

REPORT NOS. 208-TRC-91-015

212-TRC-91-015

301-TRC-91-015

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

AUDI AG.

1991 AUDI 100

4-DOOR SEDAN

NHTSA NO. CM5804

TRC TEST NO. 910513

THE TRANSPORTATION RESEARCH CENTER OF OHIO

10820 STATE ROUTE 347

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MAY 30, 1991

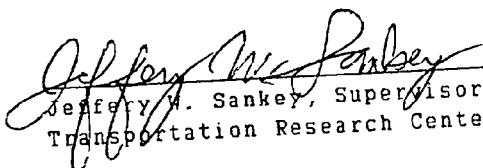
FINAL REPORT

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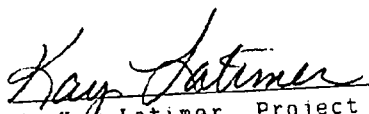
U.S. DEPARTMENT OF TRANSPORTATION
 NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
 OFFICE OF VEHICLE SAFETY COMPLIANCE (NEF-31)
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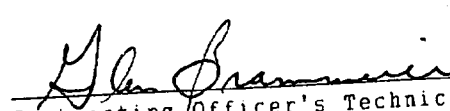
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Technical Report Documentation Page

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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1991 Audi 100 4-door sedan, NHTSA No. CM5804, at the Transportation Research Center of Ohio on May 13, 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 29.5 mph. The vehicle's maximum crush was 24.7 inches. The ambient temperature was 74° F. The driver's head injury criteria (HIC) was 407. The driver's maximum chest deceleration over three (3) milliseconds was 47.7 g. The driver's maximum left and right femur forces were 2272 pounds and 1362 pounds, respectively. The passenger's head injury criteria (HIC) was 214. The passenger's maximum chest deceleration over three (3) milliseconds was 32.1 g. The passenger's maximum left and right femur forces were 610 pounds and 276 pounds, respectively. (See DATA ACQUISITION EXPLANATIONS.) The vehicle appears to comply with the applicable requirements of FMVSS 212, 219 (partial), and 301. The vehicle's data indicated a marginal failure of the requirements of FMVSS 208.					
17. Key Words 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"			18. Distribution Statement Available from: NHTSA Technical Reference Division Room 5108, (NAD-52) 400 Seventh Street, SW Washington, DC 20590 Attn: Mr. Robert Hornickie		
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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	0.9	metric ton	t
	(2000 lb)			
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)
°C	degrees Celsius	

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	2.5	acres	ac
	(10 000 m ²)			
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton	1.1	short tons	
	(1000 kg)			
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

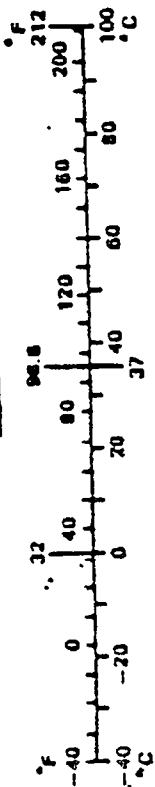
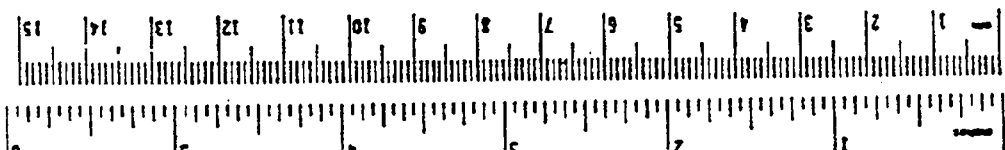


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SECTION 1.0

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 Audi 100 4-door sedan, NHTSA No. CM5804, 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 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 May 13, 1991.

The test vehicle, a 1991 Audi 100 4-door sedan, NHTSA No. CM5804, 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 a marginal failure 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 chest resultant accelerations did not exceed 60 g's. The compressive forces transmitted through the upper legs exceeded 2,250 pounds as measured. 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.

The test vehicle was equipped with a 2.3 liter, inline engine, automatic transmission, power steering, and power brakes. The vehicle's test weight was 3810 pounds. The vehicle's impact speed was 29.5 mph. The vehicle's maximum crush was 24.7 inches.

The driver's head injury criteria (HIC) was 407. The driver's maximum chest resultant acceleration over three (3) milliseconds was 47.7 g. The driver's maximum left and right femur forces were 2272 pounds and 1362 pounds, respectively.

The right front passenger's HIC was 214. The right front passenger's maximum chest resultant acceleration over three (3) milliseconds was 32.1 g. The right front passenger's maximum left and right femur forces were 610 pounds and 276 pounds, respectively. (See DATA ACQUISITION EXPLANATIONS.)

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 or during the static rollover test.

DATA ACQUISITION EXPLANATIONS

The right front passenger's left and right femur force load cells, LFMF2 and RFMF2, recorded intermittent spikes during the crash test event.

The engine bottom X-axis accelerometer, ENGXC2, lost data after 32 milliseconds due to the vehicle's crush cutting the accelerometer cable.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CM5804 TEST TYPE: Frontal Barrier Impact

TEST DATE: 05/13/91 TEST TIME: 1322 AMBIENT TEMP. (°F): 74

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991/Audi/100/4-door sedan

VEHICLE TEST WEIGHT (LBS): 3810

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: PRIMARY = 29.5 SECONDARY = 29.5

MAXIMUM STATIC CRUSH (IN): 24.7

AVERAGE REBOUND (IN): 20.7

DUMMIES:	Driver #354	Passenger #1173
TYPE:	Part 572 B	Part 572 B
LOCATION:	Left front	Right front
RESTRAINT:	Driver's airbag	Three-point unbelt
NUMBER OF DATA CHANNELS:	23	
NUMBER OF CAMERAS:	HIGH-SPEED 14	REAL-TIME 2

*With respect to tow track centerline.

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Audi Ag.

MAKE/MODEL: Audi/100

VIN: WAUBC5447MN013005

BODY STYLE: 4-door sedan

MODEL YEAR: 1991

NHTSA NO.: CM5804

COLOR: Silver

ENGINE DATA: TYPE: inline CYLINDERS: 5 DISPLACEMENT: 2.3 liter

TRANSMISSION DATA: 4 SPEED, MANUAL, X AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 05/06/91

ODOMETER READING: 200.0

DEALER'S NAME AND ADDRESS: Midwestern Auto Group
5016 Post Road
Dublin, OH 43017

ACCESSORIES:

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

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: Audi Ag.

DATE OF MANUFACTURE: 08/90

VIN: WAUBC5447MN013005

GVWR: 4145 LBS

GAWR: FRONT: 2315 LBS., REAR: 2094 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Dunlop, SP6, P195/65R15

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 42 PSI
REAR: 42 PSI

SPARE TIRE (MFR., LINE, SIZE): Continental T125/90R15

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 71.6 INCHES

WHEELBASE: 105.8 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA: THE LABEL WAS LOCATED ON
THE INSIDE OF THE FUEL FILLER DOOR.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: FRONT: P195/65R15

RECOMMENDED COLD TIRE PRESSURE: FRONT: 40 PSI; REAR: 42 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 1100 LBS. *

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 26.9; RF 26.9; LR 25.1; RR 25.1

FULLY LOADED ATTITUDE: LF 26.6; RF 26.4; LR 22.8; RR 22.5

PRE-TEST ATTITUDE: LF 27.0; RF 26.6; LR 22.5; RR 22.2

POST-TEST ATTITUDE: LF 31.0; RF 30.4; LR 22.1; RR 21.4

*The vehicle's label did not list the vehicle capacity weight. A vehicle capacity weight of 1100 lbs. was provided by the COTR.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	979 LBS.	RIGHT REAR	611 LBS.
LEFT FRONT	974 LBS.	LEFT REAR	578 LBS.
TOTAL FRONT WEIGHT	1953 LBS.	(62.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1189 LBS.	(37.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 3142 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (3142 LBS)

VCW = VEHICLE CAPACITY WEIGHT (1100 LBS) **

DSC = DESIGNATED SEATING CAPACITY (5)

$RCLW^* = VCW - 150 (DSC) = 1100 - 150 (5) = 350$

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

TARGET TEST WEIGHT = 3142 + 350 + 328

TARGET TEST WEIGHT = 3820 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 340 LBS. OF CARGO WEIGHT:

RIGHT FRONT	1008 LBS.	RIGHT REAR	916 LBS.
LEFT FRONT	990 LBS.	LEFT REAR	896 LBS.
TOTAL FRONT WEIGHT	1998 LBS.	(52.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1812 LBS.	(47.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3810 LBS.	(0.3% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 300 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 50.3 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.

**A vehicle capacity weight of 1100 pounds was provided by the COTR since the vehicle's label did not list the vehicle capacity weight.

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 910513 NHTSA NO.: CM5804
TEST DATE: 05/13/91 TEST TIME: 1322
TEST TYPE: Frontal Barrier Impact IMPACT ANGLE: 0
AMBIENT TEMPERATURE AT IMPACT AREA: 74° F
TEMPERATURE IN OCCUPANT COMPARTMENT: 70° F
IMPACT VELOCITY: PRIMARY = 29.5 MPH SECONDARY = 29.5 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.

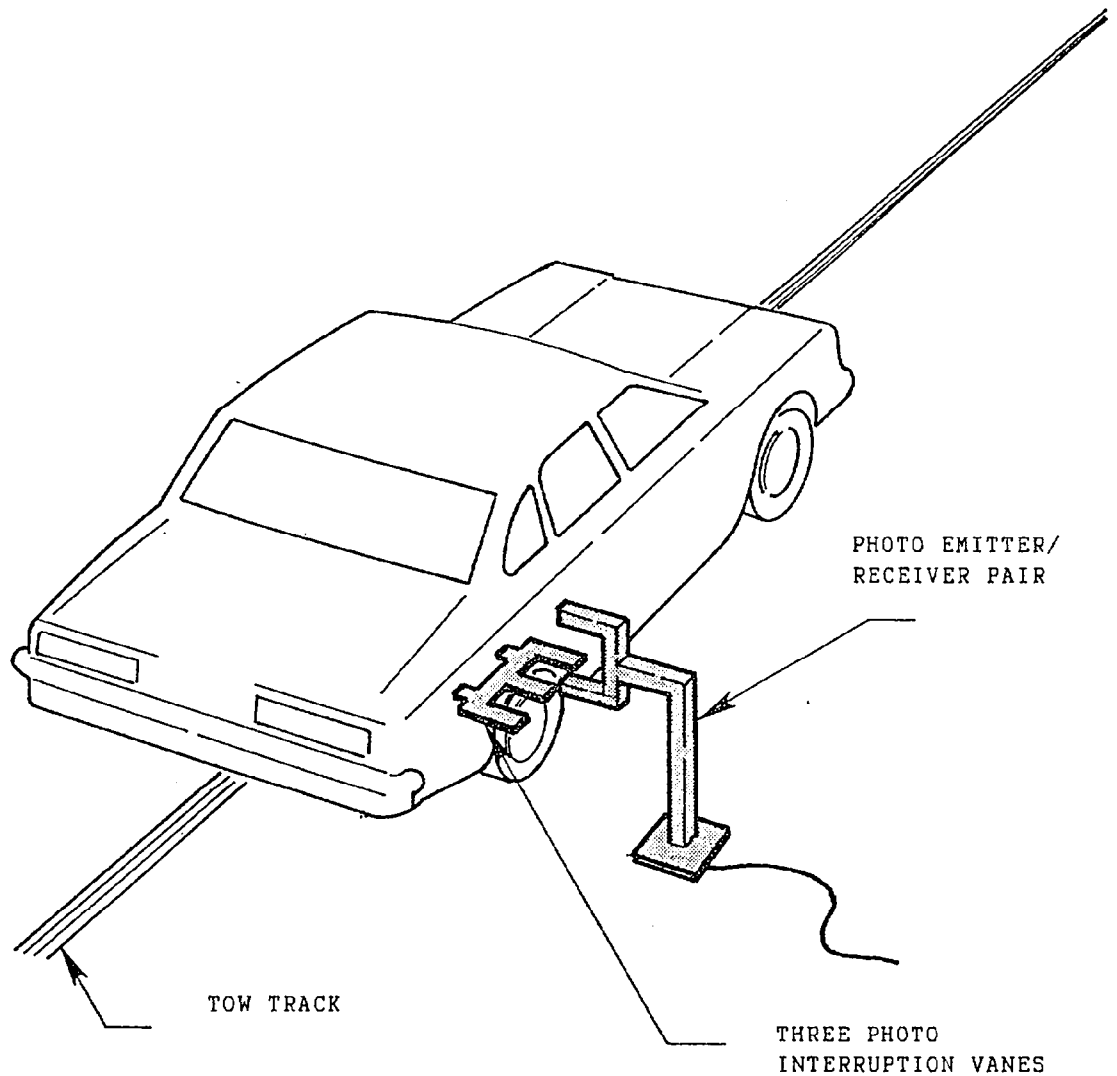
TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN INCHES):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 186.9; C 192.9; R 187.5
POST-TEST: L 167.5; C 169.1; R 169.8
TOTAL CRUSH: L 19.4; C 23.8; R 17.7
AVERAGE CRUSH: 20.3

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

DISTANCE FROM TEST VEHICLE TO BARRIER: L 22.2; C 19.1; R 20.9; AVG. 20.7

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: Audi/100/4-door sedan
 VEHICLE NHTSA NO.: CM5804; VIN: WAUBC5447MN013005
 MODEL YEAR: 1991; BUILD DATE: 08/90; TEST DATE: 05/13/91
 VEHICLE SIZE CATEGORY: Mid-size; TEST WEIGHT: 3810 LBS.
 VEHICLE WHEELBASE: 105.8 INCHES
 MAXIMUM WIDTH: 71.6 INCHES
 FRONT OVERHANG: 42.6 INCHES

COLLISION DEFORMATION
 CLASSIFICATION (CDC) CODE: 12FDEW3

CRUSH DEPTH
 MEASUREMENTS:

C1 =	<u>19.4</u>	INCHES
C2 =	<u>22.4</u>	INCHES
C3 =	<u>24.7</u>	INCHES
C4 =	<u>24.6</u>	INCHES
C5 =	<u>21.7</u>	INCHES
C6 =	<u>17.7</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
 REGION: L = 64.0 INCHES

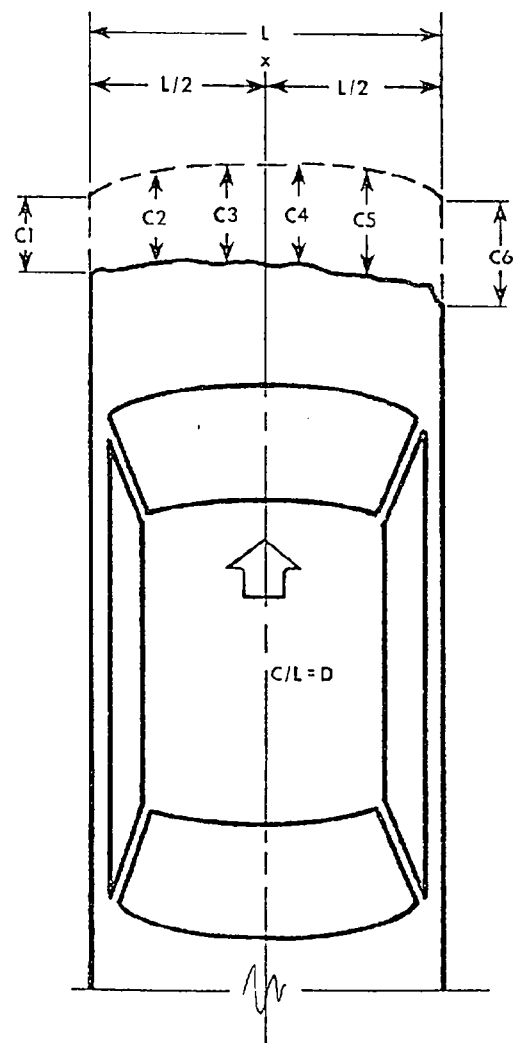
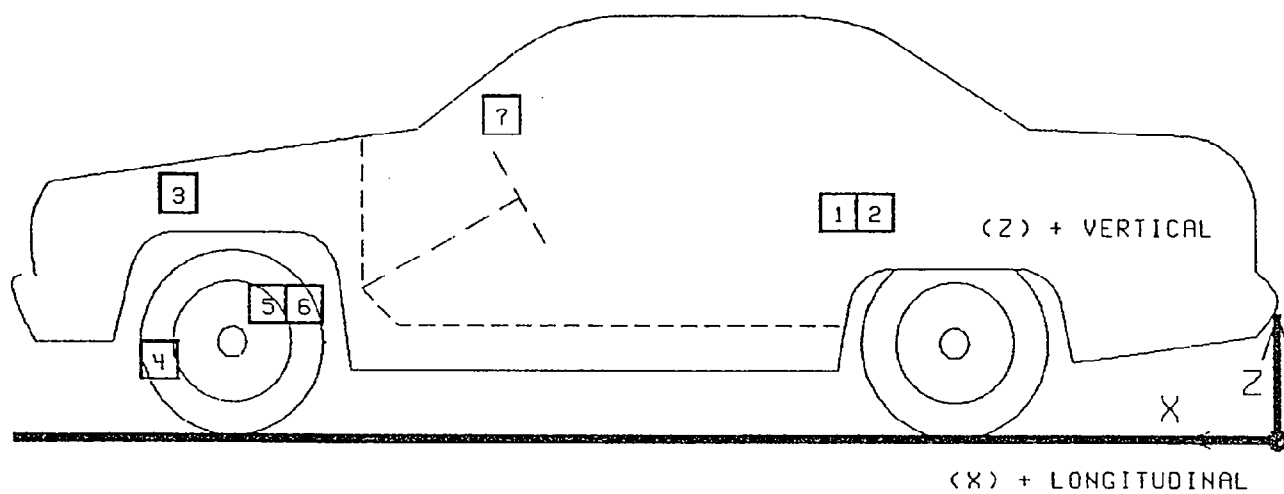
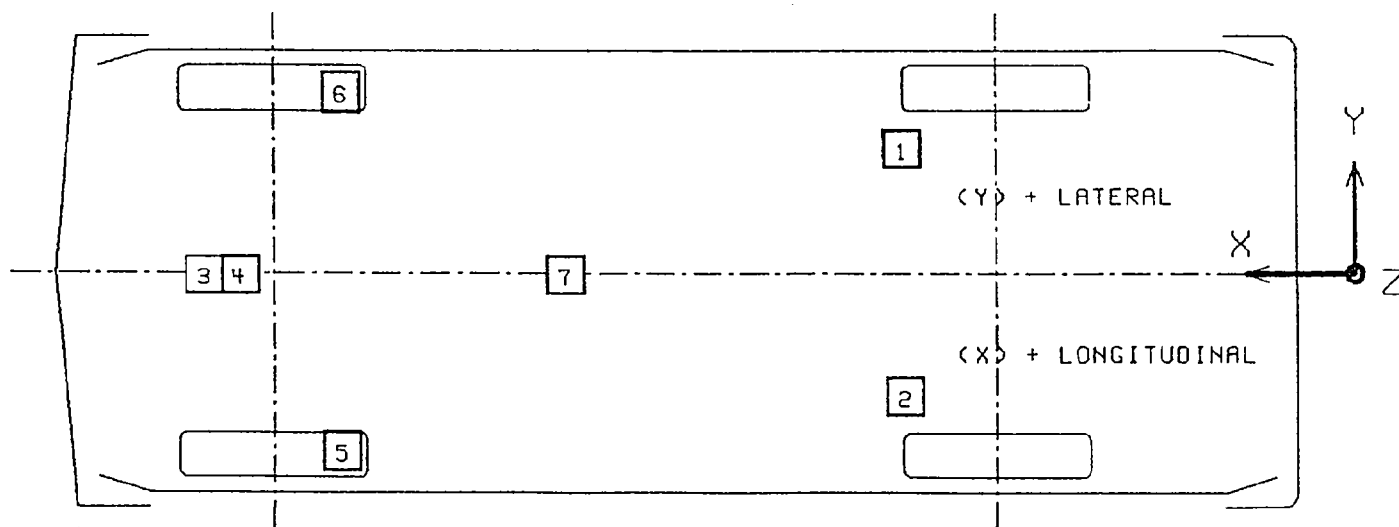


FIGURE 3
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910513

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G	MSEC	MAX G	MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	76.5	16.8	15.4				
		POST	76.2	16.6	15.5				
						12.0	11.3	34.4	40.8
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	76.5	-18.5	15.2				
		POST	76.5	-19.0	16.8				
						11.3	11.9	28.9	51.9
3	ENGINE TOP LONGITUDINAL	PRE	170.8	-5.5	31.4				
		POST	154.8	-6.0	32.2				
						44.1	39.1	240.7	26.8
4	ENGINE BOTTOM LONGITUDINAL	PRE	168.2	1.5	9.1				
		POST	155.9	1.0	10.3				
						---	--- Y	---	--- Y
5	RIGHT BRAKE CALIPER LONGITUDINAL	PRE	155.4	-24.0	11.9				
		POST	149.8	-24.0	11.3				
						14.5	85.6	72.6	40.5
6	LEFT BRAKE CALIPER LONGITUDINAL	PRE	155.6	24.0	12.0				
		POST	149.5	24.0	10.9				
						17.1	27.1	69.2	40.6
7	INSTRUMENT PANEL CENTER LONGITUDINAL	PRE	129.9	0.0	38.0				
		POST	126.8	0.0	38.8				
						5.0	16.0	37.0	51.4

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

Y See DATA ACQUISITION EXPLANATION

REPORT OF VEHICLE CONDITION AT THE
COMPLETION OF TESTING

CONTRACT NO.: DTNH22-90-C-21003
FROM: The Transportation 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.: CM5804
MAKE/MODEL/BODY STYLE: Audi/100/4-door sedan
MODEL YEAR: 1991 BODY COLOR: Silver
VIN: WAUBC5447MN013005
ODOMETER (ARRIVAL): 200 DATE: 05/06/91
ODOMETER (COMPLETION): 207 DATE: 05/13/91
COST: \$ 24,200.00

<u>X</u> AIR CONDITIONER	<u>X</u> CONSOLE	BRAKES: <u>X</u> POWER
<u>X</u> TINTED GLASS	<u>X</u> TACHOMETER	FRONT: Disc
<u>X</u> POWER STEERING	<u>X</u> SPEED CONTROL	REAR: Disc
<u>X</u> POWER WINDOWS	<u>X</u> REAR WINDOW DEF.	
<u>X</u> POWER DOOR LOCKS	<u>X</u> SUN/MOON ROOF	FRONT SEATS: <u> </u> POWER
<u>X</u> RADIO	<u> </u> T-TOP	SEAT TYPE: Bucket
<u>X</u> CLOCK	<u> </u> TILT STEERING WHEEL	NO. OF SEATS: 5
<u> </u> ROOF RACK	<u>X</u> OTHER OPTIONS: <u>Sunroof,</u>	
	<u>console</u>	

ENGINE: 5 CYLINDERS; 2.3 LITERS
TRANSMISSION: 4-speed; DRIVE TYPE: Front wheel
TIRE SIZE: 195/65R15
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 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	-50.5	11.6	-26.2	51.9	-50.8	-3.8	9.8	47.7
PASSENGER	-25.1	-9.4	-37.7	41.4	-32.6	-7.4	11.1	32.1

MAXIMUM FEMUR COMPRESSIVE FORCE (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	2272	1362
PASSENGER	610 Y	276 Y

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC) ¹	TIME t_2 (MSEC) ²
DRIVER	407	76.2	112.2
PASSENGER	214	70.6	106.6

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

YSee DATA ACQUISITION EXPLANATIONS

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #354	PASSENGER #1173
HEAD	<u>Airbag</u>	<u>Chest</u>
CHEST	<u>Airbag</u>	<u>None</u>
ABDOMEN	<u>None</u>	<u>None</u>
LEFT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>
RIGHT KNEE	<u>Instrument panel</u>	<u>Instrument panel</u>

DOOR OPENING:

	LEFT	RIGHT
FRONT	<u>Easy</u>	<u>Difficult</u>
REAR	<u>Easy</u>	<u>Difficult</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>Passenger's seat shifted 1 notch forward</u>
REAR	<u>NA</u>	<u>NA</u>

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 and chest were restrained by the driver's airbag. The dummy's torso rotated toward the right as the dummy rebounded into the right portion of the seat back and head restraint. The dummy came to rest seated in the driver's seat, leaning slightly to the right.

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 torso was restrained by the three-point unbelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated in the right front passenger's seat, restrained by the three-point unbelt.

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

MAKE/MODEL: Audi/100

VIN: WAUBC5447MN013005

BODY STYLE: 4-door sedan

NHTSA NO.: CM5804

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

OPEN-BODY VEHICLE (without doors): DOES THE SEAT BELT SYSTEM FULLY
RETRACT WHEN THE WEBBING TENSION-RELIEVING DEVICE IS MANUALLY
DEACTIVATED? NA

ACCESSIBILITY:

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

IS THE SEAT REMOVABLE? No

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

MAKE/MODEL: Audi/100

VIN: WAUBC5447MN013005

BODY STYLE: 4-door sedan

NHTSA NO.: CM5804

DATE OF MANUFACTURE: 03/90

ACCESSIBILITY, CONT'D:

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

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 PROTECTION SYSTEM: The label was located on top of the driver's sun visor.

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

X renew or 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.

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, pages 160, 161

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 161

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 on the right portion of the instrument cluster.

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? Not directly,
but page 50 states the light "indicates a malfunction in the
airbag system" and page 160 lists the components of the airbag
system.

FIGURE 4 FMVSS 212 TEST DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

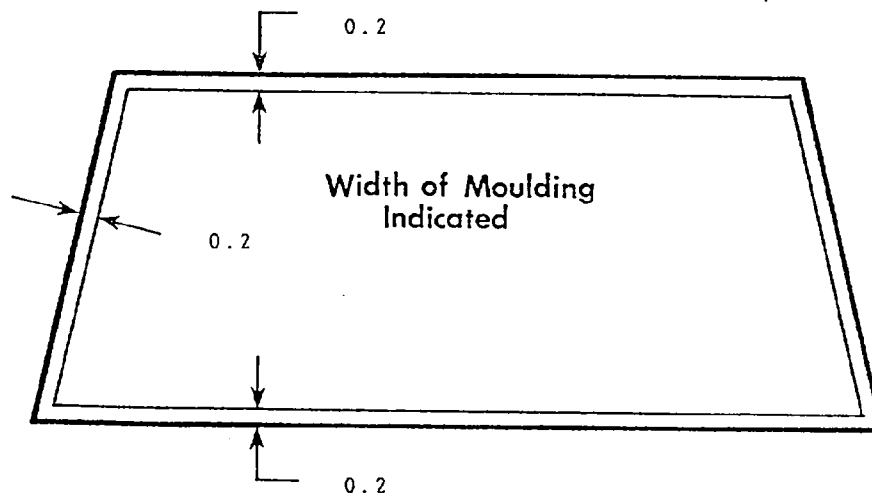
Adhesive around inner perimeter, chrome trim around outer perimeter.

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	82.4	82.4	100%
LEFT SIDE	82.4	82.4	100%
TOTAL	164.8	164.8	100%

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 70° F



FRONT VIEW OF WINDSHIELD*

LOSS OF WINDSHIELD RETENTION LENGTHS: None

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

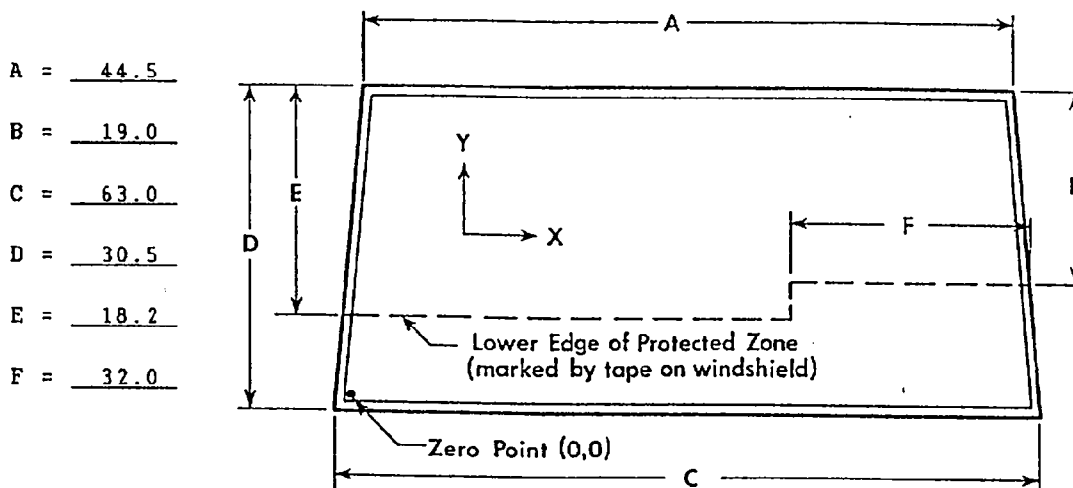
*INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

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:



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: Audi/100 NHTSA NO.: CM5804

FUEL SYSTEM CAPACITY: 21.1 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 21.0 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 19.3 GALLONS TO 19.7 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 19.5 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 filler neck was located on the right
side. The fuel tank was located in front of the rear axle. The fuel
lines ran along the left side to the front.

