

V1854

REPORT NOS. 208-TRC-93-010

212-TRC-93-010

301-TRC-93-010

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

GENERAL MOTORS CORPORATION

1993 CHEVROLET LUMINA APV

SPECIAL PURPOSE VEHICLE

NHTSA NO. CP0107

TRC TEST NO. 930113

TRANSPORTATION RESEARCH CENTER INC.

10820 STATE ROUTE 347

EAST LIBERTY, OHIO 43319



JANUARY 29, 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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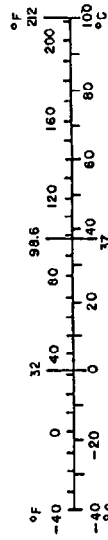
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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1993 Chevrolet Lumina APV special purpose vehicle, NHTSA No. CP0107, at the Transportation Research Center Inc. on January 13, 1993. This test was conducted to determine compliance 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 20.7 inches. The ambient temperature was 69° F. The driver's head injury criteria (HIC) was 640. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 37.3 g. The driver's chest maximum deflection was 1.5 inches. The driver's left and right femur maximum axial forces were 903 pounds and 919 pounds, respectively (See DATA ACQUISITION EXPLANATIONS). The passenger's head injury criteria (HIC) was 423. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 34.5 g. The passenger's chest maximum deflection was 1.5 inches. The passenger's left and right femur maximum axial forces were 559 pounds and 556 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 Hornick		
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	meters	m
yd	yards	0.9	kilometers	km
mi	miles	1.6		
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

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
km	kilometers	1.1	yards	yd
		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



*1 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C1110-286.

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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 Chevrolet Lumina APV special purpose vehicle, NHTSA No. CP0107, 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 January 13, 1993.

The test vehicle, a 1993 Chevrolet Lumina APV special purpose vehicle, NHTSA No. CP0107, 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 3.1 liter, transverse engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 4240 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 20.7 inches.

The driver's head injury criteria (HIC) was 640. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 37.3 g. The driver's chest maximum deflection was 1.5 inches. The driver's left and right femur maximum axial forces were 903 pounds and 919 pounds, respectively (See DATA ACQUISITION EXPLANATIONS).

The right front passenger's HIC was 423. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 34.5 g. The right front passenger's chest maximum deflection was 1.5 inches. The right front passenger's left and right femur maximum axial forces were 559 pounds and 556 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 head Z-axis accelerometer, HEDZG1, recorded questionable data spikes at 17 and 301 milliseconds. These data spikes affected the driver's head resultant acceleration calculation. The data acquisition circuit was checked immediately after the impact. The circuit appeared normal. In addition, the dummy's head passed the post-test calibration head drop test. The cause of the spikes could not be identified.

The driver's right femur force load cell, RFMF1, recorded multiple questionable data spikes from 98 to 249 milliseconds. The data acquisition circuit was checked immediately after the impact. The circuit appeared normal. The cause of the spikes could not be identified.

The engine top accelerometer, ENGXG1, recorded questionable data from 24 to 26 milliseconds due to the accelerometer cable being pinched by the vehicle's crush upon impact.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CP0107 TEST TYPE: Frontal Barrier Impact

TEST DATE: 01/13/93 TEST TIME: 1519 AMBIENT TEMP. (°F): 69

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1993/Chevrolet/Lumina APV/
special purpose vehicle

VEHICLE TEST WEIGHT (LBS): 4240

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 20.7

AVERAGE REBOUND (IN): 19.0

DUMMIES: Driver #229 Passenger #314

TYPE: Part 572 E Part 572 E

LOCATION: Left front Right front

RESTRAINT: Three-point unbelt 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: General Motors Corporation

MAKE/MODEL: Chevrolet/Lumina APV

VIN: 1GNDU06D7PT105182

BODY STYLE: special purpose vehicle

MODEL YEAR: 1993

NHTSA NO.: CP0107

COLOR: Blue

ENGINE DATA: TYPE: Transverse CYLINDERS: 6 DISPLACEMENT: 3.1 liter

TRANSMISSION DATA: 3 SPEED, MANUAL, X AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 12/17/92

ODOMETER READING: 56

DEALER'S NAME AND ADDRESS: LaPorte Chevrolet-Oldsmobile-Geo, Inc.
216 E. Main St.
Westfield, NY 14787

ACCESSORIES:

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

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

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: General Motors Corporation

DATE OF MANUFACTURE: 09/92

VIN: 1GNDU06D7PT105182

GVWR: 5126 LBS

GAWR: FRONT: 2642 LBS., REAR: 2568 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): General, Ameritech St, P205/70R15

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

SPARE TIRE (MFR., LINE, SIZE): Goodyear/Convenience Spare, T125/70R15

TYPE OF SEATS: FRONT: Bucket
REAR: Bucket

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 74.0 INCHES

WHEELBASE: 109.8 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on the driver's door.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P205/70R15

RECOMMENDED COLD TIRE PRESSURE: FRONT: 35 PSI; REAR: 35 PSI

DESIGNATED SEATING CAPACITY: NA FRONT NA REAR NA TOTAL

VEHICLE CAPACITY WEIGHT: NA LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 29.8; RF 29.8; LR 27.0; RR 27.1

FULLY LOADED ATTITUDE: LF 29.3; RF 29.4; LR 25.3; RR 25.5

PRE-TEST ATTITUDE: LF 29.4; RF 29.6; LR 25.0; RR 25.1

POST-TEST ATTITUDE: LF NA ; RF 31.1; LR 25.2; RR 24.5

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	1069 LBS.	RIGHT REAR	740 LBS.
LEFT FRONT	1082 LBS.	LEFT REAR	728 LBS.
TOTAL FRONT WEIGHT	2151 LBS.	(59.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1468 LBS.	(40.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 3619 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

GVWR = GROSS VEHICLE WEIGHT RATING (5126 LBS)

UDW = UNLOADED ELIVERED WEIGHT (3619 LBS)

VCW = VEHICLE CAPACITY WEIGHT = GVWR - UDW = 5126 - 3619 = 1507

DSC = DESIGNATED SEATING CAPACITY (7)**

RCLW* = GVWR - UDW - 150 (DSC) = 5126 - 3619 - 150(7) = 457 LBS.

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

TARGET TEST WEIGHT = 3619 + 300 + 334

TARGET TEST WEIGHT = 4253 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 287 LBS. OF CARGO WEIGHT:

RIGHT FRONT	1158 LBS.	RIGHT REAR	1012 LBS.
LEFT FRONT	1084 LBS.	LEFT REAR	986 LBS.
TOTAL FRONT WEIGHT	2242 LBS.	(52.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1998 LBS.	(47.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	4240 LBS.	(0.3% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 250 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 51.7 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.

**The designated seating capacity is determined by counting the number of seat belts installed in the vehicle.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 930113 NHTSA NO.: CP0107
TEST DATE: 01/13/93 TEST TIME: 1519
TEST TYPE: Frontal Barrier Impact IMPACT ANGLE: 0
AMBIENT TEMPERATURE AT IMPACT AREA: 69° F
TEMPERATURE IN OCCUPANT COMPARTMENT: 70° F
IMPACT VELOCITY: PRIMARY = 29.3 MPH SECONDARY = 29.3 MPH
(SPECIFIED RANGE = 28.9 TO 29.9 MPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 14.0 IN.
EXITING VELOCITY TRAP = 2.0 IN.

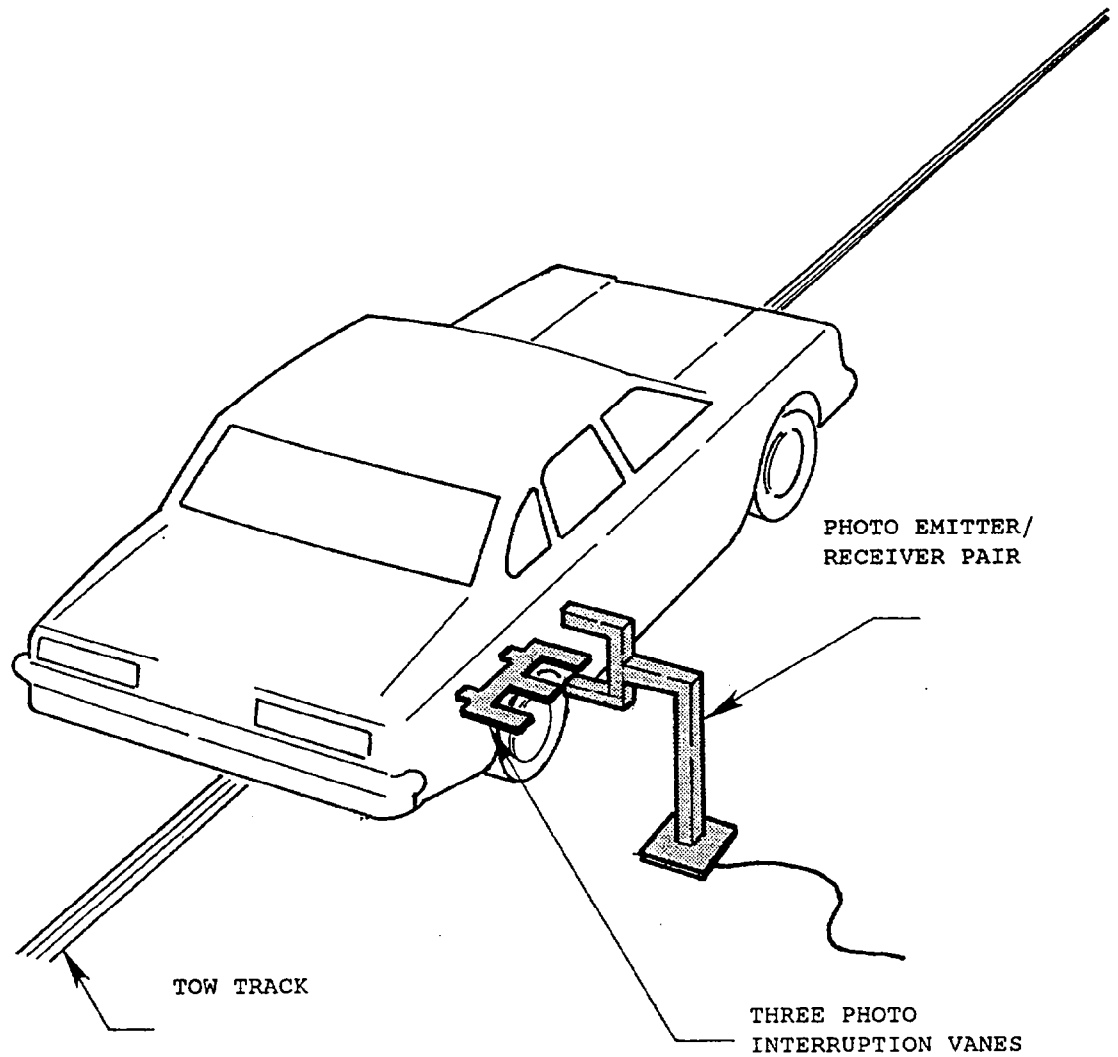
TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN INCHES):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 185.0; C 192.5; R 186.0
POST-TEST: L 167.5; C 171.9; R 168.4
TOTAL CRUSH: L 17.5; C 20.6; R 17.6
AVERAGE CRUSH: 18.6

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 20.8; C 16.3; R 19.8; AVG. 19.0

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: Chevrolet/Lumina APV/special purpose veh.

VEHICLE NHTSA NO.: CP0107; VIN: 1GNDU06D7PT105182

MODEL YEAR: 1993; BUILD DATE: 09/92; TEST DATE: 01/13/93

VEHICLE SIZE CATEGORY: Special purpose; TEST WEIGHT: 4240 LBS.

VEHICLE WHEELBASE: 109.8 INCHES

MAXIMUM WIDTH: 74.0 INCHES

FRONT OVERHANG: 43.8 INCHES

COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
MEASUREMENTS:

C1 = 17.5 INCHES

C2 = 20.3 INCHES

C3 = 20.3 INCHES

C4 = 20.7 INCHES

C5 = 19.7 INCHES

C6 = 17.6 INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
REGION: L = 60.0 INCHES

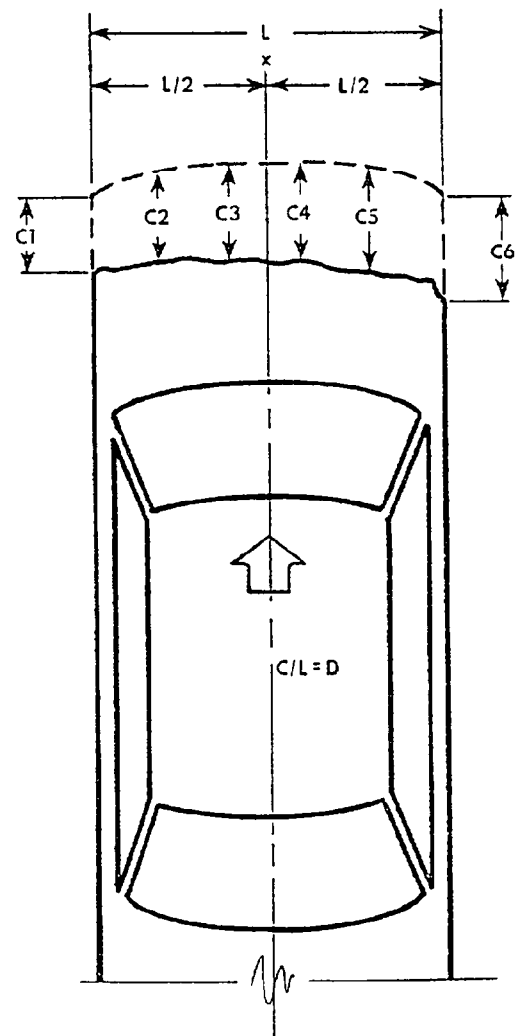
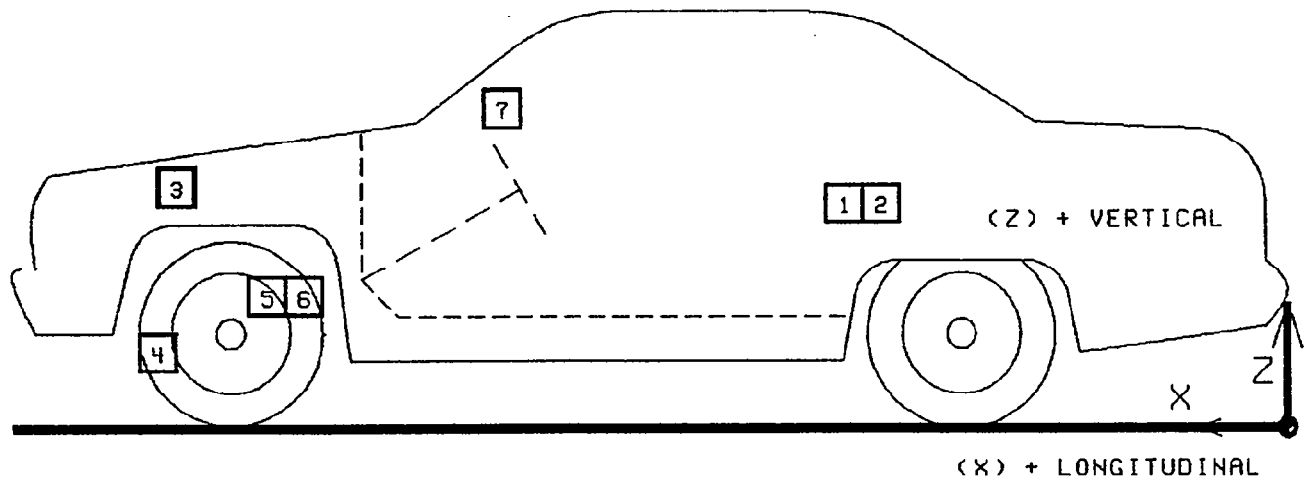
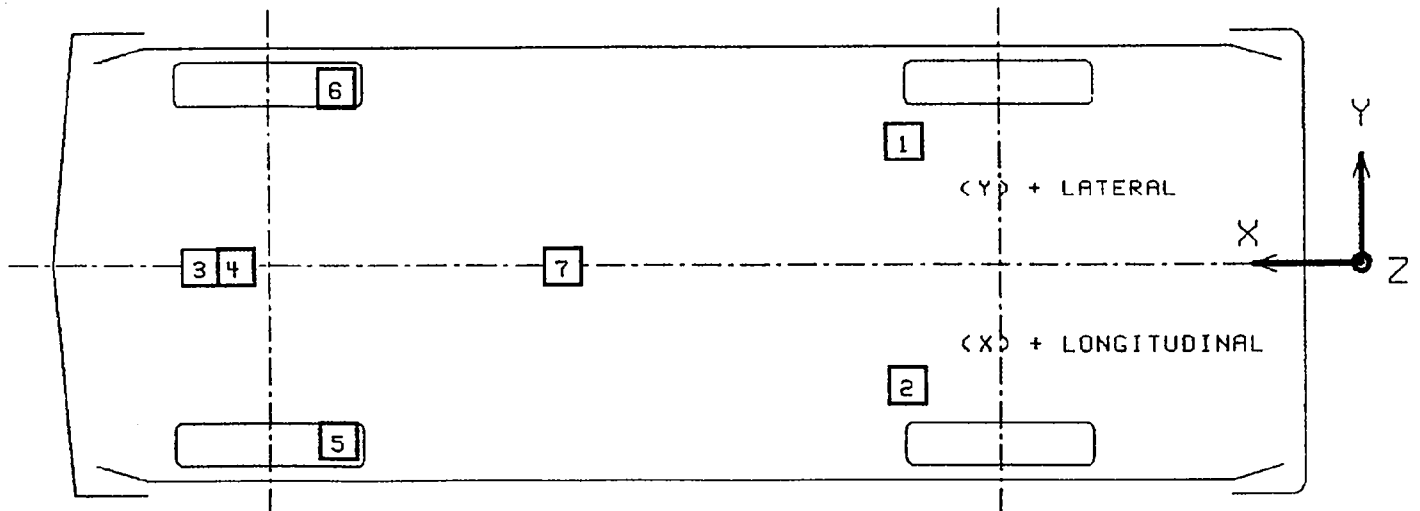


FIGURE 3
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930113

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G	MSEC	MAX G	MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	66.3	26.4	18.4				
		POST	66.3	26.4	19.9				
						1.6	157.0	20.2	57.3
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	70.9	-26.4	18.4				
		POST	70.9	-26.4	19.9				
						1.7	173.1	21.5	57.0
3	ENGINE TOP LONGITUDINAL	PRE	163.9	-1.8	31.2				
		POST	157.6	-1.8	29.8				
						31.9	69.2 ^Y	87.7	45.0 ^Y
4	ENGINE BOTTOM LONGITUDINAL	PRE	155.9	-6.6	11.4				
		POST	149.1	-5.1	8.4				
						15.4	73.4	70.1	48.4
5	RIGHT BRAKE CALIPER LONGITUDINAL	PRE	156.5	-23.9	13.9				
		POST	154.1	-24.0	14.0				
						6.5	70.1	62.4	58.0
6	LEFT BRAKE CALIPER LONGITUDINAL	PRE	156.5	23.9	13.9				
		POST	155.6	26.5	13.7				
						8.5	103.4	58.3	59.8
7	INSTRUMENT PANEL CENTER LONGITUDINAL	PRE	134.5	-0.9	41.8				
		POST	134.0	-0.9	44.2				
						10.8	62.8	38.0	44.6

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

Y 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.: CP0107
MAKE/MODEL/BODY STYLE: Chevrolet/Lumina APV/special purpose vehicle
MODEL YEAR: 1993 BODY COLOR: Blue
VIN: 1GNDU06D7PT105182
ODOMETER (ARRIVAL): 56 DATE: 12/17/92
ODOMETER (COMPLETION): 62 DATE: 01/13/93
COST: \$18,260.00

<u>X</u> AIR CONDITIONER	<u> </u> CONSOLE	BRAKES: <u>X</u> POWER
<u>X</u> TINTED GLASS	<u> </u> TACHOMETER	FRONT: Disc ABS
<u>X</u> POWER STEERING	<u>X</u> SPEED CONTROL	REAR: Drum ABS
<u>X</u> POWER WINDOWS	<u>X</u> REAR WINDOW DEF.	
<u>X</u> POWER DOOR LOCKS	<u> </u> SUN/MOON ROOF	FRONT SEATS: <u> </u> POWER
<u>X</u> RADIO	<u> </u> T-TOP	SEAT TYPE: Bucket
<u>X</u> CLOCK	<u>X</u> TILT STEERING WHEEL	NO. OF SEATS: 7
<u> </u> ROOF RACK	<u> </u> OTHER OPTIONS: <u> </u>	
		<u> </u>
		<u> </u>

ENGINE: 6 CYLINDERS; 3.1 LITERS
TRANSMISSION: automatic; DRIVE TYPE: Front wheel drive
TIRE SIZE: P205/70R15
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	-66.8	-4.9	-31.4Y	70.0Y	-38.7	7.9	-7.1
PASSENGER	-35.1	8.1	-44.3	48.8	-35.0	10.4	7.7

MAXIMUM FEMUR COMPRESSIVE FORCE (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	903	919Y
PASSENGER	559	556

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC)	TIME t_2 (MSEC)
DRIVER	640	83.0	114.0
PASSENGER	423	85.8	121.8

CHEST MAXIMUM RESULTANT ACCELERATION*

	ACCEL. (G)	TIME t_1 (MSEC)	TIME t_2 (MSEC)
DRIVER	37.3	82.4	85.5
PASSENGER	34.5	90.5	93.5

MAXIMUM CHEST DEFLECTION (IN.)

DRIVER	1.5
PASSENGER	1.5

*Defined as equal to or exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Y See DATA ACQUISITION EXPLANATIONS

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #229	PASSENGER #314
HEAD	Upper <u>steering wheel rim</u>	<u>None</u>
	Lower	
CHEST	<u>steering wheel rim</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>None</u>	<u>None</u>

GLAZING DAMAGE:

The lower half of the windshield cracked upon impact.

The left front side window shattered on impact.

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 upper torso rotated slightly forward impacting the dummy's chest into the lower steering wheel rim as the dummy's head rotated downward into the upper steering wheel rim. The driver dummy was restrained by the three-point unbelt. The dummy rebounded rearward into the seat back as the dummy's head rotated rearward into the head restraint. The driver dummy came to rest in the driver's seat 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. 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 into 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: Chevrolet/Lumina APV VIN: 1GNDU06D7PT105182
BODY STYLE: special purpose vehicle NHTSA NO.: CP0107
DATE OF MANUFACTURE: 09/92

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: Chevrolet/Lumina APV

VIN: 1GNDU06D7PT105182

BODY STYLE: special purpose vehicle

NHTSA NO.: CP0107

DATE OF MANUFACTURE: 09/92

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: Chevrolet/Lumina APV

VIN: 1GNDU06D7PT105182

BODY STYLE: special purpose vehicle

NHTSA NO.: CP0107

DATE OF MANUFACTURE: 06/92

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? NO

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? YES

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 = continuous sec.

WITH OCCUPANT IN DRIVER'S POSITION AND PASSIVE BELT 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 = 0 sec.

WORDING OF VISUAL WARNING:

 Fasten Seat Belt

 Fasten Belt

 X Symbol 101-80

 Other:

NOTE: The seat belt reminder light and audible warning signal did not initially function due to a wire connector located under the driver's seat being disconnected. TRC personnel fastened the wire connector to allow the system to operate.

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 PROTECTON SYSTEM:

Not applicable, vehicle did not contain a crash-deployed occupant protection
syste.

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.

Not applicable, vehicle did not contain a crash-deployed occupant protection system.

FIGURE 4 FMVSS 212 TEST DATA

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

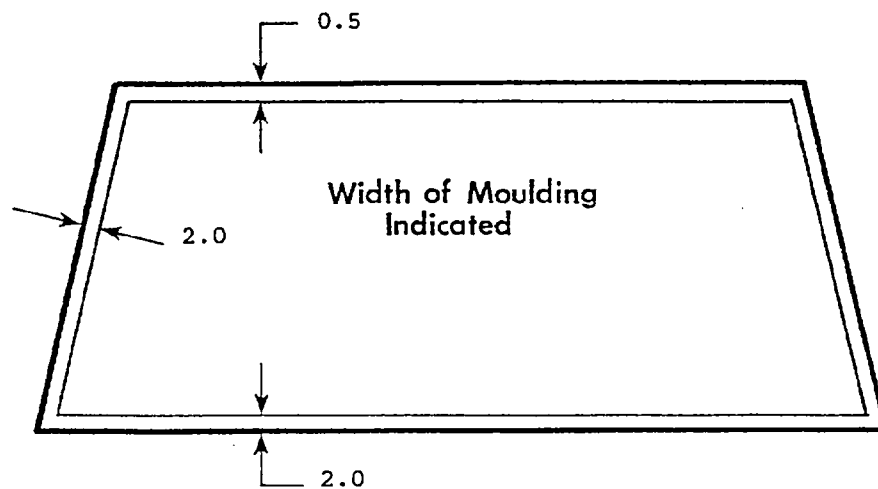
Plastic trim around outer perimeter, adhesive around inner perimeter.

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	97.4	97.4	100
LEFT SIDE	97.4	97.4	100
TOTAL	194.8	194.8	100

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 70° 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:

A = 57.8

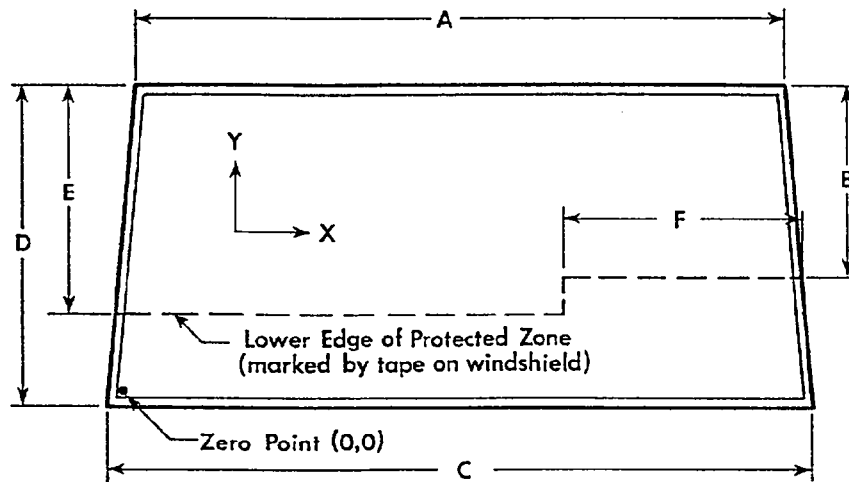
B = 28.4

C = 64.2

D = 41.5

E = 28.9

F = 60.0



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: Chevrolet/Lumina APV

NHTSA NO.: CP0107

FUEL SYSTEM CAPACITY: 20.0 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 16.6 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 15.3 GALLONS TO 15.6 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 15.5 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

TABLE 12 FMVSS 301 POST-IMPACT TEST DATA

TEST VEHICLE NHTSA NO.: CP0107 ; TEST DATE: 01/13/93

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Lumina APV/special purpose vehicle

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:

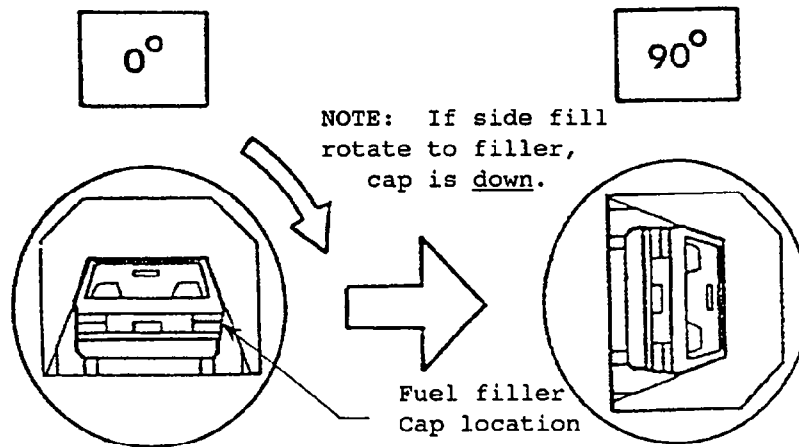
	<u>TEST</u> <u>RESULTS</u>	<u>MAXIMUM</u> <u>ALLOWABLE</u>
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 OZ.	1 OZ.
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 OZ.	5 OZ.
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 OZ.	1 OZ./1 MIN.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA

NHTSA NO.: CP0107
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:

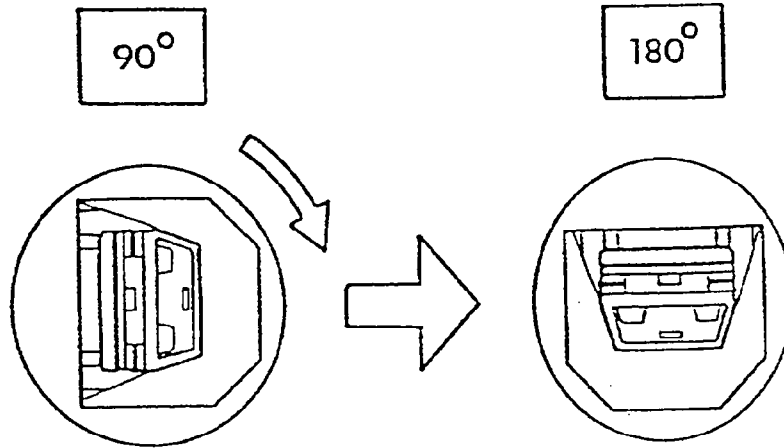
<u>0° TO 90° ROTATION (FUEL FILLER CAP DOWN)</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CP0107
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:

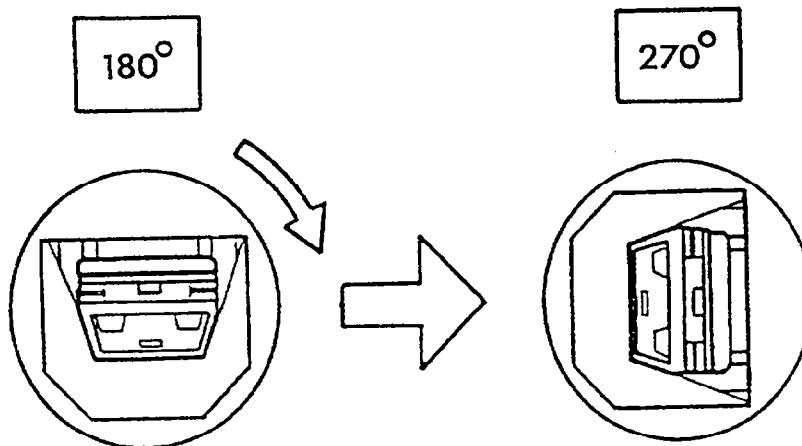
<u>90° TO 180° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CP0107
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:

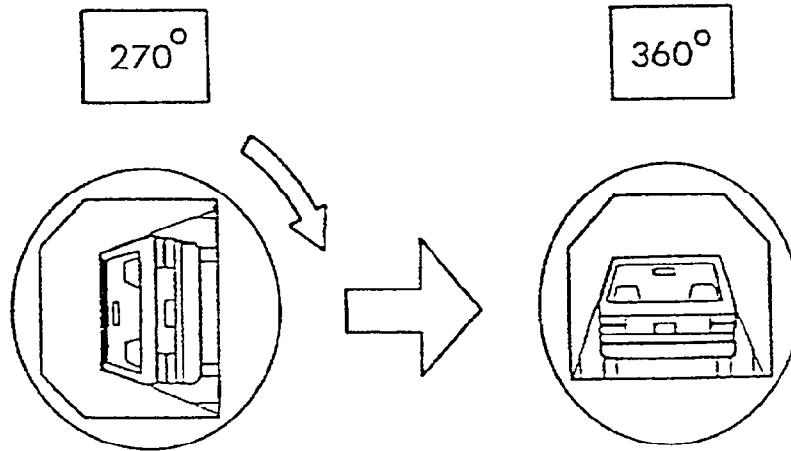
<u>180° TO 270° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CP0107
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

