

REPORT NOS. 208-TRC-91-017
212-TRC-91-017
301-TRC-91-017

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

VOLKSWAGEN AG
1991 VOLKSWAGEN CABRIOLET
2-DOOR CONVERTIBLE
NHTSA NO. CM5805
TRC TEST NO. 910725

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



AUGUST 12, 1991

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE (NEF-31)
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16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1991 Volkswagen Cabriolet 2-door convertible, NHTSA No. CM5805, at the Transportation Research Center of Ohio on July 25, 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 15.8 inches. The ambient temperature was 85° F. The driver's head injury criteria (HIC) was 355. The driver's maximum chest deceleration over three (3) milliseconds was 52.0 g. The driver's maximum left and right femur forces were 1413 pounds and 1230 pounds, respectively. The passenger's head injury criteria (HIC) was 220. The passenger's maximum chest deceleration over three (3) milliseconds was 35.5 g. The passenger's maximum left and right femur forces were 1288 pounds and 1516 pounds, respectively. The vehicle appears to comply with the applicable requirements of FMVSS 208, 212, 219 (partial), and 301.					
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 Hornick		
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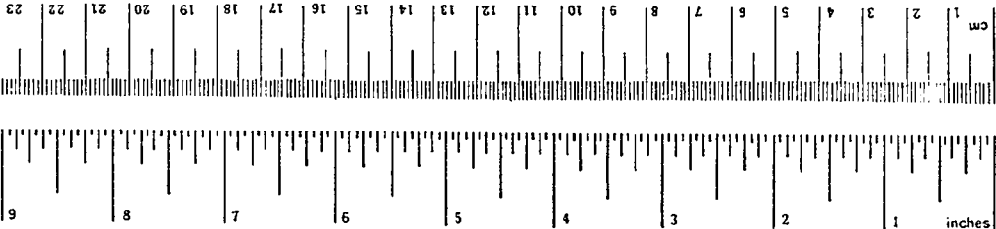
METRIC CONVERSION FACTORS

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				
m ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³

TEMPERATURE (exact)

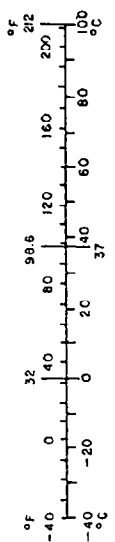
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	miles	mi
		0.6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

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
----	---------------------	-------------------	------------------------	----



*1.10 ± 0.04 (exact) For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SO Catalog No. C13.10 286.

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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 Volkswagen Cabriolet 2-door convertible, NHTSA No. CM5805, 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.

SECTION 2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at TRC on July 25, 1991.

The test vehicle, a 1991 Volkswagen Cabriolet 2-door convertible, NHTSA No. CM5805, appeared to comply with the performance requirements of FMVSS test Nos. 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the front outboard designated seating positions. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with a 1.8 liter, transverse engine, manual transmission, and power brakes. The vehicle's test weight was 2762 pounds. The vehicle's impact speed was 29.5 mph. The vehicle's maximum crush was 15.8 inches.

The driver's head injury criteria (HIC) was 355. The driver's maximum chest resultant acceleration over three (3) milliseconds was 52.0 g. The driver's maximum left and right femur forces were 1413 pounds and 1230 pounds, respectively.

The right front passenger's HIC was 220. The right front passenger's maximum chest resultant acceleration over three (3) milliseconds was 35.5 g. The right front passenger's maximum left and right femur forces were 1288 pounds and 1516 pounds, respectively.

There was no loss of windshield periphery retention.

There was no intrusion through the windshield.

No fluid spilled from the vehicle's fuel system following the crash test event or during the static rollover test.

DATA ACQUISITION EXPLANATIONS

The engine top X-axis accelerometer, ENGXG1, data was lost after 23 milliseconds due to the vehicle's crush cutting the accelerometer cable.

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CM5805 TEST TYPE: Frontal Barrier Impact

TEST DATE: 07/25/91 TEST TIME: 1438 AMBIENT TEMP. (°F): 85

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991/Volkswagen/Cabriolet/2-door convertible

VEHICLE TEST WEIGHT (LBS): 2762

IMPACT ANGLE (DEG)*: 0

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

MAXIMUM STATIC CRUSH (IN): 15.8

AVERAGE REBOUND (IN): 9.1

DUMMIES: Driver #353 Passenger #354

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: Volkswagen AG

MAKE/MODEL: VW/Cabriolet

VIN: WVWCB5154MK007932

BODY STYLE: 2-door convertible

MODEL YEAR: 1991

NHTSA NO.: CM5805

COLOR: White

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 1.8 liter

TRANSMISSION DATA: 5 SPEED, X MANUAL, AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 07/18/91

ODOMETER READING: 183.0

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	Yes	TELESCOPING STEERING WHEEL	No
TINTED GLASS	No	AIR CONDITIONING	No
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	Yes	REAR WINDOW DEFROSTER	Yes
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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE ALTERED BY: Volkswagen AG

DATE OF MANUFACTURE: 10/90

VIN: WVWCB5154MK007932

GVWR: 3029 LBS

CAWR: FRONT: 1729 LBS., REAR: 1388 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Continental Sport Contact P185/60R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 44 PSI
REAR: 44 PSI

SPARE TIRE (MFR., LINE, SIZE): Michelin Tex T105/70R14

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually Adjustable

MAXIMUM WIDTH: 64.2 INCHES

WHEELBASE: 94.8 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA: THE LABEL WAS LOCATED ON
THE DRIVER SIDE LOWER B-POST.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: FRONT: P185/60R14H

RECOMMENDED COLD TIRE PRESSURE: FRONT: 30 PSI; REAR: 33 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 2 REAR 4 TOTAL

VEHICLE CAPACITY WEIGHT: 722 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 24.1; RF 24.5; LR 23.9; RR 24.0

FULLY LOADED ATTITUDE: LF 24.1; RF 24.5; LR 22.4; RR 22.5

PRE-TEST ATTITUDE: LF 24.8; RF 25.0; LR 22.4; RR 22.8

POST-TEST ATTITUDE: LF 25.6; RF 23.8; LR 23.2; RR 21.1

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	705 LBS.	RIGHT REAR	448 LBS.
LEFT FRONT	729 LBS.	LEFT REAR	442 LBS.
TOTAL FRONT WEIGHT	1434 LBS.	(61.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	890 LBS.	(38.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2324 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2324 LBS)

VCW = VEHICLE CAPACITY WEIGHT (722 LBS)

DSC = DESIGNATED SEATING CAPACITY (4)

$RCLW* = VCW - 150 (DSC) = 722 - 150 (4) = 122$

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

TARGET TEST WEIGHT = 2324 + 122 + 328

TARGET TEST WEIGHT = 2774 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 110 LBS. OF CARGO WEIGHT:

RIGHT FRONT	766 LBS.	RIGHT REAR	596 LBS.
LEFT FRONT	798 LBS.	LEFT REAR	602 LBS.
TOTAL FRONT WEIGHT	1564 LBS.	(56.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1198 LBS.	(43.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2762 LBS.	(0.4% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 75 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

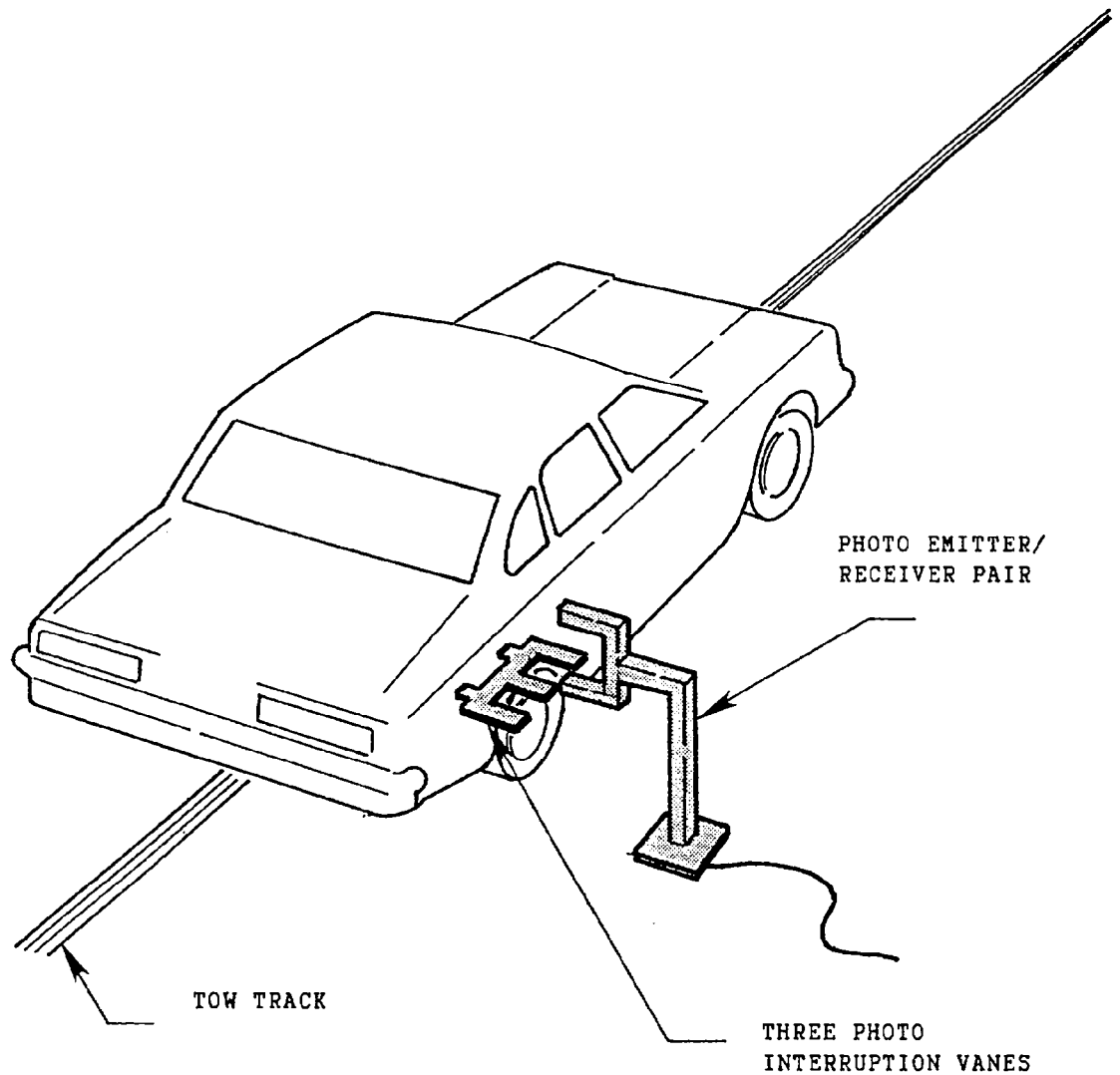
CG = 41.1 INCHES REARWARD OF FRONT WHEEL CENTERLINE

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

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 910725 NHTSA NO.: CM5805
TEST DATE: 07/25/91 TEST TIME: 1438
TEST TYPE: Frontal Barrier Impact IMPACT ANGLE: 0
AMBIENT TEMPERATURE AT IMPACT AREA: 85° F
TEMPERATURE IN OCCUPANT COMPARTMENT: 69° 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 151.3; C 153.8; R 151.3
POST-TEST: L 137.2; C 138.0; R 136.8
TOTAL CRUSH: L 14.1; C 15.8; R 14.5
AVERAGE CRUSH: 14.8
TEST VEHICLE REBOUND FROM FLAT BARRIER (ALL MEASUREMENTS ARE IN INCHES):
DISTANCE FROM TEST VEHICLE TO BARRIER: L 9.4; C 8.2; R 9.6; AVG. 9.1

FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

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

VEHICLE MAKE/MODEL/BODY STYLE: Volkswagen/Cabriolet/2-door convertible

VEHICLE NHTSA NO.: CM5805; VIN: WVWCB5154MK007932

MODEL YEAR: 1991; BUILD DATE: 10/90; TEST DATE: 07/25/91

VEHICLE SIZE CATEGORY: Mini-compact; TEST WEIGHT: 2762 LBS.

VEHICLE WHEELBASE: 94.8 INCHES

MAXIMUM WIDTH: 64.2 INCHES

FRONT OVERHANG: 32.8 INCHES

COLLISION DEFORMATION
 CLASSIFICATION (CDC) CODE: 12FDEW2

CRUSH DEPTH
 MEASUREMENTS:

C1 = 14.1 INCHES

C2 = 14.9 INCHES

C3 = 15.6 INCHES

C4 = 15.7 INCHES

C5 = 14.4 INCHES

C6 = 14.5 INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

LENGTH OF DAMAGED
 REGION:

L = 56.0 INCHES

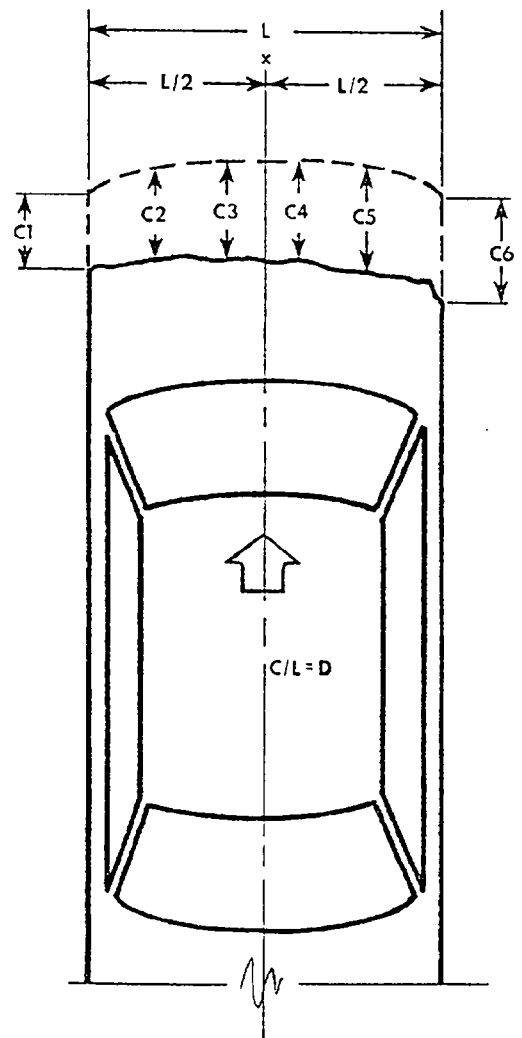
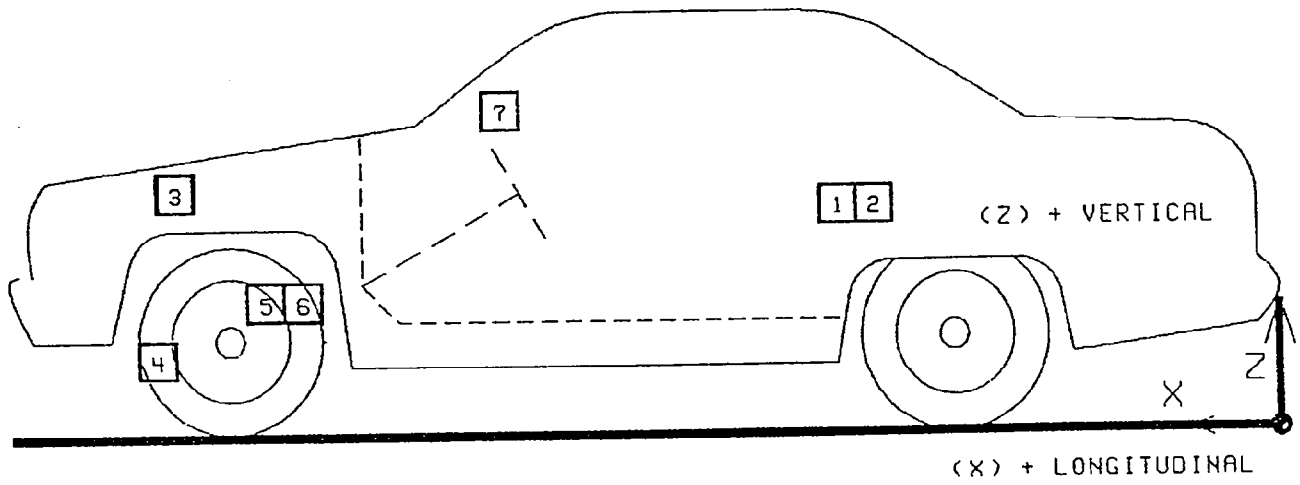
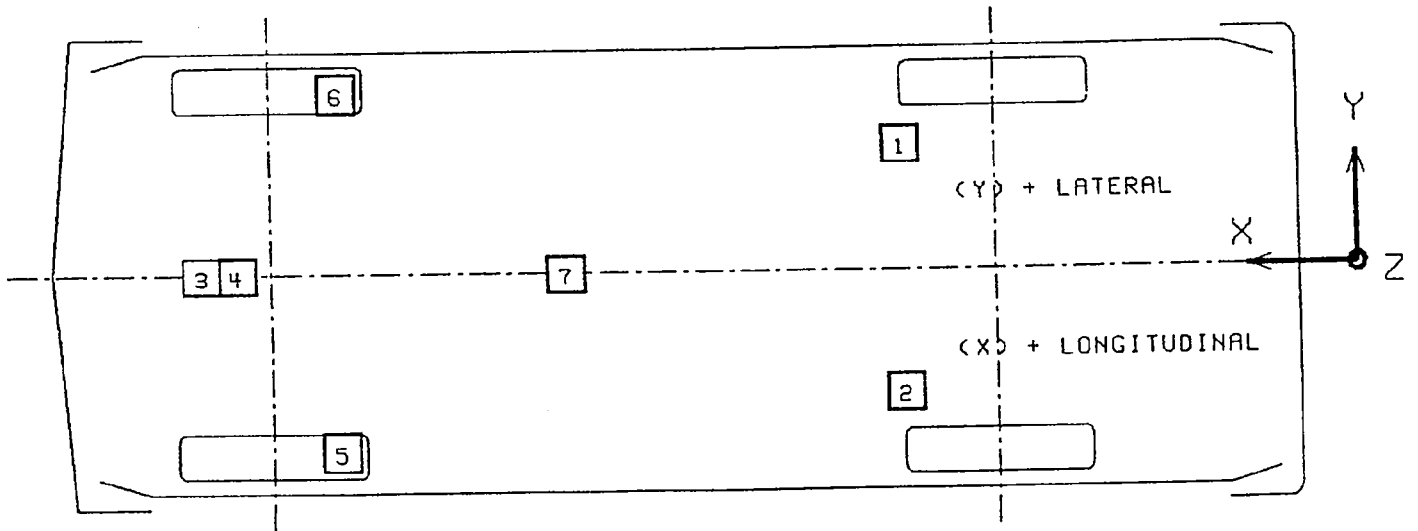


FIGURE 3

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910725

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G MSEC		MAX G MSEC	
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	55.8	19.0	16.0				
		POST	55.8	19.0	17.5				
						1.7	97.0	38.0	41.1
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	PRE	55.6	-18.9	15.8				
		POST	55.6	-18.9	15.6				
						2.3	102.3	35.8	42.6
3	ENGINE TOP LONGITUDINAL	PRE	126.1	-6.2	29.2				
		POST	122.9	-7.0	29.8				
						---	---Y	---	---Y
4	ENGINE BOTTOM LONGITUDINAL	PRE	130.3	-6.9	6.6				
		POST	125.0	-6.5	5.4				
						42.8	40.6	74.1	22.0
5	RIGHT BRAKE CALIPER LONGITUDINAL	PRE	125.2	-23.6	10.3				
		POST	124.0	-24.3	7.9				
						30.6	58.0	128.4	43.3
6	LEFT BRAKE CALIPER LONGITUDINAL	PRE	125.2	23.6	10.1				
		POST	126.8	24.3	10.3				
						24.7	71.4	84.8	57.8
7	INSTRUMENT PANEL CENTER LONGITUDINAL	PRE	100.5	-1.4	38.8				
		POST	101.2	0.2	43.9				
						14.8	66.4	50.6	58.5

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

Y See DATA ACQUISITION EXPLANATIONS

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.: CM5805
MAKE/MODEL/BODY STYLE: Volkswagen/Cabriolet/2-door convertible
MODEL YEAR: 1991 BODY COLOR: White
VIN: WVWCB5154MK007932
ODOMETER (ARRIVAL): 183 DATE: 07/18/91
ODOMETER (COMPLETION): 189 DATE: 07/25/91
COST: \$15,500.00

☐ AIR CONDITIONER	☒ CONSOLE	BRAKES: ☒ POWER
☐ TINTED GLASS	☒ TACHOMETER	FRONT: Disc
☐ POWER STEERING	☐ SPEED CONTROL	REAR: Disc
☒ 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: _____	

ENGINE: 4 CYLINDERS; 1.8 LITERS
TRANSMISSION: 5-speed; DRIVE TYPE: Front wheel
TIRE SIZE: P185/60R14
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	50.6	-27.0	-32.9	58.7	-52.1	-10.1	-8.7	52.0
PASSENGER	-25.6	-15.9	-41.0	41.7	-38.0	-16.6	-13.8	35.5

MAXIMUM FEMUR COMPRESSIVE FORCE (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	1413	1230
PASSENGER	1288	1516

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC) ¹	TIME t_2 (MSEC) ²
DRIVER	355	55.1	91.1
PASSENGER	220	62.1	98.1

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #353	PASSENGER #354
HEAD	<u>Airbag,</u> <u>left B-pillar</u>	<u>Instrument panel</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>Easy</u>
REAR	<u>NA</u>	<u>NA</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>None</u>
REAR	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

One crack in lower right center of windshield.

OTHER NOTABLE IMPACT EFFECTS:

The right front tire was flattened upon impact.

DUMMY KINEMATIC SUMMARY

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel as the dummy's head and chest were restrained by the driver's airbag. The dummy's head rotated to the right as it was restrained by the airbag. The dummy's head then rotated rearward to the left of the head restraint and into the left B-pillar as the dummy rebounded rearward and leftward into the left portion of the seat back. The dummy's upper torso then rotated forward and rearward into the seat back and the dummy's head contacted the head restraint. The dummy came to rest seated in the driver's seat.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest rotated forward as the dummy's torso was restrained by the three-point unbelt. The top of the dummy's head contacted the instrument panel as the dummy's torso rotated clockwise. The dummy rebounded into the right portion of the seat back. The dummy came to rest leaning forward and to the right against the shoulder belt portion of the unbelt and restrained by the three-point unbelt.

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

MAKE/MODEL: Volkswagen/Cabriolet VIN: WVWCB5154MK007932
BODY STYLE: 2-door convertible NHTSA NO.: CM5805
DATE OF MANUFACTURE: 10/90

WEBBING TENSION - RELIEVING DEVICE:

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

BELT CONTACT FORCE:

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

LATCHPLATE ACCESS:

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

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

RETRACTION:

SEAT BELT AUTOMATICALLY RETRACTS WHEN

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

X The seat belt latchplate is released.

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

ACCESSIBILITY:

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

IS THE SEAT REMOVABLE? No

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

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

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

MAKE/MODEL: Volkswagen/Cabriolet

VIN: WVWCB5154MK007932

BODY STYLE: 2-door convertible

NHTSA NO.: CM5805

DATE OF MANUFACTURE: 10/90

ACCESSIBILITY, CONT'D:

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, The 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, The 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?

NA, the vehicle did not contain a center arm rest.

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)

*The audible warning sounds once while the two-point passive belt is
travelling to its latched position.

Duration of reminder light operation = 6 sec.

WORDING OF VISUAL WARNING:

Fasten Seat Belt _____

Fasten Belt X

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 sunvisor.

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

inspect X replace _____ or repair _____ this system: (check one)

a. by _____ month, _____ year

b. by _____ miles

c. or after a time interval of _____ months or 4 years, 8 years, and every 2 years thereafter.

WERE APPROPRIATE INSTRUCTIONS CONCERNING MAINTENANCE AND/OR REPLACEMENT OF THIS SYSTEM PROVIDED? Yes, owner's manual, page 119

WAS A DESCRIPTION OF THE FUNCTIONAL OPERATION OF THE SYSTEM PROVIDED?

Yes, owner's manual, pages 118 and 119

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 119

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 indicator is a pair of lights on the instrument cluster below the fuel gage.

Is the readiness indicator clearly visible to the driver? Yes

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided? Yes, page 118

FIGURE 4 FMVSS 212 TEST DATA

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

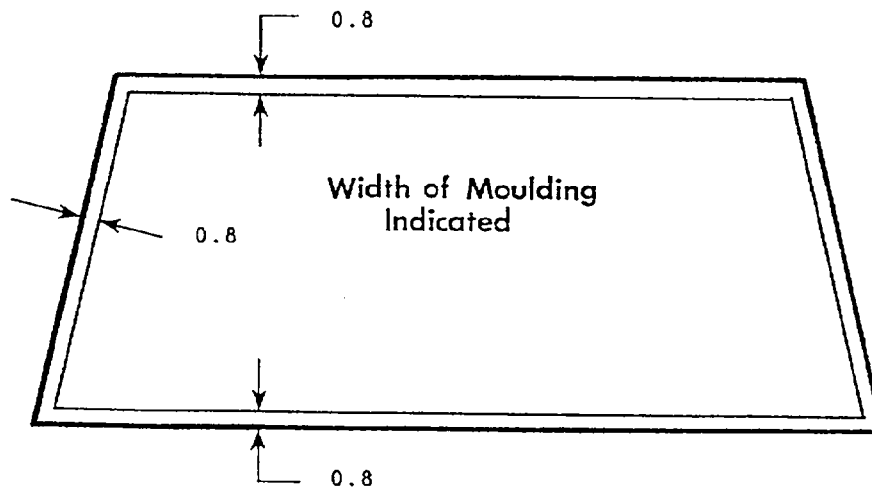
Adhesive around inner perimeter, plastic trim around outer perimeter.