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.: CM5804; TEST DATE: 05/13/91
 VEHICLE MAKE/MODEL/BODY STYLE: Audi/100/4-door sedan

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE:

- ☒ FRONTAL (30 MPH)
- ☐ OBLIQUE (30 MPH) WITH _____° BARRIER FACE
- ☐ FIRST CONTACTING _____ (DRIVER/PASS.) SIDE.
- ☐ REAR MOVING BARRIER (30 MPH)
- ☐ LATERAL MOVING BARRIER (20 MPH)

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

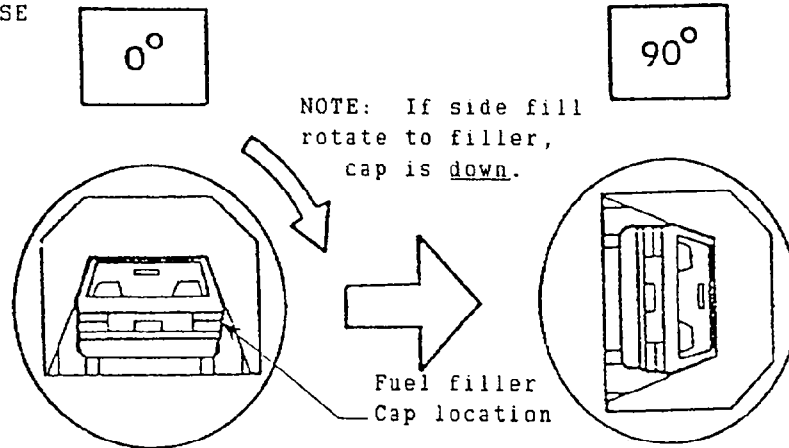
	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 OZ.	1 OZ.
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 OZ.	5 OZ.
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 OZ.	1 OZ./1 MIN.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA

NHTSA NO.: CM5804
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

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

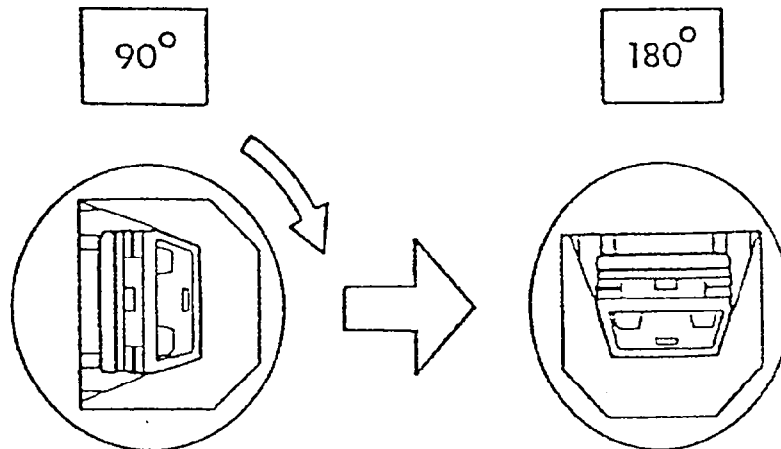
<u>0° TO 90° ROTATION (FUEL FILLER CAP DOWN)</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CM5804
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

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>90° TO 180° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

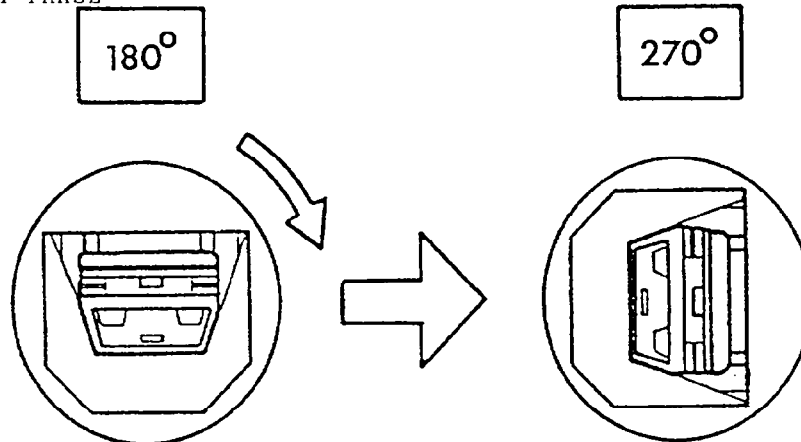
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CM5804

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

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

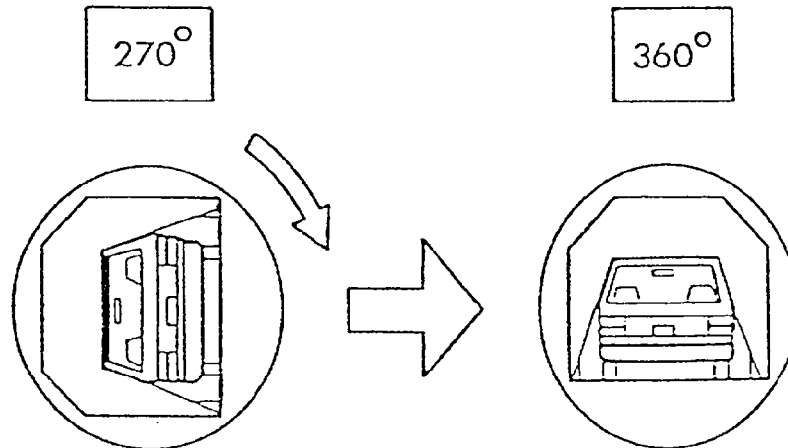
<u>180° TO 270° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA, CONT'D.

NHTSA NO.: CM5804
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

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

<u>270° TO 360° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

SECTION 4.0

VEHICLE, OCCUPANT, AND CAMERA MEASUREMENTS

FIGURE 7

PRE-TEST AND POST-TEST MEASUREMENT POINTS

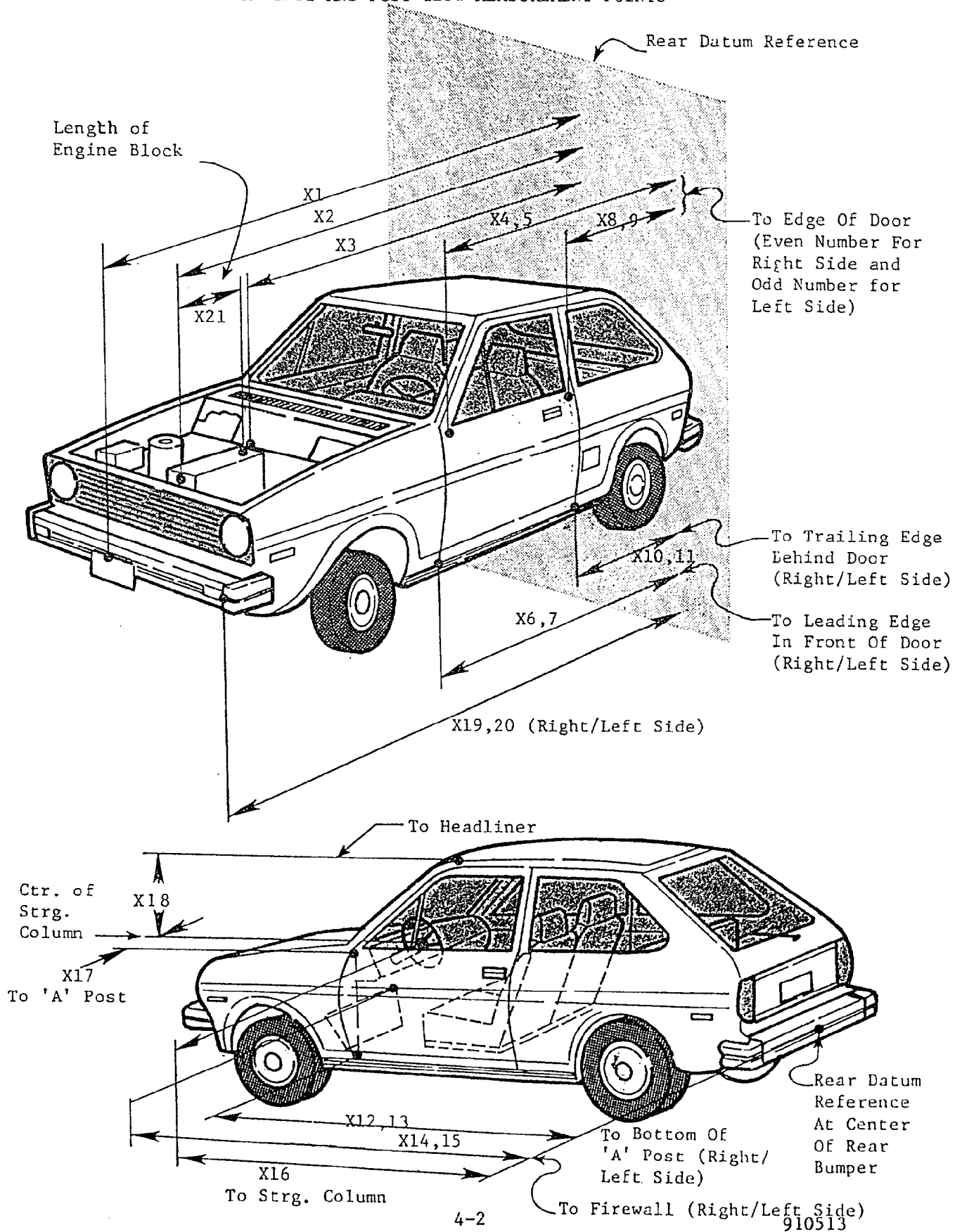
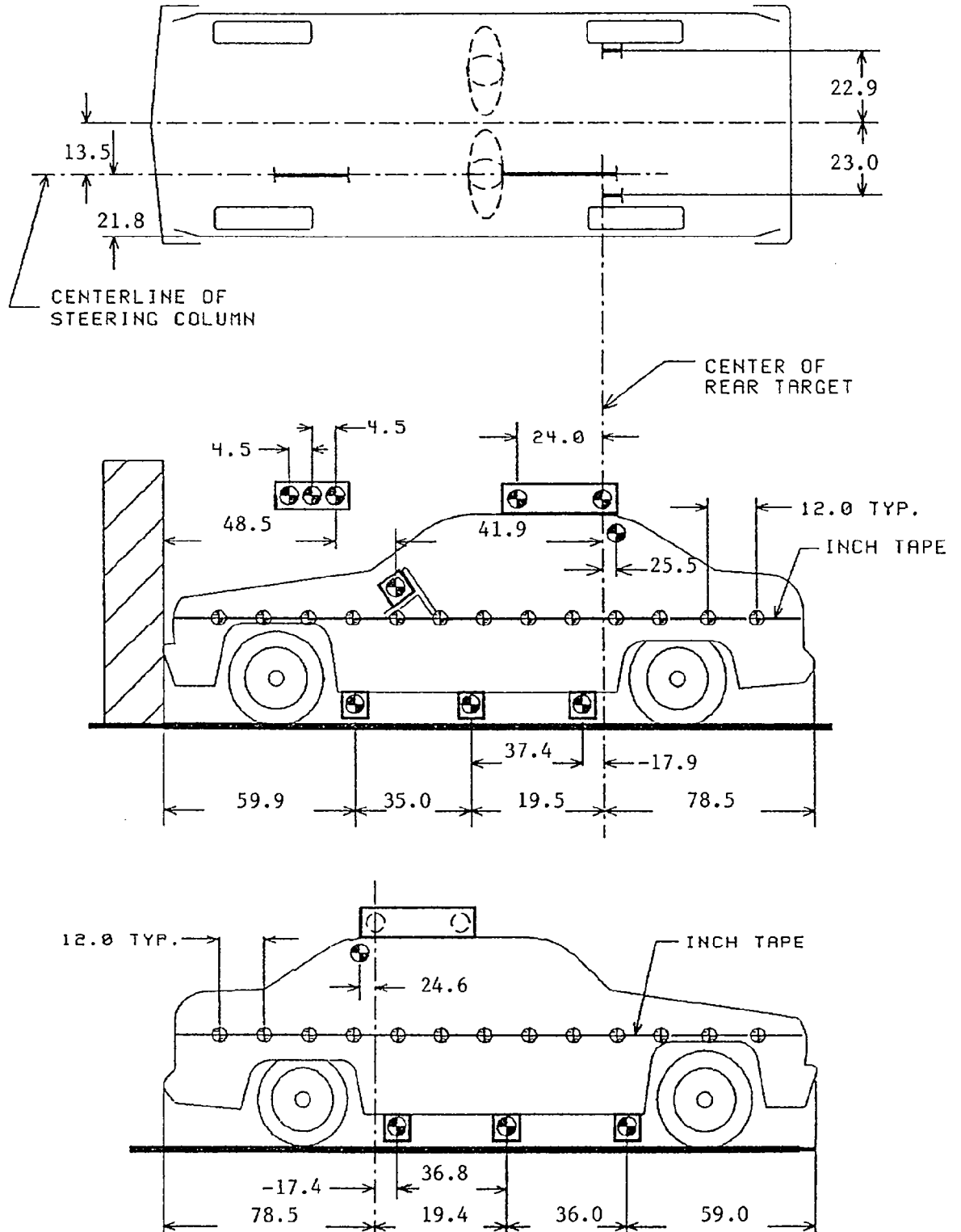


TABLE 13 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Audi/100		TEST NUMBER: 910513		ALL MEASUREMENTS ARE IN INCHES		
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.		
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	192.9	169.1	23.8		
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	173.0	164.5	8.5		
X3	REAR SURFACE OF VEHICLE TO FIREWALL	149.8	141.9	7.9		
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	128.8	128.0	0.8		
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	128.1	127.9	0.2		
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	130.5	129.2	1.3		
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	130.1	129.5	0.6		
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	88.8	88.3	0.5		
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	88.2	87.9	0.3		
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	90.8	89.8	1.0		
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	90.4	89.9	0.5		
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	127.9	126.5	1.4		
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	127.8	127.1	0.7		
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	145.5	144.1	1.4		
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	147.2	144.5	2.7		
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	115.5	112.2	3.3		
X17	CENTER OF STEERING COLUMN TO "A" POST	14.0	16.4	-2.4		
X18	CENTER OF STEERING COLUMN TO HEADLINER	17.8	18.1	-0.3		
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	187.5	169.8	17.7		
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	186.9	167.5	19.4		
X21	LENGTH OF ENGINE BLOCK	23.0	23.0	0.0		

FIGURE 8
VEHICLE TARGET LOCATIONS



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 9 DUMMY AND SEAT POSITIONING DATA

PRE-IMPACT DATA:

MAKE/MODEL: Audi/100
 BODY STYLE: 4-door sedan MODEL YEAR: 1991
 NHTSA NO.: CM5804 COLOR: Silver

DATA FROM CERTIFICATION LABEL:

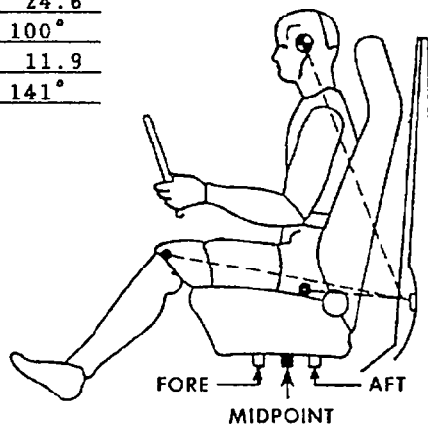
VEHICLE MANUFACTURER: Audi Aq.
 DATE OF MANUFACTURE: 08/90 VIN: WAUBC5447MN013005
 GVWR: 4145 LBS.; GAWR: FRONT = 2315 LBS.; REAR = 2094 LBS.

POST-IMPACT DATA:

DATE OF TEST: 05/13/91 TIME: 1322 TEMPERATURE: 74° F
 IMPACT VELOCITY: PRIMARY = 29.5 MPH SECONDARY = 29.5 MPH
 REQUIRED IMPACT VELOCITY RANGE: 28.9 TO 29.9 MPH
 SEAT TYPE: Bucket ADJUSTER TYPE: Manual
 FRONT SEAT BACK TYPE: Manually adjustable
 TECHNICIANS: P. Cummines & B. Crabtree

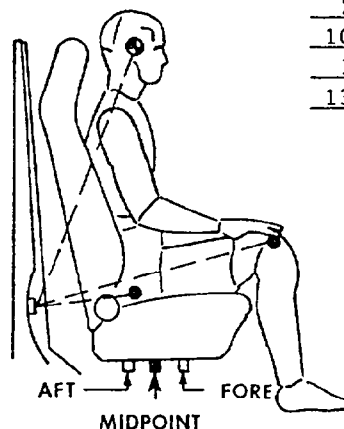
DRIVER DUMMY # 354 TYPE: HIII

HEAD 18.2
 TARGET 1°
 KNEE 24.6
 JOINT 100°
 APPROX- 11.9
 IMATE 141°
 "H"
 POINT



PASSENGER DUMMY # 1173 TYPE: HIII

HEAD 18.3
 TARGET 4°
 KNEE 24.3
 JOINT 100°
 APPROX- 10.2
 IMATE 134°
 "H"
 POINT



A = 55.1
 B = 41.8
 C = 27.6
 D = 13.5
 E = 13.3

DOOR GLASS
 HEIGHT = 8.6

LATERAL BAR

ADJUSTABLE
 POINTER

LEFT
 FRONT
 DOOR

DRIVER
 DUMMY

PASSENGER
 DUMMY

DOOR GLASS
 HEIGHT = 8.6

RIGHT
 FRONT
 DOOR

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

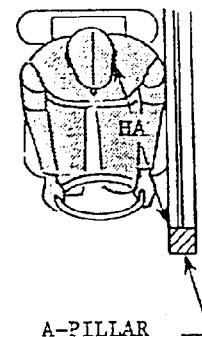
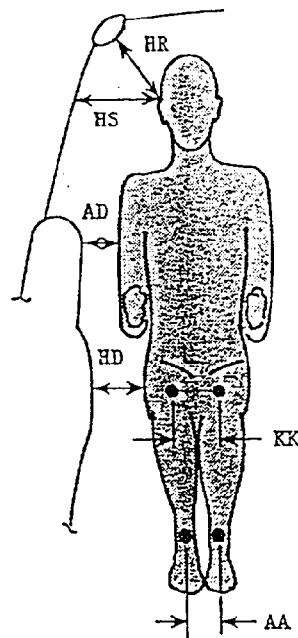
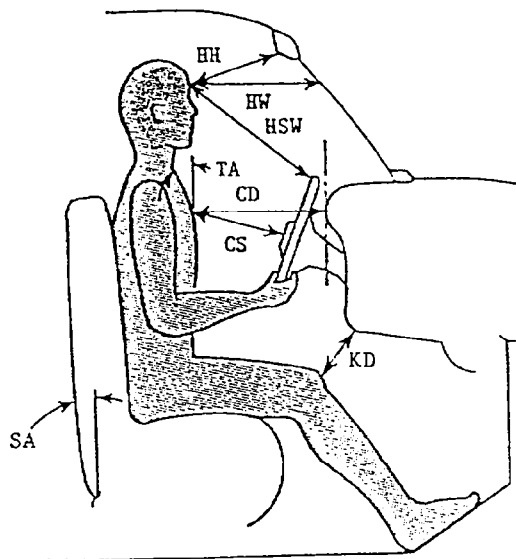
FIGURE 10 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	15.8	14.9
HW	22.8	20.3
CD	22.3	23.1
CS	16.2	NA
KDL	5.4	6.4
KDR	5.4	6.4
TA	25°	26°
SA	23°	23°
HSW	22.5	NA

	DRIVER	PASSENGER
HR	7.6	6.9
HS	10.5	10.5
AD	5.9	5.7
HD	8.2	7.5
KK	10.5	7.9
AA	12.0	7.1
HA	23.6	23.9

KNEE OUTER BOLT HEAD TO OUTER
BOLT HEAD SPACING:

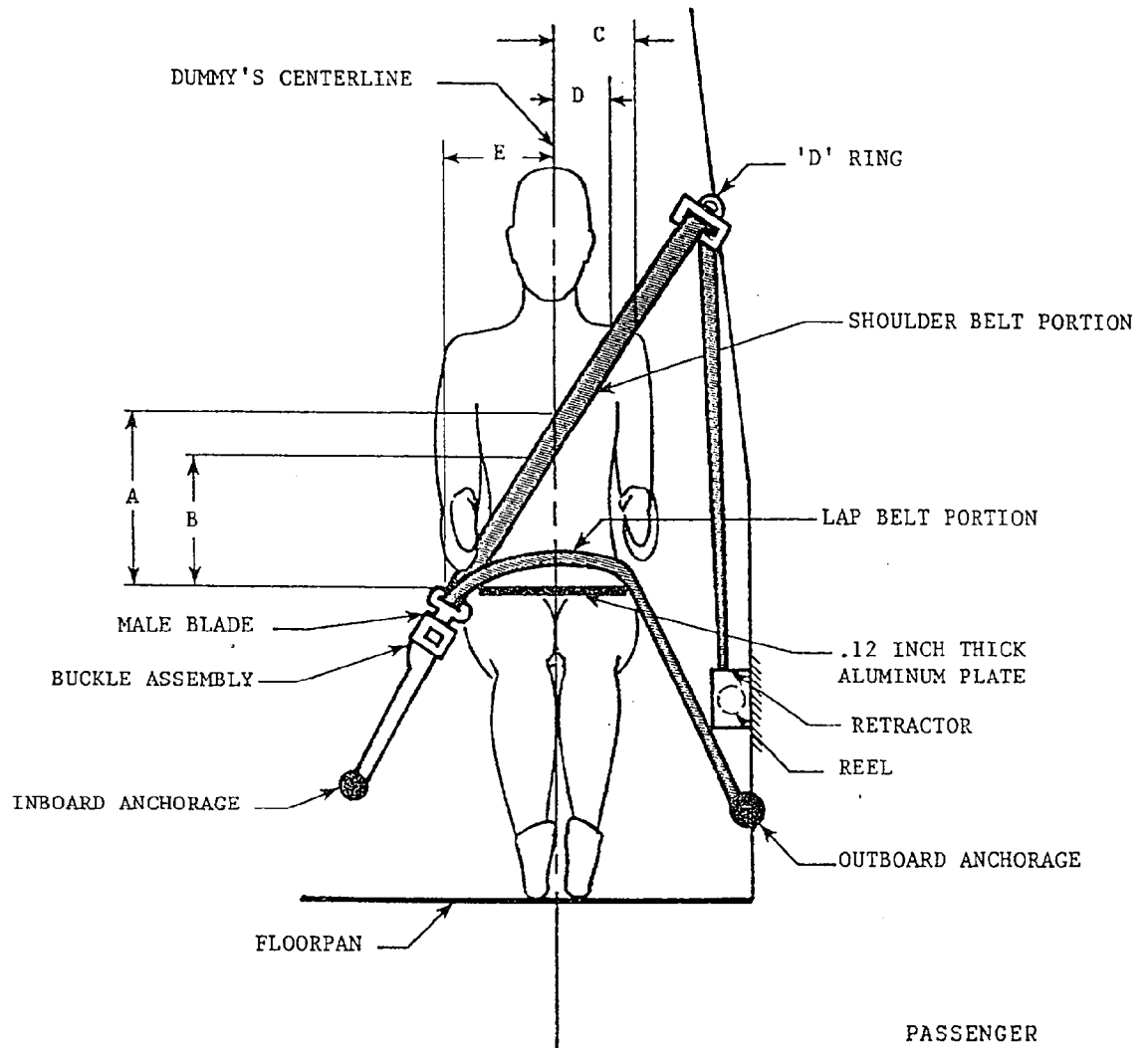
DRIVER = 14.5
PASSENGER = 11.8



HH = HEAD TO WINDSHIELD HEADER	HR = HEAD C.G. TARGET TO SIDE ROOF HEADER
HW = HEAD TO WINDSHIELD	HS = HEAD C.G. TARGET TO SIDE WINDOW
CD = CHEST TO DASH	AD = ARM TO DOOR
CS = CHEST TO STEERING WHEEL	HD = HIP TO DOOR
KD = KNEE TO DASH	KK = KNEE TO KNEE
TA = TORSO ANGLE	AA = ANKLE TO ANKLE
SA = SEAT BACK ANGLE	HA = HEAD C.G. TARGET TO A-PILLAR
HSW = HEAD TO STEERING WHEEL	

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

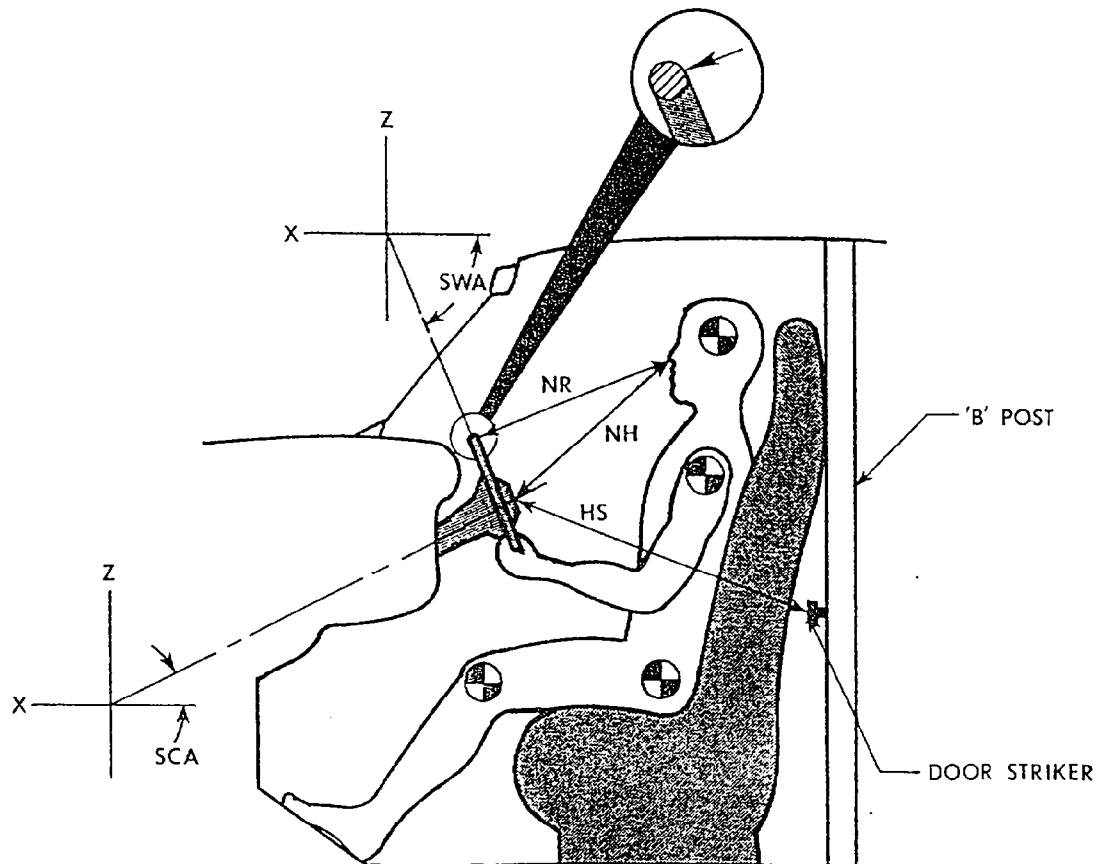
FIGURE 11 SEAT BELT POSITIONING DATA



	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	13.6
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	10.2
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.2
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	2.8
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	9.6

ALL MEASUREMENTS ARE IN INCHES.

