

V2378

Report Numbers: 208-TRC-96-008
212-TRC-96-008
301-TRC-96-008

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

Toyota Motor Corporation
1996 Toyota 4Runner
multipurpose passenger vehicle
NHTSA Number: CT5103
TRC Test Number: 960221

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



March 13, 1996

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

*Rec'd
4/14/96*

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

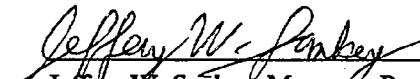
This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Report Prepared By:


Craig A. Markusic, Senior Project Engineer
Transportation Research Center Inc.

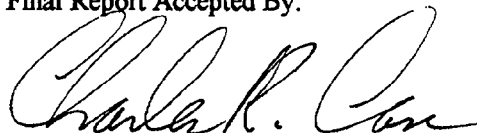
Date 4/1/96

Report Approved By:


Jeffery W. Sankey, Manager, Project Operations
Transportation Research Center Inc.

Date 4/1/96

Final Report Accepted By:


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

Date 12/2/96

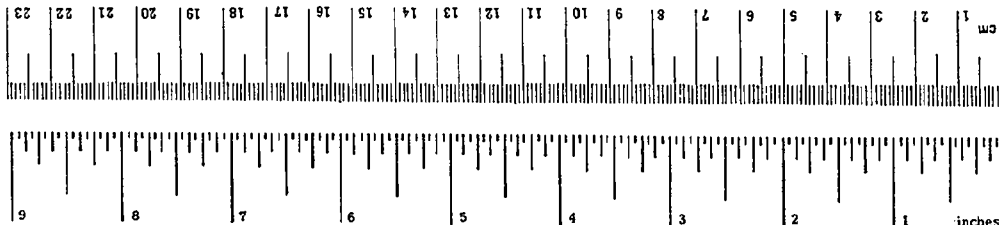
1. Report No. 208-TRC-96-008 212-TRC-96-008 301-TRC-96-008	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS Nos. 208, 212, 219 (partial), and 301 Compliance Testing of a 1996 Toyota 4Runner mpv 4-door sedan, NHTSA No. CT5103	5. Report Date March 13, 1996	6. Performing Organization Code TRC	
	7. Author(s) C. A. Markusic, Senior Project Engineer, TRC	8. Performing Organization Report No. 208-TRC-96-008, 212-TRC-96-008, 301-TRC-96-008	
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319	10. Work Unit No. (TRAIS)	11. Contract or Grant No. DTNH22-93-D-01089	
	12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-31) 400 Seventh St., S. W., Washington, DC 20590	13. Type of Report and Period Covered Final Report February - March 1996	
14. Sponsoring Agency Code NEF-30		15. Supplemental Notes	
16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1996 Toyota 4Runner multipurpose passenger vehicle, NHTSA No. CT5103, at Transportation Research Center Inc. on February 21, 1996. 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 16.6 inches. The ambient temperature was 73° F. The driver's Head Injury Criteria (HIC) was 806. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 58.2 g. The driver's chest deflection was 1.0 inch. The driver's left and right femur maximum axial forces were 1265 pounds and 1557 pounds, respectively. The passenger's HIC was 286. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 46.2 g. The passenger's chest deflection was 0.8 inch. The passenger's left and right femur maximum axial forces were 1075 pounds and 1693 pounds, respectively.			
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" 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		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. Number of Pages 147	22. Price

METRIC CONVERSION FACTORS

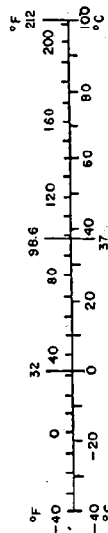
Approximate Conversions to Metric Measures

Approximate Conversions from 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	2.5	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 [after subtracting 32]	Celsius temperature	°C



Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
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	ac
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	st
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	36	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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

Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
1.0	Purpose and Test Procedure	1
2.0	Frontal Barrier Impact Test Summary	4
3.0	FMVSS 208, 212, 219 (Partial), and 301 Data	19
4.0	Vehicle, Occupant, and Camera Measurements	36
Appendix A	Photographs	A-1
Appendix B	Data Plots	B-1
Appendix C	Manufacturer's Vehicle Information	C-1

List of Tables

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Crash Test Summary	7
2	Test Vehicle Information	9
3	Post-Impact Data	12
4	Post-test Airbag Data	15
5	Vehicle Accelerometer Locations and Data Summary	18
6	Dummy Injury Criteria	20
7	FMVSS 208 Seat Belt Comfort and Convenience Test Summary Front Outboard Designated Seating Positions	22
8	FMVSS 208 Equipment Data	25
9	Fuel System Data	30
10	FMVSS 301 Post-Impact Test Data	31
11	Impacted Vehicle Measurements	38
12	Dummy Measurement Data for Front Seat Occupants	41
13	Motion Picture Camera Locations	44

List of Figures

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Impact Velocity Measurement System	13
2	Accident Investigation Division Data for 30 mph Frontal Barrier Impact	14
3	Vehicle Accelerometer Placement	17
4	FMVSS 212 Test Data	28
5	FMVSS 219 Test Data	29
6	FMVSS 301 Static Rollover Test Data	32
7	Pre-test and Post-test Measurement Points	37
8	Vehicle Target Locations	39
9	Dummy Measurement Locations for Front Seat Occupants	40
10	Camera Positions	42

List of Photographs

<u>Figure</u>	<u>Photograph Title</u>	<u>Page</u>
A-1.	Pre-test Front View	A-2
A-2.	Post-test Front View	A-3
A-3.	Pre-test Left Side View	A-4
A-4.	Post-test Left Side View	A-5
A-5.	Pre-test Right Side View	A-6
A-6.	Post-test Right Side View	A-7
A-7.	Pre-test Front Underbody View	A-8
A-8.	Post-test Front Underbody View	A-9
A-9.	Pre-test Driver's Seat Location View	A-10
A-10.	Pre-test Passenger's Seat Location View	A-11
A-11.	Pre-test Driver Dummy and Vehicle Interior View	A-12
A-12.	Post-test Driver Dummy and Vehicle Interior View	A-13
A-13.	Pre-test Passenger Dummy and Vehicle Interior View	A-14
A-14.	Post-test Passenger Dummy and Vehicle Interior View	A-15
A-15.	Post-test Driver Dummy Head Contact - View 1	A-16
A-16.	Post-test Driver Dummy Head Contact - View 2	A-17
A-17.	Post-test Driver Dummy Head Contact - View 3	A-18
A-18.	Post-test Driver Dummy Knee Contact - View 1	A-19
A-19.	Post-test Driver Dummy Knee Contact - View 2	A-20
A-20.	Post-test Passenger Dummy Head Contact - View 1	A-21
A-21.	Post-test Passenger Dummy Head Contact - View 2	A-22
A-22.	Post-test Passenger Dummy Knee Contact - View 1	A-23
A-23.	Post-test Passenger Dummy Knee Contact - View 2	A-24
A-24.	Pre-test Vehicle Certification and Recommended Tire Pressure Label View	A-25

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 1996 Toyota 4Runner multipurpose passenger vehicle, NHTSA No. CT5103, 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 B of the Laboratory Test Procedure.

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

The forty-six (46) data channels were 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 21, 1996.

The test vehicle, a 1996 Toyota 4Runner multipurpose passenger vehicle (mpv), NHTSA No. CT5103, 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, the chest deflections did not exceed 3.0 inches, 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. 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 position. The vehicle's test weight was 4057 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum static crush was 16.6 inches.

The driver's HIC was 806. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 58.2 g. The driver's chest deflection was 1.0 inches. The driver's left and right femur maximum compressive forces were 1265 pounds and 1557 pounds, respectively.

The right front passenger's HIC was 286. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 46.2 g. The passenger's chest deflection was 0.8 inch. The right front passenger's left and right femur maximum compressive forces were 1075 pounds and 1693 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 left rear seat X-axis accelerometer, TLRXG1, exceeded the data channel's full scale limit at 35 milliseconds.

Table 1 Crash Test Summary

NHTSA number:	CT5103
Test type:	Frontal barrier impact
Test date:	02/21/96
Test time:	1632
Ambient temperature at impact area:	73° F
Vehicle year/make/ model/body style:	1996/Toyota/4Runner/mpv
Vehicle test weight:	4057 lb
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	29.3 mph
Secondary:	29.3 mph
Maximum static crush:	16.6 in
Average rebound:	30.2 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 #230</u>	<u>Passenger #314</u>
Type:	Part 572 E	Part 572 E
Location:	Left front	Right front
Restraint:	Airbag	Airbag
Number of data channels:	19	19
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag and seat back	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: 1996/Toyota/4Runner/mpv

Color: White

VIN: JT3GM84R4T0001526

NHTSA number: CT5103

Engine data:

Placement: Inline/longitudinal

Cylinders: 4

Displacement: 2.7 liters

Transmission data: 5 speed, X manual, ___ automatic, ___ overdrive

Final drive: ___ fwd, X rwd, ___ 4wd

Date vehicle received: 02/16/96

Odometer reading: 89

Dealer's name
and address: Germain Toyota of Columbus
5777 Scarborough Blvd.
Columbus, OH 43232

Accessories:

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

Certification data from vehicle's label:

Vehicle manufactured by: Toyota Motor Corporation

Date of manufacture: 01/96

VIN: JT3GM84R4T0001526

GVWR: 5250 lb

GAWR: Front: 2650 lb

Rear: 3000 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: 29 psi

Rear: 29 psi

Designated Seating Capacity:

Front NA

Rear NA

Total NA

Vehicle Capacity Weight: NA

Test vehicle attitudes:

Delivered attitude: LF: 33.5 in. RF: 33.7 in LR: 33.9 in RR: 34.0 in

Fully loaded attitude: LF: 32.9 in RF: 33.2 in LR: 31.5 in RR: 32.1 in

Pre-test attitude: LF: 32.8 in RF: 32.9 in LR: 32.1 in RR: 31.8 in

Table 2 Test Vehicle Information, Cont'd.

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

Right front	879	lb	Right rear	807	lb
Left front	921	lb	Left rear	828	lb
Total front weight	1800	lb	(52.4% of total vehicle weight)		
Total rear weight	1635	lb	(47.6% of total vehicle weight)		
Total delivered weight	3435	lb			

Calculation of test vehicle's target test weight:

RCLW¹ = Rated Cargo and Luggage Weight

GVWR = Gross Vehicle Weight Rating (5250 lb)

UDW = Unloaded Delivered Weight (3435 lb)

VCW = Vehicle Capacity Weight = GVWR - UDW = 5250 - 3435 = 1815 lb

DSC² = Designated Seating Capacity (5)

RCLW¹ = GVWR - UDW - 150 (DSC) = 1065 lb

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

Target test weight = 3435 + 300 + 334 = 4069 lb

Weight of test vehicle with required dummies and 288 lb of cargo weight:

Right front	1010	lb	Right rear	1030	lb
Left front	972	lb	Left rear	1045	lb
Total front weight	1982	lb	(48.8% of total vehicle weight)		
Total rear weight	2075	lb	(51.2% of total vehicle weight)		
Total test weight	4057	lb	(0.3% under target test weight)		

Weight of ballast secured in vehicle: 175 lb

Components removed to meet target test weight: Tail lights

CG rearward of front wheel centerline: 53.7 in

Vehicle Wheelbase: 105.0 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: 960221
NHTSA number: CT5103
Test date: 02/21/96
Test time: 1632
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature
at impact area: 73° 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:

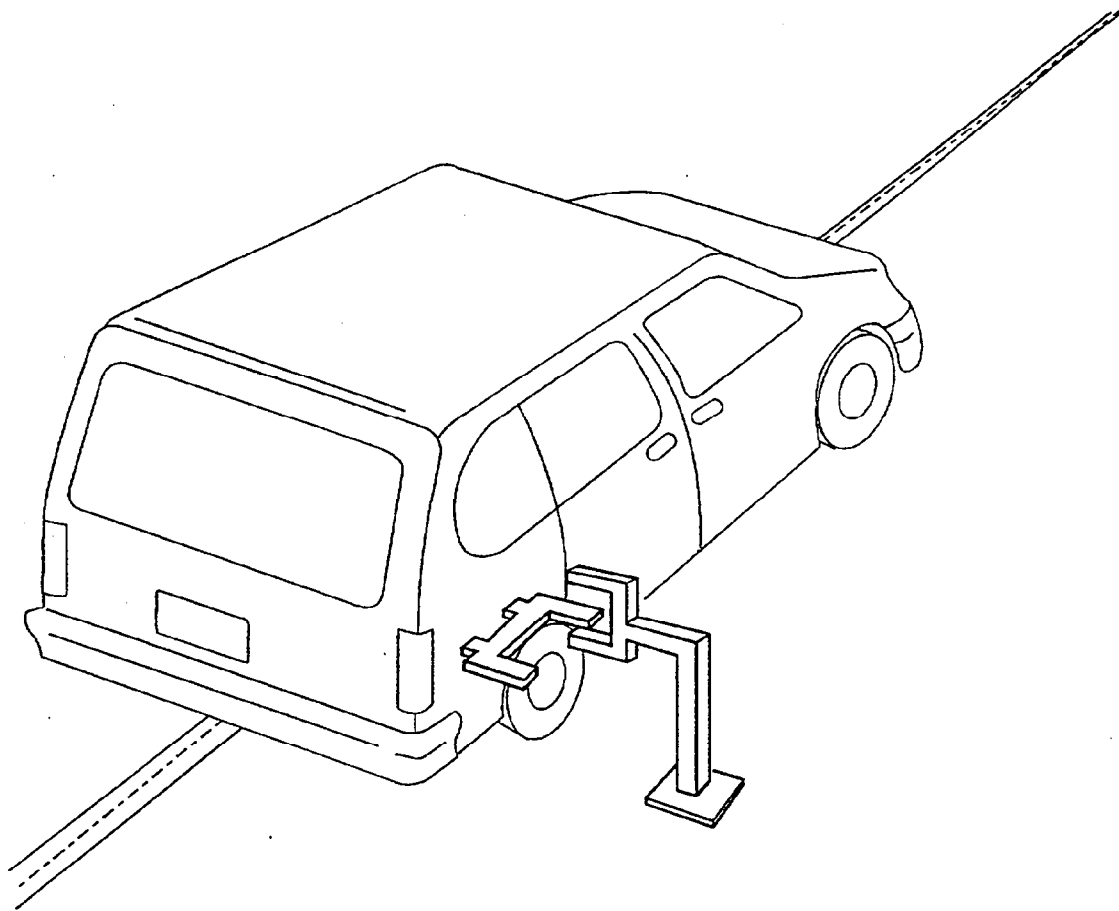
Pre-test:	L:	173.0 in	C:	178.5 in	R:	173.0 in
Post-test:	L:	158.2 in	C:	162.2 in	R:	161.0 in
Total crush:	L:	14.8 in	C:	16.3 in	R:	12.0 in
Average crush:		14.4 in				

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	30.7 in	C:	29.2 in	R:	30.6 in
Average rebound:		30.2 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: CT5103
 Test date: 02/21/96
 Vehicle year/make/model/body style: 1996/Toyota/4Runner/mpv
 Vehicle size category: Special purpose
 VIN: JT3GM84R4T0001526
 Build date: 01/96
 Test weight: 4057 lb
 Vehicle wheelbase: 105.0 in
 Maximum width: 66.6 in
 Front overhang: 30.9 in

Collision Deformation

Classification (CDC) Code: 12FDEW2

Crush depth measurements:

C1:	14.8 in
C2:	16.6 in
C3:	16.2 in
C4:	15.8 in
C5:	14.5 in
C6:	12.0 in

Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 60.0 in

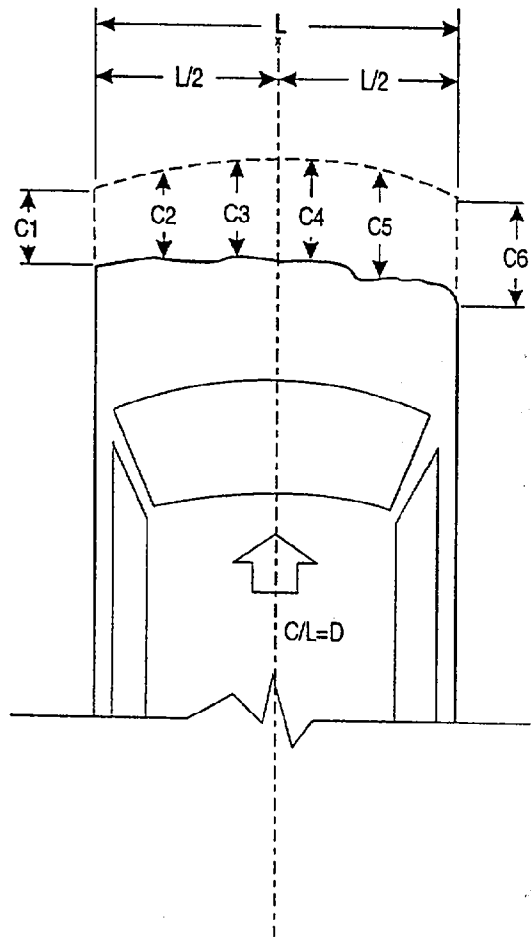


Table 4 Post-test Airbag Data, Cont'd.

E. Is the airbag tethered?

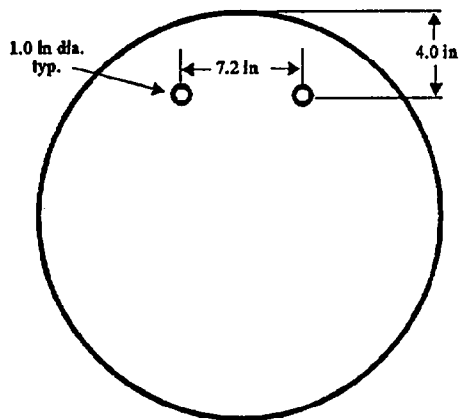
Driver: Yes

If yes, record length of tether: 2 tethers, 6.5 inches each

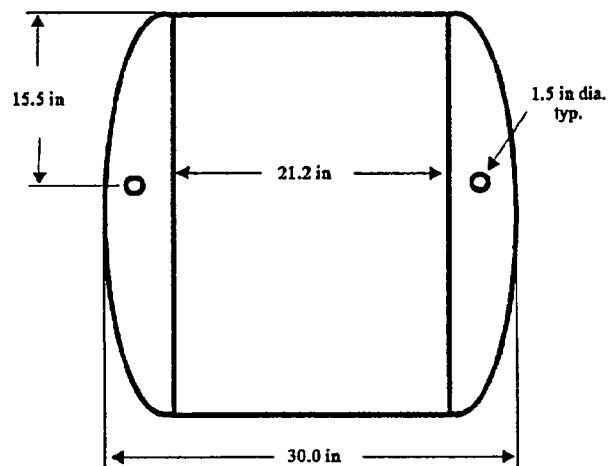
Passenger: No

If yes, record length of tether: 1 tether, 20 inches

Driver's airbag:



Passenger's airbag:



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

Driver: Manufacturer: Morton International

Airbag: 45165-35011

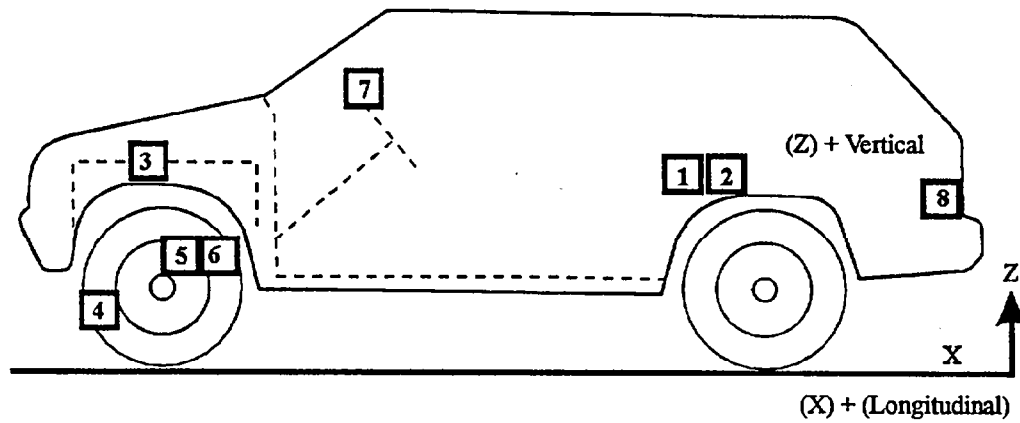
Inflator: TDBFY3ULUX

Passenger: Manufacturer: Morton International

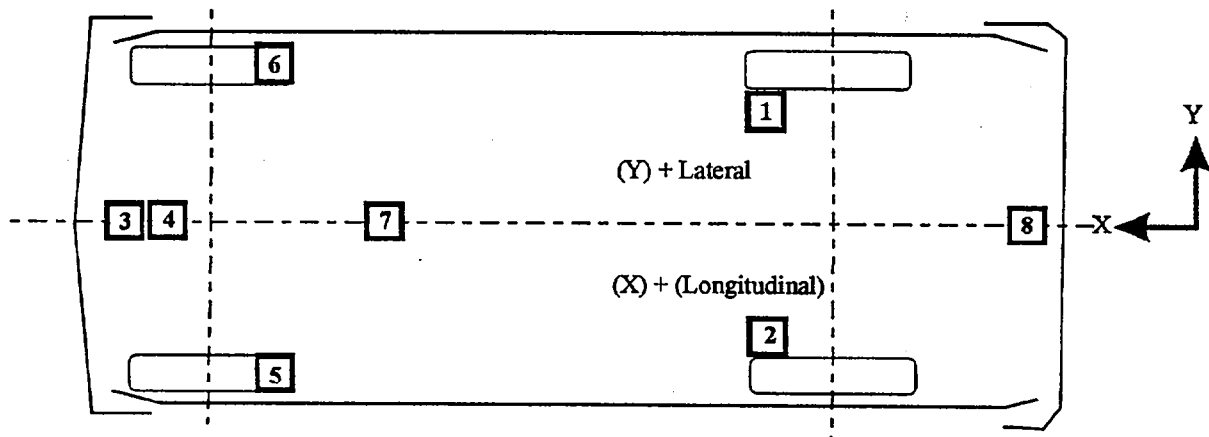
Airbag: P117080-02B

Inflator: 114152-1

Figure 3 Vehicle Accelerometer Placement



Side View



Bottom View

Table 5 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 960221	X			Y			Z			POSITIVE DIRECTION	NEGATIVE DIRECTION
No. LOCATION											
1 LEFT REAR SEAT CROSSMEMBER LONGITUDINAL ¹	PRE	71.5 in	16.5 in	23.8 in							
	POST	72.0 in	16.5 in	26.5 in					4.6 g @ 34.3 ms	33.9 g @ 40.2 ms	
2 RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	71.4 in	-16.5 in	23.6 in							
	POST	72.0 in	-16.5 in	26.5 in					2.2 g @ 173.1 ms	36.7 g @ 42.8 ms	
3 ENGINE TOP LONGITUDINAL	PRE	156.4 in	-1.8 in	40.0 in							
	POST	151.0 in	-1.0 in	42.1 in					8.8 g @ 83.4 ms	62.0 g @ 34.0 ms	
4 ENGINE BOTTOM LONGITUDINAL	PRE	151.8 in	-1.1 in	11.8 in							
	POST	148.0 in	-2.0 in	10.3 in					9.0 g @ 48.5 ms	71.9 g @ 28.5 ms	
5 RIGHT BRAKE CALIPER LONGITUDINAL	PRE	151.7 in	-24.1 in	12.7 in							
	POST	149.3 in	-23.4 in	11.4 in					32.5 g @ 34.7 ms	96.3 g @ 14.0 ms	
6 LEFT BRAKE CALIPER LONGITUDINAL	PRE	151.7 in	24.1 in	12.7 in							
	POST	149.3 in	23.4 in	11.4 in					11.7 g @ 53.3 ms	82.2 g @ 13.3 ms	
7 INSTRUMENT PANEL CENTER LONGITUDINAL	PRE	123.7 in	-0.2 in	48.0 in							
	POST	126.2 in	-0.4 in	49.0 in					99.3 g @ 35.5 ms	110.4 g @ 41.7 ms	
8 VEHICLE REAR CENTER VERTICAL	PRE	11.3 in	0.0 in	25.2 in							
	POST	11.0 in	0.0 in	29.7 in					24.5 g @ 23.0 ms	11.3 g @ 19.0 ms	

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

¹See DATA ACQUISITION EXPLANATIONS

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	-74.4 g	10.8 g	-23.0 g	77.0 g	-57.6 g	-11.3 g	-16.5 g
Passenger	-49.2 g	19.1 g	-22.2 g	52.4 g	-45.0 g	5.3 g	-18.6 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	1265 lbf	1557 lbf
Passenger	1075 lbf	1693 lbf

	<u>Head Injury Criteria¹</u>		
	HIC	Time t ₁	Time t ₂
Driver	806	65.04 ms	94.48 ms
Passenger	286	65.68 ms	93.36 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Driver	58.2 g	82.5 ms	85.4 ms
Passenger	46.2 g	73.7 ms	76.6 ms

<u>Maximum Chest Deflection</u>	
Driver	1.0 in
Passenger	0.8 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 head and chest impacted the airbag. The dummy's head and chest were restrained by the airbag. The dummy's head and upper torso rotated rearward as the dummy rebounded into the seat back. The dummy's head contacted 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 and chest impacted the airbag. The dummy's head and chest were restrained by the passenger's airbag. The dummy rebounded rearward and slightly to the left into the seat back. The dummy came to rest seated in the right front passenger's seat rotated slightly to the left and leaning to the left.

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

NHTSA number: CT5103

Vehicle model year/make/model/body style: 1996/Toyota/4Runner/mpv

Date of comfort/convenience check: 02/21/96

Technician performing check: Markusic

GVWR: 5250 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: CT5103

Vehicle model year/make/model/body style: 1996/Toyota/4Runner/mpv

Date of comfort/convenience check: 02/21/96

Technician performing check: Markusic

GVWR: 5250 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 0.3 pound.

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: CT5103

Vehicle model year/make/model/body style: 1996/Toyota/4Runner/mpv

Date of comfort/convenience check: 02/21/96

Technician performing check: Markusic

GVWR: 5250 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 unbelt in stowed position and ignition switch placed in the "start/on" position, the duration of the reminder light is 6 s. The audible warning signal operates continuously

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

NOTE: the audible warning should not operate.

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 and passenger's sun visors.

The manufacturer's recommended regular airbag maintenance is to have the airbag system inspected ten years after the date of manufacture and every 2 years thereafter.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 38.

A description of the functional operation of the system was provided in the owner's manual on pages 33 - 35.

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 33 - 35 and 38

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 "SRS" located on the left upper edge 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 34.

FMVSS 208 Rear Outboard Seating Position Seat Belts

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.

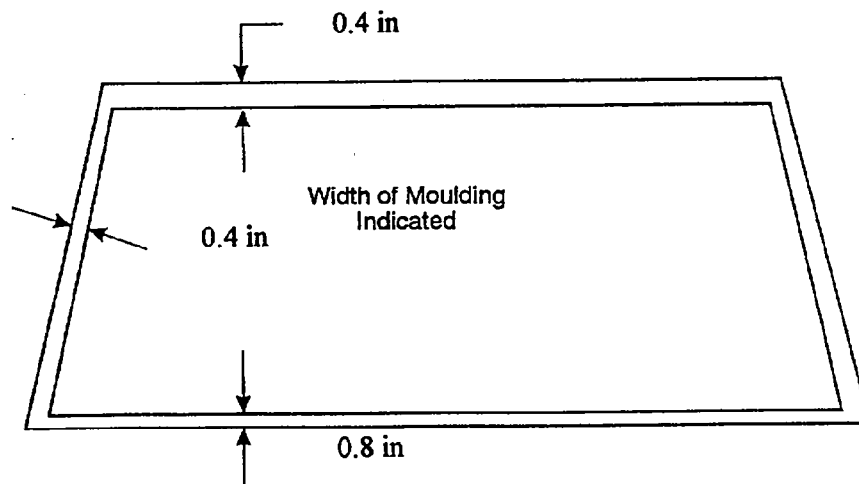
Clips or brackets used to retain windshield: None

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 the windshield for vehicles equipped with automatic restraint systems for front occupants.

Windshield periphery measurements:

	Pre-test	Post-test	Percent Retention
Right side	73.5 in	73.5 in	100.0
Left side	73.5 in	73.5 in	100.0
Total	147.0 in	147.0 in	100.0

Pre-test windshield mounting material temperature: 66° 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: 44.6 in

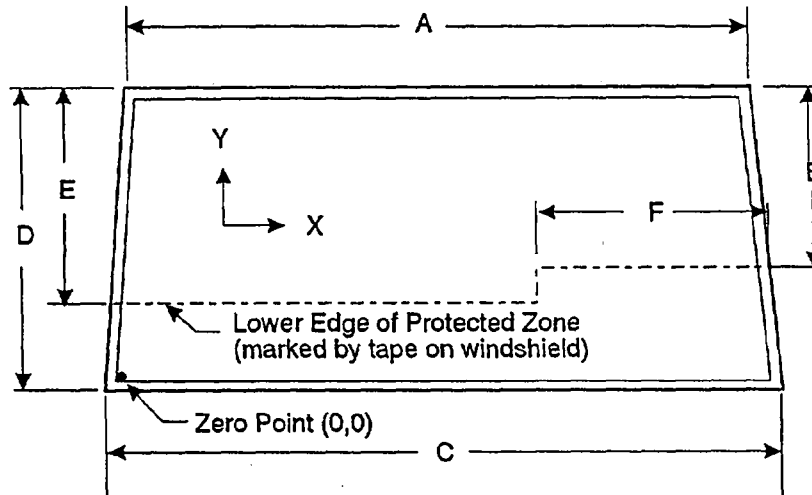
B: 14.5 in

C: 55.2 in

D: 24.9 in

E: 14.8 in

F: 34.2 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:	1996/Toyota/4Runner/mpv
NHTSA number:	CT5103
Fuel system capacity:	18.5 gal (from owner's manual)
Usable capacity:	17.2 gal (furnished by COTR)
Test volume range:	17.0 gal to 17.4 gal (92-94% of usable)
Actual test volume:	17.2 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.

Table 10 FMVSS 301 Post-Impact Test Data

NHTSA number: CT5103
Test date: 02/21/96
Vehicle year/make/
model/body style: 1996/Toyota/4Runner/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:

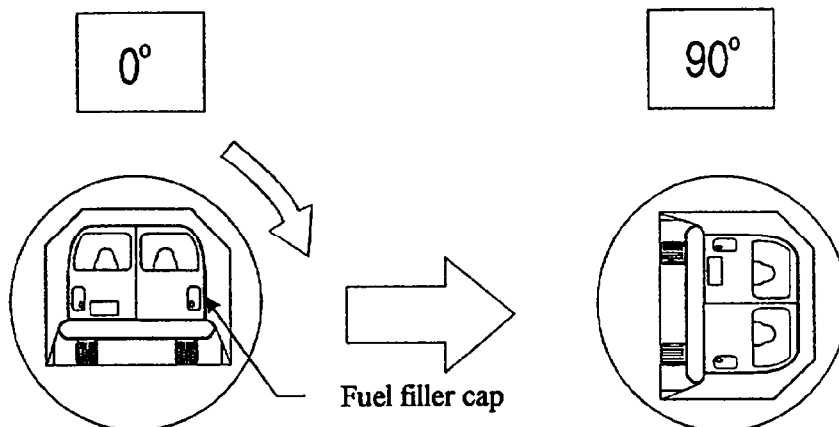
	Test Results	Maximum Allowable
1. From impact until vehicle motion ceases	0 oz	1 oz
2. 5-Minute period after vehicle motion ceases	0 oz	5 oz
3. Next 25 minutes after 5-minute period	0 oz	1 oz/1 min

Fuel system fluid spillage location(s): None

Figure 6 FMVSS 301 Static Rollover Test Data

NHTSA number: CT5103

Test phase



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

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

FMVSS 301 position hold time = 5 minutes, 0 seconds

Total = 7 minutes, 0 seconds

Next whole minute interval = 7 minutes

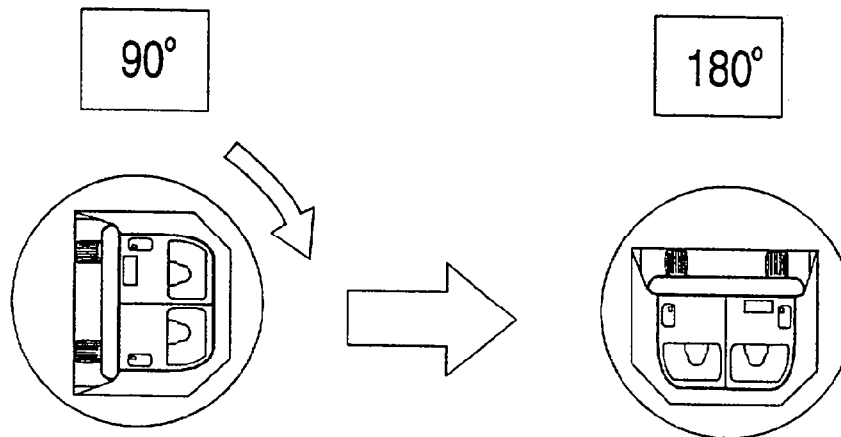
Fuel system fluid spillage measurements:

	Test Results	Maximum Allowable
<u>0° to 90° rotation (fuel filler cap down)</u>		
1. First five 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	

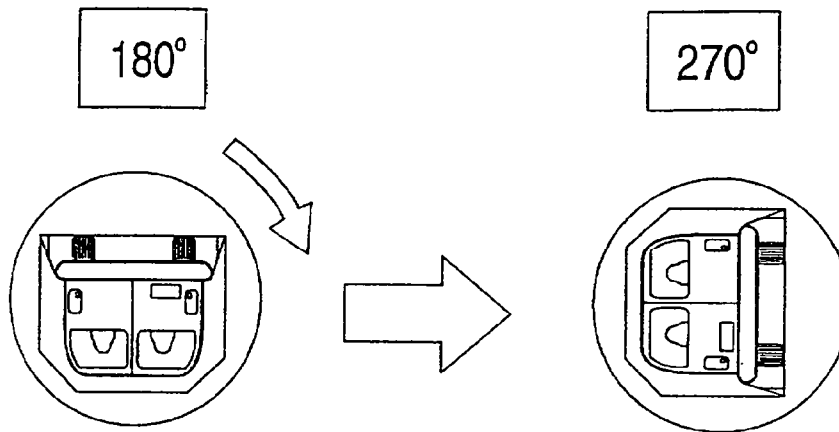
Fuel system fluid spillage measurements:

90° to 180° rotation		Test Results	Maximum Allowable
1.	First five 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		

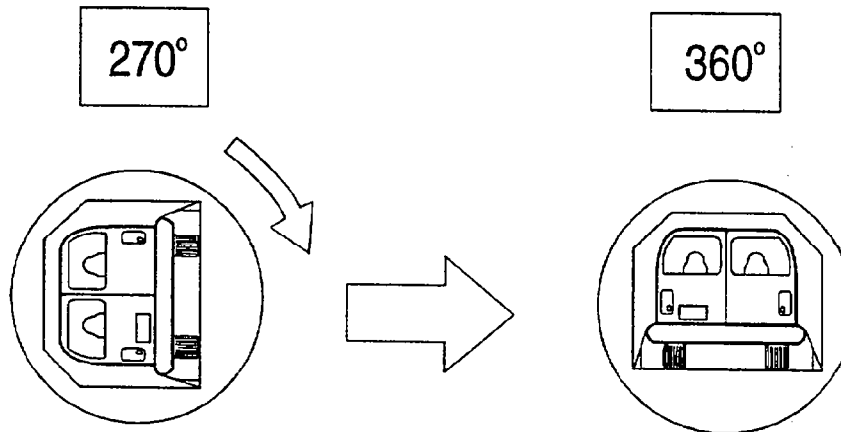
Fuel system fluid spillage measurements:

<u>180 to 270° rotation</u>	<u>Test Results</u>	<u>Maximum Allowable</u>
1. First five 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 five 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

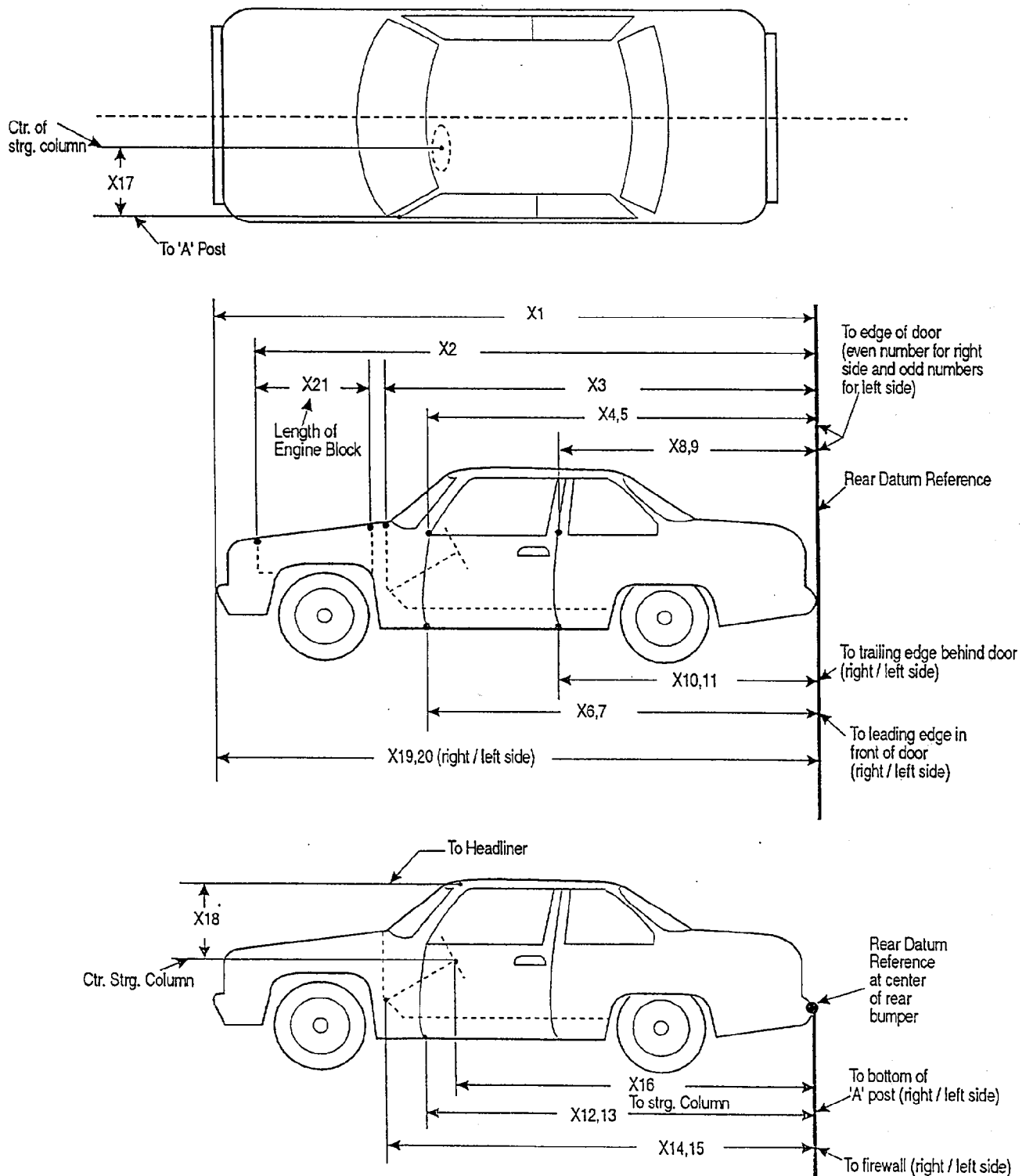


Table 11 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1996/Toyota/4Runner/mpv

Test Number: 960221

No.	Type of measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	178.5 in	162.2 in	16.3 in
X2	Rear surface of vehicle to front of engine block	158.1 in	153.5 in	4.6 in
X3	Rear surface of vehicle to firewall	135.9 in	134.7 in	1.2 in
X4	Rear surface of vehicle to upper leading edge of right door	125.0 in	126.1 in	-1.1 in
X5	Rear surface of vehicle to upper leading edge of left door	125.2 in	126.1 in	-0.9 in
X6	Rear surface of vehicle to lower leading edge of right door	124.4 in	124.5 in	-0.1 in
X7	Rear surface of vehicle to lower leading edge of left door	124.5 in	124.7 in	-0.2 in
X8	Rear surface of vehicle to upper trailing edge of right door	84.2 in	85.6 in	-1.4 in
X9	Rear surface of vehicle to upper trailing edge of left door	84.5 in	85.7 in	-1.2 in
X10	Rear surface of vehicle to lower trailing edge of right door	84.0 in	84.0 in	0.0 in
X11	Rear surface of vehicle to lower trailing edge of left door	84.2 in	84.2 in	0.0 in
X12	Rear surface of vehicle to bottom of "A" post on right side	125.0 in	125.7 in	-0.7 in
X13	Rear surface of vehicle to bottom of "A" post on left side	124.8 in	125.8 in	-1.0 in
X14	Rear surface of vehicle to firewall - right side	135.2 in	136.1 in	-0.9 in
X15	Rear surface of vehicle to firewall - left side	135.0 in	132.2 in	2.8 in
X16	Rear surface of vehicle to steering wheel center	109.5 in	113.0 in	-3.5 in
X17	Center of steering column to "A" post	10.8 in	13.1 in	-2.3 in
X18	Center of steering column to headliner	16.3 in	12.5 in	3.8 in
X19	Rear surface of vehicle to right side of front bumper	173.0 in	161.0 in	12.0 in
X20	Rear surface of vehicle to left side of front bumper	173.0 in	158.2 in	14.8 in
X21	Length of engine block	21.2 in	21.2 in	0.0 in