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

WINDSHIELD PERIPHERY MEASUREMENTS:

	PRE-TEST	POST-TEST	PERCENT RETENTION
RIGHT SIDE	68.7	68.7	100%
LEFT SIDE	68.7	68.7	100%
TOTAL	137.4	137.4	100%

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 69° F



FRONT VIEW OF WINDSHIELD*

LOSS OF WINDSHIELD RETENTION LENGTHS: None

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

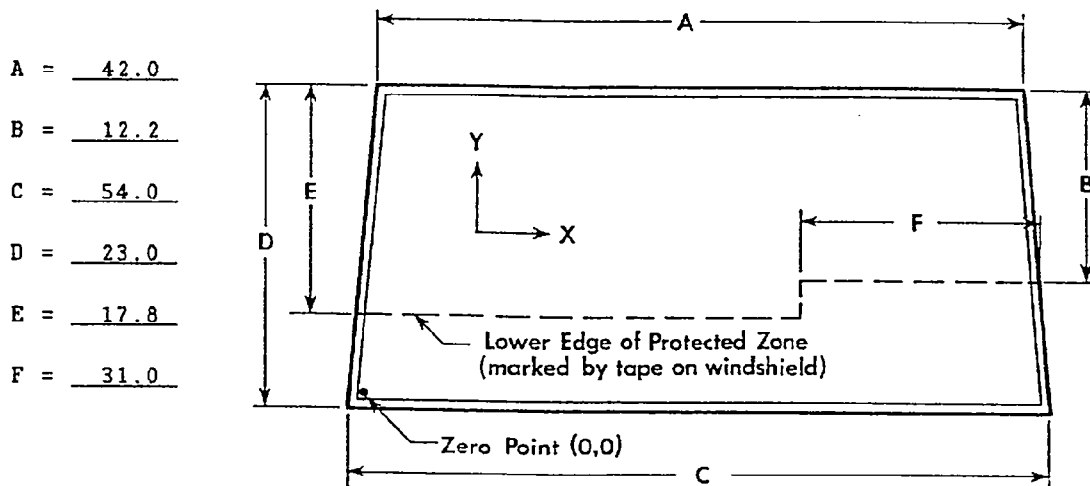
*INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

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: Volkswagen/Cabriolet NHTSA NO.: CM5805

FUEL SYSTEM CAPACITY: 13.7 GALLONS (FROM OWNER'S MANUAL)

USABLE CAPACITY: 13.7 GALLONS (FURNISHED BY COTR)

TEST VOLUME RANGE: 12.6 GALLONS TO 12.9 GALLONS (92-94% OF USABLE)

ACTUAL TEST VOLUME: 12.8 GALLONS (WITH ENTIRE FUEL SYSTEM FILLED)

TEST FLUID TYPE: STODDARD SOLVENT

SPECIFIC GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

TEST FLUID COLOR: PURPLE

DETAILS OF FUEL SYSTEM: The fuel tank was located above the rear axle.

The fuel filler neck was located on the right side and entered the right rear corner of the tank. The fuel lines ran along the right 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.: CM5805; TEST DATE: 07/25/91

VEHICLE MAKE/MODEL/BODY STYLE: Volkswagen/Cabriolet/2-door convertible

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE:

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

FUEL SYSTEM FLUID SPILLAGE MEASUREMENTS:

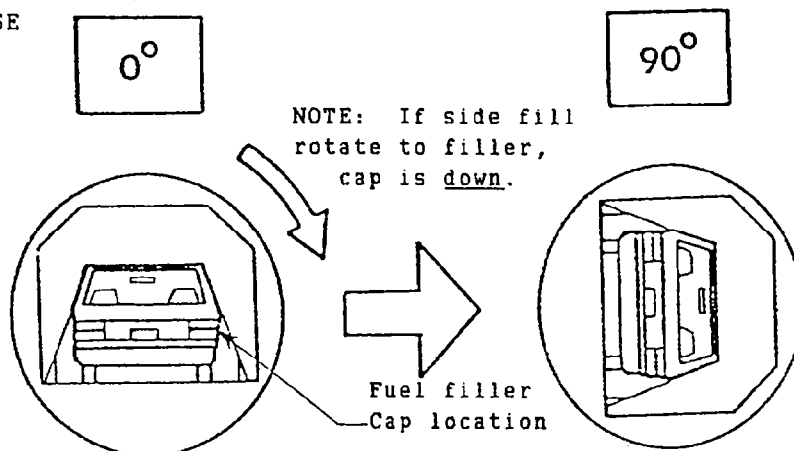
	<u>TEST</u> <u>RESULTS</u>	<u>MAXIMUM</u> <u>ALLOWABLE</u>
1. FROM IMPACT UNTIL VEHICLE MOTION CEASES - - -	0 OZ.	1 OZ.
2. 5 MINUTE PERIOD AFTER VEHICLE MOTION CEASES -	0 OZ.	5 OZ.
3. NEXT 25 MINUTES AFTER 5 MINUTE PERIOD - - - -	0 OZ.	1 OZ./1 MIN.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

FIGURE 6 FMVSS 301 STATIC ROLLOVER TEST DATA

NHTSA NO.: CM5805
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:

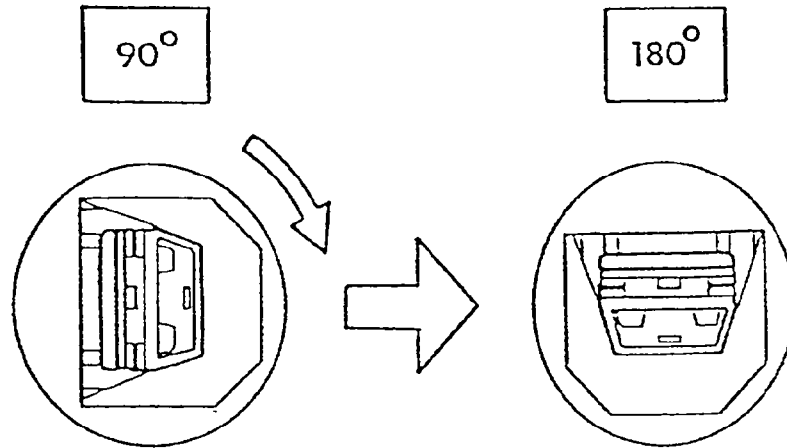
<u>0° TO 90° ROTATION (FUEL FILLER CAP DOWN)</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CM5805
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.

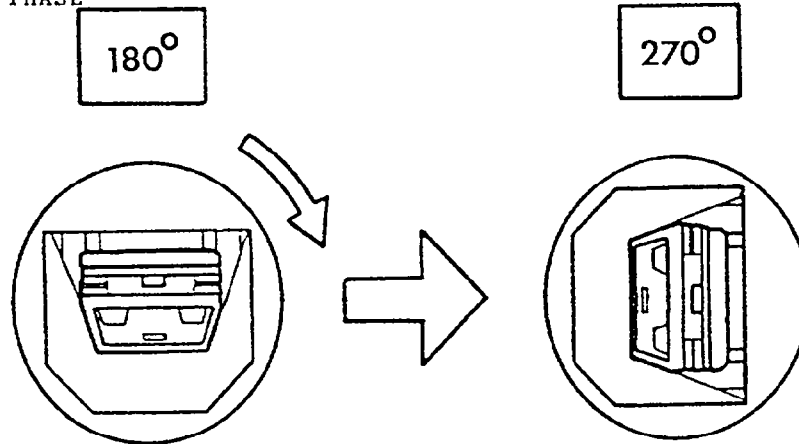
FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CM5805

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:

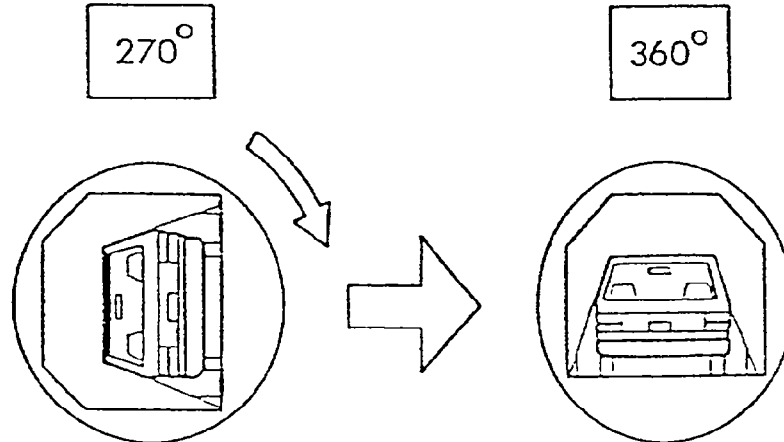
<u>180° TO 270° ROTATION</u>	<u>TEST RESULTS</u>	<u>MAXIMUM ALLOWABLE</u>
1. FIRST 5 MINUTES FROM ONSET OF ROTATION - - - - -	0 oz.	5 oz.
2. 6TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.
3. 7TH MINUTE FROM ONSET OF ROTATION - - - - -	0 oz.	1 oz.

FUEL SYSTEM FLUID SPILLAGE LOCATION(S):

None

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

NHTSA NO.: CM5805
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

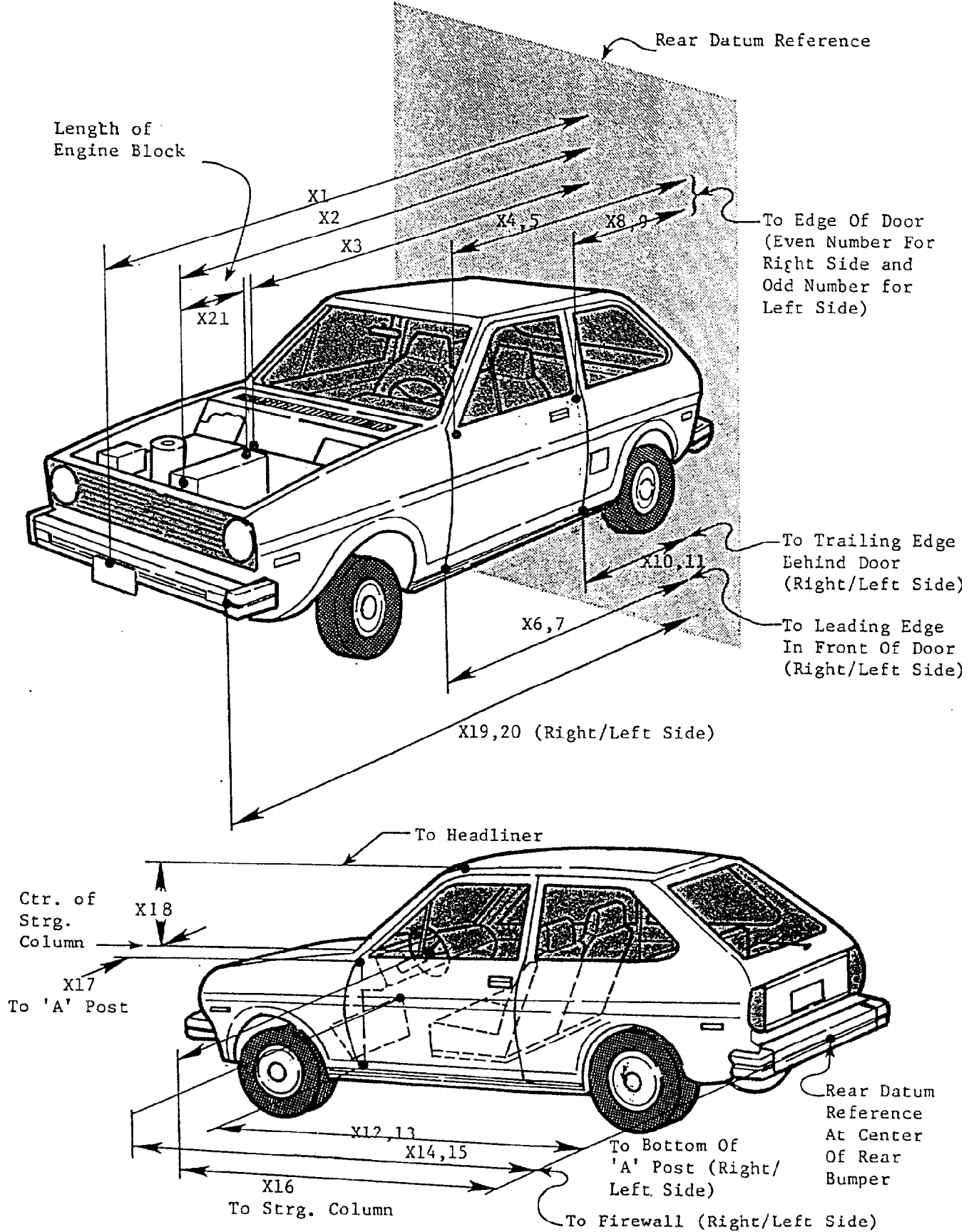
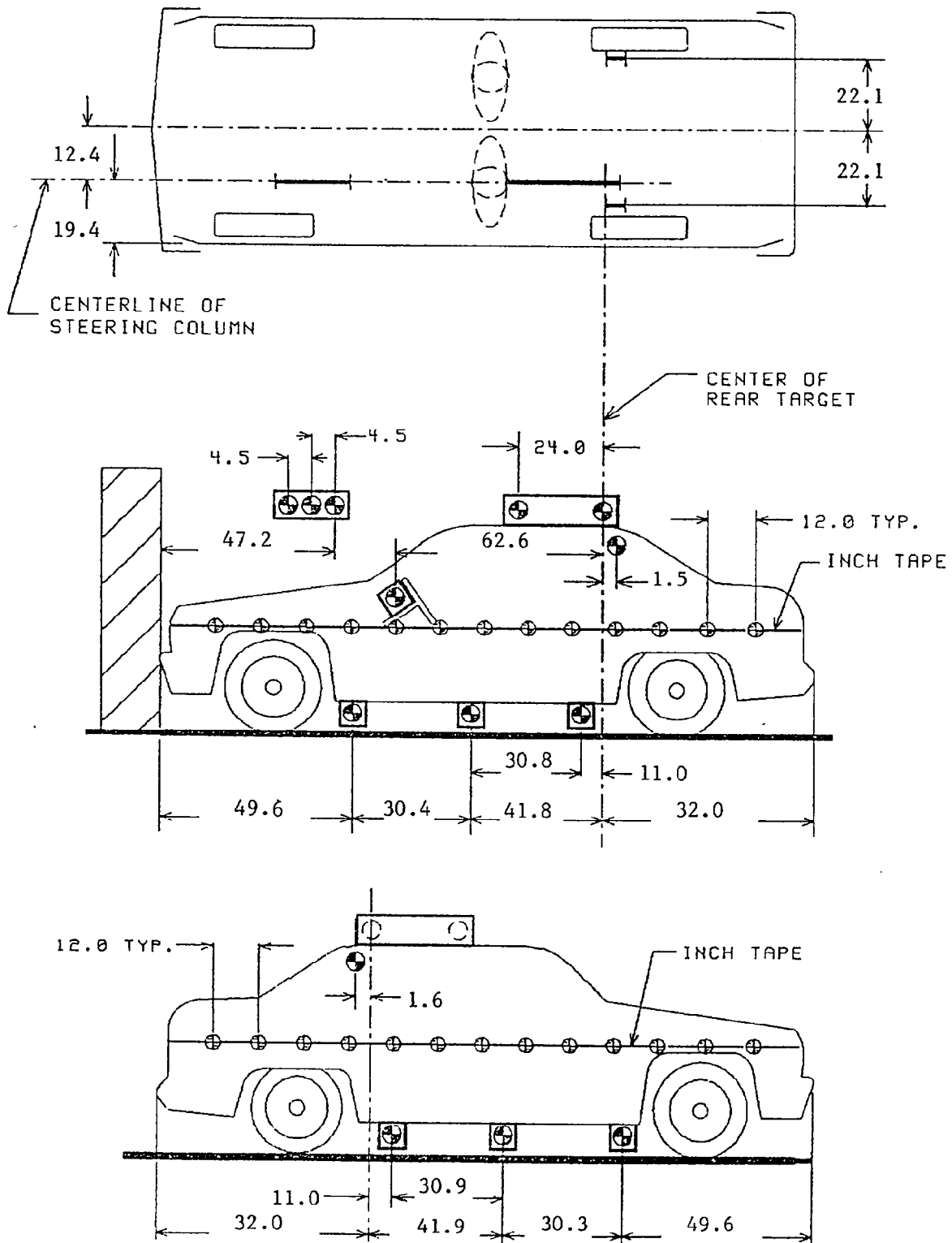


TABLE 13 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Volkswagen/Cabriolet		TEST NUMBER: 910725		ALL MEASUREMENTS ARE IN INCHES		
NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.		
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	153.8	138.0	15.8		
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	128.8	125.9	2.9		
X3	REAR SURFACE OF VEHICLE TO FIREWALL	115.5	113.5	2.0		
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	101.9	101.6	0.3		
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	101.9	101.8	0.1		
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	101.9	101.7	0.2		
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	101.9	102.0	-0.1		
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	57.8	57.6	0.2		
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	57.8	57.5	0.3		
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	58.0	57.8	0.2		
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	58.0	58.0	0.0		
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	101.3	101.1	0.2		
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	101.2	101.1	0.1		
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	117.1	117.2	-0.1		
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	114.3	115.4	-1.1		
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	85.6	89.8	-4.2		
X17	CENTER OF STEERING COLUMN TO "A" POST	10.6	11.2	-0.6		
X18	CENTER OF STEERING COLUMN TO HEADLINER	17.5	14.1	3.4		
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	151.3	136.8	14.5		
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	151.3	137.2	14.1		
X21	LENGTH OF ENGINE BLOCK	17.5	17.5	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: Volkswagen/Cabriolet
 BODY STYLE: 2-door convertible MODEL YEAR: 1991
 NHTSA NO.: CM5805 COLOR: White

DATA FROM CERTIFICATION LABEL:

VEHICLE MANUFACTURER: Volkswagen AG
 DATE OF MANUFACTURE: 10/90 VIN: WVWCB5154MK007932
 GVWR: 3029 LBS.; GAWR: FRONT = 1729 LBS.; REAR = 1388 LBS.

POST-IMPACT DATA:

DATE OF TEST: 07/25/91 TIME: 1438 TEMPERATURE: 85° 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: R. Branham, R. Benavides, E. VanVoorhis

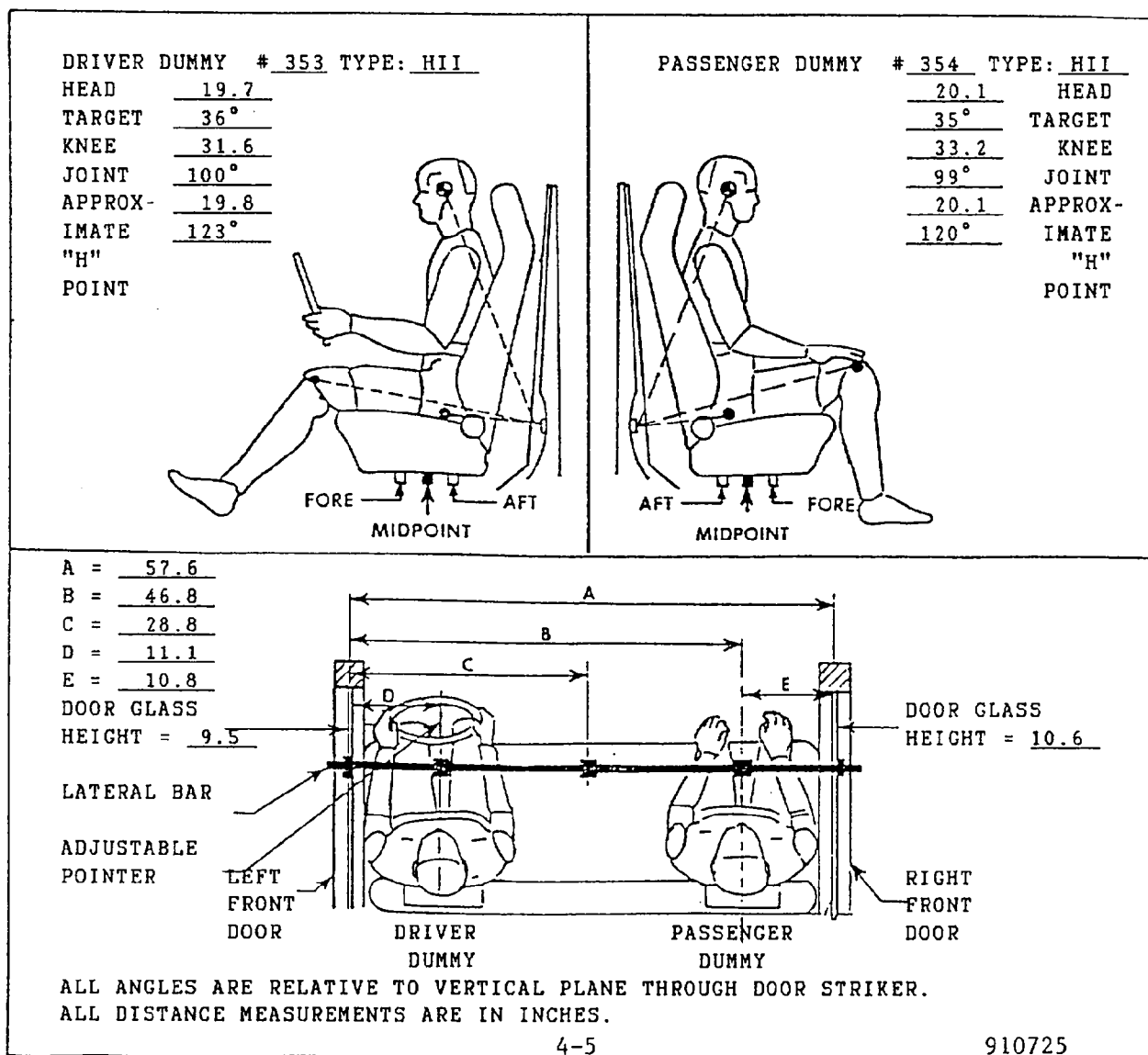


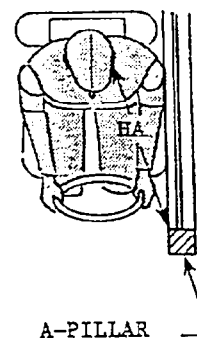
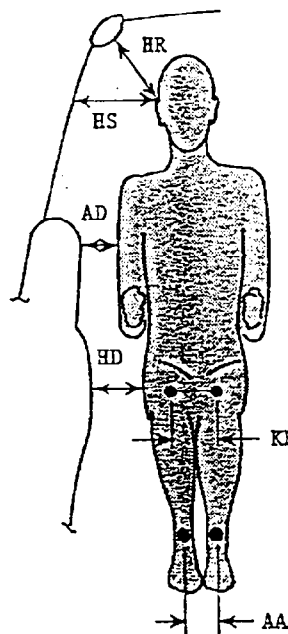
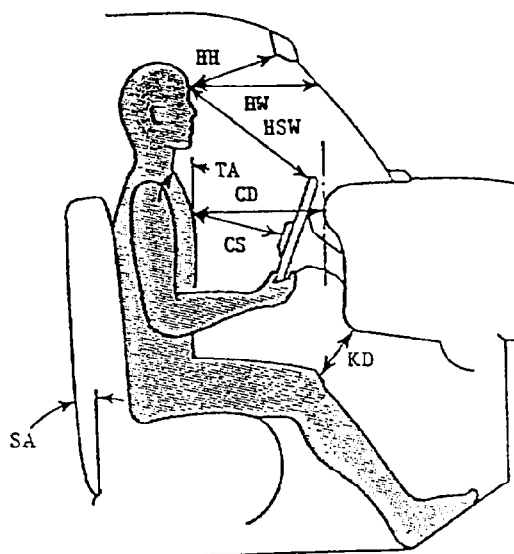
FIGURE 10 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
HH	16.1	15.4
HW	22.0	20.0
CD	20.5	20.8
CS	11.8	NA
KDL	2.2	2.2
KDR	3.2	2.0
TA	14°	14°
SA	21°	21°
HSW	17.1	NA

	DRIVER	PASSENGER
HR	6.4	6.0
HS	7.4	6.9
AD	3.5	3.1
HD	5.7	5.5
KK	10.0	7.5
AA	11.0	7.1
HA	21.8	20.8

KNEE OUTER BOLT HEAD TO OUTER
BOLT HEAD SPACING:

