

V2229

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212-TRC-95-010
301-TRC-95-010

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

Chrysler Motors Corporation
1995 Jeep Grand Cherokee Laredo
NHTSA Number: CS0312
TRC Test Number: 950215

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



March 3, 1995

Final Report

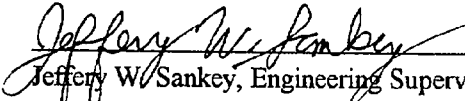
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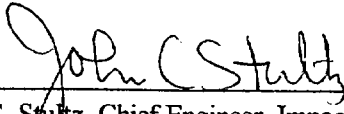
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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1995 Jeep Grand Cherokee Laredo multipurpose passenger vehicle, NHTSA No. CS0312, at Transportation Research Center Inc. on February 15, 1995. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS 208, "Occupant Crash Protection"; 212, "Windshield Mounting"; 219 (partial), "Windshield Zone Intrusion"; and 301 "Fuel System Integrity." The barrier impact velocity was 29.3 mph. The vehicle's maximum static crush was 19.8 inches. The ambient temperature was 74° F. The driver's Head Injury Criteria (HIC) was 235. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 54.4 g. The driver's chest maximum deflection was 1.3 inches. The driver's left and right femur maximum axial forces were 1412 pounds and 1475 pounds, respectively. The passenger's HIC was 643. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 49.5 g. The passenger's chest maximum deflection was 1.8 inches. The passenger's left and right femur maximum axial forces were 520 pounds and 656 pounds, respectively.			
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Retention" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division Nassif Building, Room 5108 400 Seventh Street, S.W. Washington, DC 20590	
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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

*1 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Inc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10-286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
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
		1.06	quarts	qt
		0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
		1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

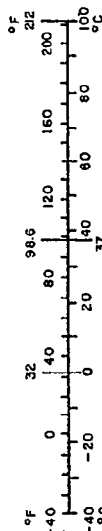


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Section 1.0

Purpose and Test Procedure

Purpose

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standards (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-93-D-01089. The purpose of this test was to determine if the subject vehicle, a 1995 Jeep Grand Cherokee Laredo multipurpose passenger vehicle, NHTSA No. CS0312, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," in the flat frontal barrier impact mode.

Test Procedure

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

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

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

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

The twenty-six (26) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 12,500 samples per second and processed per Sections 11.13 through 11.15 of the Laboratory Test Procedure.

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

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

Section 2.0

Frontal Barrier Impact Test Summary

Test Results Summary

This flat frontal barrier test was conducted at TRC on February 15, 1995.

The test vehicle, a 1995 Jeep Grand Cherokee Laredo multipurpose passenger vehicle, NHTSA No. CS0312, appeared to comply with the performance requirements of FMVSS 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy the chest deflection did not exceed 3.0 inches. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with an airbag at the driver's seating position. The vehicle's test weight was 4646 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 19.8 inches.

The driver's HIC was 235. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 54.4 g. The driver's chest maximum deflection was 1.3 inches. The driver's left and right femur maximum compressive forces were 1412 pounds and 1475 pounds, respectively.

The right front passenger's HIC was 643. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 49.5 g. The right front passenger's chest maximum deflection was 1.8 inches. The right front passenger's left and right femur maximum compressive forces were 520 pounds and 656 pounds, respectively.

There was no loss of windshield periphery retention and no penetration through the windshield. Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test or during any portion of the static rollover test.

Table 1 Crash Test Summary

NHTSA number:	CS0312
Test type:	Frontal barrier impact
Test date:	02/15/95
Test time:	1456
Ambient temperature at impact area:	74° F
Vehicle year/make/ model/body style:	1995/Jeep/Grand Cherokee Laredo /mpv
Vehicle test weight:	4646 lb
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	29.3 mph
Secondary:	29.3 mph
Maximum static crush:	19.8 in
Average rebound:	33.8 in
Number of cameras:	
Real-time:	2
High-speed:	14
Door opening data:	
Left-front:	Easy
Right-front:	Easy

¹ With respect to tow track centerline.

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

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #314</u>	<u>Passenger #230</u>
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag	3-point unbelt
Number of data channels:	9	9
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag	Chest & head restraint
Chest:	Airbag & lower steering wheel rim	None
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

Color: Green

VIN: 1J4GZ58Y1SC649846

NHTSA number: CS0312

Engine data:

Placement: Longitudinal/inline

Cylinders: 8

Displacement: 5.2 liters

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

Final drive: fwd, rwd, X 4wd

Date vehicle received: 2/10/95

Odometer reading: 141

Dealer's name
and address: Ricart Jeep-Eagle, Inc.
667 South Hamilton Road
Columbus, Oh 43213

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	No	Tilting steering wheel	Yes
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Power door locks	Yes	Other: Laredo Package #28E, Trailer Towing Group, Overhead Console, Rear Track Lock Differential, CD Player, Sunscreen Glass	

Certification data from vehicle's label:

Vehicle manufactured by: Chrysler Corporation

Date of manufacture: 1/95

VIN: 1J4GZ58Y1SC649846

GVWR: 5500 lb

GAWR: Front: 2750 lb

Rear: 2950 lb

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P225/75R15
Spare tire: Space saver
Type of front seats: Bucket

Tire & capacity data from vehicle's label:

Recommended tire size: P225/75R15

Recommended cold tire pressure:

Front: 33 psi

Rear: 33 psi

Designated Seating Capacity:

Front NA

Rear NA

Total NA

Vehicle Capacity Weight: NA lbs.

Test vehicle attitudes:

Delivered attitude:	LF: 30.4 in.	RF: 31.5 in	LR: 31.9 in	RR: 31.9 in
Fully loaded attitude:	LF: 31.0 in	RF: 31.0 in	LR: 30.2 in	RR: 30.3 in
Pre-test attitude:	LF: 31.0 in	RF: 31.0 in	LR: 30.2 in	RR: 30.3 in

Table 2 Test Vehicle Information, Cont'd.

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

Right front	1164	lb	Right rear	905	lb
Left front	1127	lb	Left rear	832	lb
Total front weight	2291	lb	(56.9% of total vehicle weight)		
Total rear weight	1737	lb	(43.1% of total vehicle weight)		
Total delivered weight	4028	lb			

Calculation of test vehicle's target test weight:

RCLW¹ = Rated Cargo and Luggage Weight

GVWR = Gross Vehicle Weight Rating (5500 lb)

UDW = Unloaded Delivered Weight (4028 lb)

VCW = Vehicle Capacity Weight = GVWR - UDW = 5500 - 4028 = 1472 lb

DSC² = Designated Seating Capacity (5)

RCLW¹ = GVWR - UDW - 150 (DSC) = 5500 - 4028 - 150(5) = 722 lb

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

Target test weight = 4028 + 300 + 334 = 4662 lb

Weight of test vehicle with required dummies and 284 lb of cargo weight:

Right front	1248	lb	Right rear	1076	lb
Left front	1189	lb	Left rear	1133	lb
Total front weight	2437	lb	(52.4% of total vehicle weight)		
Total rear weight	2209	lb	(47.6% of total vehicle weight)		
Total test weight	4646	lb	(0.3% under target test weight)		

Weight of ballast secured in vehicle cargo area: 240 lb

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 50.3 in

Vehicle Wheelbase: 105.8 in

¹ Cargo weight for multipurpose passenger vehicles, trucks, and buses is the vehicle's calculated cargo and luggage weight or 300 lbs, whichever is less.

² The designated seating capacity is determined by counting the number of seat belts installed in the vehicle.

Table 3 Post-Impact Data

Test number: 950215
NHTSA number: CS0312
Test date: 02/15/95
Test time: 1456
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature
at impact area: 74° 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:

Overall length of test vehicle:

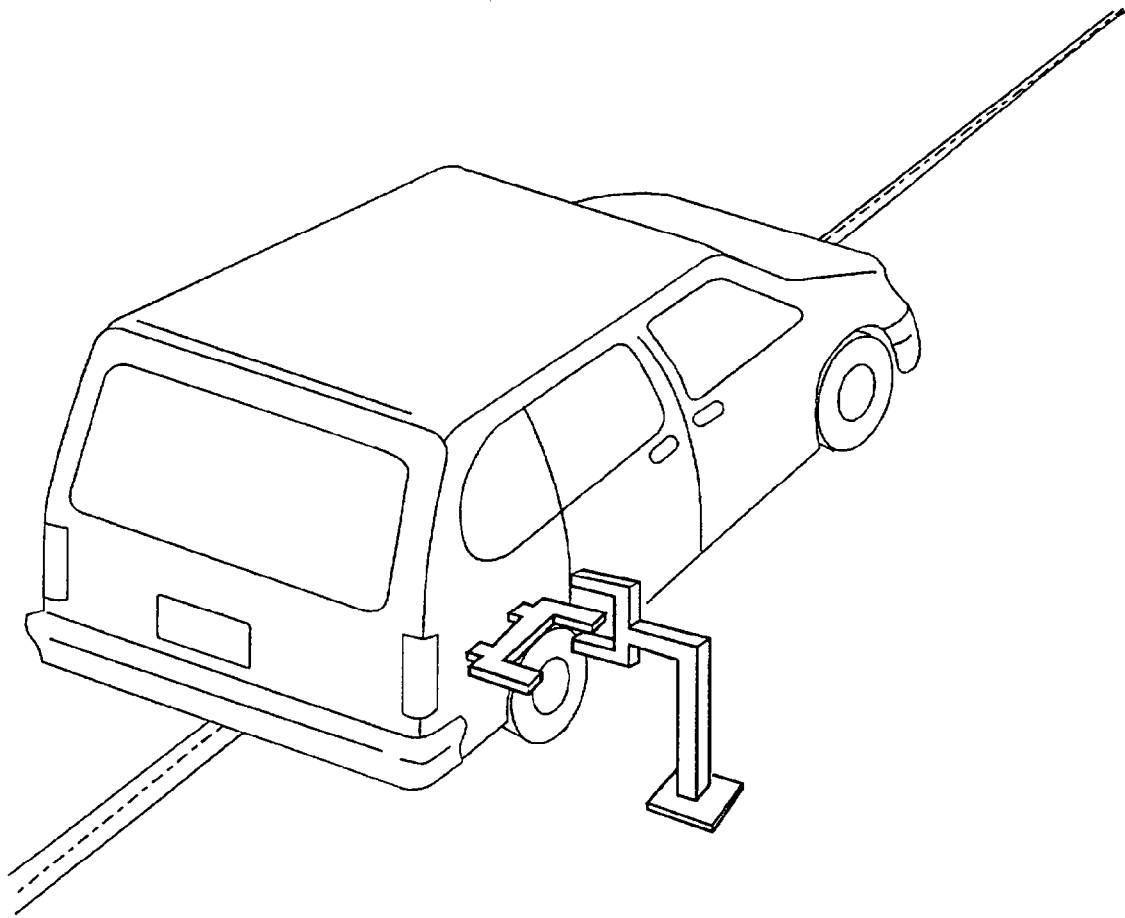
Pre-test:	L:	174.0 in	C:	176.2 in	R:	174.0 in
Post-test:	L:	156.6 in	C:	156.8 in	R:	155.8 in
Total crush:	L:	17.4 in	C:	19.4 in	R:	18.2 in
Average crush:		18.3 in				

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	35.8 in	C:	32.6 in	R:	32.9 in
Average rebound:		33.8 in				

Figure 1 Impact Velocity Measurement System



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

The vanes have a one-foot spacing.

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

NHTSA number: CS0312
 Test date: 02/15/95
 Vehicle year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv
 Vehicle size category: Special purpose
 VIN: 1J4GZ58Y1SC649846
 Build date: 01/95
 Test weight: 4646 lb
 Vehicle wheelbase: 105.8 in
 Maximum width: 71.0 in
 Front overhang: 32.2 in

Collision Deformation

Classification (CDC) Code: 12FDEW3

Crush depth measurements:

C1:	17.4 in
C2:	17.9 in
C3:	19.2 in
C4:	19.8 in
C5:	19.0 in
C6:	18.2 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 60.0 in

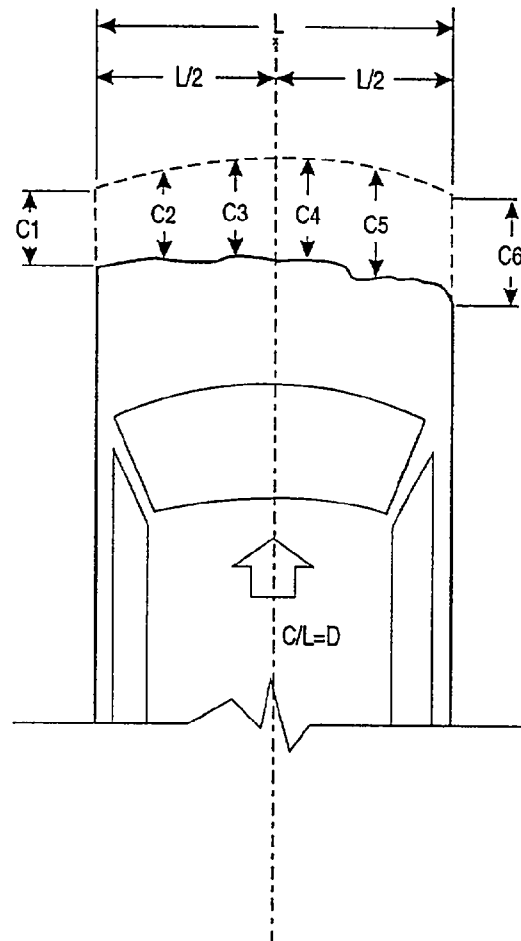


Table 4 Post-test Airbag Data

NHTSA number: CS0312
Test date: 02/15/95
Technician: Sankey
Vehicle year/make/
model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

A. Number of airbag vent holes:

Driver: 2
Passenger: NA

B. Size of airbag vent holes:

Driver: 1.2 in dia.
Passenger: NA

C. Total airbag vent area:

Driver: 2.5 in²
Passenger: NA

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

Driver:	Length	NA
	Width	NA
	Diameter	20.0 in
Passenger:	Length:	NA
	Width:	NA
	Diameter:	NA

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

E. Is the airbag tethered?

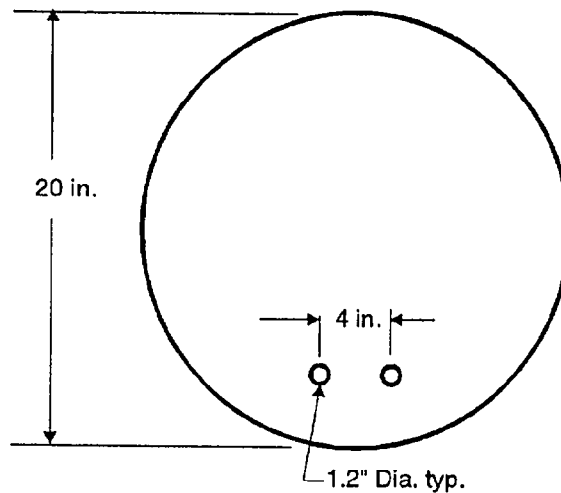
Driver: No

If yes, record length of tether: NA

Passenger: NA

If yes, record length of tether: NA

Driver's airbag:



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

Driver: Mfr.: NA; Airbag: PE5186500-00; Inflator: CBBF1812ATH

Passenger: Mfr.: NA; Airbag: NA

Figure 3 Vehicle Accelerometer Placement

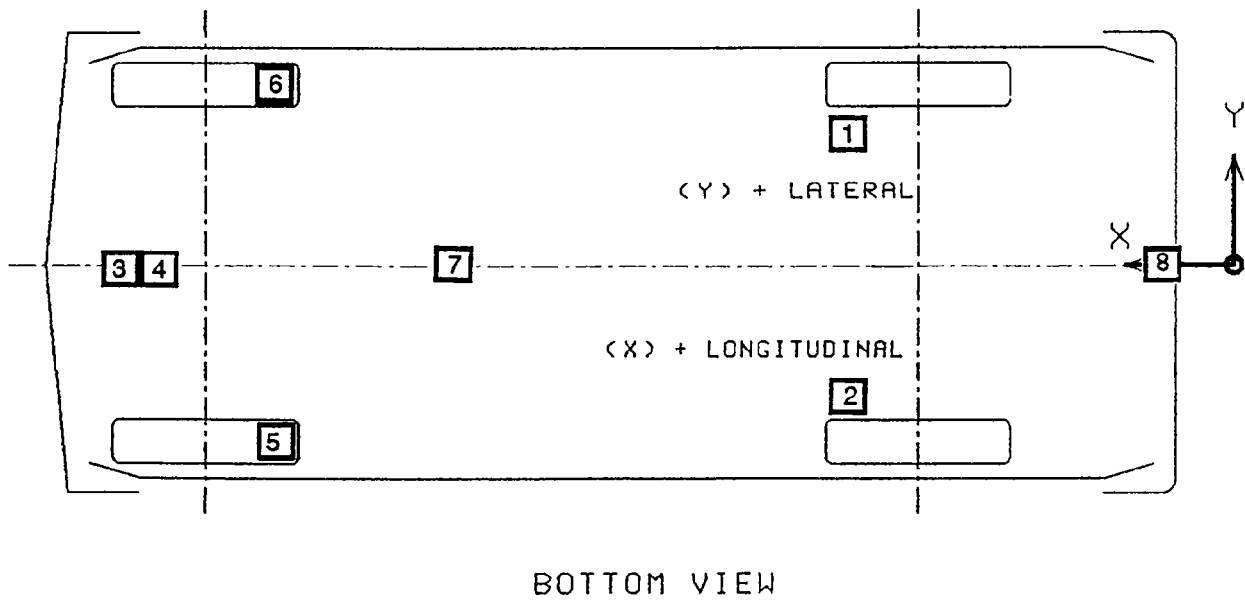
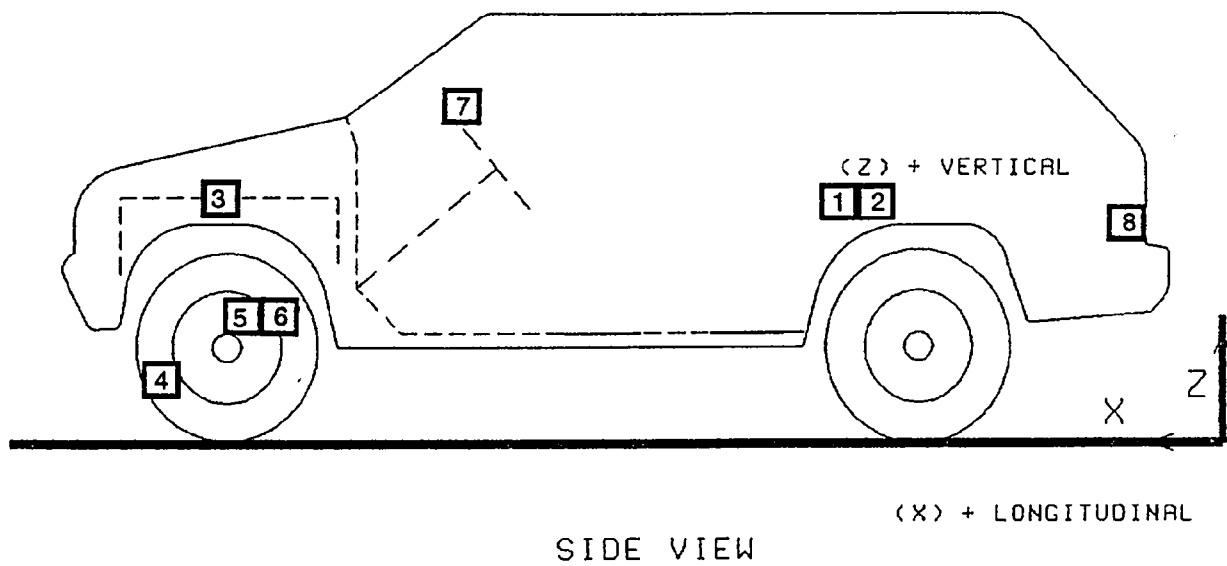


Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: CS0312 No. LOCATION	X			Y			Z			POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	66.5 in		16.3 in			21.1 in				
	POST	67.0 in		16.3 in			22.5 in			14.1 g @ 21.8 ms	43.1 g @ 50.6 ms
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	66.5 in		-14.6 in			21.1 in				
	POST	67.4 in		-14.6 in			22.1 in			6.2 g @ 139.6 ms	41.6 g @ 49.1 ms
3 ENGINE TOP LONGITUDINAL	PRE	142.5 in		-9.9 in			37.8 in				
	POST	137.0 in		-10.2 in			39.5 in			18.2 g @ 50.2 ms	84.2 g @ 35.1 ms
4 ENGINE BOTTOM LONGITUDINAL	PRE	139.9 in		-3.5 in			12.3 in				
	POST	135.7 in		-3.7 in			14.1 in			18.2 g @ 50.0 ms	84.7 g @ 41.2 ms
5 RIGHT BRAKE CALIPER LONGITUDINAL	PRE	139.8 in		-23.5 in			12.5 in				
	POST	138.1 in		-23.7 in			10.1 in			13.9 g @ 57.4 ms	56.0 g @ 45.5 ms
6 LEFT BRAKE CALIPER LONGITUDINAL	PRE	139.8 in		23.5 in			12.7 in				
	POST	138.6 in		23.8 in			10.7 in			33.3 g @ 54.6 ms	84.9 g @ 43.6 ms
7 INSTRUMENT PANEL CENTER LONGITUDINAL	PRE	118.2 in		0.0 in			45.7 in				
	POST	118.5 in		0.0 in			47.8 in			55.9 g @ 95.8 ms	106.7 g @ 89.0 ms
8 VEHICLE REAR CENTER VERTICAL	PRE	11.8 in		0.0 in			24.3 in				
	POST	12.0 in		0.0 in			27.0 in			25.2 g @ 52.2 ms	15.8 g @ 25.6 ms

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

Section 3.0

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

Table 6 Dummy Injury Criteria

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-44.9 g	14.6 g	11.0 g	47.2 g	-55.8 g	5.2 g	-8.1 g
Passenger	-63.9 g	-6.7 g	-48.6 g	67.4 g	-49.1 g	7.8 g	26.9 g

<u>Maximum Femur Compressive Force</u>		
	Left Femur	Right Femur
Driver	1412 lbf	1475 lbf
Passenger	520 lbf	656 lbf

<u>Head Injury Criteria¹</u>			
	HIC	Time t ₁	Time t ₂
Driver	235	57.7 ms	85.9 ms
Passenger	643	83.0 ms	119.0 ms

<u>Chest Maximum Resultant Acceleration²</u>			
	Acceleration	Time t ₁	Time t ₂
Driver	54.4 g	79.5 ms	82.5 ms
Passenger	49.5 g	64.8 ms	67.9 ms

<u>Maximum Chest Deflection</u>	
Driver	1.3 in
Passenger	1.8 in

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's chest impacted the lower steering rim as the dummy's head and chest were restrained by the driver's airbag. The dummy's head rotated forward and rearward as the dummy rebounded into the seat back. The driver dummy came to rest seated in the driver's seat.

Right Front Passenger Dummy

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

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

NHTSA number: CS0312

Vehicle model year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

Date of comfort/convenience check: 02/15/95

Technician performing check: Sankey

GVWR: 5500 lb

Automatic seat belts installed in any vehicle, other than a walk-in van-type vehicle which has a gross vehicle weight rating of 10,000 pounds or less, and is manufactured on or after September 1, 1986, shall meet the requirements for convenience hooks, webbing tension-relieving devices, and belt contact force.

Manual seat belts installed for compliance with this standard in front outboard designated seating positions of any vehicle, other than a walk-in van-type vehicle which has a gross vehicle rating of 10,000 pounds or less, and is manufactured after September 1, 1989, shall meet the requirements for belt contact force, plate access, retraction and seat belt guides, and hardware.

Vehicle Equipment:

The vehicle's front outboard seating positions were equipped with manual Type 2 seat belts which must comply with the dynamic test requirements of S5.1; requirements for webbing tension-relieving devices (S7.4.2), belt contact force (S7.4.3), latchplate access (S7.4.4), retraction (S7.4.5), and seat belt guides and hardware (S7.4.6) apply.

Convenience Hooks (S7.4.1):

Not applicable, the vehicle was not equipped with automatic seat belts.

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

NHTSA number: CS0312

Vehicle model year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

Date of comfort/convenience check: 02/15/95

Technician performing check: Sankey

GVWR: 5500 lb

Webbing Tension-Relieving Device (S7.4.2):

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

Belt Contact Force (S7.4.3):

The belt contact force on the chest of the test dummy is 0.7 pounds.

Latchplate Access (S7.4.4):

The seat belt latchplates, in their normal stowed position, are within the reach envelope.

The clearance test block moves unhindered to the latchplate or buckle.

Retraction (S7.4.5):

The seat belt automatically retracts when the seat belt latchplate is released.

The stowed seat belt webbing and hardware are not pinched when the door is closed.

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

NHTSA number: CS0312

Vehicle model year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

Date of comfort/convenience check: 02/15/95

Technician performing check: Sankey

GVWR: 5500 lb

Seat Belt Guides and Hardware (S7.4.6):

The seat cushion is not removable.

The seat back does not serve a function other than seating.

The seat is not removable.

The seat is movable but the space formerly occupied by the seat cannot be used for a secondary function.

Note: If the seat or seat cushion is removable or if the seat is movable so the space formerly occupied by the seat can be used for a secondary function, the seat belt guides and hardware requirements do not apply.

The webbing is not designed to pass through the seat cushion or between the cushion and seat back.

The restraint system does not include webbing guides.

The seat belt receptacles were accessible without moving the center arm rest for access.

Table 8 FMVSS 208 Equipment Data

FMVSS 208 Seat Belt Warning System Data

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

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

NOTE: the audible warning should not operate.

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

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Labeling and Driver's Manual Data

The labels which describe the manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system was located on the driver's sunvisors.

The manufacturer's recommended regular airbag maintenance is to check the system if the light does not come on after you start the vehicle or if the light comes on as you drive.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 27.

A description of the functional operation of the system was provided in the owner's manual on pages 27 and 28.

A reference to the instructions and description of the system was included on the label.

An owner's manual was provided.

The owner's manual contained appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems on page 27.

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Readiness Indicator Data

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was a light stating "airbag" located on the lower right portion of the instrument cluster.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator was provided in the owner's manual on pages 27 and 28.

All rear outboard seating positions had Type 2 seat belts.

Figure 4 FMVSS 212 Test Data

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

Plastic trim around outer perimeter and adhesive around inner perimeter.

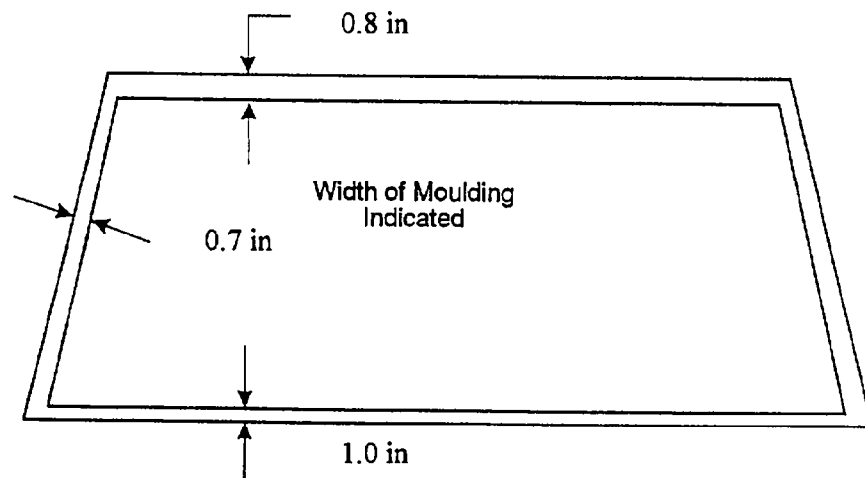
Clips or brackets used to retain windshield: None

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

Windshield periphery measurements:

	Pre-test	Post-test	Percent Retention
Right side	82.6 in	82.6 in	100.0
Left side	82.6 in	82.6 in	100.0
Total	165.2 in	165.2 in	100.0

Pre-test windshield mounting material temperature: 70° F



Front view of windshield¹

Loss of windshield retention lengths: None

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

Figure 5 FMVSS 219 Test Data

Protected zone lower edge requirement:

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

Windshield measurements:

A: 51.1 in

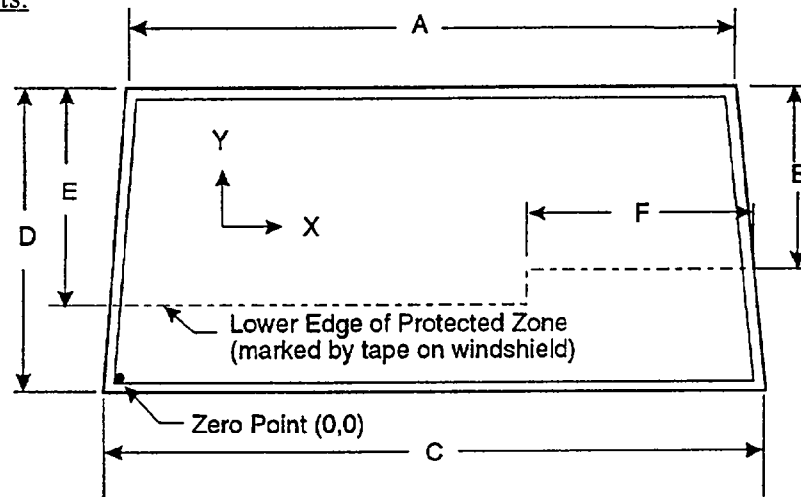
B: 15.6 in

C: 63.2 in

D: 28.6 in

E: 19.5 in

F: 35.4 in



FRONT VIEW

Method of adhering protected zone template to windshield:

NA

Areas of windshield template penetration greater than 0.25 in:

NA

Coordinates

X Y

- 1.
- 2.
- 3.

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

None

- 1.
- 2.
- 3.

Table 9 Fuel System Data

Vehicle year/make/ model/body style:	1995/Jeep/Grand Cherokee Laredo/mpv
NHTSA number:	CS0312
Fuel system capacity:	23.0 gal (from owner's manual)
Usable capacity:	23.0 gal (furnished by COTR)
Test volume range:	21.2 gal to 21.6 gal (92-94% of usable)
Actual test volume:	21.4 gal (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	purple
Type of fuel pump:	electric

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

Details of fuel system:

The fuel tank was located behind the rear axle. The fuel filler neck was located on the left side.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CS0312
Test date: 02/15/95
Vehicle year/make/
model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv

Test requirements:

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

Test vehicle impact type:

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

Fuel system fluid spillage measurements:

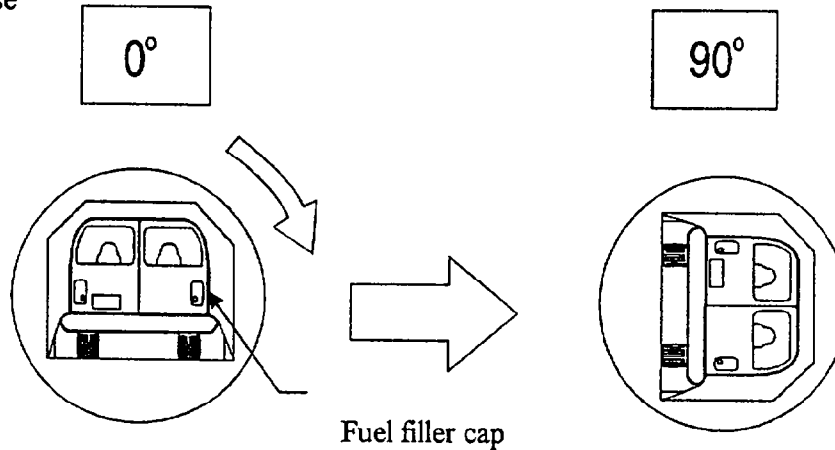
	Test Results	Maximum Allowable
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-Minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CS0312

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

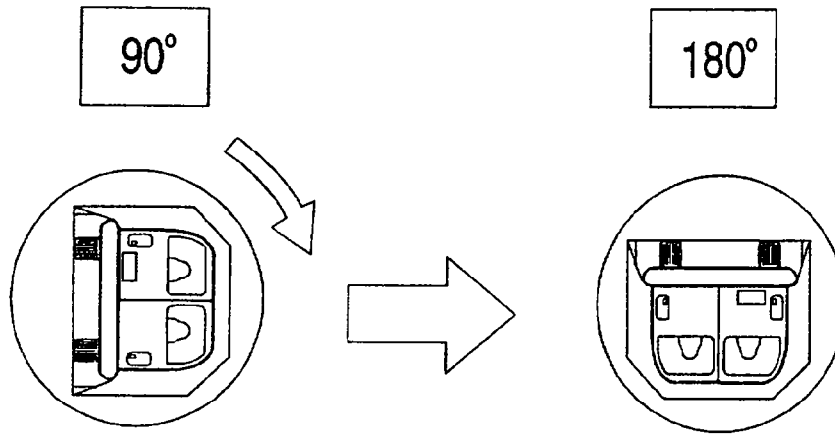
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

Time required for machine to rotate 90° = 2 minutes, 0 seconds
 FMVSS 301 position hold time = 5 minutes, 0 seconds
 Total = 7 minutes, 0 seconds
 Next whole minute interval = 14 minutes

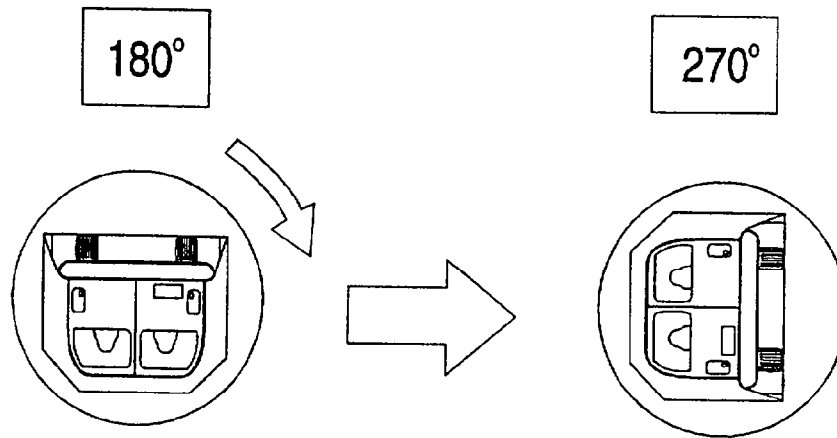
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

Time required for machine to rotate 90°	=	2	minutes,	0	seconds
FMVSS 301 position hold time	=	5	minutes,	0	seconds
Total	=	7	minutes,	0	seconds
Next whole minute interval	=	21	minutes		

