V2155

Report Numbers: 208-TRC-95-002
212-TRC-95-002
301-TRC-95-002

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

Ford Motor Corporation

1995 Ford Windstar

NHTSA Number: CS0202

TRC Test Number: 941109

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

November 28, 1994

Final Report

Prepared For:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance (NEF-30)
400 Seventh Street, S.W., Room No. 6115
Washington, DC 20590

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Report Prepared By:

Jeffery W. Sankey Date 12/20/94

Jeffery W. Sankey, Engineering Supervisor
Transportation Research Center Inc.

Report Approved By:

John C Stultz Date 12/20/94

John C. Stultz, Chief Engineer, Impact Laboratory
Transportation Research Center Inc.

Final Report Accepted By:

Charles R. Case Date 9/17/95

Contracting Officer's Technical Representative (COTR),
NHTSA, Office of Vehicle Safety Compliance

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15. Supplemental Notes

16. Abstract

A 30 mph flat frontal barrier impact test was conducted on a 1995 Ford Windstar van, NHTSA No. CS0202, at Transportation Research Center Inc. on November 9, 1994. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS 208, "Occupant Crash Protection"; 212, "Windshield Mounting"; 219 (partial), "Windshield Zone Intrusion"; and 301 "Fuel System Integrity." The barrier impact velocity was 29.6 mph. The vehicle's maximum static crush was 13.4 inches. The ambient temperature was 70° F.

The driver's head injury criteria (HIC) was 249. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 38.7 *g*. The driver's chest maximum deflection was 1.1 inches. The driver's left and right femur maximum axial forces were 1308 pounds and 1157 pounds, respectively.

The passenger's HIC was 109. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 27.9 *g*. The passenger's chest maximum deflection was 0.4 inch. The passenger's left and right femur maximum axial forces were 742 pounds and 1196 pounds, respectively.

The vehicle appears to comply with the applicable requirements of FMVSS 208, 212, 219 (partial), and 301.

17. Key Words	18. Distribution Statement
Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"	Available from: NHTSA Technical Reference Division Room 5108, (NAD-52) 400 Seventh Street, S.W. Washington, DC 20590 Attn: Mr. Robert Hornickle

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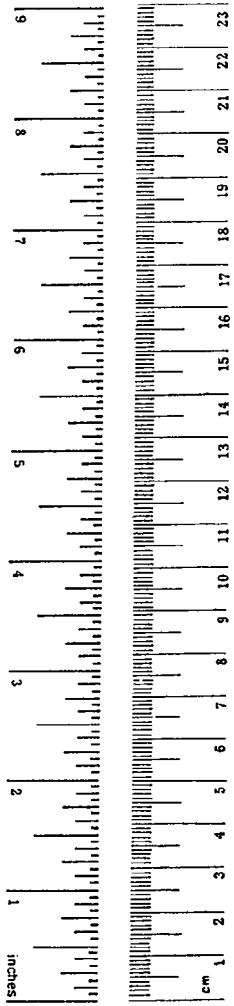
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

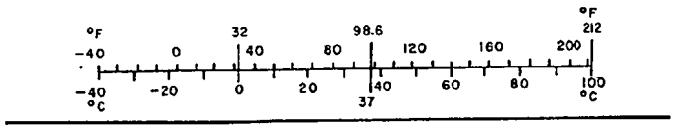
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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



Approximate Conversions from Metric Measures

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



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Section 1.0

Purpose and Test Procedure

Purpose

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standards (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-93-D-01089. The purpose of this test was to determine if the subject vehicle, a 1995 Ford Windstar van, NHTSA No. CS0202, 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 November 9, 1994.

The test vehicle, a 1995 Ford Windstar van, NHTSA No. CS0202, 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 airbags at the driver's and right front passenger's seating positions. The vehicle's test weight was 4329 pounds. The vehicle's impact speed was 29.6 mph. The vehicle's maximum static crush was 13.4 inches.

The driver's HIC was 249. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 38.7 g. The driver's chest maximum deflection was 1.1 inches. The driver's left and right femur maximum compressive forces were 1308 pounds and 1157 pounds, respectively.

The right front passenger's HIC was 109. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 27.9 g. The right front passenger's chest maximum deflection was 0.4 inches. The right front passenger's left and right femur maximum compressive forces were 742 pounds and 1196 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.

Data Acquisition Explanations

The instrument panel center X-axis accelerometer, DPCXG1, lost data after 25 milliseconds as a result of the passenger's airbag pulling the accelerometer cable out of the accelerometer.

Table 1 Crash Test Summary

NHTSA number:	CS0202
Test type:	Frontal barrier impact
Test date:	11/09/94
Test time:	1604
Ambient temperature at impact area:	70° F
Vehicle year/make/ model/body style:	1995/Ford/Windstar/van
Vehicle test weight:	4329 lb
Impact angle[1]:	0°
Impact velocity[2]:	
Primary:	29.6 mph
Secondary:	NA mph
Maximum static crush:	13.4 in
Average rebound:	34.6 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 (± .05 mph accuracy)

Table 1 Crash Test Summary, Cont'd.

Dummies:	Driver #230	Passenger #229
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag	Airbag
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	Airbag
Chest:	Airbag	Airbag
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1995/Ford/Windstar/van
Color:	Green
VIN:	2FMDA5142SBB01986
NHTSA number:	CS0202
Engine data:	
Placement:	Lateral/transverse
Cylinders:	6
Displacement:	3.8 liters
Transmission data:	_4_ speed, __ manual, _X_ automatic, _X_ overdrive
Final drive:	_X_ fwd, __ rwd, __ 4wd
Date vehicle received:	10/20/94
Odometer reading:	21
Dealer's name and address:	West-Herr Ford Inc. S. 5025 Camp Rd. Hamburg, NY 14075

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Power door locks	No	Other	Equip. pkg. 470A

Certification data from vehicle's label:

Vehicle manufactured by:		Ford Motor Corporation of Canada
Date of manufacture:		8/94
VIN:		2FMDA5142SBB01986
GVWR:		5065 lb
GAWR:	Front:	2646 lb
	Rear:	2465 lb

Table 2 Vehicle Information, Cont'd.

Size of tires on vehicle:	P205/70R15
Tire pressure with maximum capacity vehicle load:	
Front:	35 psi
Rear:	35 psi
Spare tire:	Standard
Type of front seats:	Space Saver

Tire & capacity data from vehicle's label:

Recommended tire size:	P205/70R15
Recommended cold tire pressure:	
Front:	35 psi
Rear:	35 psi

Test vehicle attitudes:

Delivered attitude:	LF:	29.4 in.	RF:	29.4 in	LR:	29.5 in	RR: 29.4 in
Fully loaded attitude:	LF:	28.1 in	RF:	28.3 in	LR:	27.8 in	RR: 27.3 in
Pre-test attitude:	LF:	28.6 in	RF:	28.6 in	LR:	27.8 in	RR: 27.8 in

Table 2 Test Vehicle Information, Cont'd.

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

Right front	1170	lb	Right rear	724	lb
Left front	1164	lb	Left rear	715	lb
Total front weight	2334	lb	(61.9% of total vehicle weight)		
Total rear weight	1439	lb	(38.1% of total vehicle weight)		
Total delivered weight	3773	lb			

Calculation of test vehicle's target test weight:

RCLW[1] = Rated Cargo and Luggage Weight

GVWR = Gross Vehicle Weight Rating (5065 lb)

UDW = Unloaded Delivered Weight (3773 lb)

VCW[1] = Vehicle Capacity Weight = 5065 - 3773 = 1292

DSC[2] = Designated Seating Capacity (7)

RCLW[1] = GVWR - UDW - 150 (DSC) = 5065 - 3773 - 150 (7) = 242

Target test weight = UDW + RCLW[1] + (Number of Hybrid III dummies x 167 lb per dummy)

Target test weight = 3773 + 242 + 334 = 4349 lb

Weight of test vehicle with required dummies and 222 lb of cargo weight:

Right front	1220	lb	Right rear	934	lb
Left front	1250	lb	Left rear	925	lb
Total front weight	2470	lb	(57.1% of total vehicle weight)		
Total rear weight	1859	lb	(42.9% of total vehicle weight)		
Total test weight	4329	lb	(0.5% under target test weight)		

Weight of ballast secured in vehicle cargo area: 110 lb

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 52.0 in

Vehicle Wheelbase: 121.0 in

[1] 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.

[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:	941109
NHTSA number:	CS0202
Test date:	11/09/94
Test time:	1604
Test type:	Frontal barrier impact
Impact angle:	0°
Ambient temperature at impact area:	70° F
Temperature in occupant compartment:	71° F

Impact velocity:

Primary:	29.6 mph
Secondary	NA 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:

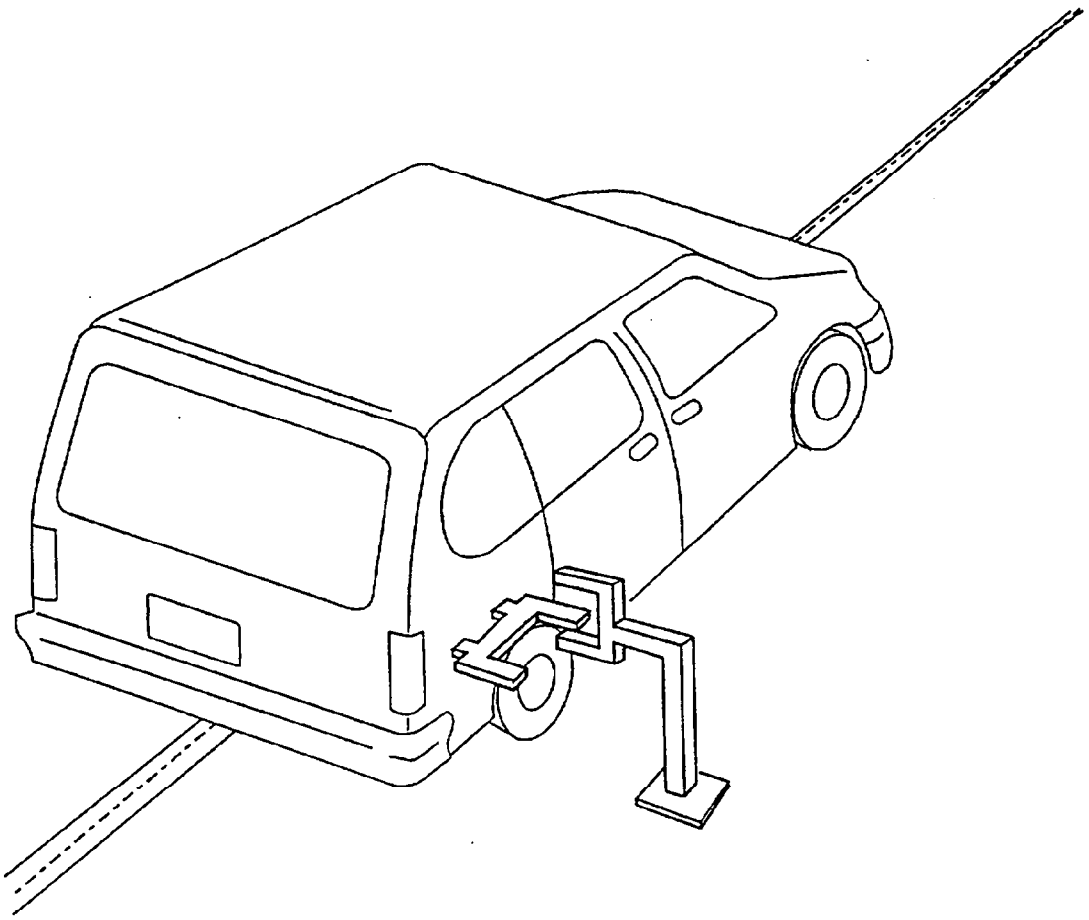
Pre-test:	L:	196.0 in	C:	200.2 in	R:	196.3 in
Post-test:	L:	183.1 in	C:	186.8 in	R:	184.0 in
Total crush:	L:	12.9 in	C	13.4 in	R:	12.3 in
Average crush:	12.9 in					

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	35.5 in	C:	32.7 in	R:	35.6 in
Average rebound:	34.6 in					

Figure 1 Impact Velocity Measurement System

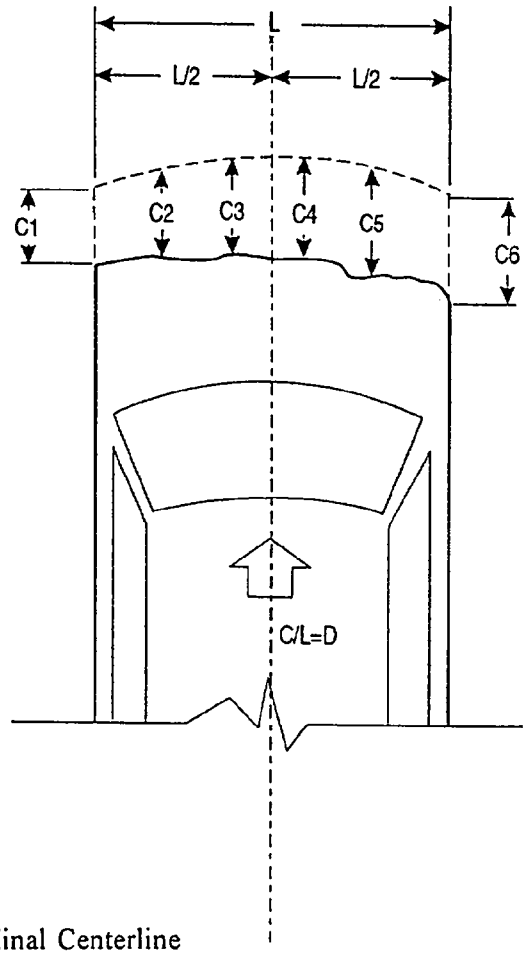


The final vane clears emitter/receiver two inches before impact.

The vanes have a one-foot spacing.

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

NHTSA number:	CS0202
Test date:	11/09/94
Vehicle year/make/ model/body style:	1995/Ford/Windstar/van
Vehicle size category:	Special purpose
VIN:	2FMDA5142SBB01986
Build date:	8/94
Test weight:	4329 lb
Vehicle wheelbase:	121.0 in
Maximum width:	75.1 in
Front overhang:	40.5 in



Collision Deformation

Classification (CDC) Code: 12FDEW2

Crush depth measurements:	C1:	12.9 in
	C2:	12.8 in
	C3:	13.3 in
	C4:	13.2 in
	C5:	12.4 in
	C6:	12.3 in
Midpoint of damage:	D:	Vehicle Longitudinal Centerline
Length of damaged region:	L:	60.0 in

Table 4 Post-test Airbag Data

NHTSA number:	CS0202
Test date:	11/09/94
Technician:	Sankey
Vehicle year/make/ model/body style:	1995/Ford/Windstar/van

A. Number of airbag vent holes:

Driver:	2
Passenger:	1

B. Size of airbag vent holes:

Driver:	0.5 in dia.
Passenger:	1.5 in dia.

C. Total airbag vent area:

Driver:	0.4 in^2
Passenger:	1.8 in^2

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

Driver:	Length	NA
	Width	NA
	Diameter	20.0 in
Passenger:	Length:	29.0 in
	Width:	27.0 in
	Diameter:	NA

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

E. Is the airbag tethered?

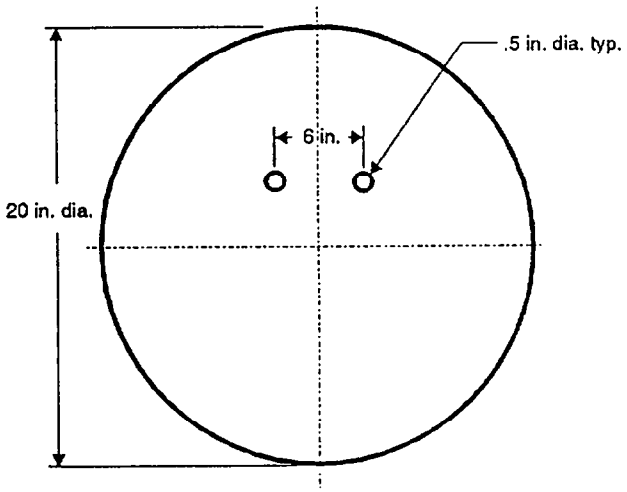
Driver: Yes

If yes, record length of tether: 9.0 inches

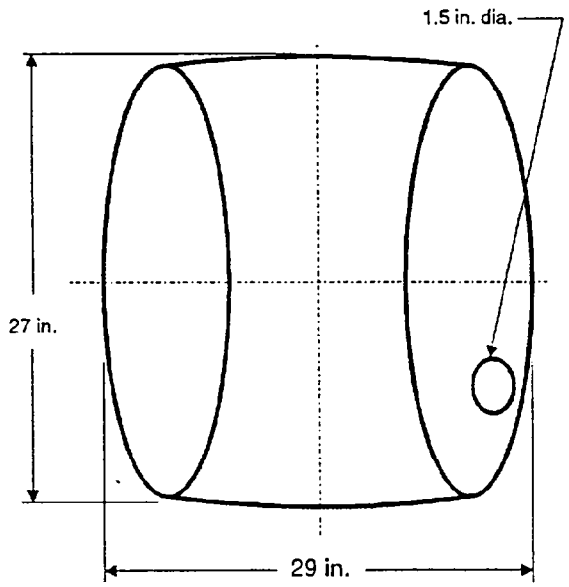
Passenger: No

If yes, record length of tether: NA

Driver's airbag:



Passenger's airbag:

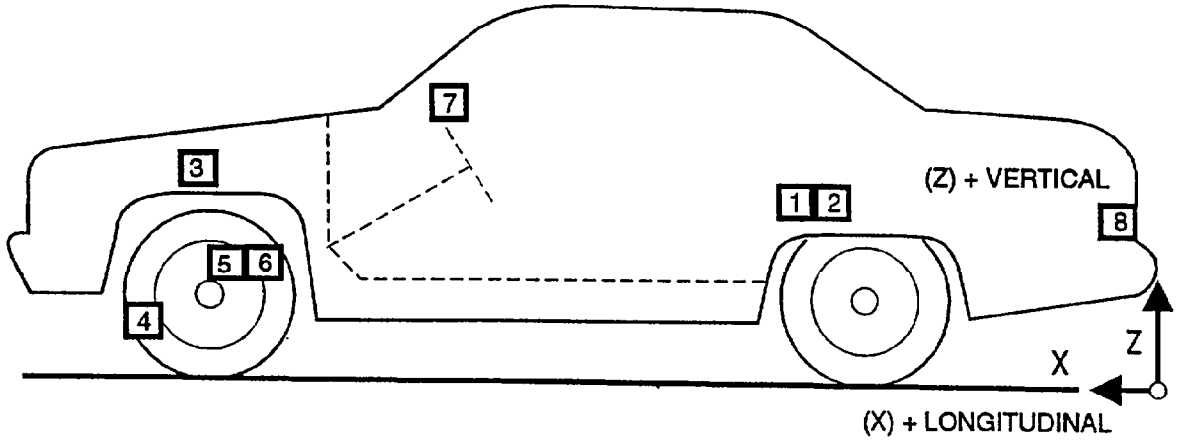


F. Airbag and gas generator part numbers and manufacturer's names.

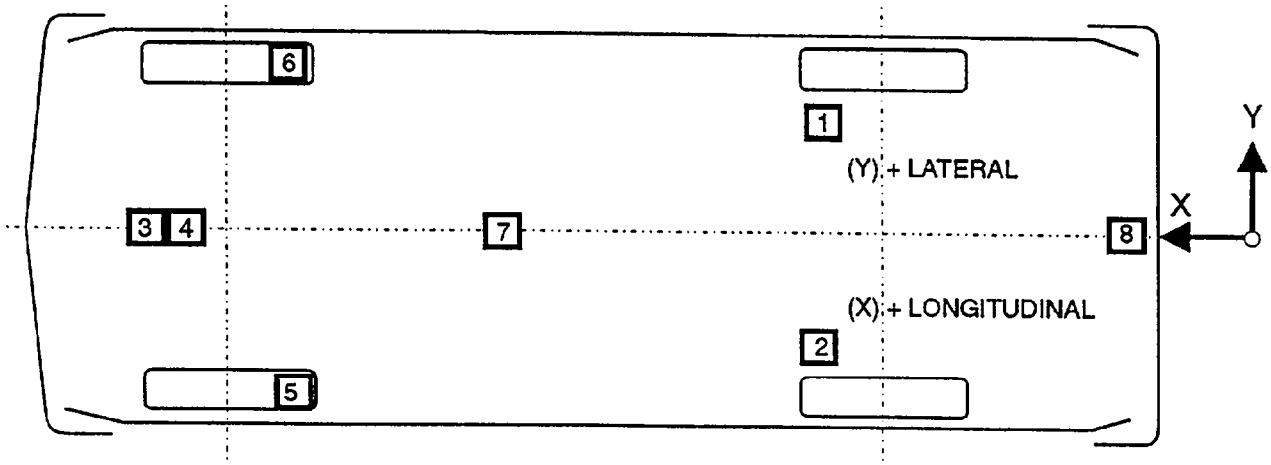
Driver: Mfr.: NA; Airbag: NA; Gen: NA

Passenger: Mfr.: NA; Airbag: 10001D94064P1

Figure 3 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: CS0202 No. LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 LEFT REAR SEAT CROSSMEMBER	PRE	88.7 in	27.2 in	16.4 in				
	POST	90.8 in	27.2 in	18.1 in				
LONGITUDINAL					1.4 g	@ 201.3 ms	24.3 g	@ 43.2 ms
2 RIGHT REAR SEAT CROSSMEMBER	PRE	82.7 in	-26.1 in	16.7 in				
	POST	83.2 in	-26.1 in	18.2 in				
LONGITUDINAL					1.1 g	@ 175.0 ms	22.1 g	@ 36.7 ms
3 ENGINE TOP	PRE	170.7 in	-4.1 in	33.8 in				
	POST	164.4 in	-3.2 in	31.2 in				
LONGITUDINAL					16.4 g	@ 63.5 ms	120.4 g	@ 37.4 ms
4 ENGINE BOTTOM	PRE	165.9 in	1.5 in	7.0 in				
	POST	160.8 in	2.9 in	4.2 in				
LONGITUDINAL					29.1 g	@ 52.3 ms	70.6 g	@ 38.5 ms
5 RIGHT BRAKE CALIPER	PRE	166.6 in	-28.0 in	12.2 in				
	POST	161.0 in	-27.8 in	11.8 in				
LONGITUDINAL					32.3 g	@ 68.2 ms	74.5 g	@ 46.4 ms
6 LEFT BRAKE CALIPER	PRE	166.7 in	28.0 in	12.3 in				
	POST	159.1 in	27.8 in	11.8 in				
LONGITUDINAL					31.7 g	@ 97.0 ms	65.9 g	@ 52.5 ms
7 INSTRUMENT PANEL CENTER	PRE	138.2 in	0.0 in	47.2 in				
	POST	139.5 in	0.0 in	49.5 in				
LONGITUDINAL[1]					---	---	---	---
8 VEHICLE REAR CENTER	PRE	9.2 in	0.0 in	22.4 in				
	POST	9.2 in	0.0 in	23.4 in				
VERTICAL					5.3 g	@ 46.9 ms	9.2 g	@ 24.7 ms

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

[1]See DATA ACQUISITION EXPLANATIONS

Section 3.0

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

Table 6 Dummy Injury Criteria

Maximum Acceleration

	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-47.7 g	9.9 g	15.9 g	48.8 g	-39.0 g	3.8 g	-14.1 g
Passenger	-29.4 g	20.1 g	-14.8 g	33.8 g	-27.1 g	-3.7 g	-13.4 g

Maximum Femur Compressive Force

	Left Femur	Right Femur
Driver	1308 lbf	1157 lbf
Passenger	742 lbf	1196 lbf

Head Injury Criteria[1]

	HIC	Time t_1	Time t_2
Driver	249	73.0 ms	107.9 ms
Passenger	109	79.0 ms	115.0 ms

Chest Maximum Resultant Acceleration[2]

	Accelerometer	Time t_1	Time t_2
Driver	38.7 g	89.4 ms	92.7 ms
Passenger	27.9 g	101.8 ms	106.3 ms

Maximum Chest Deflection

Driver	1.1 in
Passenger	0.4 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 head and chest were restrained by the driver's airbag. The dummy rebounded rearward into the seat back and came to rest in the driver's seat.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest were restrained by the passenger's airbag. The dummy rebounded into the seat back and came to rest seated in the right front passenger's seat, leaning slightly forward and to the left.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary

Front Outboard Designated Seating Positions

NHTSA number: CS0202

Vehicle model year/make/model/body style: 1995/Ford/Windstar/van

Date of comfort/convenience check: 11/09/94

Technician performing check: Sankey

GVWR: 5065 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's automatic restraint system does not include a manual convenience hook or other device to stow the seat belt webbing.

Table 7 FMVSS 208 Seat Belt Comfort and Convenience Test Summary

Front Outboard Designated Seating Positions, Cont'd.

NHTSA number: CS0202

Vehicle model year/make/model/body style: 1995/Ford/Windstar/van

Date of comfort/convenience check: 11/09/94

Technician performing check: Sankey

GVWR: 5065 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 0.4 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: CS0202

Vehicle model year/make/model/body style: 1995/Ford/Windstar/van

Date of comfort/convenience check: 11/09/94

Technician performing check: Sankey

GVWR: 5065 lb

Seat Belt Guides and Hardware (S7.4.6):

The seat cushion is not removable. The 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 vehicle is not equipped with a center arm rest.

Table 8 FMVSS 208 Equipment Data

FMVSS 208 Seat Belt Warning System Data

With an occupant in the driver's position and the 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 continuosly.

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 were located on the driver's sun visor.

No regular airbag maintenance is required.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 41 and on the vehicle's labels.

A description of the functional operation of the system was provided in the owner's manual on pages 40 and 41.

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 pages 40 and 41.

Table 8 FMVSS 208 Equipment Data, Cont'd.

FMVSS 208 Readiness Indicator Data

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was located on the 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 page 41.

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.

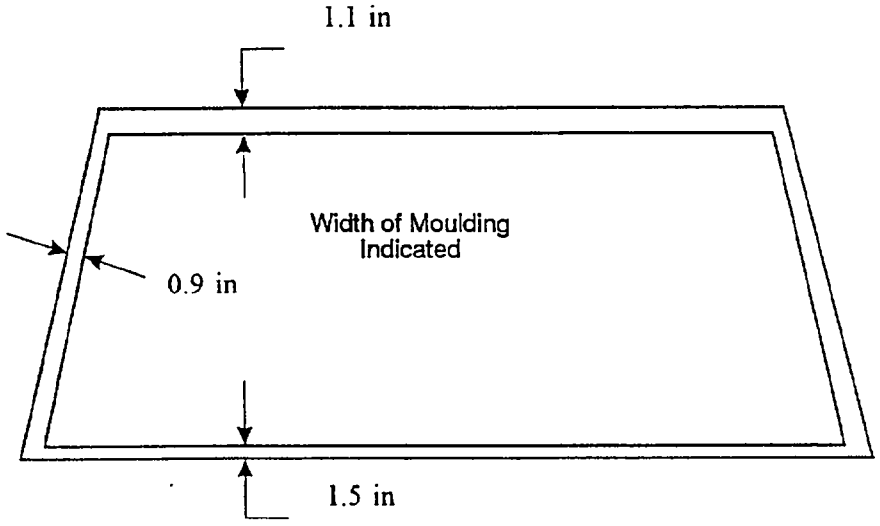
Clips or brackets used to retain windshield: None

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	93.0 in	93.0 in	100.0
Left side	93.0 in	93.0 in	100.0
Total	186.0 in	186.0 in	100.0

Pre-test windshield mounting material temperature: 71° F



Front view of windshield[1]

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: 53.4 in

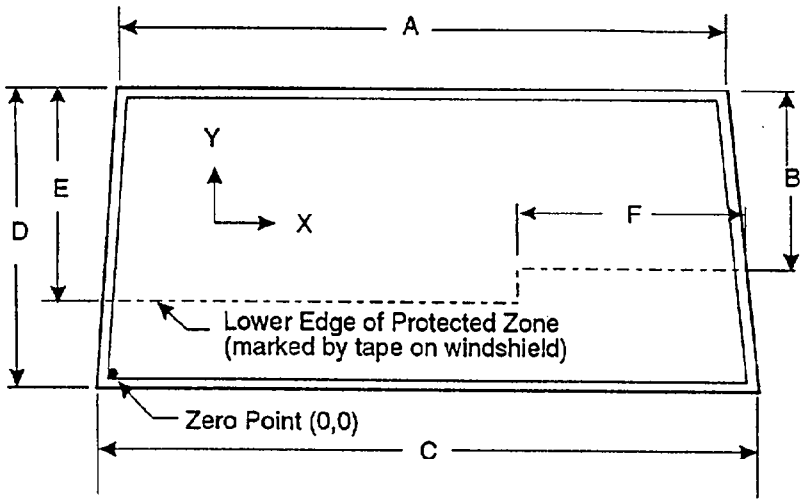
B: 19.9 in

C: 70.6 in

D: 33.6 in

E: 21.0 in

F: 27.7 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/Ford/Windstar/van
NHTSA number:	CS0202
Fuel system capacity:	20.0 gal (from owner's manual)
Usable capacity:	20.0 gal (furnished by COTR)
Test volume range:	18.4 gal to 18.8 gal (92-94% of usable)
Actual test volume:	18.6 gal (with entire fuel system filled)
Test fluid type:	Stoddard solvent
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistokes
Test fluid color:	purple
Type of fuel pump:	electric

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

Details of fuel system:

The fuel tank is located in front of the rear axle. The fuel filler neck is located on the left side. The fuel lines run along the left frame rail.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CS0202

Test date: 11/09/94

Vehicle year/make/
model/body style: 1995/Ford/Windstar/van

Test requirements:

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

Test vehicle impact type:

__x__ 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:

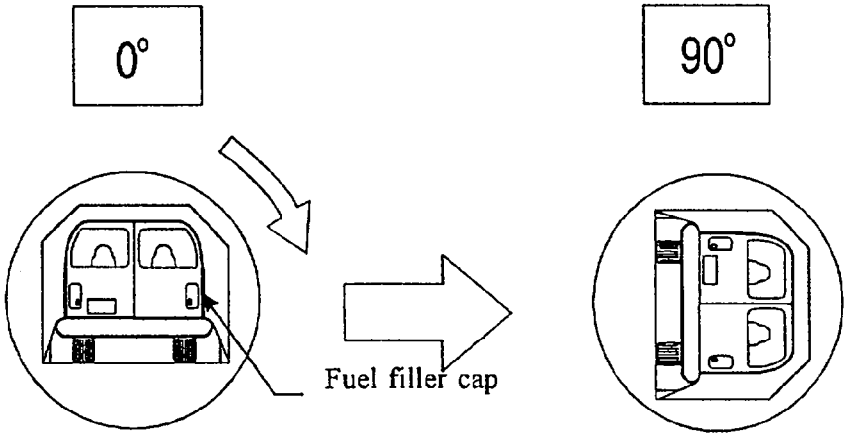
		Test Results	Maximum Allowable
1.	From impact until vehicle motion ceases	0 oz	1 oz
2.	5-Minute period after vehicle motion ceases	0 oz	5 oz
3.	Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CS0202

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	

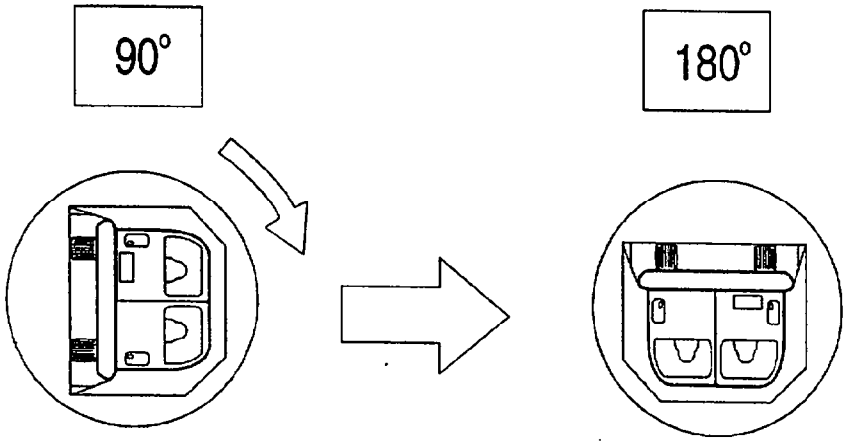
Fuel system fluid spillage measurements:

0° to 90° rotation (fuel filler cap down)	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		

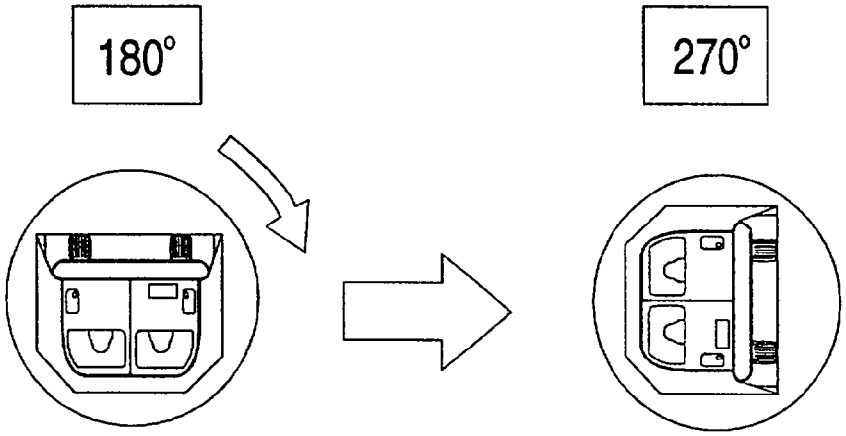
Fuel system fluid spillage measurements:

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	

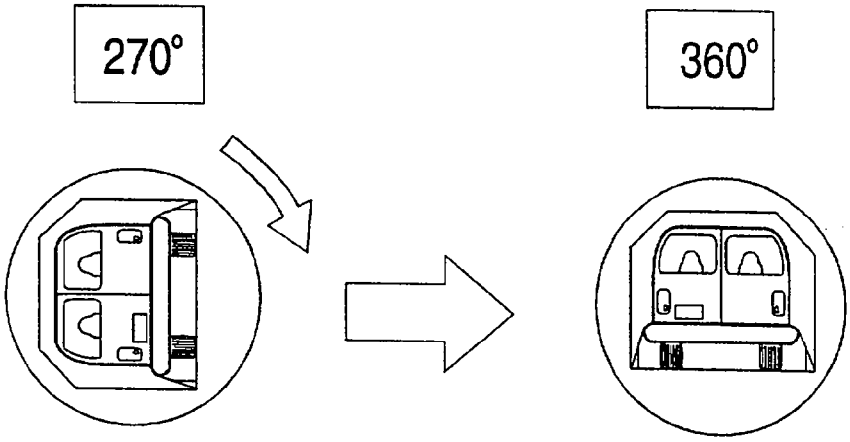
Fuel system fluid spillage measurements:

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

Fuel system fluid spillage location(s): None

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

Test phase



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

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

Fuel system fluid spillage measurements:

270° to 360° 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

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 7 Pre-test and Post-test Measurement Points

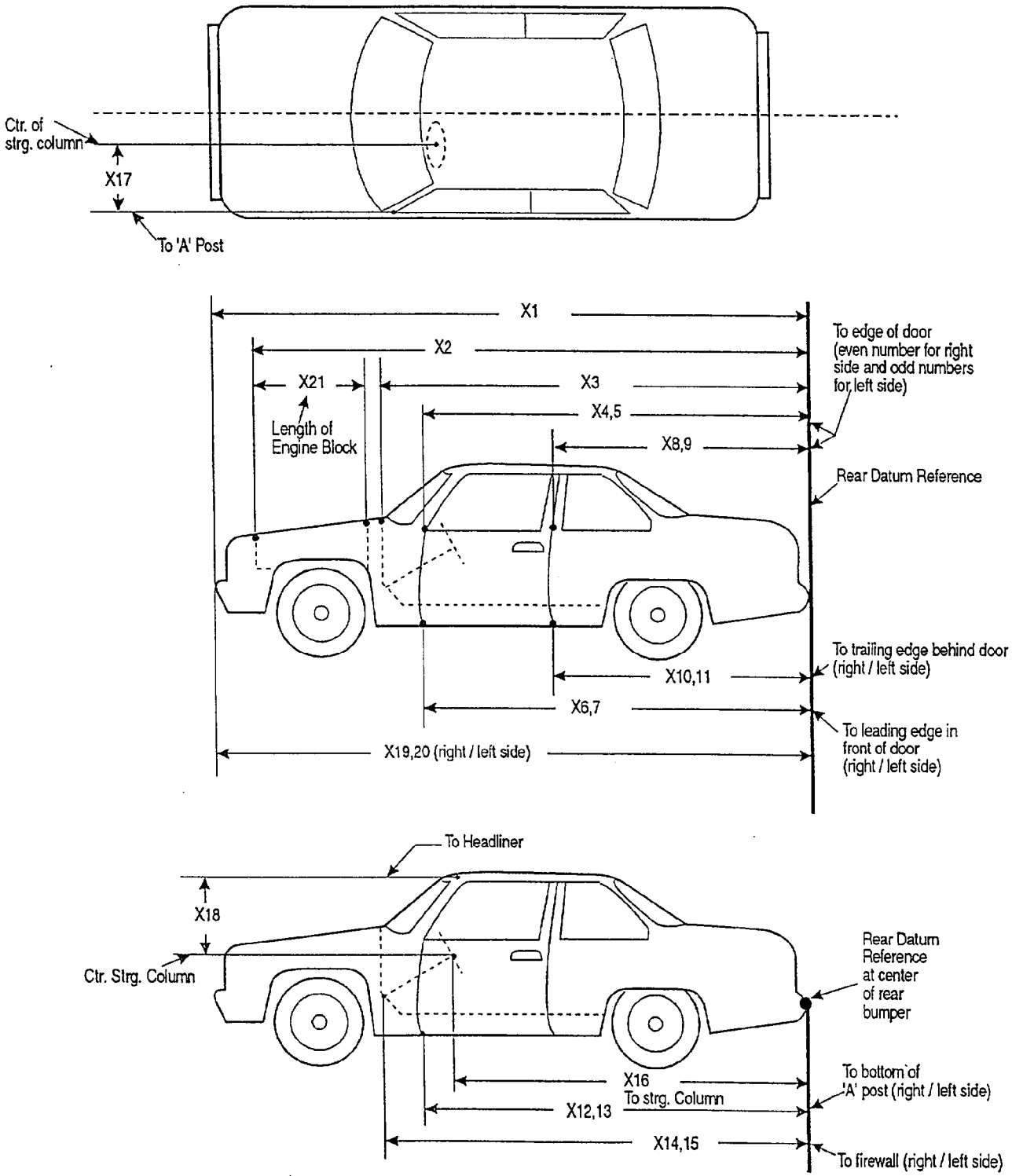


Table 11 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1995/Ford/Windstar/van

