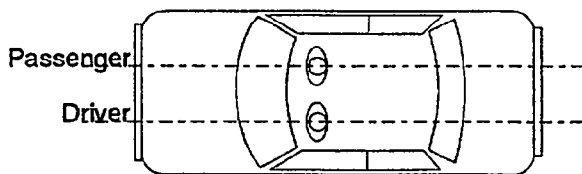
Figure 8 Vehicle Target Locations



**Figure 9 Dummy Measurement Locations for Front Seat Occupants**



**VERTICAL LONGITUDINAL PLANE**



**VERTICAL TRANSVERSE PLANE**

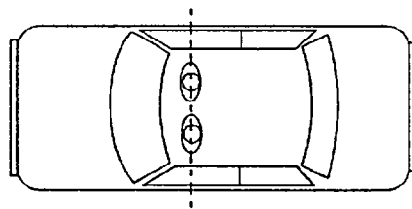


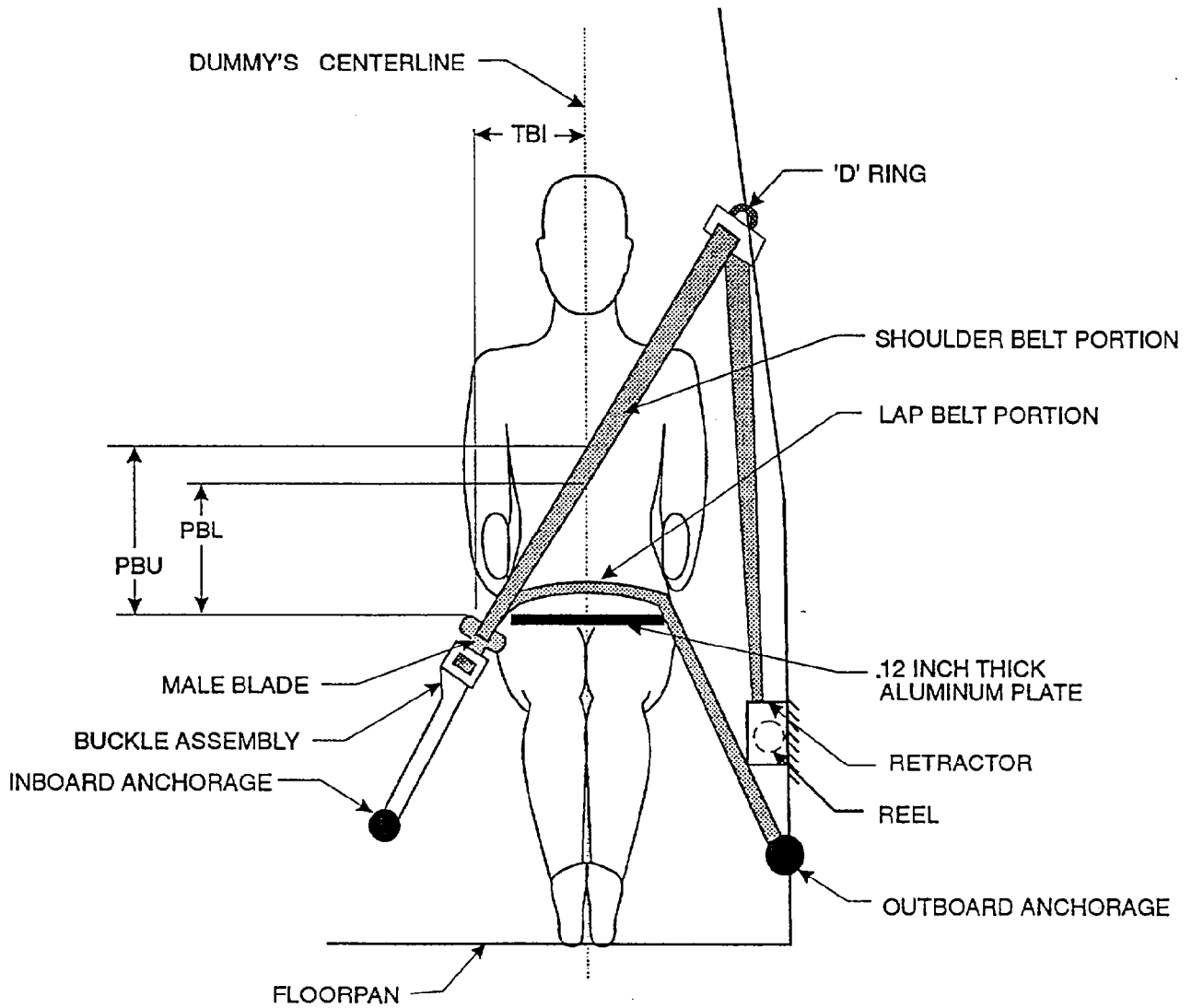
Table 12 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #314)	Passenger (Serial #229)
WA	Windshield angle	28°	NA
SWA	Steering wheel angle	68°	NA
SCA	Steering column angle	22°	NA
SA	Seat back angle	28°	28°
HZ	Head to roof	3.1 in	3.3 in
HH	Head to header	11.6 in	12.2 in
HW	Head to windshield	20.5 in	21.0 in
HR	Head to side header	6.4 in	7.5 in
NR	Nose to rim	14.6 in	NA
NA	Nose to rim angle	9°	NA
CD	Chest to dash	19.6 in	19.5 in
CS	Steering wheel to chest	12.0 in	NA
RA	Rim to abdomen	7.2 in	NA
KDL	Left knee to dash	5.5 in	6.7 in
KDR	Right knee to dash	5.3 in	6.1 in
KDA	Outboard knee to dash angle	39°	40°
PA	Pelvic angle	25°	25°
TA	Tibial angle	47°	42°
KK	Knee to knee	11.8 in	10.2 in
ST <sup>1</sup>	Striker to head	25.2 in	27.9 in
	Striker to head angle	-65°	-50°
SK <sup>1</sup>	Striker to knee	36.2 in	36.2 in
	Striker to knee angle	0°	0°
SH <sup>1</sup>	Striker to H-point	21.7 in	22.0 in
	Striker to H-point angle	13°	10°
SHY	Striker to H-point (Y dir.)	9.1 in	10.3 in
HS	Head to side window	10.0 in	12.7 in
HD	H-point to door	5.0 in	5.5 in
AD	Arm to door	4.5 in	4.9 in

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

<sup>1</sup> A negative angle indicates the measurement point was located above the striker.

**Figure 10 Seat Belt Positioning Data**



	Driver	Passenger
PBU - Top surface of aluminum plate to belt upper edge	12.5 in	13.7 in
PBL - Top surface of aluminum plate to belt lower edge	9.0 in	10.7 in
TBI - Dummy centerline to intersection of upper torso belt and lap belt	8.8 in	11.0 in

Figure 11 Camera Positions

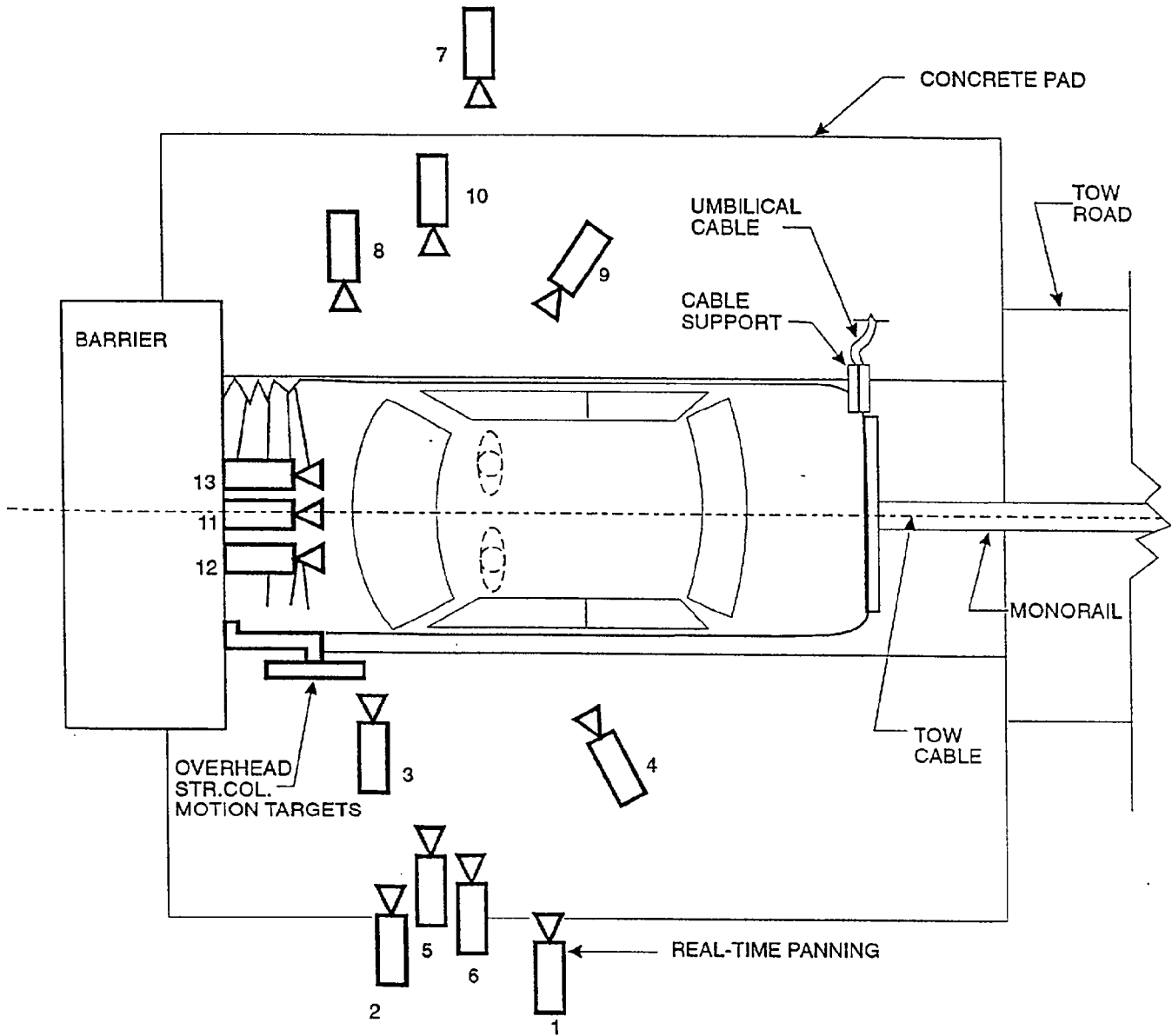


Figure 11 Camera Positions, Cont'd.

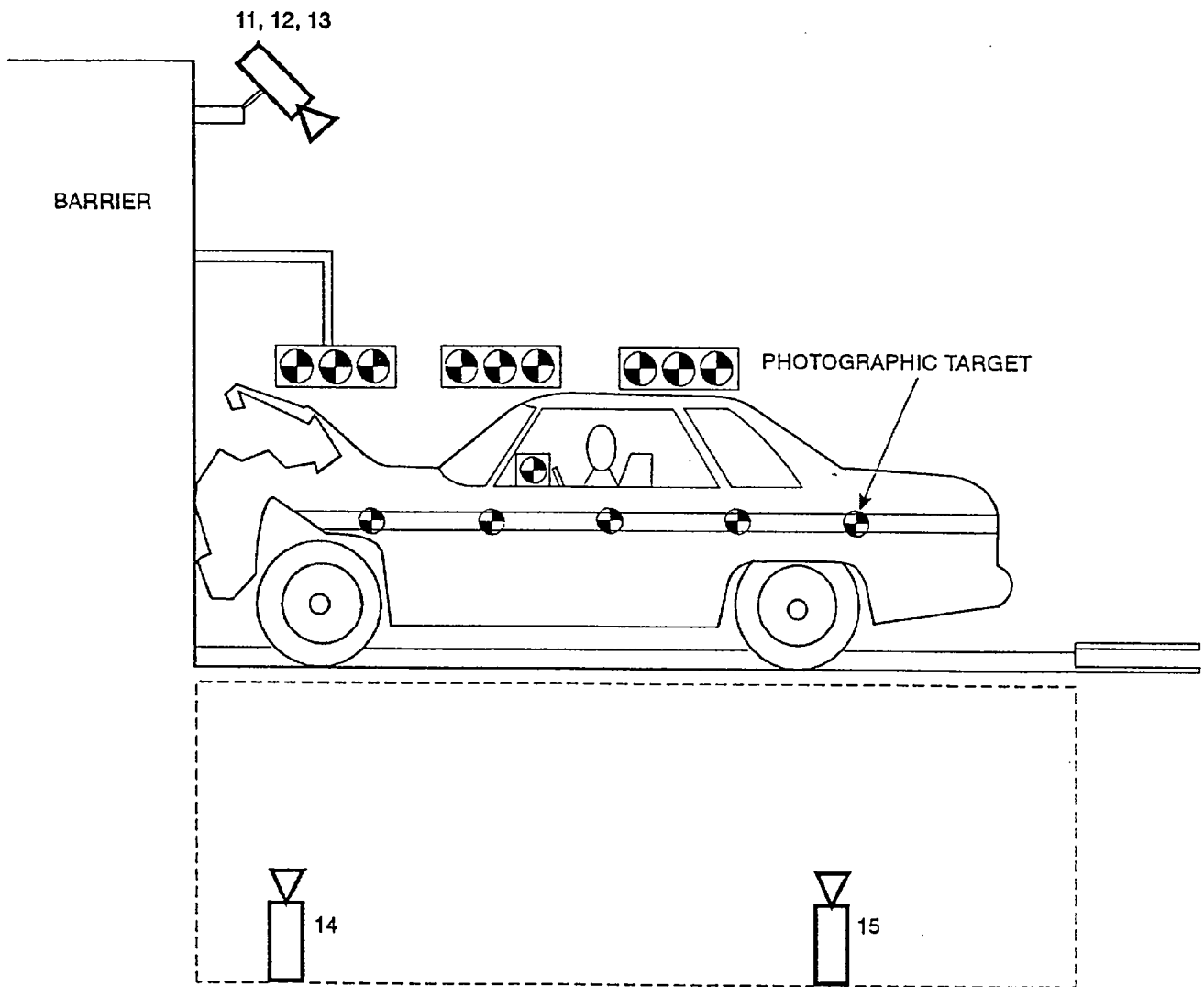


Table 13 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1995/Pontiac/Grand Am/2-door coupe

Test number: 941123

Camera Number	View	X	Y	Z	Camera Angle <sup>2</sup>	Film Plane to Head Target	Camera Lens	Film Speed
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°	307 in	25 mm	1015 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1005 frames/s
4	Driver kinematics	-157.3 in	116.0 in	87.0 in	-27°	103 in	25 mm	995 frames/s
5	Steering column motion	- 82.0 in	286.0 in	103.0 in	-14°	NA	25 mm	998 frames/s
6	Steering column motion	- 82.0 in	286.0 in	75.1 in	-9°	NA	25 mm	1000 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	1000 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	508 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	95 in	25 mm	992 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	226 in	25 mm	1002 frames/s
11	Windshield front view	-6.0 in	0.0 in	88.0 in	-40°	NA	13 mm	1000 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	1000 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	1002 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

