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REPORT NOS. 208-TRC-93-017

212-TRC-93-017

301-TRC-93-017

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

SUZUKI MOTOR CORPORATION

1993 GEO METRO

CONVERTIBLE

NHTSA NO. CP0104

TRC TEST NO. 930414

TRANSPORTATION RESEARCH CENTER INC.

10820 STATE ROUTE 347

EAST LIBERTY, OHIO 43319



APRIL 30, 1993

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE (NEF-31)
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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1993 Geo Metro convertible, NHTSA No. CP0104, at Transportation Research Center Inc. on April 14, 1993. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; FMVSS 301, "Fuel System Integrity." The barrier impact velocity was 29.3 mph. The vehicle's maximum static crush was 16.7 inches. The ambient temperature was 70° F. The driver's head injury criteria (HIC) was 442. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.2 g. The driver's chest maximum deflection was 2.1 inches. The driver's left and right femur maximum axial forces were 1297 pounds and 990 pounds, respectively. The passenger's head injury criteria (HIC) was 773. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 55.1 g. The passenger's chest maximum deflection was 1.8 inches. The passenger's left and right femur maximum axial forces were 499 pounds and 358 pounds, respectively. The vehicle appears to comply with the applicable requirements of FMVSS 208, 212, 219 (partial), and 301.					
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219P, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"			18. Distribution Statement Available from: NHTSA Technical Reference Division Room 5108, (NAD-52) 400 Seventh Street, SW Washington, DC 20590 Attn: Mr. Robert Hornickle		
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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 cm
ft feet 30 cm
yd yards 0.9 m
mi miles 1.6 km

AREA

sq in square inches 6.5 cm²
sq ft square feet 0.09 m²
sq yd square yards 0.8 m²
sq mi square miles 2.6 km²
acres 0.4 ha

MASS (weight)

oz ounces 28 g
lb pounds 0.45 kg
short tons (2000 lb) 0.9 t

VOLUME

tsp teaspoons 5 ml
Tbsp tablespoons 15 ml
fl oz fluid ounces 30 ml
c cups 0.24 l
pt pints 0.47 l
qt quarts 0.95 l
gal gallons 3.8 l
cu ft cubic feet 0.03 m³
cu yd cubic yards 0.76 m³

TEMPERATURE (exact)

°F Fahrenheit temperature 5/9 (after subtracting 32) °C Celsius temperature

Approximate Conversions from Metric Measures

Symbol When You Know Multiply by To Find Symbol

LENGTH

mm millimeters 0.04 in
cm centimeters 0.4 in
m meters 3.3 ft
km kilometers 0.6 mi

AREA

cm² square centimeters 0.16 sq in
m² square meters 1.2 sq yd
km² square kilometers 0.4 sq mi
ha hectares (10,000 m²) 2.5 acres

MASS (weight)

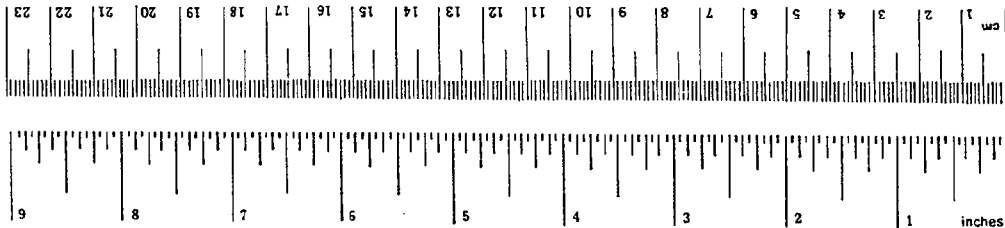
g grams 0.035 oz
kg kilograms 2.2 lb
t tonnes (1000 kg) 1.1 short tons

VOLUME

ml milliliters 0.03 fl oz
l liters 2.1 pints
liters 1.06 quarts
liters 0.26 gallons
cubic meters 35 cu ft
cubic meters 1.3 cu yd

TEMPERATURE (exact)

°C Celsius temperature 9/5 (then add 32) °F Fahrenheit temperature



* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NIST Misc. Publ. 280, Units of Weights and Measures, Price \$2.25, SD Catalog No. C1310286.

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SECTION-1.0

PURPOSE & TEST PROCEDURE

PURPOSE

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-90-C-21003. The purpose of this test was to determine if the subject vehicle, a 1993 Geo Metro Convertible, NHTSA No. CP0104, 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-208-08. 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. 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 and Optional Appendix C of the Laboratory Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. Each Part 572 E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection.

The twenty-five (25) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per second and processed per sections 12.8 and 12.9 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.

SECTION -2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at TRC on April 14, 1993.

The test vehicle, a 1993 Geo Metro convertible, NHTSA No. CP0104, 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 axial forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy, the chest deflection did not exceed 3.0 inches. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with a 1.0-liter, transverse engine, manual transmission, and power brakes. The vehicle's test weight was 2180 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 16.7 inches.

The driver's head injury criteria (HIC) was 442. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 45.2 g. The driver's chest maximum deflection was 2.1 inches. The driver's left and right femur maximum axial forces were 1297 pounds and 990 pounds, respectively.

The right front passenger's HIC was 773. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 55.1 g. The right front passenger's chest maximum deflection was 1.8 inches. The right front passenger's left and right femur maximum axial forces were 499 pounds and 358 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 left brake caliper X-axis accelerometer, BCLXG1, lost data at 47 milliseconds as a result of the accelerometer being destroyed by the vehicle's crush upon impact.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CP0104 TEST TYPE: Frontal Barrier Impact

TEST DATE: 04/14/93 TEST TIME: 1552 AMBIENT TEMP. (°F): 70

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1993/Geo/Metro/convertible

VEHICLE TEST WEIGHT (LBS): 2180

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: PRIMARY = 29.3 SECONDARY = 29.3

MAXIMUM STATIC CRUSH (IN): 16.7

AVERAGE REBOUND (IN): 19.5

DUMMIES:	Driver #230	Passenger #229
TYPE:	Part 572 E	Part 572 E
LOCATION:	Left front	Right front
RESTRAINT:	Airbag	Three-point unbelt

NUMBER OF DATA CHANNELS: 25

NUMBER OF CAMERAS: HIGH-SPEED 14 REAL-TIME 2

*With respect to tow track centerline.

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Suzuki Motor Corporation

MAKE/MODEL: Geo/Metro

VIN: JG1MR3360PK200456

BODY STYLE: Convertible

MODEL YEAR: 1993

NHTSA NO.: CP0104

COLOR: White

ENGINE DATA: TYPE: transverse CYLINDERS: 3 DISPLACEMENT: 1.0 liter

TRANSMISSION DATA: 5 SPEED, X MANUAL, AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 12/17/92

ODOMETER READING: 86

DEALER'S NAME AND ADDRESS: Edmond Chevrolet, Inc.

880 East Main St.

Bradford, PA 16701-3209

ACCESSORIES:

POWER STEERING No
POWER BRAKES Yes
POWER SEATS No
POWER WINDOWS No
TINTED GLASS No
RADIO Yes
CLOCK Yes
OTHER None

AUTOMATIC TRANSMISSION No
AUTOMATIC SPEED CONTROL No
TILTING STEERING WHEEL No
TELESCOPING STEERING WHEEL No
AIR CONDITIONING No
ANTI-SKID BRAKE No
REAR WINDOW DEFROSTER No

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Suzuki Motor Corporation

DATE OF MANUFACTURE: 07/92

VIN: JG1MR3360PK200456

GVWR: 2290 LBS

GAWR: FRONT: 1310 LBS., REAR: 980 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Bridgestone, Potenza RE92, P165/65R13

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 35 PSI
REAR: 35 PSI

SPARE TIRE (MFR., LINE, SIZE): P115/70D14

TYPE OF SEATS: FRONT: Bucket
REAR: NA

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 61.0 INCHES

WHEELBASE: 89.0 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on the driver's B-pillar.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P165/65R13

RECOMMENDED COLD TIRE PRESSURE: FRONT: 26 PSI; REAR: 26 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 0 REAR 2 TOTAL

VEHICLE CAPACITY WEIGHT: 388 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 23.7; RF 23.8; LR 23.5; RR 23.6

FULLY LOADED ATTITUDE: LF 23.5; RF 23.6; LR 23.2; RR 22.4

PRE-TEST ATTITUDE: LF 23.2; RF 23.3; LR 22.6; RR 22.9

POST-TEST ATTITUDE: LF 23.4; RF 26.6; LR 22.4; RR 22.1

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE AS RECEIVED (WITH MAXIMUM FLUIDS):

RIGHT FRONT	516 LBS.	RIGHT REAR	356 LBS.
LEFT FRONT	525 LBS.	LEFT REAR	372 LBS.
TOTAL FRONT WEIGHT	1041 LBS.	(58.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	728 LBS.	(41.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 1769 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (1769 LBS)

VCW = VEHICLE CAPACITY WEIGHT (388 LBS.)

DSC = DESIGNATED SEATING CAPACITY (2)

RCLW* = VCW - 150 (DSC) = 88

TARGET TEST WEIGHT = UDW + RCLW* + (NO. OF HYBRID III DUMMIES X 167 LBS/DUMMY)

TARGET TEST WEIGHT = 1769 + 88 + 334

TARGET TEST WEIGHT = 2191 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 77 LBS. OF CARGO WEIGHT:

RIGHT FRONT	598 LBS.	RIGHT REAR	475 LBS.
LEFT FRONT	610 LBS.	LEFT REAR	497 LBS.
TOTAL FRONT WEIGHT	1208 LBS.	(55.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	972 LBS.	(44.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2180 LBS.	(0.5% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 0 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: Rear bumper

CG = 39.7 INCHES REARWARD OF FRONT WHEEL CENTERLINE

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

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 930414 NHTSA NO.: CP0104
TEST DATE: 04/14/93 TEST TIME: 1552
TEST TYPE: Frontal Barrier Impact IMPACT ANGLE: 0
AMBIENT TEMPERATURE AT IMPACT AREA: 70° F
TEMPERATURE IN OCCUPANT COMPARTMENT: 71° F
IMPACT VELOCITY: PRIMARY = 29.3 MPH SECONDARY = 29.3 MPH

(SPECIFIED RANGE = 28.9 TO 29.9 MPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 15.0 IN.

EXITING VELOCITY TRAP = 2.0 IN.

TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN INCHES):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 143.5; C 147.5; R 143.5

POST-TEST: L 131.0; C 130.8; R 129.1

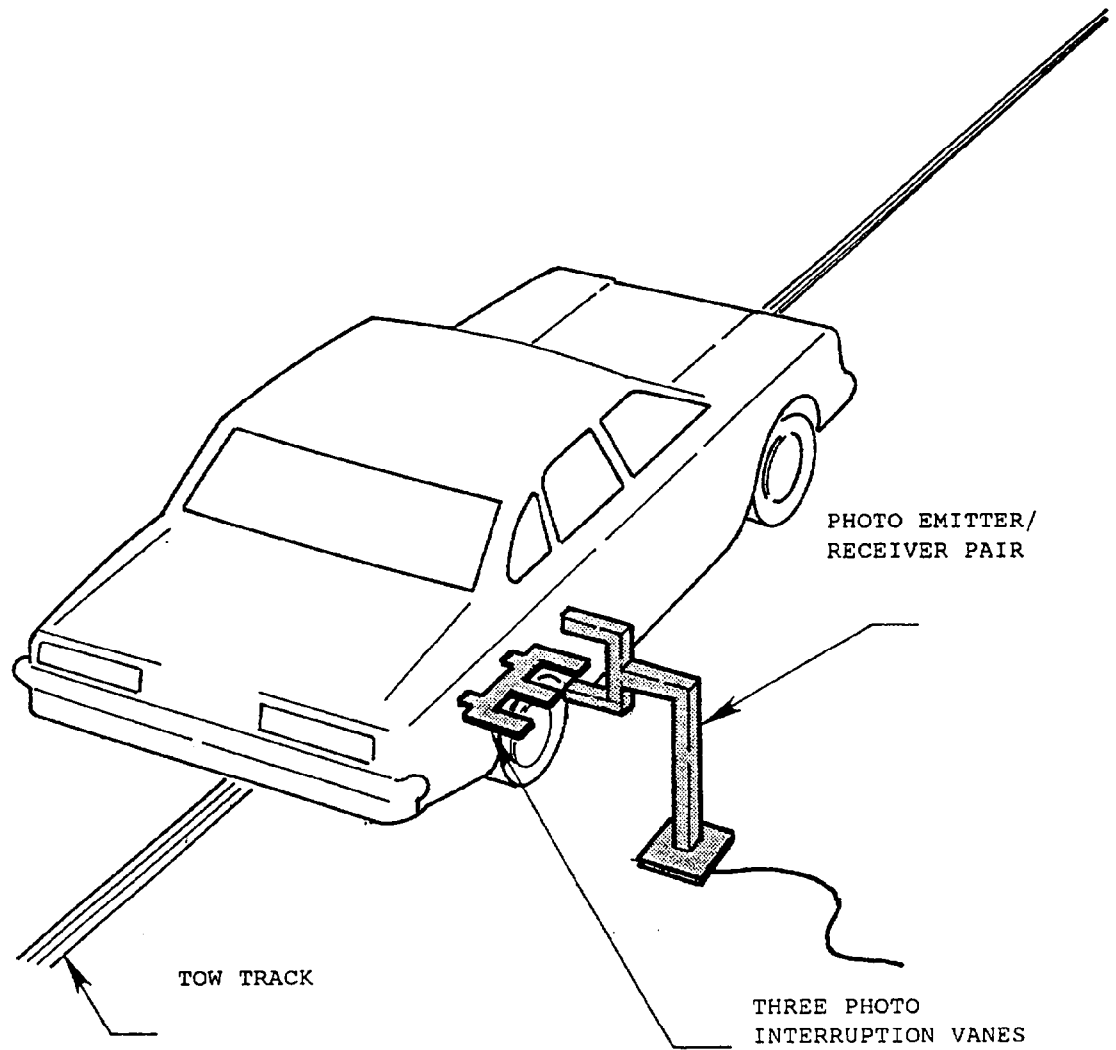
TOTAL CRUSH: L 12.5; C 16.7; R 14.4

AVERAGE CRUSH: 14.5

TEST VEHICLE REBOUND FROM FLAT BARRIER (ALL MEASUREMENTS ARE IN INCHES):

DISTANCE FROM TEST VEHICLE TO BARRIER: L 19.8; C 18.6; R 20.2 AVG. 19.5

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

FIGURE 2 ACCIDENT INVESTIGATION DIVISION DATA
FOR 30 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Geo/Metro/Convertible

VEHICLE NHTSA NO.: CP0104; VIN: JG1MR3360PK200456

MODEL YEAR: 1993; BUILD DATE: 07/92; TEST DATE: 04/14/93

VEHICLE SIZE CATEGORY: Two-seater; TEST WEIGHT: 2180 LBS.

VEHICLE WHEELBASE: 89.0 INCHES

MAXIMUM WIDTH: 61.0 INCHES

FRONT OVERHANG: 30.5 INCHES

COLLISION DEFORMATION
 CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
 MEASUREMENTS:

C1 =	<u>12.5</u>	INCHES
C2 =	<u>15.0</u>	INCHES
C3 =	<u>16.3</u>	INCHES
C4 =	<u>16.3</u>	INCHES
C5 =	<u>15.2</u>	INCHES
C6 =	<u>14.4</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
 REGION: L = 52.0 INCHES

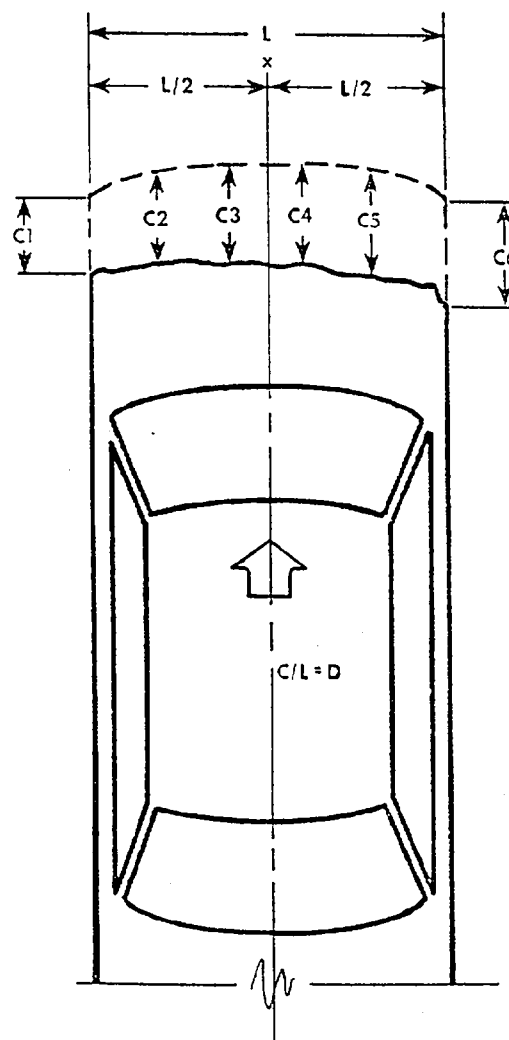
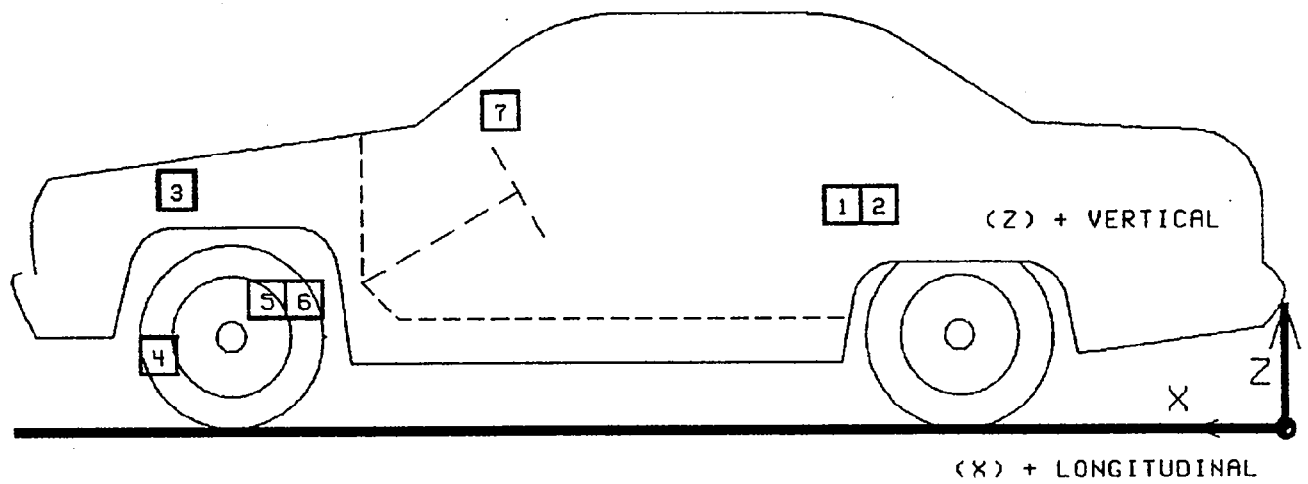
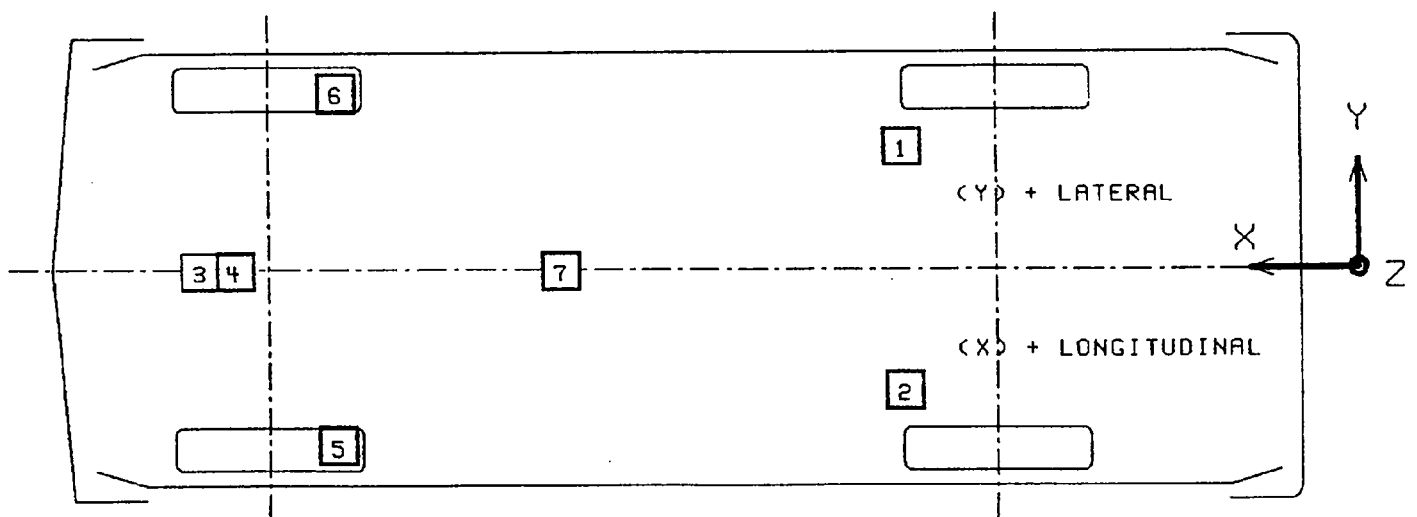


FIGURE 3
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930414

No. LOCATION	X*	Y*	Z*	POSITIVE		NEGATIVE	
				DIRECTION		DIRECTION	
				MAX G MSEC		MAX G MSEC	
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 53.2	10.8	11.2				
	POST 53.2	10.8	12.2				
			0.9	137.8	44.2	57.5	
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE 53.2	-11.4	10.9				
	POST 53.2	-11.4	12.2				
			1.3	122.0	43.7	57.6	
3 ENGINE TOP LONGITUDINAL	PRE 127.5	-8.4	30.2				
	POST 118.6	-7.2	28.8				
			92.6	45.9	277.7	31.4	
4 ENGINE BOTTOM LONGITUDINAL	PRE 123.2	9.2	6.9				
	POST 119.2	8.8	4.9				
			95.1	47.6	133.6	33.8	
5 RIGHT BRAKE CALIPER LONGITUDINAL	PRE 121.2	-23.2	11.1				
	POST 119.0	-23.9	10.8				
			25.6	66.9	62.2	50.4	

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

TEST NUMBER 930414

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
				MAX G	MSEC	MAX G	MSEC
6 LEFT BRAKE CALIPER LONGITUDINAL	PRE 121.2	23.2	11.2				
	POST 119.9	24.5	10.9				
				---	---	---	---
7 INSTRUMENT PANEL CENTER LONGITUDINAL	PRE 96.5	-1.5	31.0				
	POST 96.5	-1.5	33.8				
				46.8	85.0	47.9	90.1

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

γ See DATA ACQUISITION EXPLANATIONS

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT NO.: DTNH22-90-C-21003
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 NO.: CP0104
MAKE/MODEL/BODY STYLE: Geo/Metro/convertible
MODEL YEAR: 1993 BODY COLOR: White
VIN: JG1MR3360PK200456
ODOMETER (ARRIVAL): 86 DATE: 12/17/92
ODOMETER (COMPLETION): 90 DATE: 04/14/93
COST: \$10,475.00

☐ AIR CONDITIONER	☐ CONSOLE	BRAKES: ☒ POWER
☐ TINTED GLASS	☐ TACHOMETER	FRONT: Disc
☐ POWER STEERING	☐ SPEED CONTROL	REAR: Drum
☐ POWER WINDOWS	☐ REAR WINDOW DEF.	
☐ POWER DOOR LOCKS	☐ SUN/MOON ROOF	FRONT SEATS: ☐ POWER
☒ RADIO	☐ T-TOP	SEAT TYPE: Bucket
☒ CLOCK	☐ TILT STEERING WHEEL	NO. OF SEATS: 2
☐ ROOF RACK	☐ OTHER OPTIONS: _____	

ENGINE: 3 CYLINDERS; 1.0 LITERS
TRANSMISSION: 5-speed manual; DRIVE TYPE: Front-wheel drive
TIRE SIZE: P165/65R13
GASOLINE TYPE: Unleaded

EQUIPMENT THAT IS NO LONGER ON THE VEHICLE AS NOTED ABOVE: None

EXPLANATION: NA

VEHICLE CONDITION: Vehicle has been subjected to a 30 mph frontal
barrier crash test.

SECTION 3.0

FMVSS 208, 212, 219 (partial), & 301 DATA

TABLE 5 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION (G)

	HEAD				CHEST		
	X	Y	Z	R	X	Y	Z
DRIVER	-59.9	-23.6	-26.5	64.9	-46.2	-4.2	19.9
PASSENGER	-73.8	6.3	-53.6	75.5	-56.5	8.8	-19.3

MAXIMUM FEMUR COMPRESSIVE FORCE (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	1297	990
PASSENGER	499	358

HEAD INJURY CRITERIA*

	HIC	TIME t_1 (MSEC)	TIME t_2 (MSEC) ²
DRIVER	442	59.9	90.0
PASSENGER	773	79.1	115.1

CHEST MAXIMUM RESULTANT ACCELERATION**

	ACCEL. (G)	TIME t_1 (MSEC)	TIME t_2 (MSEC) ²
DRIVER	45.2	86.8	89.9
PASSENGER	55.1	72.2	75.4

MAXIMUM CHEST DEFLECTION (IN.)

DRIVER	2.1
PASSENGER	1.8

*As defined in FMVSS No. 208

**Defined as equal to or exceeding 0.003 sec. duration

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #230	PASSENGER #229
HEAD	<u>Airbag and sunvisor</u>	<u>Chest and sunvisor</u>
CHEST	<u>Airbag</u>	<u>None</u>
ABDOMEN	<u>None</u>	<u>None</u>
LEFT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>
RIGHT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
FRONT	<u>Easy</u>	<u>Easy</u>
REAR	<u>NA</u>	<u>NA</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>None</u>
REAR	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

None

OTHER NOTABLE IMPACT EFFECTS:

None

DUMMY KINEMATIC SUMMARY

Driver Dummy

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

TABLE 7 FMVSS 208 COMFORT & CONVENIENCE DATA FOR MANUAL SEAT BELTS

MAKE/MODEL: Geo/Metro

VIN: JG1MR3360PK200456

BODY STYLE: convertible

NHTSA NO.: CP0104

DATE OF MANUFACTURE: 07/92

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION SEAT BELTS HAVE WEBBING TENSION - RELIEVING DEVICES?(check one): NO

IF YES:

MAXIMUM SLACK RECOMMENDED IN OWNER'S MANUAL: _____ INCHES

DOES OWNER'S MANUAL WARN THAT INTRODUCING SLACK BEYOND THE AMOUNT SPECIFIED CAN SIGNIFICANTLY REDUCE THE EFFECTIVENESS OF THE SHOULDER BELT? _____ YES _____ NO

IF NO, EXPLAIN:

THE WEBBING TENSION - RELIEVING DEVICE IS CANCELLED WHEN

(check one): _____ The adjacent door is opened.

_____ The latch plate is released from the buckle.

_____ A manual means is activated on a open-body vehicle without doors.

OPEN-BODY VEHICLE (without doors): DOES THE MANUAL MEANS TO CANCEL THE WEBBING TENSION - RELIEVING DEVICE OPERATE PROPERLY? _____ YES
_____ NO

IF NO, EXPLAIN:

BELT CONTACT FORCE:

BELT CONTACT FORCE ON CHEST OF TEST DUMMY: 0.2 POUNDS

_____ NOT APPLICABLE, THE VEHICLE'S SEAT BELT SYSTEM INCLUDED A WEBBING TENSION - RELIEVING DEVICE.

TABLE 7 FMVSS 208 COMFORT & CONVENIENCE DATA FOR MANUAL SEAT BELTS, CONT'D

MAKE/MODEL: Geo/Metro

VIN: JG1MR3360PK200456

BODY STYLE: convertible

NHTSA NO.: CP0104

DATE OF MANUFACTURE: 07/92

LATCHPLATE ACCESS:

ARE THE SEAT BELT LATCHPLATES, IN THEIR NORMAL STOWED POSITION, WITHIN
THE REACH ENVELOPE? YES

DOES THE CLEARANCE TEST BLOCK MOVE UNHINDERED TO THE LATCHPLATE OR
BUCKLE? YES

RETRACTION:

SEAT BELT AUTOMATICALLY RETRACTS WHEN

(check one): The adjacent vehicle door is open and the seat belt
latchplate is released.

 X The seat belt latchplate is released.

ARE THE STOWED SEAT BELT WEBBING AND HARDWARE PINCHED WHEN THE DOOR IS
CLOSED? NO

OPEN-BODY VEHICLE (without doors): DOES THE SEAT BELT SYSTEM FULLY
RETRACT WHEN THE WEBBING TENSION-RELIEVING DEVICE IS MANUALLY
DEACTIVATED? YES NO

ACCESSIBILITY:

IS THE SEAT CUSHION REMOVABLE SO THE SEAT BACK SERVES A FUNCTION OTHER
THAN SEATING? NO

IS THE SEAT REMOVABLE? NO

IS THE SEAT MOVABLE SO THE SPACE FORMERLY OCCUPIED BY THE SEAT CAN BE
USED FOR A SECONDARY FUNCTION? NO

NOTE: IF ANY OF THE ABOVE ANSWERS ARE "YES", THE ACCESSIBILITY
REQUIREMENTS DO NOT APPLY.

TABLE 7 FMVSS 208 COMFORT & CONVENIENCE DATA FOR MANUAL SEAT BELTS, CONT'D

MAKE/MODEL: Geo/Metro

VIN: JG1MR3360PK200456

BODY STYLE: convertible

NHTSA NO.: CP0104

DATE OF MANUFACTURE: 07/92

ACCESSIBILITY, CONT'D:

IF WEBBING IS DESIGNED TO PASS THROUGH THE SEAT CUSHION OR BETWEEN THE CUSHION AND SEAT BACK ARE ONE OF THE FOLLOWING PARTS NORMALLY ON TOP OF OR ABOVE THE SEAT CUSHION: LATCHPLATE, BUCKLE, WEBBING?

Not Applicable, the webbing is not designed to pass through the seat cushion or between the cushion and seat back.

ARE THE REMAINING TWO PARTS ACCESSIBLE UNDER NORMAL CONDITIONS?

Not Applicable, the webbing is not designed to pass through the seat cushion or between the cushion and seat back.

DO THE LATCHPLATE AND BUCKLE PASS THROUGH THE GUIDES PROVIDED AND FALL BEHIND THE SEAT WHEN THE BELT IS COMPLETELY RETRACTED (OR DETACHED IF NOT RETRACTABLE); THE SEAT IS MOVED TO ANY POSITION; AND THE SEAT BACK, IF FOLDABLE, IS FOLDED FORWARD AS FAR AS POSSIBLE AND THEN MOVED BACKWARD INTO POSITION?

Not applicable, the restraint system does not provide guides.

IS THE INBOARD RECEPTACLE END OF THE OUTBOARD SEATING POSITION'S SEAT BELT ACCESSIBLE WITH THE CENTER ARM REST IN ANY POSITION TO WHICH IT CAN BE ADJUSTED WITHOUT MOVING THE ARM REST FOR ACCESS?

Not applicable, the vehicle does not contain a center arm rest.

TABLE 8 FMVSS 208 SEAT BELT WARNING SYSTEM DATA

WITH OCCUPANT IN DRIVER'S POSITION AND UNIBELT IN STOWED POSITION AND
IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 6 sec.

Duration of reminder light operation = 6 sec.

WITH OCCUPANT IN DRIVER'S POSITION AND UNIBELT IN USE AND THE IGNITION
SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 6 sec.

WORDING OF VISUAL WARNING:

 Fasten Seat Belt

 Fasten Belt

 X Symbol 101-80

 Other:

TABLE 9 FMVSS 208 LABELING AND DRIVER'S MANUAL DATA

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTION SYSTEM: The label was located on the driver's sunvisor.

THE MANUFACTURER'S RECOMMENDED SCHEDULE IS TO: (check one)

 Replace

 Repair

X Other: No regular maintainance required.

This system: (check one)

___a. by ___ month, ___ year

___b. by ___ miles

___c. or after a time interval of ____ months or
____ years.

___d. other: _____

WERE APPROPRIATE INSTRUCTIONS CONCERNING MAINTENANCE AND/OR REPLACEMENT OF THIS SYSTEM PROVIDED? YES, owner's manual supplement, page 17, and label on vehicle

WAS A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEM PROVIDED?

YES, owner's manual supplement, page 15

IS THERE A REFERENCE TO THE INSTRUCTIONS AND DESCRIPTION OF THE SYSTEM ON THE LABEL? YES

WAS AN OWNER'S MANUAL PROVIDED? YES

DID THE OWNER'S MANUAL CONTAIN APPROPRIATE INFORMATION CONCERNING
MAINTENANCE AND/OR REPLACEMENT AND A DESCRIPTION OF THE FUNCTIONAL OPERATION
OF THE SYSTEMS? YES, owner's manual supplement, pages 15 & 17

TABLE 10 FMVSS 208 READINESS INDICATOR DATA

AN OCCUPANT RESTRAINT SYSTEM THAT DEPLOYS IN THE EVENT OF A CRASH SHALL HAVE A MONITORING SYSTEM WITH A READINESS INDICATOR. A TOTALLY MECHANICAL SYSTEM IS EXEMPT FROM THIS REQUIREMENT.

IS THE SYSTEM TOTALLY MECHANICAL? NO

IF NO:

DESCRIBE THE LOCATION OF THE READINESS INDICATOR: The readiness indicator was located in the lower right corner of the instrument cluster

IS THE READINESS INDICATOR CLEARLY VISIBLE TO THE DRIVER? YES

IS A LIST OF THE ELEMENTS IN THE OCCUPANT RESTRAINT SYSTEM, BEING MONITORED BY THE READINESS INDICATOR, PROVIDED? NO

FIGURE 4 FMVSS 212 TEST DATA

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

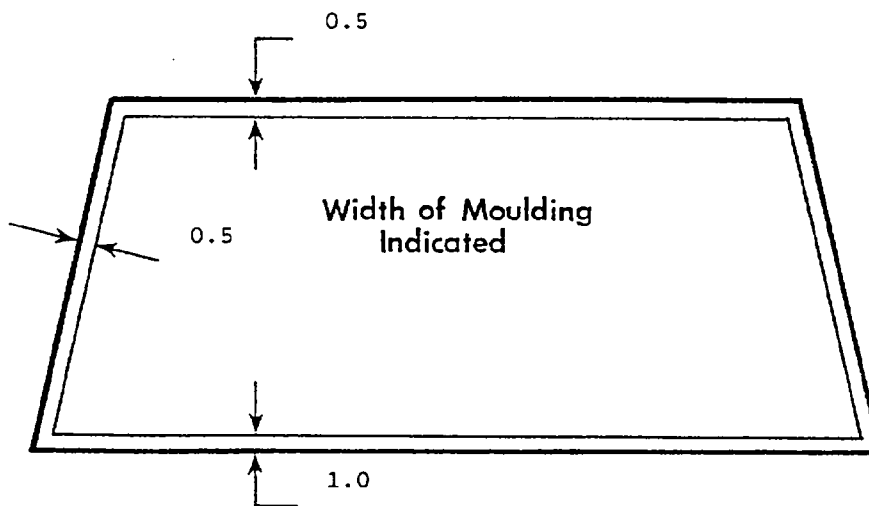
Plastic trim around outer perimeter, adhesive around inner perimeter.

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

WINDSHIELD PERIPHERY MEASUREMENTS:

	PRE-TEST	POST-TEST	PERCENT RETENTION
RIGHT SIDE	77.2	77.2	100
LEFT SIDE	77.2	77.2	100
TOTAL	154.4	154.4	100

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 71° F



FRONT VIEW OF WINDSHIELD*

LOSS OF WINDSHIELD RETENTION LENGTHS: None

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

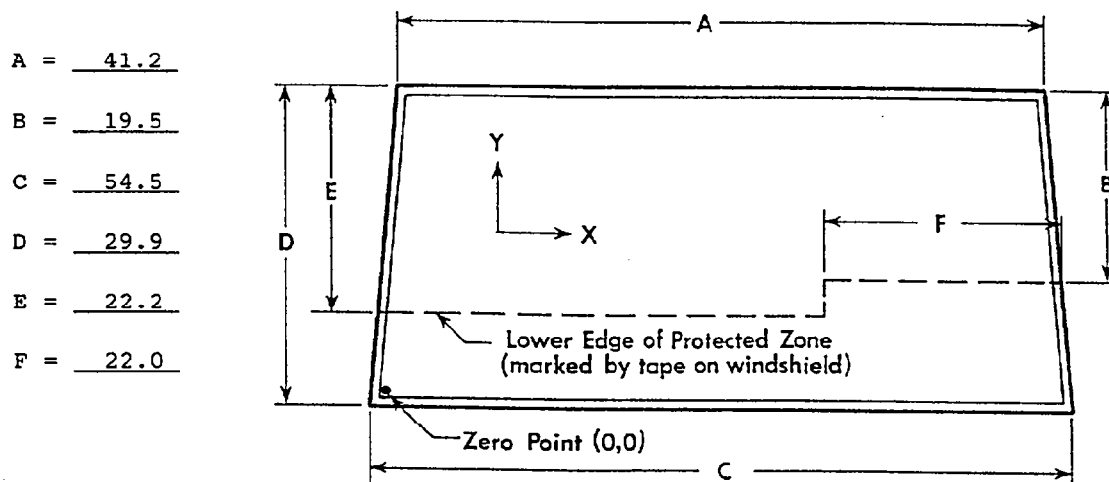
*INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

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:



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.

