V1211

REPORT NOS. 208-TRC-91-005
212-TRC-91-005
301-TRC-91-005

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

TOYOTA MOTOR CORP.
1991 TOYOTA MR2
2-DOOR COUPE
NHTSA NO. CM5102
TRC TEST NO. 910115

THE TRANSPORTATION RESEARCH CENTER OF OHIO
10820 STATE ROUTE 347
EAST LIBERTY, OHIO 43319

JANUARY 31, 1991
FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE (NEF-31)
400 SEVENTH STREET, S.W., ROOM NO. 6111
WASHINGTON, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-90-C-21003. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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Date 2-4-91

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

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
208-TRC-91-005 212-TRC-91-005 301-TRC-91-005		

4. Title and Subtitle	5. Report Date
FINAL REPORT OF FMVSS NOS. 208, 212, 219 (PARTIAL), AND 301 COMPLIANCE TESTING OF A 1991 TOYOTA MR2 2-DOOR COUPE, NHTSA NO. CM5102	JANUARY 31, 1991
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
J.W. Sankey, Supervisor, Laboratory Engineering, TRC	208-TRC-91-005 212-TRC-91-005 301-TRC-91-005
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Transportation Research Center of Ohio 10820 State Route 347 East Liberty, Ohio 43319	11. Contract or Grant No. DTNH22-90-C-21003
	13. Type of Report and Period Covered FINAL REPORT JANUARY 1991
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	14. Sponsoring Agency Code NEF-30

15. Supplementary Notes

16. Abstract

A 30 mph flat frontal barrier impact test was conducted on a 1991 Toyota MR2 2-door coupe, NHTSA No. CM5102, at the Transportation Research Center of Ohio on January 15, 1991. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards: FMVSS No. 208, "Occupant Crash Protection"; FMVSS No. 212, "Windshield Mounting"; FMVSS No. 219 (partial), "Windshield Zone Intrusion"; FMVSS 301, "Fuel System Integrity." The barrier impact velocity was 29.3 mph. The vehicle's maximum crush was 19.2 inches. The ambient temperature was 75° F.

The driver's head injury criteria (HIC) was 433. The driver's maximum chest deceleration over three (3) milliseconds was 62.5 g. The driver's maximum left and right femur forces were 1622 pounds and 1677 pounds, respectively.

The passenger's head injury criteria (HIC) was 305. The passenger's maximum chest deceleration over three (3) milliseconds was 42.4 g. The passenger's maximum left and right femur forces were 235 pounds and 390 pounds, respectively.

The vehicle appears to comply with the applicable requirements of FMVSS 212, 219 (partial), and 301. The vehicle's data indicated an apparent noncompliance with the requirements of FMVSS 208.

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

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	101	

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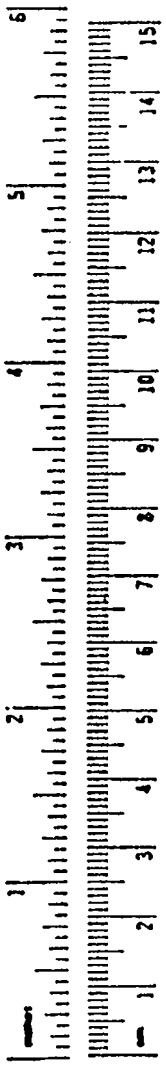
METRIC CONVERSION FACTORS

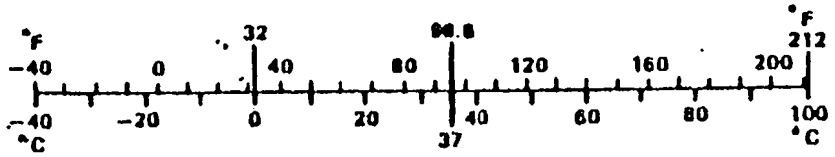
Approximate Conversions to Metric Measures

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	metric ton	t
	VOLUME			
tsp	teaspoons	5	milliliters	mL
Tbsp	tablespoons	15	milliliters	mL
in^3	cubic inches	16	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	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C



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	metric ton (1000 kg)	1.1	short tons	
	VOLUME			
mL	milliliters	0.03	fluid ounces	fl oz
mL	milliliters	0.06	cubic inches	in^3
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	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit	°F



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SECTION 1.0

PURPOSE & TEST PROCEDURE

PURPOSE

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center of Ohio (TRC) under Contract No. DTNH22-90-C-21003. The purpose of this test was to determine if the subject vehicle, a 1991 Toyota MR2 2-door coupe, NHTSA No. CM5102, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," in the flat frontal barrier impact mode.

TEST PROCEDURE

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-08. Data was obtained relative to FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

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

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

The twenty-three (23) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per second and processed per sections 12.8 and 12.9 of the Laboratory Test Procedure.

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

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

SECTION 2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at TRC on January 15, 1991.

The test vehicle, a 1991 Toyota MR2 2-door coupe, NHTSA No. CM5102, appeared to comply with the performance requirements of FMVSS test Nos. 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The vehicle's data indicated an apparent noncompliance with the FMVSS test No. 208 requirements. For the Part 572 B dummy seated in the left front outboard designated seating position, the Head Injury Criteria (HIC) calculation was less than 1000 and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured. The chest resultant acceleration exceeded 60 g's. For the Part 572 B dummy seated in the right front outboard designated seating position, the Head Injury Criteria (HIC) calculation was less than 1000, the chest resultant acceleration did not exceed 60 g's and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured. 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. Due to the apparent noncompliance, the static rollover test was not conducted.

The test vehicle was equipped with a 2.2 liter, transverse engine, manual transmission, power steering, and power brakes. The vehicle's test weight was 3124 pounds. The vehicle's impact speed was 29.3 mph. The vehicle's maximum crush was 19.2 inches.

The driver's head injury criteria (HIC) was 433. The driver's maximum chest resultant acceleration over three (3) milliseconds was 62.5 g. The driver's maximum left and right femur forces were 1622 pounds and 1677 pounds, respectively.

The right front passenger's HIC was 305. The right front passenger's maximum chest resultant acceleration over three (3) milliseconds was 42.4 g. The right front passenger's maximum left and right femur forces were 235 pounds and 390 pounds, respectively.

There was no loss of windshield periphery retention.

There was no intrusion through the windshield.

There was no fluid spillage from the vehicle's fuel system following the crash test event.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CM5102 TEST TYPE: Frontal Barrier Impact

TEST DATE: 01/15/91 TEST TIME: 1337 AMBIENT TEMP. (°F): 75

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991 Toyota MR2 2-door coupe

VEHICLE TEST WEIGHT (LBS): 3124

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 19.2

AVERAGE REBOUND (IN): 33.1

DUMMIES:	Driver #353	Passenger #354
TYPE:	Part 572 B	Part 572 B
LOCATION:	Left front	Right front
RESTRAINT:	Airbag	3-point unibelt

NUMBER OF DATA CHANNELS: 23

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

*With respect to tow track centerline.
**Speed trap measurement (± .05 mph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Toyota Motor Corp.

MAKE/MODEL: Toyota MR2 VIN: JT2SW21N7M0007717

BODY STYLE: 2-door coupe MODEL YEAR: 1991

NHTSA NO.: CM5102 COLOR: Red

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 2.2 liter

TRANSMISSION DATA: _5_SPEED, _X_MANUAL, ___AUTOMATIC, ___FWD, _X_RWD, ___4WD

DATE VEHICLE RECEIVED: 11/30/90 ODOMETER READING: 266.0

DEALER'S NAME AND ADDRESS: Germain Toyota of Columbus, Inc.
5777 Scarborough Blvd.
Columbus, OH 43232

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	No
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	Yes
POWER SEATS	No	TILTING STEERING WHEEL	Yes
POWER WINDOWS	Yes	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	Yes
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes

OTHER Power door locks Rear spoiler
Power mirrors Cassette w/7 speakers
Aluminum alloy wheels Floor mats
Wheel locks

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE ALTERED BY: Toyota Motor Corp.

DATE OF MANUFACTURE: 08-90 VIN: JT2SW21N7M0007717

GVWR: 3370 LBS

GAWR: FRONT: 1480 LBS., REAR: 1950 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): FRONT: Bridgestone 195/60R14
REAR: Potenza RE21 205/60R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 36 PSI
REAR: 36 PSI

SPARE TIRE (MFR., LINE, SIZE): Bridgestone Tracompa 3 T135/70D15

TYPE OF SEATS: FRONT: Bucket
REAR: NA

TYPE OF FRONT SEAT BACKS: Manual adjustable

MAXIMUM WIDTH: 67.0 INCHES

WHEELBASE: 94.8 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA: THE LABEL WAS LOCATED ON THE INSIDE OF THE GLOVE BOX.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: FRONT: 195/60R14
REAR: 205/60R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 29 PSI; REAR: 33 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 0 REAR 2 TOTAL

VEHICLE CAPACITY WEIGHT: 400 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE:	LF	25.4;	RF	25.3;	LR	25.8;	RR	25.8
FULLY LOADED ATTITUDE:	LF	25.2;	RF	25.1;	LR	25.3;	RR	25.2
PRE-TEST ATTITUDE:	LF	25.0;	RF	25.0;	LR	25.0;	RR	25.0
POST-TEST ATTITUDE:	LF	25.8;	RF	26.4;	LR	24.7;	RR	24.8

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	592 LBS.	RIGHT REAR	766 LBS.
LEFT FRONT	570 LBS.	LEFT REAR	778 LBS.
TOTAL FRONT WEIGHT	1162 LBS.	(42.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1544 LBS.	(57.1% OF TOTAL VEHICLE WEIGHT)	

TOTAL DELIVERED WEIGHT 2706 LBS.

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2706 LBS)

VCW = VEHICLE CAPACITY WEIGHT (400 LBS)

DSC = DESIGNATED SEATING CAPACITY (2)

RCLW*= VCW - 150 (DSC) = 400 - 150 (2) = 100

TARGET TEST WEIGHT = UDW + RCLW*+ (NO. OF HYBRID II DUMMIES X 164 LBS/DUMMY)

TARGET TEST WEIGHT = 2706 + 100 + 328

TARGET TEST WEIGHT = 3134 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 90 LBS. OF CARGO WEIGHT:

RIGHT FRONT	644 LBS.	RIGHT REAR	911 LBS.
LEFT FRONT	644 LBS.	LEFT REAR	925 LBS.
TOTAL FRONT WEIGHT	1288 LBS.	(41.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1836 LBS.	(58.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3124 LBS.	(0.3% UNDER TARGET TEST WEIGHT)	

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

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 55.7 INCHES REARWARD OF FRONT WHEEL CENTERLINE

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

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 910115 NHTSA NO.: CM5102

TEST DATE: 01/15/91 TEST TIME: 1337

TEST TYPE: Frontal Barrier Impact IMPACT ANGLE: 0

AMBIENT TEMPERATURE AT IMPACT AREA: 75° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 72° 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 = 26.0 IN.

EXITING VELOCITY TRAP = 2.0 IN.

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

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 161.2; C 164.0; R 161.1

POST-TEST: L 144.2; C 145.8; R 144.1

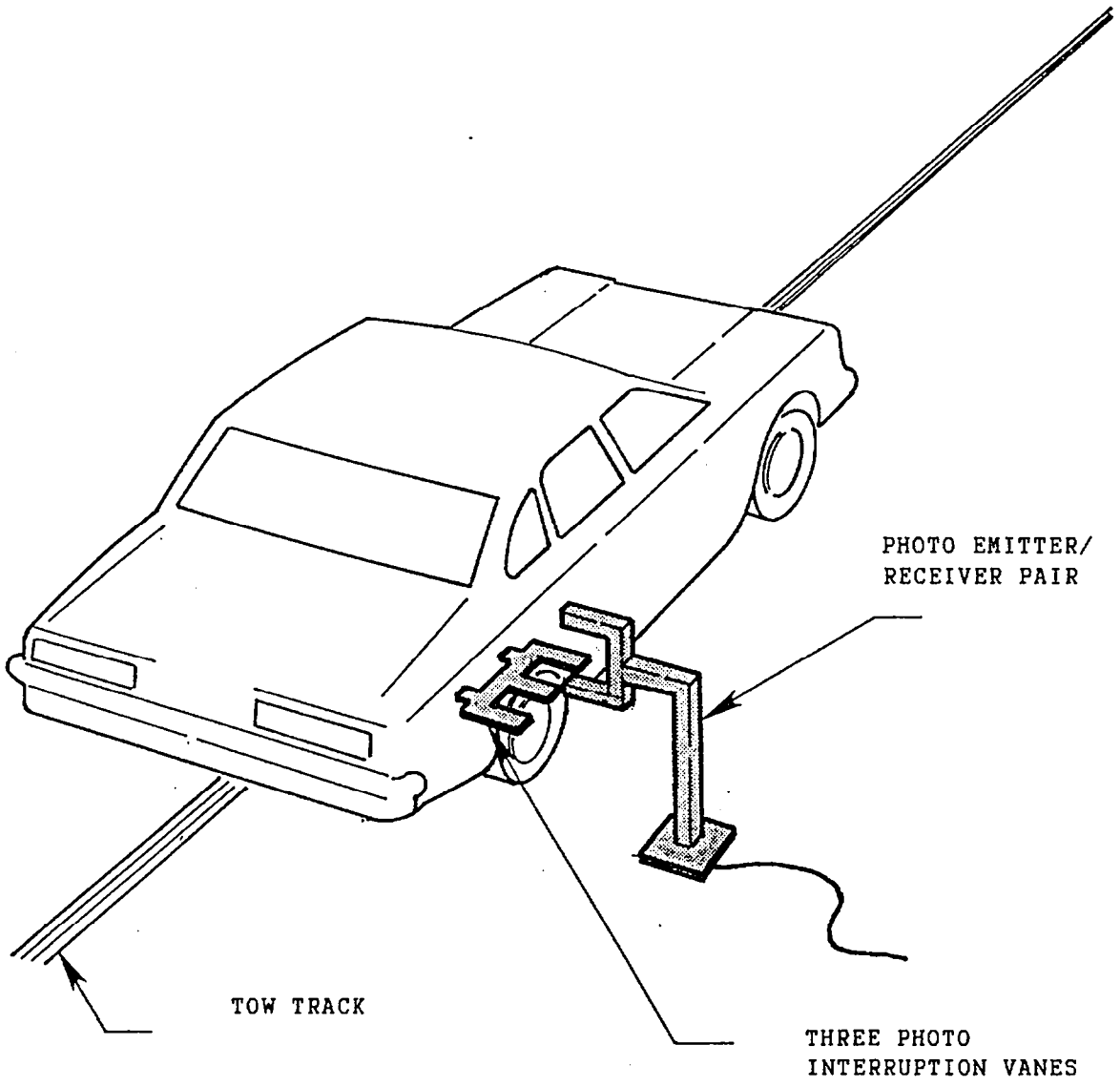
TOTAL CRUSH: L 17.0; C 18.2; R 17.0

AVERAGE CRUSH: 17.4

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 34.1; C 32.5; R 32.6; AVG. 33.1

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

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

VEHICLE MAKE/MODEL/BODY STYLE: Toyota/MR2/2-door coupe

VEHICLE NHTSA NO.: CM5102 ; VIN: JT2SW21N7M0007717

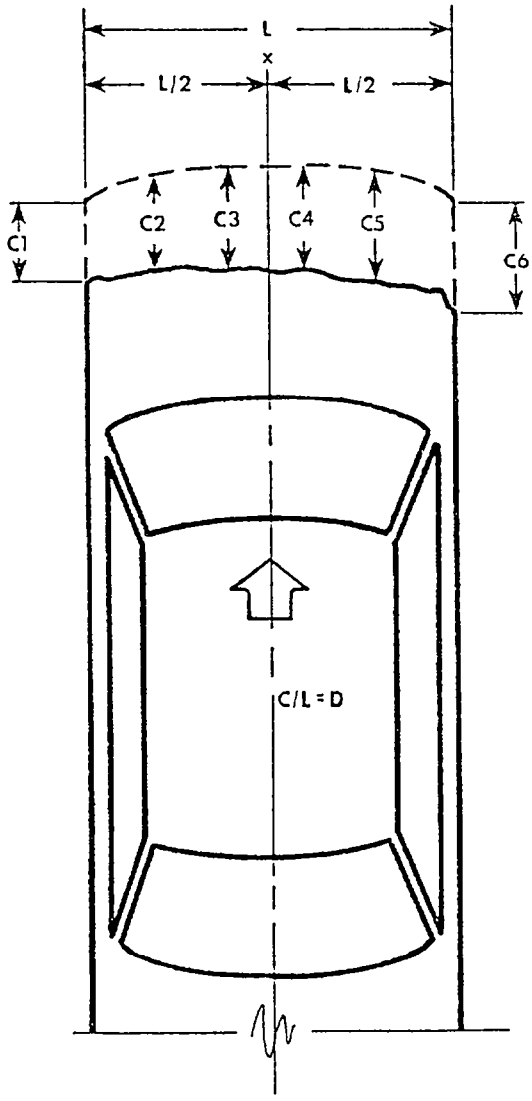
MODEL YEAR: 1991 ; BUILD DATE: 08/90 ; TEST DATE: 01/15/91

VEHICLE SIZE CATEGORY: Two seater ; TEST WEIGHT: 3124 LBS.

VEHICLE WHEELBASE: 94.8 INCHES

MAXIMUM WIDTH: 67.0 INCHES

FRONT OVERHANG: 33.6 INCHES



COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH MEASUREMENTS:

C1 = 17.0 INCHES

C2 = 18.2 INCHES

C3 = 18.2 INCHES

C4 = 19.2 INCHES

C5 = 18.2 INCHES

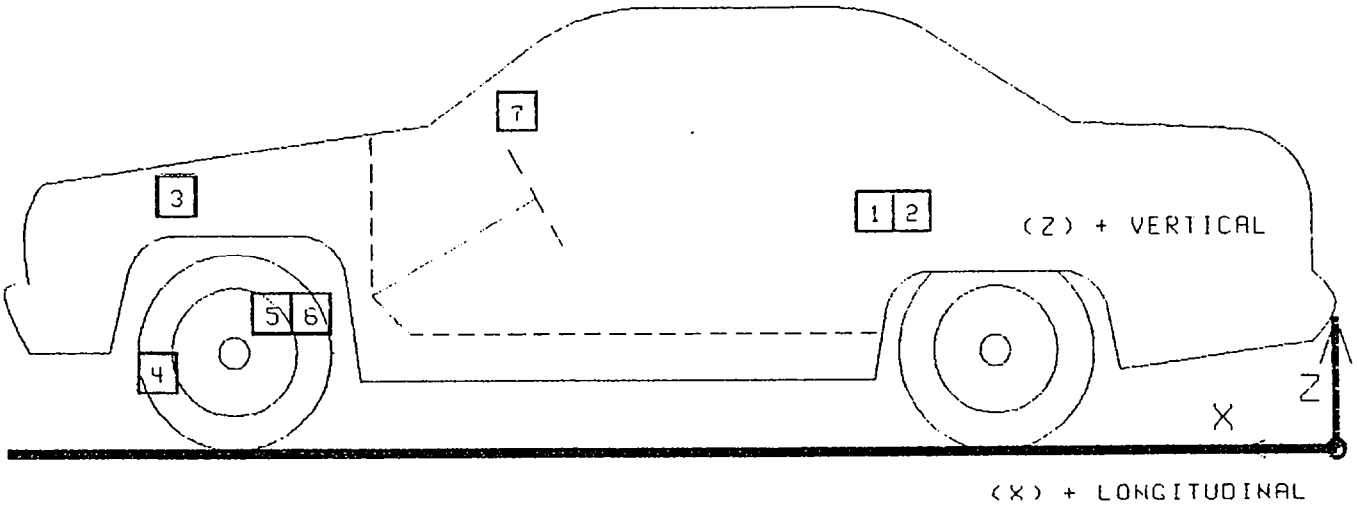
C6 = 17.0 INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE (LONGITUDINAL)

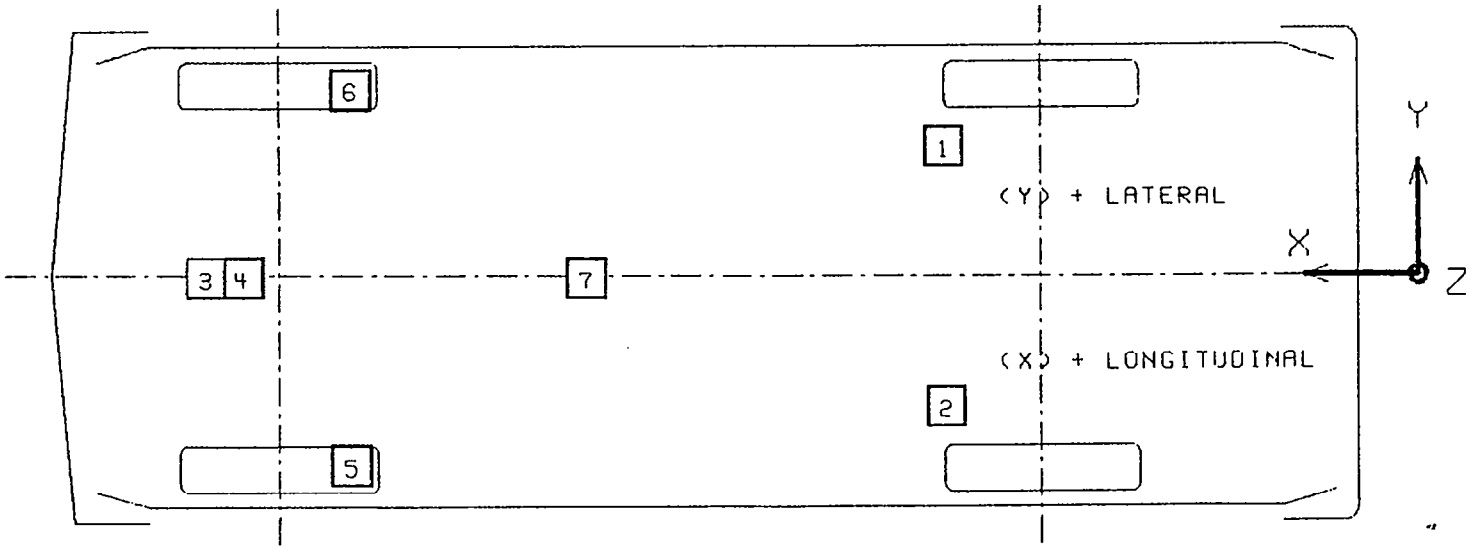
LENGTH OF DAMAGED REGION: L = 46.5 INCHES

FIGURE 3

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910115

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER	PRE	57.8	19.2	14.5				
		POST	57.8	19.2	13.5				
	LONGITUDINAL					1.7	144.0	27.8	29.1
2	RIGHT REAR SEAT CROSSMEMBER	PRE	57.8	-19.8	14.6				
		POST	57.8	-19.8	13.6				
	LONGITUDINAL					0.7	212.8	26.4	33.3
3	ENGINE TOP	PRE	39.4	0.5	30.5				
		POST	39.5	0.5	29.2				
	LONGITUDINAL					6.4	142.4	29.7	27.9
4	ENGINE BOTTOM	PRE	44.5	-10.0	5.8				
		POST	44.5	-10.0	6.0				
	LONGITUDINAL					3.0	112.3	32.5	35.1
5	RIGHT BRAKE CALIPER	PRE	126.8	-25.4	11.3				
		POST	124.8	-25.2	10.0				
	LONGITUDINAL					22.6	68.6	46.7	45.4
6	LEFT BRAKE CALIPER	PRE	126.8	25.4	11.3				
		POST	125.0	25.4	10.4				
	LONGITUDINAL					25.6	75.4	40.3	43.8
7	INSTRUMENT PANEL CENTER	PRE	109.8	1.2	33.8				
		POST	109.9	1.2	30.5				
	LONGITUDINAL					18.3	70.6	71.0	74.9

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

REPORT OF VEHICLE CONDITION AT THE
COMPLETION OF TESTING

CONTRACT NO.: DTNH22-90-C-21003
FROM: The Transporation Research Center of Ohio
10820 State Route 347
East Liberty, OH 43319

TO: Mr. Glen Brammeier
COTR
Office of Vehicle Safety Compliance

The following vehicle has been subjected to testing for FMVSS 208. The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager/NAD-30, with a carbon copy to the responsible testing office. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

NHTSA NO.: CM5102
MAKE/MODEL/BODY STYLE: Toyota/MR2/2-door coupe
MODEL YEAR: 1991 BODY COLOR: Red
VIN: JT2SW21N7M0007717
ODOMETER (ARRIVAL): 266 DATE: 11/30/90
ODOMETER (COMPLETION): 273 DATE: 01/15/91
COST: $17,800.00

X AIR CONDITIONER	___ CONSOLE	BRAKES: X POWER
X TINTED GLASS	___ TACHOMETER	FRONT: Disc
X POWER STEERING	X SPEED CONTROL	REAR: Disc
X POWER WINDOWS	___ REAR WINDOW DEF.	
X POWER DOOR LOCKS	___ SUN/MOON ROOF	FRONT SEATS: ___ POWER
X RADIO W/CASSETTE	X T-TOP	SEAT TYPE: Bucket
X CLOCK	X TILT STEERING WHEEL	NO. OF SEATS: 2
___ ROOF RACK	___ OTHER OPTIONS: Power mirrors, aluminum alloy wheels, floor mats rear spoiler, wheel locks	

ENGINE: 4 CYLINDERS; 2.2 LITERS
TRANSMISSION: 5-speed manual; DRIVE TYPE: Rear
TIRE SIZE: FRONT: 195/60R14; REAR: 205/60R14
GASOLINE TYPE: Unleaded

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

EXPLANATION: NA

VEHICLE CONDITION: Vehicle was subjected to a 30 mph frontal impact test.

SECTION 3.0

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

TABLE 5 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION (G)

	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DRIVER	-108.6	45.9	-80.2	133.5	-68.6	3.7	-16.8	62.5
PASSENGER	-23.5	-20.0	-41.6	44.2	-42.4	-11.3	-11.4	42.4

MAXIMUM FEMUR COMPRESSIVE FORCE (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	1622	1677
PASSENGER	235	390

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC)	TIME t_2 (MSEC)
DRIVER	433	66.8	70.8
PASSENGER	305	64.9	100.9

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #353	PASSENGER #354
HEAD	Sunvisor & airbag	Chest, side door
CHEST	Airbag	None
ABDOMEN	None	None
LEFT KNEE	Instrument panel	Instrument panel
RIGHT KNEE	Instrument panel	Instrument panel

DOOR OPENING:

	LEFT	RIGHT
FRONT	Easy	Easy
REAR	NA	NA

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	None
REAR	NA	NA

GLAZING DAMAGE:

The entire windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

DUMMY KINEMATIC SUMMARY

Driver Dummy

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

Right Front Passenger Dummy

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

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

MAKE/MODEL: Toyota MR2 VIN: JT2SW21N7M0007717

BODY STYLE: 2-door coupe NHTSA NO.: CM5102

DATE OF MANUFACTURE: 08/90

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION SEAT BELTS HAVE WEBBING TENSION - RELIEVING DEVICES? No

BELT CONTACT FORCE:

BELT CONTACT FORCE ON CHEST OF TEST DUMMY: .2 POUNDS

LATCHPLATE ACCESS:

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

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

RETRACTION:

SEAT BELT AUTOMATICALLY RETRACTS WHEN

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

X The seat belt latchplate is released.

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

ACCESSIBILITY:

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

IS THE SEAT REMOVABLE? No

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

TABLE 7 FMVSS 208 COMFORT AND CONVEN. DATA FOR MANUAL SEAT BELTS, CONT'D

MAKE/MODEL: Toyota MR2 VIN: JT2SW21N7M0007717

BODY STYLE: 2-door coupe NHTSA NO.: CM5102

DATE OF MANUFACTURE: 08/90

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

IF WEBBING IS DESIGNED TO PASS THROUGH THE SEAT CUSHION OR BETWEEN THE CUSHION AND SEAT BACK ARE ONE OF THE FOLLOWING PARTS NORMALLY ON TOP OF OR ABOVE THE SEAT CUSHION: LATCHPLATE, BUCKLE, WEBBING? NA, Webbing is not designed to pass through the seat cushion or between the cushion and seat back.

ARE THE REMAINING TWO PARTS ACCESSIBLE UNDER NORMAL CONDITIONS: NA Webbing is not designed to pass through the seat cushion or between the cushion and seat back.

DO THE LATCHPLATE AND BUCKLE PASS THROUGH THE GUIDES PROVIDED AND FALL BEHIND THE SEAT WHEN THE BELT IS COMPLETELY RETRACTED (OR DETACHED IF NOT RETRACTABLE); THE SEAT IS MOVED TO ANY POSITION; AND THE SEAT BACK, IF FOLDABLE, IS FOLDED FORWARD AS FAR AS POSSIBLE AND THEN MOVED BACKWARD INTO POSITION? No

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

TABLE 8 FMVSS 208 SEAT BELT WARNING SYSTEM DATA

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

Duration of audible warning signal = 6 sec.

Duration of reminder light operation = 6 sec.

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

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 6 sec.

WORDING OF VISUAL WARNING:

Fasten Seat Belt _____

Fasten Belt _____

Symbol 101-80 X

TABLE 9 FMVSS 208 LABELING AND DRIVER'S MANUAL DATA

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

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

_X_ maintain, replace _____ or repair _____ this system: (check one)

a. by _____ month, _____ year

b. by _____ miles

c. or after a time interval of _____ months or _10_ years after date of manufacture and every 2 years thereafter.

WERE APPROPRIATE INSTRUCTIONS CONCERNING MAINTENANCE AND/OR REPLACEMENT OF THIS SYSTEM PROVIDED? Yes

WAS A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEM PROVIDED?
Yes, Owner's manual, page 28

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

WAS AN OWNER'S MANUAL PROVIDED? Yes

DID THE OWNER'S MANUAL CONTAIN APPROPRIATE INFORMATION CONCERNING MAINTENANCE AND/OR REPLACEMENT AND A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEMS? Yes, page 28

TABLE 10 FMVSS 208 READINESS INDICATOR DATA

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

Is the system totally mechanical? No

IF NO:

Describe the location of the readiness indicator:
The readiness indicator is a light stating "AIRBAG" located in the lower right portion of the instrument cluster below the fuel gage.

Is the readiness indicator clearly visible to the driver? Yes

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided? Yes, Owner's Manual, page 42

FIGURE 4 FMVSS 212 TEST DATA

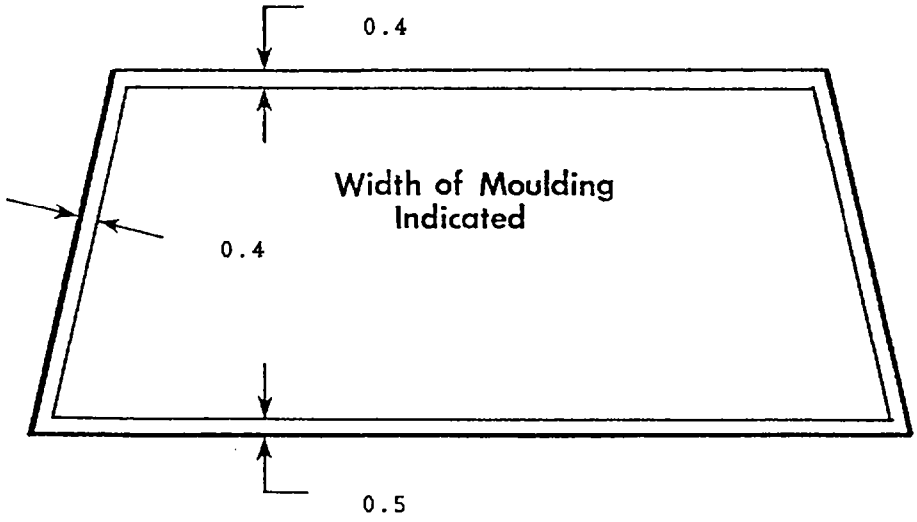
DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:
Adhesive around inner perimeter, plastic trim around outer perimeter.

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

WINDSHIELD PERIPHERY MEASUREMENTS:

	PRE-TEST	POST-TEST	PERCENT RETENTION
RIGHT SIDE	74.9	74.9	100%
LEFT SIDE	74.9	74.9	100%
TOTAL	149.8	149.8	100%

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 72° F



FRONT VIEW OF WINDSHIELD*

LOSS OF WINDSHIELD RETENTION LENGTHS: None

ALL DISTANCE MEASUREMENTS ARE IN INCHES.
*INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

FIGURE 5 FMVSS 219 TEST DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

WINDSHIELD MEASUREMENTS:

A = 43.5

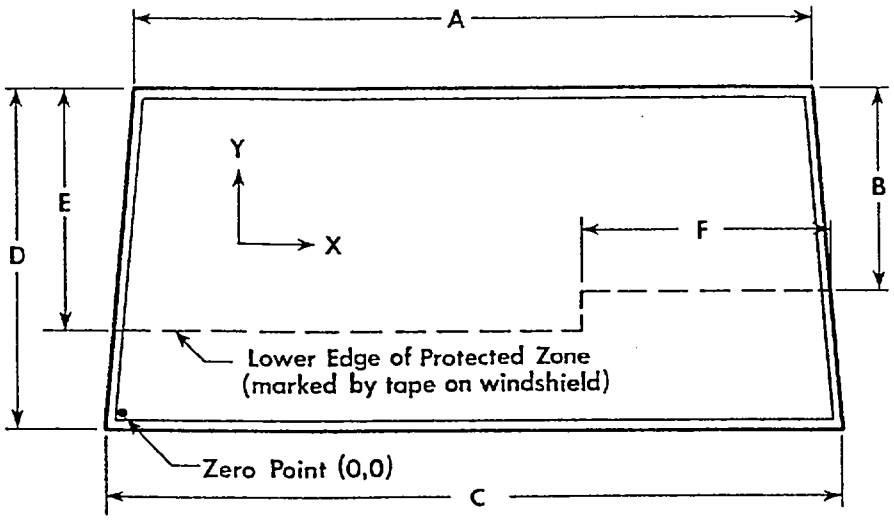
B = 16.0

C = 62.2

D = 25.8

E = 18.0

F = 33.8



FRONT VIEW

METHOD OF ADHERING PROTECTED ZONE TEMPLATE TO WINDSHIELD: NA

AREAS OF WINDSHIELD TEMPLATE PENETRATION GREATER THAN 0.25 IN.: NA

COORDINATES	X	Y
1.		
2.		
3.		

AREAS OF WINDSHIELD PENETRATION, BELOW THE PROTECTED ZONE, THROUGH THE INNER SURFACE OF THE WINDSHIELD: None

1.		
2.		
3.		

ALL MEASUREMENTS ARE IN INCHES.

TABLE 11 FUEL SYSTEM DATA

MAKE/MODEL: Toyota MR2 NHTSA NO.: CM5102

FUEL SYSTEM CAPACITY: 14.3 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 14.3 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 13.2 GALLONS TO 13.4 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 13.3 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel tank is located in front of the rear axle. The fuel filler neck is located on the left side and enters the rear of the tank.