FIGURE 12 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY:
The steering column was not adjustable. The right front passenger's
seat belt's adjustable D-ring was latched in the uppermost position.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	20.5
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	21.3
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	25.4
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	21°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	69°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 13
CAMERA POSITIONS

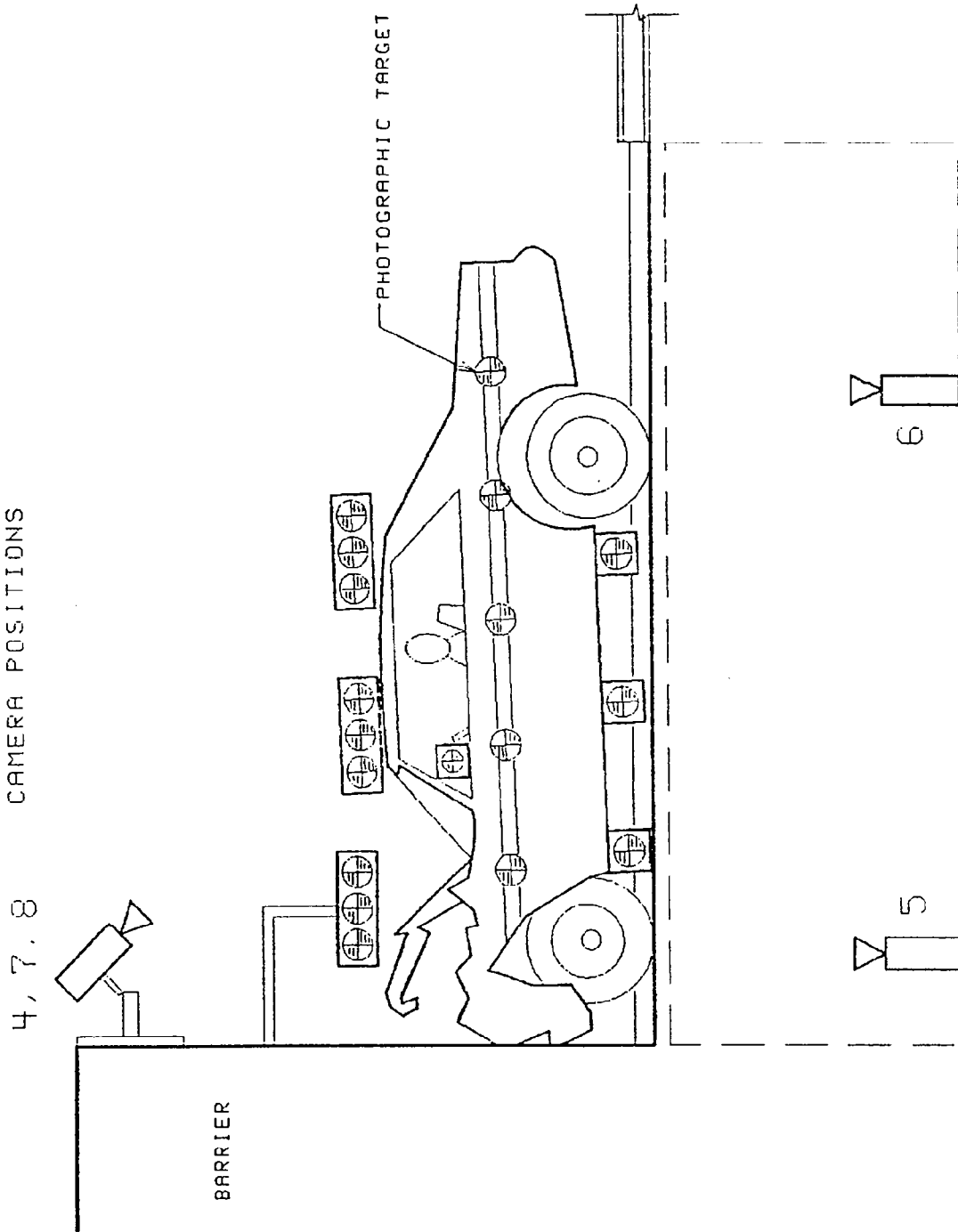


FIGURE 13
CAMERA POSITIONS, CONTINUED

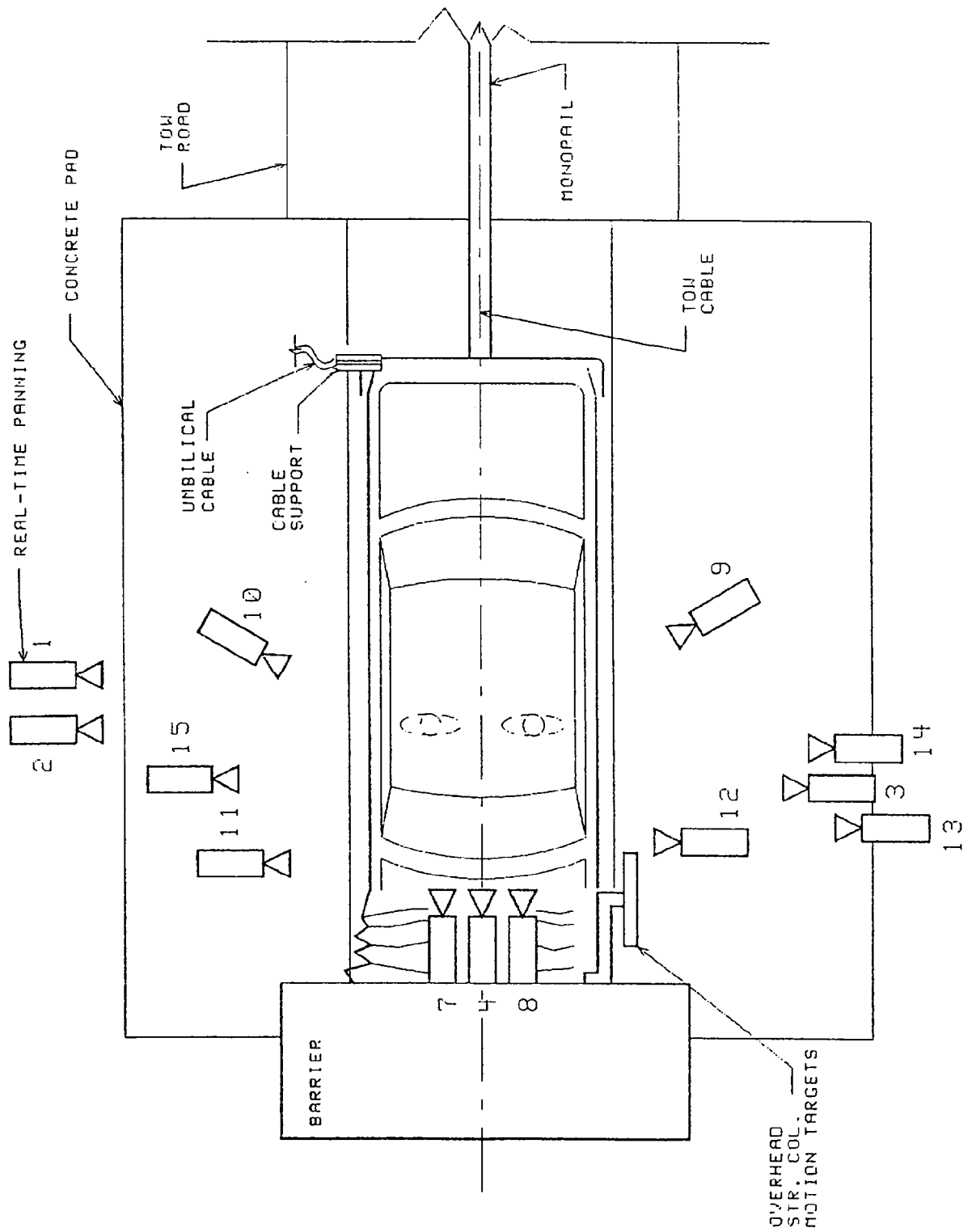


TABLE 14 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 910513		VEHICLE: Audi 100 4-door sedan					FILM PLANE		FILM
CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	TO HEAD TARGET(IN)	LENS (MM)	SPEED (FPS)	
		X	Y	Z					
1	Real-time panning	-142.0	-504.0	61.0	NA	NA	16	24	
2	Right overall	-81.3	-266.4	37.1	-2	NA	13	500	
3	Left vehicle crush	-41.5	295.0	44.0	-4	225.0	25	508	
4	Windshield front view	-6.0	0.0	96.0	-40	NA	8.5	503	
5	Pit front position	-50.5	0.0	-92.4	90	NA	13	795	
6	Pit rear position	-99.3	0.0	-99.0	90	NA	13	1000	
7	Passenger front view	-4.5	-13.8	93.0	-50	NA	17	503	
8	Driver front view	-6.8	14.5	93.0	-50	NA	17	500	
9	Driver kinematics	-157.3	116.0	87.0	-27	98.0	25	500	
10	Passenger kinematics	-152.1	-116.0	87.0	-26	90.0	25	510	
11	Right windshield intrusion	-38.1	-306.1	44.0	0	NA	50	500	
12	Left windshield intrusion	-53.0	309.4	42.3	0	NA	50	495	
13	Steering column motion	-120.0	256.0	103.0	-14	NA	25	500	
14	Steering column motion	-120.0	256.0	75.1	-9	NA	25	498	
15	Passenger kinematics	-38.8	-293.0	45.3	-4	234.0	25	512	
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
A-2