Test number: 941109

No.	Type of Measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	200.2 in	186.8 in	13.4 in
X2	Rear surface of vehicle to front of engine block	179.0 in	174.4 in	4.6 in
X3	Rear surface of vehicle to firewall	166.7 in	167.4 in	-0.7 in
X4	Rear surface of vehicle to upper leading edge of right door	144.2 in	143.9 in	0.3 in
X5	Rear surface of vehicle to upper leading edge of left door	144.2 in	143.8 in	0.4 in
X6	Rear surface of vehicle to lower leading edge of right door	140.7 in	140.4 in	0.3 in
X7	Rear surface of vehicle to lower leading edge of left door	140.9 in	140.8 in	0.1 in
X8	Rear surface of vehicle to upper trailing edge of right door	96.5 in	96.6 in	-0.1 in
X9	Rear surface of vehicle to upper trailing edge of left door	96.6 in	96.8 in	-0.2 in
X10	Rear surface of vehicle to lower trailing edge of right door	98.0 in	98.1 in	-0.1 in
X11	Rear surface of vehicle to lower trailing edge of left door	98.2 in	98.2 in	0.0 in
X12	Rear surface of vehicle to bottom of "A" post on right side	140.7 in	139.9 in	0.8 in
X13	Rear surface of vehicle to bottom of "A" post on left side	140.9 in	139.6 in	1.3 in
X14	Rear surface of vehicle to firewall - right side	163.9 in	163.0 in	0.9 in
X15	Rear surface of vehicle to firewall - left side	163.5 in	164.1 in	-0.4 in
X16	Rear surface of vehicle to steering wheel center	124.6 in	125.6 in	-1.0 in
X17	Center of steering column to "A" post	11.2 in	12.1 in	-0.9 in
X18	Center of steering column to headliner	18.6 in	17.1 in	1.5 in
X19	Rear surface of vehicle to right side of front bumper	196.3 in	184.0 in	12.3 in
X20	Rear surface of vehicle to left side of front bumper	196.0 in	183.1 in	12.9 in
X21	Length of engine block	14.6 in	14.6 in	0.0 in

Figure 8 Vehicle Target Locations

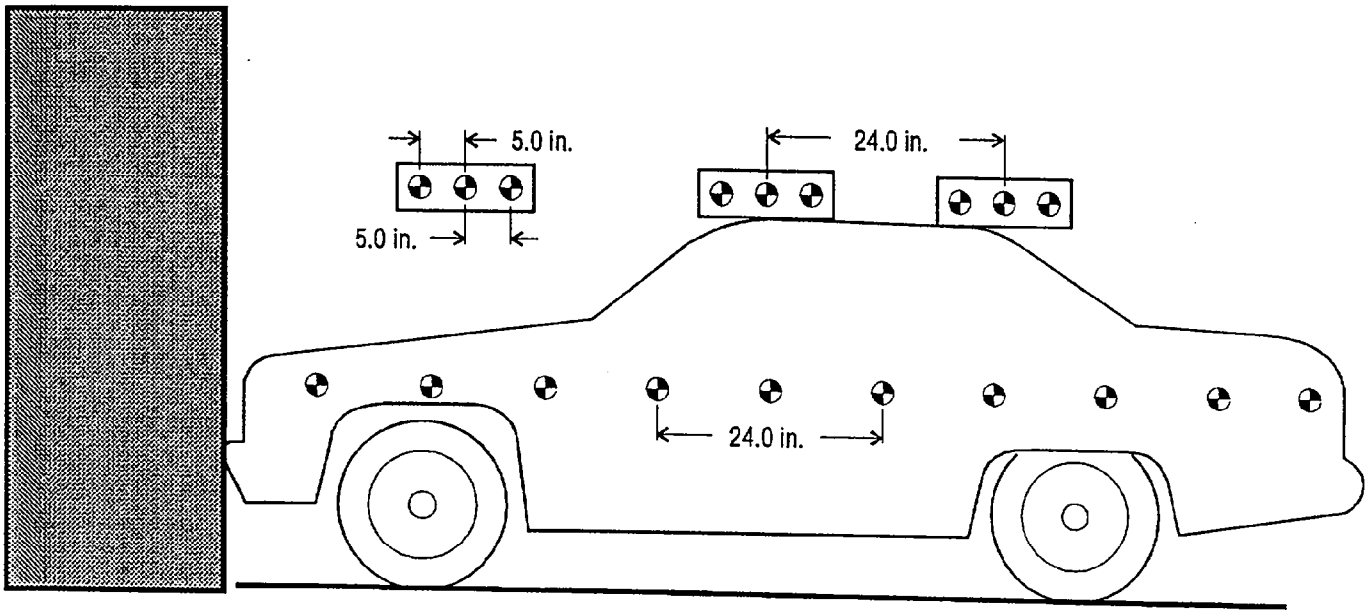
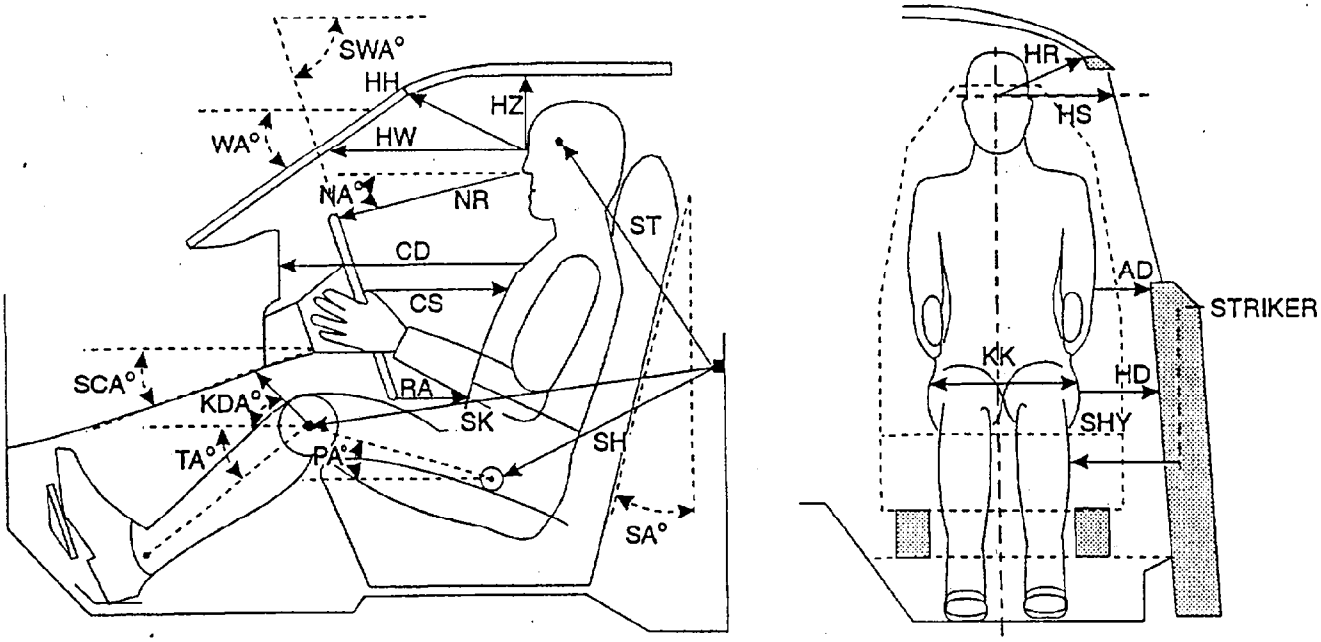


Figure 9 Dummy Measurement Locations for Front Seat Occupants



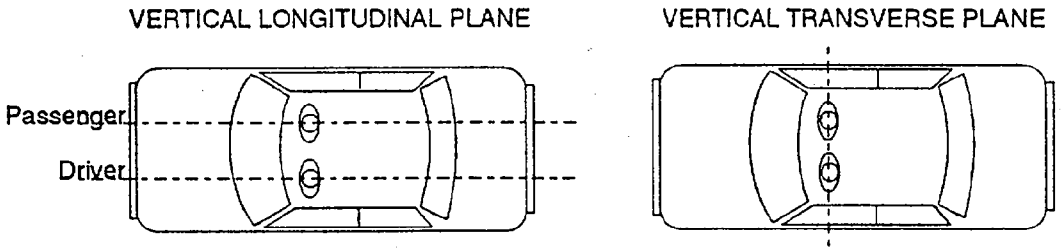


Table 12. Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial 230)	Passenger (Serial 314)
WA	Windshield angle	25°	NA
SWA	Steering wheel angle	64°	NA
SCA	Steering column angle	26°	NA
SA	Seat back angle	21°	21°
HZ	Head to roof	8.4 in	8.0 in
HH	Head to header	16.2 in	16.2 in
HW	Head to windshield	27.0 in	24.4 in
HR	Head to side header	9.2 in	8.6 in
NR	Nose to rim	17.6 in	NA
NA	Nose to rim angle	12°	NA
CD	Chest to dash	22.6 in	22.8 in
CS	Steering wheel to chest	13.8 in	NA
RA	Rim to abdomen	8.8 in	NA
KDL	Left knee to dash	6.0 in	4.8 in
KDR	Right knee to dash	5.9 in	5.7 in
KDA	Outboard knee to dash angle	21°	23°
PA	Pelvic angle	23°	24°
TA	Tibial angle	51°	48°
KK	Knee to knee	13.6 in	10.6 in
ST[1]	Striker to head	24.6 in	24.3 in
	Striker to head angle	-84°	-80°
SK[1]	Striker to knee	23.7 in	24.5 in
	Striker to knee angle	-8°	-4°
SH[1]	Striker to H-point	8.3 in	8.4 in
	Striker to H-point angle	2°	14°
SHY	Striker to H-point (Y dir.)	9.2 in	9.9 in
HS	Head to side window	13.4 in	12.9 in
HD	H-point to door	6.2 in	5.2 in
AD	Arm to door	4.4 in	1.3 in

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

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

Figure 10 Camera Positions

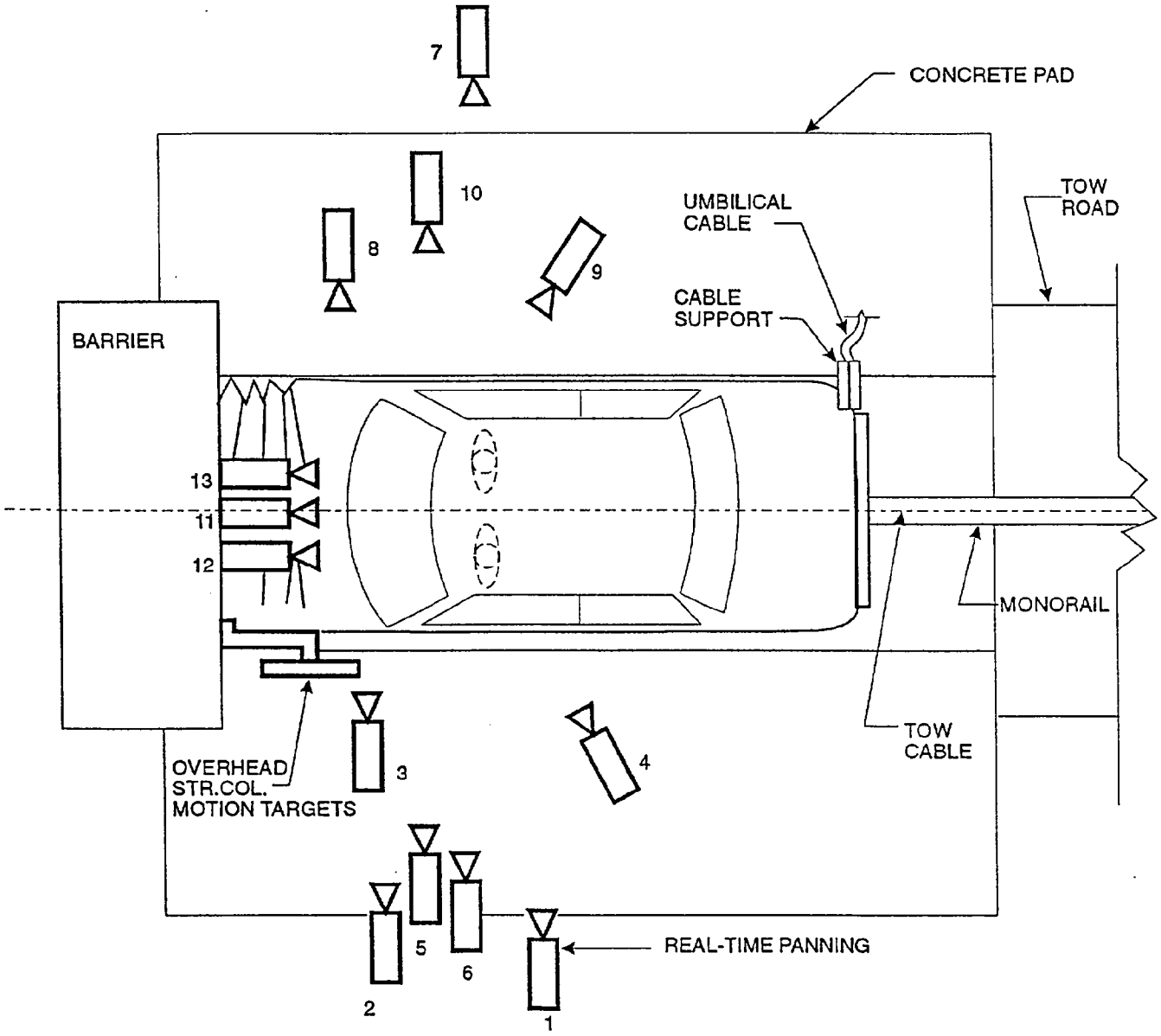


Figure 10 Camera Positions, Cont'd.

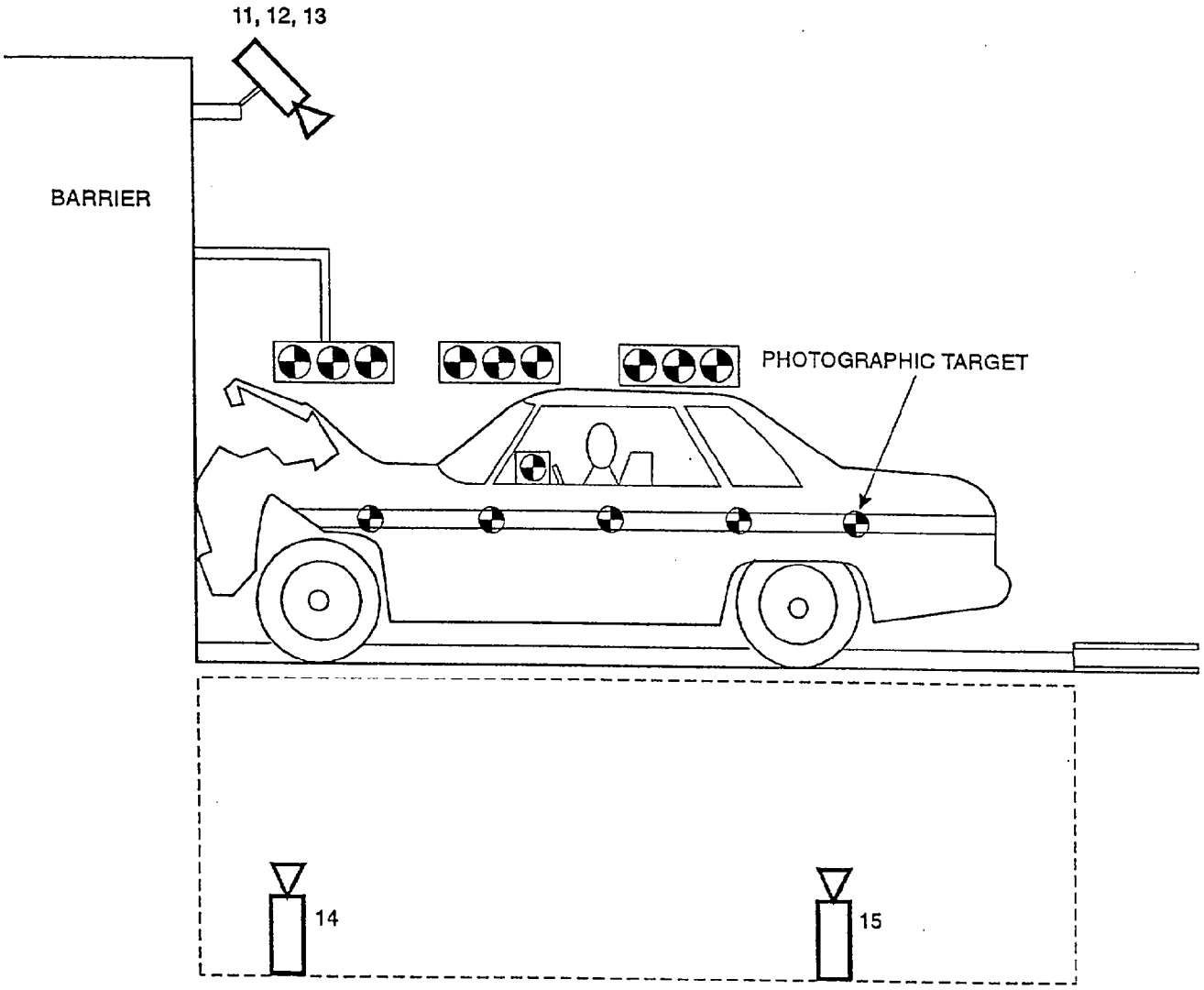


Table 13 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1995/Ford/Windstar/van

Test number: 941109

Camera Number	View	Camera Positions[1] X	Y	Z	Camera Angle[2]	Film Plane to Head Target	Camera Lens	Film Speed
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°	307 in	25 mm	1020 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°	103 in	25 mm	990 frames/s
5	Steering column motion	- 82.0 in	286.0 in	103.0 in	-14°	NA	25 mm	998 frames/s
6	Steering column motion	- 82.0 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	1000 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	95 in	25 mm	995 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	226 in	25 mm	1005 frames/s
11	Windshield front view	-6.0 in	0.0 in	88.0 in	-40°	NA	13 mm	1000 frames/s
12	Driver - front view	-6.8 in	14.5 in	93.0 in	-50°	NA	17 mm	990 frames/s
13	Passenger - front view	-4.5 in	-13.8 in	93.0 in	-50°	NA	17 mm	935 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	1002 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