Figure 8 Vehicle Target Locations

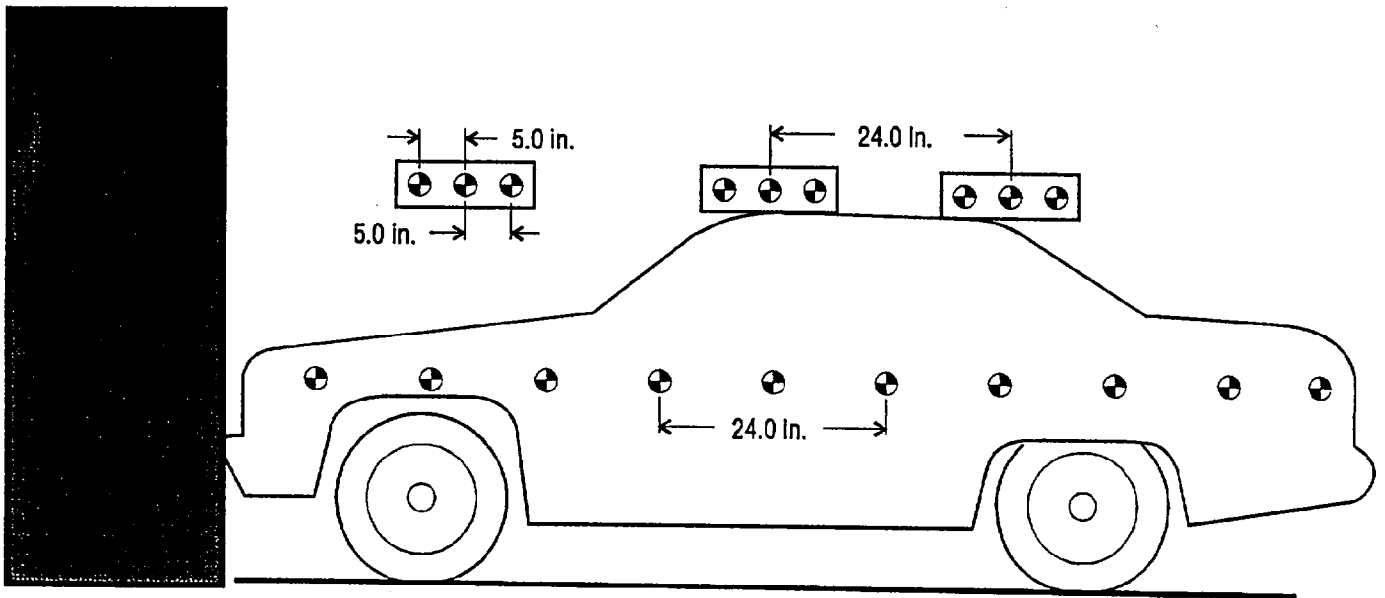


Figure 9 Dummy Measurement Locations for Front Seat Occupants

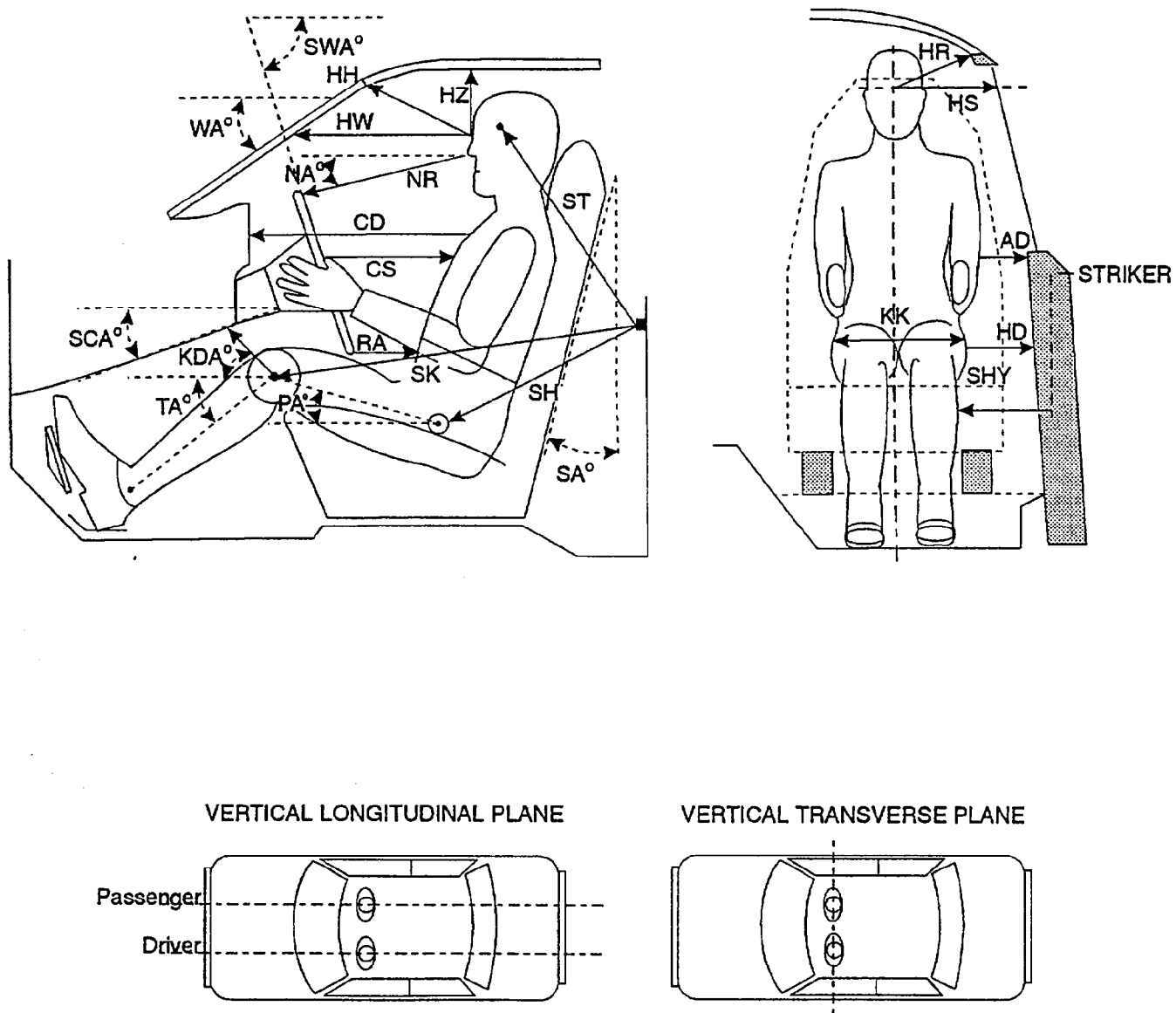


Table 12 Dummy Measurement Data for Front Seat Occupants

Designation	Type of Measurement	Driver (Serial 230)	Passenger (Serial #314)
WA	Windshield angle	38°	NA
SWA	Steering wheel angle	65°	NA
SCA	Steering column angle	25°	NA
SA	Seat back angle	15°	15°
HZ	Head to roof	7.9 in	7.7 in
HH	Head to header	15.9 in	15.8 in
HW	Head to windshield	20.6 in	20.5 in
HR	Head to side header	8.2 in	8.5 in
NR	Nose to rim	16.5 in	NA
NA	Nose to rim angle	9°	NA
CD	Chest to dash	22.3 in	20.6 in
CS	Steering wheel to chest	13.0 in	NA
RA	Rim to abdomen	8.0 in	NA
KDL	Left knee to dash	8.1 in	6.3 in
KDR	Right knee to dash	7.4 in	6.4 in
KDA	Outboard knee to dash angle	30°	30°
PA	Pelvic angle	24°	25°
TA	Tibial angle	33°	37°
KK	Knee to knee	14.0 in	10.2 in
ST ¹	Striker to head	21.4 in	21.8 in
	Striker to head angle	-77°	-81°
SK ¹	Striker to knee	23.6 in	23.8 in
	Striker to knee angle	-2°	-4°
SH ¹	Striker to H-point	10.1 in	10.2 in
	Striker to H-point angle	27°	22°
SHY	Striker to H-point (Y dir.)	8.2 in	8.7 in
HS	Head to side window	11.5 in	12.0 in
HD	H-point to door	5.7 in	4.8 in
AD	Arm to door	3.1 in	3.3 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

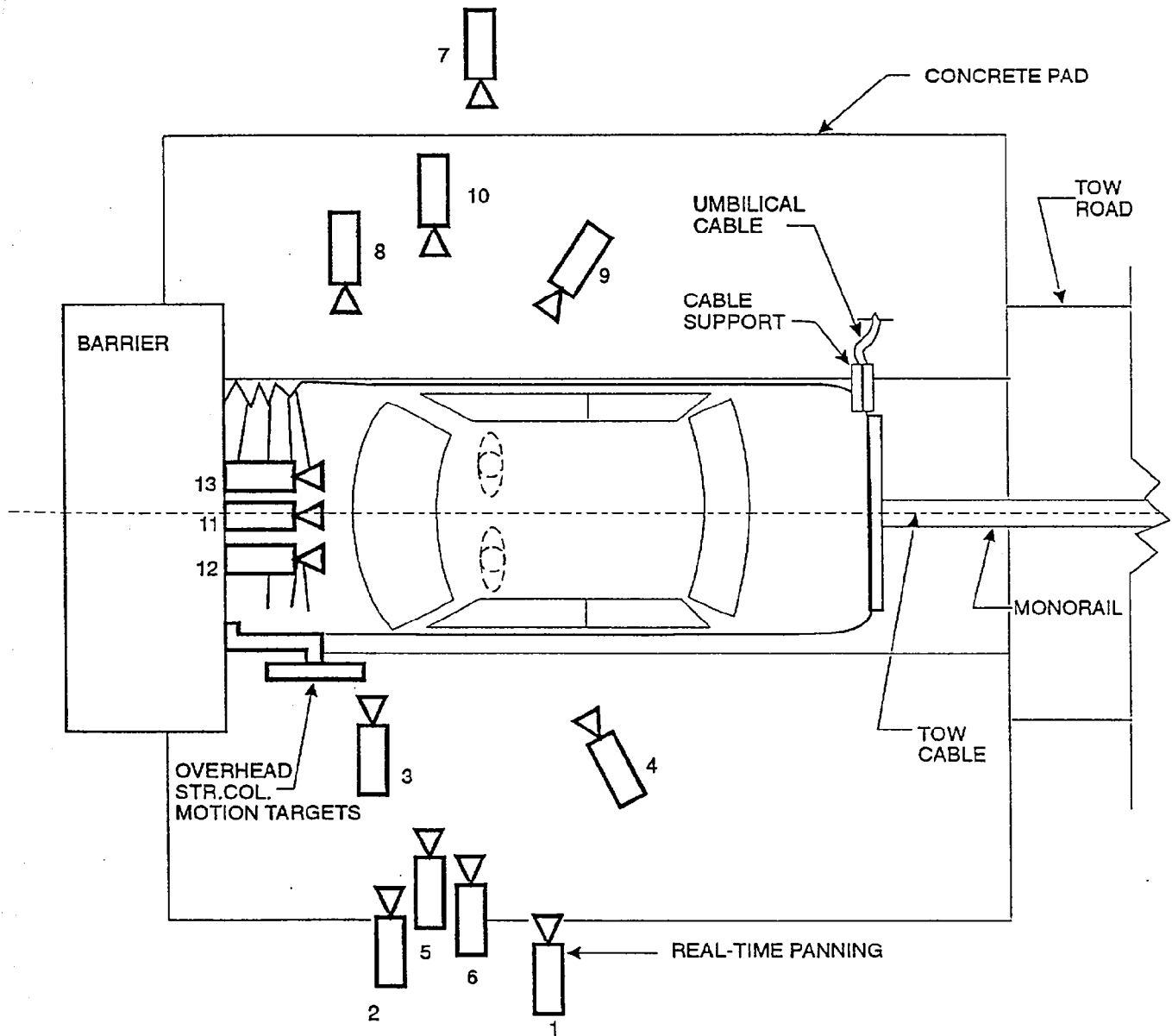


Figure 10. Camera Positions, Cont'd.

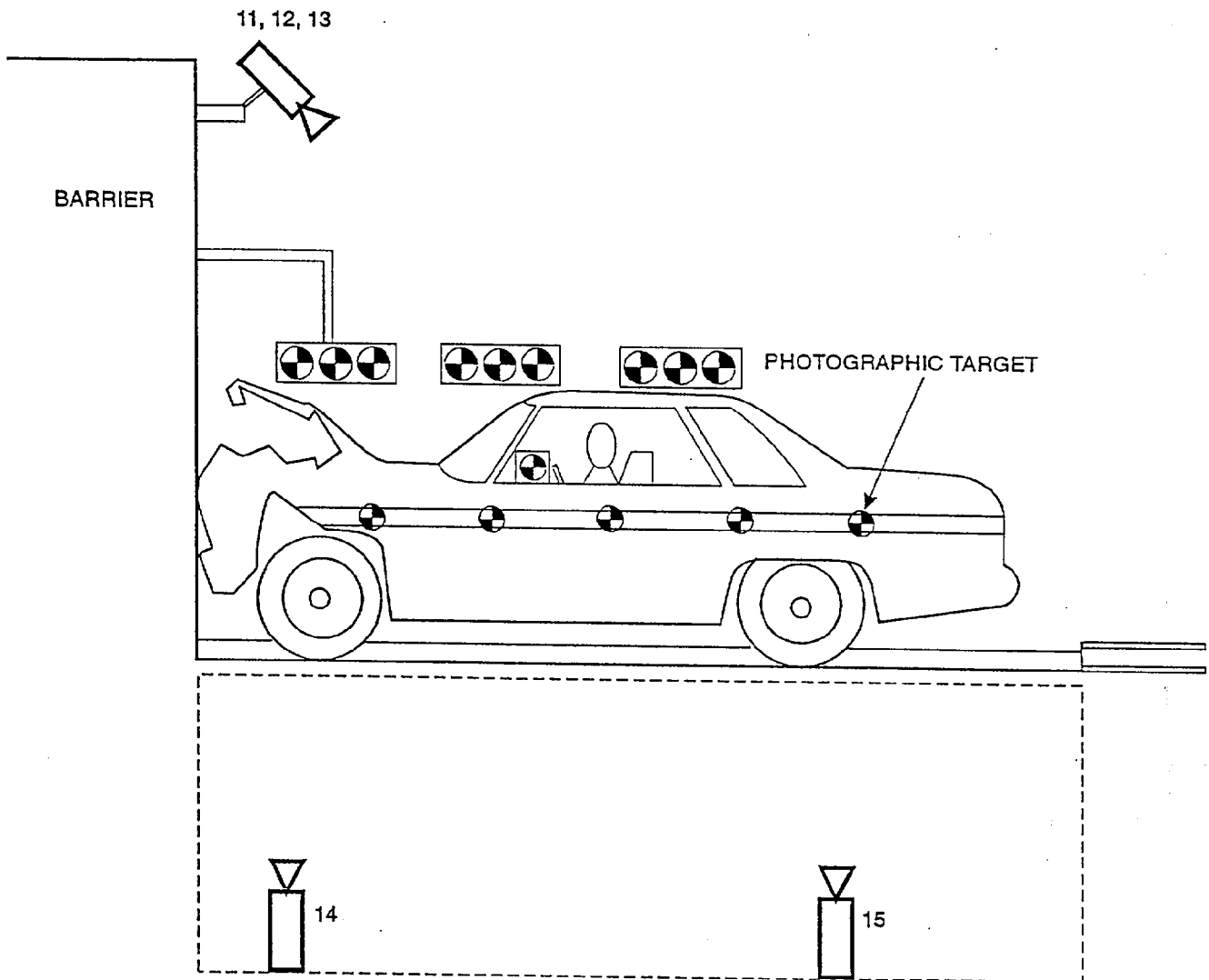


Table 13 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1996/Toyota/4Runner/mpv

Test number: 960221

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°	286.0 in	25 mm	998 frames/s
3	Left windshield intrusion	-53.0 in	309.4 in	42.3 in	0°	NA	50 mm	1005 frames/s
4	Driver kinematics	-157.3 in	116.0 in	87.0 in	-27°	93.0 in	25 mm	1008 frames/s
5	Steering column motion	-46.0 in	286.0 in	103.0 in	-14°	NA	25 mm	1000 frames/s
6	Steering column motion	-46.0 in	286.0 in	75.1 in	-9°	NA	25 mm	1002 frames/s
7	Right overall	-81.3 in	-266.4 in	37.1 in	-2°	NA	13 mm	998 frames/s
8	Right windshield intrusion	-38.1 in	-306.1 in	44.0 in	0°	NA	50 mm	998 frames/s
9	Passenger kinematics	-152.1 in	-116.0 in	87.0 in	-26°	85.0 in	25 mm	985 frames/s
10	Passenger kinematics	-38.8 in	-293.0 in	45.3 in	-4°	289.0 in	25 mm	1000 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	1008 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	1002 frames/s
15	Pit - rear position	-99.3 in	0.0 in	-99.0 in	90°	NA	13 mm	995 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