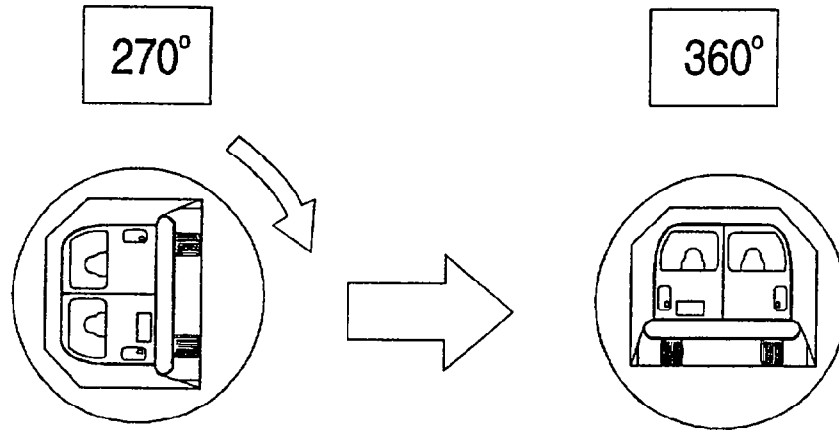
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

Time required for machine to rotate 90°	=	2 minutes,	0 seconds
FMVSS 301 position hold time	=	5 minutes,	0 seconds
Total	=	7 minutes,	0 seconds
Next whole minute interval	=	28 minutes	

Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 7 Pre-test and Post-test Measurement Points

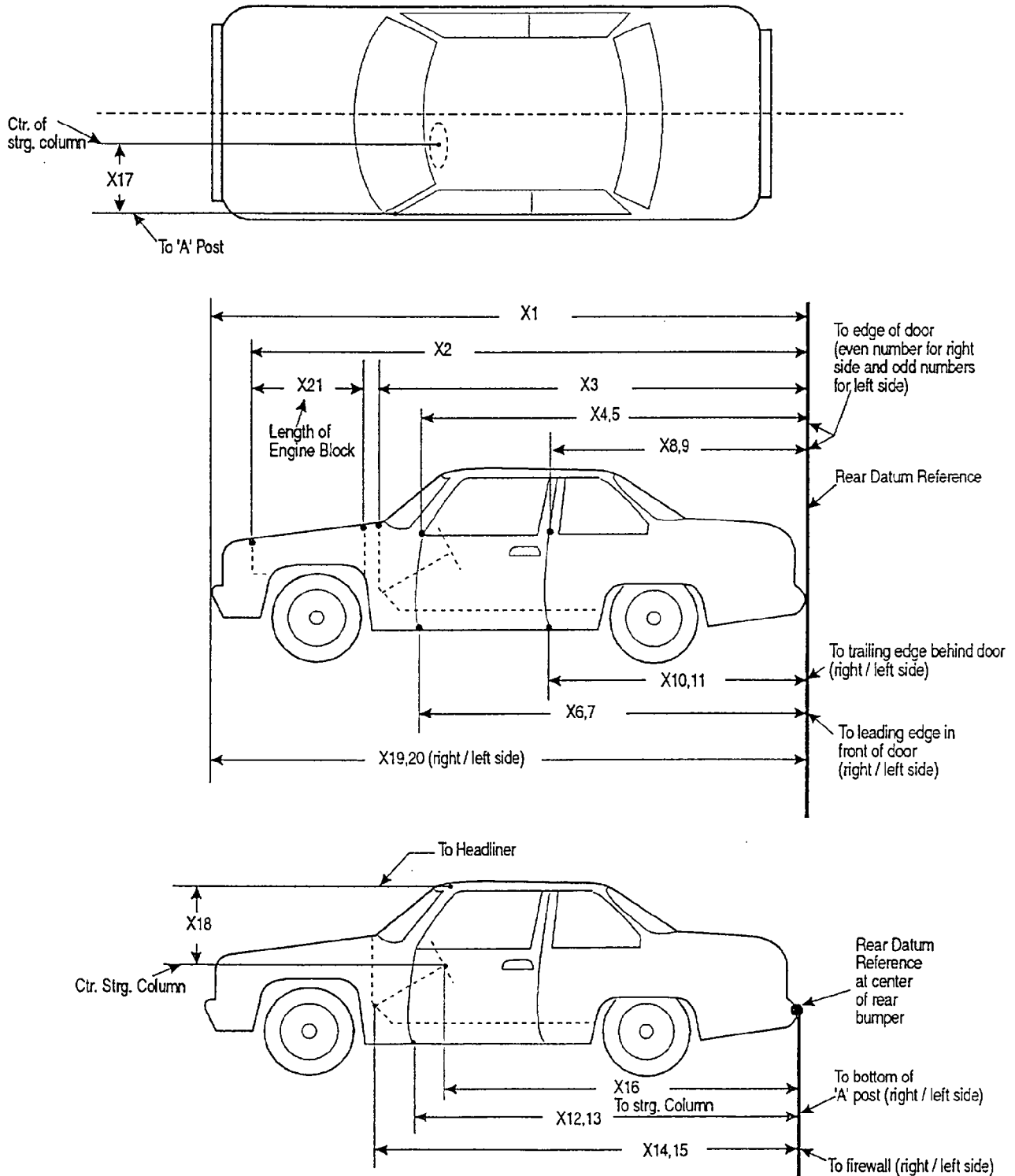


Table 11 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv Test Number: 950215

No.	Type of measurement	Pre-test	Post-test	Diff.
X1	Total length of vehicle at centerline	176.2 in	156.8 in	19.4 in
X2	Rear surface of vehicle to front of engine block	154.7 in	149.8 in	4.9 in
X3	Rear surface of vehicle to firewall	135.1 in	132.5 in	2.6 in
X4	Rear surface of vehicle to upper leading edge of right door	122.8 in	123.8 in	-1.0 in
X5	Rear surface of vehicle to upper leading edge of left door	122.8 in	123.5 in	-0.7 in
X6	Rear surface of vehicle to lower leading edge of right door	120.9 in	120.2 in	0.7 in
X7	Rear surface of vehicle to lower leading edge of left door	121.2 in	120.8 in	0.4 in
X8	Rear surface of vehicle to upper trailing edge of right door	80.6 in	81.5 in	-0.9 in
X9	Rear surface of vehicle to upper trailing edge of left door	80.5 in	81.4 in	-0.9 in
X10	Rear surface of vehicle to lower trailing edge of right door	80.0 in	79.2 in	0.8 in
X11	Rear surface of vehicle to lower trailing edge of left door	79.8 in	79.5 in	0.3 in
X12	Rear surface of vehicle to bottom of "A" post on right side	121.3 in	121.8 in	-0.5 in
X13	Rear surface of vehicle to bottom of "A" post on left side	121.5 in	121.8 in	-0.3 in
X14	Rear surface of vehicle to firewall - right side	135.4 in	131.7 in	3.7 in
X15	Rear surface of vehicle to firewall - left side	133.5 in	133.6 in	-0.1 in
X16	Rear surface of vehicle to steering wheel center	102.3 in	102.8 in	-0.5 in
X17	Center of steering column to "A" post	11.1 in	9.8 in	1.3 in
X18	Center of steering column to headliner	17.8 in	16.4 in	1.4 in
X19	Rear surface of vehicle to right side of front bumper	174.0 in	155.8 in	18.2 in
X20	Rear surface of vehicle to left side of front bumper	174.0 in	156.6 in	17.4 in
X21	Length of engine block	17.8 in	17.8 in	0.0 in

Figure 8 Vehicle Target Locations

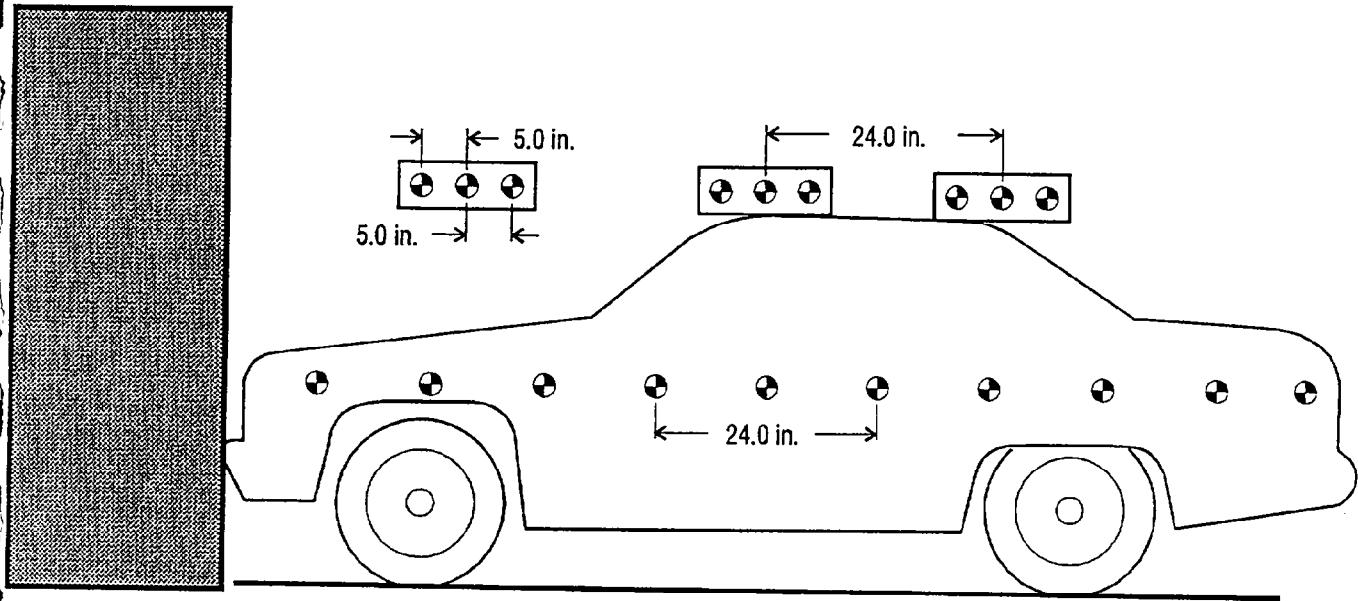
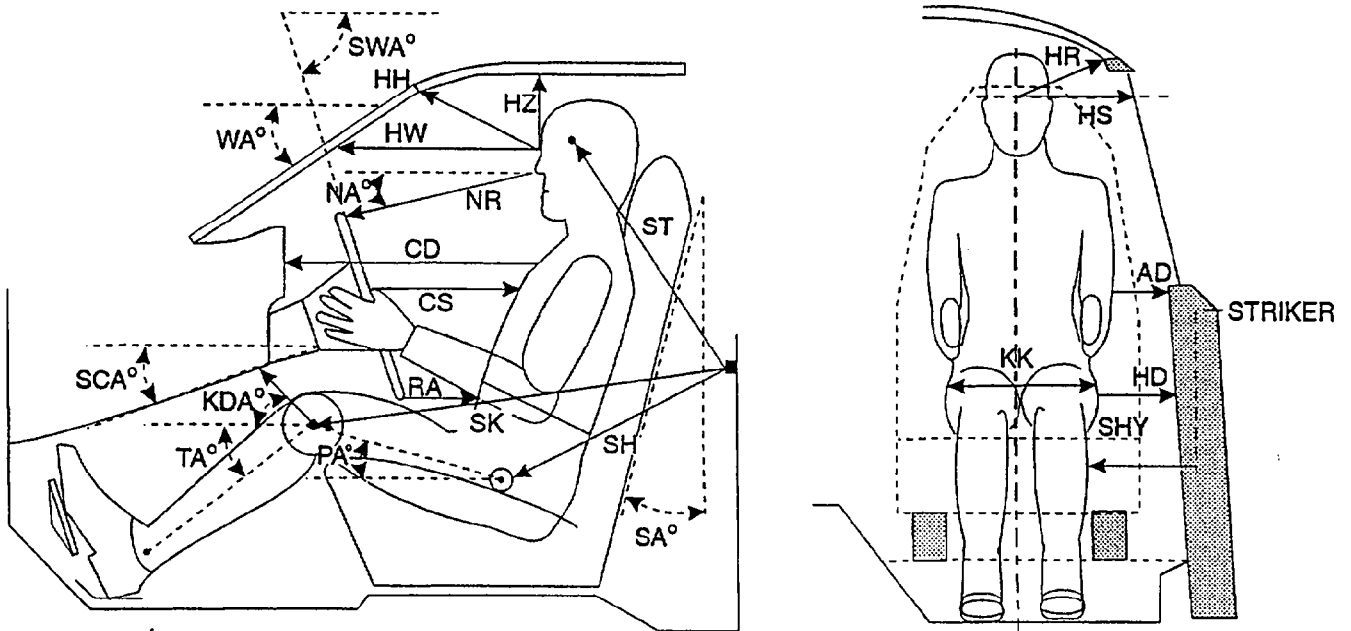
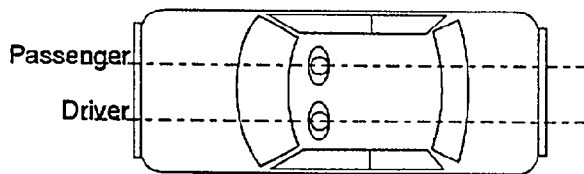


Figure 9 Dummy Measurement Locations for Front Seat Occupants



VERTICAL LONGITUDINAL PLANE



VERTICAL TRANSVERSE PLANE

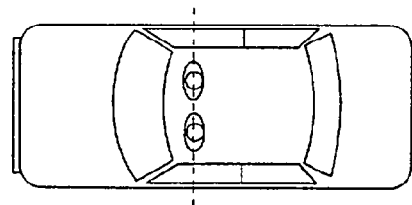


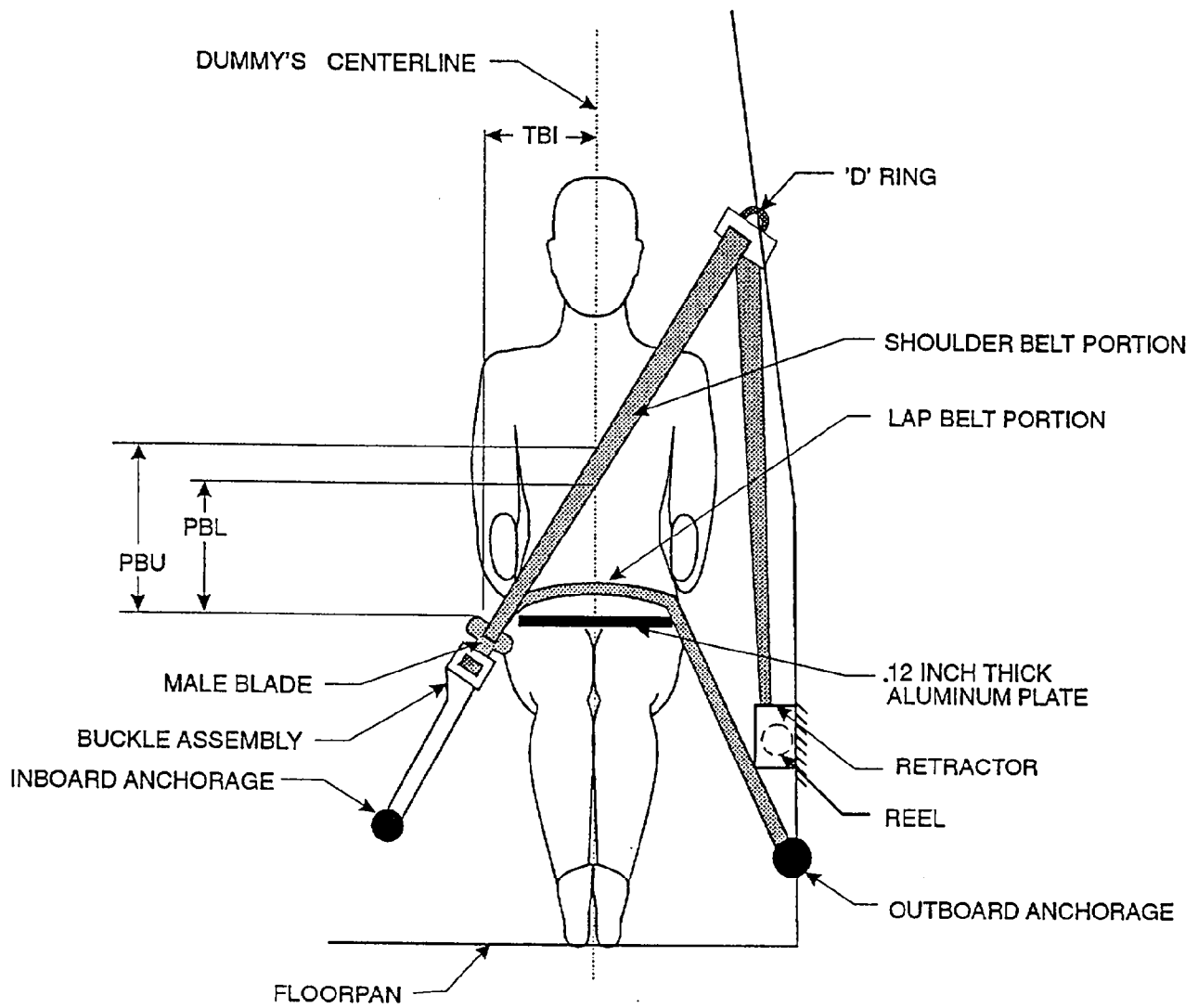
Table 12 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #314)	Passenger (Serial #230)
WA	Windshield angle	32°	32°
SWA	Steering wheel angle	65°	NA
SCA	Steering column angle	24°	NA
SA	Seat back angle	24°	24°
HZ	Head to roof	8.0 in	8.5 in
HH	Head to header	15.4 in	15.9 in
HW	Head to windshield	24.1 in	24.3 in
HR	Head to side header	8.9 in	8.8 in
NR	Nose to rim	14.9 in	NA
NA	Nose to rim angle	13°	NA
CD	Chest to dash	22.8 in	23.0 in
CS	Steering wheel to chest	11.7 in	NA
RA	Rim to abdomen	6.4 in	NA
KDL	Left knee to dash	5.5 in	6.9 in
KDR	Right knee to dash	5.2 in	7.0 in
KDA	Outboard knee to dash angle	41°	33°
PA	Pelvic angle	24°	24°
TA	Tibial angle	42°	39°
KK	Knee to knee	10.8 in	10.0 in
ST ¹	Striker to head	22.0 in	21.9 in
	Striker to head angle	-83°	-84°
SK ¹	Striker to knee	23.4 in	23.9 in
	Striker to knee angle	-3°	-3°
SH ¹	Striker to H-point	8.7 in	9.0 in
	Striker to H-point angle	17°	19°
SHY	Striker to H-point (Y dir.)	7.2 in	7.8 in
HS	Head to side window	11.2 in	13.0 in
HD	H-point to door	6.5 in	7.5 in
AD	Arm to door	2.8 in	2.1 in

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

¹ A negative angle indicates the measurement point was located above the striker.

Figure 10 Seat Belt Positioning Data



	Driver	Passenger
PBU - Top surface of aluminum plate to belt upper edge	NA	14.0 in
PBU - Top surface of aluminum plate to belt upper edge	NA	10.9 in
TBI - Dummy centerline to intersection of upper torso belt and lap belt	NA	8.5 in

Figure 11 Camera Positions

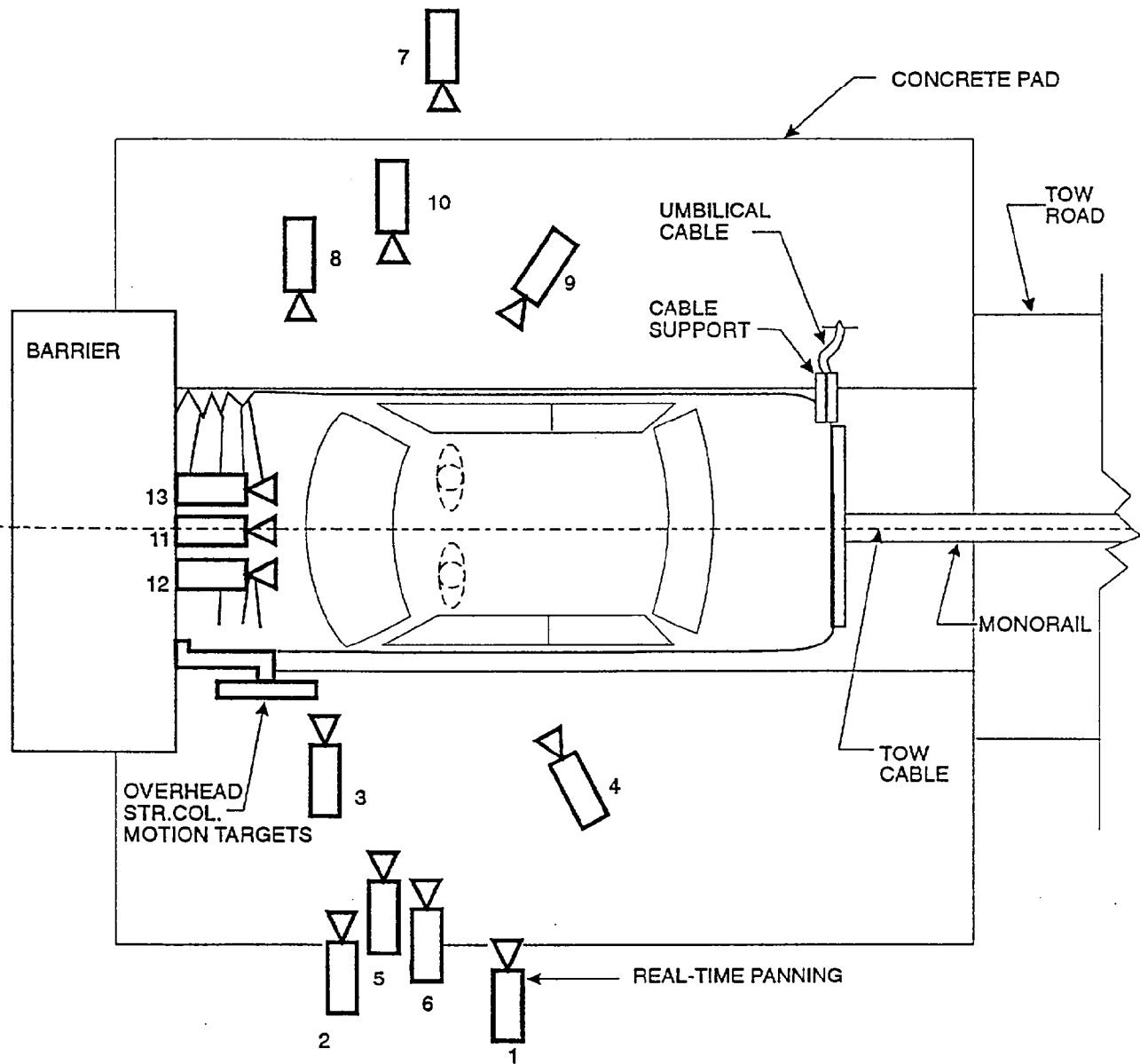


Figure 11 Camera Positions, Cont'd.

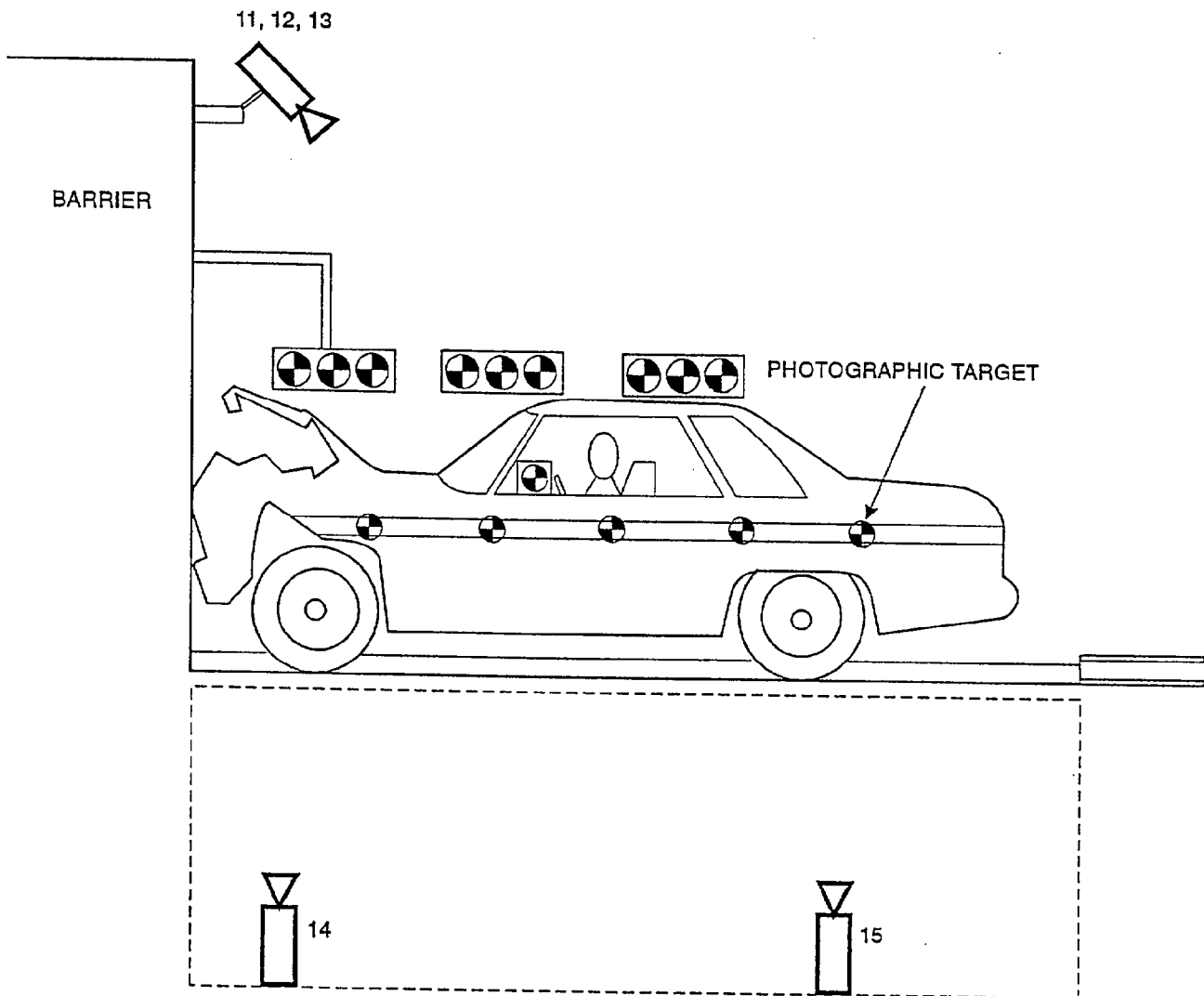


Table 13 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1995/Jeep/Grand Cherokee Laredo/mpv
 Test number: 950215

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Real-time panning	-142.0 in	504.0 in	61.0 in	NA	NA	16 mm	24 frames/s
2	Left vehicle crush	-41.5 in	295.0 in	44.0 in	-4°	296.0 in	25 mm	980 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1005 frames/s
4	Driver kinematics	-157.3 in	116.0 in	87.0 in	-27°	84.0 in	25 mm	998 frames/s
5	Steering column motion	-70.0 in	286.0 in	103.0 in	-14°	NA	25 mm	1005 frames/s
6	Steering column motion	-70.0 in	286.0 in	75.1 in	-9°	NA	25 mm	998 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	1000 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	995 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	78.0 in	25 mm	995 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	222.0 in	25 mm	1002 frames/s
11	Windshield front view	-6.0 in	0.0 in	88.0 in	-40°	NA	13 mm	995 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	1002 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	1002 frames/s
14	Pit - front position	-50.5 in	0.0 in	-92.4 in	90°	NA	13 mm	1000 frames/s
15	Pit - rear position	-99.3 in	0.0 in	-99.0 in	90°	NA	13 mm	1000 frames/s
16	Real-time documentation	NA	NA	NA	NA	NA	12-120 mm	24 frames/s