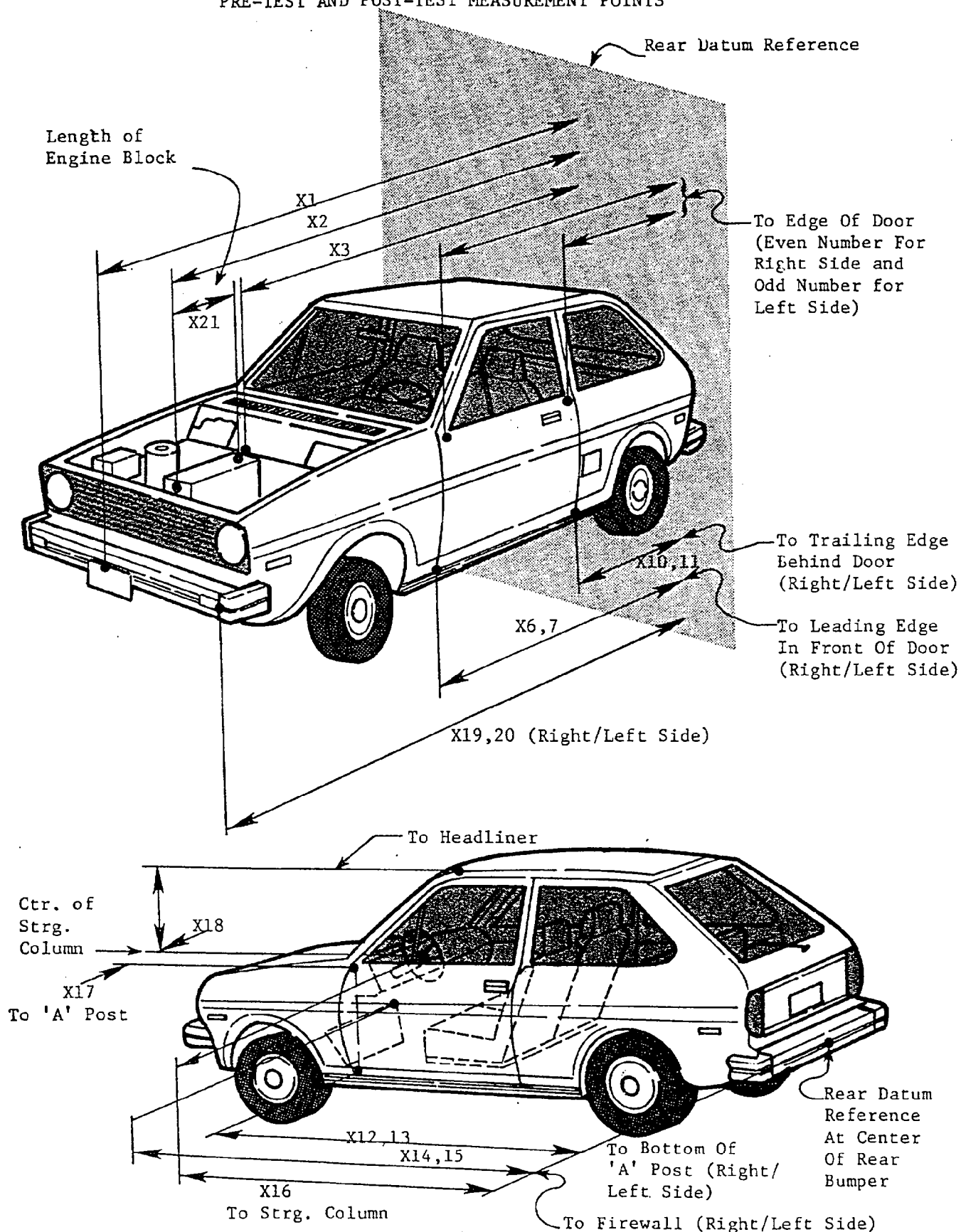
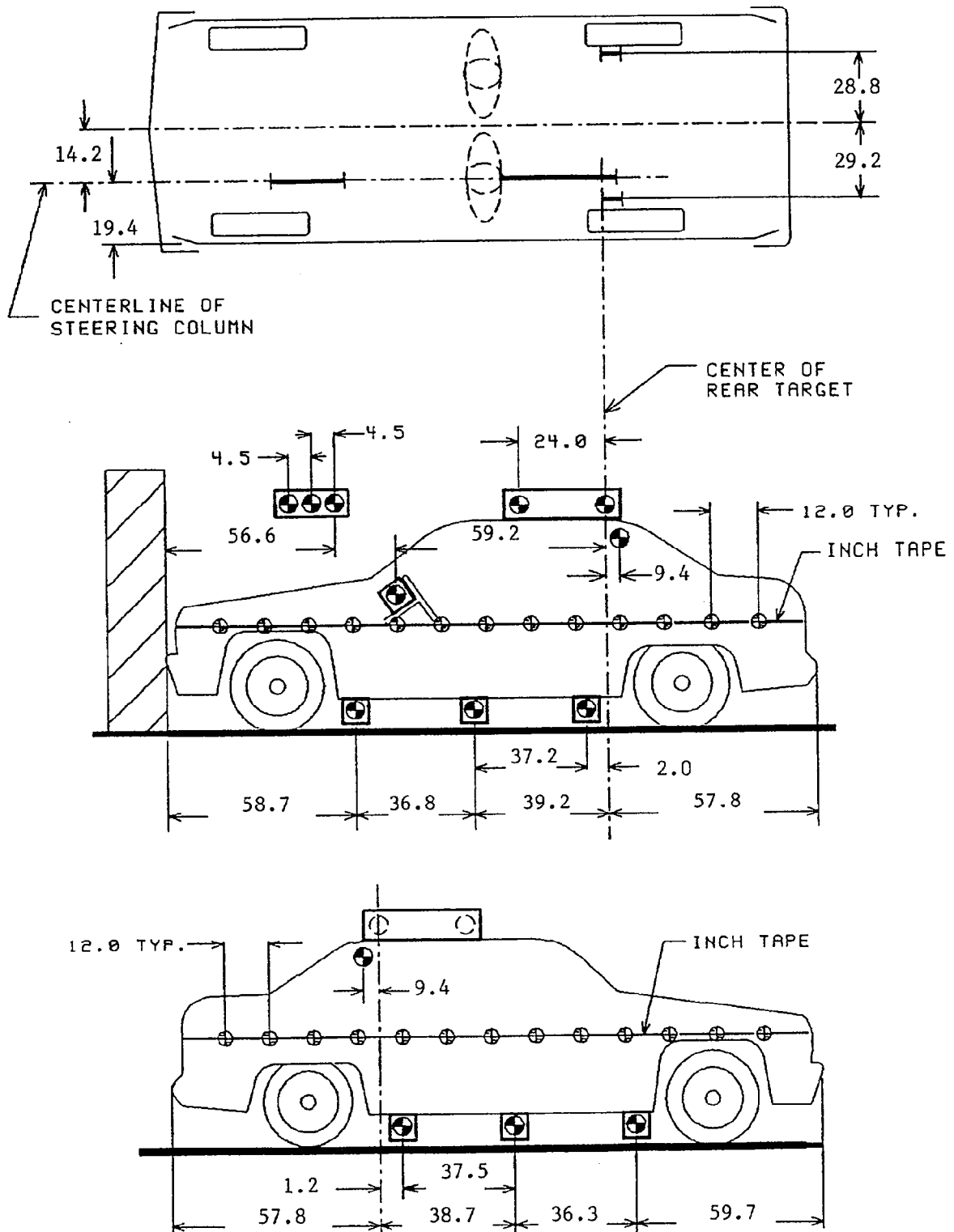


TABLE 13 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Chevrolet/Lumina		TEST NUMBER: 930113		ALL MEASUREMENTS ARE IN INCHES		
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.		
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	192.5	171.9	20.6		
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	165.0	159.1	5.9		
X3	REAR SURFACE OF VEHICLE TO FIREWALL	143.5	143.4	0.1		
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	133.0	132.9	0.1		
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	133.0	132.8	0.2		
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	133.8	133.5	0.3		
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	134.1	134.2	-0.1		
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	90.8	90.7	0.1		
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	90.6	90.5	0.1		
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	91.8	91.8	0.0		
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	92.0	92.2	-0.2		
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	131.9	131.5	0.4		
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	132.1	131.7	0.4		
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	139.5	141.2	-1.7		
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	141.4	142.5	-1.1		
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	117.0	115.8	1.2		
X17	CENTER OF STEERING COLUMN TO "A" POST	14.3	13.9	0.4		
X18	CENTER OF STEERING COLUMN TO HEADLINER	18.3	18.6	-0.3		
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	186.0	168.4	17.6		
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	185.0	167.5	17.5		
X21	LENGTH OF ENGINE BLOCK	16.0	16.0	0.0		

FIGURE 8

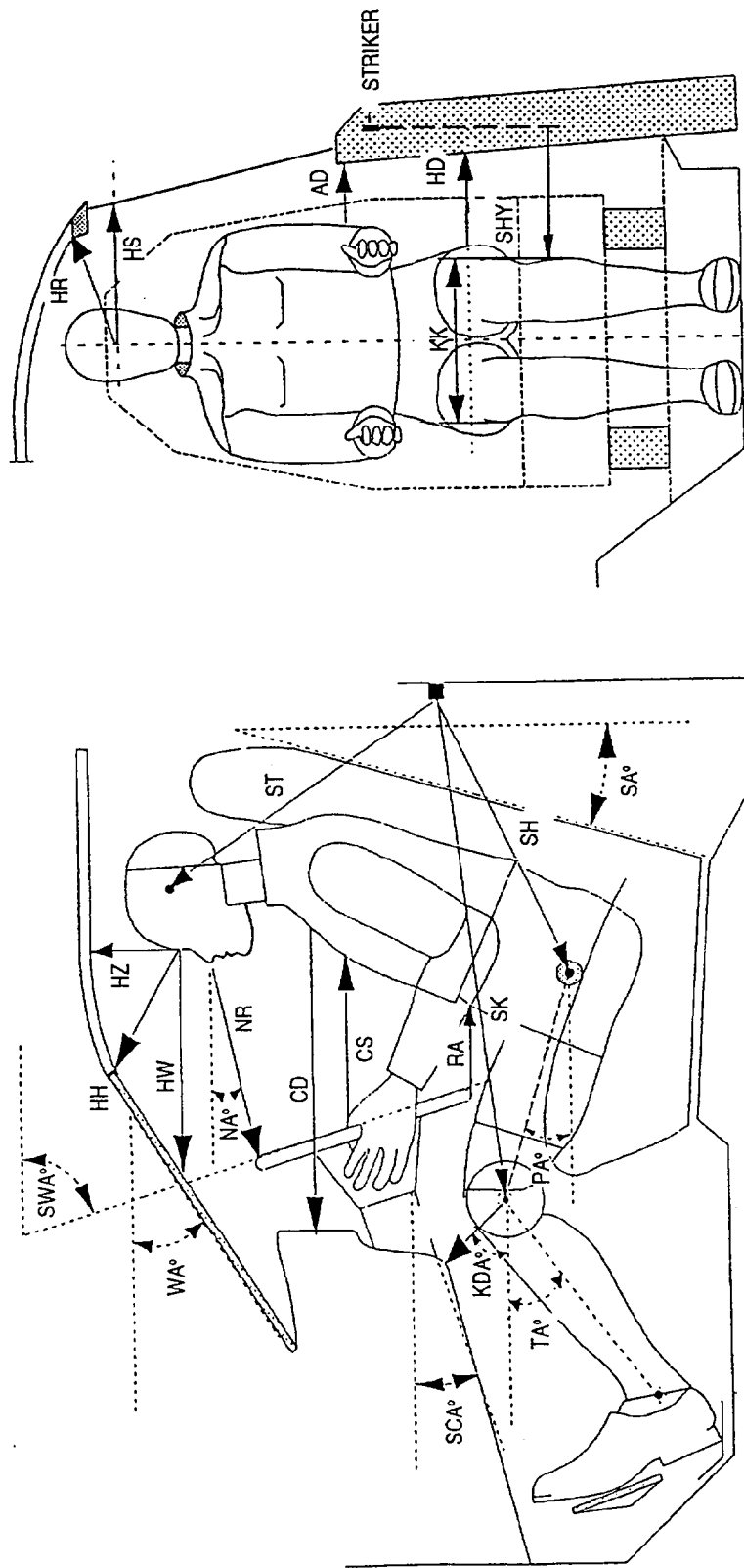
VEHICLE TARGET LOCATIONS



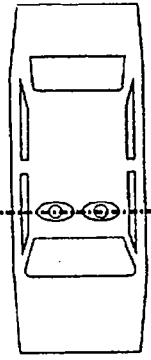
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9

DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS



VERTICAL TRANSVERSE PLANE



VERTICAL LONGITUDINAL PLANE

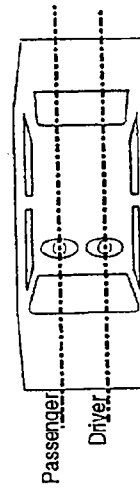


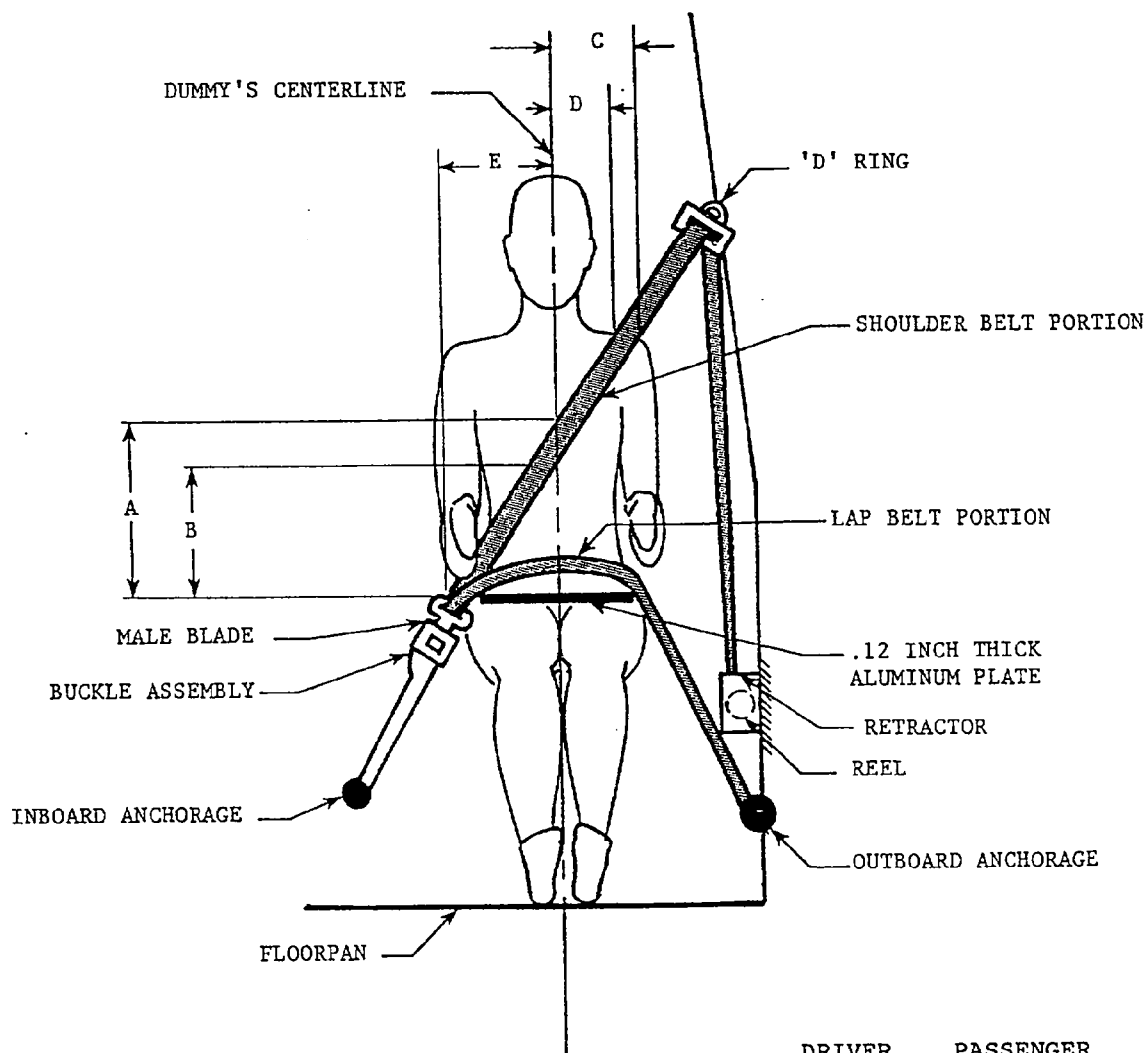
TABLE 14 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

DESIGNATION	TYPE OF MEASUREMENT	DRIVER (SERIAL #229)	PASSENGER (SERIAL #314)
WA°	WINDSHIELD ANGLE	23°	NA
SWA°	STEERING WHEEL ANGLE	65°	NA
SCA°	STEERING COLUMN ANGLE	27°	NA
SA°	SEAT BACK ANGLE	24°	24°
HZ	HEAD TO ROOF	9.8	8.2
HH	HEAD TO HEADER	17.9	17.7
HW	HEAD TO WINDSHIELD	33.1	33.8
HR	HEAD TO SIDE HEADER	11.1	10.0
NR	NOSE TO RIM	14.9	NA
NA	NOSE TO RIM ANGLE	9°	NA
CD	CHEST TO DASH	20.4	23.0
CS	STEERING WHEEL TO CHEST	12.6	NA
RA	RIM TO ABDOMEN	6.1	NA
KDL	LEFT KNEE TO DASH	7.1	9.1
KDR	RIGHT KNEE TO DASH	7.3	8.2
KDA	OUTBOARD KNEE TO DASH ANGLE	30°	35°
PA°	PELVIC ANGLE	23°	22°
TA°	TIBIAL ANGLE	50°	48°
KK	KNEE TO KNEE	11.5	10.8
ST	STRIKER TO HEAD	21.8	23.8
	STRIKER TO HEAD ANGLE	-78°	-81°
SK	STRIKER TO KNEE	26.8	25.6
	STRIKER TO KNEE ANGLE	-1°	2°
SH	STRIKER TO H-POINT	12.1	10.2
	STRIKER TO H-POINT ANGLE	23°	8°
SHY	STRIKER TO H-POINT (Y DIR.)	11.0	9.1
HS	HEAD TO SIDE WINDOW	12.1	11.5
HD	H-POINT TO DOOR	4.8	2.8
AD	ARM TO DOOR	5.4	3.6

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

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 10 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUM. PLATE TO BELT UPPER EDGE	15.0	15.2
B - TOP SURFACE OF ALUM. PLATE TO BELT LOWER EDGE	11.4	11.8
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	4.6	4.1
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	2.1	1.9
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	10.4	9.5

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 11 CAMERA POSITIONS

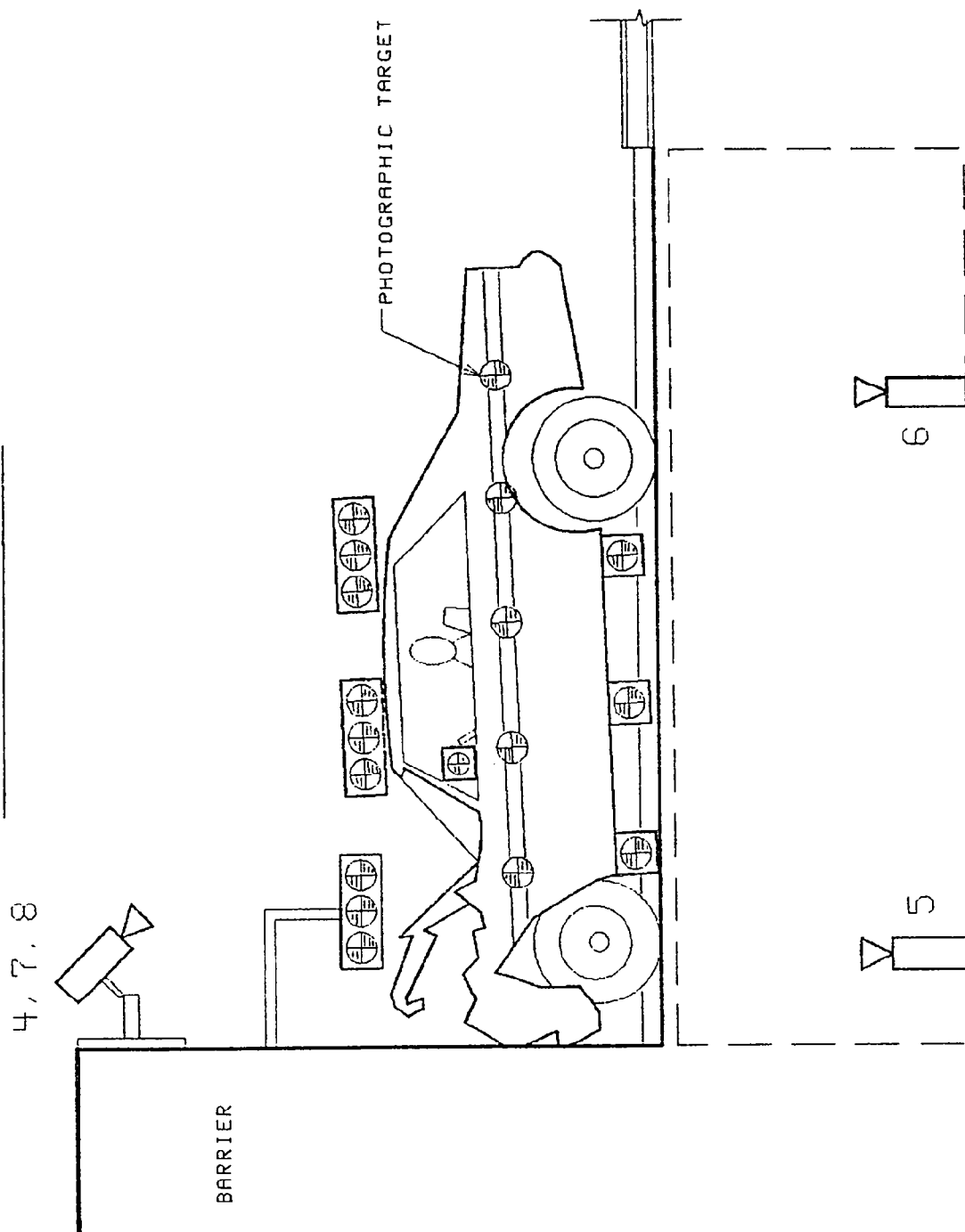


FIGURE 11 CAMERA POSITIONS, CONT'D.

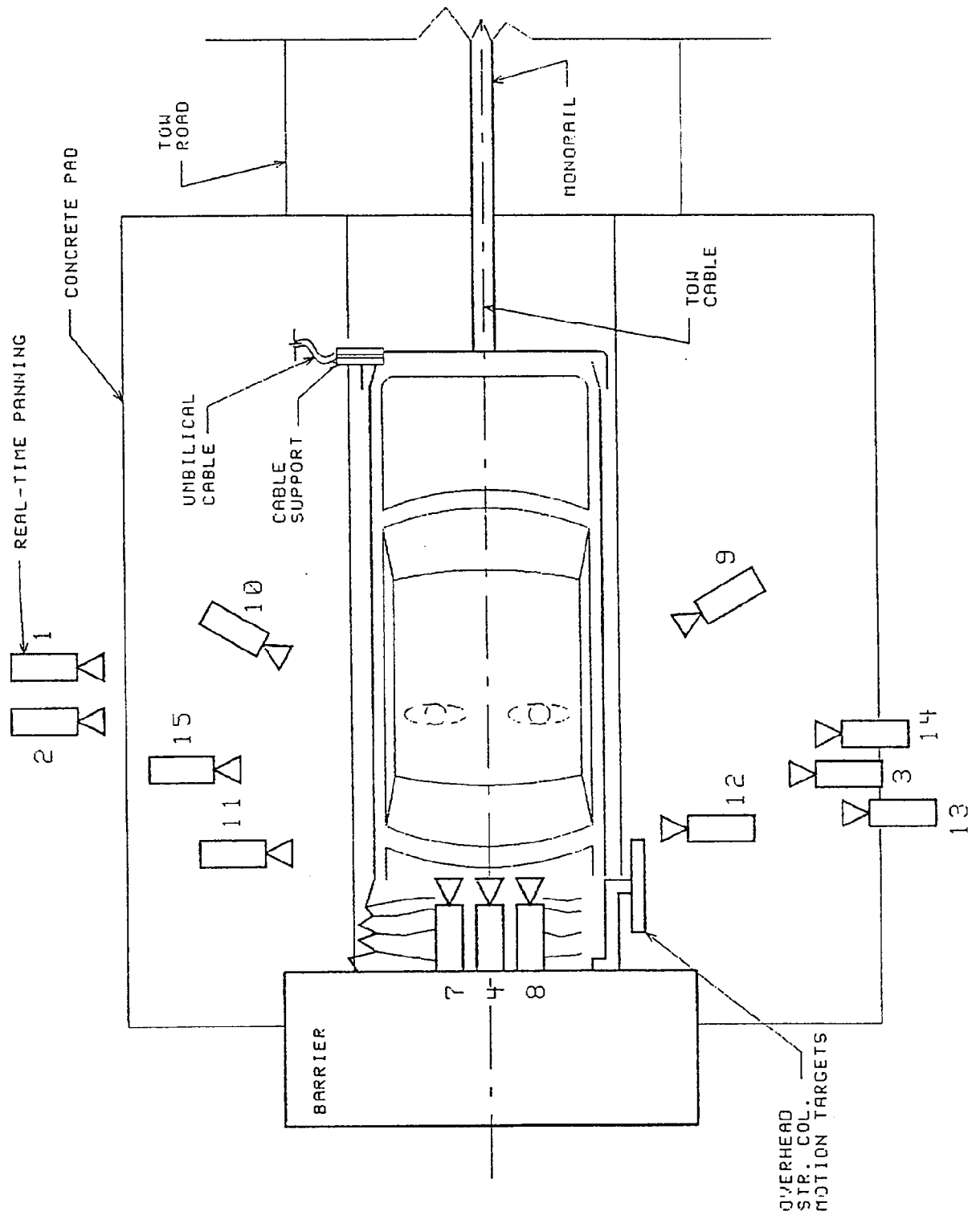


TABLE 15 MOTION PICTURE CAMERA LOCATIONS

TEST NO.:	CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	FILM PLANE		FILM SPEED (FPS)
			X	Y	Z		TO HEAD TARGET(IN)	LENS (MM)	
			VEHICLE: Chevrolet Lumina APV special purpose vehicle						
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	510
3		Left vehicle crush	-41.5	295.0	44.0	-4	235.0	25	1025
4		Windshield front view	-6.0	0.0		-40	NA	13	498
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	1005
7		Passenger front view	-4.5	-13.8	93.0	-50	NA	17	470
8		Driver front view	-6.8	14.5	93.0	-50	NA	17	502
9		Driver kinematics	-157.3	116.0	87.0	-27	90.0	25	498
10		Passenger kinematics	-152.1	-116.0	87.0	-26	84.0	25	500
11		Right windshield intrusion	-38.1	-306.1	44.0	0	NA	50	500
12		Left windshield intrusion	-53.0	309.4	42.3	0	NA	50	***
13		Steering column motion	-120.0	285.0	103.0	-14	NA	25	505
14		Steering column motion	-120.0	285.0	75.1	-9	NA	25	500
15		Passenger kinematics	-38.8	-293.0	45.3	-4	209.0	25	1010
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