<sup>1</sup> +X: Film plane forward of barrier face

+Y: Film plane to left of monorail centerline

+Z: Film plane above ground level

<sup>2</sup> +Angle: Film plane angled upward from horizontal plane

Appendix A

Photographs

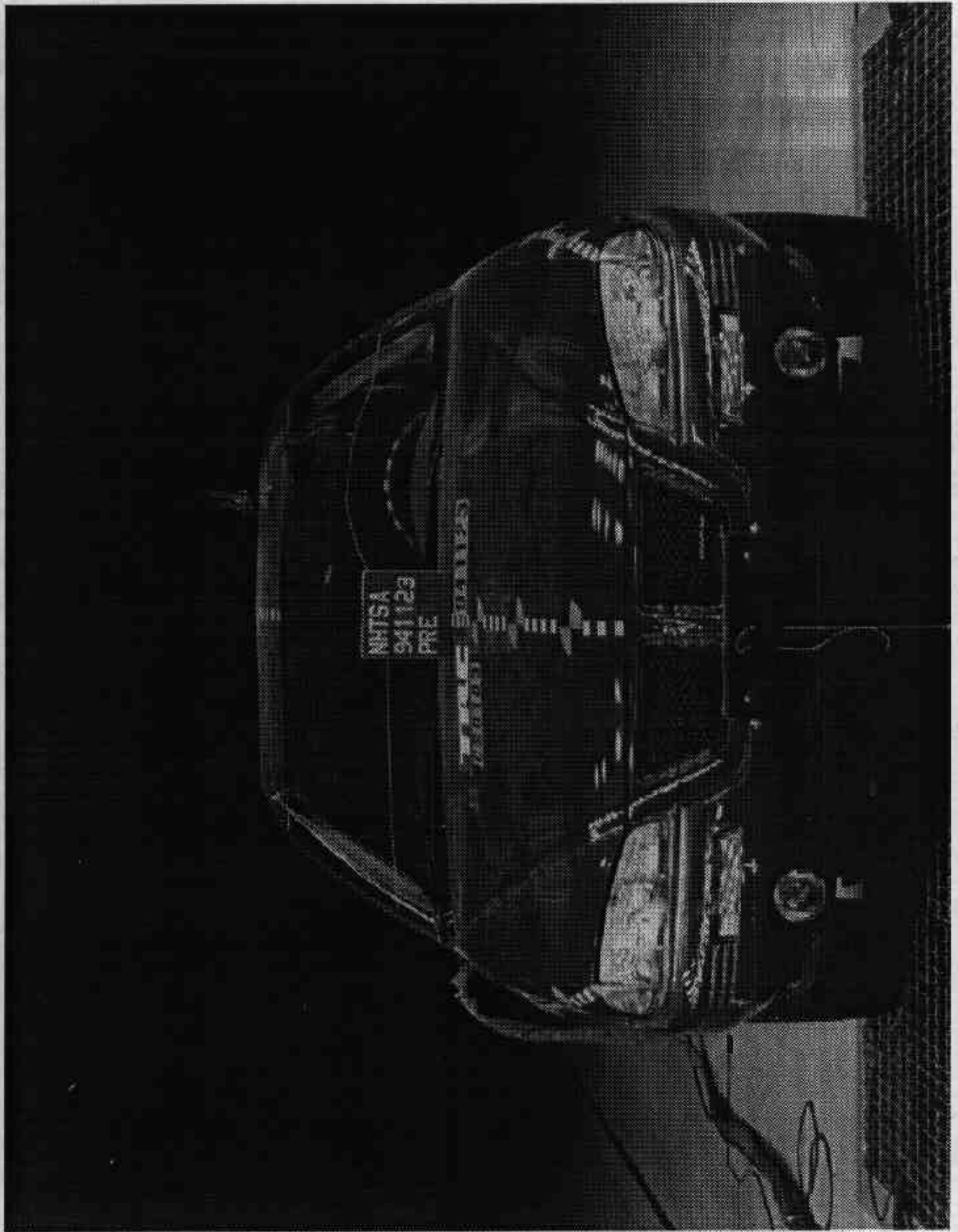


Figure A-1. Pre-Test Front View  
A-2

941123

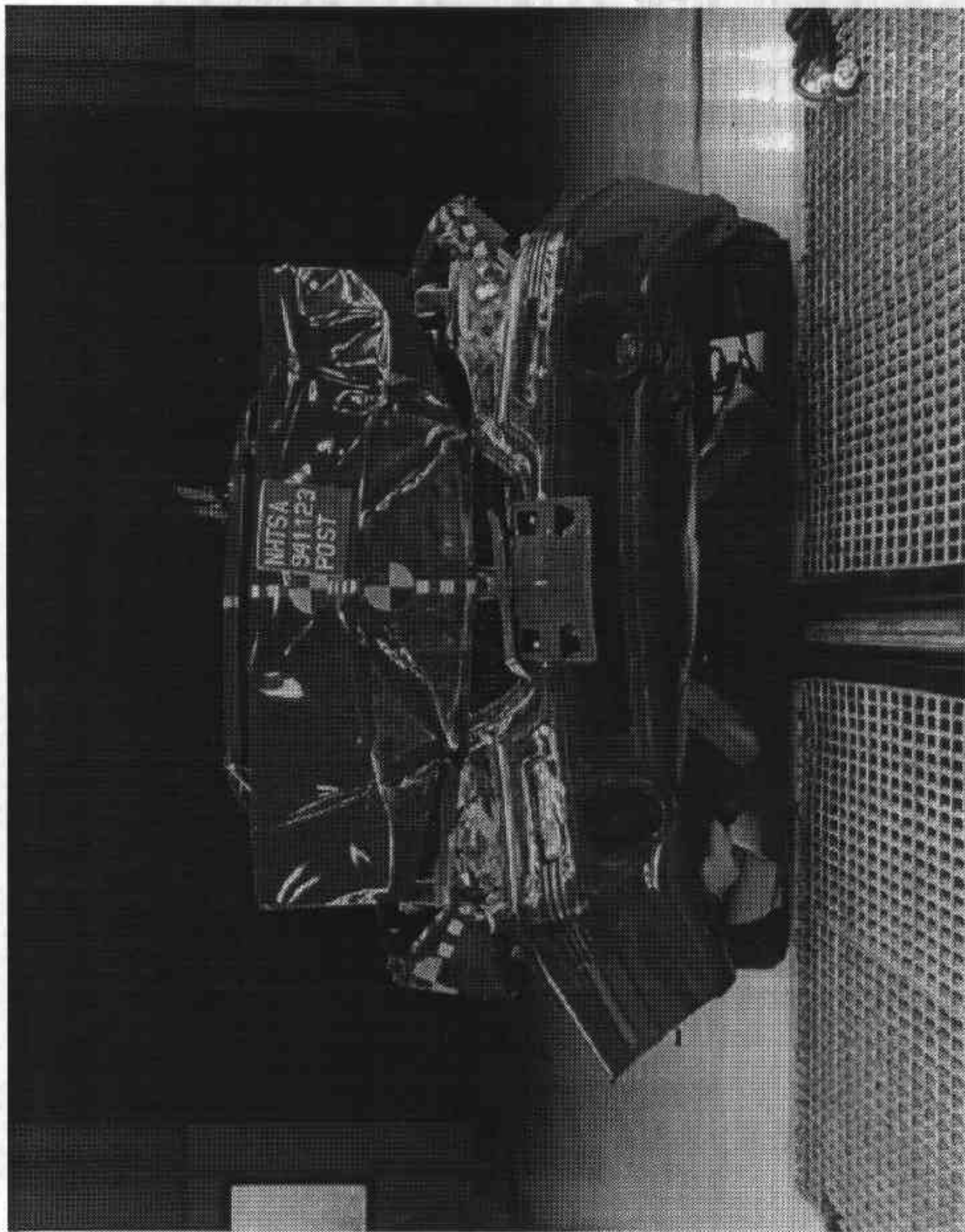


Figure A-2. Post-Test Front View  
A-3

941123

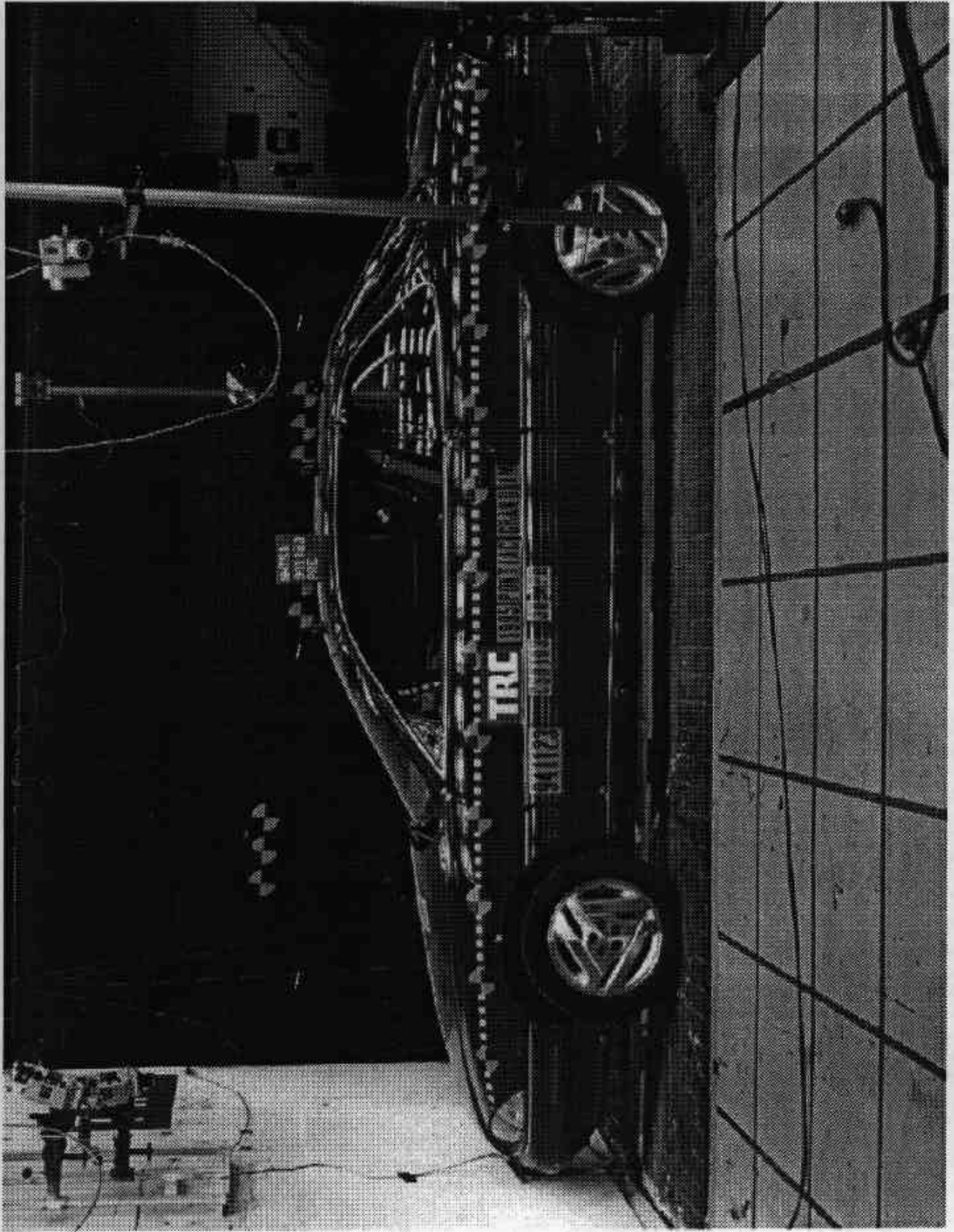


Figure A-3. Pre-Test Left Side View

A-4

941123

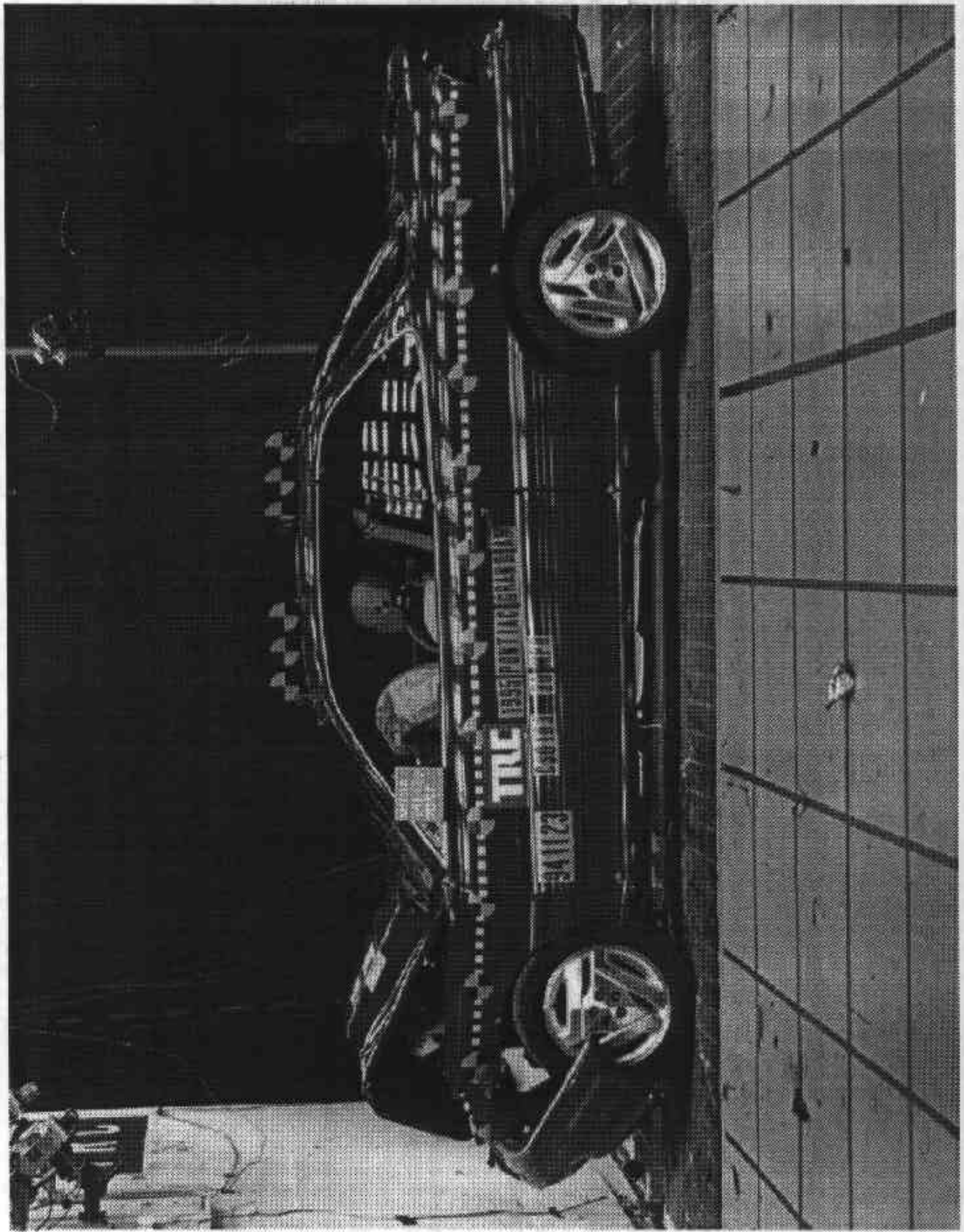


Figure A-4. Post-Test Left Side View  
A-5

941123

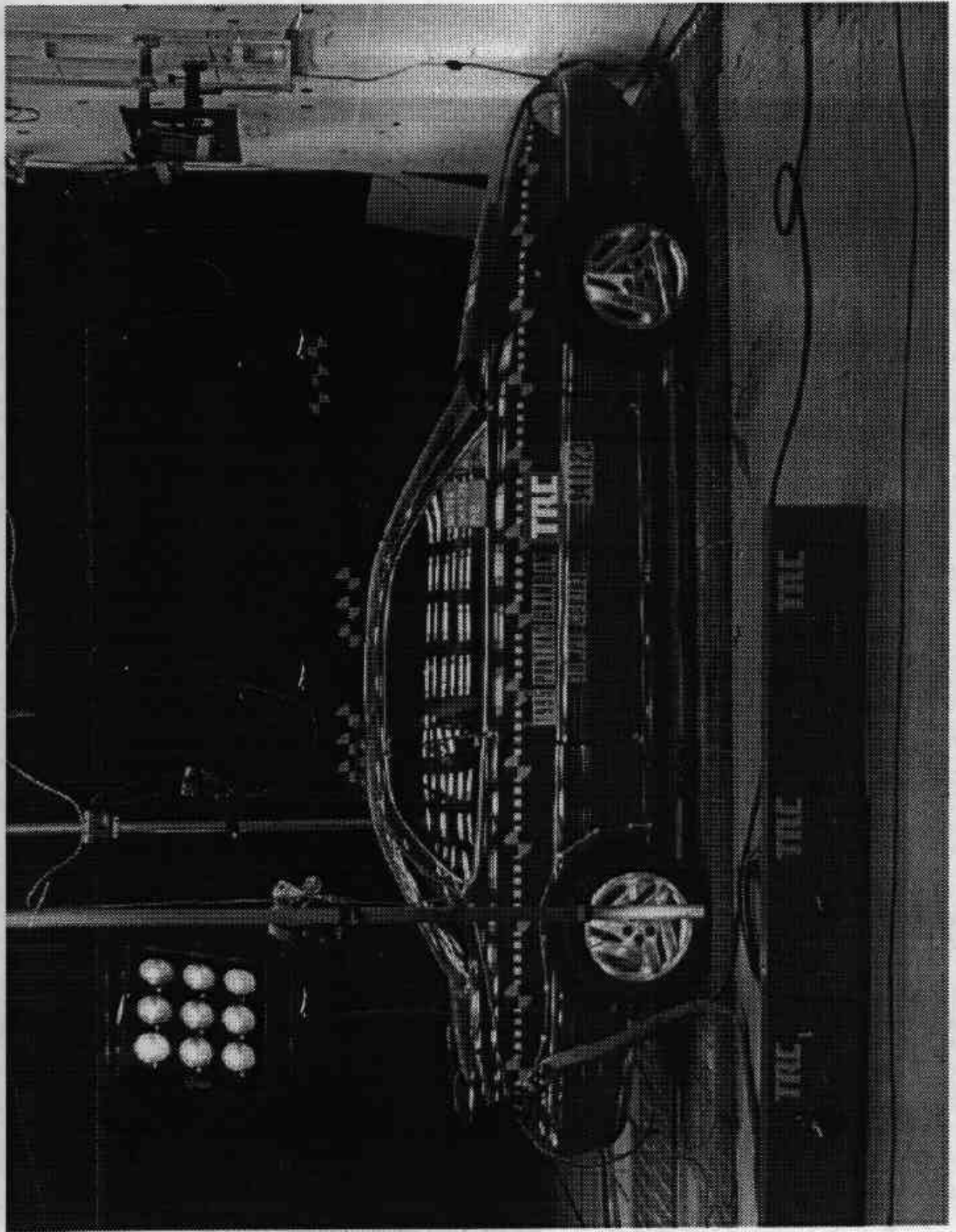


Figure A-5. Pre-Test Right Side View

A-6

941123

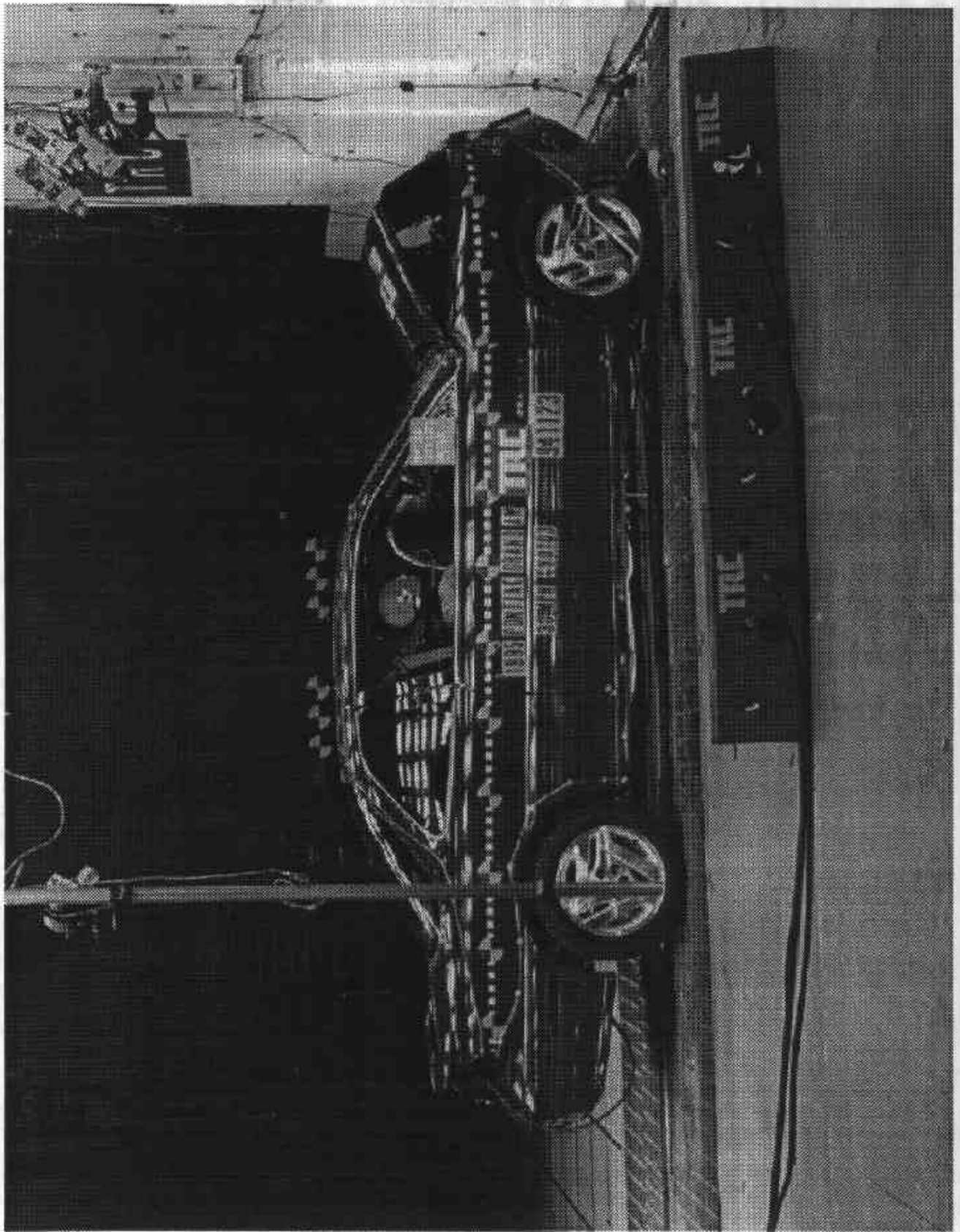


Figure A-6. Post-Test Right Side View

A-7

941123

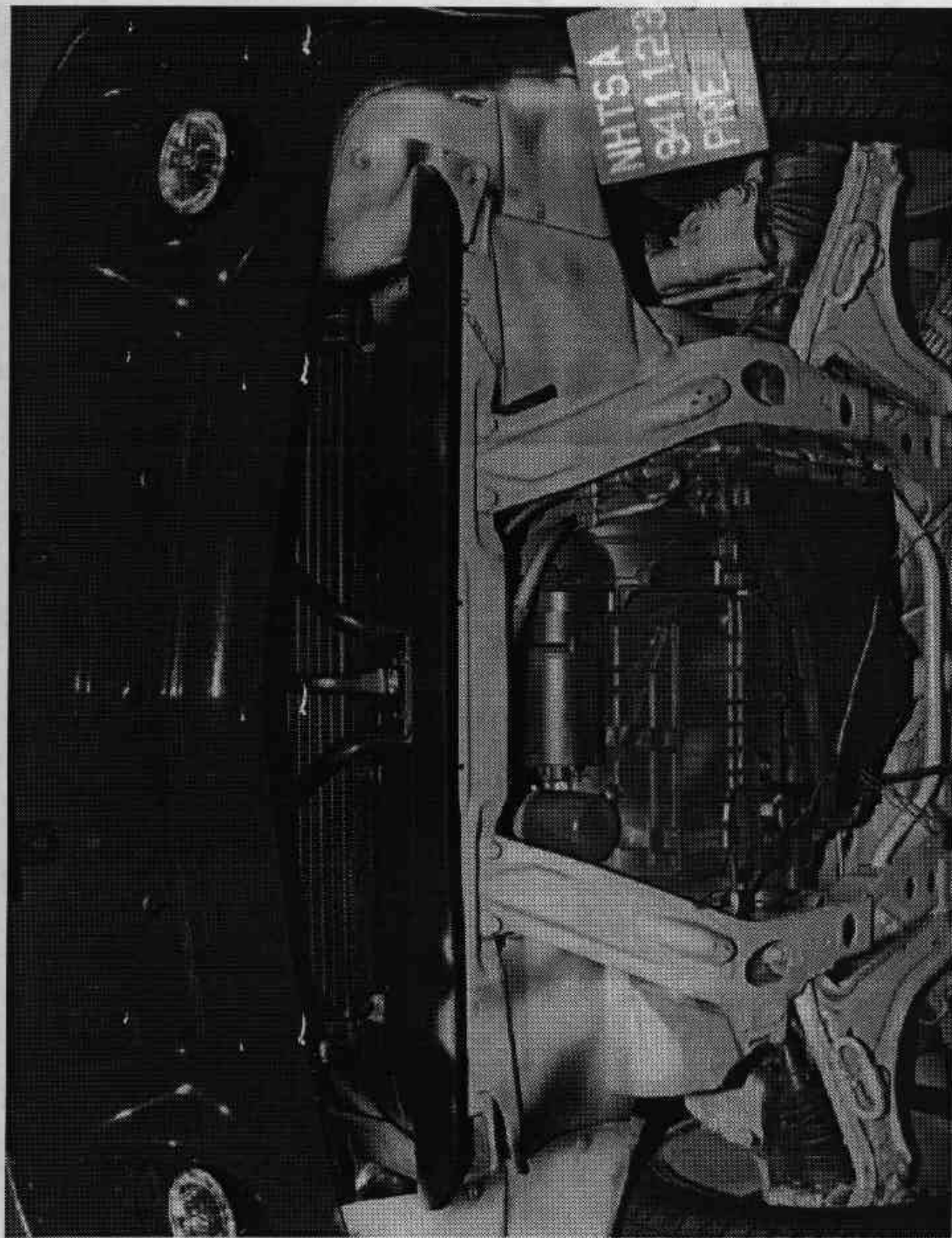


Figure A-7. Pre-Test Front Underbody View

A-8

941123



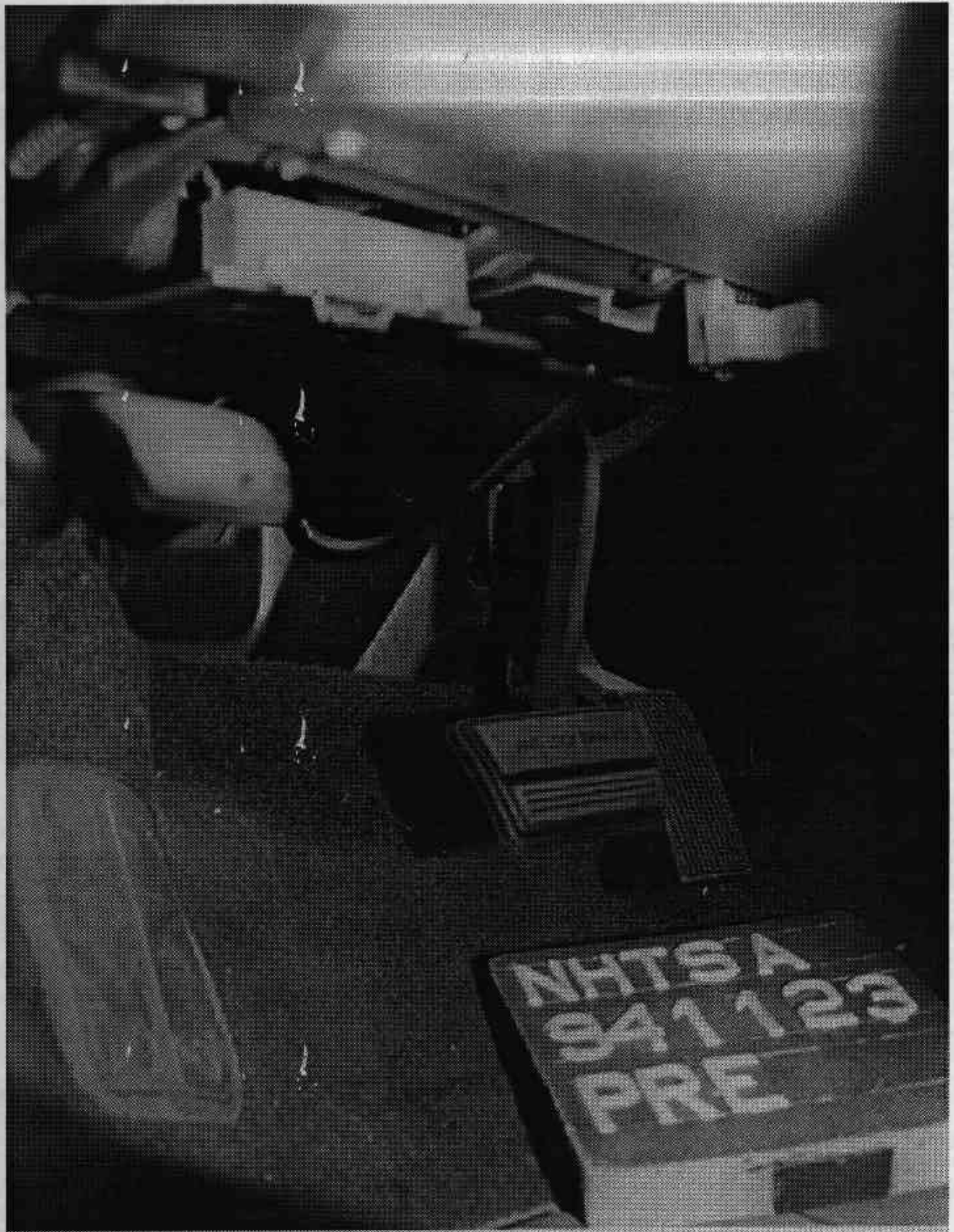


Figure A-9. Pre-Test Steering Column at Firewall View - Interior

A-10

941123

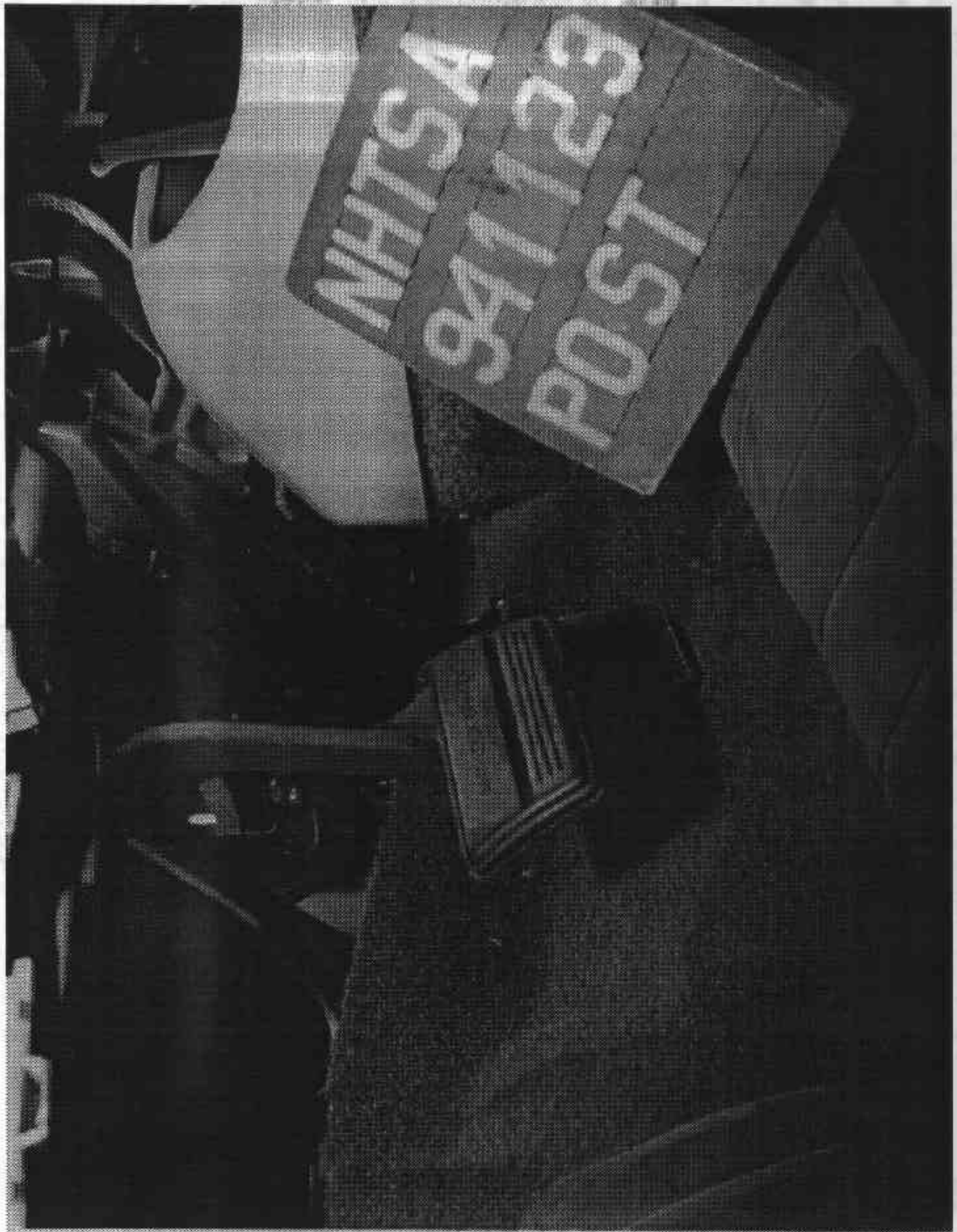


Figure A-10. Post-Test Steering Column at Firewall View - Interior

A-11

941123

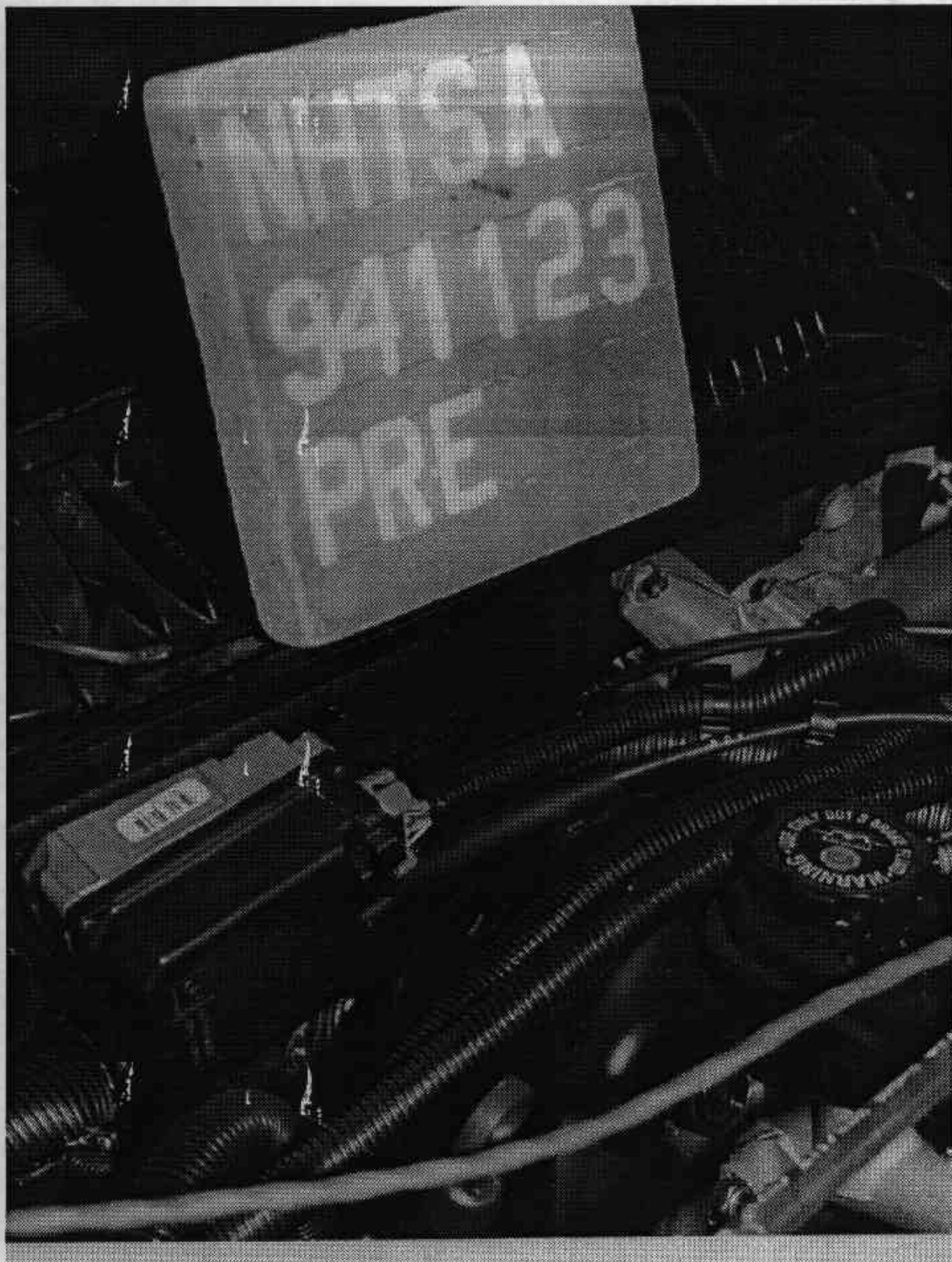


Figure A-11. Pre-Test Steering Column at Firewall View - Exterior