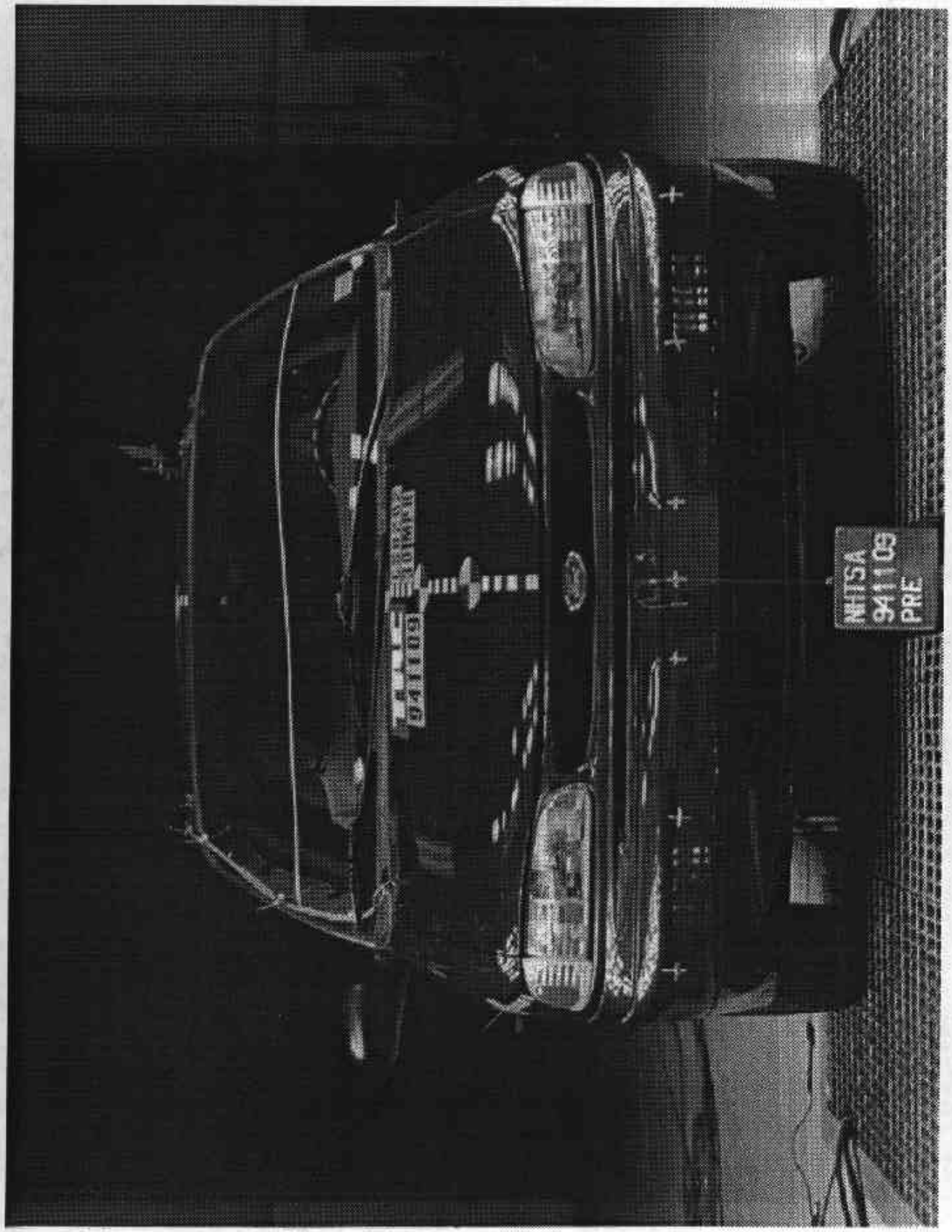


Figure A-1. Pre-Test Front View

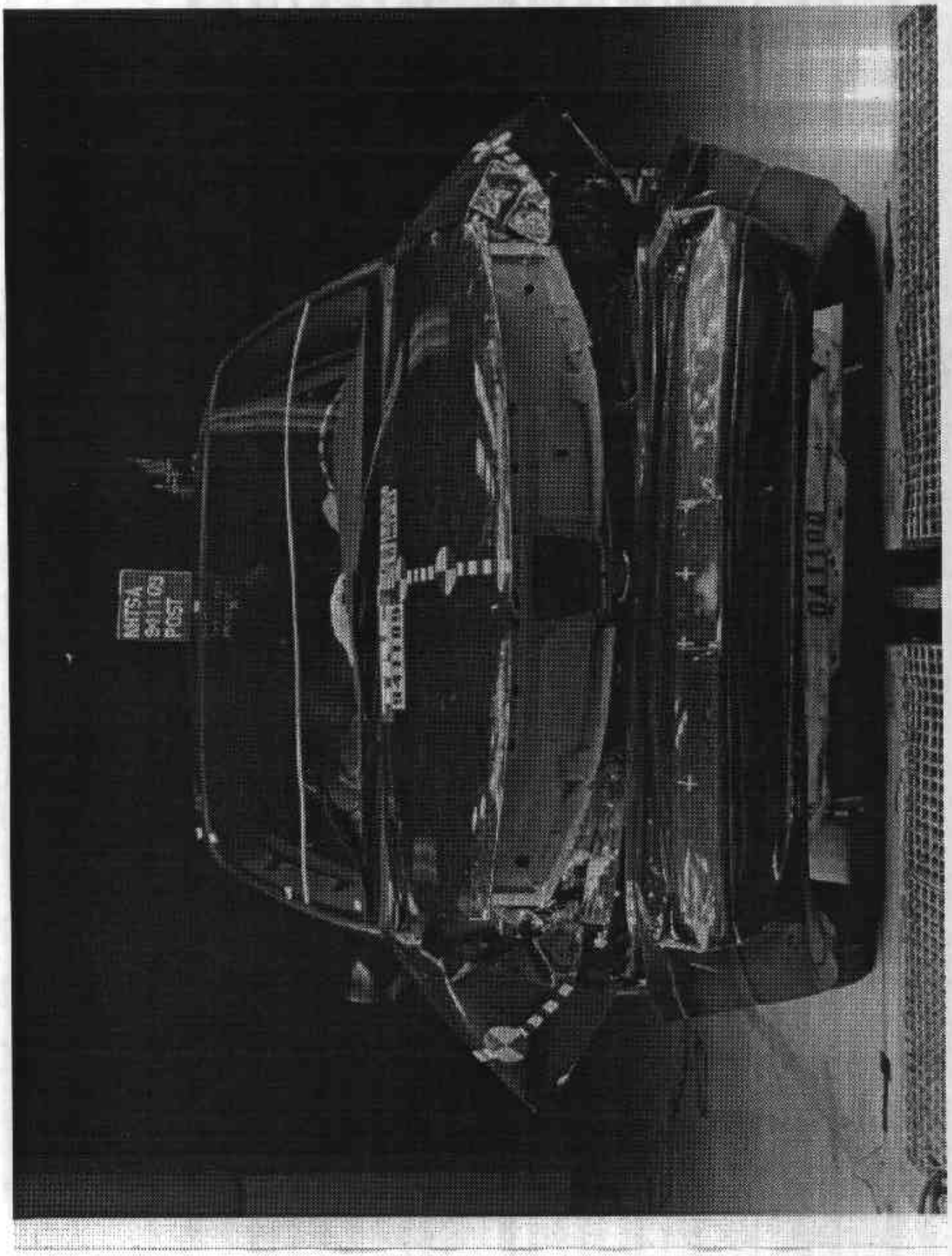


Figure A-2. Post-Test Front View

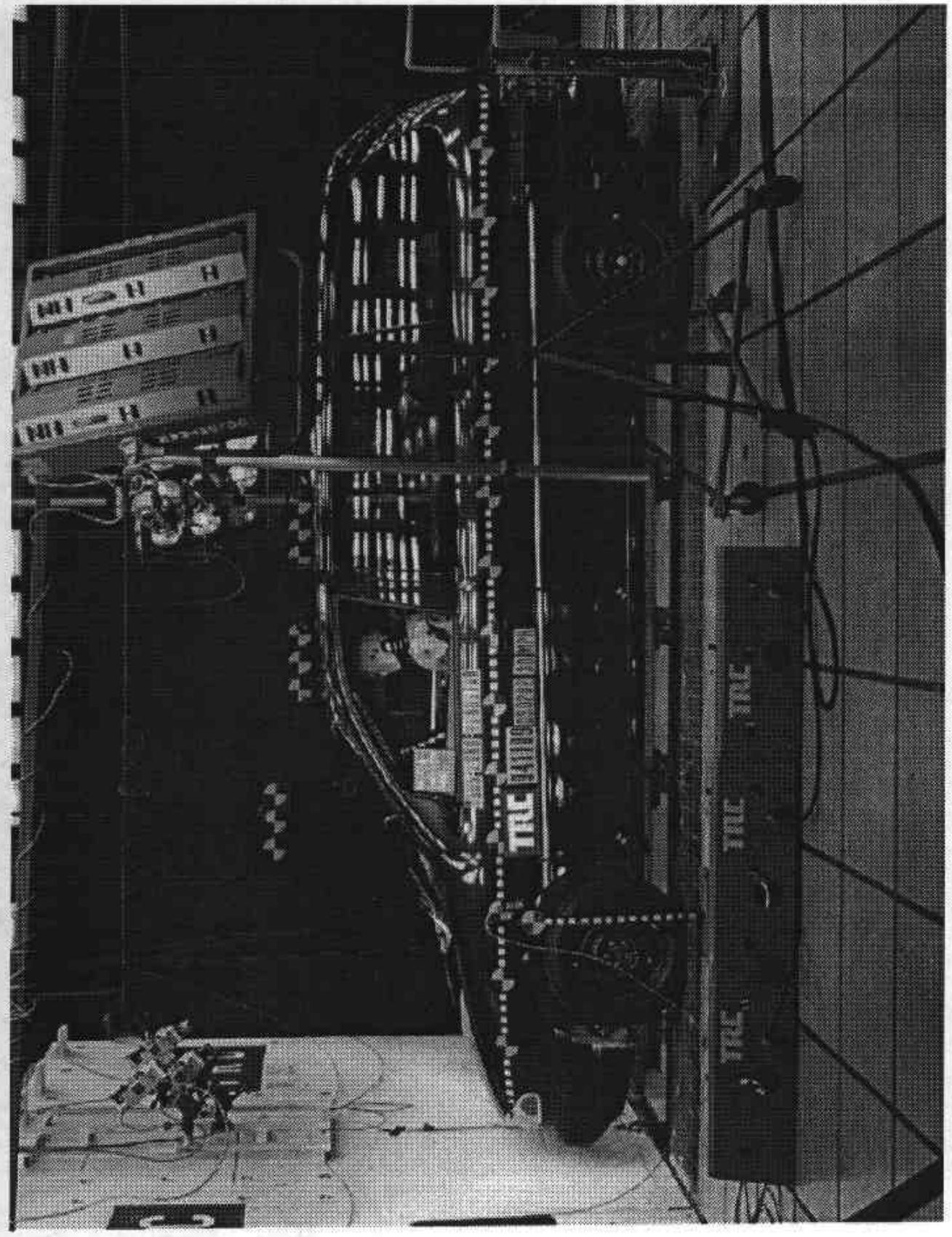


Figure A-3. Pre-Test Left Side View

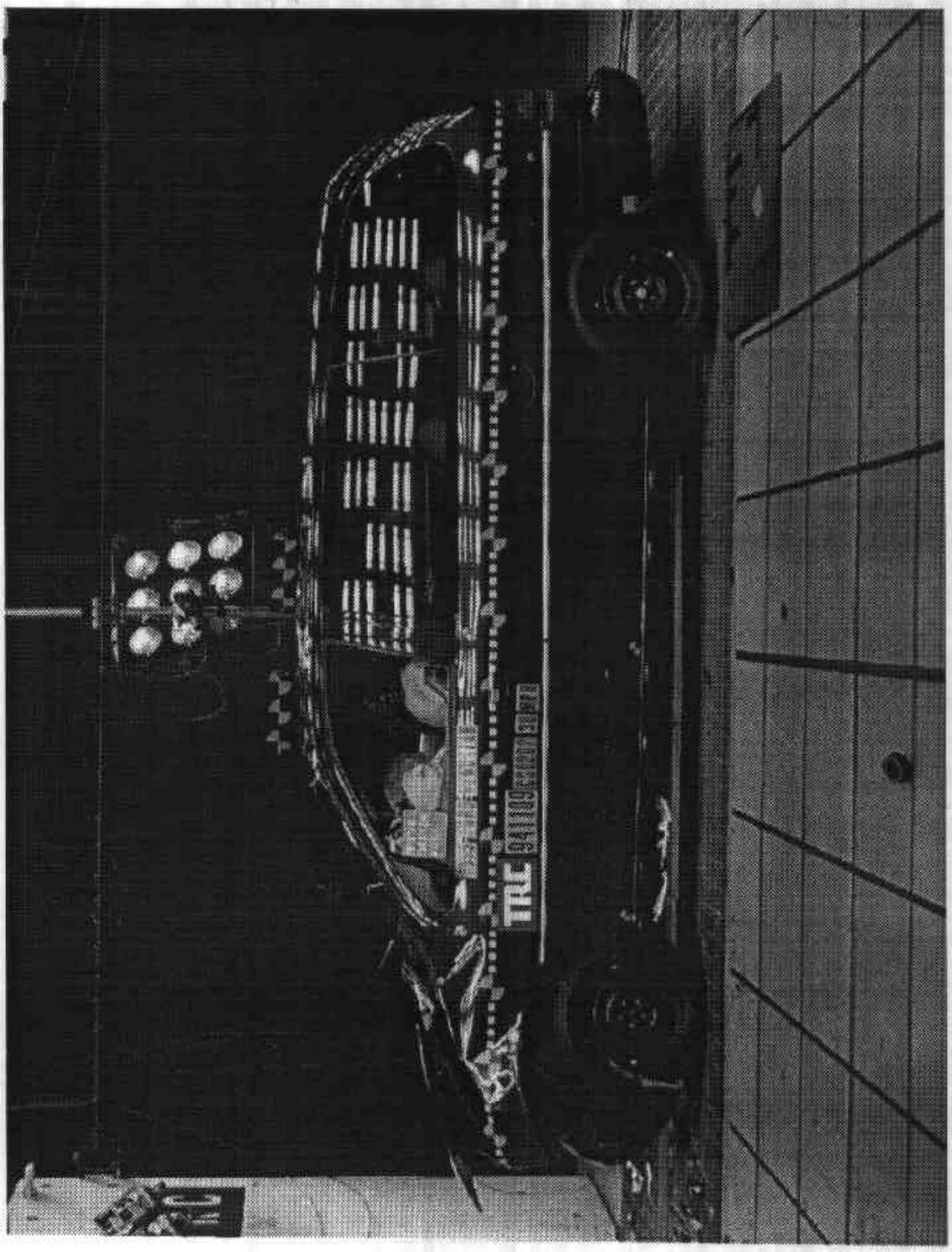


Figure A-4. Post-Test Left Side View

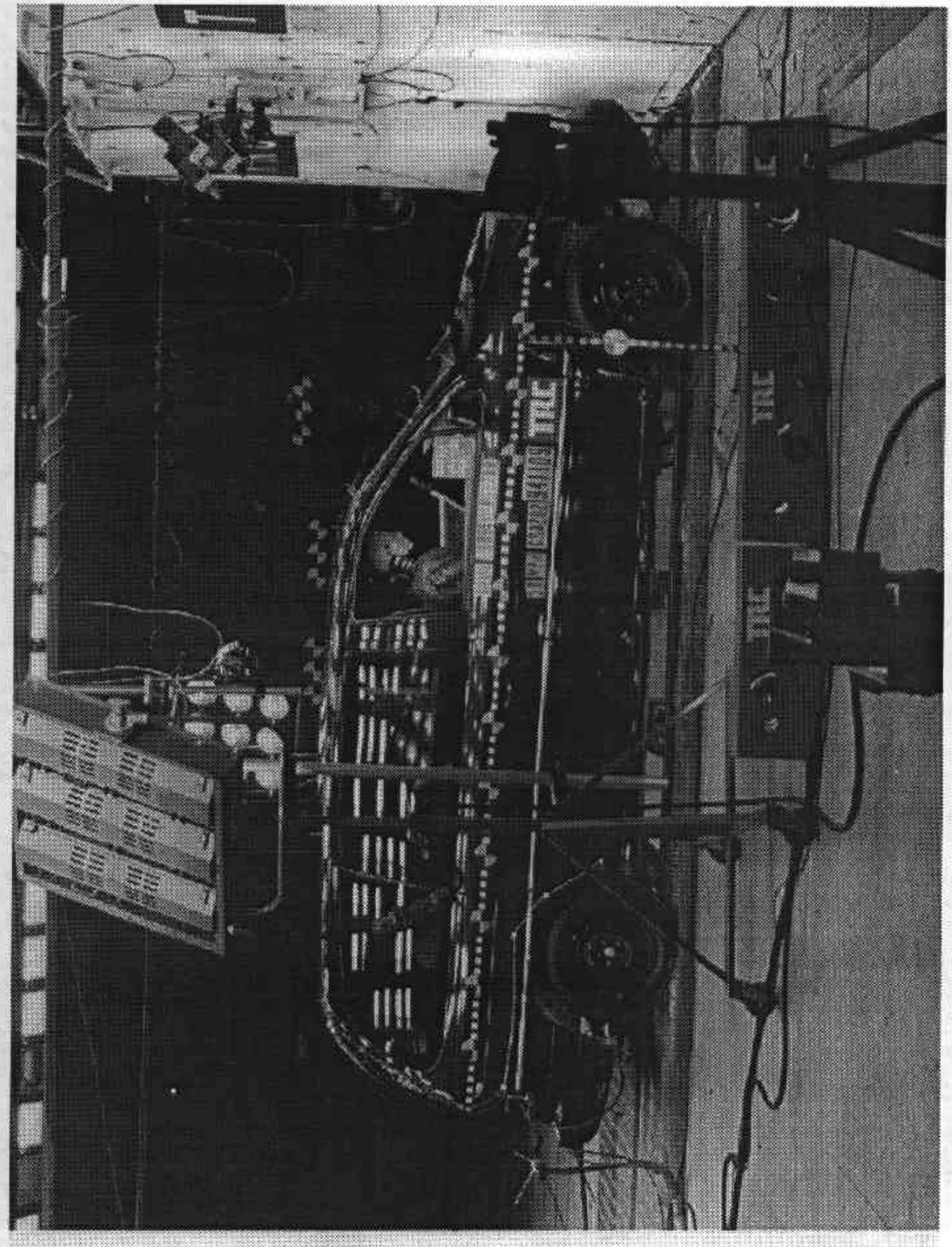


Figure A-5. Pre-Test Right Side View

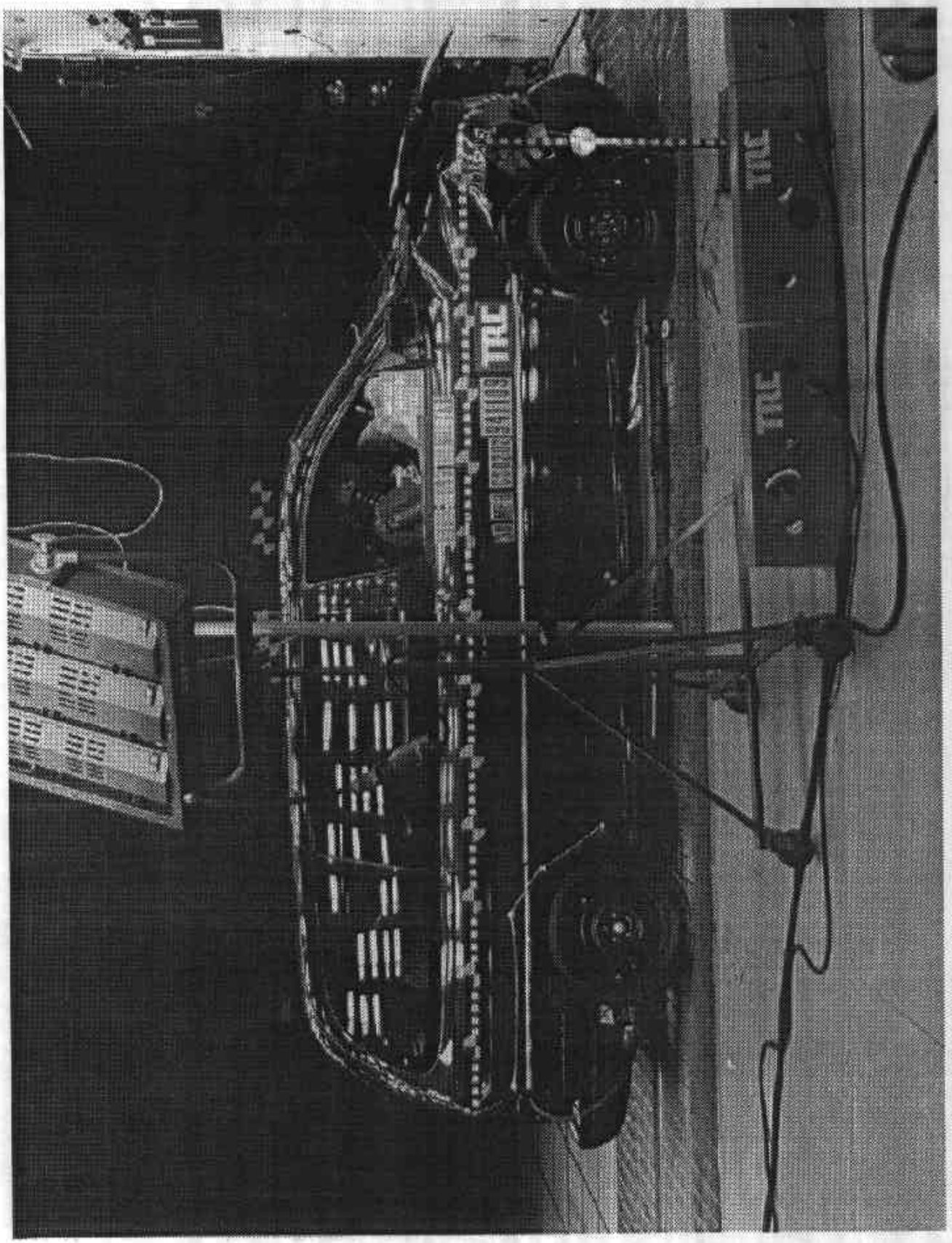


Figure A-6. Post-Test Right Side View

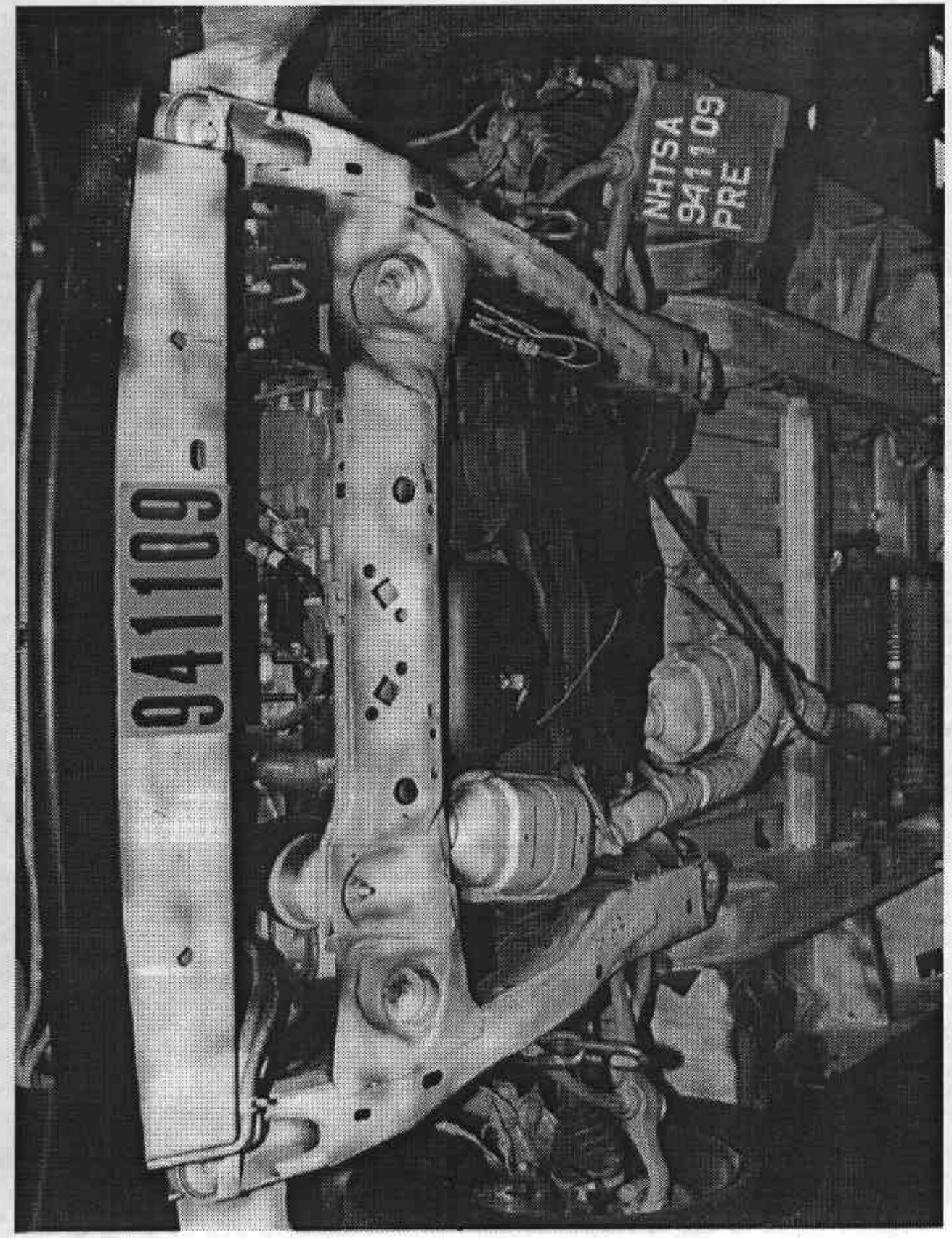


Figure A-7. Pre-Test Front Underbody View

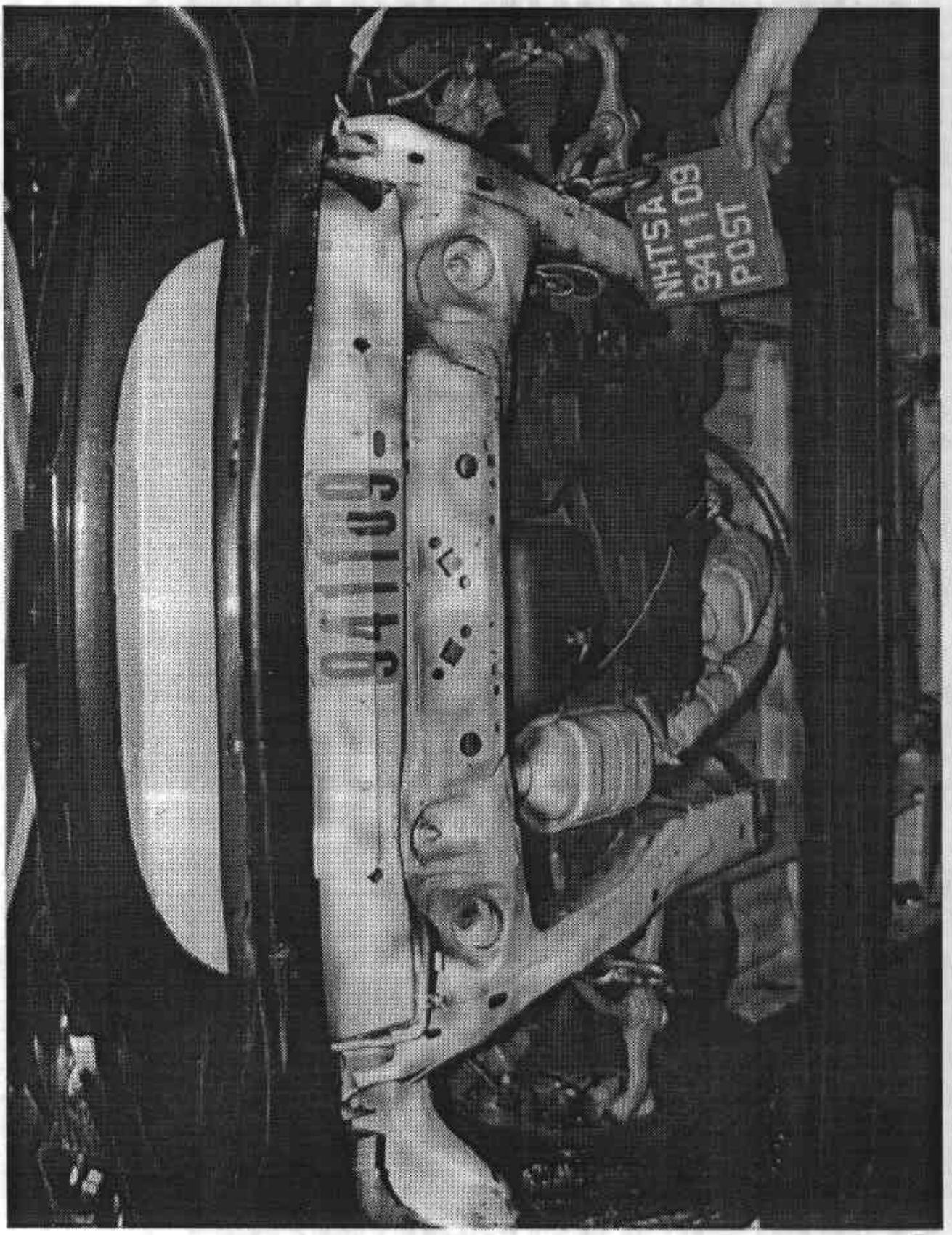


Figure A-8. Post-Test Front Underbody View

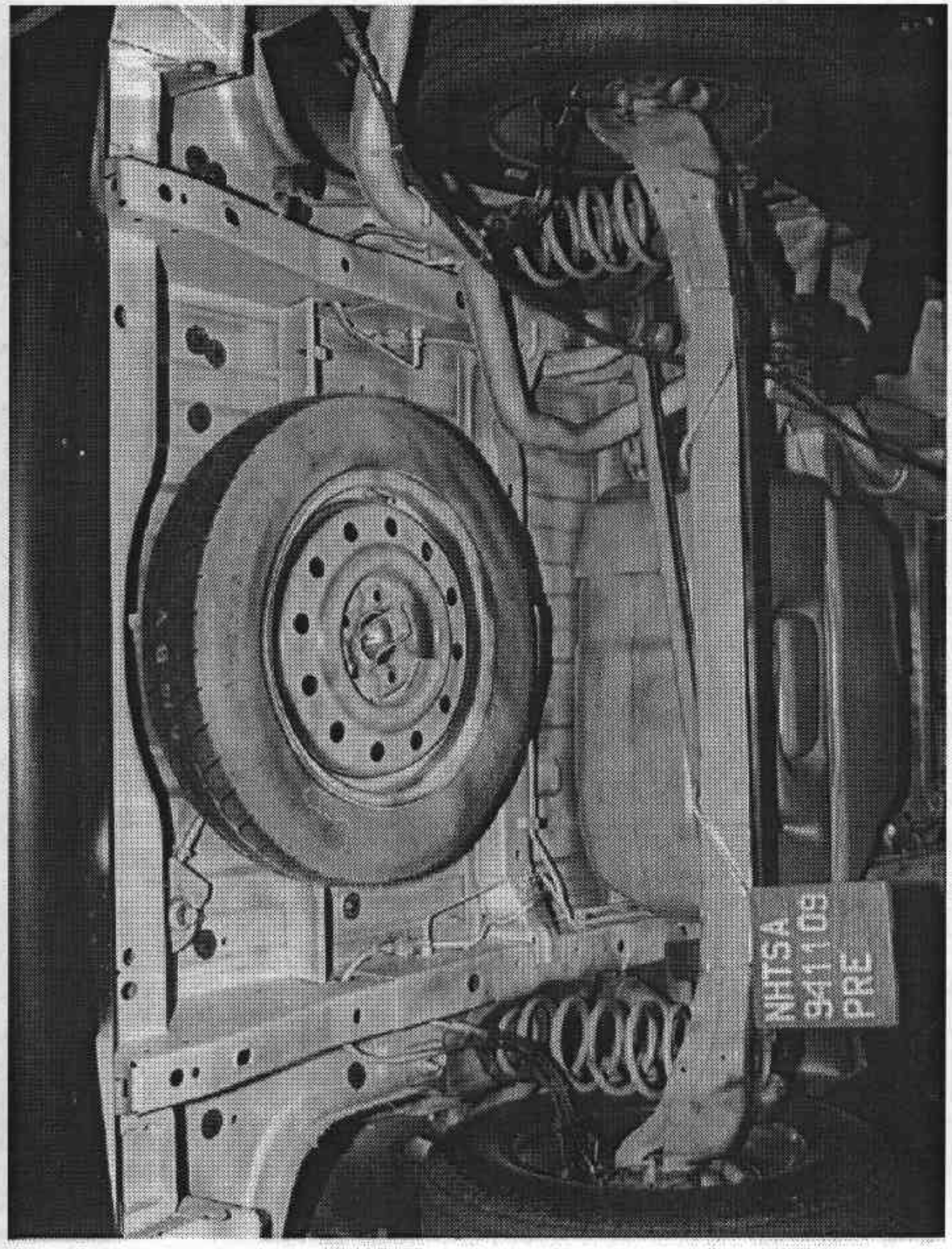


Figure A-9. Pre-Test Rear Underbody View

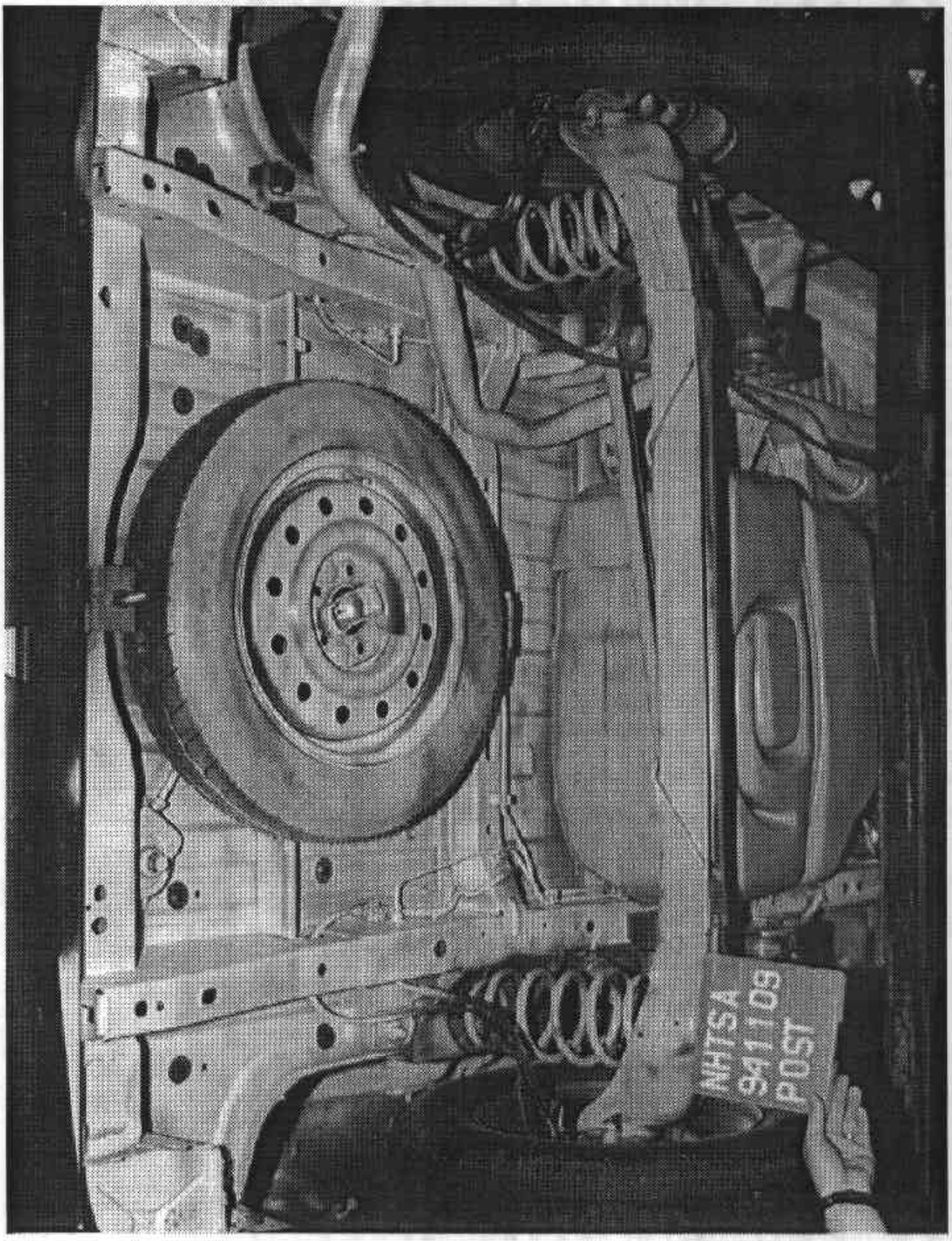


Figure A-10. Post-Test Rear Underbody View

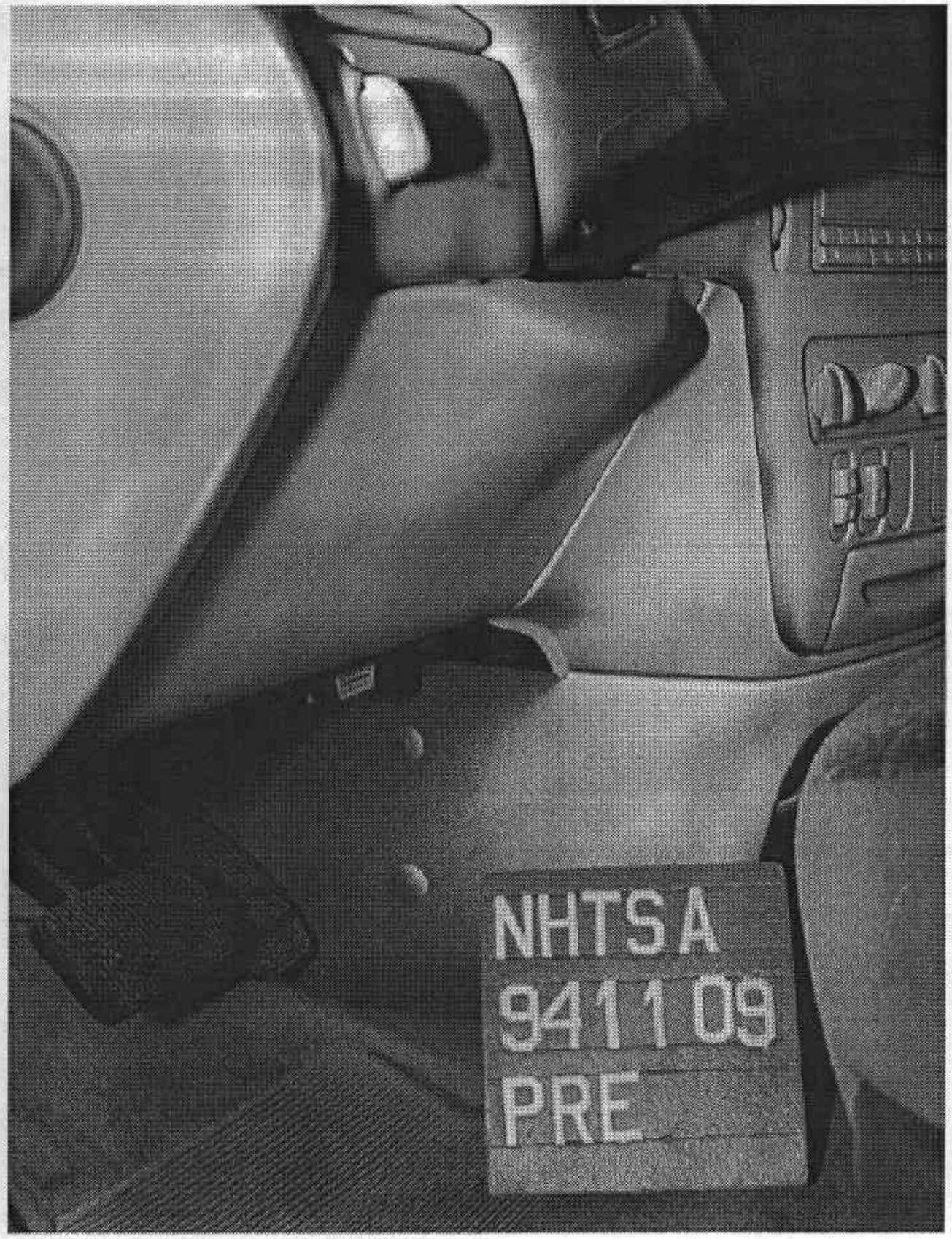


Figure A-11. Pre-Test Driver's Knee Bolster View

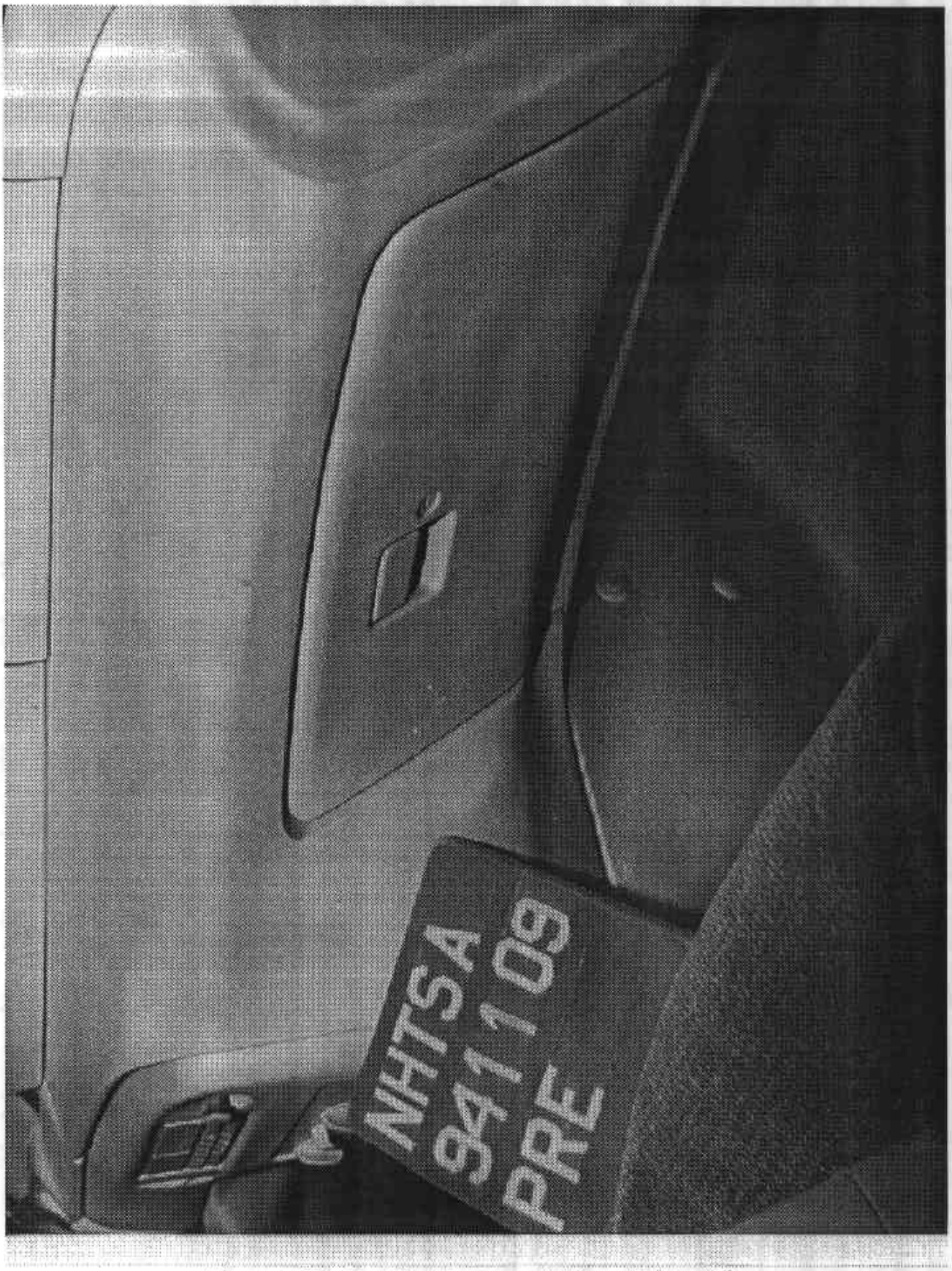


Figure A-12. Pre-Test Passenger's Knee Bolster View

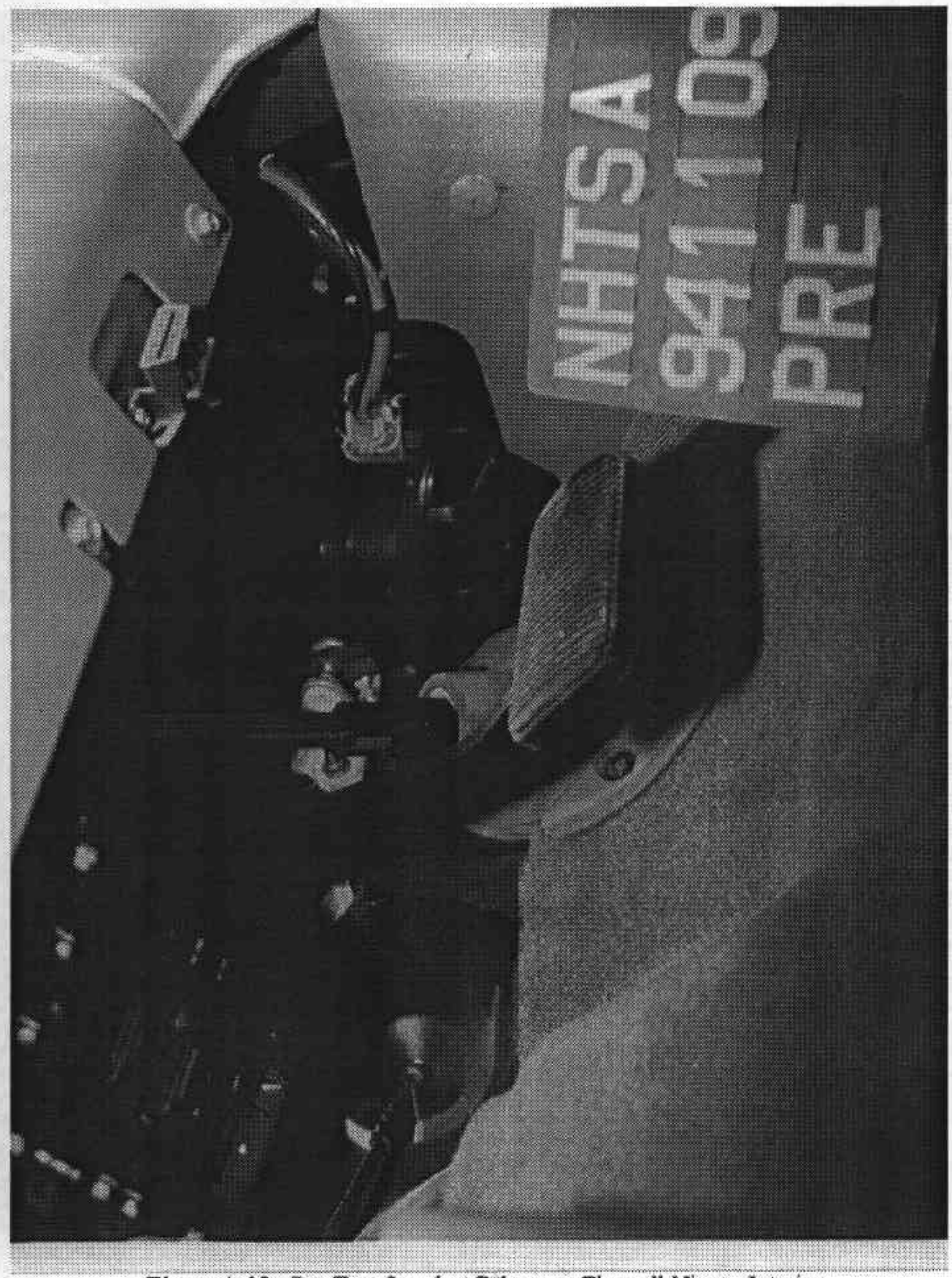


Figure A-13. Pre-Test Steering Column at Firewall View - Interior

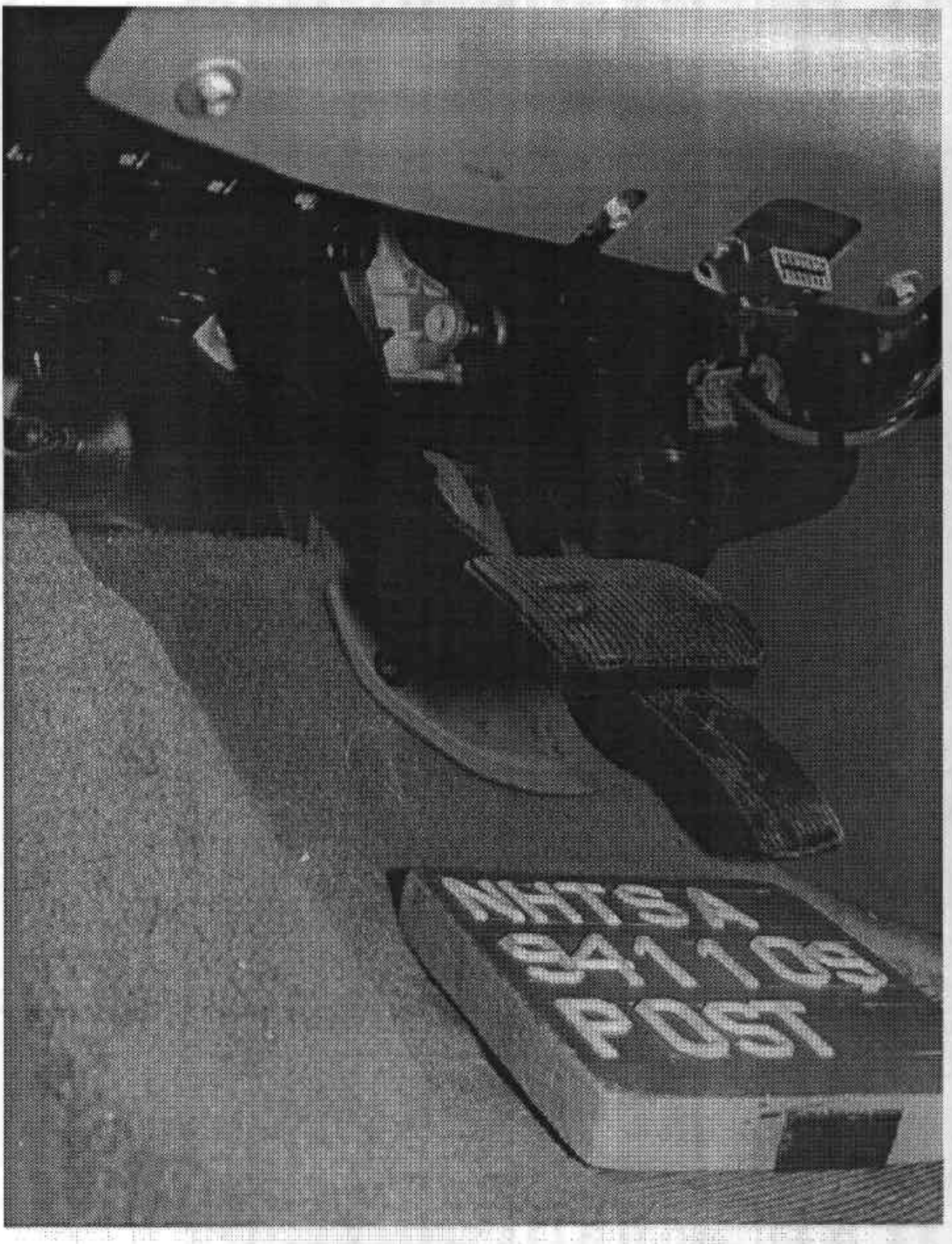


Figure A-14. Post-Test Steering Column at Firewall View - Interior

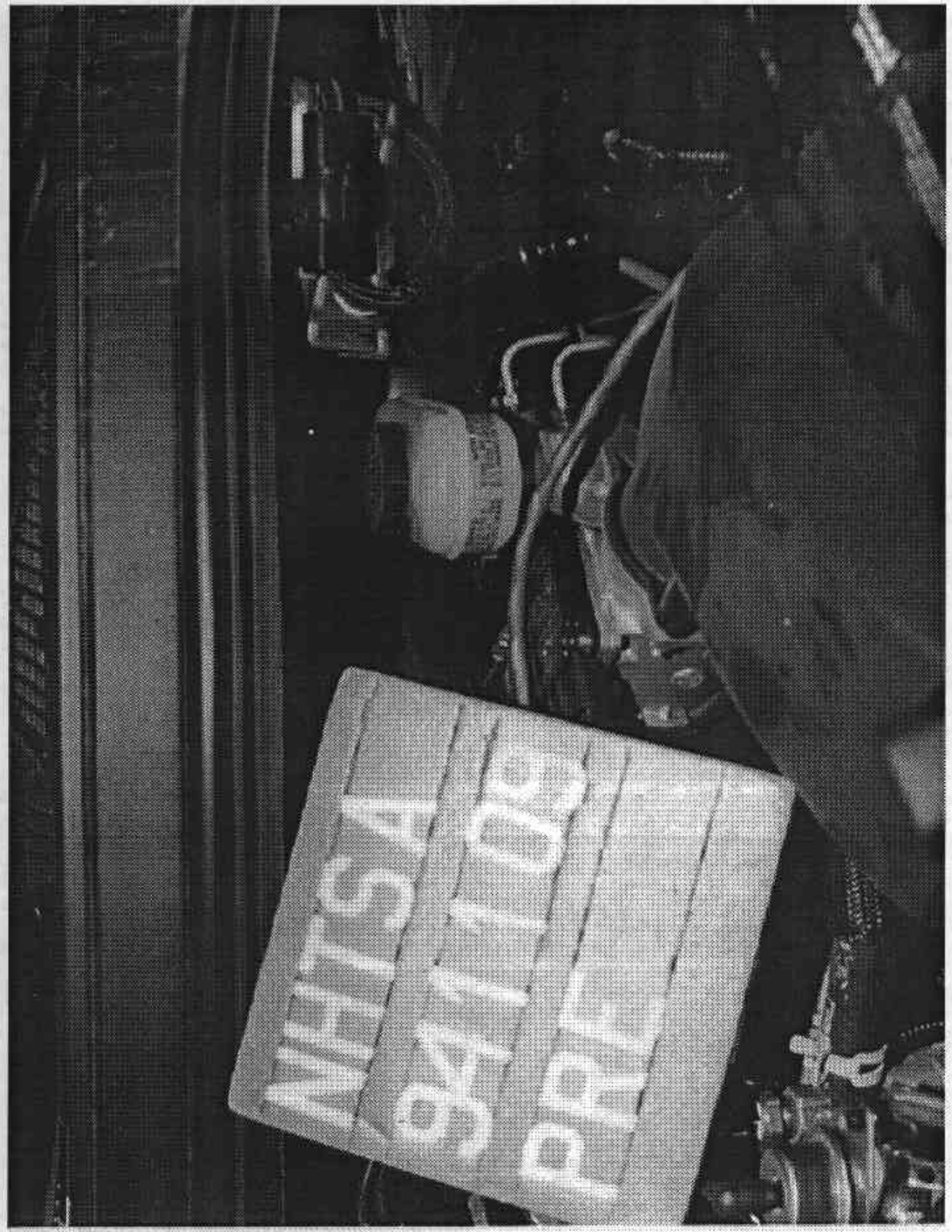


Figure A-15. Pre-Test Steering Column at Firewall View - Exterior

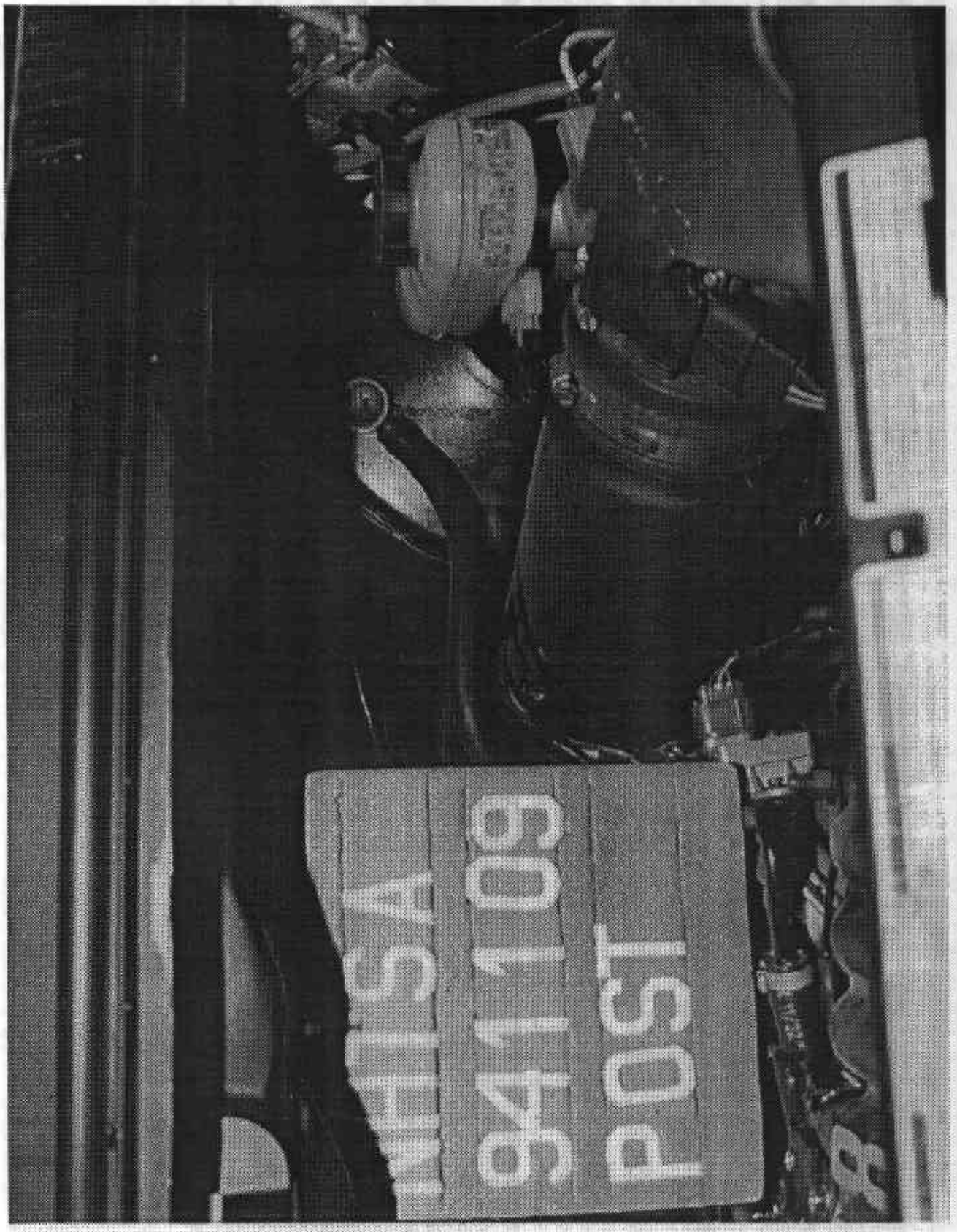


Figure A-16. Post-Test Steering Column at Firewall View - Exterior