ELECTRIC FUEL PUMP: Yes FUEL INJECTION: Yes

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

TABLE 12 FMVSS 301 POST-IMPACT TEST DATA

TEST VEHICLE NHTSA NO.: CM5102 ; TEST DATE: 01/15/91

VEHICLE MAKE/MODEL/BODY STYLE: Toyota/MR2/2-door coupe

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE:

__X__ FRONTAL (30 MPH)

_____ OBLIQUE (30 MPH) WITH ___° BARRIER FACE
FIRST CONTACTING _____ (DRIVER/PASS.) SIDE.

_____ REAR MOVING BARRIER (30 MPH)

_____ LATERAL MOVING BARRIER (20 MPH)

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

	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

SECTION 4.0

VEHICLE, OCCUPANT, AND CAMERA MEASUREMENTS

FIGURE 6

PRE-TEST AND POST-TEST MEASUREMENT POINTS

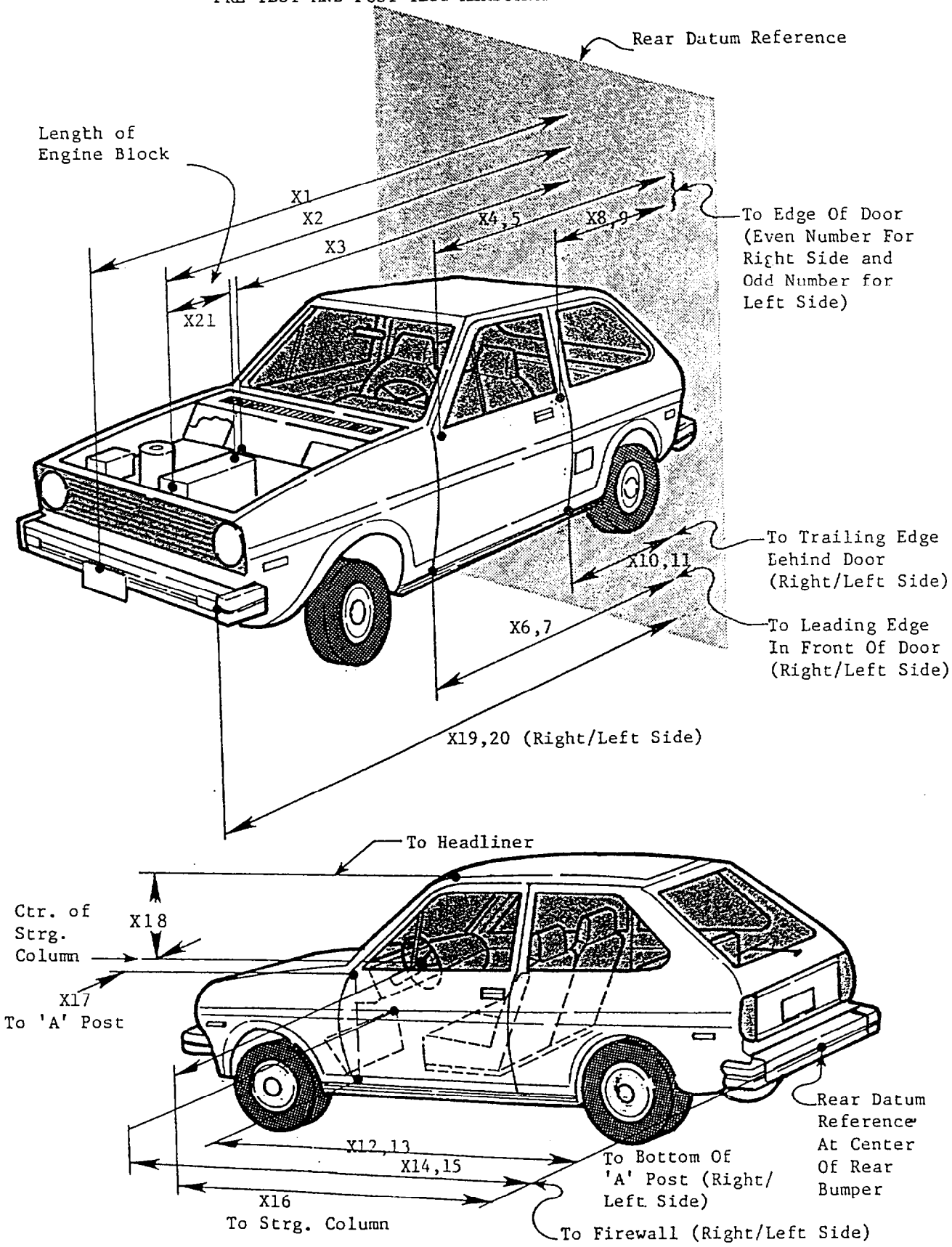


TABLE 13 IMPACTED VEHICLE MEASUREMENTS

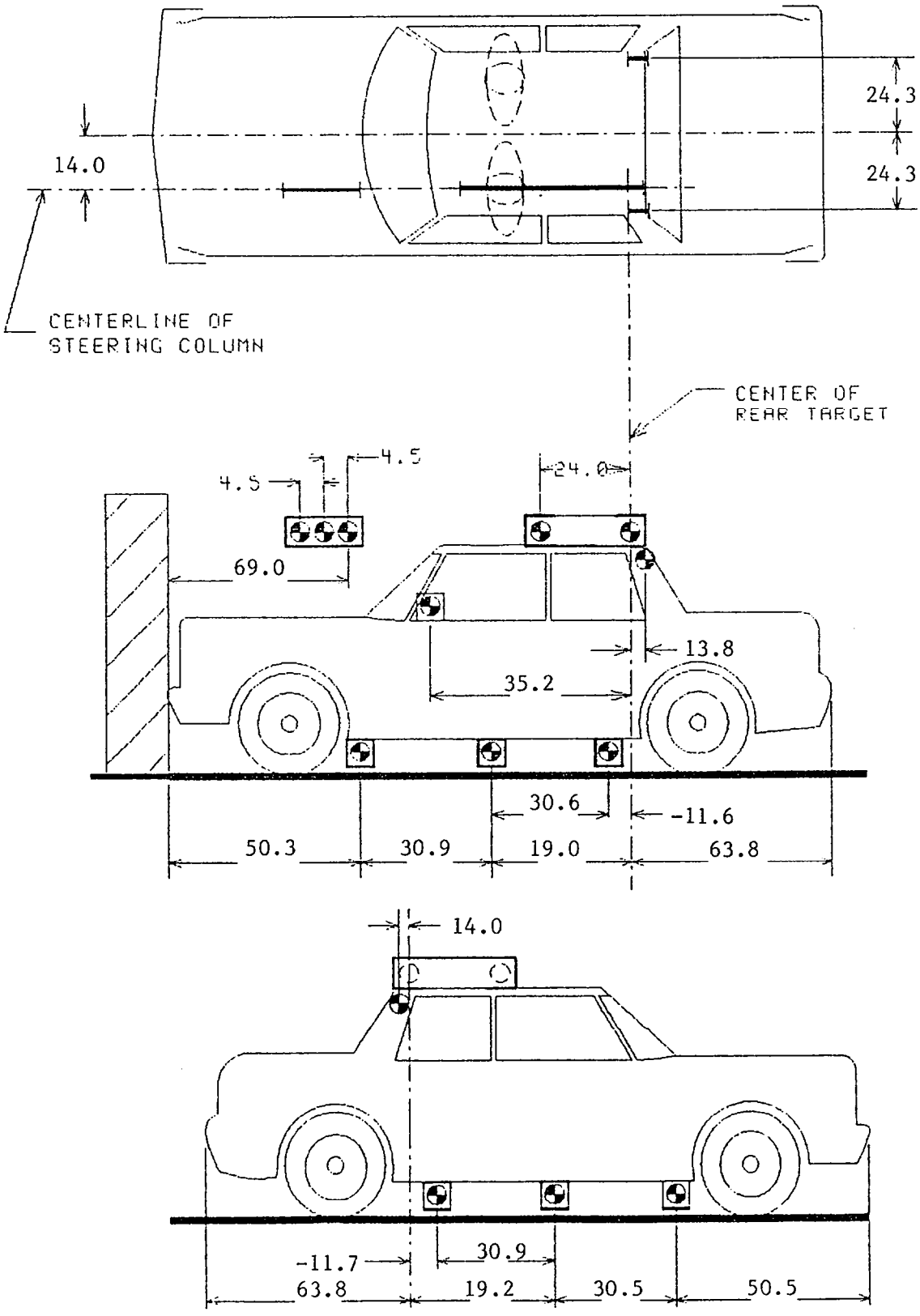
VEHICLE MAKE/MODEL: Toyota/MR2 TEST NUMBER: 910115

ALL MEASUREMENTS ARE IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	164.0	145.8	18.2
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	40.2	40.4	-0.2
X3	REAR SURFACE OF VEHICLE TO FIREWALL	124.1	119.2	4.9
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	109.6	109.9	-0.3
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	109.9	110.1	-0.2
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	109.6	109.4	0.2
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	110.3	109.6	0.7
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	65.2	65.5	-0.3
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	65.8	65.8	0.0
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	68.2	67.9	0.3
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	68.9	67.9	1.0
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	109.2	109.3	-0.1
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	110.4	109.8	0.6
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	124.0	120.1	3.9
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	123.1	120.9	2.2
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	93.1	97.1	-4.0
X17	CENTER OF STEERING COLUMN TO "A" POST	15.5	11.2	4.3
X18	CENTER OF STEERING COLUMN TO HEADLINER	15.2	15.1	0.1
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	161.1	144.1	17.0
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	161.2	144.2	17.0
X21	LENGTH OF ENGINE BLOCK	17.5	17.5	0.0

FIGURE 7

VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 8 DUMMY AND SEAT POSITIONING DATA

PRE-IMPACT DATA:

MAKE/MODEL: Toyota/MR2

BODY STYLE: 2-door coupe MODEL YEAR: 1991

NHTSA NO.: CM5102 COLOR: Red

DATA FROM CERTIFICATION LABEL:

VEHICLE MANUFACTURER: Toyota Motor Corp.

DATE OF MANUFACTURE: 08/90 VIN: JT2SW21N7M0007717

GVWR: 3370 LBS.; GAWR: FRONT = 1480 LBS.; REAR = 1950 LBS.

POST-IMPACT DATA:

DATE OF TEST: 01/15/91 TIME: 1337 TEMPERATURE: 75° F

IMPACT VELOCITY: PRIMARY = 29.3 MPH SECONDARY = 29.3 MPH

REQUIRED IMPACT VELOCITY RANGE: 28.9 TO 29.9 MPH

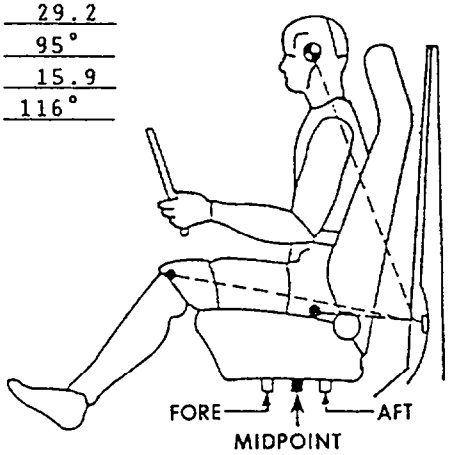
SEAT TYPE: Bucket ADJUSTER TYPE: Manual

FRONT SEAT BACK TYPE: Manual Adjustable

TECHNICIANS: B. Fishbaugh, B. Crabtree, P. Cummins

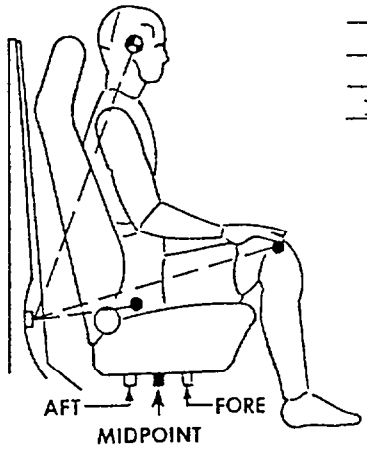
DRIVER DUMMY # 353 TYPE: HII

HEAD	19.0
TARGET	22°
KNEE	29.2
JOINT	95°
APPROX- IMATE "H" POINT	15.9 116°

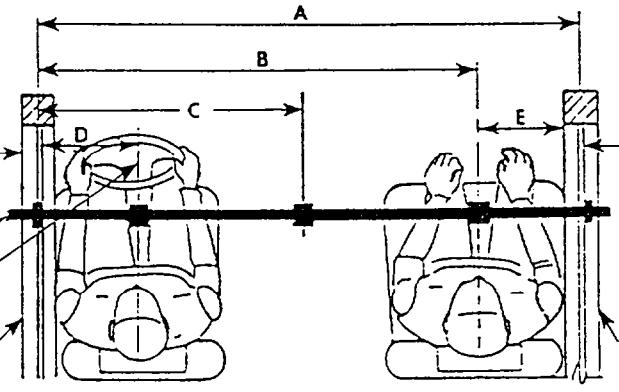


PASSENGER DUMMY # 354 TYPE: HII

18.2	HEAD
21°	TARGET
28.2	KNEE
95°	JOINT
15.8 117°	APPROX- IMATE "H" POINT



A = 50.6
B = 39.5
C = 25.3
D = 11.5
E = 11.1
DOOR GLASS HEIGHT = 6.8



DOOR GLASS HEIGHT = 6.8

LATERAL BAR

ADJUSTABLE POINTER

LEFT FRONT DOOR

DRIVER DUMMY

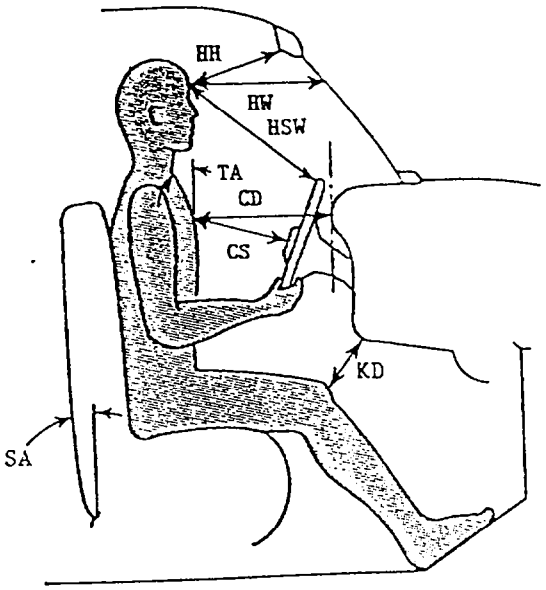
PASSENGER DUMMY

RIGHT FRONT DOOR

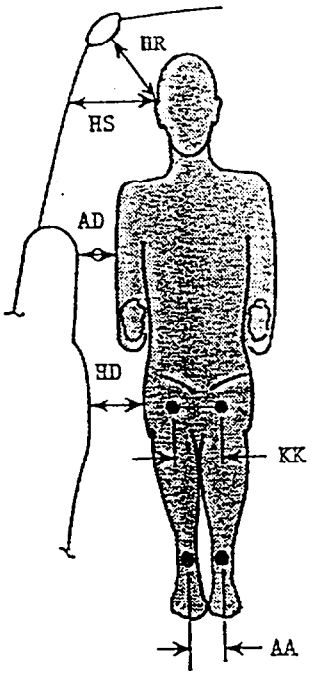
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

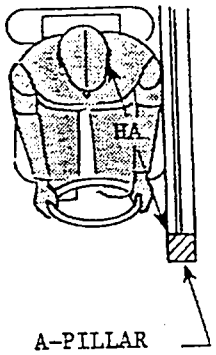
FIGURE 9 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	12.9	14.6
HW	19.2	19.2
CD	21.2	22.0
CS	12.4	NA
KDL	4.0	5.4
KDR	4.8	4.6
TA	17°	16°
SA	20°	20°
HSW	17.4	NA



	DRIVER	PASSENGER
HR	5.2	5.2
HS	8.0	8.0
AD	4.3	4.1
HD	4.4	4.8
KK	10.5	7.5
AA	11.5	8.2
HA	18.6	19.1





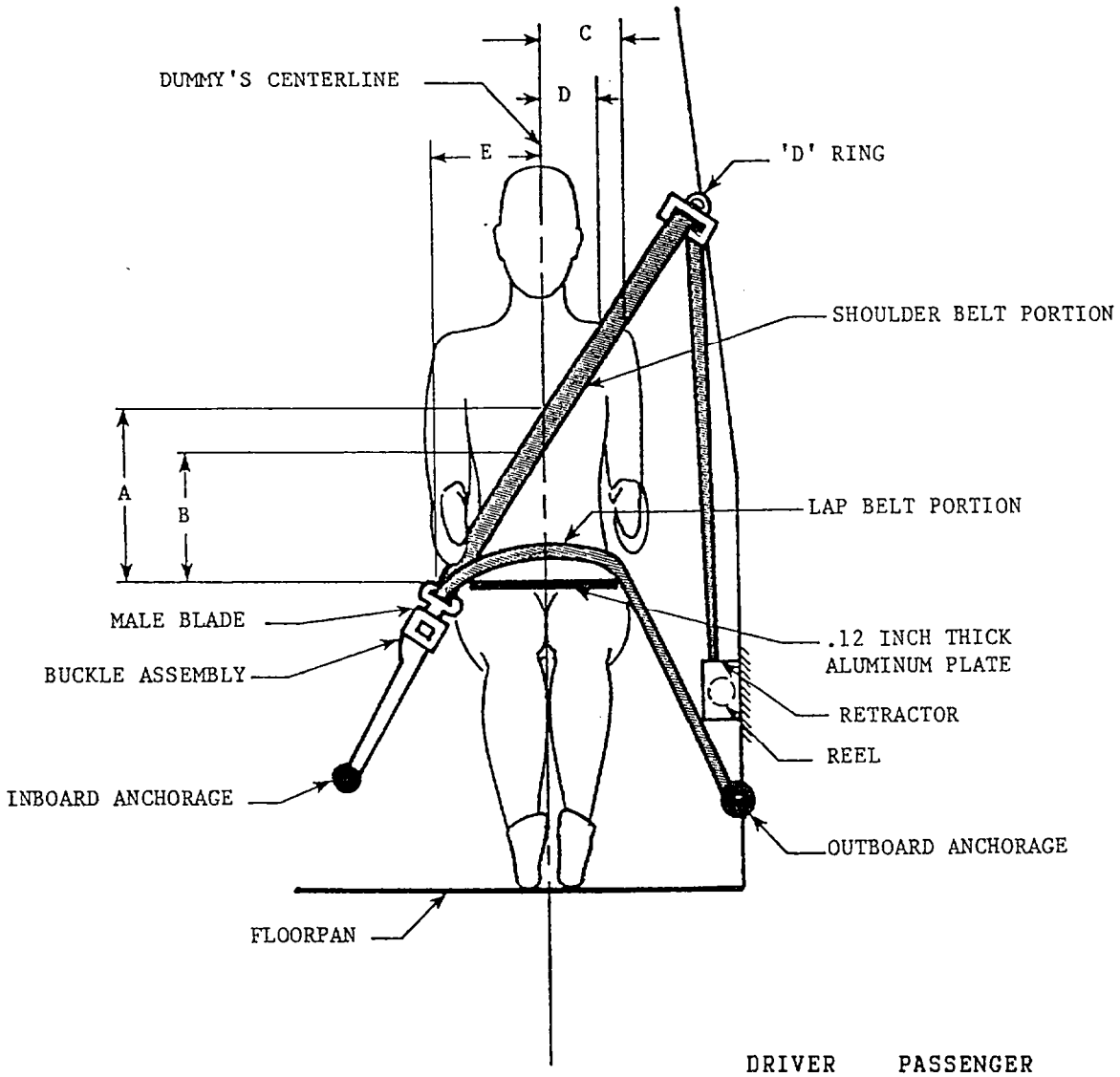
KNEE OUTER BOLT TO OUTER BOLT HEAD SPACING:
DRIVER = 14.5
PASSENGER = 11.8

HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW= HEAD TO STEERING WHEEL

HR = HEAD C.G. TARGET TO SIDE ROOF HEADER
HS = HEAD C.G. TARGET TO SIDE WINDOW
AD = ARM TO DOOR
HD = HIP TO DOOR
KK = KNEE TO KNEE
AA = ANKLE TO ANKLE
HA = HEAD C.G. TARGET TO A-PILLAR

TORSO AND SEAT BACK ANGLES ARE RELATIVE TO VERTICAL.
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 10 SEAT BELT POSITIONING DATA

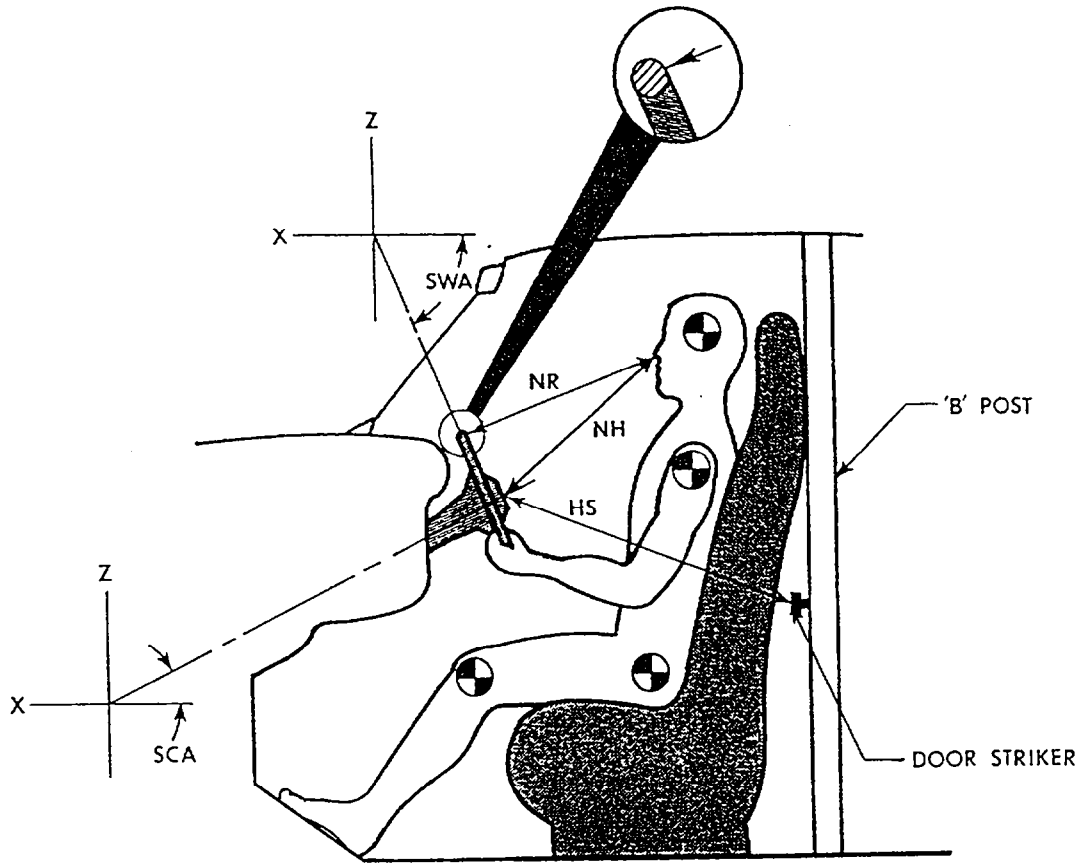


	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	NA	13.2
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	NA	10.0
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	NA	5.0
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	NA	2.6
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	NA	8.5

NOTE: The D-ring was positioned in the second latch position from the top.

ALL MEASUREMENTS ARE IN INCHES.

FIGURE 11 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY: The steering column was latched in the fourth tilt position from the bottom.

	MEASUREMENTS
NR - DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	15.8
NH - DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	16.1
HS - DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	26.6
SCA - ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	22°
SWA - ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	68°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 12

4, 7, 8 CAMERA POSITIONS

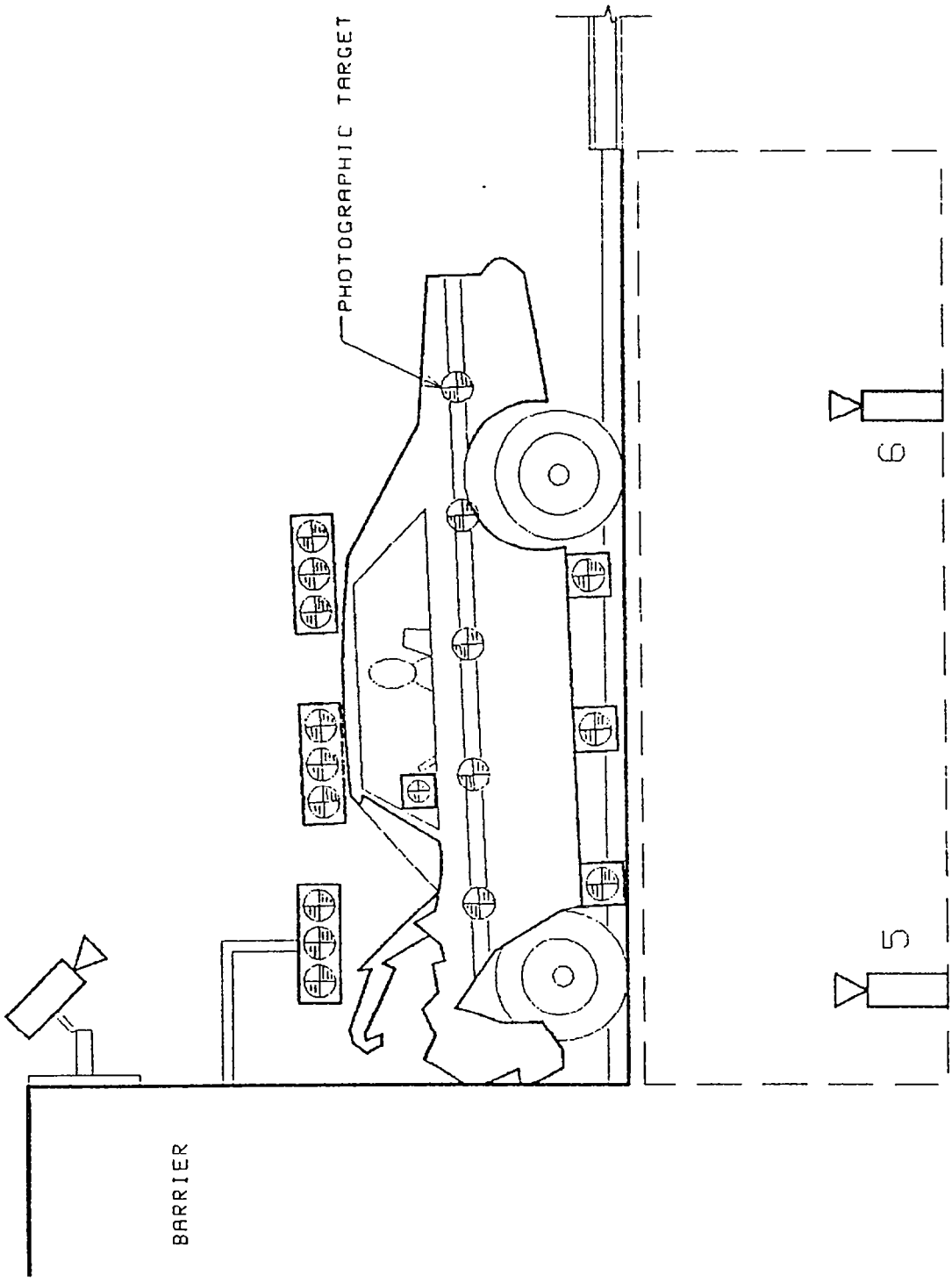


FIGURE 12

CAMERA POSITIONS, CONTINUED

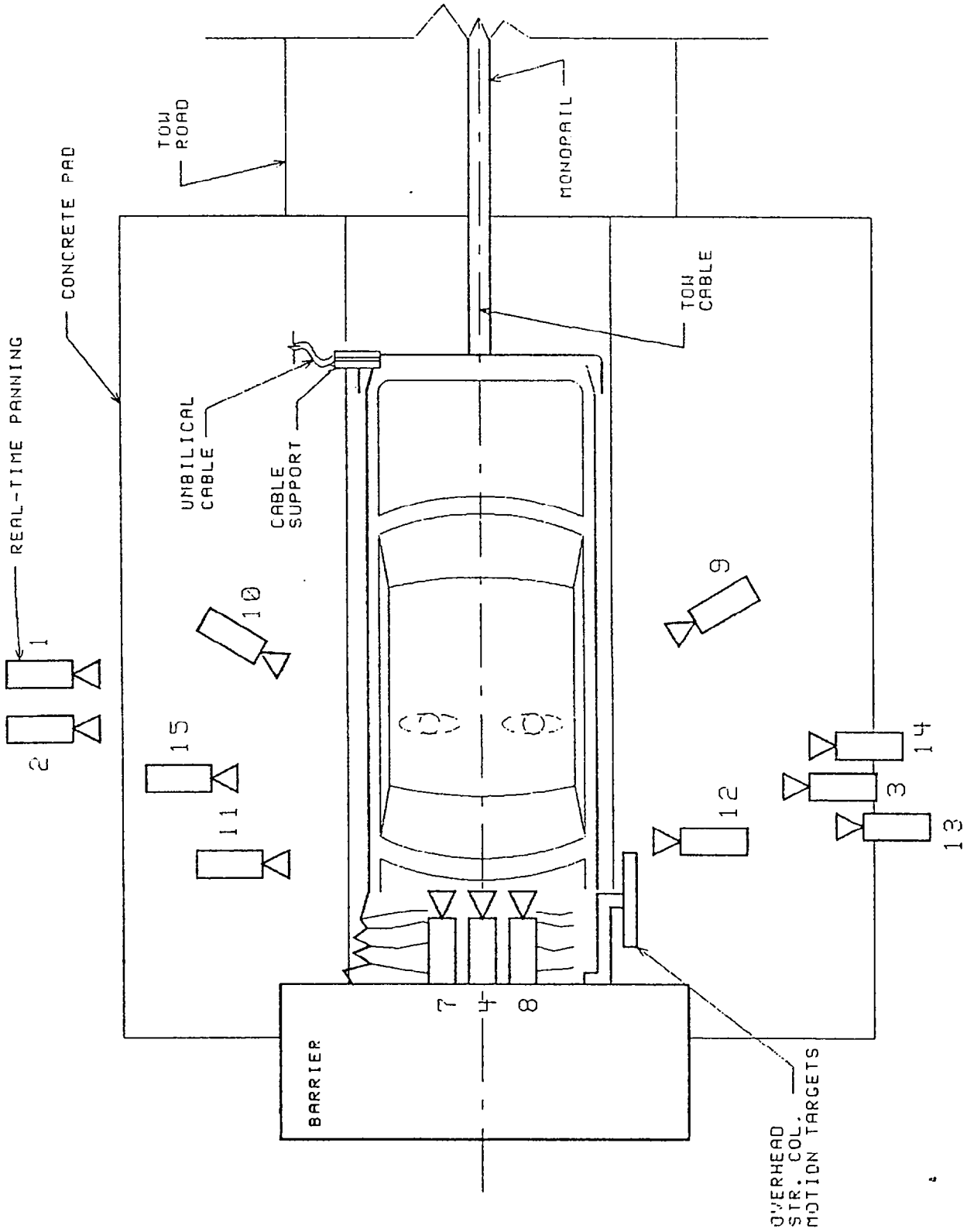


TABLE 14 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 910115 VEHICLE: Toyota MR2 2-door coupe

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)* X	Y	Z	ANGLE** (DEG)	FILM PLANE TO HEAD TARGET(IN)	LENS (MM)	FILM SPEED (FPS)
1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24
2	Vehicle crush	-81.3	-266.4	37.1	-2	NA	13	488
3	Dummy kinematics	-41.5	295.0	44.0	-4	207.5	25	485
4	Windshield damage	-6.0	0.0	98.0	-40	NA	13	500
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1000
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	998
7	Passenger kinematics	-4.5	-13.8	93.0	-50	NA	17	495
8	Driver kinematics	-6.8	14.5	93.0	-50	NA	17	498
9	Driver kinematics	-157.3	116.0	87.0	-27	91.0	25	500
10	Passenger kinematics	-152.1	-116.0	87.0	-26	82.0	25	498
11	Windshield intrusion	-38.1	-306.1	44.0	0	NA	50	500
12	Windshield intrusion	-53.0	309.4	42.3	0	NA	50	500
13	Column movement	-151.0	280.0	103.0	-14	NA	25	498
14	Column movement	-151.0	280.0	75.1	-9	NA	25	500
15	Passenger kinematics	-38.8	-293.0	45.3	-4	214.0	25	495
16	Real-time documentation	NA	NA	NA	NA	NA	12-120	24

