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301-TRC-98-001

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

Chrysler Corporation
1998 Plymouth Voyager
Van
NHTSA Number: CW0307
TRC Test Number: 980127

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



February 17, 1998

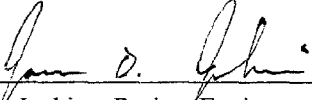
Final Report

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

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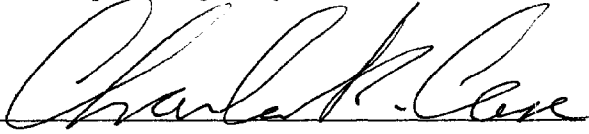
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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1998 Plymouth Voyager Van, NHTSA No. CW0307, at Transportation Research Center Inc. on January 27, 1998. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards (FMVSS): 208, "Occupant Crash Protection"; 212, "Windshield Retention"; 219 (partial), "Windshield Zone Intrusion"; and 301 "Fuel System Integrity. The barrier impact velocity was 29.2 mph. The vehicle's maximum static crush was 15.2 inches. The ambient temperature was 72° F. The driver's Head Injury Criteria (HIC) was 507. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.0 g. The driver's chest deflection was 2.2 inches. The driver's left and right femur maximum axial forces were 1643 pounds and 1446 pounds, respectively. The passenger's HIC was 379. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.4 g. The passenger's chest deflection was .8 inch. The passenger's left and right femur maximum axial forces were 1530 pounds and 1804 pounds, respectively.			
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Retention" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division Nassif Building, Room 5108 400 Seventh Street, S.W. Washington, DC 0590	
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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 (exact). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10286.

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

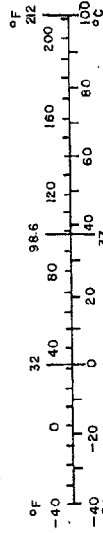


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Section 1.0

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 1998 Plymouth Voyager Van, NHTSA No. CW0307, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; 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 Retention"; 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 B of the Laboratory Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations; chest deflection potentiometers; left and right femur load cells to measure axial forces; and 6-axis upper neck load cells to measure forces and moments.

The thirty-eight (38) 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 27, 1998.

This vehicle was certified in the FMVSS 208 unbelted condition using the sled test for the passenger and the barrier test for the driver. The passenger results from this unbelted barrier test and the neck data for the driver are for informational purposes only.

The test vehicle, a 1998 Plymouth Voyager Van, NHTSA No. CW0307, 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, the chest deflections did not exceed 3.0 inches, 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. 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.

The test vehicle was equipped with airbags at the driver and right front passenger's seating positions. The vehicle's test weight was 4123 pounds. The vehicle's impact speed was 29.2 mph. The vehicle's maximum static crush was 15.2 inches.

The driver's HIC was 507. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.0 g. The driver's chest deflection was 2.2 inches. The driver's left and right femur maximum compressive forces were 1643 pounds and 1446 pounds, respectively.

The right front passenger's HIC was 379. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 53.4 g. The passenger's chest deflection was .8 inch. The right front passenger's left and right femur maximum compressive forces were 1530 pounds and 1804 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.

Data Acquisition Explanations

The vehicle's left brake caliper X-axis acceleration data channel, BCLXG1, lost data after approximately 40 milliseconds.

Table 1 Crash Test Summary

NHTSA number:	CW0307
Test type:	Frontal barrier impact
Test date:	01/27/98
Test time:	1724
Ambient temperature at impact area:	72° F
Vehicle year/make/ model/body style:	1998/Plymouth/Voyager/Van
Vehicle test weight:	4123 lb
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	29.2 mph
Secondary:	29.2 mph
Maximum static crush:	15.2 in
Average rebound:	45.1 in
Number of cameras:	
Real-time:	1
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 #230</u>	<u>Passenger #314</u>
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag	Airbag
Number of data channels:	15	15
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag, headrest	Airbag, roof
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:	1998/Plymouth/Voyager/Van		
Color:	Flame Red Clear Coat		
VIN:	2P4FP25B8WR537589		
NHTSA number:	CW0307		
Engine data:			
Placement:	Traverse/Lateral		
Cylinders:	4		
Displacement:	2.4 liters		
Transmission data:	<u>3</u> speed,	<u> </u> manual,	<u> X </u> automatic, <u> </u> overdrive
Final drive:	<u> X </u> fwd,	<u> </u> rwd,	<u> </u> 4wd
Date vehicle received:	N/A		
Odometer reading:	111		
Dealer's name and address:	Key Chrysler-Plymouth Inc. 2020 N.Detroit Street Xenia, OH 45385-1299		
<u>Accessories:</u>			
Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	No
Clock	Yes	Rear window defroster	Yes
Power door locks	No	Other:	None

Certification data from vehicle's label:

Vehicle manufactured by:	Chrysler Corporation
Date of manufacture:	08/97
VIN:	2P4FP25B8WR537589
GVWR:	5000 lb
GAWR: Front:	2650 lb
Rear:	2600 lb

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle:	P205/75R14
Spare tire:	Space Saver
Type of front seats:	Bucket

Tire & capacity data from vehicle's label:

Recommended tire size:	P205/75R14
Recommended cold tire pressure:	
Front:	35 psi
Rear:	35 psi
Designated Seating Capacity:	
Front	2
2nd Row	2
3rd Row	3
Total	7
Vehicle Capacity Weight:	1150 lbs

Test vehicle attitudes:

Delivered attitude:	LF: 30.4 in	RF: 30.6 in	LR: 30.2 in	RR: 30.4 in
Fully loaded attitude:	LF: 29.5 in	RF: 29.6 in	LR: 29.3 in	RR: 29.6 in
Pre-test attitude:	LF: 29.7 in	RF: 29.4 in	LR: 29.2 in	RR: 29.6 in
Post-test attitude:	LF: 30.5 in	RF: 30.9 in	LR: 29.4 in	RR: 28.9 in

Table 2 Test Vehicle Information, Cont'd.

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

Right front	1013	lb	Right rear	770	lb
Left front	1130	lb	Left rear	787	lb
Total front weight	2143	lb	(57.9% of total vehicle weight)		
Total rear weight	1557	lb	(42.1% of total vehicle weight)		
Total delivered weight	3700	lb			

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (3700 lb)

VCW¹ = Vehicle Capacity Weight = (1150 lb)

DSC = Designated Seating Capacity (7)

RCLW = VCW - 150 (DSC) = 1150 - 7(150) = 100 lbs

Target test weight = UDW + RCLW¹ + (Number of Hybrid III dummies x 167 lb per dummy)

Target test weight = 3700 + 100 + 334 = 4134 lbs

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

Right front	1137	lb	Right rear	895	lb
Left front	1207	lb	Left rear	884	lb
Total front weight	2344	lb	(56.9% of total vehicle weight)		
Total rear weight	1779	lb	(43.1% of total vehicle weight)		
Total test weight	4123	lb	(0.3% under target test weight)		

Weight of ballast secured in vehicle cargo area: 0 lb

Components removed to meet target test weight: Rear most seat was removed to accommodate instrumentation.

CG rearward of front wheel centerline: 48.8 in

Vehicle Wheelbase: 113.0 in.

Front Overhang: 36.8 in.

Max Width 74.0 in.

¹ From vehicle's tire load label.

Table 3 Post-Impact Data

Test number: 980127
NHTSA number: CW0307
Test date: 01/27/98
Test time: 1724
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature
at impact area: 72° F
Temperature in
occupant compartment: 68° F
Impact velocity:
Primary: 29.2 mph
Secondary 29.2 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:

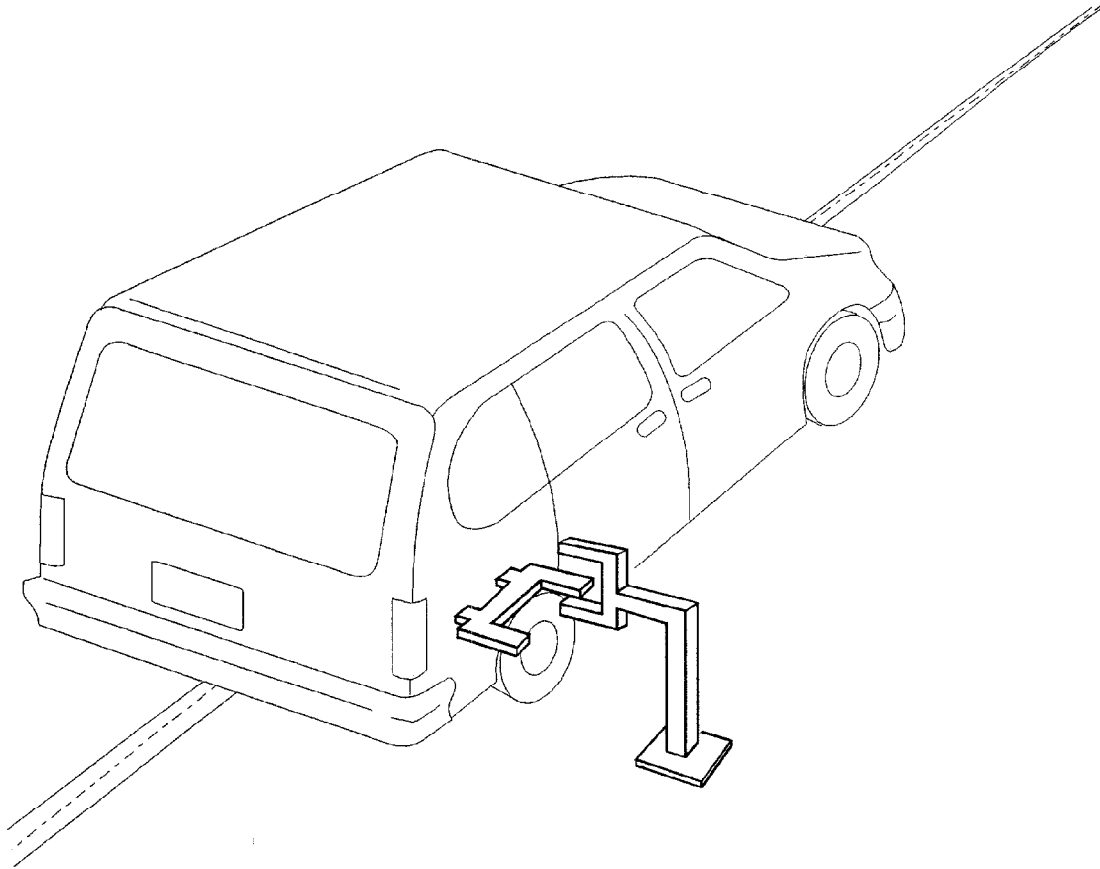
Pre-test:	L:	181.1 in	C:	188.2 in	R:	181.1 in
Post-test:	L:	171.7 in	C:	173.5 in	R:	168.0 in
Total crush:	L:	9.4 in	C:	14.7 in	R:	13.1 in
Average crush:		12.4 in				

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	43.3 in	C:	44.1 in	R:	47.0 in
Average rebound:		45.1 in				

Figure 1 Impact Velocity Measurement System



The final vane clears the final emitter/receiver pair 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: CW0307
 Test date: 01/27/98
 Vehicle year/make/
 model/body style: 1998/Plymouth/Voyager/Van
 Vehicle size category: Van
 VIN: 2P4FP25B8WR537589
 Build date: 08/97
 Test weight: 4123 lb
 Vehicle wheelbase: 113.0 in
 Maximum width: 74.0 in
 Front overhang: 36.8 in

Collision Deformation

Classification (CDC) Code: 12FDEW2

Crush depth measurements:	C1:	9.4 in
	C2:	12.9 in
	C3:	14.2 in
	C4:	15.2 in
	C5:	14.3 in
	C6:	13.1 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged
region: L: 60.0 in

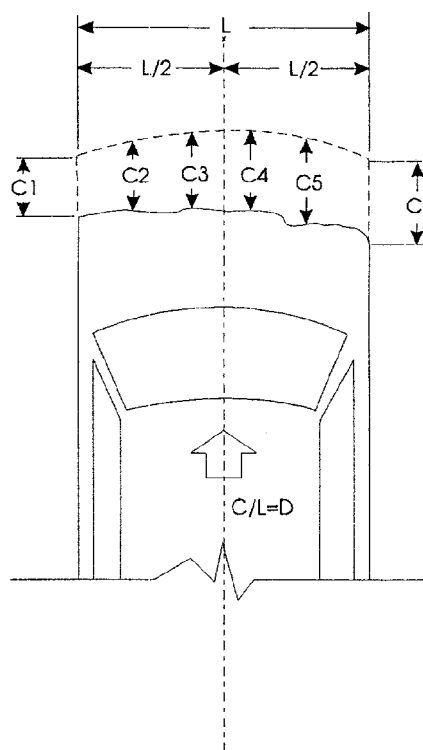


Table 4 Post-test Airbag Data

NHTSA number:	CW0307
Test date:	01/27/98
Technician:	Jenkins
Vehicle year/make/ model/body style:	1998/Plymouth/Voyager/Van

A. Number of airbag vent holes:

Driver:	0
---------	---

Passenger:	0
------------	---

B. Size of airbag vent holes:

Driver:	NA
---------	----

Passenger:	NA
------------	----

C. Total airbag vent area:

Driver:	0 in ²
---------	-------------------

Passenger:	0 in ²
------------	-------------------

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

Driver:	Length	NA
---------	--------	----

	Width	NA
--	-------	----

	Diameter	24 in
--	----------	-------

Passenger:	Length:	17 in
------------	---------	-------

	Width:	29 in
--	--------	-------

	Diameter:	NA
--	-----------	----

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

E. Is the airbag tethered?

Driver: Yes

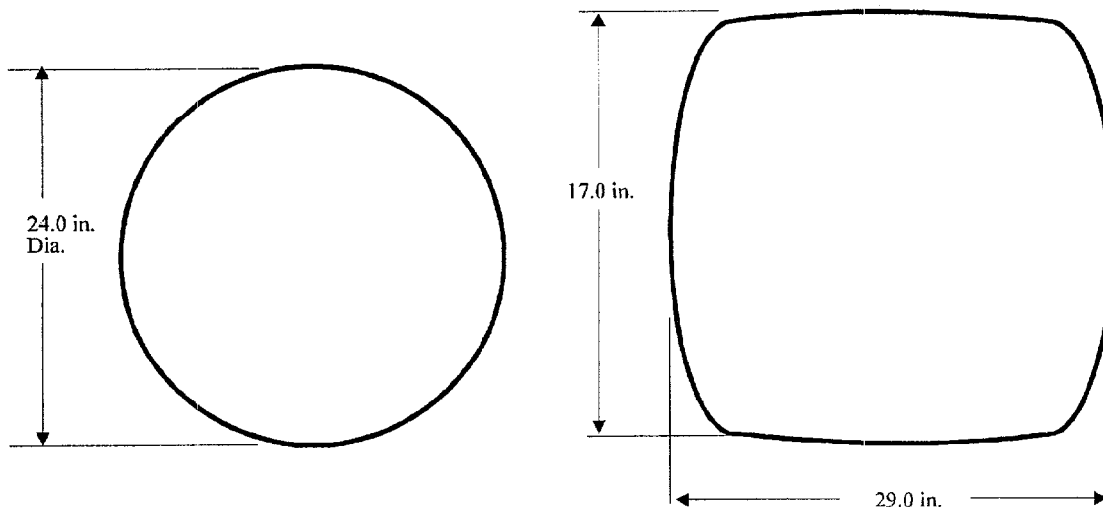
If yes, record length of tether: 9.0 inches.

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: NA

Airbag: NA

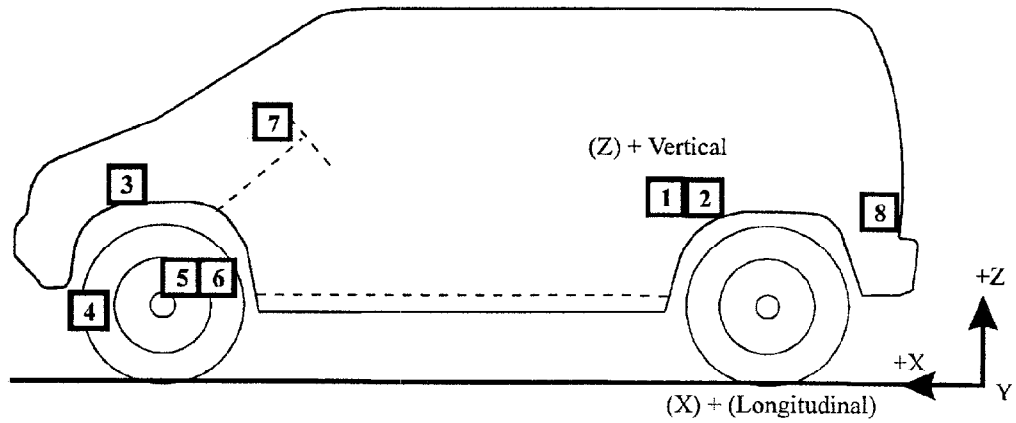
Inflator: CBL H8B 3U DQG

Passenger: Manufacturer: Allied Signal

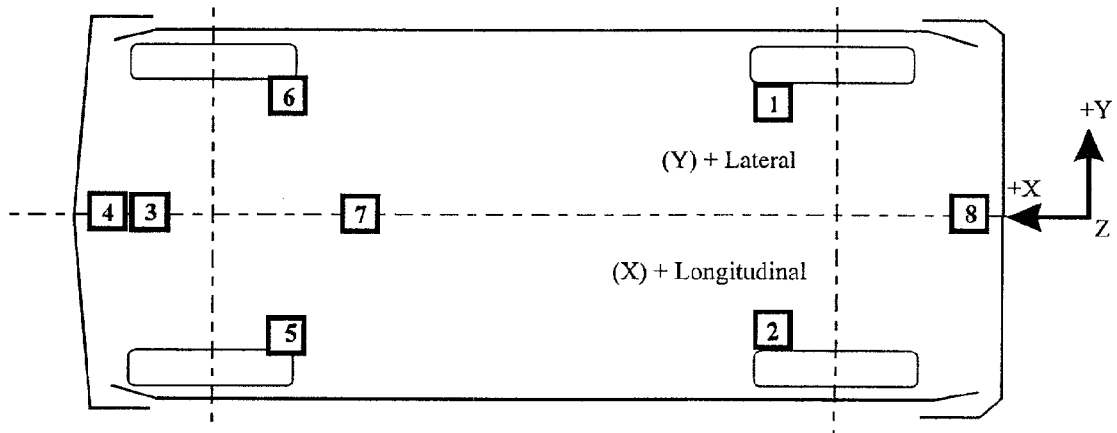
Airbag: NA

Inflator: TB227 2181379

Figure 3 Vehicle Accelerometer Placement



Side View



Bottom View

Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 980127 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 91.0 in POST 87.0 in	22.9 in 22.9 in	16.0 in 17.6 in	2.9 g @ 157.1 ms	36.8 g @ 40.3 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 90.9 in POST 89.9 in	-24.6 in -24.6 in	16.0 in 16.6 in	2.3 g @ 156.6 ms	36.7 g @ 41.3 ms
3 ENGINE TOP LONGITUDINAL	PRE 165.2 in POST 157.4 in	-1.5 in -1.0 in	36.8 in 32.4 in	13.4 g @ 42.6 ms	115.5 g @ 32.9 ms
4 ENGINE BOTTOM LONGITUDINAL	PRE 158.3 in POST 150.4 in	-5.5 in -7.0 in	7.0 in 8.0 in	43.0 g @ 49.0 ms	109.1 g @ 26.4 ms
5 RIGHT BRAKE CALIPER LONGITUDINAL	PRE 150.8 in POST 150.8 in	-29.5 in -29.5 in	12.0 in 12.7 in	36.0 g @ 71.8 ms	77.1 g @ 54.2 ms

Table 5 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 980127 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
6 LEFT BRAKE CALIPER	PRE 150.6 in	29.5 in	12.0 in		
LONGITUDINAL ¹	POST 150.6 in	29.5 in	12.7 in	0.0 g @ 71.8 ms	1034.4 g @ 50.6 ms
7 INSTRUMENT PANEL CENTER	PRE 136.3 in	0.0 in	45.1 in		
LONGITUDINAL	POST 136.0 in	0.0 in	46.7 in	6.3 g @ 64.2 ms	46.6 g @ 71.8 ms
8 REAR COMPARTMENT	PRE 20.2 in	-3.1 in	19.2 in		
VERTICAL	POST 20.2 in	-3.1 in	19.1 in	12.1 g @ 33.0 ms	18.8 g @ 67.3 ms

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

¹See DATA ACQUISITION EXPLANATIONS

Section 3.0

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

Table 6 Dummy Injury Criteria

<u>Maximum Acceleration</u>							
	<u>Head</u>				<u>Chest</u>		
	X	Y	Z	R	X	Y	Z
Driver	-58.8 g	8.0 g	-13.0 g	59.3 g	-48.3 g	4.6 g	-11.3 g
Passenger	89.0 g	-14.3 g	25.7 g	93.6 g	-52.8 g	4.1 g	20.0 g

<u>Maximum Femur Compressive Force</u>		
	<u>Left Femur</u>	<u>Right Femur</u>
Driver	1643 lbf	1446 lbf
Passenger	1530 lbf	1804 lbf

<u>Head Injury Criteria¹</u>			
	<u>HIC</u>	<u>Time t₁</u>	<u>Time t₂</u>
Driver	507	61.9 ms	97.0 ms
Passenger	379	88.3 ms	121.0 ms

<u>Chest Maximum Resultant Acceleration²</u>			
	<u>Acceleration</u>	<u>Time t₁</u>	<u>Time t₂</u>
Driver	48.0 g	85.2 ms	88.2 ms
Passenger	53.4 g	83.9 ms	87.0 ms

<u>Maximum Chest Deflection</u>	
Driver	2.2 in
Passenger	0.8 in

<u>Neck Injury Criteria</u>					
	<u>Flexion Moment</u>	<u>Extension Moment</u>	<u>Axial Tension Force</u>	<u>Axial Compression Force</u>	<u>Maximum Fore/Aft Shear Force</u>
Driver	14.3 N·m	15.6 N·m	2096 N	206 N	602 N ⁴
Passenger	69.8 N·m	14.3 N·m	1354 N	674 N	1222 N ⁴

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

³ Maximum output of channel is positive (head rearward, chest forward)

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 dummy's head and chest were restrained by the airbag. The dummy's head and upper torso rotated rearward as the dummy rebounded into the seat back. The dummy's head contacted the head restraint. 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. The dummy's head and chest were restrained by the airbag. Upon rebound, the dummy's head contacted the roof. The dummy came to rest seated in the right front passenger's seating position.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary

Front Outboard Designated Seating Positions

NHTSA number: CW0307

Vehicle model year/make/model/body style: 1998/Plymouth/Voyager/Van

Date of comfort/convenience check: 01/27/98

Technician performing check: Jenkins

GVWR: 5000 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: CW0307

Vehicle model year/make/model/body style: 1998/Plymouth/Voyager/Van

Date of comfort/convenience check: 01/27/98

Technician performing check: Jenkins

GVWR: 5000 lb

Webbing Tension-Relieving Device (S7.4.2):

Not applicable, the vehicle is not equipped with automatic seat belts or manual type-2 belts that must comply with the dynamic test requirements.

Belt Contact Force (S7.4.3):

The belt contact force on the chest of the test dummy is 0.7 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: CW0307

Vehicle model year/make/model/body style: 1998/Plymouth/Voyager/Van

Date of comfort/convenience check: 01/27/98

Technician performing check: Jenkins

GVWR: 5000 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 not movable.

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 inboard seat belt receptacles are accessible without moving the center arm rest.

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 reminder light is continuous. The audible warning signal operates for 5 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 and reminder light operation is 0 s.

NOTE: the audible warning should not operate.

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 labels which describe the manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system was located inside the glove box.

The manufacturer's recommended regular airbag maintenance is that the system does not require regular maintenance.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on pages 42 and 43.

A description of the functional operation of the system was provided in the owner's manual on pages 39 and 40.

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 page 43.

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 located on the upper right 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 pages 39 and 40.

FMVSS 208 Rear Outboard Seating Position Seat Belts

All rear outboard seating positions were equipped with type 2 manual seat belts. The rearmost center seating position was equipped with a type 1 manual seat belt.

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 the windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

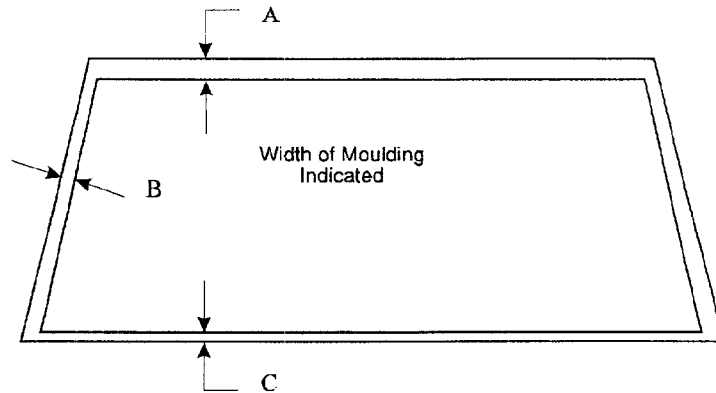
	Pre-test	Post-test	Percent Retention
Right side	92.3 in	92.3 in	100.0
Left side	92.3 in	92.3 in	100.0
Total	184.6 in	184.6 in	100.0

Pre-test windshield mounting material temperature: 68° F

A = 0.4 in

B = 0.4 in

C = 0.4 in



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:

A = 50.0 in

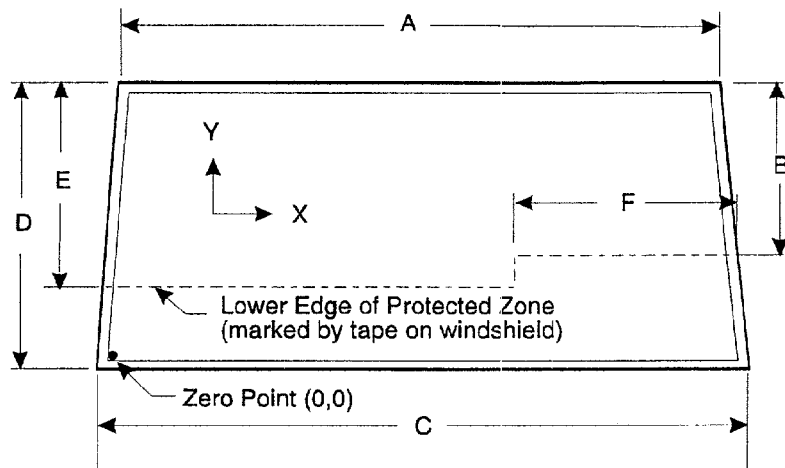
B = 22.4 in

C = 65.4 in

D = 36.6 in

E = 24.3 in

F = 27.6 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.	

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:	1998/Plymouth/Voyager/Van
NHTSA number:	CW0307
Fuel system capacity:	20.0 gal (from owner's manual)
Usable capacity:	20.0 gal (furnished by COTR)
Test volume range:	18.4 gal to 18.8 gal (92-94% of usable)
Actual test volume:	18.6 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 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 was located on the left side and entered the left side of the tank. The fuel lines ran along the right side of the vehicle.

Table 10 FMVSS 301 Post-Impact Test Data

Test date: 01/27/98

Vehicle make/model: Plymouth/Voyager

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:

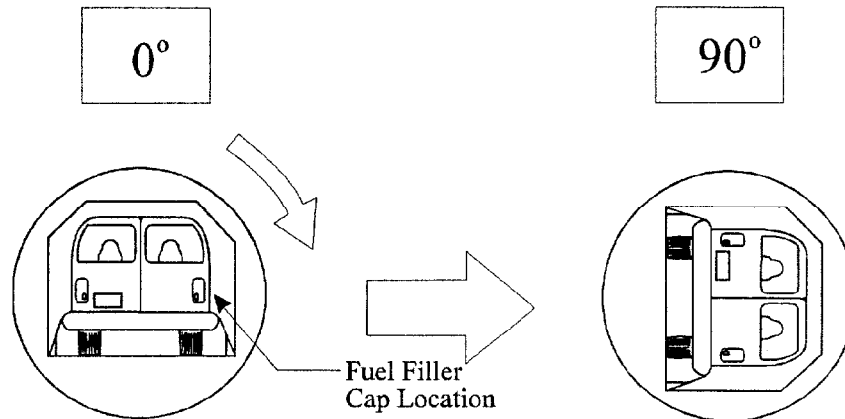
	<u>Test Results</u>	<u>Maximum Allowable</u>
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min.

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CW0307

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

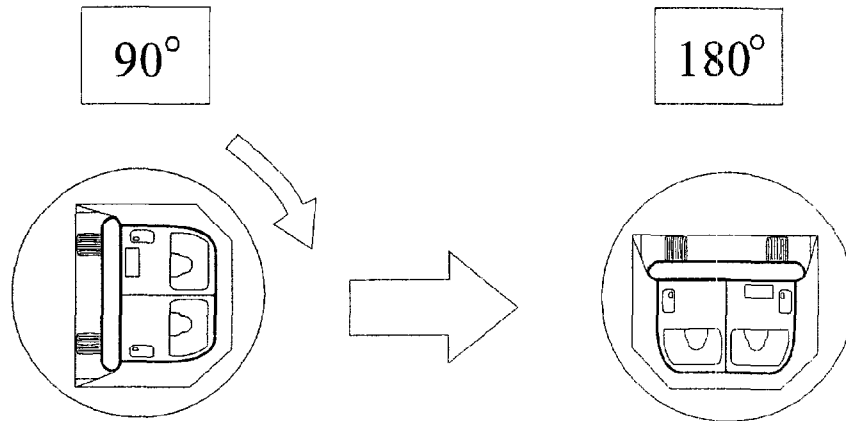
Fuel system fluid spillage measurements:

	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		

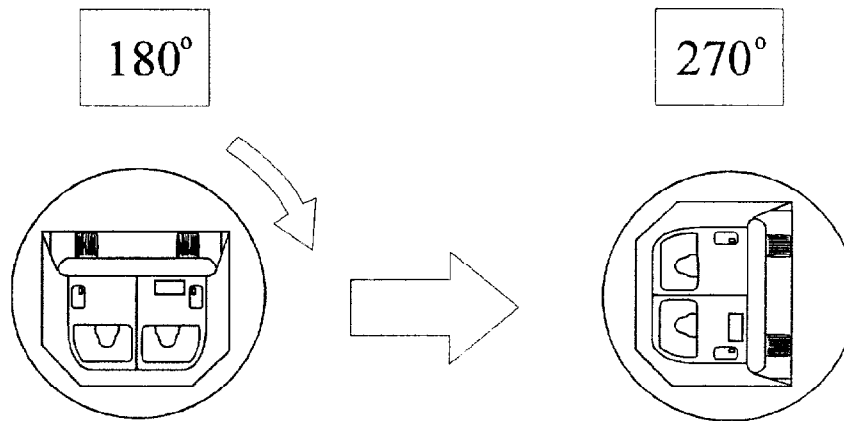
Fuel system fluid spillage measurements:

90° to 180° 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	=	21	minutes		

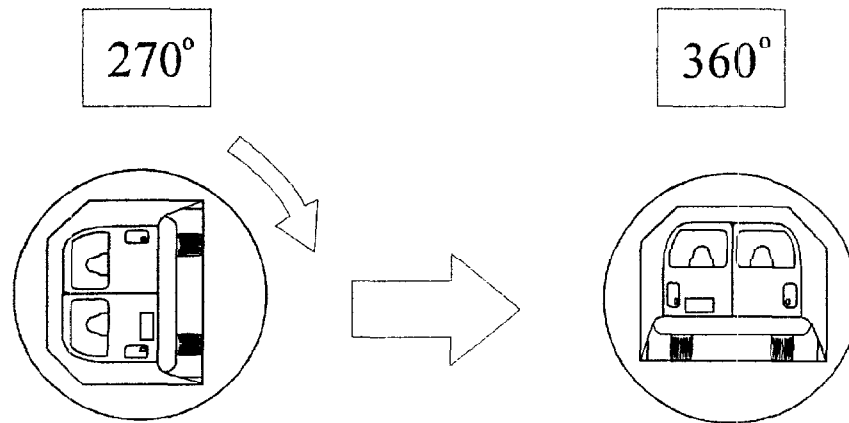
Fuel system fluid spillage measurements:

<u>180 to 270° 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	=	28	minutes		

Fuel system fluid spillage measurements:

<u>270° to 360° rotation</u>		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

Table 11
FMVSS 208 Lap Belt Lockability¹

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

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

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right front passenger seat

- ☒ 1. Record test seat position. Mid
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒ 2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☐ Yes ☒ No
- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☐ Yes-Pass ☐ No-Fail

¹ Lap belt lockability test was completed after the crash test was conducted.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right front passenger seat.

- ☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 58 inches.
- ☒11. Re-adjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

- ☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees no more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 28.25 inches.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right front passenger seat.

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second.
 Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.)

Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 28.3 inches (7.1.1.5(c)(6))

- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? $14-13=0.5$ inches ☒ Yes-Pass ☐ No-Fail
- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7)) $10-14=29.75$ inches. ☒ Yes-Pass ☐ No-Fail

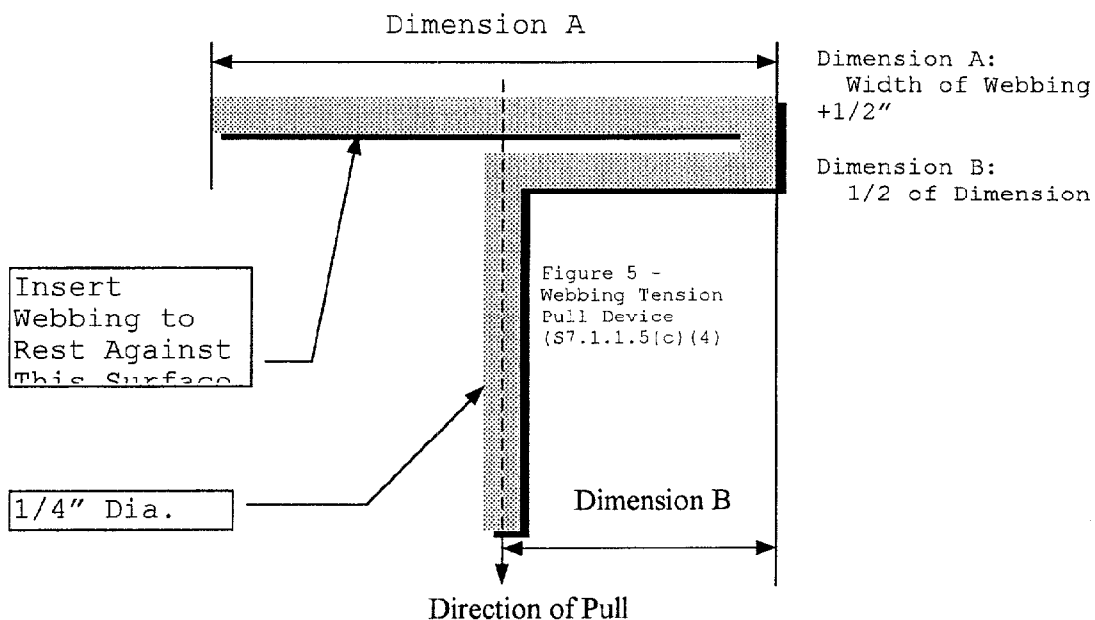


Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

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

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

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Left mid outboard

- ☒1. Record test seat position. Not adjustable
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐No-Fail
- ☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐No-Fail
- ☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☐Yes ☒No
- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☐Yes-Pass ☐No-Fail

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: left mid outboard.

- ☒ 7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 62.5 inches.
- ☒ 11. Re-adjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing.
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees no more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 22.75 inches.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Left mid outboard

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second.
 Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.)
 Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))
 Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)
 The measured distance between A and B is 24.75 inches (7.1.1.5(c)(6))
- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? $14-13=2.0$ inches ☒ Yes-Pass ☐ No-Fail
- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7)) $10-14=42.75$ inches. ☒ Yes-Pass ☐ No-Fail

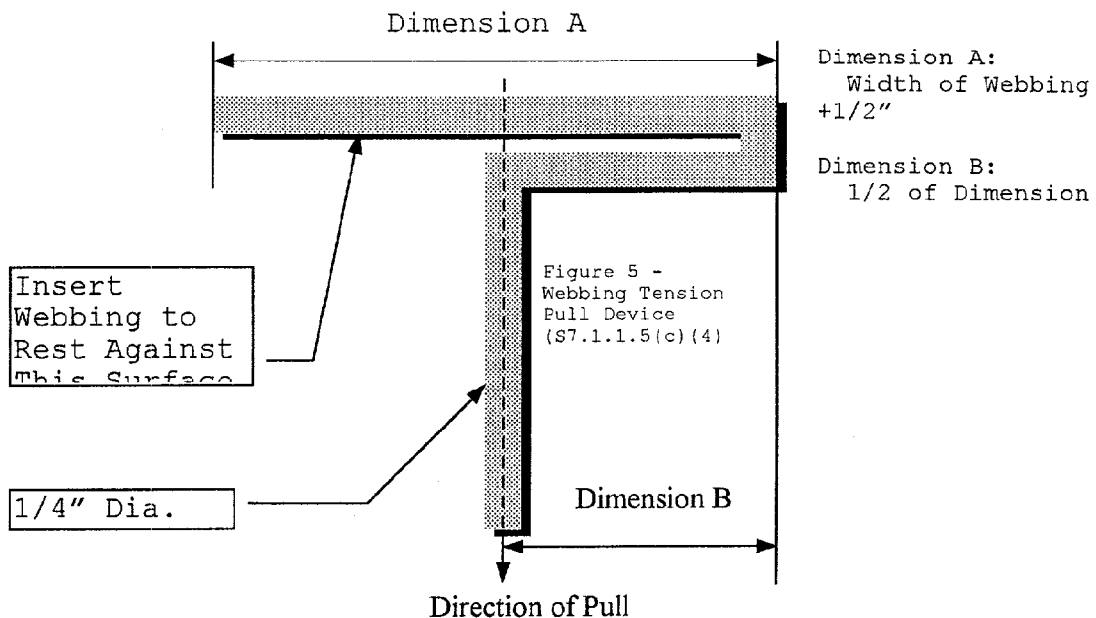


Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

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

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

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right mid outboard

- ☒ 1. Record test seat position. Not adjustable
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒ 2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☐ Yes ☒ No
- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☐ Yes-Pass ☐ No-Fail

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right mid outboard

- ☒ 7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 56.25 inches.
- ☒ 11. Re-adjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees no more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 16 inches.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right mid outboard

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second.
 Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.)

Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 17.5 inches (7.1.1.5(c)(6))

- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? 14-13=1.5 inches ☒ Yes-Pass ☐ No-Fail
- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7)) 10-14=38.75 inches. ☒ Yes-Pass ☐ No-Fail

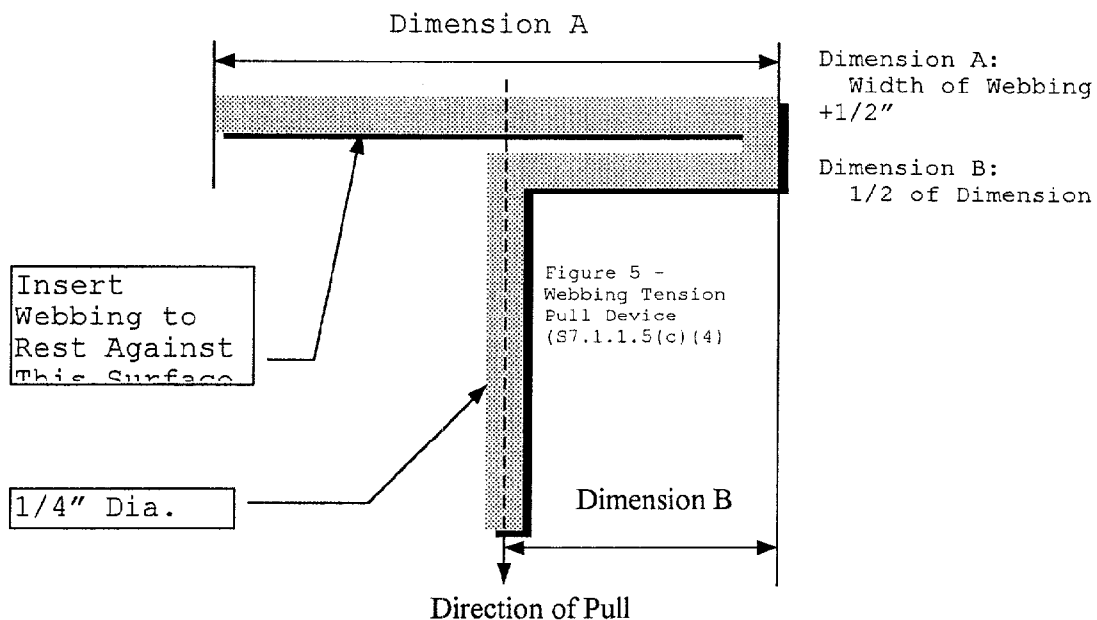


Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

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

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

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Left rearmost outboard

- ☒1. Record test seat position. Not adjustable
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐No-Fail
- ☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐No-Fail
- ☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☐Yes ☒No
- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☐Yes-Pass ☐No-Fail

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Left rearmost outboard

- ☒ 7. Locate a reference point A on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 46.38 inches.
- ☒ 11. Re-adjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing
- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees no more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 8.5 inches.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Left rearmost outboard

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second.
 Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.)
 Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))
 Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)
 The measured distance between A and B is 9.0 inches (7.1.1.5(c)(6))
- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? 14-13=0.5 inches ☒ Yes-Pass ☐ No-Fail
- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7)) 10-14=37.38 inches. ☒ Yes-Pass ☐ No-Fail

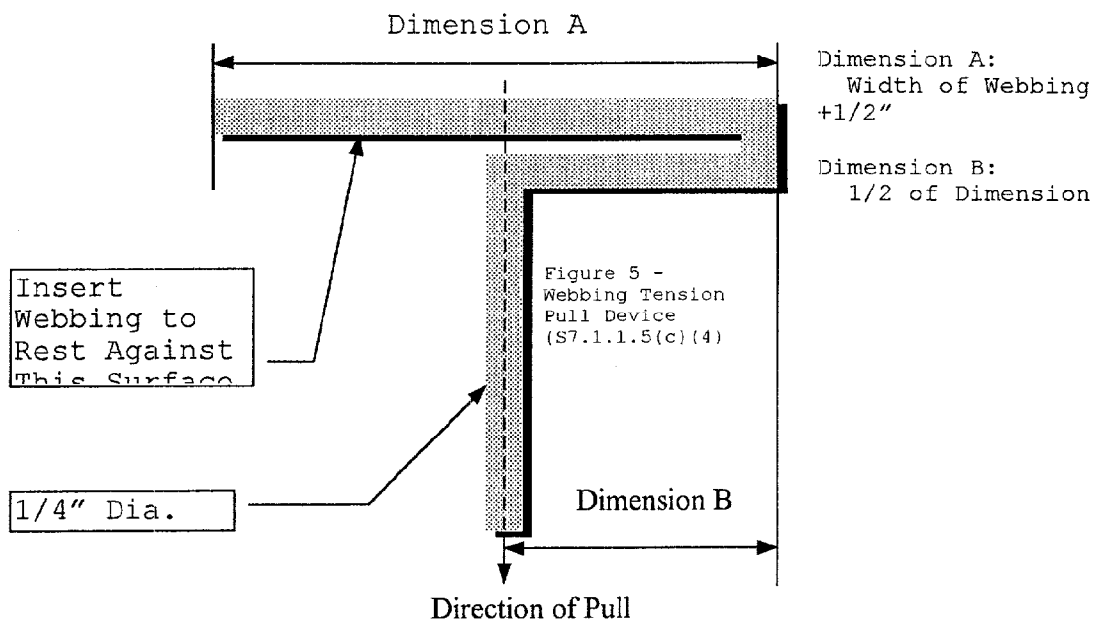


Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

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

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

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right rearmost outboard

- ☒ 1. Record test seat position. Not adjustable
(S7.1.1.5(c)(1)) (Any position is acceptable.)
- ☒ 2. Buckle the seat belt. (S7.1.1.5(c)(1))
- ☒ 3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))
- ☒ 4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒ Yes-Pass ☐ No-Fail
- ☒ 6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☐ Yes ☒ No
- 6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☐ Yes-Pass ☐ No-Fail

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right rearmost outboard

- ☒ 7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))
- ☒ 8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))
- ☒ 9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))
- ☒ 10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 47.75 inches.
- ☒ 11. Re-adjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

- ☒ 12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees no more than 15 degrees above the horizontal. (S7.1.1.5(c)(4)) Measured force application angle 10 degrees. (Spec. 5~15 degrees)
- ☒ 13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4)) Measured distance between A and B 7.25 inches.

