

V2046

Report Numbers: 208-TRC-94-014
212-TRC-94-014
301-TRC-94-014

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

Explorer Van Division of
Bodor Corporation
1994 Explorer van
NHTSA Number: CR1300
TRC Test Number: 940317

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



April 1, 1994

Final Report

Prepared For:
U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance (NEF-31)
400 Seventh Street, S.W., Room No. 6115
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-93-D-01089.

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1. Report No. 208-TRC-94-014 212-TRC-94-014 301-TRC-94-014	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle FINAL REPORT OF FMVSS NOS. 208, 212, 219 (PARTIAL), AND 301 COMPLIANCE TESTING OF A 1994 EXPLORER VAN, NHTSA NO. CR1300		5. Report Date APRIL 1, 1994	
7. Author(s) C. A. Markusic, Senior Project Engineer, TRC		6. Performing Organization Code TRC	
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		8. Performing Organization Report No. 208-TRC-94-014 212-TRC-94-014 301-TRC-94-014	
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-31) 400 Seventh St., S.W., Washington, DC 20590		10. Work Unit No. (TRIS) 11. Contract or Grant No. DTNH22-93-D-01089	
15. Supplemental Notes		13. Type of Report and Period Covered FINAL REPORT MARCH - APRIL 1994	
16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1994 Explorer van, NHTSA No. CR1300, at Transportation Research Center Inc. on March 17, 1994. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS 208, "Occupant Crash Protection"; 212, "Windshield Mounting"; 219 (partial), "Windshield Zone Intrusion"; and 301 "Fuel System Integrity." The barrier impact velocity was 29.3 mph. The vehicle's maximum static crush was 19.6 inches. The ambient temperature was 74° F. The driver's head injury criteria (HIC) was 432. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.3 g. The driver's left and right femur maximum axial forces were 820 pounds and 929 pounds, respectively. The passenger's HIC was 779. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.7 g. The passenger's left and right femur maximum axial forces were 441 pounds and 619 pounds, respectively. The vehicle appears to comply with the applicable requirements of FMVSS 208, 212, 219 (partial), and 301. The test vehicle was based on a 1994 Chevrolet Astro extended cargo van.			
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"		18. Distribution Statement Available from: NHTSA Technical Reference Division Room 5108, (NAD-52) 400 Seventh Street, S.W. Washington, DC 20590 Attn: Mr. Robert Hornick	
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages	22. Price

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 m = 2.54 (exactly). For other exact conversions and more detail tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SO Catalog No. C13.10.286.

Approximate Conversions from Metric Measures

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

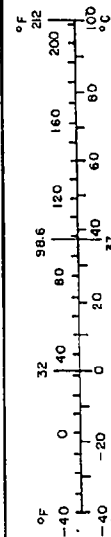


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Section 1.0

Purpose and Test Procedure

Purpose

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standards (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-93-D-01089. The purpose of this test was to determine if the subject vehicle, a 1994 Explorer van, NHTSA No. CR1300, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," in the flat frontal barrier impact mode.

Test Procedure

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

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

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

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

The twenty-four (24) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 12,500 samples per second and processed per Sections 11.13 through 11.15 of the Laboratory Test Procedure.

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

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

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This flat frontal barrier test was conducted at TRC on March 17, 1994.

The test vehicle, a 1994 Explorer van, NHTSA No. CR1300, appeared to comply with the performance requirements of FMVSS 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the front outboard designated seating positions. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with an airbag and 3-point unbelt at the driver's seating position and a 3-point unbelt at the right front passenger's seating position. The vehicle's test weight was 5200 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 19.6 inches.

The driver's HIC was 432. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 56.3 g. The driver's left and right femur maximum compressive forces were 820 pounds and 929 pounds, respectively.

The right front passenger's HIC was 779. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.7 g. The right front passenger's left and right femur maximum compressive forces were 441 pounds and 619 pounds, respectively.

There was no loss of windshield periphery retention.

There was no penetration through the windshield.

Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test or during any portion of the static rollover test.

Data Acquisition Explanations

The driver's chest X, Y, and Z-axis accelerometers recorded questionable data from approximately 88 to 94 milliseconds. The data acquisition circuitry was checked after the test and no cause for the questionable data was found. The questionable data affected the driver's chest resultant acceleration calculation.

The engine bottom X-axis accelerometer, ENGXG2, lost data after 53 milliseconds as a result of the accelerometer's cable being cut by the vehicle's crush on impact.

Table 1 Crash Test Summary

NHTSA number:	CR1300
Test type:	Frontal barrier impact
Test date:	03/17/94
Test time:	1513
Ambient temperature at impact area:	74° F
Vehicle year/make/ body style:	1994/Explorer/van
Vehicle test weight:	5200 lb
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	NA ³
Secondary:	29.3 mph
Maximum static crush:	19.6 in
Average rebound:	12.4 in
Number of cameras:	
Real-time:	2
High-speed:	14
Door opening data:	
Left front/rear:	Easy/NA
Right front/rear:	Easy/Easy

¹ With respect to tow track centerline.

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

³ Primary speed trap failed.

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #354</u>	<u>Passenger #353</u>
Type:	Part 572 B	Part 572 B
Location:	Left front	Right front
Restraint:	Airbag and 3-point unbelt	3-point unbelt
Number of data channels:	8	8
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag	Chest, head restraint, right knee
Chest:	Airbag	None
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/body style: 1994/Explorer/van
 Color: White
 VIN: 1GBDM19Z0RB114261
 NHTSA number: CR1300
 Engine data:
 Placement: Longitudinal/inline
 Cylinders: 6
 Displacement: 4.3 liters
 Transmission data: 4 speed, __ manual, X automatic, X overdrive
 Final drive: __ fwd, X rwd, __ 4wd
 Date vehicle received: 01/28/94
 Odometer reading: 437
 Dealer's name and address: Superior Chevrolet, Inc.
 4124 Spring Grove Ave.
 Cincinnati, OH 45223

Accessories:

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

Certification data from vehicle's label: NA¹

Vehicle manufactured by:

Date of manufacture:

VIN:

GVWR:

GAWR: Front:

Rear:

¹ The vehicle did not contain a certification label.

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P215/75R15

Tire pressure with maximum
capacity vehicle load:

Front: 35 psi

Rear: 35 psi

Spare tire: Space saver

Type of front seats: Bucket

Tire & capacity data from vehicle's label: NA¹

Recommended tire size:

Recommended cold tire pressure:

Front:

Rear:

Designated seating capacity:

Front:

Rear:

Total:

Vehicle capacity weight:

Test vehicle attitudes:

Delivered attitude: LF: 29.2 in. RF: 28.9 in LR: 29.4 in RR: 29.4 in

Fully loaded attitude: LF: 28.7 in RF: 28.4 in LR: 28.6 in RR: 28.6 in

Pre-test attitude: LF: 28.9 in RF: 28.6 in LR: 28.6 in RR: 28.6 in

¹ The vehicle did not contain a tire information label.

Table 2 Test Vehicle Information, Cont'd.

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

Right front	1122	lb	Right rear	1117	lb
Left front	1231	lb	Left rear	1113	lb
Total front weight	2353	lb	(51.3% of total vehicle weight)		
Total rear weight	2230	lb	(48.7% of total vehicle weight)		
Total delivered weight	4583	lb			

Calculation of test vehicle's target test weight:

RCLW¹ = Rated Cargo and Luggage Weight

GVWR² = Gross Vehicle Weight rating (5950 lb)

UDW = Unloaded Delivered Weight (4583 lb)

VCW = Vehicle Capacity Weight = GVWR - UDW = 1367

DSC³ = Designated Seating Capacity (7)

RCLW¹ = VCW - 150 (DSC) = 1367 - 150(7) = 317

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

Target test weight = 4583 + 300 + 328 = 5211 lb

Weight of test vehicle with required dummies and 81 lb of cargo weight:

Right front	1224	lb	Right rear	1345	lb
Left front	1315	lb	Left rear	1316	lb
Total front weight	2539	lb	(48.8% of total vehicle weight)		
Total rear weight	2661	lb	(51.2% of total vehicle weight)		
Total test weight	5200	lb	(0.2% under target test weight)		

Weight of ballast secured in vehicle cargo area: 350 lb

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 56.8 in

Vehicle Wheelbase: 111.0 in

¹ Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

² GVWR supplied by vehicle manufacturer.

³ DSC is determined by counting the number of seat belts installed in the vehicle.

Table 3 Post-Impact Data

Test number: 940317
 NHTSA number: CR1300
 Test date: 03/17/94
 Test time: 1513
 Test type: Frontal barrier impact
 Impact angle: 0°
 Ambient temperature
 at impact area: 74° F
 Temperature in
 occupant compartment: 72° F
 Impact velocity:
 Primary: NA¹
 Secondary: 29.3 mph
 Specified range: 28.9 to 29.9 mph

Distance from vehicle to barrier:

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

Test vehicle static crush:

Overall length of test vehicle:

Pre-test:	L: 184.1 in	C: 187.8 in	R: 184.0 in
Post-test:	L: 166.2 in	C: 168.2 in	R: 168.0 in
Total crush:	L: 17.9 in	C: 19.6 in	R: 16.0 in
Average crush:	17.8 in		

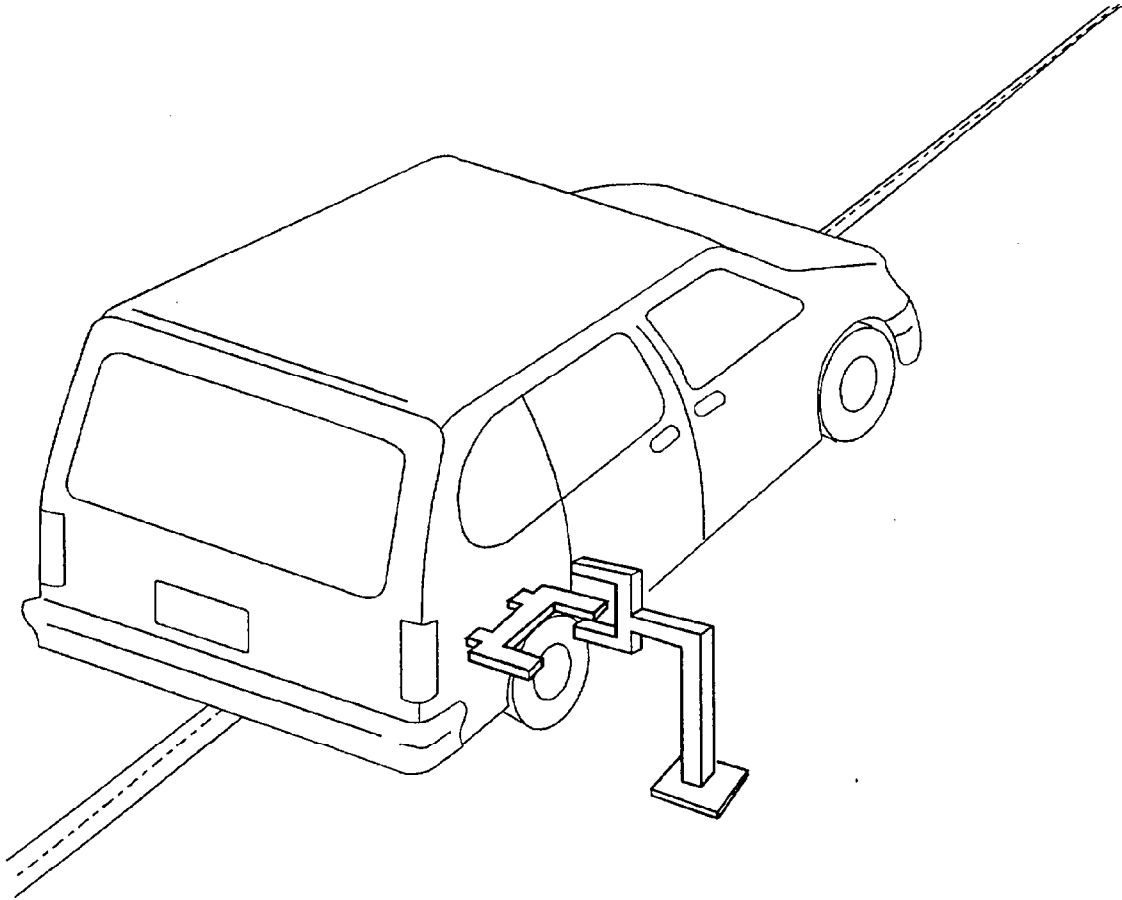
Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L: 13.8 in	C: 11.8 in	R: 11.6 in
Average rebound:	12.4 in		

¹ Primary speed trap failed.

Figure 1 Impact Velocity Measurement System



The final vane clears emitter/receiver two inches before impact.
The vanes have a one-foot spacing.

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

NHTSA number: CR1300
 Test date: 03/17/94
 Vehicle year/make/body style: 1994/Explorer/van
 Vehicle size category: Van
 VIN: 1GBDM19Z0RB114261
 Build date¹: NA
 Test weight: 5200 lb
 Vehicle wheelbase: 111.0 in
 Maximum width: 79.6 in
 Front overhang: 31.6 in

Collision Deformation

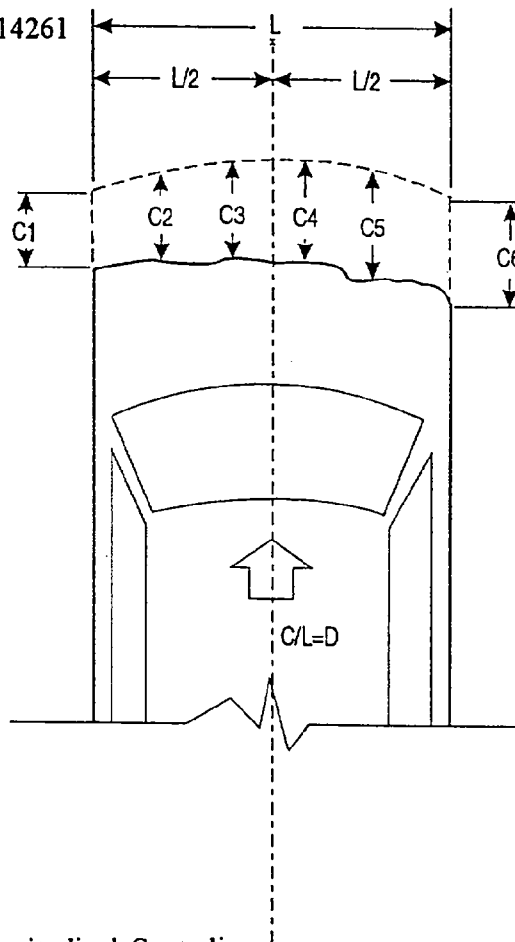
Classification (CDC) Code: 12FDEW3

Crush depth measurements:

C1:	17.9 in
C2:	19.3 in
C3:	19.6 in
C4:	19.2 in
C5:	18.3 in
C6:	16.0 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 60.0 in



¹ The vehicle did not contain a certification label.

Table 4 Post-test Airbag Data

NHTSA number: CR1300
Test date: 03/17/94
Technician: Markusic
Vehicle year/make/
body style: 1994/Explorer/van

A. Number of airbag vent holes:

Driver: 2
Passenger: NA

B. Size of airbag vent holes:

Driver: 1.8 in dia
Passenger: NA

C. Total airbag vent area:

Driver: 5.1 in²
Passenger: NA

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

Driver:	Length	NA
	Width	NA
	Diameter	29.0
Passenger:	Length:	NA
	Width:	NA
	Diameter:	NA

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

E. Is the airbag tethered?

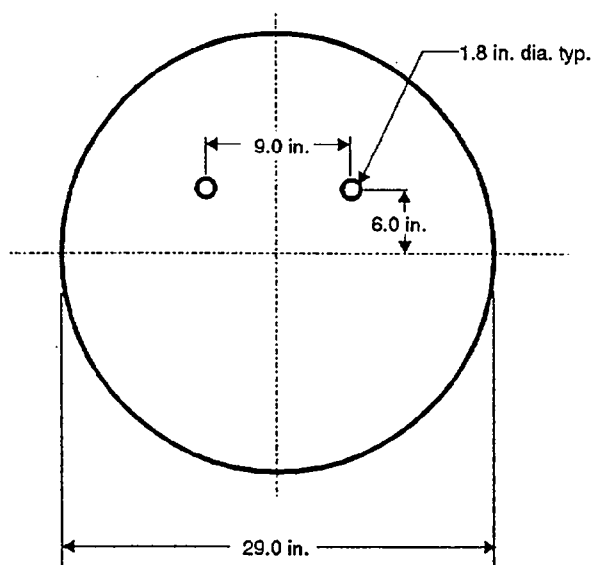
Driver: No

If yes, record length of tether: NA

Passenger: NA

If yes, record length of tether: NA

Driver's airbag:



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

Driver: Mfr.: Morton Int'l, Airbag: PUT11789-03A, Gen: GBFD763VCEC

Passenger: NA

Figure 3 Vehicle Accelerometer Placement

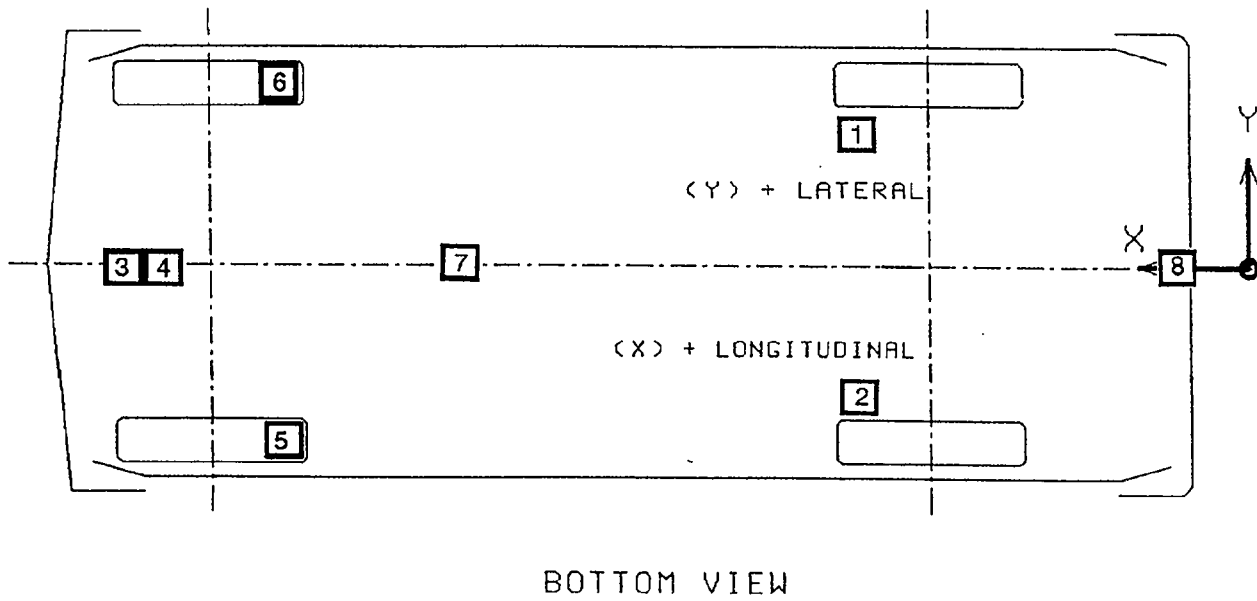
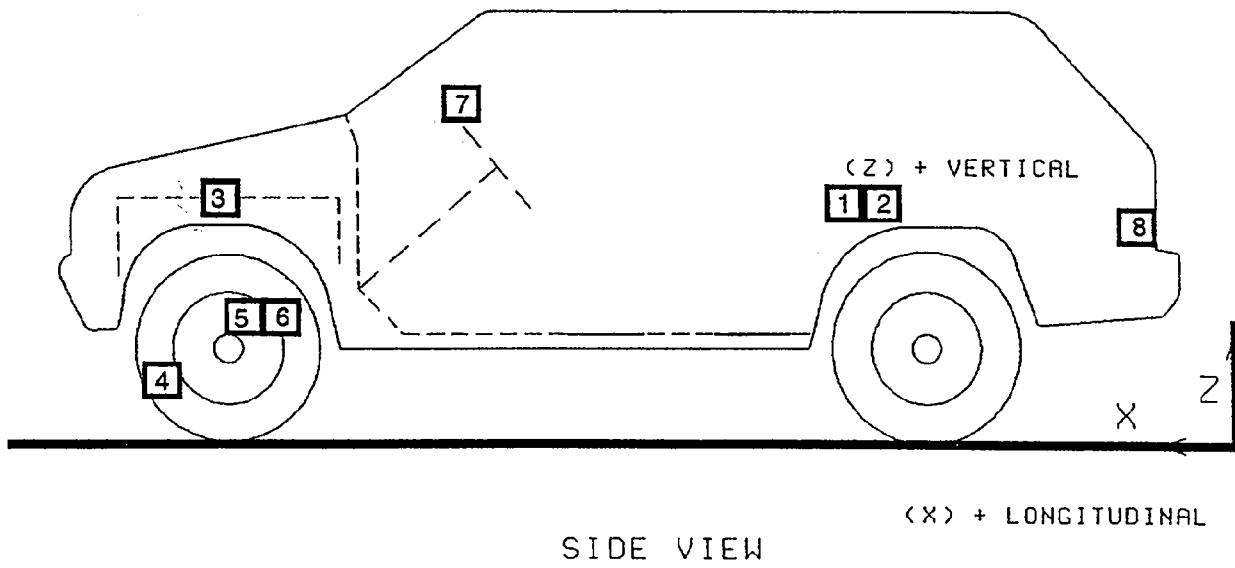


Table 5 Vehicle Accelerometer Locations and Data Summary

No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 64.0 in POST 64.7 in	17.8 in 17.8 in	23.8 in 25.8 in	2.3 g @ 111.8 ms	36.8 g @ 56.3 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 63.5 in POST 64.7 in	-20.9 in -20.9 in	23.7 in 25.6 in	3.7 g @ 111.7 ms	36.5 g @ 56.2 ms
3 ENGINE TOP LONGITUDINAL	PRE 145.1 in POST 143.2 in	10.8 in 11.0 in	31.1 in 33.1 in	11.5 g @ 58.5 ms	63.0 g @ 44.9 ms
4 ENGINE BOTTOM LONGITUDINAL ¹	PRE 145.0 in POST 143.8 in	-6.0 in -5.5 in	17.4 in 14.2 in	---	---
5 RIGHT BRAKE CALIPER LONGITUDINAL	PRE 152.5 in POST 147.5 in	-26.1 in -25.2 in	14.5 in 13.9 in	41.4 g @ 24.7 ms	82.7 g @ 31.0 ms
6 LEFT BRAKE CALIPER LONGITUDINAL	PRE 151.5 in POST 144.0 in	26.1 in 28.0 in	14.4 in 14.1 in	43.8 g @ 21.6 ms	92.0 g @ 34.8 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	PRE 144.2 in POST 144.8 in	0.0 in 0.0 in	52.9 in 55.2 in	13.3 g @ 65.3 ms	52.7 g @ 40.3 ms
8 VEHICLE REAR CENTER VERTICAL	PRE 14.5 in POST 15.1 in	0.0 in 0.0 in	23.0 in 26.0 in	9.4 g @ 67.7 ms	7.0 g @ 110.6 ms

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

¹See DATA ACQUISITION EXPLANATIONS

Report of Vehicle Condition at the Completion of Testing

Contract number: DTNH22-93-D-01089

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

To: Mr. Charles Case, COTR
 Office of Vehicle Safety Compliance

The following vehicle has been subjected to testing for FMVSS 208. The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager/NAD-30, with a carbon copy to the responsible testing office. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

NHTSA number:	CR1300				
Vehicle year/make/ body style:	1994/Explorer/van				
Body color:	White				
VIN:	1GBDM19Z0RB114261				
Odometer (arrival):	437	Date:	01/28/94		
Odometer (completion):	442	Date:	03/17/94		
Cost:	\$21,602.00				
Air conditioner	Yes	Console	Yes	Brakes	Power
Tinted glass	Yes	Tachometer	No	Front	Disc ABS
Power steering	Yes	Speed control	Yes	Rear	Drum ABS
Power windows	Yes	Rear window def.	Yes	Front seats	Power-Dr. Manual-Psngr.
Power door locks	Yes	Sun/moon roof	No	Seat type	Front-Bucket Rear-Bench
Radio	Yes	T-top	No		
Clock	Yes	Tilt steering wheel	Yes	Number of seats	7
Roof rack	No	Other options:	None		

Report of Vehicle Condition at the Completion of Testing, Cont'd.

Engine data:

Cylinders: 6
Displacement: 4.3 liters
Transmission: Automatic
Final drive: RWD
Tire size: P215/75R15
Gasoline type: Unleaded

Equipment that is no longer on the vehicle as noted above:

rear seat

Explanation:

Items removed to allow installation of data acquisition system.

VEHICLE CONDITION: Vehicle was subjected to a 30 mph crash test. There is severe structural damage. Various interior and exterior portions of the vehicle have been painted and have had holes drilled to facilitate attachment of instrumentation. Various trim and body parts have been removed including the rear seats. Stoddard solvent replaced the fuel in the fuel system and engine. THE VEHICLE IS FOR SALVAGE ONLY AND IS NOT TO BE REPAIRED FOR HIGHWAY USE.

Section 3.0

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

Table 6 Dummy Injury Criteria

	Maximum Acceleration						
	X	Y	Head Z	R	X	Chest Y	Z
Driver ¹	-53.8 g	21.2 g	-35.7 g	60.6 g	-56.9 g	8.2 g	-17.5 g
Passenger	-51.9 g	18.0 g	-68.2 g	69.4 g	-47.0 g	-9.1 g	-11.9 g

	Maximum Femur Compressive Force	
	Left femur	Right femur
Driver	820 lbf	929 lbf
Passenger	441 lbf	619 lbf

	Head Injury Criteria ²		
	HIC	Time t ₁	Time t ₂
Driver	432	58.7 ms	93.3 ms
Passenger	779	84.3 ms	120.3 ms

	Chest Maximum Resultant Acceleration ³		
	Accelerometer	Time t ₁	Time t ₂
Driver	56.3 g	64.9 ms	70.0 ms
Passenger	45.7 g	82.4 ms	85.3 ms

¹ See Data Acquisition Explanations

² As defined in FMVSS No. 208

³ Defined as equal to or exceeding 0.003 sec. duration

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag. The driver dummy was restrained by the airbag and the three-point unbelt. The dummy rebounded rearward into the seat back and slightly to the right as the dummy's head rotated rearward contacting the head restraint. The driver dummy came to rest in the driver's seat, leaning slightly to the right and restrained by the three-point unbelt.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated downward impacting the dummy's chest and right knee. The right front passenger dummy was restrained by the three-point unbelt. The dummy rebounded rearward into the seat back and slightly to the right as the dummy's head rotated rearward contacting the head restraint. The right front passenger dummy came to rest in the right front passenger's seat, leaning slightly to the right and restrained by the three-point unbelt.

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

NHTSA number: CR1300

Vehicle model year/make/body style: 1994/Explorer/van

Date of comfort/convenience check: 03/11/94

Technician performing check: Markusic

GVWR: 5950 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 is 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: CR1300

Vehicle model year/make/body style: 1994/Explorer/van

Date of comfort/convenience check: 03/11/94

Technician performing check: Markusic

GVWR: 5950 lb

Webbing Tension-Relieving Device (S7.4.2):

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

Belt Contact Force (S7.4.3):

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

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: CR1300

Vehicle model year/make/body style: 1994/Explorer/van

Date of comfort/convenience check: 03/11/94

Technician performing check: Markusic

GVWR: 5950 lb

Seat Belt Guides and Hardware (S7.4.6):

The seat cushion is not removable so the seat back serves a function other than seating.

The seat is not removable.

The seat is not movable so the space formerly occupied by the seat can be used for a secondary function.

Note: If any of the above answers are "yes", 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 provide guides.

The inboard receptacle end of the outboard seating position's seat belt is accessible with the center arm rest in any position to which it can be adjusted without moving the arm rest for access.

Table 8 FMVSS 208 Equipment Data

FMVSS 208 Seat Belt Warning System Data

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

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

NOTE: the audible warning should not operate.

The wording of the visual seat belt warning is the symbol from Table 2 of FMVSS 101.

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Labeling and Driver's Manual Data

The vehicle did not have a label which describes manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system.

The airbag system does not require maintenance unless the "Airbag" lamp does not light when key is turned on, flashes, stays lit, or groups of five beeps are heard.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 1-29.

A description of the functional operation of the system was provided in the owner's manual on pages 1-25 to 1-28.

No label with a reference to the instructions and description of the system was included on the vehicle.

An owner's manual was provided.

The owner's manual contained appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems on pages 1-25 to 1-29.

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 located on the upper left side of the instrument cluster.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator was provided in the owner's manual on page 1-26.

All rear outboard seating positions had Type 2 seat belts.

Figure 4 FMVSS 212 Test Data

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

Plastic trim around outer perimeter and adhesive around inner perimeter.

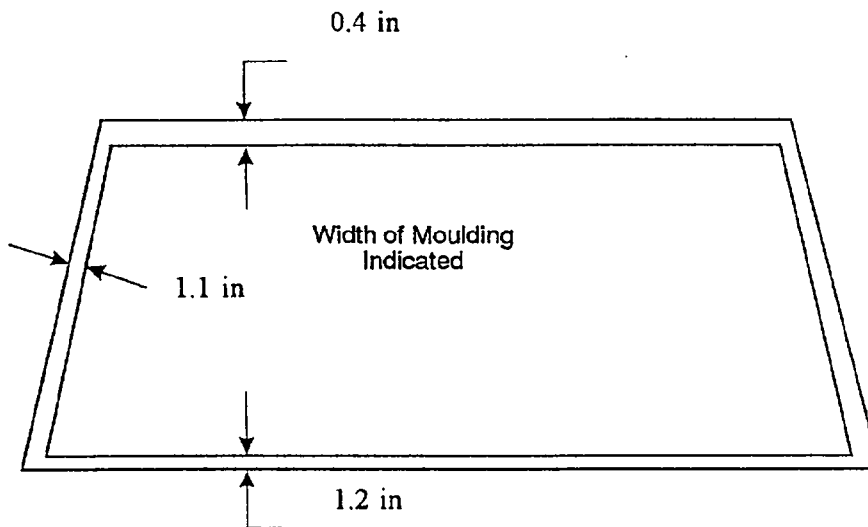
Clips or brackets used to retain windshield: None

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

Windshield periphery measurements:

	Pre-test	Post-test	Percent Retention
Right side	89.0 in	89.0 in	100
Left side	89.0 in	89.0 in	100
Total	178.0 in	178.0 in	100

Pre-test windshield mounting material temperature: 74° F



Front view of windshield¹

Loss of windshield retention lengths: None

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

Figure 5 FMVSS 219 Test Data

Protected zone lower edge requirement:

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

Windshield measurements:

A: 58.9 in

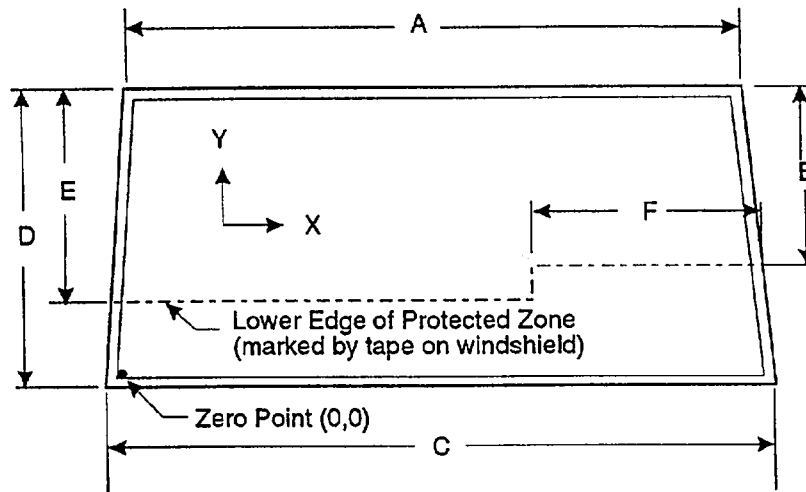
B: 12.9 in

C: 70.0 in

D: 27.4 in

E: 16.5 in

F: 26.5 in



FRONT VIEW

Method of adhering protected zone template to windshield:

NA

Areas of windshield template penetration greater than 0.25 in:

NA

Coordinates

	X	Y
1.		
2.		
3.		

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

None

- 1.
- 2.
- 3.

Table 9 Fuel System Data

Vehicle year/make/ body style:	1994/Explorer/van
NHTSA number:	CR1300
Fuel system capacity:	27.0 gal (from owner's manual)
Usable capacity:	27.0 gal (furnished by COTR)
Test volume range:	24.8 gal to 25.4 gal (92-94% of usable)
Actual test volume:	25.1 gal (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistokes
Test fluid color:	purple
Type of fuel pump:	electric

Does electric fuel pump operate with ignition switch "on" and the engine not operating? No

Details of fuel system: The fuel tank was located on the left side in front of the rear axle. The fuel filler neck was located on the left side. The fuel lines ran along the left side to the engine compartment.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CR1300
Test date: 03/17/94
Vehicle year/make/
body style: 1994/Explorer/van

Test requirements:

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

Test vehicle impact type:

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

Fuel system fluid spillage measurements:

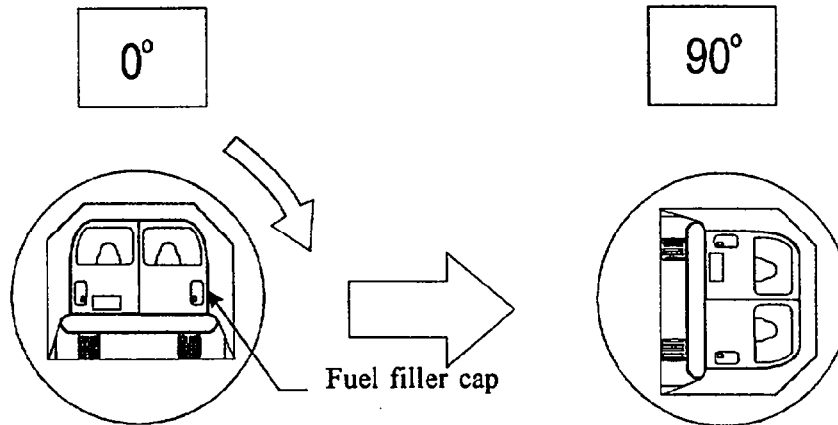
	Test Results	Maximum Allowable
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-Minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CR1300

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

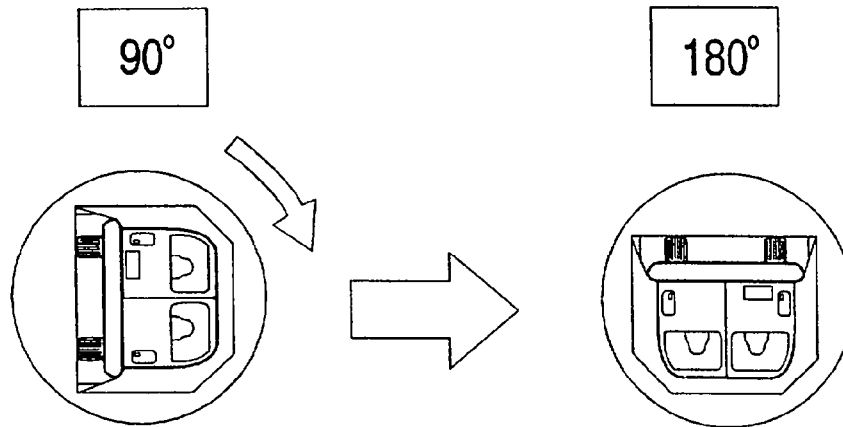
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 14 minutes

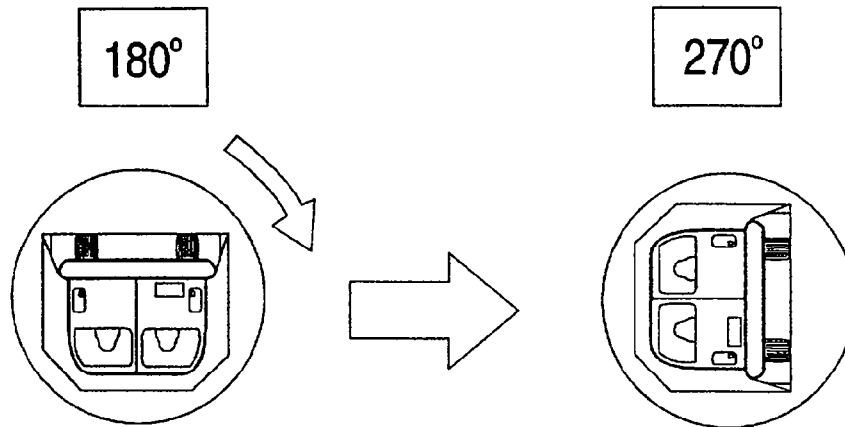
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 21 minutes

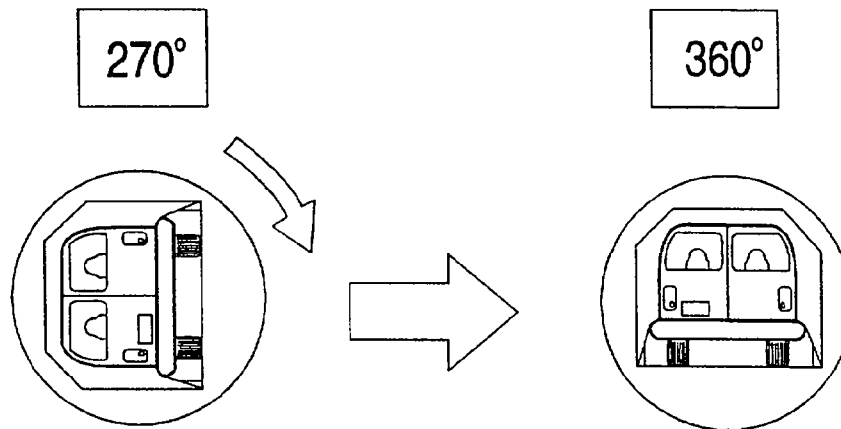
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 28 minutes

Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 7 Pre-test and Post-test Measurement Points

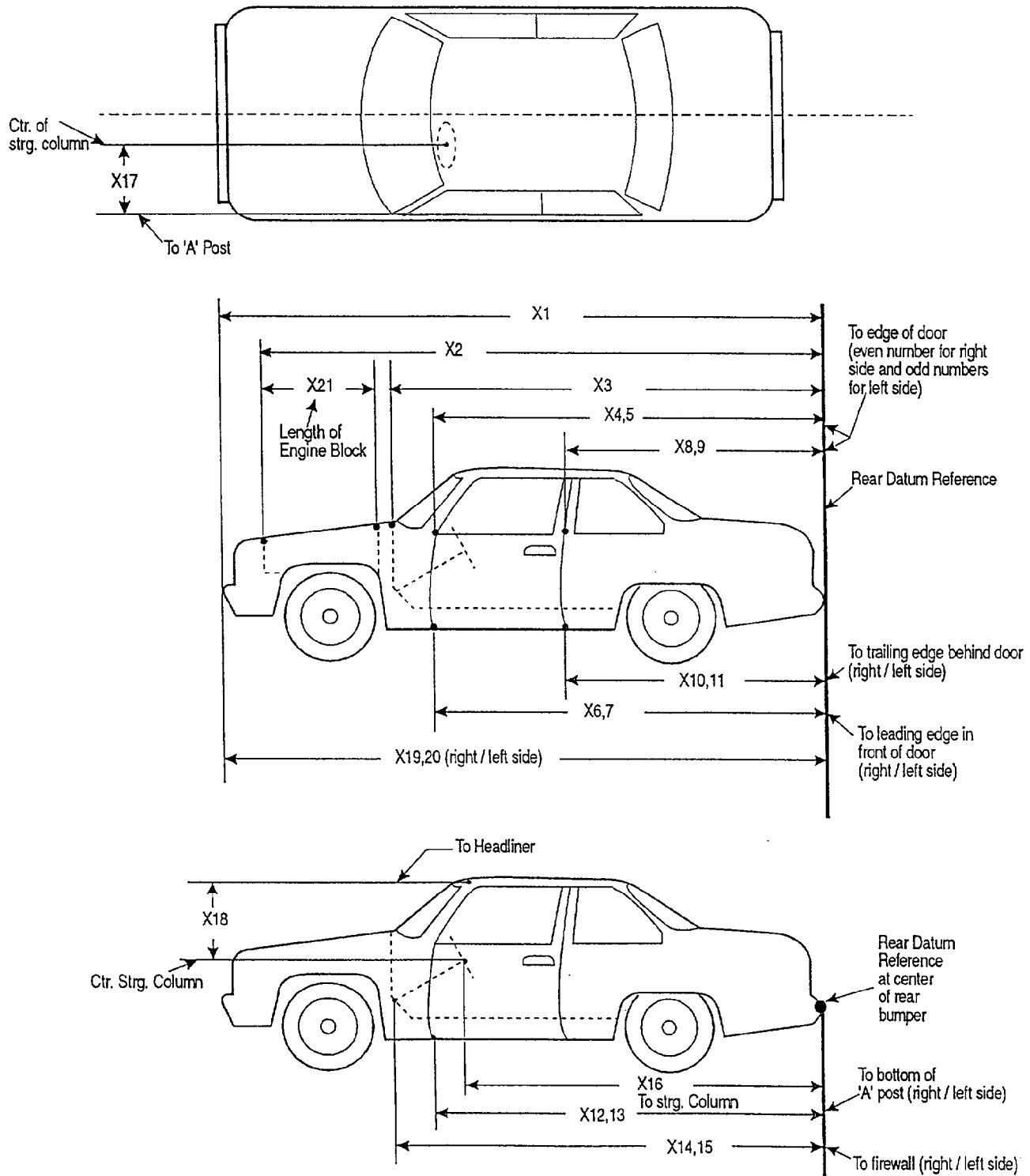


Table 11 Impacted Vehicle Measurements

Vehicle year/make/body style: 1994/Explorer/van

Test number: 940317

No.	Type of Measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	187.8 in	168.2 in	19.6 in
X2	Rear surface of vehicle to front of engine block	157.8 in	154.8 in	3.0 in
X3	Rear surface of vehicle to firewall	160.0 in	158.0 in	2.0 in
X4	Rear surface of vehicle to upper leading edge of right door	143.5 in	143.8 in	-0.3 in
X5	Rear surface of vehicle to upper leading edge of left door	143.6 in	143.1 in	0.5 in
X6	Rear surface of vehicle to lower leading edge of right door	143.3 in	136.5 in	6.8 in
X7	Rear surface of vehicle to lower leading edge of left door	136.5 in	135.8 in	0.7 in
X8	Rear surface of vehicle to upper trailing edge of right door	103.4 in	103.5 in	-0.1 in
X9	Rear surface of vehicle to upper trailing edge of left door	103.5 in	103.0 in	0.5 in
X10	Rear surface of vehicle to lower trailing edge of right door	104.8 in	104.9 in	-0.1 in
X11	Rear surface of vehicle to lower trailing edge of left door	105.2 in	104.8 in	0.4 in
X12	Rear surface of vehicle to bottom of "A" post on right side	141.5 in	141.5 in	0.0 in
X13	Rear surface of vehicle to bottom of "A" post on left side	141.0 in	140.2 in	0.8 in
X14	Rear surface of vehicle to firewall - right side	158.5 in	157.9 in	0.6 in
X15	Rear surface of vehicle to firewall - left side	160.5 in	157.0 in	3.5 in
X16	Rear surface of vehicle to steering wheel center	128.4 in	126.1 in	2.3 in
X17	Center of steering column to "A" post	10.8 in	10.2 in	0.6 in
X18	Center of steering column to headliner	16.2 in	18.6 in	-2.4 in
X19	Rear surface of vehicle to right side of front bumper	184.0 in	168.0 in	16.0 in
X20	Rear surface of vehicle to left side of front bumper	184.1 in	166.2 in	17.9 in
X21	Length of engine block	21.0 in	21.0 in	0.0 in