* +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

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

APPENDIX A

PHOTOGRAPHS

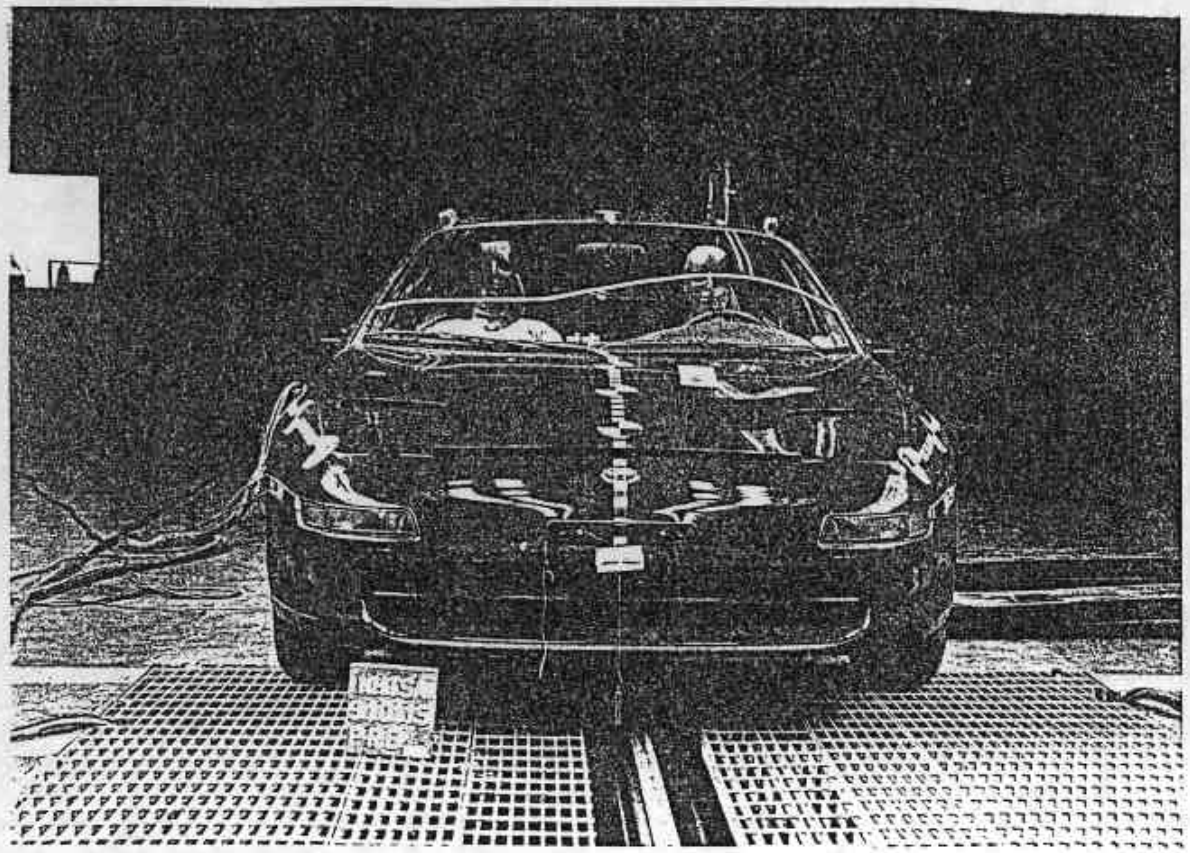


Figure A-1. PRE-TEST FRONT VIEW

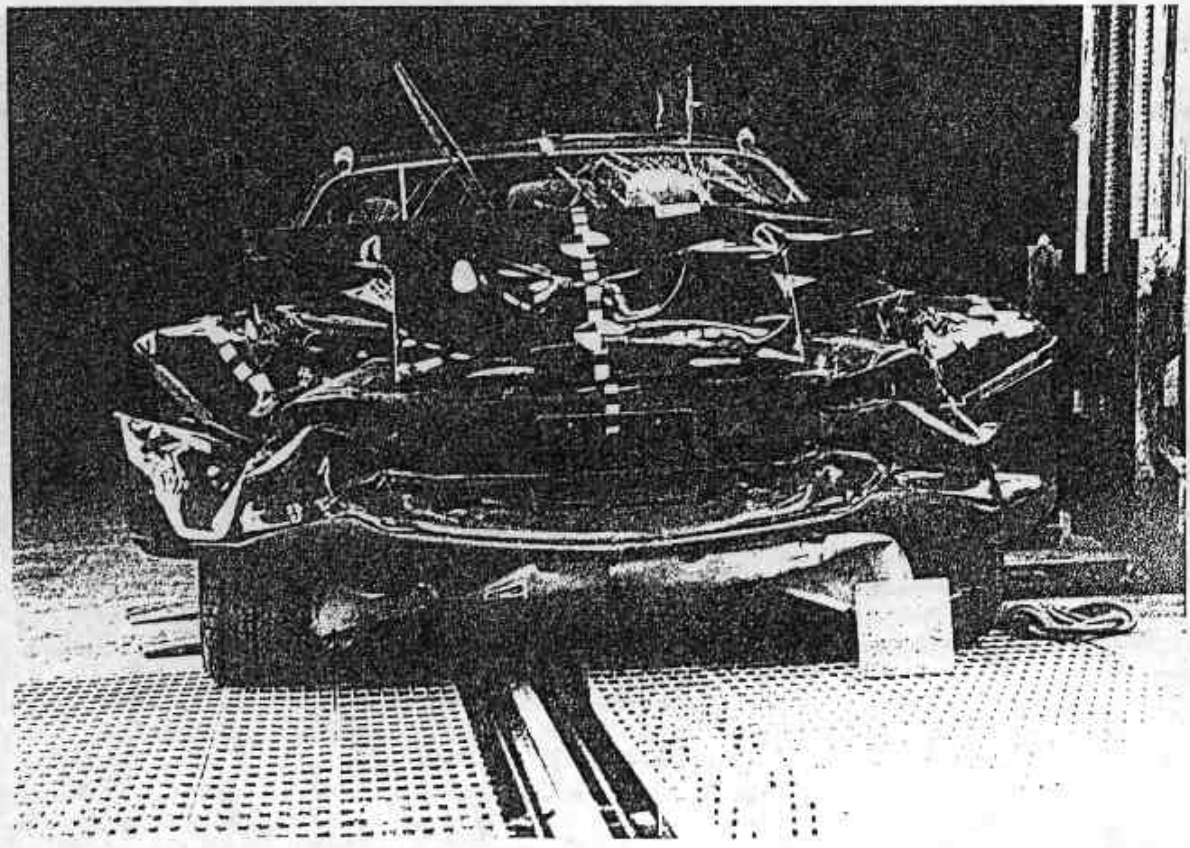


Figure A-2. POST-TEST FRONT VIEW

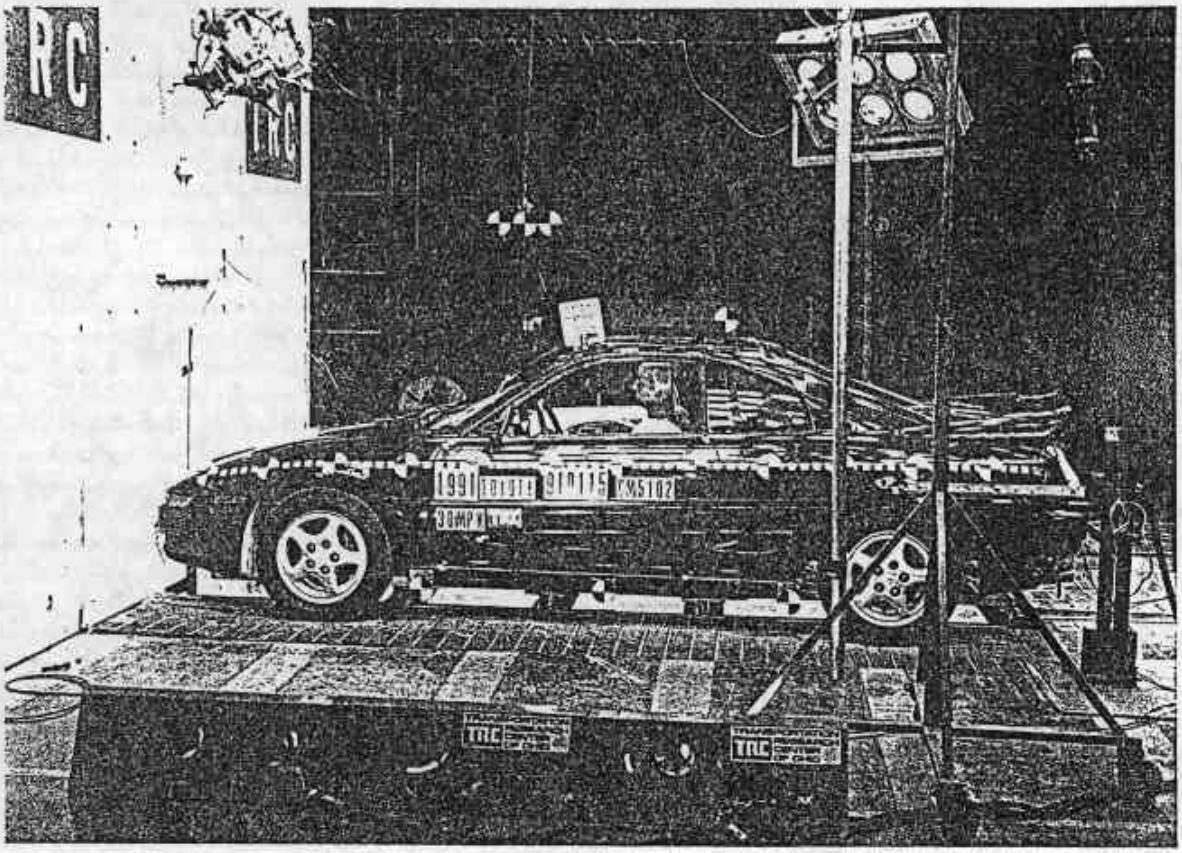


Figure A-3. PRE-TEST LEFT SIDE VIEW

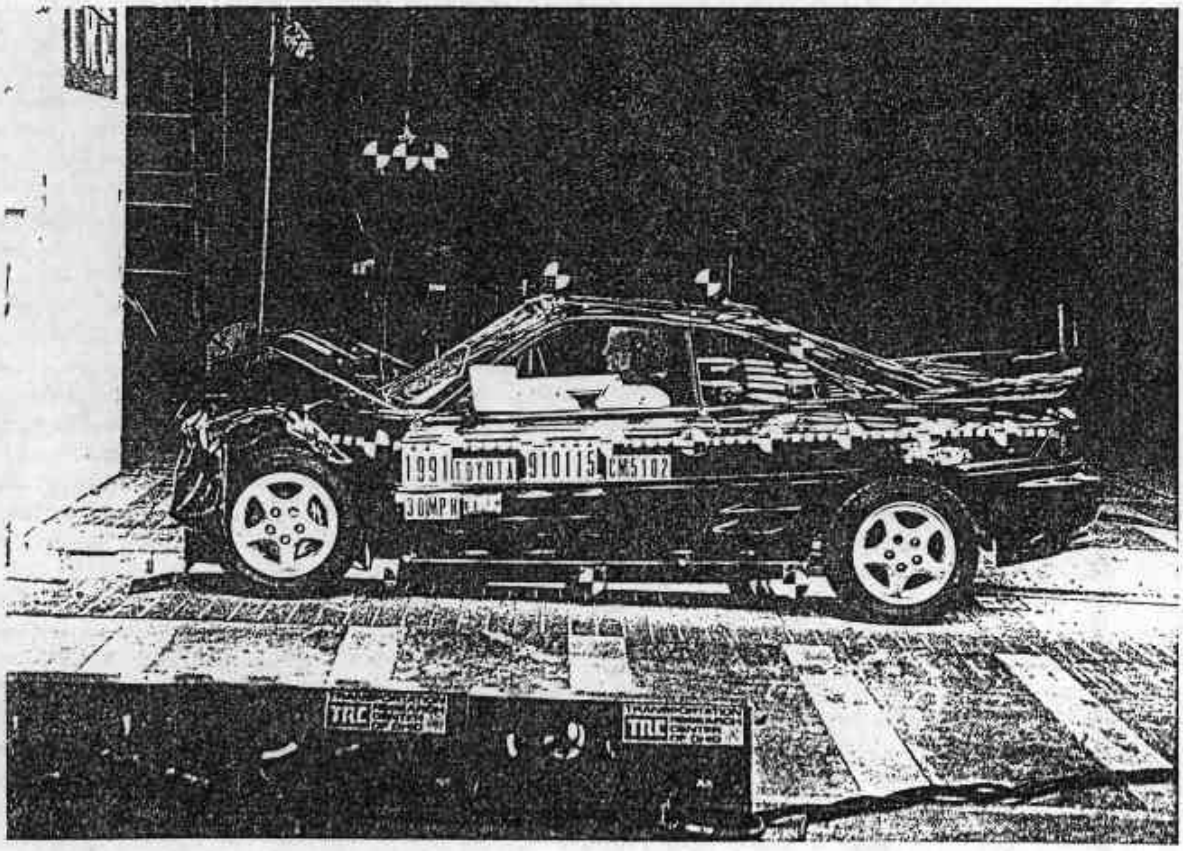


Figure A-4. POST-TEST LEFT SIDE VIEW

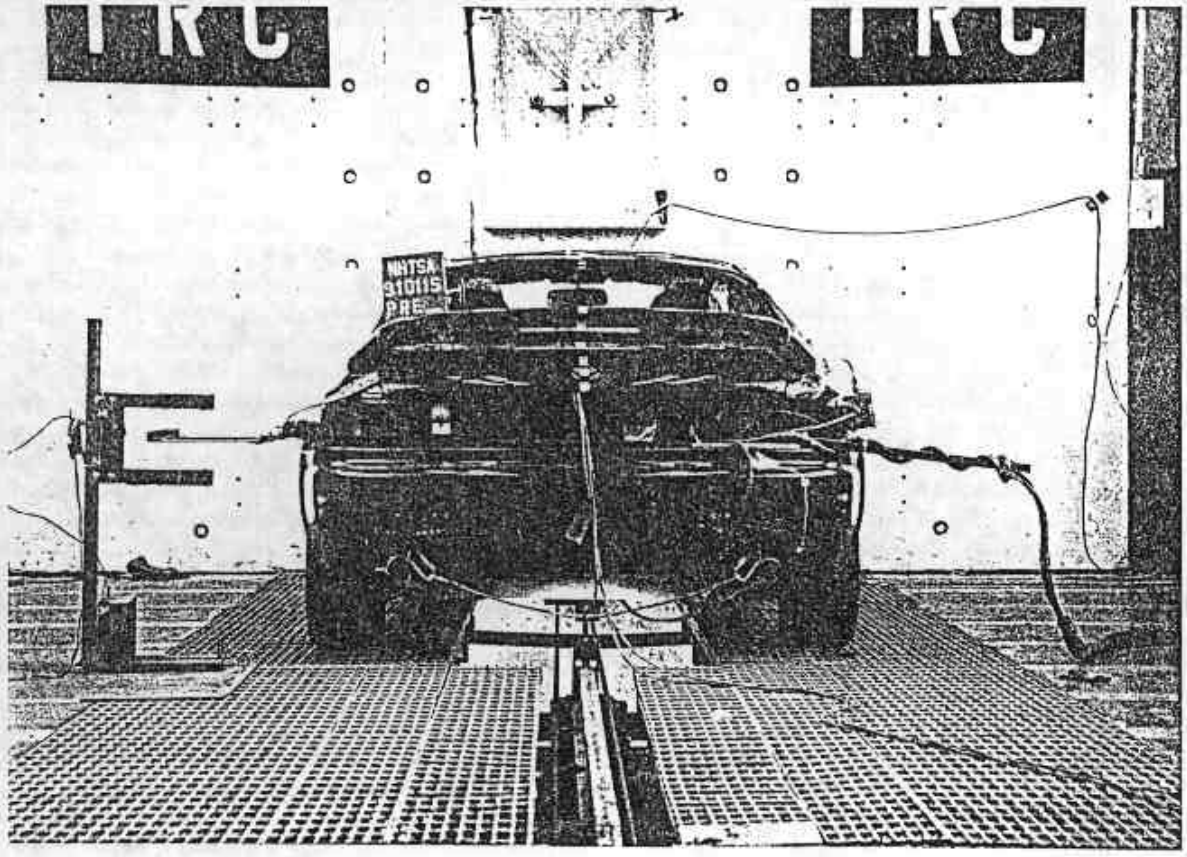


Figure A-5. PRE-TEST REAR VIEW

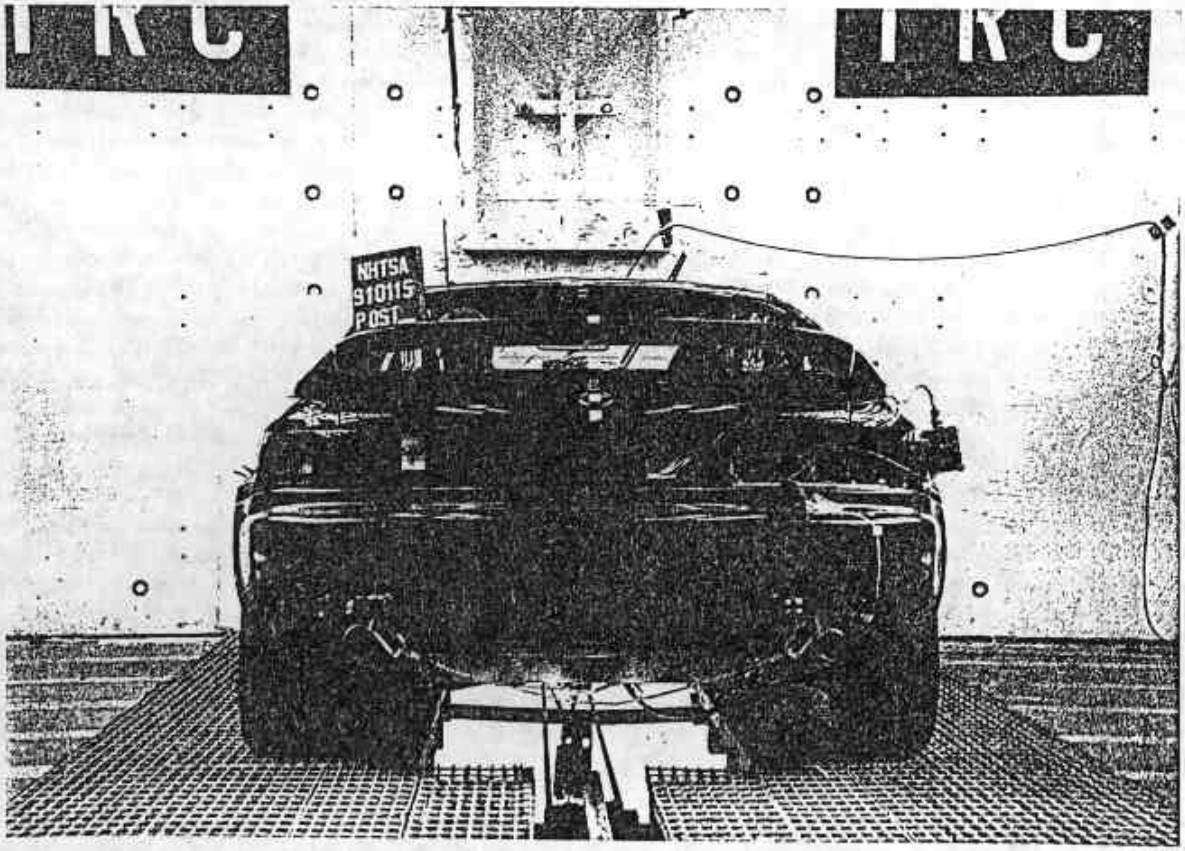


Figure A-6. POST-TEST REAR VIEW

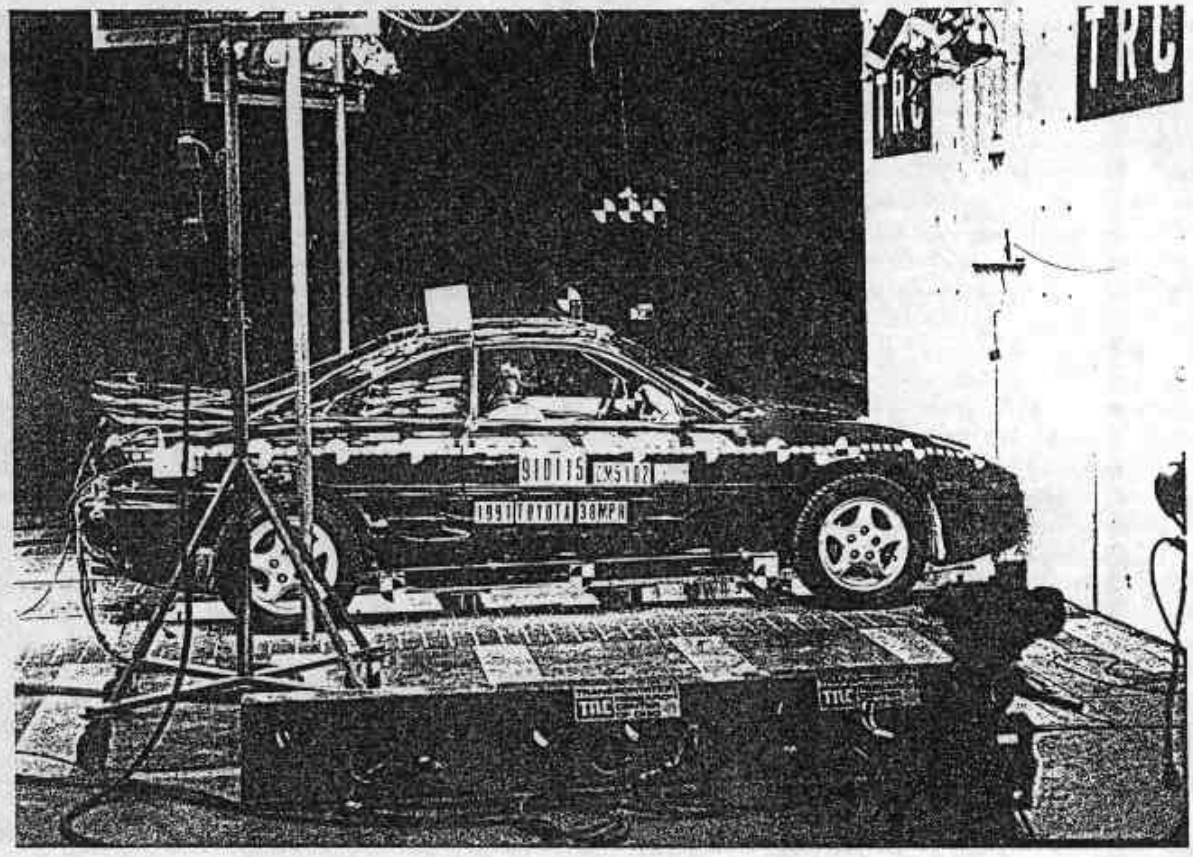


Figure A-7. PRE-TEST RIGHT SIDE VIEW

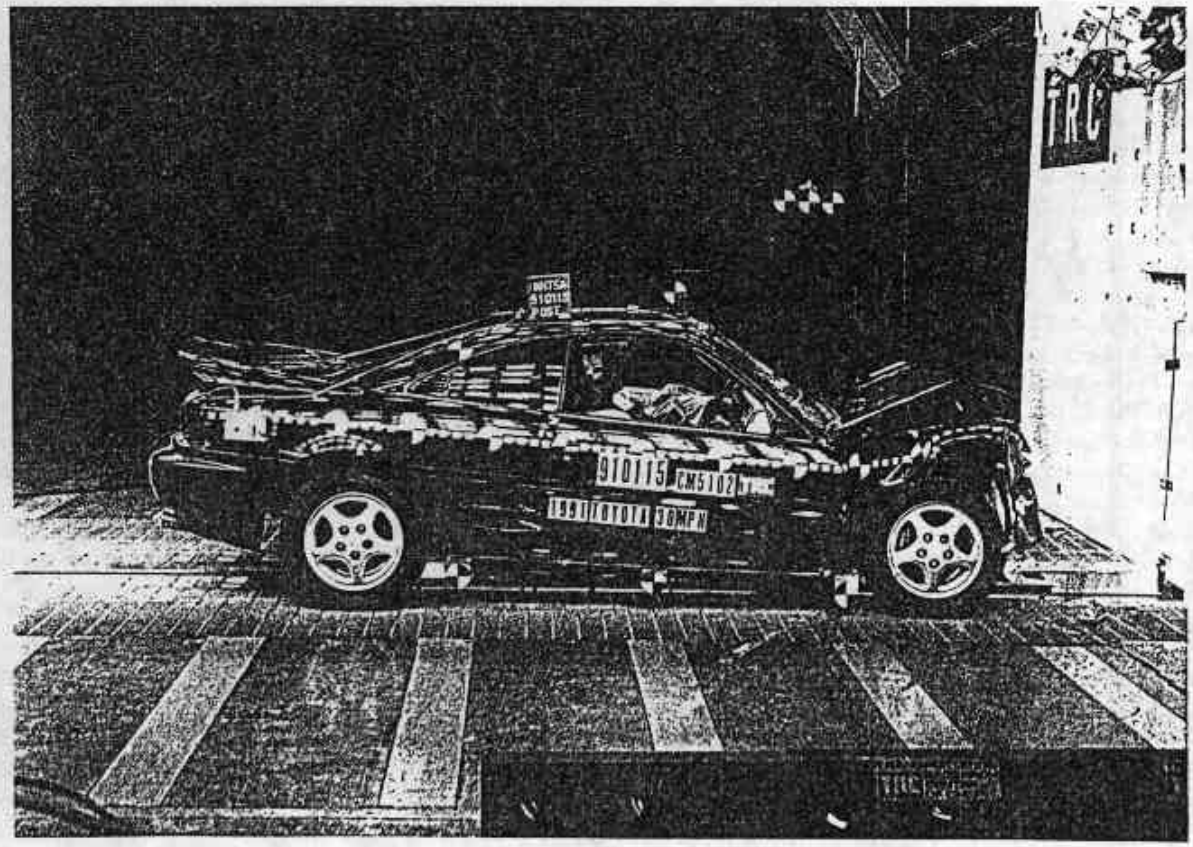


Figure A-8. POST-TEST RIGHT SIDE VIEW

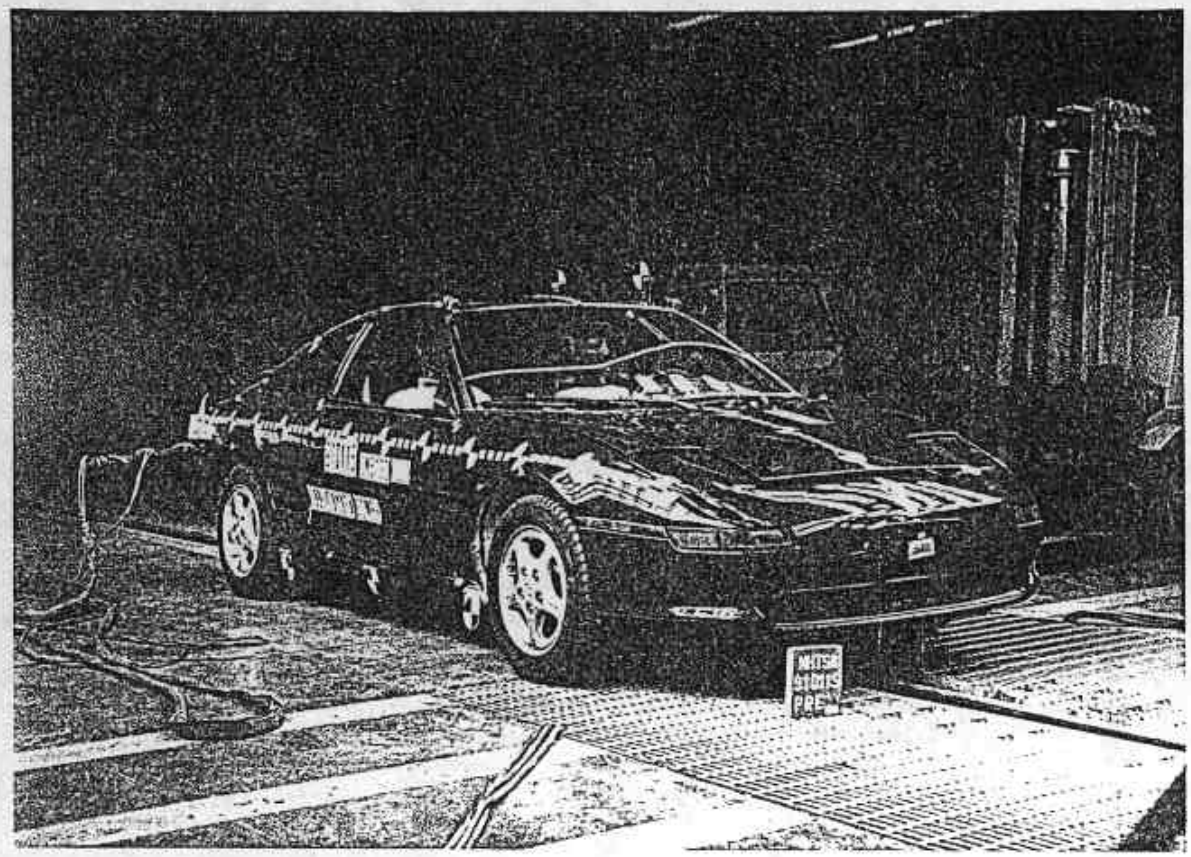


Figure A-9. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

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

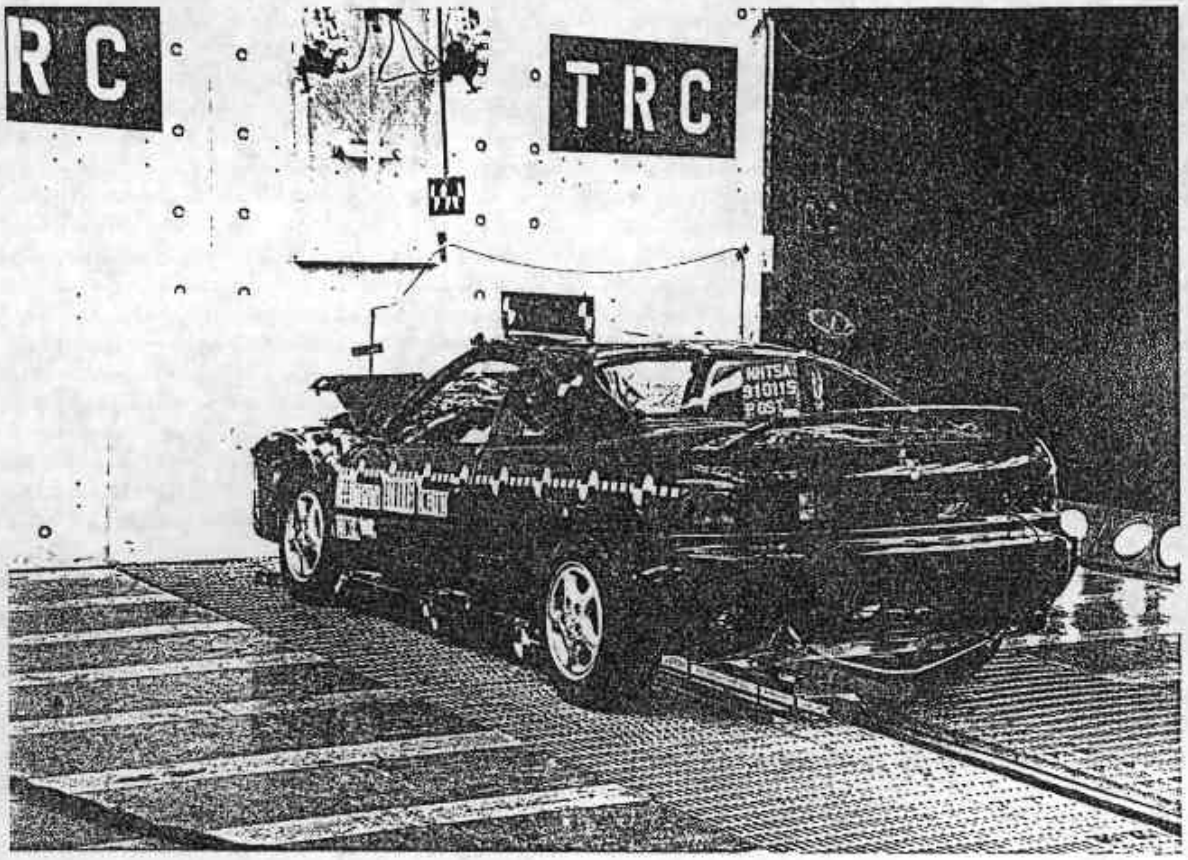


Figure A-11. POST-TEST LEFT REAR THREE-QUARTER VIEW

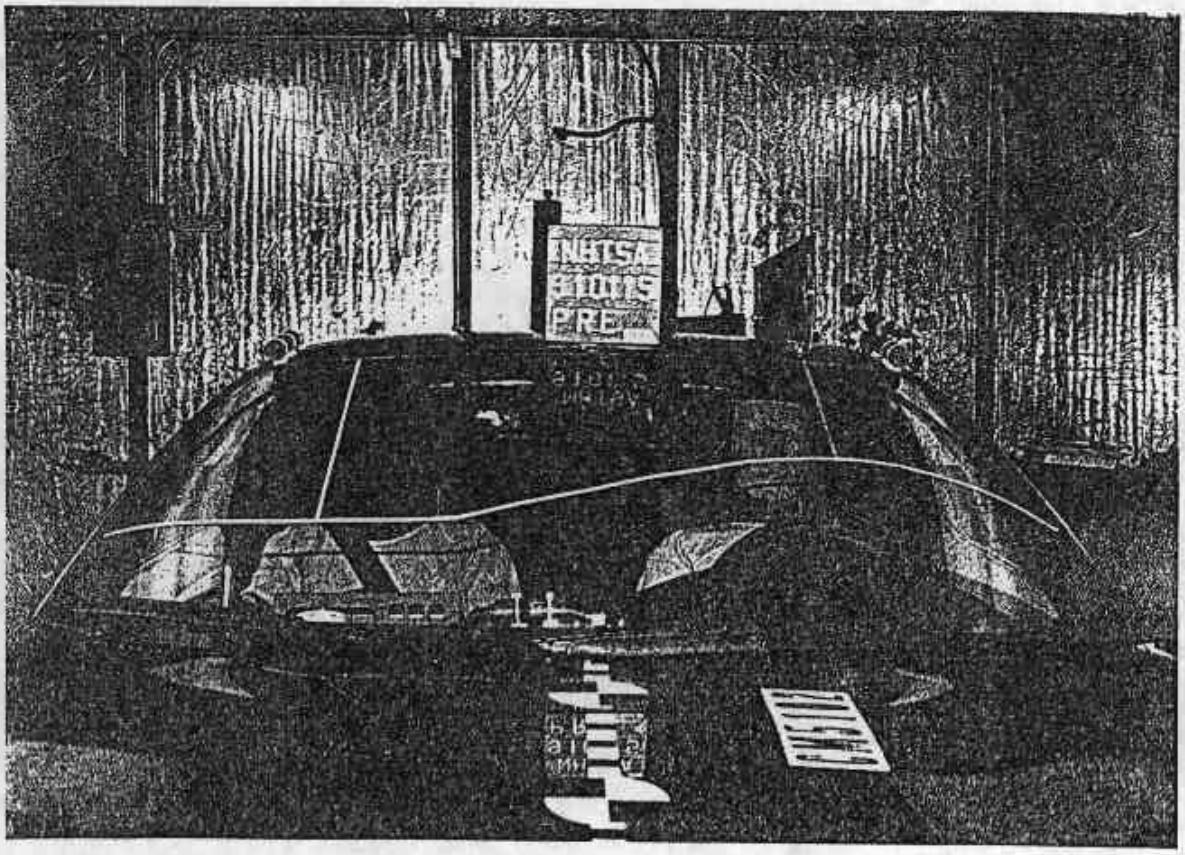