*** No film due to camera malfunction.

APPENDIX A

PHOTOGRAPHS

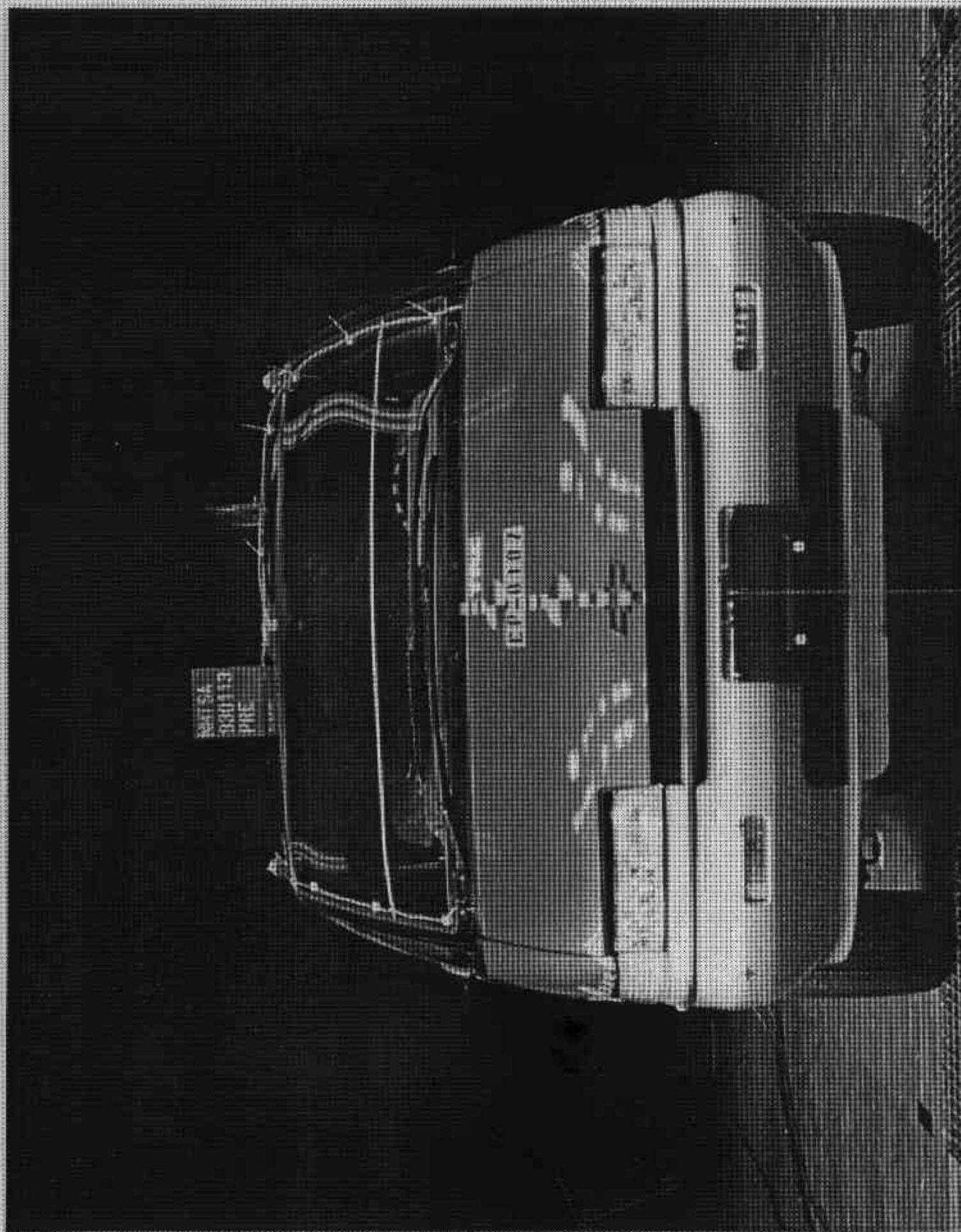


Figure A-1. PRE-TEST FRONT VIEW

A-2

930113

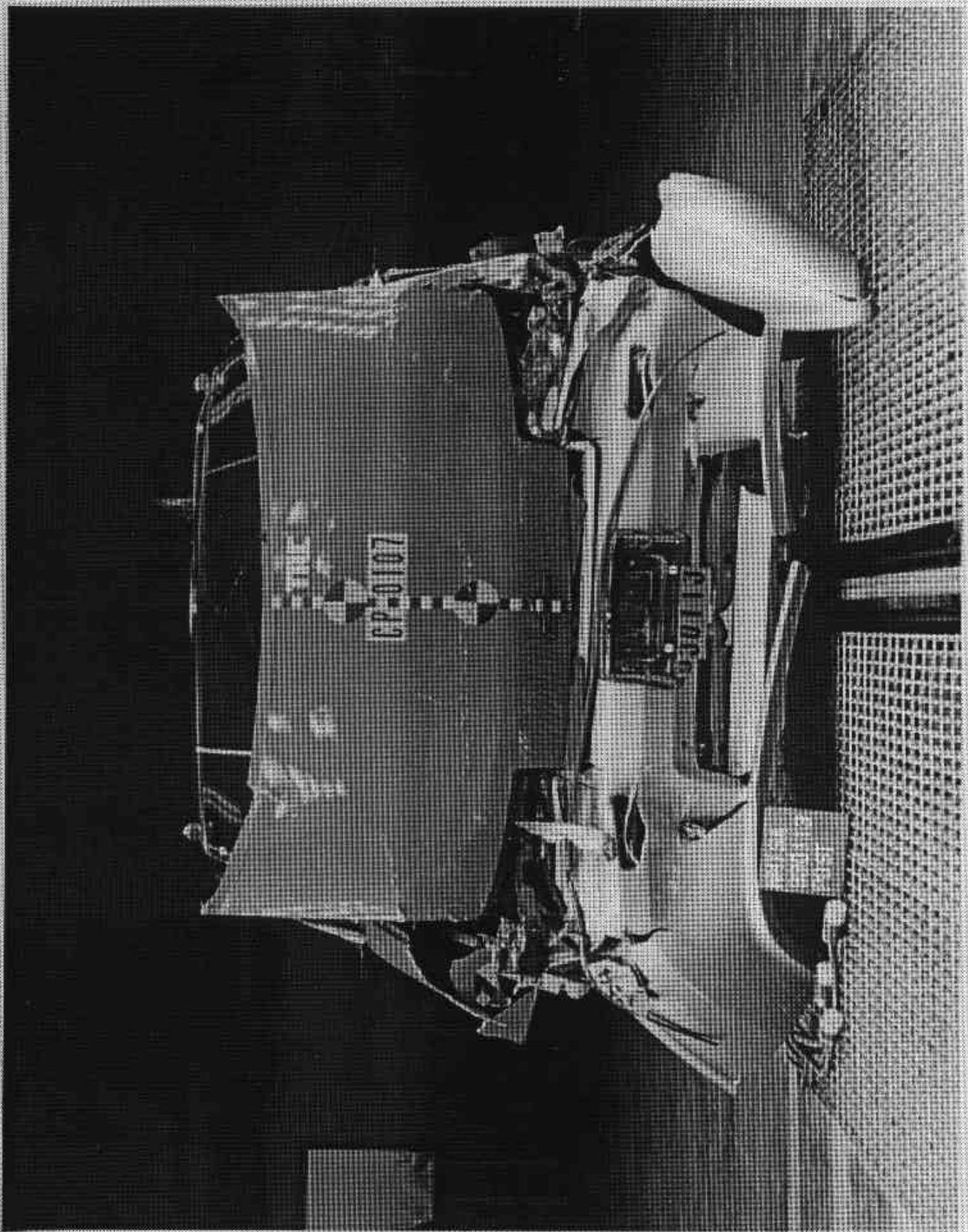


Figure A-2. POST-TEST FRONT VIEW
A-3

930113

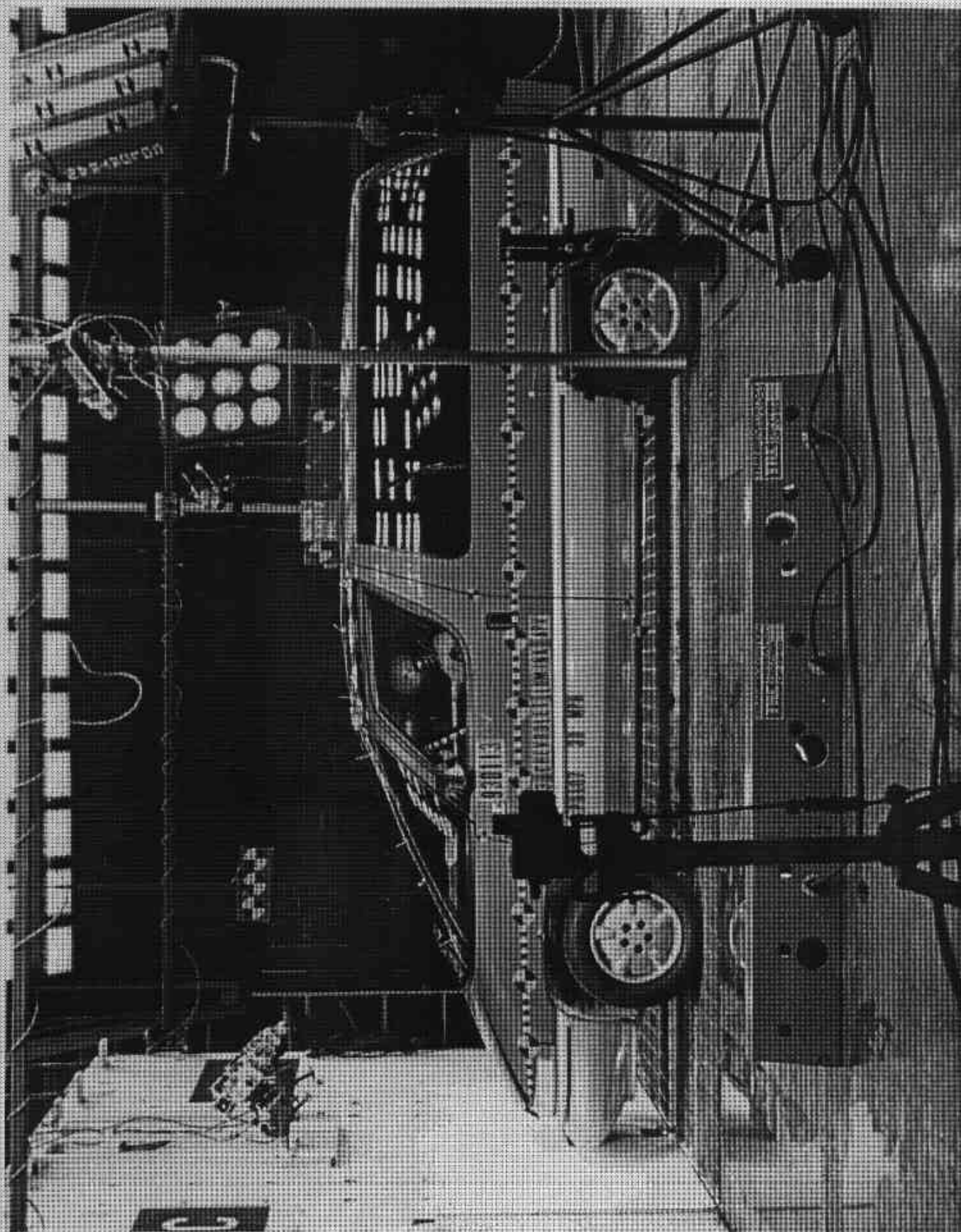


Figure A-3. PRE-TEST LEFT SIDE VIEW
A-4

930113

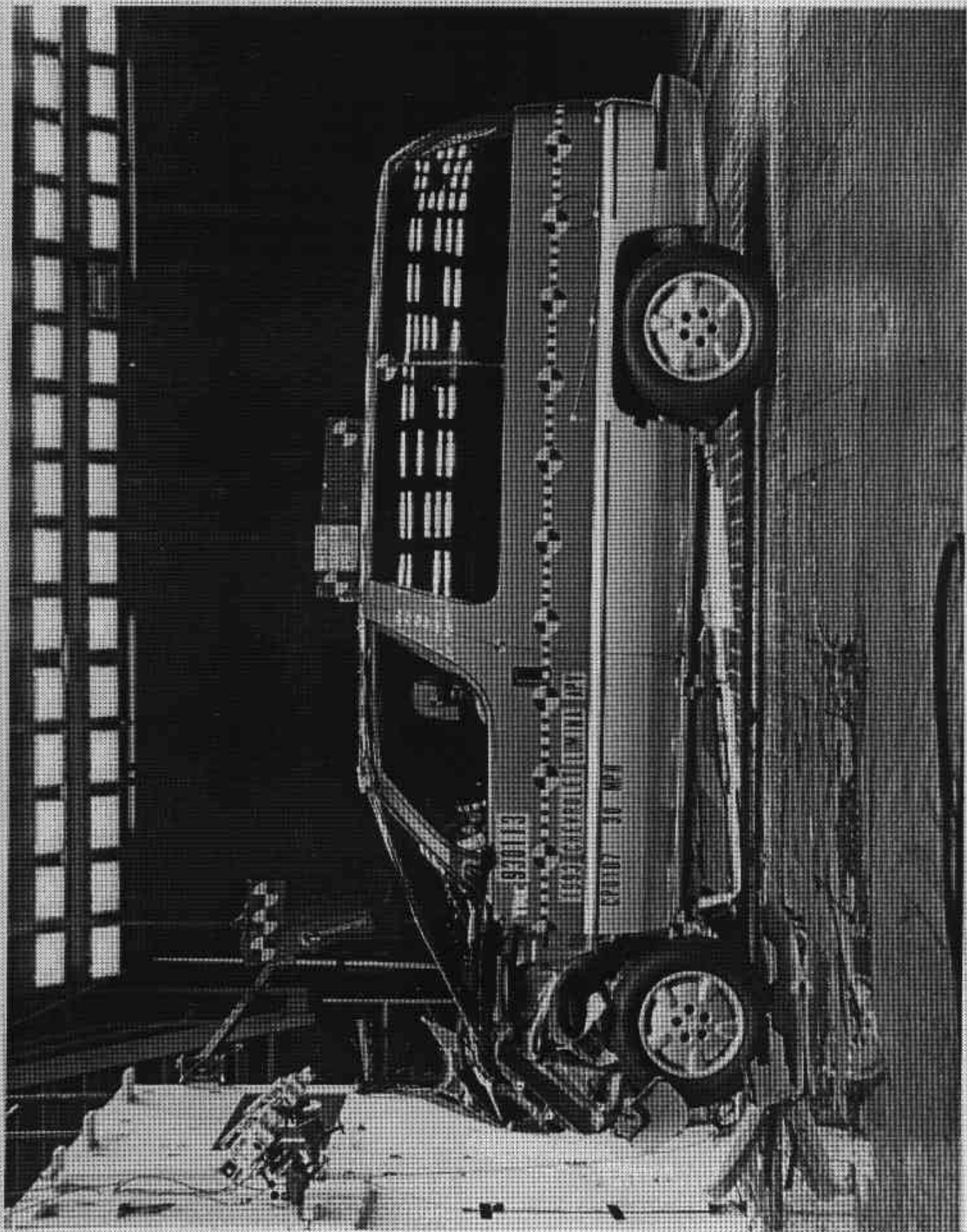


Figure A-4. POST-TEST LEFT SIDE VIEW
A-5

930113

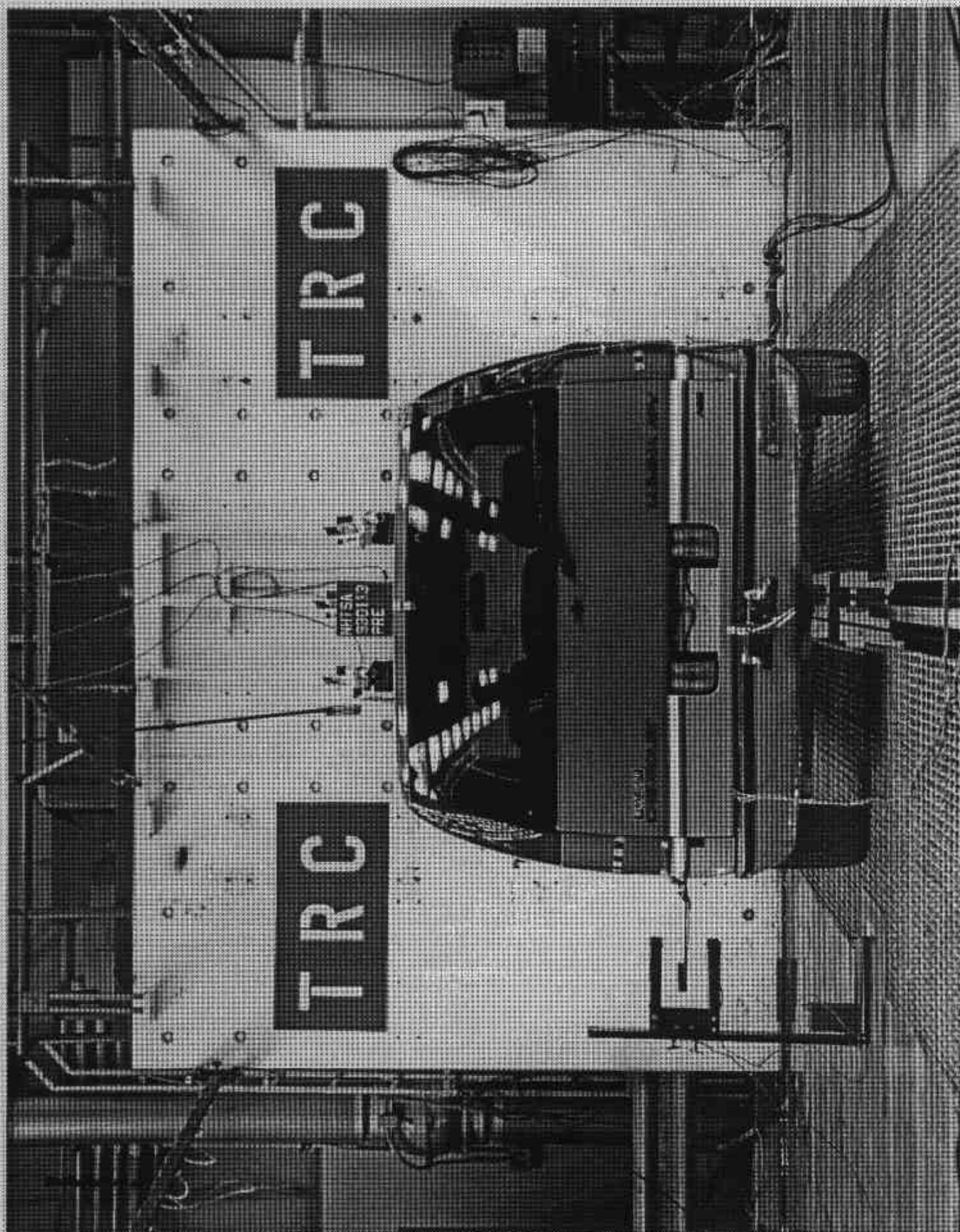


Figure A-5. PRE-TEST REAR VIEW

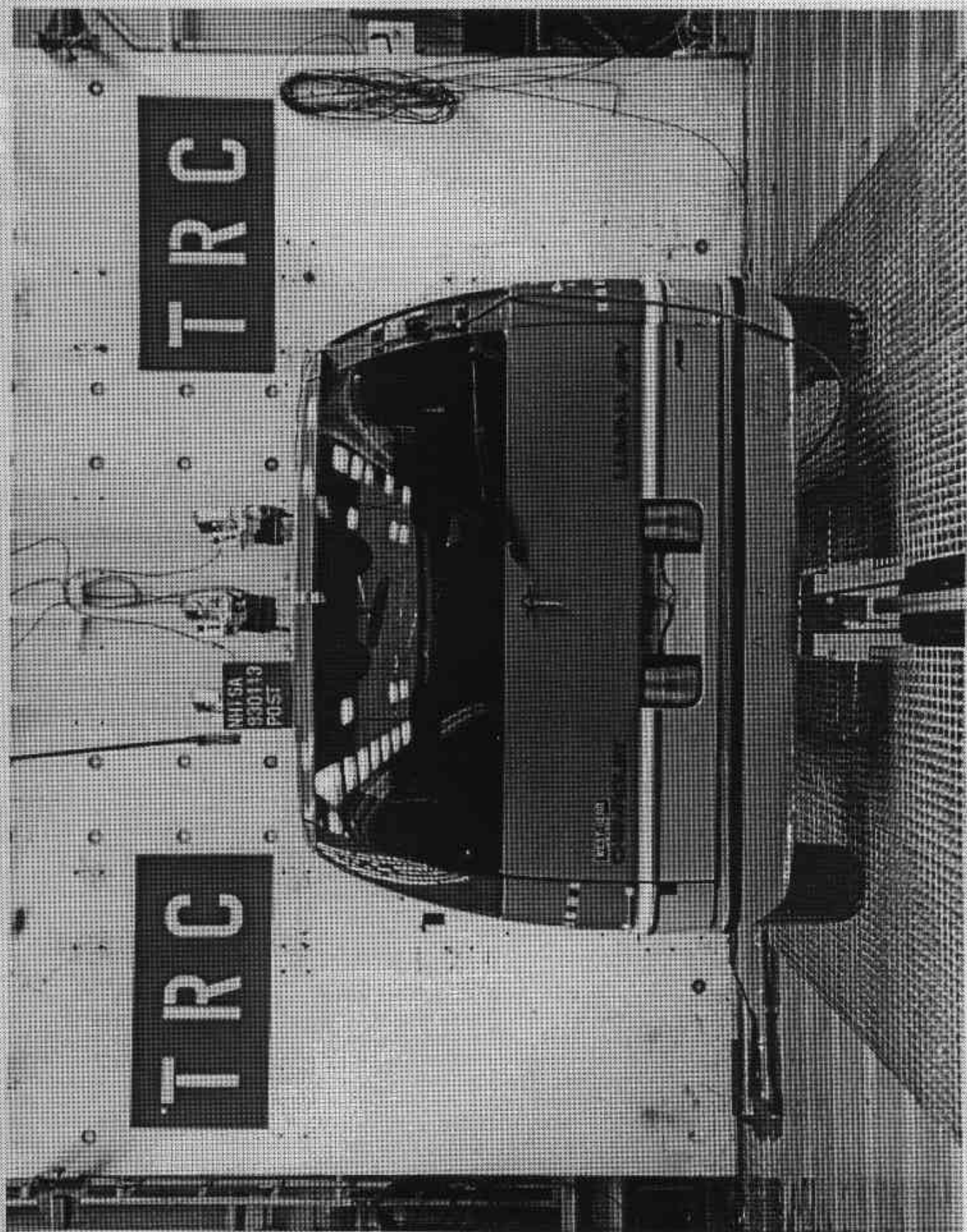


Figure A-6. POST-TEST REAR VIEW

A-7

930113

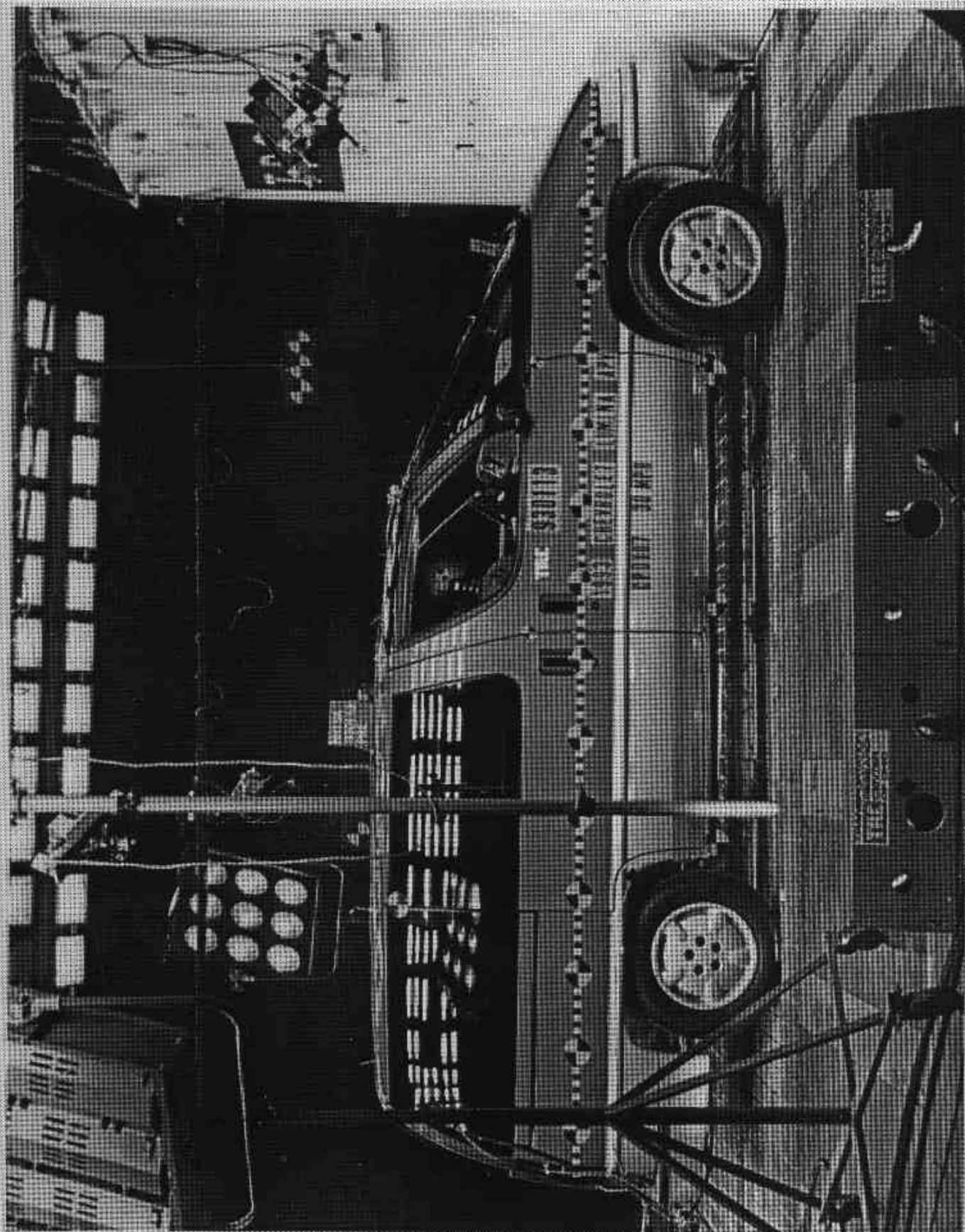


Figure A-7. PRE-TEST RIGHT SIDE VIEW
A-8

930113

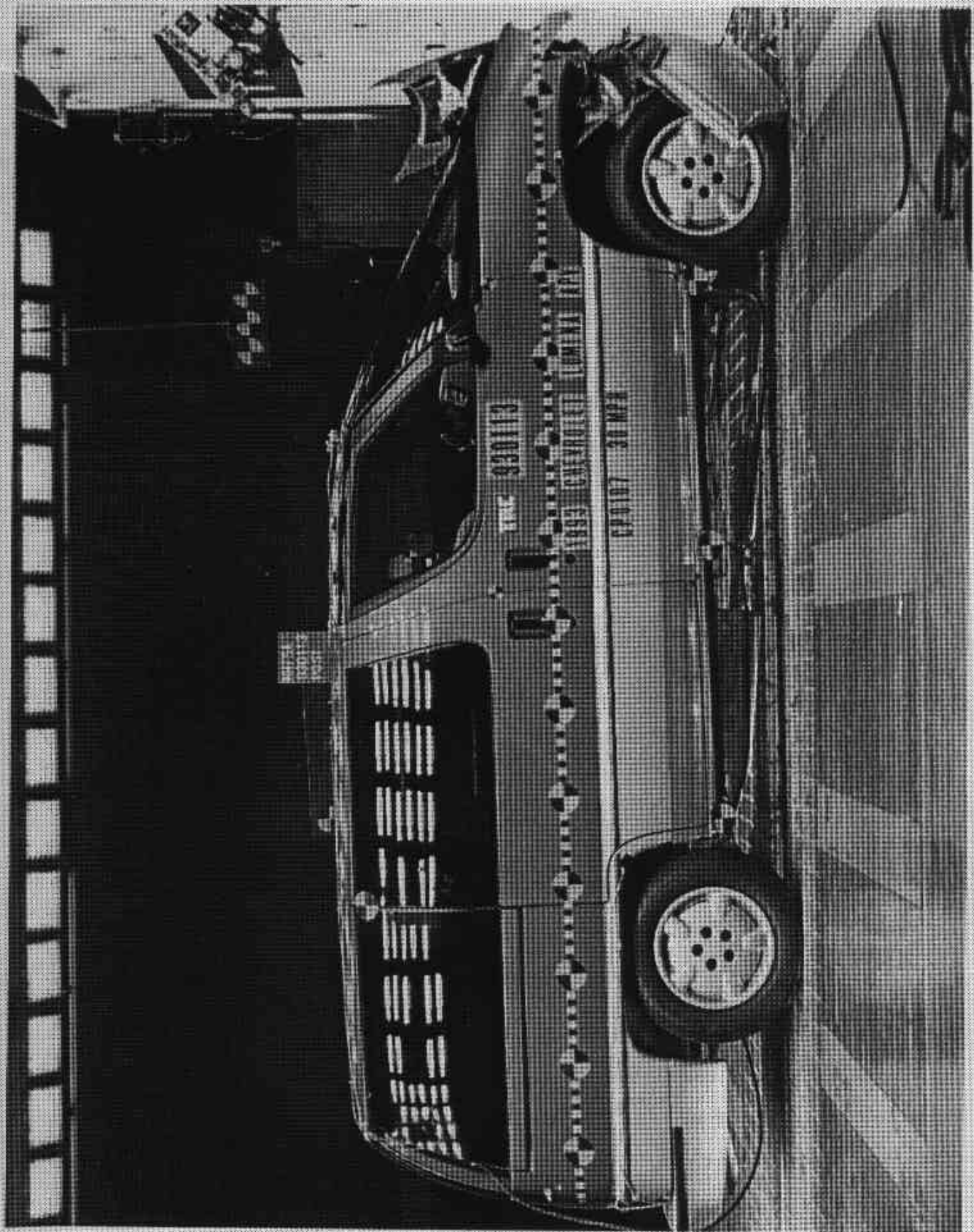


Figure A-8. POST-TEST RIGHT SIDE VIEW
A-9

930113

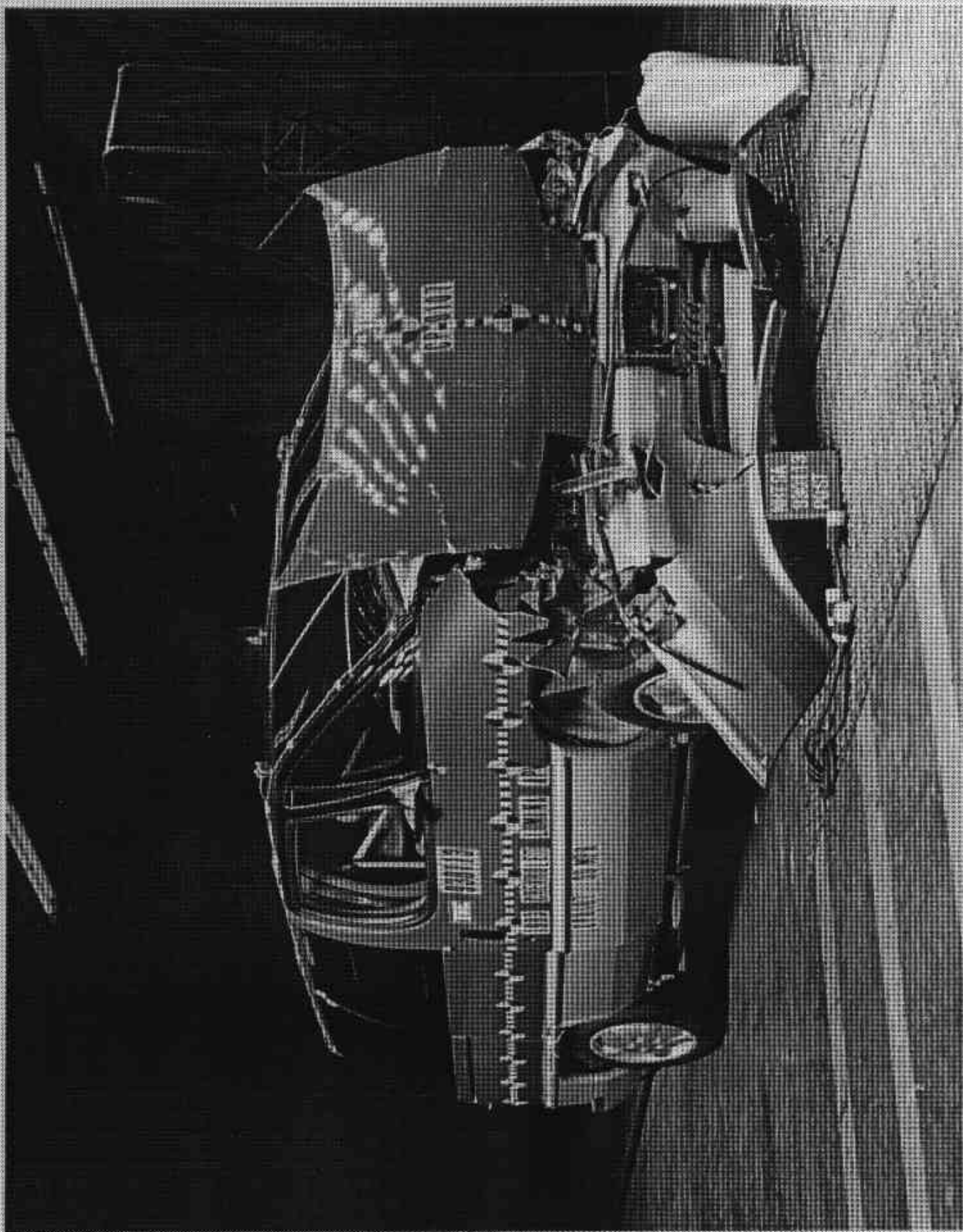


Figure A-10. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

930113

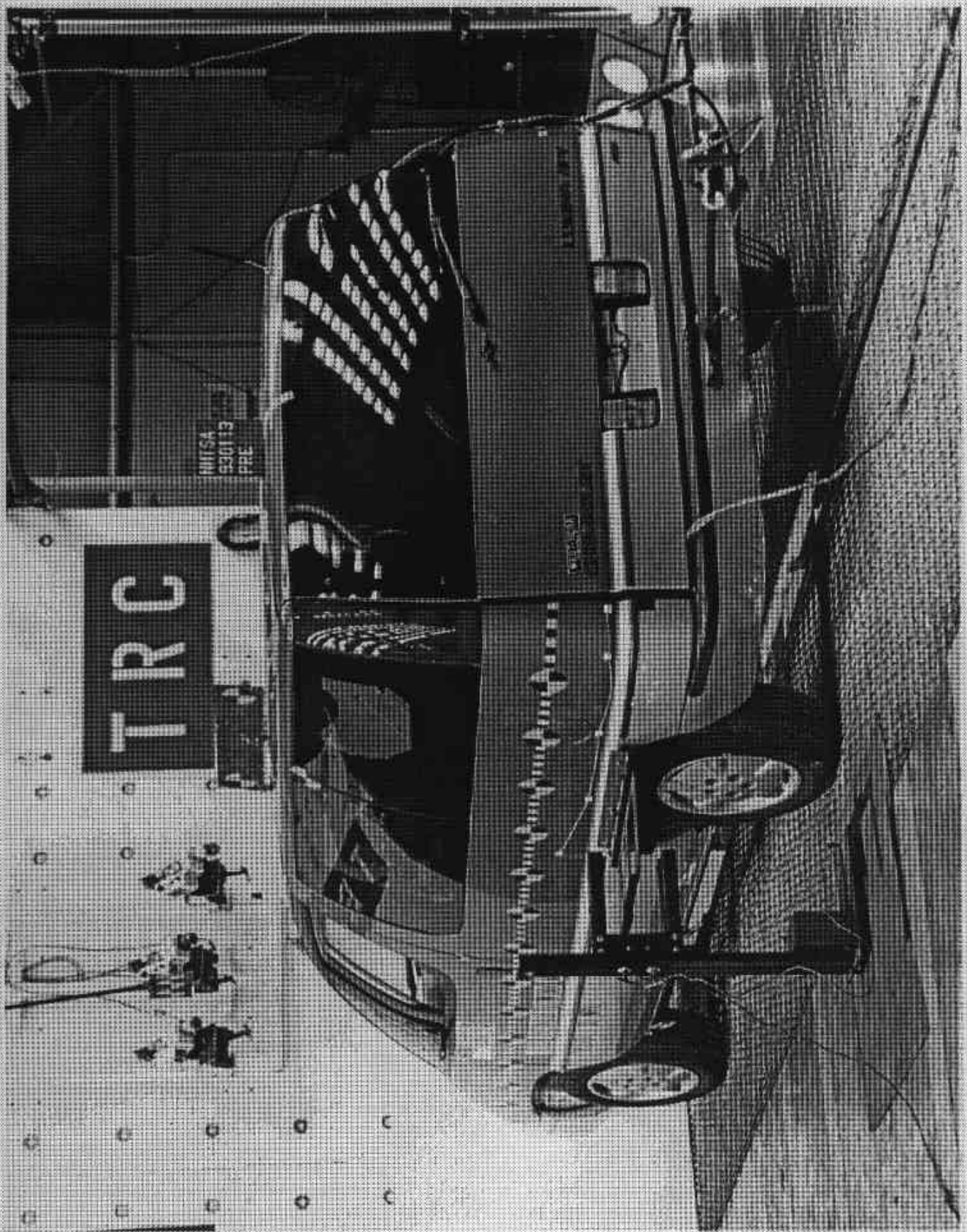


Figure A-11. PRE-TEST LEFT REAR THREE-QUARTER VIEW
A-12

930113

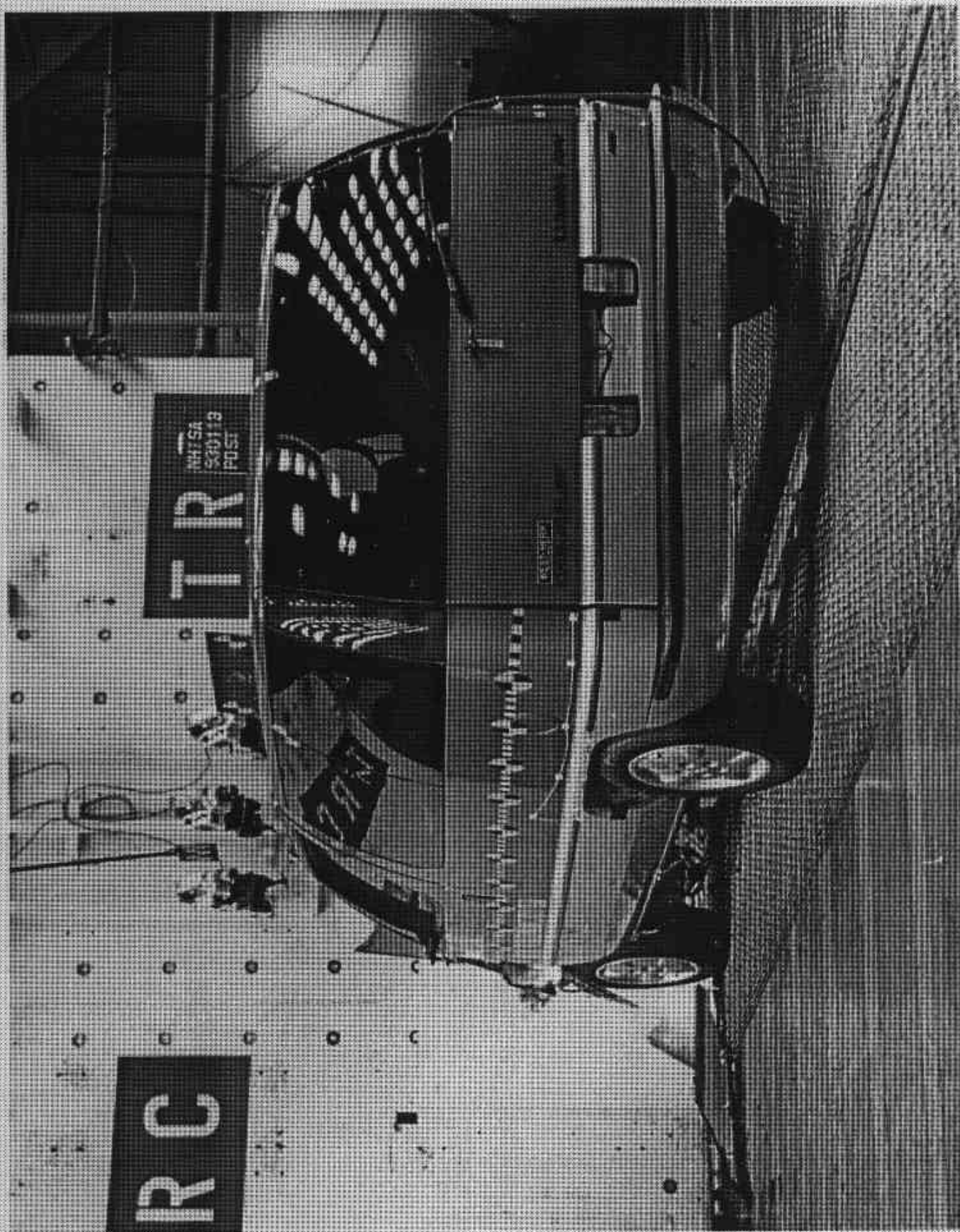


Figure A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW
A-13

930113

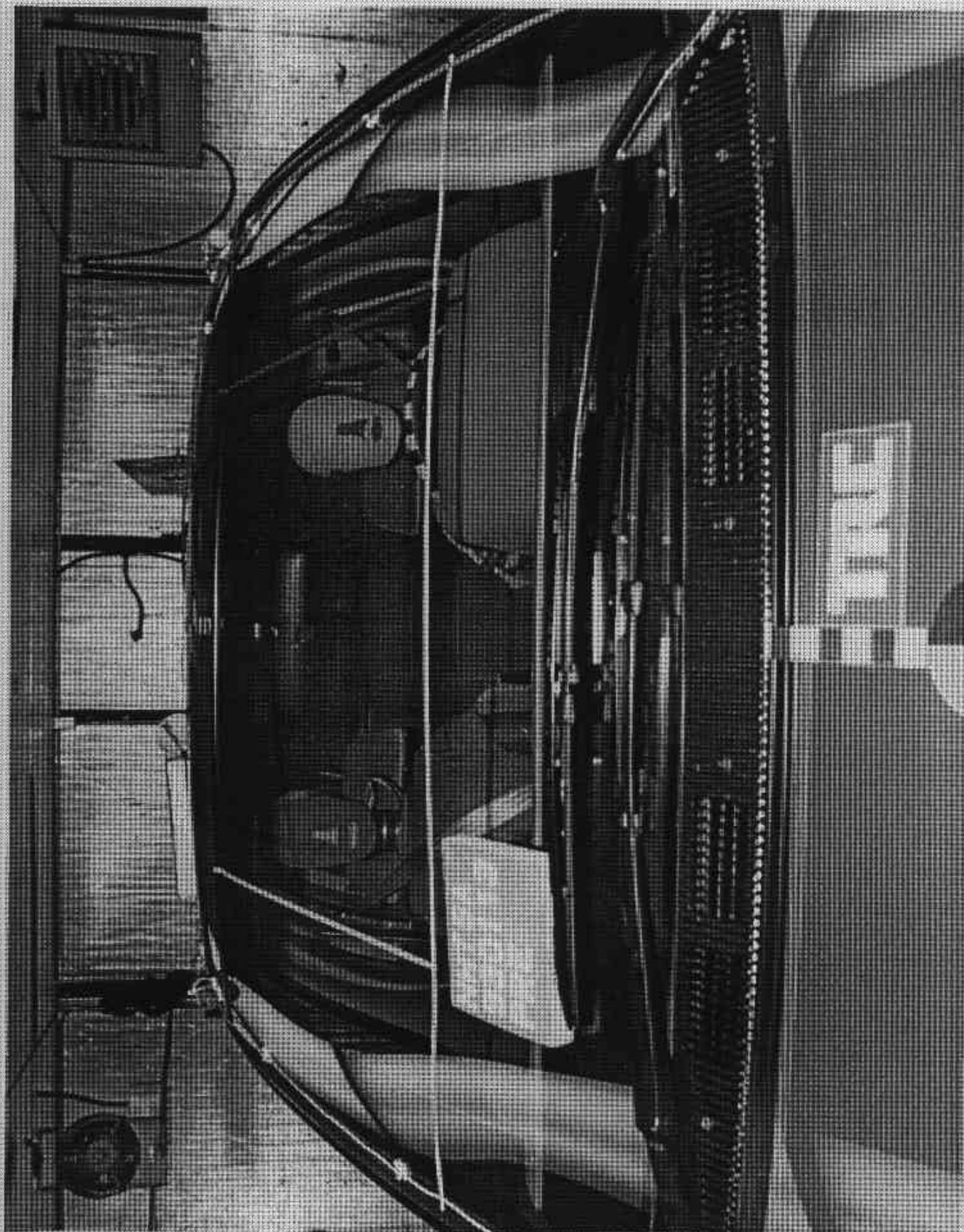


Figure A-13. PRE-TEST WINDSHIELD VIEW
A-14

930113

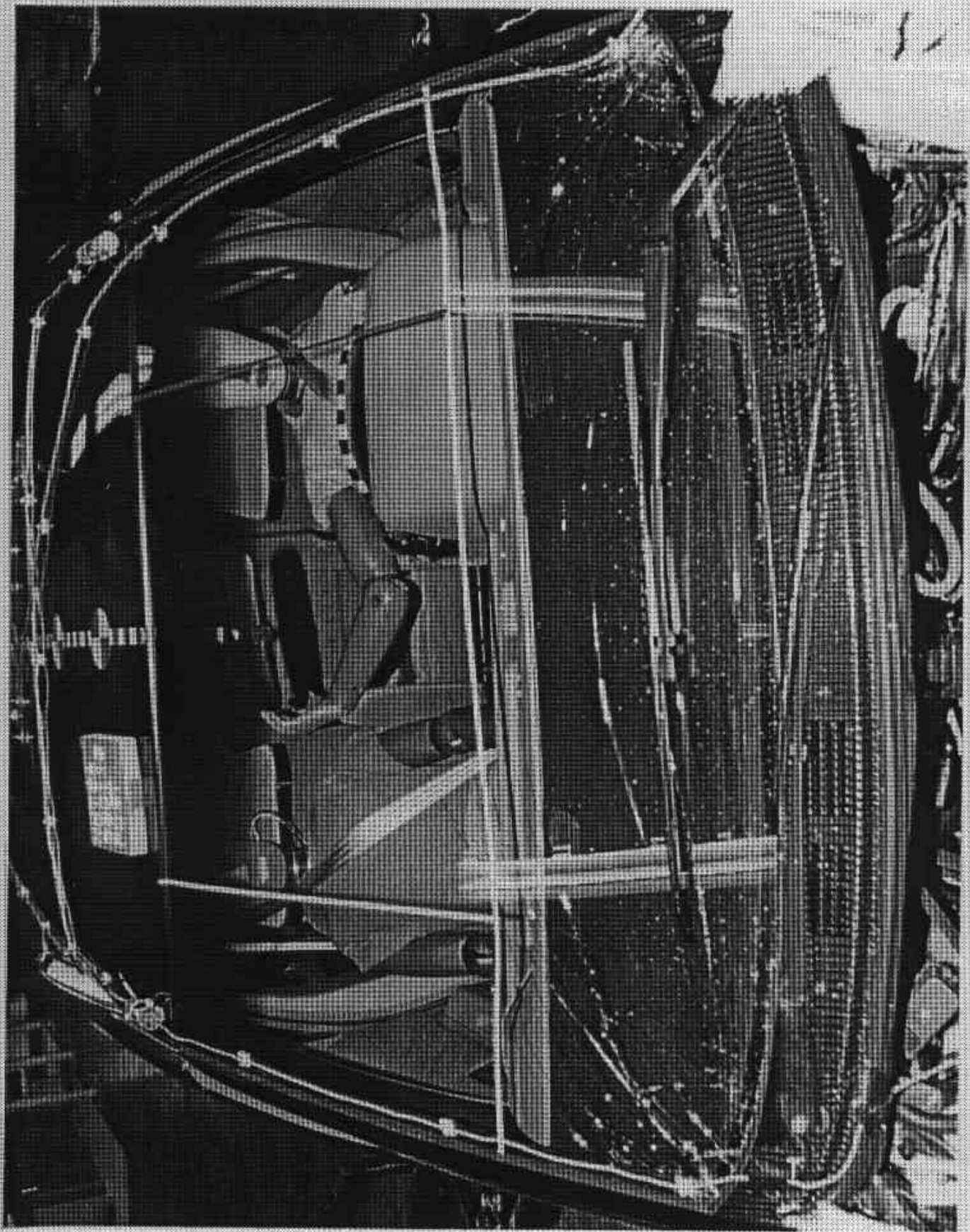


Figure A-14. POST-TEST WINDSHIELD VIEW
A-15

930113



Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW
A-16

930113



Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW
A-17

930113

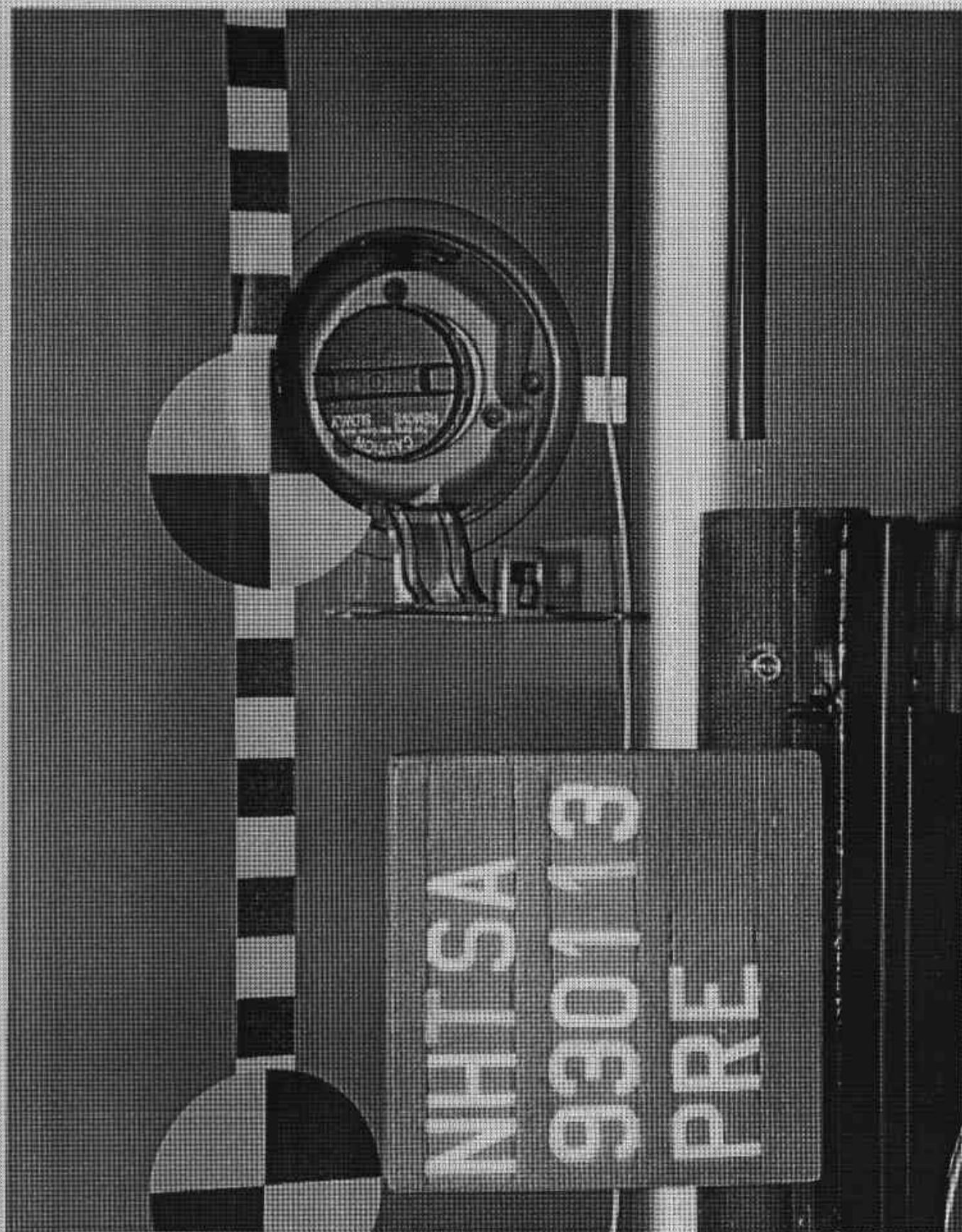


Figure A-17. PRE-TEST FUEL FILLER CAP VIEW
A-18

930113