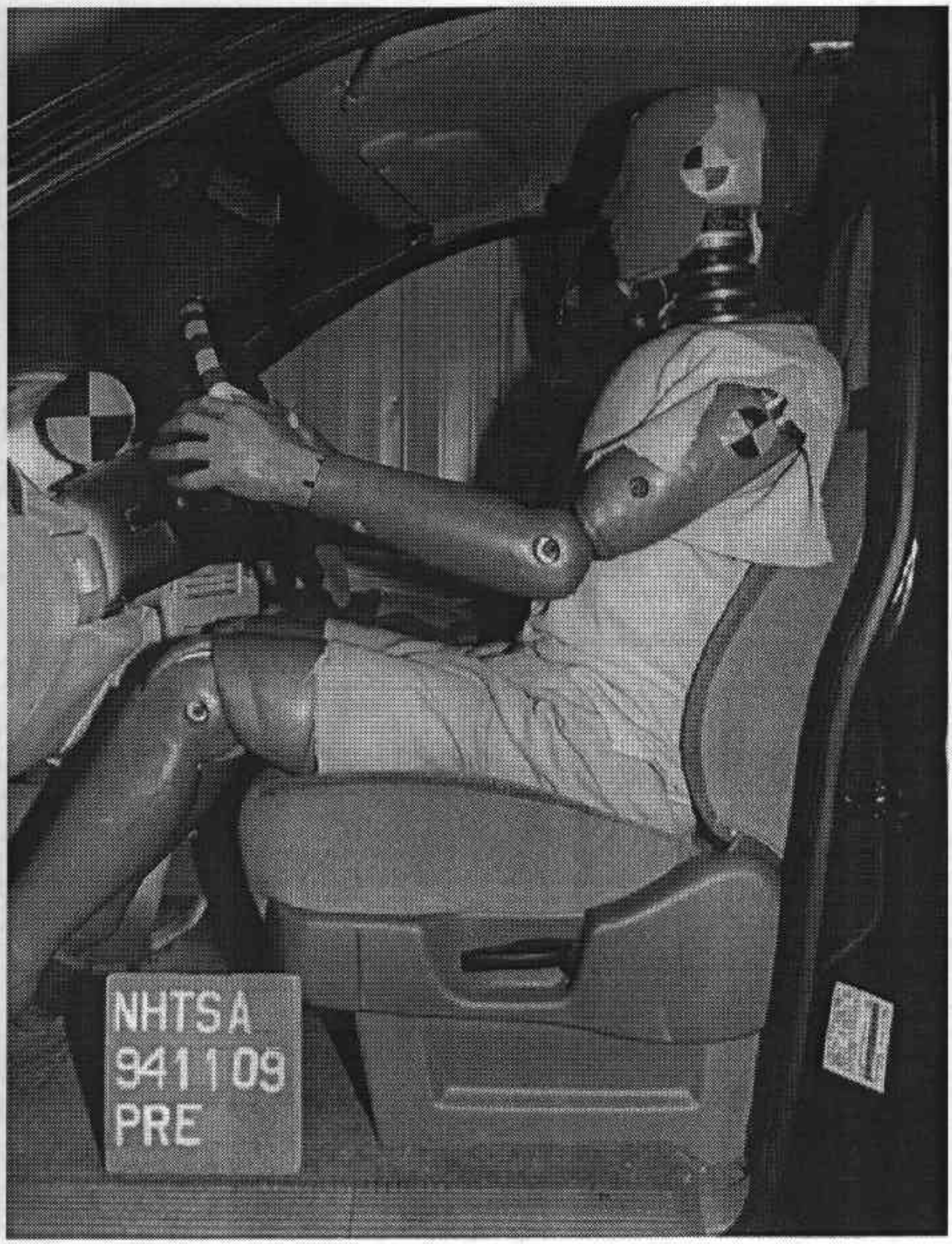


Figure A-17. Pre-Test Driver Dummy & Vehicle Interior View

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

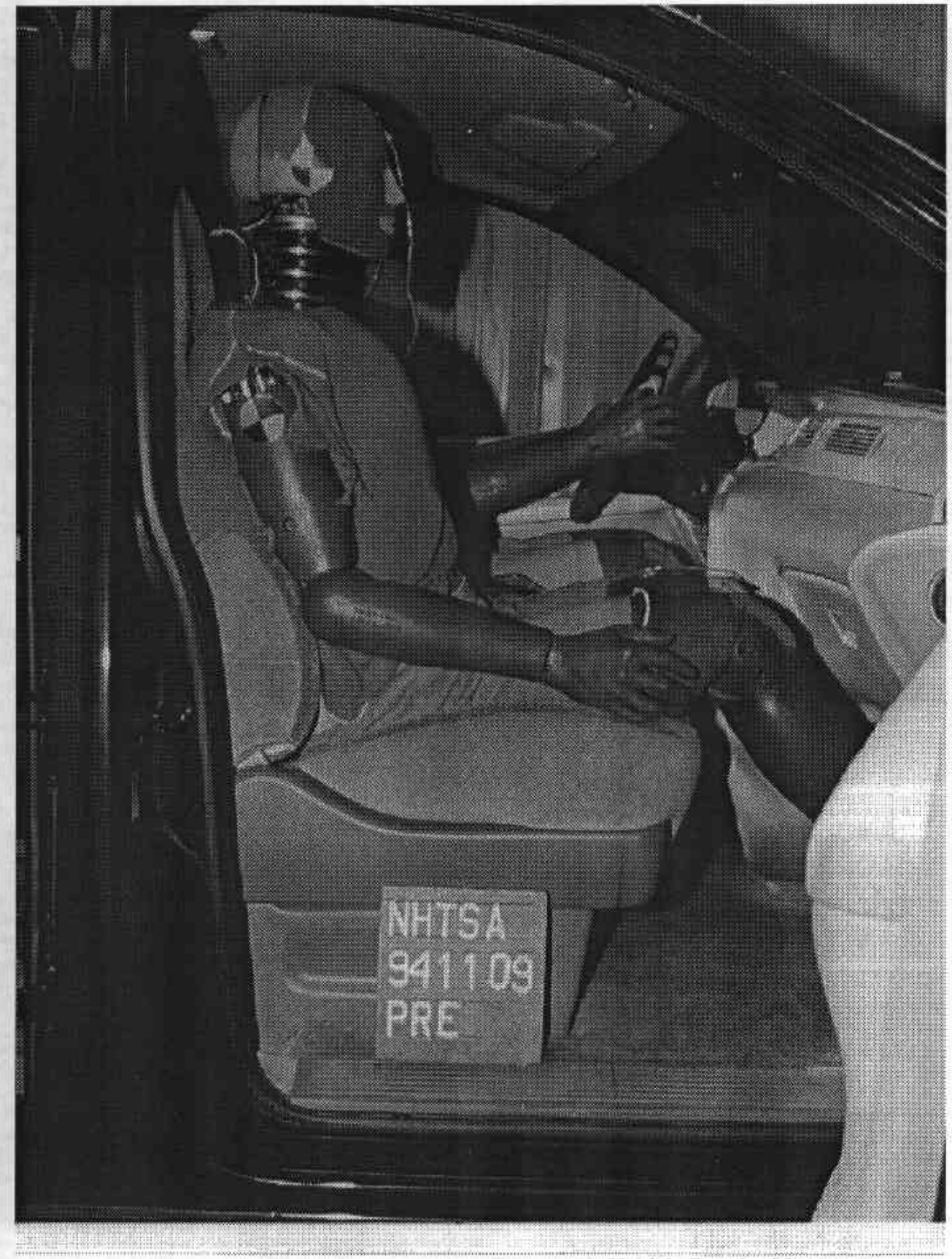


Figure A-19. Pre-Test Passenger Dummy & Vehicle Interior View

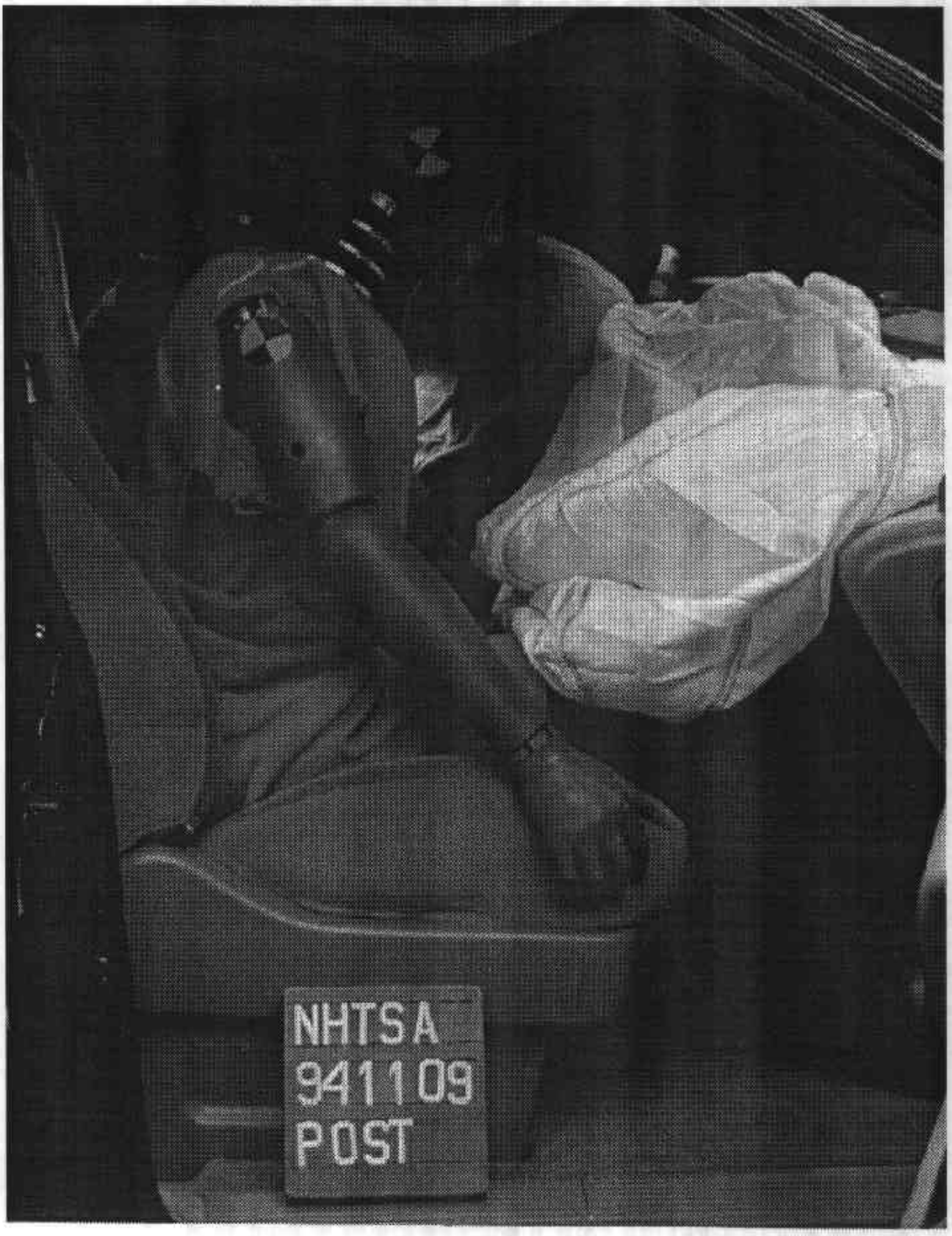


Figure A-20. Post-Test Passenger Dummy & Vehicle Interior View

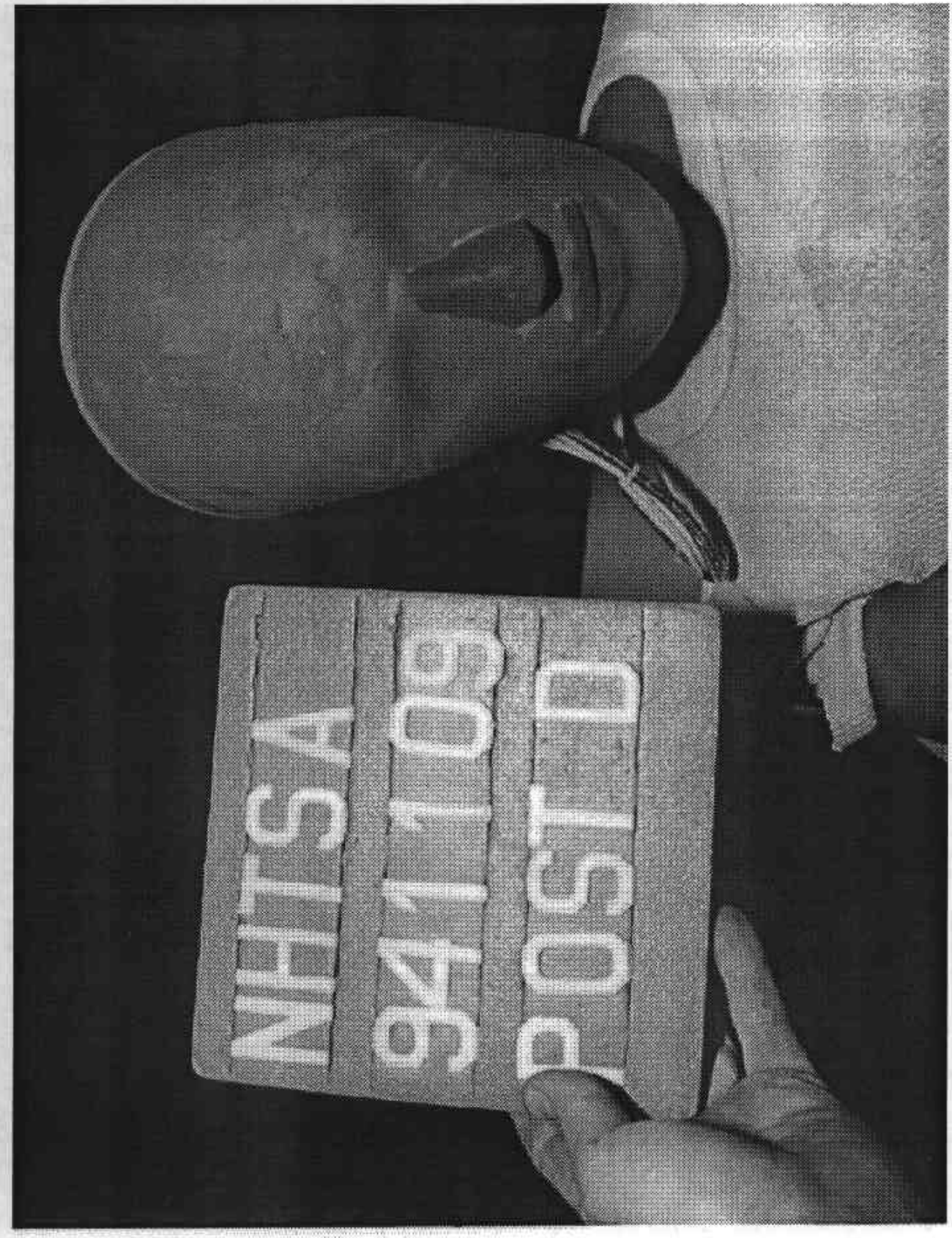


Figure A-21. Post-Test Driver Dummy Head Contact - View 1

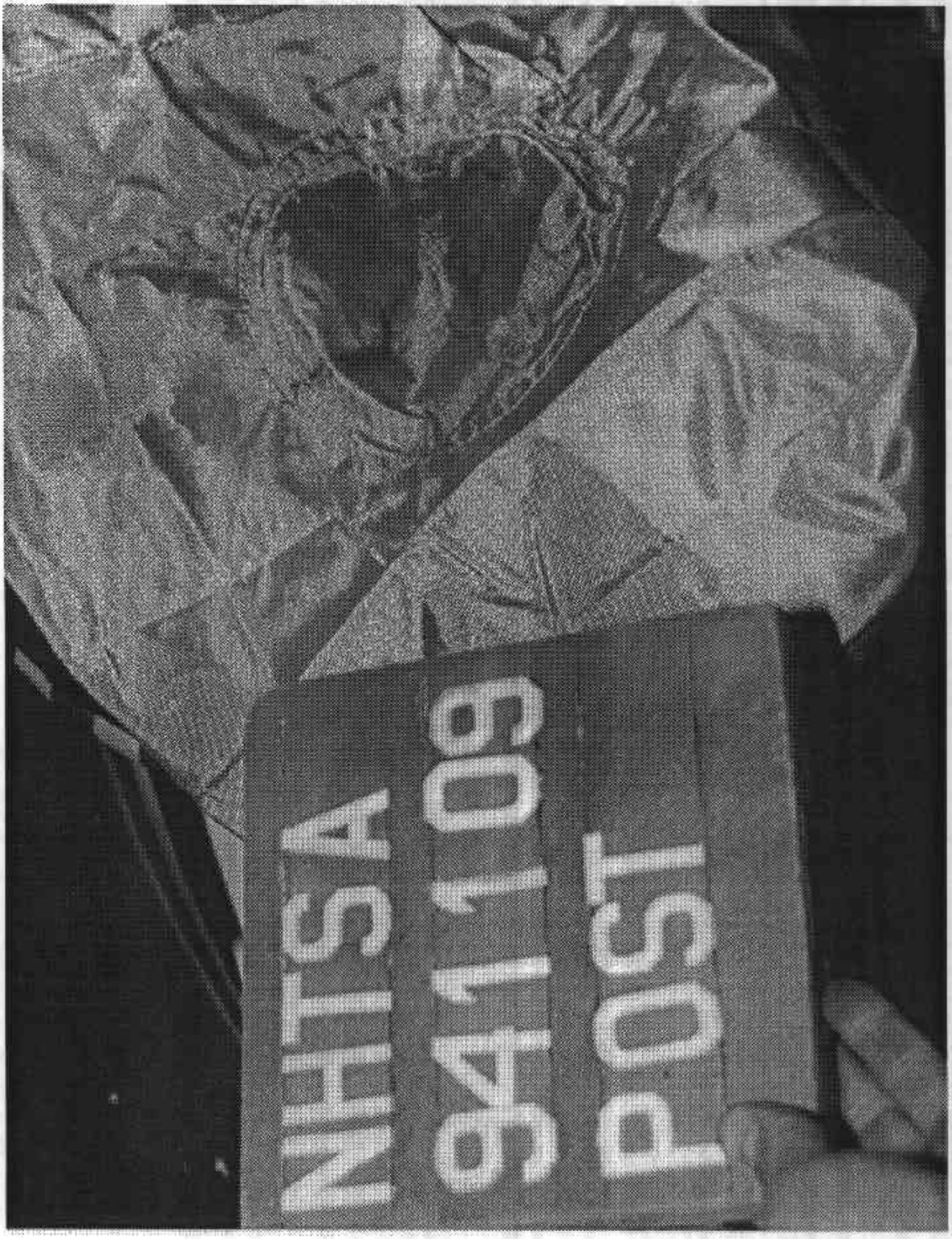


Figure A-22. Post-Test Driver Dummy Head Contact - View 2

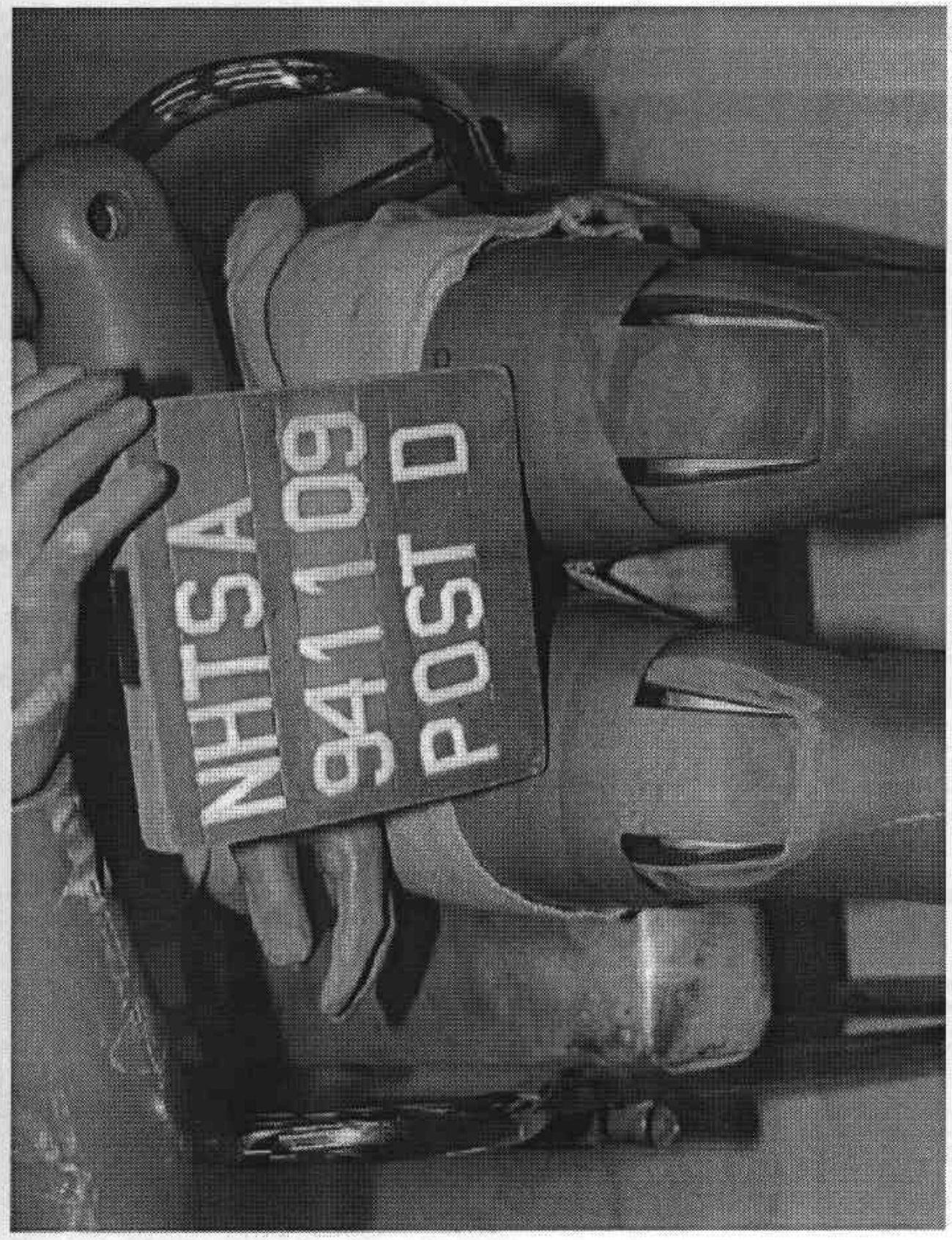


Figure A-23. Post-Test Driver Dummy Knee Contact - View 1

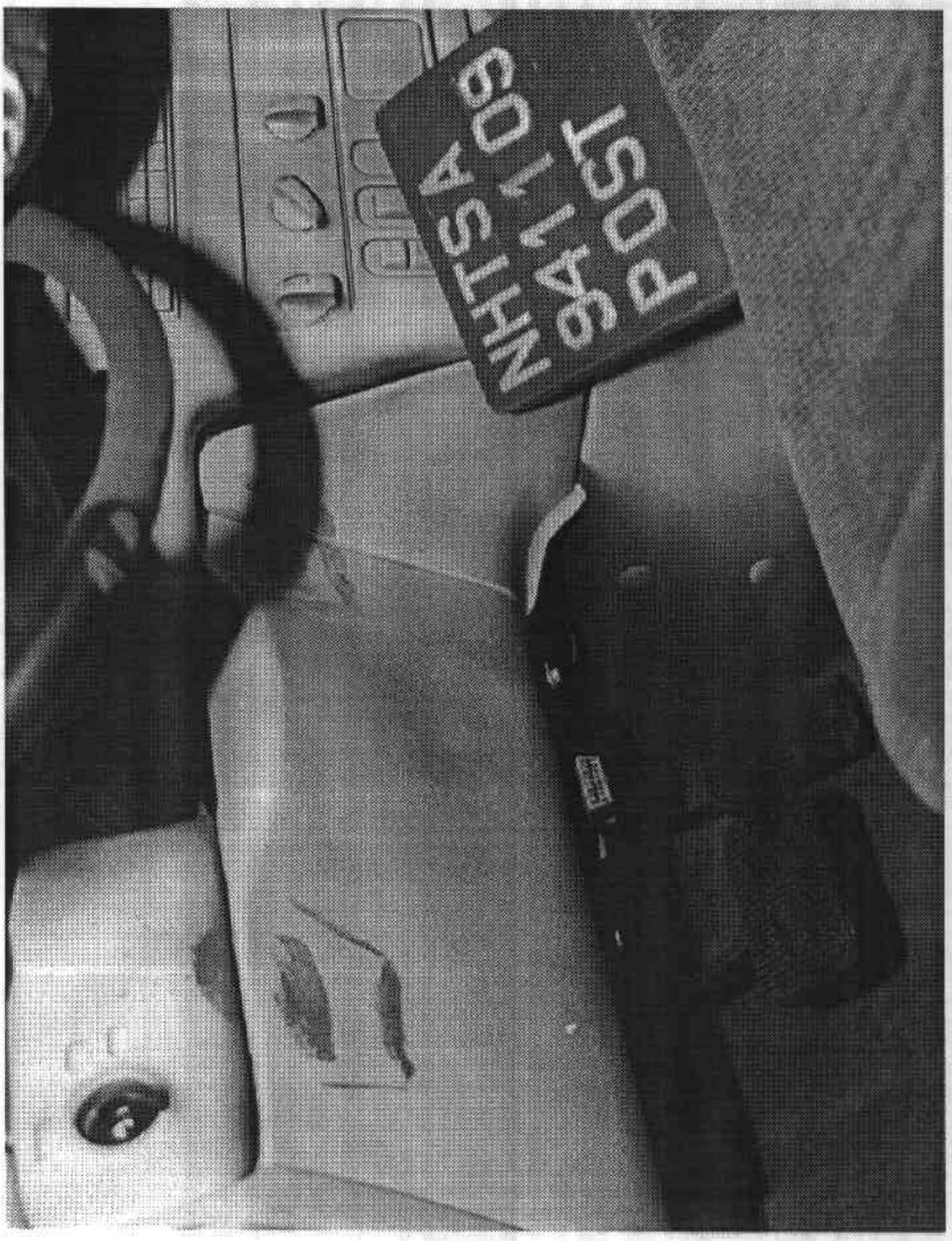


Figure A-24. Post-Test Driver Dummy Knee Contact - View 2

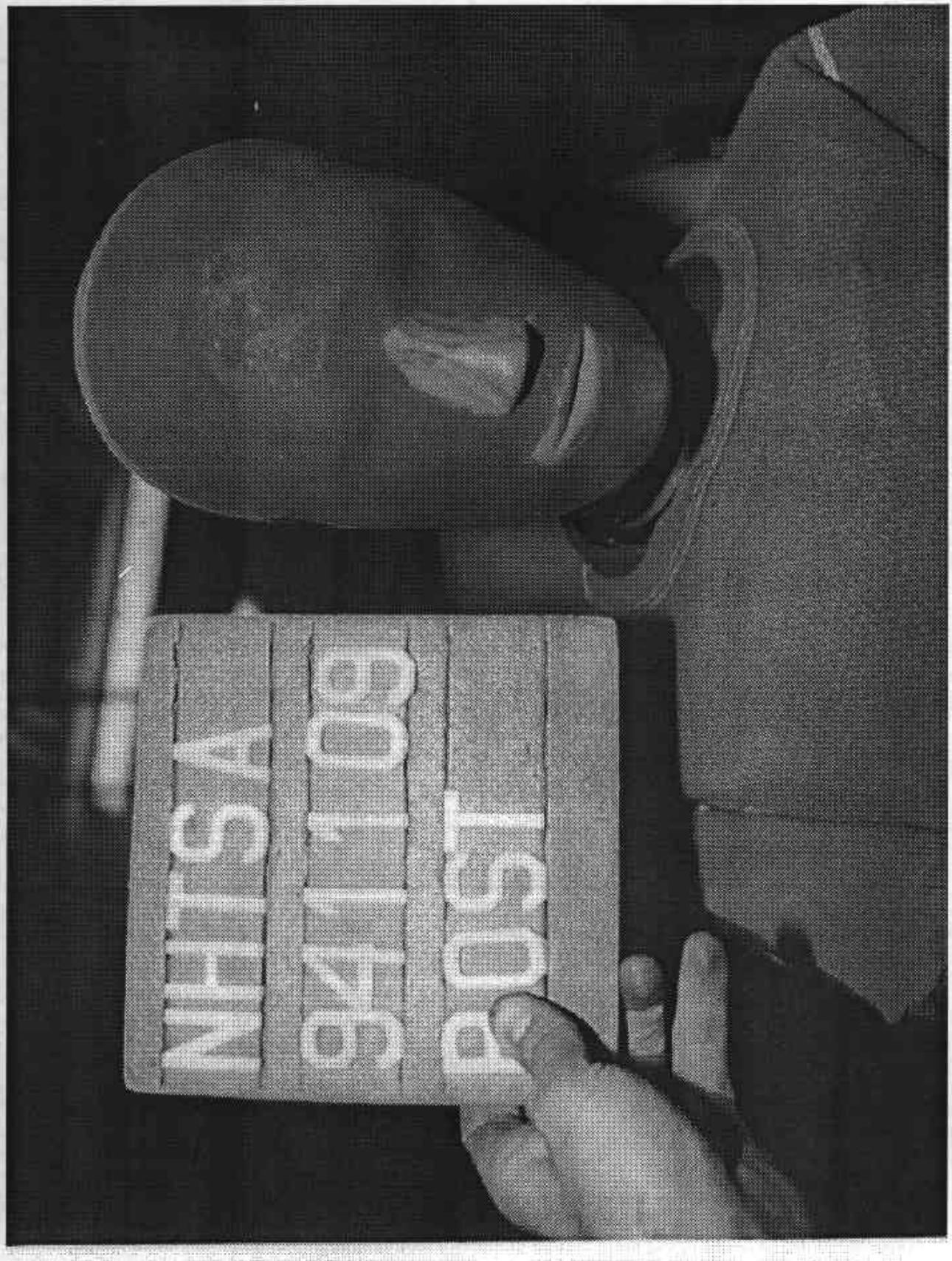


Figure A-25. Post-Test Passenger Dummy Head Contact - View 1

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

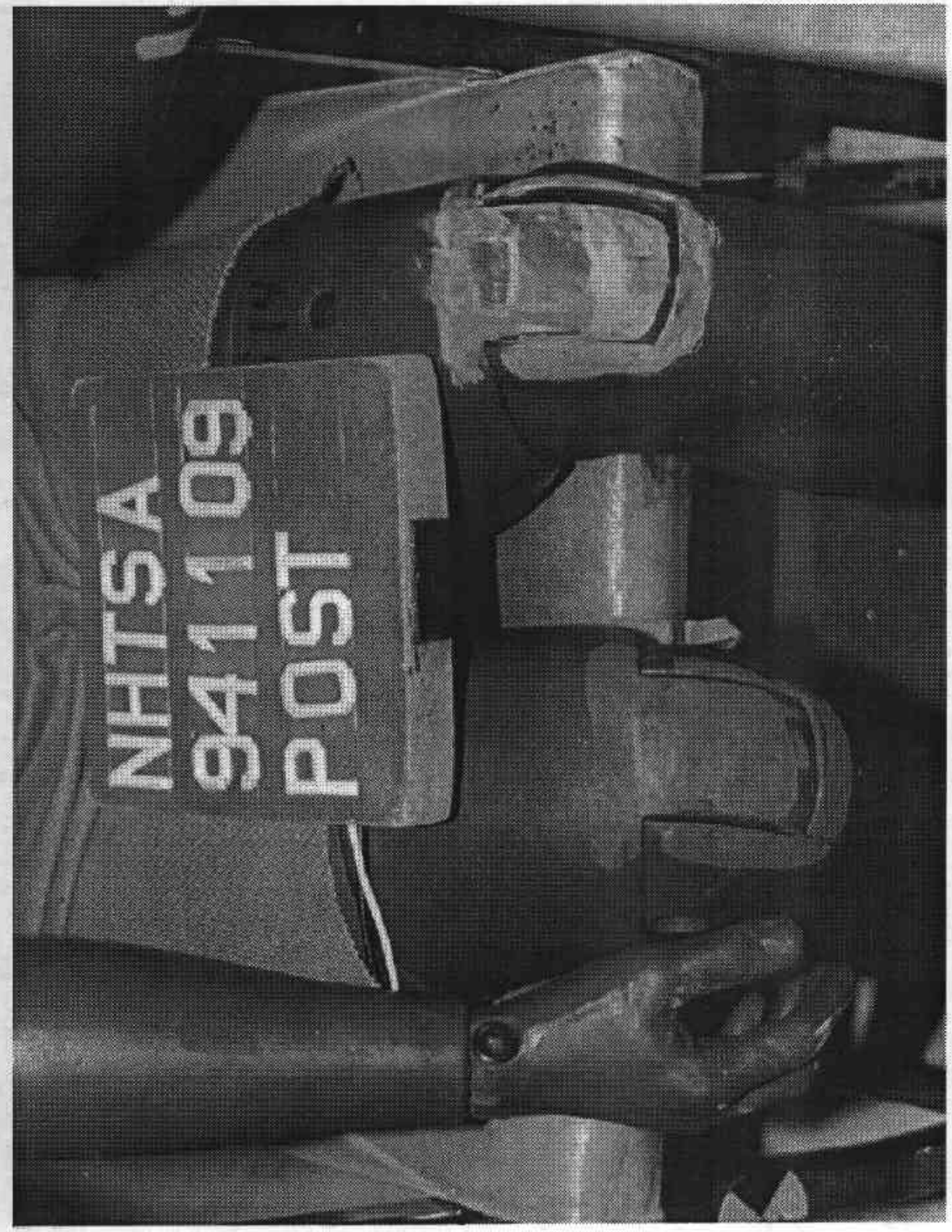


Figure A-27. Post-Test Passenger Dummy Knee Contact - View 1

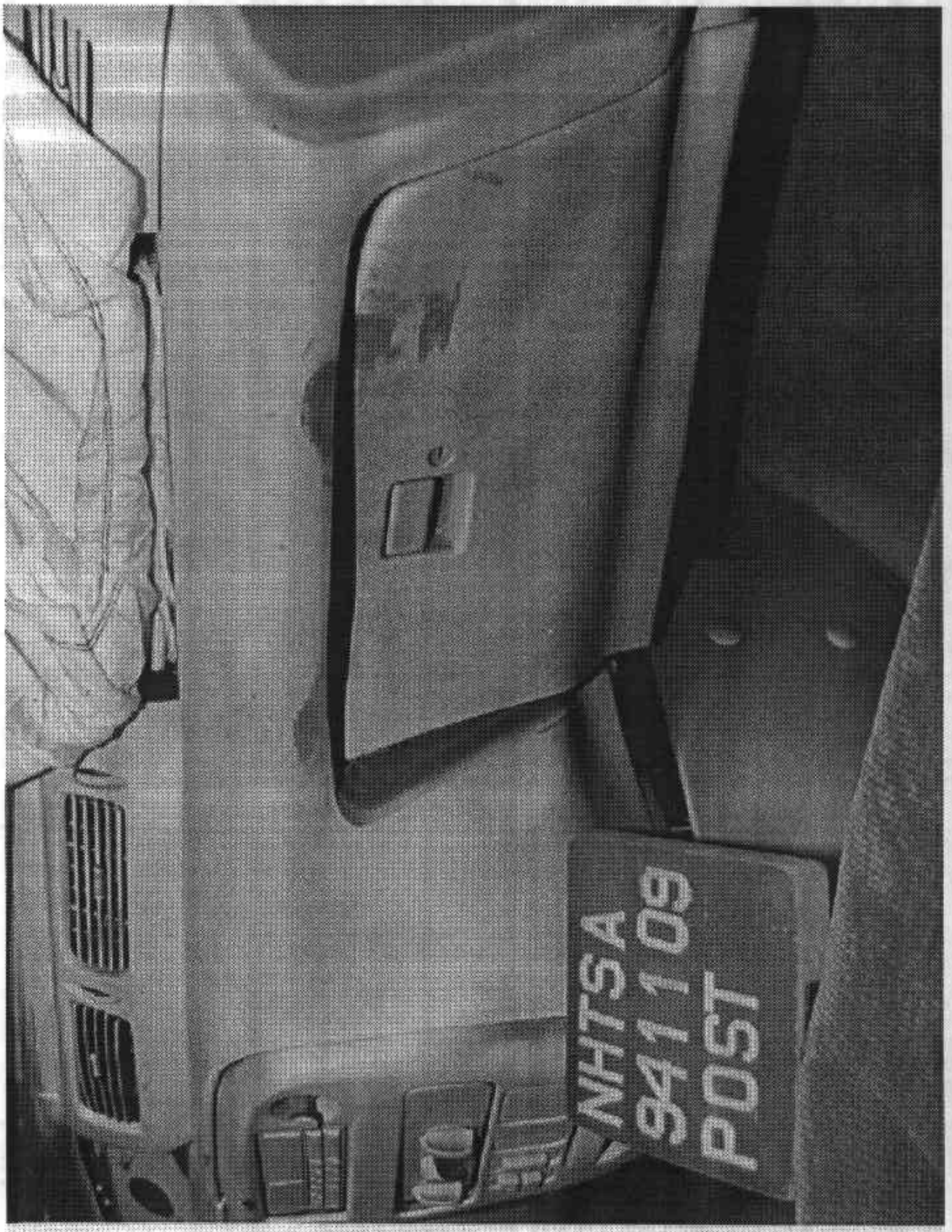


Figure A-28. Post-Test Passenger Dummy Knee Contact - View 2

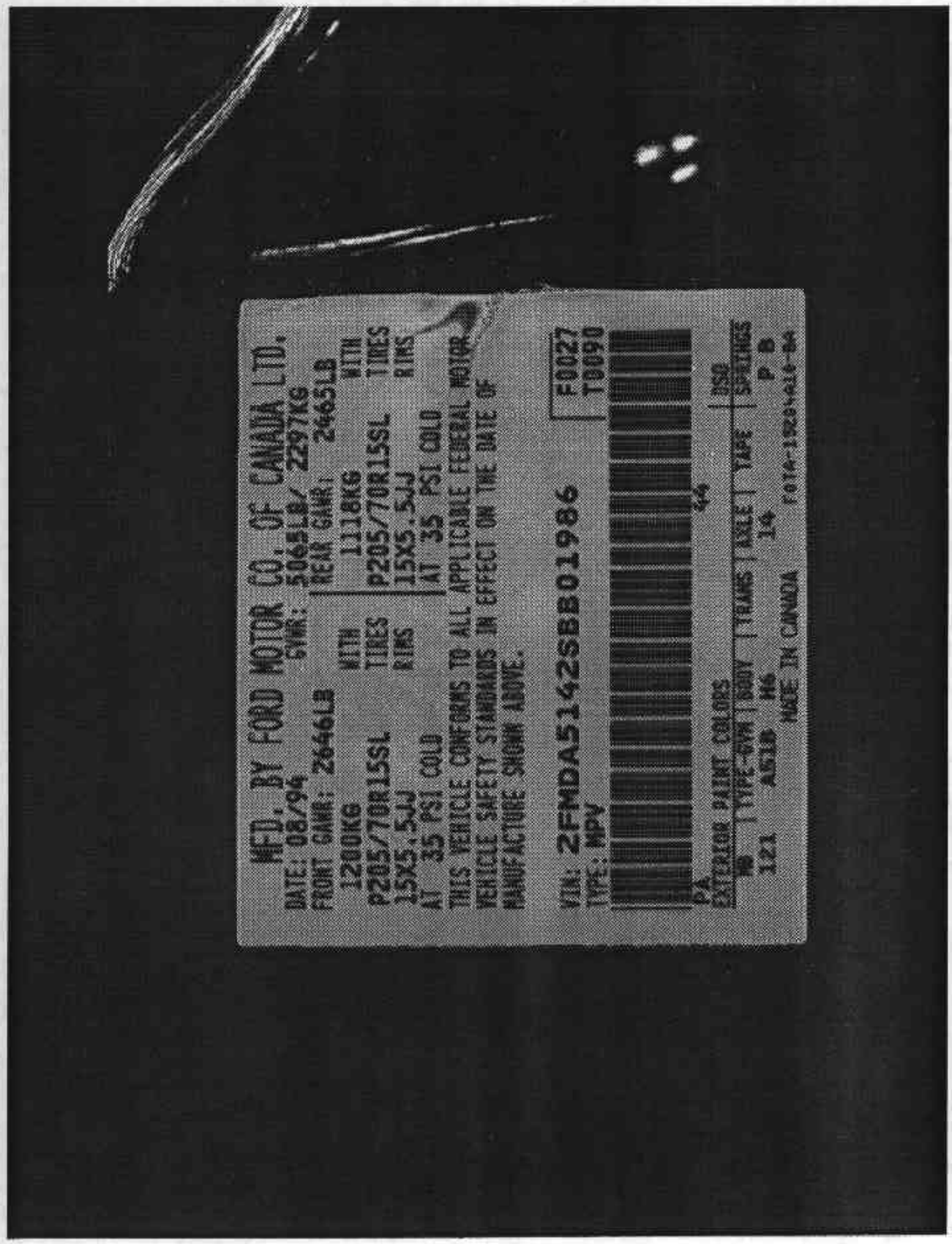
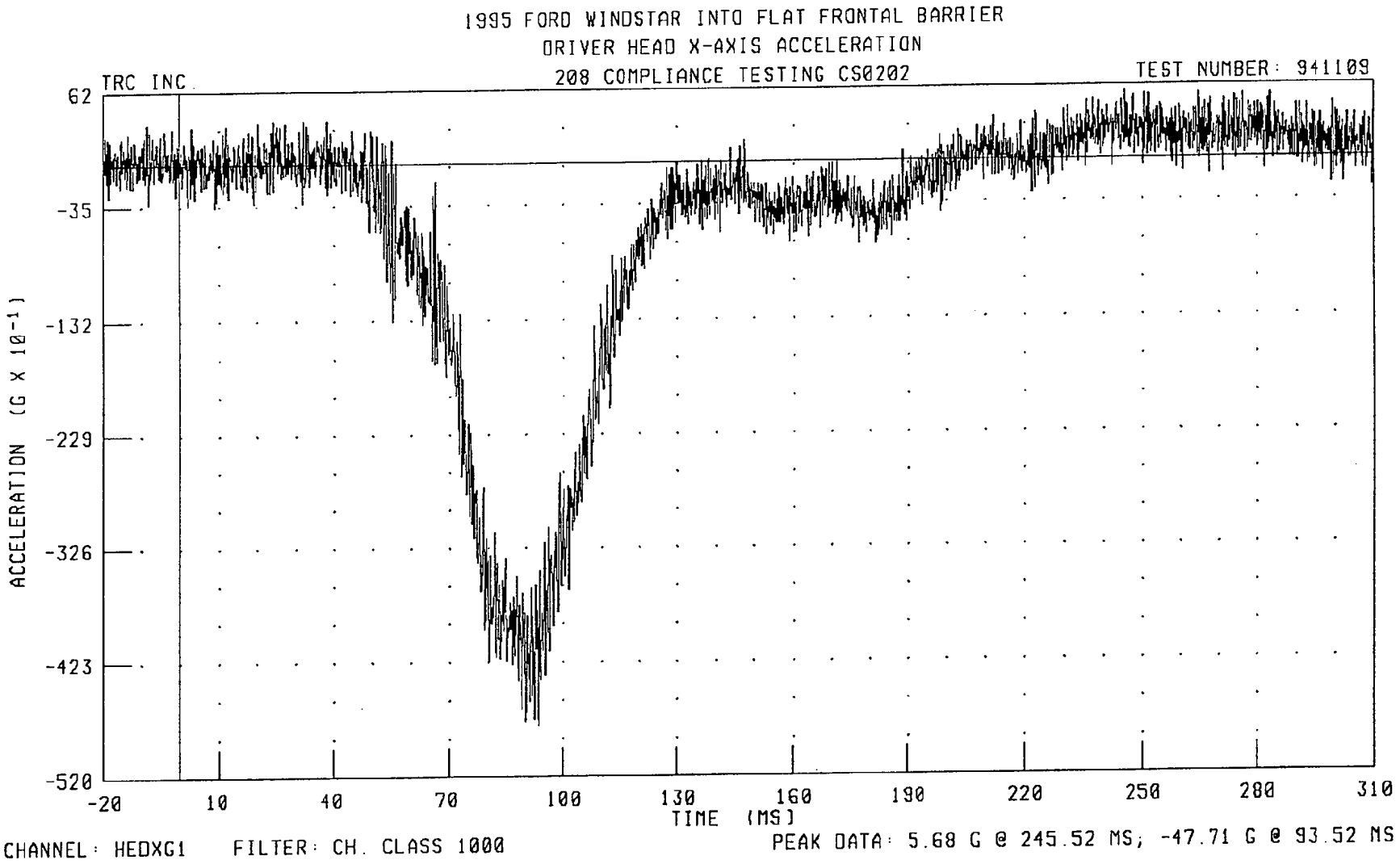


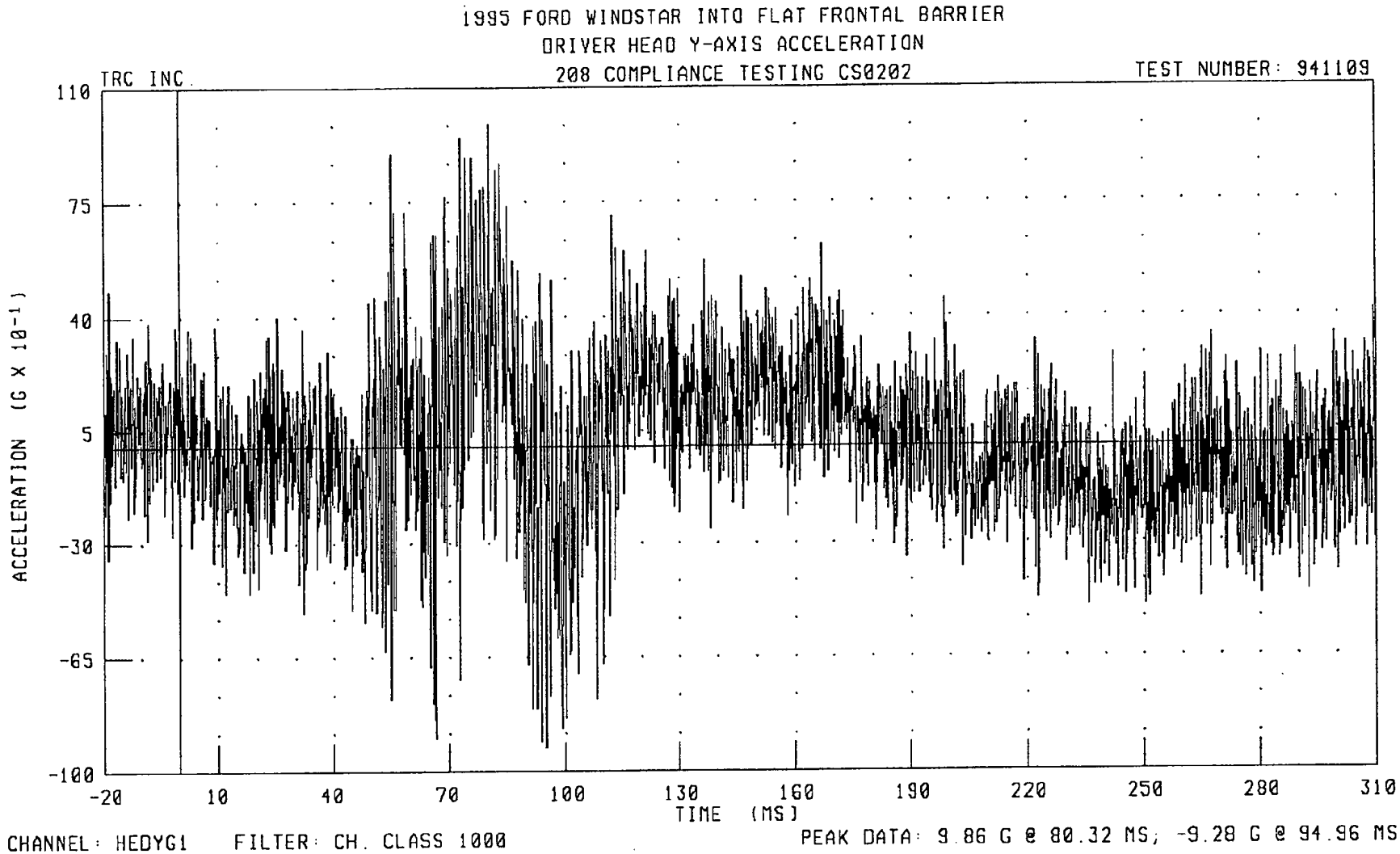
Figure A-29. Pre-Test Vehicle Certification & Recommended Tire Pressure Label

Appendix B

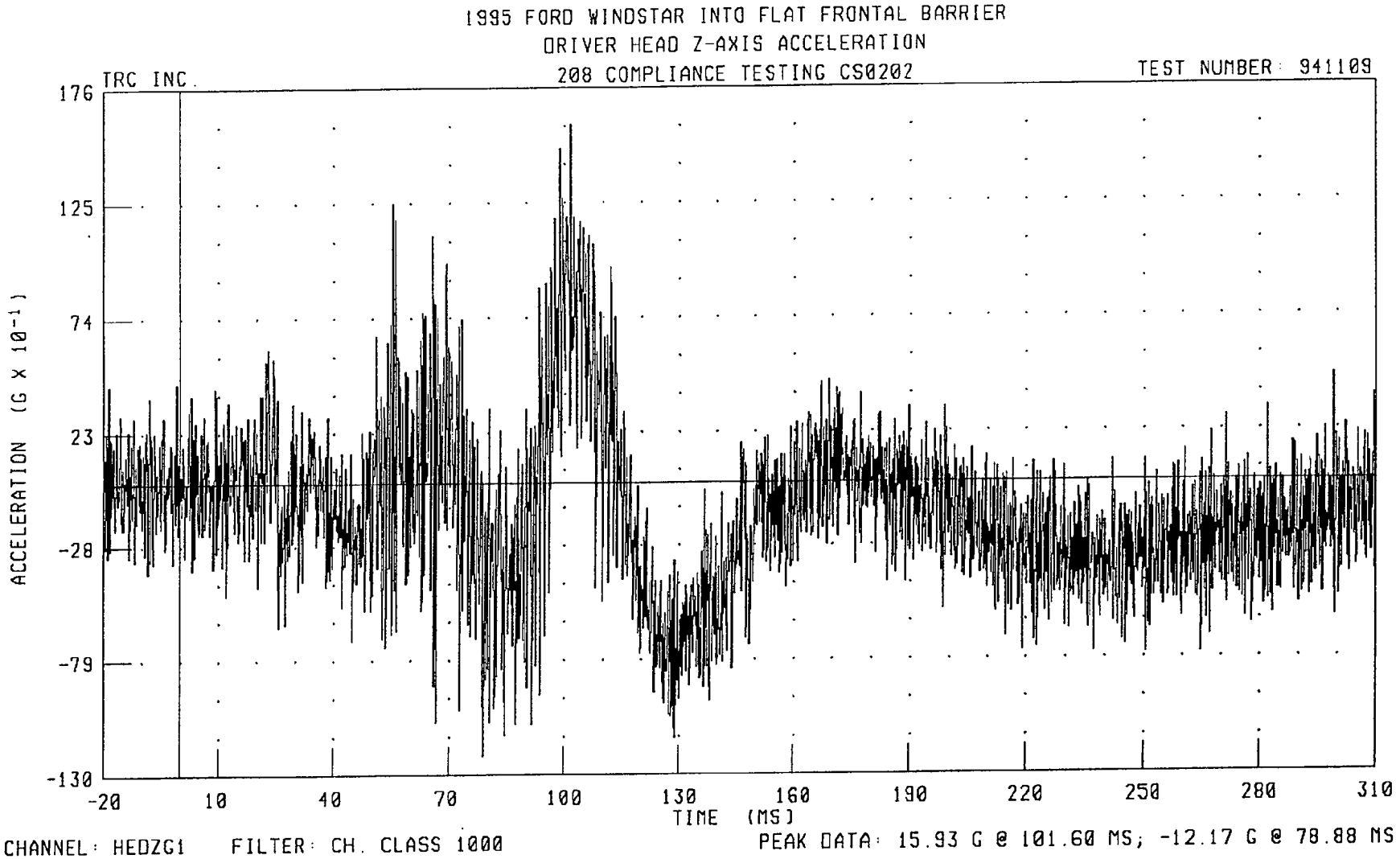
Data Plots


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
62
-35