Figure A-12. PRE-TEST WINDSHIELD VIEW

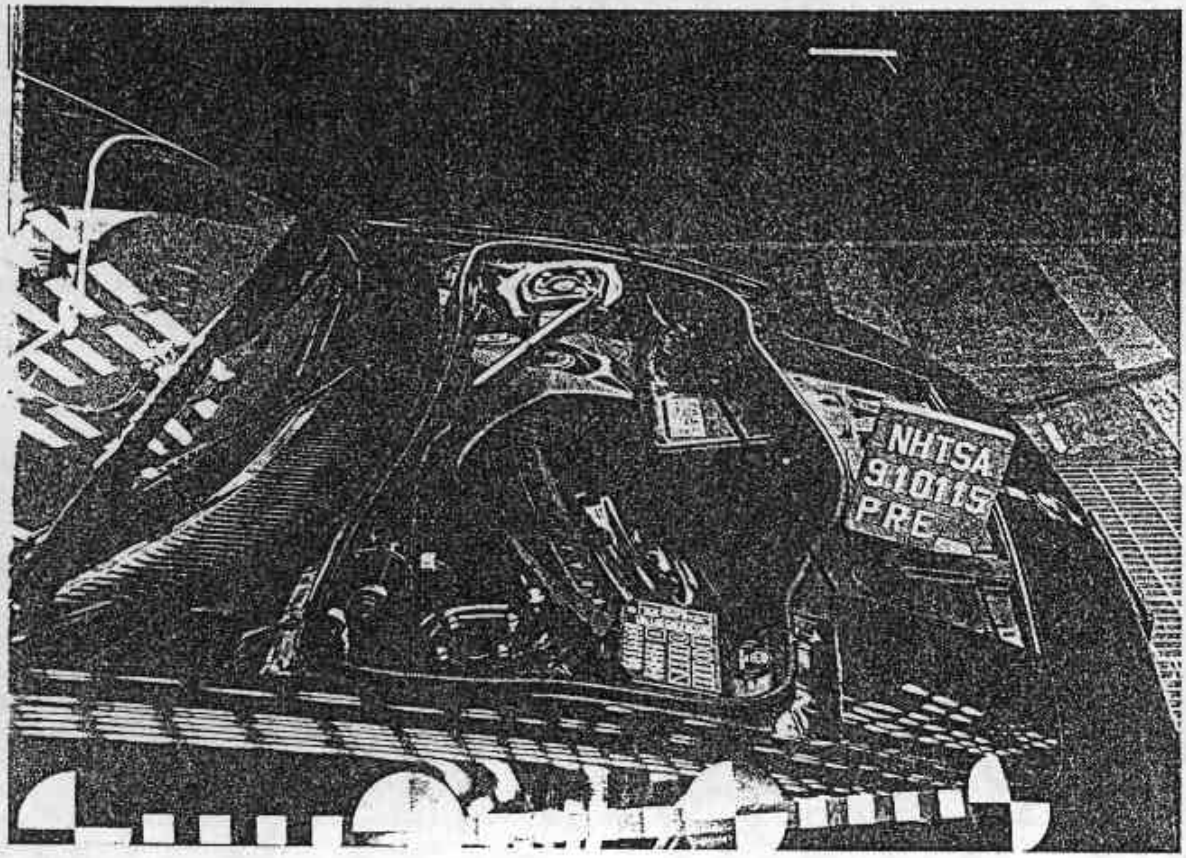


Figure A-13. PRE-TEST FRONT COMPARTMENT VIEW

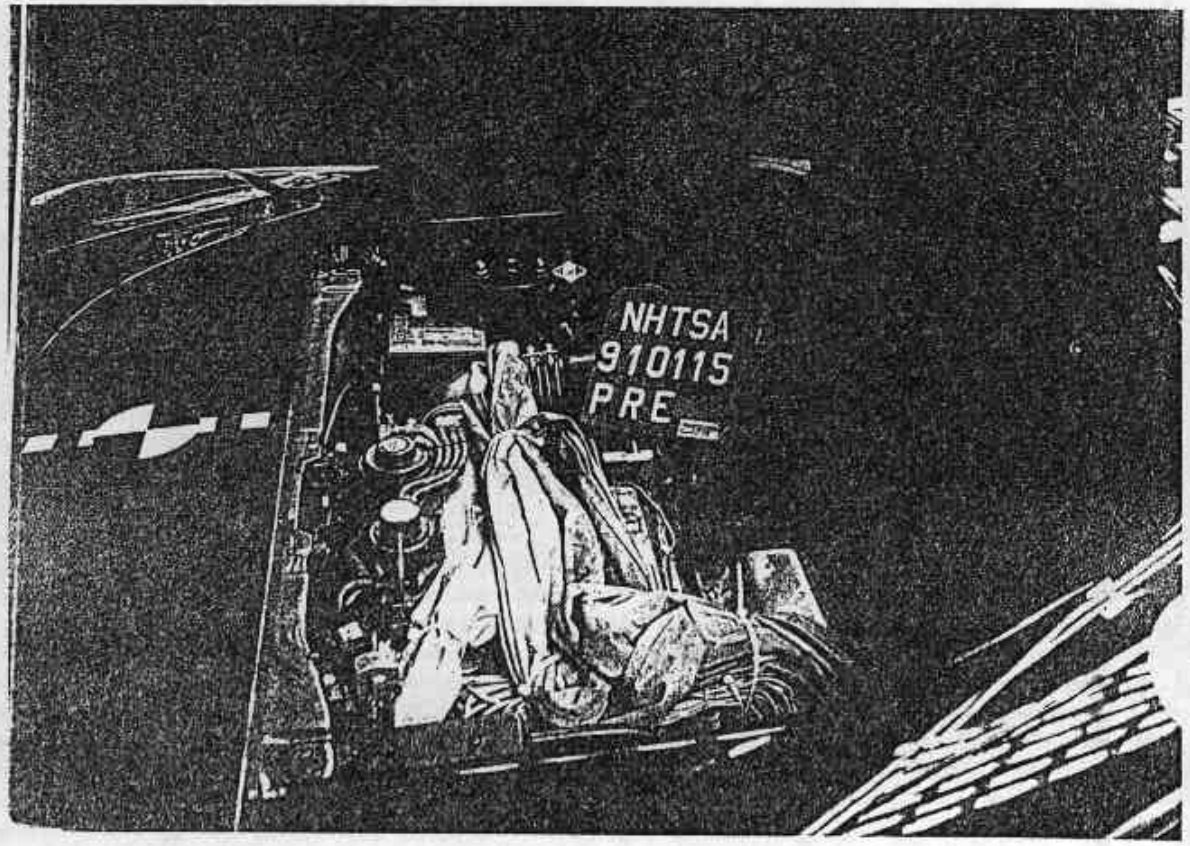


Figure A-14. PRE-TEST ENGINE COMPARTMENT VIEW

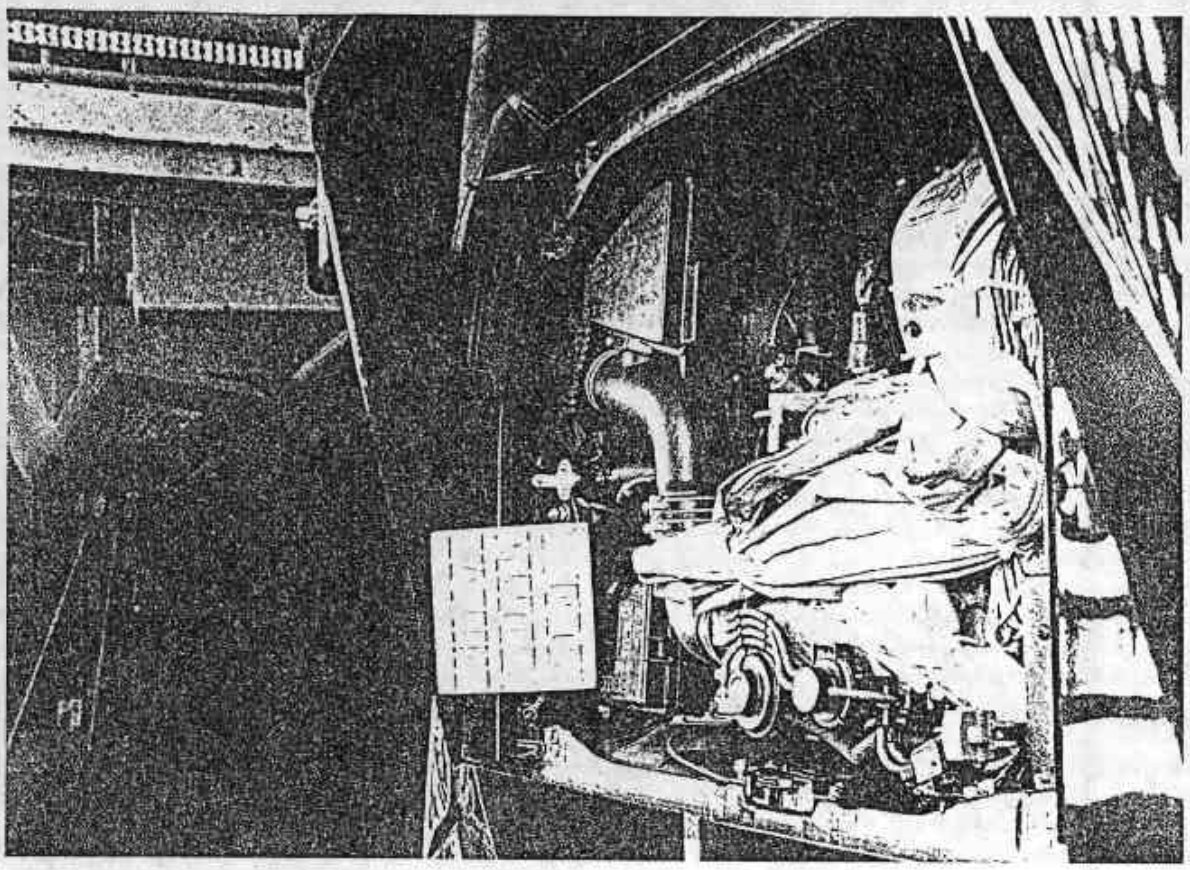


Figure A-15. POST-TEST ENGINE COMPARTMENT VIEW

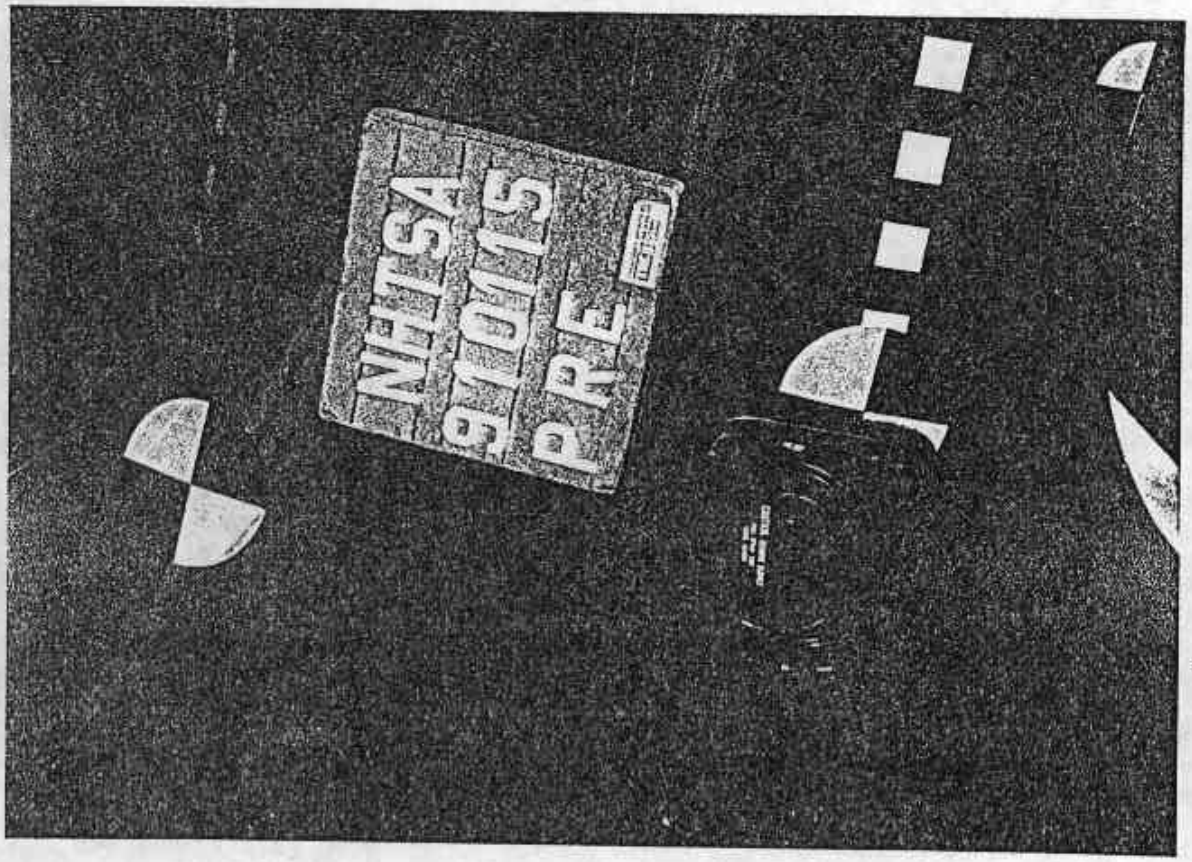


Figure A-16. PRE-TEST FUEL FILLER CAP VIEW

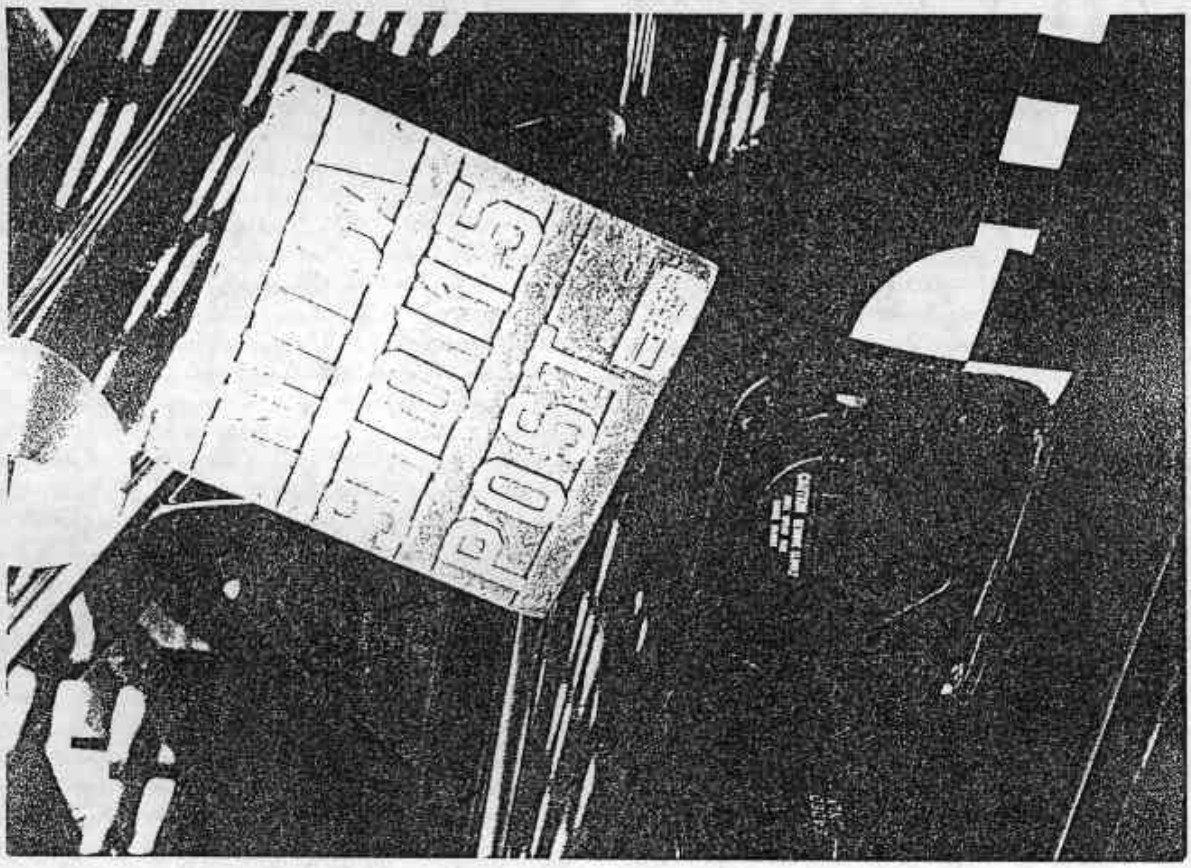


Figure A-17. POST-TEST FUEL FILLER CAP VIEW

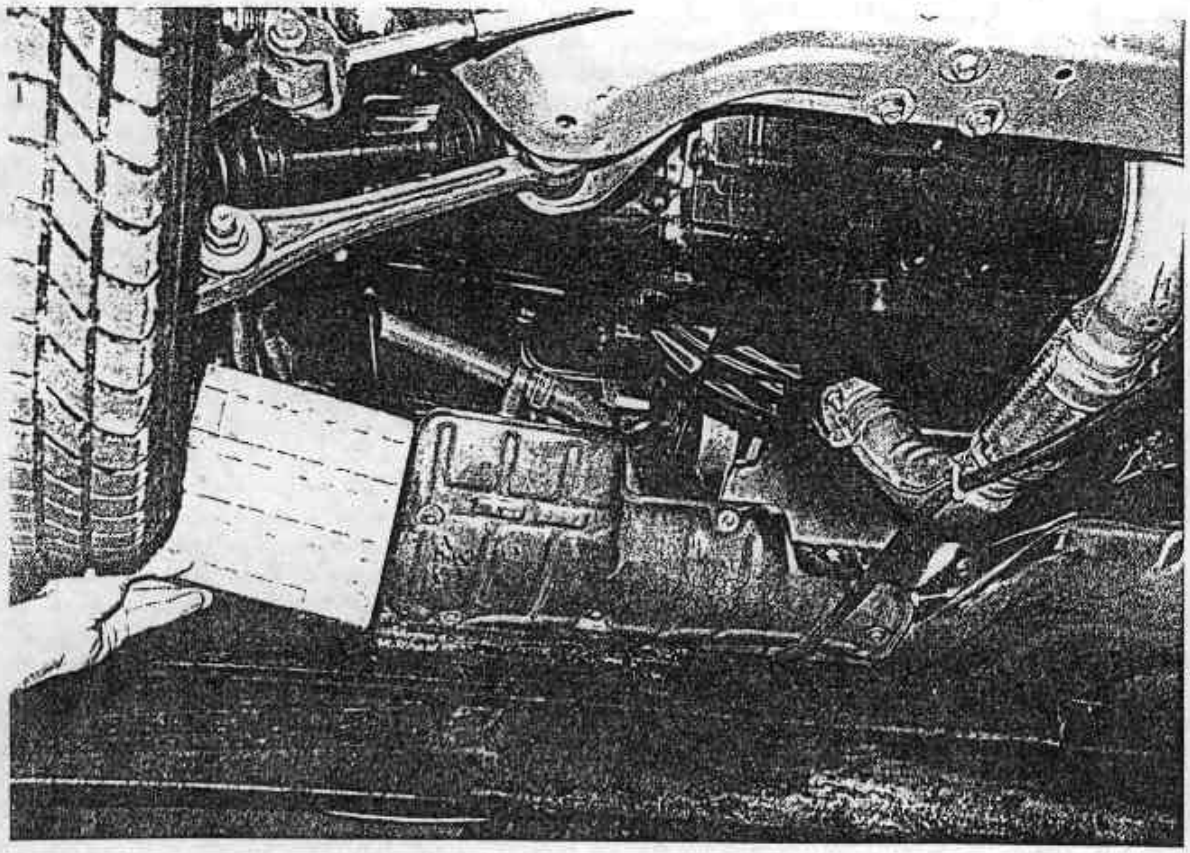


Figure A-18. PRE-TEST FUEL TANK VIEW

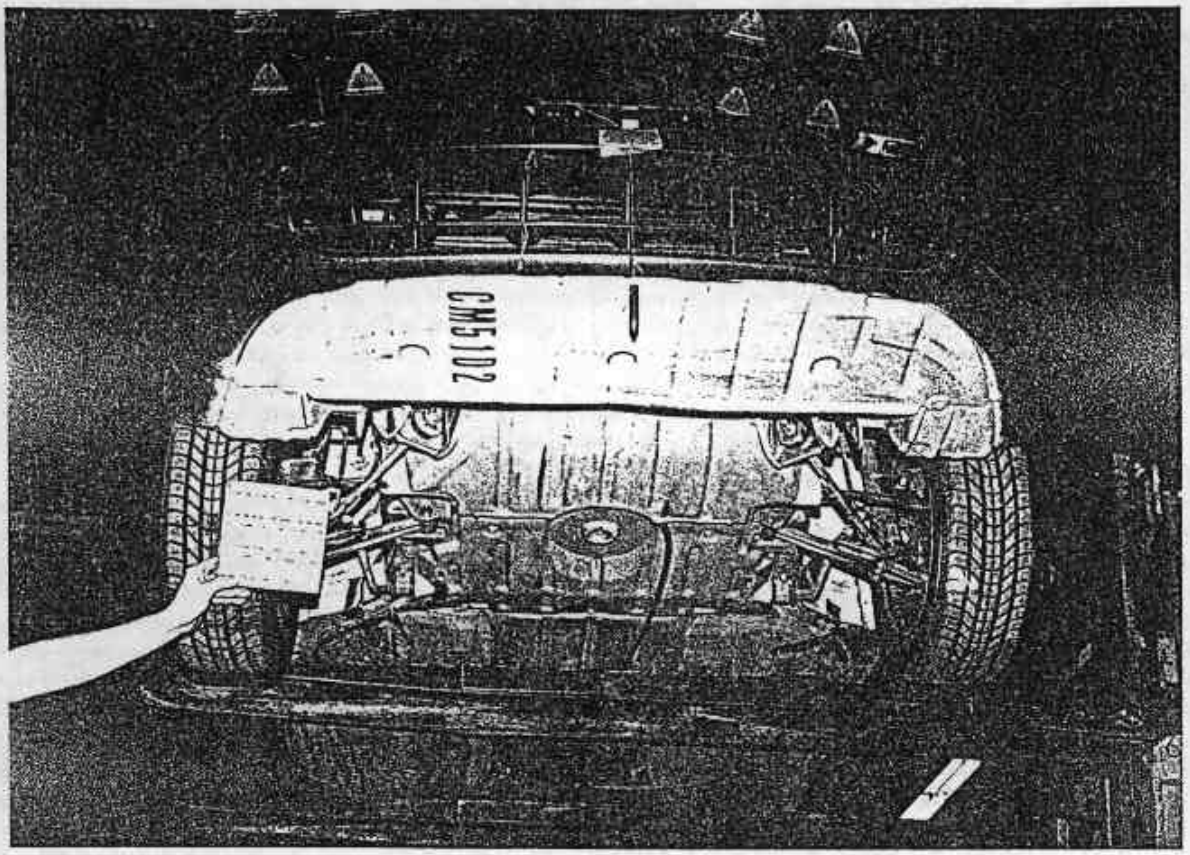


Figure A-19. PRE-TEST FRONT UNDERBODY VIEW

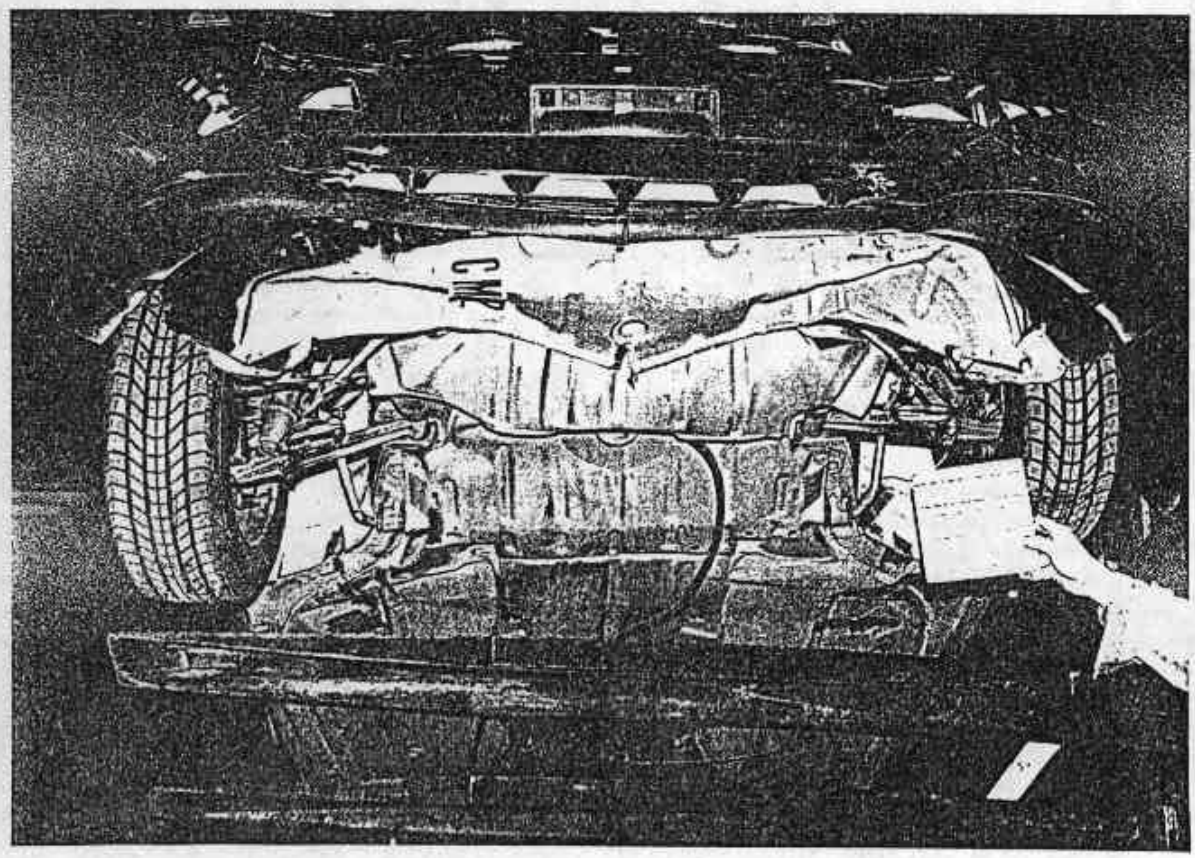


Figure A-20. POST-TEST FRONT UNDERBODY VIEW

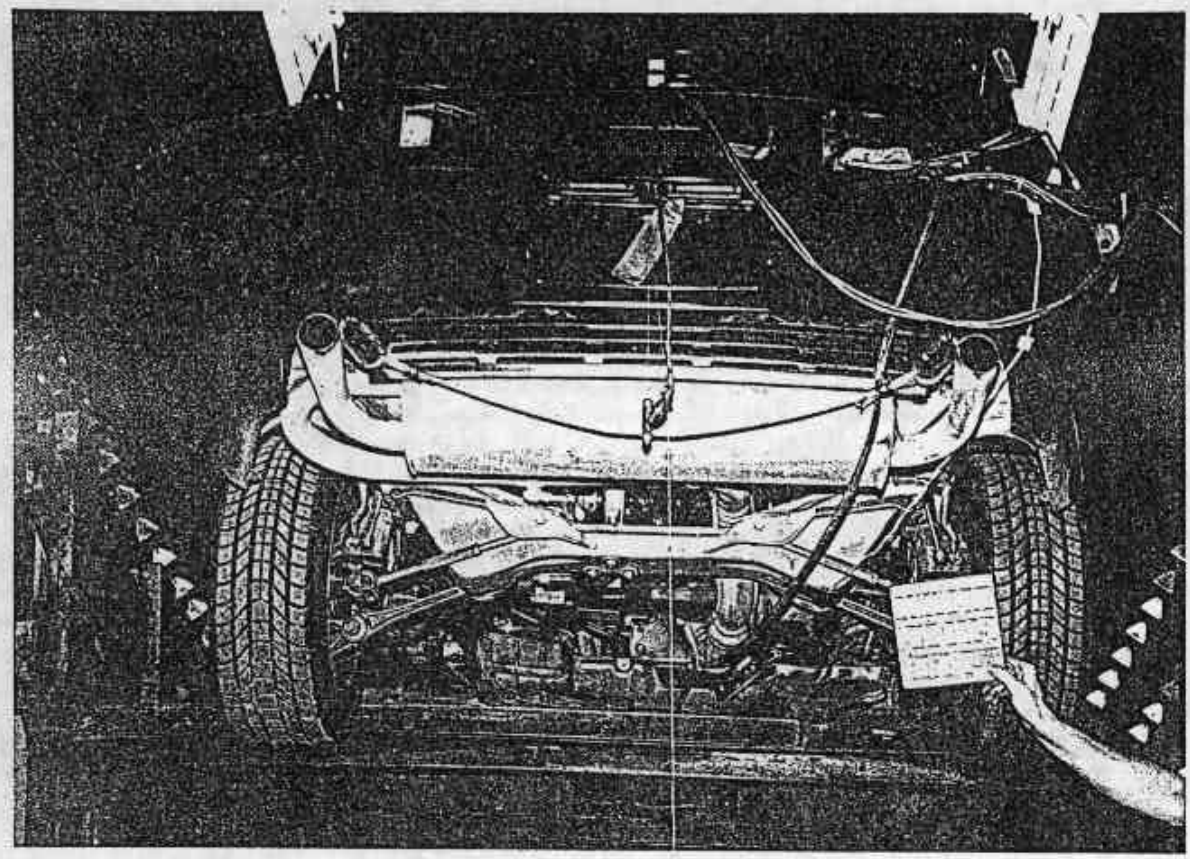


Figure A-21. PRE-TEST REAR UNDERBODY VIEW

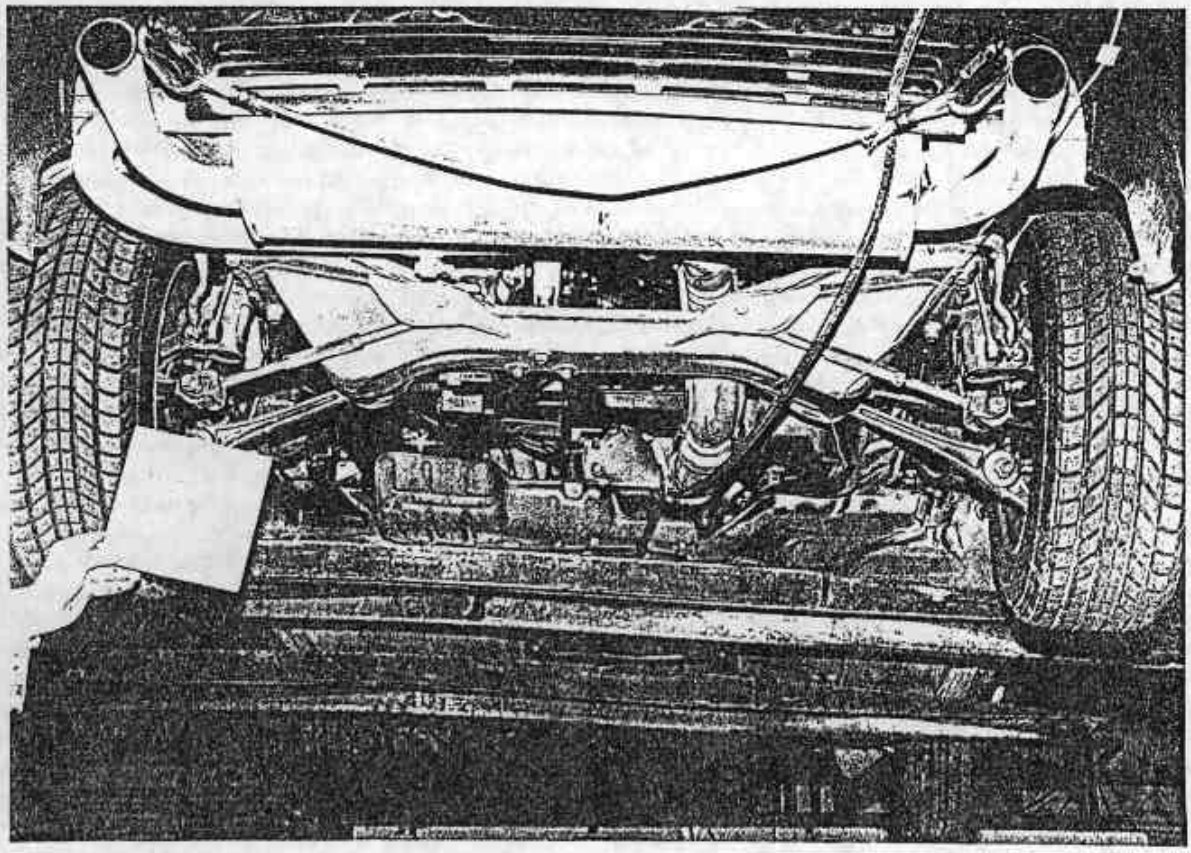


Figure A-22. POST-TEST REAR UNDERBODY VIEW

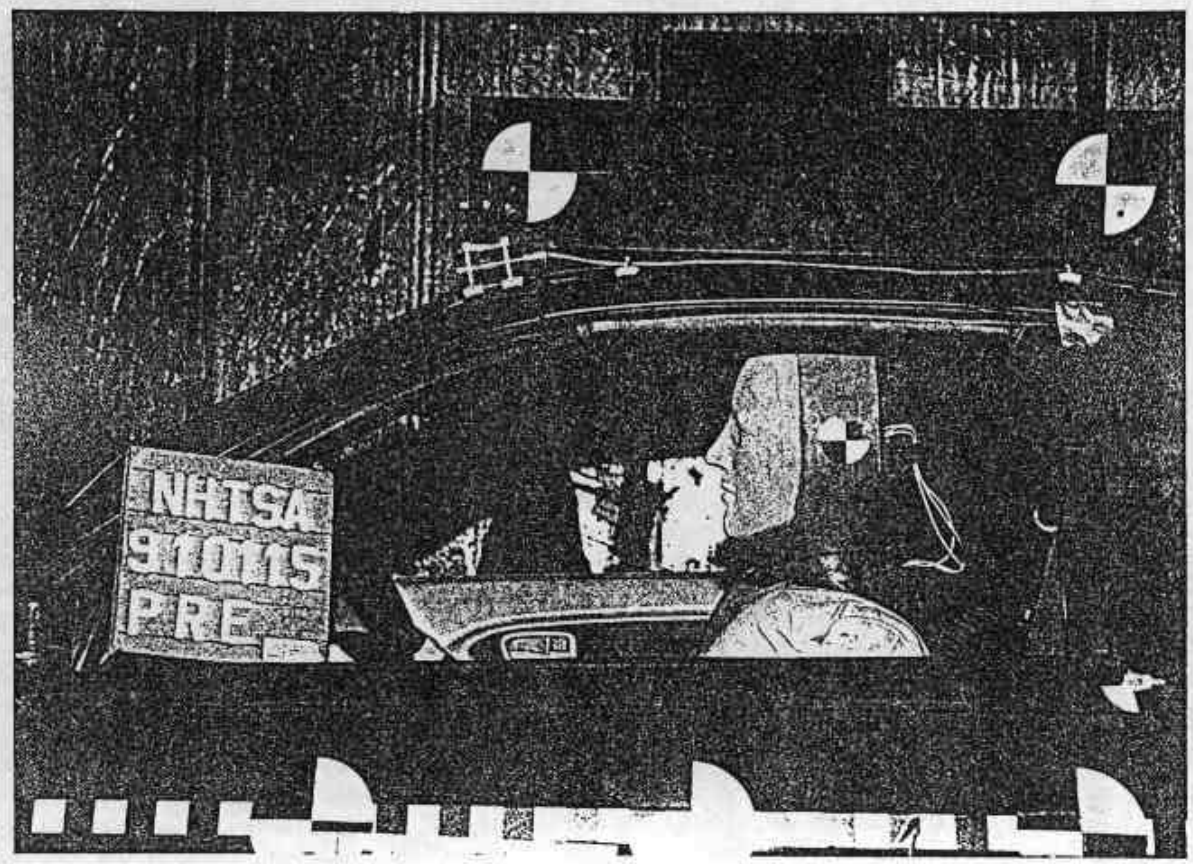


Figure A-23. PRE-TEST DRIVER DUMMY POSITION VIEW

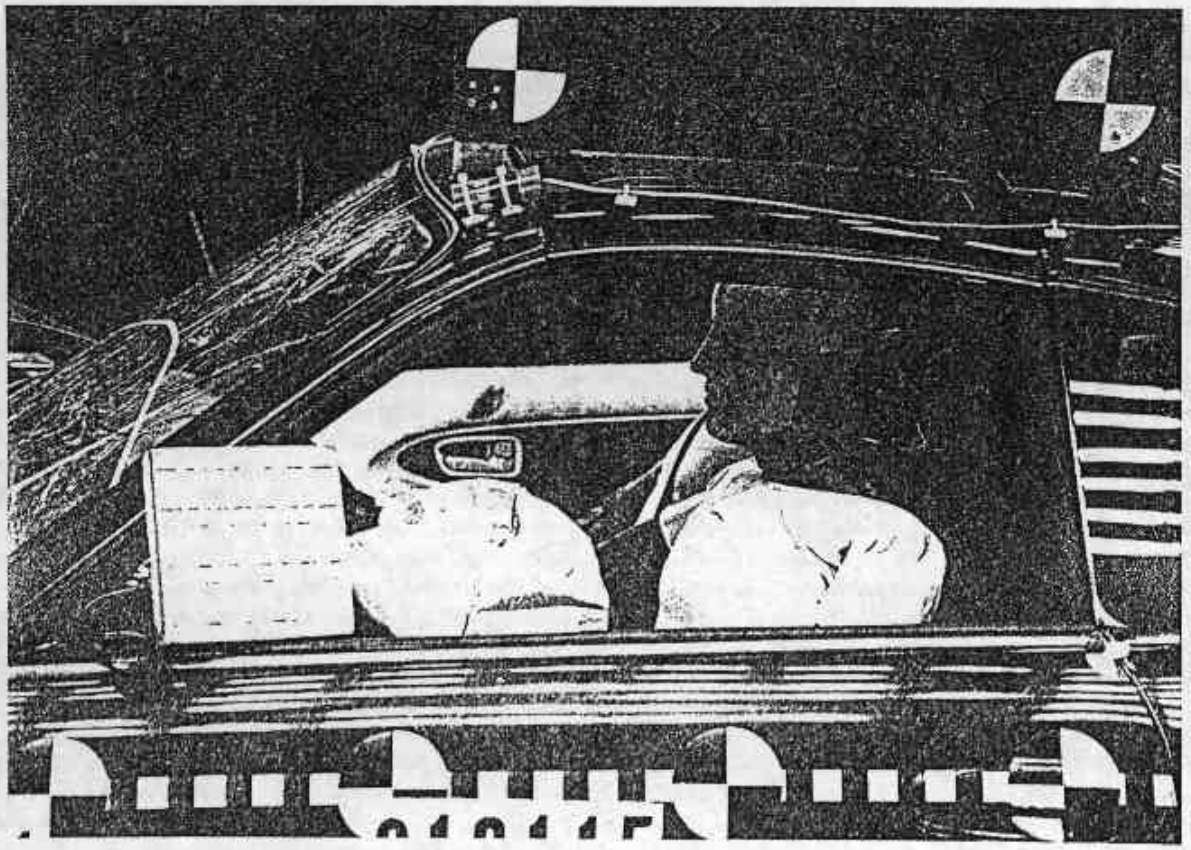


Figure A-24. POST-TEST DRIVER DUMMY POSITION VIEW

