DOT 1413

REPORT NOS. 208-TRC-90-014
212-TRC-90-014
301-TRC-90-014

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

FUJI HEAVY INDUSTRIES, LTD.
1990 SUBARU JUSTY
3-DOOR HATCHBACK
NHTSA NO. CL5502
TRC TEST NO. 900329

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

APRIL 16, 1990
FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, S.W.
ROOM NO. 6115 (NEF-31)
WASHINGTON, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-88-C-11038. 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.

REPORT PREPARED BY:

Jeffrey W. Sankey Date 4/13/90

J.W. Sankey, Supervisor, Laboratory Engineering
Transportation Research Center of Ohio

REPORT APPROVED BY:

Kay Latimer Date 4-13-90

C.K. Latimer, Project Manager
Transportation Research Center of Ohio

FINAL REPORT ACCEPTED BY:

Date 4-24-90

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

Technical Report Documentation Page

1. Report No. 208-TRC-90-014 212-TRC-90-014 301-TRC-90-014	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 1990 SUBARU JUSTY 3-DOOR HATCHBACK, NHTSA NO. CL5502		5. Report Date APRIL 1990 6. Performing Organization Code
7. Author(s) J.W. Sankey, Supervisor, Laboratory Engineering, TRC		8. Performing Organization Report No. 208-TRC-90-014, 212-TRC-90-014 301-TRC-90-014
9. Performing Organization Name and Address Transportation Research Center of Ohio 10820 State Route 347 East Liberty, Ohio 43319		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTNH22-88-C-11038
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 MARCH - APRIL 1990 14. Sponsoring Agency Code DOT/NHTSA/NEF/OVSC

15. Supplementary Notes

16. Abstract

A 30 mph flat frontal barrier impact compliance test was conducted on a 1990 Subaru Justy 3-door hatchback, VIN JF1KA7226LB701699, NHTSA No. CL5502 at the Transportation Research Center of Ohio on March 29, 1990. 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 No. 301, "Fuel System Integrity"

The barrier impact velocity was 29.6 mph.
The ambient temperature was 70° F.
The vehicle appears to comply with the applicable requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.

17. Key Words	18. Distribution Statement
Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"	Available from: Technical Reference Division National Highway Traffic Safety Admin Nassif Building, Room 5108 400 Seventh Street, SW Washington, DC 20590

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	93	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

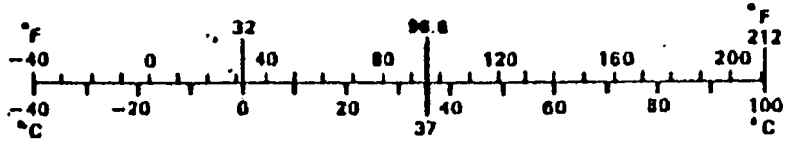
METRIC CONVERSION FACTORS

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



900329

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF PHOTOGRAPHS CONTINUED

SECTION 1.0

PURPOSE AND TEST SUMMARY

PURPOSE

This 30 mph 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. DTNH22-88-C-11038. The purpose of this test was to determine if the subject vehicle, a 1990 Subaru Justy 3-door hatchback, NHTSA No. CL5502, 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." The test was conducted in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-07.

TEST SUMMARY

The 1990 Subaru Justy 3-door hatchback, NHTSA No. CL5502, was equipped with a 1.2 liter, transverse engine, manual transmission, and power brakes. The test weight of the vehicle was 2198 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS test Nos. 208, 212, 219 (partial), and 301. The Head Injury Criteria (HIC) calculations were less than 1000, the resultant accelerations of the thorax did not exceed 60 g's and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the driver's and right front passenger's seats. There was 100 percent windshield retention. There was no intrusion into the windshield. There was no fluid spillage from the fuel system following the impact or during the static rollover test.

Two (2) Part 572 B, adult male anthropomorphic test devices (ATDs) were seated in the front outboard designated seating positions. The dummies were positioned according to the dummy placement procedures specified in Appendices B and C of Laboratory Procedure TP-208-07.

Both ATDs were instrumented with head and chest accelerometers oriented to measure accelerations in the longitudinal, lateral, and vertical directions, and with right and left femur load cells.

The vehicle was instrumented with seven (7) accelerometers oriented to measure longitudinal axis acceleration.

The crash event was recorded by one (1) real-time panning camera and fourteen (14) high-speed motion picture cameras operating at approximately 500 frames per second. The pre-test and post-test events were recorded with one (1) real-time camera.

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

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on March 29, 1990. The test vehicle's impact speed was 29.6 mph. The vehicle sustained 15.4 inches of static crush.

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

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CL5502 PROJECT: 208 Compliance

DATE: 03/29/90 TIME: 1315 TEMP: 70° F

VEHICLE: 1990 Subaru Justy 3-door hatchback

TEST WEIGHT (LBS): 2198

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: PRIMARY = 29.6 SECONDARY = 29.6

MAXIMUM STATIC CRUSH (IN): 15.4

VEHICLE REBOUND (IN): 17.0

DUMMIES:	Driver #690	Passenger #353
TYPE:	Part 572 B	Part 572 B
LOCATION:	Left front	Right front
RESTRAINT:	3-point passive belt	3-point passive belt

NUMBER OF DATA CHANNELS: 23

NUMBER OF HIGH SPEED 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: Fuji Heavy Industries, Ltd.

MAKE/MODEL: Subaru Justy VIN: JF1KA7226LB701699

BODY STYLE: 3-door hatchback MODEL YEAR: 1990

NHTSA NO.: CL5502 COLOR: Red

ENGINE DATA: TYPE: transverse CYLINDERS: 3 DISPLACEMENT: 1.2 liter

TRANSMISSION DATA: _5_SPEED, _X_MANUAL, ___AUTOMATIC, _X_FWD, ___RWD, ___4WD

DATE VEHICLE RECEIVED: 01/19/89 ODOMETER READING: 132.0

DEALER'S NAME AND ADDRESS: Midwestern Auto Group
5002 Post Road
Dublin, OH 43017

ACCESSORIES:

POWER STEERING No	AUTOMATIC TRANSMISSION No
POWER BRAKES Yes	AUTOMATIC SPEED CONTROL No
POWER SEATS No	TILTING STEERING WHEEL No
POWER WINDOWS No	TELESCOPING STEERING WHEEL No
TINTED GLASS No	AIR CONDITIONING No
RADIO No	ANTI-SKID BRAKE No
CLOCK No	REAR WINDOW DEFROSTER No
OTHER None	

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

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Fuji Heavy Industries, Ltd.

DATE OF MANUFACTURE: 10/89

GVWR: 2650 LBS

GAWR: FRONT 1445 LBS., REAR 1280 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.:

VEHICLE LOAD (UP TO CAPACITY): FRONT 28 psi; REAR 28 psi

RECOMMENDED TIRE SIZE: 145SR12 LOAD RANGE X B, ___C, ___D

TIRES ON VEHICLE (MFR., LINE, SIZE): Bridgestone 145SR12

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: No

VEHICLE CAPACITY: TYPES OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manual adjustable

NUMBER OF OCCUPANTS 2 FRONT 2 REAR 4 TOTAL

CARGO LOAD 60 LBS. TOTAL 660 LBS.

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

RIGHT FRONT	557 lbs.	RIGHT REAR	341 lbs.
LEFT FRONT	569 lbs.	LEFT REAR	355 lbs.
TOTAL FRONT WEIGHT	1126 lbs.	(61.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	696 lbs.	(38.2% OF TOTAL VEHICLE WEIGHT)	

TOTAL DELIVERED WEIGHT 1822 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (1822 LBS)

VCW = VEHICLE CAPACITY WEIGHT (660 LBS)

DSC = DESIGNATED SEATING CAPACITY (4)

RCLW = VCW - 150 (DCS) = 660 - 150(4) = 60 LBS

TARGET TEST WEIGHT = UDW + RCLW + (2 DUMMIES X 164 LBS/DUMMY)

= 1822 + 60 + 328 LBS

TARGET TEST WEIGHT = 2210 LBS

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 48 LBS. CARGO:

RIGHT FRONT	638 lbs.	RIGHT REAR	465 lbs.
LEFT FRONT	639 lbs.	LEFT REAR	456 lbs.
TOTAL FRONT WEIGHT	1277 lbs.	(58.1% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	921 lbs.	(41.9% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2198 lbs.	(0.8% UNDER TARGET WEIGHT)	

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

COMPONENTS REMOVED TO MEET TARGET WEIGHT: Rear bumper; muffler, hatchback glass, rear seat belts, rear tie-down brackets, hatchback gas springs, rear wiring harness. One onboard light was also omitted from the test equipment to meet the target weight.

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	LF	24.5;	RF	24.8;	LR	24.0;	RR	24.4
PRE-TEST ATTITUDE:	LF	24.2;	RF	24.1;	LR	22.8;	RR	23.1
POST-TEST ATTITUDE:	LF	23.6;	RF	24.8;	LR	22.9;	RR	21.7

MAXIMUM WIDTH: 60.4 INCHES

WHEELBASE: 89.0 INCHES

CG = 37.3 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TABLE 3 TEST CONDITIONS

TEST NUMBER: 900329

DATE OF TEST: 03/29/90 TIME OF TEST: 1315

TYPE OF TEST: Frontal barrier impact IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA: 70° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 70° F

IMPACT VELOCITY: PRIMARY = 29.6 MPH SECONDARY = 29.6 MPH

(SPECIFIED RANGE = 28.9 TO 29.9 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

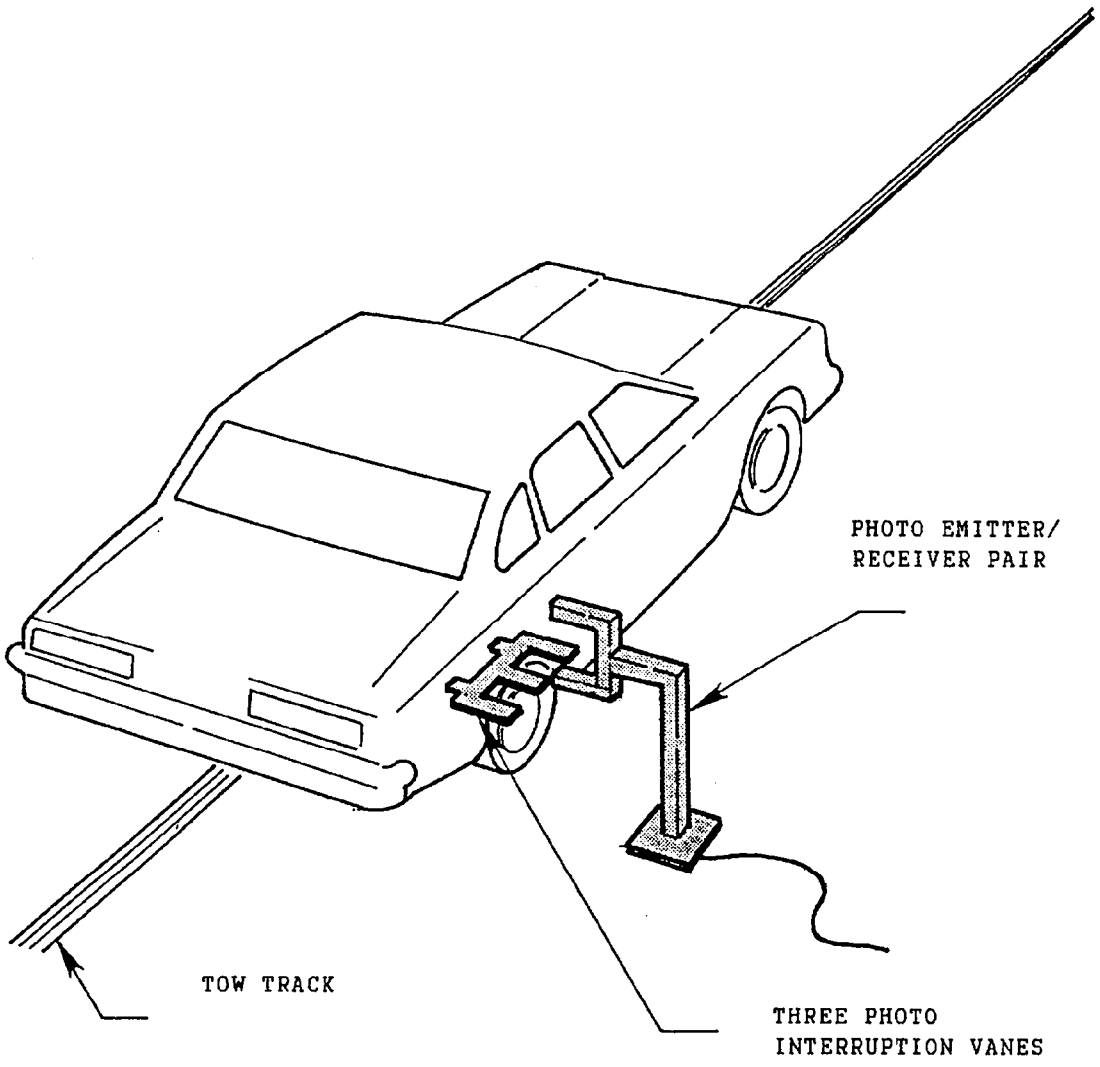
OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 140.9; C 145.5; R 140.5

POST-TEST: L 126.0; C 130.1; R 126.1

TOTAL CRUSH: L 14.9; C 15.4; R 14.4

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: L: 18.1; C: 14.9; R: 17.9; AVG: 17.0

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM

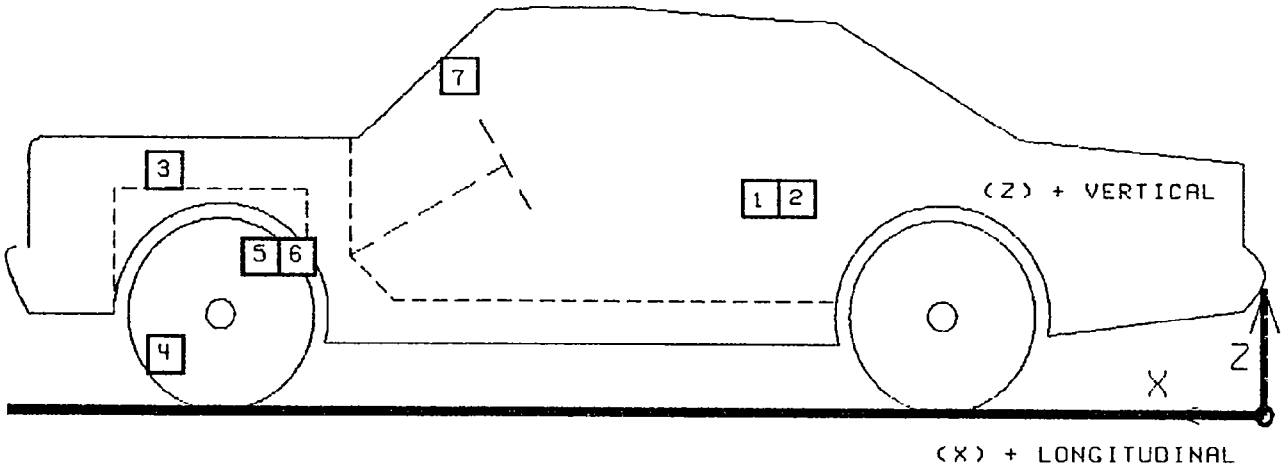


The final vane clears emitter/receiver two inches before impact.

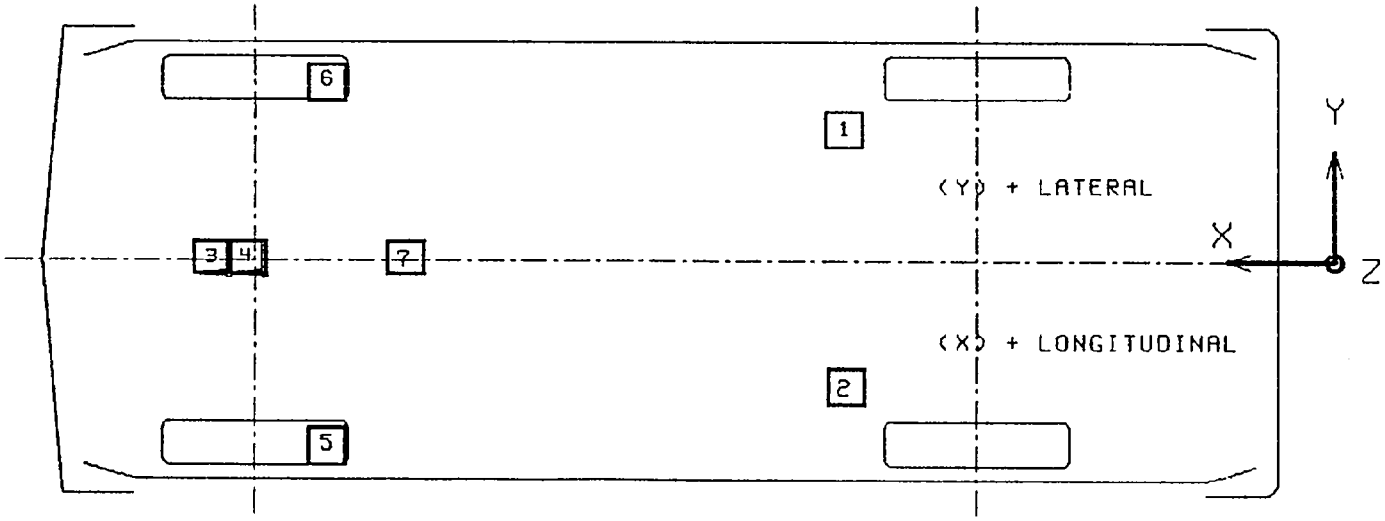
The vanes have one foot spacing.

FIGURE 2

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 900329

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION MAX @ MSEC		NEGATIVE DIRECTION MAX @ MSEC	
1	REAR SEAT CROSSMEMBER	PRE	52.2	14.6	11.7				
	AT LEFT SIDE	POST	52.2	14.3	17.3				
	LONGITUDINAL					1.3	120.4	32.6	35.0
2	REAR SEAT CROSSMEMBER	PRE	51.9	-14.0	17.2				
	AT RIGHT SIDE	POST	52.8	-14.1	17.3				
	LONGITUDINAL					1.2	238.0	26.8	35.4
3	TOP OF ENGINE BLOCK	PRE	124.5	-11.5	30.5				
		POST	116.8	-9.4	30.2				
	LONGITUDINAL					42.7	35.5	145.3	24.6
4	BOTTOM OF ENGINE BLOCK	PRE	120.2	-9.1	8.9				
		POST	115.6	-7.1	8.3				
	LONGITUDINAL					82.0	38.6	115.5	27.3
5	BRAKE CALIPER	PRE	119.6	-21.2	8.2				
	AT RIGHT SIDE	POST	116.7	-21.4	7.5				
	LONGITUDINAL					27.5	63.4	73.1	18.1
6	BRAKE CALIPER	PRE	119.6	21.2	8.3				
	AT LEFT SIDE	POST	117.1	21.4	7.7				
	LONGITUDINAL					25.4	58.8	80.7	44.6
7	DASH PANEL	PRE	98.6	-2.0	35.1				
		POST	96.3	-1.2	35.1				
	LONGITUDINAL					3.8	99.3	48.6	29.5

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

FIGURE 3 ACCIDENT INVESTIGATION DIVISION DATA
FOR 30 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Subaru/Justy/3-door hatchback

VEH. NHTSA NO.: CL5502 ; VIN: JF1KA7226LB701699

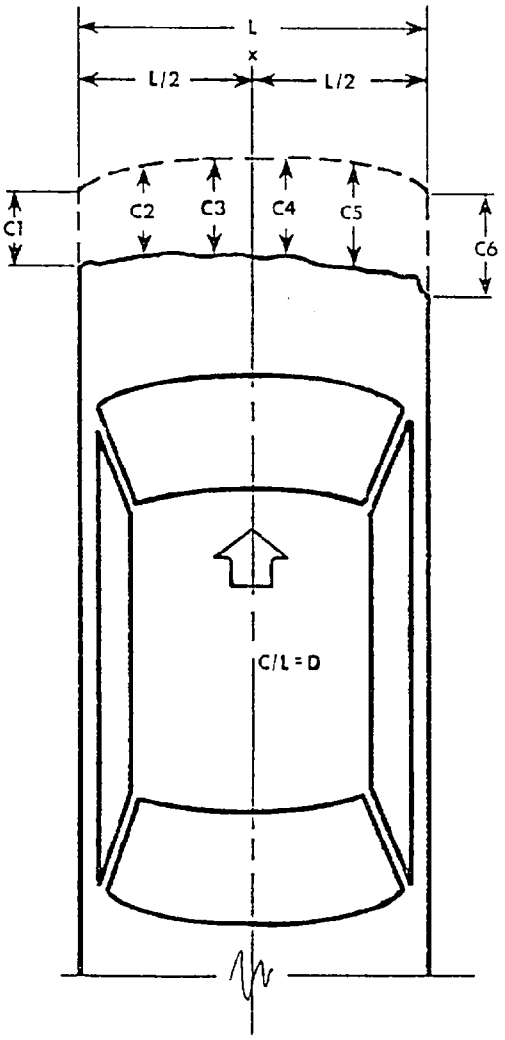
MODEL YEAR: 1990 ; BUILD DATE: 10/89 ; TEST DATE: 03/29/90

VEH. SIZE CATEGORY: Compact ; TEST WEIGHT: 2198 lbs.

VEH. WHEELBASE: 89.0

MAX. WIDTH: 60.4

FRONT OVERHANG: 29.5



COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 14.9 inches

C2 = 15.3 inches

C3 = 15.3 inches

C4 = 15.4 inches

C5 = 14.5 inches

C6 = 14.4 inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitudinal)

LENGTH OF DAMAGED REGION: L = 58.0 inches

FIGURE 3

PRE-TEST AND POST-TEST MEASUREMENT POINTS

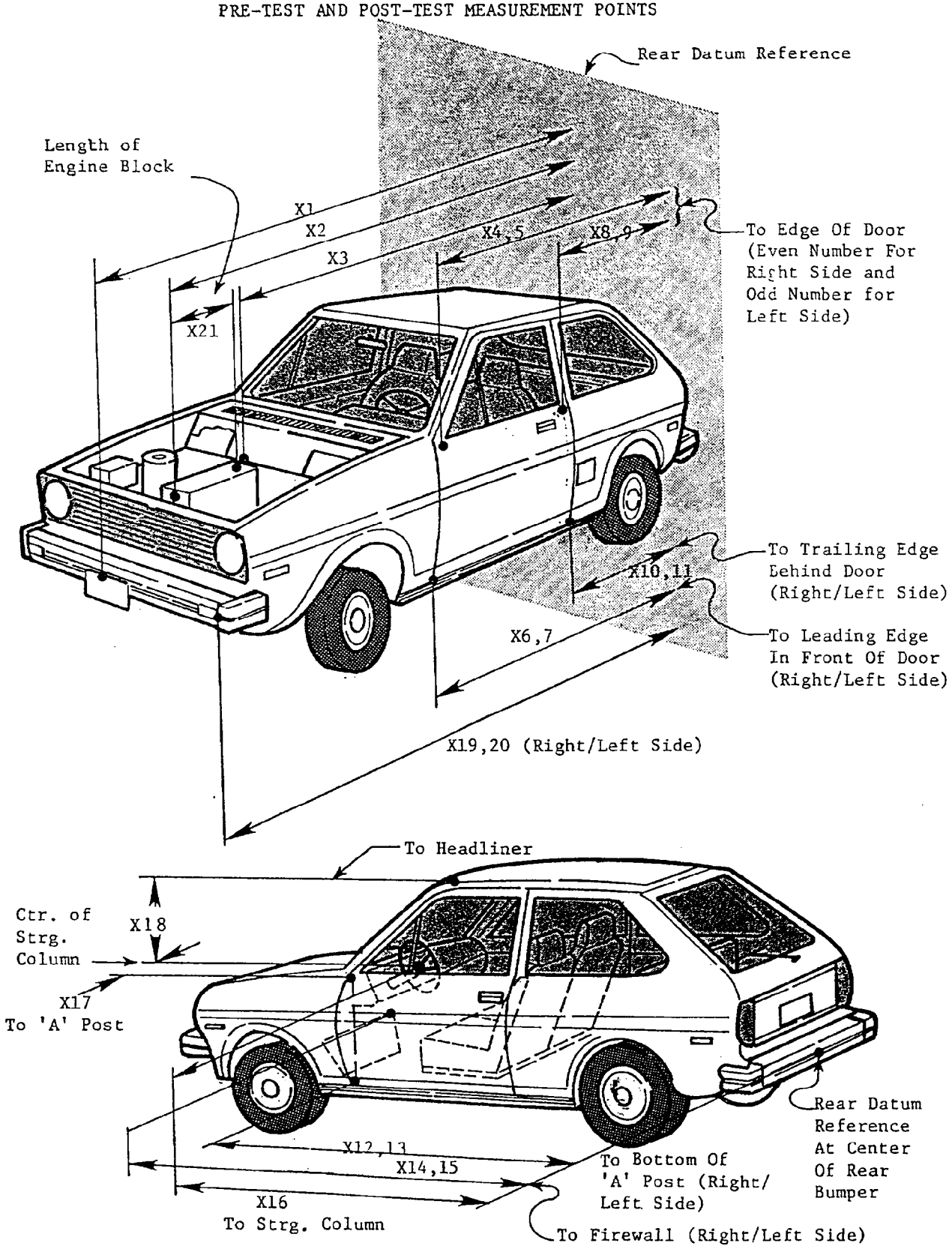


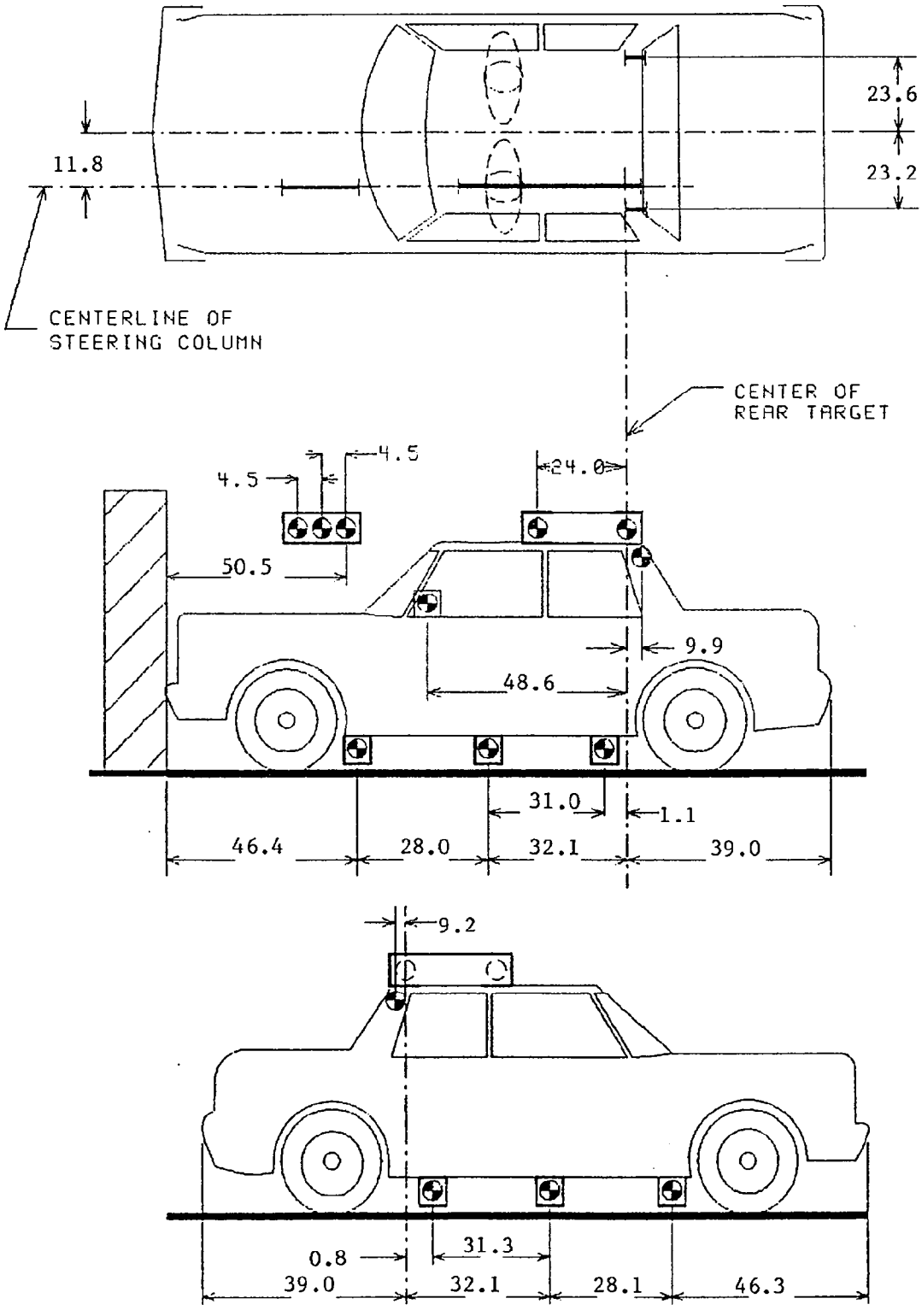
TABLE 5 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Subaru Justy TEST NUMBER: 900329

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	145.5	130.1	15.4
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	127.5	120.2	7.3
X3	REAR SURFACE OF VEHICLE TO FIREWALL	106.8	105.0	1.8
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	98.6	98.7	-0.1
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	98.4	99.1	-0.7
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	98.6	98.5	0.1
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	99.0	98.5	0.5
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	54.2	55.0	-0.8
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	54.2	54.9	-0.7
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	54.2	54.5	-0.3
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	54.6	54.5	0.1
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	99.2	98.9	0.3
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	99.2	98.8	0.4
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	106.8	106.9	-0.1
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	106.1	106.5	-0.4
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	83.5	80.9	2.6
X17	CENTER OF STEERING COLUMN TO "A" POST	14.8	13.8	1.0
X18	CENTER OF STEERING COLUMN TO HEADLINER	15.7	16.2	-0.5
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	140.5	126.1	14.4
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	140.9	126.0	14.9
X21	LENGTH OF ENGINE BLOCK	6.0	6.0	0.0

FIGURE 5

VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

REPORT OF VEHICLE CONDITION AT THE
COMPLETION OF TESTING

Contract No.: DTNH22-88-C-11038
From: The Transportation Research Center of Ohio
10820 State Route 347
East Liberty, OH 43319

To: Karen Nuschler
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.: CL5502
MAKE/MODEL/BODY STYLE: Subaru/Justy/3-door hatchback
MODEL YEAR: 1990 BODY COLOR: Red
VIN: JF1KA7226LB701699
ODOMETER (ARRIVAL): 132.0 DATE: 01/19/90
ODOMETER (COMPLETION): 136.0 DATE: 03/29/90
COST: $ 6,196.00

___ Air Conditioner	___ Console	Brakes: X Power
___ Tinted Glass	___ Tachometer	Front: Disc
___ Power Steering	___ Speed Control	Rear: Drum
___ Power Windows	___ Rear Window Def.	
___ Power Door Locks	___ Sun/Moon Roof	Front Seats: ___ Power
___ Radio	___ T-Top	Seat Type: Bucket
___ Clock	___ Tilt Steering Wheel	No. of Seats: 4
___ Roof Rack	___ Other Options: None	

Engine: 3 Cylinders; 1.2 LITRES
Transmission: 5-speed; Drive Type: Front
Tire Size: 145SR12
Gasoline Type: Unleaded

Equipment that is no longer on the vehicle as noted above: None

Explanation: NA

Vehicle Condition: Vehicle has been subjected to a 30 mph frontal barrier crash test.

SECTION 2.0

SUMMARY OF RESULTS FOR:

FMVSS 208, "Occupant Crash Protection"

FMVSS 212, "Windshield Mounting"

FMVSS 219, (Partial), "Windshield Zone Intrusion"

FMVSS 301, "Fuel System Integrity"

COMPLIANCE DATA SUMMARY

The test vehicle, a 1990 Subaru Justy 3-door hatchback, NHTSA No. CL5502, appeared to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.

The driver's Head Injury Criteria (HIC) was 769. The driver's maximum chest deceleration over three milliseconds was 45.1 g. The driver's right and left compressive femur loads were 622 pounds and 297 pounds, respectively.

The right front passenger's Head Injury Criteria (HIC) was 626. The right front passenger's maximum chest deceleration over three milliseconds was 48.3 g. The right front passenger's right and left compressive femur loads were 717 pounds and 352 pounds, respectively.

The vehicle's restraint system met the comfort and convenience requirements of FMVSS 208.

The windshield retention was 100 percent.

There was no intrusion into the inner surface of the windshield below the protected zone.

There was no Stoddard fluid spillage following the crash test event or during any phase of the post-test static rollover.