¹ +X: Film plane forward of barrier face

+Y: Film plane to left of monorail centerline

+Z: Film plane above ground level

² +Angle: Film plane angled upward from horizontal plane

Appendix A

Photographs

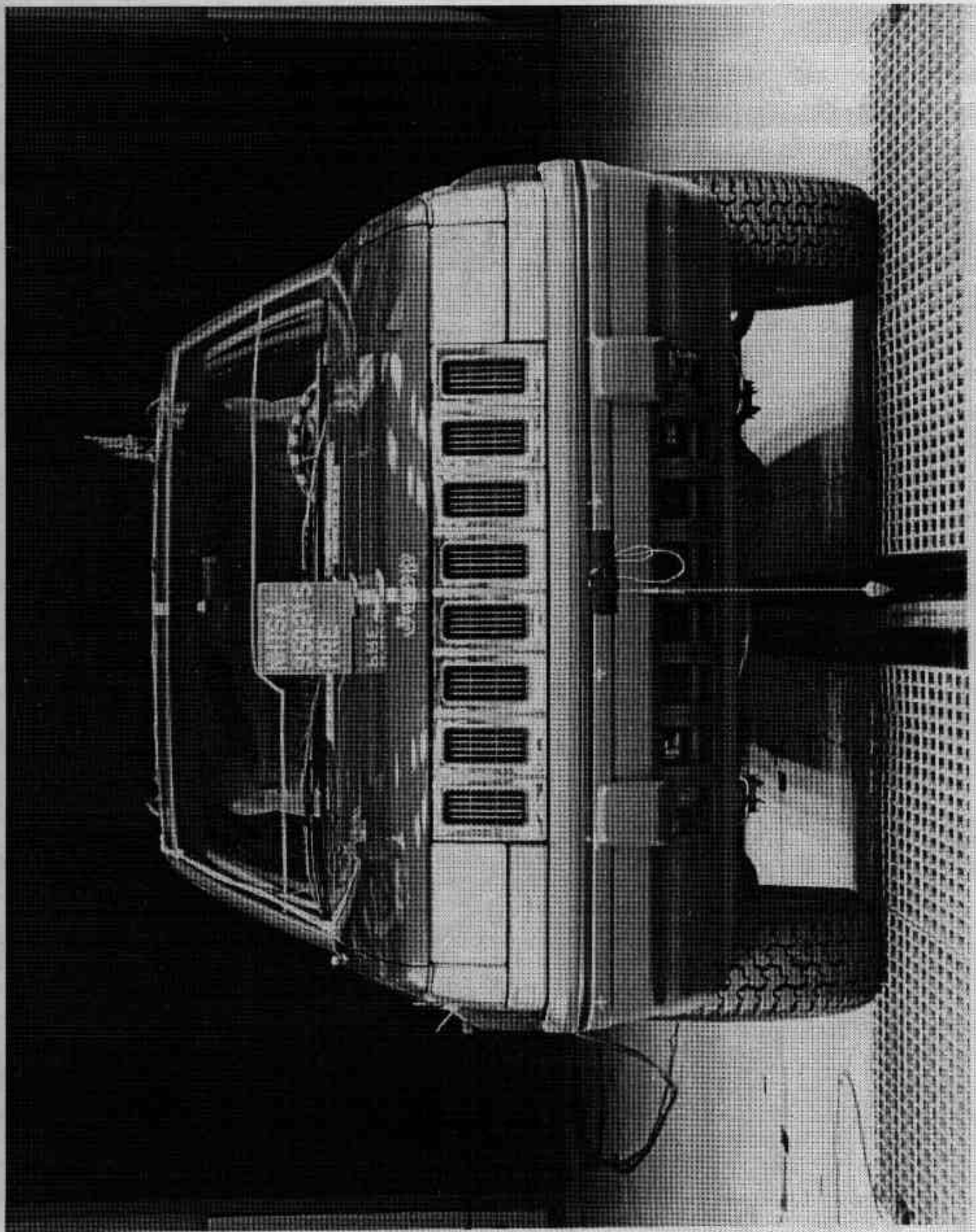


Figure A-1. Pre-Test Front View
A-2

950215

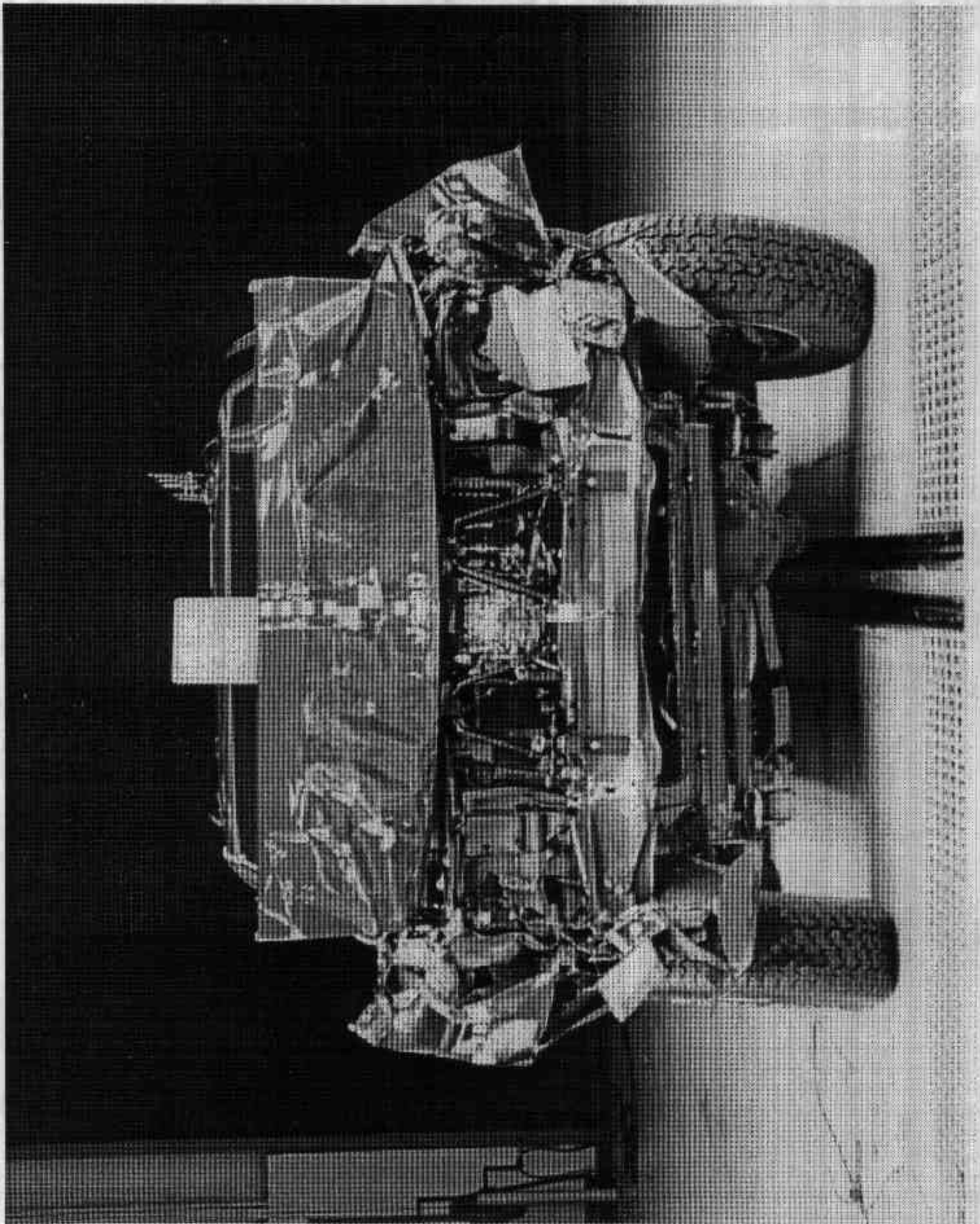


Figure A-2. Post-Test Front View
A-3

950215

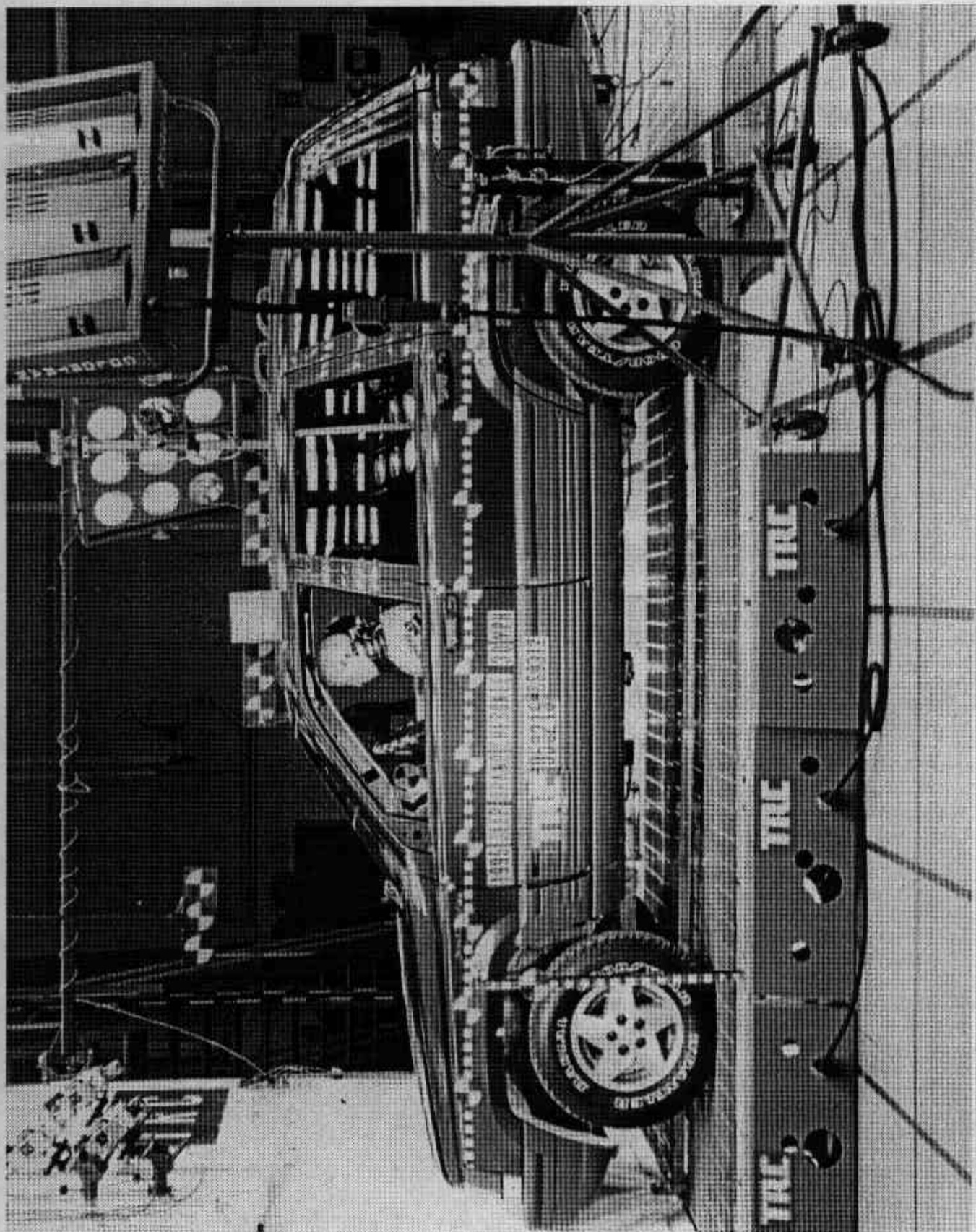


Figure A-3. Pre-Test Left Side View
A-4

950215

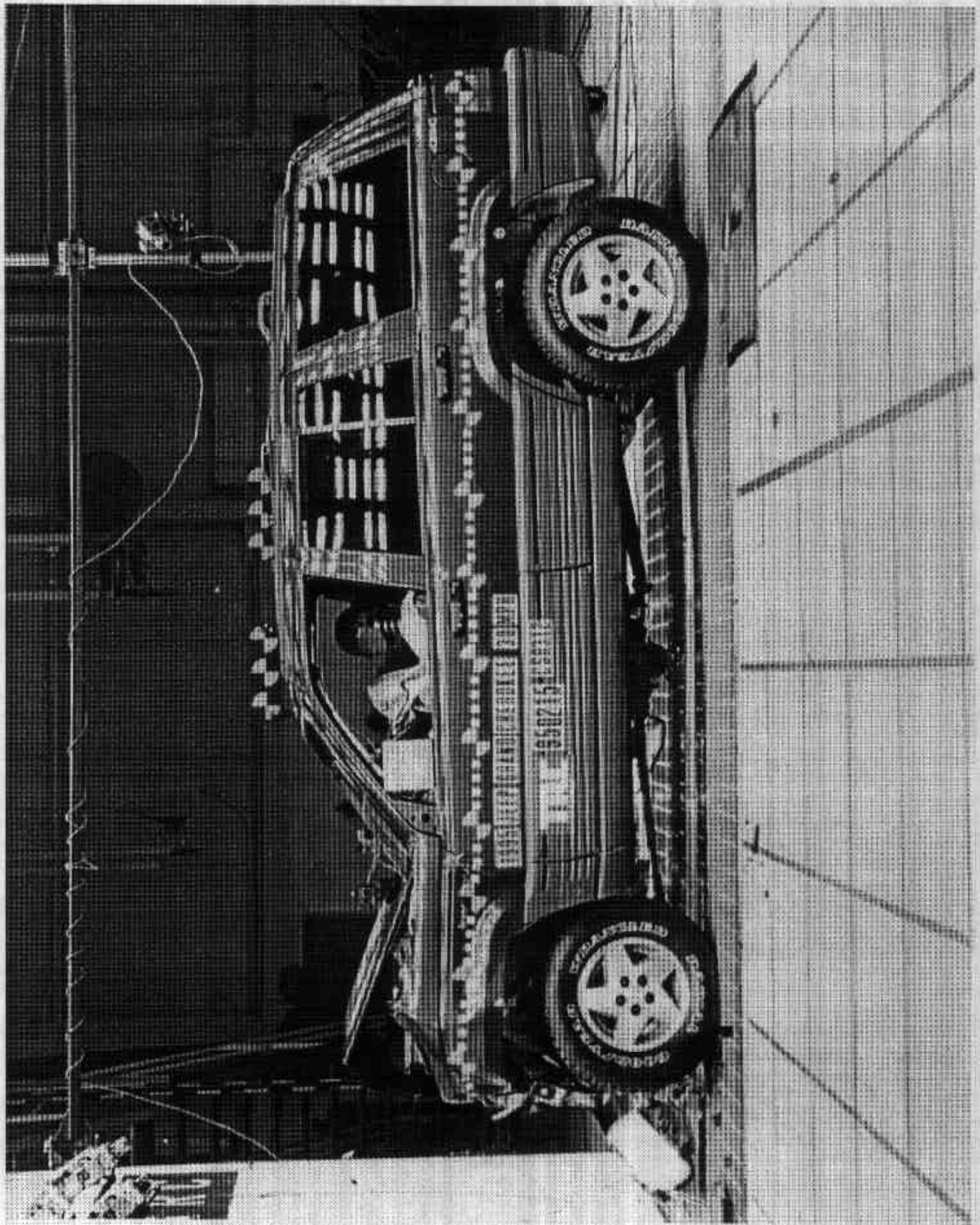


Figure A-4. Post-Test Left Side View
A-5

950215

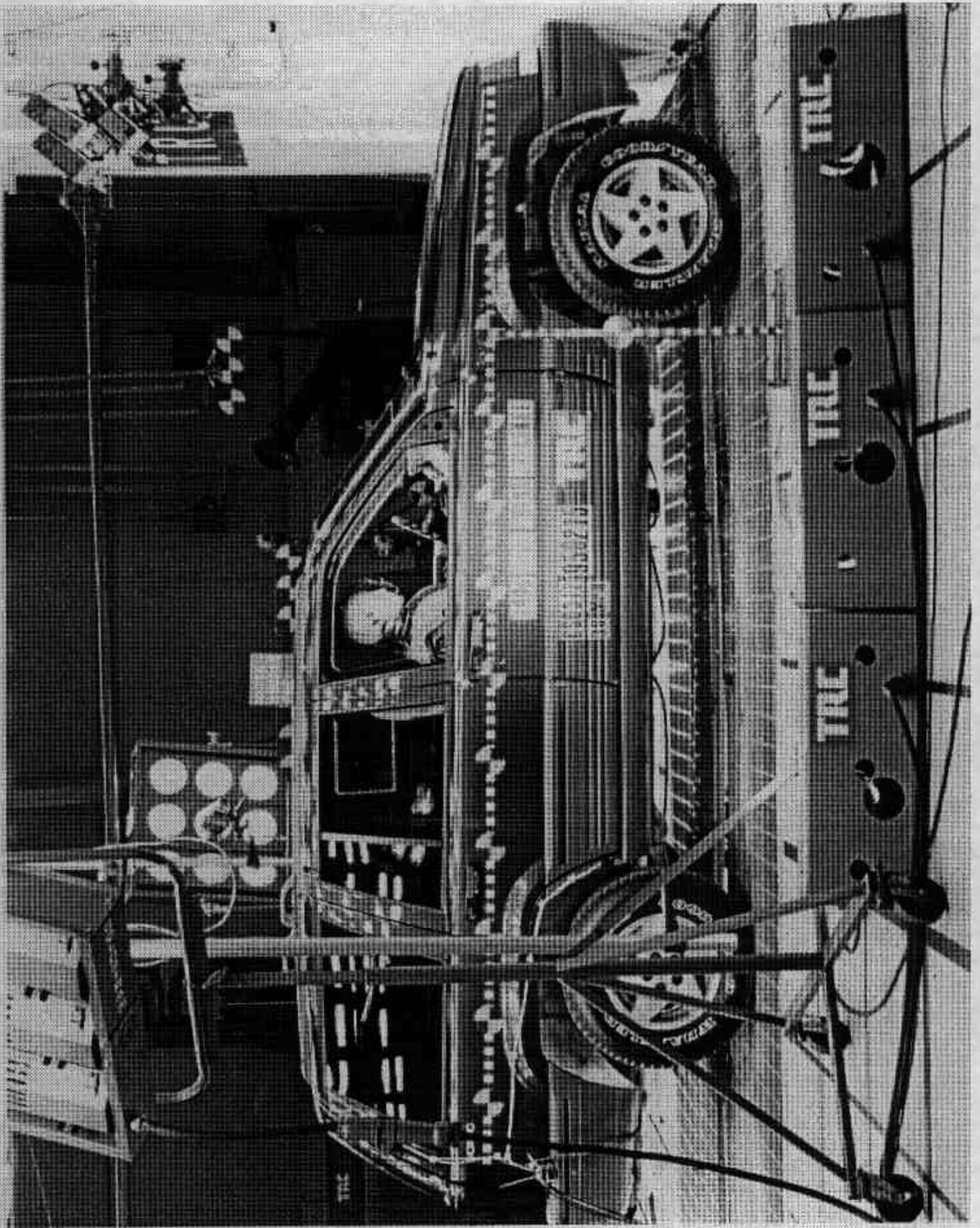


Figure A-5. Pre-Test Right Side View
A-6

950215

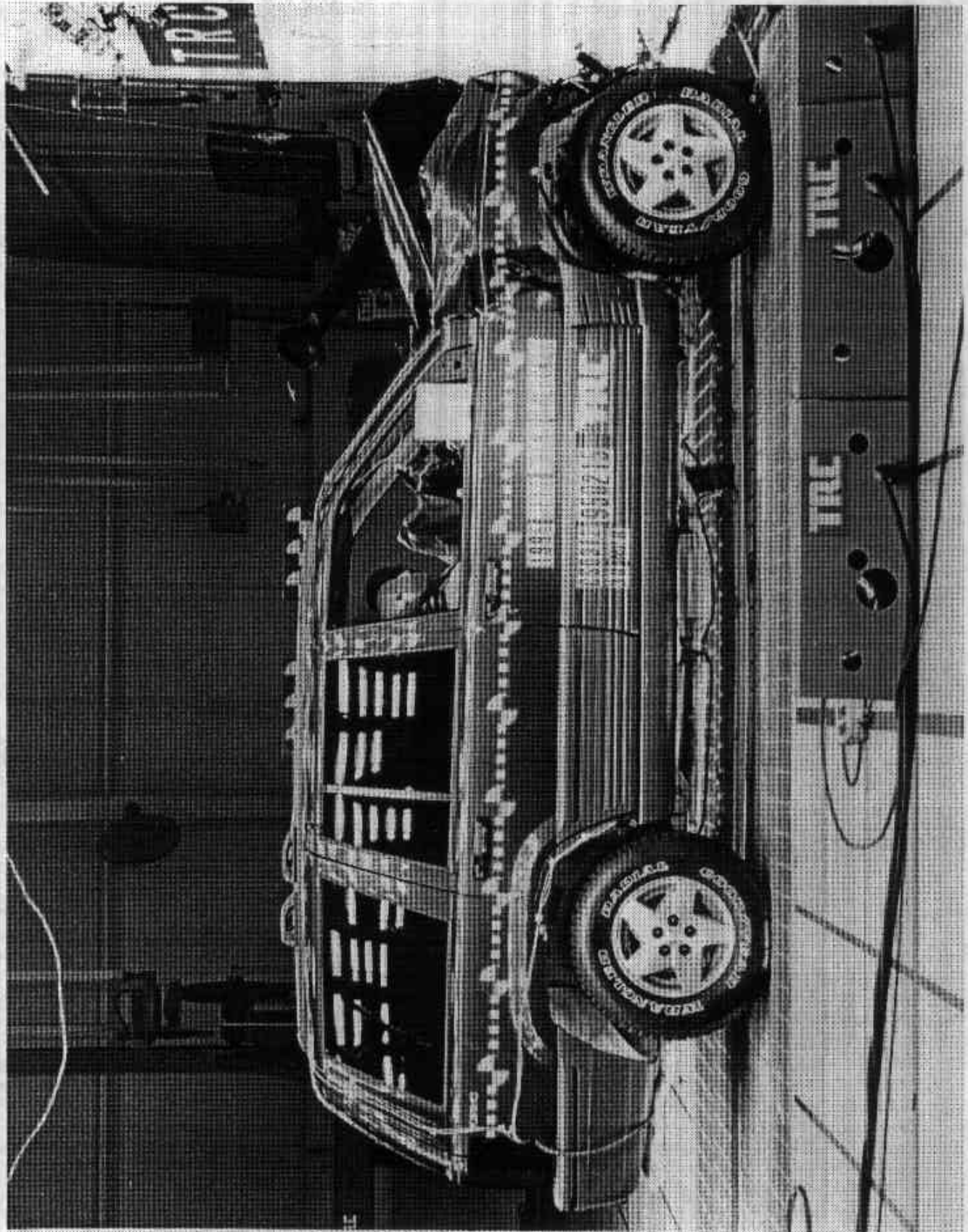


Figure A-6. Post-Test Right Side View
A-7

950215

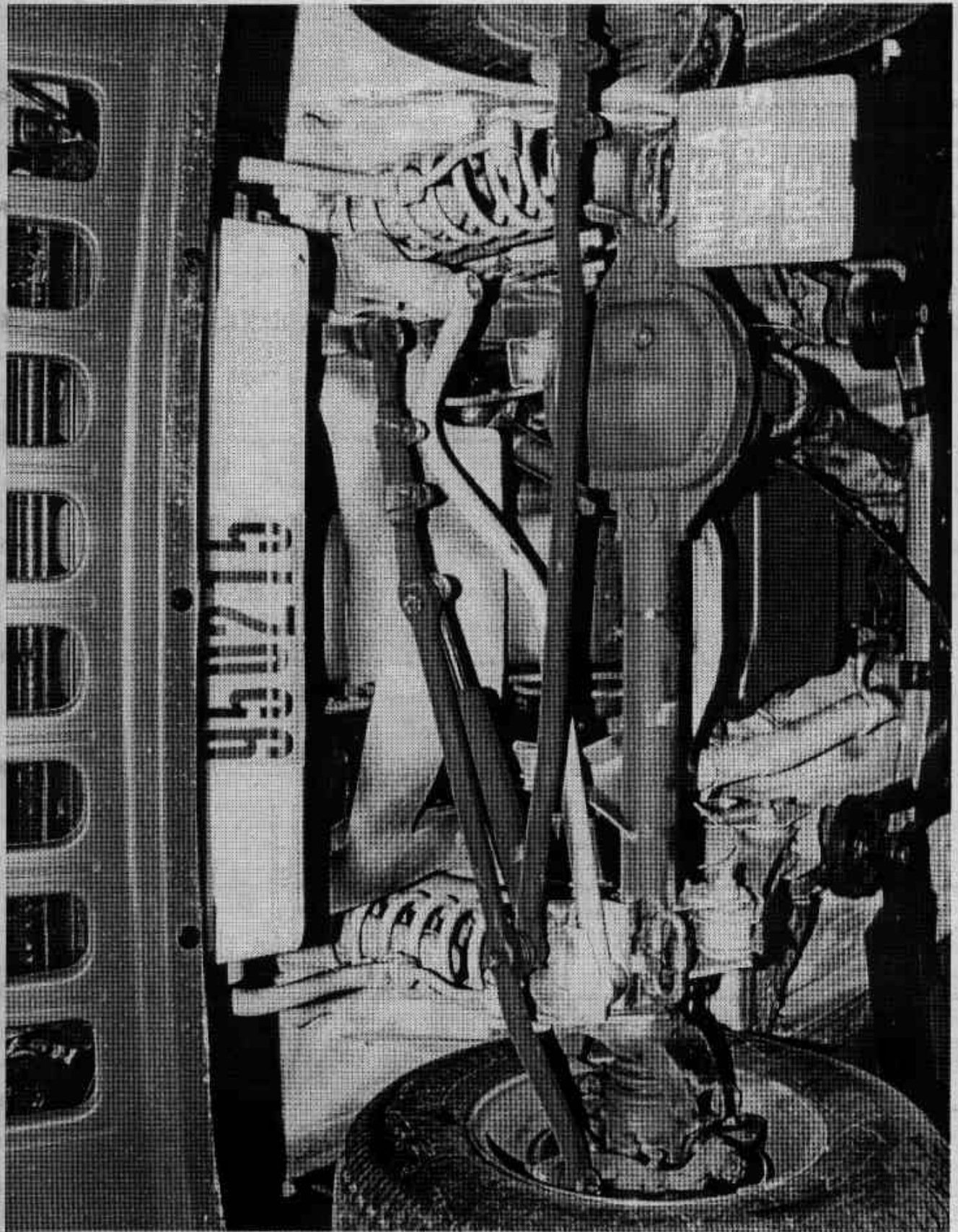


Figure A-7. Pre-Test Front Underbody View
A-8

950215

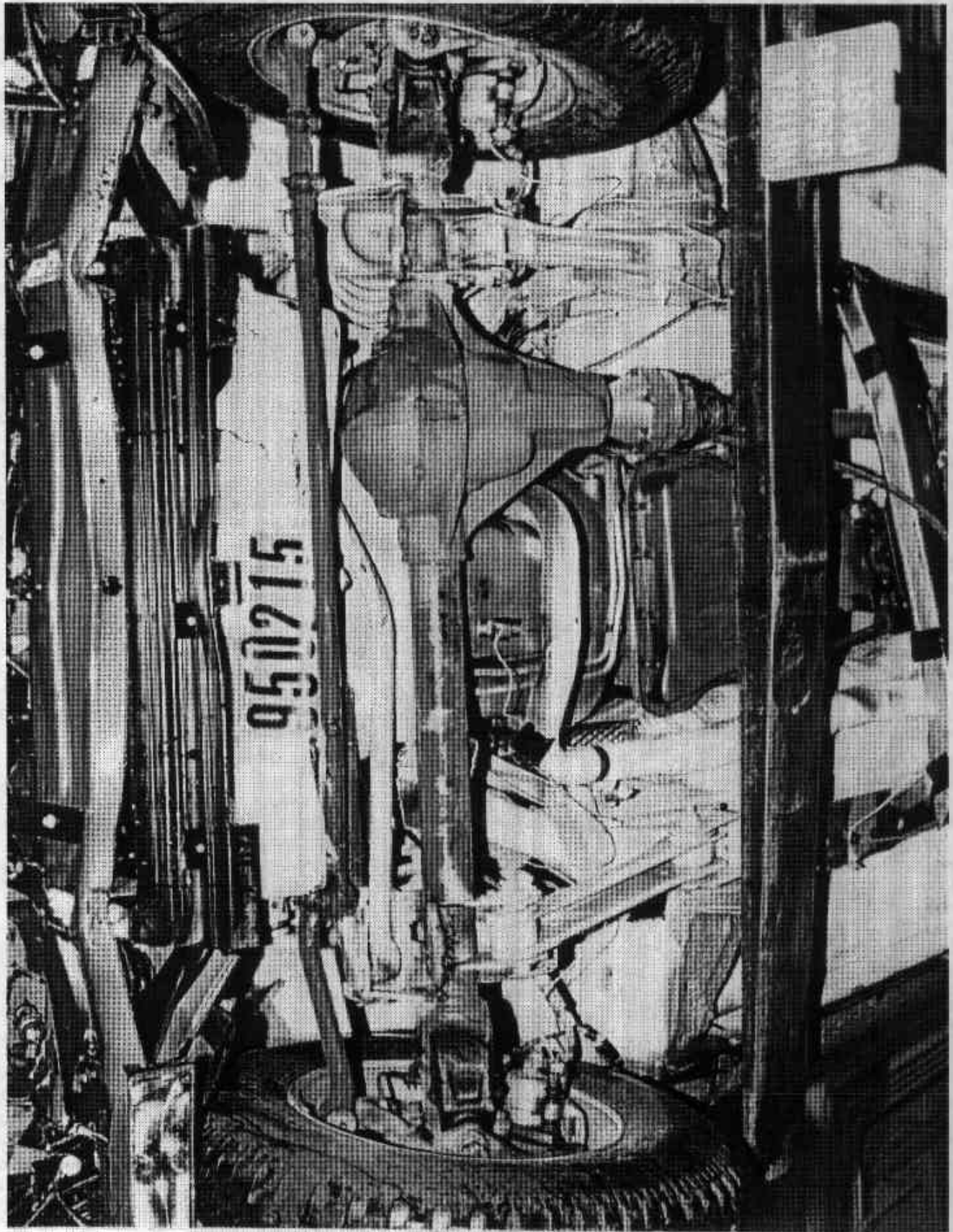


Figure A-8. Post-Test Front Underbody View
A-9

950215

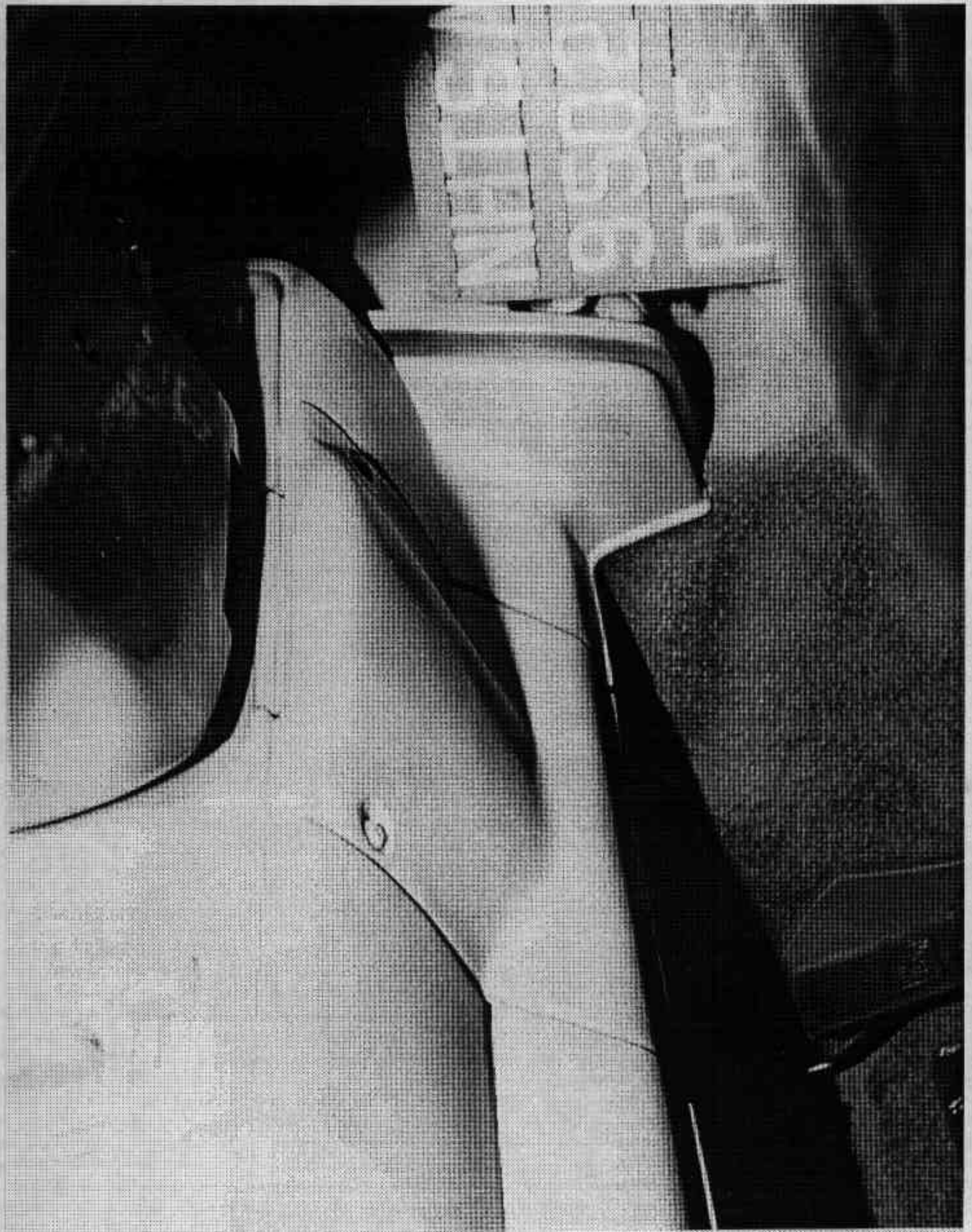


Figure A-9. Pre-Test Driver's Knee Bolster View
A-10

950215

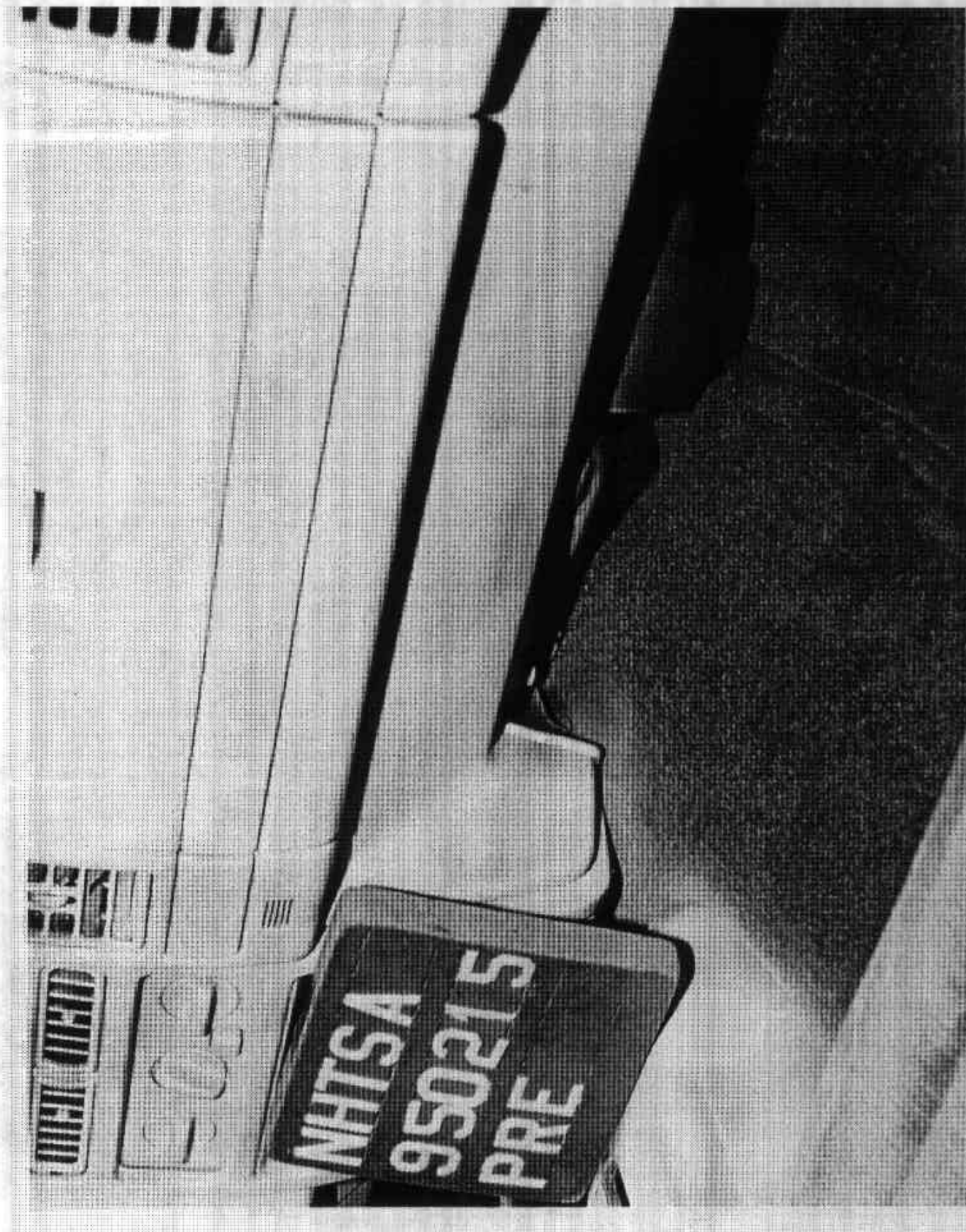


Figure A-10. Pre-Test Passenger's Knee Bolster View
A-11

950215



Figure A-11. Pre-Test Driver's Seat Location View
A-12

950215



Figure A-12. Pre-Test Passenger's Seat Location View
A-13

950215



Figure A-13. Pre-Test Steering Column at Firewall View - Interior
A-14

950215

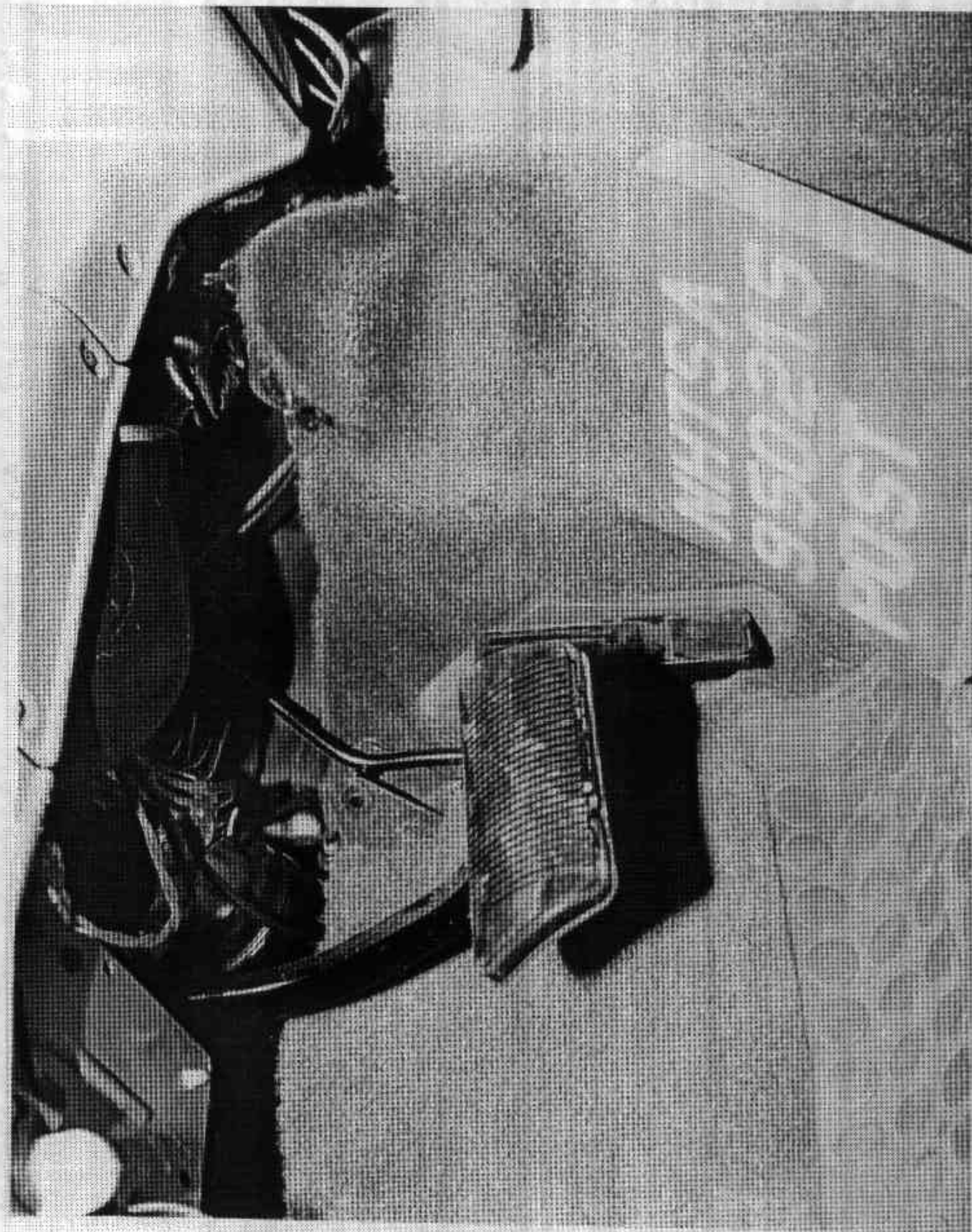


Figure A-14. Post-Test Steering Column at Firewall View - Interior
A-15

950215

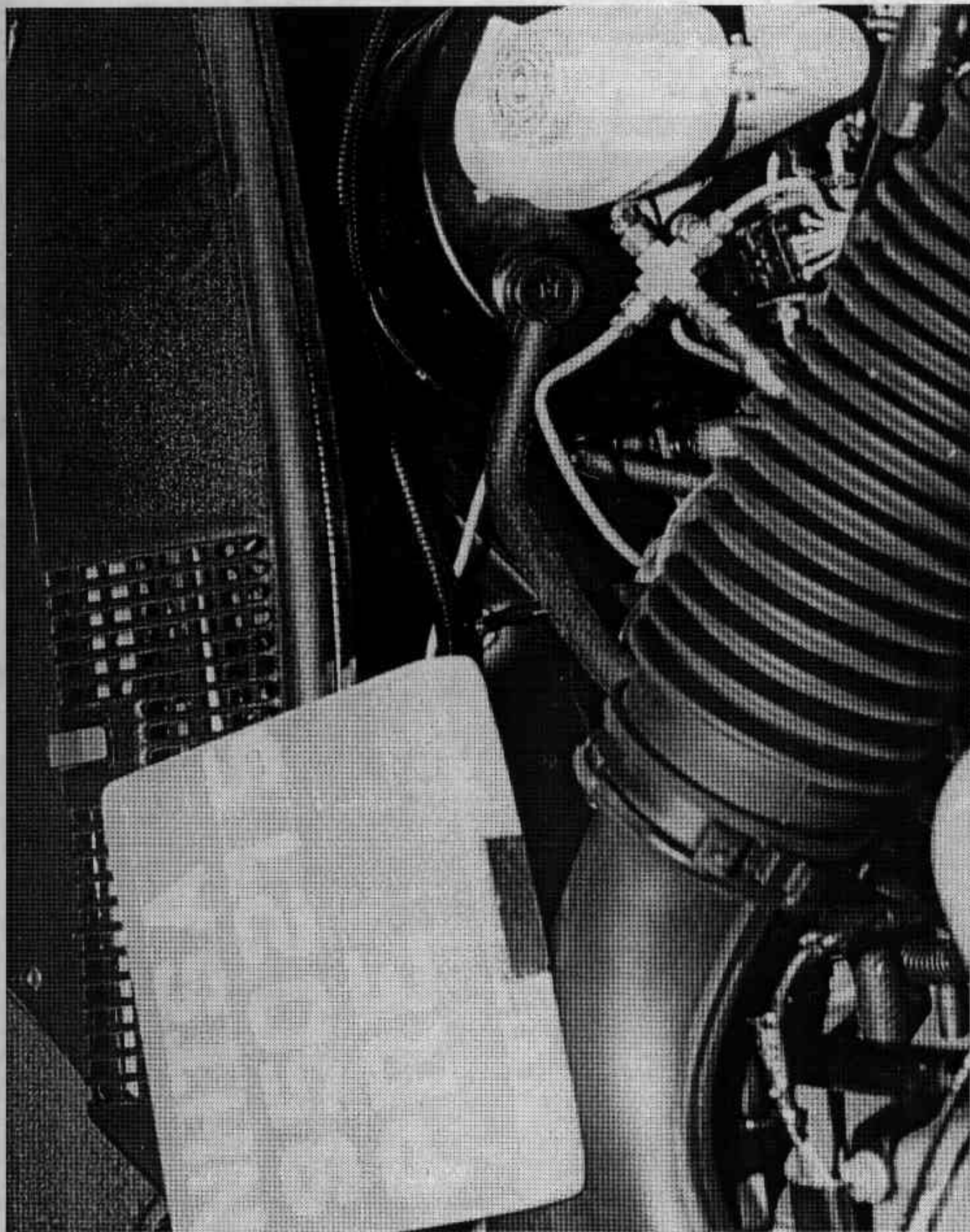