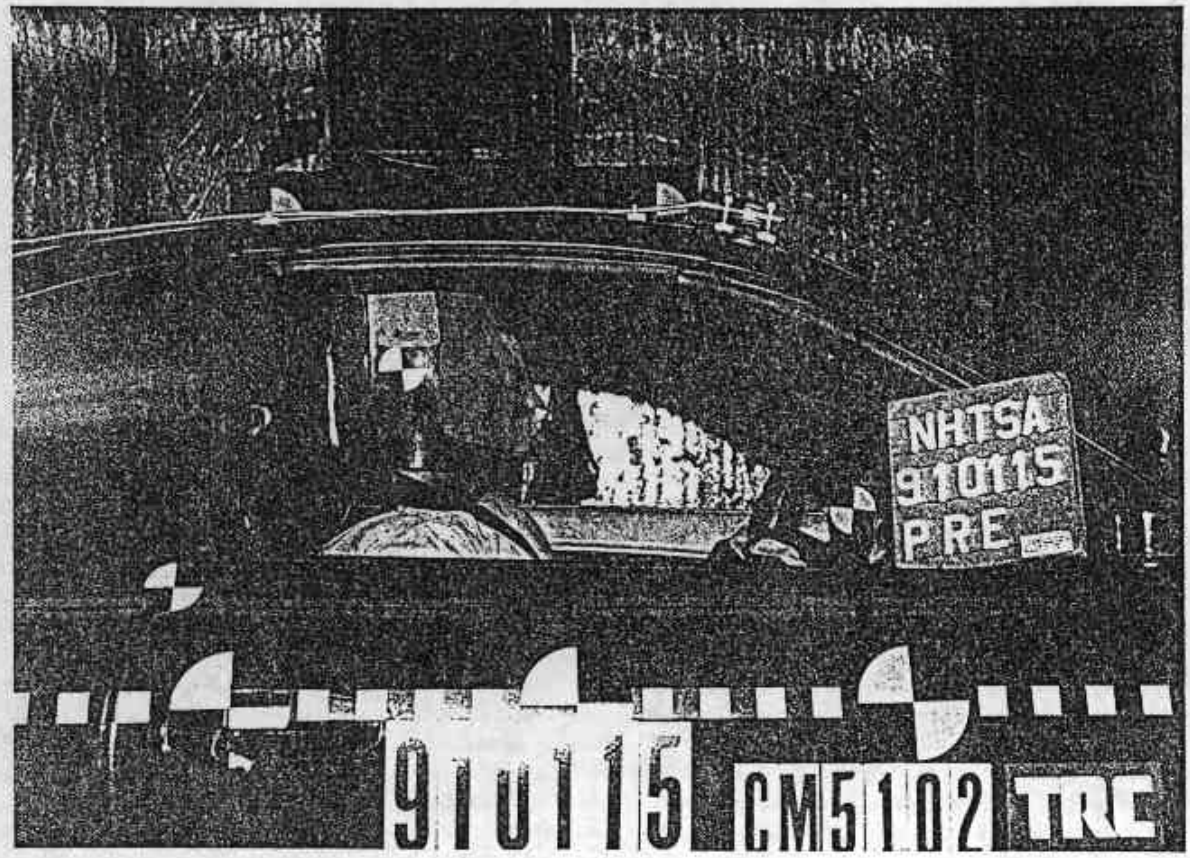


Figure A-25. PRE-TEST PASSENGER DUMMY POSITION VIEW

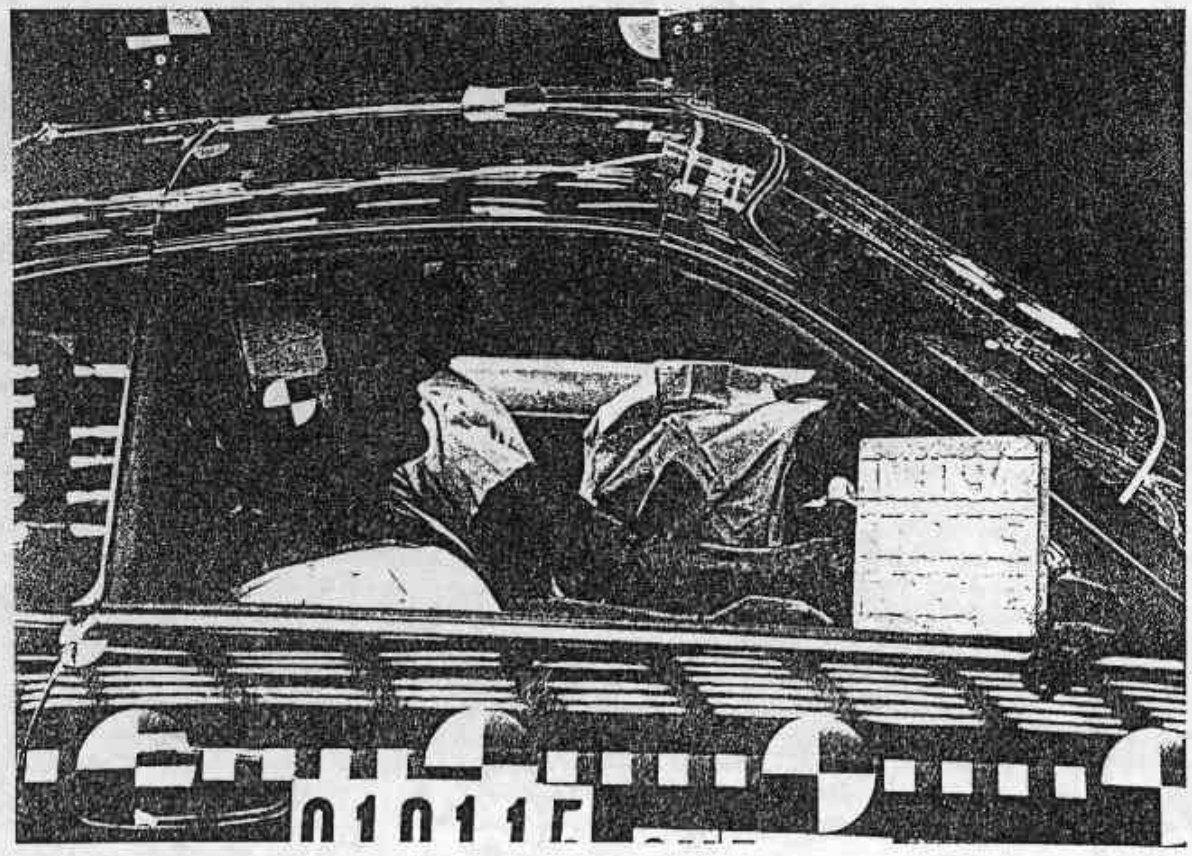


Figure A-26. POST-TEST PASSENGER DUMMY POSITION VIEW

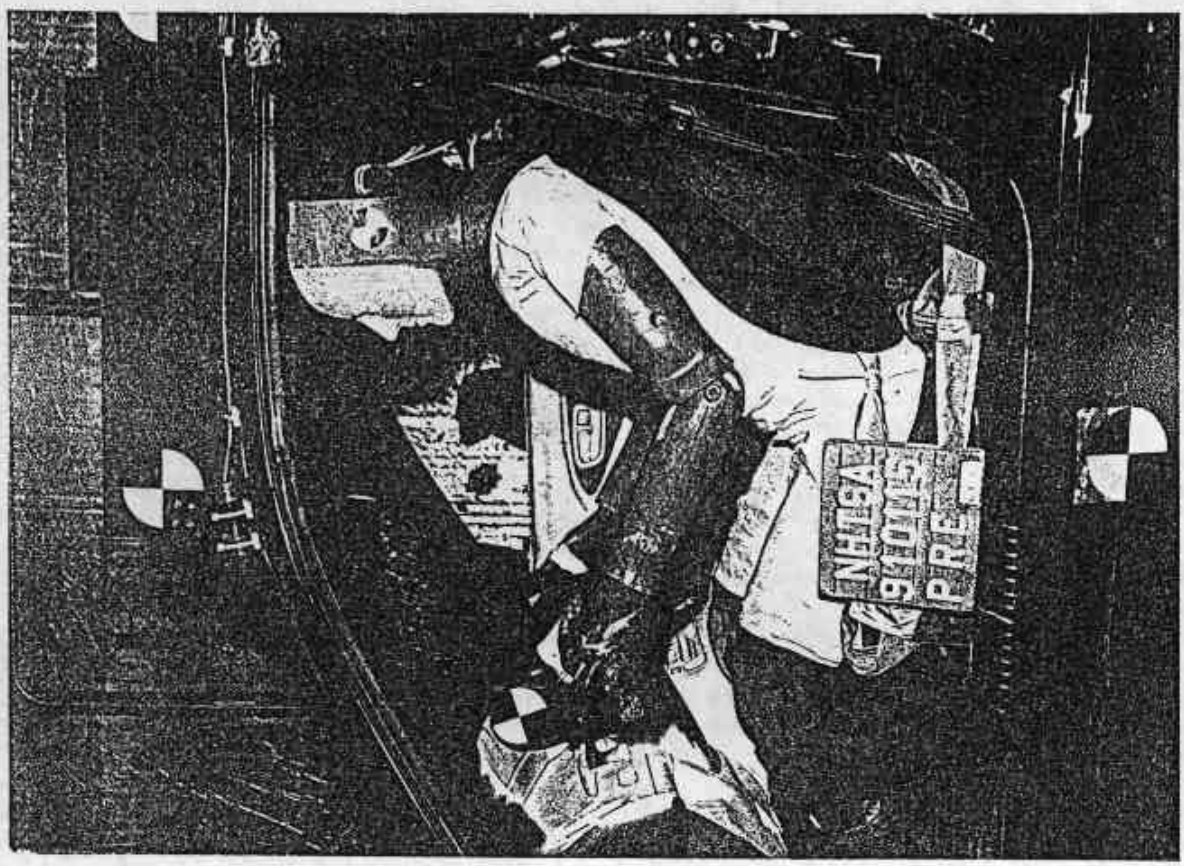


Figure A-27. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

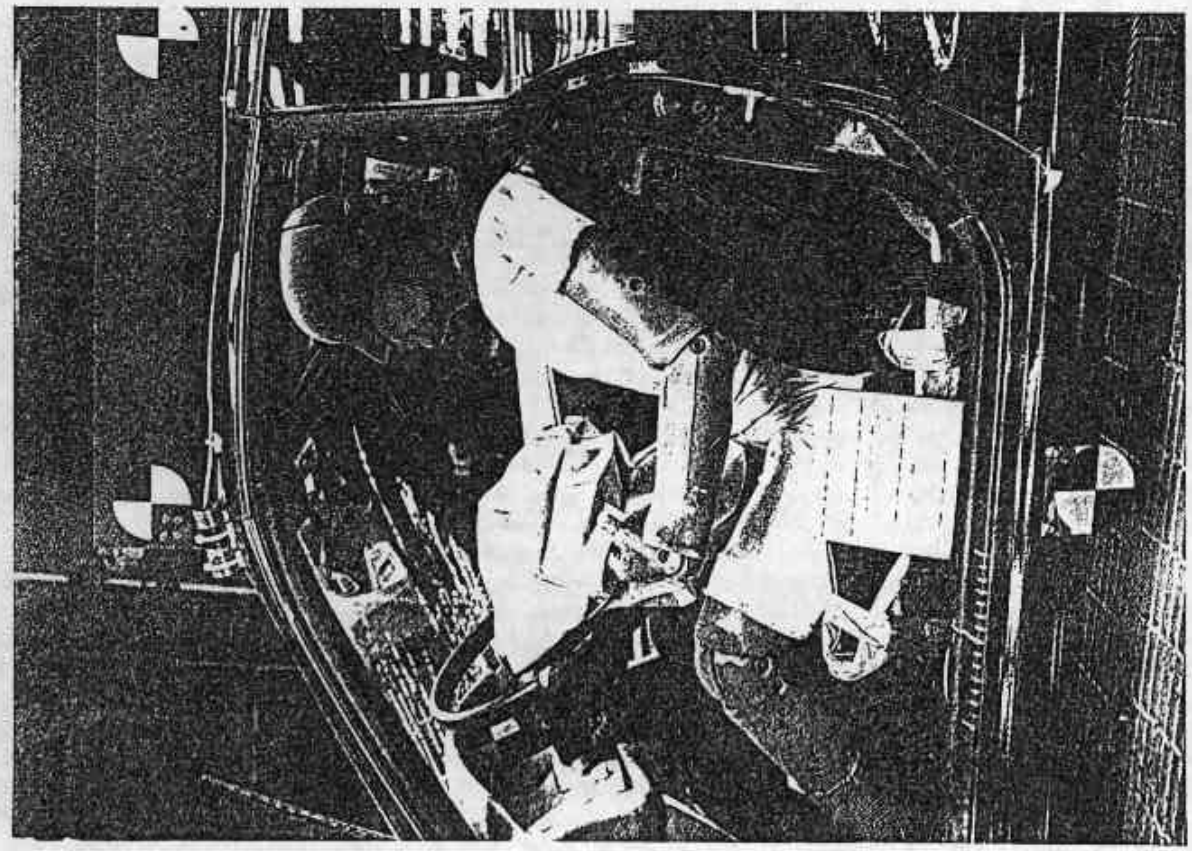


Figure A-28. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

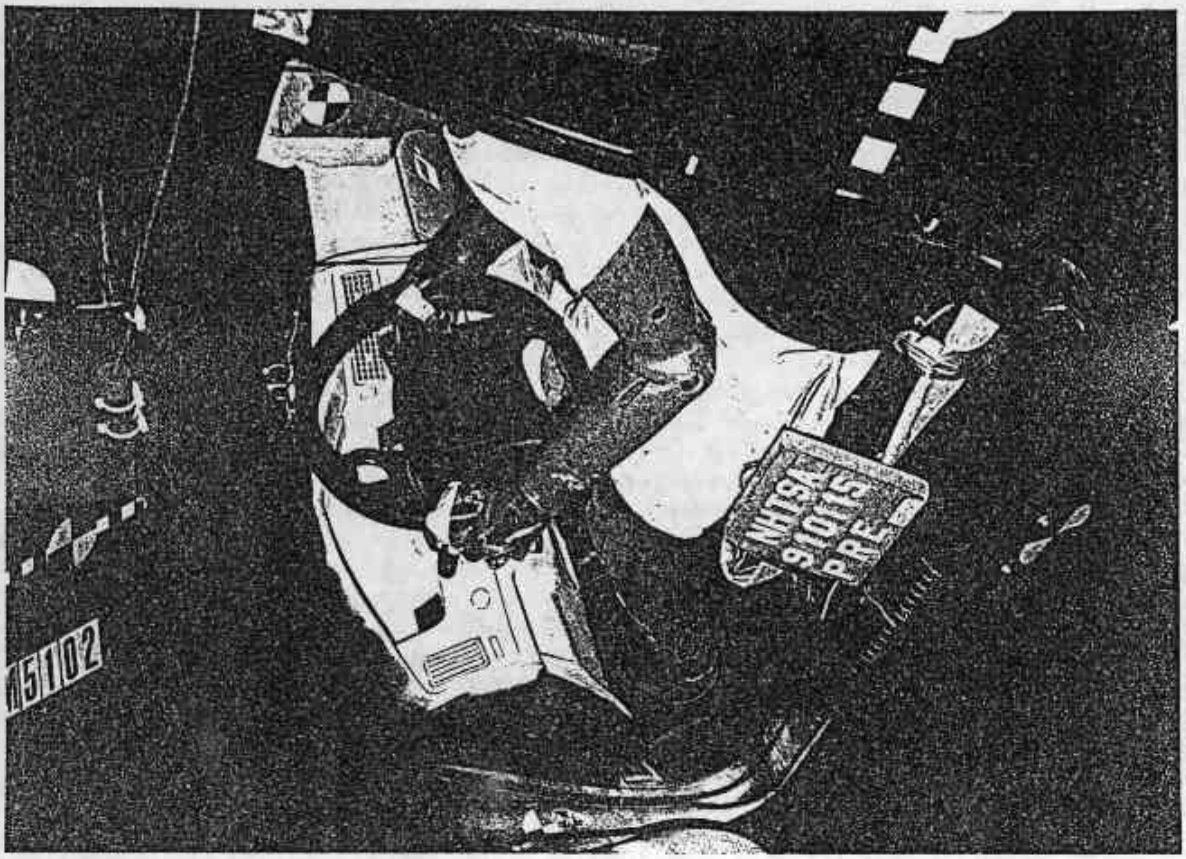


Figure A-29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

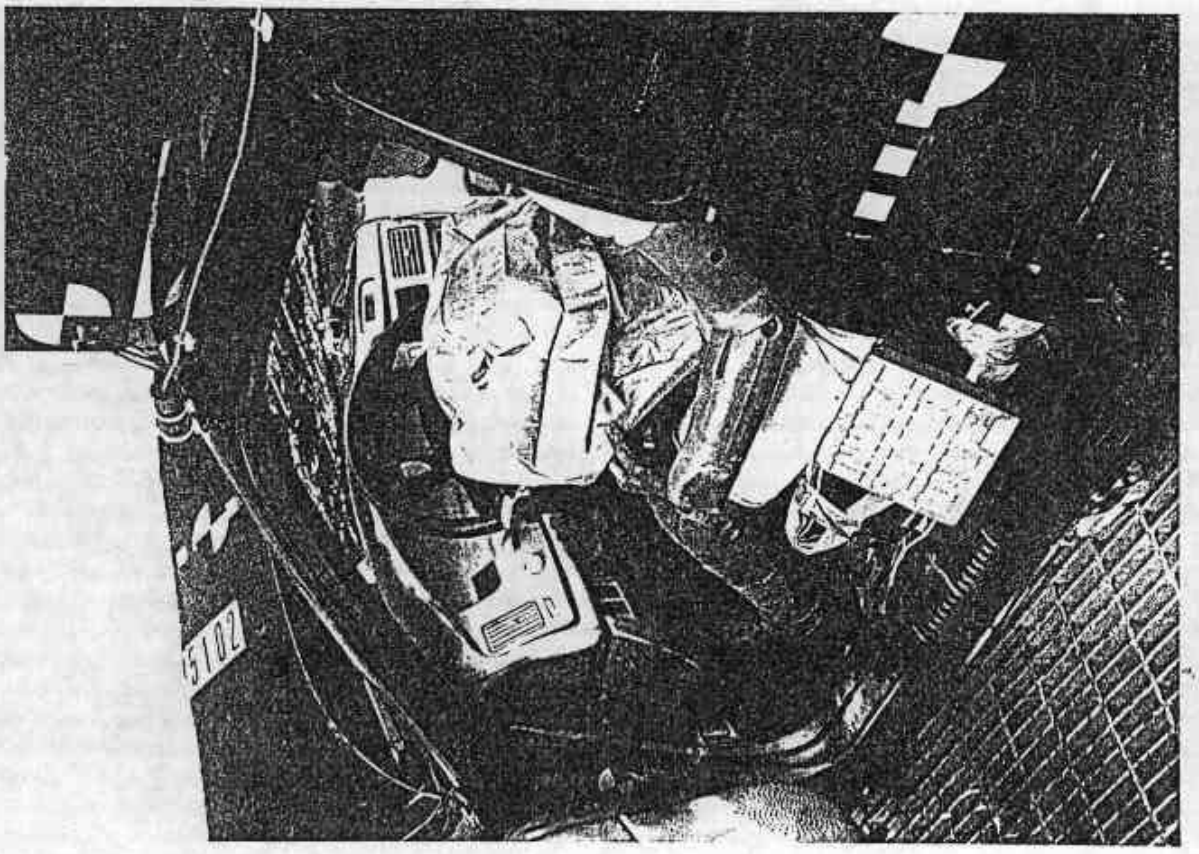


Figure A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

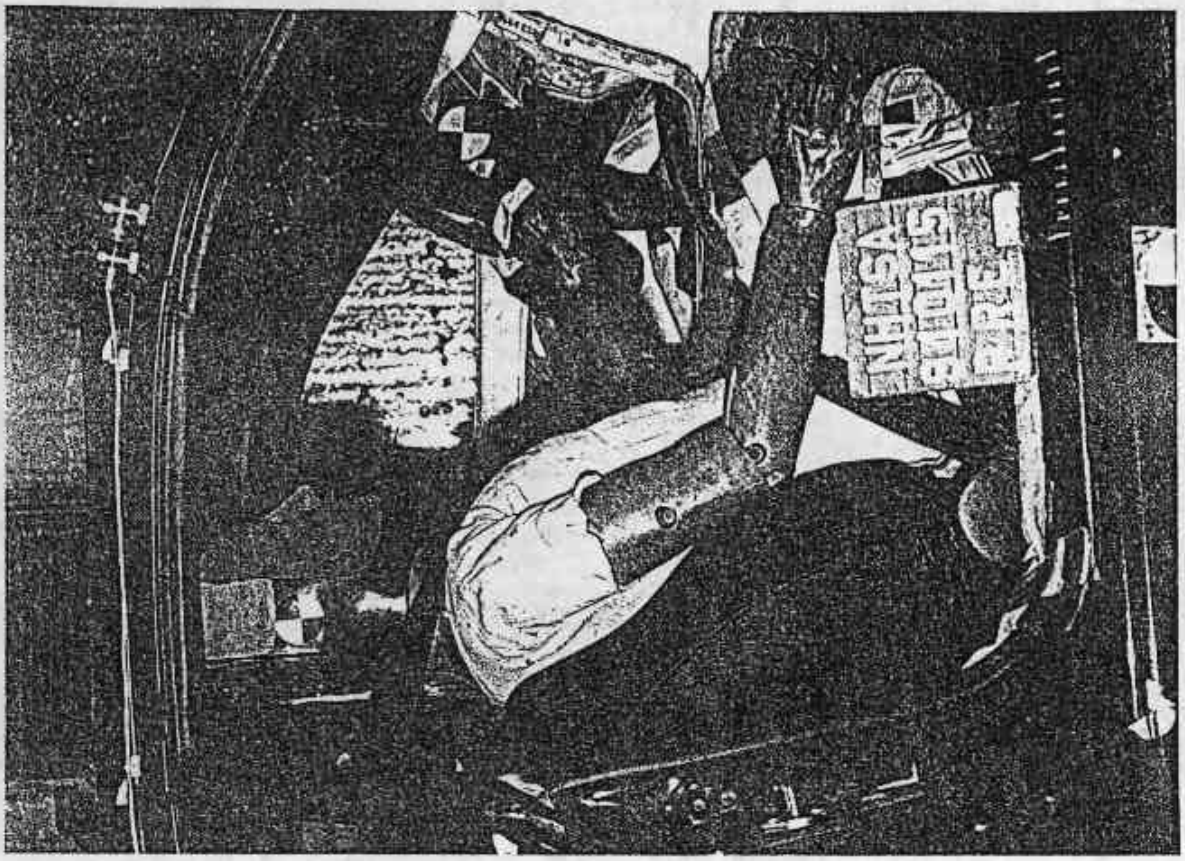


Figure A-31. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

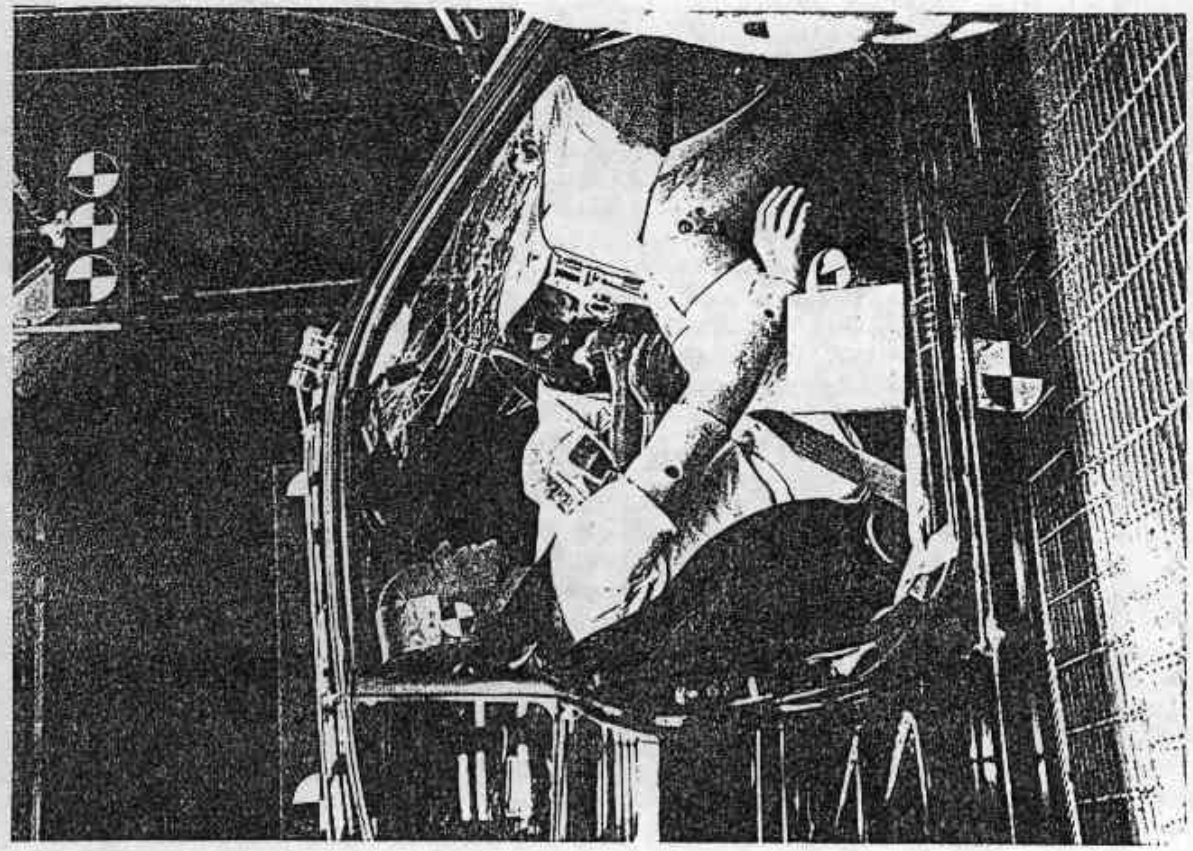


Figure A-32. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-33. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

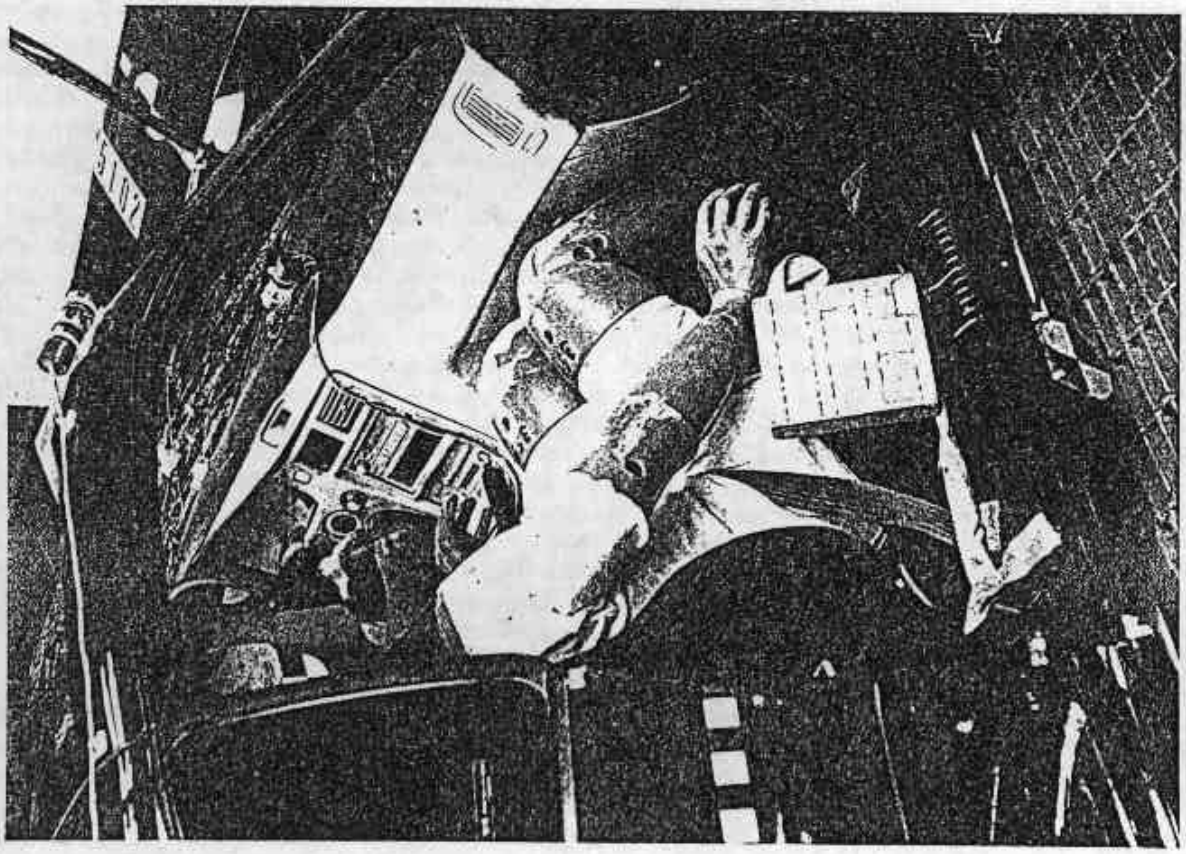


Figure A-34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-35. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