-132
-229
-326
-423
-520
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXG1
FILTER: CH. CLASS 1000
PEAK DATA: 5.68 G @ 245.52 MS; -47.71 G @ 93.52 MS

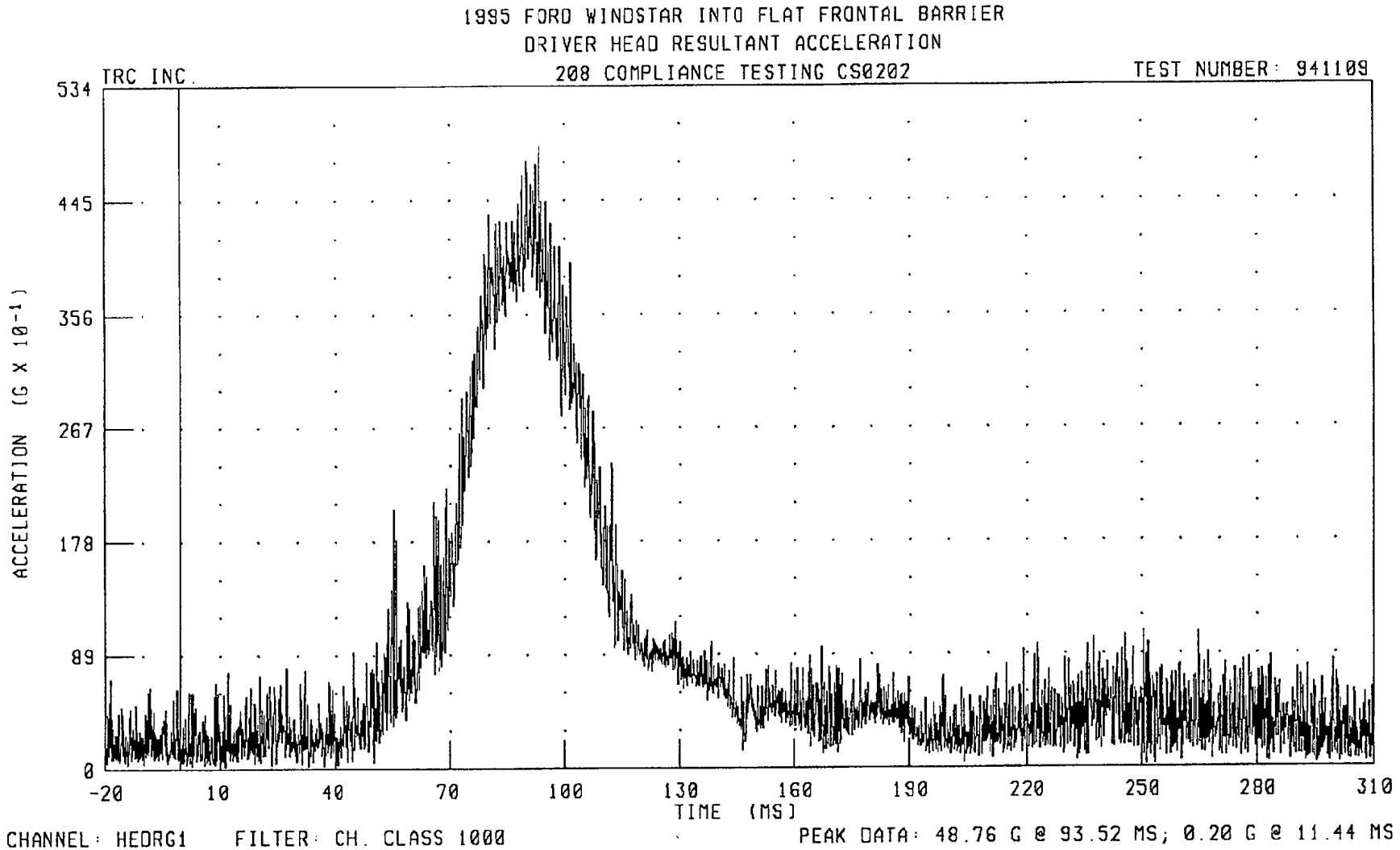
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
110
75
40
5
-30
-65
-100
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG1
FILTER: CH. CLASS 1000
PEAK DATA: 9.86 G @ 80.32 MS; -9.28 G @ 94.96 MS

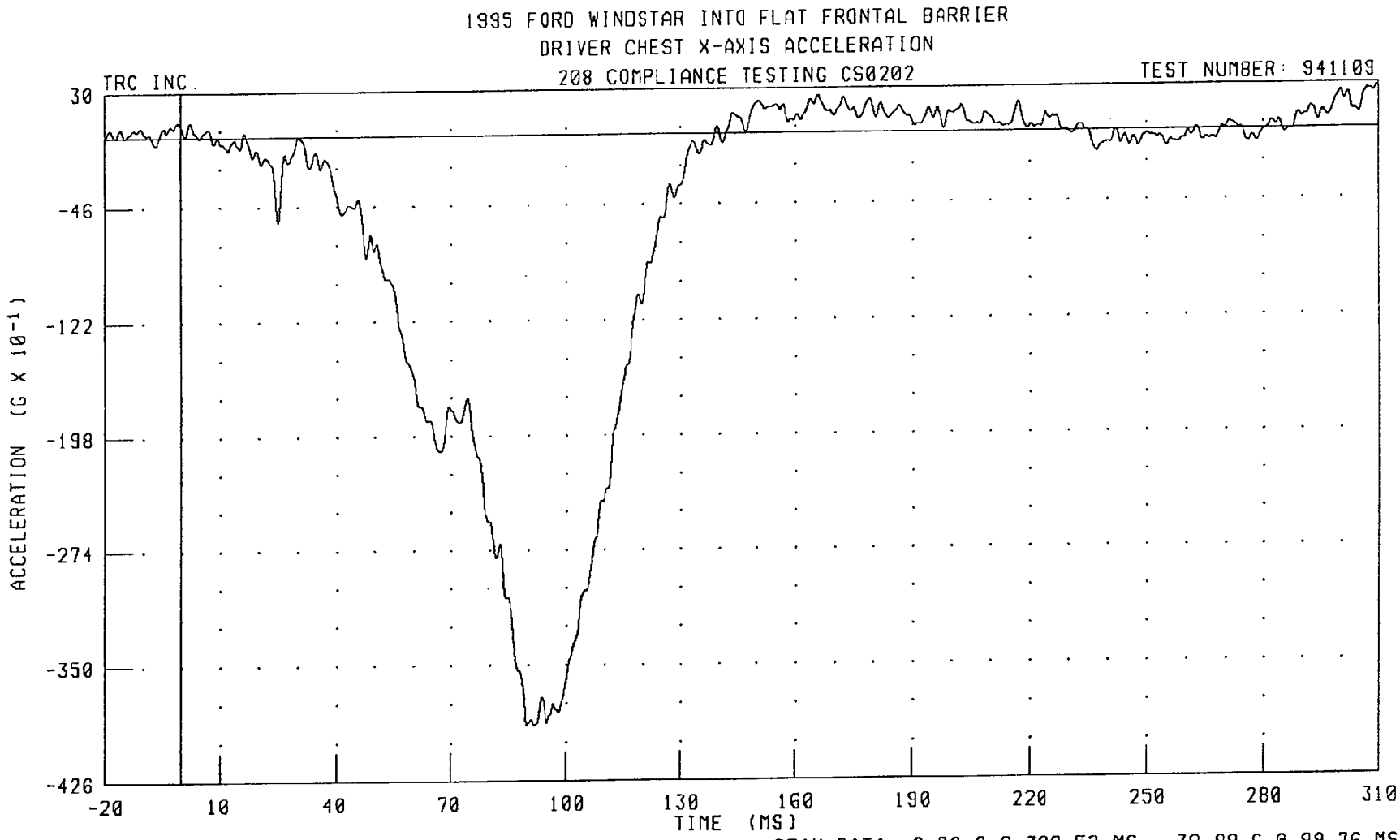
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
176
125
74
23
-28
-79
-130
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZG1
FILTER: CH. CLASS 1000
PEAK DATA: 15.93 G @ 101.60 MS; -12.17 G @ 78.88 MS

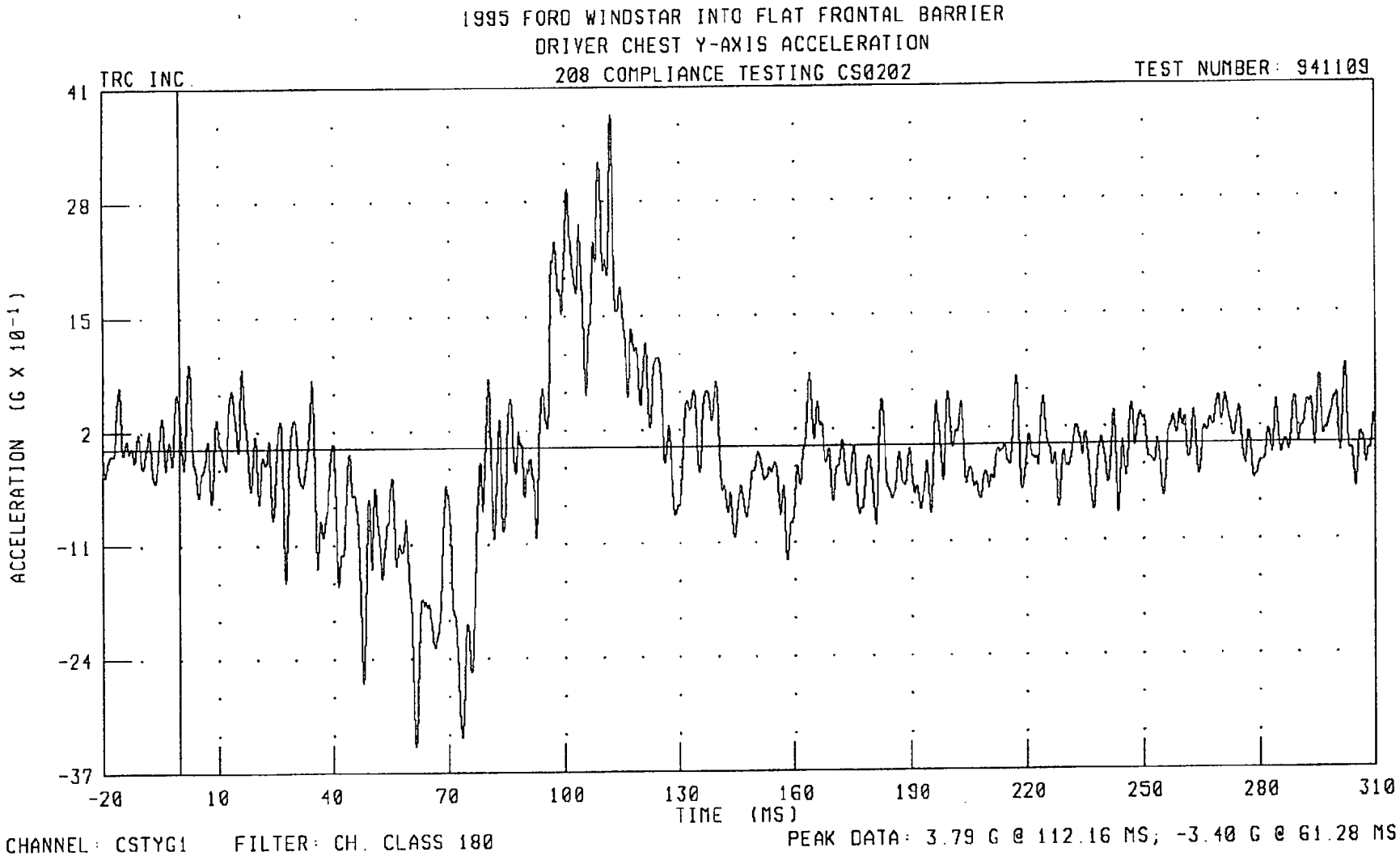
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
534
445
356
267
178
89
0
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG1
FILTER: CH. CLASS 1000
PEAK DATA: 48.76 G @ 93.52 MS; 0.20 G @ 11.44 MS

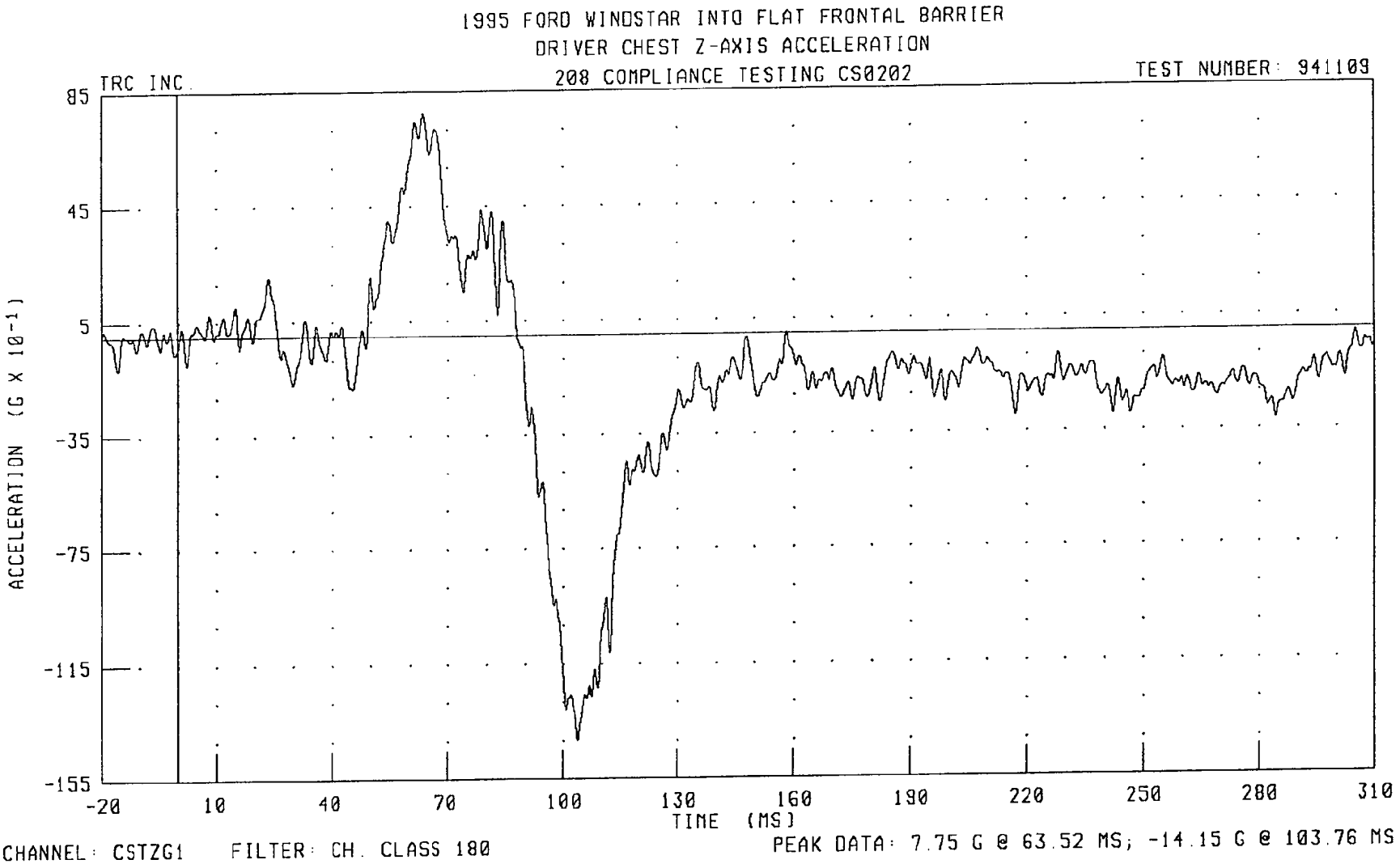
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
30
-46
-122
-198
-274
-350
-426
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXG1
FILTER: CH. CLASS 180
PEAK DATA: 2.79 G @ 309.52 MS; -38.98 G @ 89.76 MS

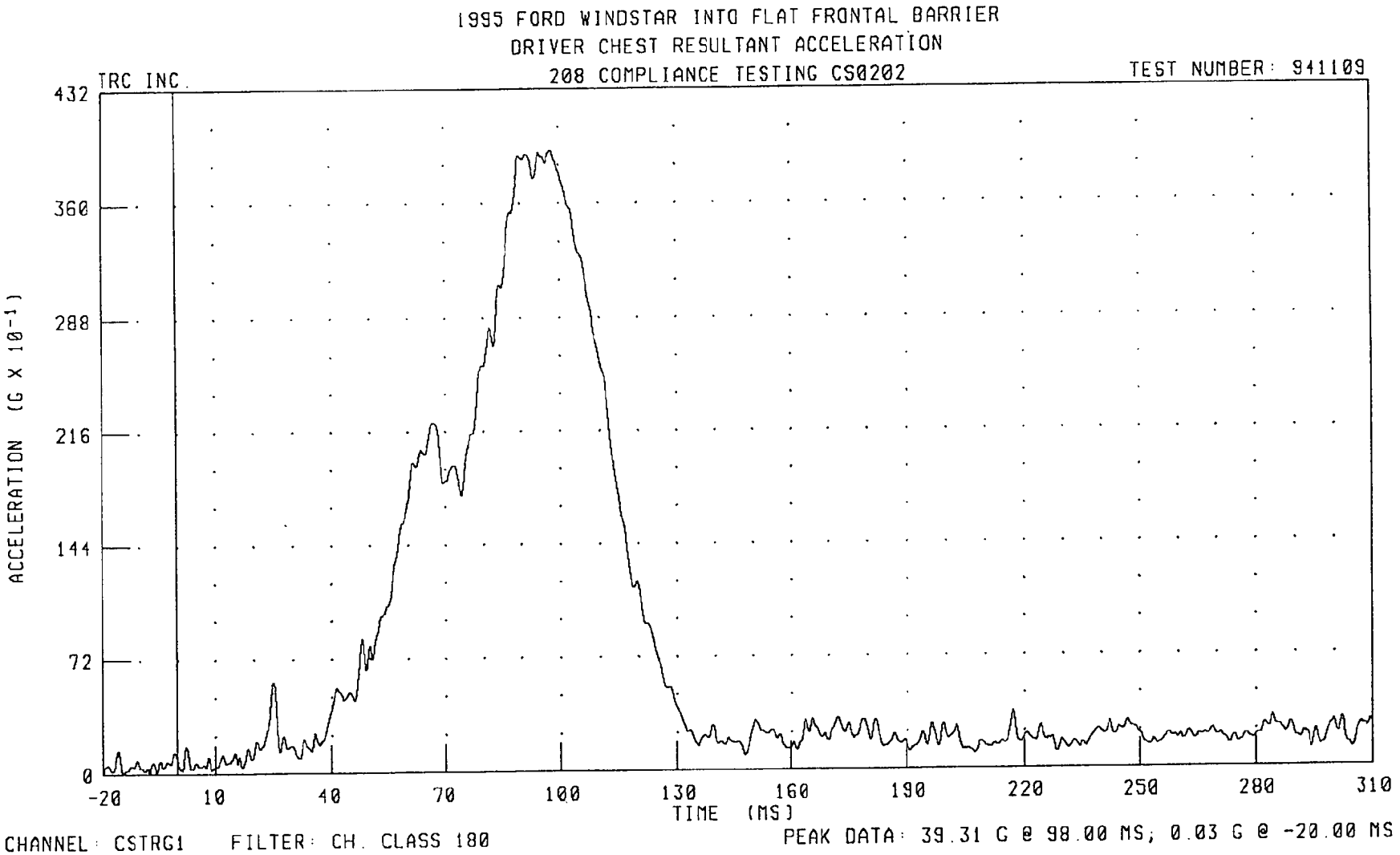
941109

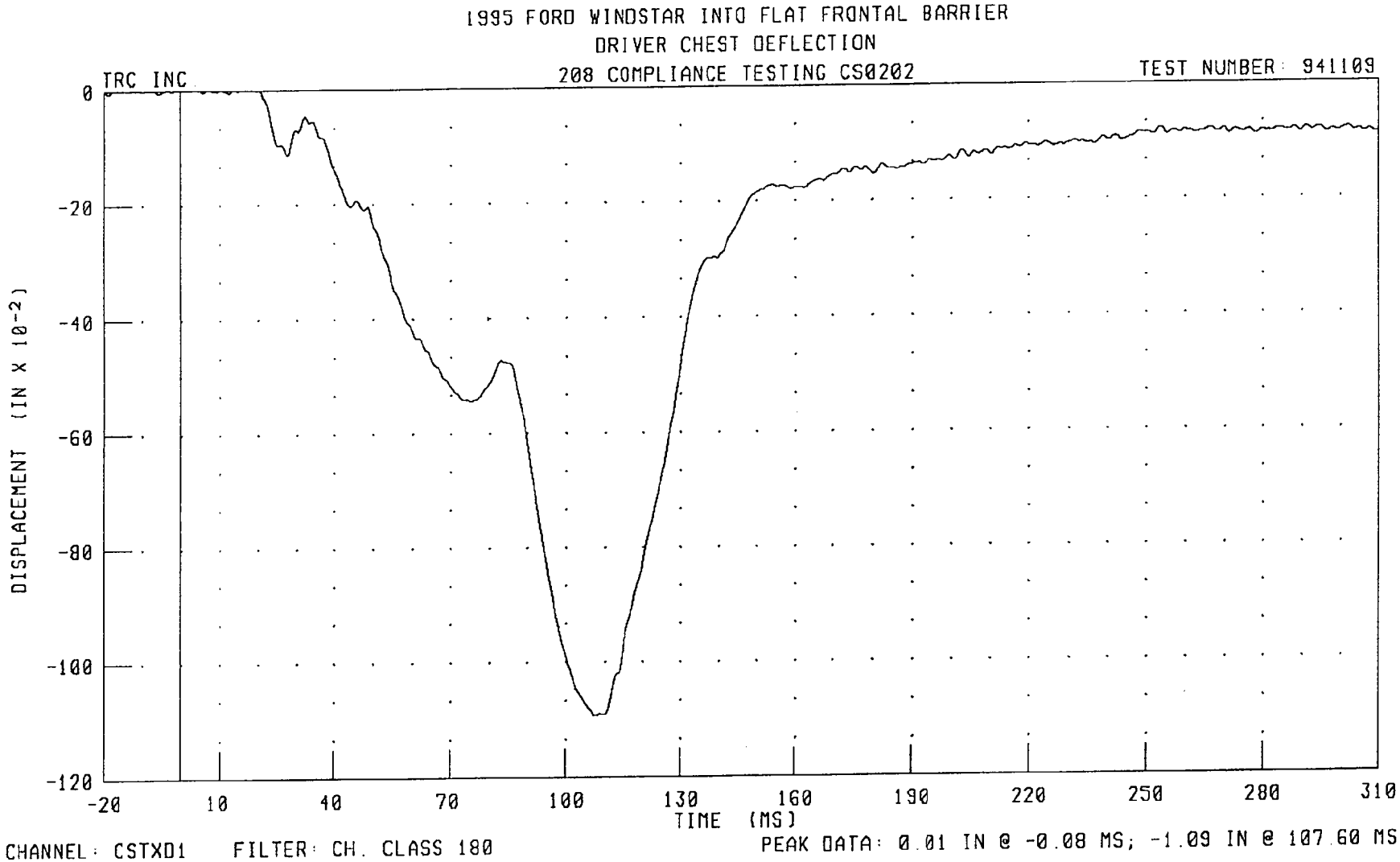

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10-1)
41
28
15
2
-11
-24
-37
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG1
FILTER: CH. CLASS 180
PEAK DATA: 3.79 G @ 112.16 MS; -3.40 G @ 61.28 MS