ALL MEASUREMENTS ARE IN INCHES.

TABLE 11 FUEL SYSTEM DATA

MAKE/MODEL: Geo/Metro

NHTSA NO.: CP0104

FUEL SYSTEM CAPACITY: 10.0 GALLONS (FROM OWNER'S MANUAL)*

USABLE CAPACITY: 10.6 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 9.8 GALLONS TO 10.0 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 9.8 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel tank is located in front of the rear
axle. The fuel filler is on the left side. The fuel lines run along
the left side to the front.

ELECTRIC FUEL PUMP: Yes FUEL INJECTION: Yes

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? No

*A Ford Motor Company owner's manual for a 1993 Ford Econoline van was provided with the test vehicle.

TABLE 12 FMVSS 301 POST-IMPACT TEST DATA

TEST VEHICLE NHTSA NO.: CP0104; TEST DATE: 04/14/93

VEHICLE MAKE/MODEL/BODY STYLE: Geo/Metro/convertible

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:

- ☒ X FRONTAL (30 MPH)
☐ OBLIQUE (30 MPH) WITH ° BARRIER FACE
FIRST CONTACTING (DRIVER/PASS.) SIDE.
☐ REAR MOVING BARRIER (30 MPH)
☐ LATERAL MOVING BARRIER (20 MPH)

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

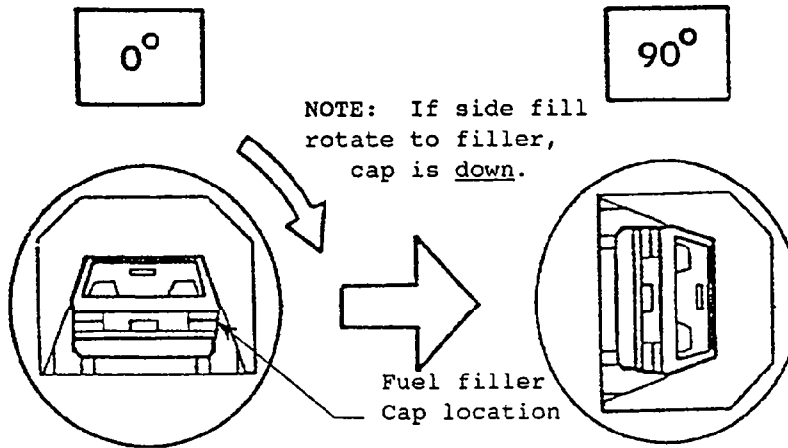
	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 OZ.	1 OZ.
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 OZ.	5 OZ.
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - -	0 OZ.	1 OZ./1 MIN.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA

NHTSA NO.: CP0104
TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds
FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds
TOTAL - - - - - = 7 minutes, 00 seconds
NEXT WHOLE MINUTE INTERVAL - - - - - = 7 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>0° TO 90° ROTATION (FUEL FILLER CAP DOWN)</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

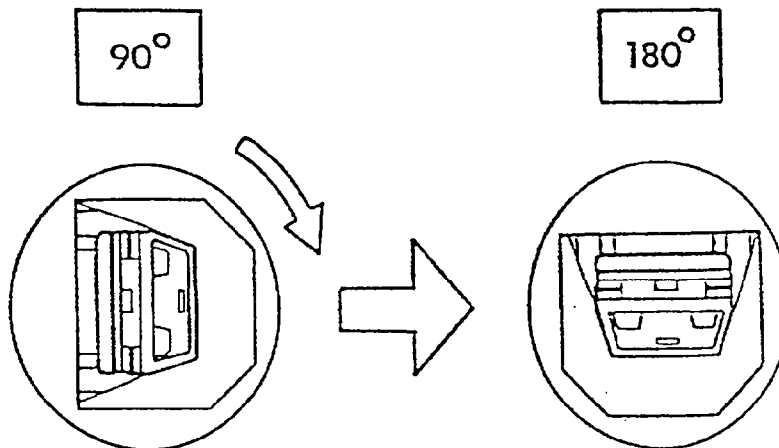
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CP0104

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - = 14 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>90° TO 180° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

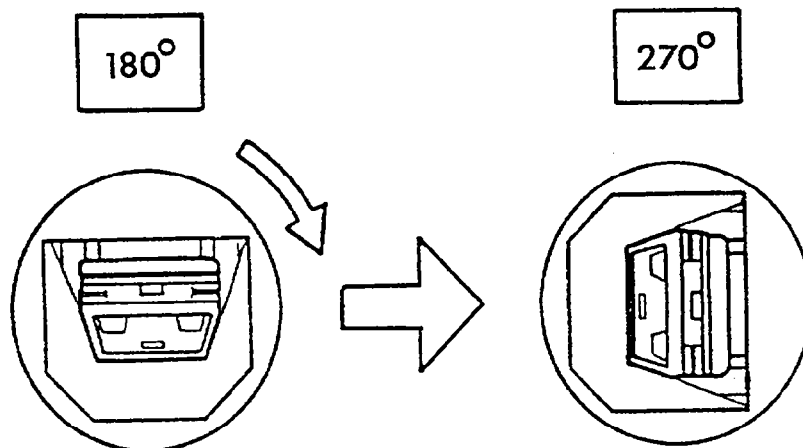
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CP0104

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds

FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds

TOTAL - - - - - = 7 minutes, 00 seconds

NEXT WHOLE MINUTE INTERVAL - - - - - = 21 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

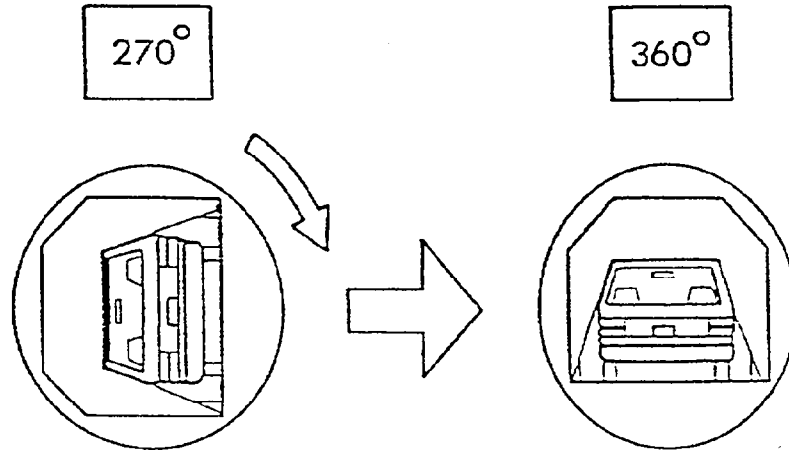
<u>180° TO 270° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CP0104
TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

TIME REQ. FOR MACHINE TO ROTATE 90° = 2 minutes, 00 seconds
FMVSS 301 POSITION HOLD TIME = 5 minutes, 00 seconds
TOTAL - - - - - = 7 minutes, 00 seconds
NEXT WHOLE MINUTE INTERVAL - - - - = 28 minutes

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>270° TO 360° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH 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

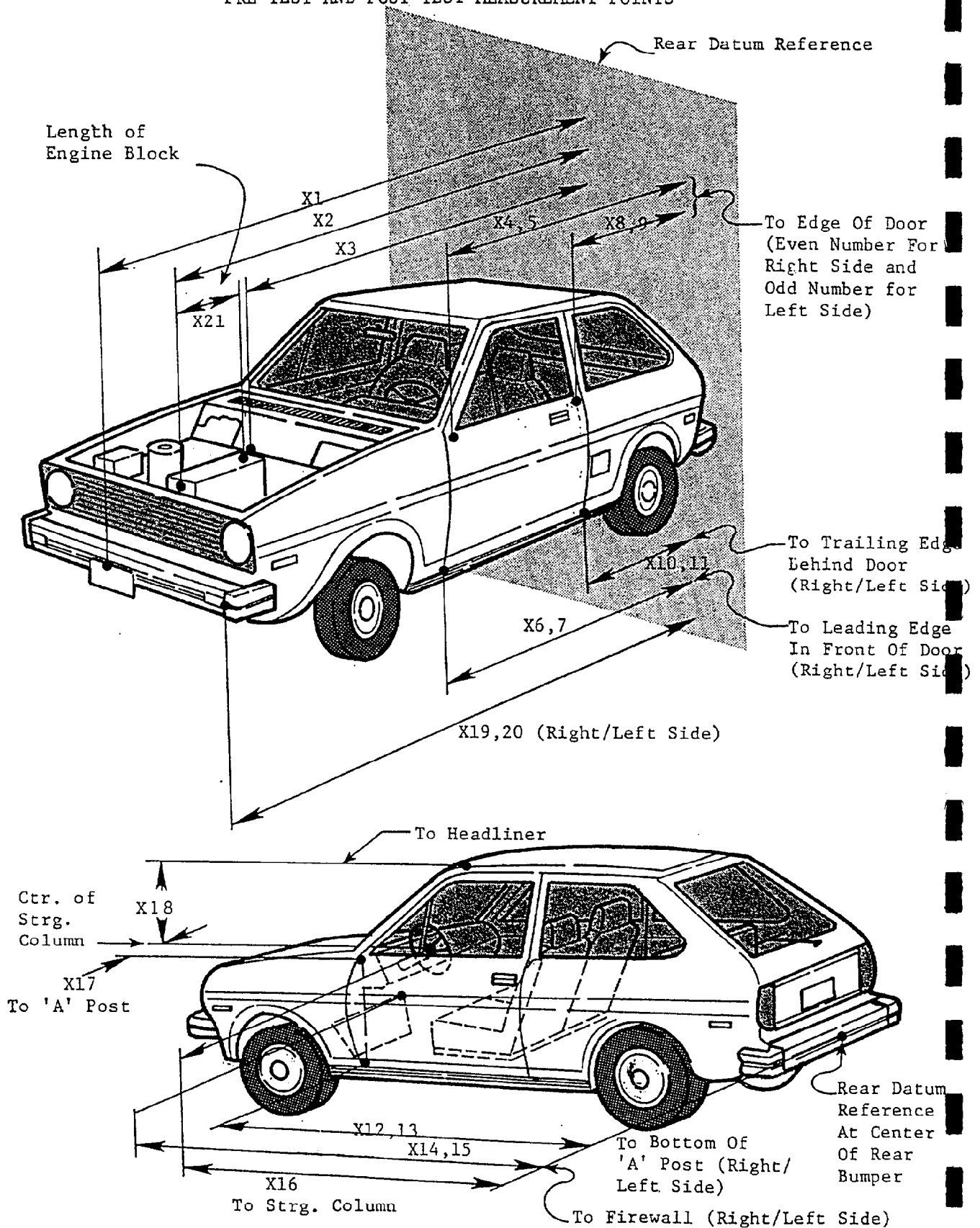
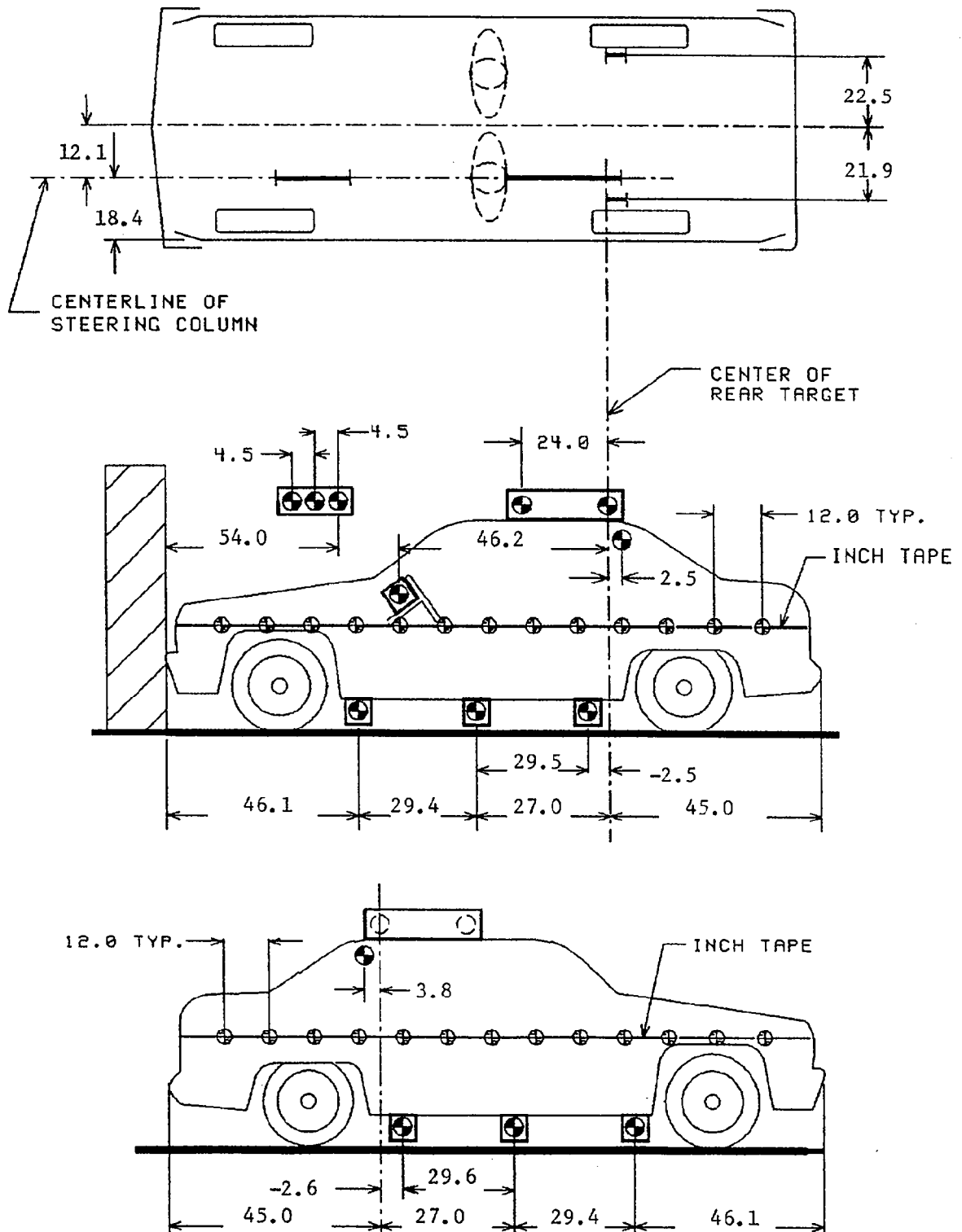


TABLE 13 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Geo/Metro		TEST NUMBER: 930414		ALL MEASUREMENTS ARE IN INCHES	
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.	
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	147.5	130.8	16.7	
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	128.5	119.6	8.9	
X3	REAR SURFACE OF VEHICLE TO FIREWALL	112.1	111.5	0.6	
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	100.1	101.0	-0.9	
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	100.0	101.0	-1.0	
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	99.0	99.4	-0.4	
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	99.2	89.9	9.3	
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	51.1	52.0	-0.9	
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	51.0	52.0	-1.0	
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	51.8	52.2	-0.4	
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	52.2	51.6	0.6	
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	99.1	99.4	-0.3	
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	99.1	98.9	0.2	
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	110.4	109.8	0.6	
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	110.8	112.0	-1.2	
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	84.0	84.3	-0.3	
X17	CENTER OF STEERING COLUMN TO "A" POST	11.5	13.8	-2.3	
X18	CENTER OF STEERING COLUMN TO HEADLINER	17.2	15.1	2.1	
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	143.5	129.1	14.4	
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	143.5	131.0	12.5	
X21	LENGTH OF ENGINE BLOCK	14.5	14.5	0.0	

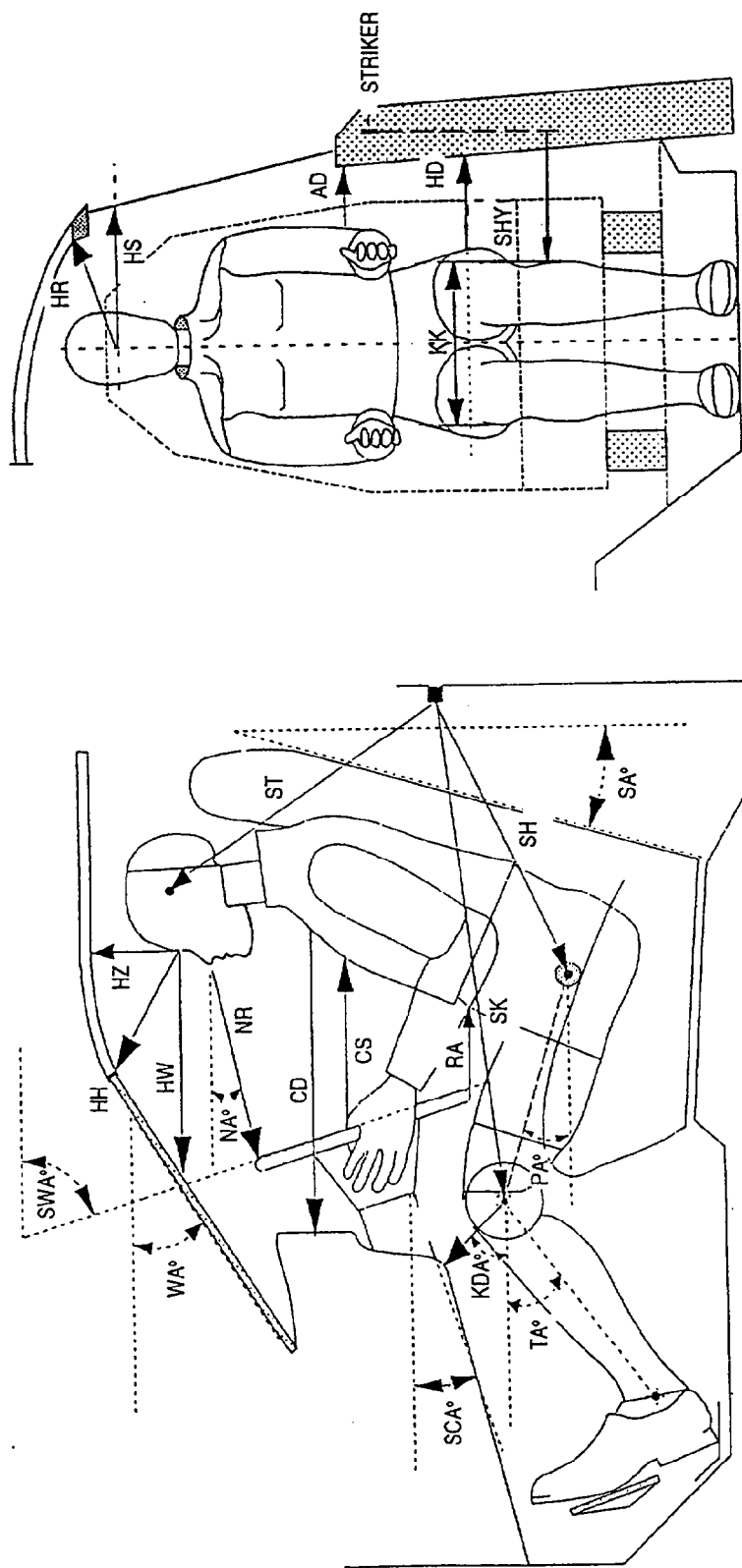
FIGURE 8
VEHICLE TARGET LOCATIONS



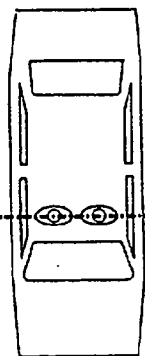
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9

DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS



VERTICAL TRANSVERSE PLANE



VERTICAL LONGITUDINAL PLANE

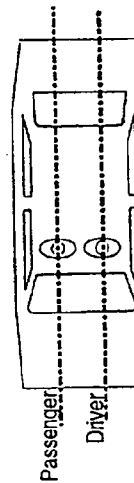


TABLE 14 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

<u>DESIGNATION</u>	<u>TYPE OF MEASUREMENT</u>	<u>DRIVER (SERIAL #230)</u>	<u>PASSENGER (SERIAL #229)</u>
WA	WINDSHIELD ANGLE	28	NA
SWA	STEERING WHEEL ANGLE	67	NA
SCA	STEERING COLUMN ANGLE	23	NA
SA	SEAT BACK ANGLE	20	20
HZ	HEAD TO ROOF	8.8	8.4
HH	HEAD TO HEADER	14.2	14.3
HW	HEAD TO WINDSHIELD	23.2	24.7
HR	HEAD TO SIDE HEADER	9.1	8.2
NR	NOSE TO RIM	17.1	NA
NA	NOSE TO RIM ANGLE	7	NA
CD	CHEST TO DASH	21.9	23.8
CS	STEERING WHEEL TO CHEST	13.6	NA
RA	RIM TO ABDOMEN	8.8	NA
KDL	LEFT KNEE TO DASH	8.4	10.2
KDR	RIGHT KNEE TO DASH	9.1	9.9
KDA	OUTBOARD KNEE TO DASH ANGLE	28	30
PA	PELVIC ANGLE	22	24
TA	TIBIAL ANGLE	36	26
KK	KNEE TO KNEE	10.4	10.0
ST*	STRIKER TO HEAD	22.5	21.2
	STRIKER TO HEAD ANGLE	-65	-63
SK*	STRIKER TO KNEE	30.4	29.9
	STRIKER TO KNEE ANGLE	0	5
SH*	STRIKER TO H-POINT	16.8	15.8
	STRIKER TO H-POINT ANGLE	20	28
SHY	STRIKER TO H-POINT (Y DIR.)	7.8	7.6
HS	HEAD TO SIDE WINDOW	11.2	9.6
HD	H-POINT TO DOOR	5.9	6.4
AD	ARM TO DOOR	4.1	3.4

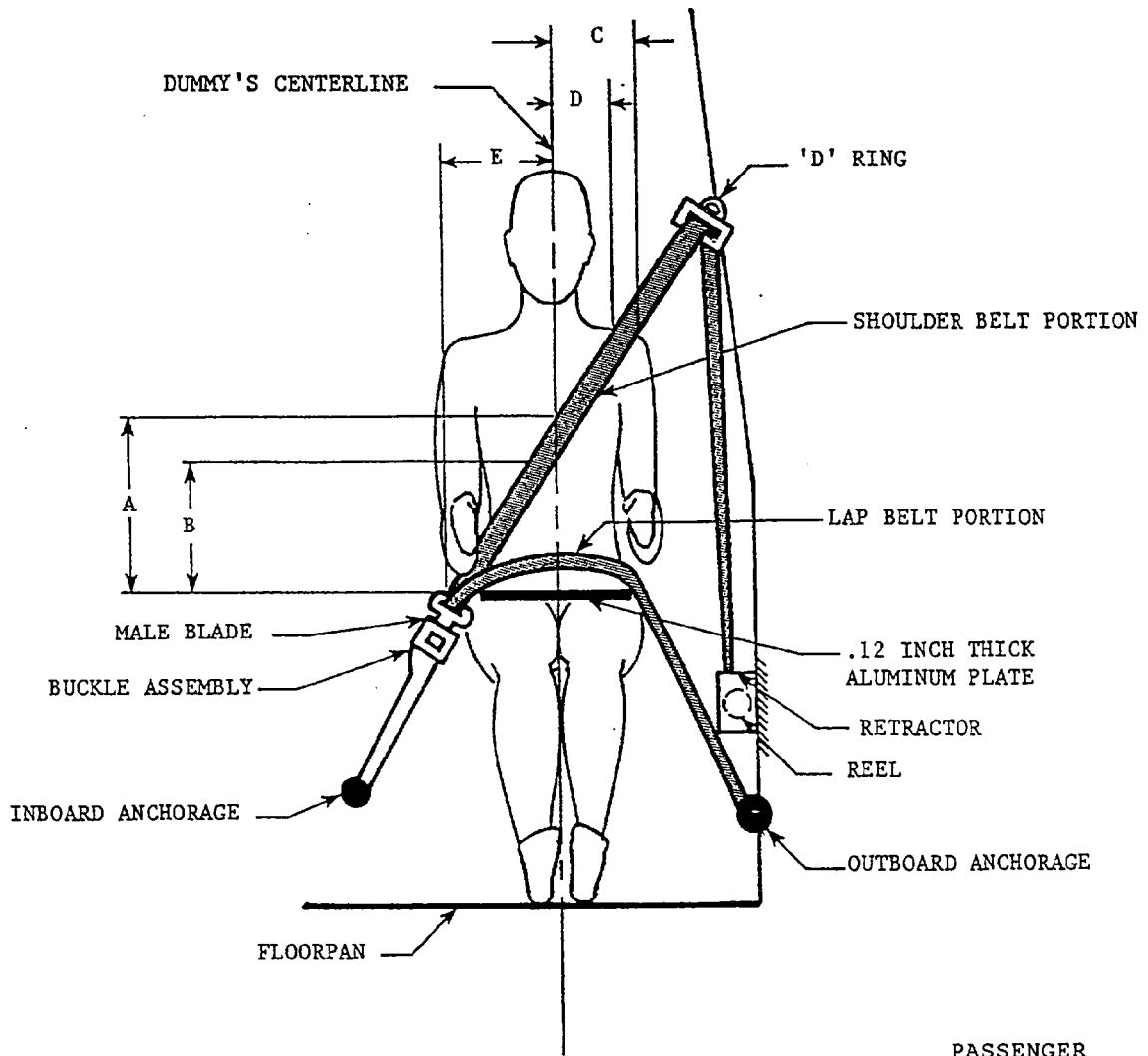
THE SEAT BACK ANGLE (SA°) IS MEASURED RELATIVE TO VERTICAL, ALL OTHER ANGLES ARE MEASURED RELATIVE TO HORIZONTAL.

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

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

ALL ANGLE MEASUREMENTS ARE IN DEGREES.

FIGURE 10 SEAT BELT POSITIONING DATA



	PASSENGER DUMMY
A - TOP SURFACE OF ALUM. PLATE TO BELT UPPER EDGE	12.9
B - TOP SURFACE OF ALUM. PLATE TO BELT LOWER EDGE	9.2
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	4.4
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	2.5
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	30.2

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 11
CAMERA POSITIONS
4, 7, 8

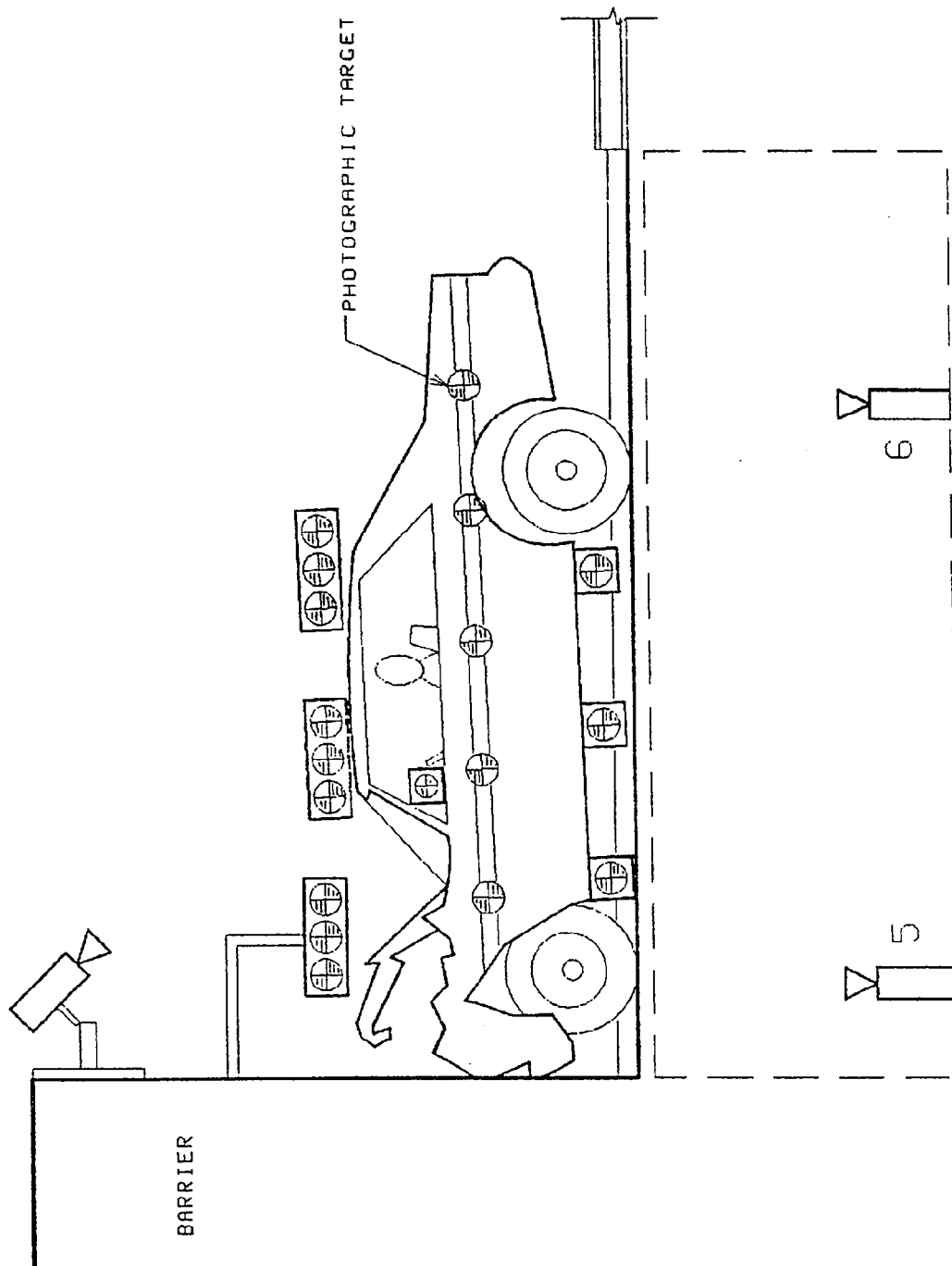


FIGURE 11

CAMERA POSITIONS, CONTINUED

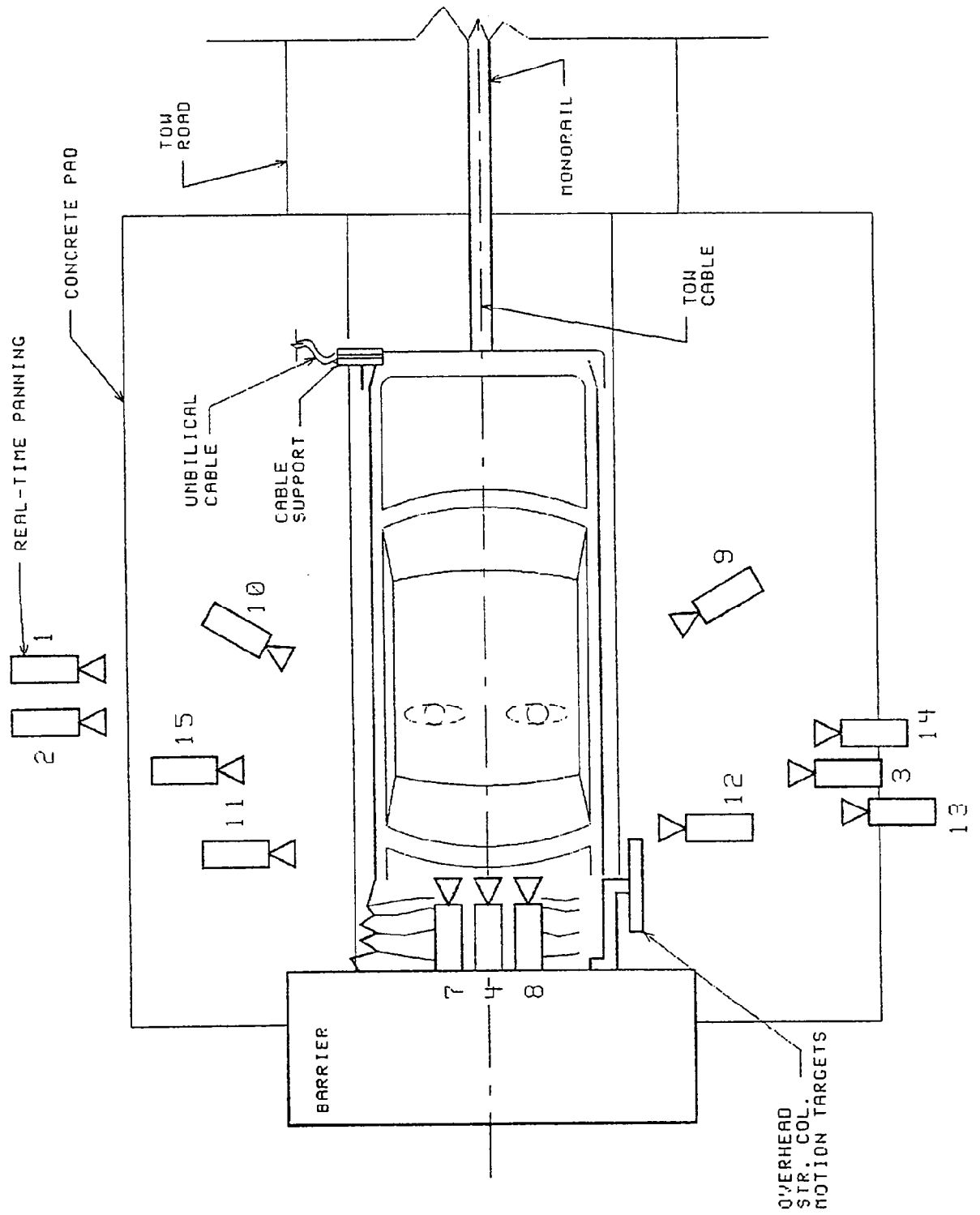


TABLE 15 MOTION PICTURE CAMERA LOCATIONS

TEST NO.:		930414		VEHICLE: Geo Metro convertible			FILM PLANE			FILM
CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	TO HEAD TARGET (IN)	LENS (MM)	SPEED (FPS)		
		X	Y	Z						
1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24		
2	Right overall	-81.3	-266.4	37.1	-2	NA	13	498		
3	Left vehicle crush	-41.5	295.0	44.0	-4	198.0	25	1008		
4	Windshield front view	-6.0	0.0	85.0	-40	NA	13	495		
5	Pit-left subframe sidemember	-8.0	29.0	-16.0	90	NA	13	1000		
6	Pit-right subframe sidemember	-7.0	30.0	-12.0	90	NA	13	998		
7	Passenger front view	-4.5	-13.8	93.0	-50	NA	17	505		
8	Driver front view	-6.8	14.5	93.0	-50	NA	17	498		
9	Driver kinematics	-157.3	116.0	87.0	-27	94.0	25	500		
10	Passenger kinematics	-152.1	-116.0	87.0	-26	99.0	25	508		
11	Right windshield intrusion	-38.1	-306.1	44.0	0	NA	50	498		
12	Left windshield intrusion	-53.0	309.4	42.3	0	NA	50	500		
13	Steering column motion	-98.0	286.0	103.0	-14	NA	25	502		
14	Steering column motion	-98.0	286.0	75.1	-9	NA	25	500		
15	Passenger kinematics	-38.8	-293.0	45.3	-4	189.0	25	1002		
16	Real-time documentation	NA	NA	NA	NA	NA	12-120	24		