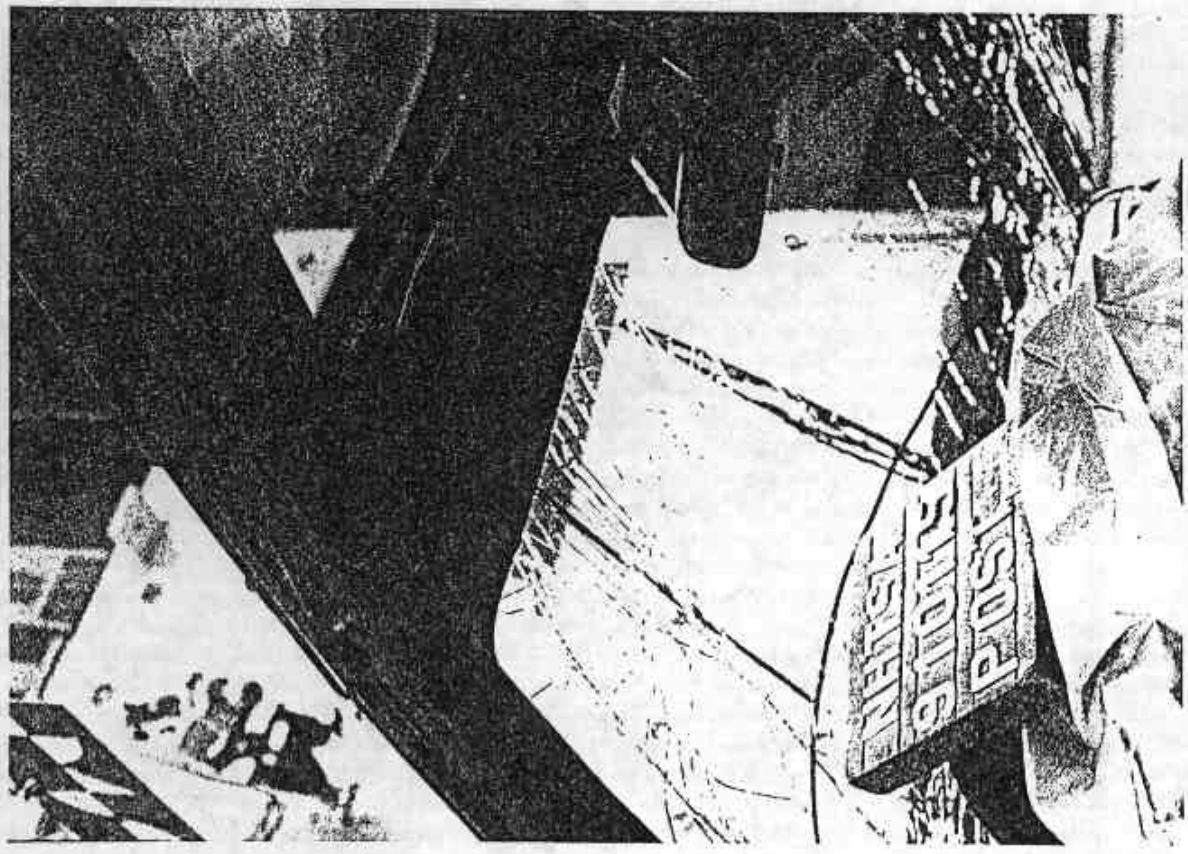


Figure A-36. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

Figure A-37. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 3

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

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

Figure A-40. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 1

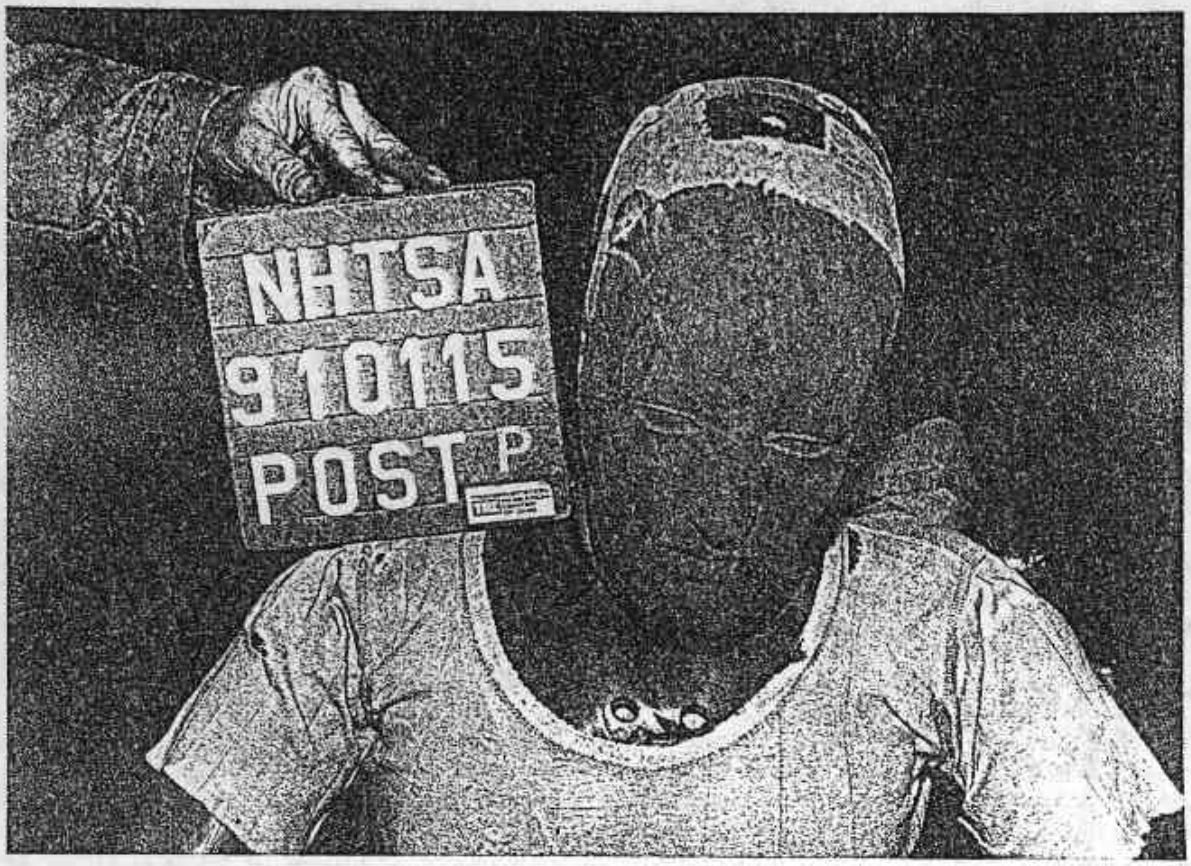


Figure A-41. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 2

Figure A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1

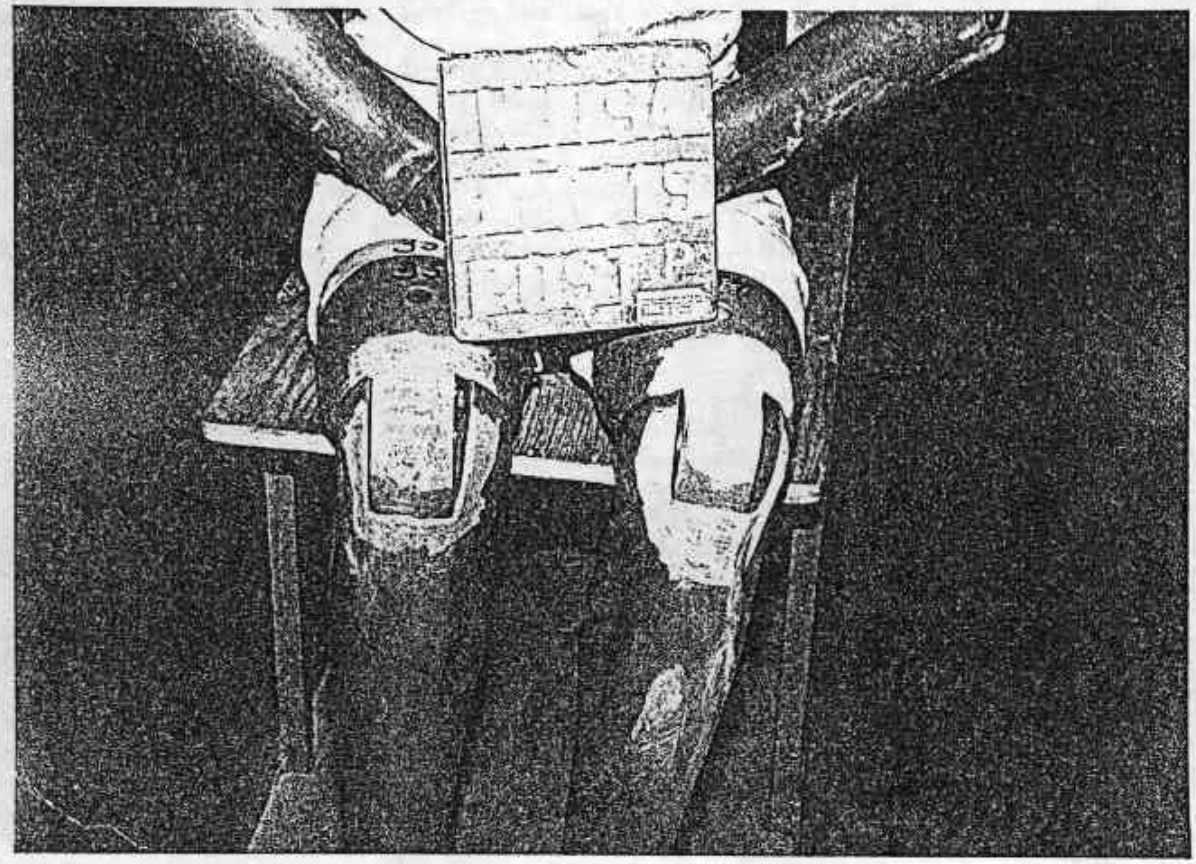


Figure A-43. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

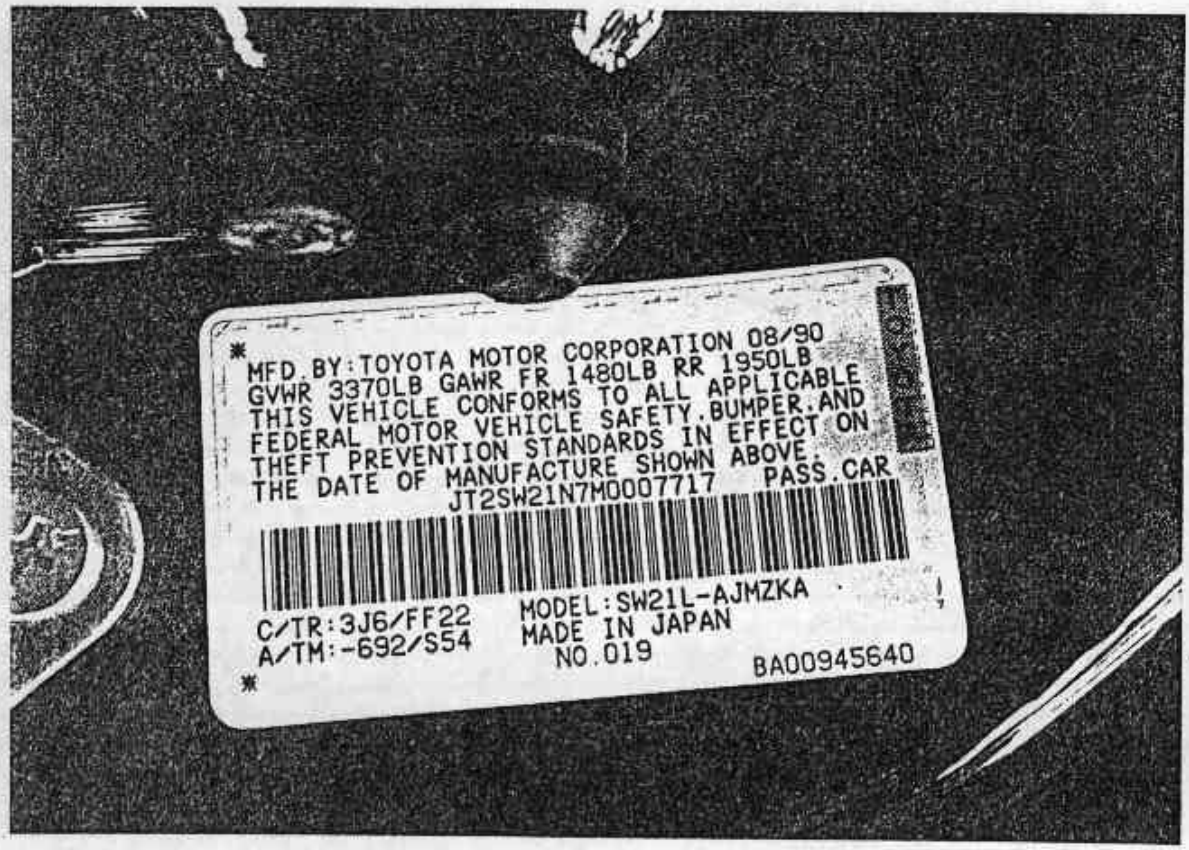


Figure A-44. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

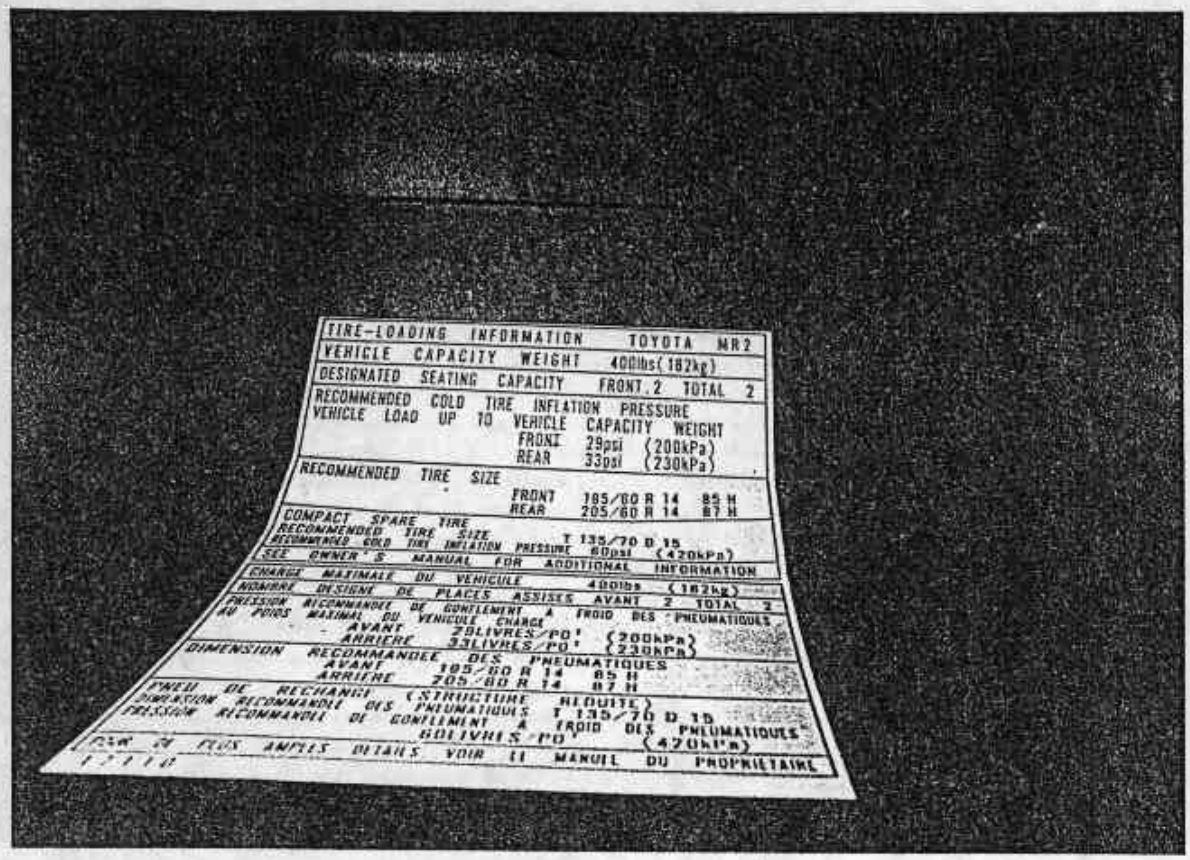


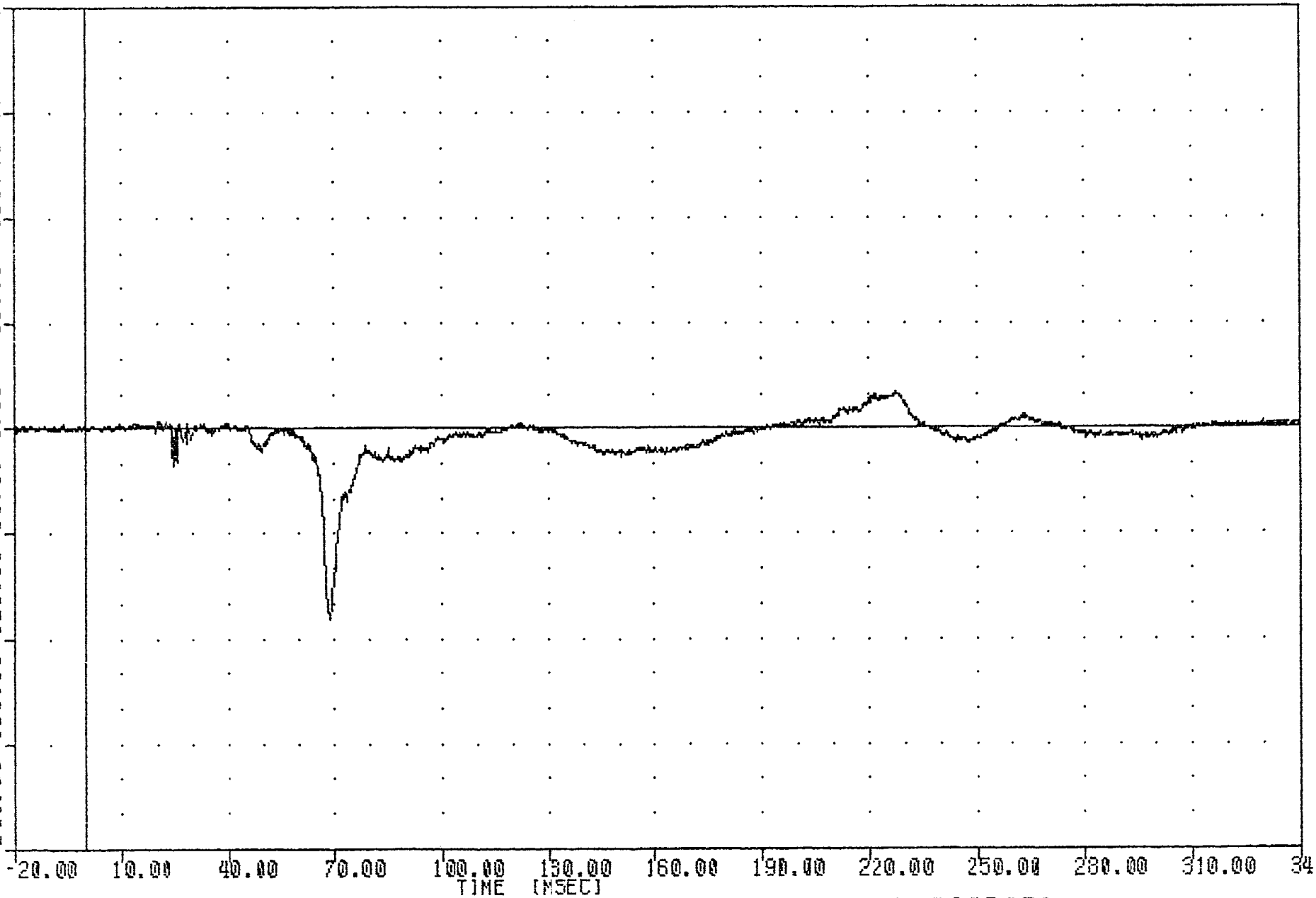
Figure A-45. PRE-TEST VEHICLE RECOMMENDED TIRE PRESSURE LABEL VIEW

APPENDIX B

DATA PLOTS

208 COMPLIANCE TESTING
91015
HEDXG1

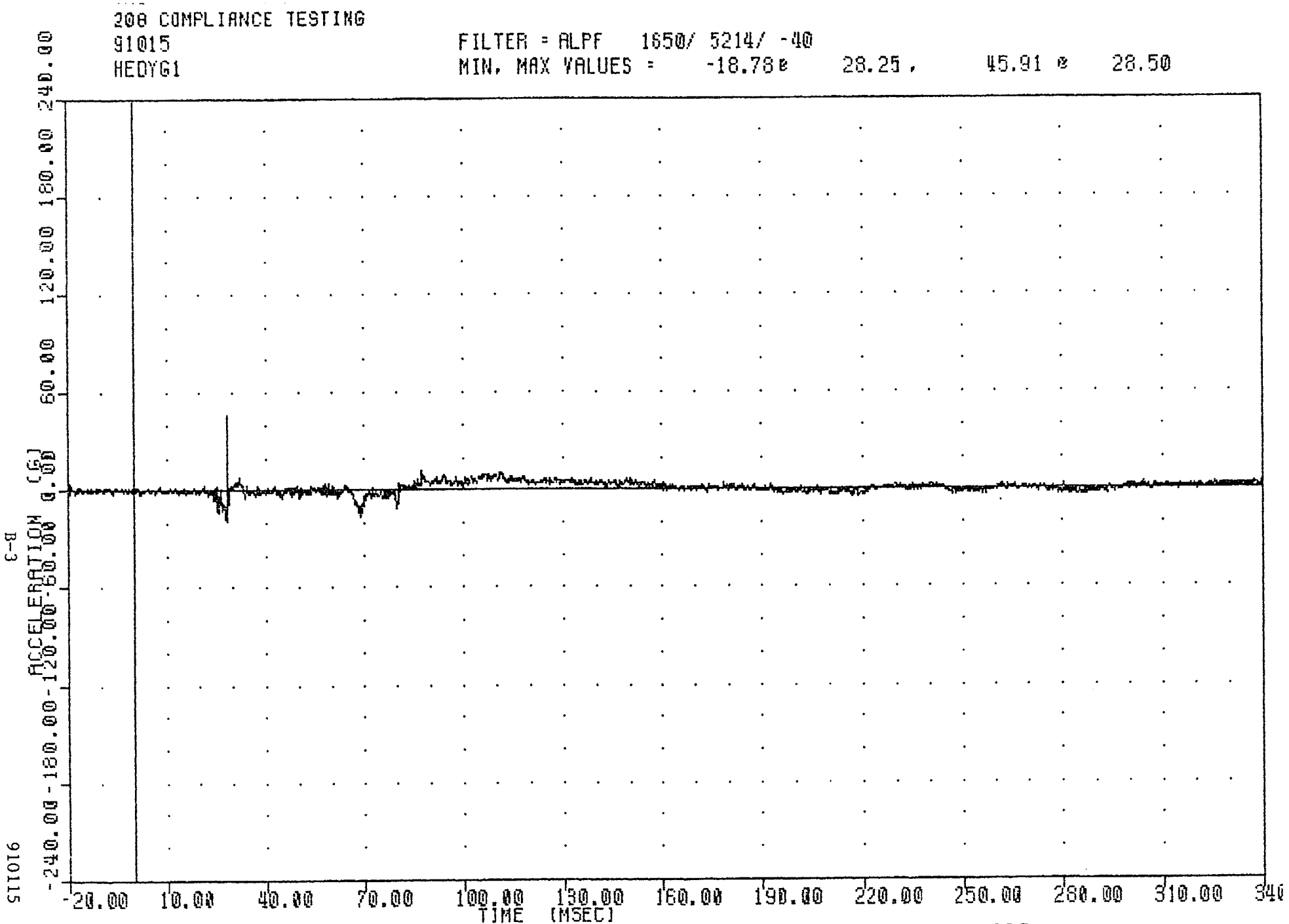
FILTER = CFC 1650/ 5214/ -40
MIN, MAX VALUES = -108.61 @ 68.63 , 20.12 @ 227.63



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION

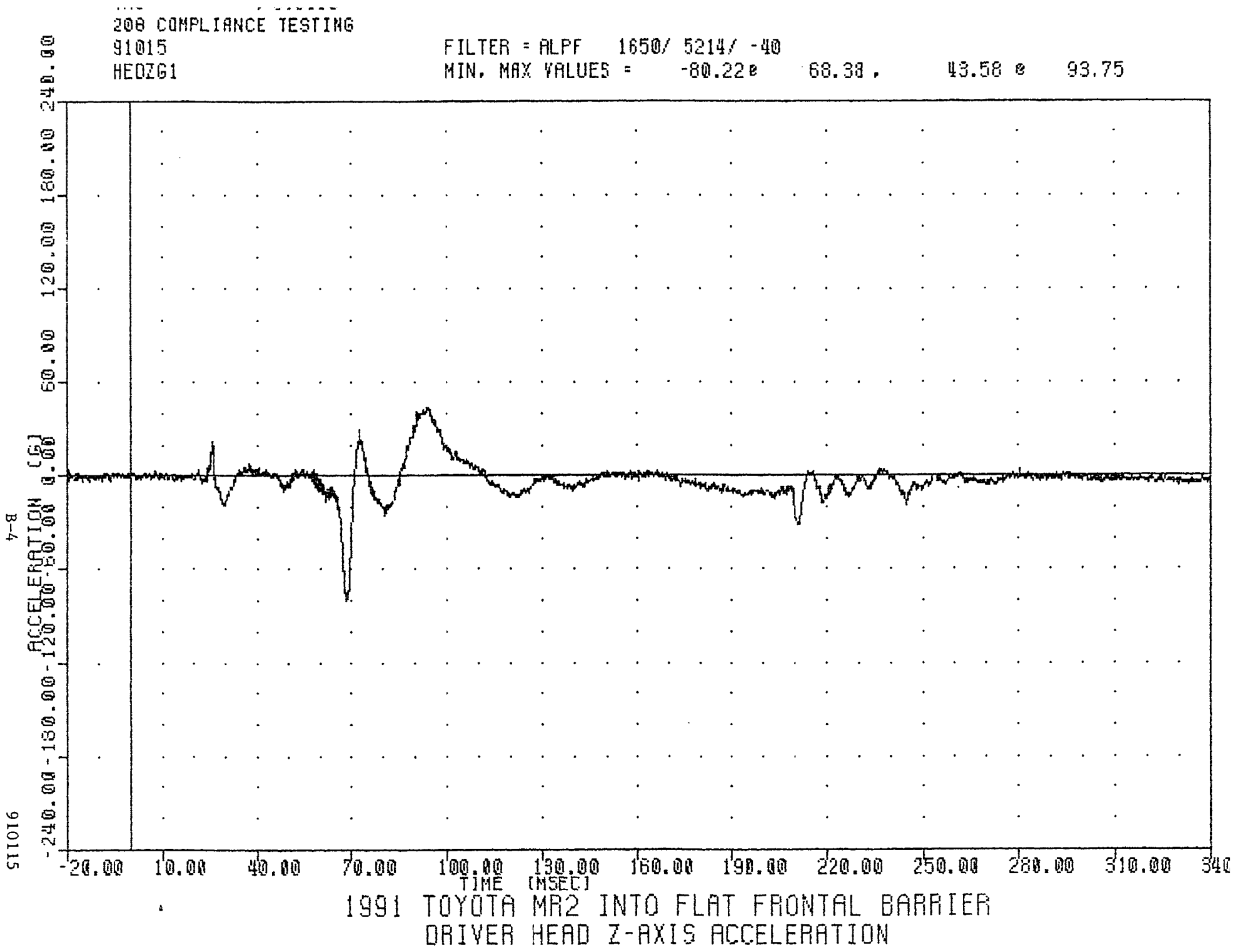
B-2

910115



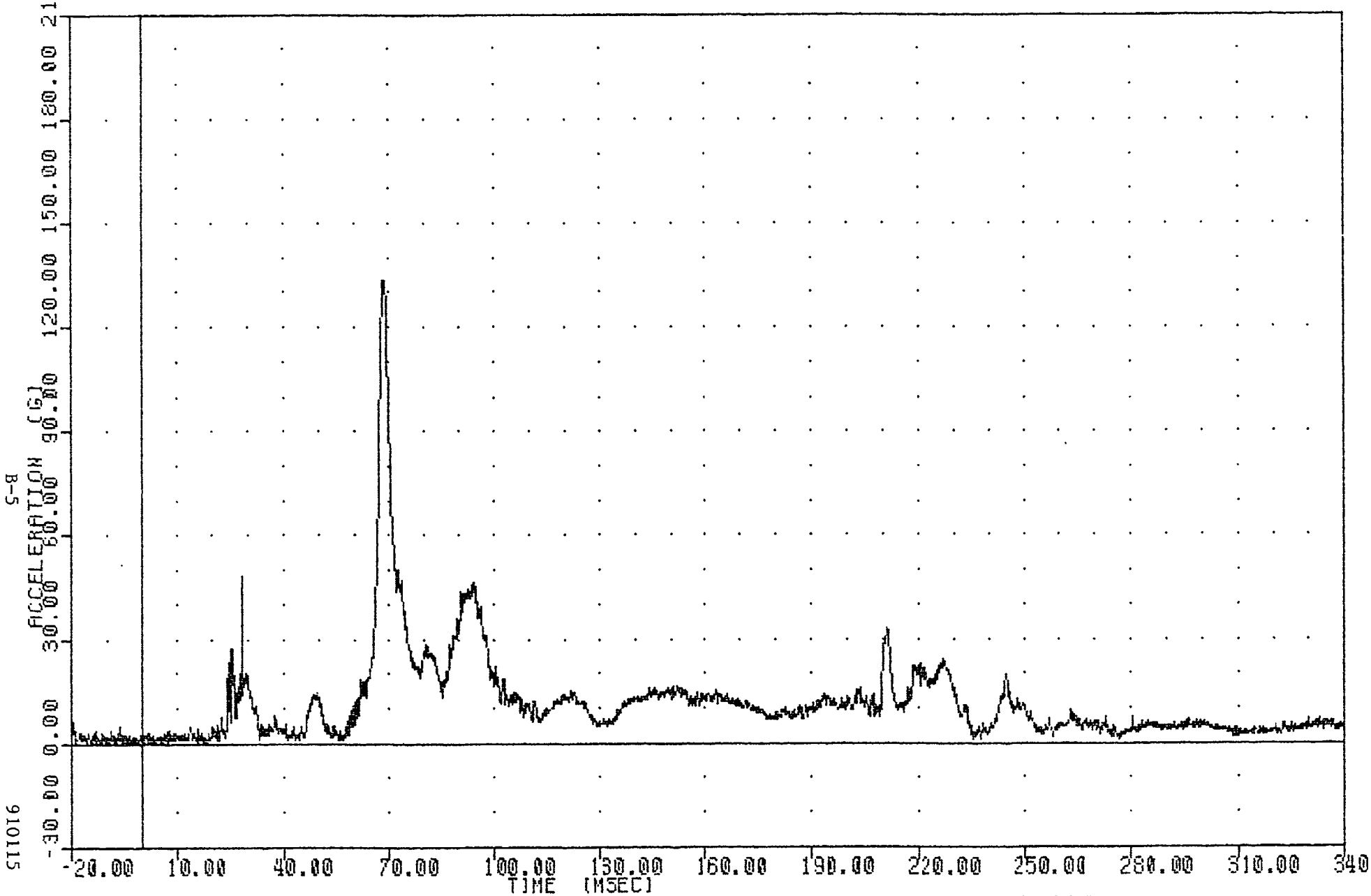
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION

91015


208 COMPLIANCE TESTING
91015
HEDZG1
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -80.22@ 68.38, 43.58@ 93.75
240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340
TIME (MSEC)
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION

208 COMPLIANCE TESTING
91015
HEDRG1

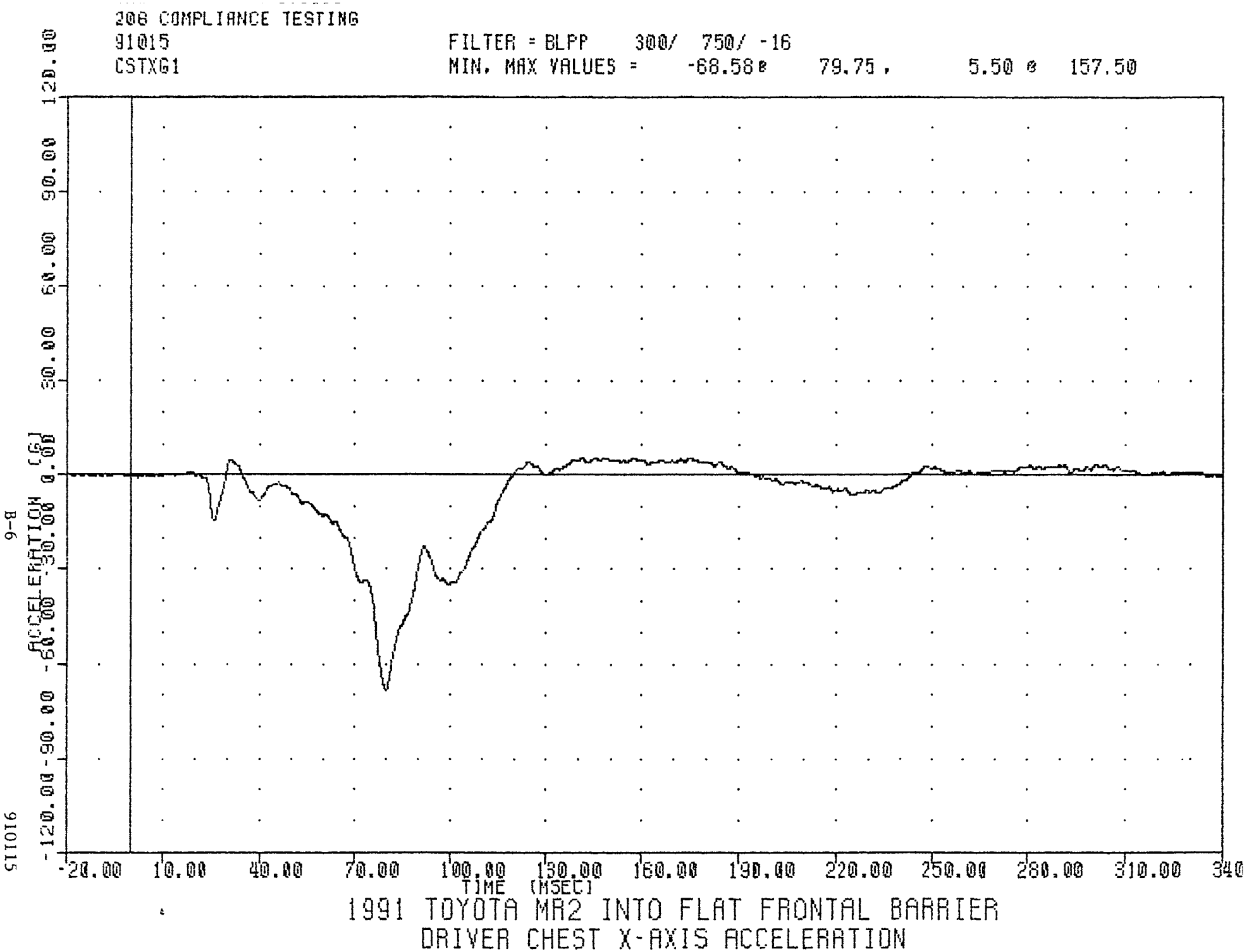
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = 0.17@ -4.75, 133.51@ 68.50



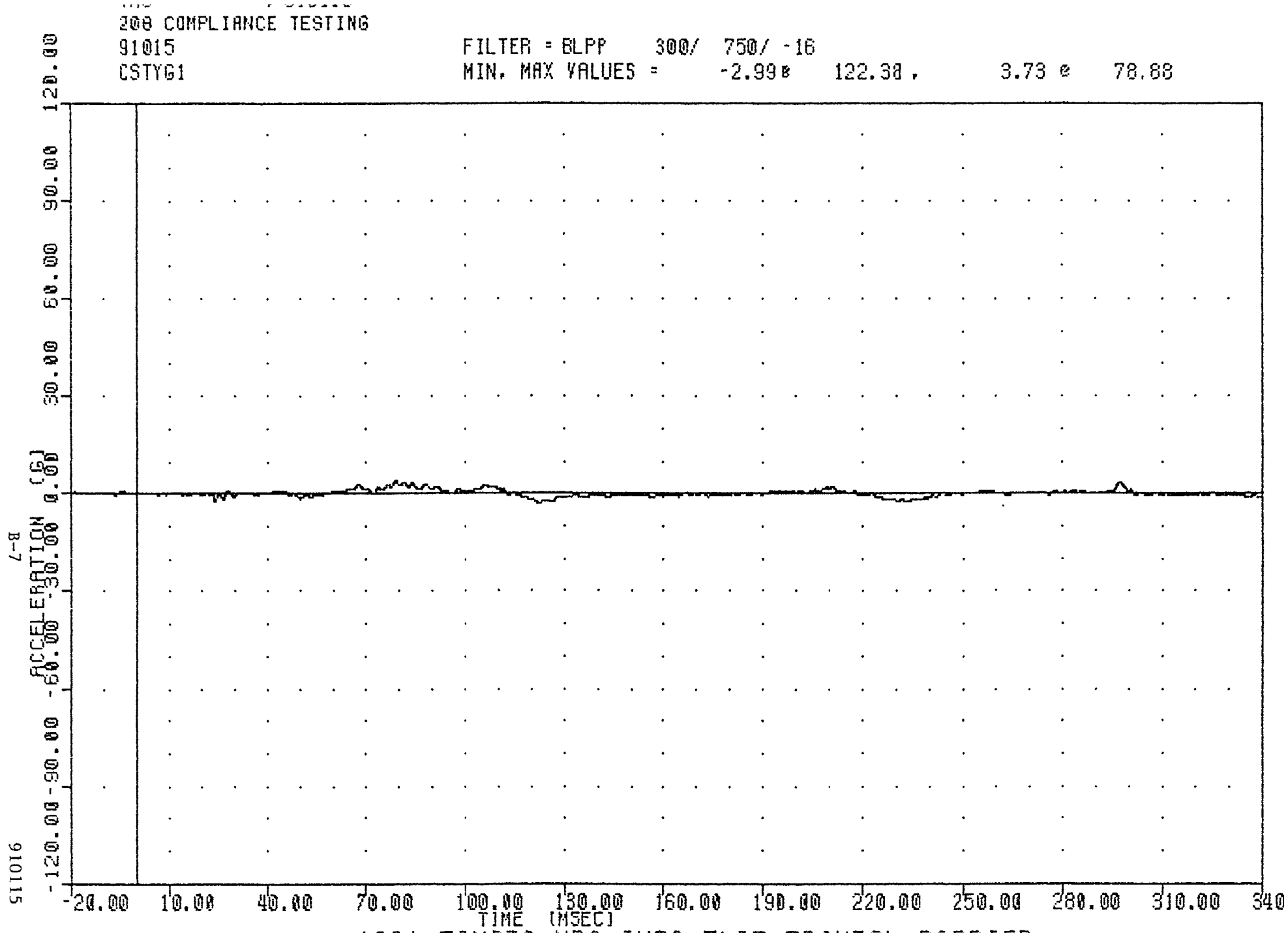
B-5

91015

1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

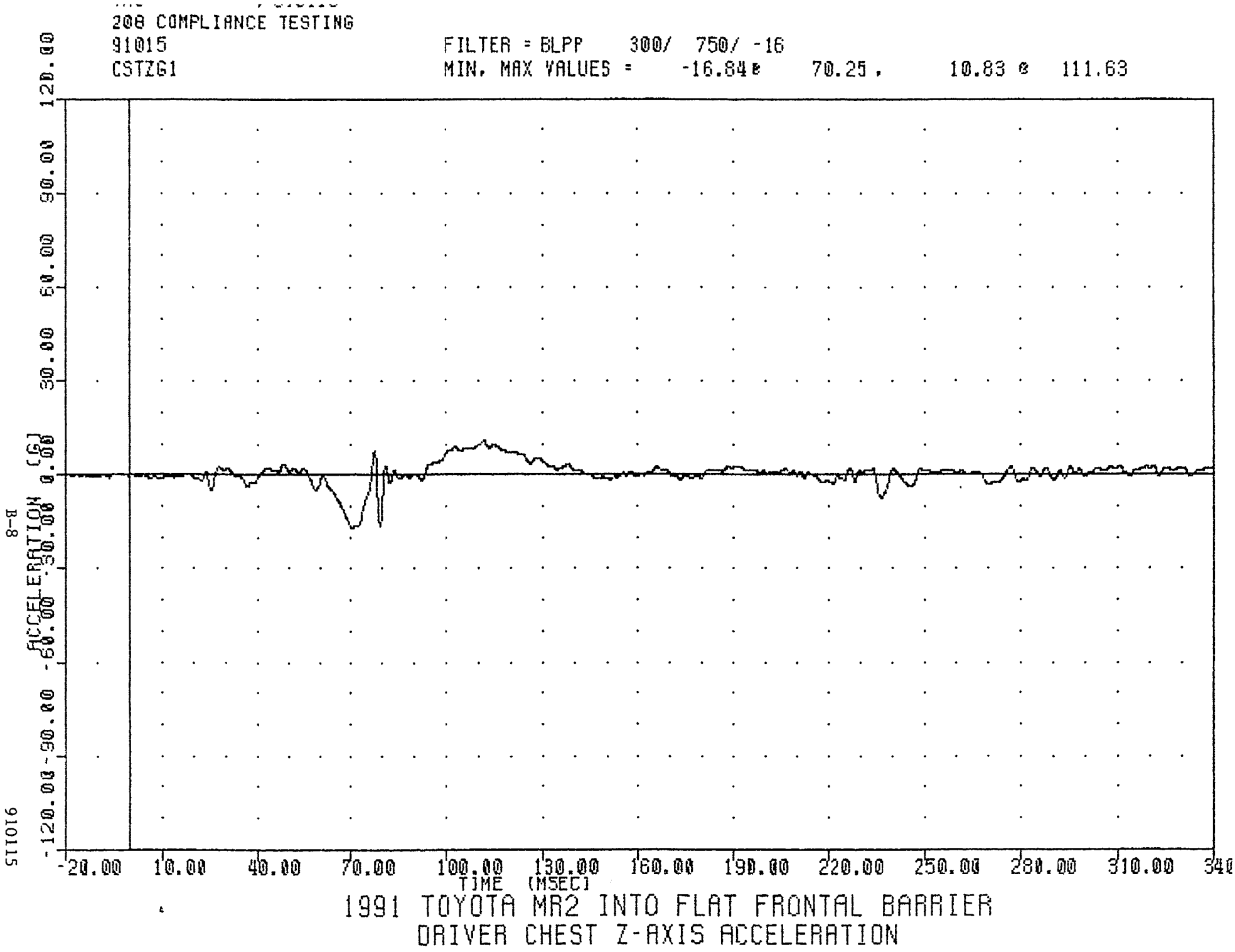


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION



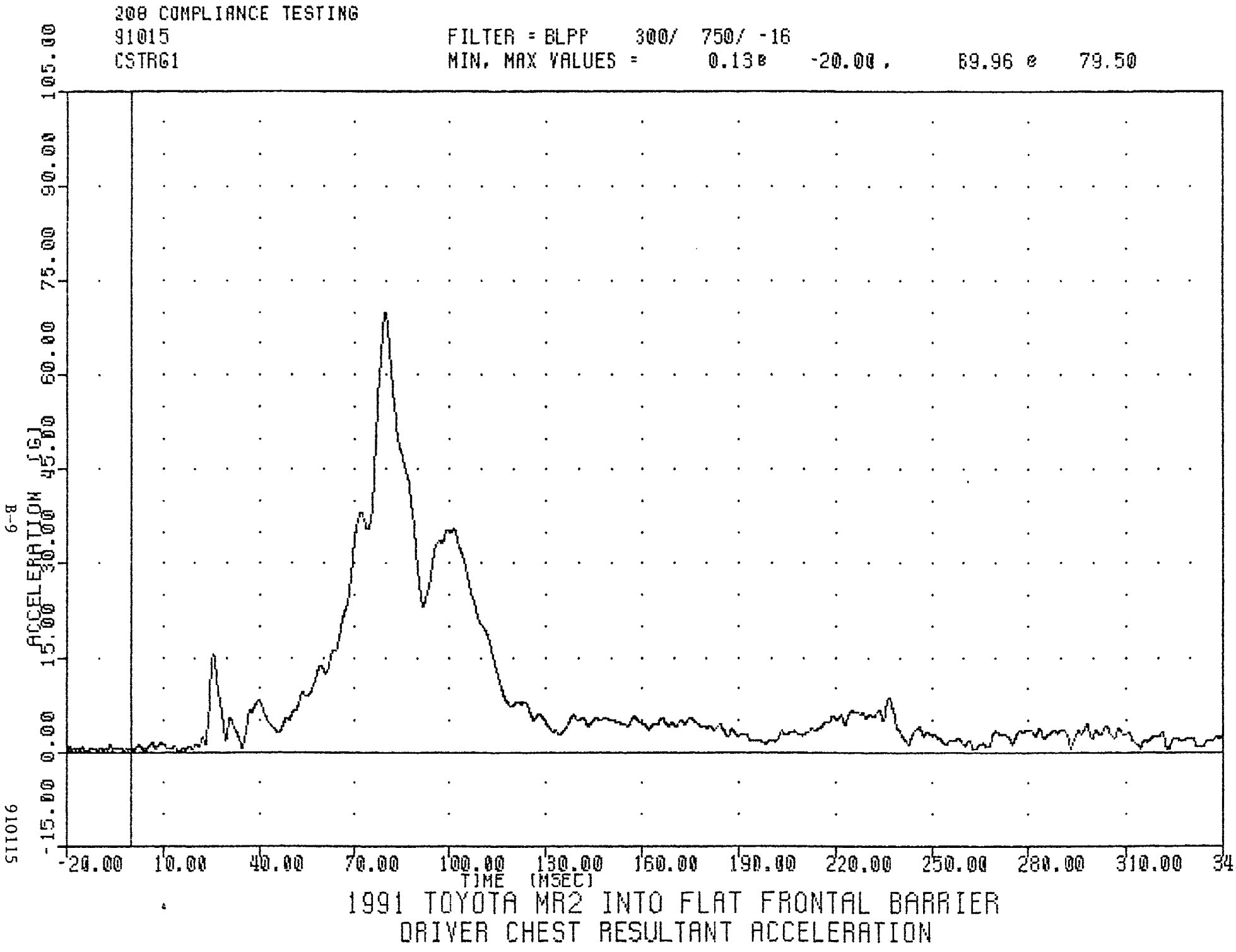
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