A-12

941123

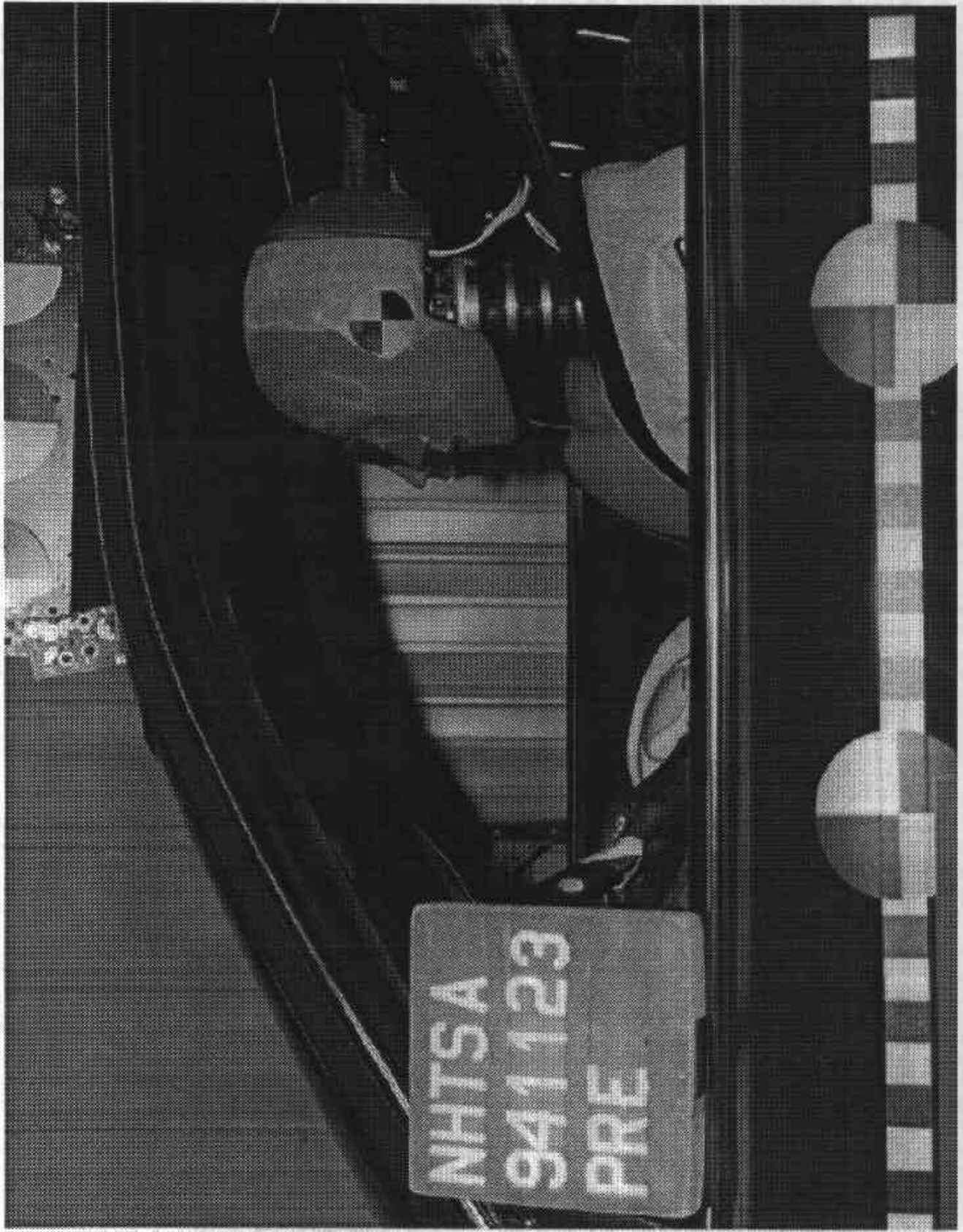


Figure A-12. Pre-Test Driver Dummy Position View

A-13

941123

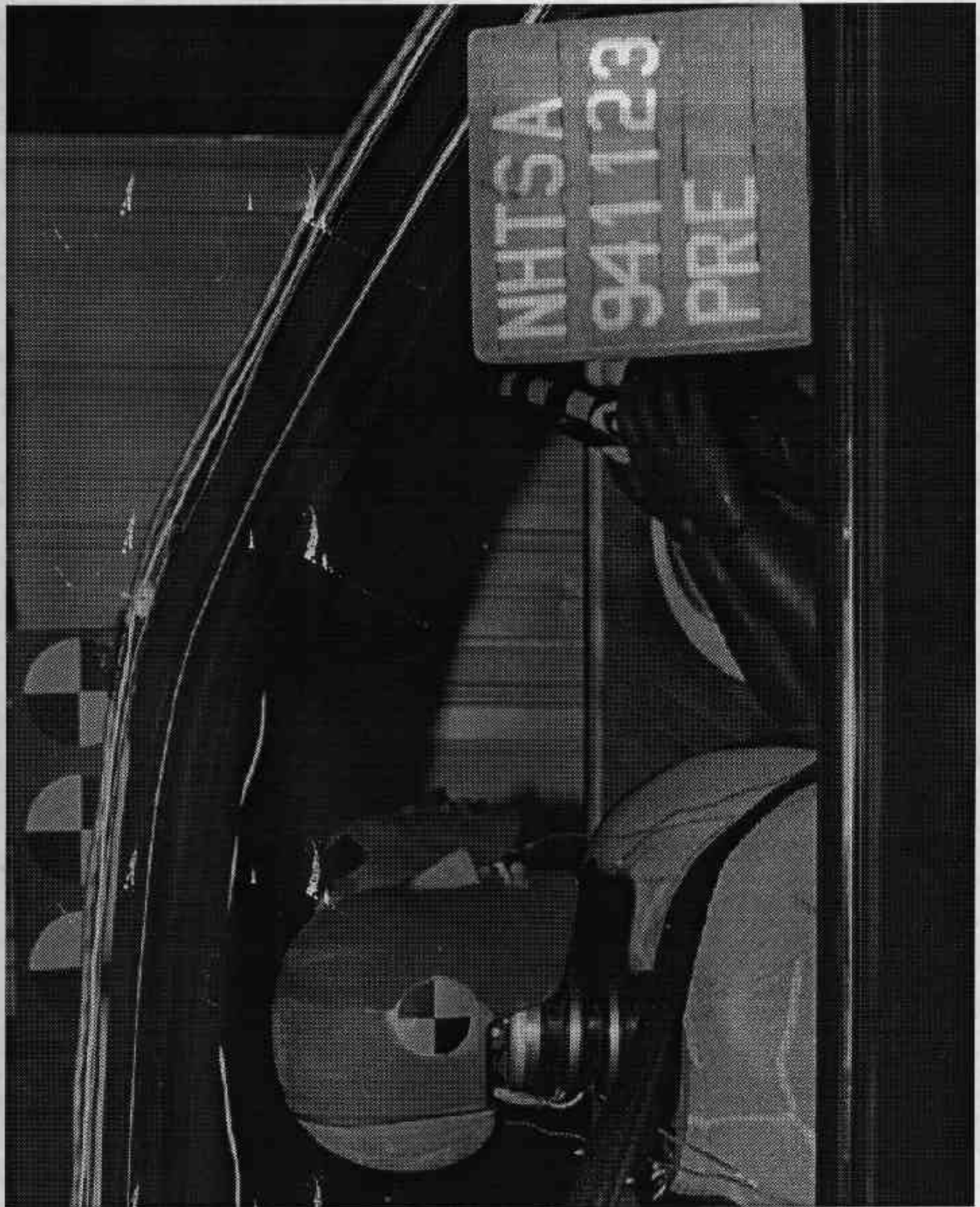


Figure A-13. Pre-Test Passenger Dummy Position View  
A-14

941123

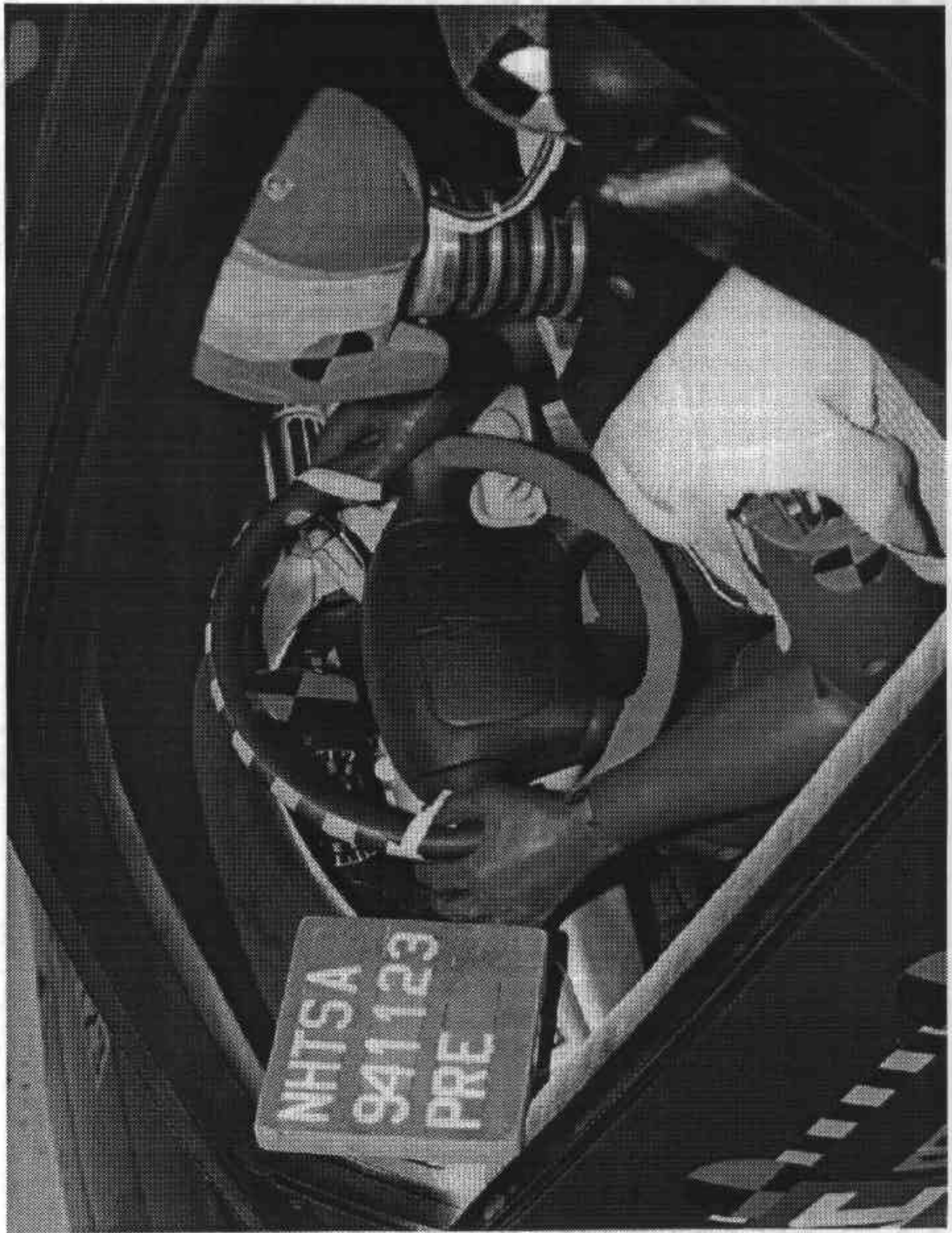


Figure A-14. Pre-Test Driver Dummy & Vehicle Interior View  
A-15

941123



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

A-16

941123



Figure A-16. Pre-Test Passenger Dummy & Vehicle Interior View

A-17

941123

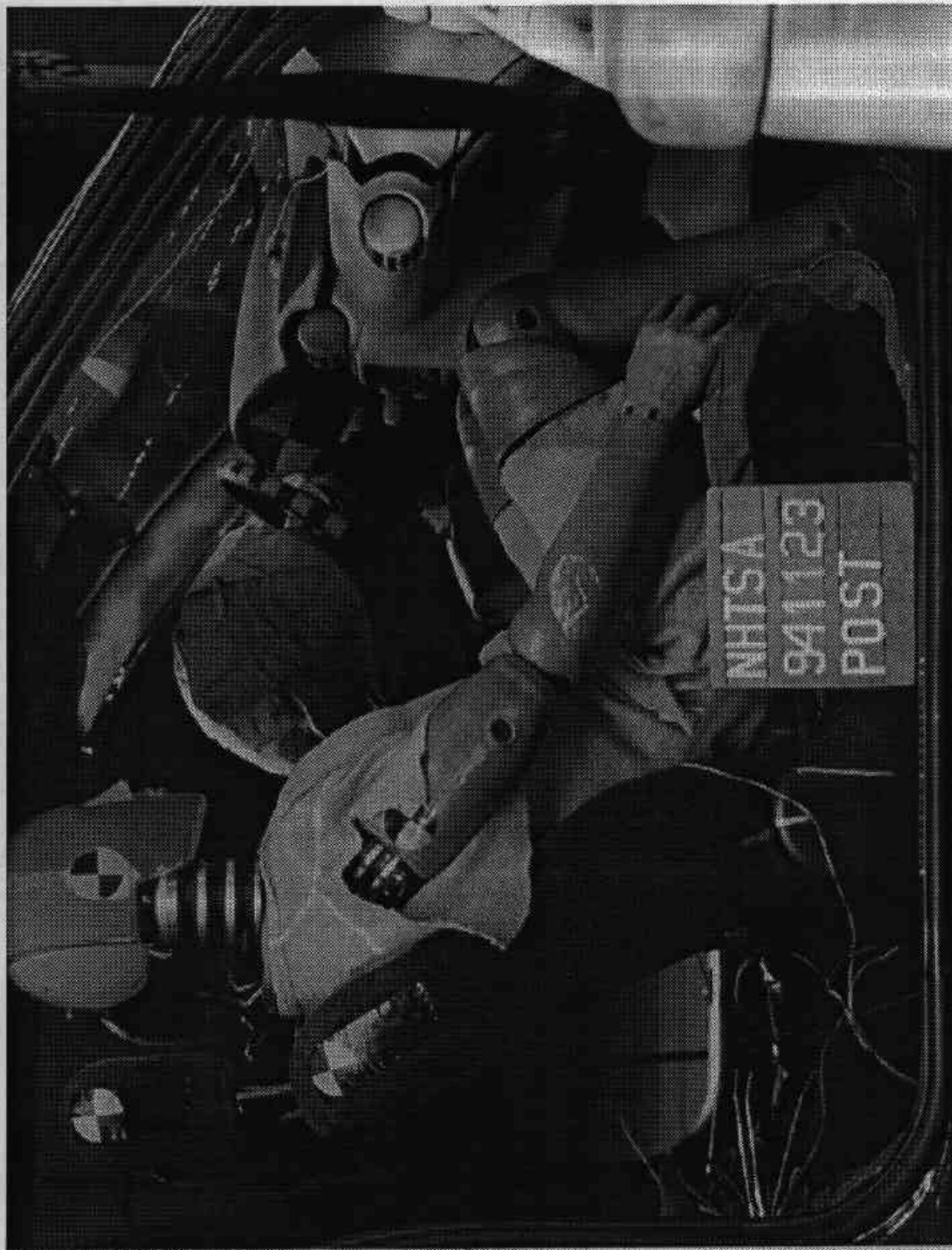


Figure A-17. Post-Test Passenger Dummy & Vehicle Interior View

A-18

941123

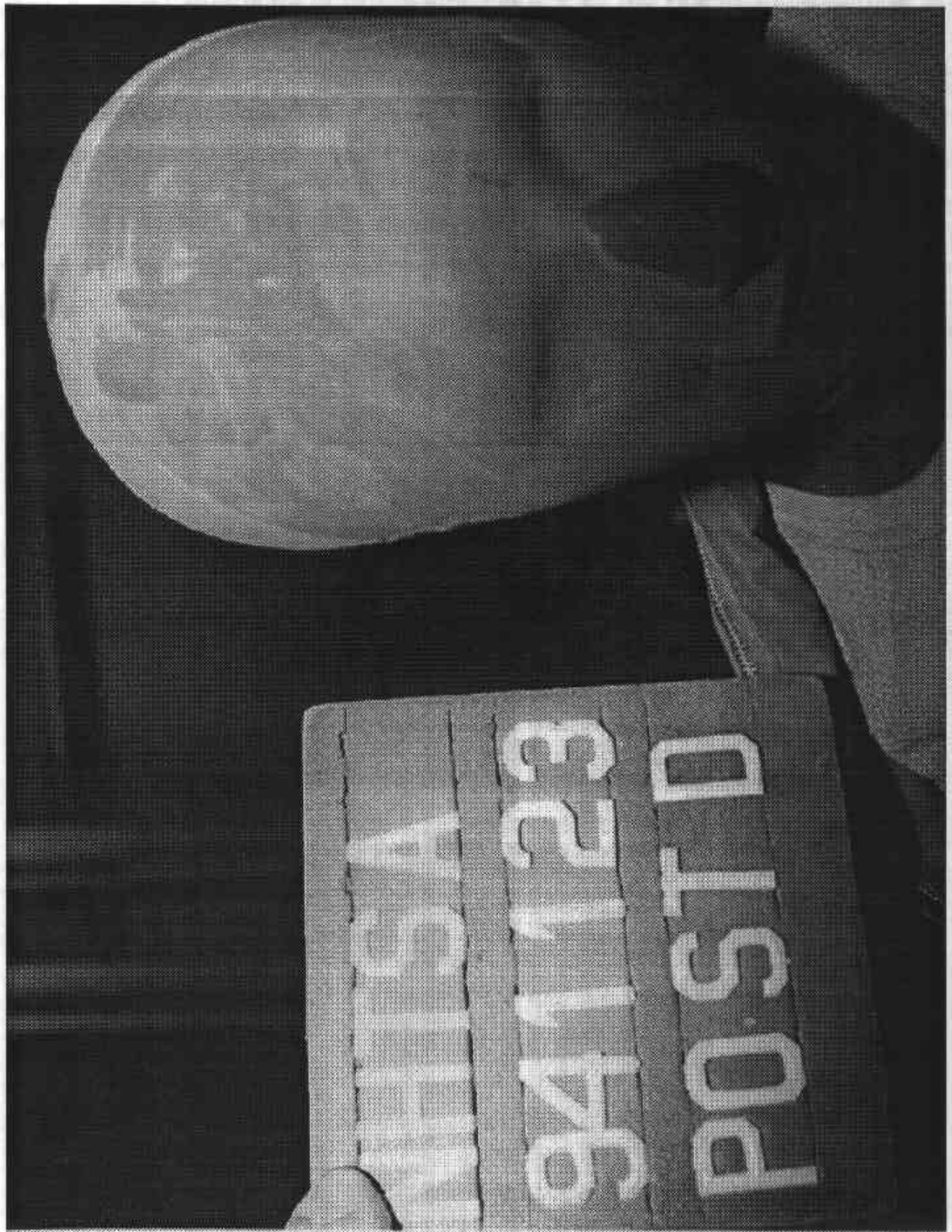


Figure A-18. Post-Test Driver Dummy Head Contact - View 1

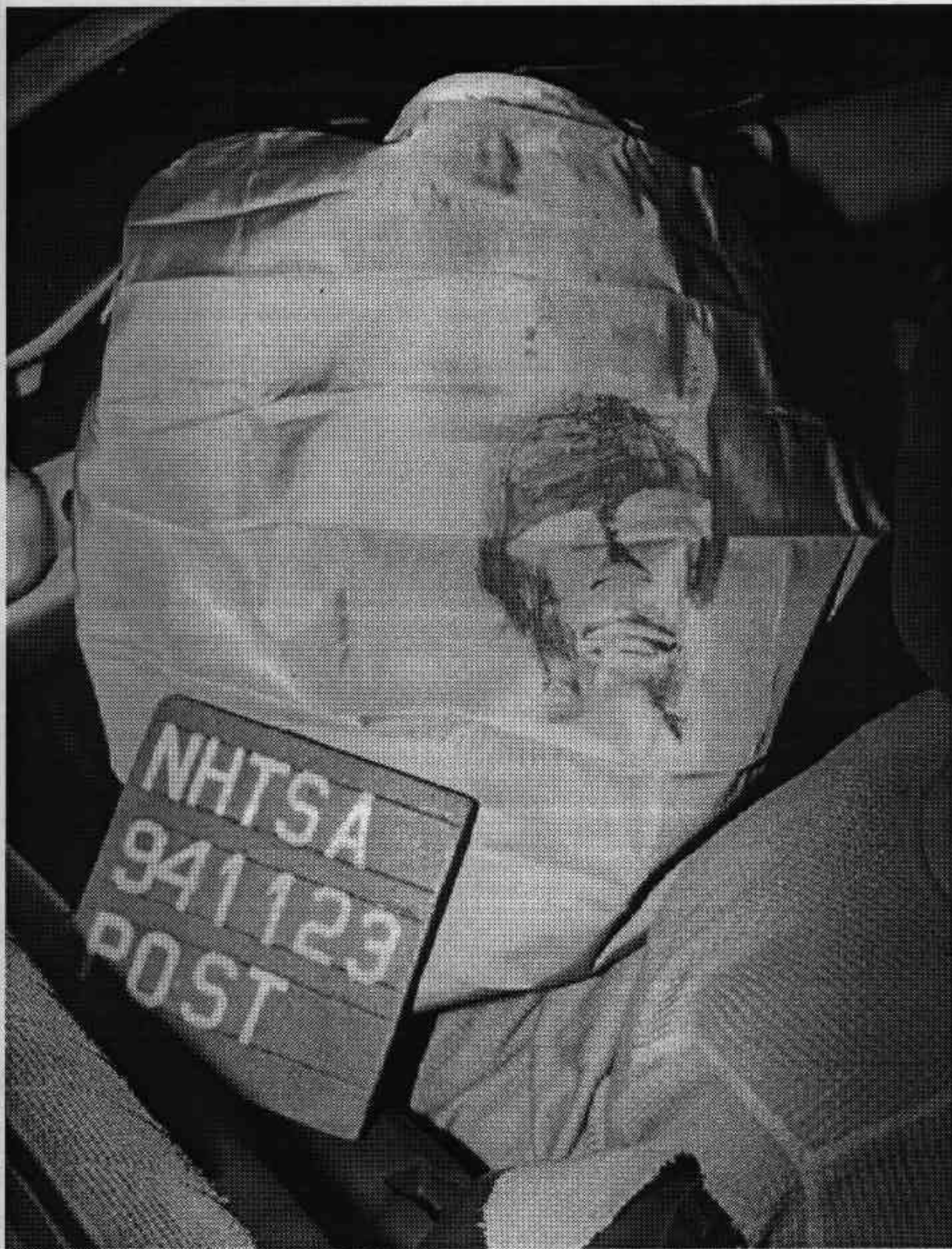


Figure A-19. Post-Test Driver Dummy Head Contact - View 2

A-20

941123

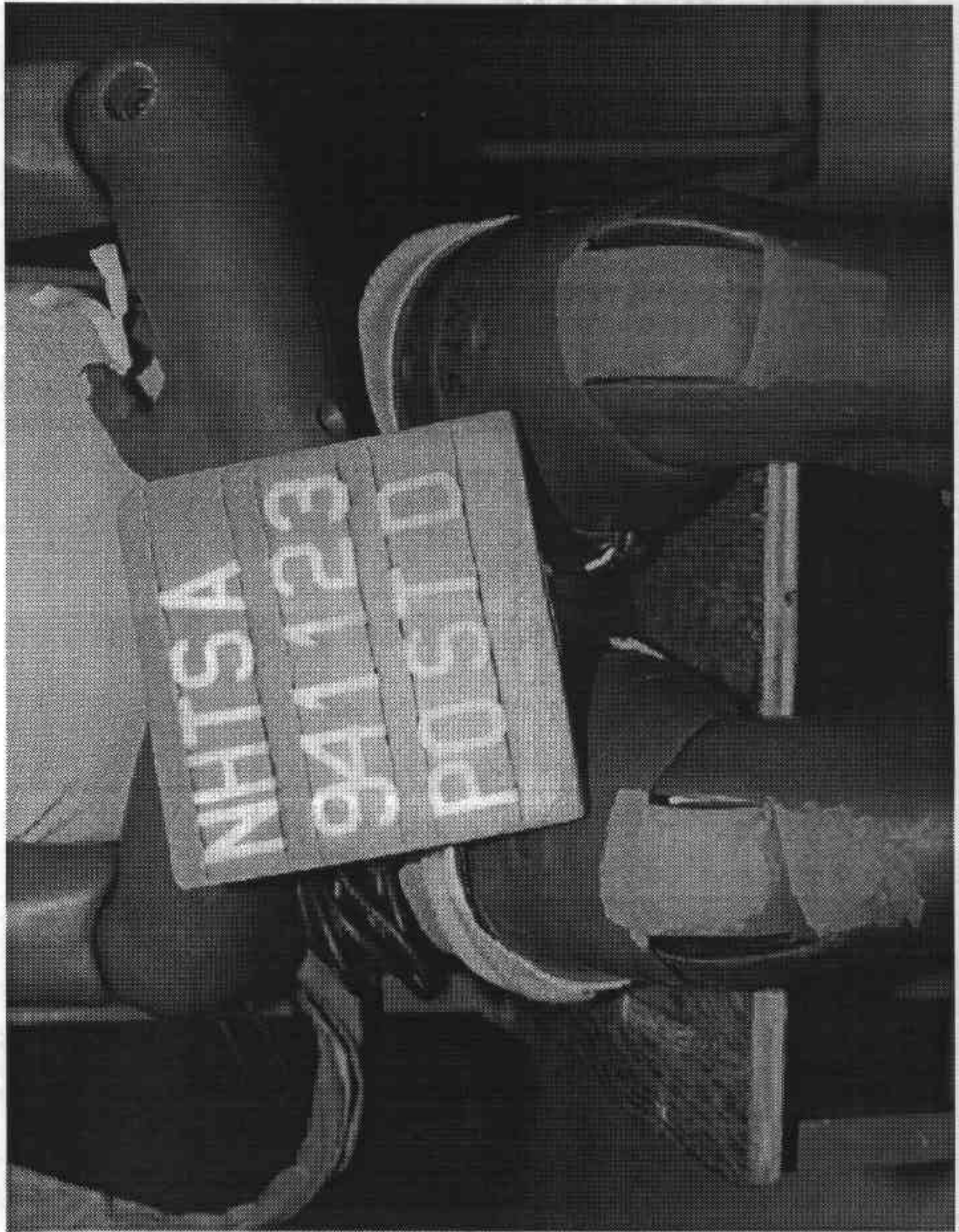


Figure A-20. Post-Test Driver Dummy Knee Contact - View 1

A-21

941123

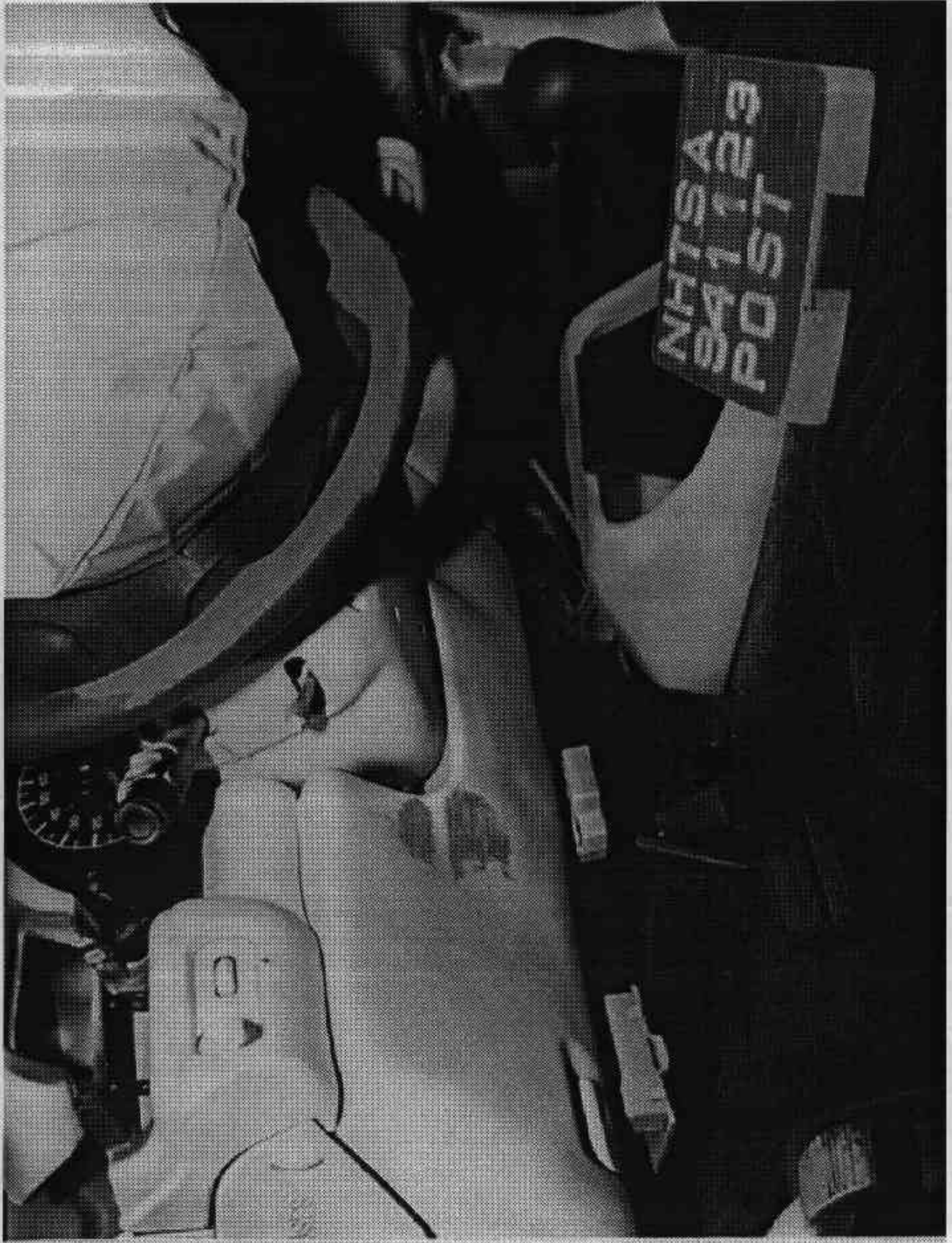


Figure A-21. Post-Test Driver Dummy Knee Contact - View 2

A-22

941123



Figure A-22. Post-Test Driver Dummy Knee Contact - View 3

A-23

941123

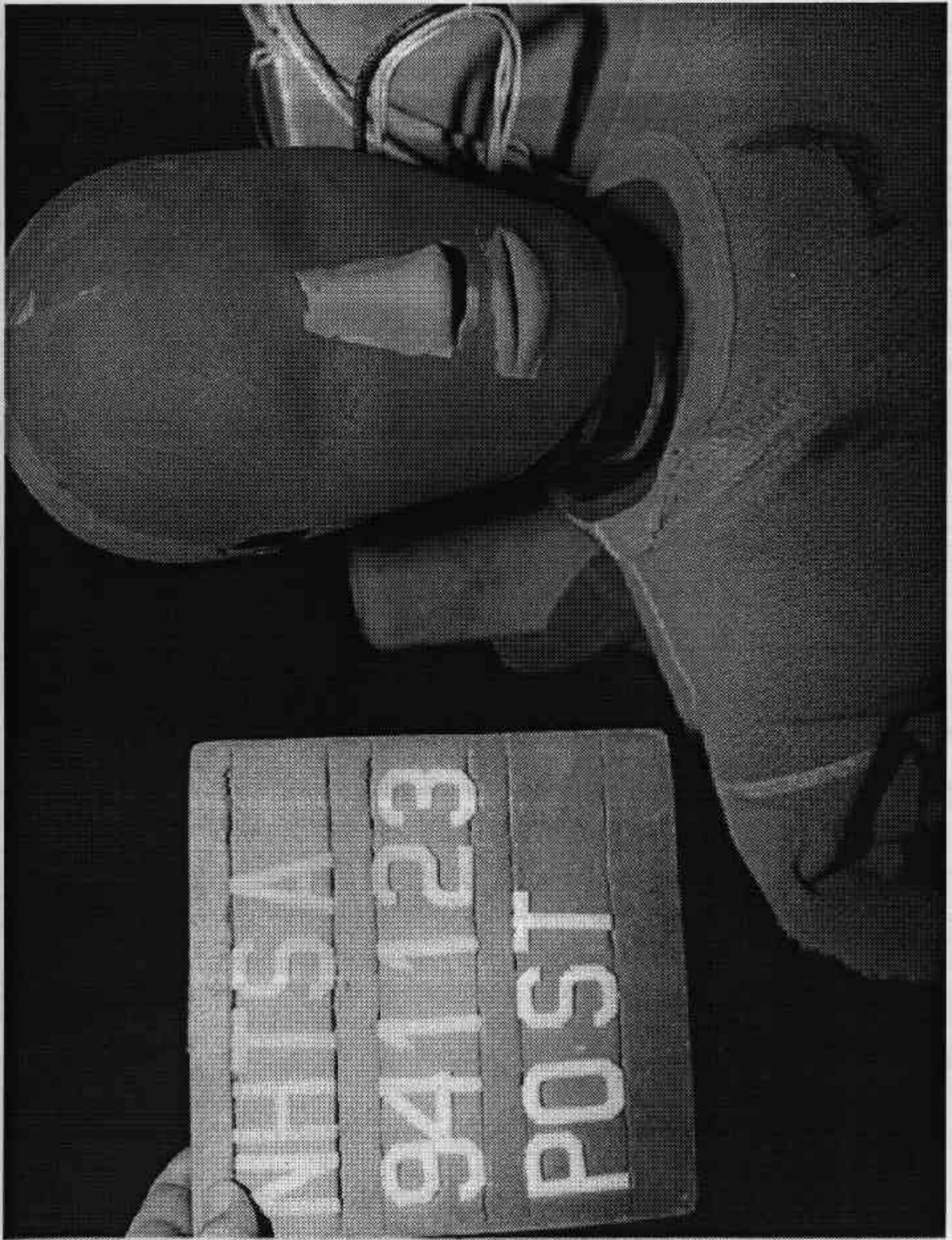


Figure A-23. Post-Test Passenger Dummy Head Contact View