DRIVER = 14.5
PASSENGER = 11.8

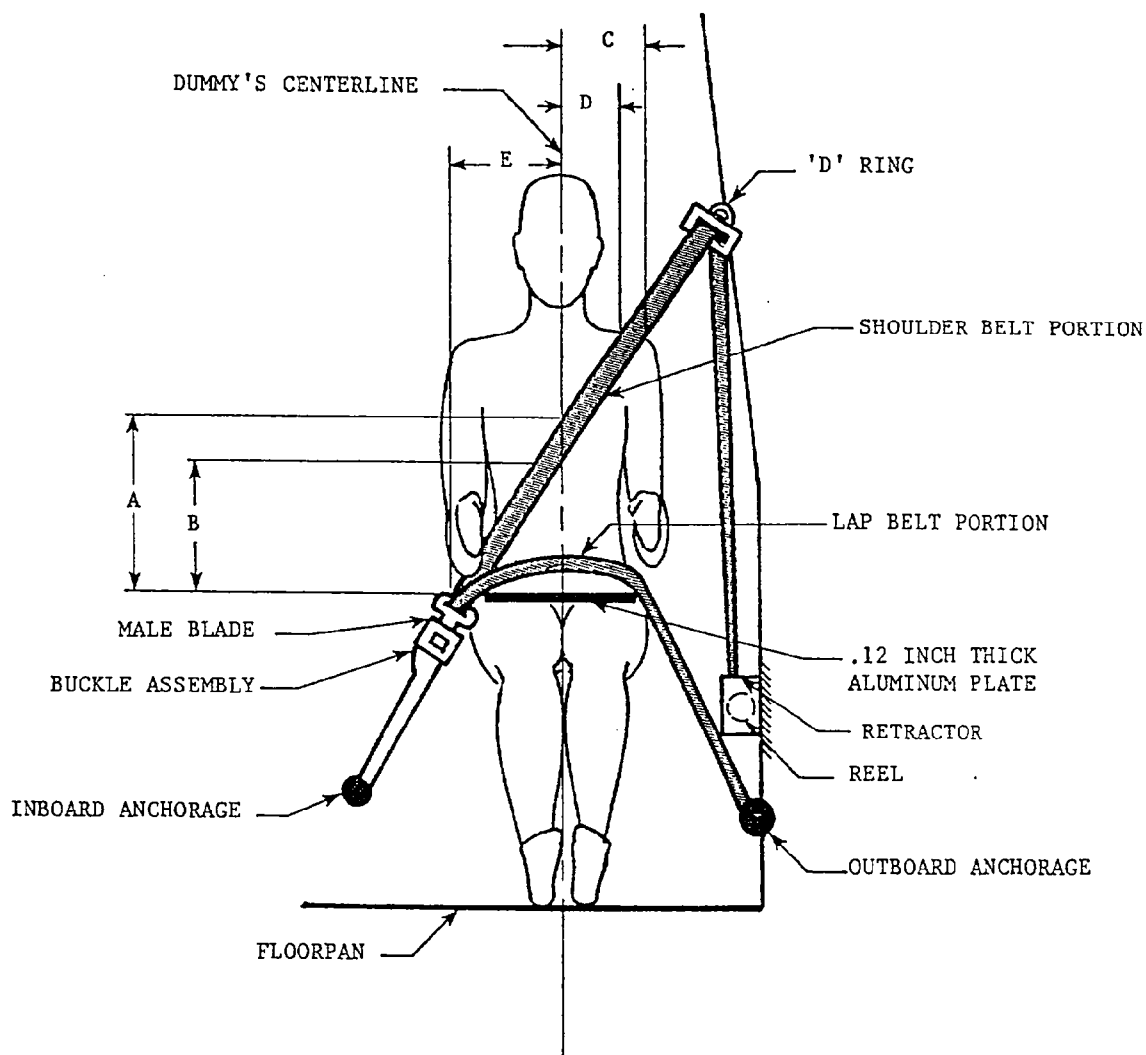


HH = HEAD TO WINDSHIELD HEADER
HW = HEAD TO WINDSHIELD
CD = CHEST TO DASH
CS = CHEST TO STEERING WHEEL
KD = KNEE TO DASH
TA = TORSO ANGLE
SA = SEAT BACK ANGLE
HSW = HEAD TO STEERING WHEEL

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

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

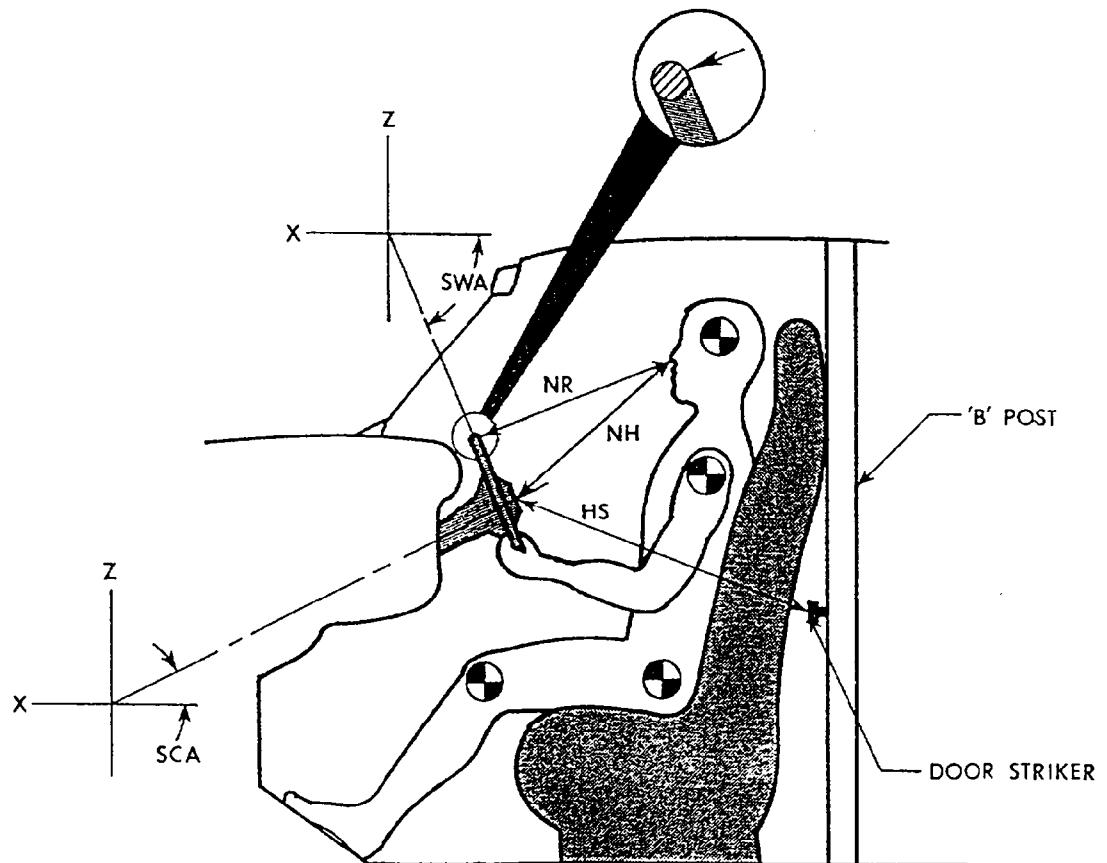
FIGURE 11 SEAT BELT POSITIONING DATA



	PASSENGER DUMMY
A - TOP SURFACE OF ALUM. PLATE TO BELT UPPER EDGE	13.2
B - TOP SURFACE OF ALUM. PLATE TO BELT LOWER EDGE	10.0
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.1
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	15.0

ALL DISTANCE 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.

MEASUREMENTS

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	15.6
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	15.5
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	29.1
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	30°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	60°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 13
CAMERA POSITIONS

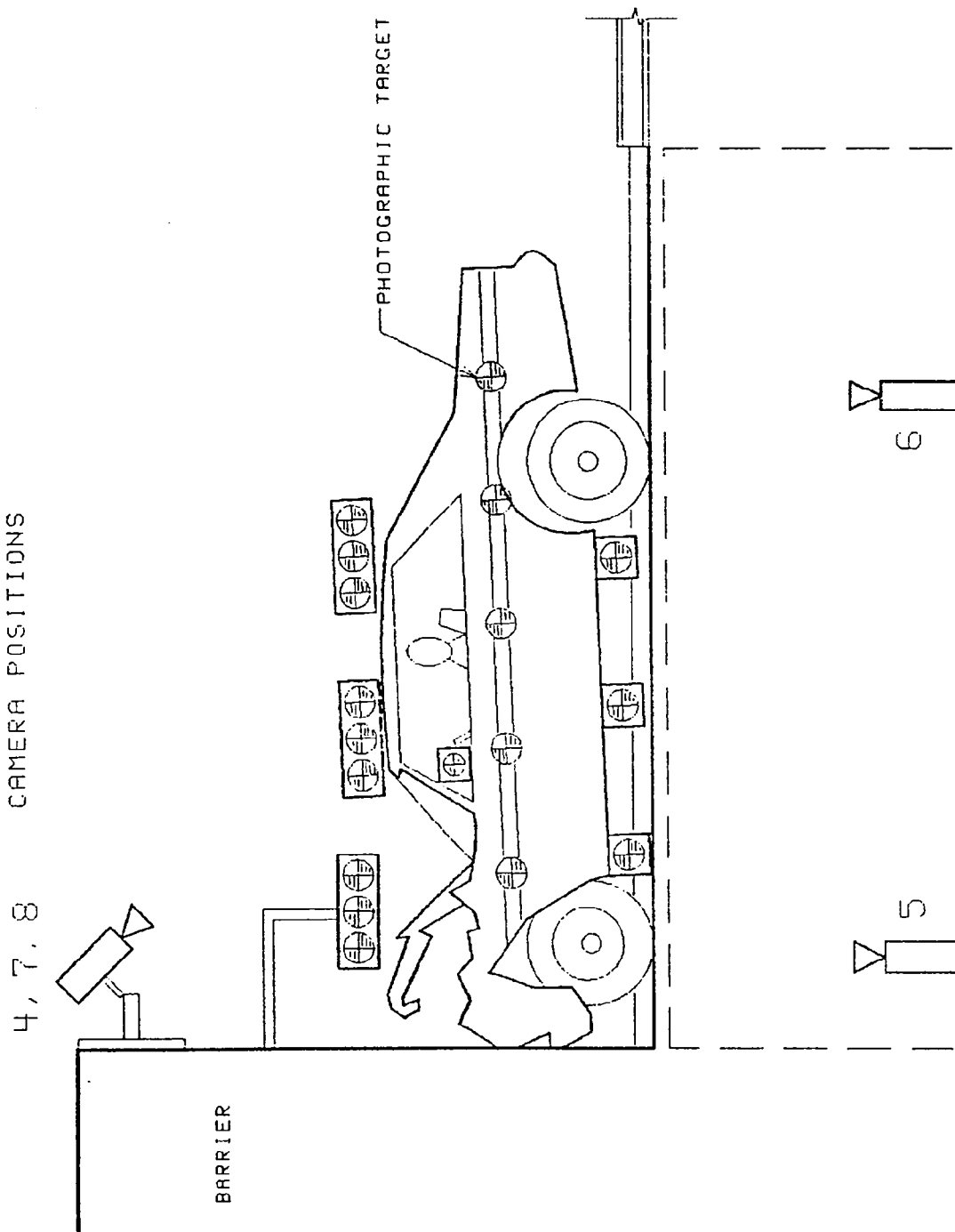


FIGURE 13

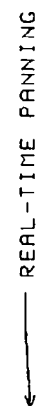


TABLE 14 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 910725		VEHICLE: VW/Cabriolet/2-door convertible					FILM PLANE		FILM SPEED
CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE** (DEG)	TO HEAD TARGET(IN)	LENS (MM)	(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	187.0	25	500	
4	Windshield front view	-6.0	0.0	96.0	-40	NA	13	498	
5	Pit front position	-50.5	0.0	-92.4	90	NA	13	750	
6	Pit rear position	-99.3	0.0	-99.0	90	NA	13	1015	
7	Passenger front view	-4.5	-13.8	93.0	-50	NA	17	505	
8	Driver front view	-6.8	14.5	93.0	-50	NA	17	500	
9	Driver kinematics	-157.3	116.0	87.0	-27	67.0	25	500	
10	Passenger kinematics	-152.1	-116.0	87.0	-26	61.0	25	500	
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	500	
13	Steering column motion	-102.0	285.0	103.0	-14	NA	25	500	
14	Steering column motion	-102.0	285.0	75.1	-9	NA	25	498	
15	Passenger kinematics	-38.8	-293.0	45.3	-4	225.0	25	498	
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