91015



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION

91015


208 COMPLIANCE TESTING
91015
CSTRG1
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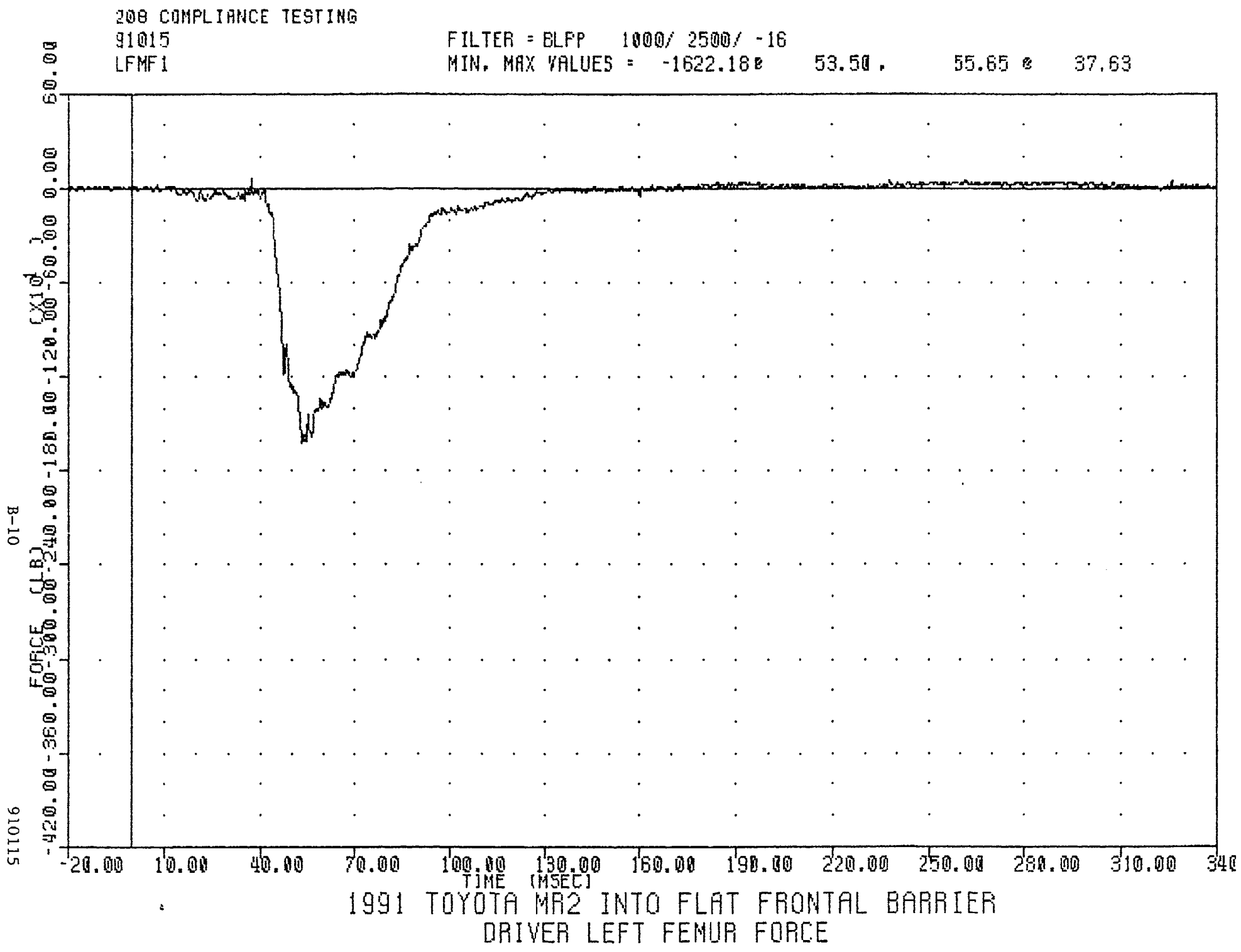
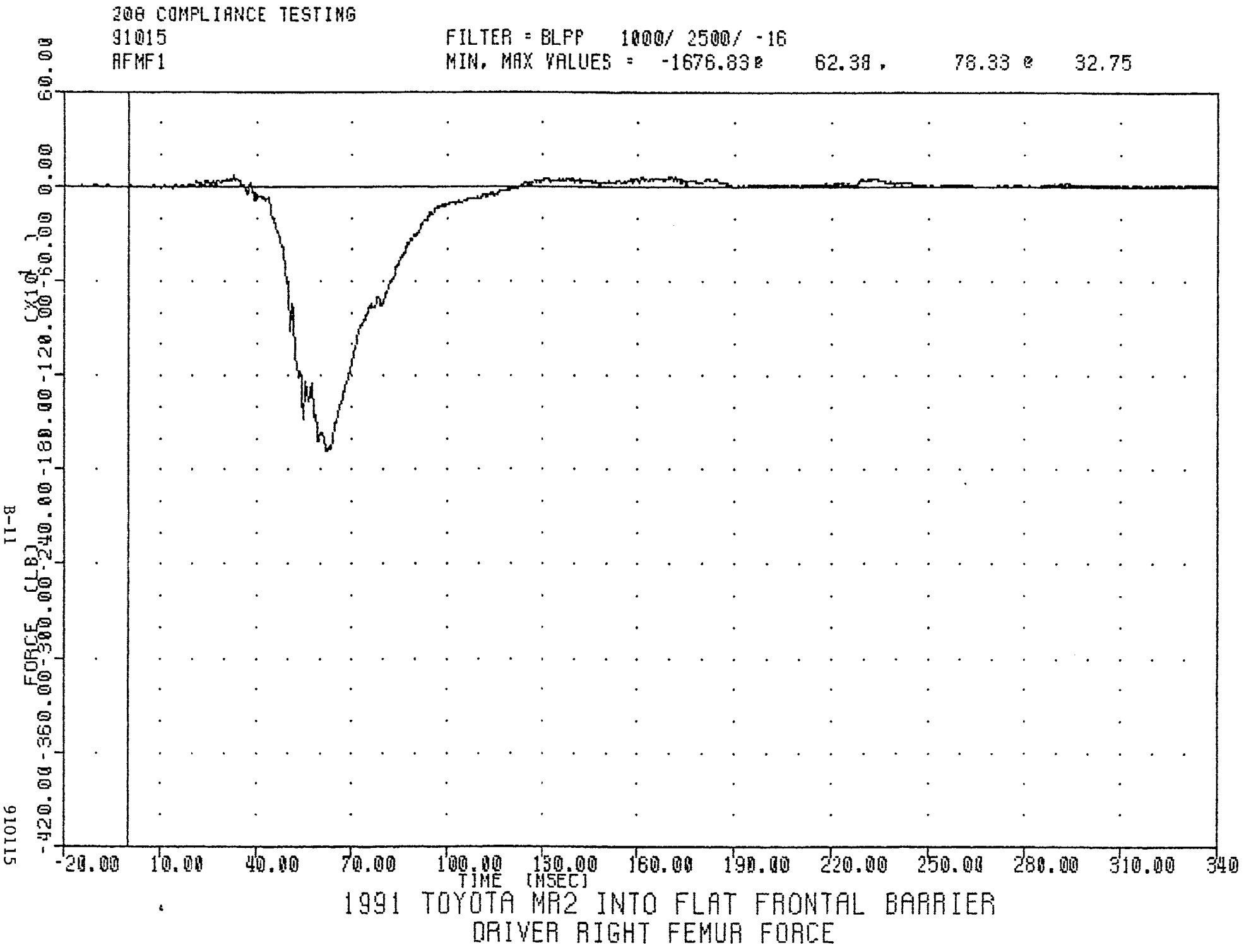
105.00
90.00
75.00
60.00
45.00
30.00
15.00
0.00
-15.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340
TIME (MSEC)
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE


208 COMPLIANCE TESTING
91015
AFMF1
FILTER = BLPP 1000/ 2500/ -16
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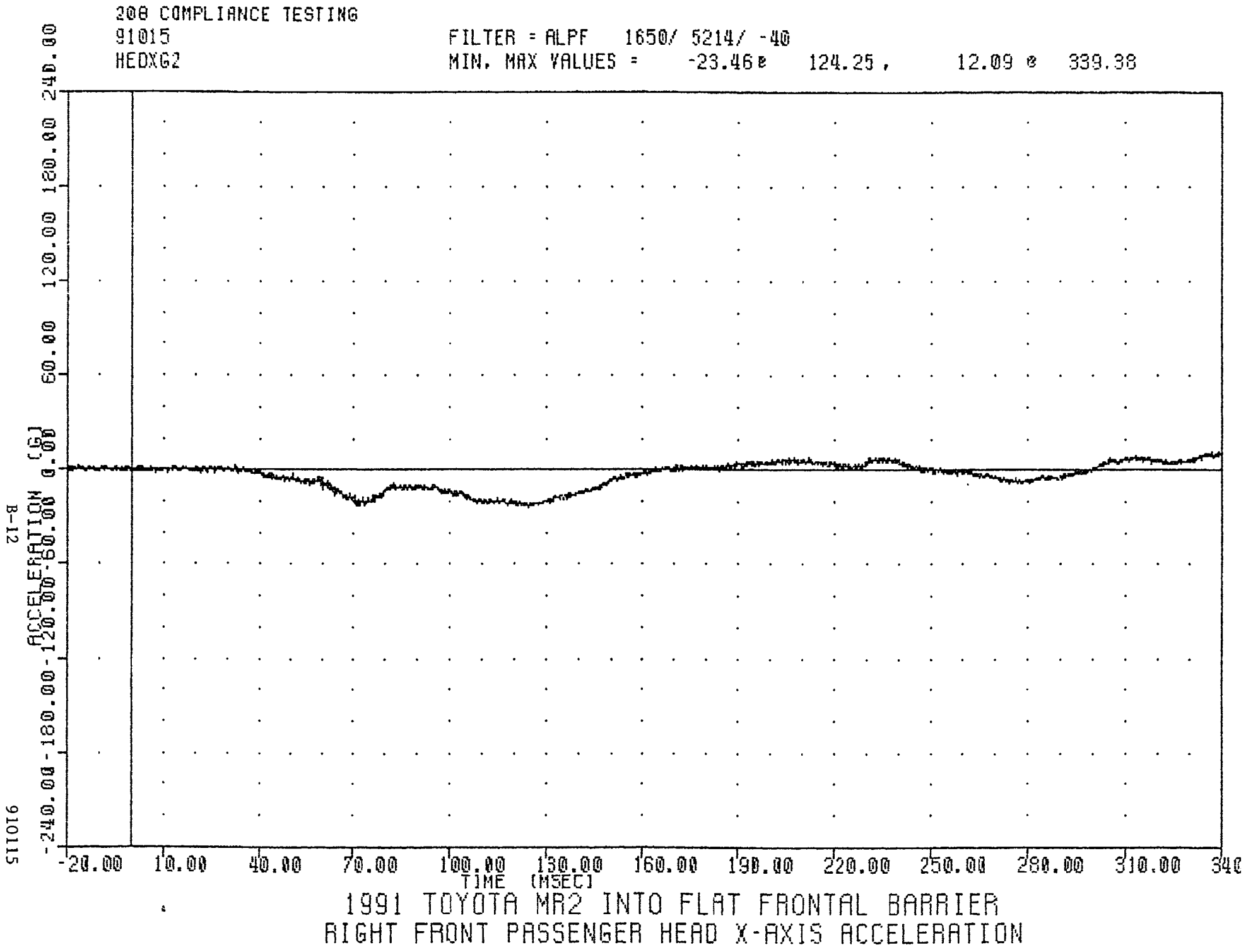
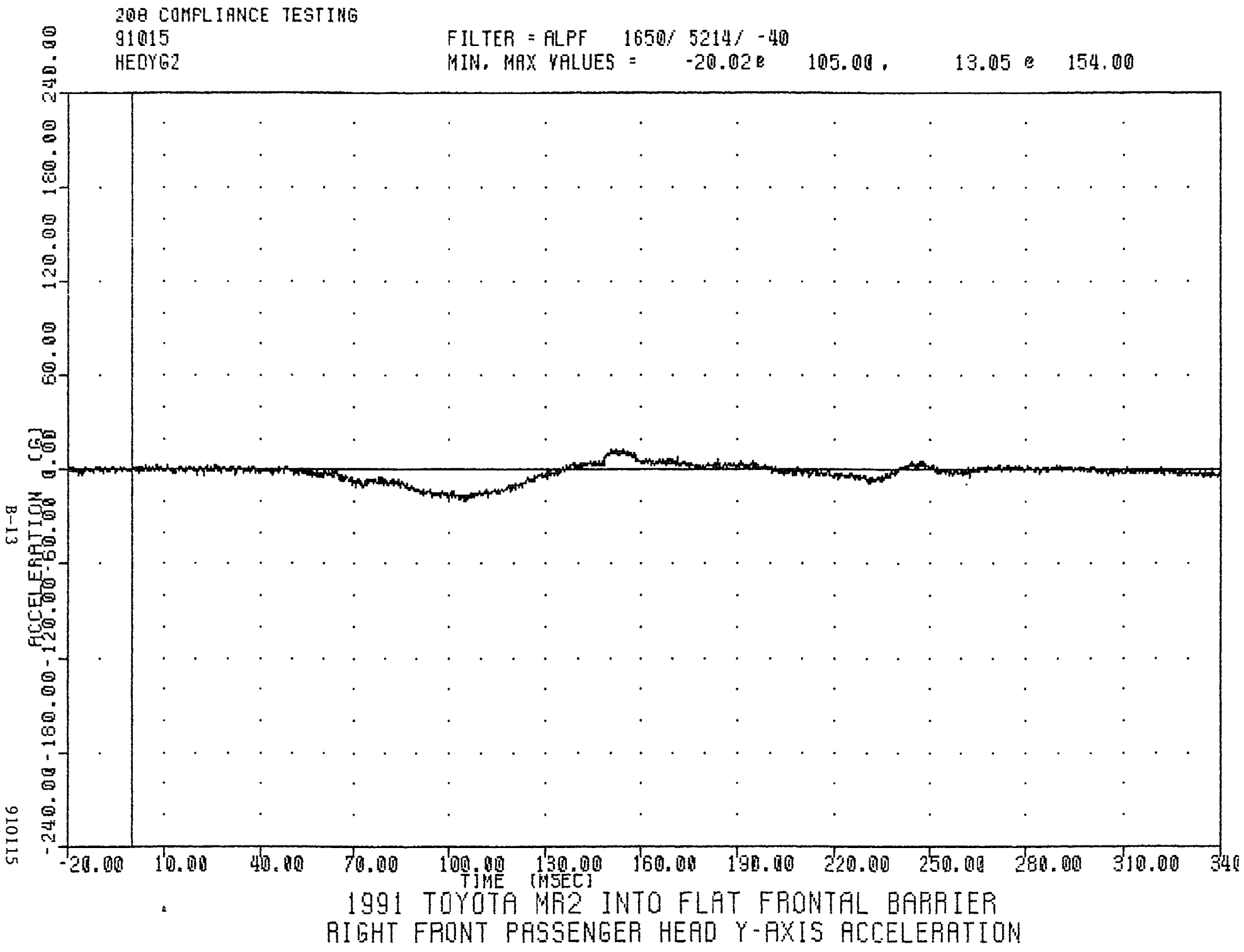
60.00
0.00
-60.00
-120.00
-180.00
-240.00
-300.00
-360.00
-420.00
FORCE (LB) (X10^1)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340
TIME (MSEC)
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

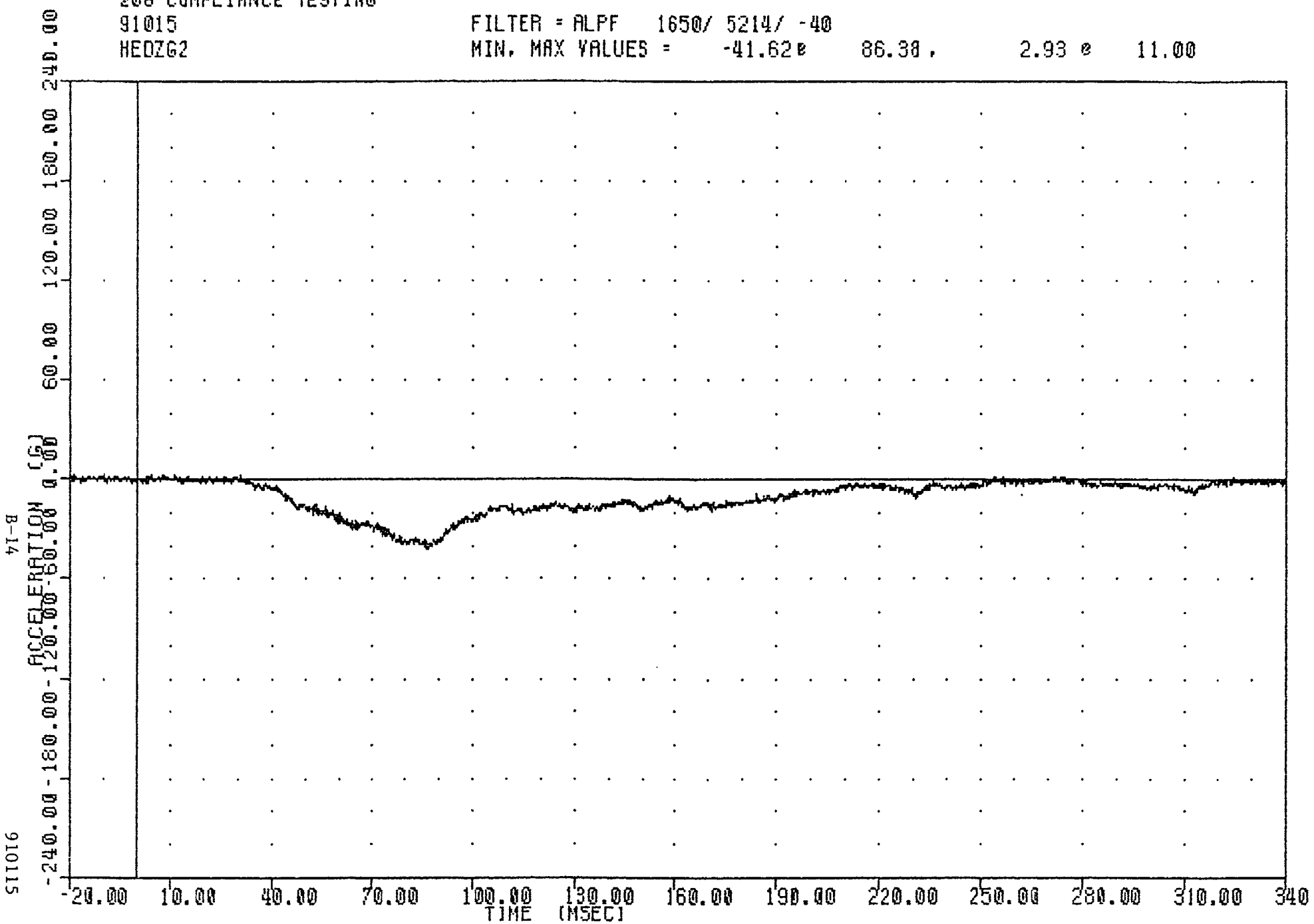


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

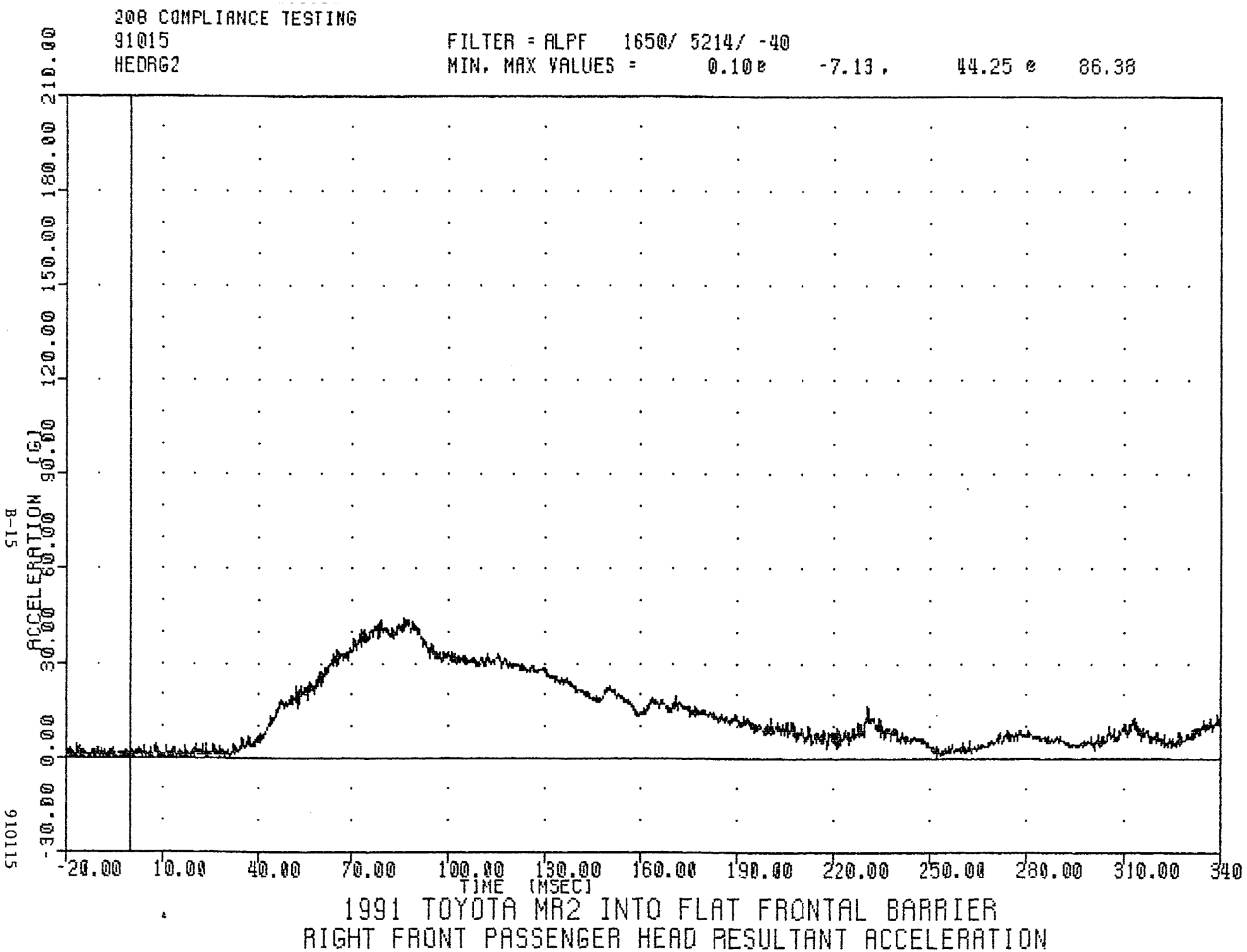


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

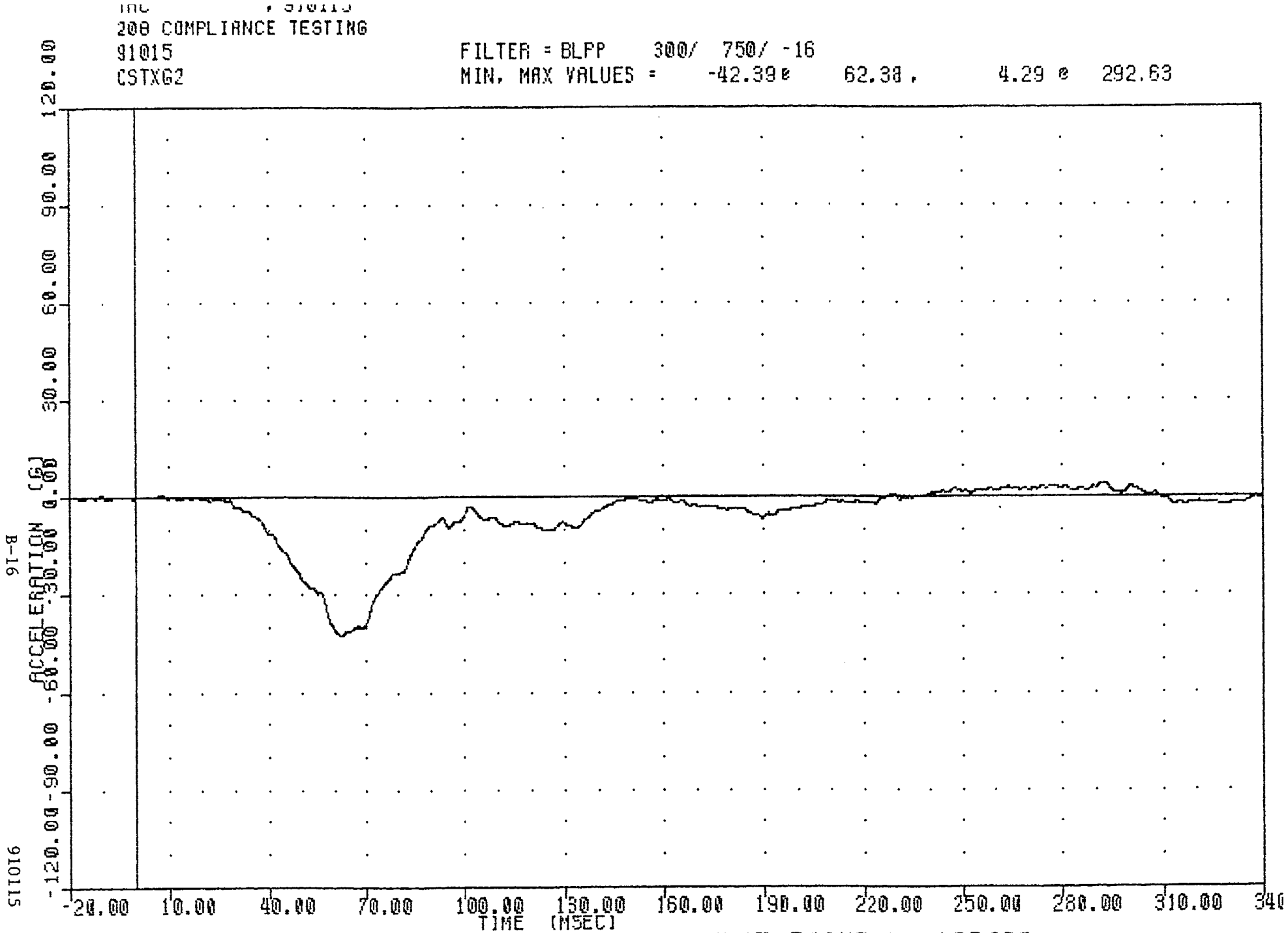
91015



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

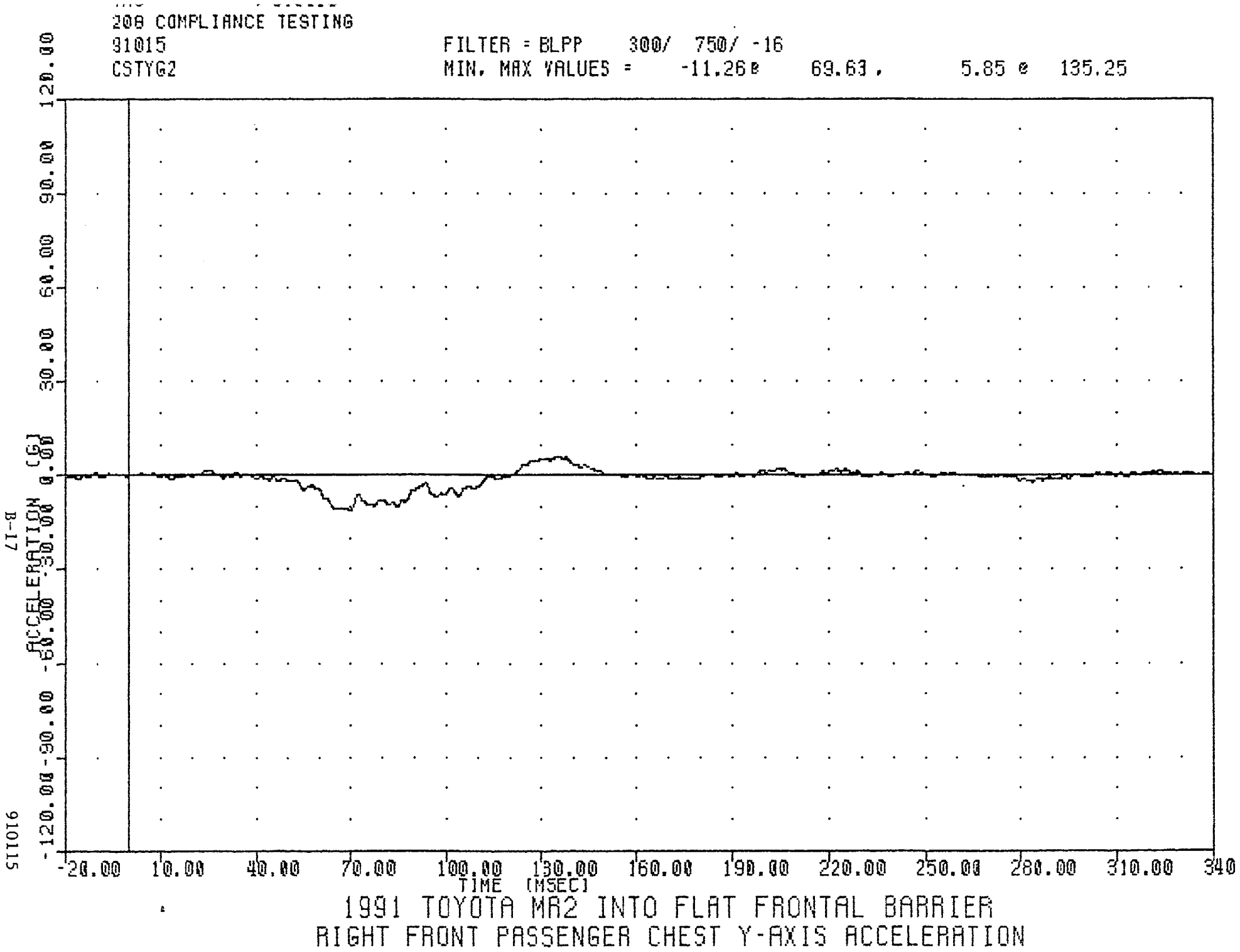


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION



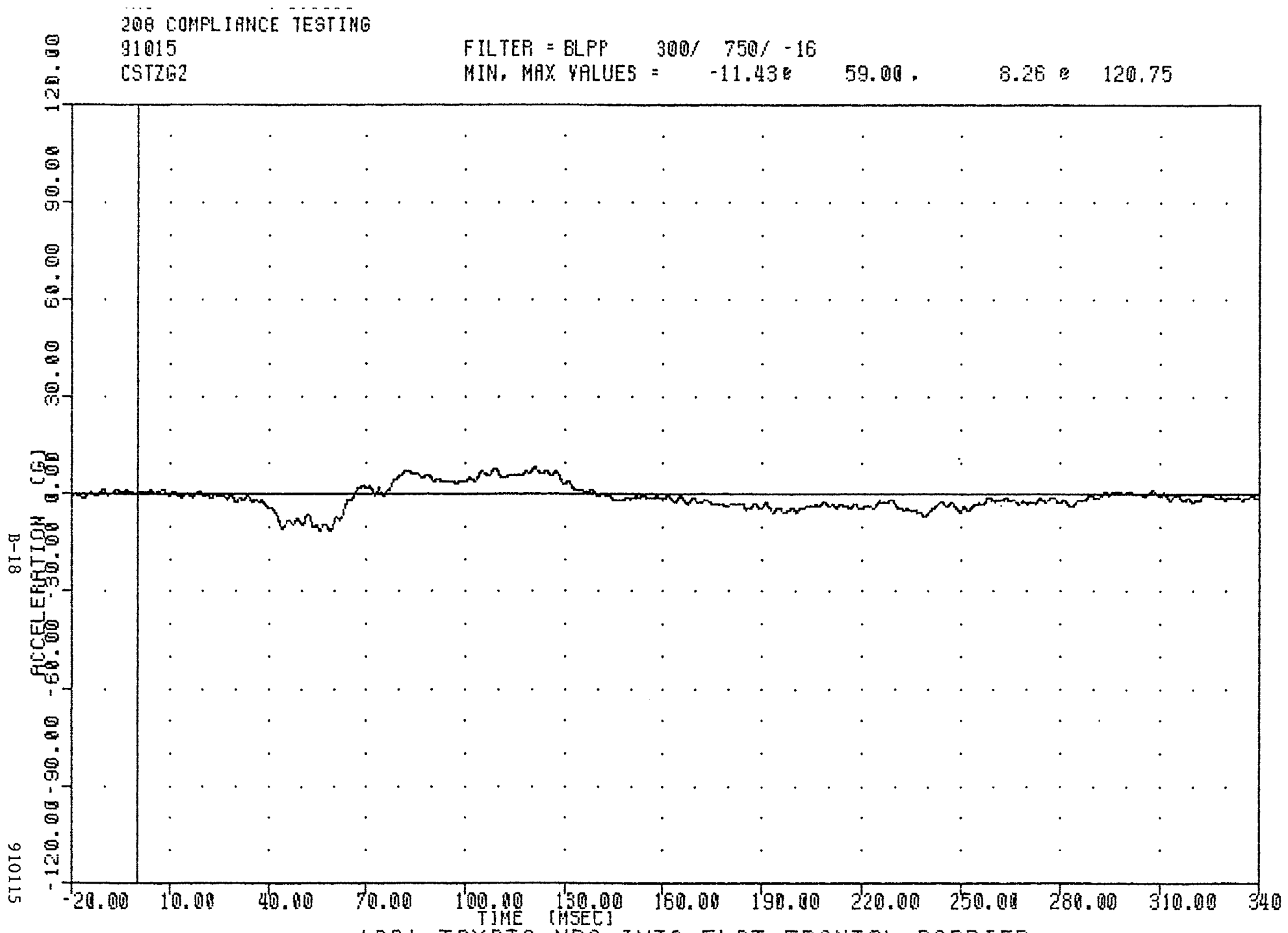
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