* +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

** +Angle = Film plane angled upward from horizontal plane

APPENDIX A
PHOTOGRAPHS

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NHTSA
930414
PRE



Figure A-1. PRE-TEST FRONT VIEW

A-2

930414

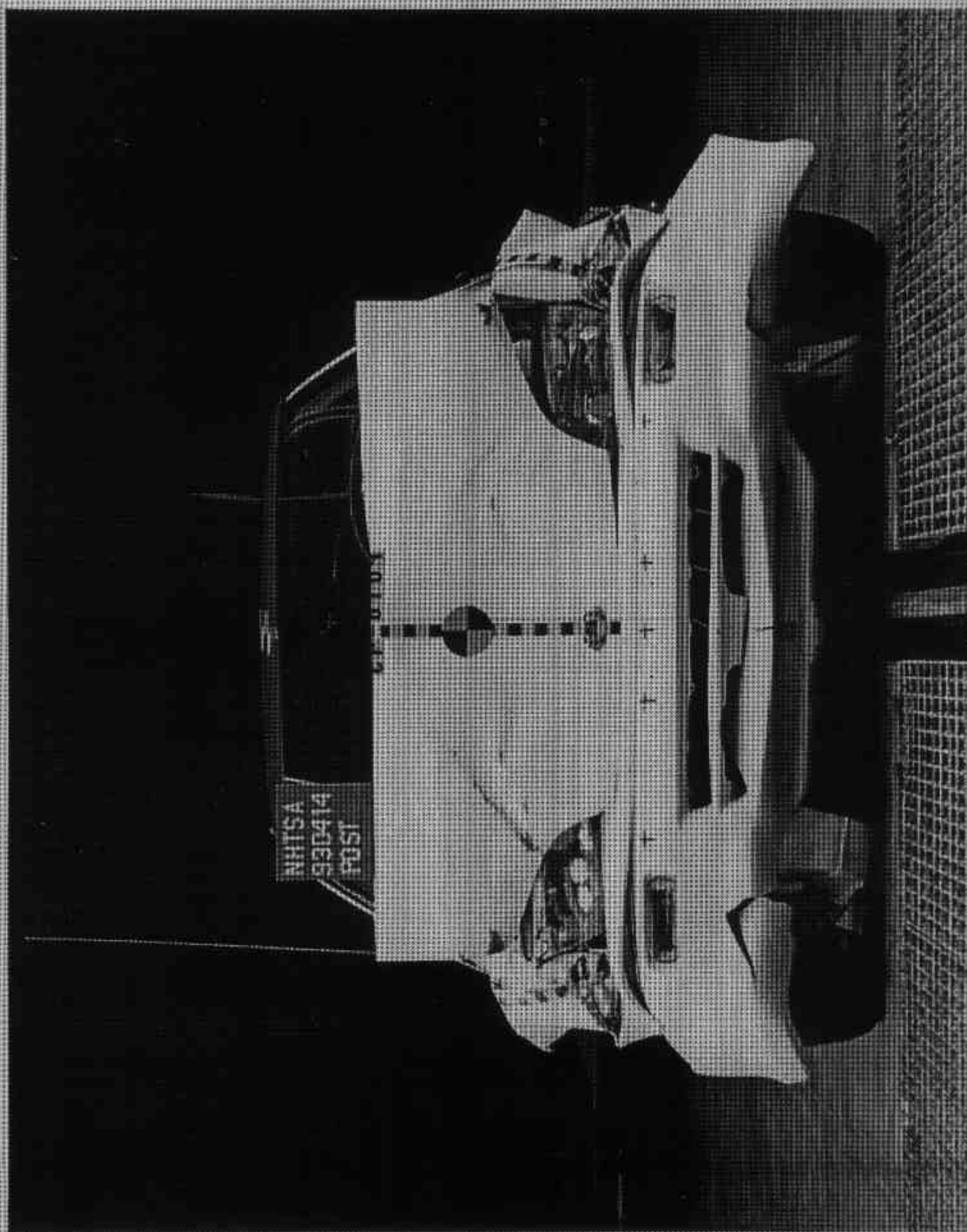


Figure A-2. POST-TEST FRONT VIEW
A-3

930414

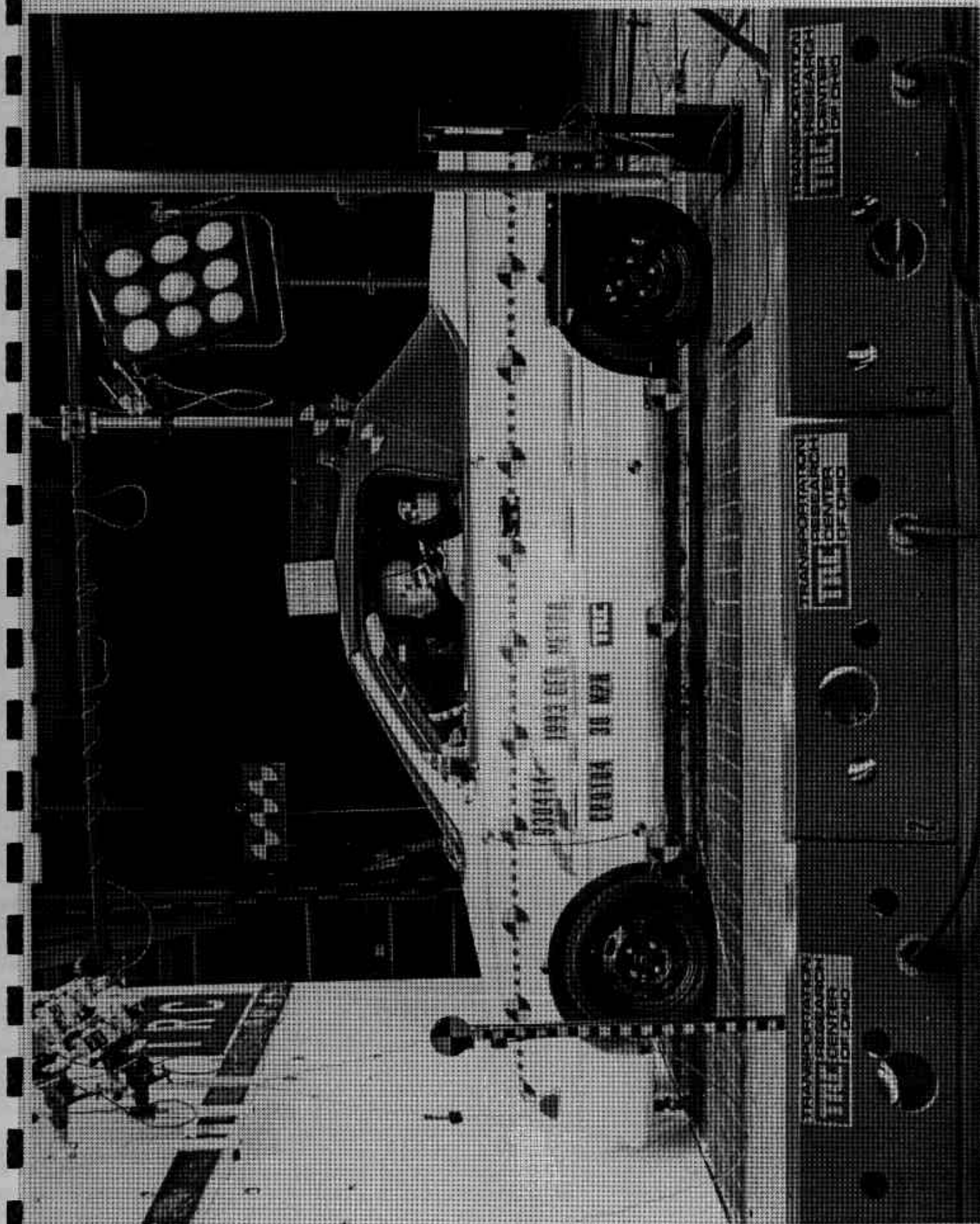


Figure A-3. PRE-TEST LEFT SIDE VIEW

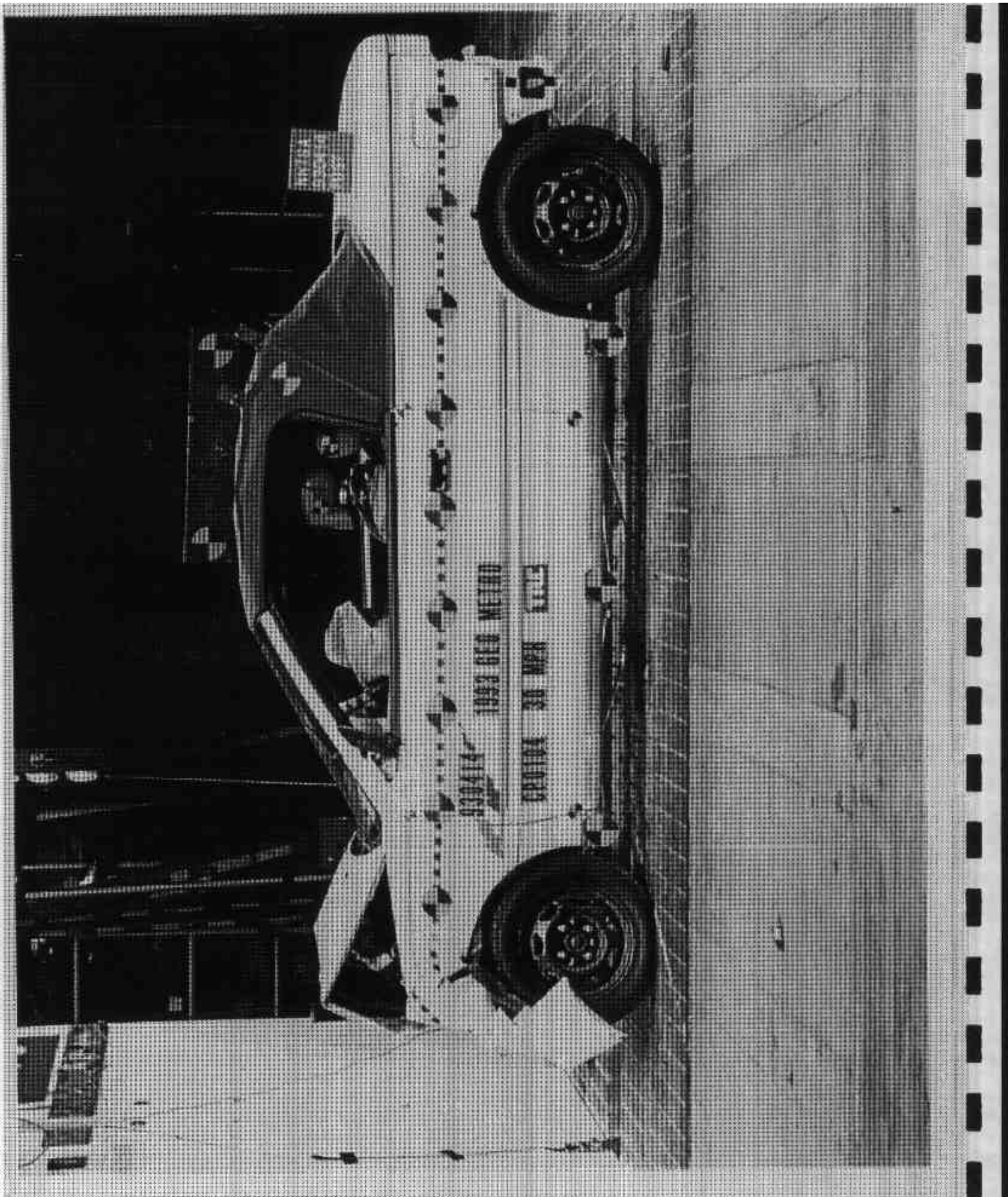


Figure A-4. POST-TEST LEFT SIDE VIEW
A-5

930414

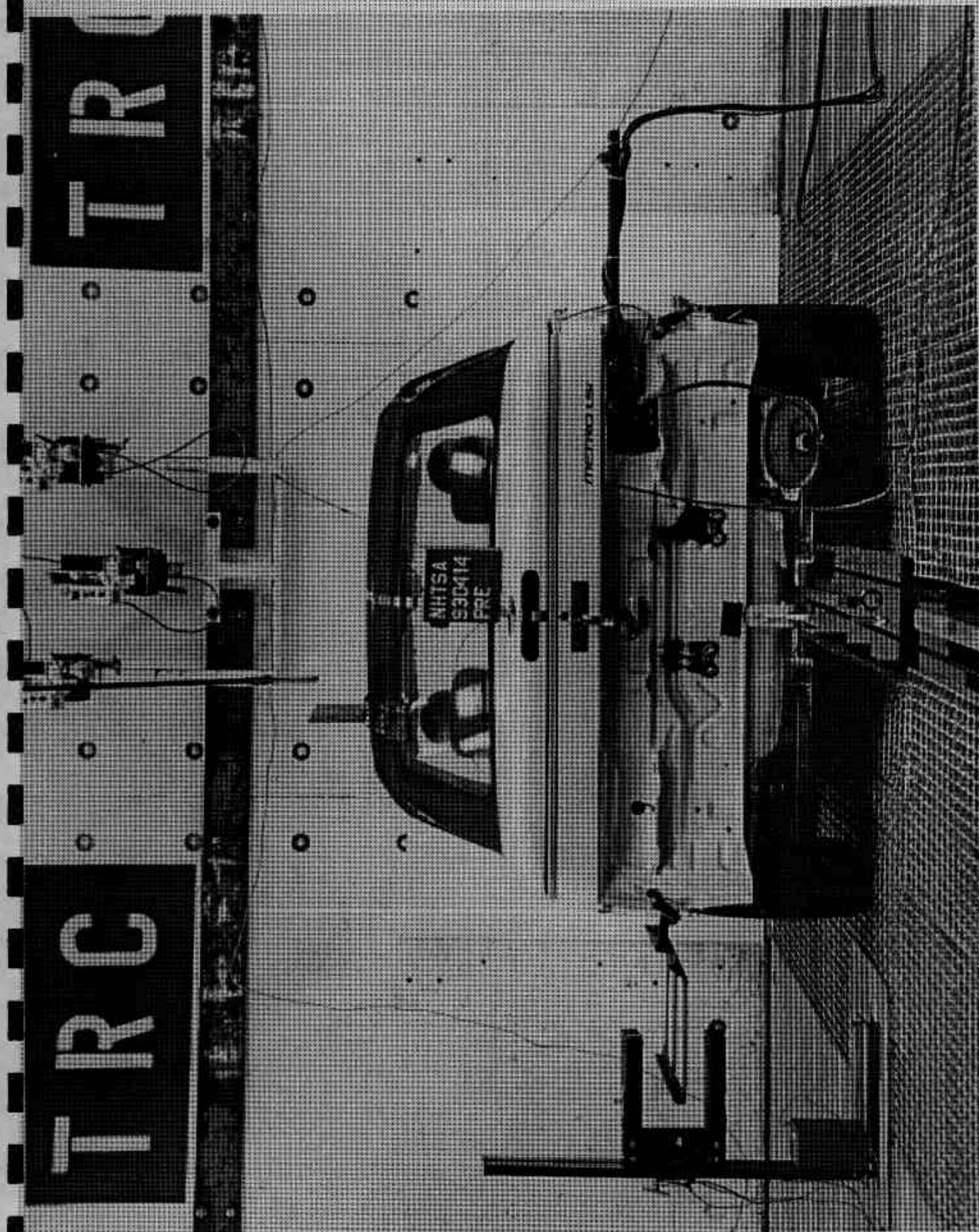


Figure A-5. PRE-TEST REAR VIEW

A-6

930414

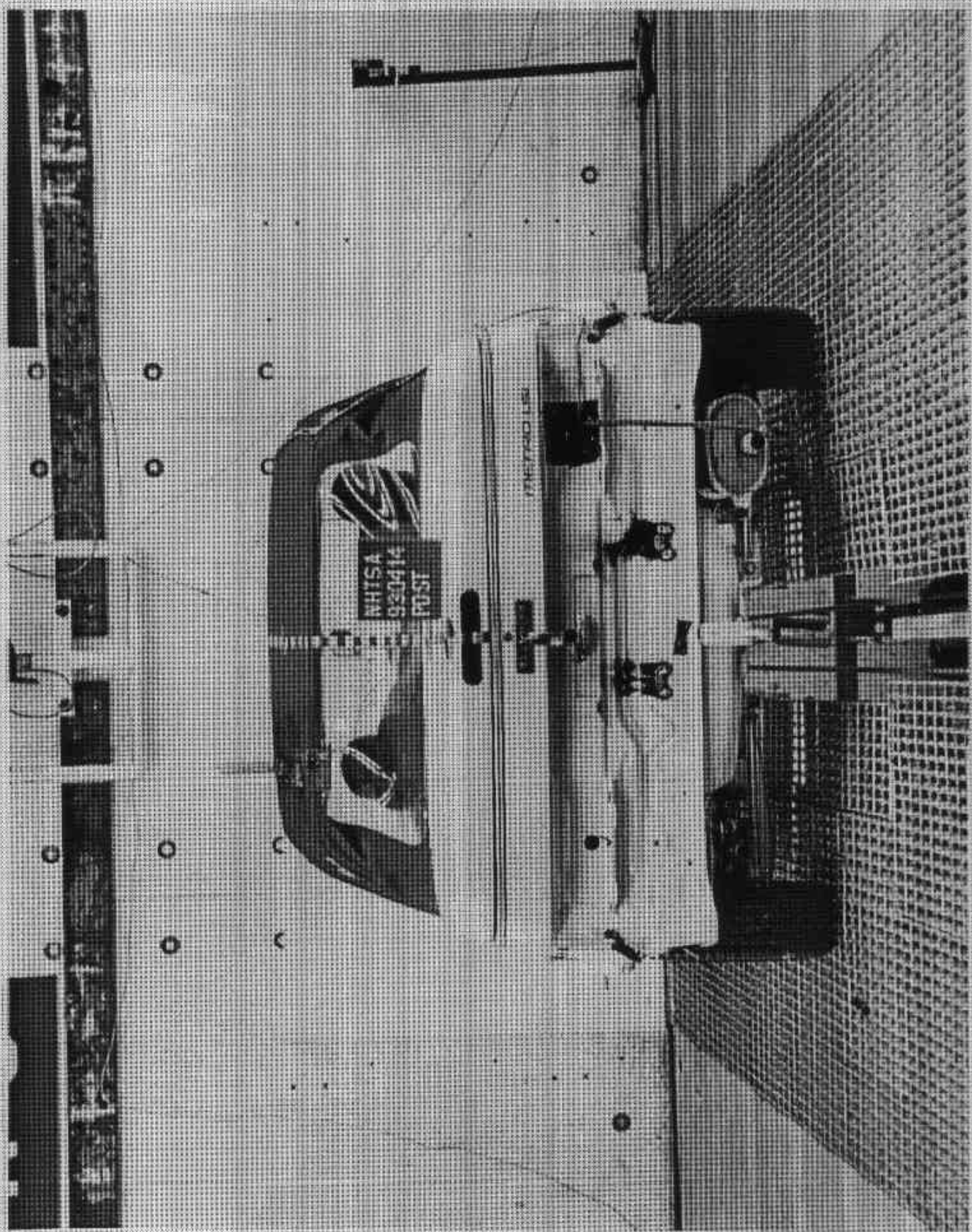


Figure A-6. POST-TEST REAR VIEW
A-7

930414

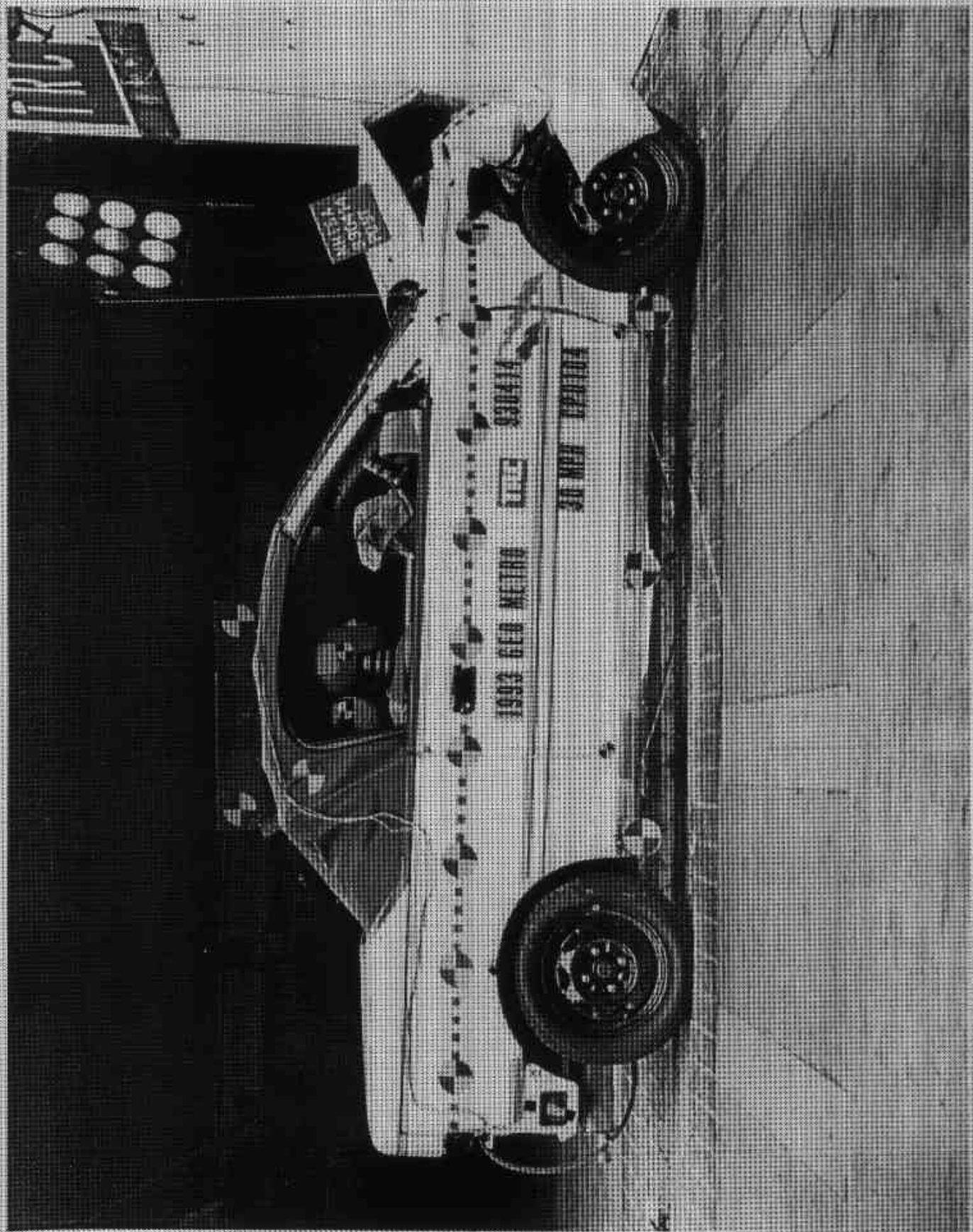


Figure A-8. POST-TEST RIGHT SIDE VIEW

A-9

930414



Figure A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-10

930414



Figure A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

930414

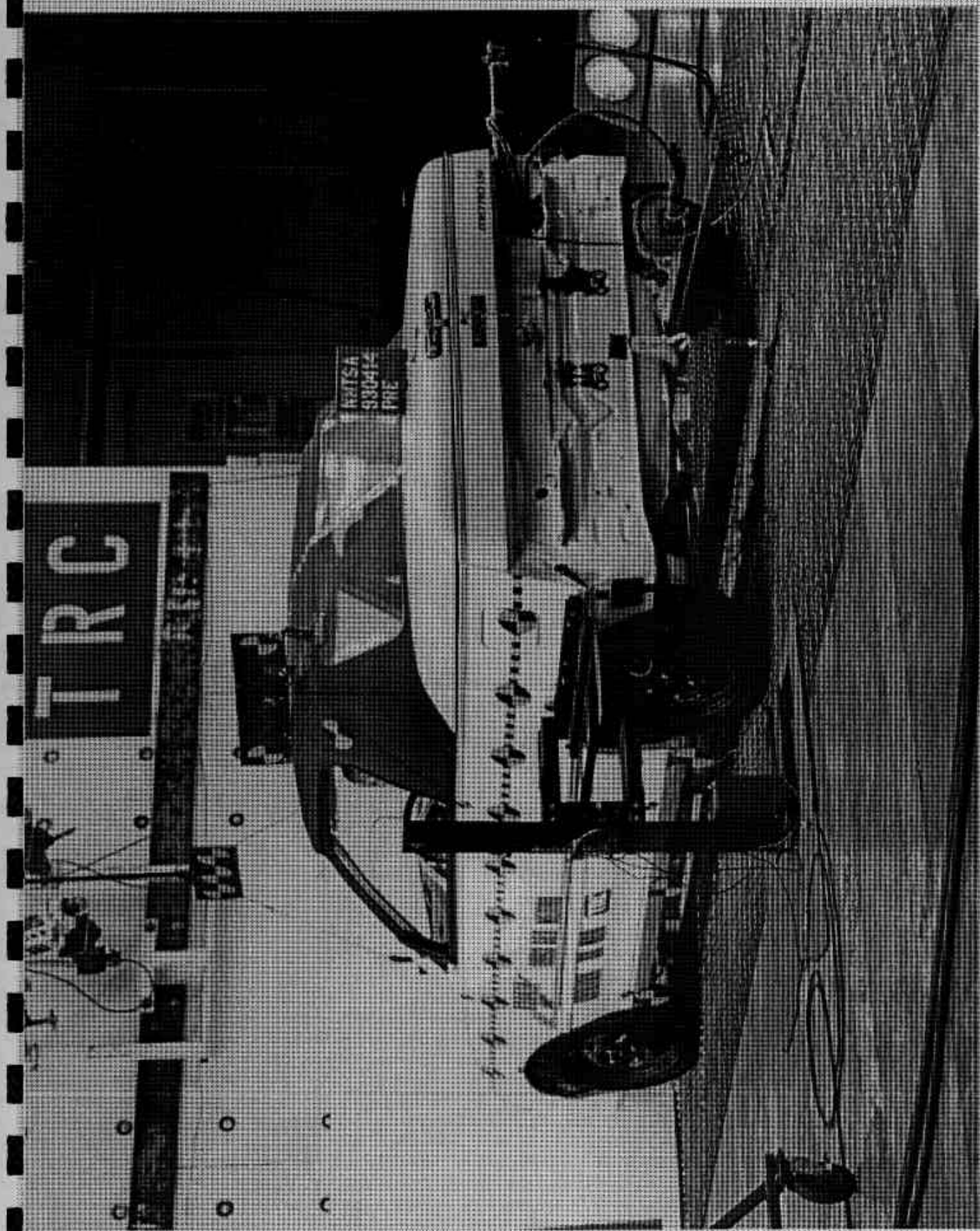


Figure A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW

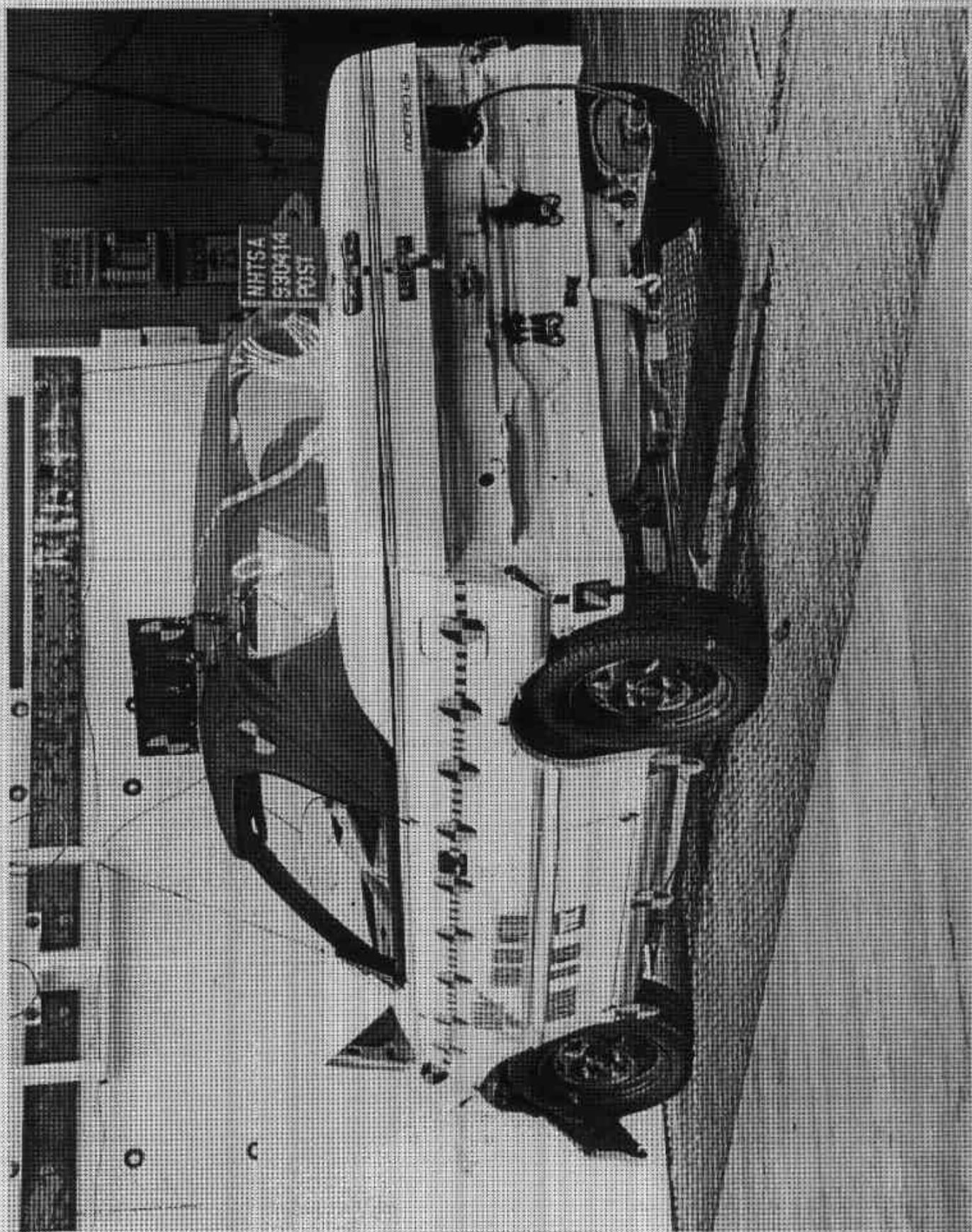


Figure A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

A-13

930414

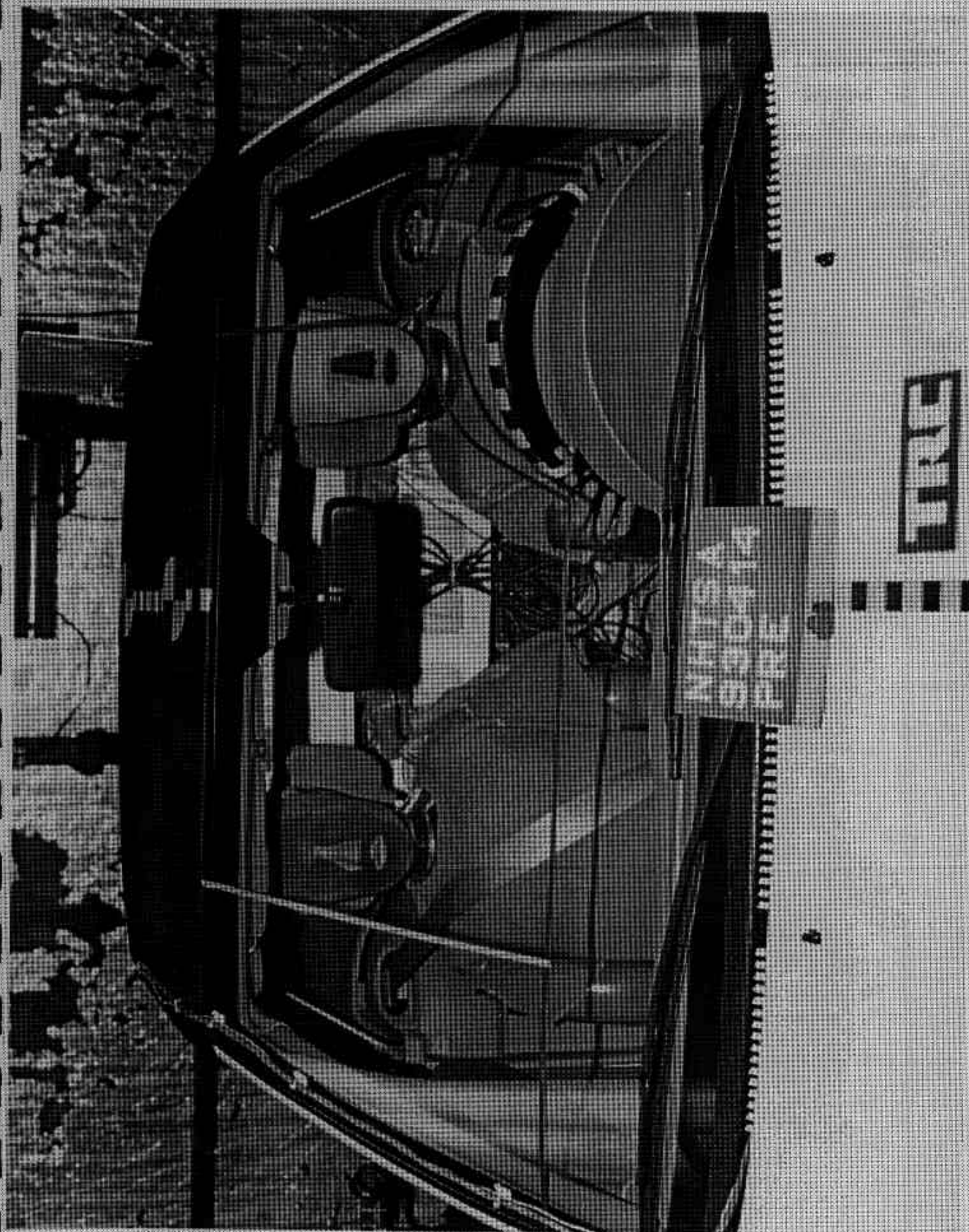


Figure A-13. PRE-TEST WINDSHIELD VIEW

A-14

930414

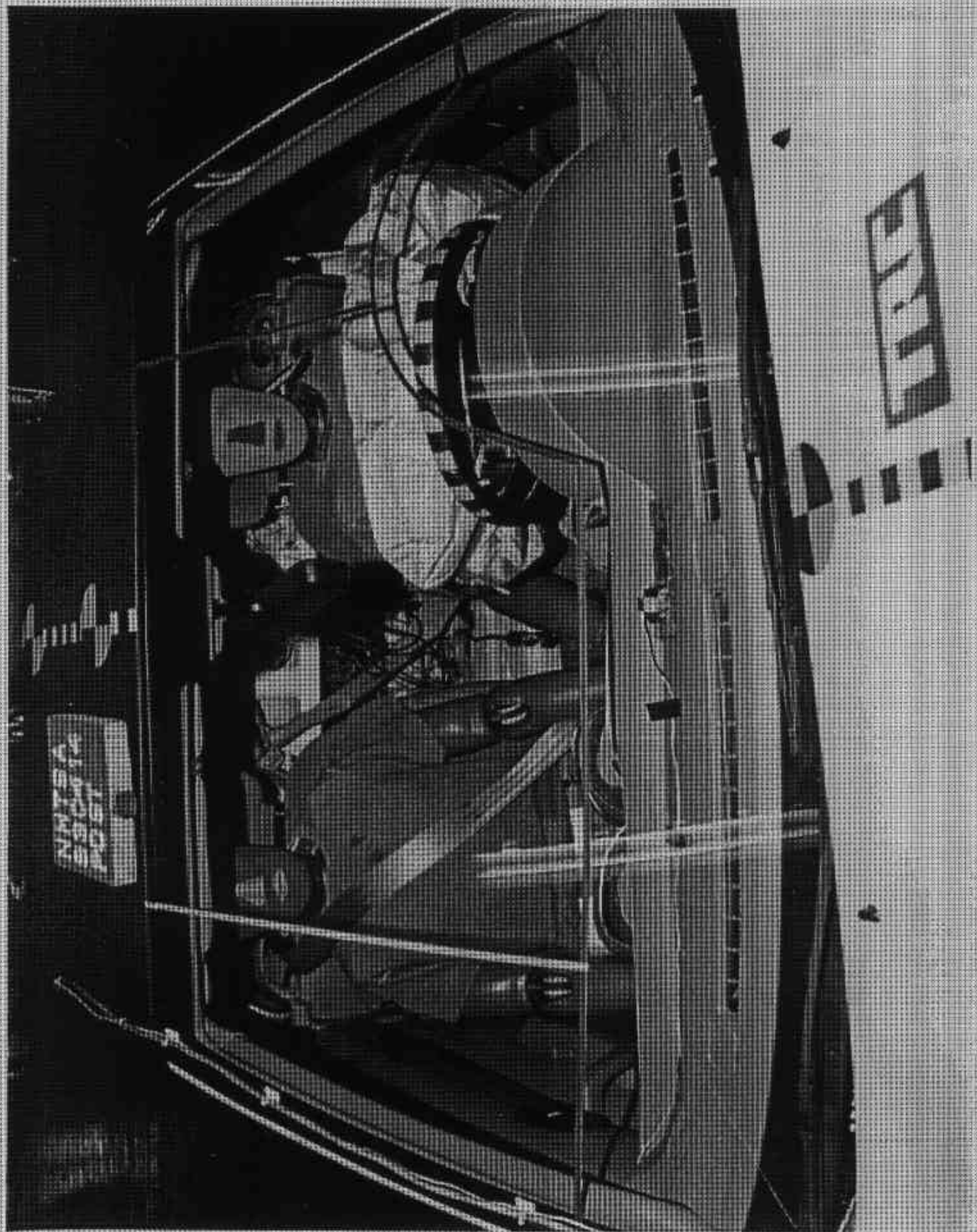


Figure A-14. POST-TEST WINDSHIELD VIEW
A-15

930414

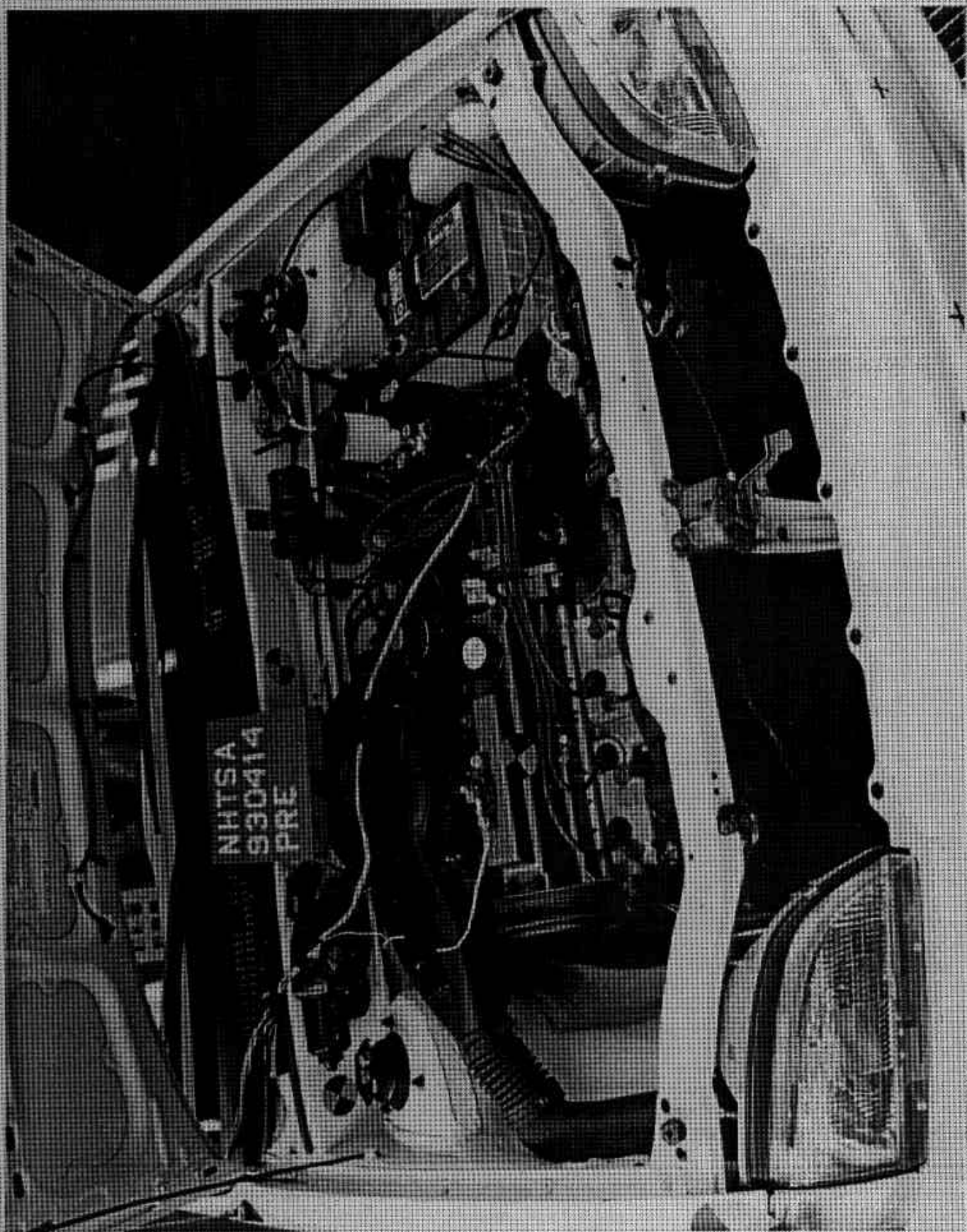


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

A-16

930414

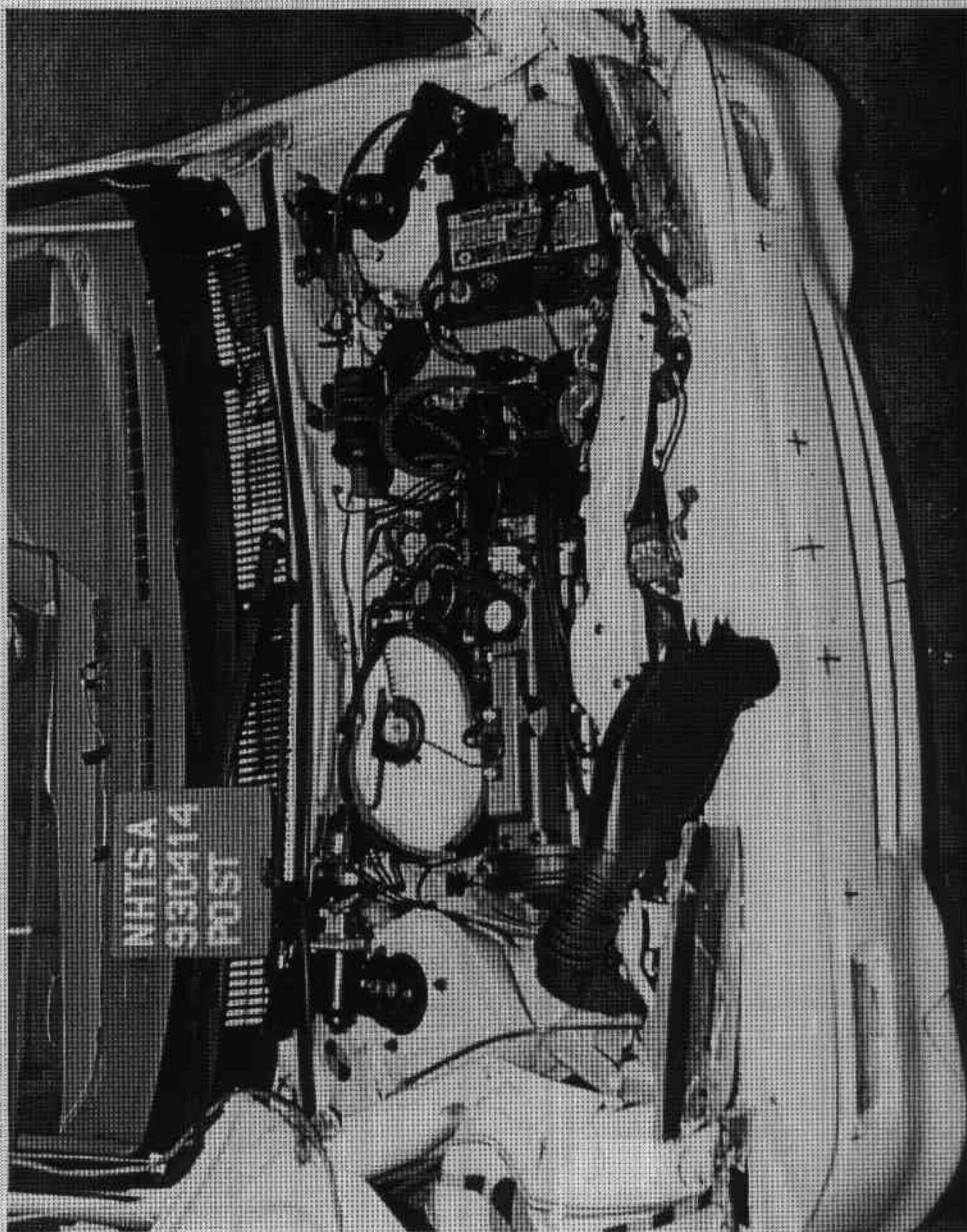


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

A-17

930414



Figure A-17. PRE-TEST FUEL FILLER CAP VIEW

A-18

930414



Figure A-18. POST-TEST FUEL FILLER CAP VIEW
A-19

930414



Figure A-19. PRE-TEST FUEL FILLER NECK VIEW

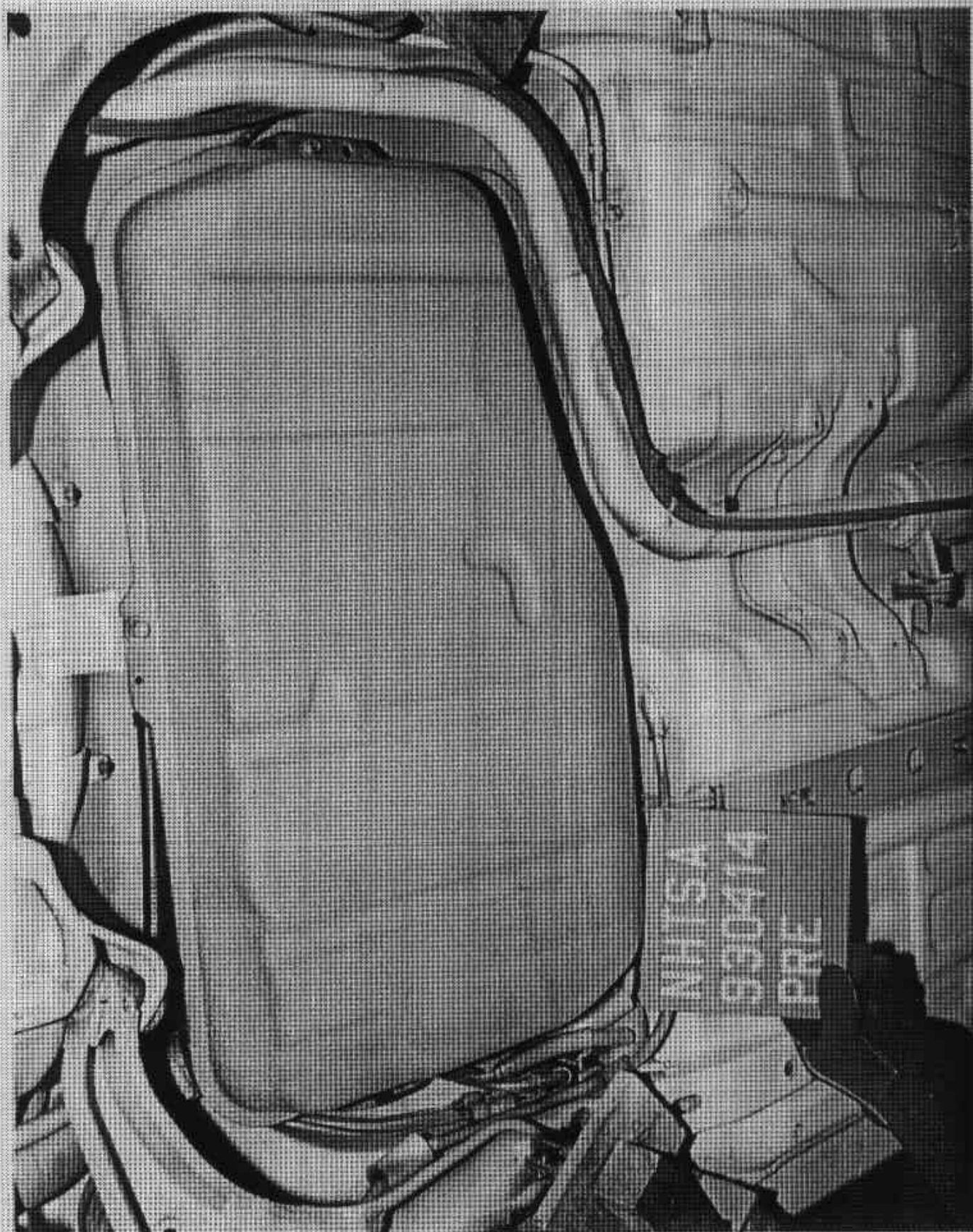