Table 11
FMVSS 208 Lap Belt Lockability, Cont'd.

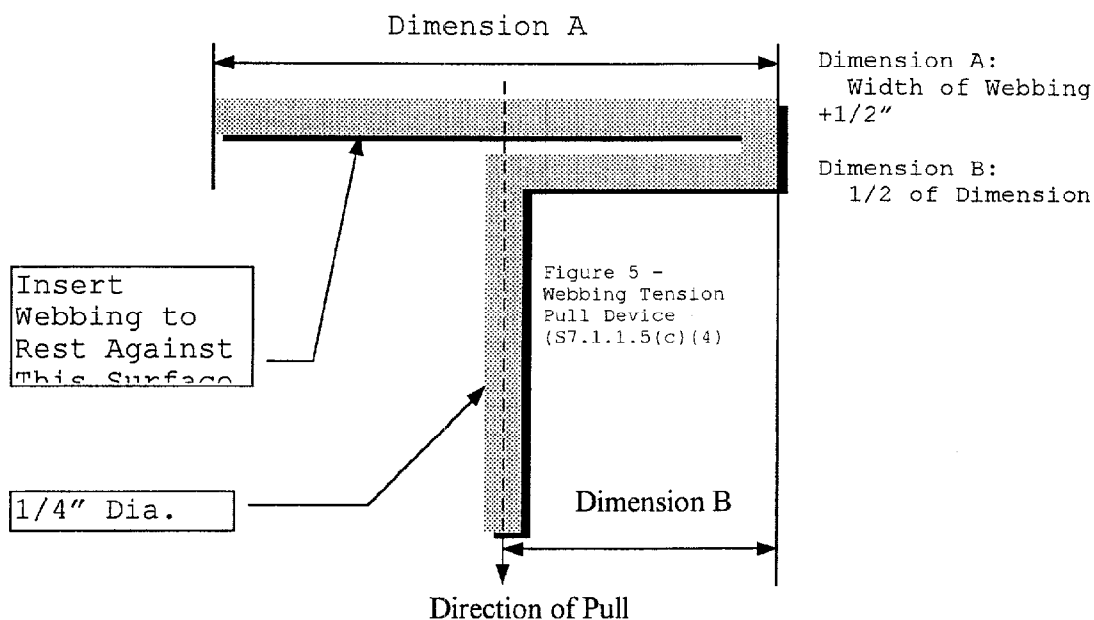
NHTSA NO.: CW0307

Technician: R. Benavides

Date: 02/10/98

DESIGNATED SEATING POSITION: Right rearmost outboard

- ☒ 14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second.
 Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.)
 Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline of the webbing. (S7.1.1.5(c)(5))
 Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)
 The measured distance between A and B is 7.75 inches (7.1.1.5(c)(6))
- ☒ 15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less? $14-13=\underline{0.5}$ inches ☒ Yes-Pass ☐ No-Fail
- ☒ 16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7)) $10-14=\underline{40.0}$ inches. ☒ Yes-Pass ☐ No-Fail



Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 7 Pre-test and Post-test Measurement Points

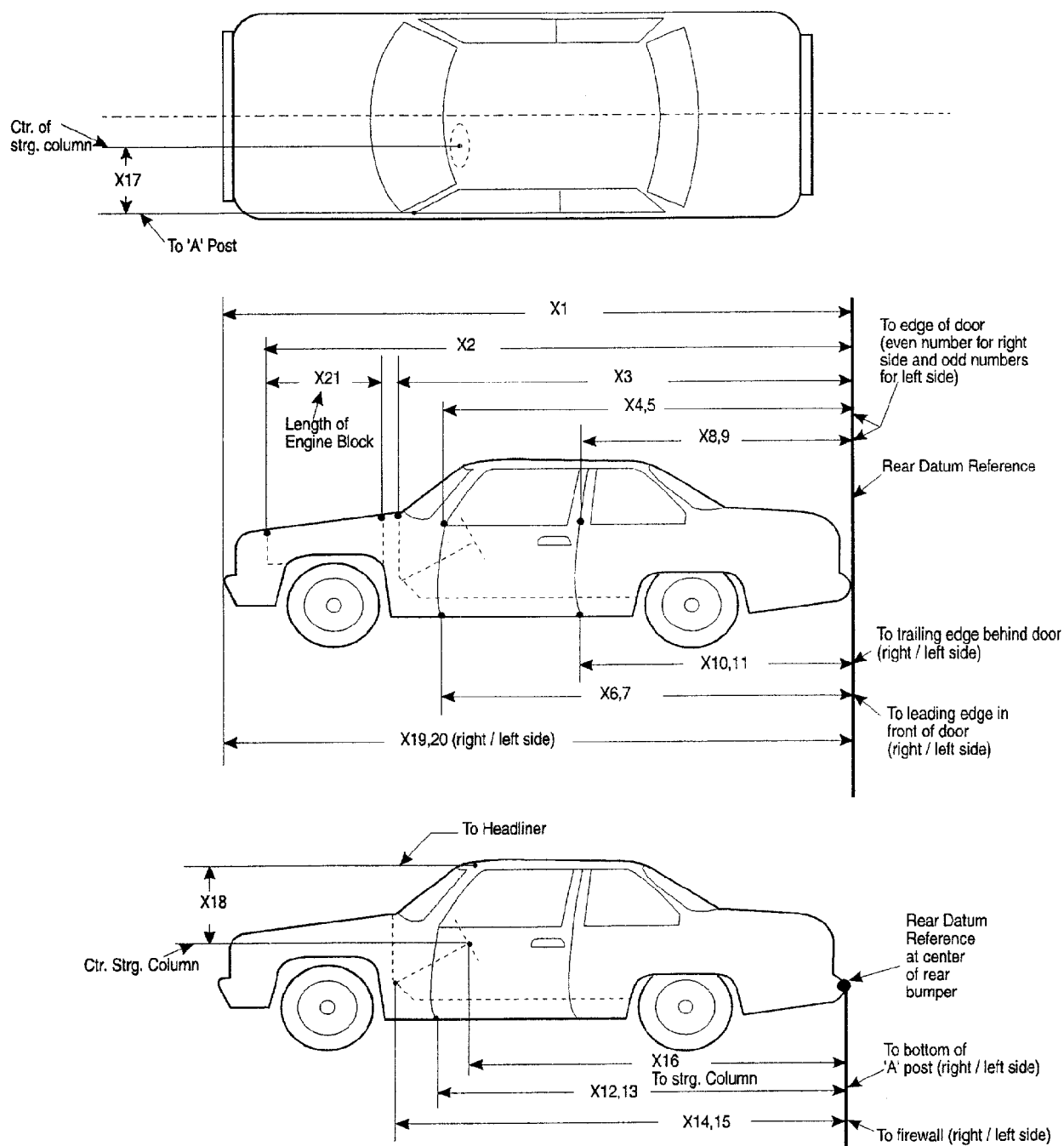


Table 12 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1998/Plymouth/Voyager/Van

Test Number: 980127

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	188.2 in	173.5 in	14.7 in
X2	Rear surface of vehicle to front of engine block	170.6 in	163.8 in	6.8 in
X3	Rear surface of vehicle to firewall	159.6 in	159.6 in	0.0 in
X4	Rear surface of vehicle to upper leading edge of right door	132.4 in	132.4 in	0.0 in
X5	Rear surface of vehicle to upper leading edge of left door	132.9 in	132.6 in	0.3 in
X6	Rear surface of vehicle to lower leading edge of right door	131.3 in	131.3 in	0.0 in
X7	Rear surface of vehicle to lower leading edge of left door	131.5 in	131.4 in	0.1 in
X8	Rear surface of vehicle to upper trailing edge of right door	93.7 in	93.7 in	0.0 in
X9	Rear surface of vehicle to upper trailing edge of left door	94.1 in	93.9 in	0.4 in
X10	Rear surface of vehicle to lower trailing edge of right door	93.9 in	93.8 in	0.1 in
X11	Rear surface of vehicle to lower trailing edge of left door	94.1 in	94.0 in	0.1 in
X12	Rear surface of vehicle to bottom of "A" post on right side	130.7 in	130.7 in	0.0 in
X13	Rear surface of vehicle to bottom of "A" post on left side	130.7 in	130.7 in	0.0 in
X14	Rear surface of vehicle to firewall - right side	152.6 in	152.1 in	0.5 in
X15	Rear surface of vehicle to firewall - left side	152.2 in	152.6 in	-0.4 in
X16	Rear surface of vehicle to steering wheel center	117.4 in	117.7 in	-0.3 in
X17	Center of steering column to "A" post	12.5 in	12.0 in	0.5 in
X18	Center of steering column to headliner	17.8 in	16.7 in	1.1 in
X19	Rear surface of vehicle to right side of front bumper	181.1 in	168.0 in	13.1 in
X20	Rear surface of vehicle to left side of front bumper	181.1 in	171.7 in	9.4 in
X21	Length of engine block	19.7 in	19.7 in	0.0 in

Figure 8 Vehicle Target Locations

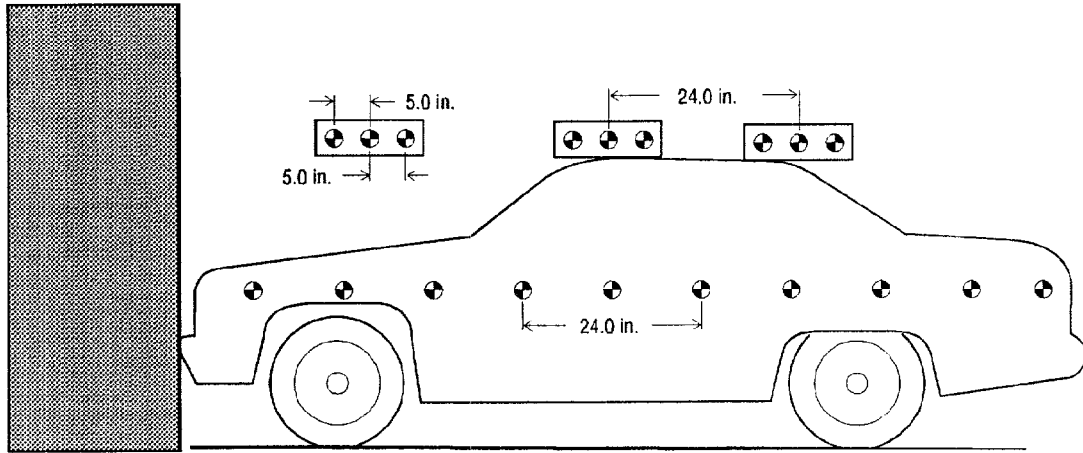


Figure 9 Dummy Measurement Locations for Front Seat Occupants

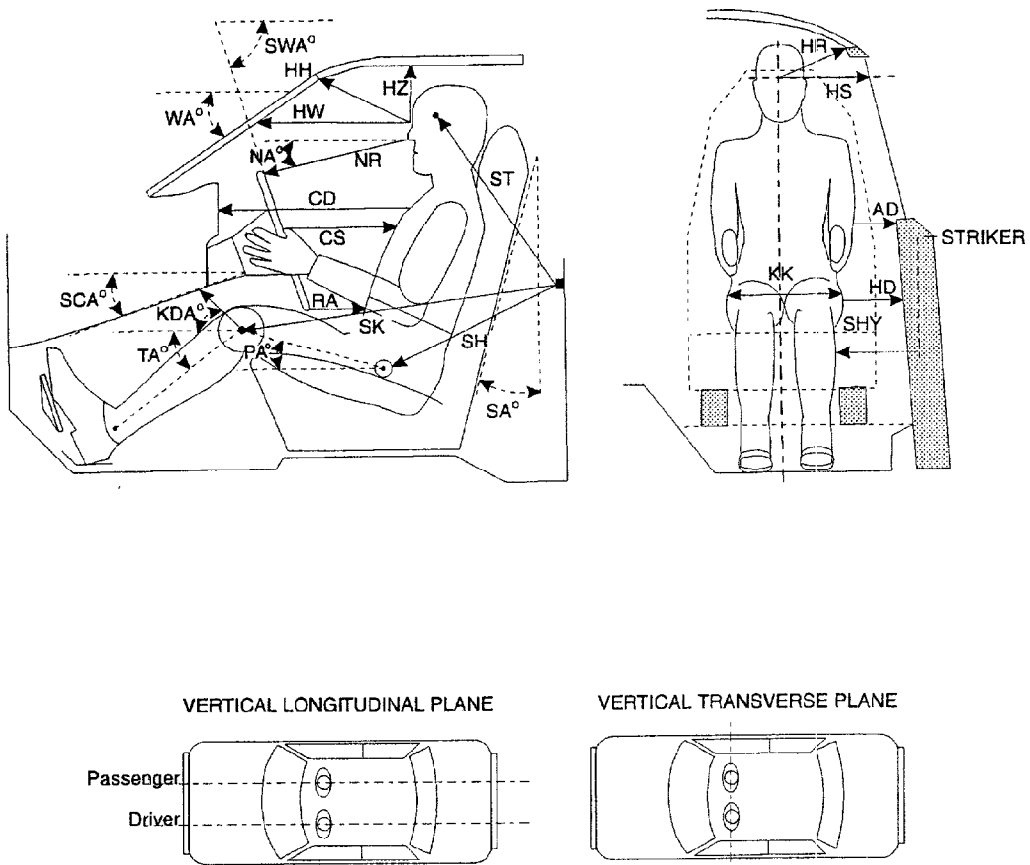


Table 13 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #230)	Passenger (Serial #314)
WA	Windshield angle	28°	28°
SWA	Steering wheel angle	62°	NA
SCA	Steering column angle	28°	NA
SA	Seat back angle	17°	17°
HZ	Head to roof	7.1 in	7.5 in
HH	Head to header	13.0 in	12.0 in
HW	Head to windshield	21.9 in	21.1 in
HR	Head to side header	8.8 in	8.1 in
NR	Nose to rim	15.1 in	NA
NA	Nose to rim angle	18°	NA
CD	Chest to dash	21.3 in	20.4 in
CS	Steering wheel to chest	11.3 in	NA
RA	Rim to abdomen	6.0 in	NA
KDL	Left knee to dash	7.2 in	6.0 in
KDR	Right knee to dash	8.0 in	6.2 in
KDA	Outboard knee to dash angle	17°	20°
PA	Pelvic angle	23°	21°
TA	Tibial angle	48°	54°
KK	Knee to knee	12.8 in	11.0 in
ST ¹	Striker to head	26.7 in	26.3 in
	Striker to head angle ¹	-79°	-77°
SK ¹	Striker to knee	25.2 in	25.9 in
	Striker to knee angle ¹	-10°	-12°
SH ¹	Striker to H-point	9.8 in	10.3 in
	Striker to H-point angle ¹	-6°	-5°
SHY	Striker to H-point (Y dir.)	8.9 in	8.9 in
HS	Head to side window	13.0 in	12.4 in
HD	H-point to door	5.6 in	5.2 in
AD	Arm to door	4.8 in	4.9 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

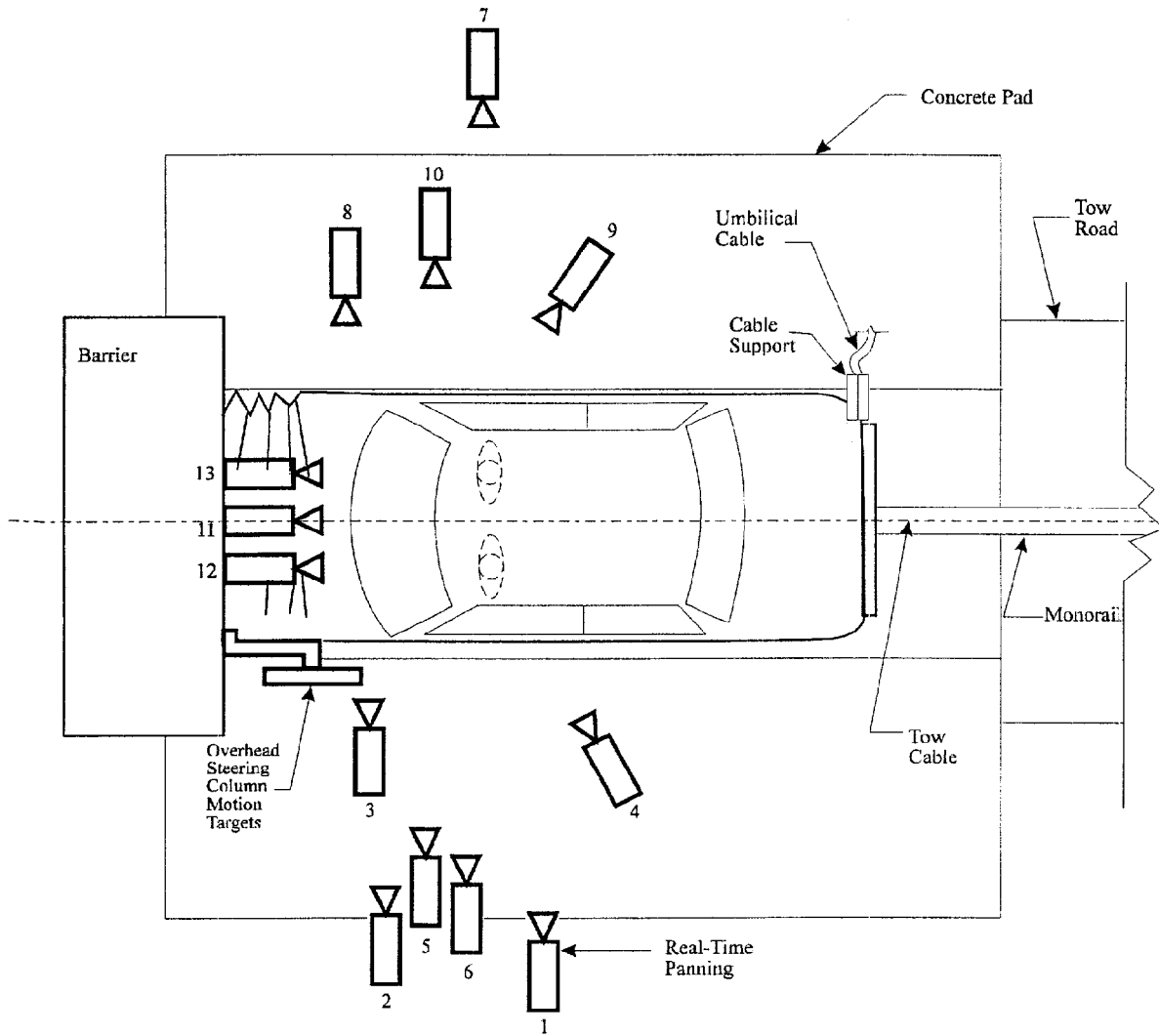


Figure 10 Camera Positions, Cont'd.

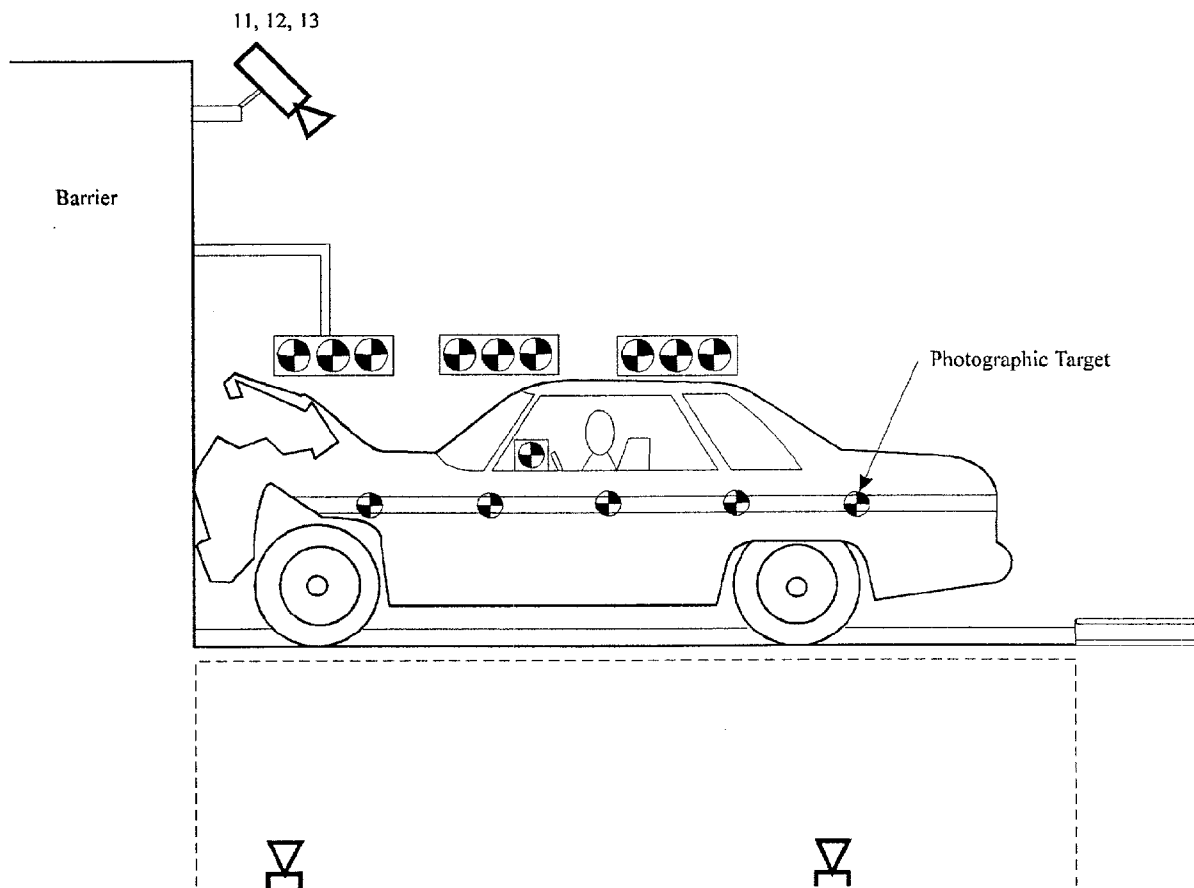


Table 14 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1998/Plymouth/Voyager/Van
 Test number: 980127

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	288.0 in	44.0 in	-4°	264.0 in	25 mm	995 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1008 frames/s
4	Driver kinematics	-157.3 in	96.0 in	87.0 in	-27°	72.0 in	25 mm	1002 frames/s
5	Steering column motion	-96.0 in	312.0 in	103.0 in	-14°	NA	25 mm	1000 frames/s
6	Steering column motion	-96.0 in	312.0 in	75.1 in	-9°	NA	25 mm	995 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	975 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	1008 frames/s
9	Passenger kinematics	-152.1 in	-96.0 in	87.0 in	-26°	72.0 in	25 mm	1000 frames/s
10	Passenger kinematics	-38.8 in	-240.0 in	45.3 in	-4°	216.0 in	25 mm	1000 frames/s
11	Windshield front view	-6.0 in	0.0 in	88.0 in	-40°	NA	13 mm	1002 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	1005 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	992 frames/s
14	Pit - front position	-50.5 in	0.0 in	-92.4 in	90°	NA	13 mm	992 frames/s
15	Pit - rear position	-99.3 in	0.0 in	-99.0 in	90°	NA	13 mm	1002 frames/s
16	Real-time documentation	NA	NA	NA	NA	NA	12-120 mm	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