Figure 8 Vehicle Target Locations

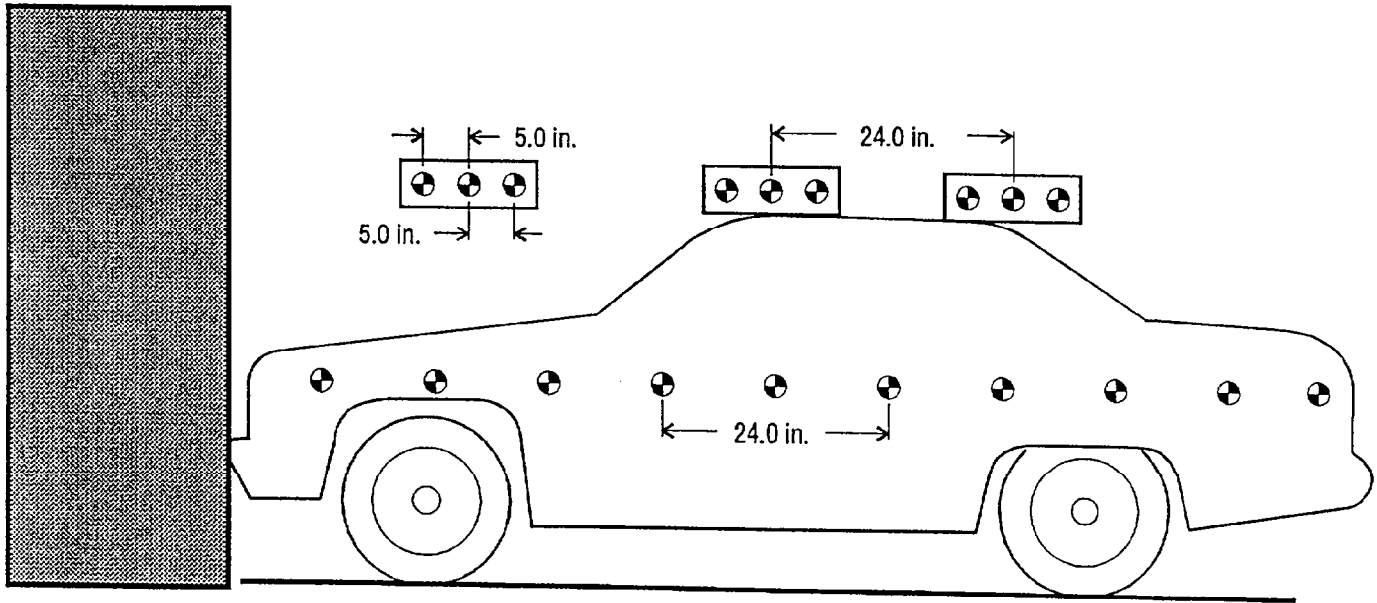


Figure 9 Dummy Measurement Locations for Front Seat Occupants

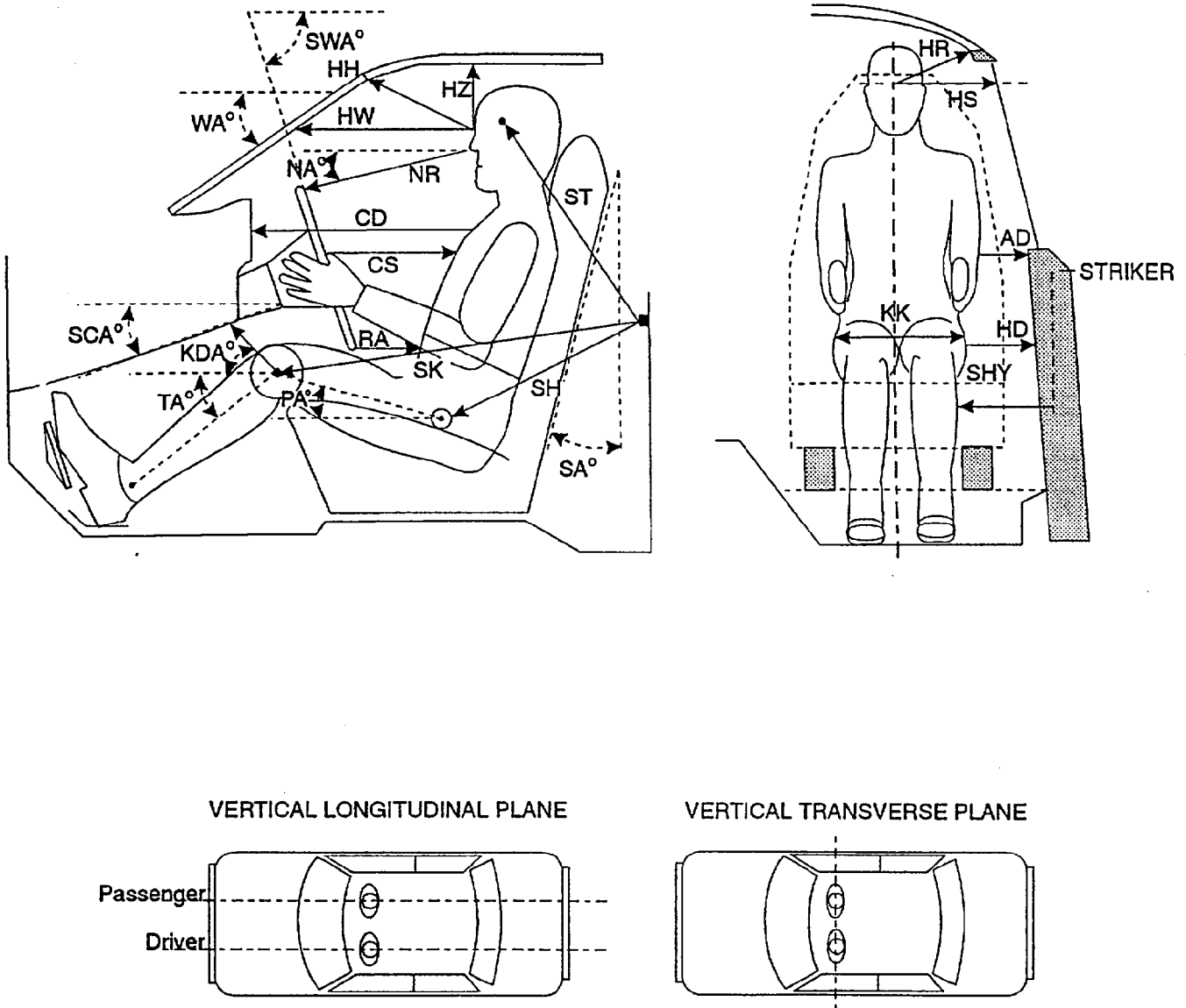


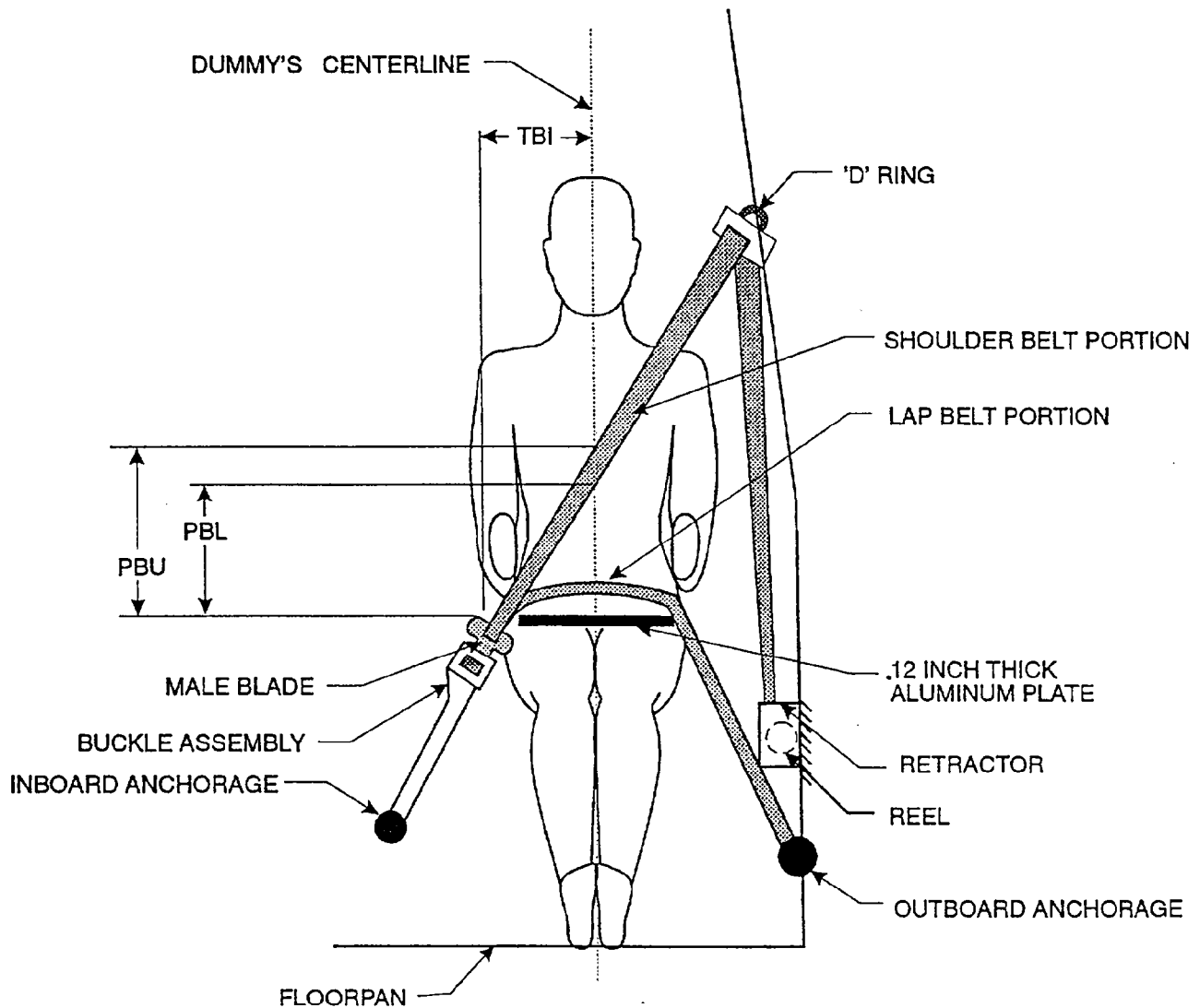
Table 12 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #354)	Passenger (Serial #353)
WA	Windshield angle	41°	NA
SWA	Steering wheel angle	66°	NA
SCA	Steering column angle	23°	NA
SA	Seat back angle	21°	21°
HZ	Head to roof	8.3 in	9.2 in
HH	Head to header	19.4 in	21.1 in
HW	Head to windshield	24.4 in	27.4 in
HR	Head to side header	9.8 in	10.6 in
NR	Nose to rim	14.8 in	NA
NA	Nose to rim angle	14°	NA
CD	Chest to dash	22.8 in	23.6 in
CS	Steering wheel to chest	13.2 in	NA
RA	Rim to abdomen	8.0 in	NA
KDL	Left knee to dash	9.6 in	8.7 in
KDR	Right knee to dash	10.4 in	8.6 in
KDA	Outboard knee to dash angle	20°	35°
PA	Pelvic angle	0°	24°
TA	Tibial angle	27°	50°
KK	Knee to knee	13.2 in	11.9 in
ST ¹	Striker to head	22.0 in	21.2 in
	Striker to head angle	-70°	-76°
SK ¹	Striker to knee	27.7 in	24.5 in
	Striker to knee angle	-8°	0°
SH ¹	Striker to H-point	8.2 in	11.4 in
	Striker to H-point angle	29°	23°
SHY	Striker to H-point (Y dir.)	10.2 in	9.4 in
HS	Head to side window	13.8 in	13.8 in
HD	H-point to door	6.0 in	6.0 in
AD	Arm to door	4.1 in	1.2 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 Seat Belt Positioning Data



	Driver	Passenger
PBU - Top surface of aluminum plate to belt upper edge	13.6 in	13.5 in
PBU - Top surface of aluminum plate to belt upper edge	10.3 in	10.3 in
TBI - Dummy centerline to intersection of upper torso belt and lap belt	11.0 in	12.9 in

Figure 11 Camera Positions

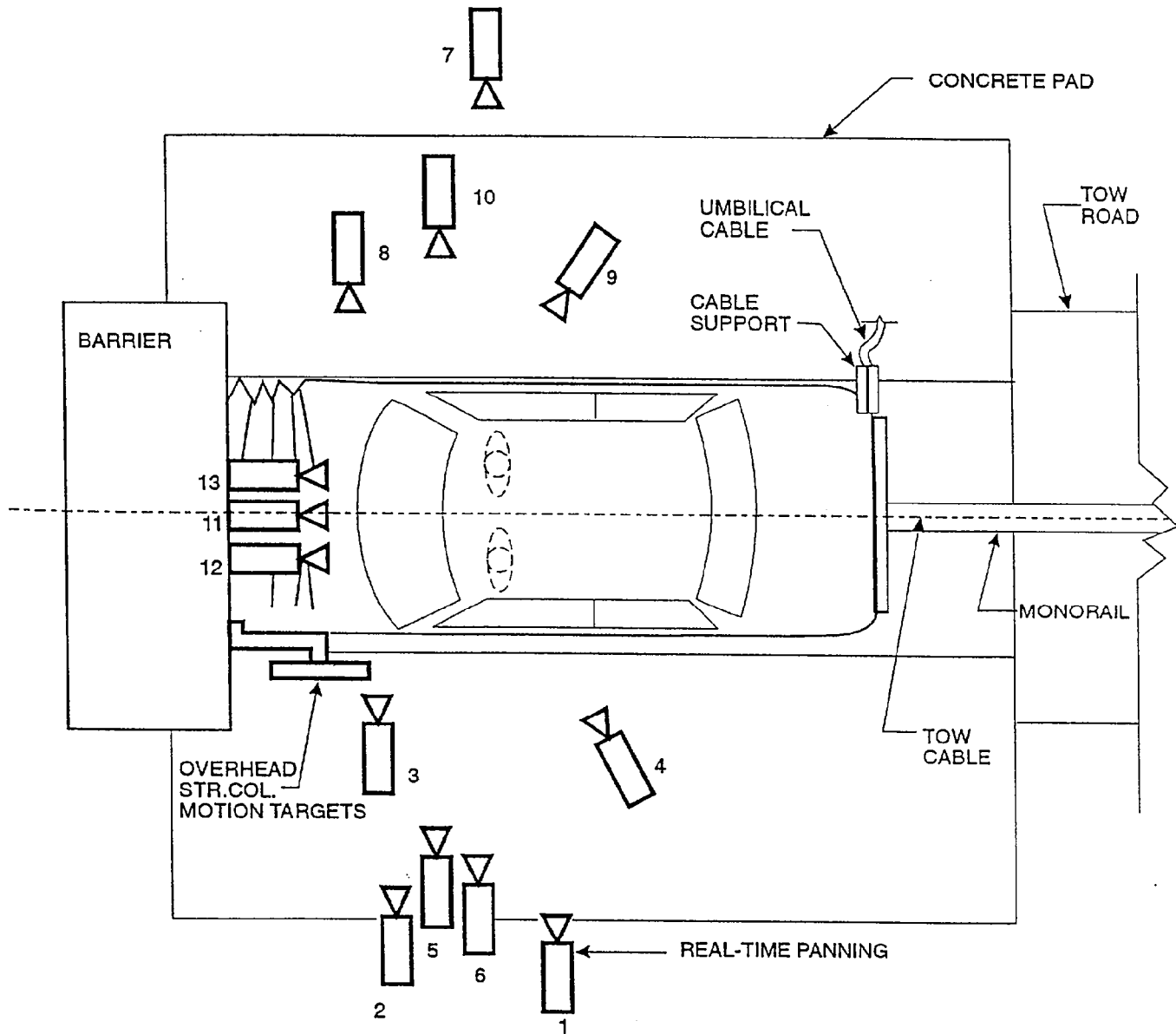


Figure 11 Camera Positions, Cont'd.

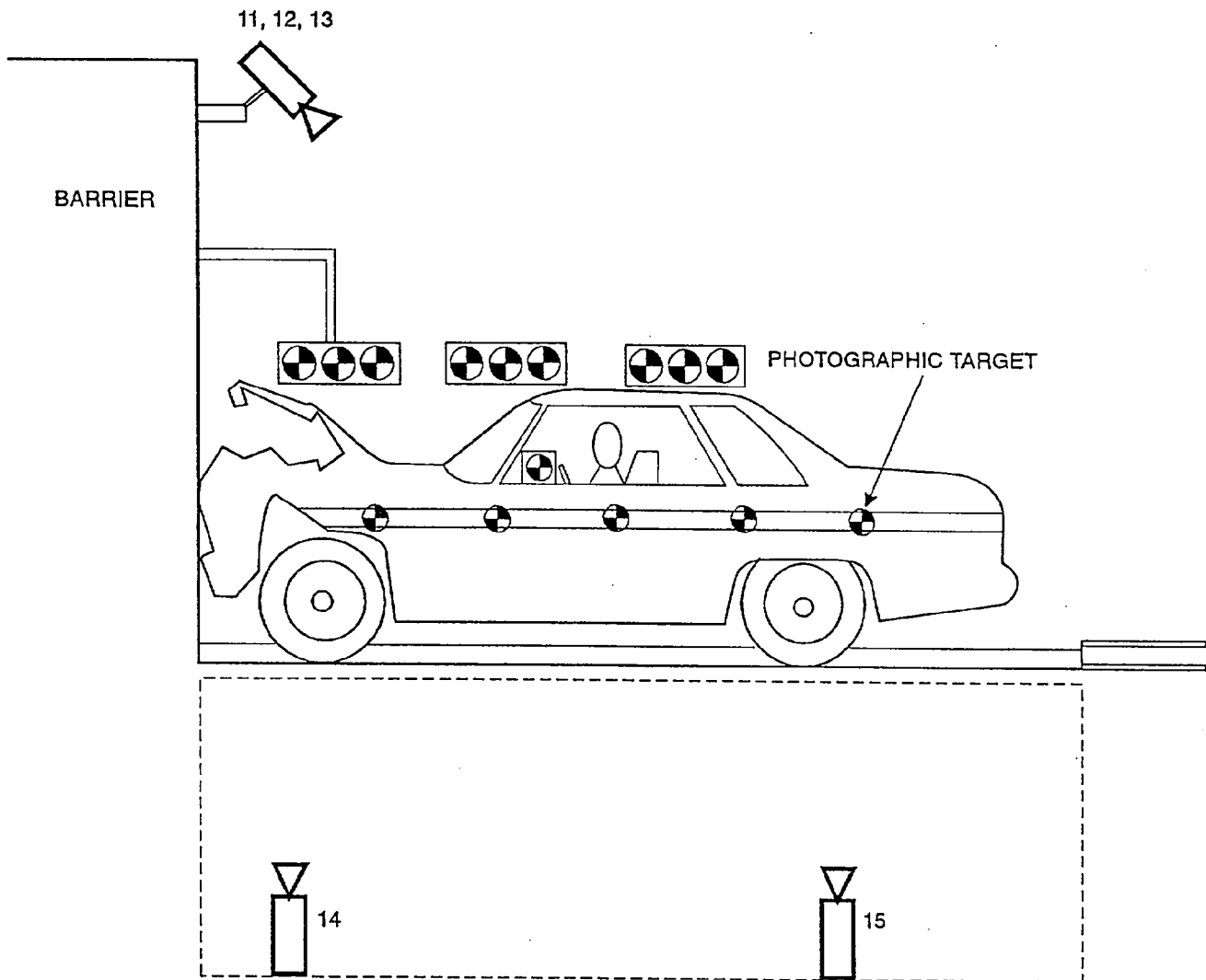


Table 13 Motion Picture Camera Locations

Vehicle year/make/body style: 1994/Explorer/van

Test number: 940317

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Real-time panning	-142.0 in	504.0 in	61.0 in	NA	NA	16 mm	24 frames/s
2	Left vehicle crush	-41.5 in	295.0 in	44.0 in	-4°	253 in	25 mm	998 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1005 frames/s
4	Driver kinematics	-157.3 in	116.0 in	87.0 in	-27°	87 in	25 mm	998 frames/s
5	Steering column motion	-74.0 in	286.0 in	103.0 in	-14°	NA	25 mm	1015 frames/s
6	Steering column motion	-74.0 in	286.0 in	75.1 in	-9°	NA	25 mm	1000 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	993 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	998 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	65 in	25 mm	998 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	218 in	25 mm	998 frames/s
11	Windshield front view	-6.0 in	0.0 in	85.0 in	-40°	NA	13 mm	1020 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	973 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	998 frames/s
14	Pit - front position	-50.5 in	0.0 in	-92.4 in	90°	NA	13 mm	998 frames/s
15	Pit - rear position	-99.3 in	0.0 in	-99.0 in	90°	NA	13 mm	1005 frames/s
16	Real-time documentation	NA	NA	NA	NA	NA	12-120 mm	24 frames/s