TABLE 6 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION ('G')

	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DRIVER	-81.6	16.0	-74.4	110.4	-47.2	6.2	13.0	45.1
PASSENGER	-36.6	-15.8	-61.8	63.6	-48.1	36.4	16.1	48.3

MAXIMUM FORCE-FEMUR LOAD (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	297	622
PASSENGER	352	717

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC)	TIME t_2 (MSEC)
DRIVER	769	70.0	106.0
PASSENGER	626	71.1	107.1

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

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 rotated forward, impacting the upper steering wheel rim and the dummy's chest. The dummy's chest impacted the steering wheel as the dummy was restrained by the three-point passive belt. The dummy's head rotated rearward as the dummy rebounded into the seat back. The dummy came to rest seated in the driver's seat, restrained by the three-point passive belt.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward impacting the dummy's chest as the dummy was restrained by the three-point passive belt. The dummy's head rotated rearward as the dummy rebounded rearward and leftward into the left portion of the seat back. The dummy's head then contacted the driver dummy's right arm. The dummy came to rest seated in the right front passenger's seat, leaning to the left, restrained by the three-point passive belt.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #690	PASSENGER #353
Head	Upper steering wheel rim & chest	Chest & driver's right arm
Chest	Steering wheel	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

FIGURE 6 DUMMY POSITIONING DATA FOR 30 MPH FRONTAL BARRIER IMPACT TEST

PRE-IMPACT DATA:

Make/Model: Subaru/Justy

Body Style: 3-door hatchback Model Year: 1990

NHTSA No.: CL5502 Color: Red

DATA FROM CERTIFICATION LABEL:

Vehicle Manufacturer: Fuji Heavy Industries, Ltd.

Date of Manufacture: 10/89 VIN: JF1KA7226LB701699

GVWR: 2650 lb; GAWR: Front = 1445 lb; Rear = 1280 lb

POST-IMPACT DATA:

Date of Test: 03/29/90 Time: 1315 Temperature: 70° F

Required Impact Velocity Range: 28.9 to 29.9 mph

Impact Velocity: Primary = 29.6 mph Secondary = 29.6 mph

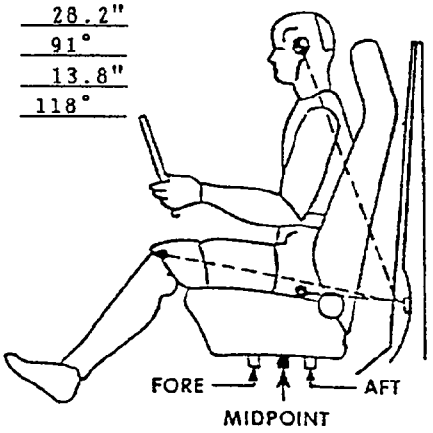
Seat Type: Bucket Adjuster Type: Manual

Bucket Seat Back Type: Manual-adjustable

Technicians: D. Carpenter, R. Cribley, & B. Crabtree

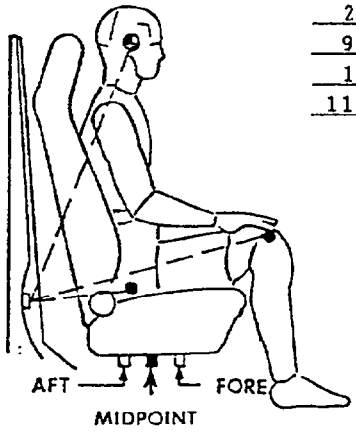
DRIVER DUMMY # 690 TYPE: HII

Head	20.1"
Target	8°
Knee	28.2"
Joint	91°
Approx-imate "H" Point	13.8" 118°

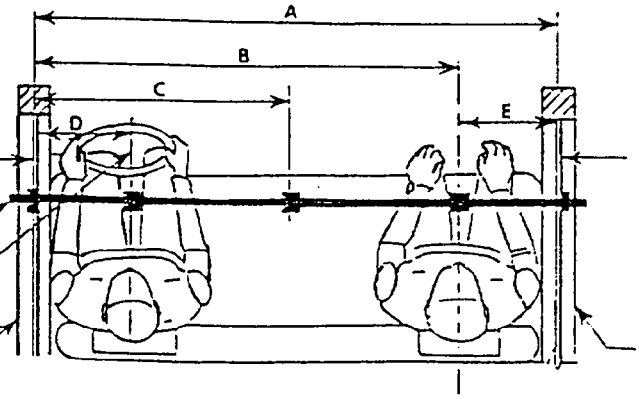


PASSENGER DUMMY # 353 TYPE: HII

20.5"	Head
7°	Target
28.8"	Knee
94°	Joint
14.2" 118°	Approx-imate "H" Point



A = 47.5"
B = 36.7"
C = 23.8"
D = 10.8"
E = 10.8"
DOOR GLASS HEIGHT = 11.5"



DOOR GLASS HEIGHT = 11.5"

LATERAL BAR

ADJUSTABLE POINTER

LEFT FRONT DOOR

DRIVER DUMMY 690

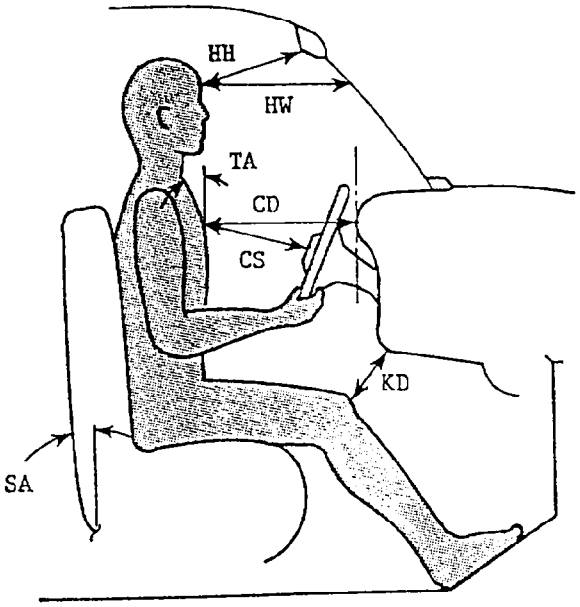
PASSENGER DUMMY 353

RIGHT FRONT DOOR

900329

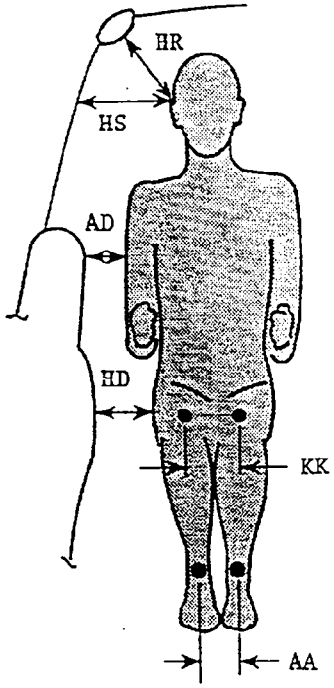
FIGURE 7 DUMMY IN-VEHICLE POSITION RECORDING SHEET

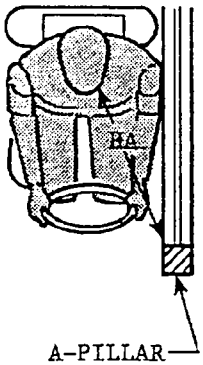
	DRIVER	PASSENGER
HH	19.6	19.2
HW	24.8	23.9
CD	23.5	25.4
CS	15.9	NA
KDL	7.8	7.8
KDR	6.8	7.9
TA	27°	25°
SA	26°	26°
HA	18.3	19.1



	DRIVER	PASSENGER
HR	6.1	6.1
HS	7.9	7.8
AD	3.0	2.9
HD	4.4	5.3
KK	10.8	8.0
AA	11.1	7.8

Knee outer bolt head to outer bolt head spacing:
Driver = 14.5
Passenger = 11.8



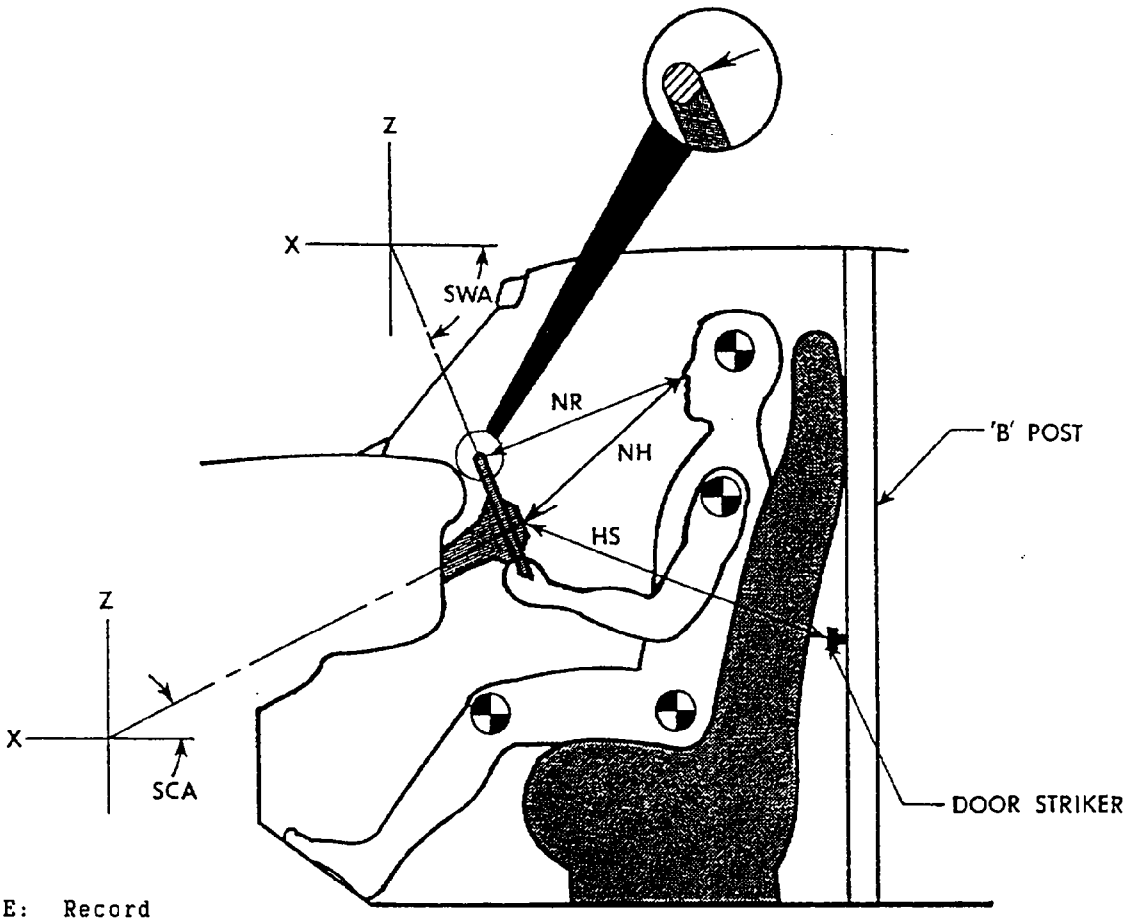


HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knee to Dash
TA = Torso Angle
SA = Seat Back Angle
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle
HA = Head to A-Pillar

Torso and seat back angles are relative to vertical.

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 8 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

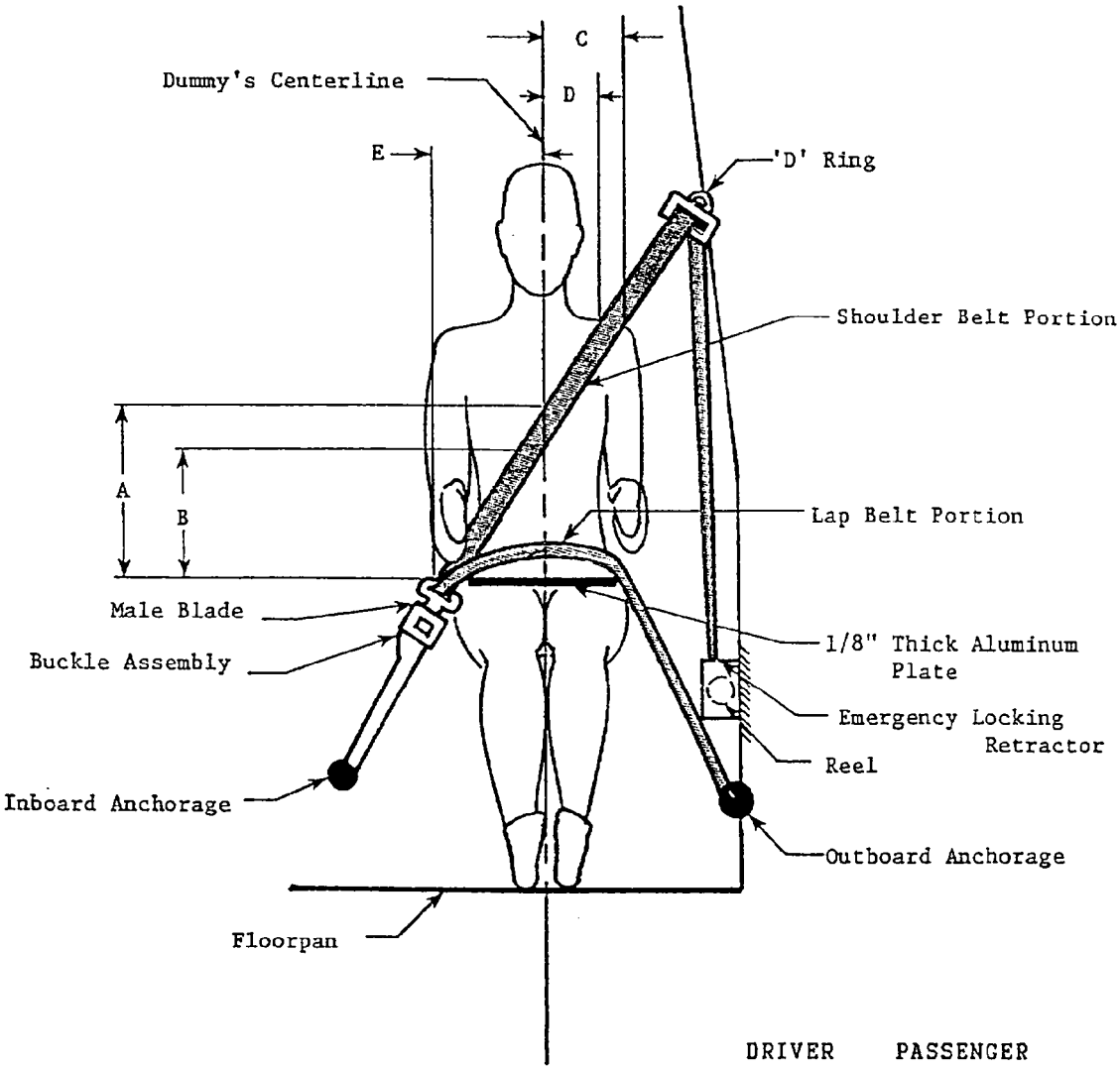


NOTE: Record position of tilt strg. column in REMARKS section

REMARKS: The steering column was a non-tilt column.

	MEASUREMENTS
NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim. (in.)	21.6
NH - Distance from tip of dummy's nose to center of steering column hub. (in.)	21.2
HS - Distance from center of steering column hub to the forward surface of the door lock striker pin. (in.)	28.8
SCA - Angle of steering column relative to the horizontal X axis	28°
SWA - Angle of steering wheel relative to the horizontal X axis	64°

FIGURE 9 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	13.4	13.5
B - Top surface of alum. plate to belt lower edge (in)	10.2	9.9
C - Dummy centerline to outer edge of belt at chest flesh top (in)	7.4	7.5
D - Dummy centerline to inner edge of belt at chest flesh top (in)	5.2	5.1
E - Dummy centerline to intersection of upper torso belt and lap belt (in)	7.6	7.8

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN: JF1KA7226LB701699 NHTSA NO: CL5502

MAKE: Subaru MODEL: Justy

VEHICLE BUILD DATE: 10/89 VEHICLE TYPE: 3-door hatchback

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one): X Automatic belts

_____ Type 2 lap/shoulder belts

_____ Other

CONVENIENCE HOOKS:

DEVICE AUTOMATICALLY RELEASES WHEN IGNITION IS TURNED TO "ON" OR "START" AND (check one):

_____ Vehicle's drivetrain is engaged

_____ Vehicle's parking brake is in the released mode

X Not applicable, vehicle's restraint system does not include convenience hooks

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION BELTS HAVE TENSION - RELIEVING DEVICES?

No

BELT CONTACT FORCE:

FOR BELTS WITHOUT TENSION-RELIEVING DEVICES: BELT CONTACT FORCE:

0.1 POUNDS

LATCHPLATE ACCESS: NA

RETRACTION: NA

ACCESSIBILITY: NA

LATCH MECHANISM: NA

TABLE 8 FMVSS NO. 208 - SEAT BELT WARNING SYSTEM DATA

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

Duration of audible warning signal = 7 sec.

Duration of reminder light operation = Continuous sec.

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

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 7 sec.

Wording of visual warning:

Fasten Seat Belt _____

Fasten Belt _____

Symbol 101-80 X

TABLE 9 FMVSS NO. 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: NA, vehicle did not contain a crash-deployed occupant protection system.

TABLE 10 FMVSS NO. 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. NA, vehicle did not contain a crash-deployed occupant protection system.

TABLE 11 SUMMARY OF FMVSS 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Subaru/Justy

BODY STYLE: 3-door hatchback MODEL YEAR: 1990

NHTSA NO.: CL5502 COLOR: Red

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: Fuji Heavy Industries, Ltd.

DATE OF MANUFACTURE: 10/89 VIN: JF1KA7226LB701699

GVWR: 2650 LBS., GAWR: FRONT 1445 LBS., REAR 1280 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Barrier Impact

DATE OF TEST: 03/29/90 TIME: 1315 TEMP: 70° F

REQUIRED IMPACT VELOCITY RANGE: 28.9 MPH TO 29.9 MPH

IMPACT VELOCITY: PRIMARY = 29.6 MPH, SECONDARY = 29.6 MPH

TEST WEIGHT = 2198 LBS., STATIC CRUSH MAX. = 15.4 IN., REBOUND = 17.0 IN.

FUEL SYSTEM DATA

TEST FLUID TYPE: PURPLE SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: 9.2 GALLONS (FURNISHED BY COTR)

TEST VOLUME: 8.6 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 9.2 GALLONS

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

ELECTRIC FUEL PUMP: No FUEL INJECTON: No

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

*WITH ENTIRE FUEL SYSTEM FILLED.

FIGURE 10 FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

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

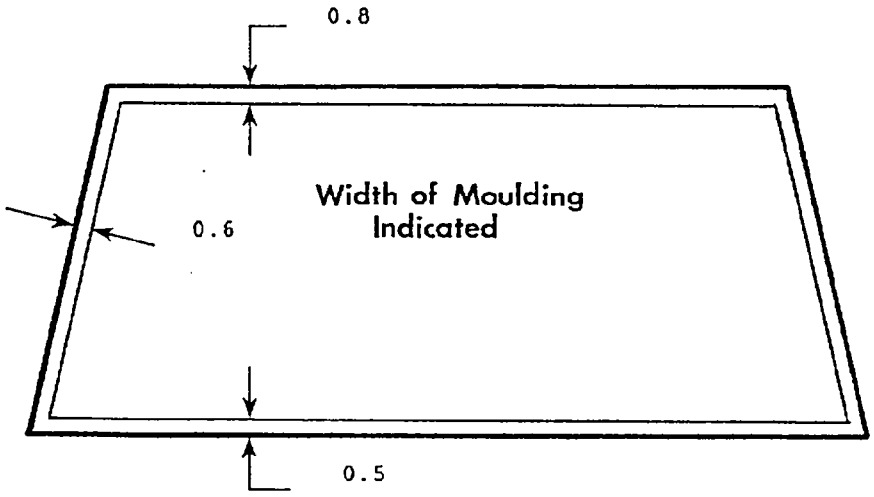
Adhesive around inner perimeter, plastic trim around outer perimeter.

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.

FMVSS 212 TEST DATA: WINDSHIELD PERIPHERY

	PRE-TEST (in)	POST-TEST (in)	PERCENT RETENTION
RIGHT SIDE	69.5	69.5	100%
LEFT SIDE	69.5	69.5	100%
TOTAL	139.0	139.0	100%

AREA OF RETENTION FAILURE:



WINDSHIELD TEMPERATURE: 70° F

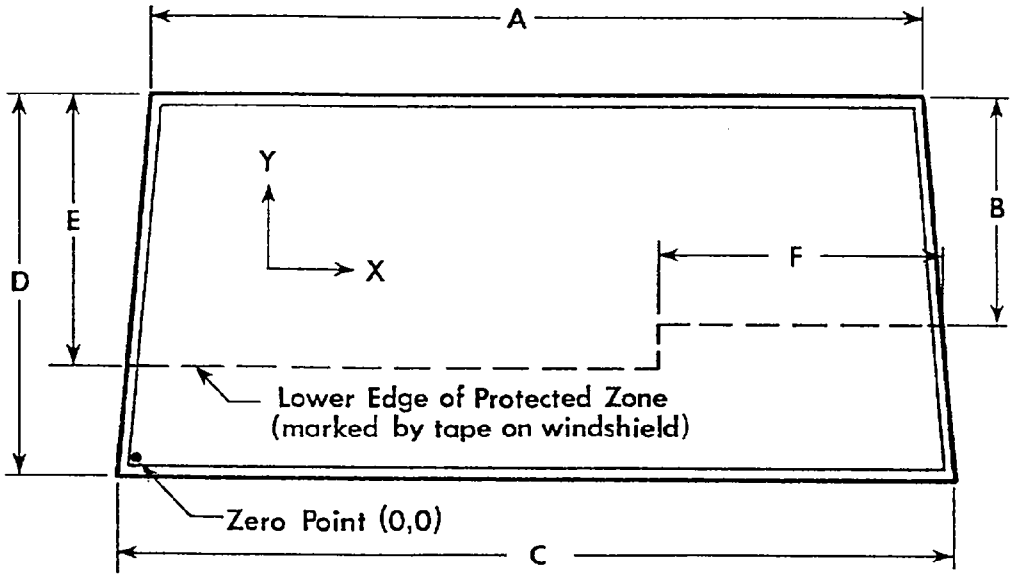
FAILURE DETAILS: None

FIGURE 11 FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. 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 1/2" 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.

FMVSS 219 TEST DATA:



FRONT VIEW

A = 43.0 C = 53.7 E = 18.0

B = 17.1 D = 24.2 F = 21.9

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4": (Show location of penetration on above sketch)

COORDINATES X Y

None

1.

2.

3.

4.

ALL MEASUREMENTS ARE IN INCHES.

TABLE 12 "FUEL SYSTEM INTEGRITY" POST-IMPACT

TEST DATA, FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CL5502 ; TEST DATE: 03/29/90

VEH. MFR./MAKE/MODEL: Fuji Heavy Industries, Ltd./Subaru/Justy

Test vehicle fuel tank filled to 92 to 94% of manufacturer's "useable" 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 SPILLAGE MEASUREMENT:

	ACTUAL	MAX. ALLOW.
1. From impact until vehicle motion ceases - - -	0	1 oz.
2. For 5 min. period after veh. motion ceases- -	0	5 oz.
3. For next 25 minutes - - - - - - - - - - - - -	0	1 oz./1 min.

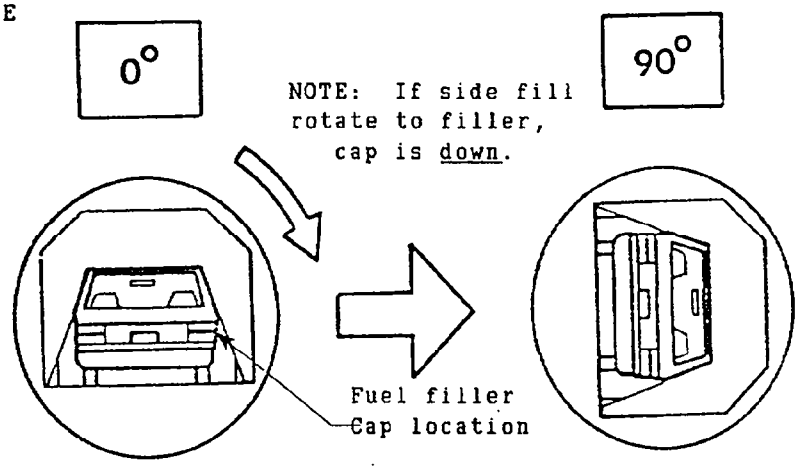
SOLVENT SPILLAGE DETAILS:

None

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

NHTSA NO.: CL5502

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301 position hold time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next whole minute interval - - - - = 7 minutes

FMVSS 301 REQUIREMENTS

	First 5 minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum allowable solvent spillage - -	5 oz.	1 oz.	1 oz.
0 to 90° (filler cap down) - - - - - -	0 oz.	0 oz.	0 oz.

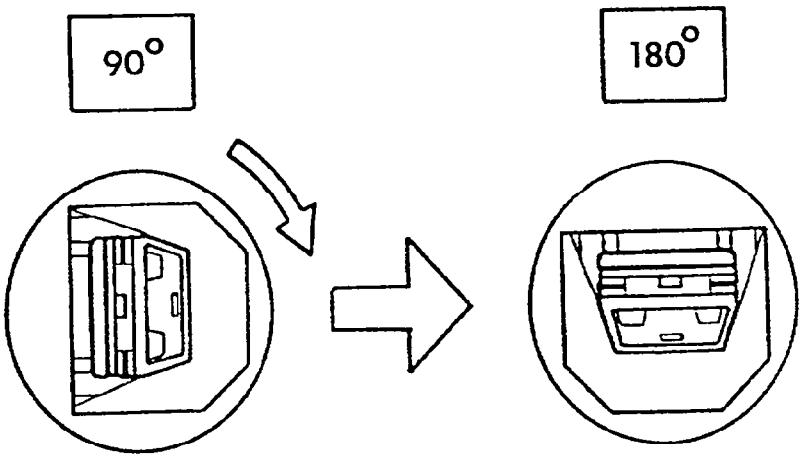
SOLVENT SPILLAGE LOCATION(S)

None

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D

NHTSA NO.: CL5502

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301 position hold time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next whole minute interval - - - - = 14 minutes

FMVSS 301 REQUIREMENTS

	First 5 minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum allowable solvent spillage - -	5 oz.	1 oz.	1 oz.
90° to 180°- - - - - - - - - - - - - - -	0 oz.	0 oz.	0 oz.

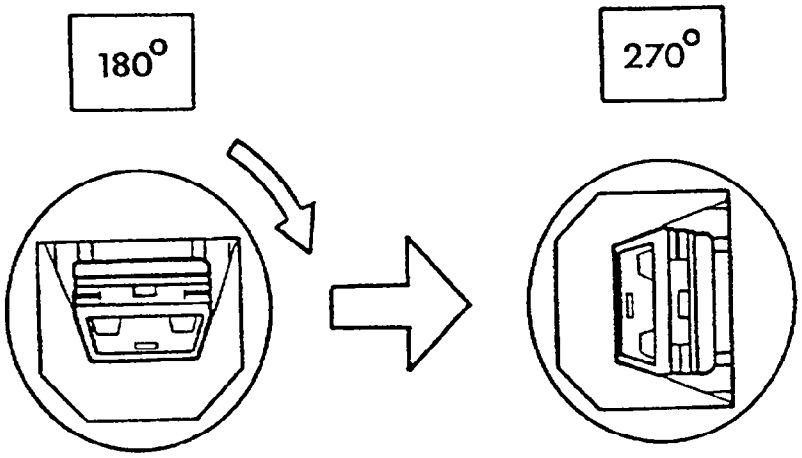
SOLVENT SPILLAGE LOCATION(S)

None

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D

NHTSA NO.: CL5502

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301 position hold time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next whole minute interval - - - - = 21 minutes

FMVSS 301 REQUIREMENTS

	First 5 minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum allowable solvent spillage - -	5 oz.	1 oz.	1 oz.
180° to 270° - - - - - - - - - - - - - -	0 oz.	0 oz.	0 oz.

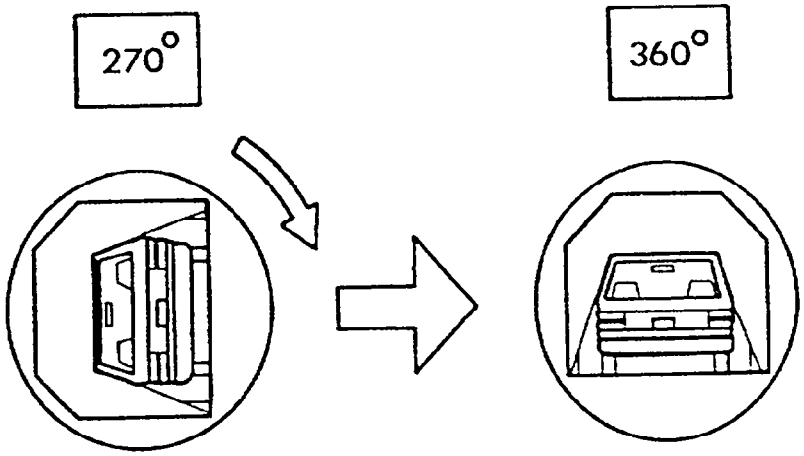
SOLVENT SPILLAGE LOCATION(S)

None

FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET CONT'D

NHTSA NO.: CL5502

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1-3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

FMVSS 301 position hold time = 5 minutes, 00 seconds

TOTAL - - - - - - - - = 7 minutes, 00 seconds

Next whole minute interval - - - - = 28 minutes

FMVSS 301 REQUIREMENTS

	First 5 minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum allowable solvent spillage - -	5 oz.	1 oz.	1 oz.
270° to 360° - - - - - - - - - - - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