941109

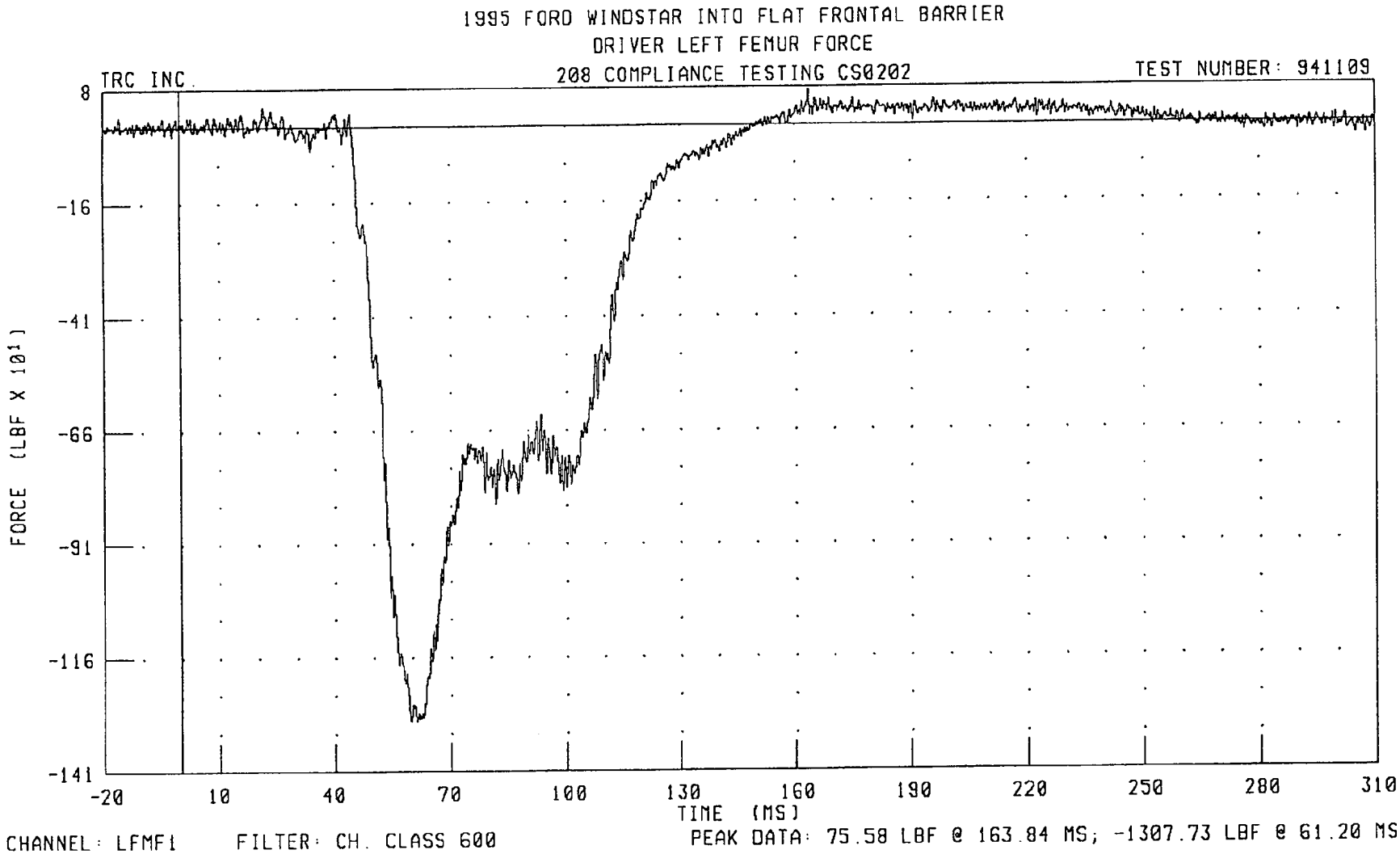

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
85
45
5
-35
-75
-115
-155
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG1
FILTER: CH. CLASS 180
PEAK DATA: 7.75 G @ 63.52 MS; -14.15 G @ 103.76 MS

941109

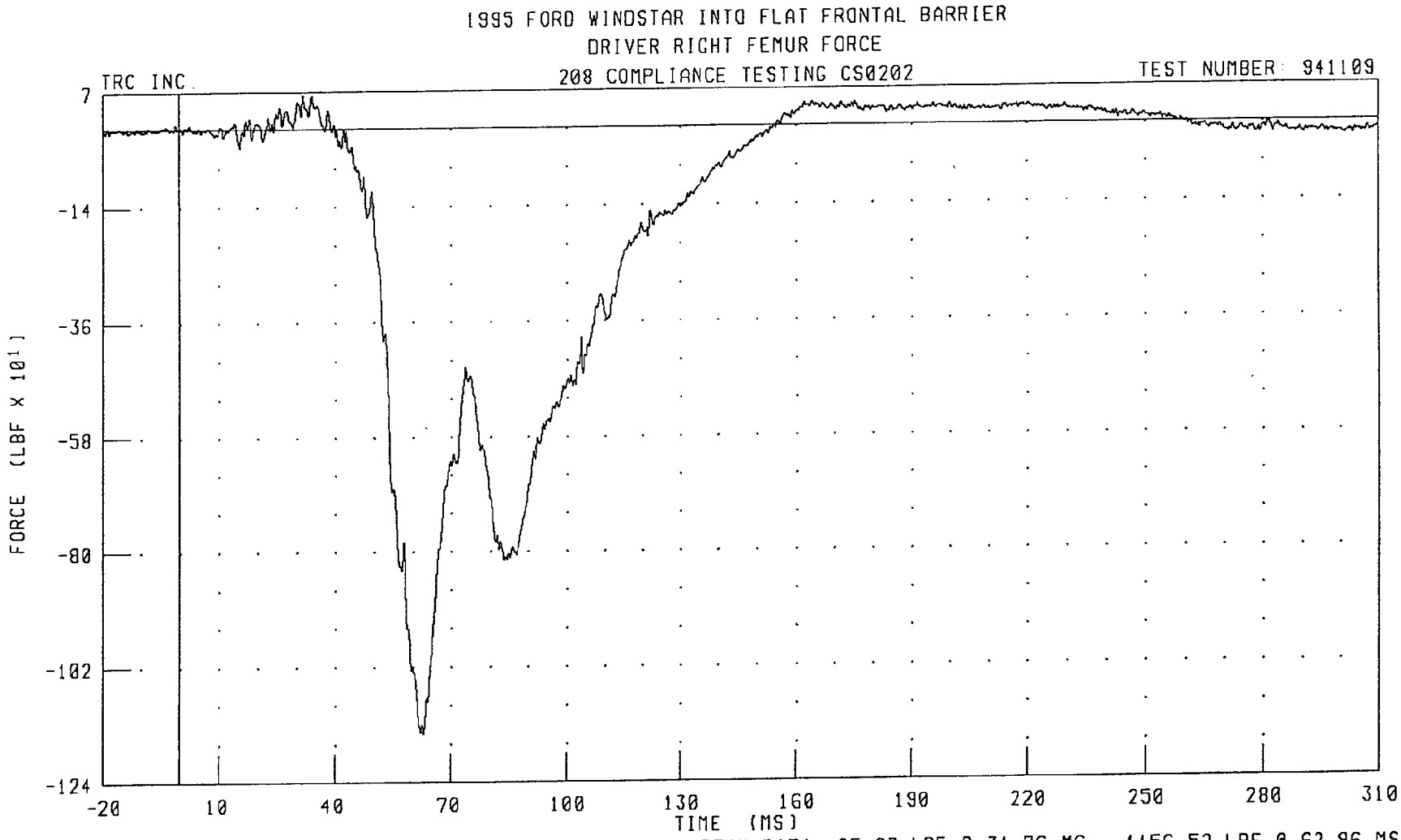

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10⁻¹)
432
360
288
216
144
72
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG1
FILTER: CH. CLASS 180
PEAK DATA: 39.31 G @ 98.00 MS; 0.03 G @ -20.00 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER CHEST DEFLECTION
208 COMPLIANCE TESTING CS0202
TRC INC
TEST NUMBER: 941109
DISPLACEMENT (IN X 10-2)
0
-20
-40
-60
-80
-100
-120
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD1
FILTER: CH. CLASS 180
PEAK DATA: 0.01 IN @ -0.08 MS; -1.09 IN @ 107.60 MS

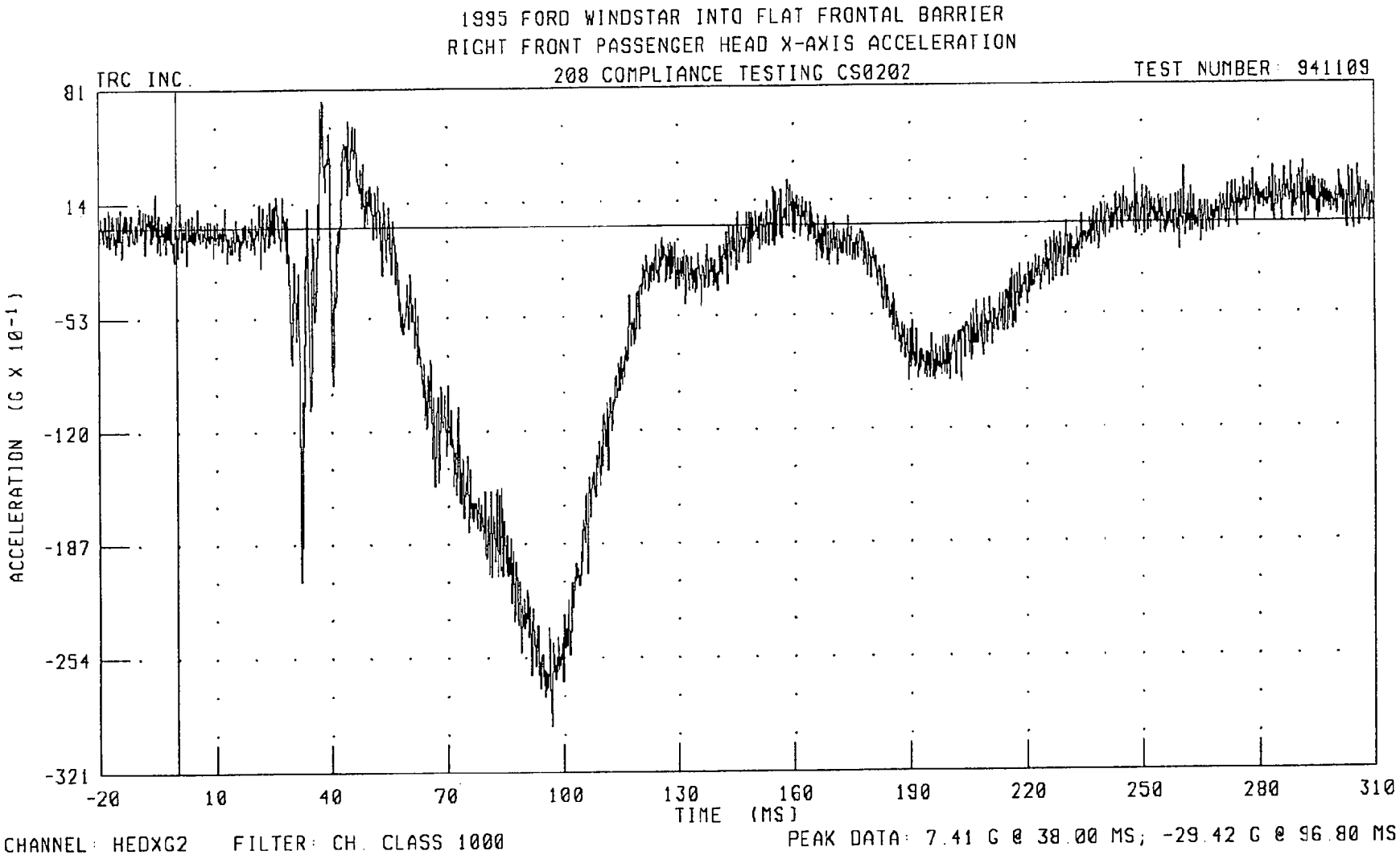
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
8
-16
-41
-66
-91
-116
-141
FORCE (LBF X 101)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF1
FILTER: CH. CLASS 600
PEAK DATA: 75.58 LBF @ 163.84 MS; -1307.73 LBF @ 61.20 MS

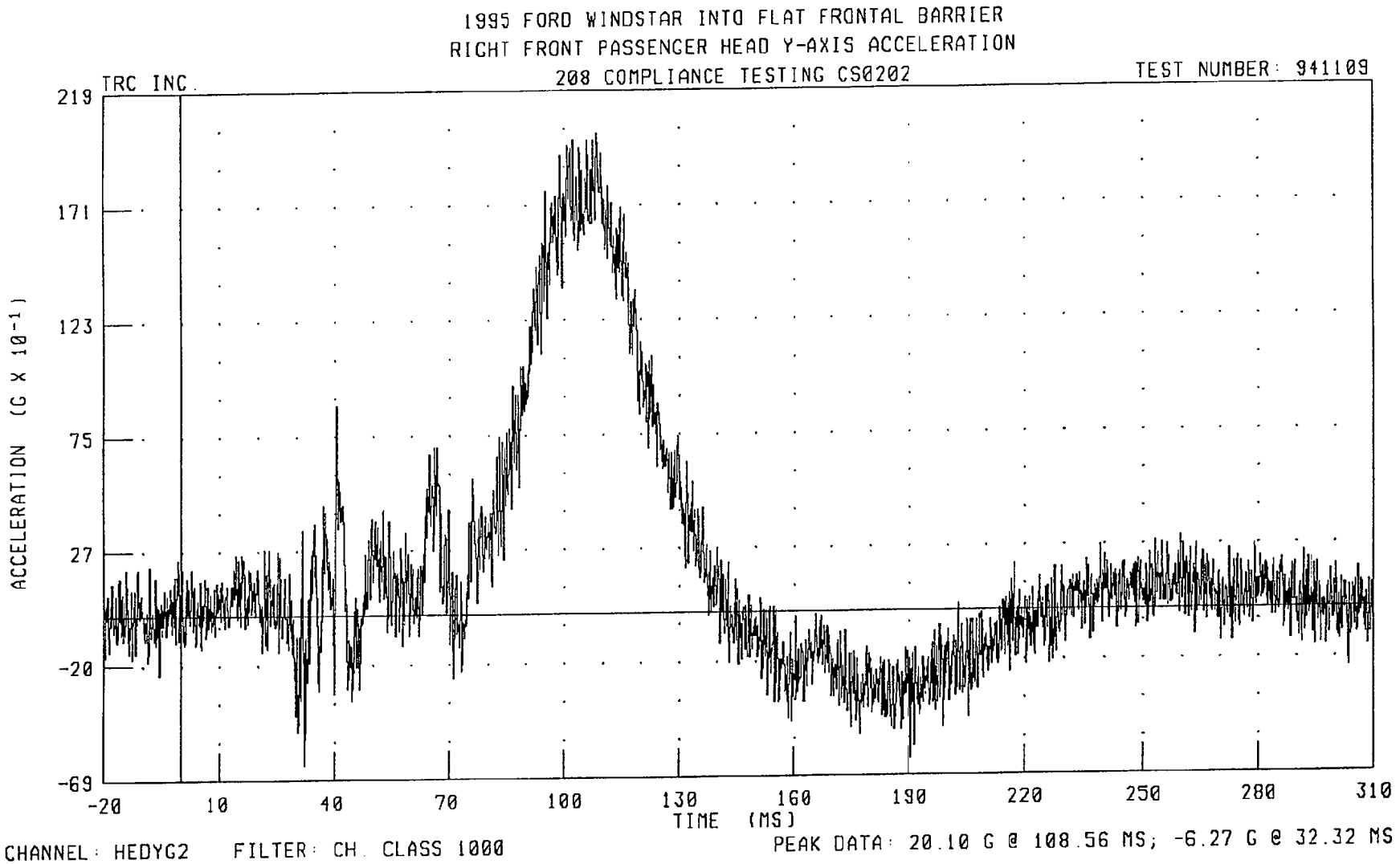
941109

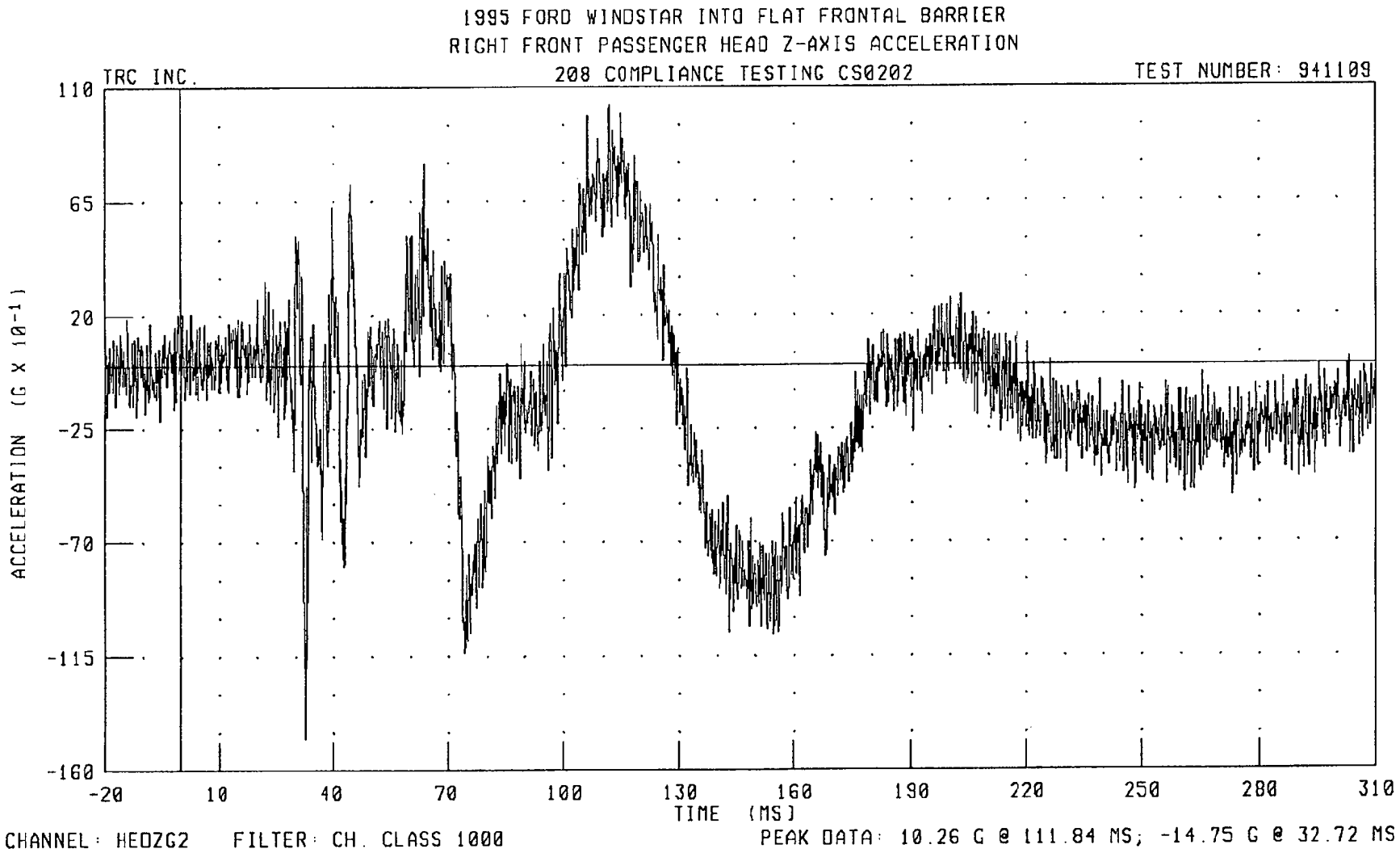

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
7
-14
-36
-58
-80
-102
-124
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF1
FILTER: CH. CLASS 600
PEAK DATA: 65.83 LBF @ 31.76 MS; -1156.52 LBF @ 62.96 MS

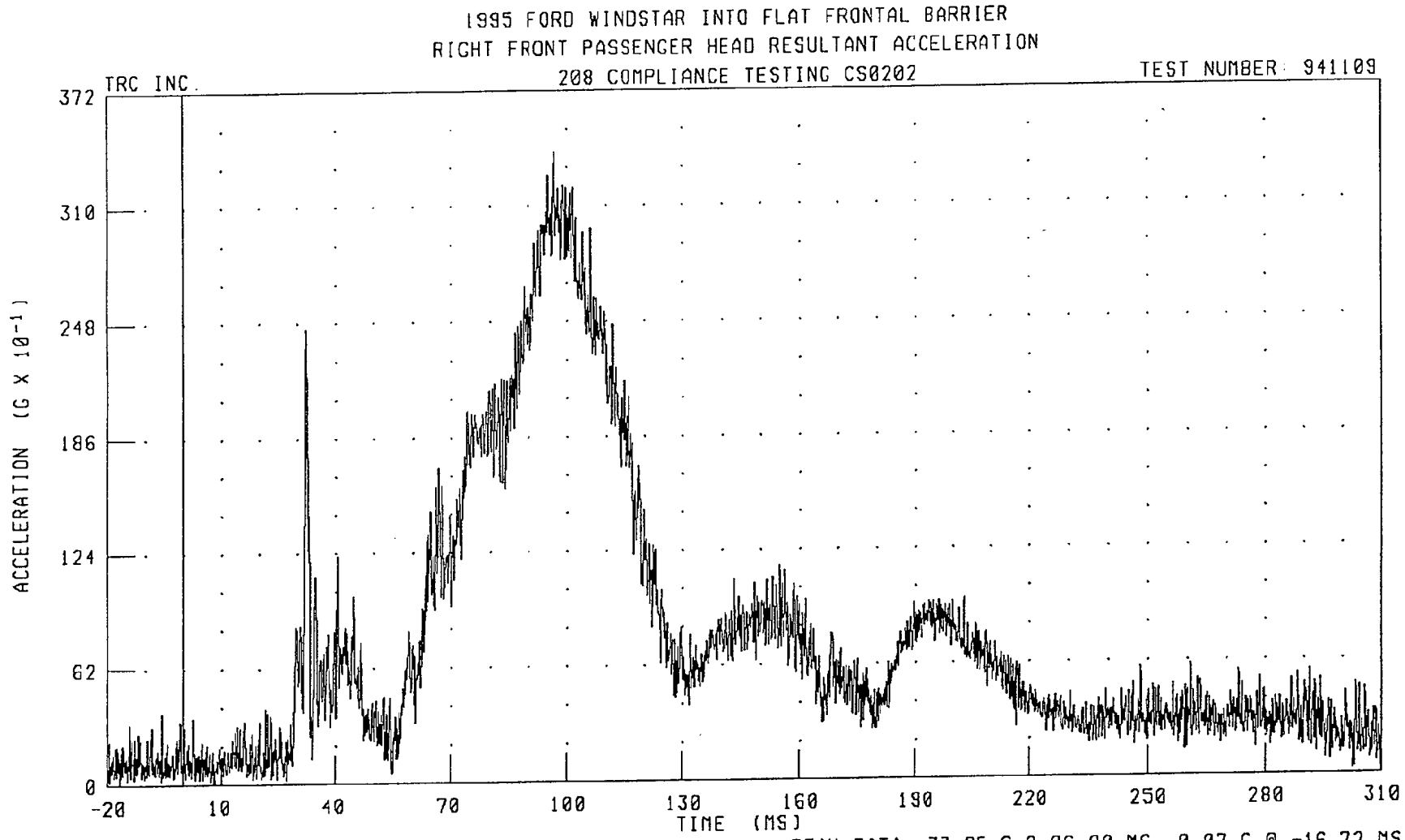
941109

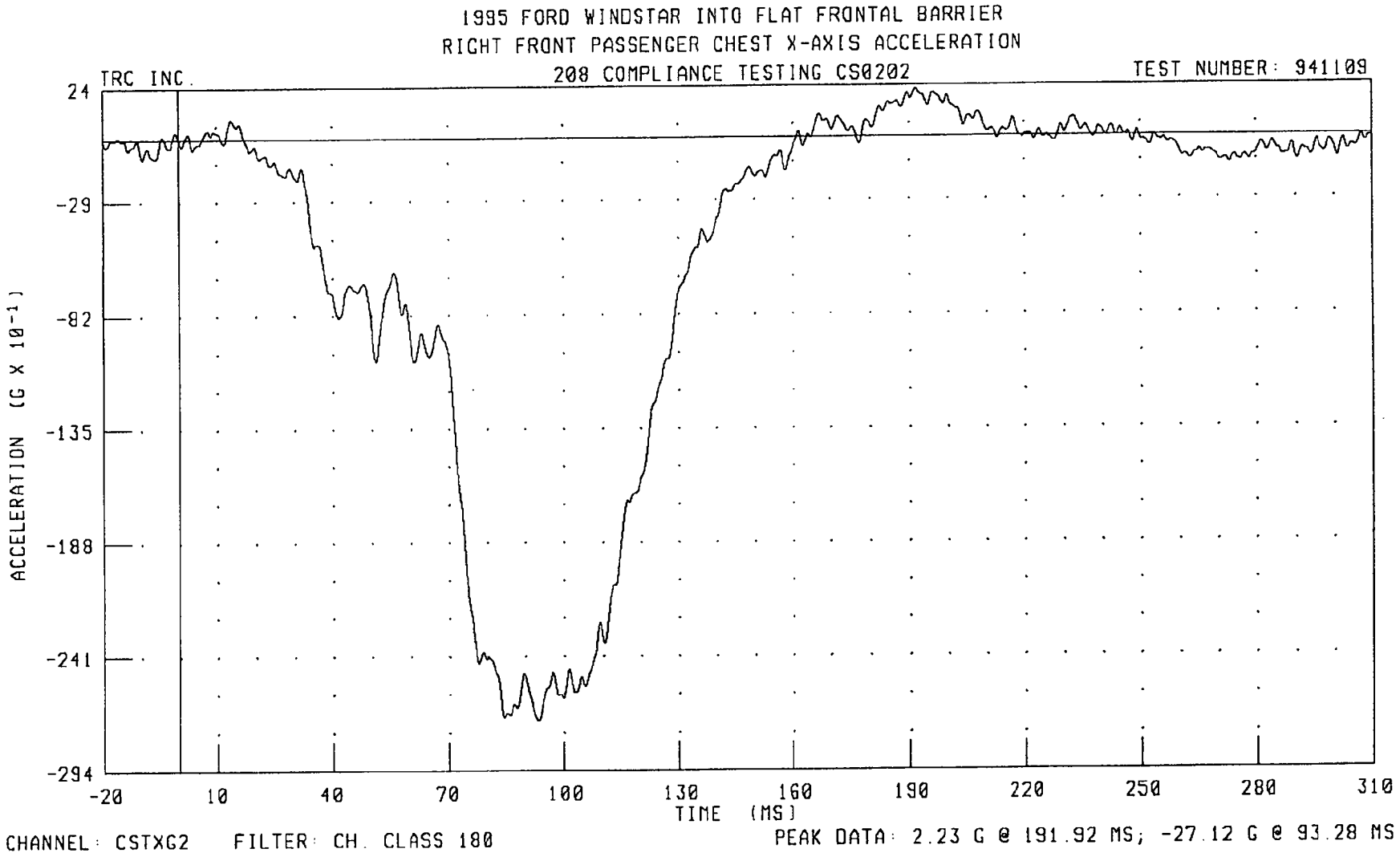

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
81
14
-53
-120
-187
-254
-321
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXG2
FILTER: CH. CLASS 1000
PEAK DATA: 7.41 G @ 38.00 MS; -29.42 G @ 96.80 MS

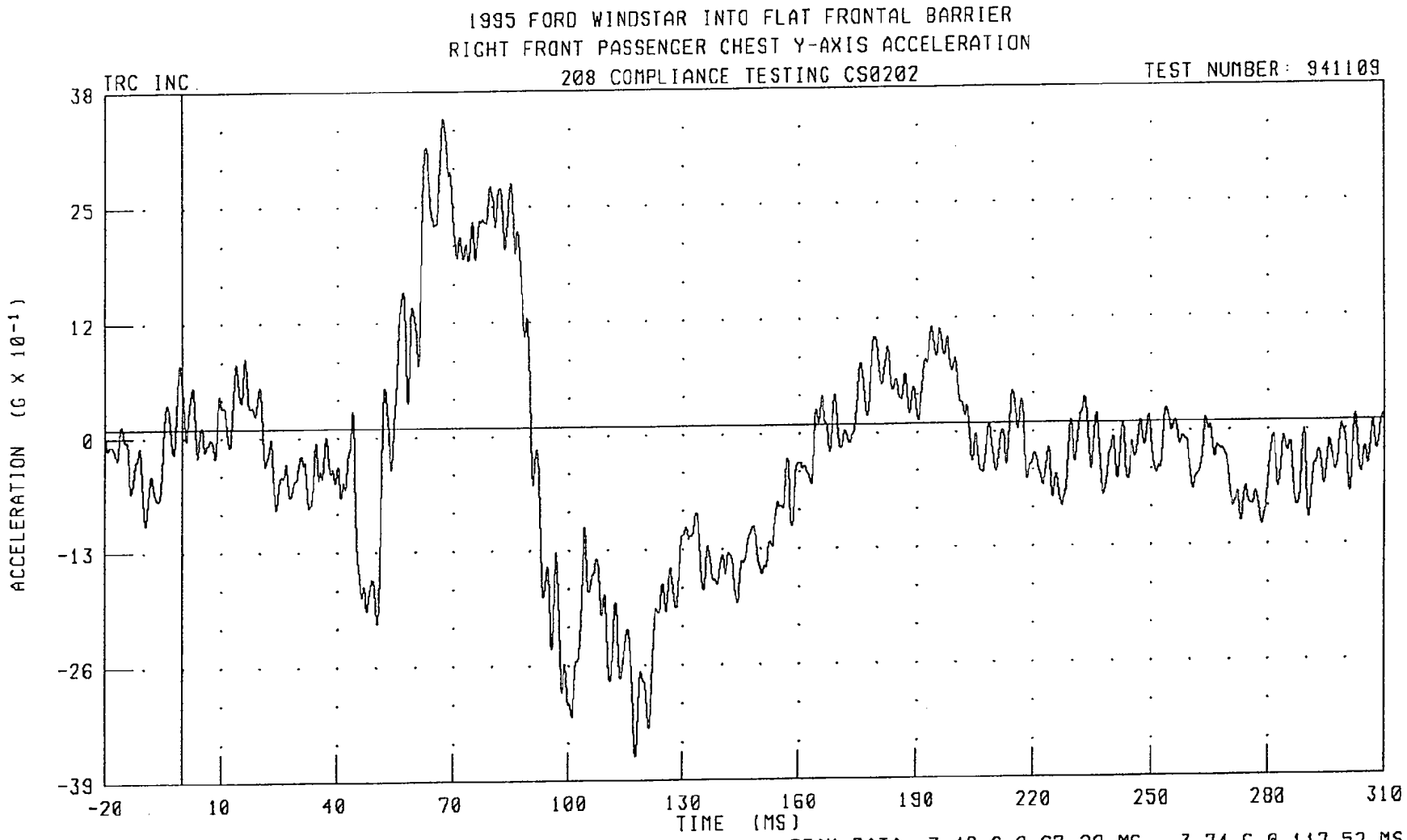
941109

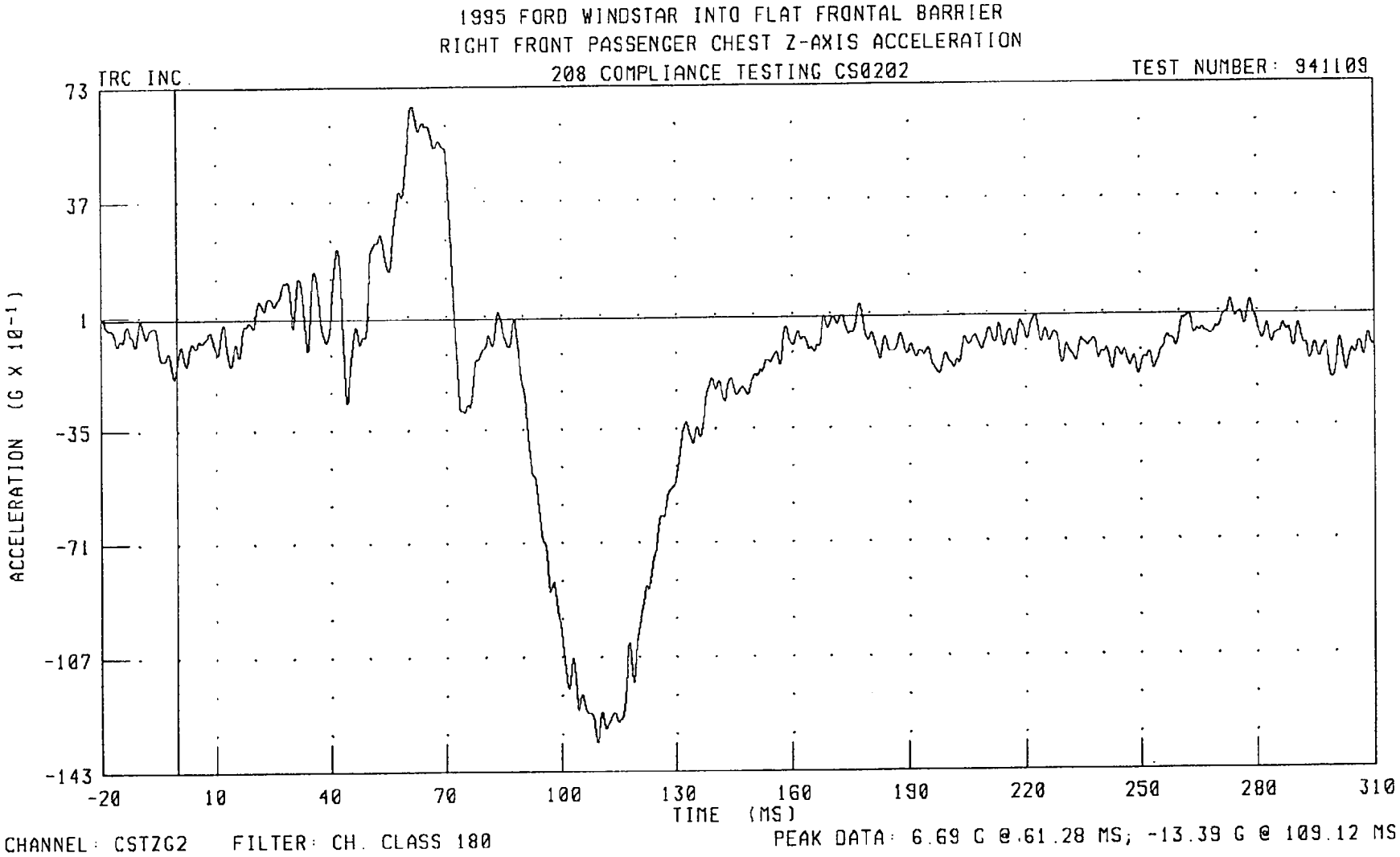

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10-1)
219
171
123
75
27
-20
-69
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG2
FILTER: CH. CLASS 1000
PEAK DATA: 20.10 G @ 108.56 MS; -6.27 G @ 32.32 MS