910725



Figure A-3. PRE-TEST LEFT SIDE VIEW



Figure A-4. POST-TEST LEFT SIDE VIEW

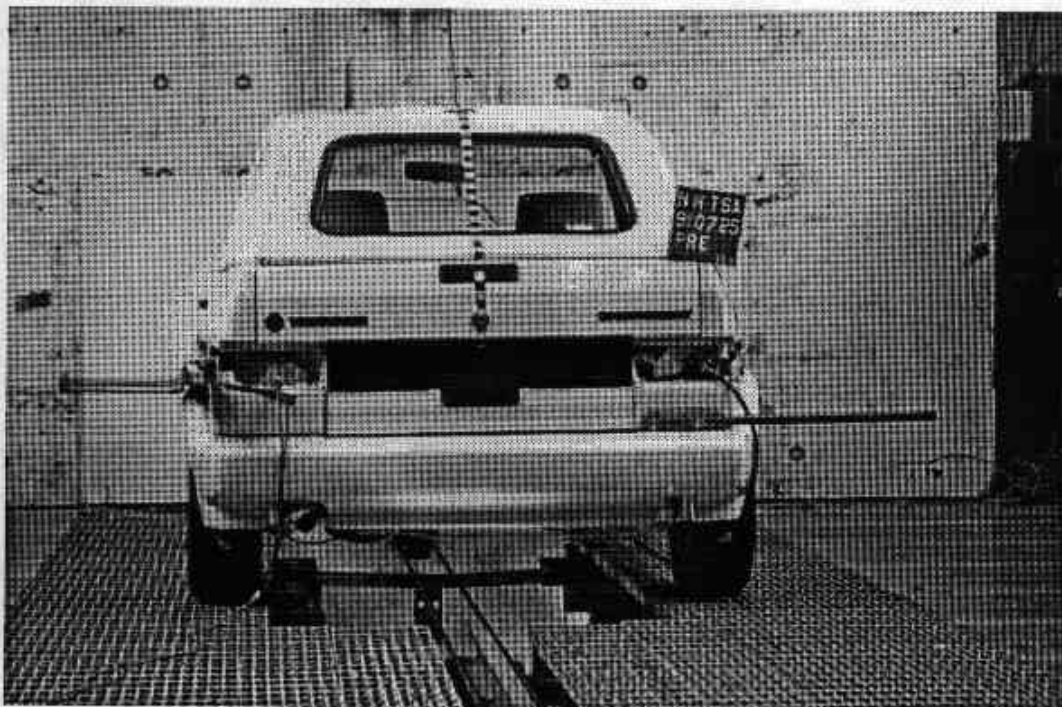


Figure A-5. PRE-TEST REAR VIEW

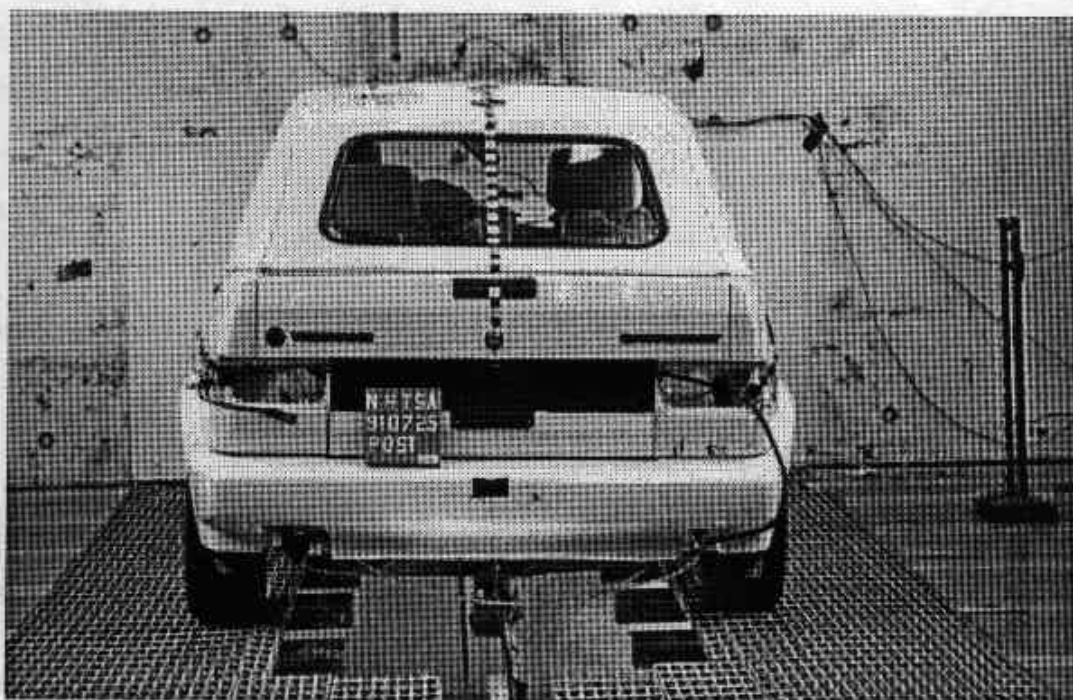


Figure A-6. POST-TEST REAR VIEW



Figure A-7. PRE-TEST RIGHT SIDE VIEW



Figure A-8. POST-TEST RIGHT SIDE VIEW



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



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



Figure A-11. 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

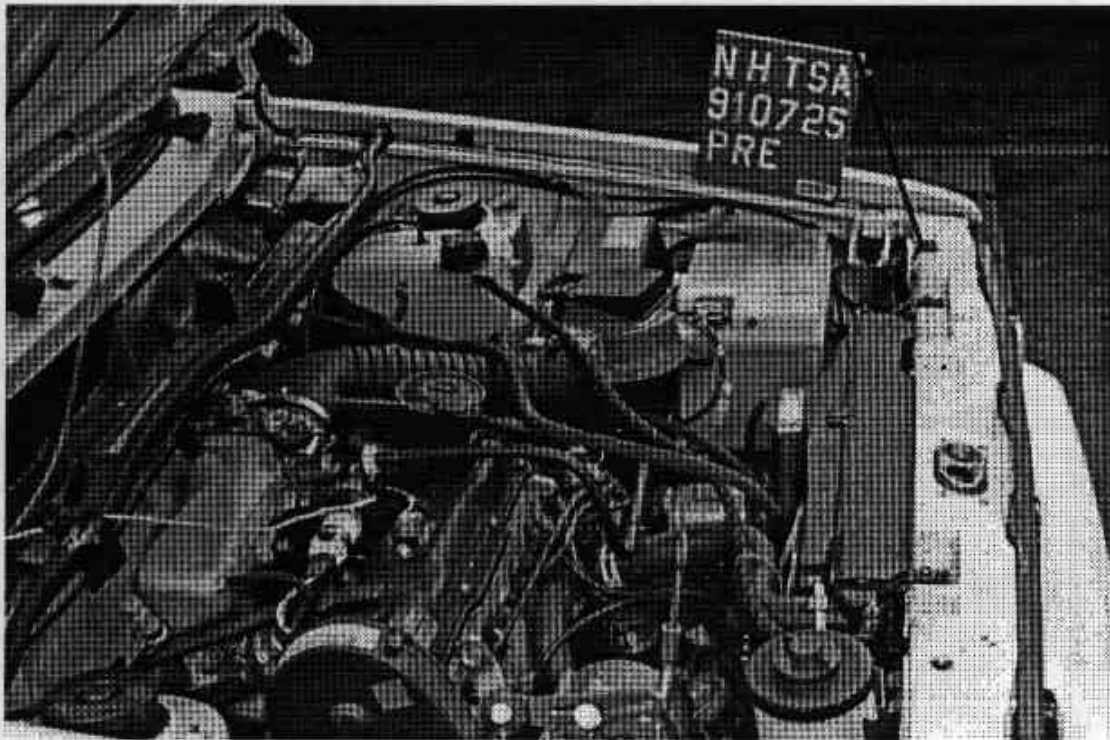


Figure A-15. PRE-TEST ENGINE COMPARTMENT VIEW



Figure A-16. POST-TEST ENGINE COMPARTMENT VIEW

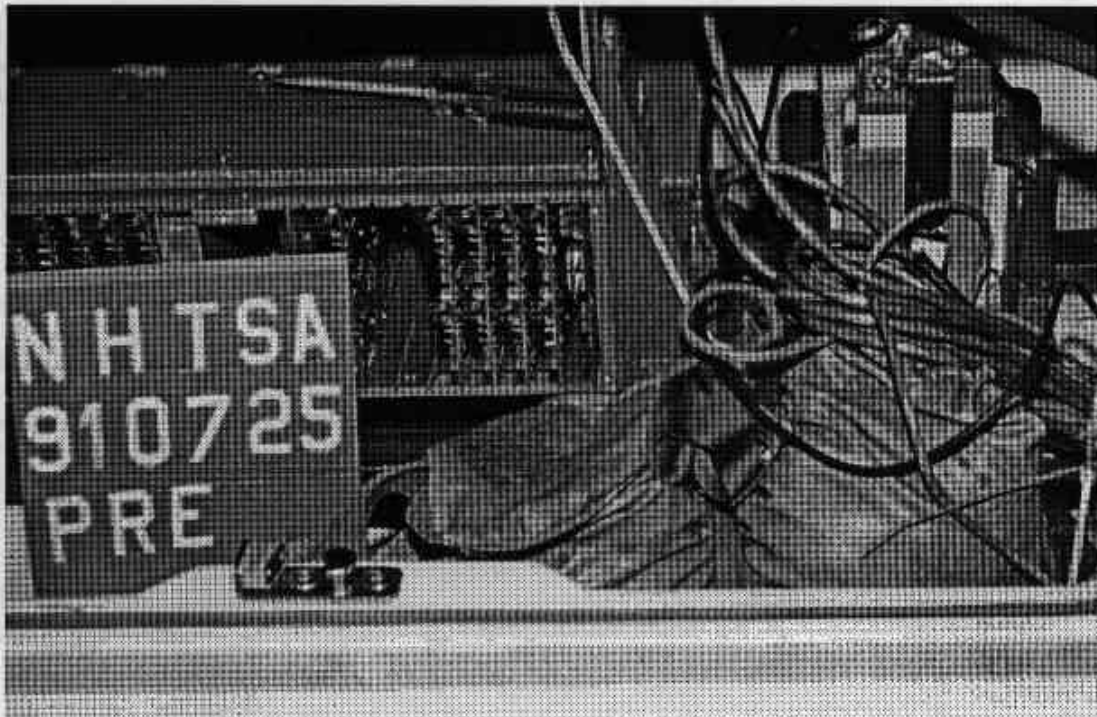


Figure A-17. PRE-TEST BALLAST LOCATION VIEW



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



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

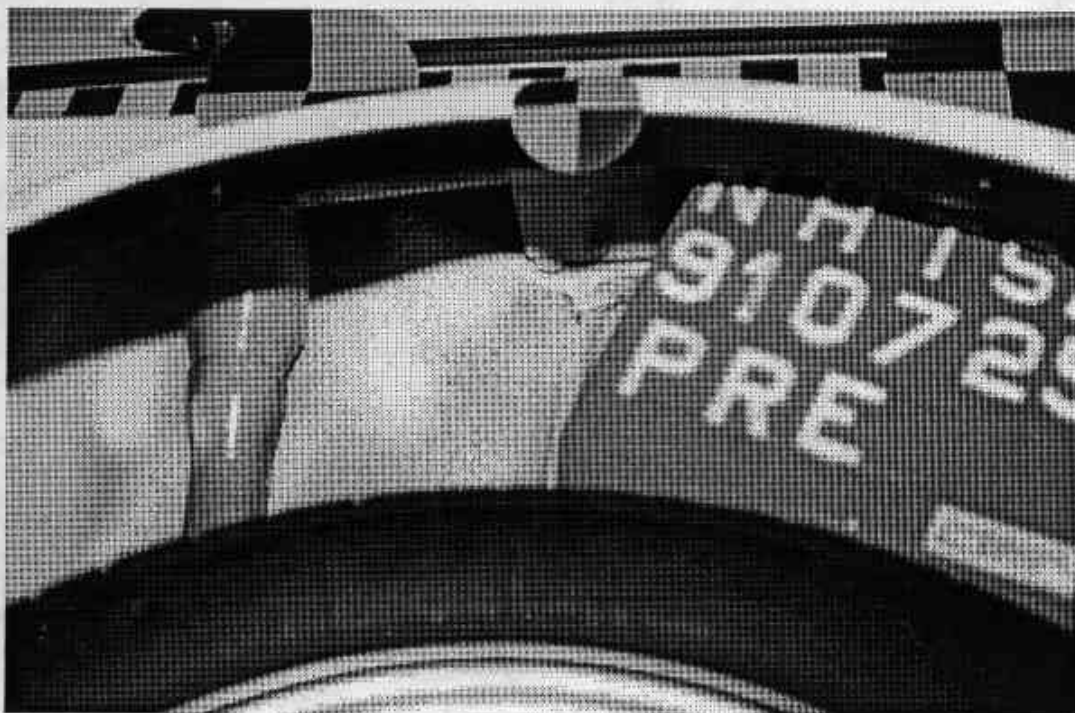


Figure A-20. PRE-TEST FUEL FILLER NECK - VIEW 1



Figure A-21. PRE-TEST FUEL FILLER NECK - VIEW 2

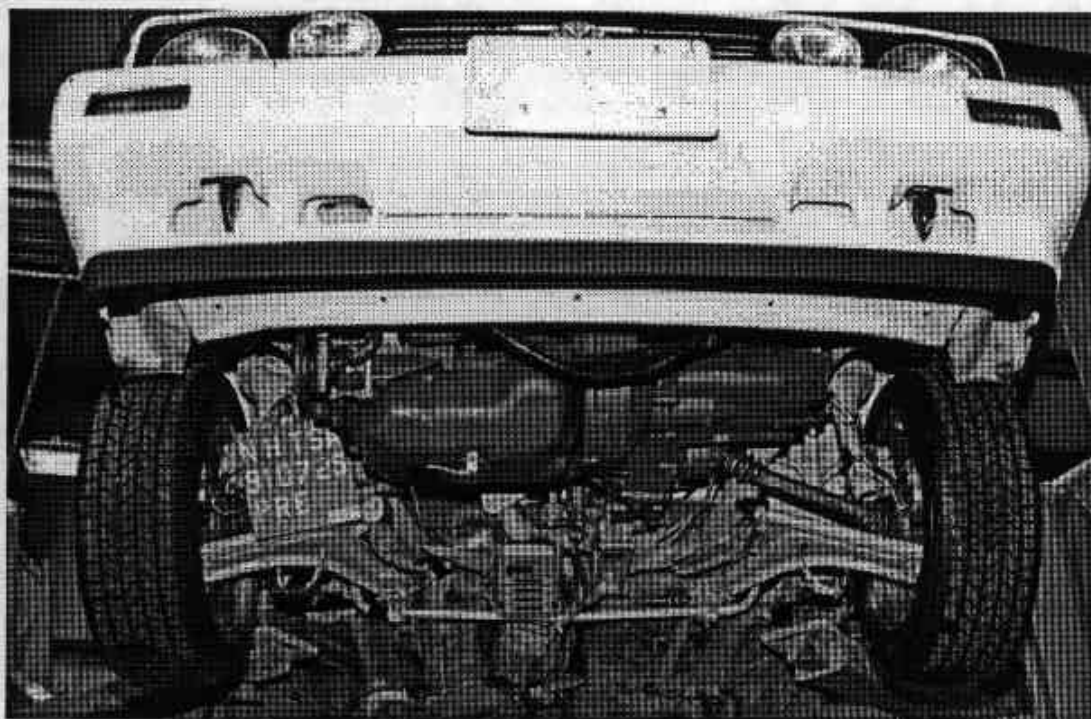


Figure A-22. PRE-TEST FRONT UNDERBODY VIEW

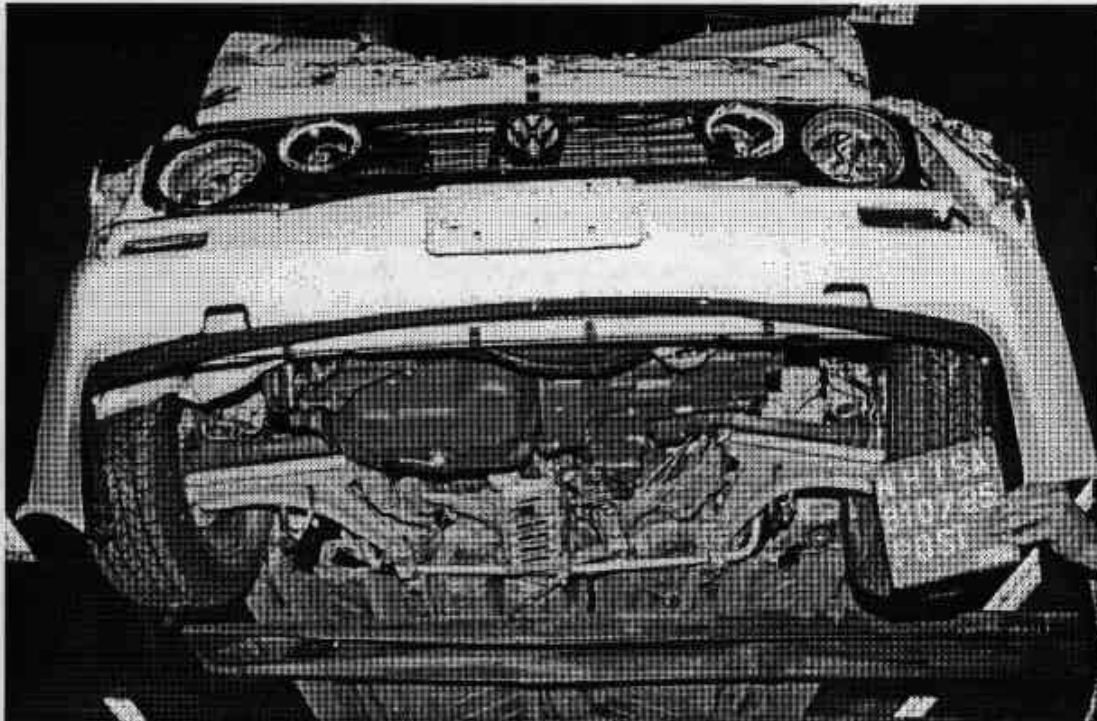


Figure A-23. POST-TEST FRONT UNDERBODY VIEW

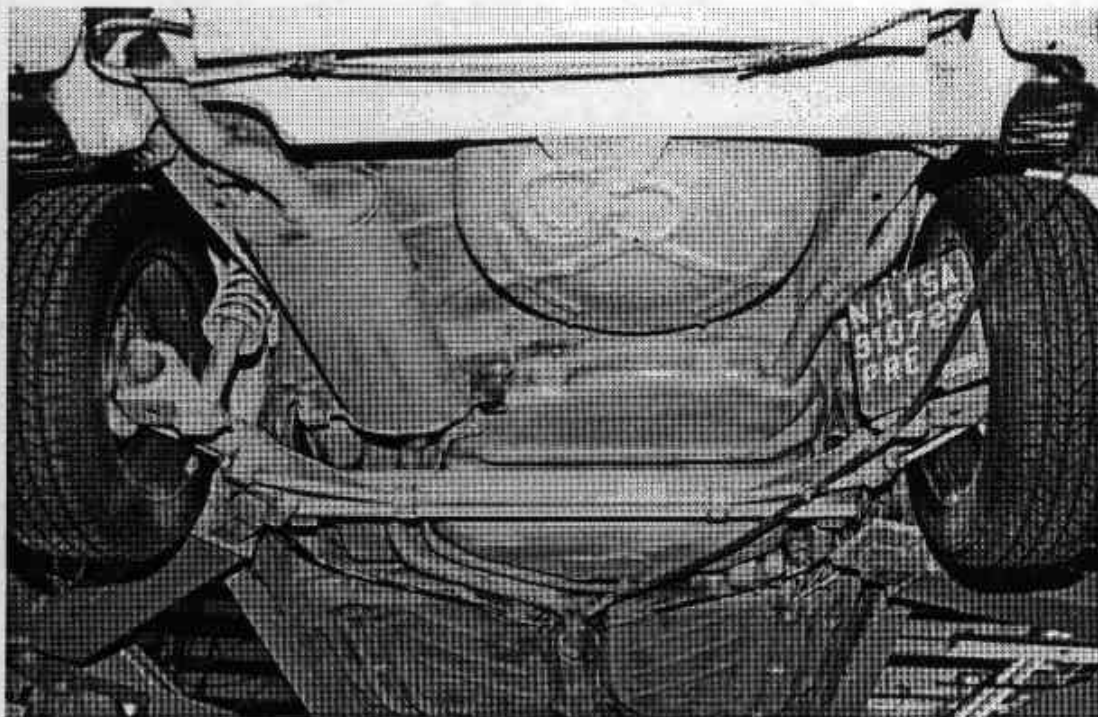


Figure A-24. PRE-TEST REAR UNDERBODY VIEW

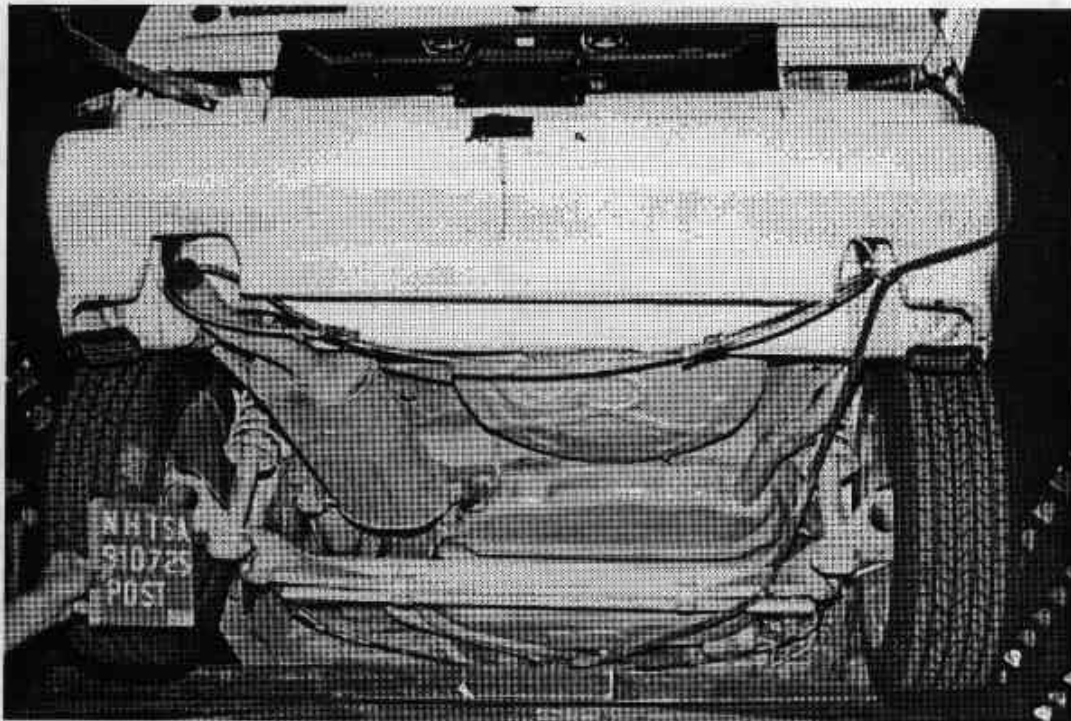


Figure A-25. POST-TEST REAR UNDERBODY VIEW



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

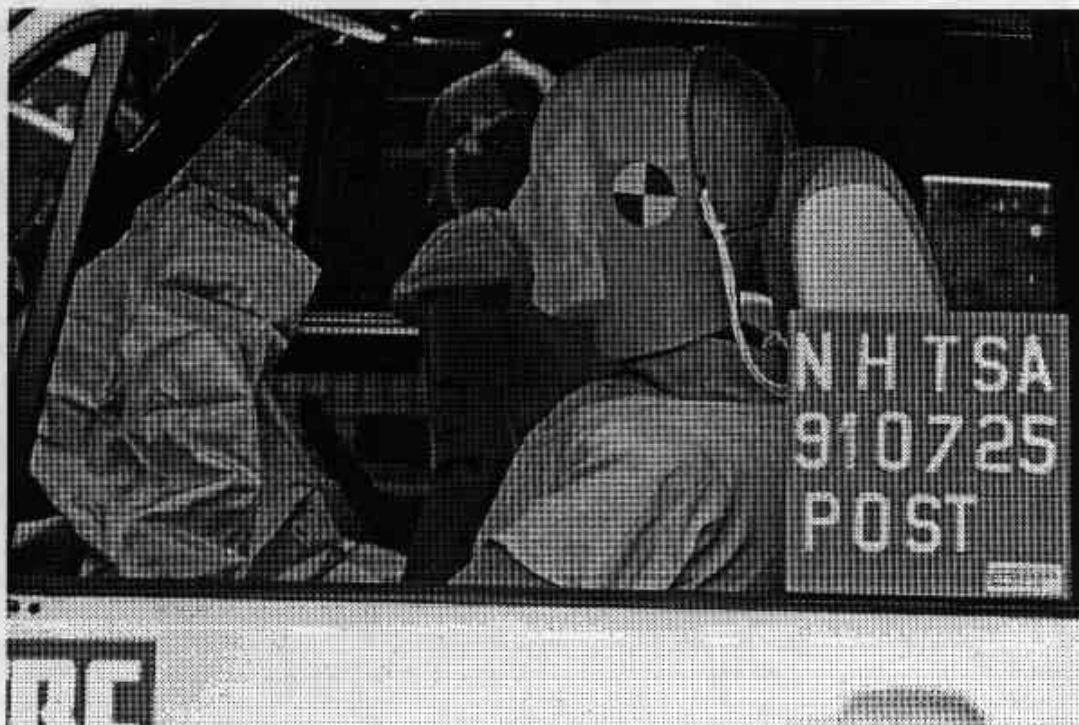


Figure A-27. POST-TEST DRIVER DUMMY POSITION VIEW



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



Fig A-29. POST-TEST PASSENGER DUMMY POSITION VIEW



Fig A-30. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 1



Fig A-31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 1



Fig A-32. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 2



Fig A-33. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 2



Fig A-34. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW 1



Fig A-35. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW 1

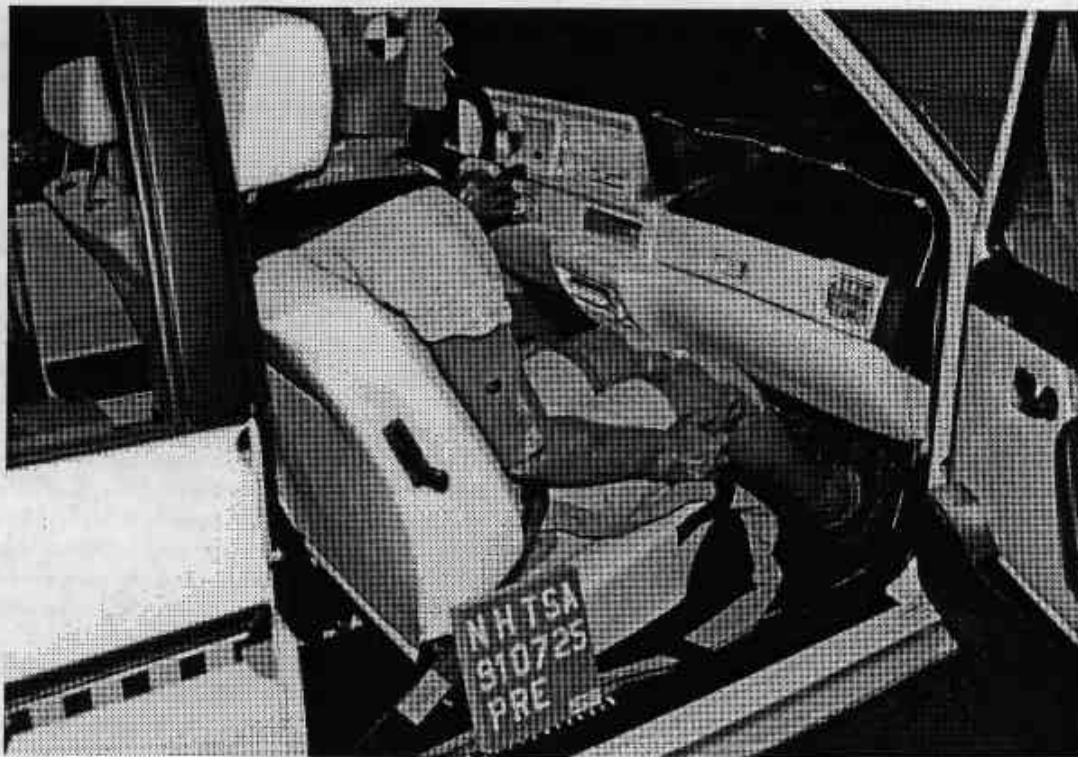


Fig A-36. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW 2



Fig A-37. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW 2

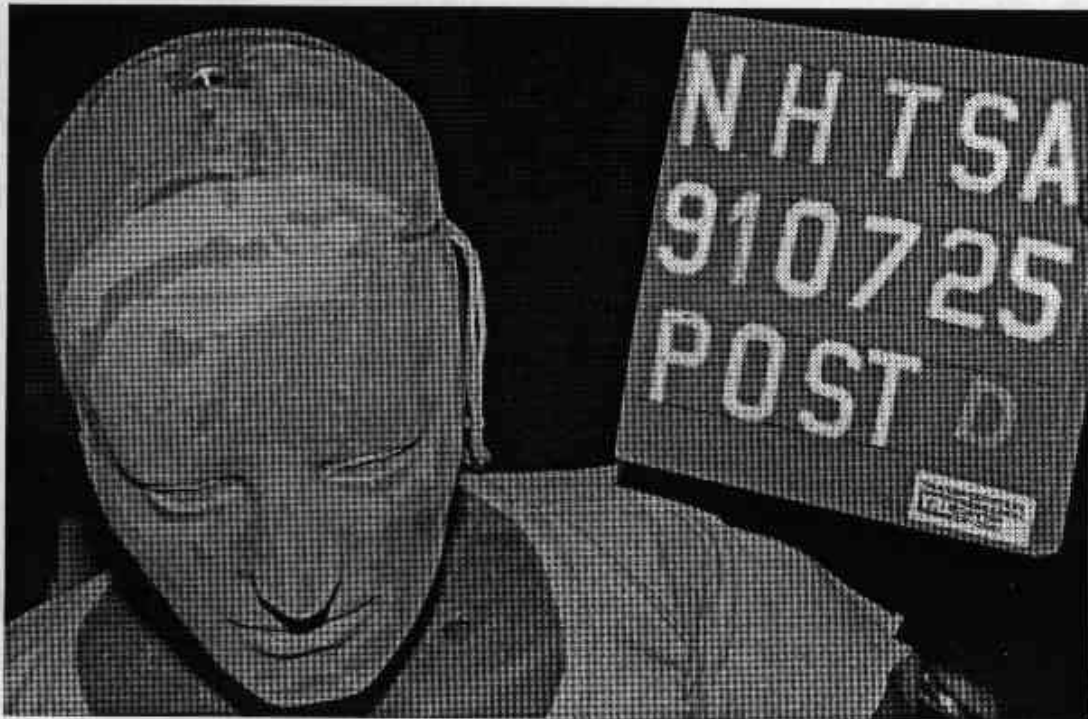


Fig A-38. POST-TEST DRIVER DUMMY HEAD CONTACT VIEW 1



Fig A-39. POST-TEST DRIVER DUMMY HEAD CONTACT VIEW 2



Fig A-40. POST-TEST DRIVER DUMMY KNEE CONTACT VIEW 1

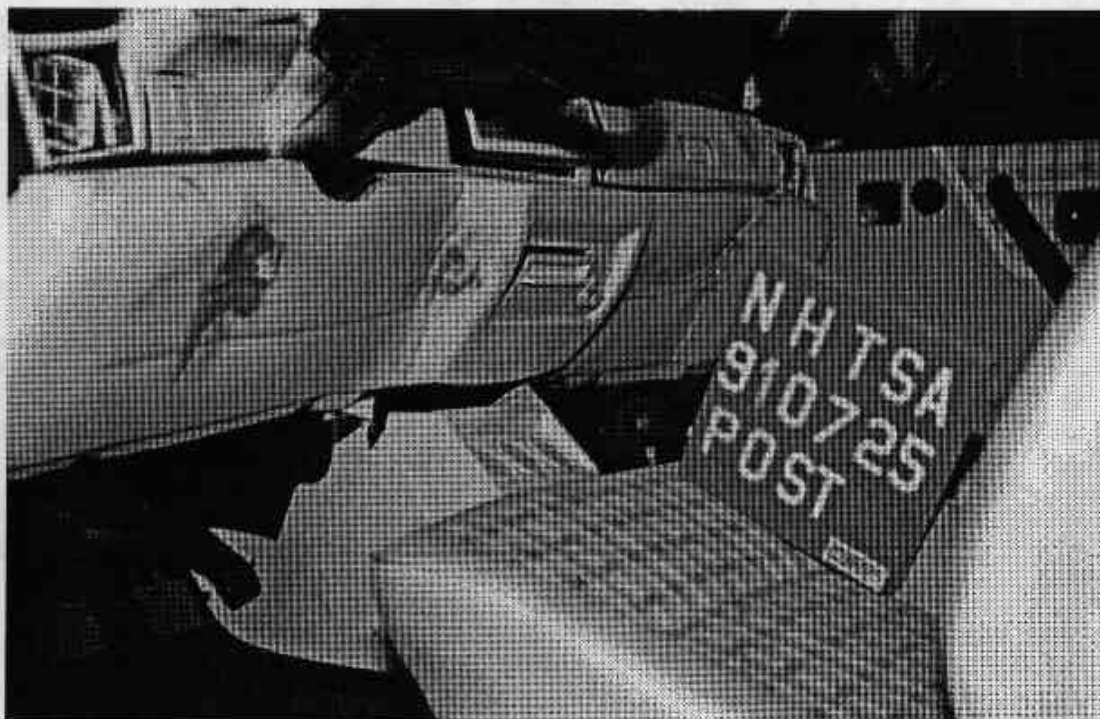


Fig A-41. POST-TEST DRIVER DUMMY KNEE CONTACT VIEW 2



Fig A-42. POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW



Fig A-43. POST-TEST PASSENGER DUMMY KNEE CONTACT VIEW



Fig A-44. POST-TEST PASSENGER DUMMY HEAD & KNEE CONTACT VIEW

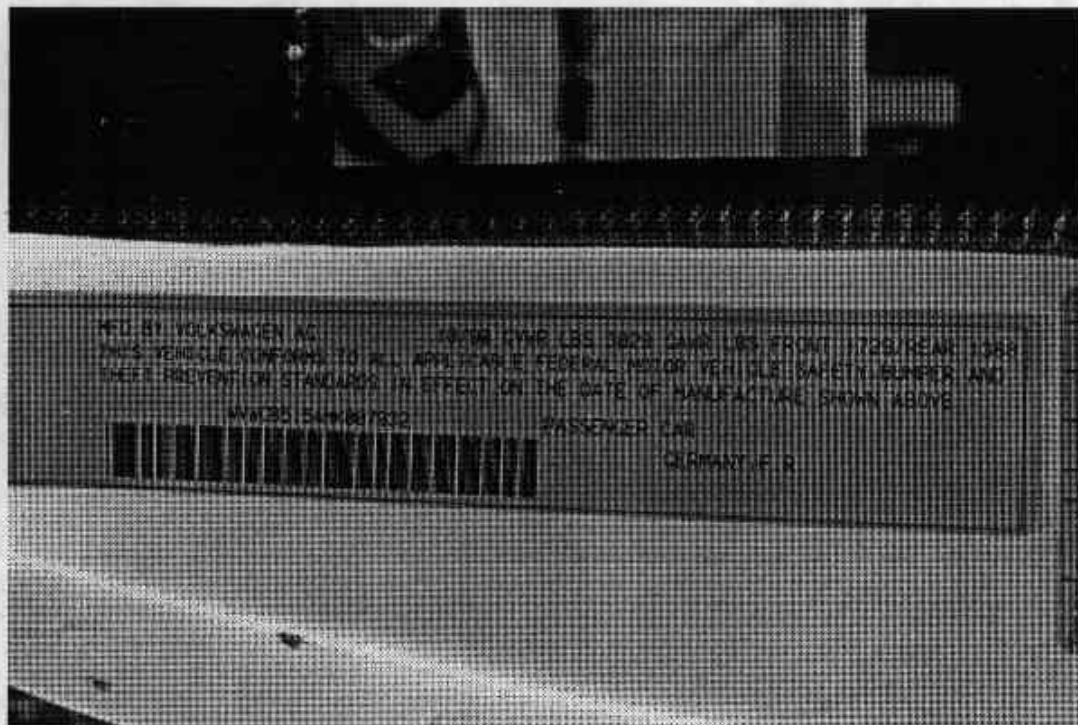


Fig A-45. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW

MAX. LOAD / VEHICLE CAPACITY WEIGHTS (in lbs / kg)							
If provided		2 doors		4 doors			
		Shk Tr.	Aut Tr.	Shk Tr.	Aut Tr.		
With	Z	660	605				
Air-conditioning							
Without		722	667				
Air-conditioning							
DESIGNATED SEATING CAPACITY: 4 2 front / 2 rear							
COLD TIRE		RIM 6J					
INFLATION		half load	max. load	half load	max. load		
PRESSURE		front	rear	front	rear	front	rear
S 185/60 R14 H		29	29	30	33		
Z							
1 (COMPACT SPARE WHEEL) 1 (105/70 R13) RIM 3 1/2 J 50PSI							