Figure A-3. PRE-TEST LEFT SIDE VIEW

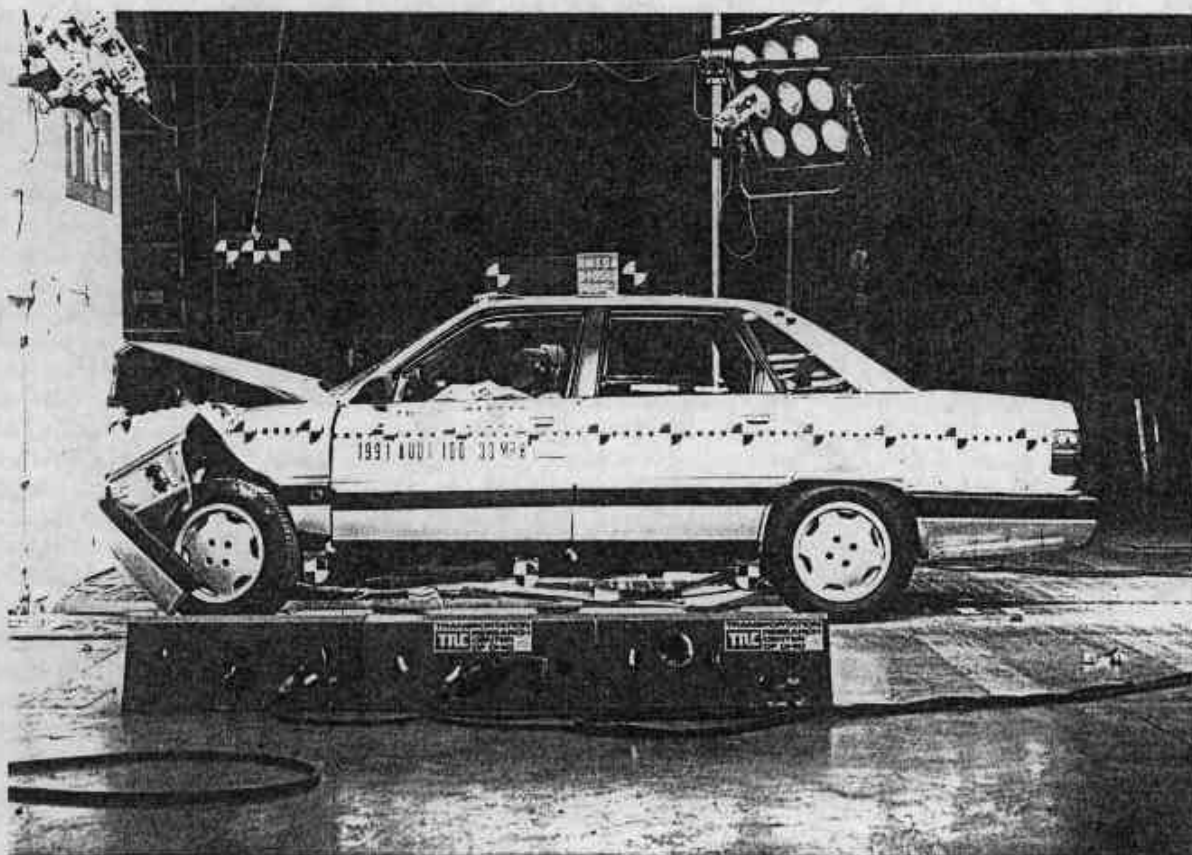


Figure A-4. POST TEST LEFT SIDE VIEW

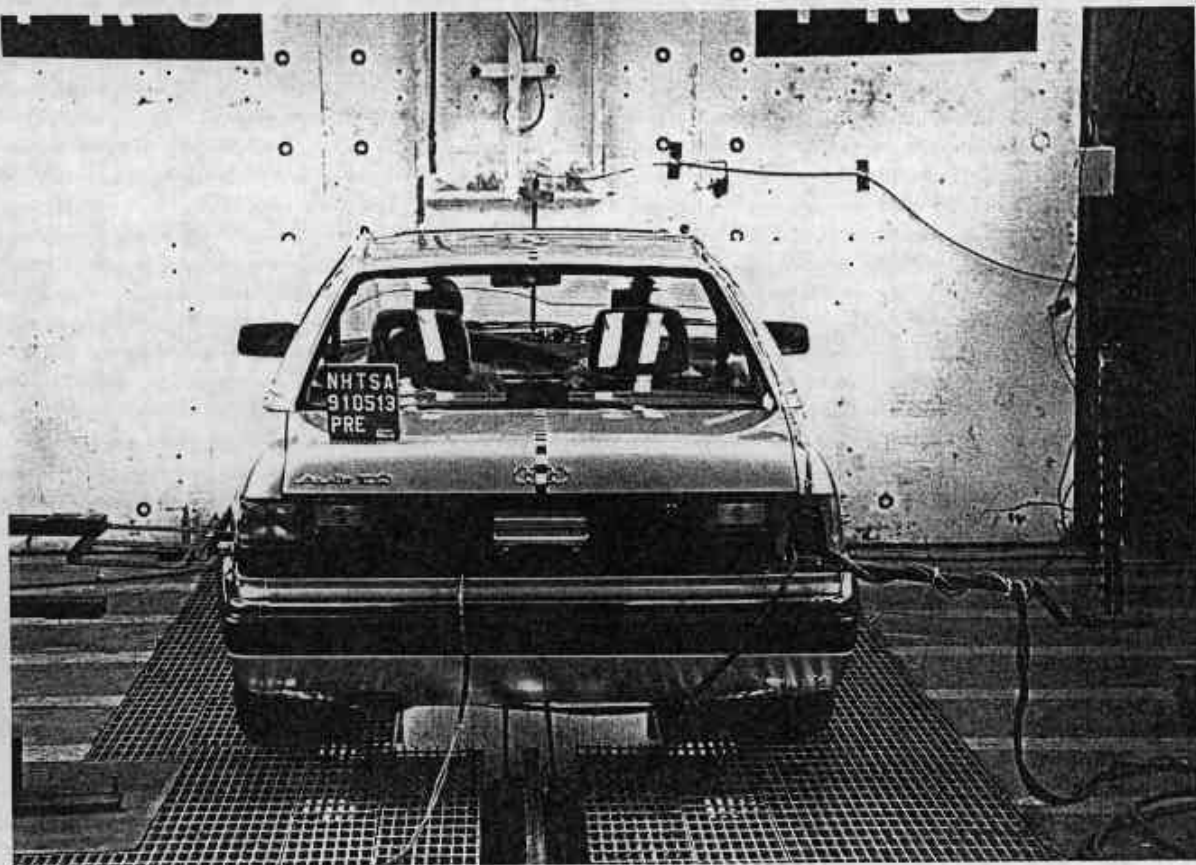


Figure A-5. PRE-TEST REAR VIEW



Figure A-6. POST-TEST REAR VIEW



Figure A-7. PRE-TEST RIGHT SIDE VIEW

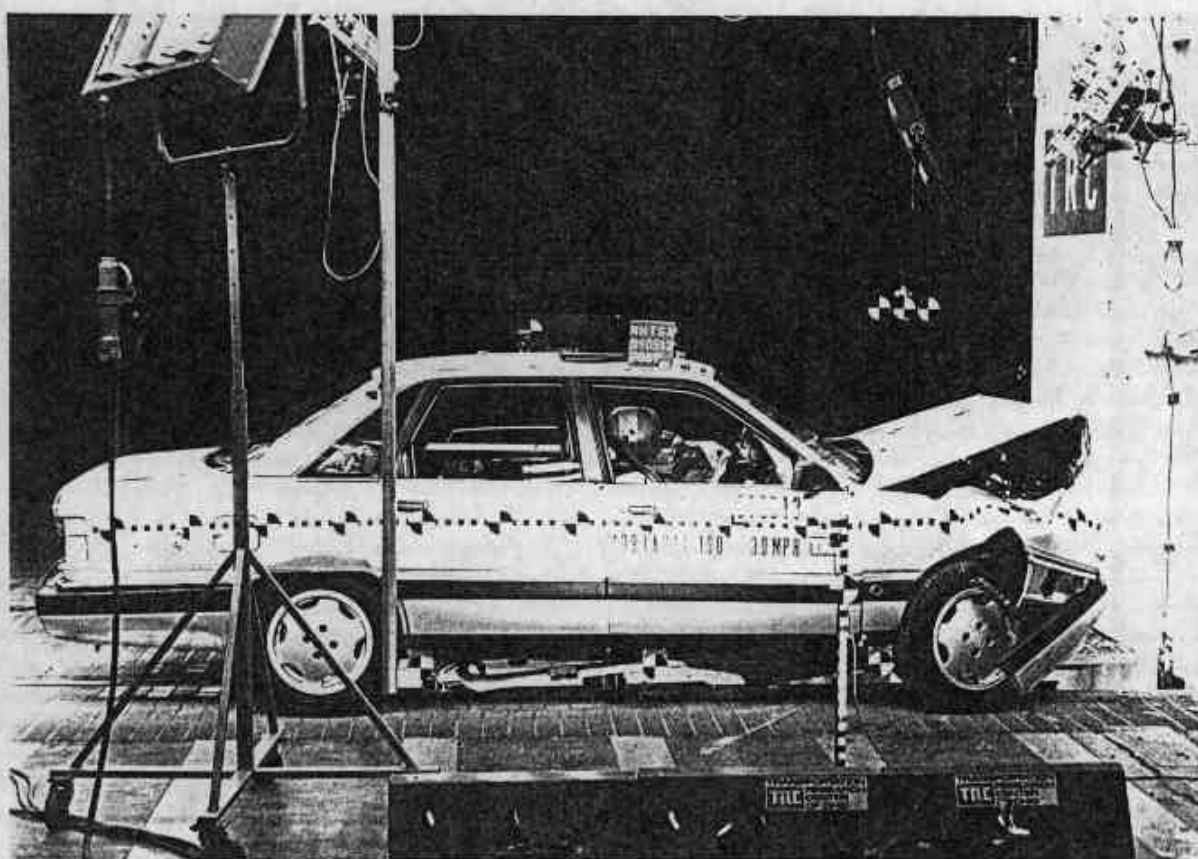


Figure A-8. POST-TEST RIGHT SIDE VIEW
A-5

910513



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



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



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



Figure A-12. POST-TEST LEFT REAR THREE-QUARTER VIEW

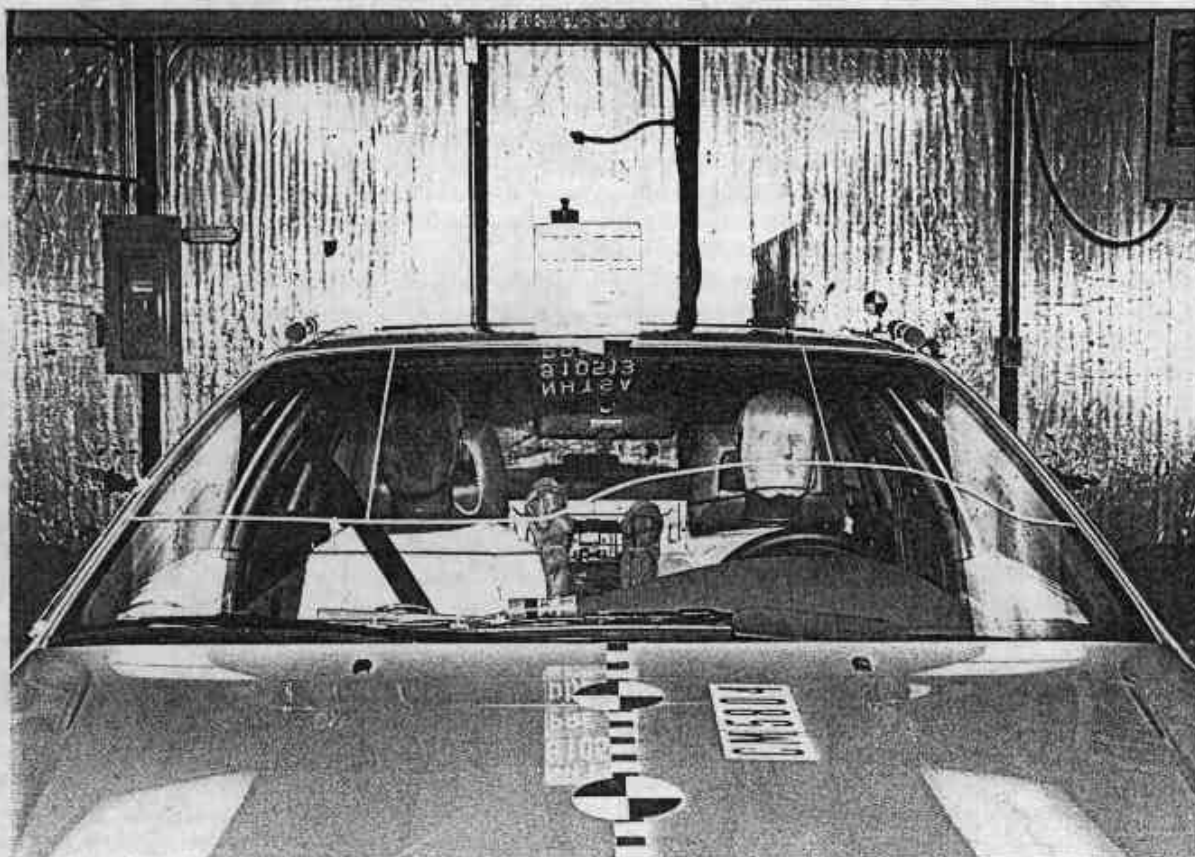


Figure A-13. PRE-TEST WINDSHIELD VIEW

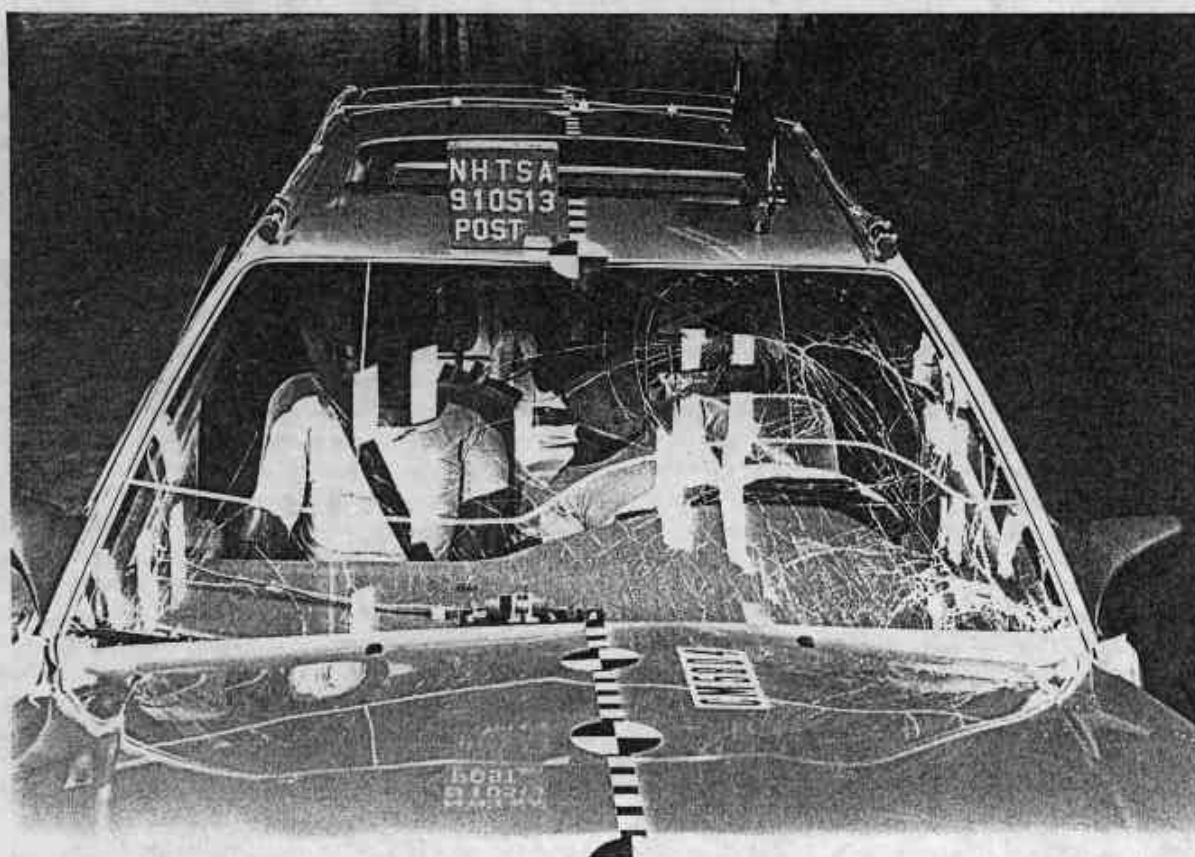


Figure A-14. POST-TEST WINDSHIELD VIEW
A-8

910513

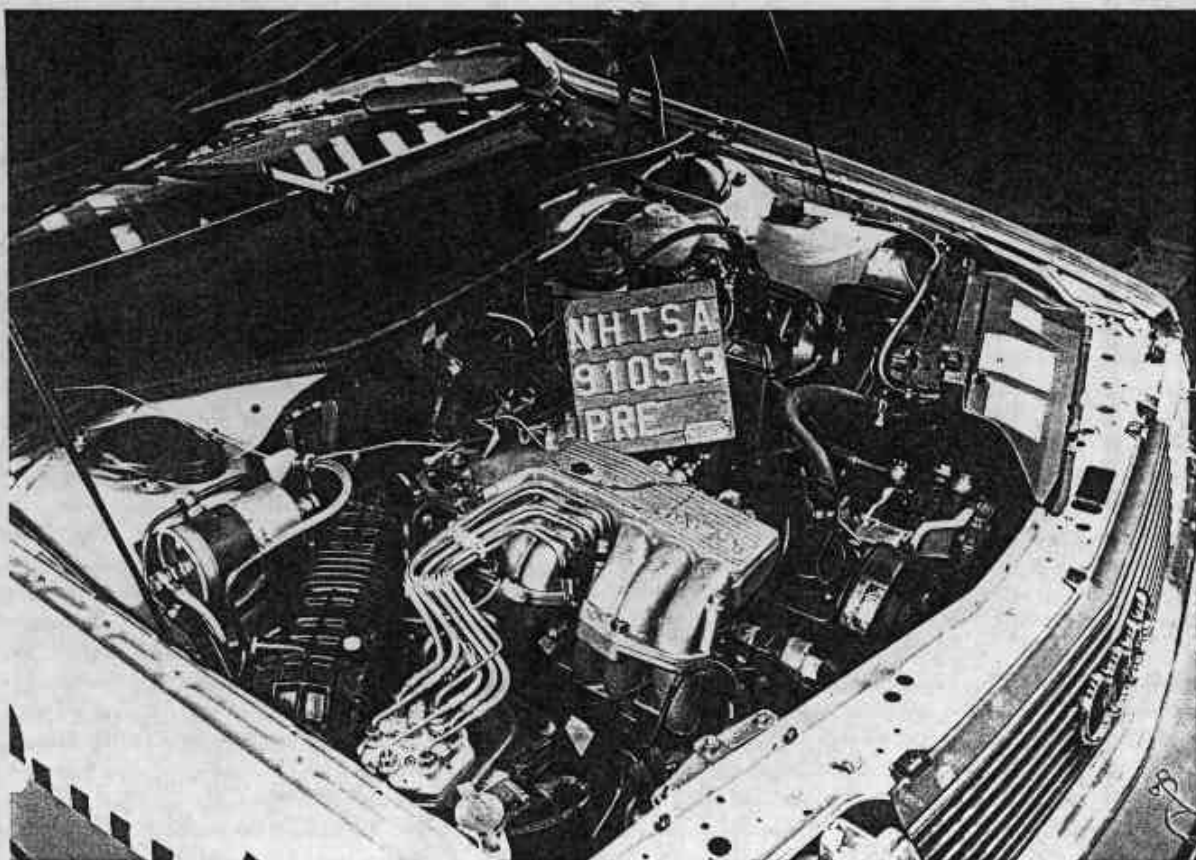


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW

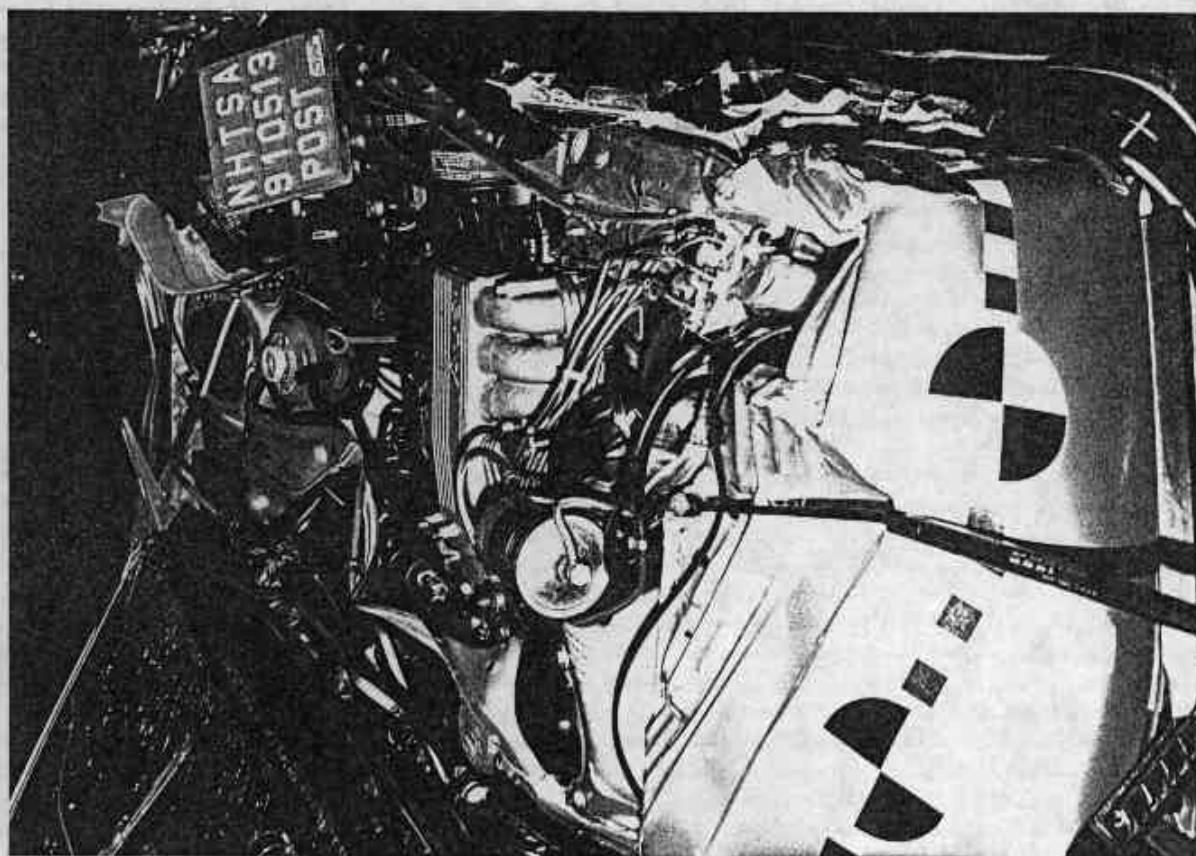


Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

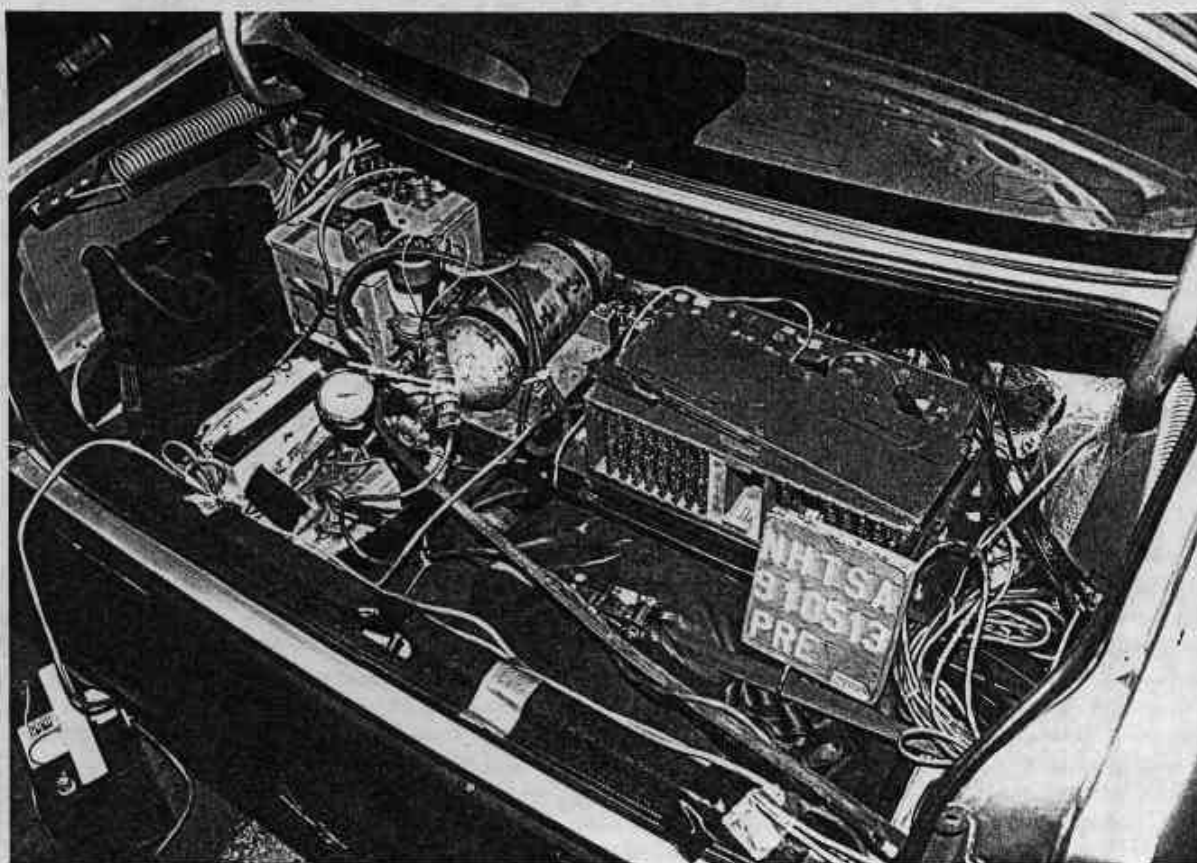


Figure A-17. PRE-TEST BALLAST LOCATION VIEW

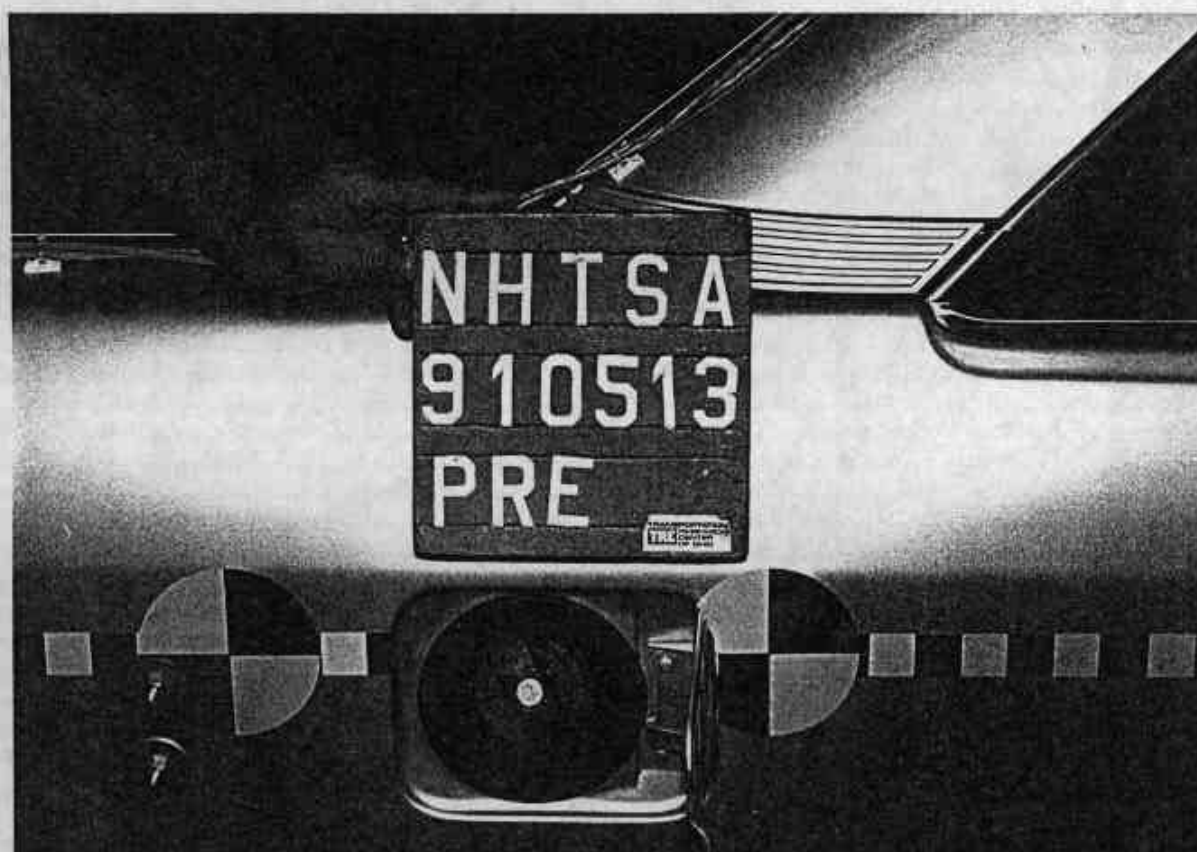


Figure A-18. PRE-TEST FUEL FILLER CAP VIEW



Figure A-19. POST-TEST FUEL FILLER CAP VIEW

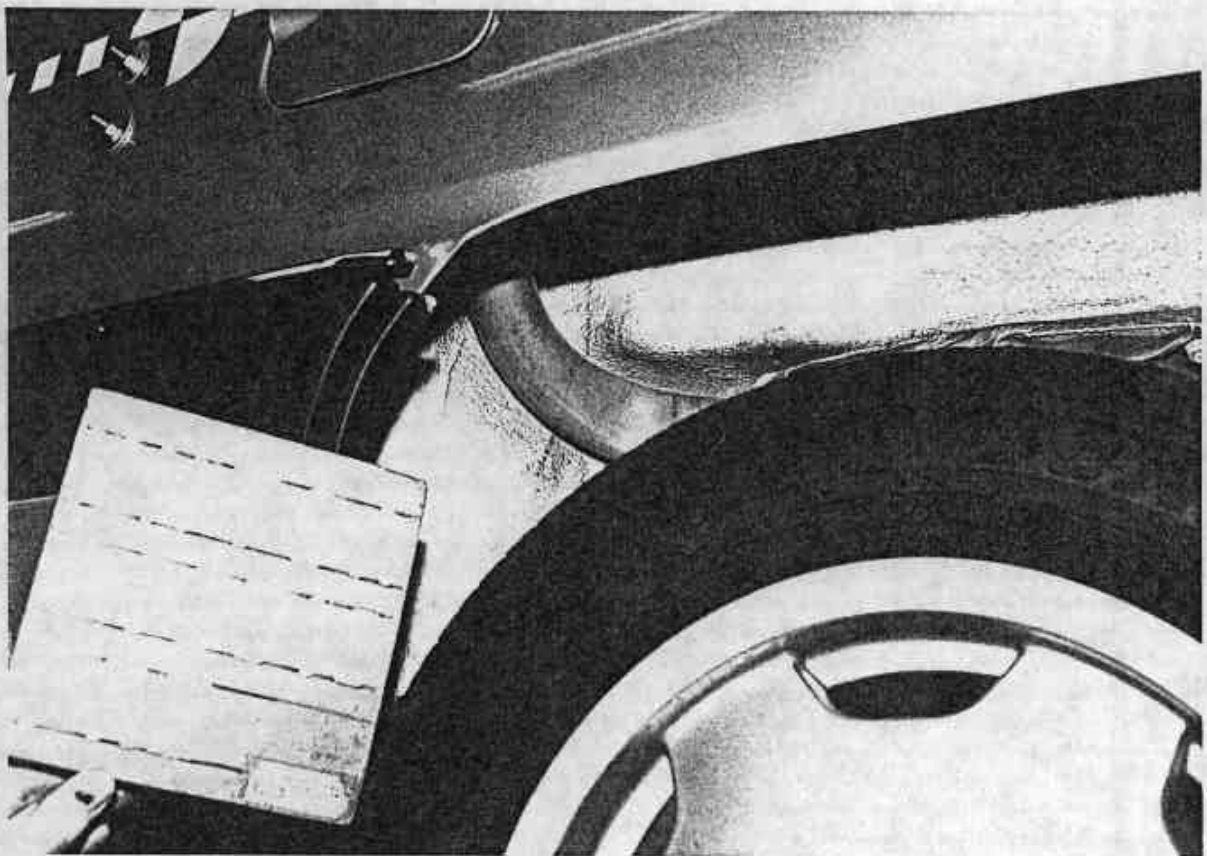


Figure A-20. PRE-TEST FUEL FILLER NECK VIEW

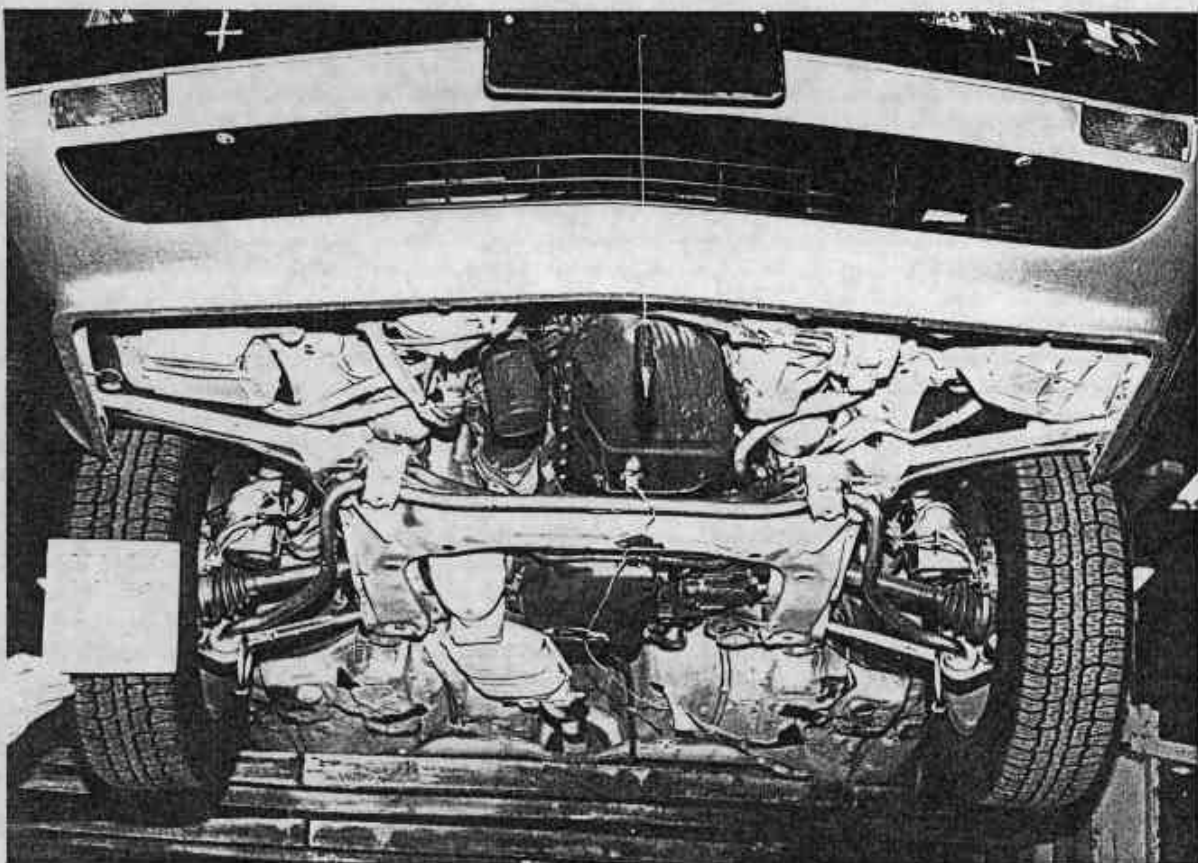


Figure A-21. PRE-TEST FRONT UNDERBODY VIEW

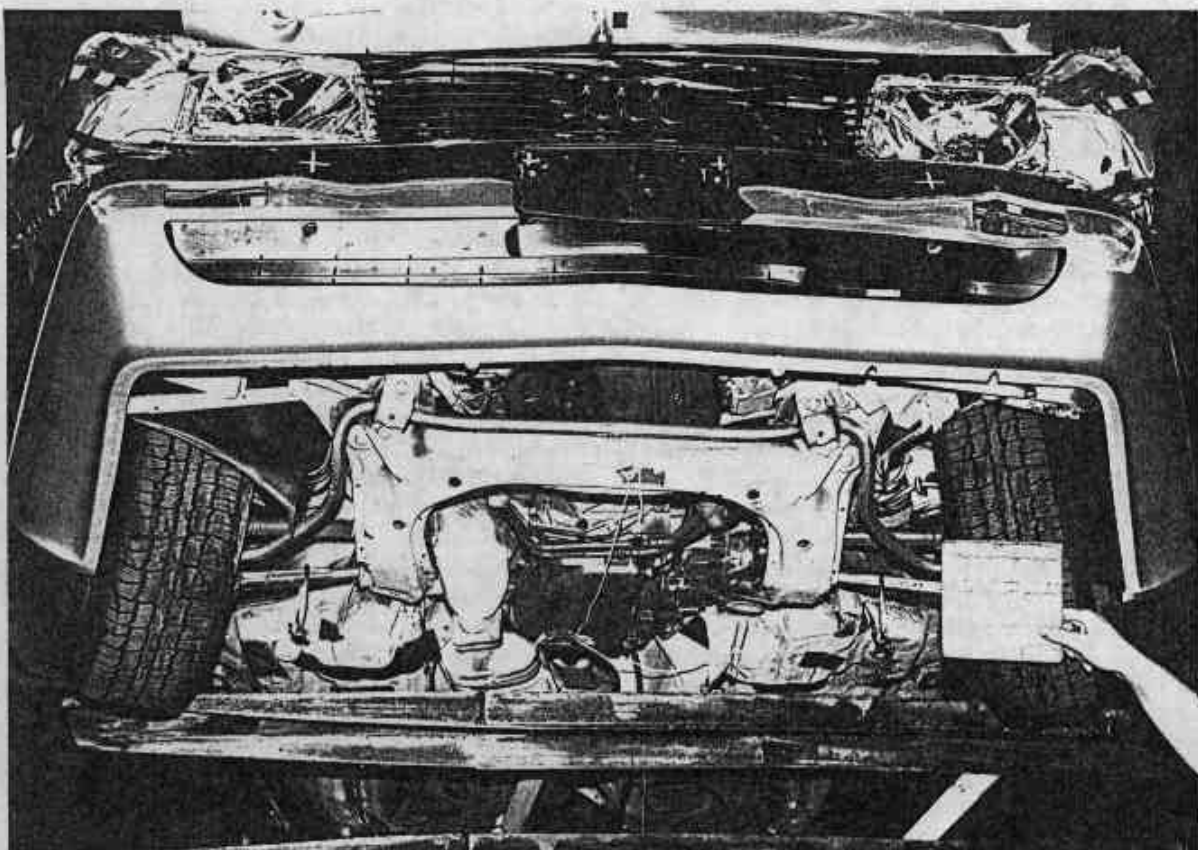


Figure A-22. POST-TEST FRONT UNDERBODY VIEW

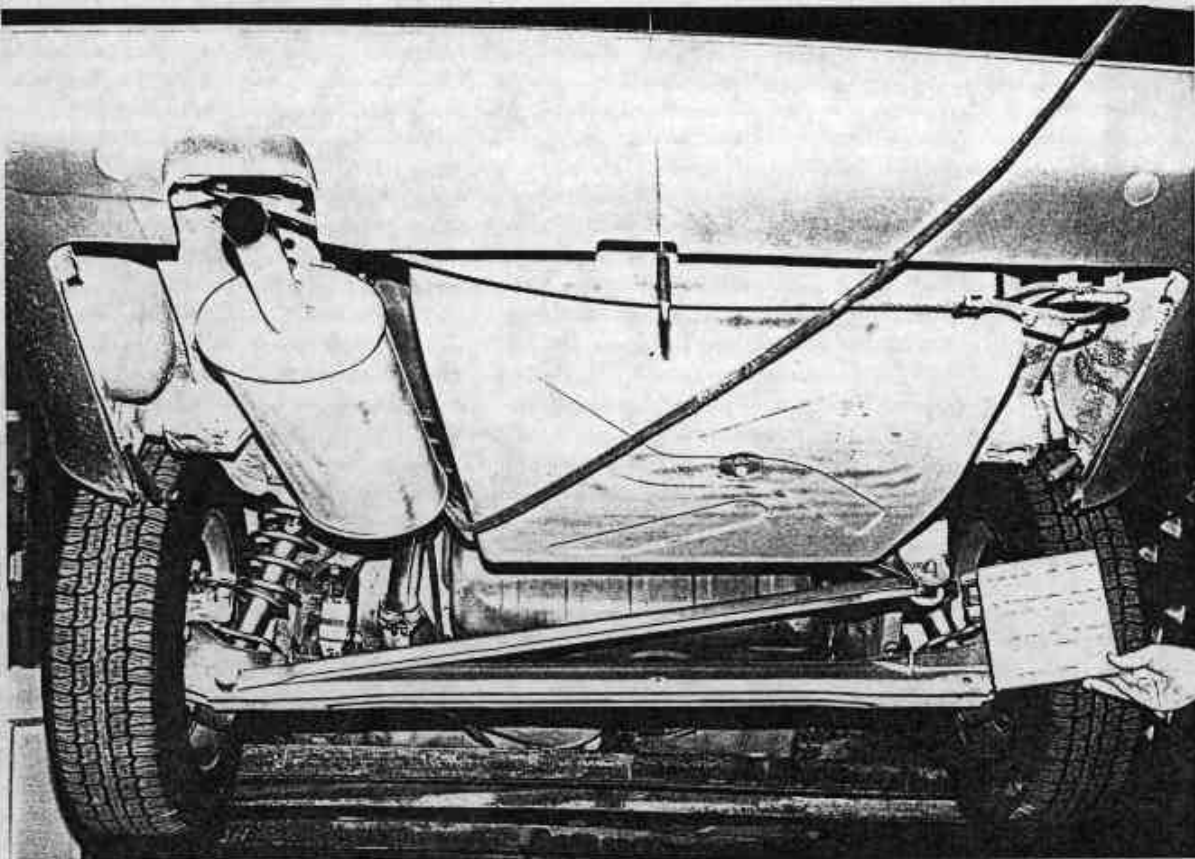


Figure A-23. PRE-TEST REAR UNDERBODY VIEW

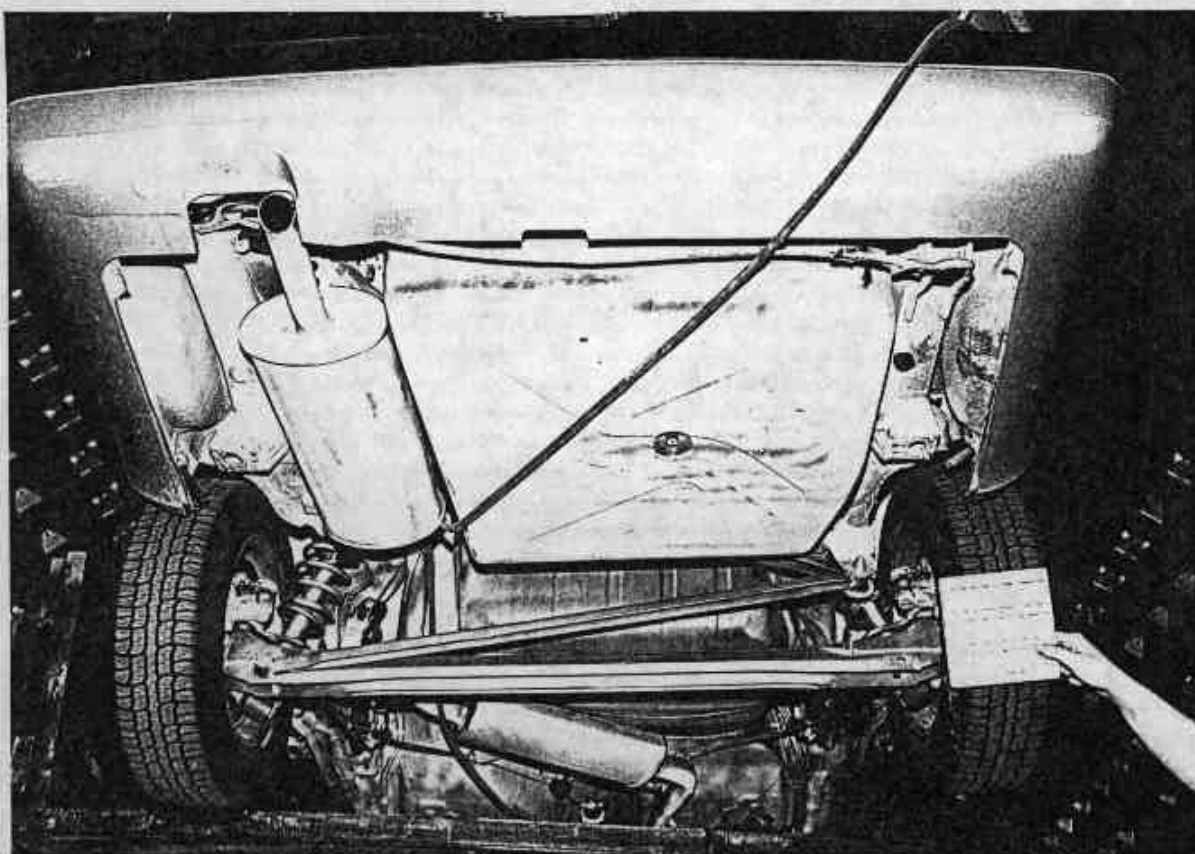


Figure A-24. POST-TEST REAR UNDERBODY VIEW



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



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



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



Figure A-28. POST-TEST PASSENGER DUMMY POSITION VIEW

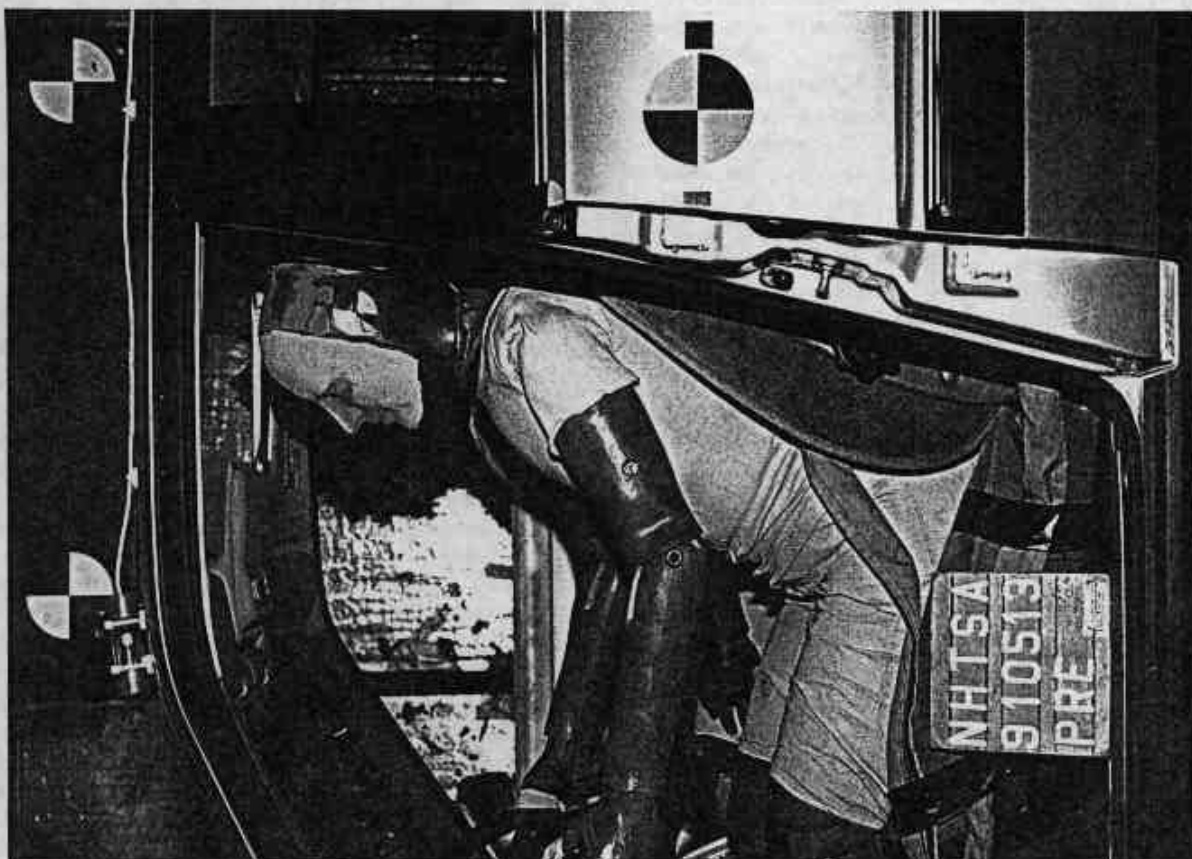


Figure A-29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

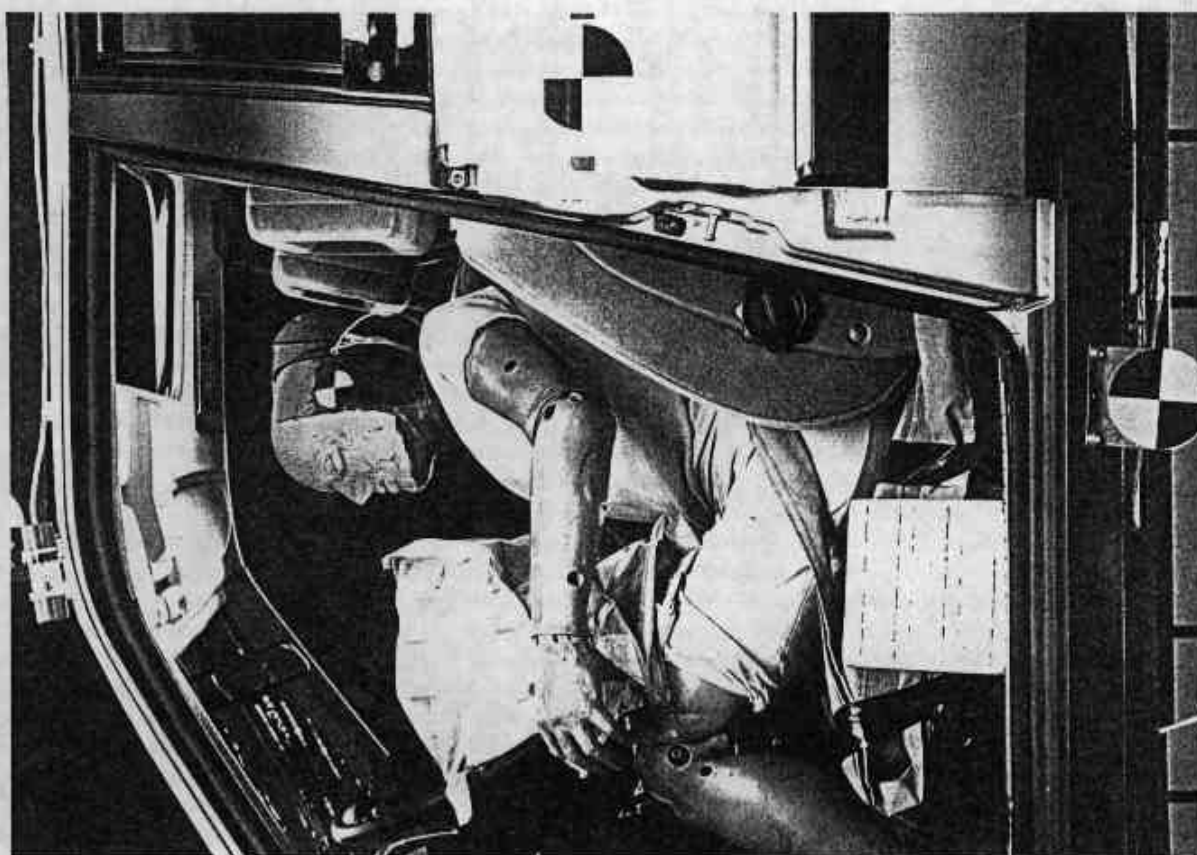


Figure A-30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1



Figure A-31. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-32. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