Figure A-15. Pre-Test Steering Column at Firewall View - Exterior
A-16

950215

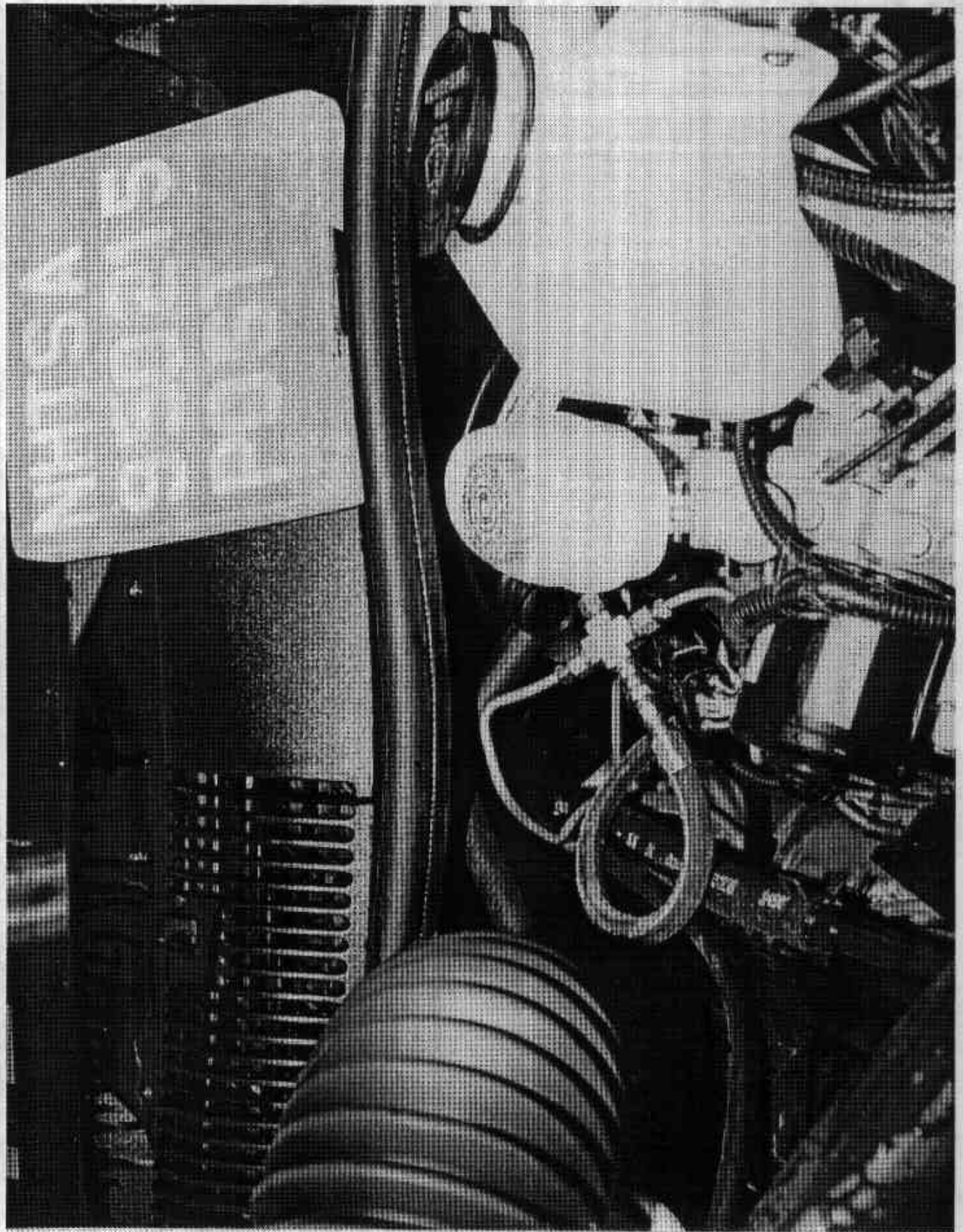


Figure A-16. Post-Test Steering Column at Firewall View - Exterior

A-17

950215

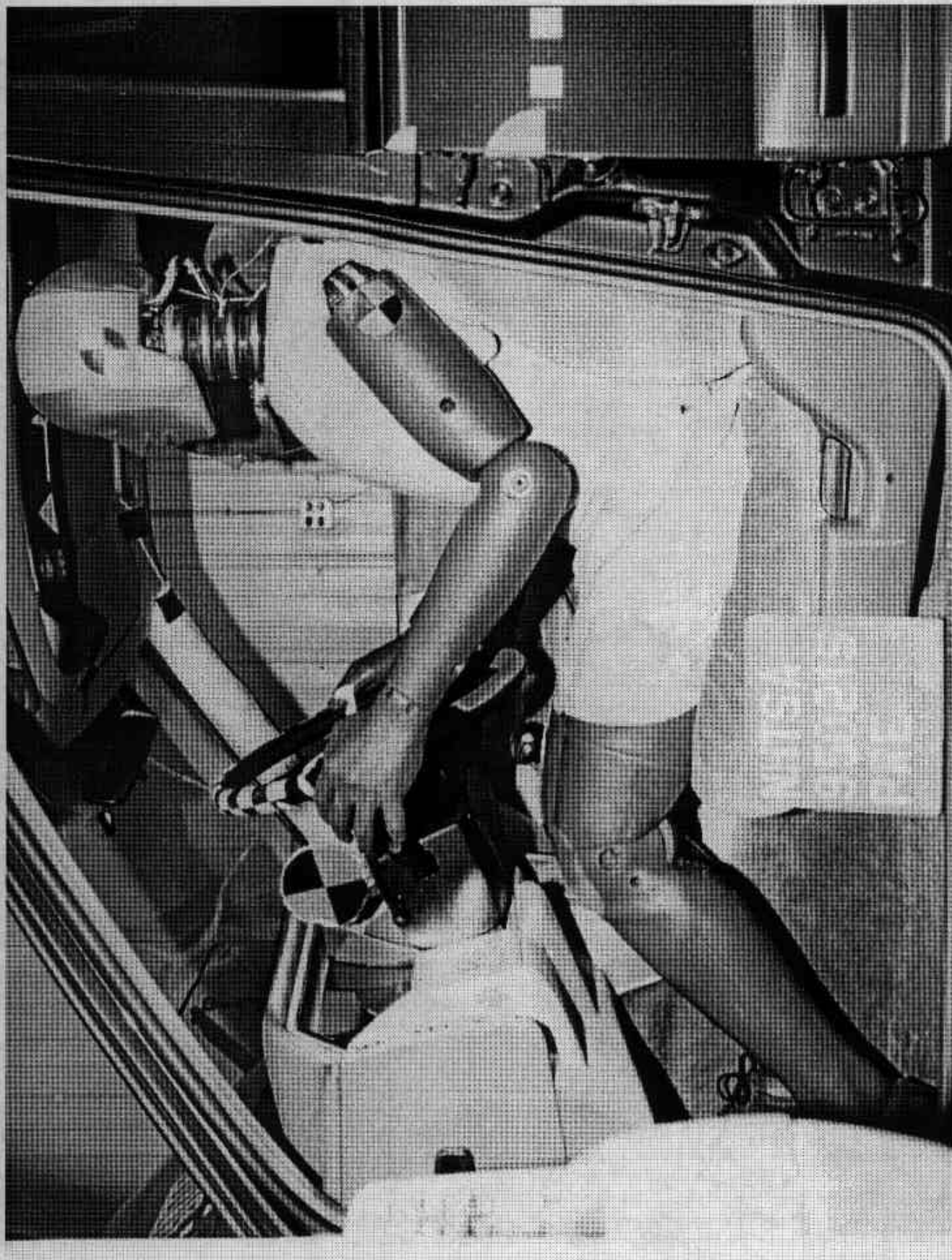


Figure A-17. Pre-Test Driver Dummy & Vehicle Interior View
A-18

950215



Figure A-18. Post-Test Driver Dummy & Vehicle Interior View
A-19

950215



Figure A-19. Pre-Test Passenger Dummy & Vehicle Interior View
A-20

950215

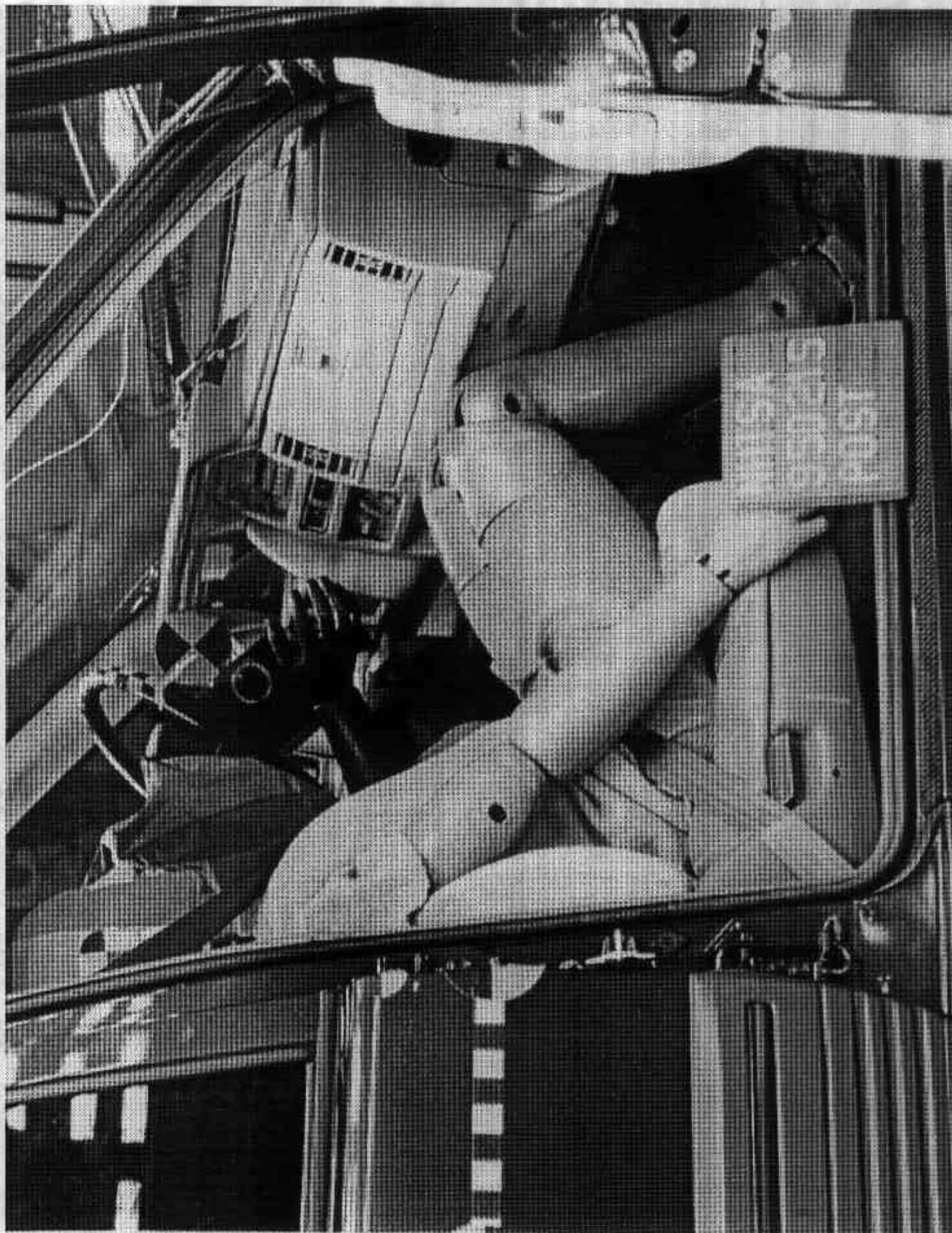


Figure A-20. Post-Test Passenger Dummy & Vehicle Interior View

A-21

950215

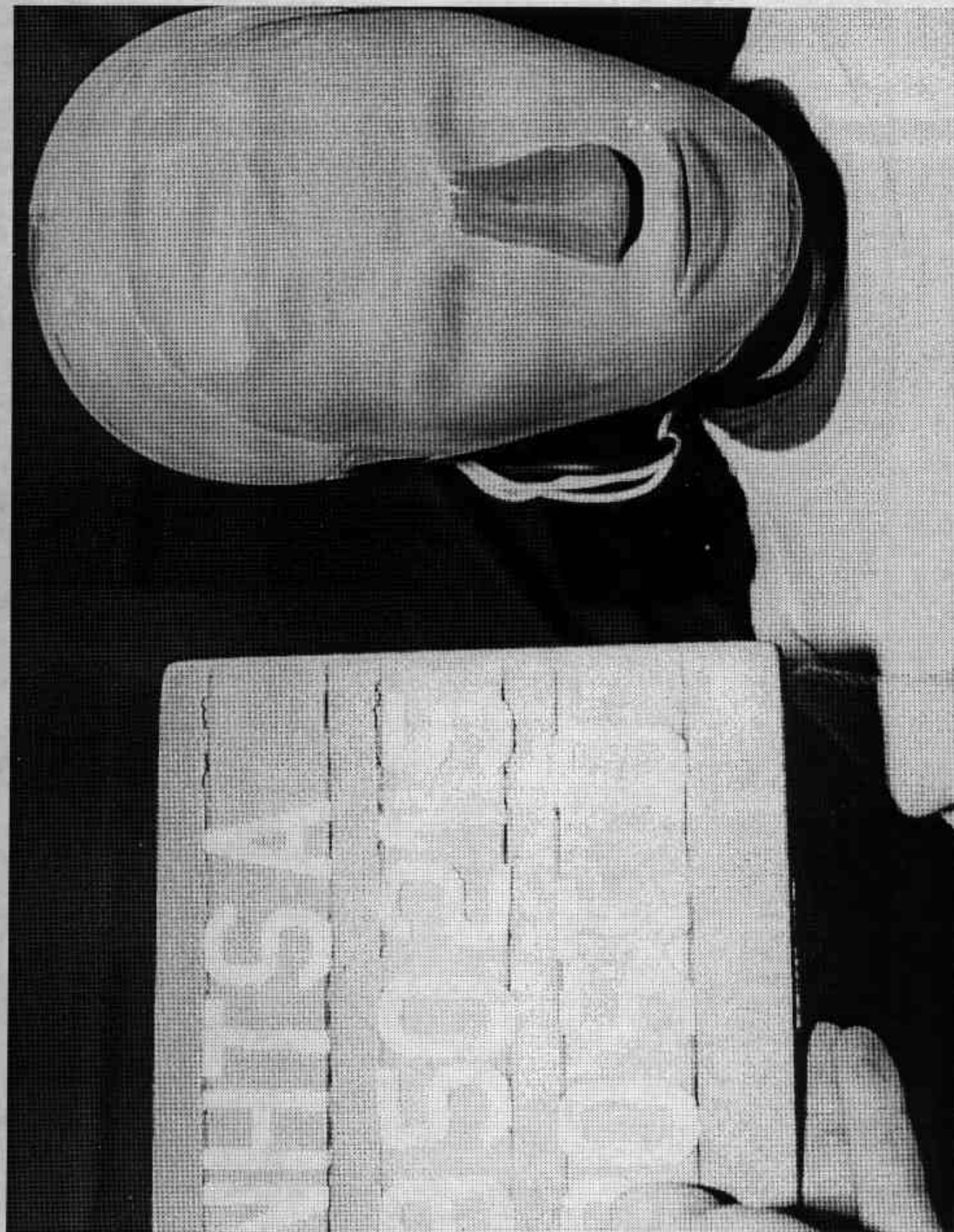


Figure A-21. Post-Test Driver Dummy Head Contact - View 1
A-22

950215

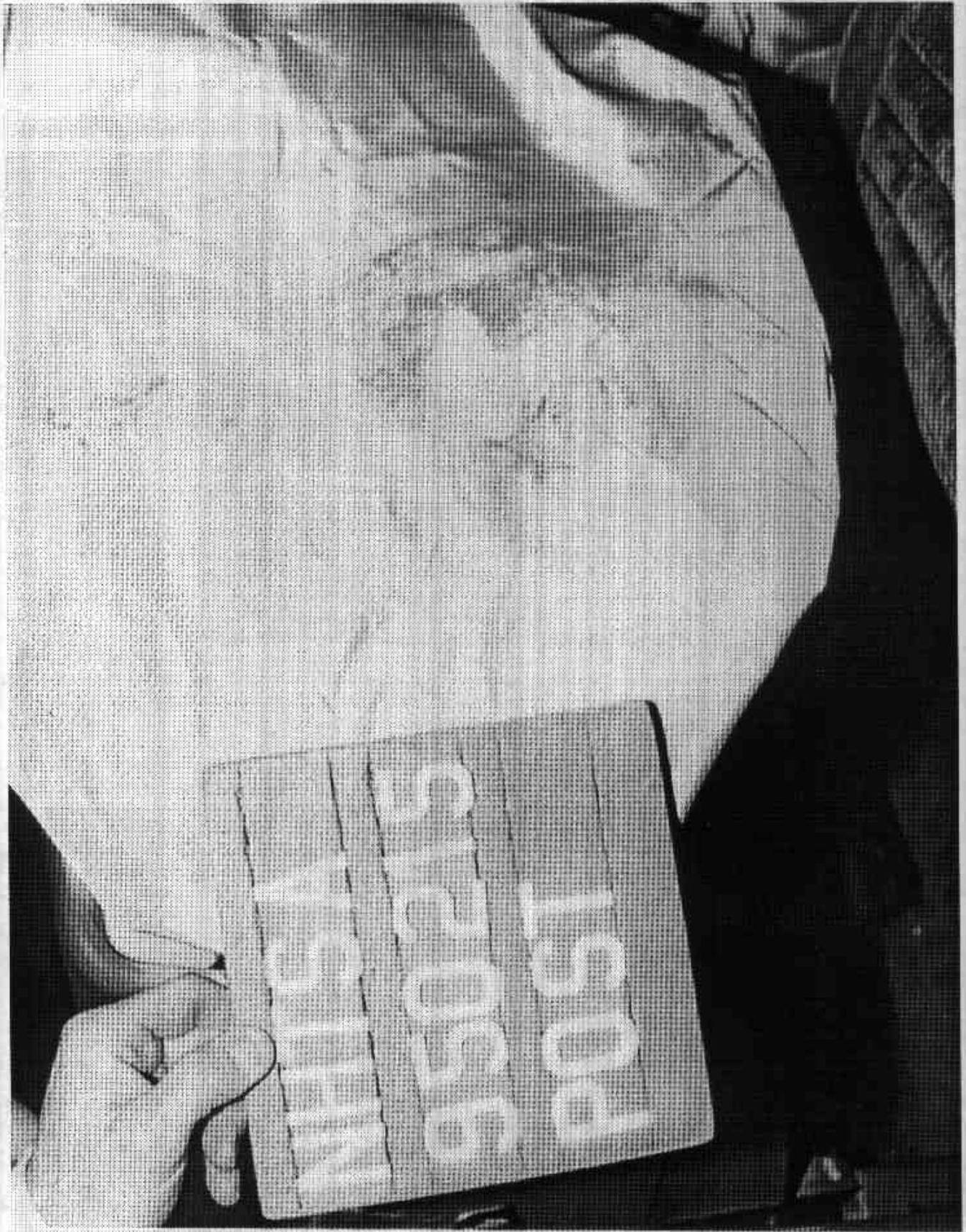


Figure A-22. Post-Test Driver Dummy Head Contact - View 2
A-23

950215

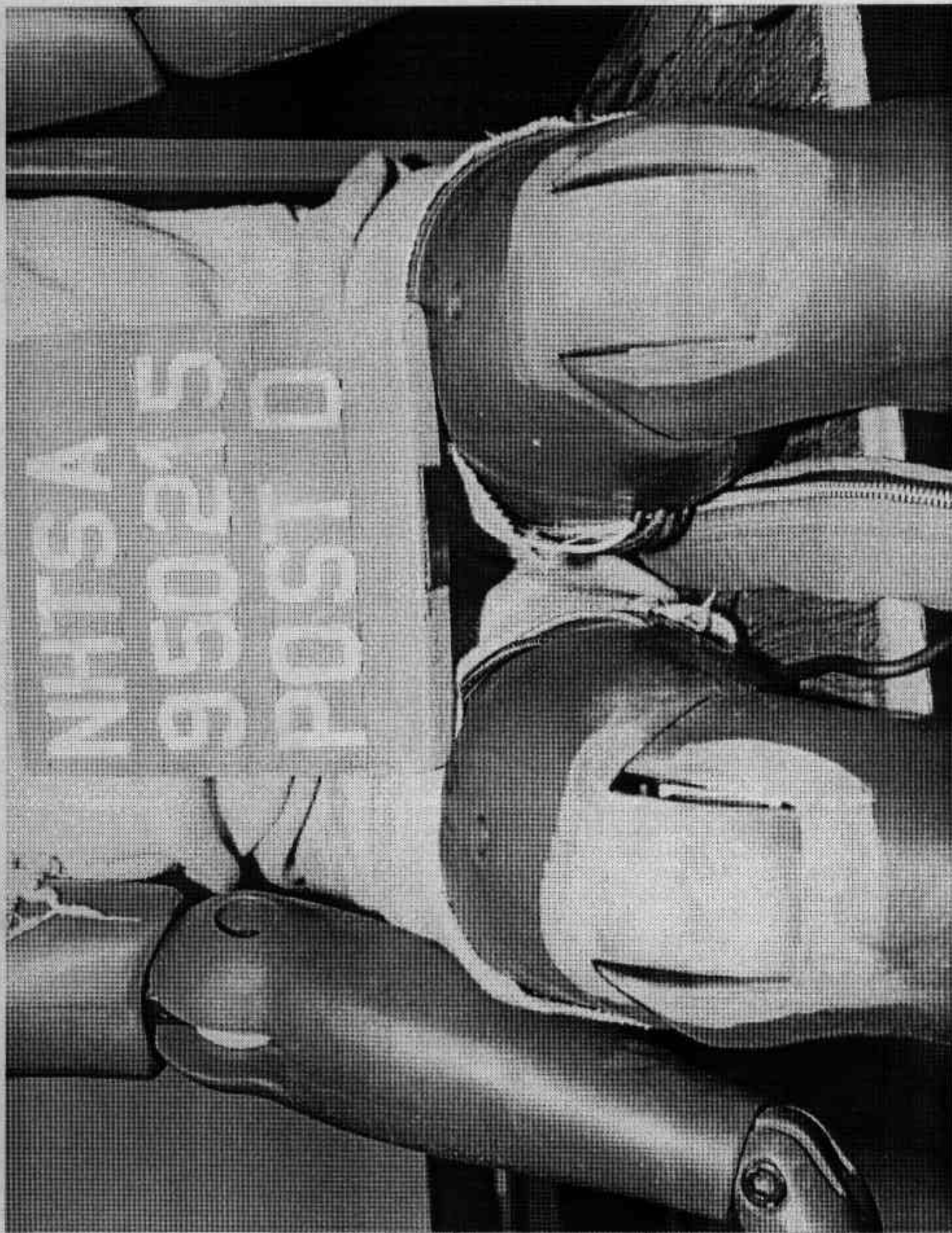


Figure A-23. Post-Test Driver Dummy Knee Contact - View 1

A-24

950215



Figure A-24. Post-Test Driver Dummy Knee Contact - View 2
A-25

950215

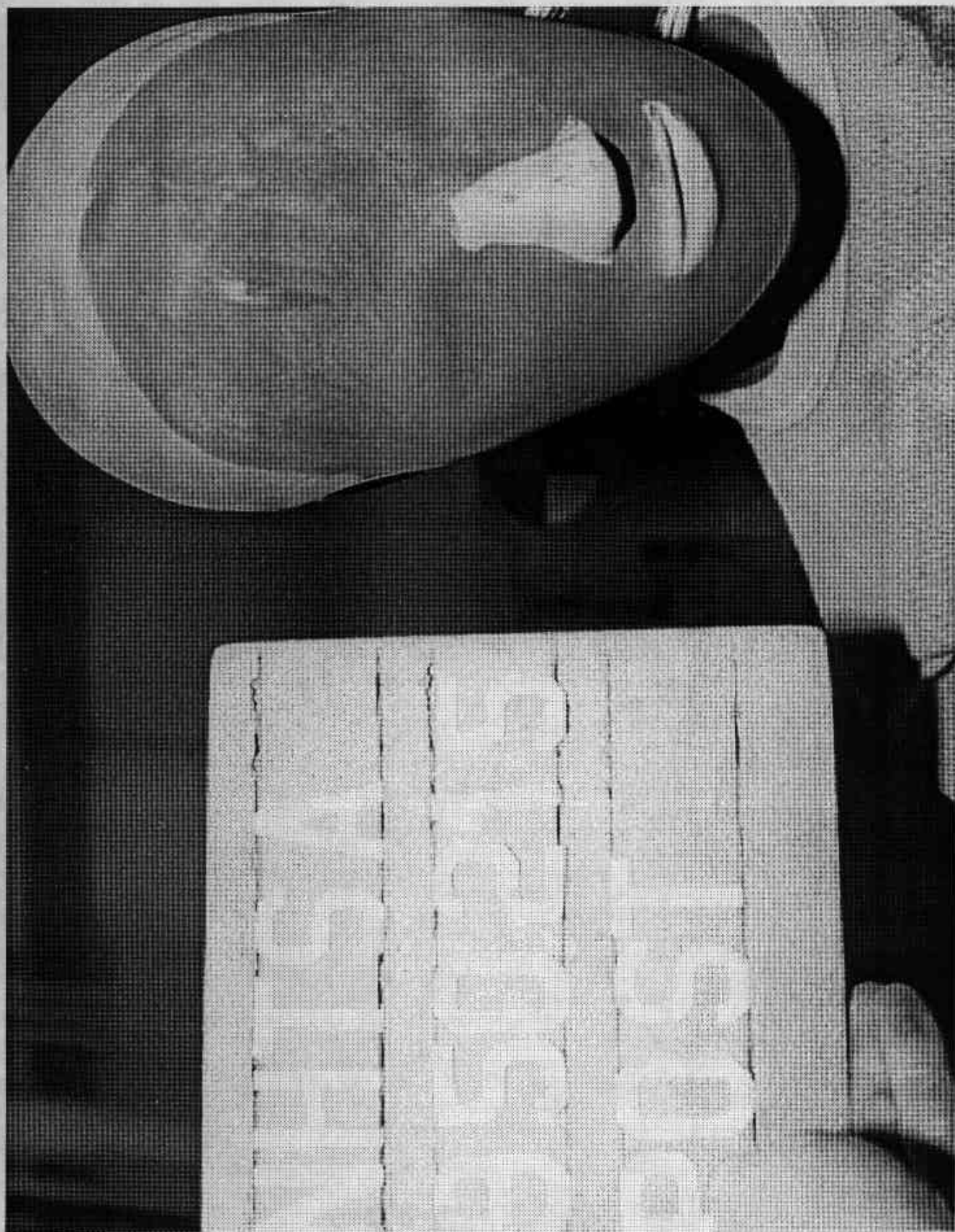


Figure A-25. Post-Test Passenger Dummy Head Contact - View 1

A-26

950215

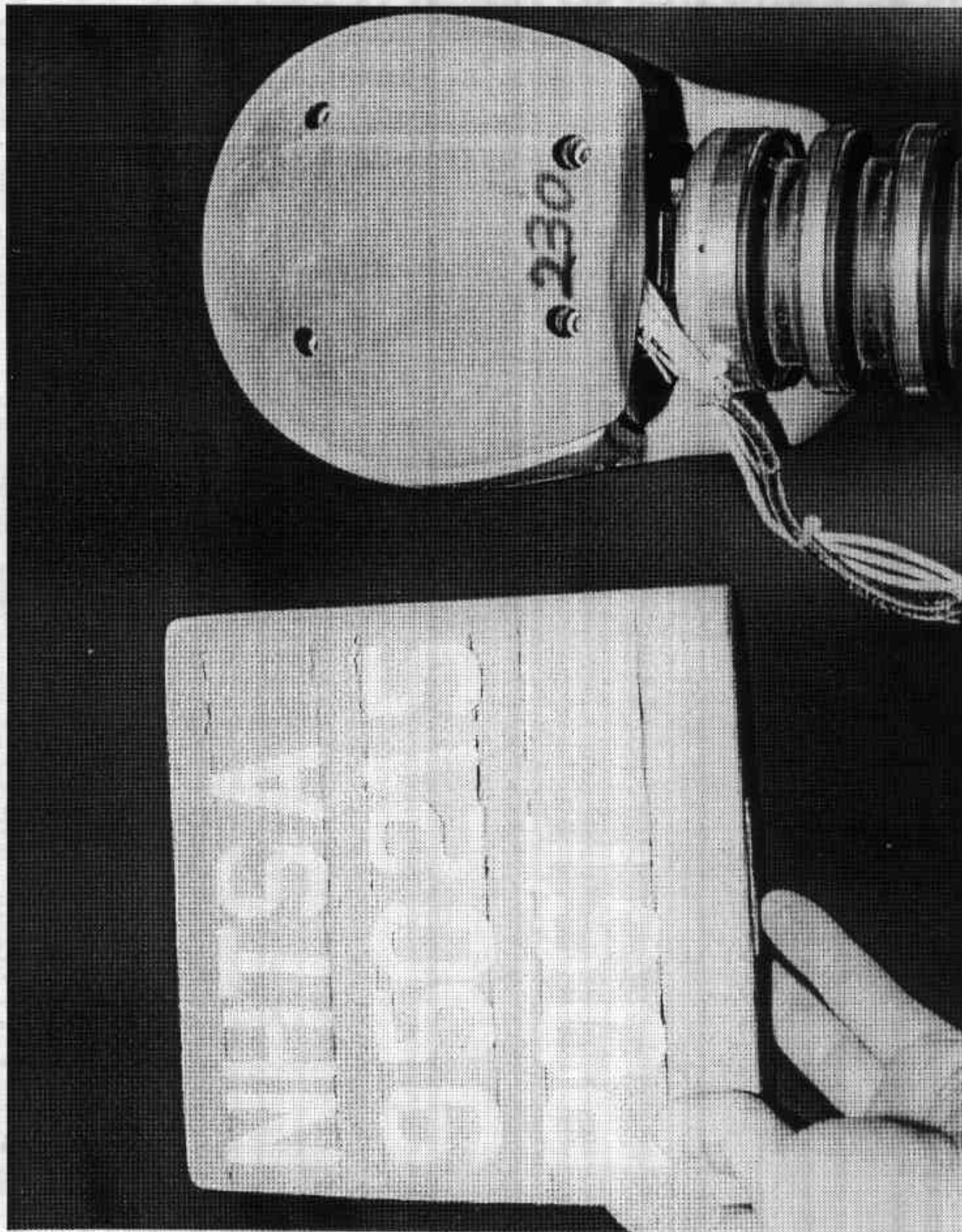


Figure A-26. Post-Test Passenger Dummy Head Contact - View 2

A-27

950215

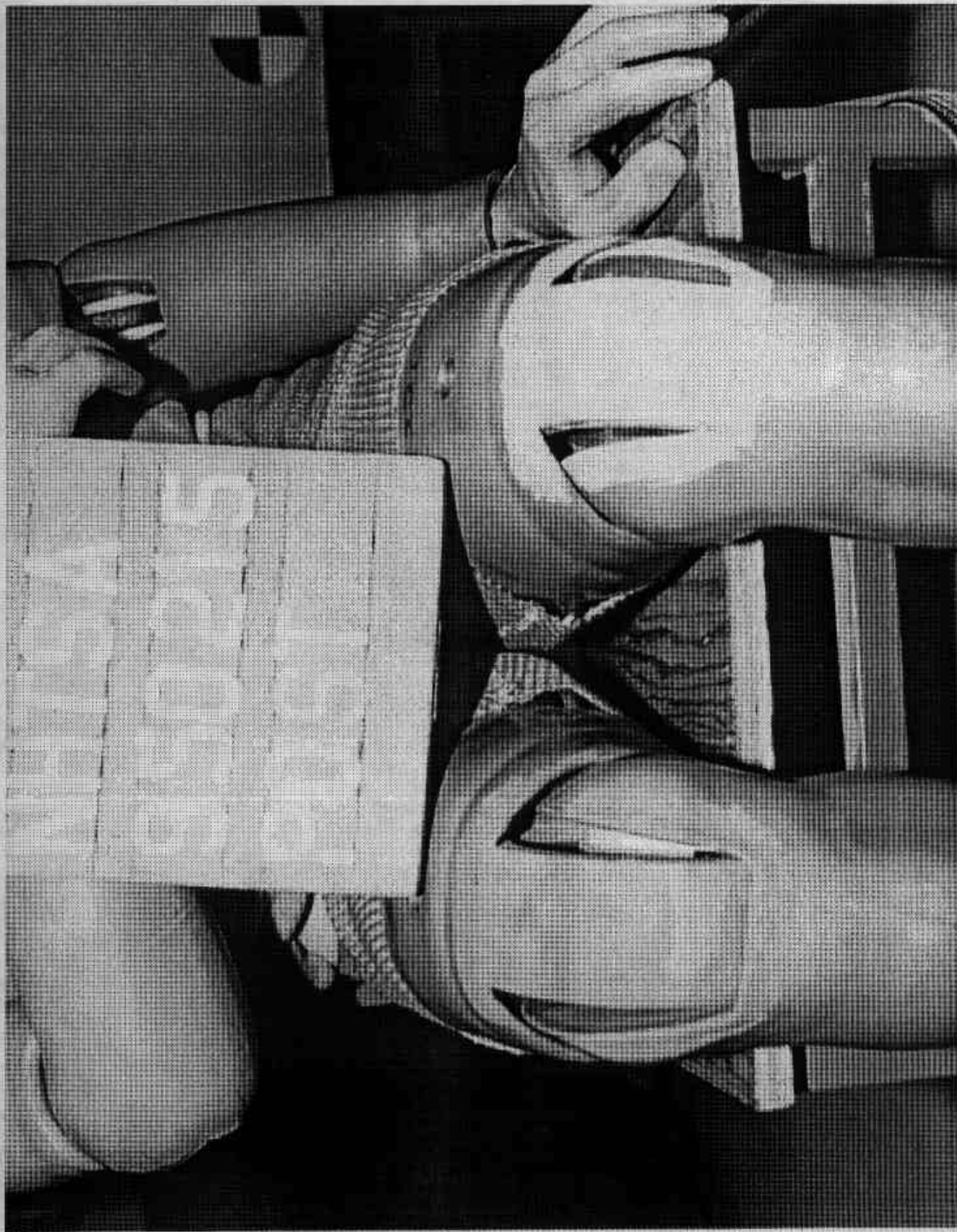


Figure A-27. Post-Test Passenger Dummy Knee Contact - View 1

A-28

950215

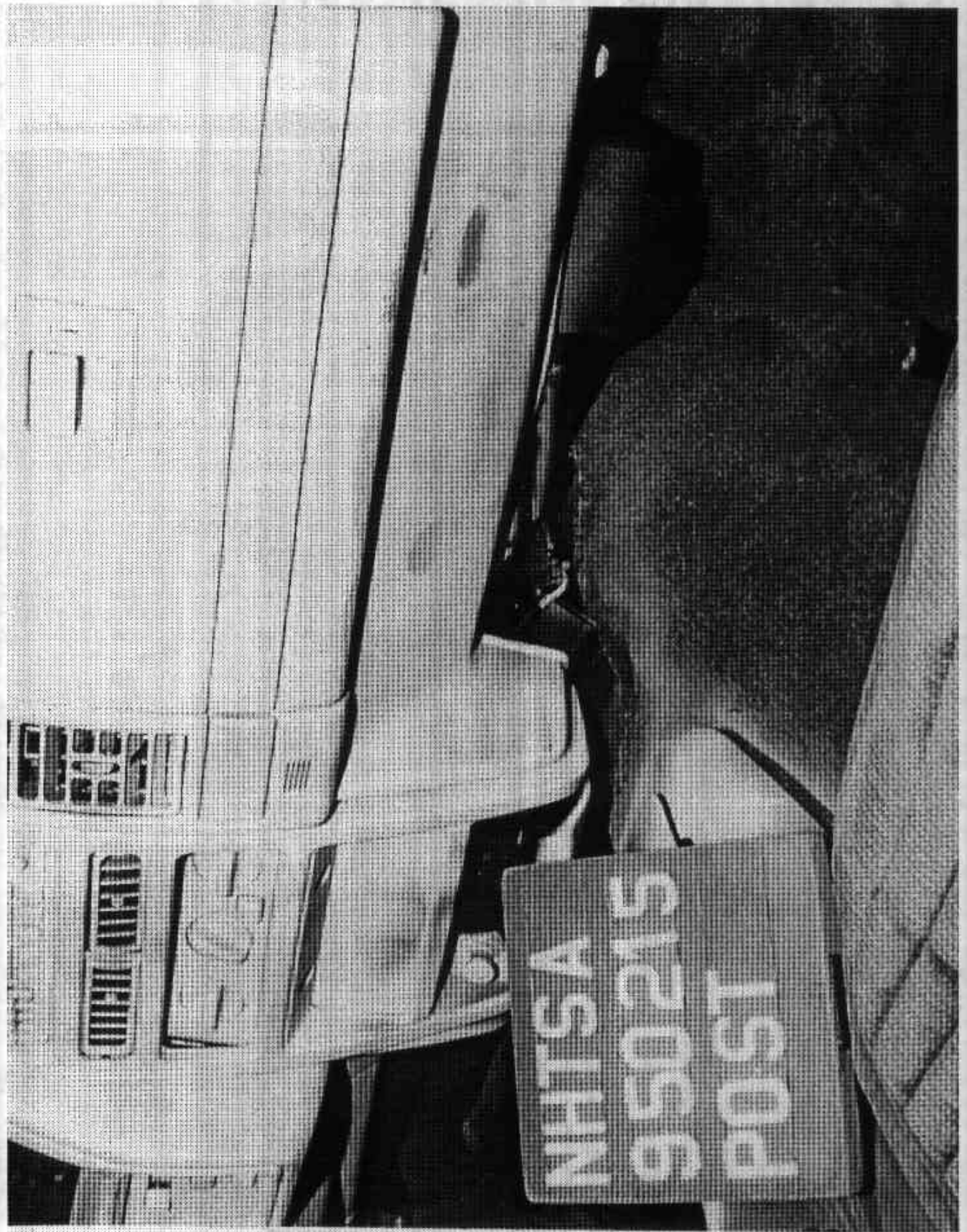
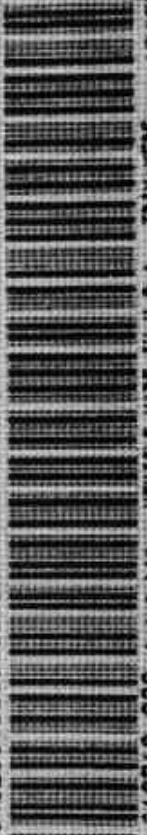


Figure A-28. Post-Test Passenger Dummy Knee Contact - View 2

MFD BY	CHRYSLER CORPORATION	DATE OF MFR	1-95	GWR	05500 LB	2495 KG
