

REPORT NOS. 208-TRC-87-002
212-TRC-87-002
301-TRC-87-002

DOT 1051

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

GENERAL MOTORS CORPORATION
1987 OLDSMOBILE CALAIS
2-DOOR COUPE
NHTSA NO. CH0105
TRC TEST NO. 870714

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



AUGUST 4, 1987

FINAL REPORT

PREPARED FOR:
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OFFICE OF VEHICLE SAFETY COMPLIANCE
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16. Abstract A 30 mph flat frontal barrier impact compliance test was conducted on a 1987 Oldsmobile Calais 2-door coupe, VIN 1G3NF14UXHM289612, NHTSA No. CH0105, at the Transportation Research Center of Ohio on July 14, 1987 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 29.5 mph. The ambient temperature was 68° F. The vehicle appears to comply with the applicable requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.					
17. Vehicle Safety Compliance Testing: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity" Frontal Impact				18. 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
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in ³	cubic inches	16	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions From Metric Measures

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

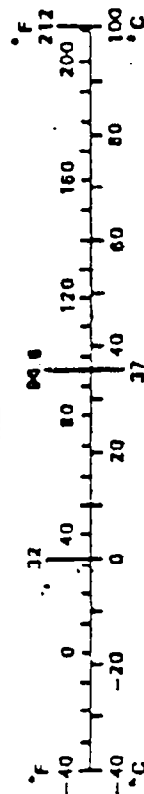


TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1.0	PURPOSE AND TEST SUMMARY	1-1
2.0	SUMMARY OF RESULTS FOR:	2-1
	FMVSS 208, "OCCUPANT CRASH PROTECTION"	
	FMVSS 212, "WINDSHIELD MOUNTING"	
	FMVSS 219, (PARTIAL), "WINDSHIELD ZONE INTRUSION"	
	FMVSS 301, "FUEL SYSTEM INTEGRITY"	
3.0	CAMERA INFORMATION	3-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	DATA PLOTS	B-1

LIST OF TABLES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1	CRASH TEST SUMMARY	1-5
2	TEST VEHICLE INFORMATION	1-6
3	TEST CONDITIONS	1-9
4	VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	1-11
5	IMPACTED VEHICLE MEASUREMENTS	1-14
6	DUMMY INJURY CRITERIA	2-3
7	FMVSS 208 COMFORT AND CONVENIENCE DATA	2-10
8	FMVSS 208 SEAT BELT WARNING SYSTEM DATA	2-11
9	FMVSS 208 LABELING AND DRIVER'S MANUAL DATA	2-12
10	FMVSS 208 READINESS INDICATOR DATA	2-13
11	SUMMARY OF FMVSS 301 DATA	2-14
12	"FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA	2-17
13	HIGH SPEED CAMERA LOCATIONS	3-4

LIST OF FIGURES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1	VEHICLE ACCELEROMETER LOCATIONS	1-10
2	ACCIDENT INVESTIGATION DIVISION DATA	1-12
3	PRE-TEST AND POST-TEST MEASUREMENT POINTS	1-13
4	VEHICLE TARGET LOCATIONS	1-16
5	DUMMY POSITIONING DATA	2-6
6	DUMMY IN-VEHICLE POSITION RECORDING SHEET	2-7
7	DRIVER DUMMY TO STEERING COLUMN ASSEMBLY REFERENCE DIMENSIONS	2-8
8	SEAT BELT POSITIONING DATA	2-9
9	FMVSS NO. 212, "WINDSHIELD MOUNTING" DATA SHEET	2-15
10	FMVSS NO. 219, "WINDSHIELD INTRUSION" DATA SHEET	2-16
11	FMVSS NO. 301, STATIC ROLLOVER DATA SHEETS	2-18
12	CAMERA POSITIONS	3-2

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. DTNH22-87-C-01024. The purpose of this test was to determine if the subject vehicle, a 1987 Oldsmobile Calais 2-door coupe, NHTSA No. CH0105, 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-208-06 dated May 15, 1987.

TEST SUMMARY

The 1987 Oldmobile Calais 2-door coupe, NHTSA No. CH0105, was equipped with a 2.5 liter 4 cylinder engine, 5 speed manual transmission, air conditioning, power steering, and power brakes. The test weight of the vehicle was 3139 pounds. The test vehicle appeared to comply with the performance requirements of FMVSS 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 60g's except for intervals less than three milliseconds, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 B dummies seated in the driver's and right front passenger's seats. There was 100 percent windshield retention. There was no intrusion into the windshield. There was no fluid leakage from the fuel system following the impact or during the static rollover test.

Two Part 572 B, 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 Appendices B and C of Laboratory Test Procedure No. TP-208-06 dated May 15, 1987.

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

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

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

The twenty-three 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 July 14, 1987. The test vehicle's impact speed was 29.5 mph. The vehicle sustained 22.5 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.: CH0105

PROJECT: 30 MPH FRONTAL
BARRIER IMPACT TEST

DATE: July 14, 1987

TIME: 1436 TEMP: 68°F

VEHICLE: 1987 Oldsmobile Calais 2-Door Coupe

TEST WEIGHT (LBS): 3139

IMPACT ANGLE (DEG)*: 0

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

MAX CRUSH (IN) STATIC: 22.5

REBOUND (IN): 10.3

DUMMIES: Driver

Passenger

TYPE: Part 572 B

Part 572 B

LOCATION: Front Left

Front Right

RESTRAINT: 3-point passive
 seat belt

3-point passive
seat belt

NUMBER OF DATA CHANNELS: 23

NUMBER OF HIGH SPEED CAMERAS: 14 and 1 real-time cameras

*With respect to tow track centerline.

**Speed trap measurement (± .05% accuracy).

TABLE 2

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: General Motors Corporation

MAKE/MODEL: Oldsmobile Calais Coupe VIN: 1G3NF14UXHM289612

BODY STYLE: 2-Door MODEL YEAR: 1987

NHTSA NO.: CH0105 COLOR: Gray

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT: 2.5 liter

X GAS, DIESEL, TURBOCHARGE

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

DATE VEHICLE RECEIVED: 7/3/87 ODOMETER READING: 72

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	No
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	Yes
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		

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

VEHICLE MANUFACTURED BY: General Motors Corporation

CERTIFICATION DATE: 5/87

GVWR: 3472 LBS.,

GAWR: FRONT 1917 LBS., REAR 1555 LBS.

TABLE 2, CONT'D.

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 35 psi cold; REAR 35 psi cold

RECOMMENDED TIRE SIZE: P185-80R13 LOAD RANGE X B, C, D

TIRES ON VEHICLE (MFR., LINE, SIZE): Firestone P185-80R13

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS Front - Bucket
Rear - Bench

TYPE OF FRONT SEAT BACKS Manual adjustable

NUMBER OF OCCUPANTS 2 FRONT 3 REAR 5 TOTAL

CARGO LOAD 132 LBS. TOTAL 882 LBS.

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

RIGHT FRONT 874 LBS. RIGHT REAR 486 LBS.

LEFT FRONT 860 LBS. LEFT REAR 470 LBS.

TOTAL FRONT WEIGHT 1734 LBS. (64.5 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 956 LBS. (35.5 % OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2690 LBS.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2690 LBS)

VCW = VEHICLE CAPACITY WEIGHT (882 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

RCLW = VCW - 150 (DCS) = (132 LBS)

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

= 2690 + 132 + 328 LBS

TARGET TEST WEIGHT = 3150 LBS

TABLE 2, CONT'D.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 121 LBS. CARGO:

RIGHT FRONT 890 LBS. RIGHT REAR 697 LBS.

LEFT FRONT 878 LBS. LEFT REAR 674 LBS.

TOTAL FRONT WEIGHT 1768 LBS. (56.3 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1371 LBS. (43.7 % OF TOTAL VEHICLE WEIGHT)

TOTAL TEST WEIGHT 3139 LBS. (0.3 % UNDER TARGET TEST WEIGHT)

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 175 LBS.

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE: LF 26.6 ;RF 26.4 ;LR 26.6 ;RR 26.6

PRE-TEST ATTITUDE: LF 26.0 ;RF 25.6 ;LR 23.8 ;RR 23.8

POST-TEST ATTITUDE: LF 25.3 ;RF 26.5 ;LR 24.1 ;RR 23.0

WHEELBASE: 103.5 INCHES

MAX. WIDTH: 67.6 INCHES

CG = 45.2 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TABLE 3
TEST CONDITIONS

TEST NUMBER: 870714

DATE OF TEST: July 14, 1987

TIME OF TEST: 1436

TYPE OF TEST: FLAT FRONTAL

IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA:

68°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 TRAP = 26.0 IN.

EXITING TRAP = 2.0 IN.

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES)

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 174.1 ;C 179.1 ;R 174.1

POST-TEST: L 157.0 ;C 156.6 ;R 156.6

TOTAL CRUSH: L 17.1 ;C 22.5 ;R 17.5

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER
IMPACT: L: 9.5; C: 10.5; R 10.9; AVG: 10.3