Figure A-20. PRE-TEST FUEL TANK VIEW
A-21

930414

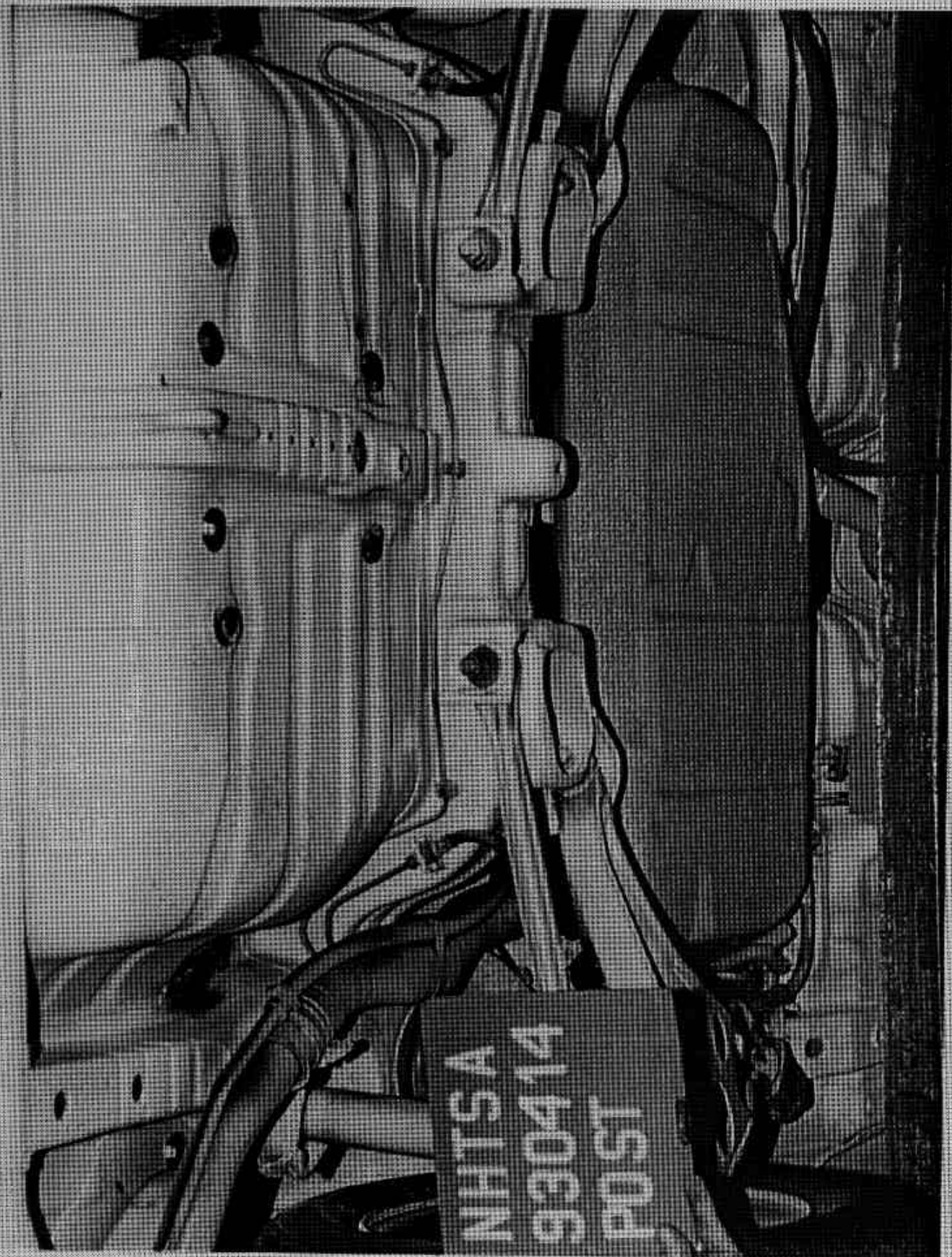


Figure A-21. POST-TEST FUEL FILLER NECK & FUEL TANK VIEW

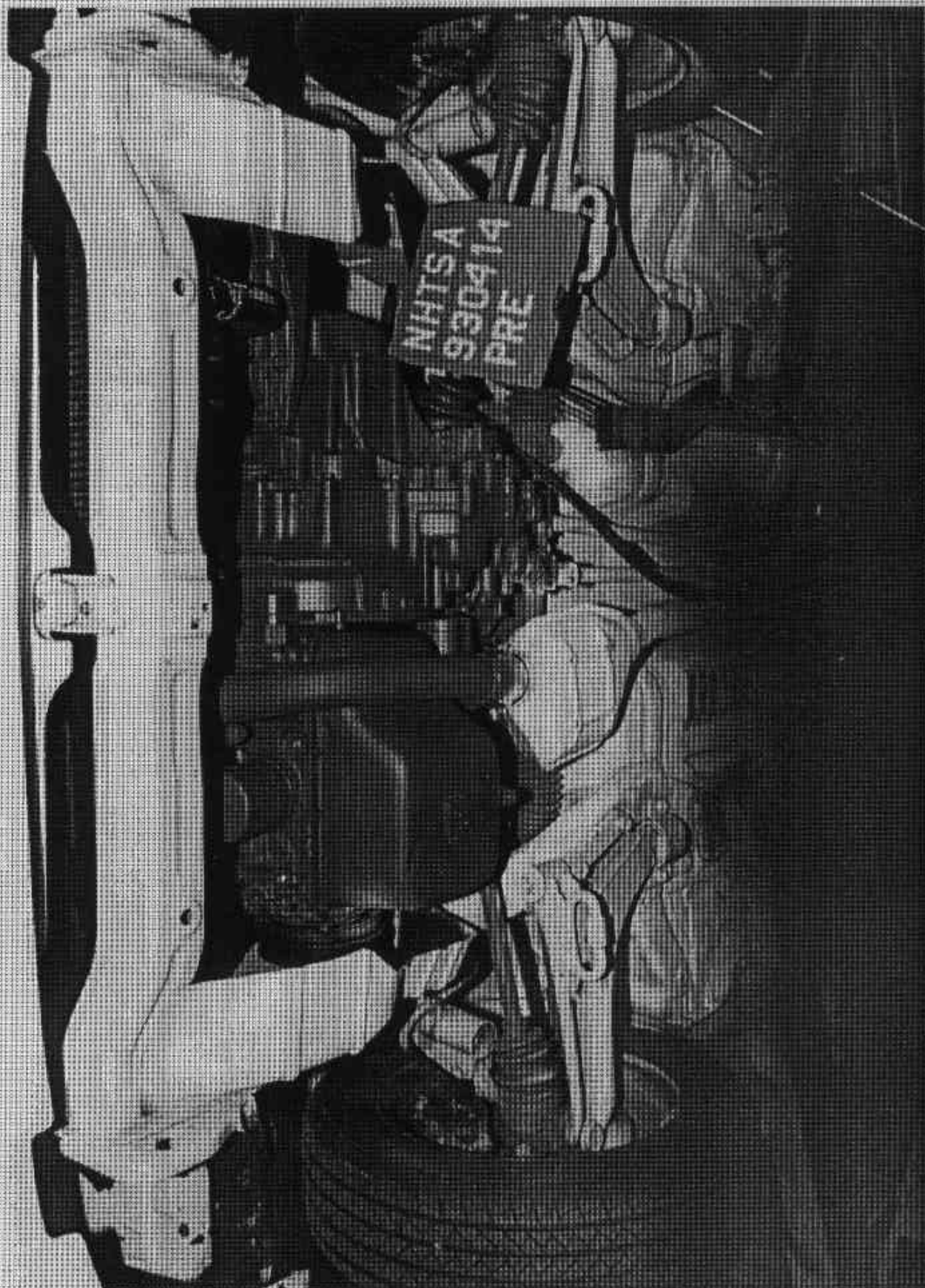


Figure A-22. PRE-TEST FRONT UNDERBODY VIEW

A-23

930414



Figure A-23. POST-TEST FRONT UNDERBODY VIEW

A-24

930414

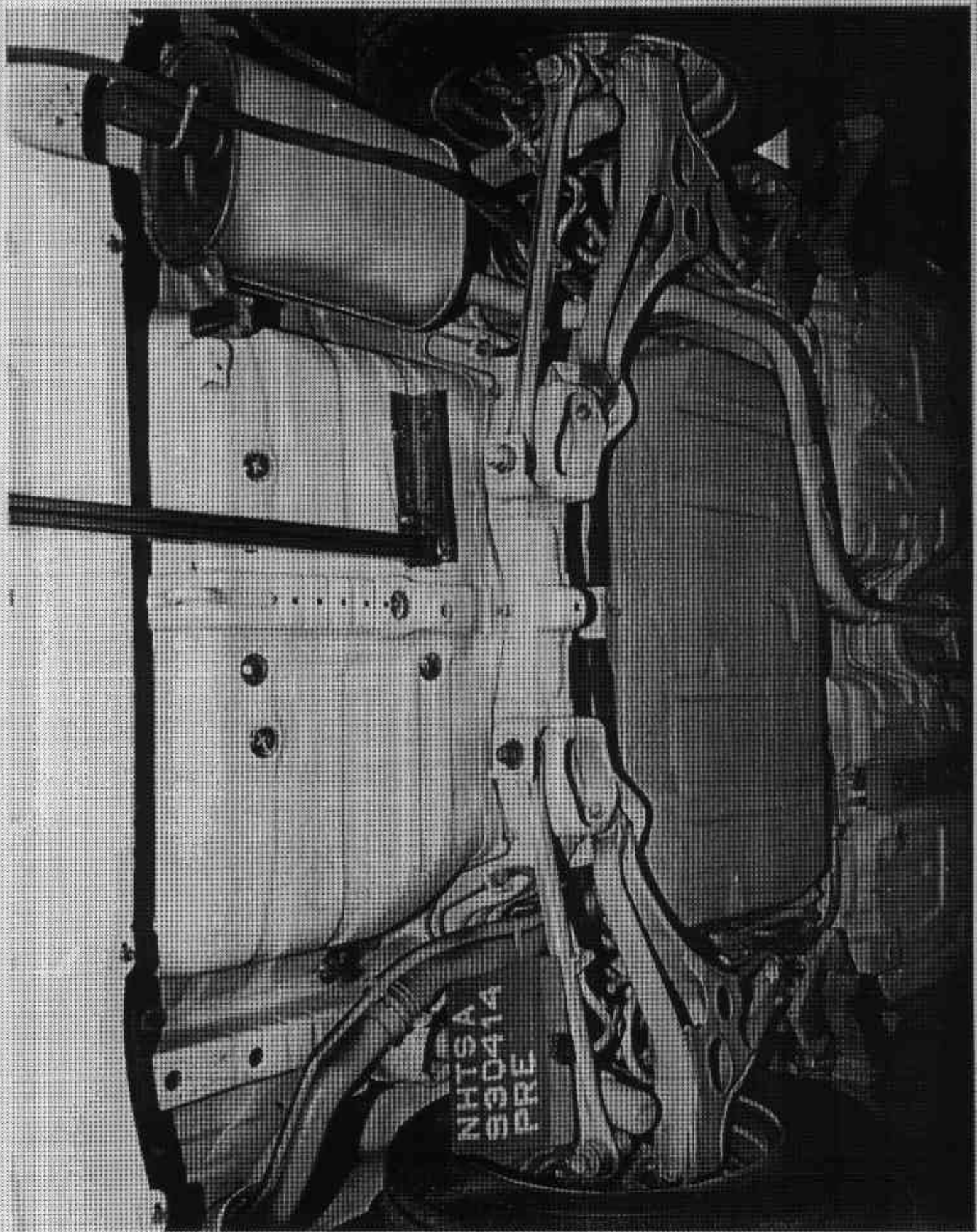


Figure A-24. PRE-TEST REAR UNDERBODY VIEW

A-25

930414

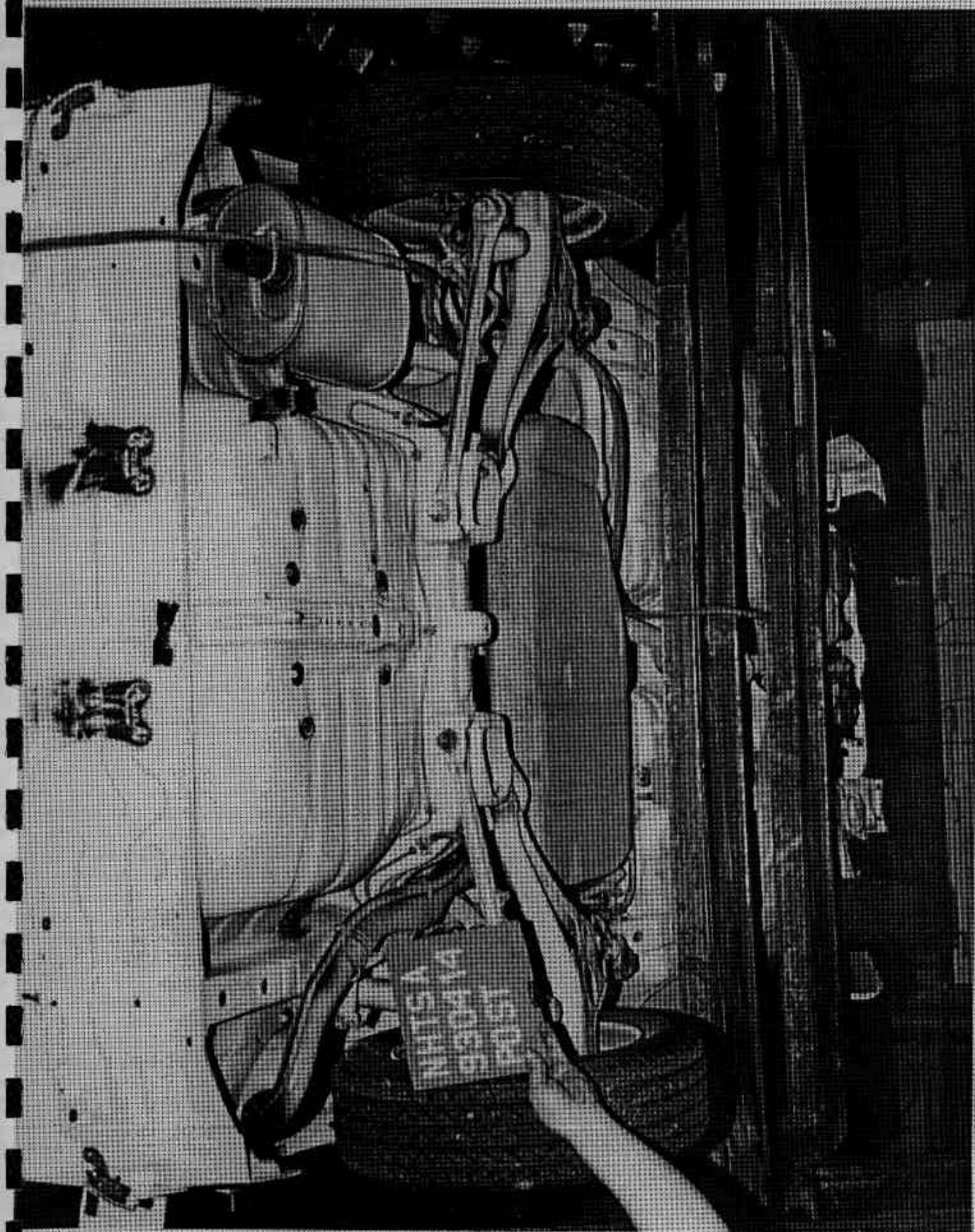


Figure A-25. POST-TEST REAR UNDERBODY VIEW

A-26

930414

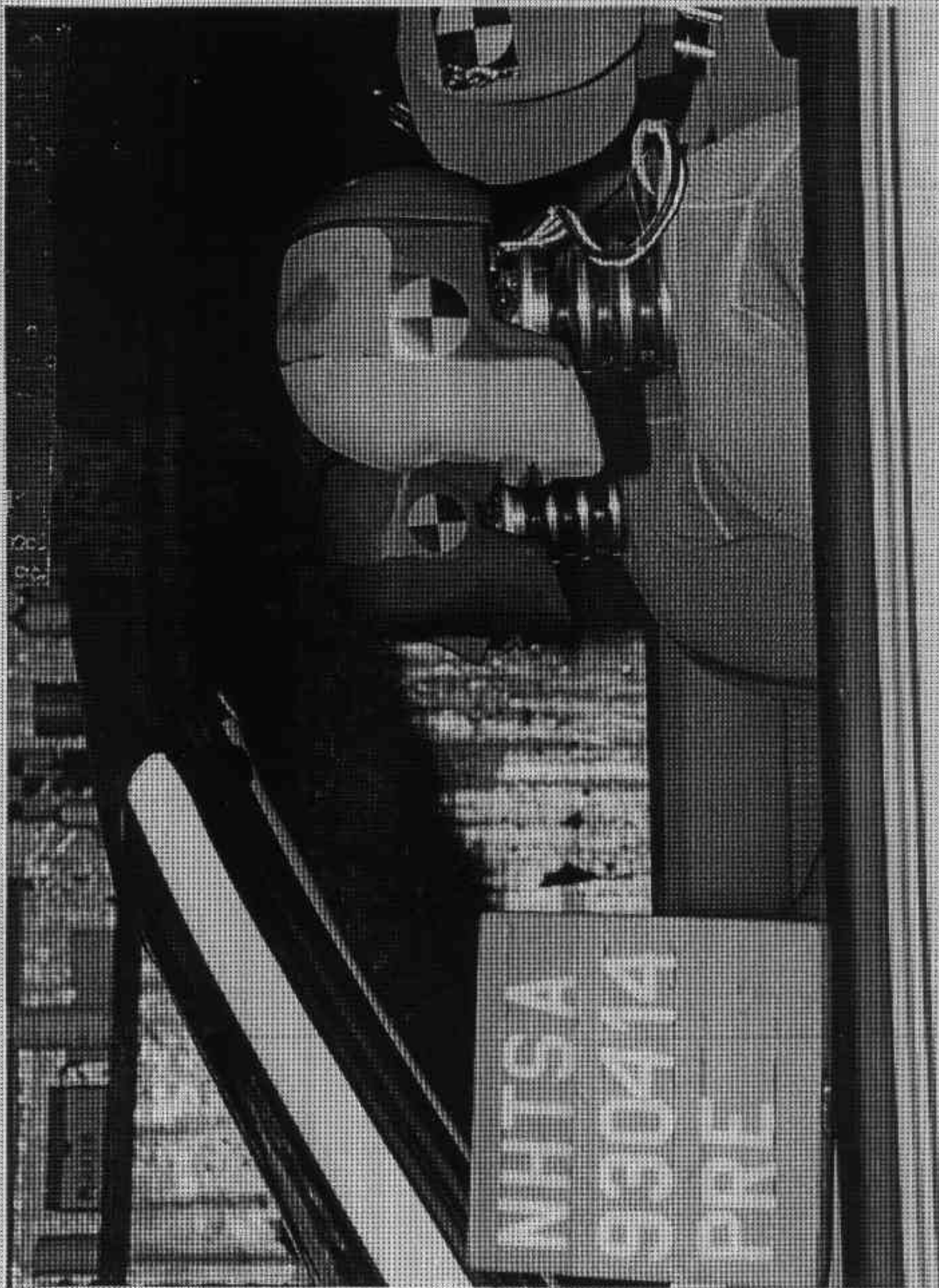


Figure A-26. PRE-TEST DRIVER DUMMY POSITION VIEW

A-27

930414

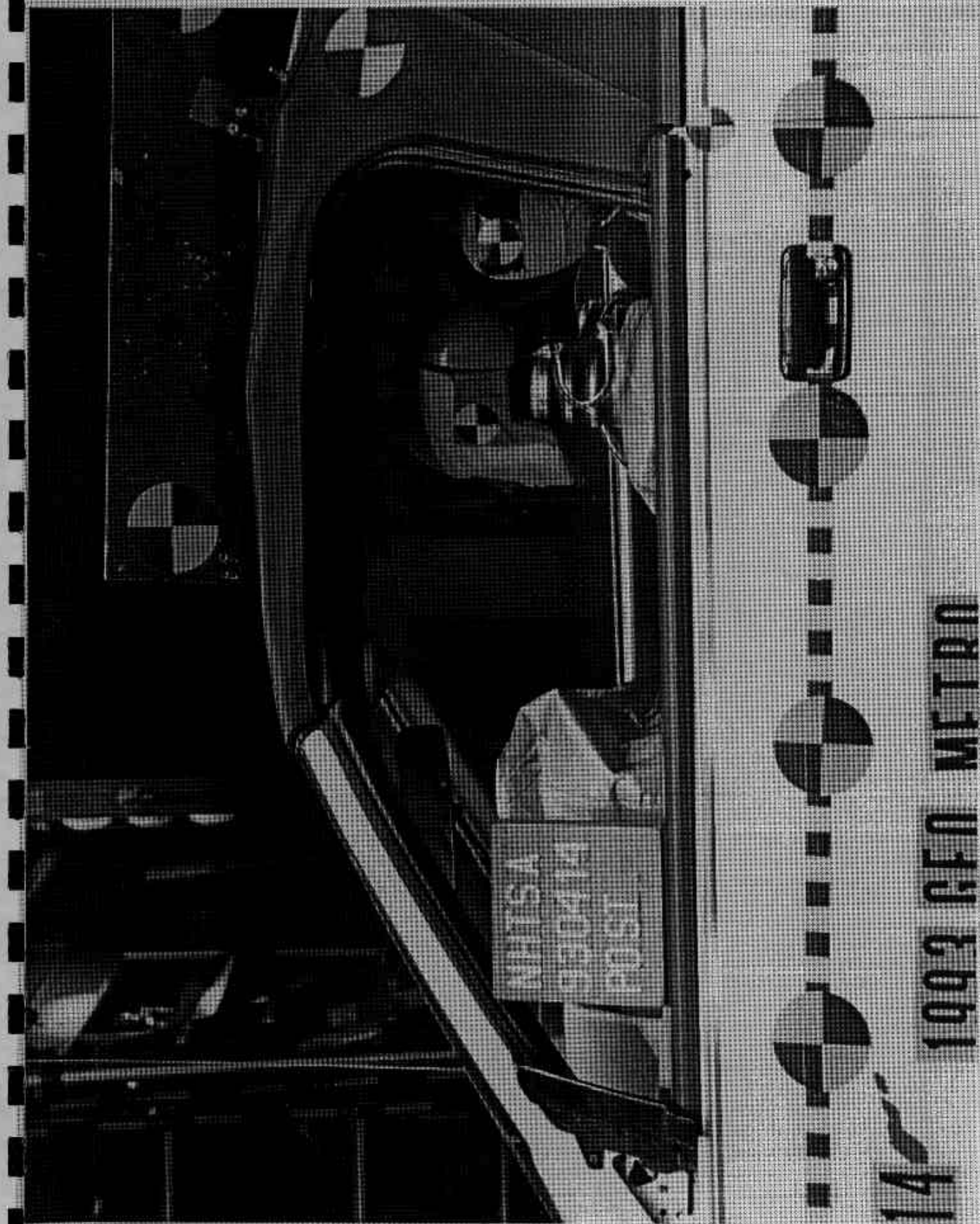


Figure A-27. POST-TEST DRIVER DUMMY POSITION VIEW

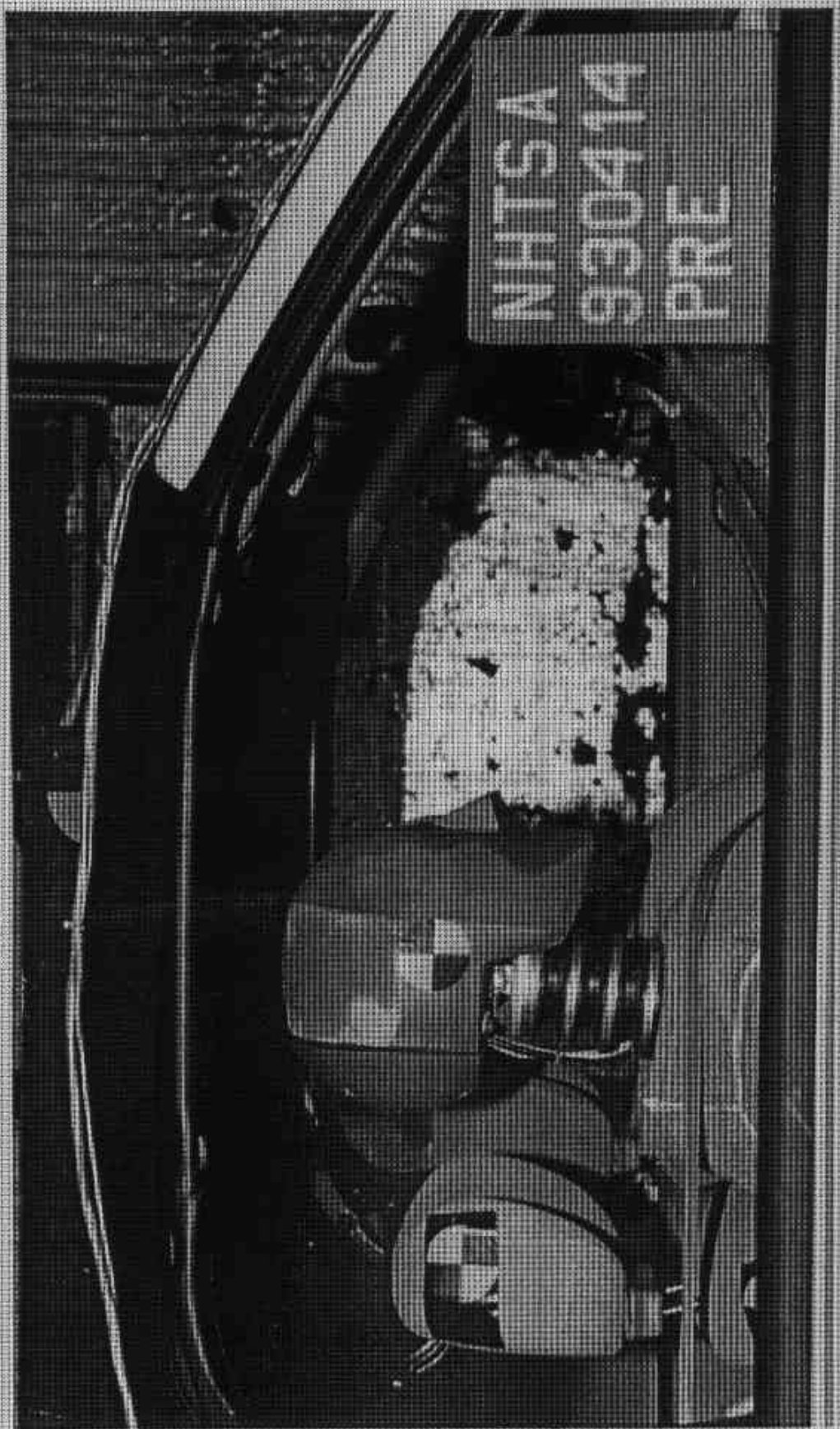


Figure A-28. PRE-TEST PASSENGER DUMMY POSITION VIEW

A-29

930414

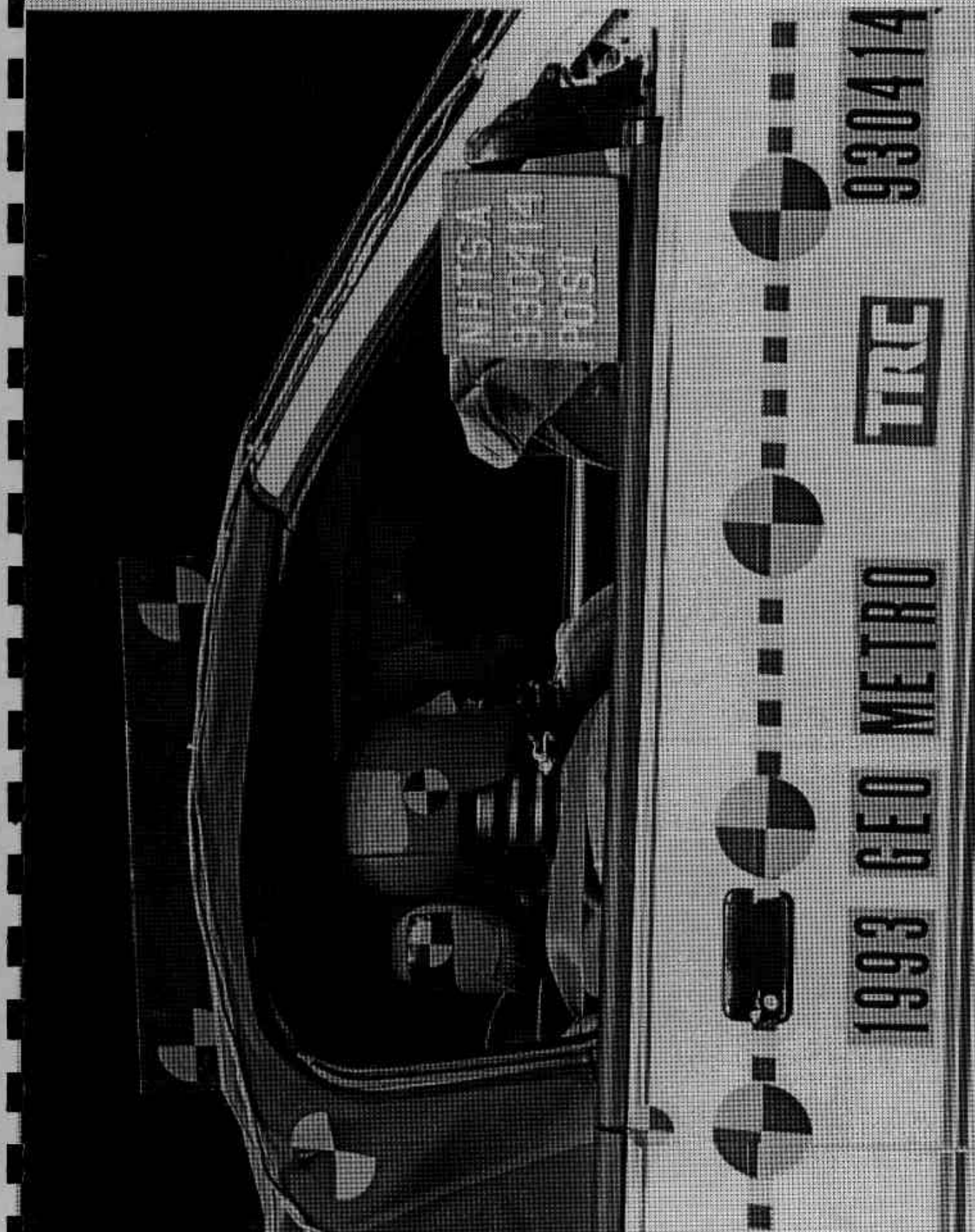


Figure A-29. POST-TEST PASSENGER DUMMY POSITION VIEW

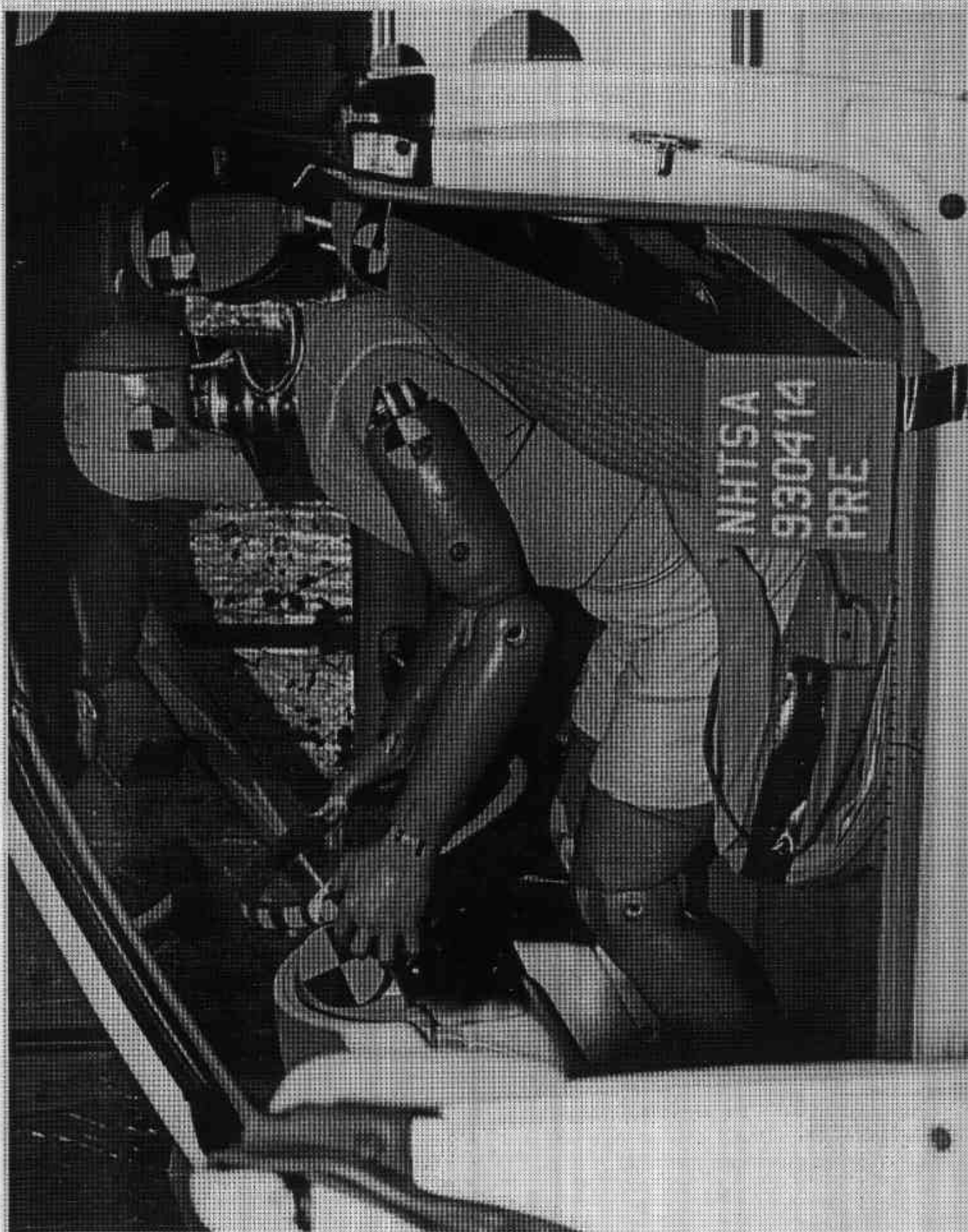


Figure A-30. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-31

930414



Figure A-31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

A-32

930414



Figure A-32. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-33 930414



Figure A-33. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-34

930414

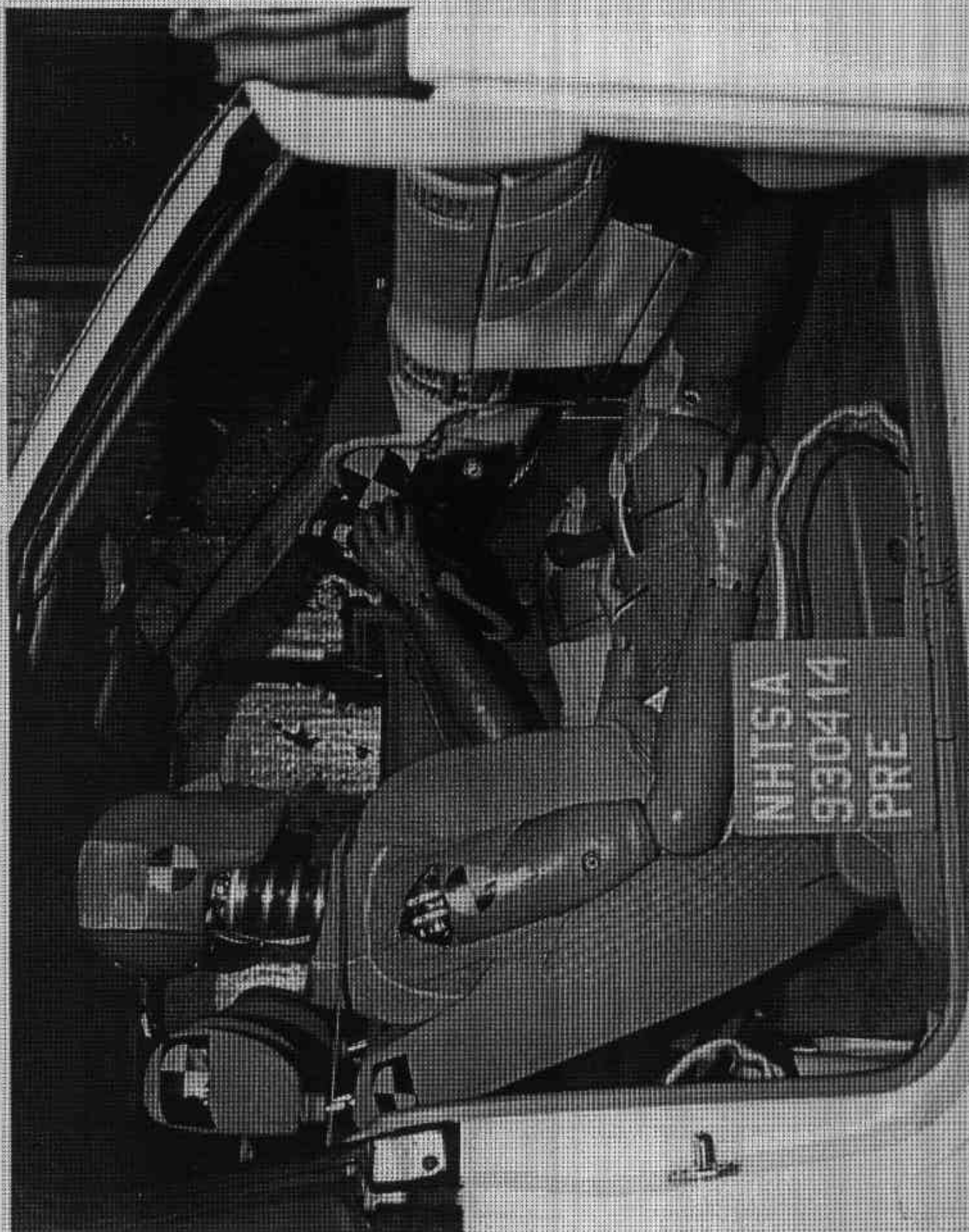


Figure A-34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

A-35

930414



Figure A-35. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

A-36

930414

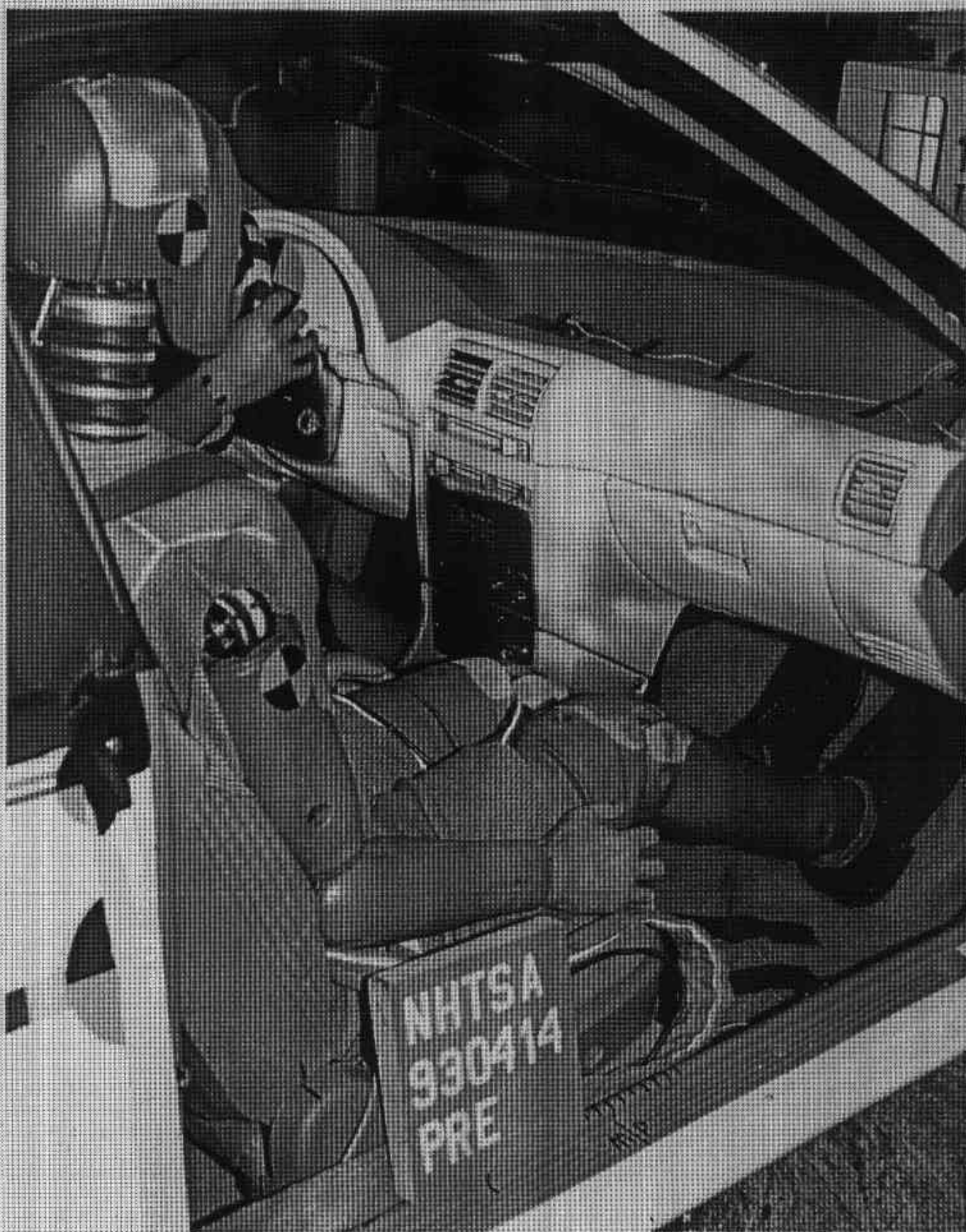


Figure A-36. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-37 930414



Figure A-37. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

A-38

930414



Figure A-38. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

A-39

930414