None

SECTION 3.0

CAMERA INFORMATION

FIGURE 13

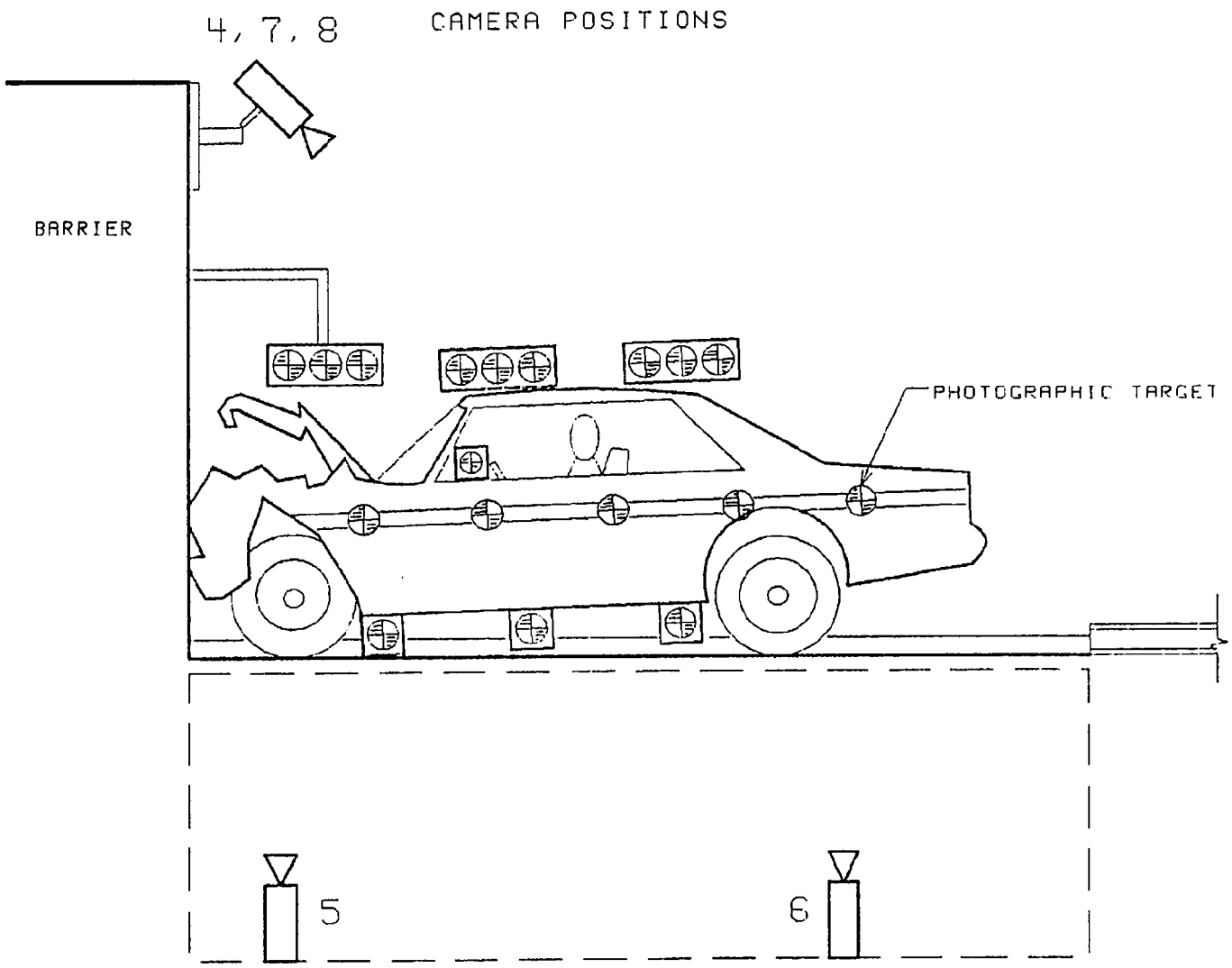


FIGURE 13

CAMERA POSITIONS, CONTINUED

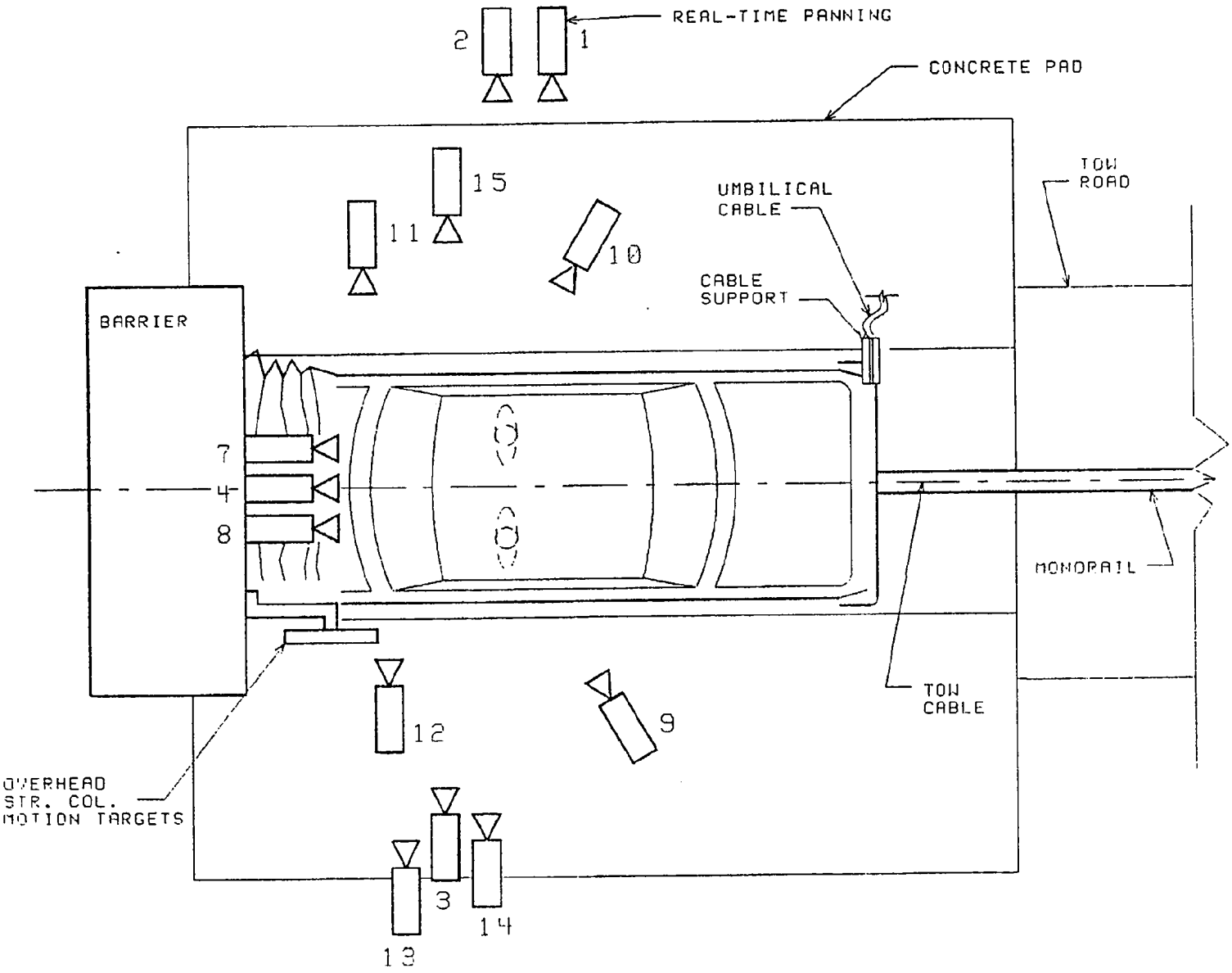


TABLE 13 HIGH SPEED CAMERA LOCATIONS

TEST NO.: 900329 VEHICLE: 1990 Subaru Justy 3-door hatchback

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)* X	Y	Z	ANGLE** (DEG)	FILM PLANE TO HEAD TARGET	LENS (MM)	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	500
3	Dummy kinematics	-41.5	295.0	44.0	-4	198.0	25	498
4	Windshield damage	-6.0	0.0	96.0	-40	NA	8.5	505
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	988
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	990
7	Passenger kinematics	-4.5	-13.8	93.0	-50	NA	17	500
8	Driver kinematics	-6.8	14.5	93.0	-50	NA	17	505
9	Driver kinematics	-157.3	116.0	87.0	-27	92.0	25	500
10	Passenger kinematics	-152.1	-116.0	87.0	-26	89.0	25	495
11	Windshield intrusion	-38.1	-306.1	44.0	0	NA	50	493
12	Windshield intrusion	-53.0	309.4	42.3	0	NA	50	493
13	Column movement	-106.0	290.0	103.0	-14	NA	25	498
14	Column movement	-106.0	290.0	75.1	-9	NA	25	502
15	Passenger kinematics	-38.8	-293.0	45.3	-4	194.0	25	515

* +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

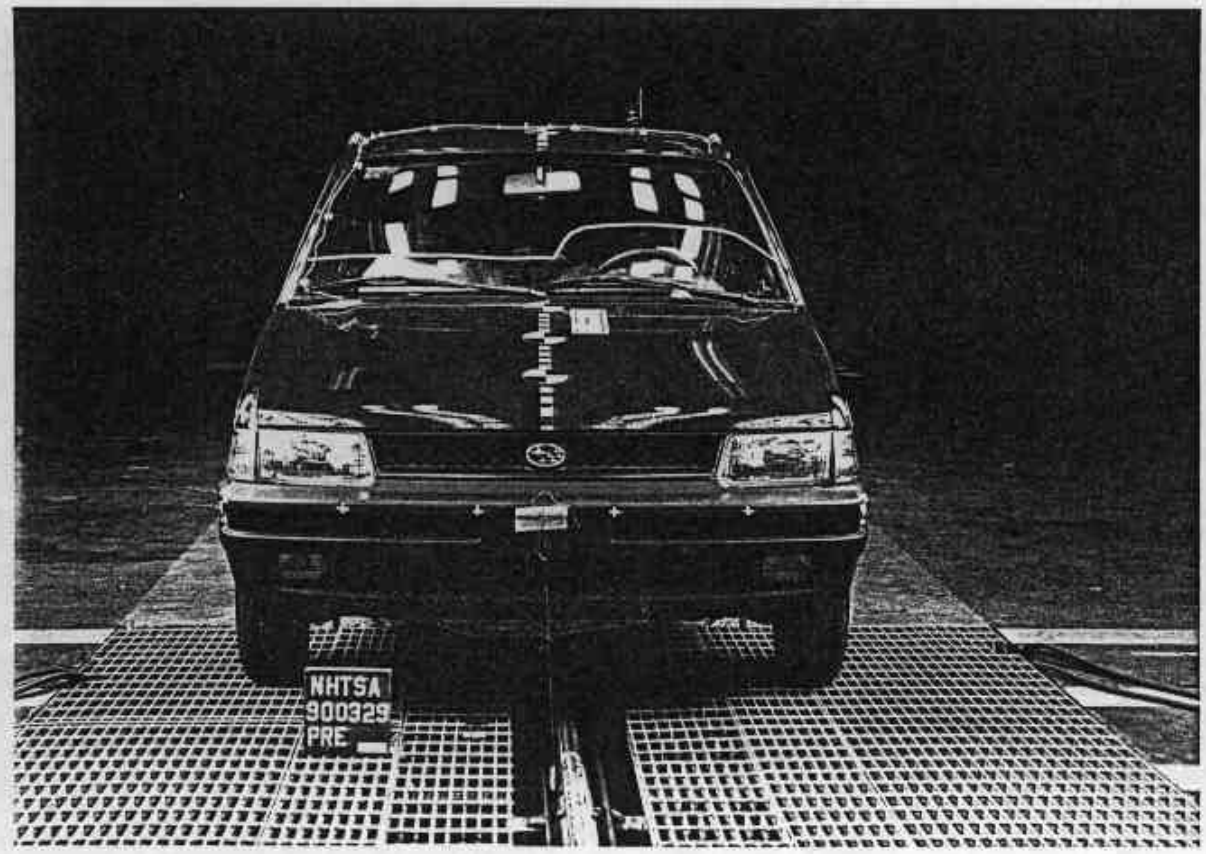


Figure A-1. PRE-TEST FRONT VIEW

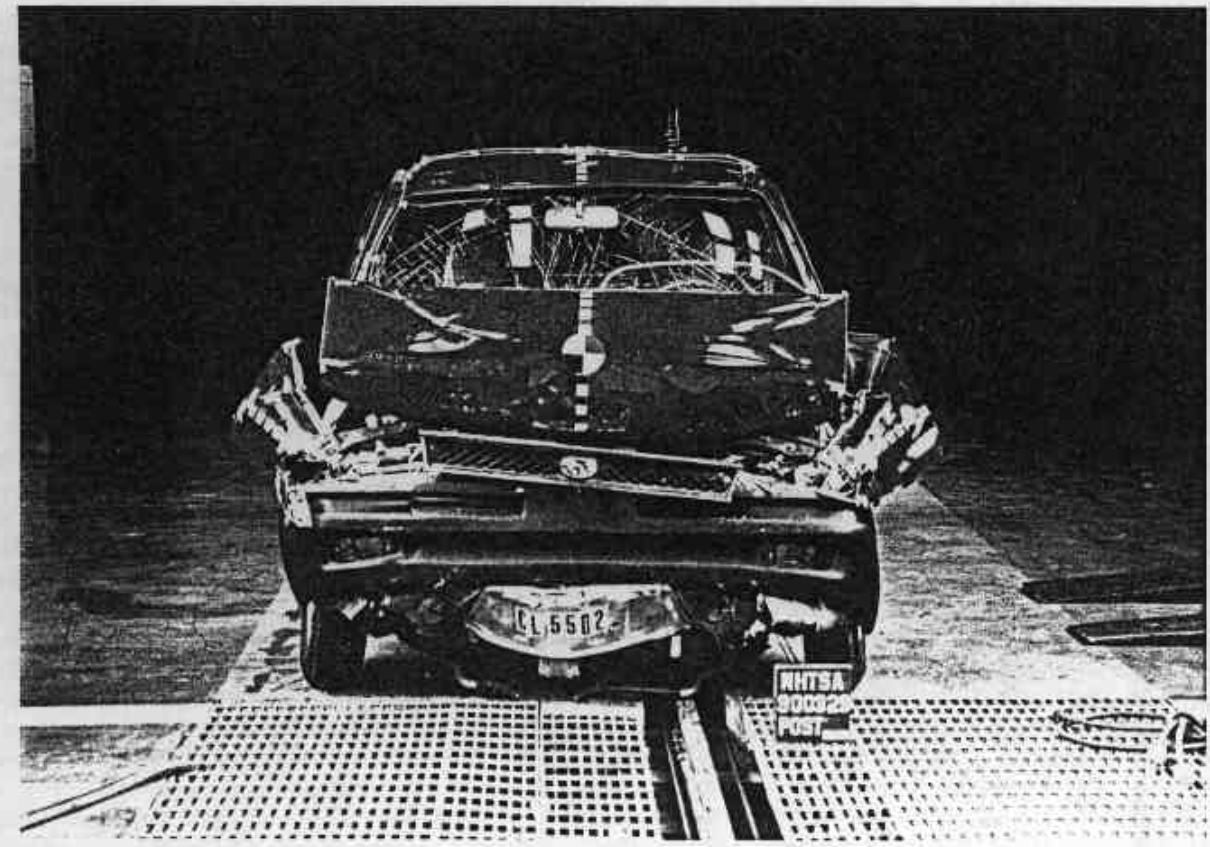


Figure A-2. POST-TEST FRONT VIEW

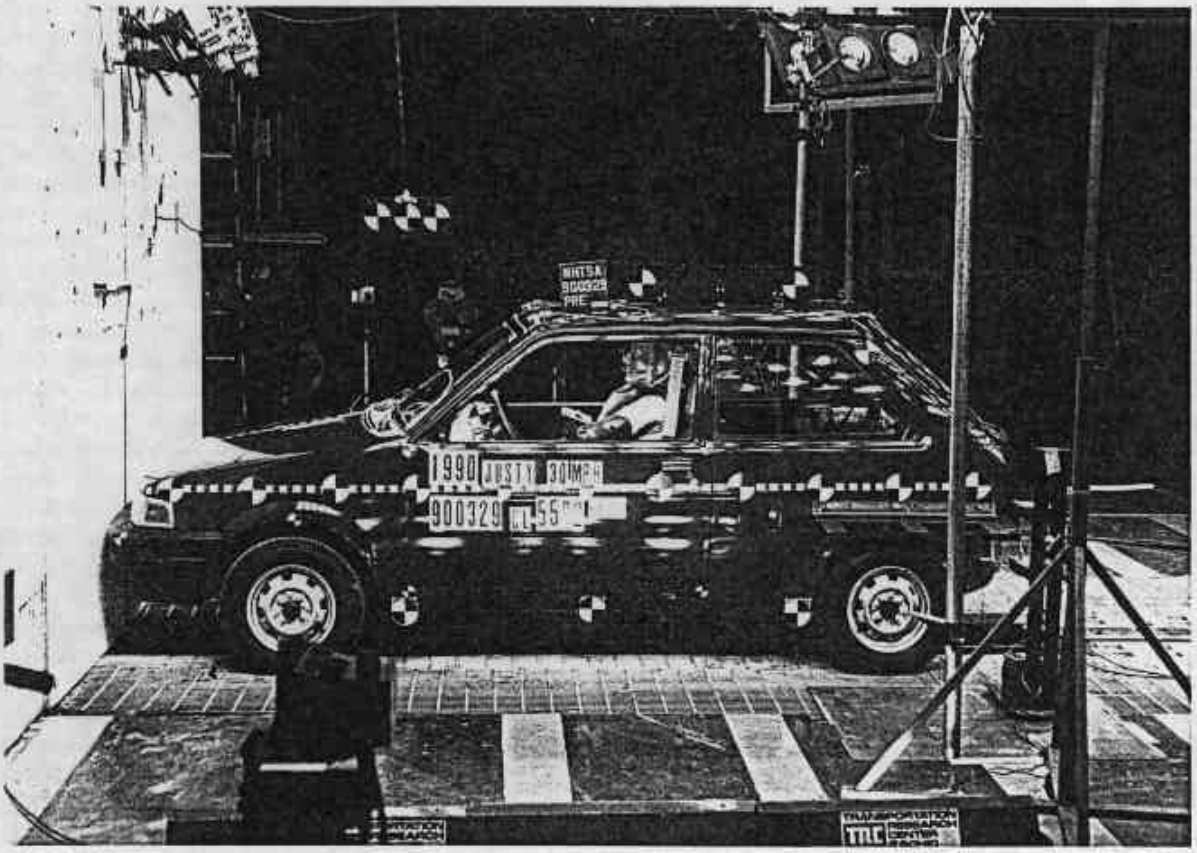


Figure A-3. PRE-TEST LEFT SIDE VIEW

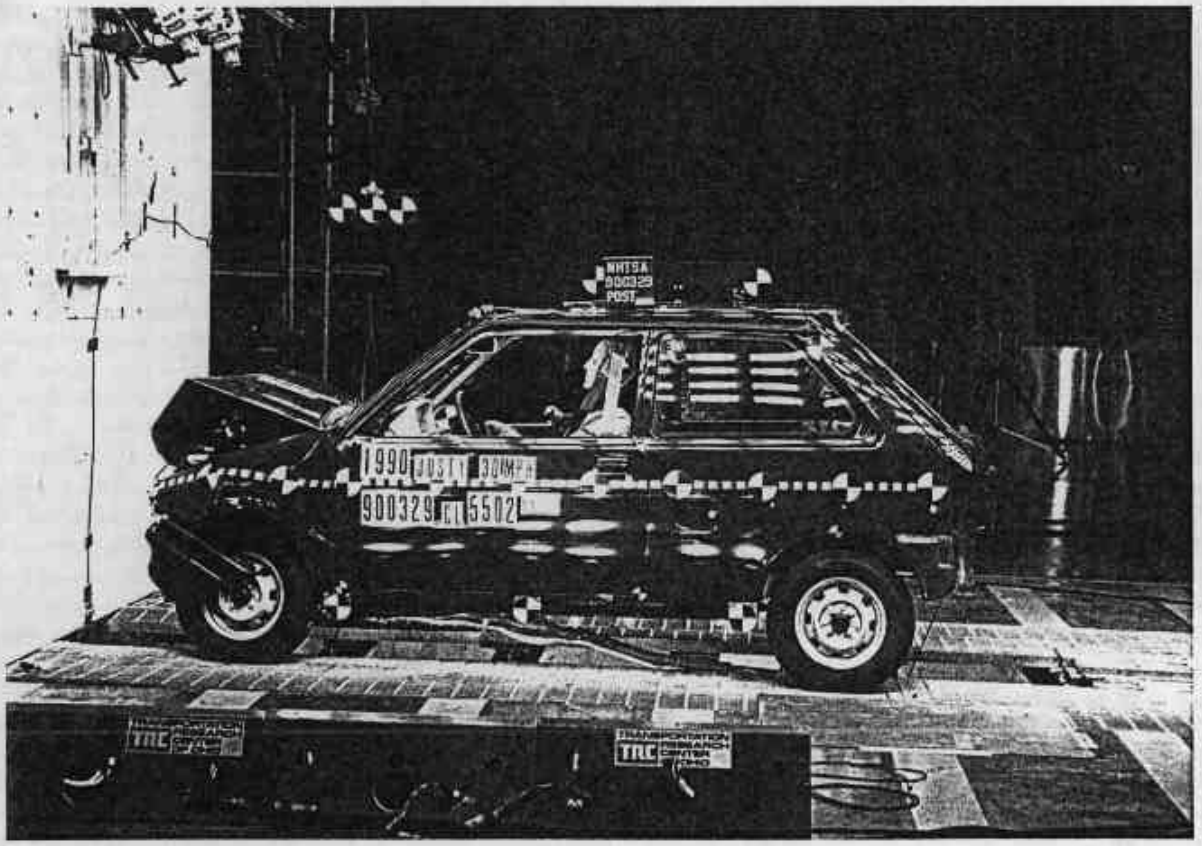


Figure A-4. POST-TEST LEFT SIDE VIEW

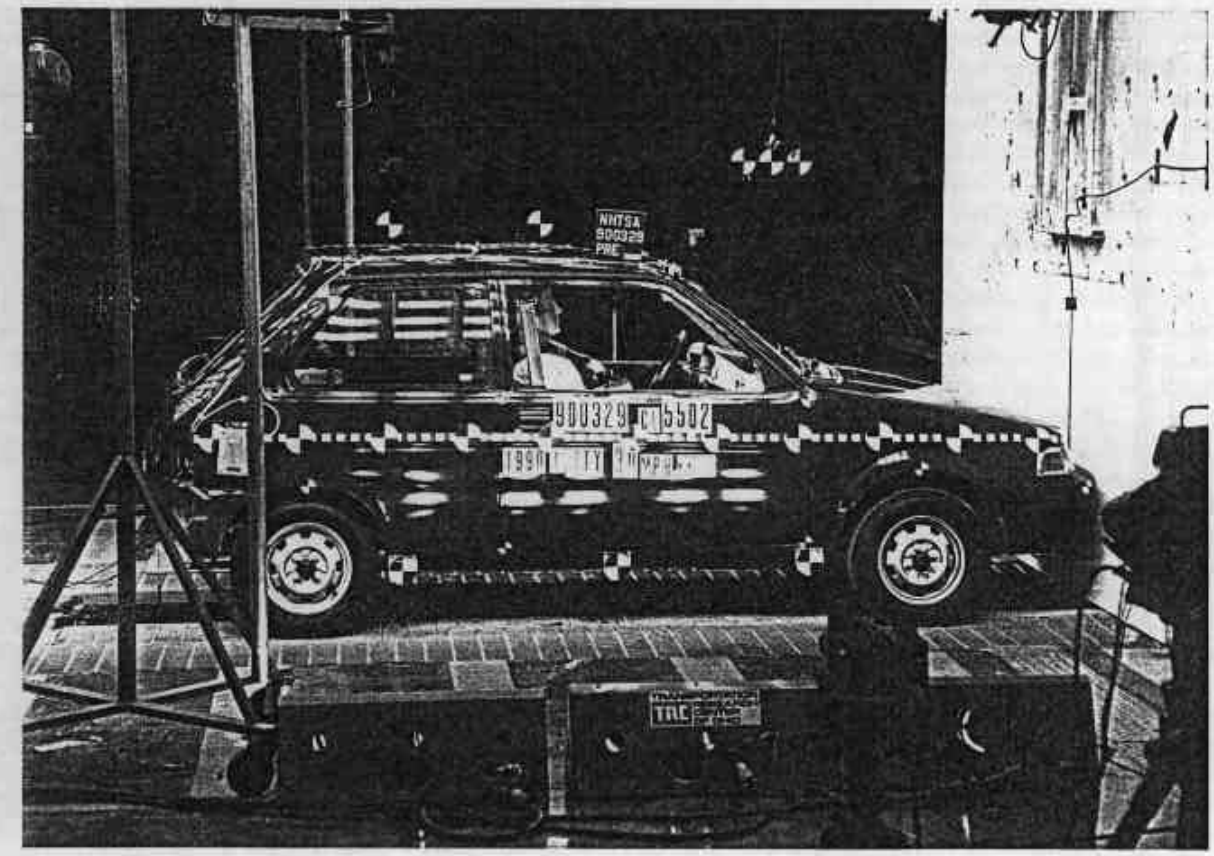


Figure A-5. PRE-TEST RIGHT SIDE VIEW

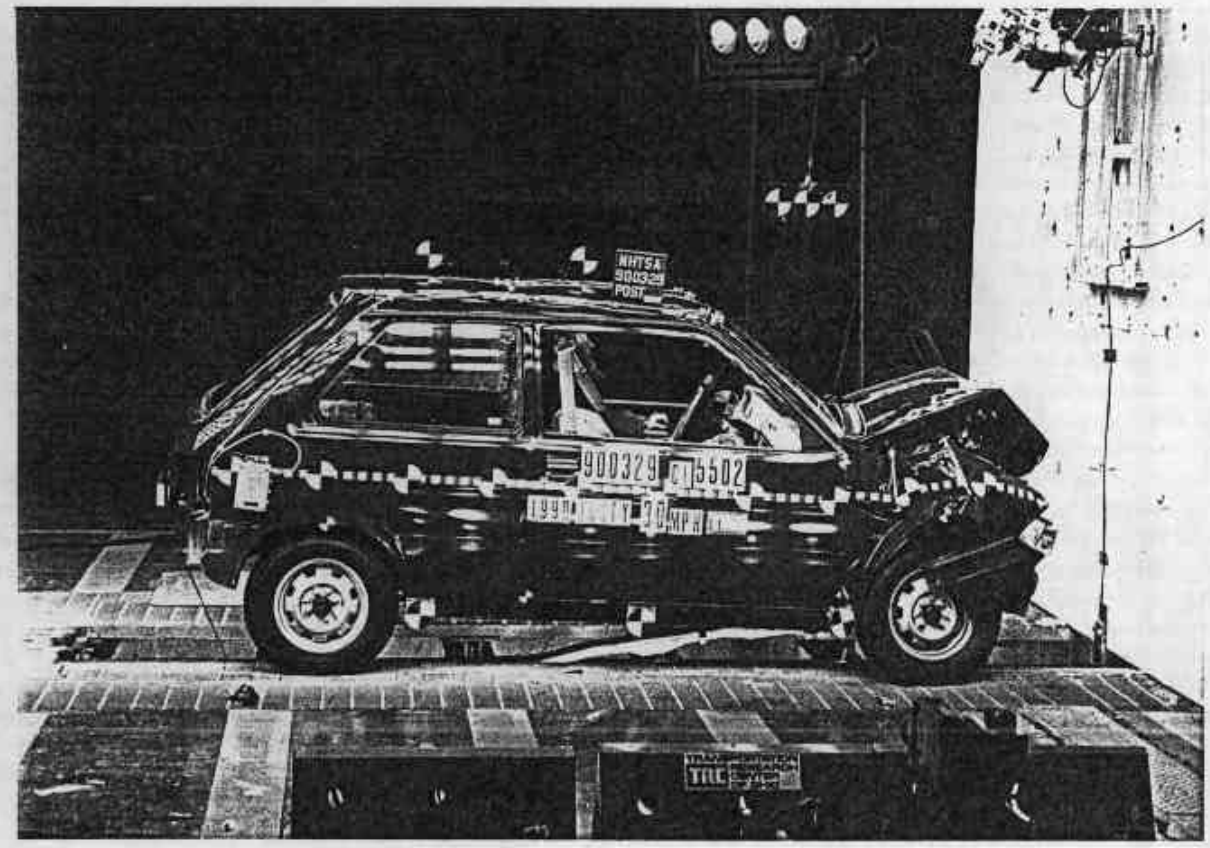


Figure A-6. POST-TEST RIGHT SIDE VIEW

Figure A-7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

Figure A-8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

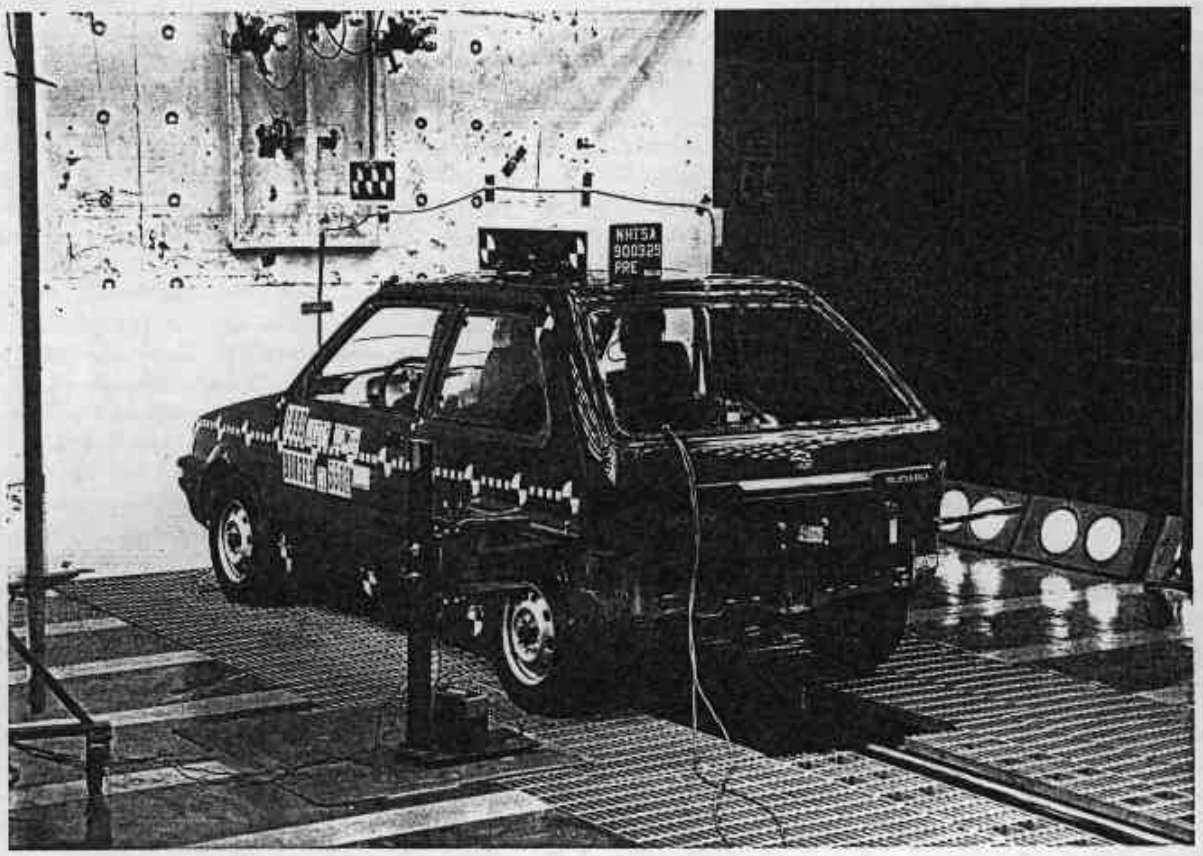


Figure A-9. PRE-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-10. POST-TEST LEFT REAR THREE-QUARTER VIEW