¹ +X: Film plane forward of barrier face

+Y: Film plane to left of monorail centerline

+Z: Film plane above ground level

² +Angle: Film plane angled upward from horizontal plane

Appendix A

Photographs

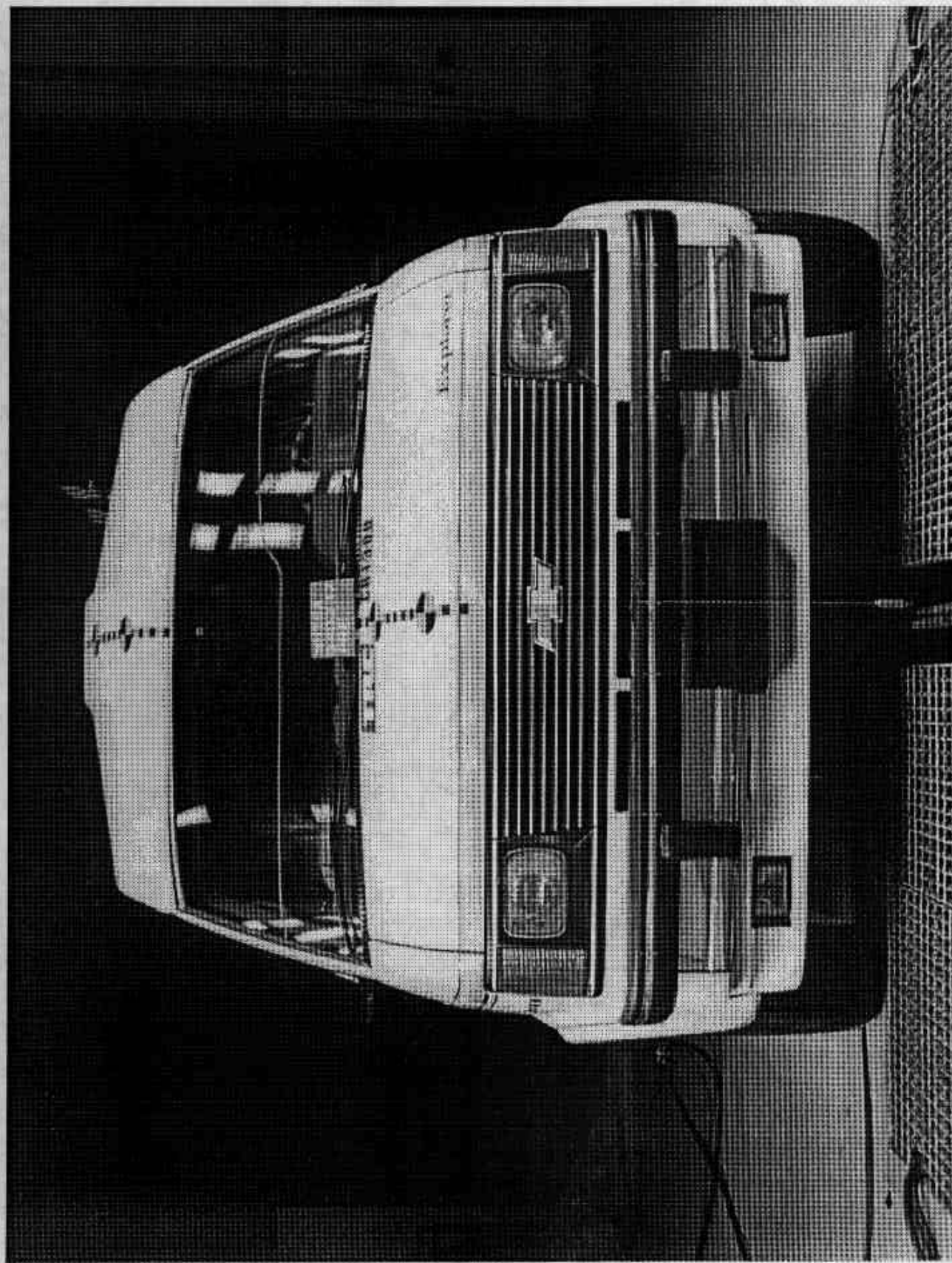


Figure A-1. Pre-test Front View
A-2

940317

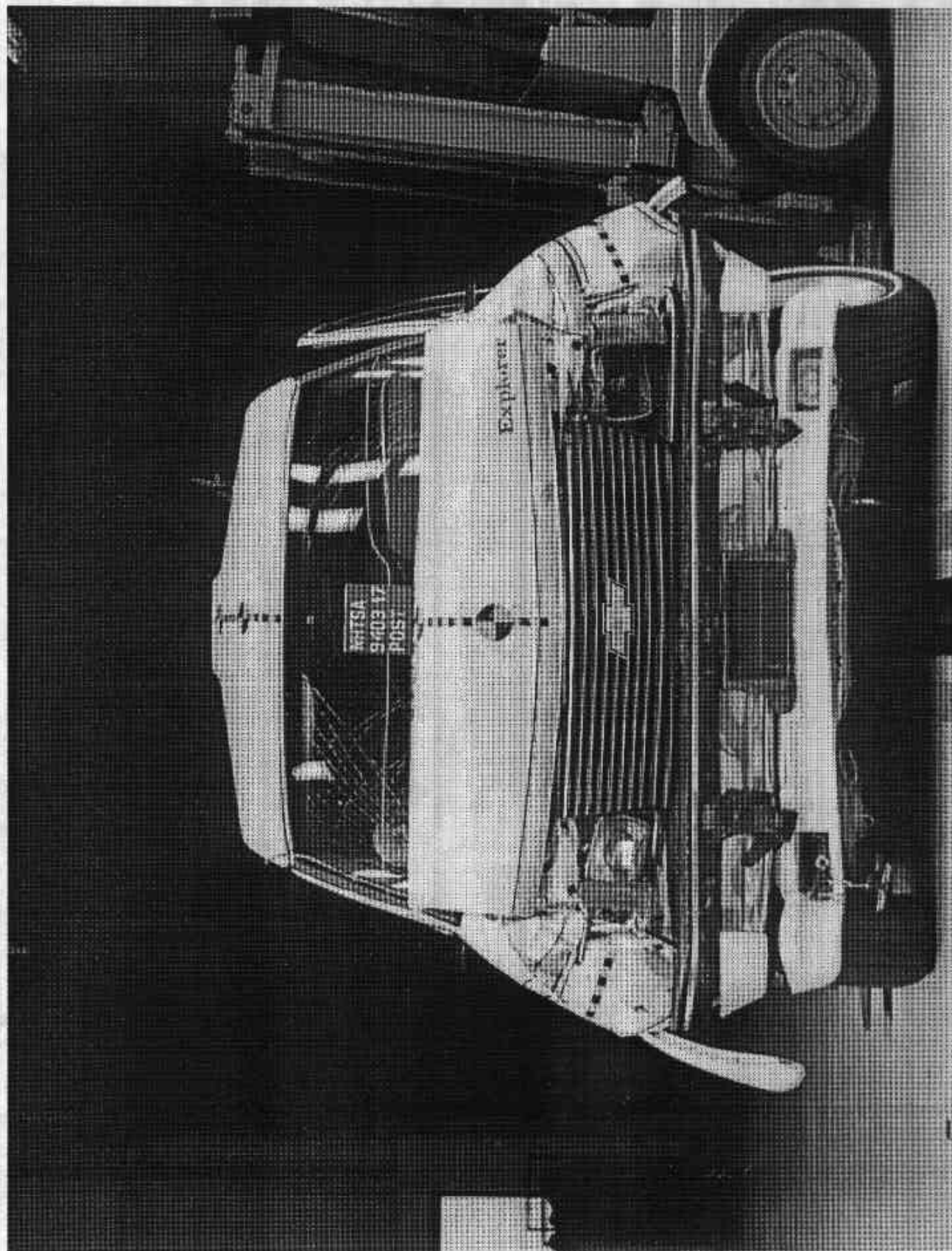


Figure A-2. Post-test Front View
A-3

940317

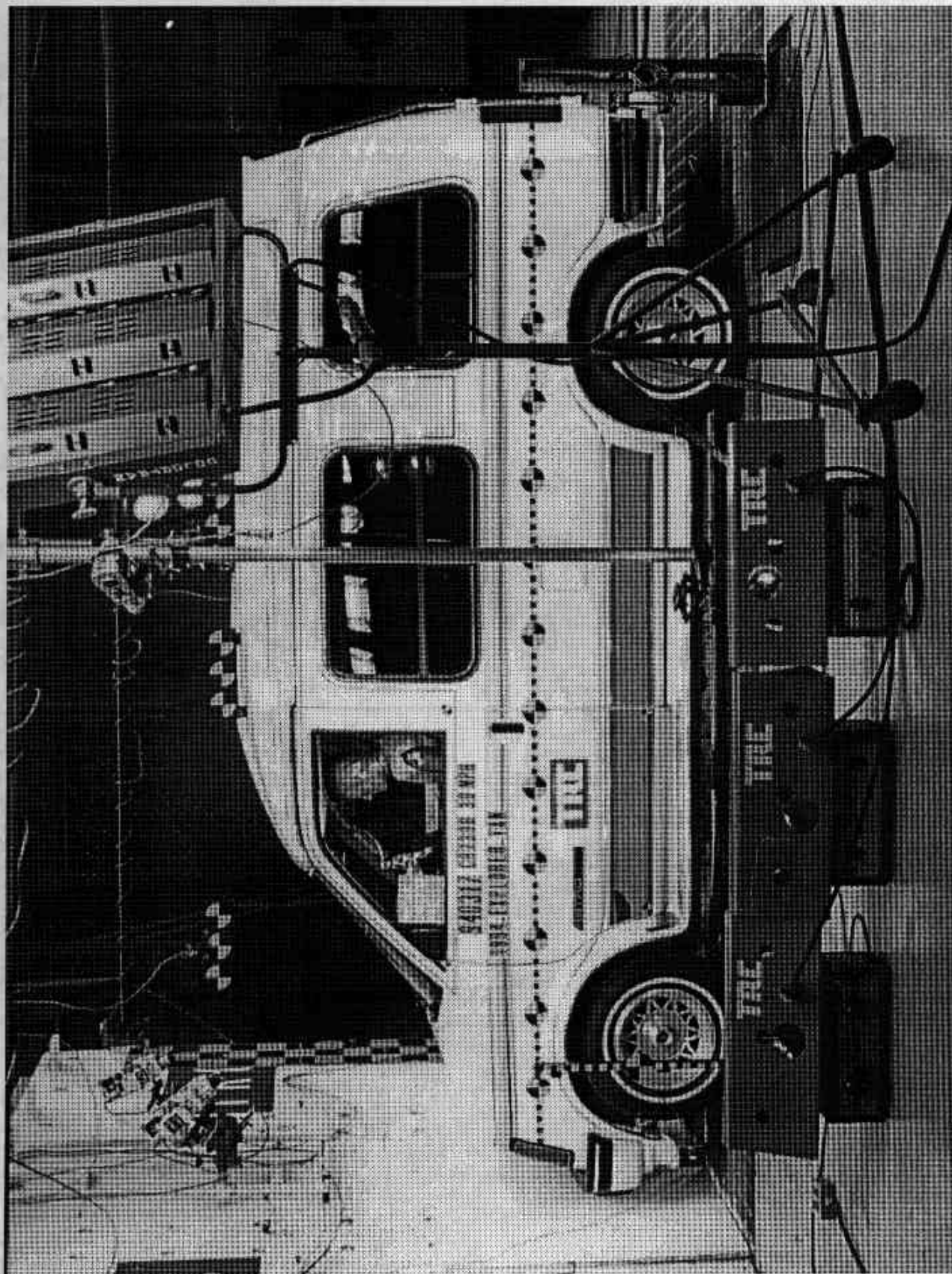


Figure A-3. Pre-test Left Side View

A-4

940317

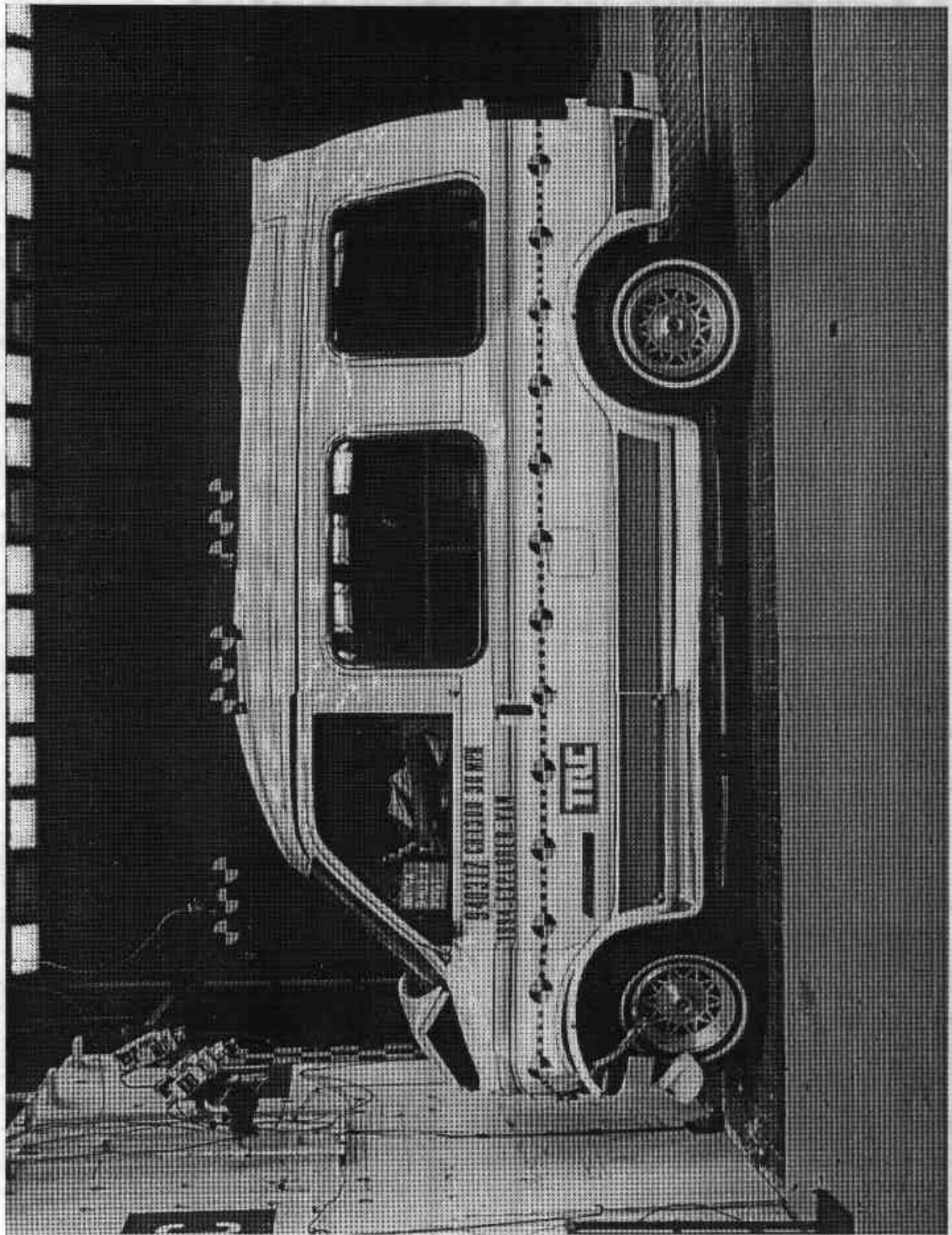


Figure A-4. Post-test Left Side View
A-5

940317

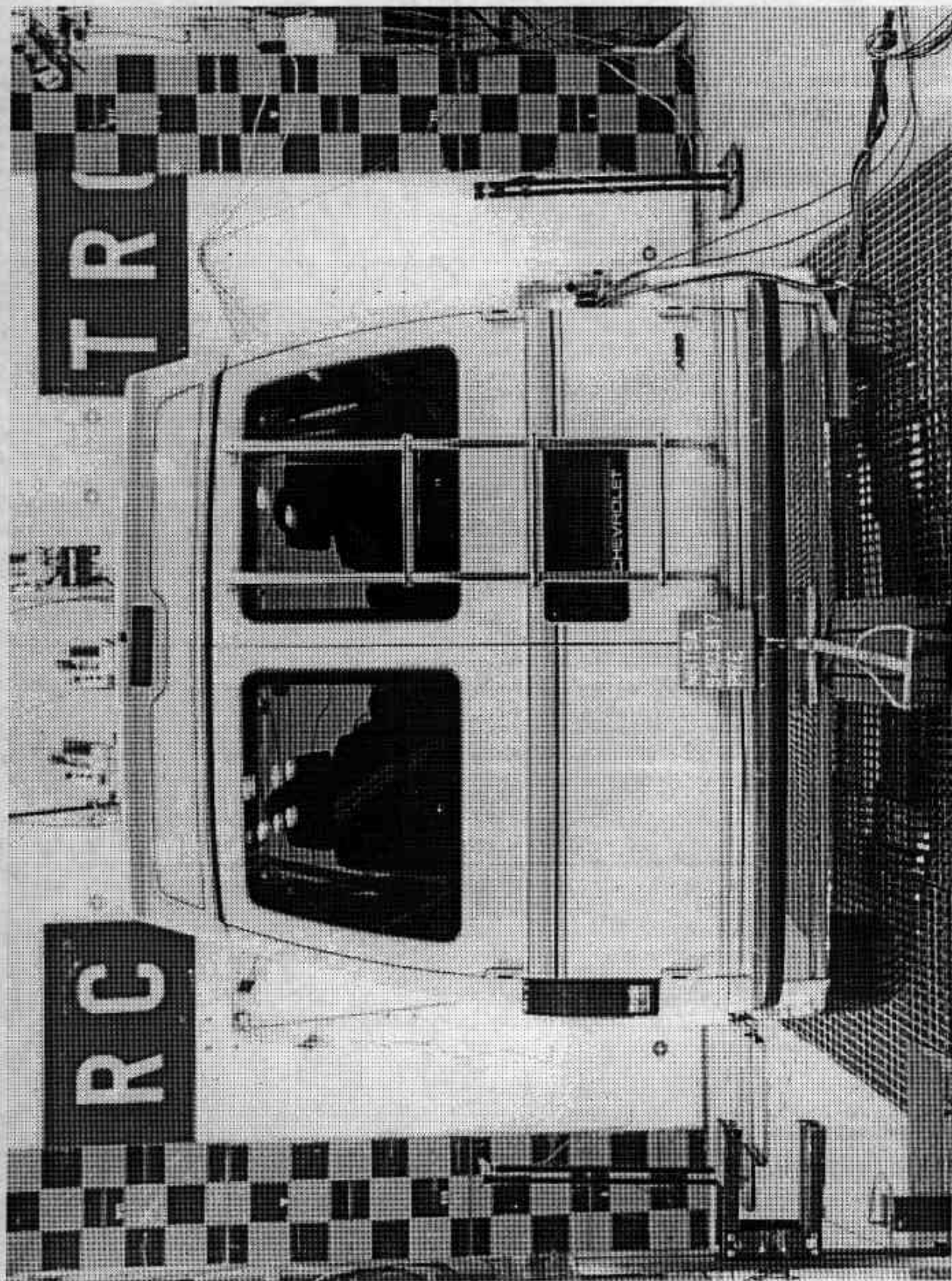


Figure A-5. Pre-test Rear View
A-6

940317

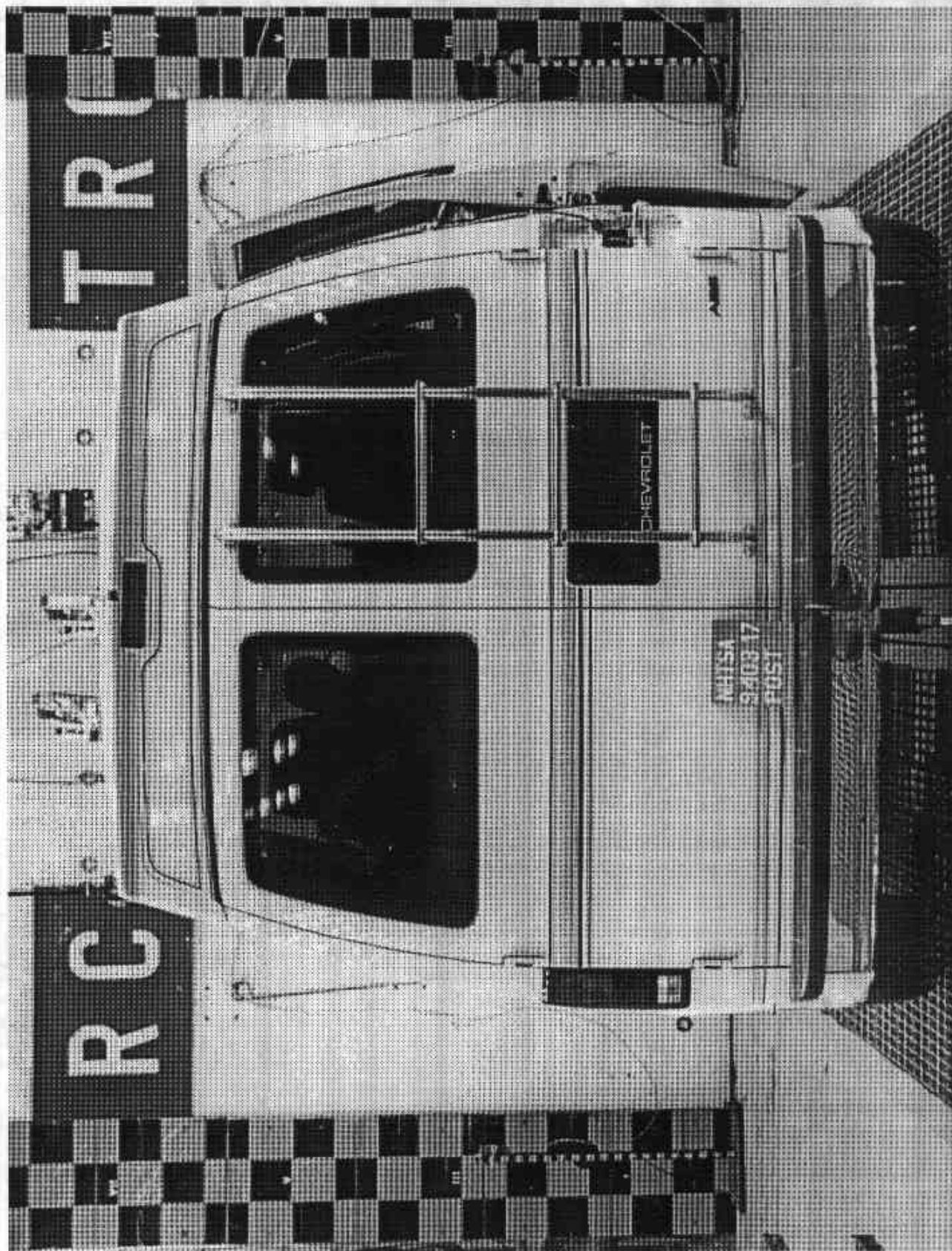


Figure A-6. Post-test Rear View
A-7

940317

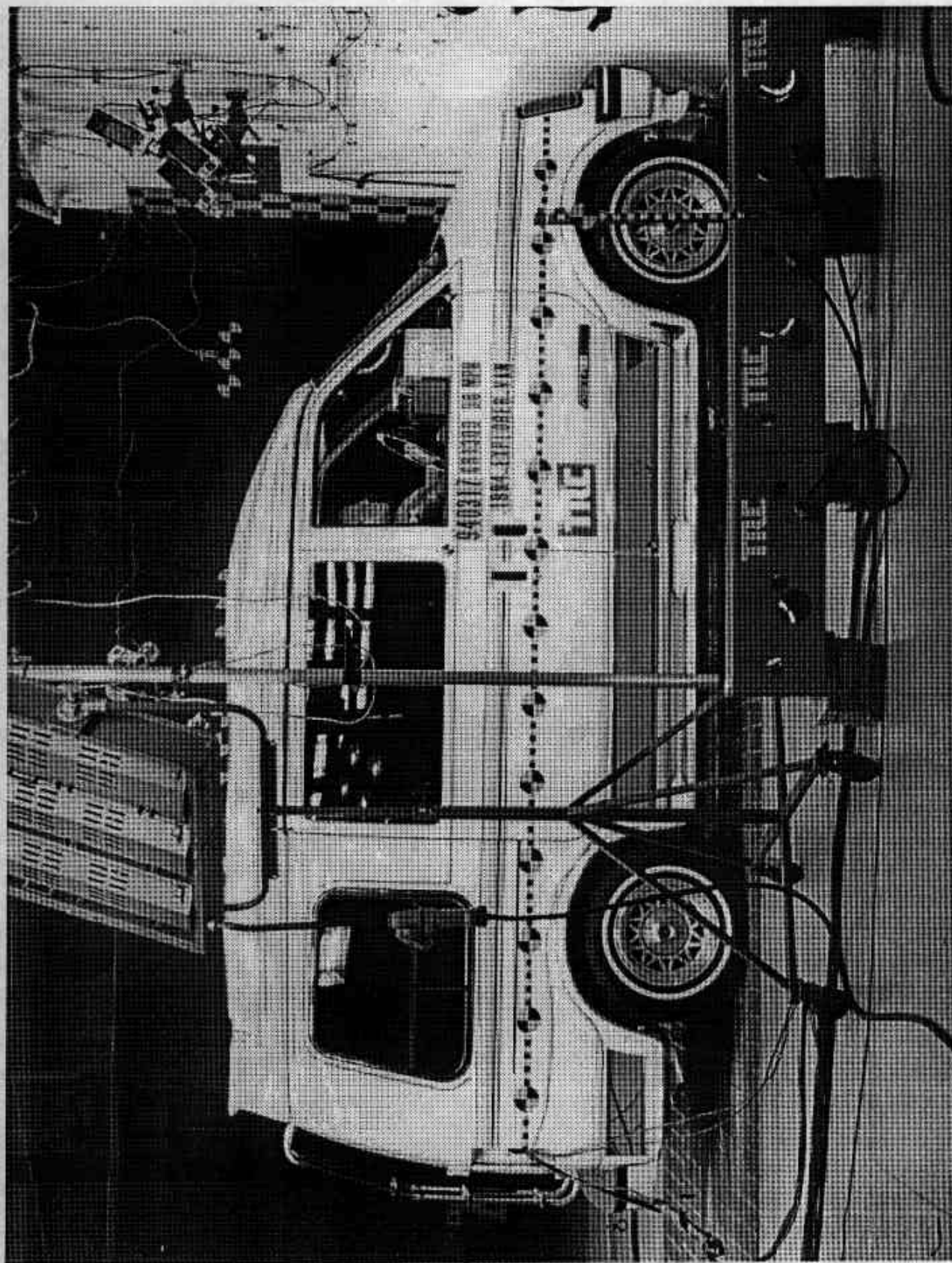


Figure A-7. Pre-test Right Side View
A-8

940317

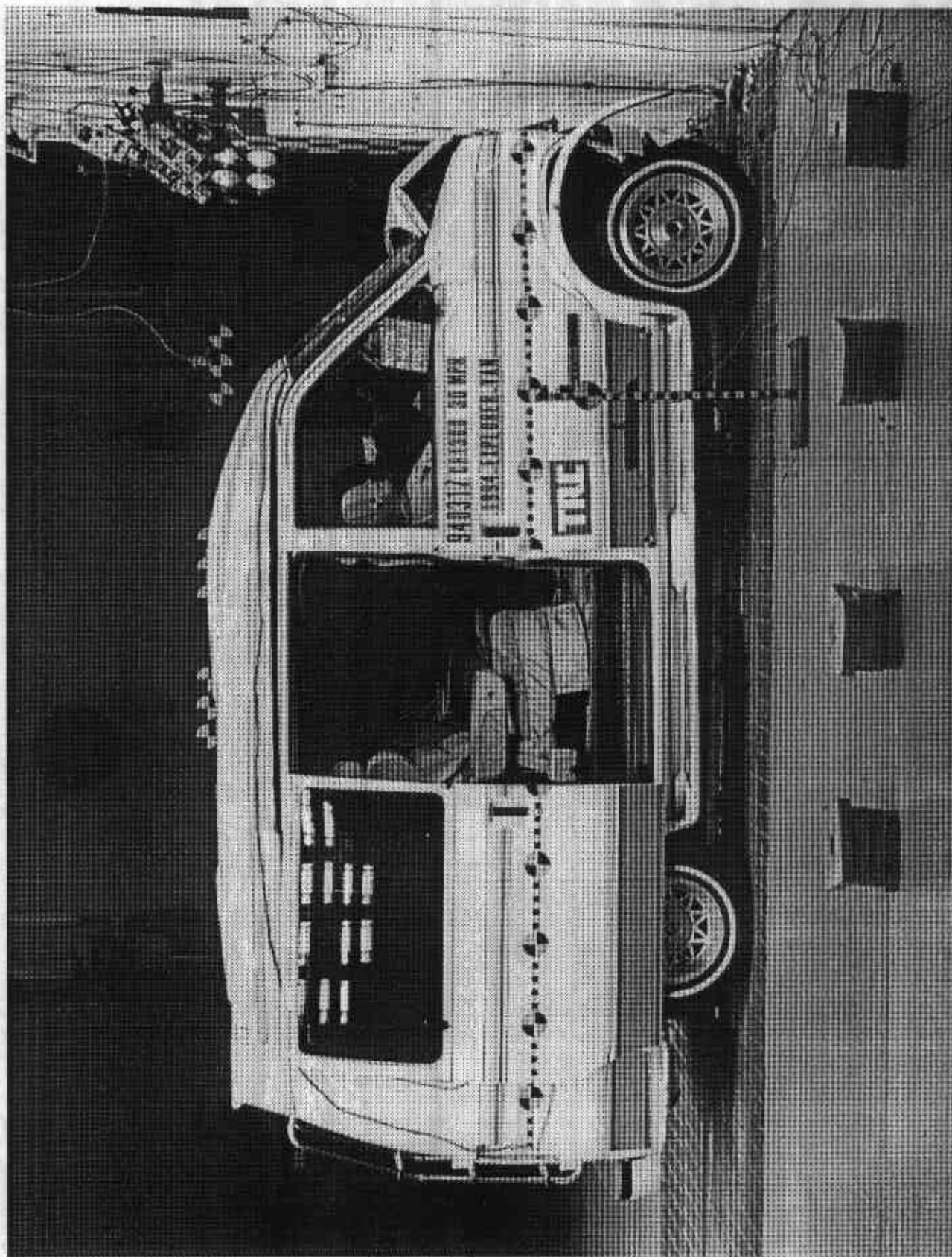


Figure A-8. Post-test Right Side View
A-9

940317



Figure A-9. Pre-test Right Front Three-quarter View
A-10

940317

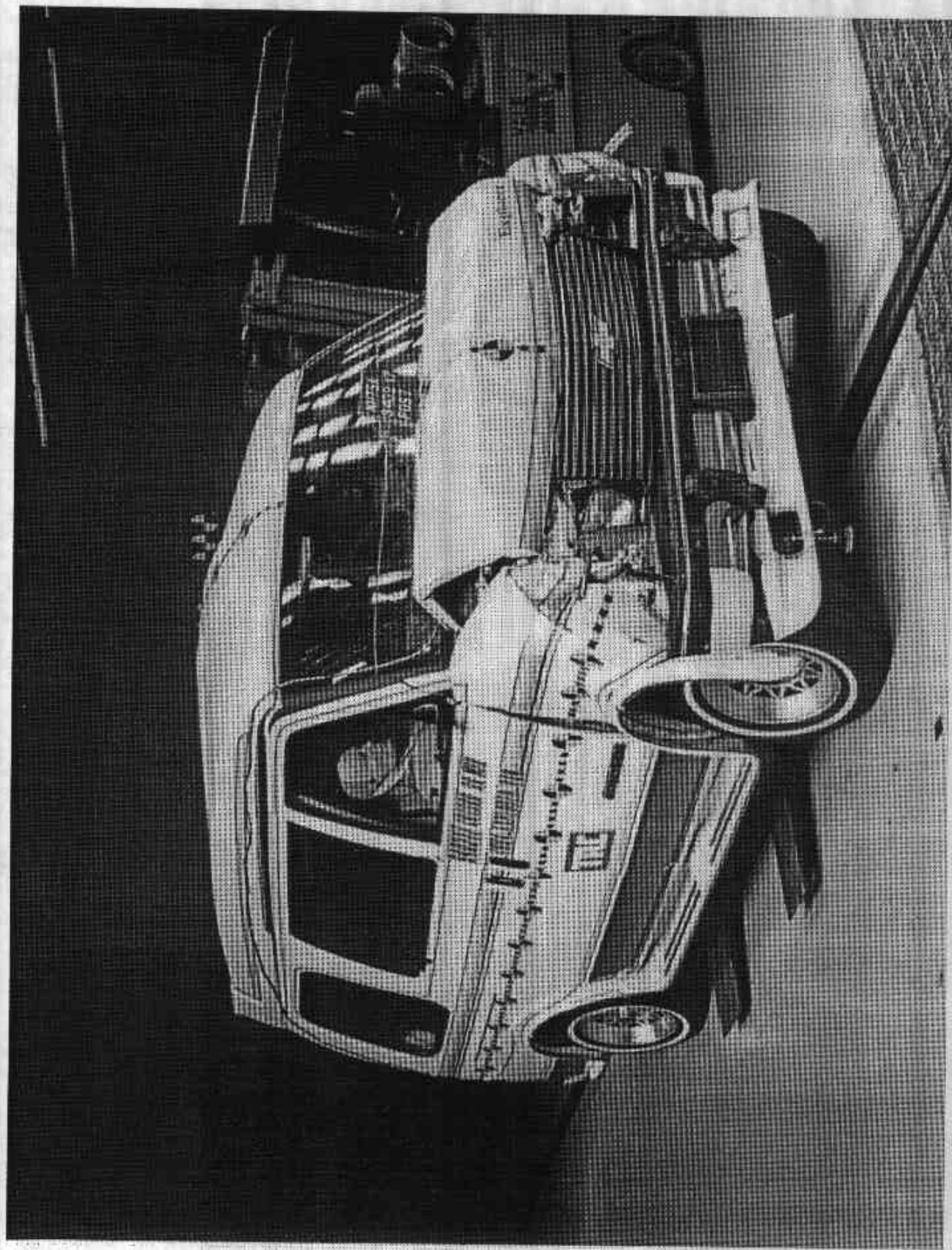


Figure A-10. Post-test Right Front Three-quarter View
A-11

940317

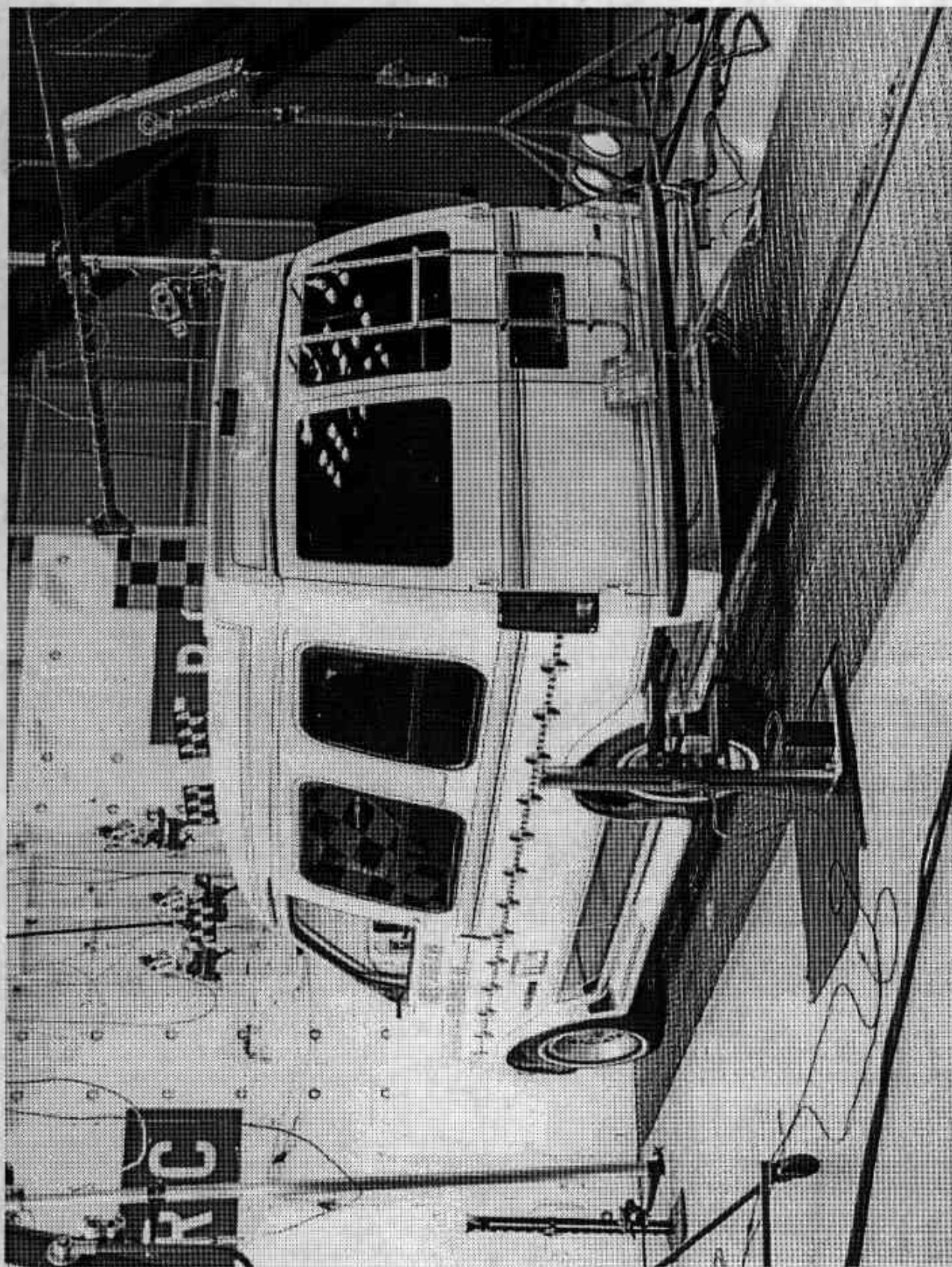


Figure A-11. Pre-test Left Rear Three-quarter View
A-12

940317

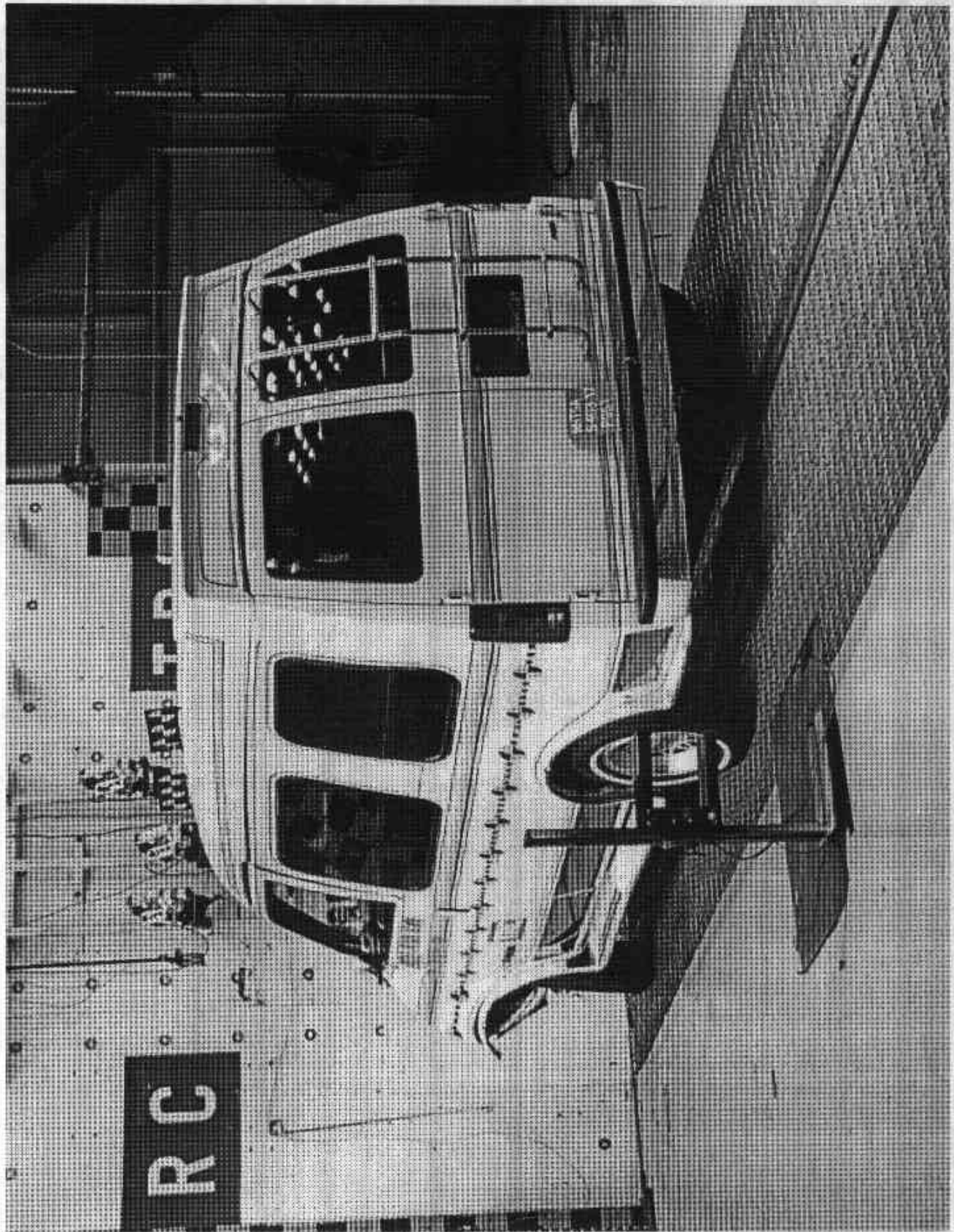


Figure A-12. Post-test Left Rear Three-quarter View
A-13

940317

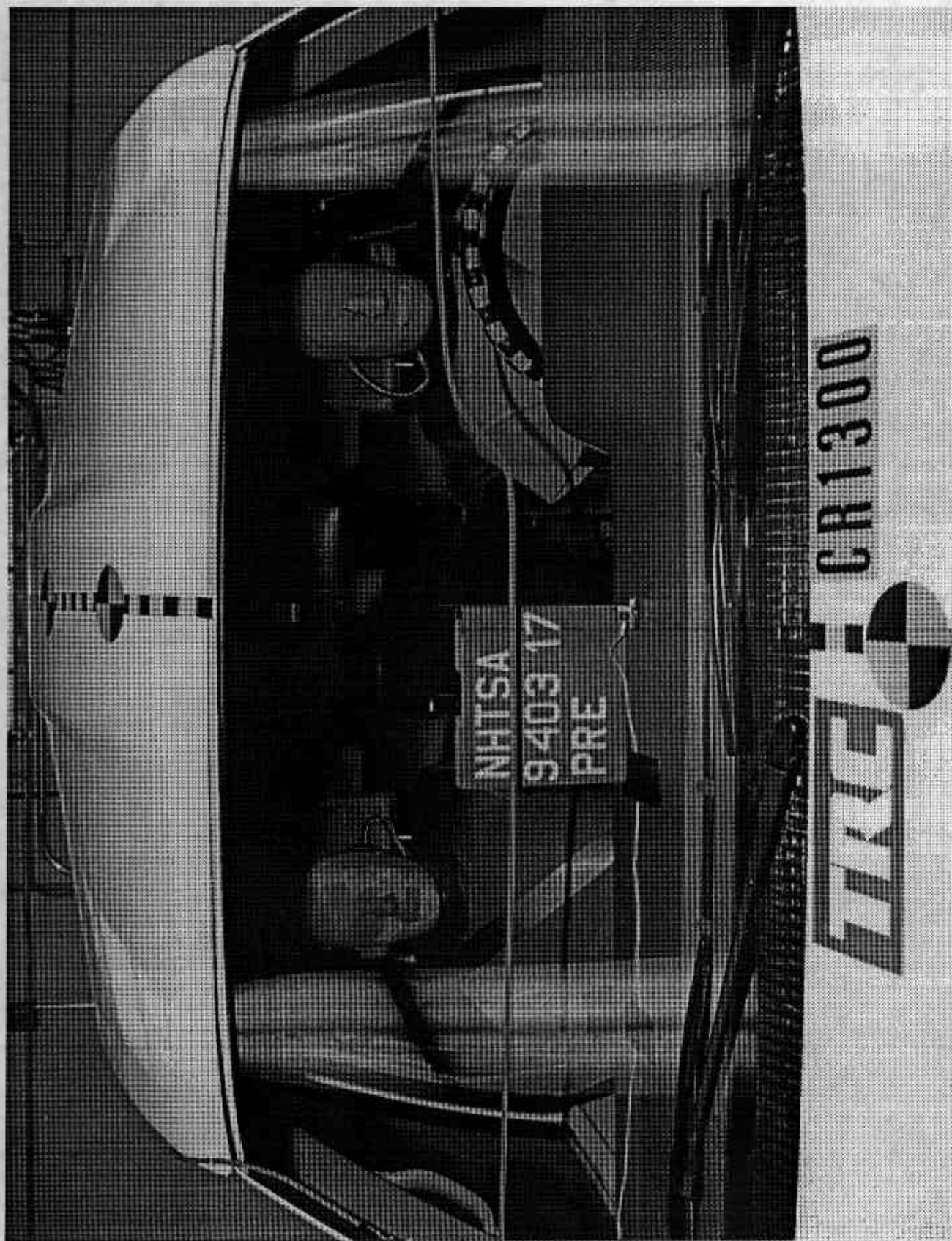


Figure A-13. Pre-test Windshield View
A-14

940317

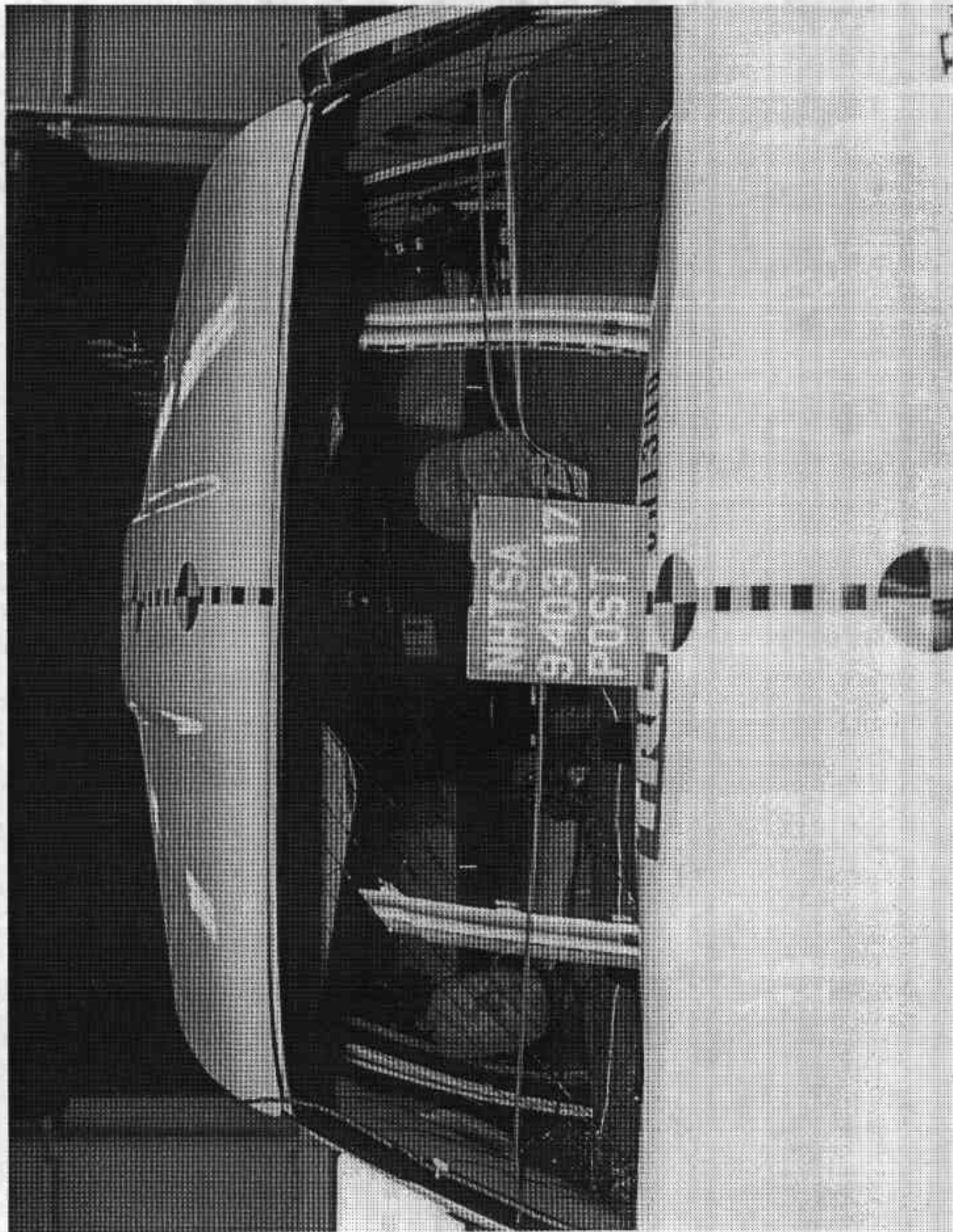


Figure A-14. Post-test Windshield View
A-15

940317

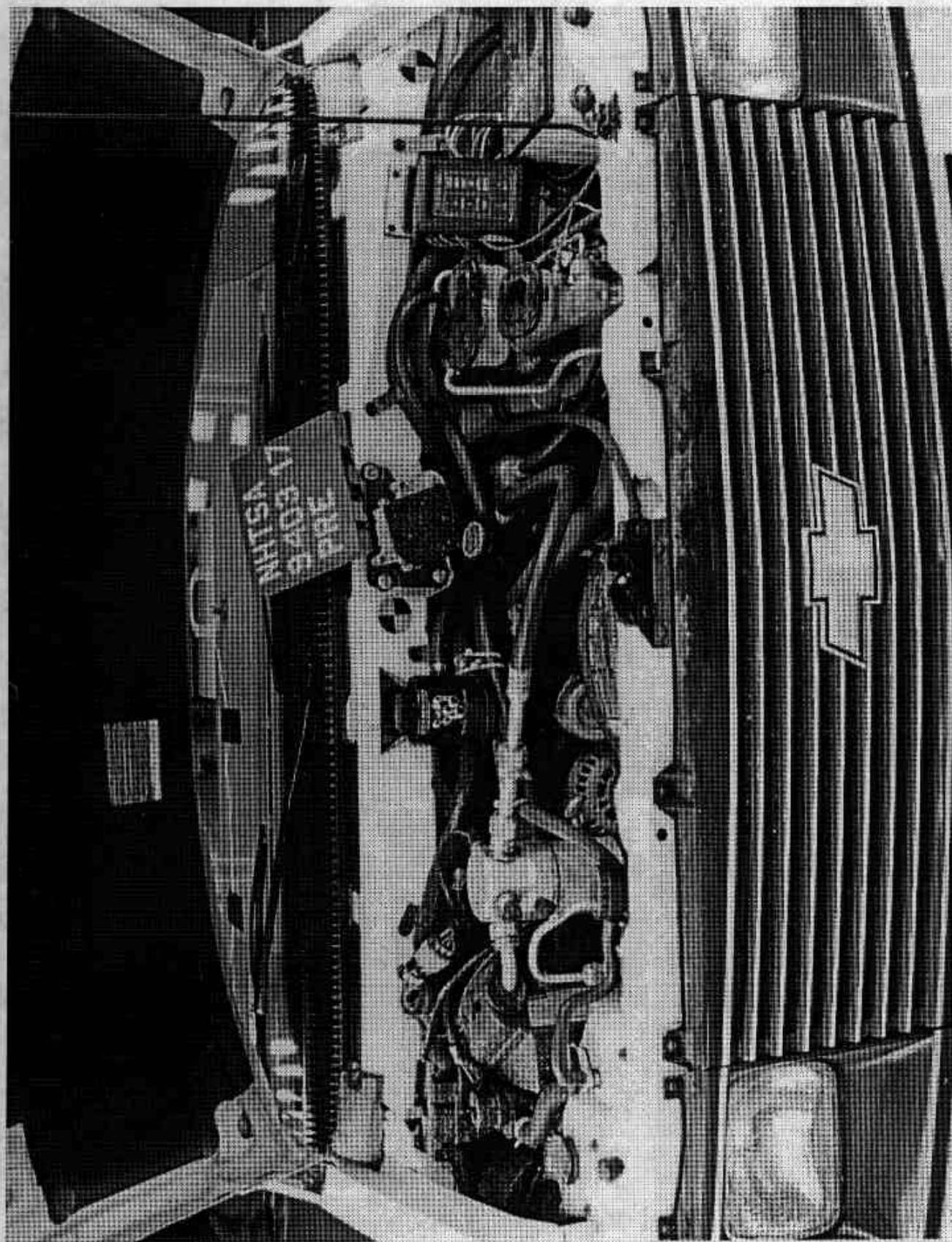


Figure A-15. Pre-test Engine Compartment View
A-16

940317

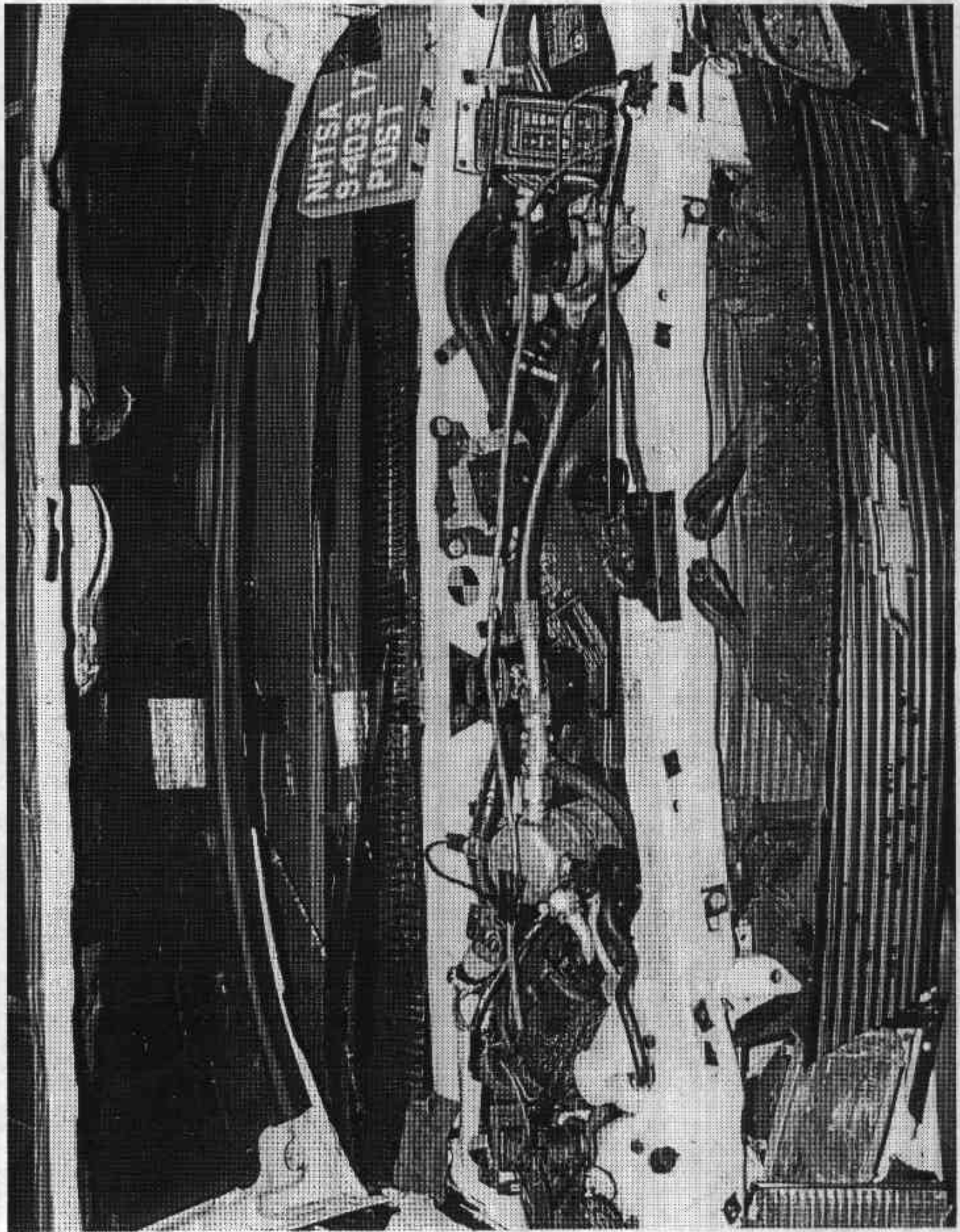


Figure A-16. Post-test Engine Compartment View
A-17