GAWR FRONT	1248 KG	WITH TIRES	P225/75R15	RIMS AT	15 X 7.0	PSI COLD 33
GAWR REAR	1339 KG	WITH TIRES	P225/75R15	RIMS AT	15 X 7.0	PSI COLD 33

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

VIN: 1J4GZ58Y1SC689846 TYPE: MPV SINGLE X DUAL



MPH: 012716 239 PAINT: P05 VEHICLE MADE IN U.S.A. TRIM: 5D5 4648543

Fig. A-29. Pre-test Vehicle Certification Label & Recommended Tire Pressure Label

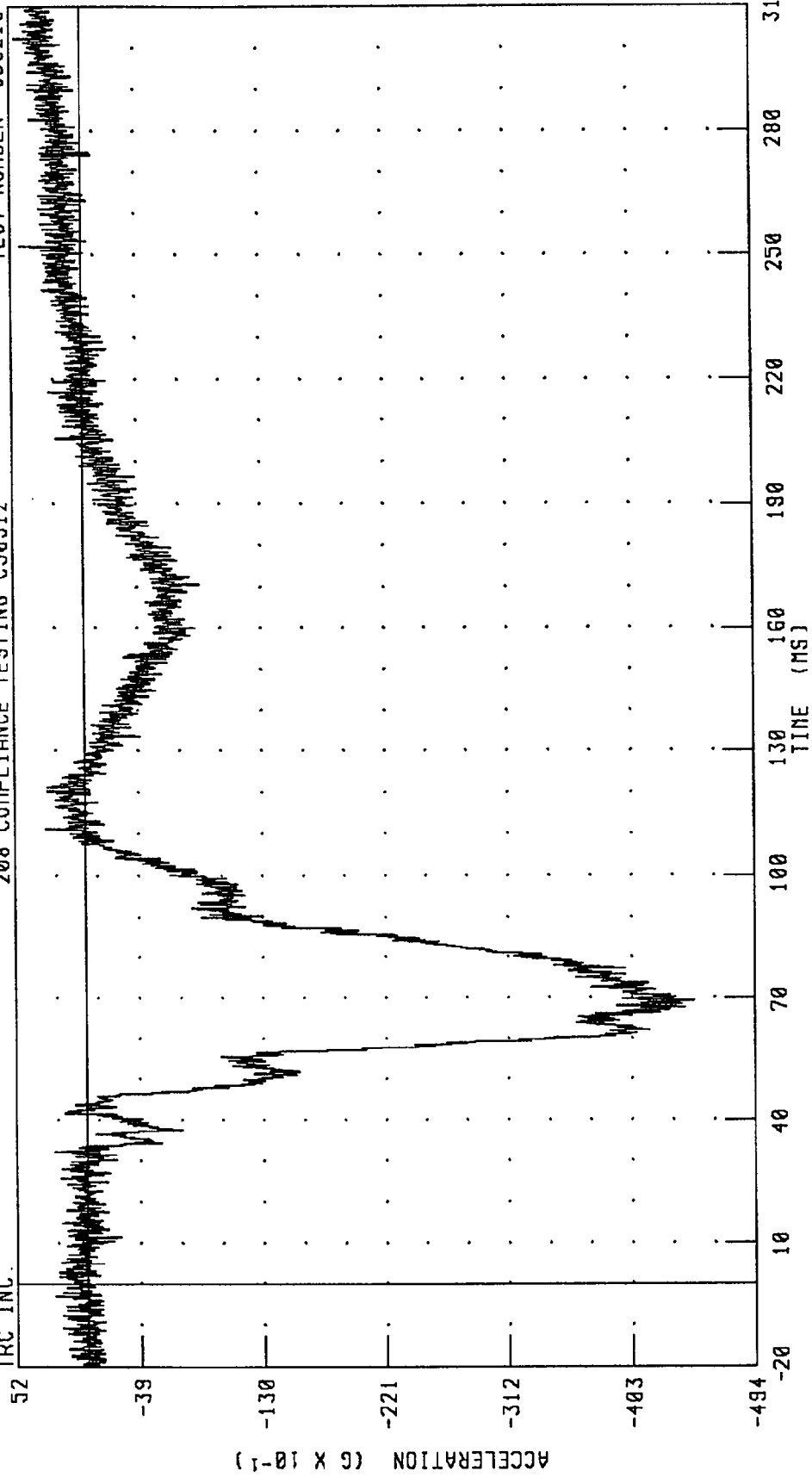
Appendix B

Data Plots

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.

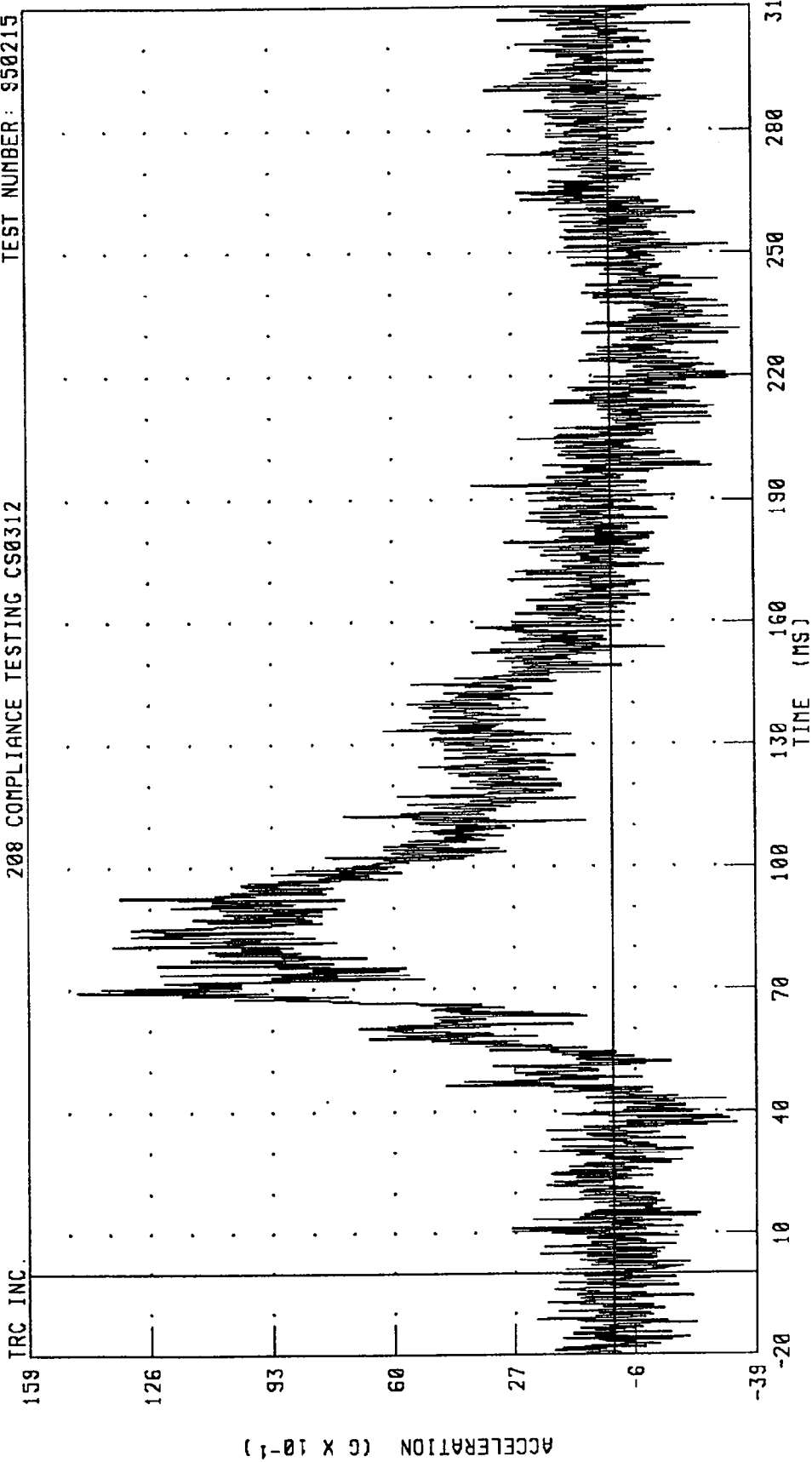


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 4.78 G @ 302.24 MS; -44.90 G @ 69.36 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

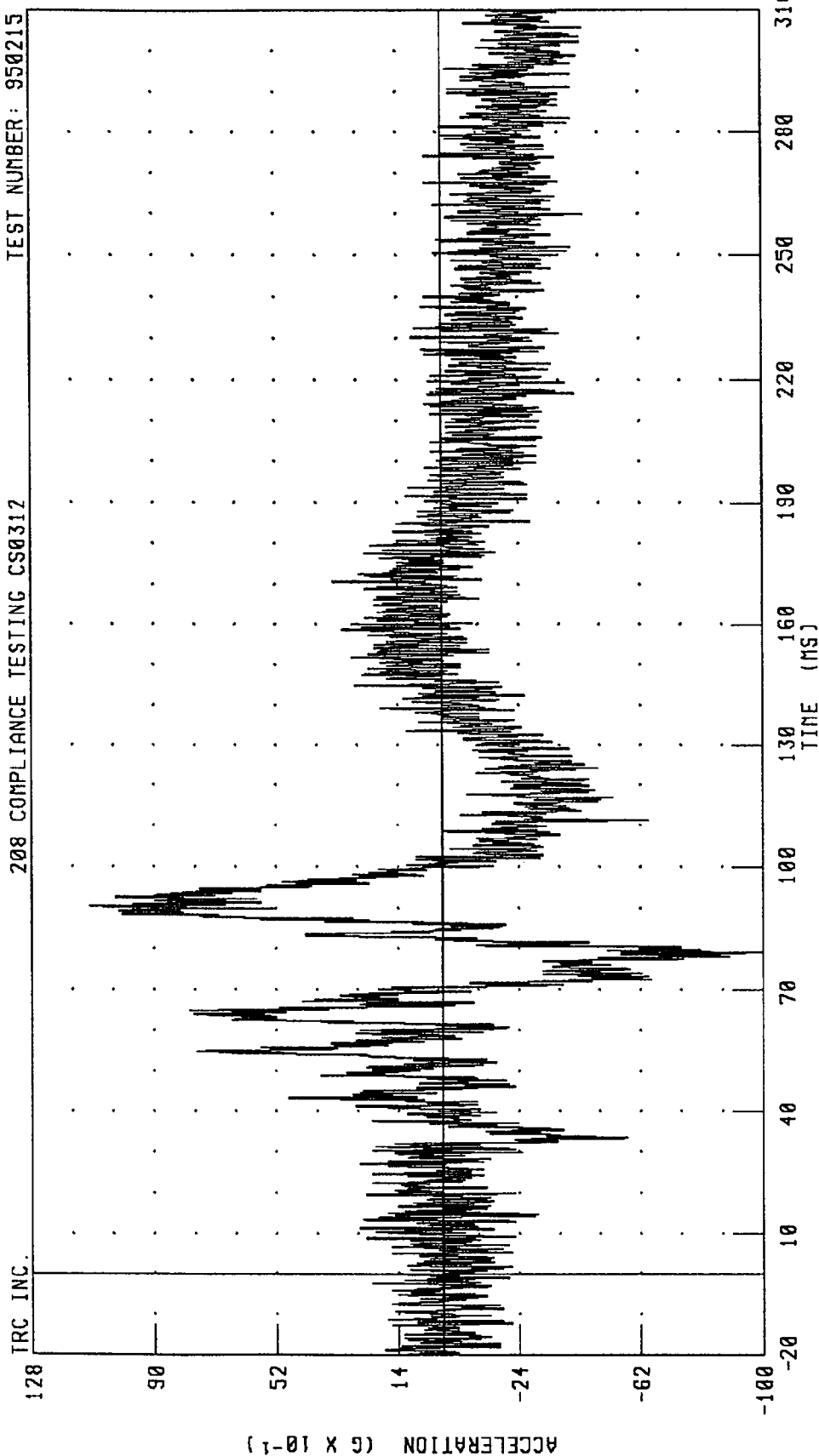
TEST NUMBER: 950215



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215



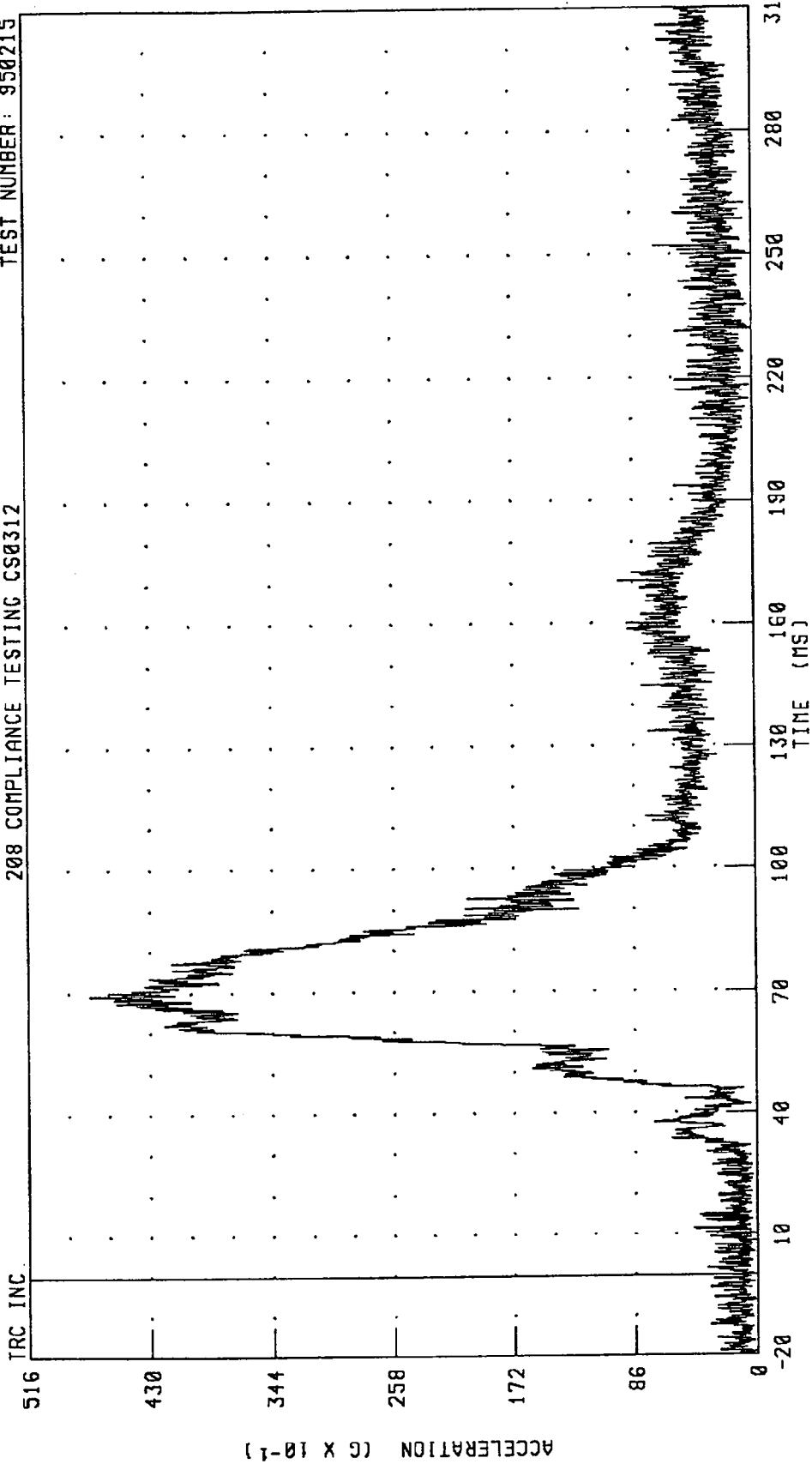
PEAK DATA: 10.98 G @ 90.56 MS; -9.95 G @ 79.04 MS

CHANNEL: HE07G1 FILTER: CH. CLASS 1000

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312



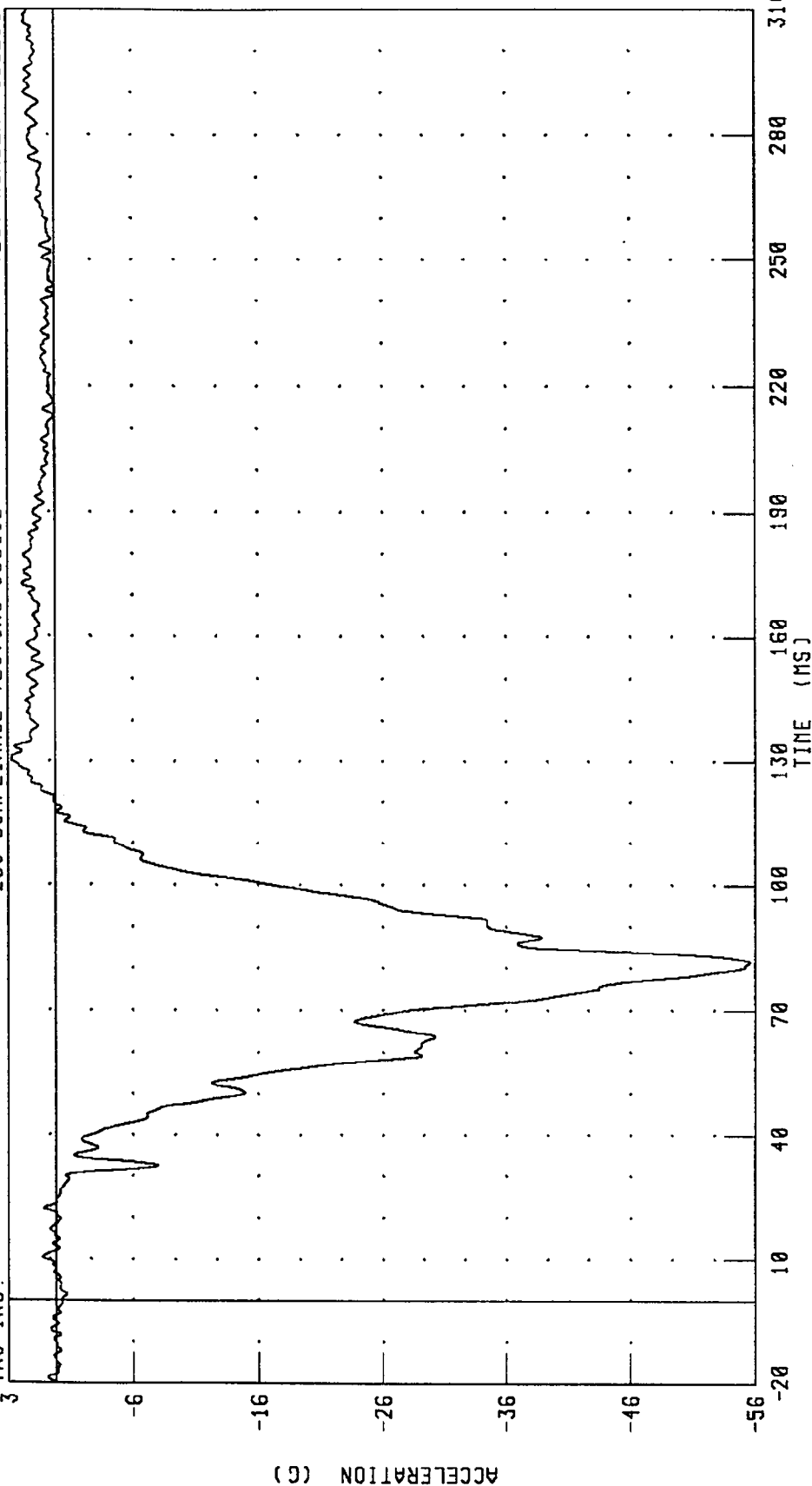
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

PEAK DATA: 47.19 G @ 69.36 MS; 0.13 G @ -19.20 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.

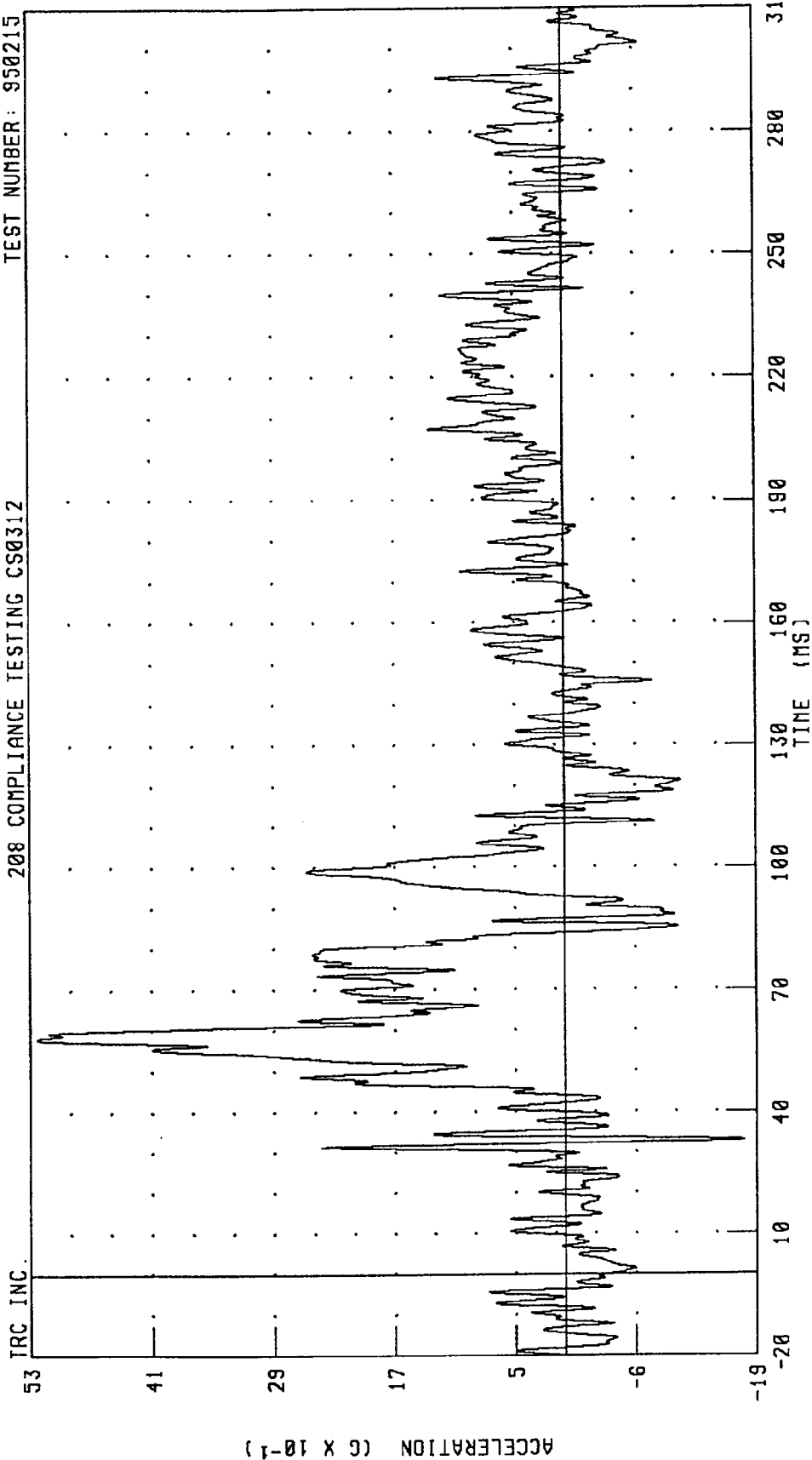


PEAK DATA: 3.49 G @ 130.40 MS; -55.78 G @ 81.52 MS

CHANNEL: CSTXG1 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215



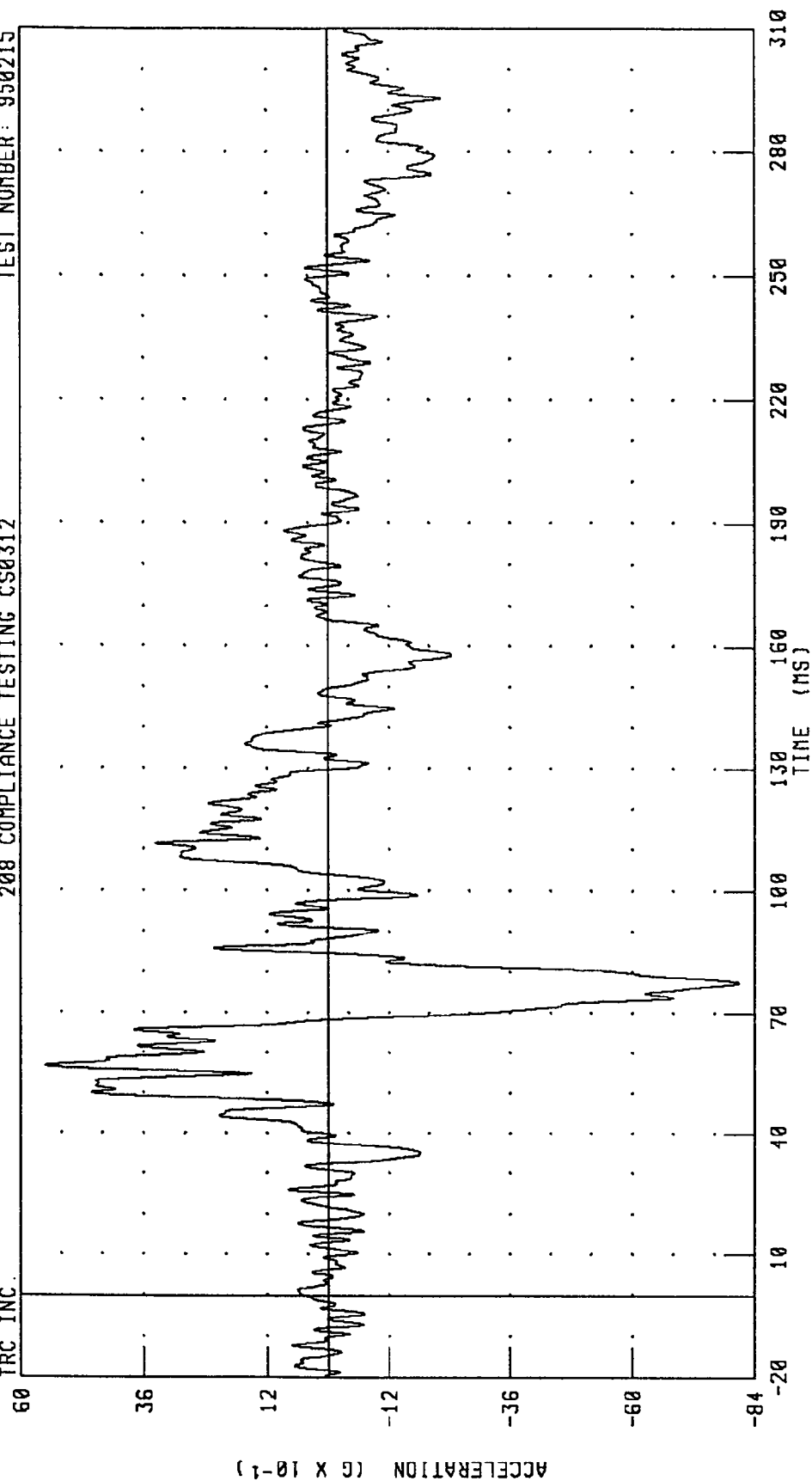
PEAK DATA: 5.23 G @ 57.92 MS; -1.77 G @ 33.12 MS

CHANNEL: CSTYG1 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.