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

980127

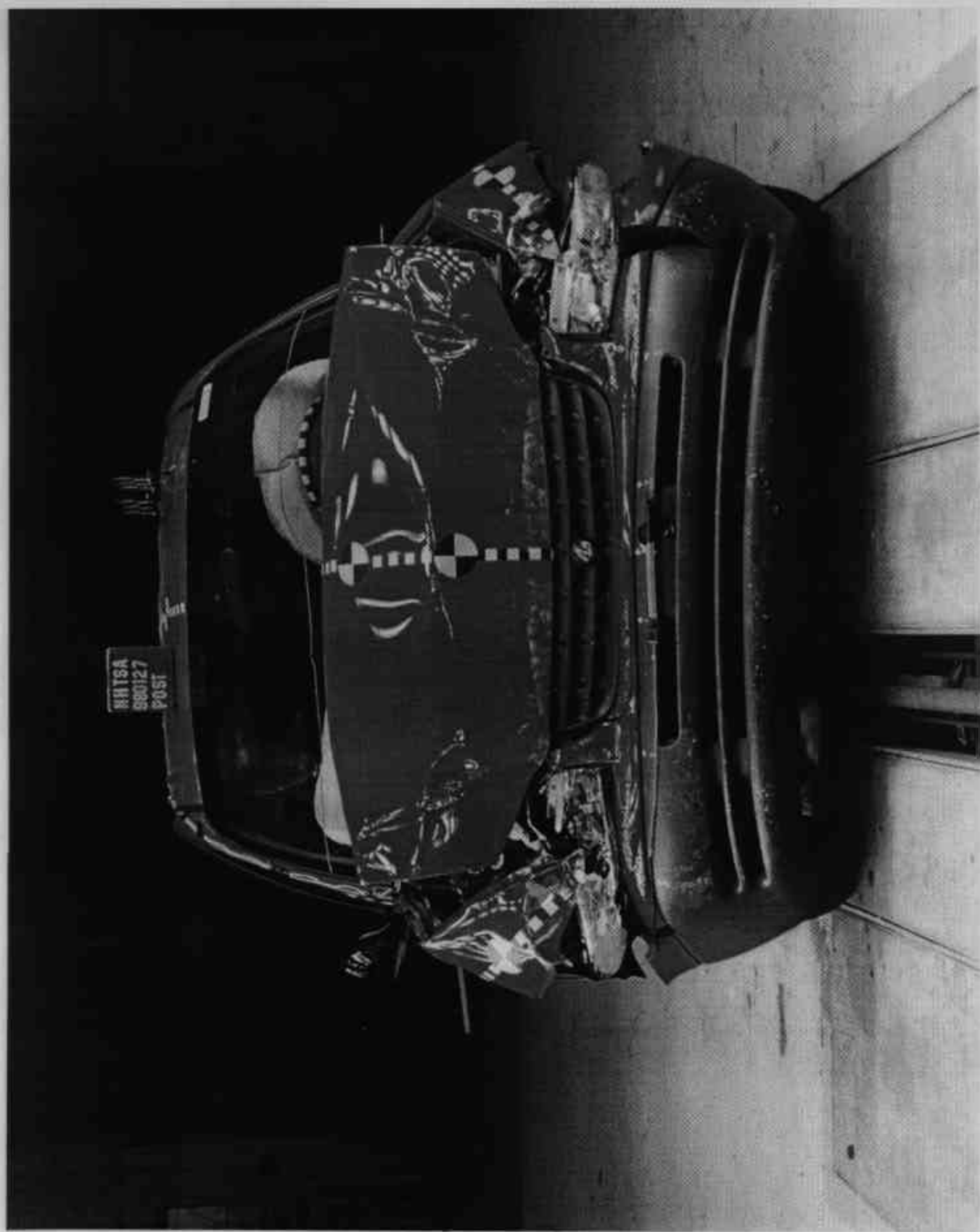


Figure A-2 Post-Test Front View
A-3

980127

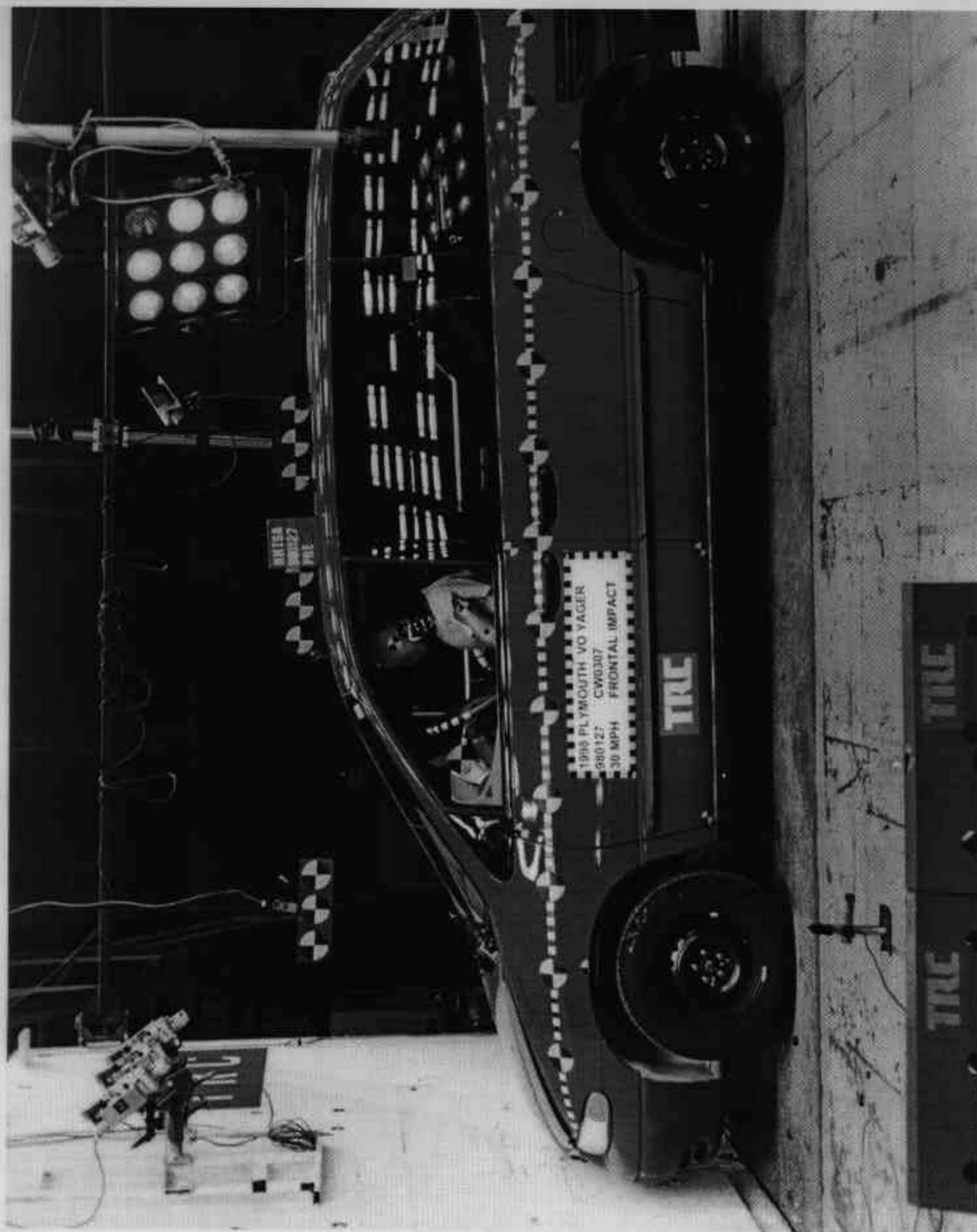


Figure A-3 Pre-Test Left Side View
A-4

980127

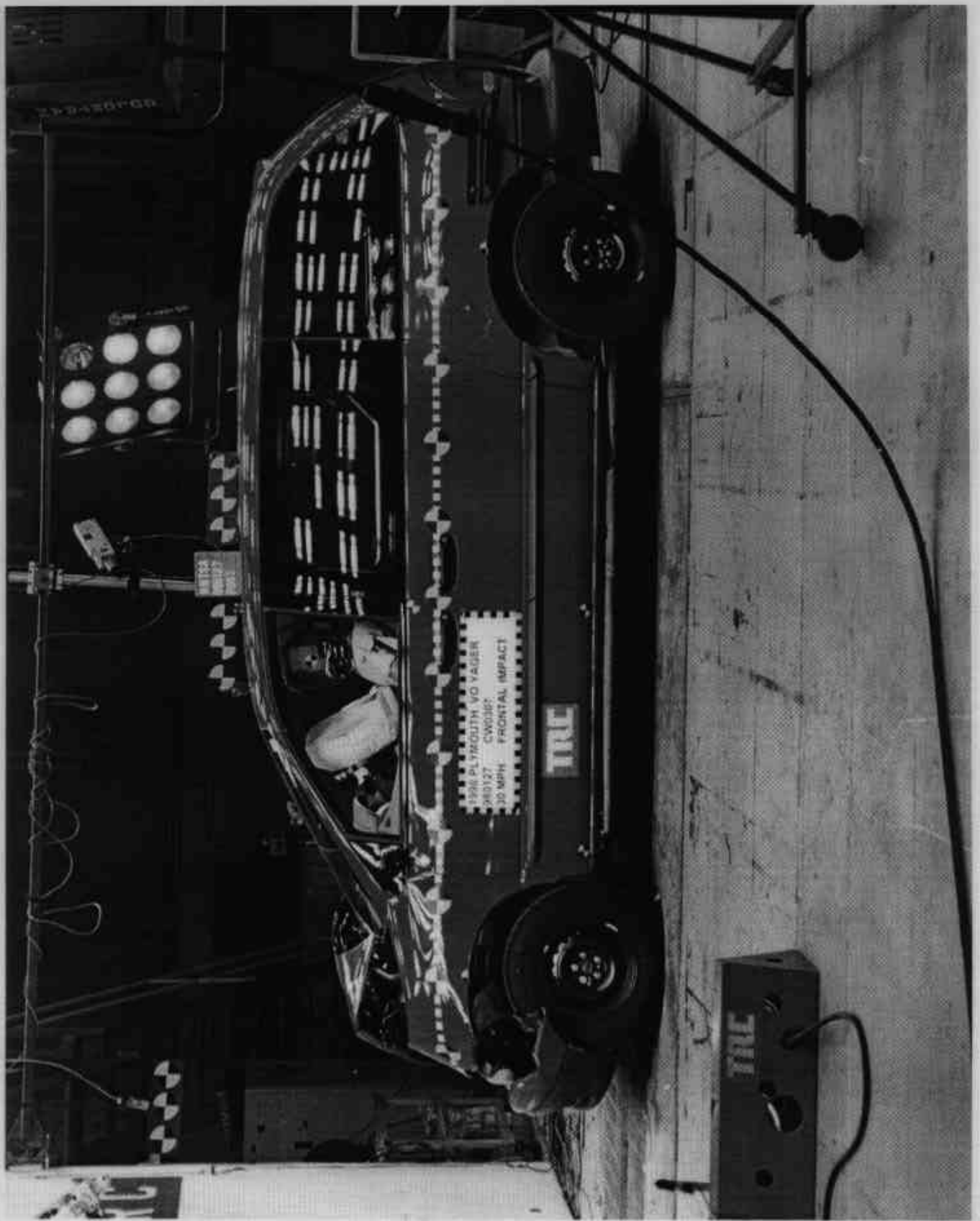


Figure A-4 Post-Test Left Side View
A-5

980127

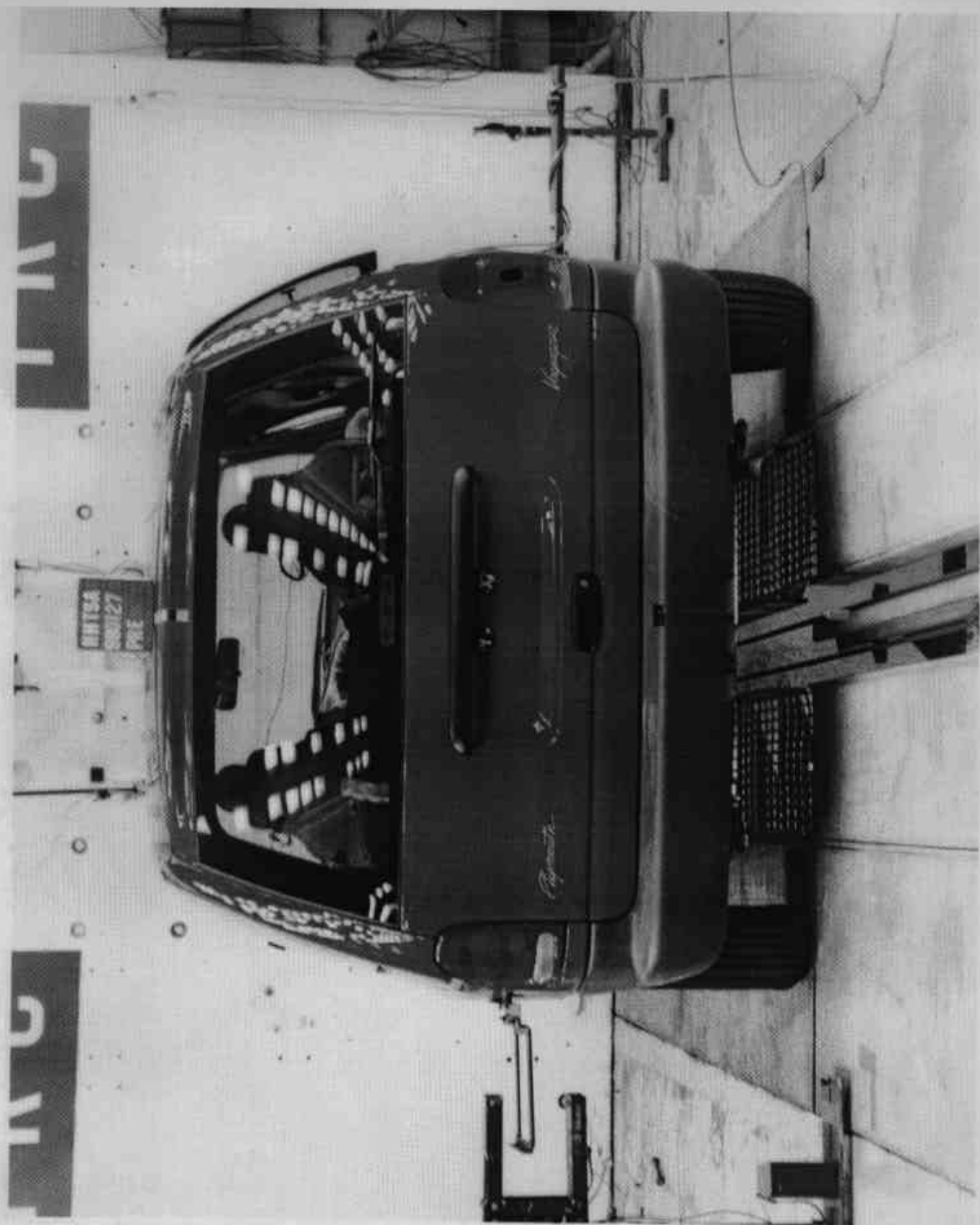


Figure A-5 Pre-Test Rear View
A-6

980127

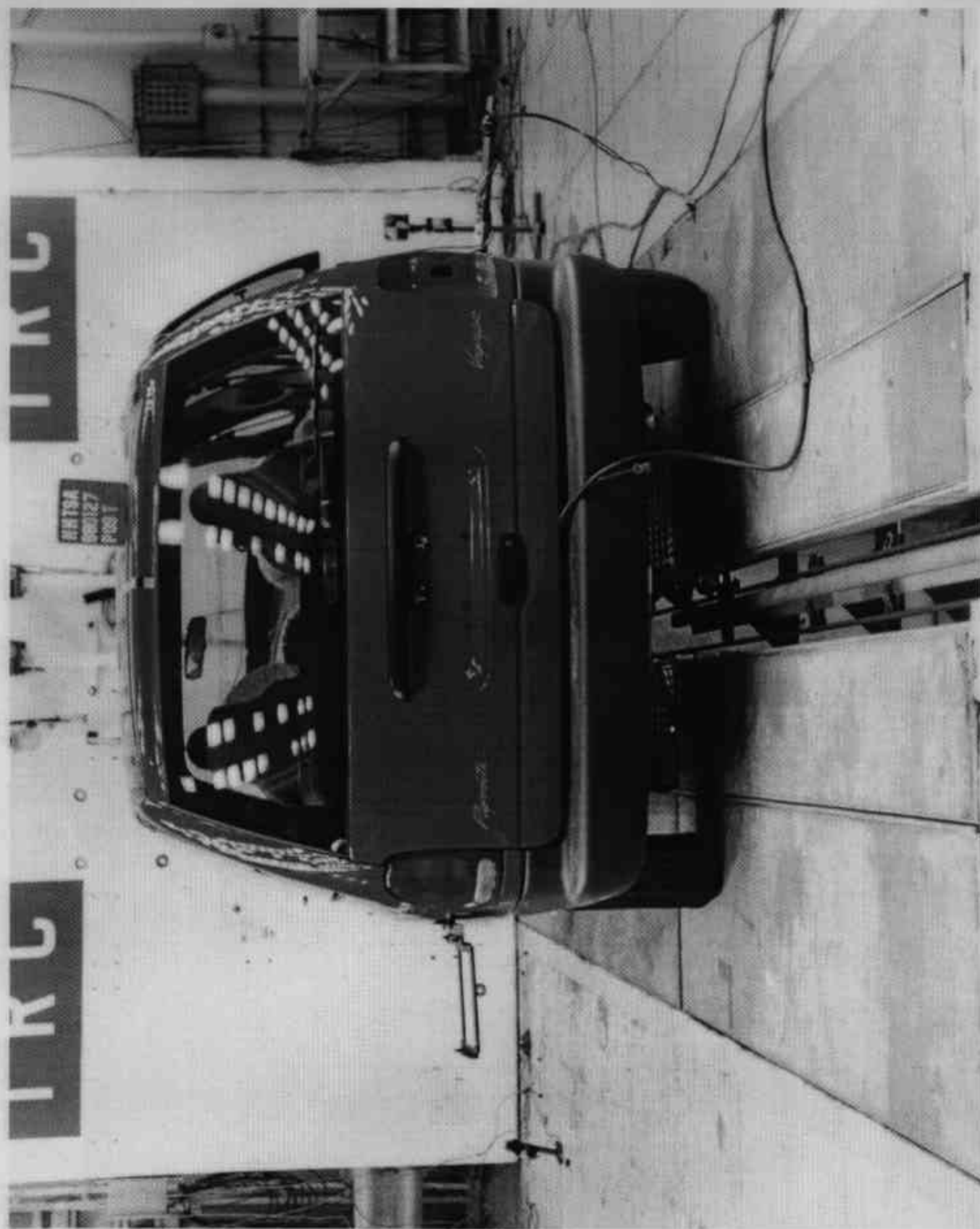


Figure A-6 Post-Test Rear View
A-7

980127

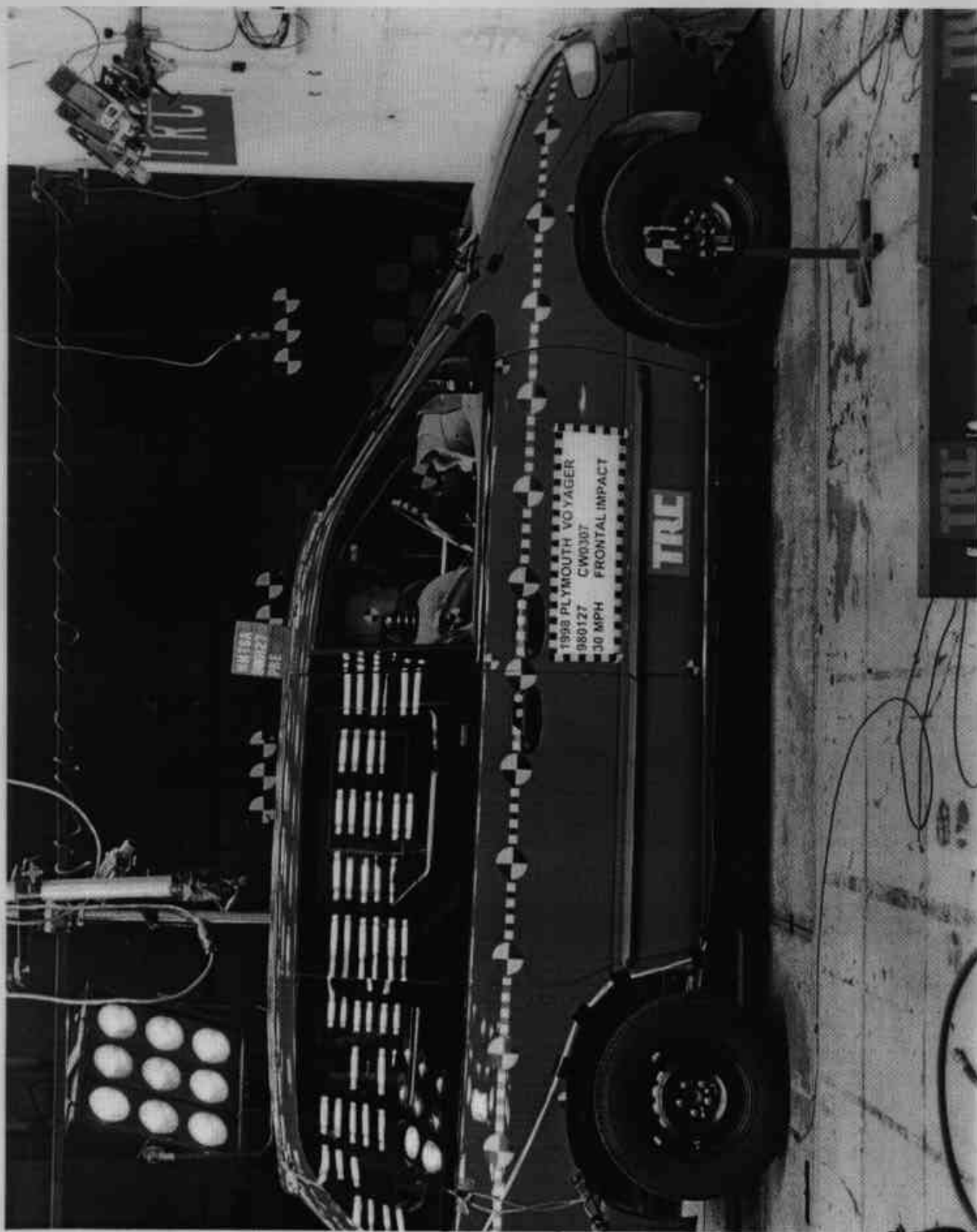


Figure A-7 Pre-Test Right Side View
A-8

980127

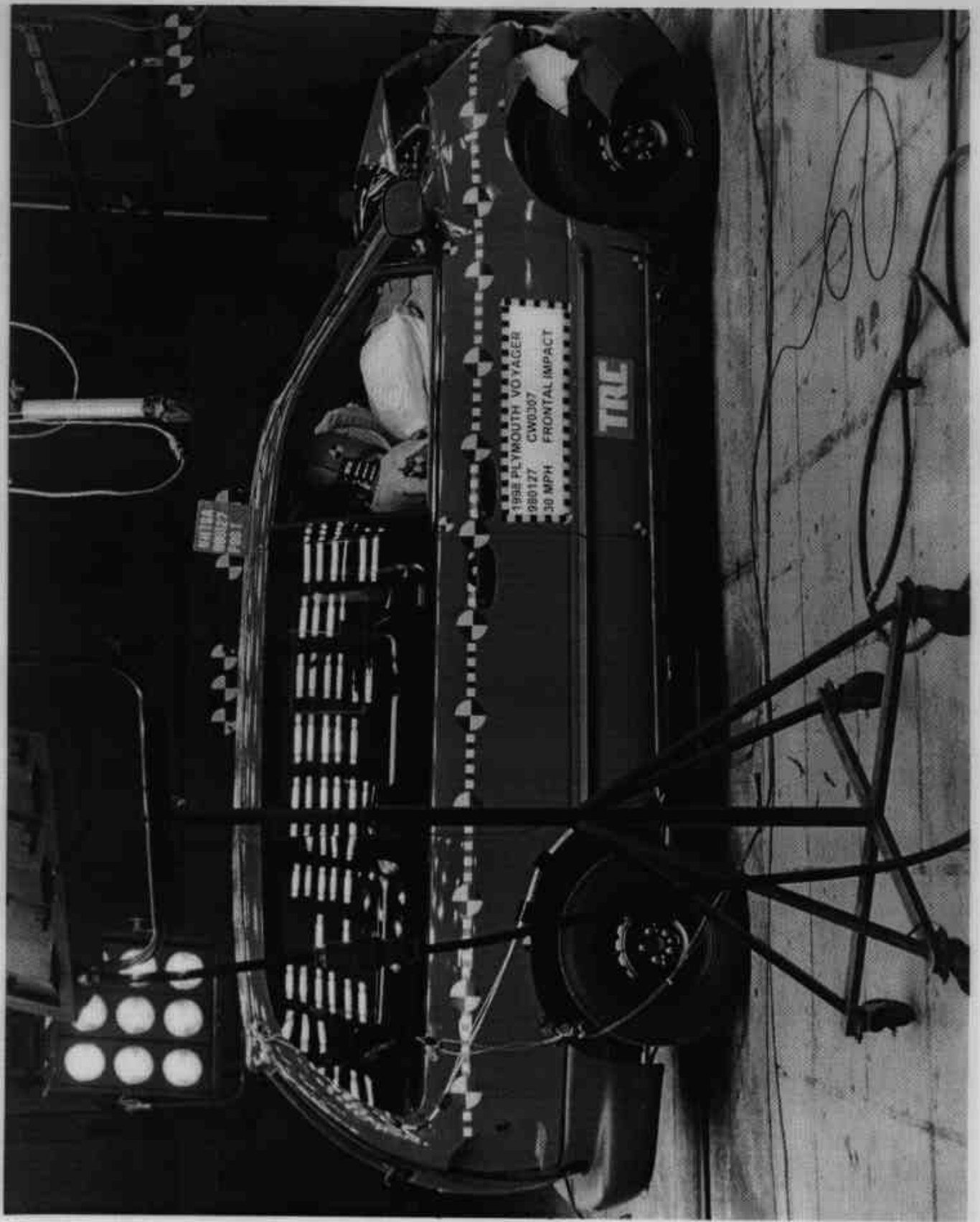


Figure A-8 Post-Test Right Side View
A-9

980127



Figure A-9 Pre-Test Right Front Three-Quarter View
A-10

980127



Figure A-11 Pre-Test Left Rear Three-Quarter View
A-12

980127

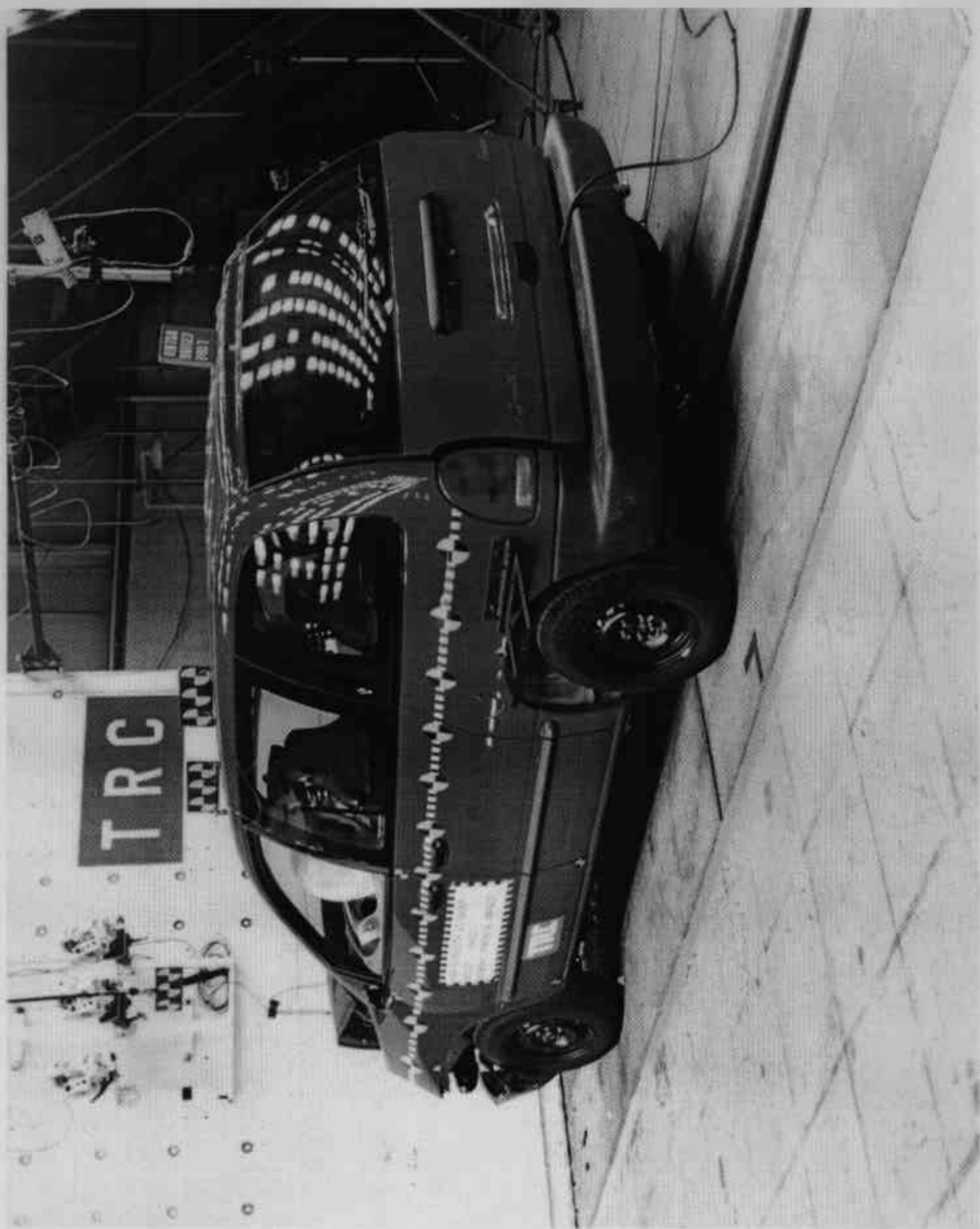


Figure A-12 Post-Test Left Rear Three-Quarter View
A-13

980127

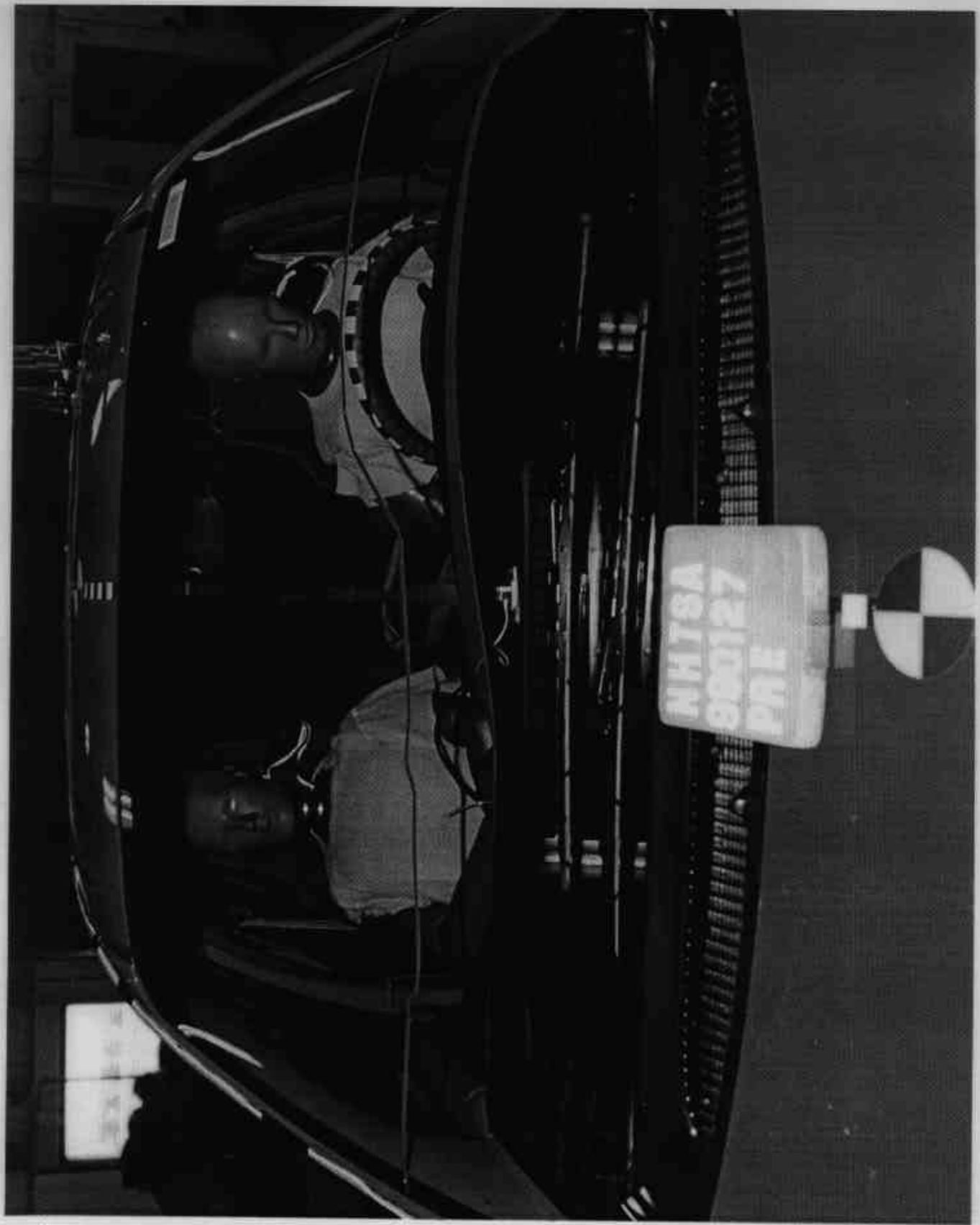


Figure A-13 Pre-Test Windshield View

A-14

980127

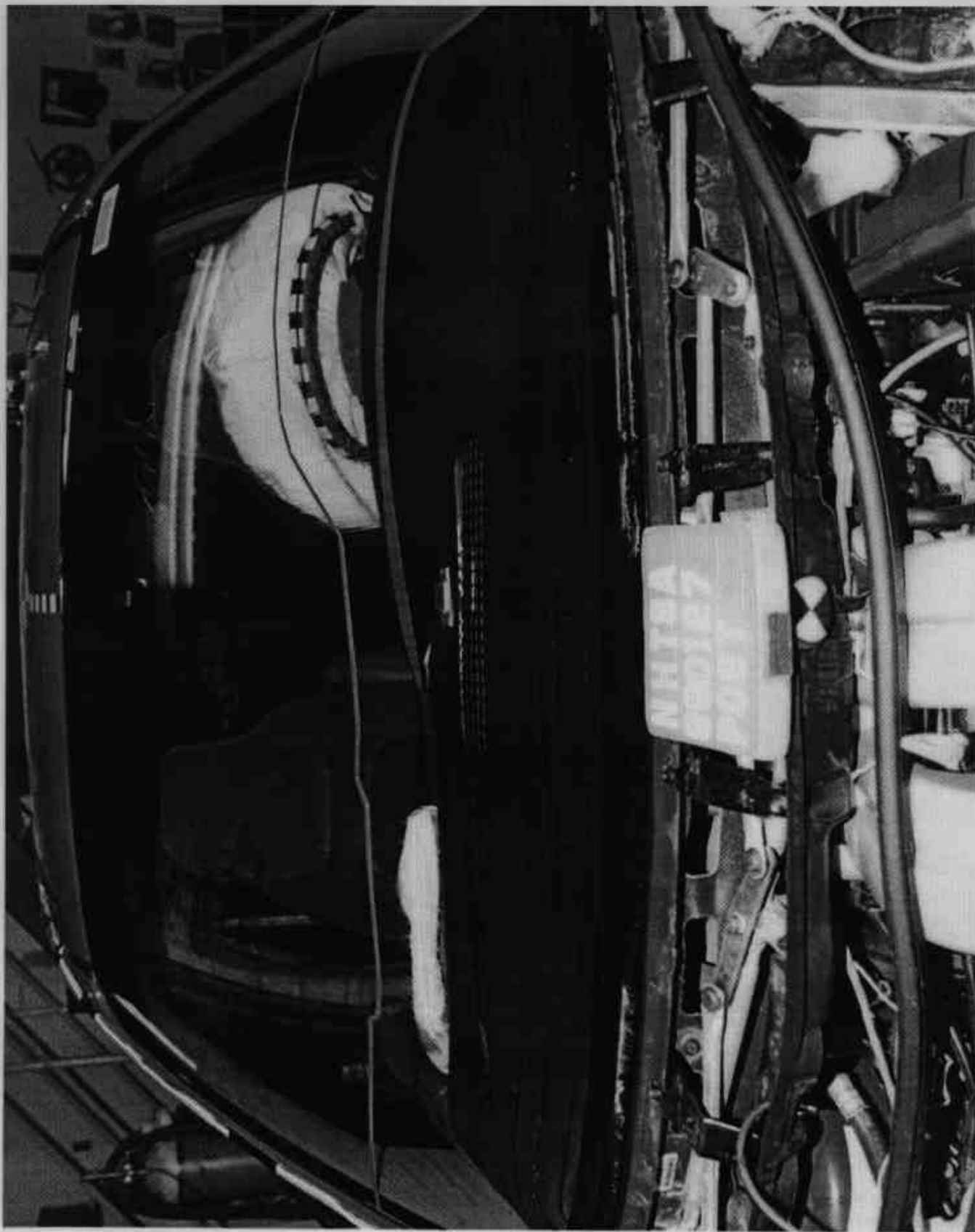


Figure A-14 Post-Test Windshield View
A-15

980127

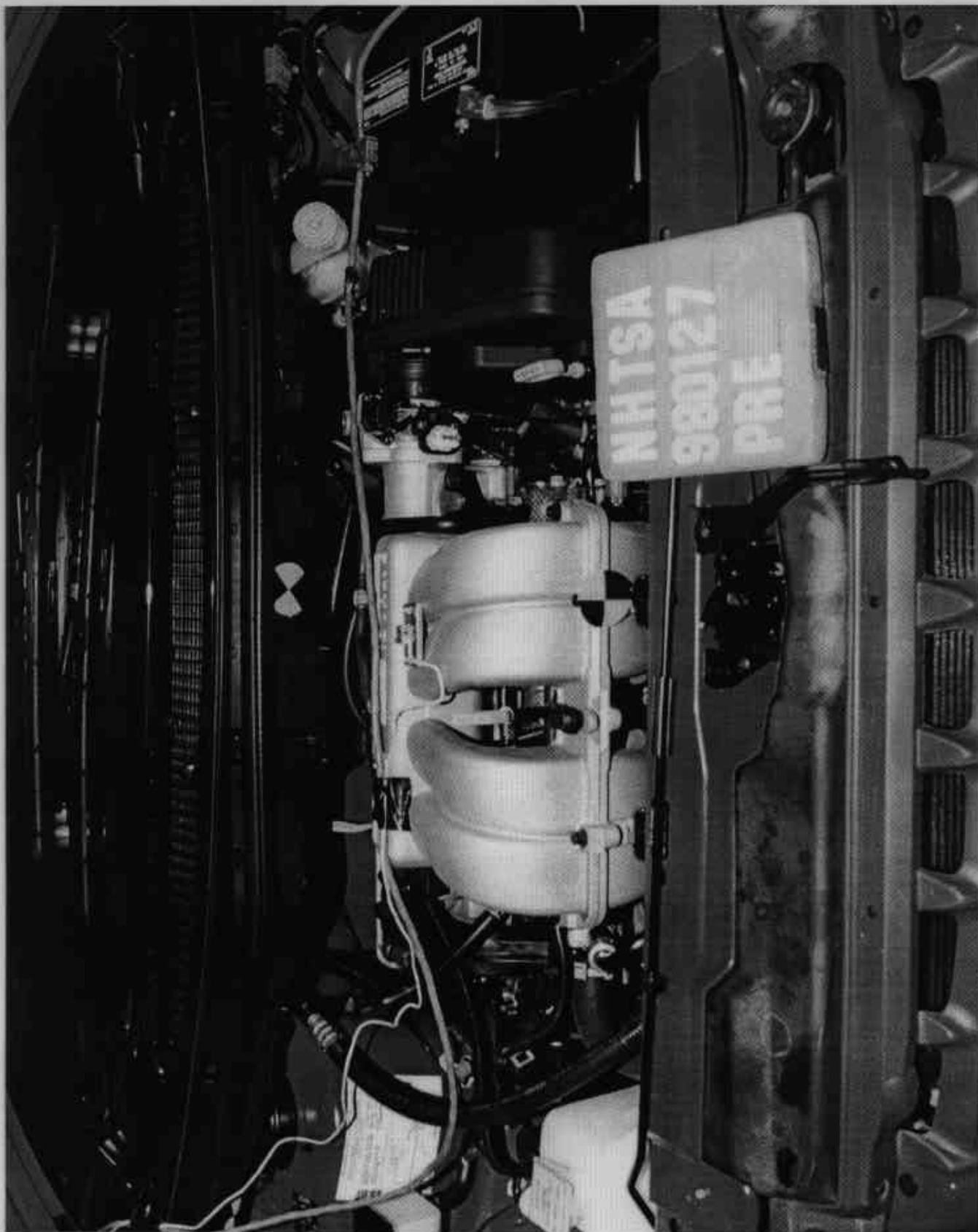


Figure A-15 Pre-Test Engine Compartment View
A-16

980127

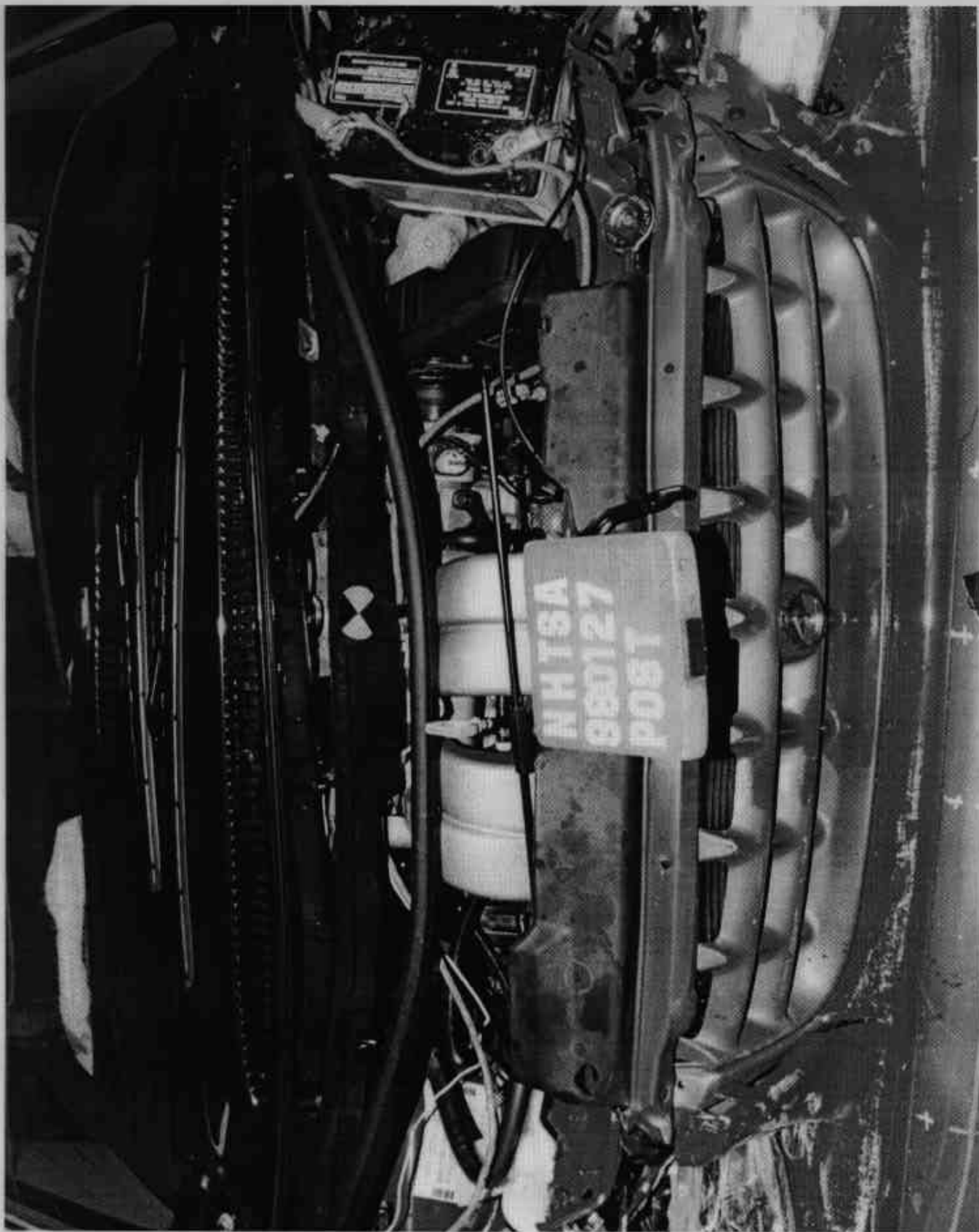


Figure A-16 Post-Test Engine Compartment View
A-17

980127



Figure A-17 Pre-Test Fuel Filler Cap View
A-18

980127



Figure A-18 Post-Test Fuel Filler Cap View
A-19

980127

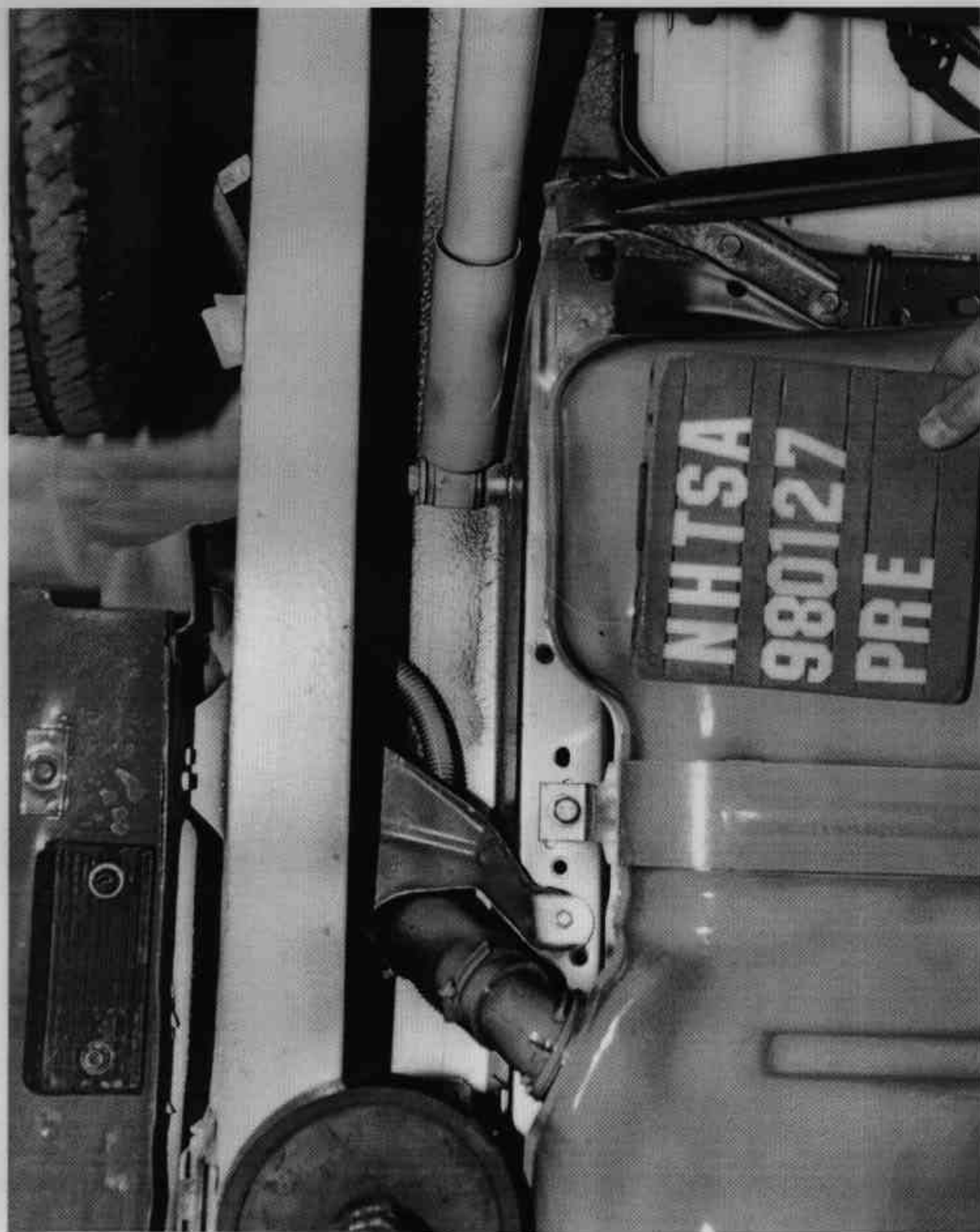


Figure A-19 Pre-Test Fuel Filler Neck View
A-20

980127



Figure A-20 Post-Test Fuel Filler Neck View
A-21

980127

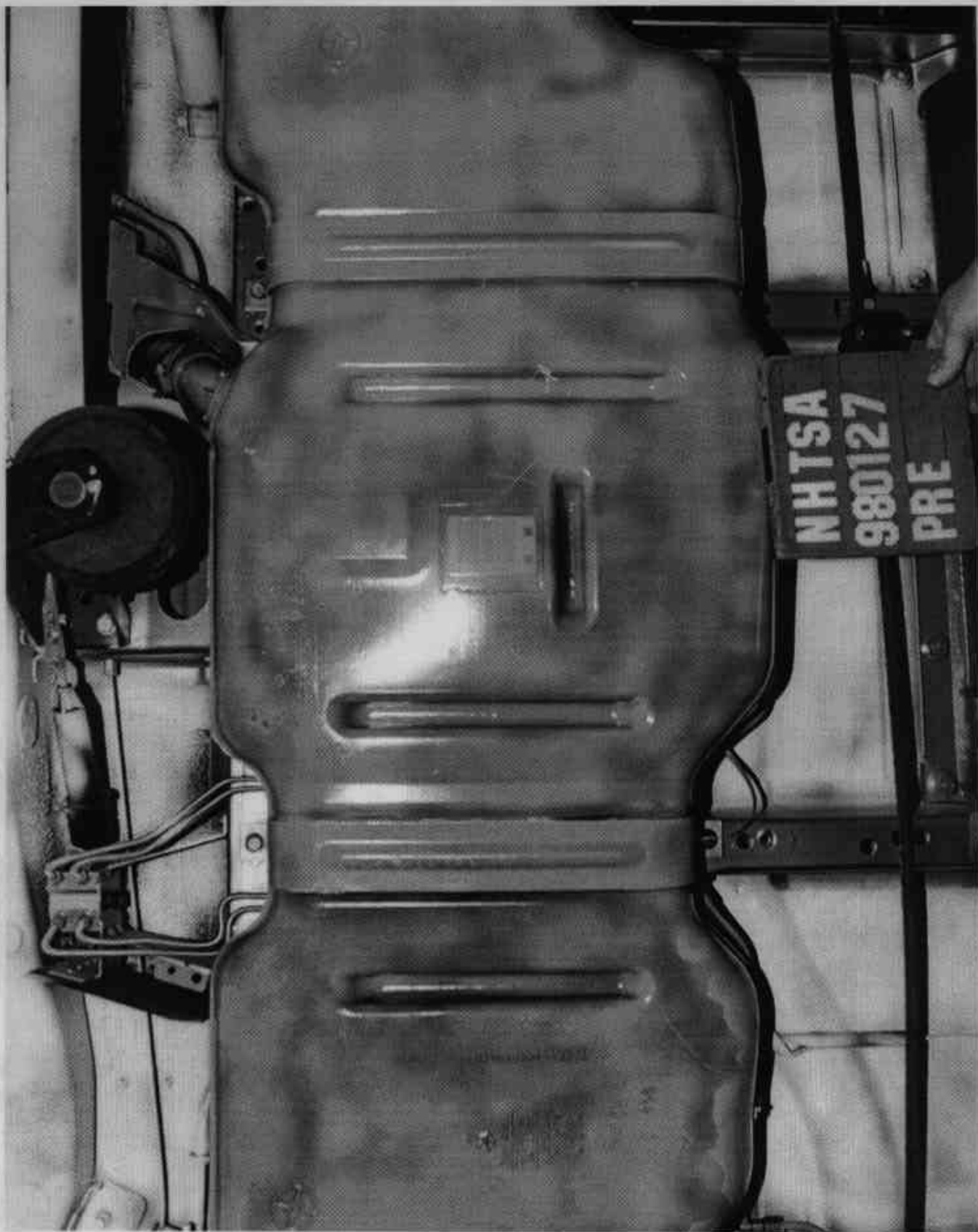


Figure A-21 Pre-Test Fuel Tank View
A-22

980127

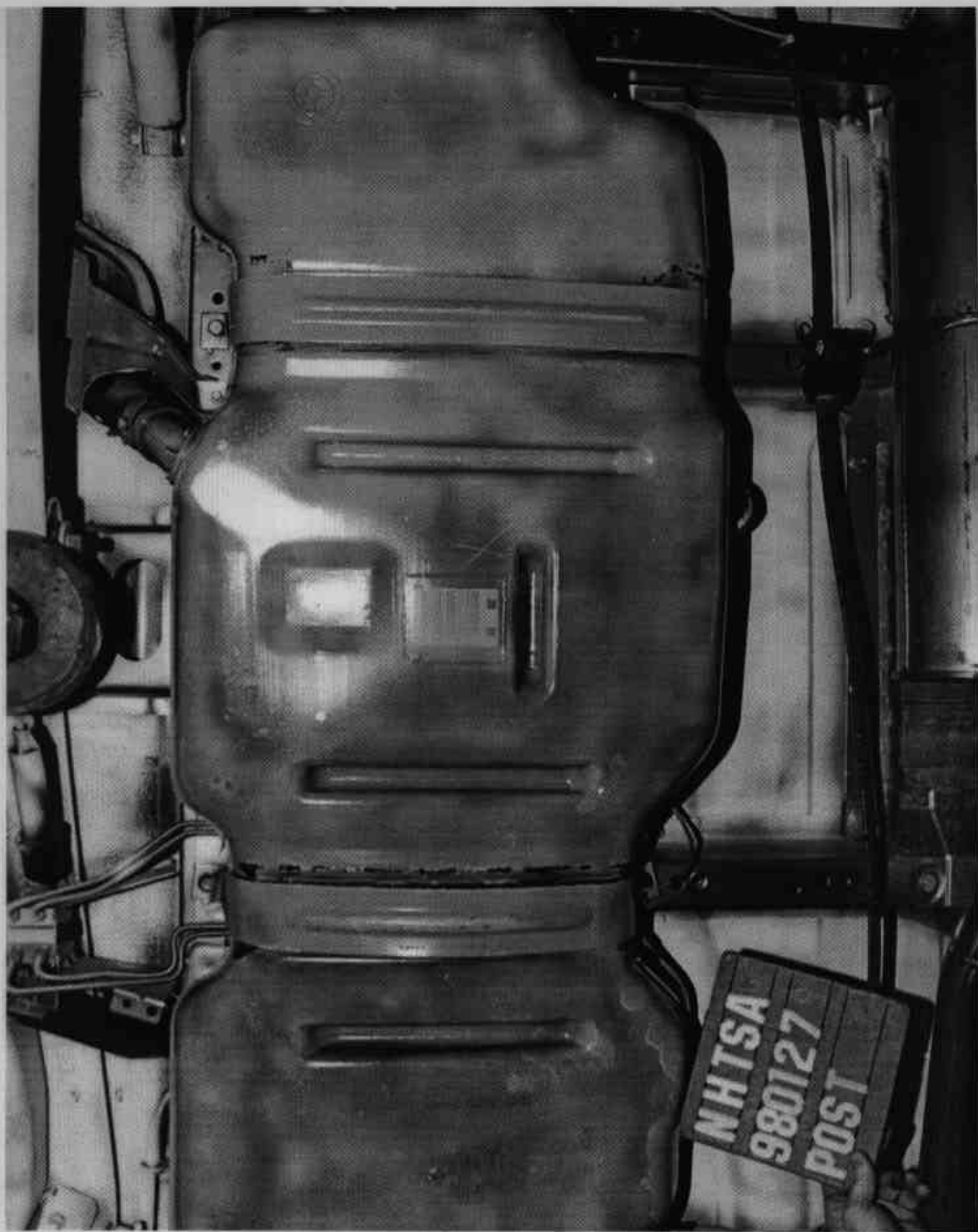


Figure A-22 Post-Test Fuel Tank View
A-23

980127

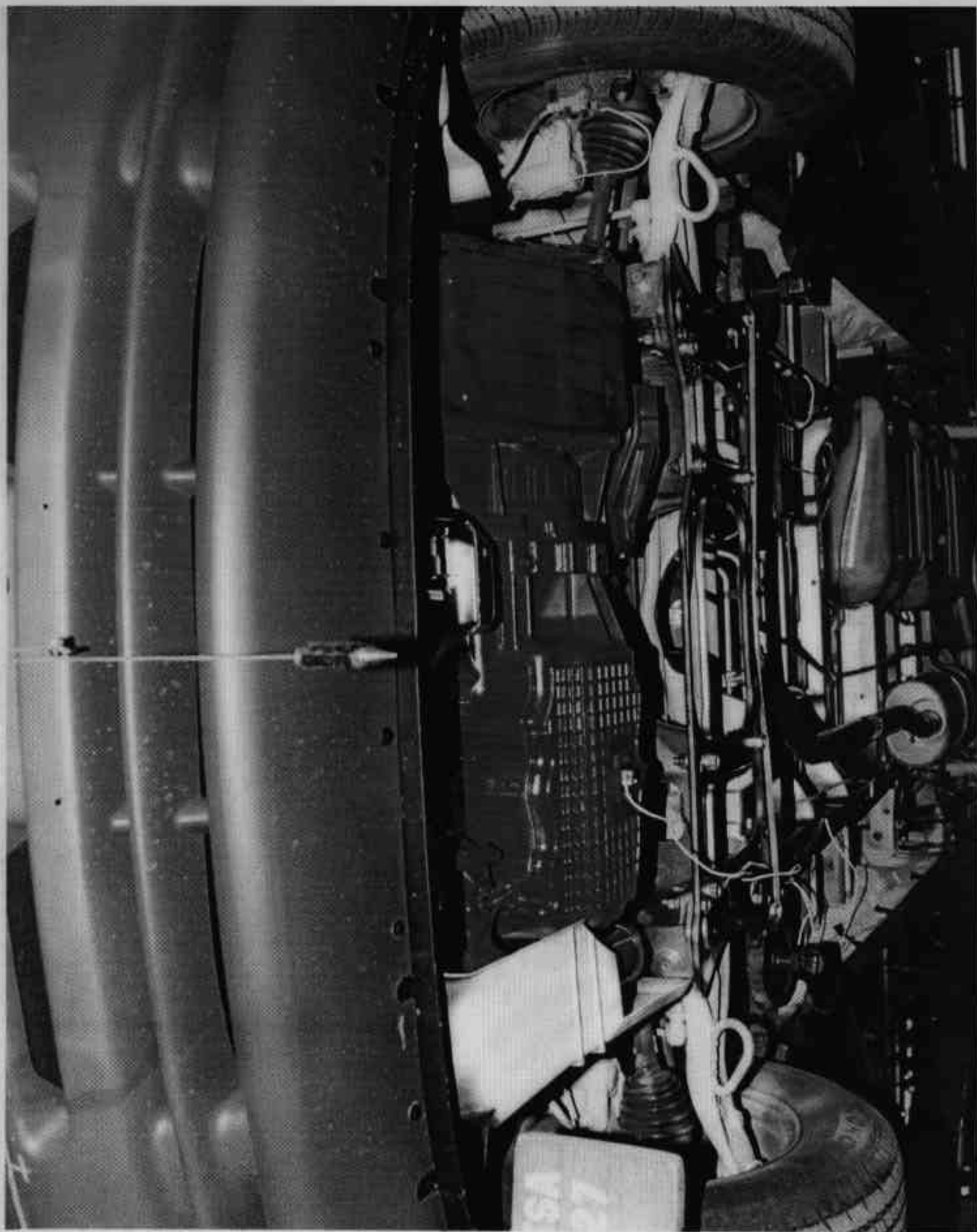


Figure A-23 Pre-Test Front Underbody View
A-24

980127

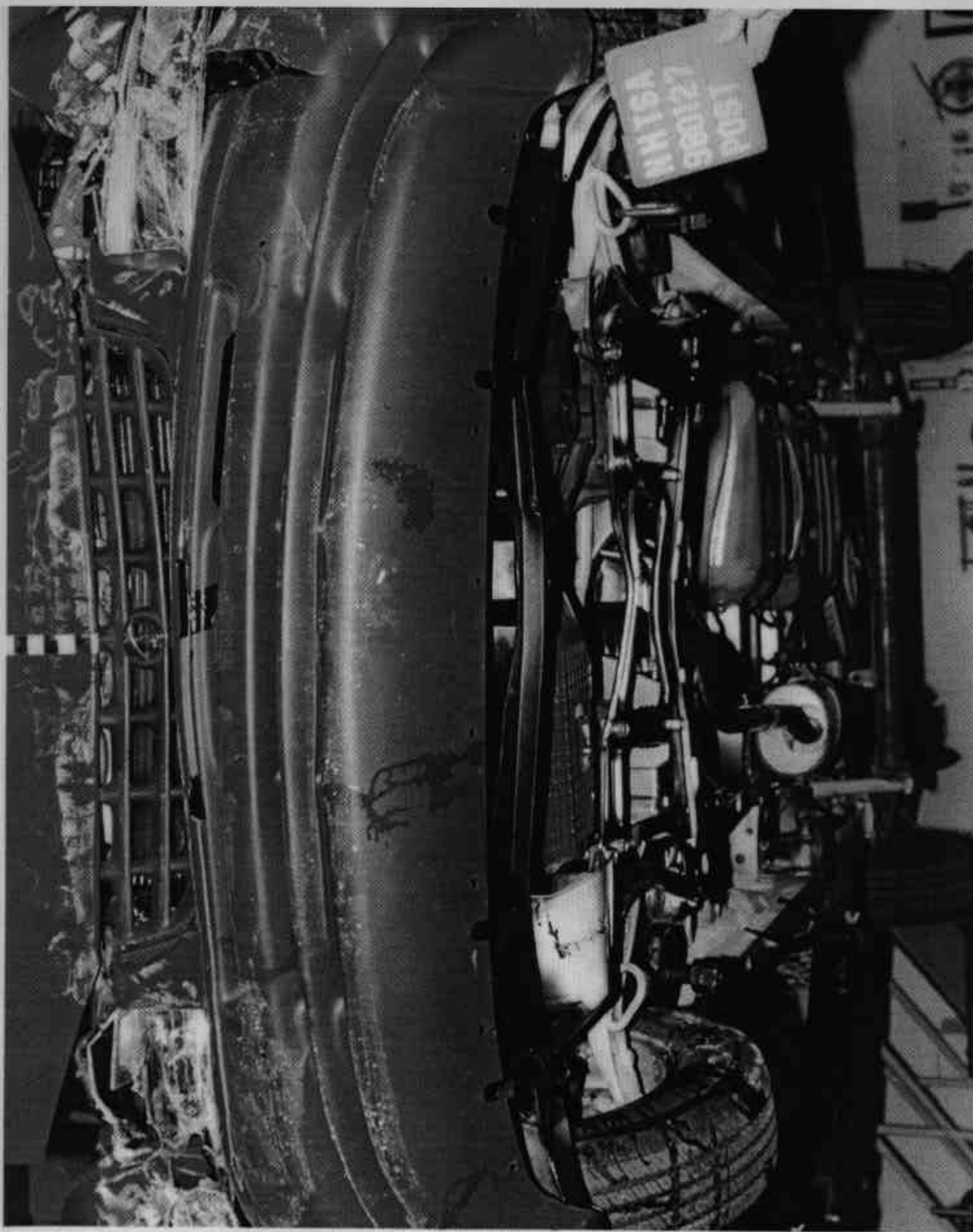


Figure A-24 Post-Test Front Underbody View
A-25

980127

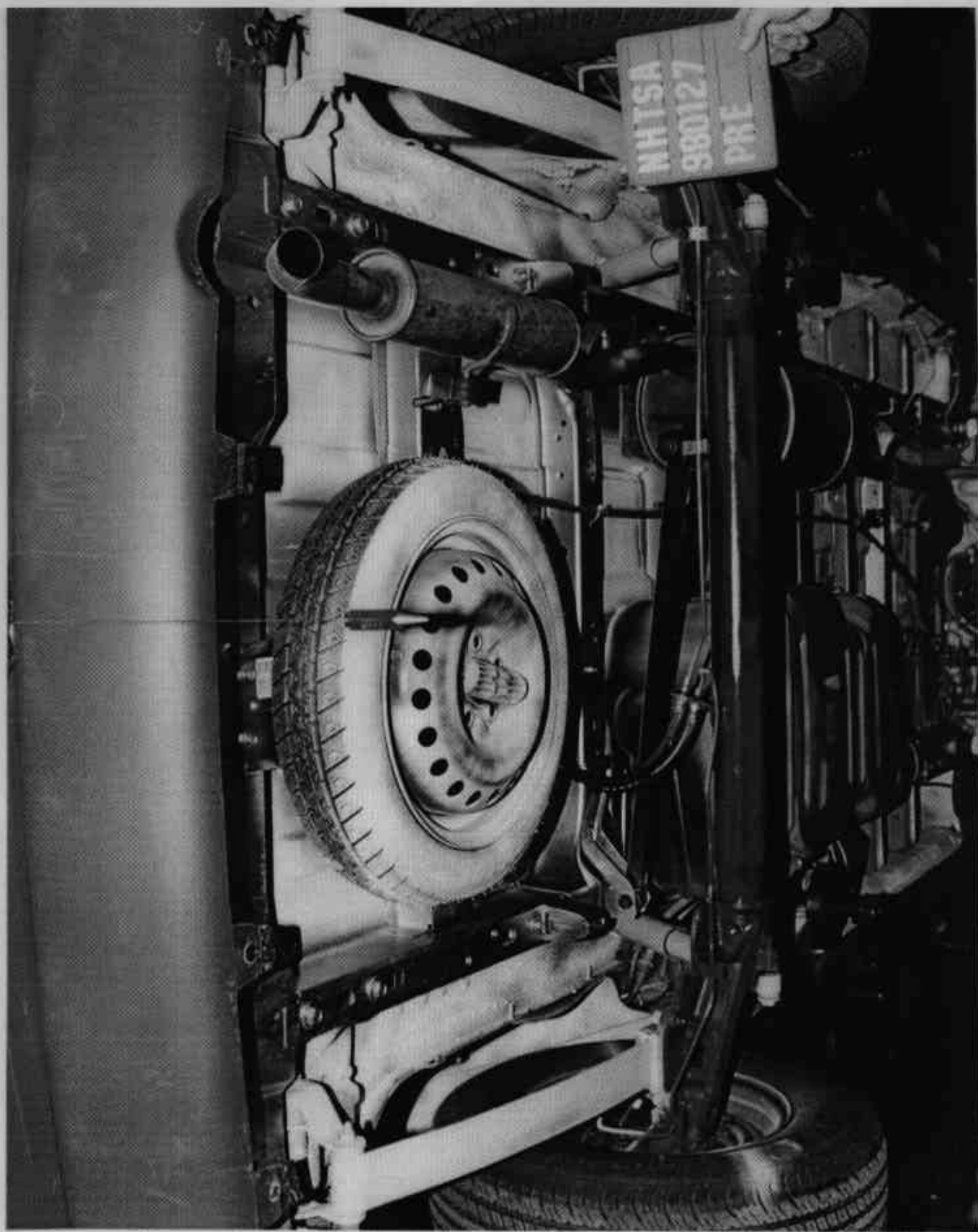


Figure A-25 Pre-Test Rear Underbody View
A-26

980127

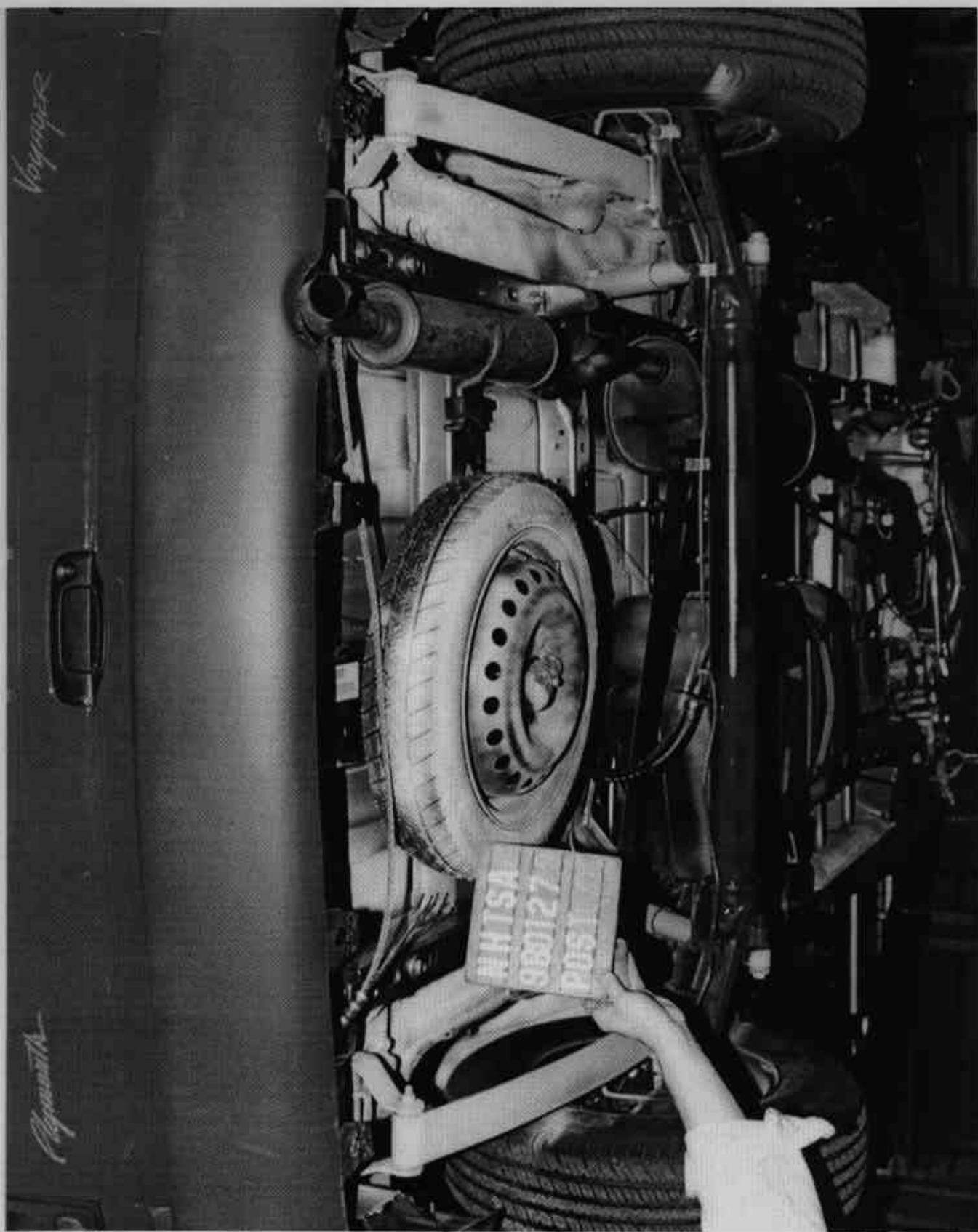


Figure A-26 Post-Test Rear Underbody View
A-27

980127

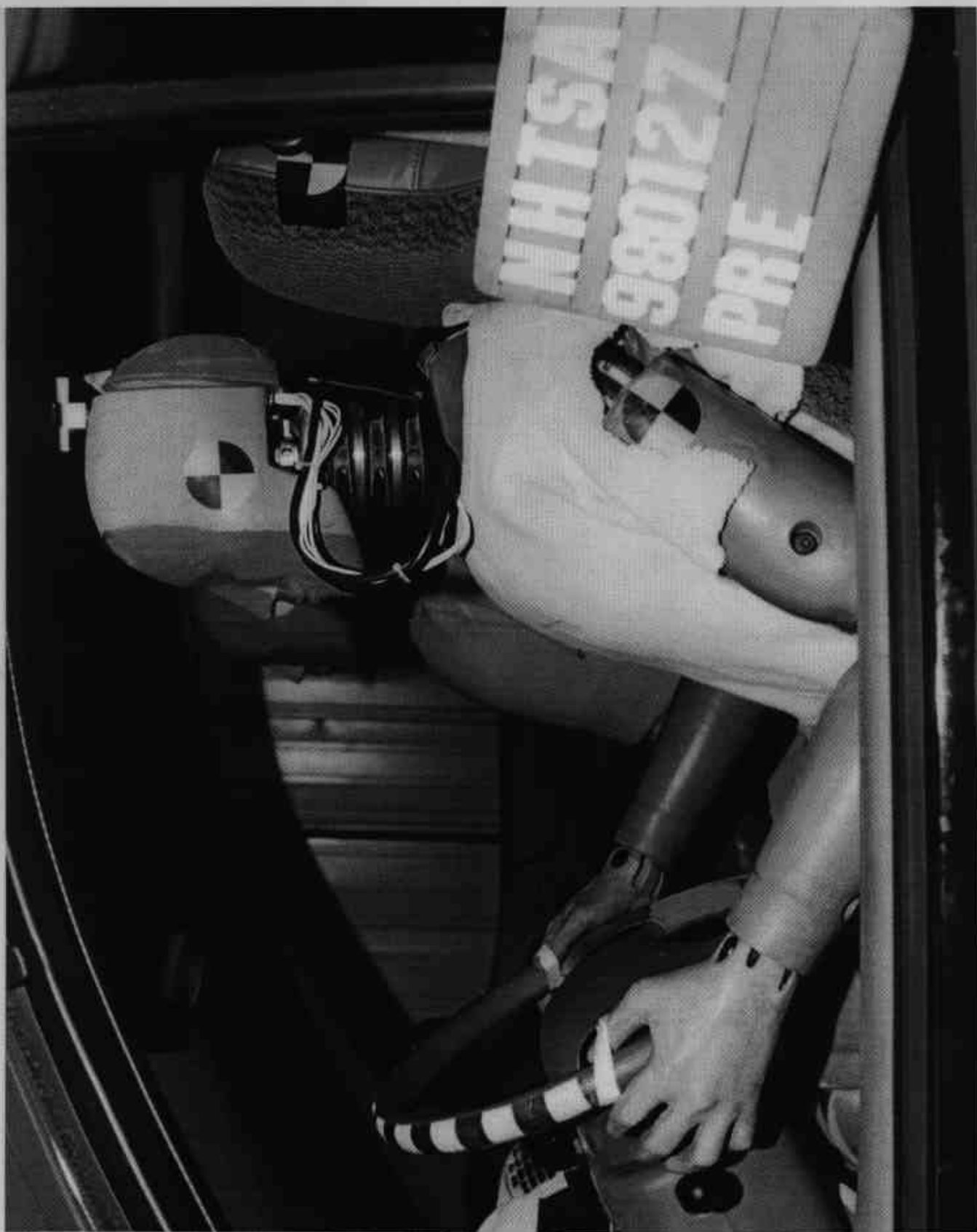


Figure A-27 Pre-Test Driver Dummy Position View
A-28

980127



Figure A-28 Post-Test Driver Dummy Position View

A-29

980127



Figure A-29 Pre-Test Passenger Dummy Position View
A-30

980127



Figure A-30 Post-Test Passenger Dummy Position View
A-31

980127



Figure A-31 Pre-Test Driver Dummy and Vehicle Interior - View 1

A-32

980127



Figure A-32 Post-Test Driver Dummy and Vehicle Interior - View 1