A-17

910513

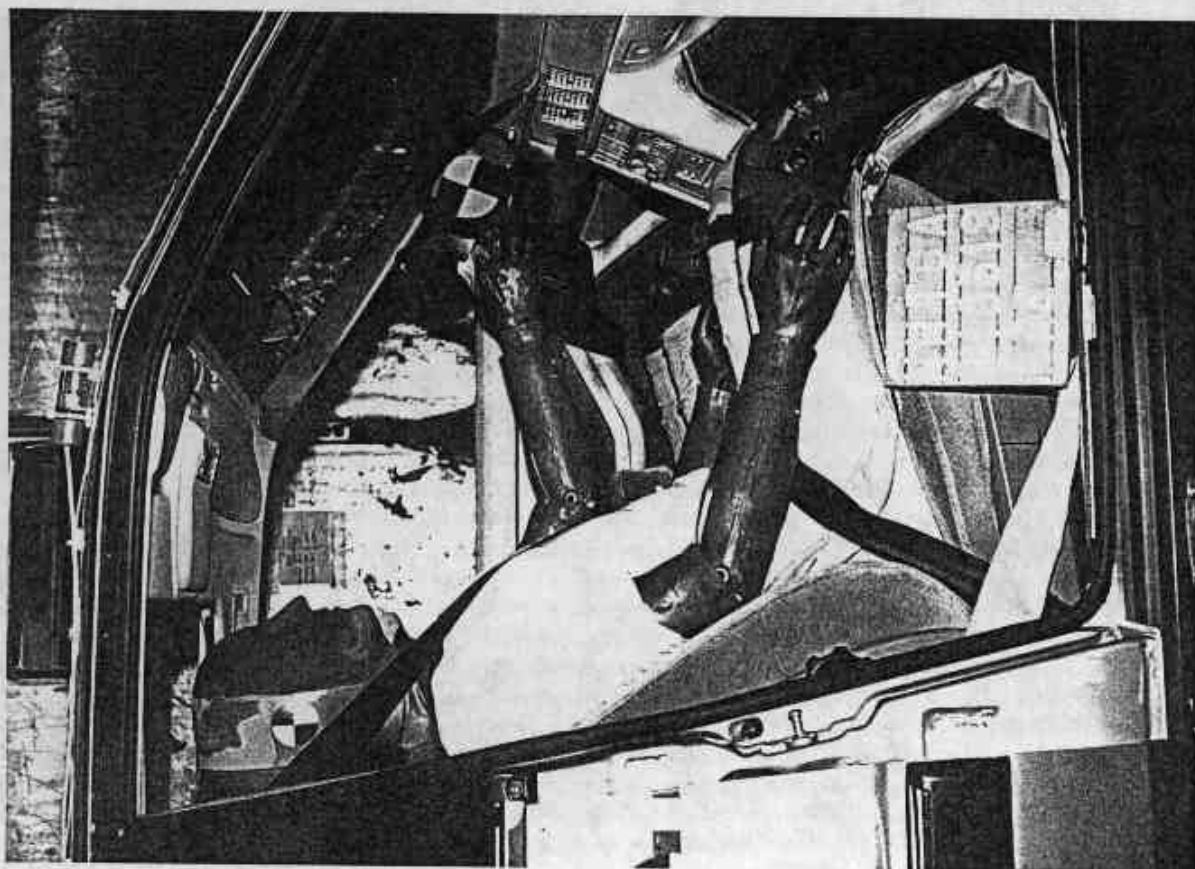


Figure A-33. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

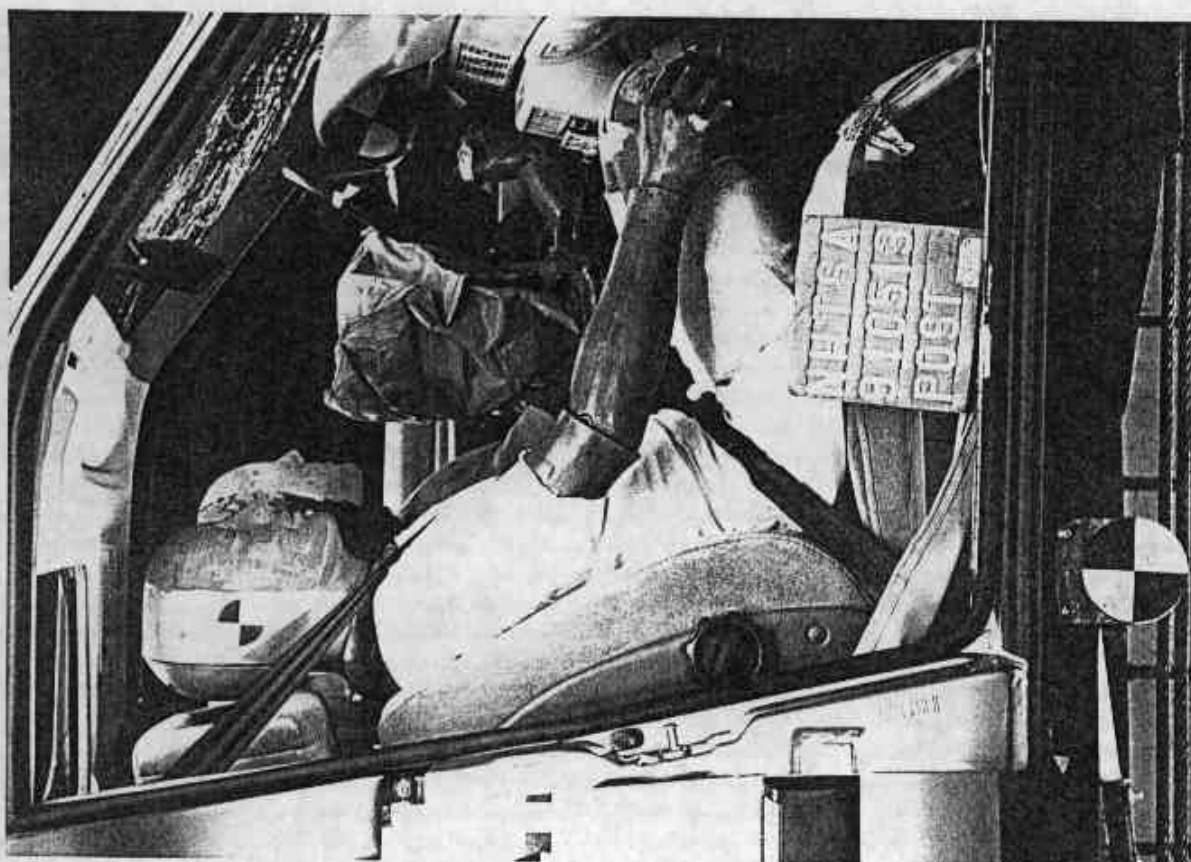


Figure A-34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
A-13 310513



Figure A-35. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-36. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

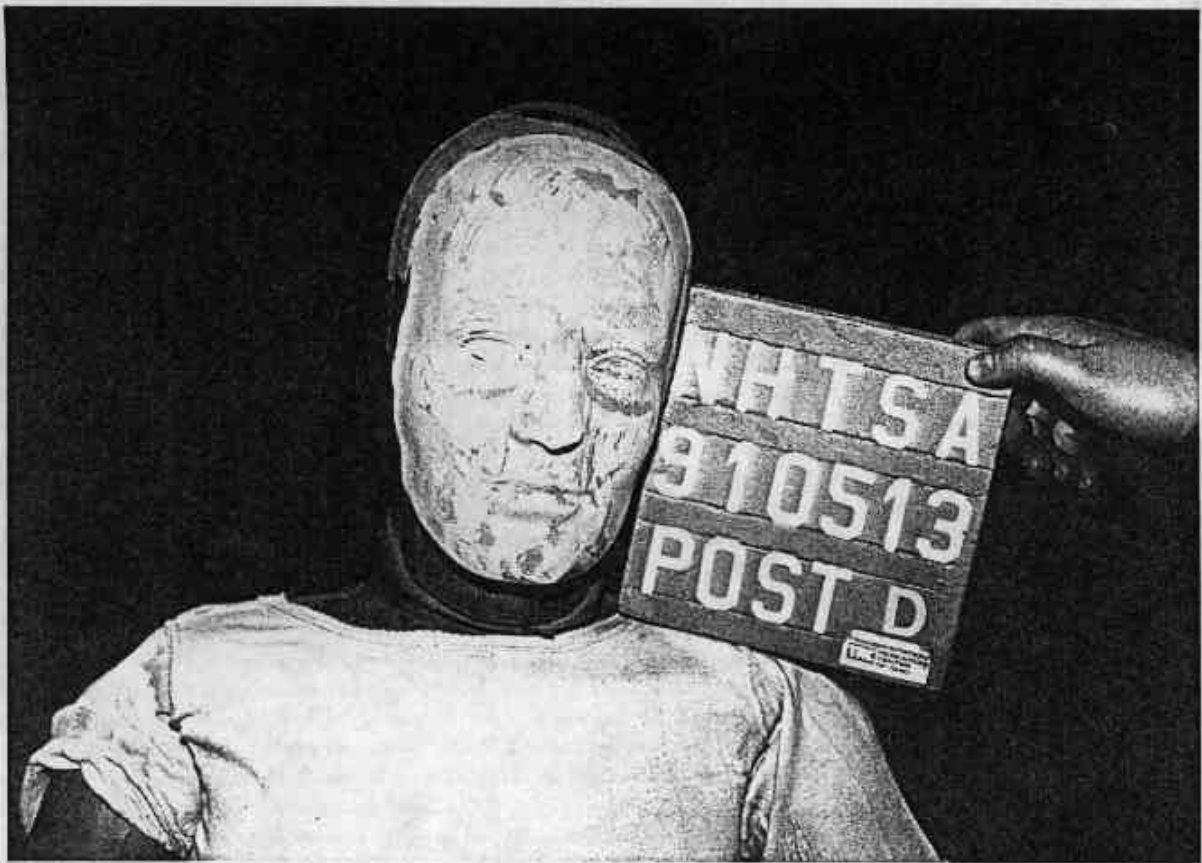


Figure A-37. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1



Figure A-38. POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

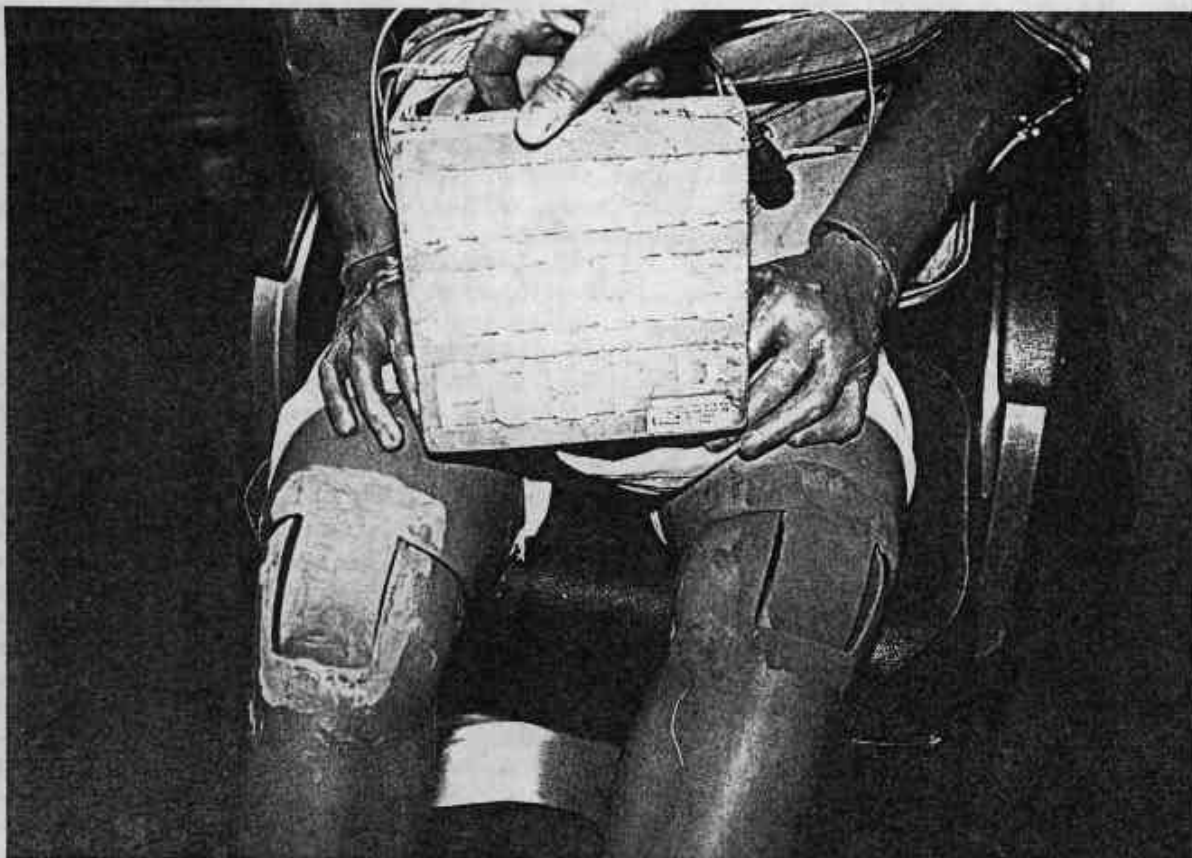


Figure A-39. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

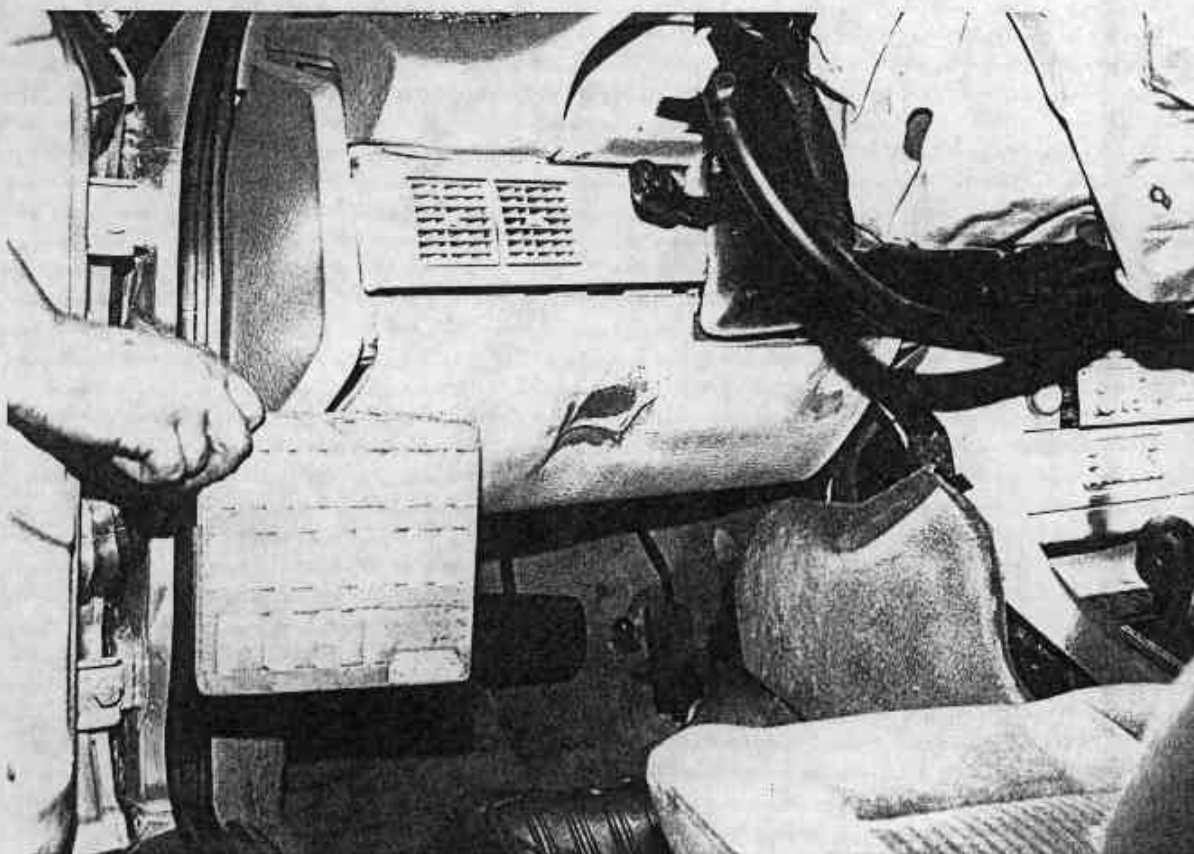


Figure A-40. POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2



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



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

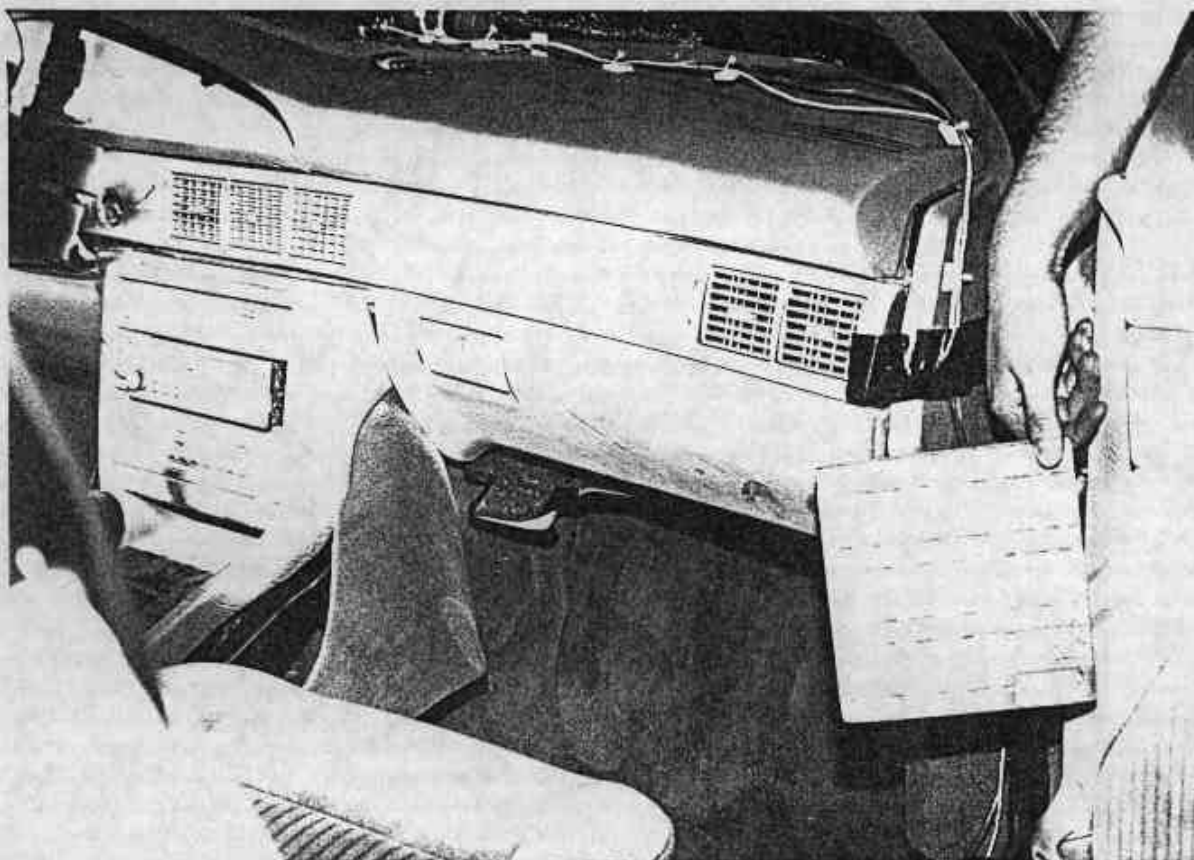


Figure A-43. POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

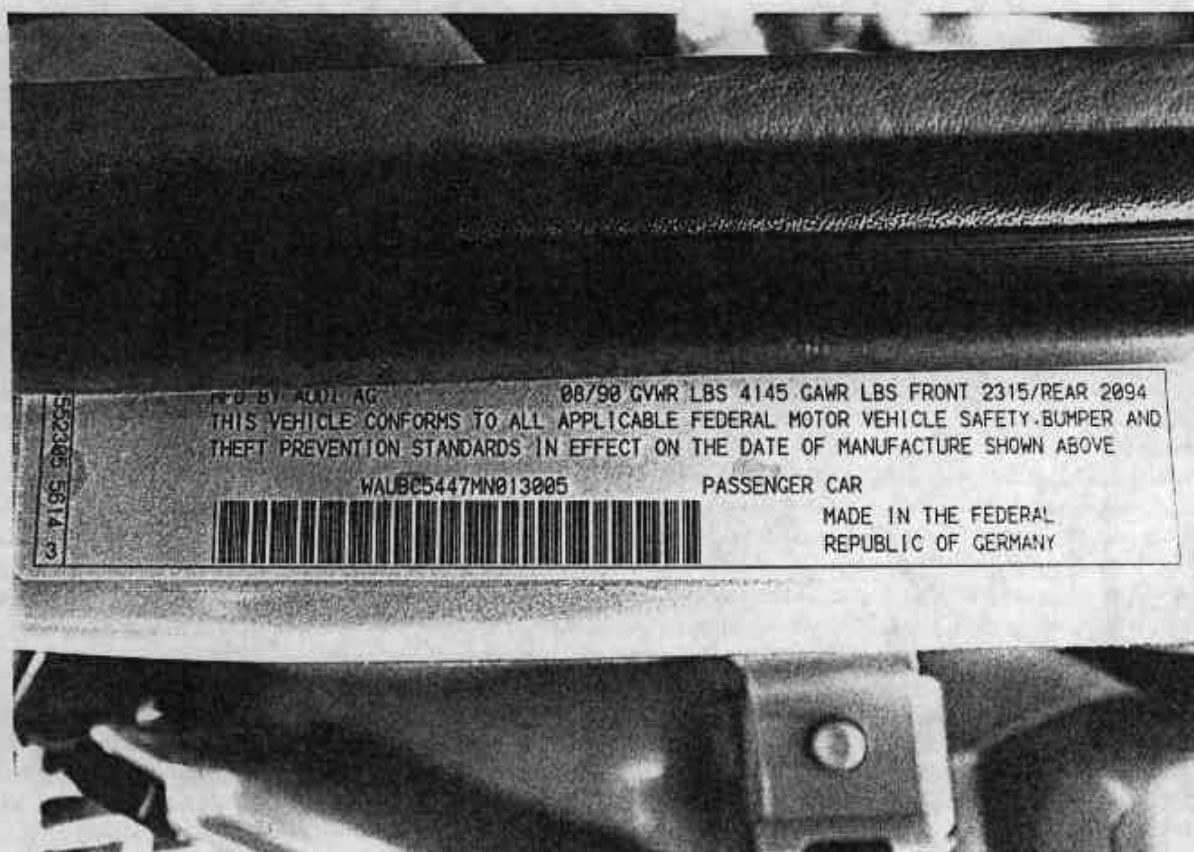


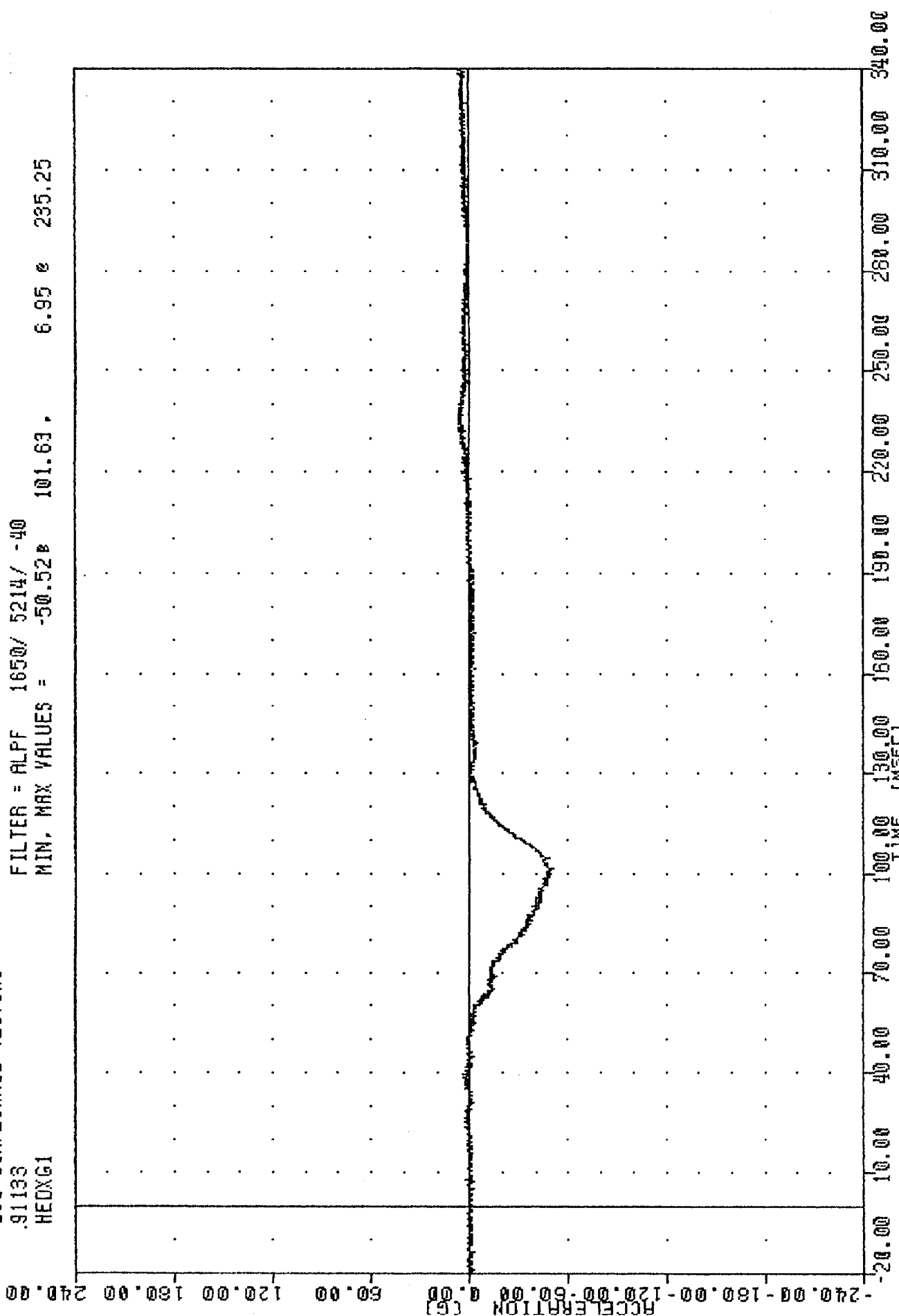
Figure A-44. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

APPENDIX B

DATA PLOTS

TRC , 910513
 200 COMPLIANCE TESTING
 91133
 HEDXG1

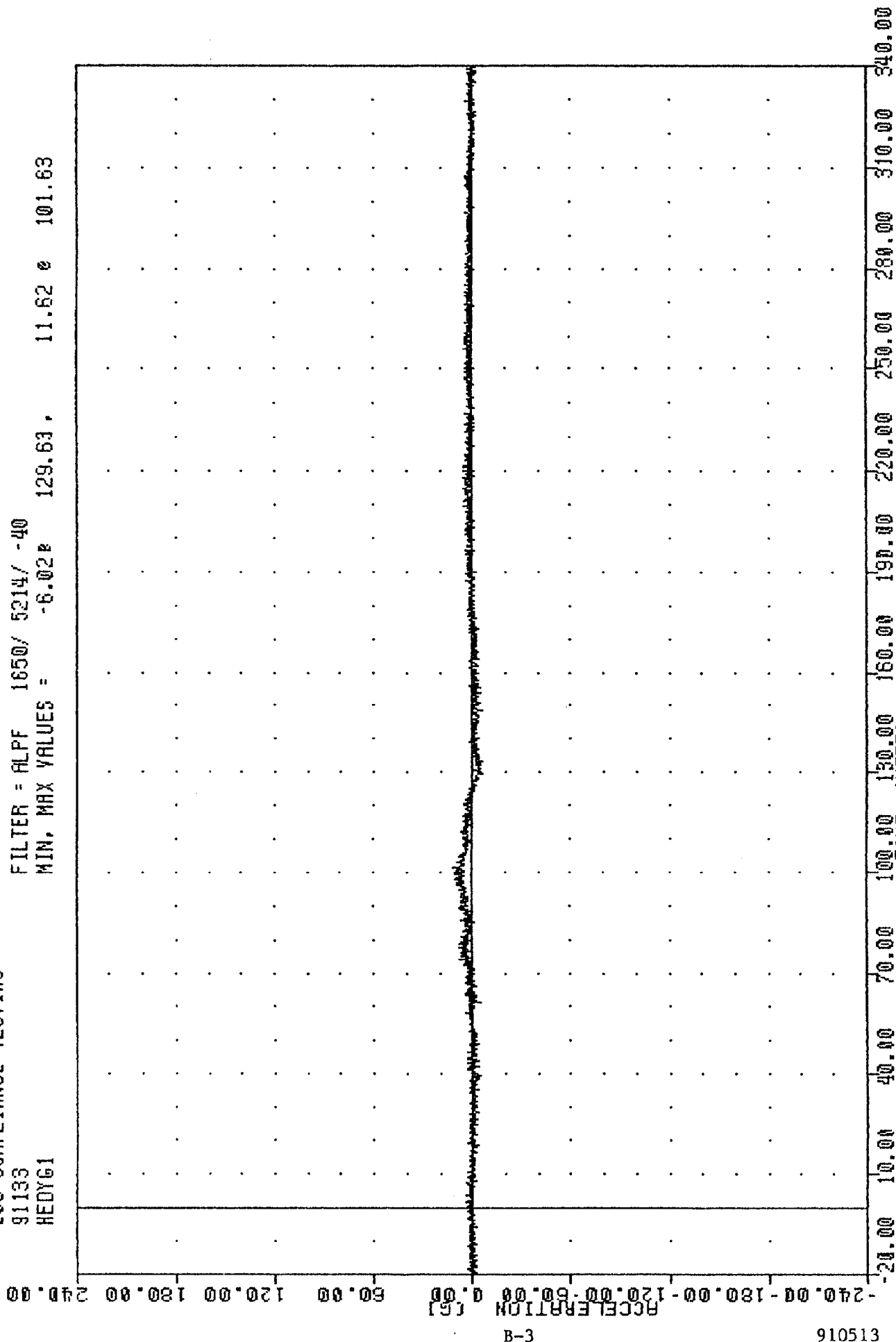
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -50.52 101.63 6.95 235.25



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 DRIVER HEAD X-AXIS ACCELERATION

TRC , 910513
 200 COMPLIANCE TESTING
 91133
 HEDYG1

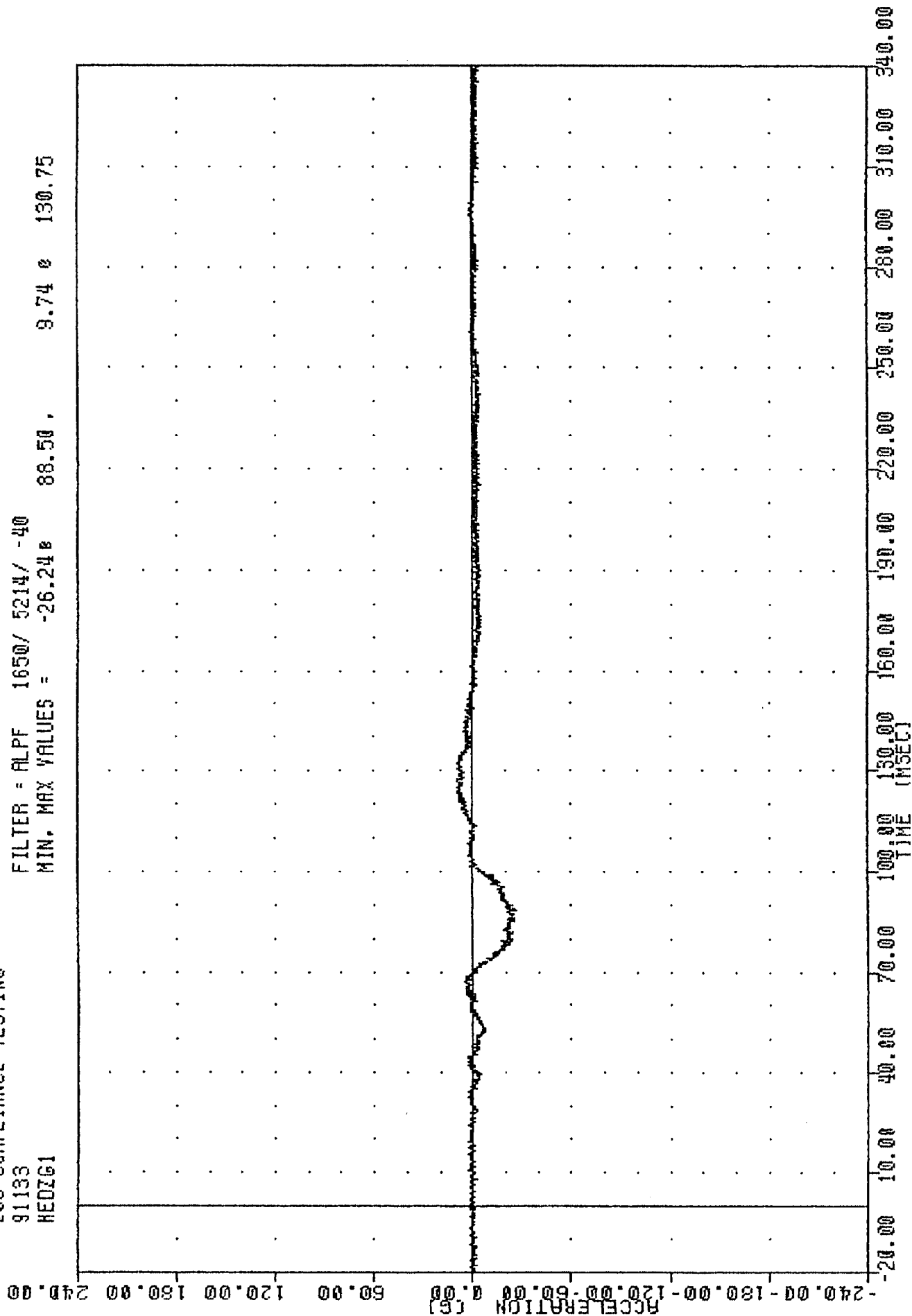
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -6.028 129.63, 11.62 101.63