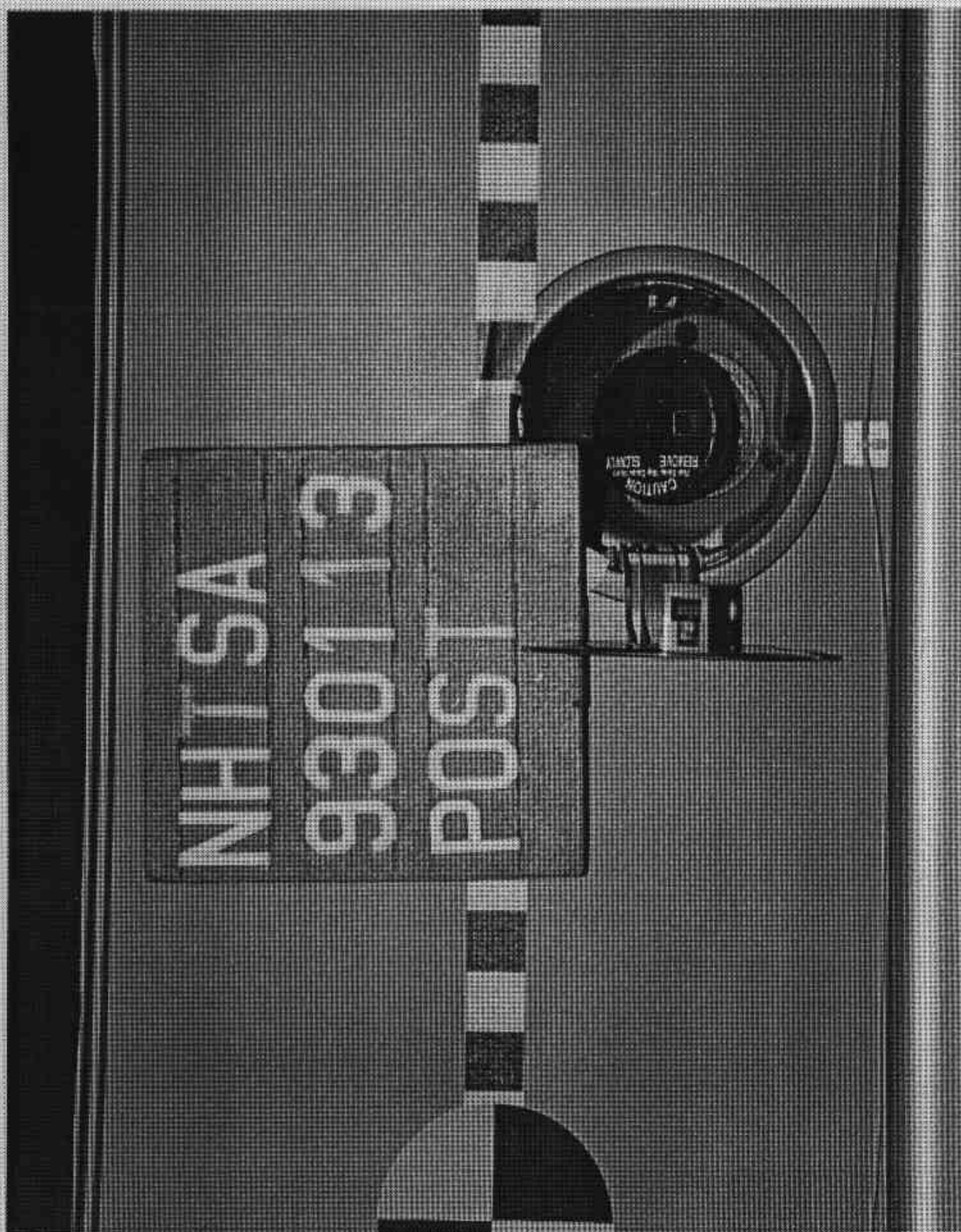


Figure A-18. POST-TEST FUEL FILLER CAP VIEW
A-19

930113



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

A-20

930113



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

930113

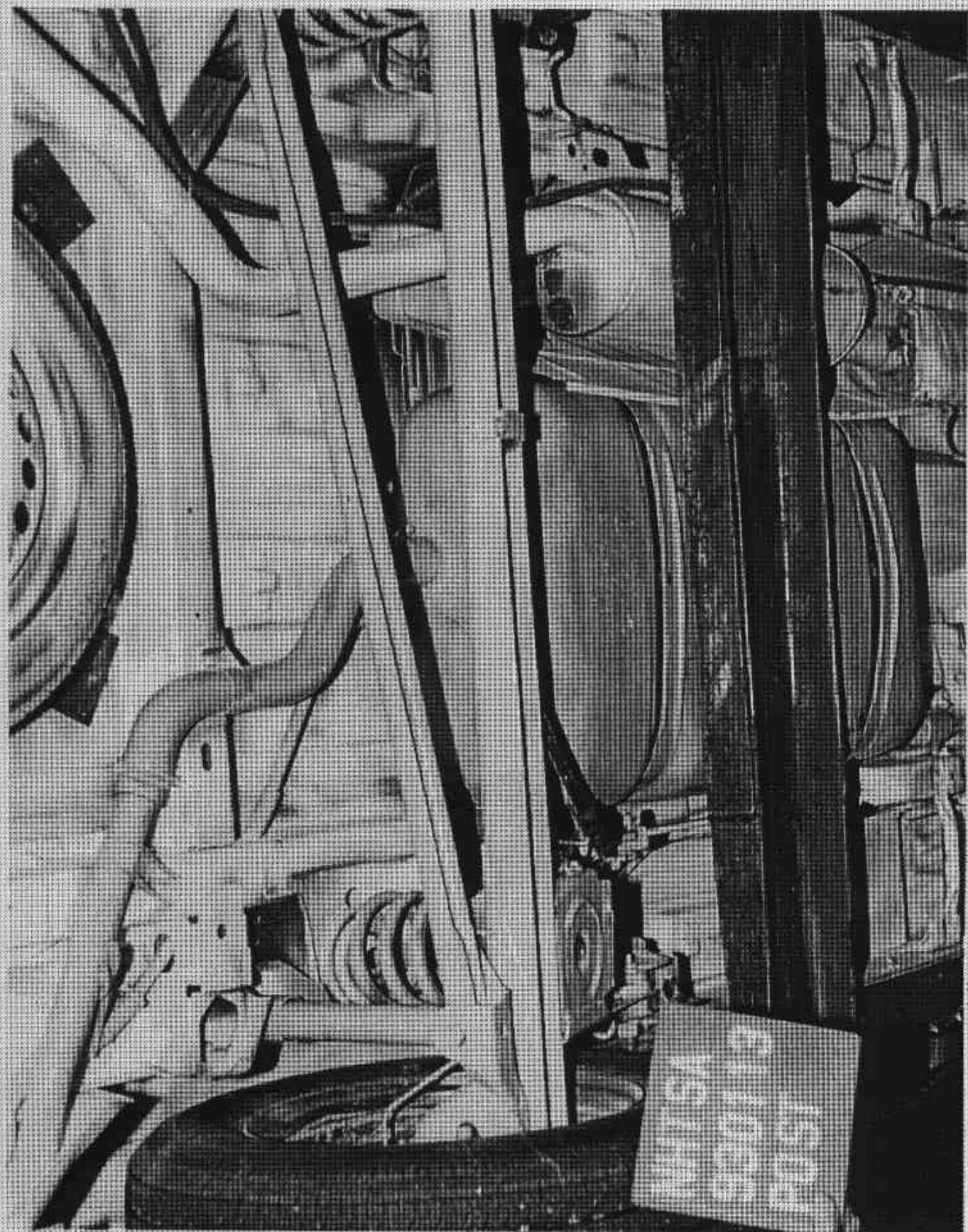


Figure A-21. POST-TEST FUEL TANK & FUEL FILLER NECK VIEW
A-22

930113



Figure A-22. PRE-TEST FRONT UNDERBODY VIEW

A-23

930113

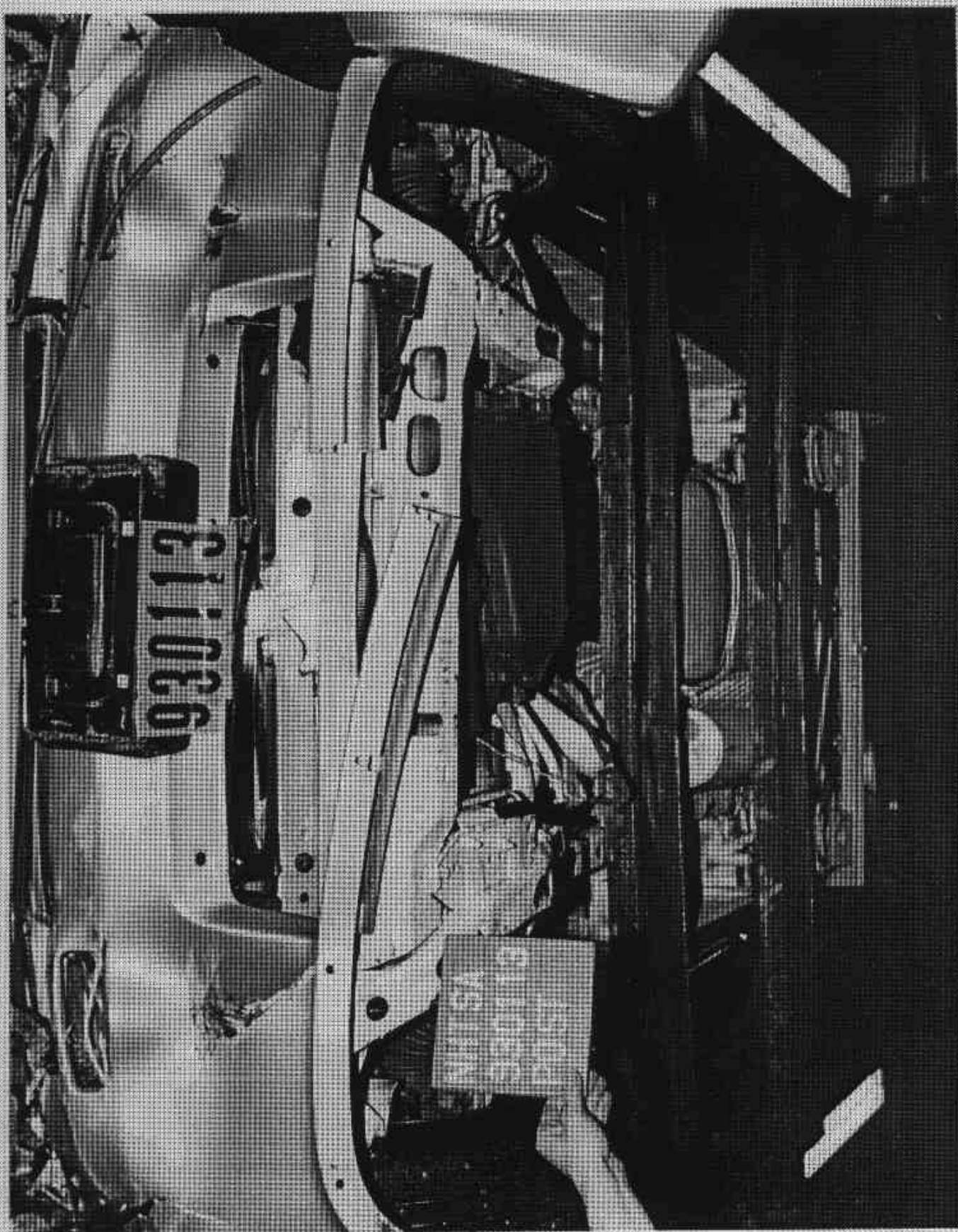


Figure A-23. POST-TEST FRONT UNDERBODY VIEW
A-24

930113



Figure A-24. PRE-TEST REAR UNDERBODY VIEW
A-25

930113

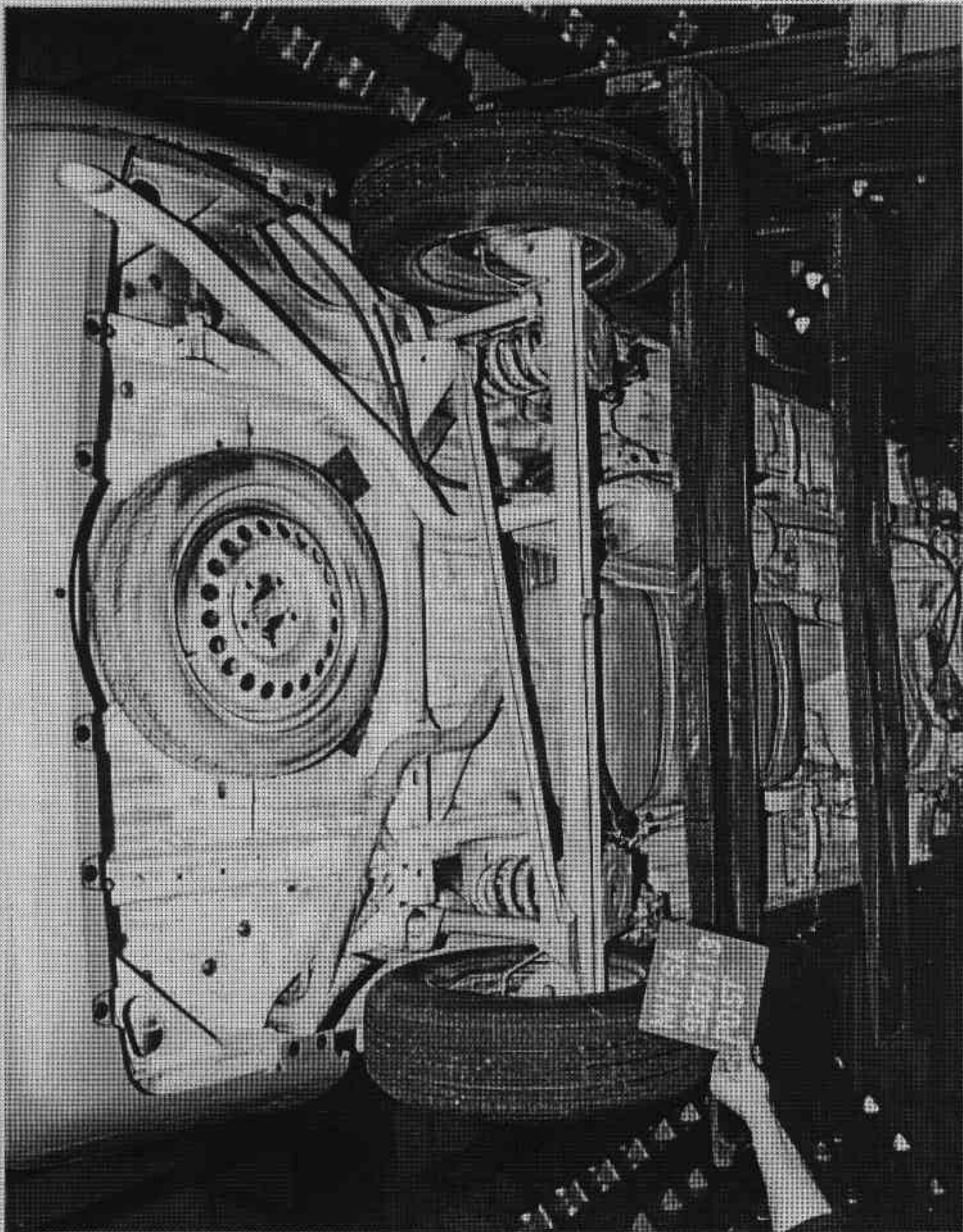


Figure A-25. POST-TEST REAR UNDERBODY VIEW
A-26

930113

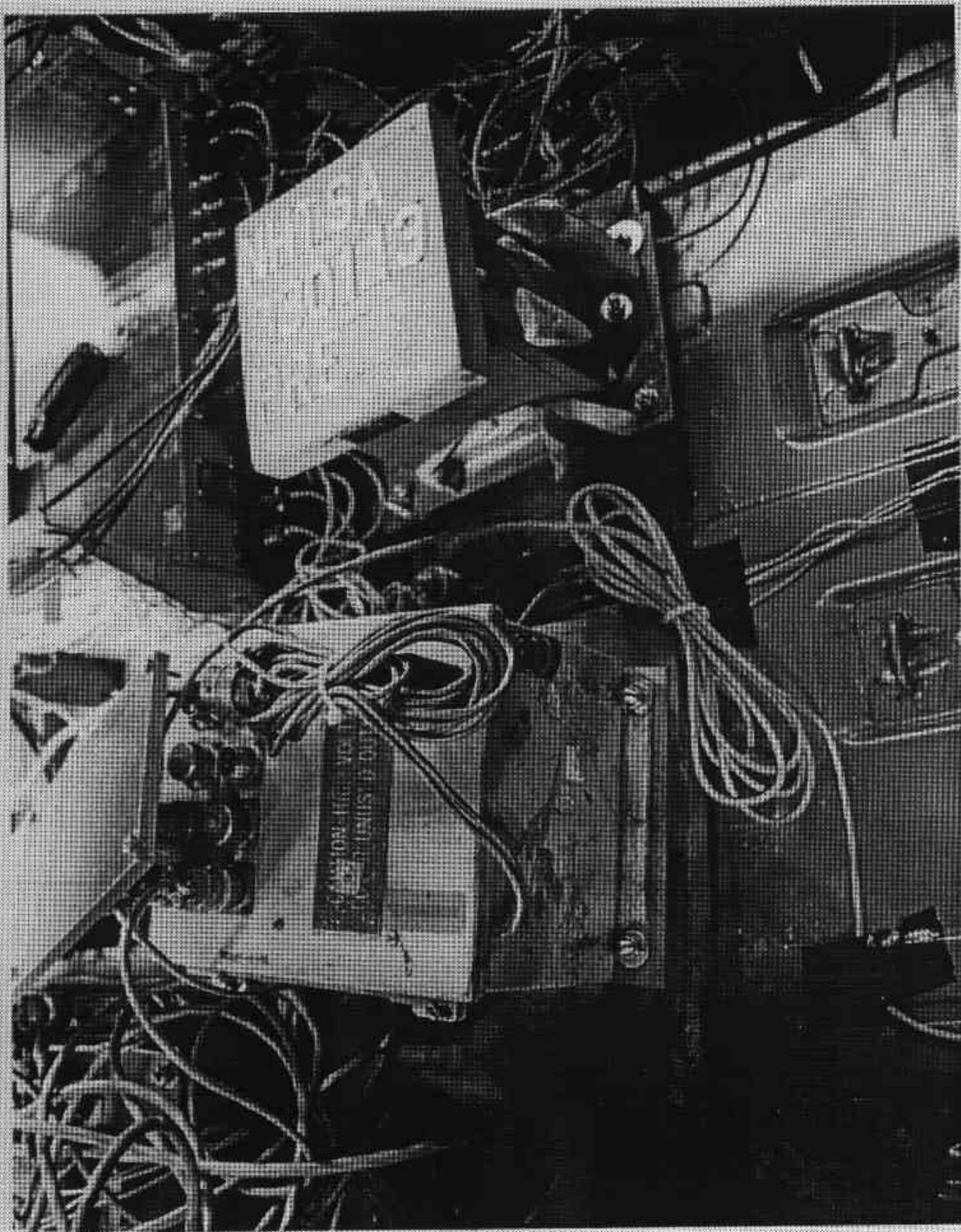


Figure A-26. PRE-TEST BALLAST LOCATION VIEW
A-27

930113

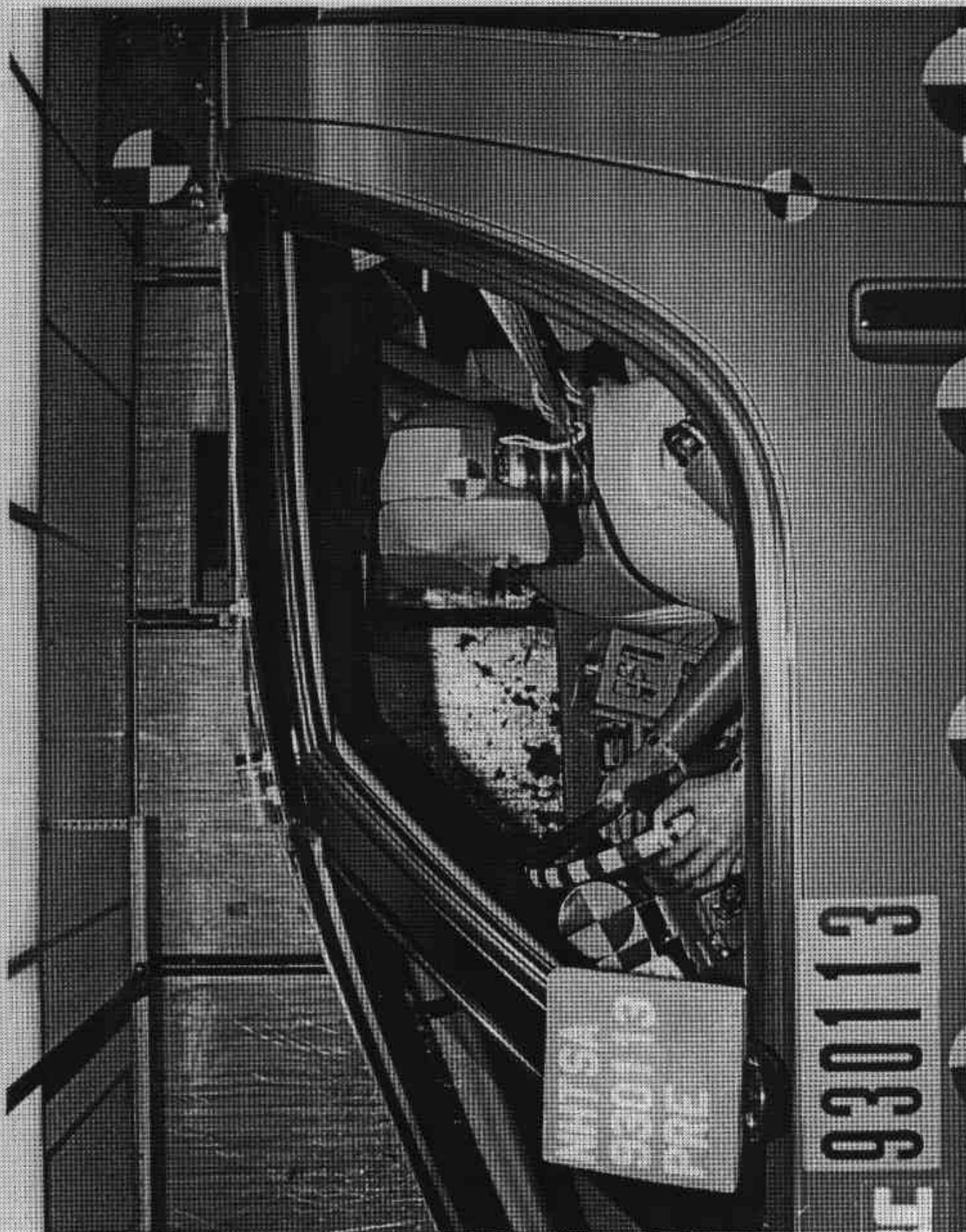


Figure A-27. PRE-TEST DRIVER DUMMY POSITION VIEW
A-28

930113

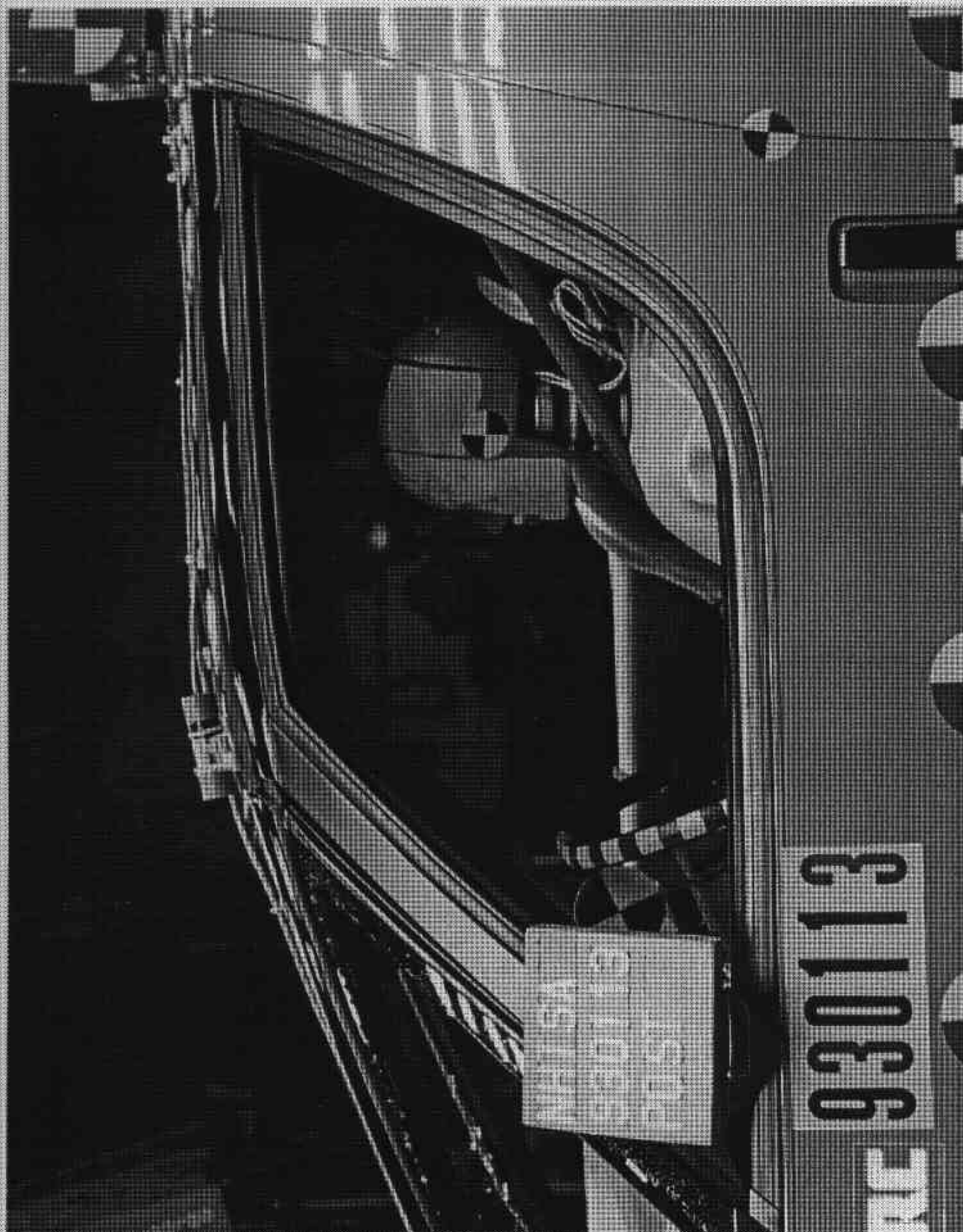


Figure A-28. POST-TEST DRIVER DUMMY POSITION VIEW
A-29

930113

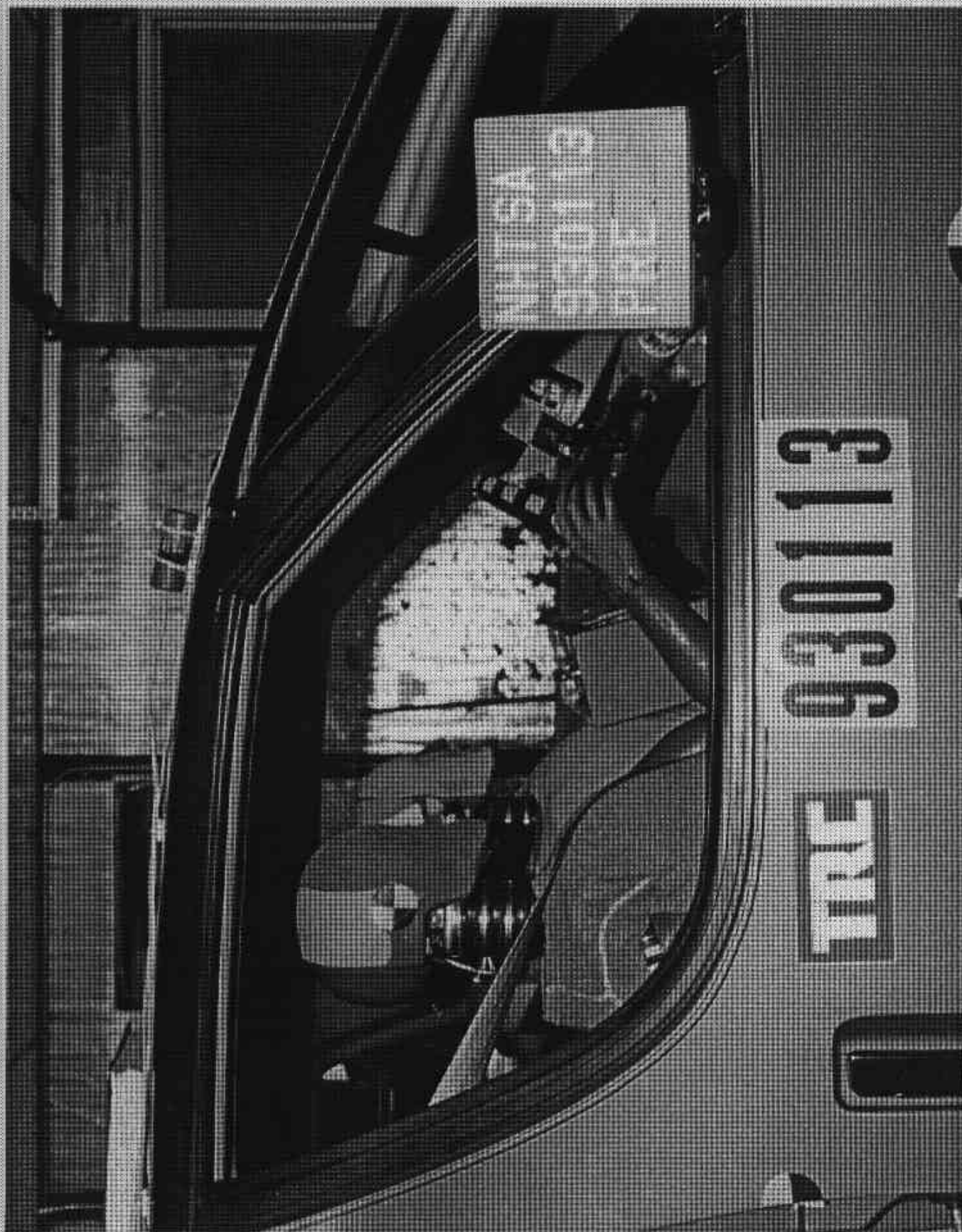


Figure A-29. PRE-TEST PASSENGER DUMMY POSITION VIEW
A-30

930113

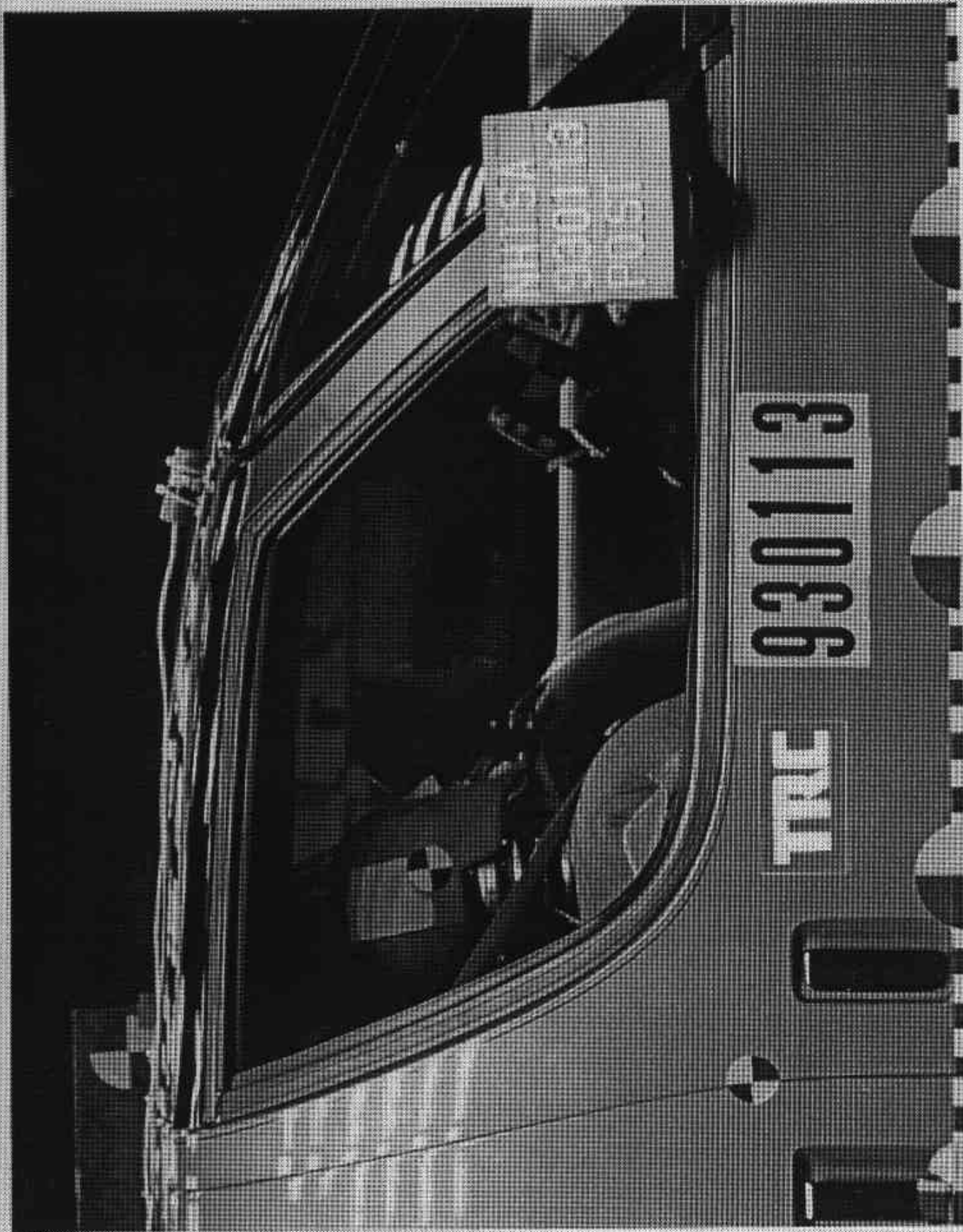


Figure A-30. POST-TEST PASSENGER DUMMY POSITION VIEW
A-31

930113



Figure A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
A-32 930113



Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
A-33 930113



Figure A-33. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-34 930113



Figure A-34. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2
A-35 930113

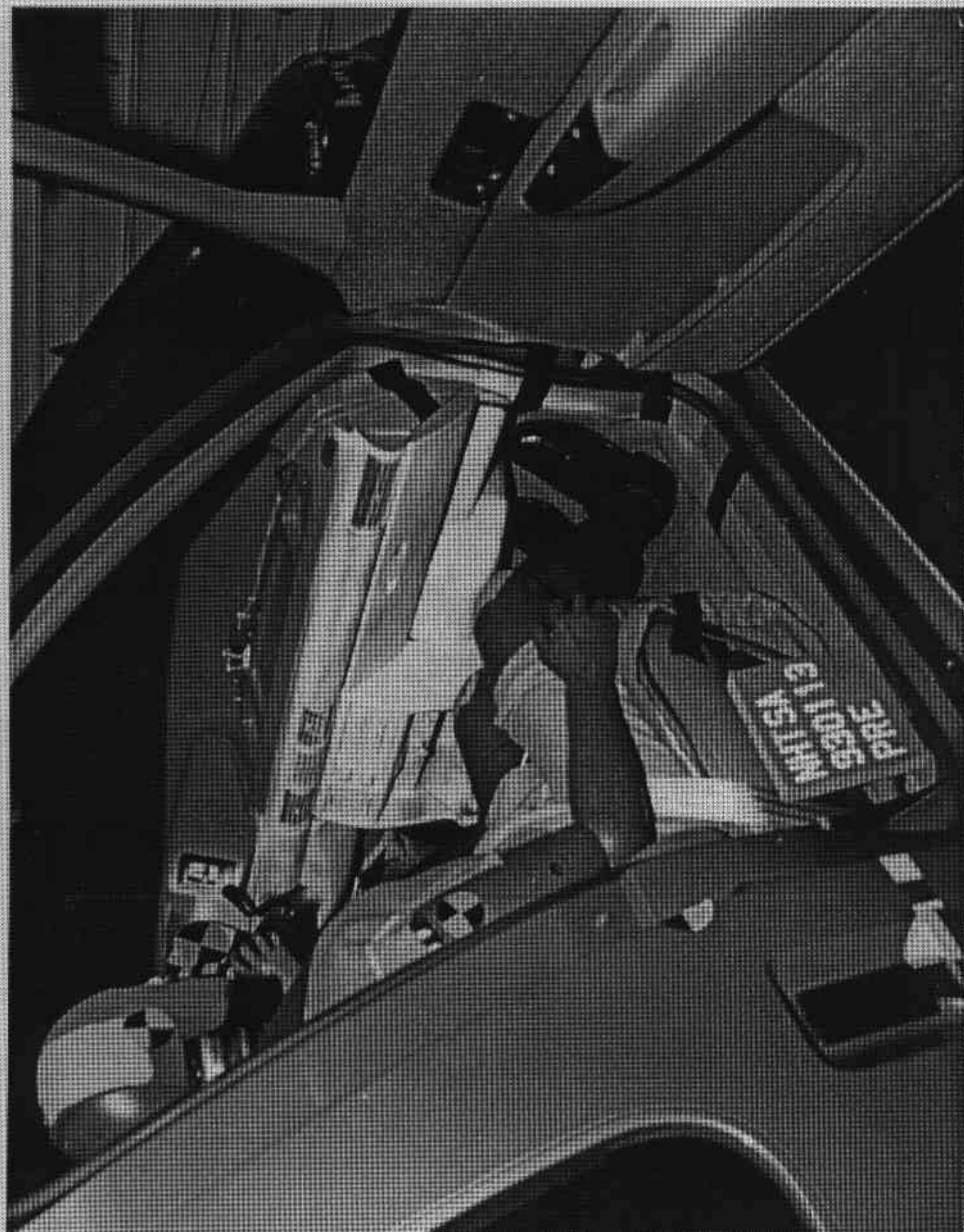