960221

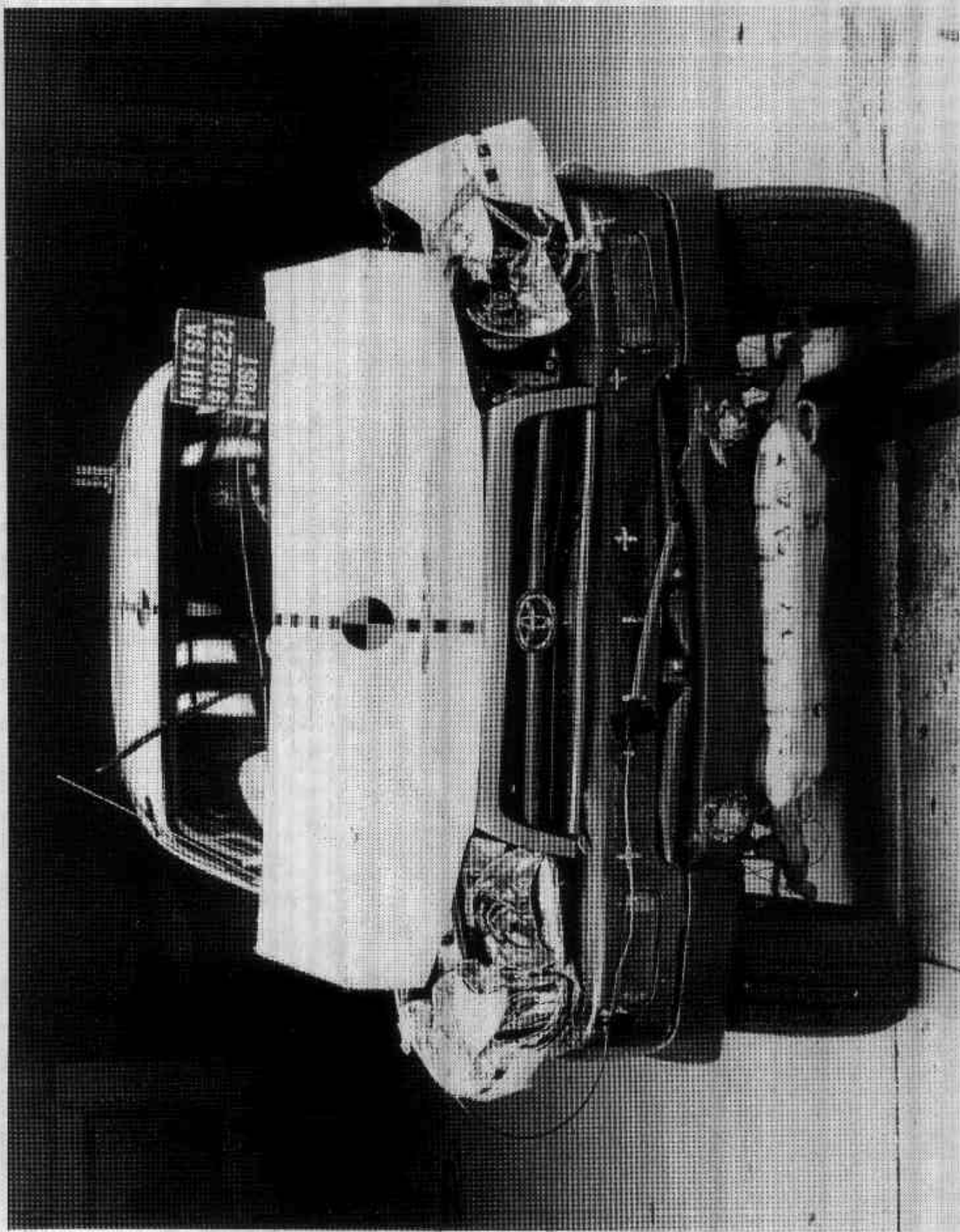


Figure A-2 Post-Test Front View

A-3

960221

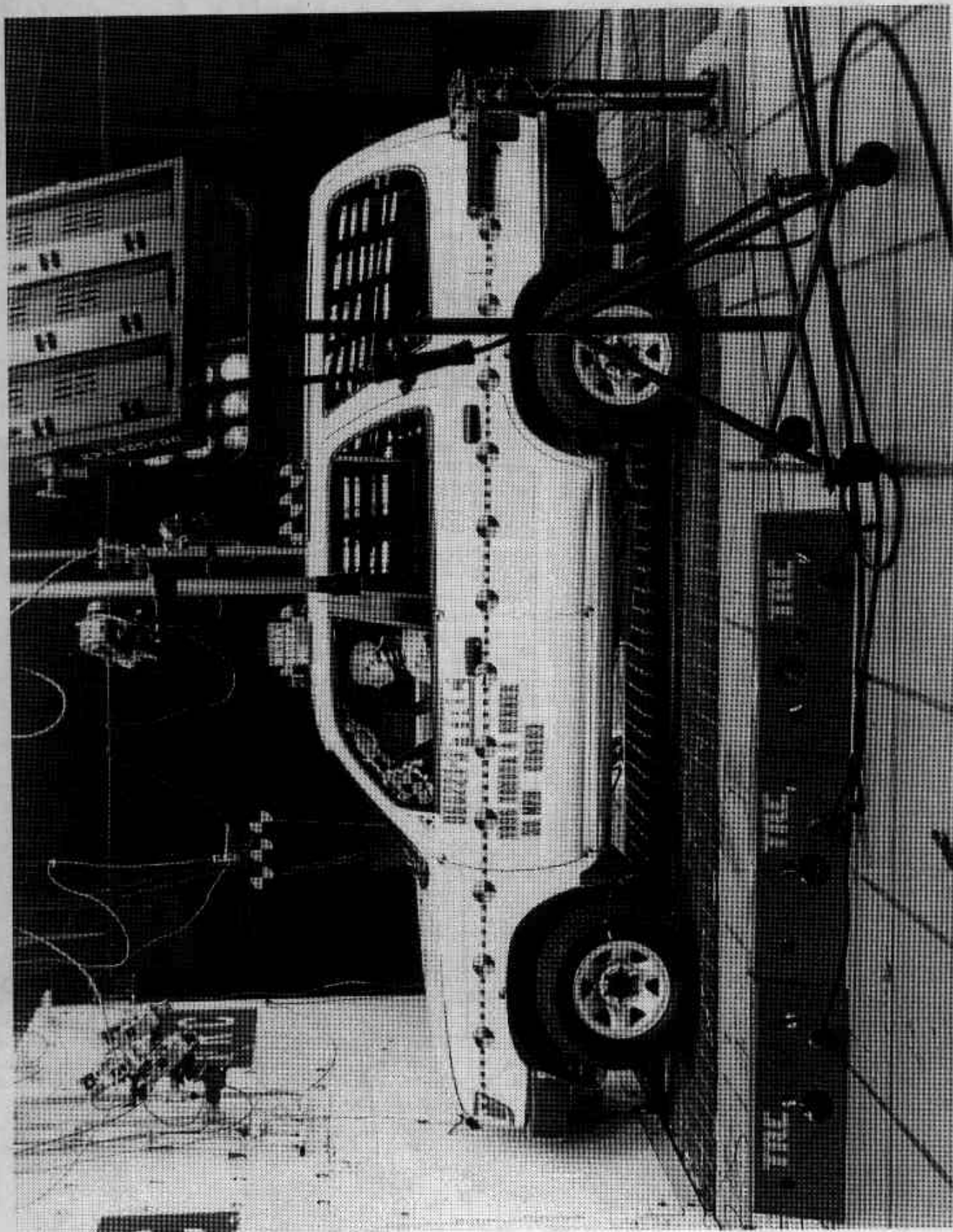


Figure A-3 Pre-Test Left Side View

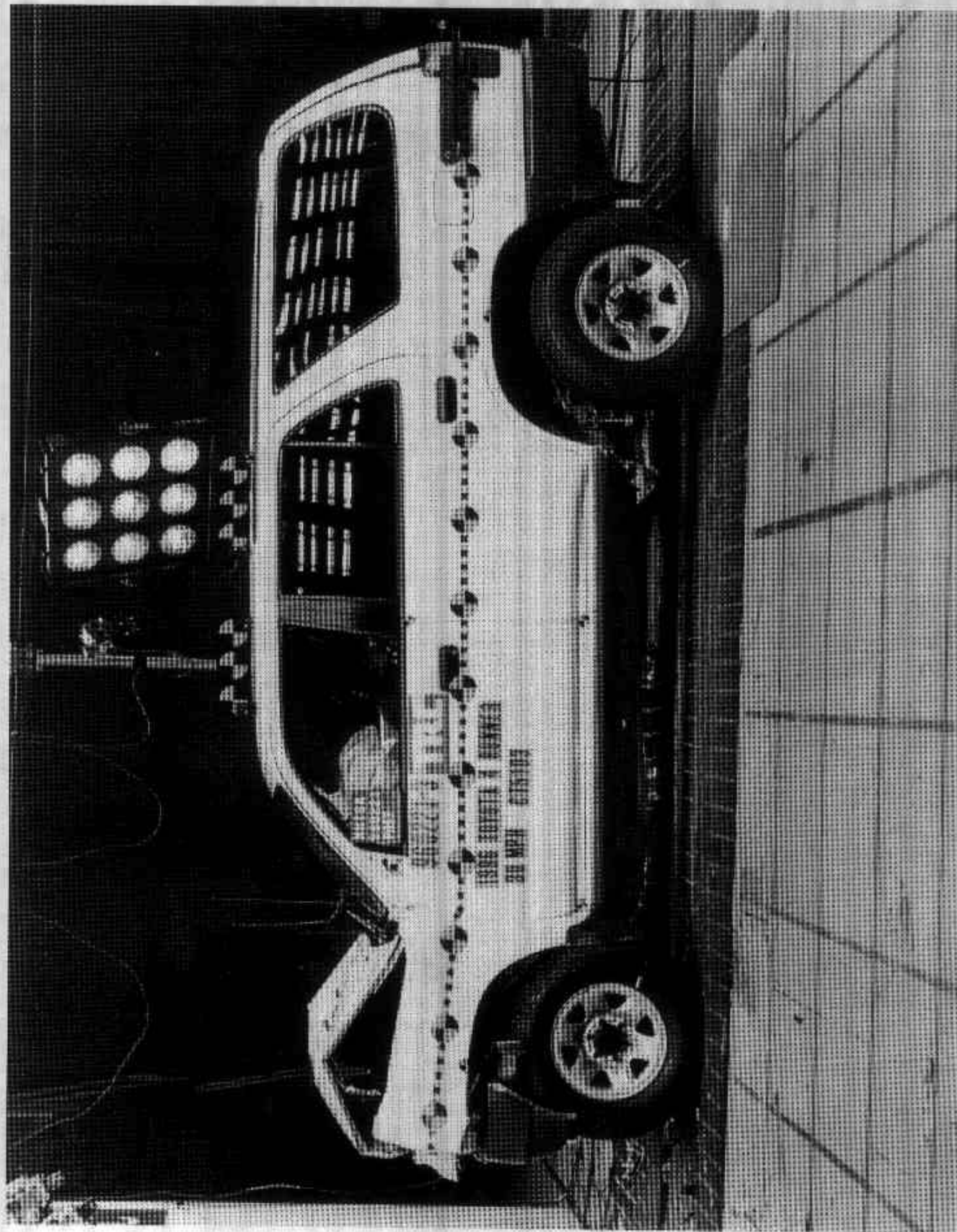


Figure A-4 Post-Test Left Side View

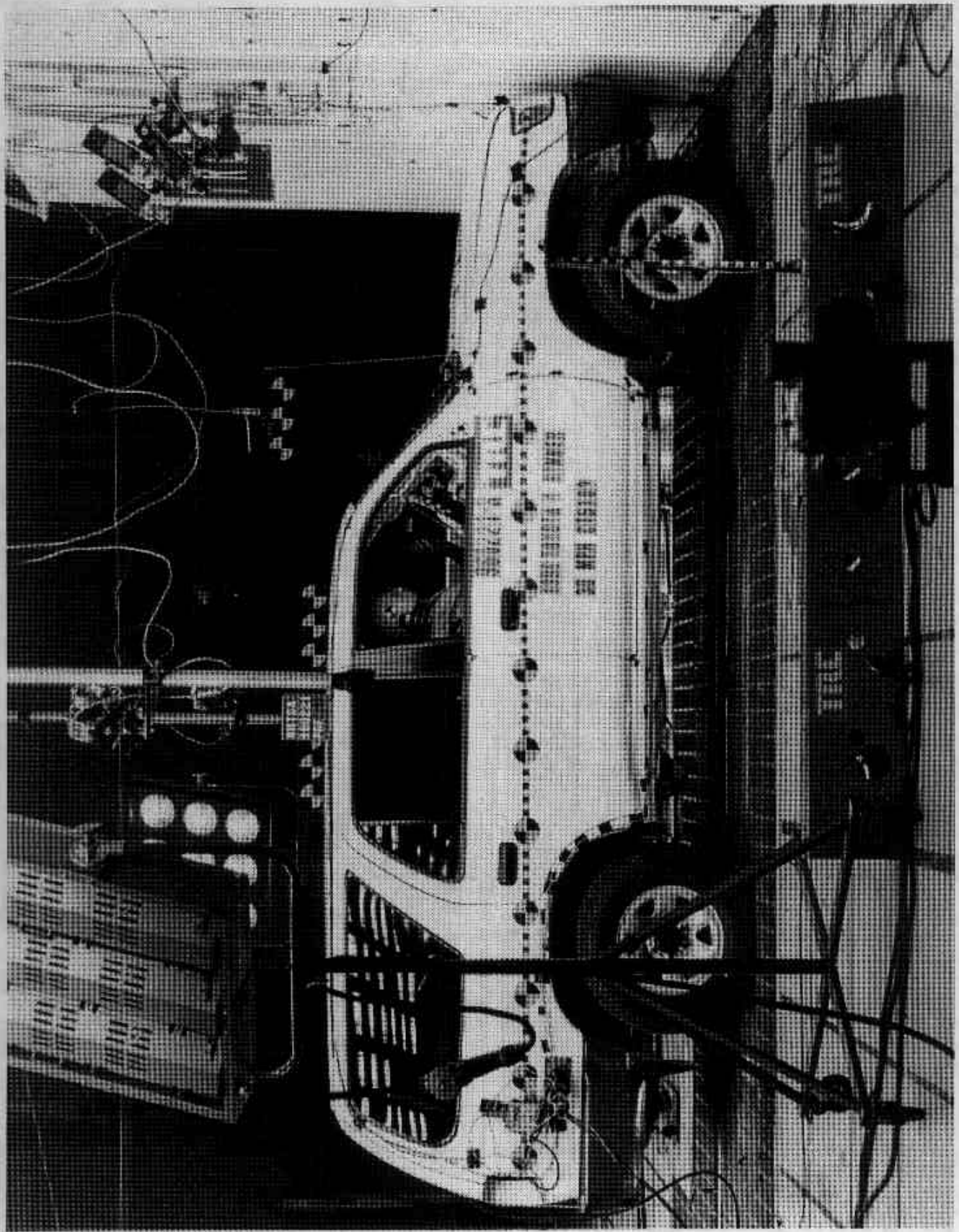


Figure A-5 Pre-Test Right Side View

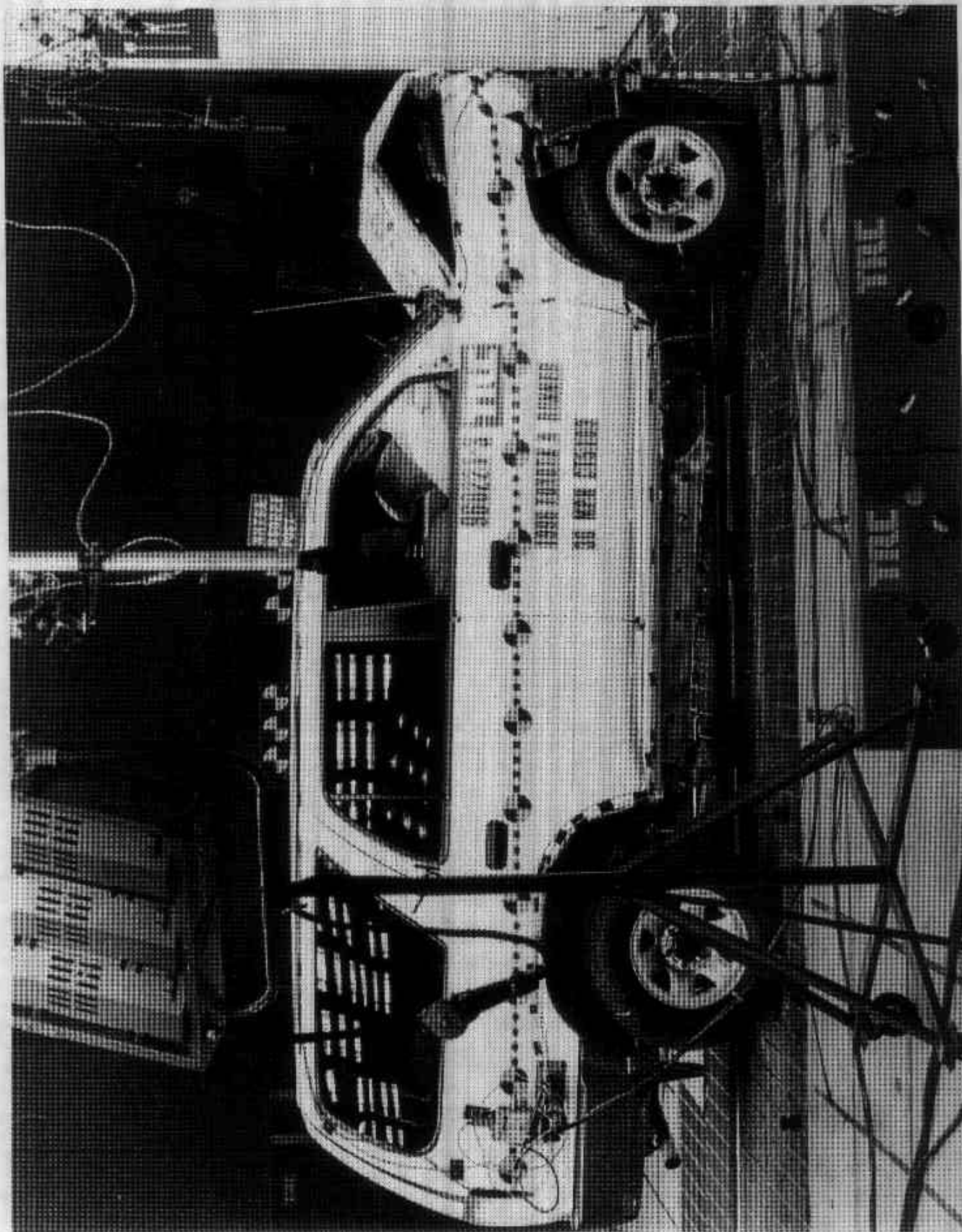


Figure A-6 Post-Test Right Side View

A-7

960221

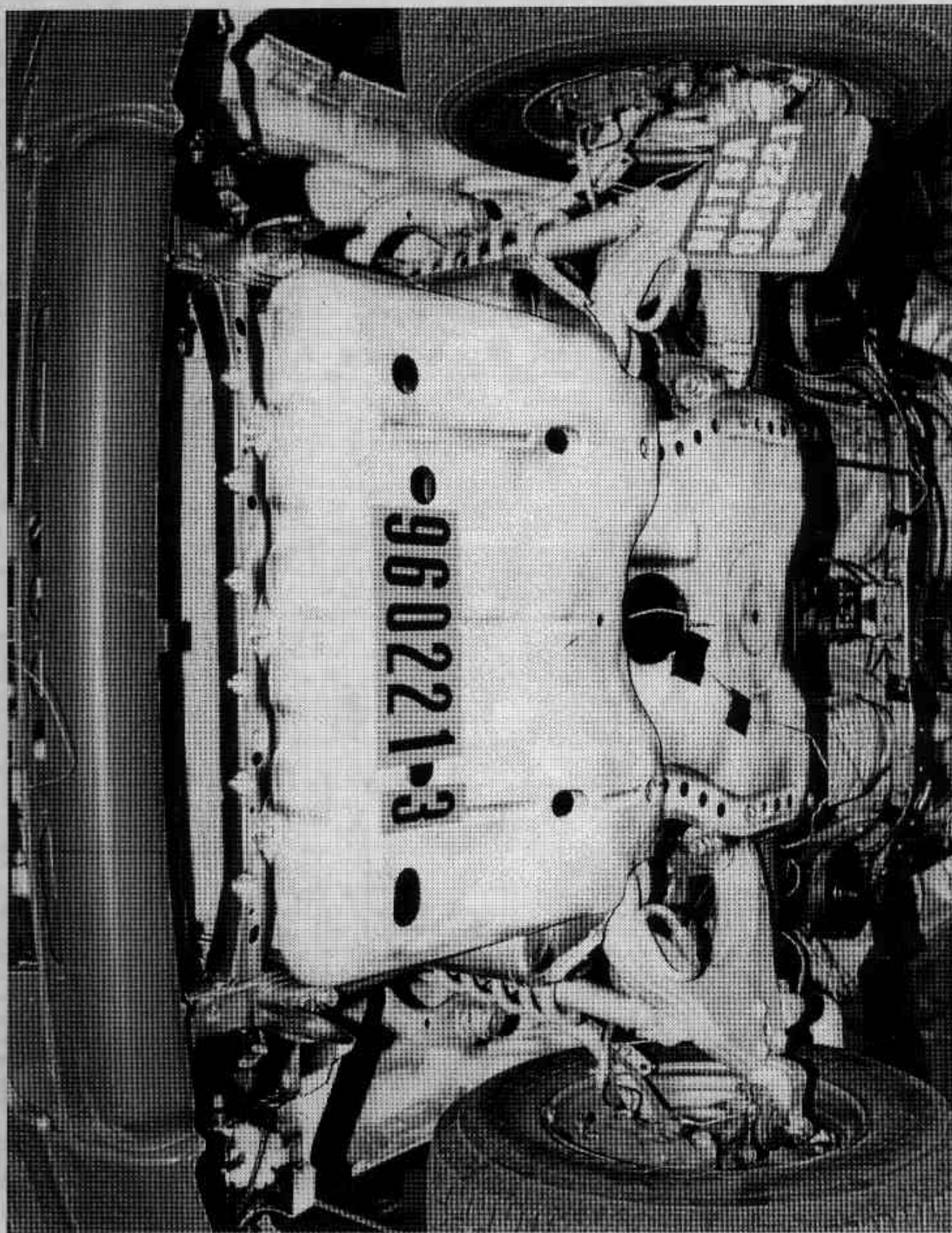


Figure A-7 Pre-Test Front Underbody View

A-8

960221

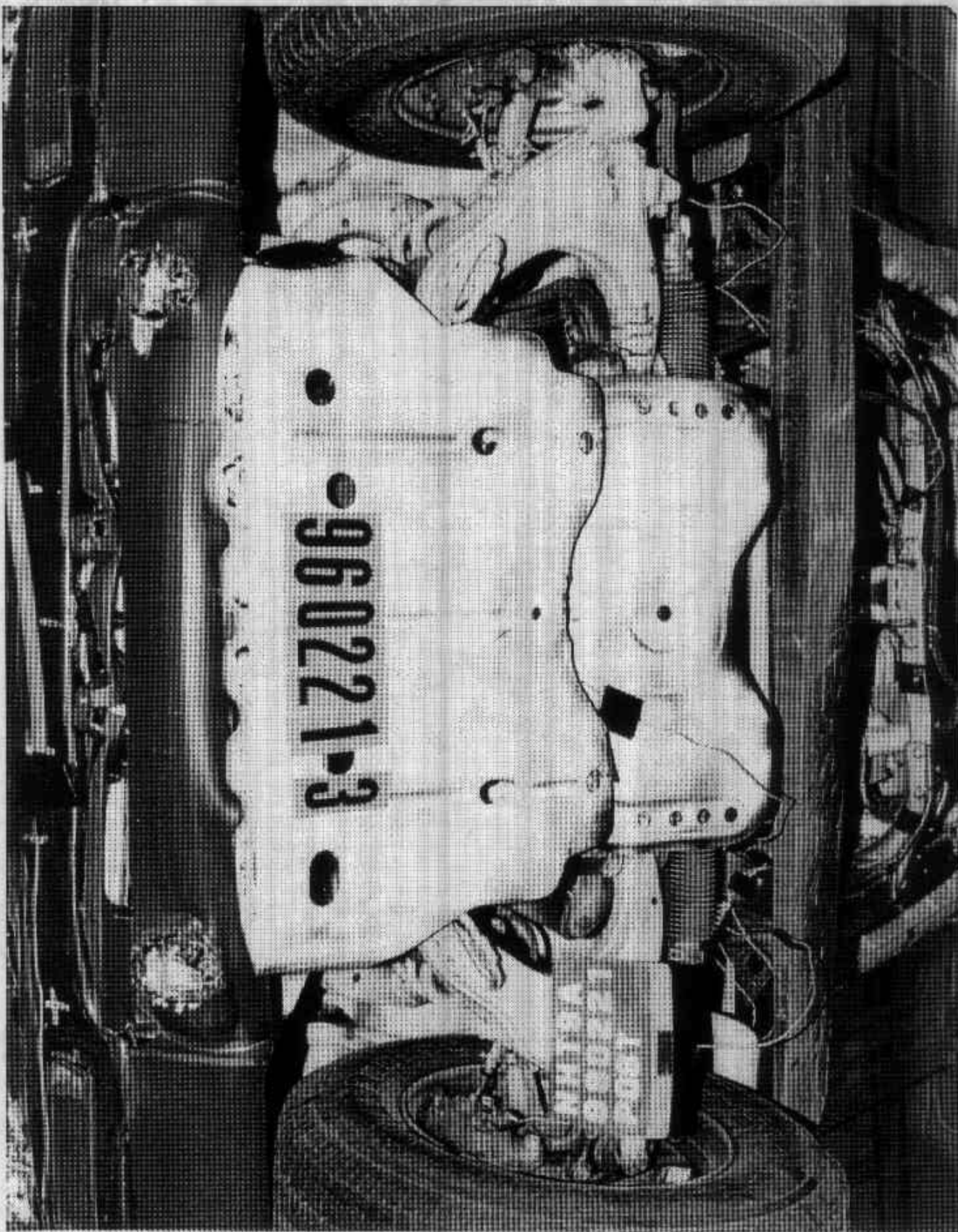


Figure A-8 Post-Test Front Underbody View

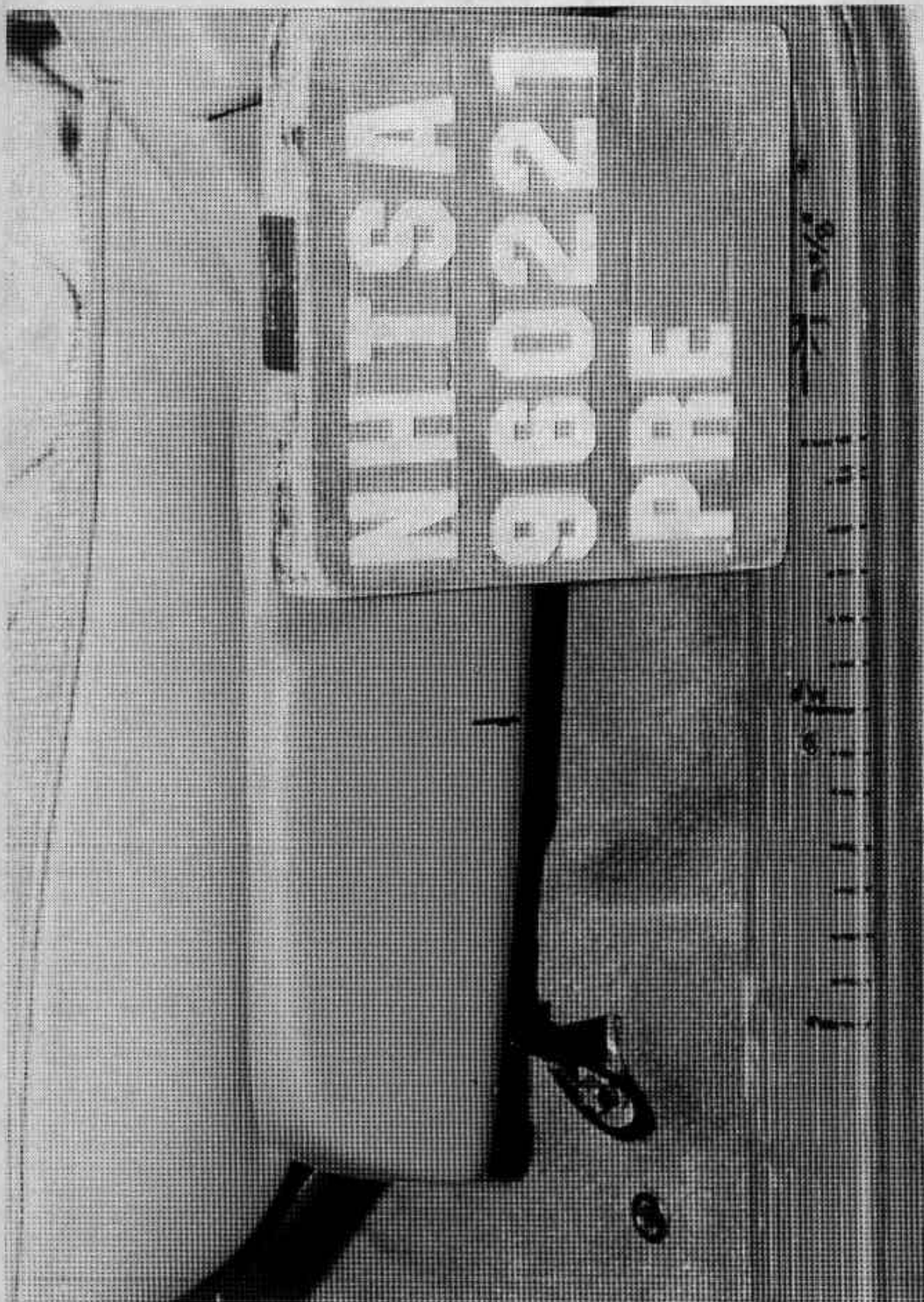


Figure A-9 Pre-Test Driver's Seat Location View



Figure A-10 Pre-Test Passenger's Seat Location View

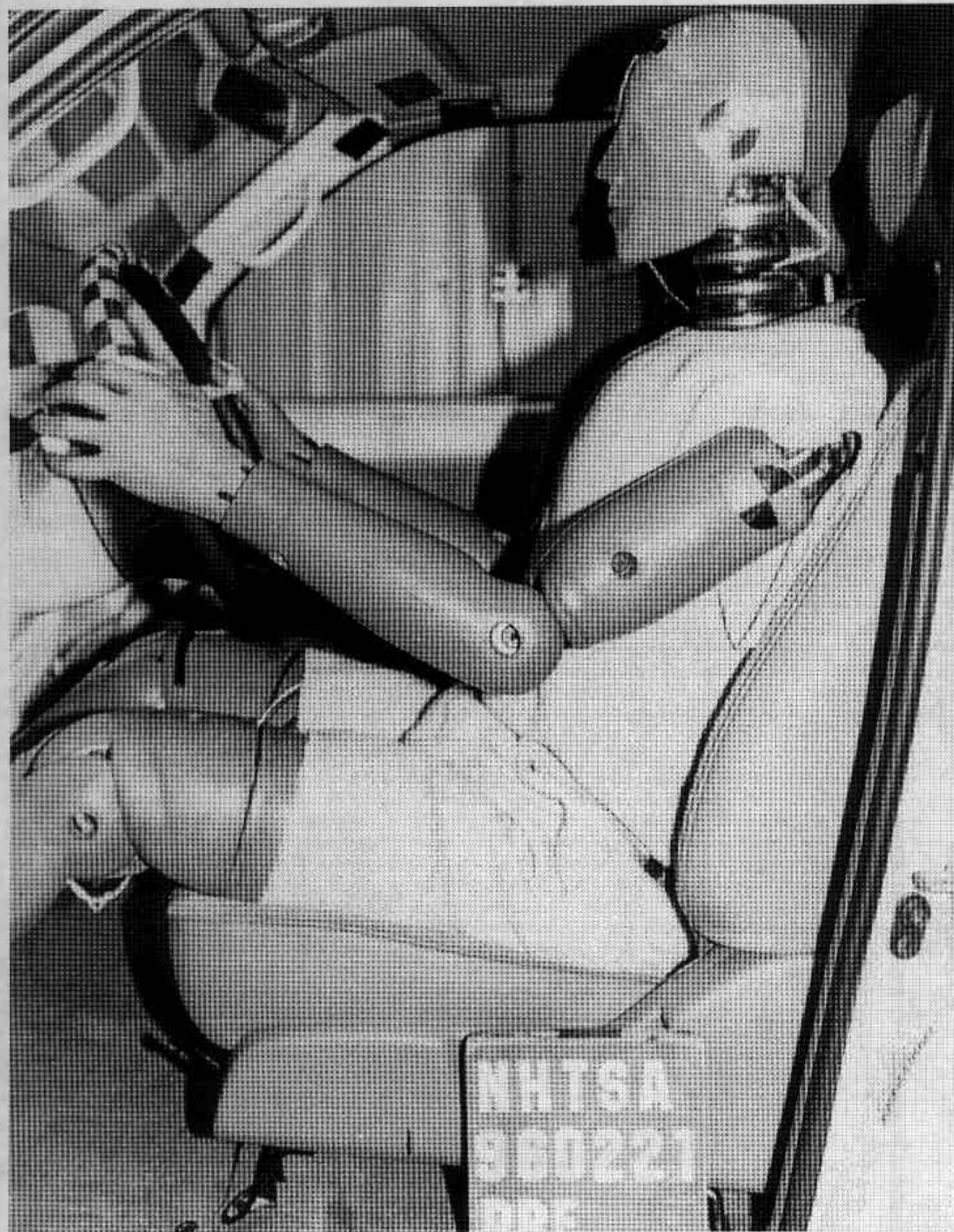


Figure A-11 Pre-Test Driver Dummy and Vehicle Interior View

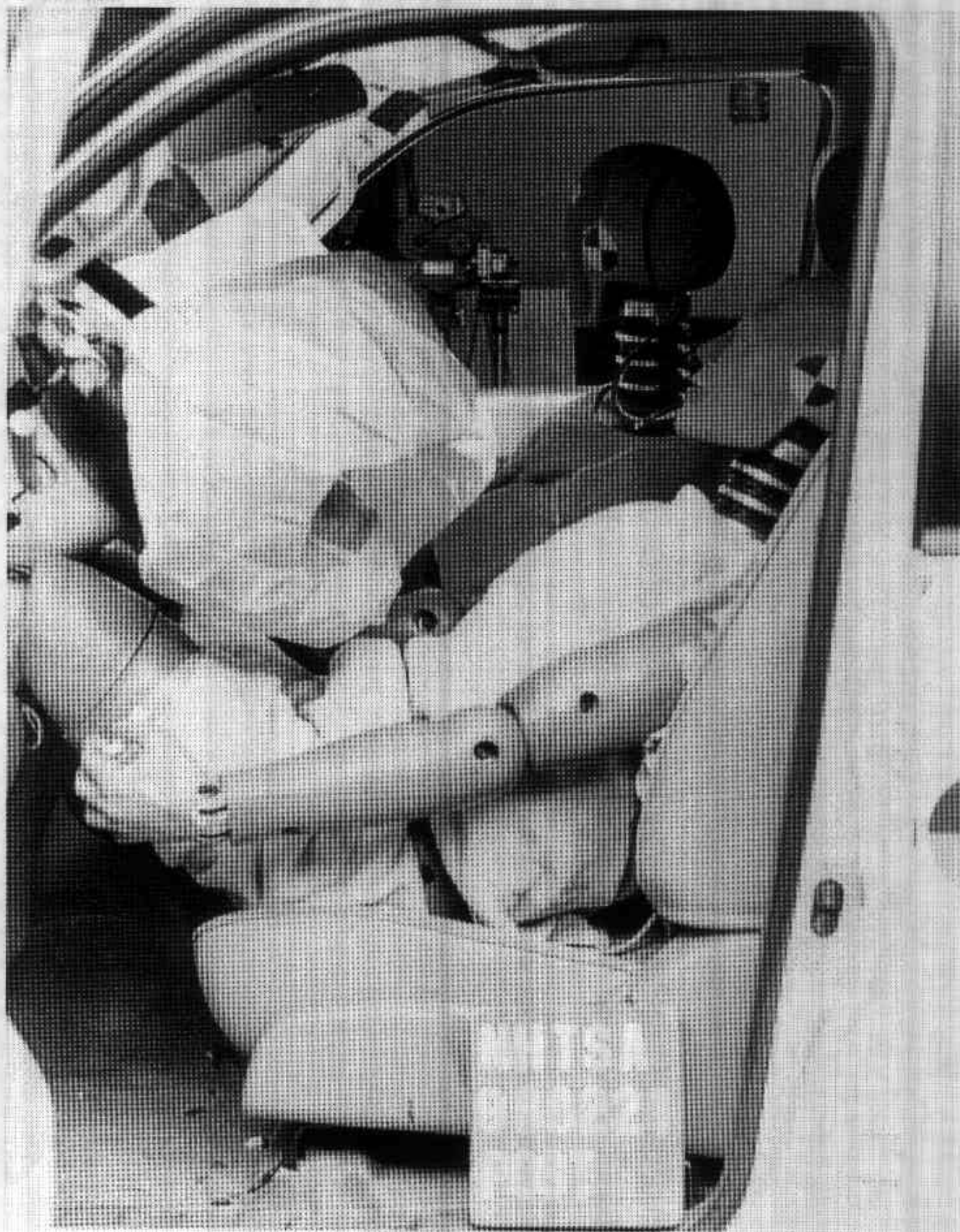


Figure A-12 Post-Test Driver Dummy and Vehicle Interior View

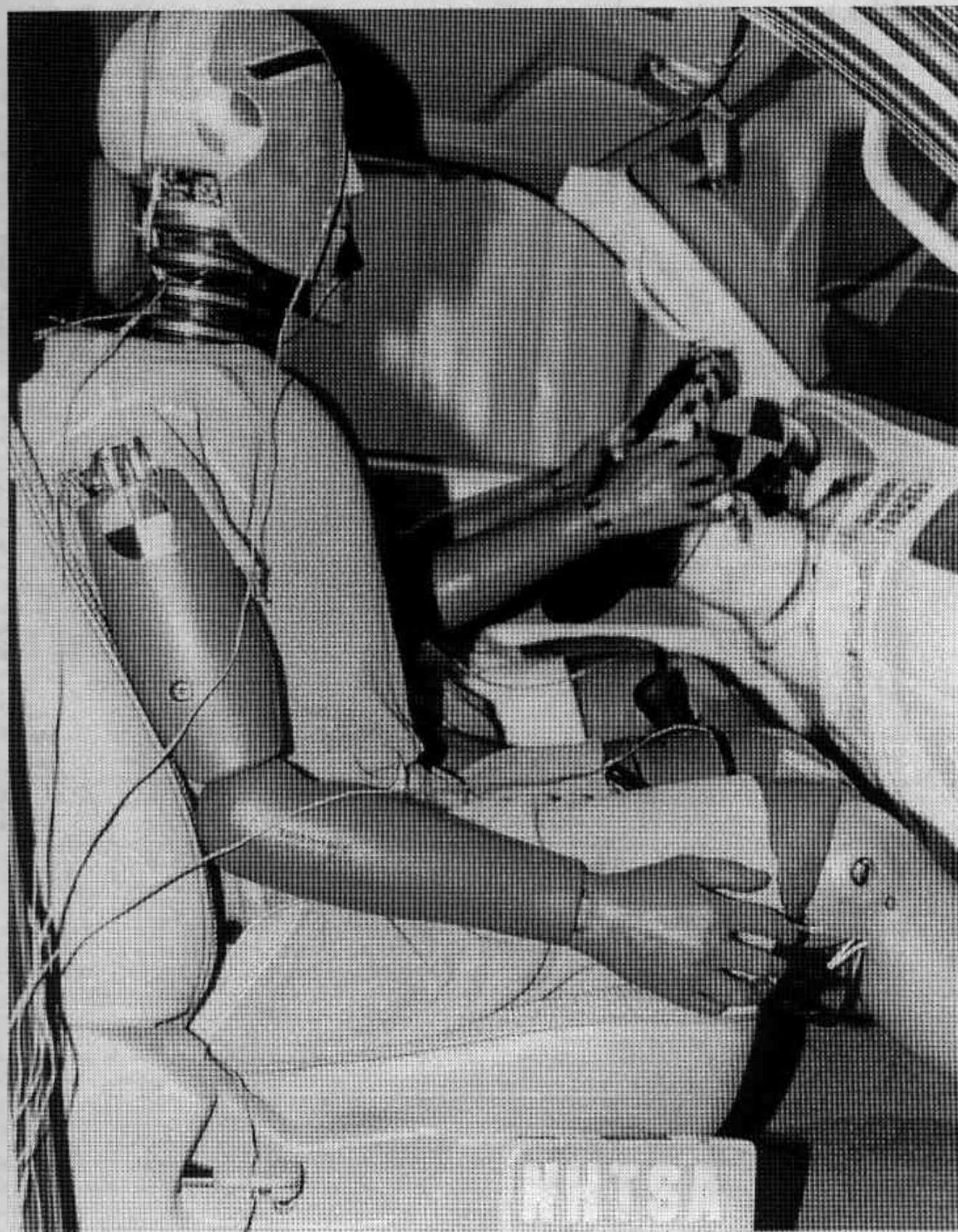


Figure A-13 Pre-Test Passenger Dummy and Vehicle Interior View

A-14

960221



Figure A-14 Post-Test Passenger Dummy and Vehicle Interior View

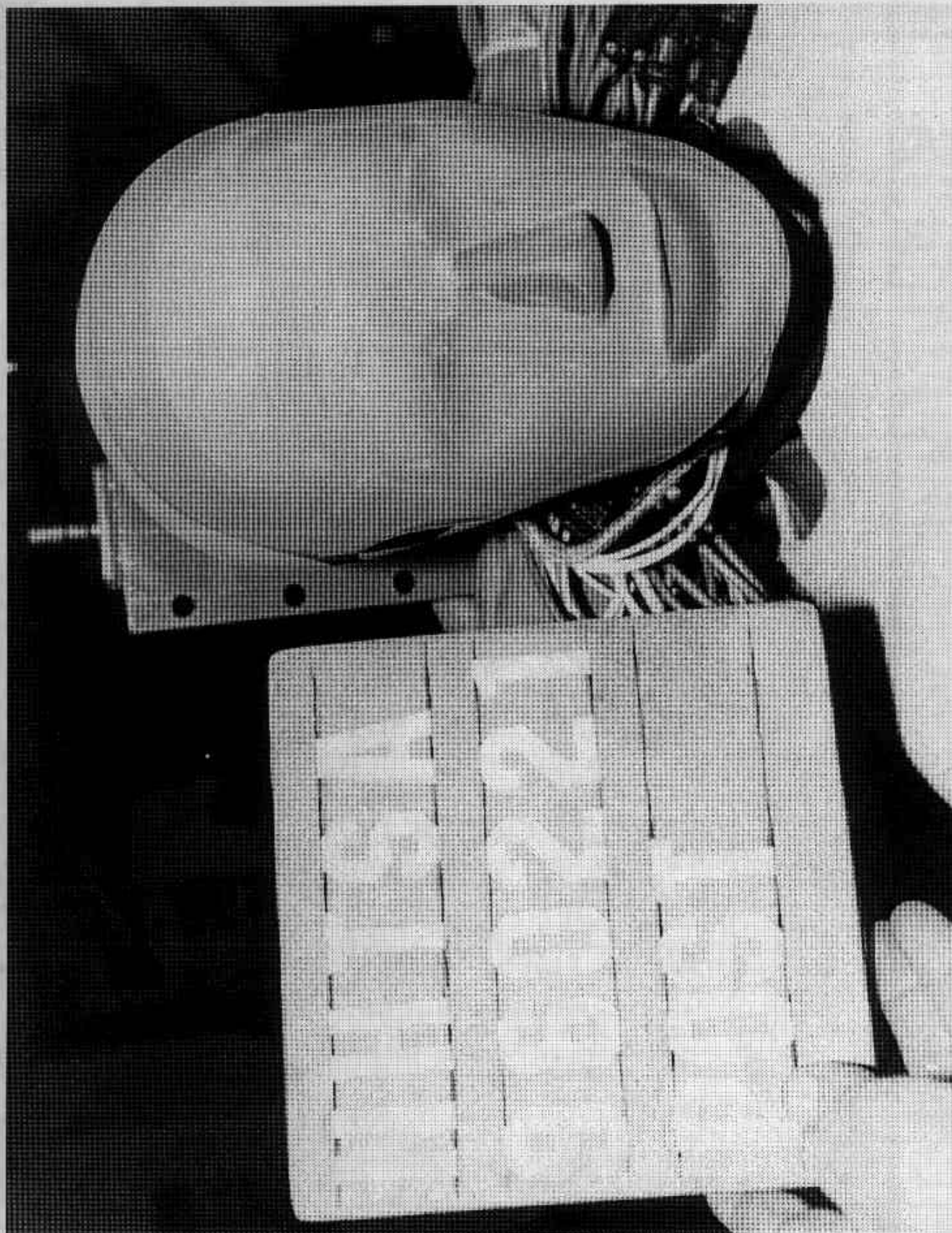


Figure A-15 Post-Test Driver Dummy Head Contact - View 1



Figure A-16 Post-Test Driver Dummy Head Contact - View 2



Figure A-17 Post-Test Driver Dummy Head Contact - View 3

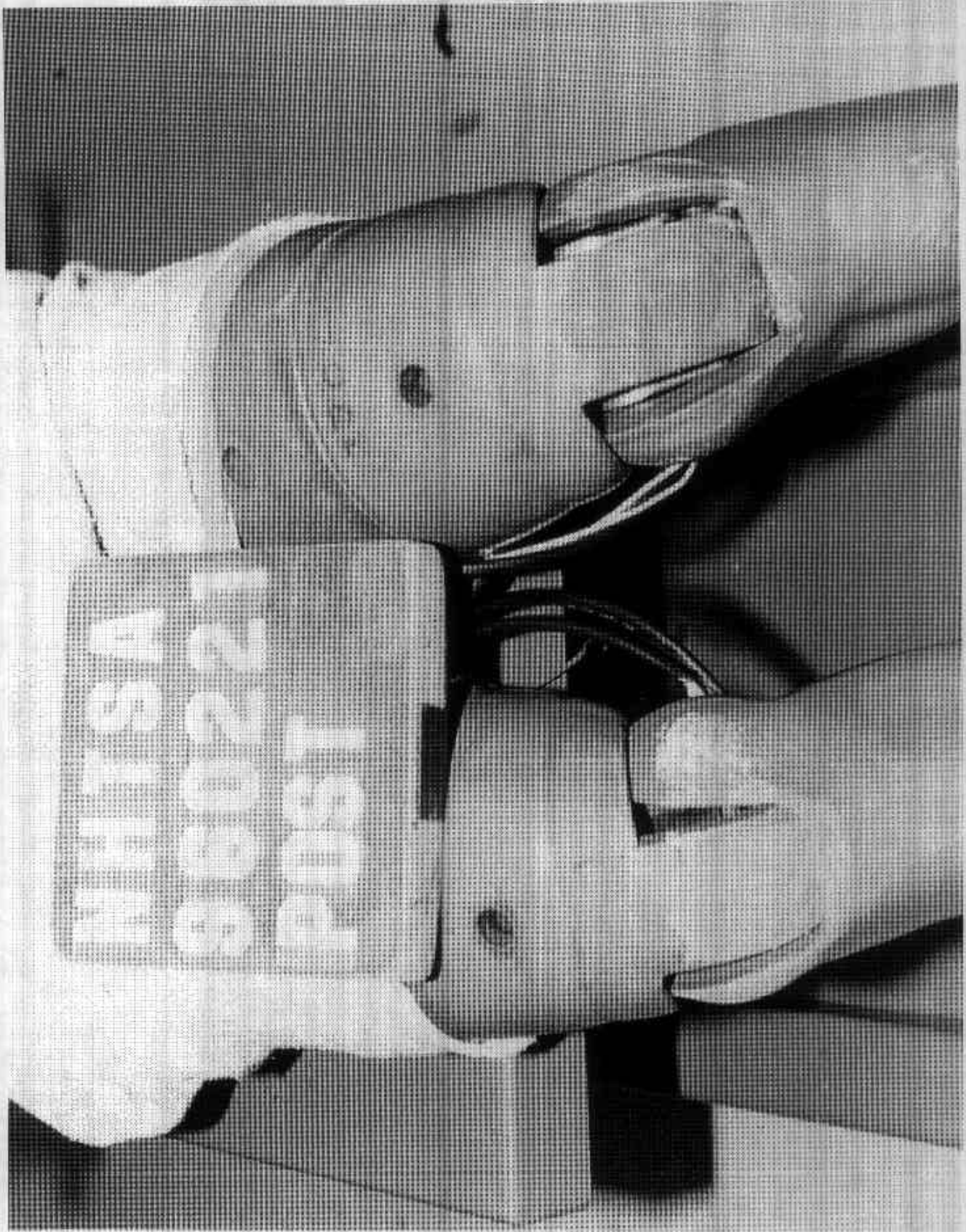


Figure A-18 Post-Test Driver Dummy Knee Contact - View 1



Figure A-19 Post-Test Driver Dummy Knee Contact - View 2

A-20

960221

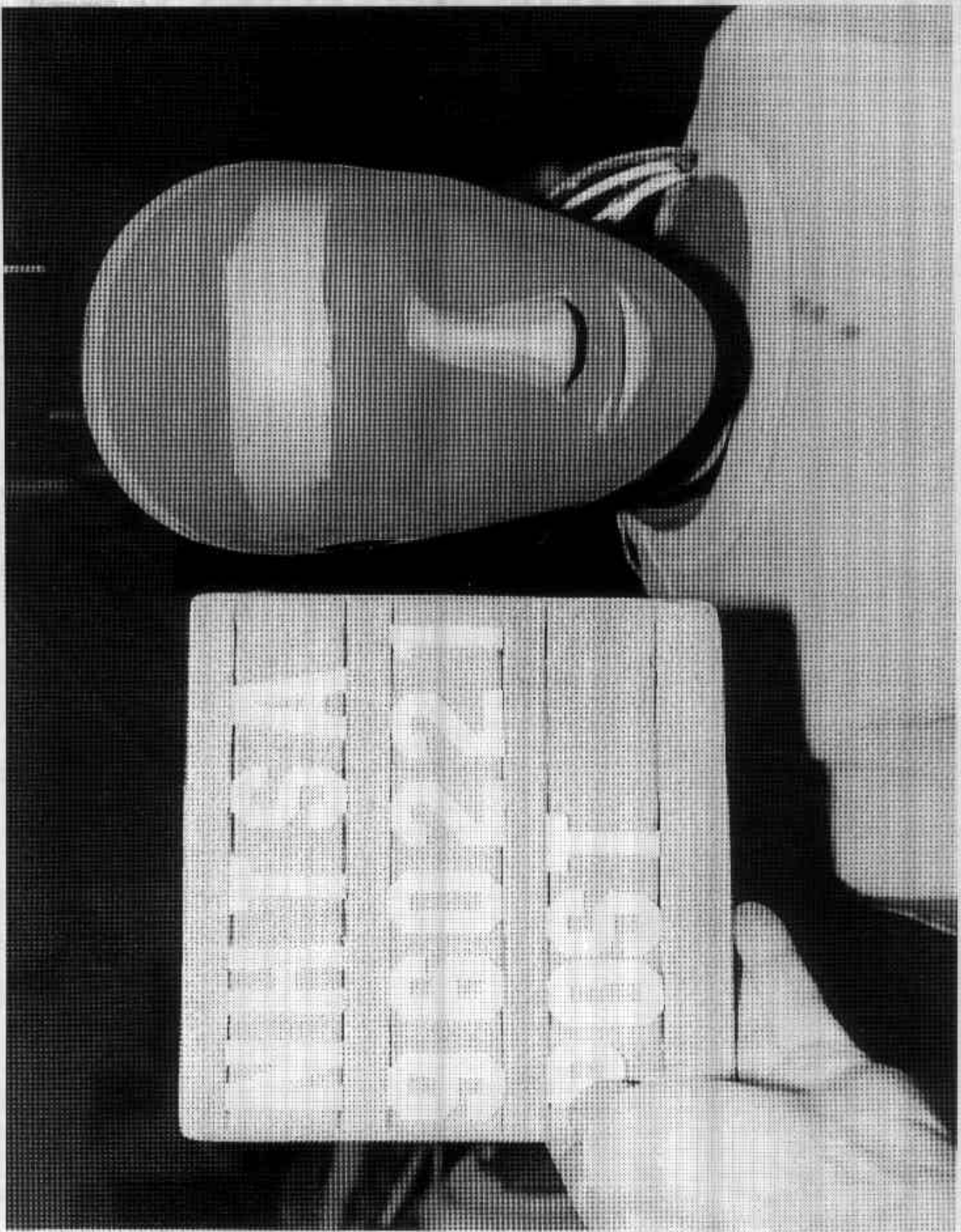


Figure A-20 Post-Test Passenger Dummy Head Contact - View 1



Figure A-21 Post-Test Passenger Dummy Head Contact - View 2

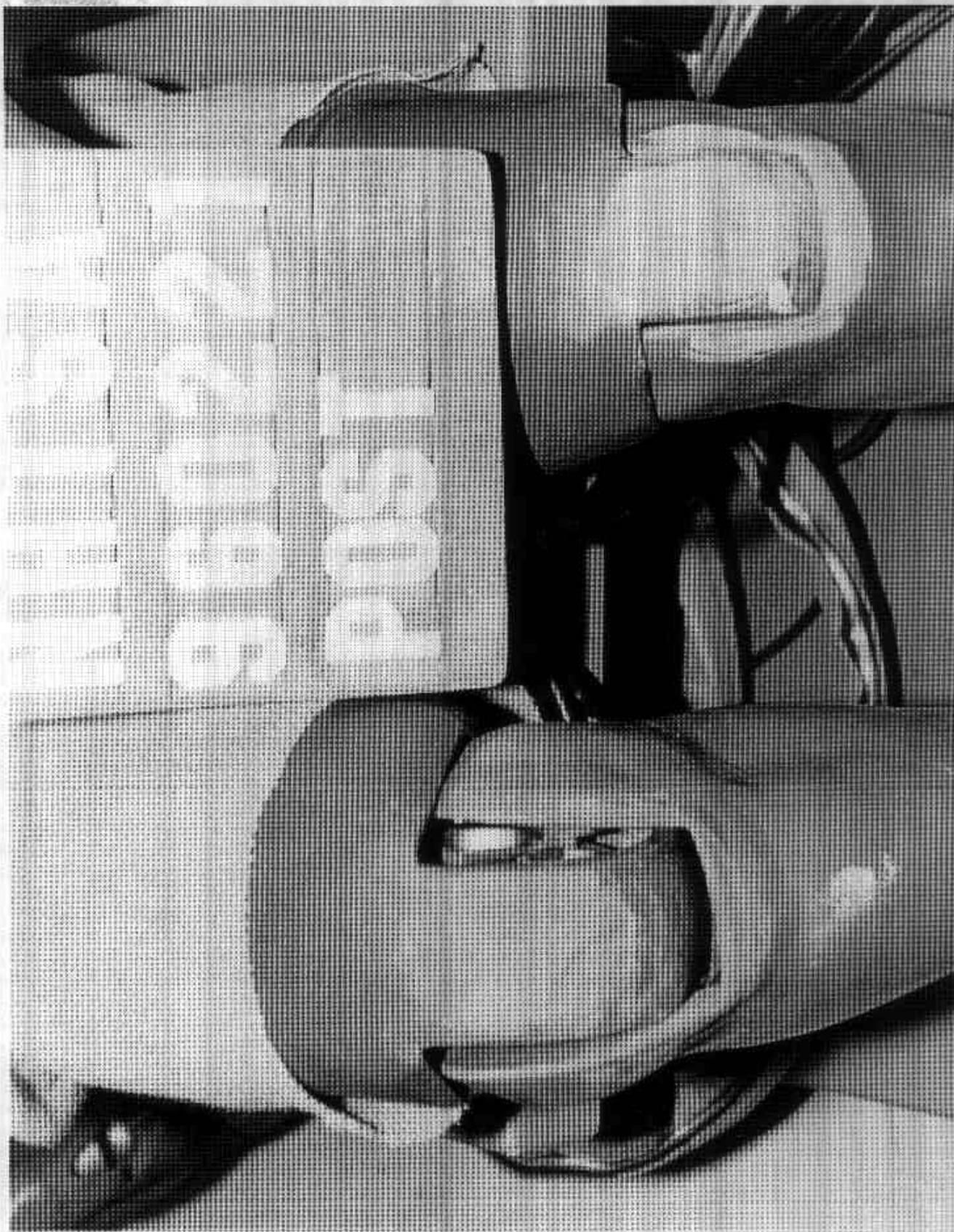


Figure A-22 Post-Test Passenger Dummy Knee Contact - View 1

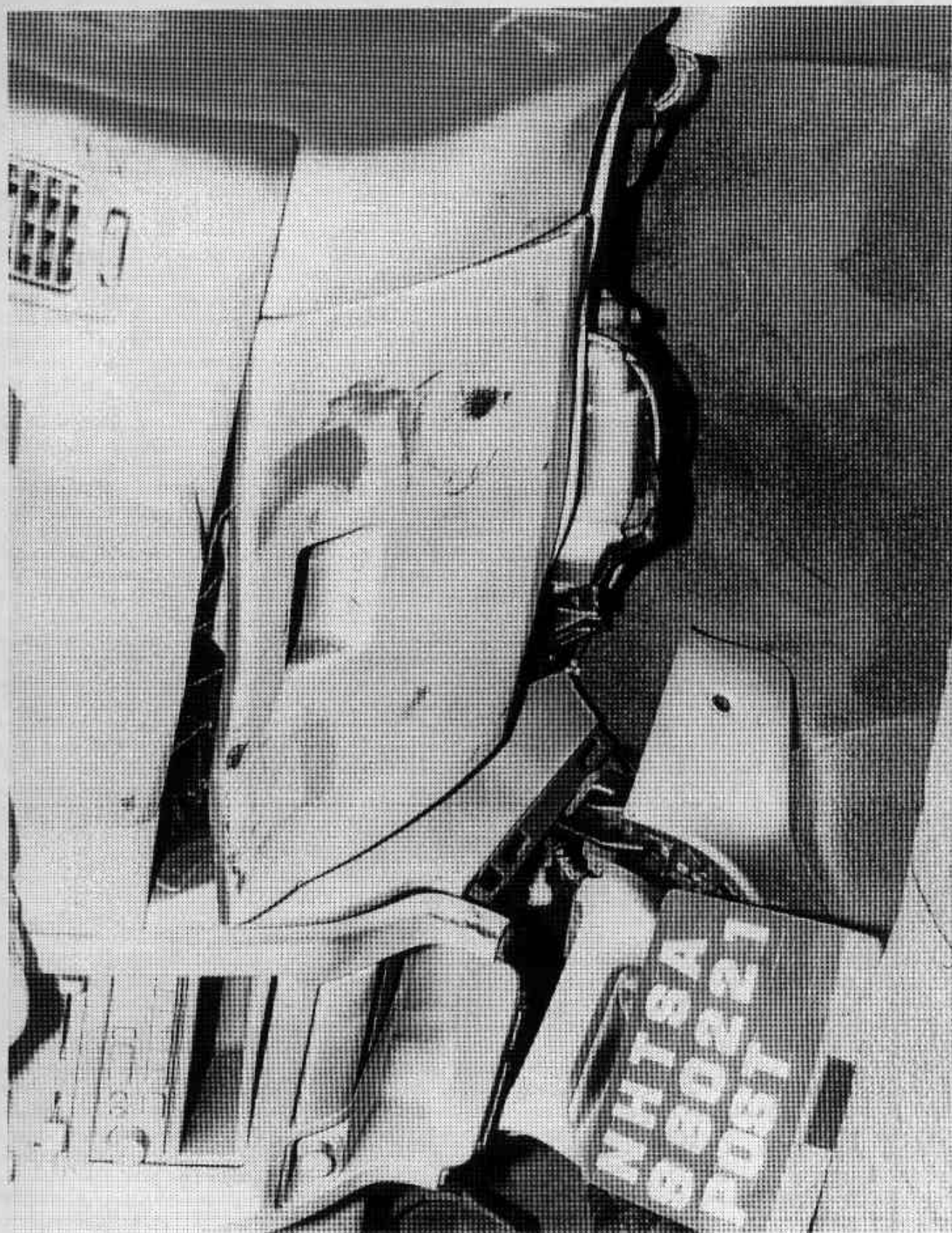


Figure A-23 Post-Test Passenger Dummy Knee Contact - View 2

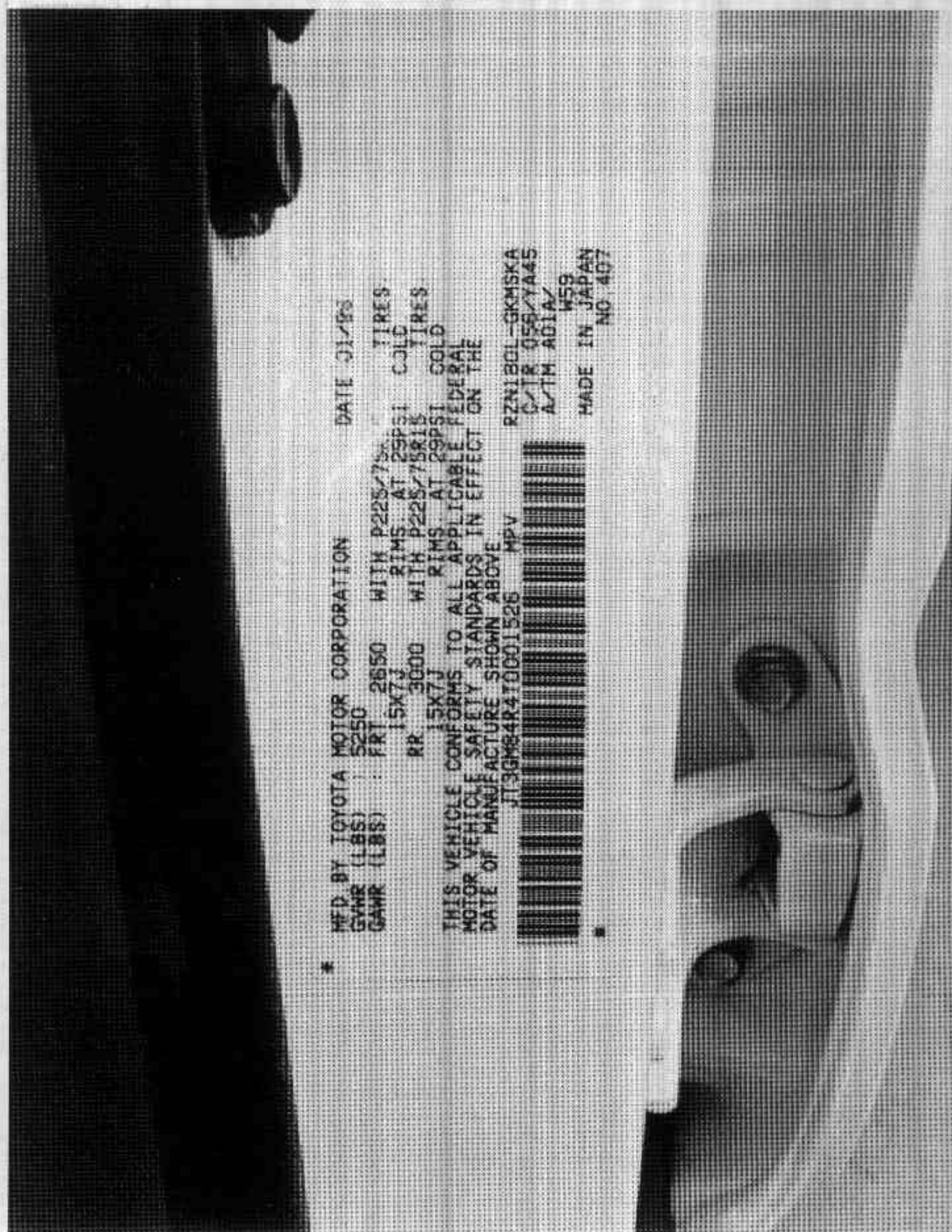


Figure A-24 Pre-Test Vehicle Certification and Recommended Tire Pressure Label

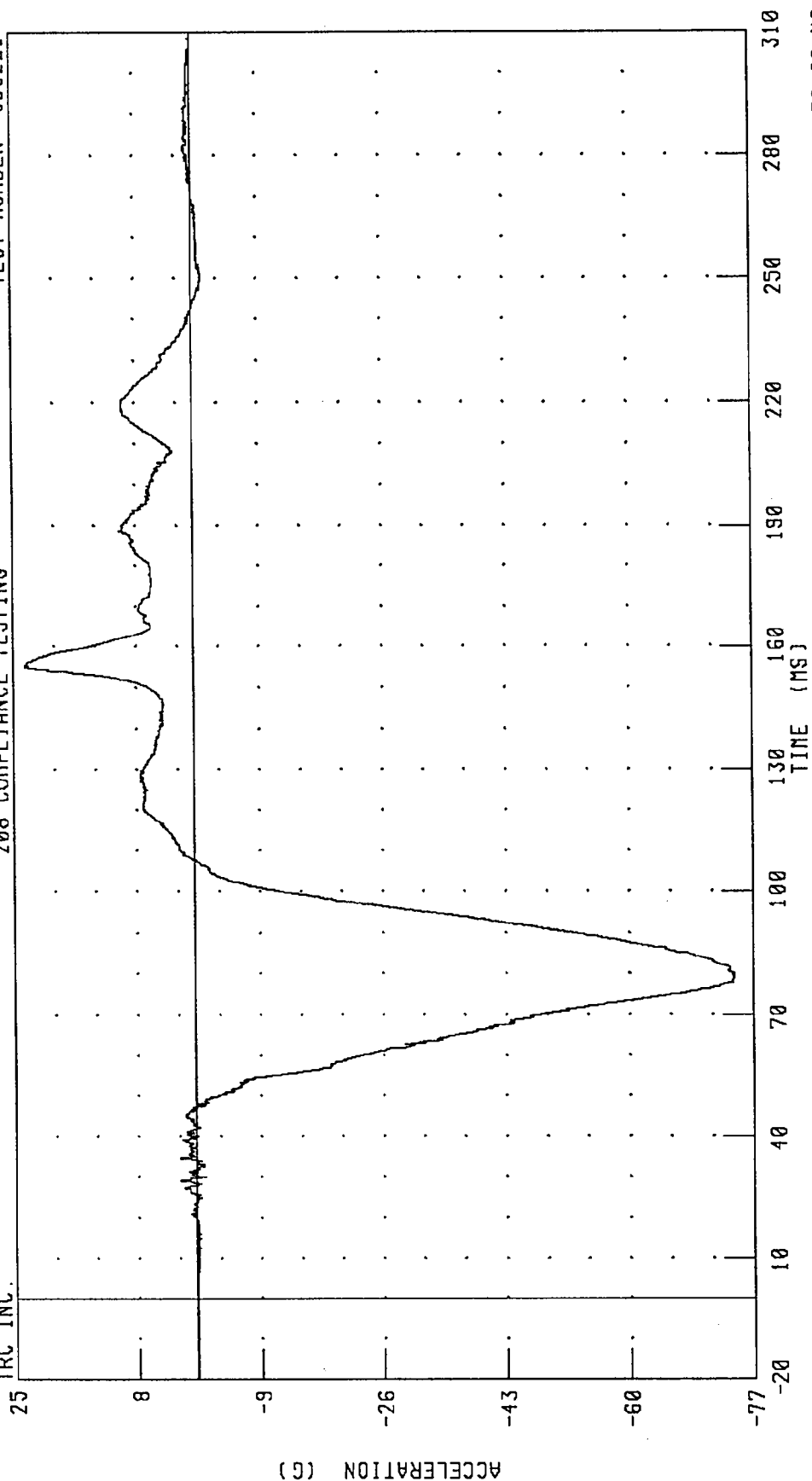
Appendix B

Data Plots

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

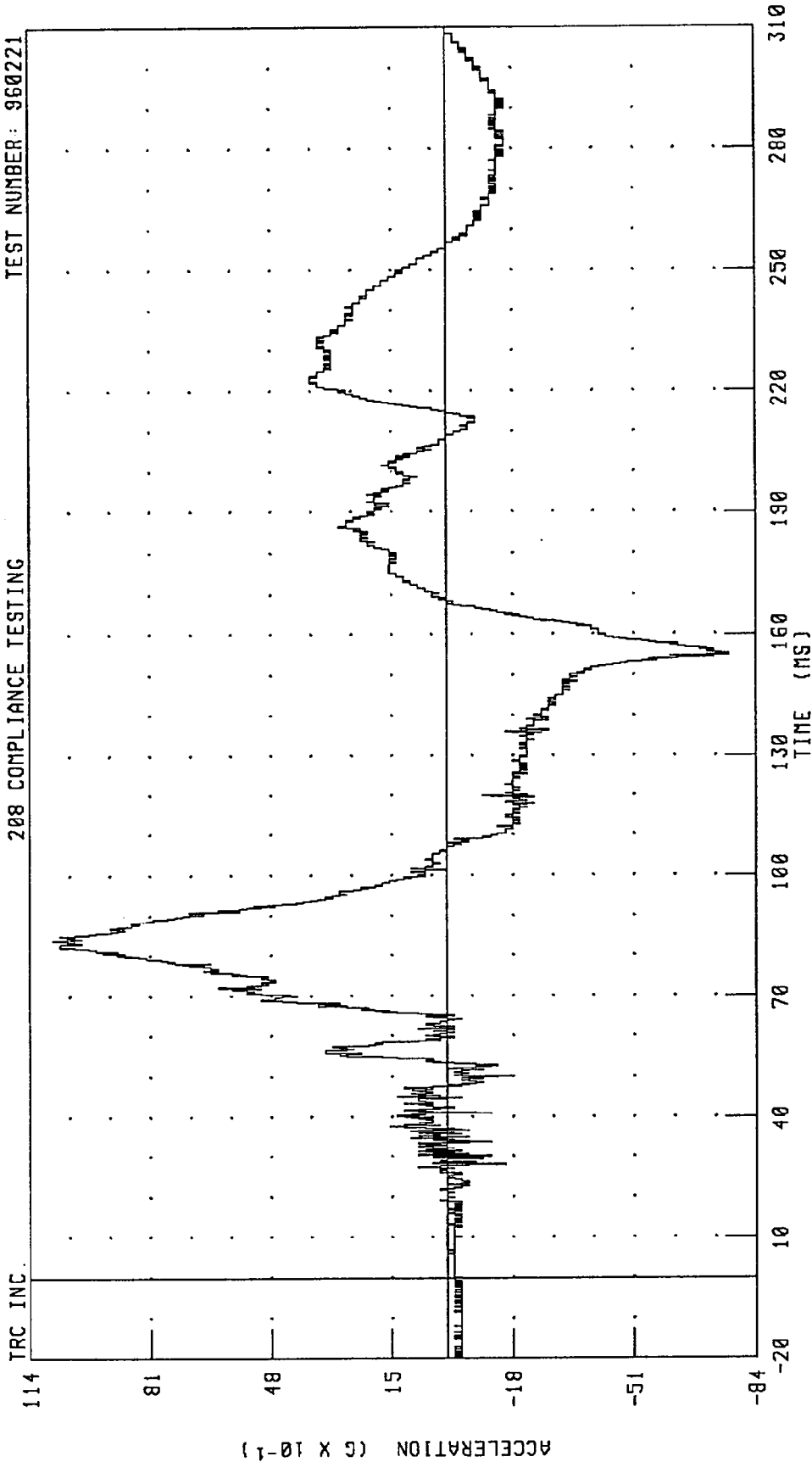


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 23.35 G @ 155.04 MS; -74.42 G @ 78.96 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