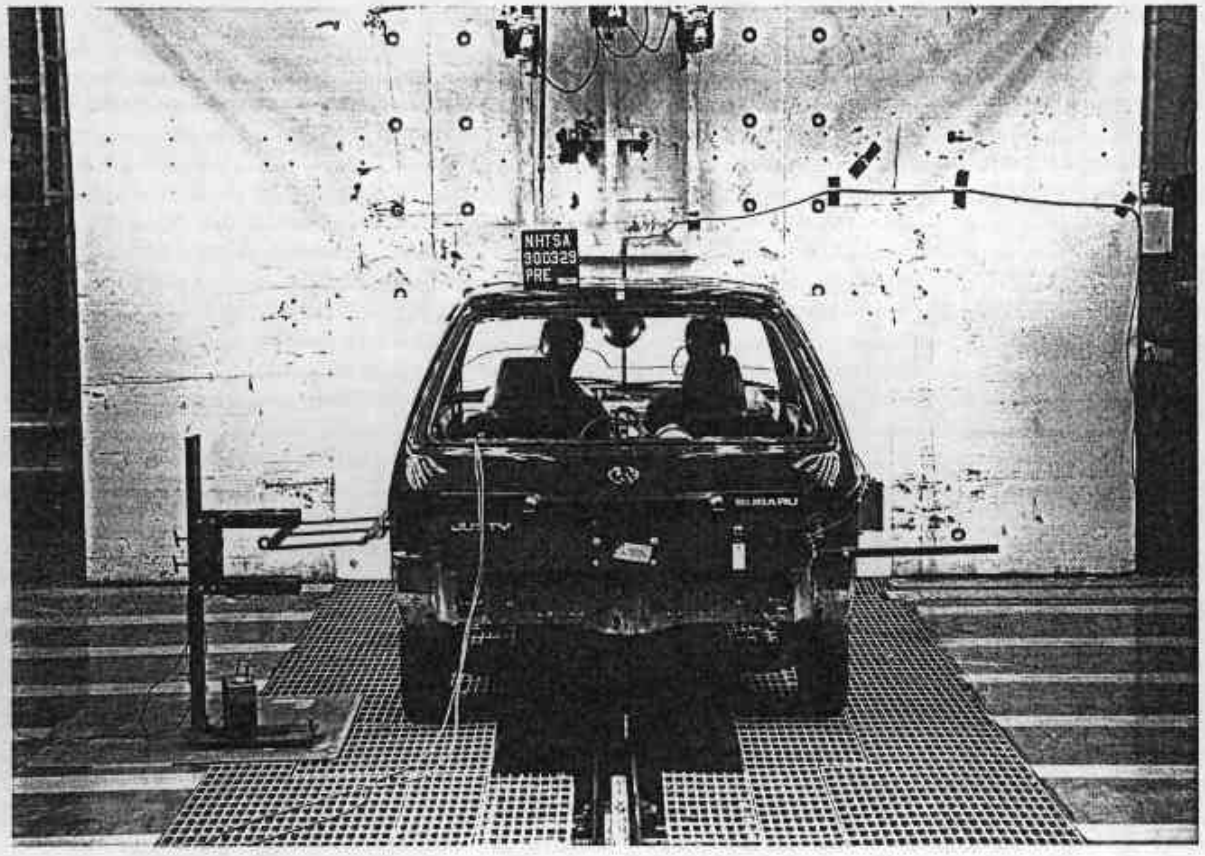


Figure A-11. PRE-TEST REAR VIEW

Figure A-12. POST-TEST REAR VIEW

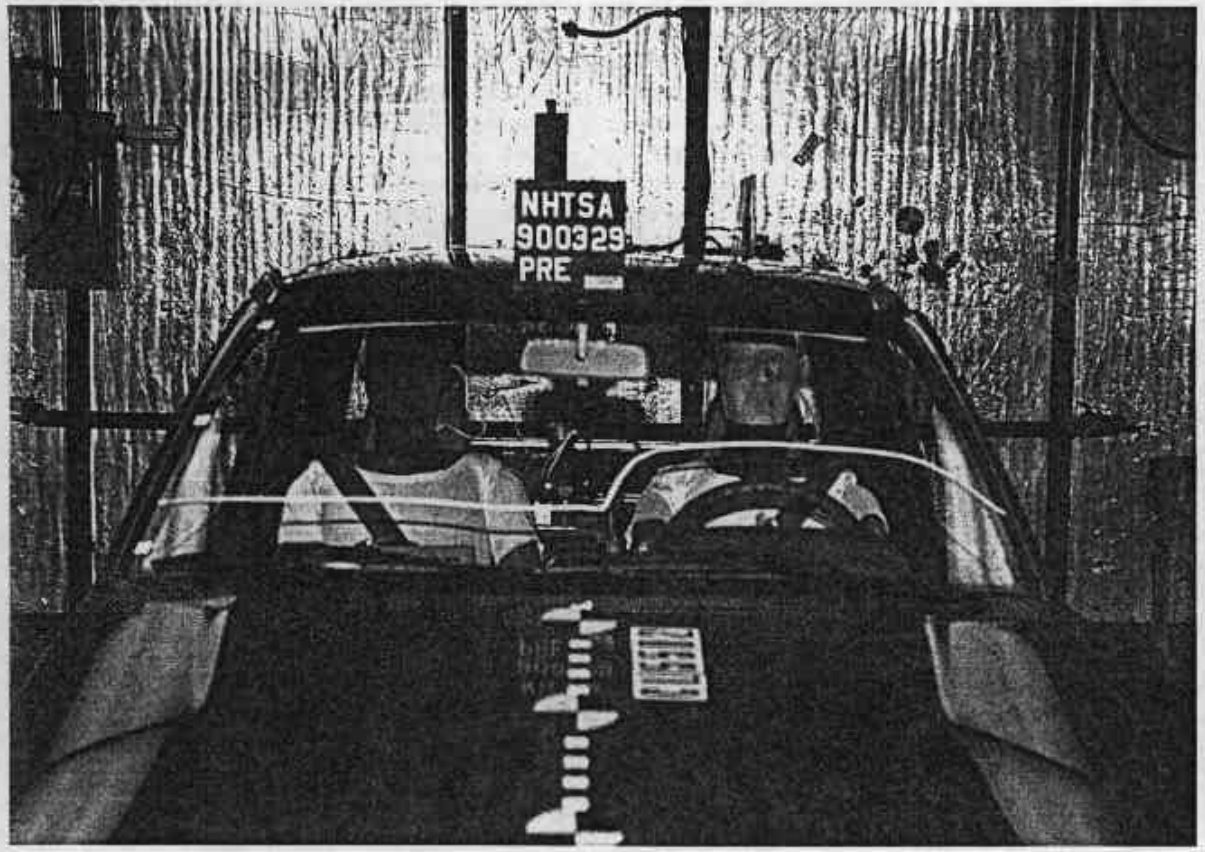


Figure A-13. PRE-TEST WINDSHIELD VIEW

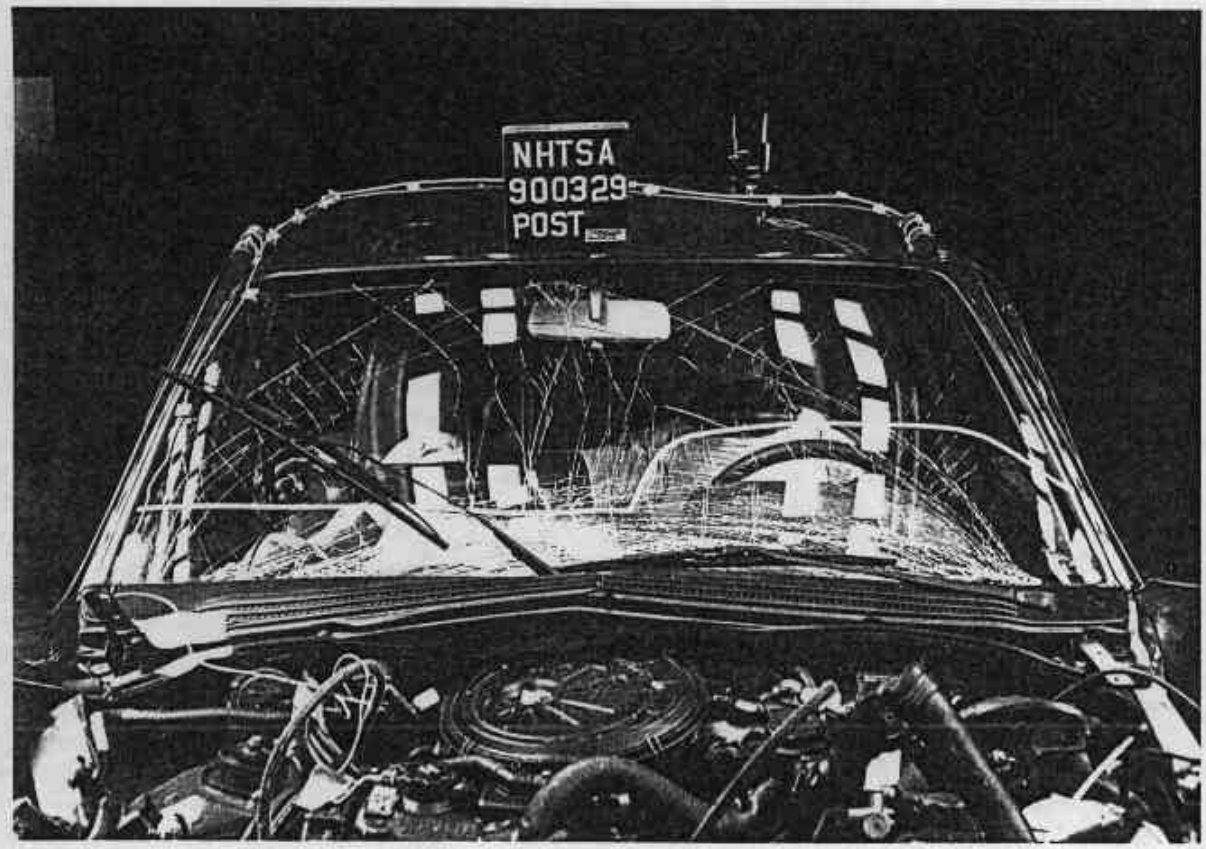


Figure A-14. POST-TEST WINDSHIELD VIEW

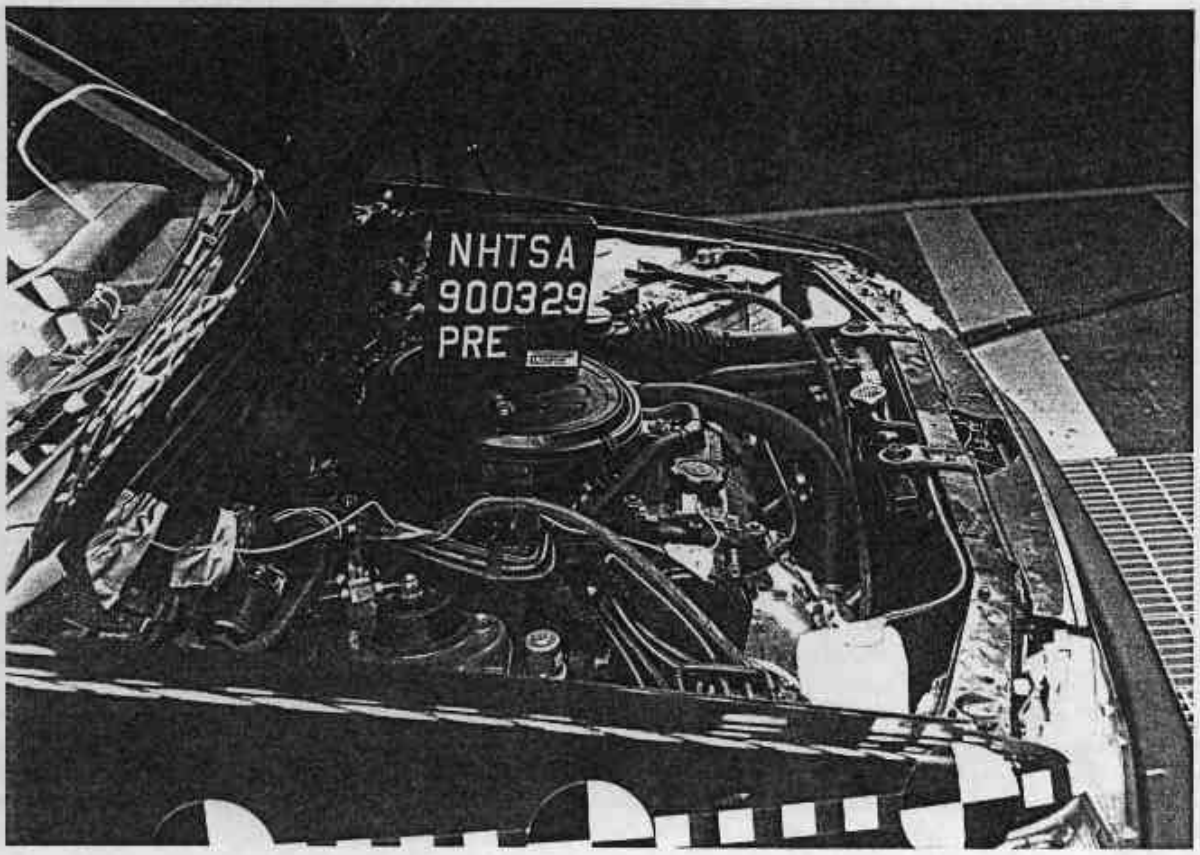


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

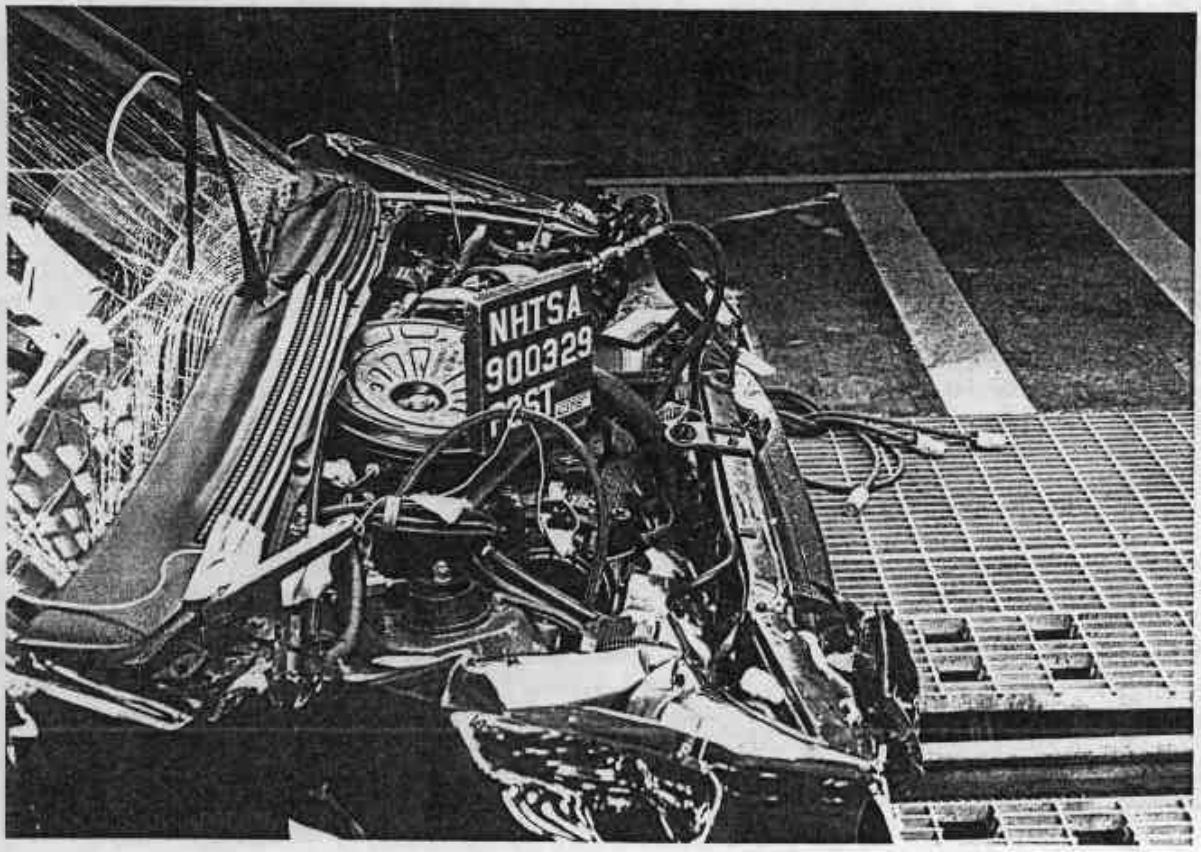


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

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

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

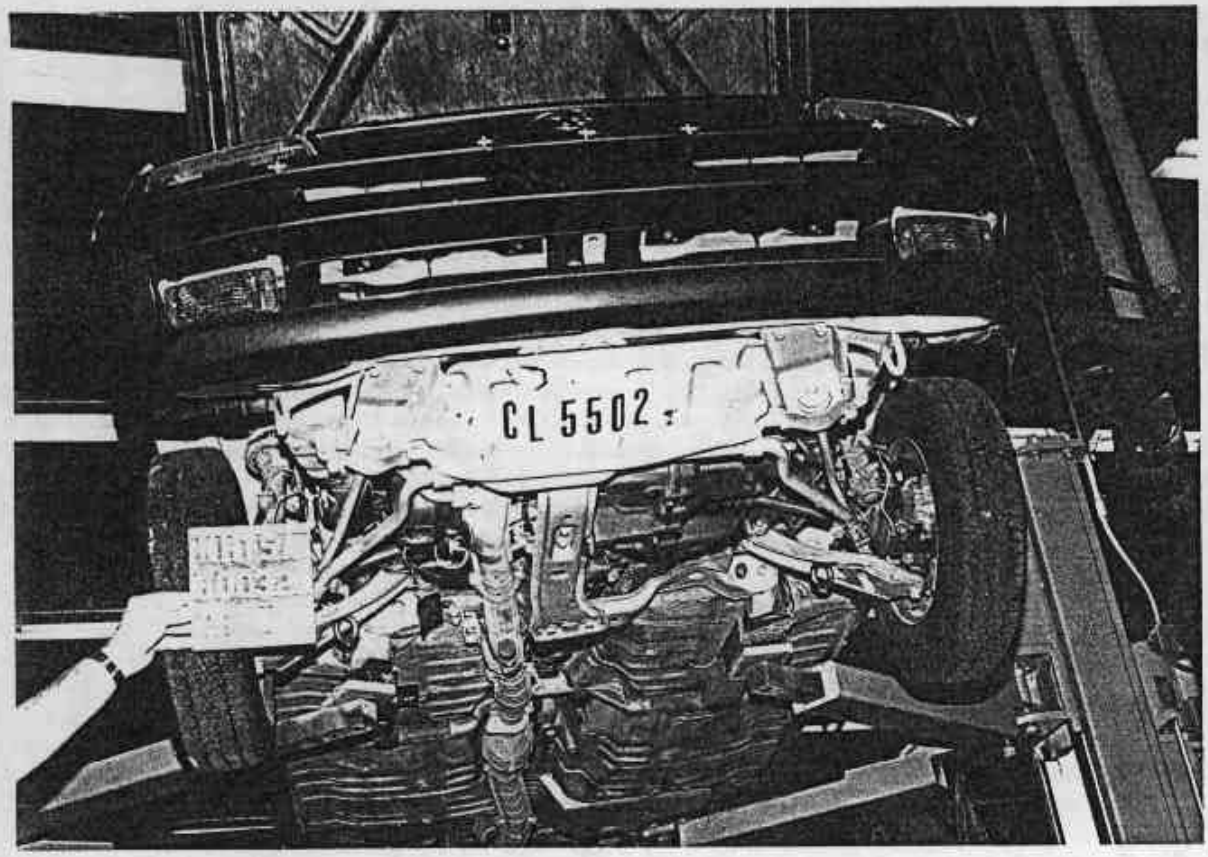


Figure A-19. PRE-TEST FRONT UNDERBODY VIEW

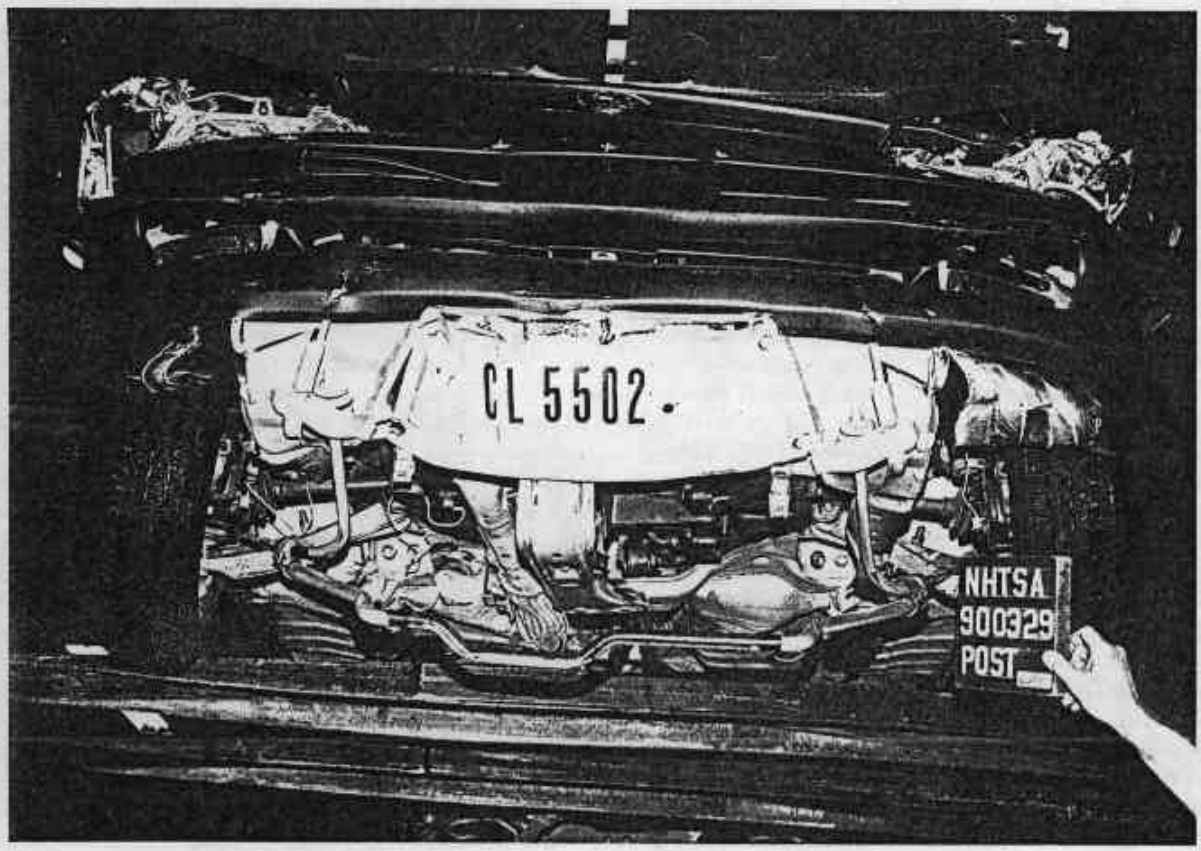


Figure A-20. POST-TEST FRONT UNDERBODY VIEW

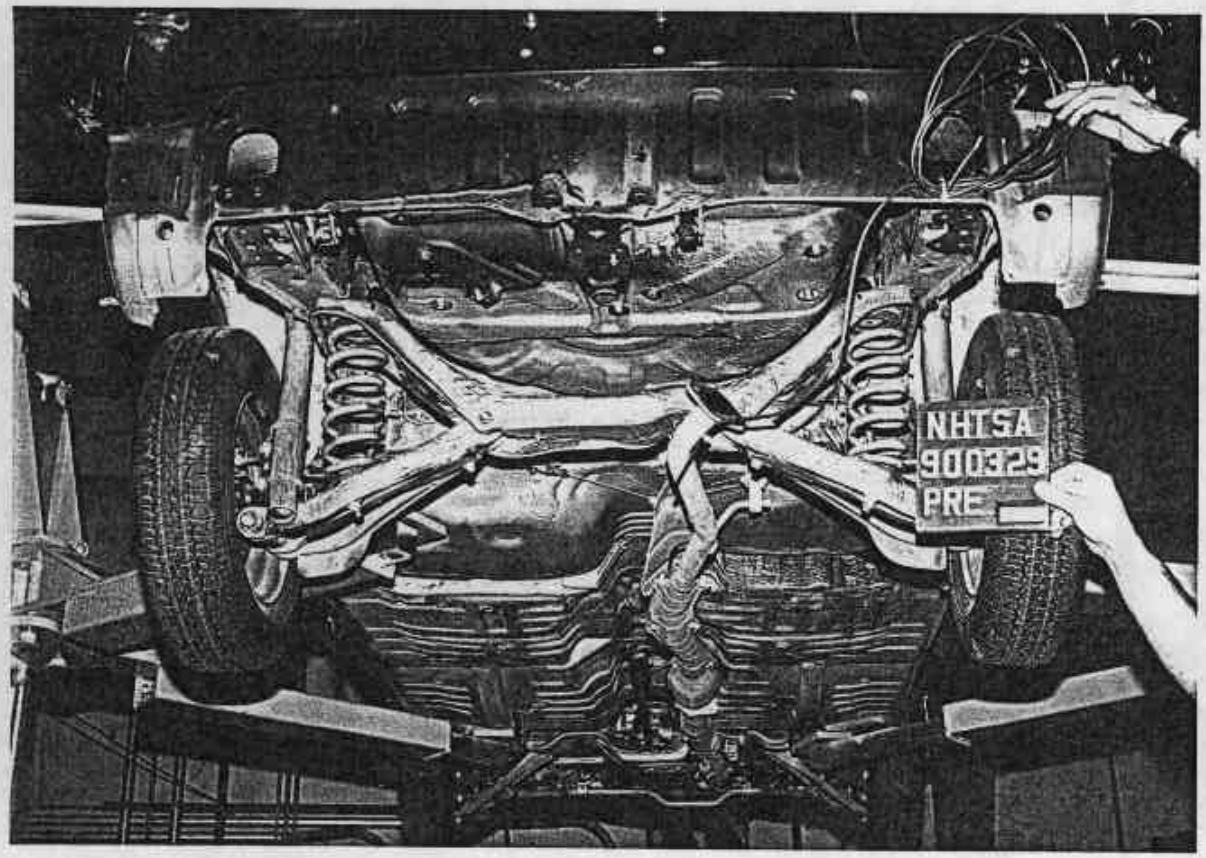


Figure A-21. PRE-TEST REAR UNDERBODY VIEW

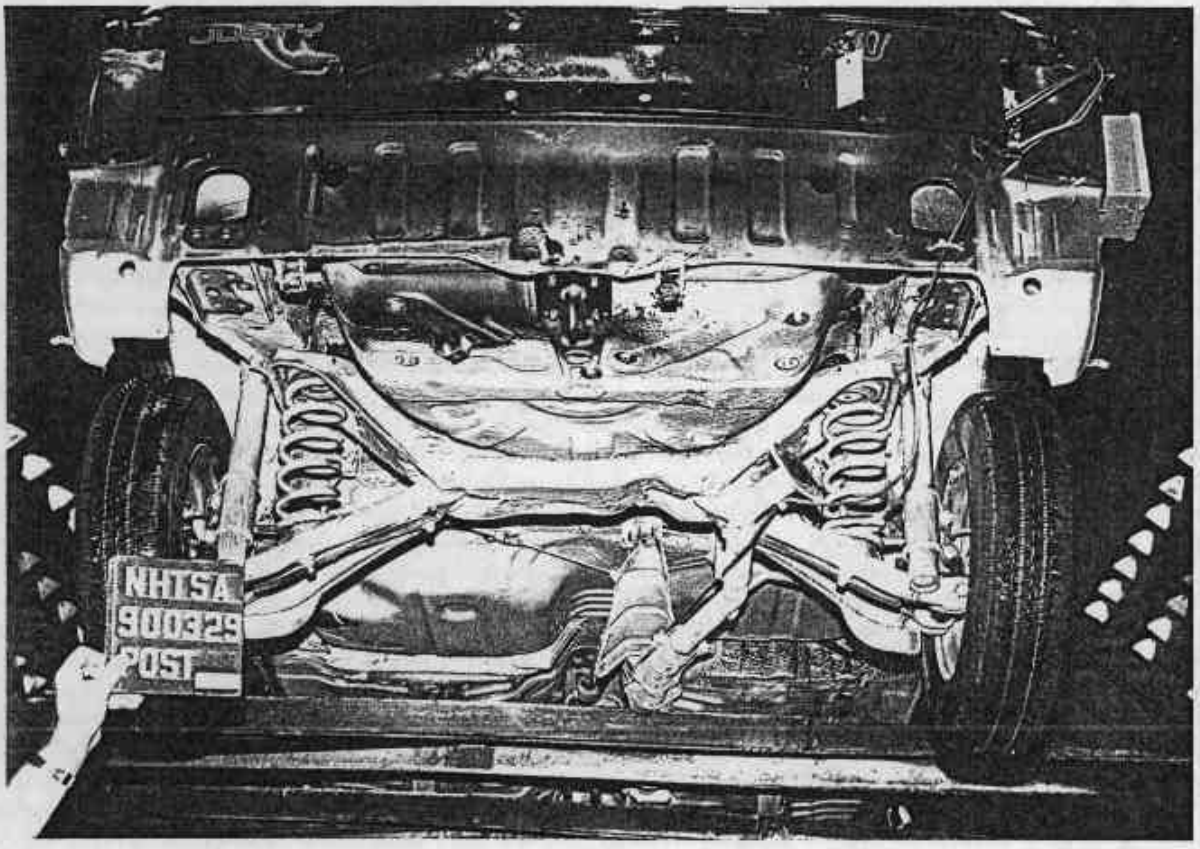


Figure A-22. POST-TEST REAR UNDERBODY VIEW

Figure A-23. PRE-TEST FUEL TANK VIEW

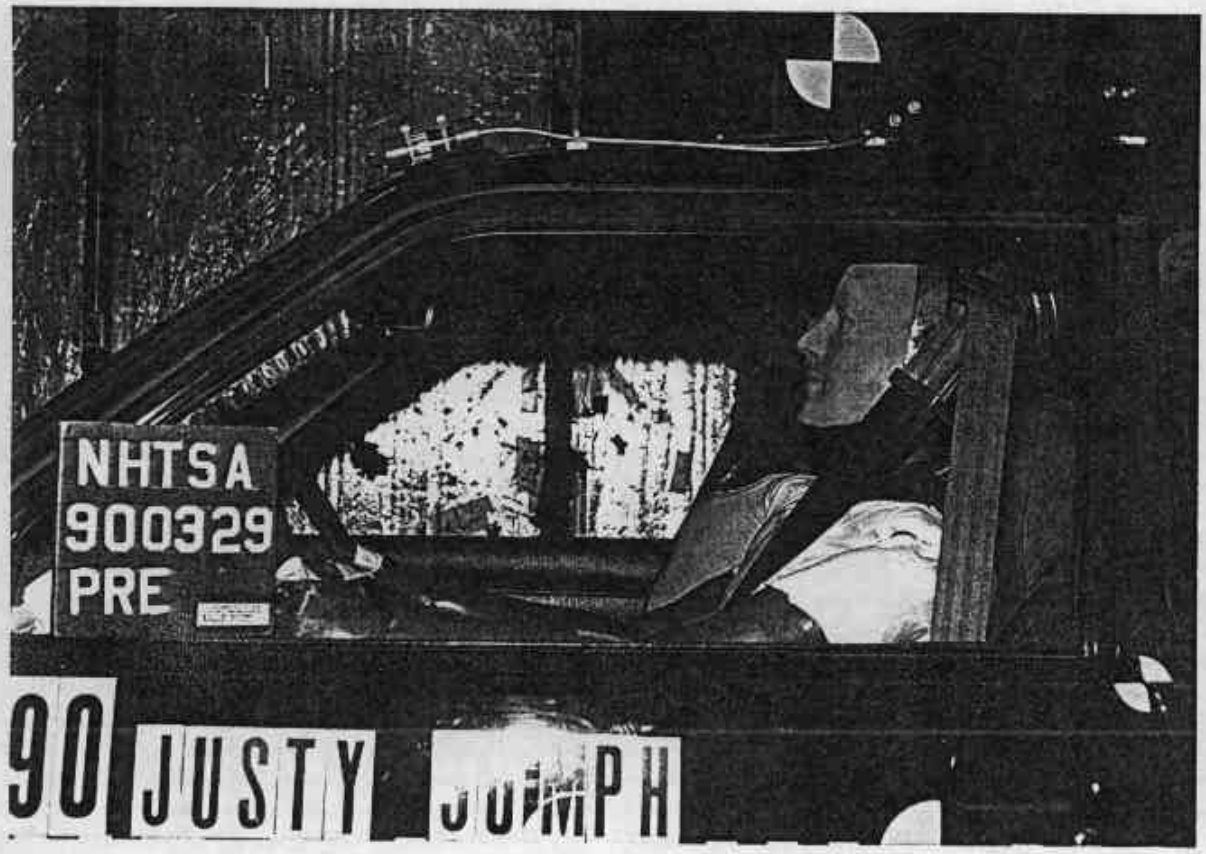


Figure A-24. PRE-TEST DRIVER DUMMY POSITOIN VIEW

Figure A-25. POST-TEST DRIVER DUMMY POSITION VIEW

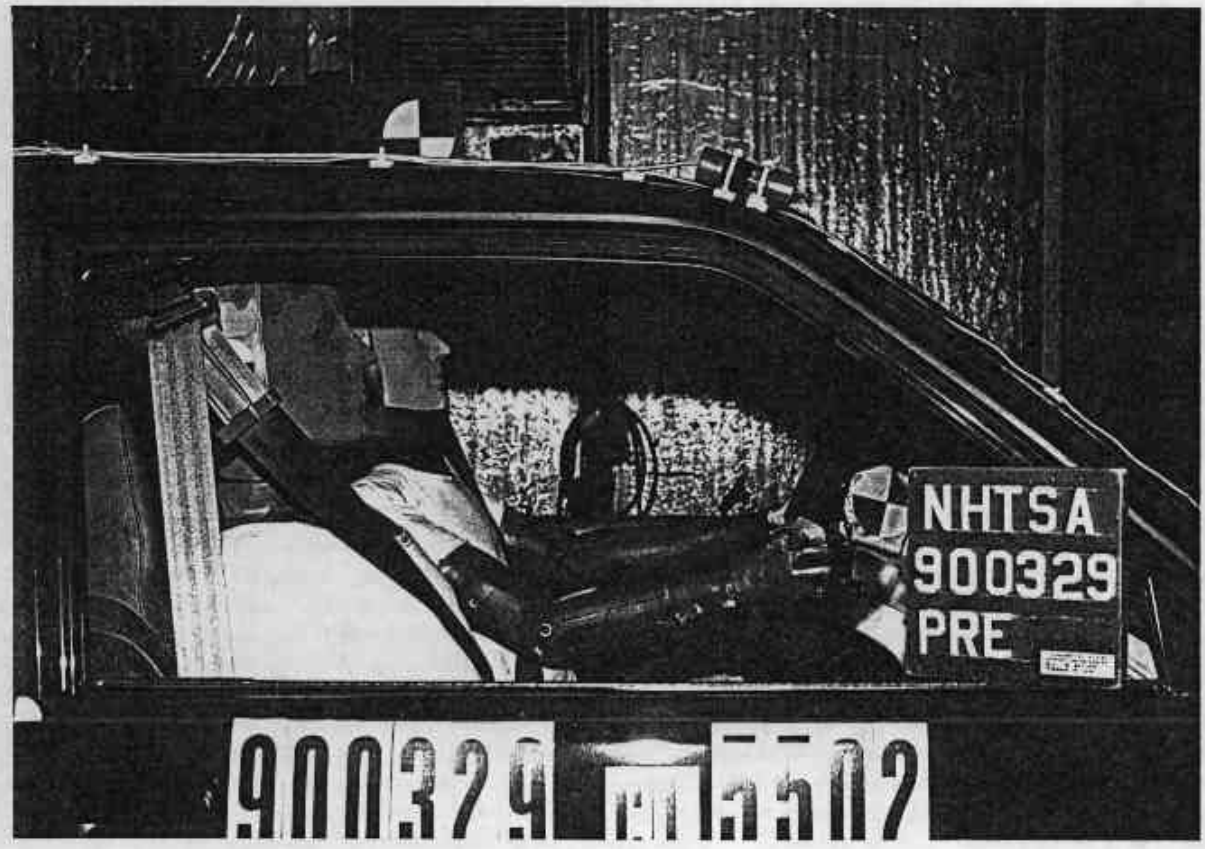


Figure A-26. PRE-TEST PASSENGER DUMMY POSITION VIEW

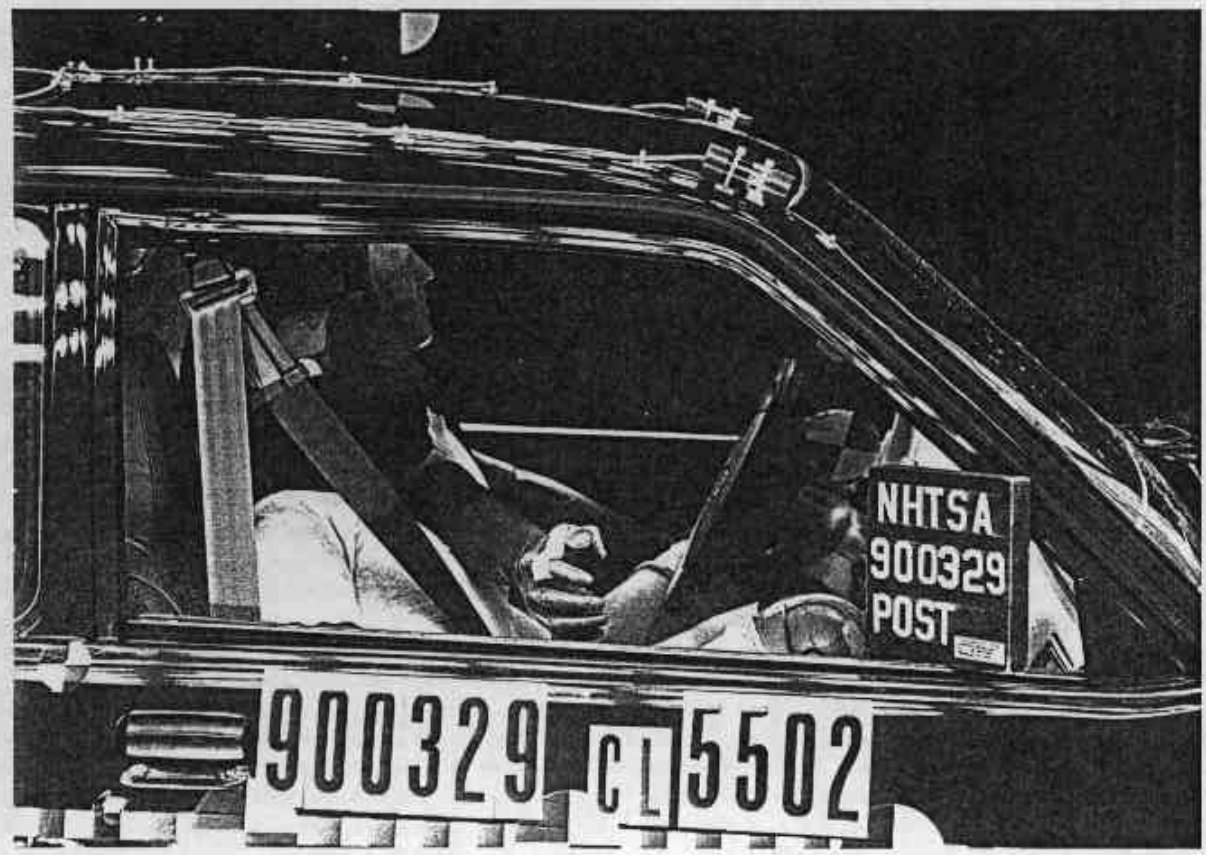


Figure A-27. POST-TEST PASSENGER DUMMY POSITION VIEW

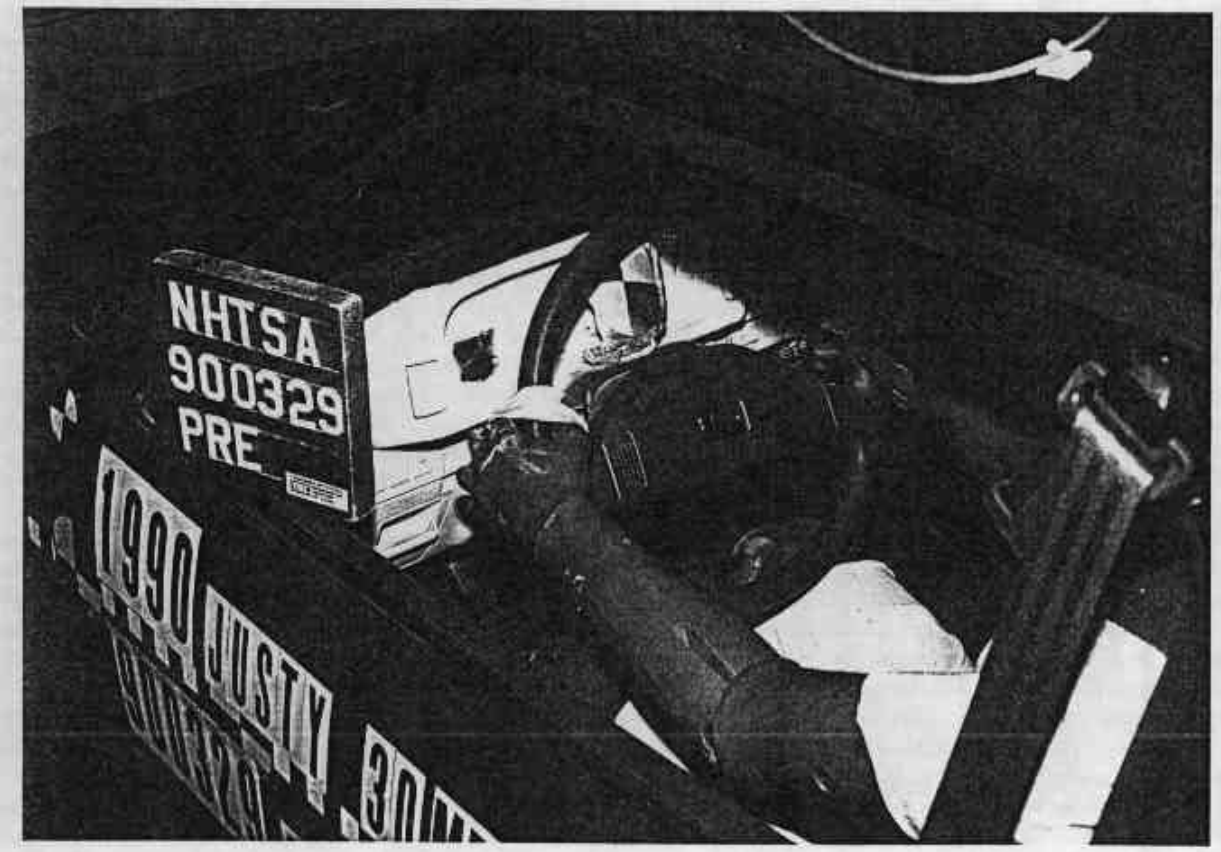