FIGURE 1

VEHICLE ACCELEROMETER LOCATIONS

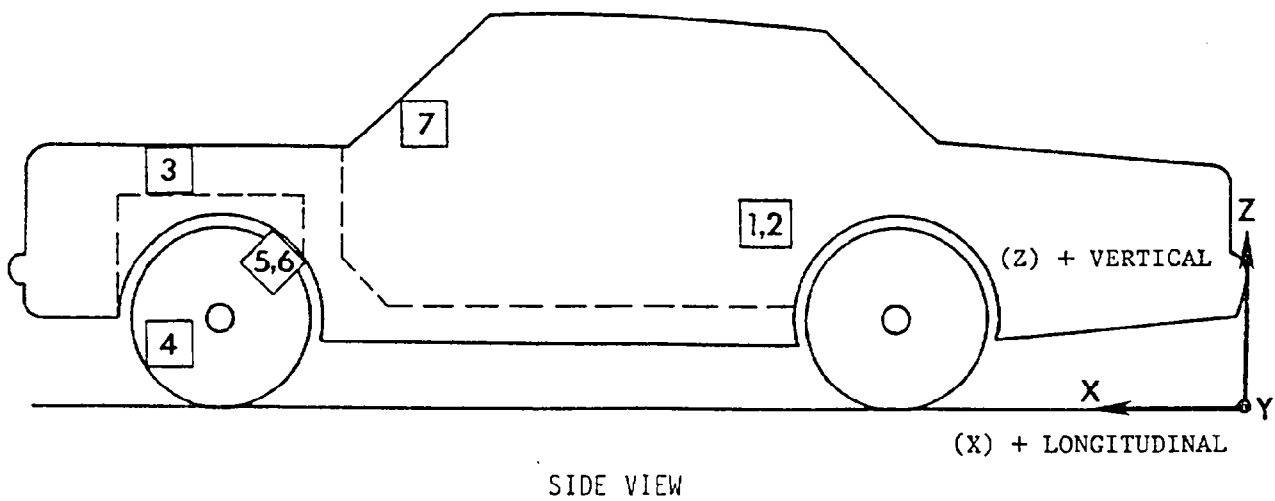
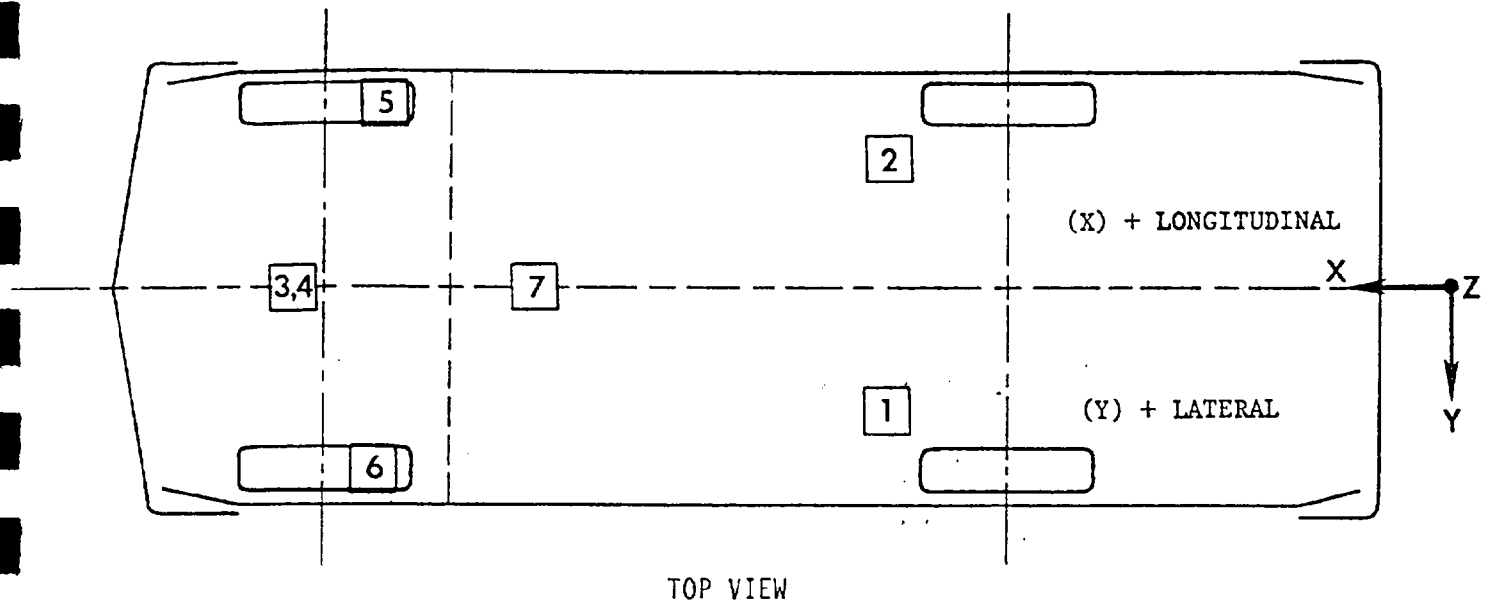


TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION**		NEGATIVE DIRECTION**	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	REAR SEAT X-MEMBER AT LEFT SIDE	PRE: 66.1	17.4	14.4				
	LONGITUDINAL	POST: 65.4	17.4	14.5	1.8	134.5	22.9	53.4
2	REAR SEAT X-MEMBER AT RIGHT SIDE	PRE: 66.1	-17.0	14.5				
	LONGITUDINAL	POST: 65.4	-17.2	16.1	2.0	132.1	25.2	53.8
3	TOP OF ENGINE BLOCK	PRE: 149.4	0.8	28.8				
	LONGITUDINAL	POST: 142.9	2.8	29.5	34.9	53.9	100.6	39.0
4	BOTTOM OF ENGINE BLOCK	PRE: 148.6	-3.5	7.4				
	LONGITUDINAL	POST: 141.1	-2.2	6.7	56.6	54.0	77.3	33.8
5	BRAKE CALIPER AT RIGHT SIDE	PRE: 141.4	-24.9	13.0				
	LONGITUDINAL	POST: 138.5	-23.2	11.5	22.9	76.9	51.9	58.6
6	BRAKE CALIPER AT LEFT SIDE	PRE: 141.5	24.9	12.1				
	LONGITUDINAL	POST: 139.0	27.6	11.2	4.3	73.5	49.8	40.8
7	DASH PANEL	PRE: 114.6	0.0	36.8				
	LONGITUDINAL	POST: 114.9	0.0	35.5	3.4	60.9	35.1	75.0

**
 *X + Forward from rear bumper
 Y + Left from vehicle centerline
 Z + Up from ground

LONGITUDINAL: FORWARD
 LATERAL: LEFTWARD
 VERTICAL: UPWARD

POSITIVE
 NEGATIVE
 REARWARD
 RIGHTWARD
 DOWNWARD

DISTANCE MEASUREMENTS IN INCHES

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

VEHICLE MAKE/MODEL/BODY STYLE: Oldsmobile Calais 2-door Coupe
VEH. NHTSA NO.: CH0105; VIN: 1G3NF14UXHM289612
MODEL YEAR: 1987; BUILD DATE: 5/87; TEST DATE 7/14/87
VEH. SIZE CATEGORY: Compact; TEST WEIGHT: 3139
VEH. WHEELBASE: 103.5 FRONT OVERHANG: 39.5 OVERALL WIDTH: 67.6

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE: 12FDEW2

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 =	<u>17.1</u>	inches
C2 =	<u>18.7</u>	inches
C3 =	<u>21.9</u>	inches
C4 =	<u>21.9</u>	inches
C5 =	<u>20.5</u>	inches
C6 =	<u>17.5</u>	inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline
(Longitudinal)

LENGTH OF DAMAGED REGION: L = 57.0 inches

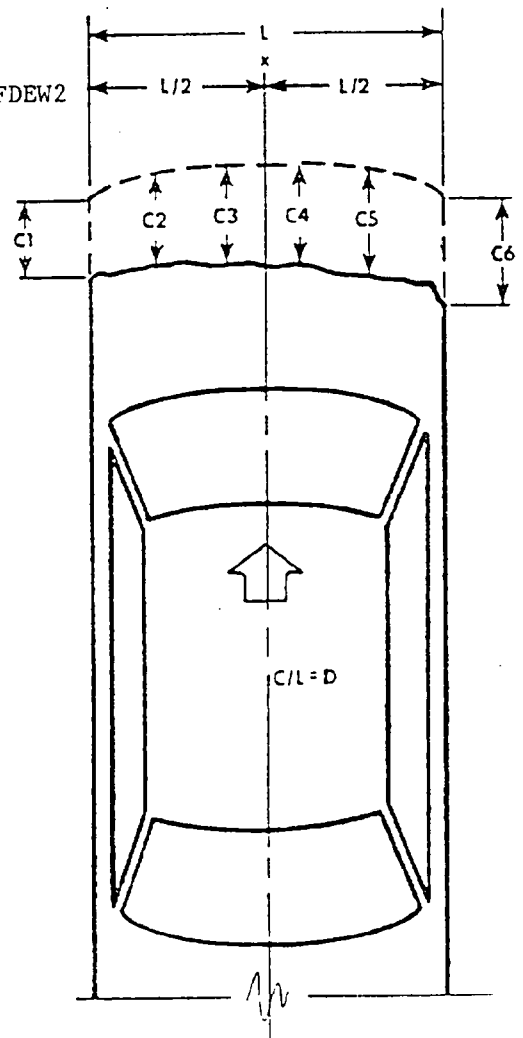
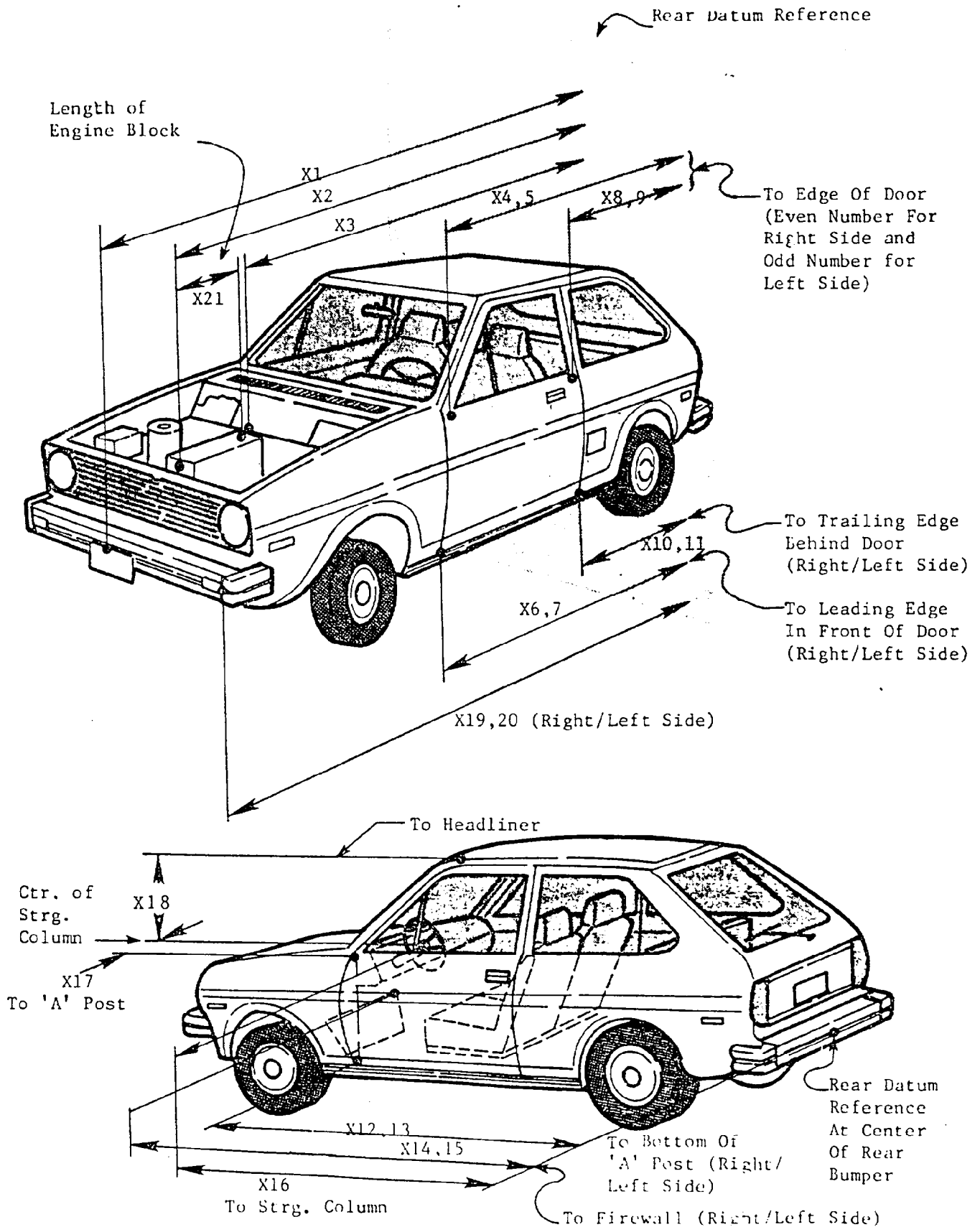