Fig A-46. PRE-TEST VEHICLE RECOMMENDED TIRE PRESSURE LABEL

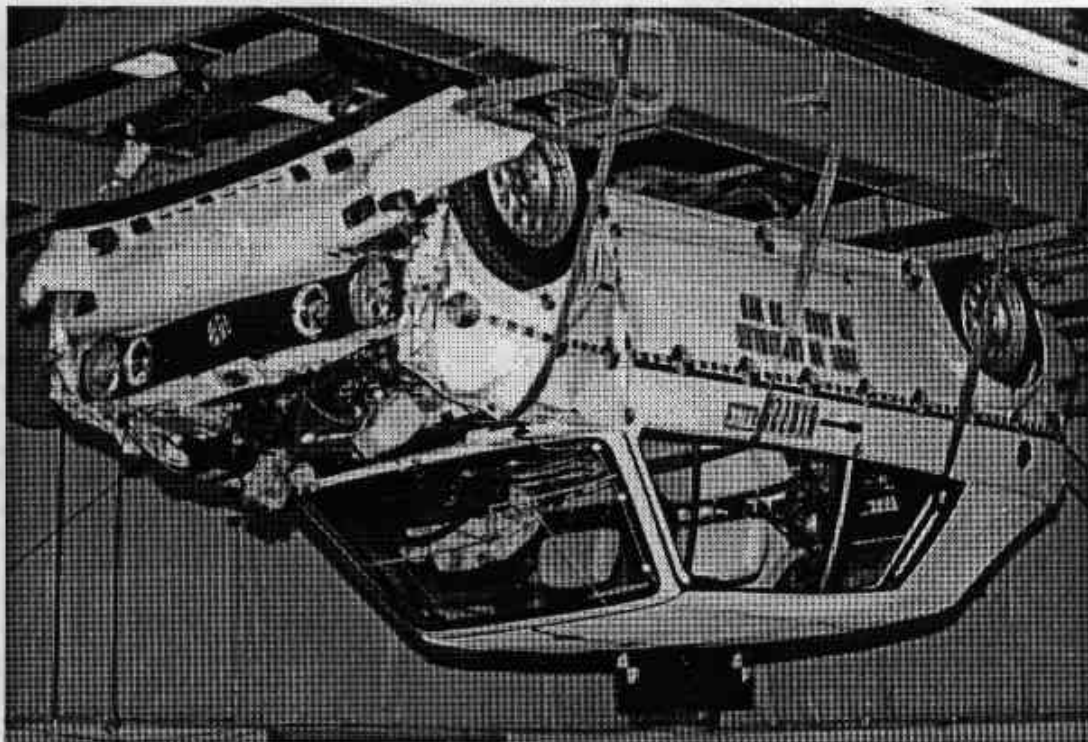


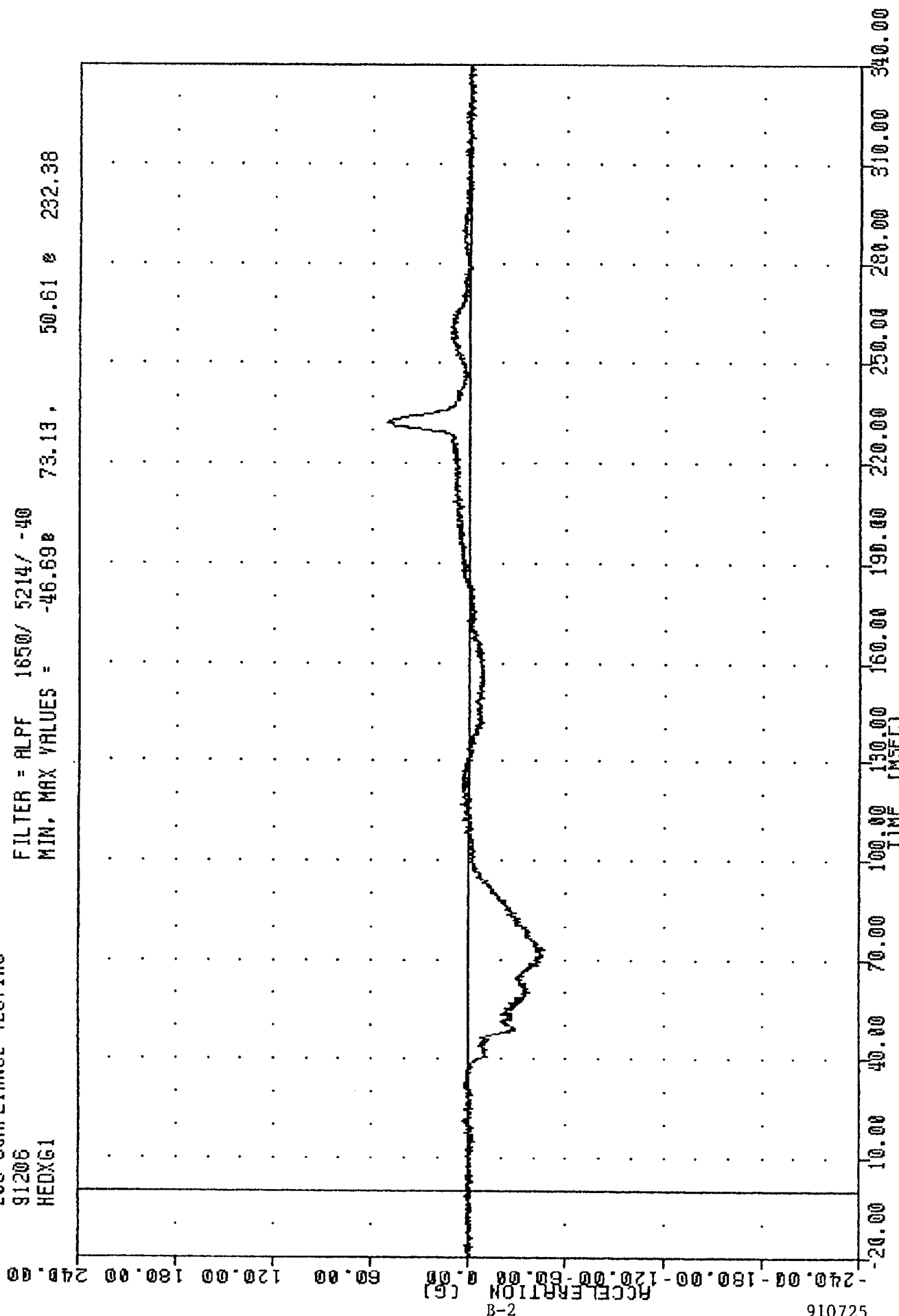
Fig A-47. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW

APPENDIX B

DATA PLOTS

TRC
208 COMPLIANCE TESTING
91206
HEDXG1

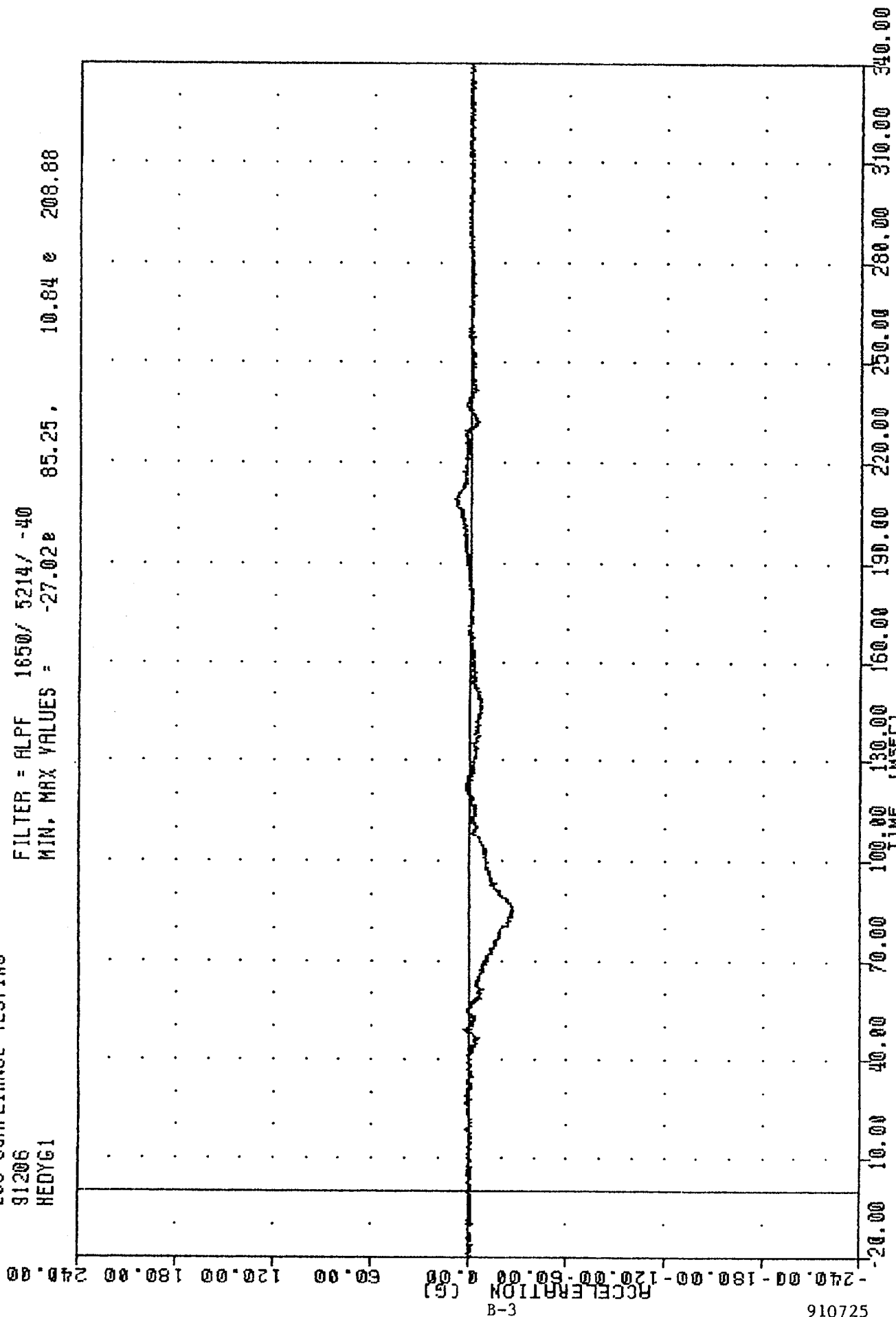
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -46.698 73.13, 50.61 232.38



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 HEDYG1

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -27.02e 85.25, 10.84 e 208.88



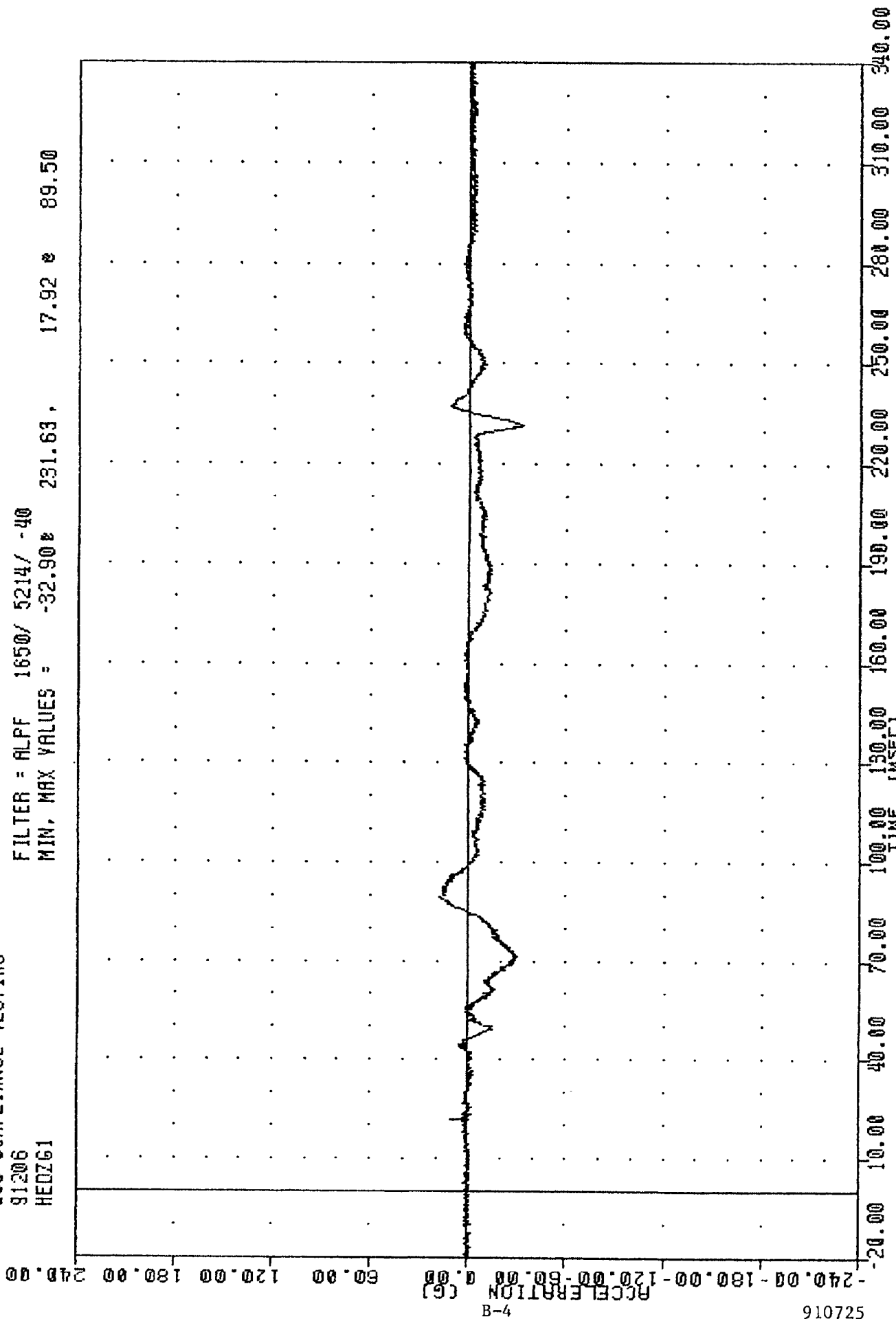
B-3

910725

1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Y-AXIS ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 HED761

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -32.90% 231.63, 17.92% 89.50



B-4

910725

1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 DRIVER HEAD Z-AXIS ACCELERATION

TRC

910725

208 COMPLIANCE TESTING

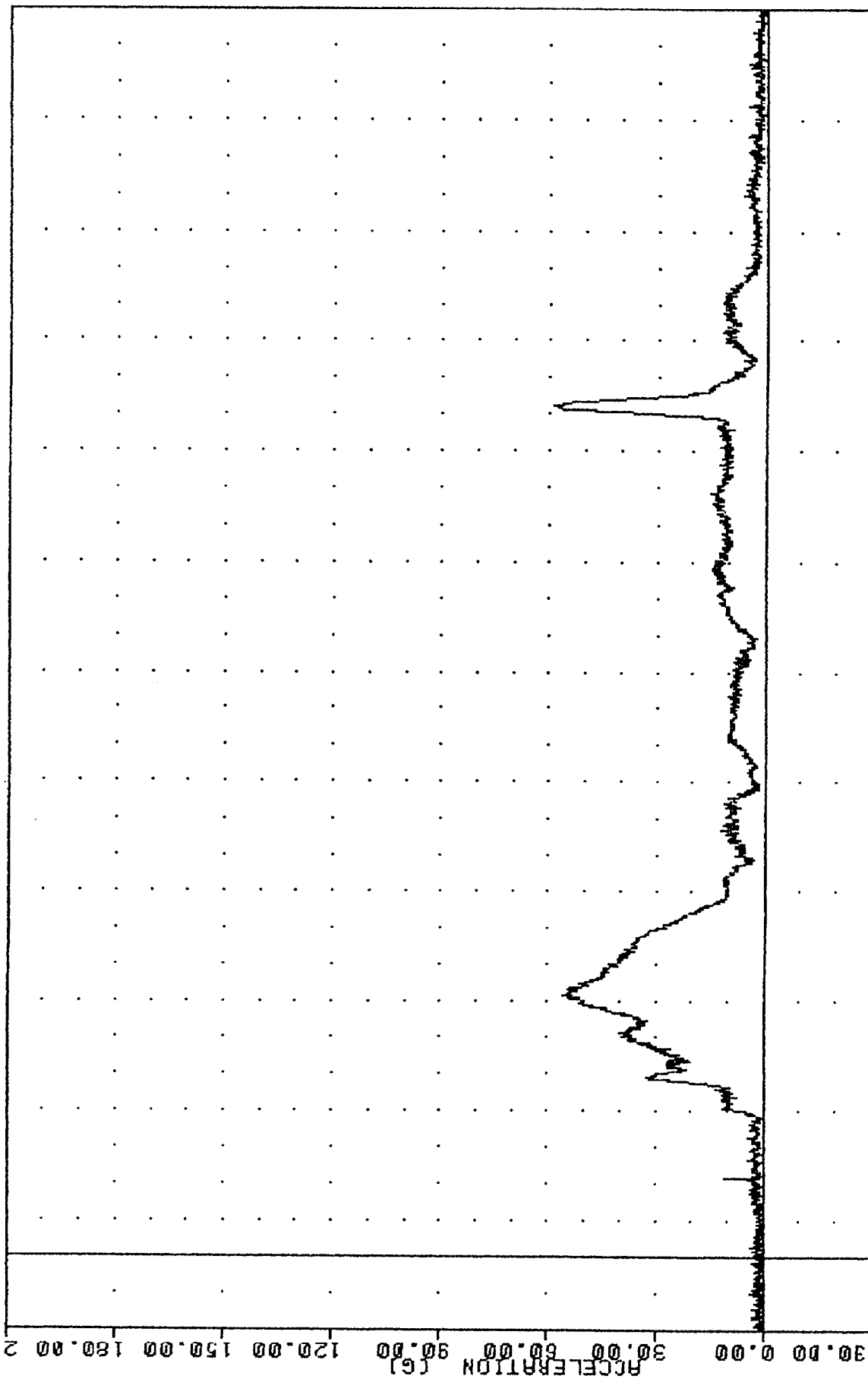
91206

HEADG1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = 0.10e 4.00, 58.71 e 232.38

210.00



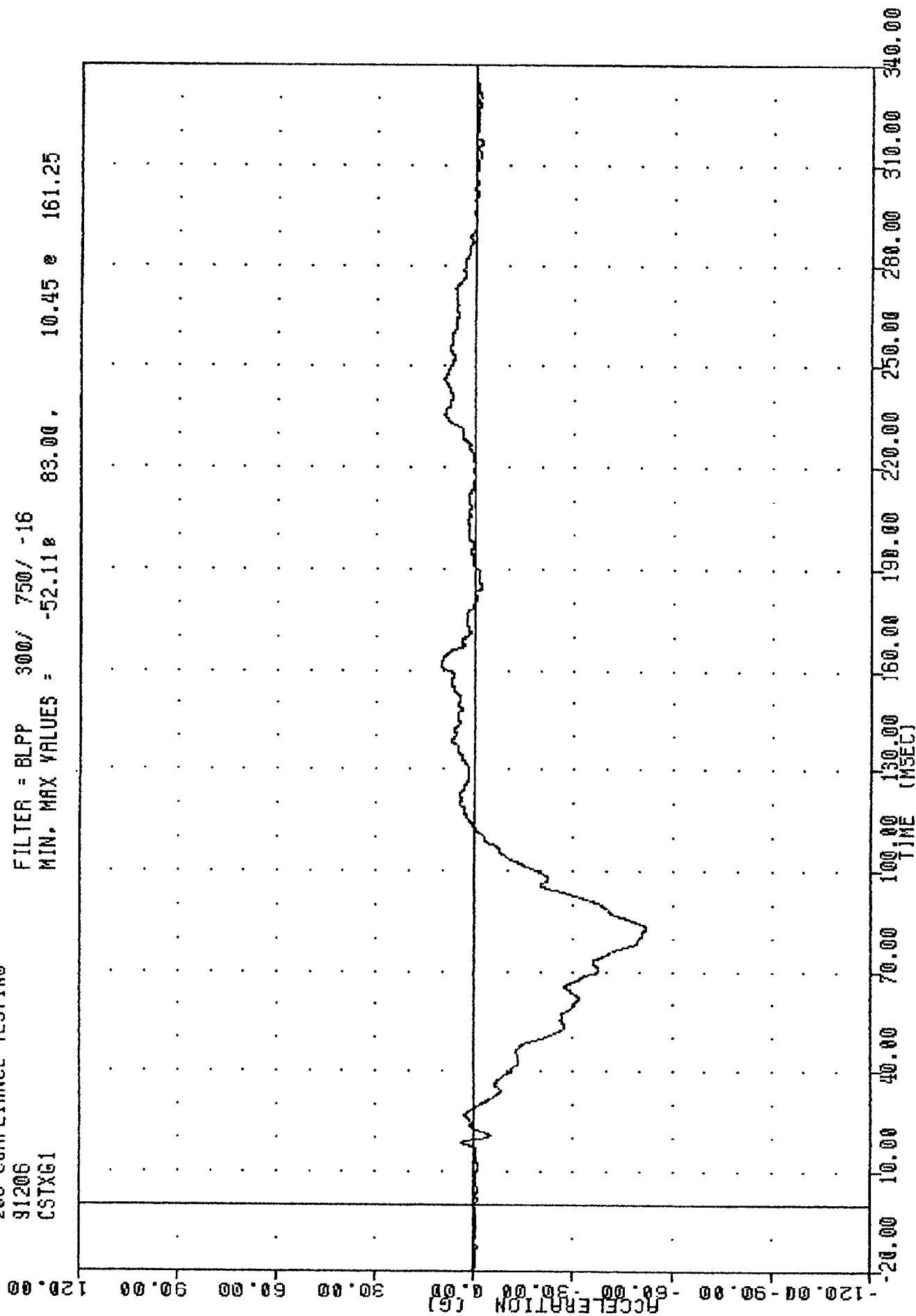
B-5

910725

1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

TRC , 910725
200 COMPLIANCE TESTING
91206
CSTXG1

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -52.118 83.00, 10.45 e 161.25



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION

TRC

910725

200 COMPLIANCE TESTING

91206

CSTYG1

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -10.07e 83.38 , 4.38 e 138.38

120.00

90.00

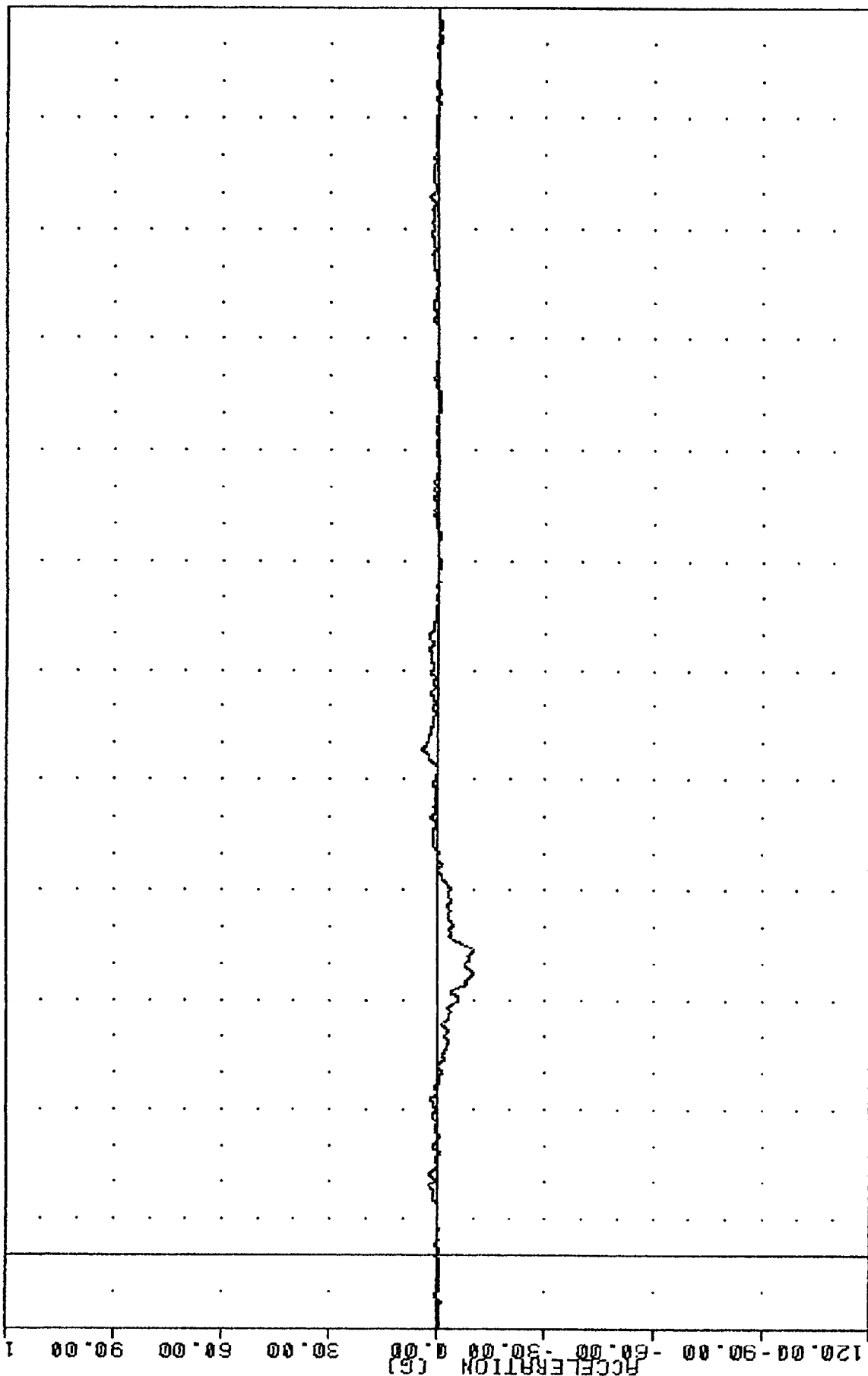
60.00

30.00

0.00

B-7

910725



-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

1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION

TRC 910725

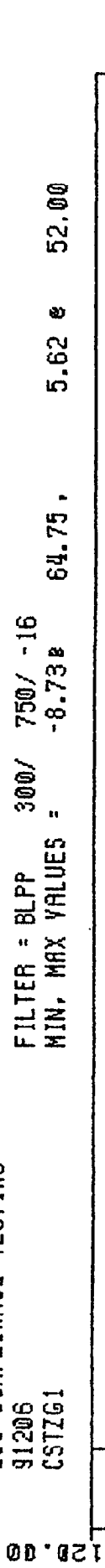
200 COMPLIANCE TESTING

91206

CSTIG1

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -8.73 64.75, 5.62 52.00



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION

TRC 910725

200 COMPLIANCE TESTING

91206

CSTRG1

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = 0.050 -20.00, 53.17 e 83.13