Figure A-28. PRE-TEST DRIVER DUMMY POSITION VIEW

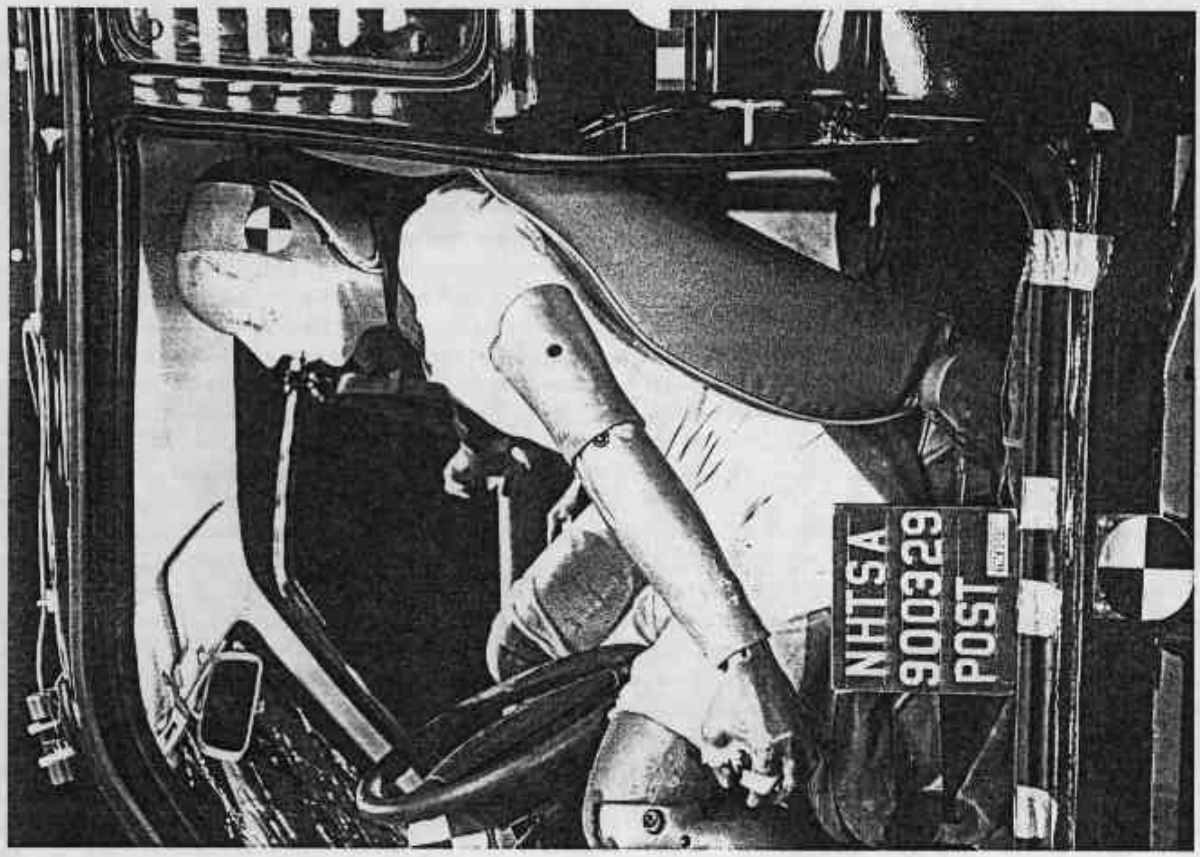


Figure A-29. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

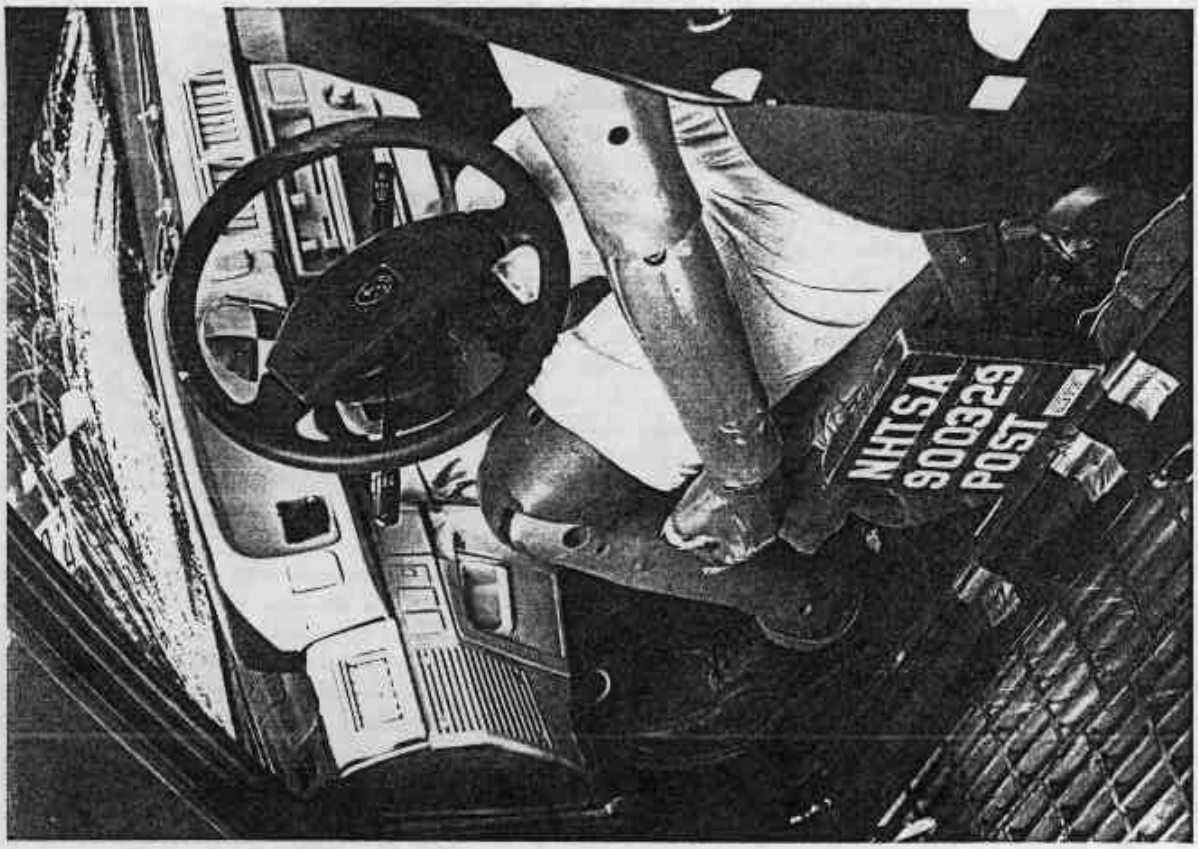


Figure A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

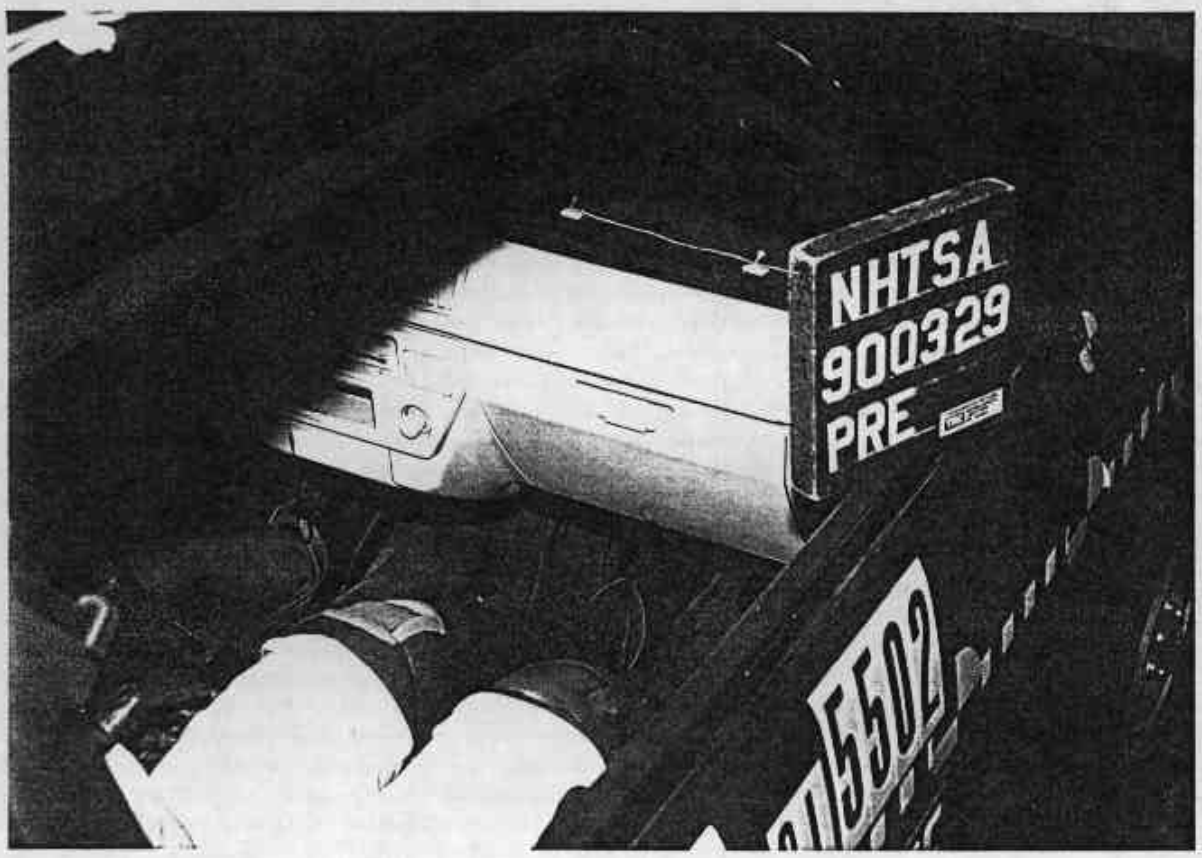


Figure A-31. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR

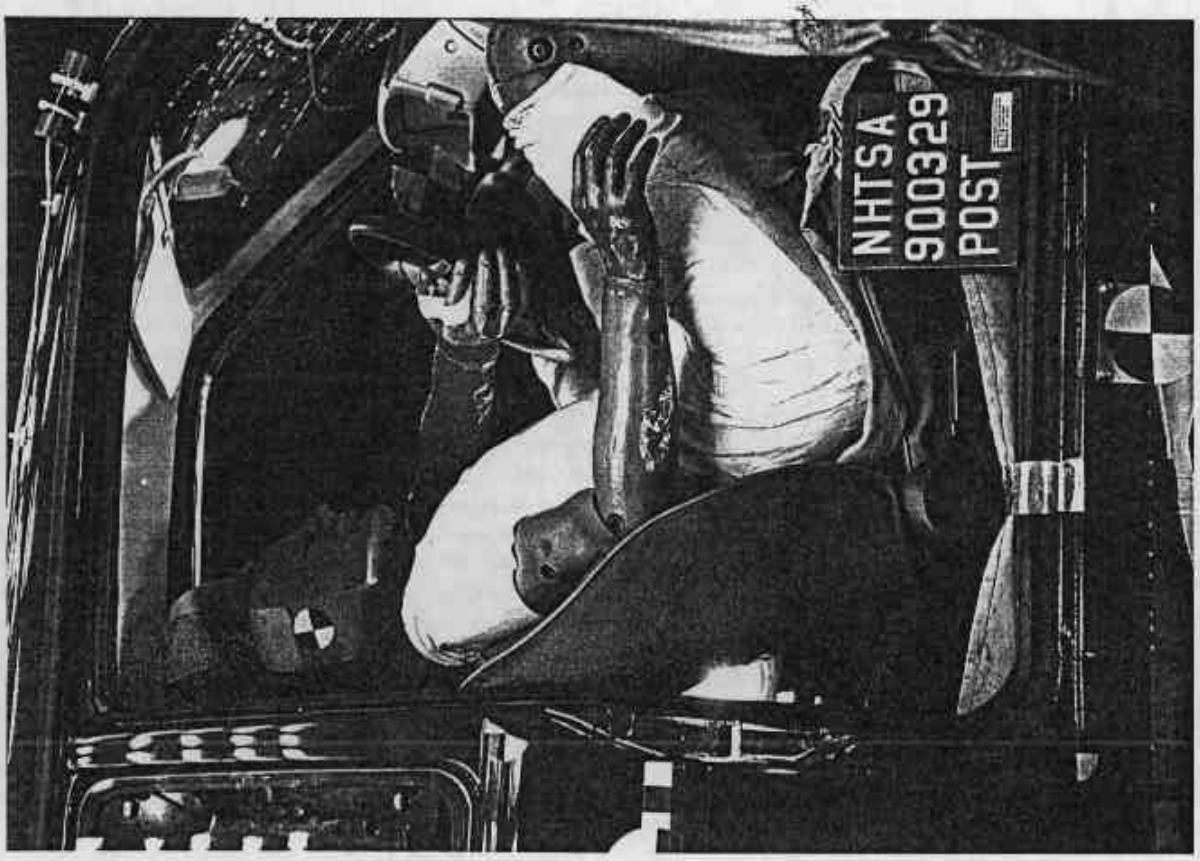


Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

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

Figure A-34. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

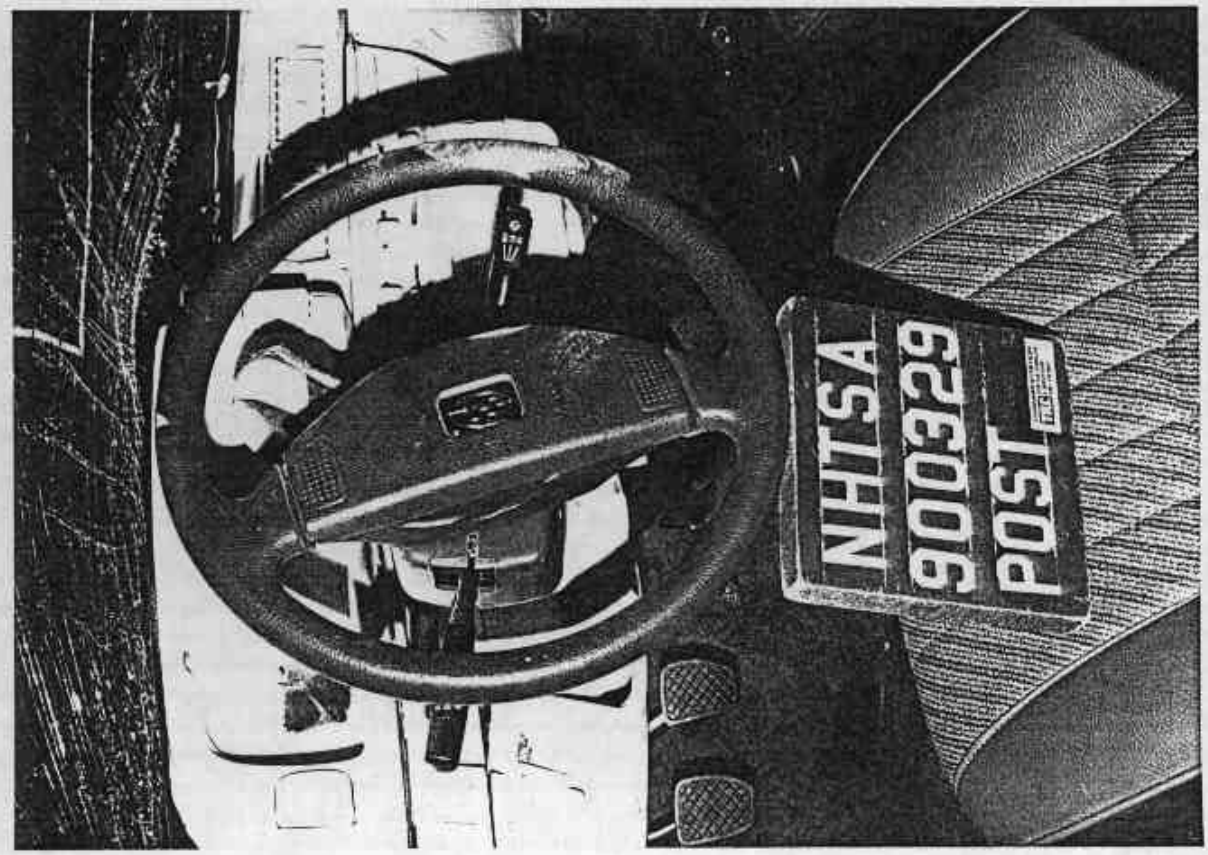


Figure A-35. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

Figure A-36. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

Figure A-37. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

Figure A-38. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 3

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

Figure A-40. POST-TEST PASSENGER DUMMY HEAD CONTACT - VIEW 2

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

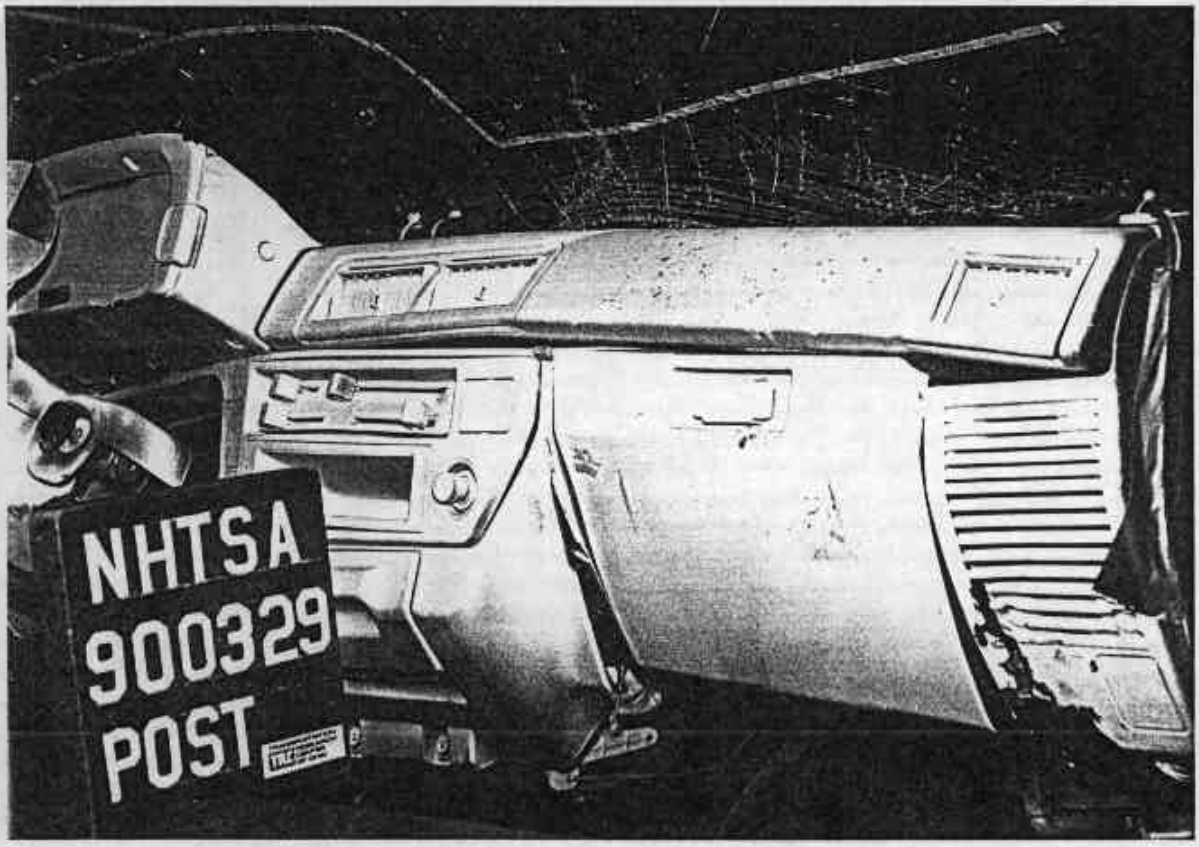


Figure A-42. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

Figure A-43. PRE-TEST VEHICLE CERTIFICATION AND TIRE LOAD LABEL VIEW

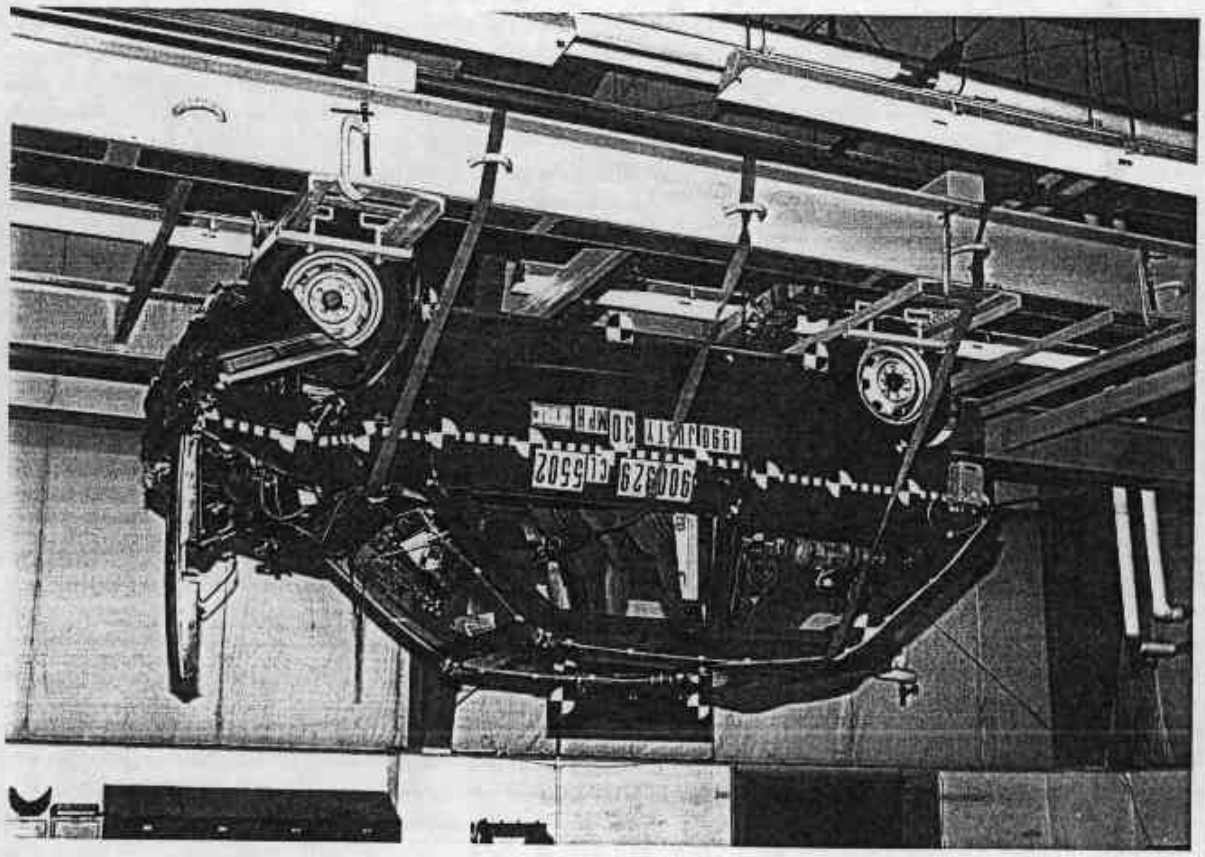


Figure A-44. POST-TEST VEHICLE ON ROLLOVER MACHINE VIEW

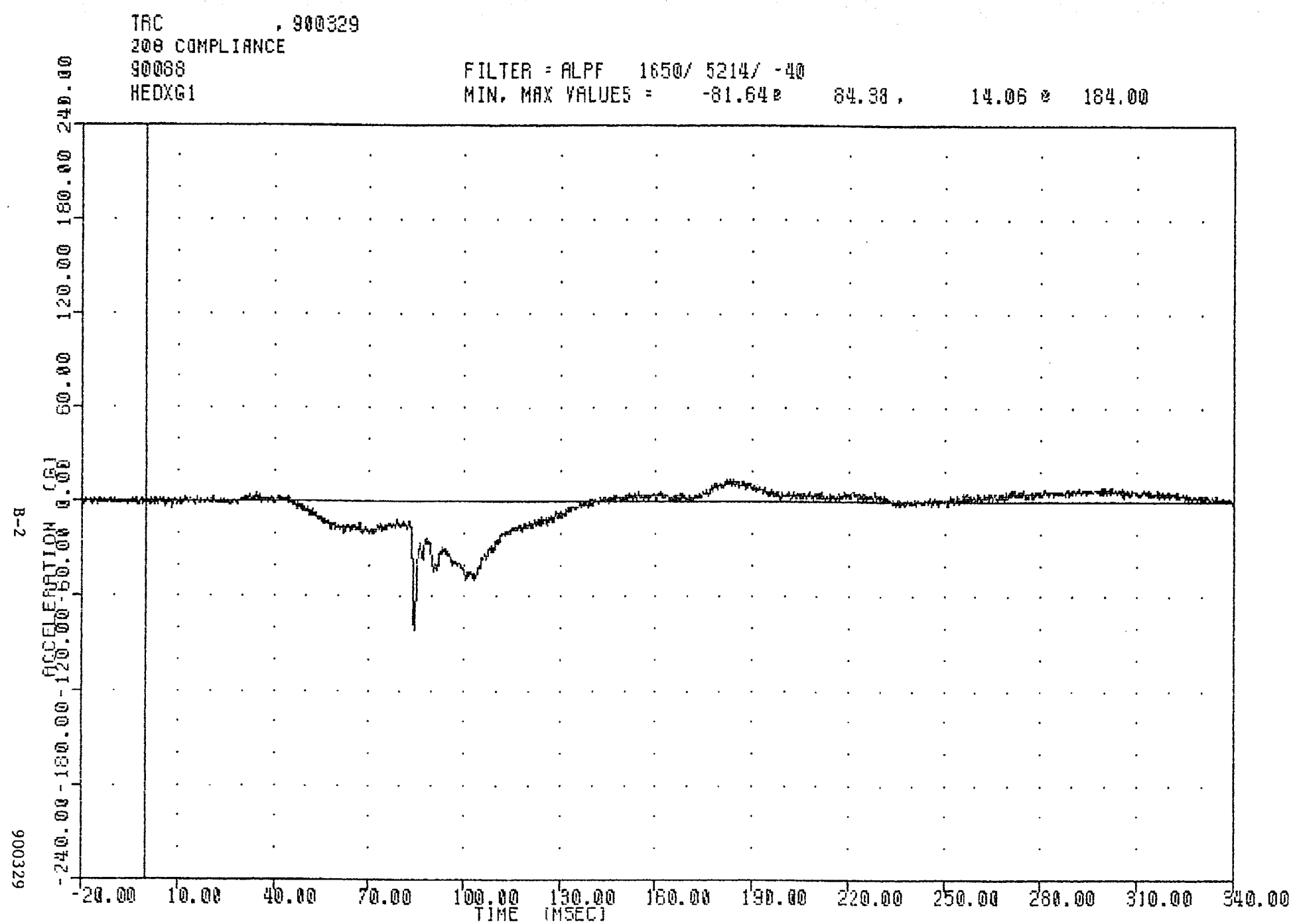