940317

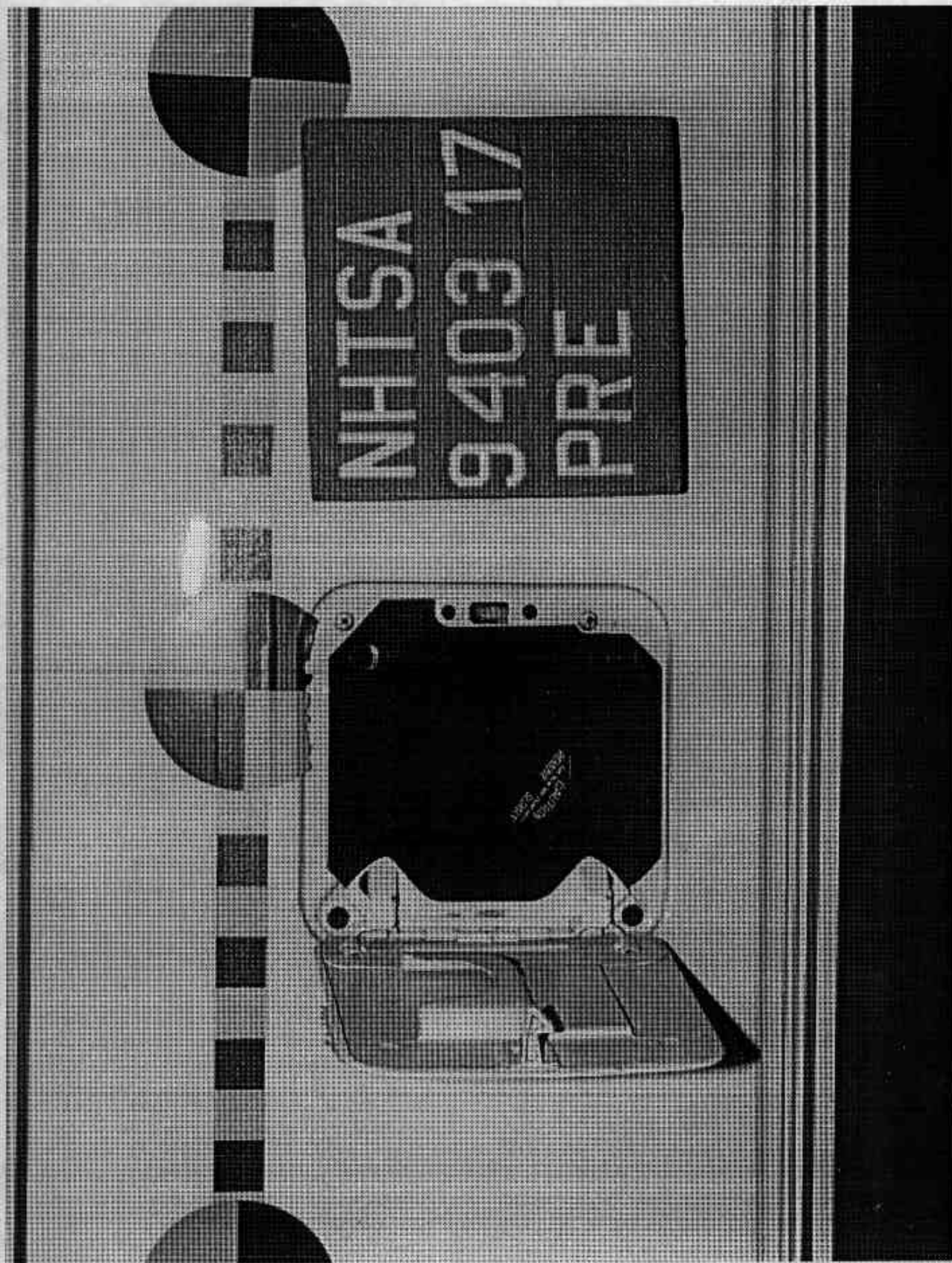


Figure A-17. Pre-test Fuel Filler Cap View
A-18

940317

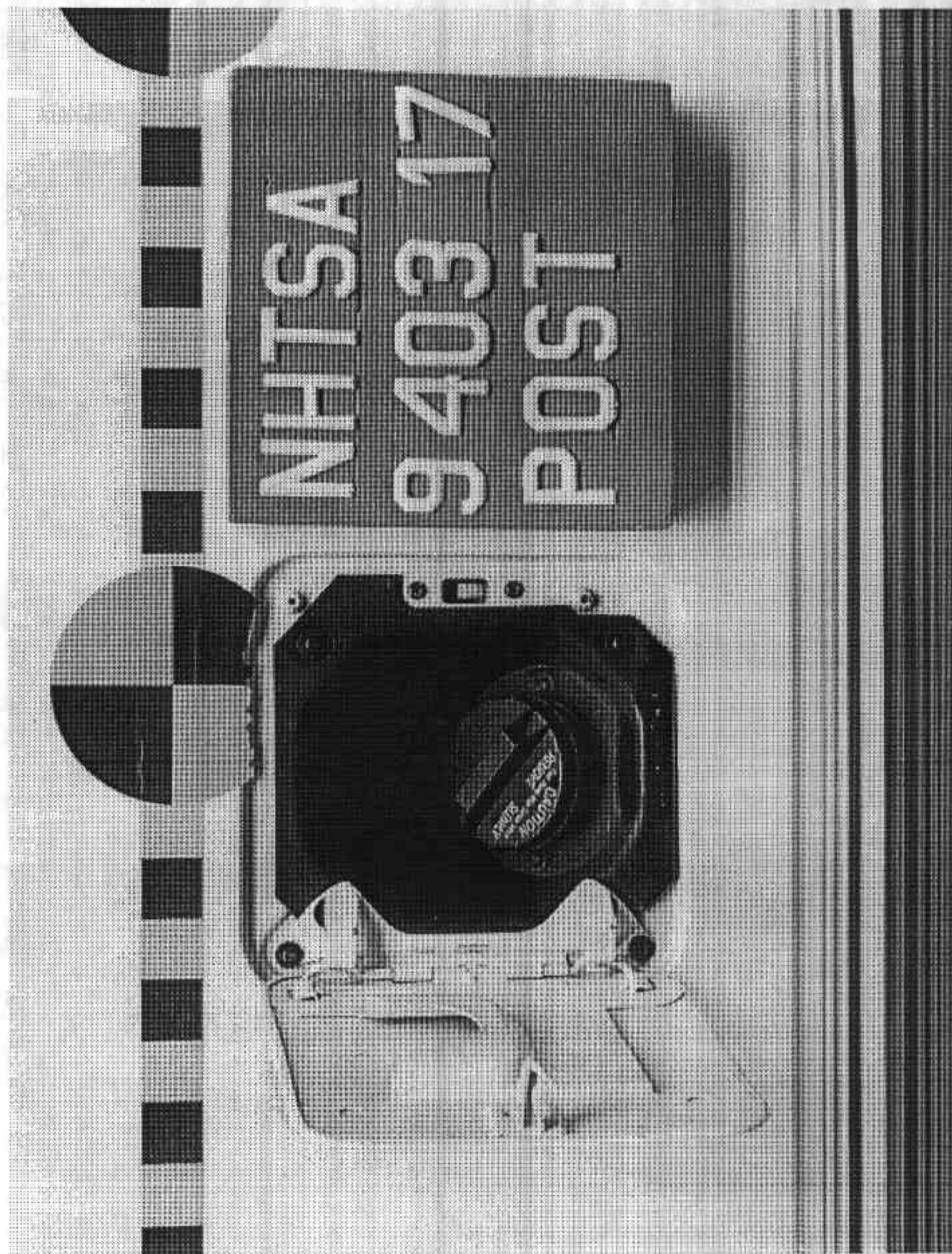


Figure A-18. Post-test Fuel Filler Cap View
A-19

940317



Figure A-19. Pre-test Fuel Filler Neck View
A-20

940317

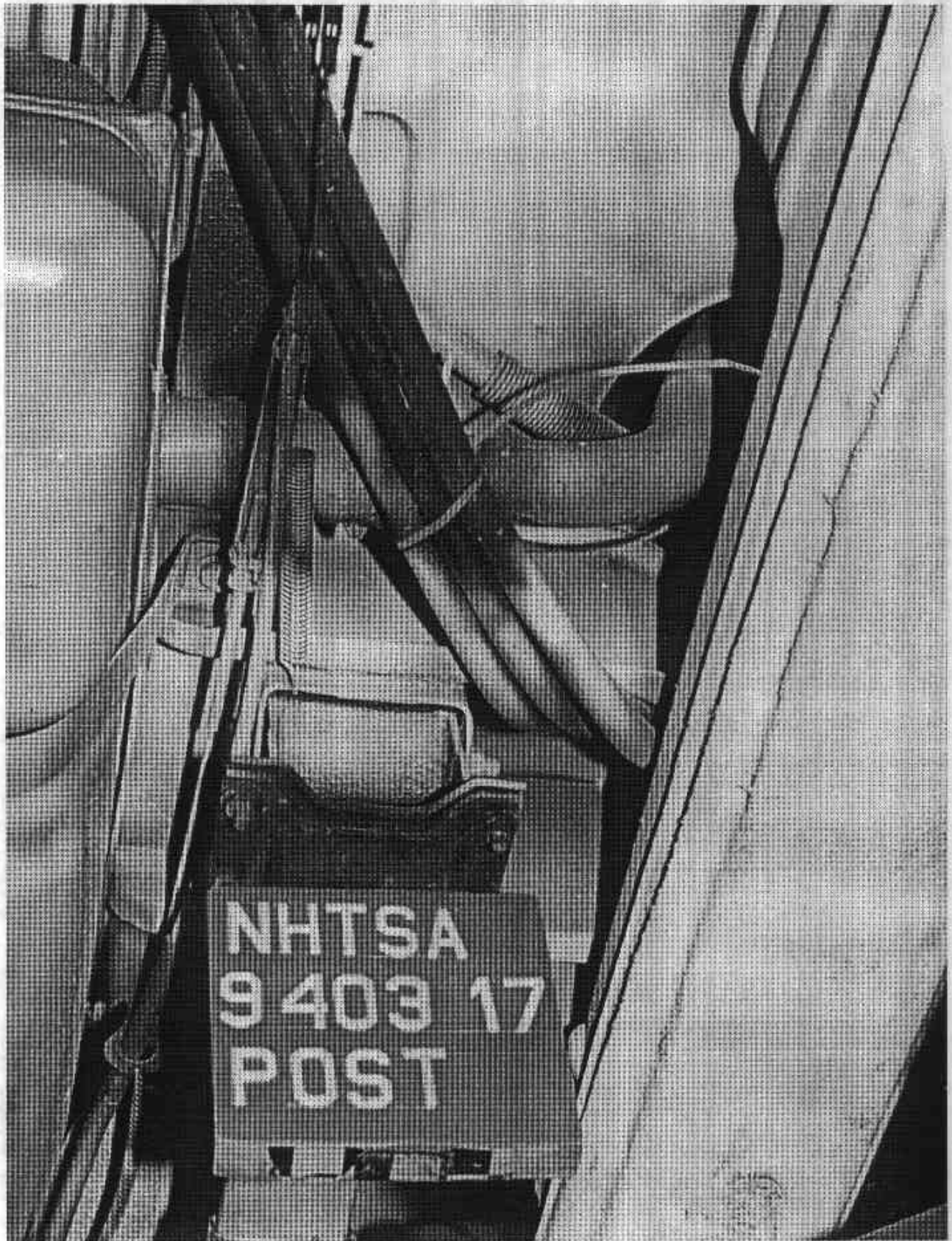


Figure A-20. Post-test Fuel Filler Neck View
A-21

940317

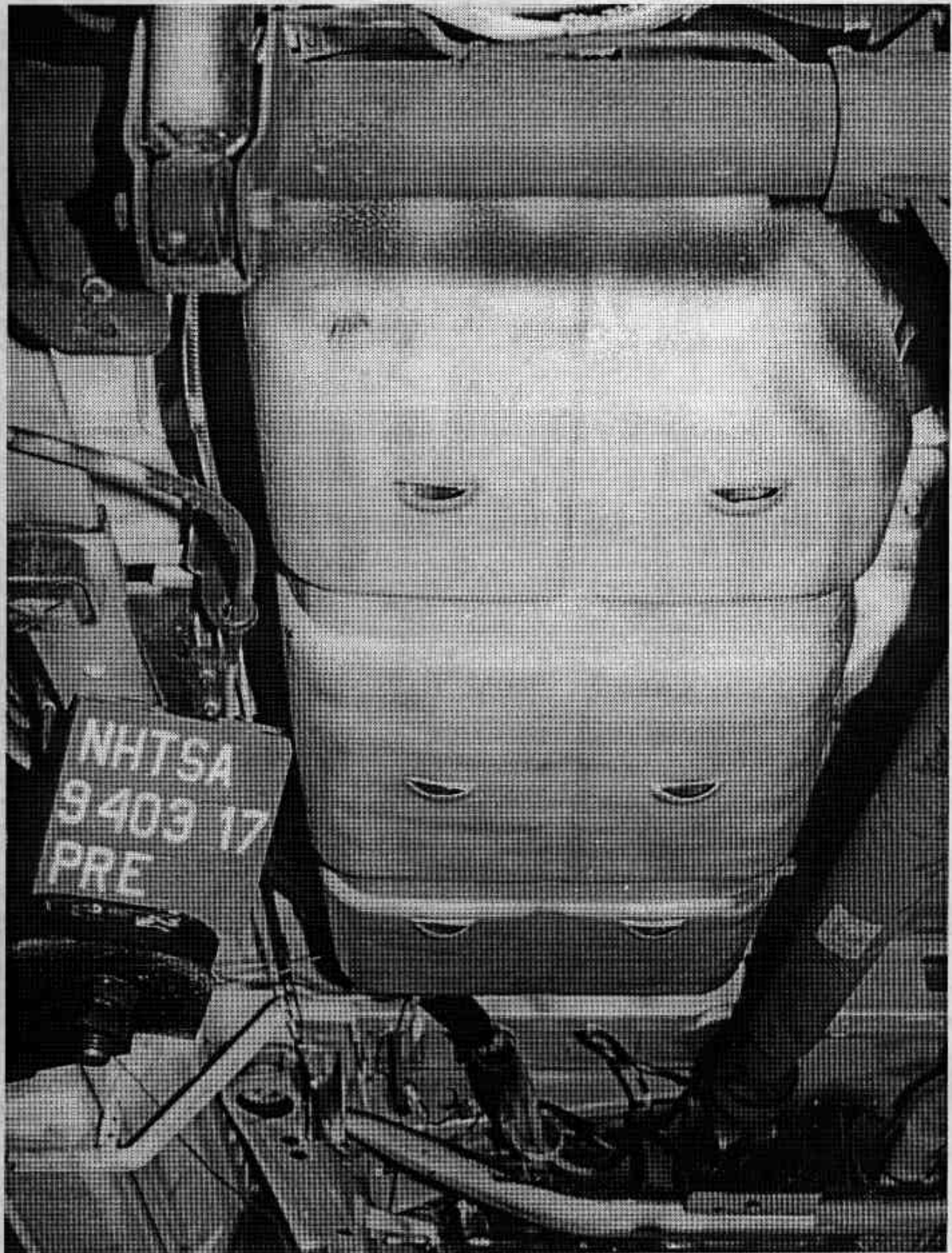


Figure A-21. Pre-test Fuel Tank View
A-22

940317

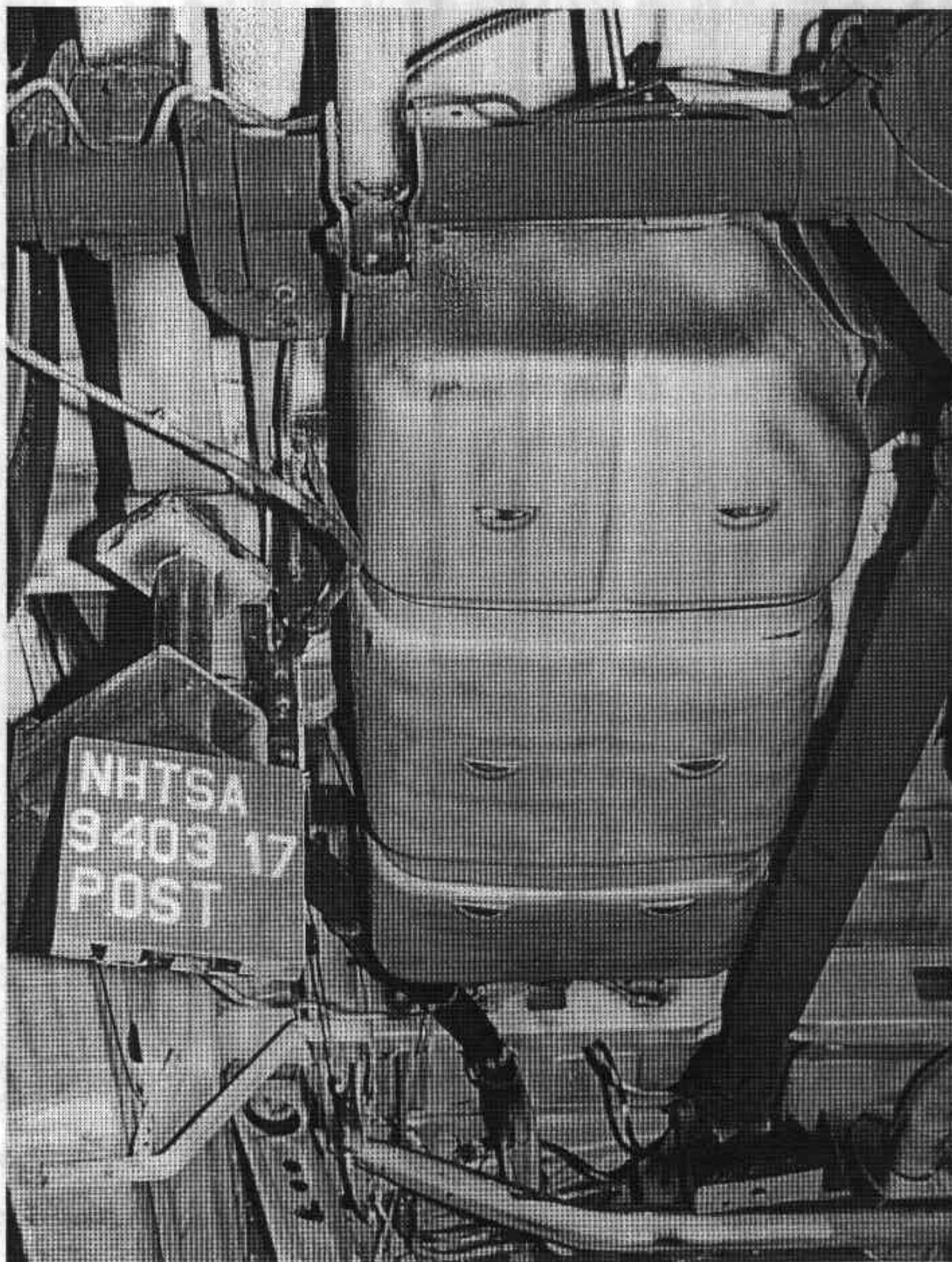


Figure A-22. Post-test Fuel Tank View
A-23

940317

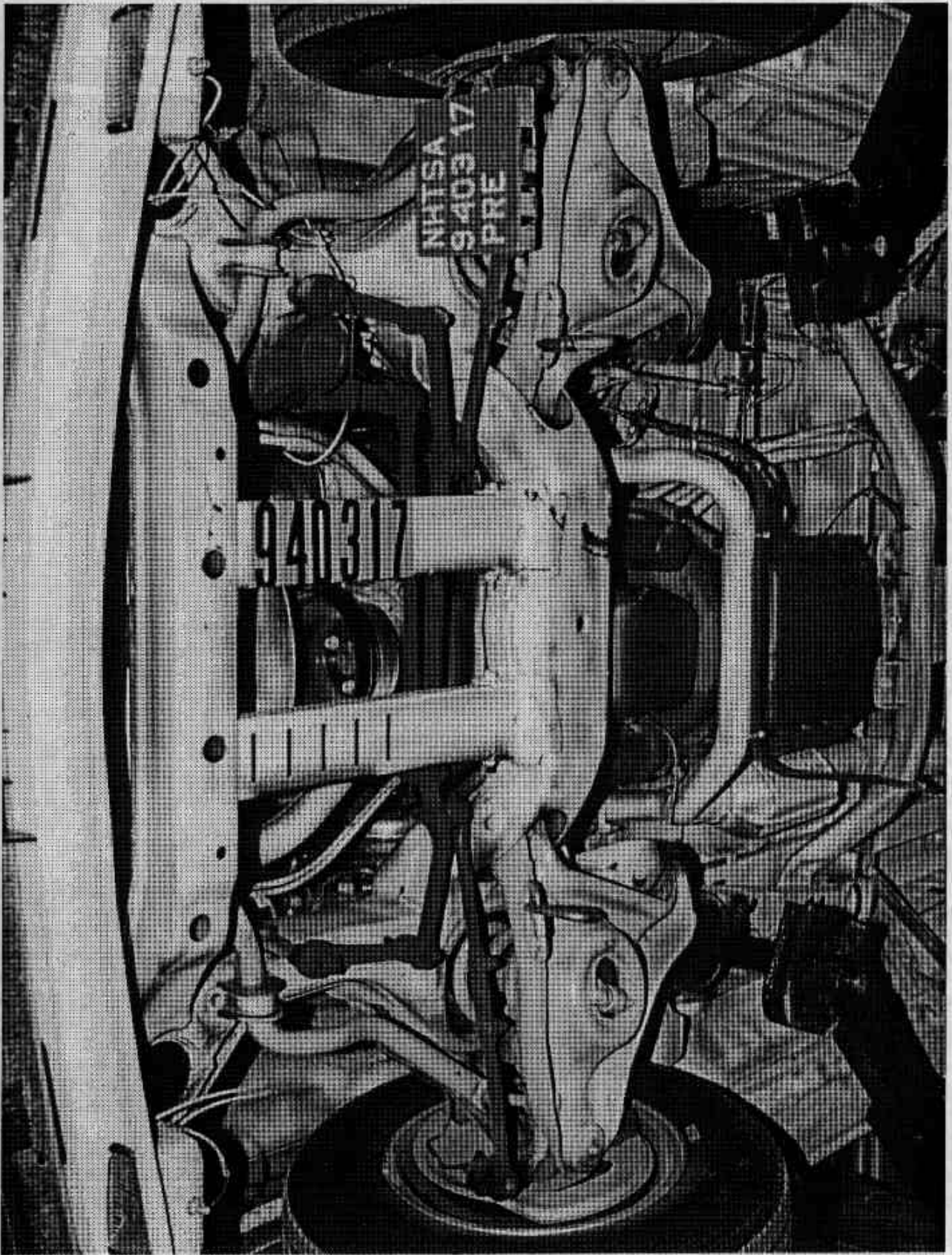


Figure A-23. Pre-test Front Underbody View
A-24

940317

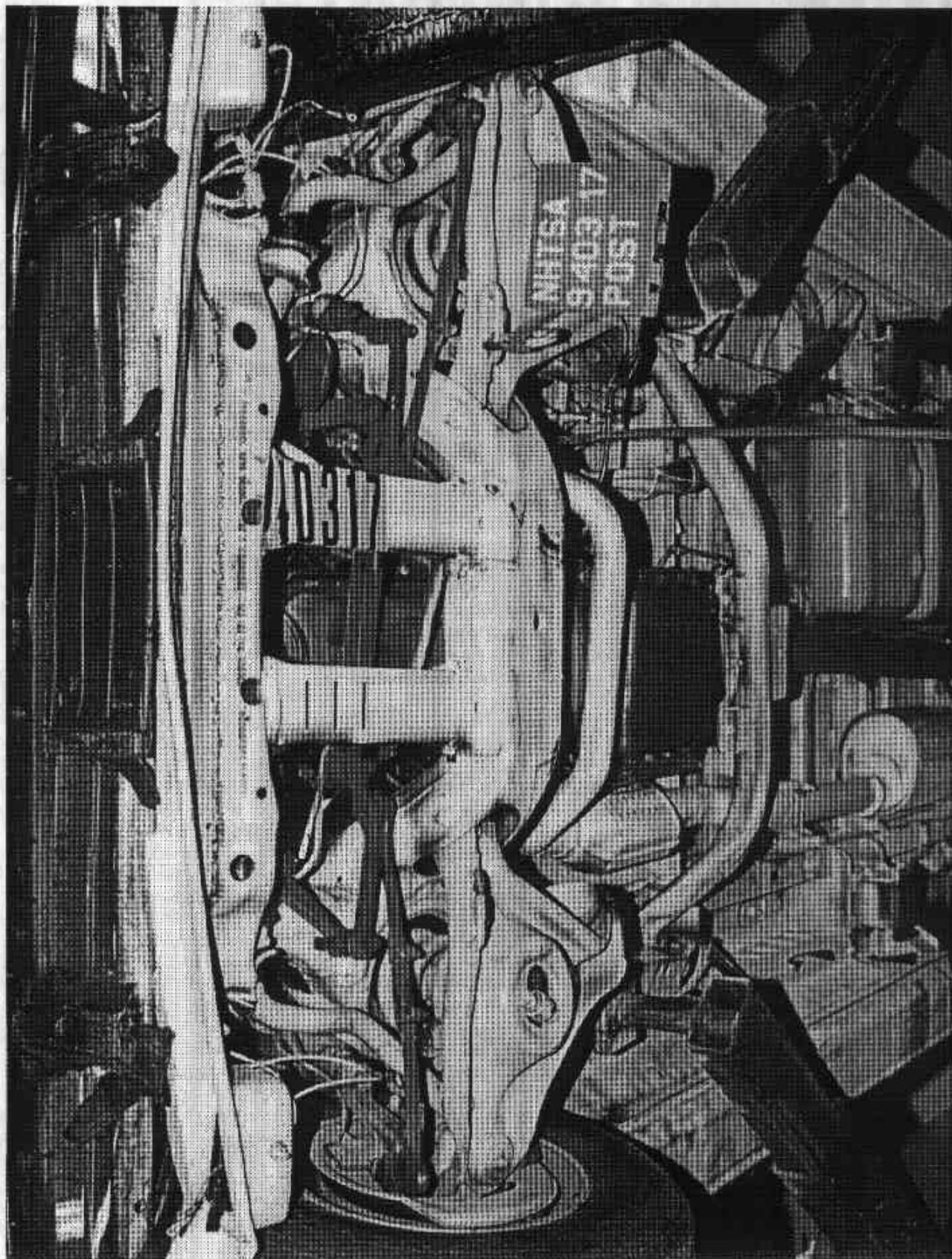


Figure A-24. Post-test Front Underbody View
A-25

940317

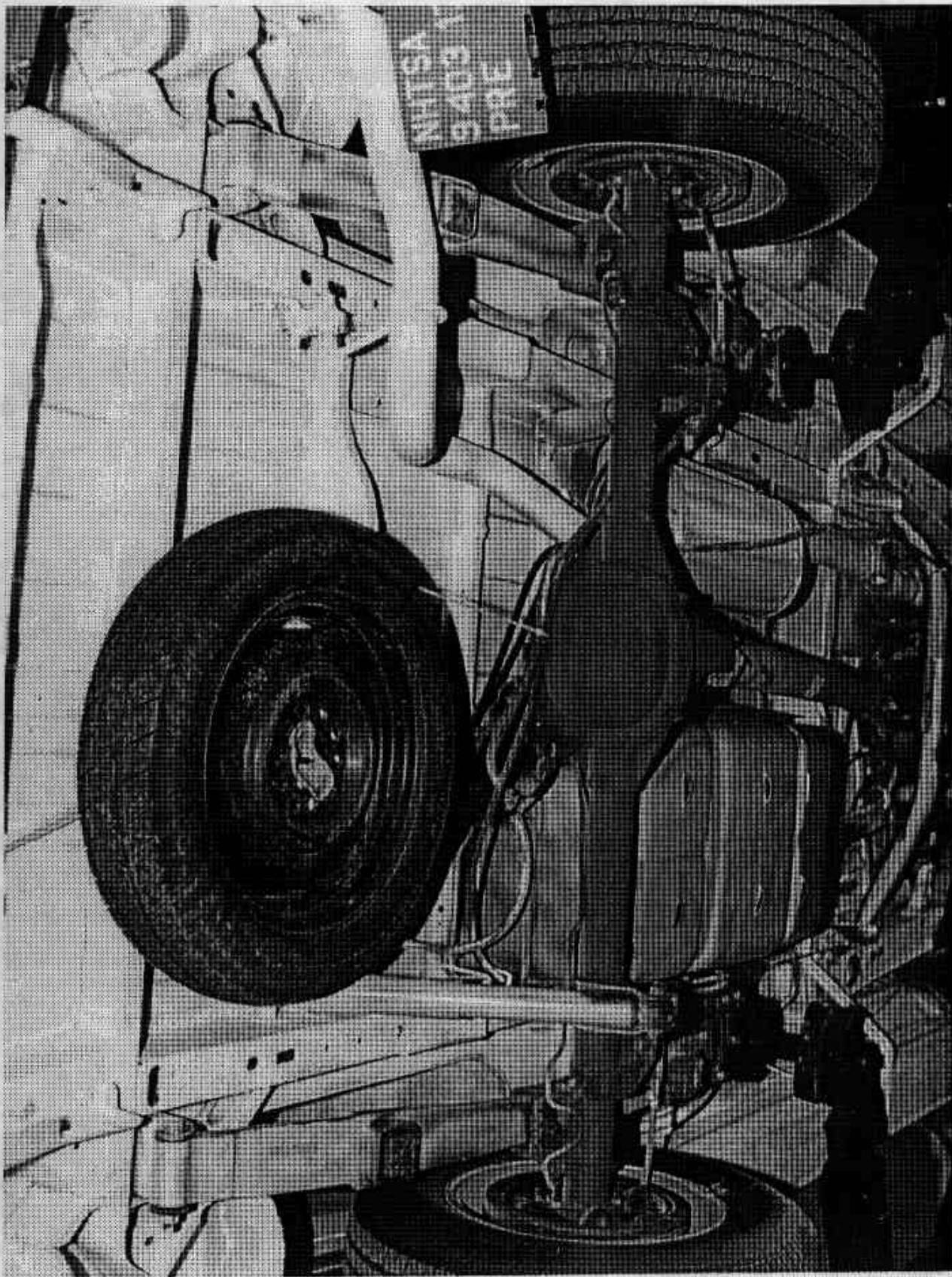


Figure A-25. Pre-test Rear Underbody View
A-26

940317

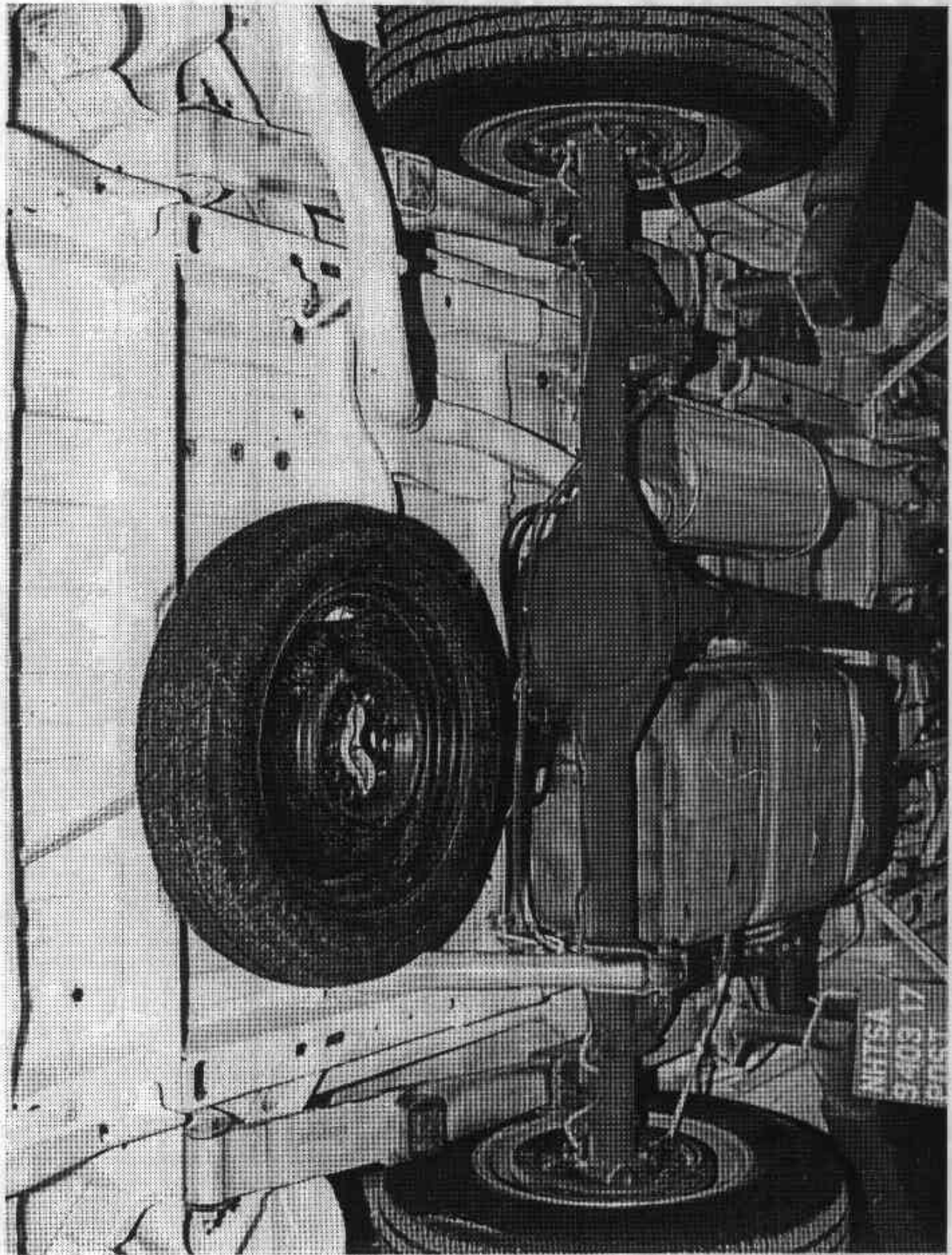


Figure A-26. Post-test Rear Underbody View
A-27

940317

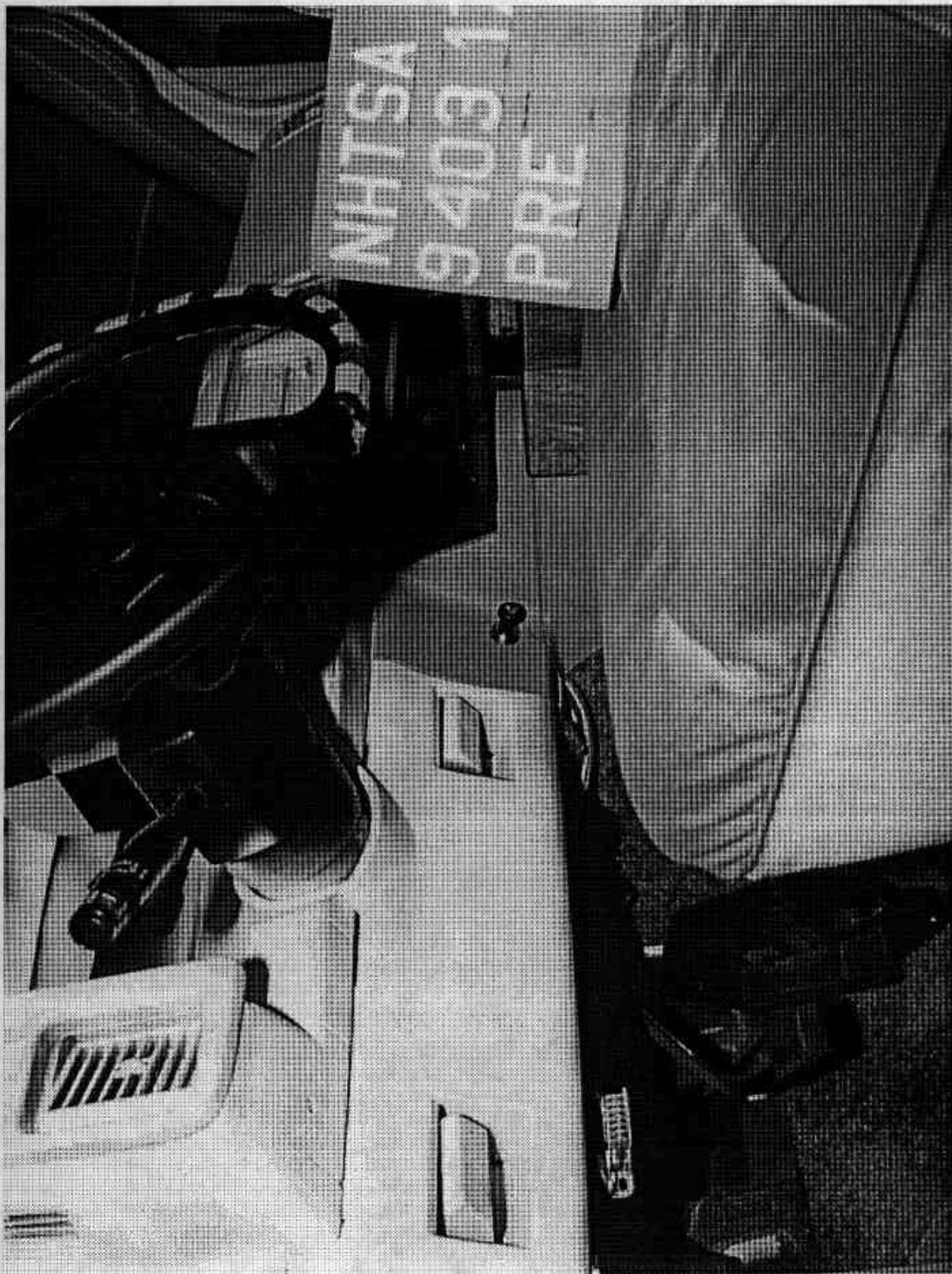


Figure A-27. Pre-test Driver's Knee Bolster View
A-28

940317

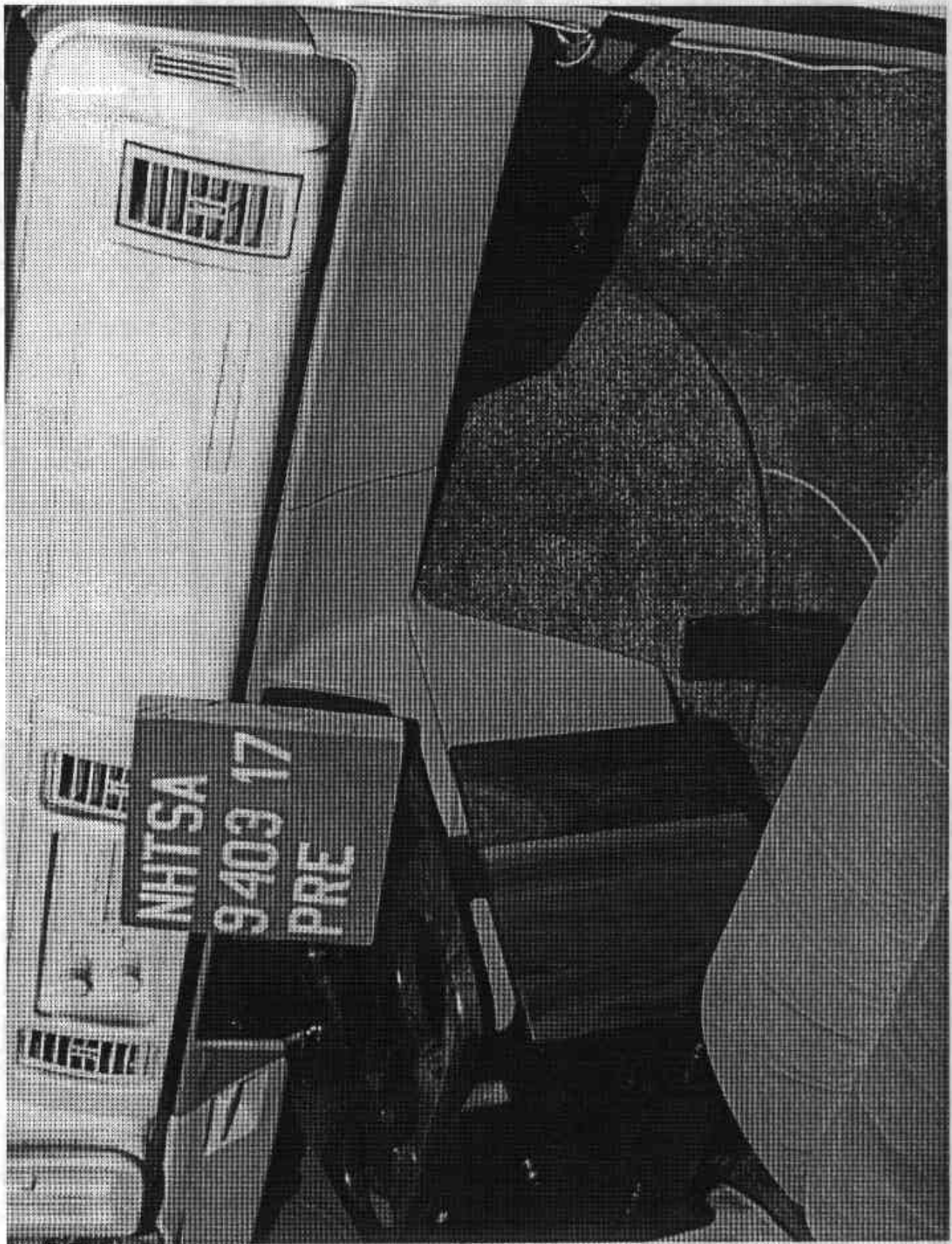


Figure A-28. Pre-test Passenger's Knee Bolster View
A-29

940317

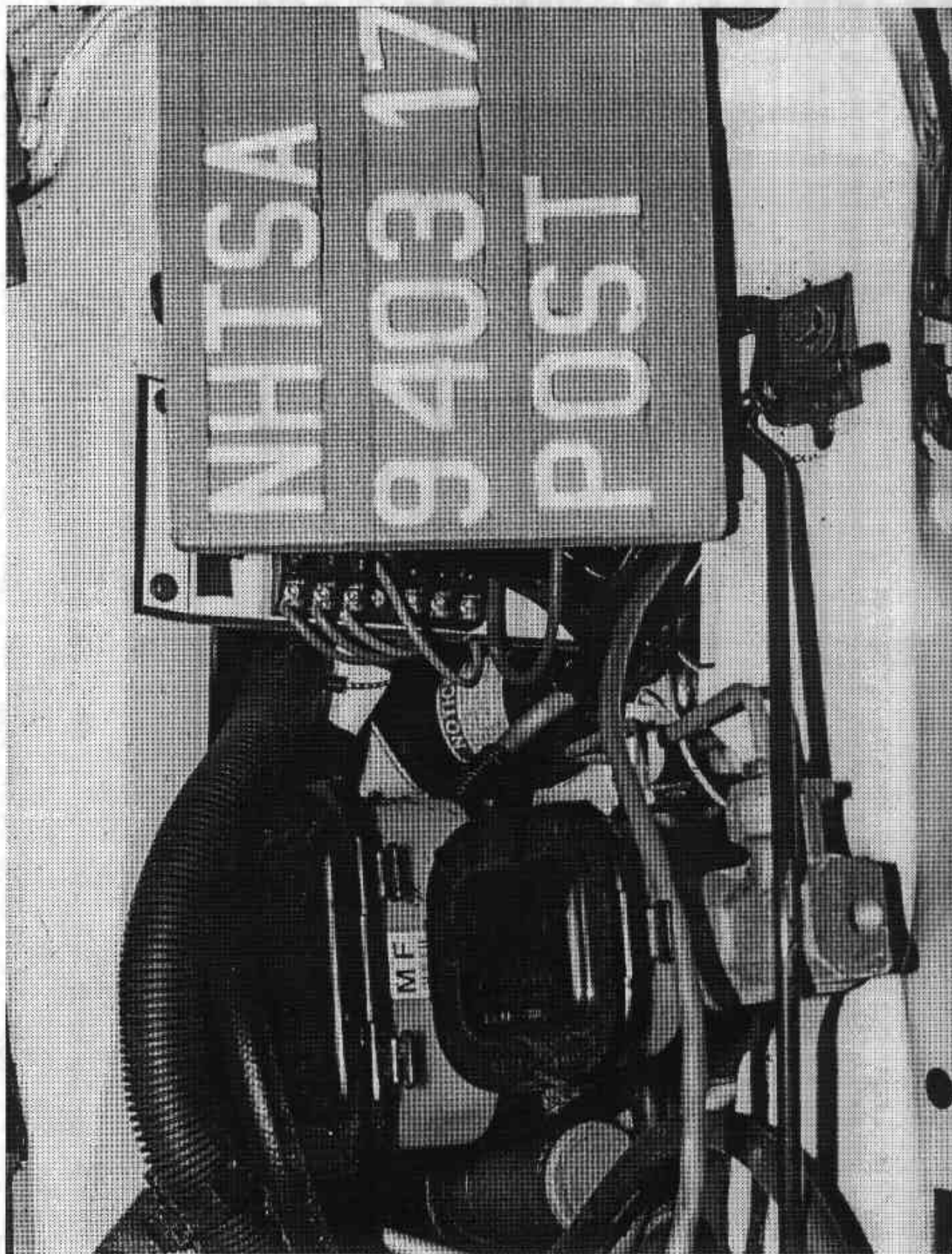


Figure A-30. Post-test Steering Column at Firewall View
A-31

940317



Figure A-31. Pre-test Steering Column at Firewall View - Interior

A-32

940317

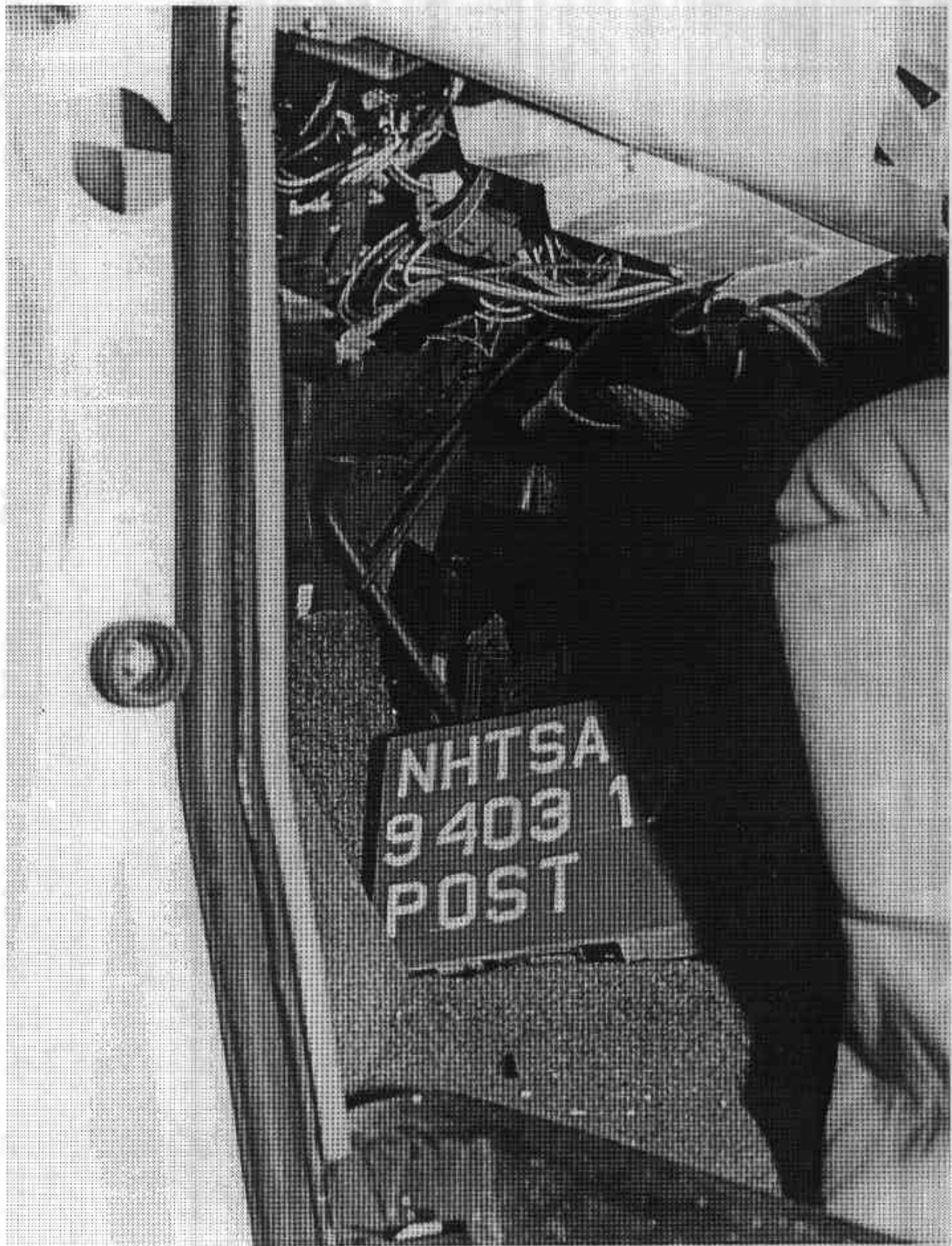


Figure A-32. Post-test Steering Column at Firewall View - Interior
A-33

940317

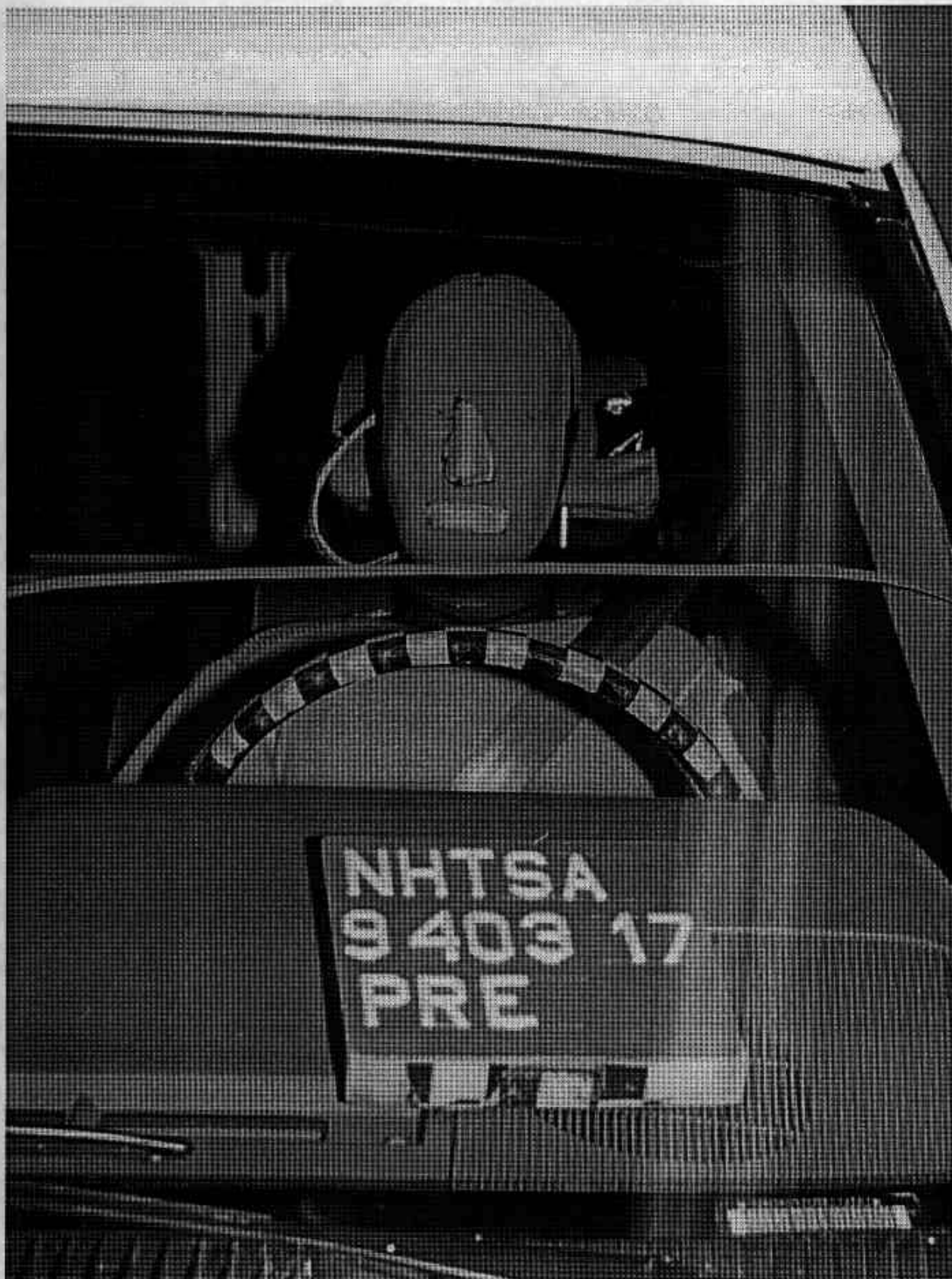


Figure A-33. Pre-test Driver Dummy Position - View 1
A-34

940317

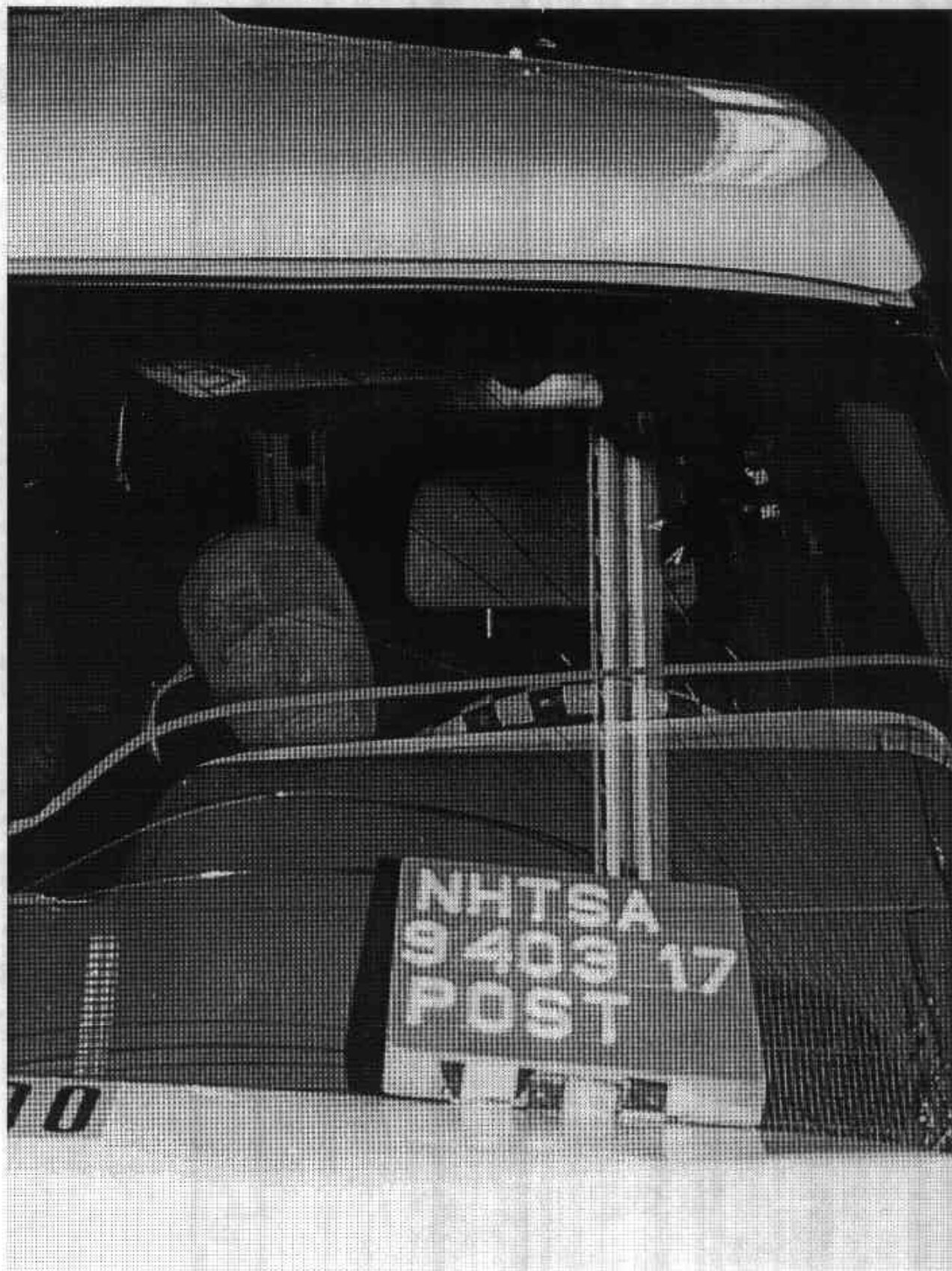


Figure A-34. Post-test Driver Dummy Position - View 1
A-35

940317