105.00

90.00

75.00

60.00

45.00

B-9

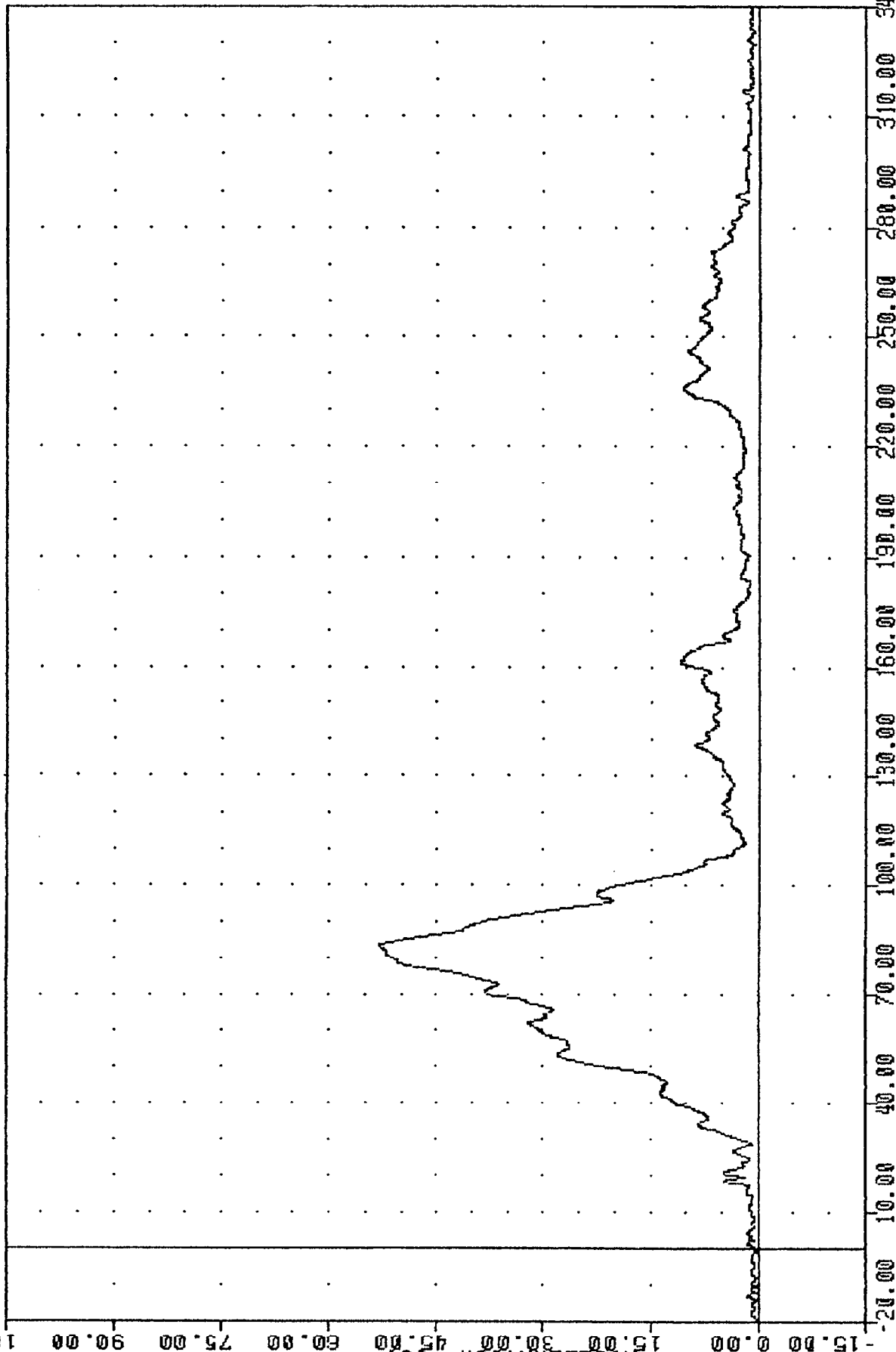
ACCELERATION (G)

15.00

0.00

-15.00

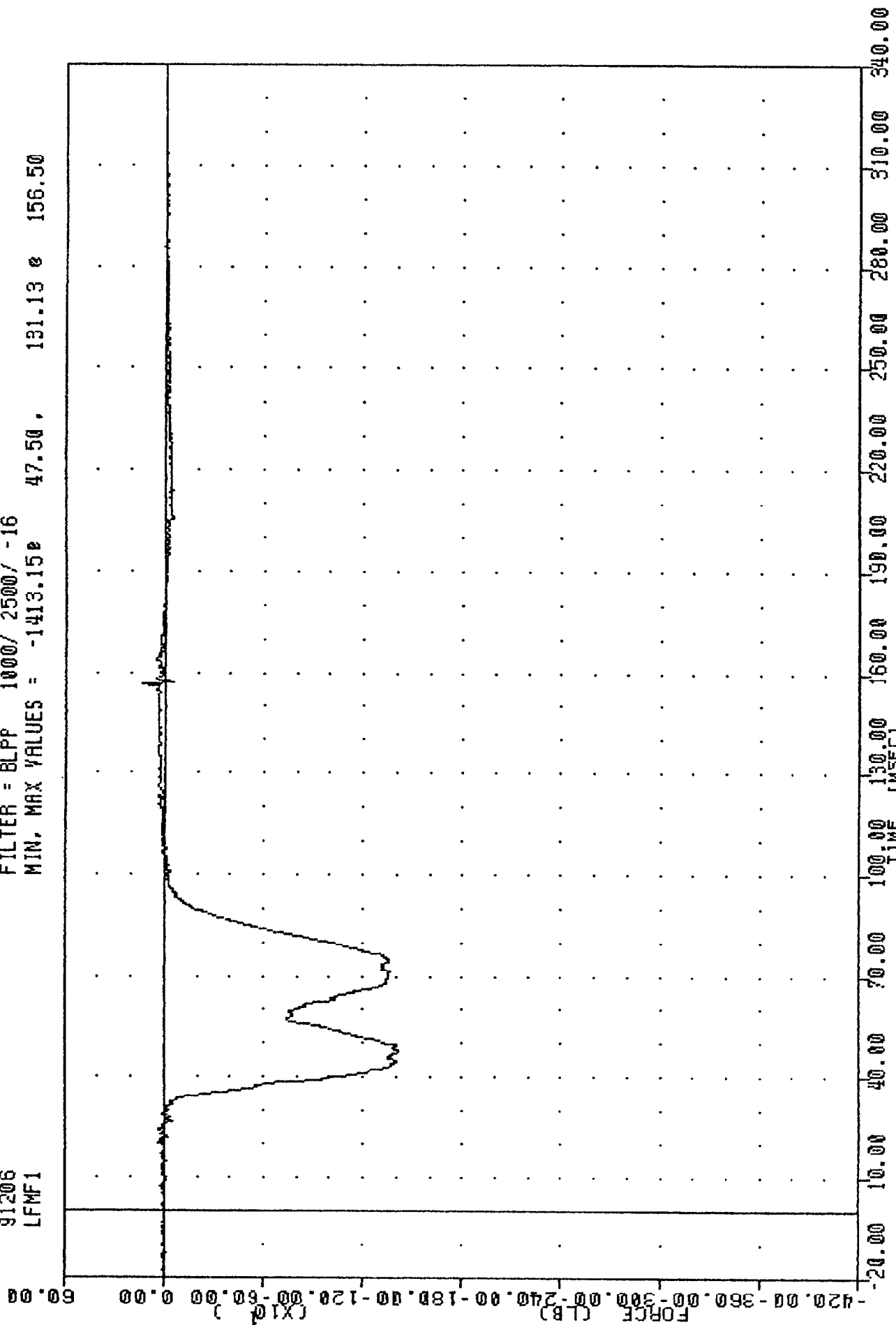
910725



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 LFMF1

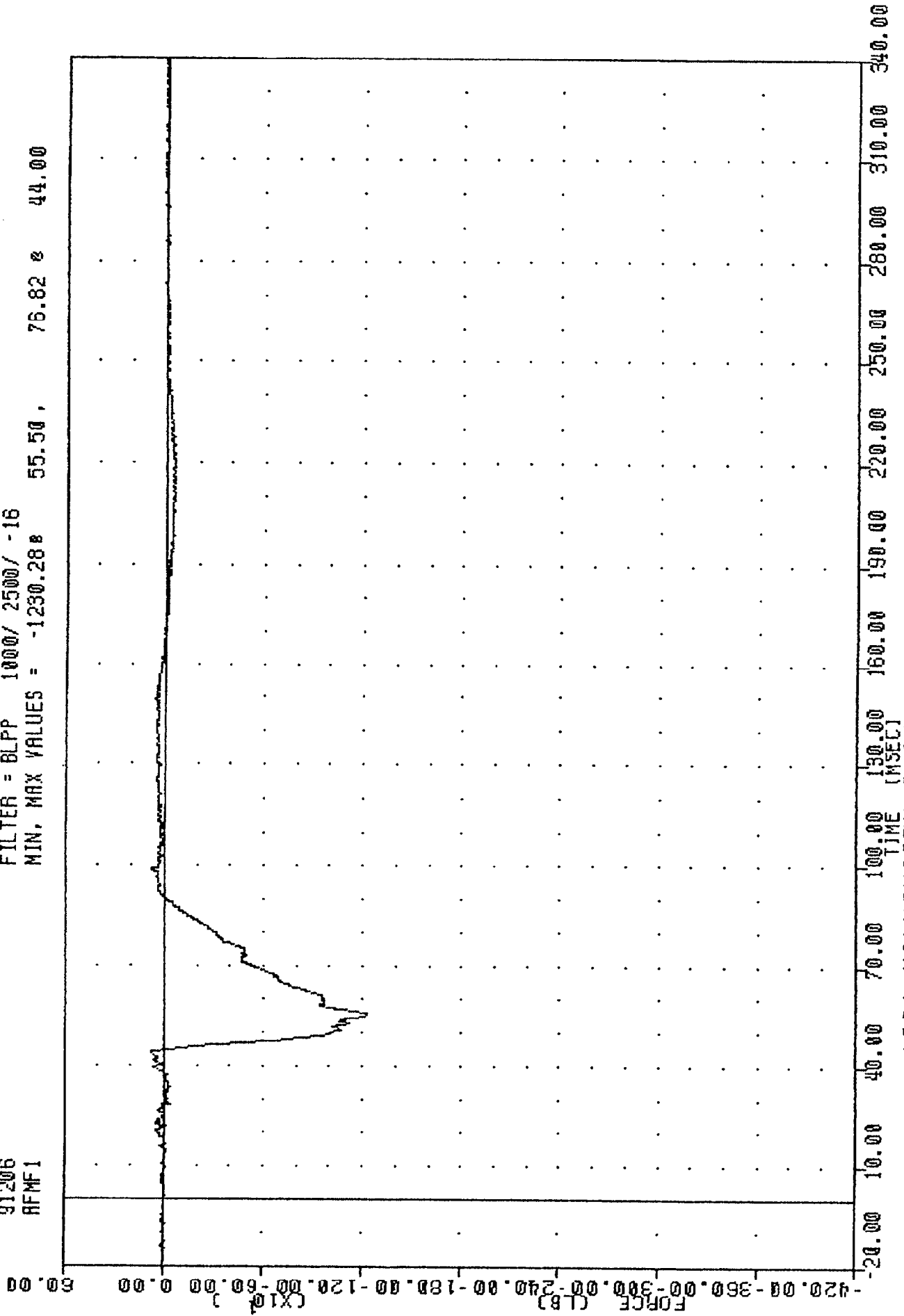
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1413.15e 47.50, 131.13 e 156.50



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 DRIVER LEFT FEMUR FORCE

TRC 910725
 208 COMPLIANCE TESTING
 91206
 RFMF1

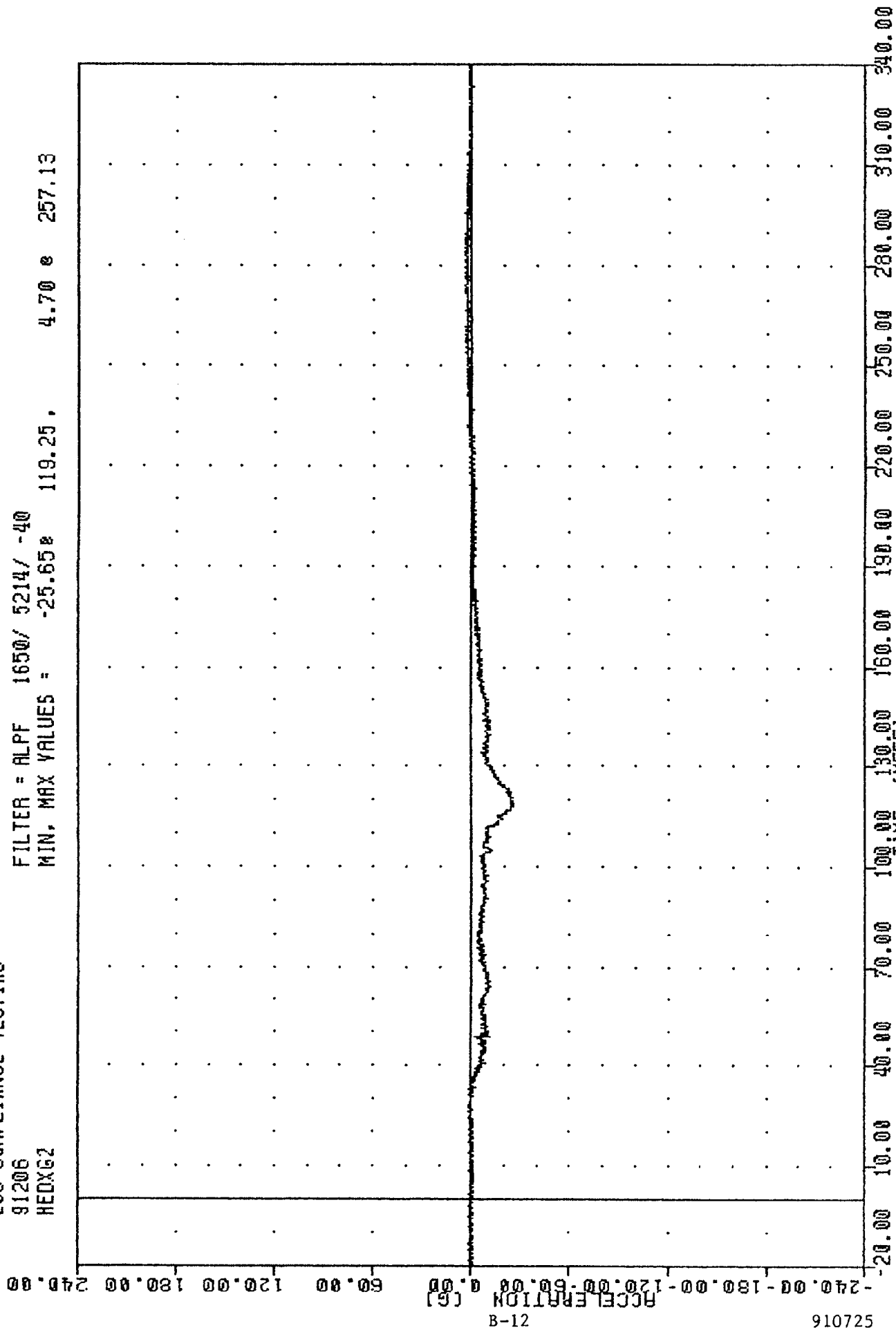
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1230.28 55.50, 76.82 44.00



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 DRIVER RIGHT FEMUR FORCE

TRC 910725
 208 COMPLIANCE TESTING
 91206
 HEDXG2

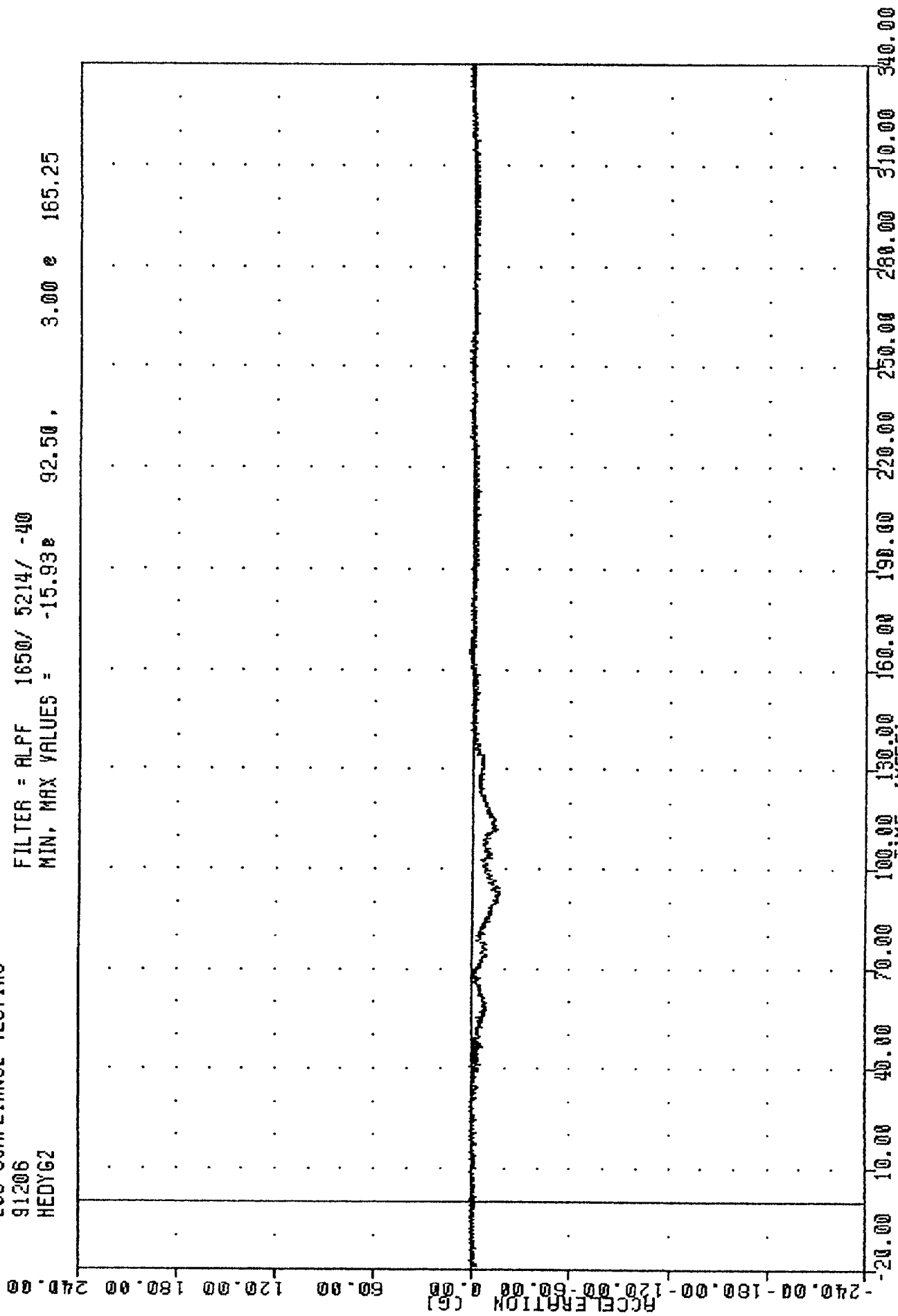
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -25.658 119.25, 4.70 e 257.13



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 HEDY62

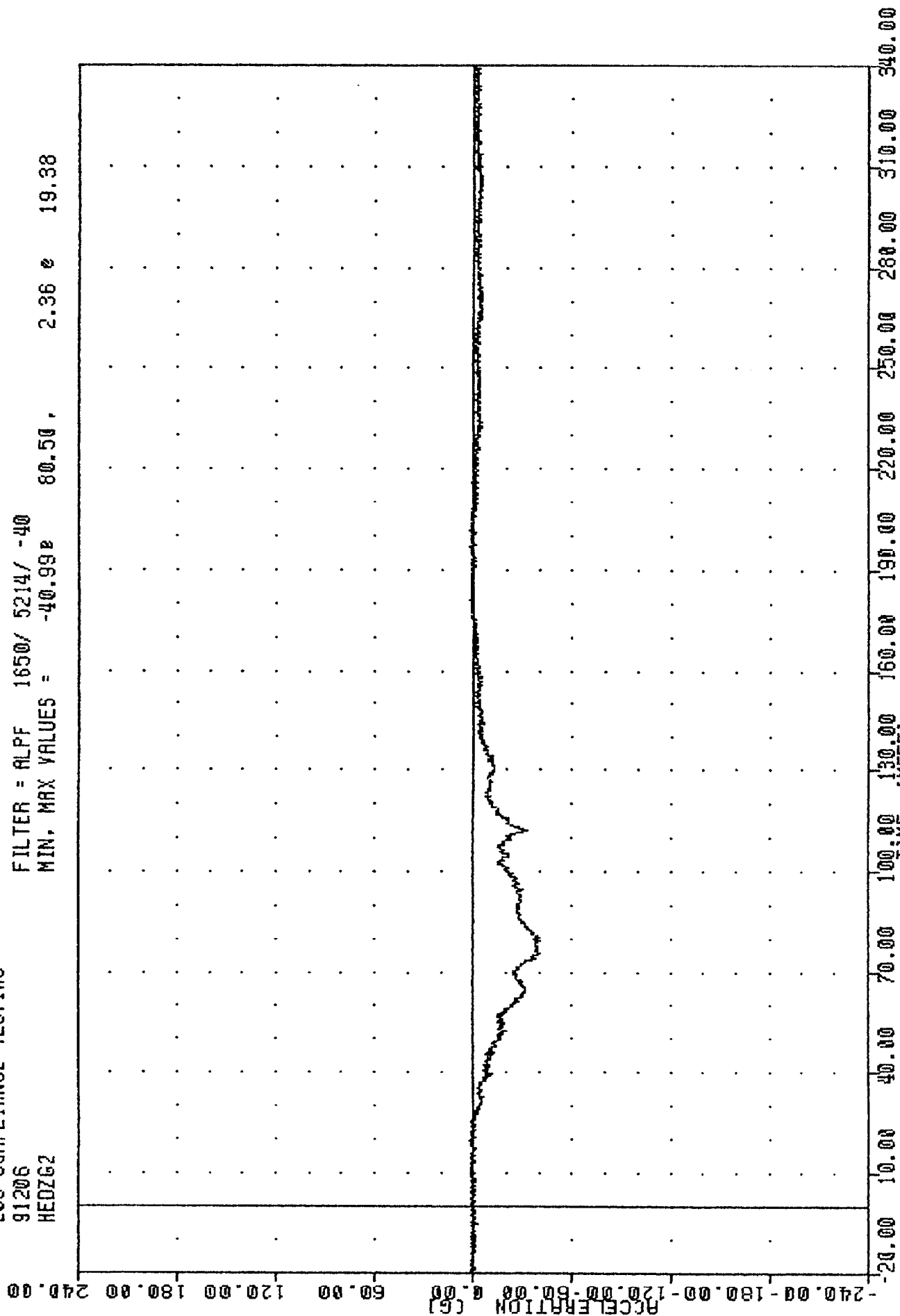
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -15.93e 92.50, 3.00 e 165.25