APPENDIX B

DATA PLOTS

DUMMY AND VEHICLE AXES: X: FRONT/REAR

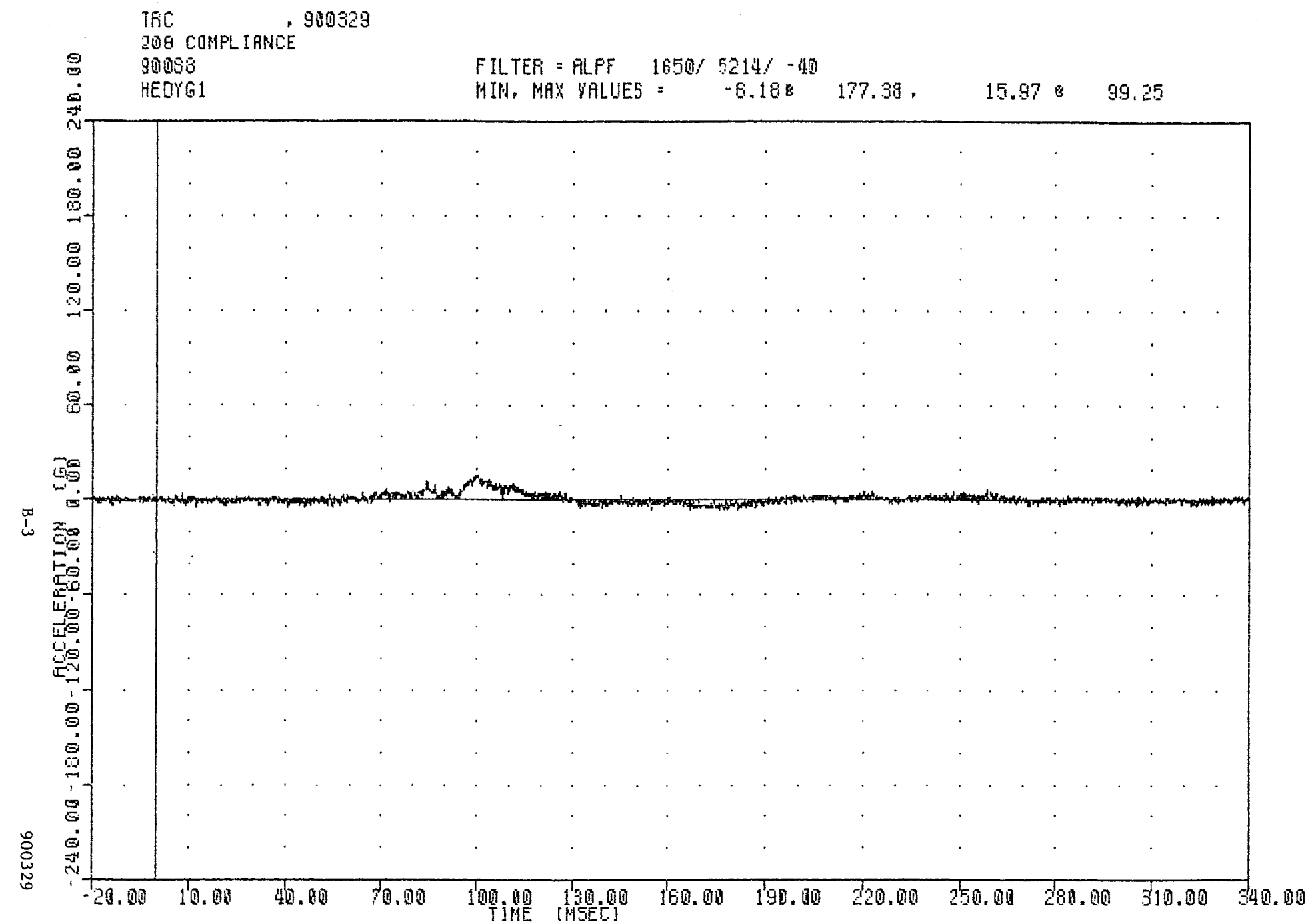
Y: LEFT/RIGHT

Z: UP/DOWN



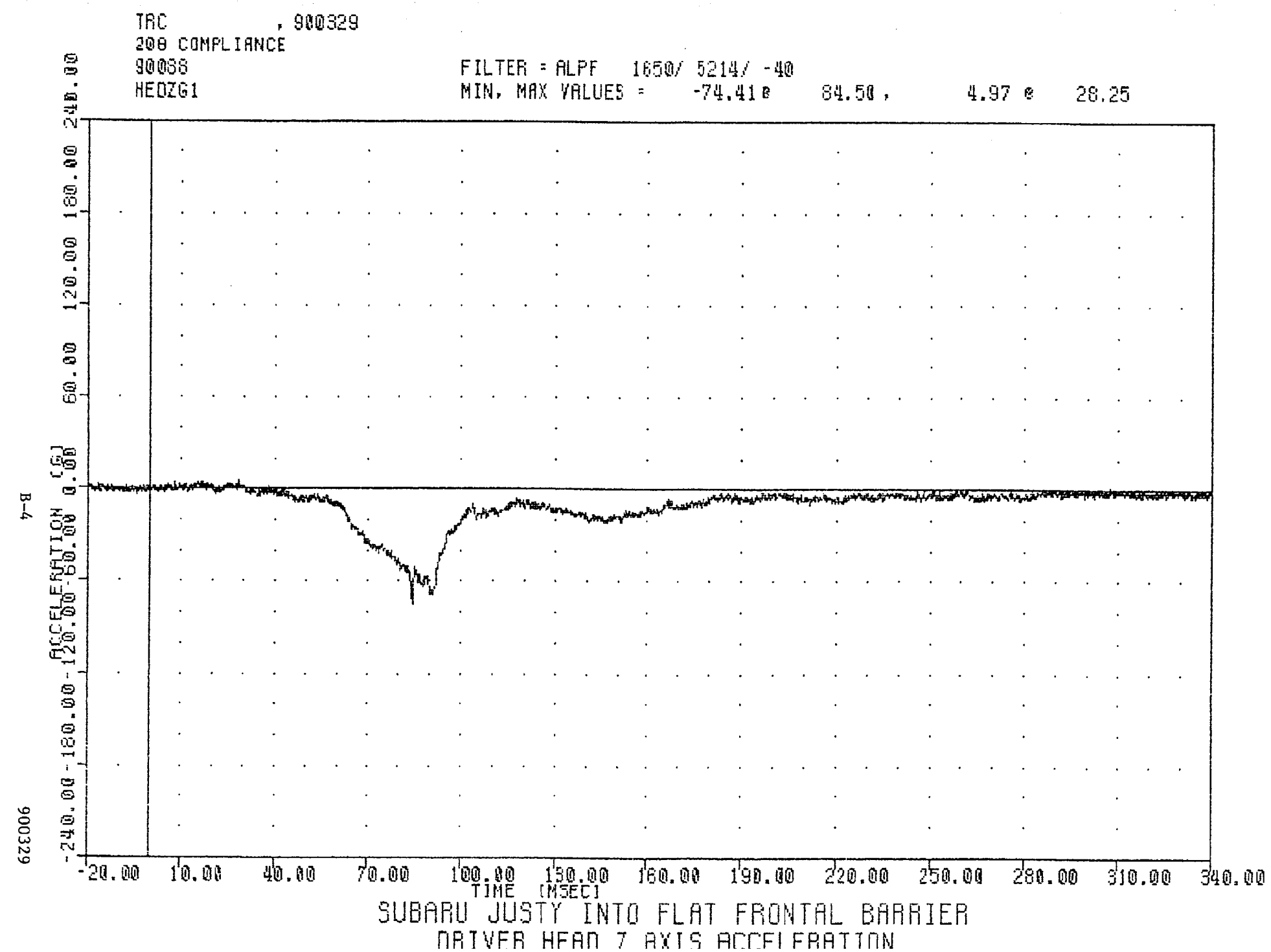
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER HEAD X AXIS ACCELERATION

900329



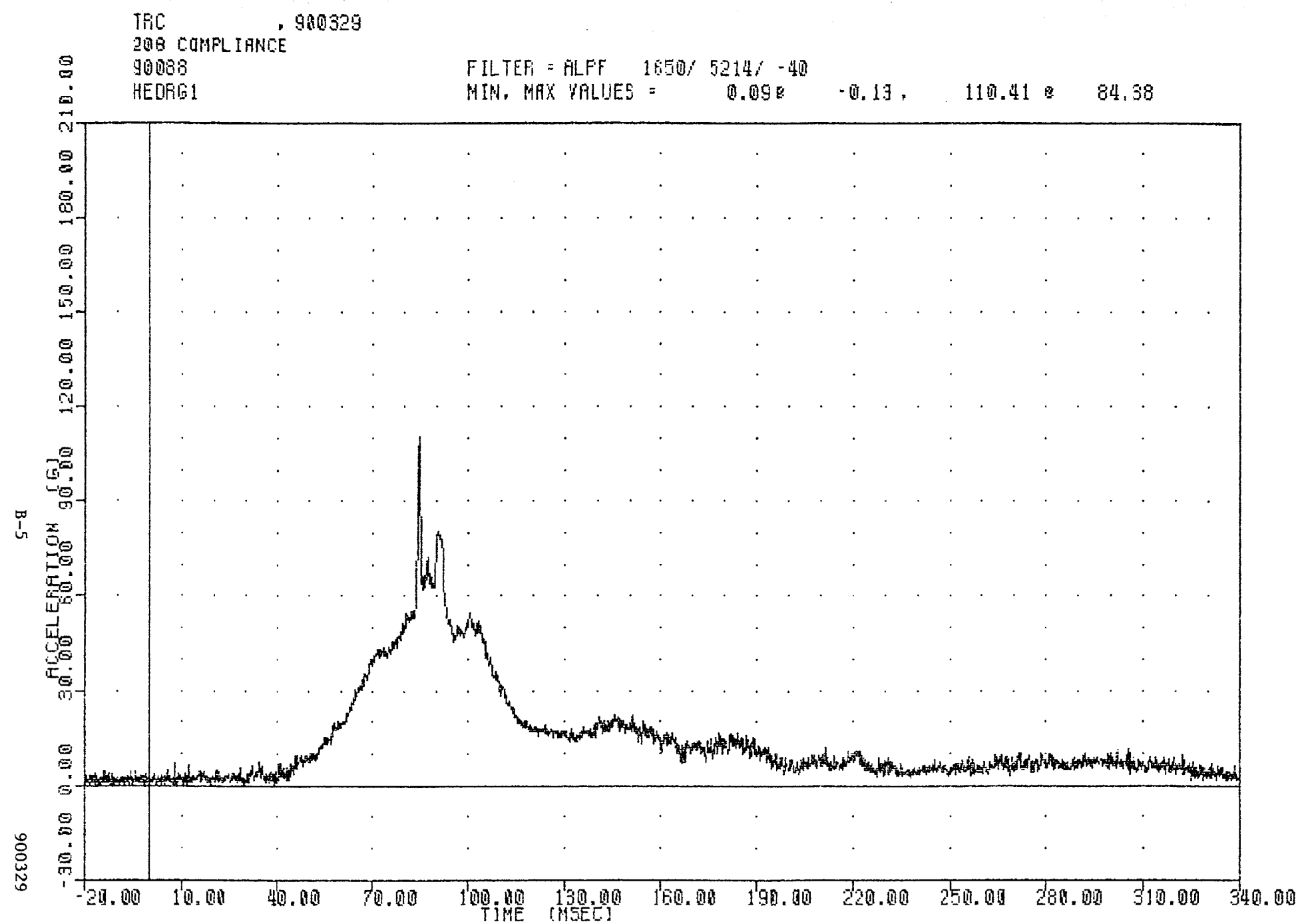
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y AXIS ACCELERATION

900329



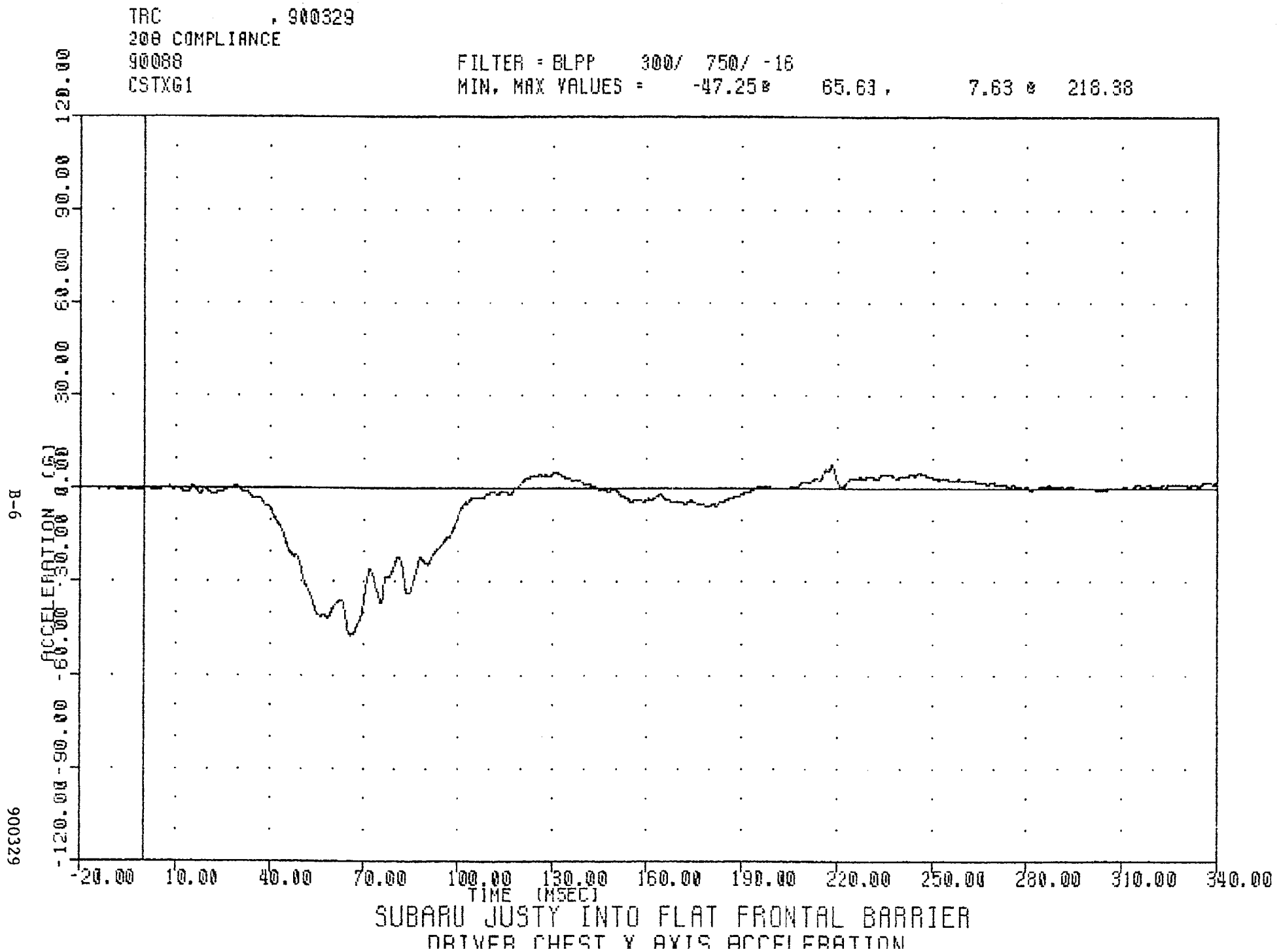
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z AXIS ACCELERATION

900329

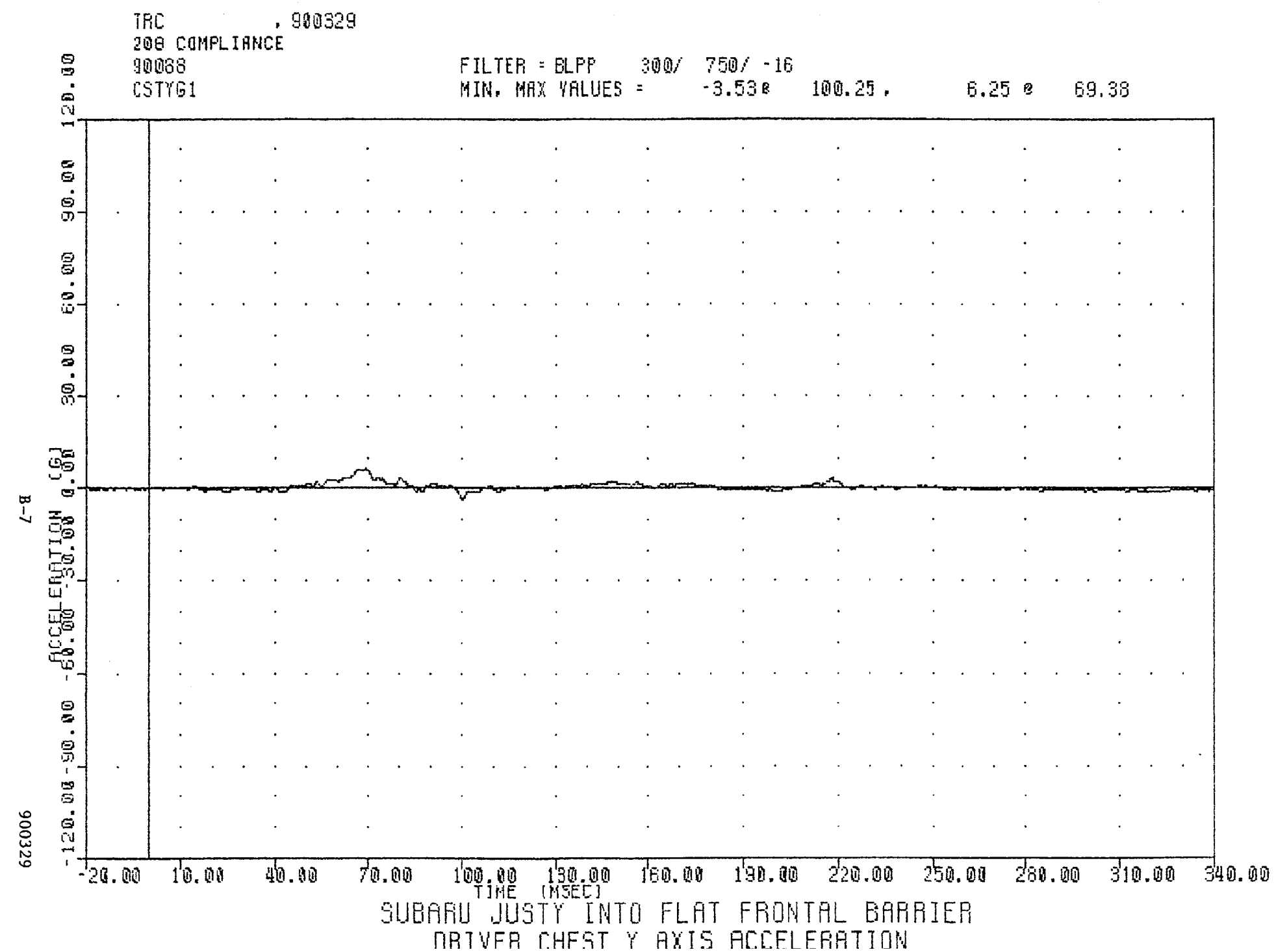


SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

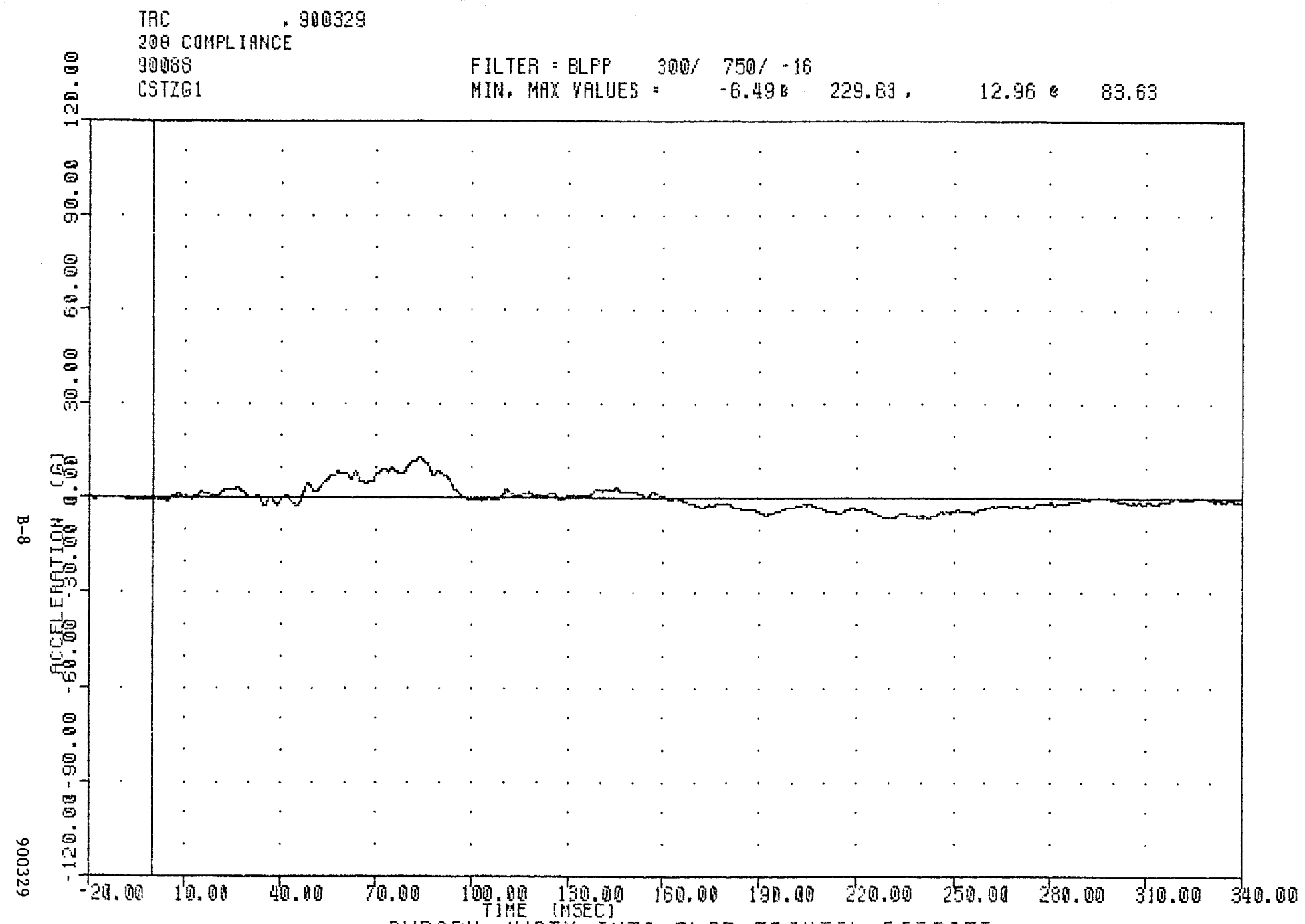
900329


TRC , 900329
208 COMPLIANCE
90088
CSTXG1
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -47.25 @ 65.63 , 7.63 @ 218.38
120.00
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER CHEST X AXIS ACCELERATION

900329

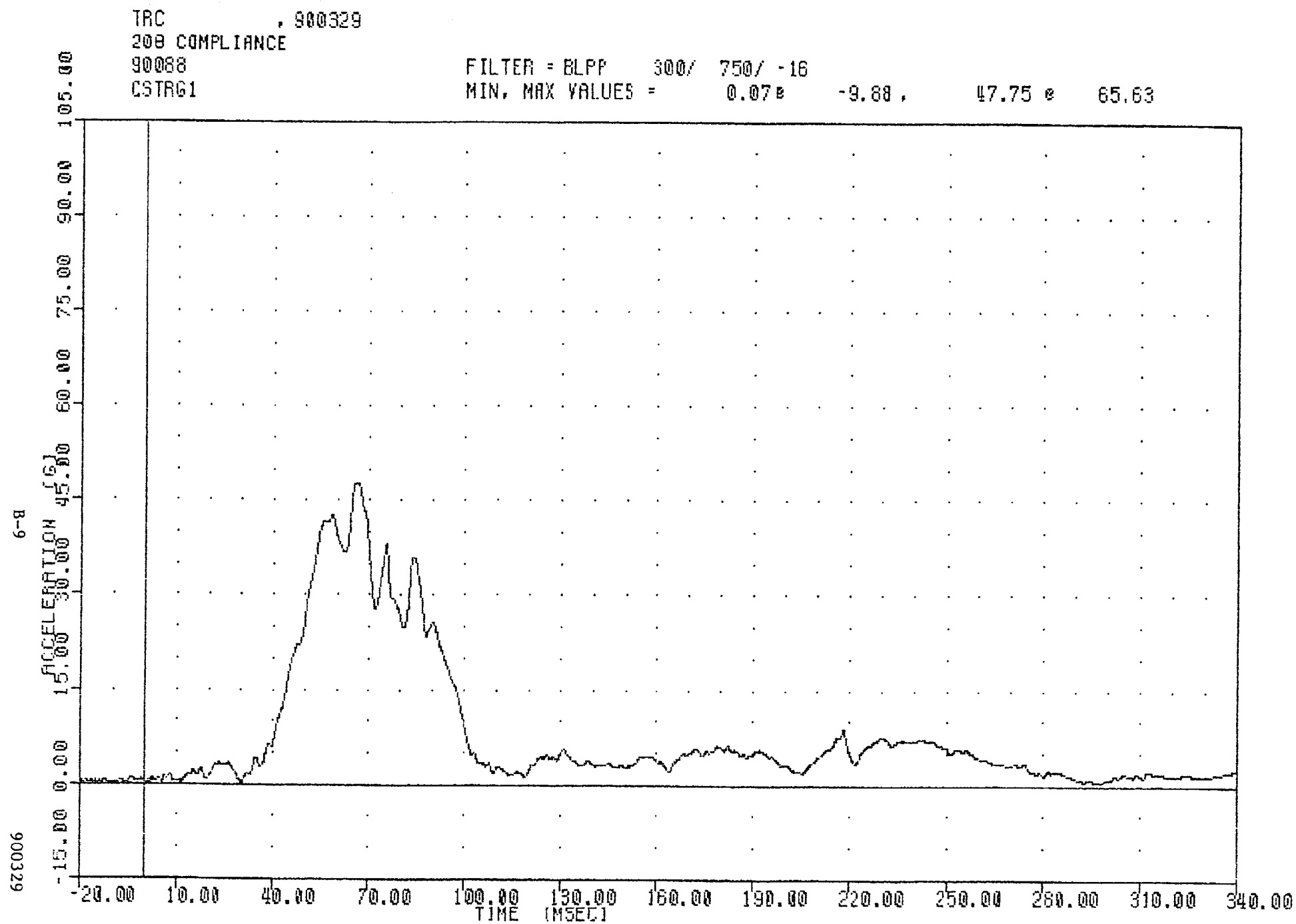

TRC , 900329
208 COMPLIANCE
90068
CSTYG1
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -3.53 @ 100.25 , 6.25 @ 69.38
120.00
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y AXIS ACCELERATION

900329



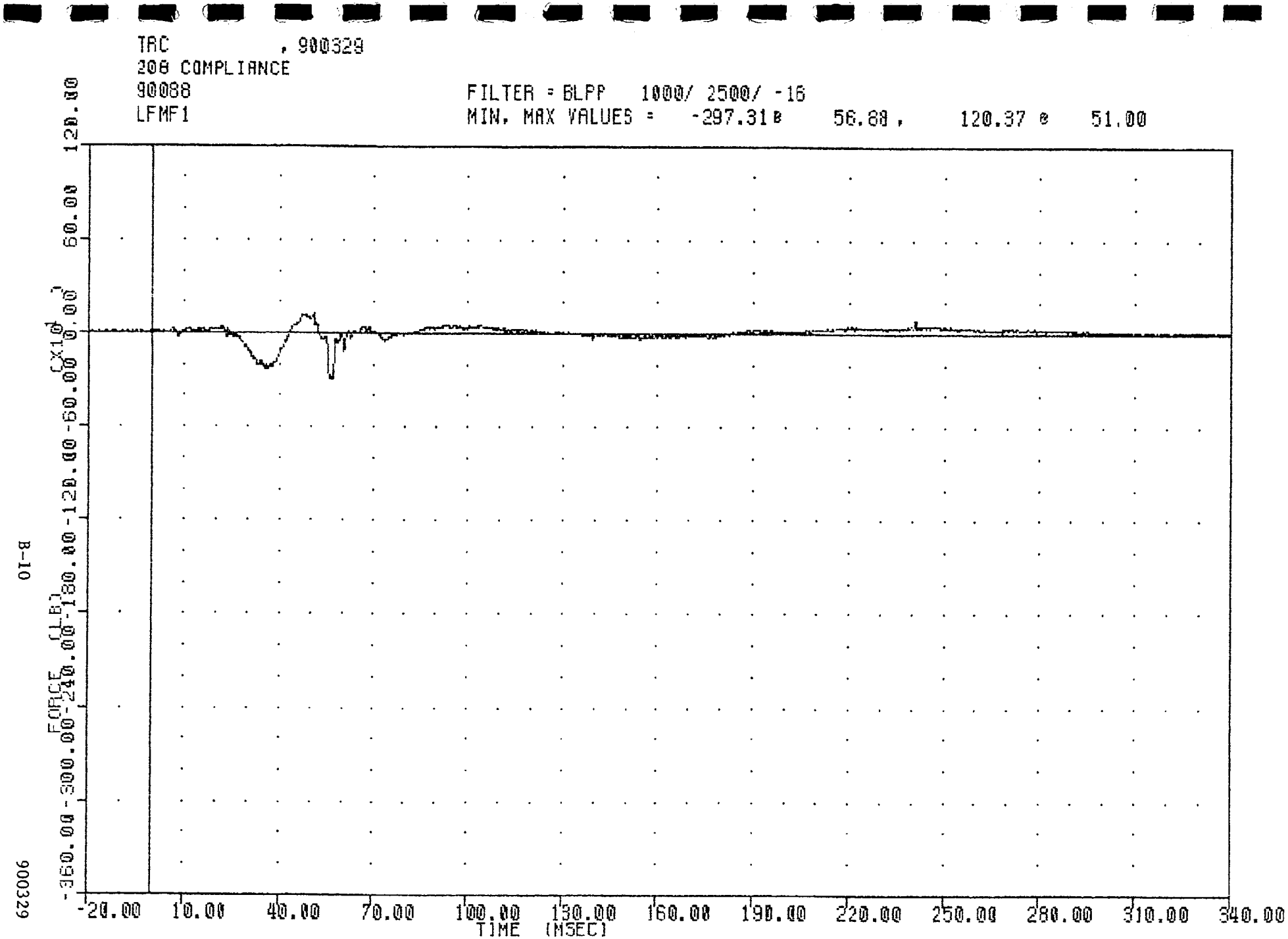
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z AXIS ACCELERATION

900329



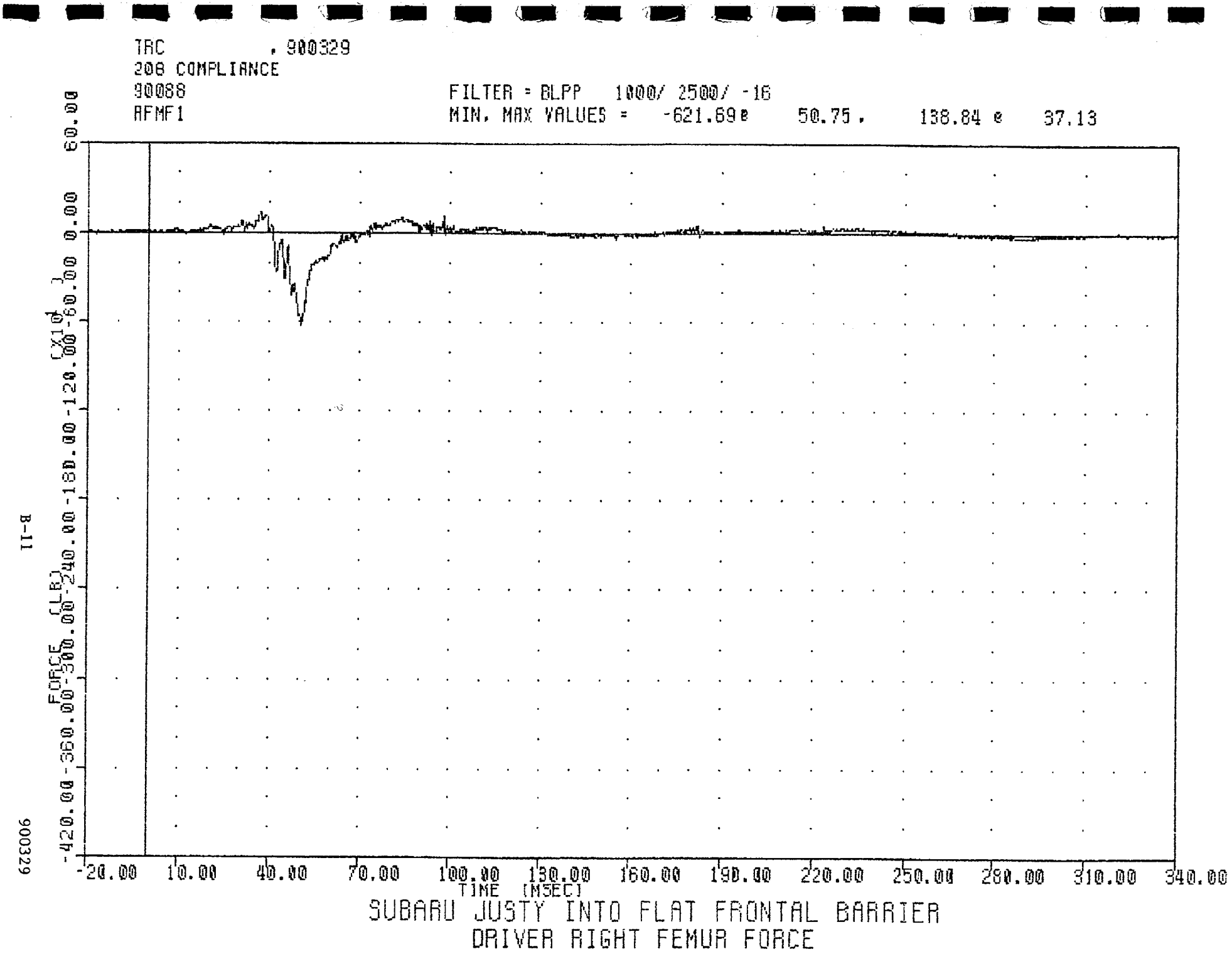
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

