

REPORT NOS. 208-TRC-88-007  
212-TRC-88-007  
301-TRC-88-007

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

GENERAL MOTORS CORPORATION  
1988 OLDSMOBILE CUTLASS SUPREME  
2-DOOR COUPE  
NHTSA NO. CJ0110  
TRC TEST NO. 881014

THE TRANSPORTATION RESEARCH CENTER OF OHIO  
U.S. RT. 33, LOGAN COUNTY  
EAST LIBERTY, OHIO 43319



OCTOBER 31, 1988

FINAL REPORT

PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
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11. Abstract A 30 mph flat frontal barrier impact compliance test was conducted on a 1988 Oldsmobile Cutlass Supreme 2-door coupe, VIN 1G3WH14W1JD362081, NHTSA No. CJ0110, at the Transportation Research Center of Ohio on October 14, 1988 to determine compliance with Federal Motor Vehicle Safety Standards:  FMVSS No. 208, "Occupant Crash Protection" FMVSS No. 212, "Windshield Mounting" FMVSS No. 219, (Partial), "Windshield Zone Intrusion" FMVSS No. 301, "Fuel System Integrity"  The barrier impact velocity was 29.3 mph. The ambient temperature was 72° F The vehicle appears to comply with the applicable requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.					
12. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"			18. Distribution Statement Available from: Technical Reference Division National Highway Traffic Safety Admin Nassif Building, Room 5108 400 Seventh Street, SW Washington, DC 20590		
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# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

Symbol	When You Know Multiply by	To Find	Symbol
<b>LENGTH</b>			
in	2.5	centimeters	cm
ft	30	centimeters	cm
yd	0.9	meters	m
mi	1.6	kilometers	km
<b>AREA</b>			
in <sup>2</sup>	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	2.6	square kilometers	km <sup>2</sup>
acres	0.4	hectares	ha
<b>MASS (weight)</b>			
oz	28	grams	g
lb	0.45	kilograms	kg
	0.9	metric ton	t
		(2000 lb)	
<b>VOLUME</b>			
tsp	5	milliliters	ml
Tbsp	15	milliliters	ml
in <sup>3</sup>	16	milliliters	ml
fl oz	30	milliliters	ml
c	0.24	liters	L
pt	0.47	liters	L
qt	0.95	liters	L
gal	3.8	liters	L
ft <sup>3</sup>	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>			
°F	degrees Fahrenheit	subtracting 32)	degrees Celsius

## Approximate Conversions from Metric Measures

Symbol	When You Know Multiply by	To Find	Symbol
<b>LENGTH</b>			
mm	0.04	inches	in
cm	0.4	inches	in
m	3.3	feet	ft
m	1.1	yards	yd
km	0.6	miles	mi
<b>AREA</b>			
cm <sup>2</sup>	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	0.4	square miles	mi <sup>2</sup>
ha	2.5	acres	
		(10 000 m <sup>2</sup> )	
<b>MASS (weight)</b>			
g	0.035	ounces	oz
kg	2.2	pounds	lb
t	1.1	short tons	
		(1000 kg)	
<b>VOLUME</b>			
ml	0.03	fluid ounces	fl oz
ml	0.06	cubic inches	in <sup>3</sup>
l	2.1	pints	pt
L	1.06	quarts	qt
L	0.26	gallons	gal
m <sup>3</sup>	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>			
°C	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit

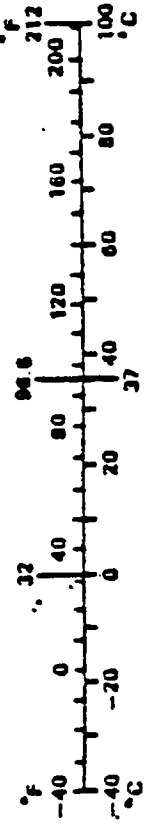


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SECTION 1.0

PURPOSE AND TEST SUMMARY

## PURPOSE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (Partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center of Ohio (TRC) under Contract No. DTNH22-88-C-11038. The purpose of this test was to determine if the subject vehicle, a 1988 Oldsmobile Cutlass Supreme 2-door coupe, NHTSA No. CJ0110, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity." The test was conducted in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-07.

## TEST SUMMARY

The 1988 Oldsmobile Cutlass 2-door coupe, NHTSA No. CJ0110, was equipped with a 2.8 liter, transverse engine, automatic transmission, power steering, and power brakes. The test weight of the vehicle was 3620 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS test Nos. 208, 212, 219 (partial), and 301. The Head Injury Criteria (HIC) calculations were less than 1000, the resultant accelerations of the thorax did not exceed 60 g's, the thorax displacement did not exceed 3.0 inches, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 E dummies seated in the driver's and right front passenger's seats. There was 100 percent windshield retention. There was no intrusion into the windshield. There was no fluid spillage from the fuel system following the impact or during the static rollover test.

Two Part 572 E, 50th percentile, adult male anthropomorphic test devices (ATDs) were seated in the front outboard designated seating positions. The dummies were positioned according to the dummy placement procedures specified in Notice 45 of Federal Motor Vehicle Safety Standard No. 208.

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

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

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

The twenty-five (25) channels of data were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8000 samples per

second and digitally processed per sections 12.8 and 12.9 of the Laboratory Procedure.

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on October 14, 1988. The test vehicle's impact speed was 29.3 mph. The vehicle sustained 14.1 inches of static crush.

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

TABLE 1 CRASH TEST SUMMARY

NHTSA NO.: CJ0110 PROJECT: 208 Compliance  
DATE: 10/14/88 TIME: 1252 TEMP: 72° F  
VEHICLE: 1988 Oldsmobile Cutlass Supreme 2-door coupe  
TEST WEIGHT (LBS): 3620  
IMPACT ANGLE (DEG)\*: 0°  
IMPACT VELOCITY (MPH)\*\*: PRIMARY = 29.3 SECONDARY = 29.3  
MAXIMUM STATIC CRUSH (IN): 14.1  
VEHICLE REBOUND (IN): 70.4  
DUMMIES: Driver #230 Passenger #229  
TYPE: Part 572 E Part 572 E  
LOCATION: Left front Right front  
RESTRAINT: 3-point passive belt 3-point passive belt  
NUMBER OF DATA CHANNELS: 25  
NUMBER OF HIGH SPEED CAMERAS: 14 and 1 real-time

\*With respect to tow track centerline.

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: General Motor Corporation

MAKE/MODEL: Oldsmobile/Cutlass Supreme VIN: 1G3WH14W1JD362081

BODY STYLE: 2-door coupe MODEL YEAR: 1988

NHTSA NO.: CJ0110 COLOR: red

ENGINE DATA: TYPE: transverse CYLINDERS: 6 DISPLACEMENT: 2.8 liter

TRANSMISSION DATA: 3 SPEED,    MANUAL, X AUTOMATIC, X FWD,    RWD,    4WD

DATE VEHICLE RECEIVED: 6/8/88 ODOMETER READING: 66.3

DEALER'S NAME AND ADDRESS: Jack Schmidt Oldsmobile/Peugeot  
447 East Main Street  
Columbus, OH 43215

ACCESSORIES:

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

REMARKS:

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

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

VEHICLE MANUFACTURED BY: General Motors Corporation

DATE OF MANUFACTURE: 5/88

GVWR: 4241 LBS

GAWR: FRONT 2350 LBS., REAR 1891 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 30 psi; REAR 30 psi

RECOMMENDED TIRE SIZE: P195/75R14 LOAD RANGE X B,      C,      D

TIRES ON VEHICLE (MFR., LINE, SIZE): Michelin X24 P195/75R14 Mud & Snow

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS: FRONT: Split bench  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manual adjustable

NUMBER OF OCCUPANTS 3 FRONT 3 REAR 6 TOTAL

CARGO LOAD 167 LBS. TOTAL 1067 LBS.

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

RIGHT FRONT 972 lbs. RIGHT REAR 517 lbs.

LEFT FRONT 1069 lbs. LEFT REAR 577 lbs.

TOTAL FRONT WEIGHT 2041 lbs. (65.1% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1094 lbs. (34.9% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 3135 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (3135 LBS)

VCW = VEHICLE CAPACITY WEIGHT (1067 LBS)

DSC = DESIGNATED SEATING CAPACITY (6)

RCLW = VCW - 150 (DCS) = 1067 - 150(6) = 167 LBS

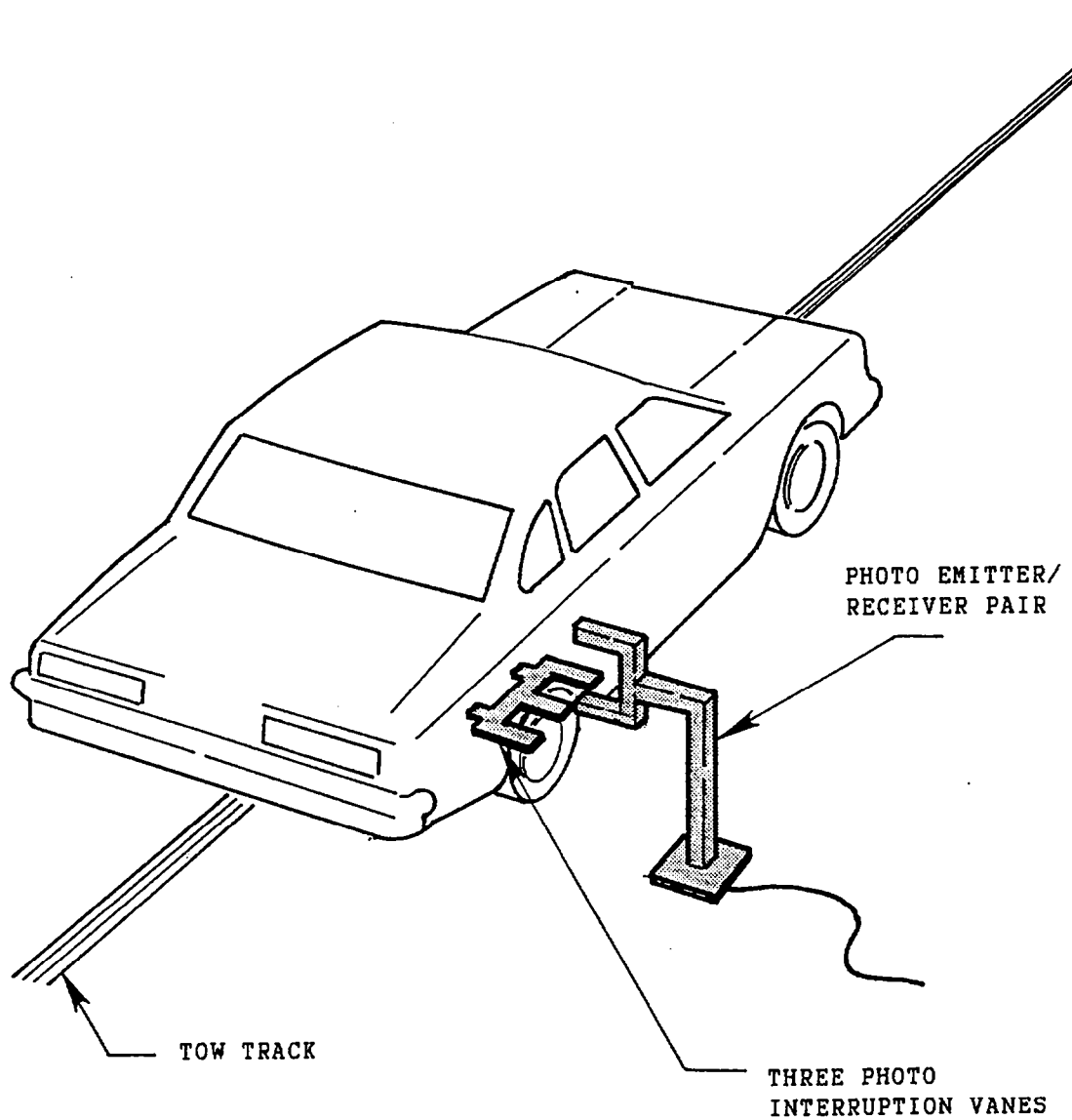
TARGET TEST WEIGHT = UDW + RCLW + (2 DUMMIES X 164 LBS/DUMMY)

= 3135 + 167 + 328 LBS

TARGET TEST WEIGHT = 3630 LBS



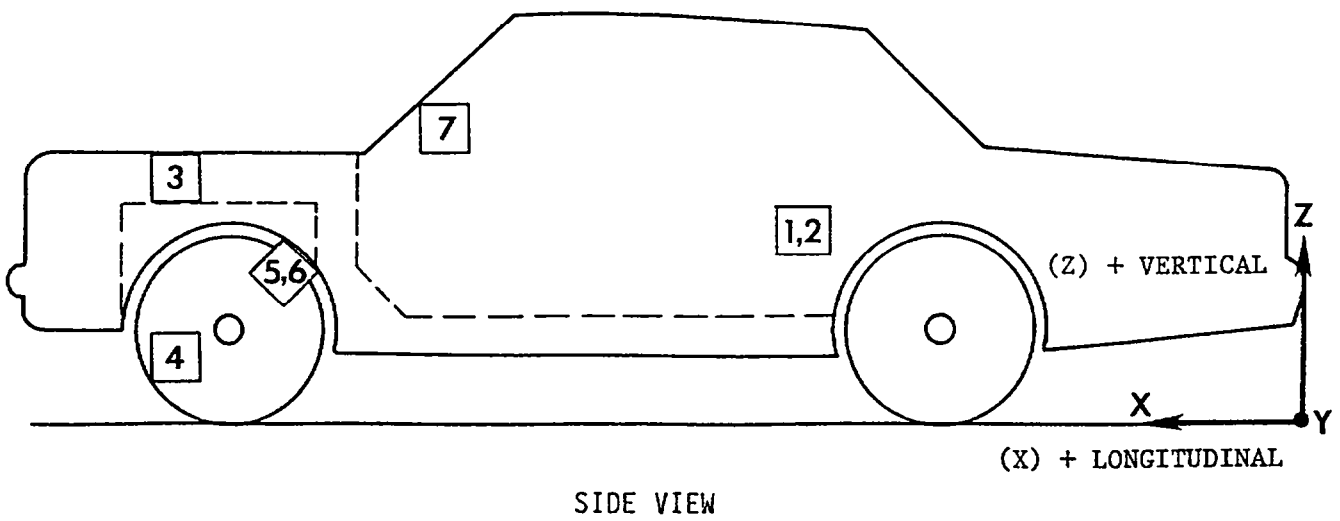
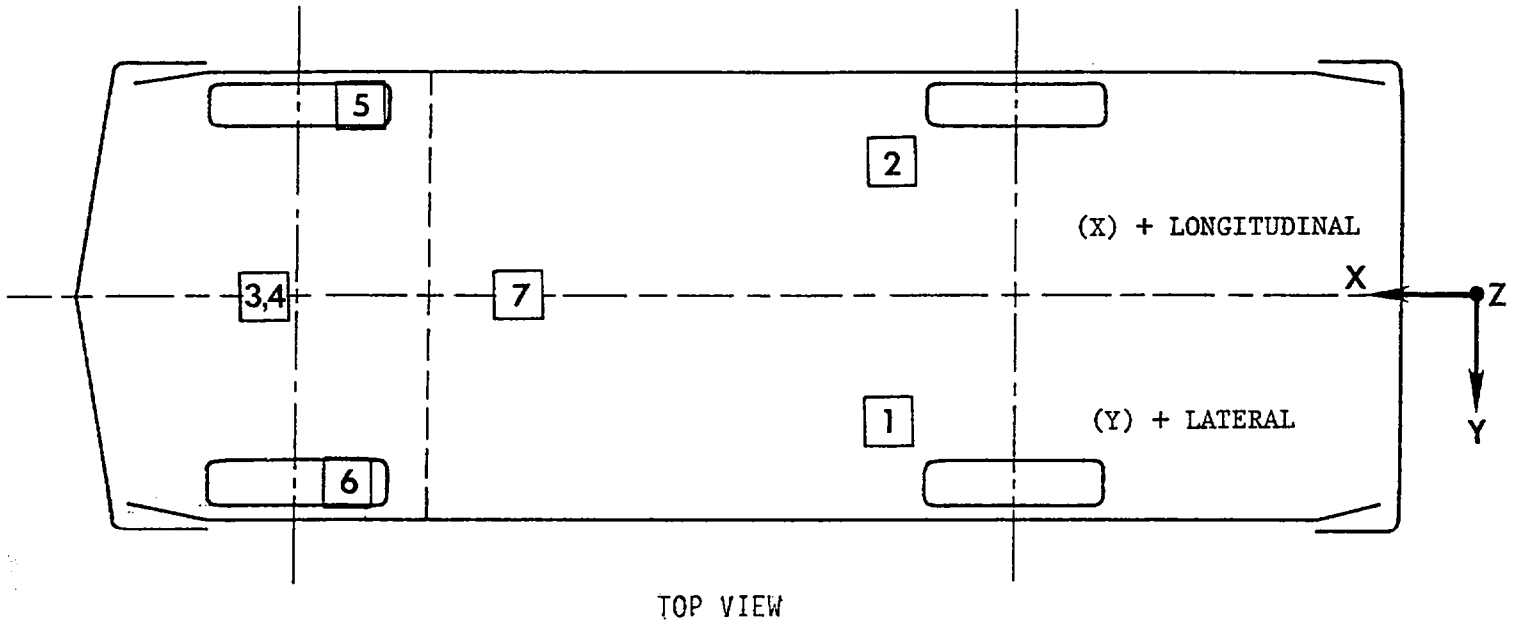
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have one foot spacing.

FIGURE 2  
VEHICLE ACCELEROMETER LOCATIONS



TEST NUMBER 881014

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
						MAX G	MSEC	MAX G	MSEC
1	REAR SEAT CROSSMEMBER AT LEFT SIDE LONGITUDINAL	PRE	73.7	17.7	15.1				
		POST	74.2	17.2	16.8	1.1	138.8	25.5	24.1
2	REAR SEAT CROSSMEMBER AT RIGHT SIDE LONGITUDINAL	PRE	73.3	-17.2	15.1				
		POST	74.1	-17.2	16.9	1.3	138.4	26.1	24.0
3	TOP OF ENGINE BLOCK LONGITUDINAL	PRE	163.2	-3.0	32.0				
		POST	158.4	-2.0	31.8	34.4	57.0	94.4	41.4
4	BOTTOM OF ENGINE BLOCK LONGITUDINAL	PRE	161.0	-1.0	8.2				
		POST	156.1	0.0	7.2	30.3	66.6	63.5	40.1
5	BRAKE CALIPER AT RIGHT SIDE LONGITUDINAL	PRE	155.5	-25.0	11.4				
		POST	153.9	-25.0	11.2	29.5	38.0	52.8	31.6
6	BRAKE CALIPER AT LEFT SIDE LONGITUDINAL	PRE	155.5	26.5	11.8				
		POST	153.6	26.5	11.0	4.5	155.5	44.7	49.9
7	DASH PANEL LONGITUDINAL	PRE	123.4	-1.8	39.0				
		POST	124.9	-1.8	40.9	12.4	56.6	49.0	44.0

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

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

VEHICLE MAKE/MODEL/BODY STYLE: Oldsmobile/Cutlass Supreme/2-door coupe

VEH. NHTSA NO.: CJ0110; VIN: 1G3WH14W1JD362081

MODEL YEAR: 1988; BUILD DATE: 5/88; TEST DATE: 10/14/88

VEH. SIZE CATEGORY: Mid-size; TEST WEIGHT: 3620

VEH. WHEELBASE: 107.5

MAX. WIDTH: 70.6

FRONT OVERHANG: 42.5

COLLISION DEFORMATION  
CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)  
CRUSH DEPTH  
DIMENSIONS:

C1 =	<u>10.8</u>	inches
C2 =	<u>12.7</u>	inches
C3 =	<u>13.2</u>	inches
C4 =	<u>13.7</u>	inches
C5 =	<u>14.1</u>	inches
C6 =	<u>13.1</u>	inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitudinal)

LENGTH OF DAMAGED REGION: L = 56.9 inches

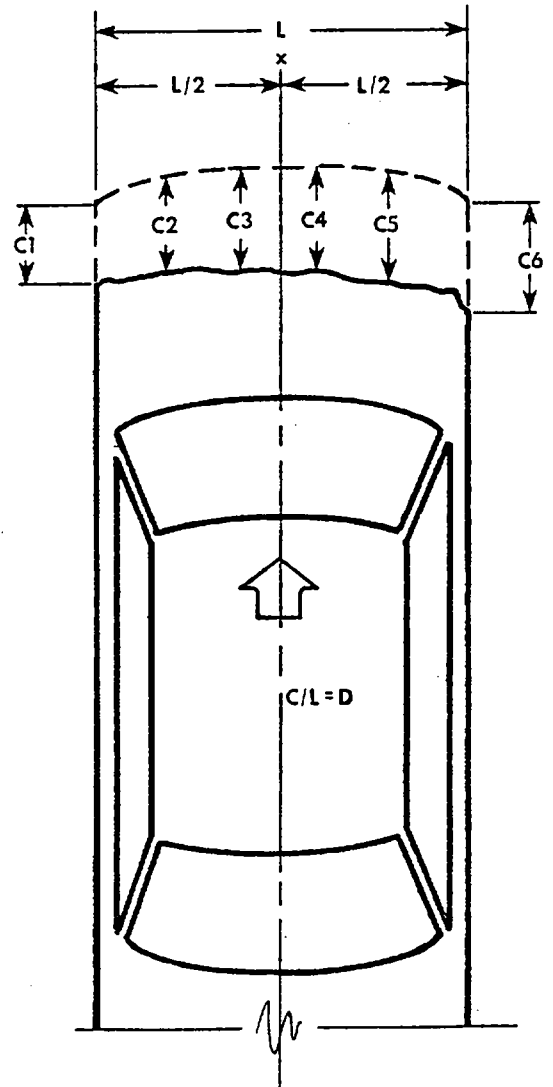


FIGURE 4

PRE-TEST AND POST-TEST MEASUREMENT POINTS

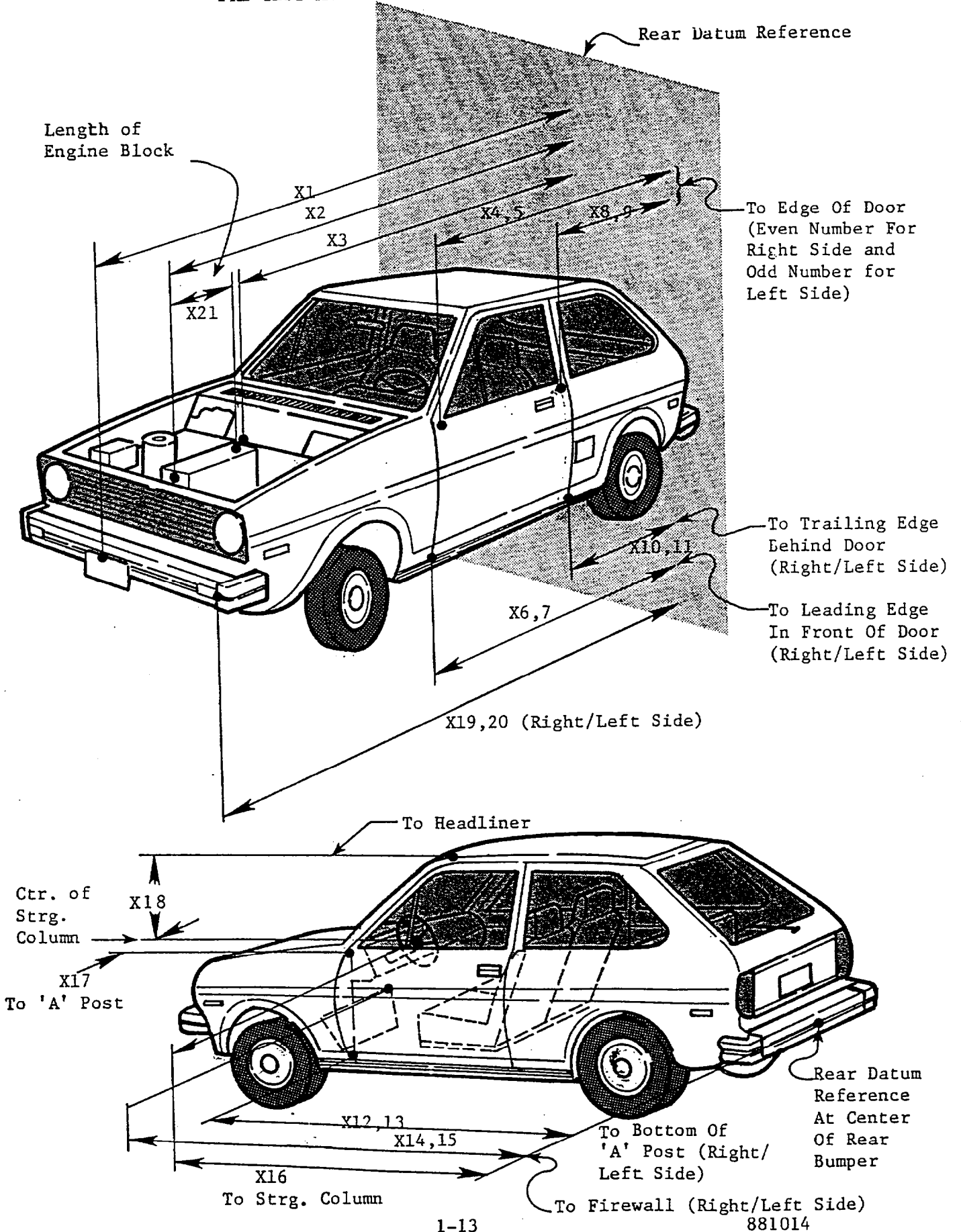
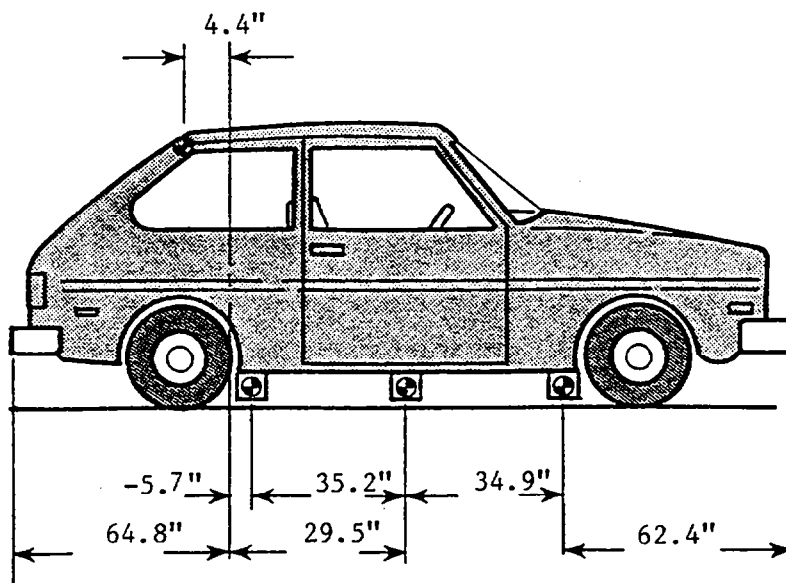
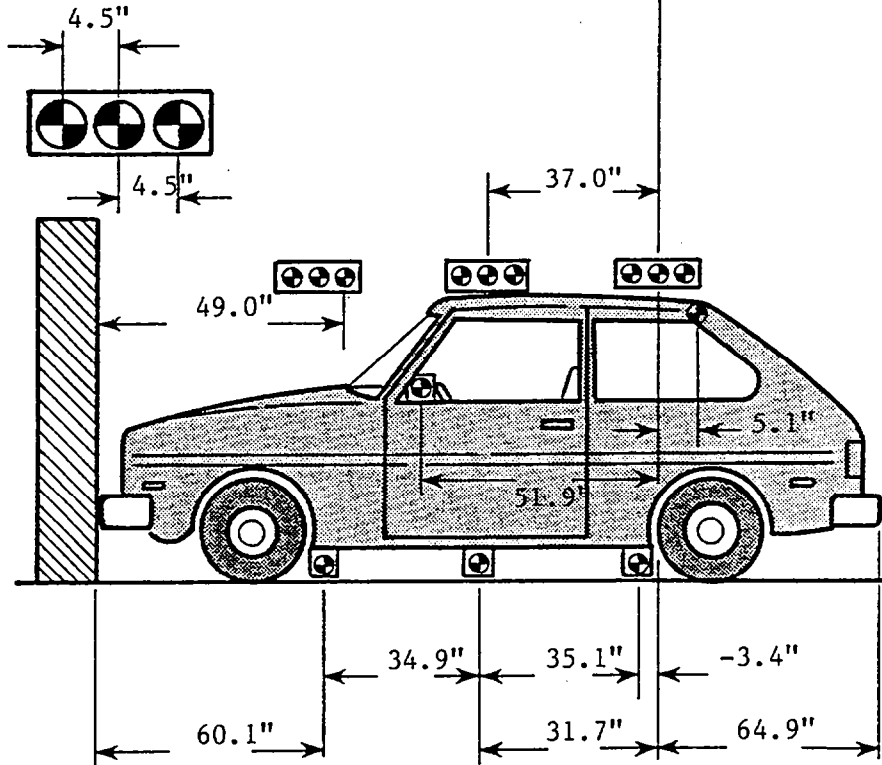
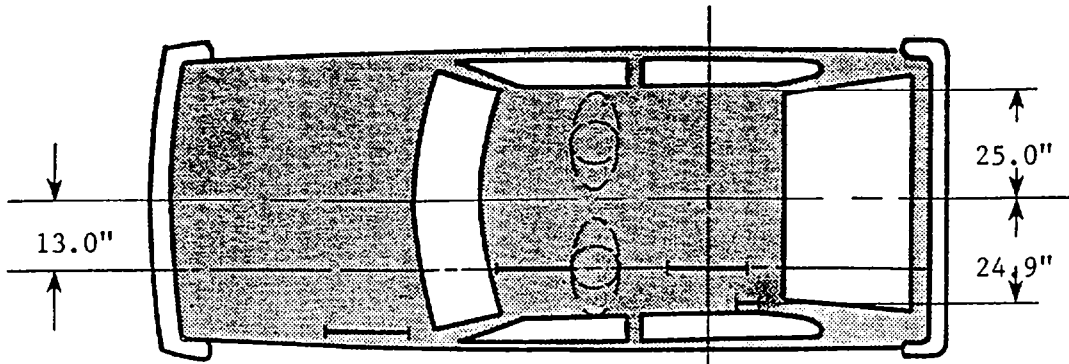


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Oldsmobile/Cutlass Supreme TEST NUMBER: 881014

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	191.6	177.8	13.8
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	165.5	161.8	3.7
X3	REAR SURFACE OF VEHICLE TO FIREWALL	145.5	145.4	0.1
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	129.7	128.9	0.8
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	129.6	129.1	0.5
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	129.0	128.9	0.1
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	128.9	129.0	-0.1
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	76.8	76.0	0.8
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	76.8	76.2	0.6
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	75.8	75.8	0.0
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	75.7	75.8	-0.1
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	126.9	126.8	0.1
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	127.9	127.8	0.1
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	144.8	141.9	2.9
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	144.9	141.8	3.1
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	111.8	111.0	0.8
X17	CENTER OF STEERING COLUMN TO "A" POST	16.4	17.9	-1.5
X18	CENTER OF STEERING COLUMN TO HEADLINING	16.1	18.2	-2.1
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	184.9	171.8	13.1
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	185.0	174.2	10.8
X21	LENGTH OF ENGINE BLOCK	15.0	15.0	0.0

VEHICLE TARGET LOCATION



SECTION 2.0

SUMMARY OF RESULTS FOR:

FMVSS 208, "Occupant Crash Protection"

FMVSS 212, "Windshield Mounting"

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

FMVSS 301, "Fuel System Integrity"

## COMPLIANCE DATA SUMMARY

The test vehicle, a 1988 Oldsmobile Cutlass Supreme 2-door coupe, NHTSA No. CJ0110, appeared to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.

The driver's Head Injury Criteria (HIC) was 631. The driver's maximum chest deceleration over three milliseconds was 33.9 g. The driver's right and left compressive femur loads were 723 pounds and 909 pounds, respectively. The driver's maximum chest displacement was 2.1 inches.