Figure A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-36 930113



Figure A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-37 930113



Figure A-37. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-38 930113



Figure A-38. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
A-39 930113



Figure A-39. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1



Figure A-40. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2
A-41 930113

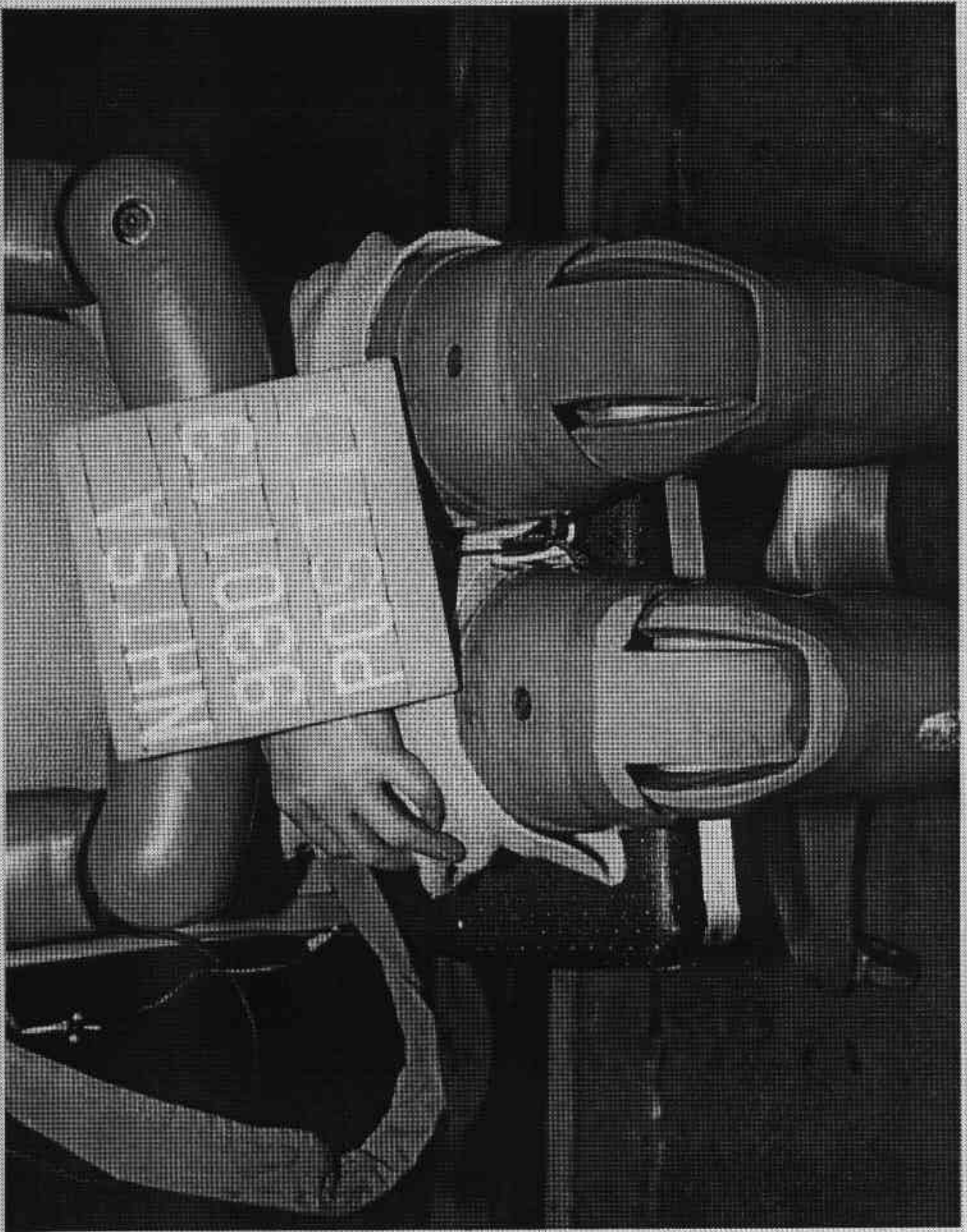


Figure A-41. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

A-42

930113

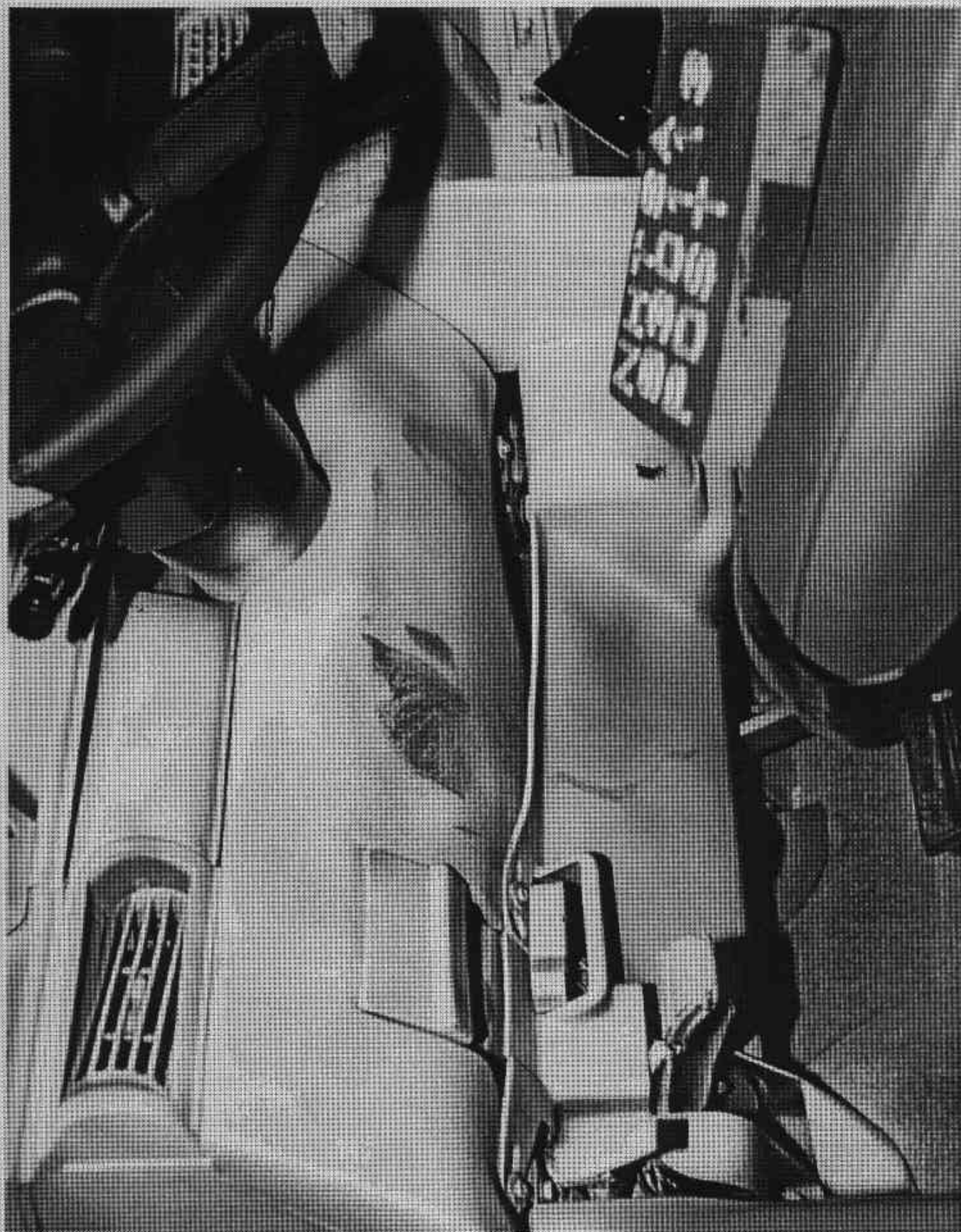


Figure A-42. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2
A-43 930113

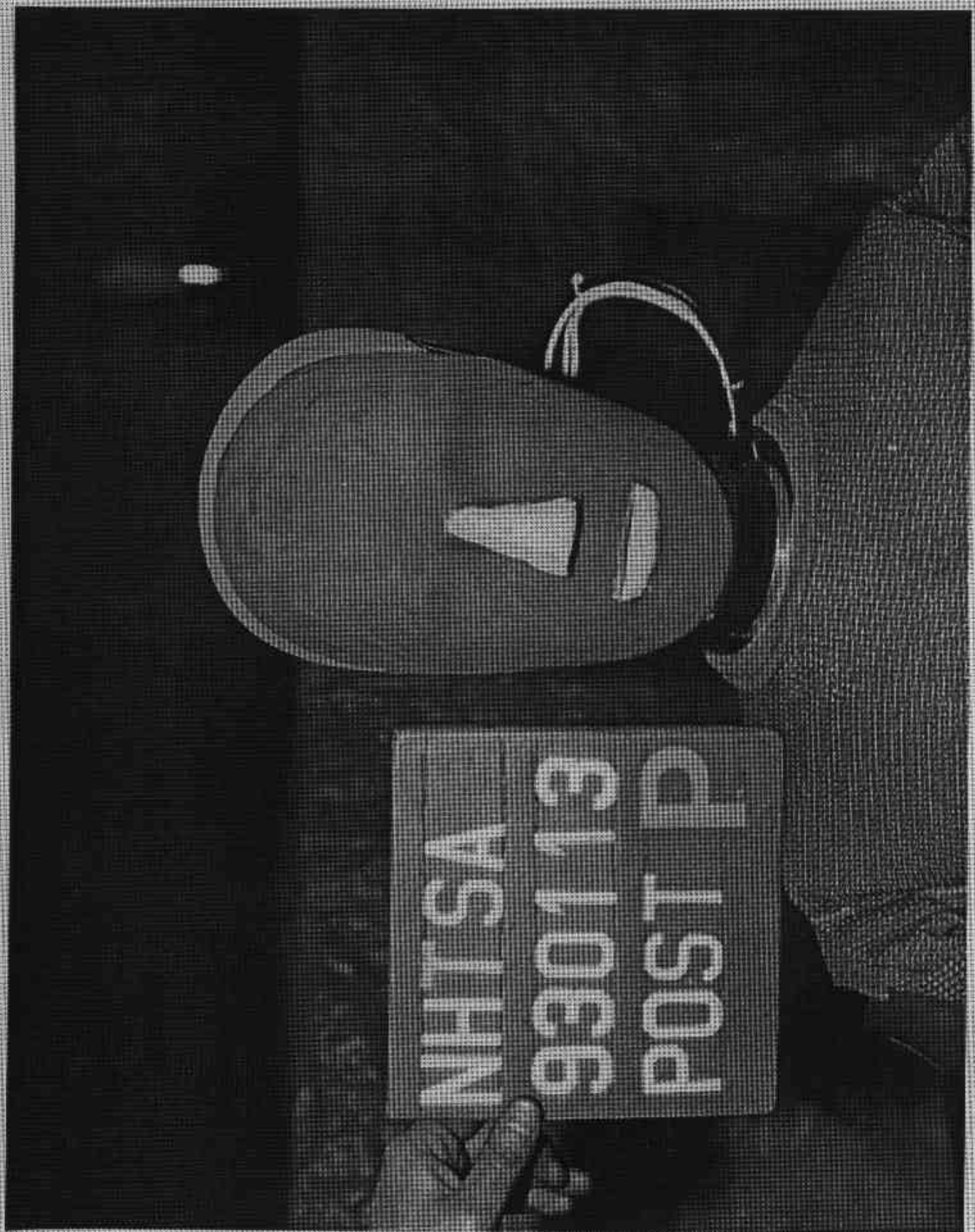


Figure A-43. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW



Figure A-44. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1
A-45 930113



Figure A-45. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2
A-46 930113

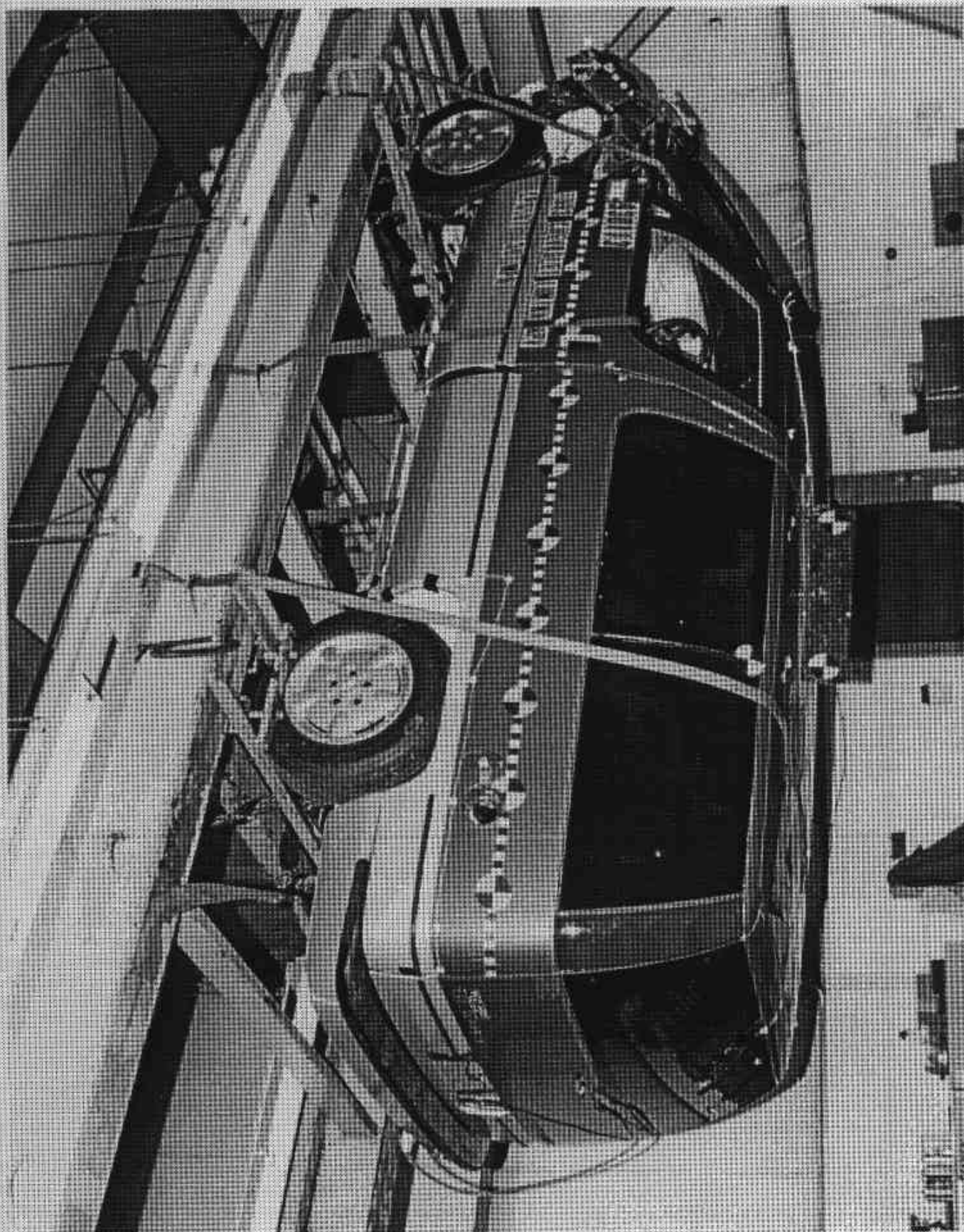


Figure A-47. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW
A-48 930113

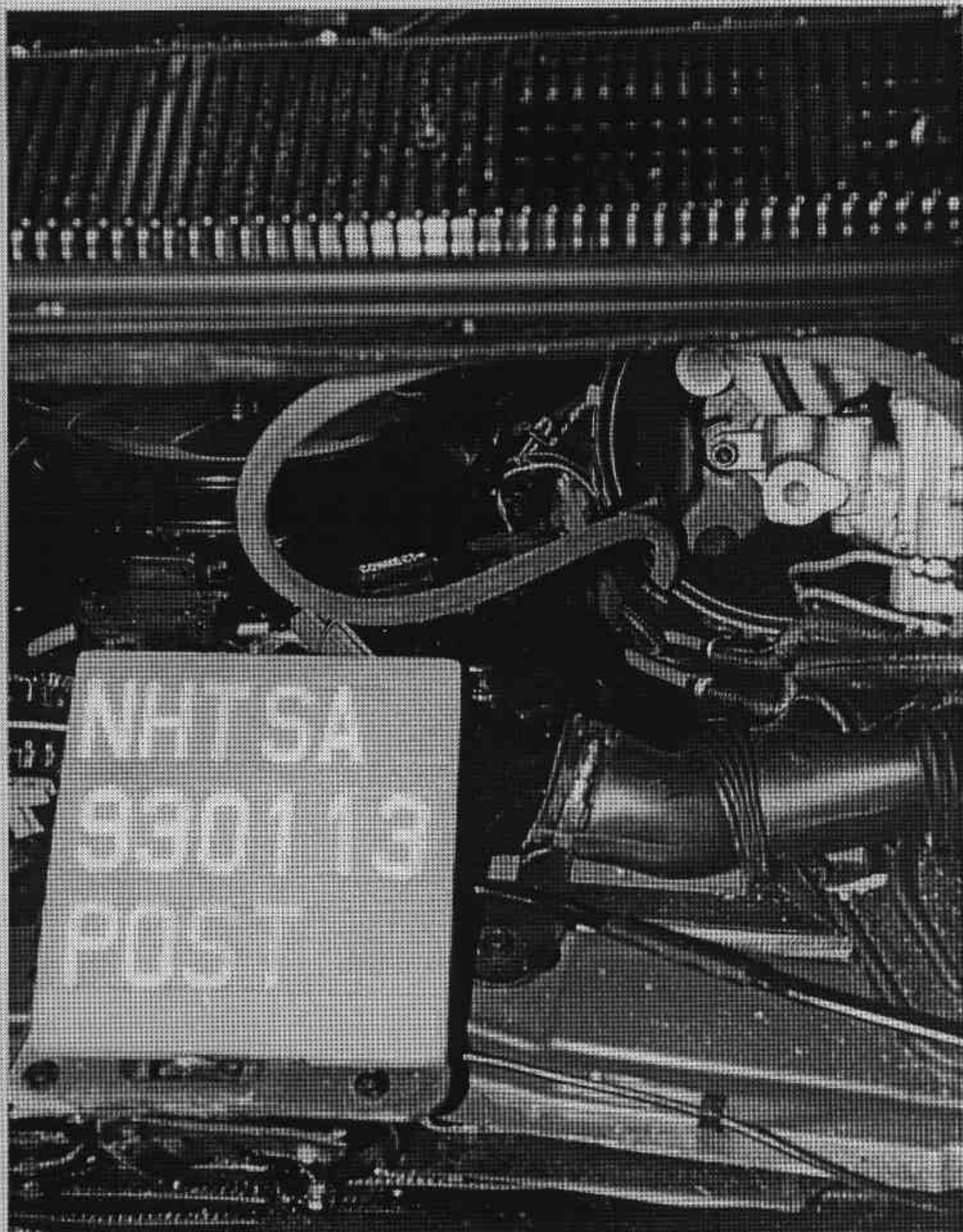


Figure A-48. POST-TEST FUEL LINE FITTINGS CLOSE-UP - VIEW 1

A-49

930113

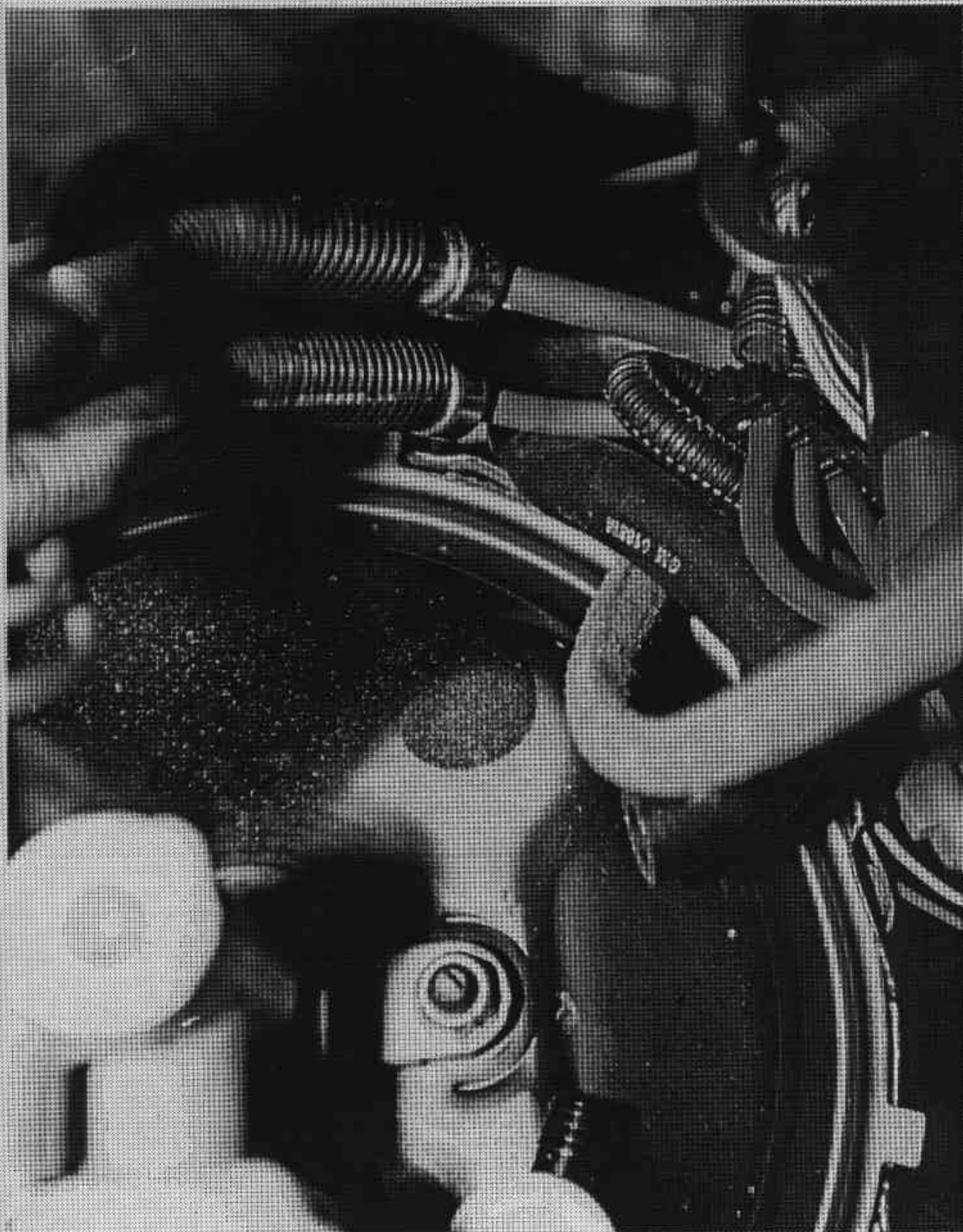


Figure A-49. POST-TEST FUEL LINE FITTINGS CLOSE-UP - VIEW 2

A-50

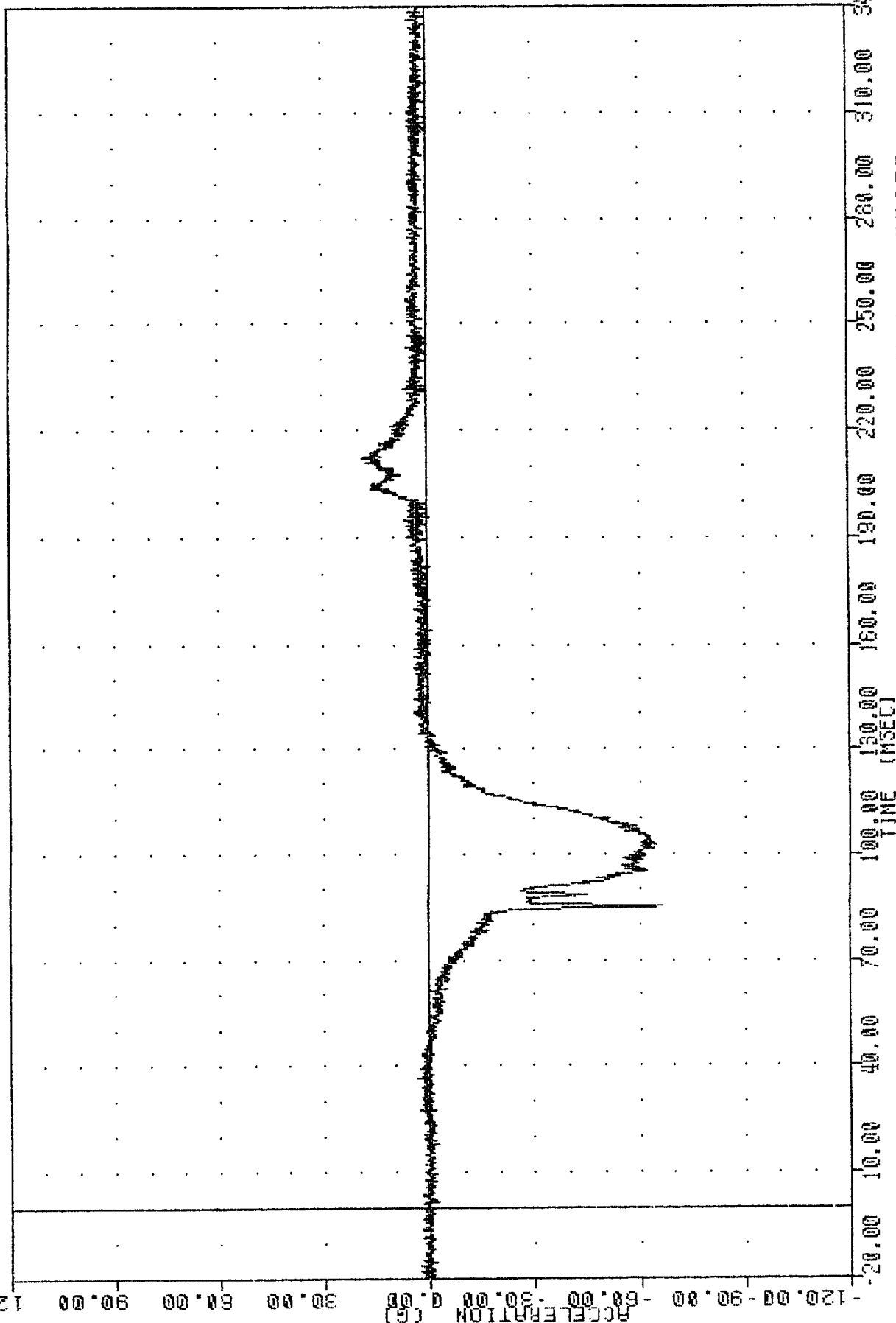
930113

APPENDIX B

DATA PLOTS

TRC
208 COMPLIANCE TESTING
93013
HEDXG1

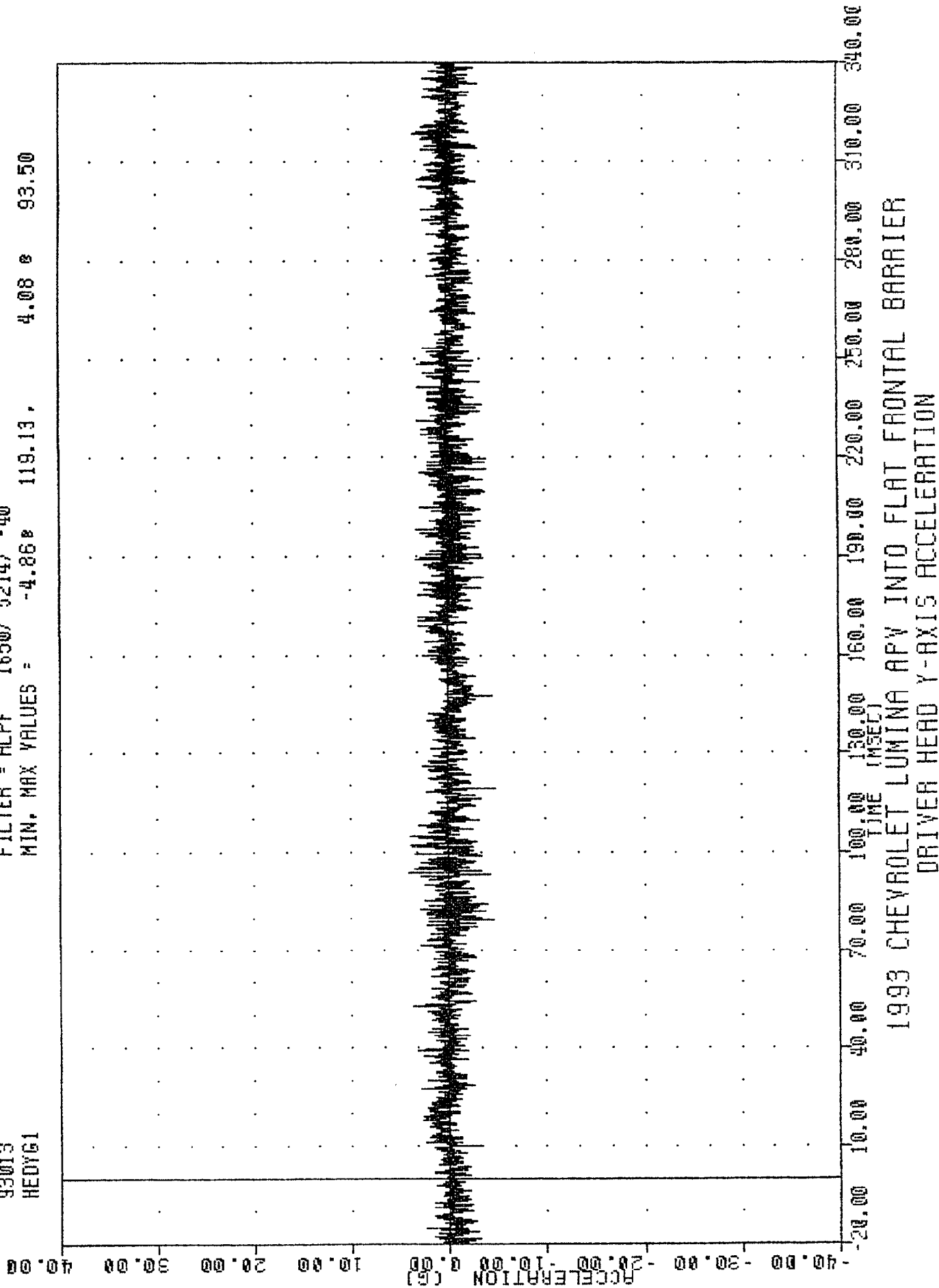
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -66.82 85.00, 18.40 e 212.00