Figure A-39. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

A-40

930414

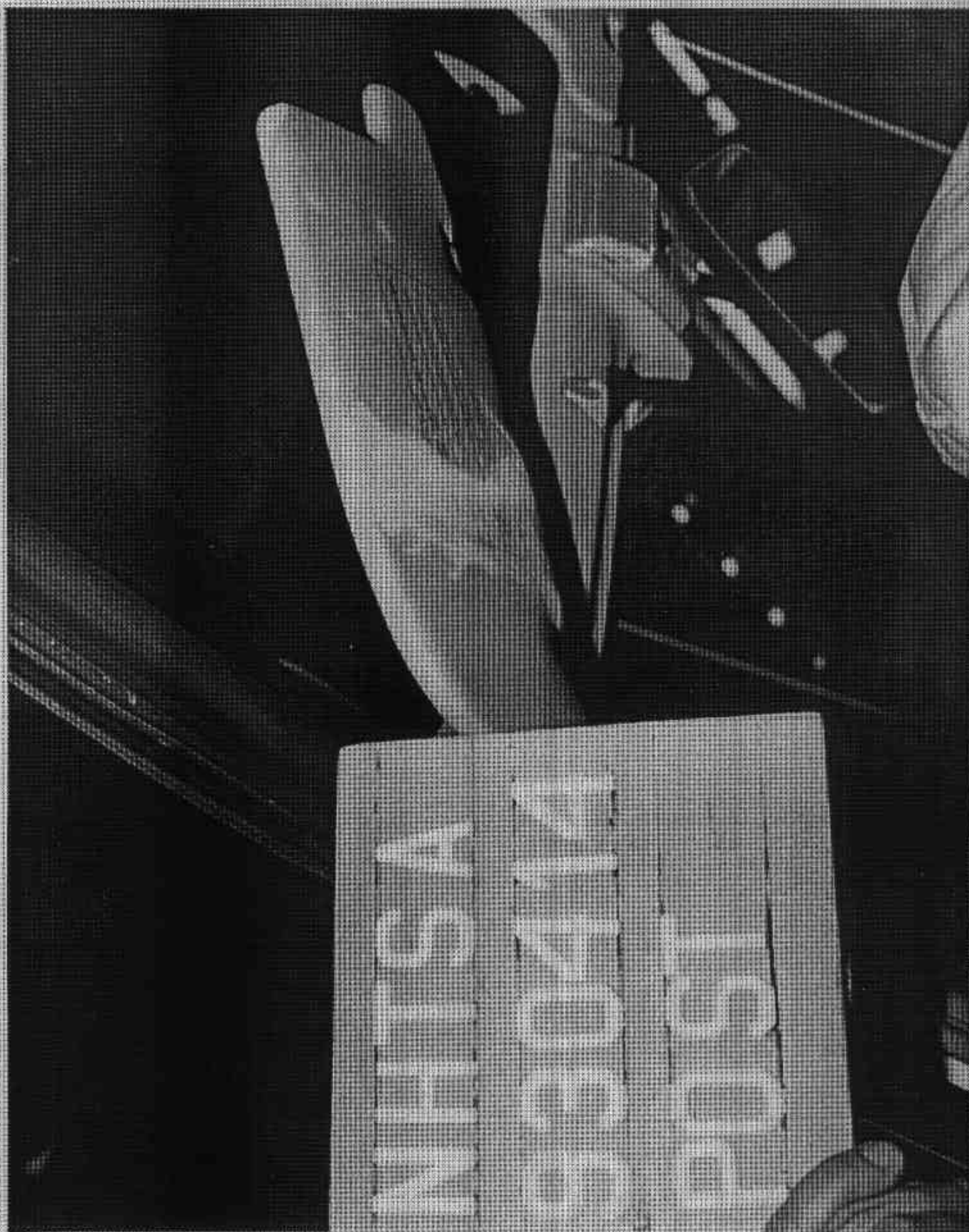


Figure A-40. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 3
A-41 930414



Figure A-41. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1



Figure A-42. POST-TEST DRIVER DUMMY KNEE CONTACT- VIEW 2

A-43

930414

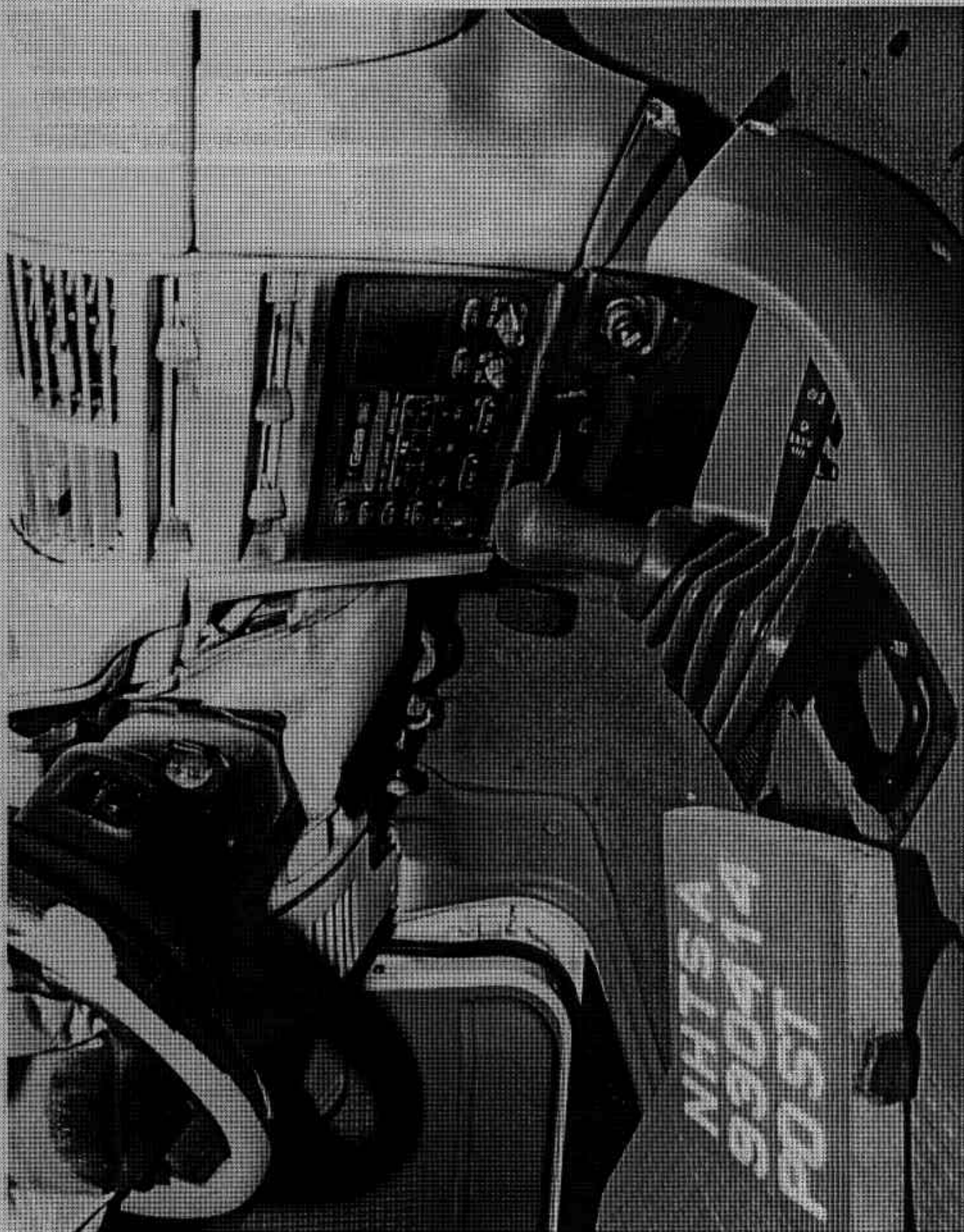


Figure A-43. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 3

A-44

930414

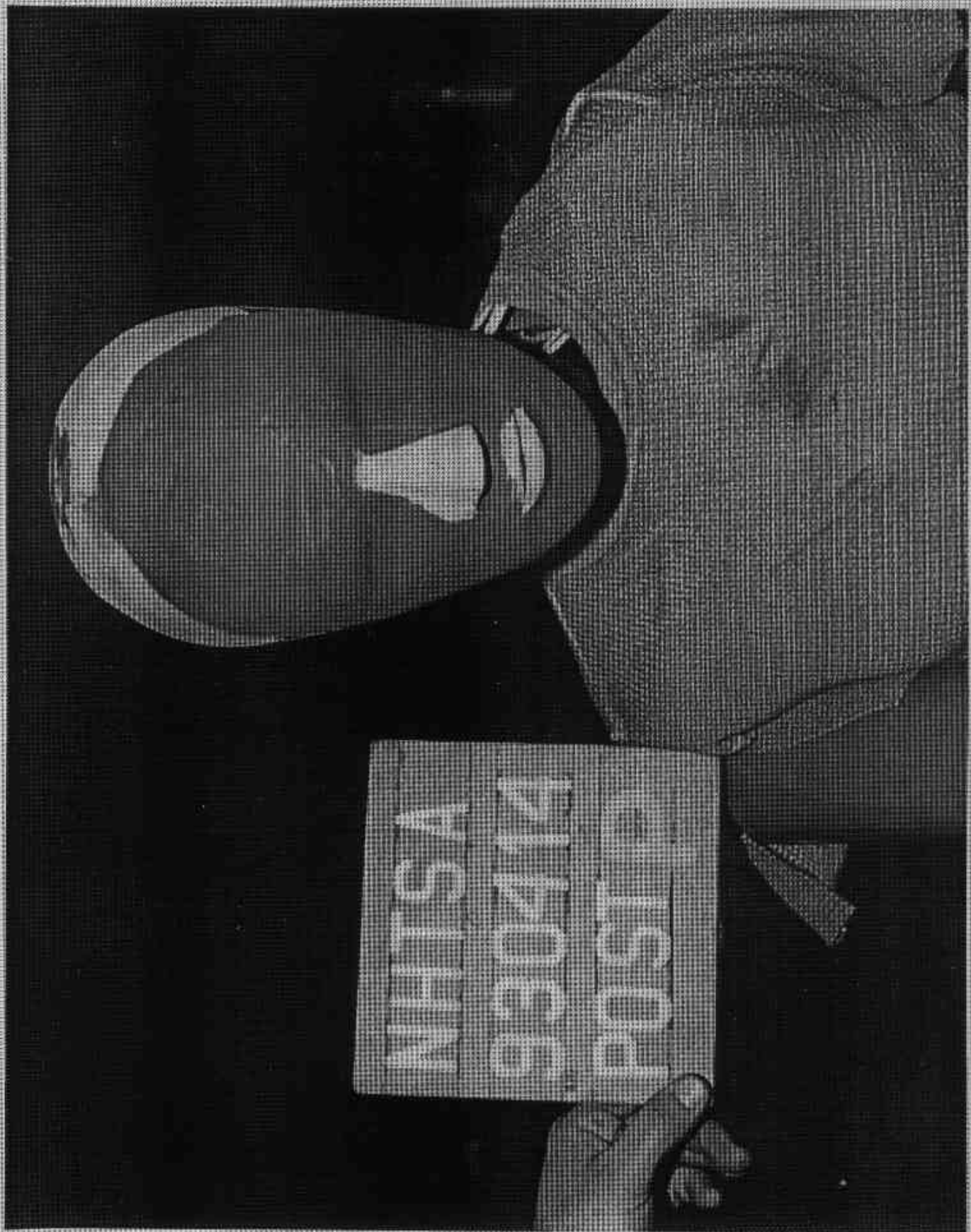


Figure A-44. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 1
A-45 930414

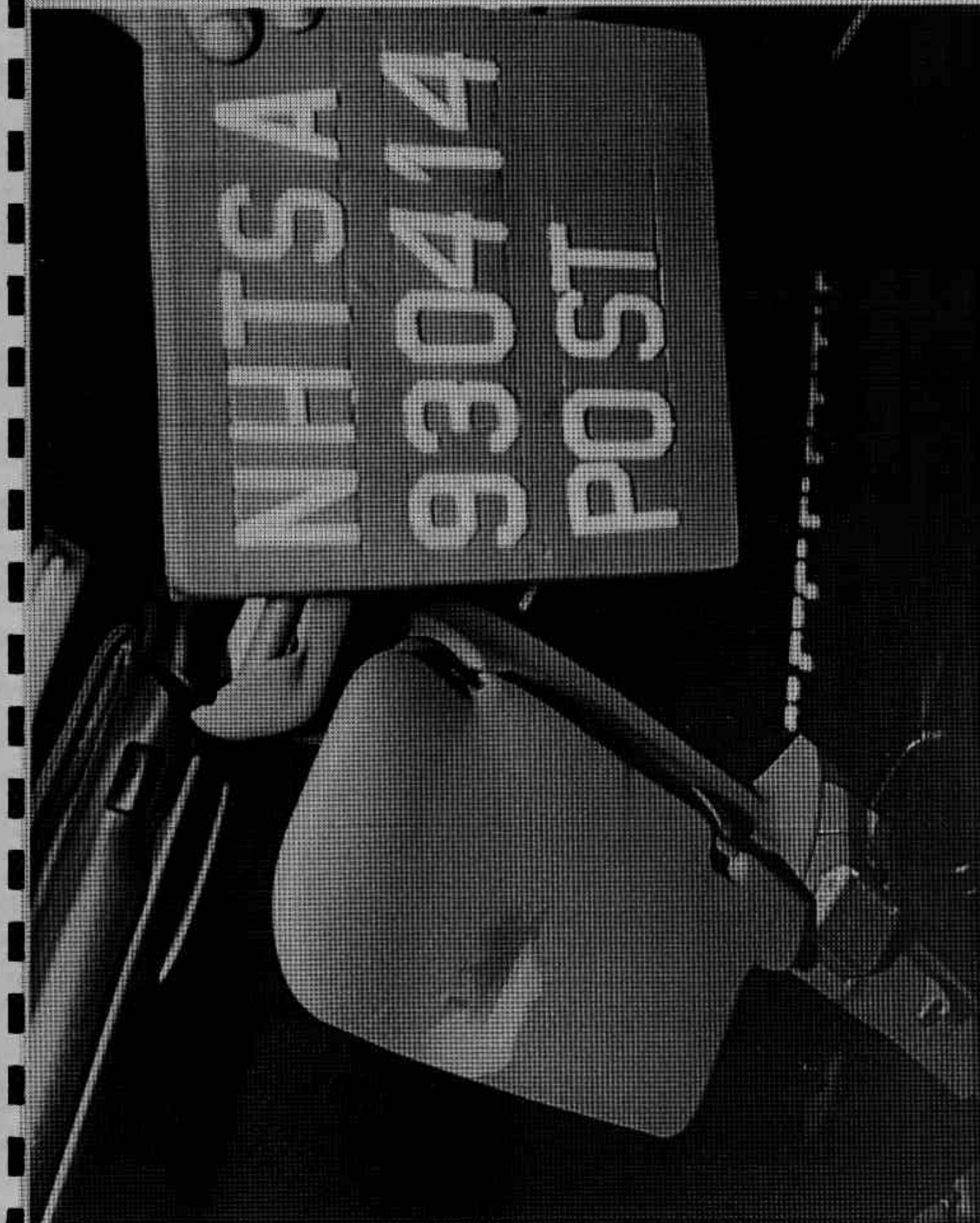


Figure A-45. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 2



Figure A-46. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1

A-47

930414

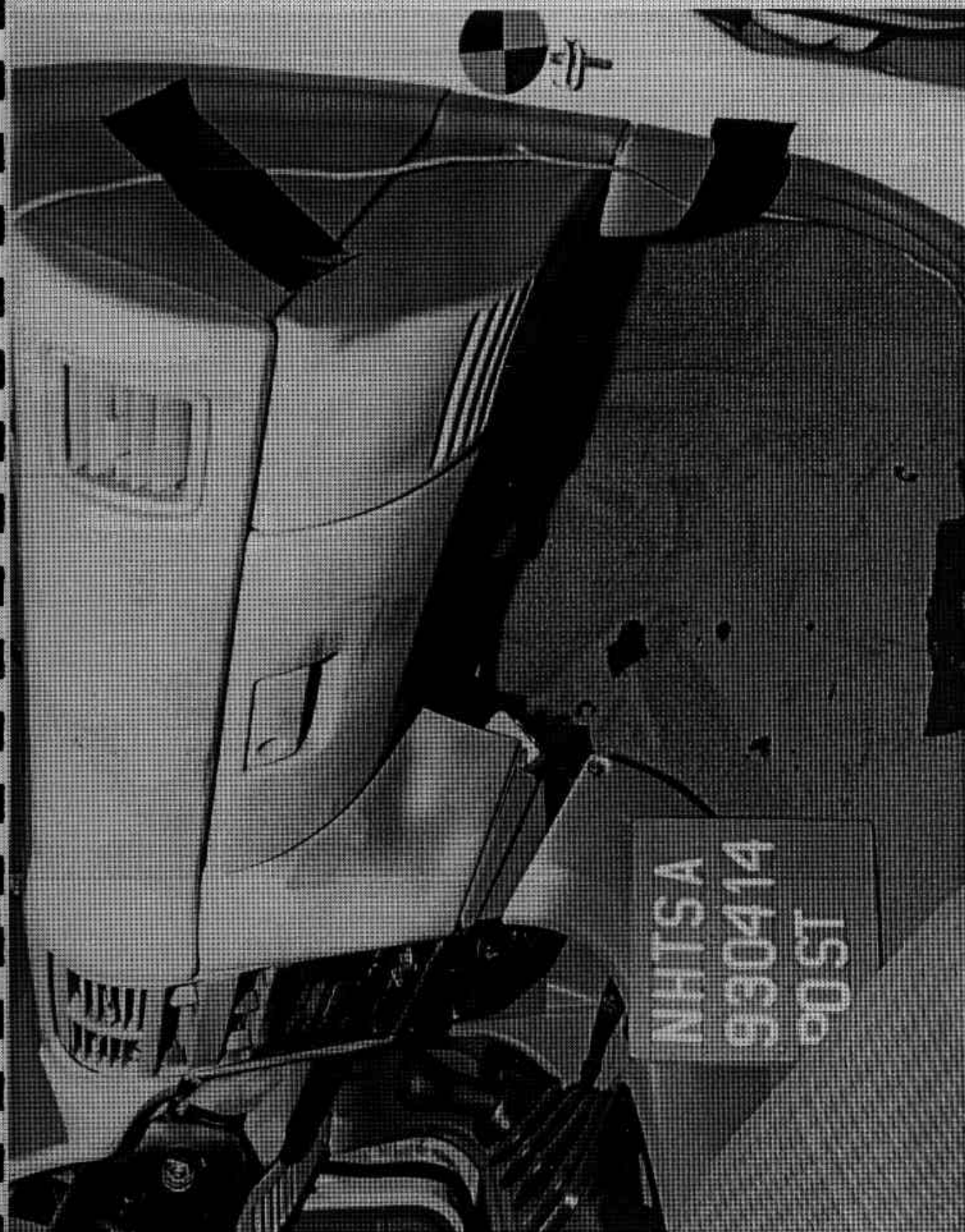


Figure A-47. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

MFD BY SUZUKI MOTOR CORPORATION JAPAN			
DATE	GVWR	GAWR FRT	GAWR RR
07 / 92	2290LB	1310LB	980LB
	1040KG	595KG	445KG
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.			
JG1MR3360PK200456		PASS CAR	CON US

Figure A-48. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

RECOMMENDED

	FRONT	REAR	SPARE TIRE
TIRE SIZE	P165/65R13		T115/70D14
COLD TIRE PRESSURE	26 PSI		60 PSI
AT MAX. LOAD	180 kPa		420 kPa

VEHICLE CAPACITY

MAX. LOAD (LBS.)	388 (OCCUPANTS PLUS LUGGAGE)
OCCUPANTS	2

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

79161-6036

Fig. A-49. PRE-TEST VEHICLE RECOMMENDED TIRE PRESSURE LABEL VIEW

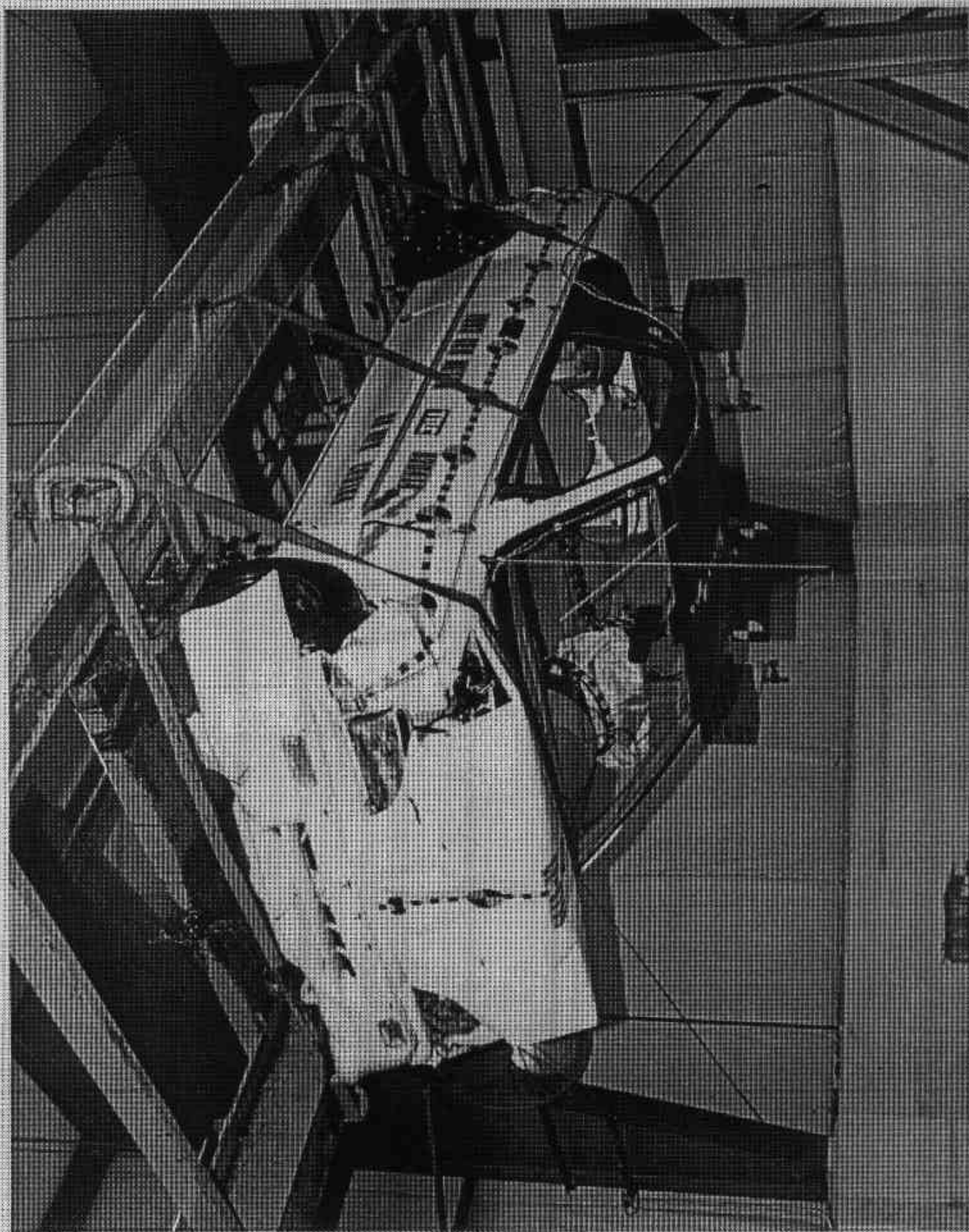


Figure A-50. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW
A-51 930414

APPENDIX B

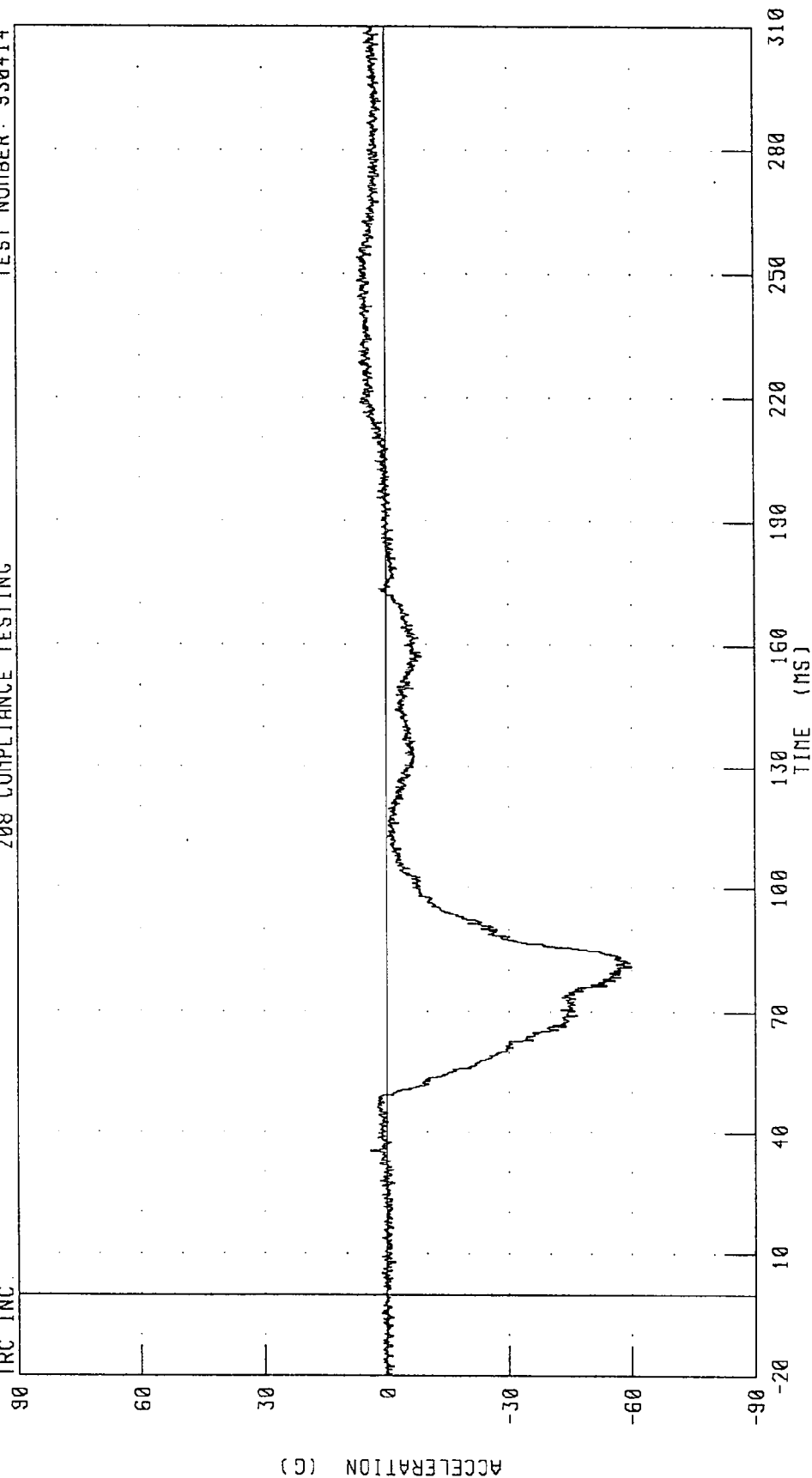
DATA PLOTS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION

TEST NUMBER: 930414

208 COMPLIANCE TESTING

IRC INC.