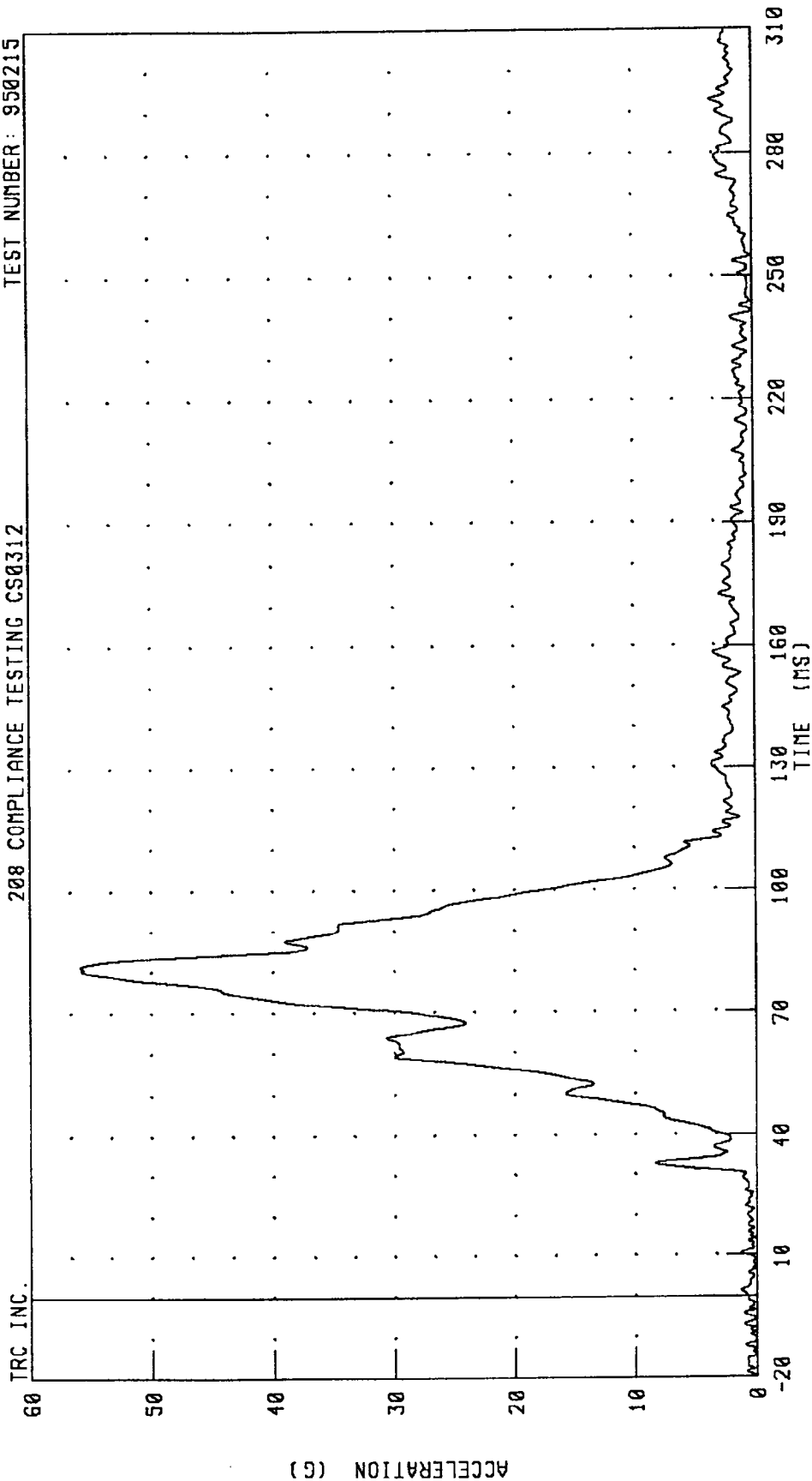


CHANNEL: CSTZG1 FILTER: CH. CLASS 180

PEAK DATA: 5.50 G @ 56.80 MS; -8.09 G @ 77.52 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING CS0312

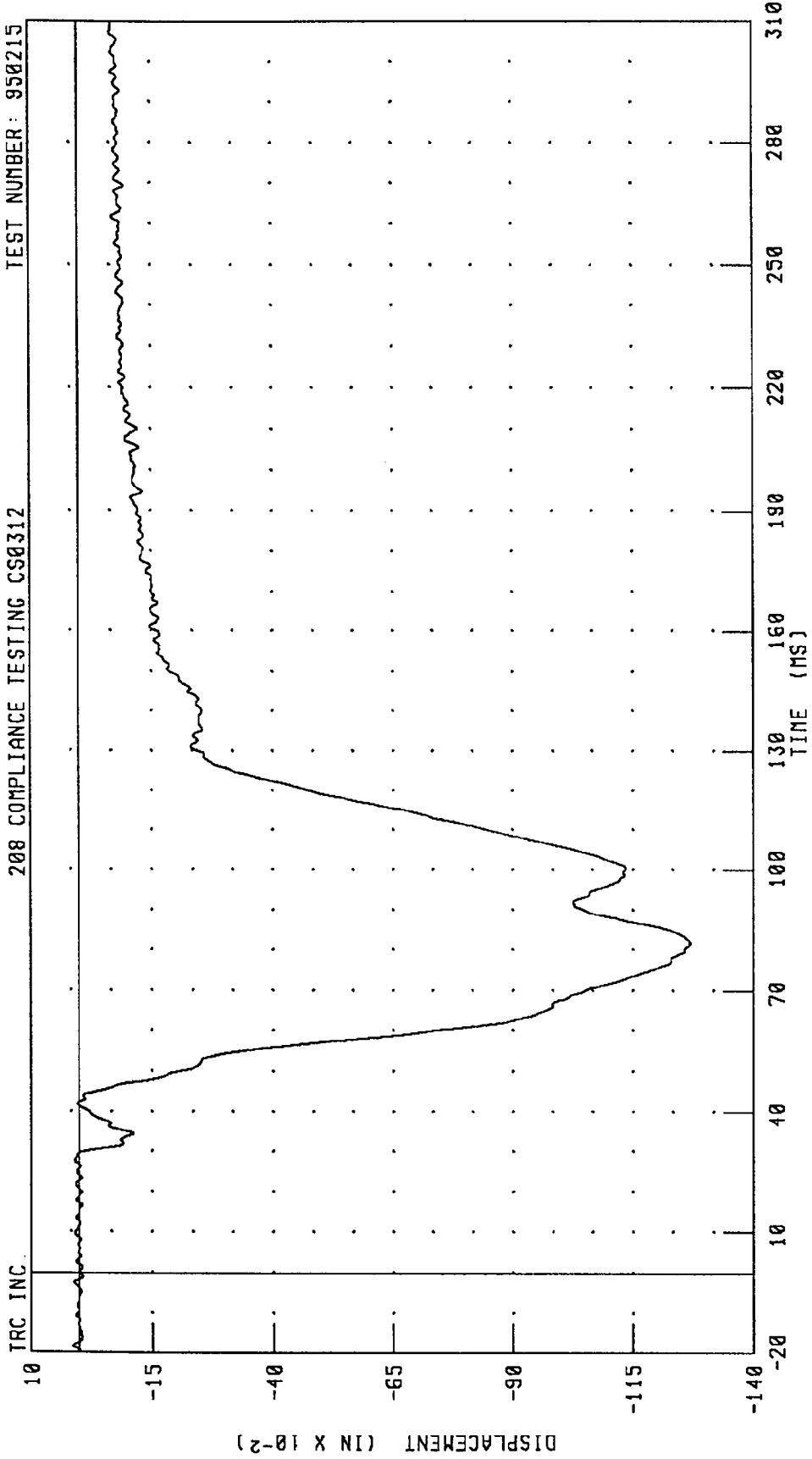
TEST NUMBER: 950215



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER CHEST DEFLECTION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

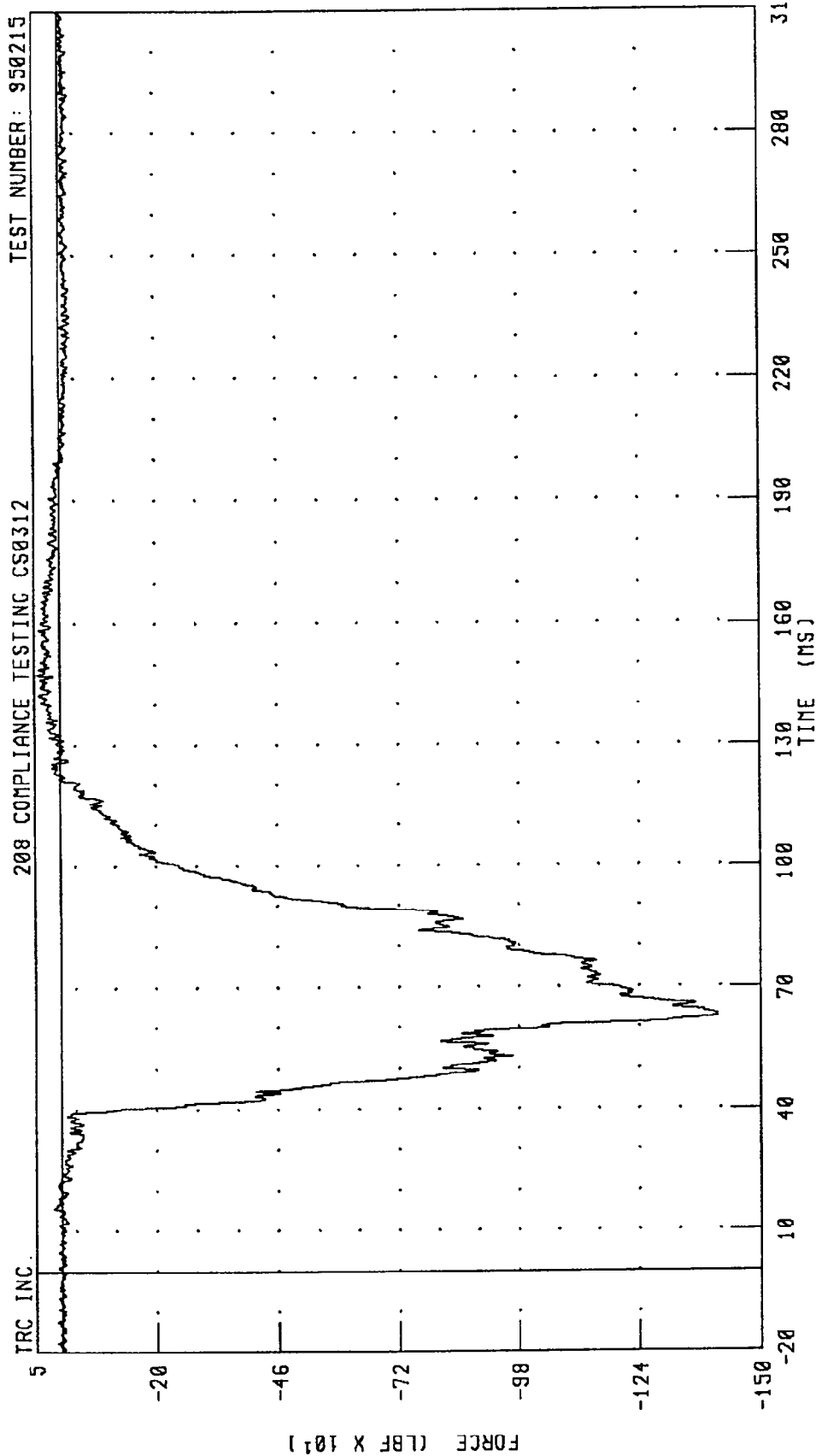


CHANNEL: CSTXD1 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312

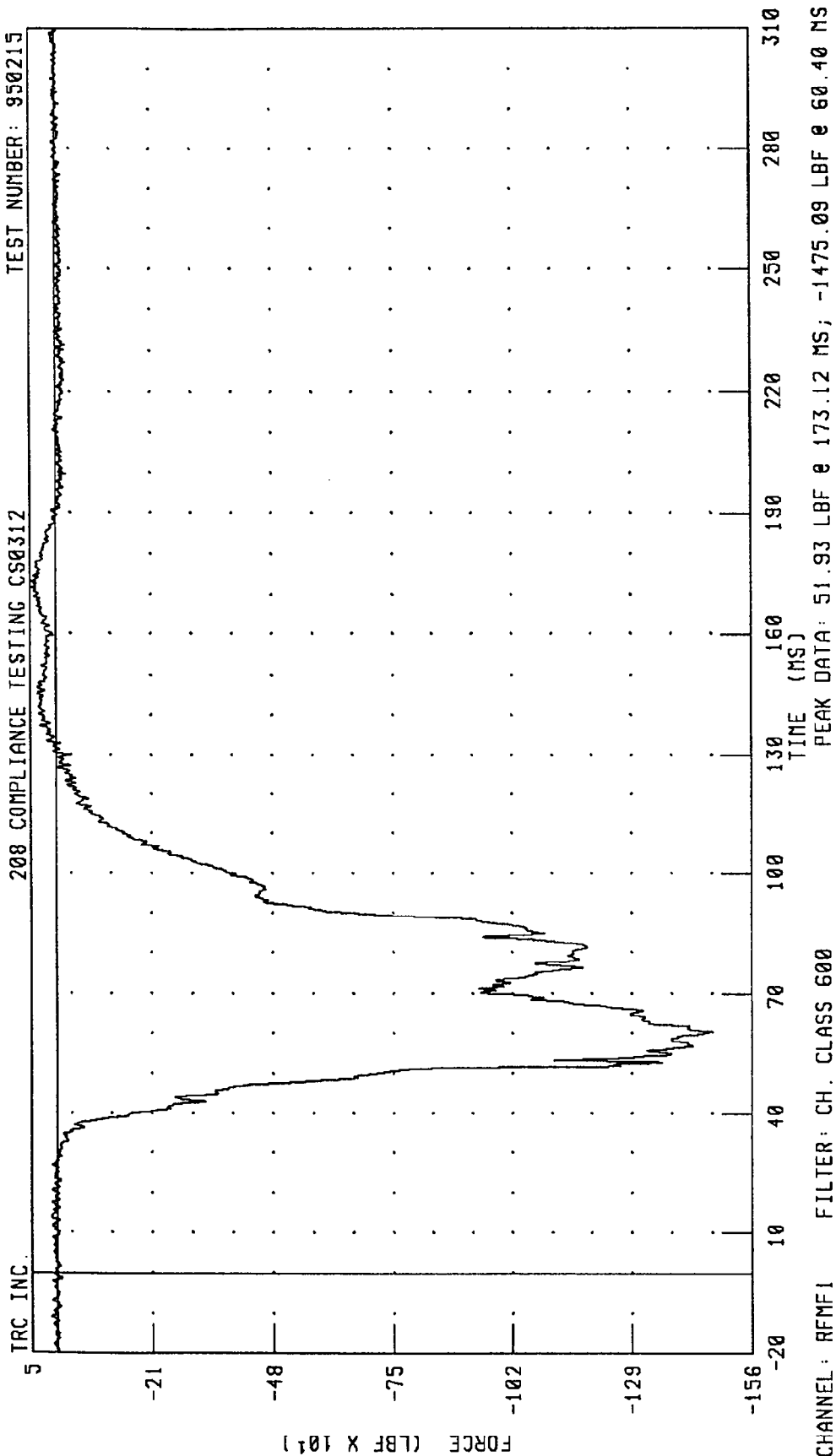


PEAK DATA: 51.07 LBF @ 147.68 MS; -1411.54 LBF @ 62.88 MS

CHANNEL: LFMF1 FILTER: CH. CLASS 600

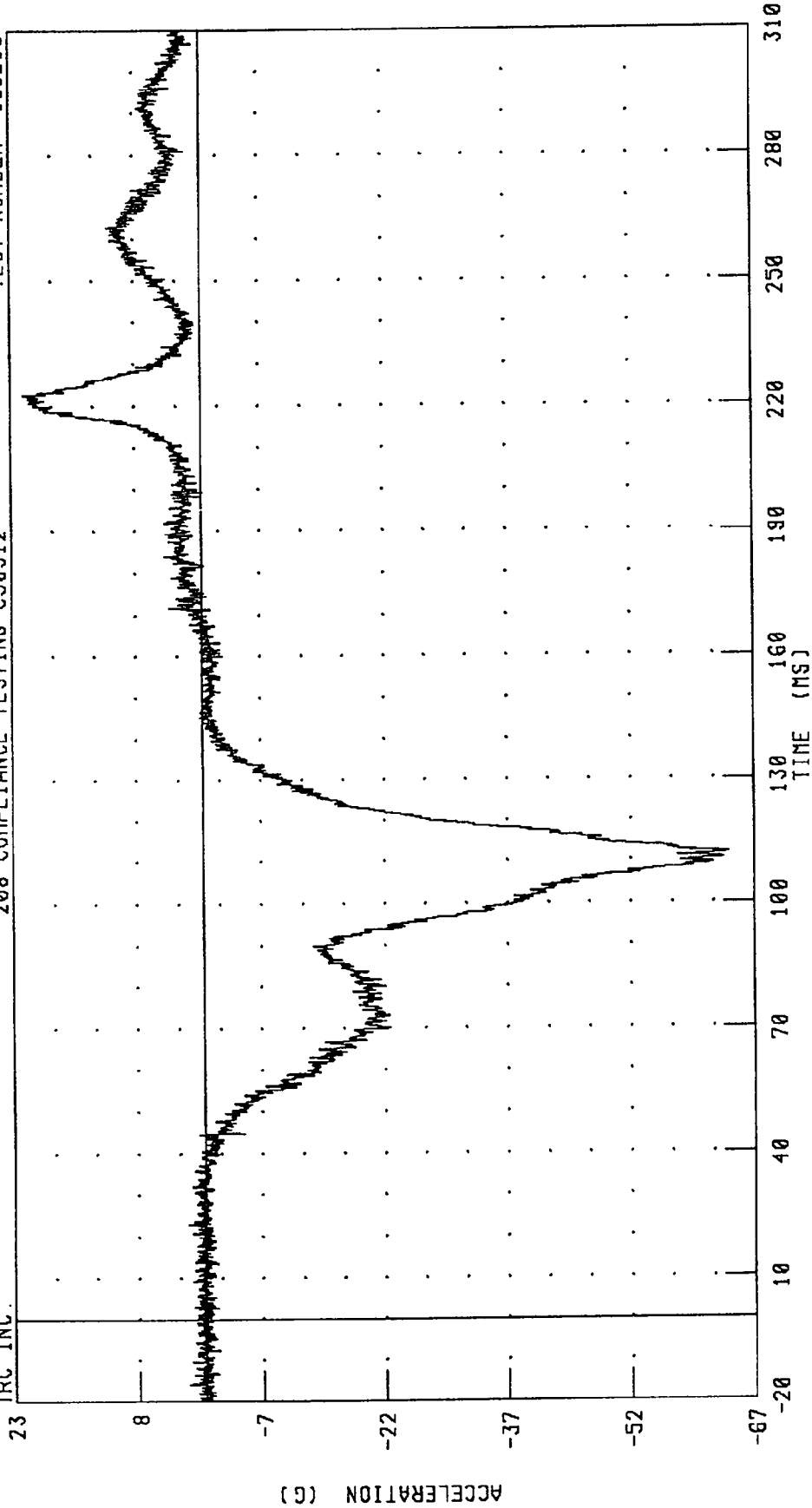
1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215



1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

TRC INC. 208 COMPLIANCE TESTING CS0312 TEST NUMBER: 950215



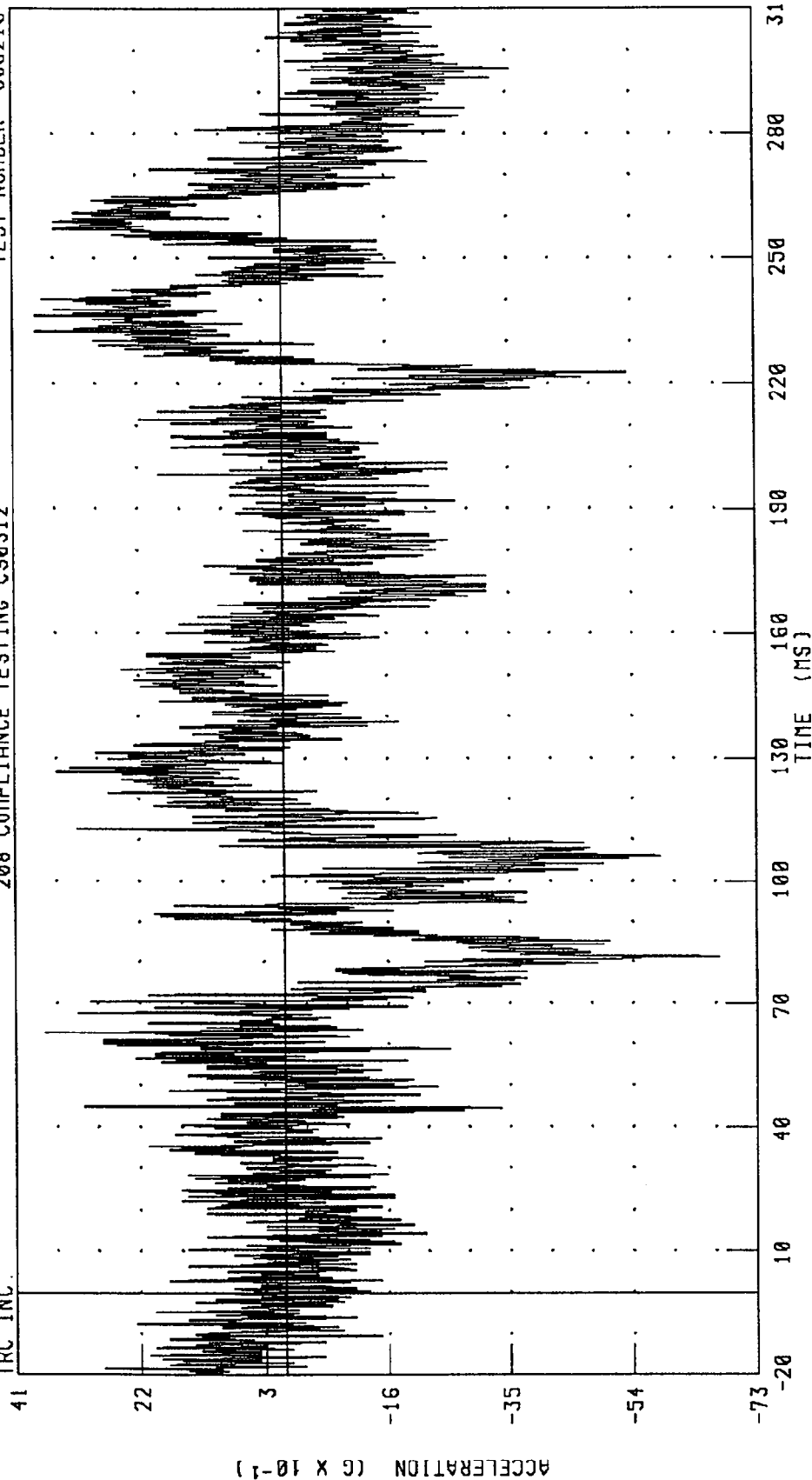
CHANNEL: HEDXG2 FILTER: CH. CLASS 1000

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 950215

200 COMPLIANCE TESTING CS0312

TRC INC.



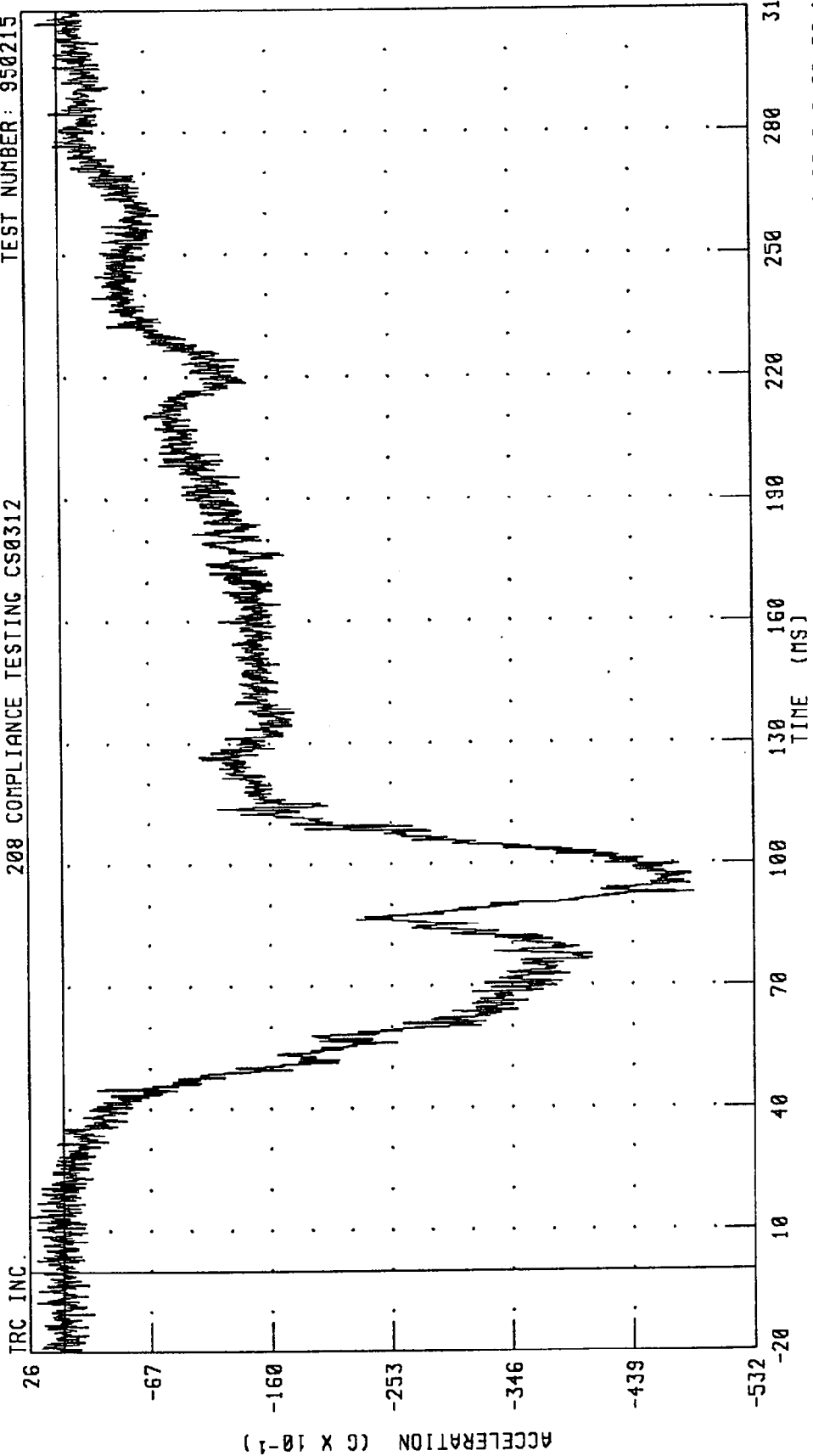
PEAK DATA: 3.74 G @ 232.40 MS; -6.72 G @ 81.20 MS

CHANNEL: HEDYC2 FILTER: CH. CLASS 1000

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312



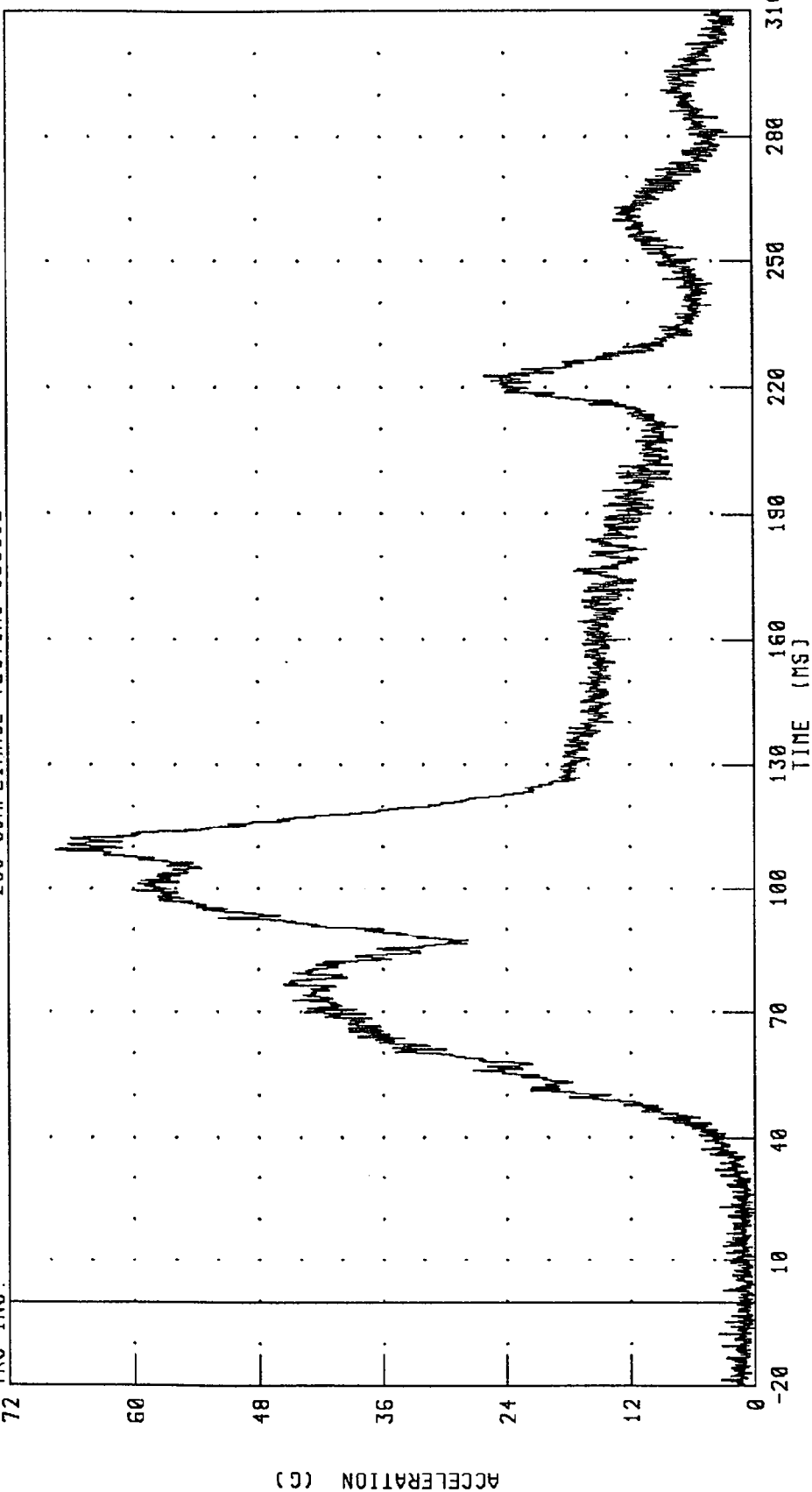
CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312

TRC INC.



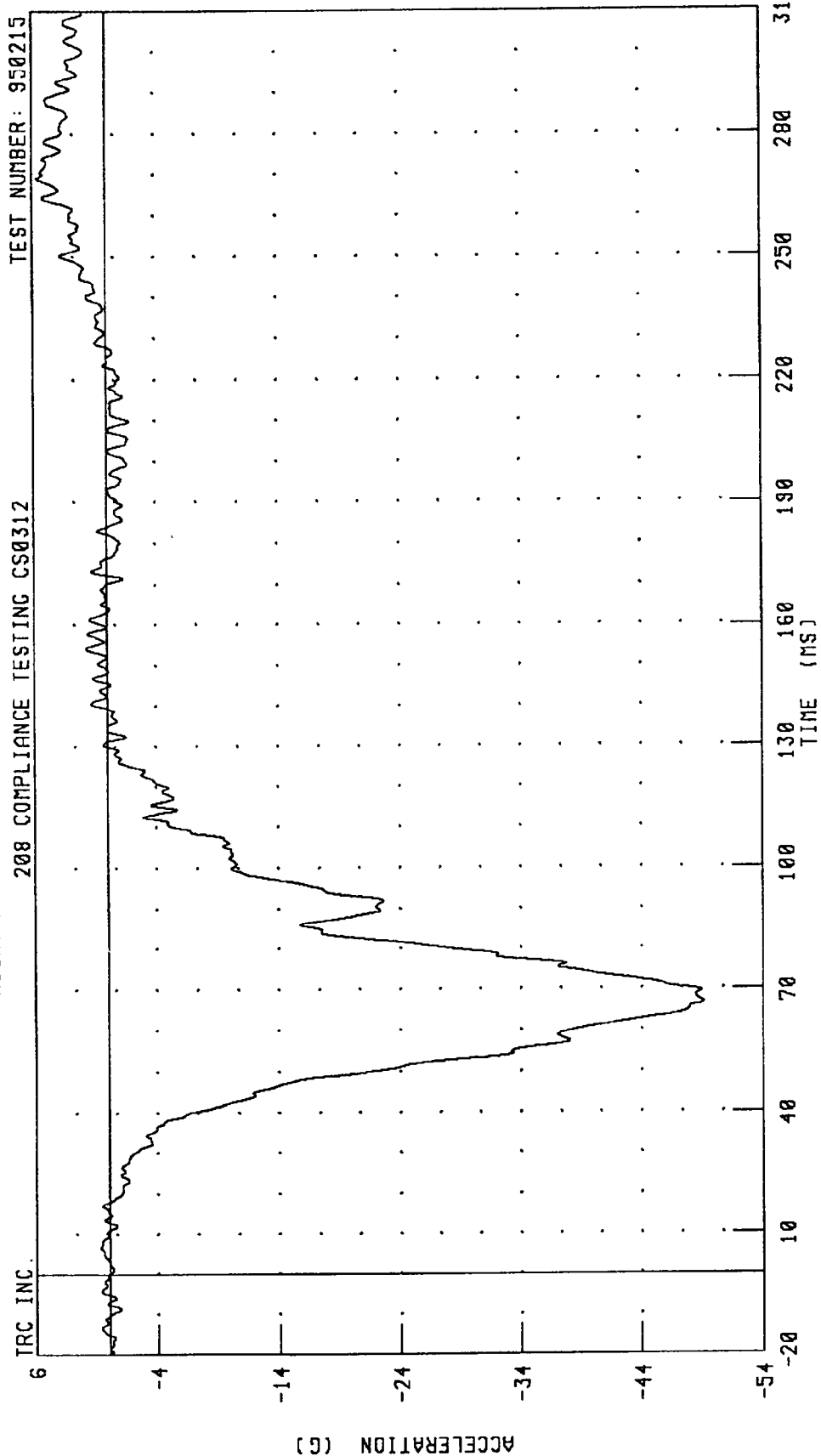
CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

PEAK DATA: 67.44 G @ 109.36 MS; 0.11 G @ 4.24 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312

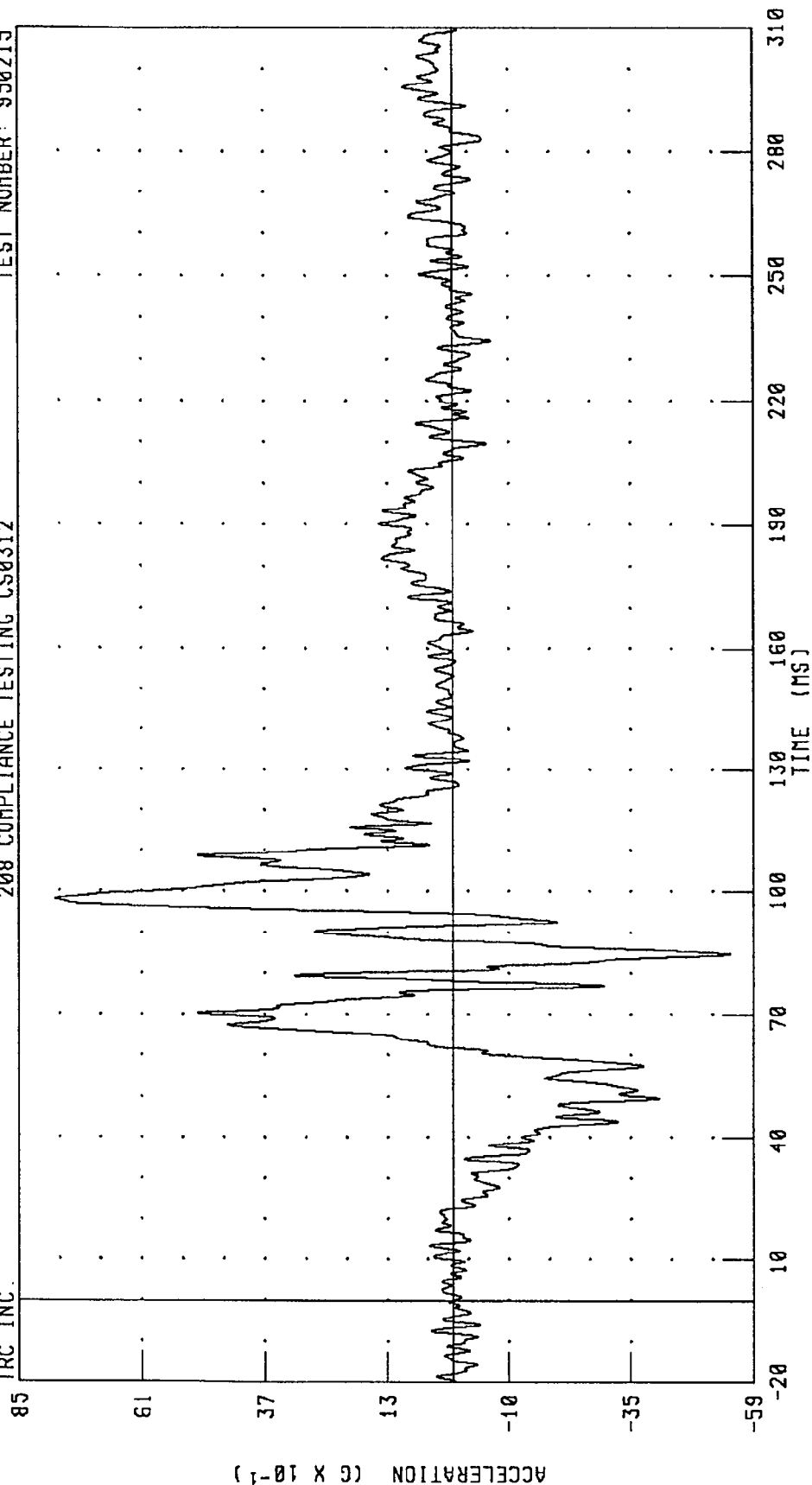


CHANNEL: CSTXG2 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.