The right front passenger's Head Injury Criteria (HIC) was 507. The right front passenger's maximum chest deceleration over three milliseconds was 37.9 g. The right front passenger's right and left compressive femur loads were 291 pounds and 856 pounds, respectively. The right front passenger's maximum chest displacement was 2.4 inches.

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

The windshield retention was 100 percent.

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

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

TABLE 6 DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION ('G')

	HEAD				CHEST			R*
	X	Y	Z	R	X	Y	Z	
DRIVER	-73.2	11.9	-10.4	74.1	-35.7	-8.0	5.8	33.9
PASSENGER	-41.5	-8.4	-45.5	57.1	-38.3	-4.2	7.6	37.9

MAXIMUM FORCE-FEMUR LOAD (LBS)

	LEFT FEMUR	RIGHT FEMUR
DRIVER	909	723
PASSENGER	856	291

HEAD INJURY CRITERIA\*\*

	HIC	TIME t <sub>1</sub> (MSEC) <sup>1</sup>	TIME t <sub>2</sub> (MSEC) <sup>2</sup>
DRIVER	631	75.9	104.5
PASSENGER	507	77.1	113.1

\*Defined as exceeding 0.003 sec. duration

\*\*As defined in FMVSS No. 208

## DUMMY KINEMATIC SUMMARY

### DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward, impacting the steering wheel rim and hub. The dummy's chest contacted the steering wheel rim as the chest was restrained by the three-point passive belt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seat back. The dummy came to rest seated upright in the driver's seat, restrained by the three-point passive belt.

### RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated forward, contacting the dummy's chest as the chest was restrained by the three-point passive belt. The dummy's head rotated rearward as the dummy rebounded into the seat back. The dummy came to rest seated upright in the right front passenger's seat, restrained by the three-point passive belt.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #230	PASSENGER #229
Head	<u>Steering wheel rim and hub</u>	<u>Chest</u>
Chest	<u>Steering wheel rim</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:

Each side of the windshield was cracked upon impact.

\_\_\_\_\_

\_\_\_\_\_

OTHER NOTABLE IMPACT EFFECTS:

None

\_\_\_\_\_

\_\_\_\_\_

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

**PRE-IMPACT DATA:**

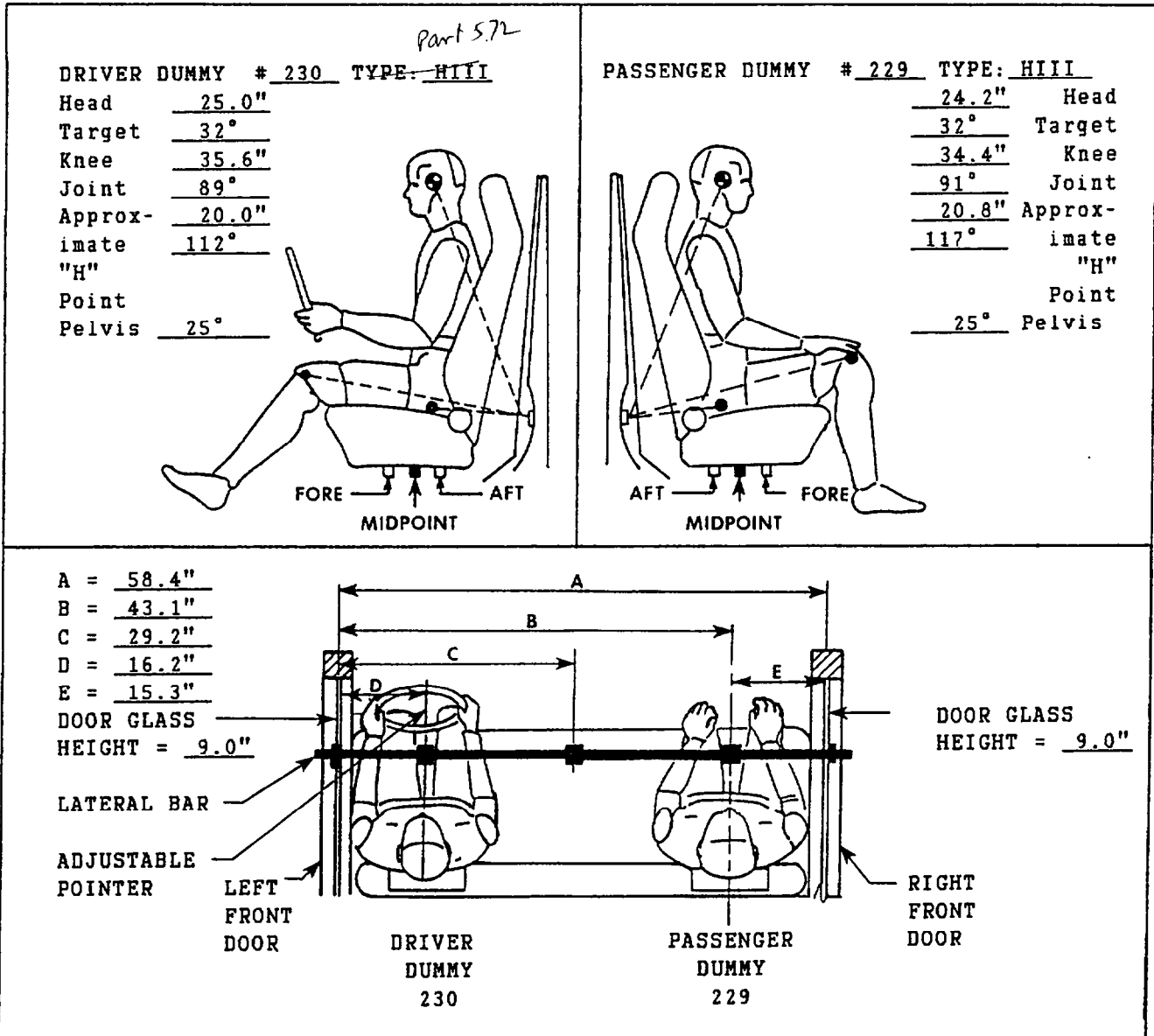
Make/Model: Oldsmobile/Cutlass Supreme  
 Body Style: 2-door coupe Model Year: 1988  
 NHTSA No.: CJ0110 Color: Red

**DATA FROM CERTIFICATION LABEL:**

Vehicle Manufacturer: General Motors Corporation  
 Date of Manufacture: 5/88 VIN: 1G3WH14W1JD362081  
 GVWR: 4241 lb; GAWR: Front = 2350 lb; Rear = 1891 lb

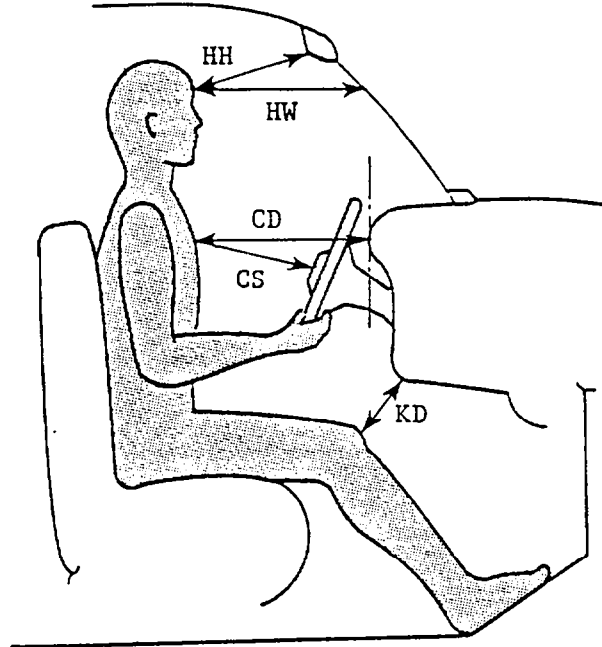
**POST-IMPACT DATA:**

Date of Test: 10/14/88 Time: 1252 Temperature: 72 ° F  
 Required Impact Velocity Range: 28.9 to 29.9 mph  
 Impact Velocity: Primary = 29.3 mph Secondary = 29.3 mph  
 Seat Type: Split bench Adjuster Type: Manual  
 Bucket Seat Back Type: Non-adjustable  
 Technicians: P. Cummins, D. Carpenter, & B. Miller

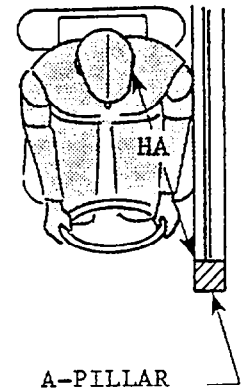
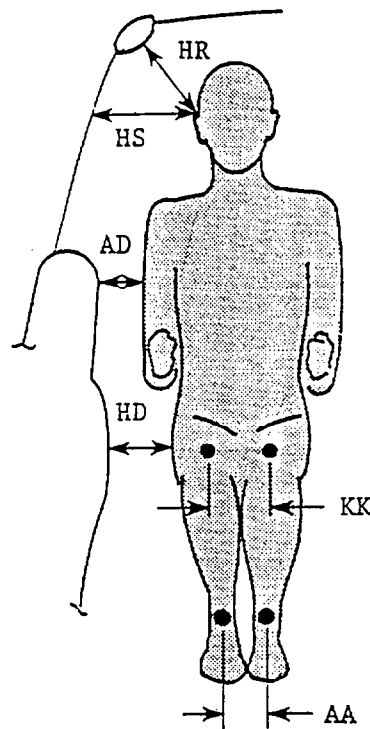


**FIGURE 7 DUMMY IN-VEHICLE POSITION RECORDING SHEET**

	DRIVER	PASSENGER
HH	12.1	13.1
HW	21.8	21.8
CD	22.6	20.5
CS	12.8	NA
KDL	3.9	6.0
KDR	4.8	6.9
TA	16°	17°
SA	26°	26°
HA	19.2	20.4



	DRIVER	PASSENGER
HR	7.2	7.4
HS	13.4	12.5
AD	5.4	5.9
HD	4.5	6.1
KK	8.3	8.2
AA	11.6	8.9



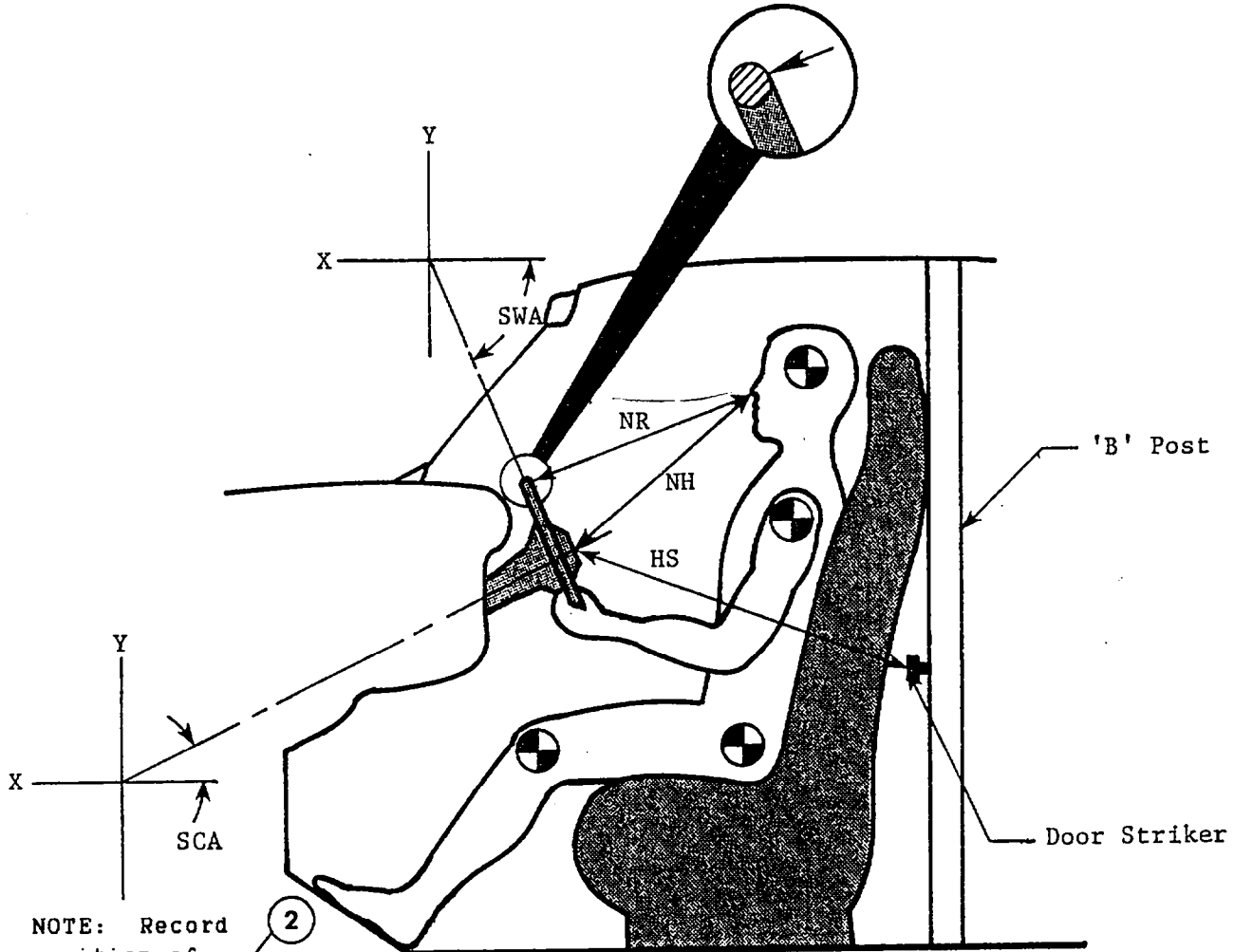
Knee outer clevis to outer clevis spacing:  
 Driver = 10.6  
 Passenger = 10.6

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

Torso and seat back angles are relative to vertical.

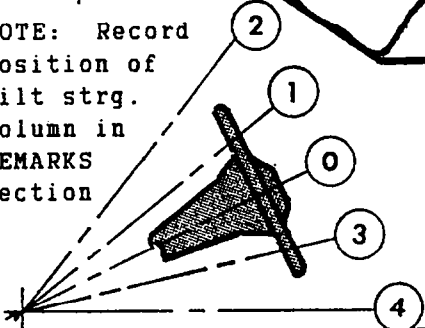
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

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



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

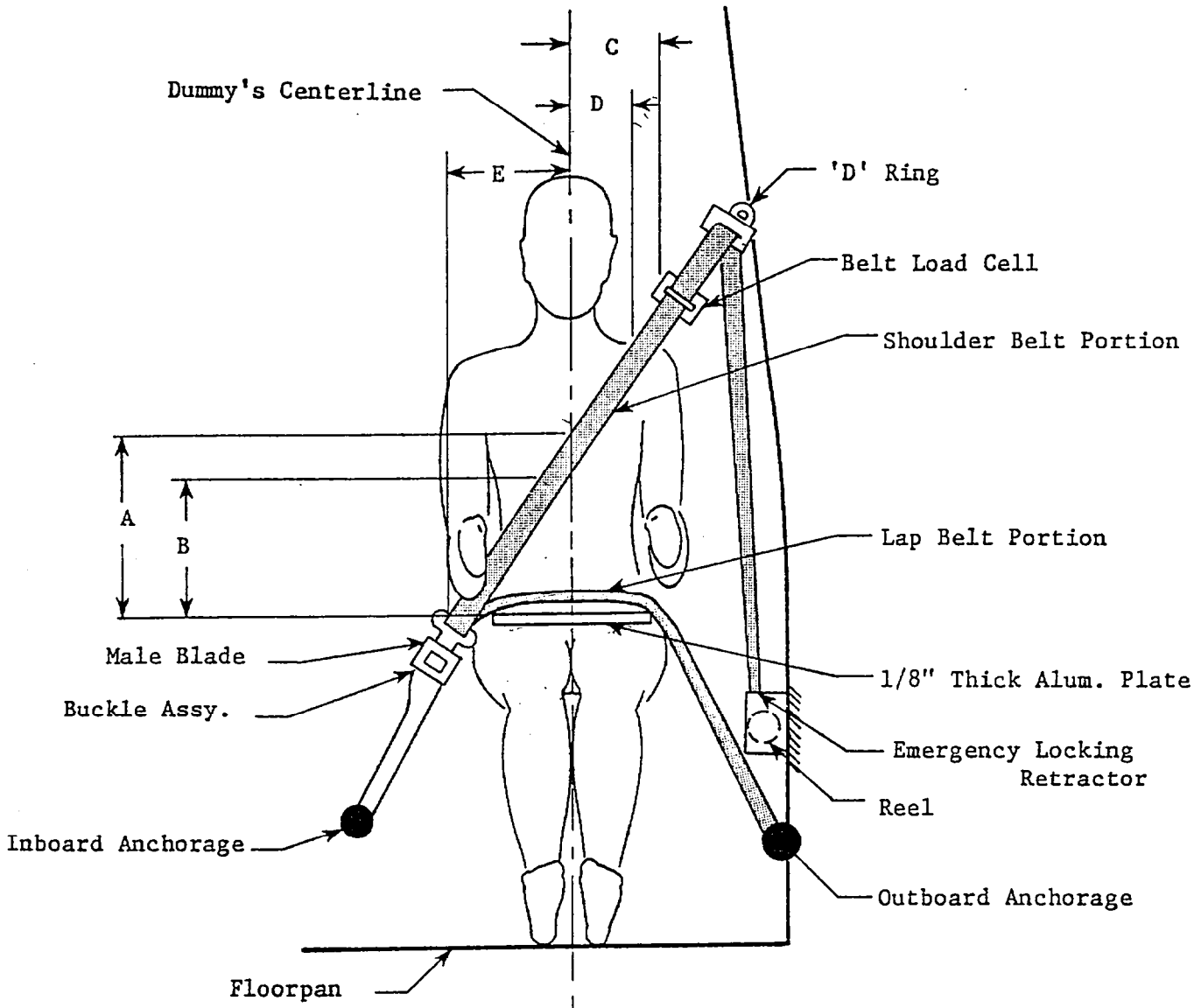
REMARKS: Steering column was a non-tilt column



**MEASUREMENTS**

NR	- Distance from tip of dummy's nose to top rear surface of steering wheel rim. (in.)	14.8	16.09
NH	- Distance from tip of dummy's nose to center of steering column hub. (in.)	16.1	17.9?
HS	- Distance from center of steering column hub to the forward surface of the door lock striker pin. (in.)	32.7	
SCA	- Angle of steering column relative to the horizontal X axis	19°	
SWA	- Angle of steering wheel relative to the horizontal X axis	71°	

FIGURE 9 SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	10.9	12.0
B - Top surface of alum. plate to belt lower edge (in)	7.9	8.5
C - Dummy centerline to outer edge of belt at chest flesh top (in)	6.0	5.0
D - Dummy centerline to inner edge of belt at chest flesh top (in)	3.8	2.8
E - Dummy centerline to intersection of upper torso belt and lap belt (in)	4.6	6.6

TABLE 7 FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN: 1G3WH14W1JD362081 NHTSA NO: CJ0110

MAKE: Oldsmobile MODEL: Cutlass Supreme

VEHICLE BUILD DATE: 5/88 VEHICLE TYPE: 2-door coupe

FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:

(check one):  Automatic belts  
 Type 2 lap/shoulder belts  
 Other

CONVENIENCE HOOKS:

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

Vehicle's drivetrain is engaged  
 Vehicle's parking brake is in the released mode  
 Not applicable, vehicle's restraint system does not  
include convenience hooks

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITON BELTS HAVE TENSION - RELIEVING DEVICES?

Yes

MAXIMUM SLACK RECOMMENDED IN OWNER'S MANUAL: 1.0 INCH.

DOES OWNER'S MANUAL WARN THAT INTRODUCING SLACK BEYOND THE AMOUNT  
SPECIFIED CAN SIGNIFICANTLY REDUCE THE EFFECTIVENESS OF THE SHOULDER  
BELT? Yes

IF NO, EXPLAIN:

AUTOMATIC BELTS: IS TENSION - RELIEVING DEVICE CANCELLED EACH TIME THE  
ADJACENT DOOR IS OPENED? YES

BELT CONTACT FORCE: NA

LATCHPLATE ACCESS: NA

RETRACTION: NA

ACCESSIBILITY: NA

LATCH MECHINISM: NA

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

WITH OCCUPANT IN DRIVER'S POSITION AND 3-POINT PASSIVE BELT IN STOWED POSITION AND IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 6 sec.

Duration of reminder light operation = continuous sec.

WITH OCCUPANT IN DRIVER'S POSITION AND 3-POINT PASSIVE BELT IN USE AND THE IGNITION SWITCH PLACED IN "START/ON" POSITION:

Duration of audible warning signal = 0 sec.

(NOTE: audible warning should not operate)

Duration of reminder light operation = 0 sec.

Wording of visual warning:

Fasten Seat Belt \_\_\_\_\_

Fasten Belt   X  

Symbol 101-80   X

TABLE 9 FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL DATA

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR  
REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTON SYSTEM:

NA,vehicle did not contain a crash-deployed occupant protection system.

TABLE 10 FMVSS NO. 208 - READINESS INDICATOR DATA

AN OCCUPANT RESTRAINT SYSTEM THAT DEPLOYS IN THE EVENT OF A CRASH SHALL HAVE A MONITORING SYSTEM WITH A READINESS INDICATOR. A TOTALLY MECHANICAL SYSTEM IS EXEMPT FROM THIS REQUIREMENT. NA, vehicle did not contain crash-deployed occupant protection system.

TABLE 11 SUMMARY OF FMVSS 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Oldsmobile/Cutlass Supreme

BODY STYLE: 2-door coupe

MODEL YEAR: 1988

NHTSA NO.: CJ0110

COLOR: red

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: General Motors Corporation

DATE OF MANUFACTURE: 5/88

VIN: 1G3WH14W1JD362081

GVWR: 4241 LBS., GAWR: FRONT 2350 LBS., REAR 1891 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Barrier

DATE OF TEST: 10/14/88

TIME: 1252

TEMP:

72°F

REQUIRED IMPACT VELOCITY RANGE: 28.9 MPH TO 29.9 MPH

IMPACT VELOCITY: PRIMARY = 29.3 MPH, SECONDARY = 29.3 MPH

TEST WEIGHT = 3620 LBS., STATIC CRUSH MAX. = 14.1 IN., REBOUND = 70.4 IN.

FUEL SYSTEM DATA

TEST FLUID TYPE:

PURPLE SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY:

0.99 CENTISTOKES

"USEABLE" CAPACITY\*:

16.6 GALLONS (FURNISHED BY COTR)

TEST VOLUME:

15.4 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL):

16.0 GALLONS

DETAILS OF FUEL SYSTEM: Fuel tank is located in front of the rear axle.

The fuel filler neck is located on the left side and enters the left

rear of the tank. Fuel lines run along the left frame rail.

ELECTRIC FUEL PUMP: Yes

FUEL INJECTOR: Yes

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

\*WITH ENTIRE FUEL SYSTEM FILLED.

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

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

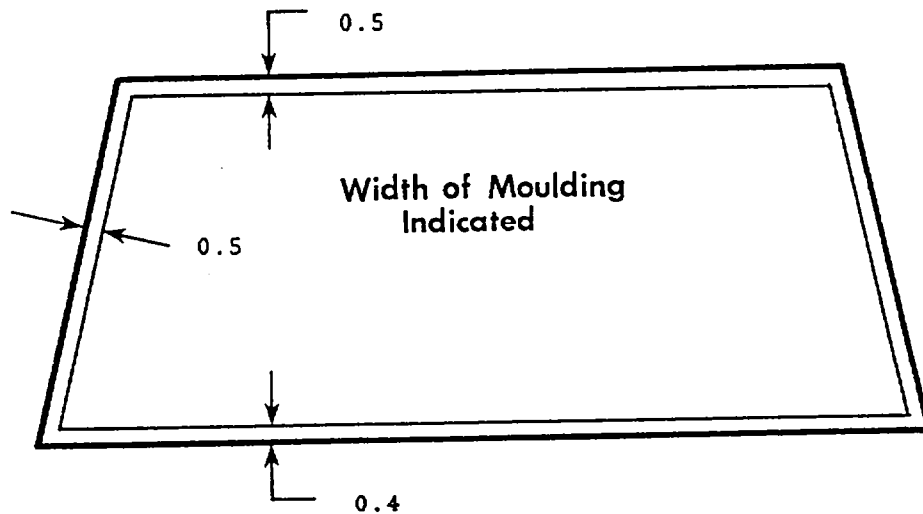
FMVSS 212 REQUIREMENTS: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

WINDSHIELD PERIPHERY

	PRE-TEST (in)	POST-TEST (in)	PERCENT RETENTION
RIGHT SIDE	87.2	87.2	100%
LEFT SIDE	87.2	87.2	100%
TOTAL	174.4	174.4	100%

AREA OF RETENTION FAILURE:



FAILURE DETAILS: None

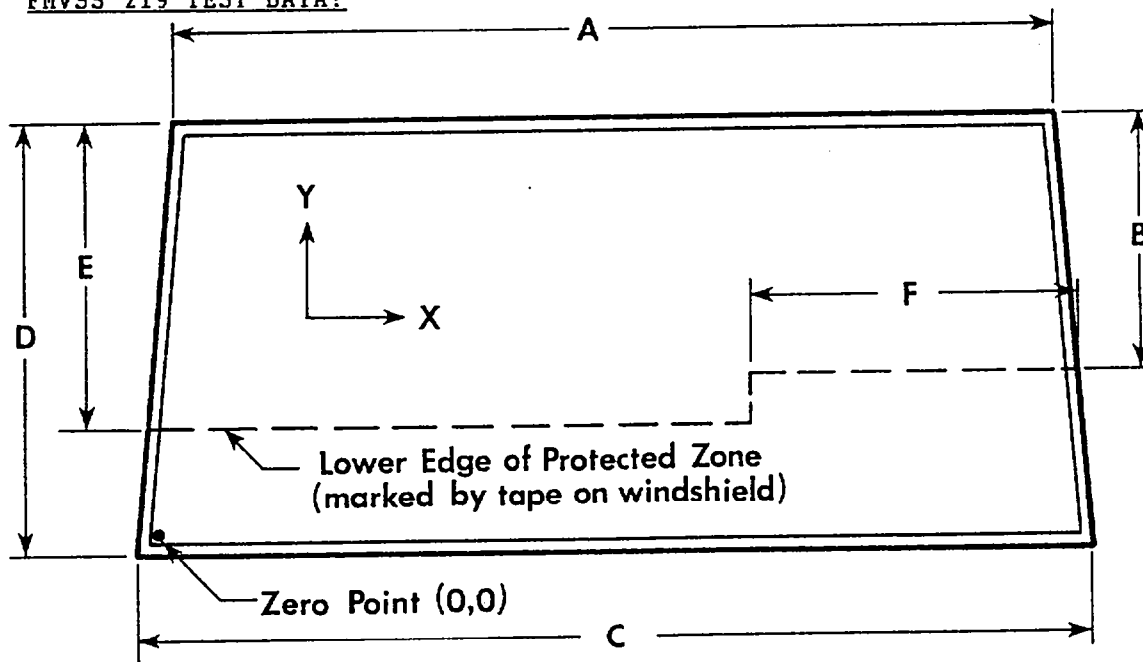
Windshield Temperature: 70° F

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:



**FRONT VIEW**

A = <u>50.6</u>	C = <u>65.8</u>	E = <u>20.2</u>
B = <u>16.9</u>	D = <u>29.0</u>	F = <u>36.0</u>

<u>DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":</u>	<u>COORDINATES</u>
(Show location of penetration on above sketch)	<u>    X    Y</u>

None

- 1.
- 2.
- 3.
- 4.

ALL MEASUREMENTS ARE IN INCHES.

TABLE 12 "FUEL SYSTEM INTEGRITY" POST-IMPACT

TEST DATA, FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CJ0110 ; TEST DATE: 10/14/88

VEH. MFR./MAKE/MODEL: General Motors Corp./Oldsmobile/Cutlass Supreme

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

TEST VEHICLE IMPACT TYPE:

- Frontal (30 mph)
- Oblique (30 mph) with  barrier face first contacting  (driver/pass.) side.
- Rear Moving Barrier (30 mph)
- Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

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

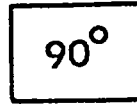
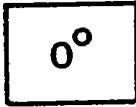
SOLVENT SPILLAGE DETAILS:

None

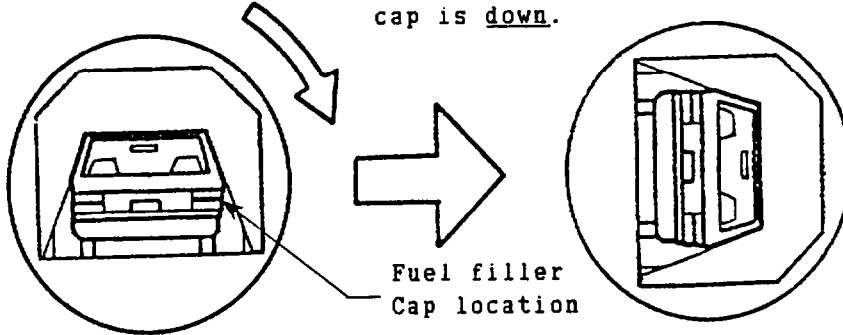
FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

NHTSA NO.: CJ0110

TEST PHASE



NOTE: If side fill rotate to filler, cap is down.