900329



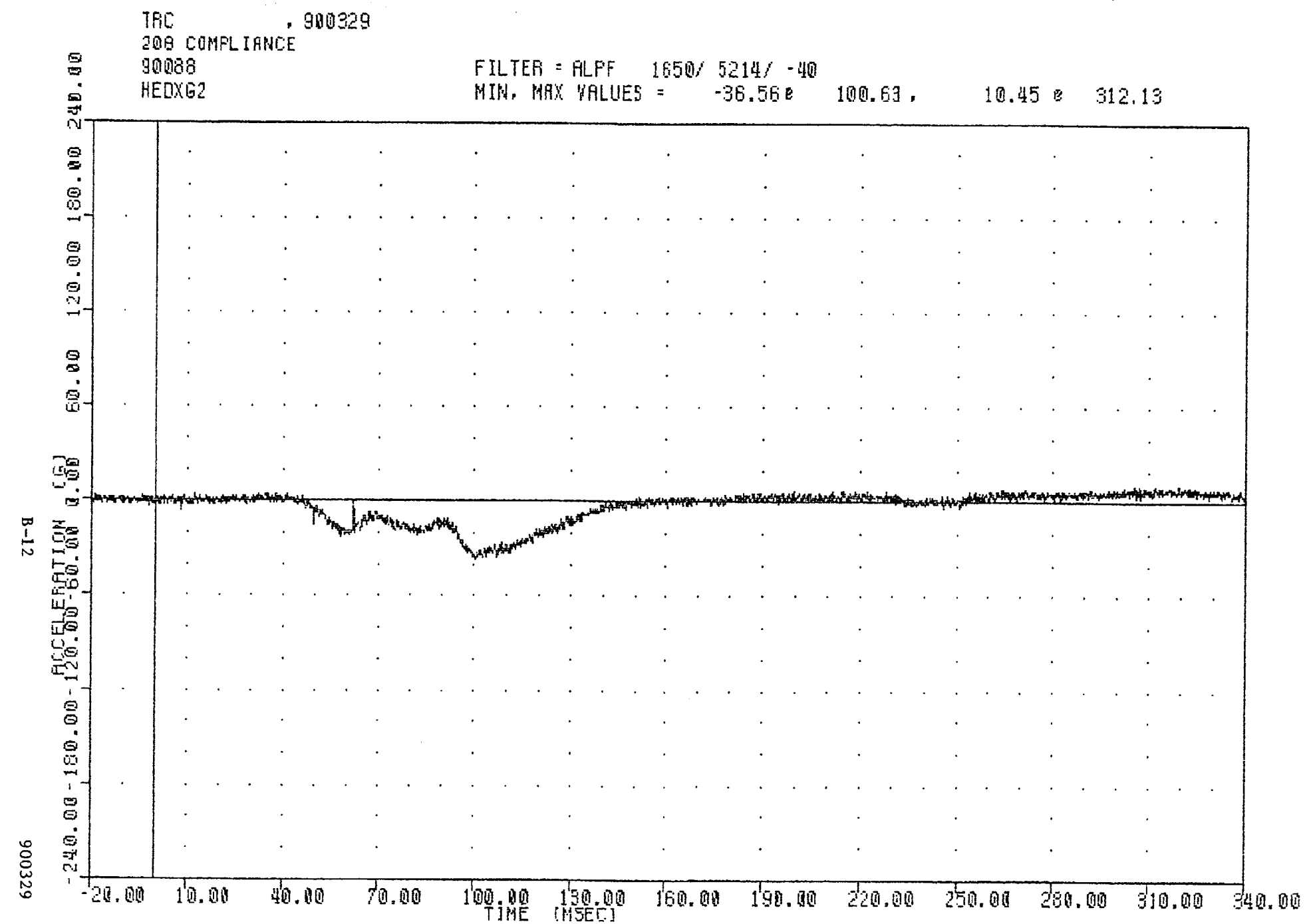
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE

900329



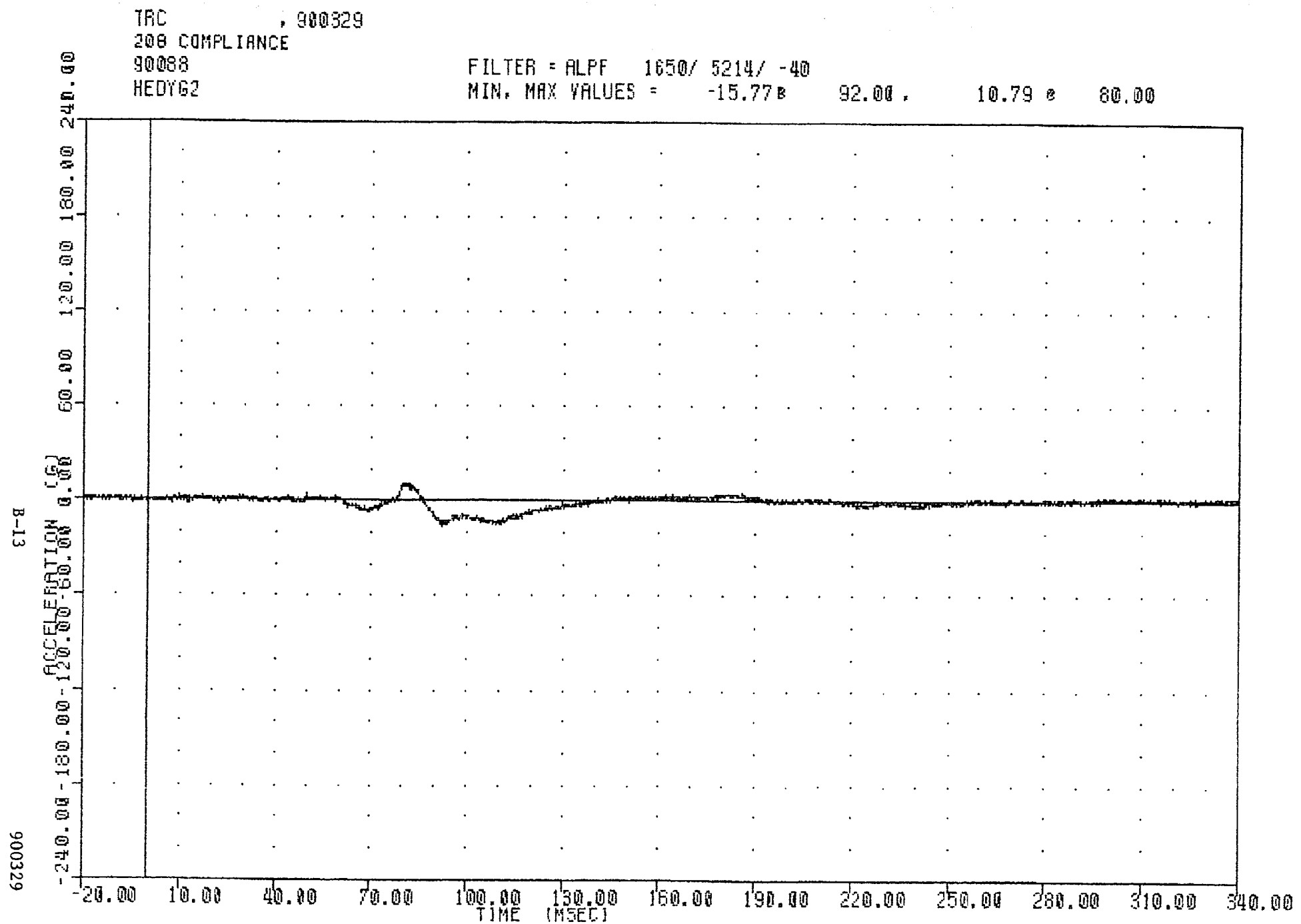
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

900329



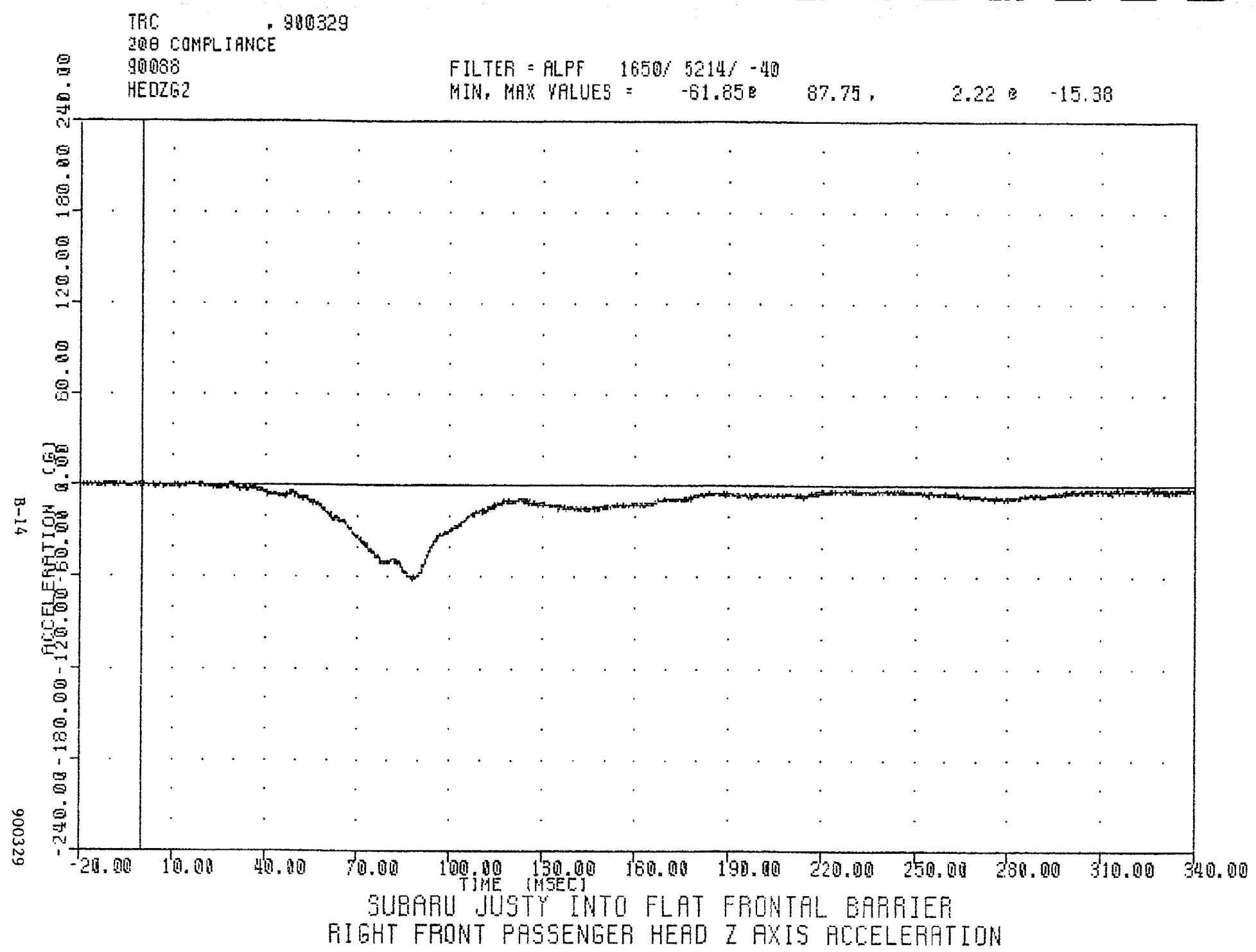
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X AXIS ACCELERATION

900329



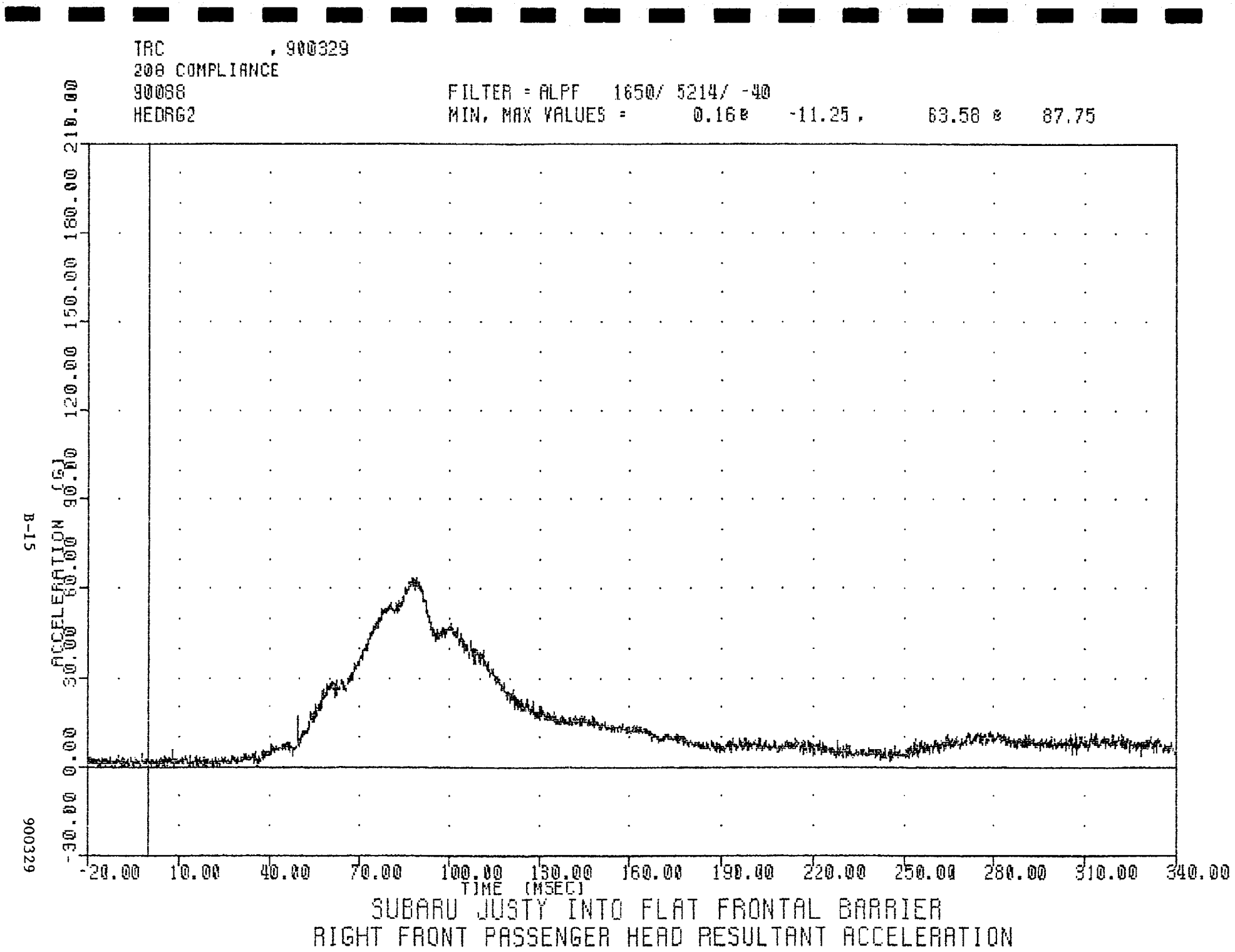
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y AXIS ACCELERATION

900329

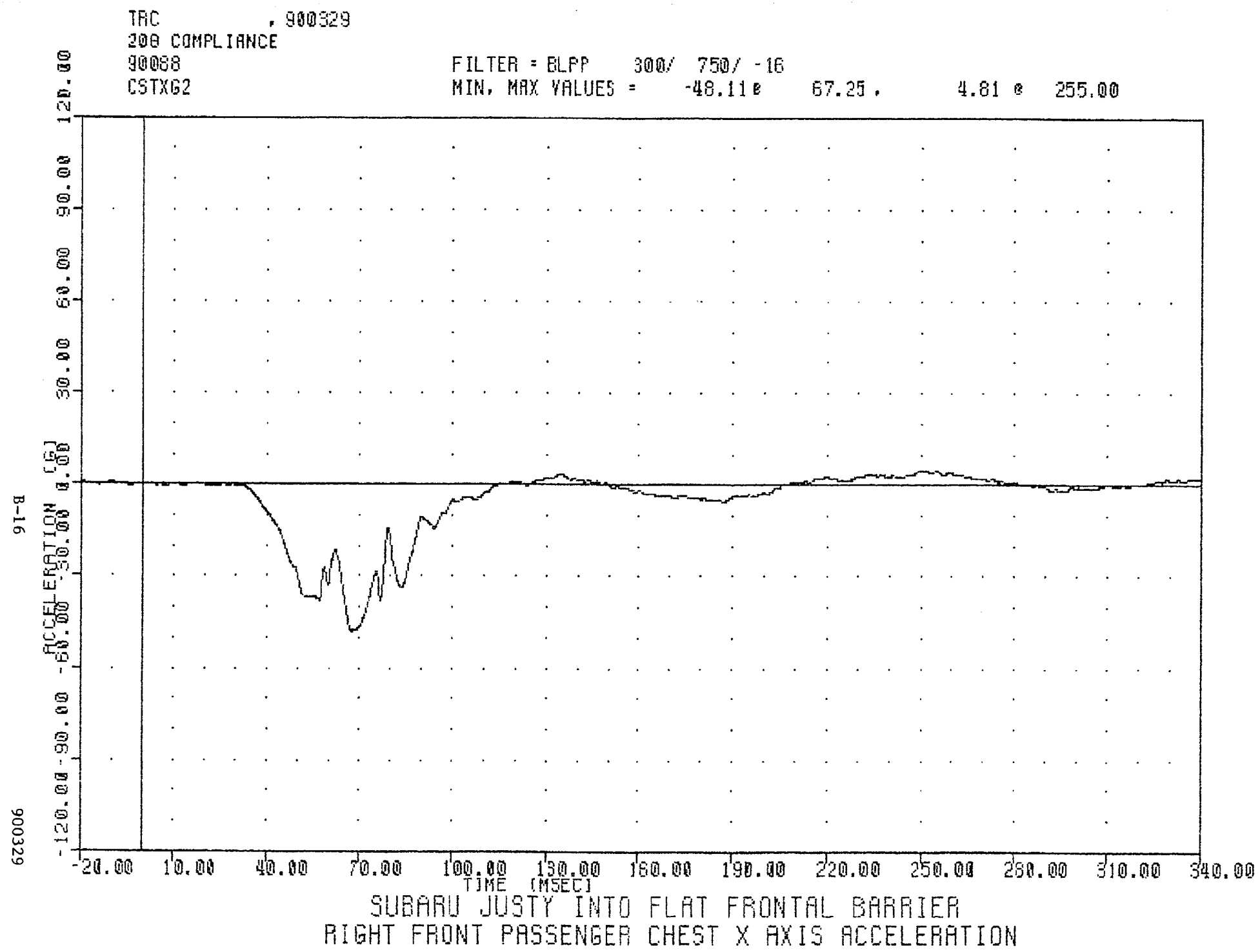


SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z AXIS ACCELERATION

900329

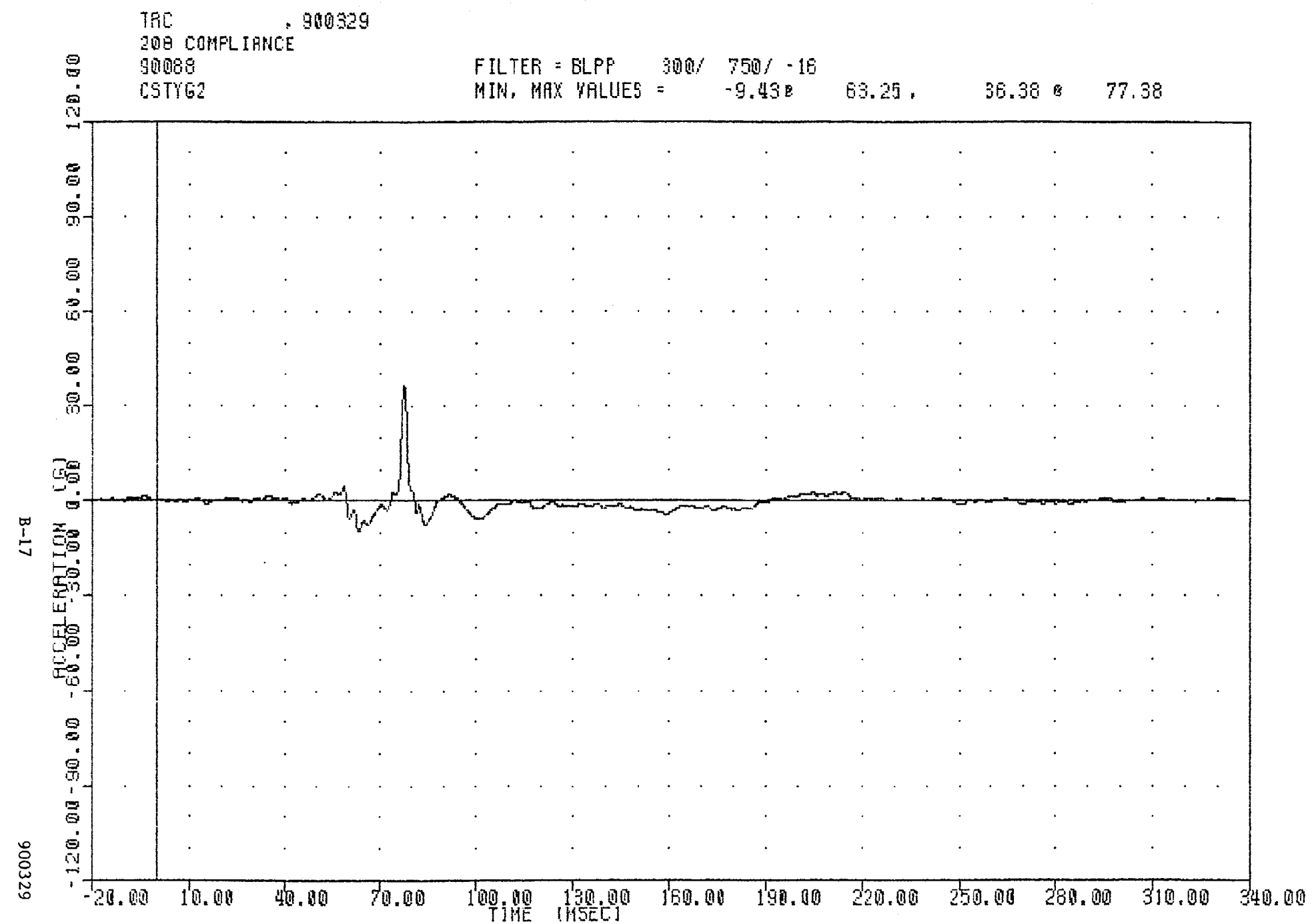


SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION



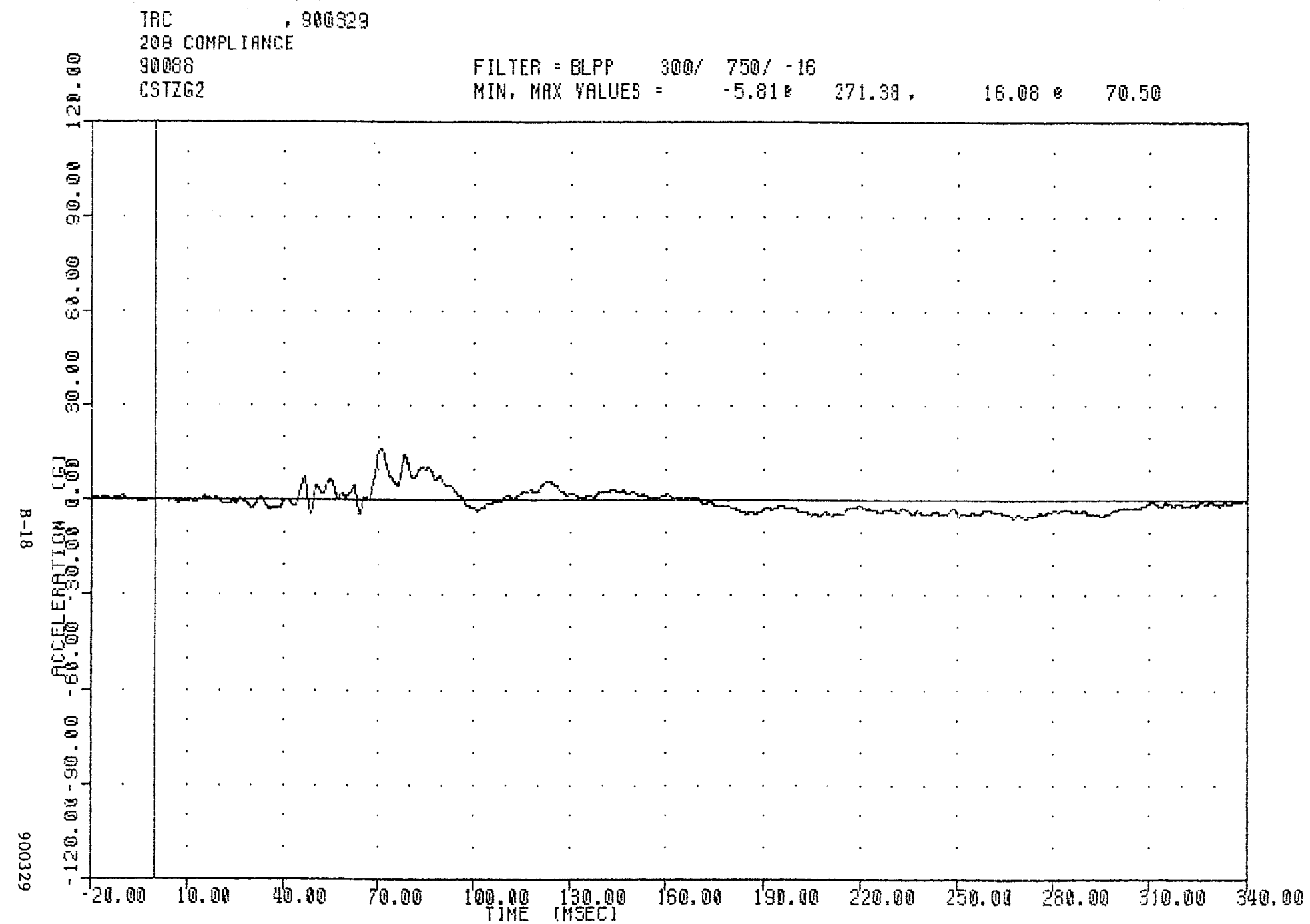
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X AXIS ACCELERATION

900329



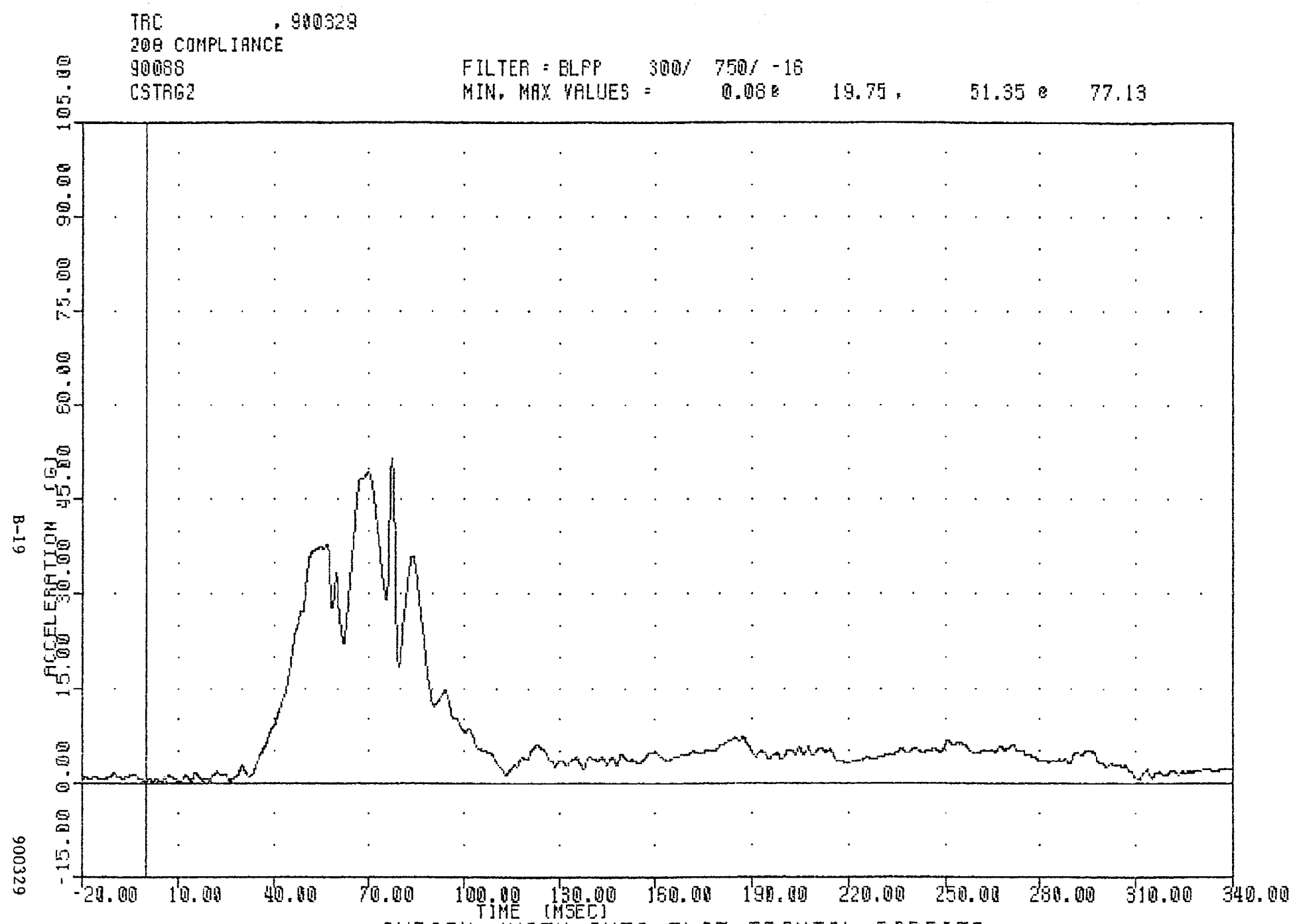
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Y AXIS ACCELERATION