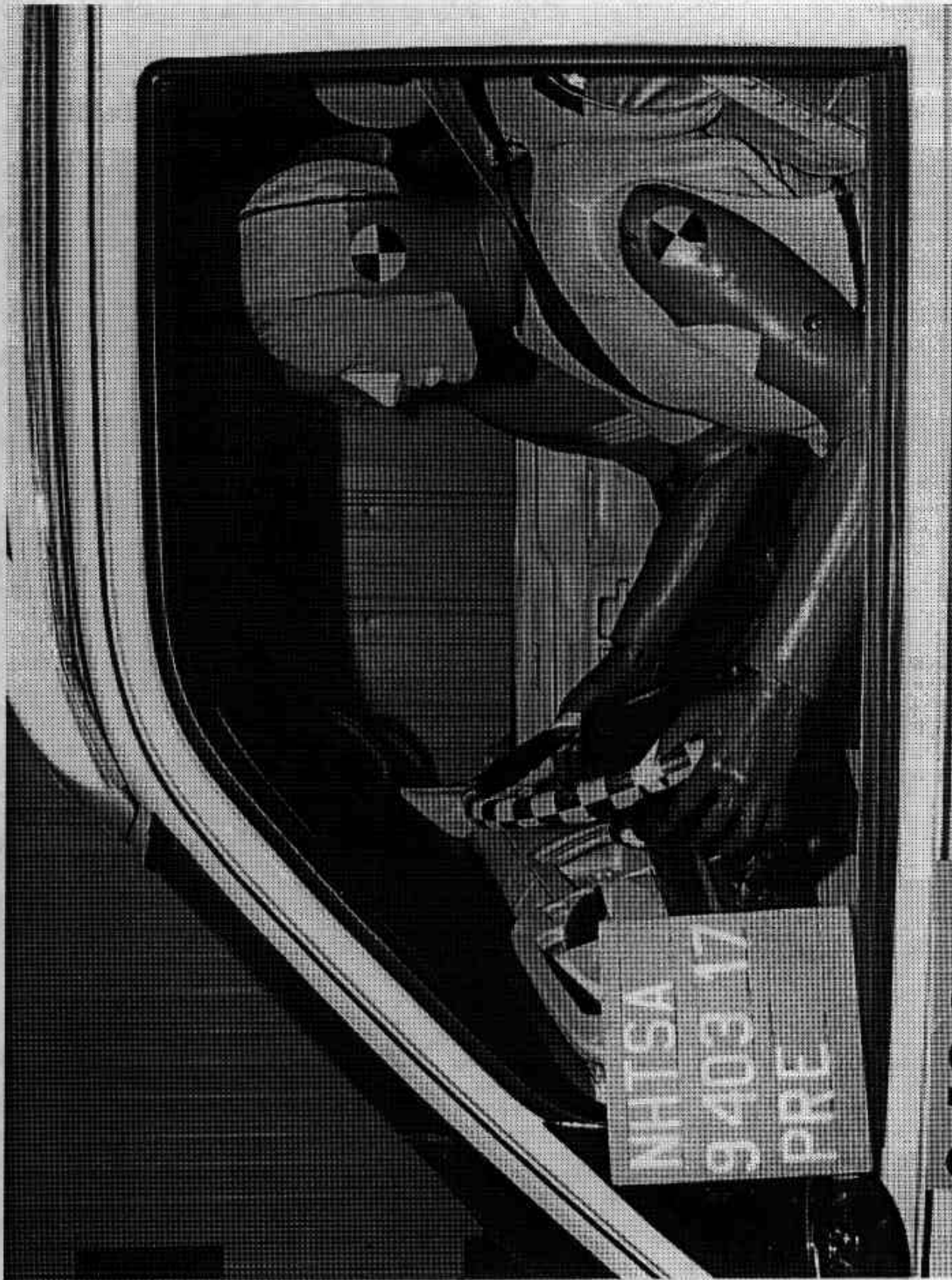


Figure A-35. Pre-test Driver Dummy Position - View 2
A-36

940317

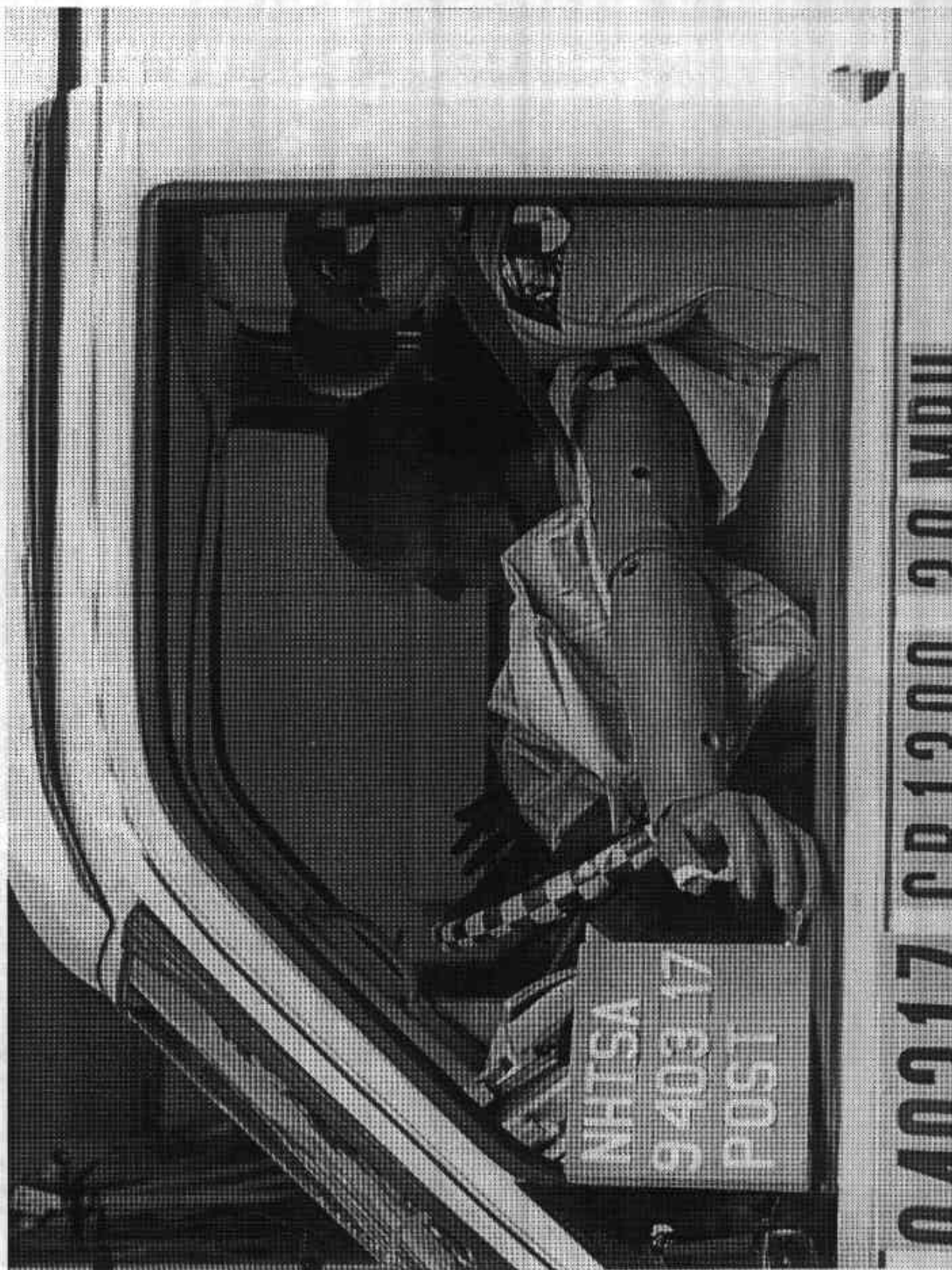


Figure A-36. Post-test Driver Dummy Position - View 2
A-37

940317

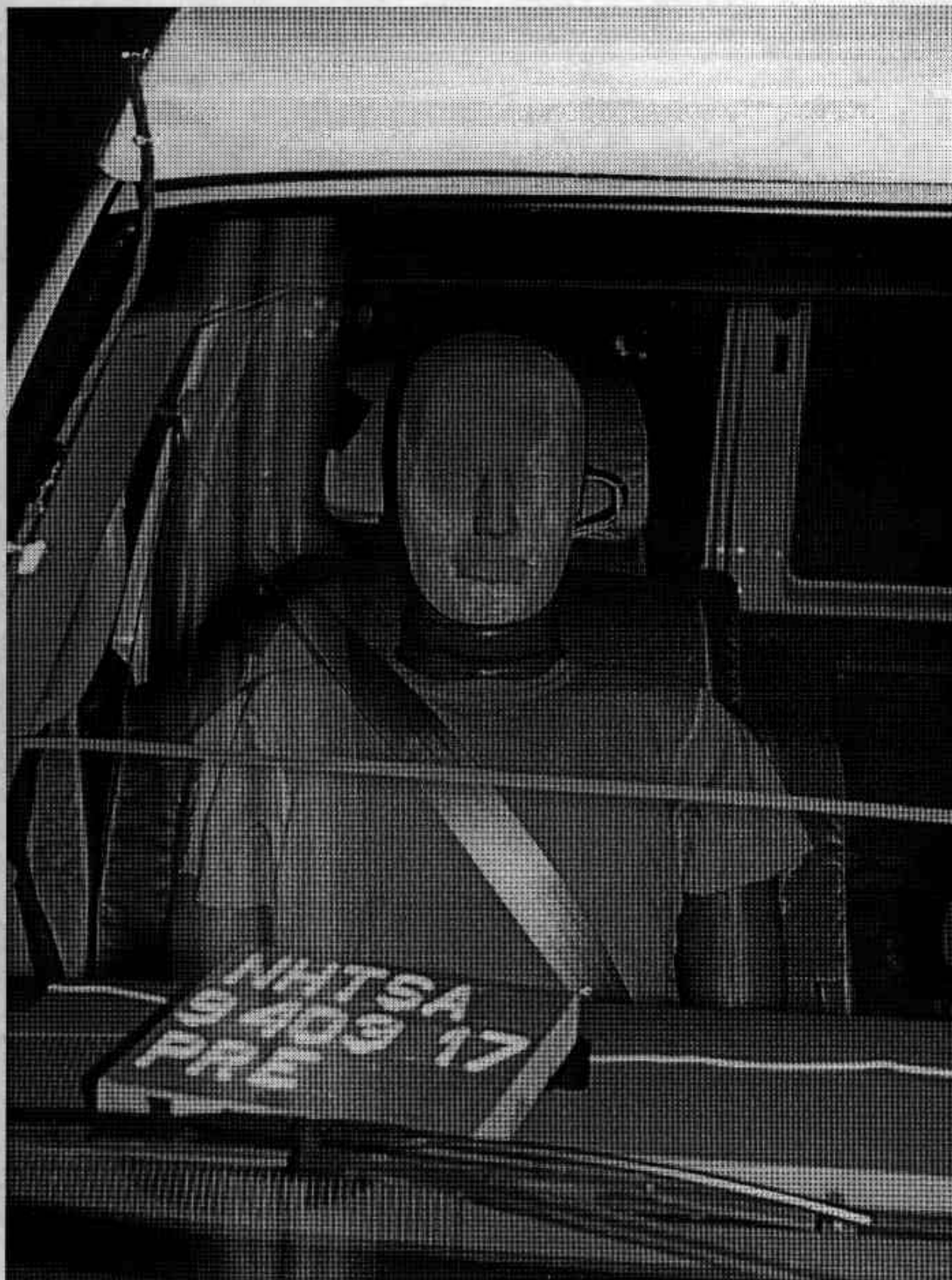


Figure A-37. Pre-test Passenger Dummy Position - View 1
A-38

940317



Figure A-38. Post-test Passenger Dummy Position - View 1
A-39

940317

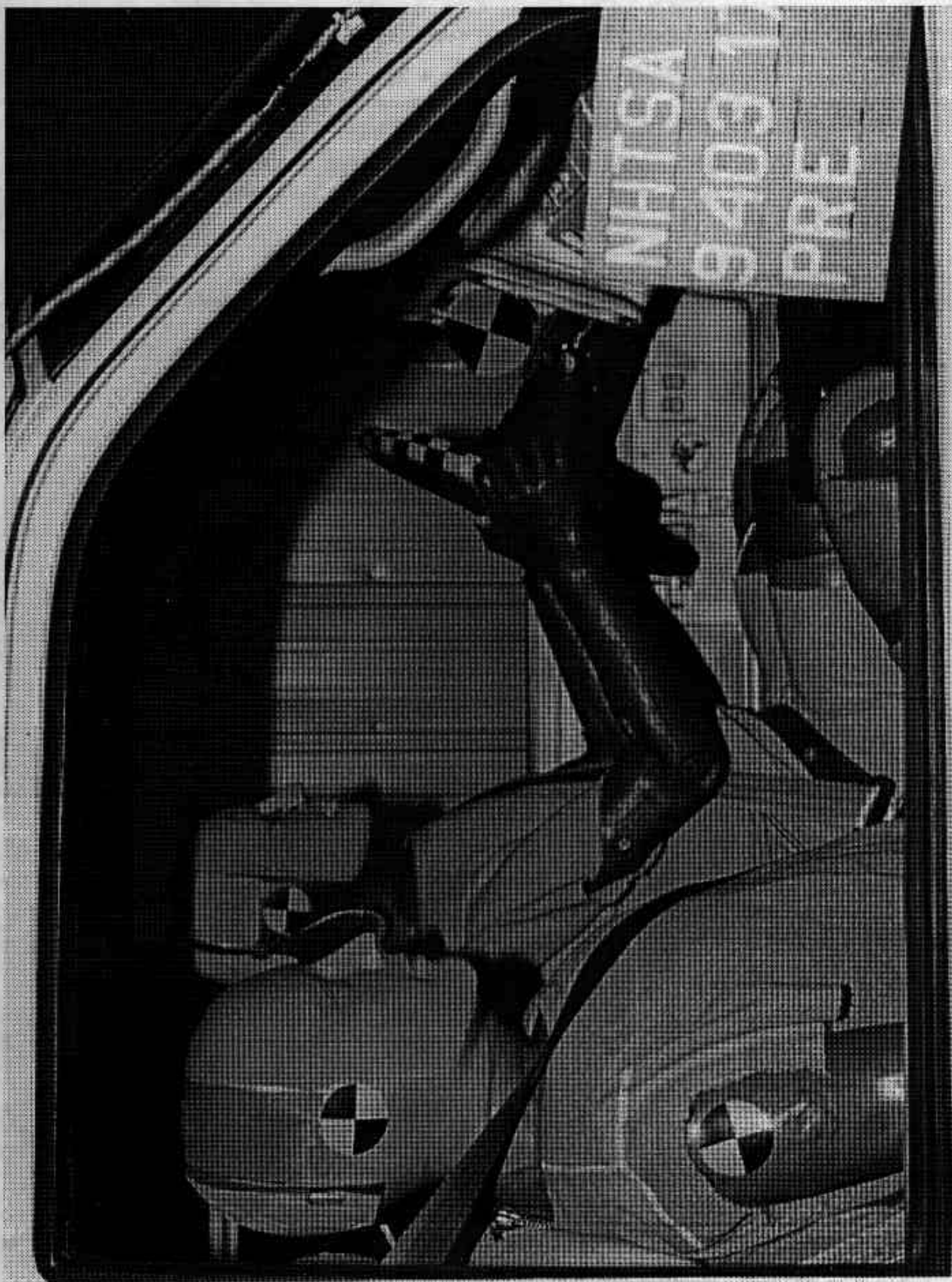


Figure A-39. Pre-test Passenger Dummy Position - View 2
A-40

940317



Figure A-40. Post-test Passenger Dummy Position - View 2
A-41

940317



Figure A-41. Pre-test Driver Dummy & Vehicle Interior - View 1
A-42

940317



Figure A-42. Post-test Driver Dummy & Vehicle Interior - View 1
A-43

940317

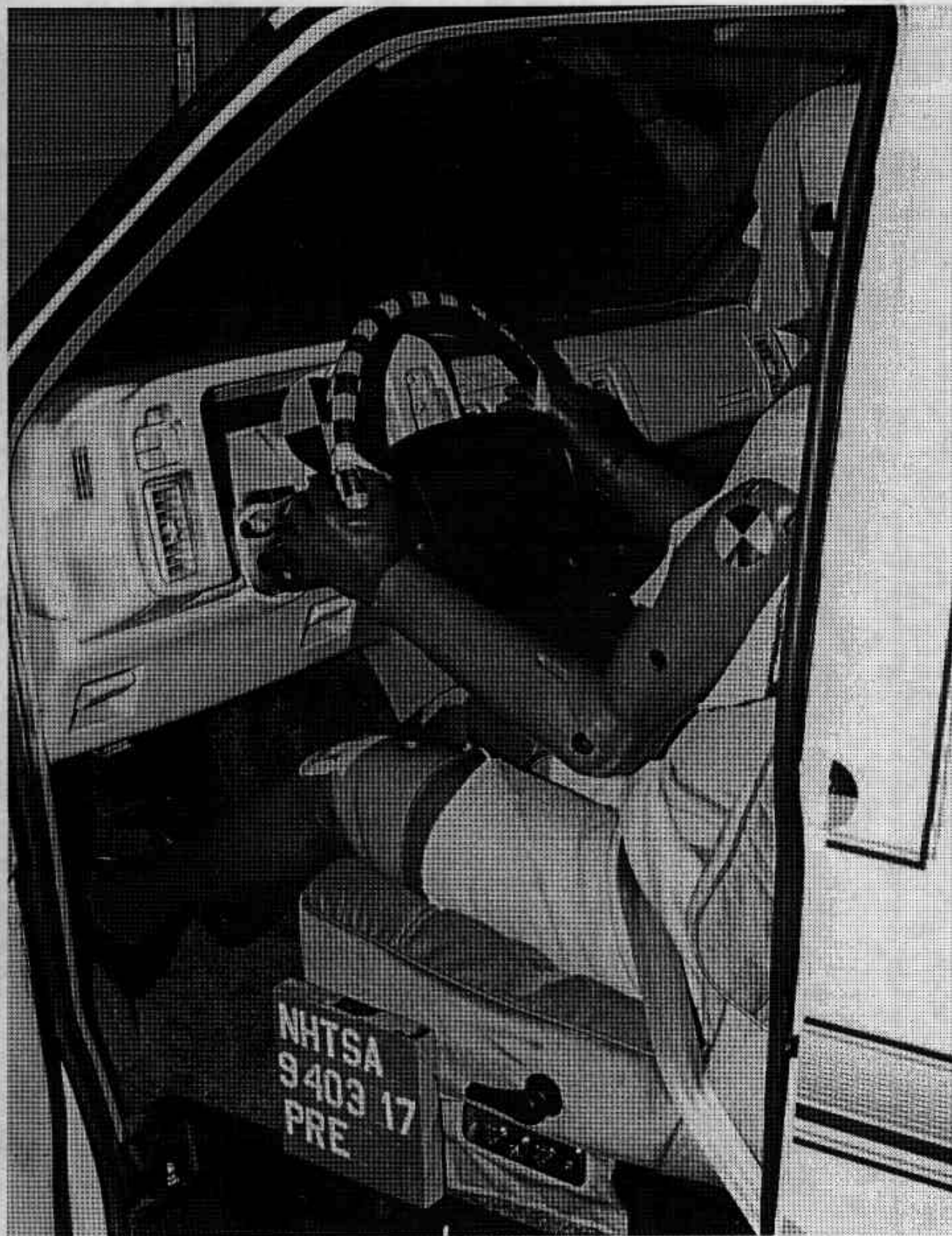


Figure A-43. Pre-test Driver Dummy & Vehicle Interior - View 2
A-44

940317



Figure A-44. Post-test Driver Dummy & Vehicle Interior - View 2

A-45

940317



Figure A-45. Pre-test Passenger Dummy & Vehicle Interior - View 1

A-46

940317



Figure A-46. Post-test Passenger Dummy & Vehicle Interior - View 1
A-47

940317



Figure A-47. Pre-test Passenger Dummy & Vehicle Interior - View 2

A-48

940317



Figure A-48. Post-test Passenger Dummy & Vehicle Interior - View 2

A-49

940317

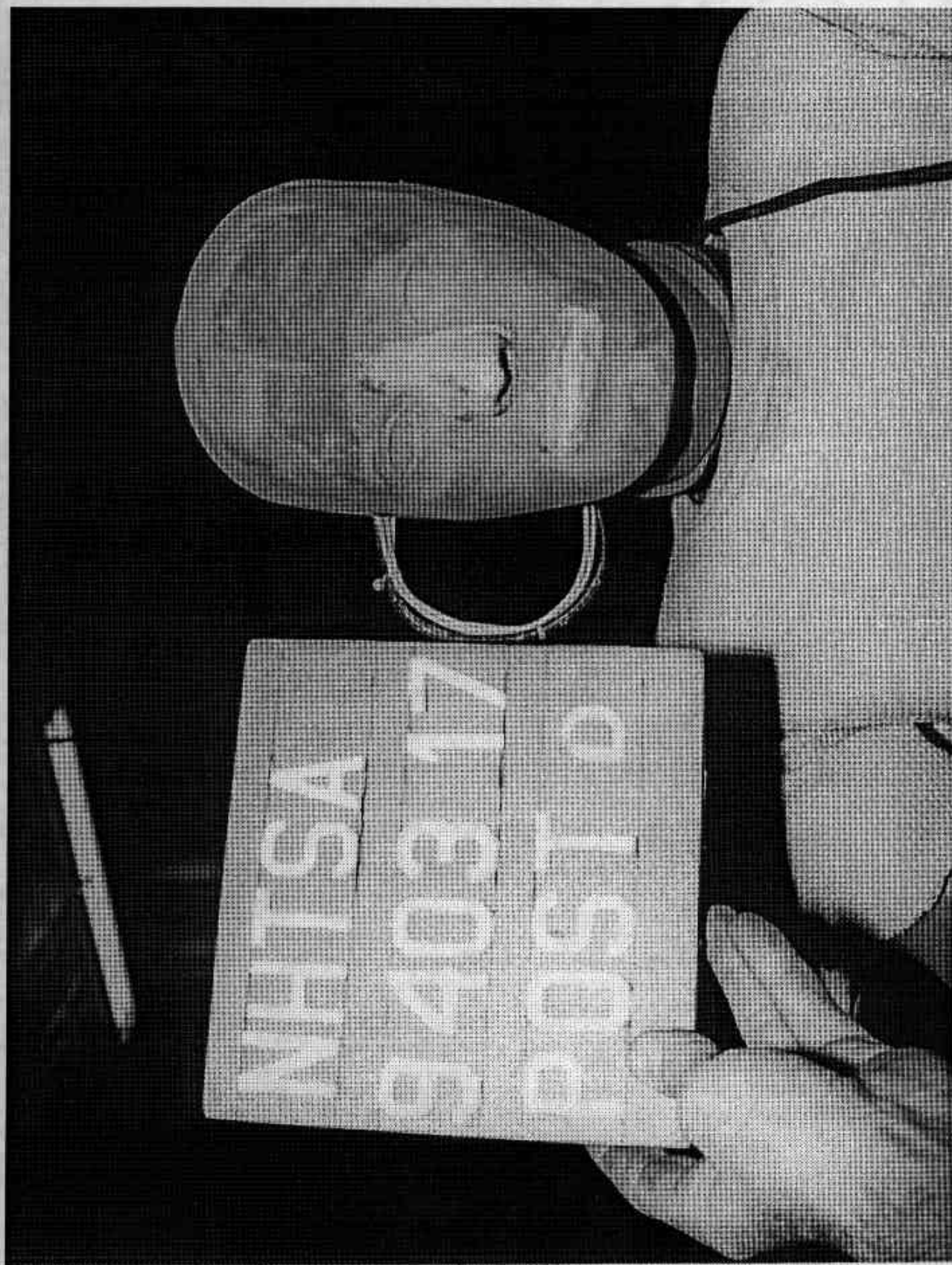


Figure A-49. Post-test Driver Dummy Head Contact - View 1
A-50

940317



Figure A-50. Post-test Driver Dummy Head Contact - View 2
A-51

940317

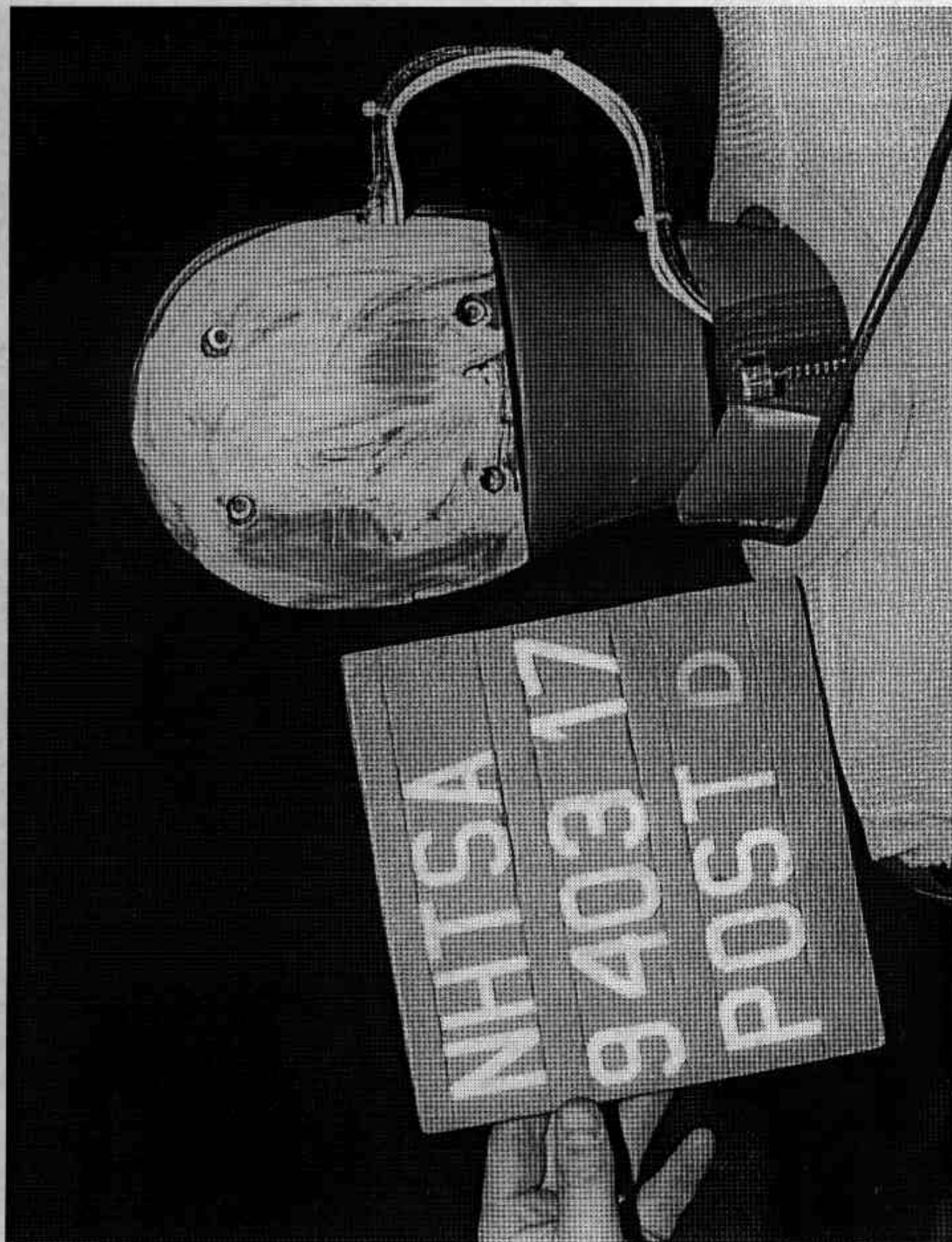


Figure A-51. Post-test Driver Dummy Head Contact - View 3

A-52

940317

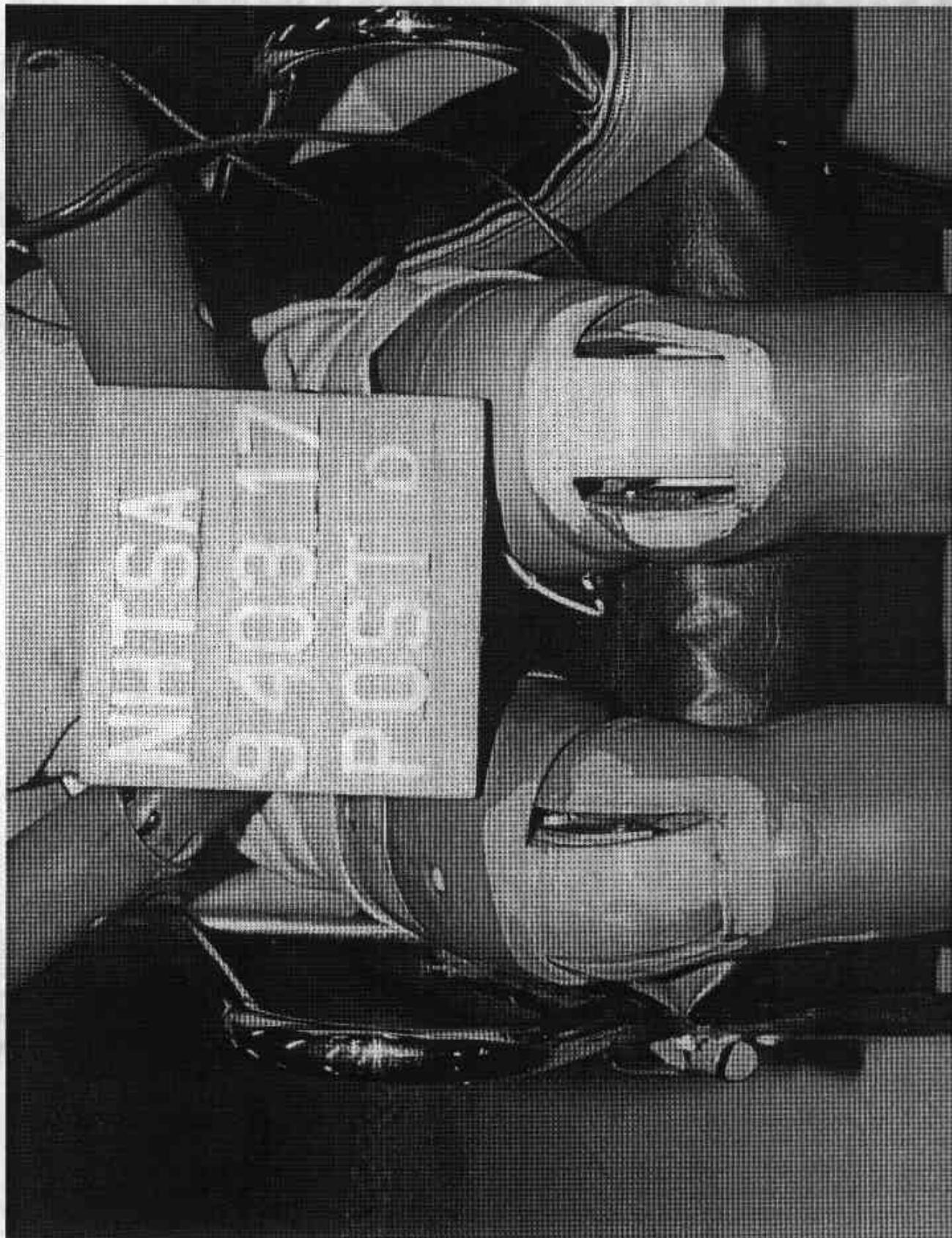


Figure A-52. Post-test Driver Dummy Knee Contact - View 1
A-53

940317