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

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

FMVSS 301 position hold time =  5  minutes,  00  seconds

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

Next whole minute interval - - - - =  7  minutes

FMVSS 301 REQUIREMENTS

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

SOLVENT SPILLAGE LOCATION(S)

None

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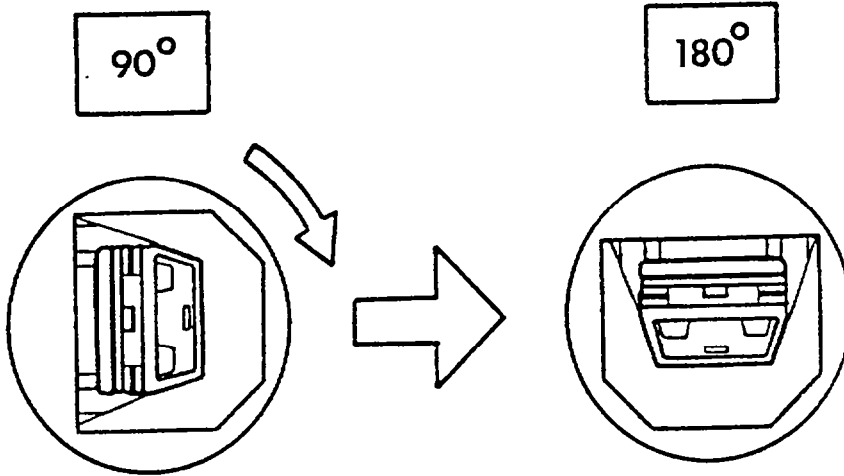


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FIGURE 12 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET, CONT'D

NHTSA NO.: CJ0110

TEST PHASE



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

Time req. for machine to rotate 90° =  2  minutes,  00  seconds  
 FMVSS 301 position hold time =  5  minutes,  00  seconds  
 TOTAL - - - - - =  7  minutes,  00  seconds  
 Next whole minute interval - - - - =  14  minutes

FMVSS 301 REQUIREMENTS

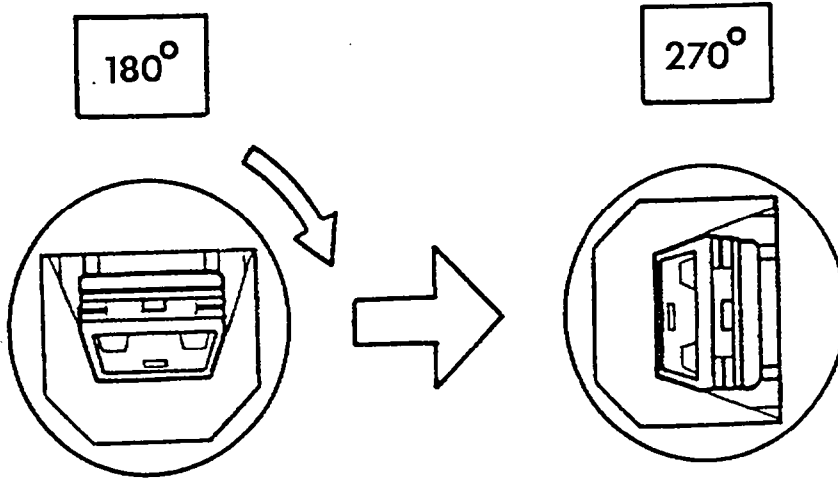
	First 5 minutes	6th	7th
	FROM ONSET OF ROTATION		
	Minute	Minute	Minute
Maximum allowable solvent spillage - -	<u> 5 oz. </u>	<u> 1 oz. </u>	<u> 1 oz. </u>
90° to 180° - - - - -	<u> 0 oz. </u>	<u> 0 oz. </u>	<u> 0 oz. </u>

SOLVENT SPILLAGE LOCATION(S)

None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

NHTSA NO.: CJ0110  
TEST PHASE



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

Time req. for machine to rotate 90° =  2  minutes,  00  seconds  
 FMVSS 301 position hold time =  5  minutes,  00  seconds  
 TOTAL - - - - - =  7  minutes,  00  seconds  
 Next whole minute interval - - - - =  21  minutes

FMVSS 301 REQUIREMENTS

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

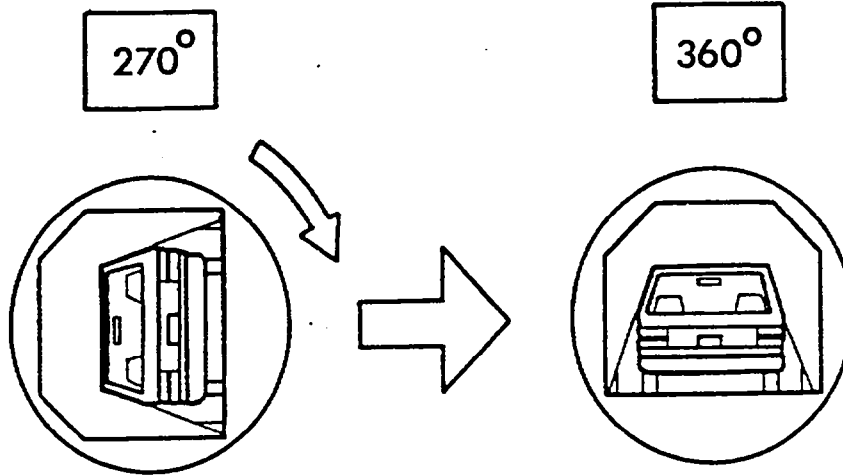
SOLVENT SPILLAGE LOCATION(S)

None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

NHTSA NO.: CJ0110

TEST PHASE



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

Time req. for machine to rotate 90° =  2  minutes,  00  seconds  
 FMVSS 301 position hold time =  5  minutes,  00  seconds  
 TOTAL - - - - - =  7  minutes,  00  seconds  
 Next whole minute interval - - - - =  28  minutes

FMVSS 301 REQUIREMENTS

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

SOLVENT SPILLAGE LOCATION(S)

None  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SECTION 3.0

CAMERA INFORMATION

FIGURE 13

CAMERA POSITIONS

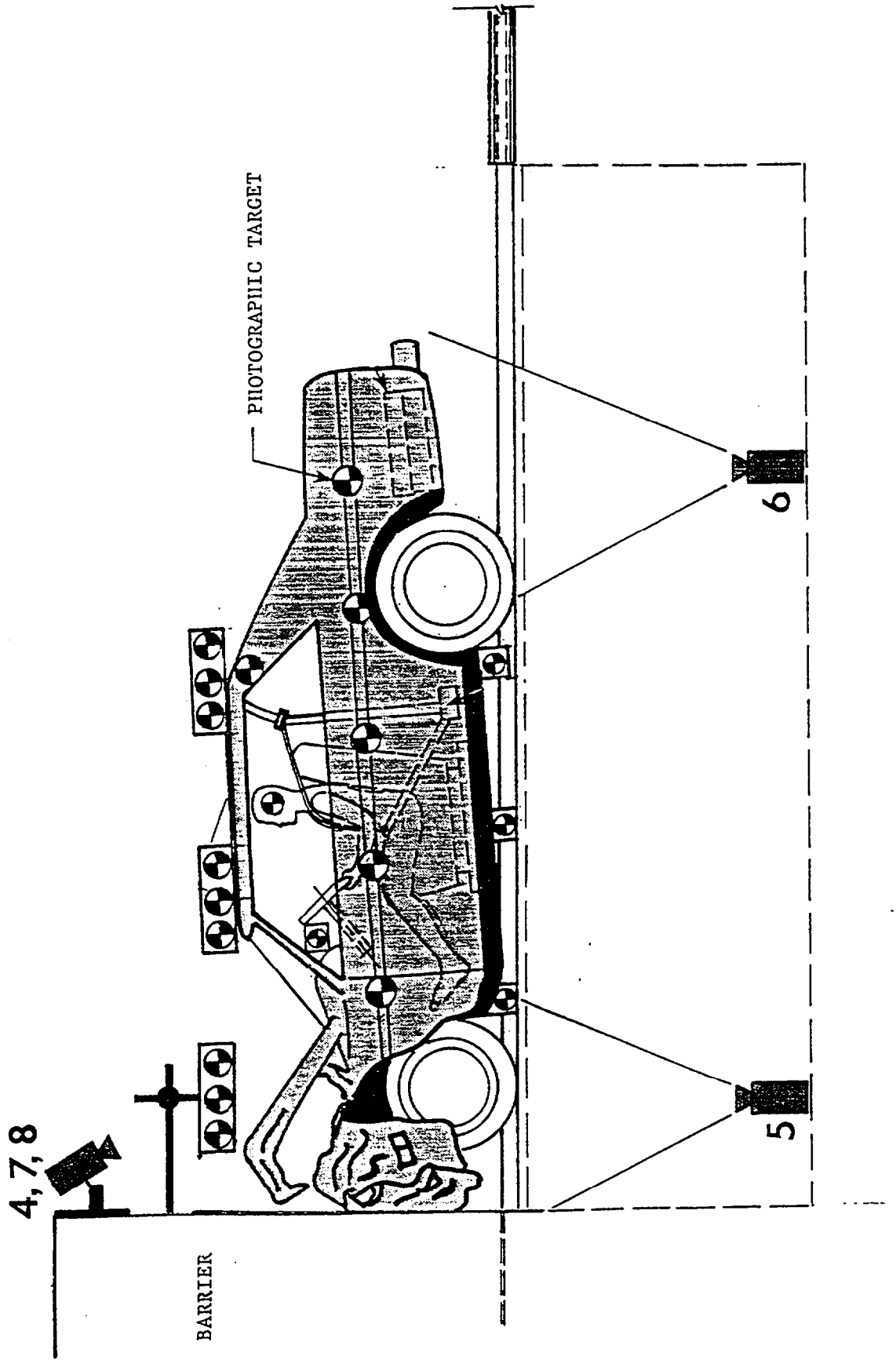


FIGURE 13 CONT'D

CAMERA POSITIONS

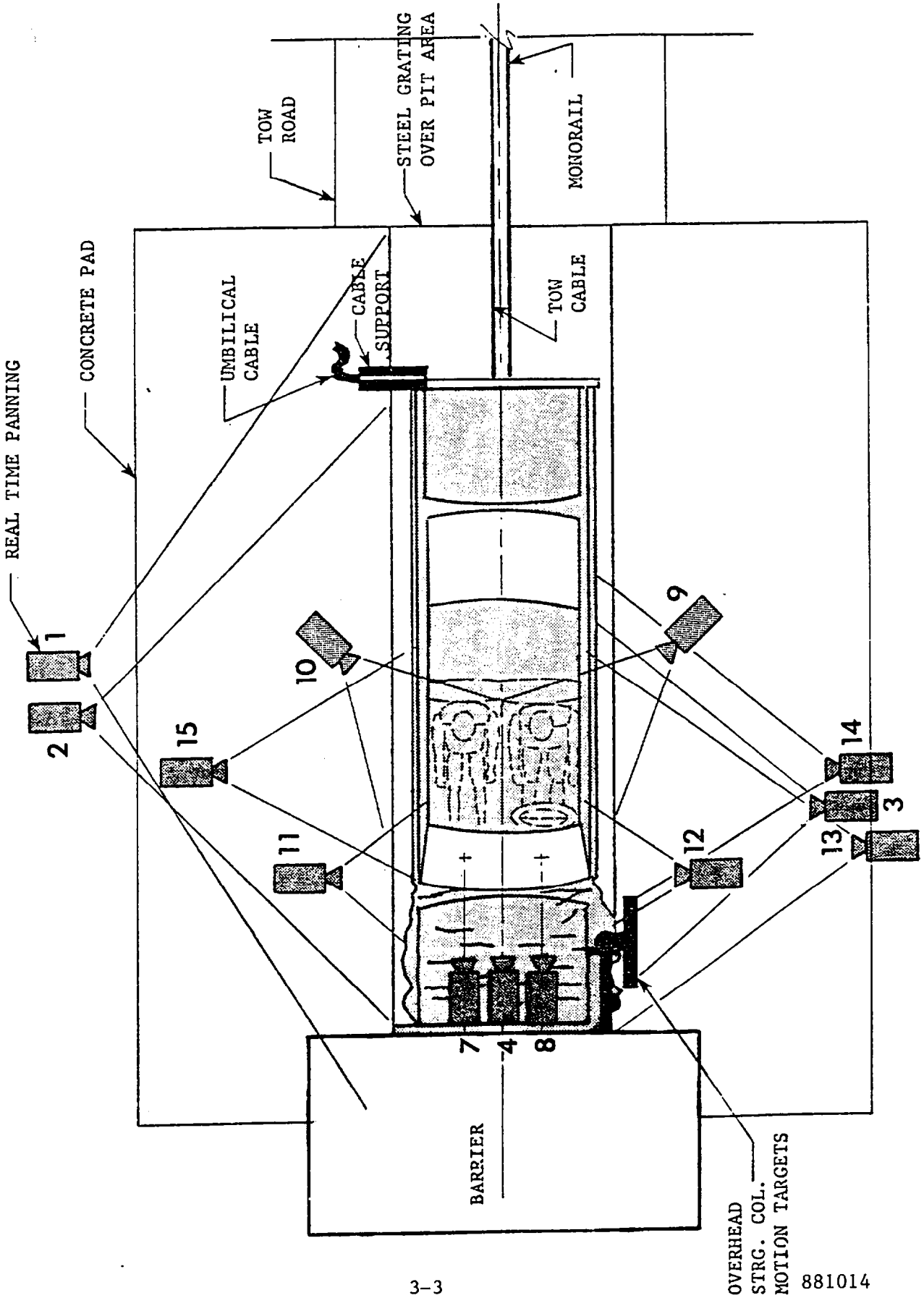


TABLE 13 HIGH SPEED CAMERA LOCATIONS

TEST NO.:	881014	VEHICLE:	1988 Oldsmobile Cutlass Supreme			FILM PLANE			
			CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*	ANGLE** (DEG)	TO HEAD TARGET	LENS (MM)	SPEED (FPS)
			X	Y	Z				
1	Real time panning		-142.0	504.0	61.0	NA	NA	16	24
2	Vehicle crush		-81.3	266.4	37.1	-2	NA	13	500
3	Dummy kinematics		-41.5	-295.0	44.0	-4	275.0	25	517
4	Windshield damage		-6.0	0.0	89.0	-40	NA	13	497
5	Crush & fluid spillage		-50.5	0.0	-92.4	90	NA	13	1000
6	Fluid spillage		-99.3	0.0	-99.0	90	NA	13	1002
7	Passenger kinematics		-4.5	13.8	93.0	-50	NA	17	500
8	Driver kinematics		-6.8	-14.5	93.0	-50	NA	17	500
9	Driver kinematics		-157.3	-116.0	87.0	-27	105.0	25	500
10	Passenger kinematics		-152.1	116.0	87.0	-26	102.0	25	497
11	Windshield intrusion		-38.1	306.1	44.0	0	NA	50	497
12	Windshield intrusion		-53.0	-309.4	42.3	0	NA	50	500
13	Column movement		-106.0	-286.0	103.0	-14	NA	25	502
14	Column movement		-106.0	-286.0	75.1	-9	NA	25	500
15	Passenger kinematics		-38.8	293.0	45.3	-4	276.0	25	522

\*X = Film plane to plane of barrier face

Y = Film plane to monorail centerline

Z = Film plane to ground

\*\*Referenced to horizontal plane

APPENDIX A

PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. POST-TEST FRONT VIEW
3. PRE-TEST LEFT SIDE VIEW
4. POST-TEST LEFT SIDE VIEW
5. PRE-TEST RIGHT SIDE VIEW
6. POST-TEST RIGHT SIDE VIEW
7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW
8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
9. PRE-TEST LEFT REAR THREE-QUARTER VIEW
10. POST-TEST LEFT REAR THREE-QUARTER VIEW
11. PRE-TEST REAR VIEW
12. POST-TEST REAR VIEW
13. PRE-TEST WINDSHIELD VIEW
14. PRE-TEST ENGINE COMPARTMENT VIEW
15. POST-TEST ENGINE COMPARTMENT VIEW
16. PRE-TEST FUEL FILLER CAP VIEW
17. POST-TEST FUEL FILLER CAP VIEW
18. PRE-TEST FRONT UNDERBODY VIEW
19. POST-TEST FRONT UNDERBODY VIEW
20. PRE-TEST REAR UNDERBODY VIEW
21. POST-TEST REAR UNDERBODY VIEW
22. PRE-TEST FUEL LINES VIEW
23. PRE-TEST FUEL FILLER NECK VIEW
24. PRE-TEST CARGO BALLAST VIEW
25. PRE-TEST DRIVER DUMMY POSITION VIEW
26. POST-TEST DRIVER DUMMY POSITION VIEW
27. PRE-TEST PASSENGER DUMMY POSITION VIEW
28. POST-TEST PASSENGER DUMMY POSITION VIEW
29. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR
30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1
31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

PHOTOGRAPHS, CONT'D

32. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR
33. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1
34. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2
35. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1
36. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2
37. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 3
38. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 4
39. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 1
40. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 2
41. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 3
42. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW
43. PRE-TEST VEHICLE TIRE LOAD LABEL VIEW
44. POST-TEST VEHICLE ON STATIC ROLLOVER VIEW