A-24

941123

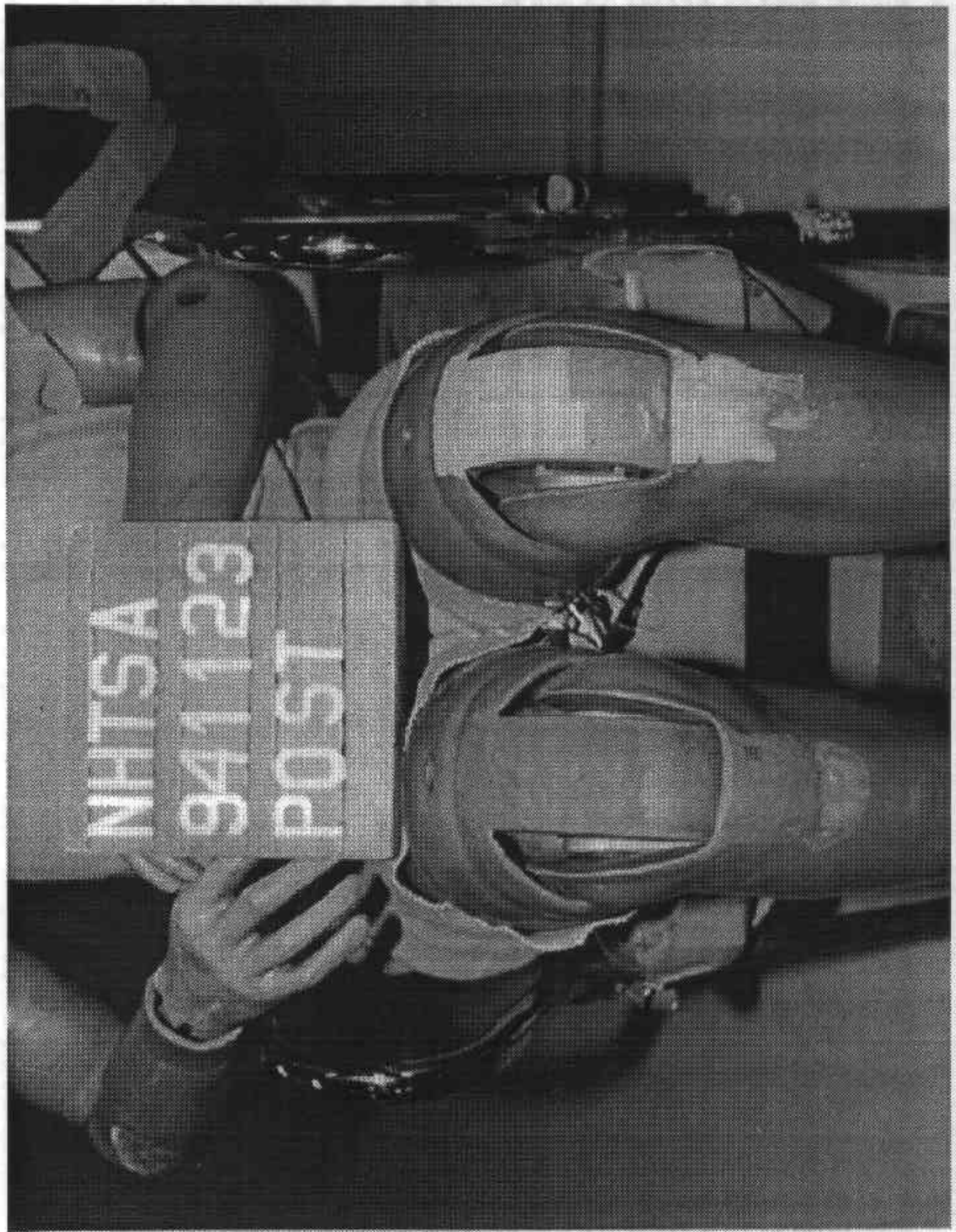


Figure A-24. Post-Test Passenger Dummy Knee Contact - View 1

A-25

941123

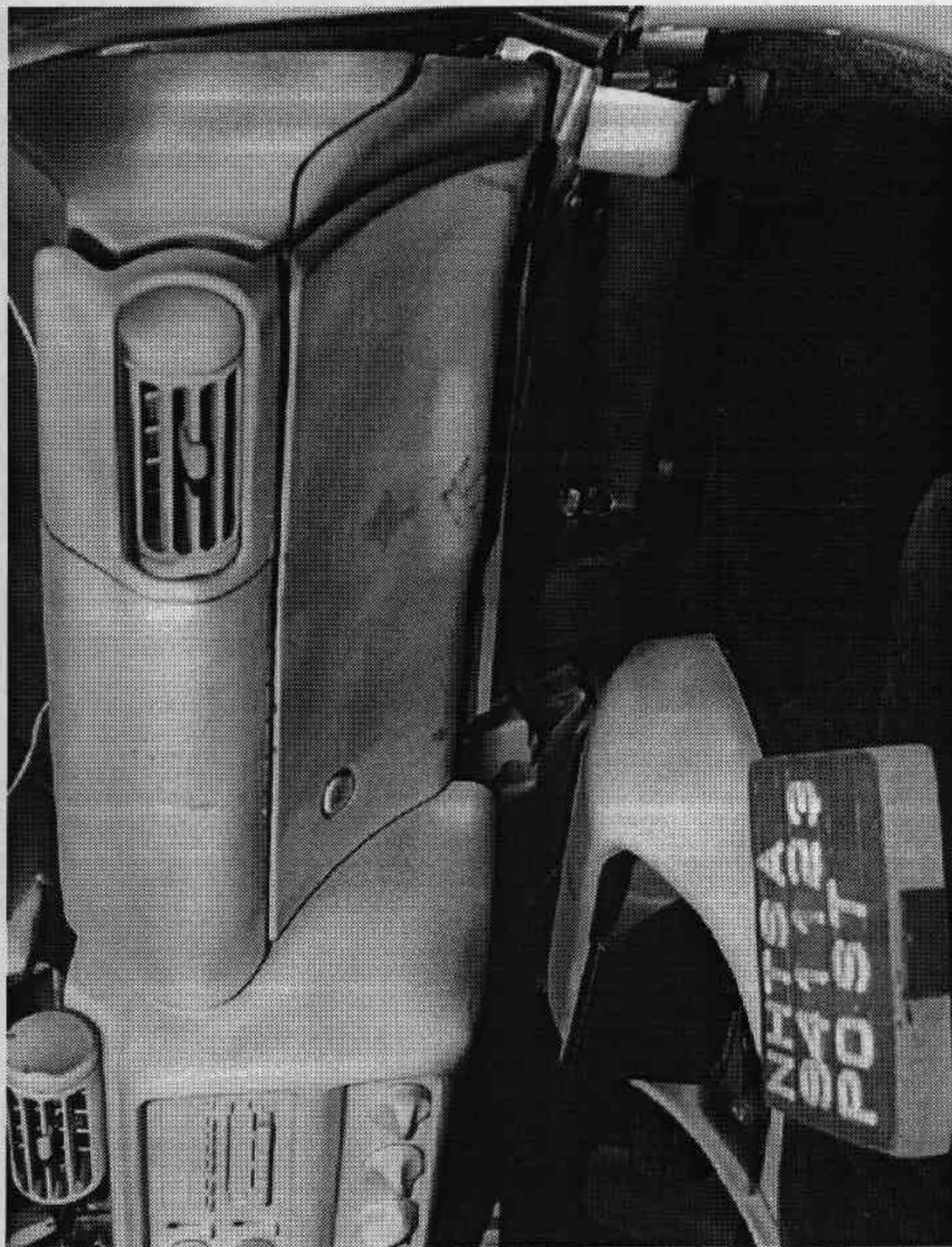


Figure A-25. Post-Test Passenger Dummy Knee Contact - View 2

A-26

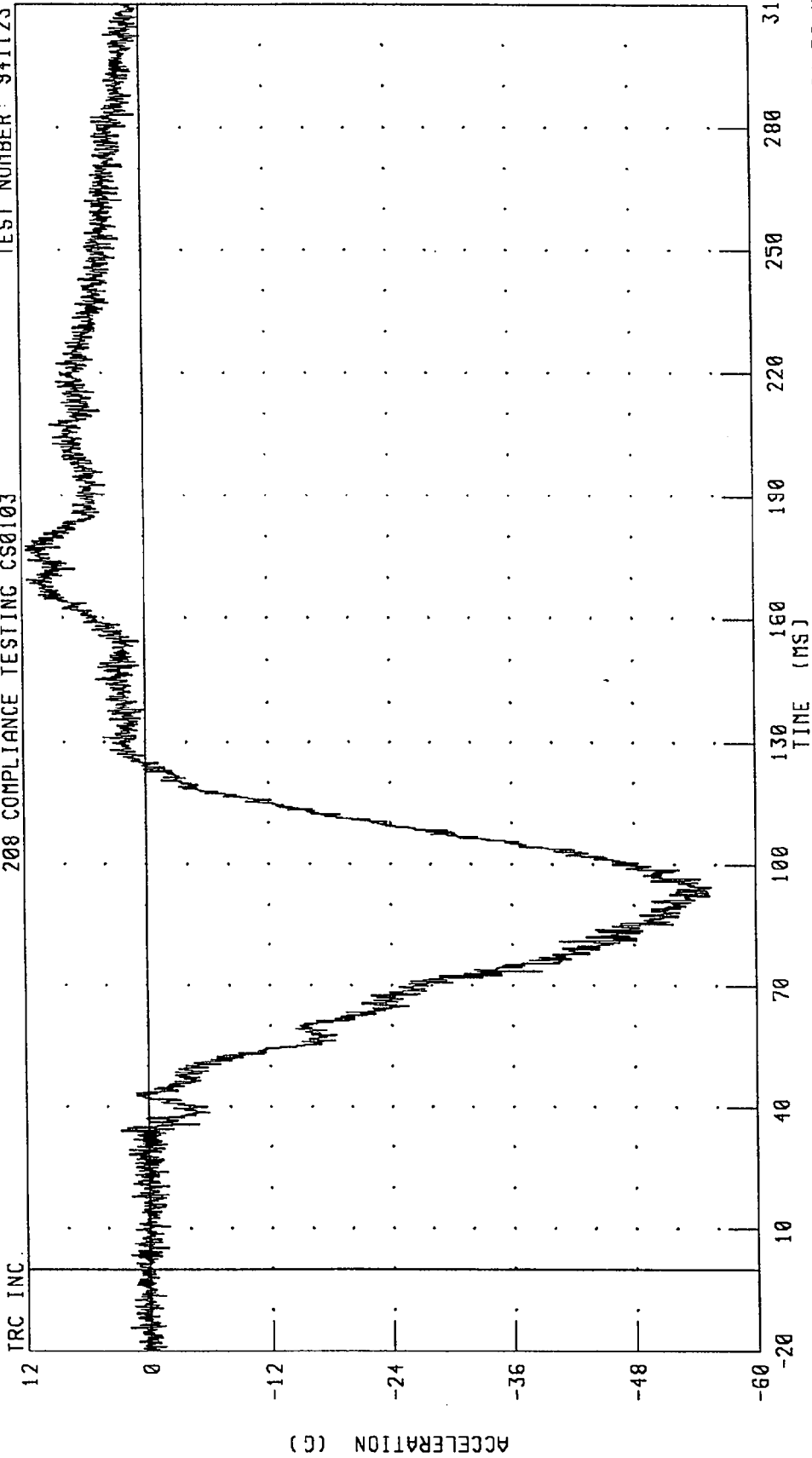
941123

Appendix B

Data Plots

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER HEAD X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



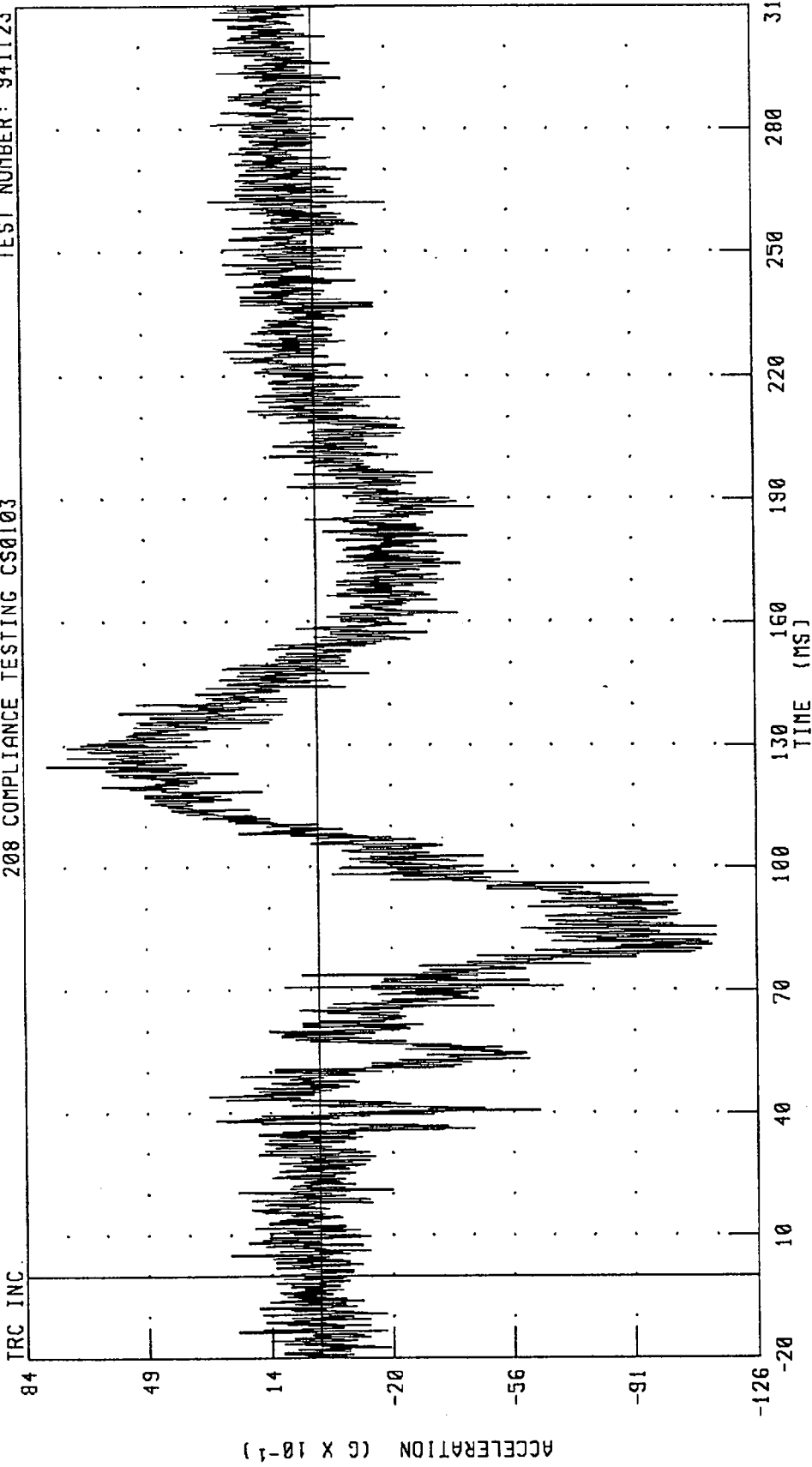
CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 11.54 G @ 176.80 MS; -55.61 G @ 94.56 MS

TRC INC.

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER HEAD Y-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TRC INC. TEST NUMBER: 941123

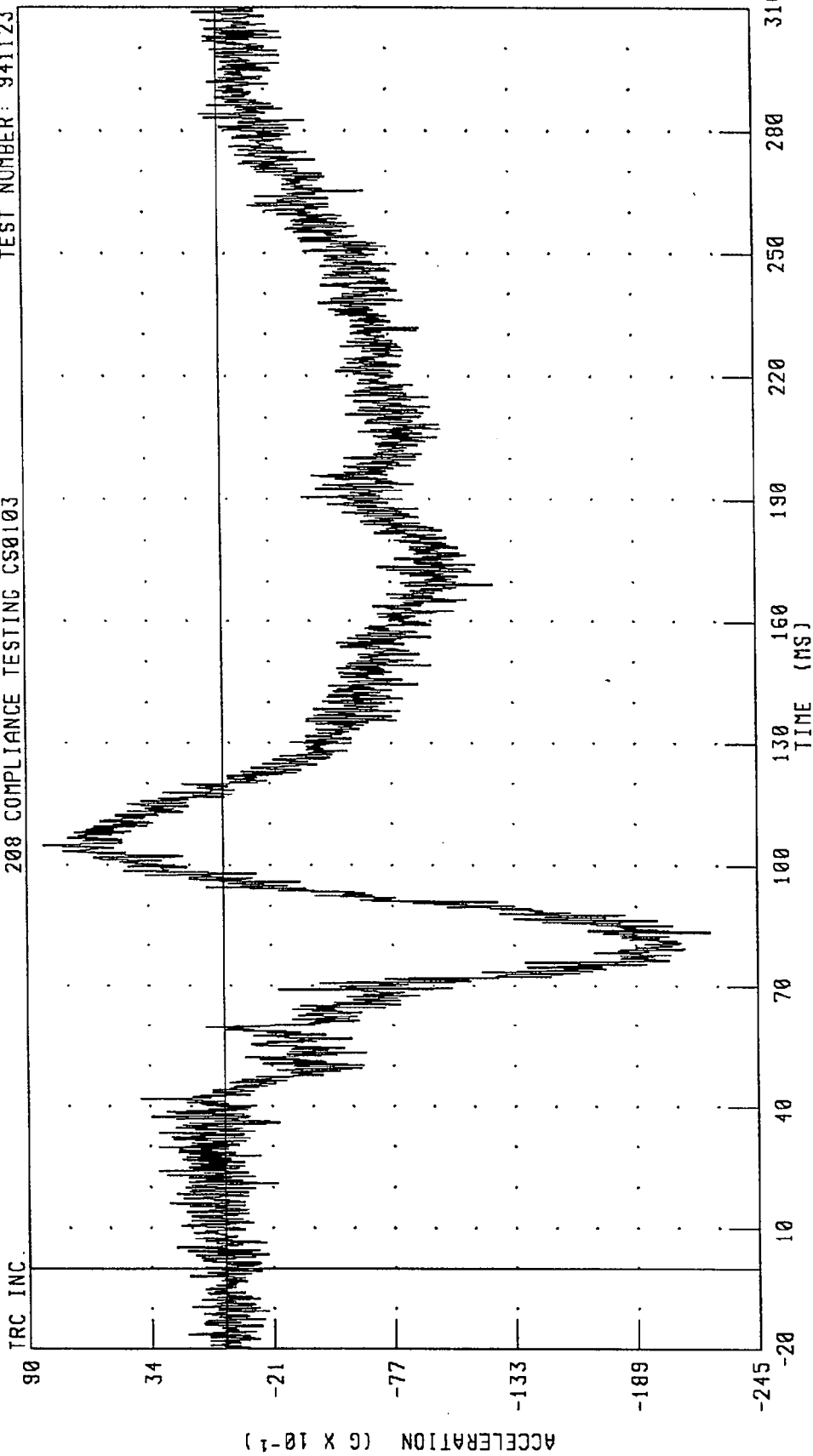


PEAK DATA: 7.71 G @ 124.96 MS; -11.42 G @ 83.28 MS

CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER HEAD Z-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

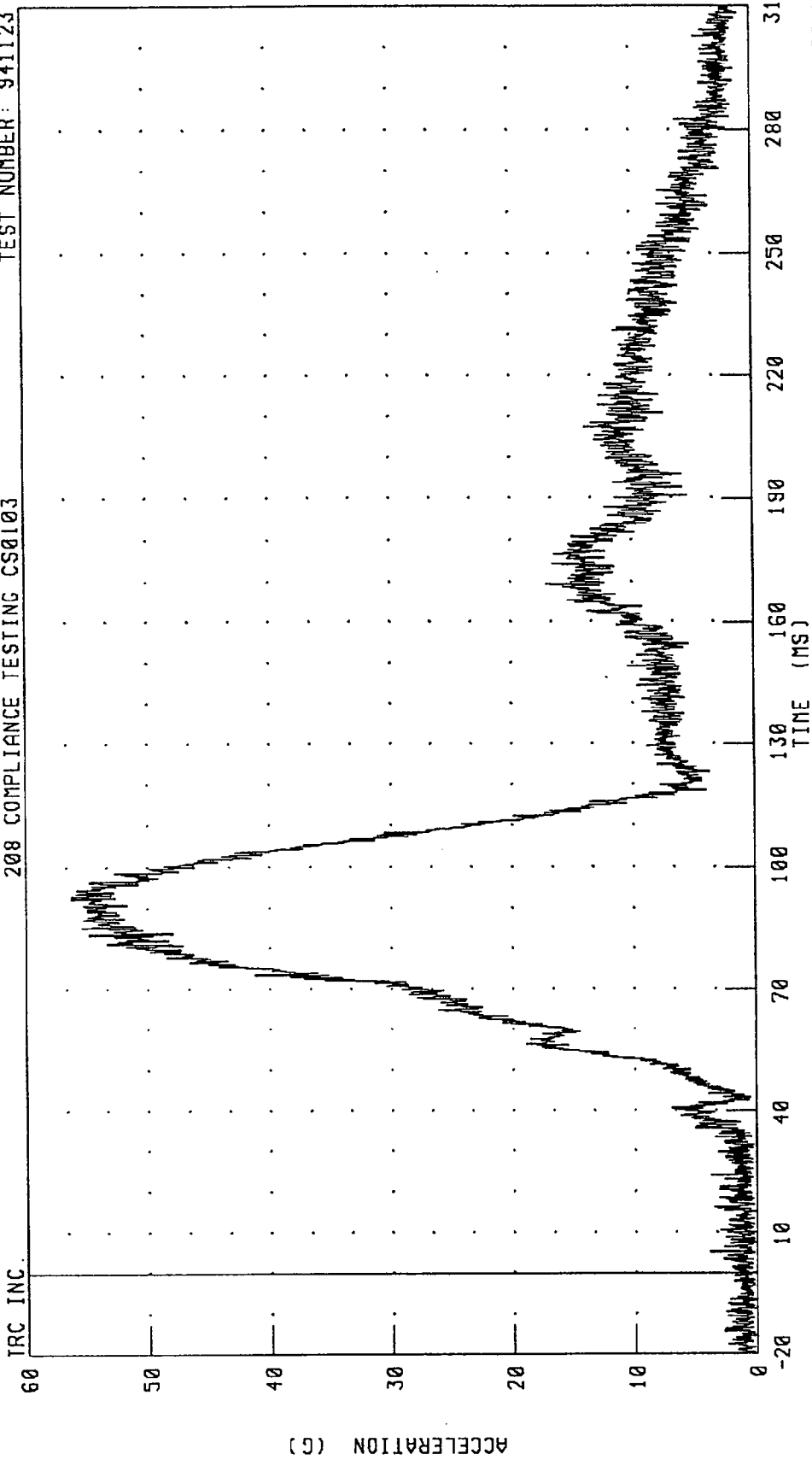


PEAK DATA: 8.21 G @ 104.88 MS; -22.38 G @ 83.52 MS

CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

1985 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER HEAD RESULTANT ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