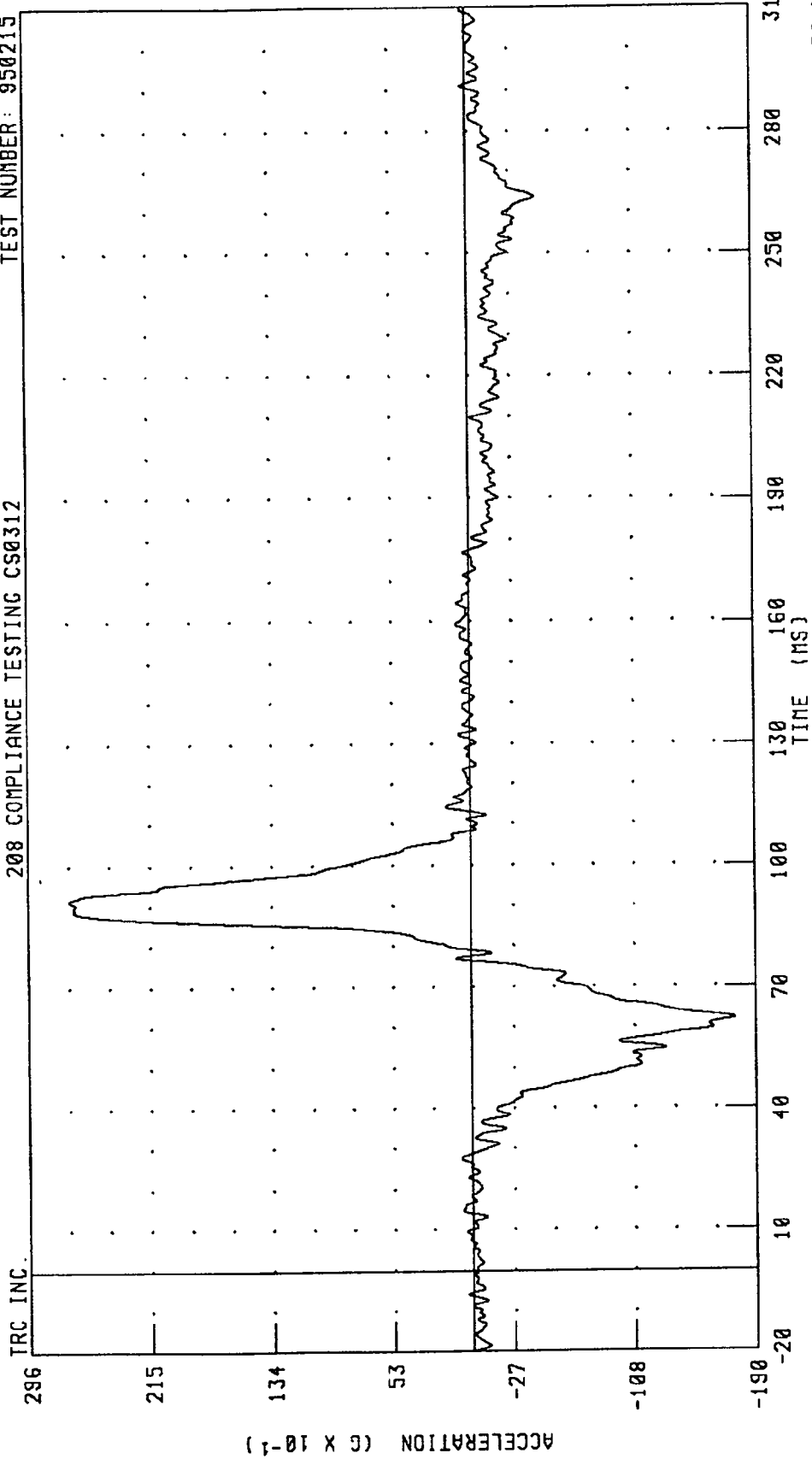


CHANNEL: CSTYG2 FILTER: CH. CLASS 180

PEAK DATA: 7.79 G @ 98.08 MS; -5.45 G @ 84.80 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

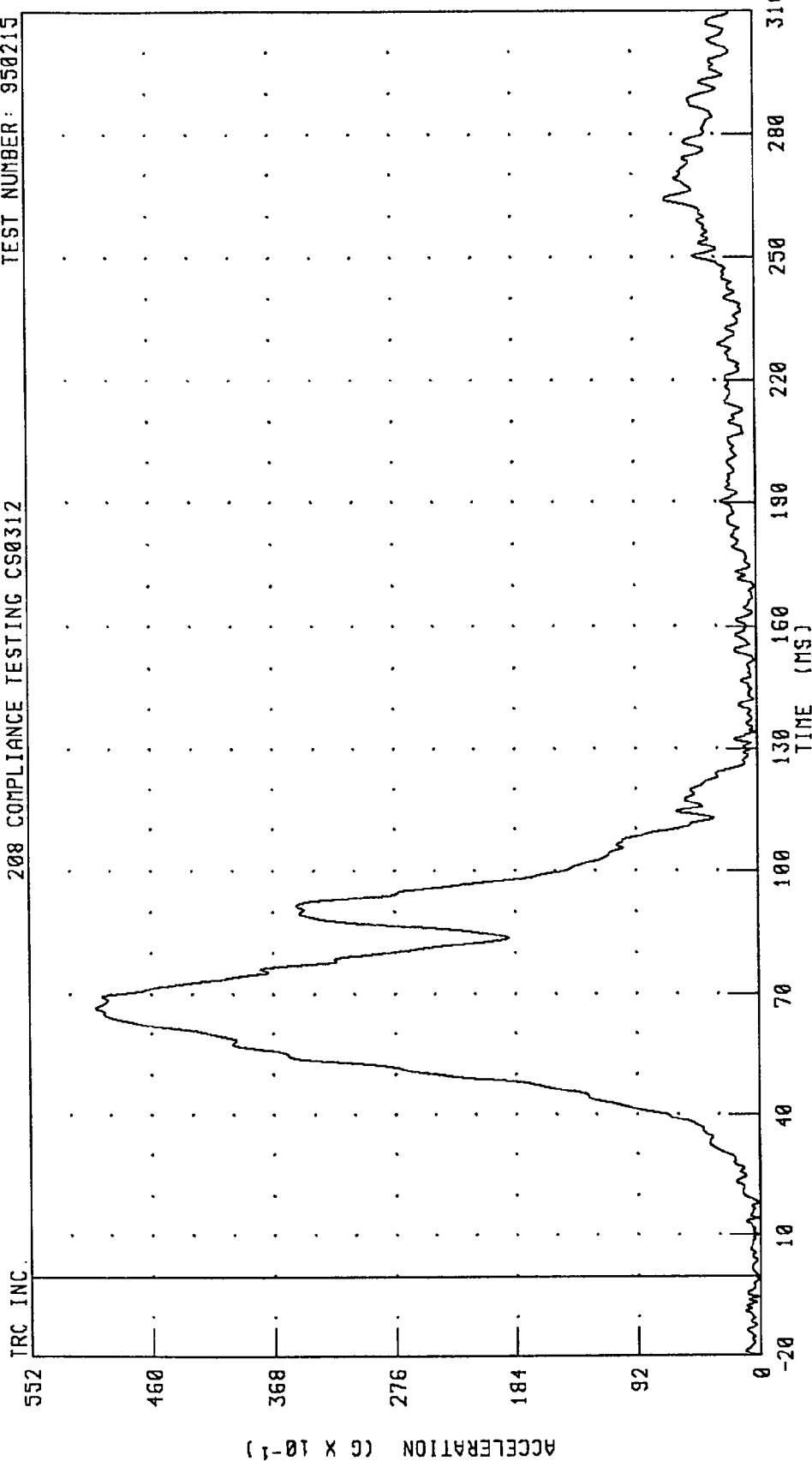


CHANNEL: CST7C2 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312

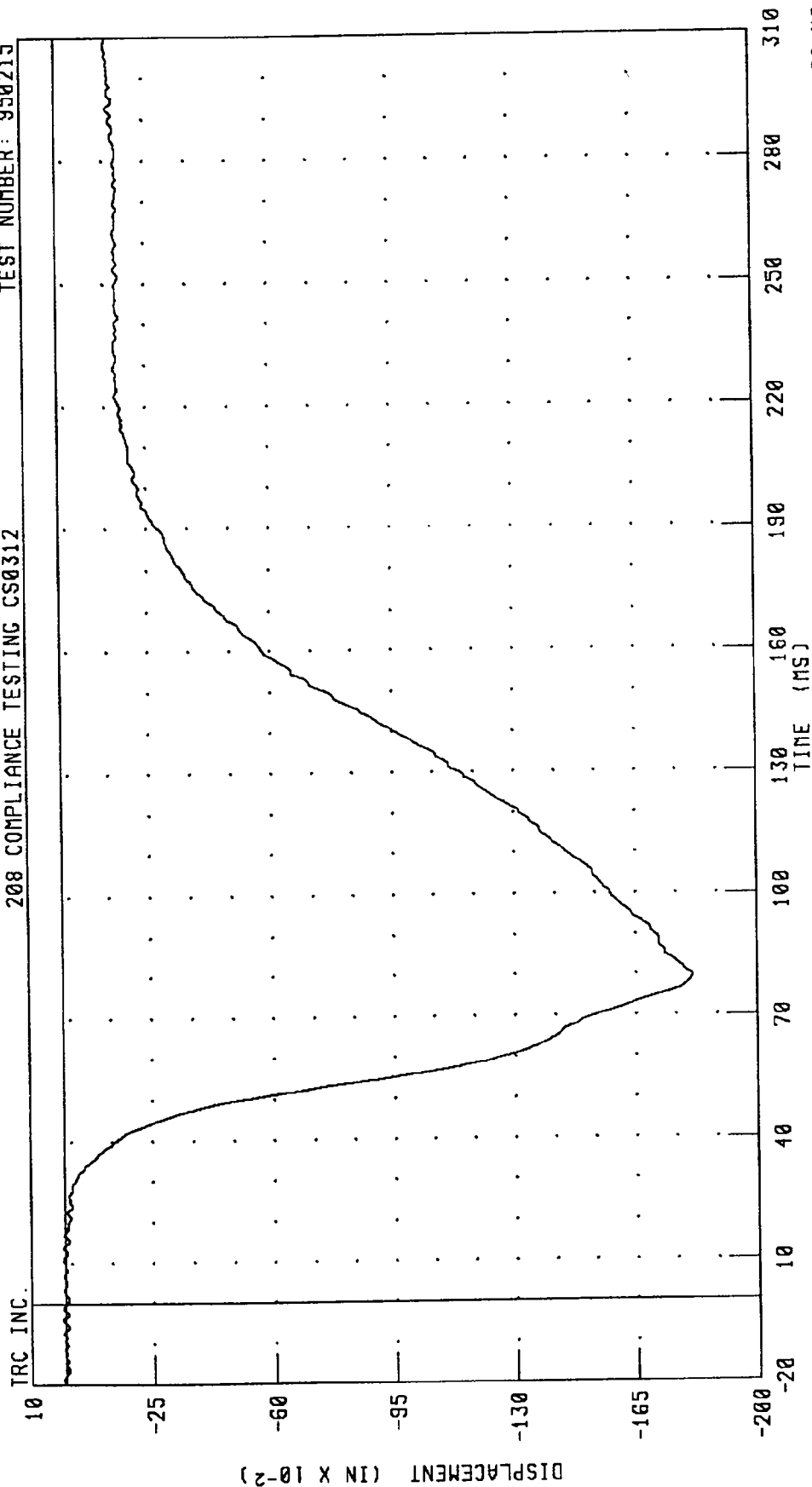


PEAK DATA: 50.20 G @ 66.64 MS; 0.06 G @ -20.00 MS

CHANNEL: CSTRG2 FILTER: CH. CLASS 180

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST DEFLECTION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

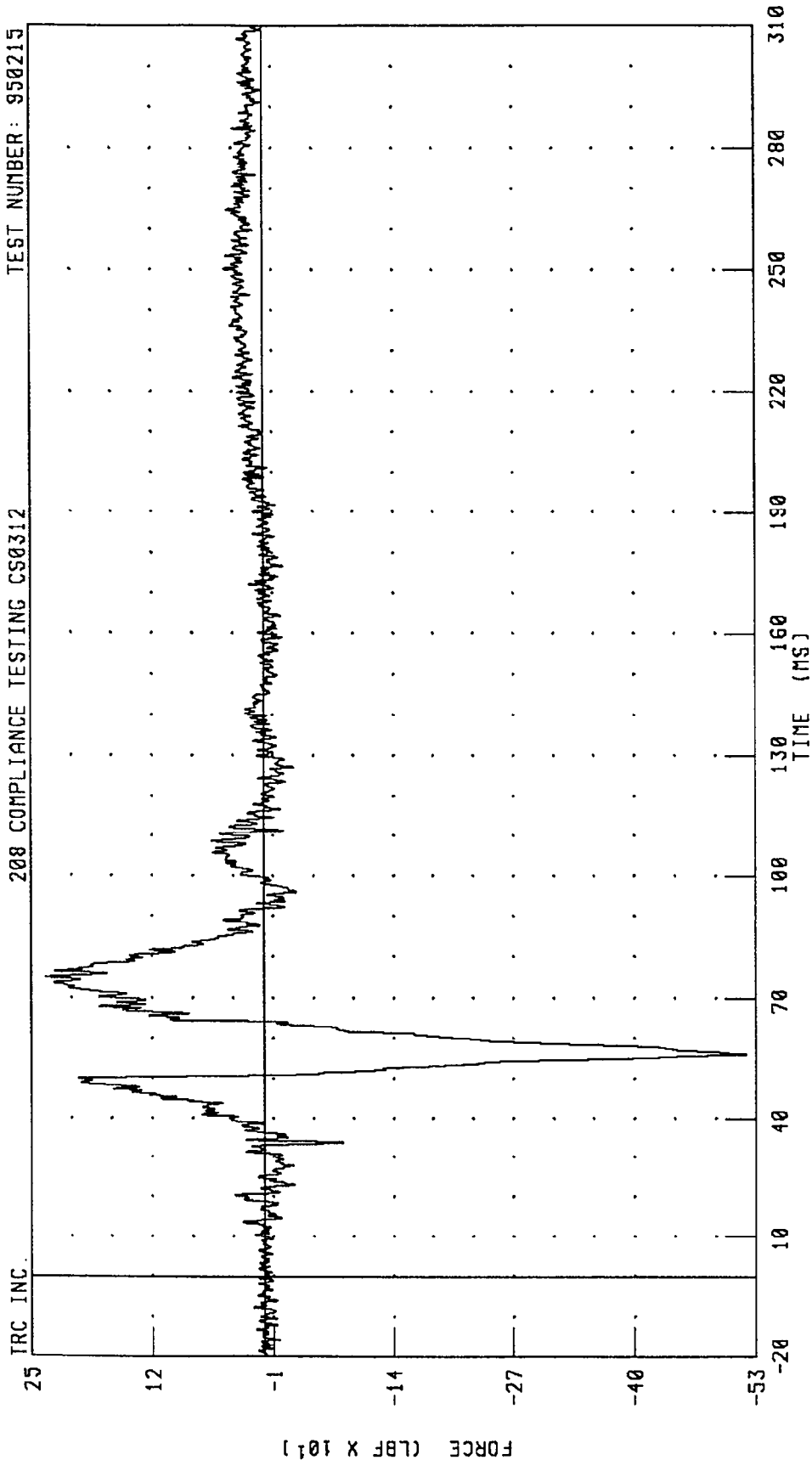


CHANNEL: CSTXD2 FILTER: CH. CLASS 180

950215

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT FEMUR FORCE

208 COMPLIANCE TESTING CS0312 TEST NUMBER: 950215

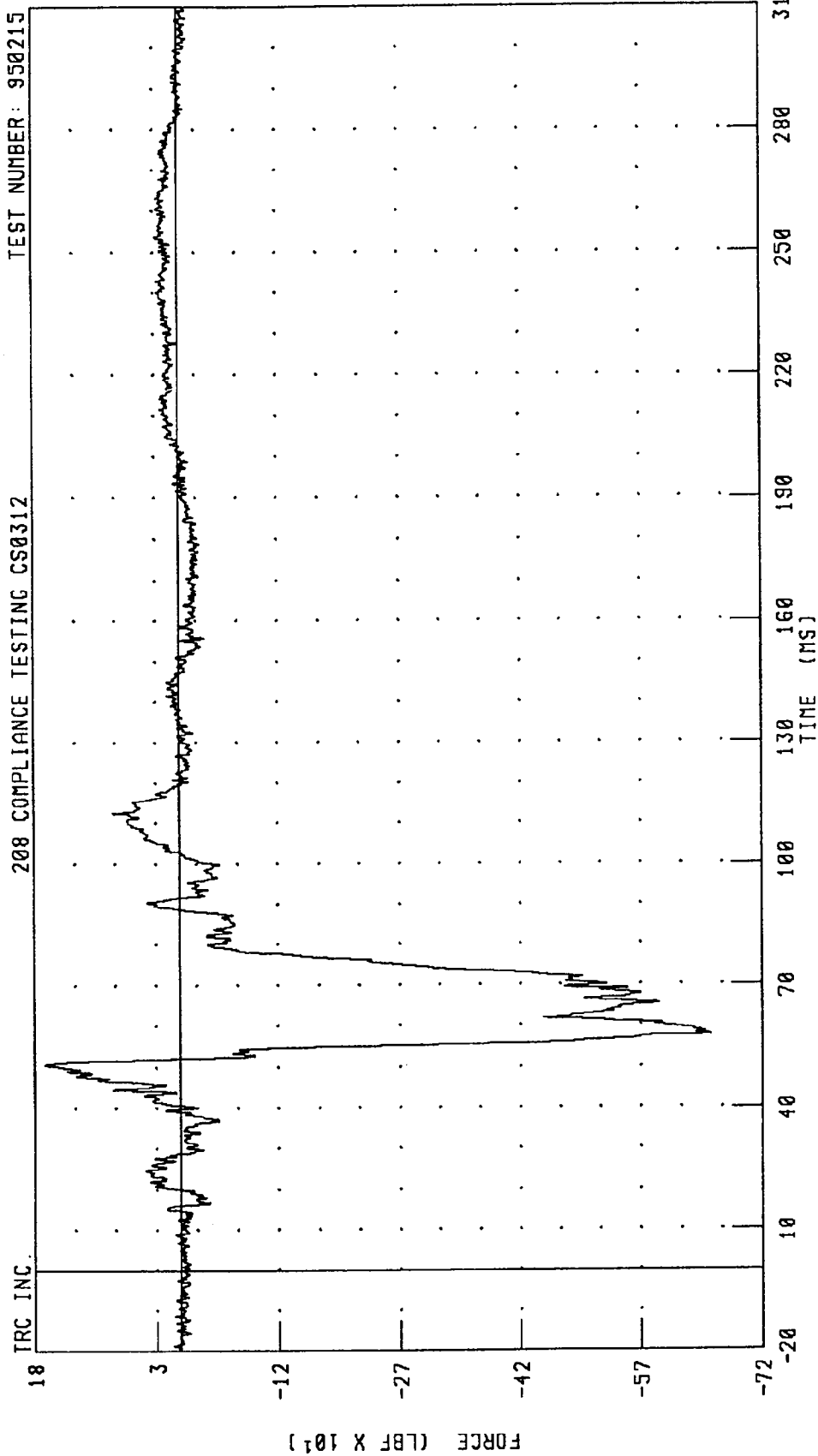


CHANNEL: LFMF2 FILTER: CH. CLASS 600

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312

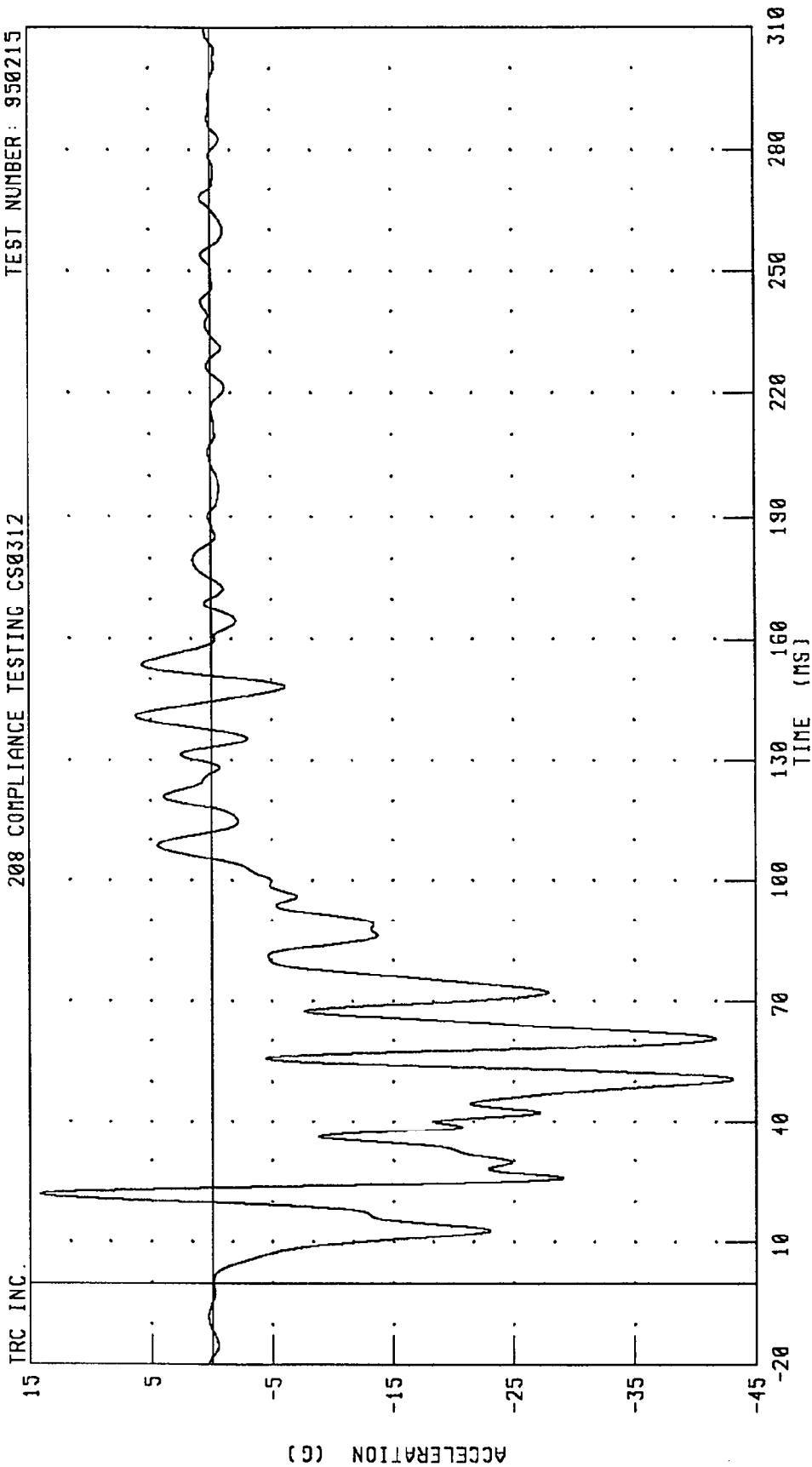


PEAK DATA: 166.62 LBF @ 50.72 MS; -656.27 LBF @ 57.84 MS

CHANNEL: RFMF2 FILTER: CH. CLASS 600

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 LEFT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

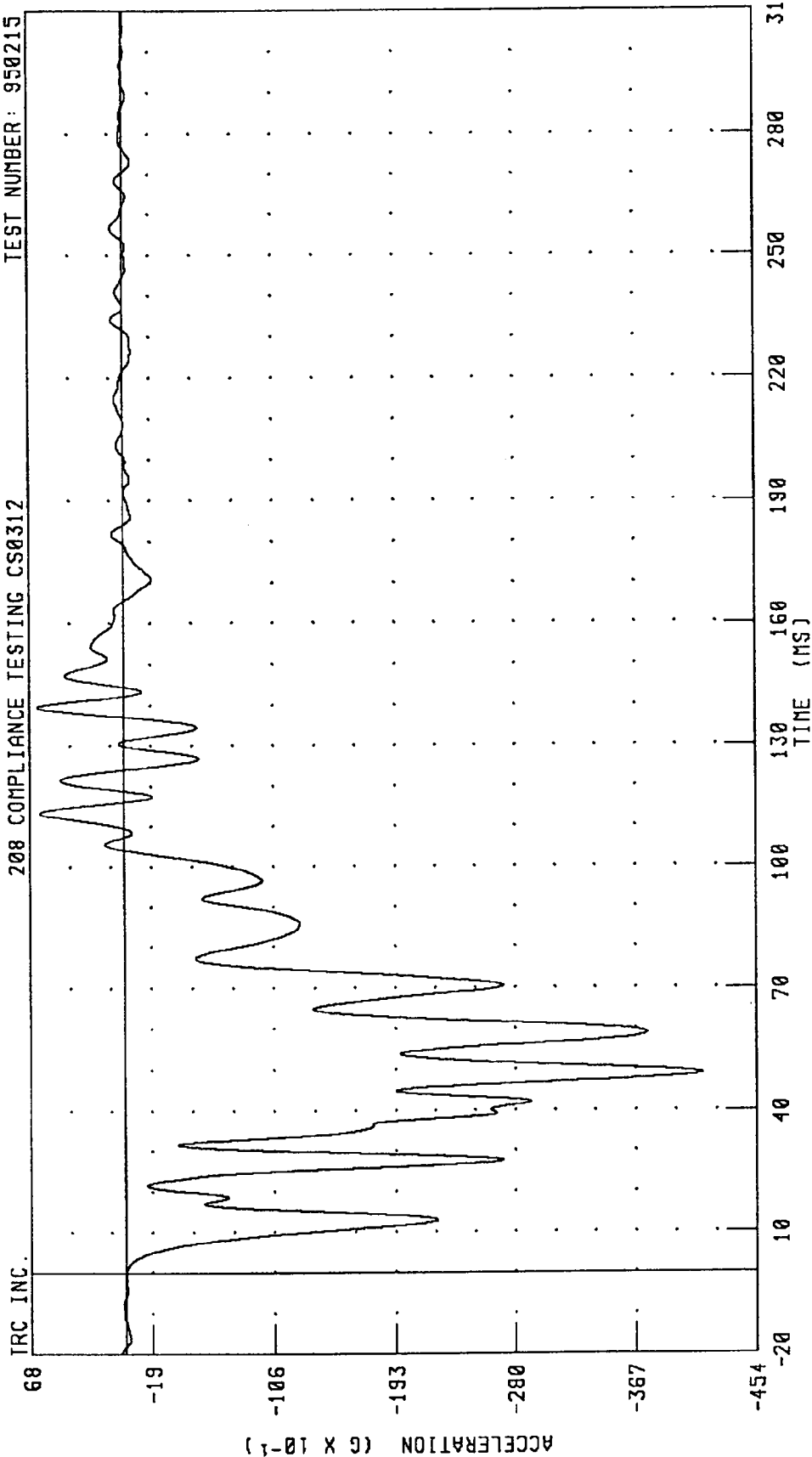


PEAK DATA: 14.13 G @ 21.84 MS; -43.14 G @ 50.64 MS

CHANNEL: TLRXG1 FILTER: CH. CLASS 60

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215



CHANNEL: TRRXG1 FILTER: CH. CLASS 60

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.

20

2

-16

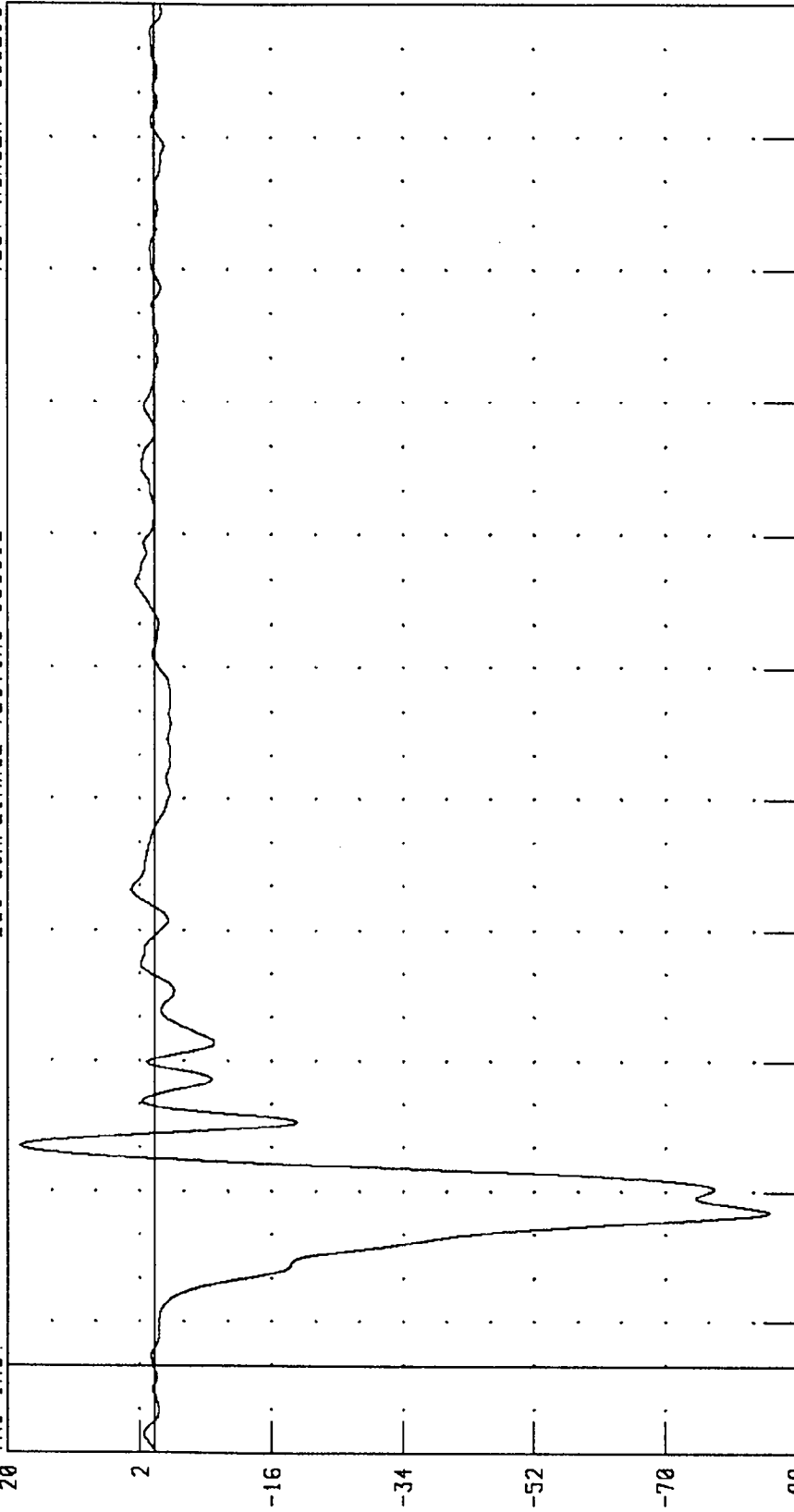
-34

-52

-70

-88

ACCELERATION (G)