FIGURE 3
PRE-TEST AND POST-TEST MEASUREMENT POINTS



IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Oldsmobile Calais

TEST NUMBER 870714

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X 1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	179.1	156.6	22.5
X 2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	153.0	150.0	3.0
X 3	REAR SURFACE OF VEHICLE TO FIREWALL	130.8	126.4	4.4
X 4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	119.2	119.2	0.0
X 5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	119.2	119.2	0.0
X 6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	118.2	118.0	0.2
X 7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	118.2	117.8	0.4
X 8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	68.5	68.7	-0.2
X 9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	68.4	68.8	-0.4
X 10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	67.6	67.4	0.2
X 11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE ON LEFT DOOR	67.8	67.2	0.6
X 12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	117.4	117.4	0.0
X 13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	117.4	117.1	0.3
X 14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	130.0	129.4	0.6
X 15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	130.0	129.2	0.8
X 16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	101.9	102.2	-0.3
X 17	CENTER OF STEERING COLUMN TO "A" POST	14.2	15.0	-0.8

TABLE 5

IMPACTED VEHICLE MEASUREMENTS CONT'D

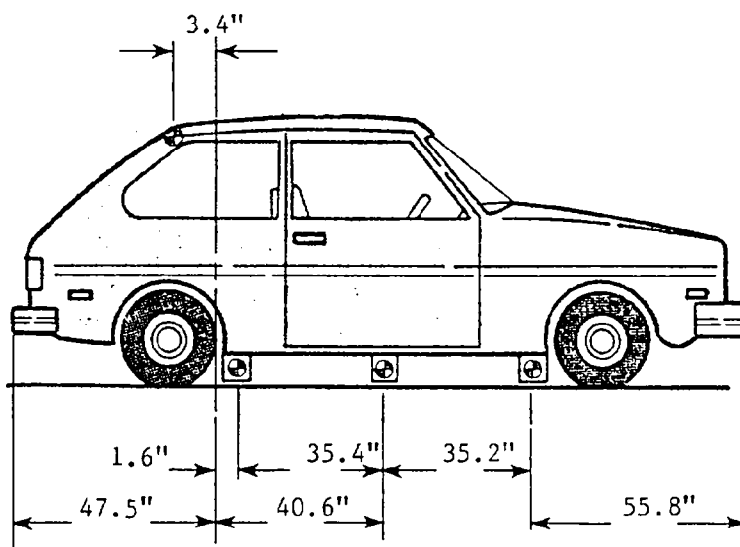
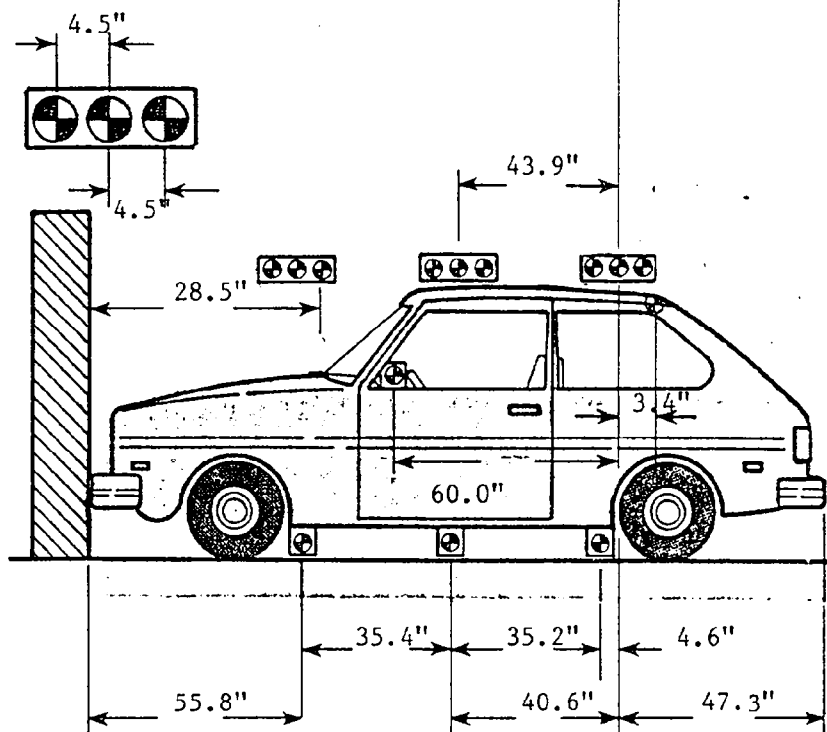
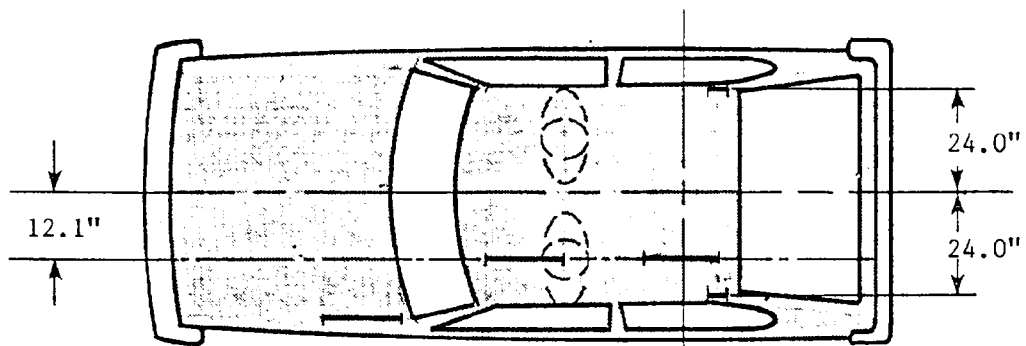
VEHICLE MAKE/MODEL Oldsmobile Calais

TEST NUMBER 870714

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	16.5	16.2	0.3
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	174.1	157.0	17.1
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	174.1	156.6	17.5
X21	LENGTH OF ENGINE BLOCK	17.8	17.8	0.0

TABLE 5 CONT'D

FIGURE 4
VEHICLE TARGET LOCATIONS



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 vehicle, a 1987 Oldsmobile Calais 2-door coupe, NHTSA No. CH0105, appeared to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial), and 301.

The driver's Head Injury Criteria (HIC) was 681. The driver's maximum chest deceleration over three milliseconds was 35.9 g. The driver's right and left femur loads were 1575 pounds and 1022 pounds, respectively.

The right front passenger's Head Injury Criteria (HIC) was 383. The right front passenger's maximum chest deceleration over three milliseconds was 33.9 g. The right front passenger's right and left femur loads were 874 and 455 pounds, respectively.

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

The windshield retention was 100 percent.

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

There was no Stoddard fluid leakage following the crash test event or during the static rollover test.

TABLE 6

DUMMY INJURY CRITERIA

MAXIMUM ACCELERATION ('G')

	<u>HEAD</u>				<u>CHEST</u>			
	X	Y	Z	R	X	Y	Z	R*
DRIVER	-100.9	21.5	-134.6	145.3	-37.4	-8.3	-11.2	35.9
PASSENGER	-24.8	-20.3	-47.4	51.8	-33.7	-7.6	10.8	33.9

MAXIMUM FORCE-FEMUR LOAD (LBS)

	<u>RIGHT FEMUR</u>	<u>LEFT FEMUR</u>
DRIVER	1575	1022
PASSENGER	874	455

HEAD INJURY CRITERIA**

	HIC	TIME t_1 (MSEC)	TIME t_2 (MSEC)
DRIVER	681	75.9	111.9
PASSENGER	383	81.0	117.0

*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 driver's head rotated forward contacting the steering wheel hub. The driver's chest contacted the lower steering wheel rim as the driver's torso was restrained by the three-point passive seatbelt. The dummy's head rotated rearward into the head restraint as the dummy rebounded into the seatback. The driver dummy came to rest seated upright in the driver's seat restrained by the three-point passive seat belt.

PASSENGER DUMMY

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

VISIBLE DUMMY CONTACT POINTS:

	DRIVER	PASSENGER
Head	<u>Steering wheel hub</u>	<u>None</u>
Chest	<u>Lower 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>Difficult, no tools required</u>	<u>Difficult, no tools required</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:

None

OTHER NOTABLE IMPACT EFFECTS:

None

FIGURE 5
DUMMY POSITIONING DATA FOR
30 MPH FRONTAL BARRIER IMPACT TEST

PRE-IMPACT DATA:

Make/Model: Oldsmobile Cutlass Calais
Body Style: 2-Door Coupe Model Year: 1987
NHTSA No.: CH0105 Color: Gray

DATA FROM CERTIFICATION LABEL:

Vehicle Manufacturer: General Motors Corporation
Date of Manufacture: 5/87 ; VIN: 1G3NF14UXHM289612
GVWR: 3472 lb; GAWR: Front = 1917 lb; Rear = 1555 lb

POST-IMPACT DATA:

Date of Test: 7/14/87 Time: 1436 Temperature 68 °F
Required Impact Velocity Range: 28.9 to 29.9 mph
Impact Velocity: Primary = 29.5 mph Secondary = 29.5 mph
Seat Type: Bucket Adjuster Type: Manual
Bucket Seat Back Type: Adjustable

Technicians:

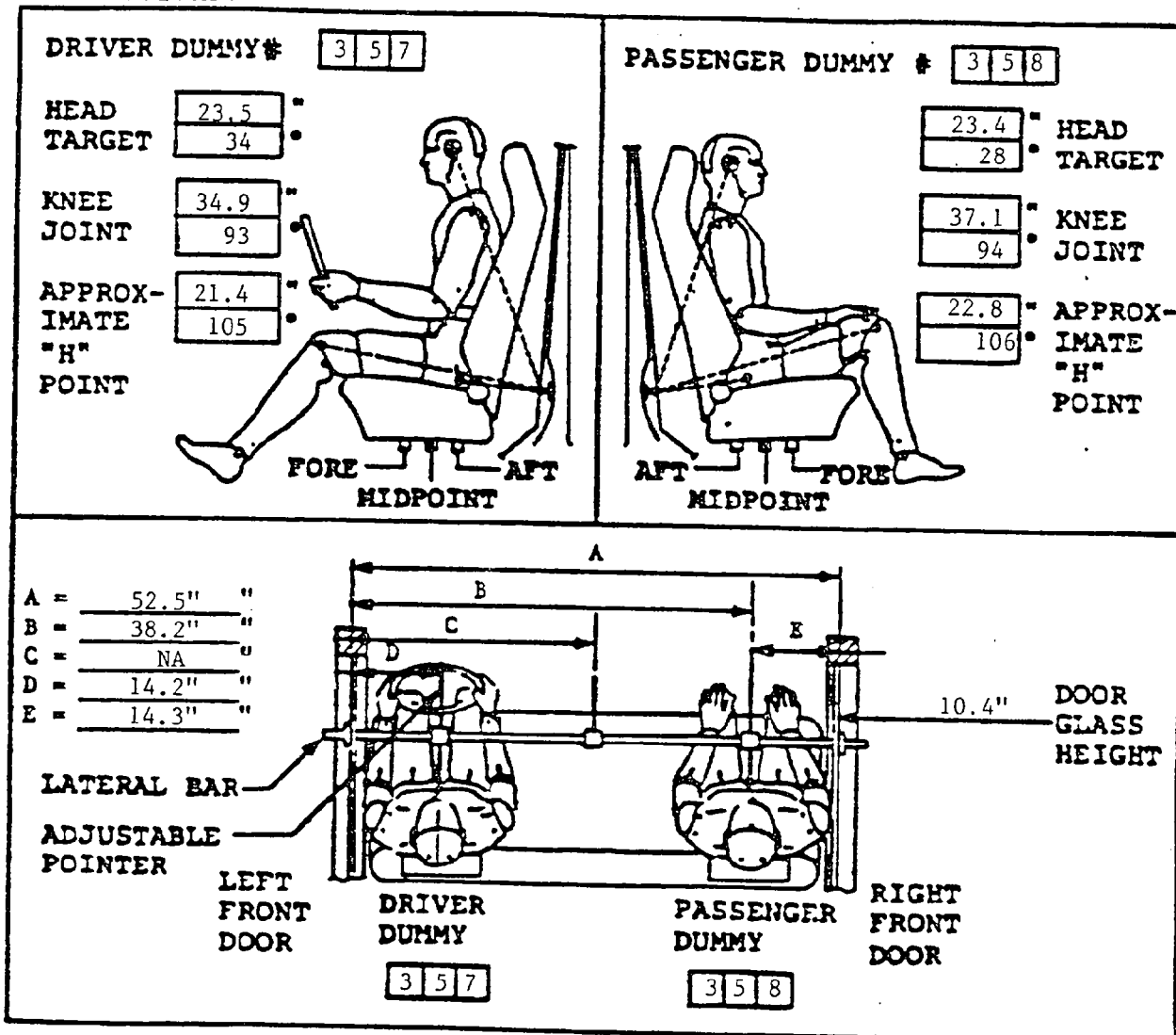
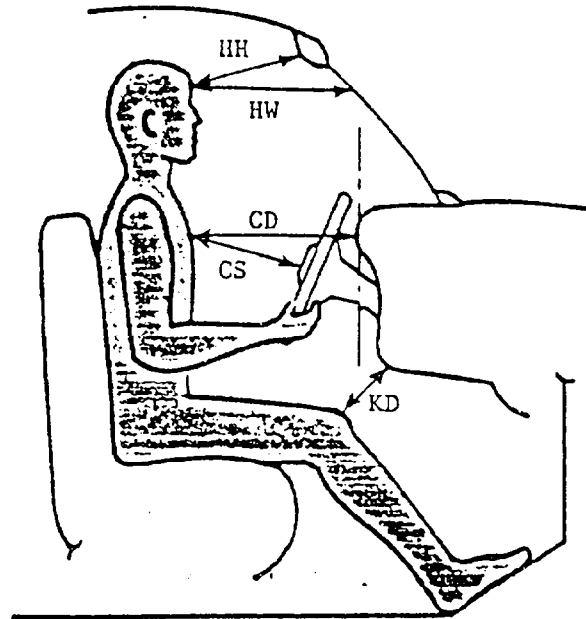


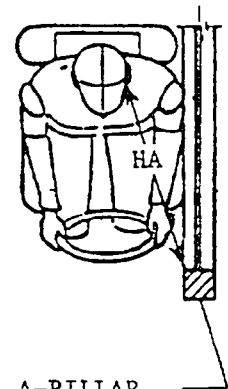
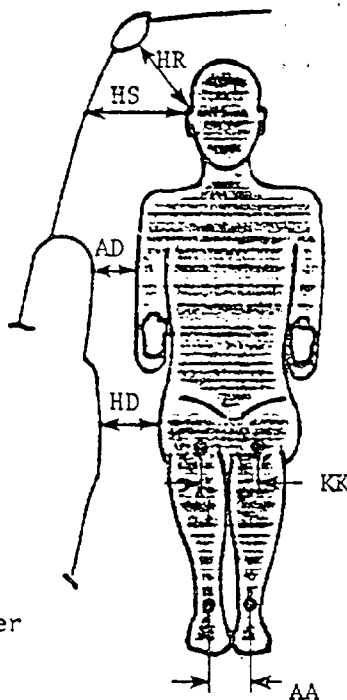
FIGURE 6

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER 357	PASSENGER 358
HH	11.4	14.1
HW	18.3	22.4
CD	20.4	22.5
CS	13.6	NA
KDL	5.9	6.5
KDR	4.6	5.9
TA	19°	25°
SA	24°	24°
HA	NA	NA



	DRIVER 357	PASSENGER 358
HR	6.6	7.2
HS	10.6	10.8
AD	4.4	5.2
HD	4.1	4.1
KK	10.2	7.5
AA	11.1	7.0



A-PILLAR

Knee outer bolt head to outer bolt head spacing:

Driver = 14.6

Passenger = 11.9

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

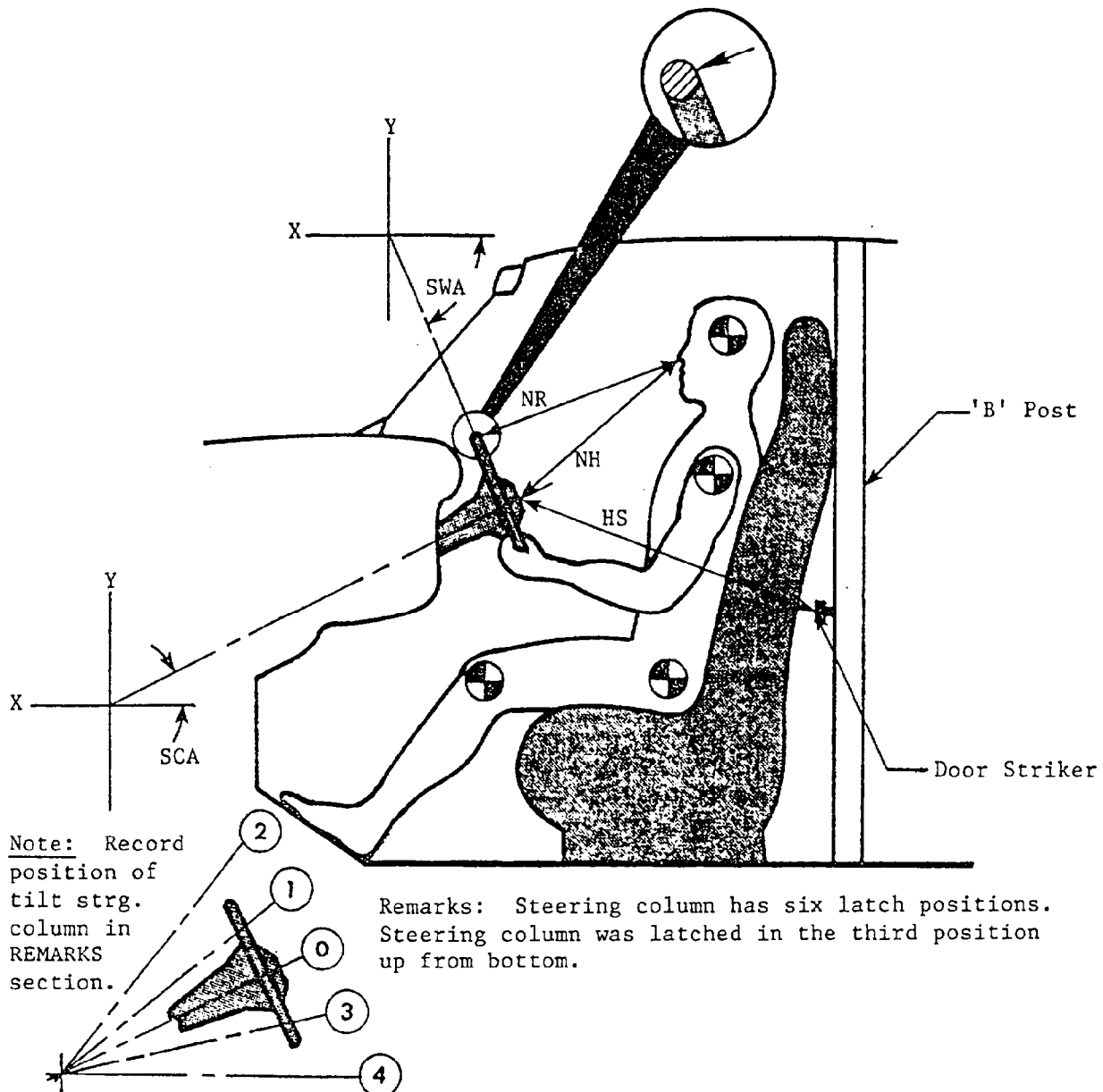
HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee
 AA = Ankle to Ankle
 HA = Head to A Pillar

Torso and seat back angles are relative to vertical.

ALL DISTANCE MEASUREMENTS IN INCHES

FIGURE 7

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim.

MEASUREMENTS

16.9"

NH - Distance from tip of dummy's nose to center of steering column hub.

17.8"

HS - Distance from center of steering column hub to the forward surface of the door lock striker pin.