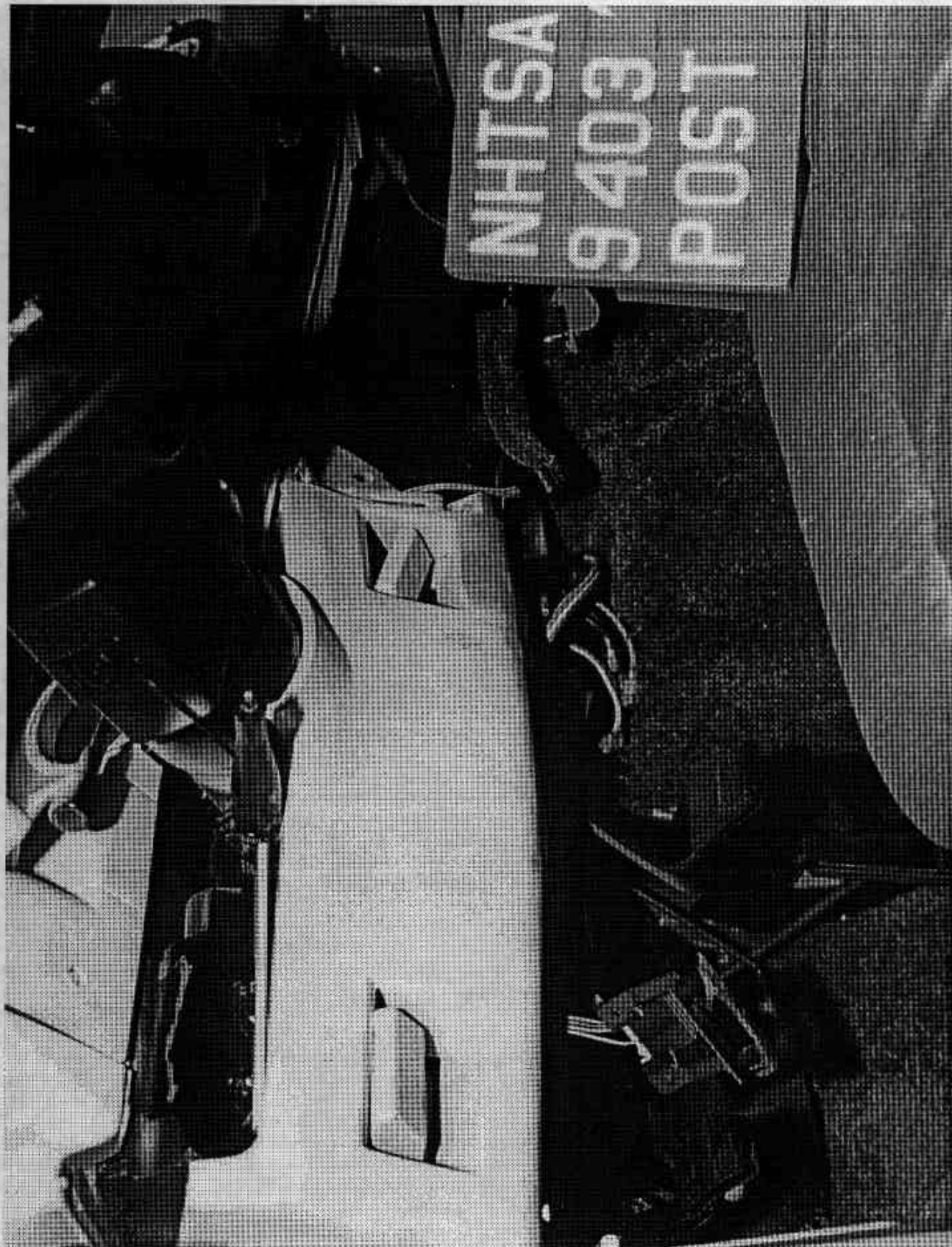


Figure A-53. Post-test Driver Dummy Knee Contact- View 2
A-54

940317

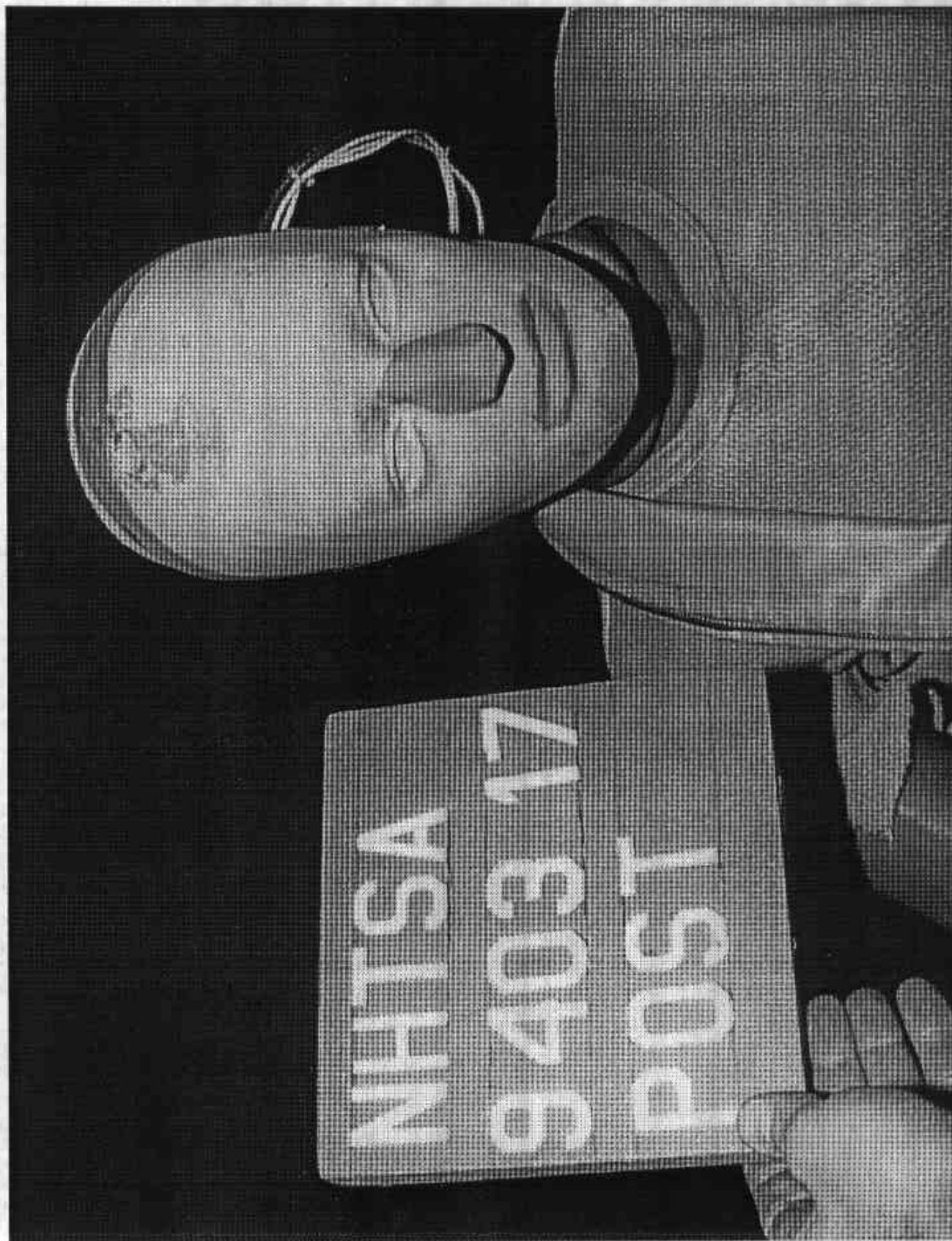


Figure A-54. Post-test Passenger Dummy Head Contact - View 1

A-55

940317



Figure A-55. Post-test Passenger Dummy Head Contact - View 2
A-56

940317

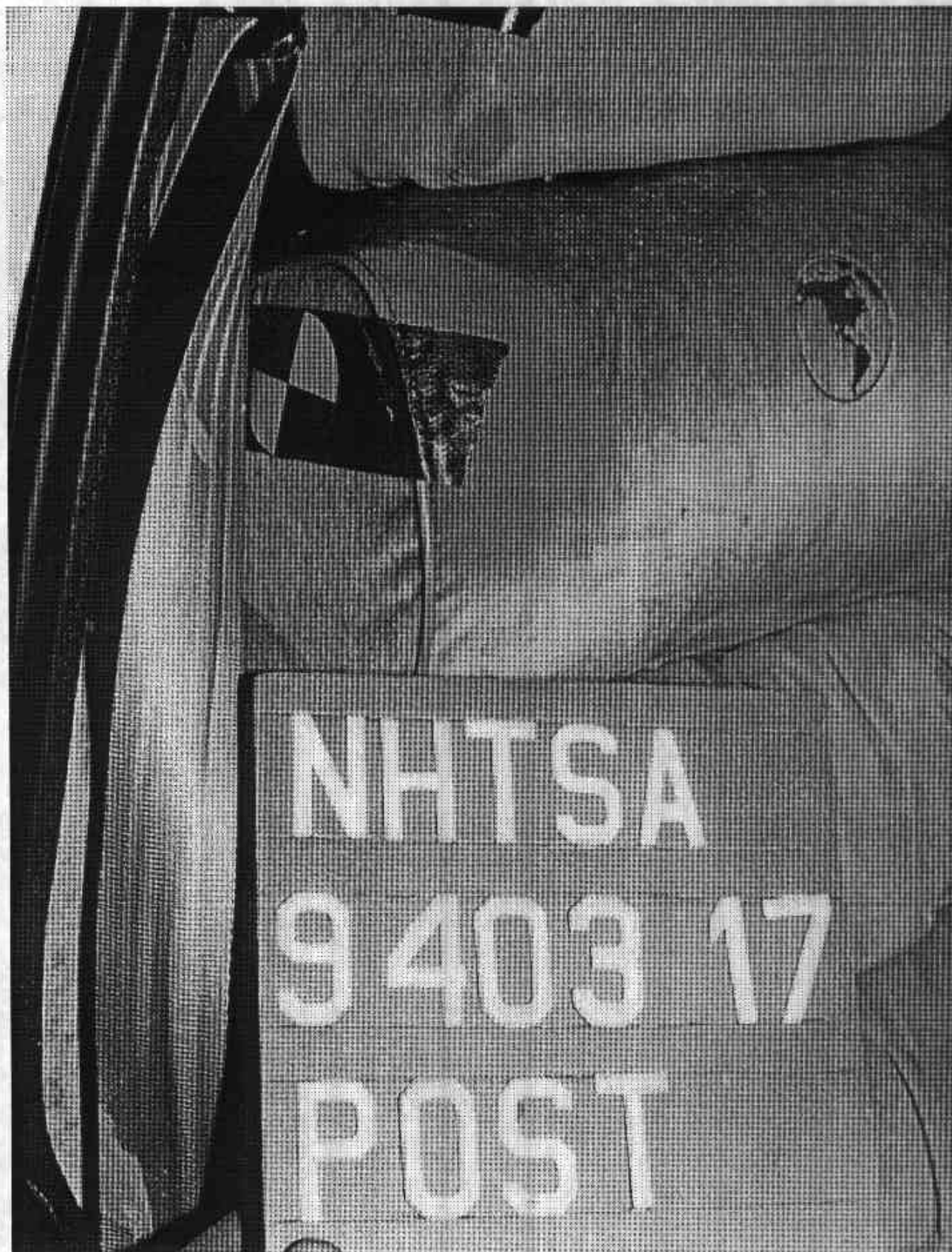


Figure A-56. Post-test Passenger Dummy Head Contact - View 3
A-57

940317



Figure A-57. Post-test Passenger Dummy Knee Contact - View 1
A-58

940317

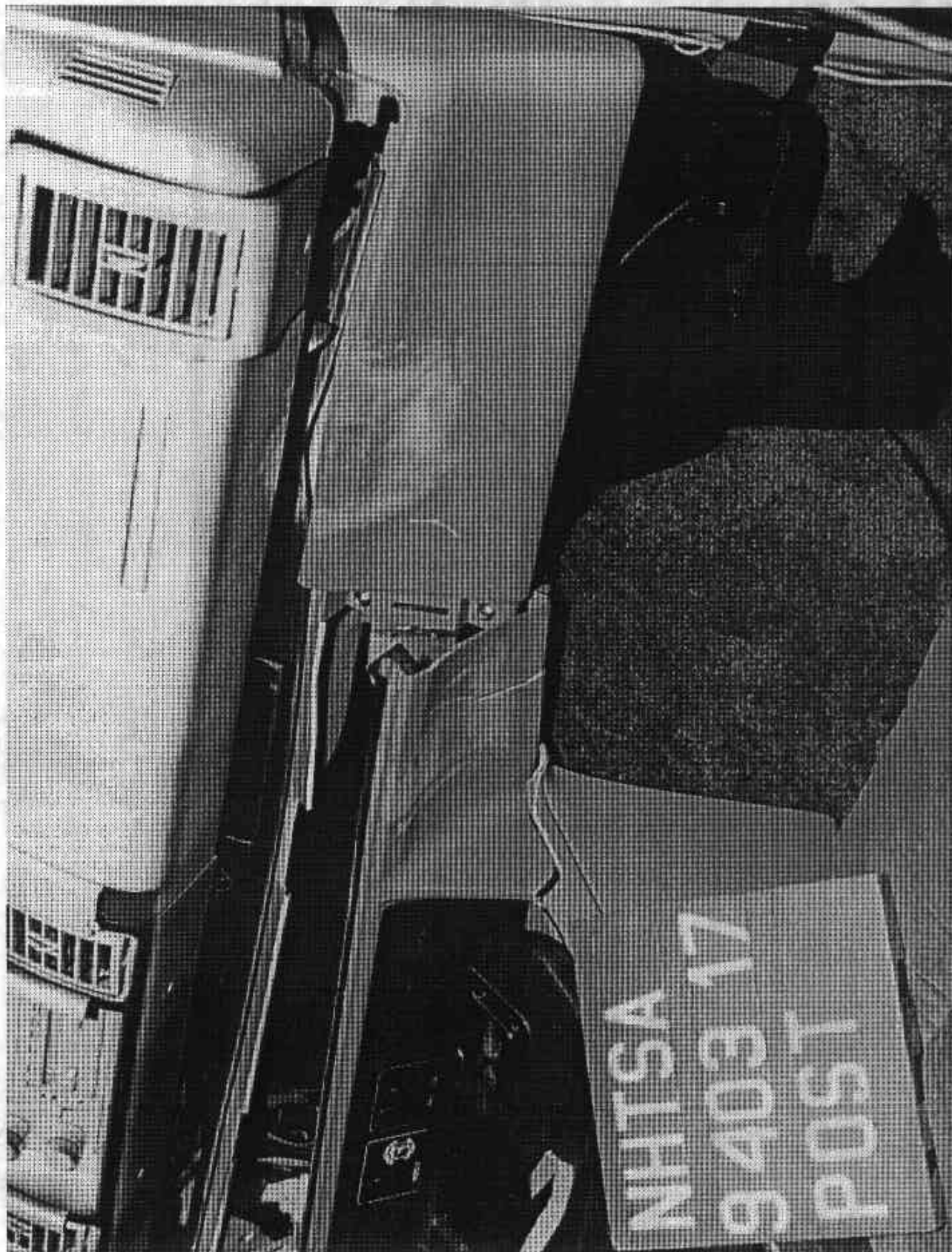


Figure A-58. Post-test Passenger Dummy Knee Contact - View 2
A-59

940317

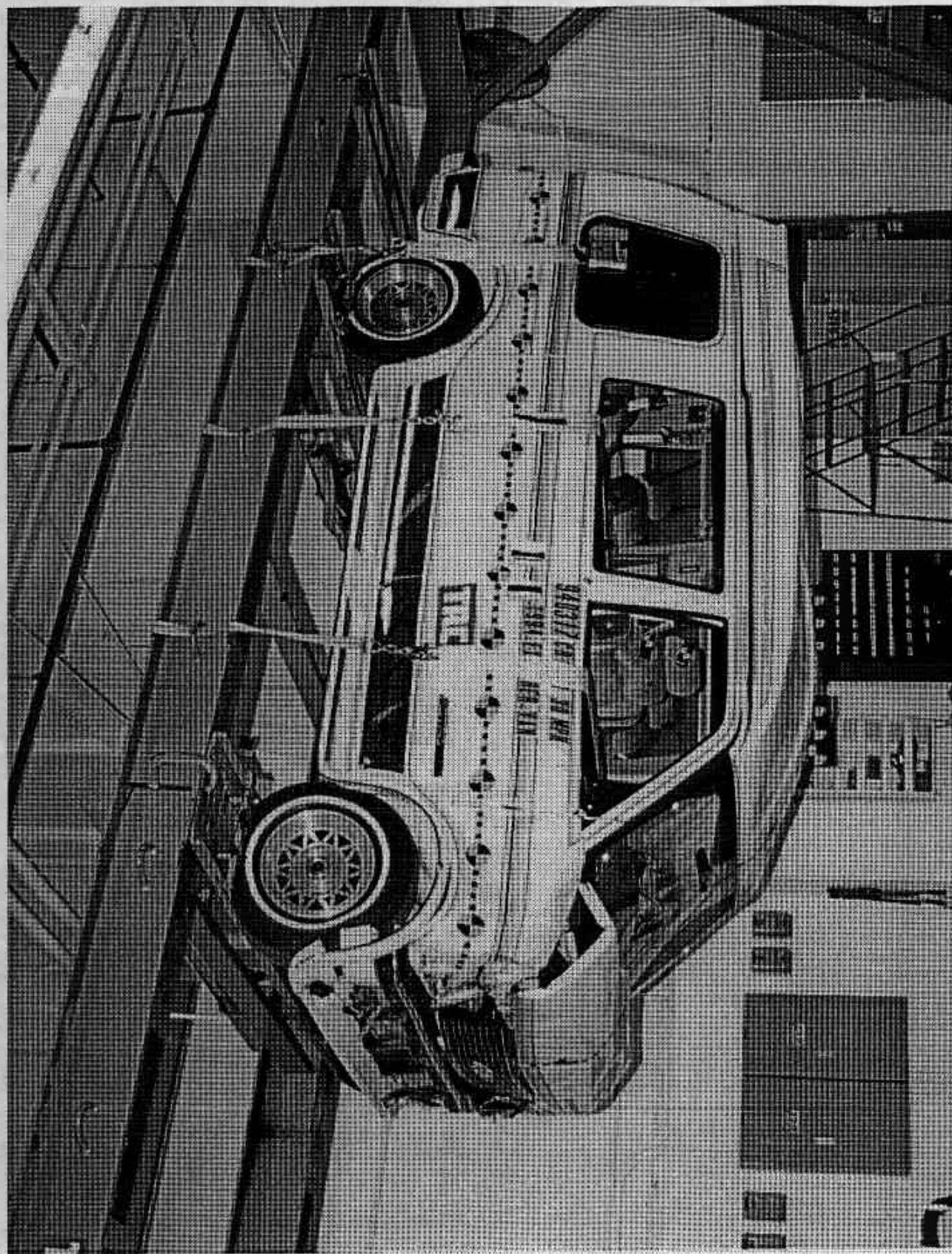


Figure A-59. Post-test Vehicle on Static Rollover Machine View

A-60

940317

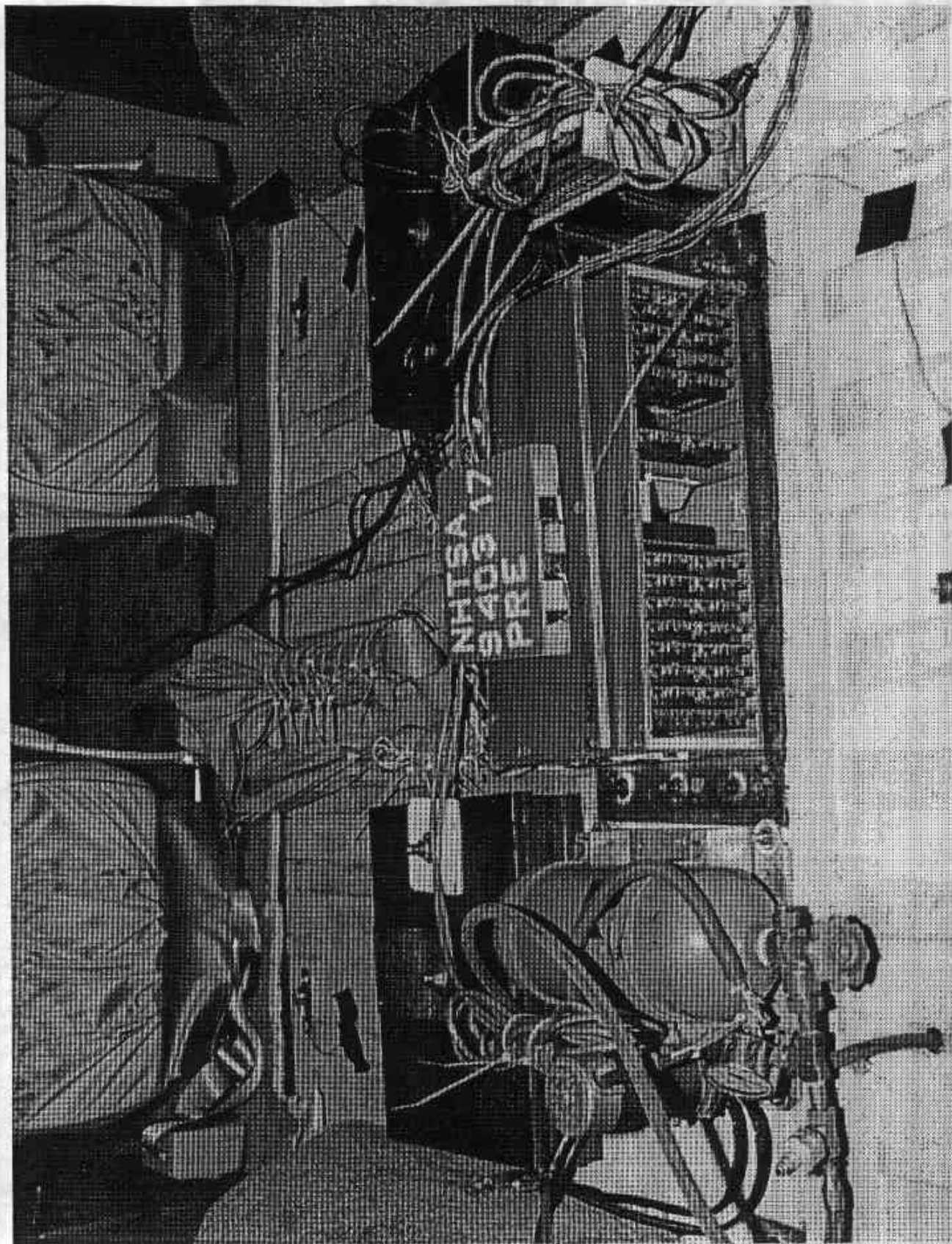


Figure A-60. Pre-test Ballast Location View
A-61

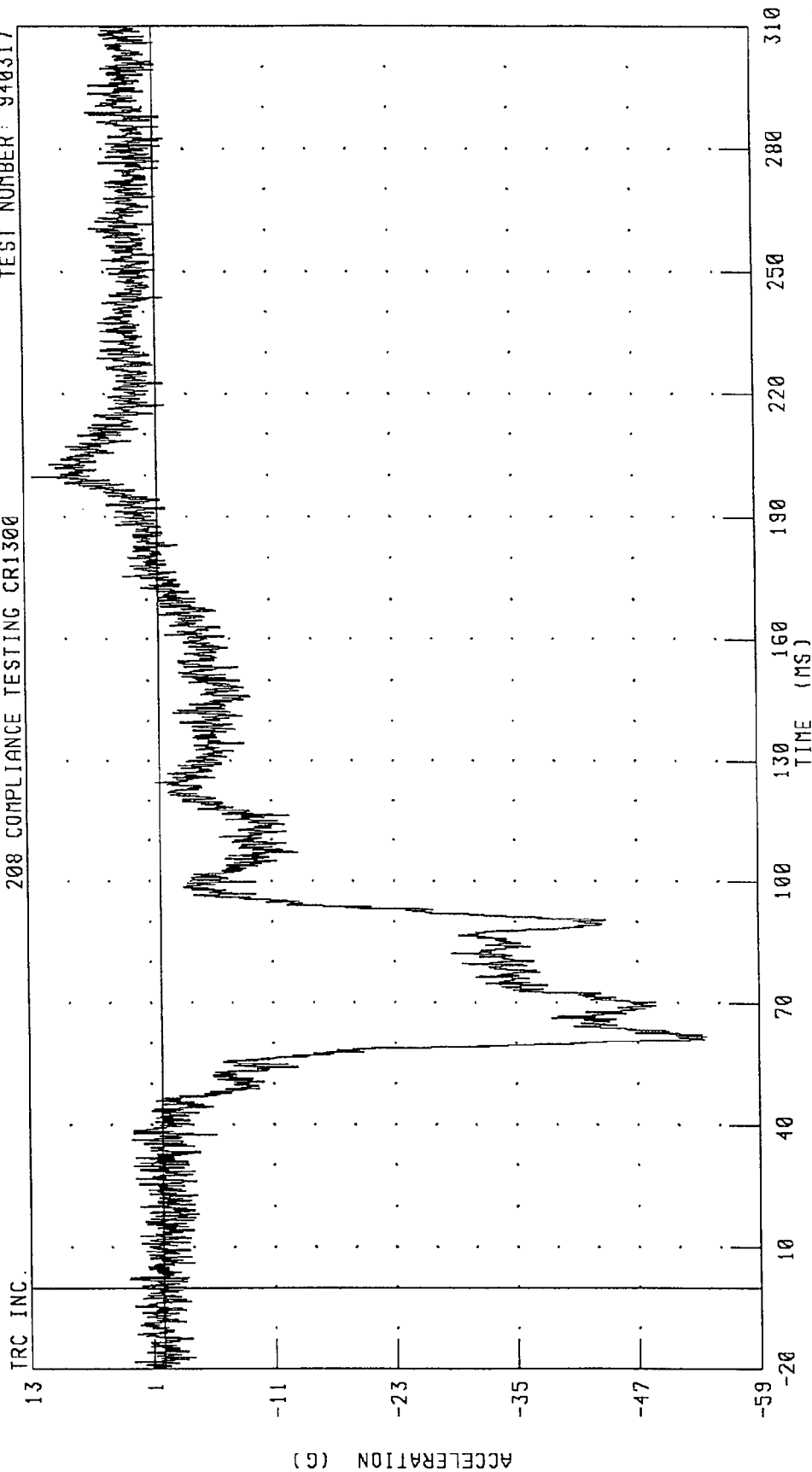
940317

Appendix B

Data Plots

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

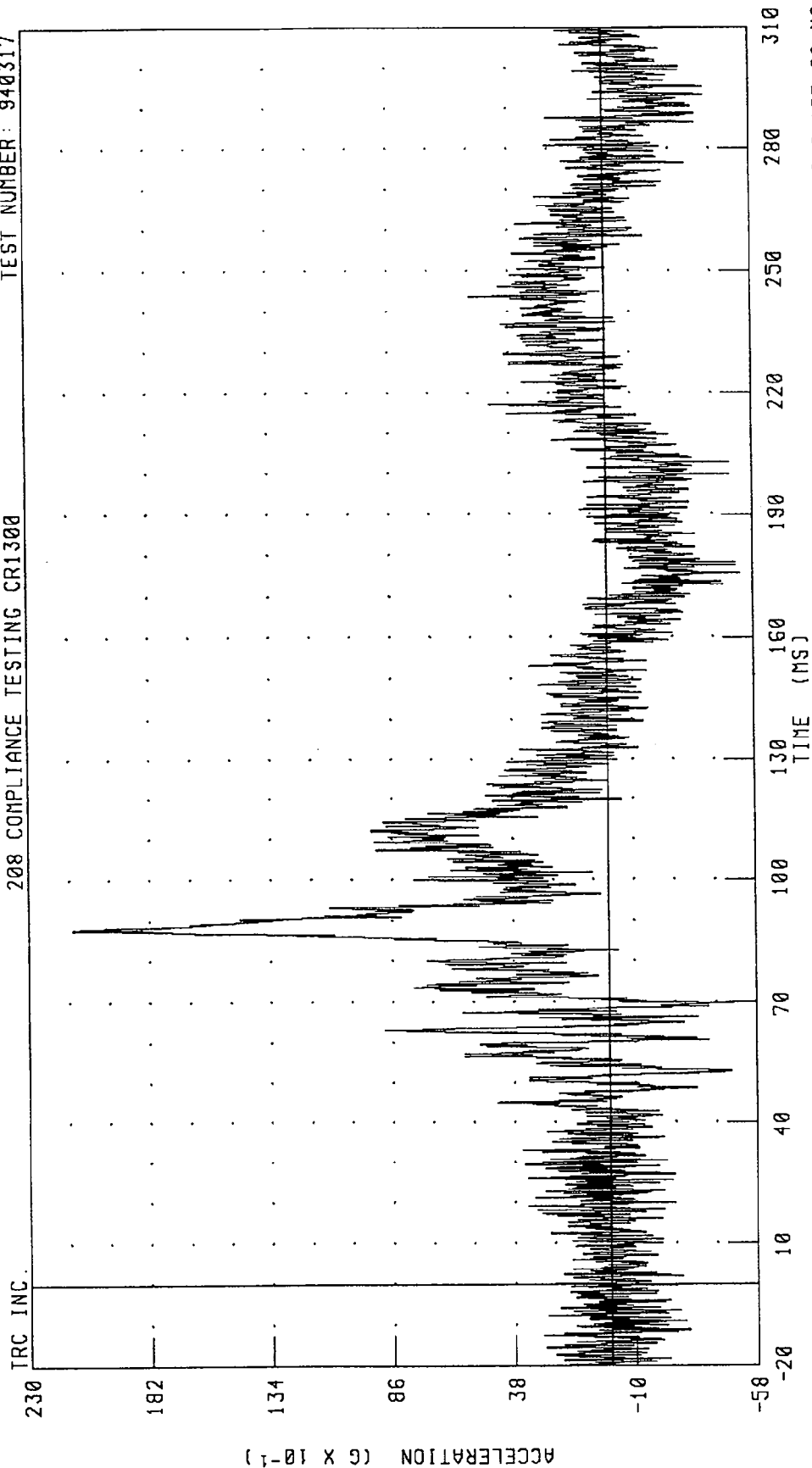


PEAK DATA: 12.18 G @ 199.68 MS; -53.82 G @ 61.92 MS

CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

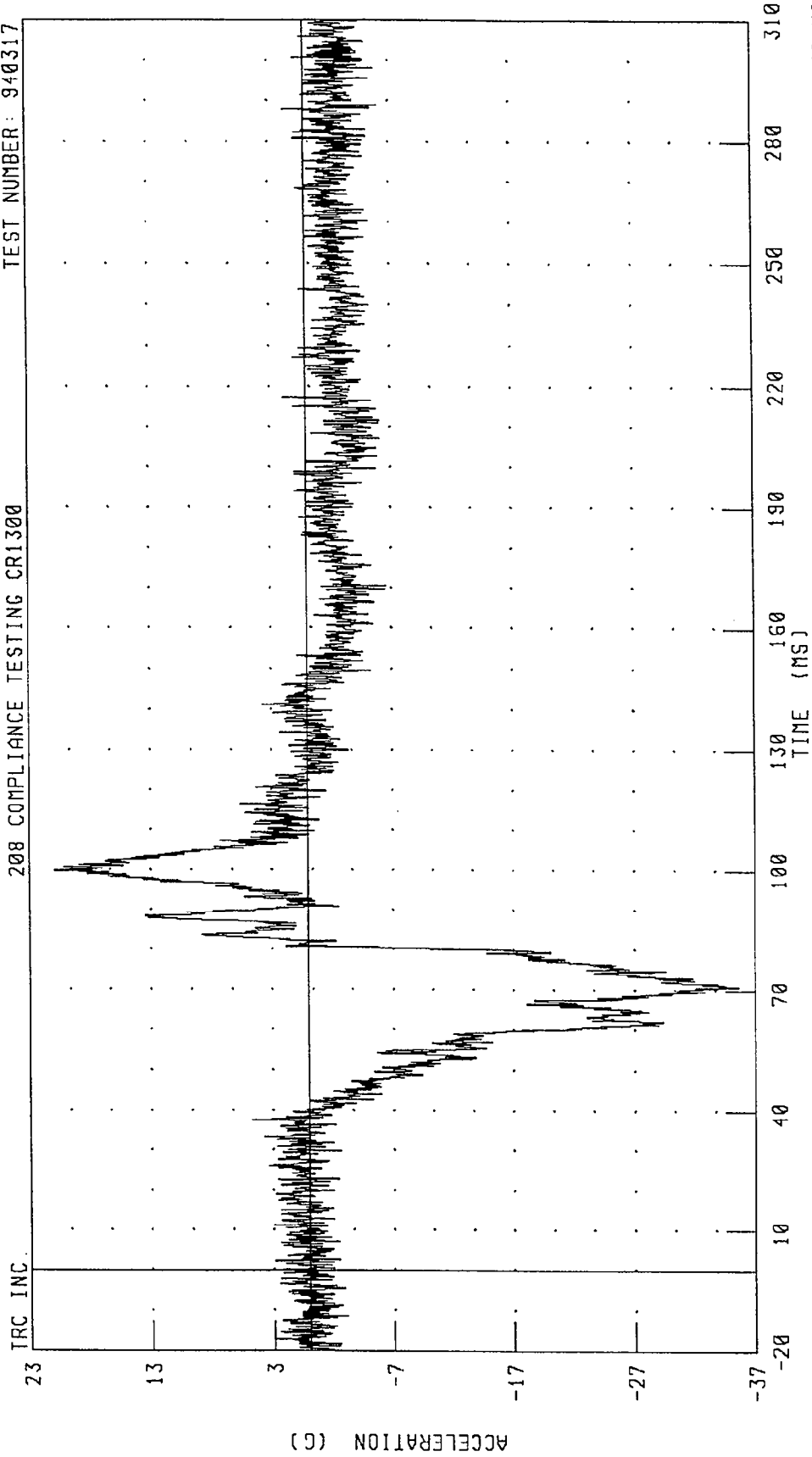


PEAK DATA: 21.25 G @ 87.84 MS; -5.29 G @ 175.68 MS

CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION
208 COMPLIANCE TESTING CR1300

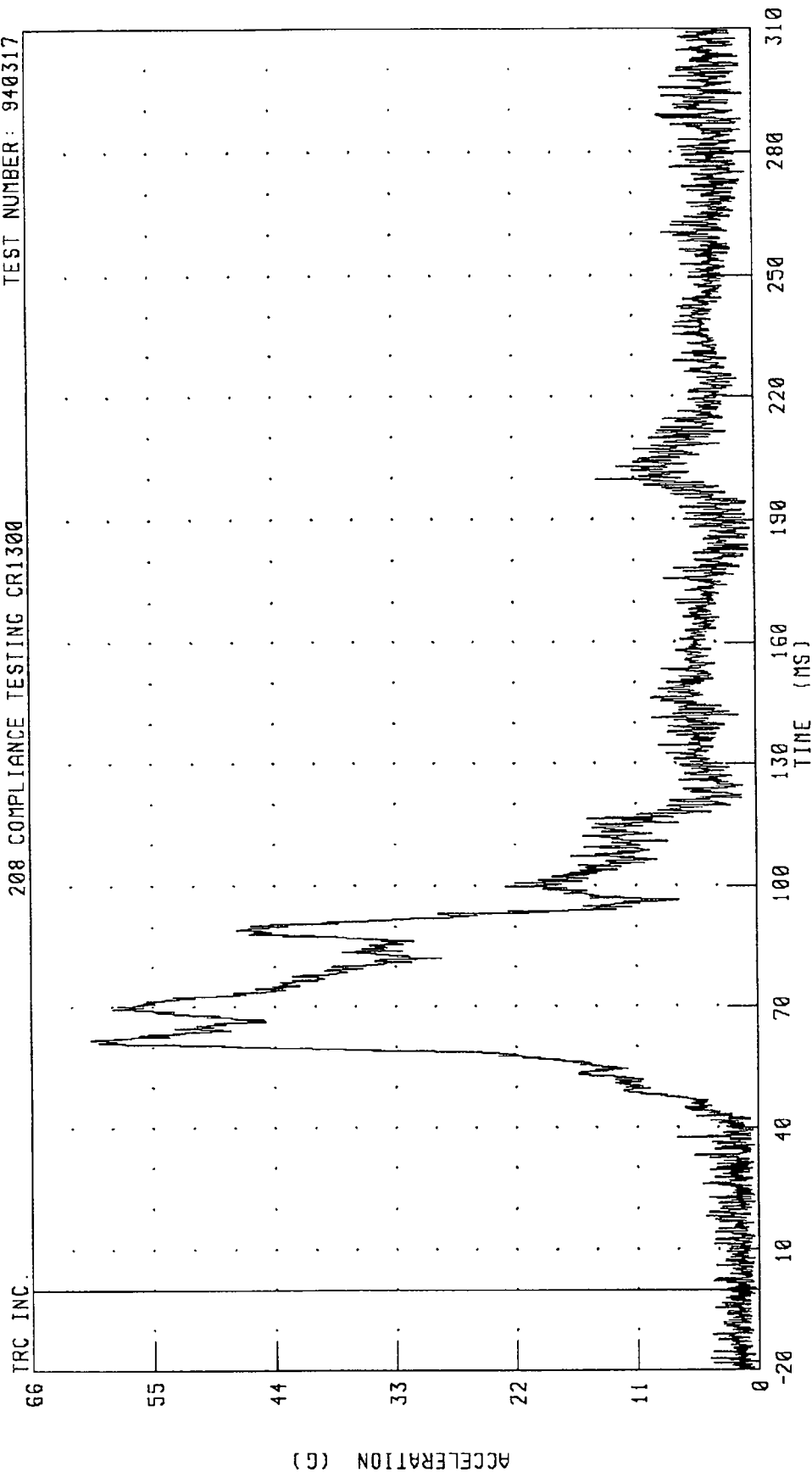
TEST NUMBER: 940317



CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION
 208 COMPLIANCE TESTING CR1300

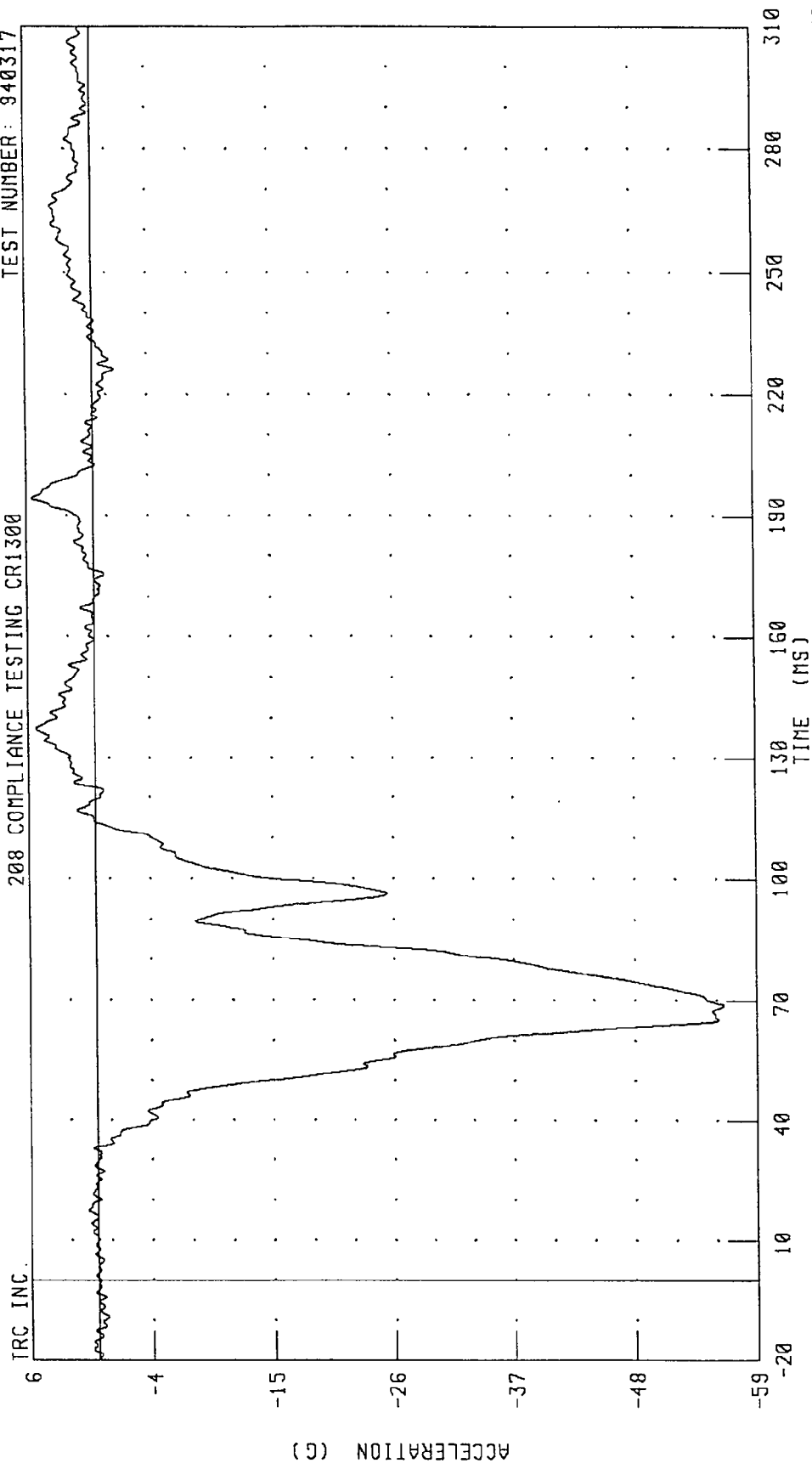
TEST NUMBER: 940317



CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

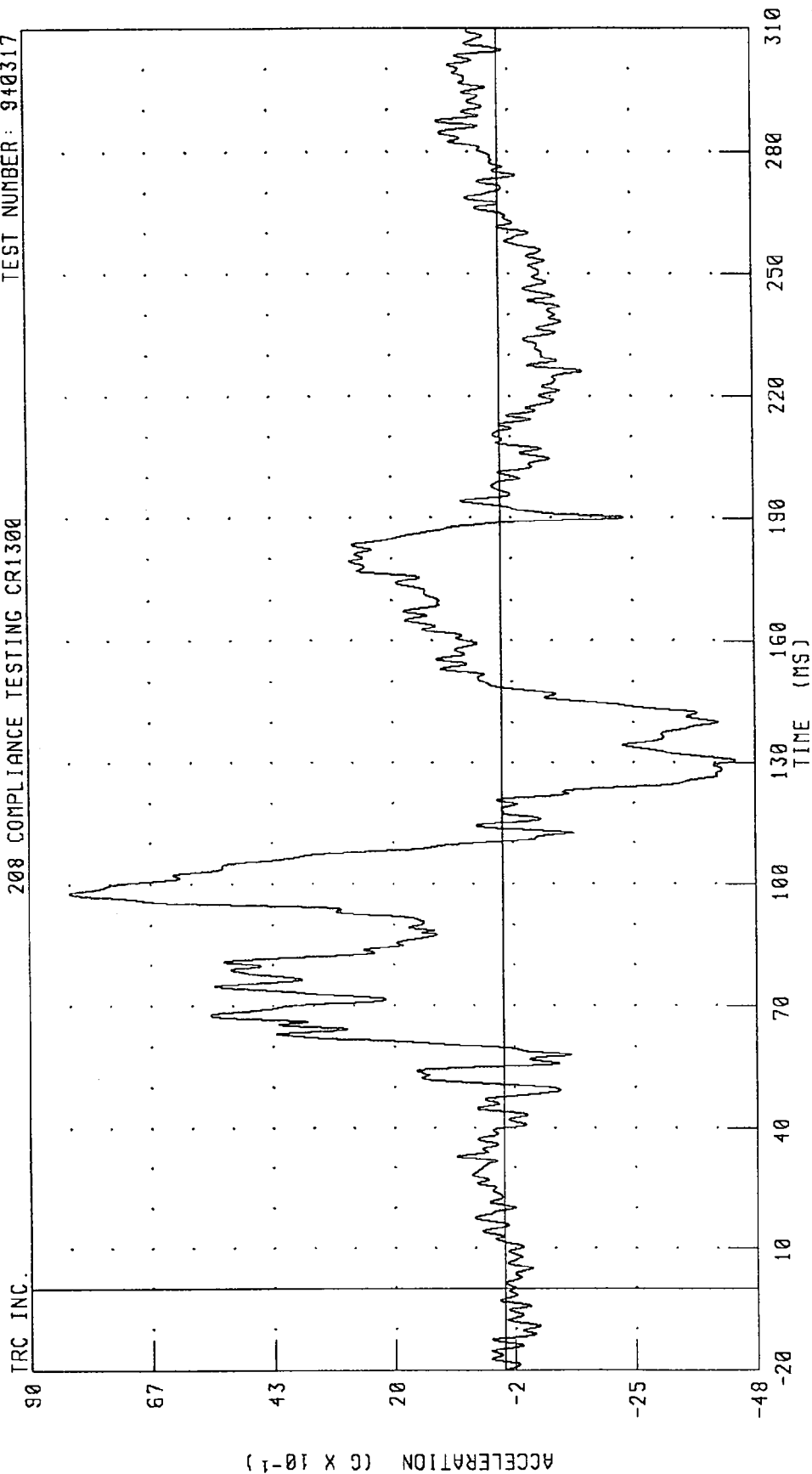


PEAK DATA: 5.59 G @ 194.32 MS; -56.88 G @ 68.80 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