900329



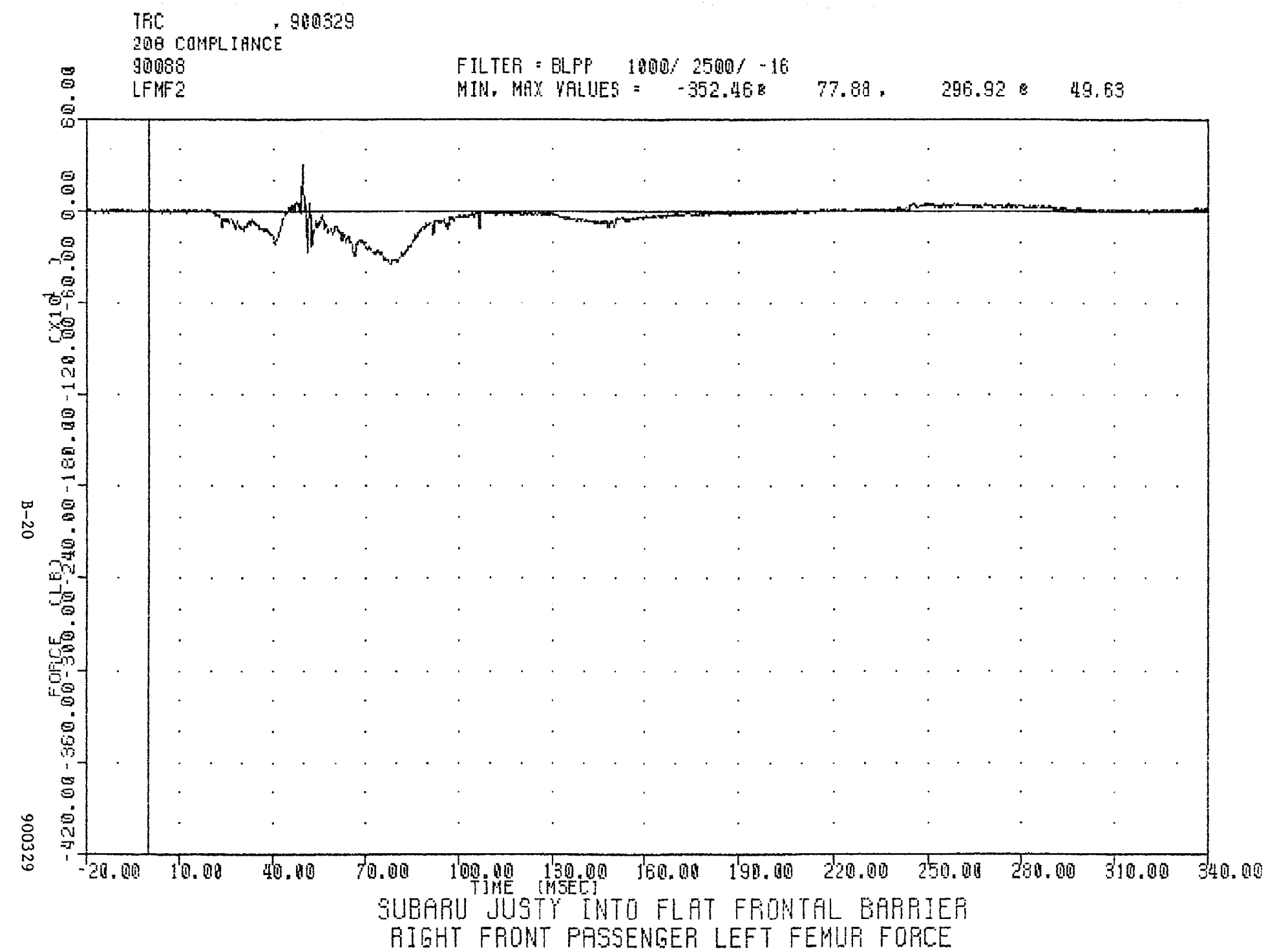
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z AXIS ACCELERATION

900329



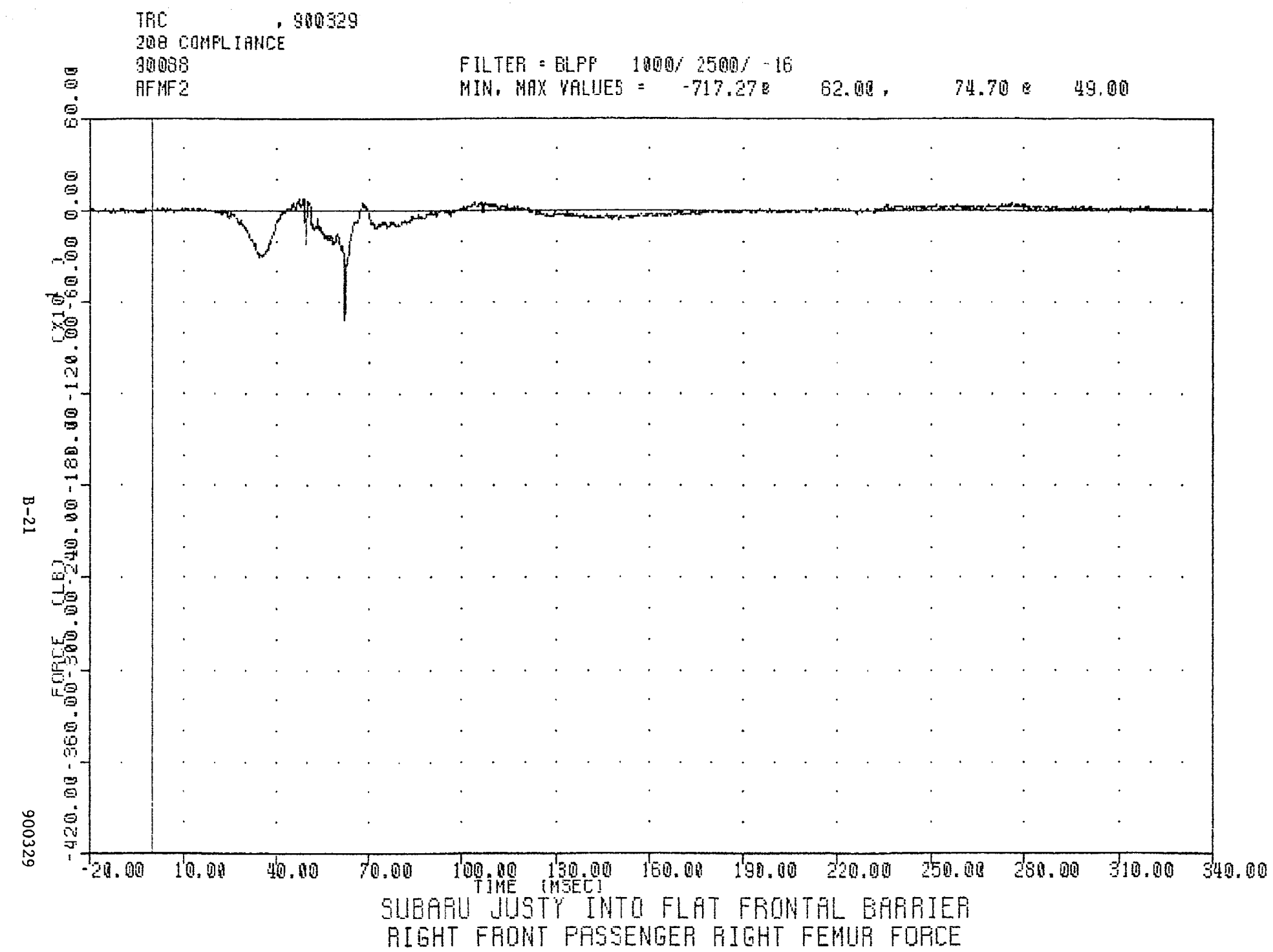
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

900329



SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

900329

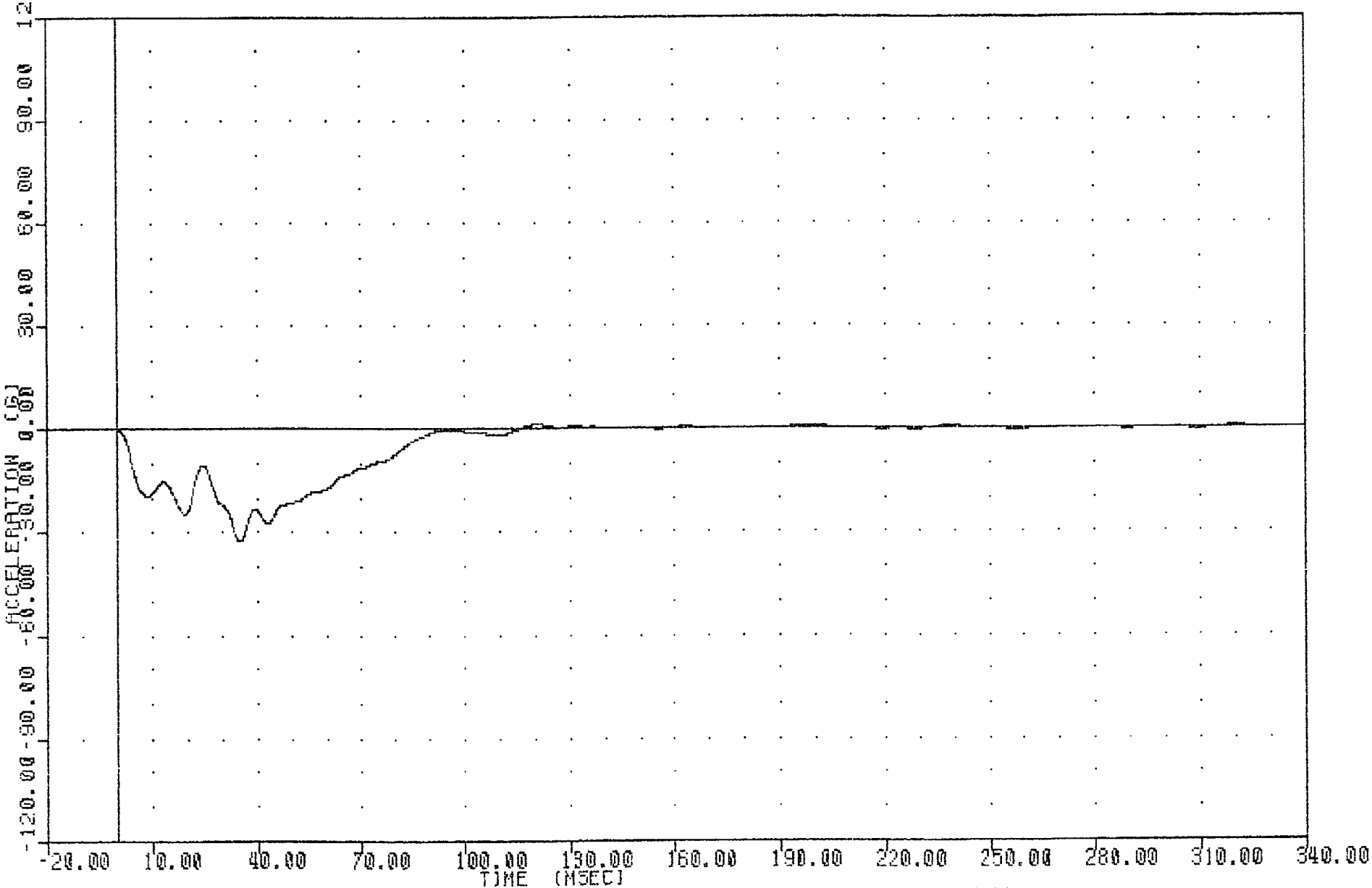


SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

900329

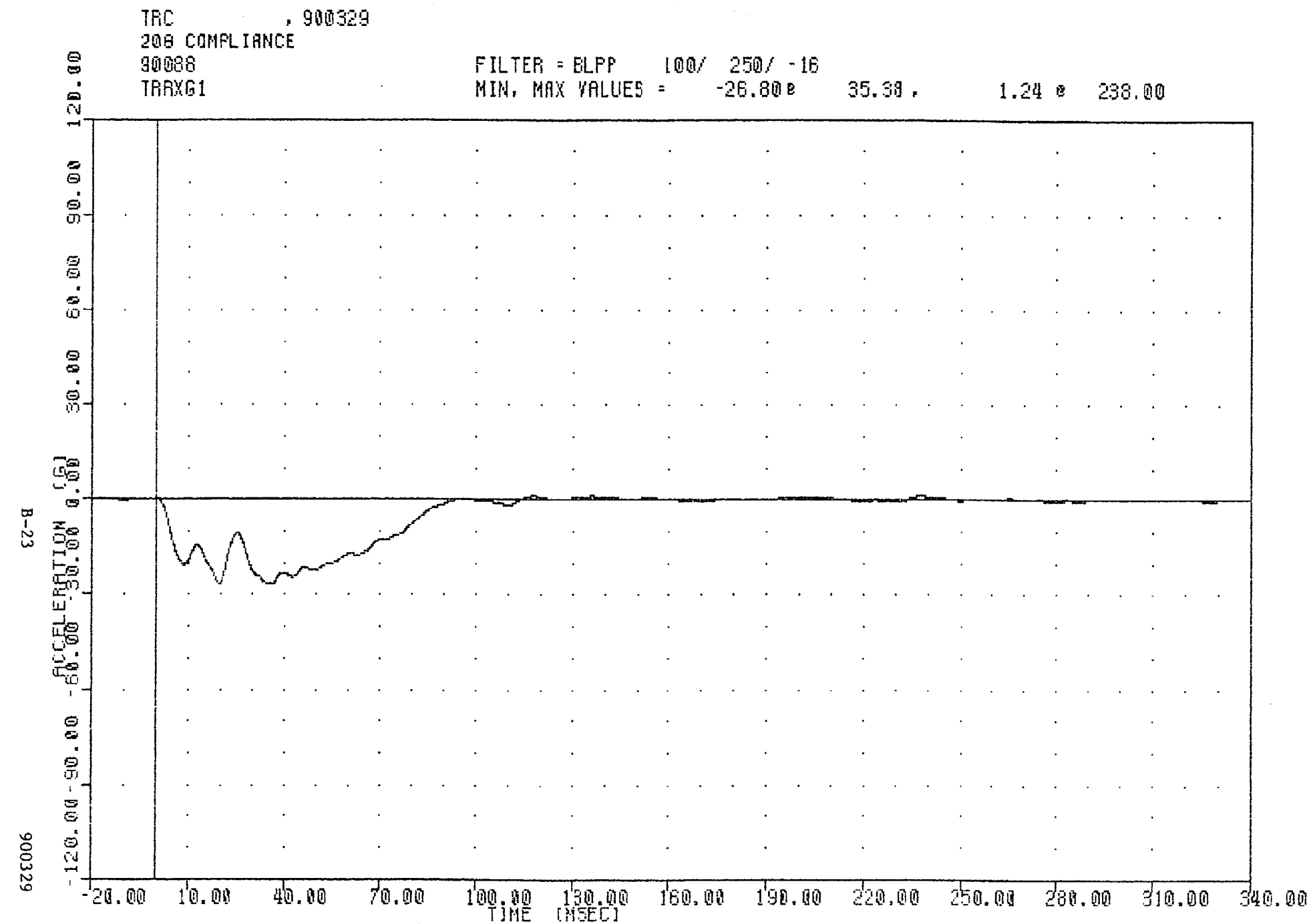
TRC , 900329
208 COMPLIANCE
90088
TLRXG1

FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = -32.58 @ 35.00 , 1.33 @ 120.38



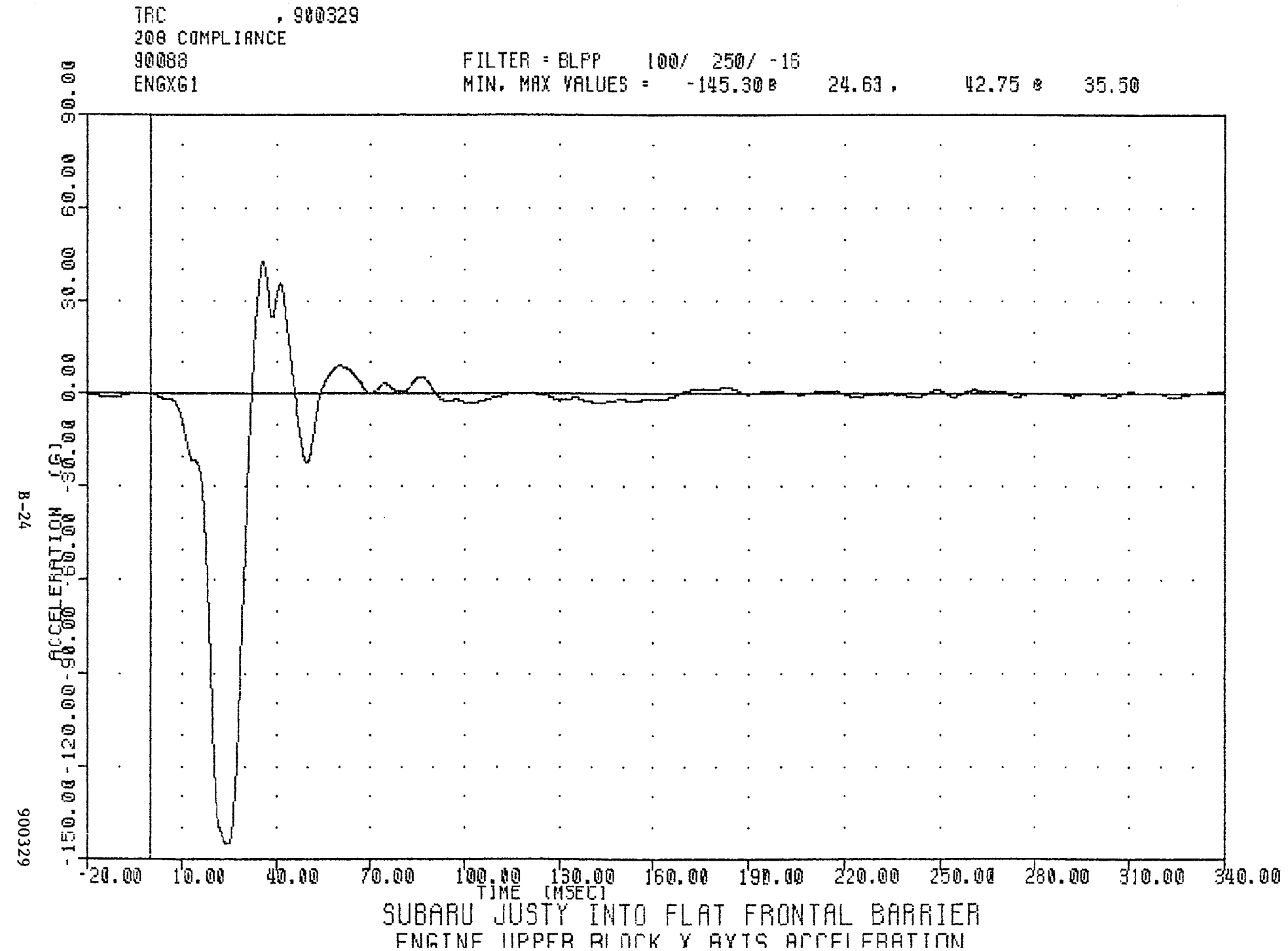
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X AXIS ACCELERATION

900329

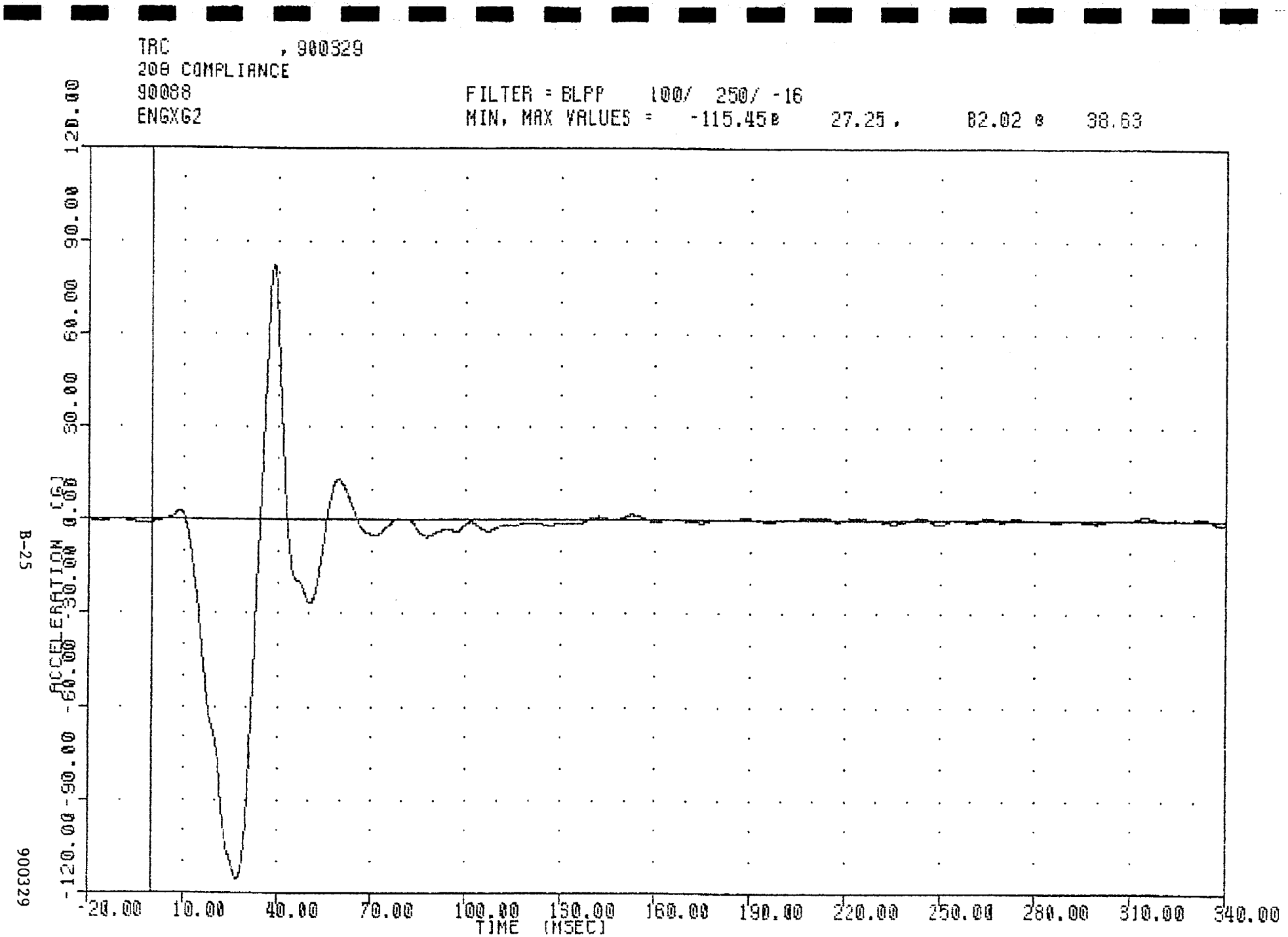


SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X AXIS ACCELERATION

900329

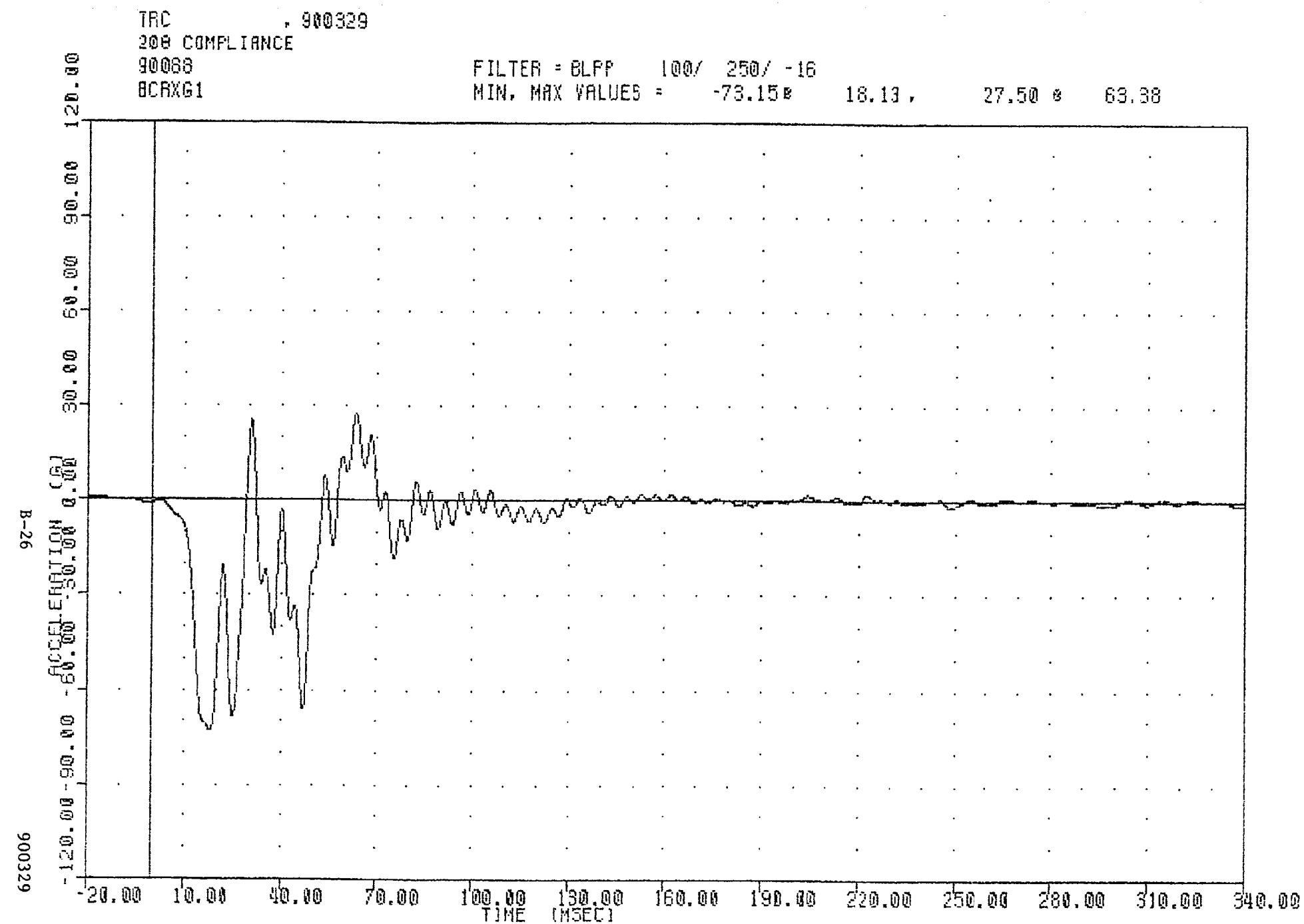

TRC , 900329
208 COMPLIANCE
90088
ENGXG1
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -145.30 @ 24.63 , 42.75 @ 35.50
90.00
60.00
30.00
0.00
-30.00
-60.00
-90.00
-120.00
-150.00
ACCELERATION (G)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
ENGINE UPPER BLOCK X AXIS ACCELERATION

900329



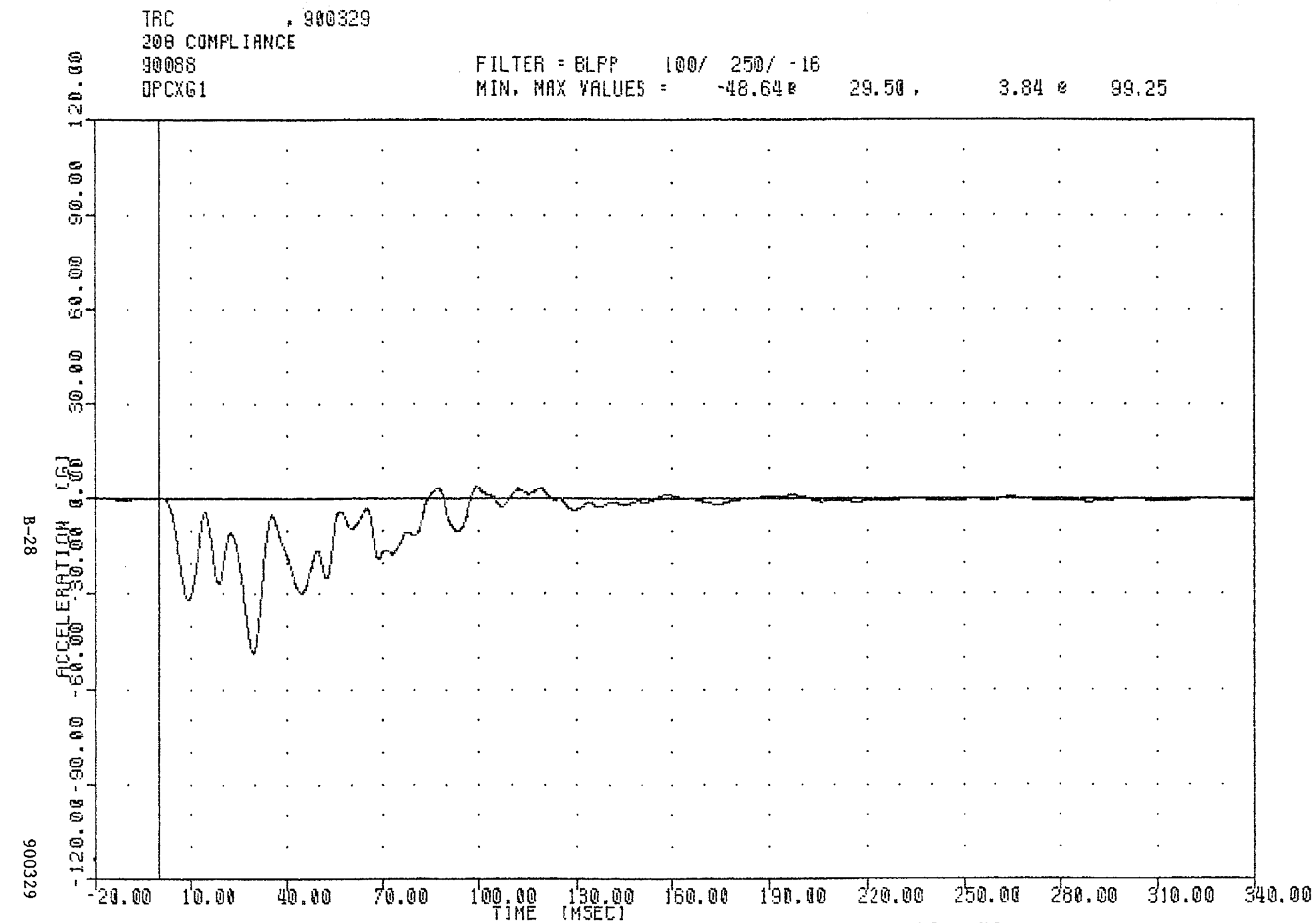
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM BLOCK X AXIS ACCELERATION

900329



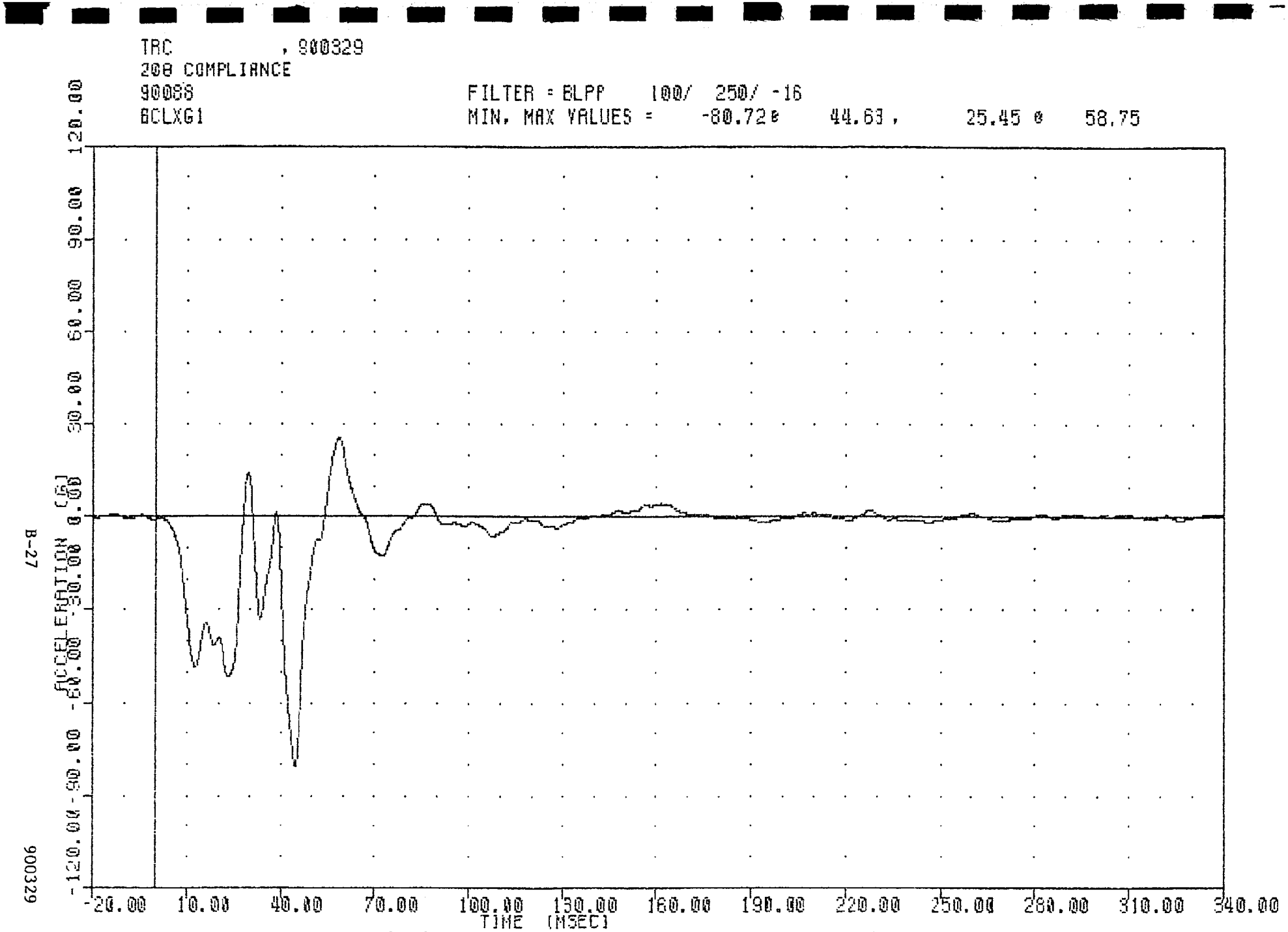
SUBARU JUSTY INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X AXIS ACCELERATION

900329



SUBARU JUSTY INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X AXIS ACCELERATION

900329



SUBARU JUSTY INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X AXIS ACCELERATION

900329