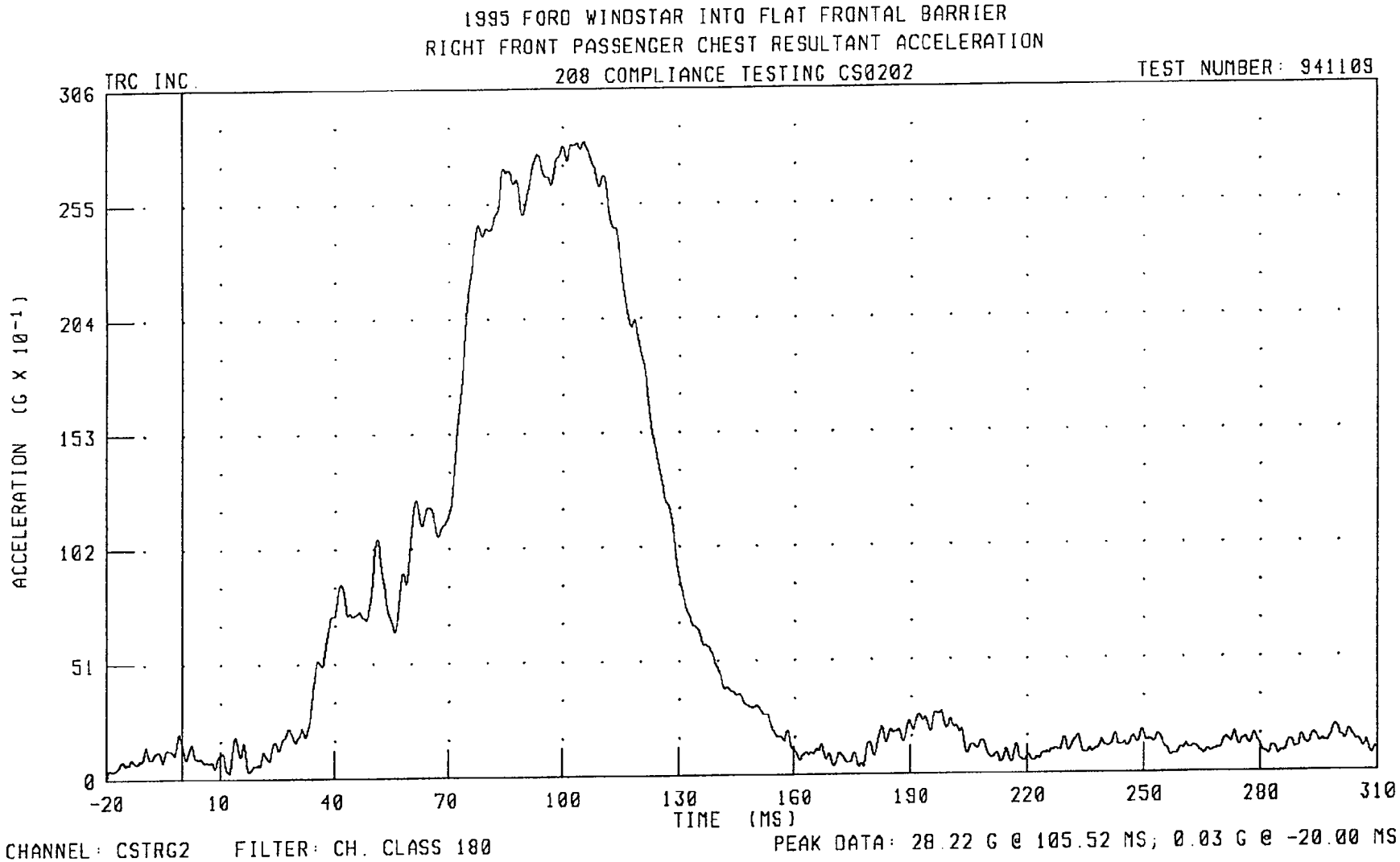

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
TRC INC.
208 COMPLIANCE TESTING CS0202
TEST NUMBER: 941109
110
65
20
-25
-70
-115
-160
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZG2
FILTER: CH. CLASS 1000
PEAK DATA: 10.26 G @ 111.84 MS; -14.75 G @ 32.72 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10-1)
372
310
248
186
124
62
0
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG2
FILTER: CH. CLASS 1000
PEAK DATA: 33.85 G @ 96.80 MS; 0.07 G @ -16.72 MS

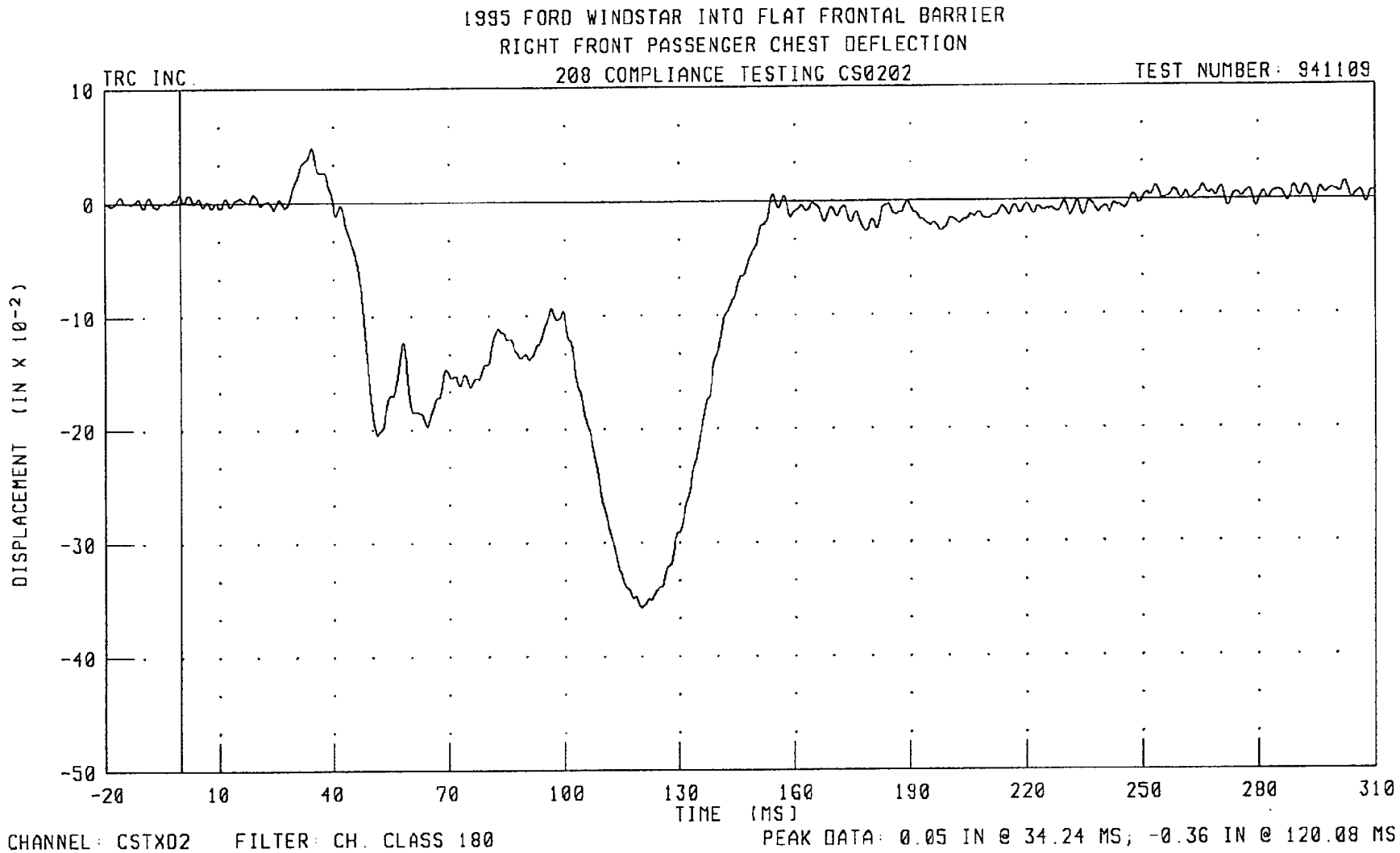

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
24
-29
-82
-135
-188
-241
-294
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXG2
FILTER: CH. CLASS 180
PEAK DATA: 2.23 G @ 191.92 MS; -27.12 G @ 93.28 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10⁻¹)
38
25
12
0
-13
-26
-39
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG2
FILTER: CH. CLASS 180
PEAK DATA: 3.49 G @ 67.28 MS; -3.74 G @ 117.52 MS

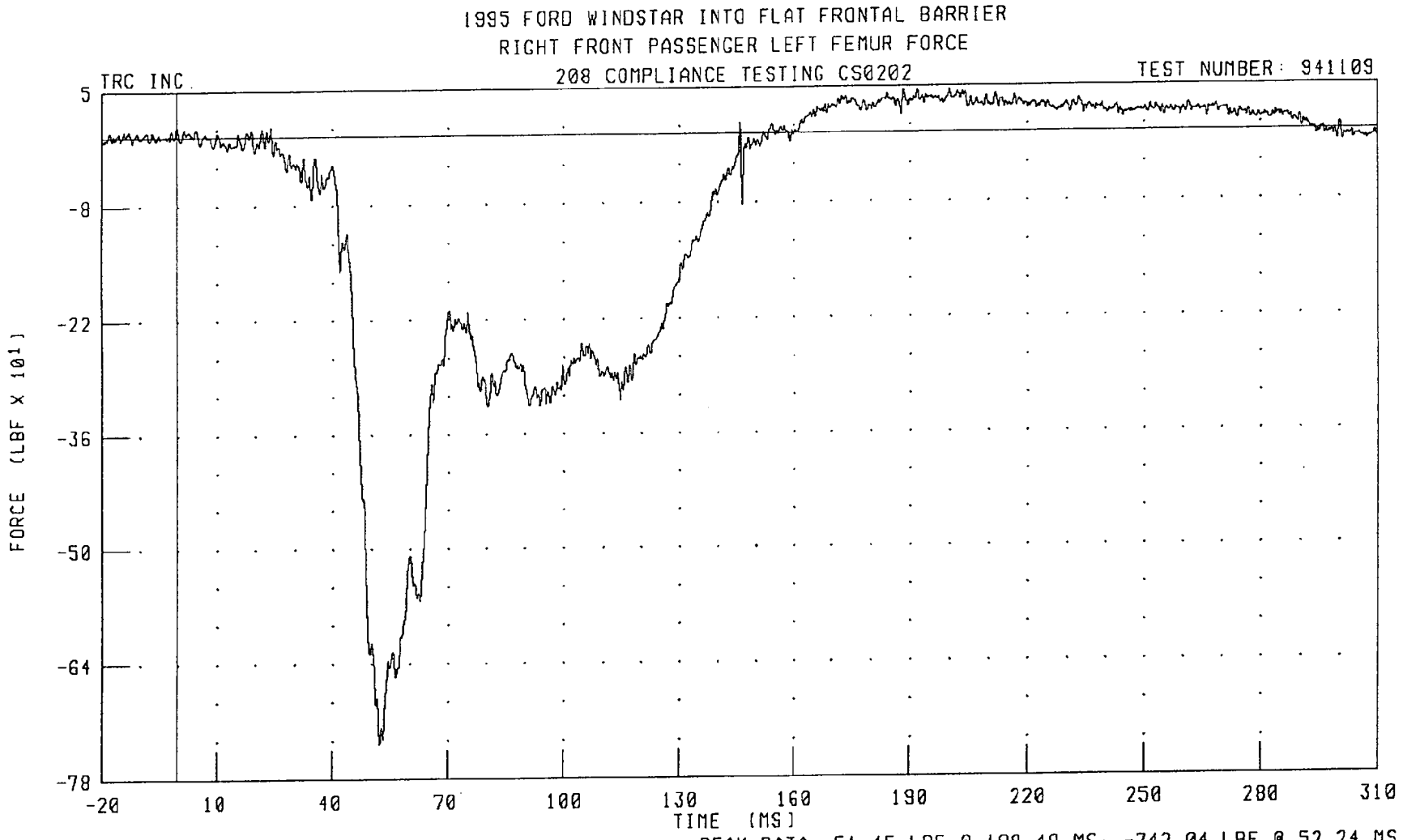

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10-1)
73
37
1
-35
-71
-107
-143
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG2
FILTER: CH. CLASS 180
PEAK DATA: 6.69 G @ 61.28 MS; -13.39 G @ 109.12 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
306
255
204
153
102
51
0
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG2 FILTER: CH. CLASS 180
PEAK DATA: 28.22 G @ 105.52 MS; 0.03 G @ -20.00 MS

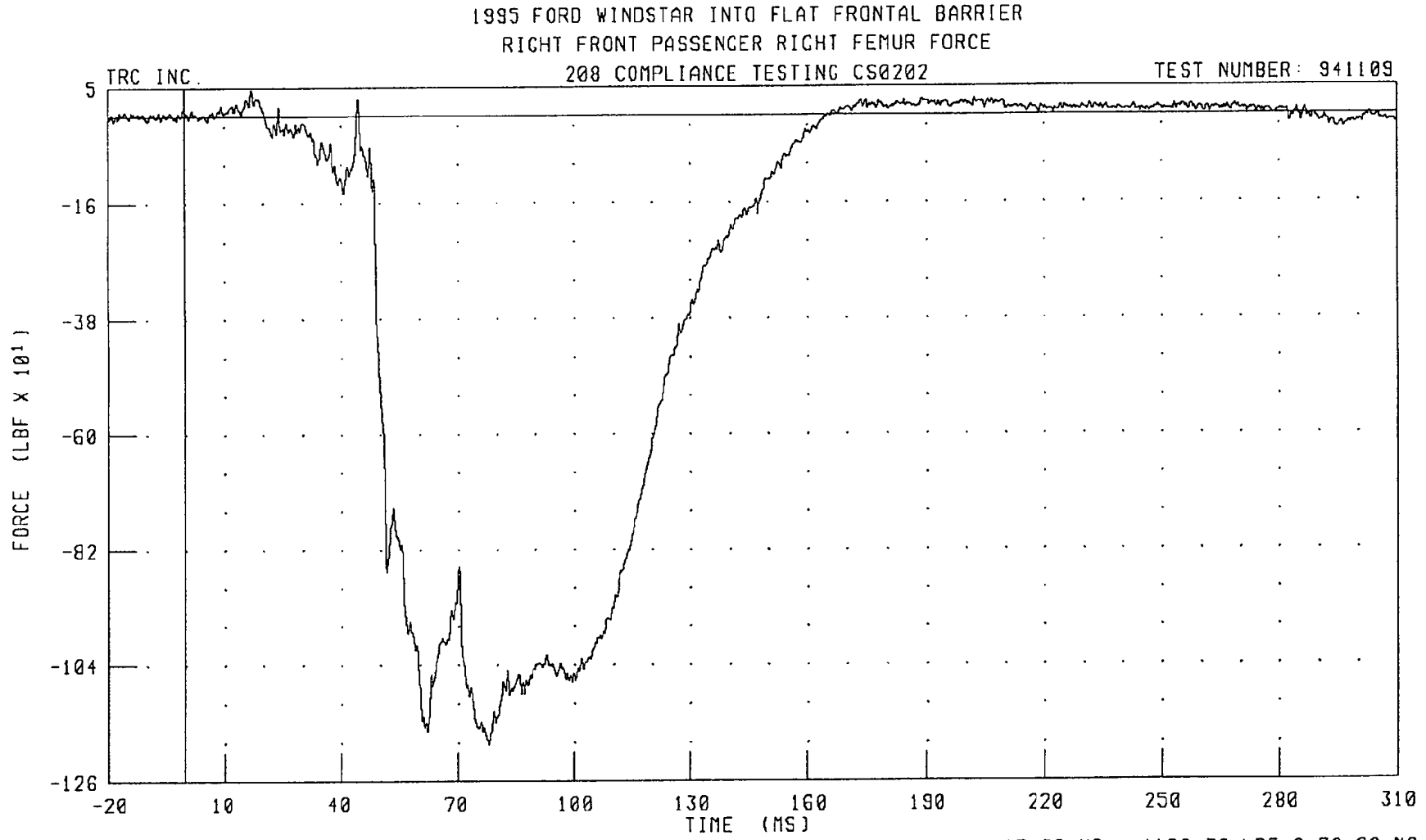
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST DEFLECTION
TRC INC.
208 COMPLIANCE TESTING CS0202
TEST NUMBER: 941109
10
0
-10
-20
-30
-40
-50
DISPLACEMENT (IN X 10-2)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD2
FILTER: CH. CLASS 180
PEAK DATA: 0.05 IN @ 34.24 MS; -0.36 IN @ 120.08 MS

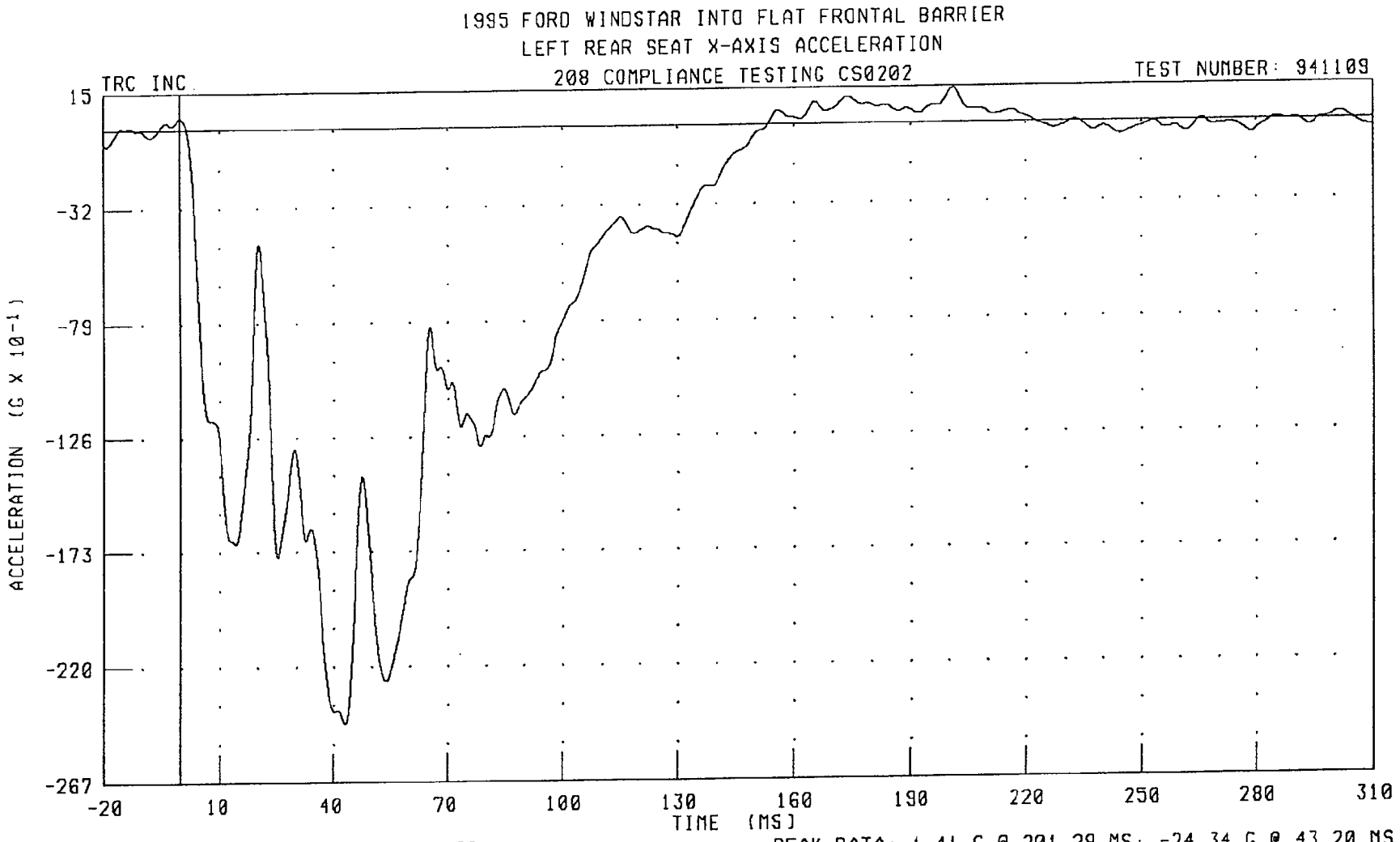
941109

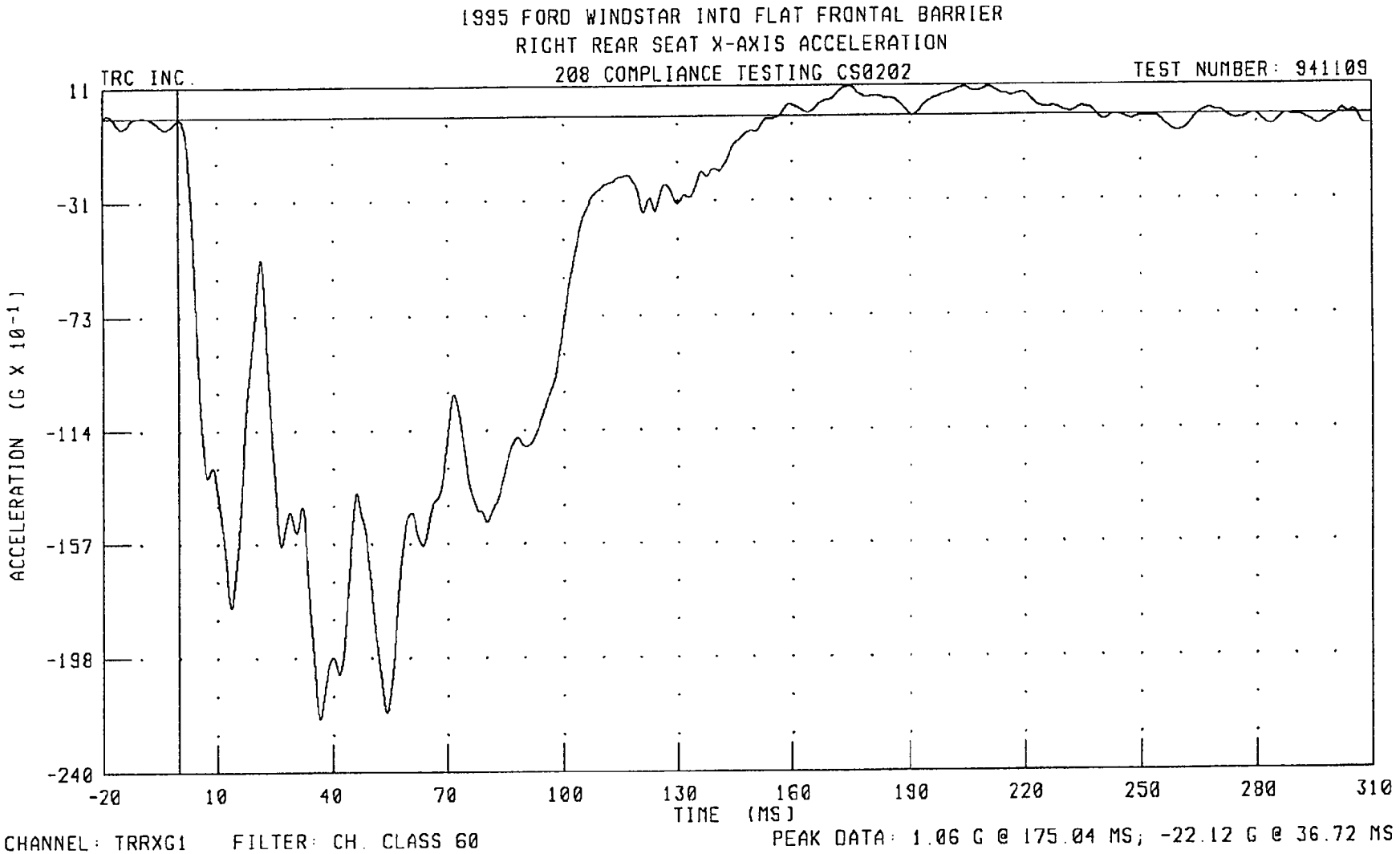

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
5
-8
-22
-36
-50
-64
-78
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF2
FILTER: CH. CLASS 600
PEAK DATA: 51.45 LBF @ 188.48 MS; -742.04 LBF @ 52.24 MS

941109

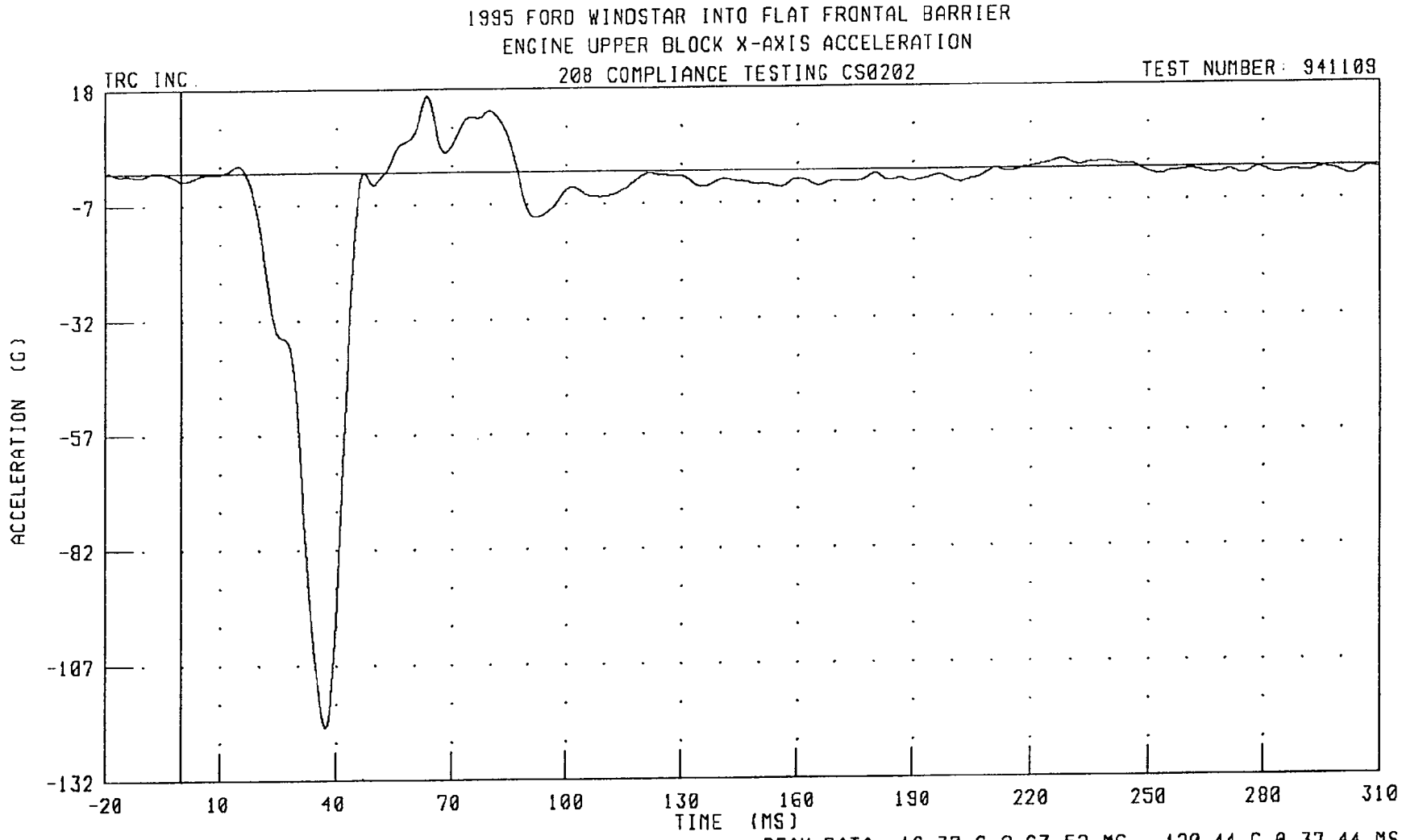

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
5
-16
-38
-60
-82
-104
-126
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF2
FILTER: CH. CLASS 600
PEAK DATA: 50.83 LBF @ 17.36 MS; -1196.30 LBF @ 78.00 MS

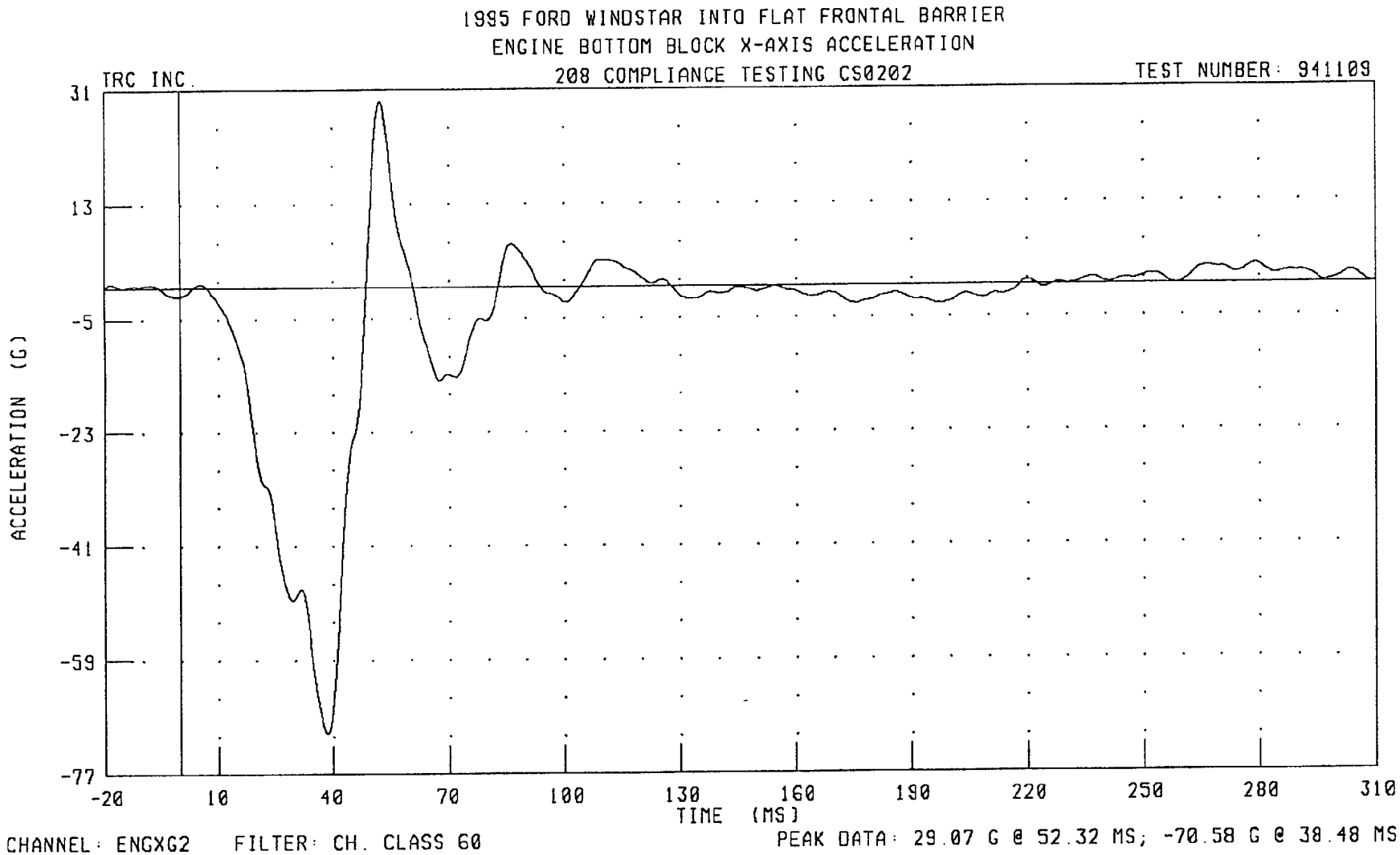
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC
TEST NUMBER: 941109
15
-32
-79
-126
-173
-220
-267
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TLRXG1
FILTER: CH. CLASS 60
PEAK DATA: 1.41 G @ 201.28 MS; -24.34 G @ 43.20 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G X 10-1)
11
-31
-73
-114
-157
-198
-240
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TRRXG1
FILTER: CH. CLASS 60
PEAK DATA: 1.06 G @ 175.04 MS; -22.12 G @ 36.72 MS

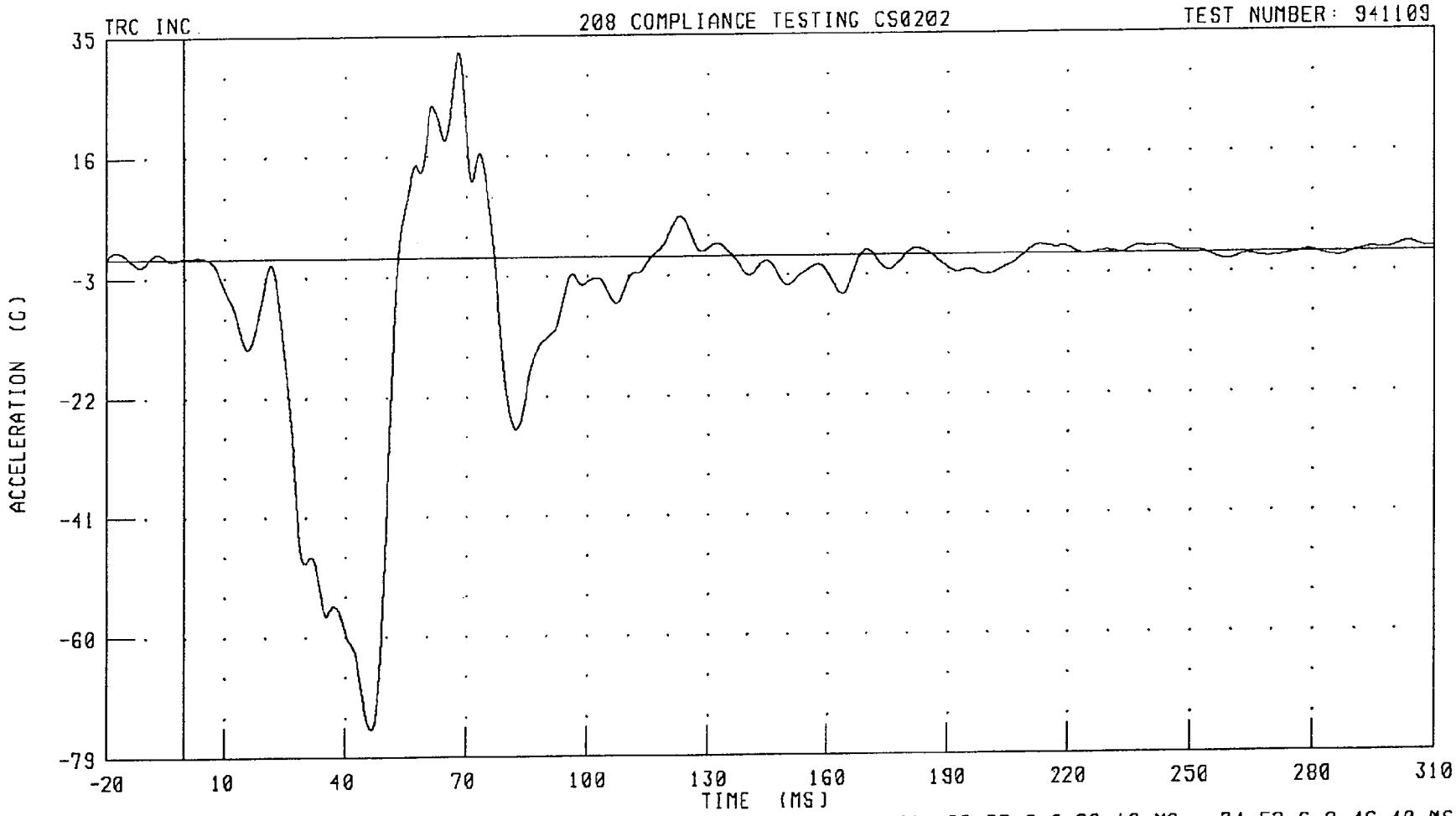
941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
18
-7
-32
-57
-82
-107
-132
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ENGXG1
FILTER: CH. CLASS 60
PEAK DATA: 16.37 G @ 63.52 MS, -120.44 G @ 37.44 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
ACCELERATION (G)
31
13
-5
-23
-41
-59
-77
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ENGXG2
FILTER: CH. CLASS 60
PEAK DATA: 29.07 G @ 52.32 MS; -70.58 G @ 38.48 MS