A-33

980127



Figure A-33 Pre-Test Driver Dummy and Vehicle Interior - View 2

A-34

980127



Figure A-34 Post-Test Driver Dummy and Vehicle Interior - View 2

A-35

980127



Figure A-35 Pre-Test Passenger Dummy and Vehicle Interior - View 1

A-36

980127



Figure A-36 Post-Test Passenger Dummy and Vehicle Interior - View 1
A-37 980127



Figure A-37 Pre-Test Passenger Dummy and Vehicle Interior - View 2

A-38

980127



Figure A-38 Post-Test Passenger Dummy and Vehicle Interior - View 2

A-39

980127



Figure A-39 Post-Test Driver Dummy View
A-40

980127

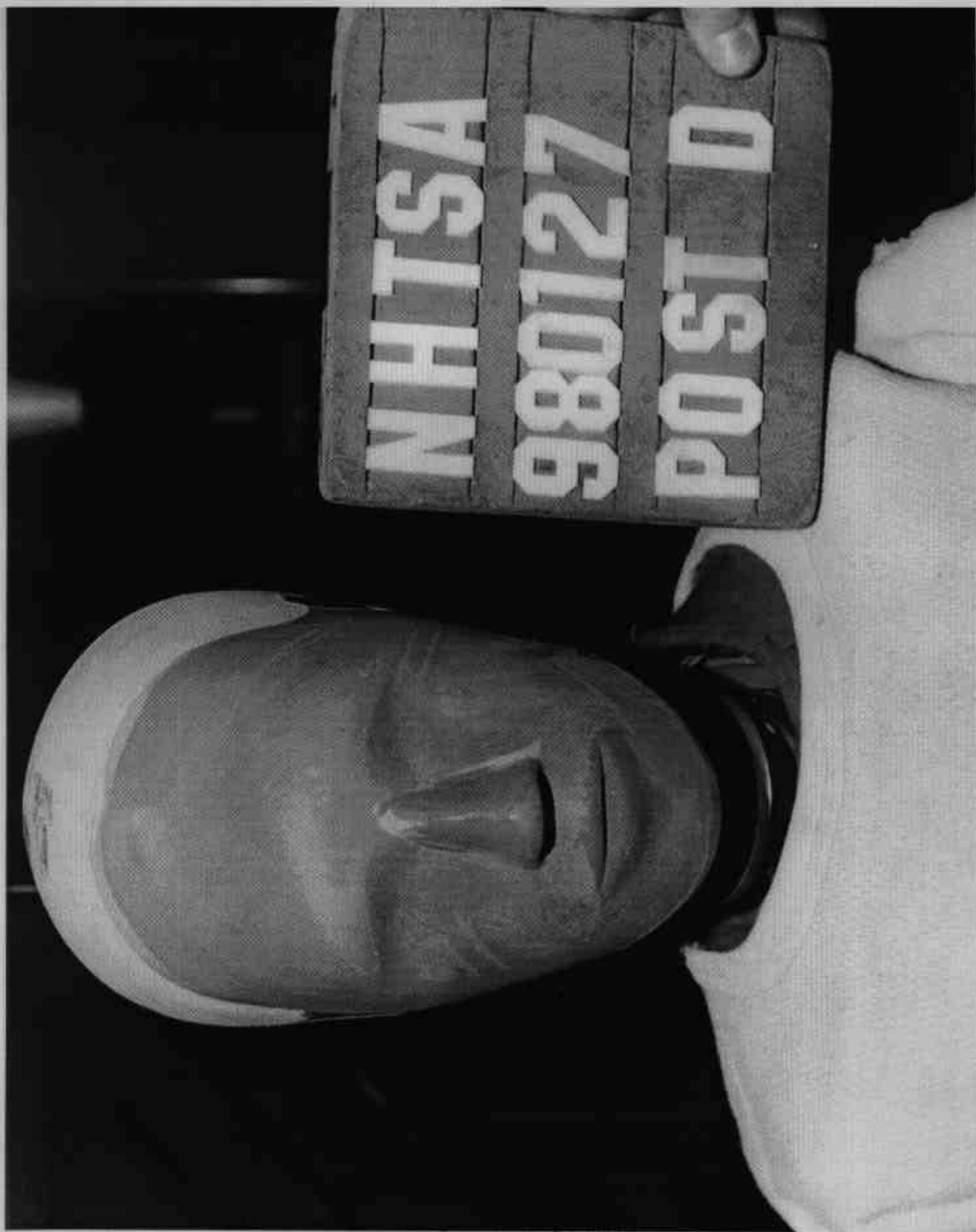


Figure A-40 Post-Test Driver Dummy Head Contact - View 1

A-41

980127



Figure A-41 Post-Test Driver Dummy Head Contact - View 2

A-42

980127



Figure A-42 Post-Test Driver Dummy Head Contact - View 3

A-43

980127



Figure A-43 Post-Test Driver Dummy Knee Contact - View 1

A-44

980127



Figure A-44 Post-Test Driver Dummy Knee Contact - View 2
A-45

980127



Figure A-45 Post-Test Passenger Dummy View
A-46

980127



Figure A-46 Post-Test Passenger Dummy Head Contact - View 1

A-47

980127

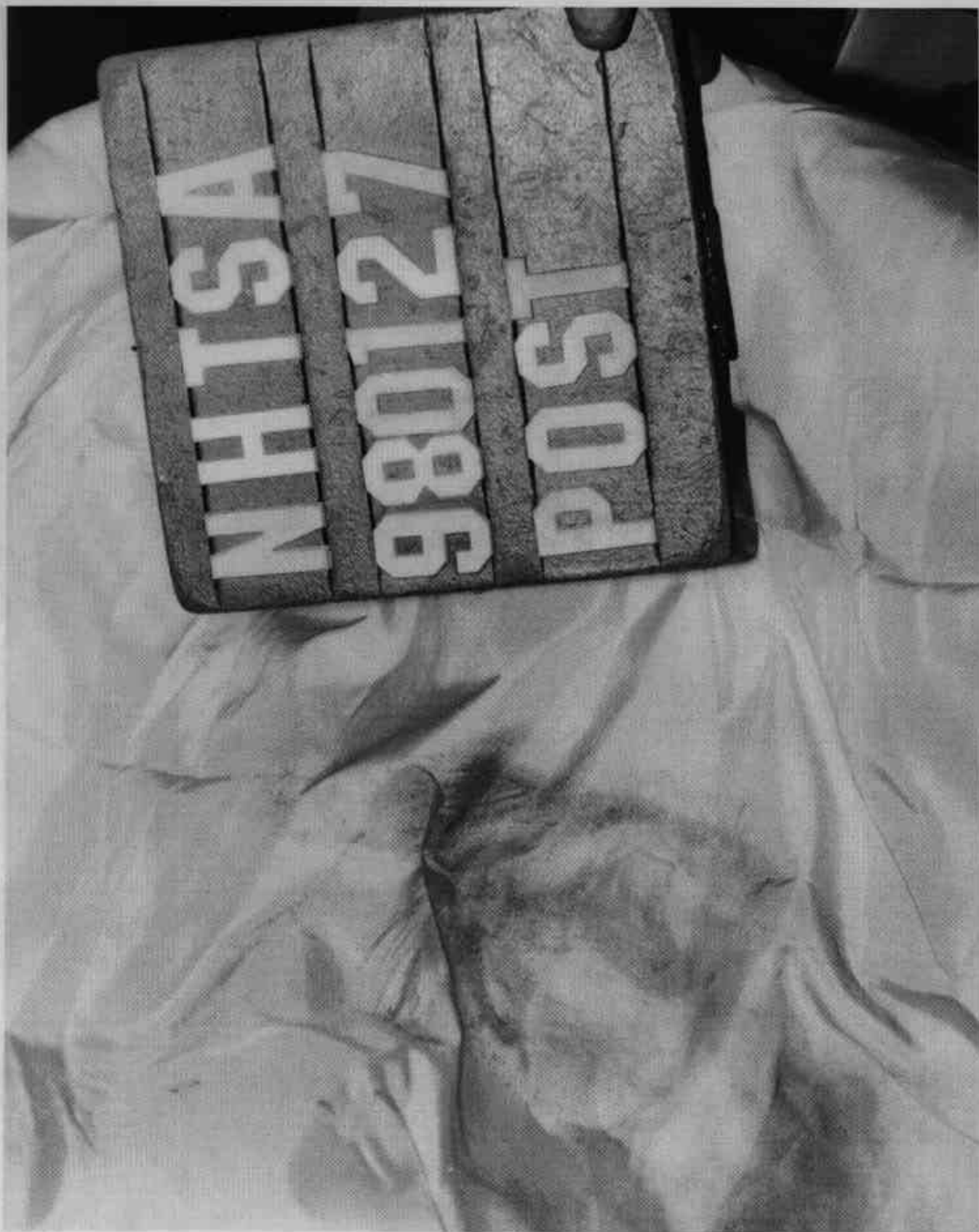


Figure A-47 Post-Test Passenger Dummy Head Contact - View 2

A-48

980127



Figure A-48 Post-Test Passenger Dummy Knee Contact - View 1

A-49

980127



Figure A-49 Post-Test Passenger Dummy Knee Contact - View 2

A-50

980127



Figure A-50 Pre-Test Steering Column - Interior View
A-51

980127



Figure A-51 Post-Test Steering Column - Interior View

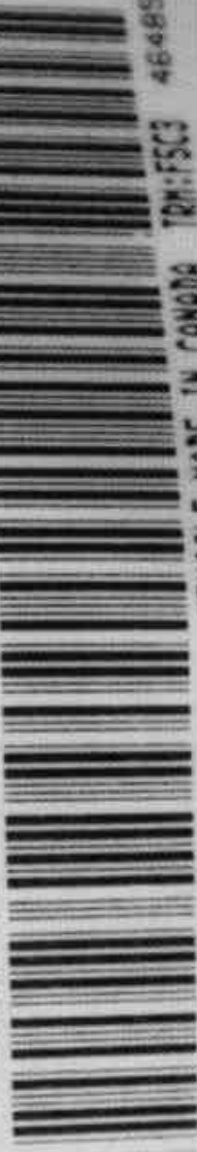
A-52

980127

MFD BY	CHRYSLER	DATE OF MFR	GUWR
	CORPORATION	8-97	2268 KG(05000 LB)
GAWR FRONT	WITH TIRES	RIMS AT	COLD
1203 KG(2650 LB)	P205/75R14	14X6.0	241 KPA(35 PSI)
GAWR REAR	WITH TIRES	RIMS AT	COLD
1180 KG(2600 LB)	P205/75R14	14X6.0	241 KPA(35 PSI)

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

VIN: 2P4FP25B8UR537589 TYPE: MPV SINGLE X DUAL
 4648505



MDH: 081913 134AA PNT:PR4 VEHICLE MADE IN CANADA TRM:FSC3

Figure A-52 Pre-Test Vehicle Certification Label View

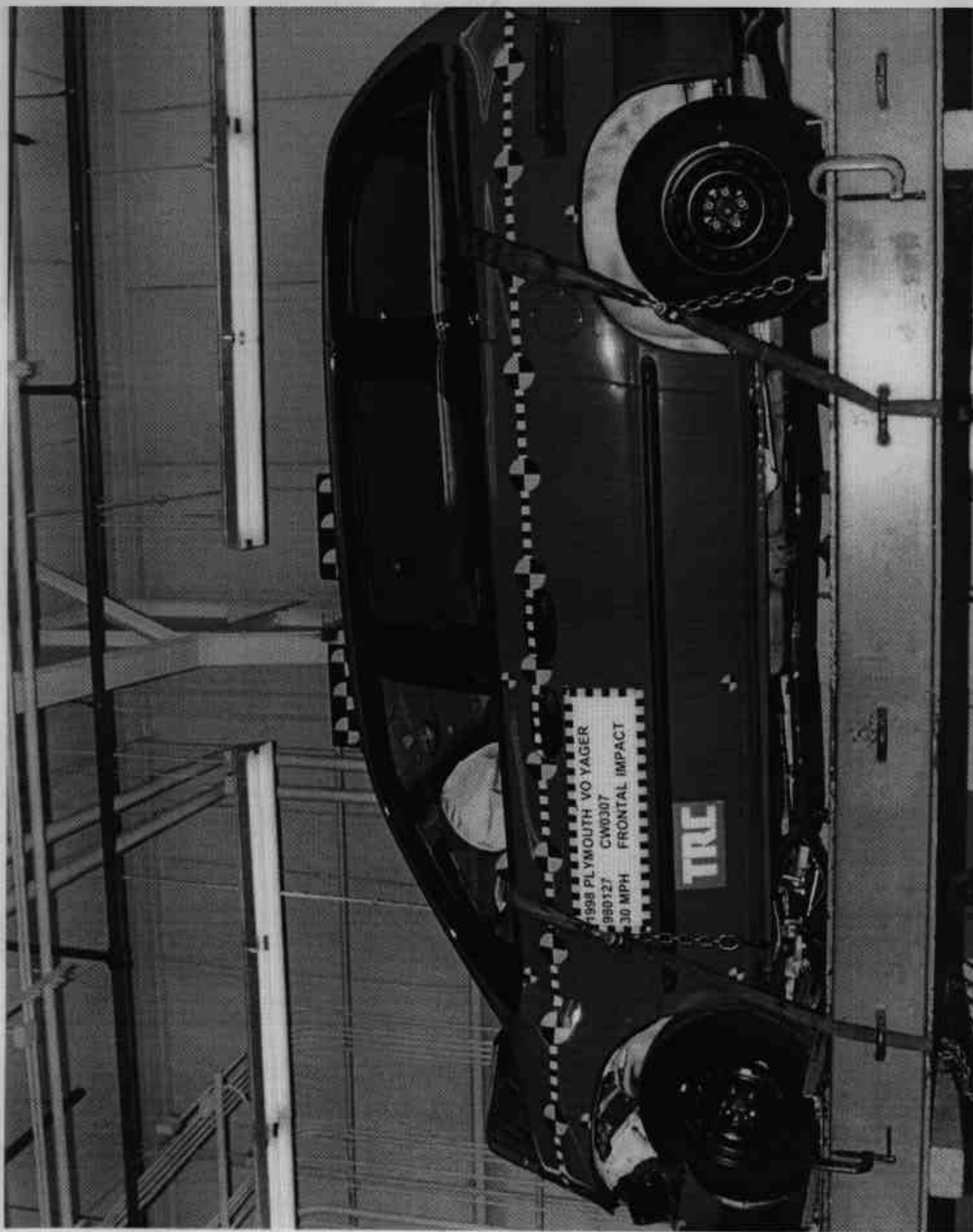


Figure A-53 Post-Test Vehicle on Static Rollover - View 1
A-54

980127

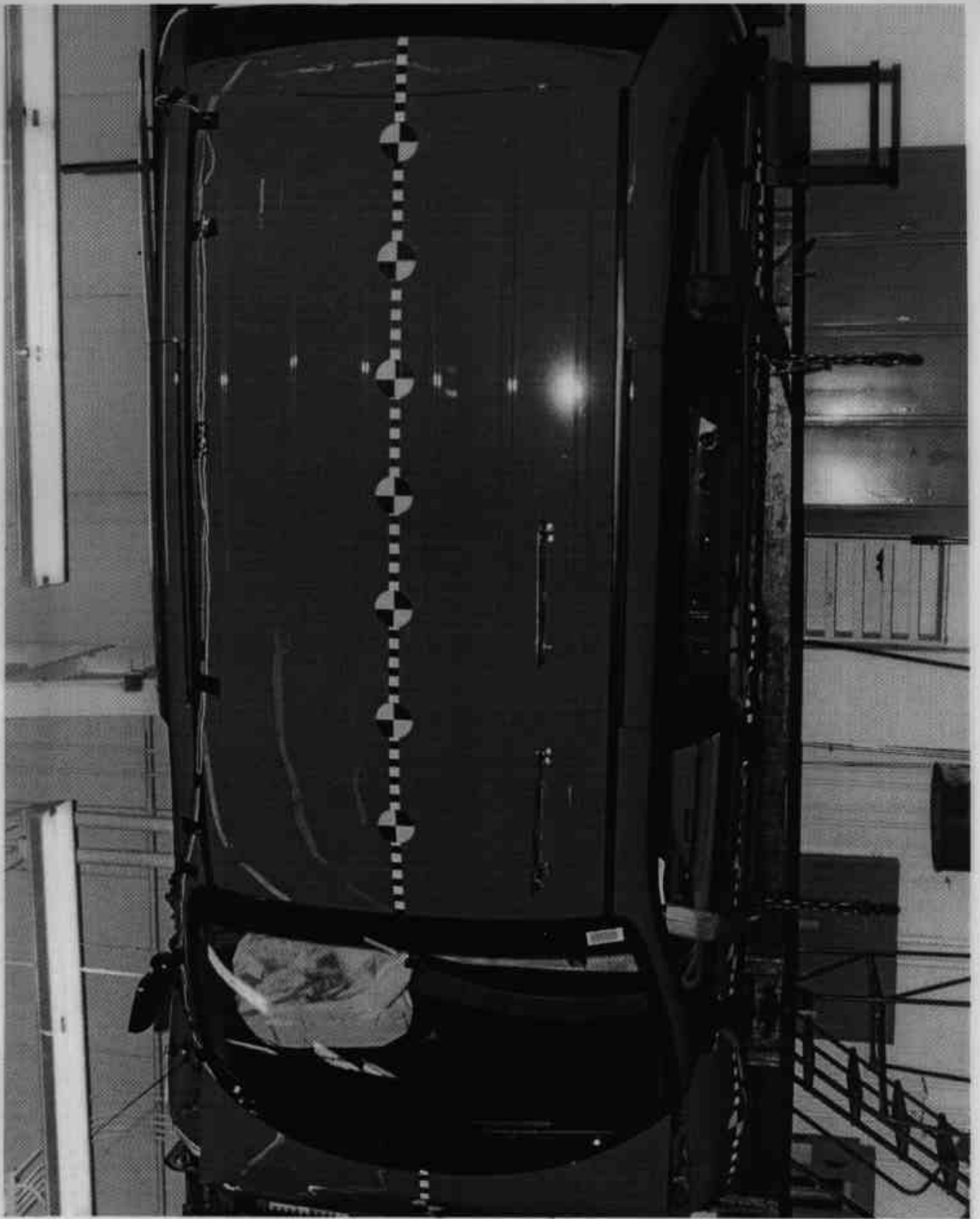


Figure A-54 Post-Test Vehicle on Static Rollover - View 2
A-55

980127

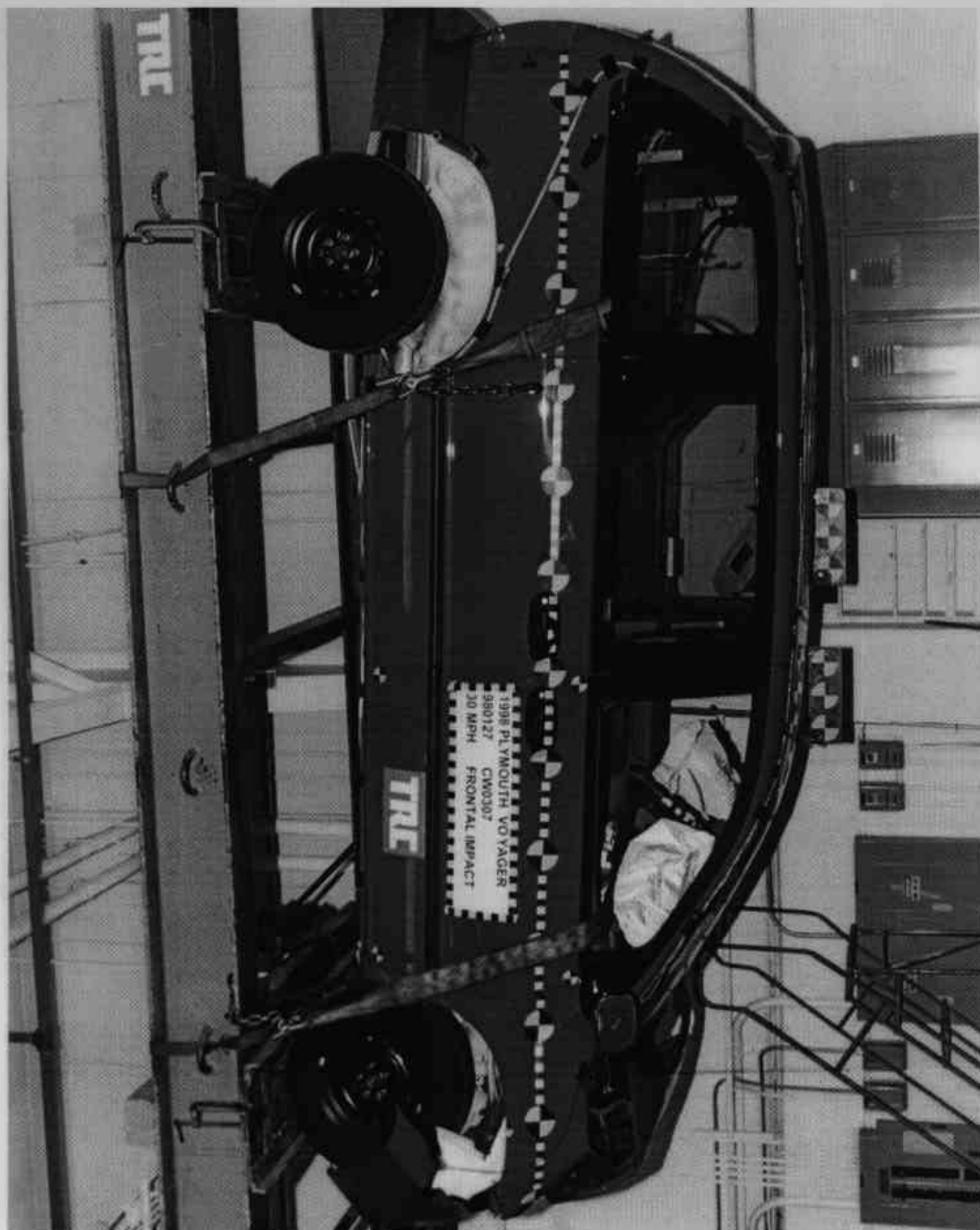


Figure A-55 Post-Test Vehicle on Static Rollover - View 3

A-56

980127

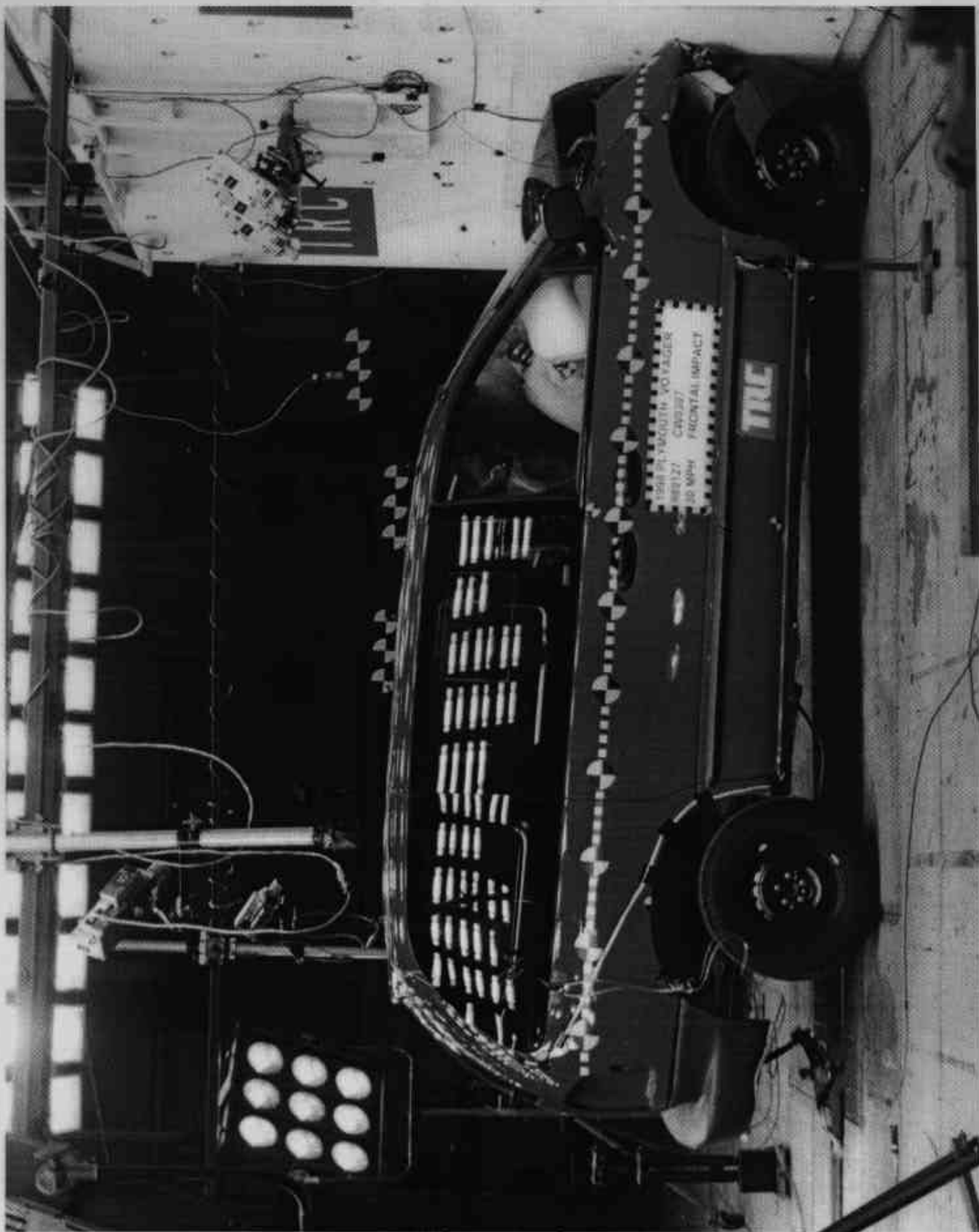


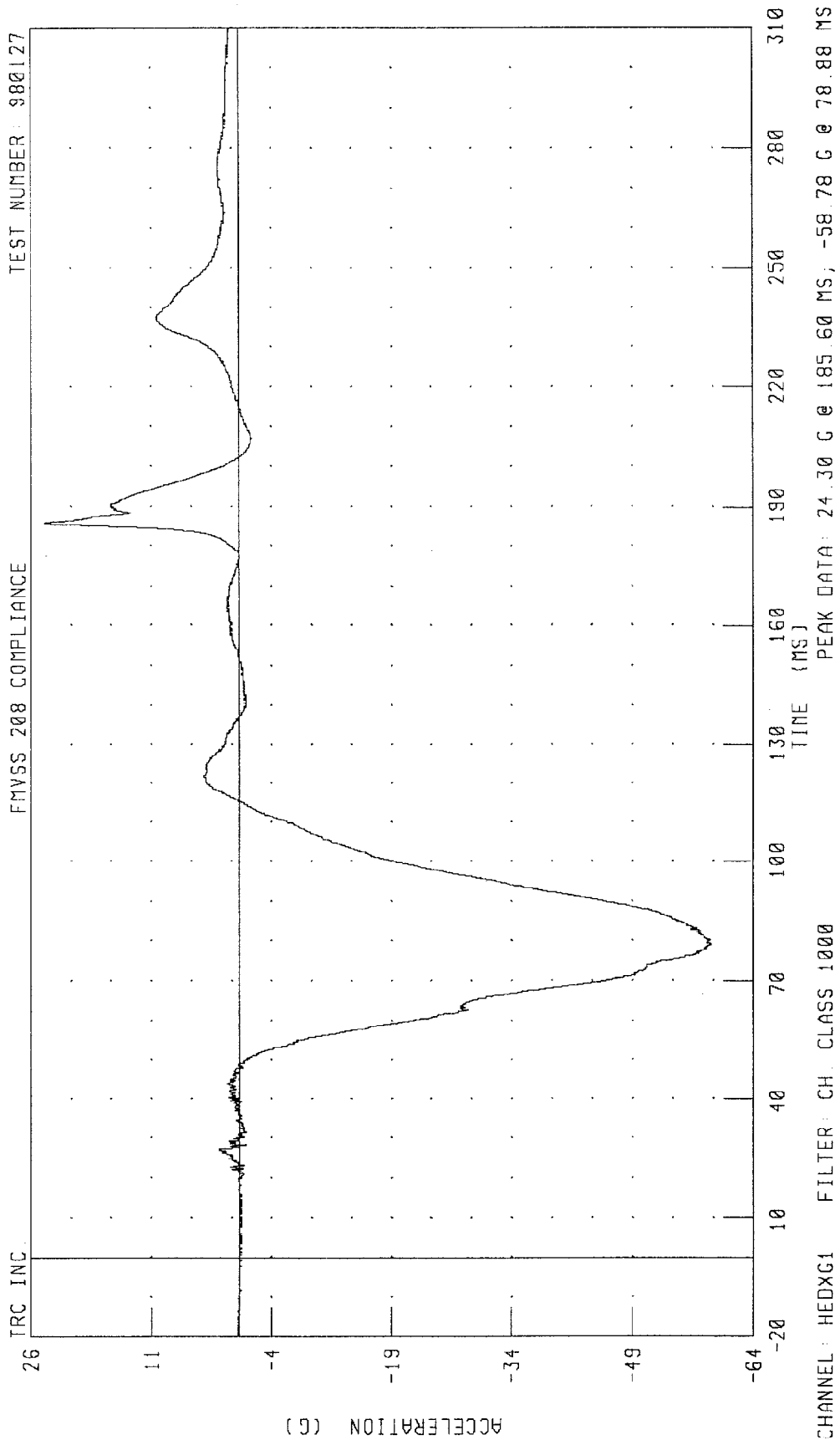
Figure A-56 Impact Event
A-57

980127

Appendix B

Data Plots

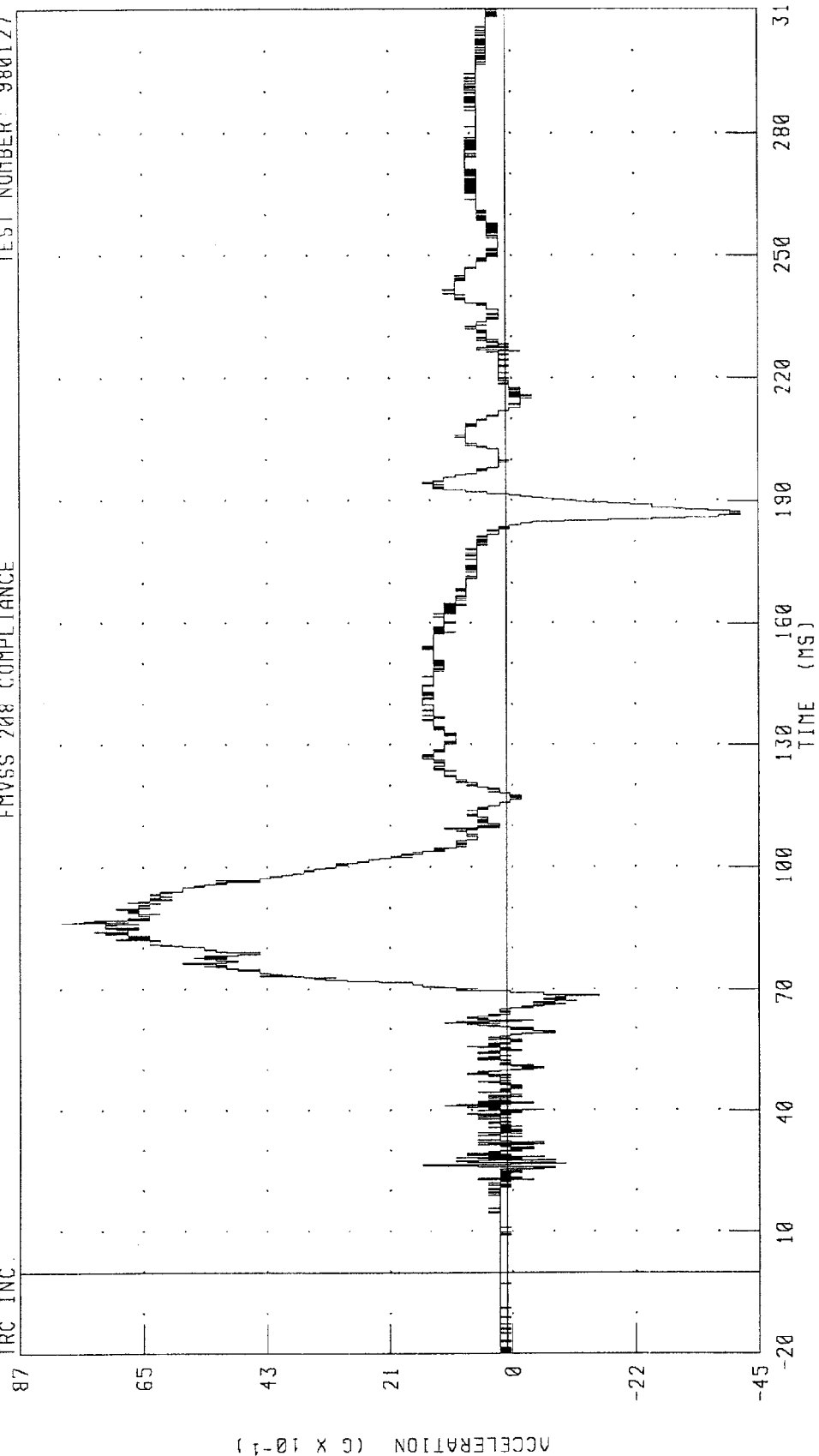
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE



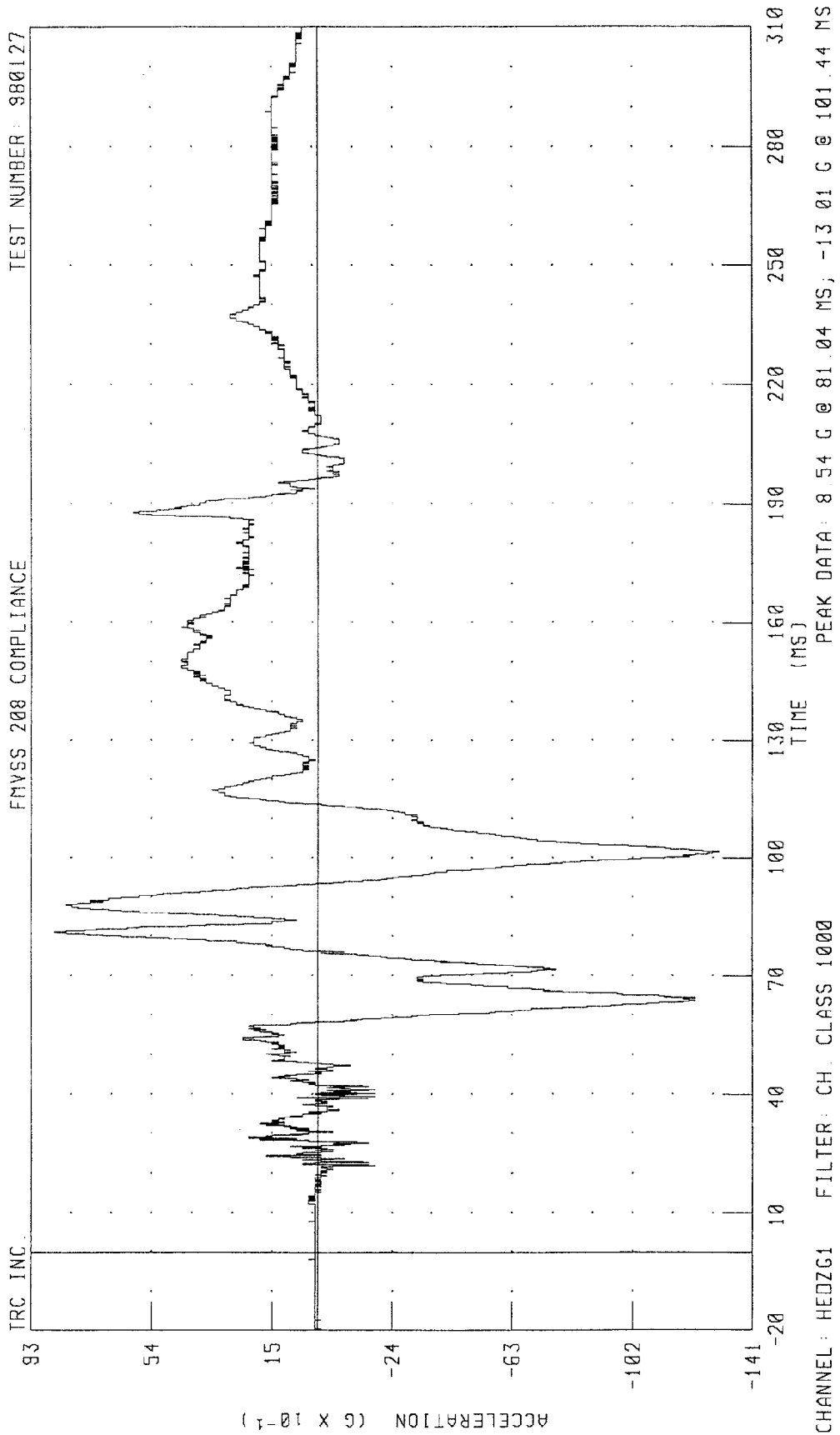
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127

IRC INC.

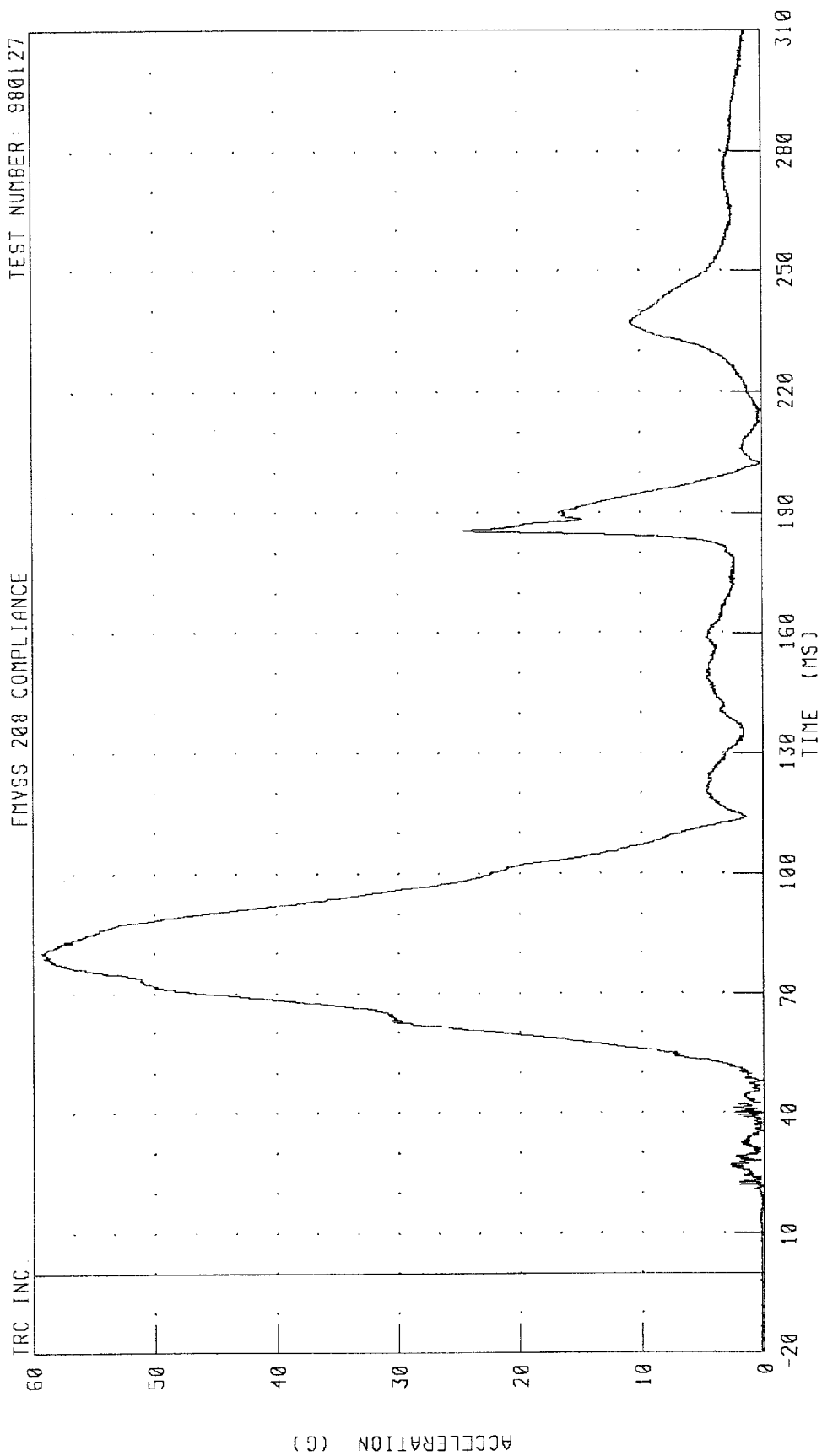


1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION
 FMVSS 208 COMPLIANCE

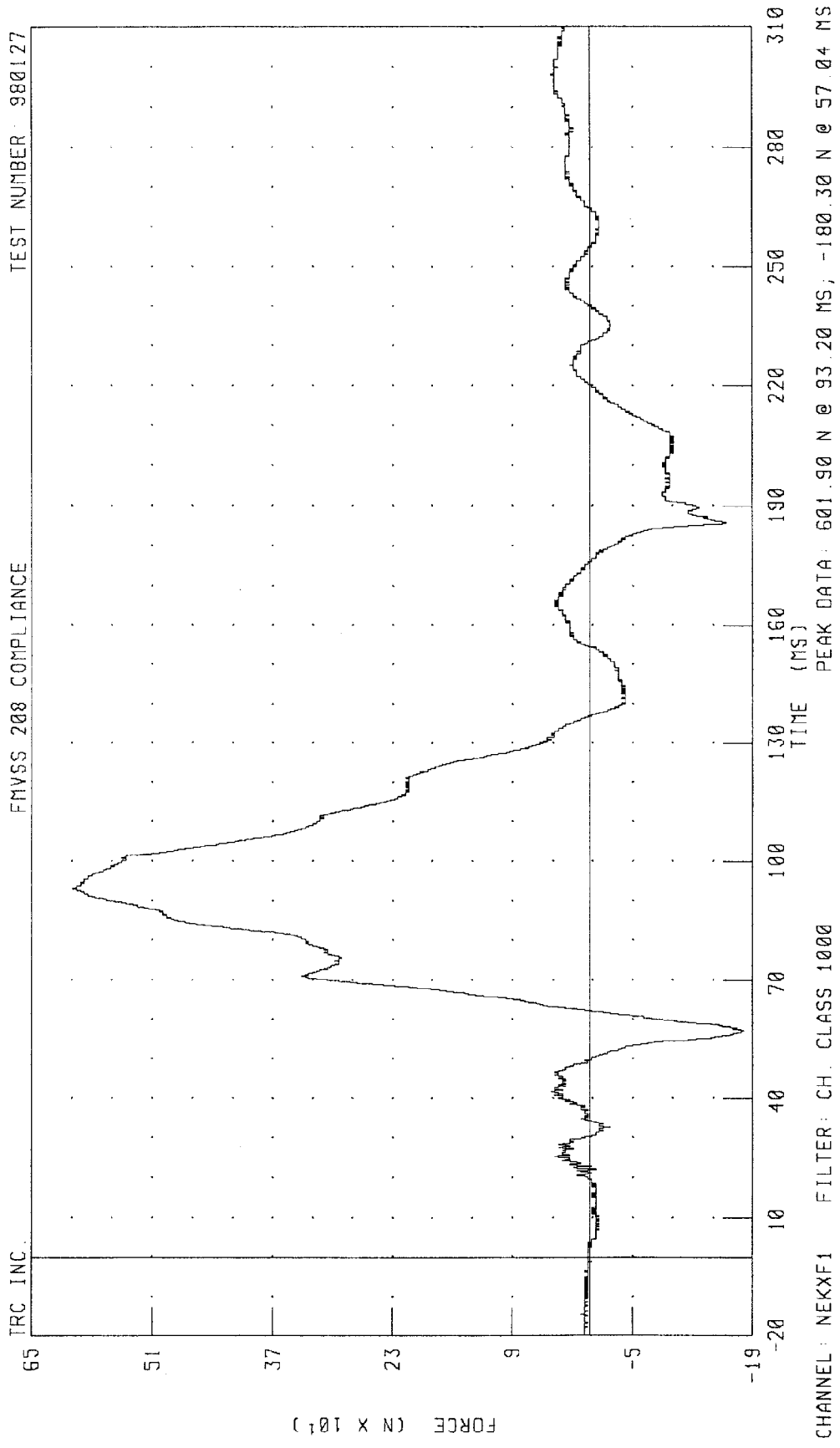
TEST NUMBER: 980127



PEAK DATA: 59.31 G @ 80.32 MS, 0.14 G @ -20.00 MS

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER NECK X-AXIS SHEAR FORCE

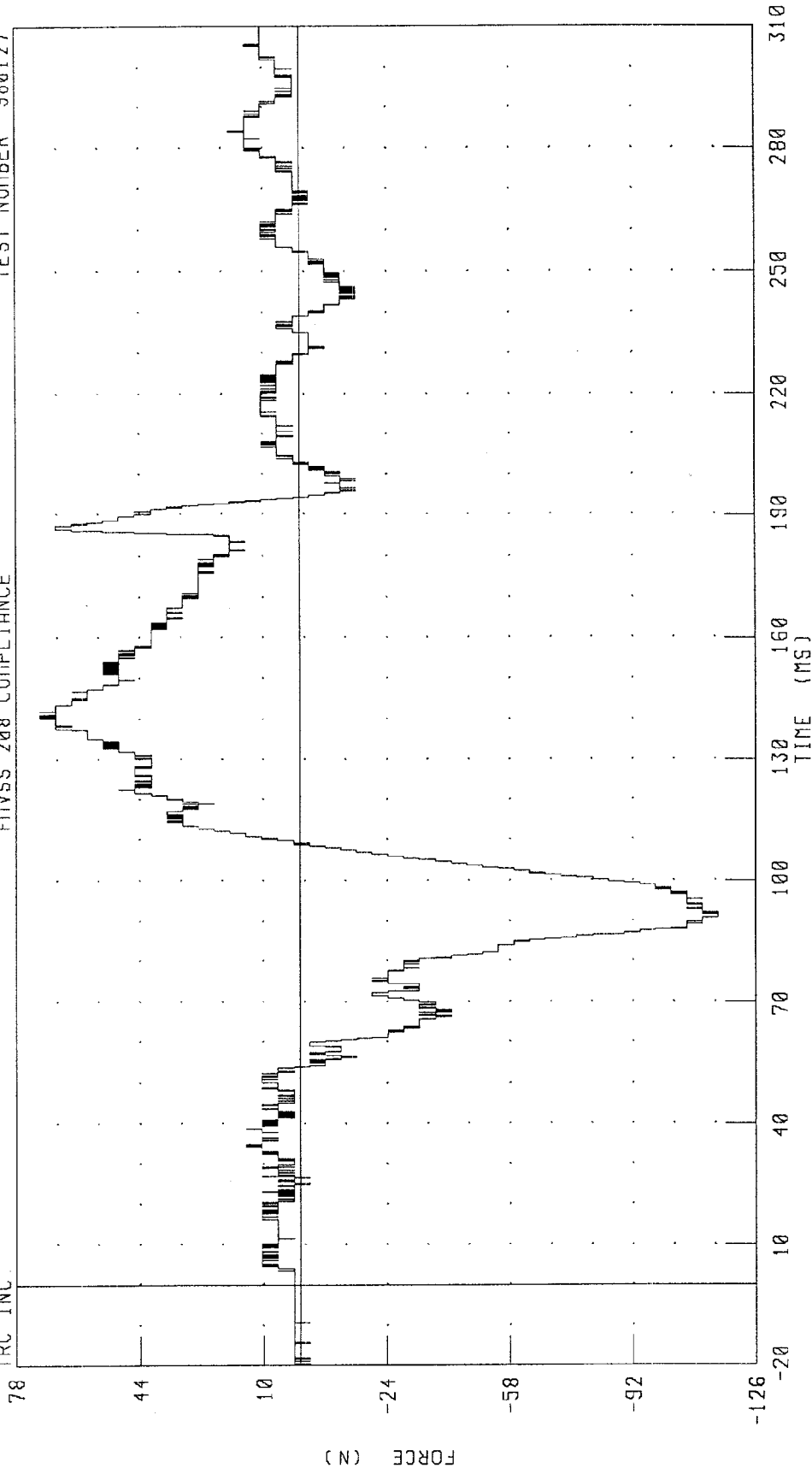


1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER NECK Y-AXIS SHEAR FORCE

TEST NUMBER 980127

FMVSS 208 COMPLIANCE

TRC INC.

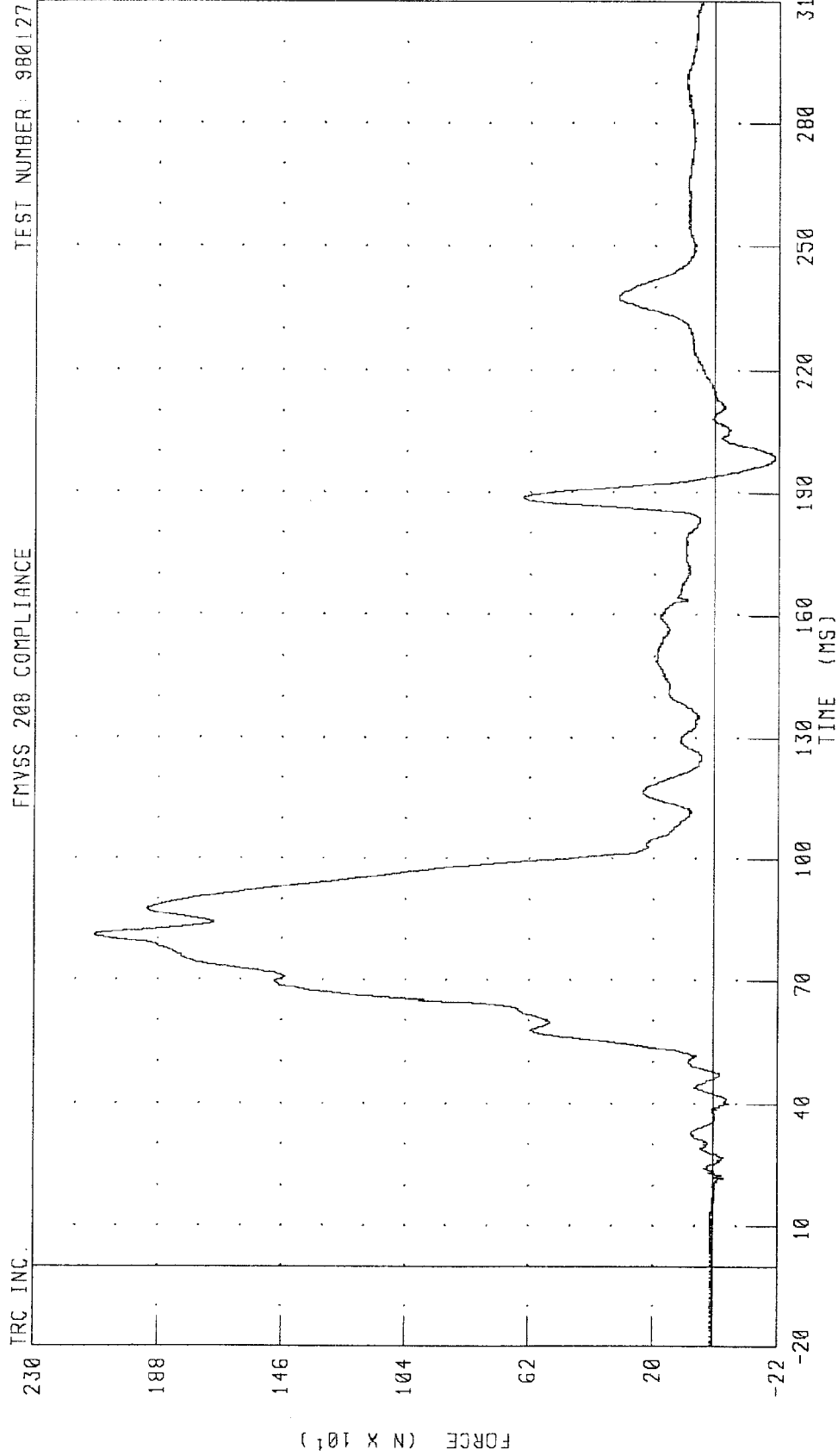


CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

PEAK DATA: 71.34 N @ 140.48 MS; -115.65 N @ 90.72 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER NECK Z-AXIS AXIAL FORCE
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127



PEAK DATA: 2096.25 N @ 81.04 MS; -205.80 N @ 198.40 MS

CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

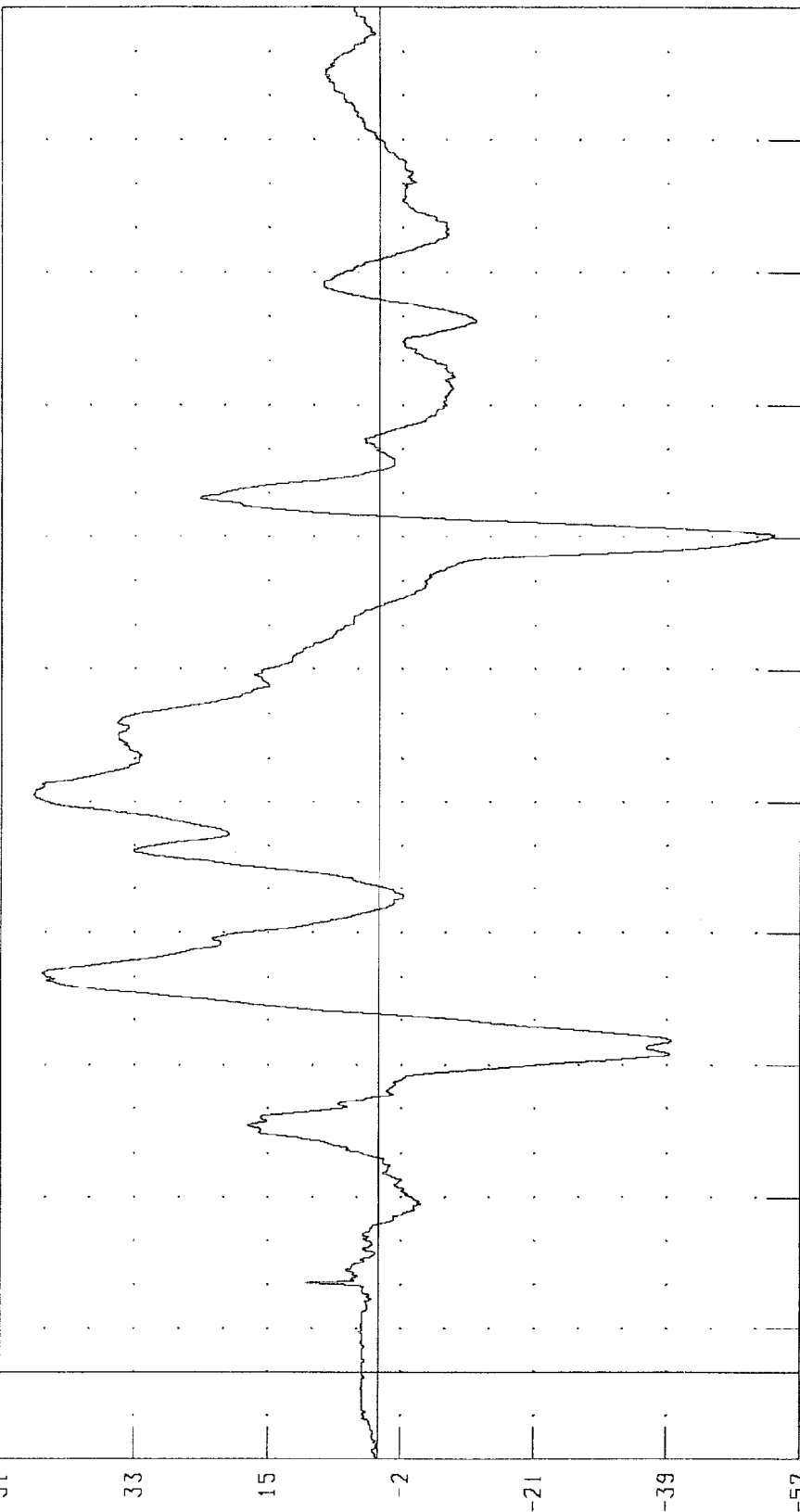
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER NECK MOMENT ABOUT X AXIS

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

IRC INC

51

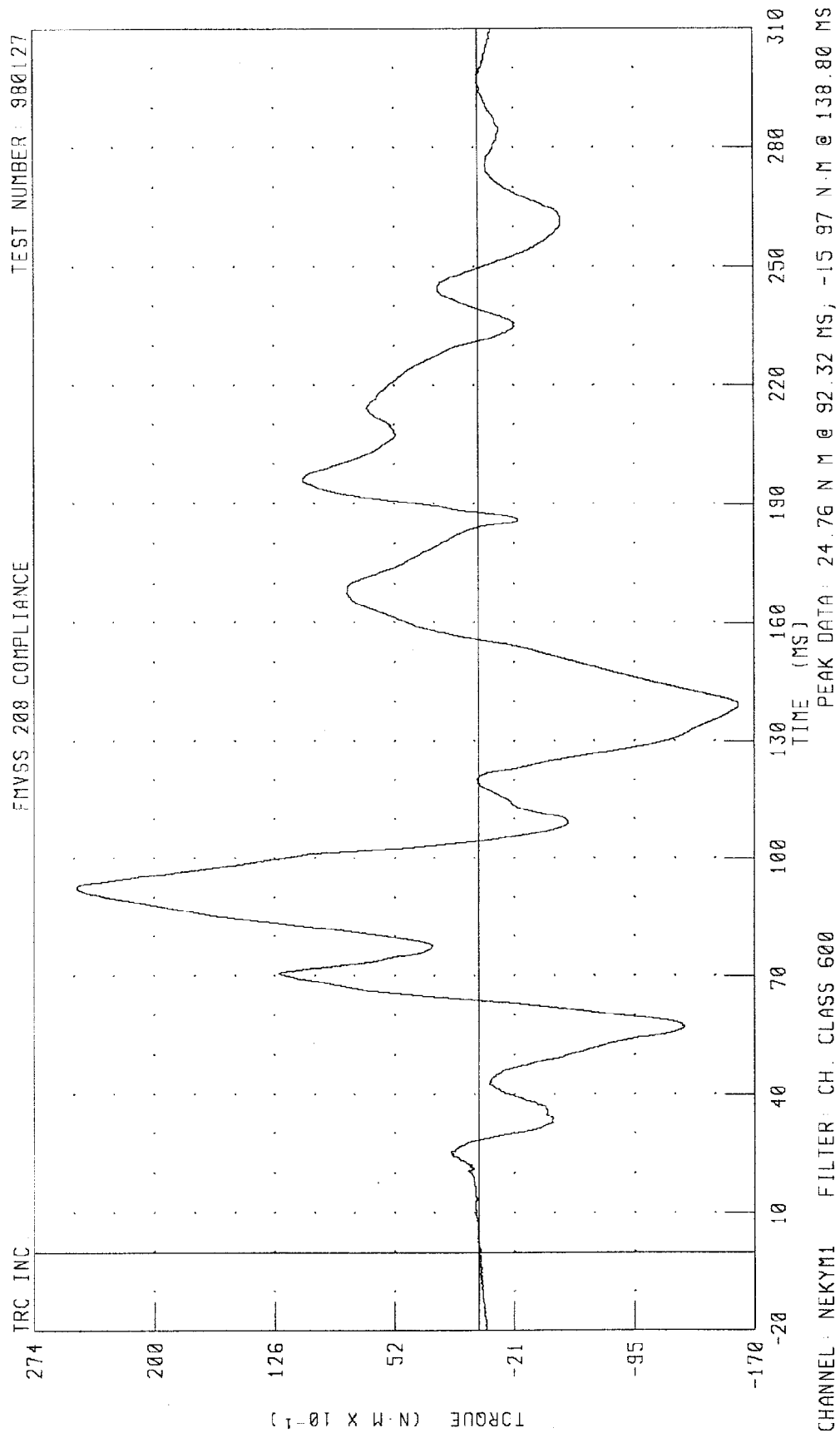


TIME (MS) 310 280 250 220 190 160 130

CHANNEL: NEKXM1 FILTER: CH CLASS 600

PEAK DATA: 4.66 N·m @ 131.68 MS, -5.34 N·m @ 190.40 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER NECK MOMENT ABOUT Y AXIS



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER NECK MOMENT ABOUT Z AXIS

FMVSS 208 COMPLIANCE

TRC INC.

43

24

5

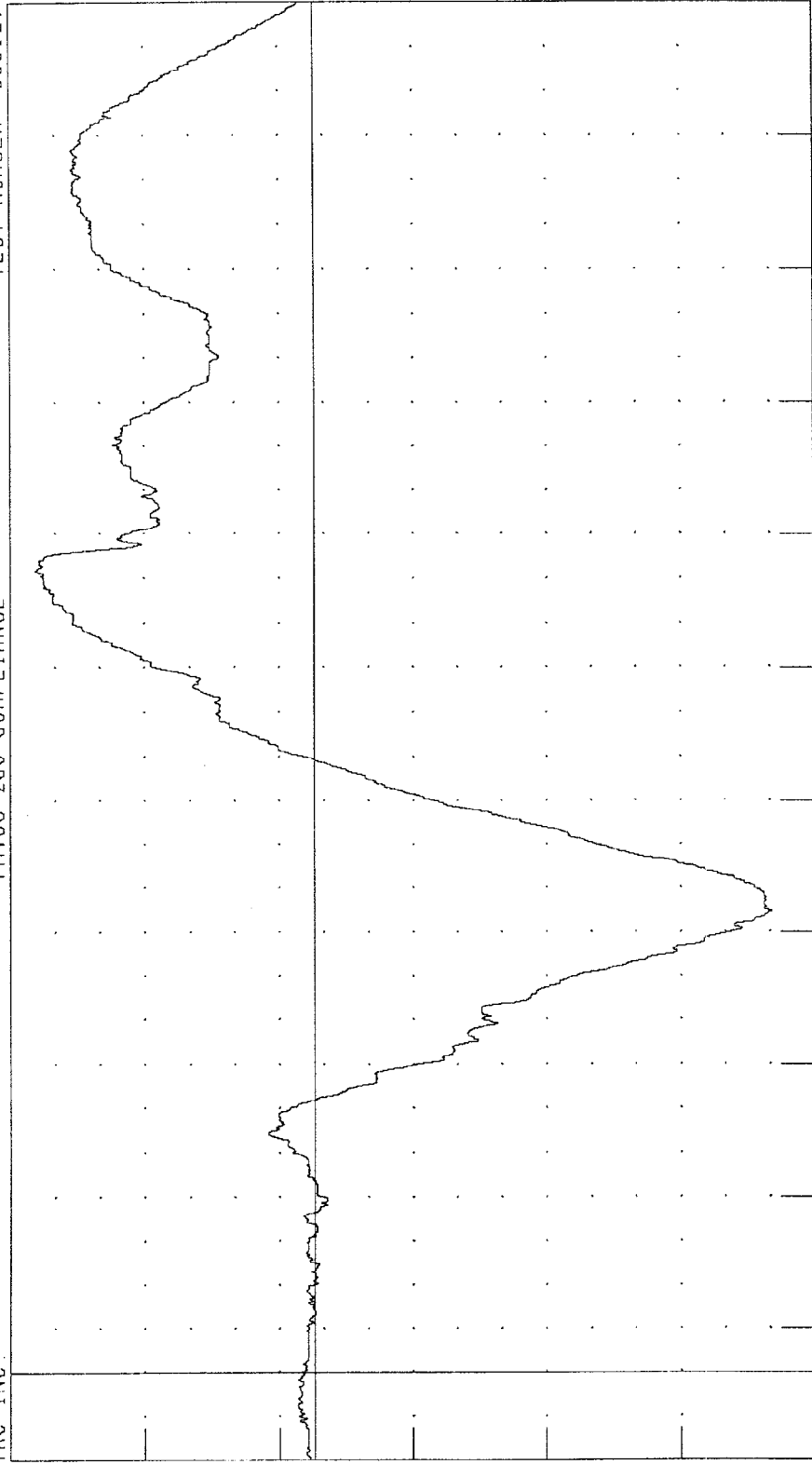
-13

-32

-51

-70

TORQUE (N M X 10⁻¹)



TEST NUMBER 980127

TIME (MS)

310

280

250

220

190

160

130

100

70

40

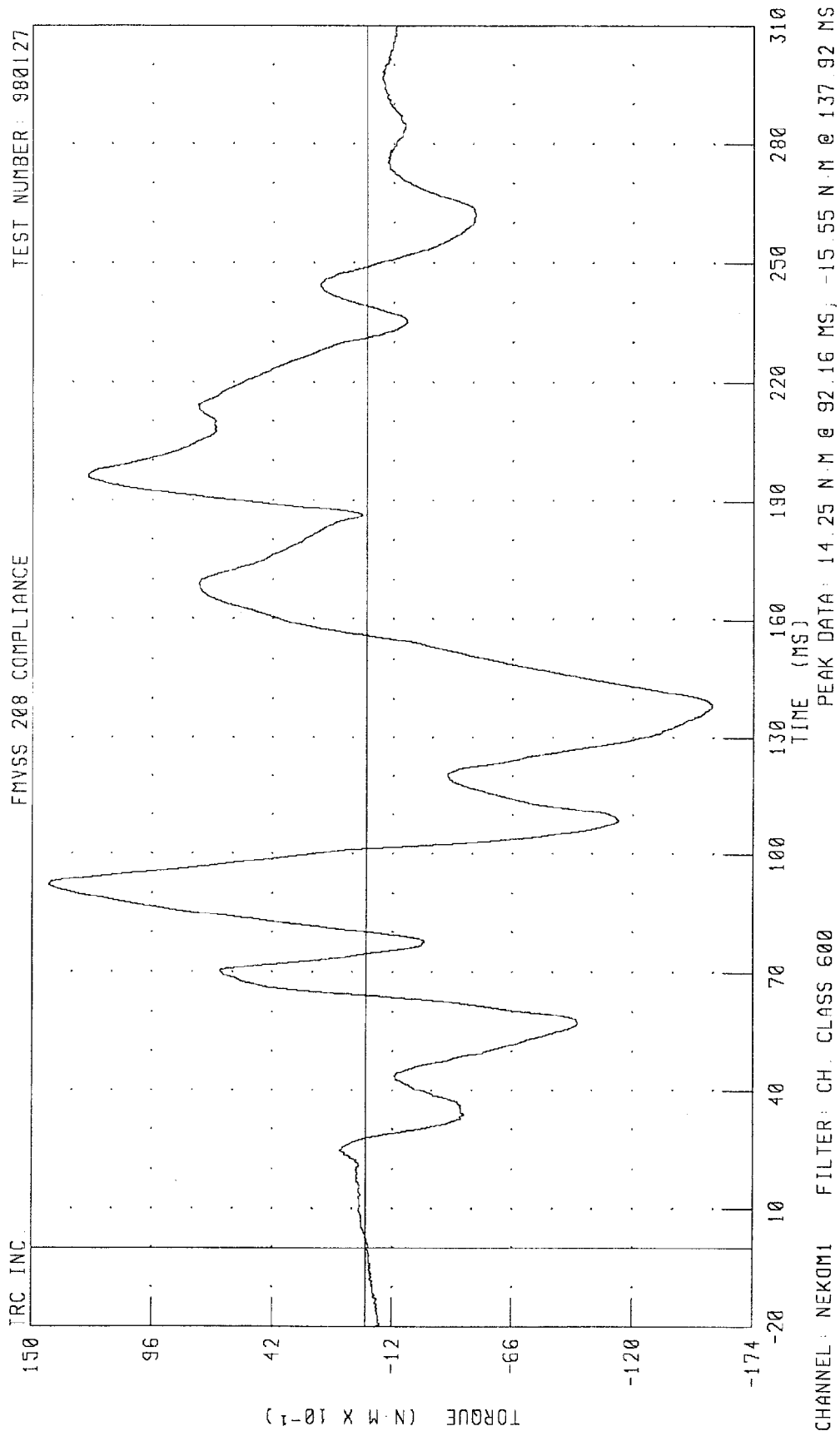
10

-20

CHANNEL: NEK2M1 FILTER: CH CLASS 600

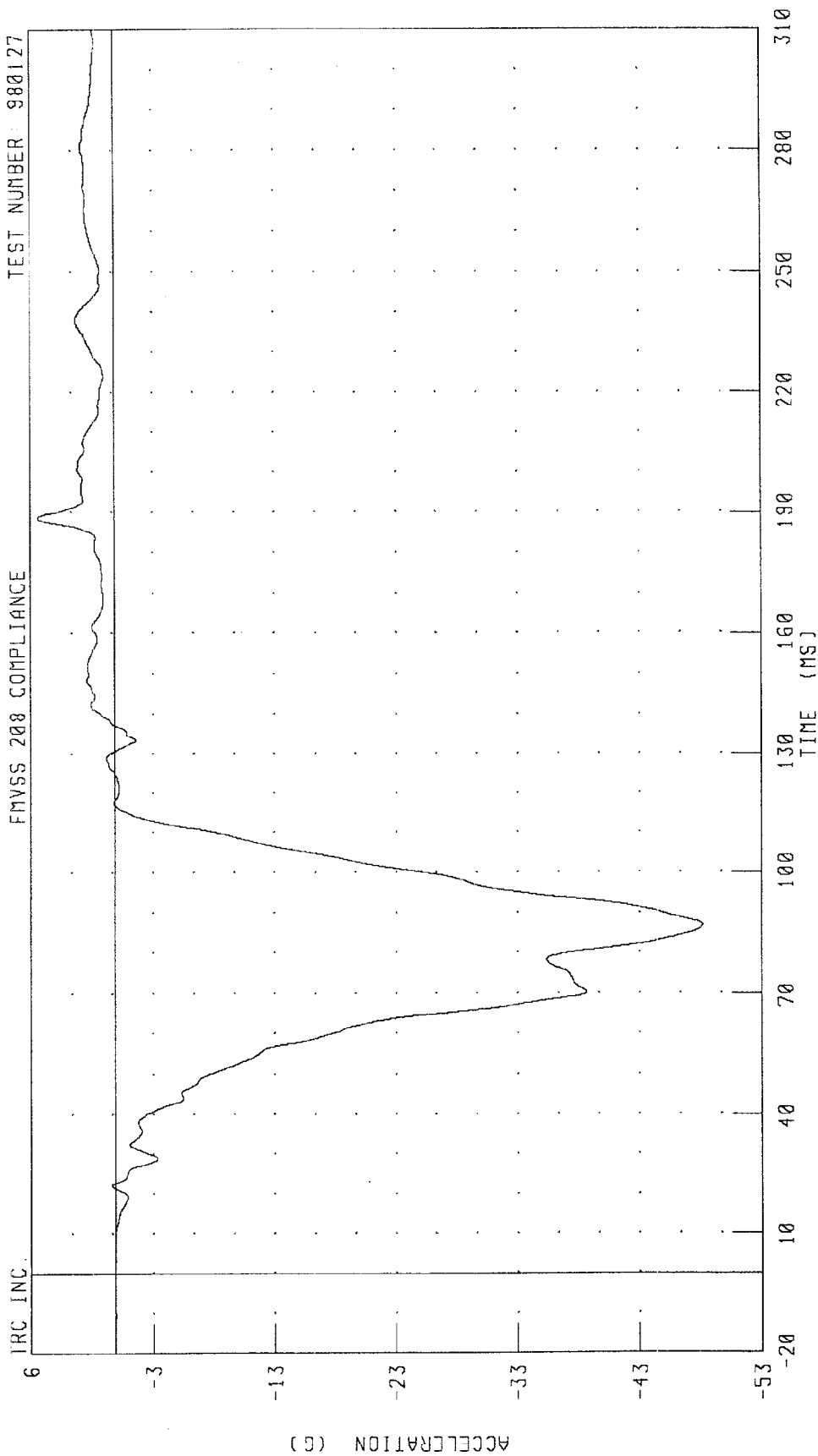
PEAK DATA: 3.94 N M @ 181.68 MS, -6.49 N M @ 104.64 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER NECK OCCIPITAL CONDYLE



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127



PEAK DATA: 6.28 G @ 188.64 MS; -48.30 G @ 86.88 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

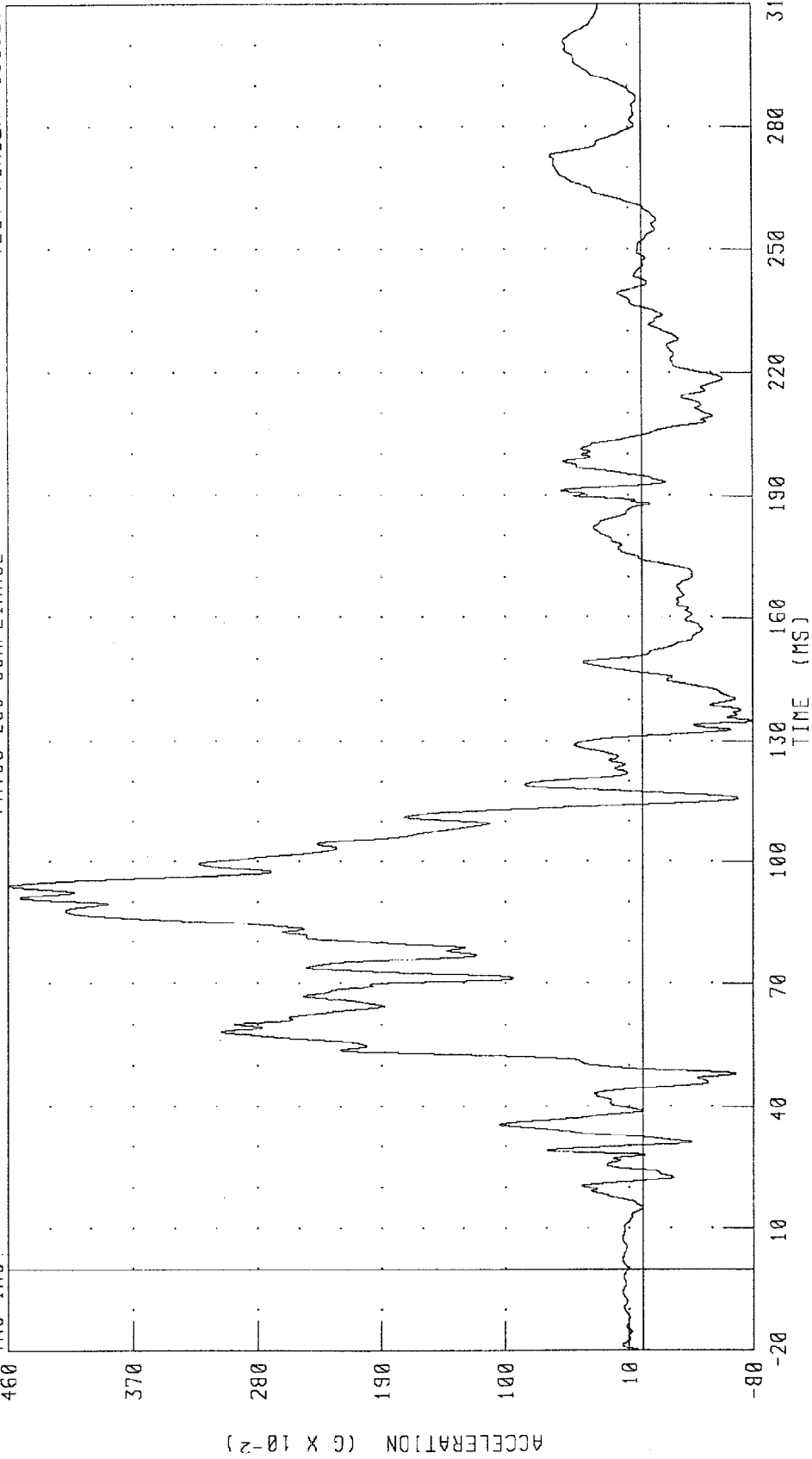
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

DRIVER CHEST Y-AXIS ACCELERATION

FMVSS 208 COMPLIANCE

TRC INC.