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION

TRC
208 COMPLIANCE TESTING
91133
HEDZG1

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -26.24 88.50 9.74 130.75



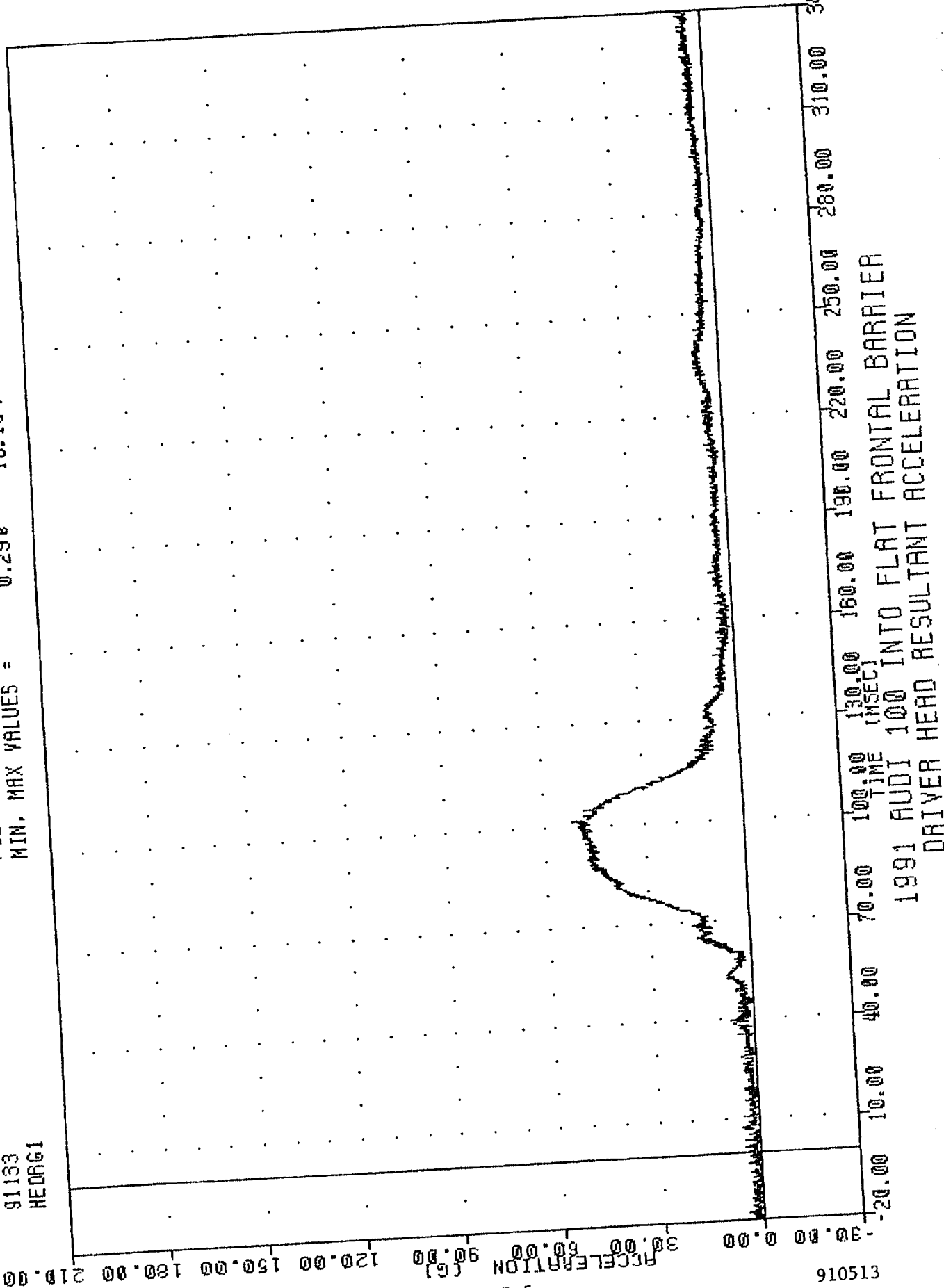
TRC , 910513
208 COMPLIANCE TESTING
91133
HEADG1

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.29% 16.13, 51.86% 101.63

ACCELERATION (G)

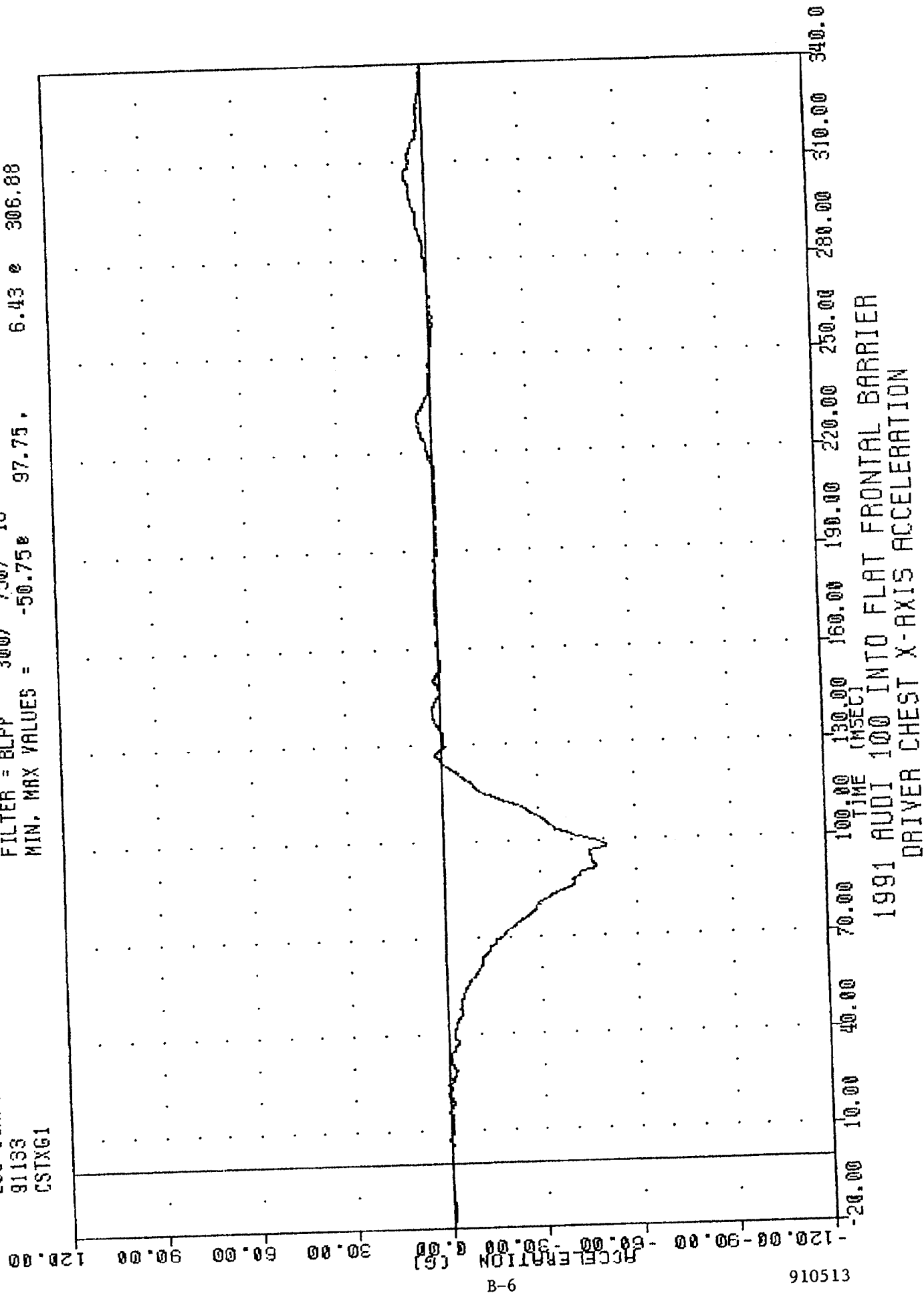
B-5

910513



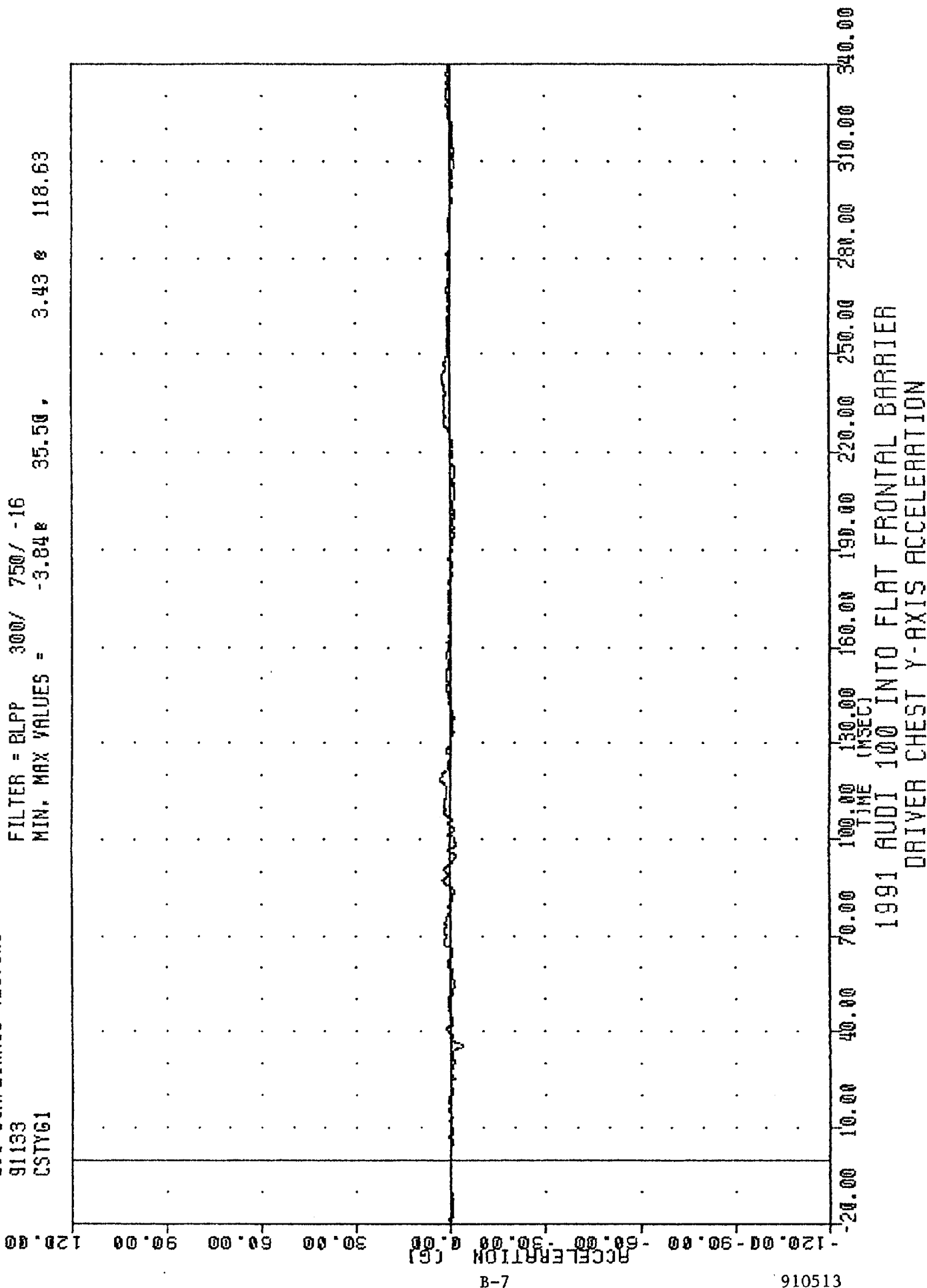
TRC , 910513
 200 COMPLIANCE TESTING
 91133
 CSTXG1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -50.75e 97.75, 6.43 e 306.88



TRC , 910513
 208 COMPLIANCE TESTING
 91133
 CSTY61

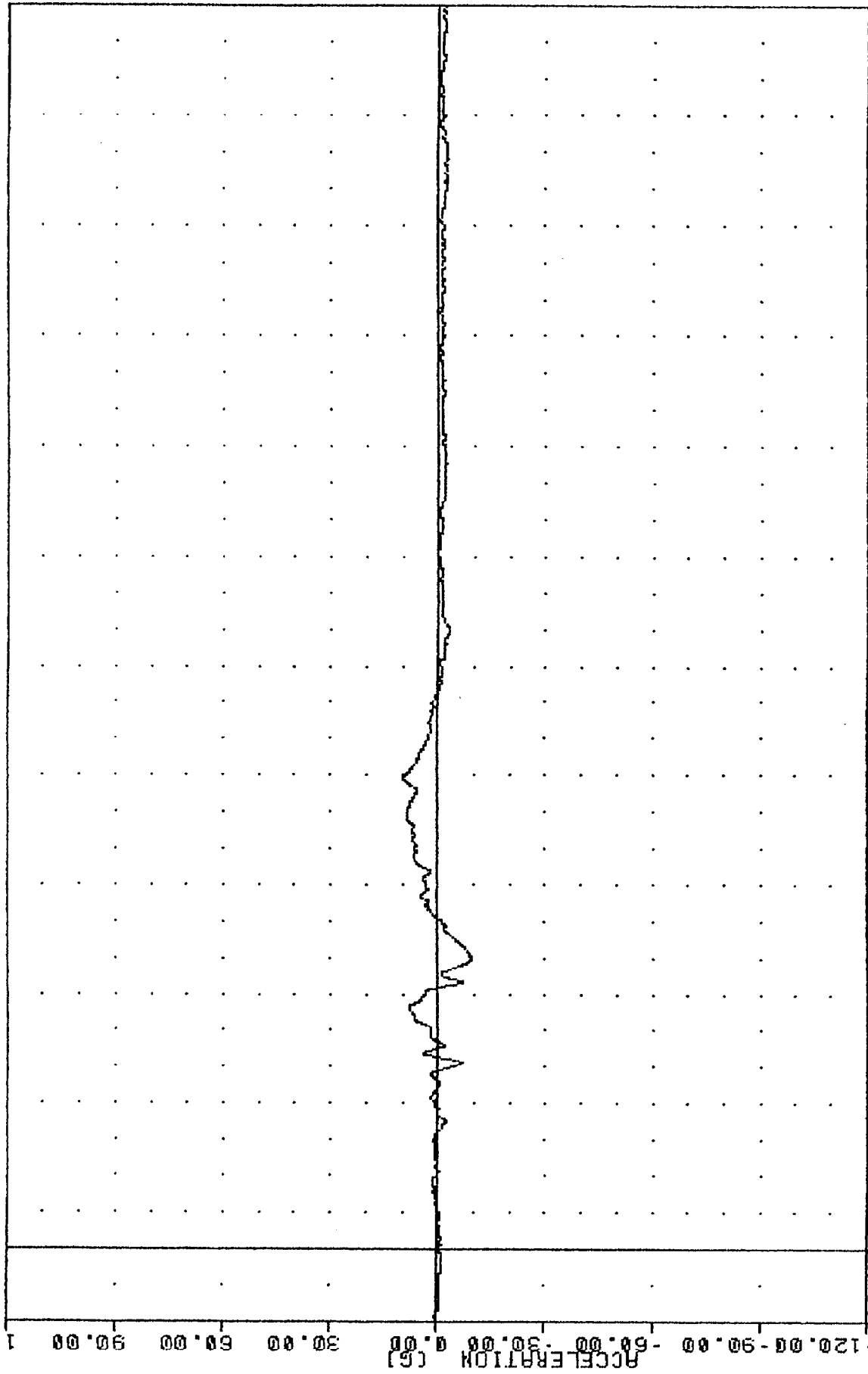
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -3.84 35.50 3.43 118.63



TRC 910513
200 COMPLIANCE TESTING
91133
CSTZG1

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -9.44e 79.88, 9.75 e 129.00

120.00



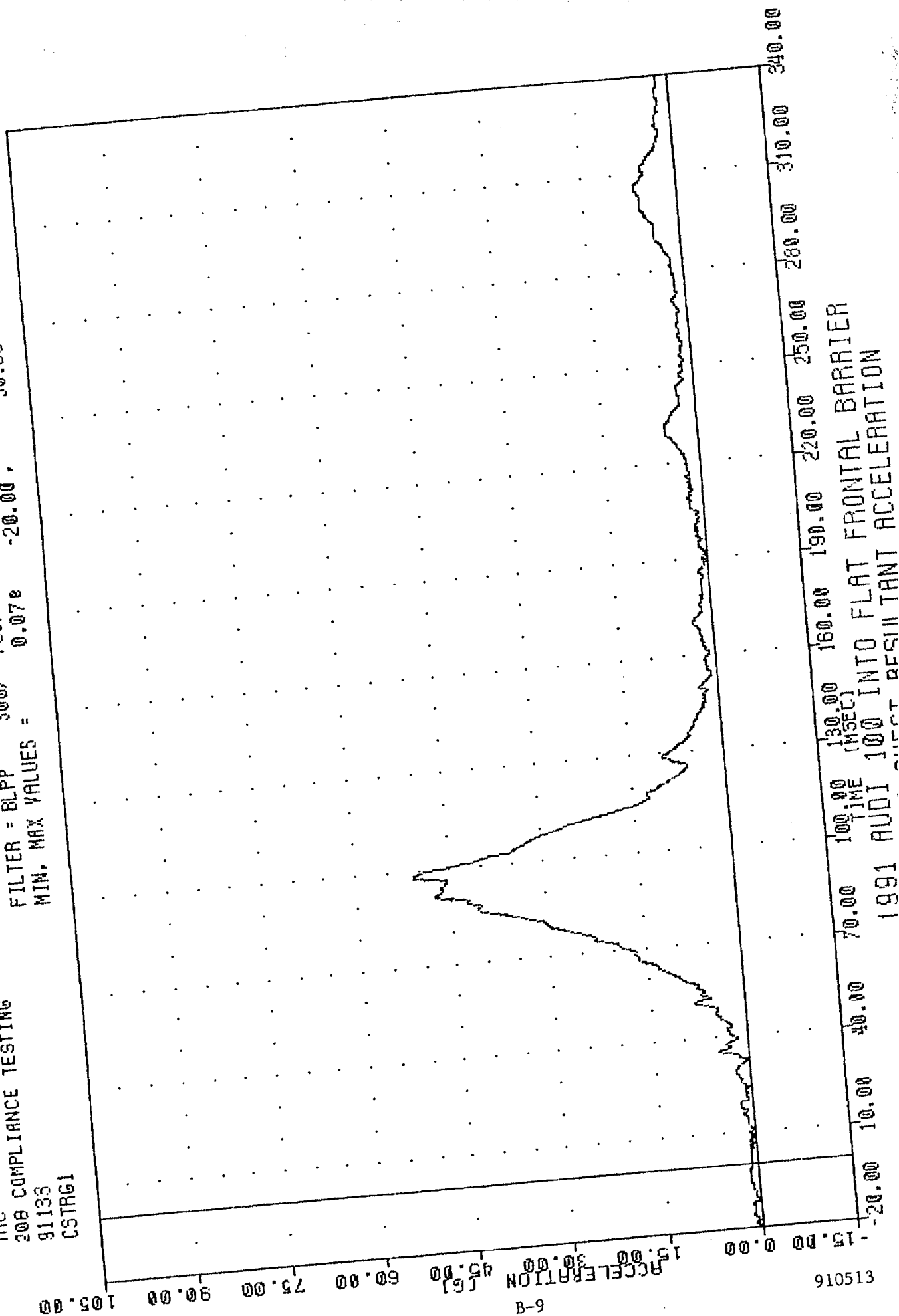
B-8

910513

1991 AUDI 100 INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION

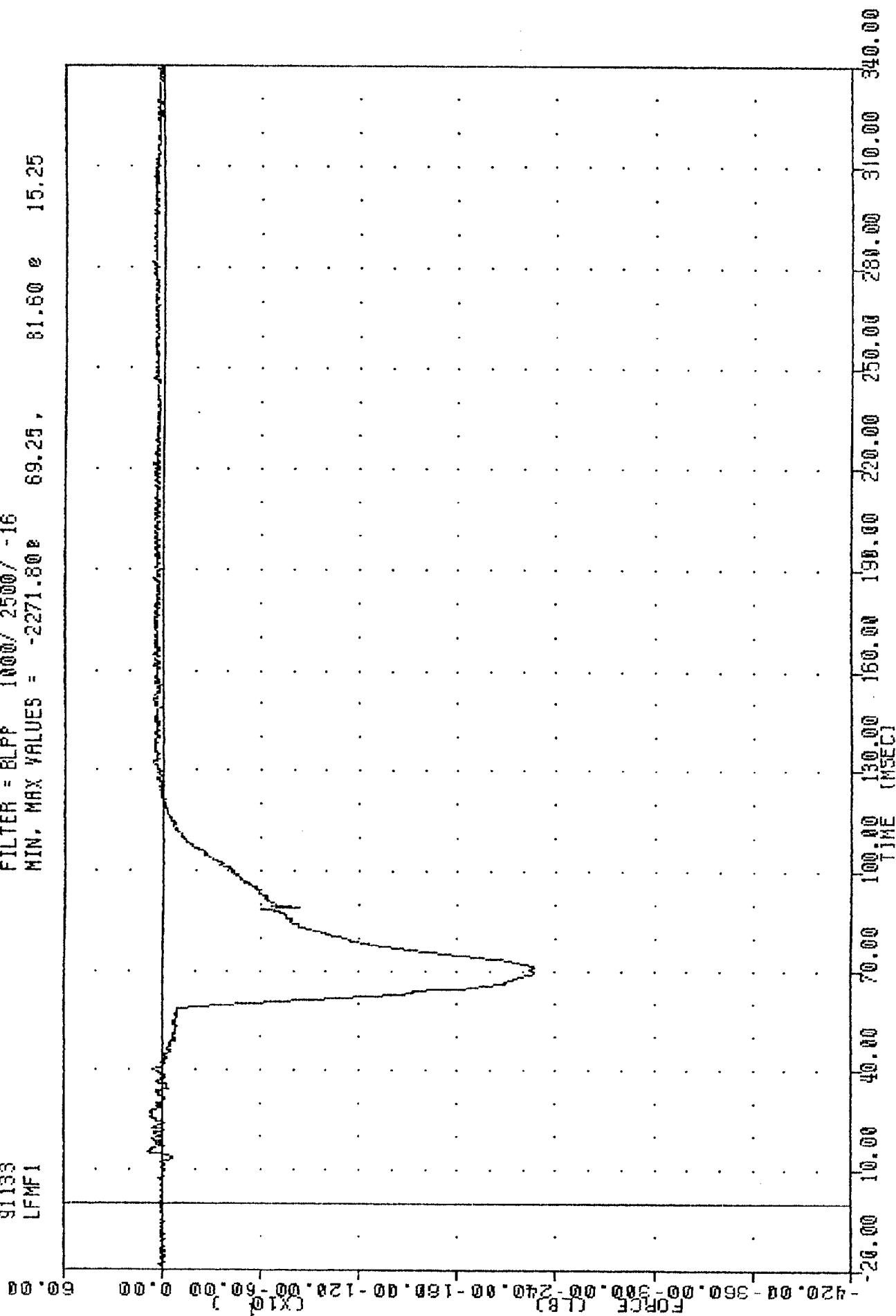
TRC 910513
 208 COMPLIANCE TESTING
 91133
 CSTRG1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.07e -20.00e 50.89e 97.75



TRC 910513
 208 COMPLIANCE TESTING
 91133
 LFMF1

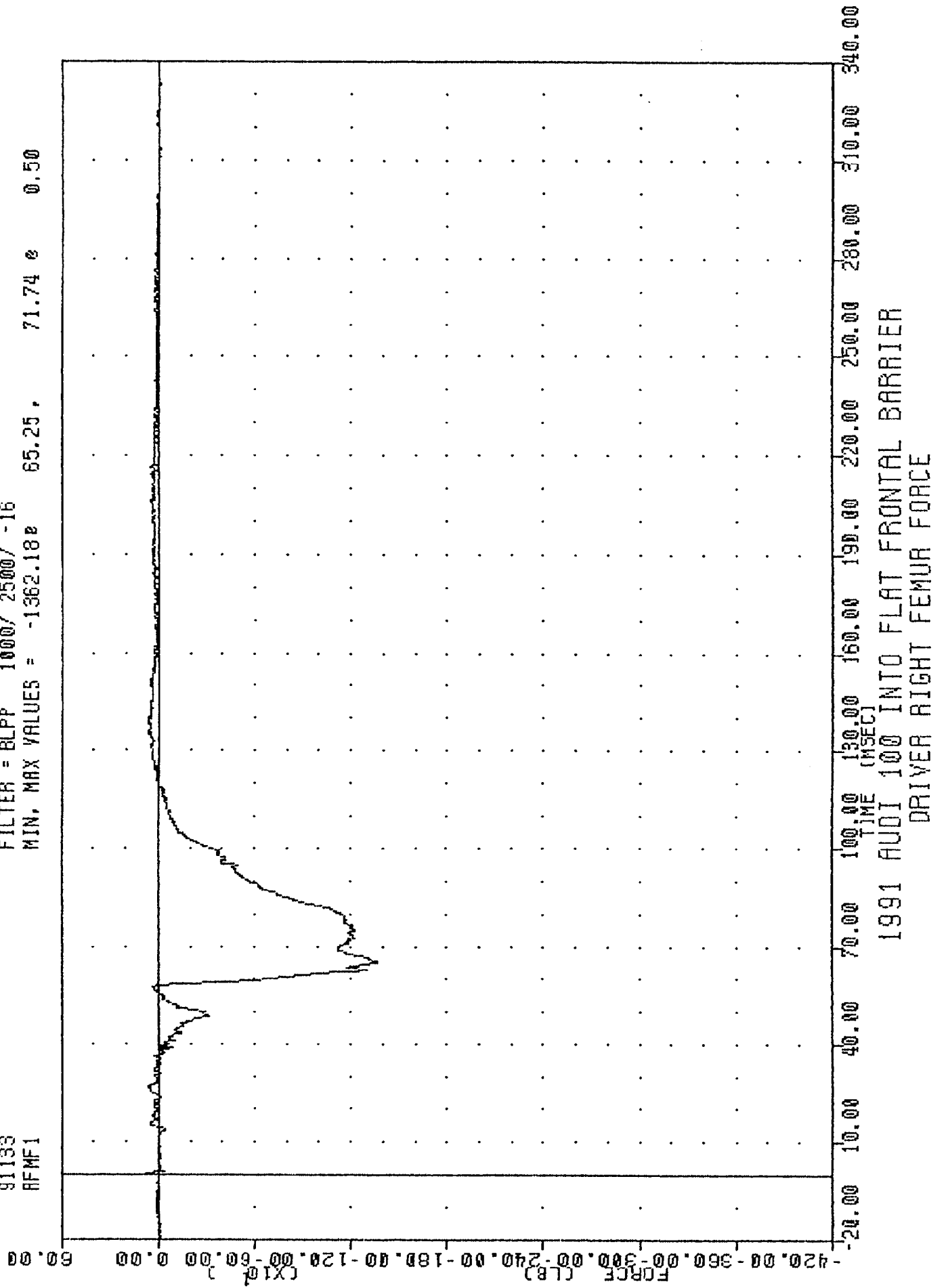
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -2271.800 69.25, 81.60 0 15.25