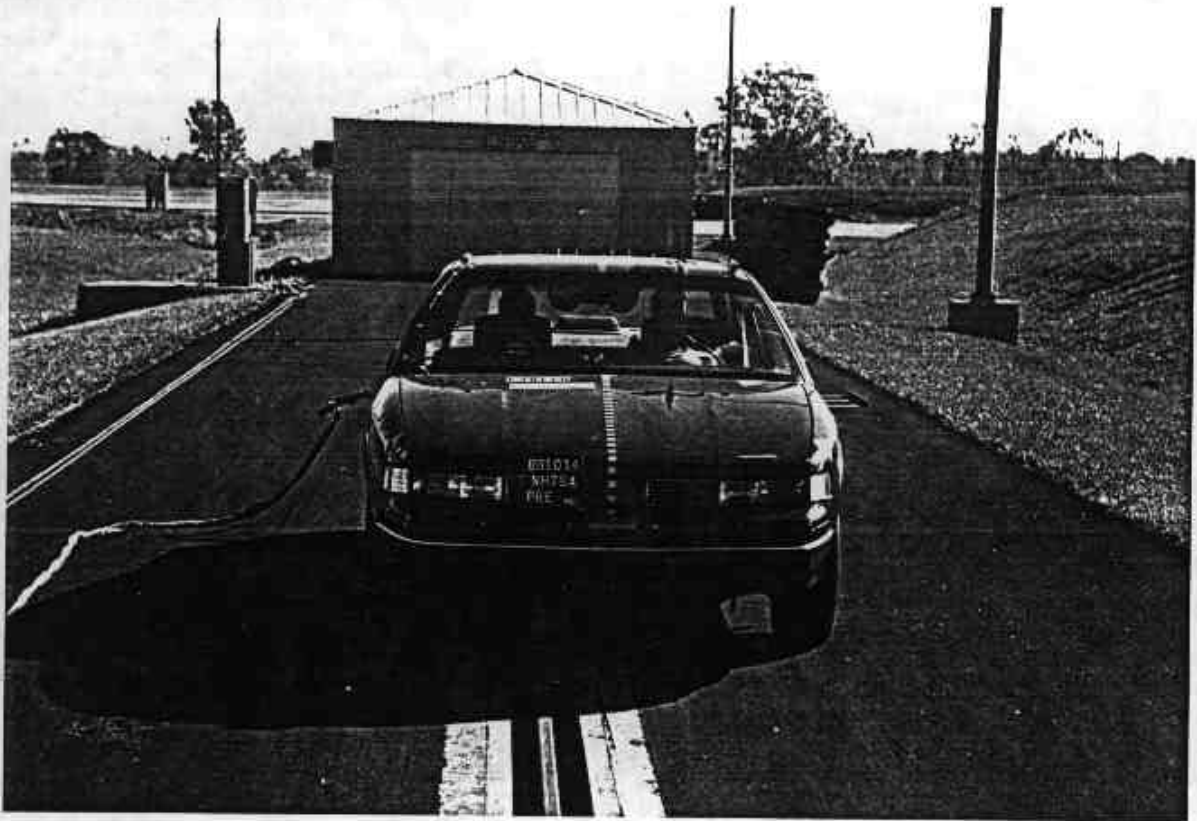


Figure A-1. PRE-TEST FRONT VIEW



Figure A-2. POST-TEST FRONT VIEW  
A-3

881014

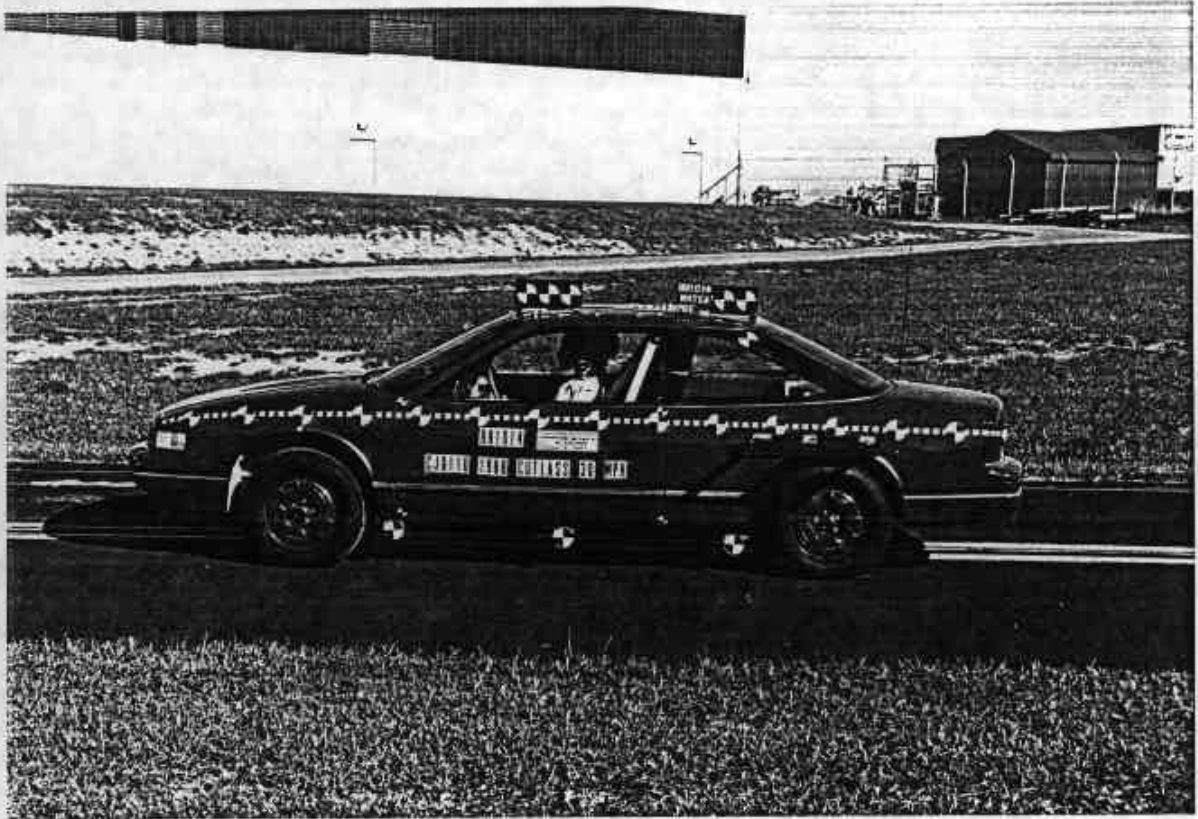


Figure A-3. PRE-TEST LEFT SIDE VIEW



Figure A-4. POST-TEST LEFT SIDE VIEW

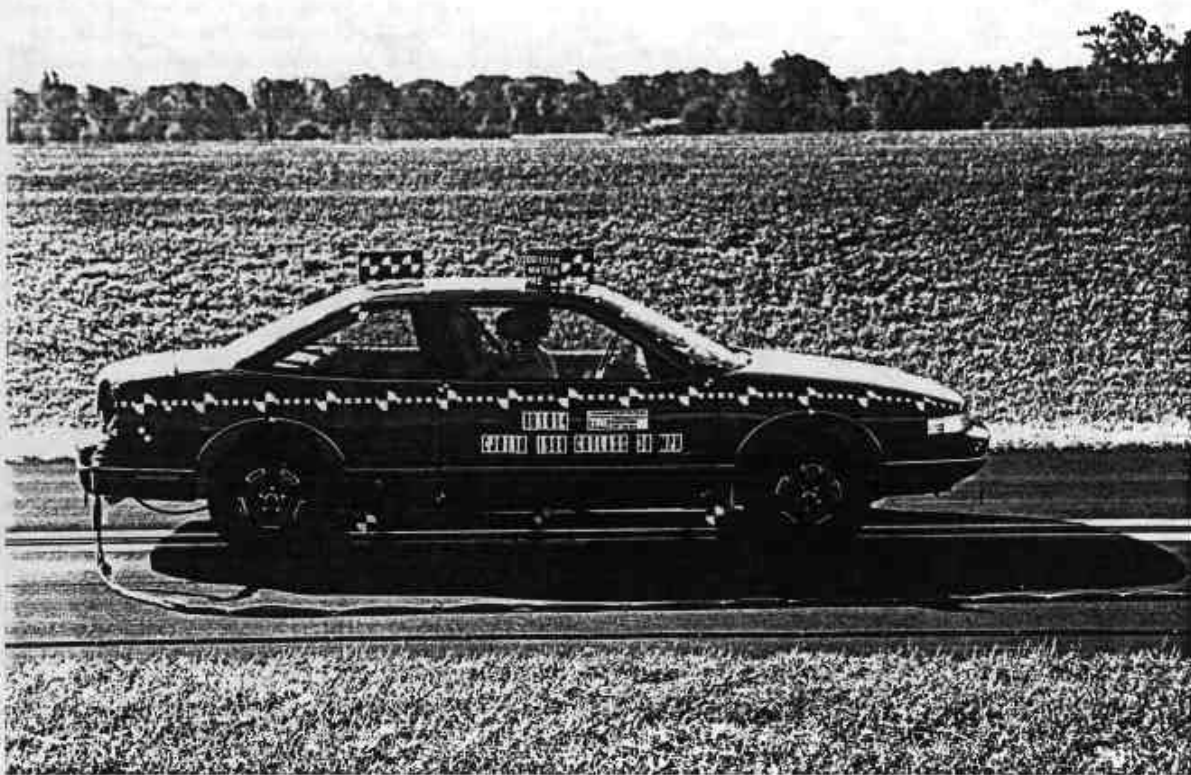


Figure A-5. PRE-TEST RIGHT SIDE VIEW



Figure A-6. POST-TEST RIGHT SIDE VIEW  
A-5

881014

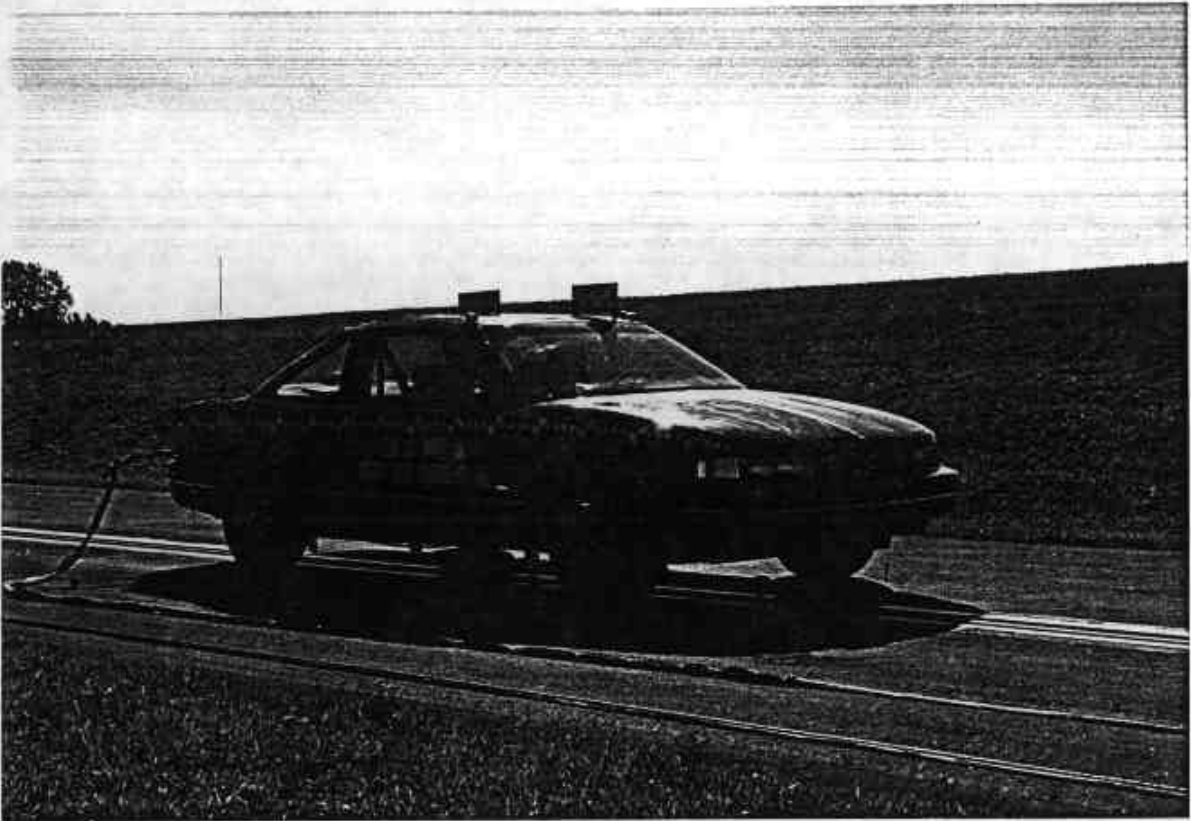


Figure A-7. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

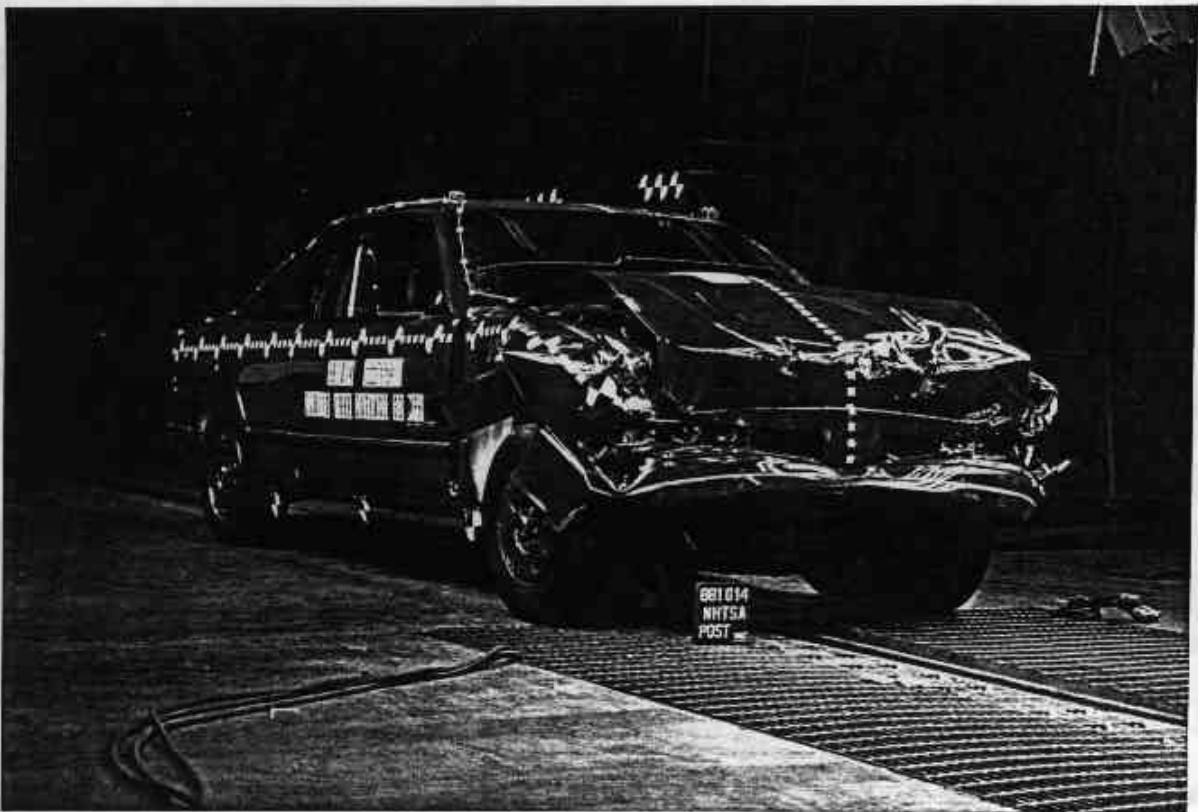


Figure A-8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-6

881014

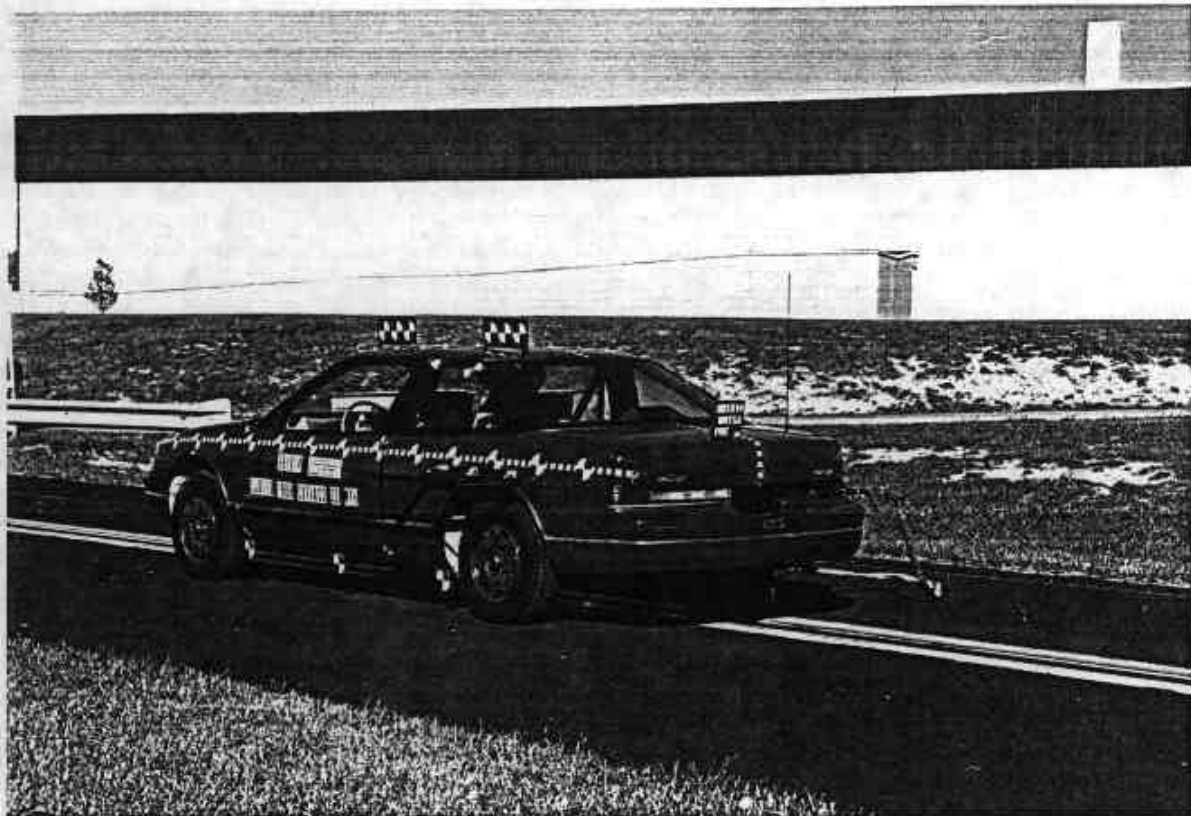


Figure A-9. PRE-TEST LEFT REAR THREE-QUARTER VIEW



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

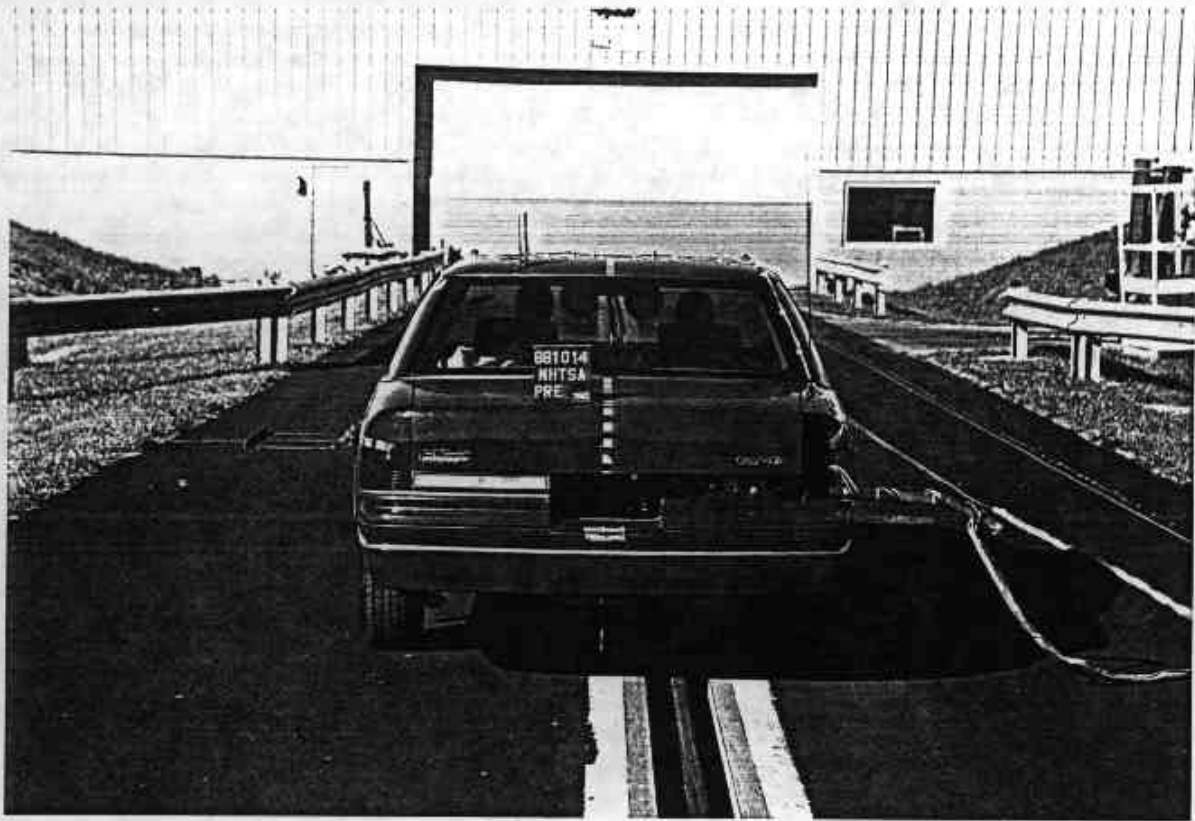


Figure A-11. PRE-TEST REAR VIEW



Figure A-12. POST-TEST REAR VIEW

A-8

881014

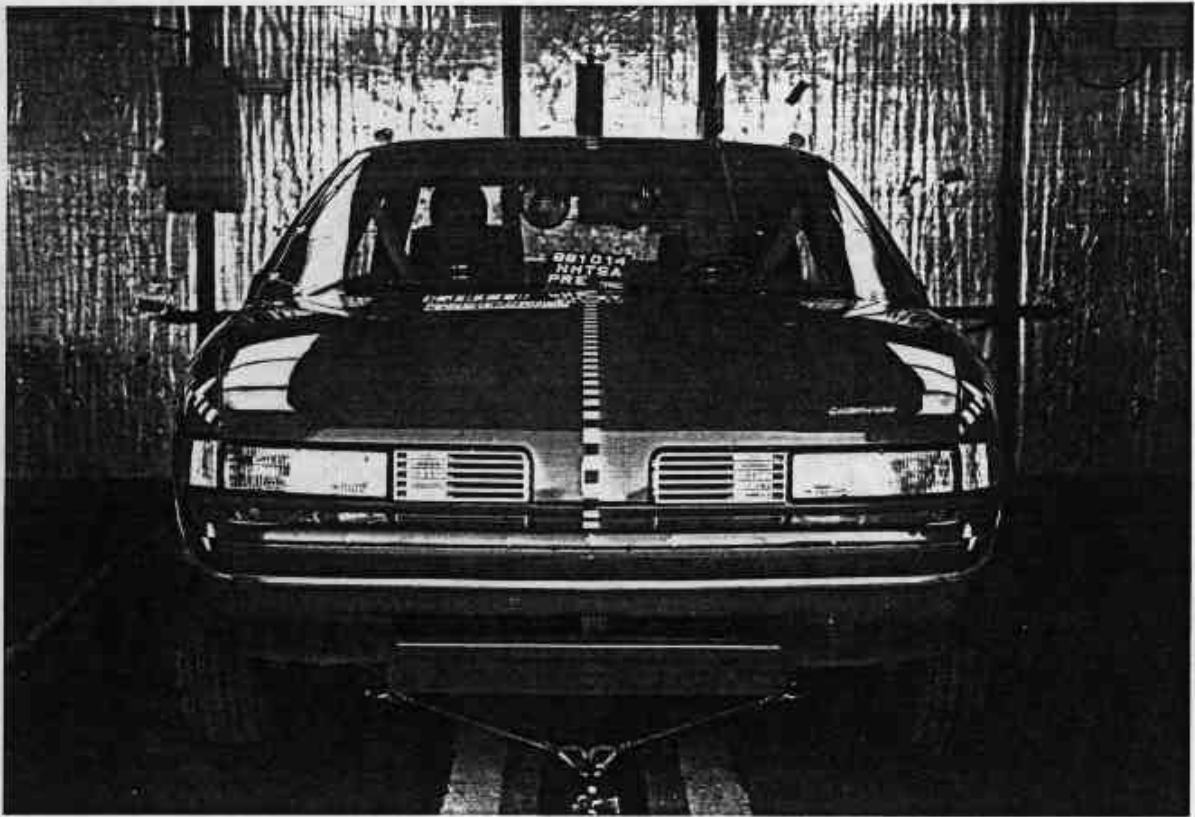


Figure A-13. PRE-TEST WINDSHIELD VIEW

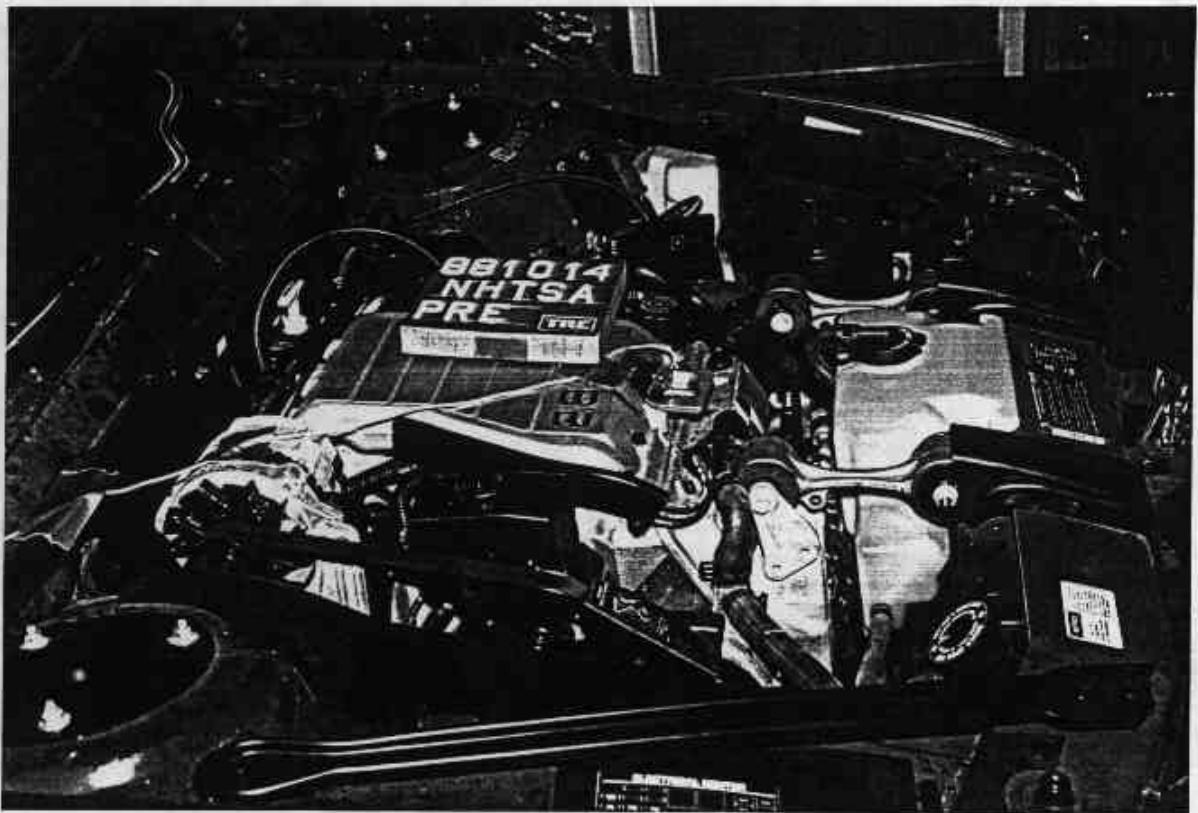


Figure A-14. PRE-TEST ENGINE COMPARTMENT VIEW

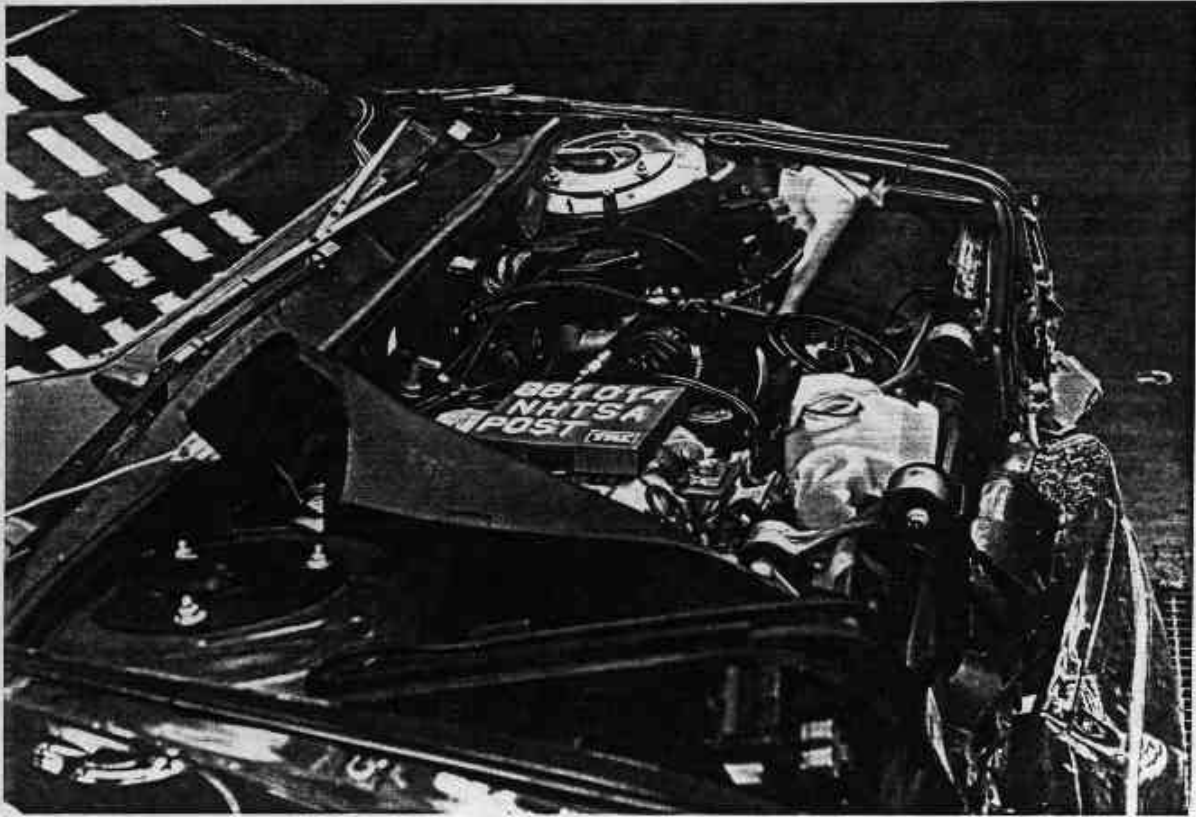


Figure A-15. POST-TEST ENGINE COMPARTMENT VIEW

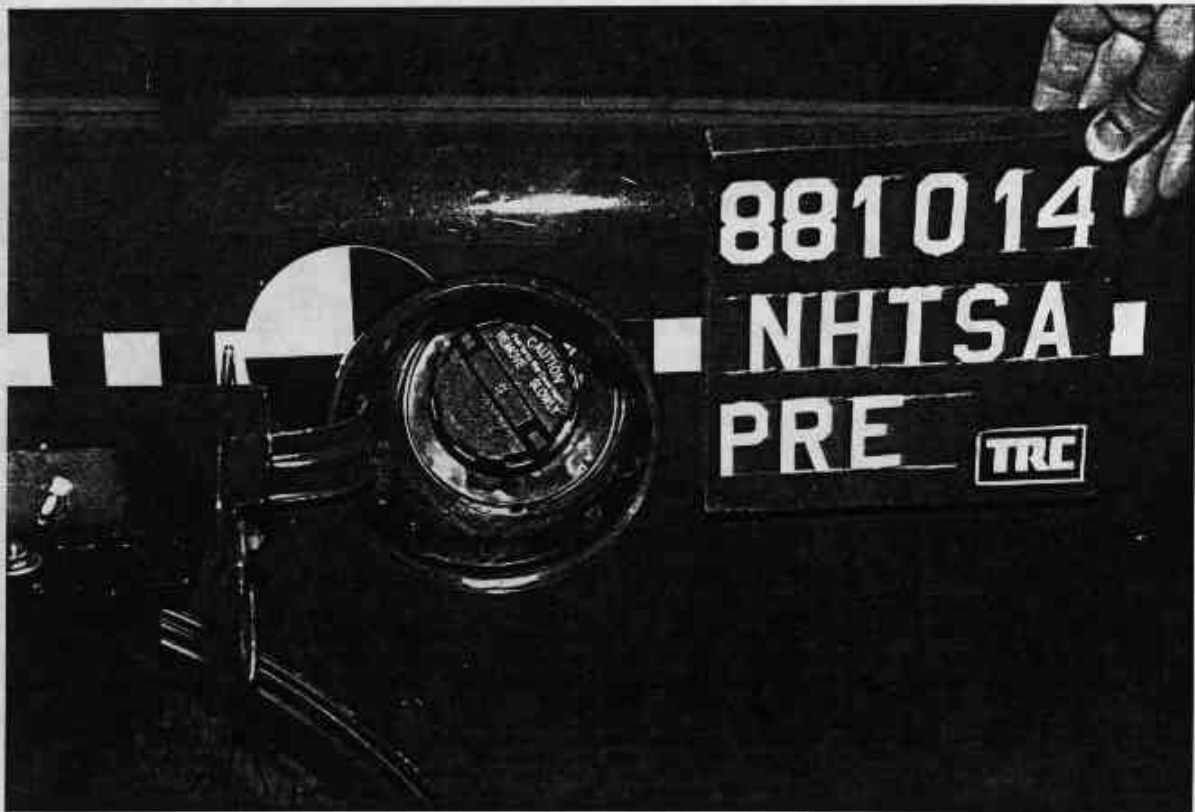


Figure A-16. PRE-TEST FUEL FILLER CAP VIEW



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



Figure A-18. PRE-TEST FRONT UNDERBODY VIEW

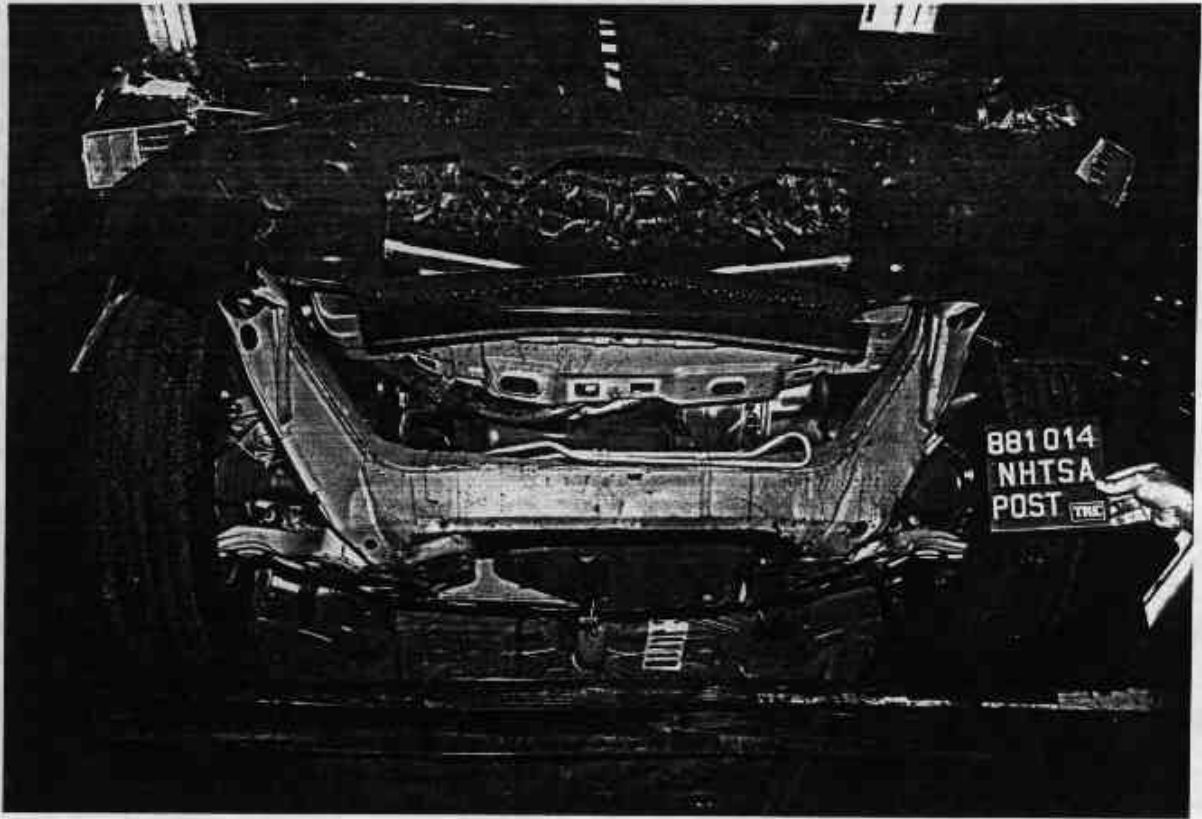


Figure A-19. POST-TEST FRONT UNDERBODY VIEW

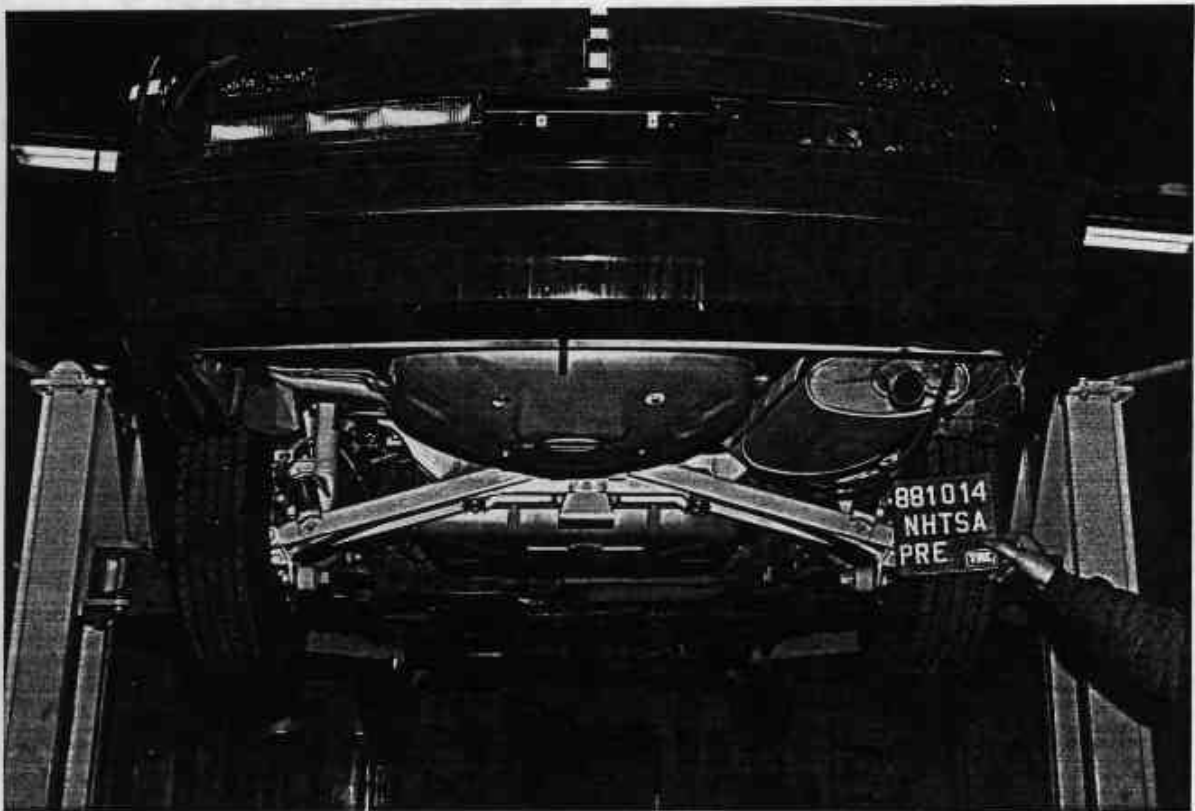


Figure A-20. PRE-TEST REAR UNDERBODY VIEW

A-12

881014

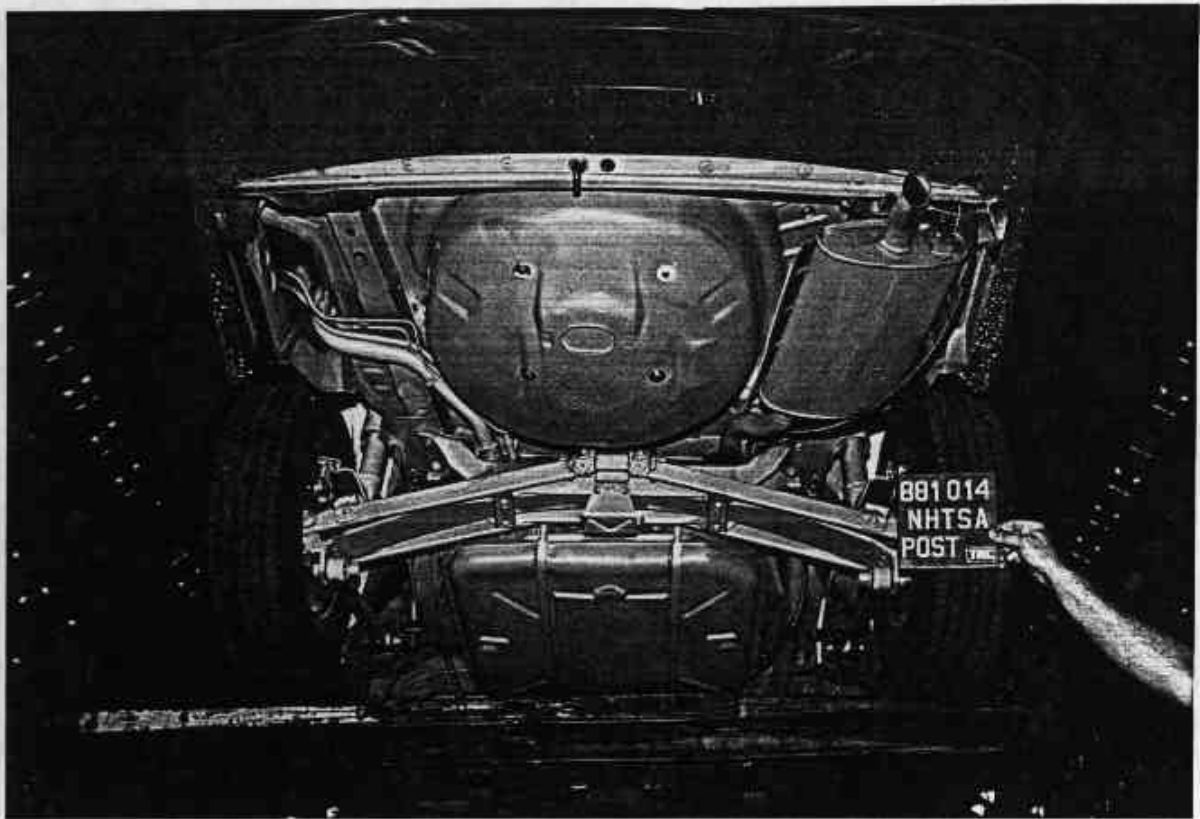


Figure A-21. POST-TEST REAR UNDERBODY VIEW



Figure A-22. PRE-TEST FUEL LINES VIEW  
A-13

881014



Figure A-23. PRE-TEST FUEL FILLER NECK VIEW

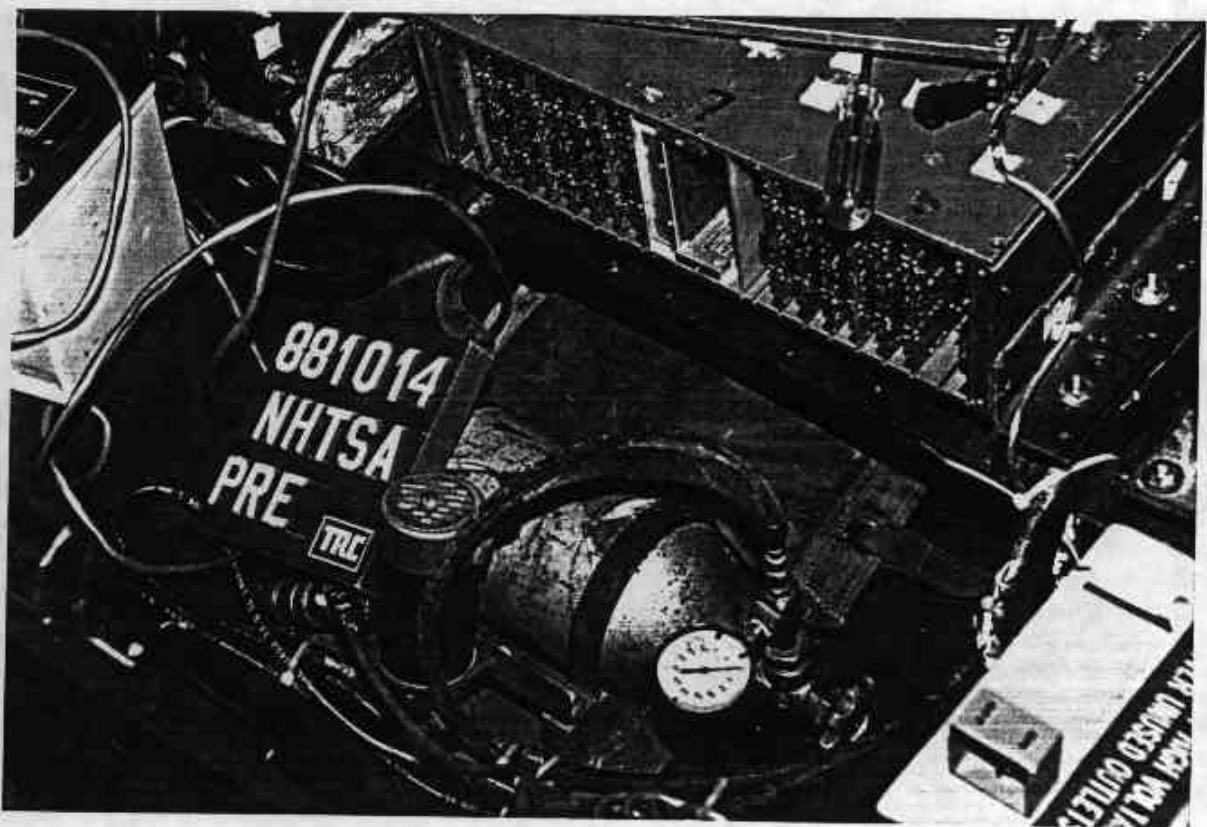


Figure A-24. PRE-TEST CARGO BALLAST VIEW



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



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

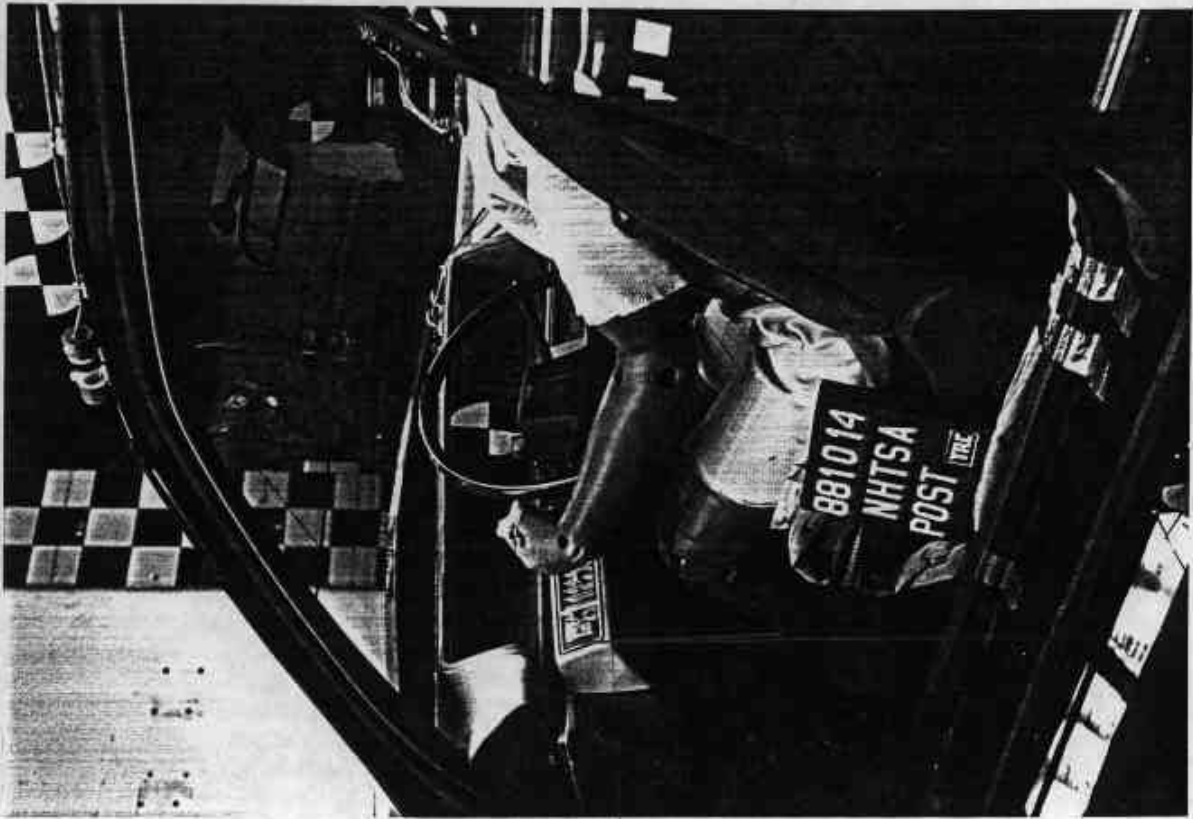


Figure A-31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-32. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR

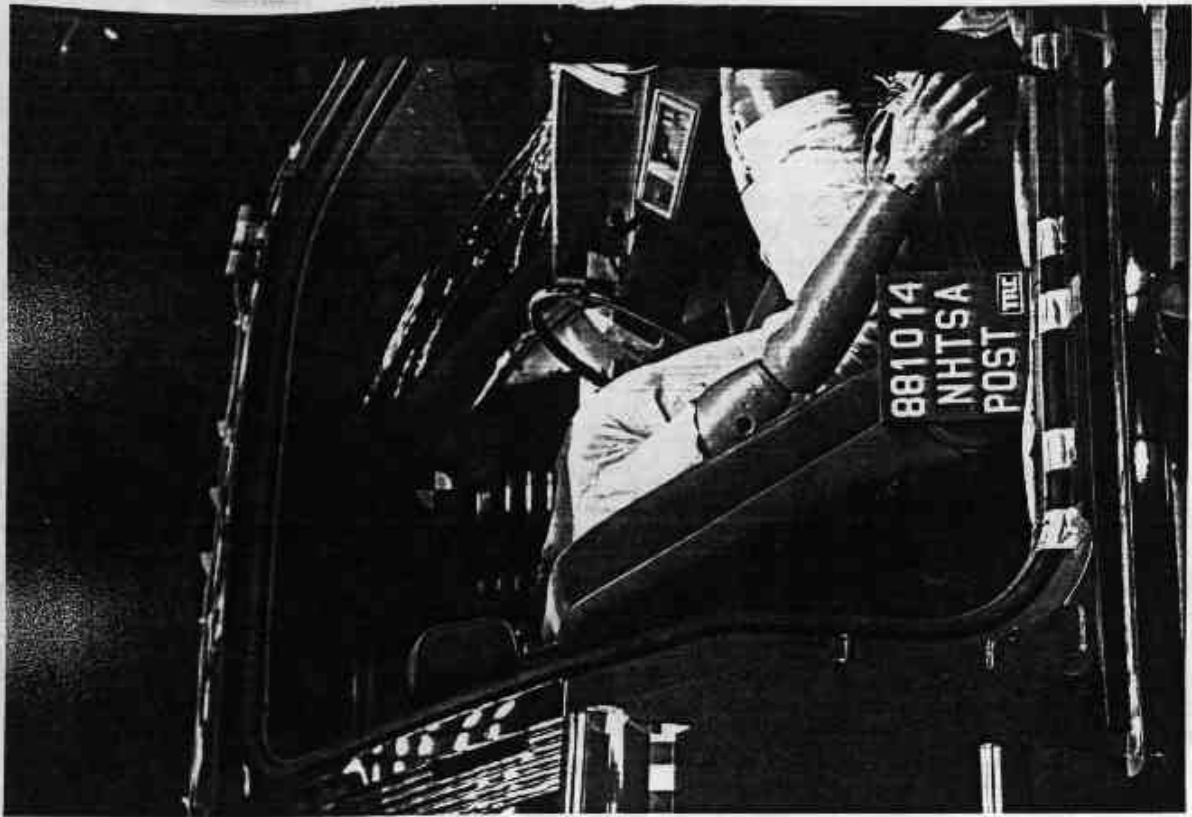


Figure A-33. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1



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



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

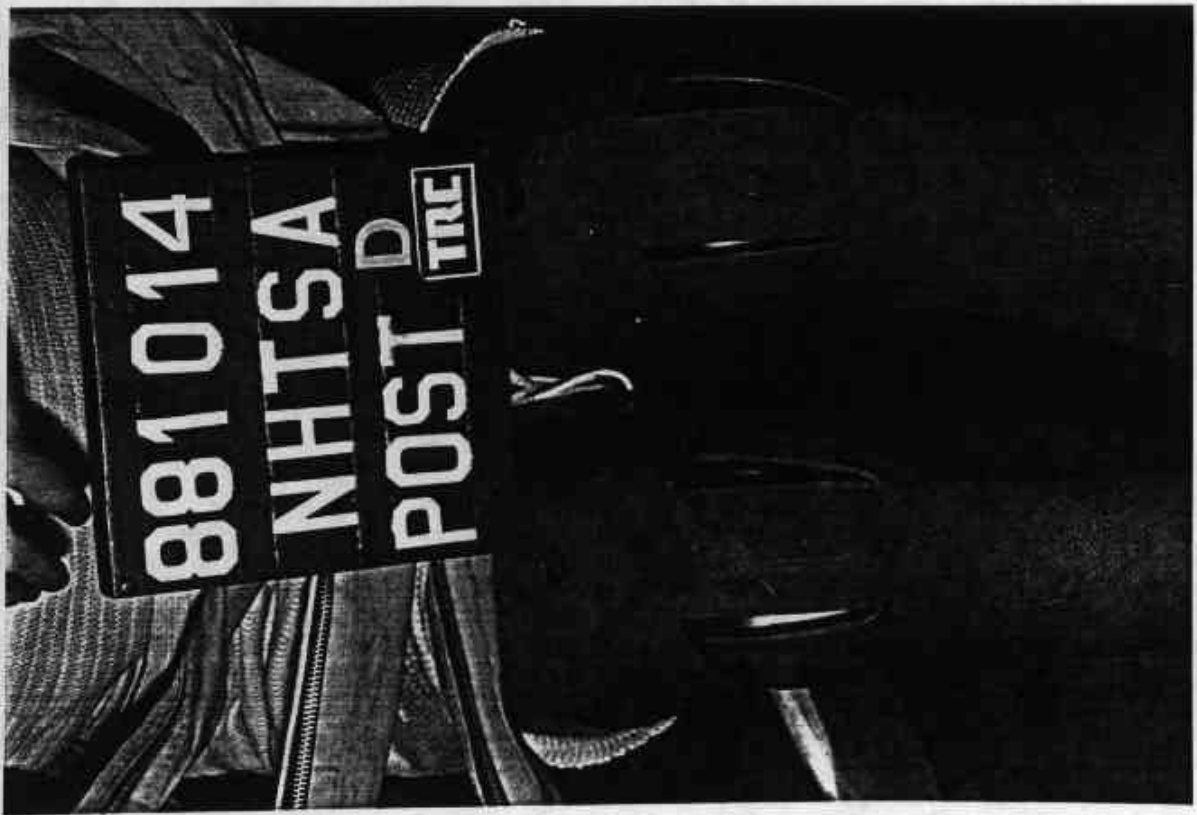


Figure A-36. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2



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

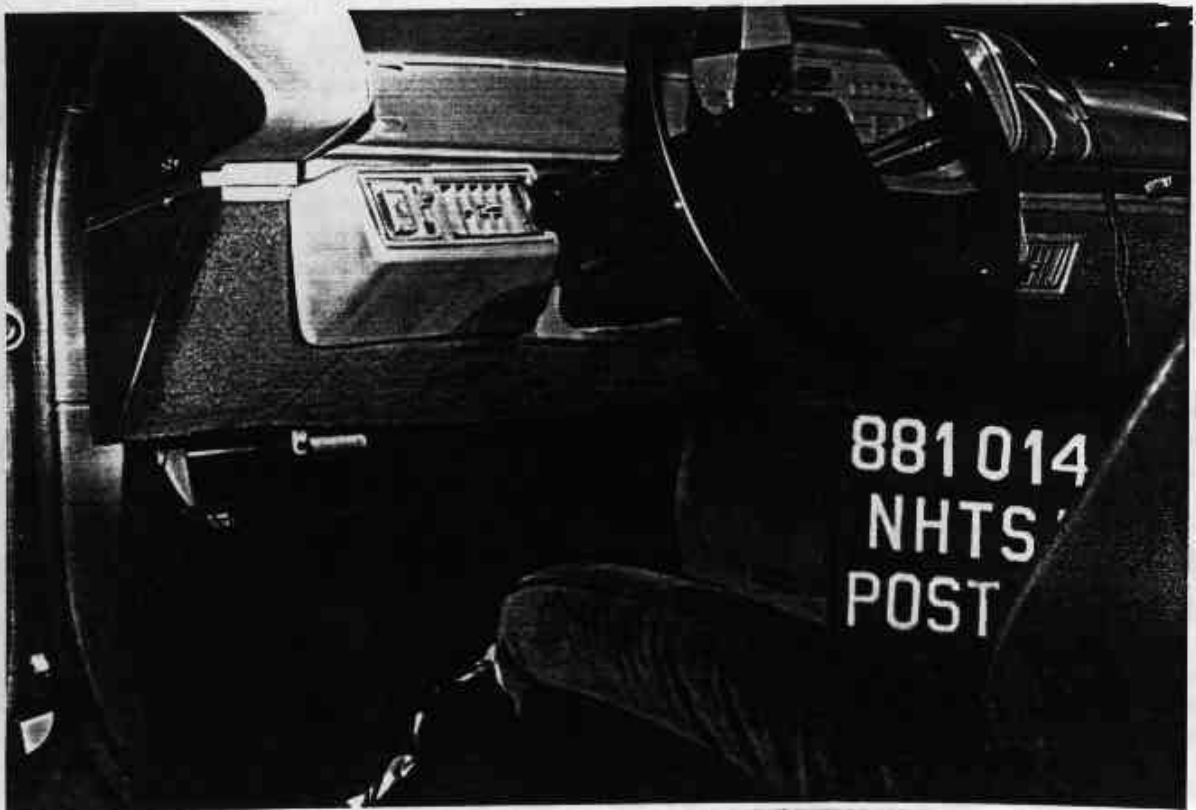


Figure A-38. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 4



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

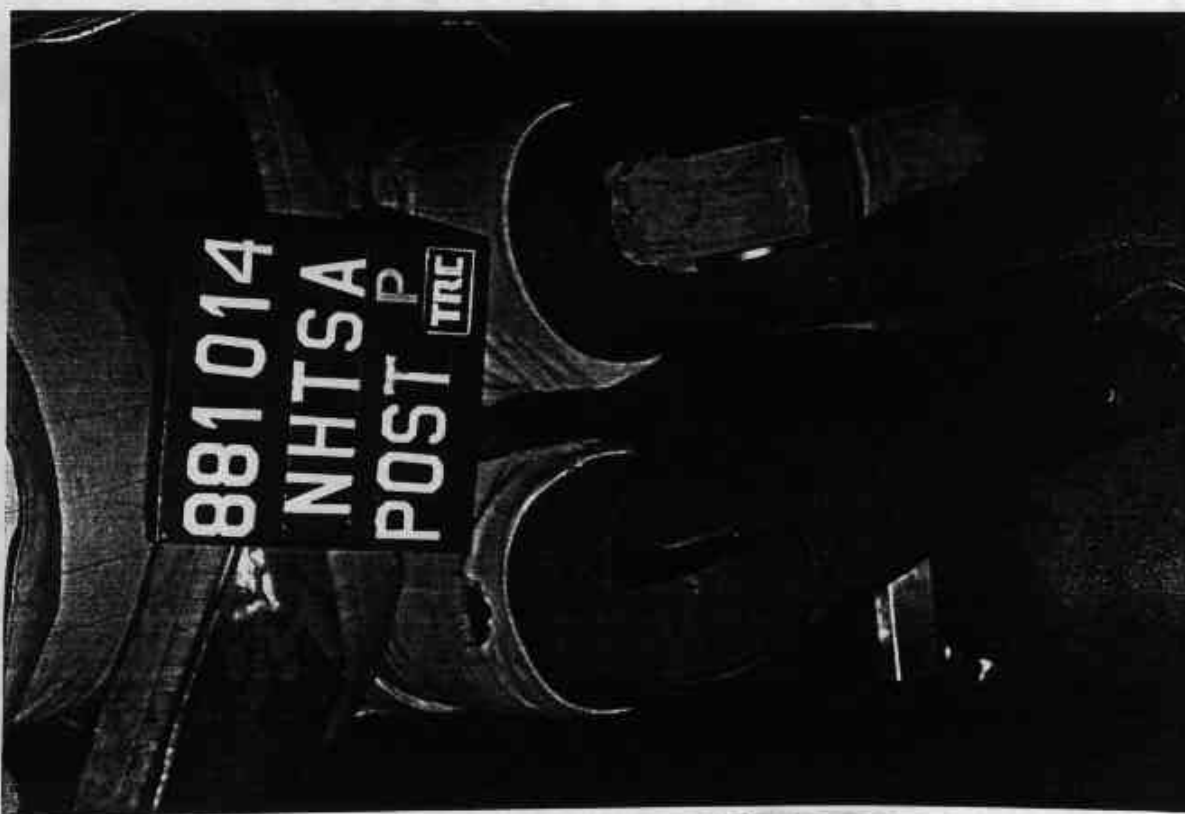


Figure A-40. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 2



Figure A-41. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT - VIEW 3



Figure A-42. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW



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

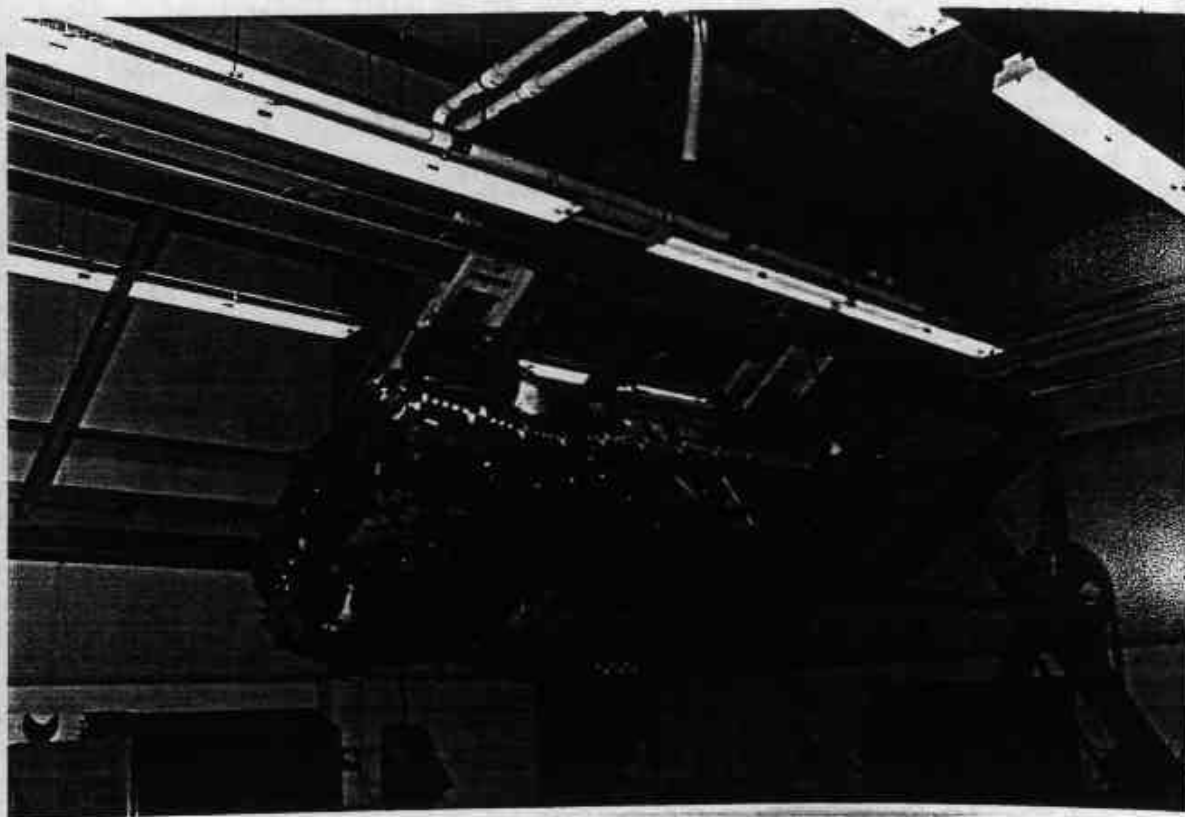


Figure A-44. POST-TEST VEHICLE ON STATIC ROLLOVER VIEW

APPENDIX B

DATA PLOTS

DUMMY AND VEHICLE AXES: X: FRONT/REAR  
Y: LEFT/RIGHT  
Z: UP/DOWN

200 COMPLIANCE TEST

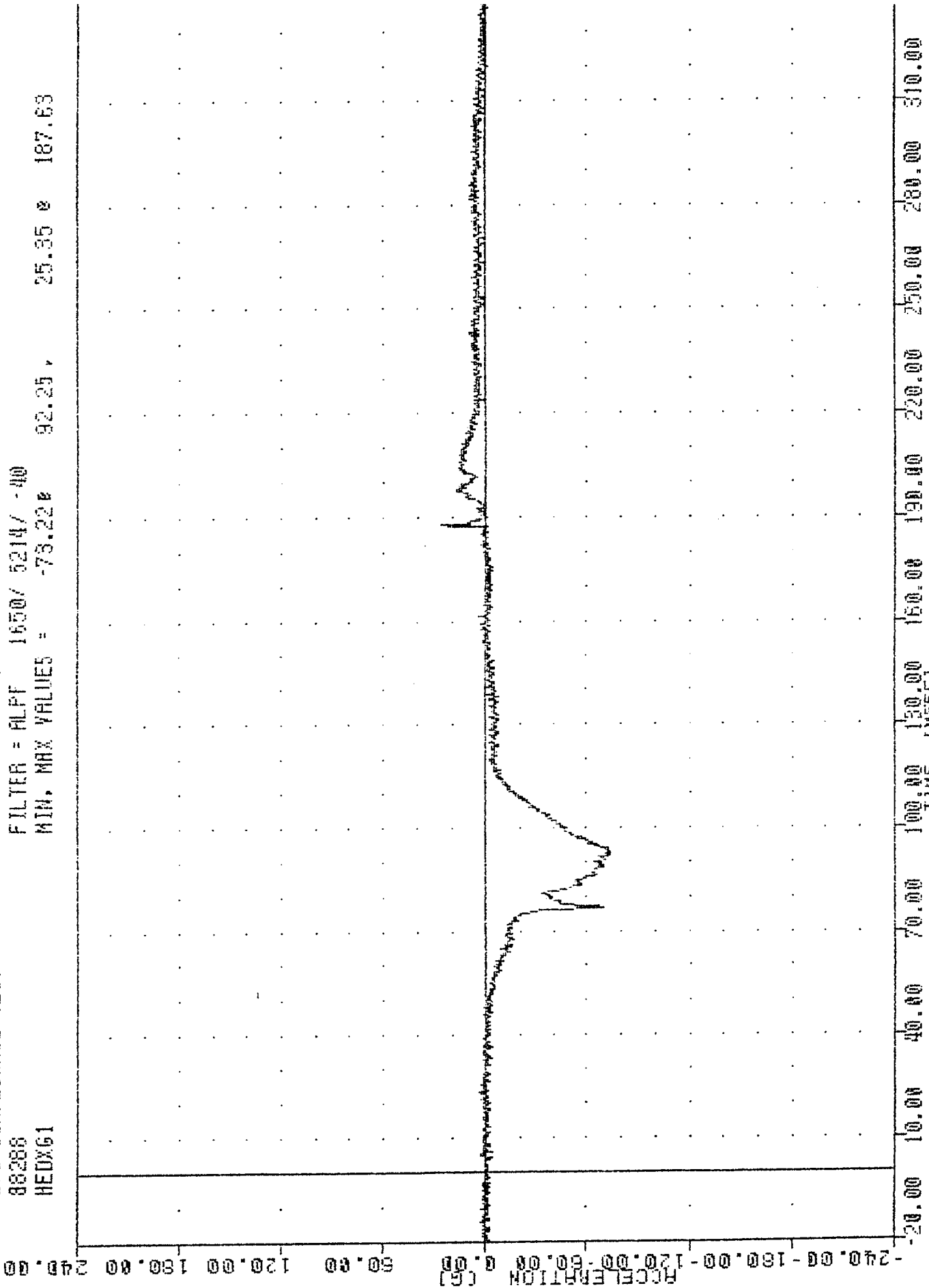
88286

HEDX61

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -73.22 92.25

25.35 187.63



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER HEAD X AXIS ACCELERATION

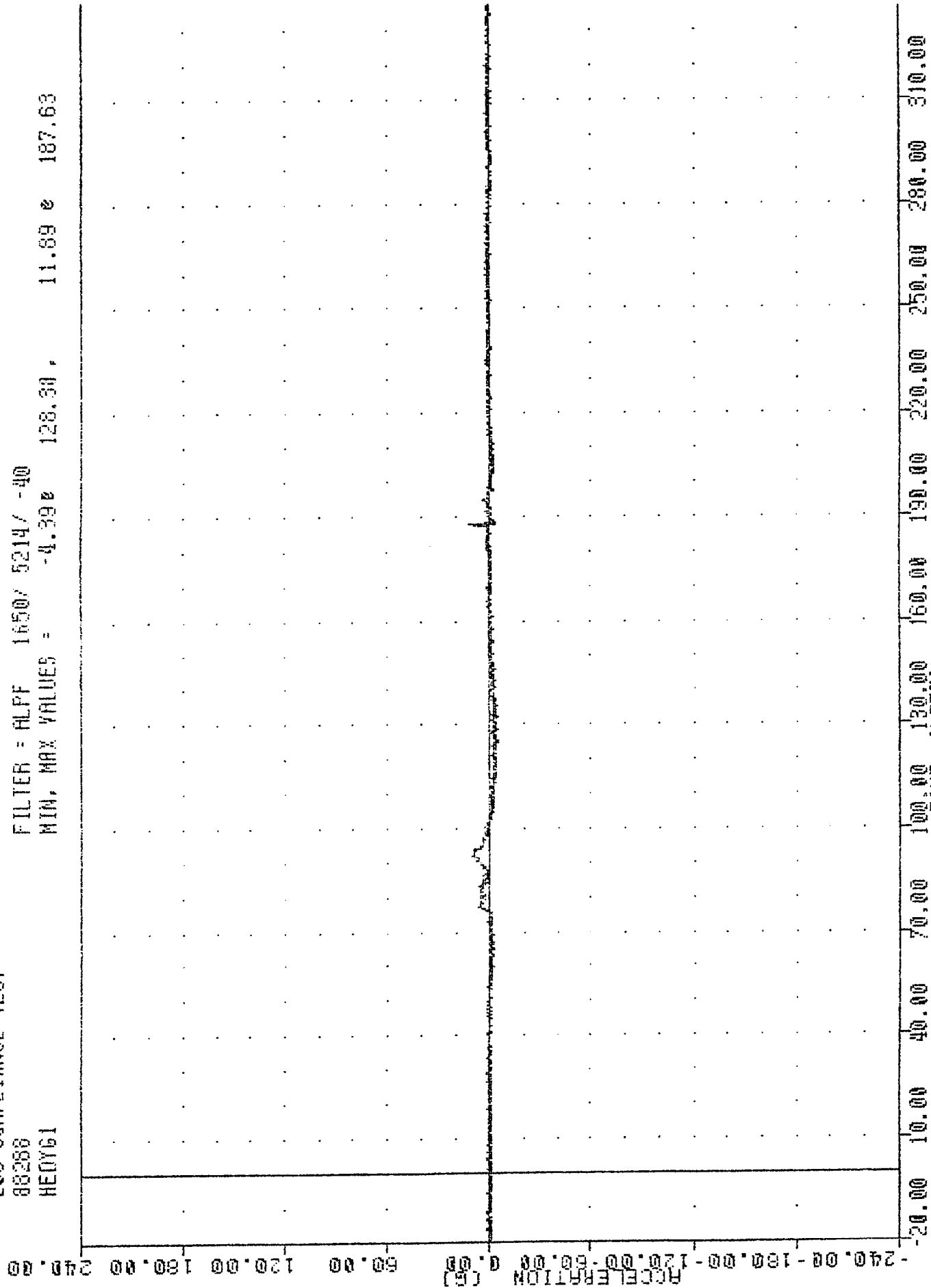
200 COMPLIANCE TEST

88288

HE0Y61

FILTER = ALPF 16507 5214/ -40

MIN. MAX VALUES = -4.39e 128.30 , 11.89 e 187.63



-20.00 10.00 40.00 70.00 100.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00  
 TIME (MSEC)  
 OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
 DRIVER HEAD Y AXIS ACCELERATION

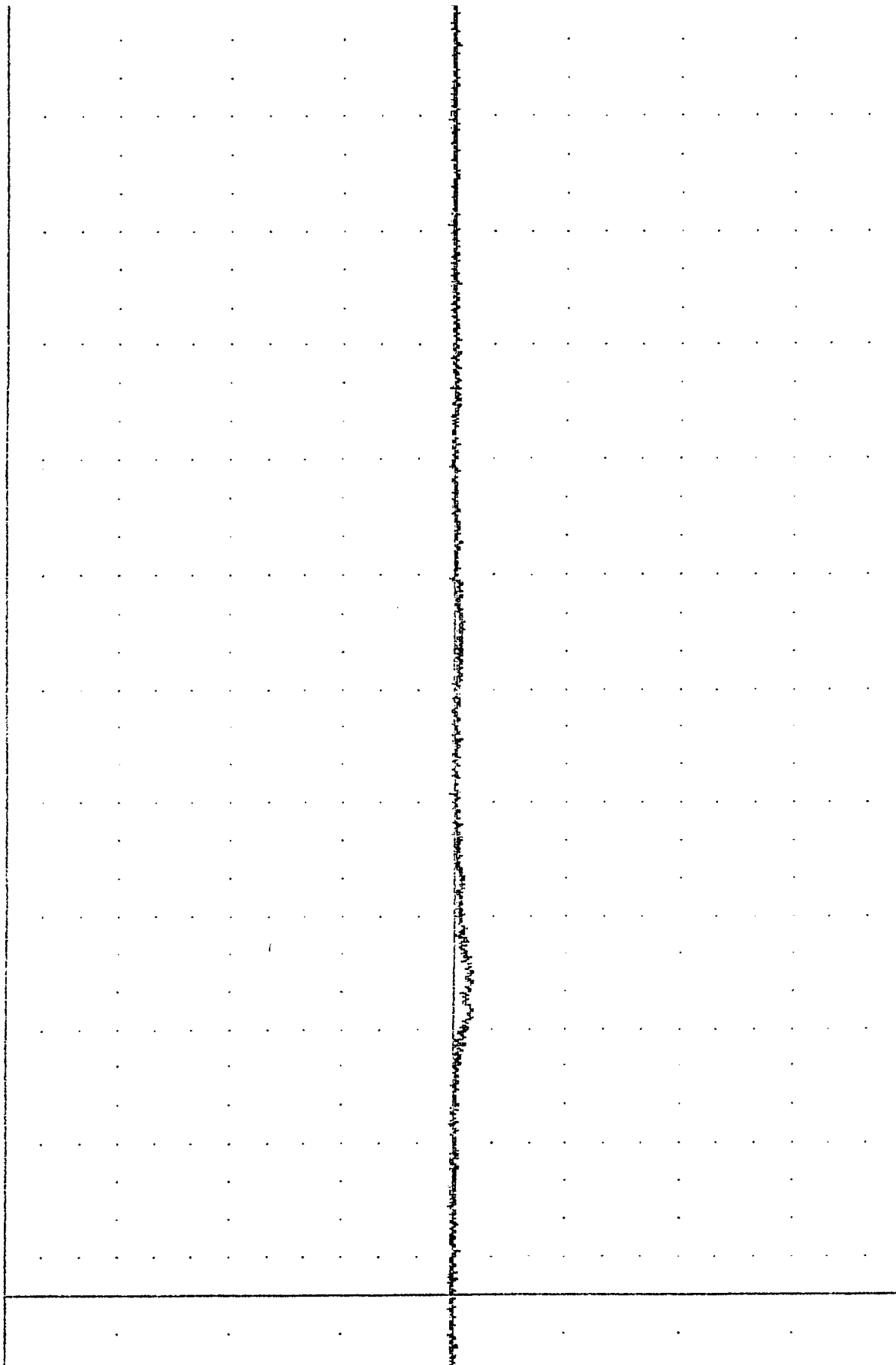
208 COMPLIANCE TEST

88288  
HEDZ61

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -10.43% 85.13, 4.03 @ 281.50

ACCELERATION (G)



240.00  
200.00  
180.00  
160.00  
140.00  
120.00  
100.00  
80.00  
60.00  
40.00  
20.00  
0.00  
-20.00

0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER HEAD Z AXIS ACCELERATION

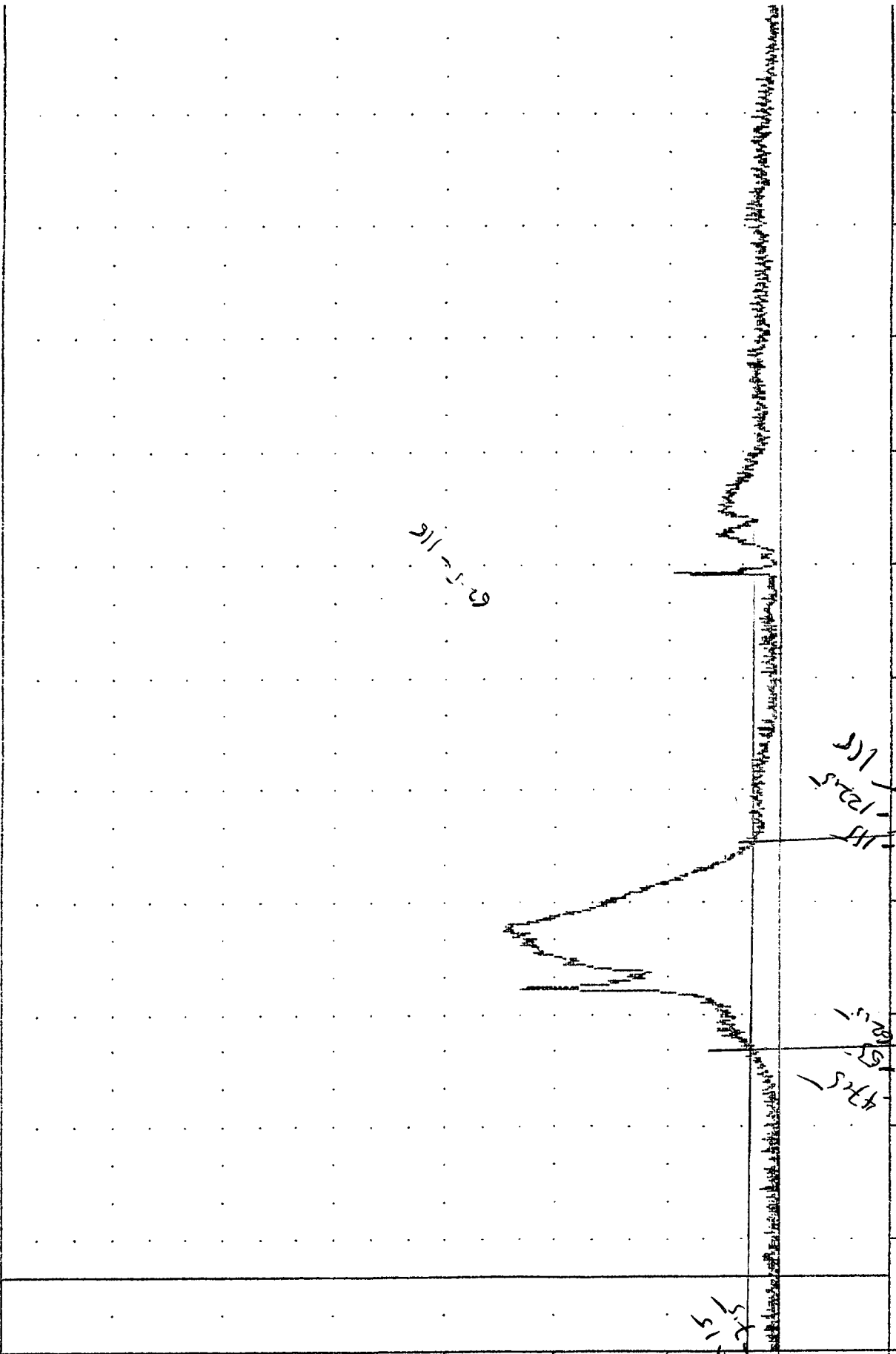
200 COMPLIANCE TEST

85288  
HEAD61

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = 0.208 16.13, 74.08 @ 92.13