TEST NUMBER: 980127

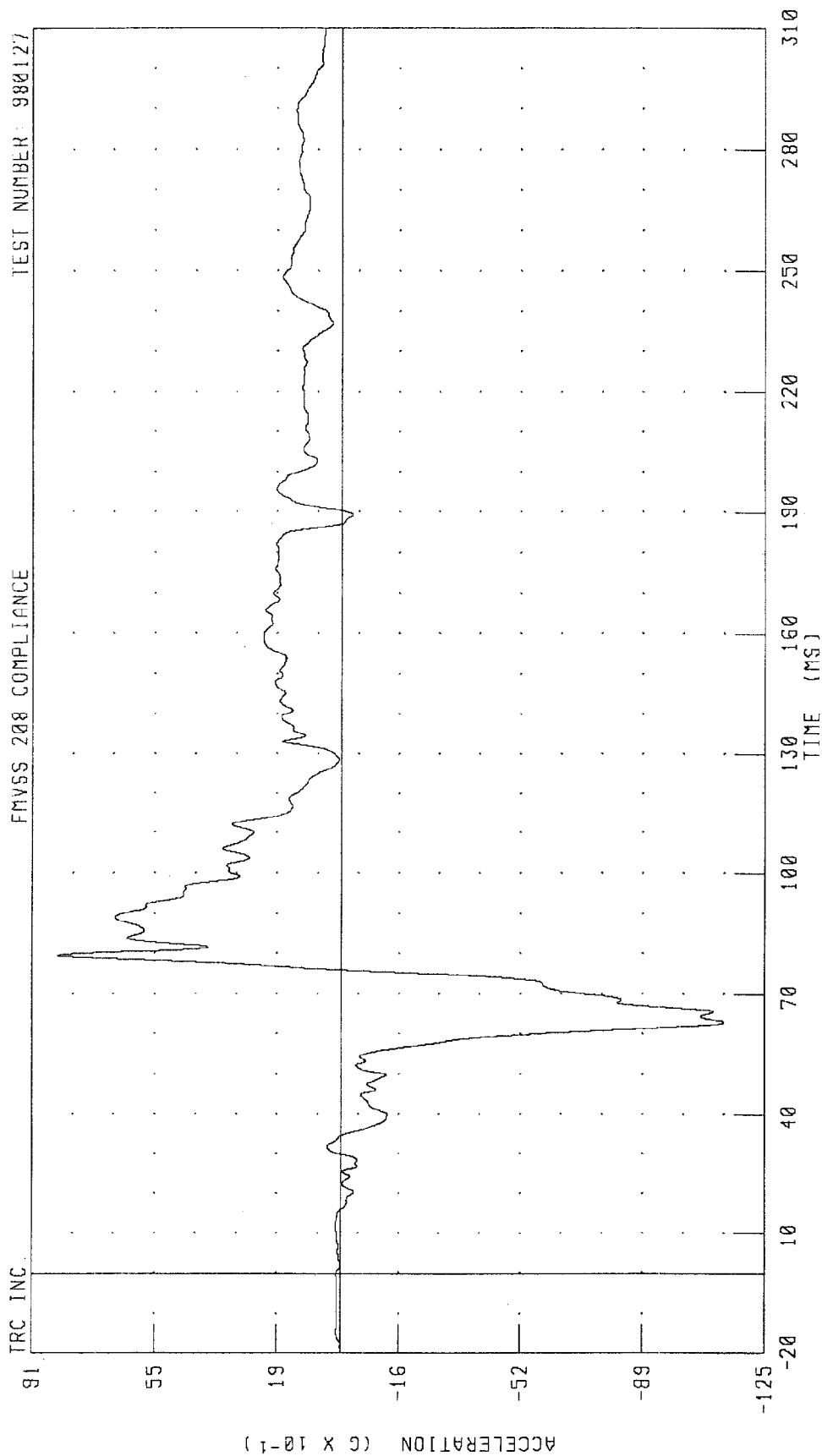


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 4.61 G @ 94.00 MS, -0.80 G @ 134.88 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE

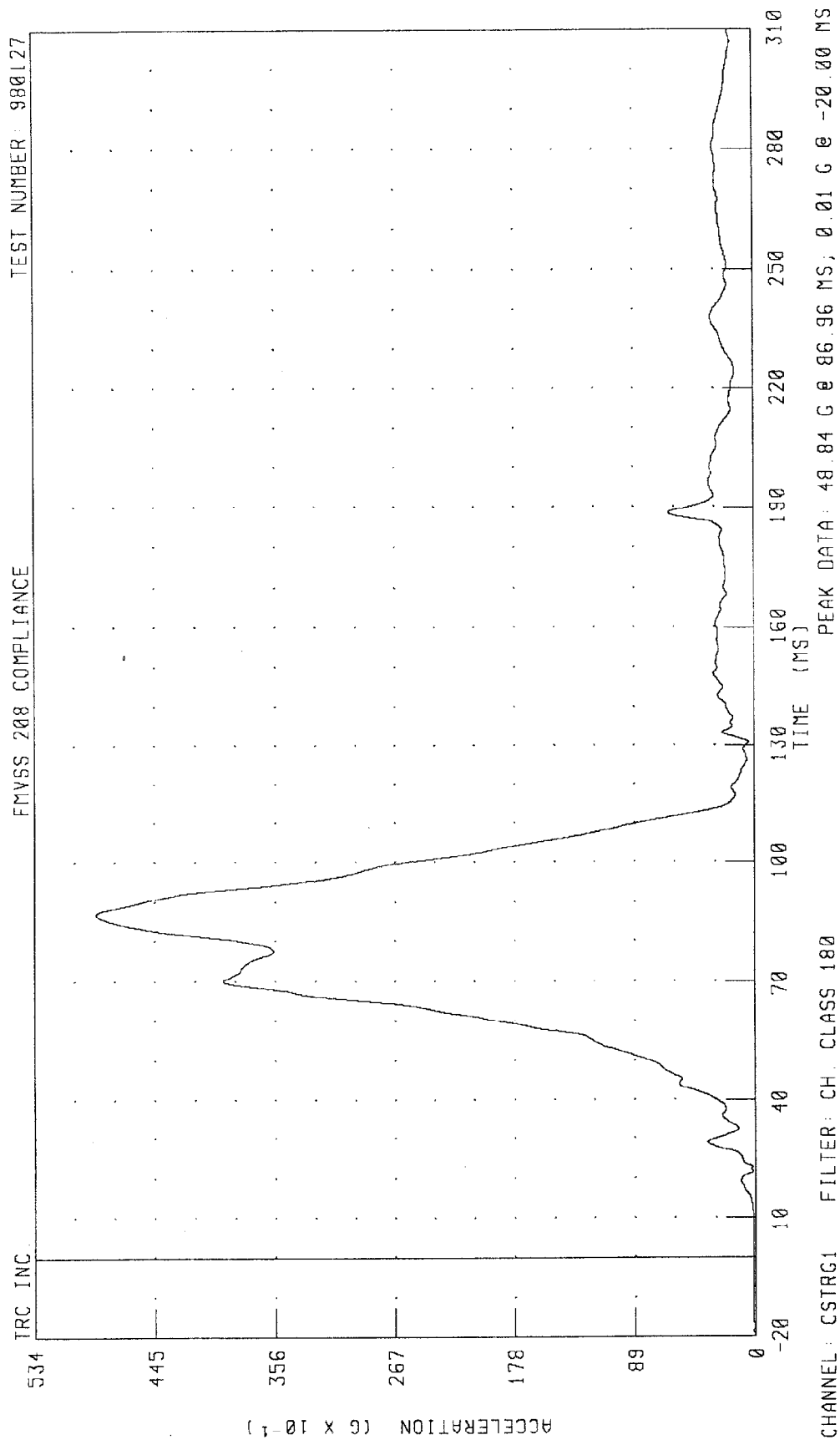
TEST NUMBER: 980127



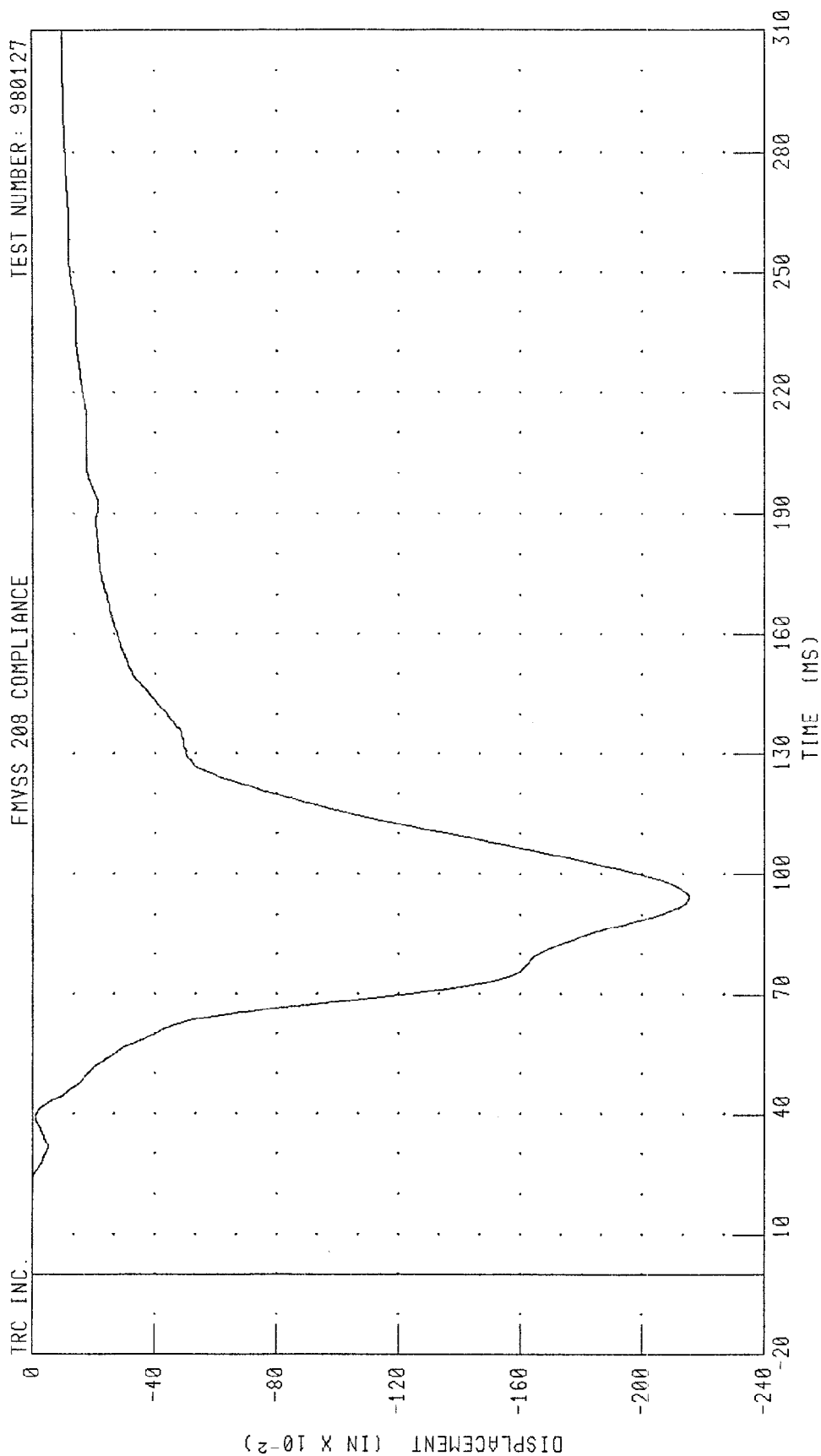
CHANNEL: CSTZG1 FILTER: CH. CLASS 180

PEAK DATA: 8.35 G @ 79.60 MS, -11.31 G @ 62.96 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 DRIVER CHEST DEFLECTION
 FMVSS 208 COMPLIANCE



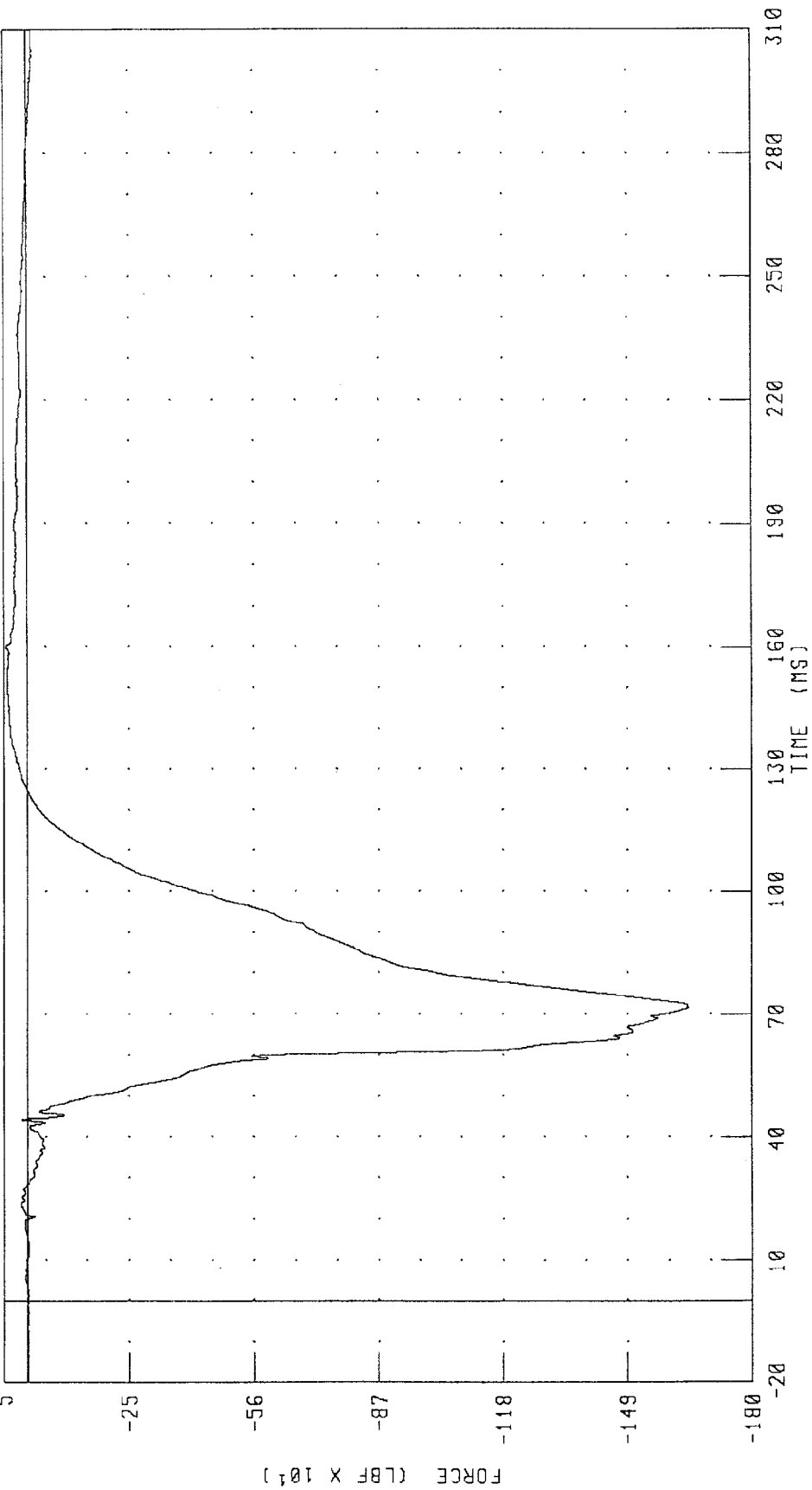
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

DRIVER LEFT FEMUR FORCE

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.

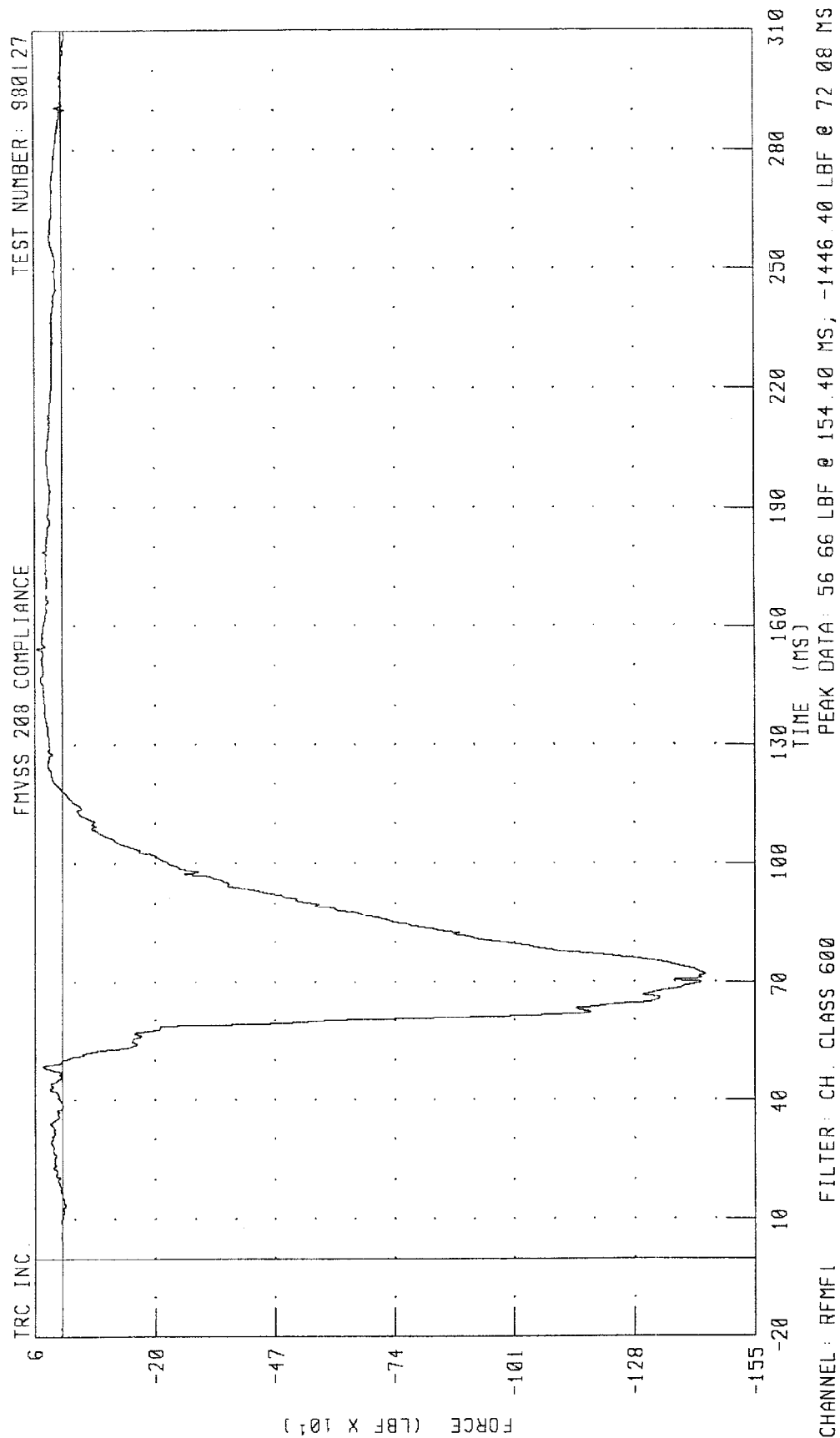


1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

DRIVER RIGHT FEMUR FORCE

FMYSS 208 COMPLIANCE

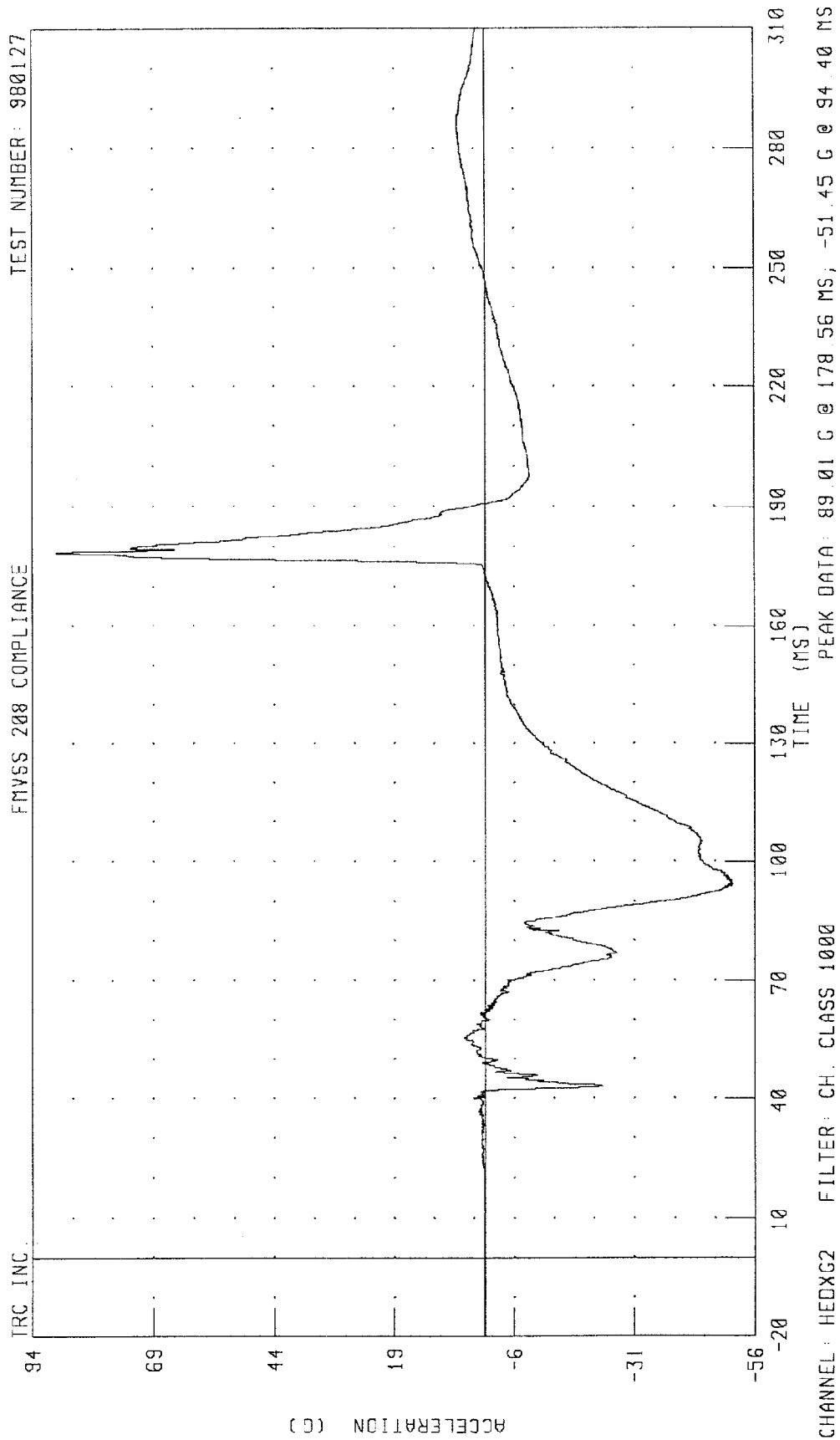
TEST NUMBER: 980127



CHANNEL: RFMFI FILTER: CH. CLASS 600

PEAK DATA: 56 66 LBF @ 154.40 MS, -1446.40 LBF @ 72 08 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

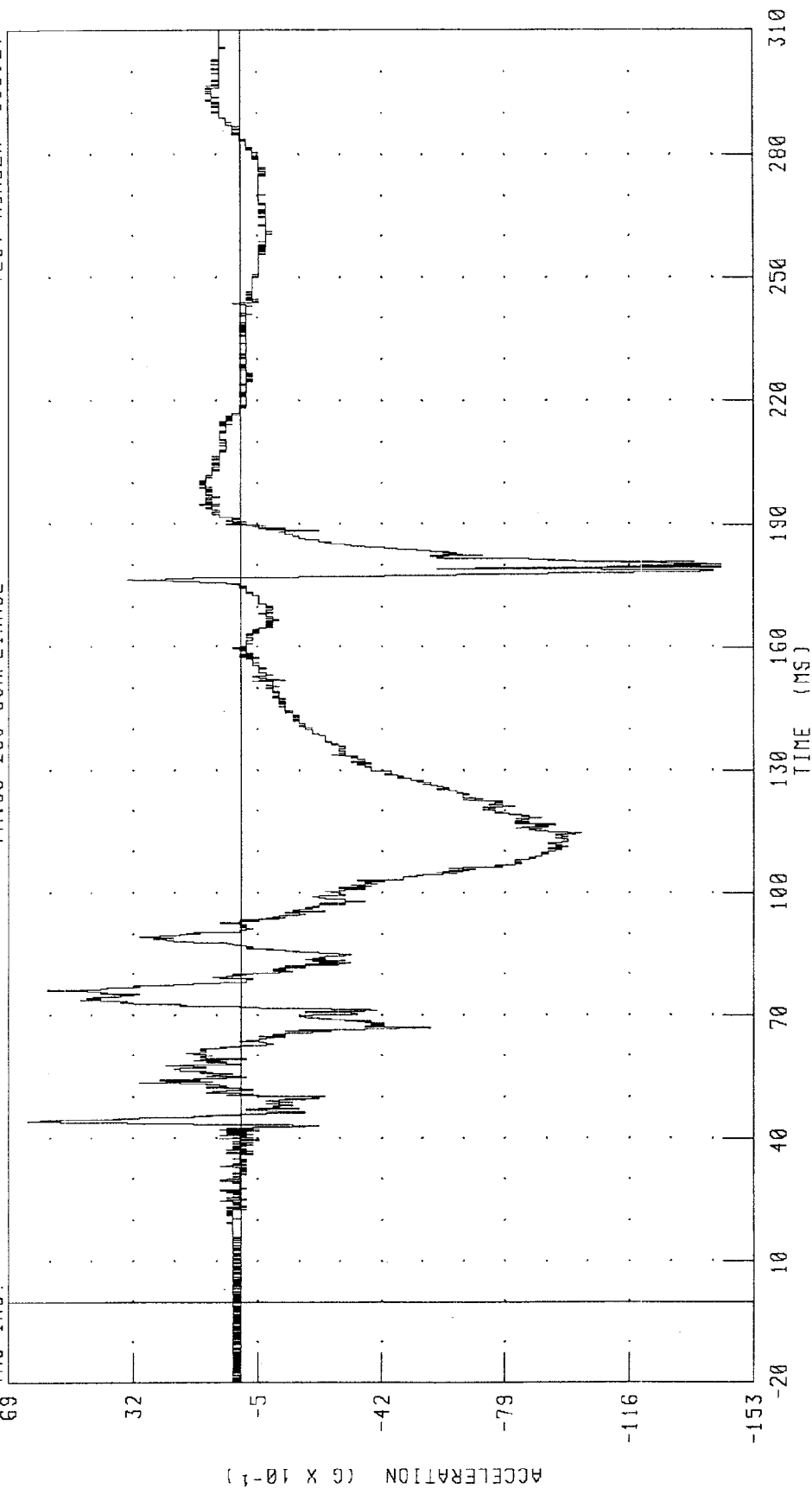


1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.

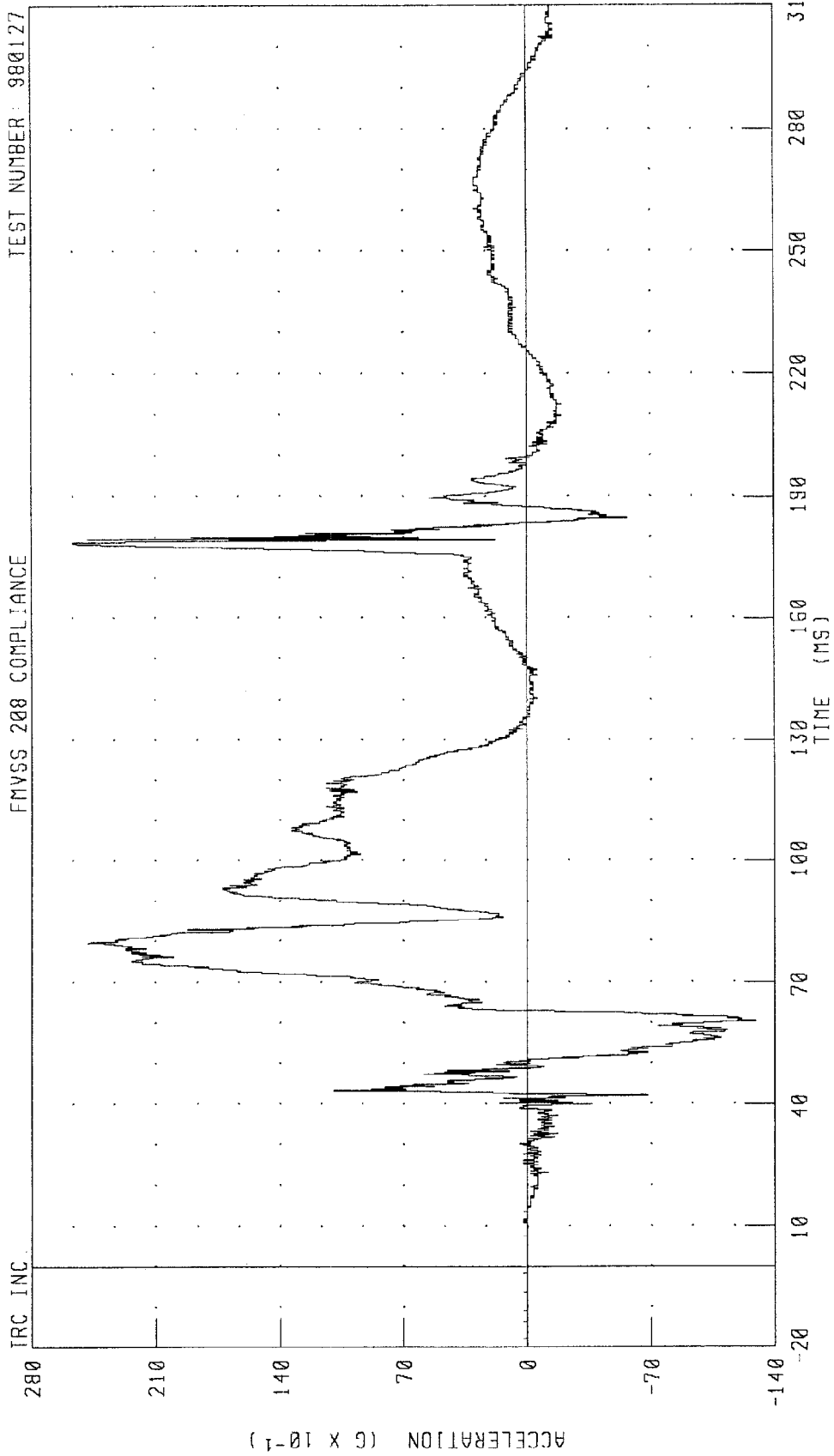


CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 6.34 G @ 44.00 MS, -14.31 G @ 179.60 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE

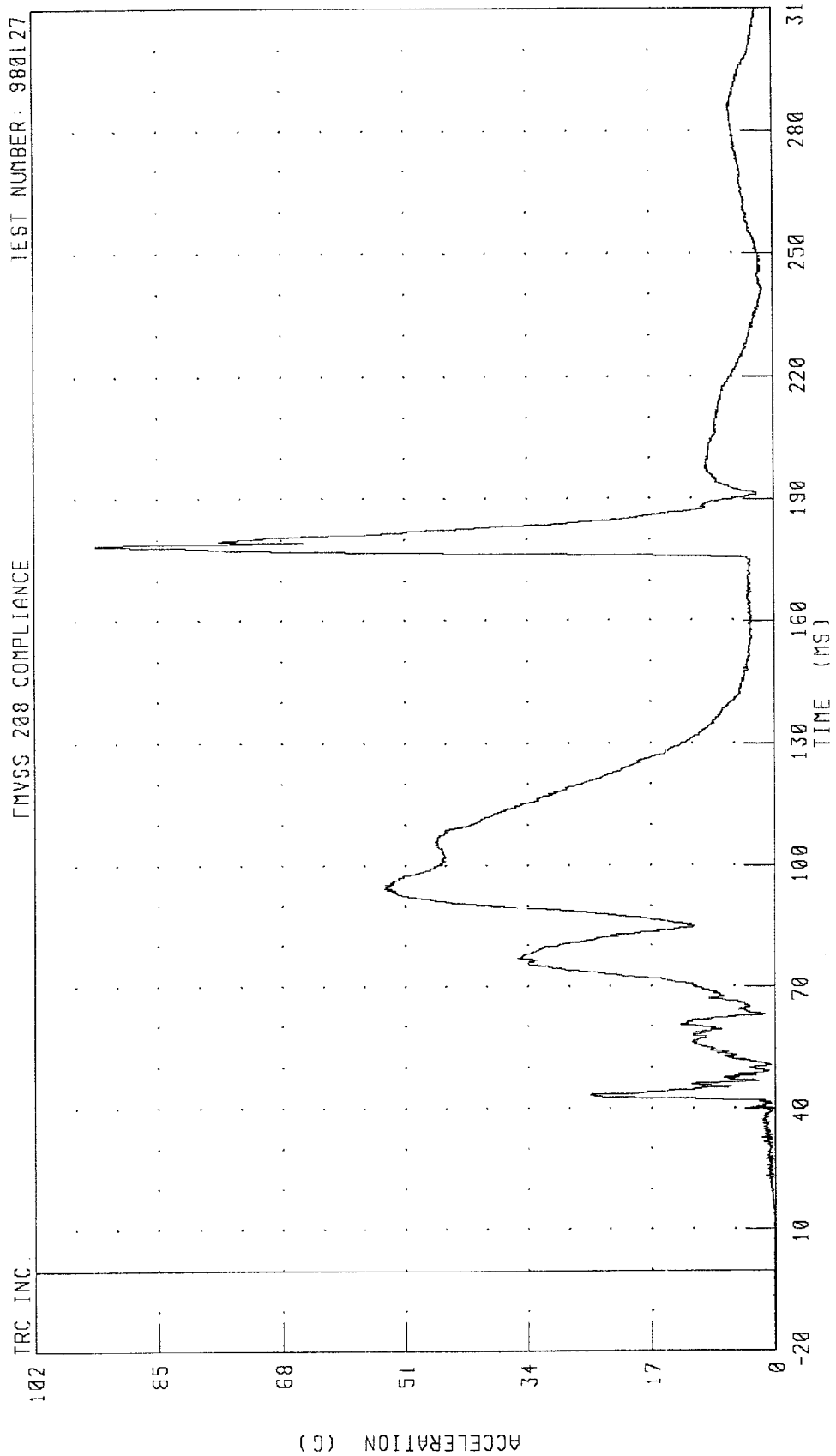
TEST NUMBER: 980127



CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127



PEAK DATA: 93.64 G @ 178.56 MS, 0.09 G @ -19.68 MS

CHANNEL: HEDRG2 FILTER: CH CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.