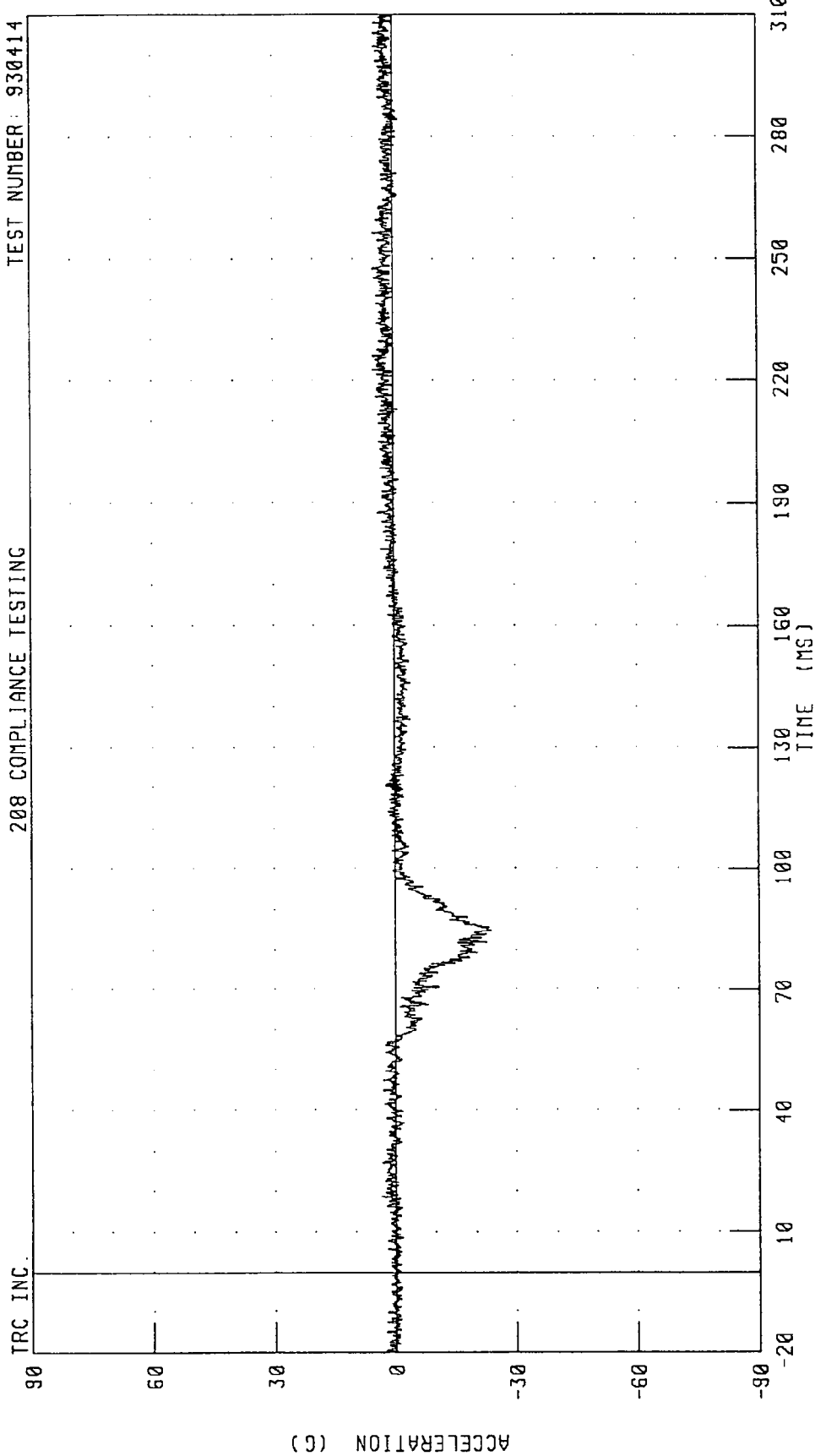


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 6.99 G @ 248.25 MS; -59.92 G @ 81.00 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

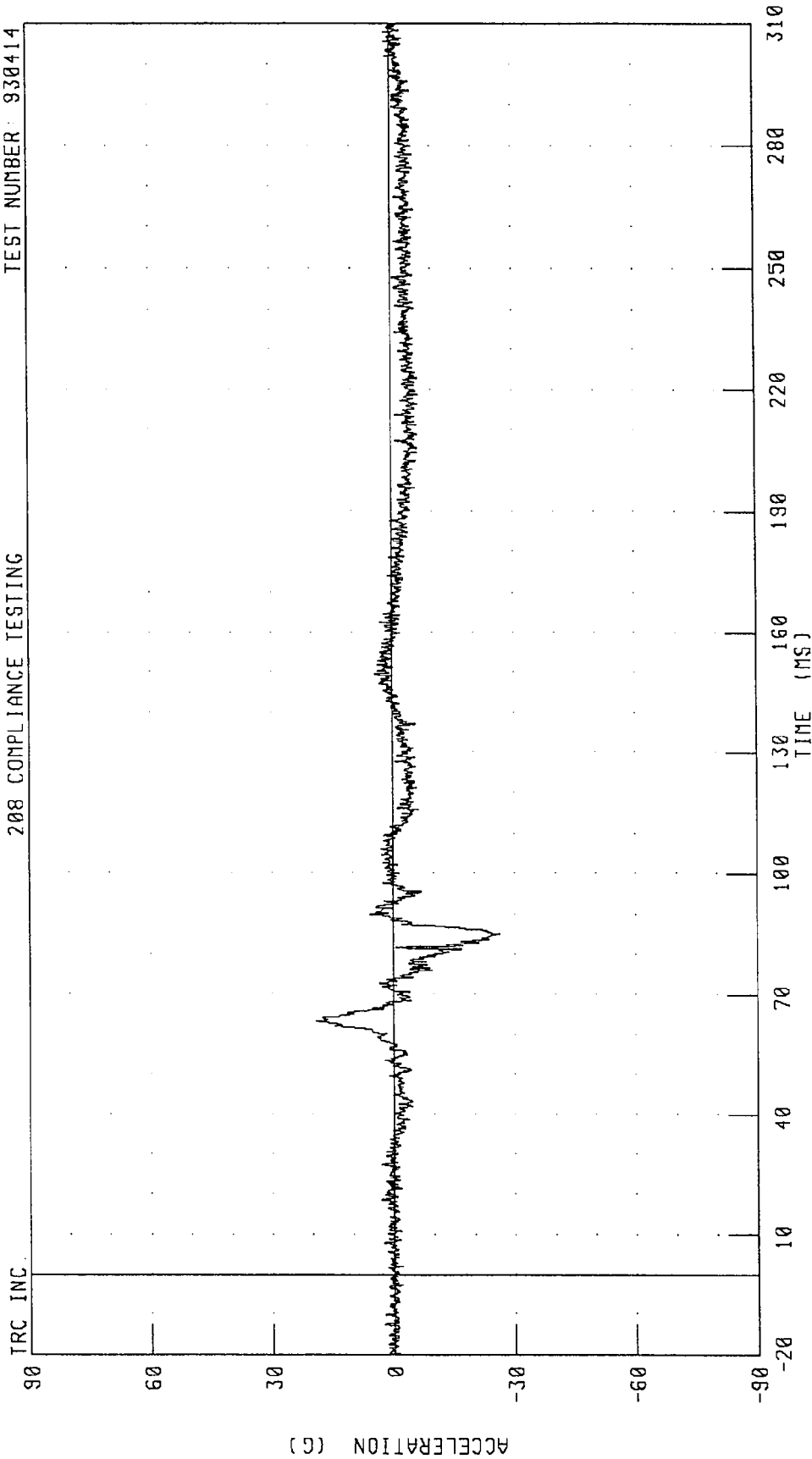


CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 5.19 G @ 226.00 MS; -23.60 G @ 84.75 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

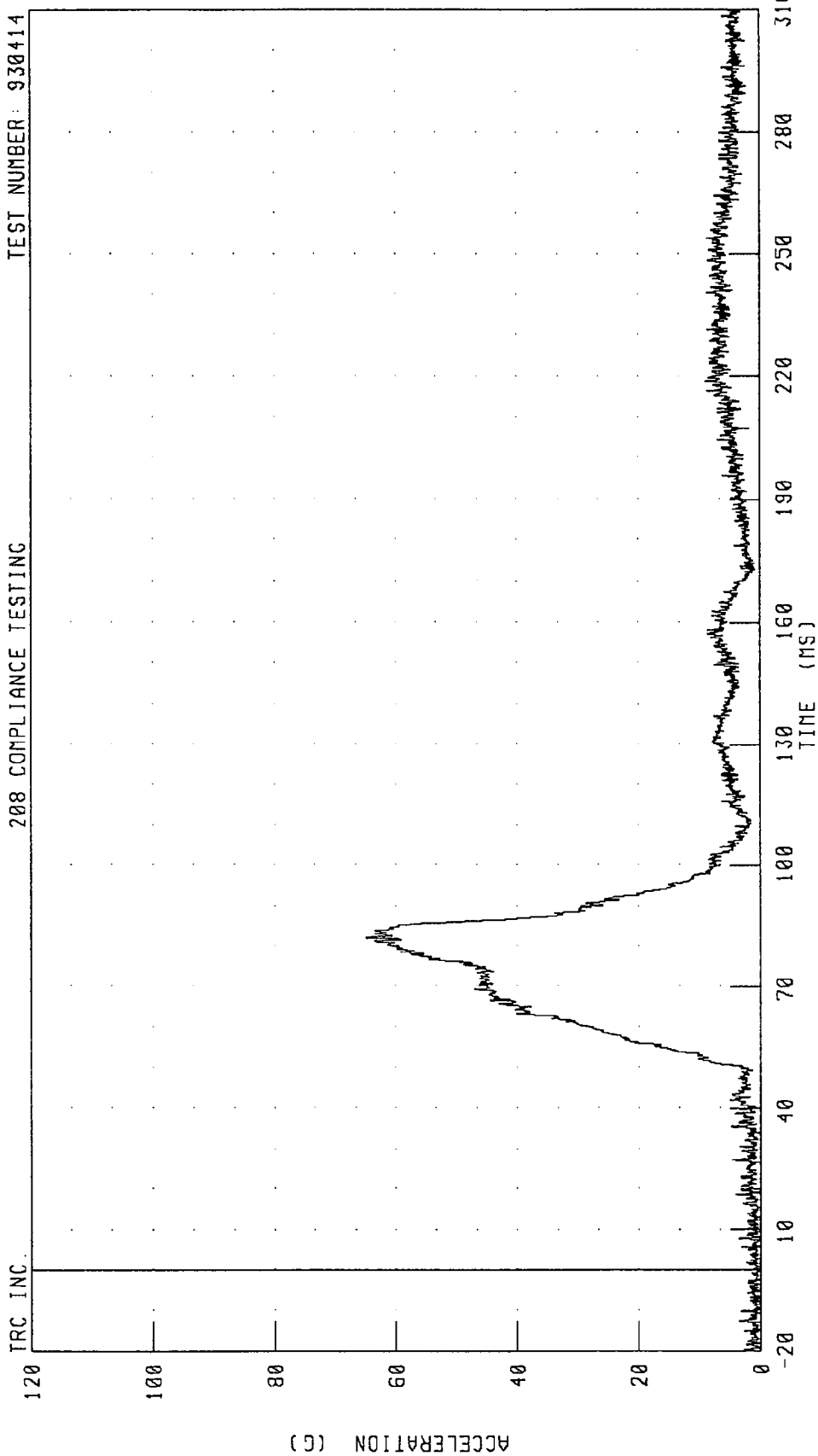
TEST NUMBER: 930414



CHANNEL: HEDZG1 FILTER: CH CLASS 1000

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

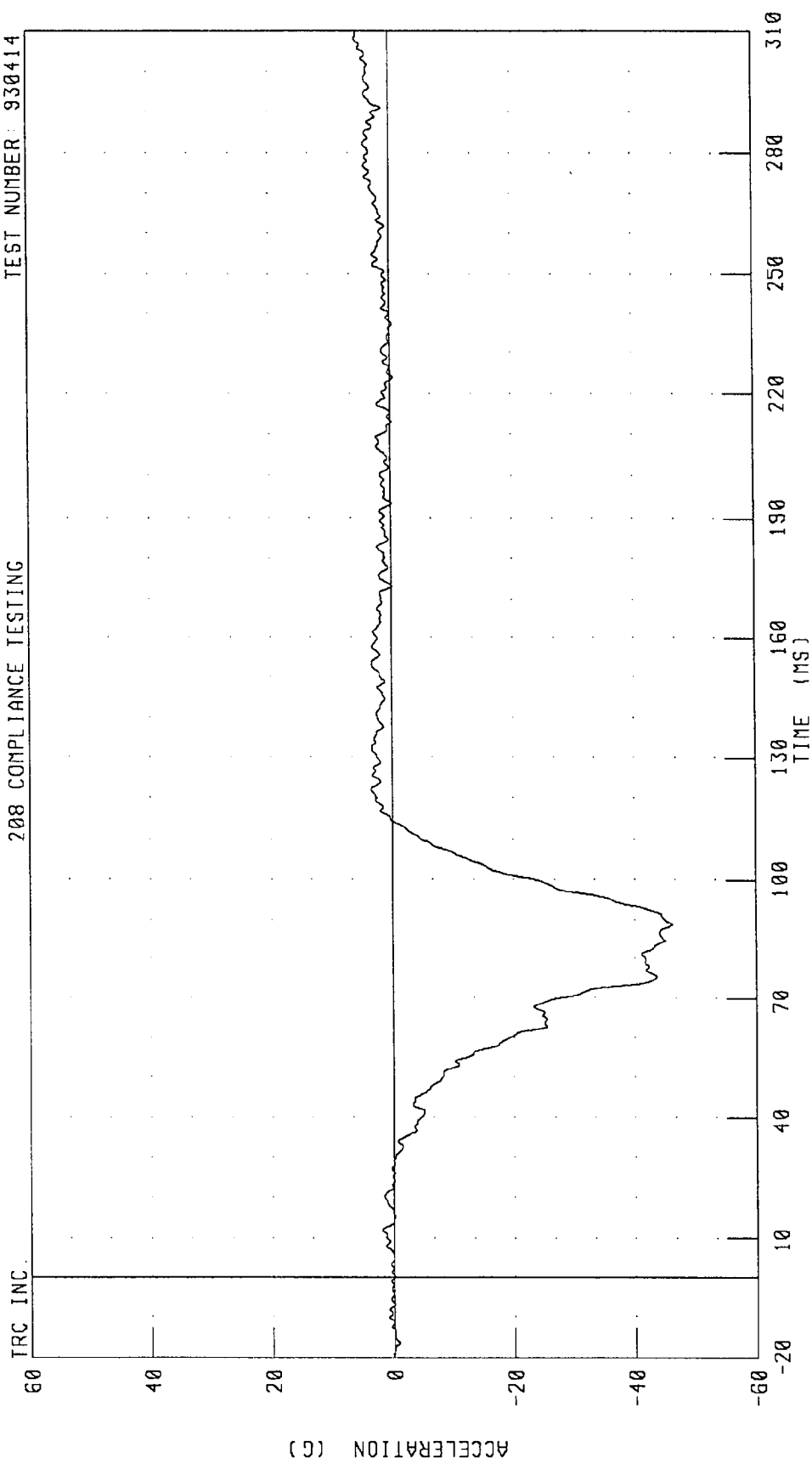


CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

PEAK DATA: 64.89 G @ 82.00 MS; 0.20 G @ -2.63 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414



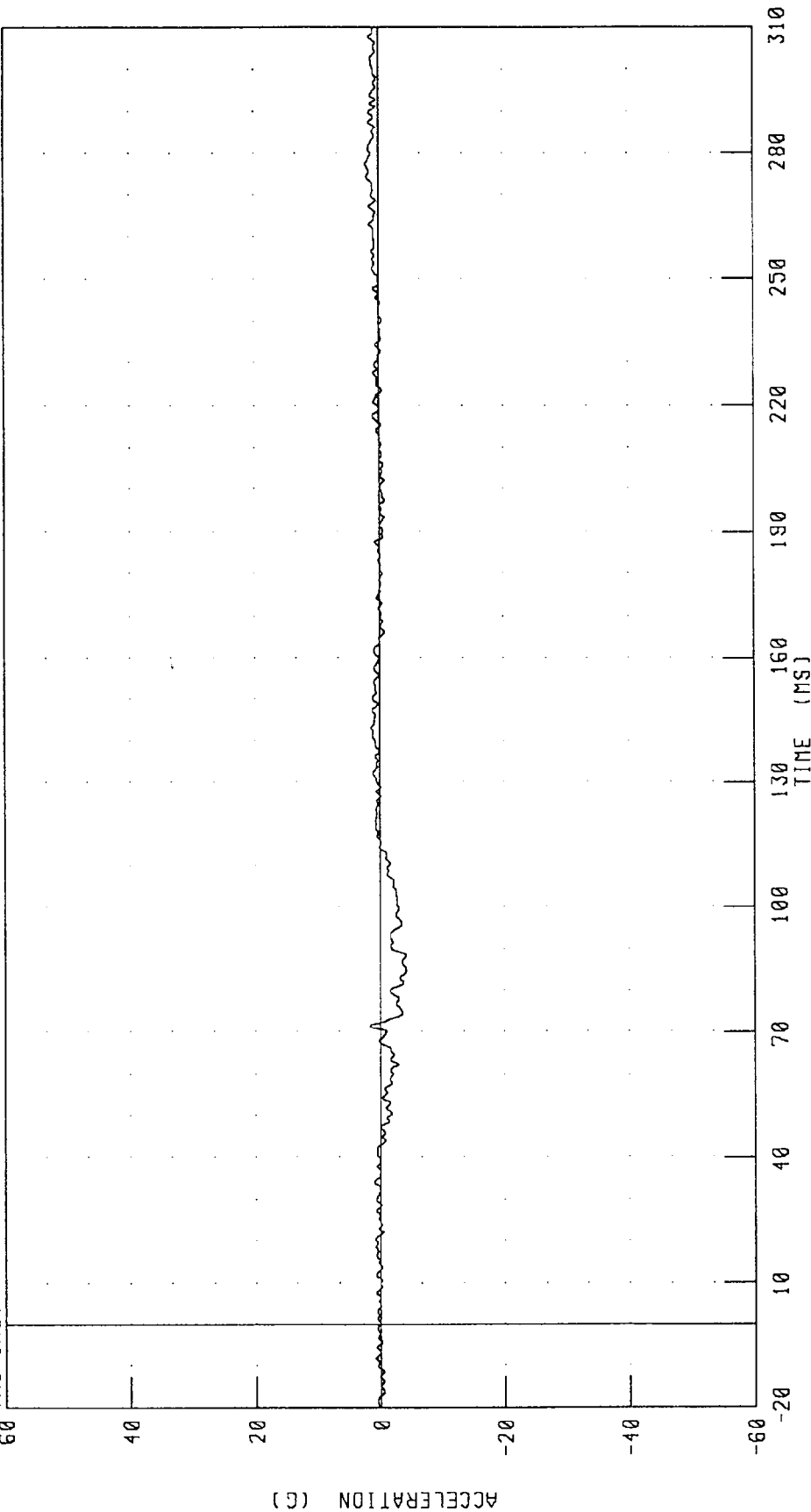
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

PEAK DATA: 5.63 G @ 308 00 MS, -46.19 G @ 88.75 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

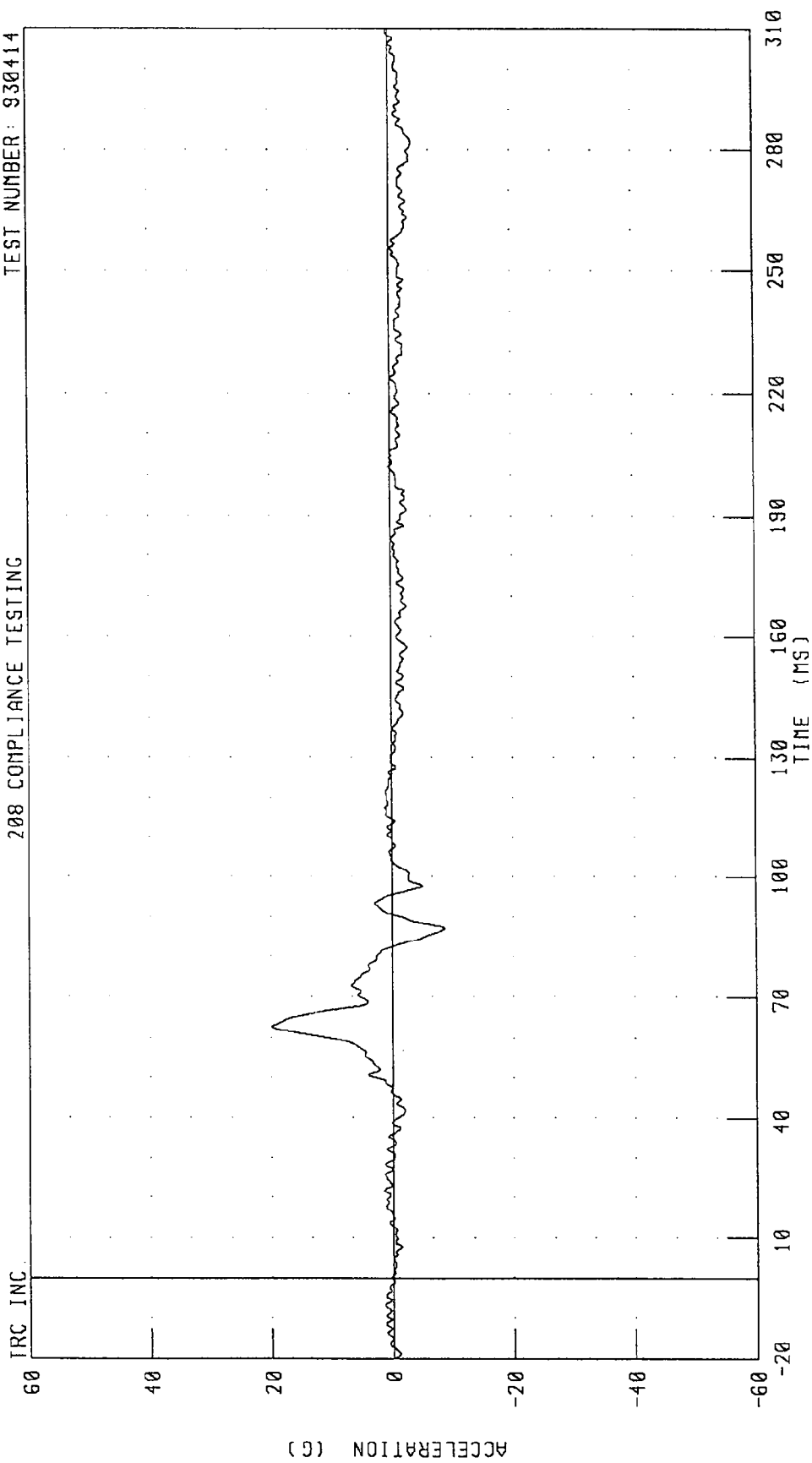


CHANNEL: CSTYG1 FILTER: CH CLASS 180

PEAK DATA: 2.07 G @ 277.38 MS, -4.15 G @ 84.75 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414



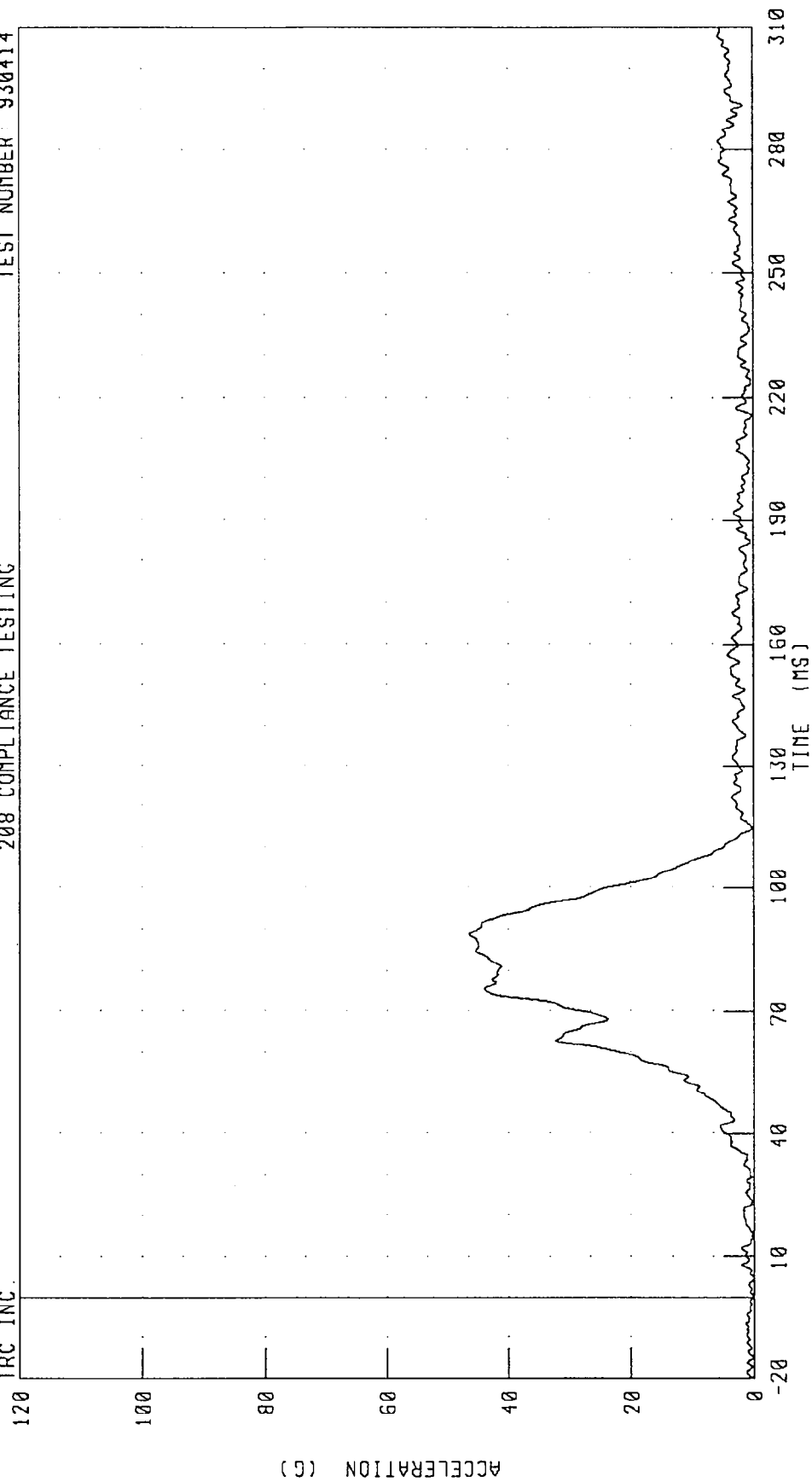
CHANNEL: CSTZG1 FILTER: CH. CLASS 180

PEAK DATA: 19.95 G @ 62.63 MS; -8.67 G @ 87.13 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

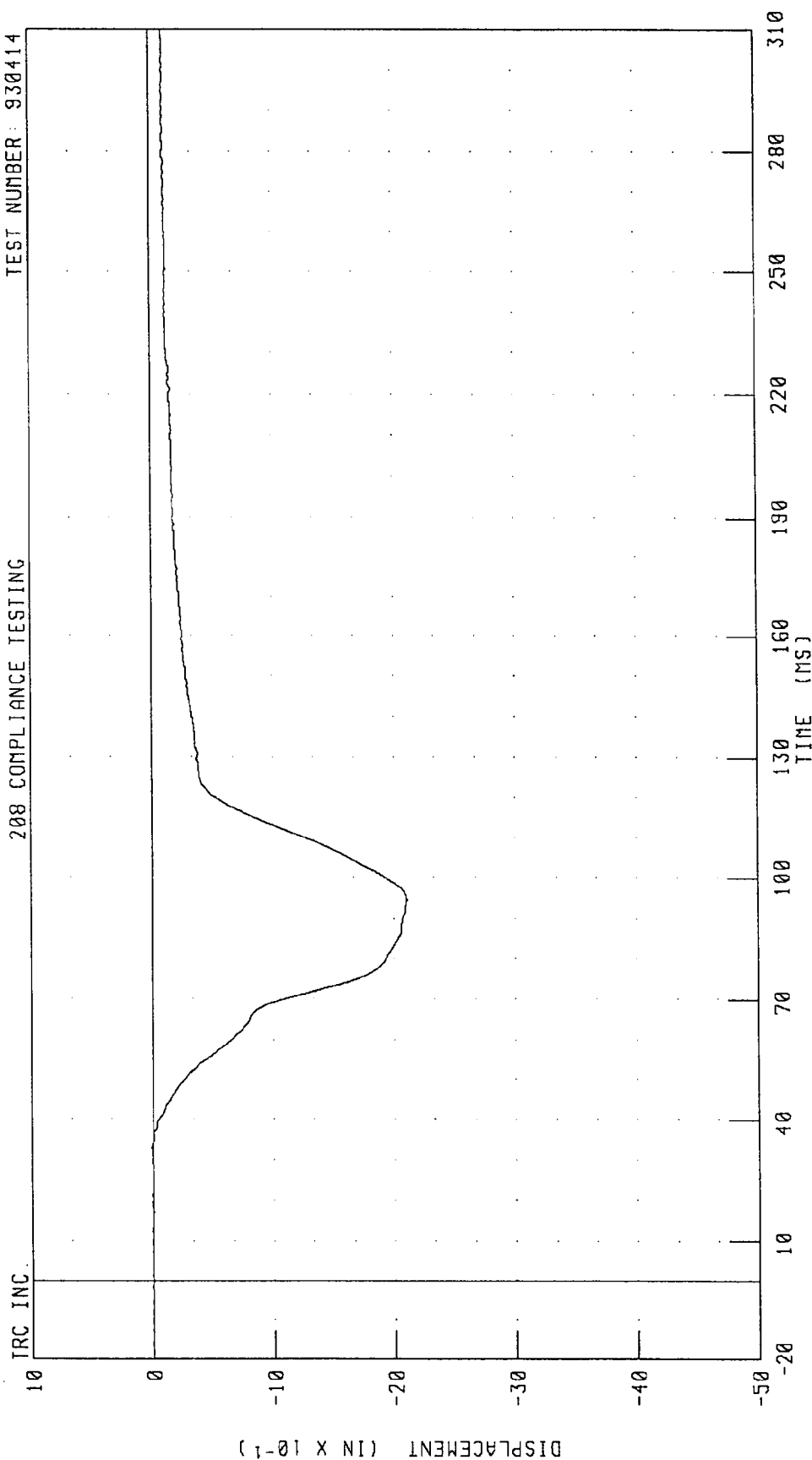


CHANNEL: CSTRG1 FILTER: CH CLASS 180

PEAK DATA: 46.51 G @ 88.75 MS, 0.07 G @ 4.50 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER CHEST DEFLECTION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414



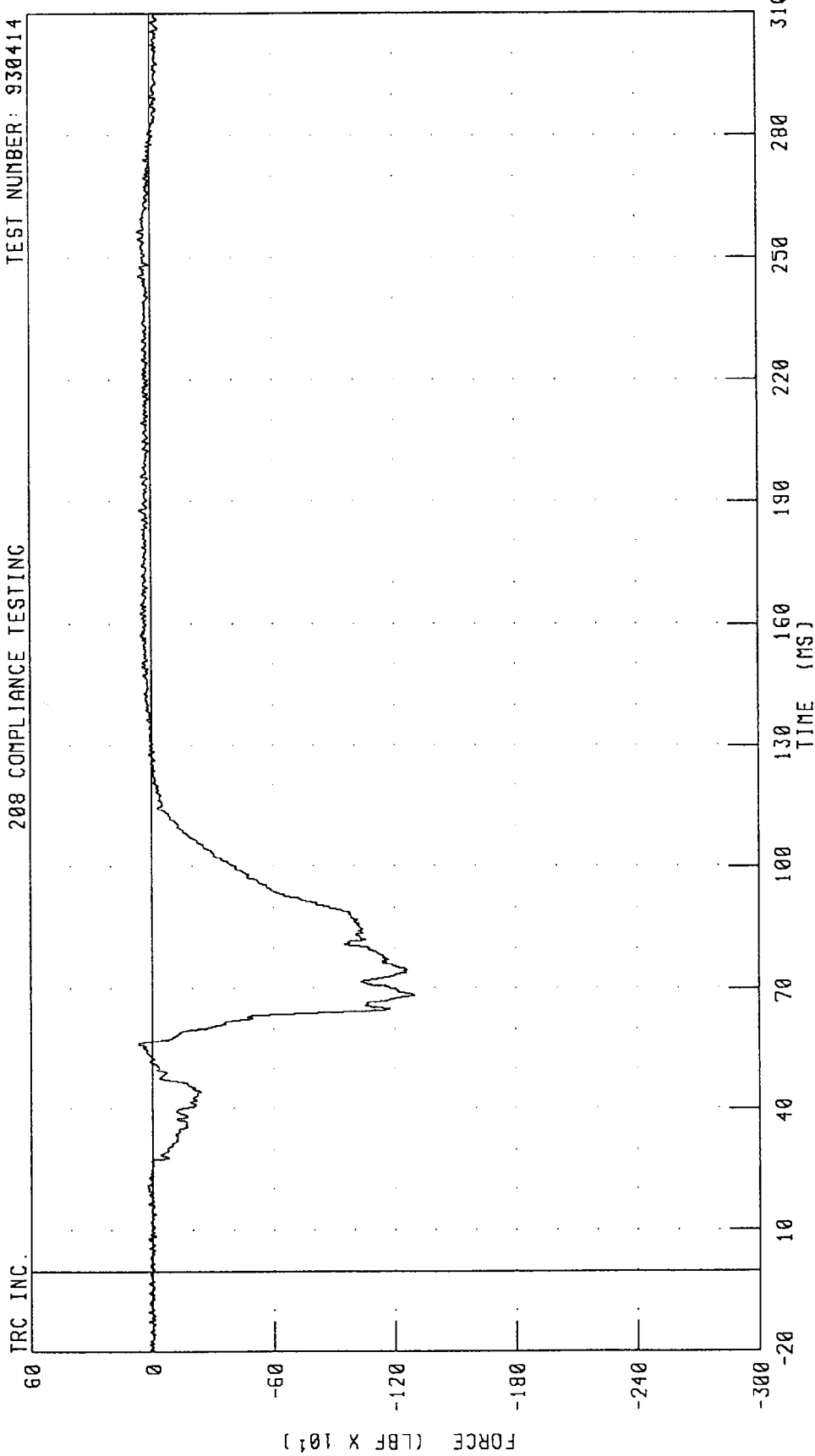
PEAK DATA: 0.01 IN @ 33.00 MS; -2.11 IN @ 94.50 MS

CHANNEL: CSTXD1 FILTER: CH. CLASS 180

TRC INC.