ACCELERATION (G) 30.00 20.00 10.00 0.00 -10.00 -20.00 -30.00



TIME (MSEC) 310.00 280.00 250.00 220.00 190.00 160.00 130.00 100.00 70.00 40.00 10.00 -20.00

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER HEAD RESULTANT ACCELERATION

208 COMPLIANCE TEST

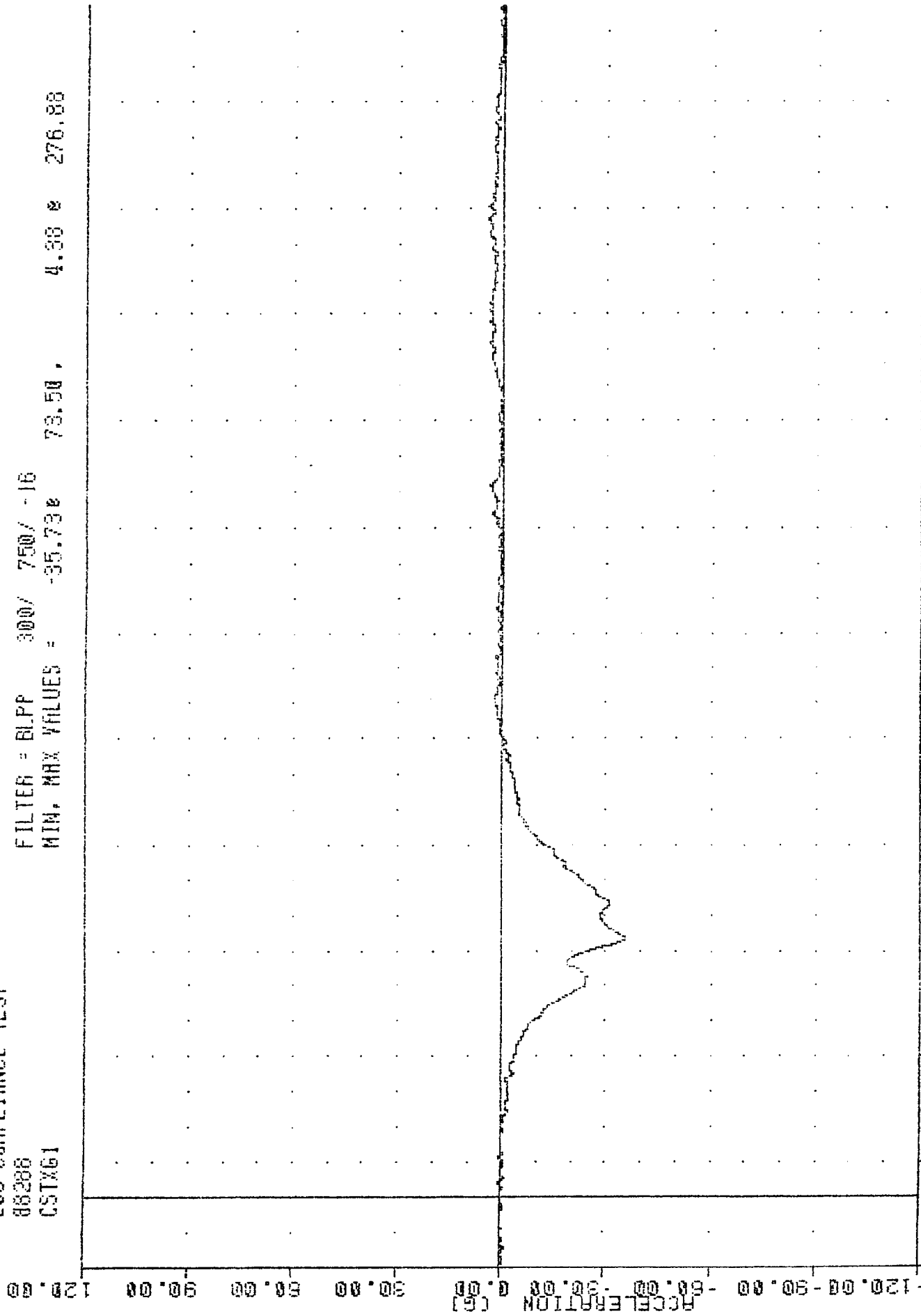
88288

CSTX61

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -35.730 73.50 ,

4.38 @ 276.88



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

TIME (MSEC)  
VEHICLE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER CHEST X AXIS ACCELERATION

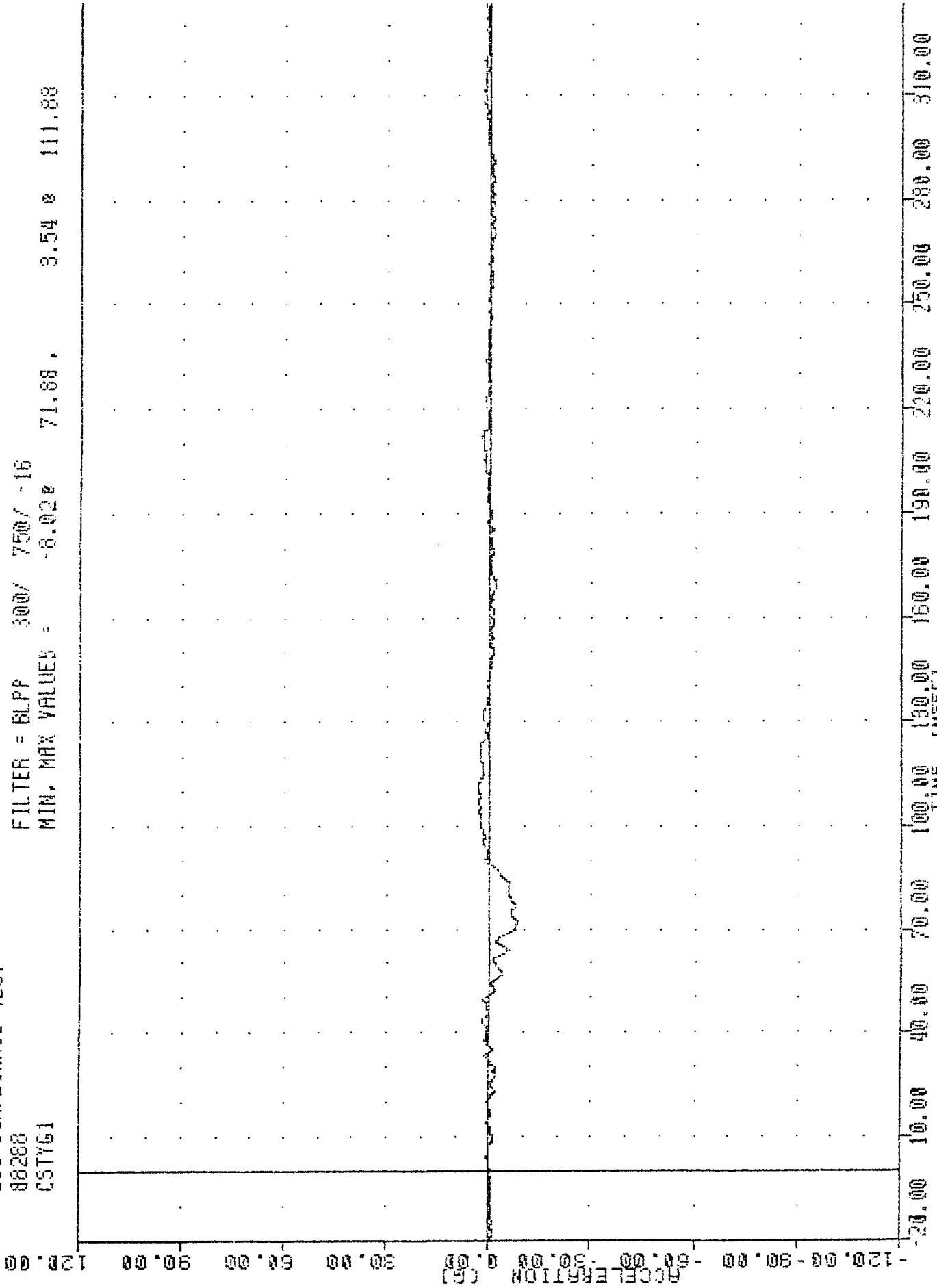
200 COMPLIANCE TEST

88288

CSTY61

FILTER = BLFF 300/ 750/ -16

MIN. MAX VALUES = -8.02e 71.88 , 3.54 e 111.88



0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00	310.00
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OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
 DRIVER CHEST Y AXIS ACCELERATION

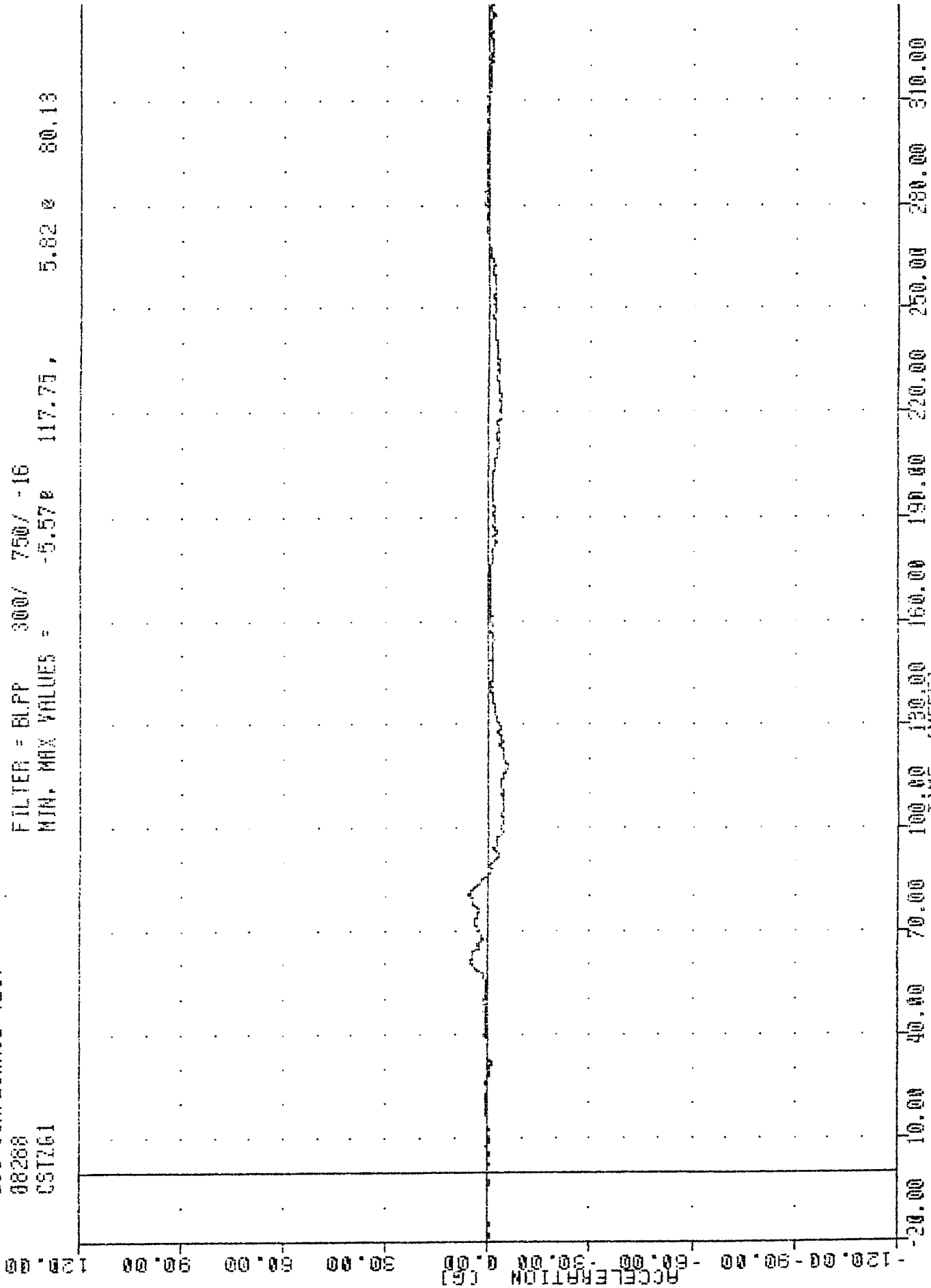
208 COMPLIANCE TEST

08268

CST261

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -5.57 117.75, 5.82 80.13



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER CHEST Z AXIS ACCELERATION

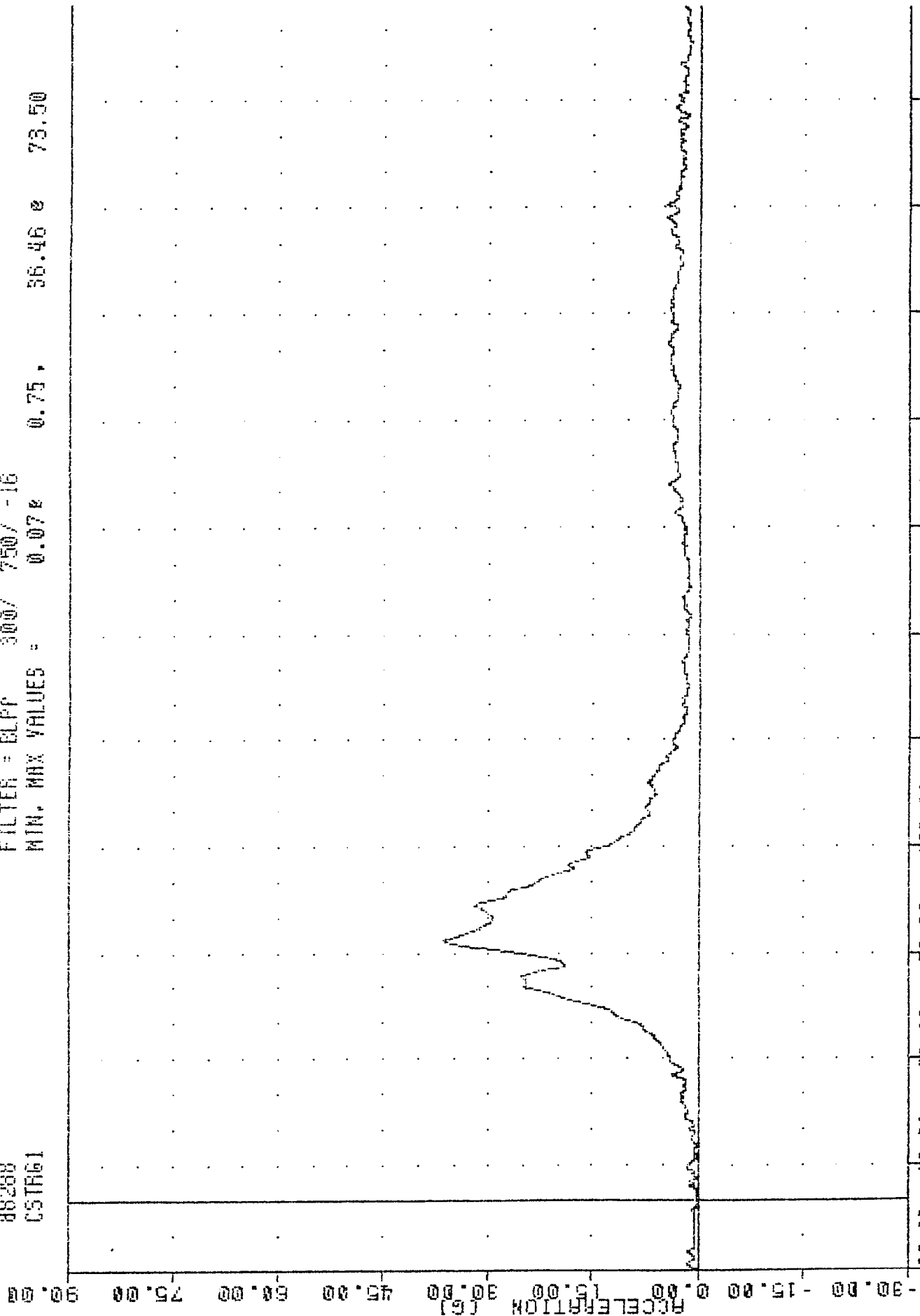
200 COMPLIANCE TEST

88288

CSTR61

FILTER = BLPF 300/ 750/ -16

MIN. MAX VALUES = 0.07% 0.75% 56.46 e 73.50



-20.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER CHEST RESULTANT ACCELERATION