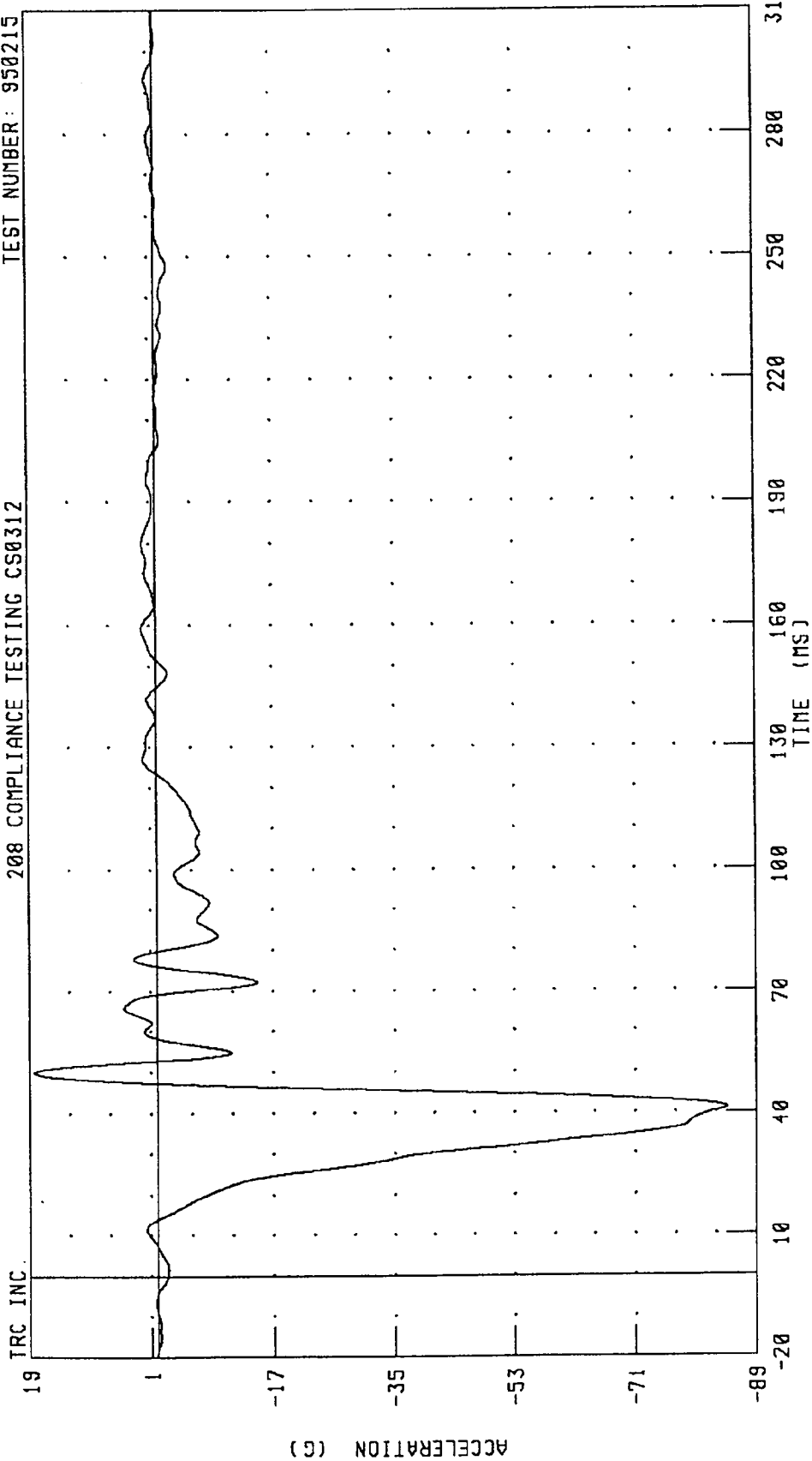


CHANNEL: ENGXG1 FILTER: CH. CLASS 60

PEAK DATA: 18.24 G @ 50.24 MS; -84.22 G @ 35.12 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

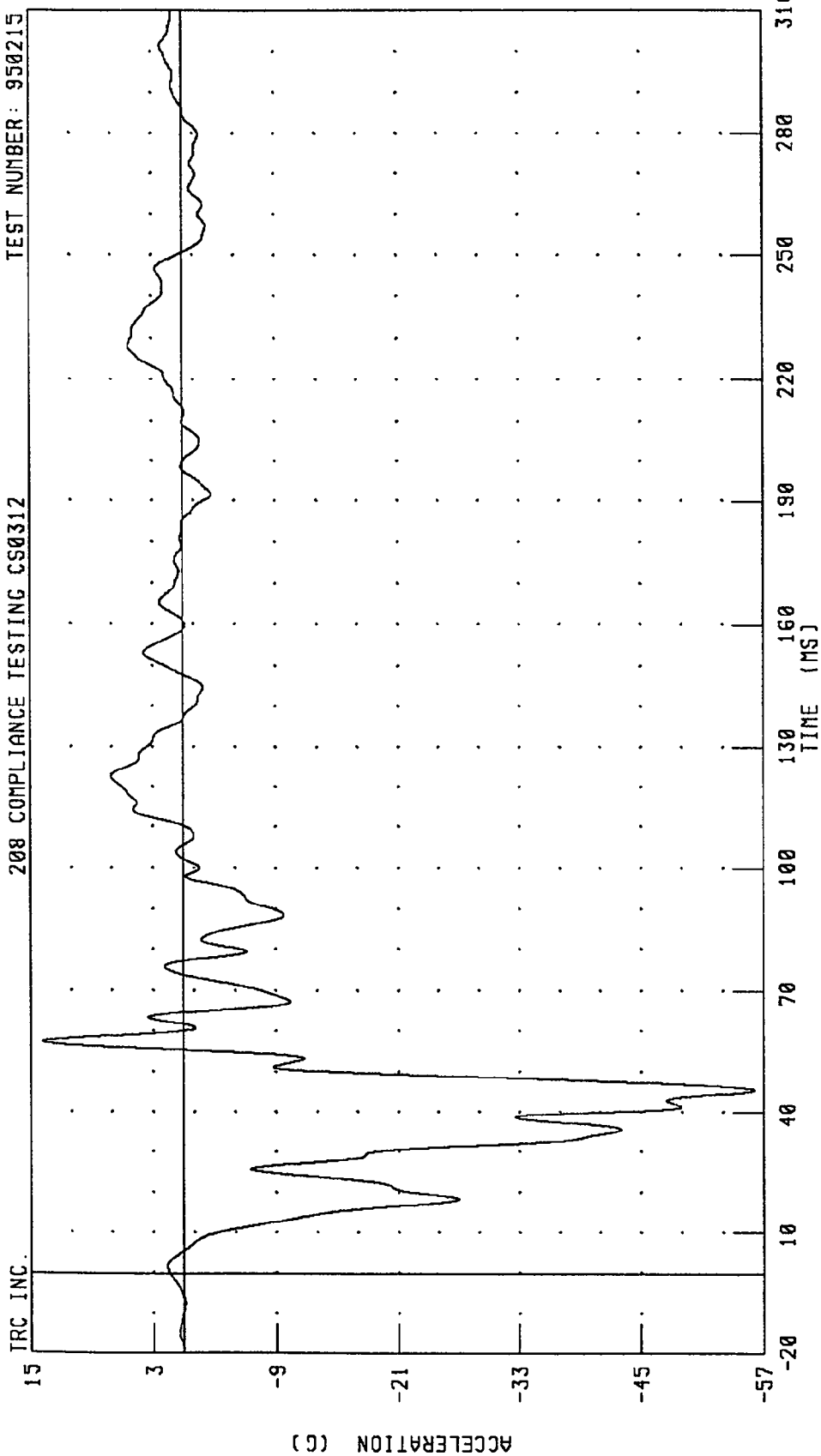


CHANNEL: ENGXC2 FILTER: CH. CLASS 60

PEAK DATA: 18.16 G @ 50.00 MS; -84.66 G @ 41.20 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0312

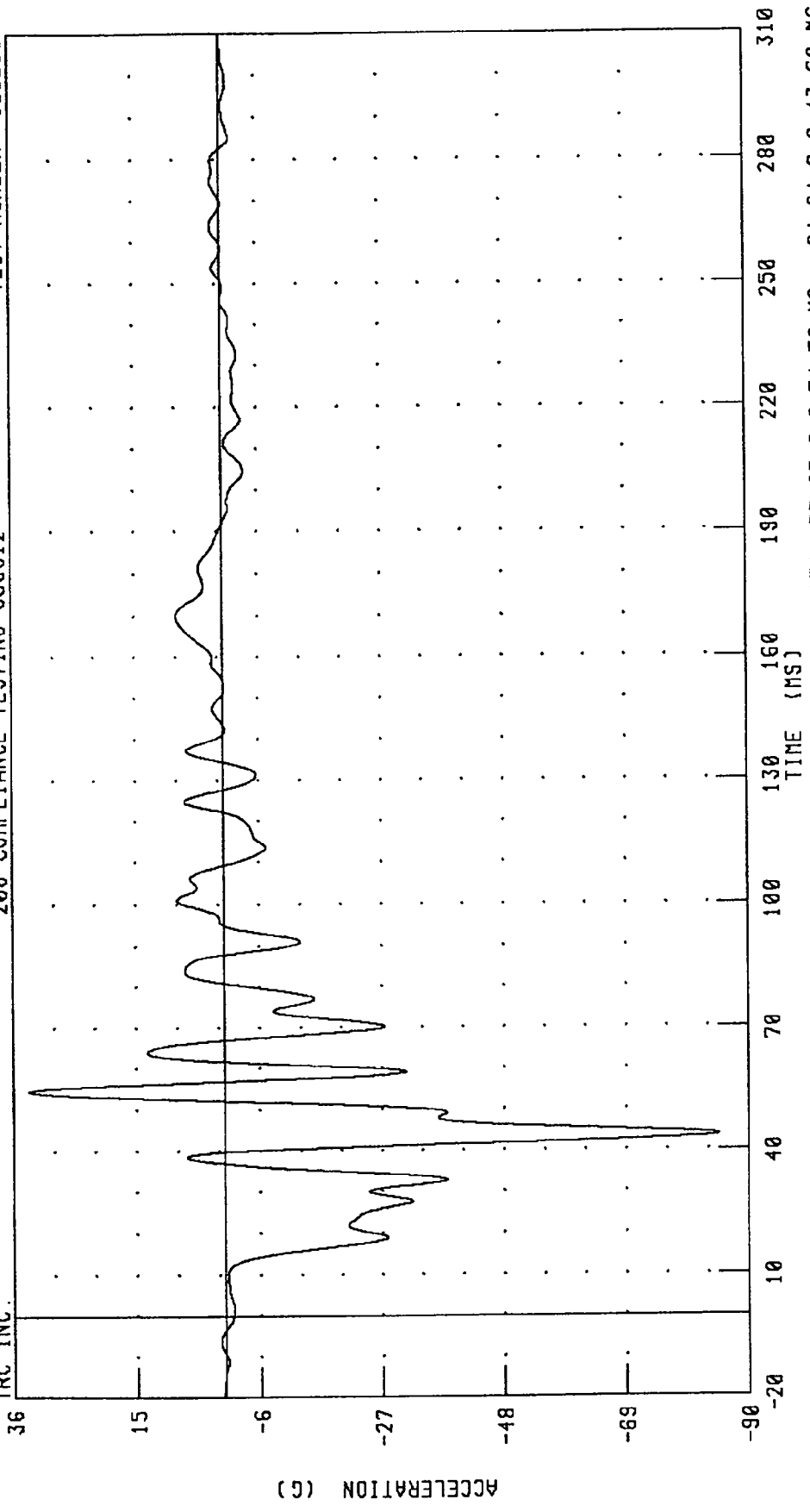
TEST NUMBER: 950215



CHANNEL: BCRXG1 FILTER: CH. CLASS 60

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC INC. TEST NUMBER: 950215
208 COMPLIANCE TESTING CS0312

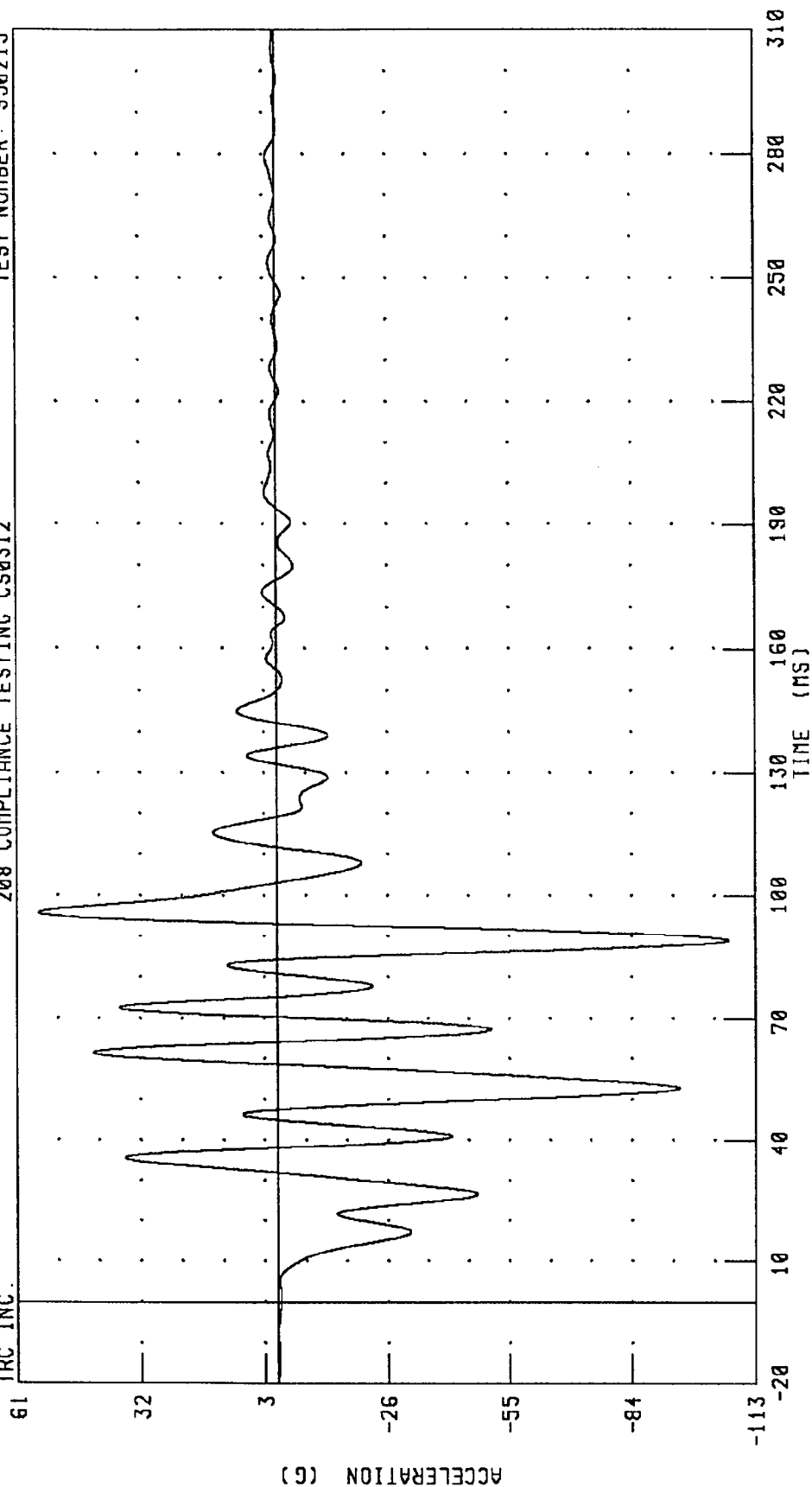


CHANNEL: BCLXG1 FILTER: CH. CLASS 60
PEAK DATA: 33.27 G @ 54.56 MS; -84.94 G @ 43.60 MS

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
 DASH PANEL CENTER X-AXIS ACCELERATION
 200 COMPLIANCE TESTING CS0312

TEST NUMBER: 950215

TRC INC.



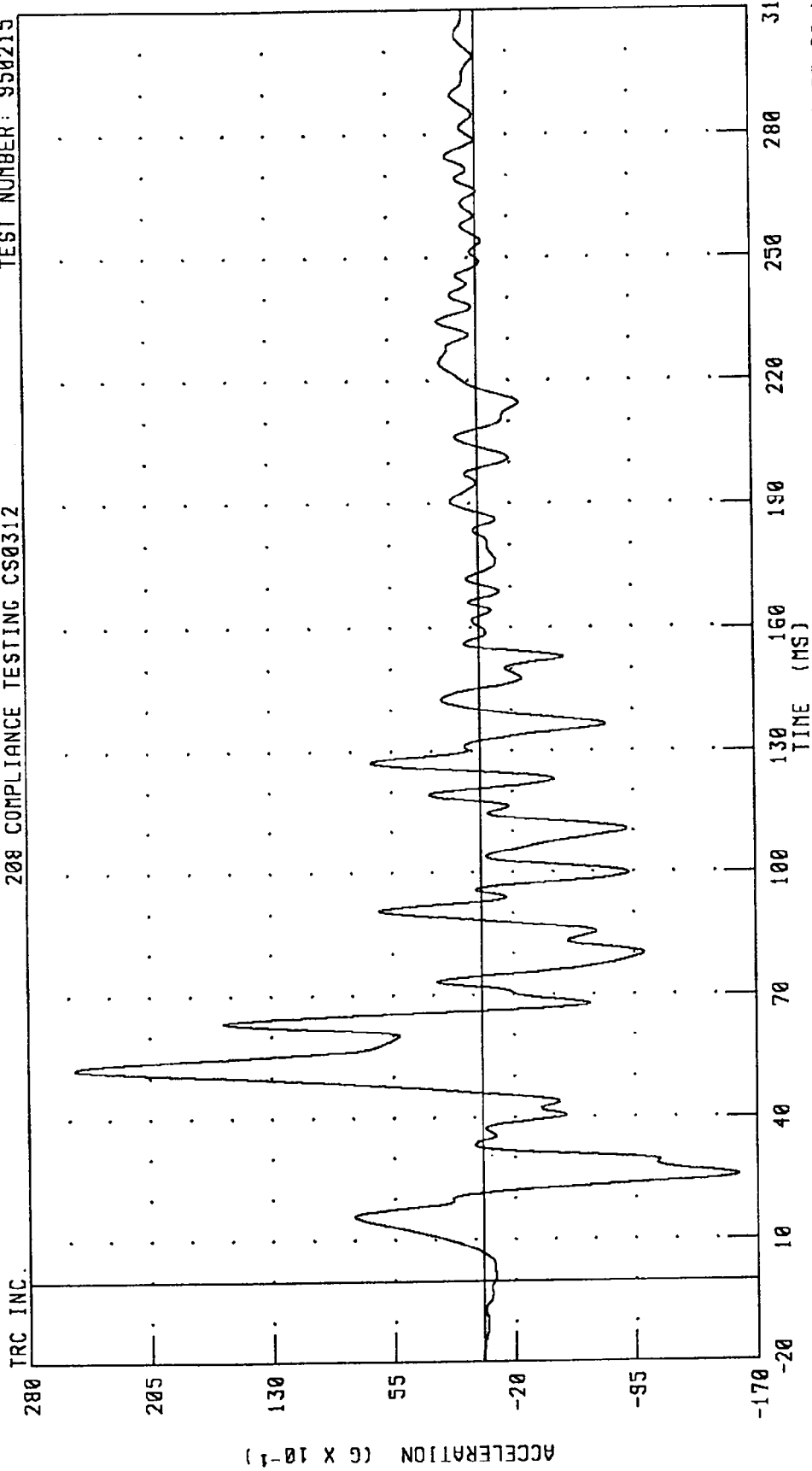
PEAK DATA: 55.89 G @ 95.76 MS; -106.73 G @ 88.96 MS

CHANNEL: DPCXG1 FILTER: CH. CLASS 60

1995 JEEP GRAND CHEROKEE INTO FLAT FRONTAL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

TEST NUMBER: 950215

208 COMPLIANCE TESTING CS0312



PEAK DATA: 25.15 G @ 52.16 MS; -15.83 G @ 25.60 MS

CHANNEL: TFCZG1 FILTER: CH. CLASS 60

Appendix C

Manufacturer's Vehicle Information

Appendix C

Manufacturer's Vehicle Information



Dale E Dawkins
Director - Vehicle Compliance and
Safety Affairs

September 28, 1994

Mr. Robert F. Hellmuth, Director
Office of Vehicle Safety Compliance
National Highway Traffic Safety Administration
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

Dear Mr. Hellmuth:

Reference: NEF-31CCa IR 1516; FMVSS 208 -- 1995 JEEP GRAND CHEROKEE

The following is provided in response to your referenced information request.

- Q1.** Please inform the OVSC whether the air bag restraint system at the driver's seating position is certified to meet the requirements of S4.1.2.1. If it is, please inform OVSC whether the air bag restraint provided at the driver's seating position is certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1(c)(2) for FMVSS No. 208.

If the air bag restraint was installed to meet the requirements of S4.1.2.1(c)(1), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., moving barrier lateral impact and dynamic rollover) and a copy of the certification test reports for the frontal/angular barrier impact test required by S4.1.2.1.

If the manual 3-point safety belt is provided with the driver's air bag restraint in order to meet the requirements of S4.1.2.1(c)(2), please provide certification test reports for each of the test configurations required by that section of the standard (i.e., frontal/angular barrier impact test of the automatic restraint system with the manual safety belt unfastened and frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened).

- A1.** The air bag automatic restraint system provided at the driver seating position was installed to meet the requirements of S4.1.2.1(c)(2). See Attachment 1 for copies of applicable compliance reports.

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Q2. If the air bag restraint at the driver's seating position was not installed to meet the requirements of S4.1.2.1, please inform OVSC whether the manual 3-point safety belts provided in the front outboard seating positions were installed to meet the requirements of S4.1.2.3 as referenced by S4.2.2.

If the manual safety belts provided at the front outboard seating positions were installed in accordance with S4.1.2.3, please provide a copy of your certification test reports for the requirements specified (frontal crash test requirements of S5.1) in S4.6 of the standard.

A2. As indicated in our response to Question #1, the automatic restraint system provided at the driver seating position was installed to meet the requirements of S4.1.2.1.(c)(2).

Q3. If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.1.

A3. A pressure vessel is not used to inflate the air bag on the subject vehicle.

Q4. If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.2.

A4. An explosive device is used to inflate the driver air bag. Information demonstrating that this device meets all requirements of S9.2 is provided in Attachment 2.

Q5. State for any safety belt system in this vehicle whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7.4.2. if the tension-relieving device is used.

A5. No tension-relieving device is available.

Q6. FMVSS No. 208, S8.1.5, provides the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were opened or closed for certification tests.

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A6. Our certification tests were conducted with movable windows in the open position.

Q7. FMVSS No. 208, §5.1, provides a manufacturer with the option of using either a Part 572(B) or Part 572(E) test dummy. Please inform OVSC which test dummy was used in each seat for each certification test. Submit dummy placement measurements, including diagrams or photographs which show exactly where measurements were taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use the dimension shown in the diagram to provide the individual dummy placement measurements.

State whether the vehicle has a foot rest for the driver.

If the vehicle can be equipped with a split front bench seat, state whether the driver dummy was located so that the midsagittal plane was centered on the steering wheel rim or the center of the seat cushion. Also, state whether the passenger dummy was located so that the midsagittal plane was centered the same distance from the longitudinal centerline of the vehicle as the driver dummy or in the center of the seat cushion.

A7. The Part 572(E) (Hybrid - III) test dummy was used in both front outboard designated seating positions for all compliance tests. Attachment 3 contains typical dummy placement measurements and a diagram.

The vehicle is not equipped with a foot rest for the driver. The vehicle can be equipped with a split front bench seat. For this configuration the driver dummy was located so that the midsagittal plane centered to the steering wheel rim. The passenger dummy was located so that the midsagittal plane was centered the same distance from the longitudinal centerline of the vehicle as the driver dummy.

Q8. Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating configuration, steering column or fuel tank are available on this vehicle, provide separate information for each.

A8. See Attachment 4.

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Q9. If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant.

A9. There are no adjustable seat belt anchorages available on the subject vehicle.

Q10. Provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression for the Part 572(E) dummy and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.2.1 or S4.1.2.3.

In addition, include each dummy's head and chest acceleration versus time plots and femur load versus time plots for the full frontal barrier impact tests. Mark these plots to indicate when the following and any other significant events occur:

- 10.1 Driver and passenger knee contact with the knee bolster
- 10.2 Collapse of the driver and passenger knee bolsters
- 10.3 Beginning and end of seat belt stretch
- 10.4 Steering column stroke (when it starts and when it ends)
- 10.5 Driver: Contact of the head with the air bag, steering wheel, hub, windshield, header and any other contact points
Passenger: Contact of the head with the instrument panel, windshield, header and any other contact points
- 10.6 Contact of the driver's torso with the air bag, steering wheel, and hub
- 10.7 Time during event when the air bag starts to deploy and when it is fully deployed
- 10.8 Mark on the plots any unexpected events, like steering wheel fracture, windshield contact, windshield header contact, that affected the normal loading characteristics.

A10. See Attachment 5 for requested information concerning frontal barrier impact (Data Traces for Test VC4421). No information is available for questions 10.2, 10.3 and 10.4. Regarding 10.8, there were no unexpected events. The requested data and results for all compliance tests are included in Attachment 1.

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Q11. When vehicle components must be removed to obtain the proper test weight, what components do you recommend for removal and in what priority order do you recommend removal?

A11. If vehicle components must be removed to obtain the proper test weight, the following order of priority should be utilized:

Lift gate, rear seats, rear bumper.

Q12. Please provide FMVSS No. 204, "Steering Control Rearward Displacement" certification data. Include a copy of the test report and any engineering analysis forming the basis of certification. The report should document the vehicle test weight, impact velocity and the horizontal and vertical displacements of the steering control. Pre and post test photographs are also requested.

Discuss the test procedure detailing the vehicle preparation and the measurement technique used to determine the steering control rearward displacement.

Provide a diagram of the steering control system and describe how the components of steering control system work to provide energy management in a frontal impact.

A12. The following attachments provide the requested information:

Attachment #6 - Steering Control Rearward Displacement Compliance

Attachment #7 - Test Photographs

Attachment #8 - Compliance Procedures (CP-370B)

Attachment #9 contains illustrations which identify components of the steering control system. The following typical events occur:

- The steering column intermediate shaft collapses due to front end crush and corresponding intrusion of the powertrain during impact.
- The driver's face and chest will make contact with the deployed airbag, venting gas through the back panel of the airbag.

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- The driver's knees will contact the knee bolster on either side of steering column, distorting the kneeblocker which consists of energy absorbing foam and metal substrate.
- The steering column jacket and upper support bracket may bend, and the lower portion of the steering wheel rim may become slightly deformed as a result of occupant loading. The steering column utilizes two plastic capsules which allow axial release of the upper support bracket from its mounting bracket.
- Typical steering column rearward displacement is expected to be less than 2 inches.

Q13. Inform OVSC if these vehicles have built-in child restraints either as standard equipment or optional equipment. If they do, provide a copy of the certification test reports and any engineering analysis forming the basis for certification to FMVSS No. 213, "Child Restraint Systems."

A13. The integrated child safety seat will be offered as an option on these vehicles later in the 1995 model year. If requested by NHTSA, we will supplement our response with FMVSS No. 213 certification information and all relevant engineering materials regarding the integrated child safety seat when it becomes available in production.

If you have any questions concerning the information provided, please contact Leo A. Moses of my staff at (313) 370-8556.

Sincerely,



D. E. Dawkins

Attachments(a/s)
lam/ded

FMVSS 208

1995 JEEP GRAND CHEROKEE

NEF-31CCa; IR 1516

ATTACHMENT #4

RESPONSE TO QUESTION #8

SELECTED VEHICLE DATA

FORM NO. 1

TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1995 Jeep Grand CherokeeVehicle Model & Body Style: 4 Door

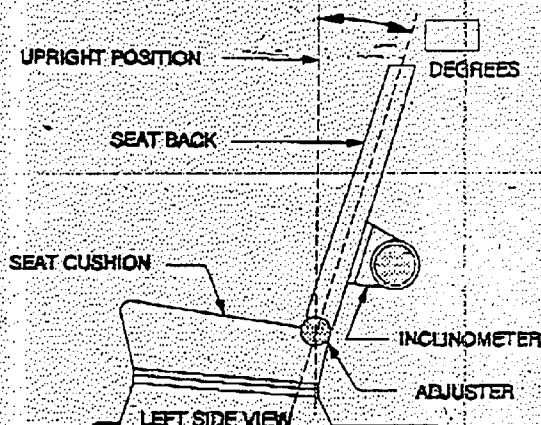
1. NOMINAL DESIGN RIDING POSITION

For adjustable driver and passenger seat backs.
Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch/detent if applicable.

Seat back angle for driver's seat = N/A degrees.

Measurement Instructions:

1) Adjust seat back to full forward position. 2) Using inclinometer, move seat back rearward 8.2 degrees or adjust seat back rearward 11 notches from full forward position.

Seat back angle for passenger's seat = degrees.

Measurement Instructions:

Same as above

2. SEAT FORE & AFT POSITIONS -

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat:

Manual adjust seats: 1) Move seat full rearward. 2) Move seat forward 40 mm (or 4 clicks). Power seats use same method with seat in the full down elevation position.

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

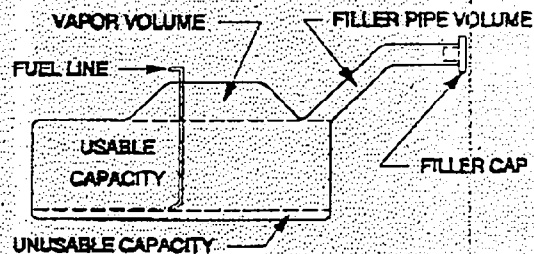
See above

3. FUEL TANK CAPACITY DATA -

3.1 A. "Usable Capacity" of standard equipment fuel tank = 23 gallons.

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

C. Capacity used when certification testing to requirements of FMVSS 301 = 22 gallons.



VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

3.2 Amount of Stoddard solvent added to vehicle for certification test = 22 gallons.

3.3 Is vehicle equipped with electric fuel pump? ☒ YES ☐ NO

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

FORM NO. 1 Continued

FUEL PUMP WILL RUN IN EITHER THE "IGNITION START" OR "IGNITION RUN" KEY POSITIONS.
NOTE: PUMP STOPS IF ENGINE DOES NOT RUN FOR ONE SECOND.

TEST VEHICLE INFORMATION

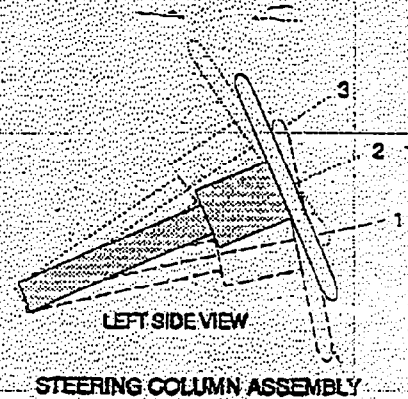
4. STEERING COLUMN ADJUSTMENTS --

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

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

Operational Instructions:

Tilt adjustable steering columns are provided as standard equipment on all models of the 1995 Grand Cherokee. For testing, move wheel to the top position (4), move the wheel down 2 positions from the top, referred to as position 2 or nominal.



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FMVSS 208

1995 JEEP GRAND CHEROKEE

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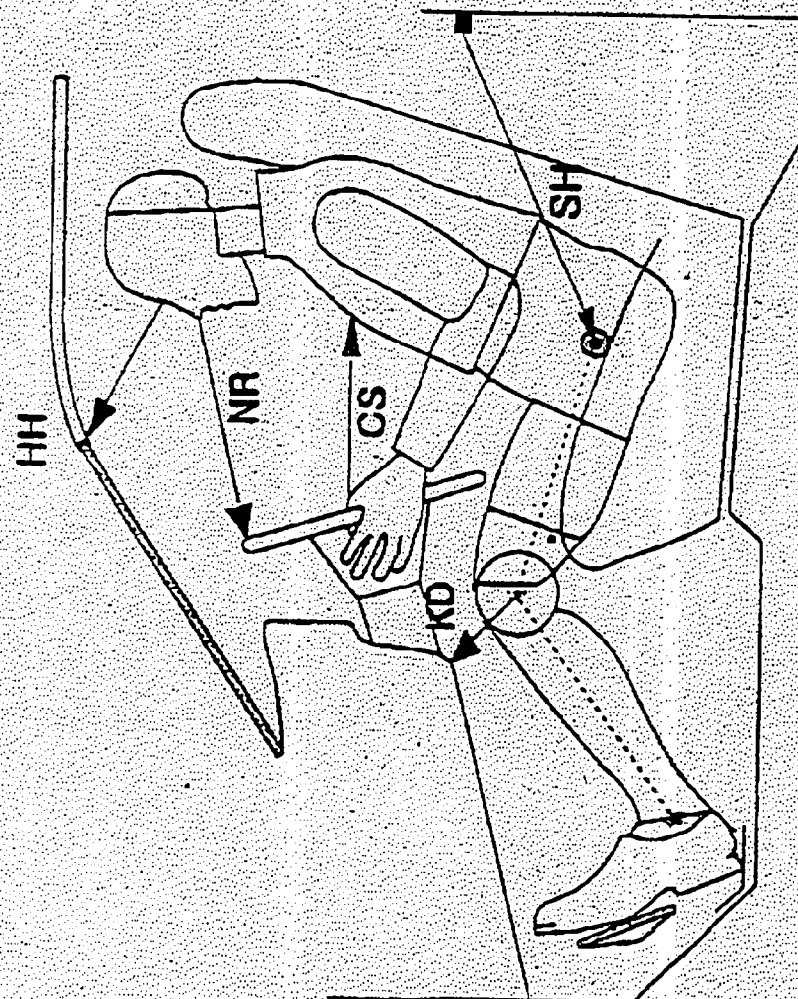
ATTACHMENT #3

RESPONSE TO QUESTION #7

SUMMARY OF DUMMY

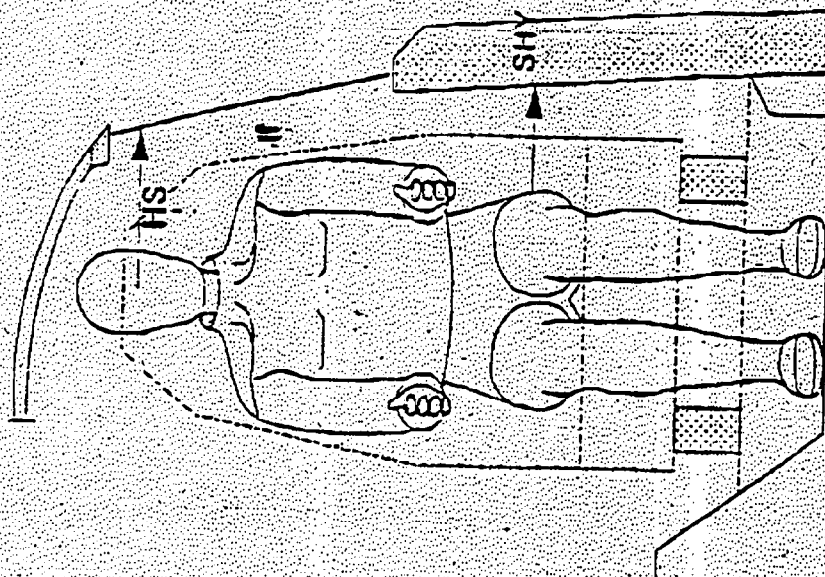
PLACEMENT MEASUREMENTS

DUMMY MEASUREMENTS FOR FRONT SEAT PASSENGERS



HH = Head to Header = 10.7"
 NR = Nose to Rim = 14.0"
 CS = Steering Wheel to Chest = 9.3"
 KDL/KDR = Knee to Dash = * 3.2"
 SH = Striker H-Point = N/A

(*Note this value differs from the OVSC dimension, OVSC measures from the kneeblocker to knee pivot point, Chrysler measures from kneeblocker to knee exterior)



Shy = Striker to H-Point (Y-dir.) = N/A
 HS = Head to Side Window = 9.8"

Per FMVSS section S10.1, Dummy located by placing the test dummy's torso against the seat back and its upper legs against the seat cushion to the extent permitted by placement of the test dummy's feet in accordance with the appropriate paragraph of S10. Center the test dummy on the seat cushion of the bucket seat and set its midsagittal plane so that it is vertical and parallel to the centerline of the seat cushion.

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01/12/95 13:58 202 366 3081

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*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.	9583
CONNECTION TEL	87166316843
CONNECTION ID	
START TIME	01/12 13:45
USAGE TIME	13'03
PAGES	12
RESULT	OK