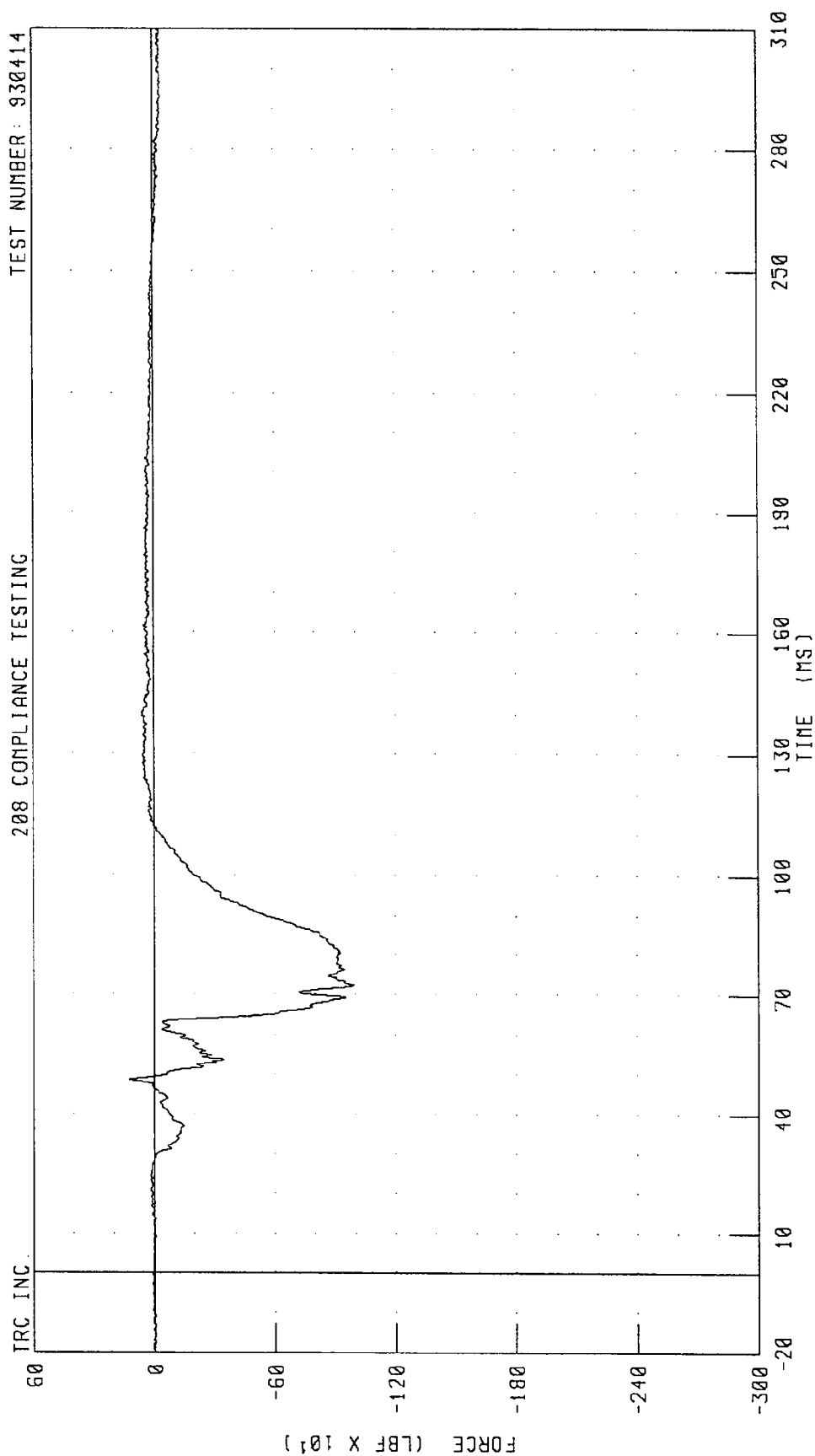
1993 GEO METRO INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE
208 COMPLIANCE TESTING

TEST NUMBER: 930414



1993 GEO METRO INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

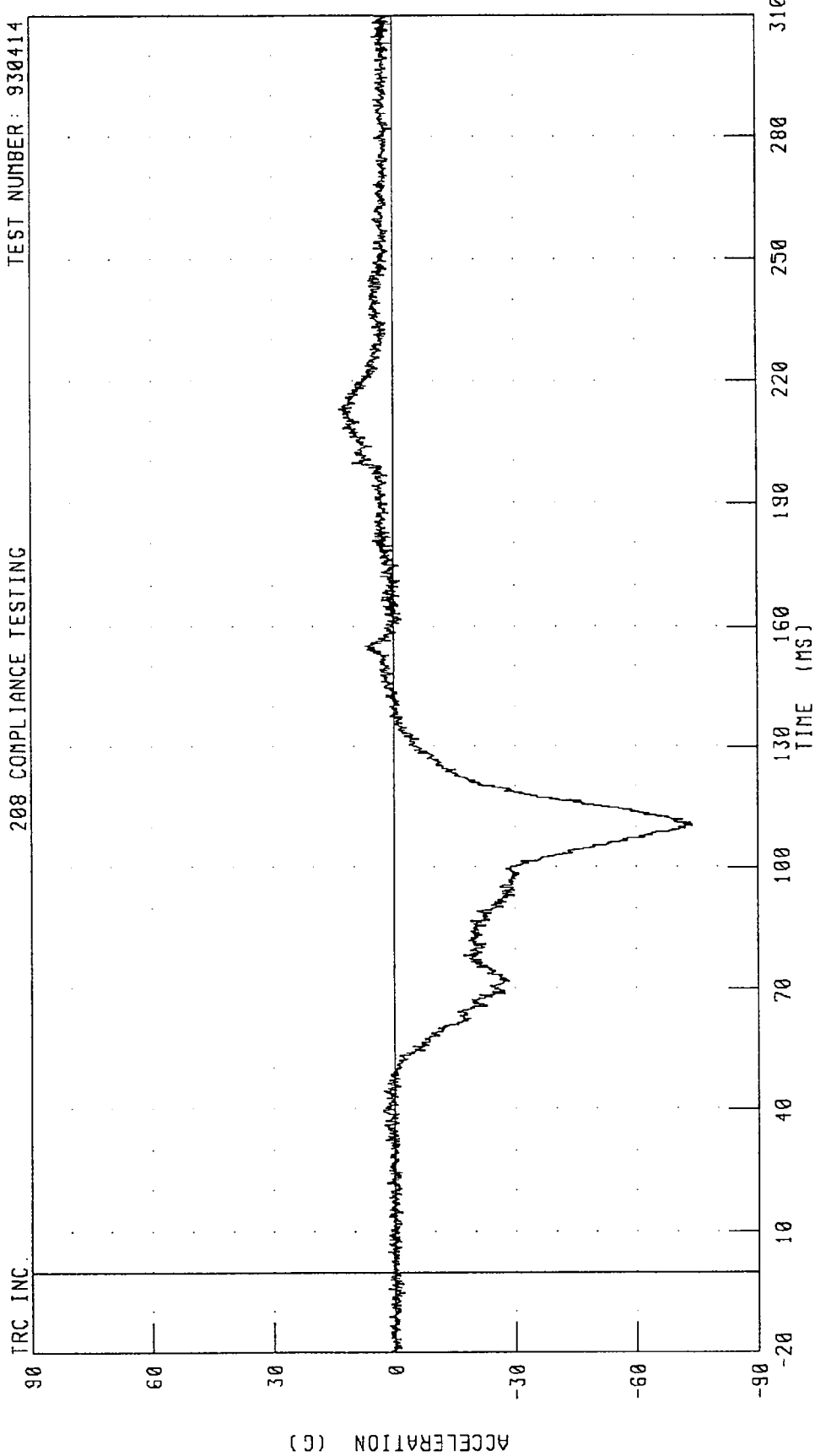


PEAK DATA: 127.00 LBF @ 48.75 MS, -990.11 LBF @ 72.25 MS

CHANNEL: RFMF1 FILTER: CH. CLASS 600

1993 GEO METRO INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414

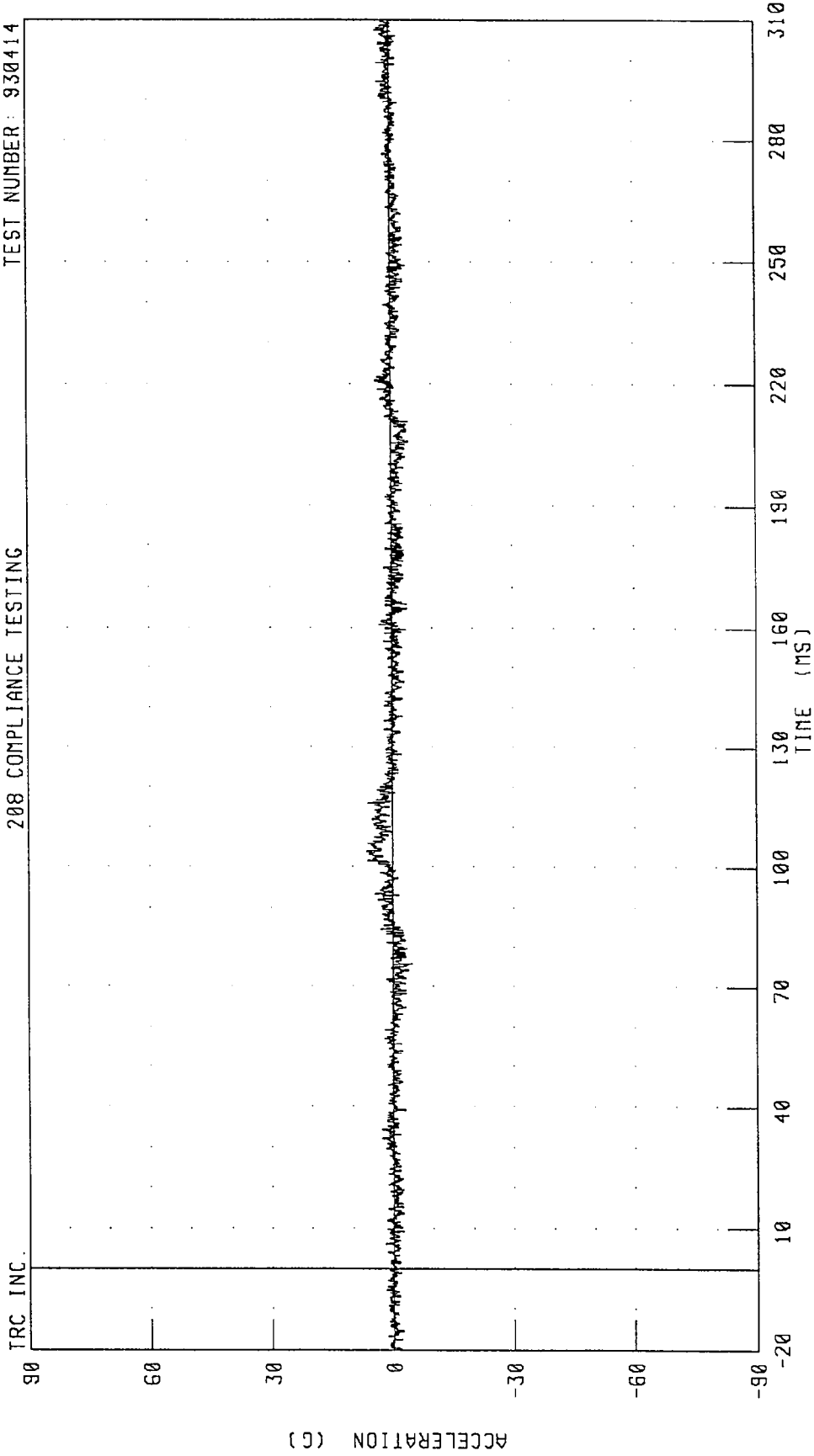


CHANNEL: HEDXC2 FILTER: CH. CLASS 1000

PEAK DATA: 13.38 G @ 212.88 MS, -73.80 G @ 110.50 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

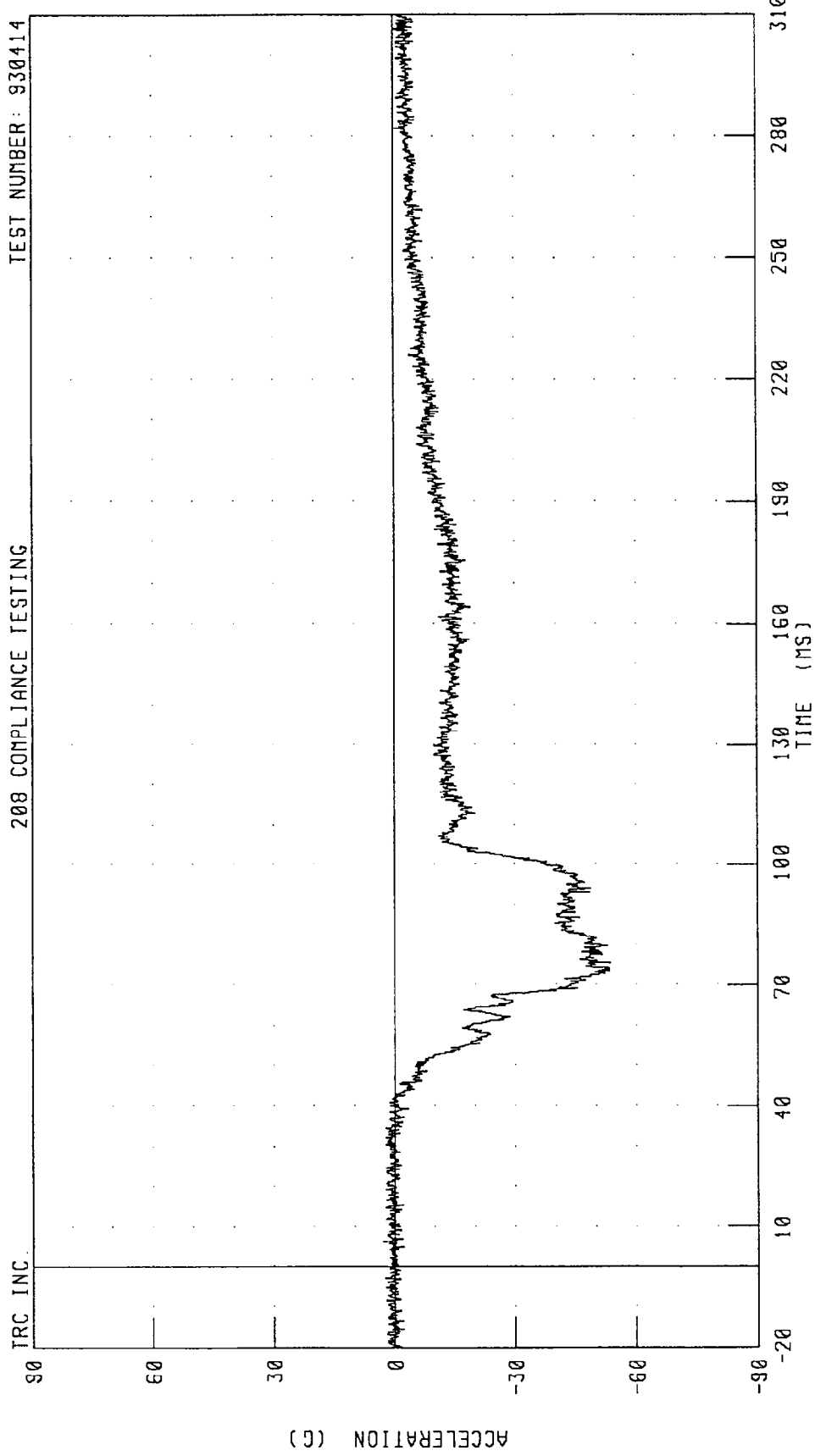


PEAK DATA: 6.31 G @ 103.88 MS; -4.79 G @ 75.75 MS

CHANNEL: HEDYG2 FILTER: CH CLASS 1000

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

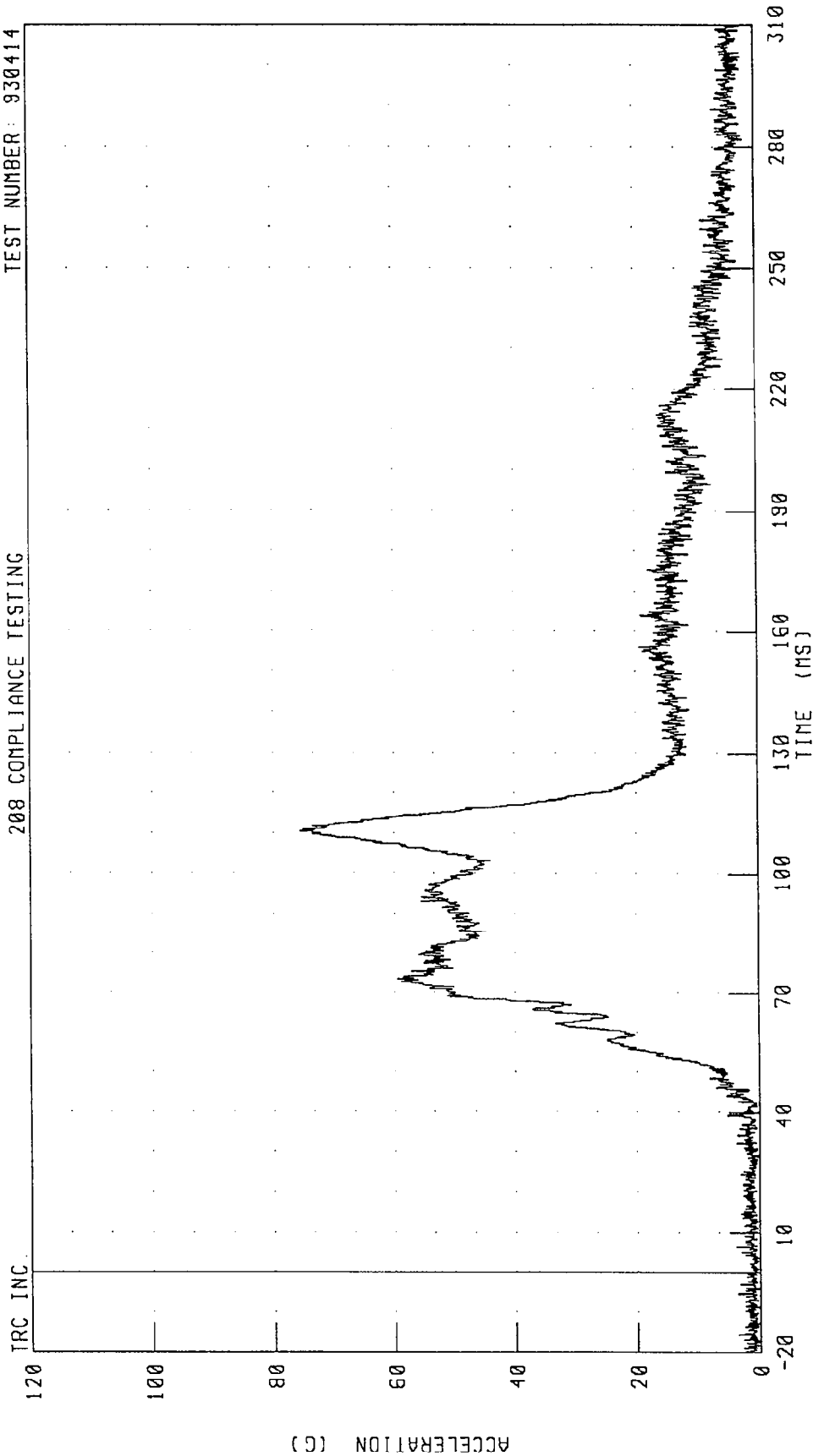


CHANNEL: HDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 3 01 G @ 6 25 MS, -53.58 G @ 75.38 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414



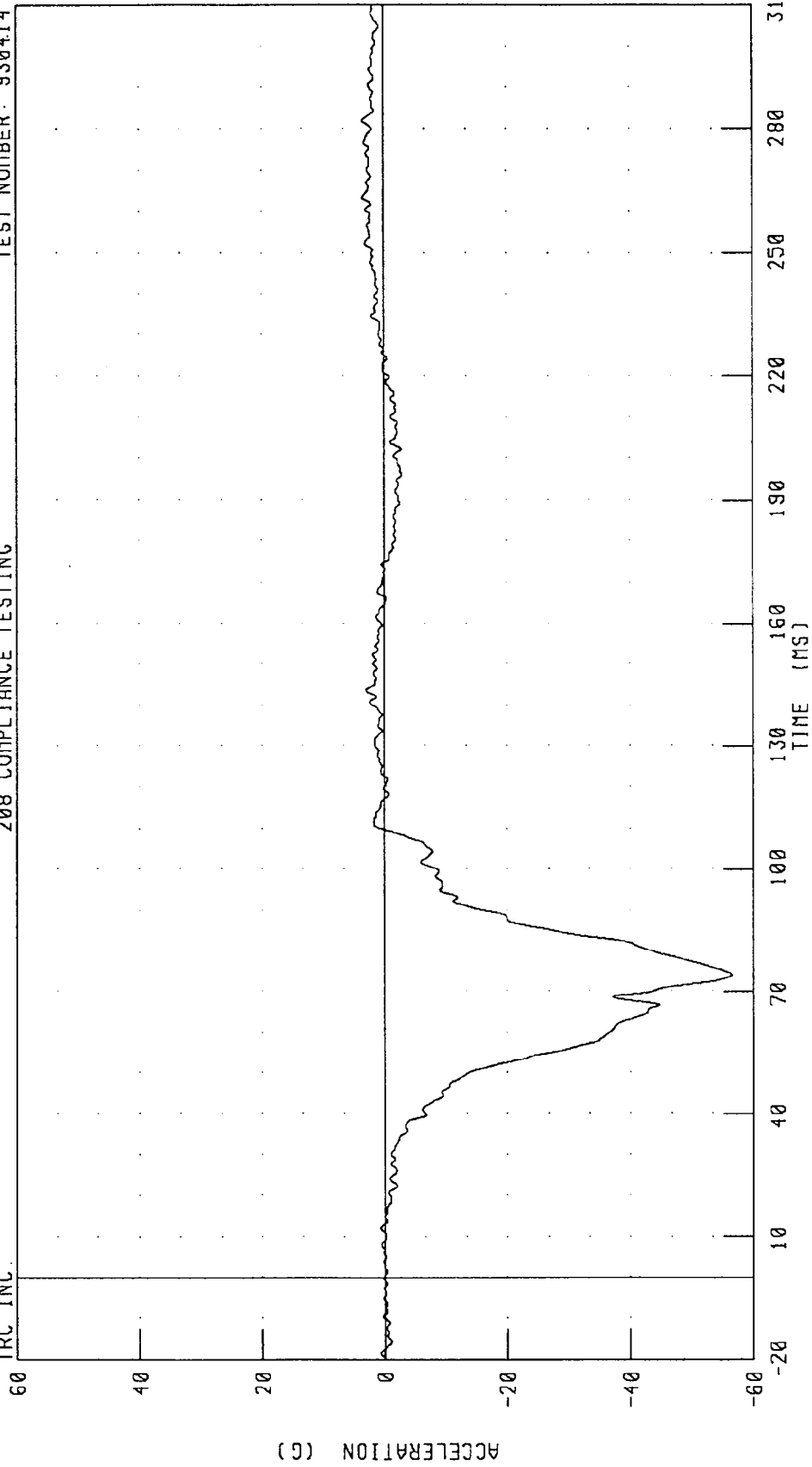
PEAK DATA: 75.53 G @ 110.50 MS; 0.16 G @ -4.13 MS

CHANNEL: HEDRC2 FILTER: CH. CLASS 1000

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

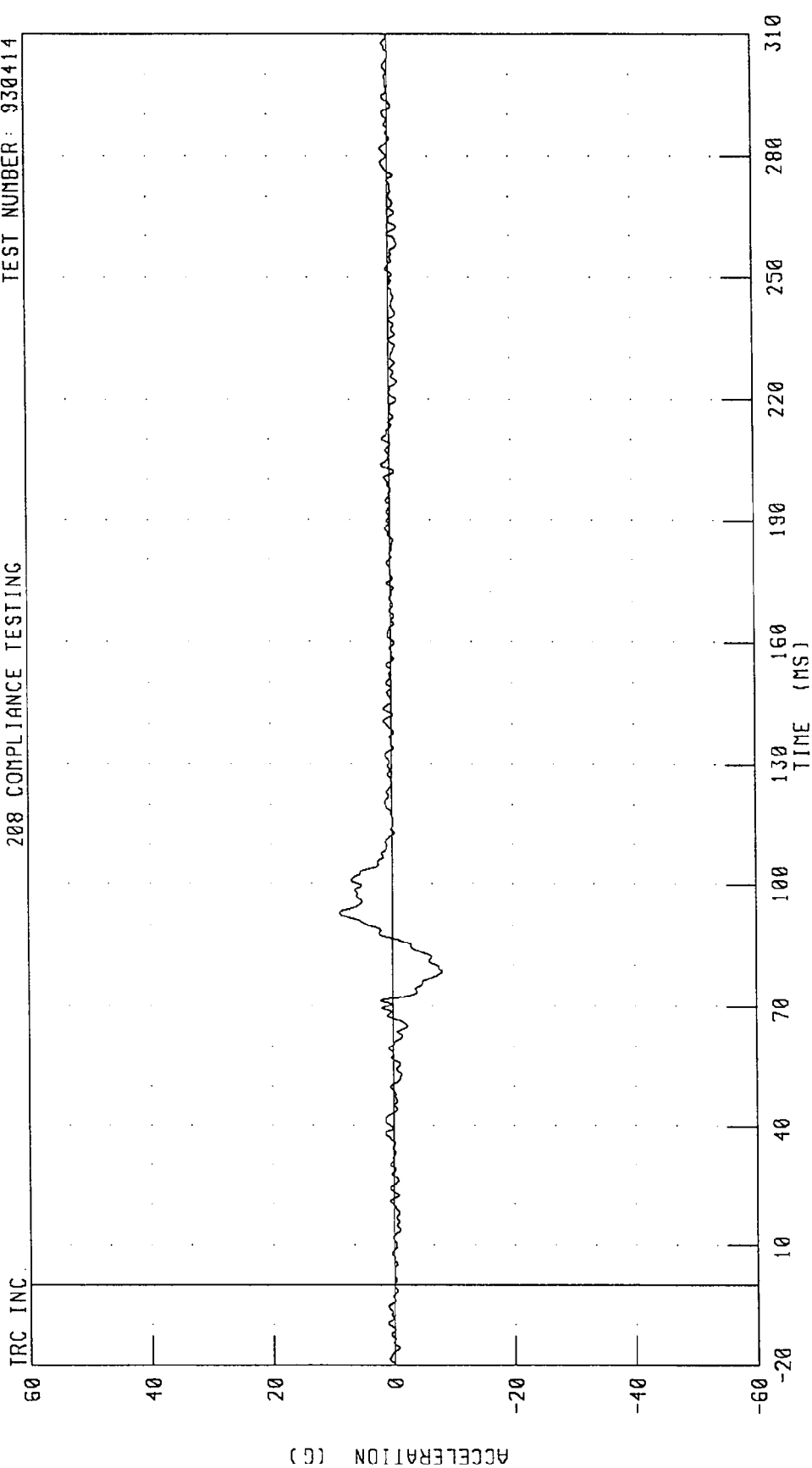


CHANNEL: CSTXG2 FILTER: CH. CLASS 180

PEAK DATA: 3.54 G @ 281.88 MS; -56.51 G @ 74.00 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

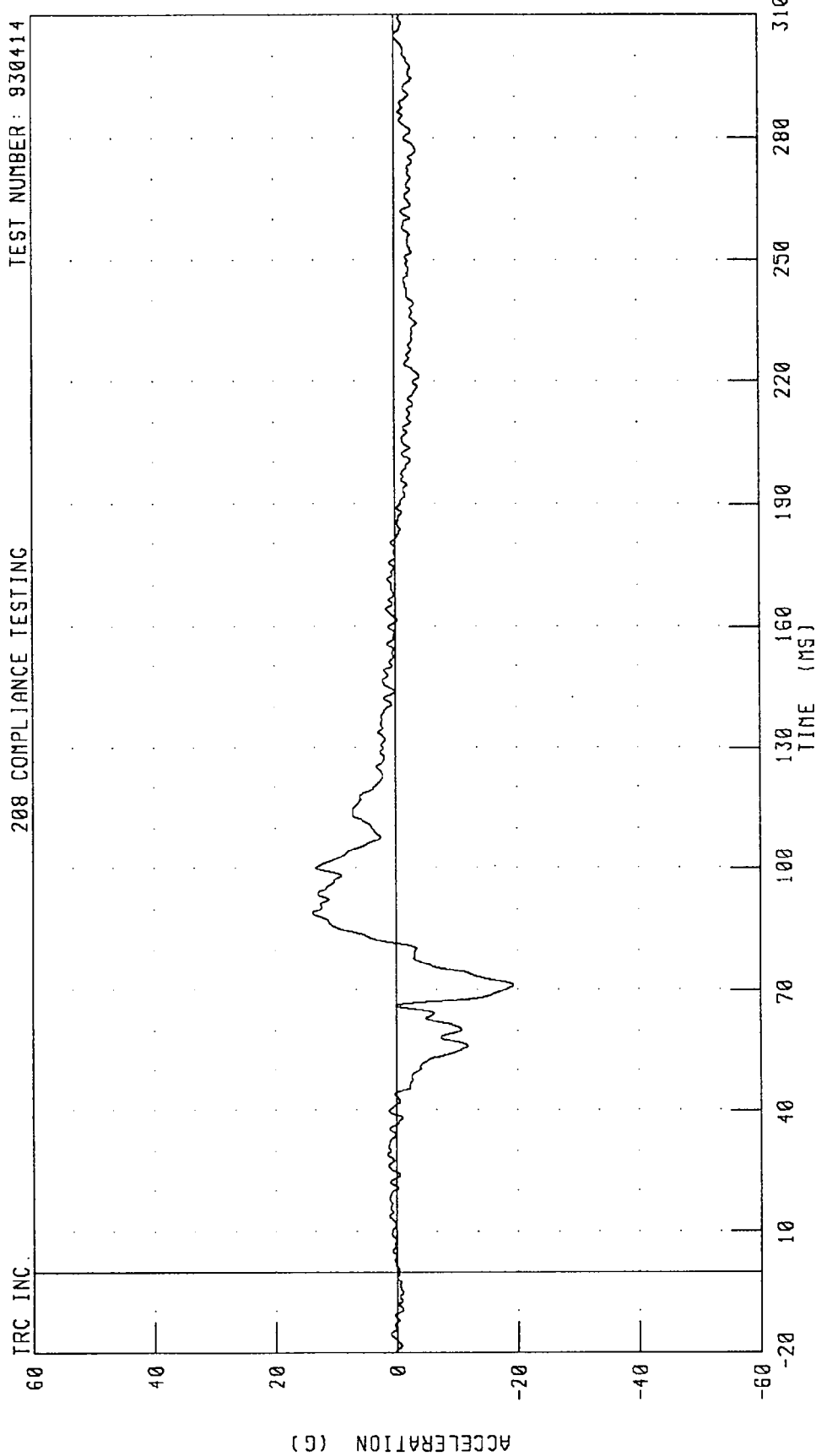


CHANNEL: CSTYC2 FILTER: CH. CLASS 180

PEAK DATA: 8.82 G @ 93.00 MS; -8.14 G @ 78.50 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414

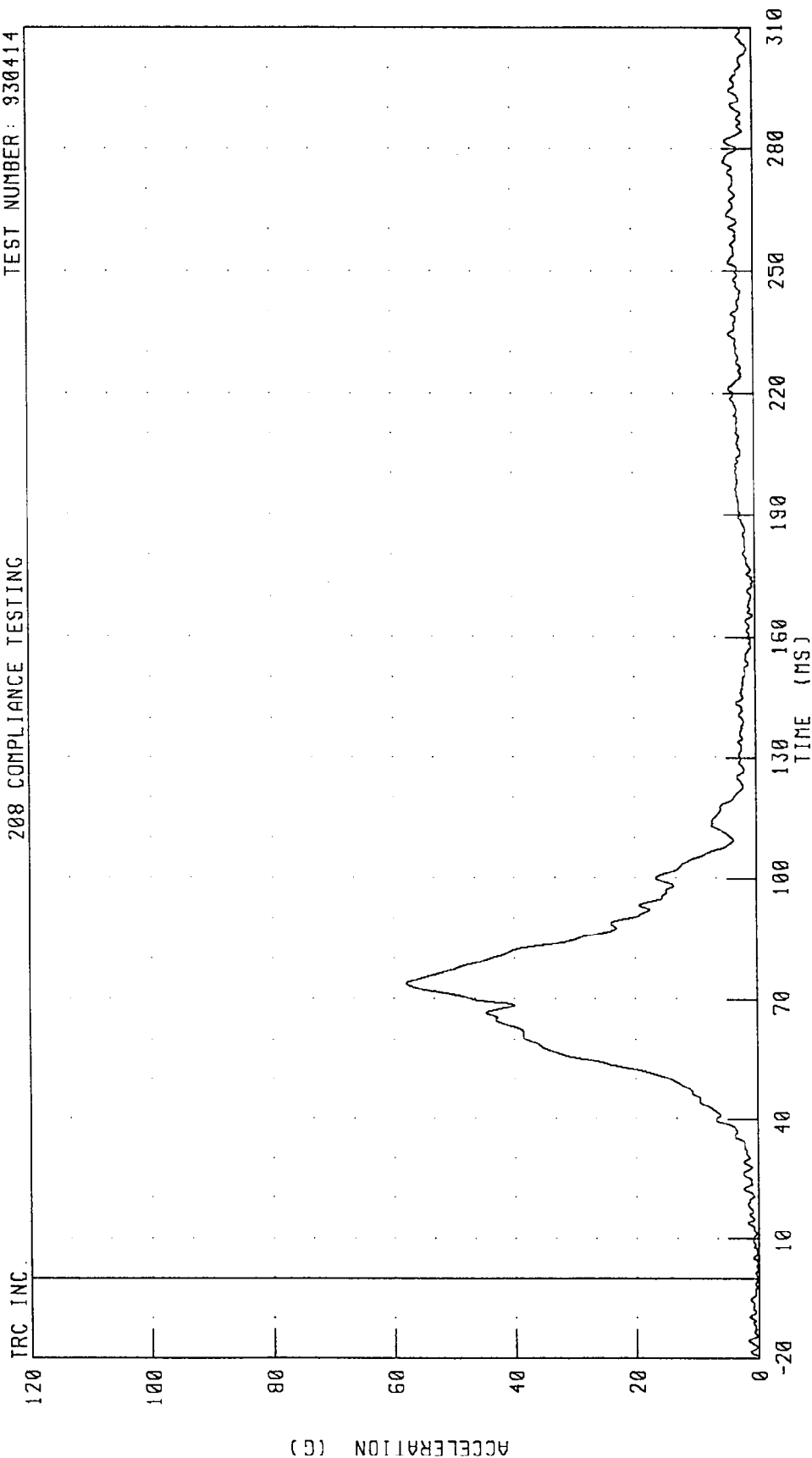


CHANNEL: CSTZG2 FILTER: CH. CLASS 180

PEAK DATA: 13.78 G @ 89.00 MS; -19.34 G @ 71.25 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