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 HEDZG2

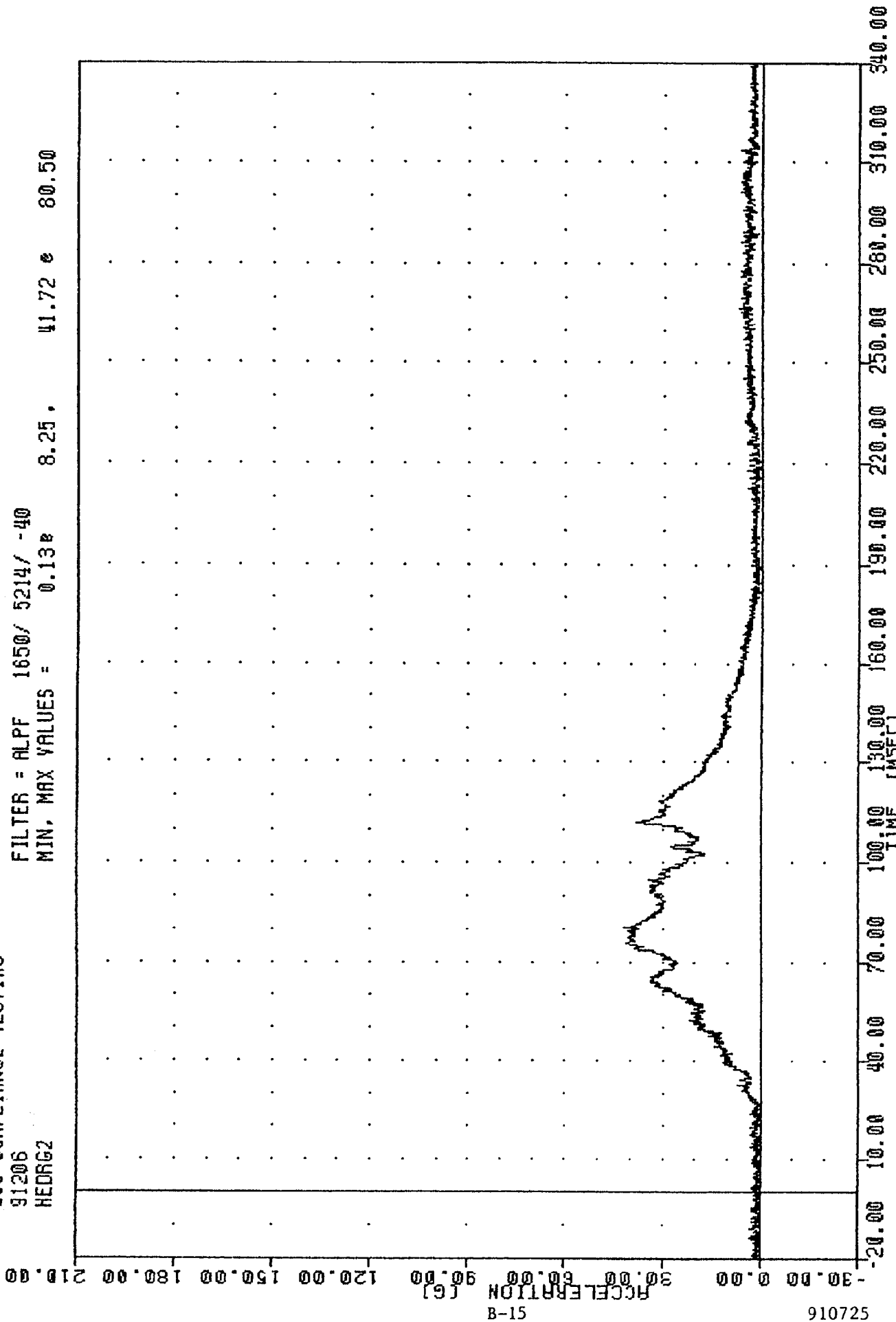
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -40.992 80.50, 2.36 e 19.38



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

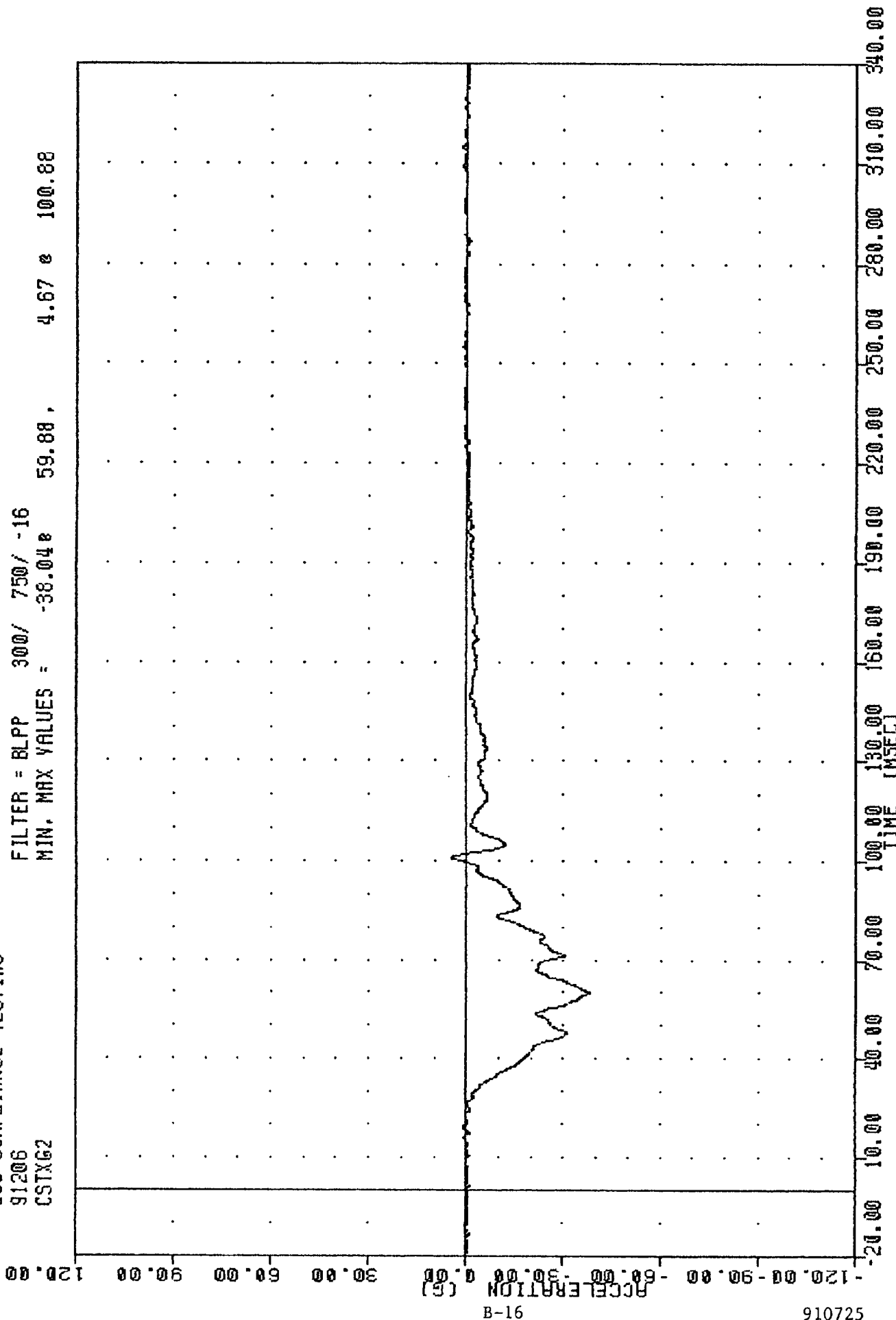
TRC 910725
 208 COMPLIANCE TESTING
 91206
 HEDRG2

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.13e 8.25, 41.72 e 80.50



TRC 910725
200 COMPLIANCE TESTING
91206
CSTX62

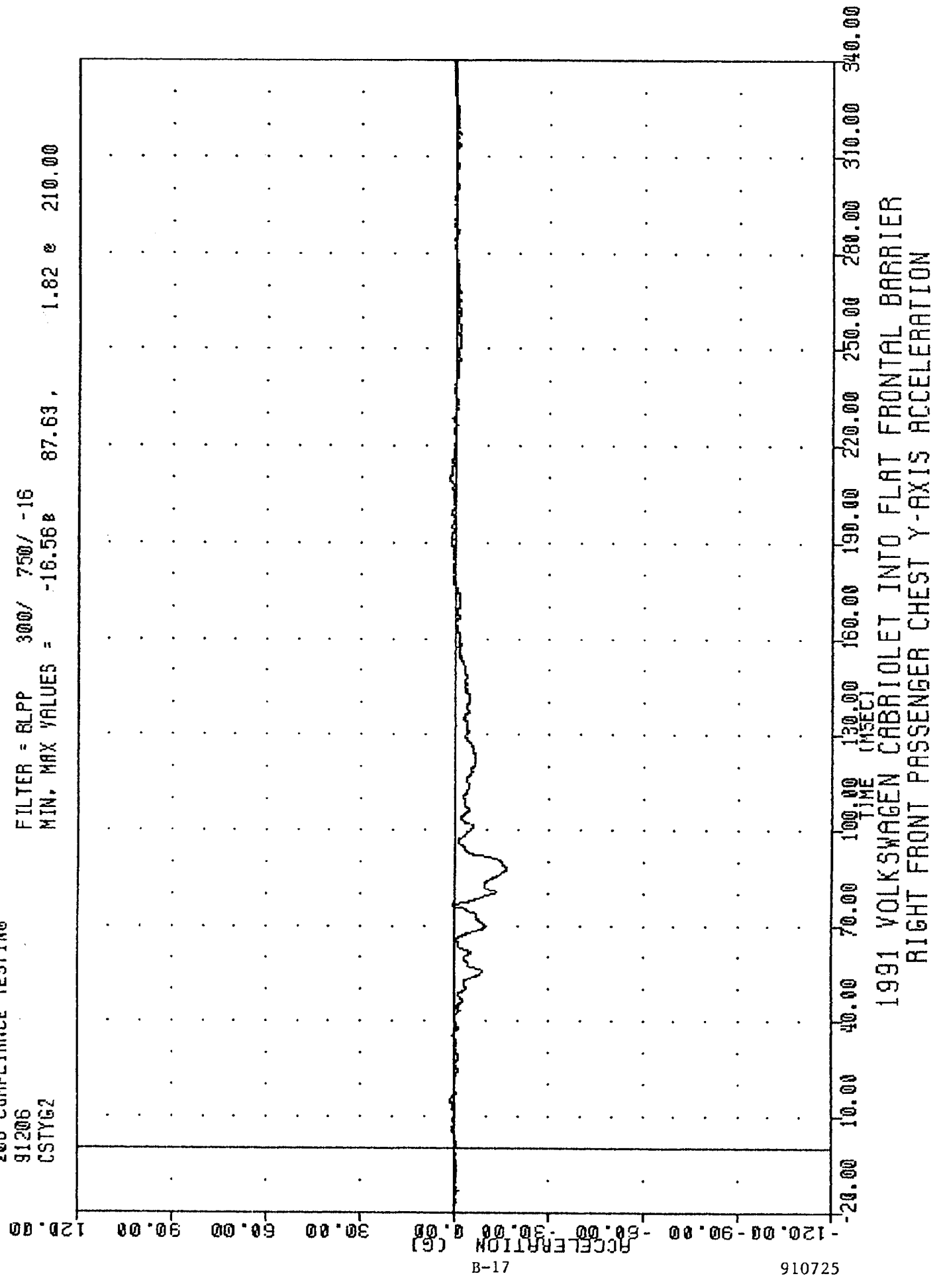
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -38.048 59.88 , 4.67 & 100.88



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

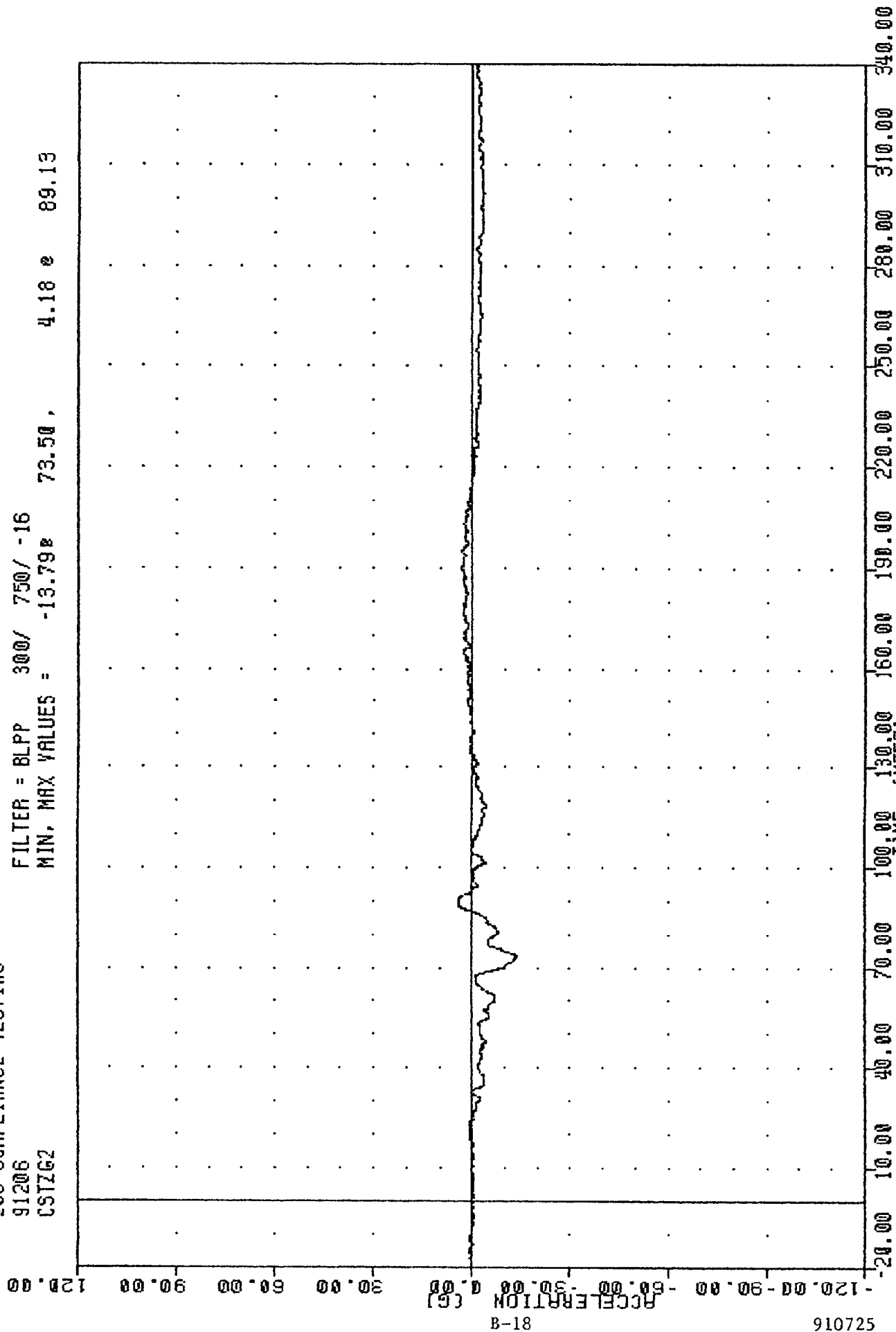
TRC 910725
200 COMPLIANCE TESTING
91206
CSTYG2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -16.56 87.63, 1.82 e 210.00



TRC 910725
 208 COMPLIANCE TESTING
 91206
 CST162

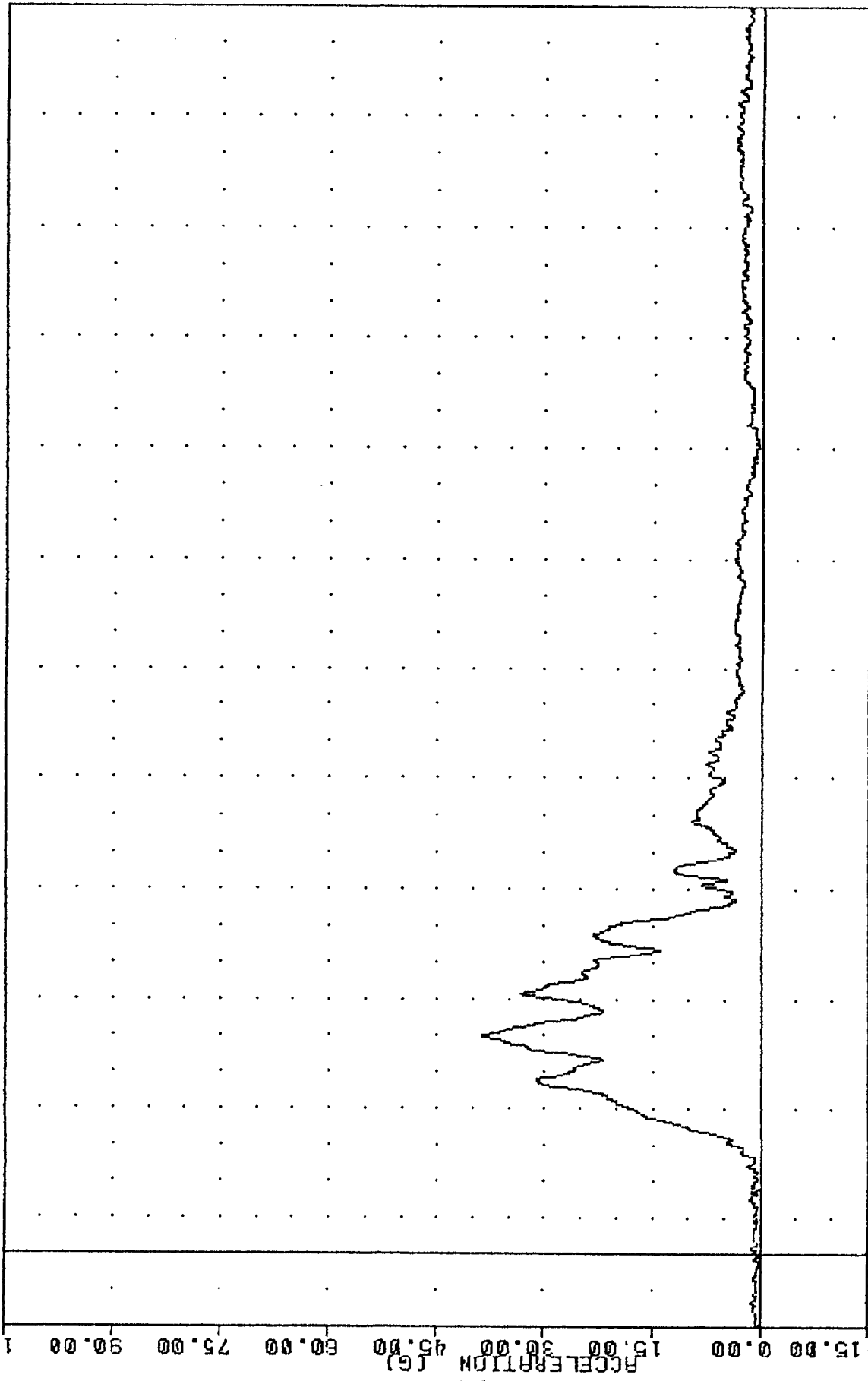
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -13.79% 73.50, 4.18 e 89.13



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

TRC 910725
 200 COMPLIANCE TESTING
 91206
 CSTRG2

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.108 -20.00, 38.73 e 60.00



-15.00
 -10.00
 -5.00
 0.00
 5.00
 10.00
 15.00
 20.00
 25.00
 30.00
 35.00
 40.00
 45.00
 50.00
 55.00
 60.00
 65.00
 70.00
 75.00
 80.00
 85.00
 90.00
 95.00
 100.00
 105.00

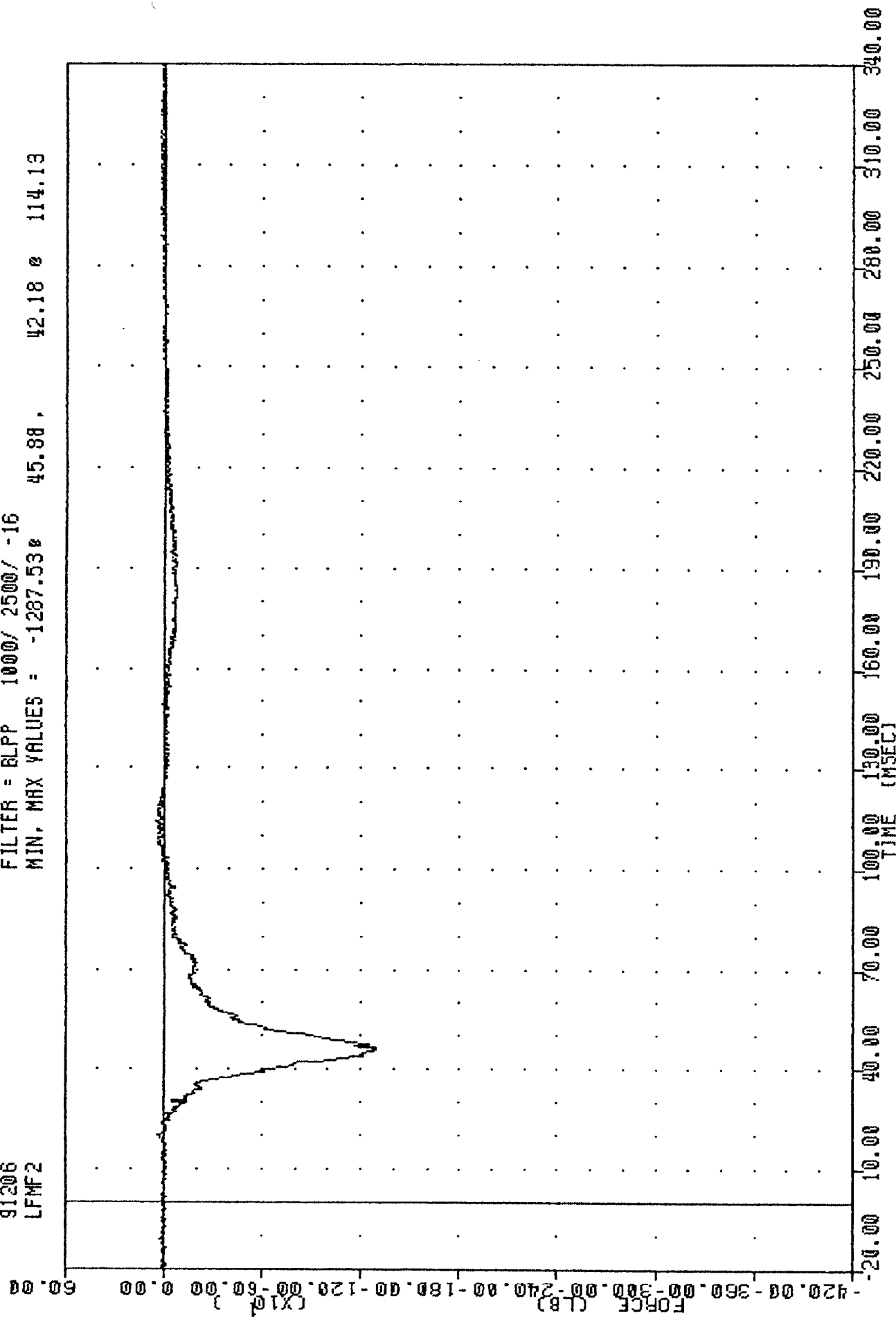
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (MSEC)

1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

TRC 910725
 208 COMPLIANCE TESTING
 91206
 LFMF2

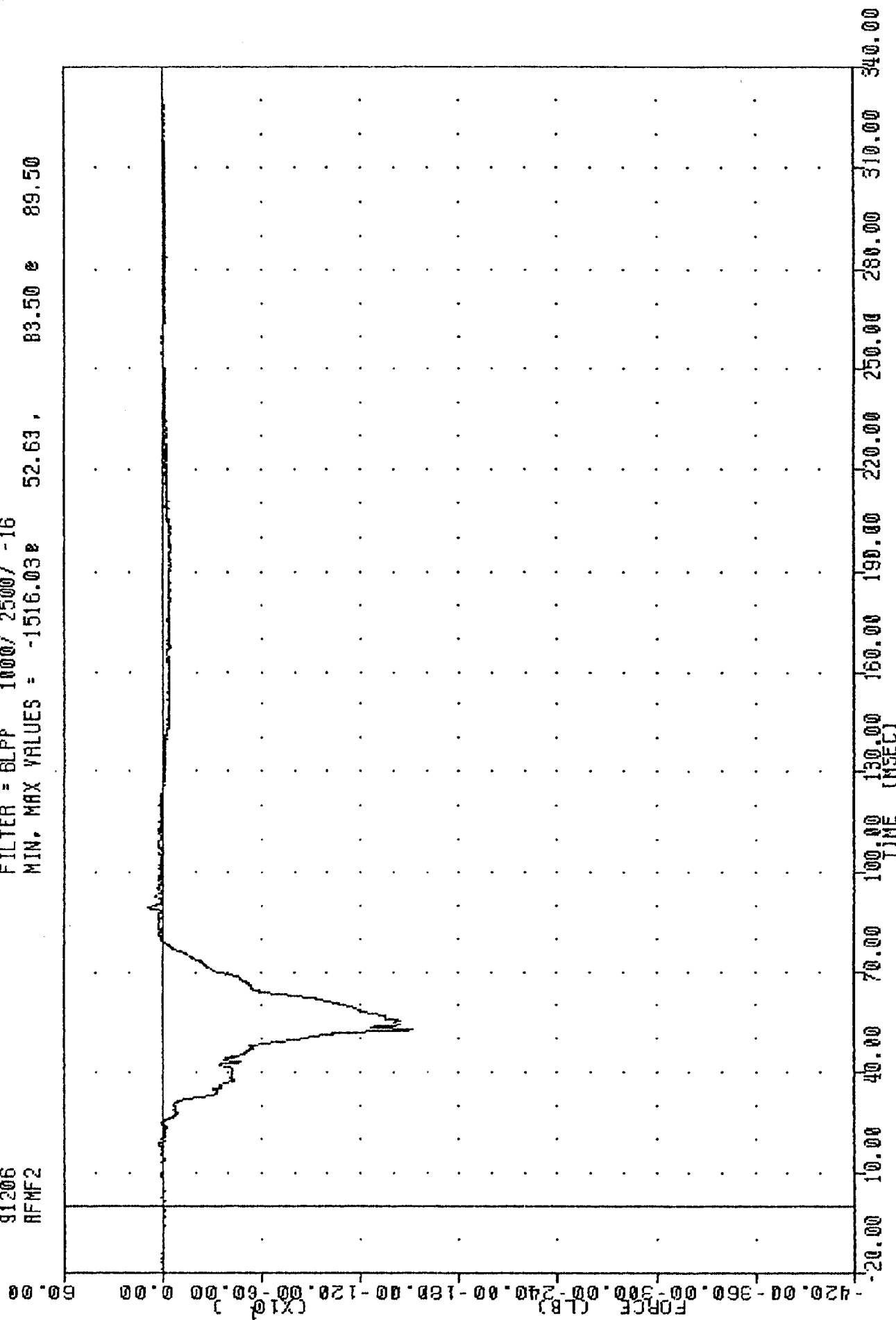
FILTER = BLPP 1000/ 2500/ -16
 MIN, MAX VALUES = -1287.53# 45.88 , 42.18 # 114.13