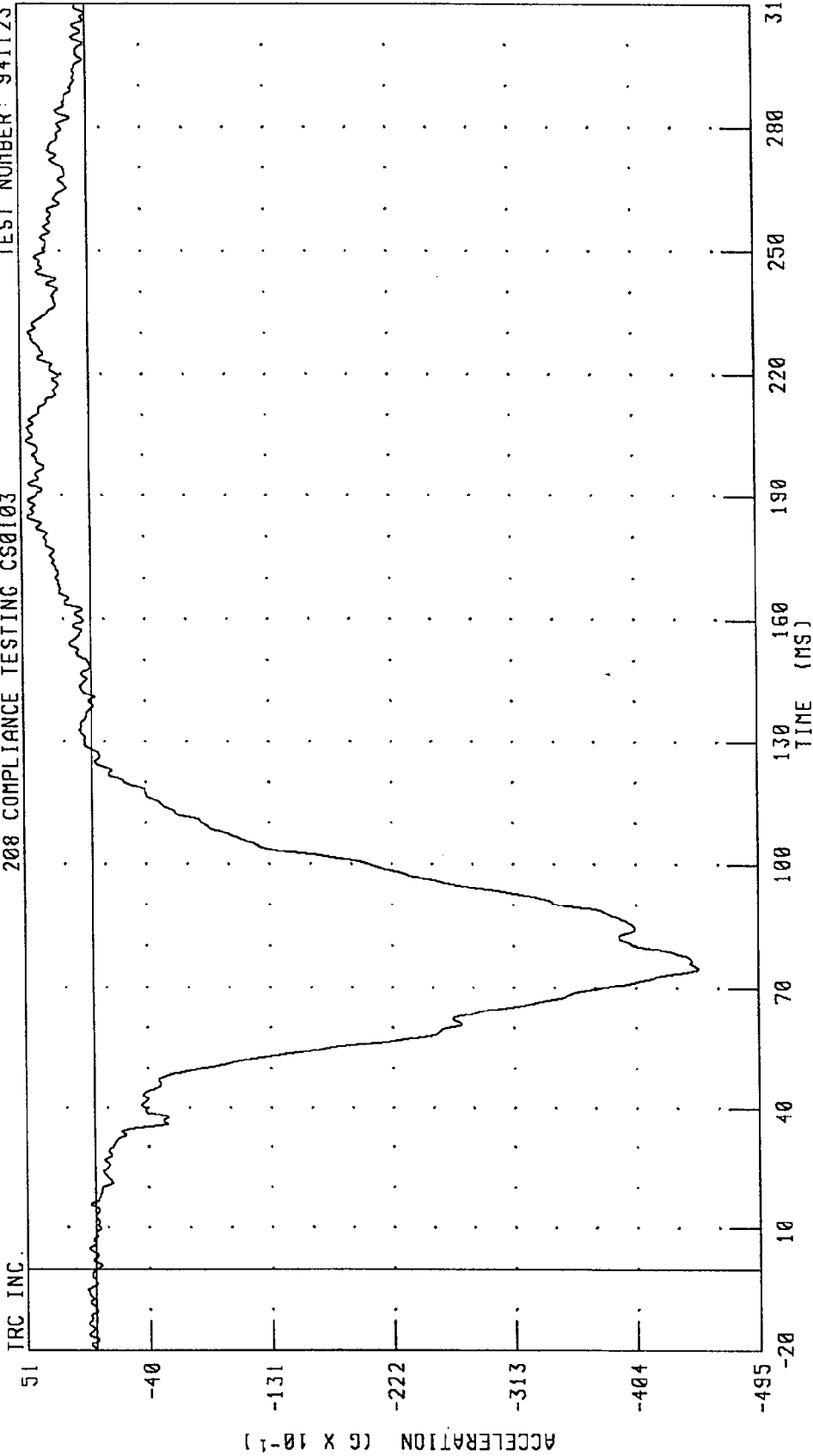


PEAK DATA: 56.25 G @ 92.48 MS; 0.16 G @ 7.52 MS

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER CHEST X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

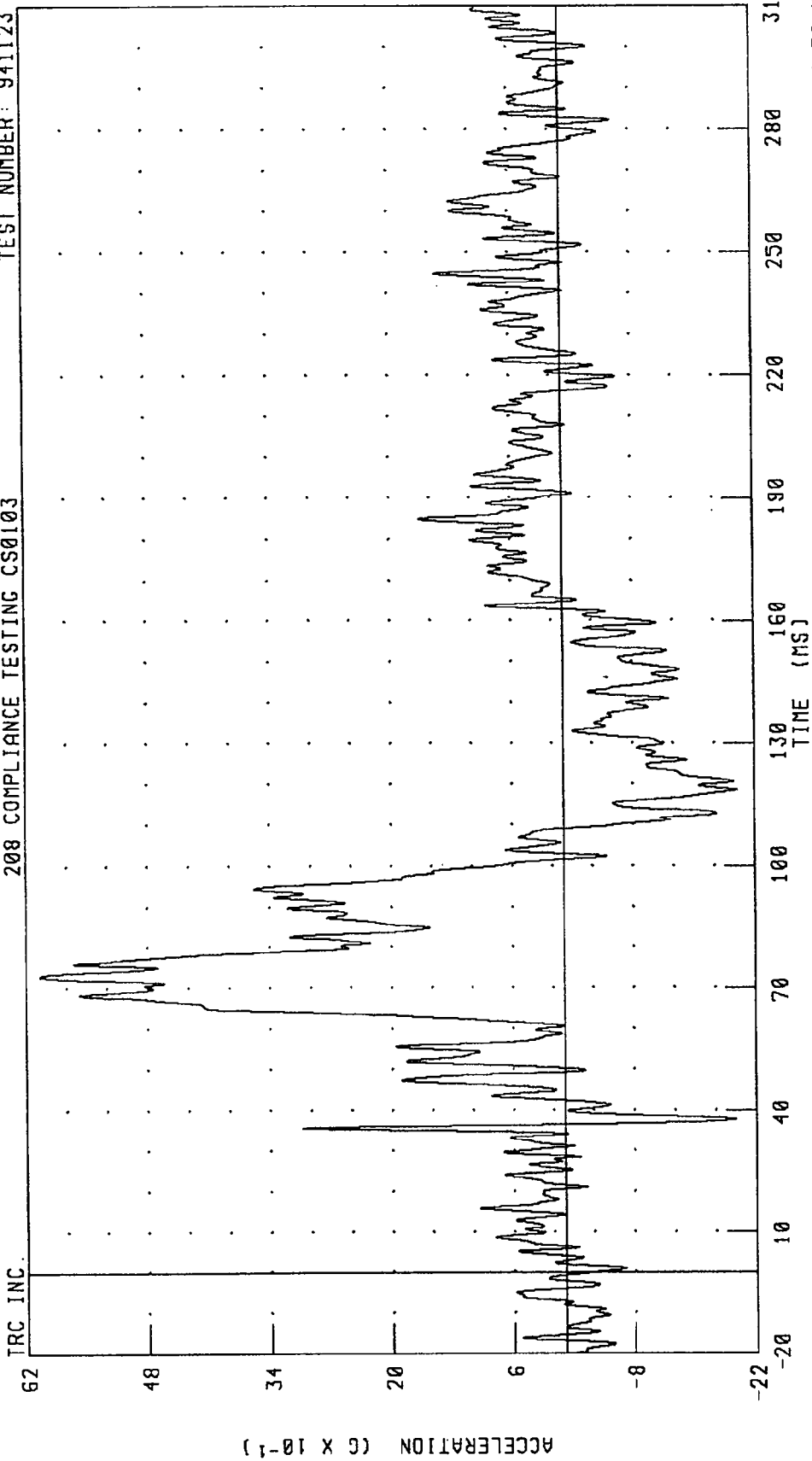


CHANNEL: CSTXG1 FILTER: CH. CLASS 180

PEAK DATA: 4.68 G @ 203.60 MS; -45.00 G @ 74.72 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER CHEST Y-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

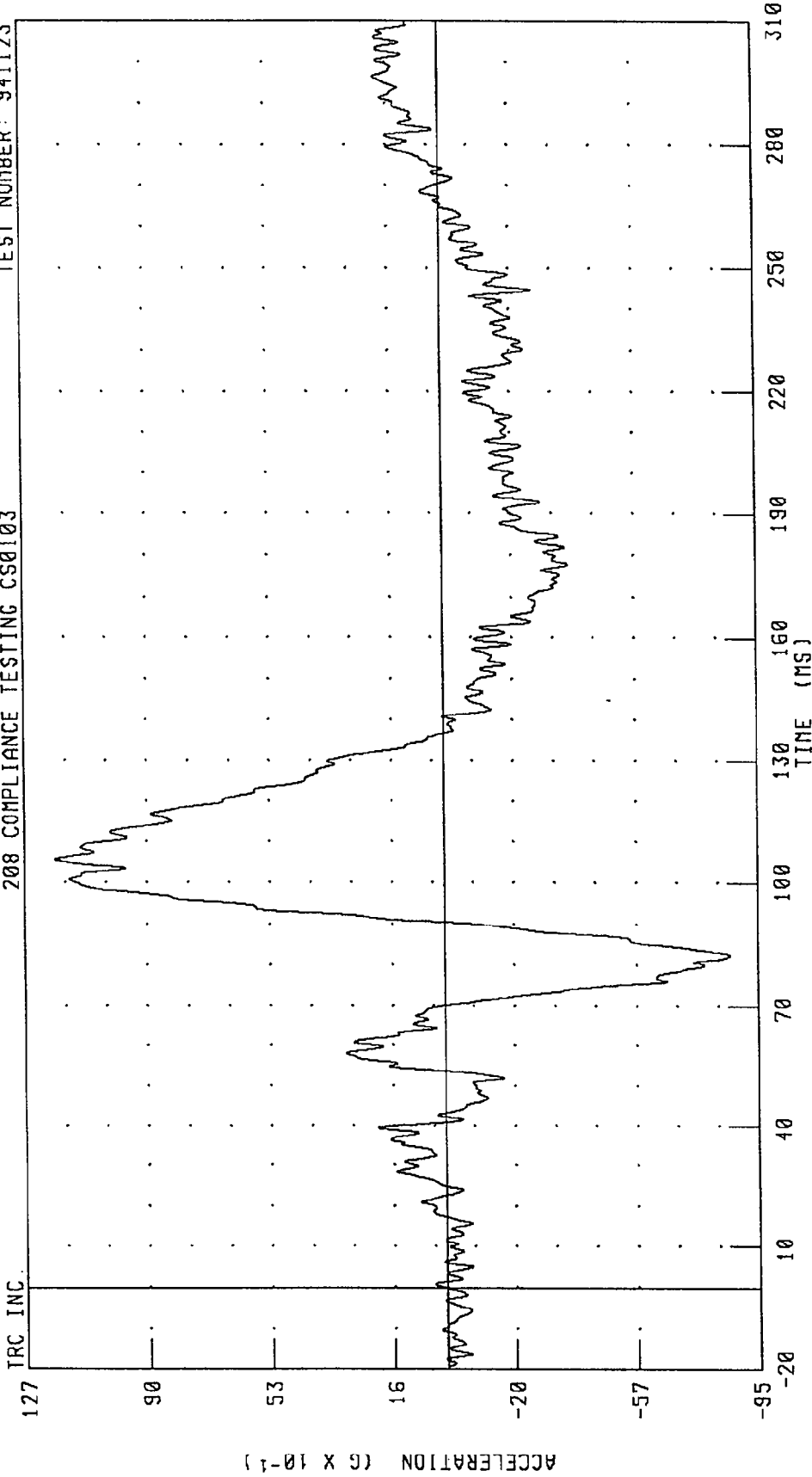


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

941123

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER CHEST Z-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

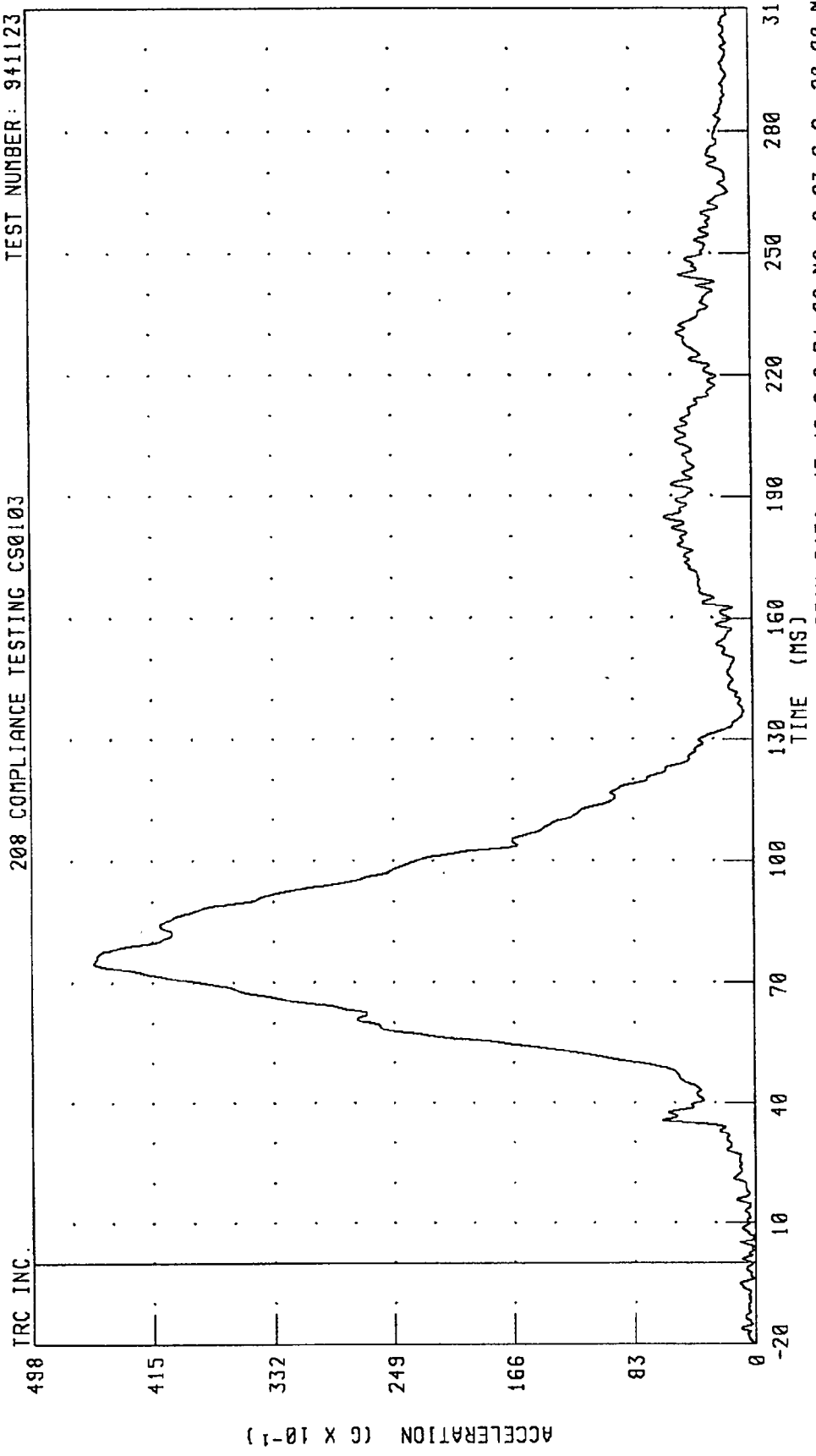


CHANNEL: CSTZG1 FILTER: CH. CLASS 180

941123

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER CHEST RESULTANT ACCELERATION  
208 COMPLIANCE TESTING CS0103

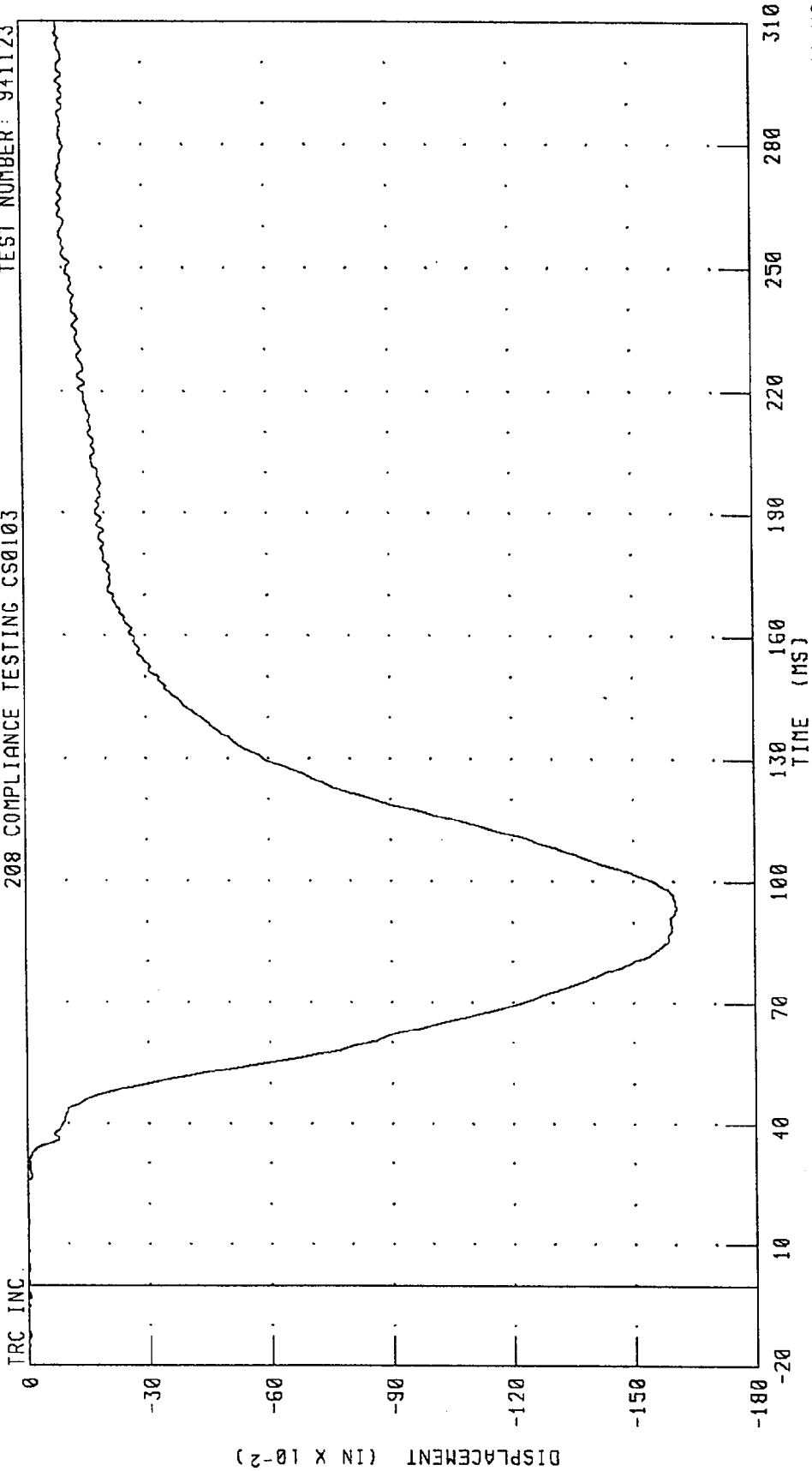
TEST NUMBER: 941123



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER CHEST DEFLECTION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

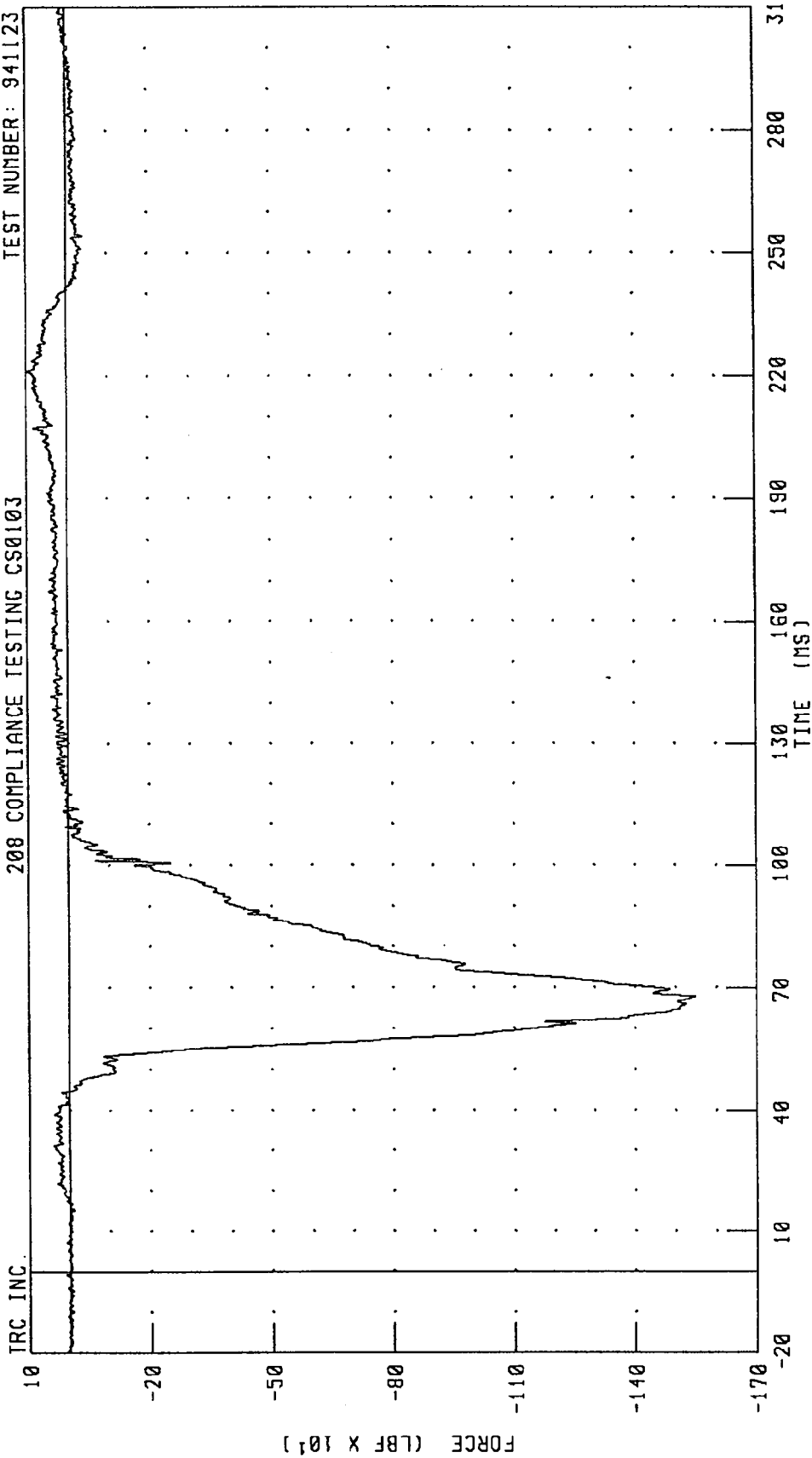


CHANNEL: CSTXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.01 IN @ -18.88 MS, -1.61 IN @ 93.60 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER LEFT FEMUR FORCE  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

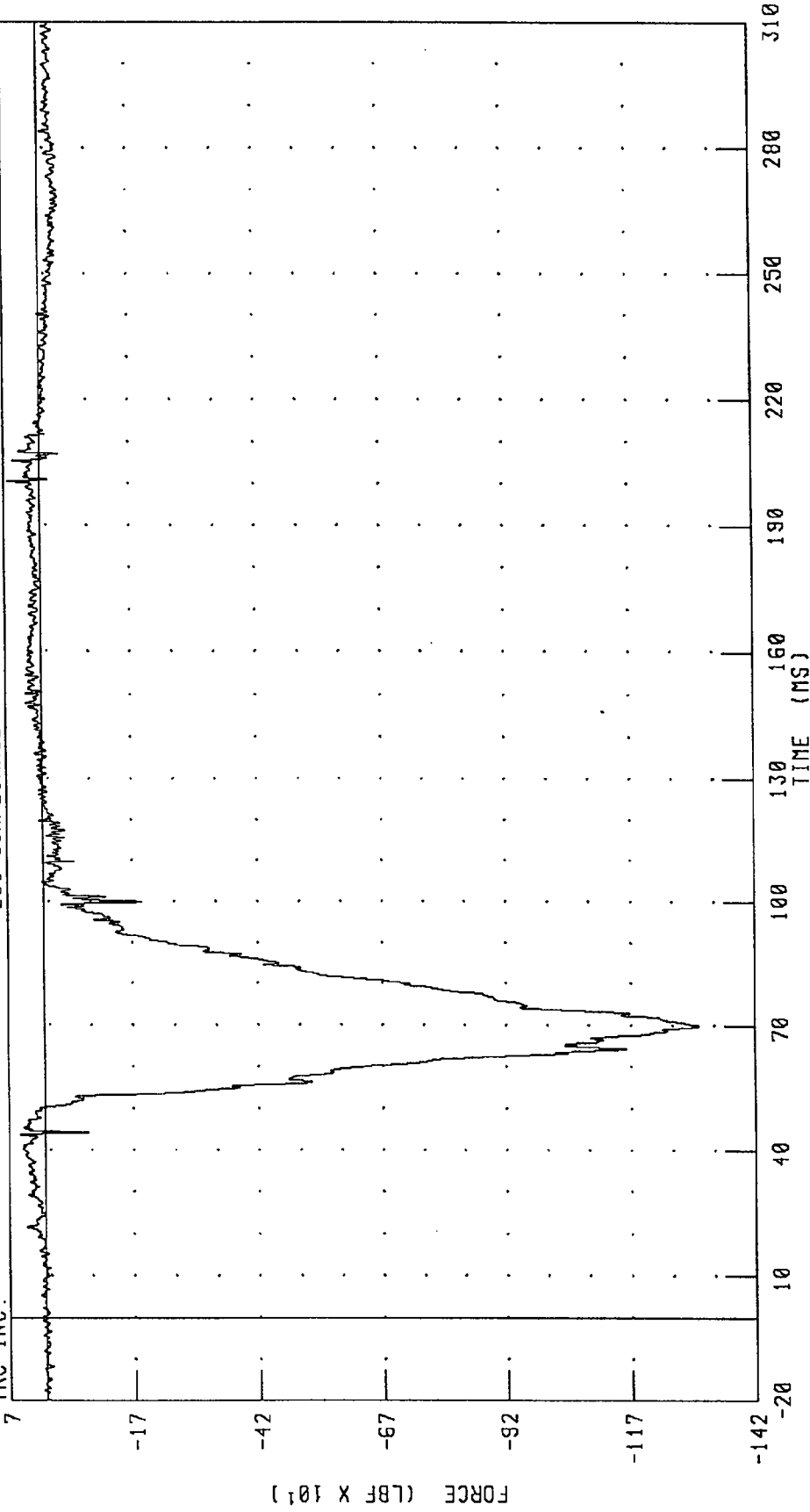


CHANNEL: LFMF1 FILTER: CH. CLASS 600  
PEAK DATA: 96.77 LBF @ 221.28 MS; -1550.40 LBF @ 67.76 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DRIVER RIGHT FEMUR FORCE  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

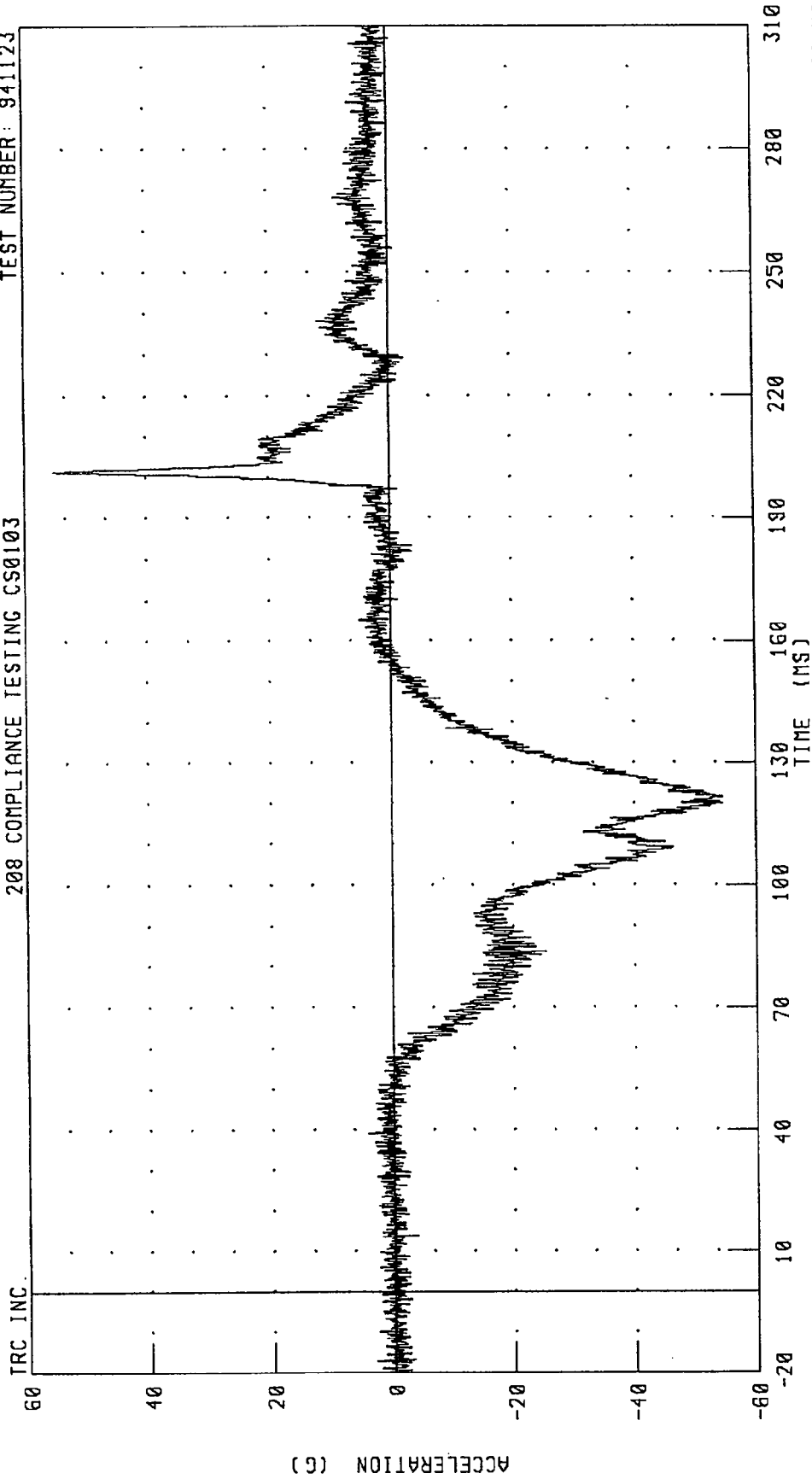
TRC INC.