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 DRIVER LEFT FEMUR FORCE

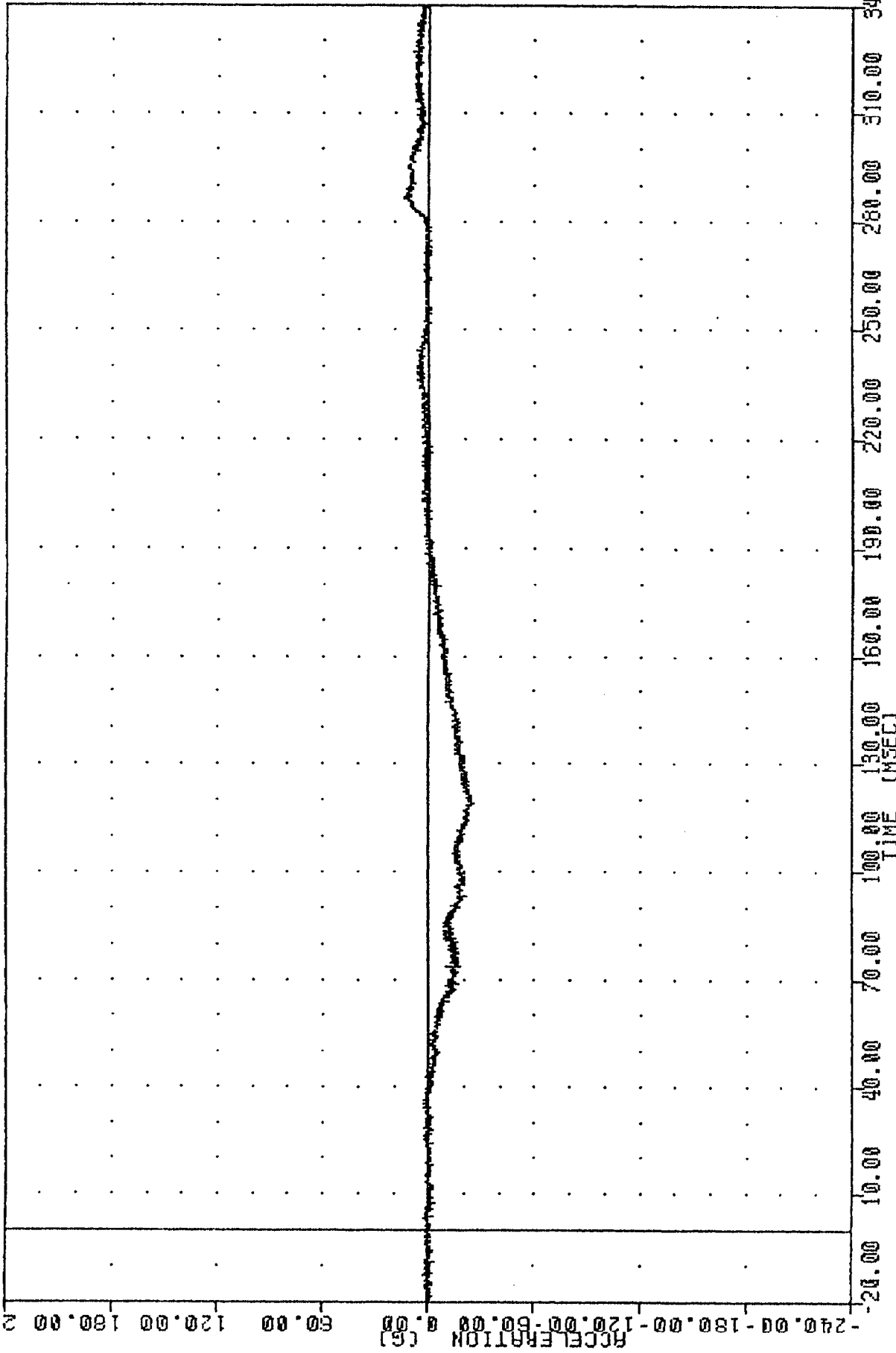
TRC
 200 COMPLIANCE TESTING
 91133
 RFMF1

FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1362.18e 65.25, 71.74 e 0.50



TRC
 200 COMPLIANCE TESTING
 91133
 HEDXG2

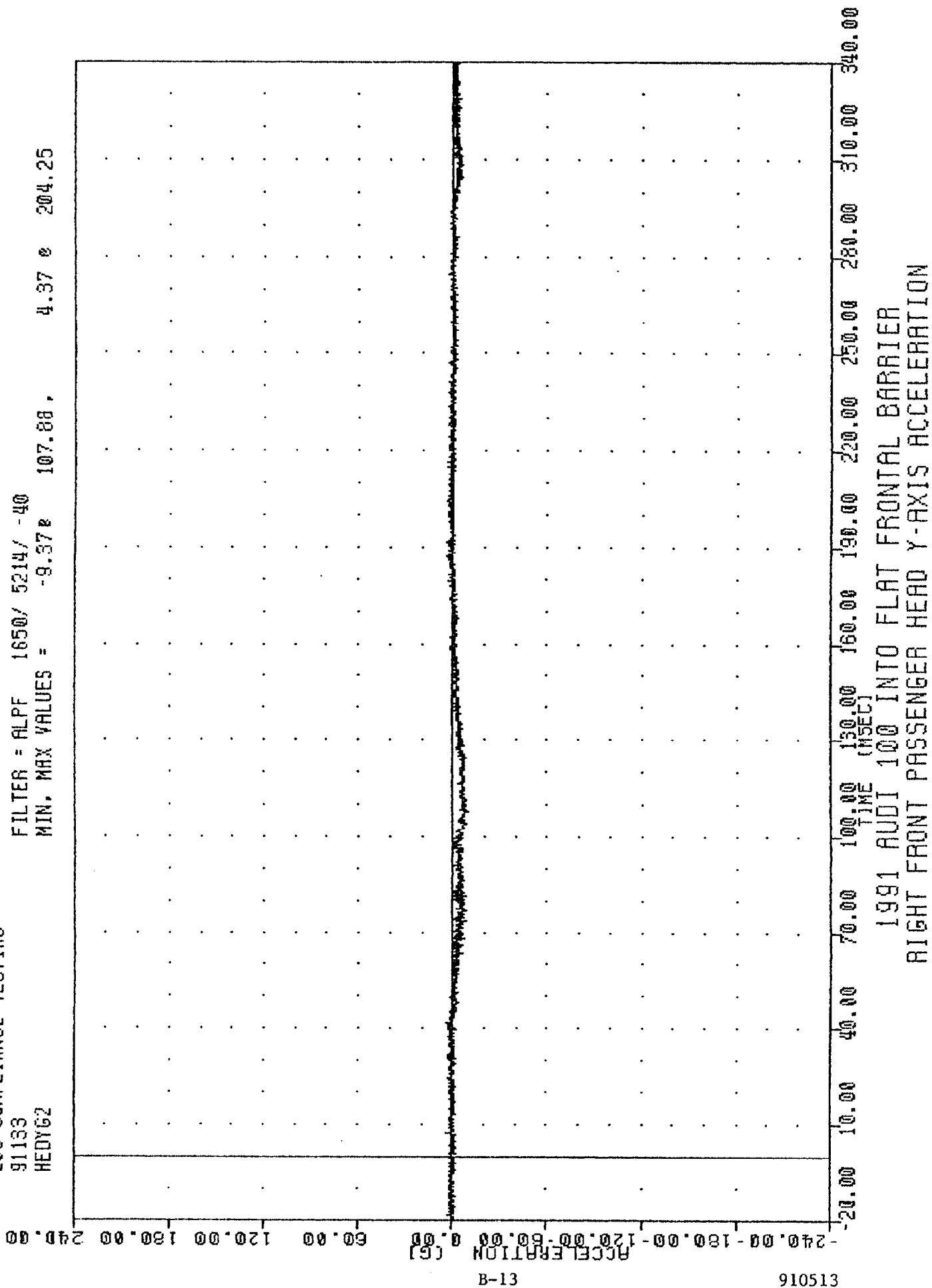
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -25.14e 118.75, 14.40 e 286.25



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

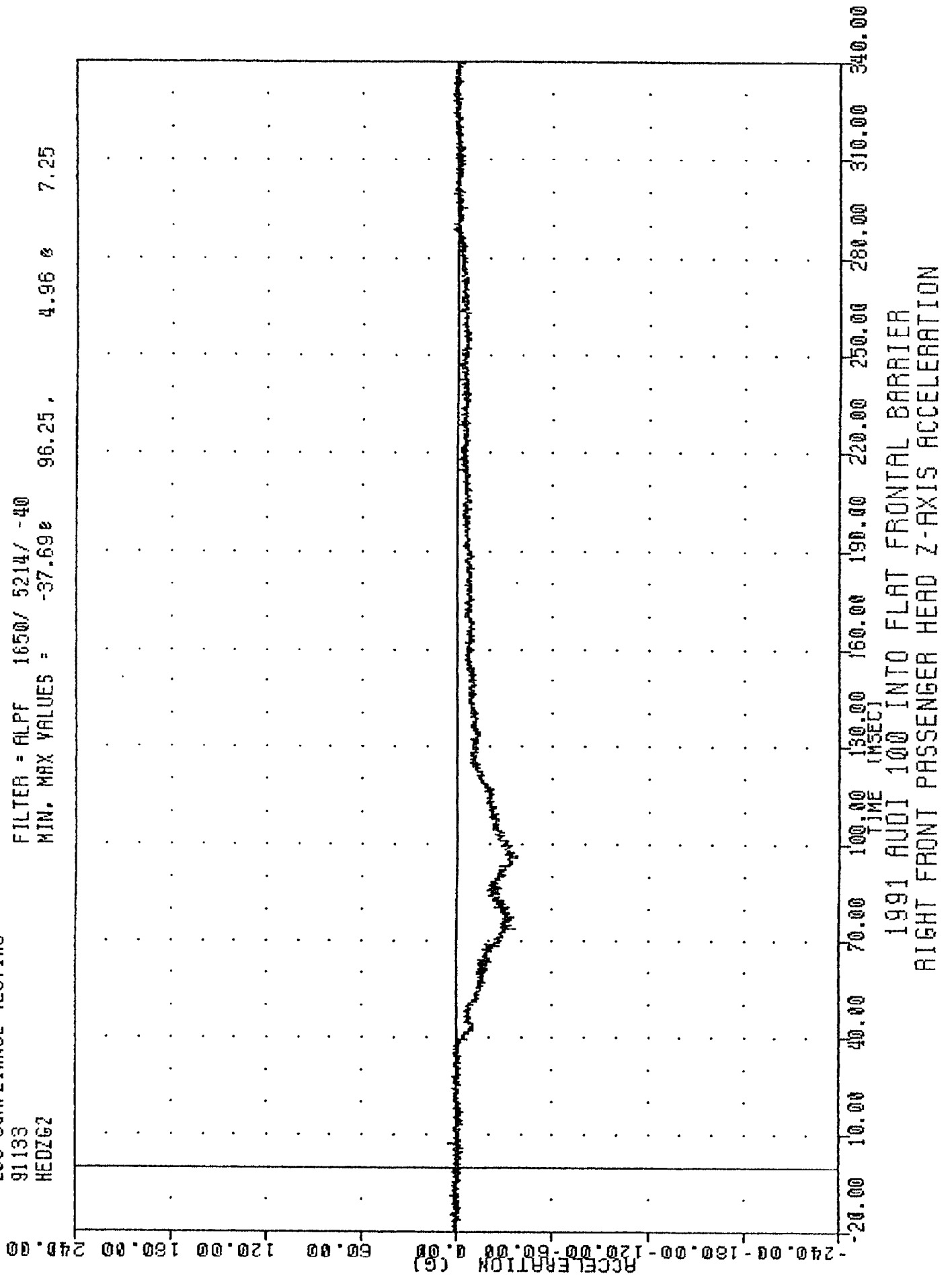
TRC 910513
 208 COMPLIANCE TESTING
 91133
 HEDYG2

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -9.37E 107.88 , 4.37 E 204.25



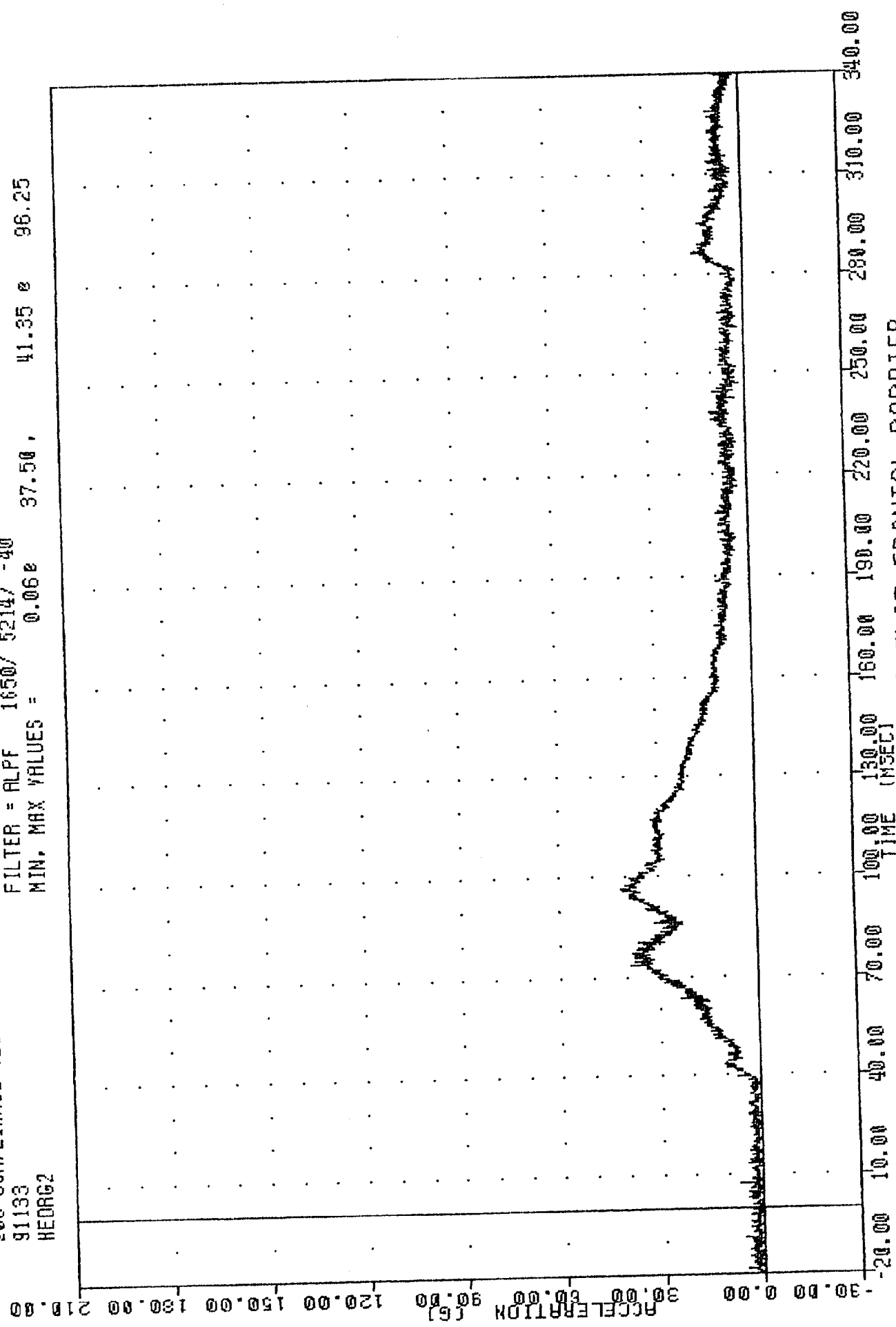
TRC 910513
200 COMPLIANCE TESTING
91133
HEDZG2

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -37.69e 96.25, 4.96 e 7.25



TRC , 910513
 200 COMPLIANCE TESTING
 91133
 HEADG2

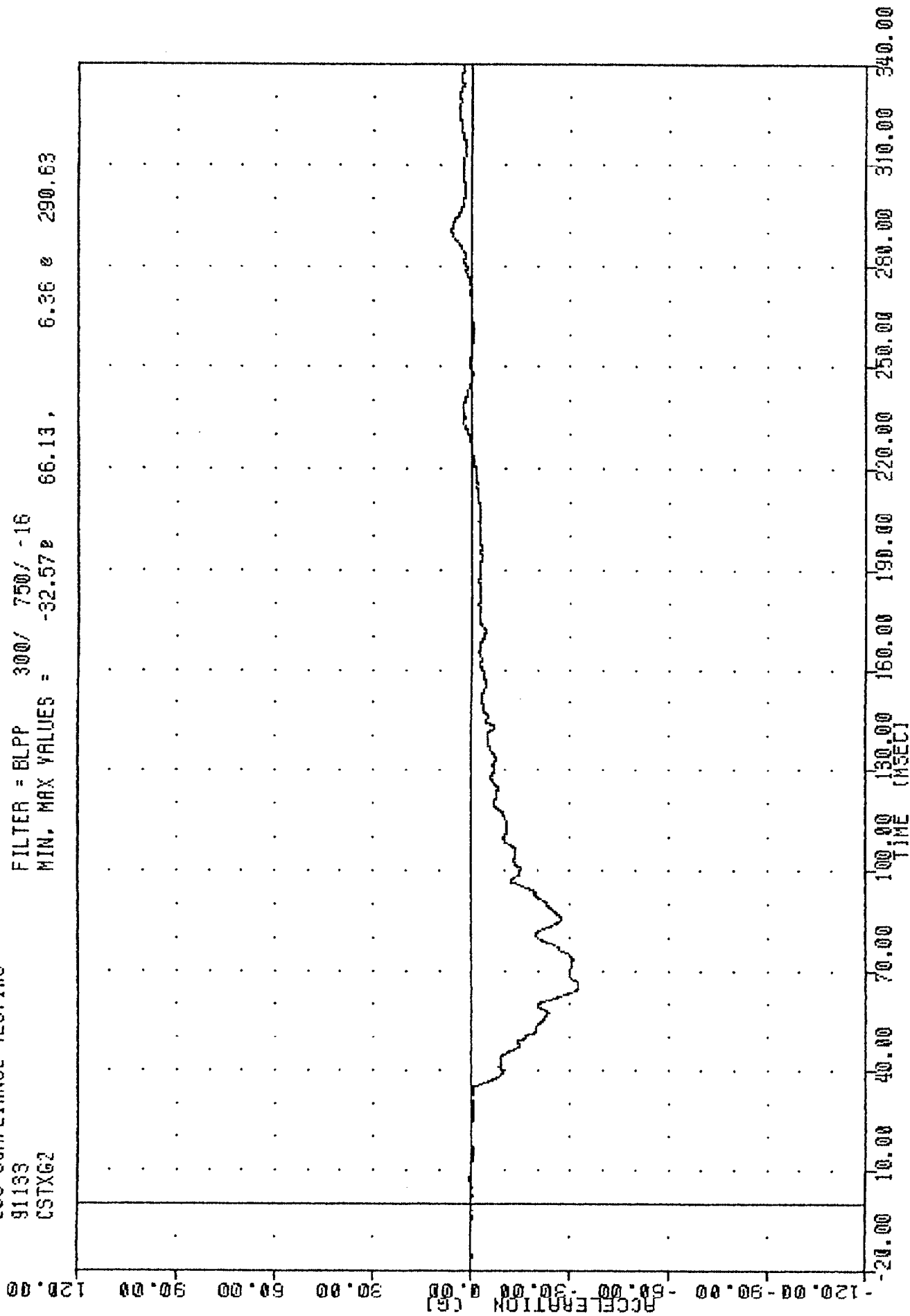
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 0.06e 37.50, 41.35 e 96.25



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

TRC
200 COMPLIANCE TESTING
91133
CSTXG2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -32.57 66.13 6.36 290.63



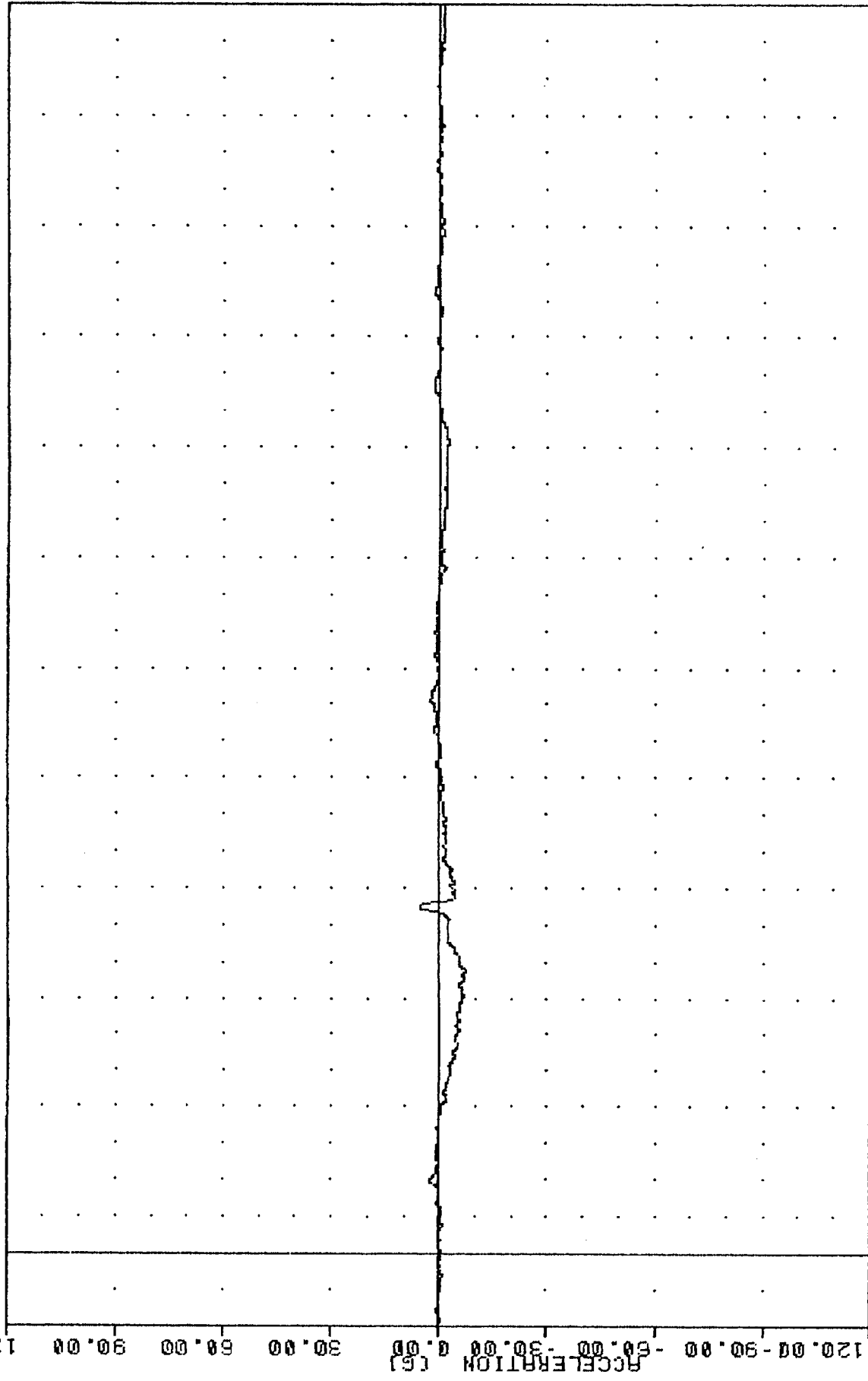
B-16

910513

1991 AUDI 100 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

TRC , 910513
 308 COMPLIANCE TESTING
 91133
 CSTYG2

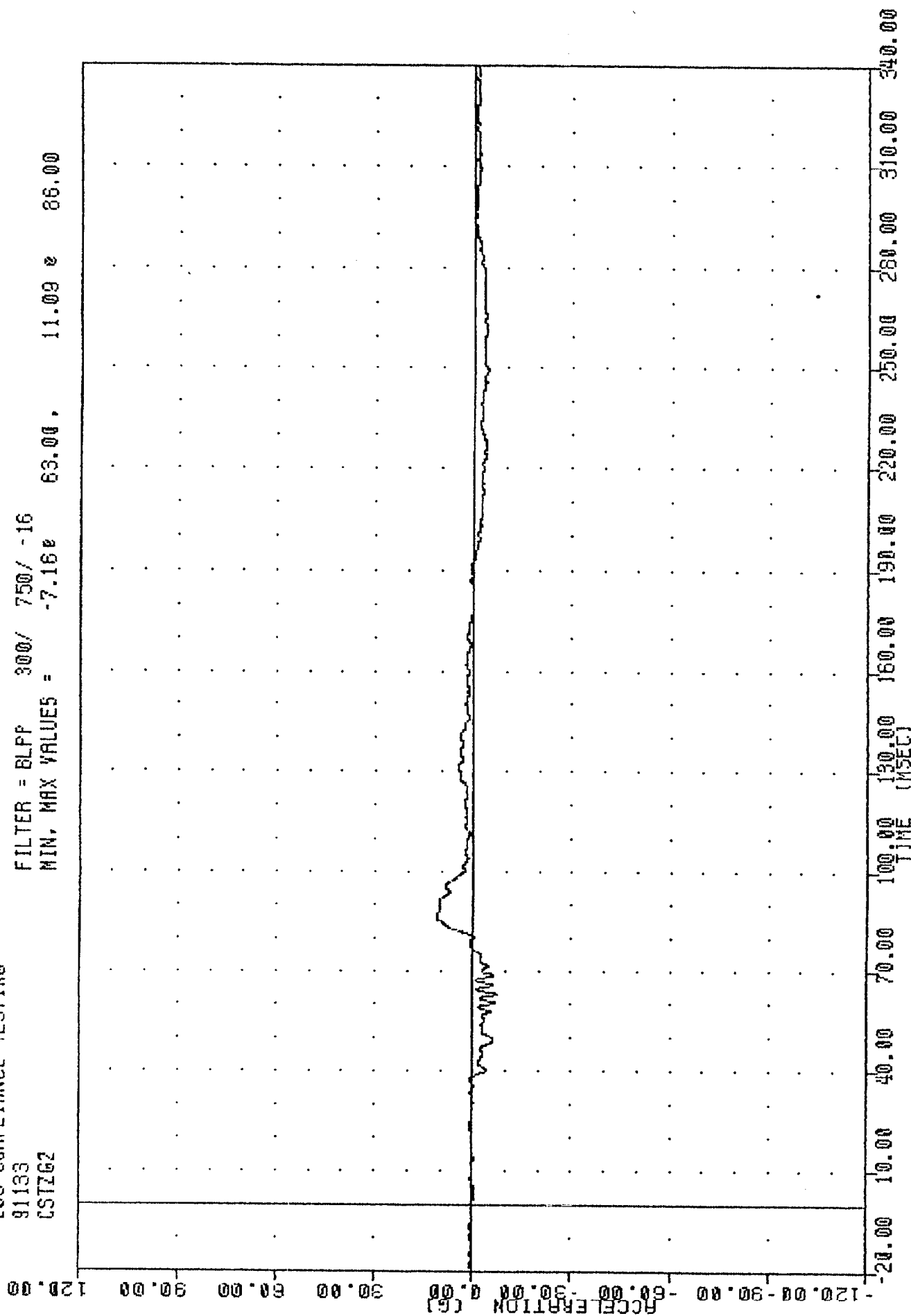
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -7.40e 77.63, 5.46 e 95.00



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

TRC
200 COMPLIANCE TESTING
91133
CSTZG2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -7.16e 63.00, 11.09 e 86.00