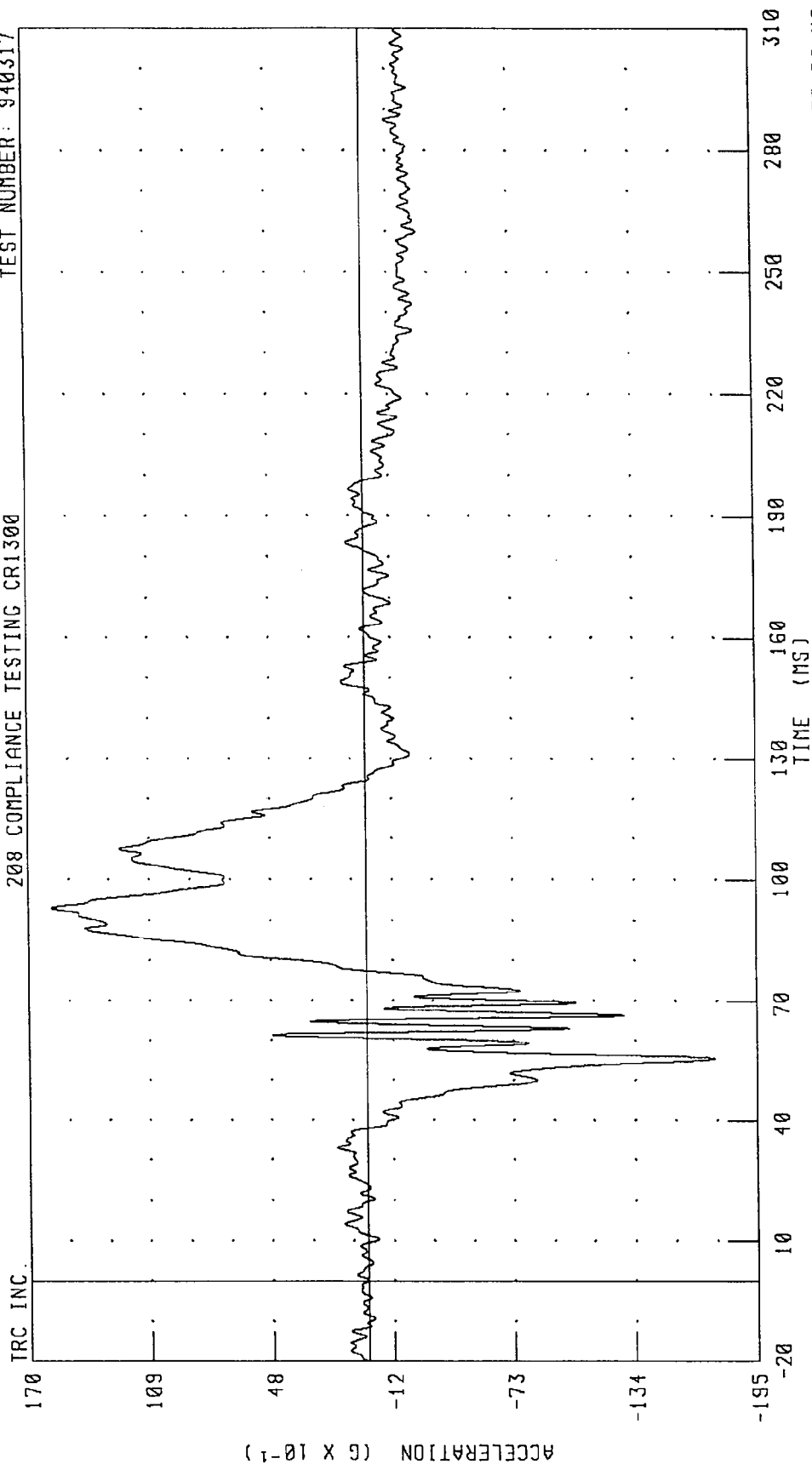
TEST NUMBER: 940317



CHANNEL: CSTYG1 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

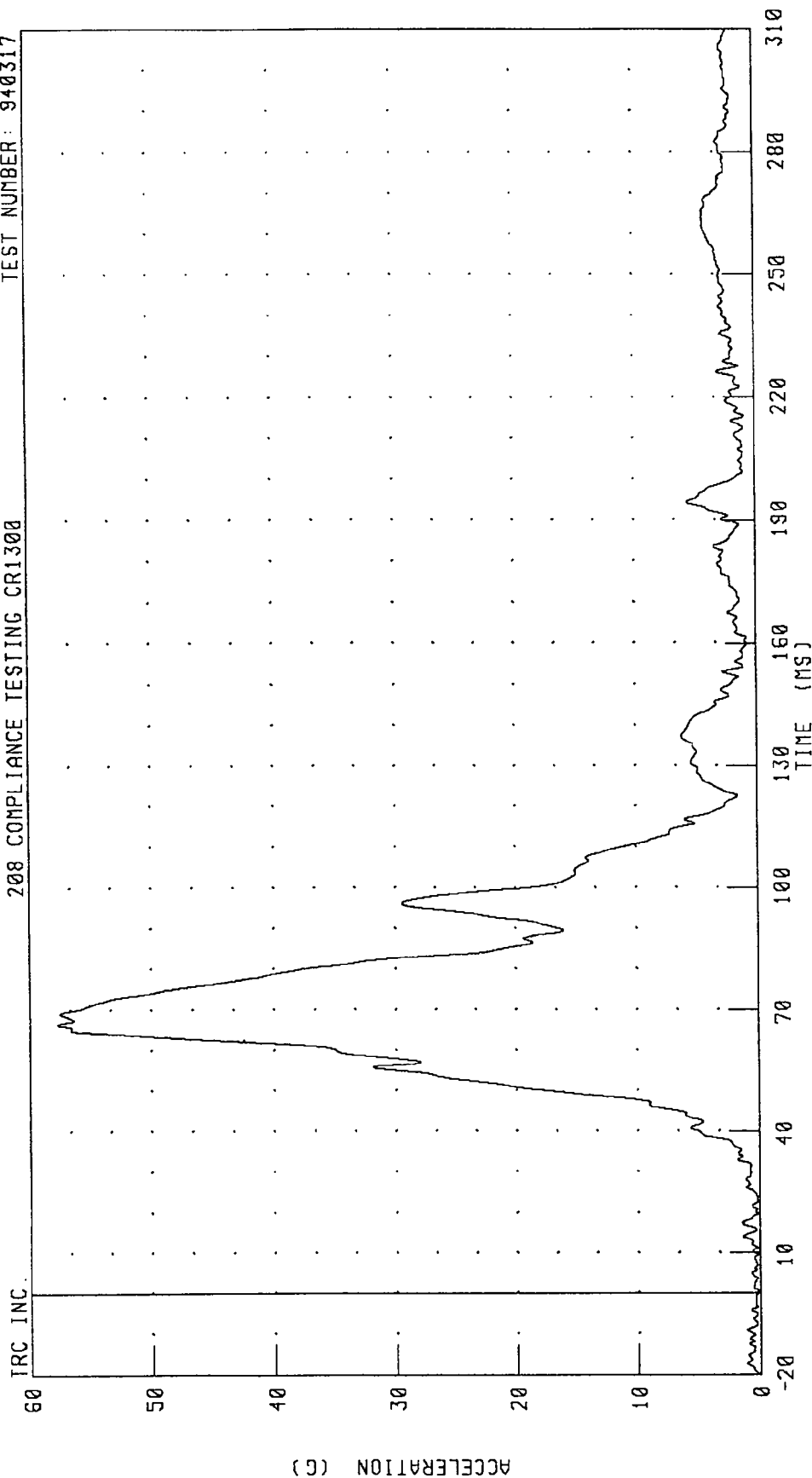
TEST NUMBER: 940317



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

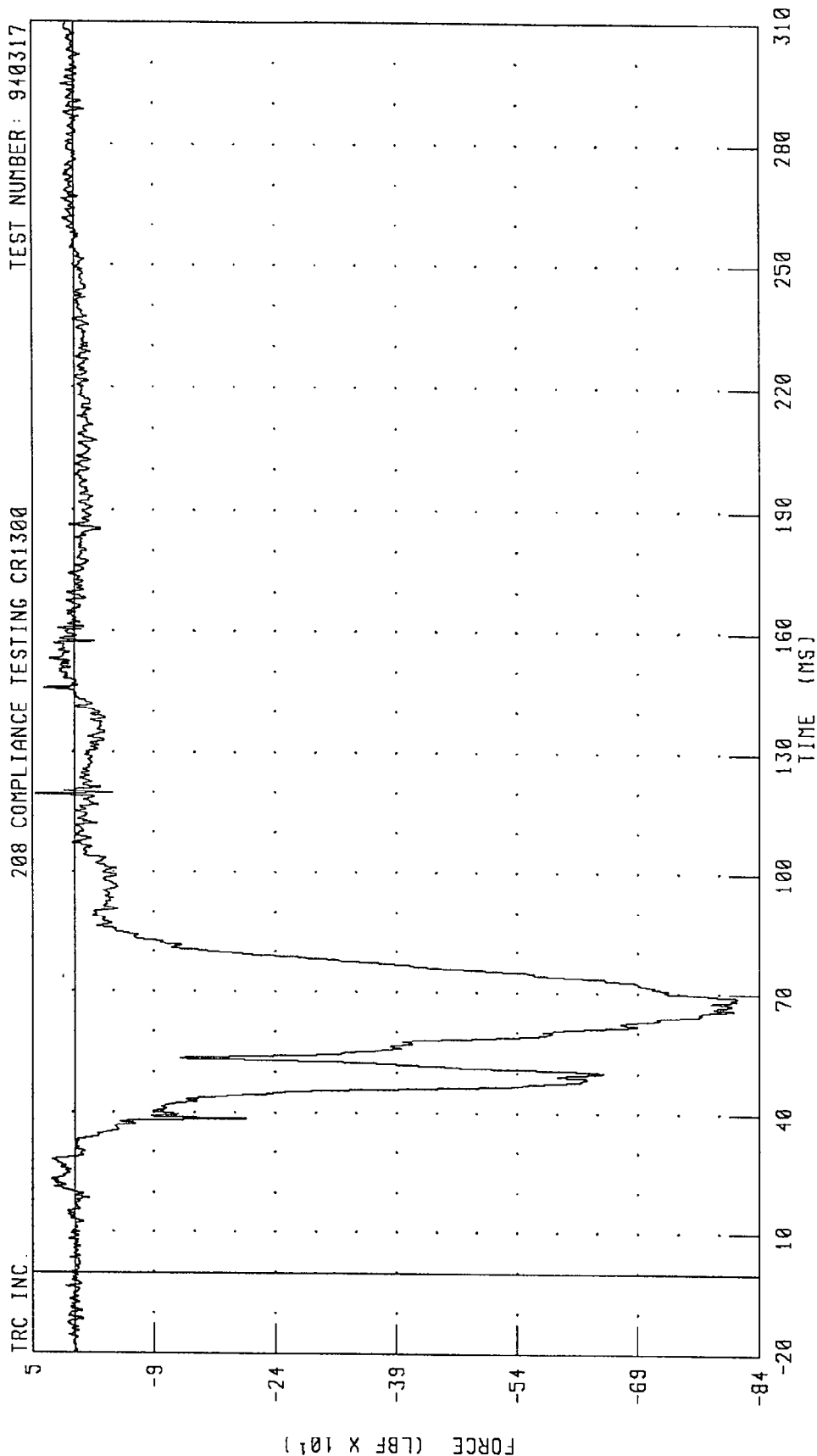
PEAK DATA: 57.72 G @ 66.48 MS; 0.01 G @ -20.00 MS

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER

DRIVER LEFT FEMUR FORCE

208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317



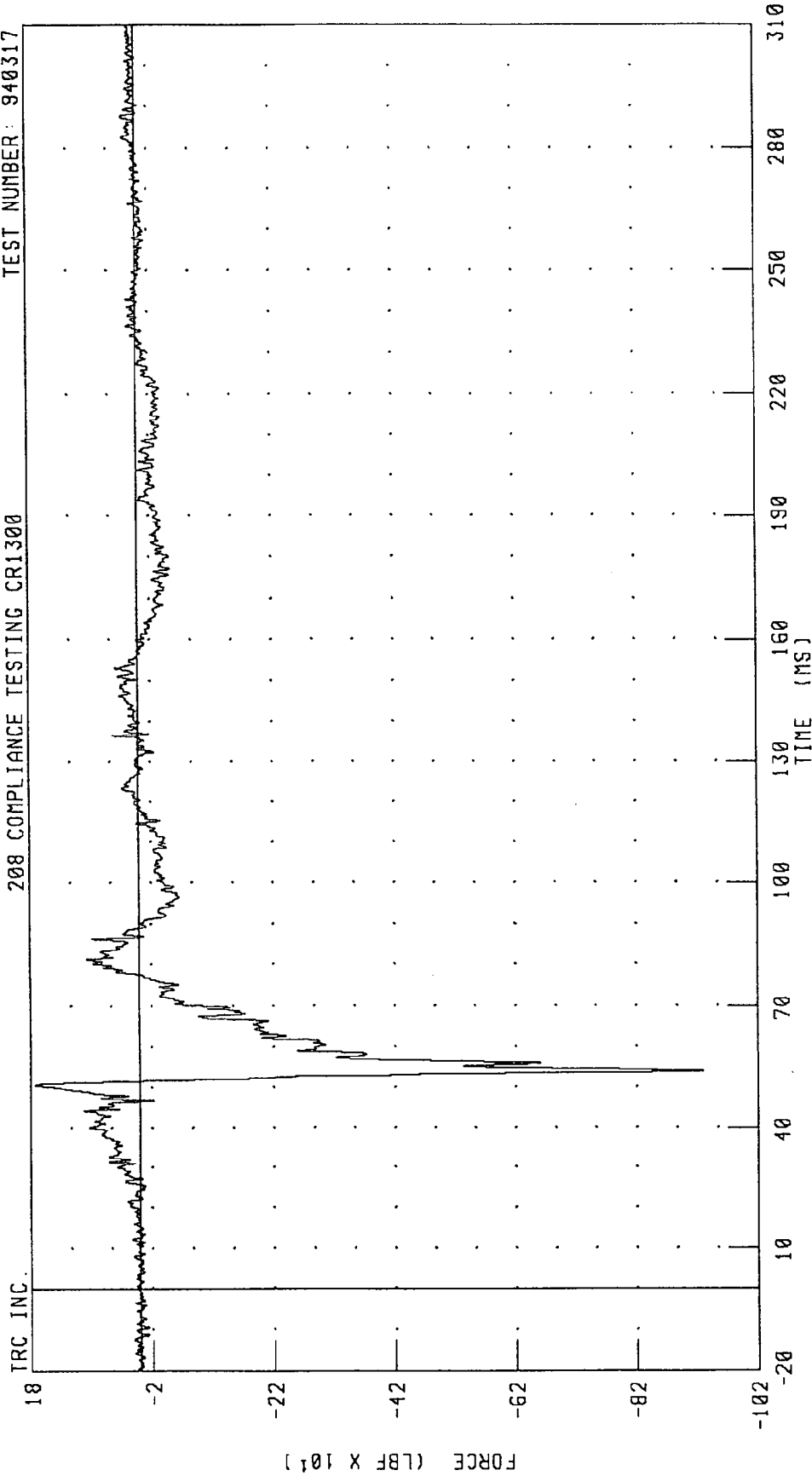
CHANNEL: LFMF1 FILTER: CH. CLASS 600

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER

DRIVER RIGHT FEMUR FORCE

208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

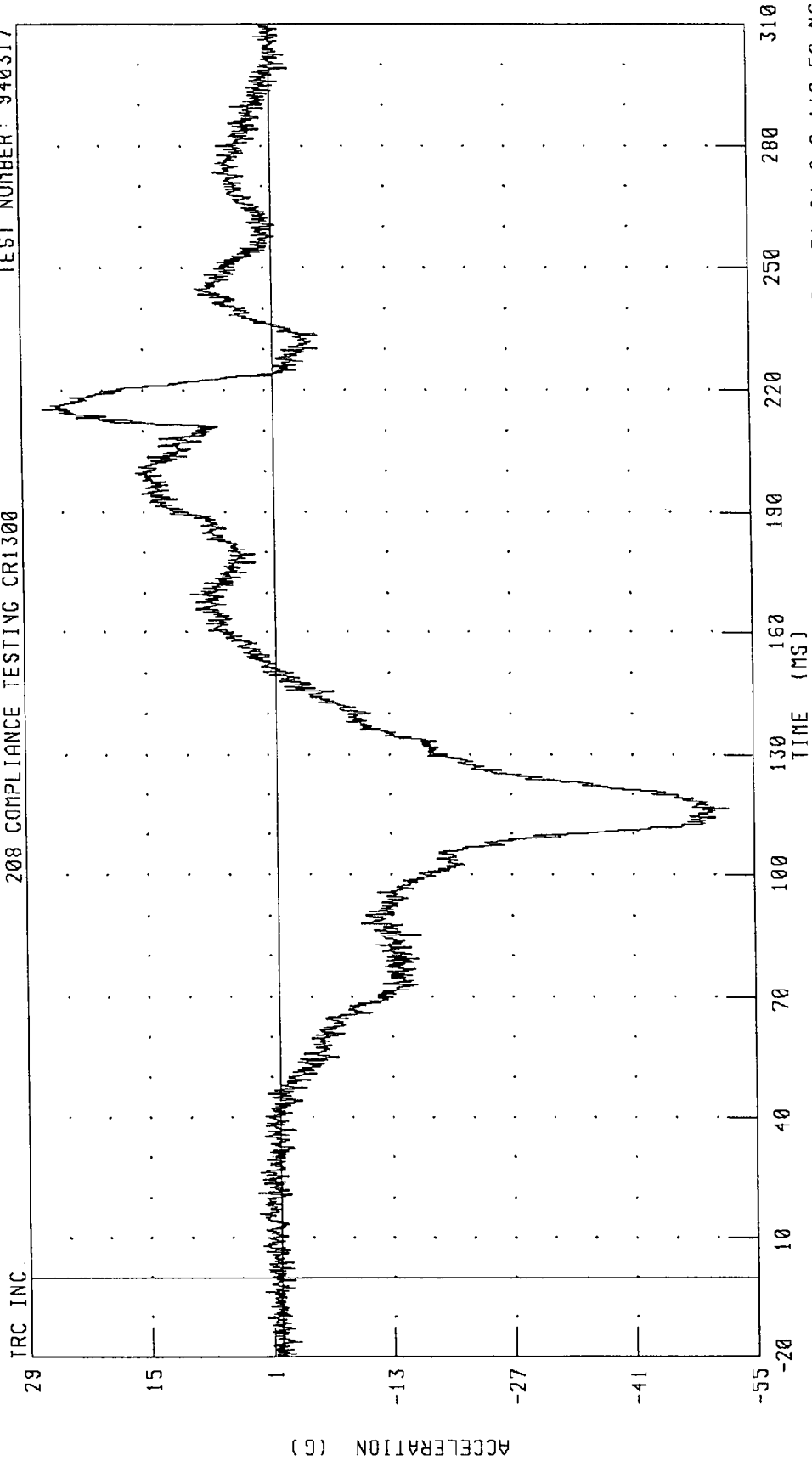


PEAK DATA: 171.30 LBF @ 50.64 MS; -929.10 LBF @ 53.84 MS

CHANNEL: RFMFI FILTER: CH. CLASS 600

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

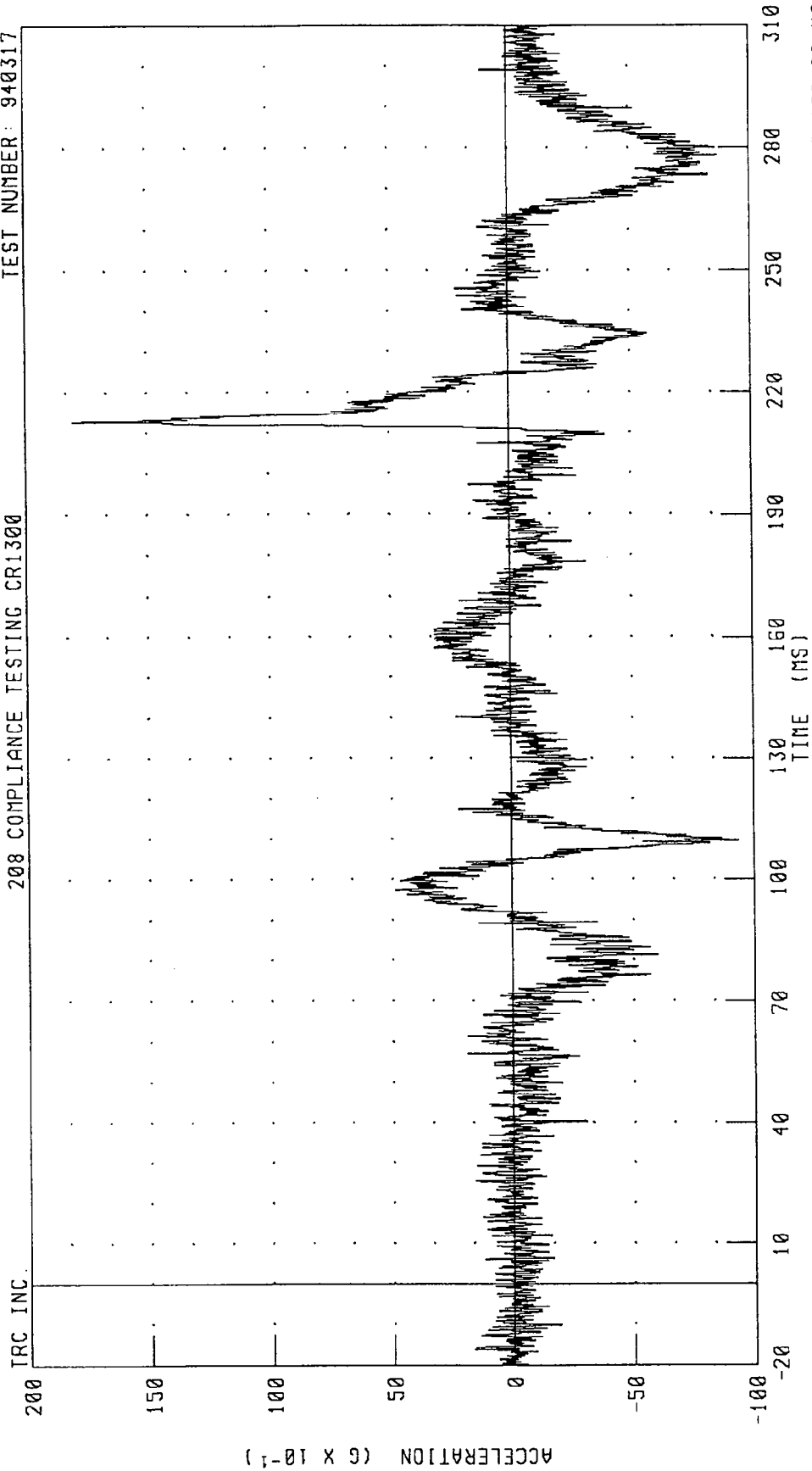
TEST NUMBER: 940317



CHANNEL: HEDXC2 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

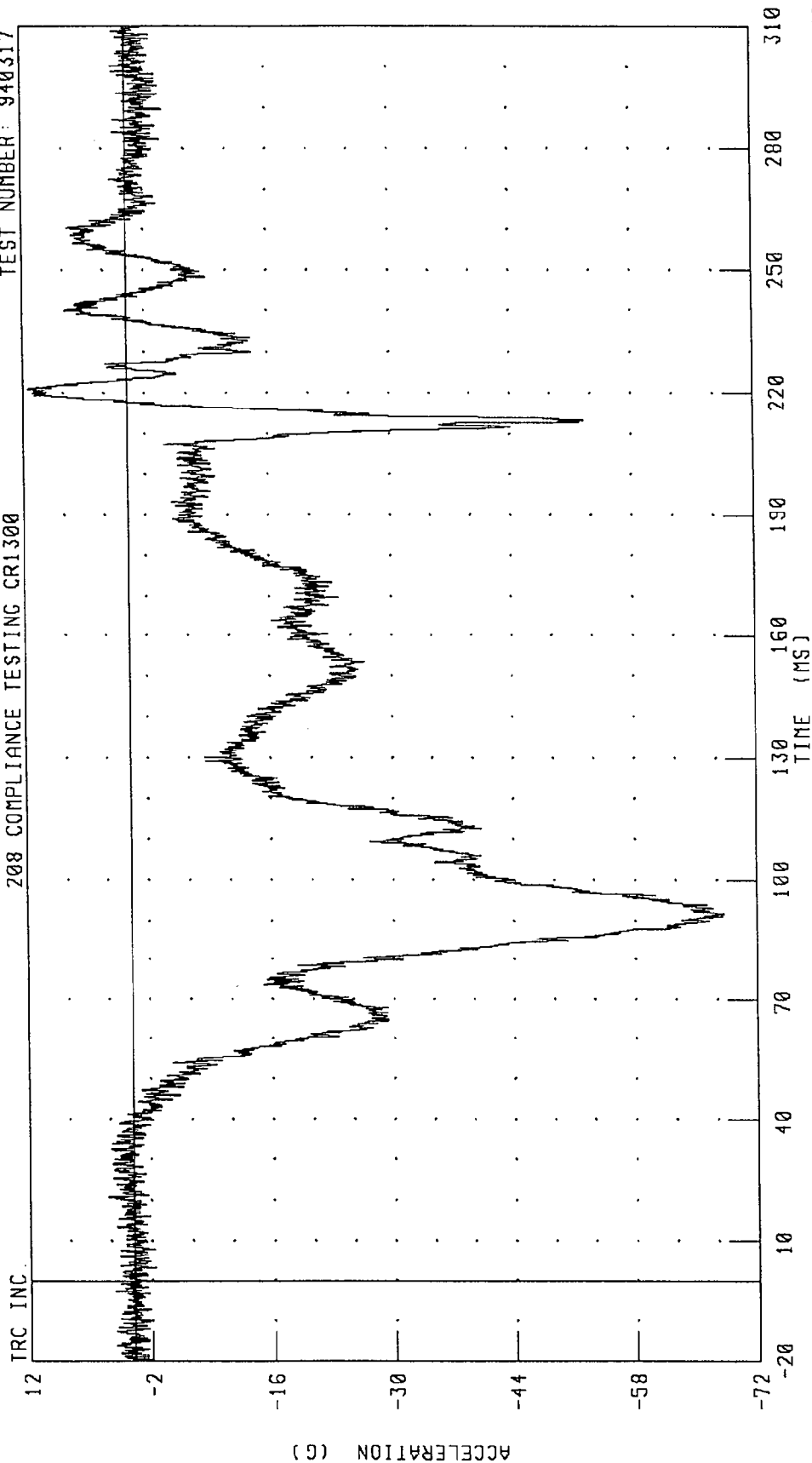


PEAK DATA: 18.04 G @ 212.80 MS; -9.36 G @ 109.60 MS

CHANNEL: HEDYC2 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

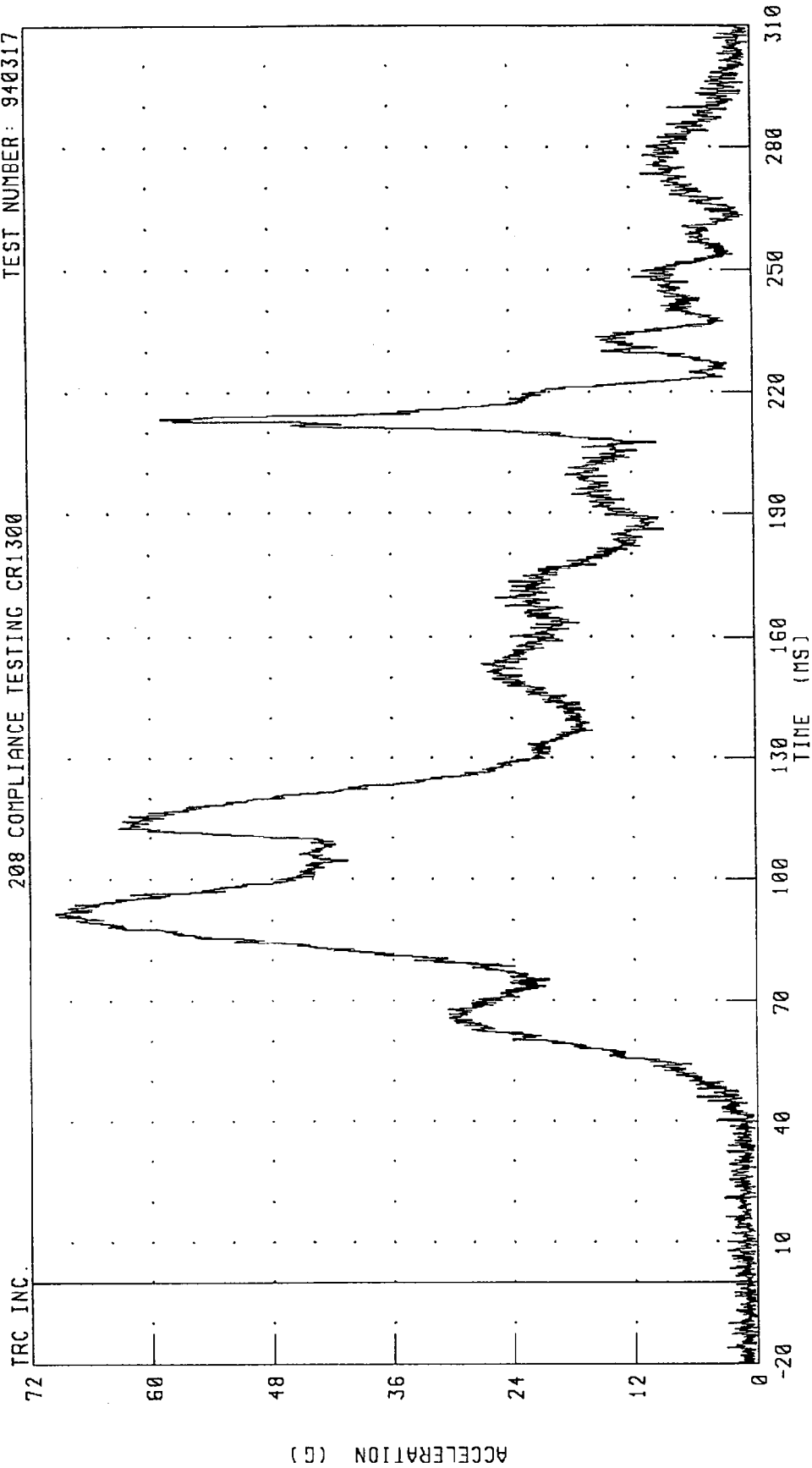


PEAK DATA: 11.37 G @ 221.04 MS, -68.20 G @ 91.68 MS

CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

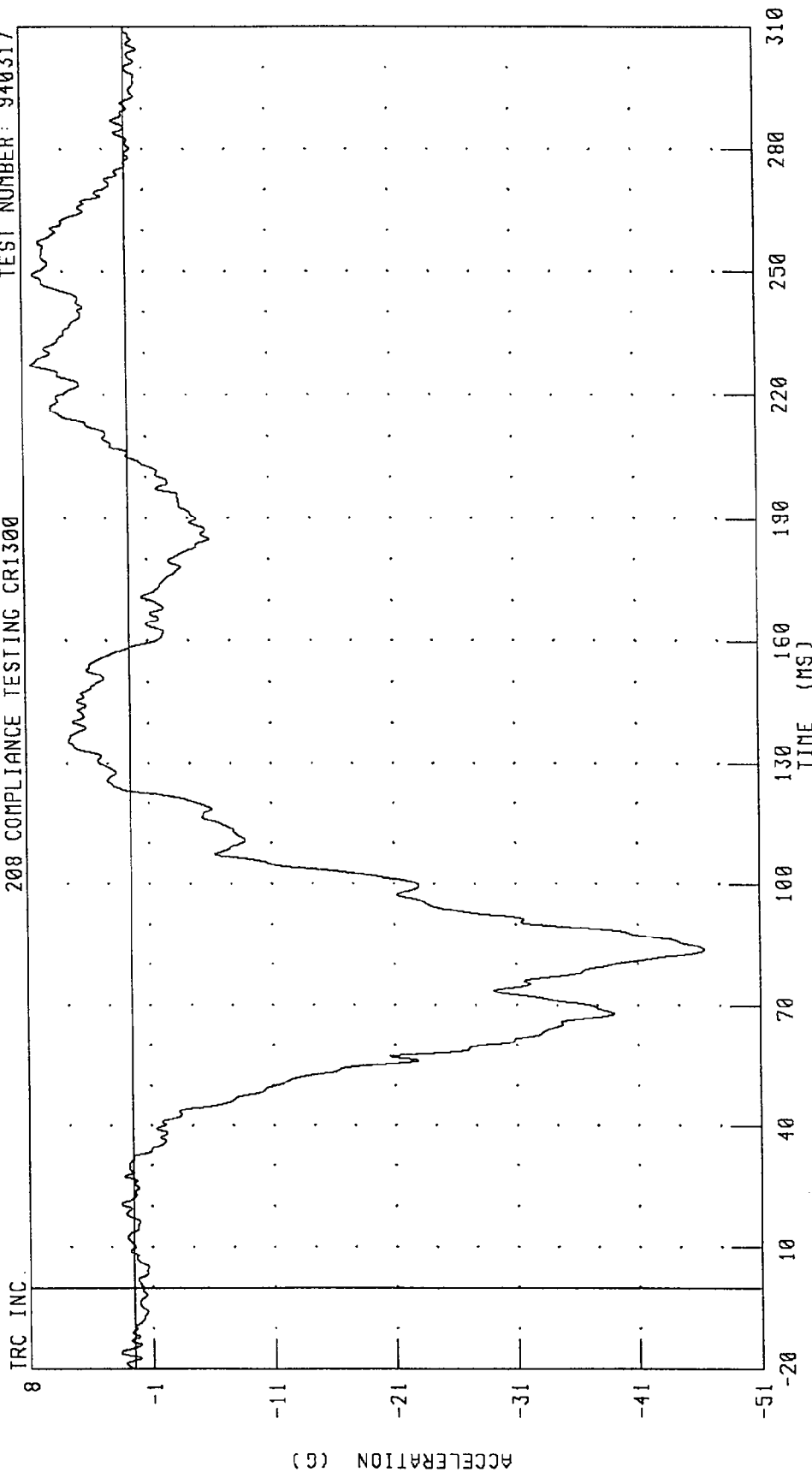


PEAK DATA: 69.41 G @ 91.68 MS; 0.06 G @ -4.96 MS

CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION
 200 COMPLIANCE TESTING CR1300

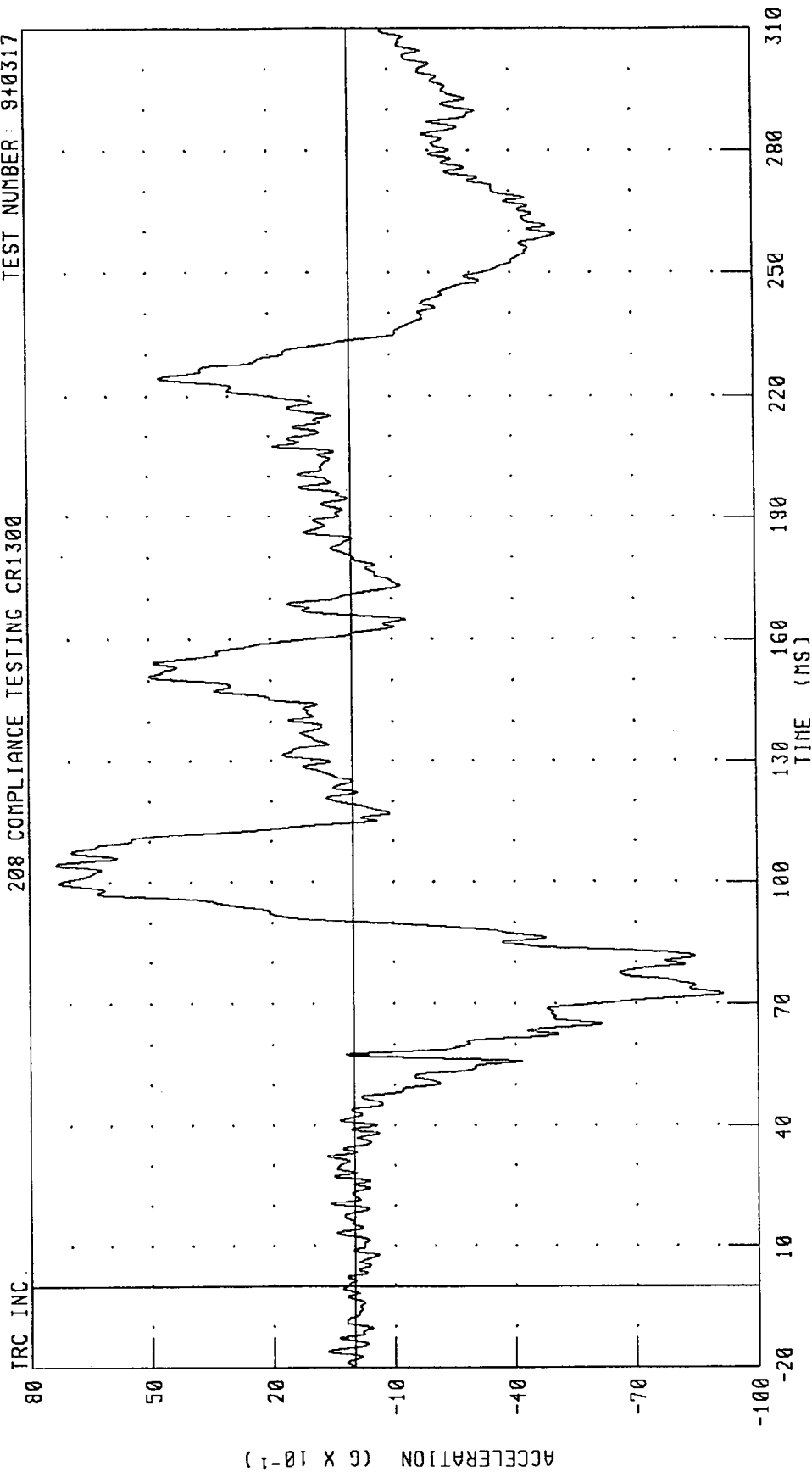
TEST NUMBER: 940317



CHANNEL: CSTXG2 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

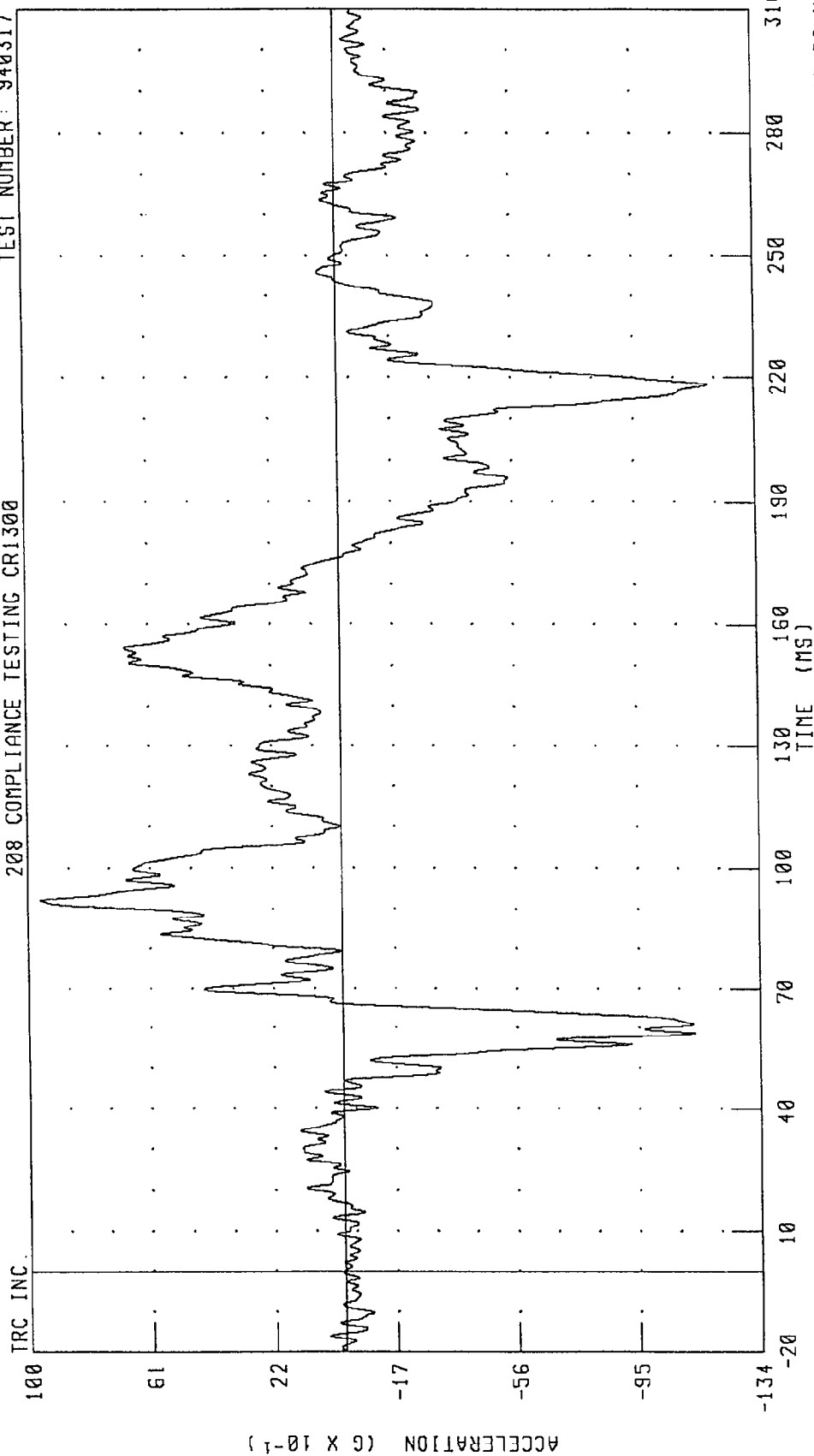


PEAK DATA: 7.34 G @ 104.48 MS; -9.15 G @ 72.40 MS

CHANNEL: CSTYG2 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

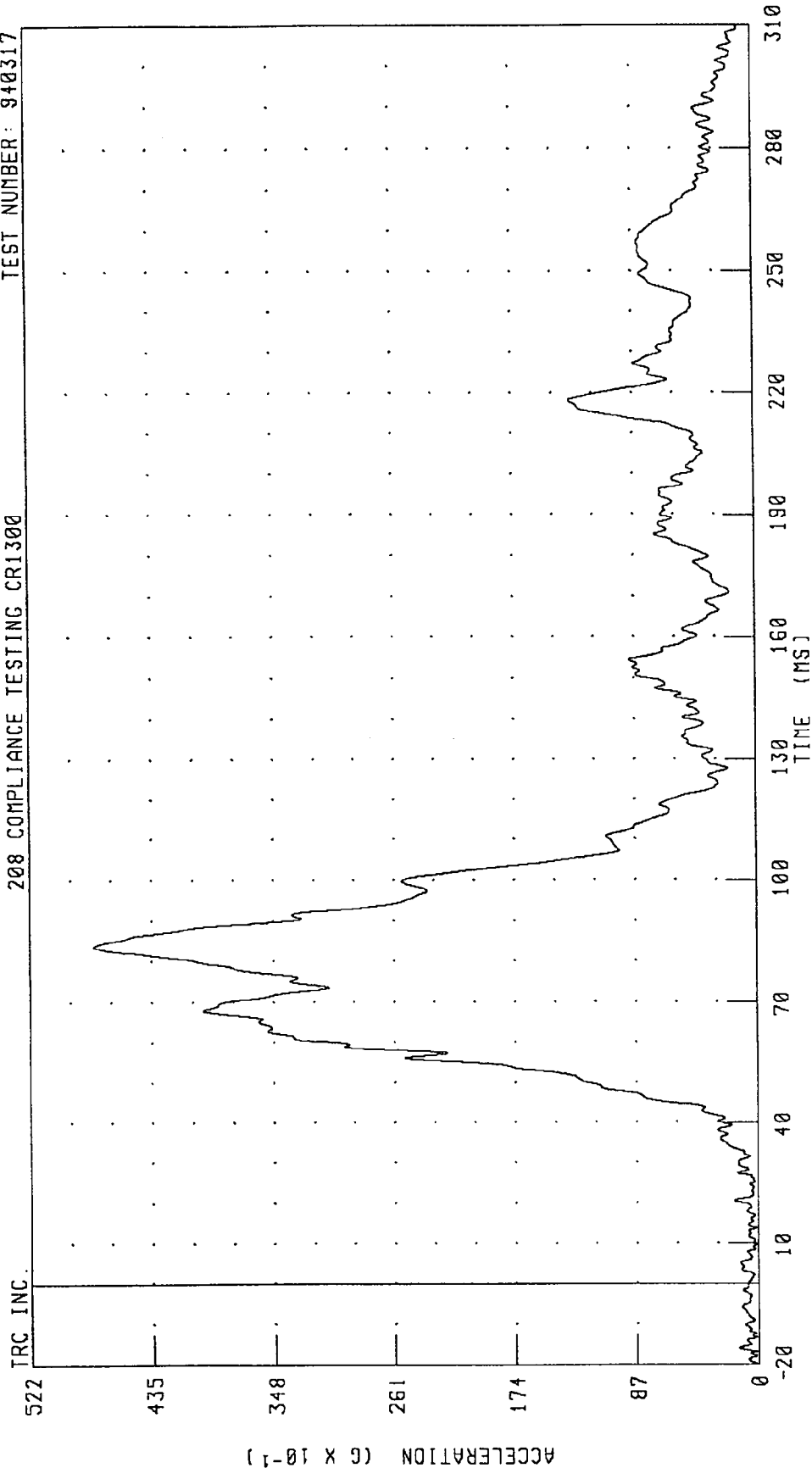


PEAK DATA: 9.59 G @ 92.16 MS; -11.90 G @ 218.32 MS

CHANNEL: CSTZG2 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING CR1300

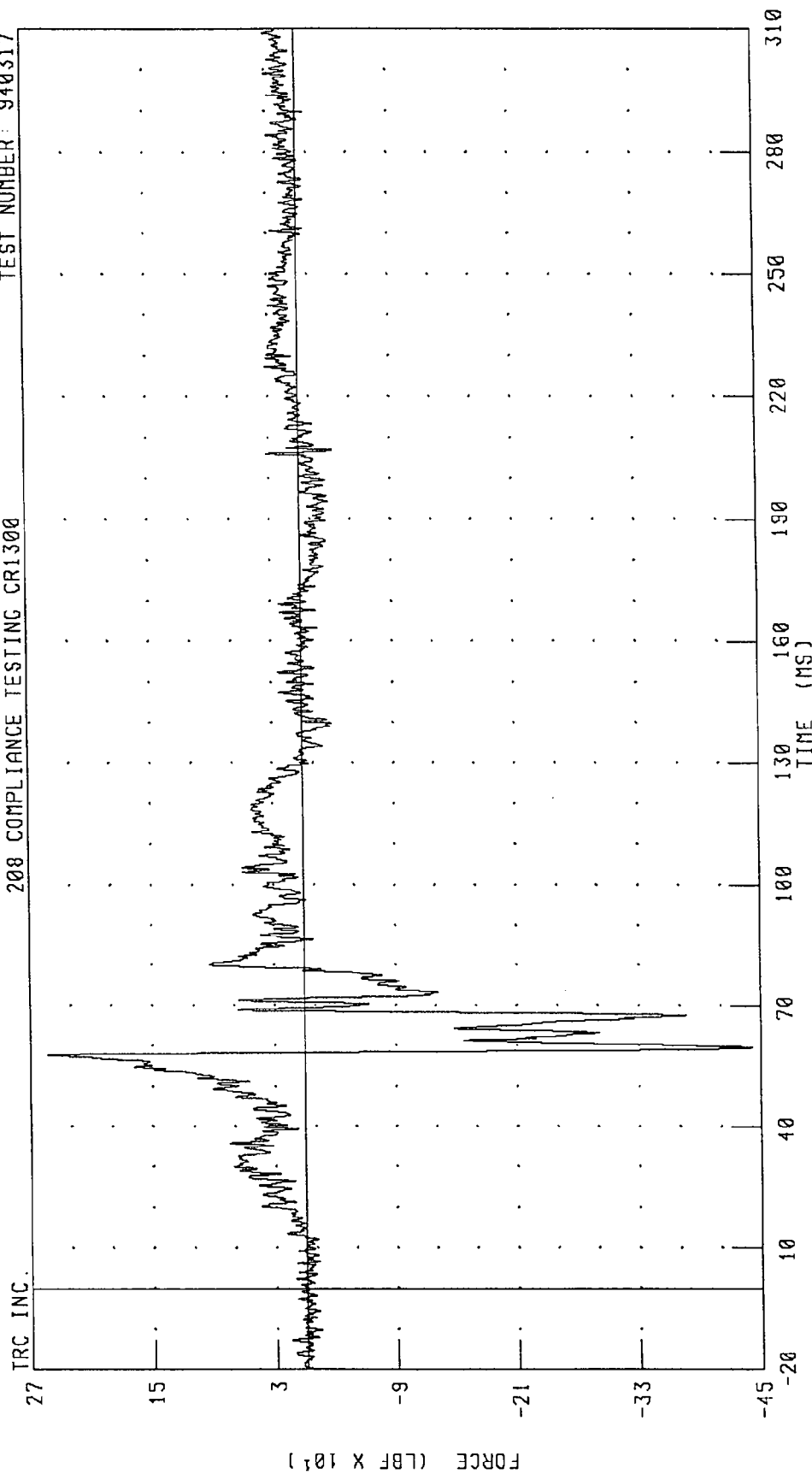
TEST NUMBER: 940317



CHANNEL: CSTRG2 FILTER: CH. CLASS 180

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT FEMUR FORCE
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