CHANNEL: RFMF1 FILTER: CH. CLASS 600  
PEAK DATA: 66.53 LBF @ 200.56 MS; -1313.85 LBF @ 70.00 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

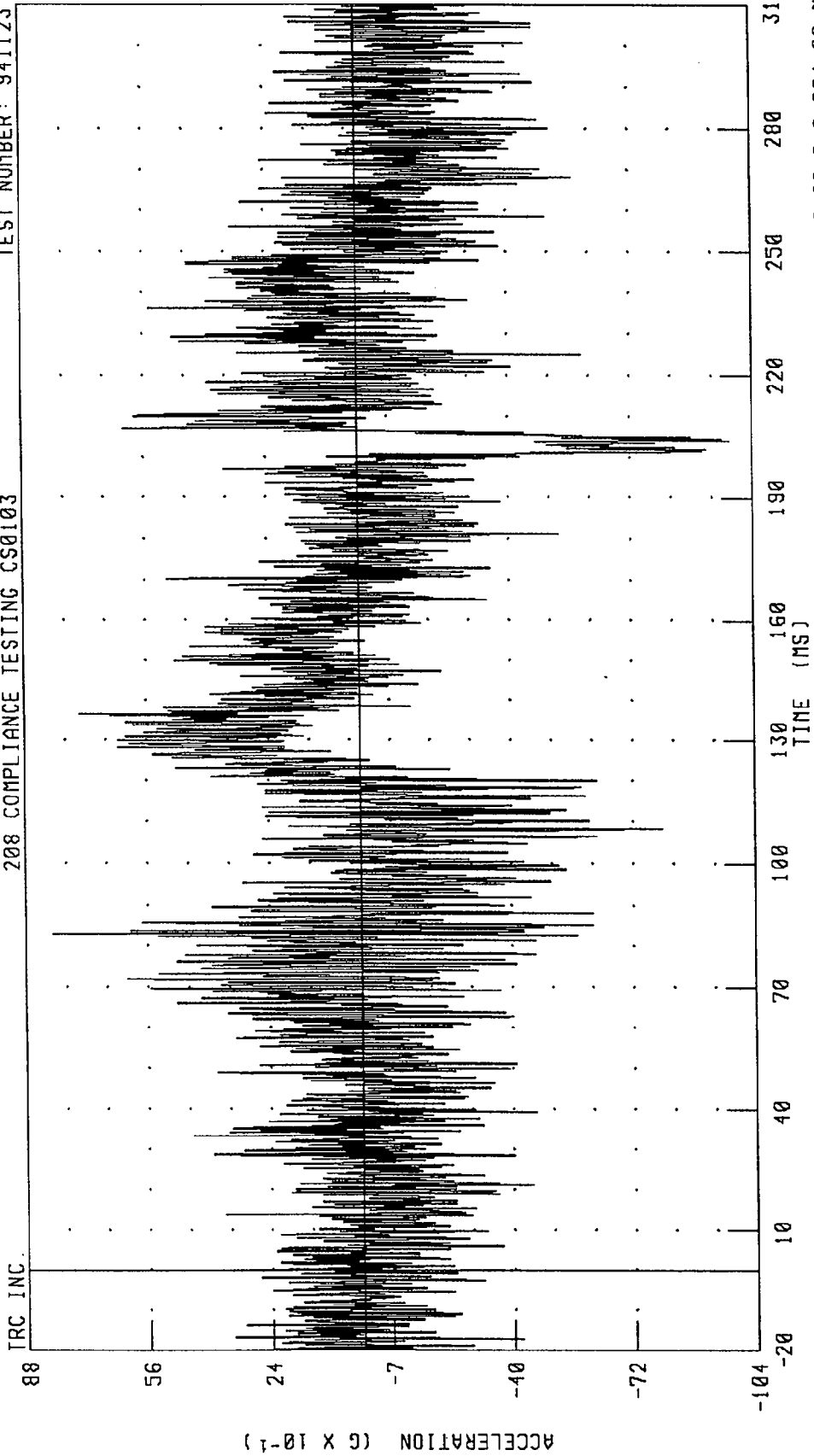


CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

PEAK DATA: 55.22 G @ 201.52 MS; -54.57 G @ 121.68 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



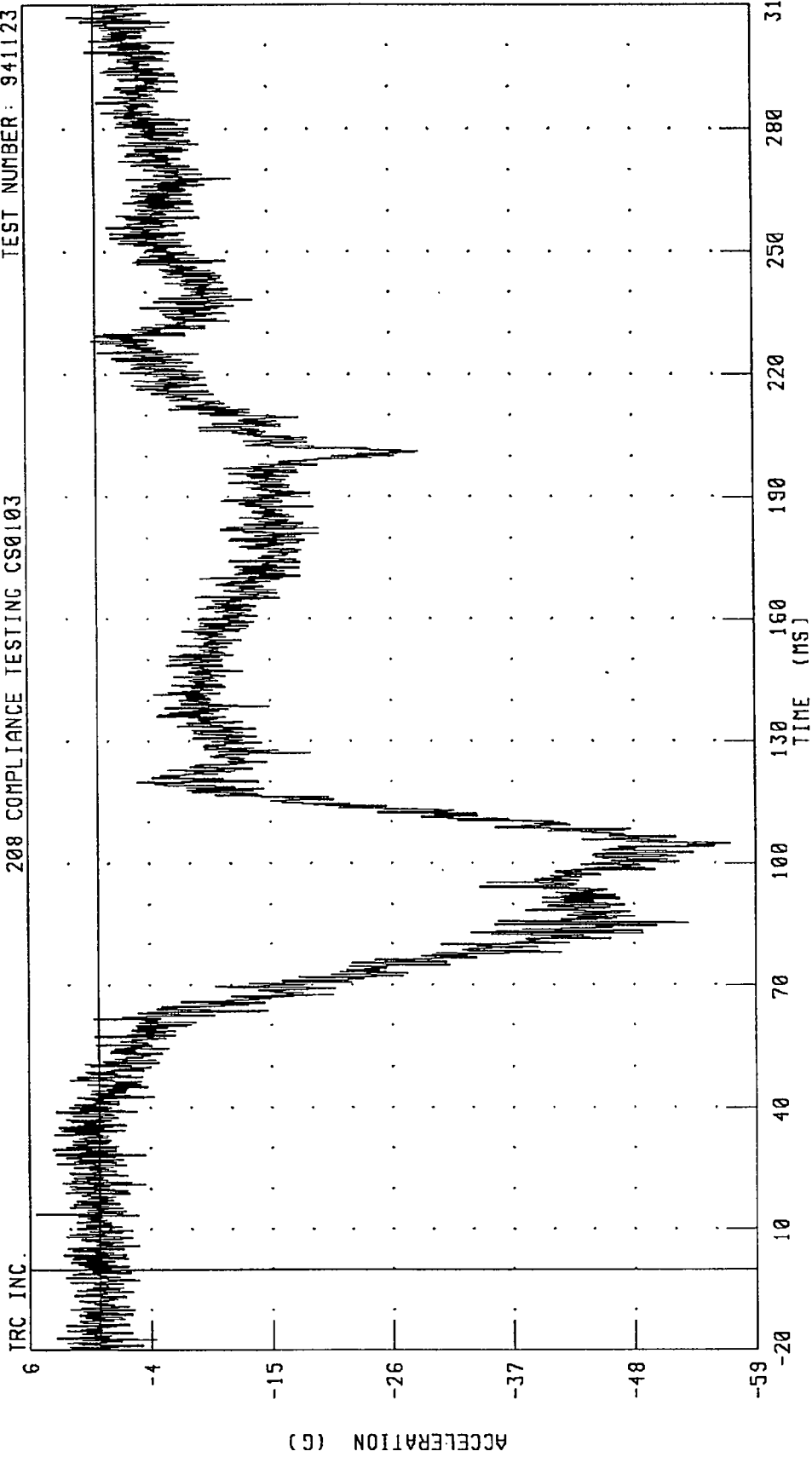
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 8.08 G @ 82.96 MS; -9.80 G @ 204.08 MS

TRC INC.

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

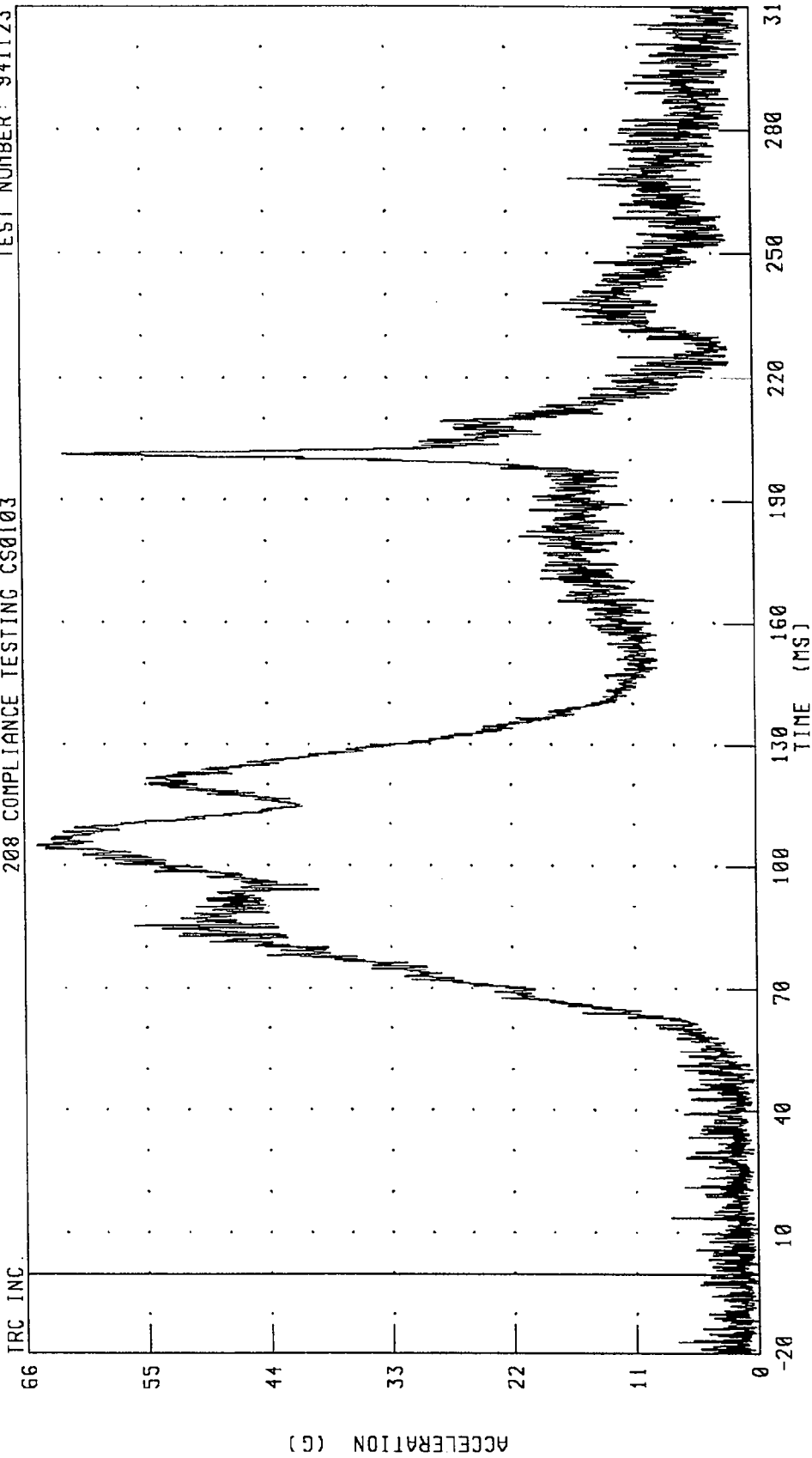


CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 5.84 G @ 13.76 MS; -57.34 G @ 104.72 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



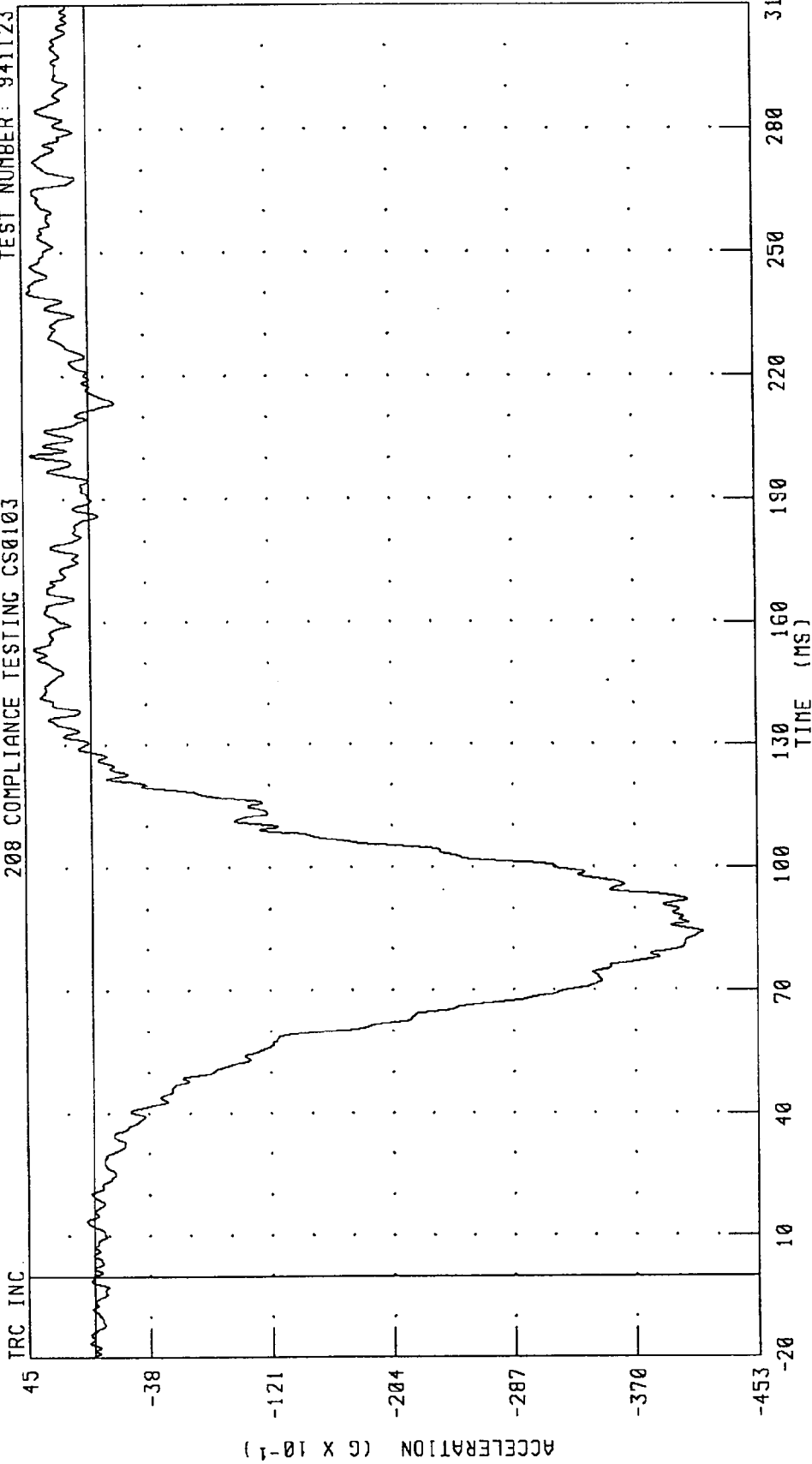
CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

PEAK DATA: 64.89 G @ 104.72 MS; 0.07 G @ 11.12 MS

TRC INC.

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



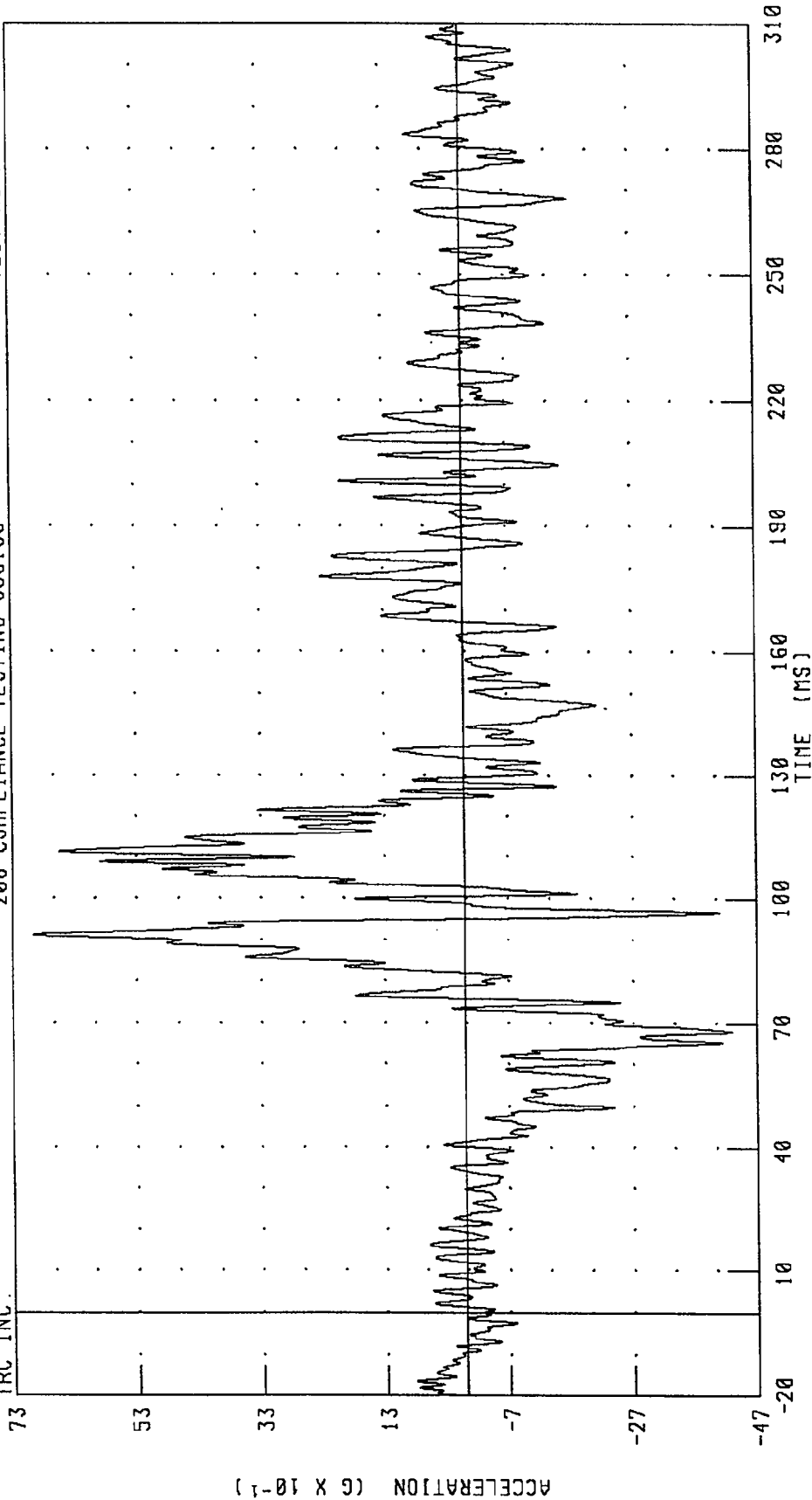
PEAK DATA: 4.10 G @ 240.24 MS; -41.64 G @ 84.16 MS

CHANNEL: CSTXG2 FILTER: CH. CLASS 180

1985 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

TRC INC.

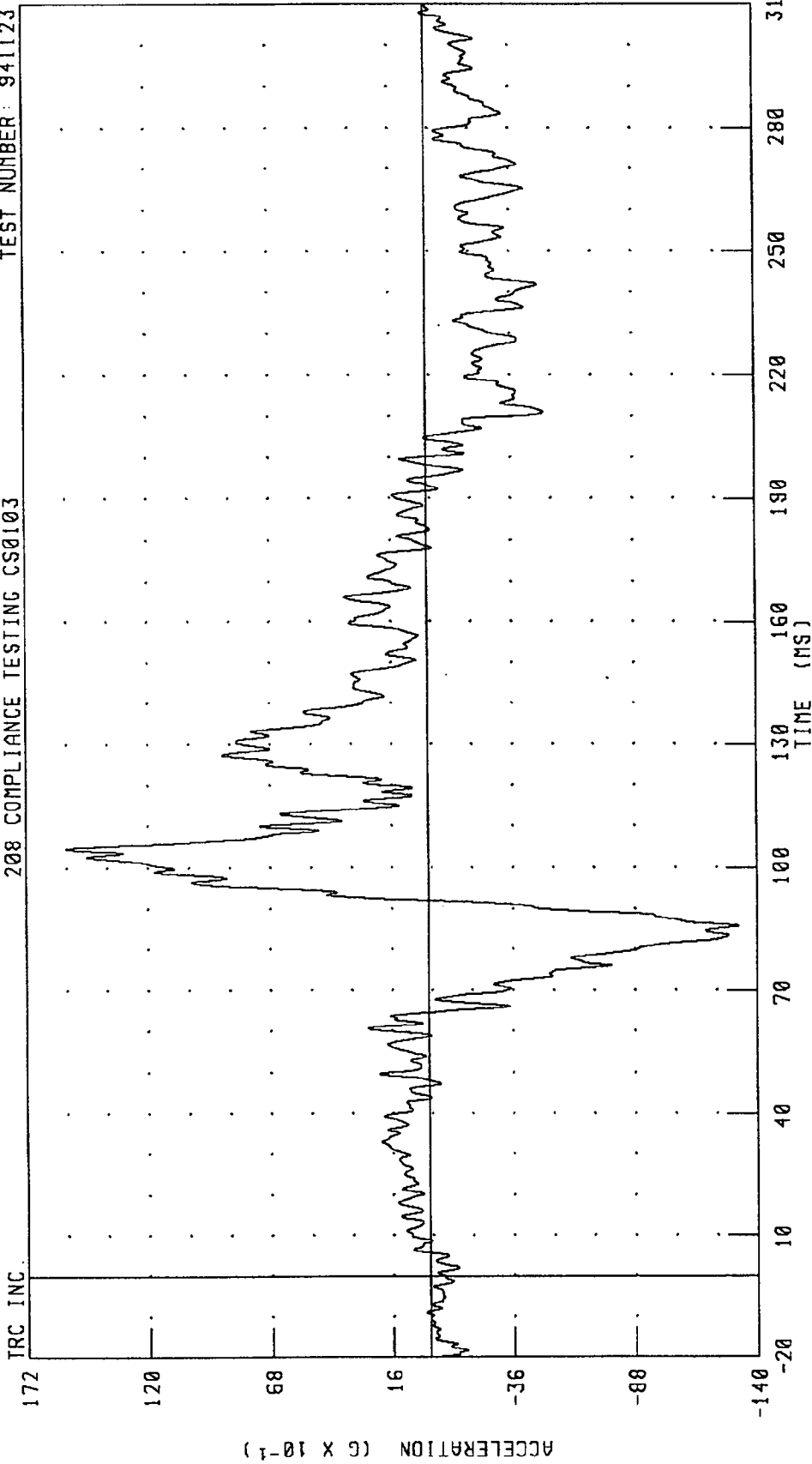


CHANNEL: CSTYG2 FILTER: CH. CLASS 180

PEAK DATA: 6.95 G @ 91.20 MS; -4.28 G @ 68.00 MS

1985 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



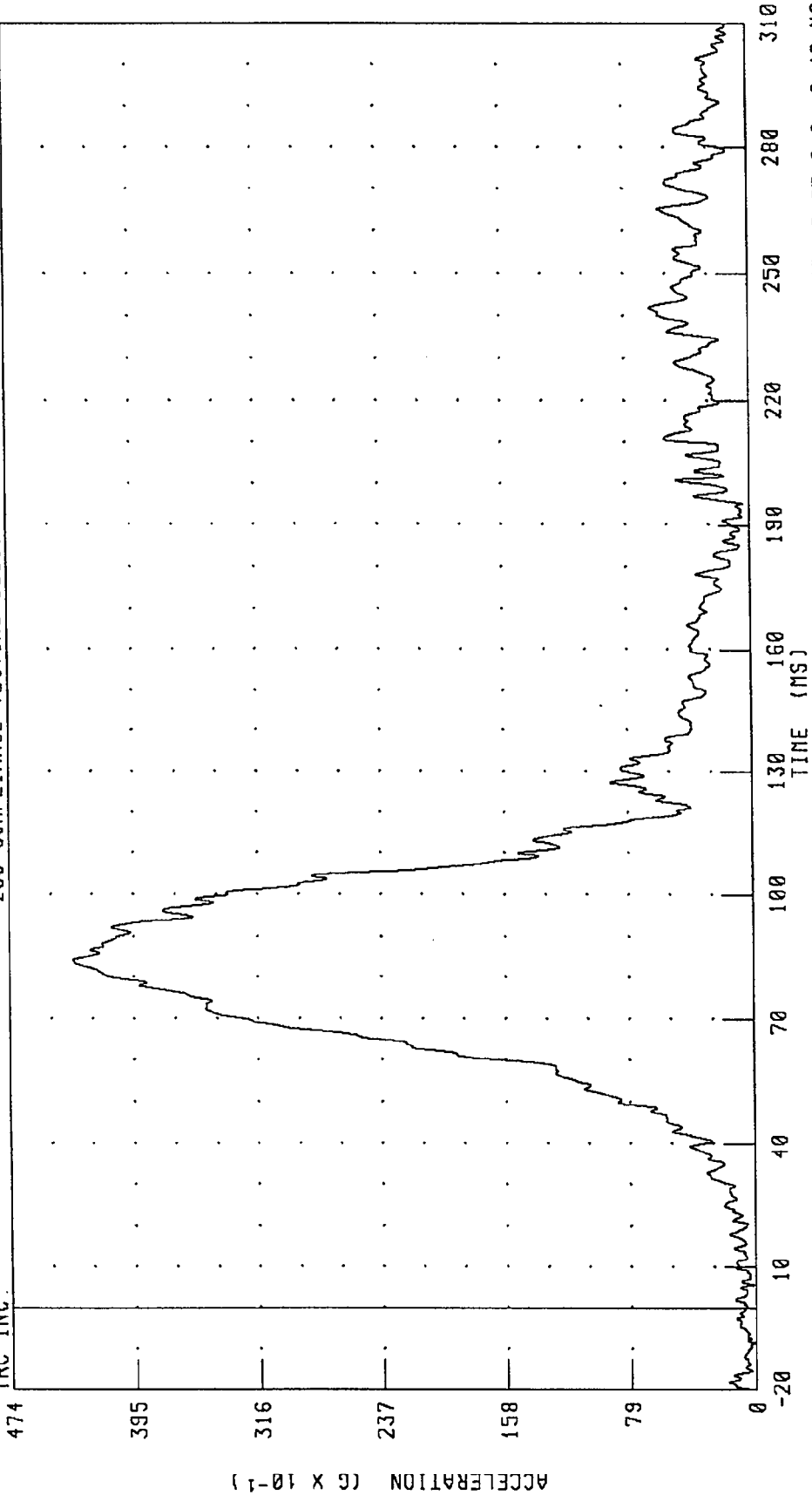
CHANNEL: CSTZG2 FILTER: CH. CLASS 180

PEAK DATA: 15.49 G @ 104.64 MS; -13.23 G @ 85.68 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

TRC INC.