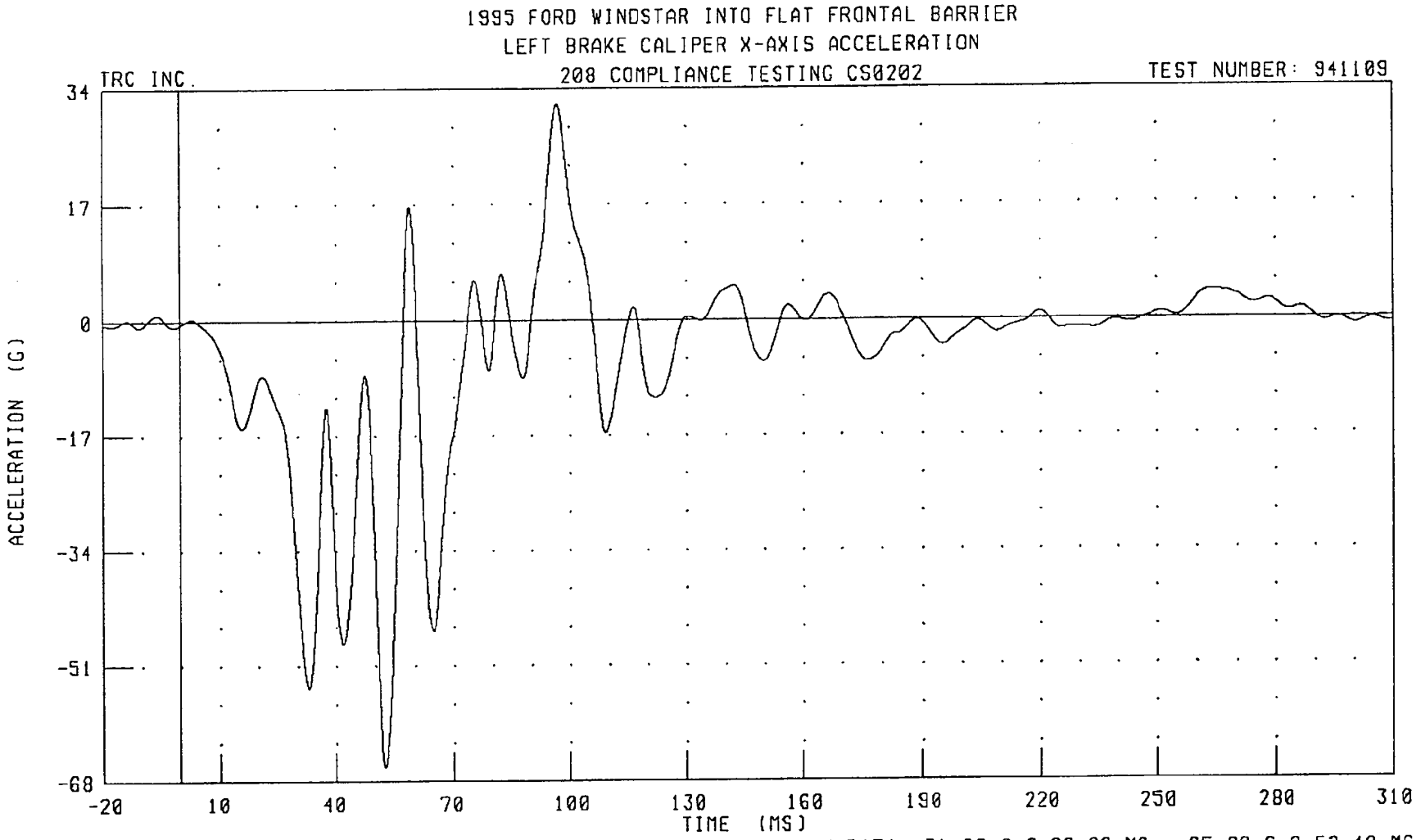
941109

1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202

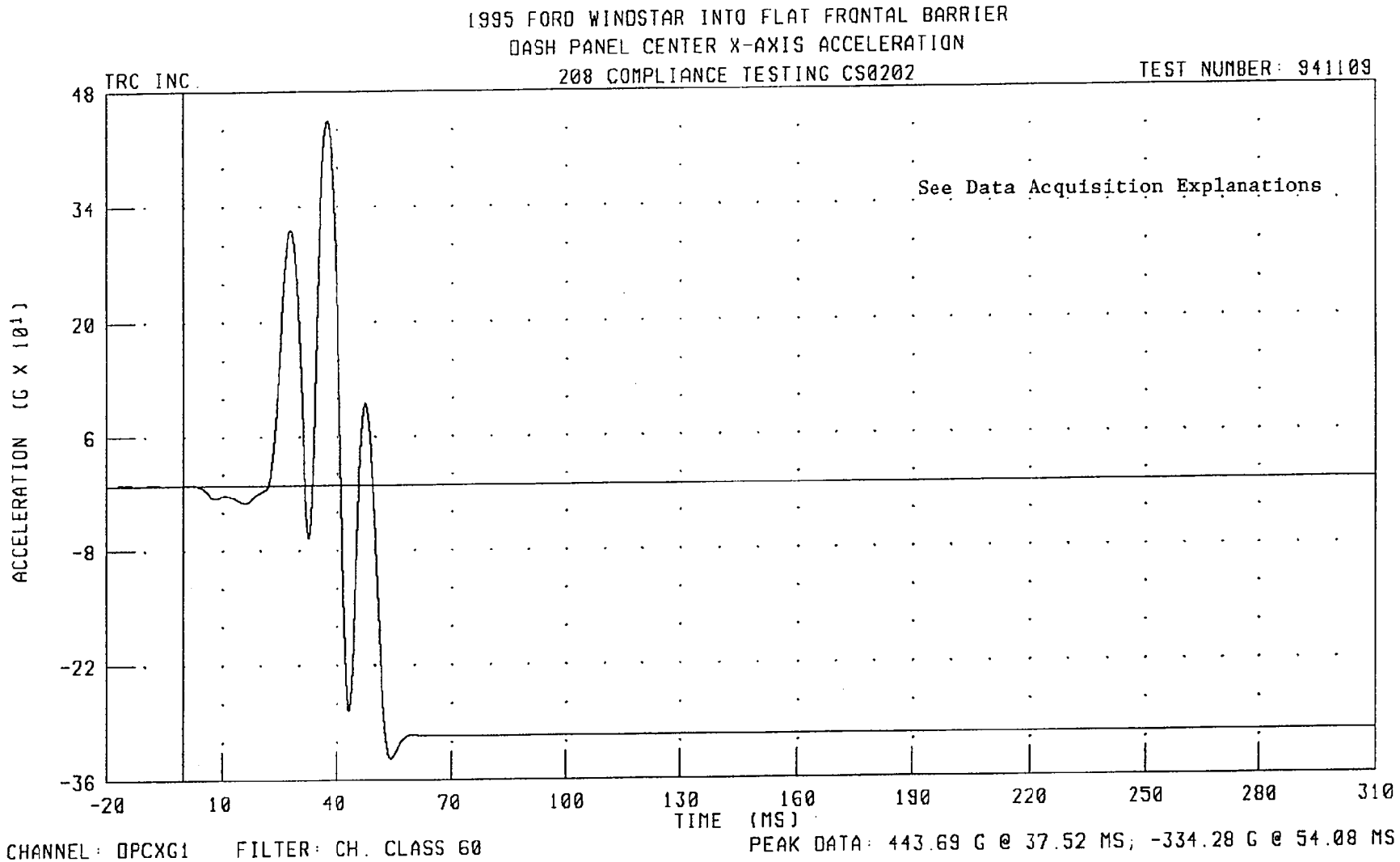


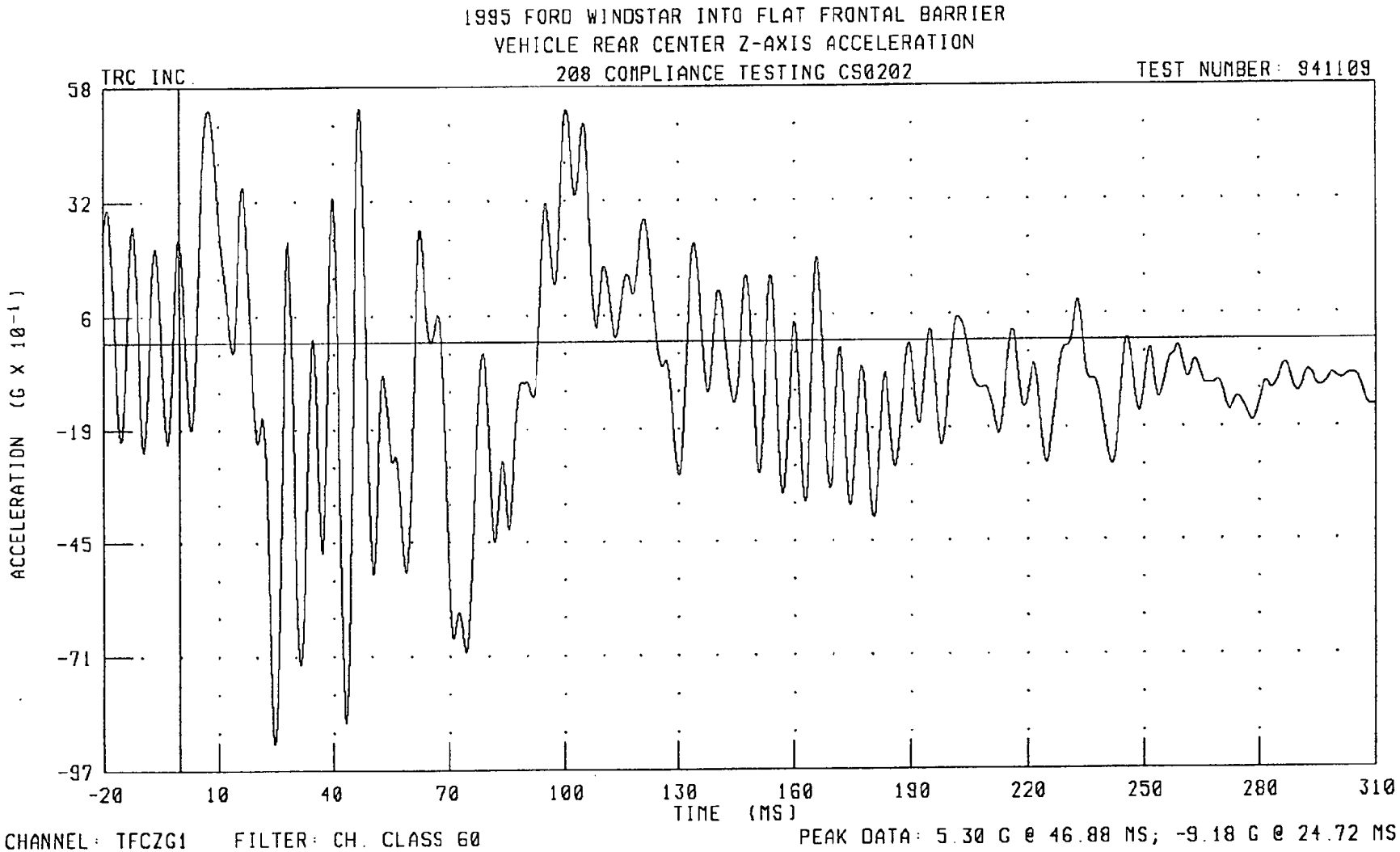
CHANNEL: BCRXG1 FILTER: CH. CLASS 60

PEAK DATA: 32.33 G @ 68.16 MS; -74.52 G @ 46.40 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
34
17
0
-17
-34
-51
-68
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCLXG1
FILTER: CH. CLASS 60
PEAK DATA: 31.66 G @ 96.96 MS; -65.90 G @ 52.48 MS

941109


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
See Data Acquisition Explanations
ACCELERATION (G X 10¹)
48
34
20
6
-8
-22
-36
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: DPCXG1
FILTER: CH. CLASS 60
PEAK DATA: 443.69 G @ 37.52 MS; -334.28 G @ 54.08 MS


1995 FORD WINDSTAR INTO FLAT FRONTAL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION
208 COMPLIANCE TESTING CS0202
TRC INC.
TEST NUMBER: 941109
58
32
6
-19
-45
-71
-97
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TFCZG1
FILTER: CH. CLASS 60
PEAK DATA: 5.30 G @ 46.88 MS; -9.18 G @ 24.72 MS

941109

Appendix C

Manufacturer's Vehicle Information

Robert H. Munson
Executive Director
Automotive Safety and Engineering Standards Office
Environmental and Safety
Engineering Staff

Ford Motor Company
330 Town Center Drive
Dearborn, Michigan 48126

September 7, 1994

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

Dear Mr. Hellmuth:

Reference: NEF-31CCa; IR 1521

This is in response to your letter of July 15, 1994 requesting information relative to possible FMVSS 208 testing by OVSC of a 1995 model year Ford Windstar (all models) equipped with a driver and passenger air bag restraint system. Ford's responses to your several requests for information are set out below.

Request No. 1

"Please inform OVSC whether the air bag automatic restraint system at the driver's and passenger's seating positions is certified to meet the requirements of S4.1.2.1. If it is, please inform the OVSC whether the air bag restraint provided at the driver's and passenger's seating positions 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 restraints were 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 a manual 3-point safety belts are provided with the driver's and passenger'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)."

Answer

The manual three-point safety belts provided with the driver's and passenger's air bag restraint systems in the 1995 Ford Windstar were installed to meet the requirements of S4.1.2.1(c)(2) of FMVSS No. 208. Attachments I and II contain copies of those portions of the final test reports for Crash Tests 8836 and 8895, 90 degree front fixed barrier impact tests with the driver's and passenger's side manual safety belts unfastened and fastened, respectively, relevant to S4.1.2.1(c)(2). Ford relied on the results of these tests as a basis for certifying compliance of the 1995 Ford Windstar equipped with the driver's and passenger's supplemental air bag restraint systems with S4.1.2.1.

Request No. 2

"If the air bag restraint at the driver's and passenger's seating positions were not installed to meet the requirements of S4.1.2.1, please inform the OVSC whether the three point manual 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 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."

Answer

As indicated in our response to Request No. 1, the manual three-point safety belts provided with the driver's and passenger's air bag restraint systems in the 1995 Ford Windstar were installed to meet the requirements of S4.1.2.1 of FMVSS No. 208.

Request No. 3

"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."

Answer

The 1995 Ford Windstar driver and passenger air bags do not use a pressure vessel.

Request No. 4

"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 paragraph S9.2."

Answer

Attachment III contains the engineering analyses and the related TRW test reports demonstrating compliance to S9.2 of FMVSS No. 208 for the driver and passenger air bag restraint system module assemblies for the 1995 Ford Windstar.

Request No. 5

"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."

Answer

The 1995 Ford Windstar is not equipped with a tension-relieving device for any safety belt system in this vehicle.

Request No. 6

"FMVSS No. 208, S8.1.5 allows 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 the certification tests."

Answer

Frontal crash tests upon which Ford relies as a basis for certification of 1995 Ford Windstar vehicles were conducted with all moveable windows and vents fully open.

Request No. 7

"FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or Part(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."

Answer

Part 572(E) (Hybrid III) test dummies were used at both front outboard designated seating positions of the test vehicles in those front barrier crash tests on which Ford relies as a basis for certification of 1995 Ford Windstar vehicle to FMVSS No. 208. Attachment IV contains dummy placement measurements applicable for the 1995 Ford Windstar.

The 1995 Ford Windstar does have a foot rest for the driver.

The 1995 Ford Windstar is available only with bucket-type seats in frontal seating positions.

Request No. 8

"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."

Answer

Attachment V contains the NHTSA form enclosed with your letter completed with the requested seat positioning, steering column positioning, and fuel tank data applicable to FMVSS No. 208 front barrier impact testing of the 1995 Ford Windstar.

Request No. 9

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

Answer

The 1995 Ford Windstar is equipped with adjustable seat belt anchorages. The nominal design position of the D-ring for the 50th percentile adult male occupant is in the mid-position (3rd of 5 positions).

Request No. 10

"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 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 each 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."

Answer

The listing contained in Attachment VI includes the speed at impact, vehicle test weight, and injury criteria values recorded in compliance tests of 1995 Ford Windstar vehicles to the requirements FMVSS No. 208, S4.1.2.1.

Attachments VII through XI contains resultant head and chest acceleration and chest compression versus time plots and femur loads versus time plots for Crash Tests 8790, 8828, 8893, 8923 and 8930 respectively. These plots together with the plots

from Crash Tests 8836 and 8895, which were provided in response to Request No. 1, represent all the full front barrier (90 degree) impact tests that were used to certify the 1995 Ford Windstar to FMVSS No. 208.

In response to your request for items 10.1 through 10.8, Ford does not normally record this data in the manner requested as part of our test analysis. In the absence of any known relevance or need related to the stated purpose of your inquiry, we must respectfully decline to undertake the substantial effort required to analyze this data in the manner requested. Should the agency require this information subsequent to it's compliance testing, Ford, of course, will provide all necessary and relevant information.

Request No. 11

"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?"

Answer

The following is a suggested list of items that may be removed from the test vehicle for frontal FMVSS No. 208 testing. This list below is in order of removal priority:

- Third row seat
- Second row seat
- Carpet and trim behind the C-pillar
- Spare tire
- Exhaust system

All onboard instrumentation should be included in the vehicle test weight.

Request No. 12

"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 the 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 the steering control system work to provide energy management in a frontal impact."

Answer

Attachment XII contains a copy of those portions of the final test report for Crash Test 9067, a 90 degree front fixed barrier impact test, relevant to FMVSS No. 204. Also included with this report are the photographs as requested. Ford relied on the results of this test as a basis for certifying the 1995 Ford Windstar to the requirements of FMVSS No. 204. This test was conducted using Ford Engineering Test Procedure ST-14 (dated January 15, 1992), which is included as Attachment XIII.

FMVSS No. 204 does not contain any requirements for the steering control system to provide energy management. Rather, as the agency is aware, the standard sets a limit on the allowable rearward displacement of the upper end of the column. Ford does not have available any description or diagram describing the vehicle and column characteristics which serve to enable compliance with FMVSS No. 204 and must therefore respectfully decline to submit a description of this operation.

Request No. 13

"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"."

Answer

The 1995 Ford Windstar currently does not have built-in child restraints as either standard or optional equipment. A post Job No. 1 option is planned but no firm date for its availability nor corresponding test data is available at this time.

We believe the information and test reports contained herein are fully responsive to your needs. If you have any questions, please call Mr. R. A. Nevi on (313) 594-7688.

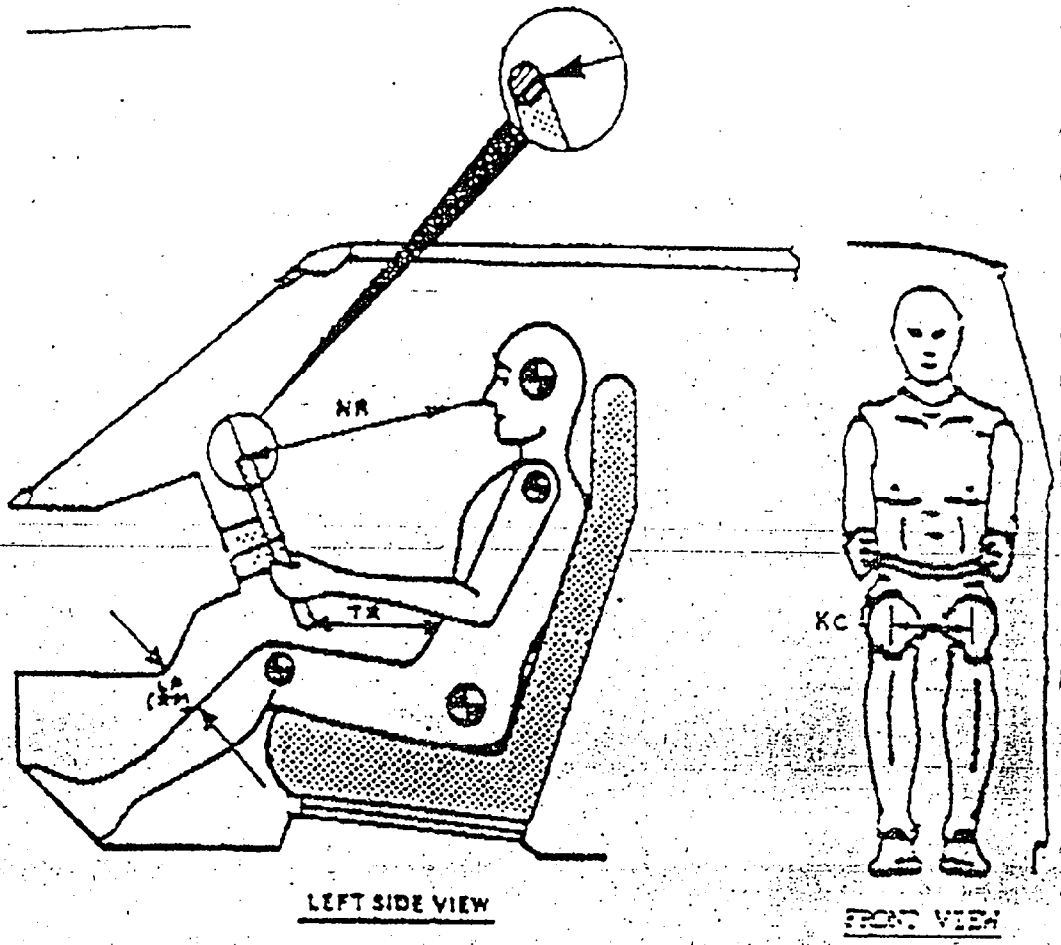
Very truly yours,

R. H. Munson

Attachments
IR1521.003

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

VEHICLE 1995 Ford Windstar Wagon



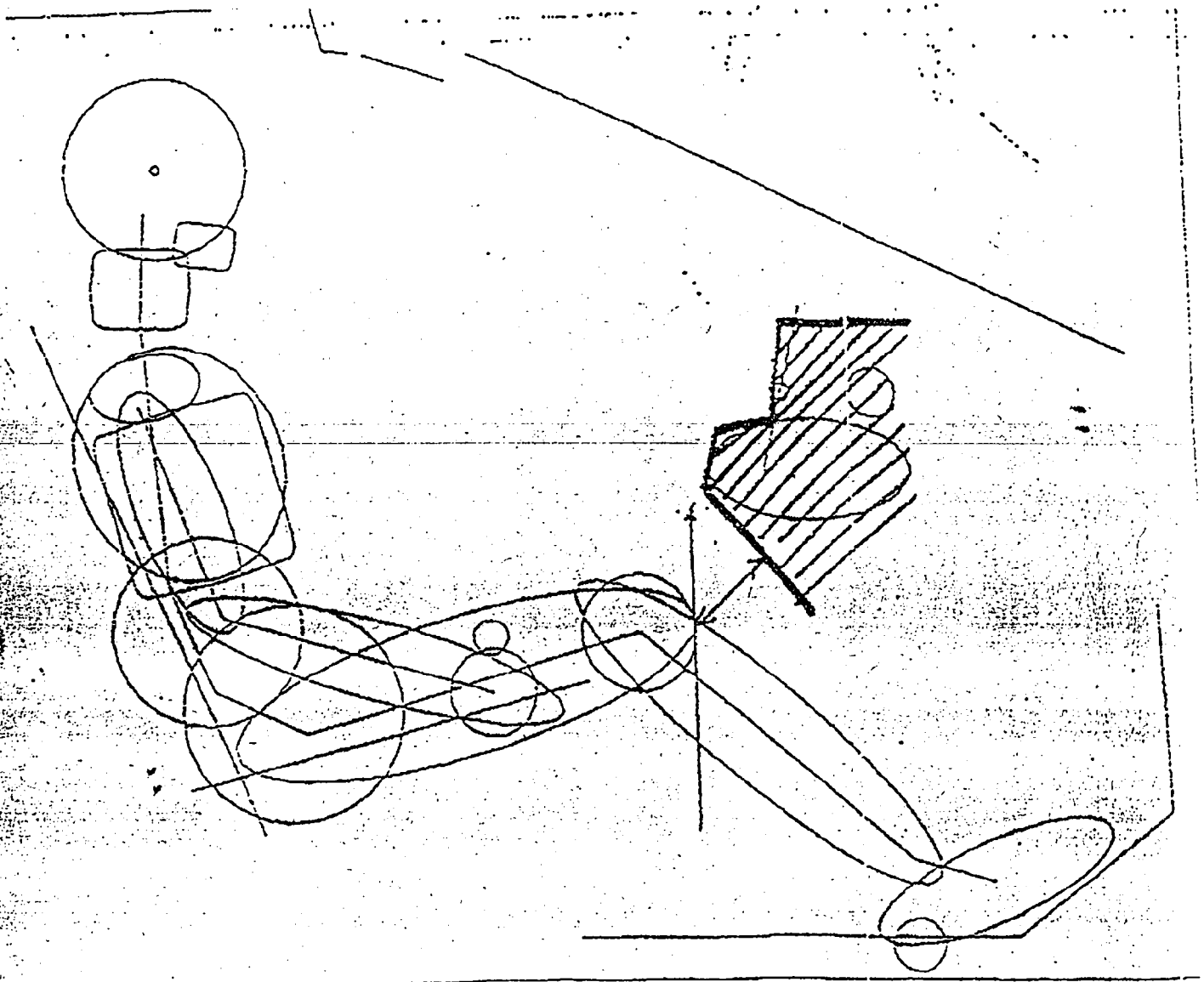
LEFT SIDE VIEW

FRONT VIEW

HYBRID III DUMMY PLACEMENT REFERENCE DIMENSIONS	MEASUREMENTS (ALL DISTANCES IN INCHES)	
	TARGET	RANGE
NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim.	17.2	18.1-16.4
TR - Horizontal distance from bottom rear surface of steering wheel rim to dummy's torso.	8.6	9.5-8.1
LP - Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface.	4.5	5.3-3.9
RP - Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface.	4.5	5.4-3.4
KC - Distance between centerline of dummy's legs measured at top of knee pivot joint.	9.6	10.5-8.8

Note: NOTE: Driver Left Footrest

* KNEE TO IP MEASUREMENT AT THE BARRIER/SLED.

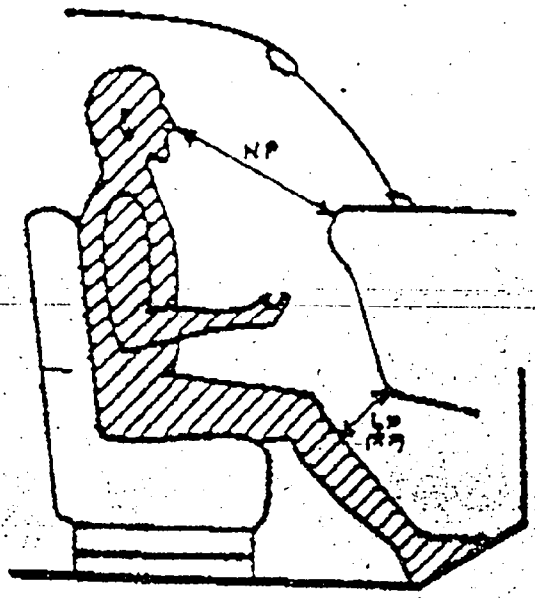


* THE REPORTED KNEE TO IP MEASUREMENT IN THE DUMMY'S INITIAL POSITION AT THE BARRIER/SLED SHOULD BE TAKEN AS FOLLOWS:

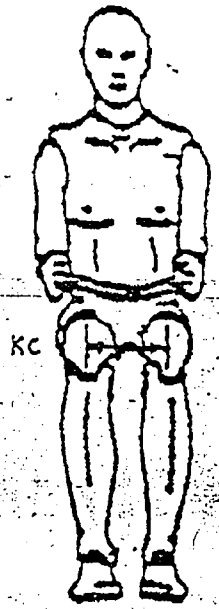
"AT THE VERTICAL PLANE IN FRONT OF THE KNEE, FROM THE CENTER OF THE KNEE (AND NOT THE LOWER LEG) TO THE CLOSEST POINT ON THE PANEL."

PASSENGER DUMMY PLACEMENT REFERENCE DIMENSIONS

VEHICLE 1995 Ford Windstar Wagon



RIGHT SIDE VIEW

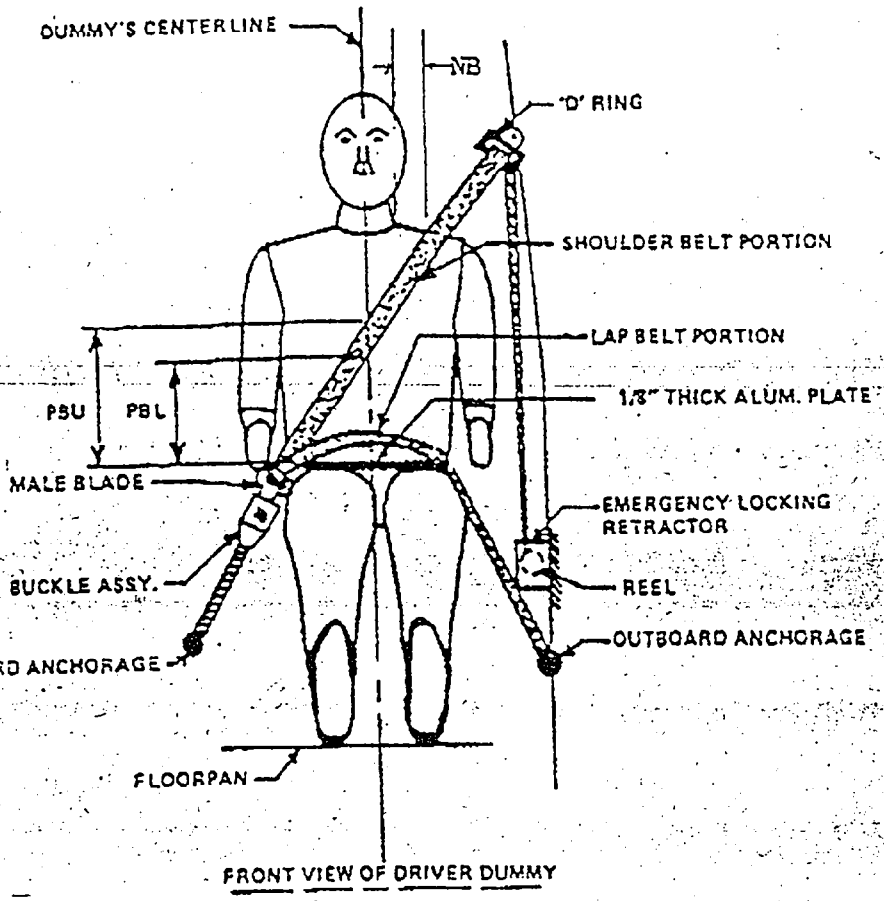


FRONT VIEW

HYBRID III DUMMY PLACEMENT REFERENCE DIMENSIONS	MEASUREMENTS (ALL DISTANCES IN INCHES)	
	TARGET	RANGE
NP - Distance from tip of dummy's nose to closest point on surface of instrument panel.	25.7	24.5-26.6
LP - Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface.	4.2	4.9-3.3
RP - Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface.	4.7	5.4-3.7
KC - Distance between centerline of dummy's legs measured at top of knee pivot joint.	7.8	7.1-8.1

Pre-Test

SEAT BELT POSITIONING DATA

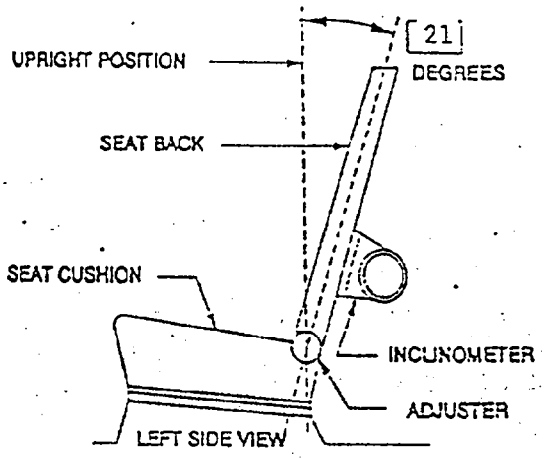


(sample belt configuration)

	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	Not	NM
PBL -- Top surface of alum. plate to belt lower edge	Measured (NM)	NM
LAP BELT TENSION	4 lbs.	4 lbs.
SHOULDER BELT TENSION	4 lbs.	4 lbs.
NB - Edge of neck to edge of belt	NM	NM

Vehicle Model Year & Make: 1995 Ford
Vehicle Model & Body Style: Windstar Wagon

1. NOMINAL DESIGN RIDING POSITION - -
For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable. Indicate, if applicable, how the detents are numbered (Is the first detent "0" of "1"?). Indicate if the seat back angle is measured with the dummy in the seat.



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

See detailed note below.

See attached sheet.

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

Same as for driver's seat.

2. SEAT FORE & AFT POSITIONS - -
Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, indicate how the detents are numbered (Is the first detent "0" or "1"?). Provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat:

Reference points are chosen on the seat and seat track. Total seat travel is measured, and the seat is then positioned at the center of the seat travel.

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

Same method as for driver's seat.

Note:

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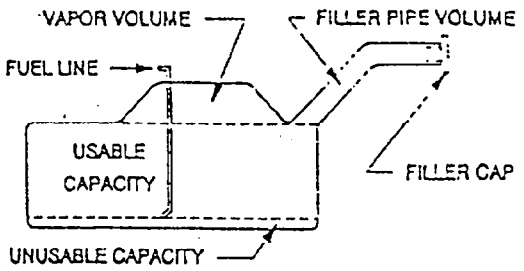
The Ford procedure uses an inclinometer attached to a small fixture which contacts the back of the seat back frame at a specified location (13 inches up from pivot on outboard edge) using pins which penetrate the seat pads and trim. Using this procedure and the angle data provided, the seat back can be adjusted to assure that it is in the design riding position with a test dummy positioned in the seat.

3.1 A. "Usable Capacity" of standard equipment fuel tank = 20 gallons.

B. "Usable Capacity" of optional equipment fuel tank = 25 gallons.

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 20/25 gallons.



VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

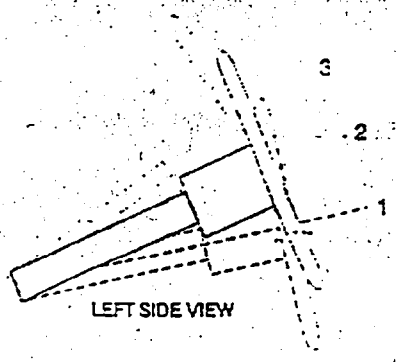
3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 19/23.75 gallons

3.3 Is vehicle equipped with electric fuel pump? X YES ___ NO
If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

See note below.

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.



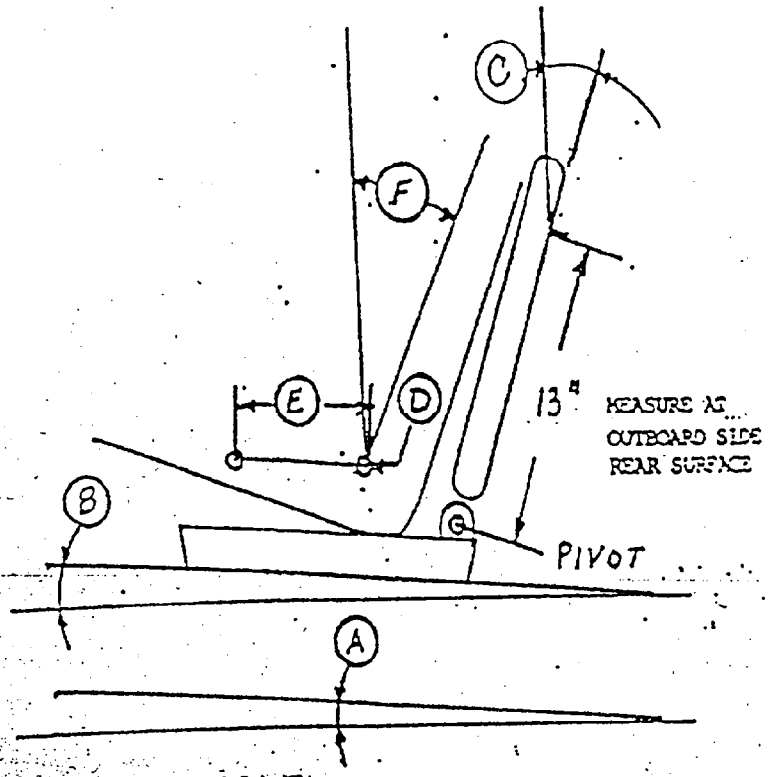
STEERING COLUMN ASSEMELY

Operational Instructions:

Adjustable steering columns are positioned in the center detent for FMVSS No. 208 testing. The Windstar tilt column has 5 positions. Position column in position 3.

Note: ELECTRIC FUEL PUMP OPERATION

The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls, the fuel pump is inactivated. Also, a fuel pump shut-off switch is provided, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude.



A - SILL ANGLE

B - DESIGN CUSHION FRAME ANGLE

C - DESIGN SEAT BACK FRAME ANGLE

D - REARMOST 'H' POINT

E - TRACK TRAVEL

F - MANIKIN BACK ANGLE

WIN 88
CAPTAIN CHAIR & BKT.SEAT (DRIVER)
DRAWING #

SILL ANGLE	0 DEG
DESIGN CUSHION FRAME ANGLE	3 DEG
DESIGN SEAT BACK FRAME ANGLE	21 DEG
MANIKIN BACK ANGLE	21 DEG +/- 3
R/H HORIZONTAL "H" PT. LOC.	3011 +/- 15
R/H VERTICAL "H" PT. LOCATION	1130 +/- 15
TRACK TRAVEL	160 mm

WIN 88
CAPTAIN CHAIR (DRIVER-POWER)
DRAWING

SILL ANGLE	0 DEG
DESIGN CUSHION FRAME ANGLE	3 DEG
DESIGN SEAT BACK FRAME ANGLE	21 DEG
MANIKIN BACK ANGLE	21 DEG +/- 3
R/H HORIZONTAL "H" PT. LOC.	3010 +/- 15
R/H VERTICAL "H" PT. LOCATION	1131 +/- 15
TRACK TRAVEL	160 mm

WIN 88
CAPTAIN CHAIR & BKT.SEAT (PASS.)
DRAWING #PL-F2UB-15563-B

SILL ANGLE	0 DEG
DESIGN CUSHION FRAME ANGLE	3 DEG
DESIGN SEAT BACK FRAME ANGLE	21 DEG
MANIKIN BACK ANGLE	21 DEG +/- 3
R/H HORIZONTAL "H" PT. LOC.	3011 +/- 15
R/H VERTICAL "H" PT. LOCATION	1130 +/- 15
TRACK TRAVEL	160 mm