34.9"

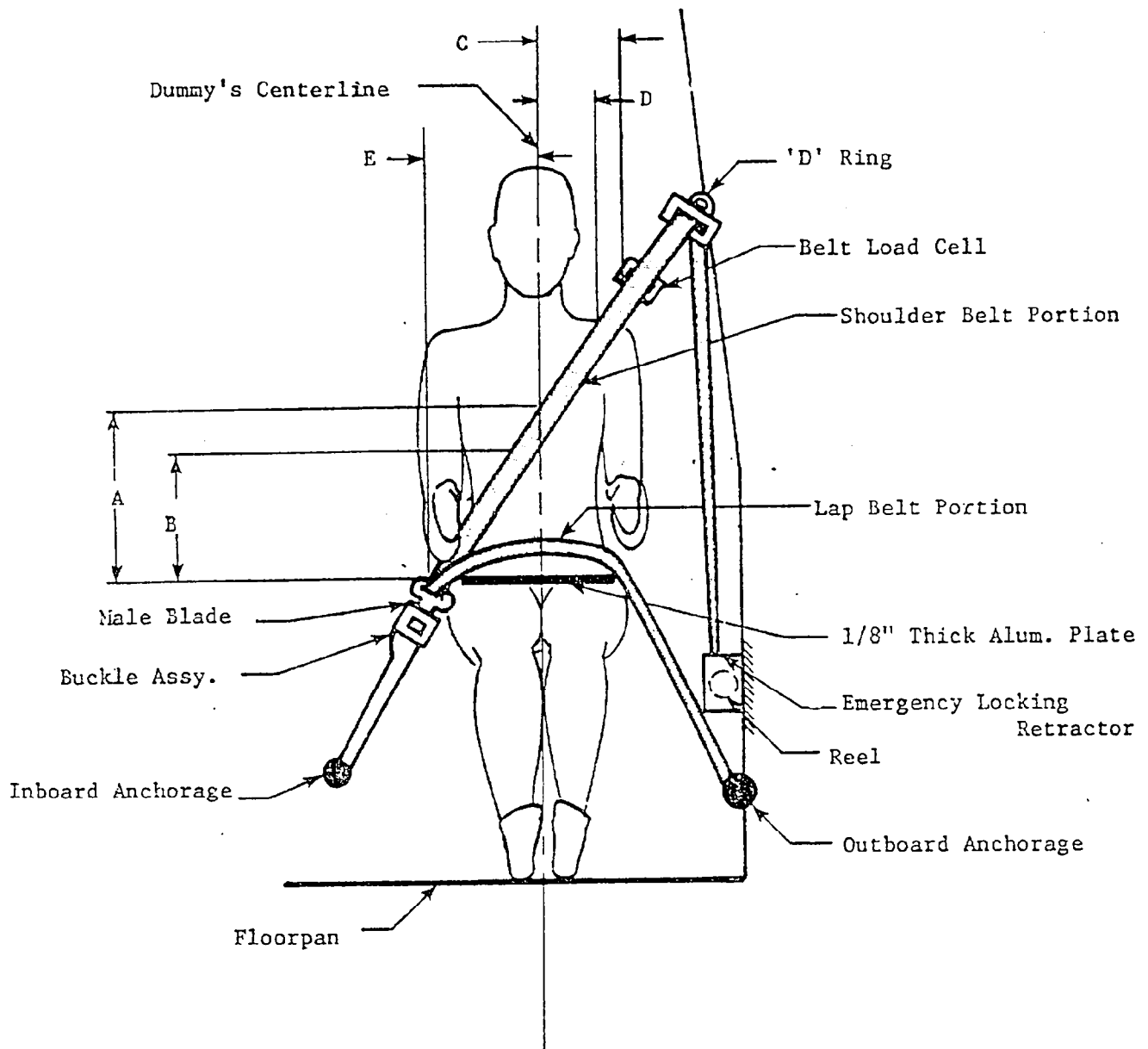
SCA - Angle of steering column relative to the horizontal X axis.

15°

SWA - Angle of steering wheel relative to the horizontal X axis.

75°

FIGURE 8
SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - Top surface of alum. plate to belt upper edge (in)	12.0	11.0
B - Top surface of alum. plate to belt lower edge (in)	9.0	8.0
C - Dummy centerline to outer edge of belt at chest flesh top (in)	3.0	4.0
D - Dummy centerline to inner edge of belt at chest flesh top (in)	5.2	6.2
E - Dummy centerline to intersection of upper torso belt and lap belt (in)	8.2	8.2

TABLE 7

FMVSS 208 COMFORT AND CONVENIENCE DATA

VEHICLE VIN NO: 1G3NF14UXHM289612 NHTSA NO: CH0105
MAKE: Oldsmobile MODEL: Calais
VEHICLE CERTIFICATION DATE: 5/87 VEHICLE TYPE: 2-door coupe
FRONT OUTBOARD SEATING POSITIONS SEAT BELT TYPE:
(check one): X Automatic belts
 Type 2 lap/shoulder belts
 Other

CONVENIENCE HOOKS: Vehicle's restraint system does not include convenience hooks.

WEBBING TENSION - RELIEVING DEVICE:

DO OUTBOARD SEATING POSITION BELTS HAVE TENSION - RELIEVING DEVICES?
Yes

MAXIMUM SLACK RECOMMENDED IN OWNERS MANUAL: One INCH
DOES OWNER'S MANUAL WARN THAT INTRODUCING SLACK BEYOND THE AMOUNT
SPECIFIED CAN SIGNIFICANTLY REDUCE THE EFFECTIVENESS OF THE SHOULDER
BELT? Yes, Page 18

IF NO, EXPLAIN:

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

IF NO, EXPLAIN:

BELT CONTACT FORCE:

FOR BELTS WITHOUT TENSION-RELIEVING DEVICES: BELT CONTACT FORCE:
NA POUNDS NOTE: BELTS HAVE A TENSION - RELIEVING DEVICE.

LATCHPLATE ACCESS: NA

RETRACTION: NA

ACCESSIBILITY: NA

LATCH MECHANISM: NA

TABLE 8

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM DATA

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

Duration of audible warning signal = 6 sec.

Duration of reminder light operation = 67 sec.

WITH OCCUPANT IN DRIVER'S POSITION AND LAP 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 = 3 sec.

Wording of visual warning:

Fasten Seat Belt

Fasten Belt

Symbol 101-80 X

TABLE 9

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

DESCRIBE LOCATION OF LABEL WHICH DESCRIBES MANUFACTURER'S MAINTENANCE OR
REPLACEMENT SCHEDULE FOR CRASH-DEPLOYED OCCUPANT PROTECTION SYSTEM: NA
Vehicle did not contain a crash-deployed occupant protection system.

TABLE 10

FMVSS NO. 208 - READINESS INDICATOR DATA

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

Vehicle did not contain a crash-deployed occupant protection system.

TABLE 11

SUMMARY OF FMVSS NO. 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Oldsmobile Calais

BODY STYLE: 2-door coupe

MODEL YEAR: 1987

NHTSA NO.: CH0105

COLOR: Gray

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: General Motors Corporation

CERTIFICATION DATE: 5/87

VIN: 1G3NF14UXHM289612

GWR: 3472 LBS., GAWR: FRONT 1917 LBS., REAR 1555 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Barrier Impact

DATE OF TEST: 7/14/87

TIME: 1436

TEMP: 68°F

REQUIRED IMPACT VELOCITY RANGE: 28.9 MPH TO 29.9 MPH

IMPACT VELOCITY: PRIMARY = 29.5 MPH, SECONDARY = 29.5 MPH

TEST WEIGHT = 3139 LBS., STATIC CRUSH MAX. = 22.5 IN., REBOUND = 10.5 IN.

FUEL SYSTEM DATA

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

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: 13.6 GALLONS (FURNISHED BY CTM)

TEST VOLUME: 12.6 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 13.5 GALLONS

DETAILS OF FUEL SYSTEM: Fuel tank is located in front of rear axle under rear seat area. Fuel filler cap is on right side, filler neck enters rear of tank. Fuel lines run from rear of tank along left side of vehicle.

ELECTRIC FUEL PUMP: Yes

FUEL INJECTION: Yes

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

*WITH ENTIRE FUEL SYSTEM FILLED.

FIGURE 9

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

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

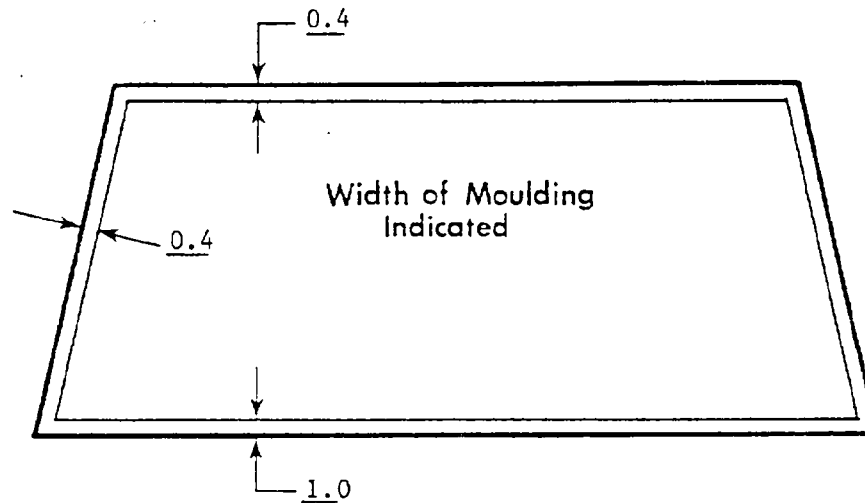
FMVSS 212 REQUIREMENTS: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

WINDSHIELD PERIPHERY

	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	78.2	78.2	100%
LEFT SIDE	78.2	78.2	100%
TOTAL	156.4	156.4	100%

AREA OF RETENTION FAILURE:



TEST VEHICLE TEMPERATURE: 71°F

FAILURE DETAILS: None

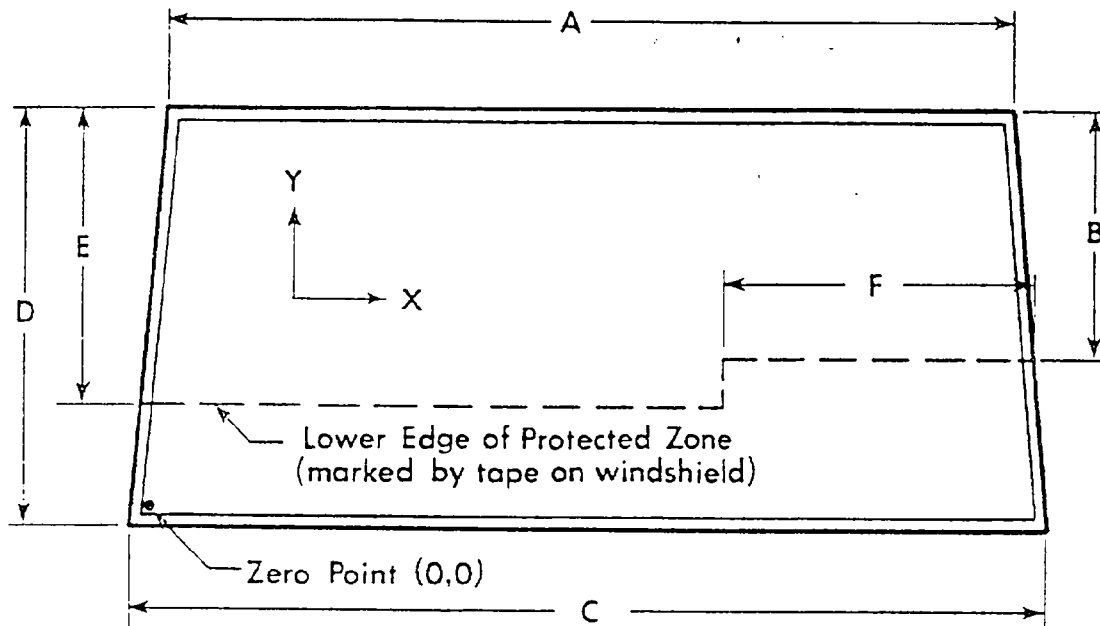
FIGURE 10

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" distant 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 = 46.7"

C = 58.5"

E = 18.0"

B = 17.0"

D = 30.8"

F = 25.4"

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

None

COORDINATES
X Y

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

TABLE 12

"FUEL SYSTEM INTEGRITY" POST-IMPACT
TEST DATA, FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CH0105 ; TEST DATE: JULY 14, 1987
VEH. MFR./MAKE/MODEL: General Motors Corporation/Oldsmobile Calais

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:

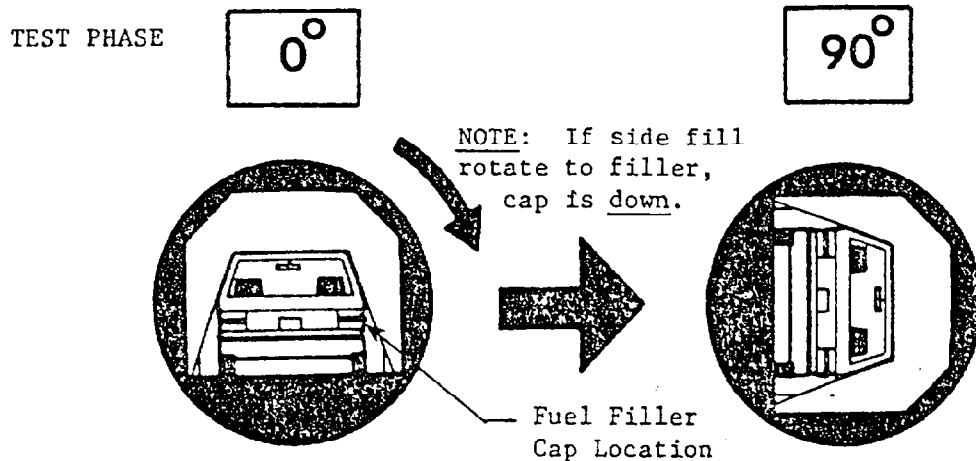
	<u>ACTUAL</u>	<u>MAX. ALLOW.</u>
1. From impact until vehicle motion ceases - -	0	1 oz.
2. For 5 min. period after veh. motion ceases-	0	5 oz.
3. For next 25 minutes - - - - -	0	1 oz./1 min.

SOLVENT SPILLAGE DETAILS:

No spillage during post-impact and static rollover time intervals.

FIGURE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET



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

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

FMVSS 301 Position Hold Time = 5 minutes, 00 seconds

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

Next Whole Minute Interval - - - - = 7 minutes

FMVSS 301 REQUIREMENTS

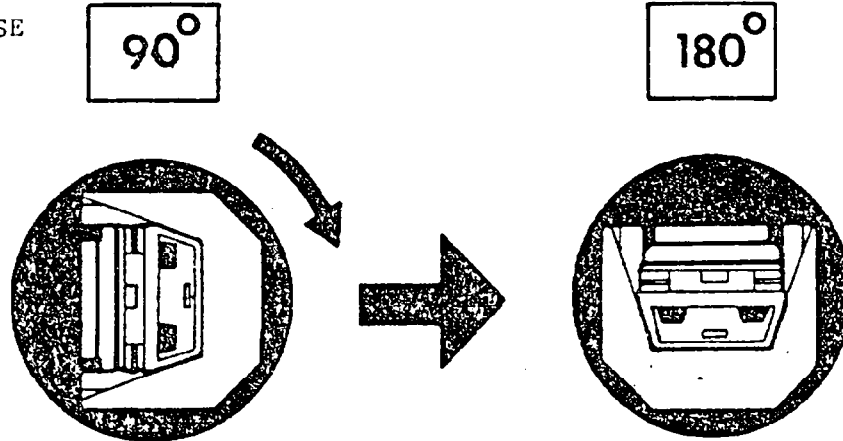
	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
0 to 90° (filler cap down) - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FIGURE 11, CONT'D

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE



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

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

FMVSS 301 Position Hold Time = 5 minutes, 00 seconds

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

Next Whole Minute Interval - - - - = 7 minutes

FMVSS 301 REQUIREMENTS

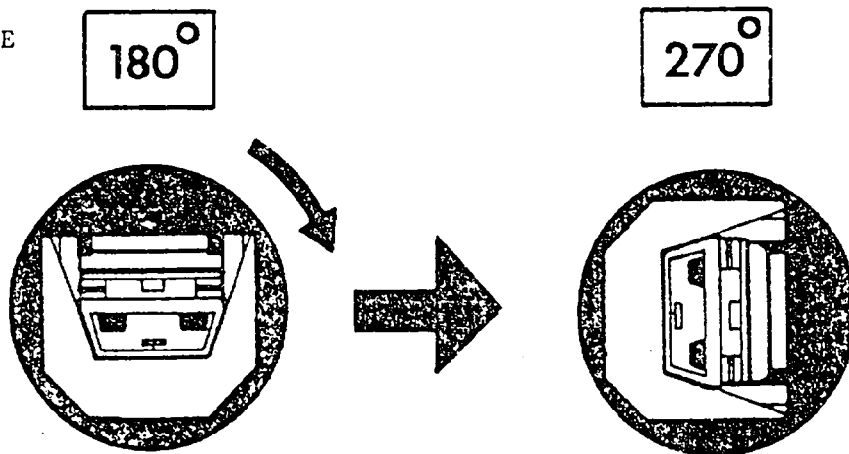
	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage -	5 oz.	1 oz.	1 oz.
90° to 180° - - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FIGURE 11, CONT'D

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 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, 21 seconds

Next Whole Minute Interval - - - - = 21 minutes

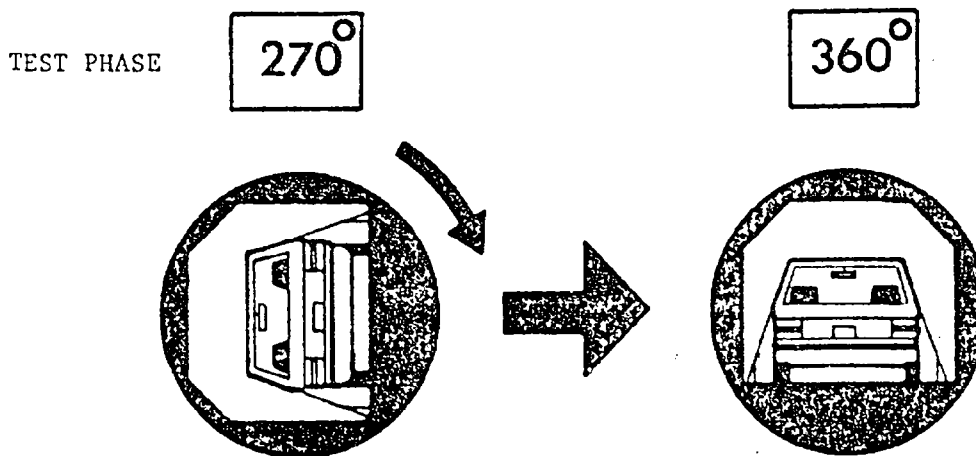
FMVSS 301 REQUIREMENTS

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute
Maximum Allowable Solvent Spillage - -	5 oz.	1 oz.	1 oz.
180° to 270° - - - - -	0 oz.	0 oz.	0 oz.

SOLVENT SPILLAGE LOCATION(S)

FIGURE 11, CONT'D

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET



STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 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)