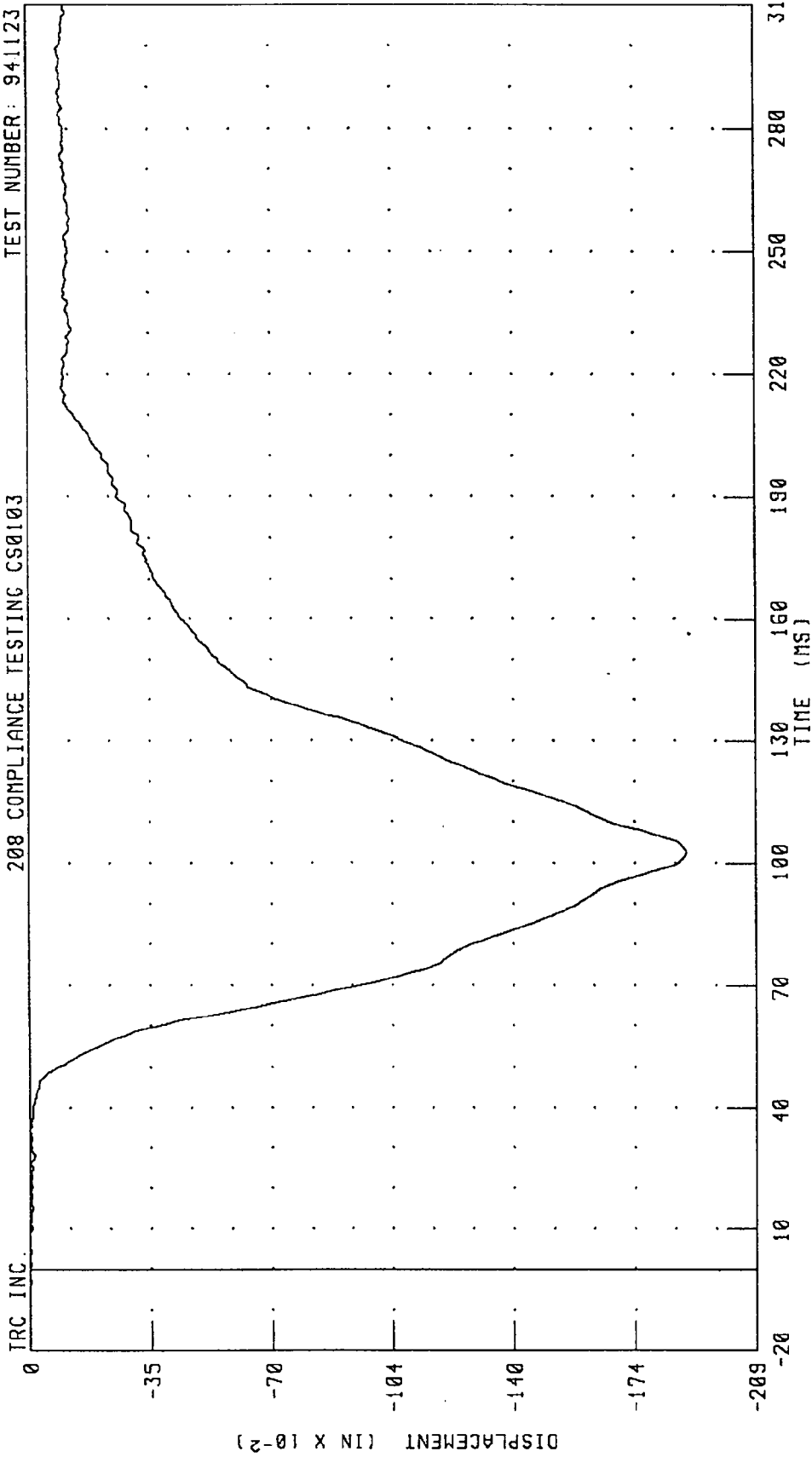


PEAK DATA: 43.37 G @ 84.08 MS; 0.07 G @ -8.48 MS

CHANNEL: CSTRG2 FILTER: CH. CLASS 180

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST DEFLECTION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



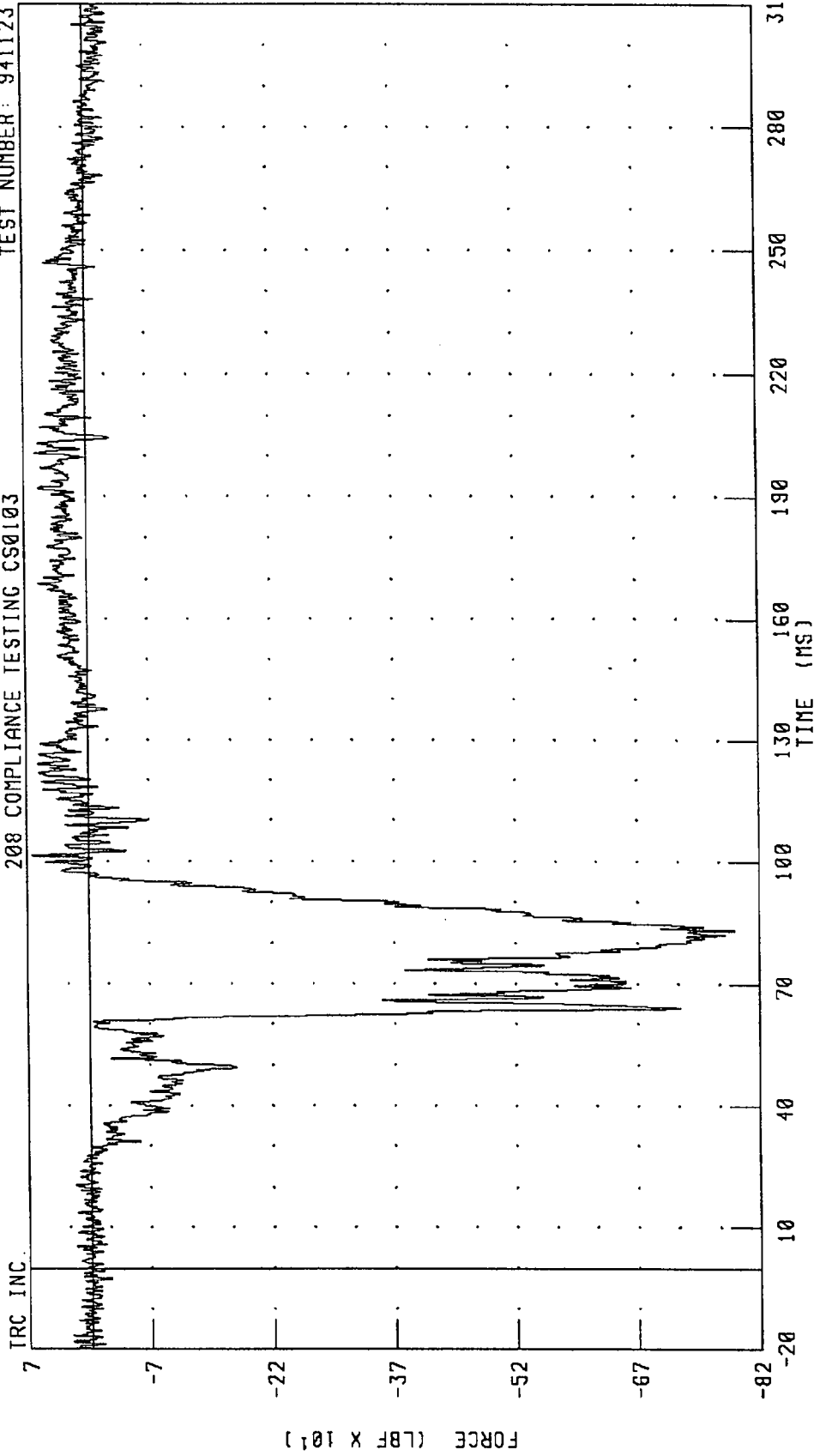
CHANNEL: CSTXD2 FILTER: CH. CLASS 180

PEAK DATA: 0.01 IN @ -15.76 MS; -1.90 IN @ 102.64 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TEST NUMBER: 941123

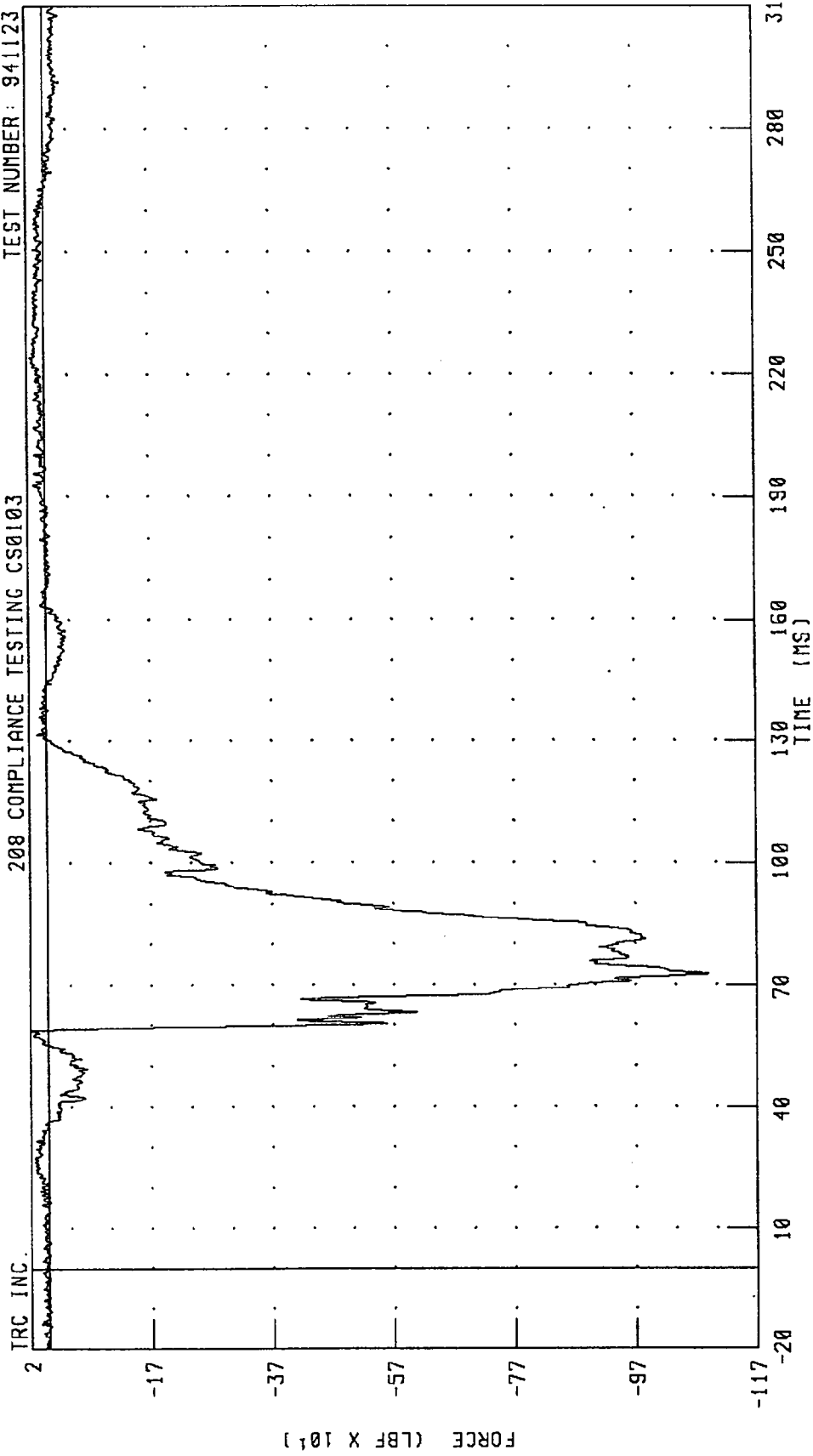
208 COMPLIANCE TESTING CS0103



CHANNEL: LFMF2 FILTER: CH. CLASS 600

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE  
208 COMPLIANCE TESTING CS0103

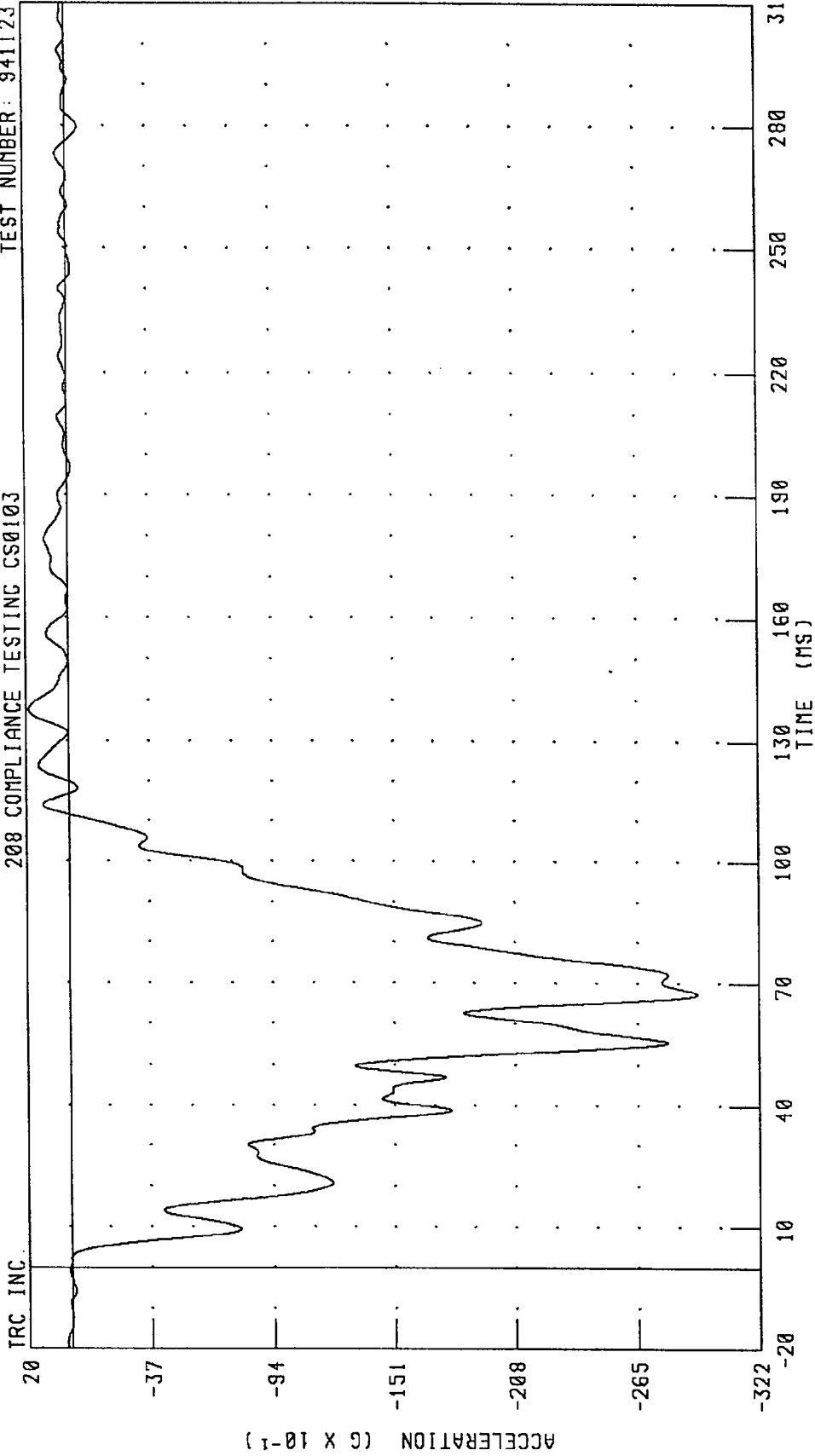
TEST NUMBER: 941123



CHANNEL: RFMF2 FILTER: CH. CLASS 600  
PEAK DATA: 27.19 LBF @ 58.64 MS; -1091.32 LBF @ 72.72 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
LEFT REAR SEAT X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

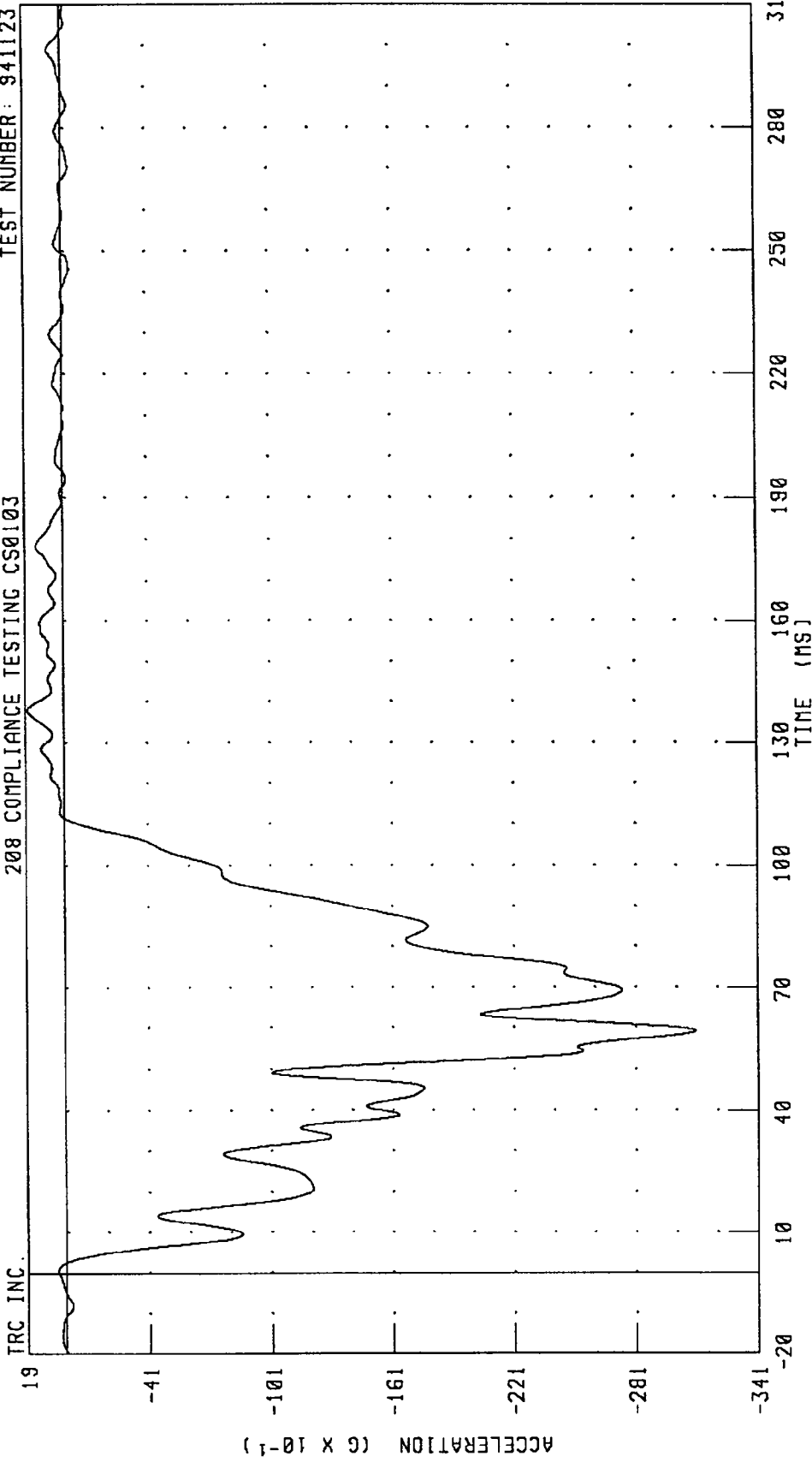


PEAK DATA: 1.88 G @ 137.52 MS; -29.31 G @ 67.44 MS

CHANNEL: TLRXG1 FILTER: CH. CLASS 60

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT REAR SEAT X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123

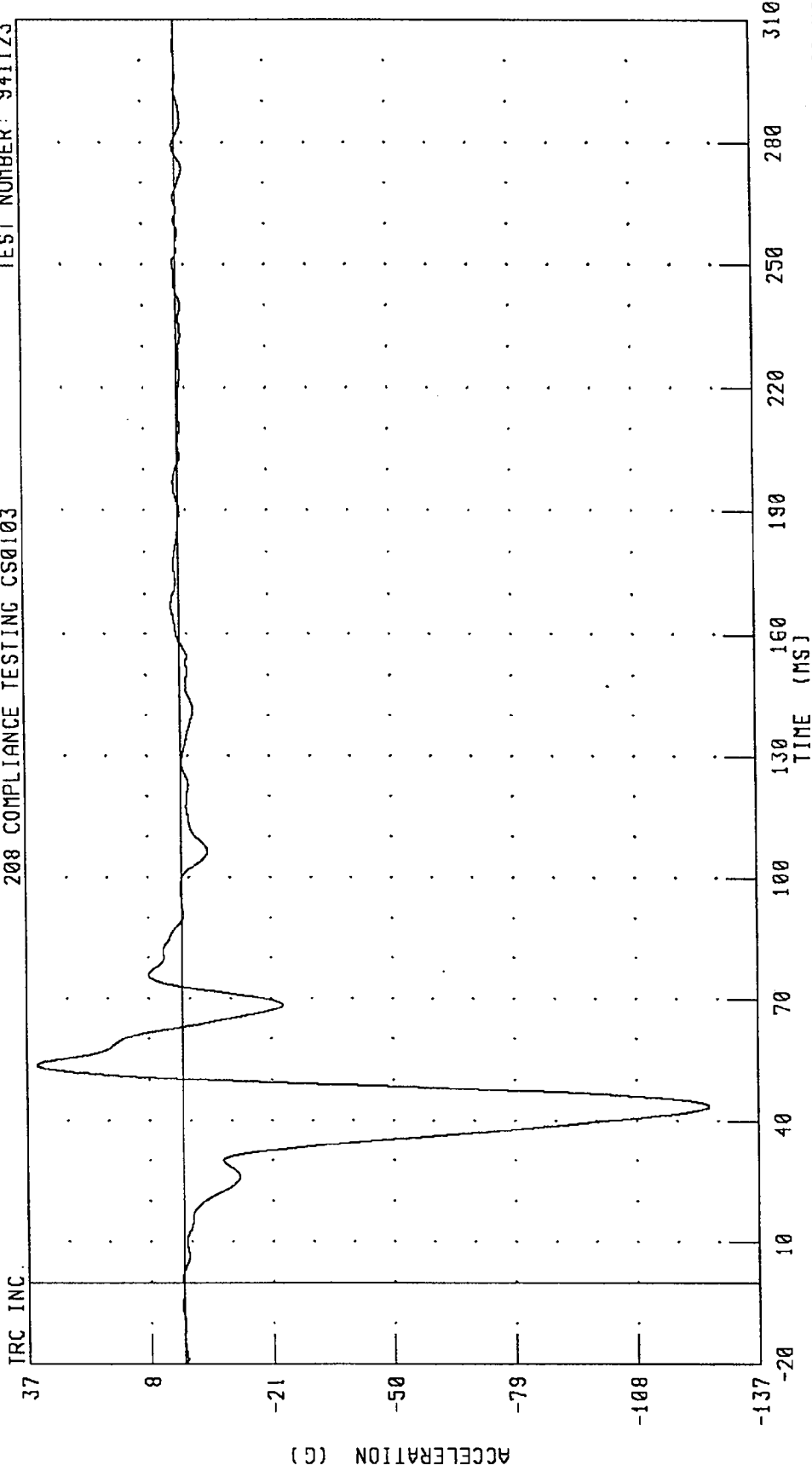


CHANNEL: TRRXG1 FILTER: CH. CLASS 60

PEAK DATA: 1.77 G @ 137.92 MS; -31.04 G @ 59.12 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
ENGINE UPPER BLOCK X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