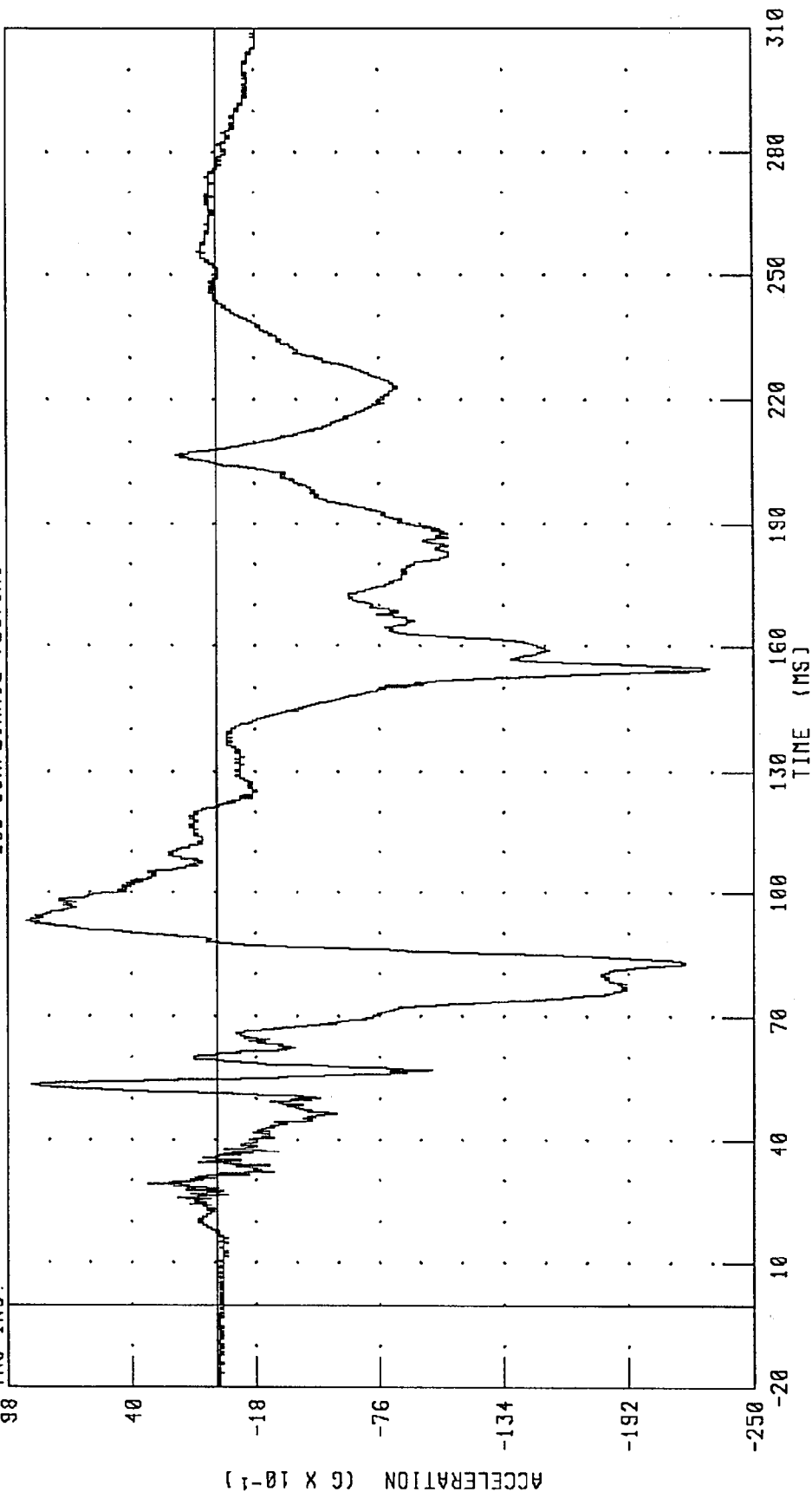
PEAK DATA: 10.75 G @ 83.84 MS; -7.66 G @ 154.88 MS

CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



PEAK DATA: 8.93 G @ 93.04 MS; -22.99 G @ 154.88 MS

CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.

84

70

56

42

28

14

0

-20

ACCELERATION (G)

TIME (MS)

10 40 70 100 130 160 190 220 250 280 310

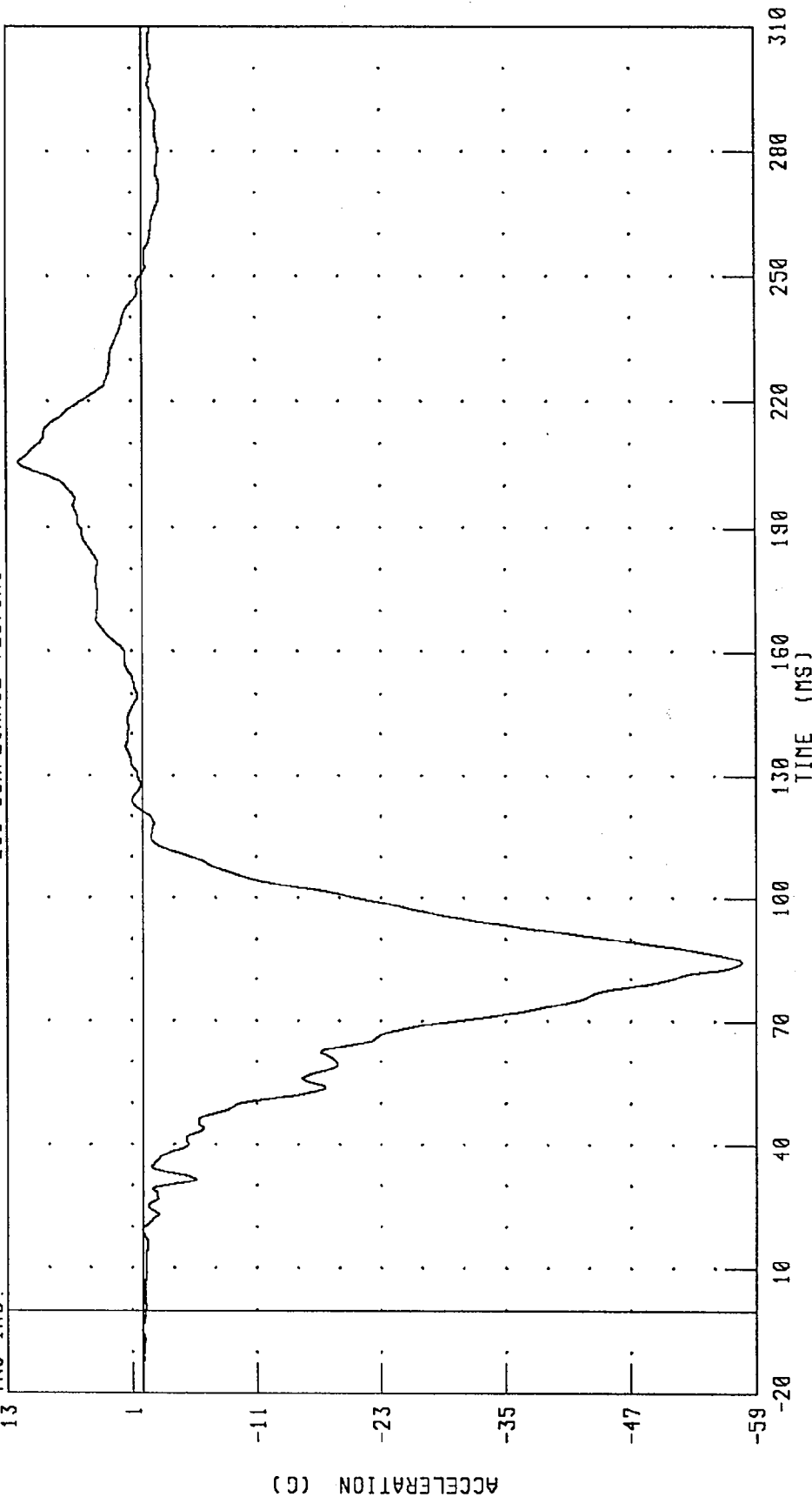
PEAK DATA: 77.04 G @ 79.92 MS; 0.17 G @ 23.12 MS

CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER CHEST X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



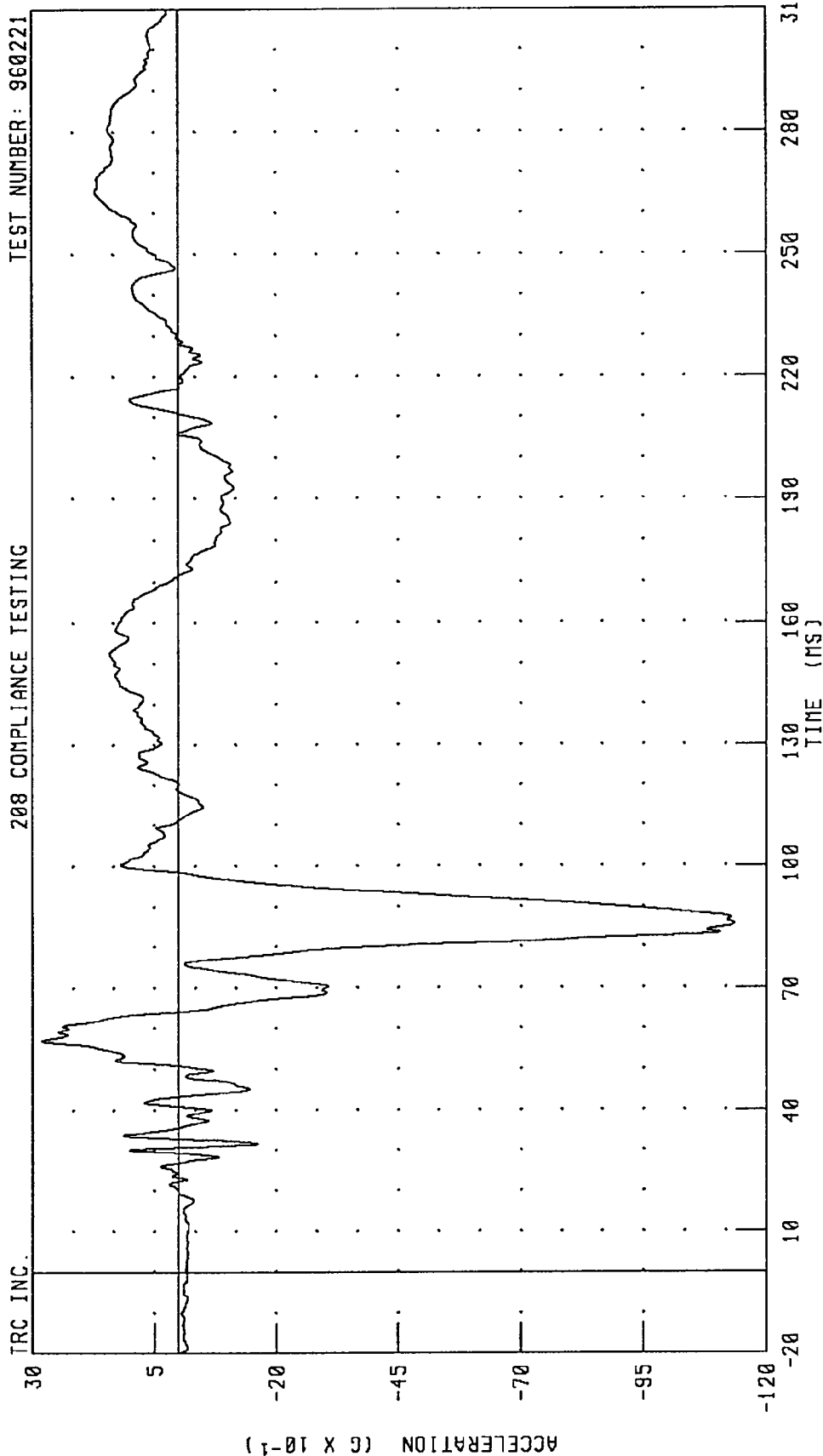
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

PEAK DATA: 11.82 G @ 205.68 MS; -57.60 G @ 84.40 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

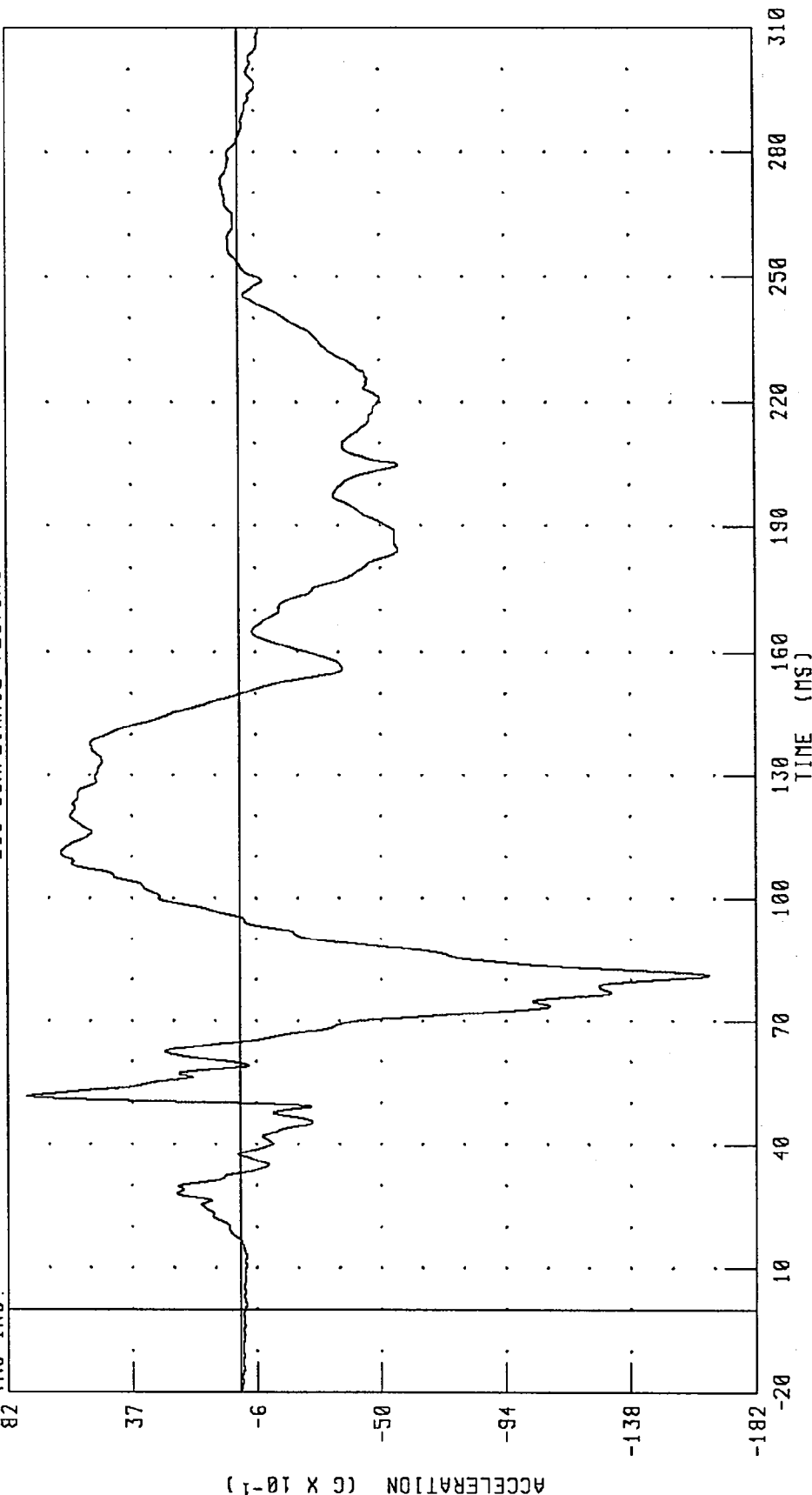


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER CHEST Z-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

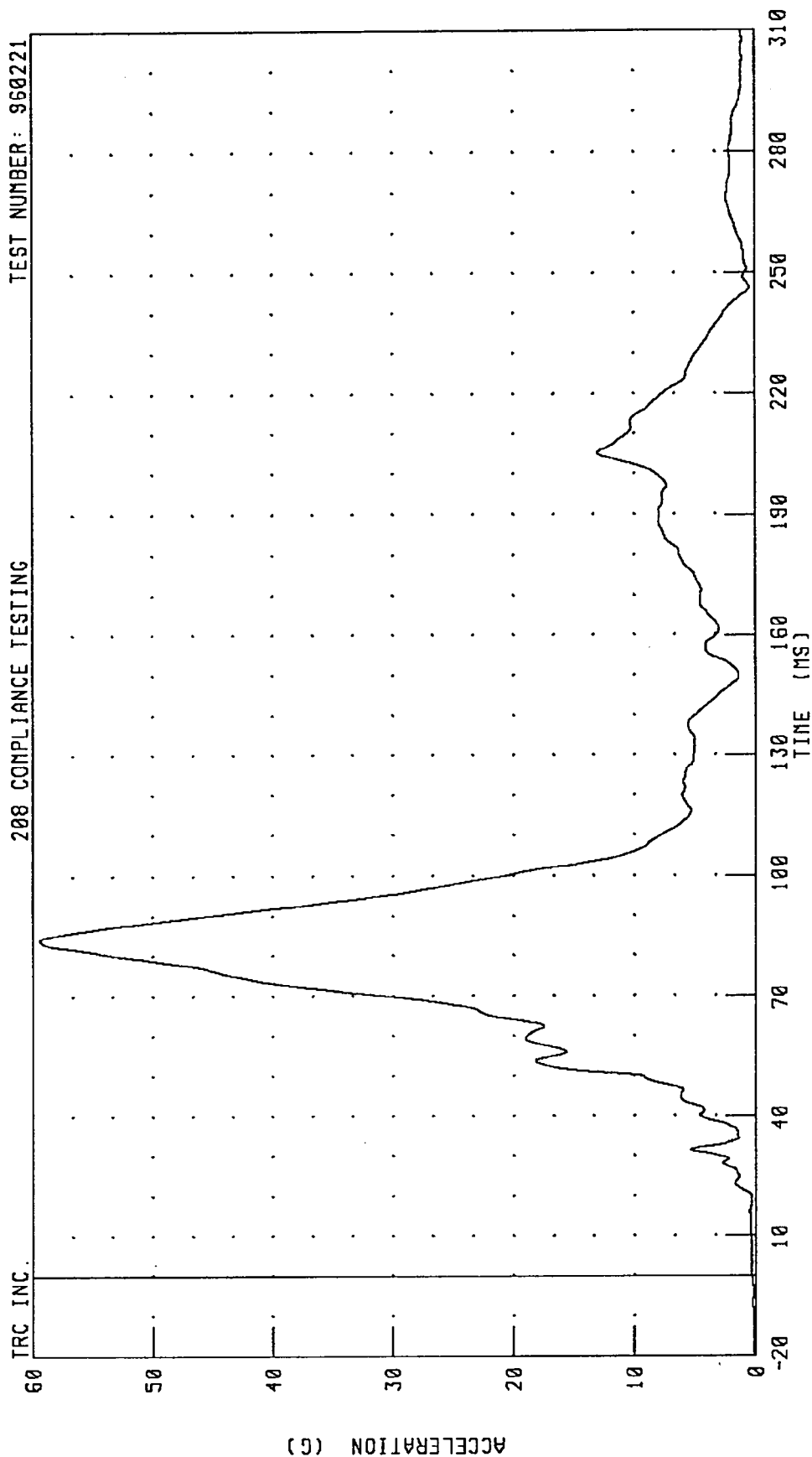


PEAK DATA: 7.53 G @ 51.60 MS; -16.54 G @ 81.20 MS

CHANNEL: CSTZG1 FILTER: CH. CLASS 180

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

208 COMPLIANCE TESTING TEST NUMBER: 960221

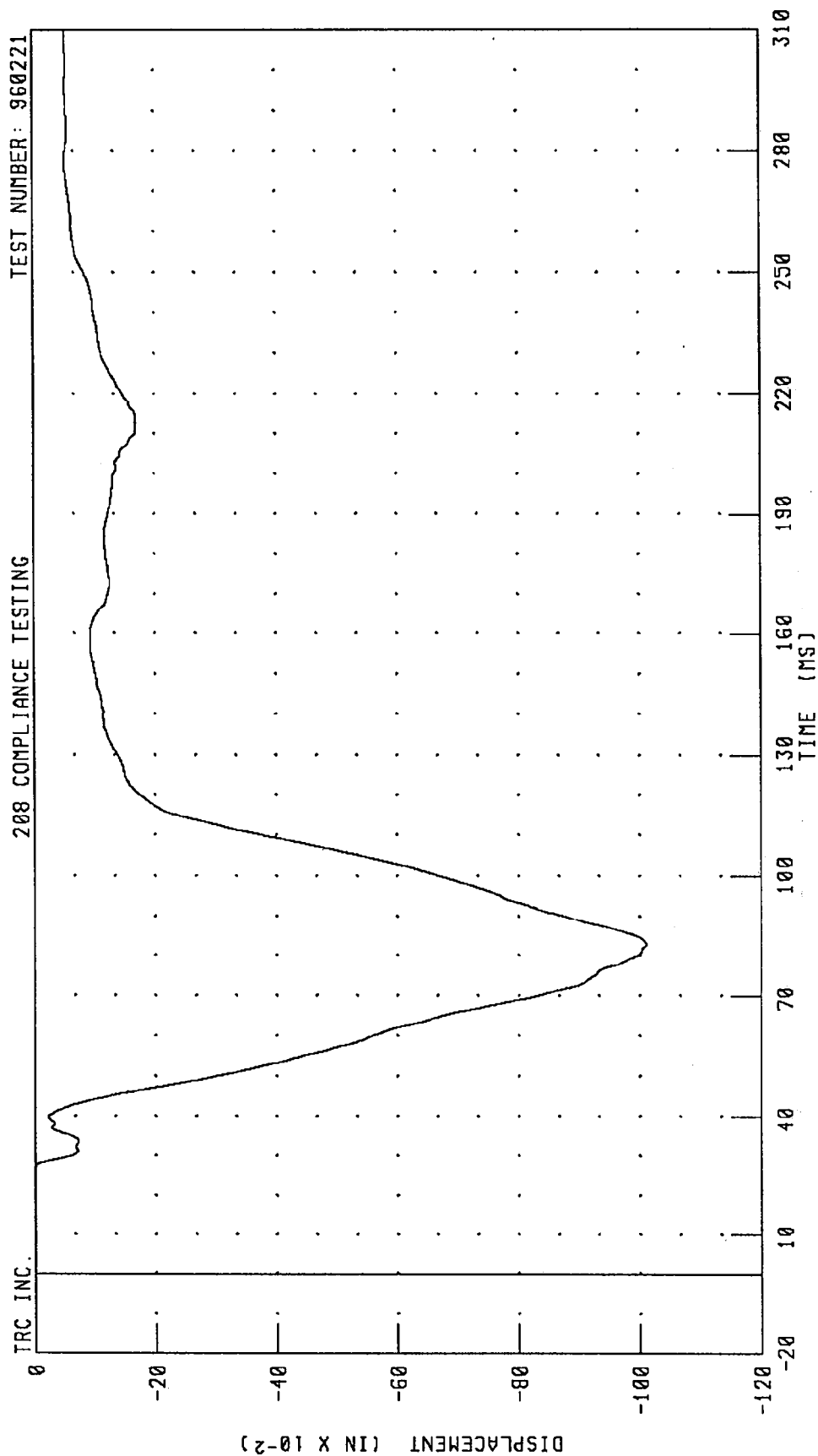


CHANNEL: CSTRG1 FILTER: CH. CLASS 180

PEAK DATA: 59.38 G @ 84.16 MS; 0.01 G @ -20.00 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER CHEST DEFLECTION
208 COMPLIANCE TESTING

TEST NUMBER: 960221

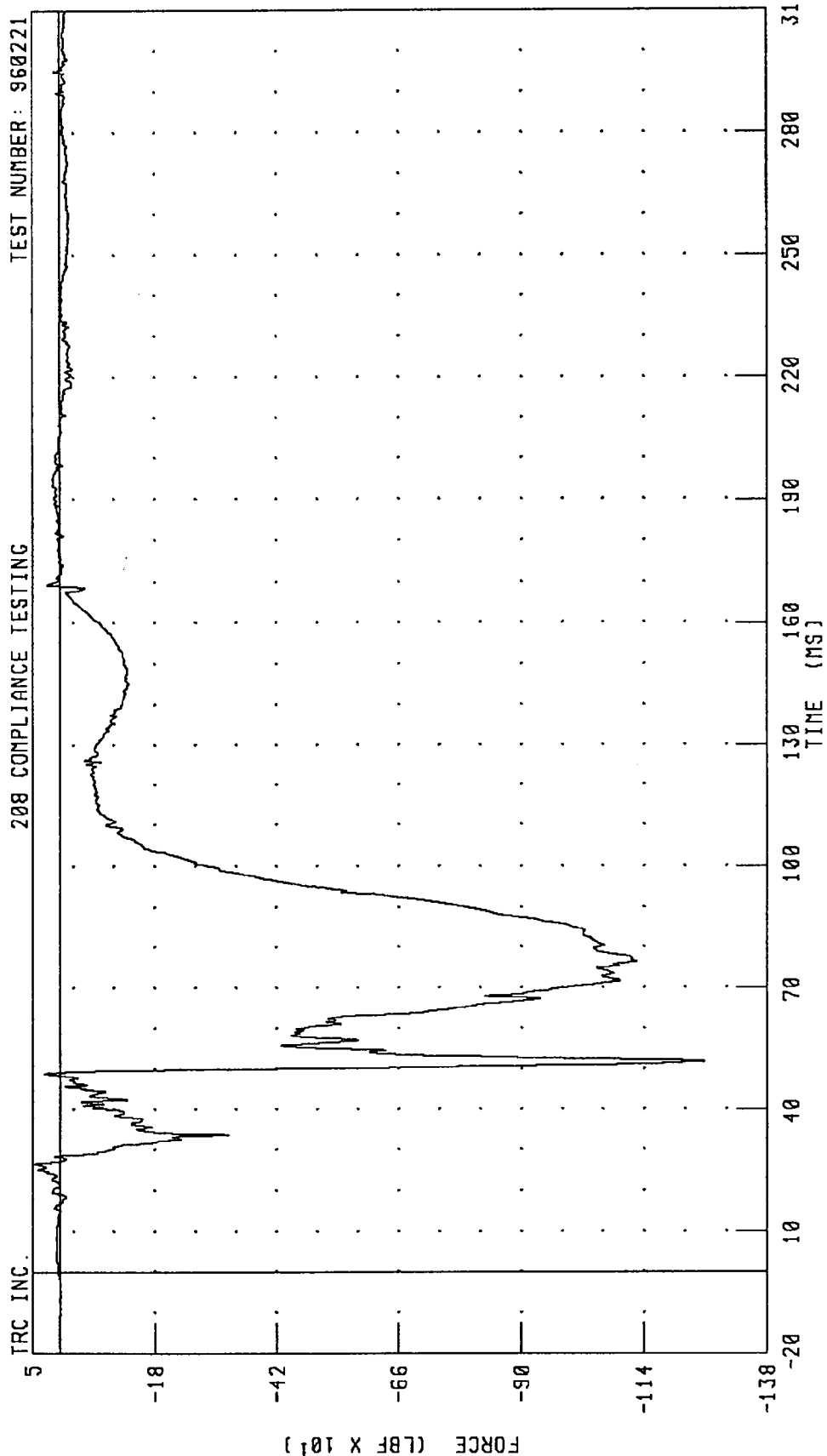


CHANNEL: CSTXD1 FILTER: CH. CLASS 180

PEAK DATA: 0.00 IN @ 24.24 MS; -1.01 IN @ 82.88 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER LEFT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



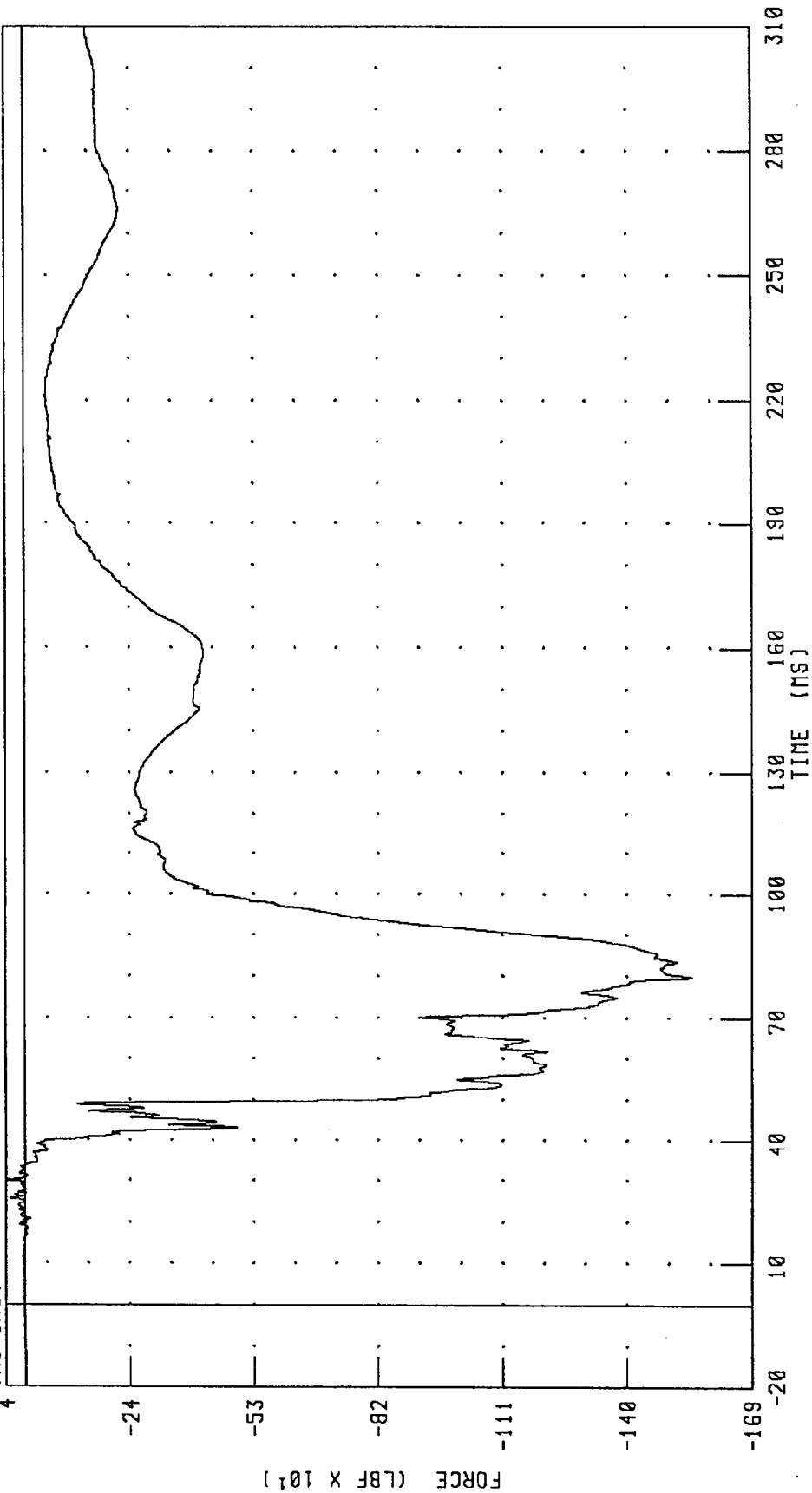
PEAK DATA: 48.55 LBF @ 26.56 MS; -1264.97 LBF @ 51.84 MS

CHANNEL: LFMF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



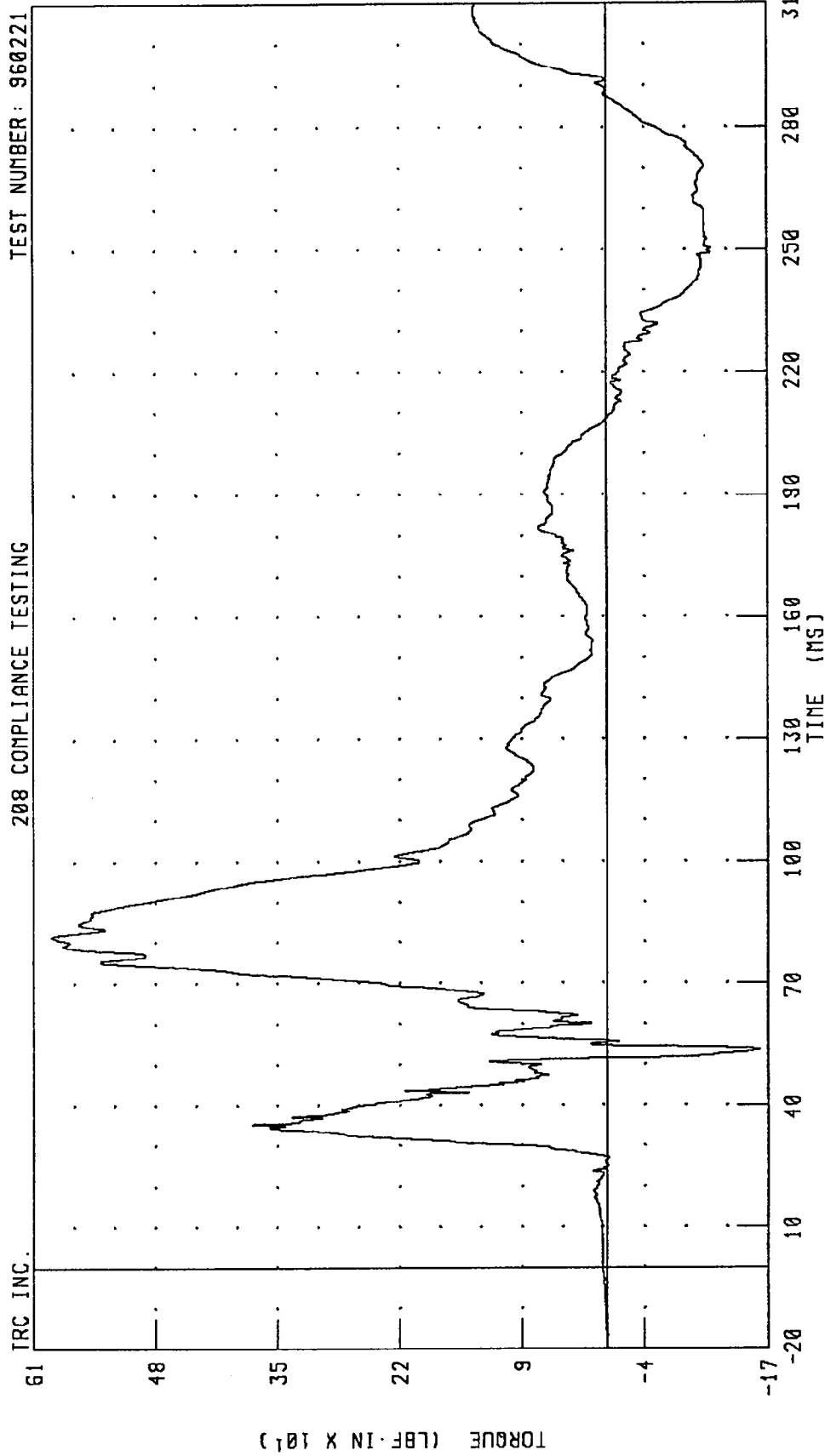
PEAK DATA: 41.43 LBF @ 30.00 MS; -1556.70 LBF @ 79.92 MS

CHANNEL: RFMF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER LEFT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING



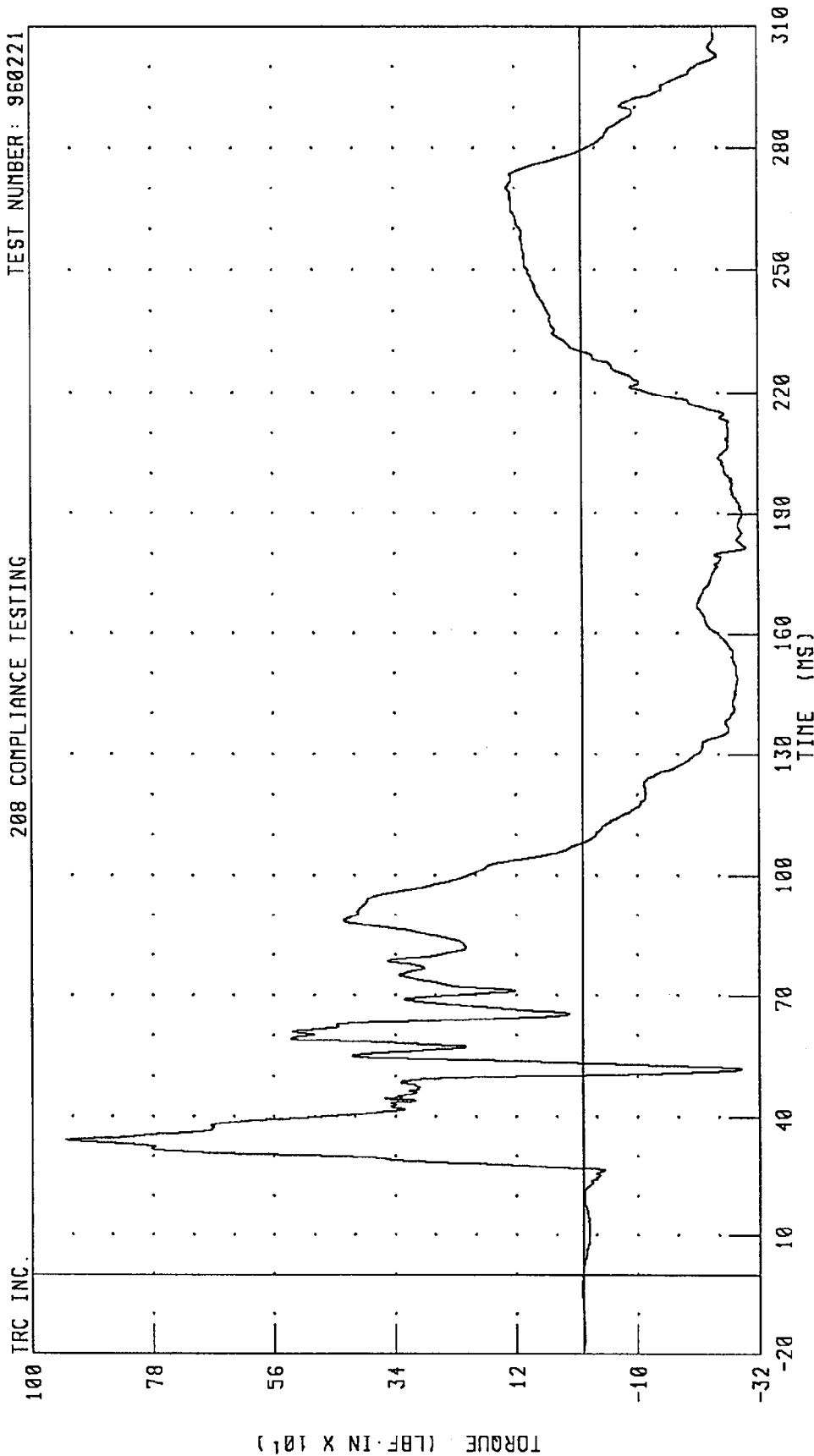
PEAK DATA: 591.32 LBF-IN @ 81.52 MS; -161.04 LBF-IN @ 53.68 MS