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION

TRC
208 COMPLIANCE TESTING
93013
HEDYG1

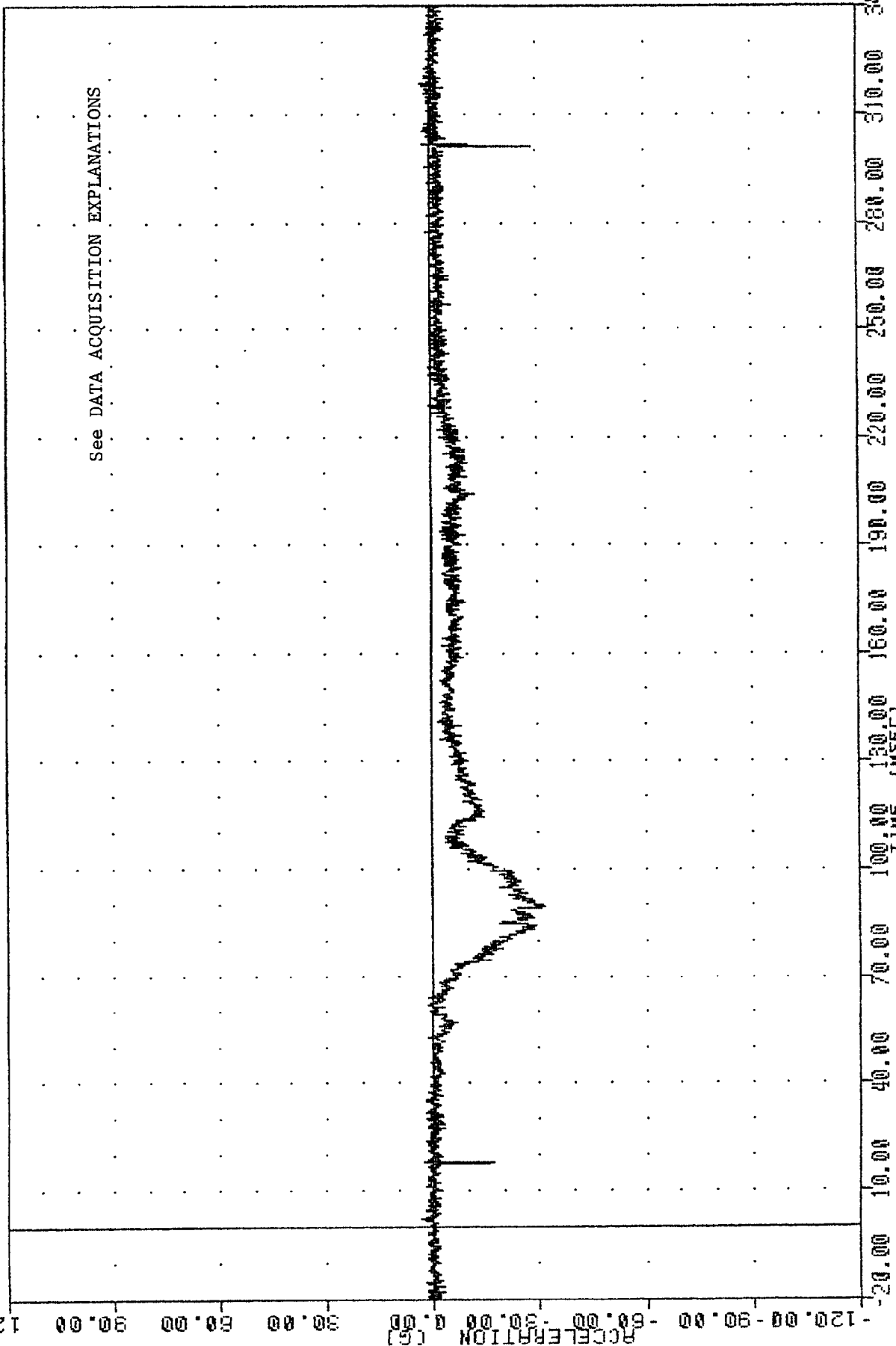
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -4.86% 119.13, 4.08 % 93.50



TRC
208 COMPLIANCE TESTING
93013
HEDZG1

930113

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -31.40% 89.63, 3.15 % 1.88

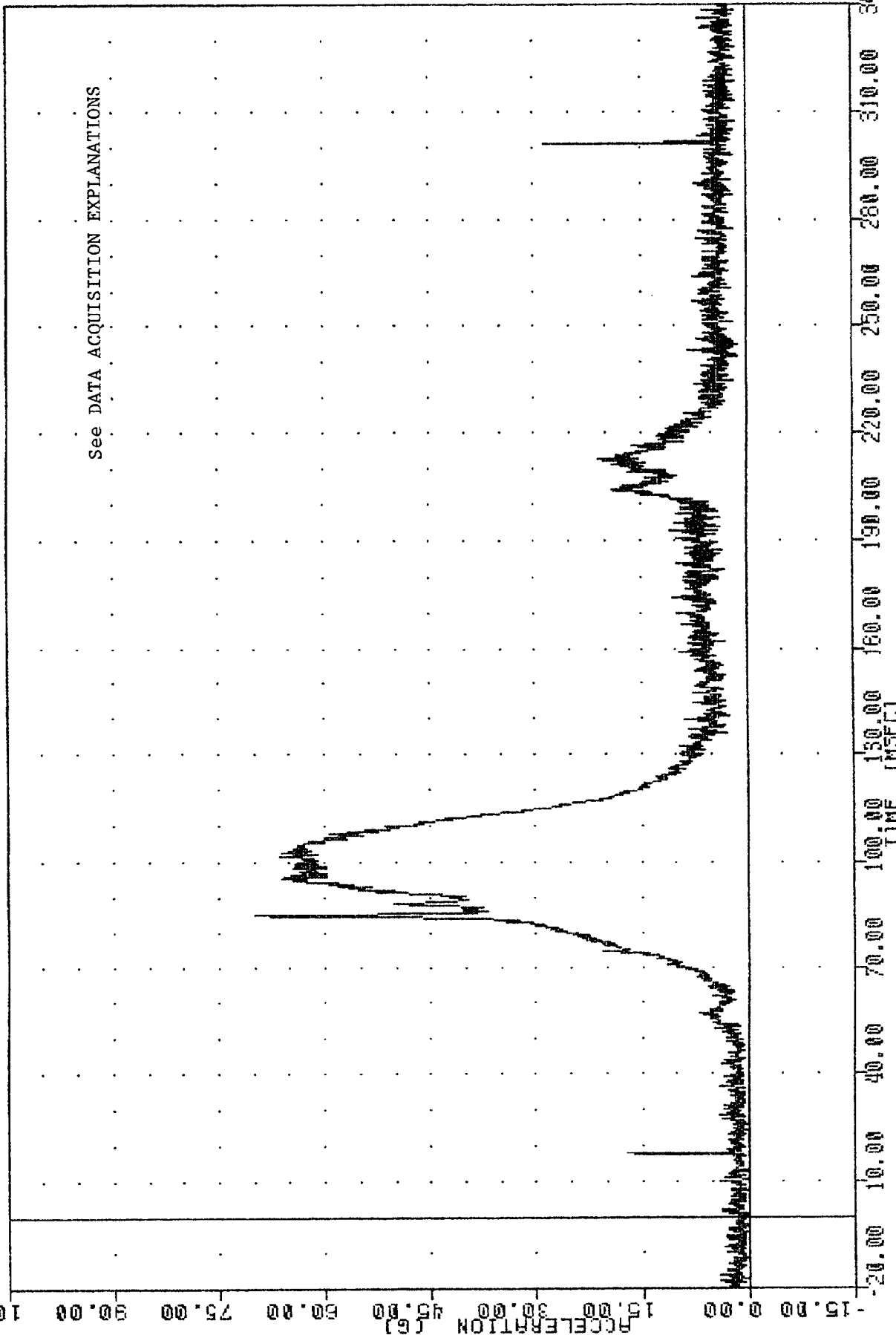


1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION

TRC 930113
 208 COMPLIANCE TESTING
 93013
 HEDRG1

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.098 -17.38, 69.97 & 85.00

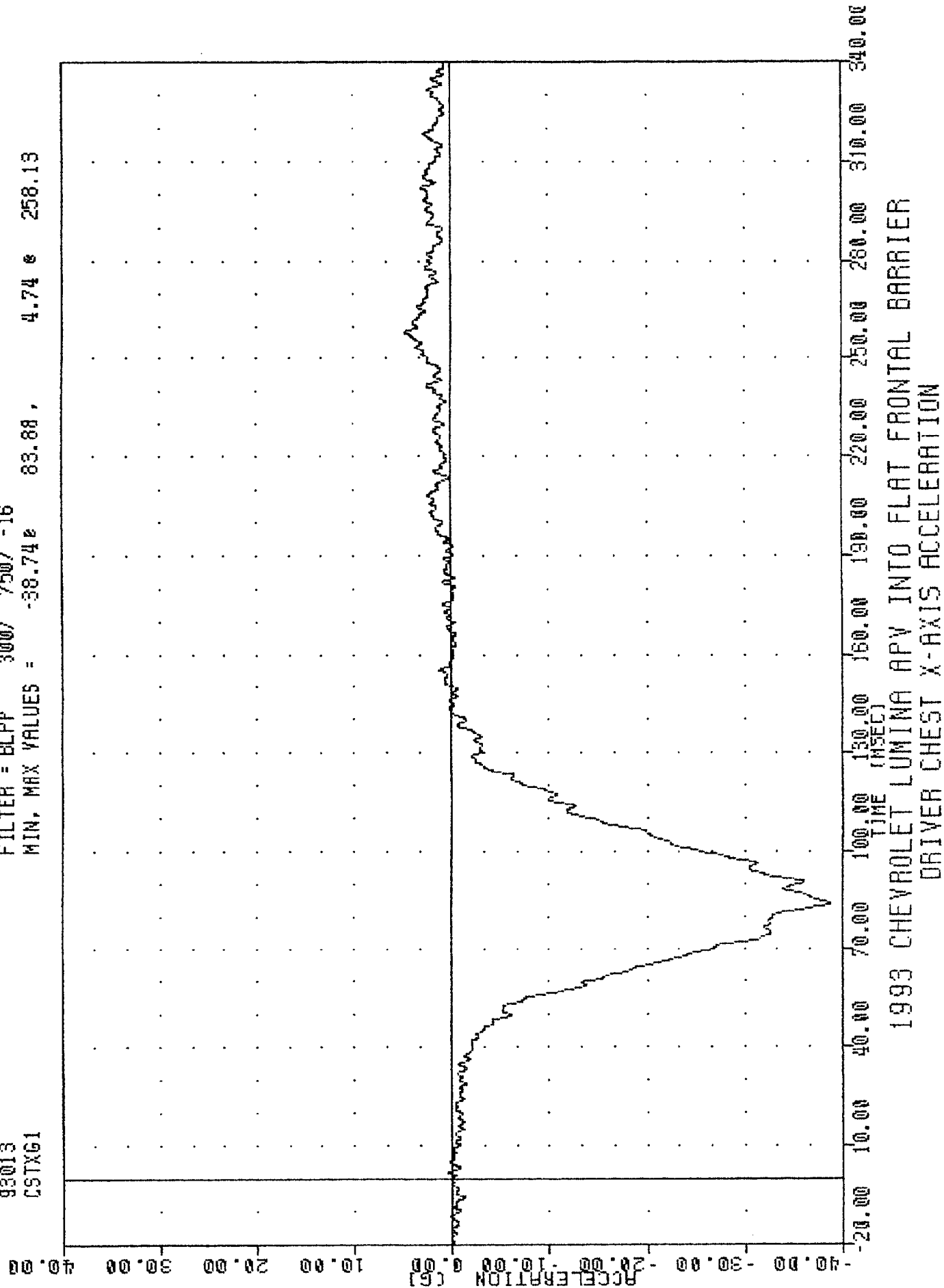
105.00



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION

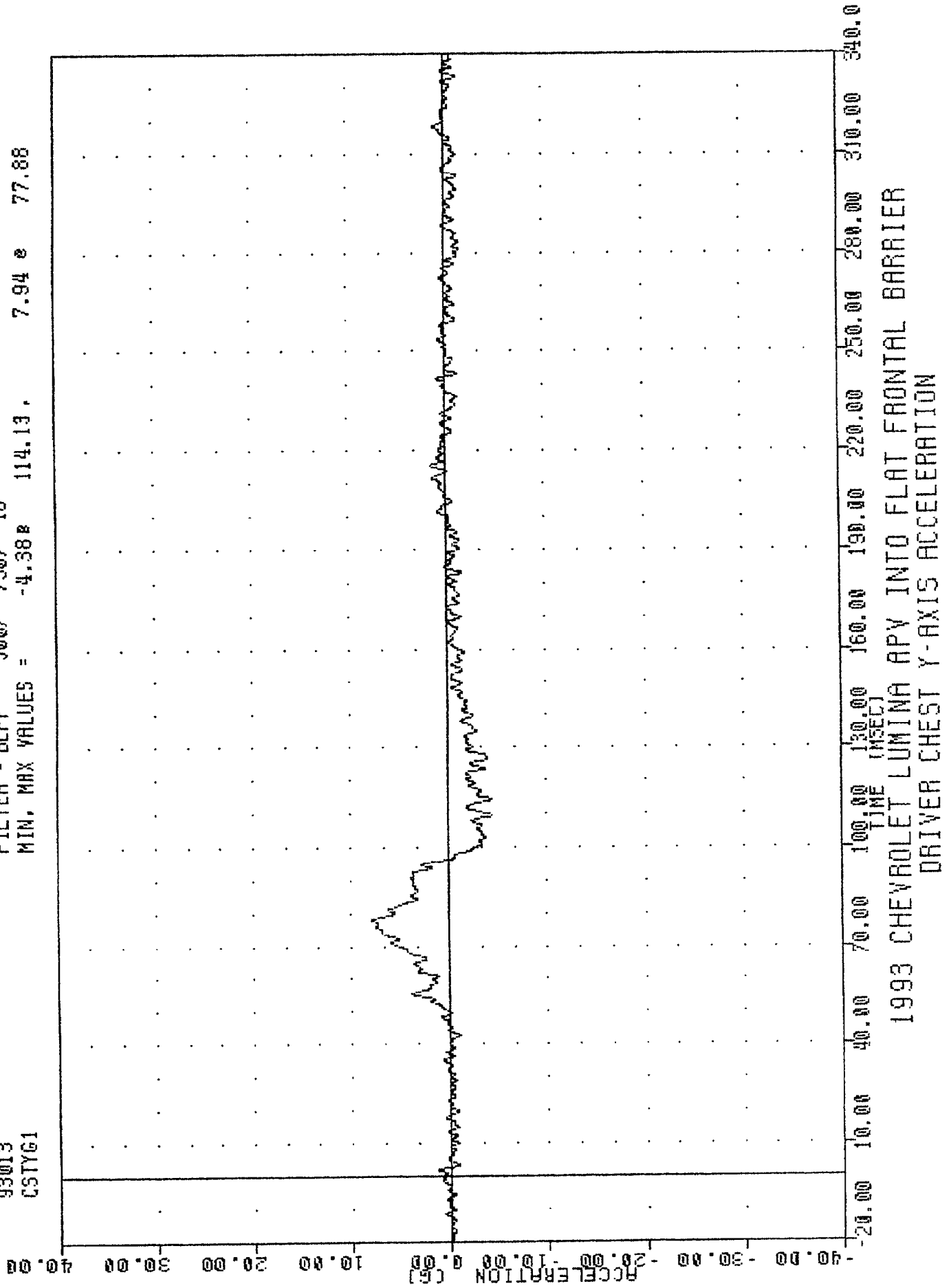
TRC 930113
 208 COMPLIANCE TESTING
 93013
 CSTXG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -38.74e 83.88, 4.74 e 258.13



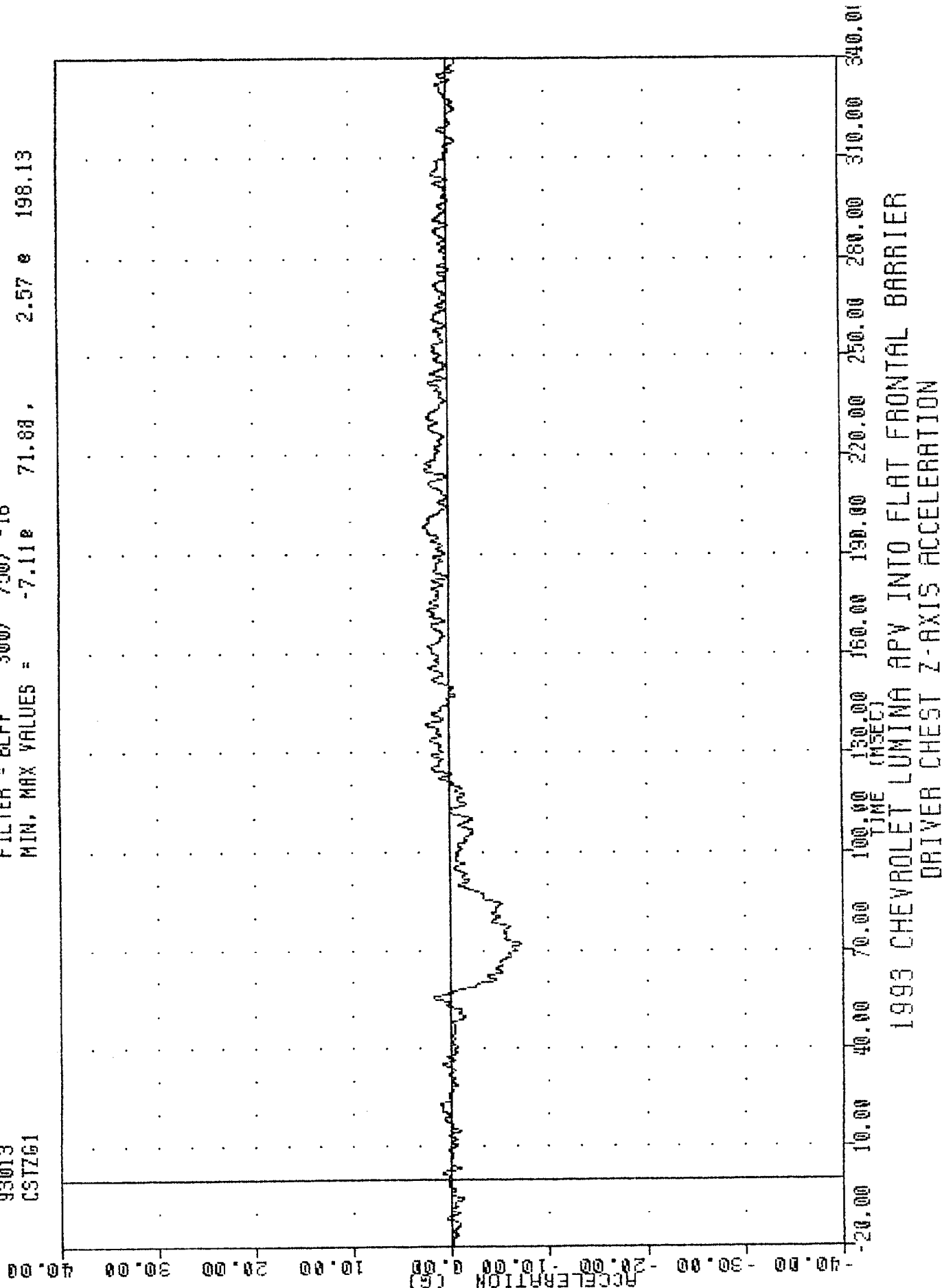
TRC
200 COMPLIANCE TESTING
930113
CSTYG1

FILTER = BLPP 300/ 750/ -16
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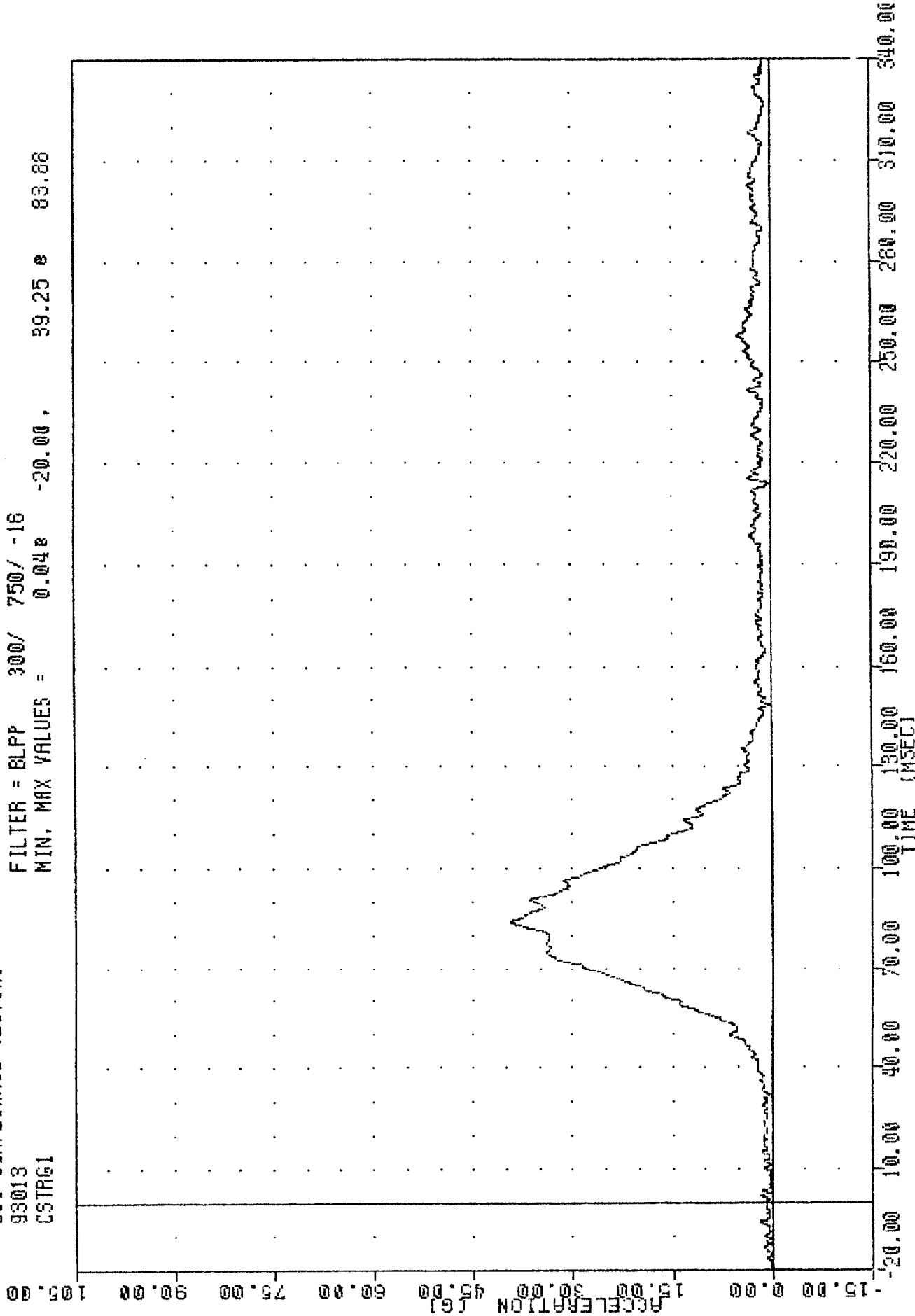
TRC
208 COMPLIANCE TESTING
93013
CSTZG1

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -7.11e 71.88, 2.57 e 198.13



TRC
208 COMPLIANCE TESTING
93013
CSTR61

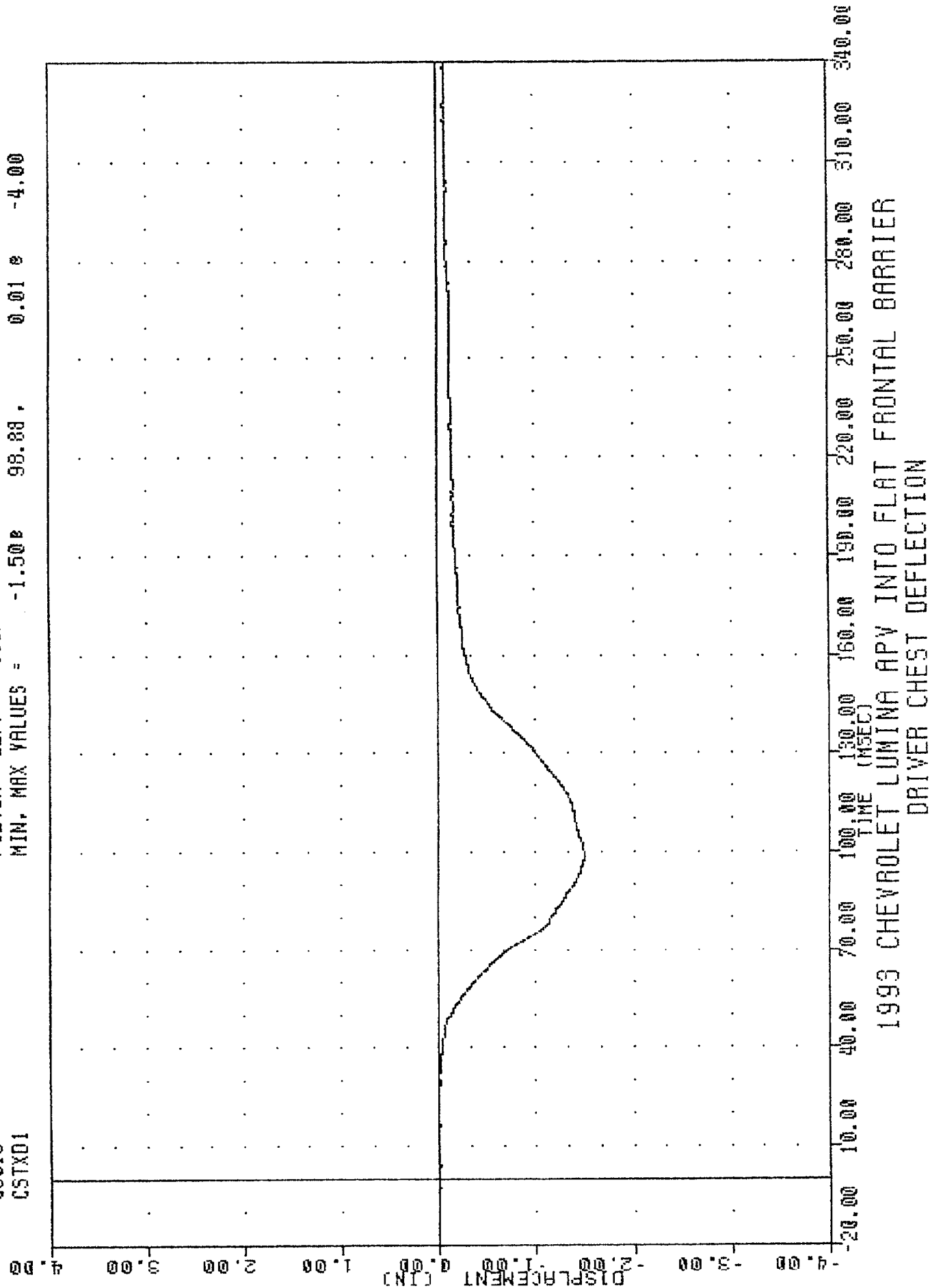
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1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