SECTION 3.0

CAMERA INFORMATION

FIGURE 12
CAMERA POSITIONS

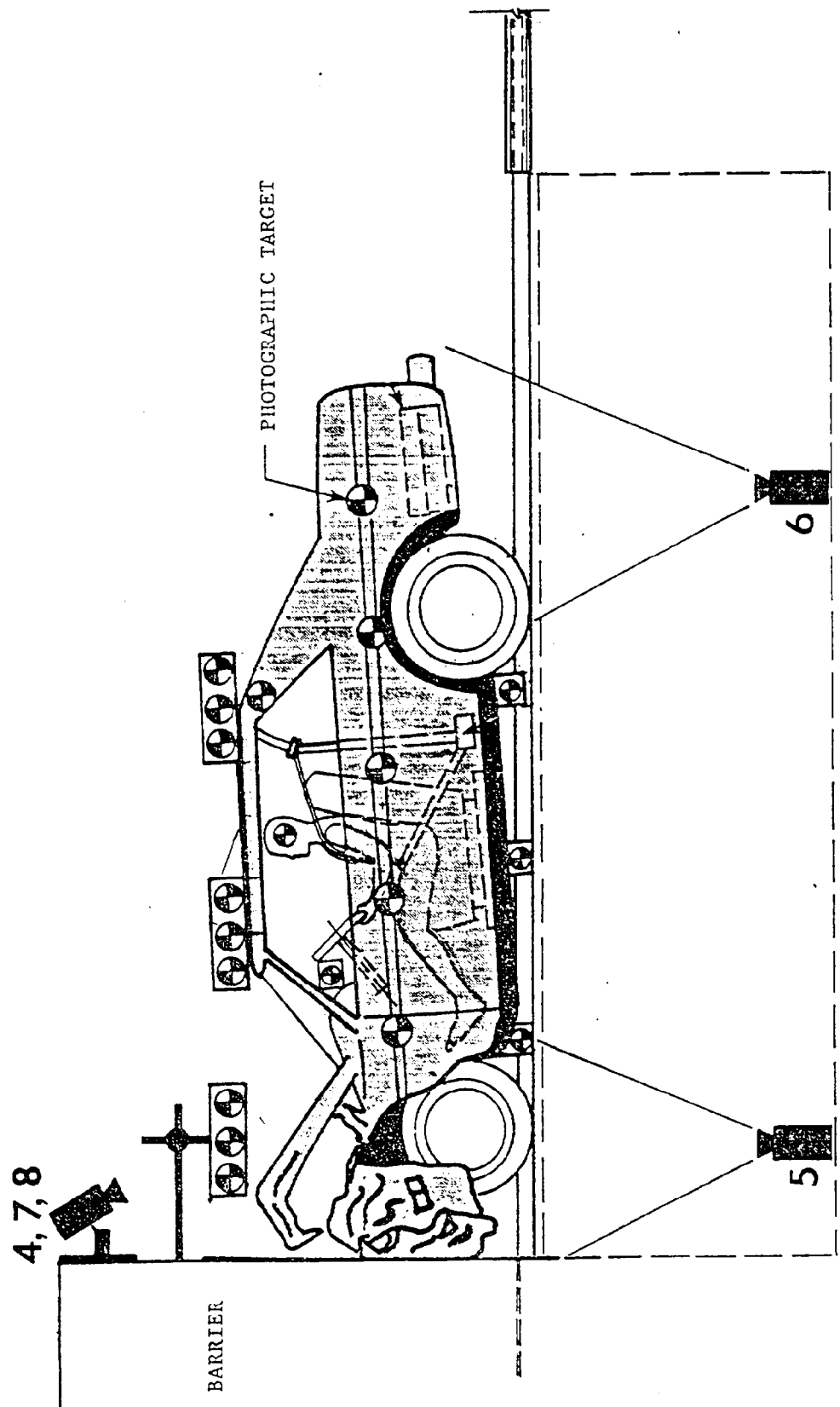


FIGURE 12 CONT'D

CAMERA POSITIONS

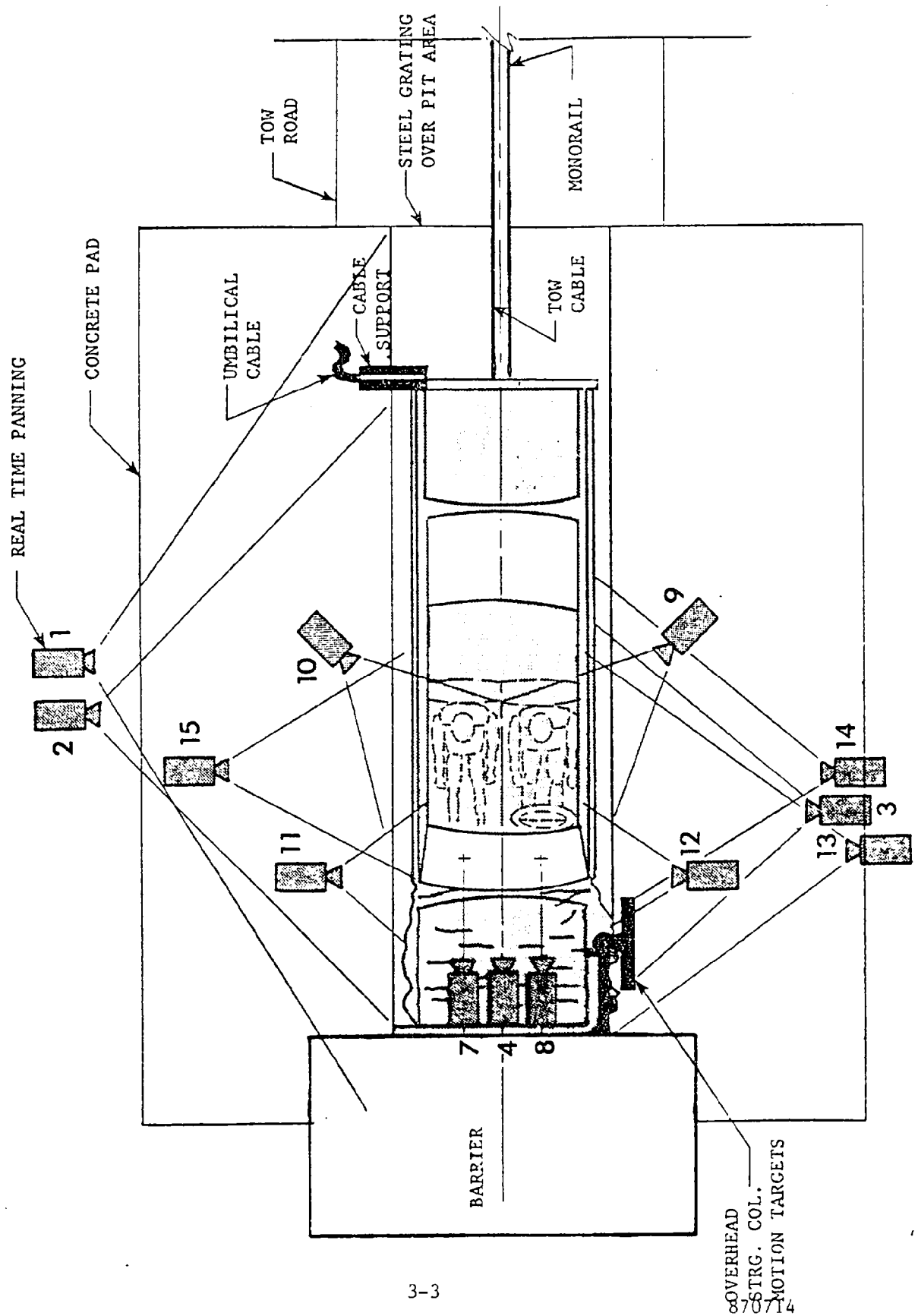


TABLE 13

TABLE 13

HIGH SPEED CAMERA LOCATIONS

TEST NO.: 870714 VEHICLE: Oldsmobile Calais

CAMERA NO.	VIEW	CAMERA POSITIONS (IN)*			ANGLE ** (DEG)	FILM PLANE 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	497
3	Dummy kinematics	-41.5	-295.0	44.0	-4	265.0	25	517
4	Windshield damage	-6.0	0.0	98.0	-45	NA	13	493
5	Crush & fluid spillage	-50.5	0.0	-92.4	90	NA	13	1002
6	Fluid spillage	-99.3	0.0	-99.0	90	NA	13	998
7	Passenger kinematics	-4.5	13.8	93.0	-50	NA	17	495
8	Driver kinematics	-6.8	-14.5	93.0	-50	NA	17	493
9	Driver kinematics	-157.3	-116.0	87.0	-27	114.0	25	495
10	Passenger kinematics	-152.1	116.0	87.0	-26	115.0	25	495
11	Windshield intrusion	-38.1	306.1	44.0	0	NA	50	495
12	Windshield intrusion	-53.0	-309.4	42.3	0	NA	50	498
13	Column movement	-140.0	-286.0	103.0	-14	NA	25	498
14	Column movement	-140.0	-286.0	75.1	-9	NA	25	493
15	Passenger kinematics	-38.8	293.0	45.3	-4	267.0	25	527

* 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. POST-TEST WINDSHIELD VIEW
15. PRE-TEST ENGINE COMPARTMENT VIEW
16. POST-TEST ENGINE COMPARTMENT VIEW
17. PRE-TEST FUEL FILLER CAP VIEW
18. POST-TEST FUEL FILLER CAP VIEW
19. PRE-TEST FRONT UNDERBODY VIEW
20. POST-TEST FRONT UNDERBODY VIEW
21. PRE-TEST REAR UNDERBODY VIEW
22. POST-TEST REAR UNDERBODY VIEW
23. PRE-TEST FUEL LINES - VIEW 1
24. PRE-TEST FUEL LINES - VIEW 2
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 VIEW
30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 1
31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 2
32. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW

APPENDIX A CONTINUED

PHOTOGRAPHS

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 PASSENGER HEAD/KNEE CONTACT - VIEW 1
39. POST-TEST PASSENGER HEAD/KNEE CONTACT - VIEW 2
40. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW
41. PRE-TEST VEHICLE TIRE LOAD LABEL VIEW
42. PRE-TEST VEHICLE BALLAST VIEW
43. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW