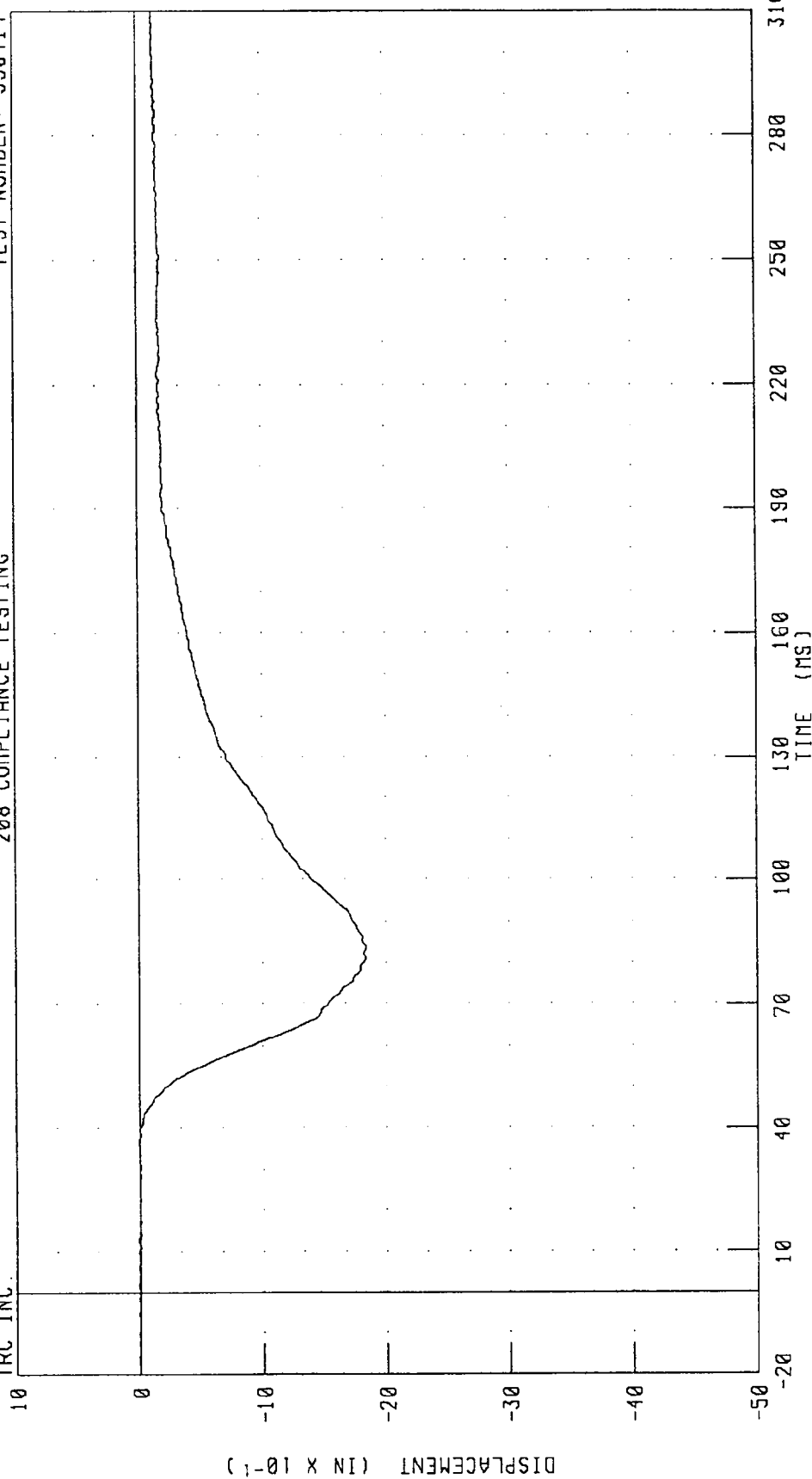
TEST NUMBER: 930414



1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST DEFLECTION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

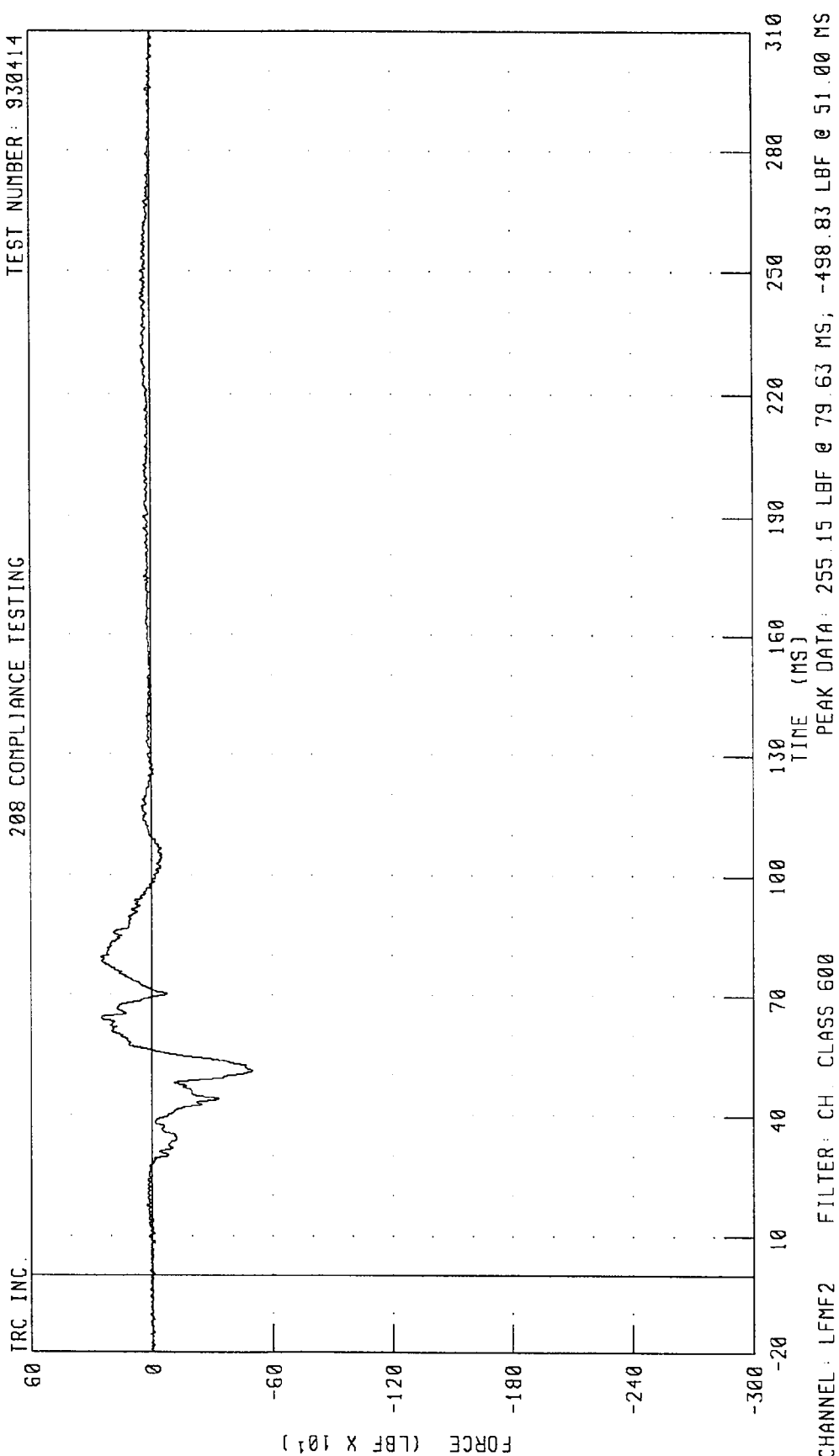


CHANNEL: CSTX02 FILTER: CH CLASS 180

PEAK DATA: 0.01 IN @ 36.75 MS; -1.84 IN @ 83.63 MS

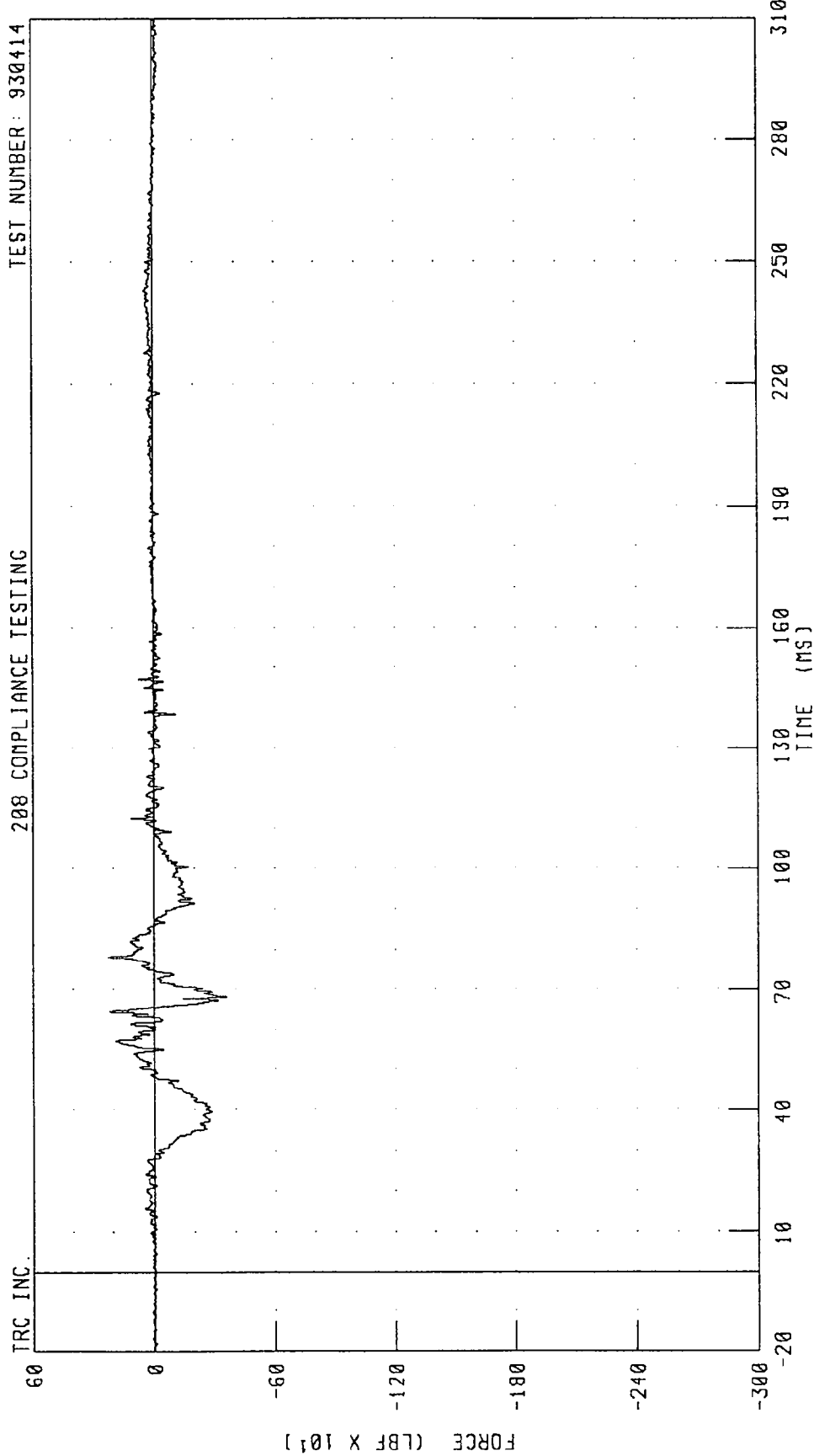
1993 GEO METRO INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE
208 COMPLIANCE TESTING

TEST NUMBER: 930414



1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 930414



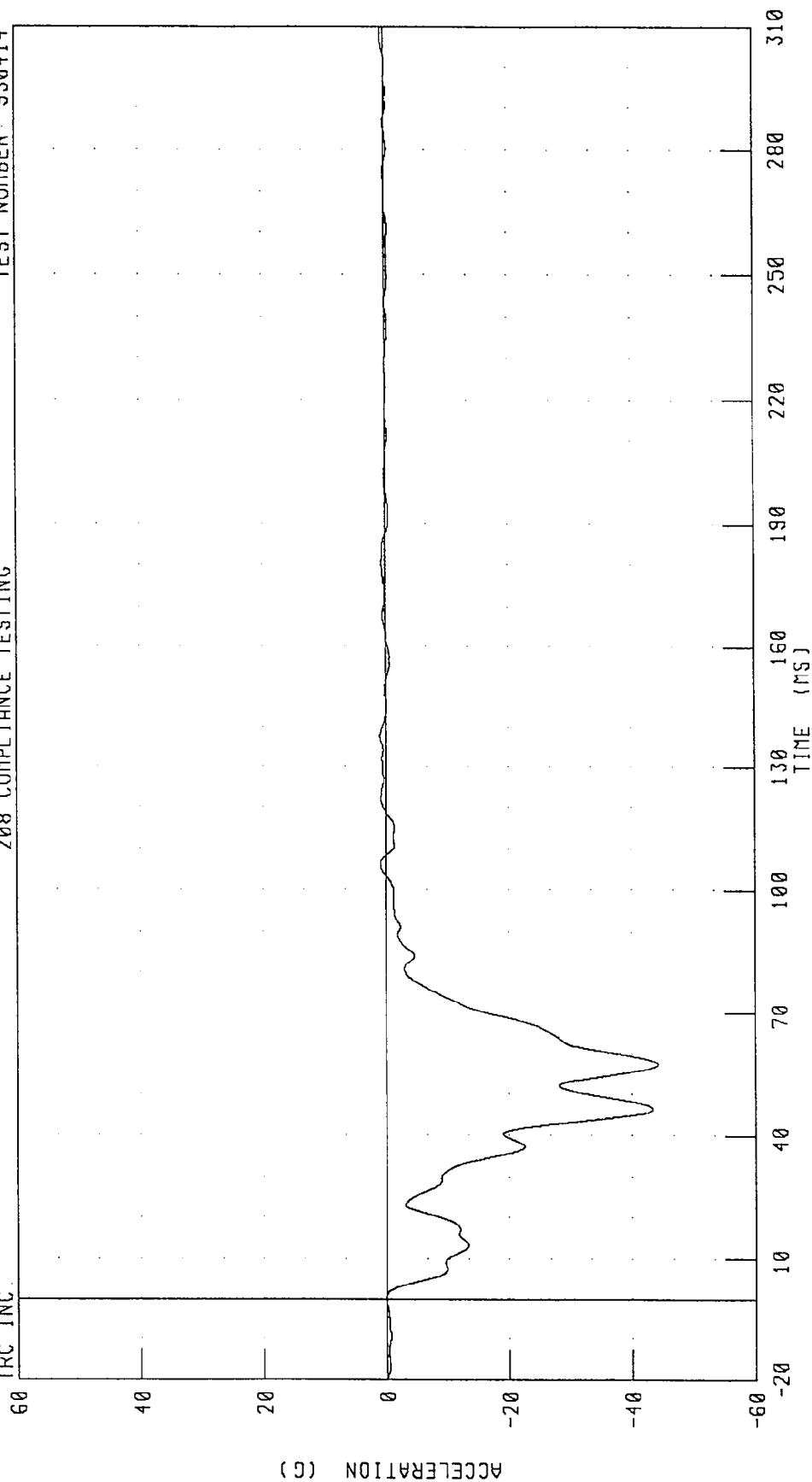
CHANNEL: RFMF2 FILTER: CH CLASS 600

PEAK DATA: 228.62 LBF @ 78.38 MS; -357.61 LBF @ 68.25 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 LEFT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

IRC INC.



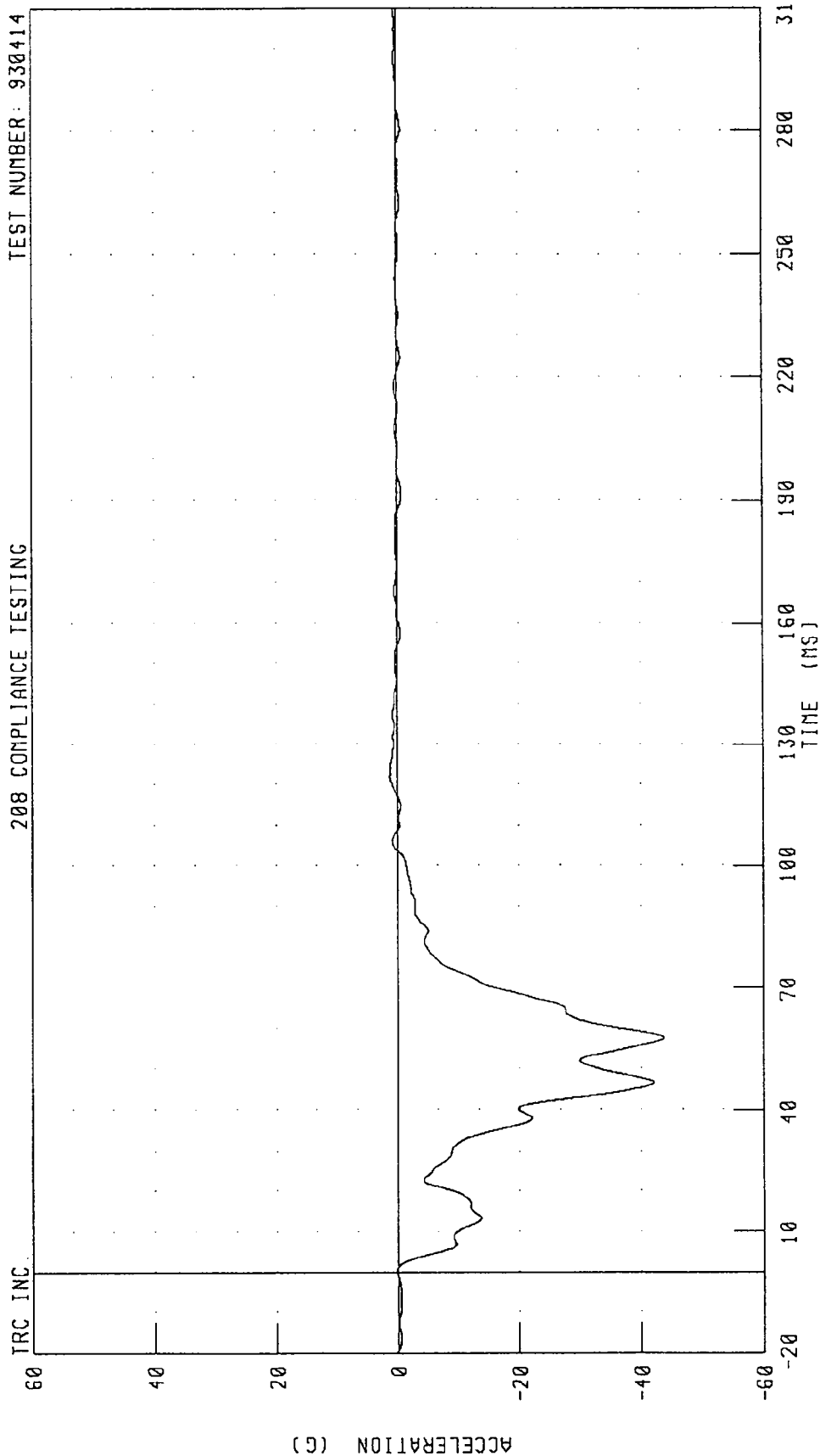
CHANNEL: TLRXG1 FILTER: CH. CLASS 60

PEAK DATA: 0 95 G @ 137.75 MS; -44.21 G @ 57.50 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

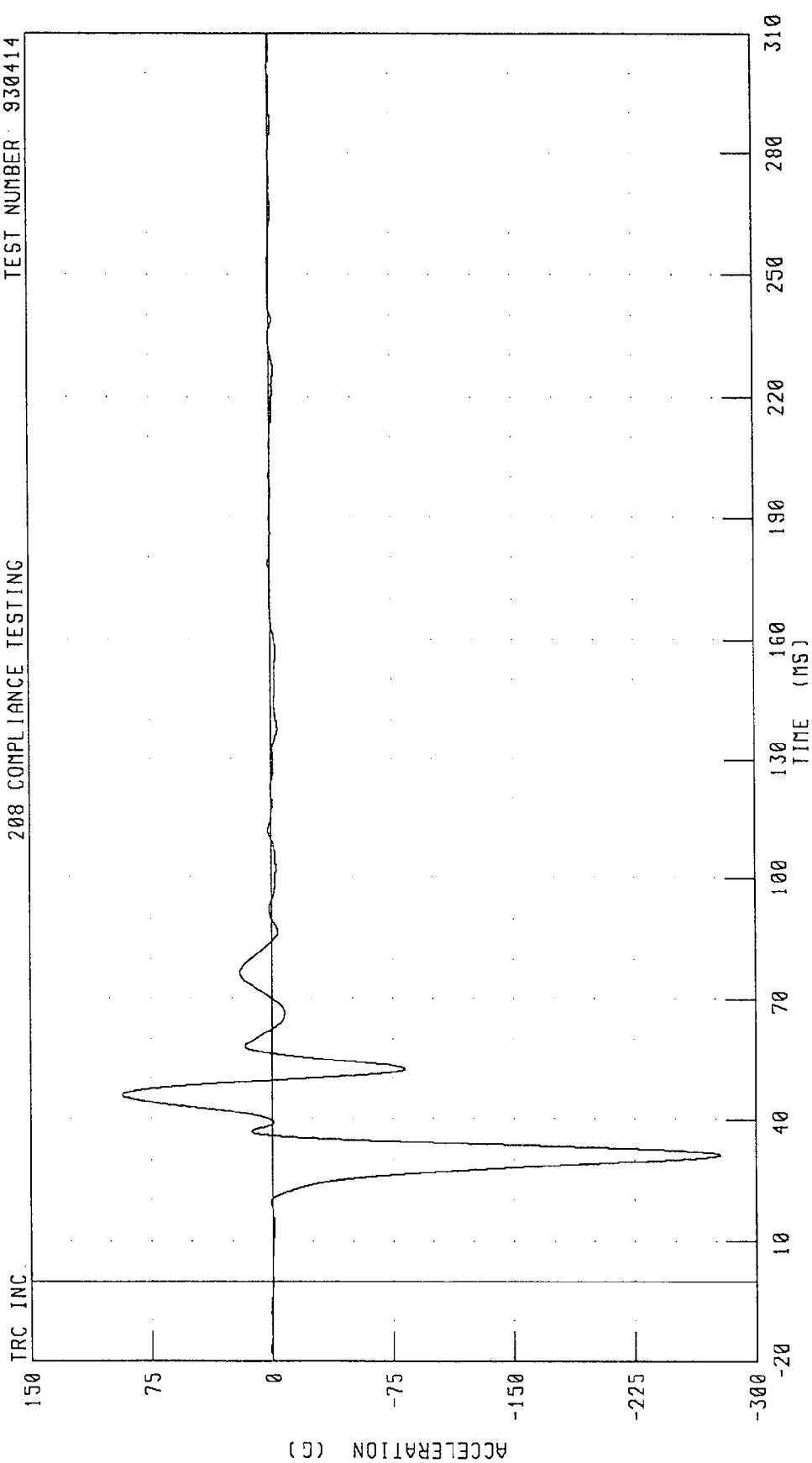


CHANNEL: TRRXG1 FILTER: CH CLASS 60

PEAK DATA: 1.28 G @ 122.00 MS; -43.70 G @ 57.63 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
ENGINE TOP X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER 930414

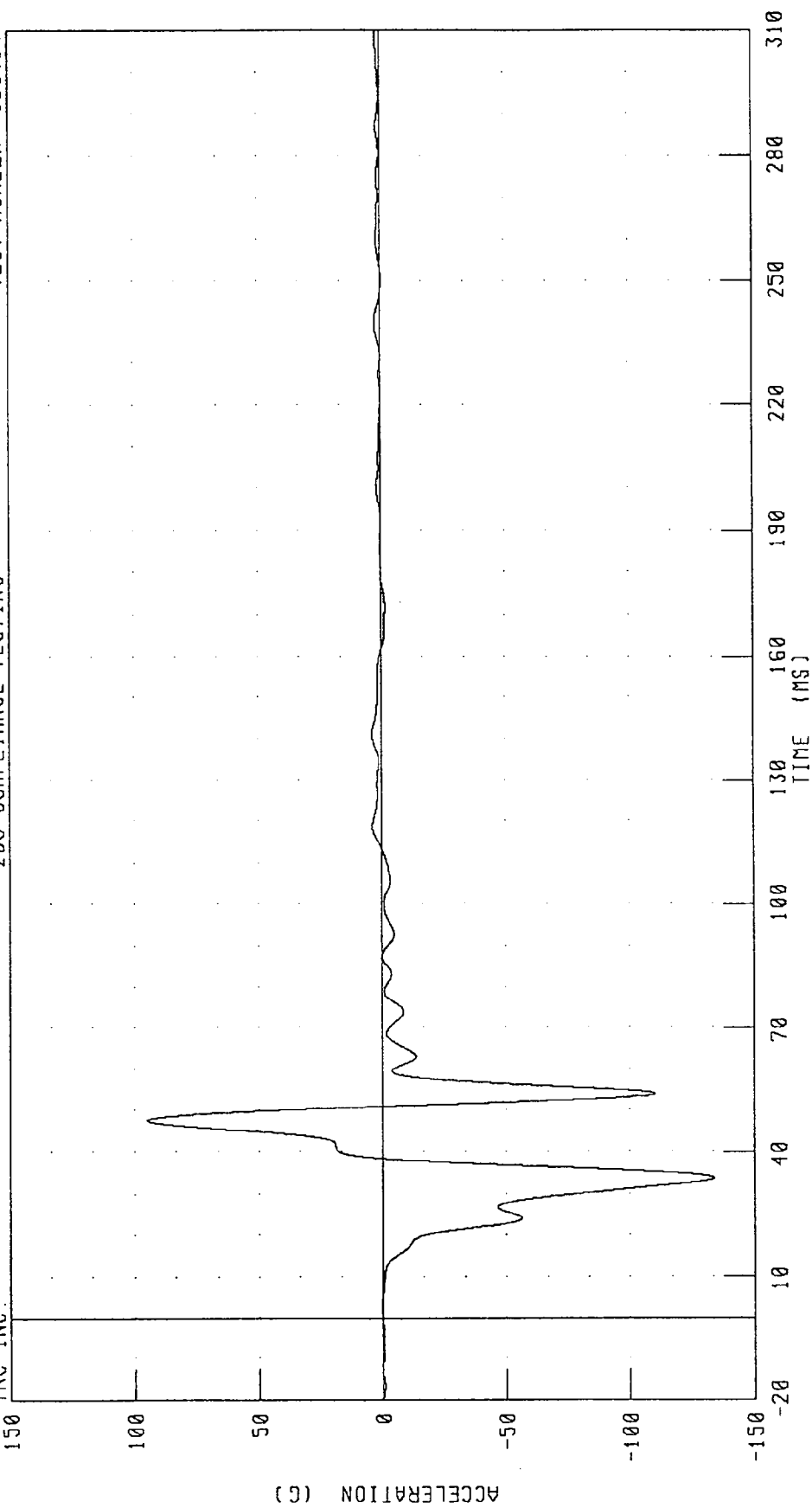


CHANNEL: ENGXG1 FILTER: CH. CLASS 60

1993 GEO METRO INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414

TRC INC.

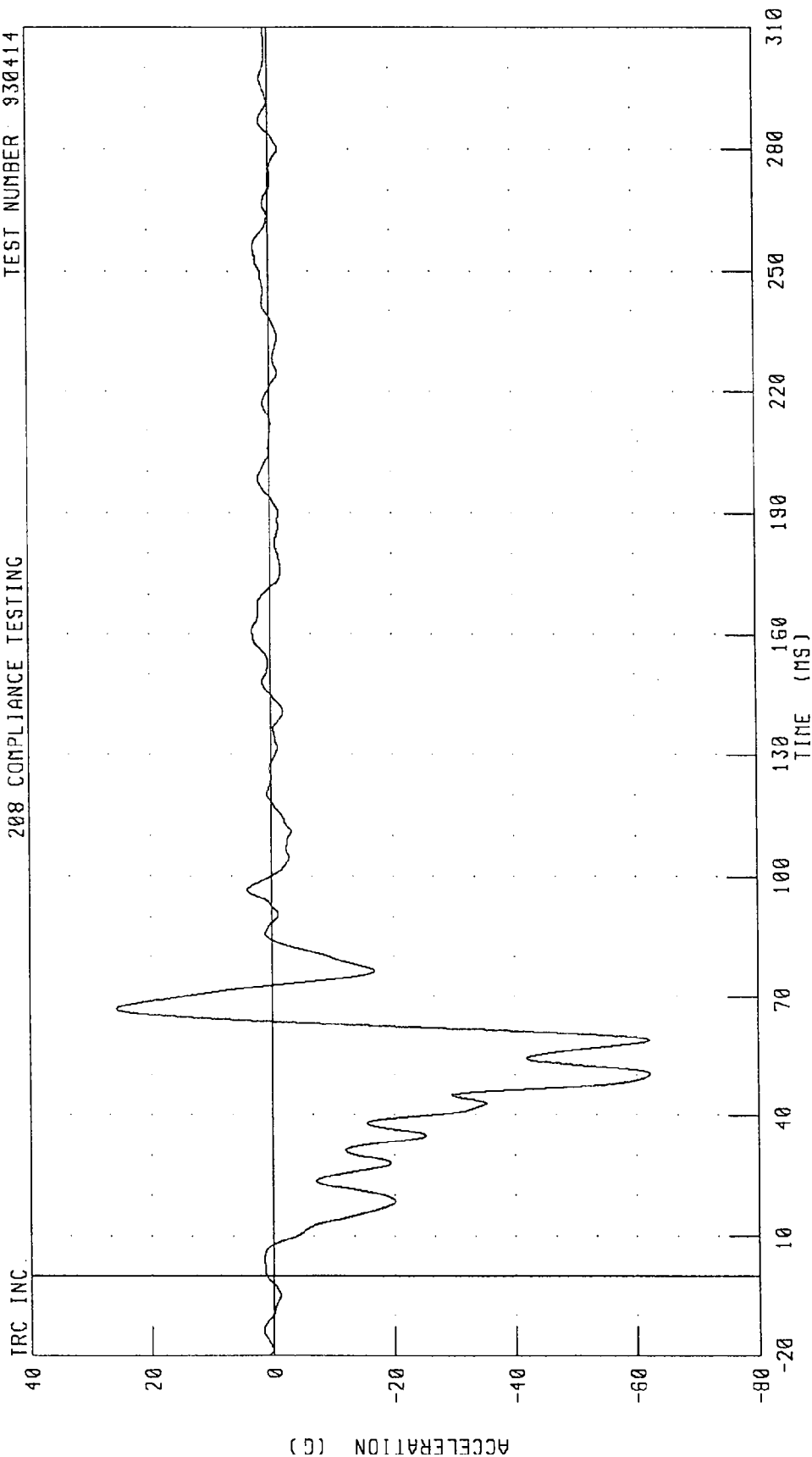


CHANNEL: ENGXC2 FILTER: CH. CLASS 60

PEAK DATA: 95.08 G @ 47.63 MS, -133.61 G @ 33.75 MS

1993 GEO METRO INTO FLAT FRONTAL BARRIER
 RIGHT BRAKE CALIPER X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

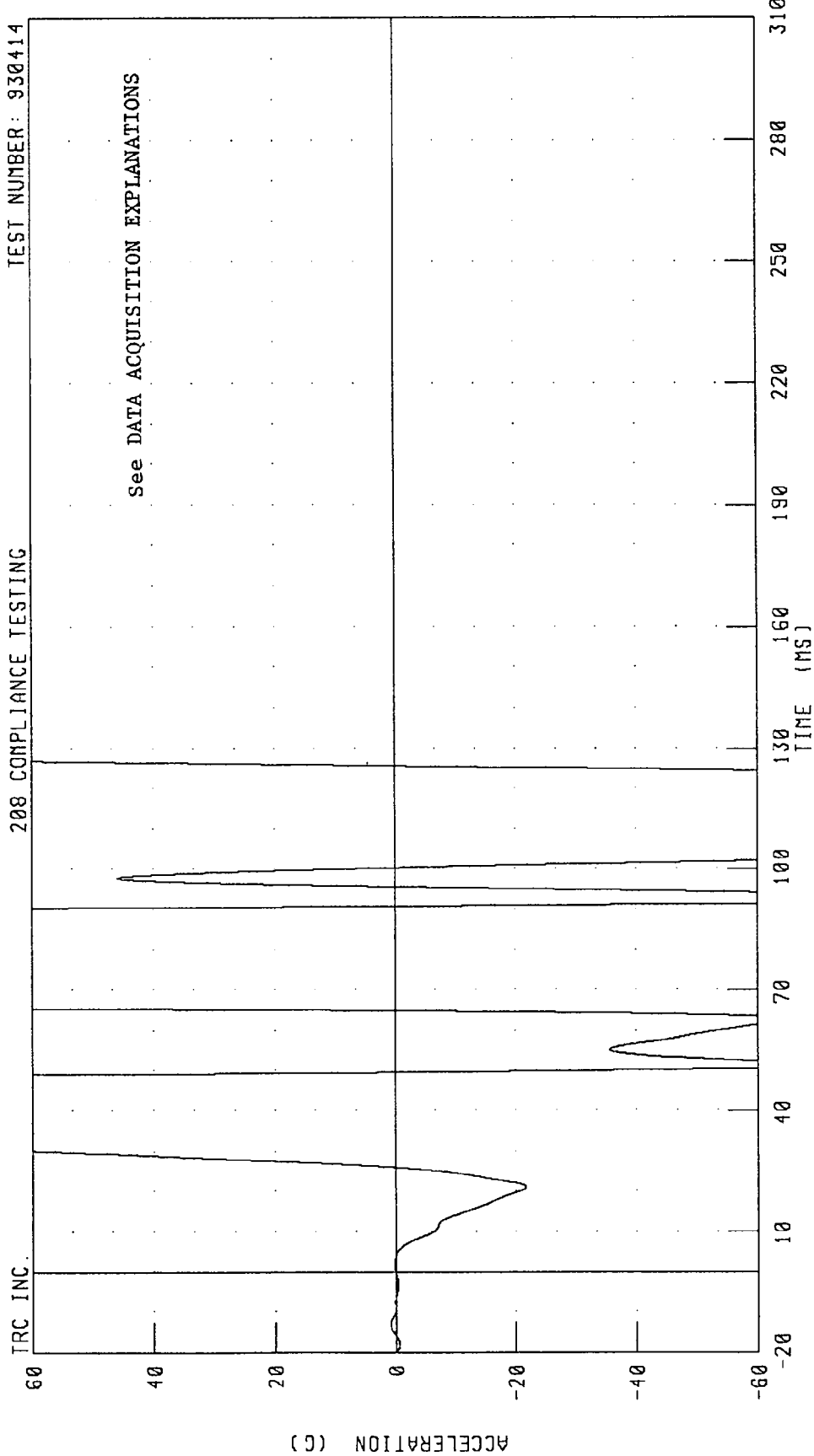
TEST NUMBER 930414



CHANNEL: BCRXG1 FILTER: CH. CLASS 60

1993 GEO METRO INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414

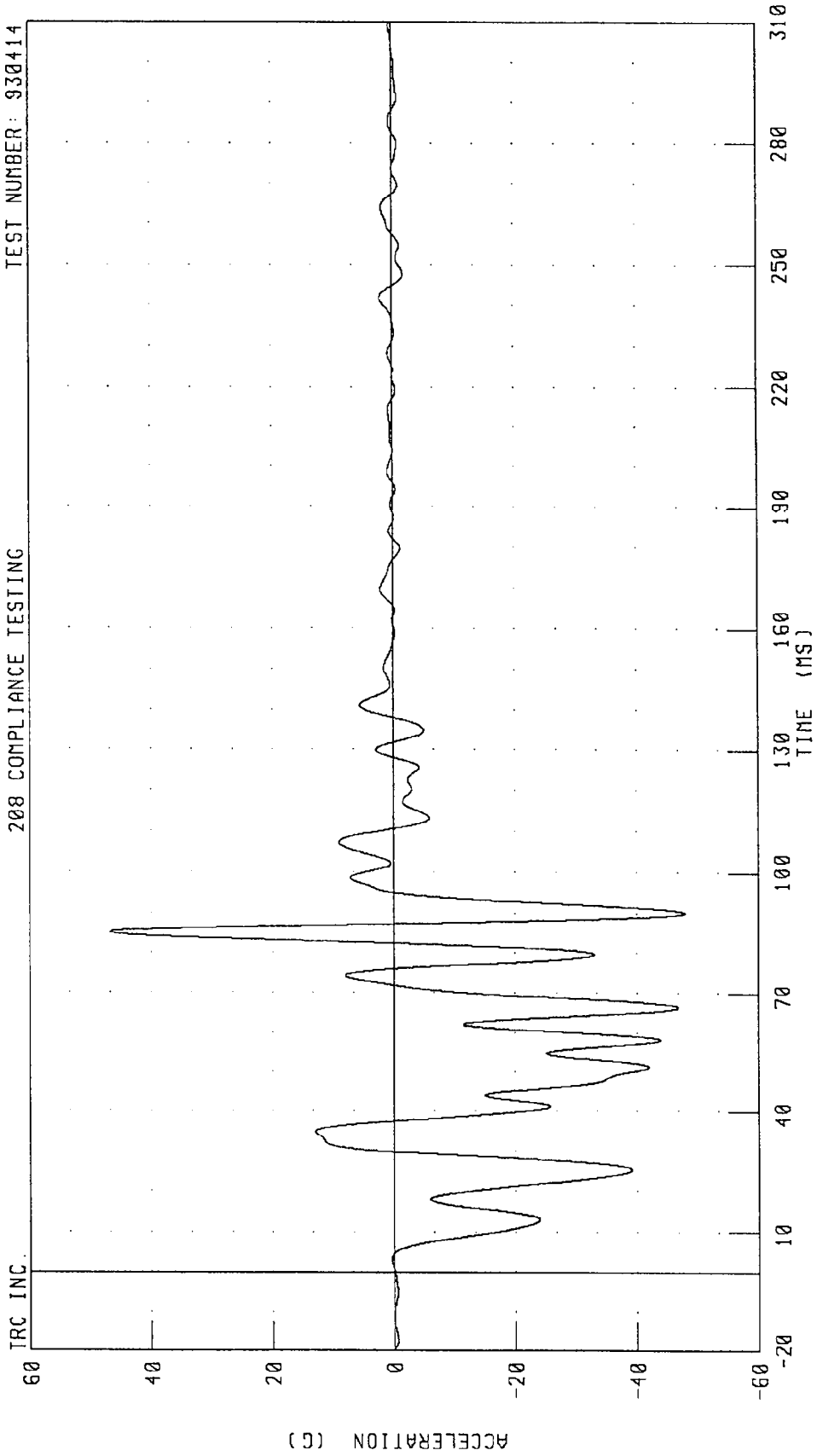


PEAK DATA: 1194.77 G @ 84.13 MS; -209.94 G @ 119.25 MS

CHANNEL: BCLXCI FILTER: CH. CLASS 60

1993 GEO METRO INTO FLAT FRONTAL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 930414



PEAK DATA: 46.78 G @ 85.00 MS, -47.87 G @ 90.13 MS

CHANNEL: OPCXG1 FILTER: CH. CLASS 60