CHANNEL: TBLXM1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER LEFT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING



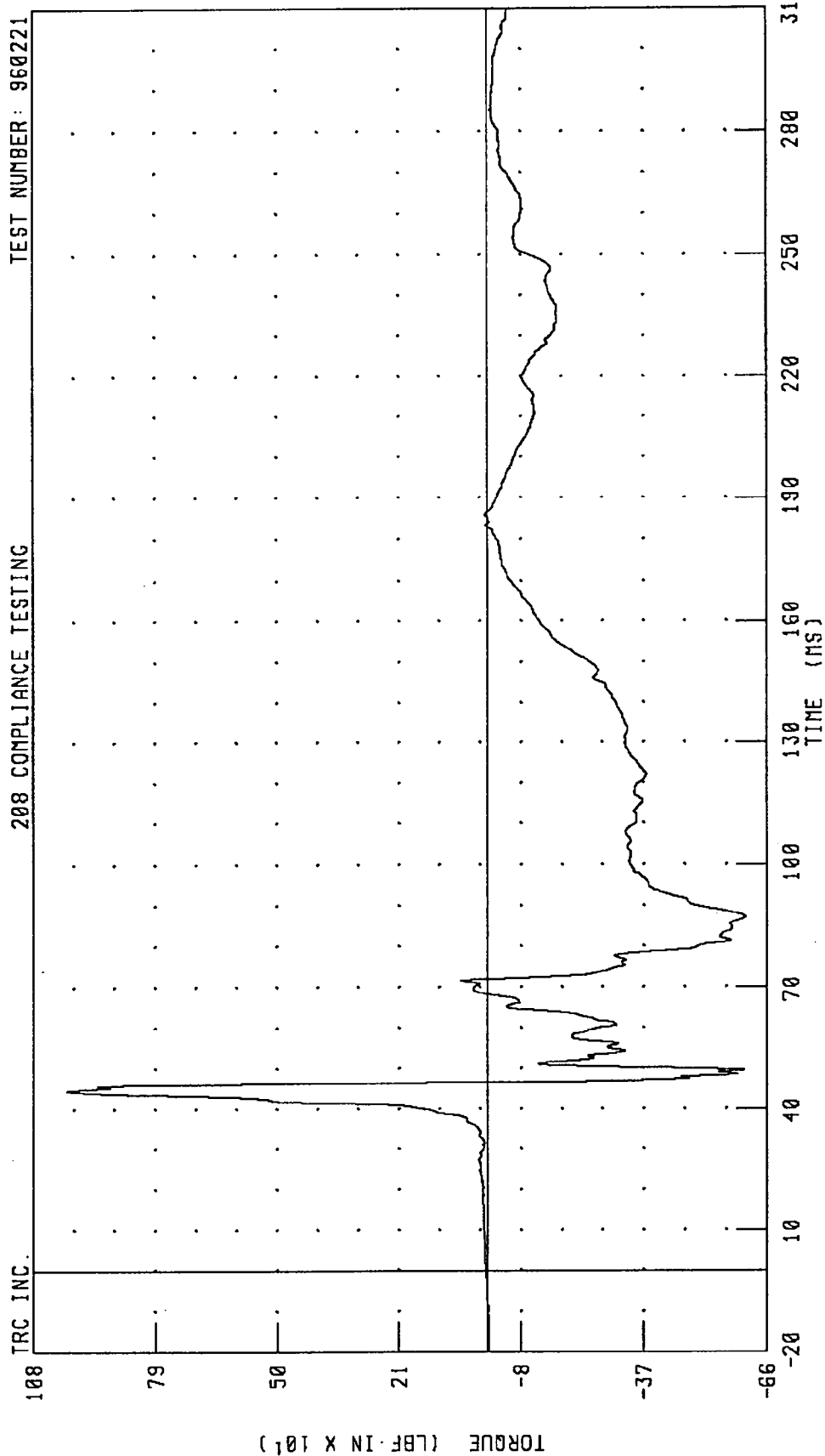
PEAK DATA: 939.27 LBF-IN @ 34.16 MS; -296.19 LBF-IN @ 181.52 MS

CHANNEL: TBLYM1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING



PEAK DATA: 1001.64 LBF-IN @ 44.56 MS; -609.05 LBF-IN @ 87.28 MS

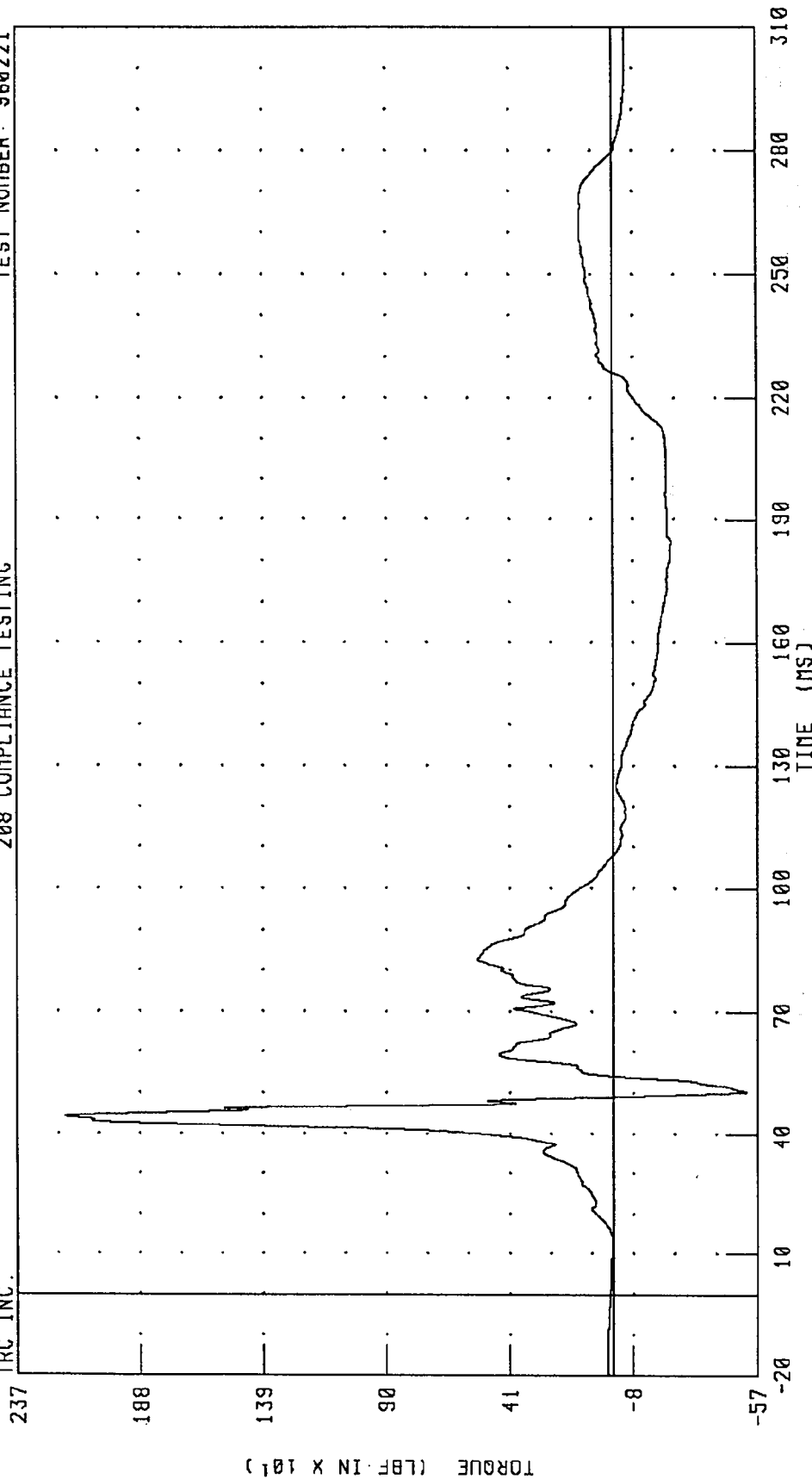
CHANNEL: TBRXM1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT UPPER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.

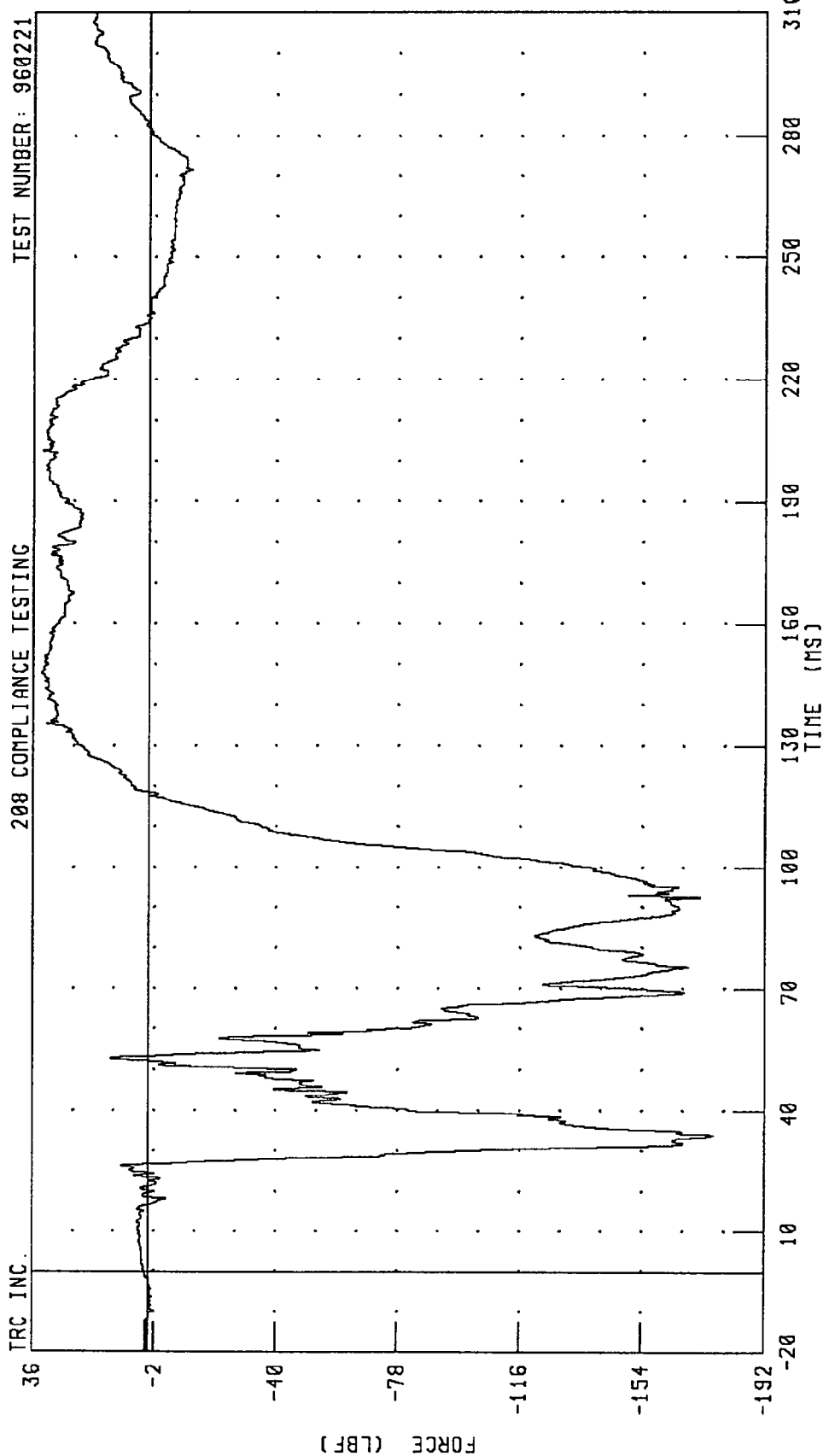


PEAK DATA: 2178.52 LBF-IN @ 44.32 MS; -525.81 LBF-IN @ 50.40 MS

CHANNEL: TBRYM1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER LEFT LOWER TIBIA X-AXIS FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

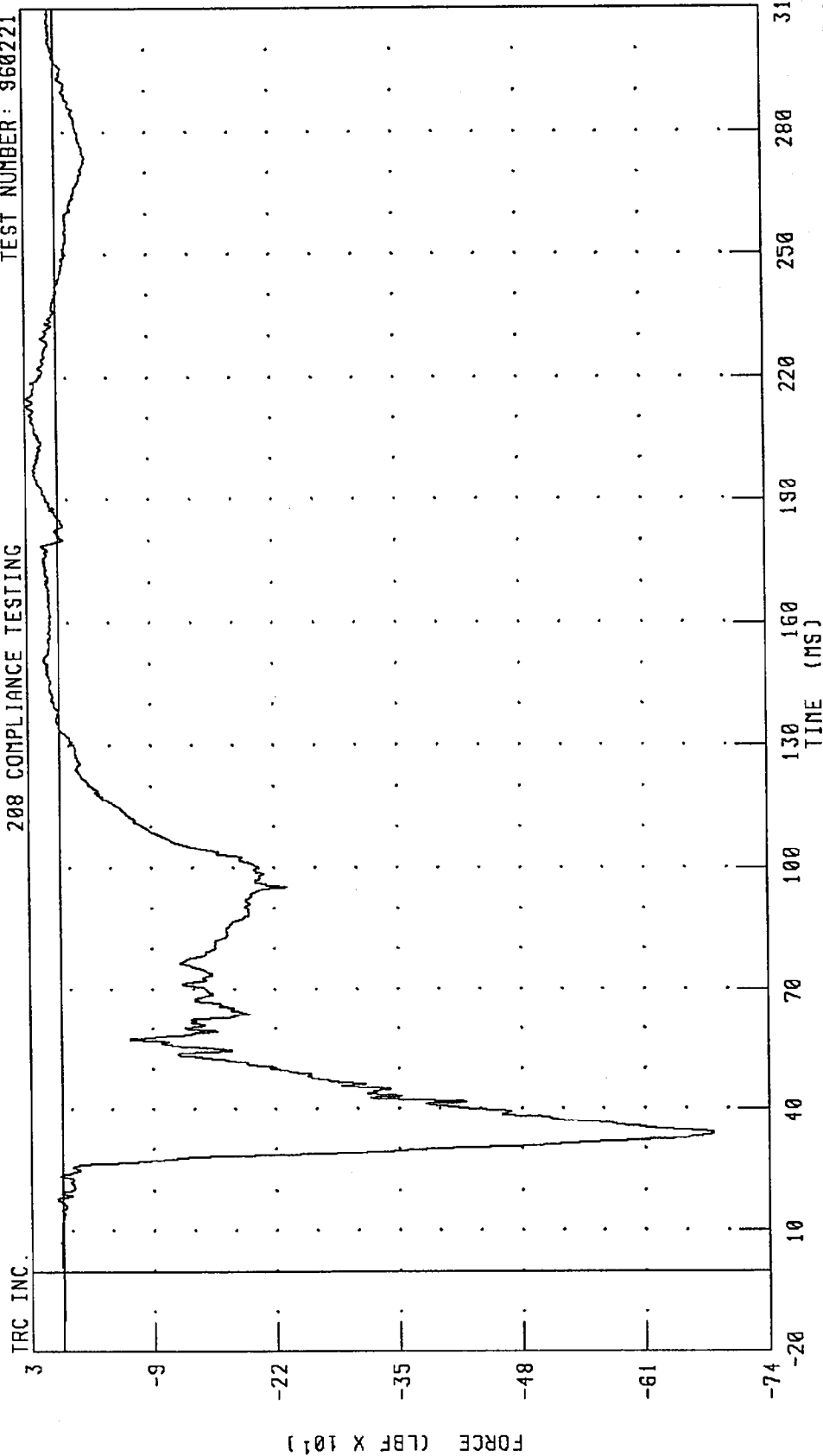


CHANNEL: ANLXF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER LEFT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960221

208 COMPLIANCE TESTING

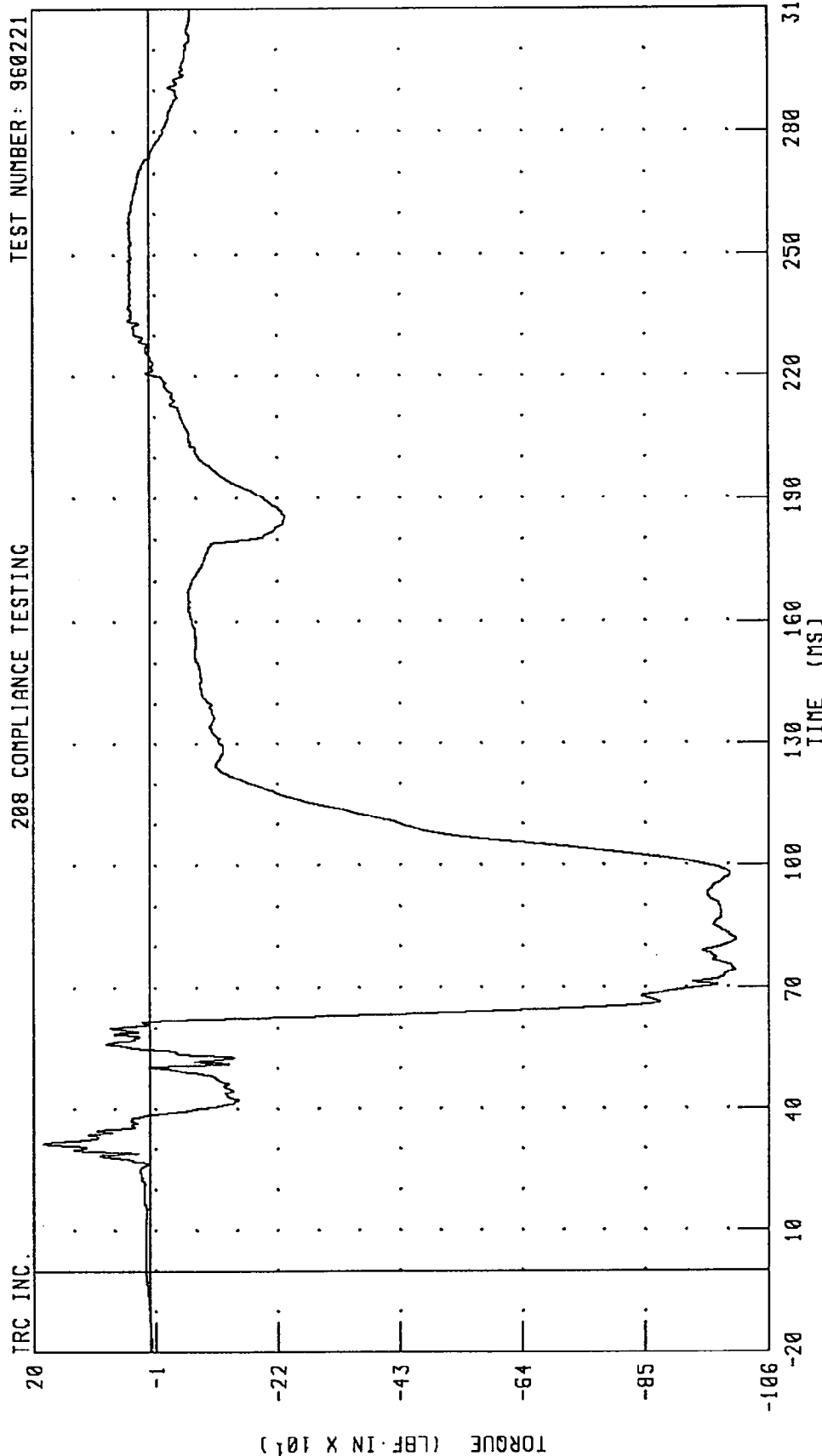


CHANNEL: ANLZF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DRIVER LEFT LOWER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING

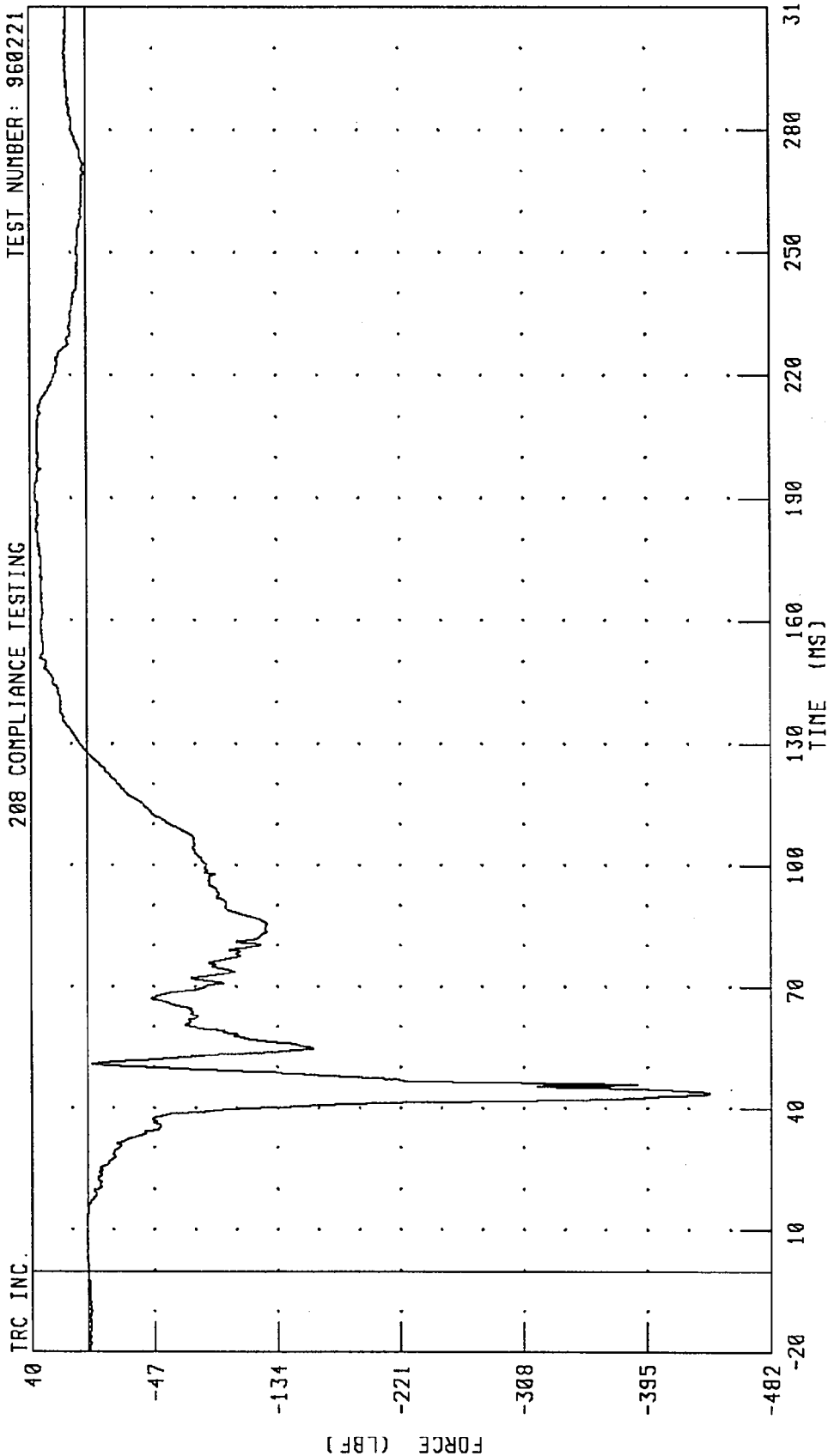


PEAK DATA: 183.84 LBF-IN @ 31.44 MS; -1003.79 LBF-IN @ 81.68 MS

CHANNEL: ANLYM1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT LOWER TIBIA X-AXIS FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



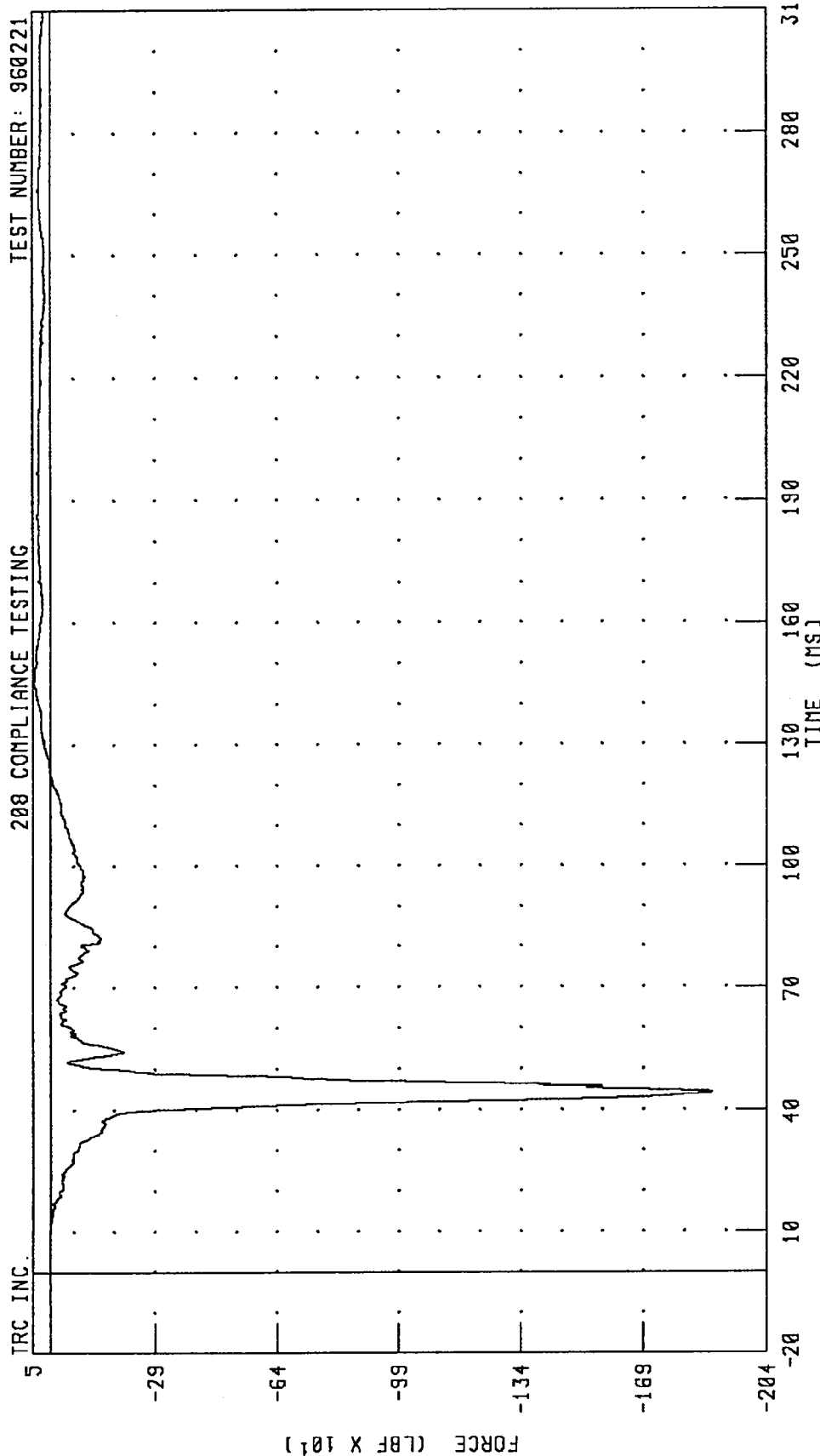
PEAK DATA: 36.82 LBF @ 191.28 MS; -439.25 LBF @ 43.60 MS

CHANNEL: ANRXF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960221

200 COMPLIANCE TESTING

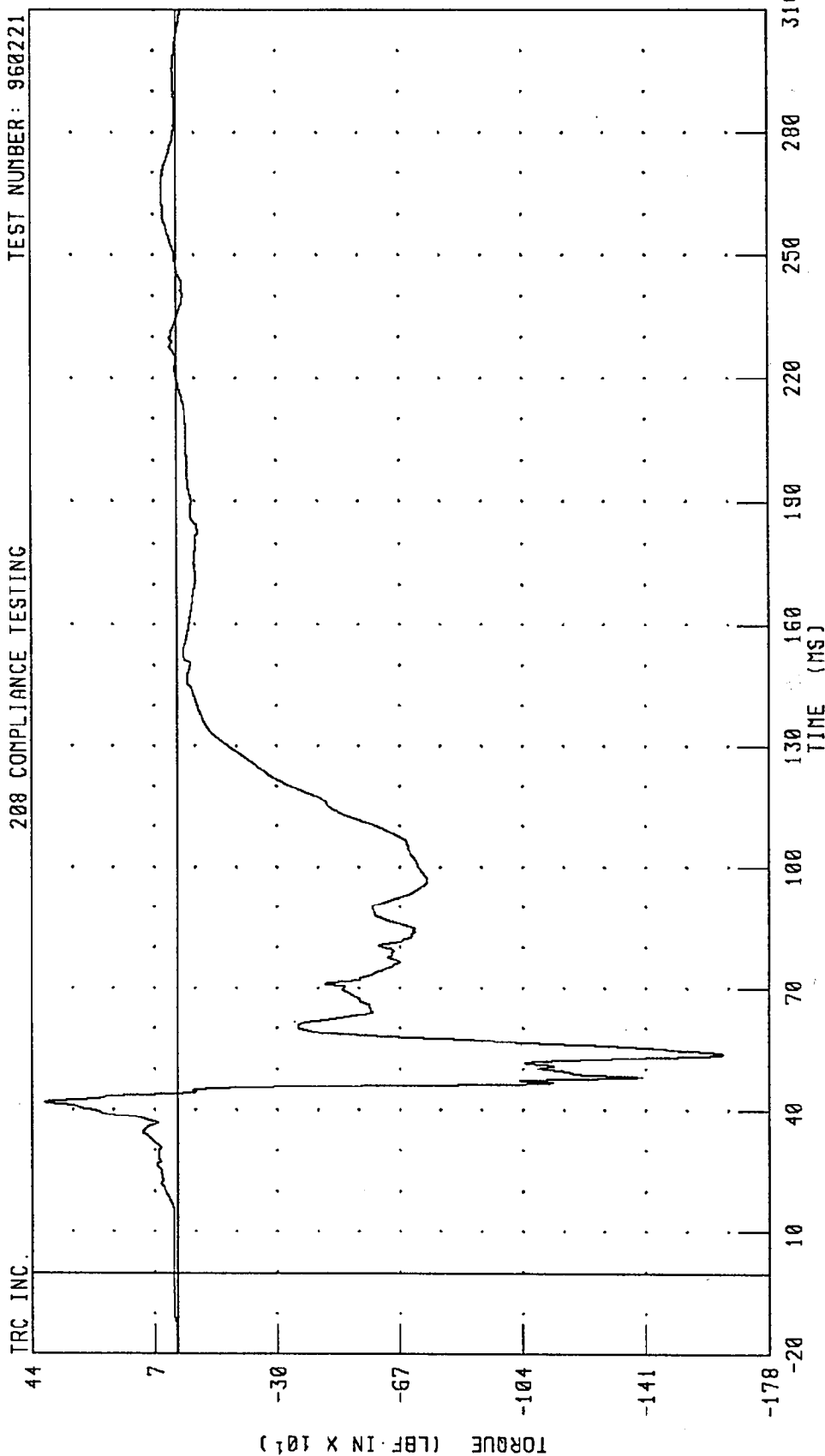


CHANNEL: ANRZF1 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT LOWER TIBIA MOMENT ABOUT Y-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING



PEAK DATA: 400.15 LBF-IN @ 42.00 MS; -1640.54 LBF-IN @ 53.76 MS

CHANNEL: ANRYM1 FILTER: CH. CLASS 600

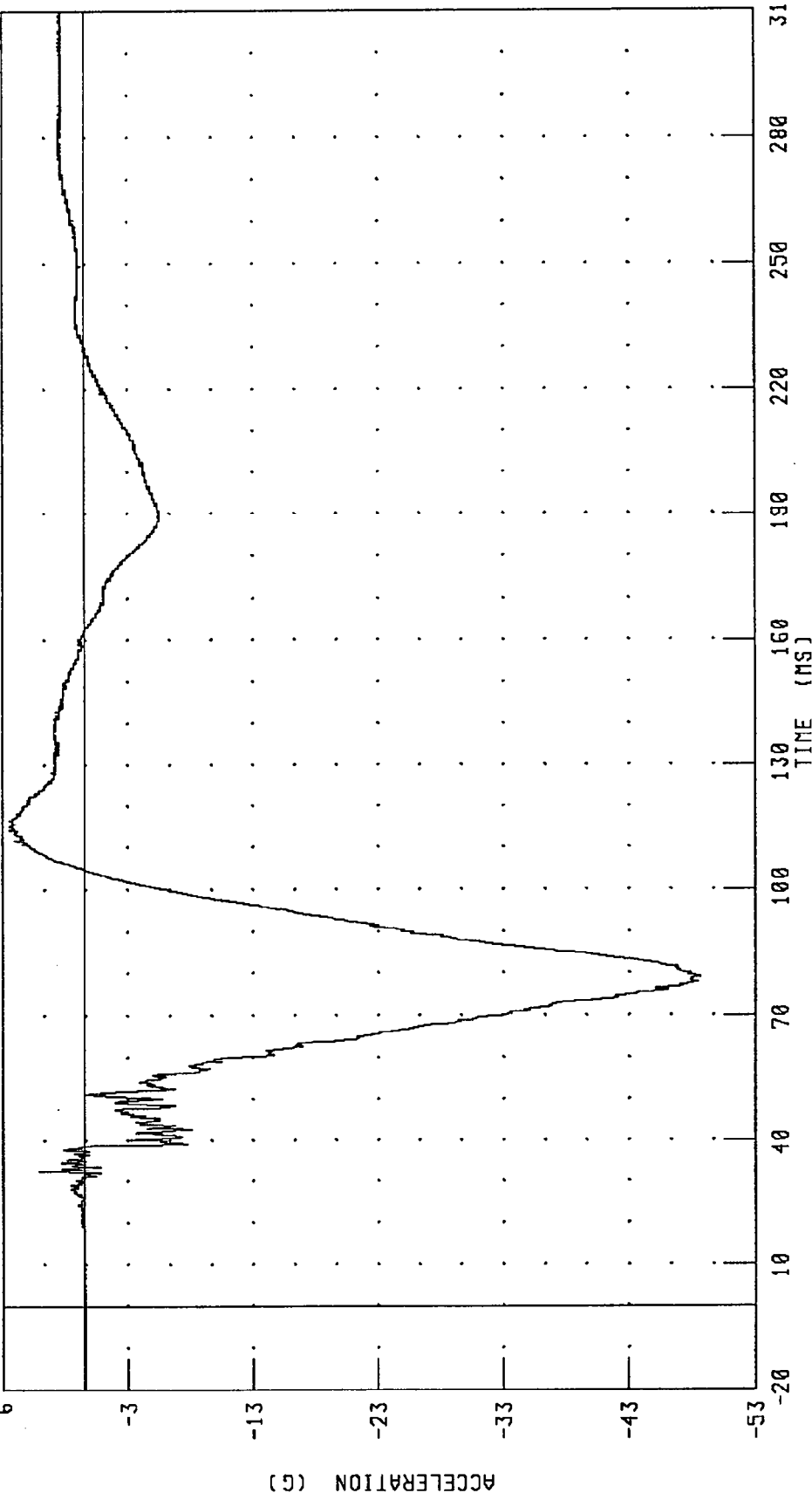
1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

IRC INC.

6



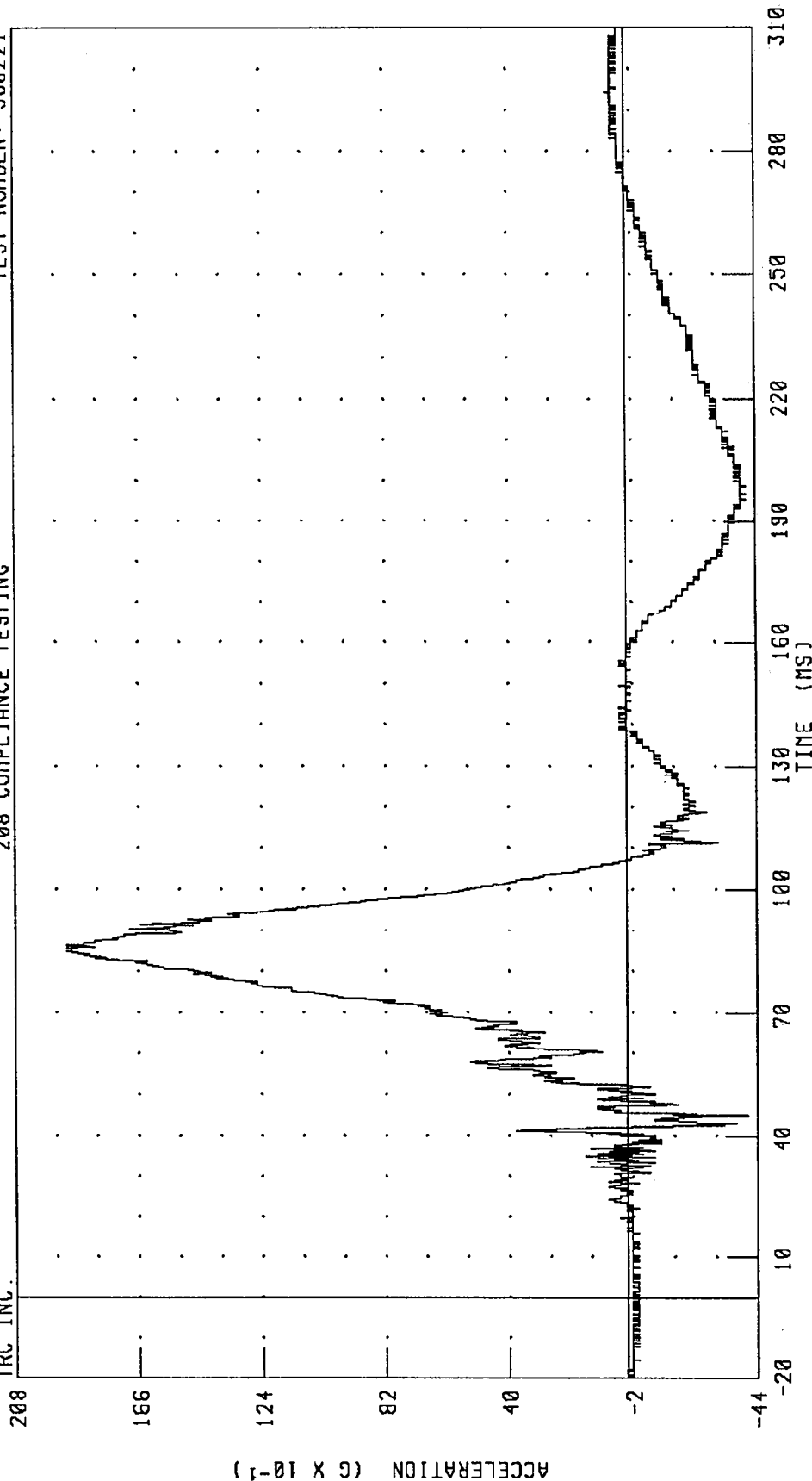
CHANNEL: HEDXC2 FILTER: CH. CLASS 1000

PEAK DATA: 5.94 G @ 114.56 MS; -49.15 G @ 79.20 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

208 COMPLIANCE TESTING

TRC INC.