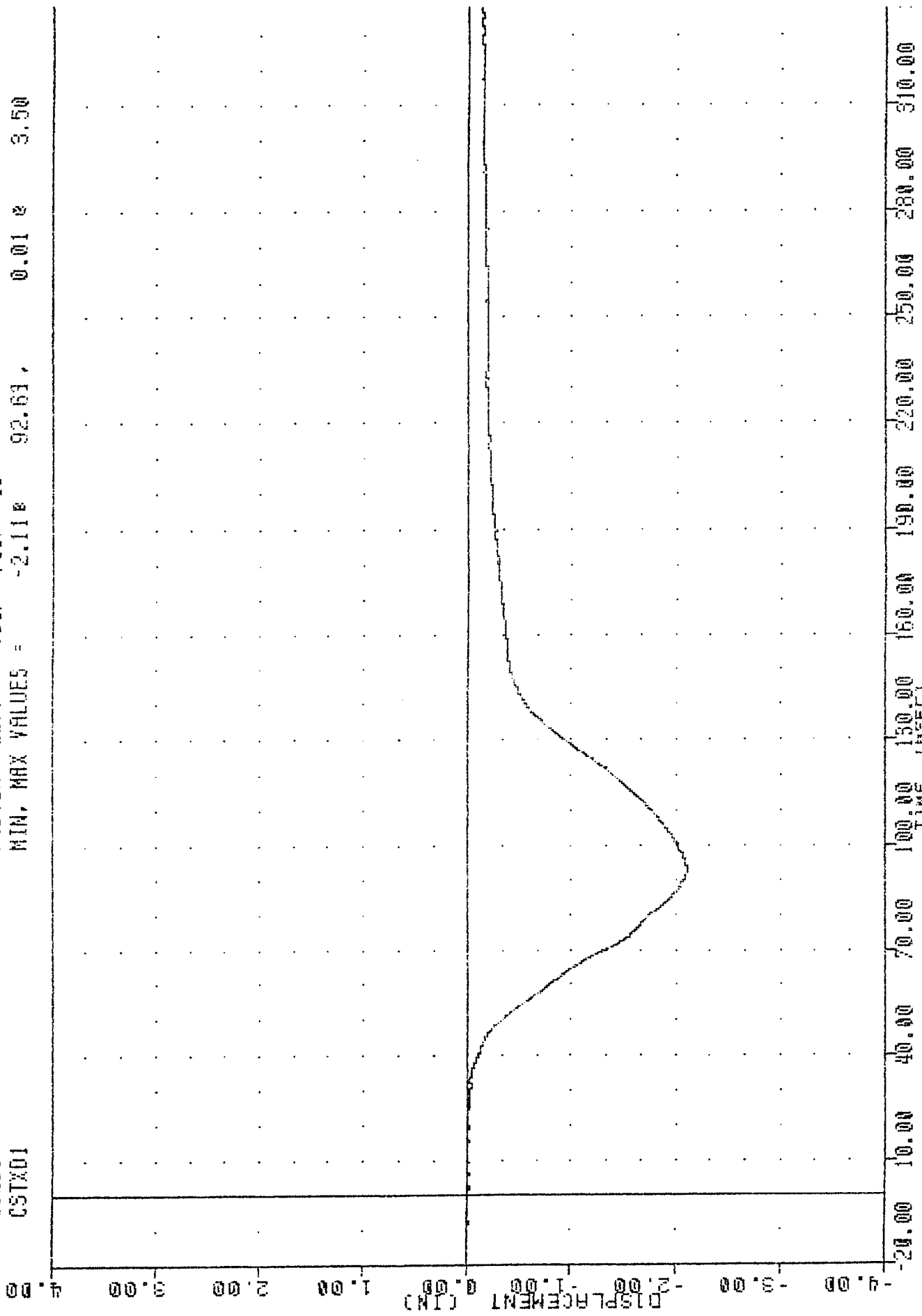
200 COMPLIANCE TEST

88288

CSTXD1

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -2.11E 92.63, 0.01E 3.50



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER CHEST DISPLACEMENT

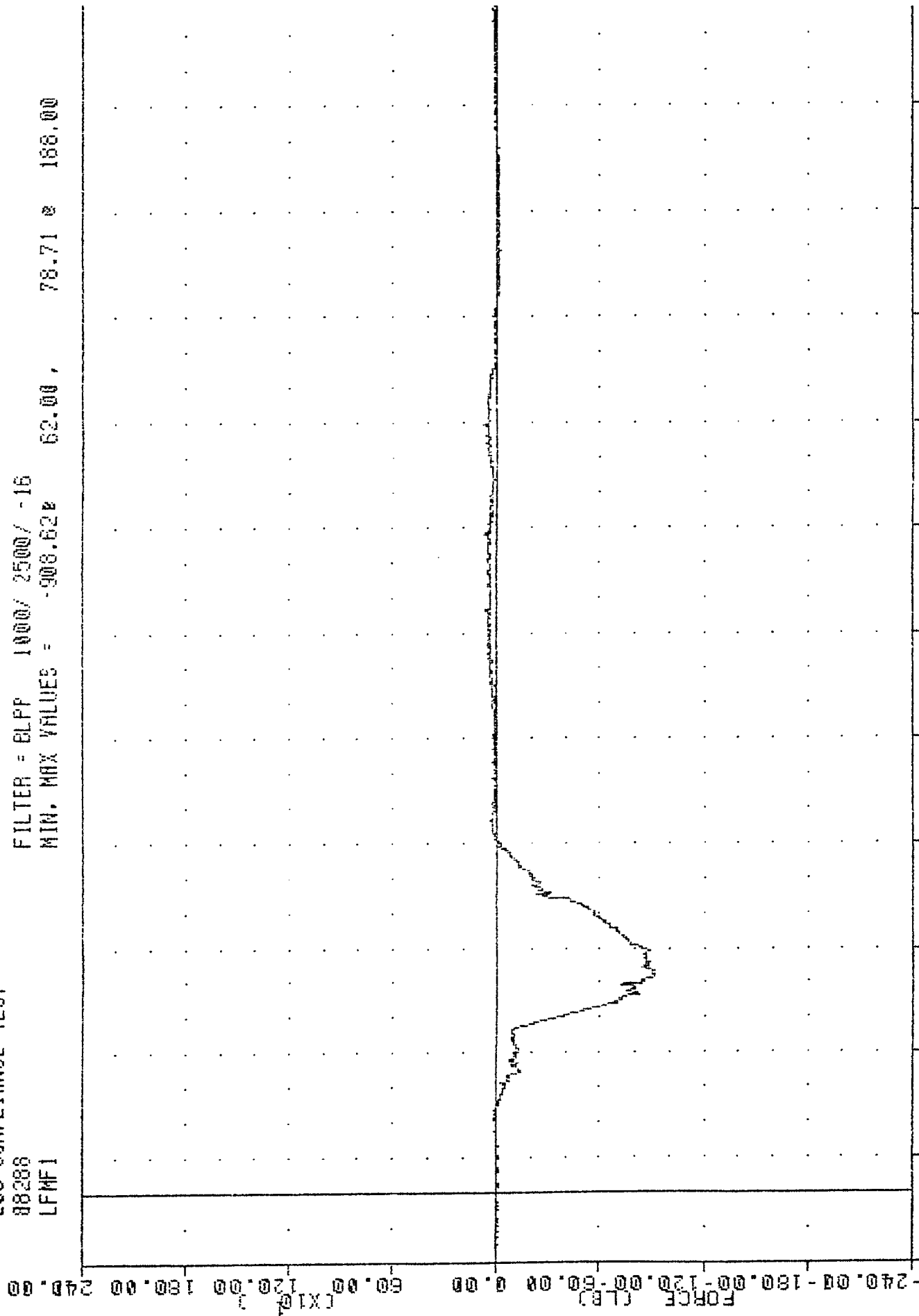
308 COMPLIANCE TEST

88288

LFMF1

FILTER = BLPP 1000/ 2500/ -16

MIN. MAX VALUES = -508.62# 62.00 , 78.71 @ 188.00



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER LEFT FEMUR FORCE

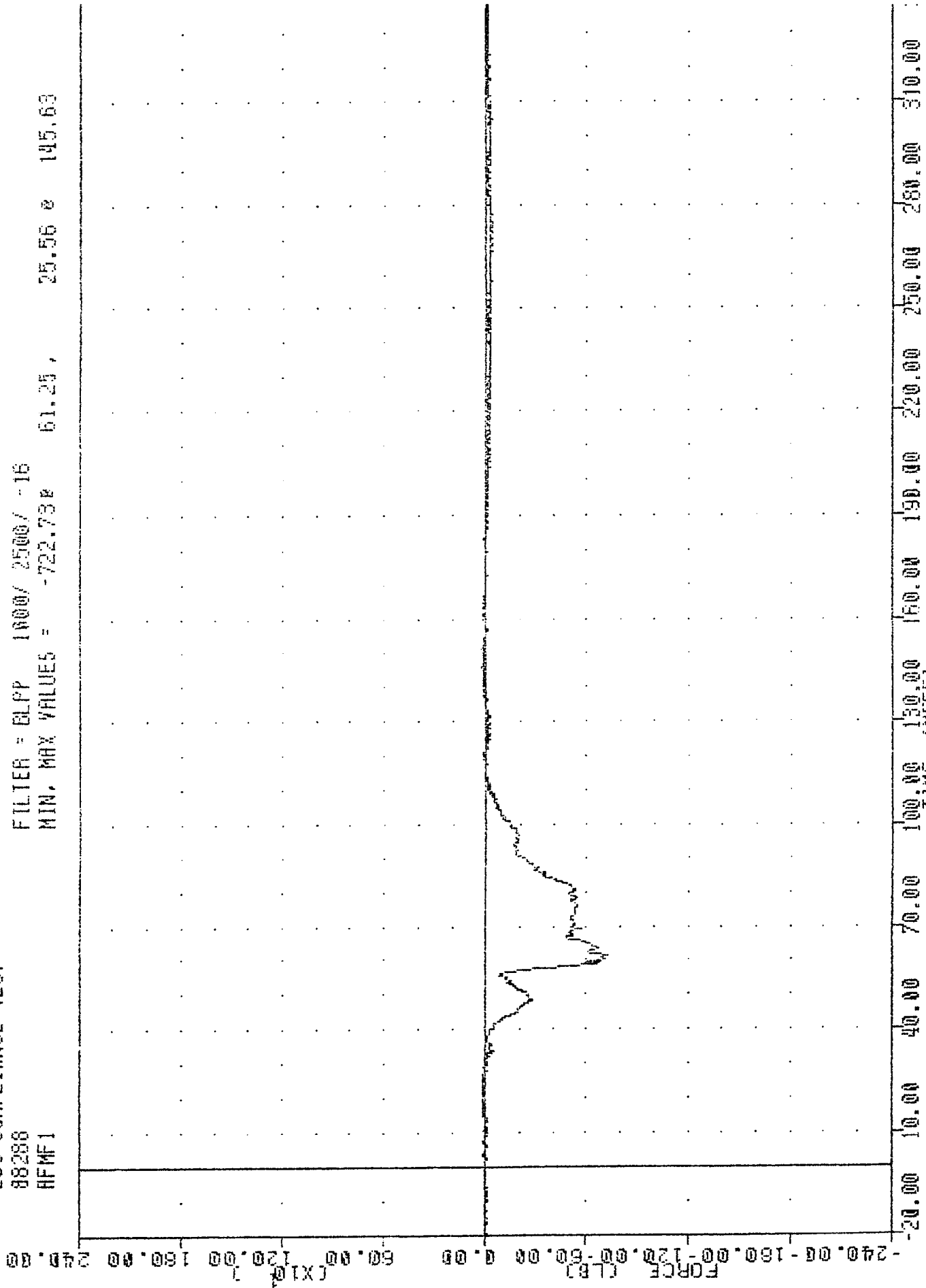
200 COMPLIANCE TEST

88288

AFMF1

FILTER = BLPP 1000/ 2500/ -16

MIN. MAX VALUES = -722.73# 61.25 , 25.56 e 145.63



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DRIVER RIGHT FEMUR FORCE

208 COMPLIANCE TEST

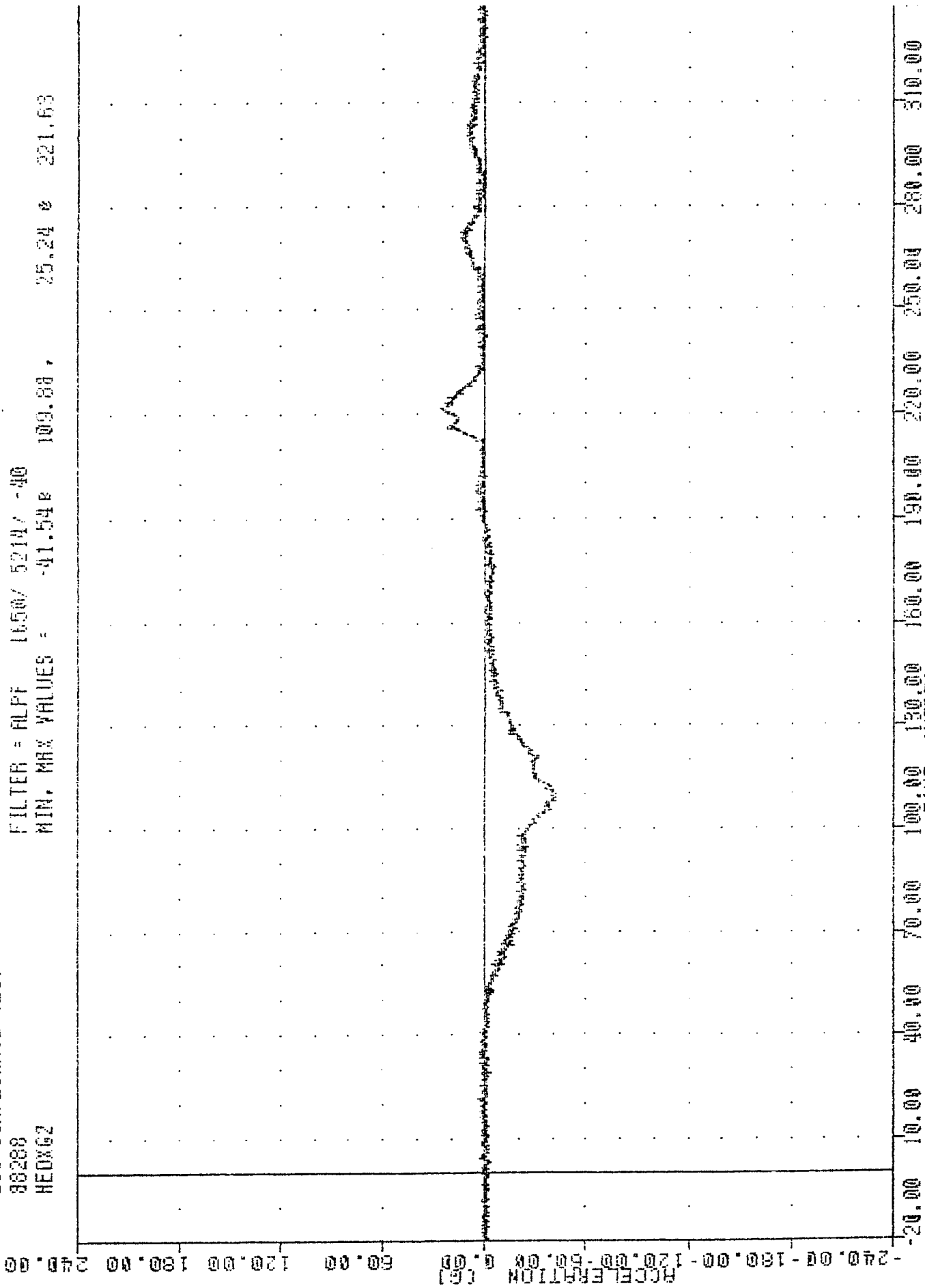
88288

HEDX62

FILTER = ALPF 1650/ 5212/ -40

MIN. MAX VALUES = -41.54g 109.88g

25.24 @ 221.63



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
 RIGHT FRONT PASSENGER HEAD X AXIS ACCELERATION

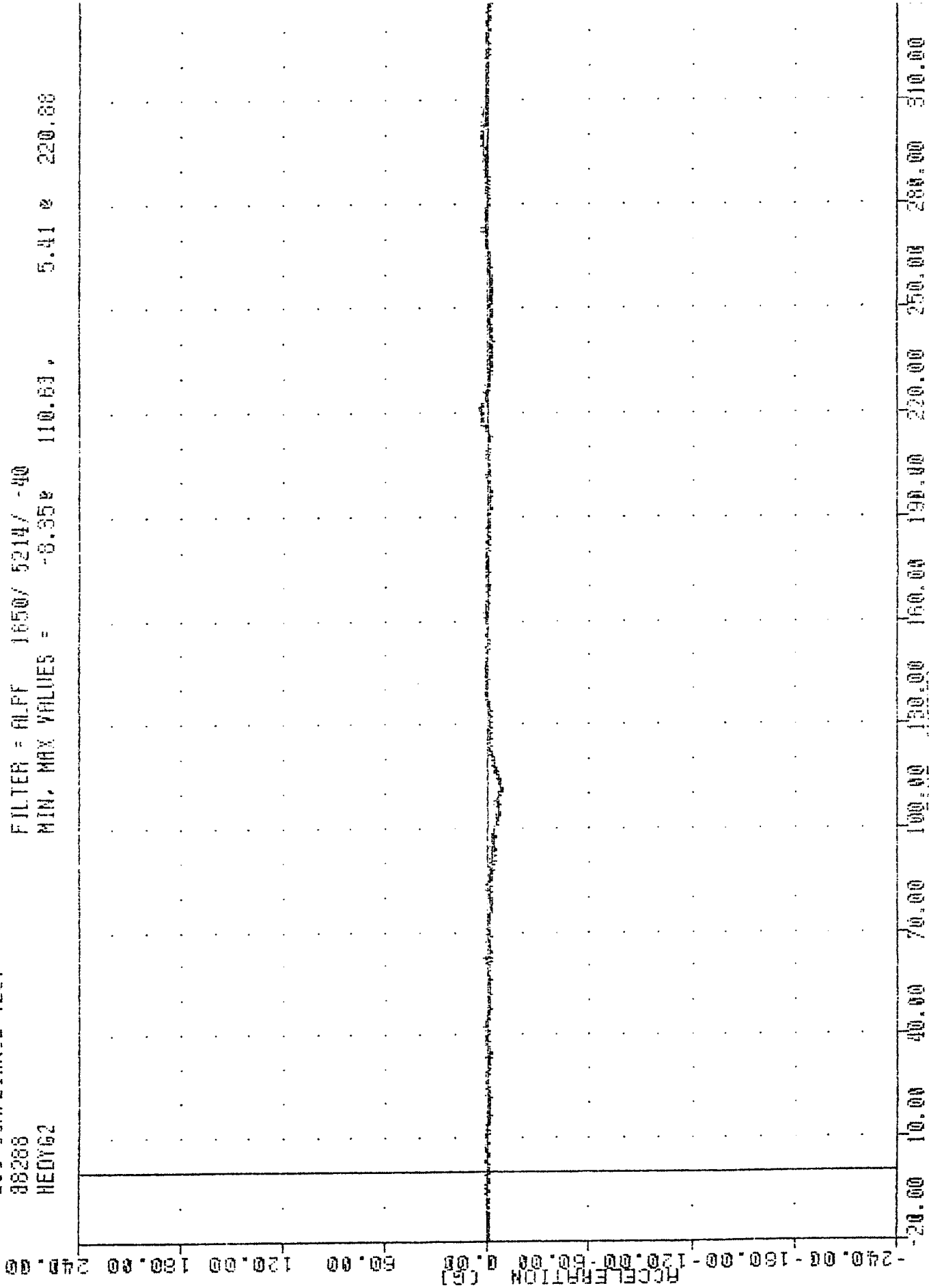
200 COMPLIANCE TEST

88288

HEDY62

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -8.35% 110.63, 5.41% 220.60



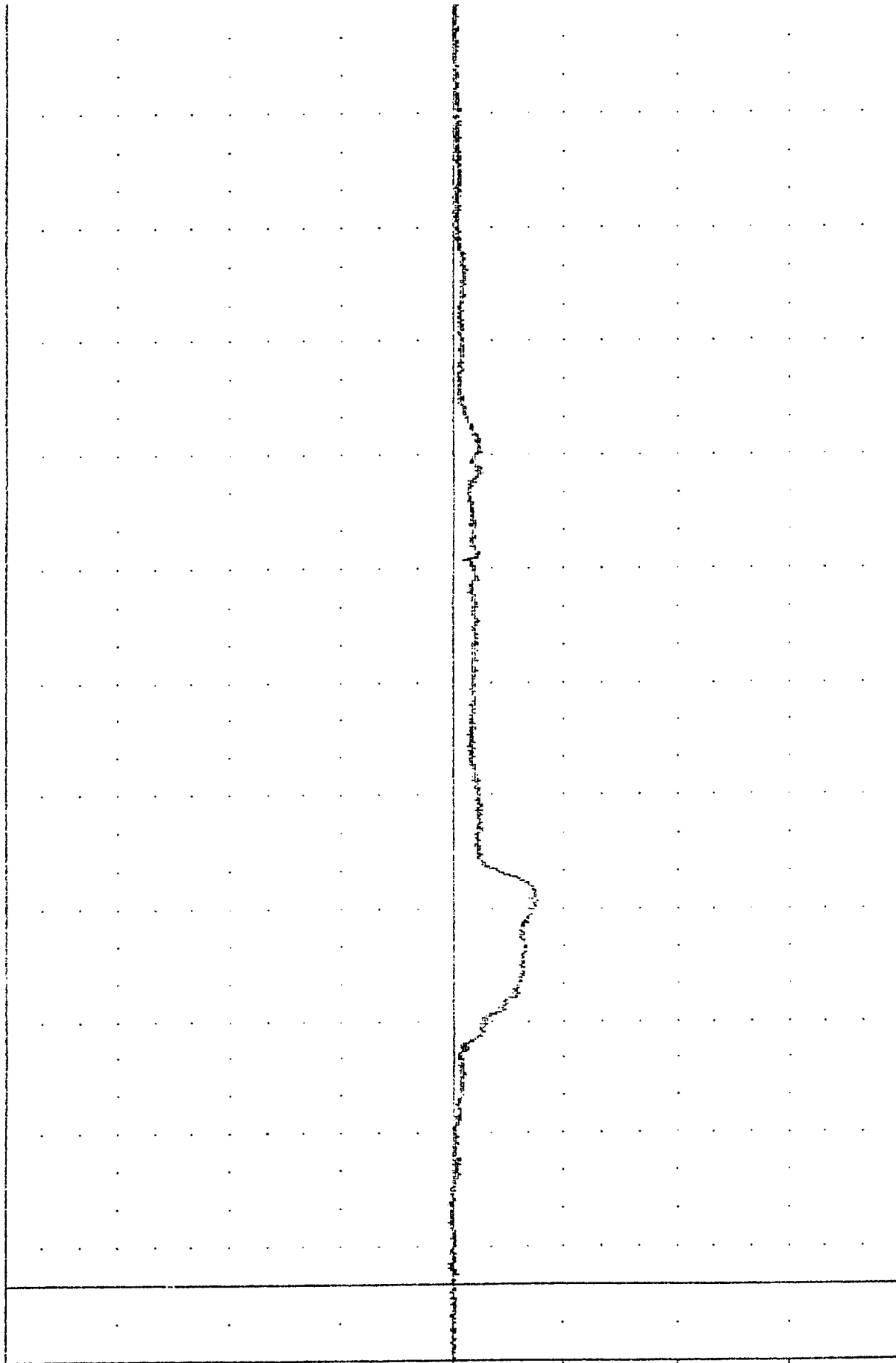
OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD Y AXIS ACCELERATION

208 COMPLIANCE TEST

88268  
HEZ262

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -45.46% 101.88 , 2.88 % 21.75

ACCELERATION (G)

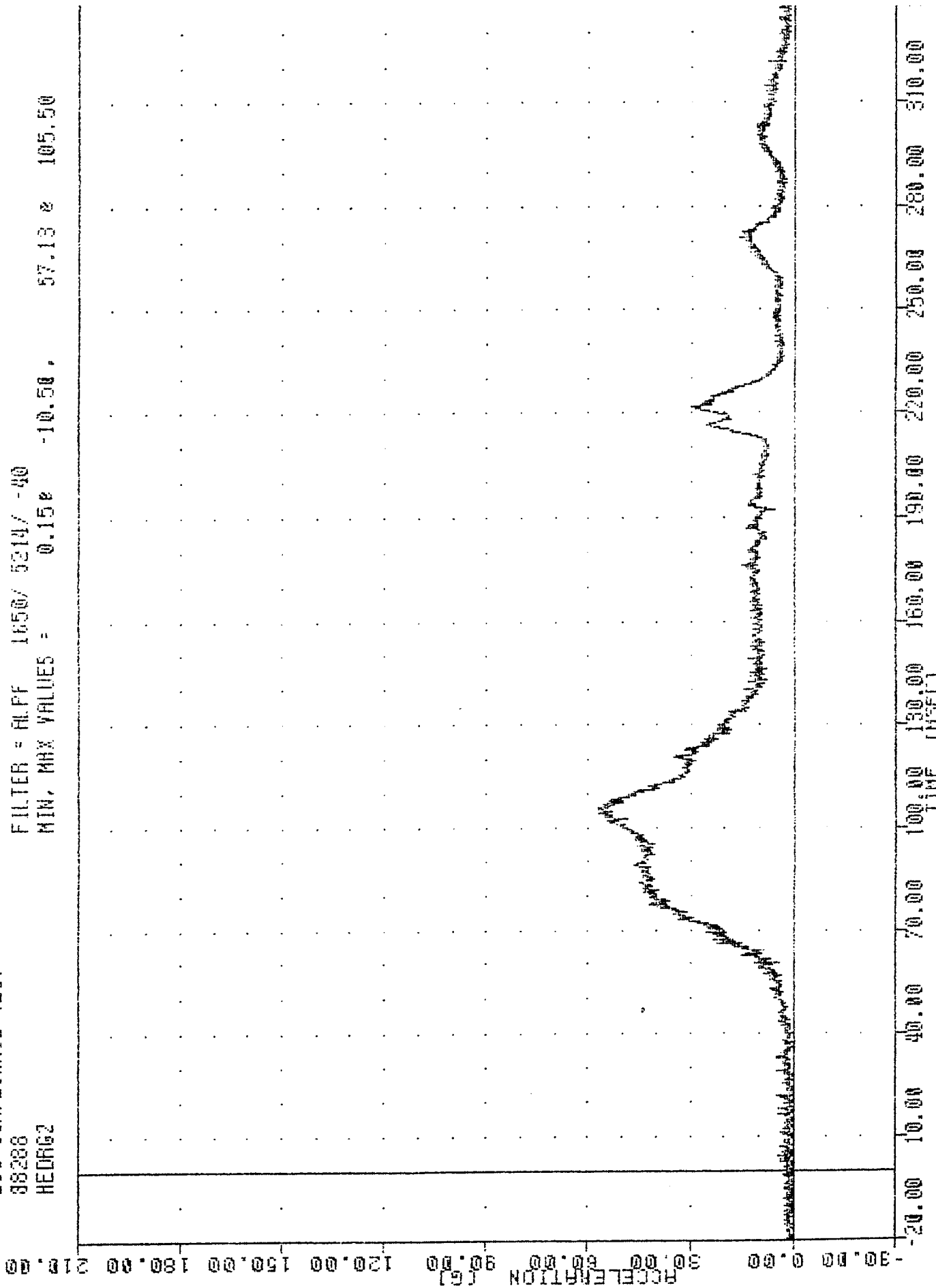


TIME (MSEC)

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD Z AXIS ACCELERATION

200 COMPLIANCE TEST  
88288  
HEDRG2

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.15e -10.50, 57.13 e 105.50



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

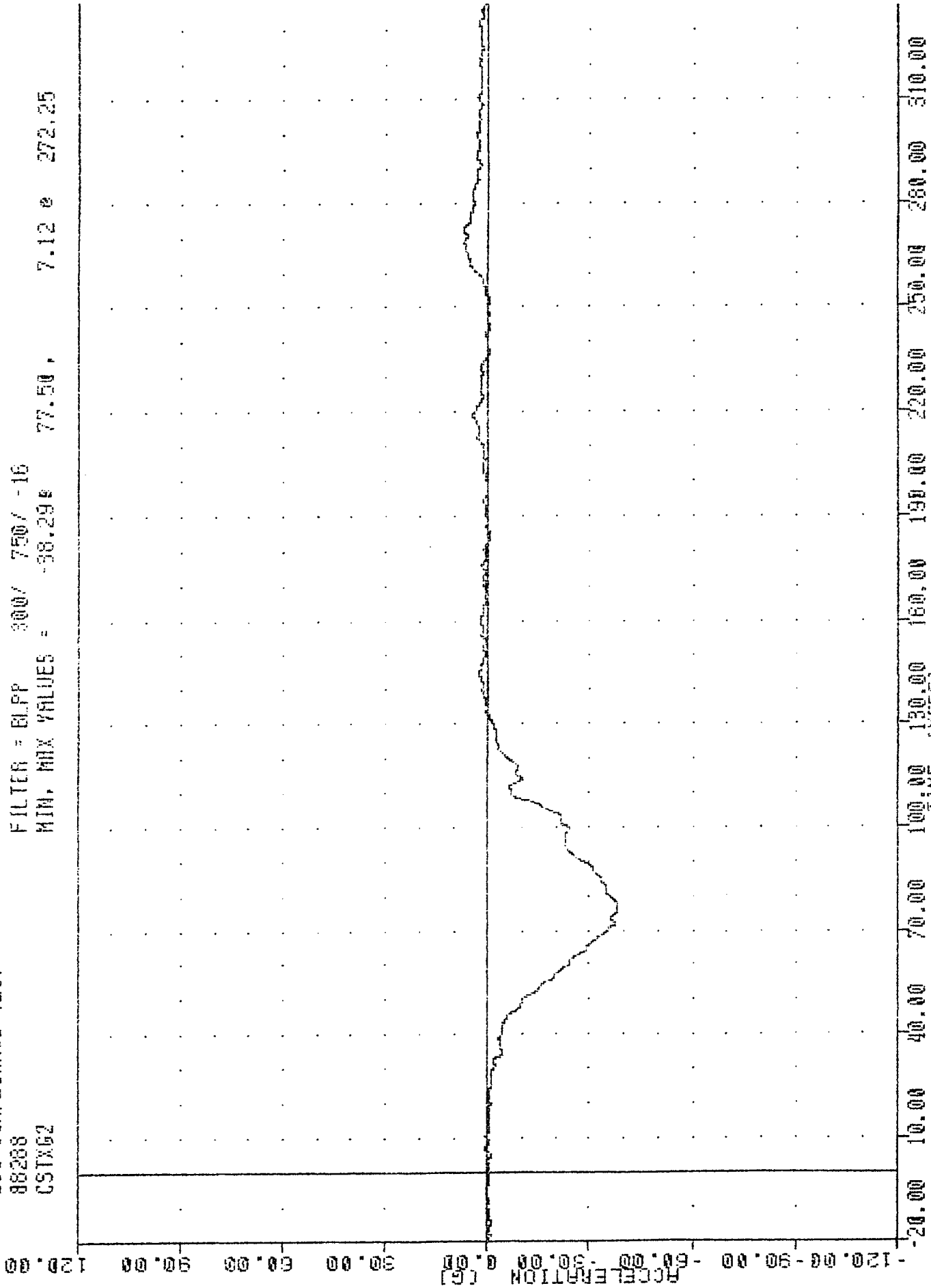
208 COMPLIANCE TEST

88288

CSTX62

FILTER = BLPP 300/ 750/ -16

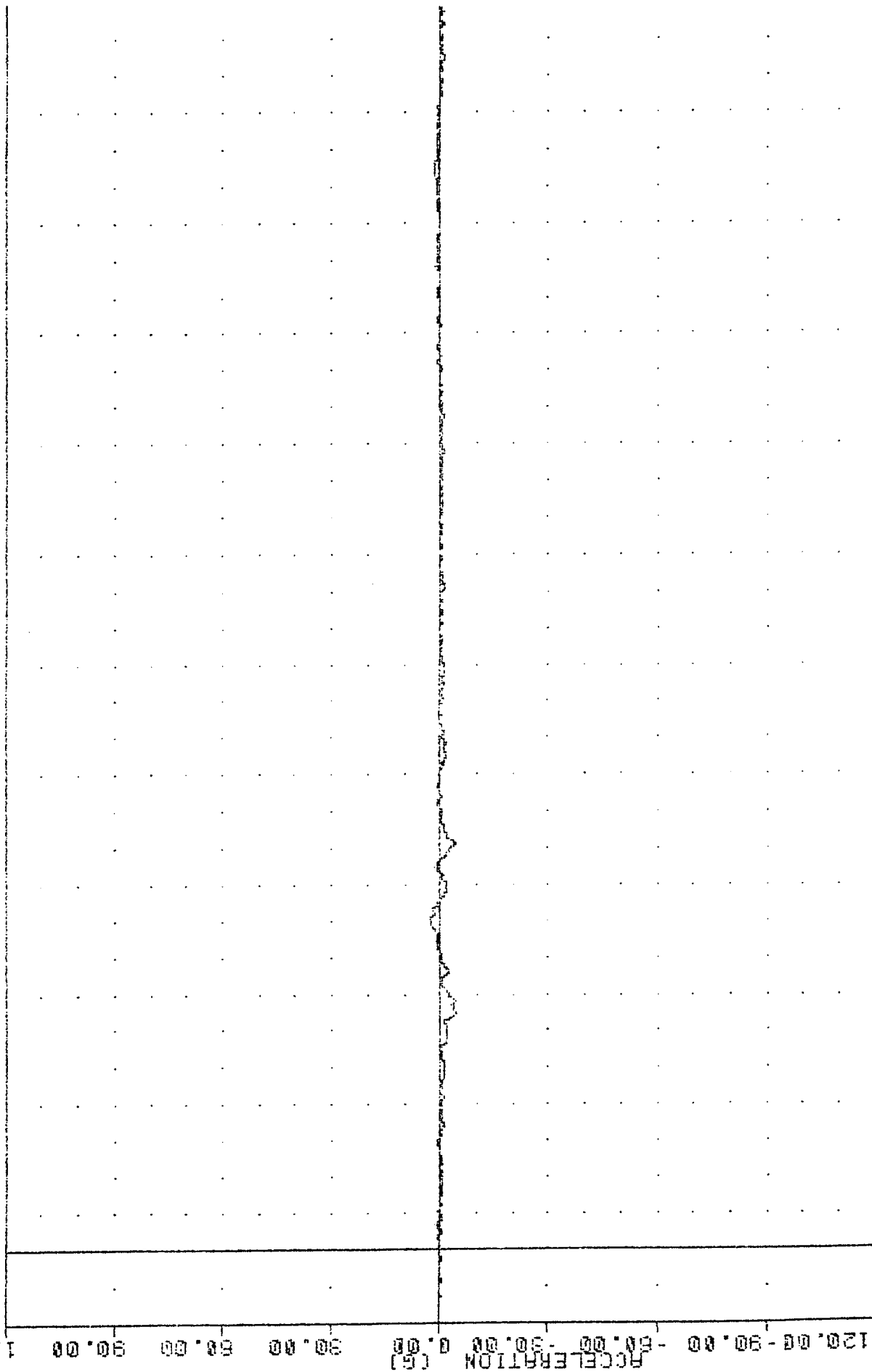
MIN, MAX VALUES = -38.296 77.50 , 7.12 @ 272.25



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST X AXIS ACCELERATION

200 COMPLIANCE TEST  
 88288  
 CSTY62

FILTER = BLFF 300/ 750/ -18  
 MIN. MAX VALUES = -4.23e 111.25, 2.89 e 90.00



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00  
 TIME (MSEC)  
 OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
 RIGHT FRONT PASSENGER CHEST Y AXIS ACCELERATION

209 COMPLIANCE TEST

88288

C57Z62

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -7.02# 116.38/

7.57 @ 61.63

120.00

90.00

60.00

30.00

ACCELERATION (G)

-30.00

-60.00

-90.00

-120.00

20.00 10.00 0.00 -20.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00

TIME (MSECT)

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST Z AXIS ACCELERATION

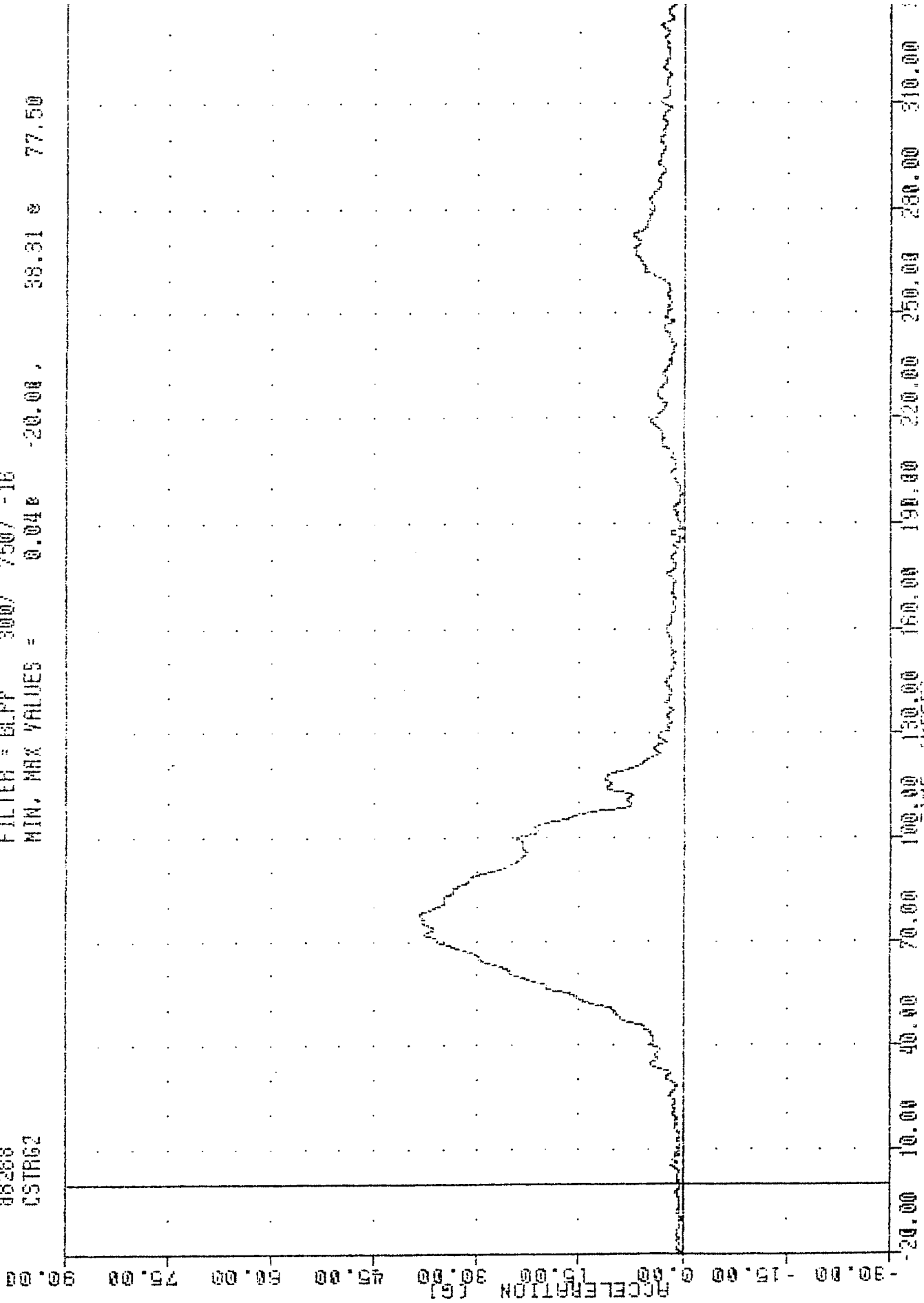
209 COMPLIANCE TEST

88266

CSTR62

FILTER = 6LPP 300/ 750/ -18

MIN. MAX VALUES = 0.048 -20.00 , 38.31 & 77.50



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

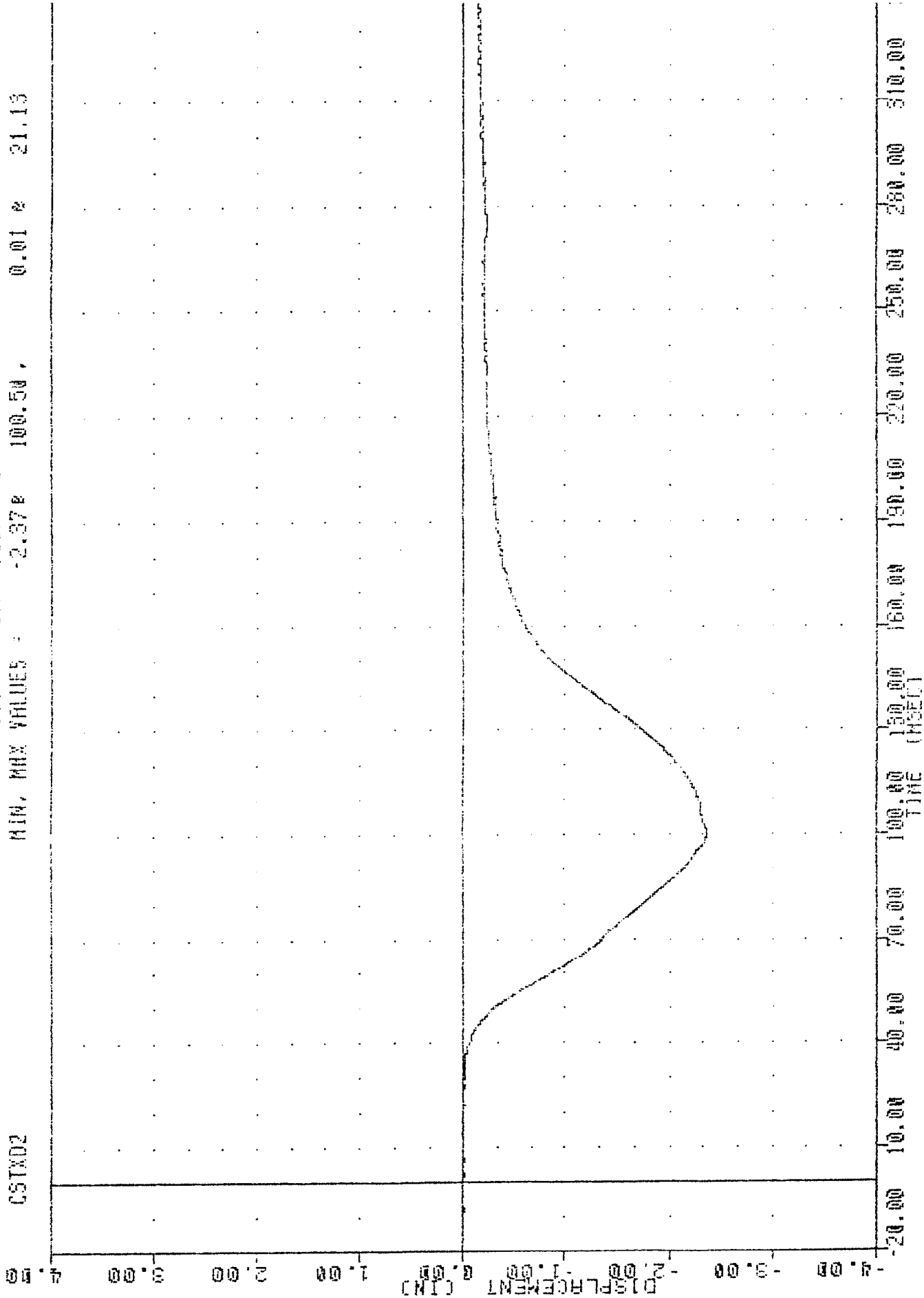
200 COMPLIANCE TEST

88288

CSTXD2

FILTER = BLPP 300/ 750/ - 16

MIN, MAX VALUES : -2.37E 100.50 , 0.01E 21.13



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER CHEST DISPLACEMENT

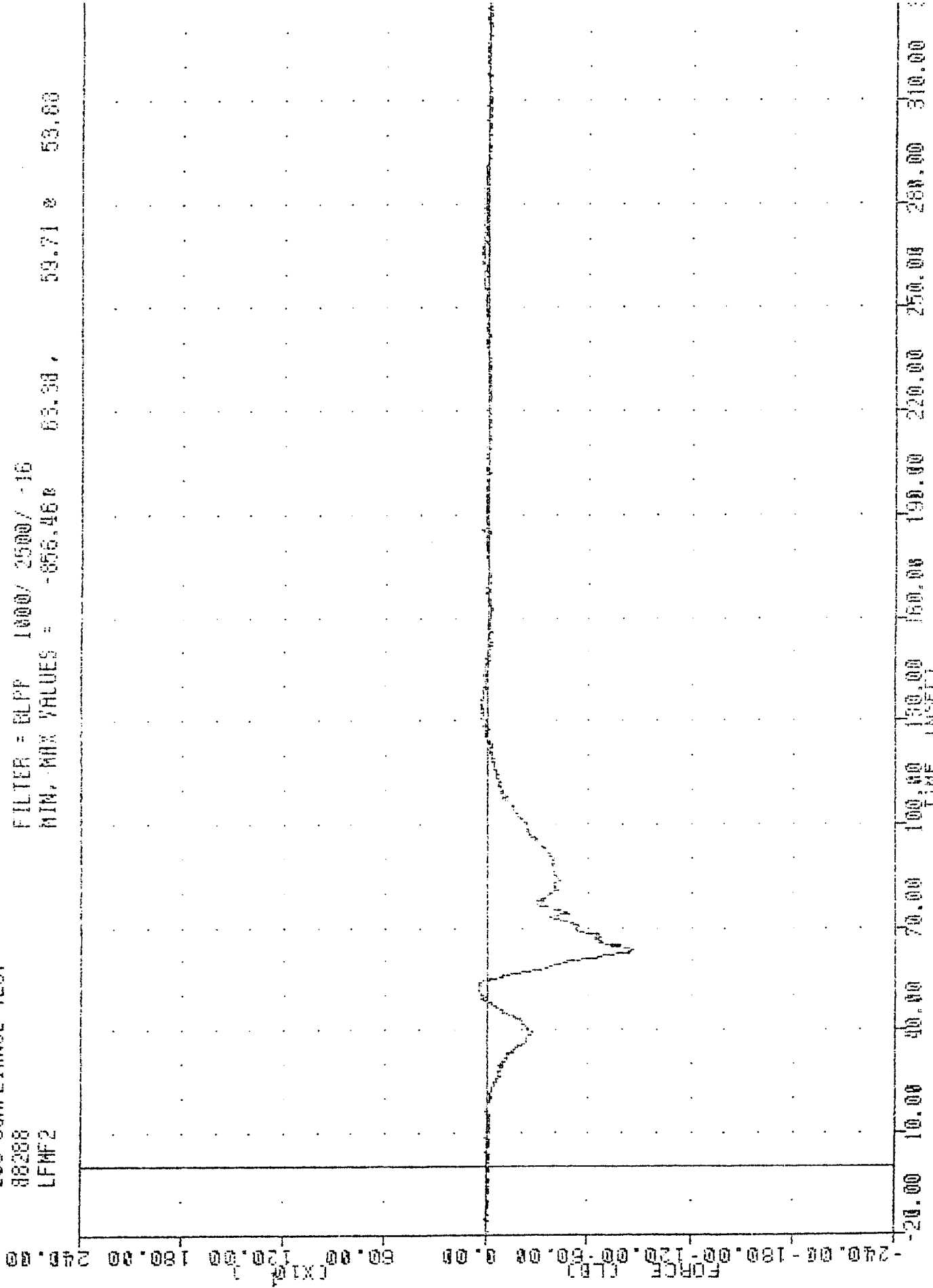
200 COMPLIANCE TEST

88288

LFHF2

FILTER = 6LPP 1000/ 2500/ -16

MIN, MAX VALUES = -856.46 63.38, 59.71 & 53.60



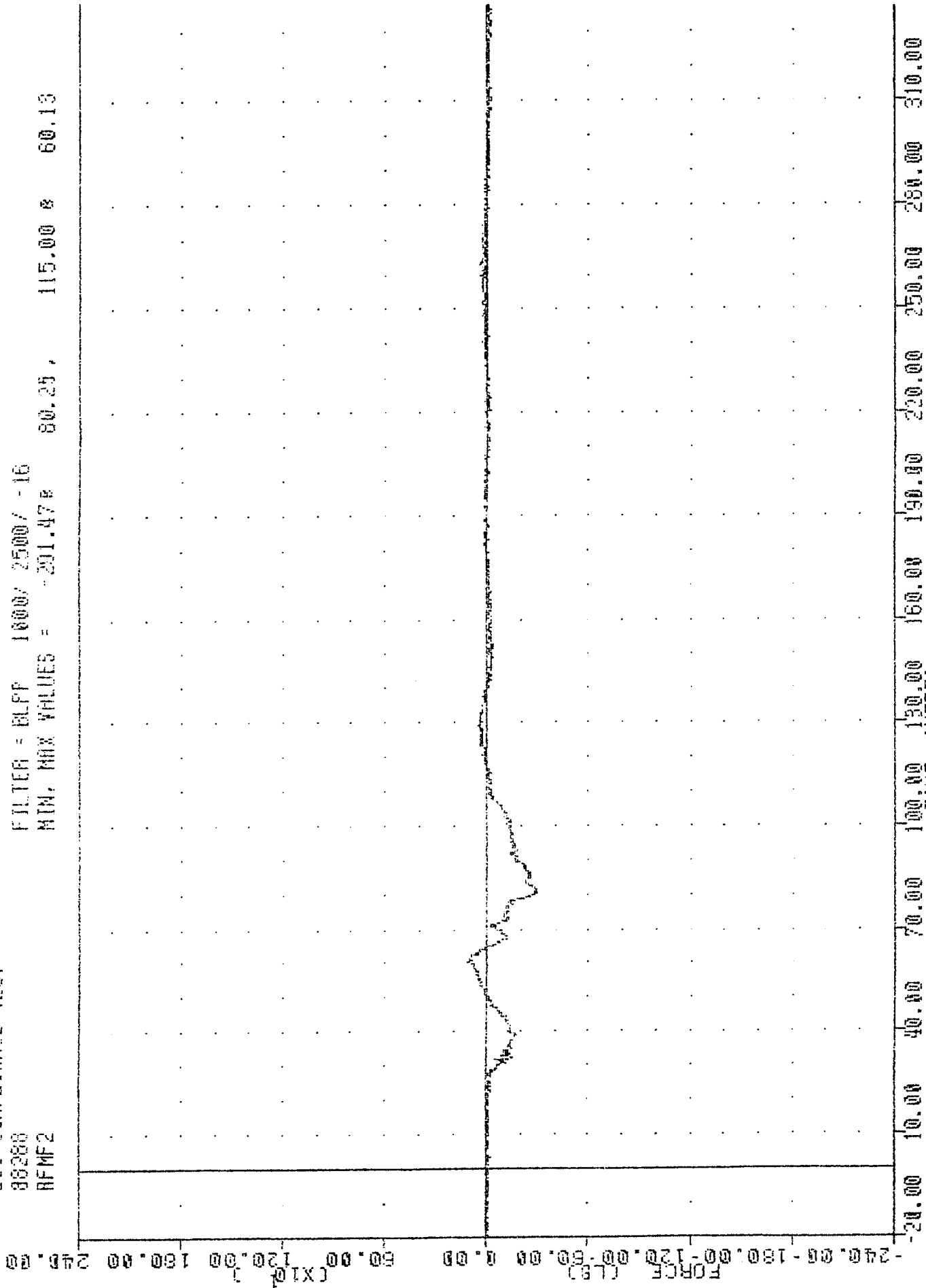
OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