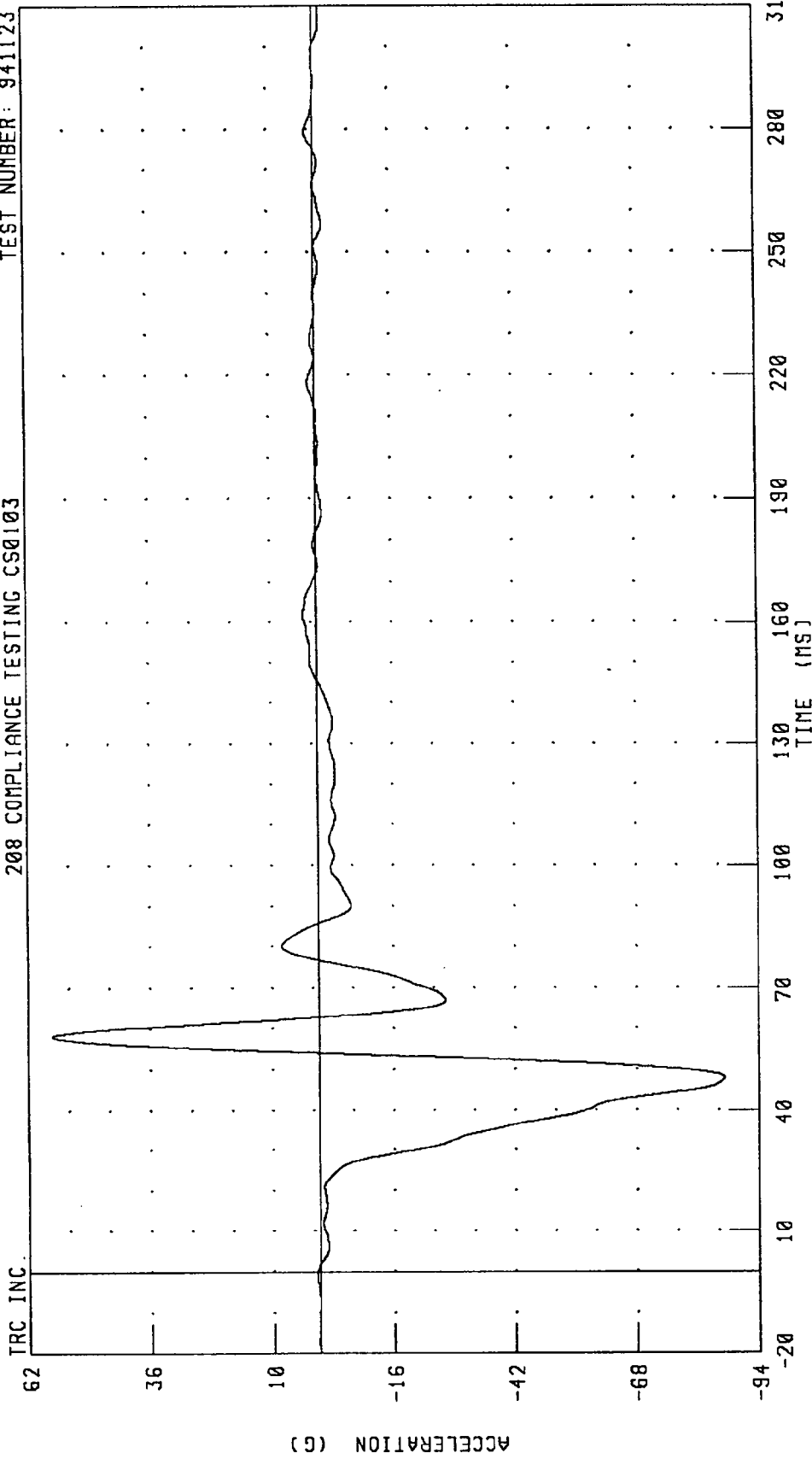
TEST NUMBER: 941123



CHANNEL: ENGCG1 FILTER: CH. CLASS 60

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

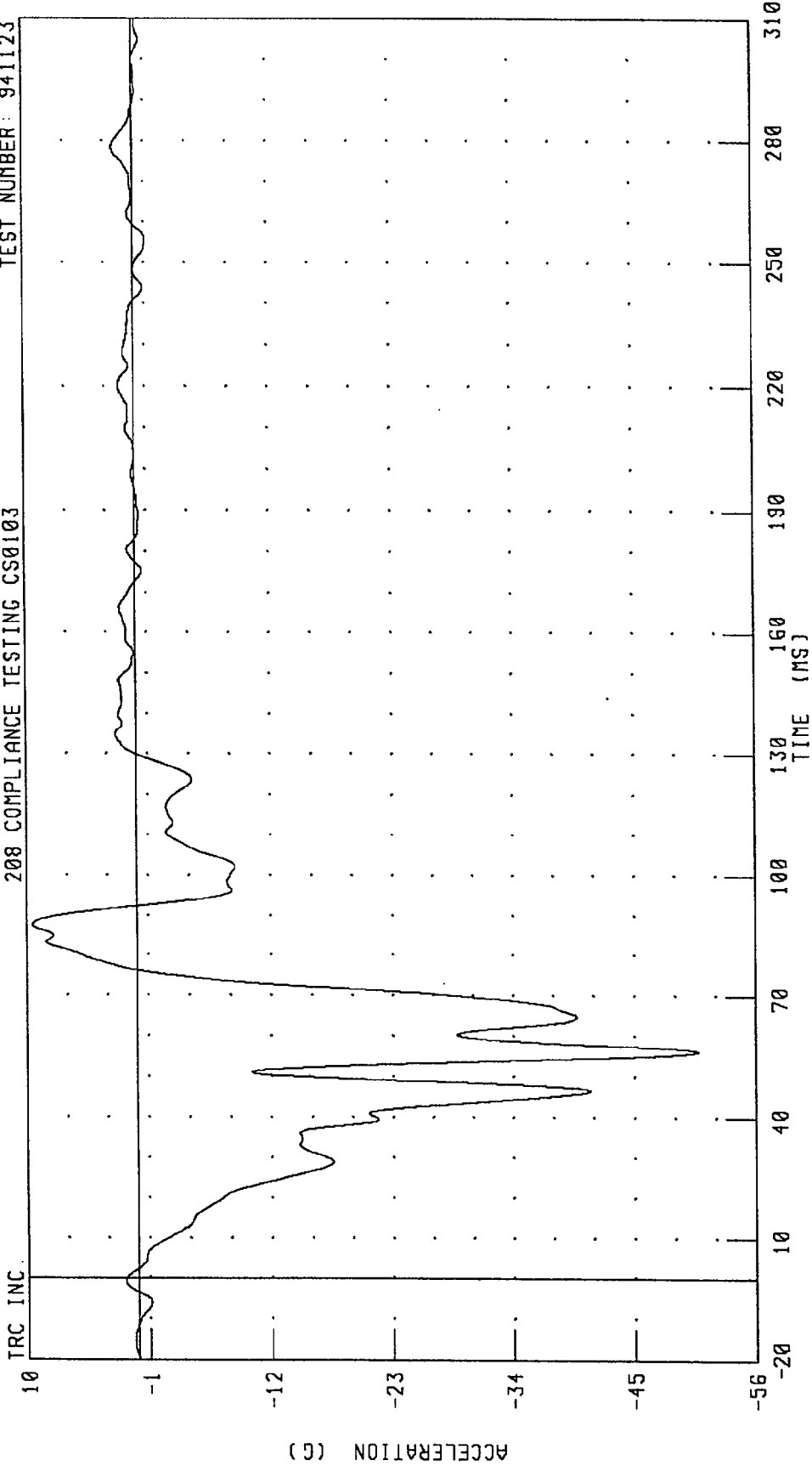
TEST NUMBER: 941123



CHANNEL: ENGXC2 FILTER: CH. CLASS 60

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
RIGHT BRAKE CALIPER X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



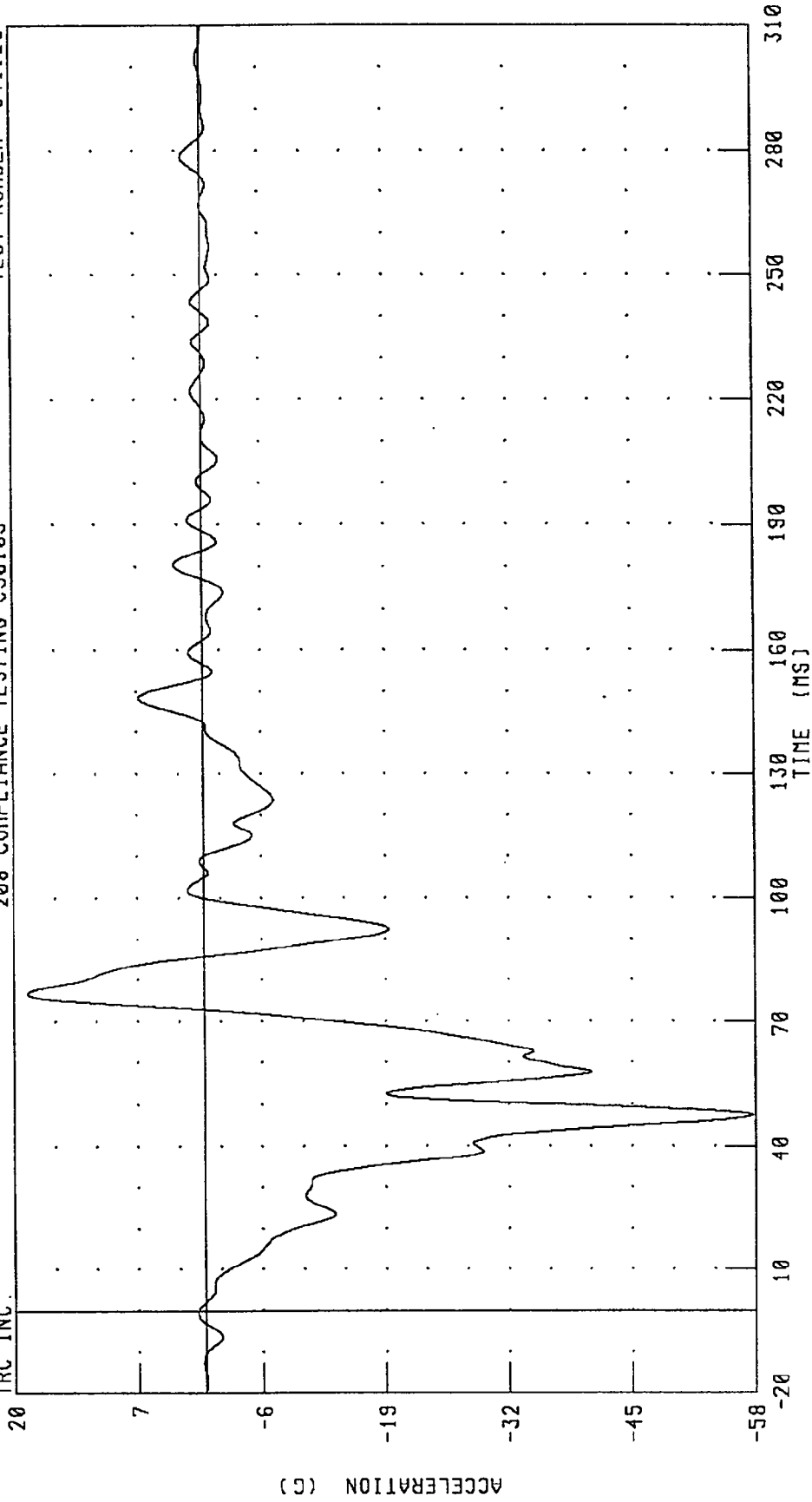
CHANNEL: BCRXG1 FILTER: CH. CLASS 60

941123

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC INC. TEST NUMBER: 941123

208 COMPLIANCE TESTING CS0103

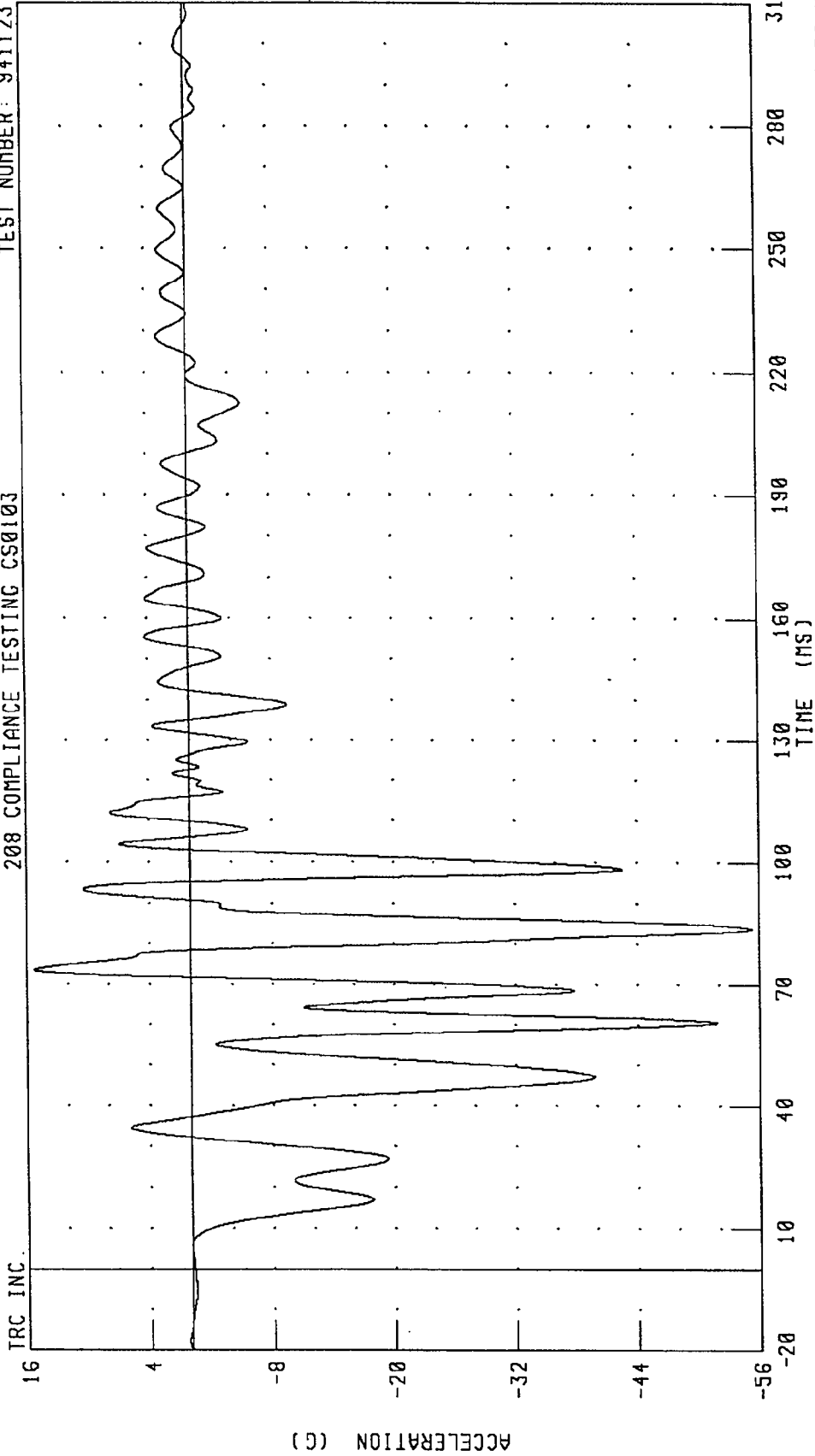


CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 18.55 G @ 76.80 MS; -57.68 G @ 47.44 MS

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
DASH PANEL CENTER X-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

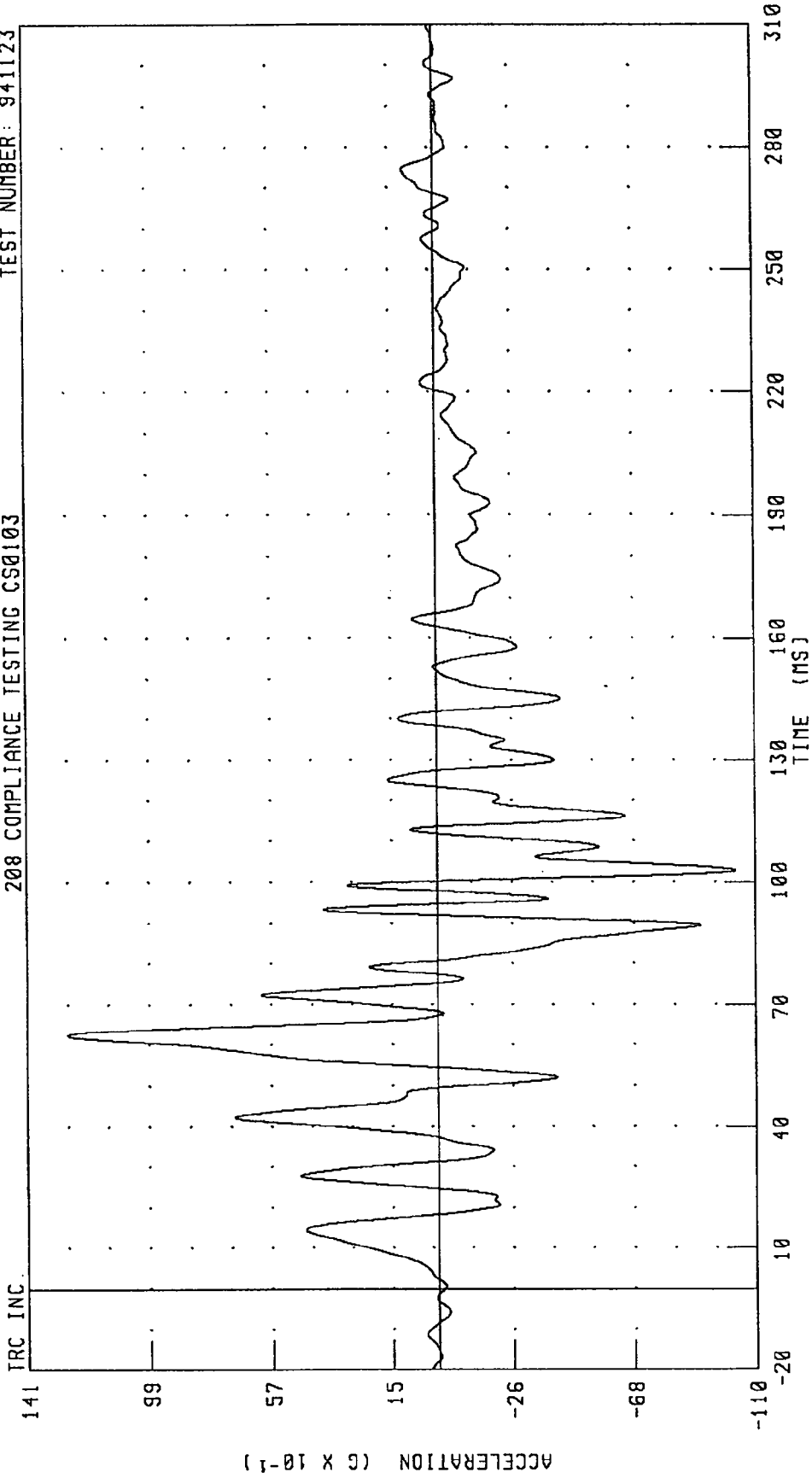
TEST NUMBER: 941123



CHANNEL: DPCXG1 FILTER: CH. CLASS 60

1995 PONTIAC GRAND AM INTO FLAT FRONTAL BARRIER  
VEHICLE REAR CENTER Z-AXIS ACCELERATION  
208 COMPLIANCE TESTING CS0103

TEST NUMBER: 941123



CHANNEL: ROKZG1 FILTER: CH. CLASS 60

Appendix C

Manufacturer's Vehicle Information

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

# of pages &gt;

9

To Prais, Markusic KRC	From Charlie Case
Fax # 313)666-5705	Phone # (202) 366-5319
SN 7540-G1-317-7388	Fax #

5099-101

GENERAL SERVICES ADMINISTRATION

Enclosure 1  
USG 3133

## OVSC QUESTIONS &amp; GM RESPONSES

## REGARDING FMVSS 208 INFORMATION REQUEST

1995 Pontiac Grand Am (all models)

NEF-31CCa/IR-1532

Item 1

Please inform OVSC whether the air bag automatic restraint system provided at the driver's and passenger's seating positions in your vehicle is certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1(c)(2) for FMVSS No. 208.

GM Response

The driver air bag and the automatic lap/shoulder belts provided at the driver's and passenger's designated seating positions in the subject vehicle were installed to meet the requirements of paragraphs S4.1.2.1(a) and S4.1.2.1(c)(2) of FMVSS 208.

Item 2

If the automatic restraint system provided at the driver's and passenger's seating positions in the subject vehicle was installed to meet the requirements of S4.1.2.1(c)(1), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., moving barrier lateral impact and dynamic rollover) and a copy of the certification reports for the frontal/angular barrier impact test required by S4.1.2.1.

GM Response

Since the subject vehicle's front outboard restraint systems are installed to meet the requirements of S4.1.2.1(c)(2), no response is required.

Item 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

-2-

Enclosure 1  
USG 3133

frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened).

GM Response

Since the subject vehicle is equipped with automatic lap/shoulder belts, no response is required.

Item 4

If the manual safety belt provided at the driver's seating positions was not installed to meet the requirements of S4.1.2.1(c)(2), please provide a copy of a crash test report or engineering analysis showing that the use of the manual safety belt with the automatic restraint system does not affect the ability of the vehicle to meet the requirements FMVSS No. 208.

GM Response

Since the subject vehicle is equipped with an automatic lap/shoulder belt at the driver's seat position, no response is required.

Item 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.

GM Response

The air bag installed in this vehicle does not incorporate a pressure vessel to inflate the system. Therefore, no response is required.

Item 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 of the requirements of S9.2.

GM Response

The air bag installed in this vehicle does not incorporate an explosive device to inflate the system. Therefore, no response is required.

-3-

Enclosure 1  
USG 3133Item 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.

GM Response

This vehicle is not equipped with a tension-relieving device on the safety belt systems.

Item 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.

GM Response

The windows and vents were open during testing.

Item 9

FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or 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 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.

-4-

Enclosure 1  
USG 3133GM Response

The Part 572(E) test dummy was used in each front outboard seat position during certification testing for the subject vehicle. Attachment A includes the available dummy placement information.

The driver position is not equipped with a foot rest.

A split front bench seat is not available for the subject vehicle.

Item 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.

GM Response

Attachment B includes the requested information.

Item 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.

GM Response

The subject vehicle is not equipped with adjustable shoulder belt anchorages.

Item 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. Mark these plots to indicate when the following and any other significant events occur:

**Attachment A**

**USG 3133**

**2 pages  
(including this cover)**

## DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

### COUPE

	<u>Driver</u>	<u>Passenger</u>	<u>Comments</u>
HH - Head to Header	285 mm	330 mm	Middle of fore head to header
NR - Nose to Rim	395 mm	N/A	
CS - Steering Wheel To Chest	300 mm	N/A	To center of module
KDL - Left Knee to Dash (see note)	180 mm	190 mm	Closest point on knee bolster
KDL - Left Knee to Dash (see note)	190 mm	210 mm	Upper edge of knee bolster
KDR - Right Knee to Dash (see note)	225 mm	<del>185 mm</del>	<del>Closest point on knee bolster</del>
KDR - Right Knee to Dash (see note)	240 mm	<del>195 mm</del>	<del>Upper edge of knee bolster</del>
SH - Striker to H-Point	515 mm	515 mm	Center of striker to H-Pt in x direction
SHY - Striker to H-Point	233 mm	210 mm	Center of striker to H-Pt in y direction
HS - Head to Side Window	320 mm	280 mm	Middle of fore head to side glass

Driver dummy was seated at: H-Point (3053, 443); Pelvic Angle - 24 deg; Seat Back Angle - 21 deg

Passenger dummy was seated at: H-Point (3061, 441); Pelvic Angle - 22 deg; Seat Back Angle - 21 deg

### SEDAN

	<u>Driver</u>	<u>Passenger</u>	<u>Comments</u>
HH - Head to Header	285 mm	305 mm	Middle of fore head to header
NR - Nose to Rim	380 mm	N/A	
CS - Steering Wheel To Chest	290 mm	N/A	To center of module
KDL - Left Knee to Dash	200 mm	175 mm	Upper edge of knee bolster
KDR - Right Knee to Dash	205 mm	170 mm	Upper edge of knee bolster
SH - Striker to H-Point	220 mm	220 mm	Center of striker to H-Pt in x direction
SHY - Striker to H-Point	240 mm	225 mm	Center of striker to H-Pt in y direction
HS - Head to Side Window	300 mm	275 mm	Middle of fore head to side glass

Driver dummy was seated at: H-Point (3055, 435); Pelvic Angle - 23.5 deg; Seat Back Angle - 21 deg

Passenger dummy was seated at: H-Point (3051, 435); Pelvic Angle - 21.5 deg; Seat Back Angle - 21 deg

**Attachment B**

**USG 3133**

**3 pages**  
**(including this cover)**

U.S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration

TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1995 PONTIAC  
Vehicle Model & Body Style: GRAND AM SEDAN / COUPE

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 =        degrees.

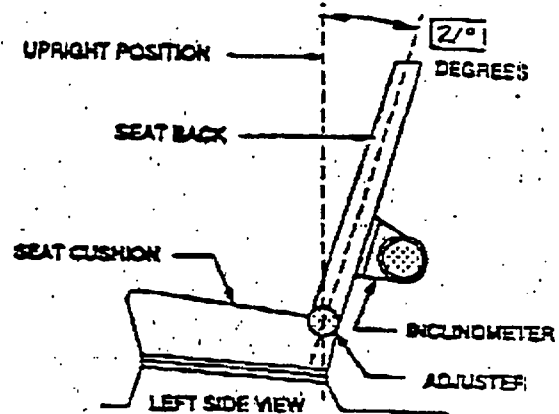
Measurement Instructions:

CUT SEAT FABRIC @ CENTER OF SEAT BACK DIRECTLY  
BELOW HEAD RESTRAINT, EXPOSING U-CHANNEL. PLACE  
INCLINOMETER ON FRAME, SET TO 21°

Seat back angle for passenger's seat =        degrees.

Measurement Instructions:

SAME AS DRIVER



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.

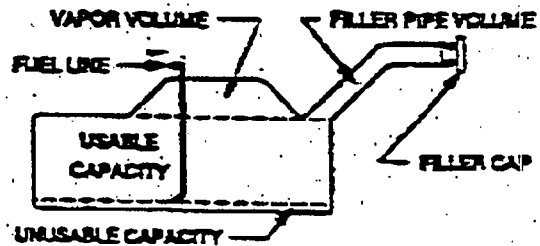
Positioning of the driver's seat:

POSITION SEAT AT MID-POINT OF FORE/REAR SEAT TRAVEL. SEAT IS FULL DOWN FOR  
4-WAY MANUAL AND POWER ADJUSTER.

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

3. FUEL TANK CAPACITY DATA --

- 3.1 A. "Usable Capacity" of standard equipment fuel tank = 15.2 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.



Operational Instructions:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TEST VEHICLE INFORMATION

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 14.4 gallons

3.3 Is vehicle equipped with electric fuel pump?  YES  NO

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

WITH KEY IN THE 'ON' POSITION, THE FUEL PUMP WILL PRIME FOR 2-5 SECONDS, THEN SHUT OFF. WITH THE KEY IN THE 'RUN' POSITION, AND IF THERE IS OIL PRESSURE, THE FUEL PUMP IS PUMPING FUEL.

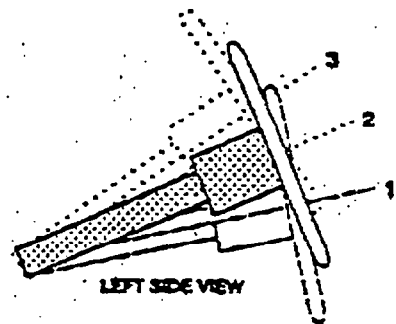
A. STEERING COLUMN ADJUSTMENTS - -

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:

TILT WHEEL HAS FIVE (5) POSITIONS.  
MIDPOINT IS 3RD NOTCH FROM  
TOP OR BOTTOM.



LEFT SIDE VIEW  
STEERING COLUMN ASSEMBLY