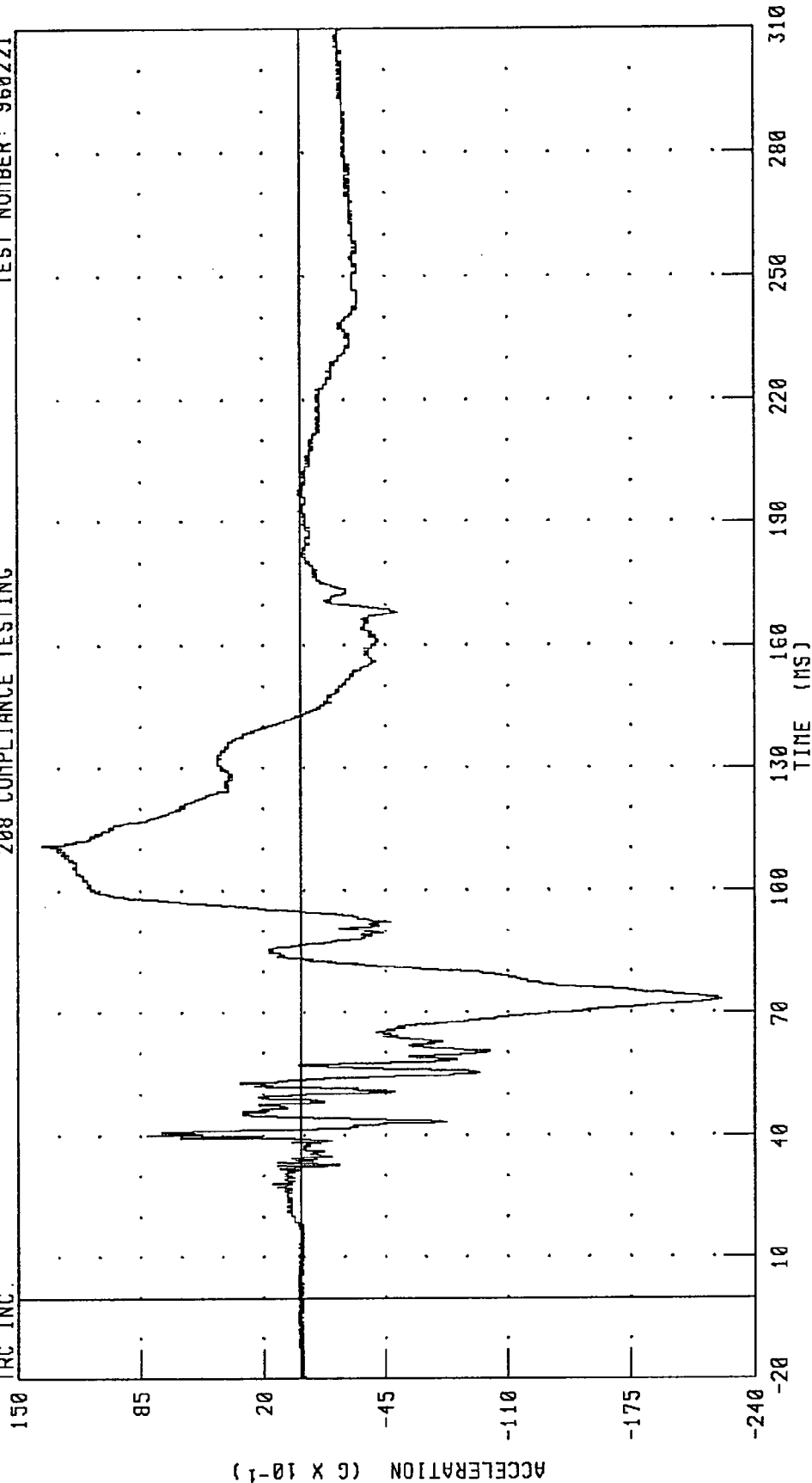
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000

PEAK DATA: 19.06 G @ 84.88 MS; -4.08 G @ 44.96 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

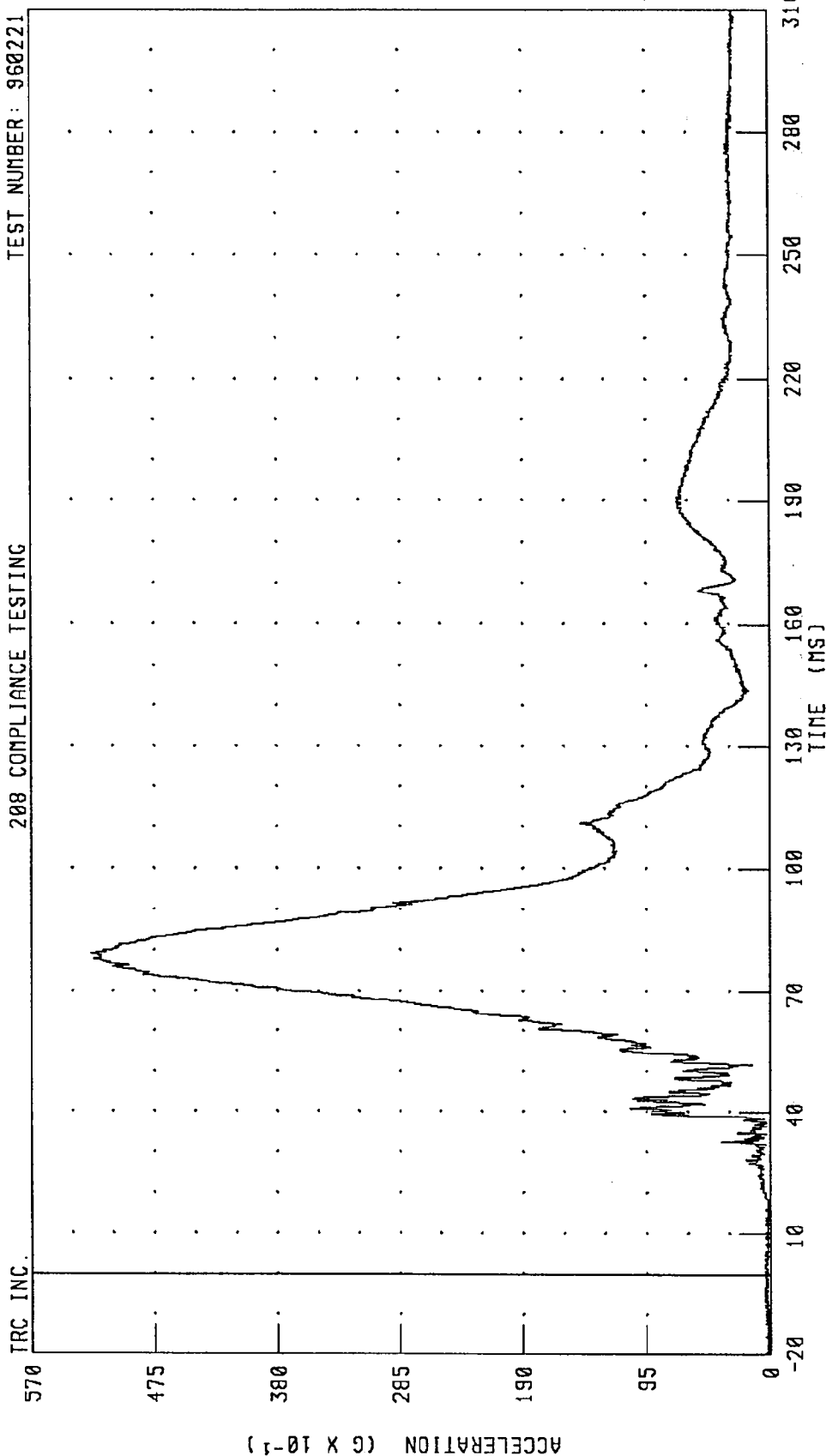


CHANNEL: HED762 FILTER: CH. CLASS 1000

PEAK DATA: 13.66 G @ 110.88 MS; -222.23 G @ 73.20 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221



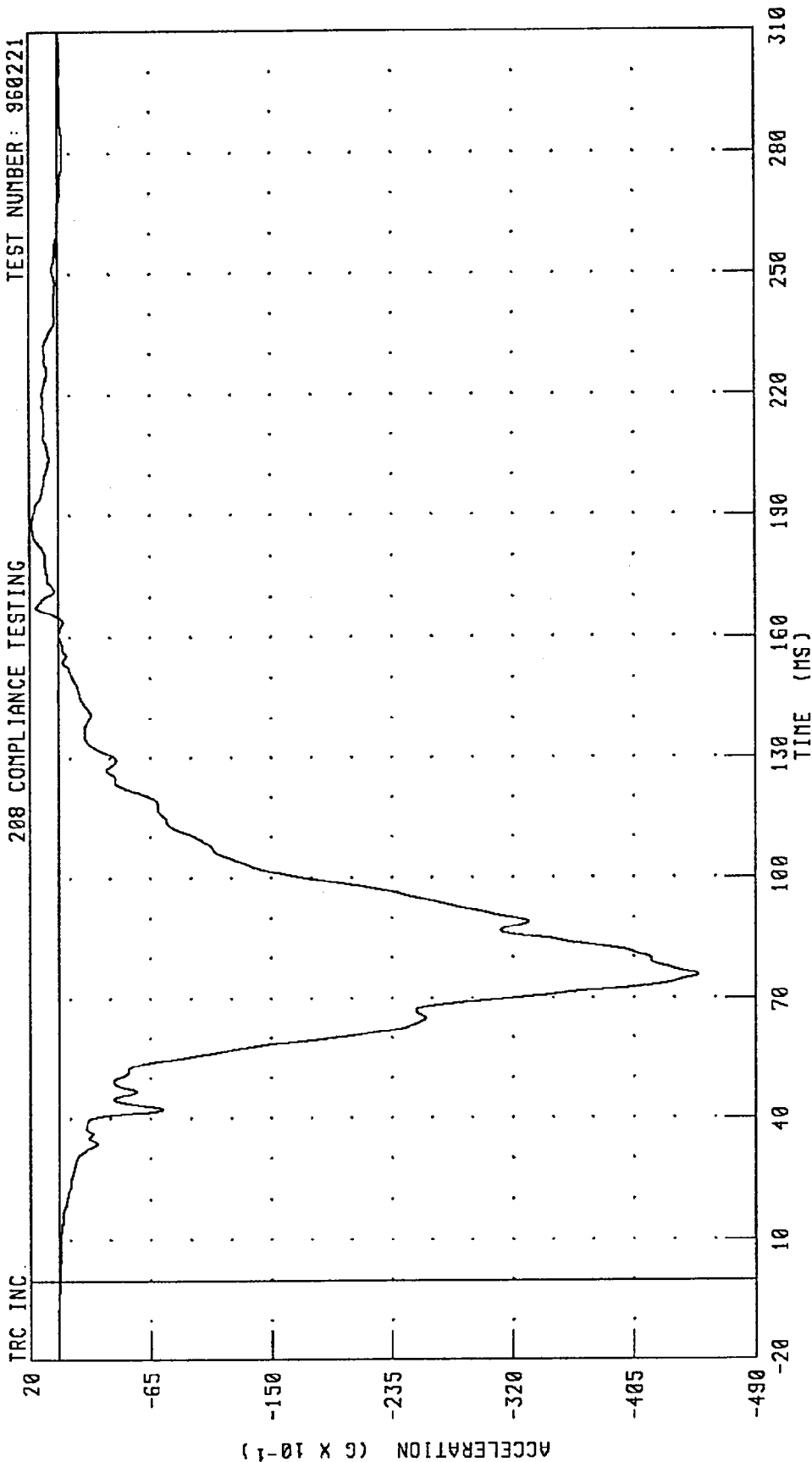
CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

PEAK DATA: 52.36 G @ 79.36 MS; 0.09 G @ -18.40 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

208 COMPLIANCE TESTING

TEST NUMBER: 960221



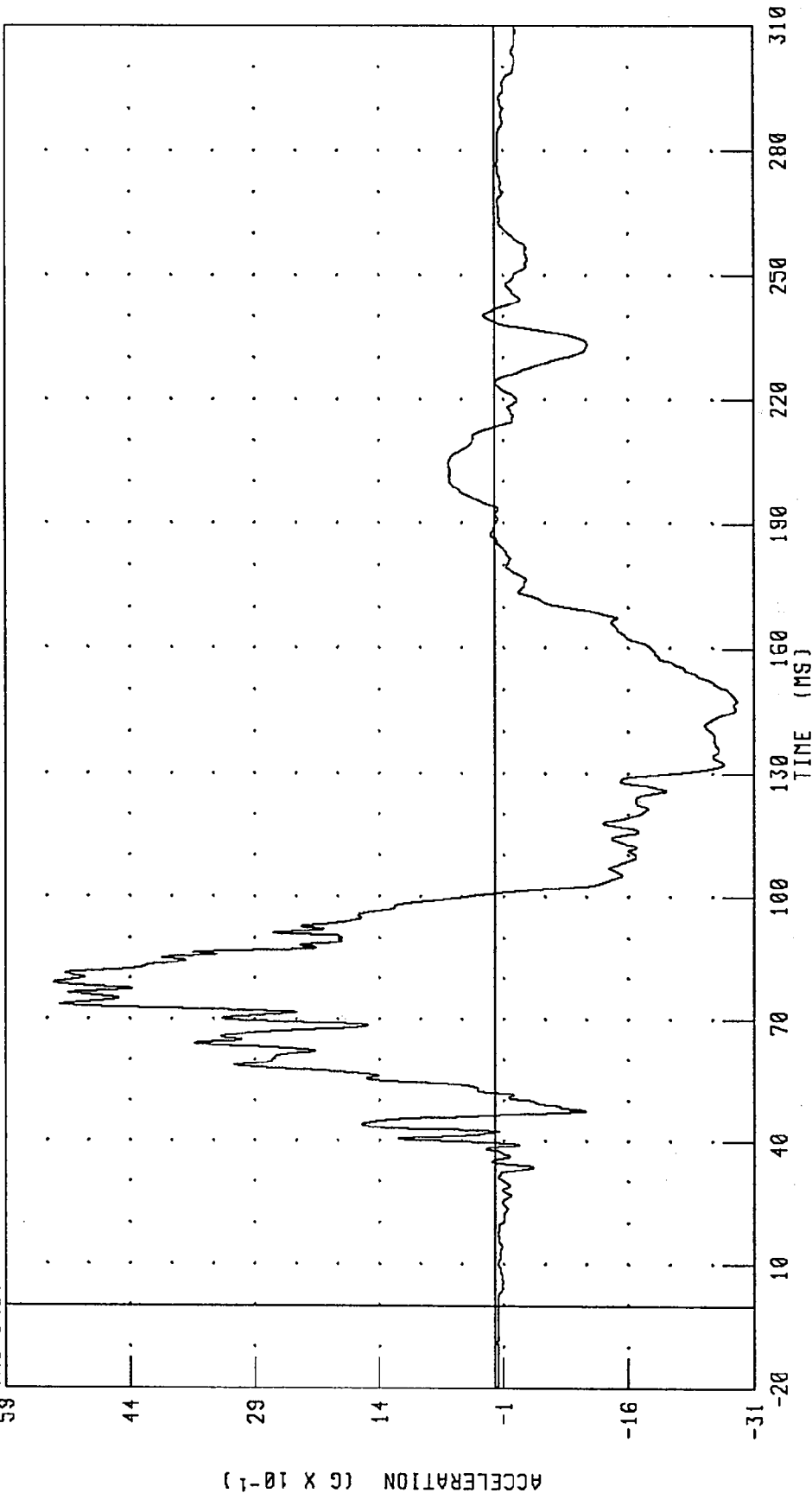
CHANNEL: CSTXG2 FILTER: CH. CLASS 180

PEAK DATA: 1.84 G @ 188.72 MS; -45.02 G @ 75.76 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



PEAK DATA: 5.31 G @ 79.04 MS; -2.89 G @ 147.36 MS

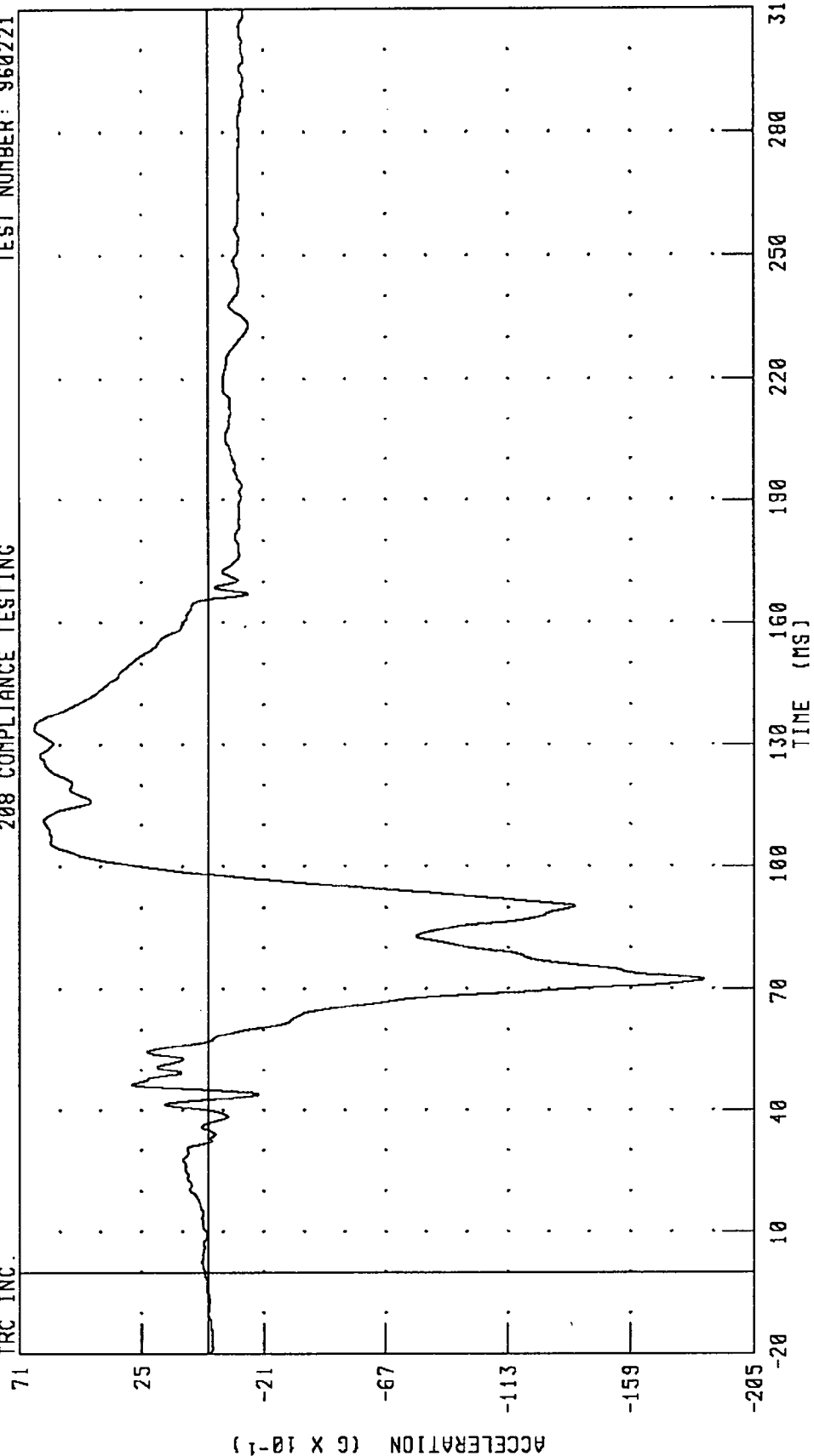
CHANNEL: CSTYG2 FILTER: CH. CLASS 180

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.

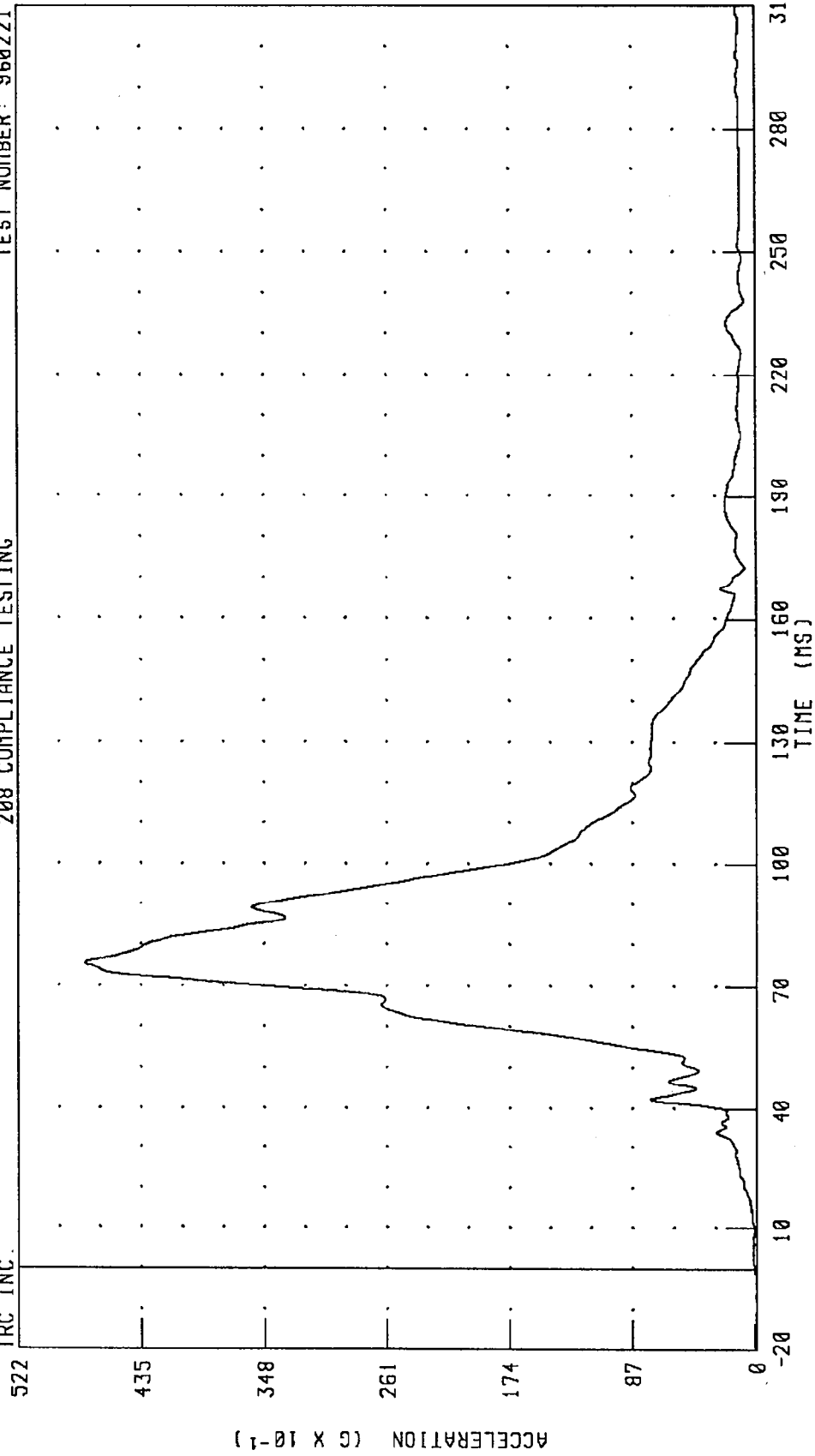


CHANNEL: CSTZG2 FILTER: CH. CLASS 180

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



CHANNEL: CSTRG2 FILTER: CH. CLASS 180

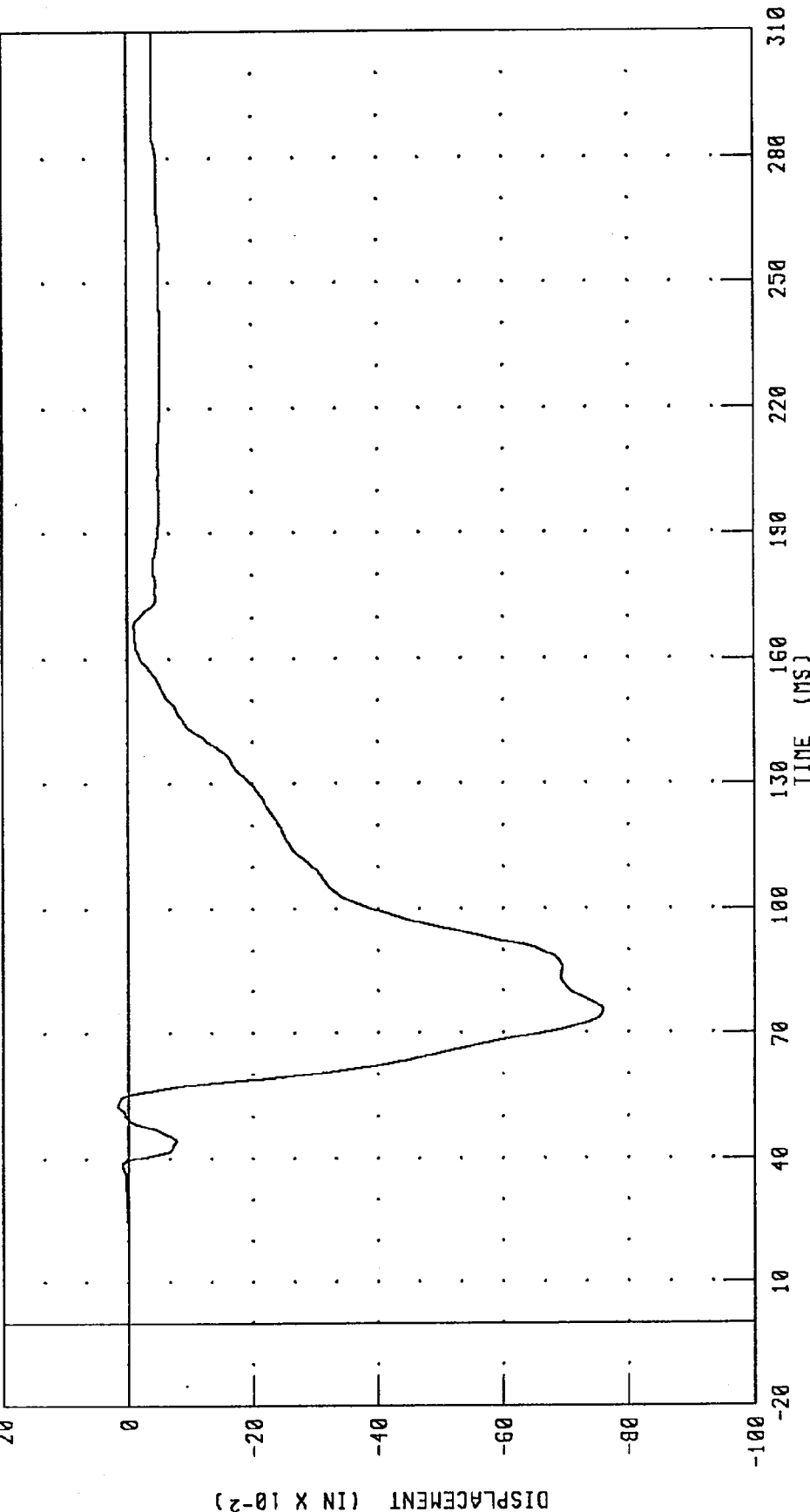
PEAK DATA: 47.49 G @ 75.60 MS; 0.01 G @ -20.00 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST DEFLECTION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.



PEAK DATA: 0.02 IN @ 52.72 MS; -0.76 IN @ 75.44 MS

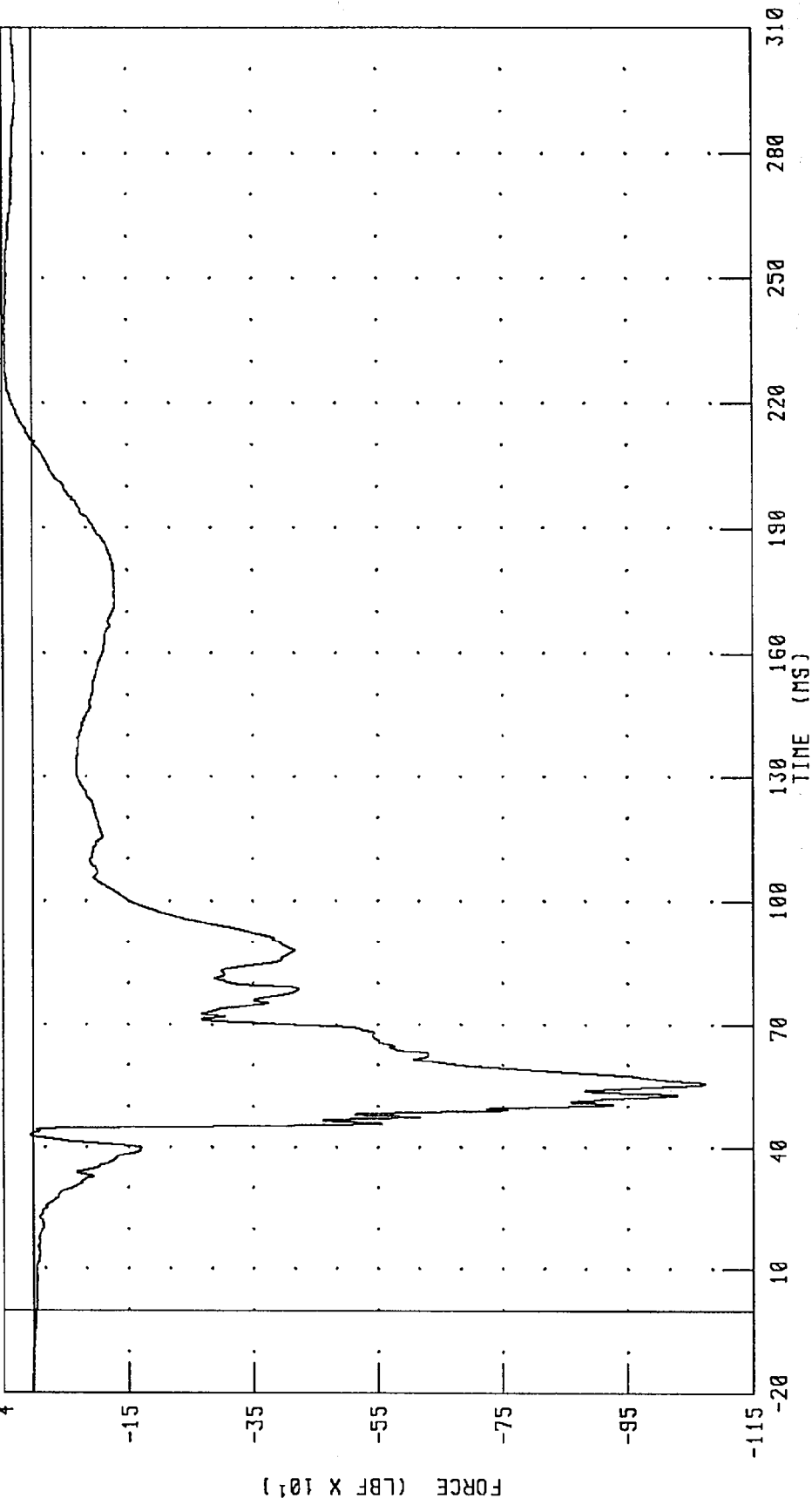
CHANNEL: CSTX02 FILTER: CH. CLASS 180

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.



PEAK DATA: 44.32 LBF @ 238.16 MS, -1075.01 LBF @ 55.60 MS

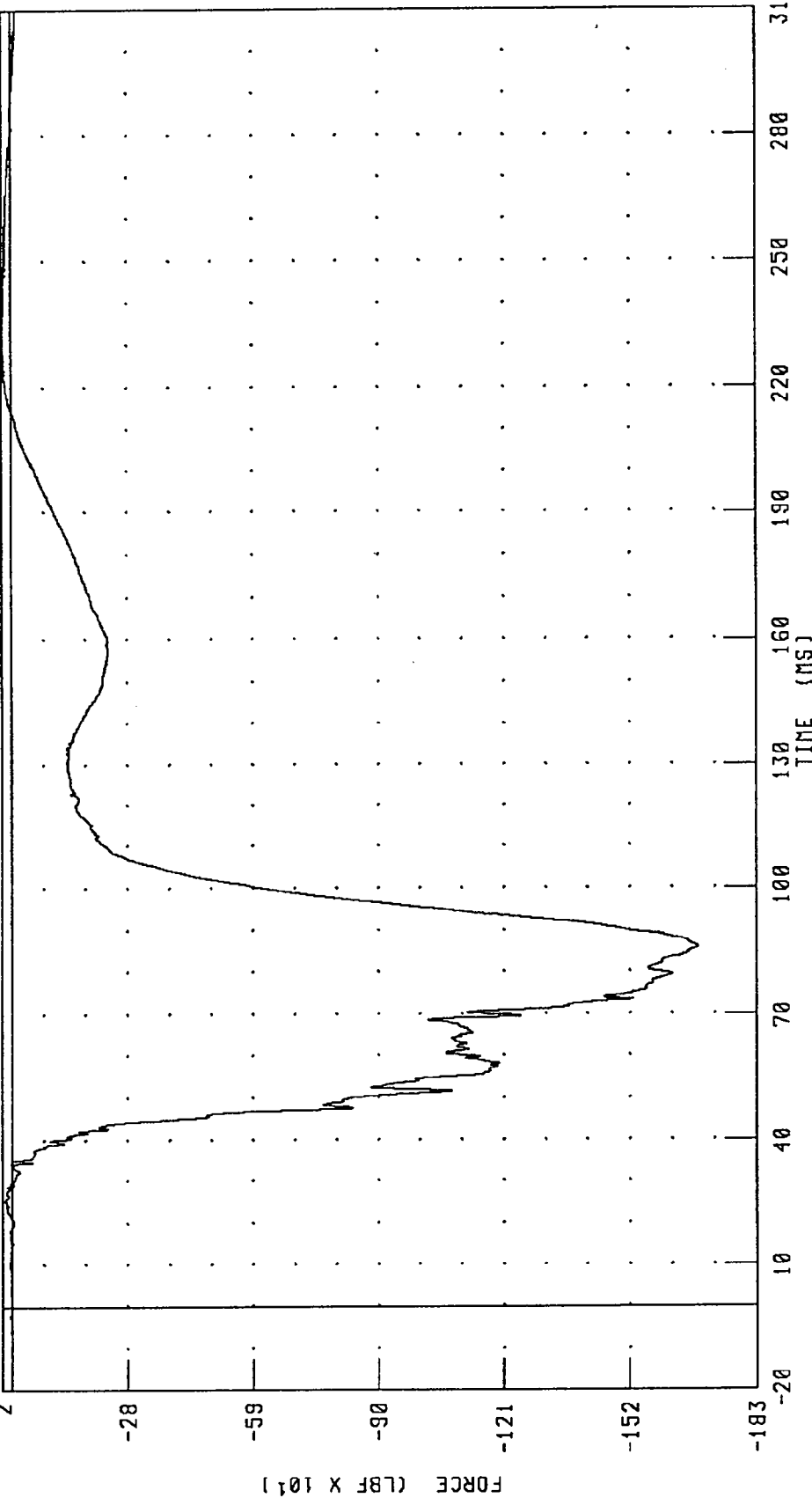
CHANNEL: LFMF2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

2



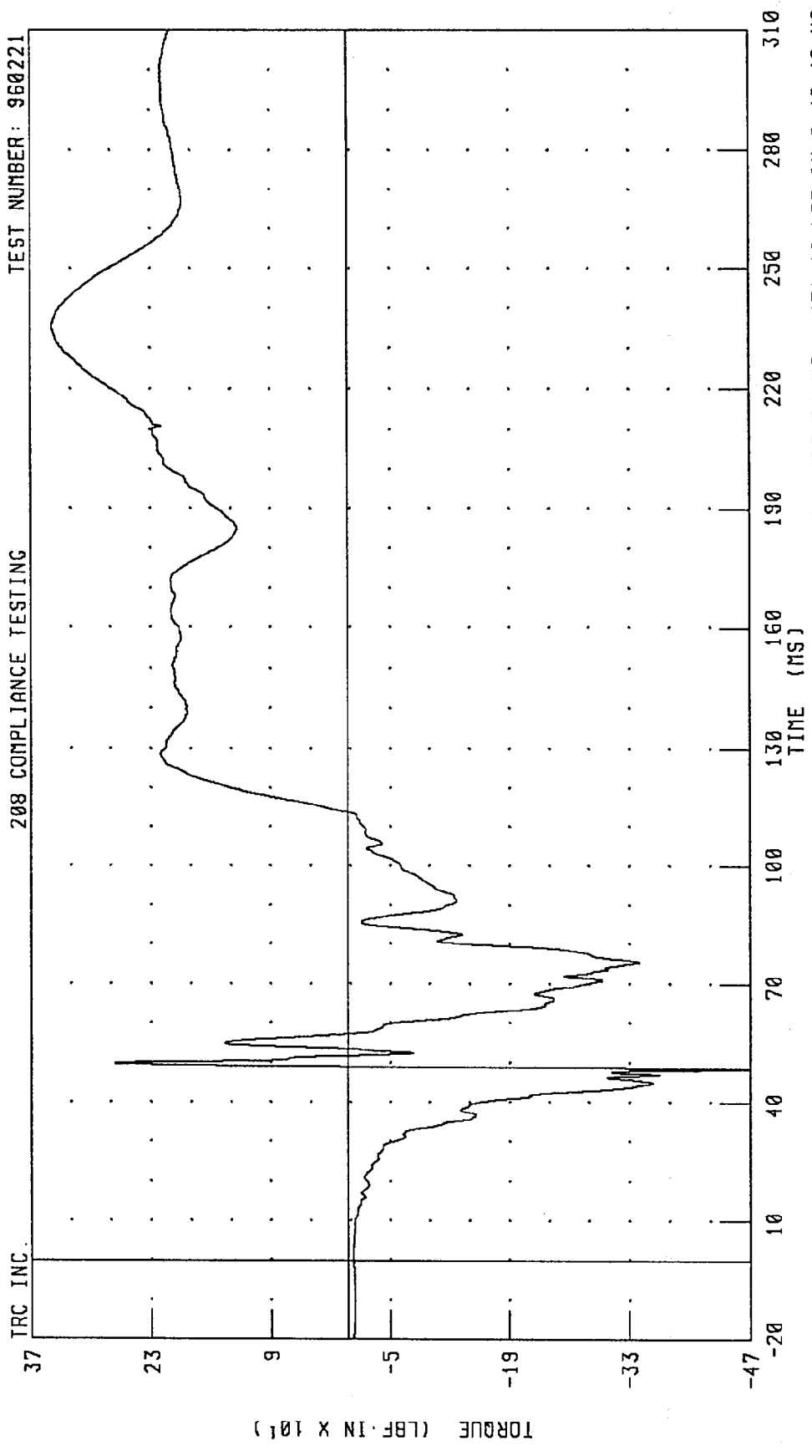
PEAK DATA: 22.17 LBF @ 247.36 MS; -1692.73 LBF @ 85.84 MS

FILTER: CH. CLASS 600

CHANNEL: RFMF2

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT UPPER TIBIA MOMENT ABOUT X-AXIS
 208 COMPLIANCE TESTING

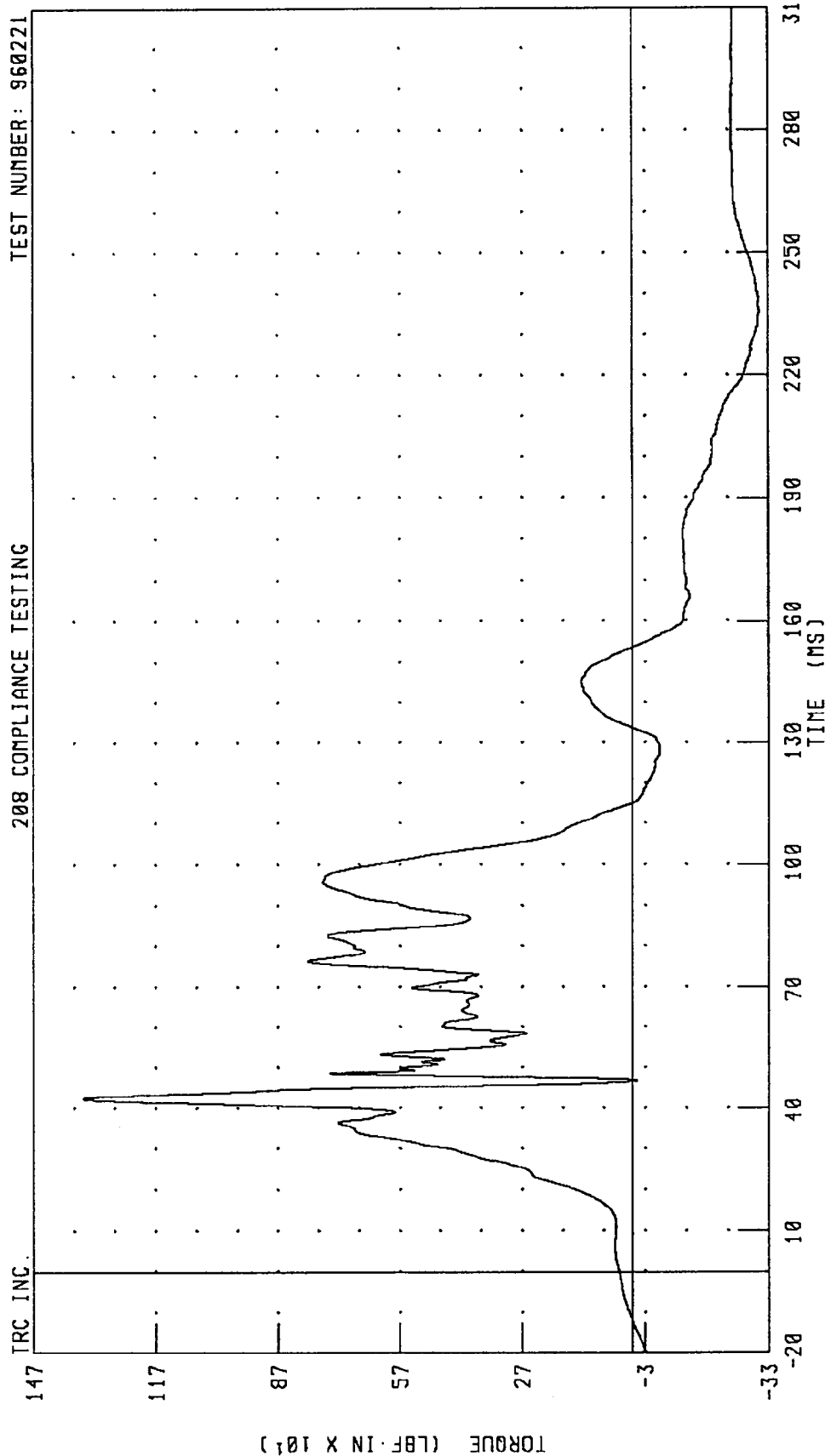
TEST NUMBER: 960221



CHANNEL: TBLXM2 FILTER: CH. CLASS 600 PEAK DATA: 344.89 LBF-IN @ 235.84 MS; -471.12 LBF-IN @ 48.48 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT UPPER TIBIA MOMENT ABOUT Y-AXIS
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



PEAK DATA: 1348.06 LBF-IN @ 42.48 MS; -308.12 LBF-IN @ 235.60 MS

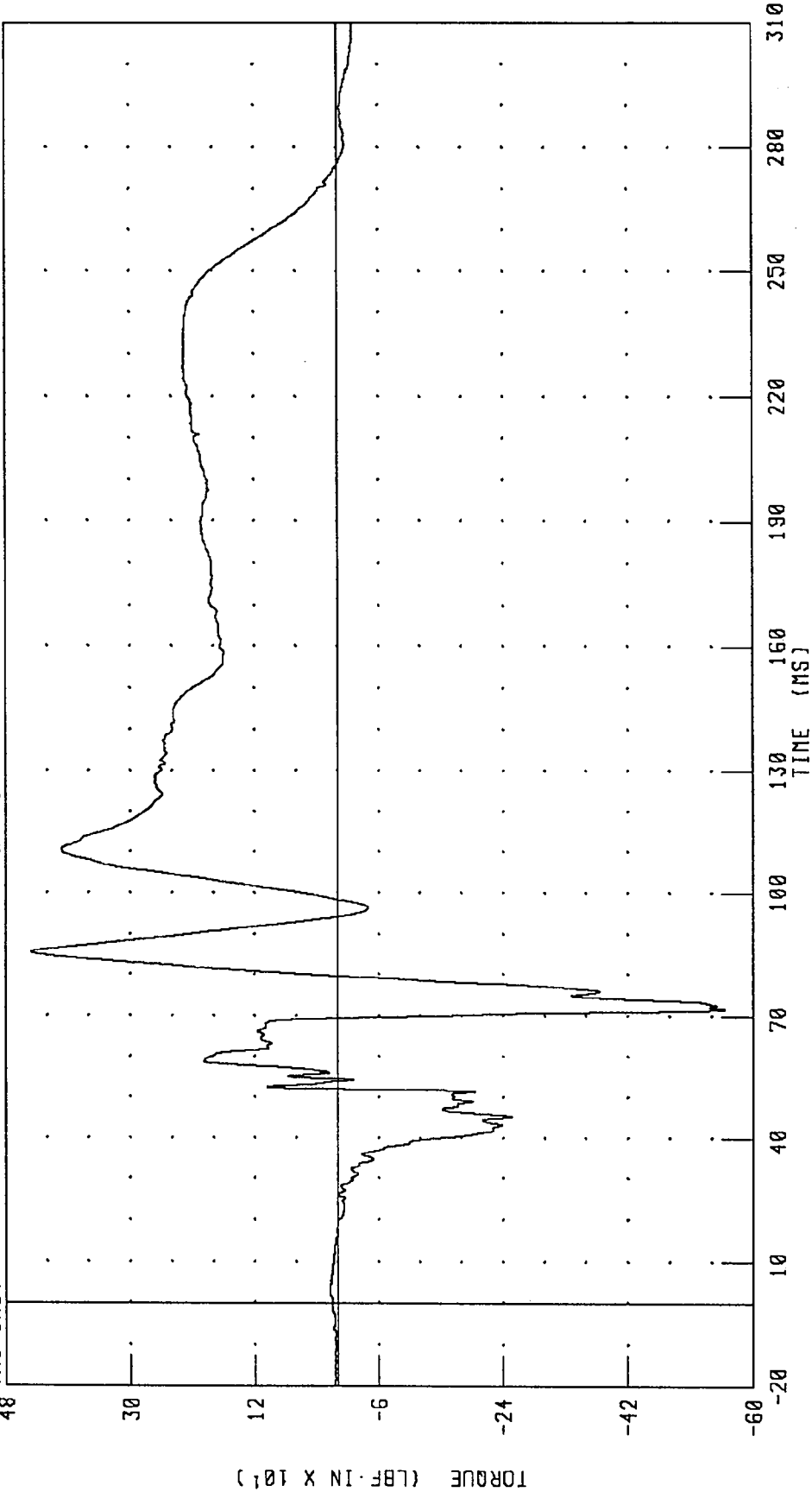
CHANNEL: TBLYM2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT X-AXIS

TEST NUMBER: 960221

208 COMPLIANCE TESTING

IRC INC.