200 COMPLIANCE TEST

86288  
RFMF2

FILTER = BLPP 1000/ 2500/ -16

MIN, MAX VALUES = -291.47% 80.25, 115.00 & 60.13



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

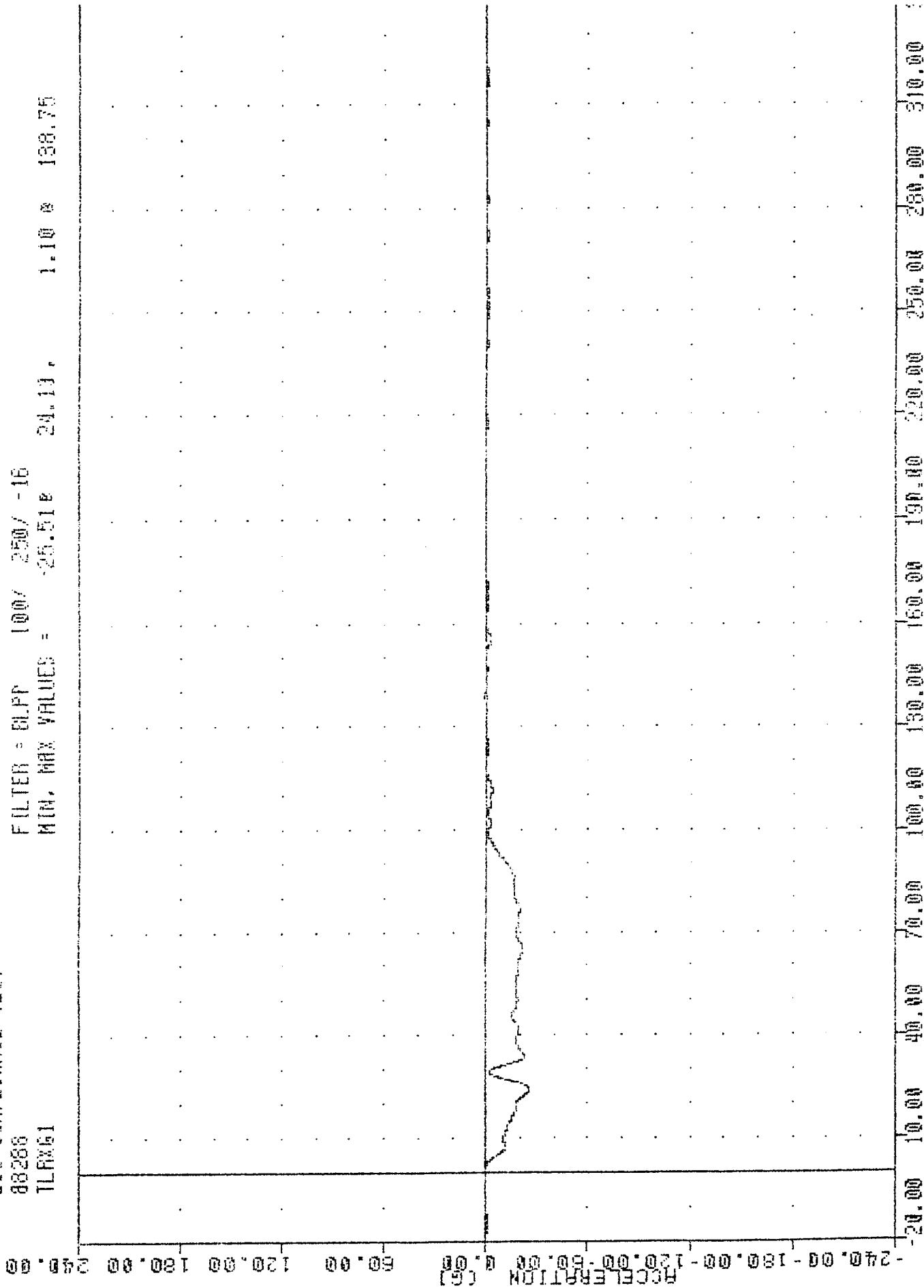
200 COMPLIANCE TEST

88288

TLRX61

FILTER = 6LPP 100/ 250/ -16

MIN. MAX VALUES = -25.51g 24.13g 1.10g 138.75



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
LEFT REAR SEAT X AXIS ACCELERATION

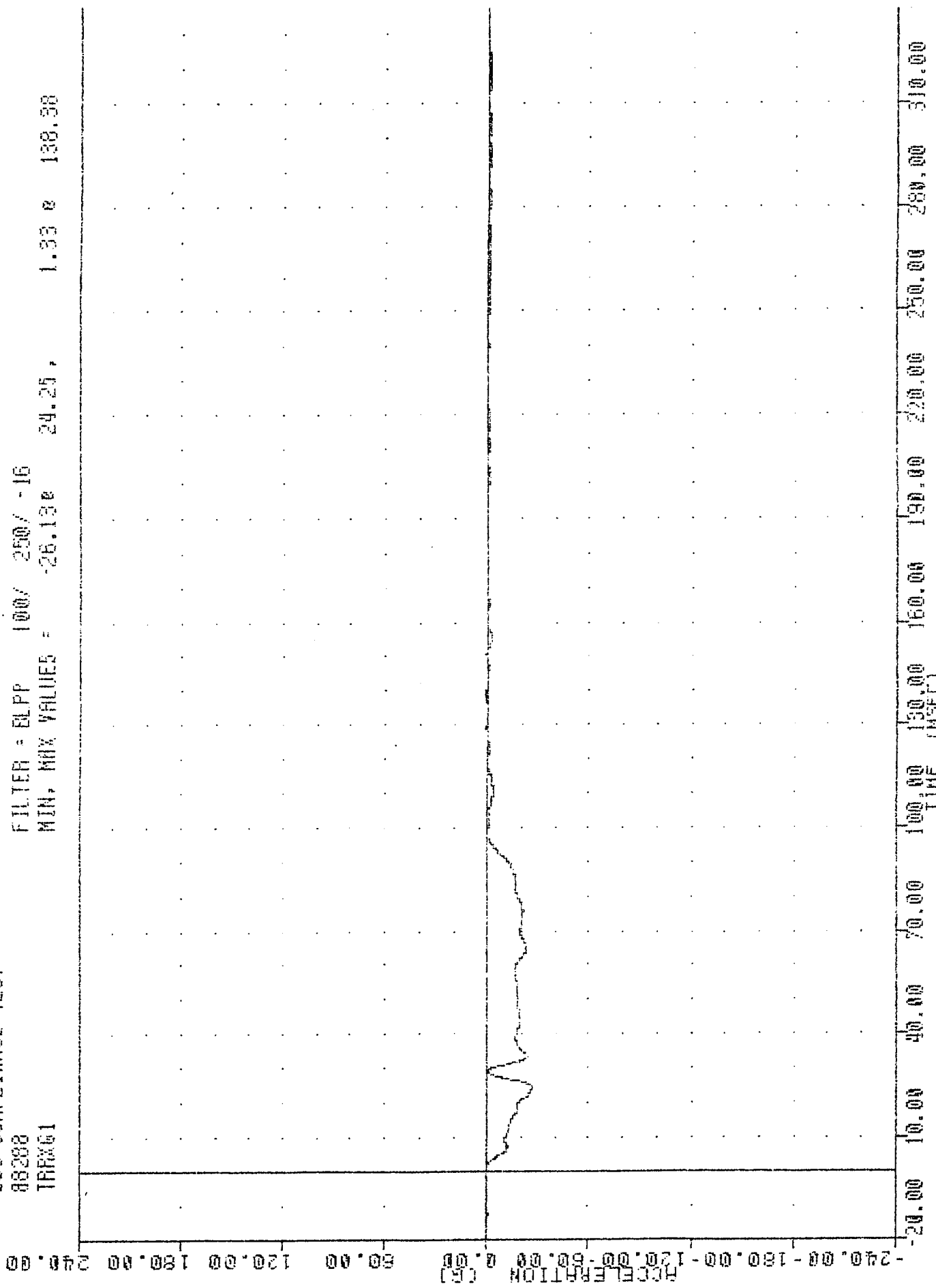
200 COMPLIANCE TEST

88288

TRX61

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -26.13e 24.25 , 1.93 e 138.98



-240.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00  
 TIME (MSEC)

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
 RIGHT REAR SEAT X AXIS ACCELERATION

200 COMPLIANCE TEST

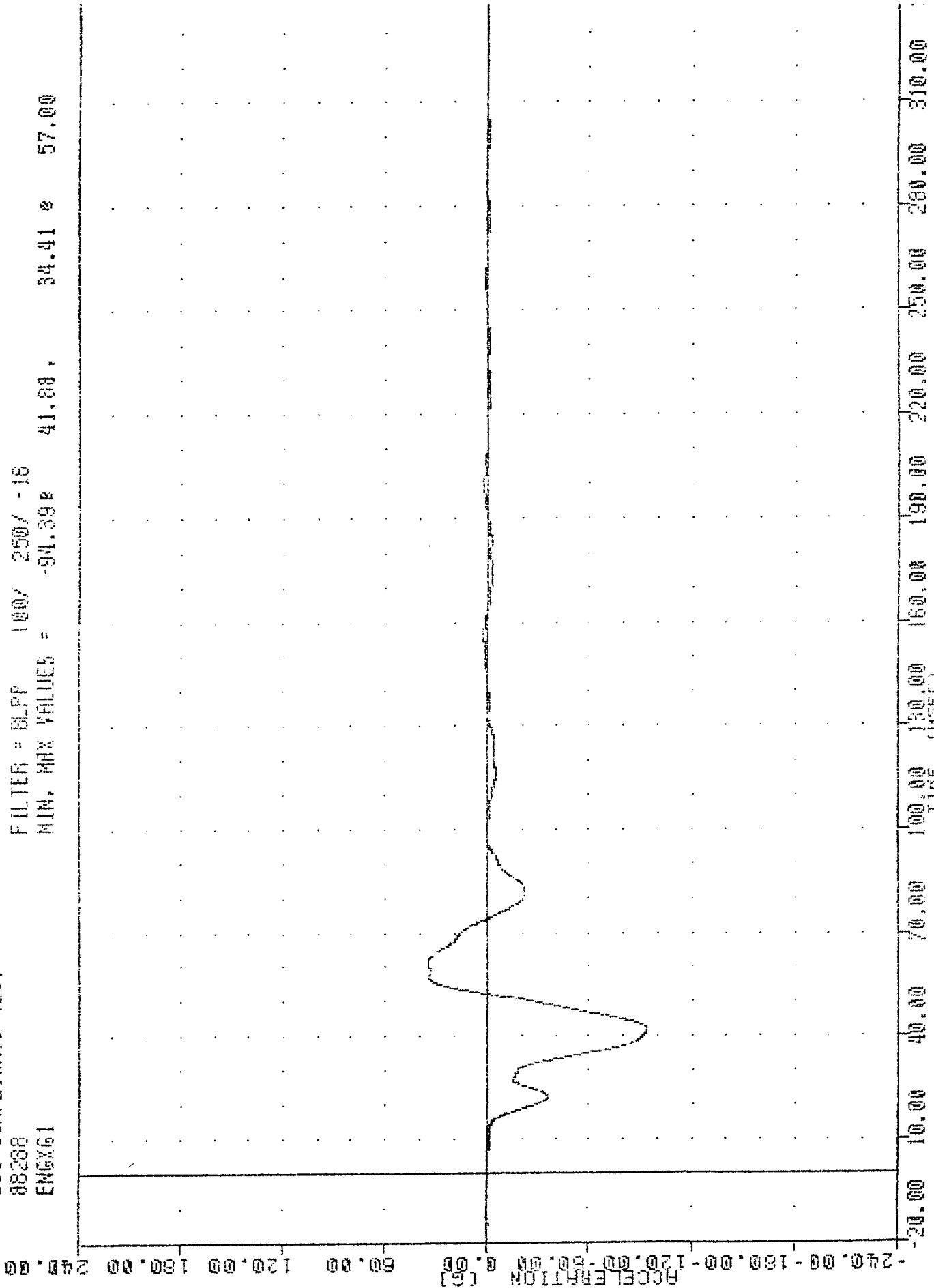
88288

ENGX61

FILTER = BLPP 100/ 250/ -18

MIN, MAX VALUES = -94.39g 41.80g

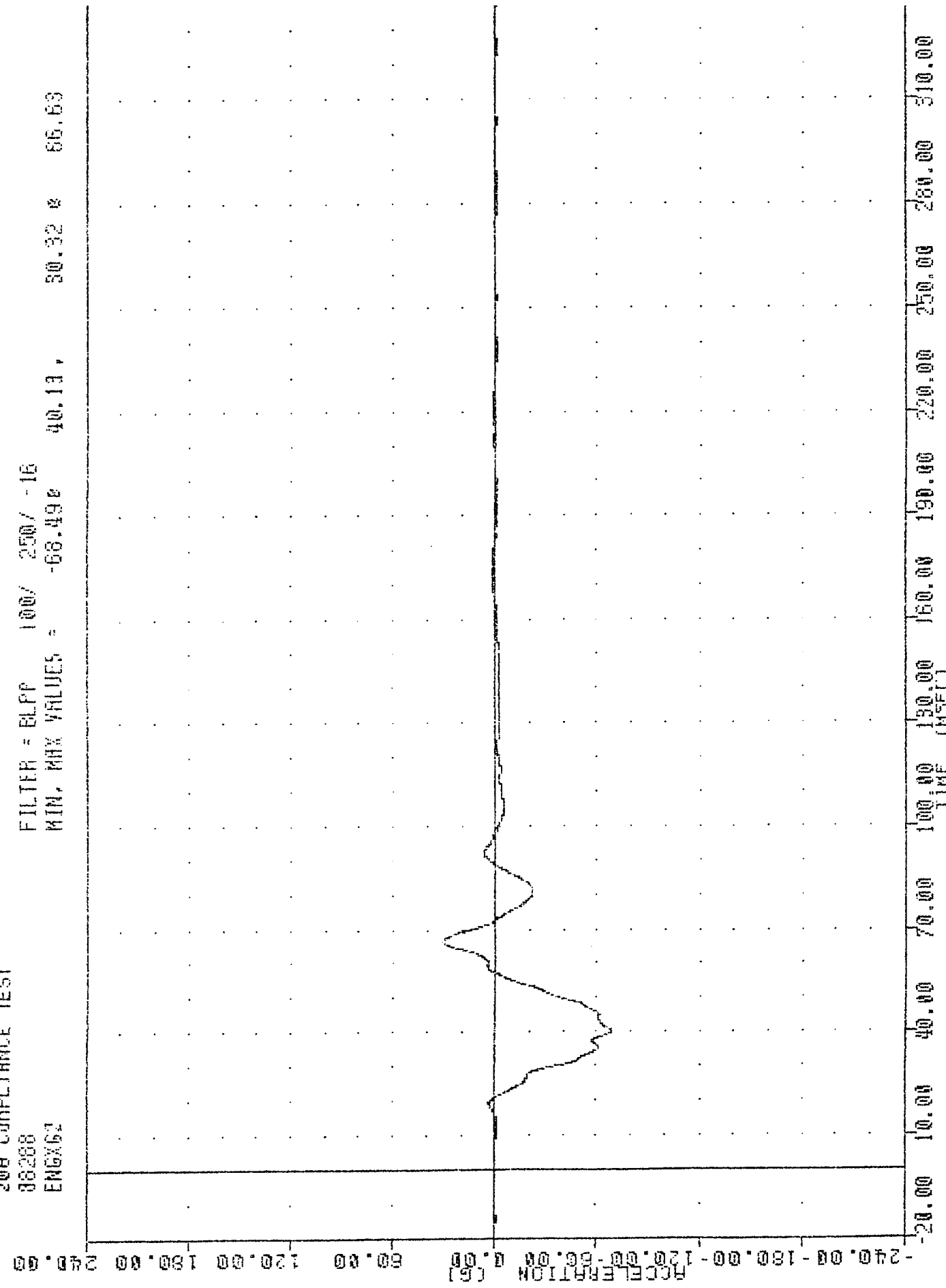
34.41g 57.00g



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
ENGINE UPPER BLOCK X AXIS ACCELERATION

208 COMPLIANCE TEST  
88288  
ENGX62

FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -68.49e 40.13 , 30.32 e 66.63



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
ENGINE BOTTOM BLOCK X AXIS ACCELERATION

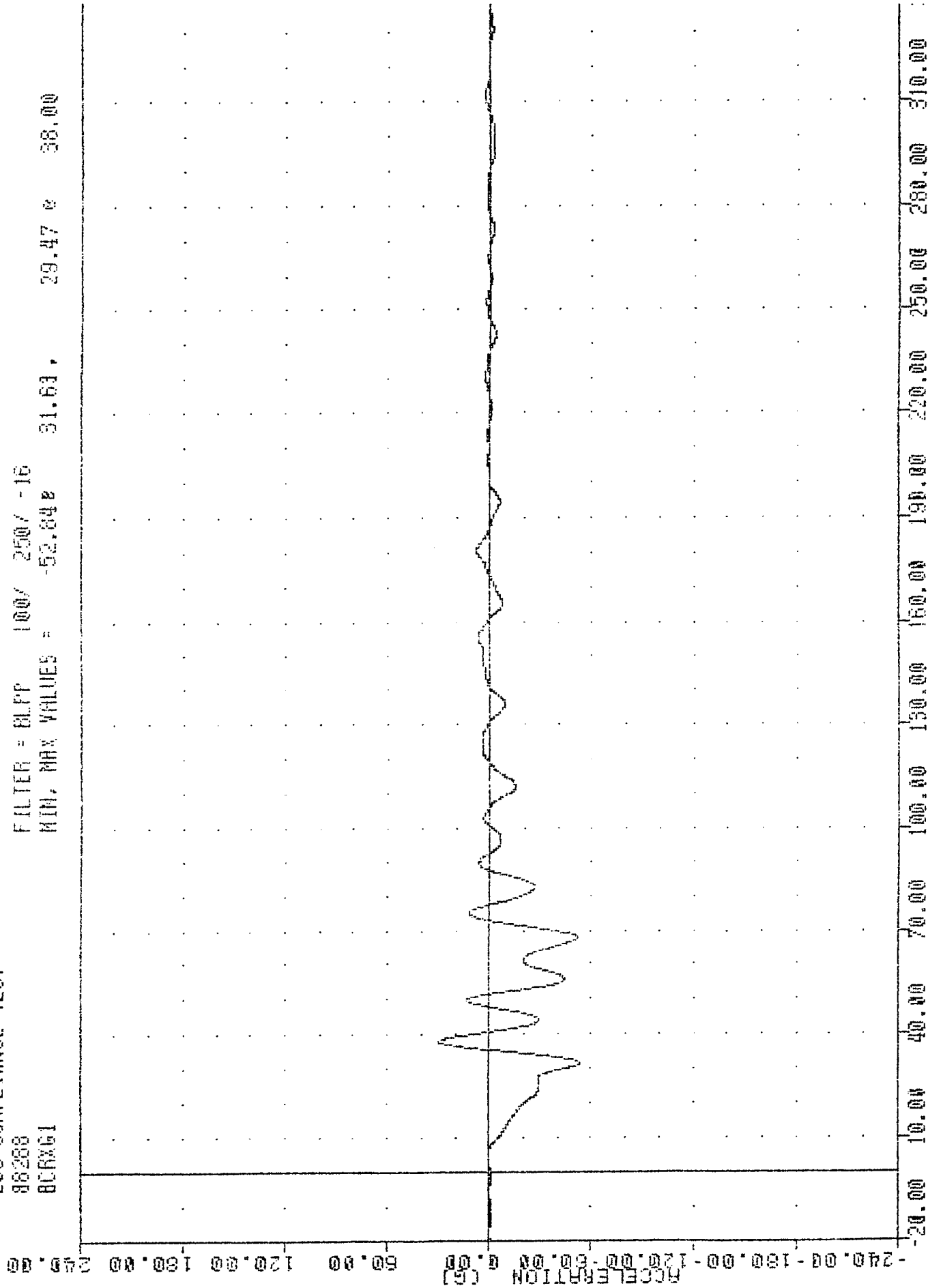
306 COMPLIANCE TEST

86268

BCRX61

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -52.64% 31.63, 29.47% 38.00



VEHICLE CUTLASS SUPREME INTO FRONTAL BARRIER  
RIGHT BRAKE CALIPER X AXIS ACCELERATION

300 COMPLIANCE TEST

88268

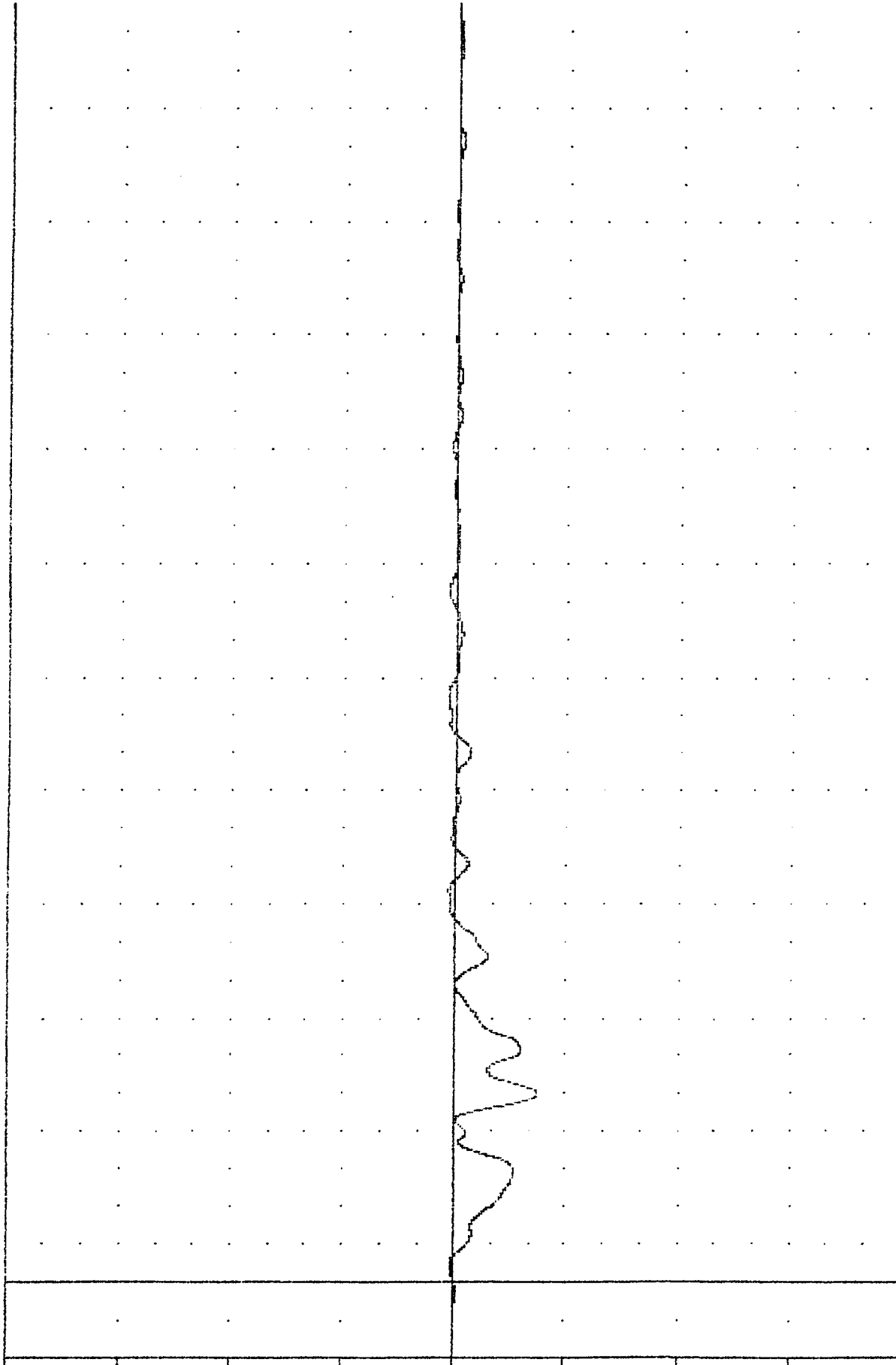
BCLX61

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -44.66e 49.88e

4.54 e 155.50

ACCELERATION (G)



TIME (MSEC)

OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
LEFT BRAKE CALIPER X AXIS ACCELERATION

200 COMPLIANCE TEST

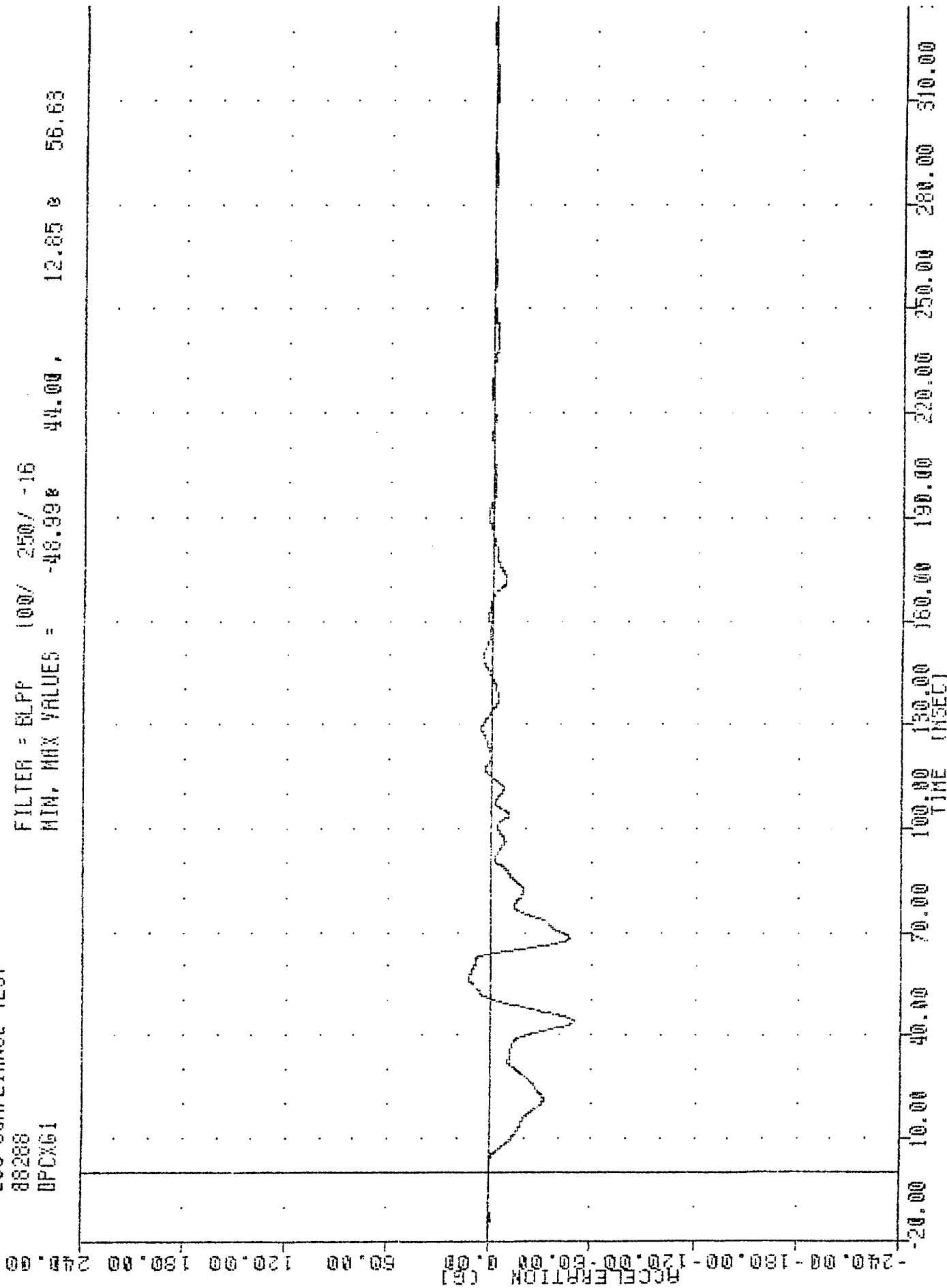
88288

DPCX61

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -48.99 44.00

12.85 56.63



OLDSMOBILE CUTLASS SUPREME INTO FRONTAL BARRIER  
DASH PANEL CENTER X AXIS ACCELERATION