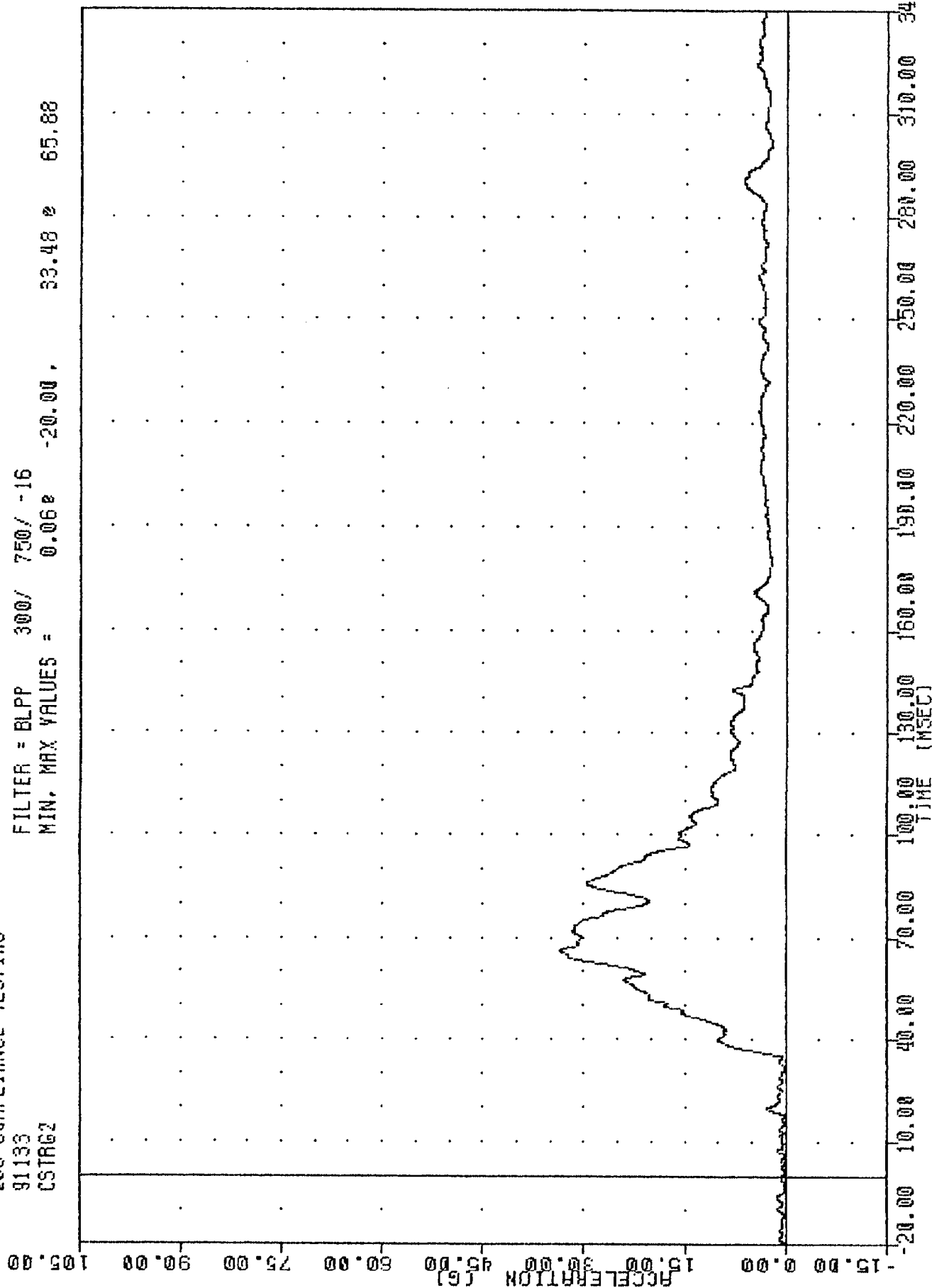
B-18

910513

1991 AUDI 100 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TRC , 910513
 200 COMPLIANCE TESTING
 91133
 CSTR62

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.06e -20.00 , 33.48 e 65.88

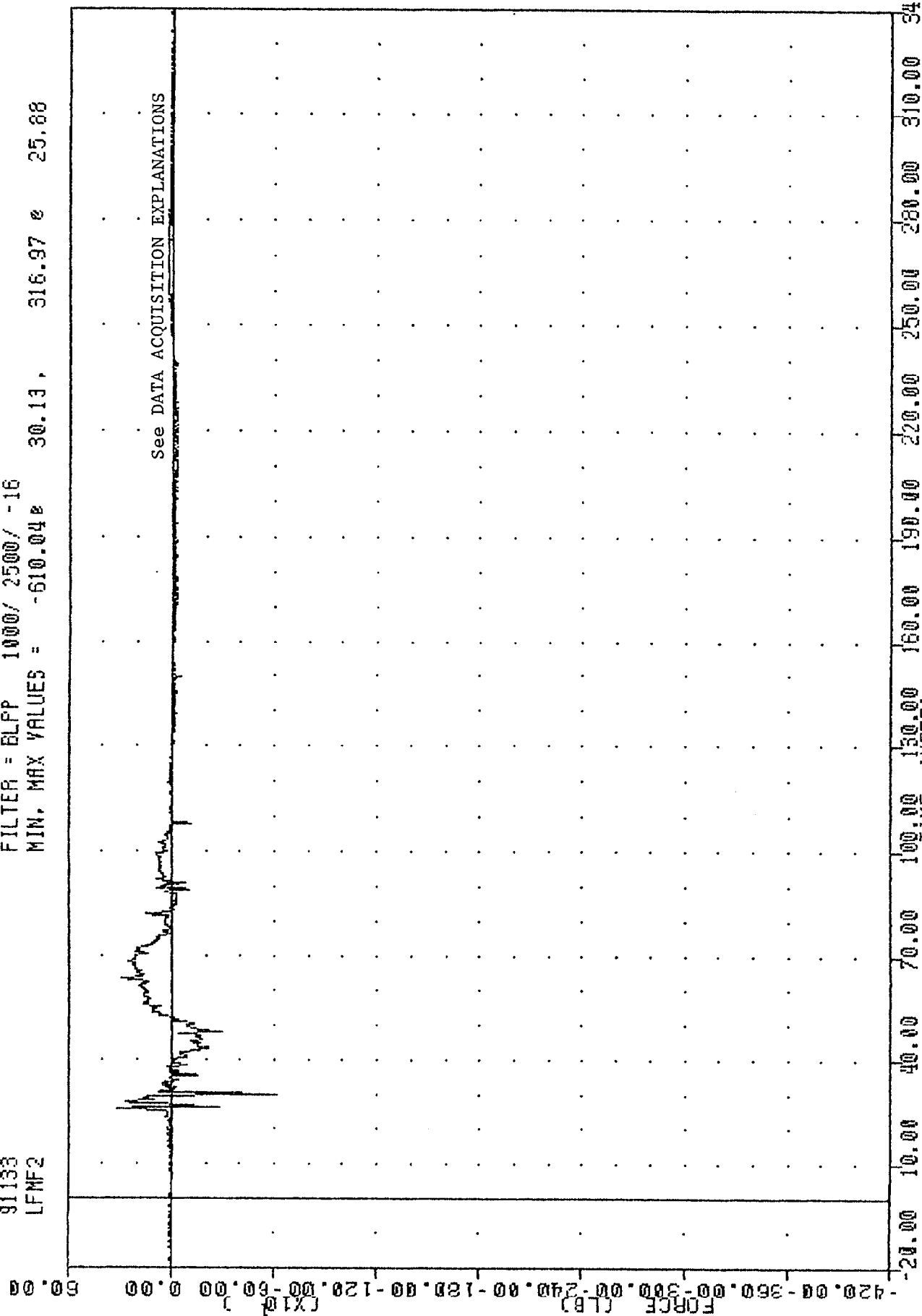


1991 AUDI 100 INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

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FILTER = BLPP  1000/ 2500/ -16
MIN, MAX VALUES = -610.04 & 30.13, 316.97 & 25.68

```

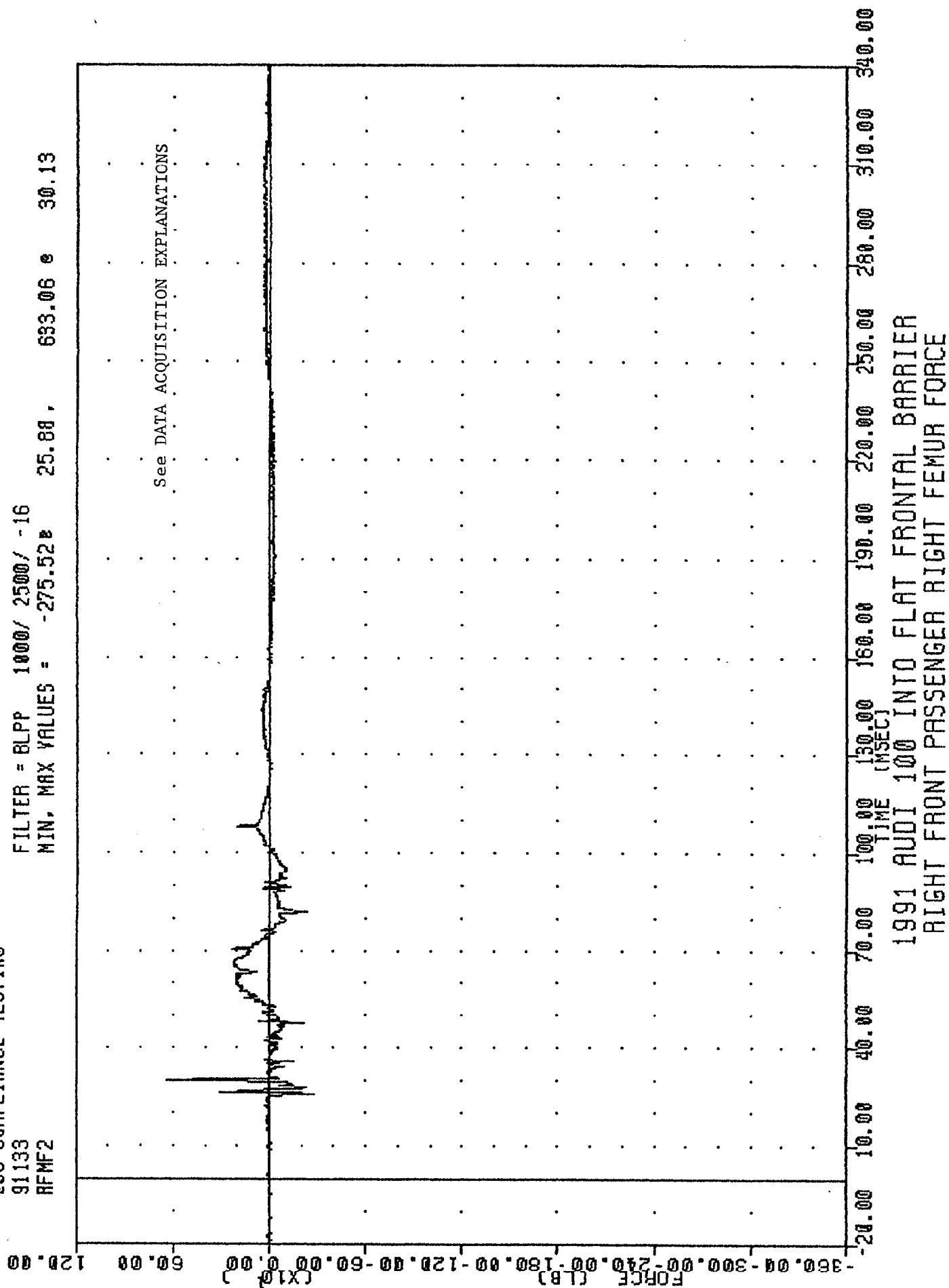


1991 AUDI 100 INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TRC
208 COMPLIANCE TESTING
91133
RFMF2

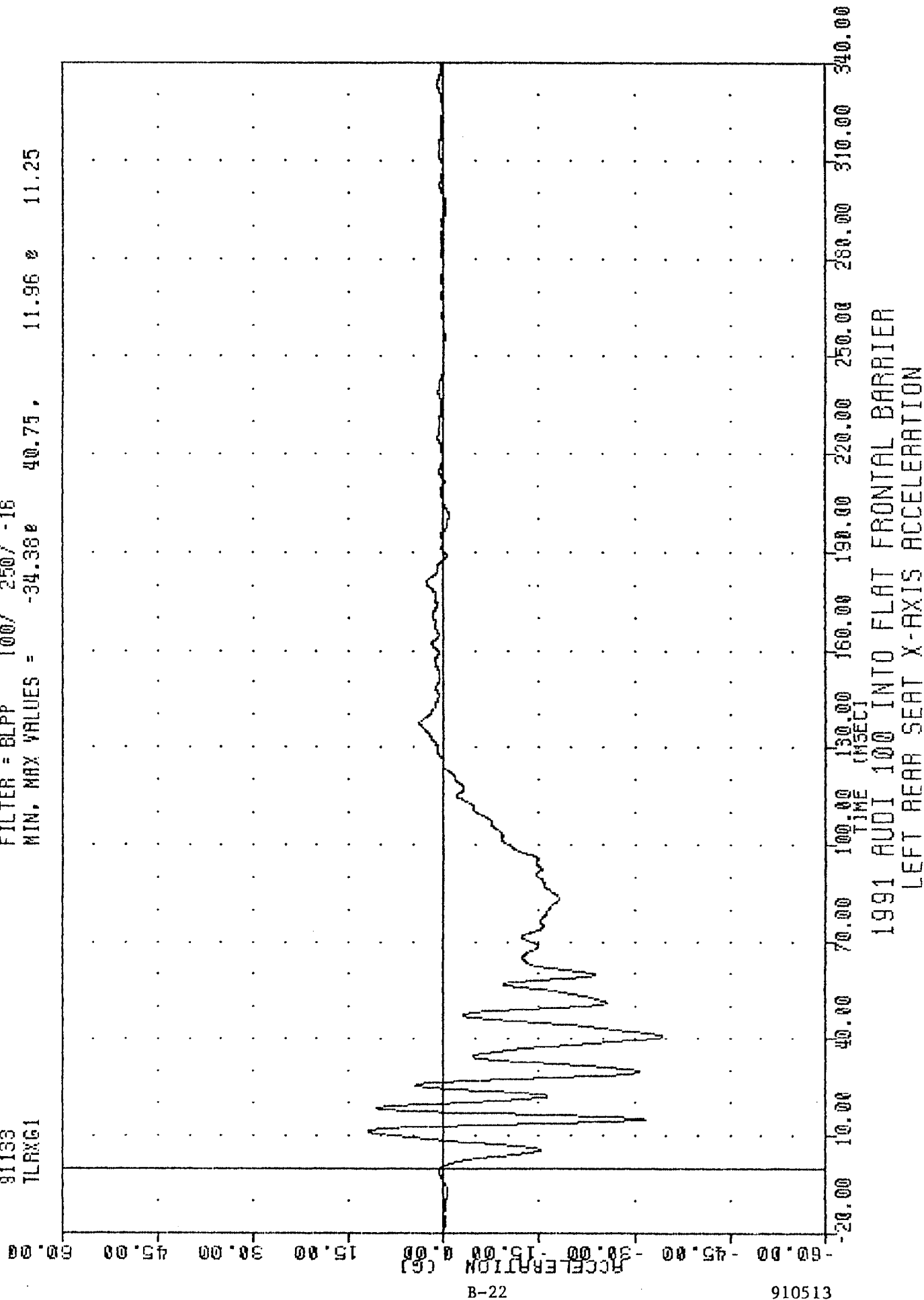
, 910513

FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = -275.52 25.88 633.06 30.13



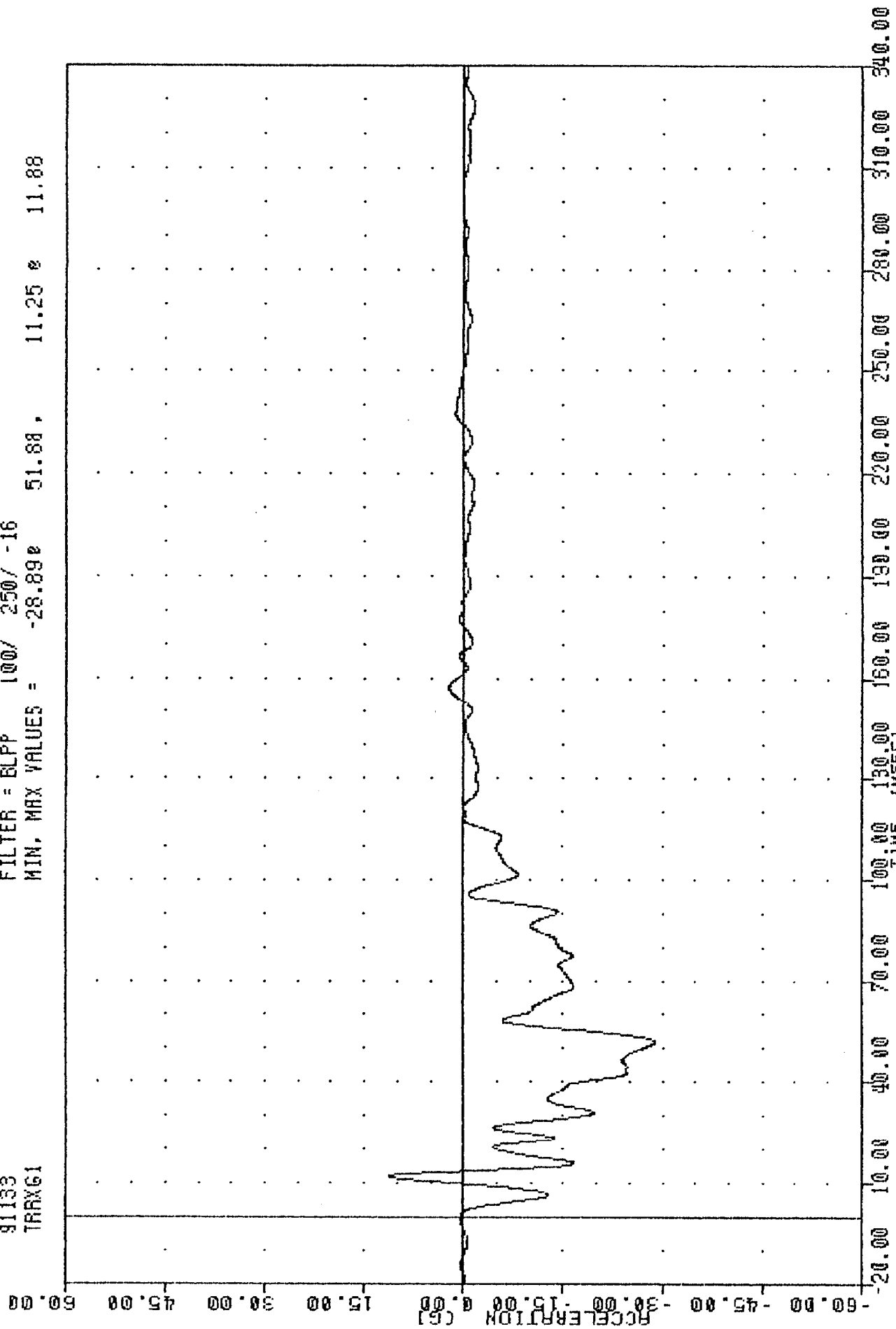
TRC , 910513
 200 COMPLIANCE TESTING
 91133
 TLRXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -34.38 40.75, 11.96 11.25



TRC , 910513
200 COMPLIANCE TESTING
91133
TRAX61

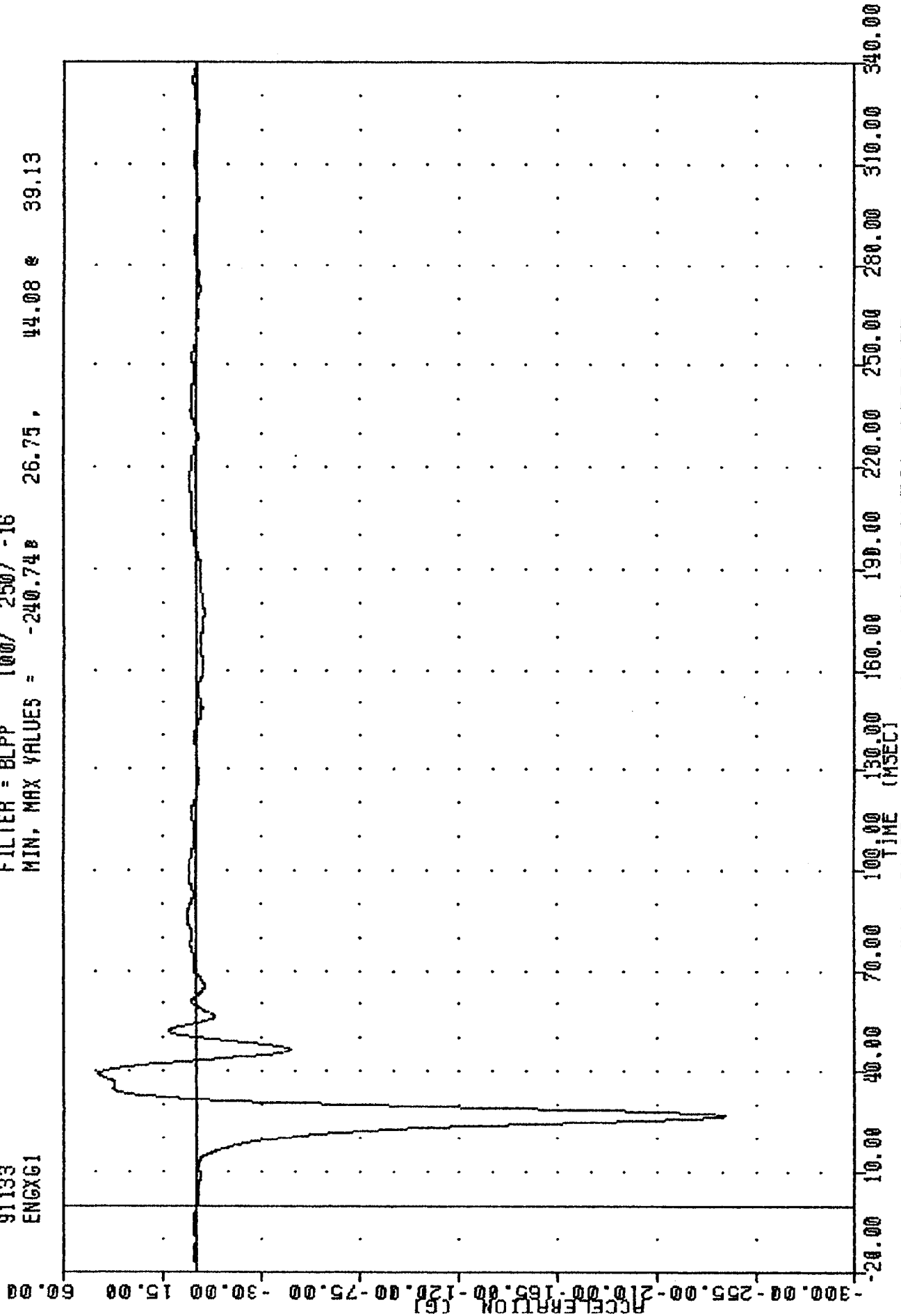
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -28.89e 51.88, 11.25 e 11.88



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

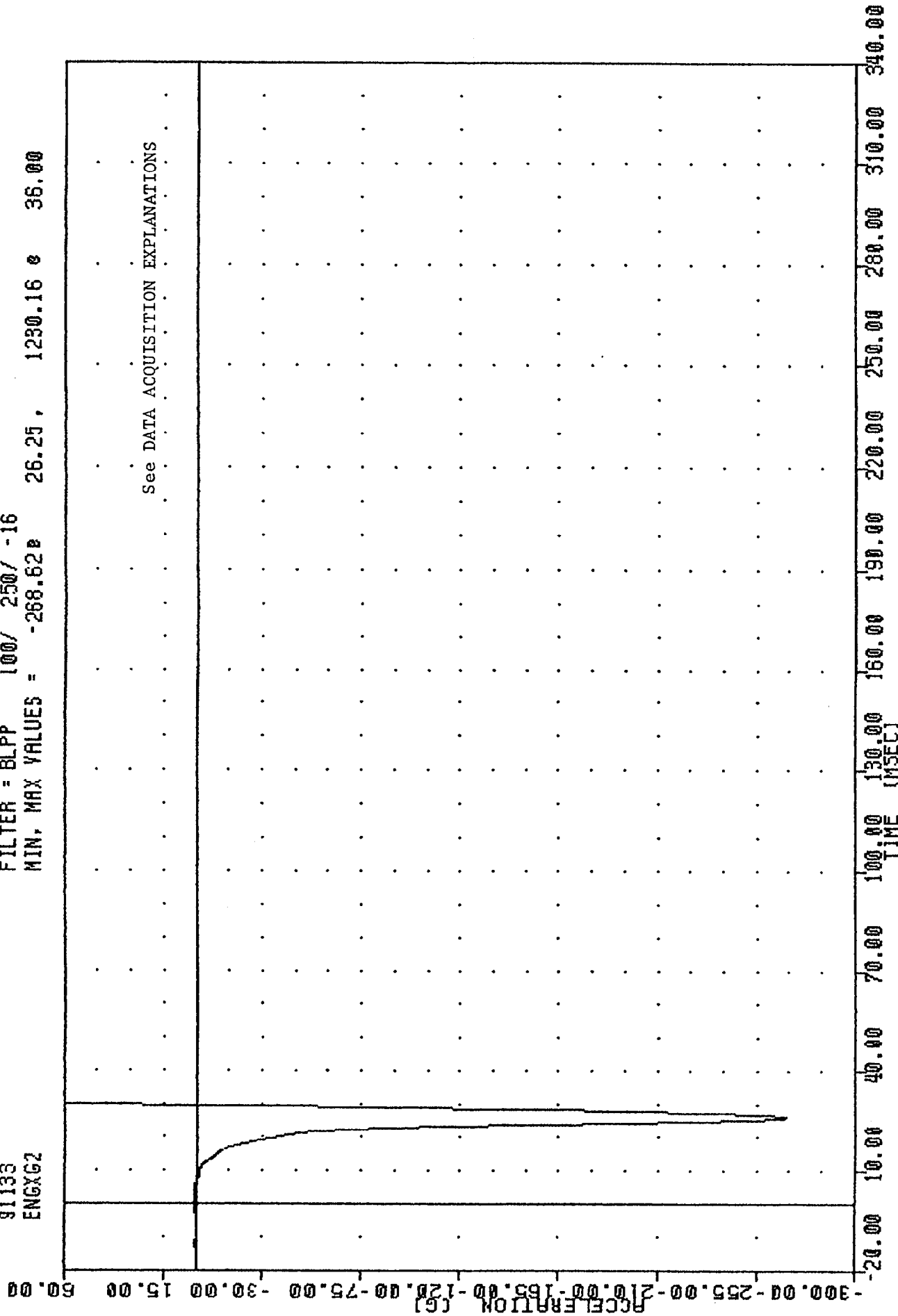
TRC , 910513
208 COMPLIANCE TESTING
91133
ENGXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -240.748 26.75, 44.08 & 39.13



TRC
208 COMPLIANCE TESTING
91133
ENGXG2

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -268.62 26.25, 1230.16 36.00

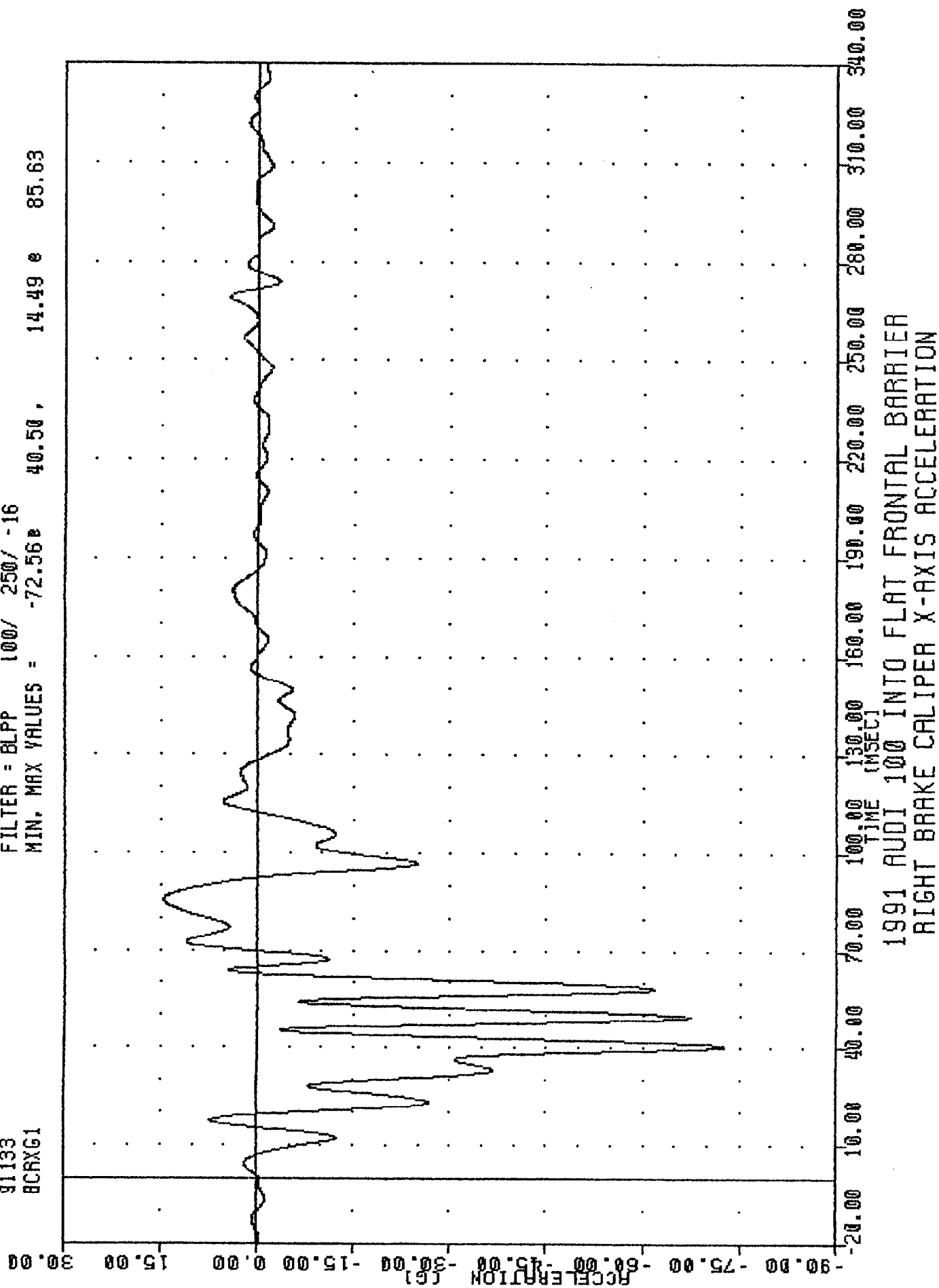


See DATA ACQUISITION EXPLANATIONS

1991 AUDI 100 INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

TRC
208 COMPLIANCE TESTING
91133
BCRXG1

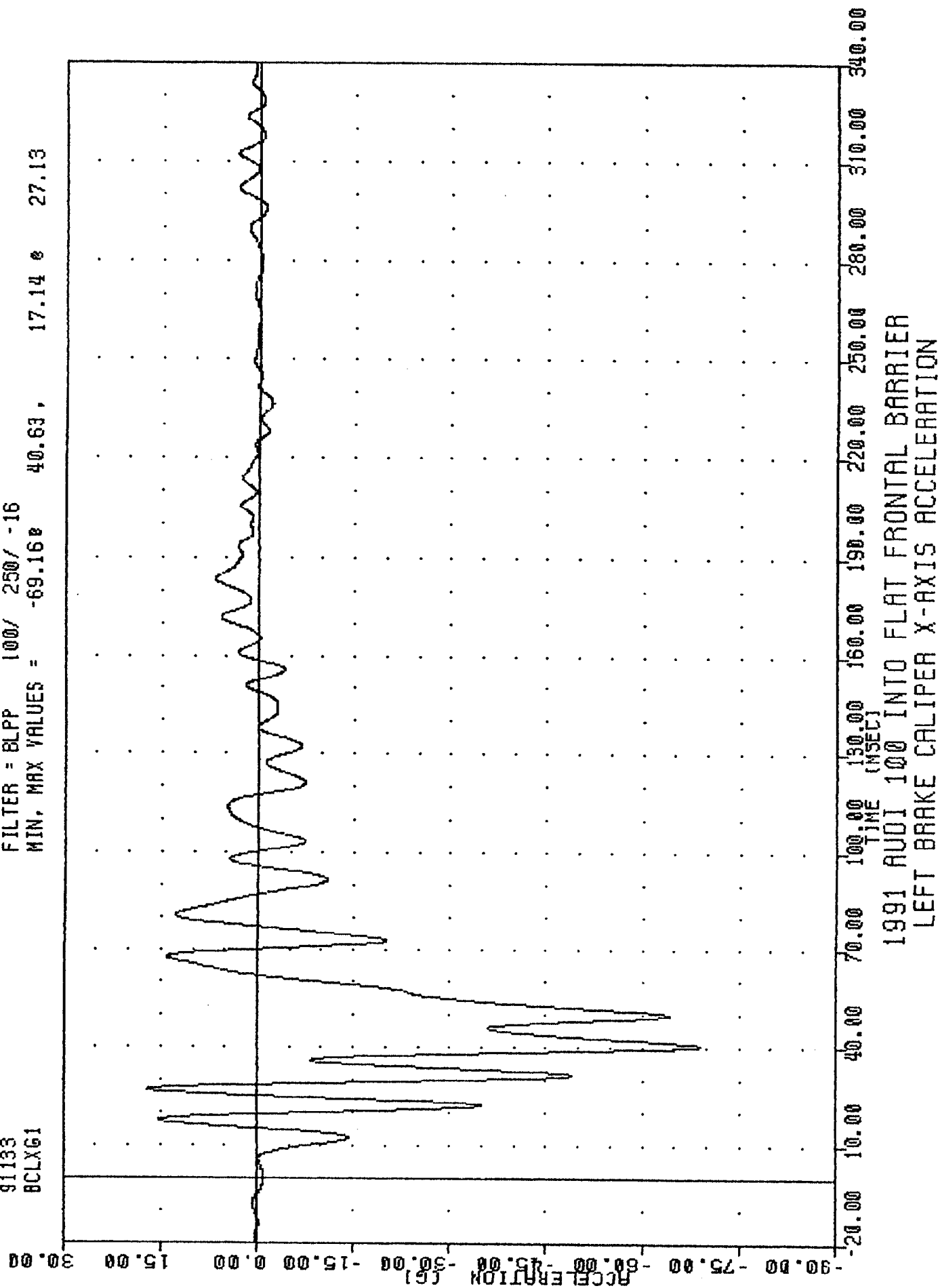
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -72.56 e 40.50 , 14.49 e 85.63



1991 AUDI 100 INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TRC
910513
200 COMPLIANCE TESTING
91133
BCLXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -69.16e 40.63, 17.14 e 27.13



TRC
208 COMPLIANCE TESTING
91133
DPCXG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -37.05% 51.38, 5.04 @ 16.00