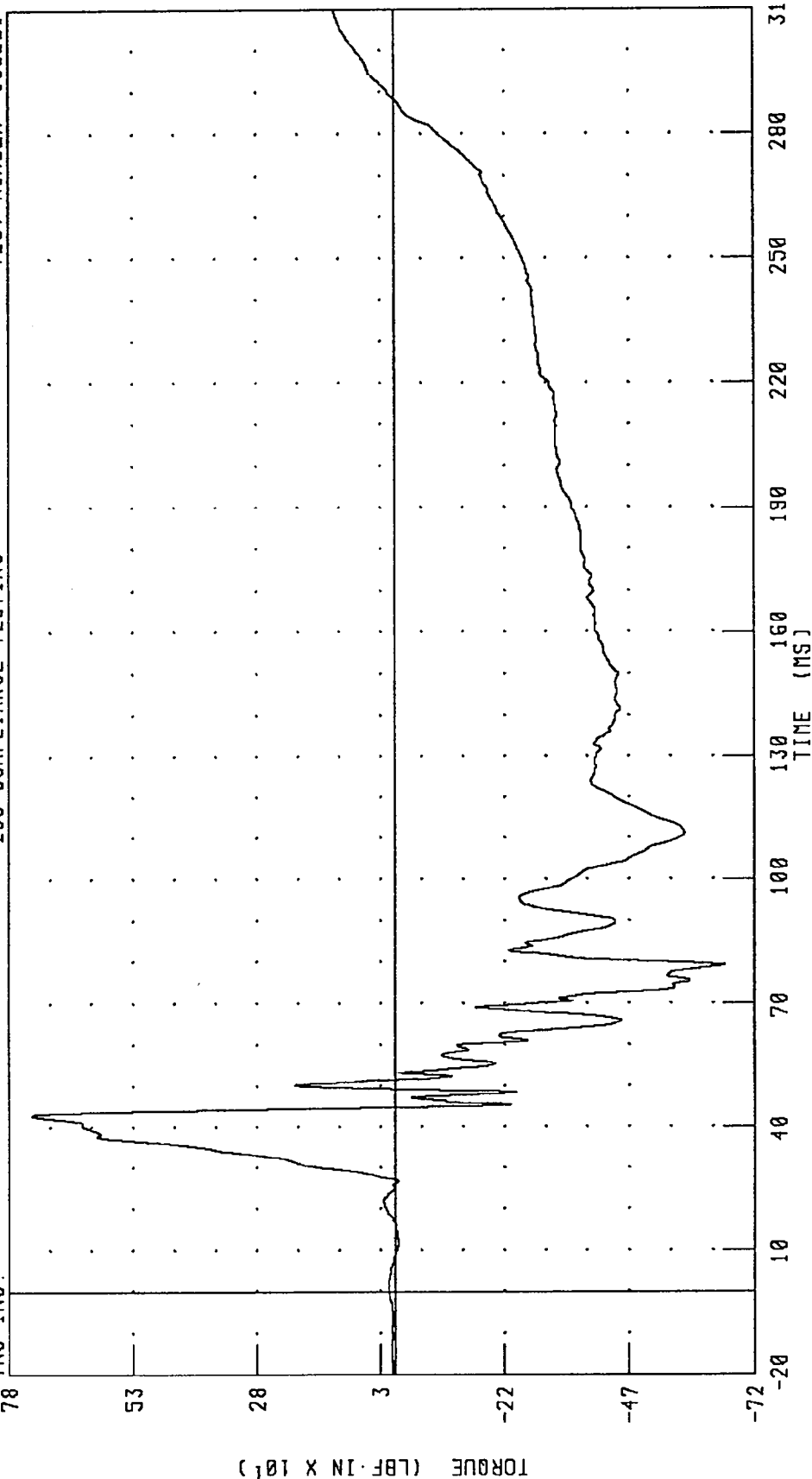


CHANNEL: TBRXM2 FILTER: CH. CLASS 600 PEAK DATA: 442.94 LBF-IN @ 85.52 MS; -558.00 LBF-IN @ 71.60 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT UPPER TIBIA MOMENT ABOUT Y-AXIS
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

IRC INC.

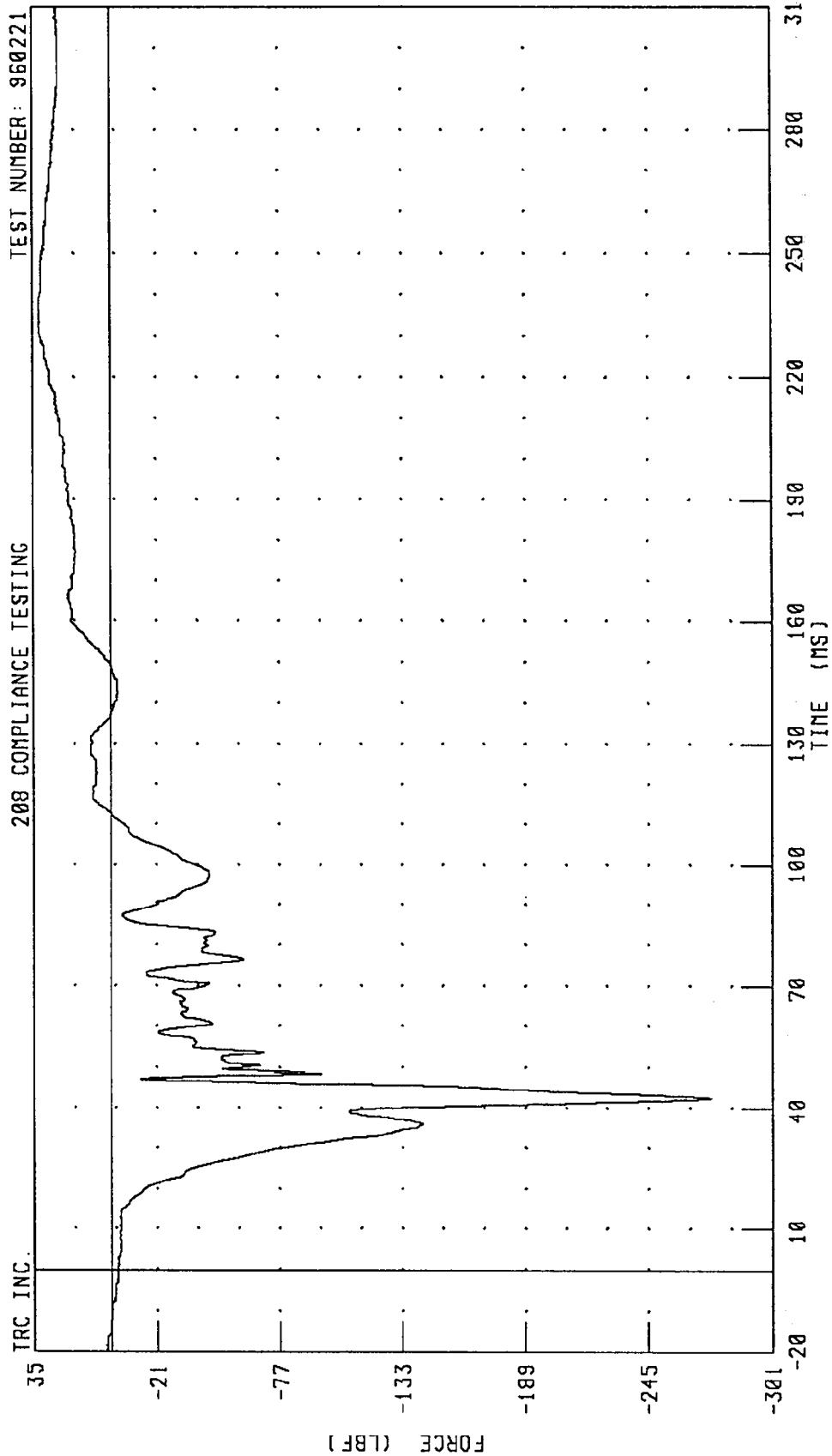


PEAK DATA: 733.44 LBF-IN @ 42.96 MS; -659.20 LBF-IN @ 79.20 MS

CHANNEL: TBRYM2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA X-AXIS FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

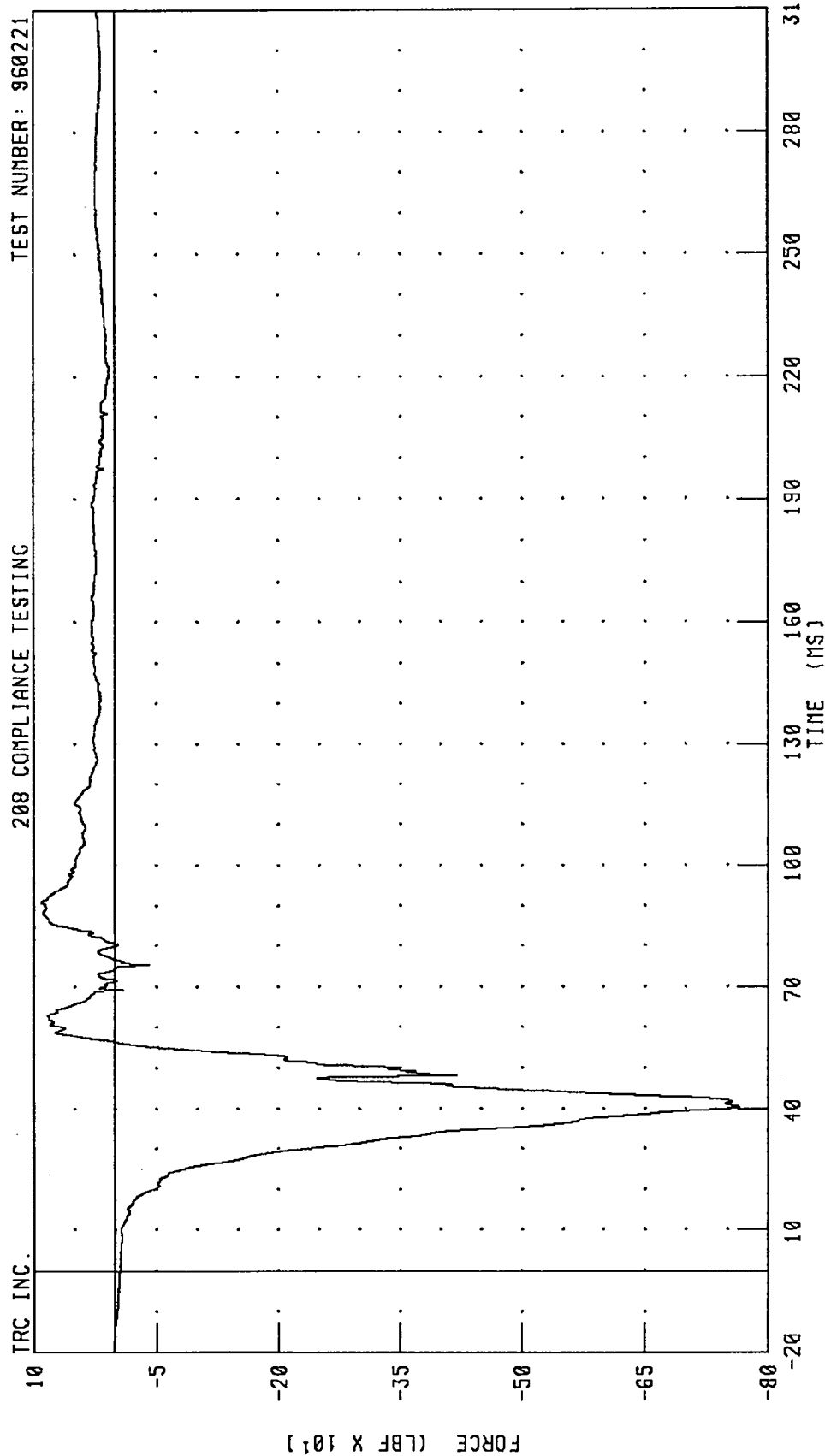


PEAK DATA: 32.26 LBF @ 238.96 MS; -273.27 LBF @ 42.48 MS

CHANNEL: ANLXF2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA Z-AXIS FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

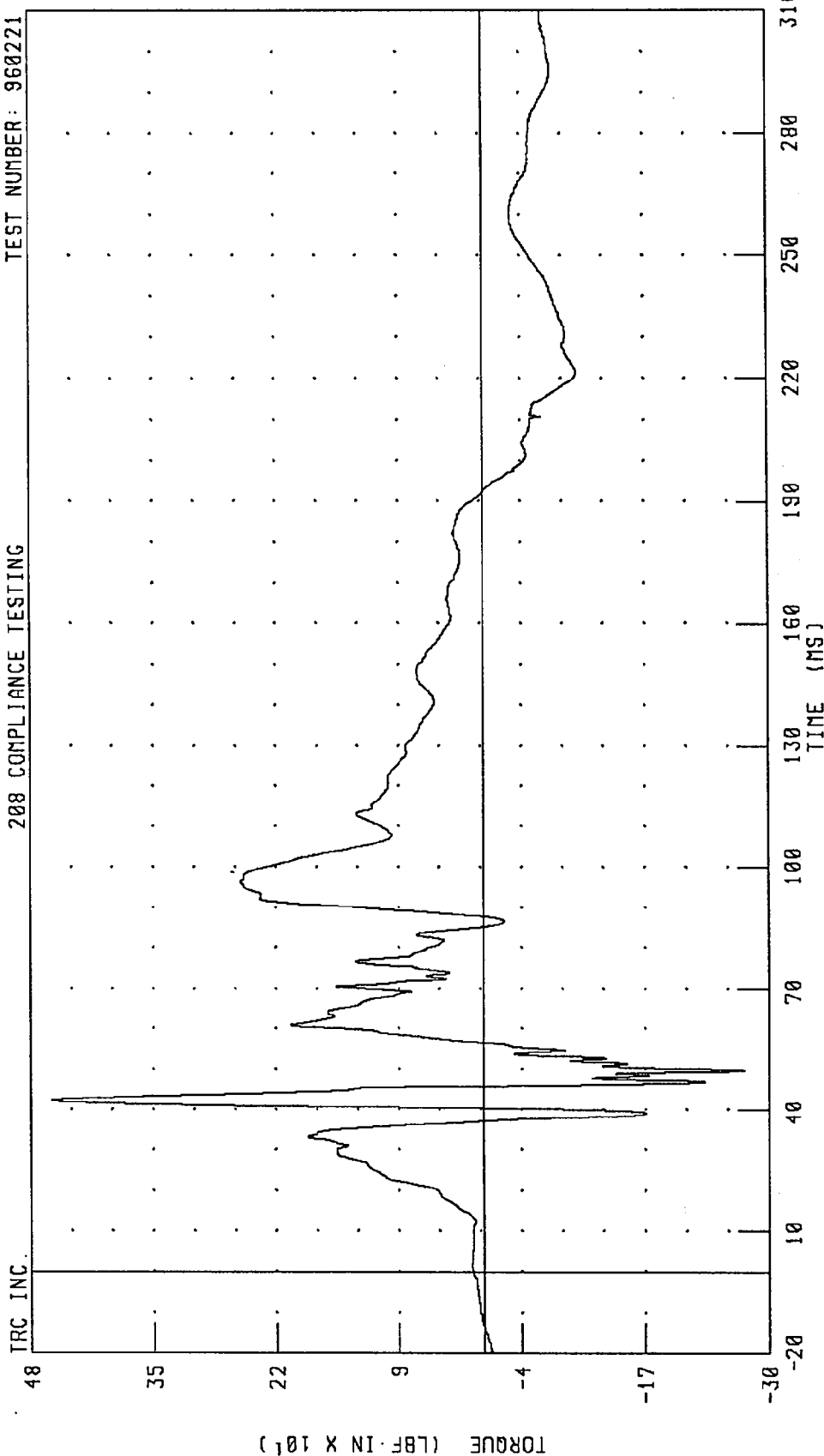


PEAK DATA: 91.27 LBF @ 90.88 MS; -764.65 LBF @ 40.48 MS

CHANNEL: ANLZF2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT LOWER TIBIA MOMENT ABOUT Y-AXIS
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

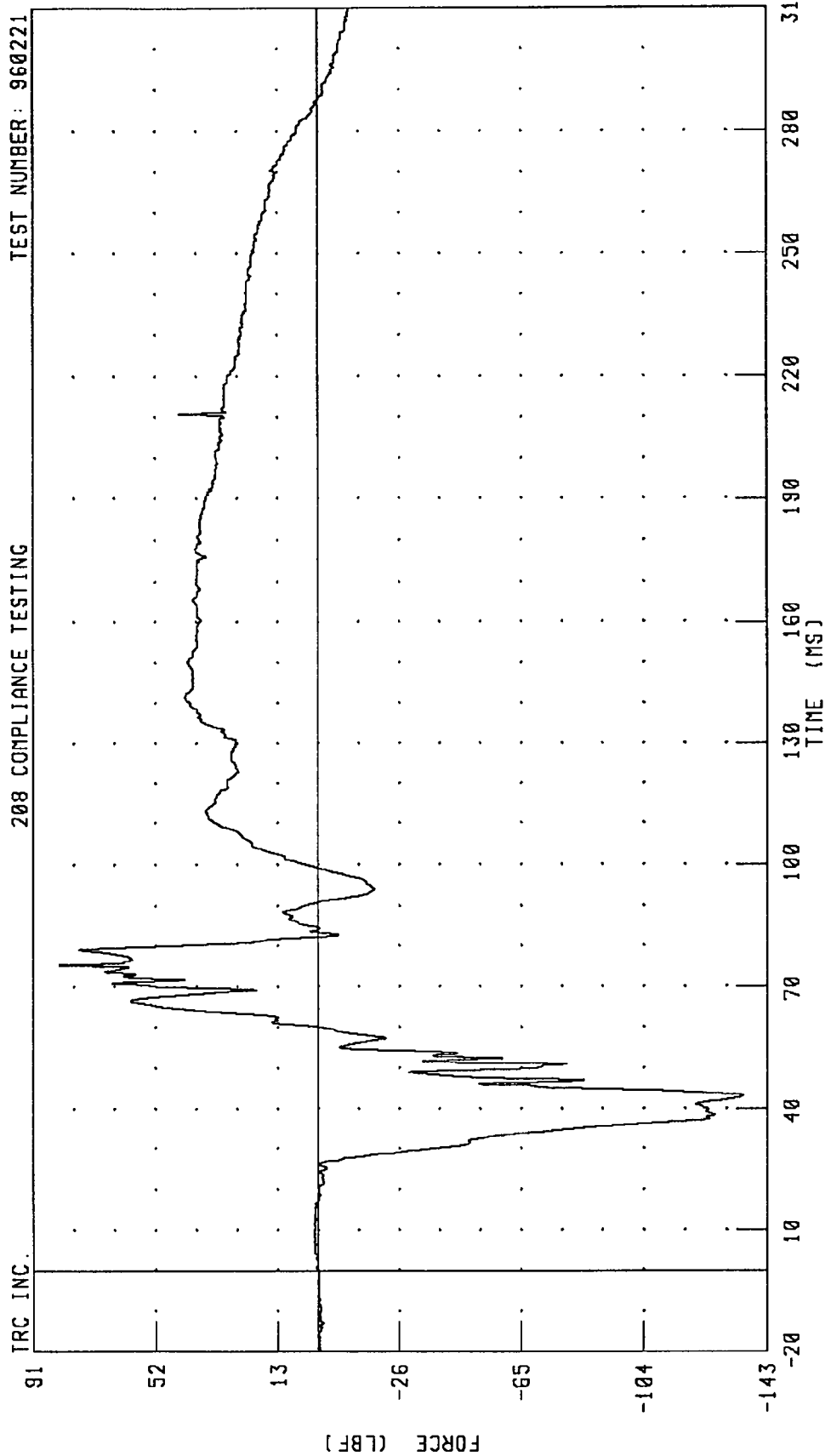


PEAK DATA: 457.61 LBF-IN @ 42.40 MS; -273.83 LBF-IN @ 49.68 MS

CHANNEL: ANLYM2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA X-AXIS FORCE
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



CHANNEL: ANRFX2 FILTER: CH. CLASS 600

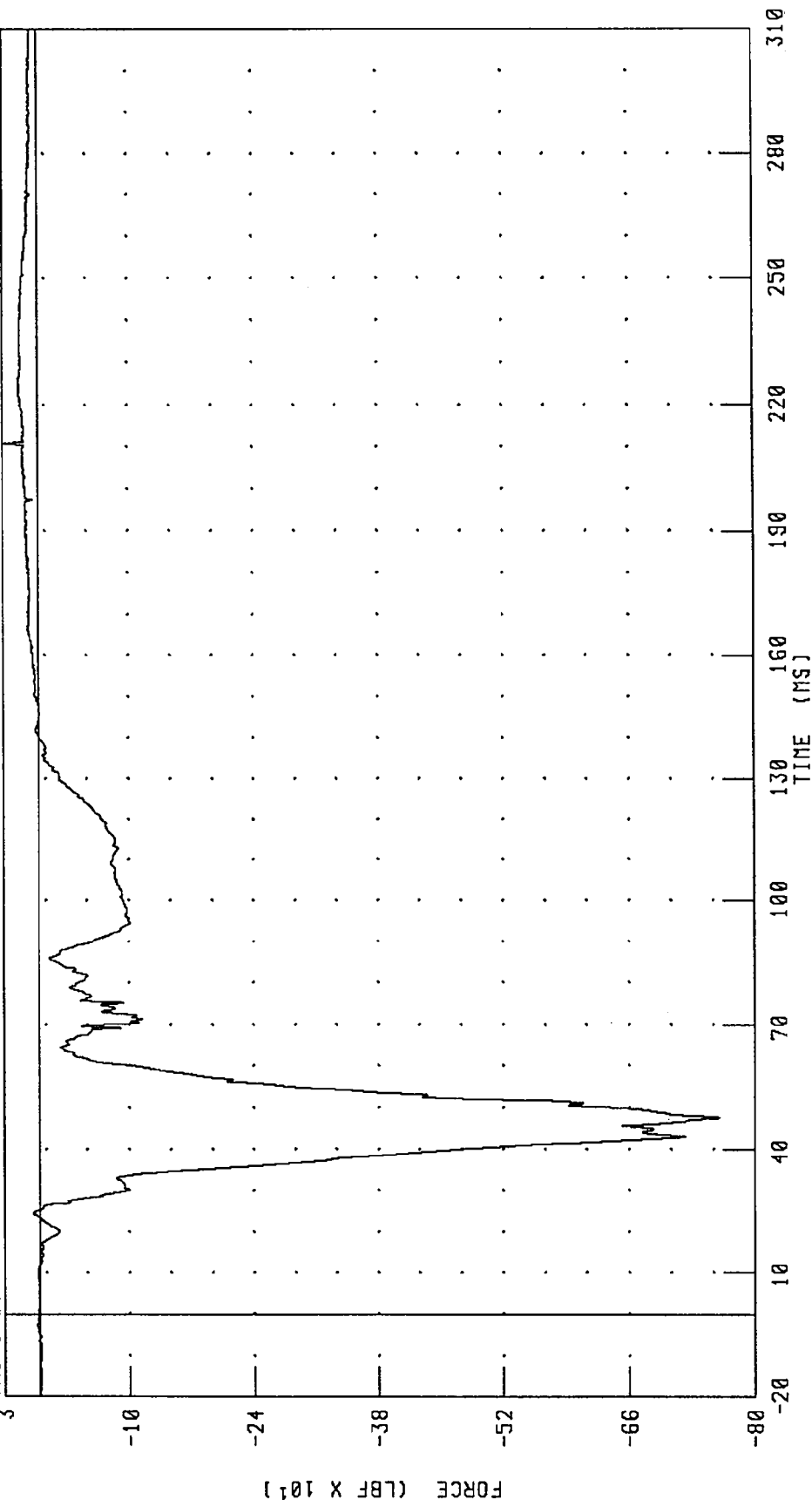
PEAK DATA: 82.75 LBF @ 75.44 MS; -135.39 LBF @ 43.28 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT LOWER TIBIA Z-AXIS FORCE

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.



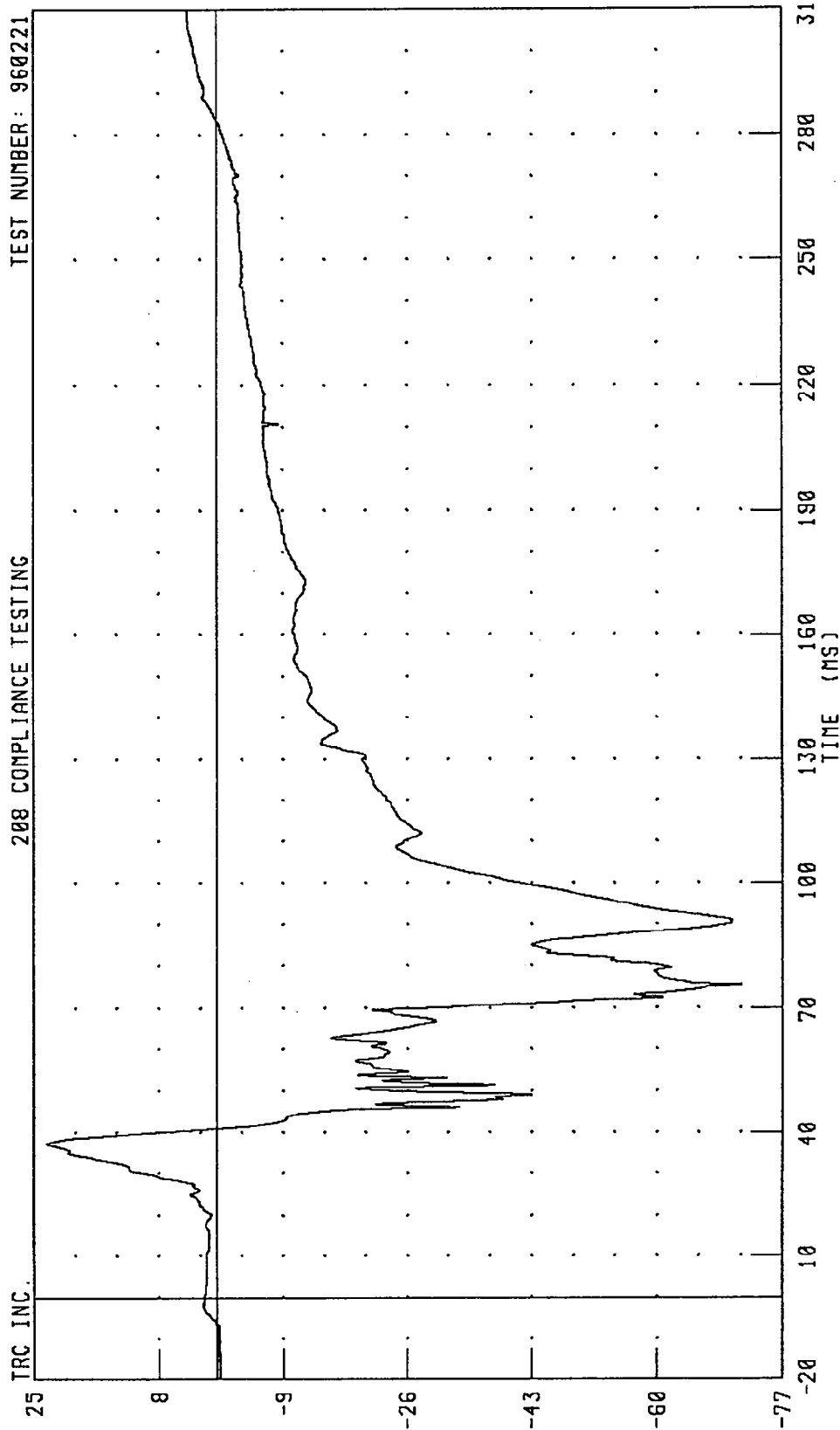
CHANNEL: ANRZF2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT LOWER TIBIA MOMENT ABOUT Y-AXIS
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

TORQUE (LBF·IN X 10¹)

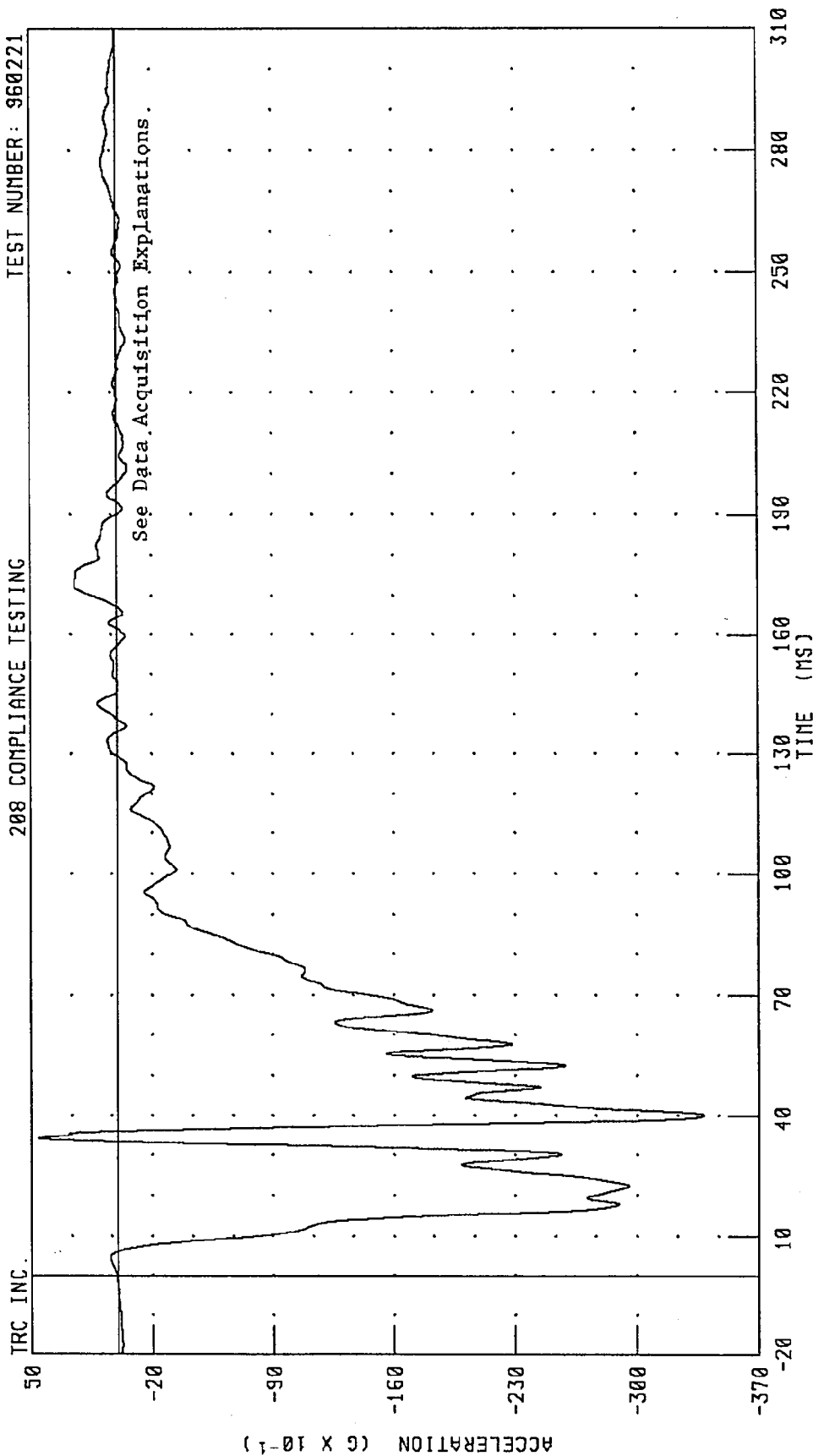


PEAK DATA: 232.89 LBF·IN @ 37.28 MS; -715.39 LBF·IN @ 75.36 MS

CHANNEL: ANR2M2 FILTER: CH. CLASS 600

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 LEFT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221



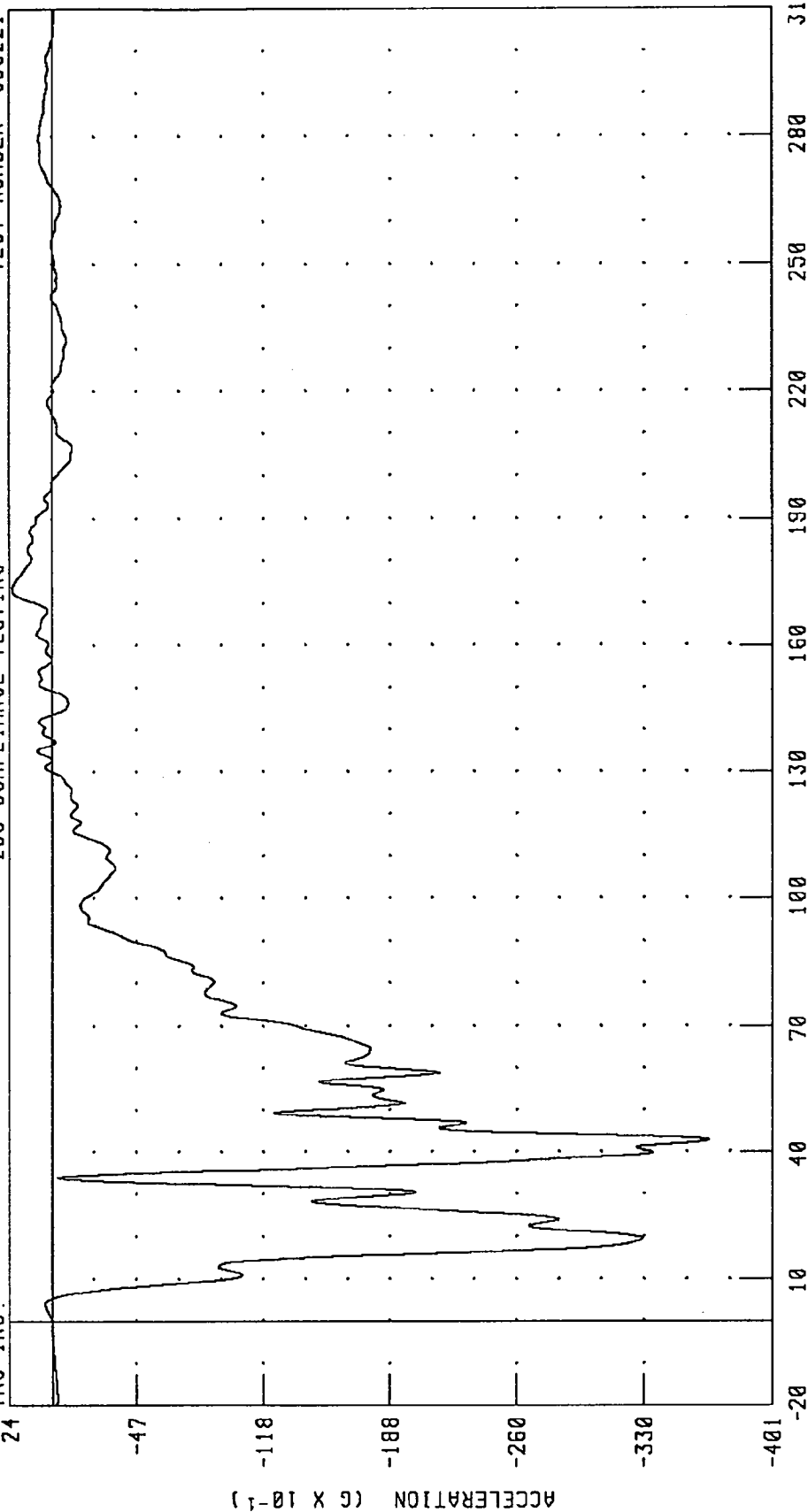
PEAK DATA: 4.59 G @ 34.32 MS; -33.86 G @ 40.16 MS

CHANNEL: TLRXG1 FILTER: CH. CLASS 60

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
 RIGHT REAR SEAT X-AXIS ACCELERATION
 208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.