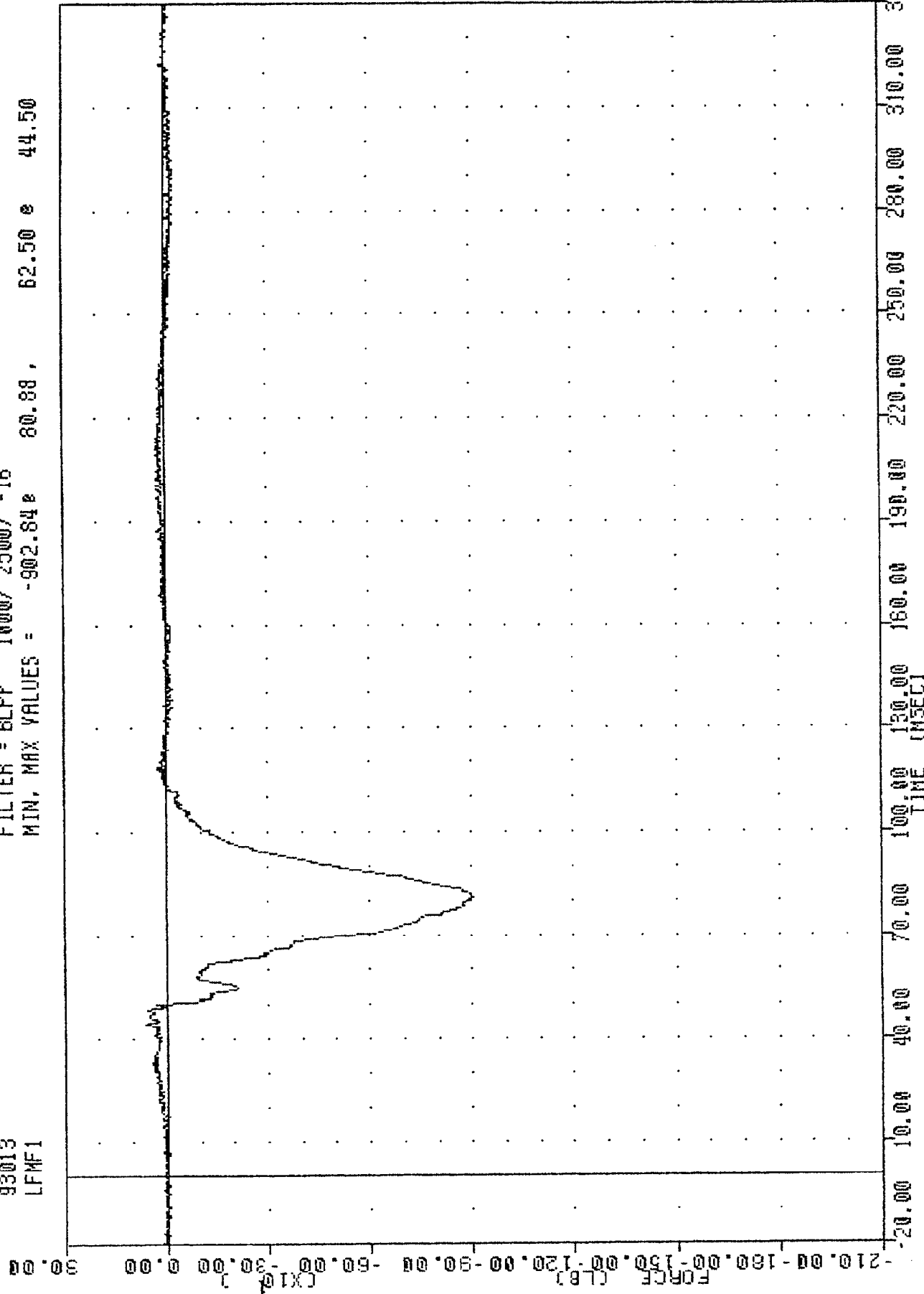
TRC
208 COMPLIANCE TESTING
93013
CSTX01

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -1.50e 98.88, 0.01 e -4.00



TRC 930113
 208 COMPLIANCE TESTING
 93013
 LFMF1

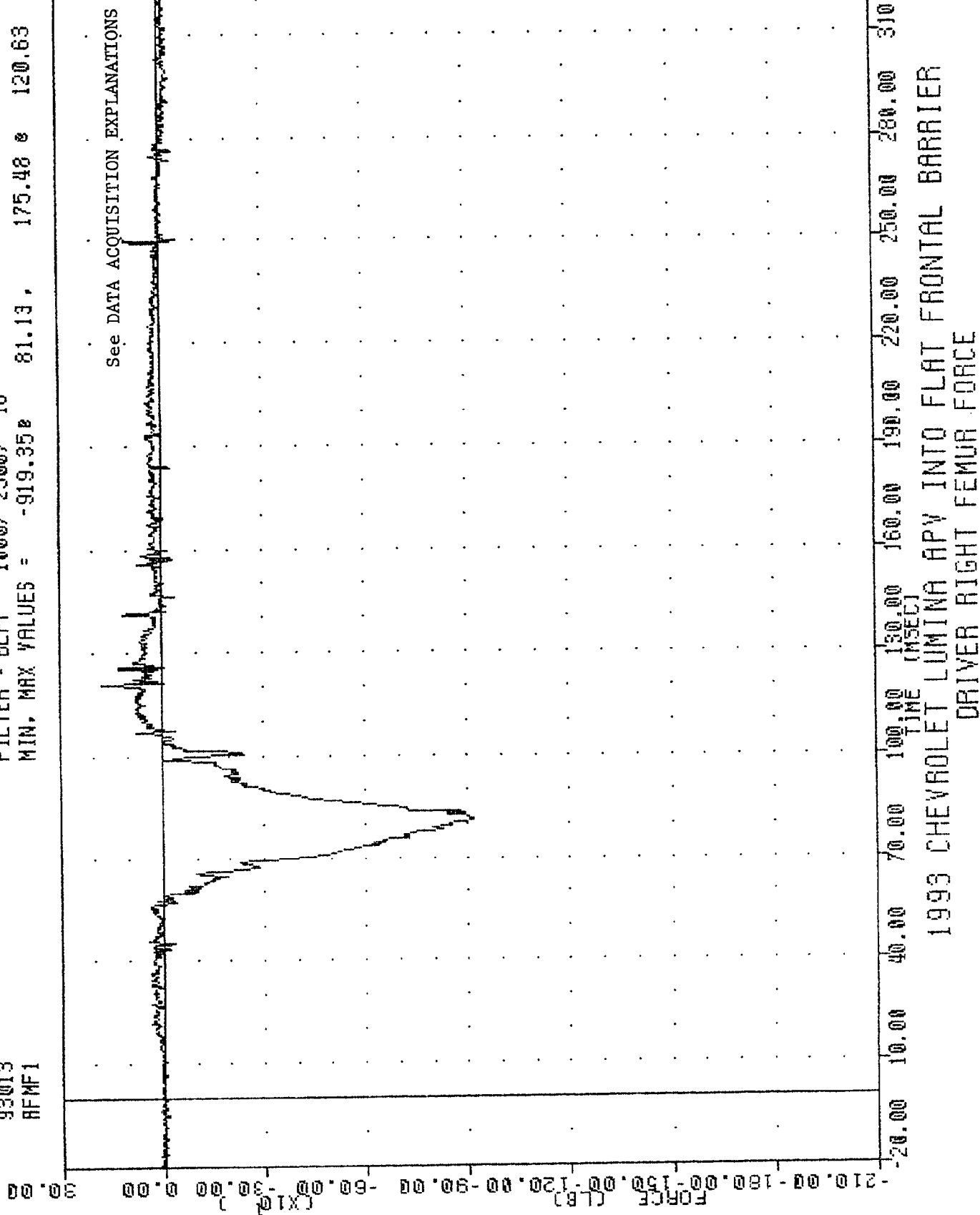
FILTER = BLPP 1000/ 2500/ -16
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1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 DRIVER LEFT FEMUR FORCE

TRC
208 COMPLIANCE TESTING
93013
AFMF1

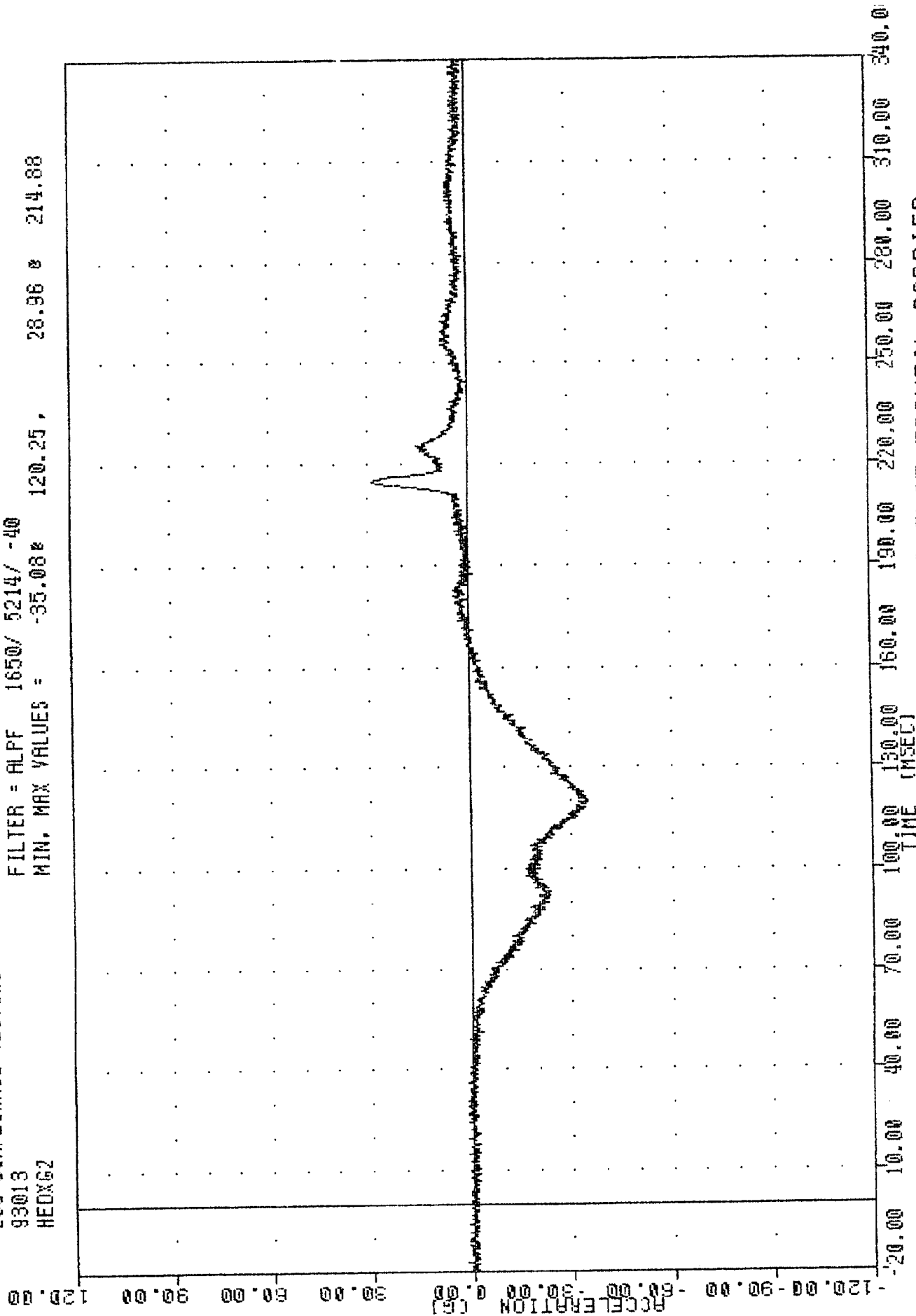
FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -919.35 81.13, 175.48 120.63



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

TRC
200 COMPLIANCE TESTING
930113
HEDX62

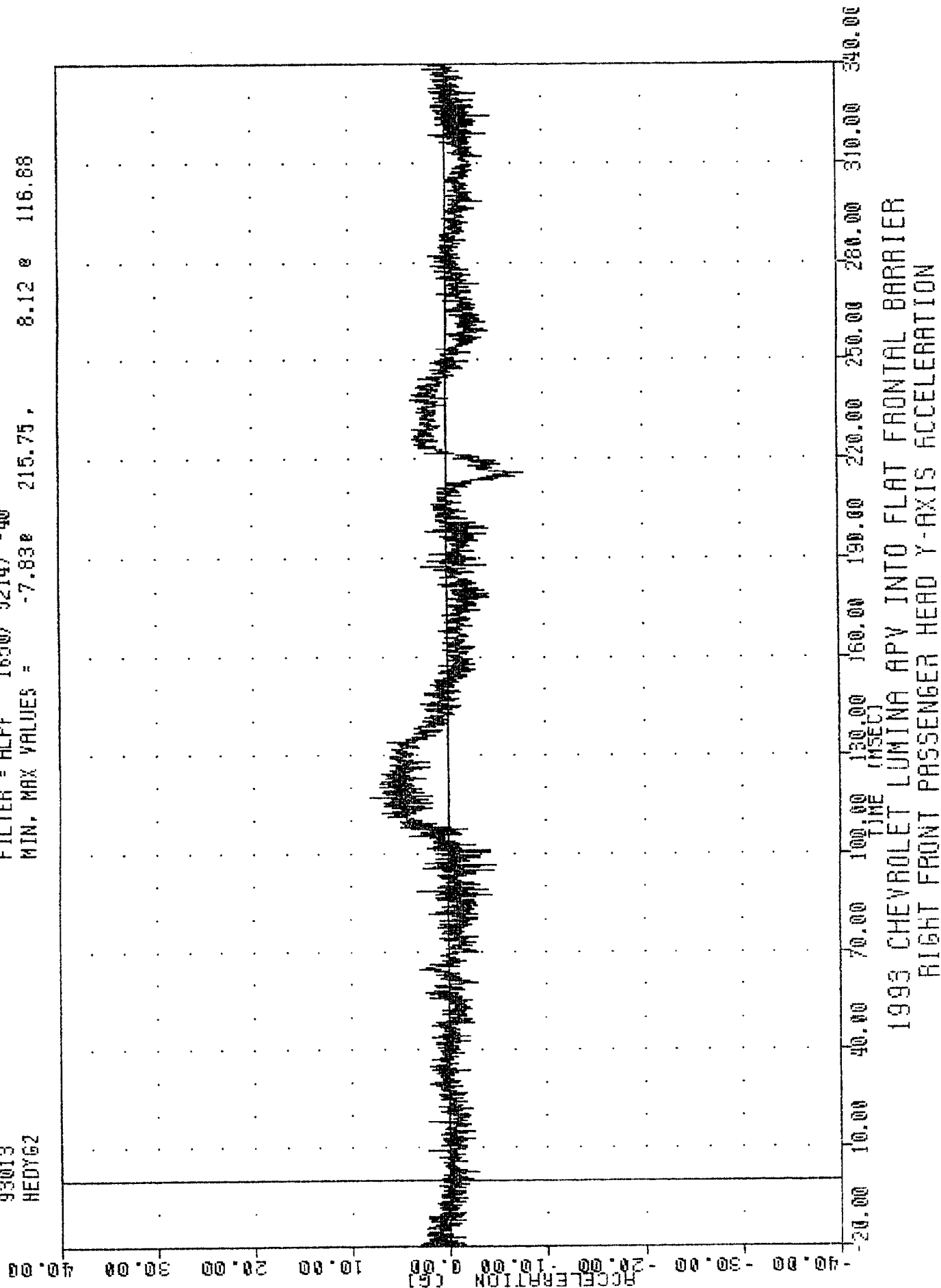
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -35.08 28.96 214.88



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

TRC
200 COMPLIANCE TESTING
930113
HEDYG2

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -7.83e 215.75, 8.12 e 116.88



TRC
208 COMPLIANCE TESTING
93013
HE07G2

, 930113

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -44.31e 98.00, 3.69 e 17.75

120.00

90.00

60.00

30.00

0.00

-30.00

-60.00

-90.00

-120.00

ACCELERATION (G)

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

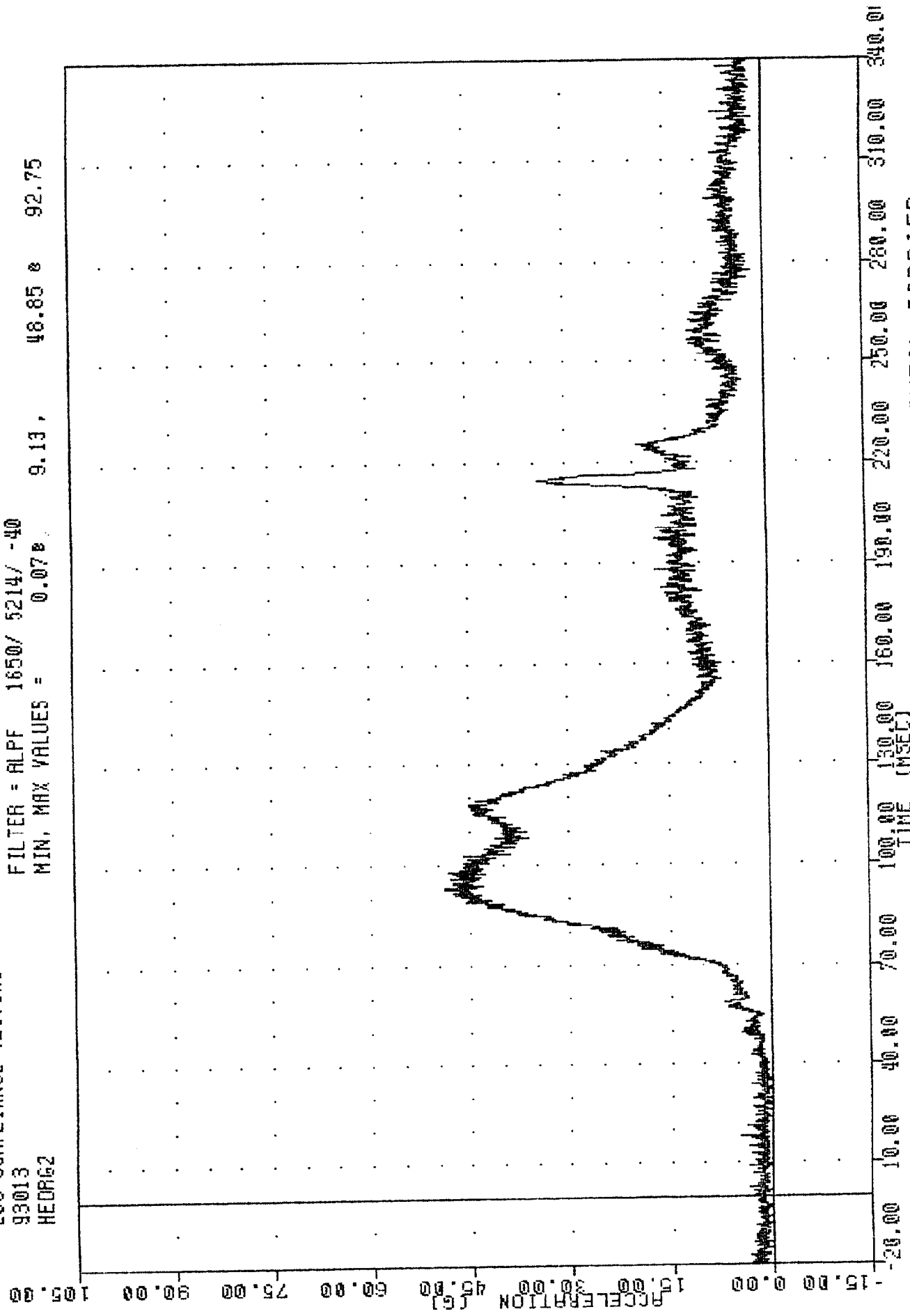
340.00

TIME (MSEC)

1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

TRC , 930113
 200 COMPLIANCE TESTING
 930113
 HEDR62

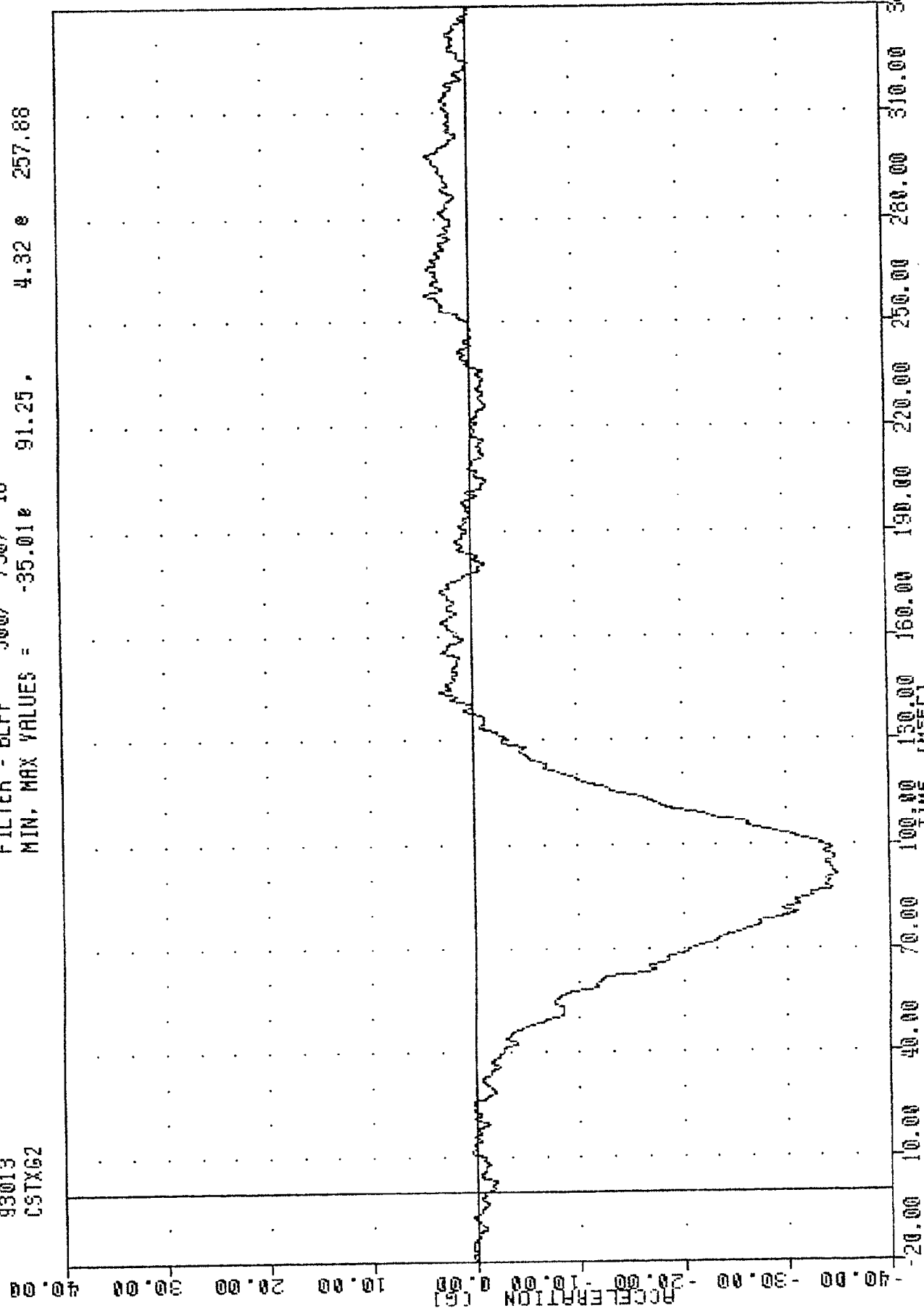
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.078 9.13, 48.85 & 92.75



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TRC , 930113
 208 COMPLIANCE TESTING
 93013
 CSTXG2

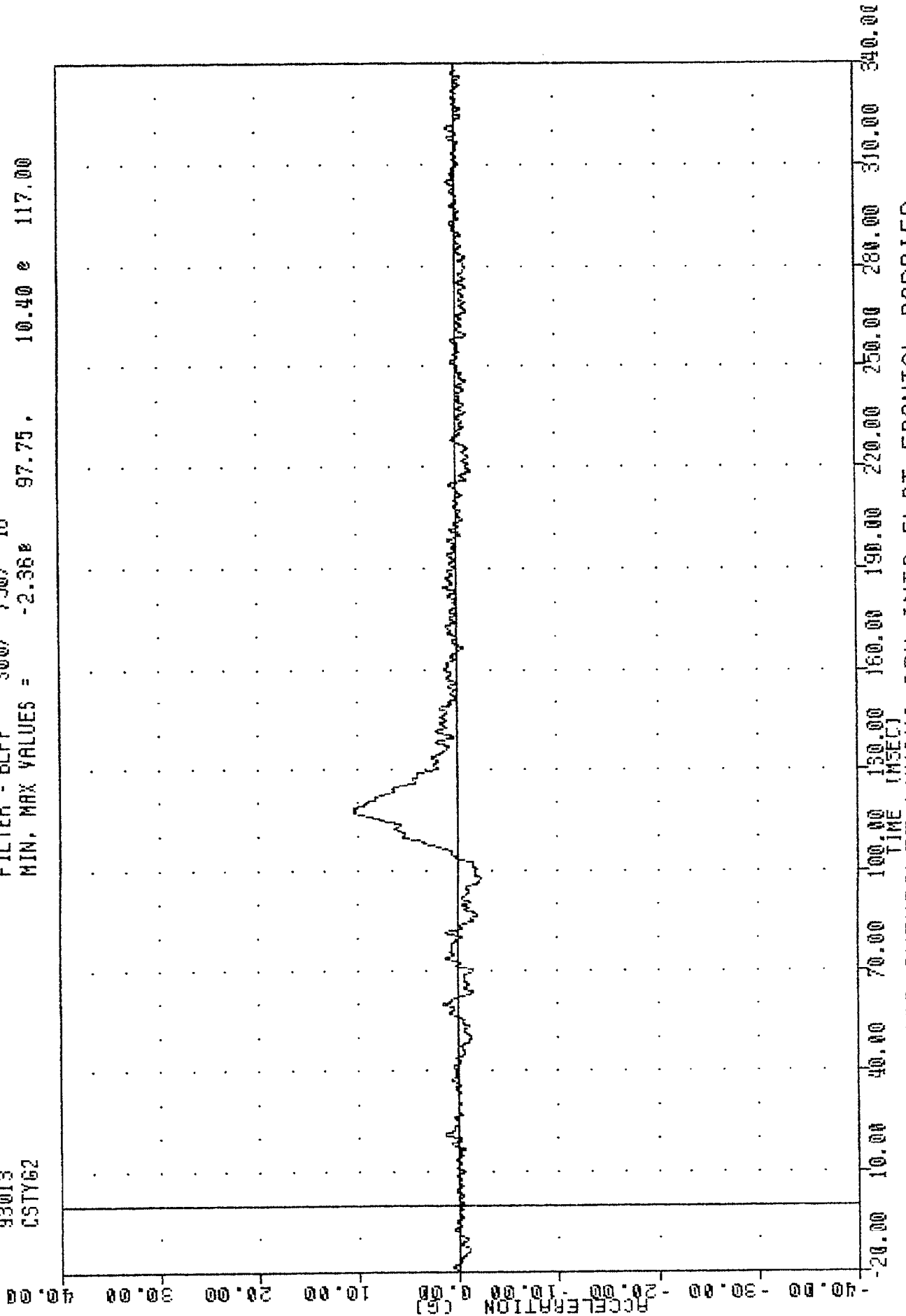
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -35.01e 91.25, 4.32 e 257.88



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

TRC , 930113
 208 COMPLIANCE TESTING
 93013
 CSTY62

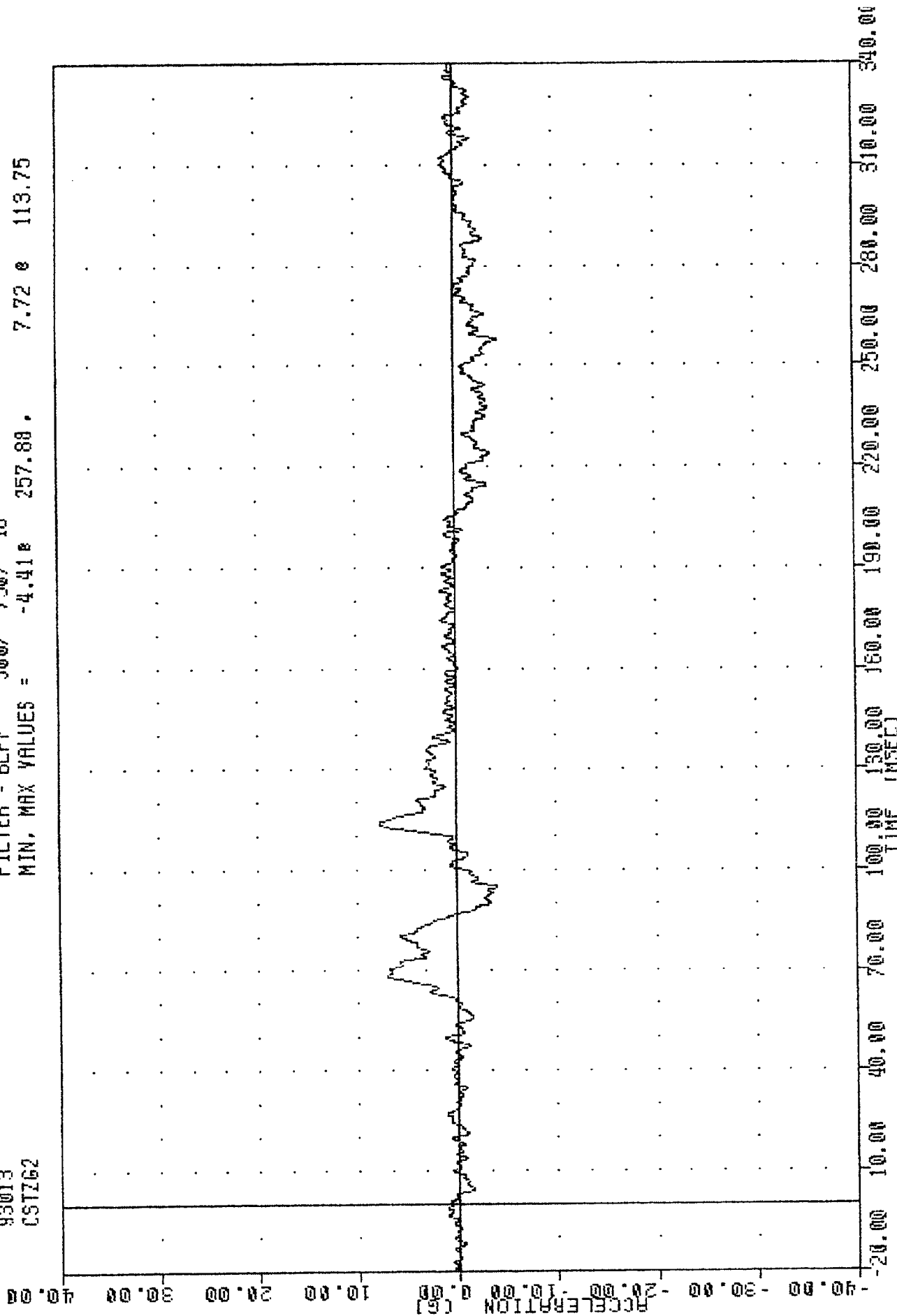
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -2.360 97.75, 10.40 e 117.00



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

TRC 930113
 208 COMPLIANCE TESTING
 93013
 CSTZG2

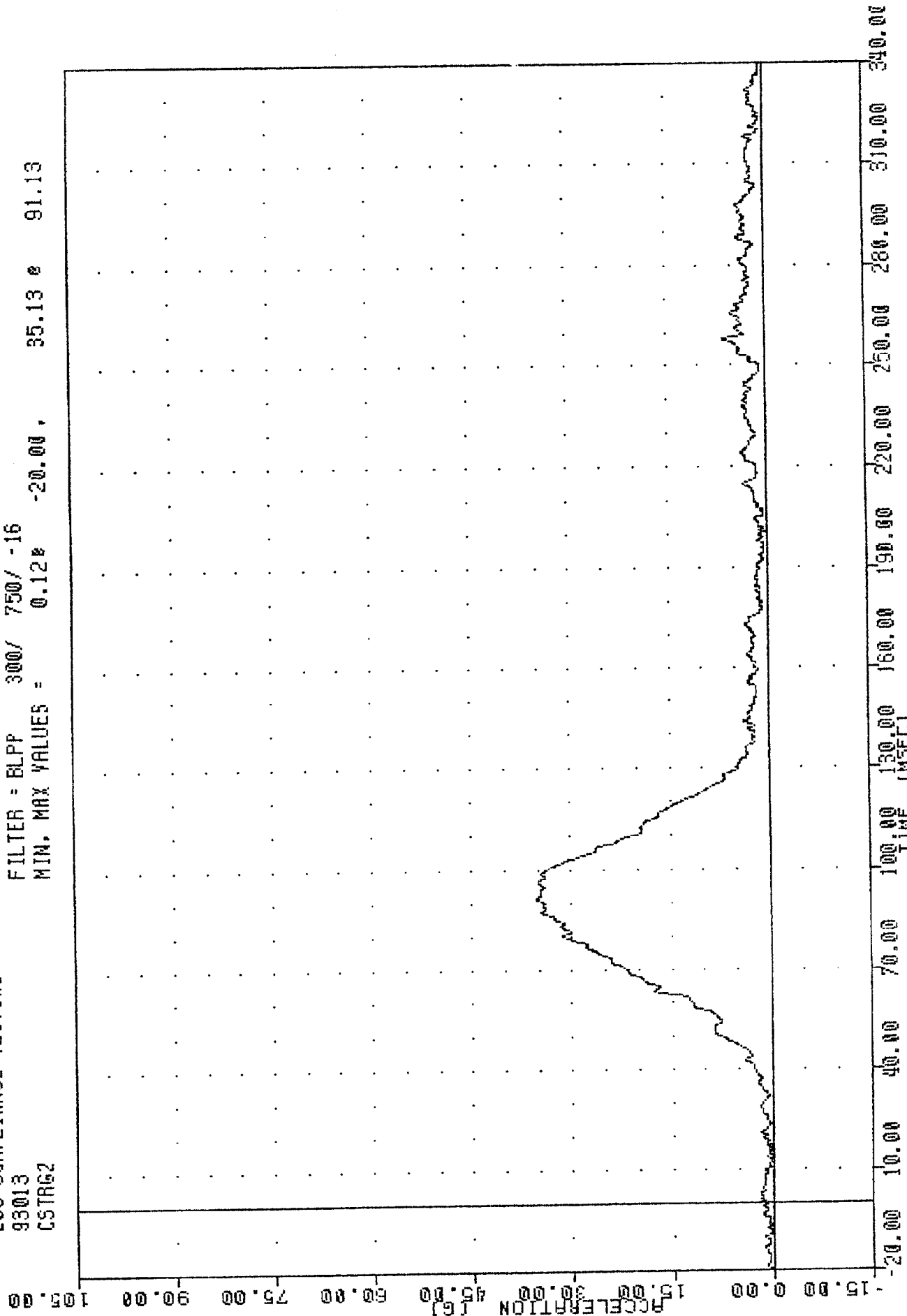
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -4.418 257.88 7.72 113.75



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TRC , 930113
 200 COMPLIANCE TESTING
 93013
 CSTR62