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER LEFT FEMUR FORCE

TRC 910725
 308 COMPLIANCE TESTING
 91206
 RFMF2

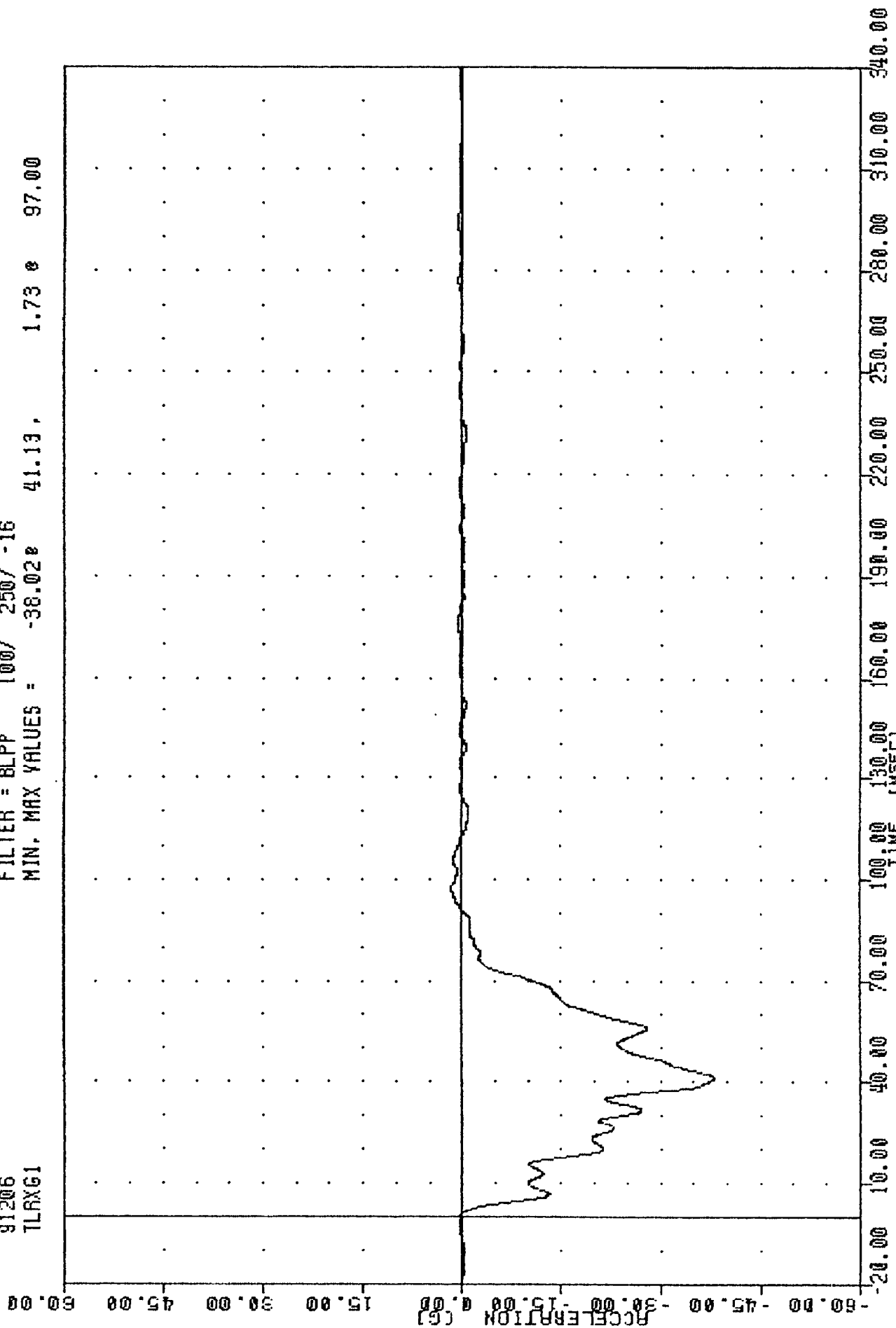
FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -1516.03 52.63 , 83.50 e 89.50



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

TRC 910725
200 COMPLIANCE TESTING
91206
TLRX61

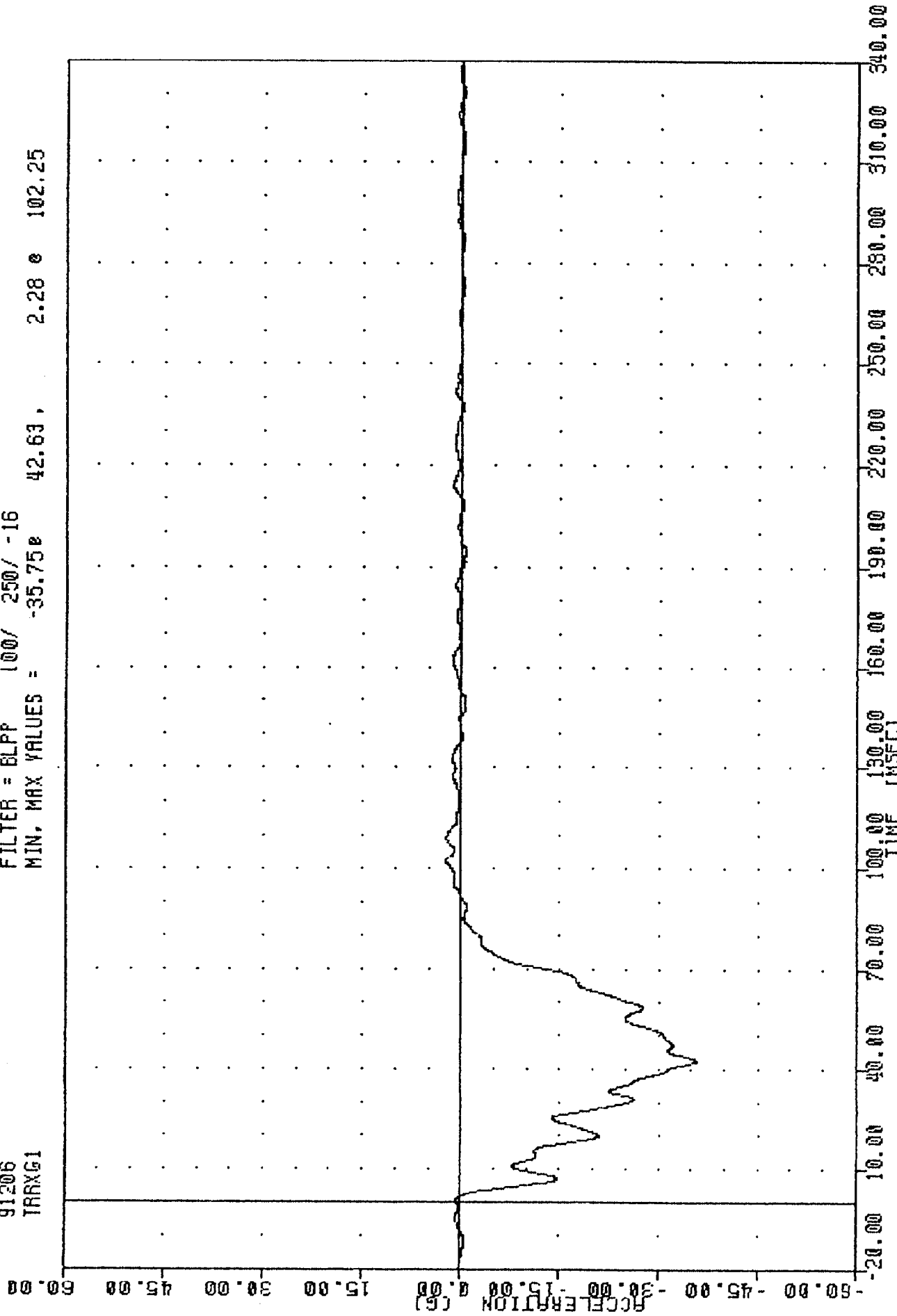
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -38.020 41.13 1.73 0 97.00



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION

TRC 910725
208 COMPLIANCE TESTING
91206
TRRXG1

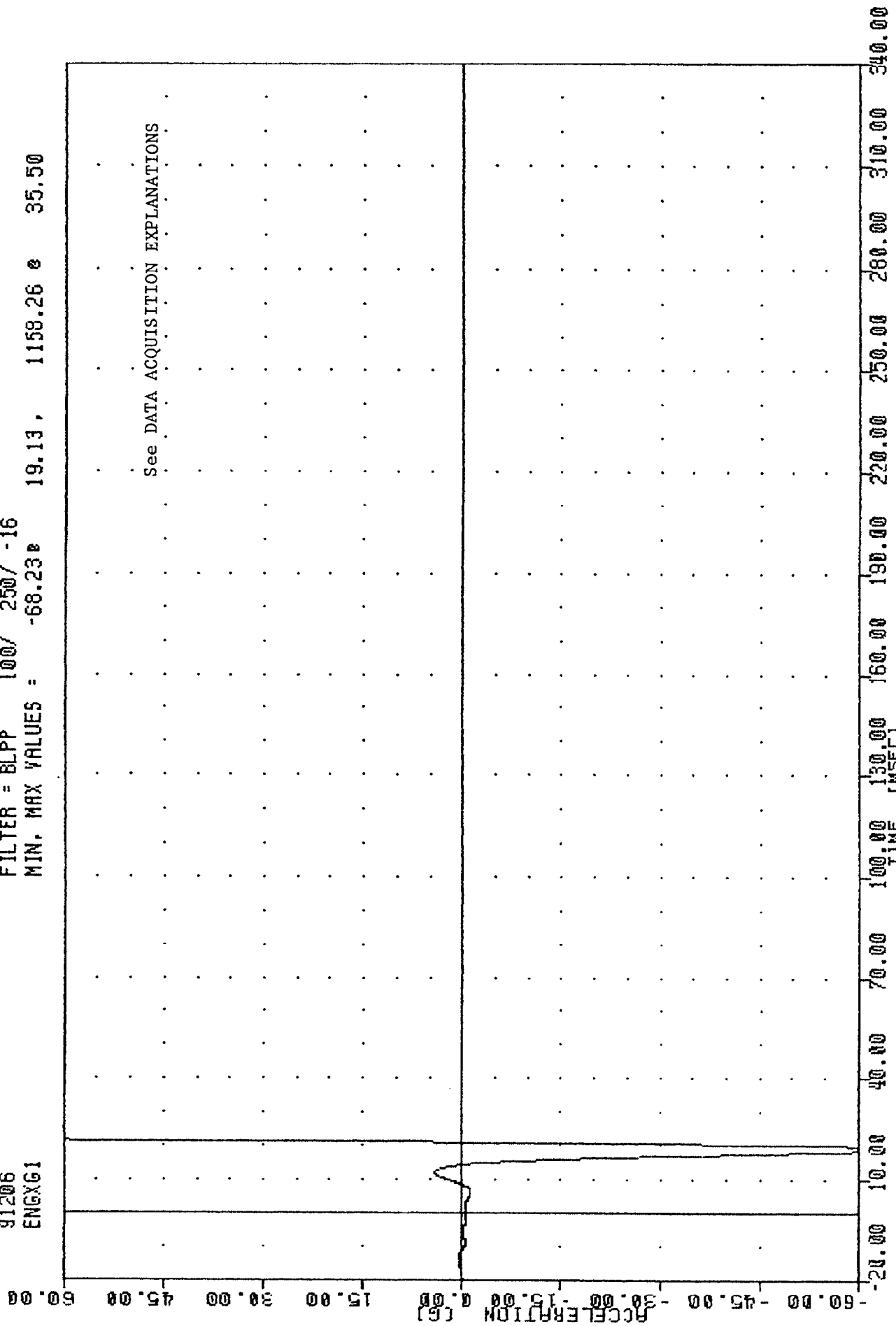
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -35.75e 42.63, 2.28 e 102.25



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

TRC , 910725
 200 COMPLIANCE TESTING
 91206
 ENGCG1

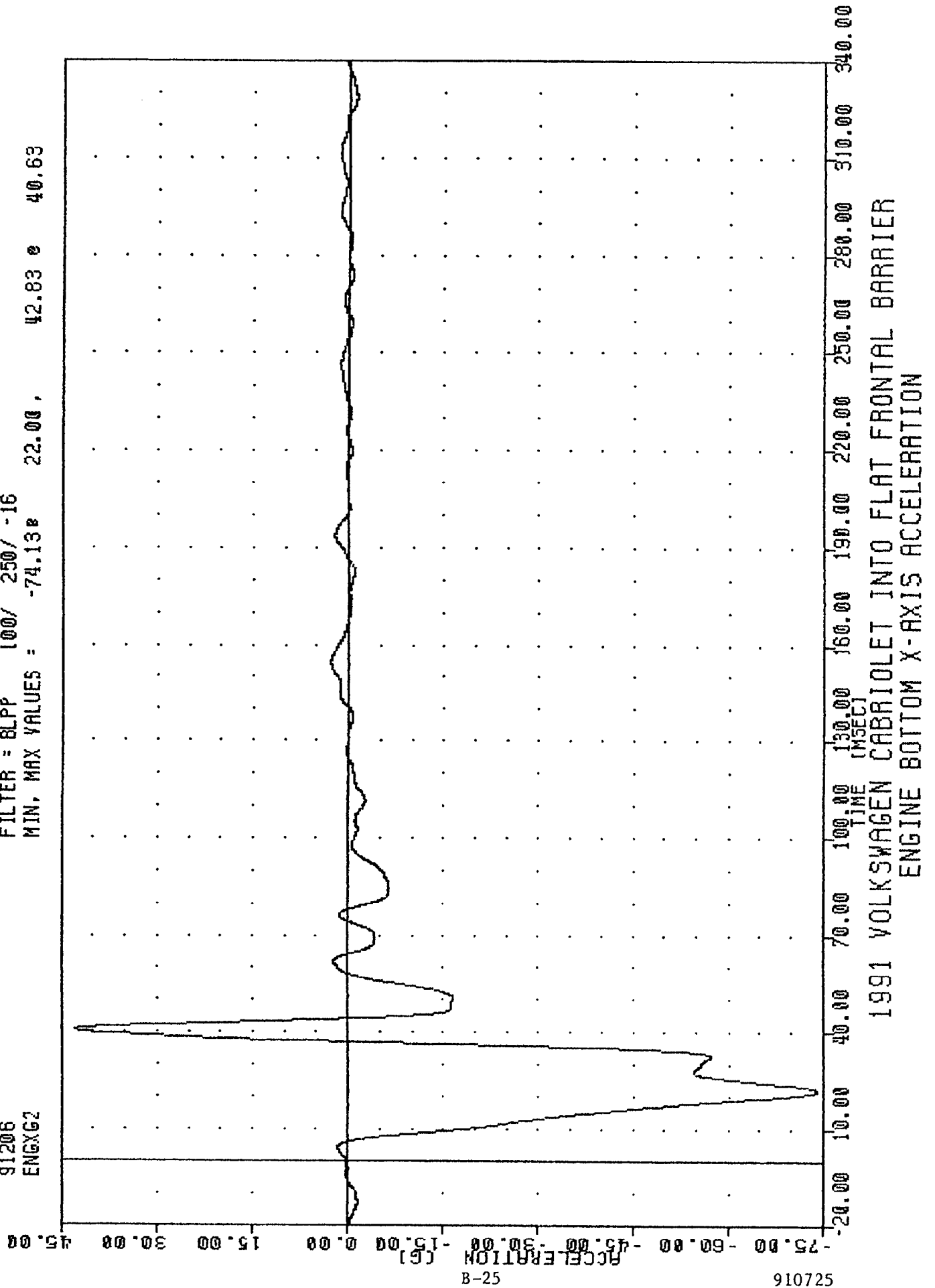
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -68.230 19.13, 1158.26 0 35.50



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
 ENGINE TOP X-AXIS ACCELERATION

TRC 910725
208 COMPLIANCE TESTING
91206
ENGXG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -74.13 22.00, 42.83 40.63



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
ENGINE BOTTOM X-AXIS ACCELERATION

TRC 910725

208 COMPLIANCE TESTING

91206

BCRXG1

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -128.43 43.25, 30.61 e 58.00

90.00

60.00

30.00

0.00

-30.00

-60.00

-90.00

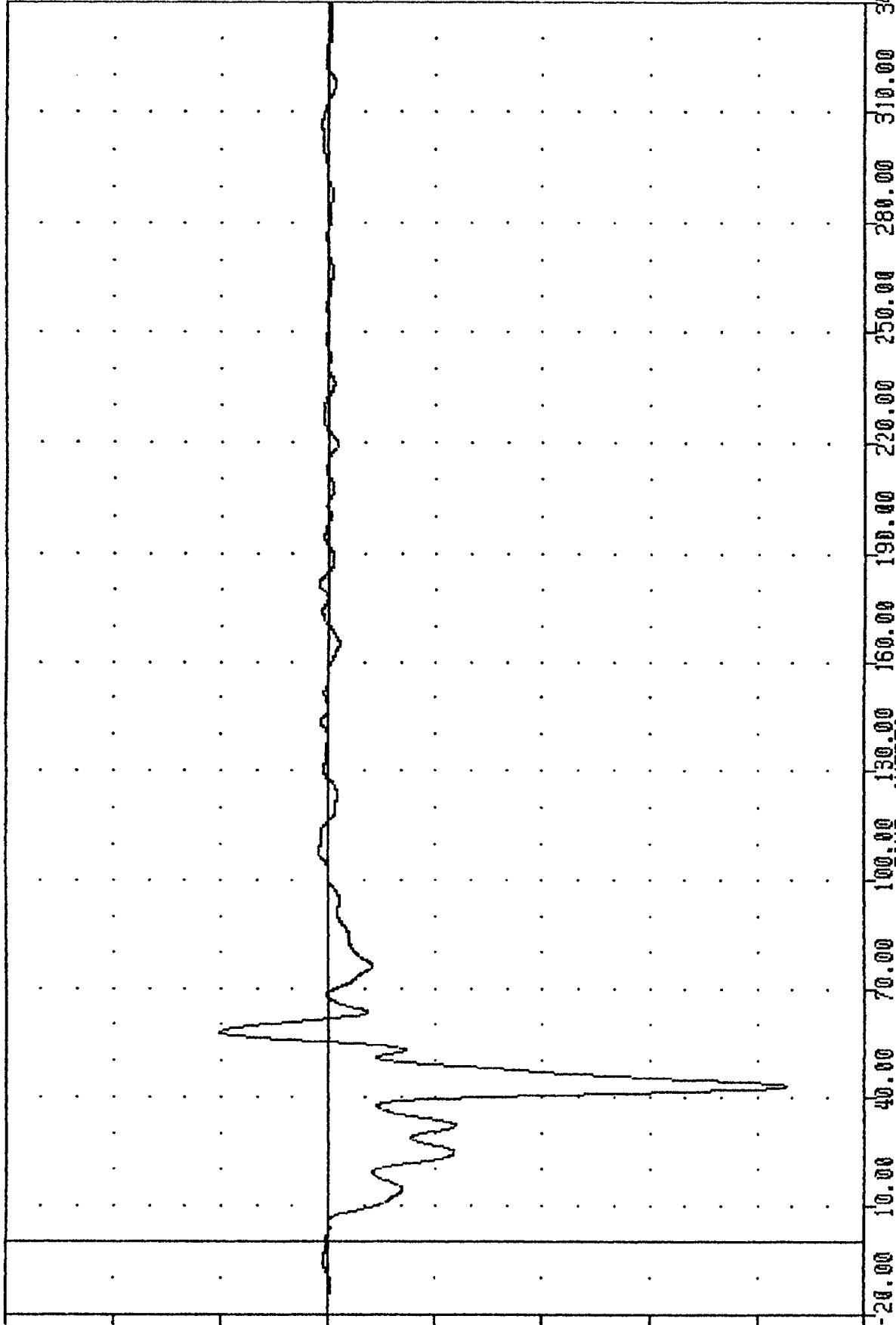
-120.00

-150.00

ACCELERATION [G]

B-26

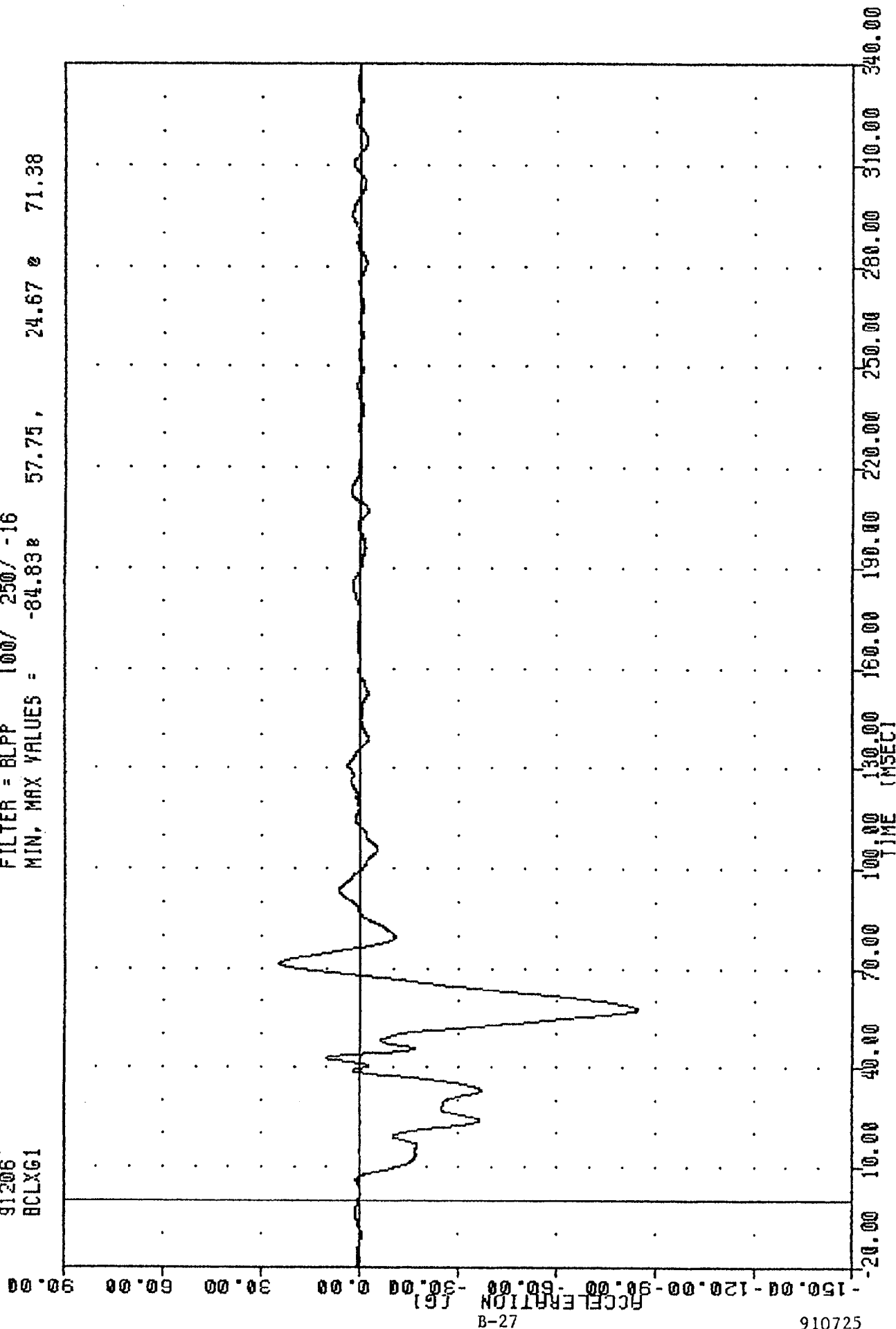
910725



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TRC 910725
208 COMPLIANCE TESTING
91206
BCLXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -84.83 57.75, 24.67 71.38



1991 VOLKSWAGEN CABRIOLET INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC , 910725
208 COMPLIANCE TESTING
91206
DPCXG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -50.64 58.50 , 14.84 e 66.38