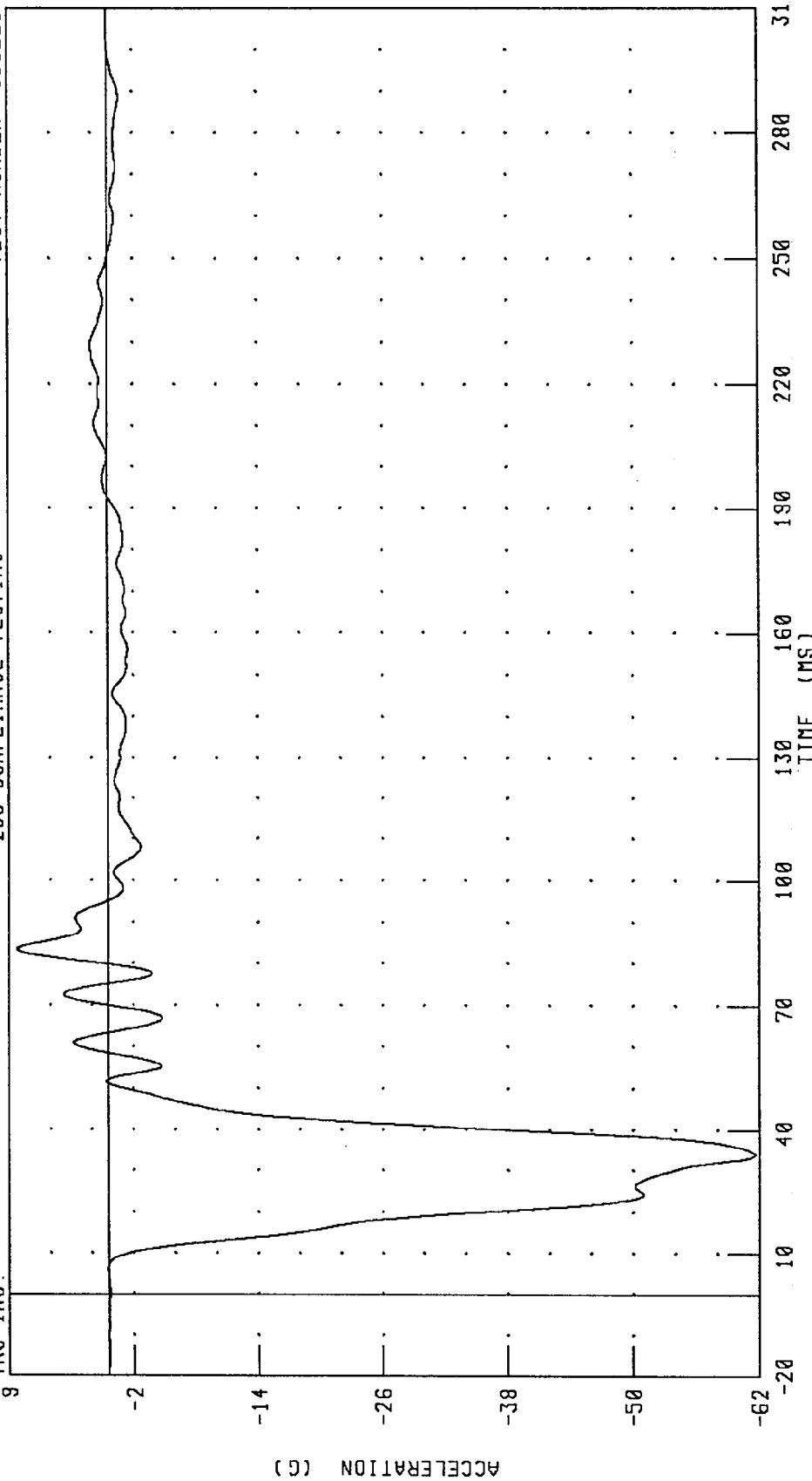
PEAK DATA: 2.21 G @ 173.12 MS; -36.69 G @ 42.80 MS

CHANNEL: TRRXG1 FILTER: CH. CLASS 60

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

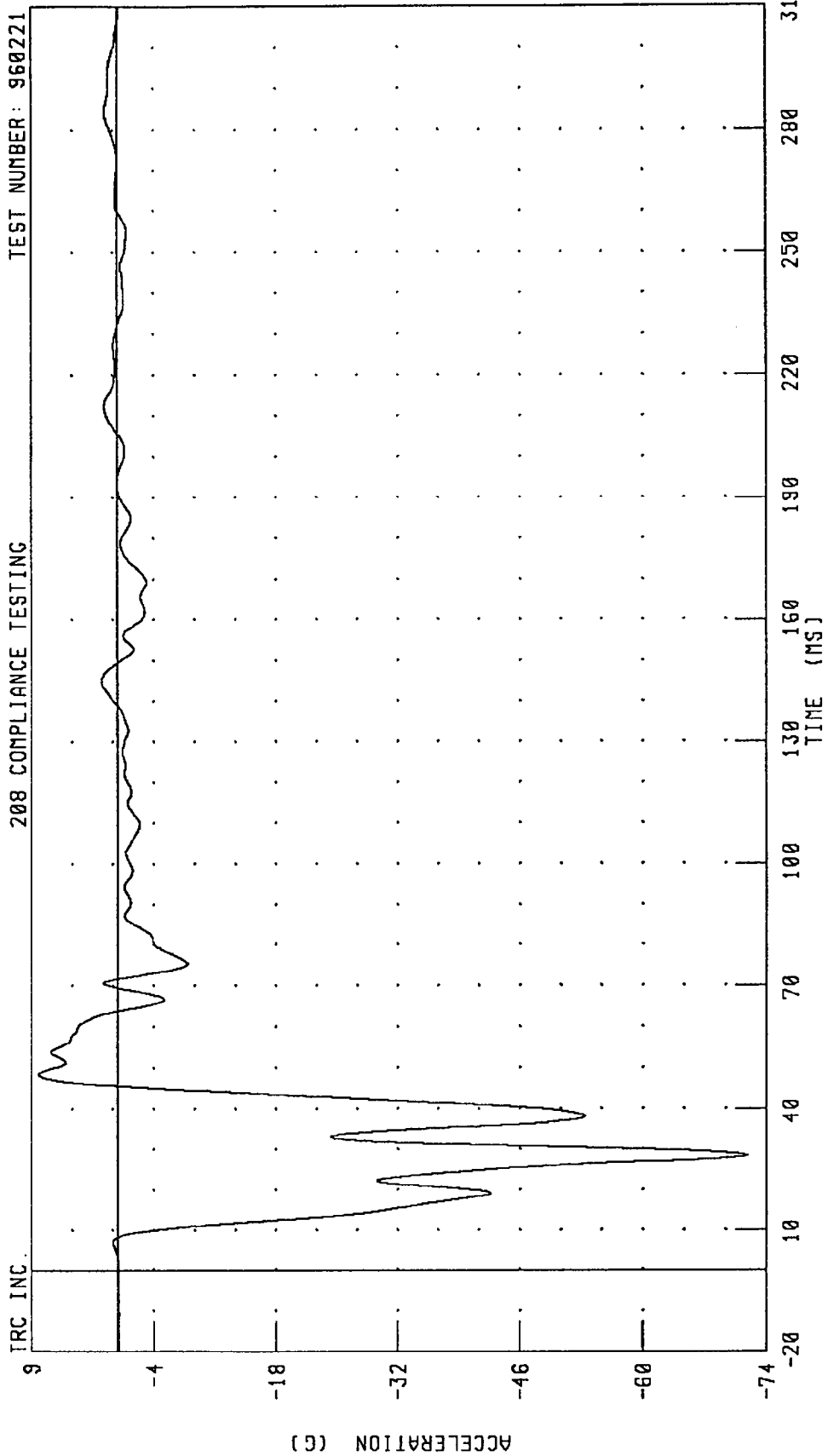


CHANNEL: ENGXG1 FILTER: CH. CLASS 60

PEAK DATA: 8.78 G @ 83.36 MS; -62.01 G @ 34.00 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X-AXIS ACCELERATION
208 COMPLIANCE TESTING

TEST NUMBER: 960221



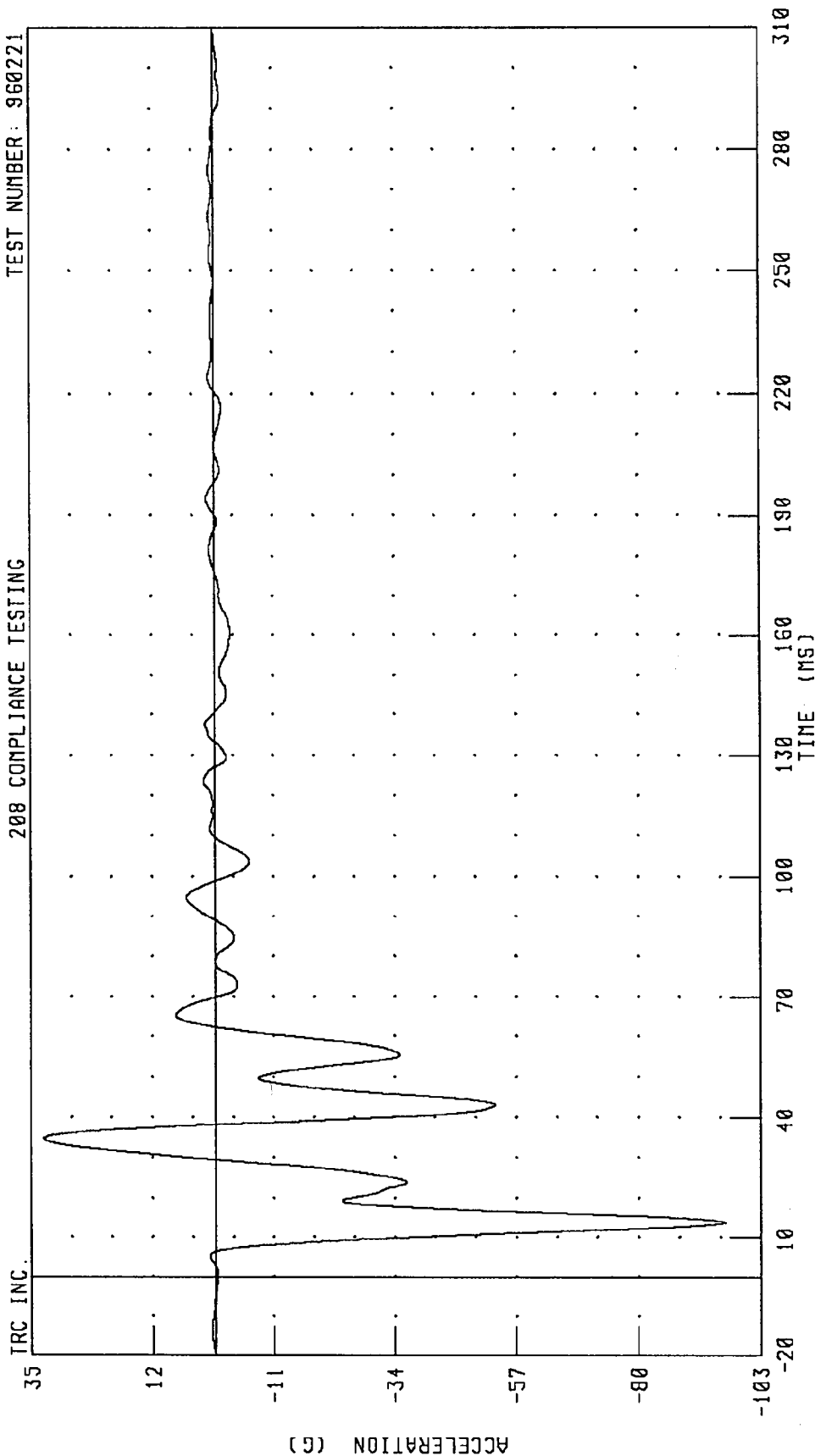
CHANNEL: ENGXC2 FILTER: CH. CLASS 60

PEAK DATA: 9.05 G @ 48.48 MS; -71.89 G @ 28.48 MS

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING



CHANNEL: BCRXG1 FILTER: CH. CLASS 60

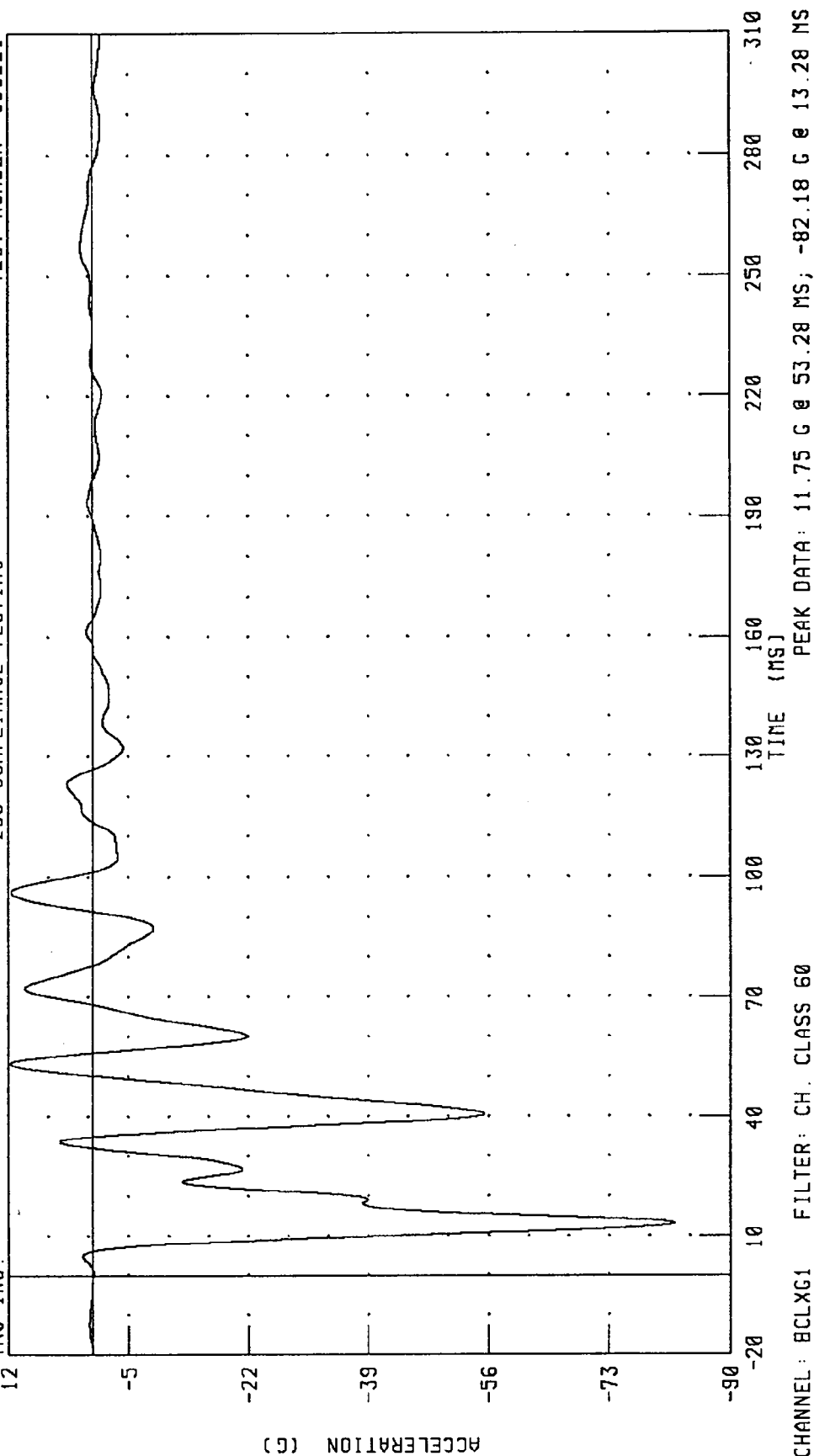
960221

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

208 COMPLIANCE TESTING

TEST NUMBER: 960221

TRC INC.

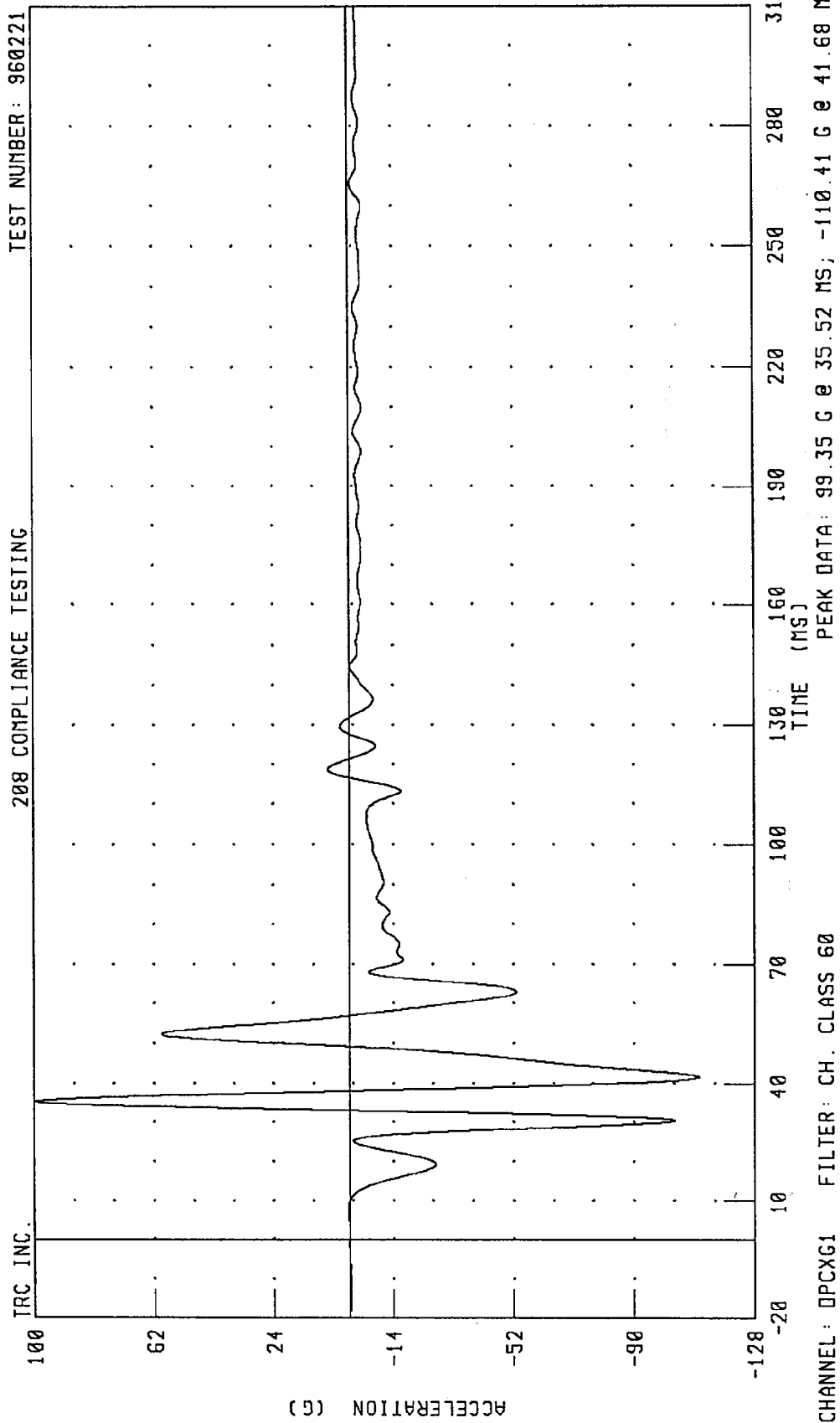


CHANNEL: BCLXG1 FILTER: CH. CLASS 60

1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

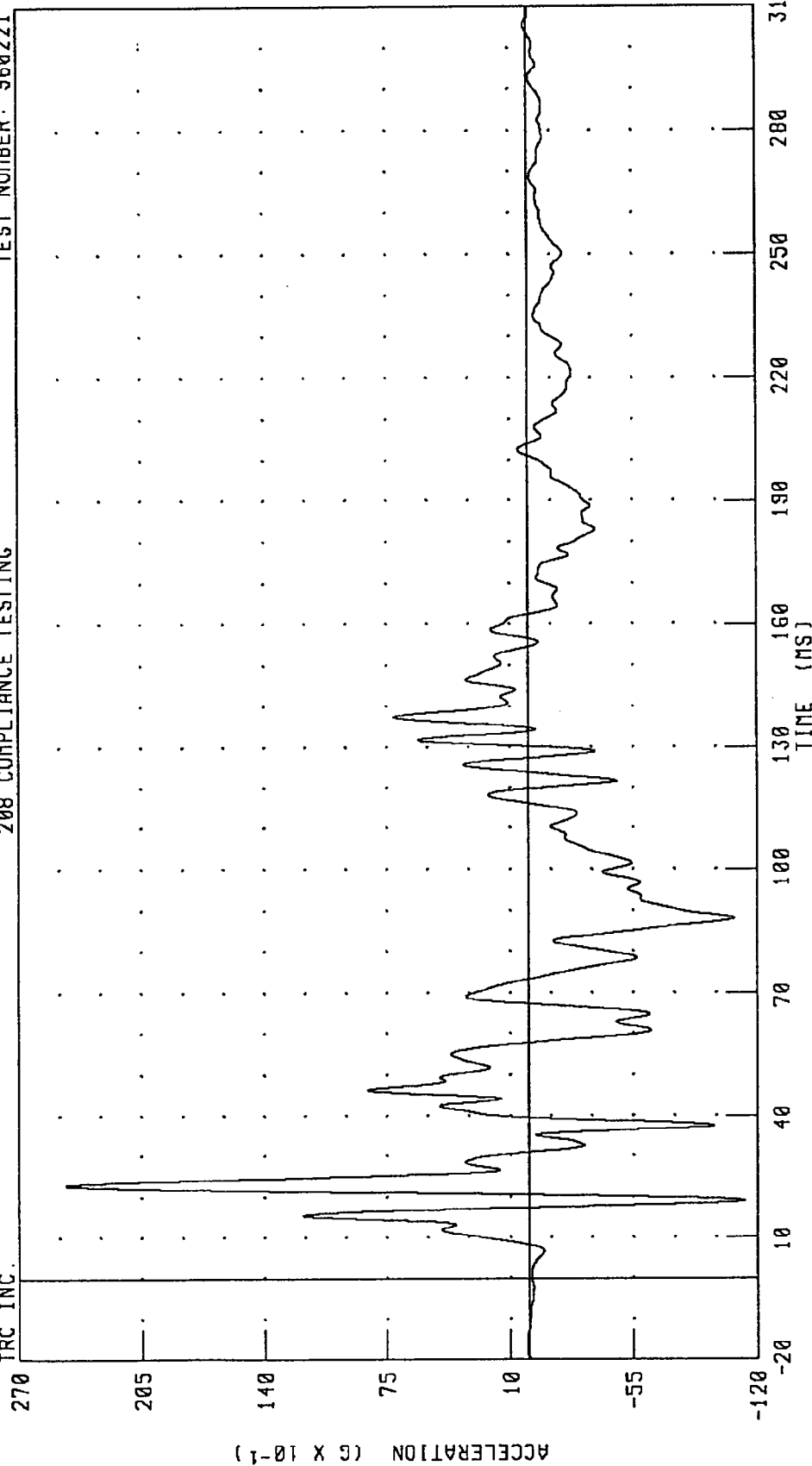


1996 TOYOTA 4 RUNNER INTO FLAT FRONTAL BARRIER
VEHICLE REAR CENTER Z-AXIS ACCELERATION

TEST NUMBER: 960221

208 COMPLIANCE TESTING

TRC INC.



PEAK DATA: 24.53 G @ 22.96 MS; -11.29 G @ 19.04 MS

CHANNEL: TFCZG1 FILTER: CH. CLASS 60

Appendix C

Manufacturer's Vehicle Information

TOYOTA'S RESPONSE TO
NHTSA'S REQUEST ON FMVSS No. 208 FOR
THE 1996 TOYOTA 4RUNNER (All models)
(NEF-31CCa, IR 1663)

- Q. 1. Please inform the OVSC whether the air bag restraint system at the driver's and passenger's seating positions are 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 and passenger's seating position are 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 the 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).

Response 1:

The air bag restraint systems of the 1996 4RUNNER meet the requirements of S4.1.2.1(C) (2) of FMVSS No. 208.

We provide the summary reports of our certification tests with the manual belt unfastened as Attachment I-1 through Attachment I-4.

We submit a technical analysis report provided as Attachment II-1 and II-2 as a substitute for test reports with safety belt fastened.

- Q. 2. If the air bag restraints at the driver's and passenger's seating positions were not installed to meet the requirements of S4.1.2.1, please inform OVSC whether the 3-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.

Response 2:

Not applicable.

- Q. 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.

Response 3:

Not applicable.

We do not use any pressure vessel to inflate the air bag of the 1996 4RUNNER.

- Q. 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 S9.2.

Response 4:

The air bag inflators at the driver's and passenger's seating positions of the 1996 4RUNNER were approved for shipment by the Research and Special Programs Administration of the Department of Transportation. These approvals mean that the air bag inflators of the 1996 4RUNNER meet all the requirements of S9.2.

We provide the approval letters of Research and Programs Administration as Attachment III-1 for the driver's air bag inflator and as Attachment III-2 for passenger's air bag inflator.

Q. 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.

Response 5:

Tension-relieving device is not used in the 1996 4RUNNER.

Q. 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 during certification tests.

Response 6:

All windows and vents were opened during the tests.

Q. 7. FMVSS No. 208, S5.1, 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.

Response 7:

Part 572 (E) test dummies were used in both front seats of the 1996 4RUNNER certification tests. The dummy placement measurement data including our diagrams is provided in the section 10 of Attachment IV.

Also the dummy placement data in the OVSC form is provided as the Attachment V.

A foot rest is provided for the driver.

The 1996 4RUNNER is not equipped with any split bench seat.

- Q. 8. Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form.

Response 8:

We provide above information as Attachment IV.

- Q. 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.

Response 9:

See section 9 of the Attachment IV.

- Q. 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.

Response 10:

We provide the testing injury criteria recorded during each certification test in Attachment I-1 through I-4 in response to your request No. 1.

The required plots for the full frontal barrier impact test are provided as Attachment VI.

- Q. 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?

Response 11:

The recommended parts for vehicle weight adjustment are listed in the Attachment VII.

- Q. 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 required.

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.

Response 12:

The test report is provided as Attachment VIII.

The test procedure for FMVSS 204 is provided as Attachment IX.

The steering control system of the 1996 4RUNNER is detailed in the Attachment X.

Q.13. Inform OVSC if these vehicles have built-in child restraints either as standard equipment. If they do, provide a copy of the certification test reports and any engineering analysis from the basis for certification to FMVSS No. 213, "Child Restraint Systems."

Response 13:

The 1996 4RUNNER is not equipped with built-in child restraint.

Report No.: RRMS-951017

Report Date: Nov. 9, 1995

FMVSS 208 "Occupant Crash Protection"Compliance Testing for the 1996 4RUNNER (summary)

1. Test Date : November 6, 1995
2. Test Location : Toyota Vehicle Safety Laboratory
3. Test Vehicle : 1996 model 4RUNNER 4x4 with 3RZ-FE engine
4. Test Conditions :
 - 4.1 Type of the Test

☒ Frontal ☐ Angular Left ☐ Angular Right
 - 4.2 Use of Manual Belt

Driver : ☐ Yes ☒ No
 Passenger : ☐ Yes ☒ No
 - 4.3 Impact Speed : 30.0mph
 - 4.4 Vehicle Weight : 4495 lbs (2039kgf)
5. Test Result :

		Driver	Passenger
Head Injury Criterion(HIC)		4 4 6	1 6 6
Chest Deceleration(G's)		5 1. 3	4 6. 8
Chest Deflection(inch)		1. 8	0. 8
Femur Load (lbs)	Left	1 2 8 7	1 0 4 9
	Right	1 7 2 5	1 6 1 7

Report No. :RRMS-951016

Report Date:Nov. 10, 1995

FMVSS 208 "Occupant Crash Protection"Compliance Testing for the 1996 4RUNNER (summary)

1. Test Date : November 8, 1995
2. Test Location : Toyota Vehicle Safety Laboratory
3. Test Vehicle : 1996 model 4RUNNER 4x4 with 5VZ-FE engine

4. Test Conditions :

4.1 Type of the Test

☒ Frontal ☐ Angular Left ☐ Angular Right

4.2 Use of Manual Belt

Driver : ☐ Yes ☒ NoPassenger : ☐ Yes ☒ No

4.3 Impact Speed :30.0mph

4.4 Vehicle Weight :4729 lbs (2145kgf)

5. Test Result :

		Driver	Passenger
Head Injury Criterion(HIC)		4 0 4	1 5 6
Chest Deceleration(G's)		5 0. 6	4 9. 6
Chest Deflection(inch)		1. 7	0. 8
Femur Load (lbs)	Left	1 5 3 1	1 0 3 9
	Right	1 9 7 2	1 9 7 4

INFORMATION FOR NHTSA REGARDING THE 1996 4RUNNER
(TEST CONDITIONS FOR CRASH TEST)

The following are design-related matters necessary for conducting the barrier crash test.

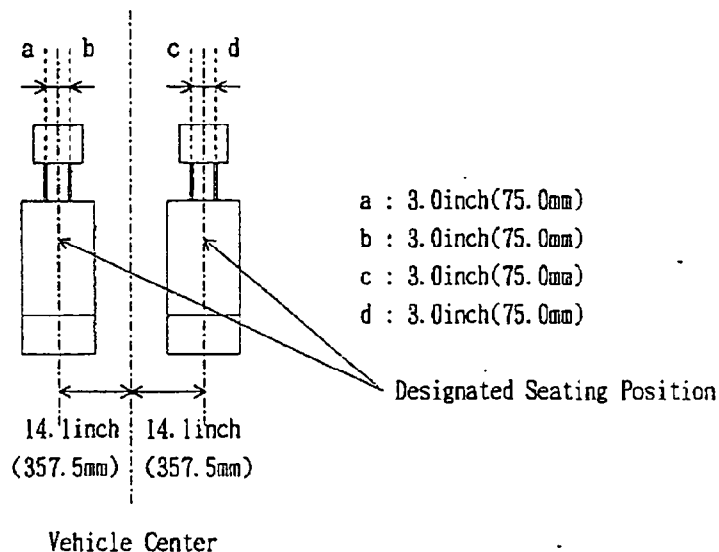
1. Useable Fuel Tank Volume : 18.5gallons
 92% of useable volume : 17.0gallons
 94% of useable volume : 17.4gallons
 Stoddard solvent amount : 17.6gallons
 Condition for fuel pump operation: Electric fuel pump operates only during engine is running

2. Vehicle Capacity Weight

Rated Cargo & Luggage Weight : 300 lbs
 Designated Seating Capacity : 2

3. Tire Inflation Pressure : P225/75R15 (Fr: 29psi, Rr: 29psi)
 P265/70R16 (Fr: 32psi, Rr: 32psi)

4. Outboard Designated Seating Position :

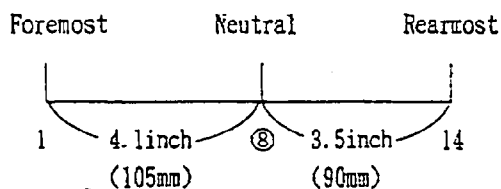


5. Designated Seat Slide Position :

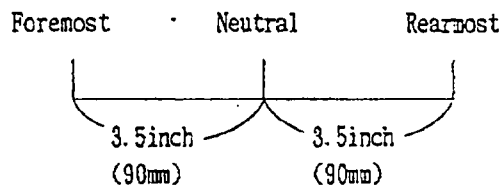
Driver's & Passenger's Seat

(Manual Seat)

Move the seat rearward from the foremost latched position to the eighth latched position.



(Power Seat)

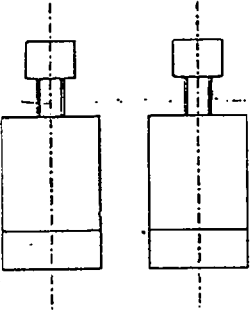
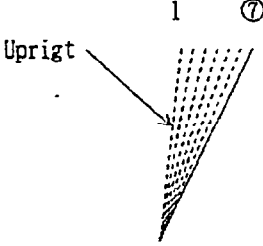
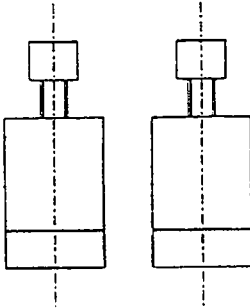
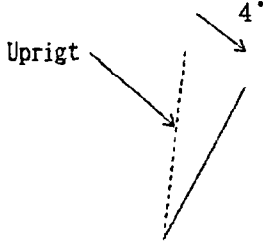


SUPPLEMENTARY EXPLANATION FOR FRONT SEAT ADJUSTMENT

The relationship of the location between the outer seat track upper rail and lower rail at the designated seat slid position.

Seat Type	Driver's & Passenger's Position
Manual Seat Diagram showing the Manual Seat track with dimensions: 0.6 inch (15mm) for the lower rail and 1.0 inch (25mm) for the upper rail.	Diagram showing the Manual Seat occupant position with dimensions: 0.6 inch (15mm) for the lower rail and 1.0 inch (25mm) for the upper rail.
Power Seat Diagram showing the Power Seat track with dimensions: 2.0 inch (50mm) for the lower rail and 0.4 inch (10mm) for the upper rail.	Diagram showing the Power Seat occupant position with dimensions: 2.0 inch (50mm) for the lower rail and 0.4 inch (10mm) for the upper rail.

6. Designated Seat Back Position :

Seat Type	Driver's & Passenger's Seat
Manual Seat 	Recline the seat back six notches rearward from the foremost latched position. 1 ⑦ Upright 
Power Seat 	Recline the seat back 4° rearward from the foremost position. Upright 4° 

7. Other seat adjustment :

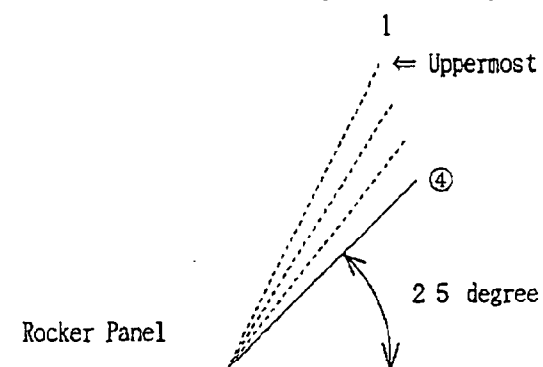
Lumbar support : Rearmost

Vertical adjuster : Lowermost

8. Steering column angle :

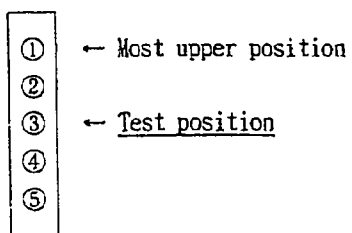
Tilt the steering column three notches downward from the uppermost latched position.

(Designated steering column angle is 25.0° upward from the rocker panel.)



9. Shoulder Belt Anchor Position :

Lock on the second position from the most upper position.



7. Other seat adjustment :

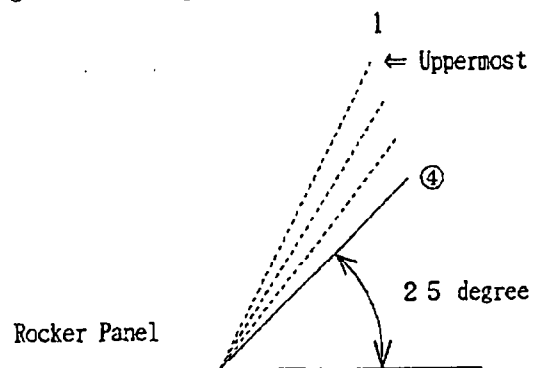
Lumbar support : Rearmost

Vertical adjuster : Lowermost

8. Steering column angle :

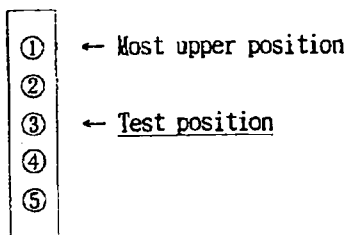
Tilt the steering column three notches downward from the uppermost latched position.

(Designated steering column angle is 25.0° upward from the rocker panel.)



9. Shoulder Belt Anchor Position :

Lock on the second position from the most upper position.

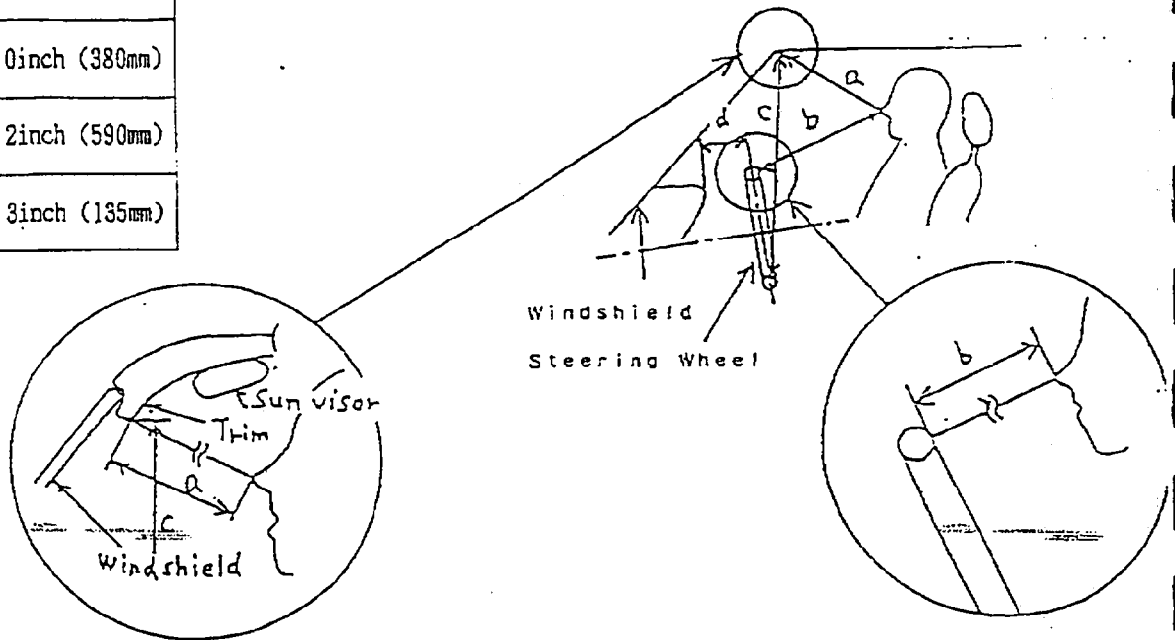


10. Dummy Clearance Dimensions :

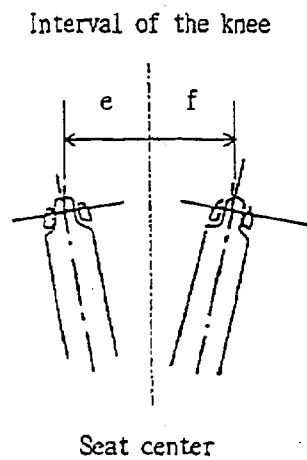
If the dummy are properly positioned on the seat, the dimensions are shown as follows :

Driver :

a	15.2inch (385mm)
b	15.0inch (380mm)
c	23.2inch (590mm)
d	5.3inch (135mm)

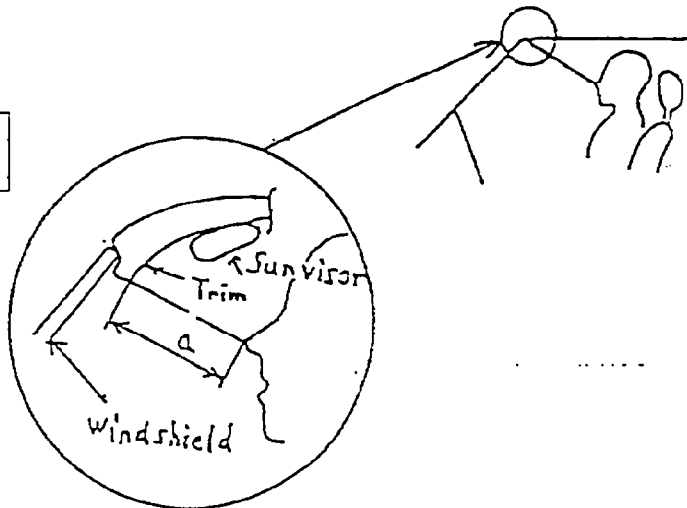


e	6.3inch (160mm)
f	4.9inch (125mm)



Passenger :

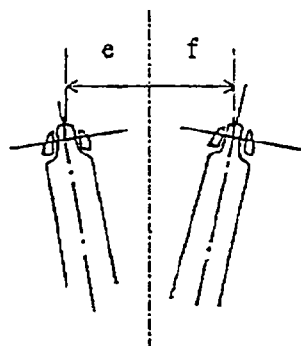
a 15.2inch (385mm)



Interval of the knee

e : 3.9inch (100mm)

f : 3.9inch (100mm)

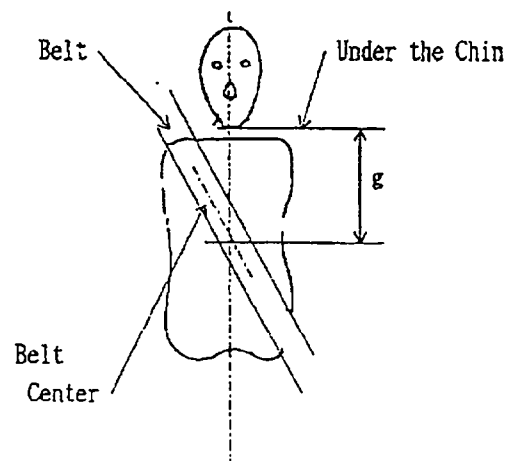


Seat center

11. Belt Position :

Belt Position

g : 6.3inch (160mm)



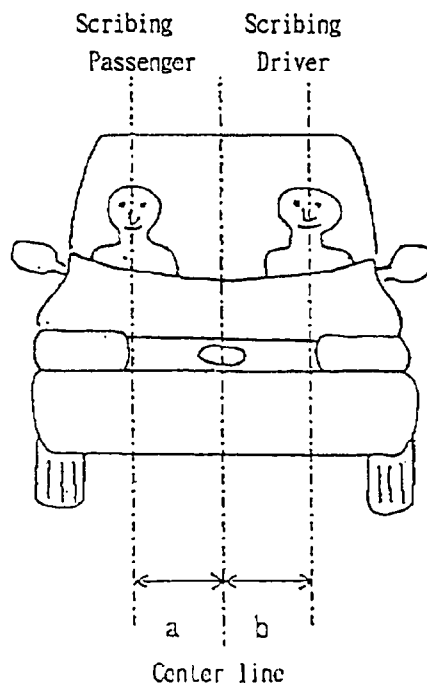
12. Reconfirmation of the Test Procedure :

We would like to reconfirm the FMVSS208 test procedure, in particular concerning the following 9 items, in order to avoid test proceduer trouble that may affect the test result.

(1). Dummy center positions :

We would like you to adjust the dummy center position in the following mannar.

- ① Scribe a line for the dummy center position 14.1 inches apart from the vehicle center line in side and passenger side is 14.1 inches as illustrated below.
- ② The lines are to be scribed on windshield, seat cushion, seat back, roof and rear window.
- ③ Place each dummy so that its center line is adjusted to the line described in ②.



a	b
14.1inch	14.1inch

Figure 1. Outline of the scribing position

(2). Dummy H-point :

Please adjust the H-point of dummy as close as possible to the point where was obtained by using a three dimensional dummy. If differs, please record the gap between the position of the three dimensional dummy and that of the pre-test position.

(3). Hands :

The palms of the driver test dummy shall be contact with the outer part of the steering wheel rim. The thumbs shall be over the steering wheel rim and shall be lightly taped to the steering rim so that if the hand of the test dummy is pushed upward by a force of not less than 2 pounds and not more than 5 pounds, the tape shall release the hand from the steering wheel rim. The tape shall be 0.5 inch width and the thumb taping shall be one round.

(4). Limb joint :

The dummy limb joints shall be set at 1G, barely restraining the weight of the limb when it is extended horizontally. The force required to move a limb segment shall not exceed 2G throughout the range of limb motion.

(5). Abdomen assy :

A extremely worn abdomen assembly which seemed to fail with the calibration requirement was used in a compliance test. If any abnormal condition can be seen on dummy, please assure that the abdomen complies with the calibration requirements.

(6). Ribs :

Please assure that the ribs of the dummies are not deformed. If any deformation can be seen on ribs, please exchange it to the undeformed one.

(7). Leg positioning :

Please set the legs in the following mannar.

- (1) Put the driver's feet on the accelerator pedal and foot rest.
- (2) After the feet are positioned, adjust the knee position so that the legs stand perpendicularly.

(8). Shoulder belt :

(9). Steering column target :

In some NHTSA's vehicle impact tests, the steering column target was fixed onto the steering column cover by using a steel plate as a bracket. The steel plate fixed onto the steering column cover may contact with the speedometer and the contact between steel plate and speedometer has a possibility of preventing the normal steering column stroke.

Therefore, we would like to propose the following countermeasures:

- ① Using any breakable material like plastic as the substitution for steel .
- ② Having enough distance (at least not less than 40mm) between the front end of bracket target and the rear end of speedometer.

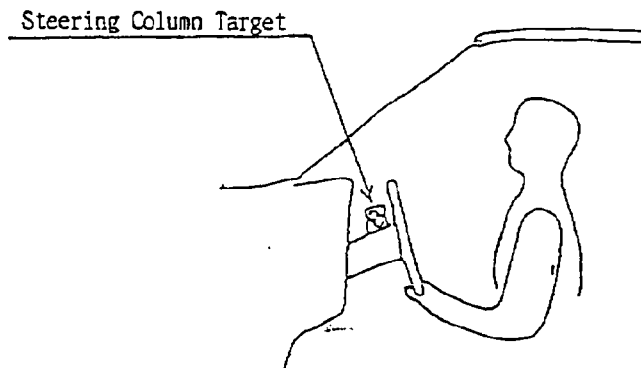
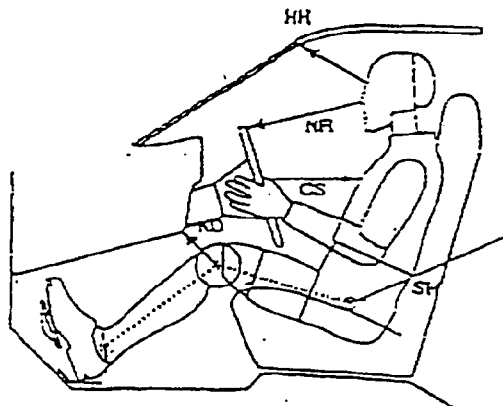


Figure : Steering column target

OCCUPANT CLEARANCE DIMENSION

	DRIVER	PASSENGER
HH	14.6inch	14.6inch
NR	15.0inch	—
CS	7.5inch	—
KDL	9.1inch	7.5inch
KDR	9.1inch	7.5inch
SH	13.4inch	13.4inch



HU - Head to Header

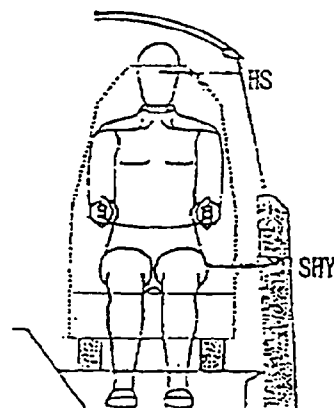
NR - Nose to Rim

CS - Steering Wheel Lower to Chest

KDL/KDR - Knee to Dash

SH - Striker to H-Point

	DRIVER	PASSENGER
SHY	4.3inch	4.3inch
HS	9.9inch	9.9inch



SHY - Striker to H-Point(Y-Dir.)

HS - Head to Side Window