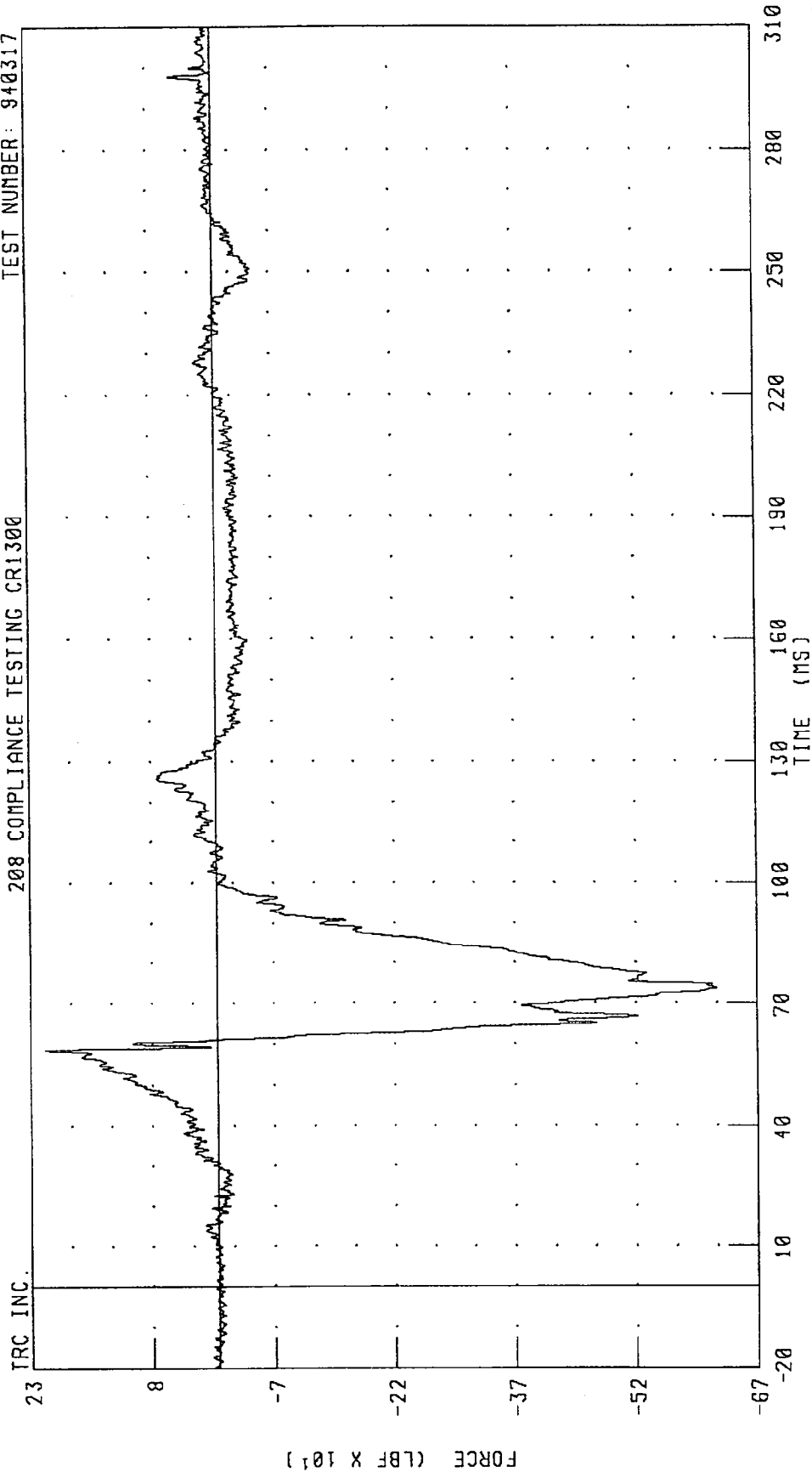


PEAK DATA: 251.95 LBF @ 57.68 MS; -440.98 LBF @ 59.52 MS

CHANNEL: LFMF2 FILTER: CH. CLASS 600

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

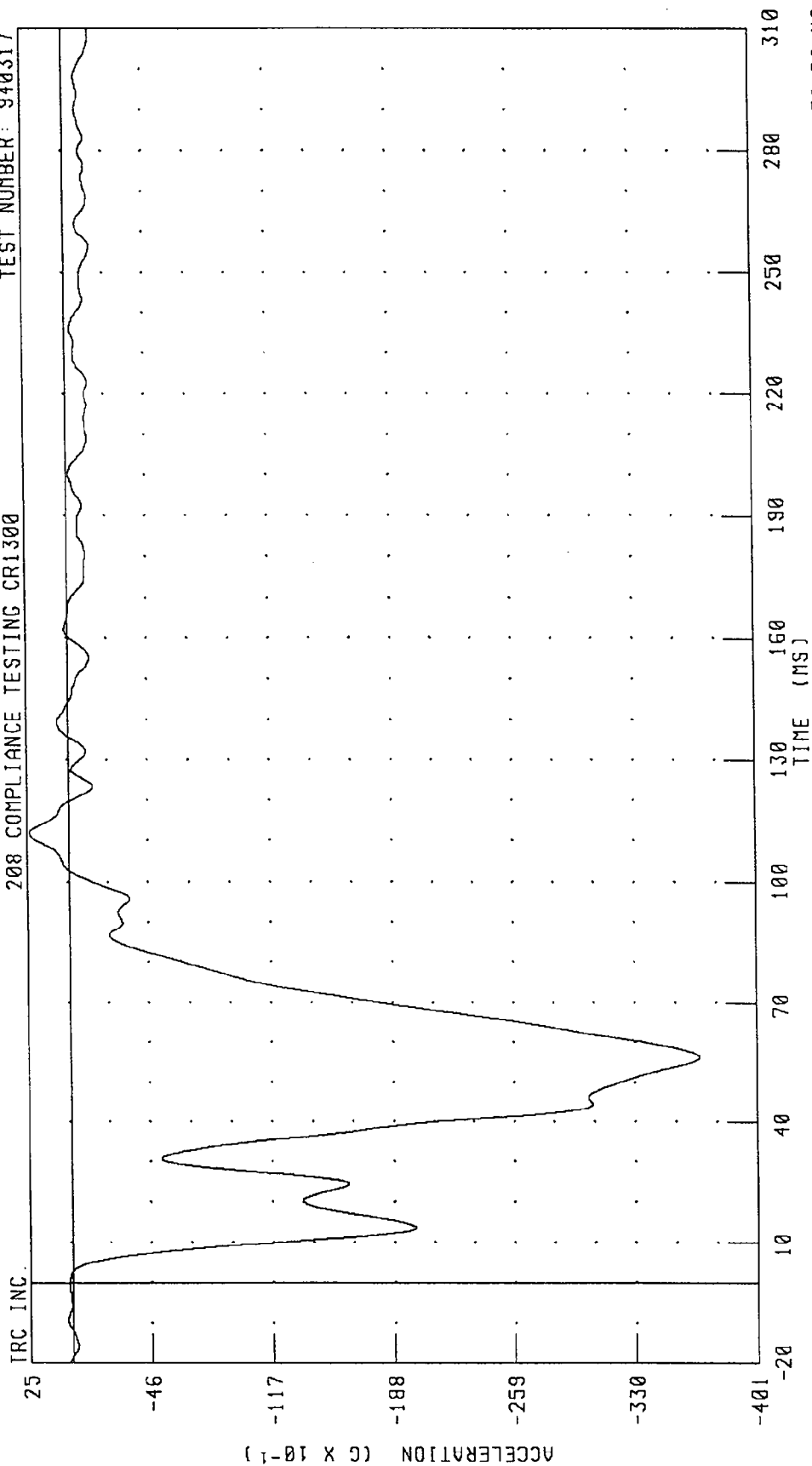


PEAK DATA: 211.94 LBF @ 58.56 MS; -619.37 LBF @ 73.68 MS

CHANNEL: RFMF2 FILTER: CH. CLASS 600

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 LEFT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

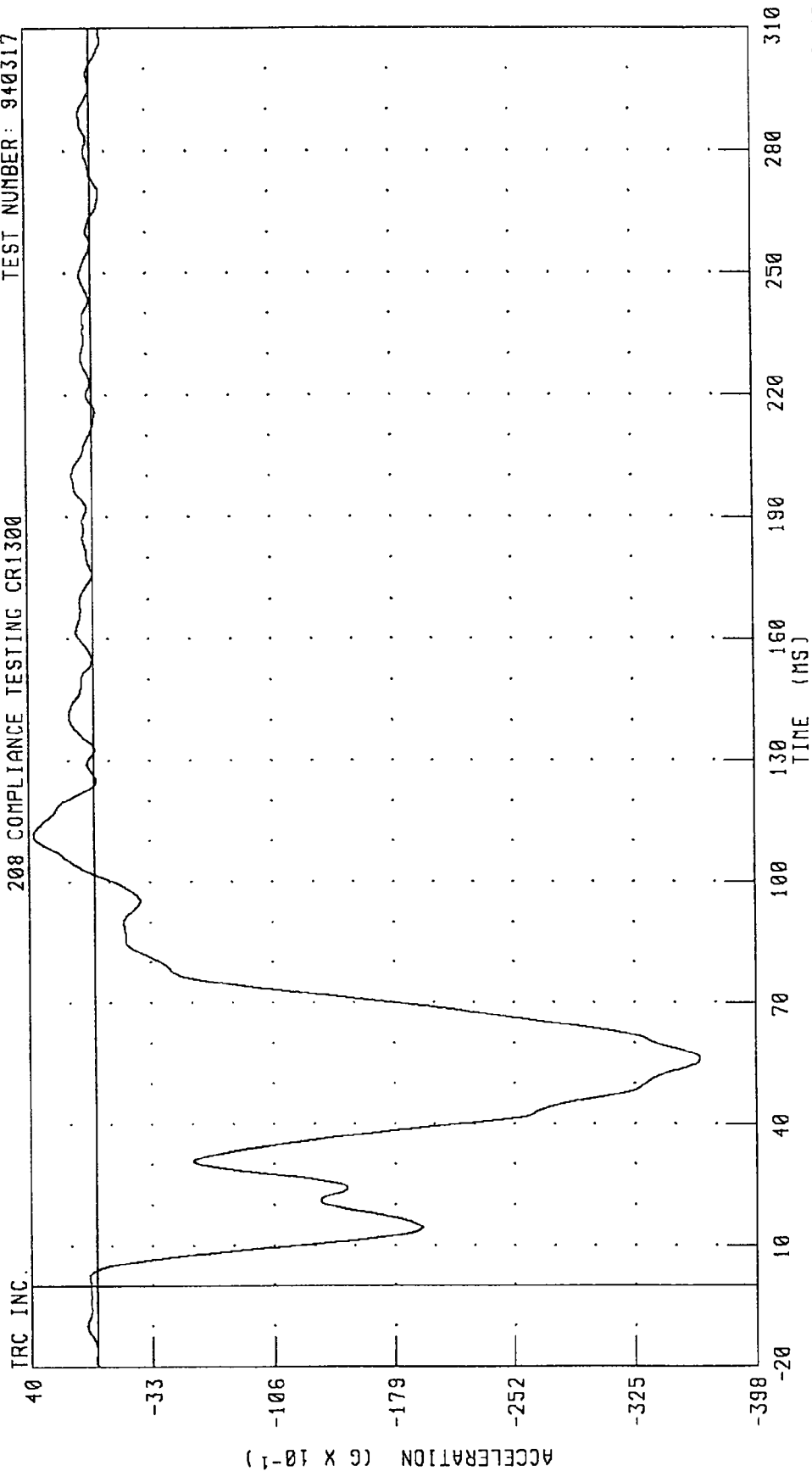
TEST NUMBER: 940317



CHANNEL: TLRXG1 FILTER: CH. CLASS 60

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

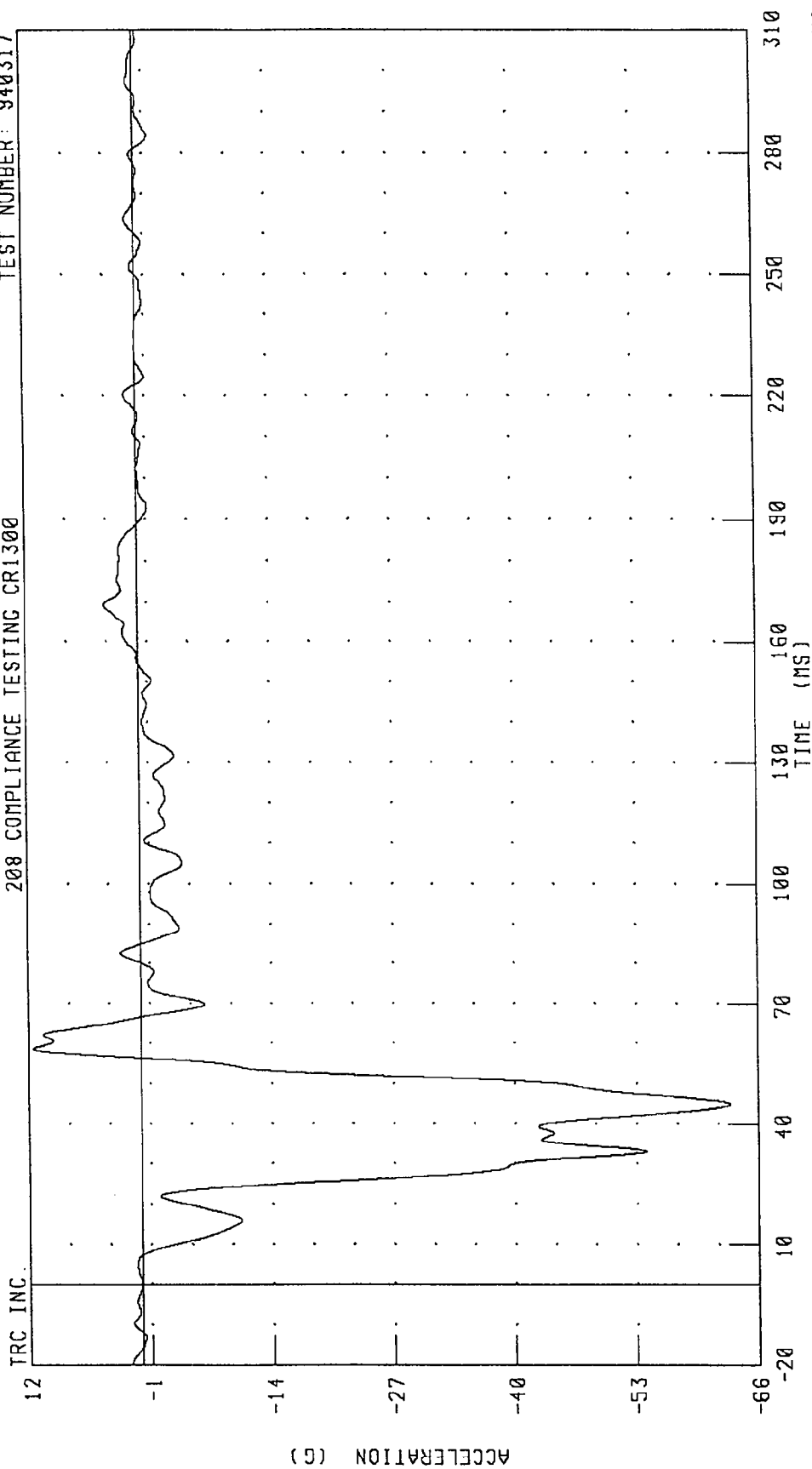
TEST NUMBER: 940317



CHANNEL: TRRXG1 FILTER: CH. CLASS 60

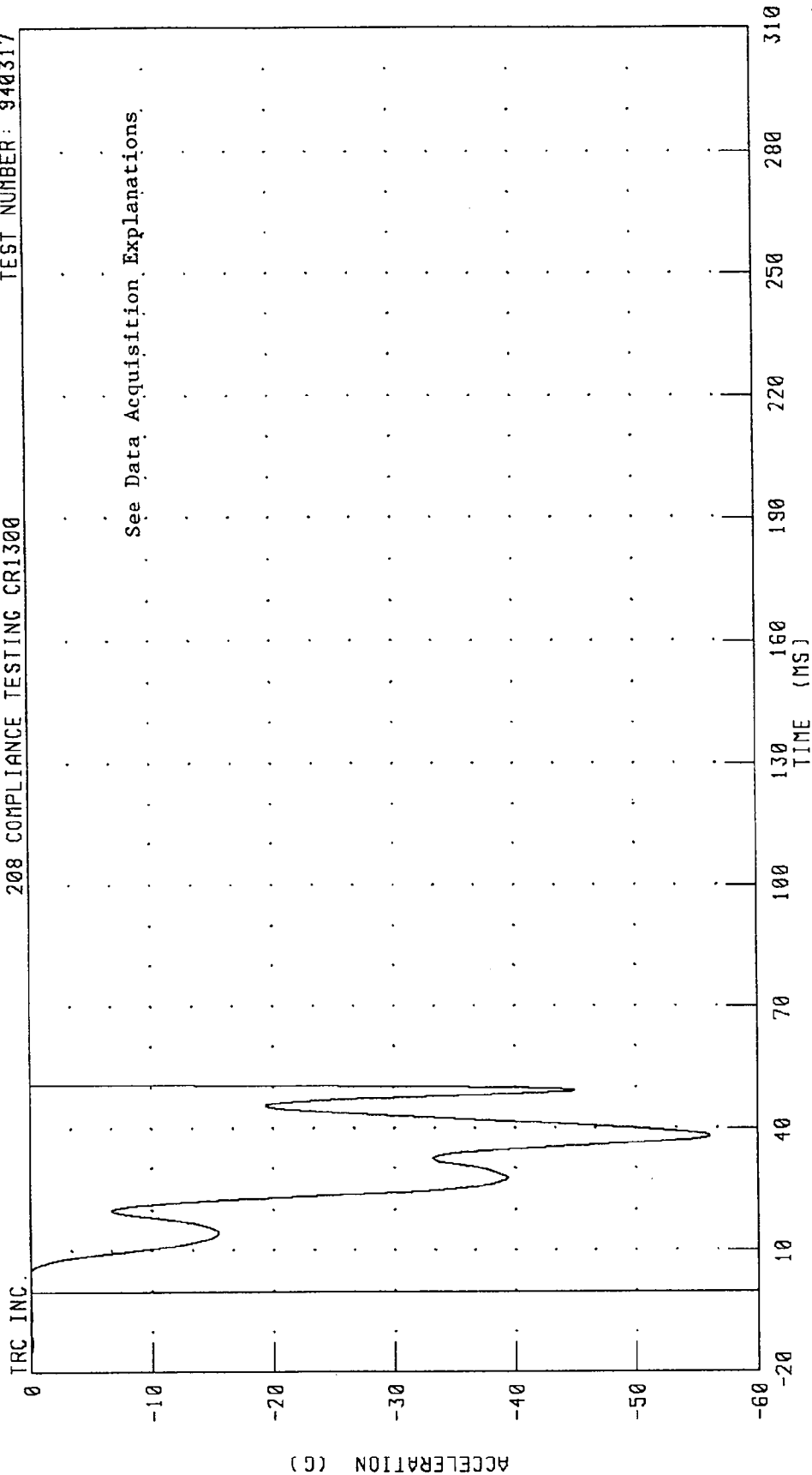
1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317



1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 ENGINE BOTTOM BLOCK X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

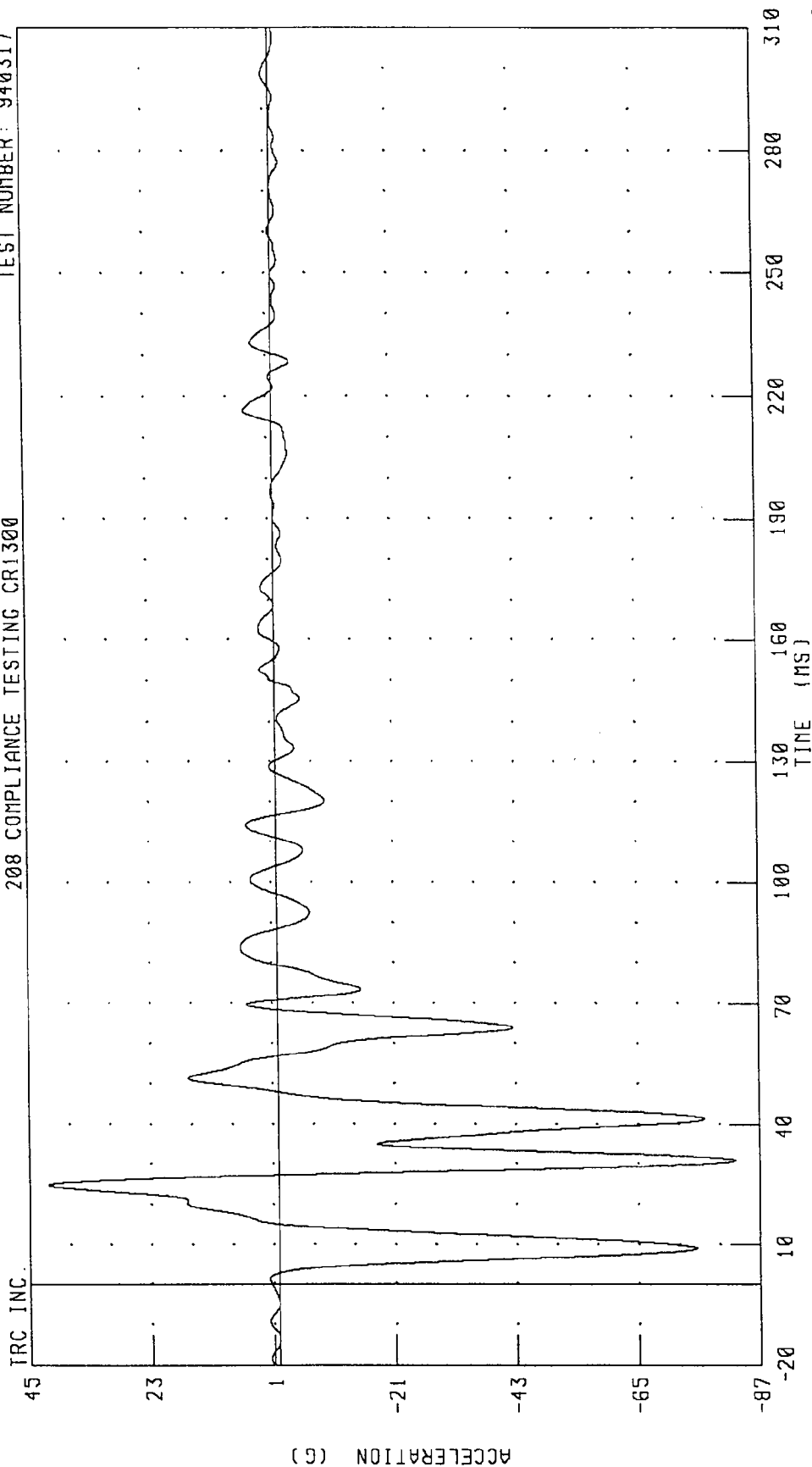
TEST NUMBER: 940317



CHANNEL: ENGXC2 FILTER: CH. CLASS 60

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CR1300

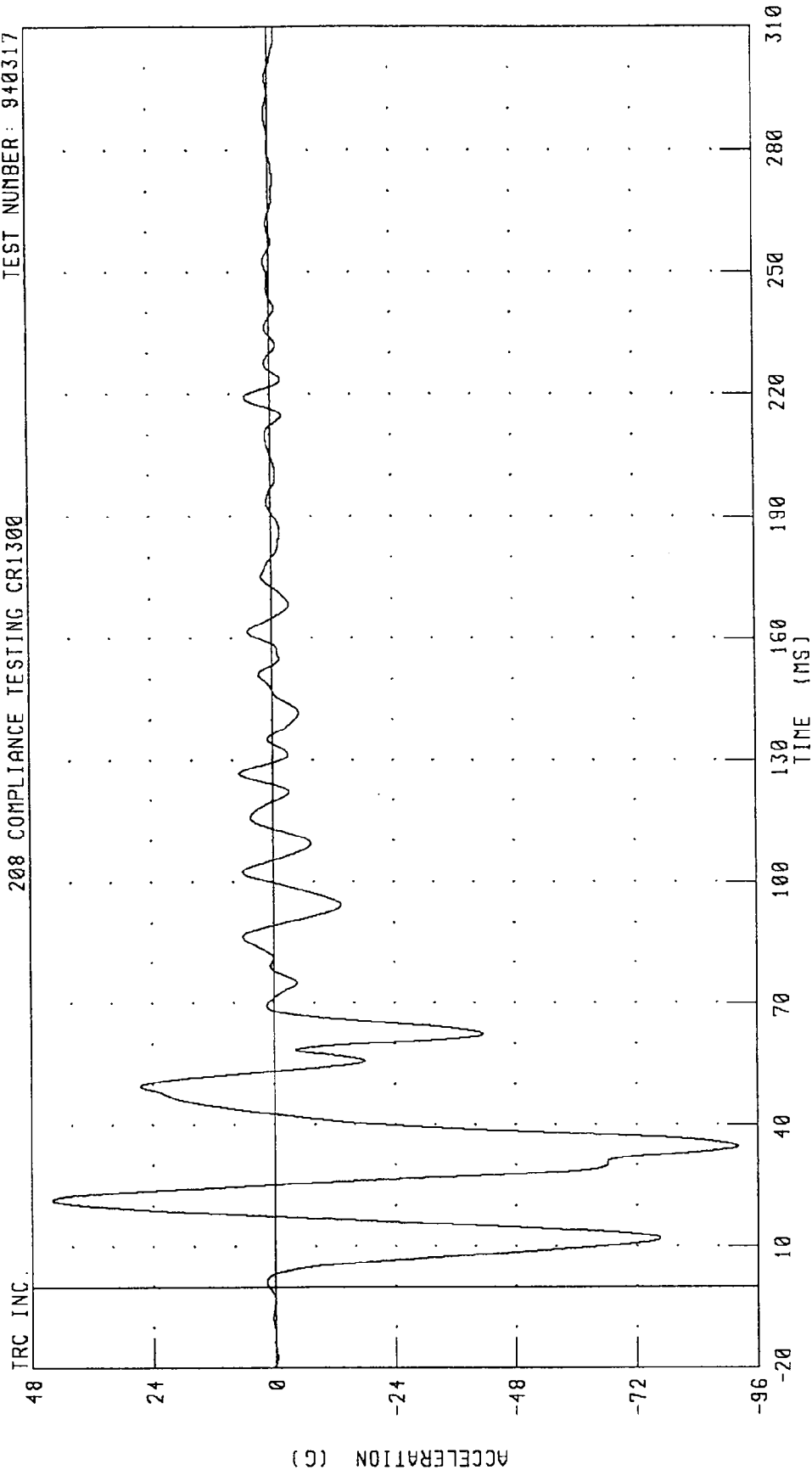
TEST NUMBER: 940317



CHANNEL: BCRXG1 FILTER: CH. CLASS 60

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CR1300

TEST NUMBER: 940317

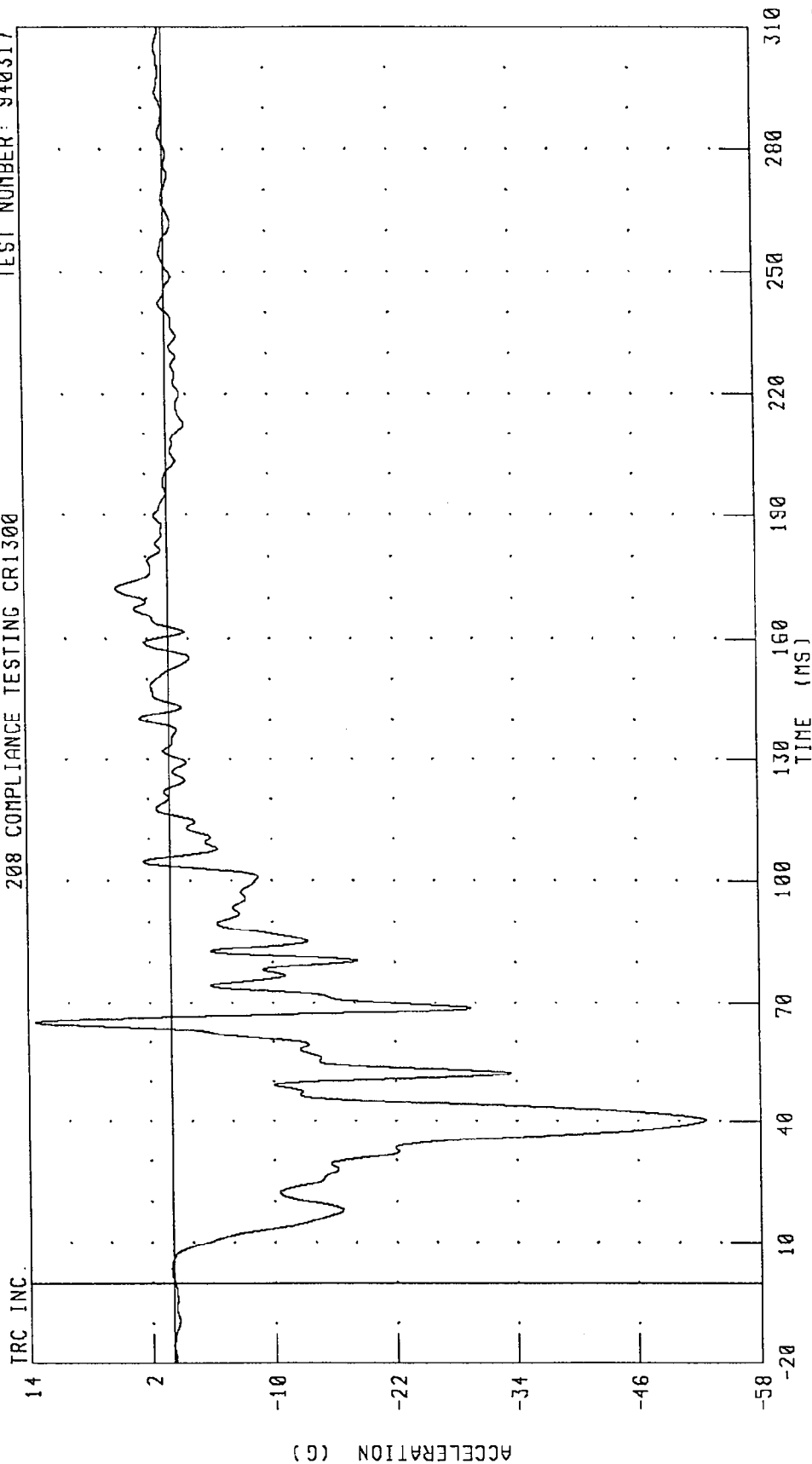


CHANNEL: BCLXG1 FILTER: CH. CLASS 60

PEAK DATA: 43.80 G @ 21.60 MS; -92.01 G @ 34.80 MS

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
 DASH PANEL CENTER X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CR1300

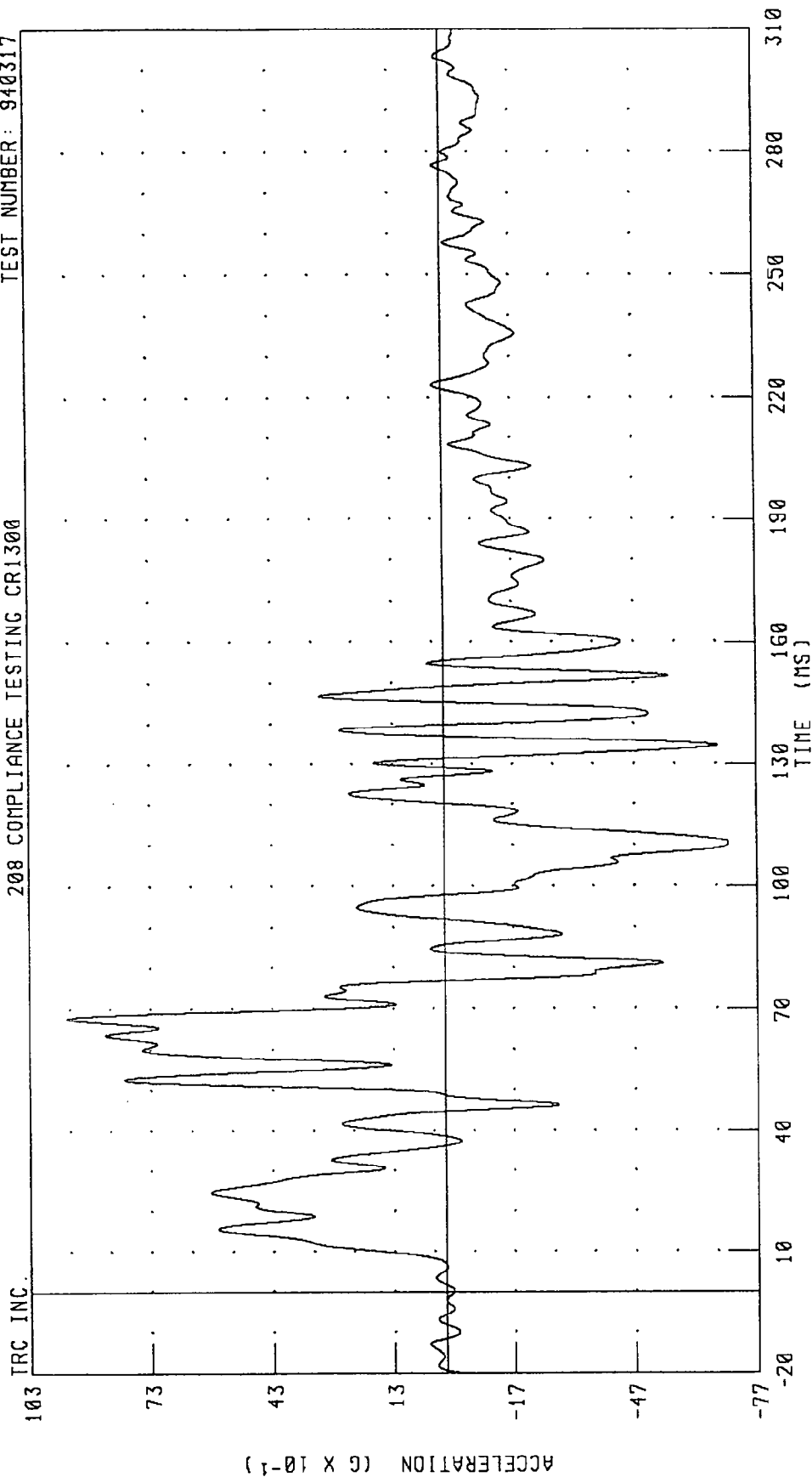
TEST NUMBER: 940317



CHANNEL: DPCXG1 FILTER: CH. CLASS 60

1994 EXPLORER VAN INTO FLAT FRONTAL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

208 COMPLIANCE TESTING CR1300 TEST NUMBER: 940317



PEAK DATA: 9.38 G @ 67.68 MS; -7.01 G @ 110.56 MS

CHANNEL: ROKZG1 FILTER: CH. CLASS 60

Appendix C

Manufacturer's Vehicle Information



Explorer Van Co.

Div. of Bodor Corp.

P. O. Box 527, Warsaw, IN 46581-0527 • Phone: 219/267-7666

"America's Van"

March 2, 1994

Federal Express #7298673082

Re: NEF-31CCa

IR 1433

Robert F. Hellmuth, Director
Office of Vehicle Safety Compliance
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Sir:

Referencing the above entitled matter, enclosed are documents provided to me for responding to each inquiry. Test documents are submitted in "Confidential" envelopes. This company considers all test documentation confidential business information in that it may relate to systems designed expressly for our use. Should you have need for more information, please contact the undersigned.

In reviewing the attached or enclosed test information and documents, please take note of the following:

A. Test data included herein regarding Explorer Van Company embraces sled testing using factory OEM as the base for standard. Explorer Van Company does NOT use OEM equipment.

B. In Calspan Test Report No. 7972-19, Calspan photographs were damaged during film processing and were not available to us. Run No. 8936 is OEM to establish our comparison standard base.

C. We have also included an example of the General Motors Certification "Document for Incomplete Vehicle" referencing the subject test vehicle for your to use, as needed.

Specific responses with documentation attached, if applicable, pursuant to your letter NEF-31CCa, IR 1433, are:

1. Refer to Item 2.
2. S4.1.2.3 Confidential test results are enclosed.

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NEF-31CCa, IR 1433
Robert F. Hellmuth
NHTSA
March 2, 1994

3. Not applicable.
4. Certified by General Motors. We were unable to obtain General Motors documentation.
5. None. Explorer Van Company installs no such devices.
6. Not applicable. For your test purposes we request the windows be closed.
7. Please refer to test set-up information for Calspan Test Report No. 7972-19, Part 572(B) dummy, enclosed. There is no foot rest. Split bench seat is not used.
8. "Test Vehicle Information" enclosed assumes the test vehicle you will test. Information regarding fuel tank capacity data is not applicable in our tests.
9. The adjustable "D" ring is placed in the upper position in accordance with factory certifications in all positions.
10. See Calspan Test Report No. 7972-19 confidentially enclosed.
11. Not applicable.
12. Supplier names and addresses:

Seats and Pedestals: Haimbaugh Enterprises, Inc.
2392 No. Boeing Rd.
Warsaw, IN 46580

Slider: Johnson International
21303 Protesta Dr.
Elkhart, IN 45616

Seat Belts: Bendix Safety Restraint Group
7000 19 Mile Road
Sterling Hts, MI 48314

Seat Frame: Better Products
P. O. Box 1927
Elkhart, IN 46517-0927

or

American Metal Fabricators
55515 Franklin St.
Three Rivers, MI 49093

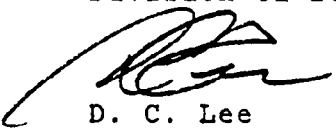
PAGE 3
NEF-31CCa, IR 1433
Robert F. Hellmuth
NHTSA
March 2, 1994

13. Not applicable.

Again, should you have need for additional information please contact us.

Sincerely,

EXPLORER VAN COMPANY
Division of Bodor Corporation



D. C. Lee
Regulatory Affairs

DCL:am

Enclosures

cc: Chief Counsel/NCC-01; Federal Express #7298673093

TEST VEHICLE INFORMATION

Page 1 of 2

Vehicle Model Year & Make: 1994 Chevrolet Astro Minivan

Vehicle Model & Body Style: Astro Minivan, Explorer Van Company Conversion

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"?).

REFER TO ENCLOSED TEST REPORTS

Seat back angle for driver's seat = 21 degrees.

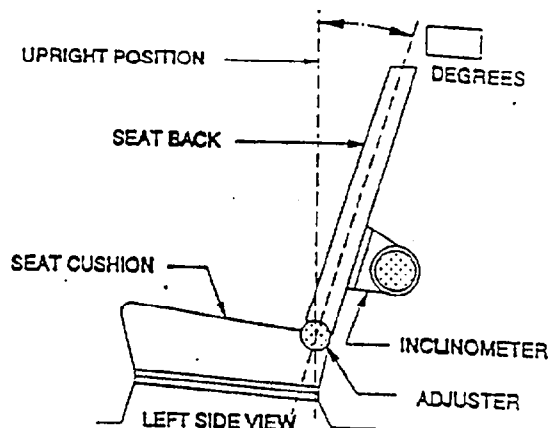
Measurement Instructions:

Cutout section of seatback cover
and attach inclinometer to seat
frame.

Seat back angle for passenger's seat = 21 degrees.

Measurement Instructions:

Cutout section of seatback cover
and attach inclinometer to seat
frame.



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:

6-way power seat. Seat is moved to the full rearward position, measured;
moved to the full forward position, measured; then moved to the
calculated center (mid) position.

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

Manual seat. Seat is moved to the full rearward position, measured;
moved to the full forward position, measured; then to the calculated
center (mid) position. (Note: center position is a standard "notch".)

3. FUEL TANK CAPACITY DATA - -

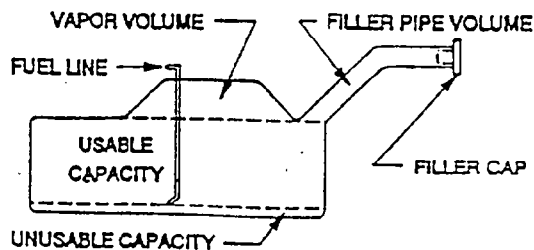
NOT APPLICABLE IN OUR TESTS.

3.1 A. "Usable Capacity" of standard equipment fuel

tank = 27 gallons.

B. "Usable Capacity" of optional equipment fuel
tank = none gallons.

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



VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

MANUFACTURED BY:			DATE:	
EXPLORER VAN COMPANY			MAR 1994	
INC. VEH. MFG. BY: GENERAL MOTORS CORPORATION			DATE:	
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT IN:	FRONT	INTERMEDIATE	REAR	GAWR
	2800		3150	TIRES
	P215/75R15		P215/75R15	RIMS
	15X7		15X7	PSI COLD SINGLE
DATE: 3/94	35		35	PSI COLD DUAL
GVWR	5950			
VEHICLE I.D. NUMBER		M11005		
TYPE		FD-122 MODEL NUMBER		
MULTI-PURPOSE PASSENGER VEHICLE				