129

101

73

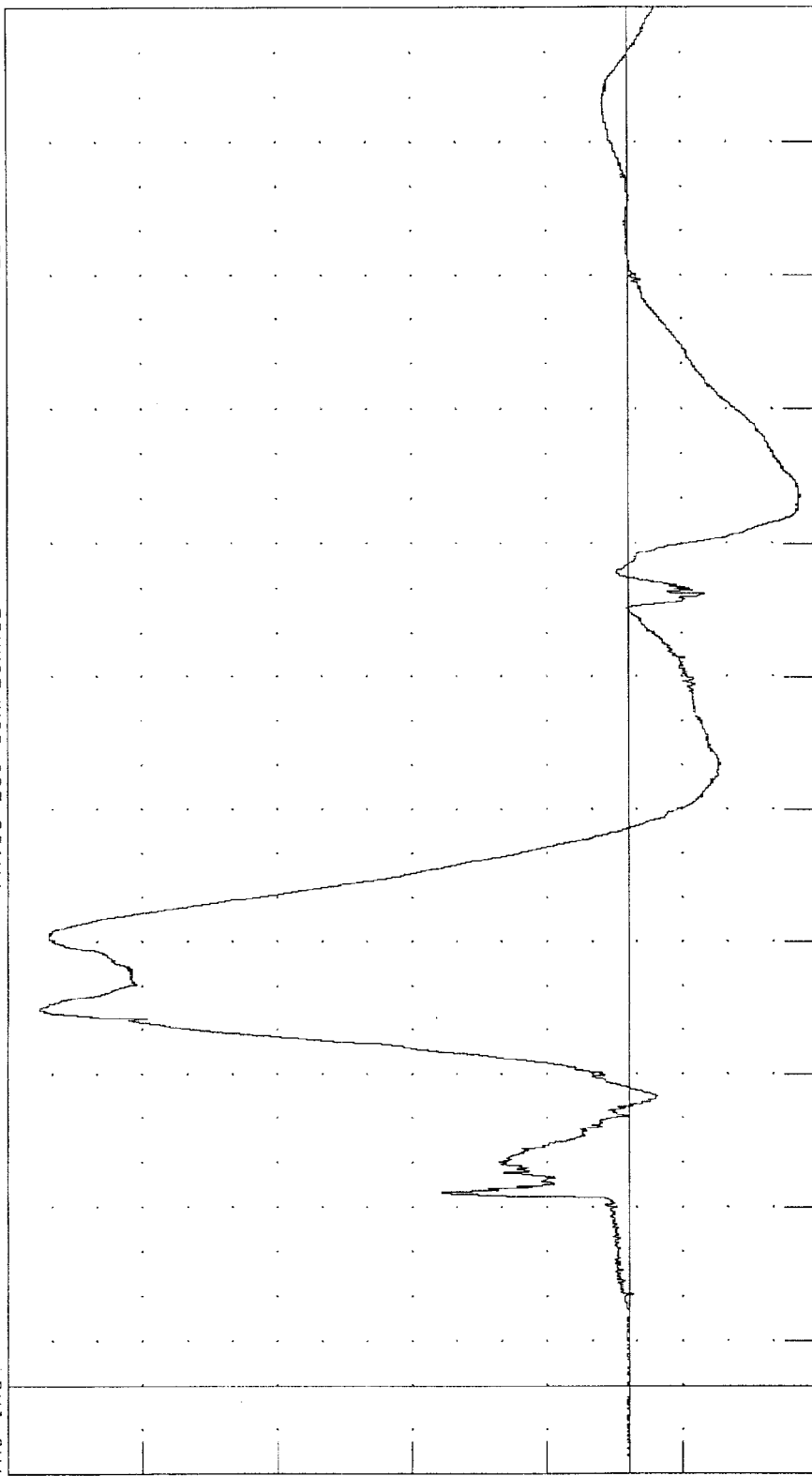
45

17

-11

-39

FORCE (N X 10⁴)



TIME (MS)

PEAK DATA: 1221.95 N @ 84.56 MS; -355.69 N @ 200.24 MS

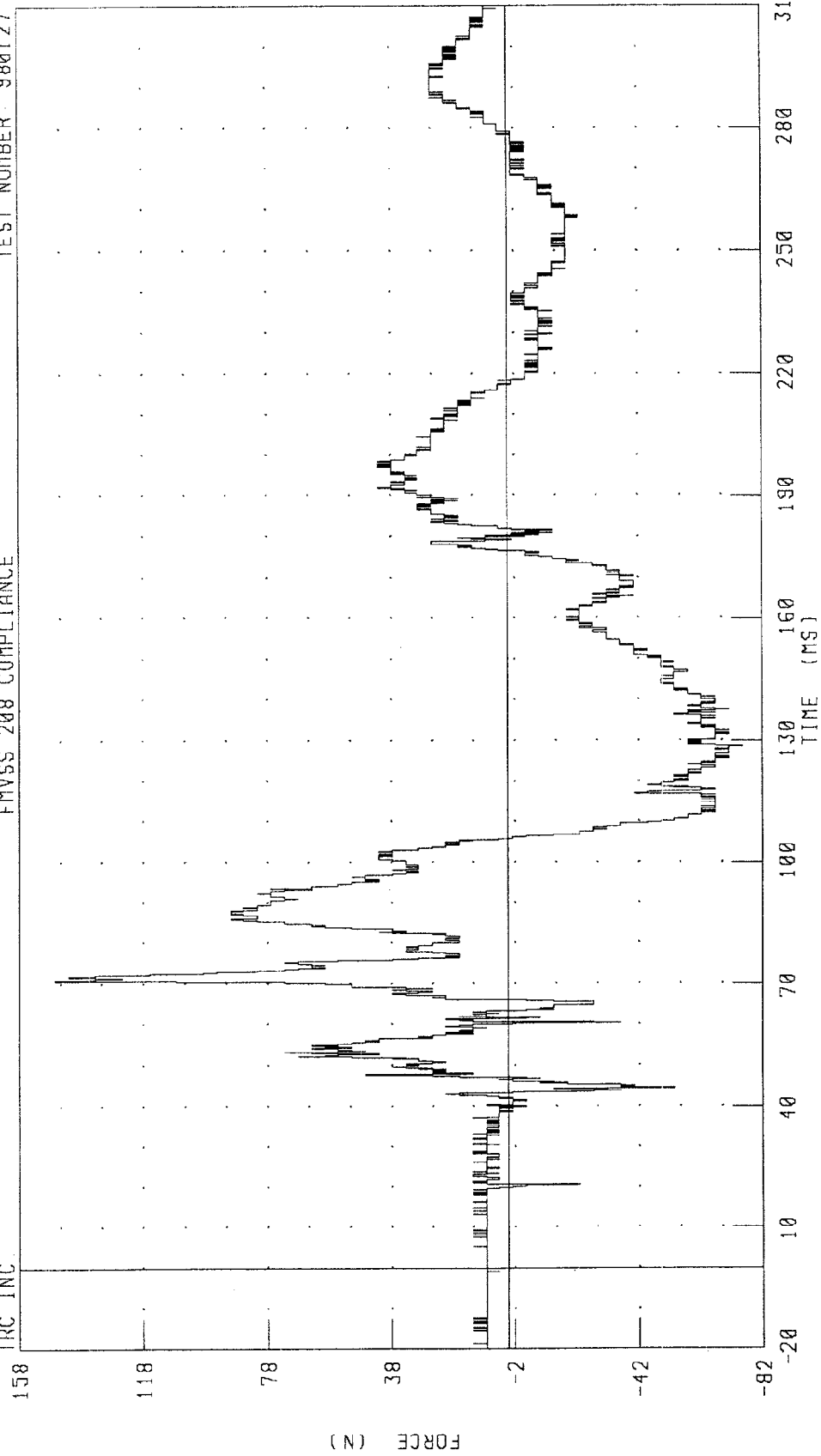
CHANNEL: NEKXF2 FILTER CH. CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.



PEAK DATA: 146.50 N @ 70.80 MS; -75.29 N @ 128.32 MS

CHANNEL: NEKYF2 FILTER: CH. CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.

148

111

74

FORCE (N X 10¹)

0

-37

-74

-20

10

40

70

100

130

160

190

220

250

280

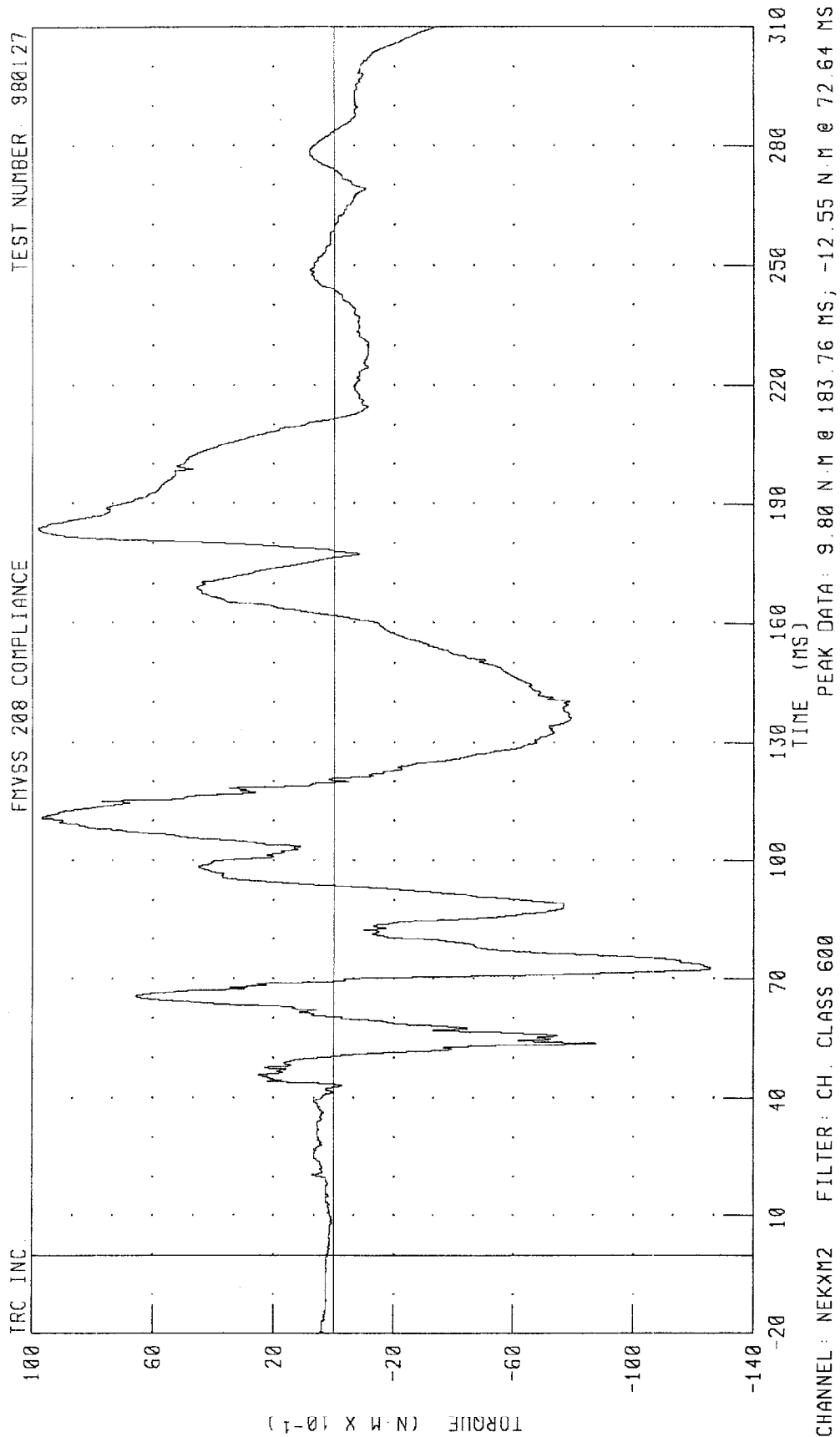
310

TIME (MS)

PEAK DATA: 1353.83 N @ 81.44 MS, -673.78 N @ 182.32 MS

CHANNEL: NEKZF2 FILTER: CH CLASS 1000

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK MOMENT ABOUT X AXIS



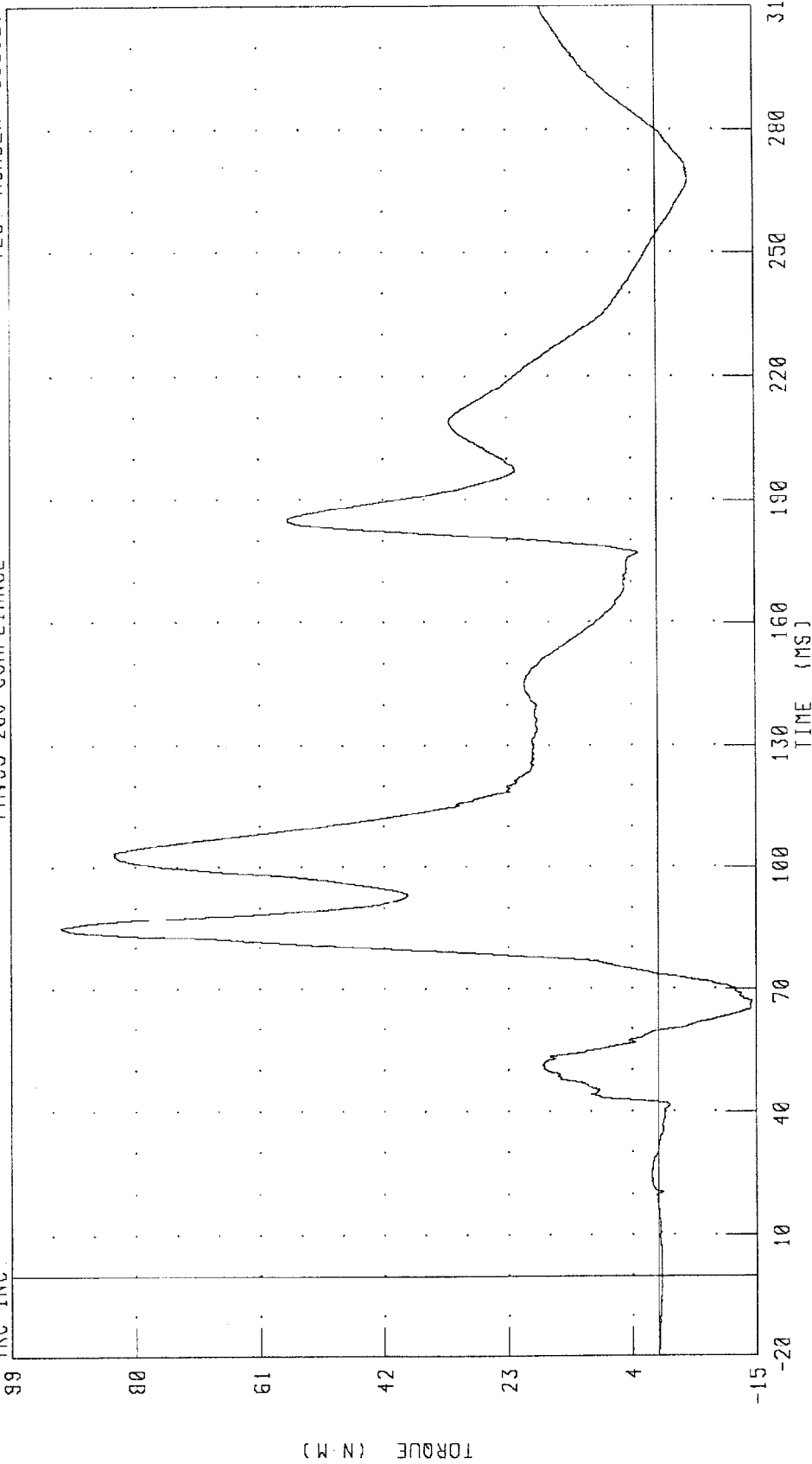
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

PASSENGER NECK MOMENT ABOUT Y AXIS

FMVSS 208 COMPLIANCE

TEST NUMBER 980127

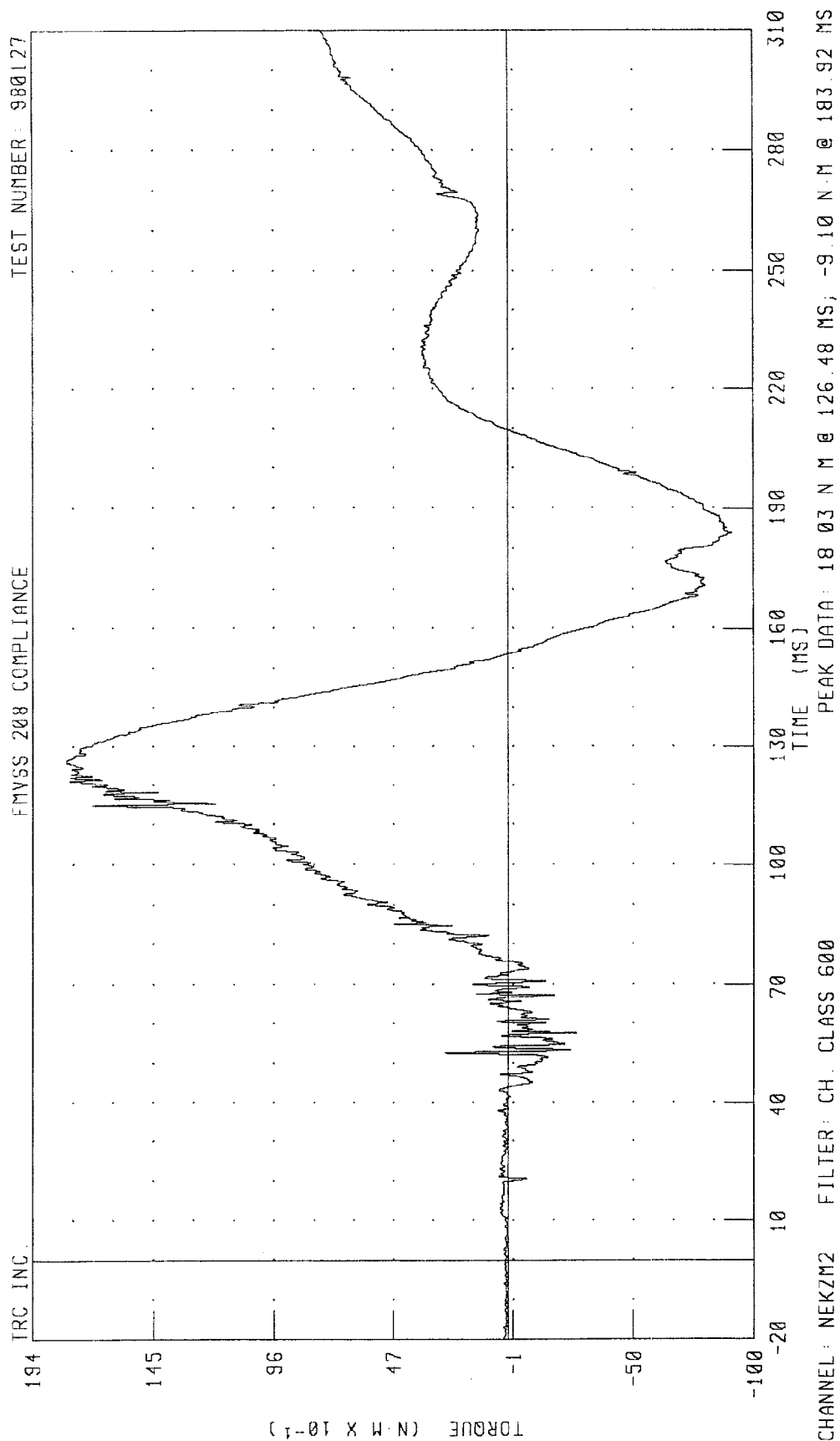
TRC INC.



CHANNEL: NEYM2 FILTER: CH. CLASS 600

PEAK DATA: 91.44 N-M @ 84.96 MS; -14.28 N-M @ 66.96 MS

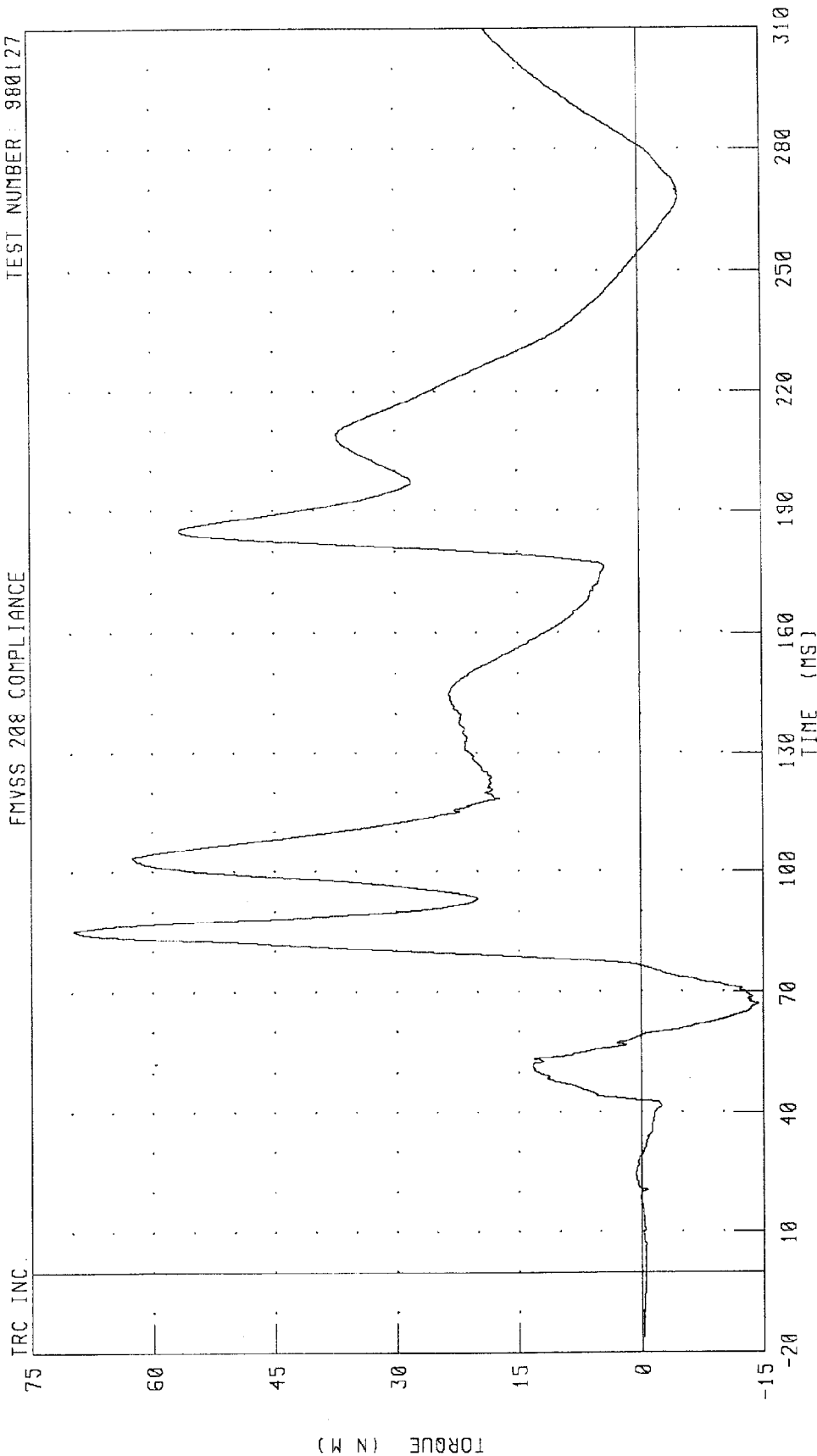
1998 FLYNOOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK MOMENT ABOUT Z AXIS



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
PASSENGER NECK OCCIPITAL CONDOYLE

TEST NUMBER: 980127

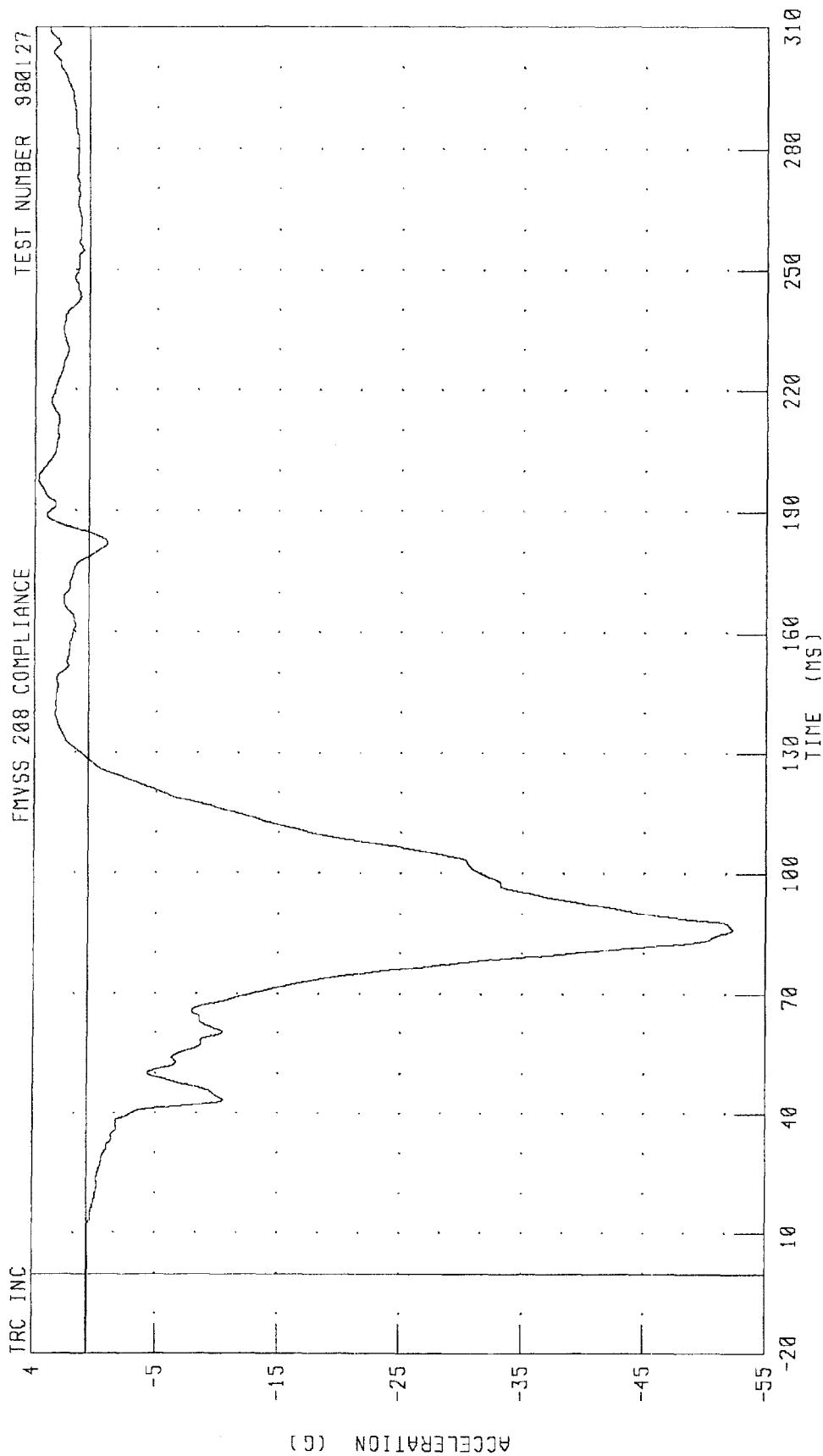
FMVSS 208 COMPLIANCE



CHANNEL: NEKOM2 FILTER: CH. CLASS 600

PEAK DATA: 69.80 N.M @ 85.04 MS, -14.29 N.M @ 66.96 MS

1988 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

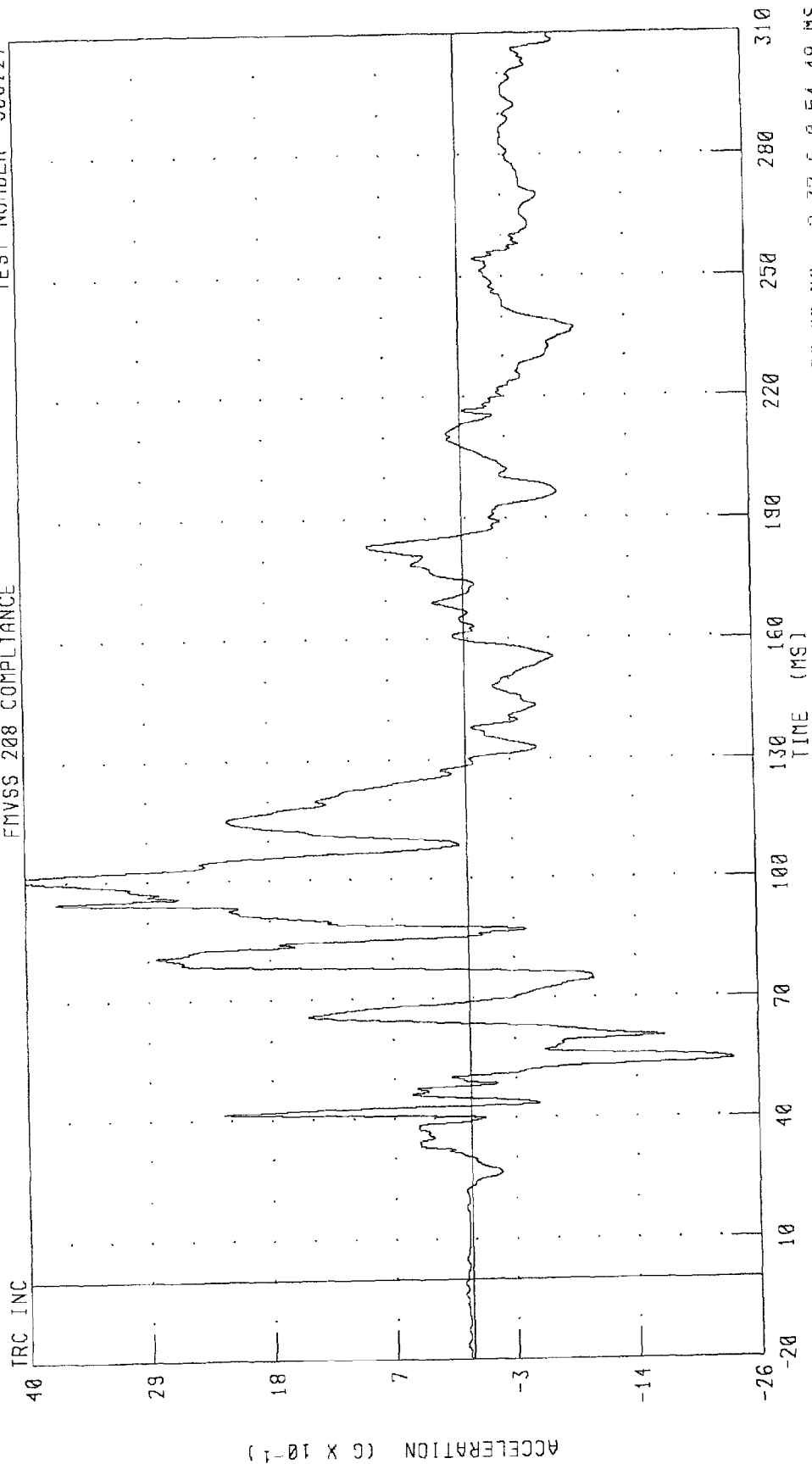


PEAK DATA: 4 07 G @ 198 72 MS; -52 84 G @ 86 08 MS

CHANNEL: CSTXC2 FILTER: CH. CLASS 180

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

FMVSS 208 COMPLIANCE
TEST NUMBER 980127



PEAK DATA: 4 14 G @ 100.96 MS, -2 37 G @ 54 48 MS

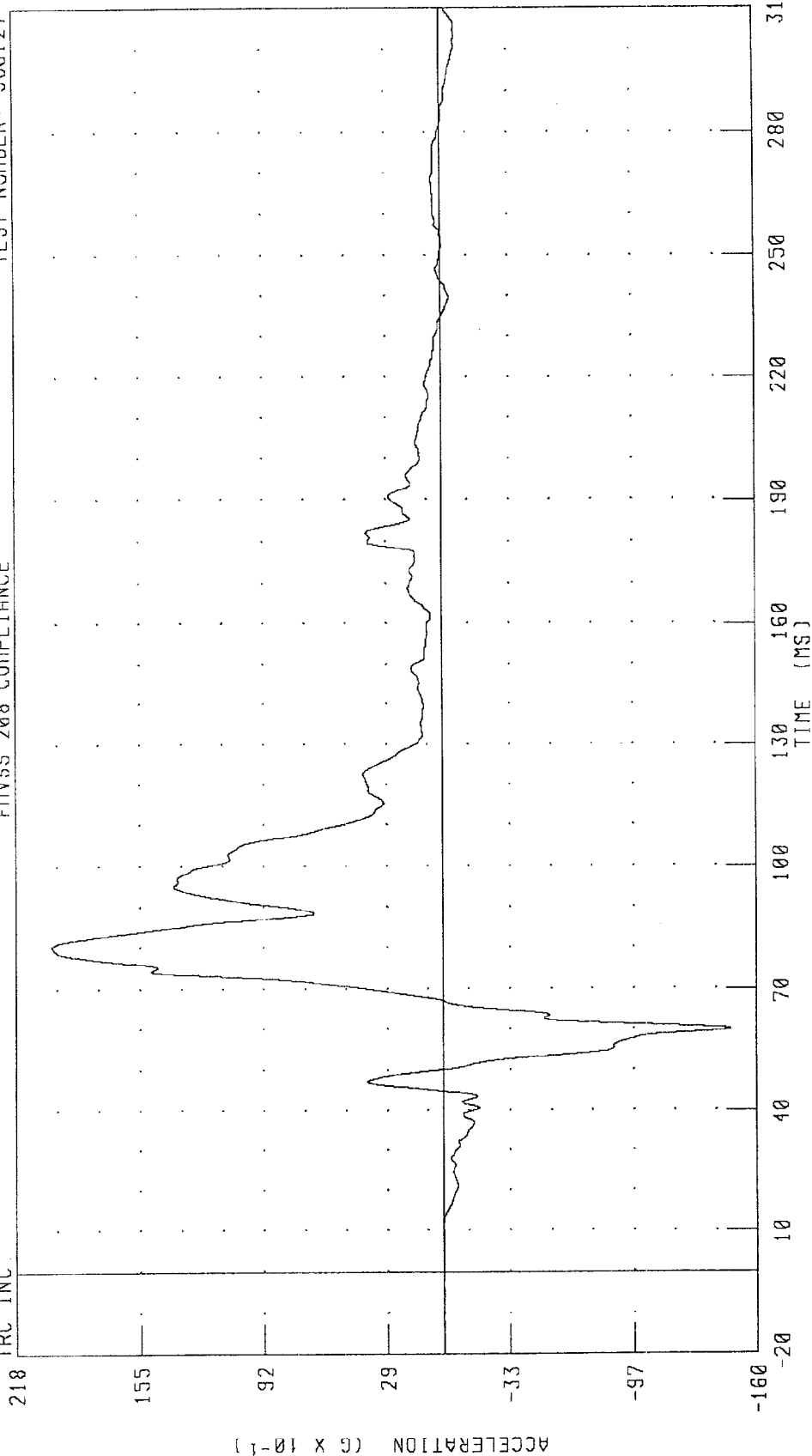
CHANNEL: CSTYC2 FILTER: CH CLASS 180

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC



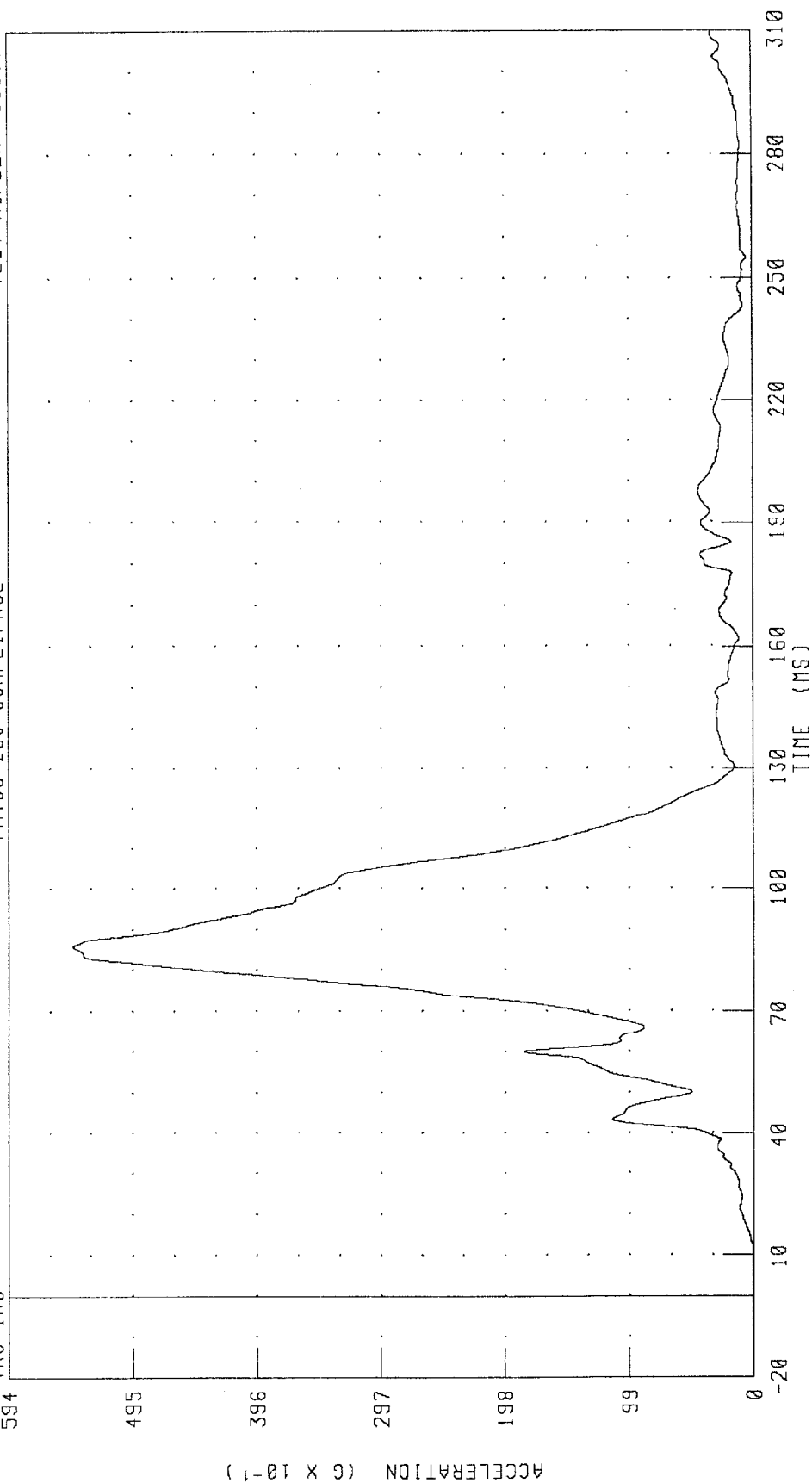
PEAK DATA: 19.97 G @ 80.32 MS, -14.63 G @ 59.92 MS

CHANNEL: CSTZG2 FILTER: CH. CLASS 180

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127

IRC INC

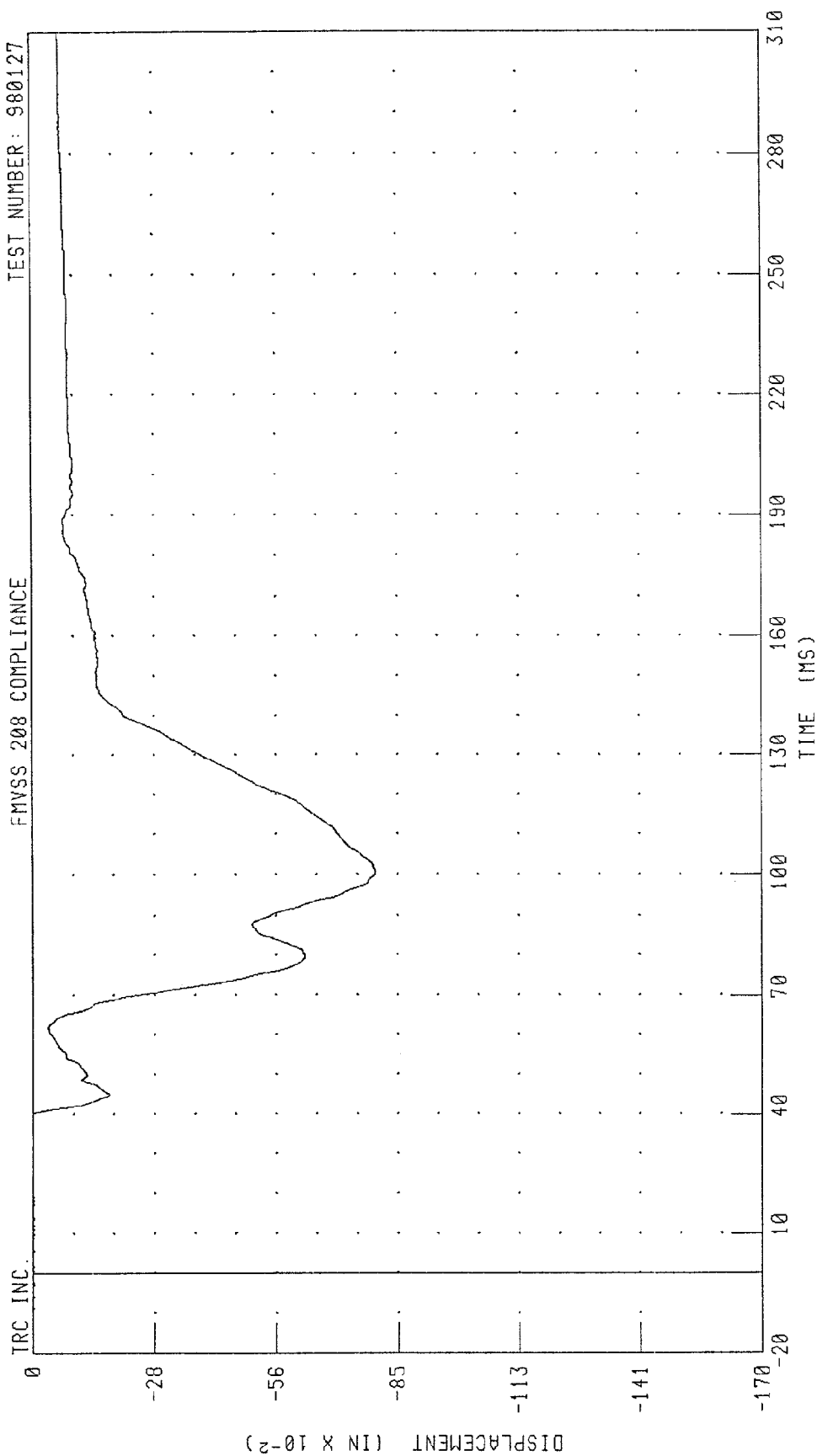


CHANNEL: CSTRG2 FILTER: CH. CLASS: 180

PEAK DATA: 54.23 G @ 85.84 MS, 0.01 G @ -20.00 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST DEFLECTION
 FMVSS 208 COMPLIANCE