91015

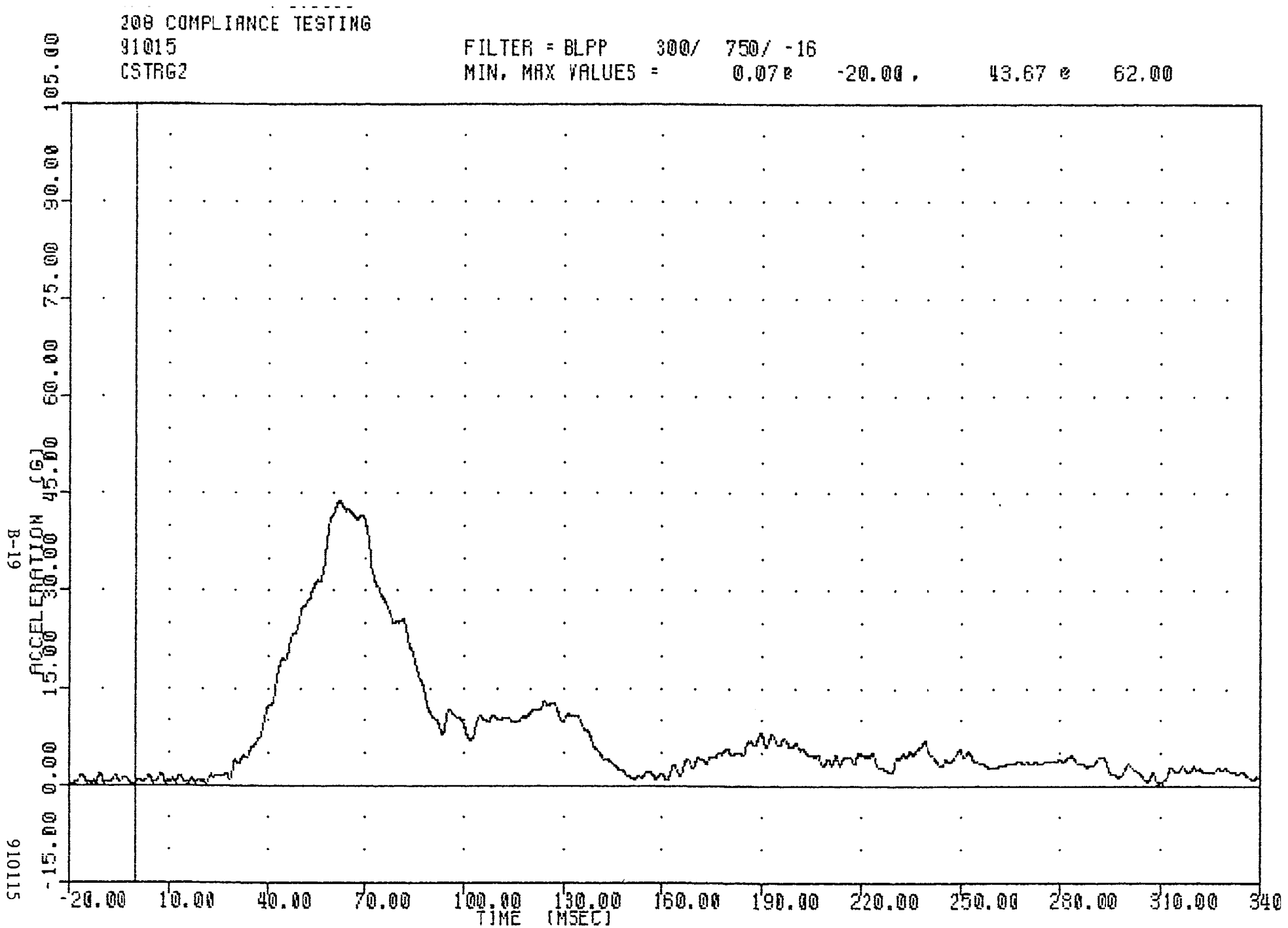


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

910115



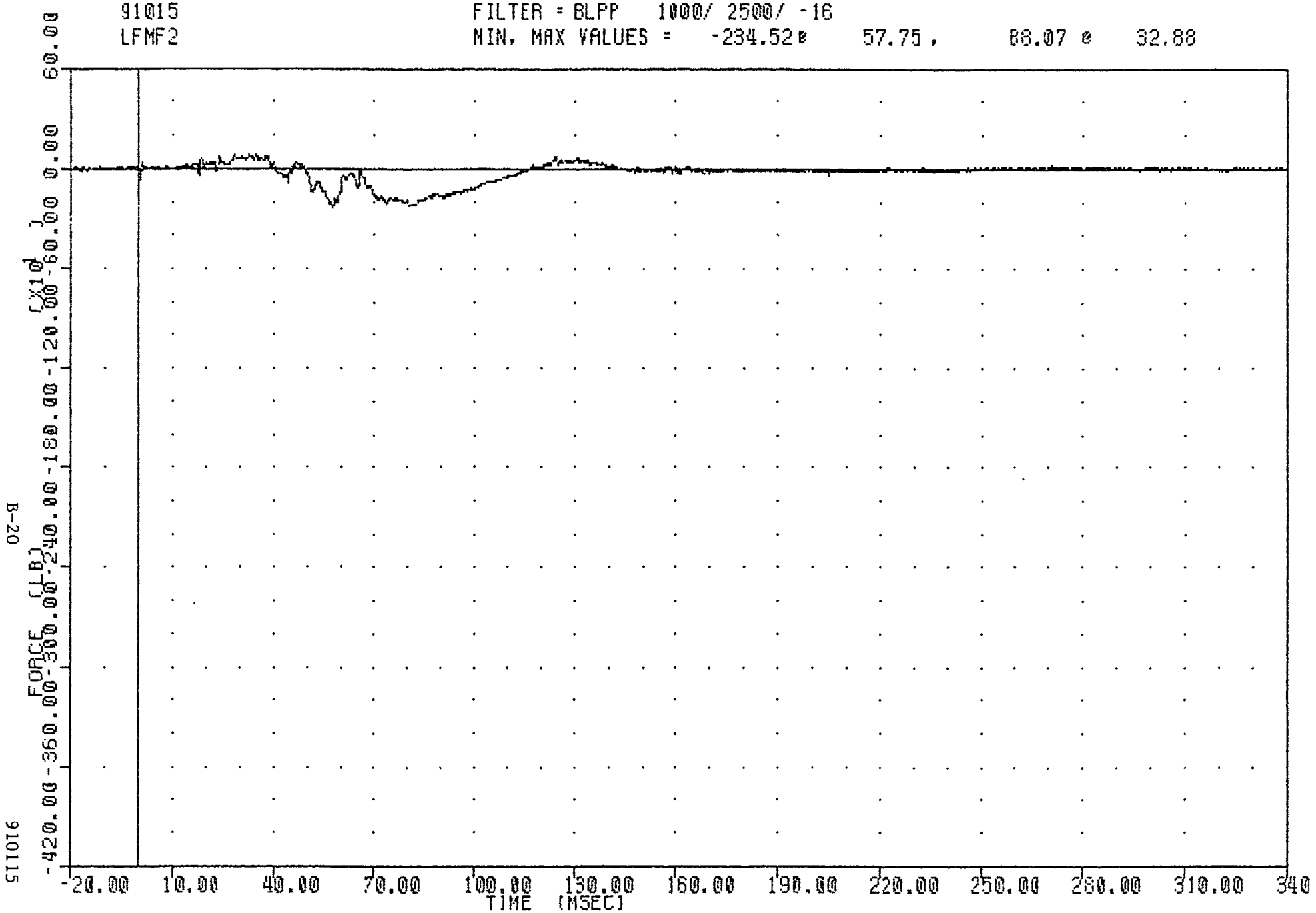
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

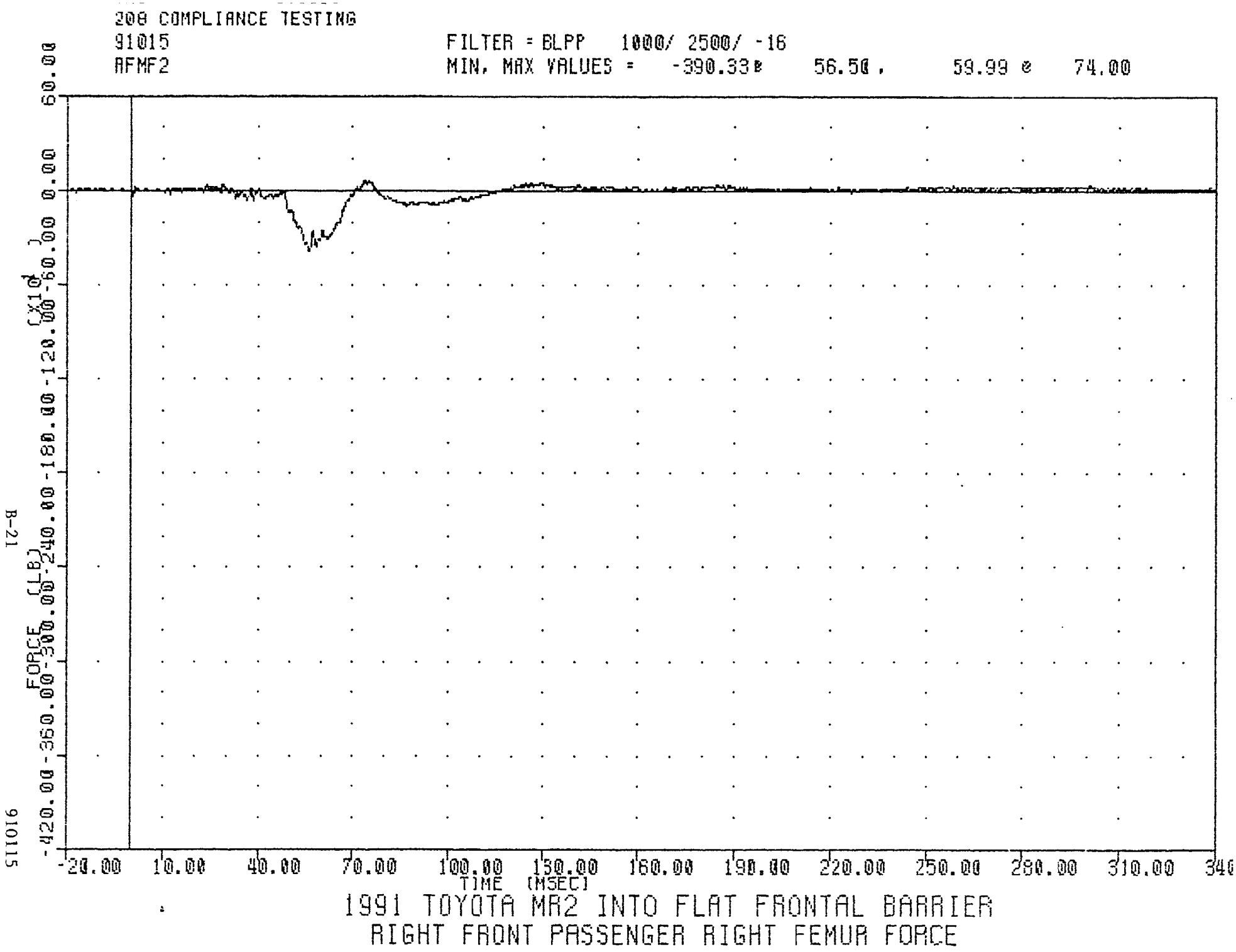
208 COMPLIANCE TESTING
91015
LFMF2

FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = -234.52 @ 57.75 , 88.07 @ 32.88



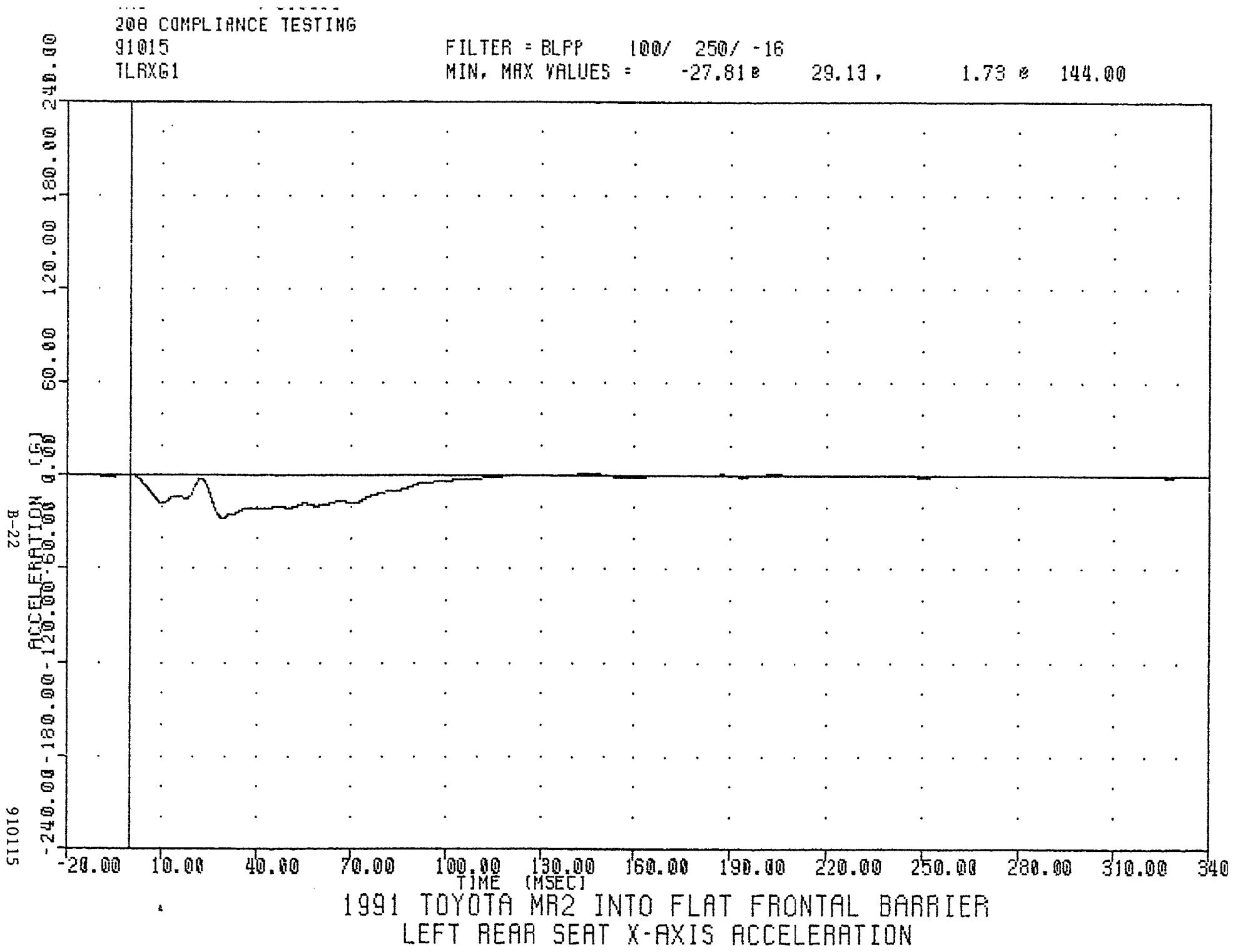
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

910115



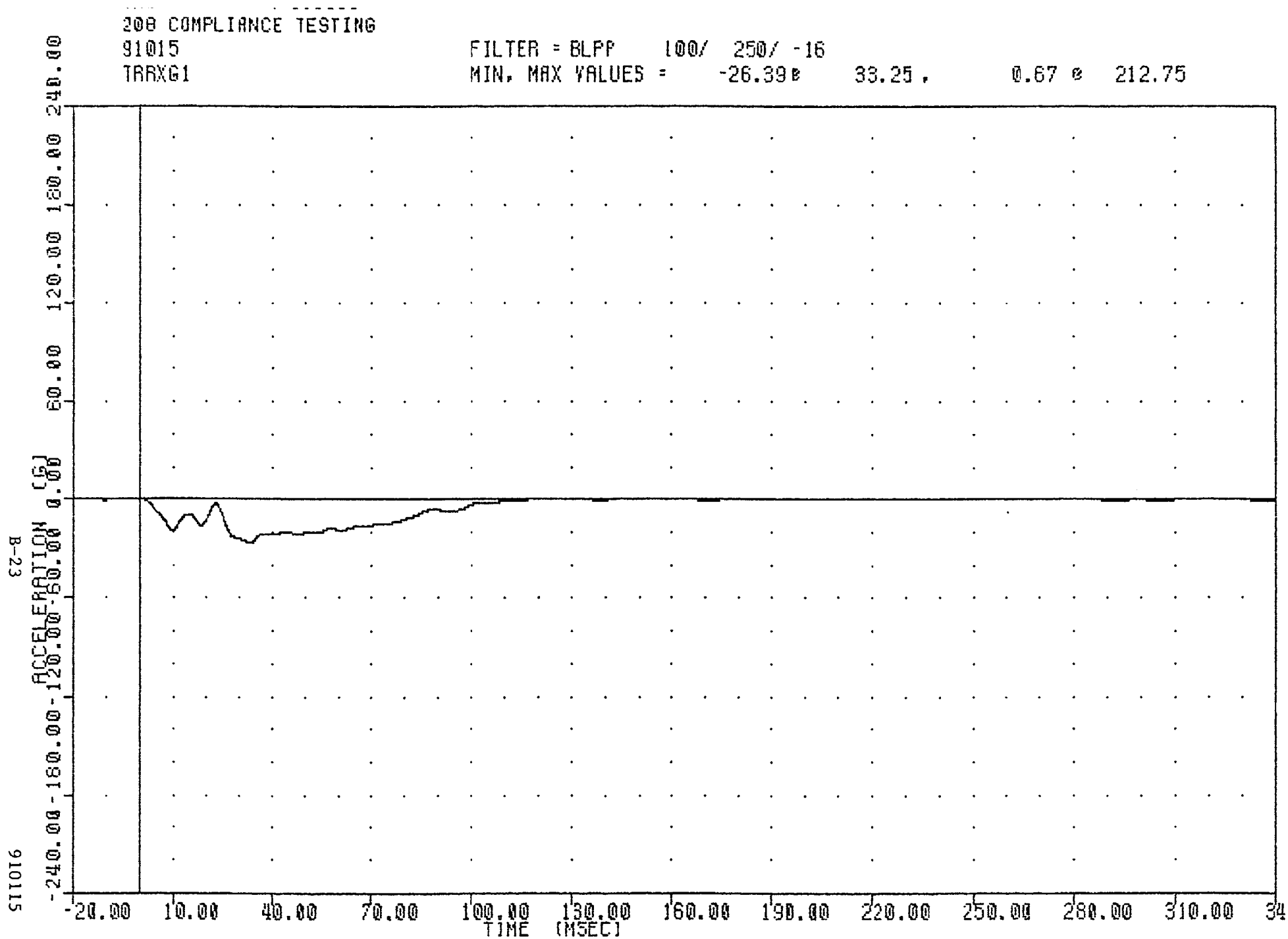
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

910115



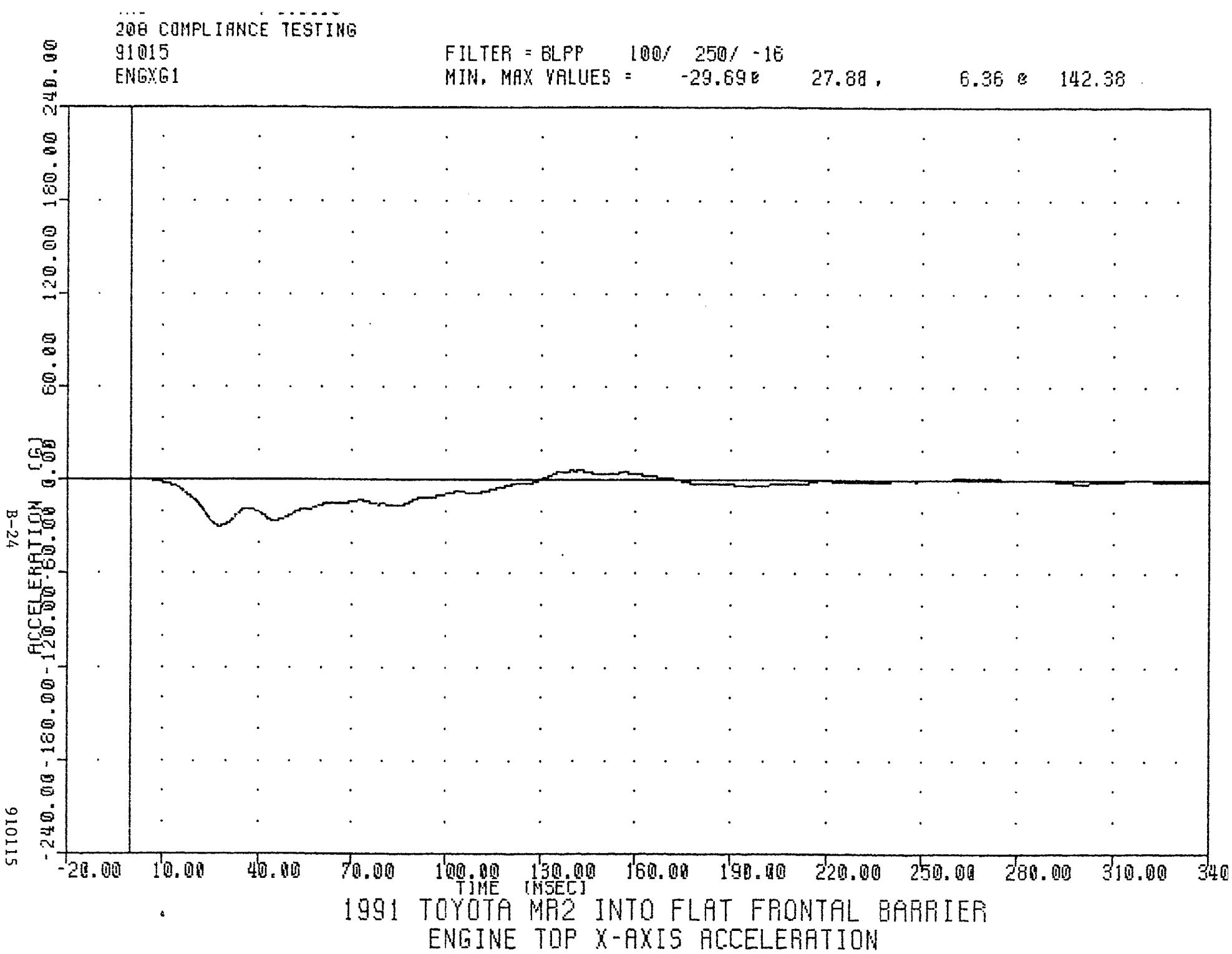
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION

910115

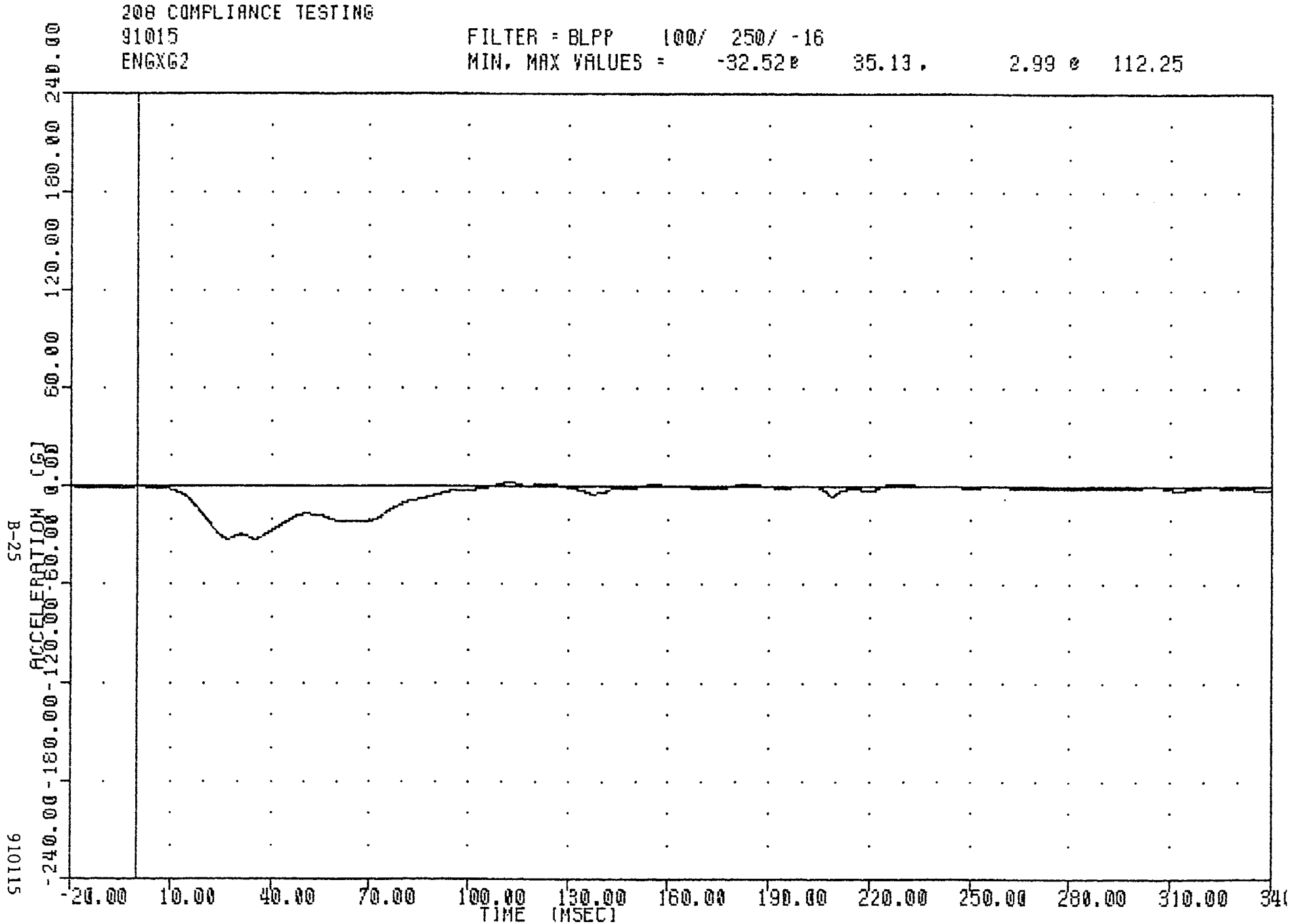


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

910115

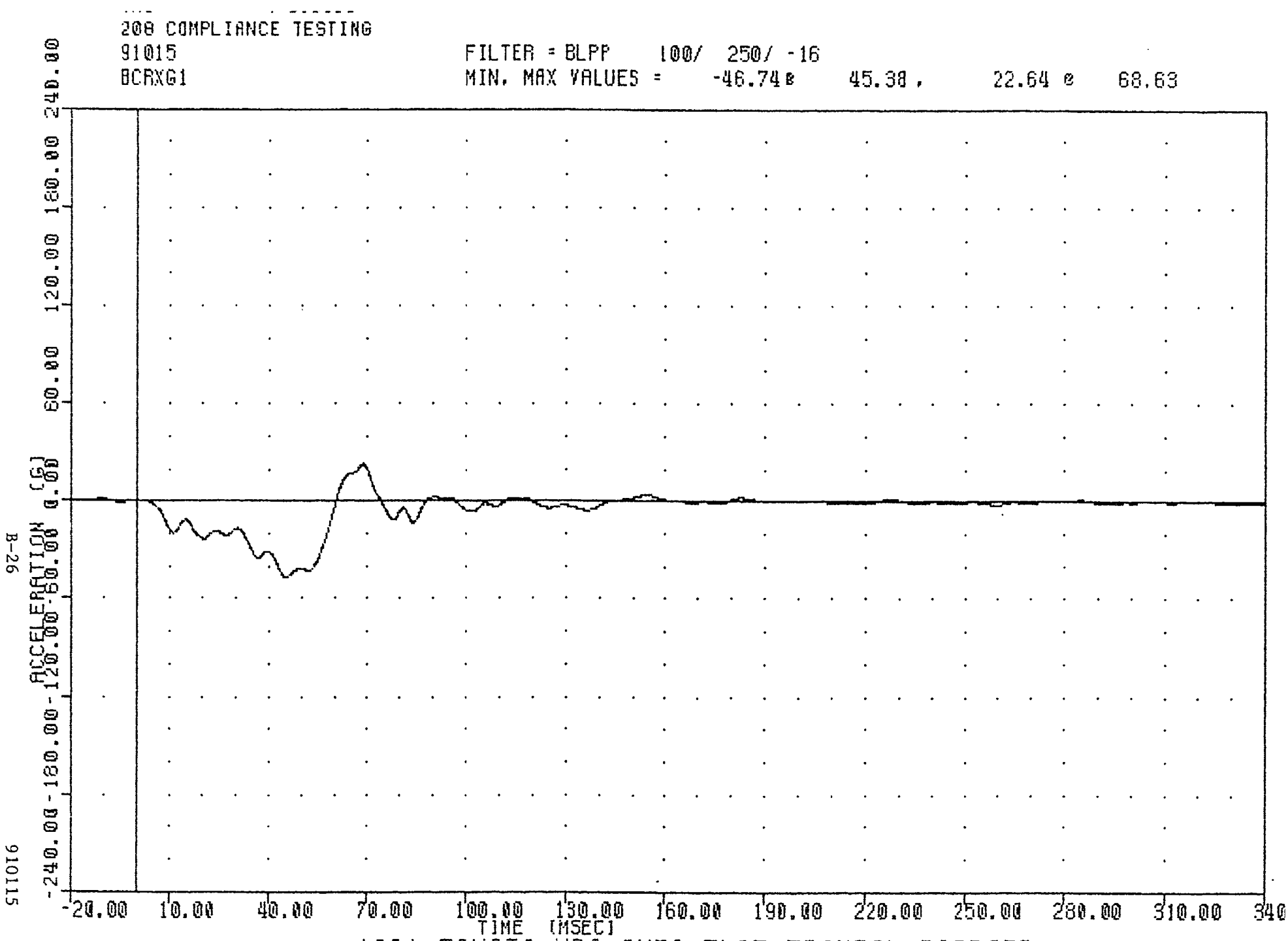

208 COMPLIANCE TESTING
91015
ENGXG1
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -29.69 @ 27.88 , 6.36 @ 142.38
240.00
180.00
120.00
60.00
0.00
-60.00
-120.00
-180.00
-240.00
ACCELERATION [G]
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340
TIME (MSEC)
1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
ENGINE TOP X-AXIS ACCELERATION

91015

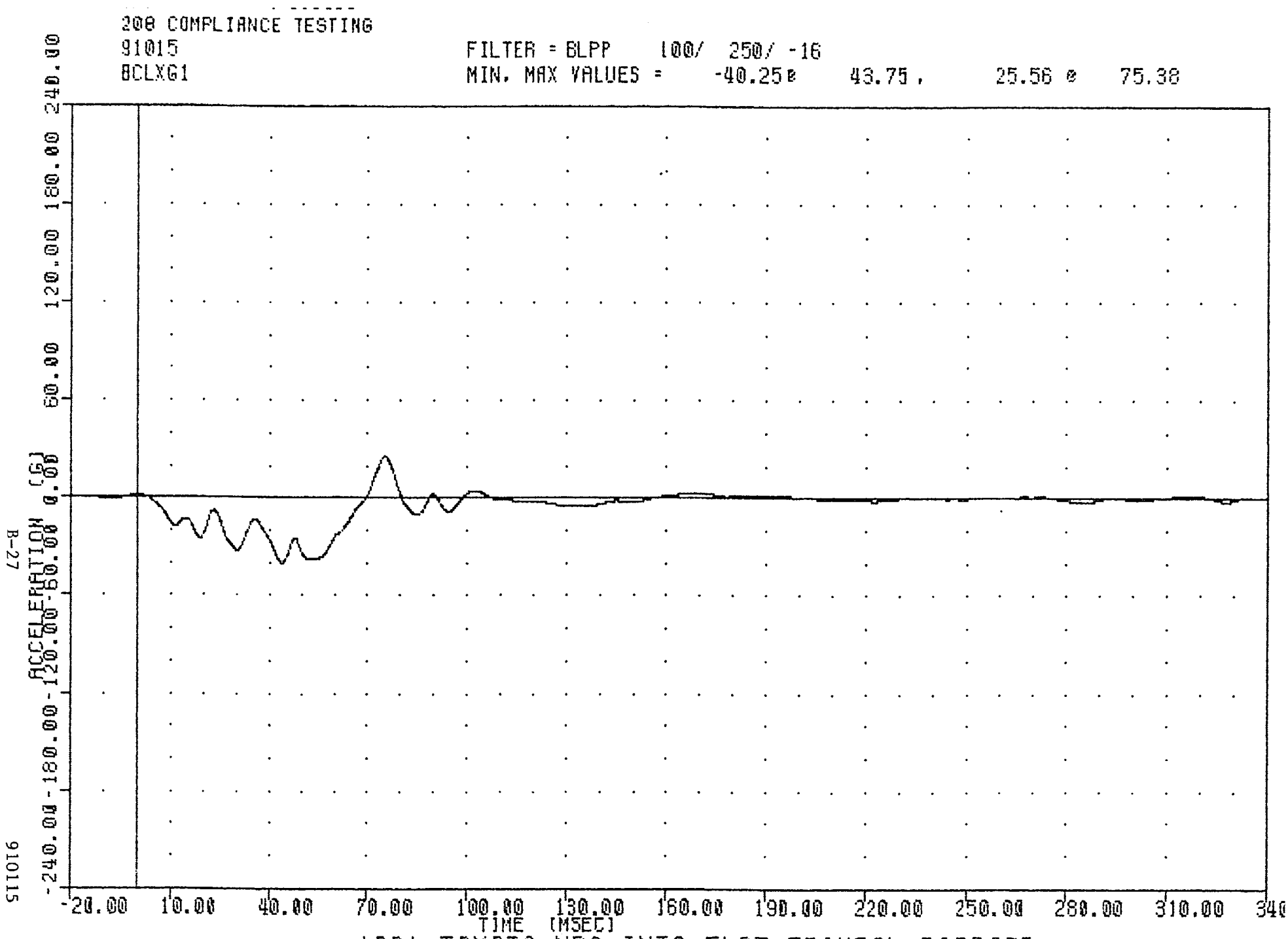


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

910115

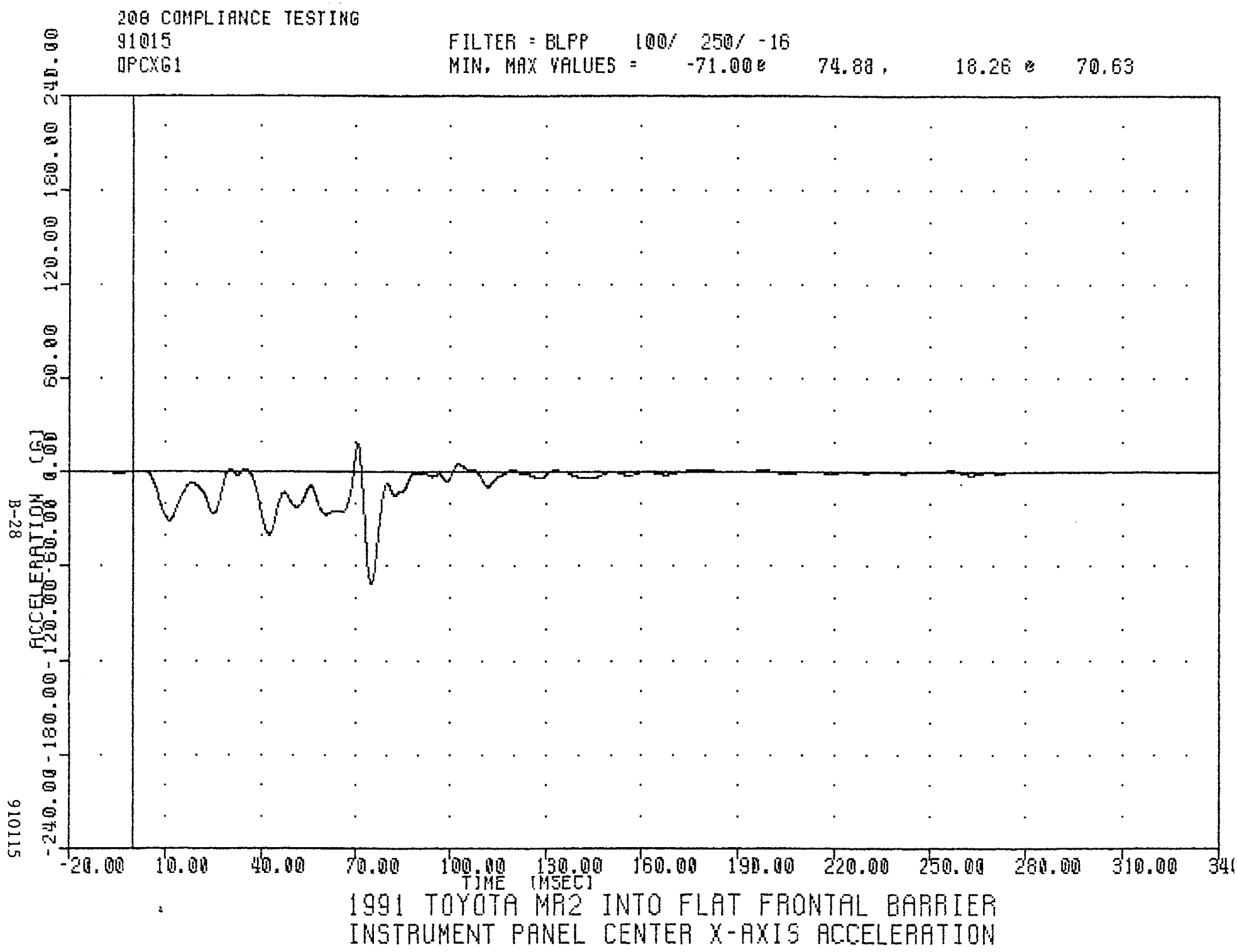


1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

910115



1991 TOYOTA MR2 INTO FLAT FRONTAL BARRIER
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

910115