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.12# -20.00 , 35.13 # 91.13

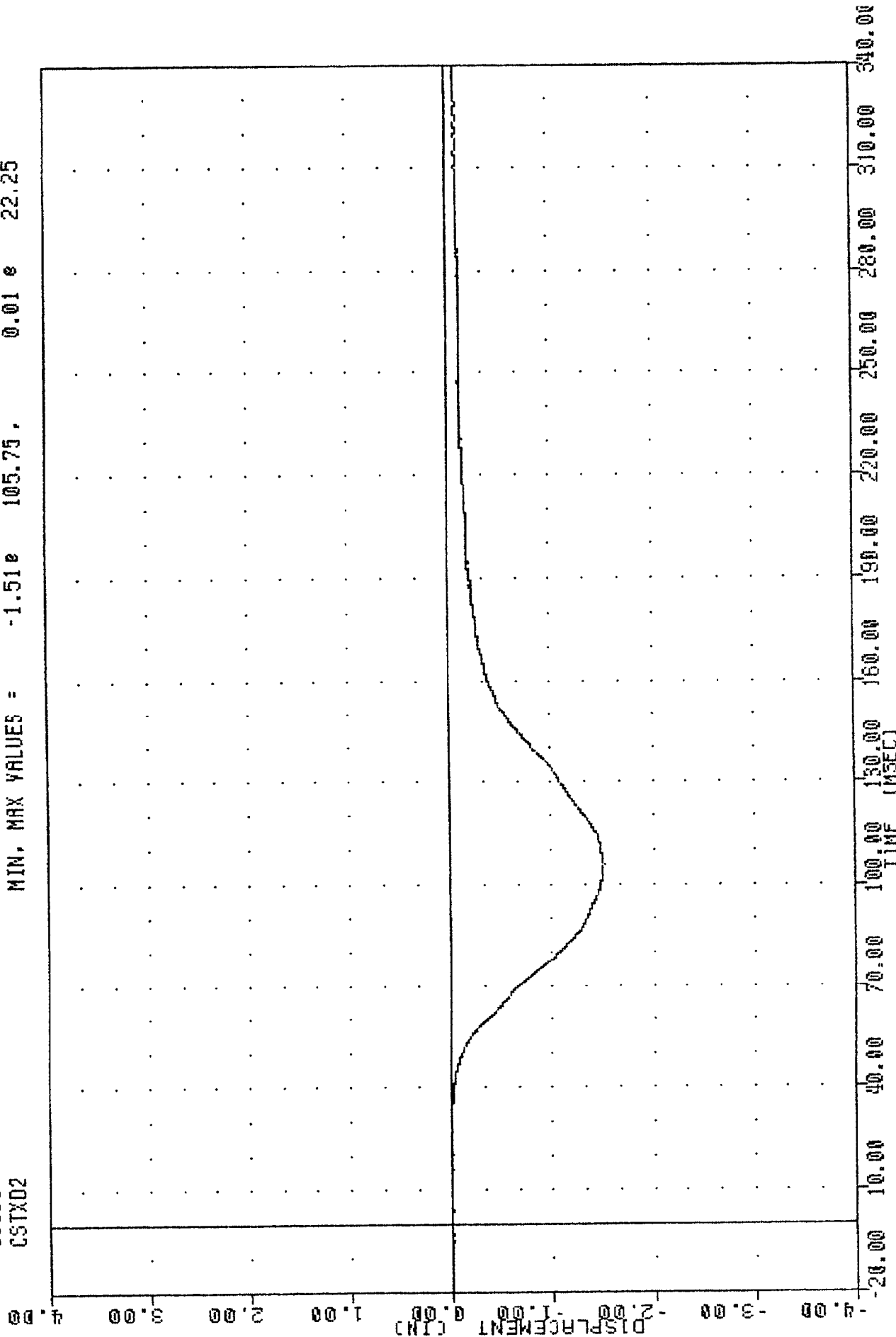


1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

TRC
208 COMPLIANCE TESTING
93013
CSTXD2

, 930113

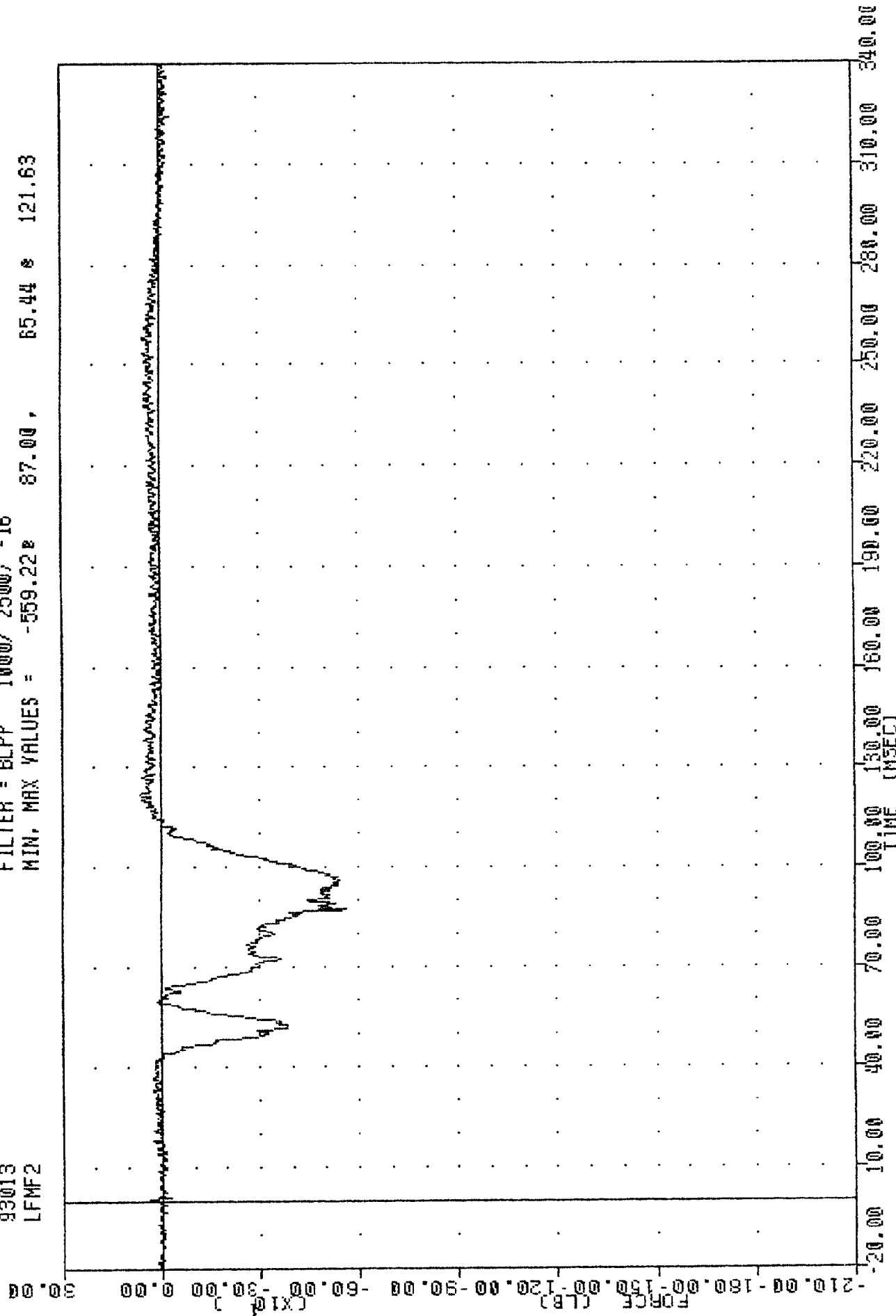
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -1.51e 105.75, 0.01 e 22.25



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST DEFLECTION

TPC
 208 COMPLIANCE TESTING
 93013
 LFMF2

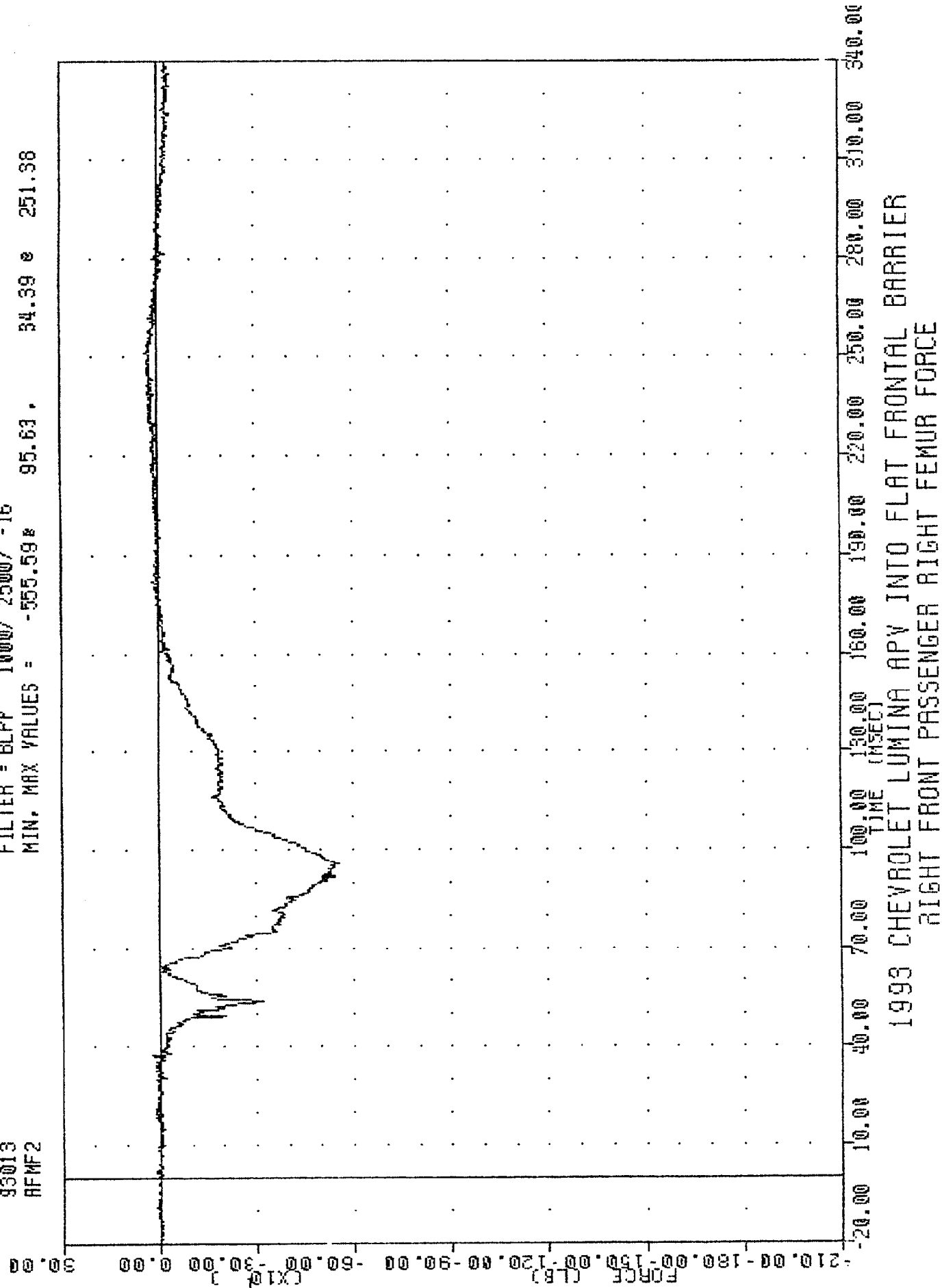
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -559.22 87.00 , 65.44 121.63



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT FEMUR FORCE

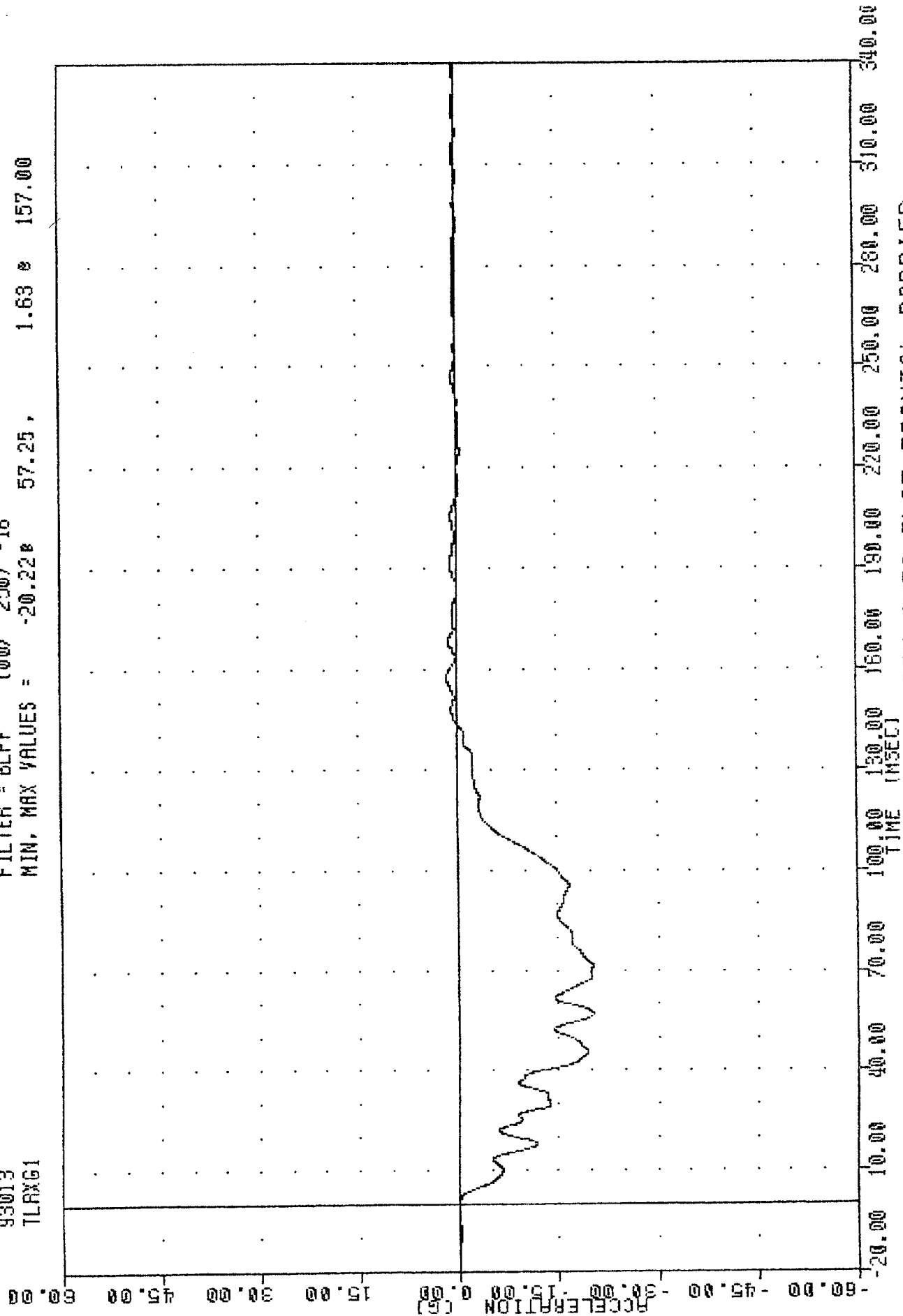
TRC
208 COMPLIANCE TESTING
93013
AFMF2

FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -555.59# 95.63, 34.39 @ 251.38



TRC
200 COMPLIANCE TESTING
93013
TLRXG1

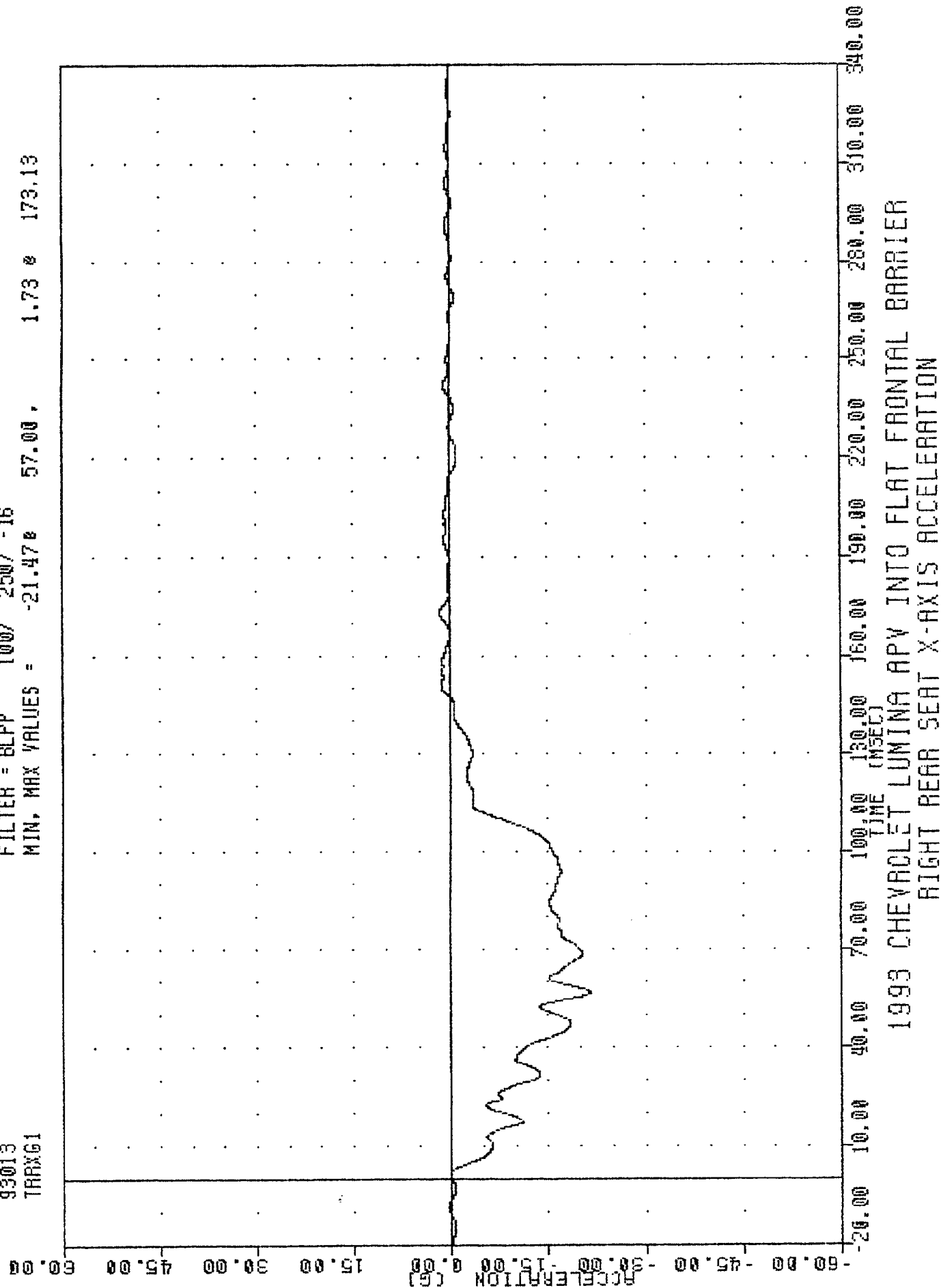
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -20.22 57.25, 1.63 157.00



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION

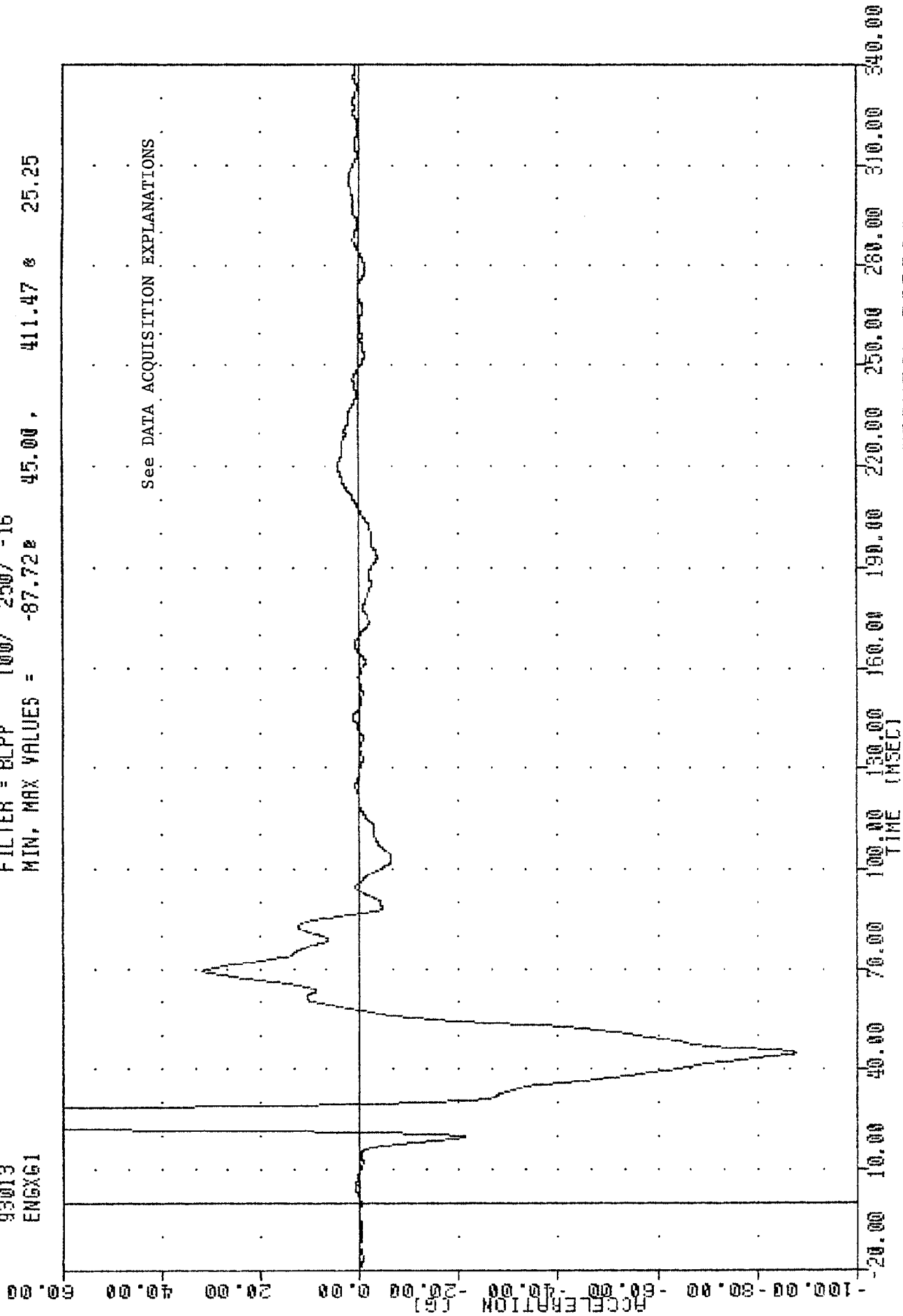
TRC , 930113
 208 COMPLIANCE TESTING
 93013
 TRRXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -21.47% 57.00 , 1.73 % 173.13



TRC , 930113
200 COMPLIANCE TESTING
93013
ENGXG1

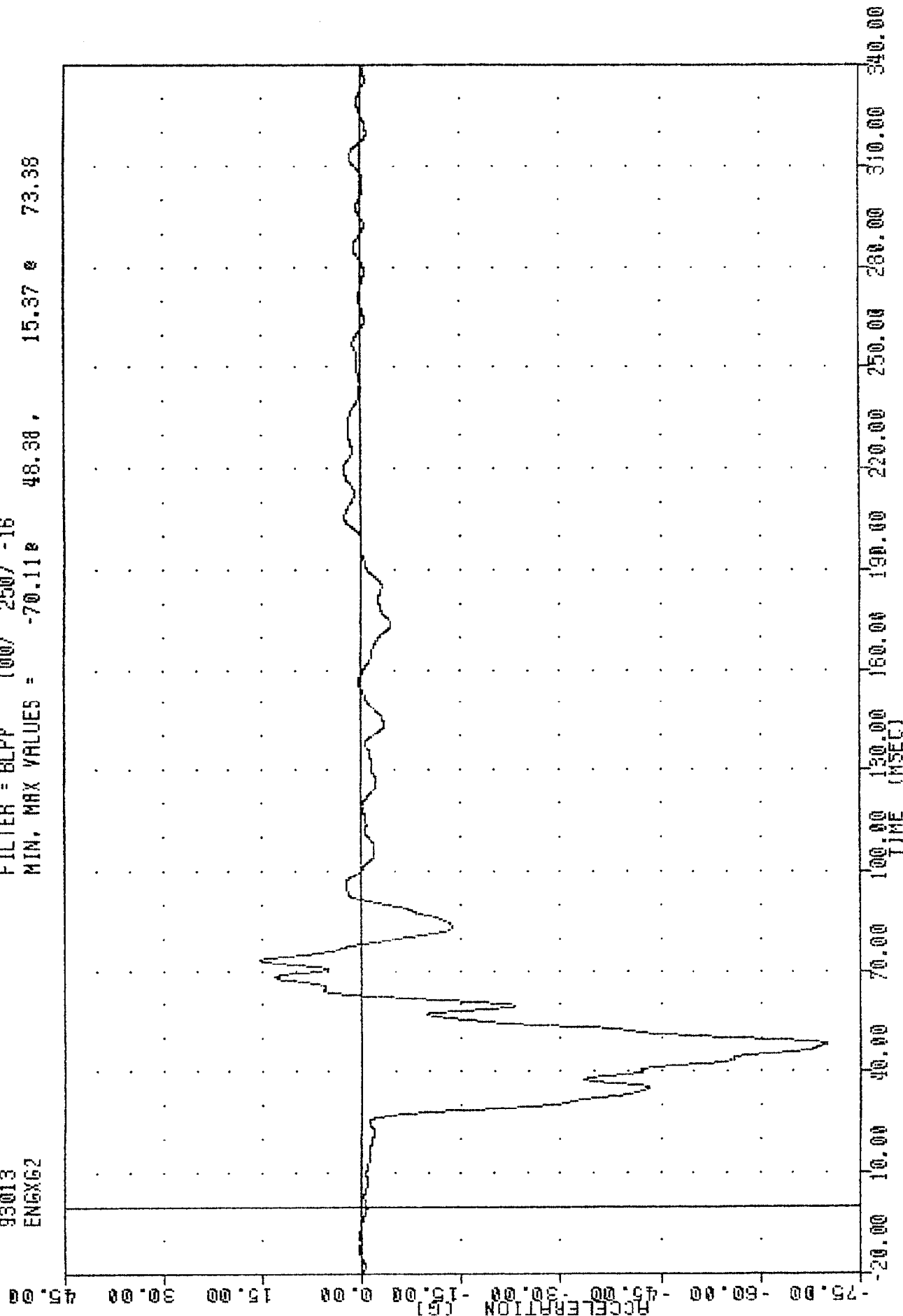
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -87.72 45.00 , 411.47 s 25.25



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
ENGINE TOP X-AXIS ACCELERATION

TRC , 930113
 208 COMPLIANCE TESTING
 93013
 ENG062

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -70.11e 48.38 , 15.37 e 73.38

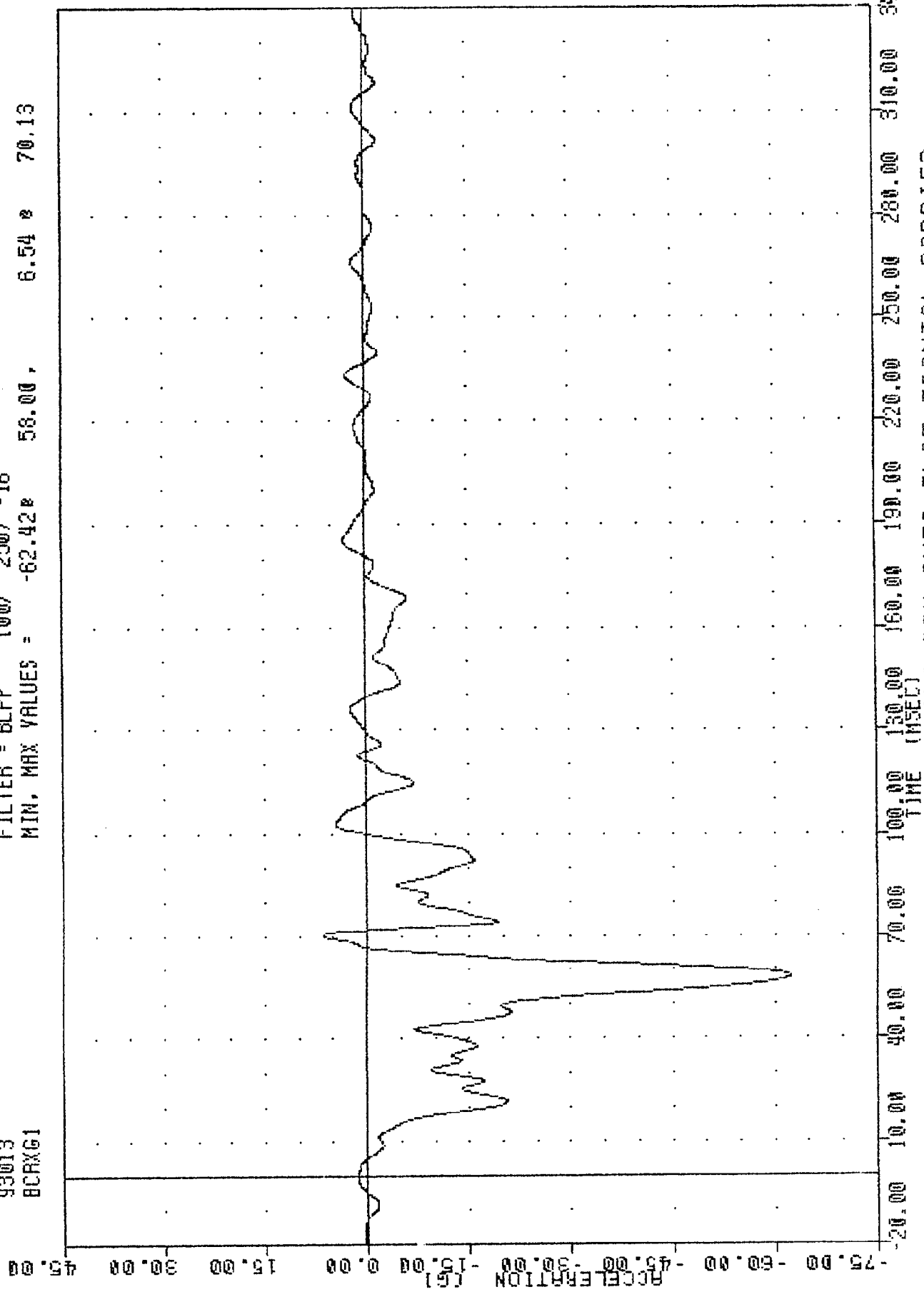


1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 ENGINE BOTTOM X-AXIS ACCELERATION

TRC , 930113
208 COMPLIANCE TESTING

93013
BCRXG1

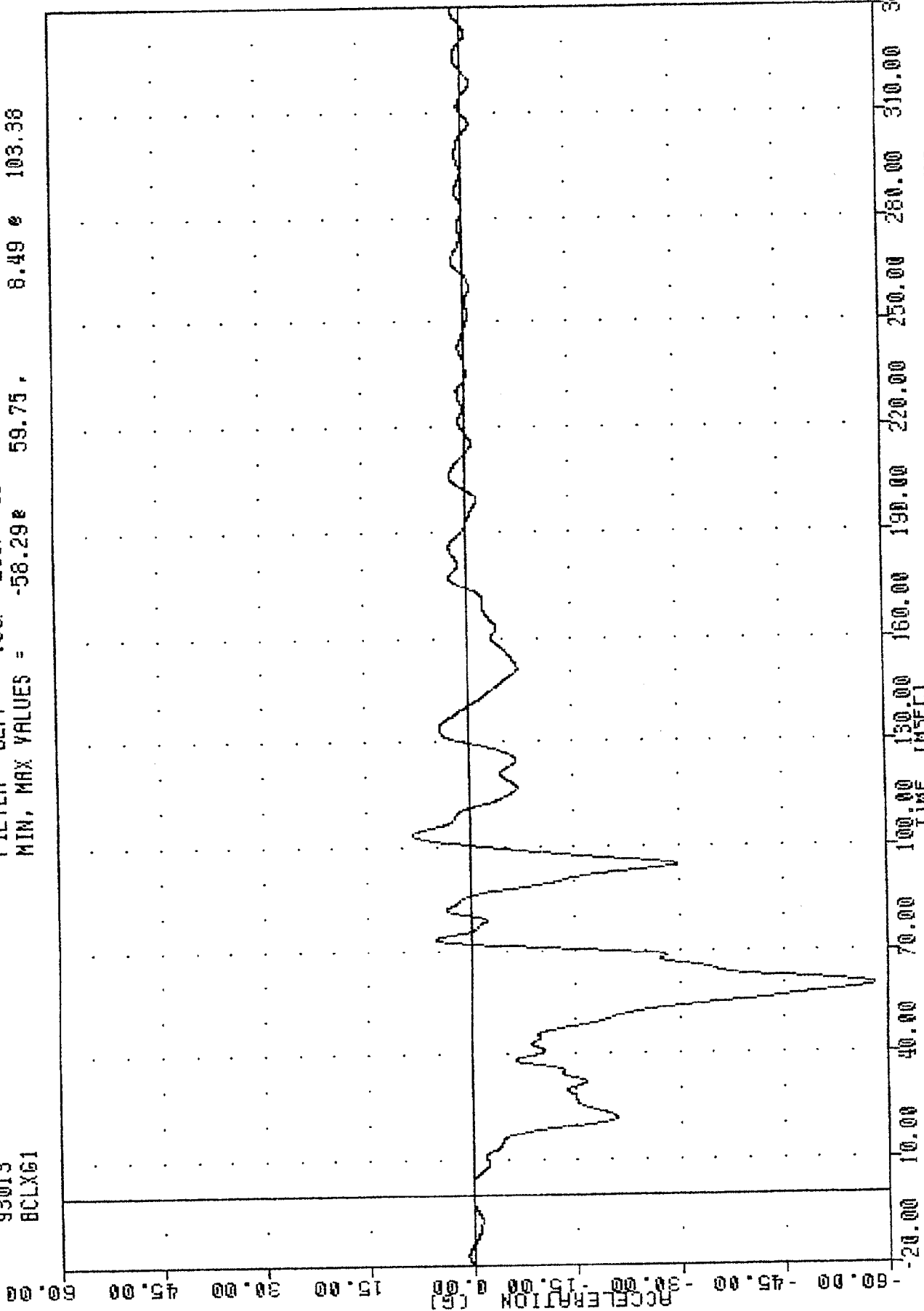
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -62.42 58.00 , 6.54 70.13



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TRC 930113
200 COMPLIANCE TESTING
93013
BCLXG1

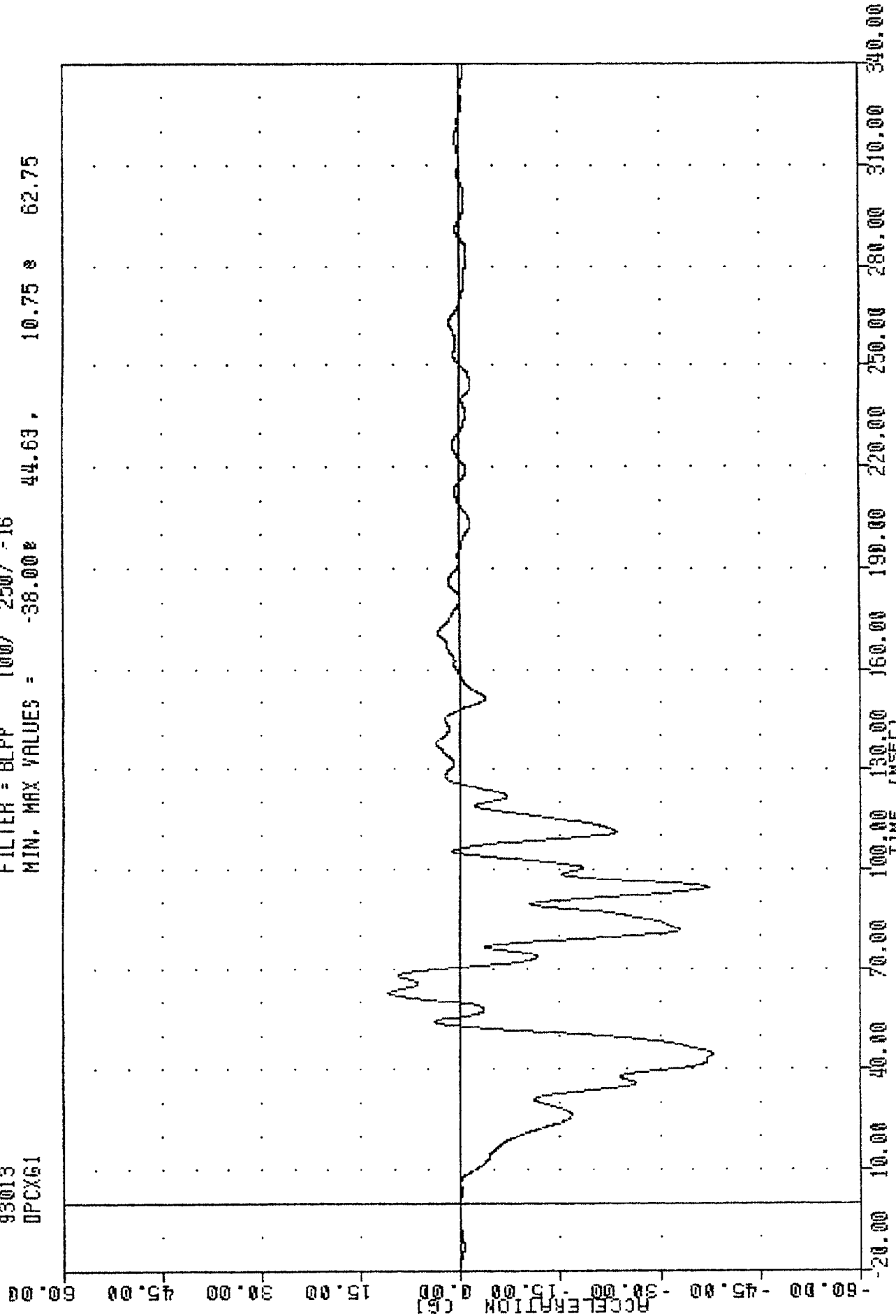
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -58.29e 59.75, 8.49 e 103.38



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC , 930113
 208 COMPLIANCE TESTING
 93013
 DPCXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -38.00 44.63, 10.75 62.75



1993 CHEVROLET LUMINA APV INTO FLAT FRONTAL BARRIER
 INSTRUMENT PANEL CENTER X-AXIS ACCELERATION