TEST NUMBER: 980127



PEAK DATA: 0.02 IN @ 39.36 MS; -0.80 IN @ 100.72 MS

CHANNEL: CSTXD2 FILTER: CH. CLASS 600

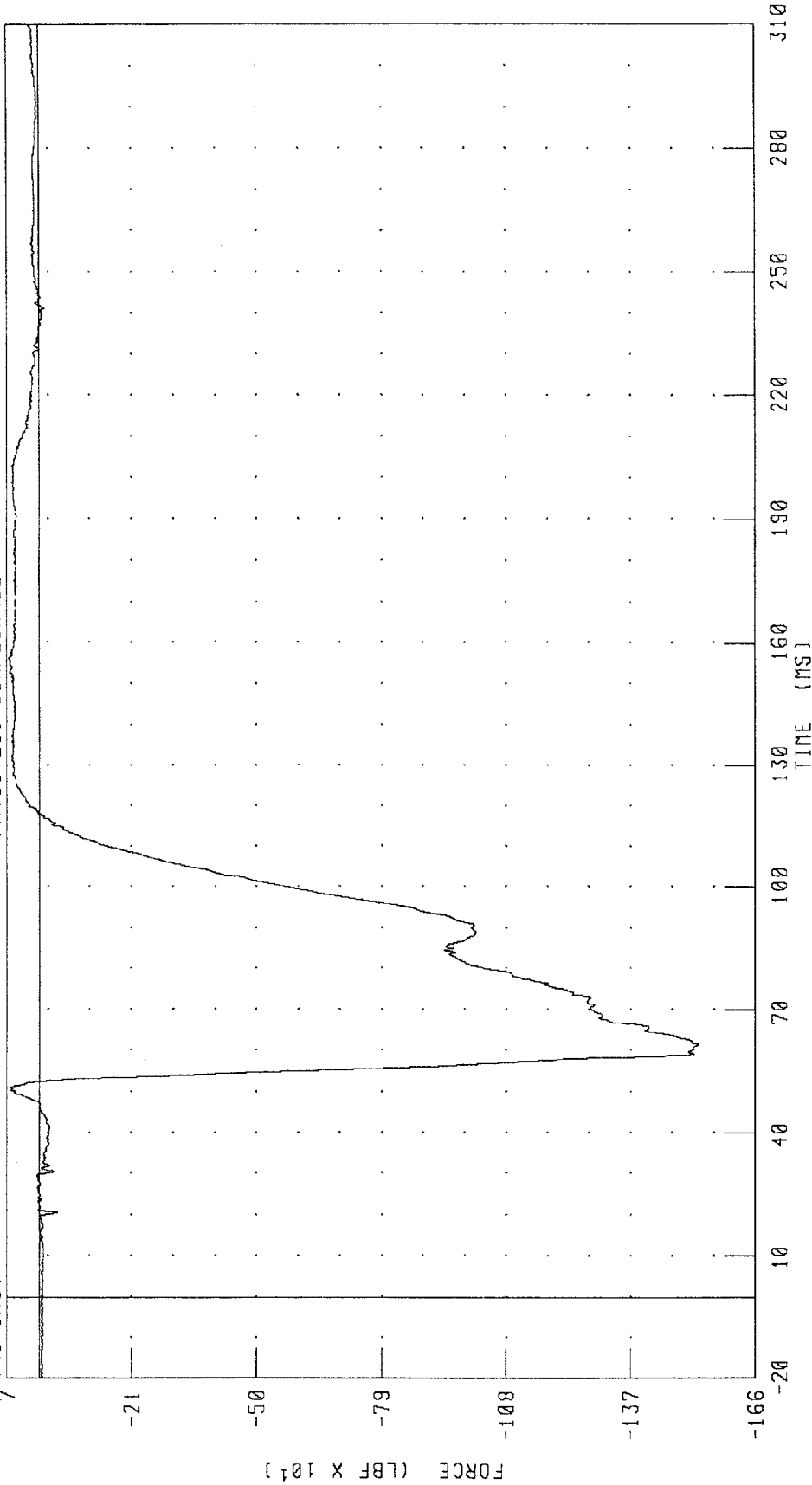
1988 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

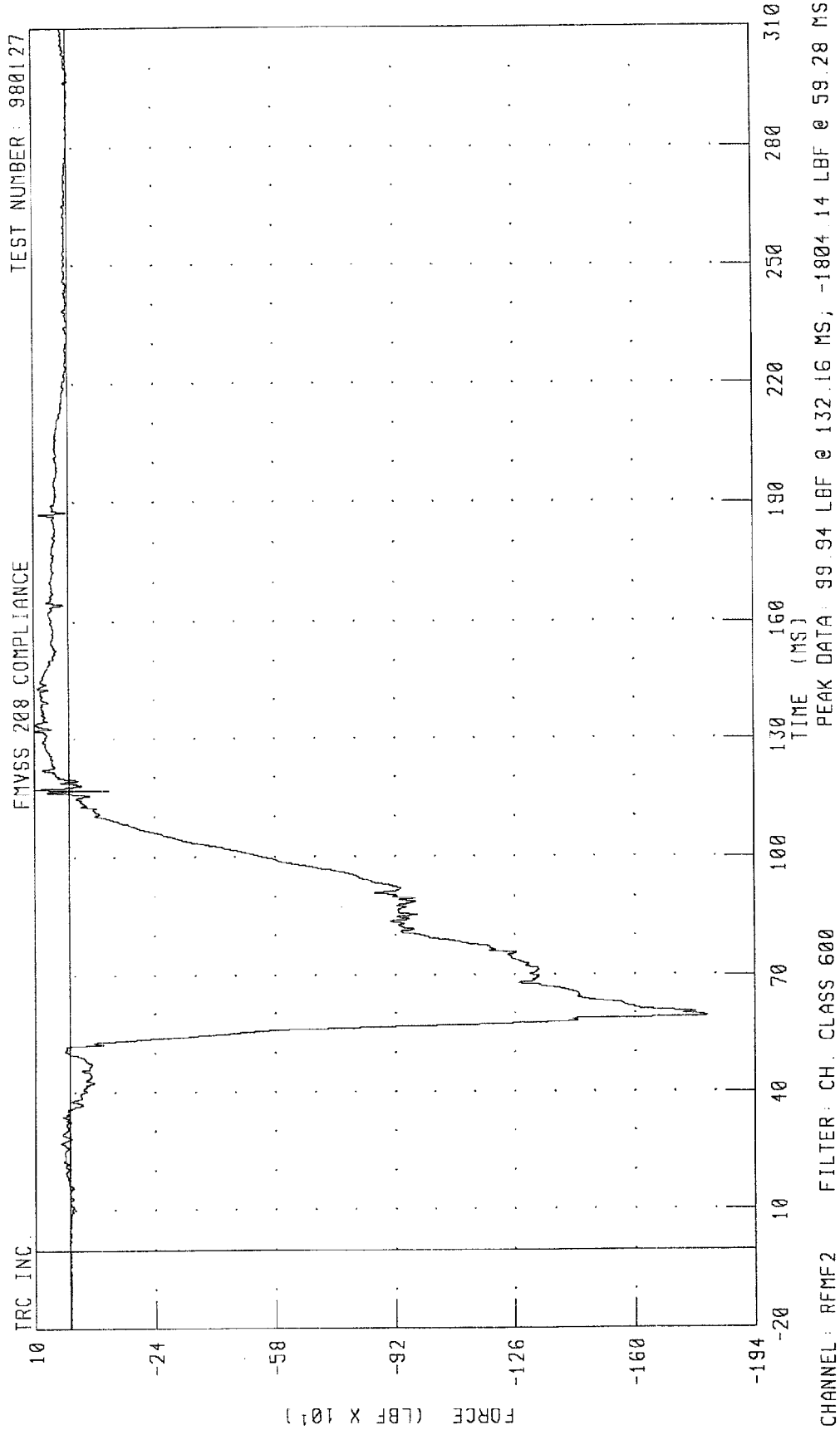
TRC INC.



CHANNEL: LFMF2 FILTER: CH. CLASS 600

PEAK DATA: 71.42 LBF @ 156.16 MS; -1530.24 LBF @ 61.60 MS

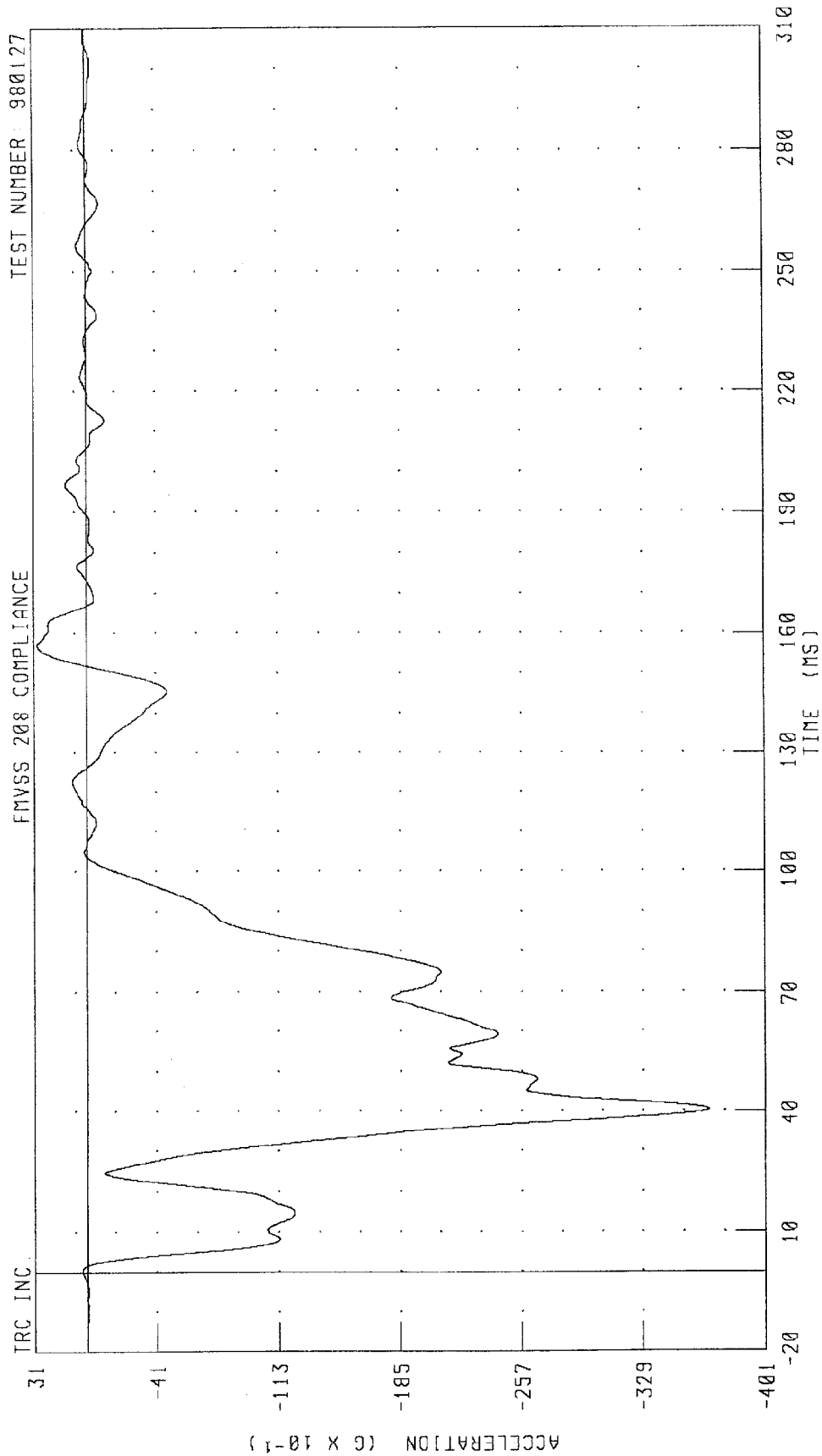
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE



1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE



CHANNEL: TLRXG1 FILTER: CH. CLASS 60

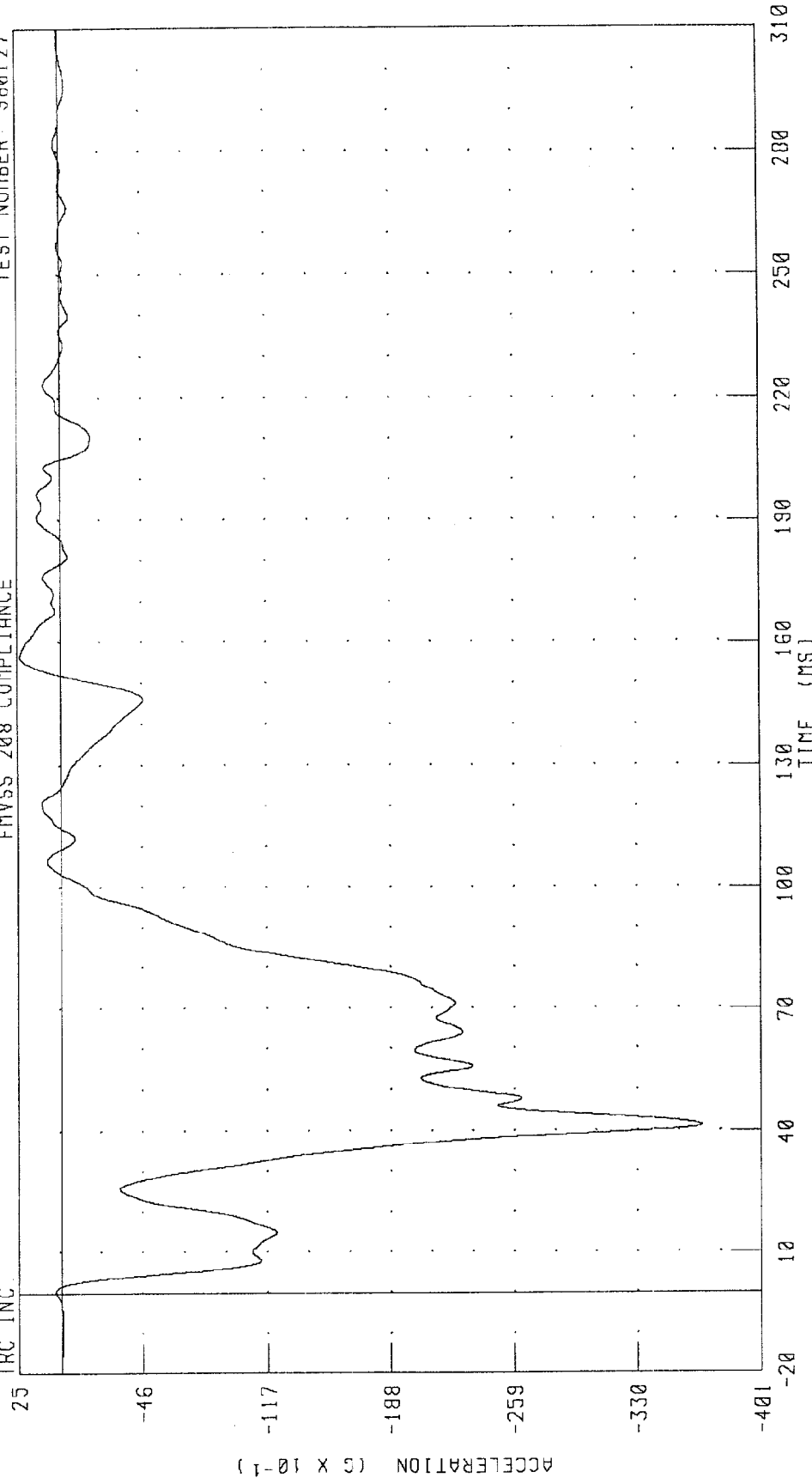
PEAK DATA: 2.89 G @ 157.12 MS; -36.78 G @ 40.32 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC



PEAK DATA: 2.34 G @ 156.64 MS; -36.70 G @ 41.28 MS

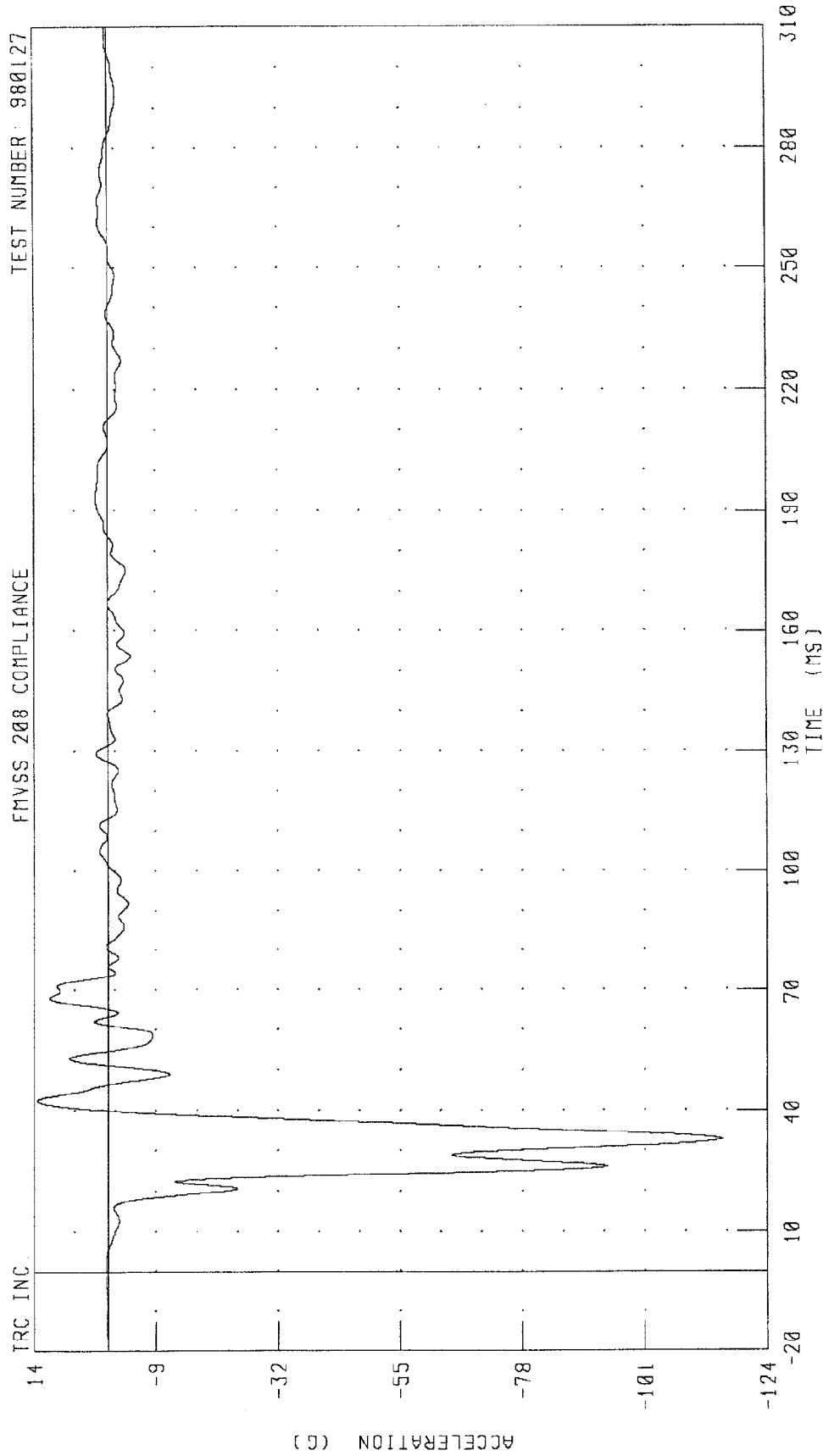
CHANNEL: TRRXG1 FILTER: CH. CLASS 60

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER

ENGINE UPPER BLOCK X-AXIS ACCELERATION

FMVSS 208 COMPLIANCE

TEST NUMBER 980127



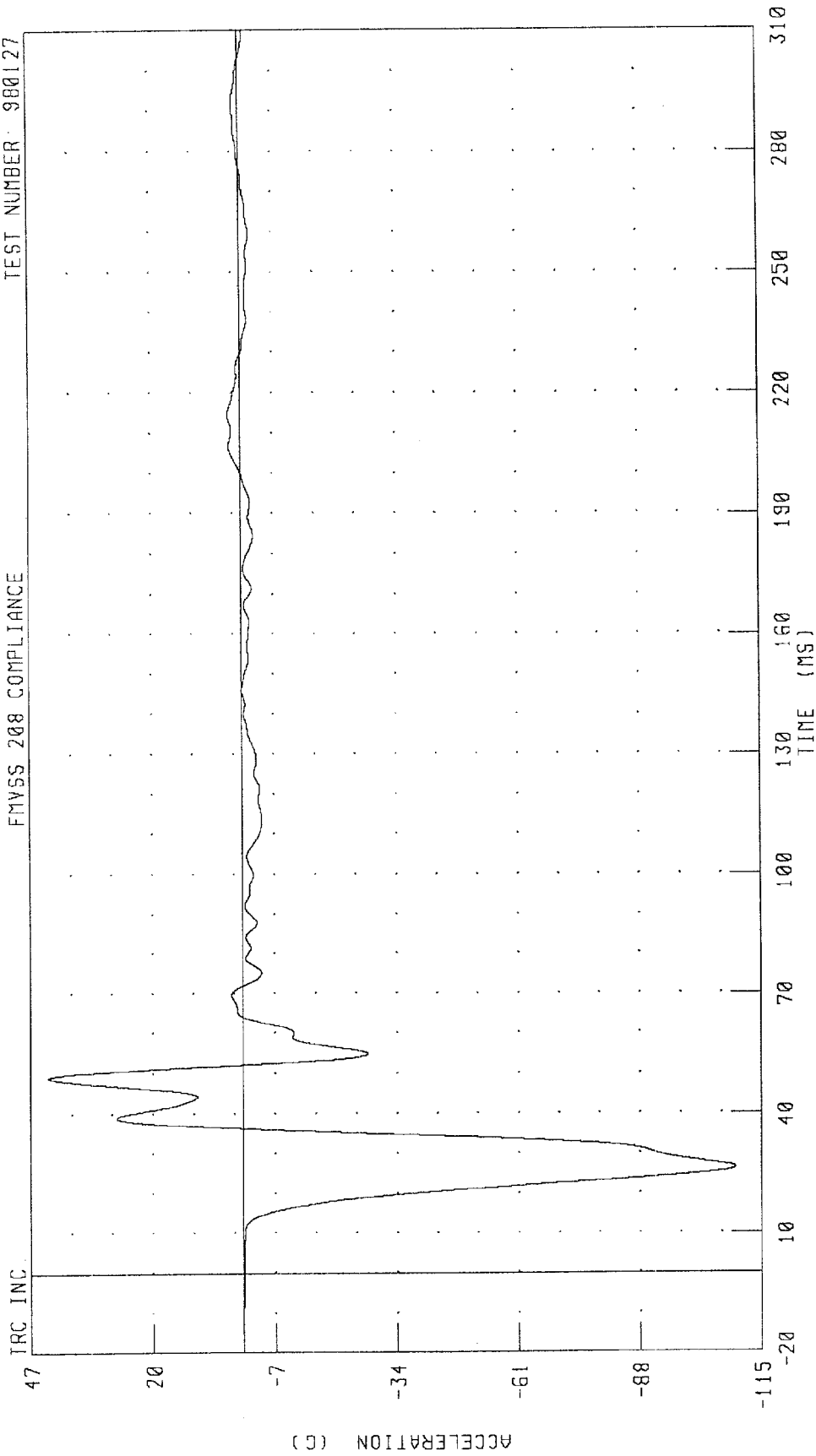
CHANNEL: ENGXC1 FILTER: CH. CLASS 60

PEAK DATA: 13.43 G @ 42.64 MS, -115.45 G @ 32.88 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION

TEST NUMBER 980127

FMVSS 208 COMPLIANCE



CHANNEL: ENGXG2 FILTER: CH. CLASS 60

PEAK DATA: 43.03 G @ 49.04 MS; -109.15 G @ 26.40 MS

1988 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC

39

19

ACCELERATION (G)

-1

-21

-41

-61

-81

TIME (MS)

130 160 190 220 250 280 310

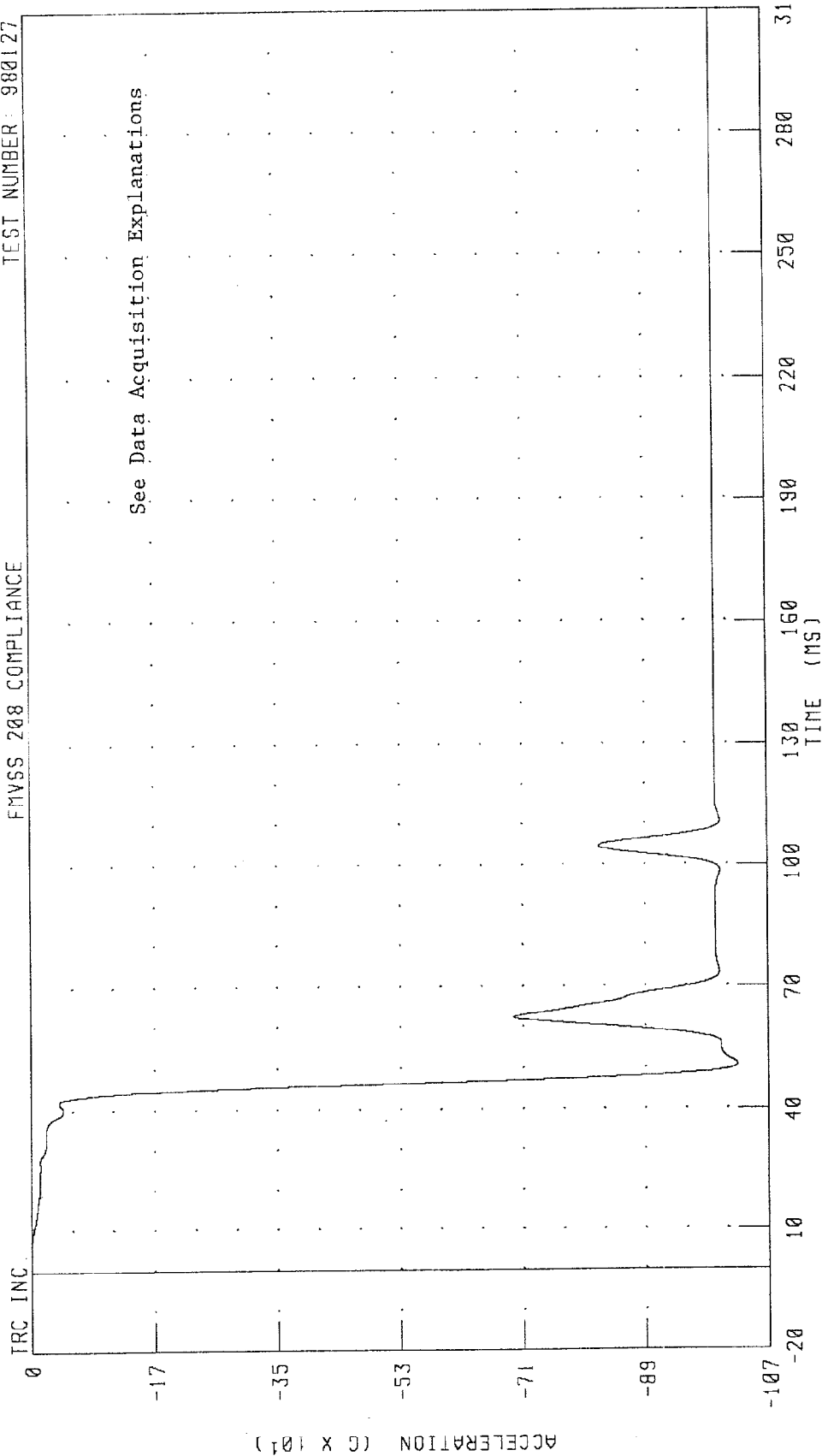
CHANNEL: BCRXG1 FILTER: CH. CLASS 60

PEAK DATA: 36.01 G @ 71.76 MS, -77.06 G @ 54.24 MS

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE



CHANNEL: BCLXG1 FILTER: CH. CLASS 60

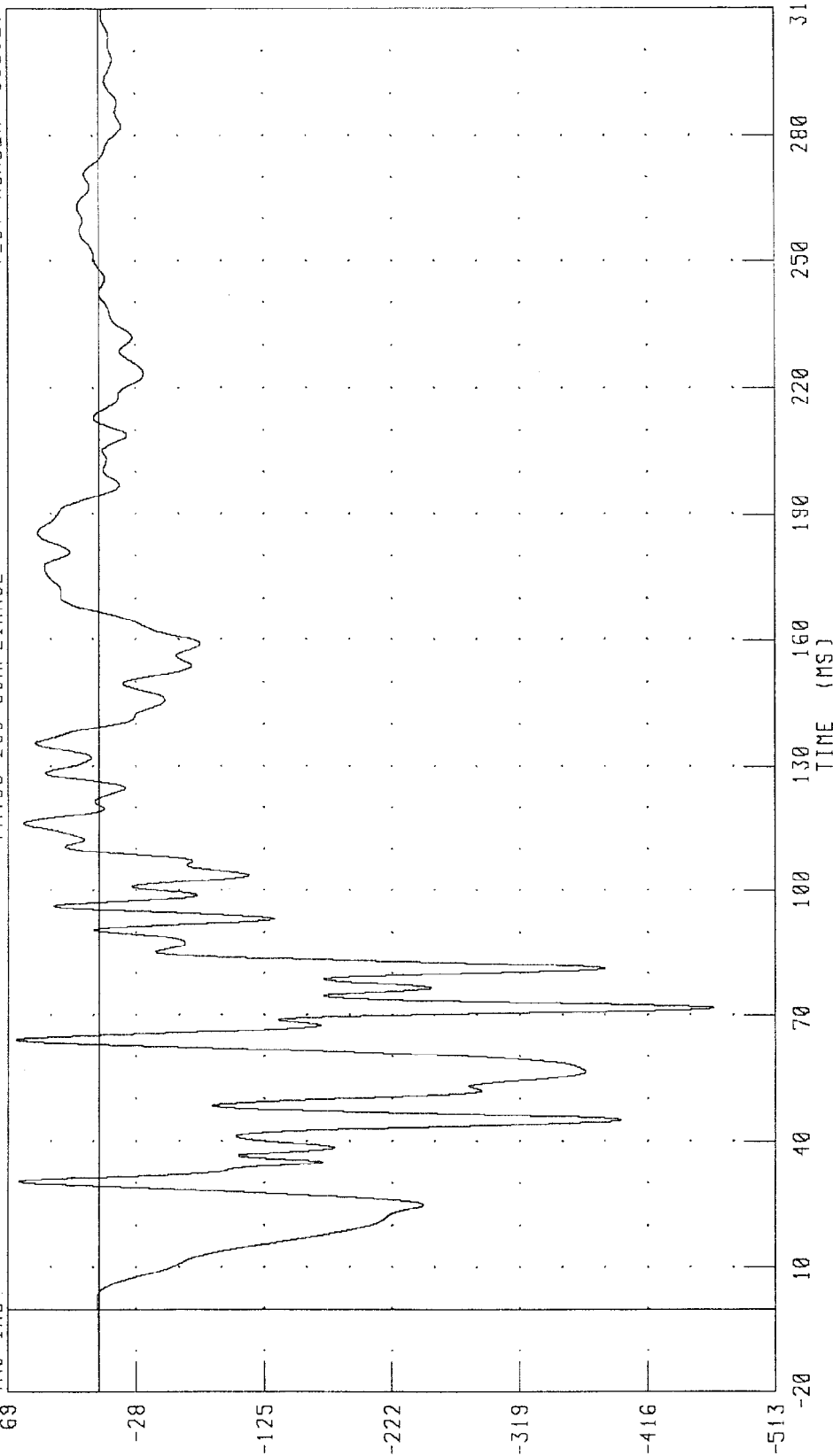
1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X-AXIS ACCELERATION

TEST NUMBER: 980127

FMVSS 208 COMPLIANCE

TRC INC.

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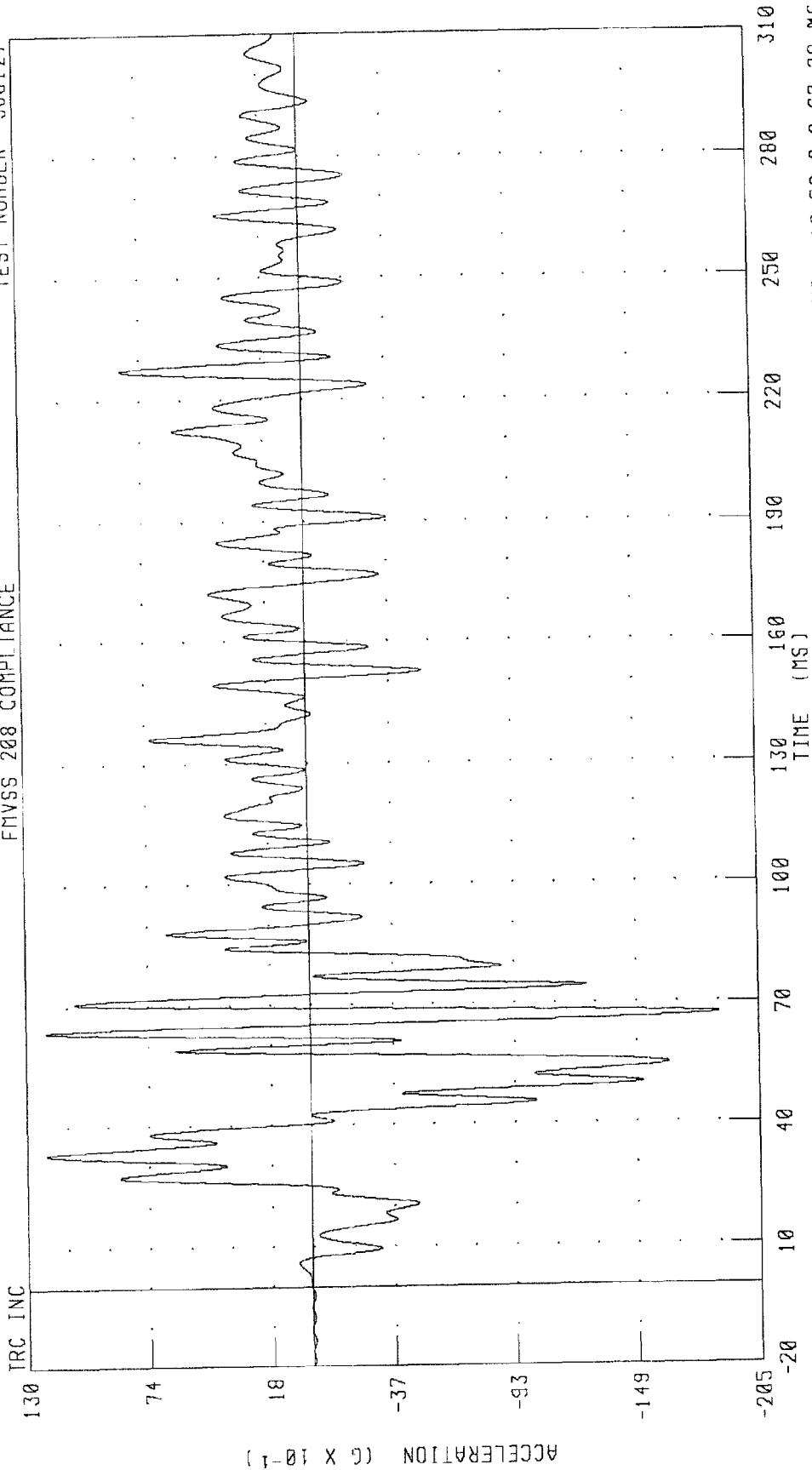


PEAK DATA: 6.33 G @ 64.16 MS; -46.61 G @ 71.76 MS

CHANNEL: DPCXG1 FILTER: CH. CLASS 60

1998 PLYMOUTH VOYAGER INTO FLAT FRONTAL BARRIER
 VEHICLE REAR CENTER Z-AXIS ACCELERATION
 FMVSS 208 COMPLIANCE

TEST NUMBER 980127



PEAK DATA 12.07 G @ 33.04 MS, -18.78 G @ 67.28 MS

CHANNEL TFCZG1 FILTER CH CLASS 60

Appendix C

Manufacturer's Vehicle Information

FMVSS 208

1998 DODGE CARAVAN



ATTACHMENT 3

RESPONSE TO QUESTION #8

GENERAL SETUP CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1998 Dodge CaravanVehicle Model & Body Style: Minivan

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"?). Indicate if the seat back angle is measured with the dummy in the seat.

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

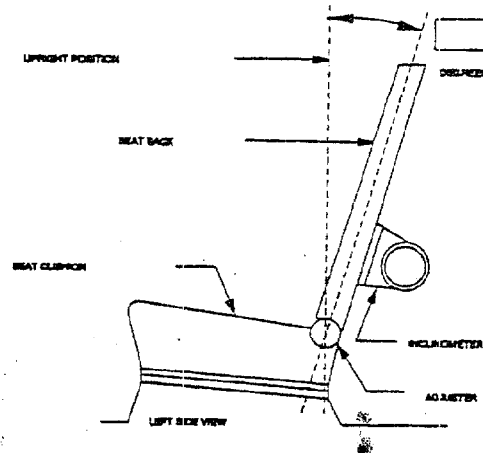
Measurement Instructions:

Set seatback without dummy in seat. Fully incline seatback. Hold inclinometer against frame of seatback approximately 55 mm above pivot point. Recline seat four degrees.

Seat back angle for passenger's seat = X 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:

Ensure seat is completely lowered. Only power seat has vertical adjustment. Locate full-forward and full-rear positions. Mark the seat at those positions. Distance should be 200 mm. Place seat mid-way between forward and rear. -- or -- For seat with manual adjuster, front latched position is number one. Move seat rearward ten clicks to eleventh latched position.

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

Same as driver seat.

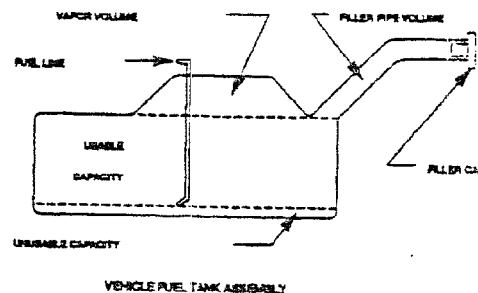
3. FUEL TANK CAPACITY DATA --

3.1 A. "Usable Capacity" of standard equipment fuel tank = 20.0 gallons.

B. "Usable Capacity" of optional equipment fuel tank = N/A gallons.

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 20.0 gallons.

Operational Instructions:



3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 19.0 gallons

Rev. 08/97ajr

TEST VEHICLE INFORMATION

3.3 Is vehicle equipped with electric fuel pump? X YES NO

If YES, does pump normally operate when vehicle's electrical system is activated? X YES NO

Insert key in ignition. Turn key to "run" position. Fuel pump will operate briefly, pressurizing fuel lines.

4. ADJUSTABLE UPPER ANCHORAGE POSITION:

Highest latched position is one. Lower turning loop two clicks to position number three. Verify it is securely latched.

5. STEERING COLUMN ADJUSTMENTS - -

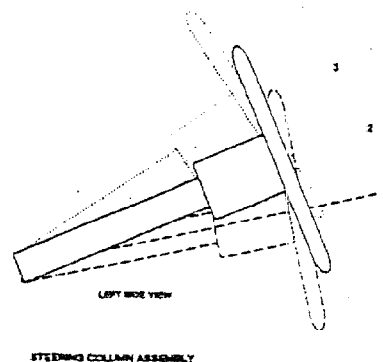
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.

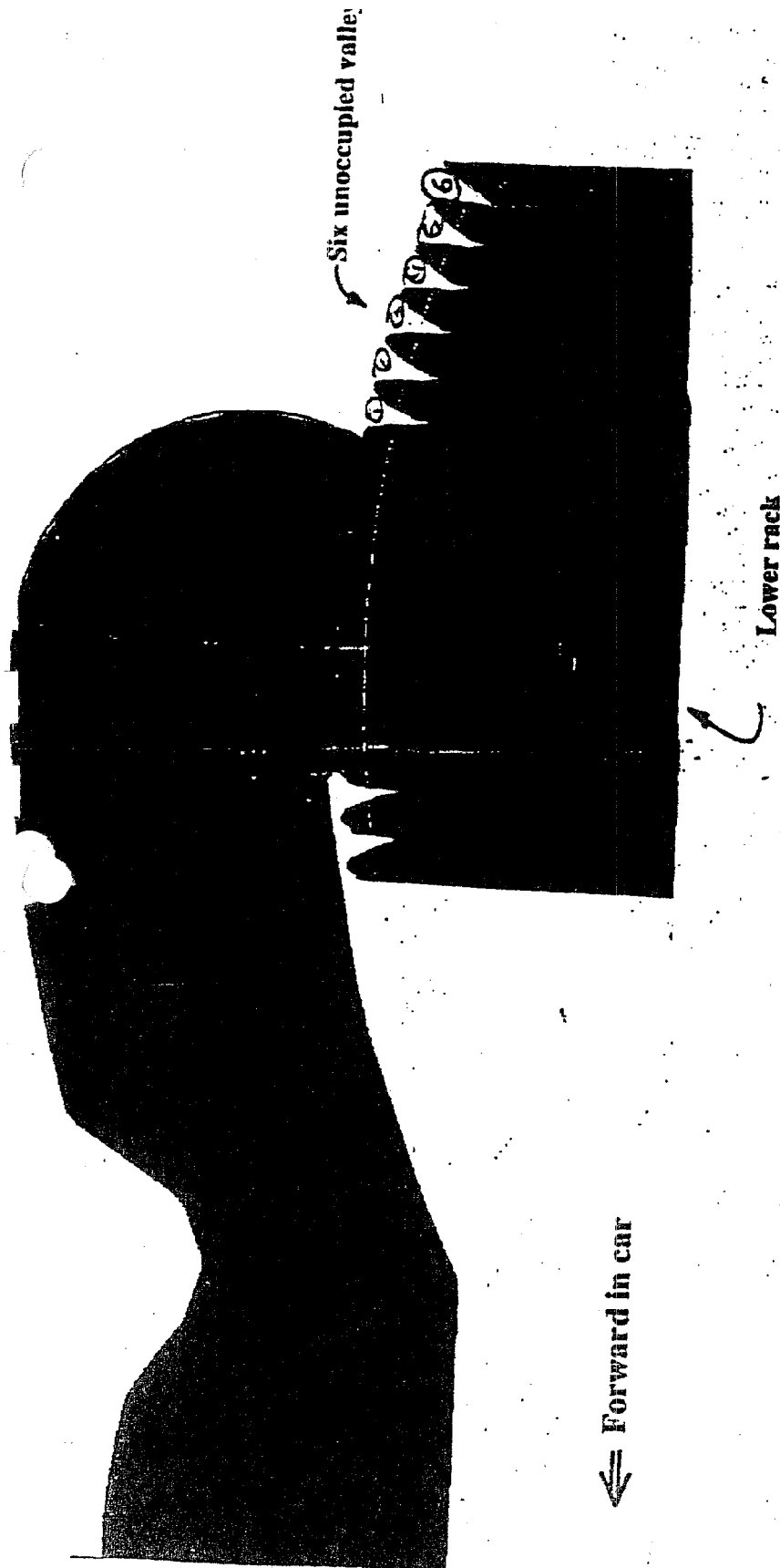
If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions:

Place tilt column in highest locked position. Verify tilt mechanism is engaged. This is position one. Lower steering wheel five clicks to position number six.

- or - Remove steering column shrouds to expose the tilt mechanism. A tilt pawl (pivots on fixed portion of column) engages a lower rack (resides on non-fixed portion of column). When column is correctly placed in "neutral" six unoccupied valleys are visible in the lower rack, rearward-in-car of the tilt pawl. See attachment.





Left Side View

NS-Body Tilt Steering Column: Proper Position for Impact

Achieve proper tilt head position for impact by:

- Locking tilt head in the full-up position. Ensure teeth are engaged.
- Lower tilt head (5) clicks.

This is also achieved by removing the shroud and visually inspecting the tilt mechanism. There should be six unoccupied valleys in the lower rack.

MWC
6/20/97

Appendix A

Photographs