Figure 1. PRE-TEST FRONT VIEW



Figure 2. POST-TEST FRONT VIEW
A-3

870714

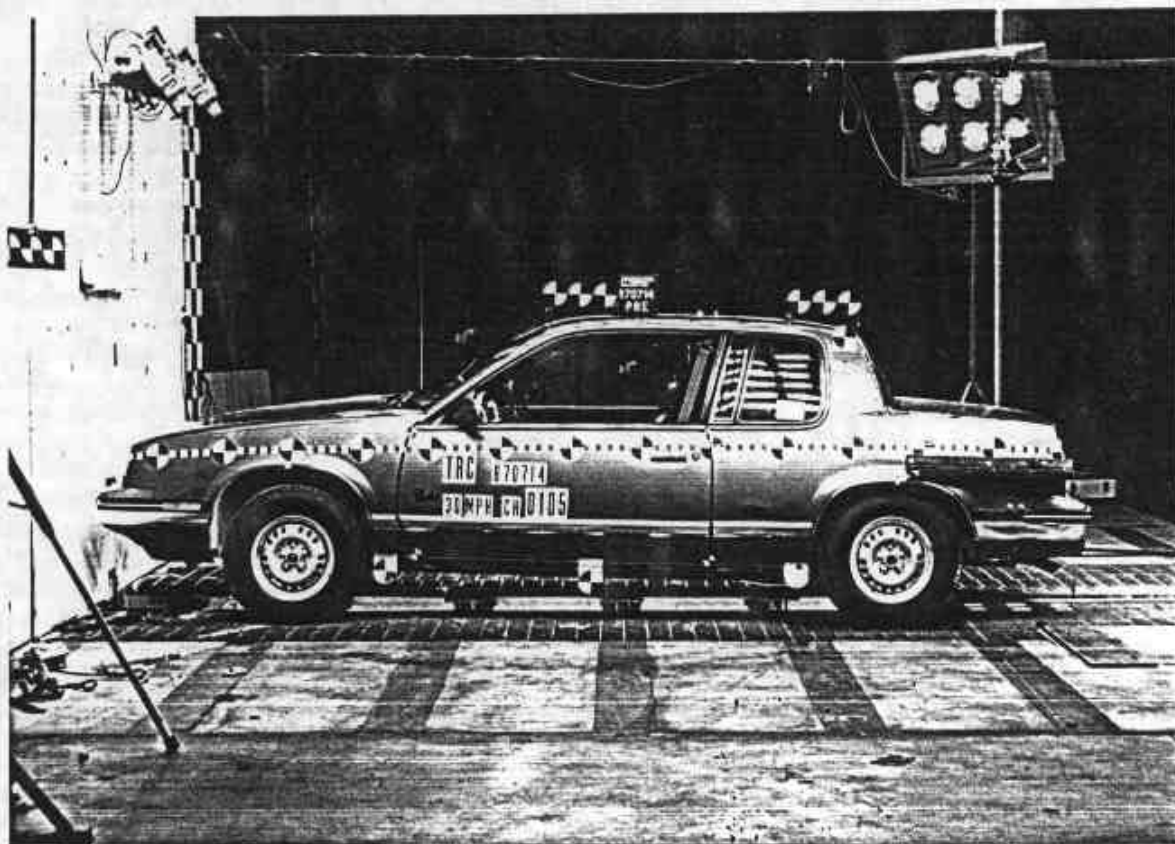


Figure 3. PRE-TEST LEFT SIDE VIEW



Figure 4. POST-TEST LEFT SIDE VIEW

A-4

870714



Figure 5. PRE-TEST RIGHT SIDE VIEW

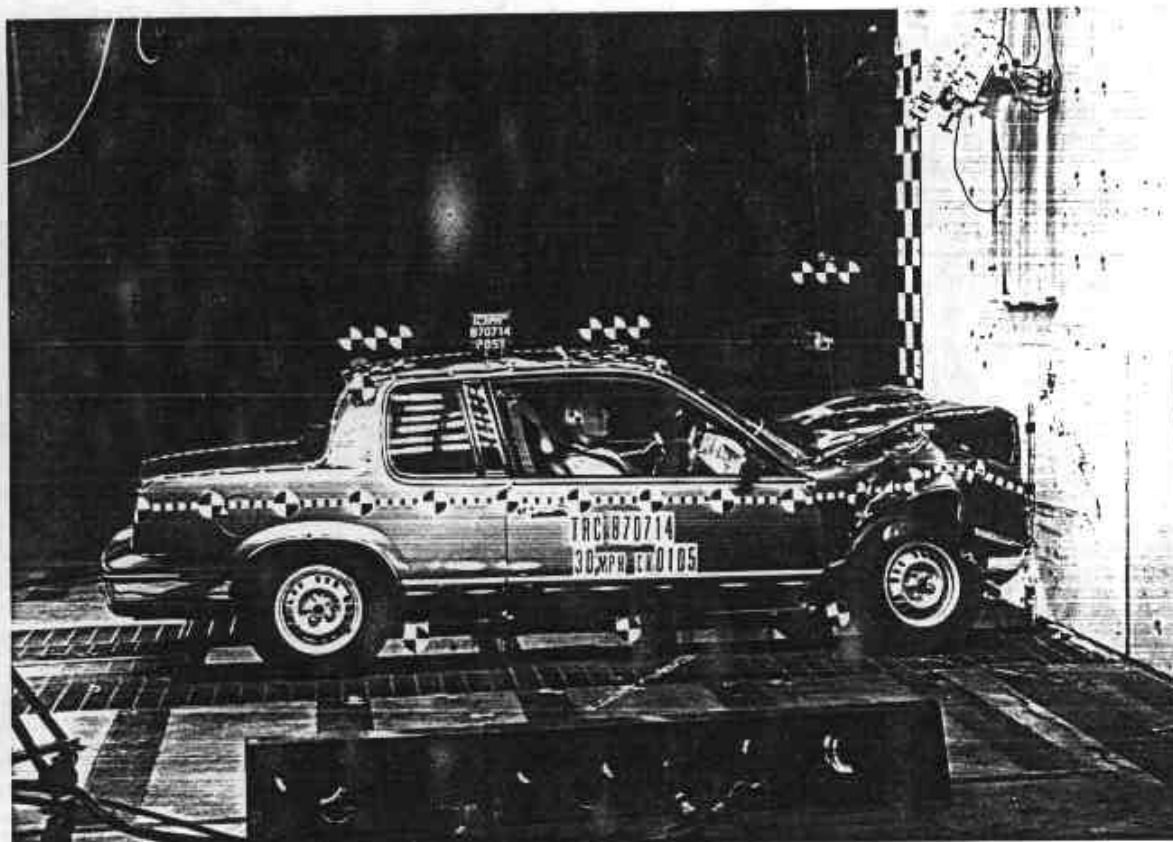


Figure 6. POST-TEST RIGHT SIDE VIEW
A-5

870714



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

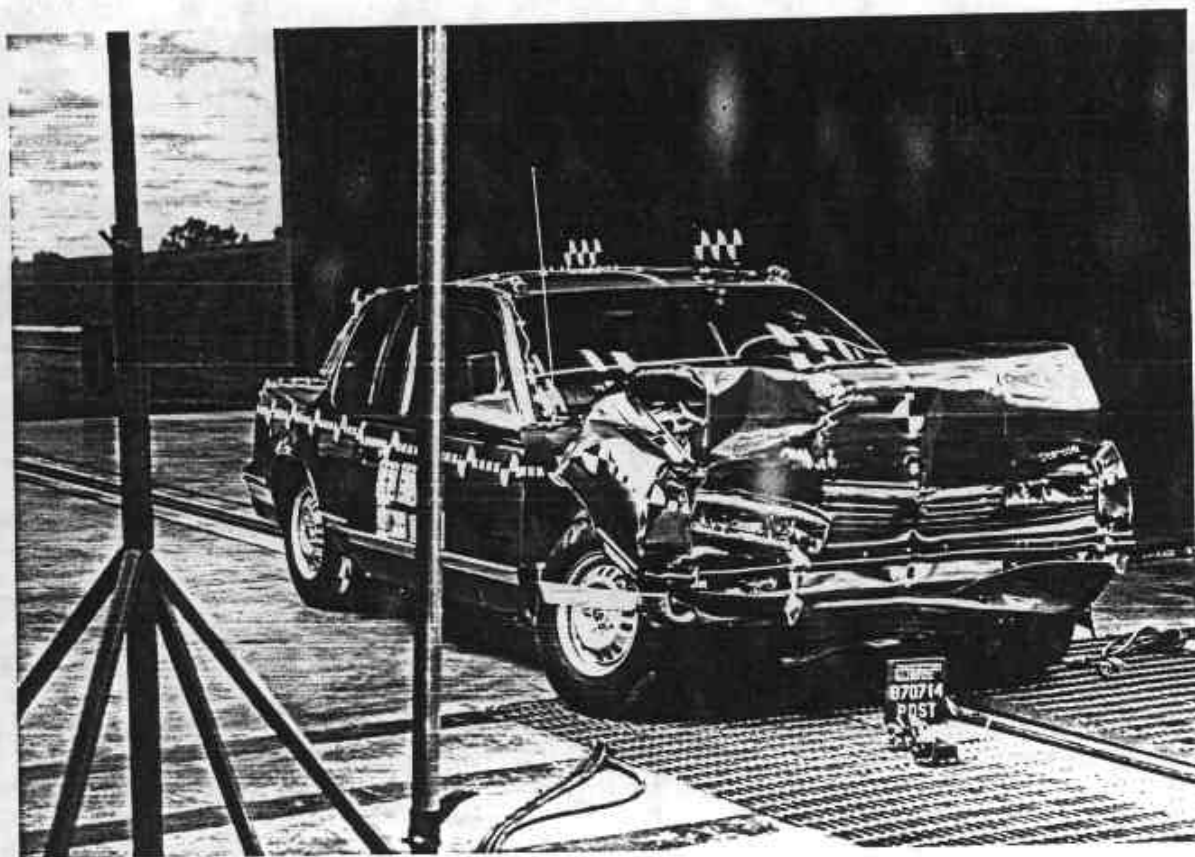


Figure 8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-6

870714

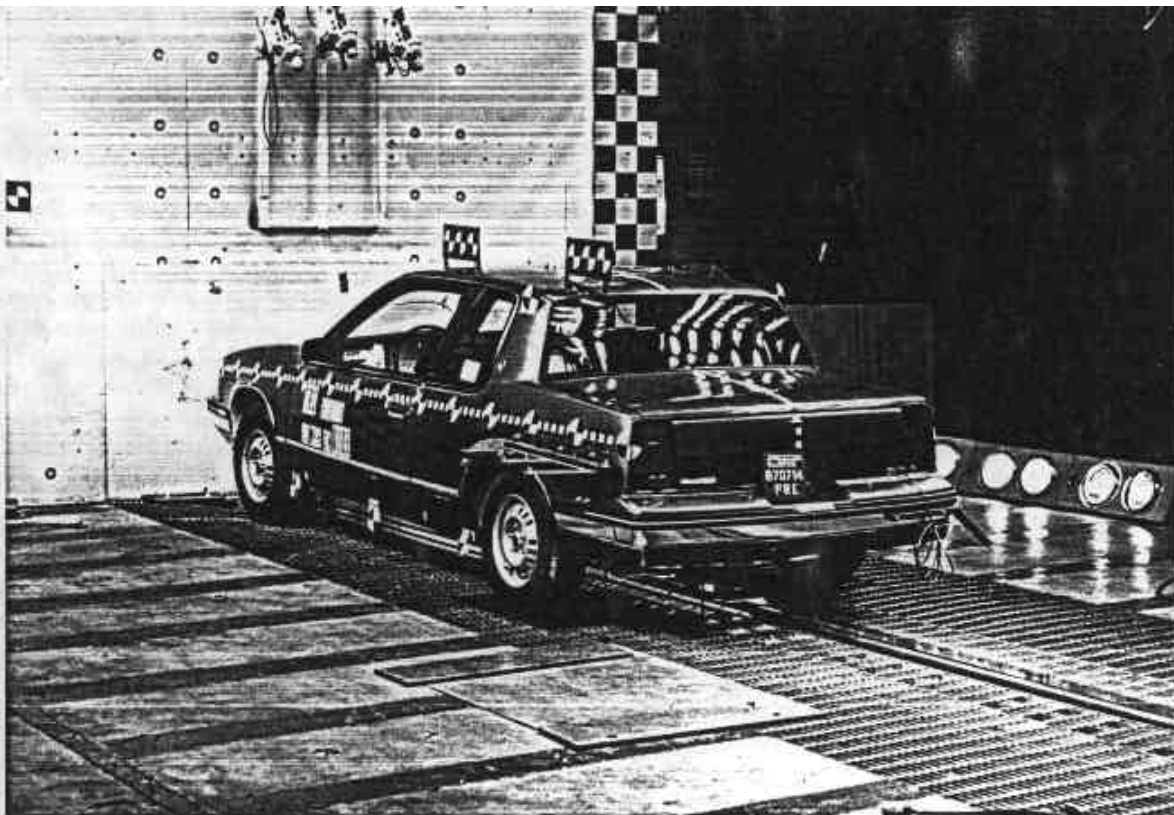


Figure 9. PRE-TEST LEFT REAR THREE-QUARTER VIEW

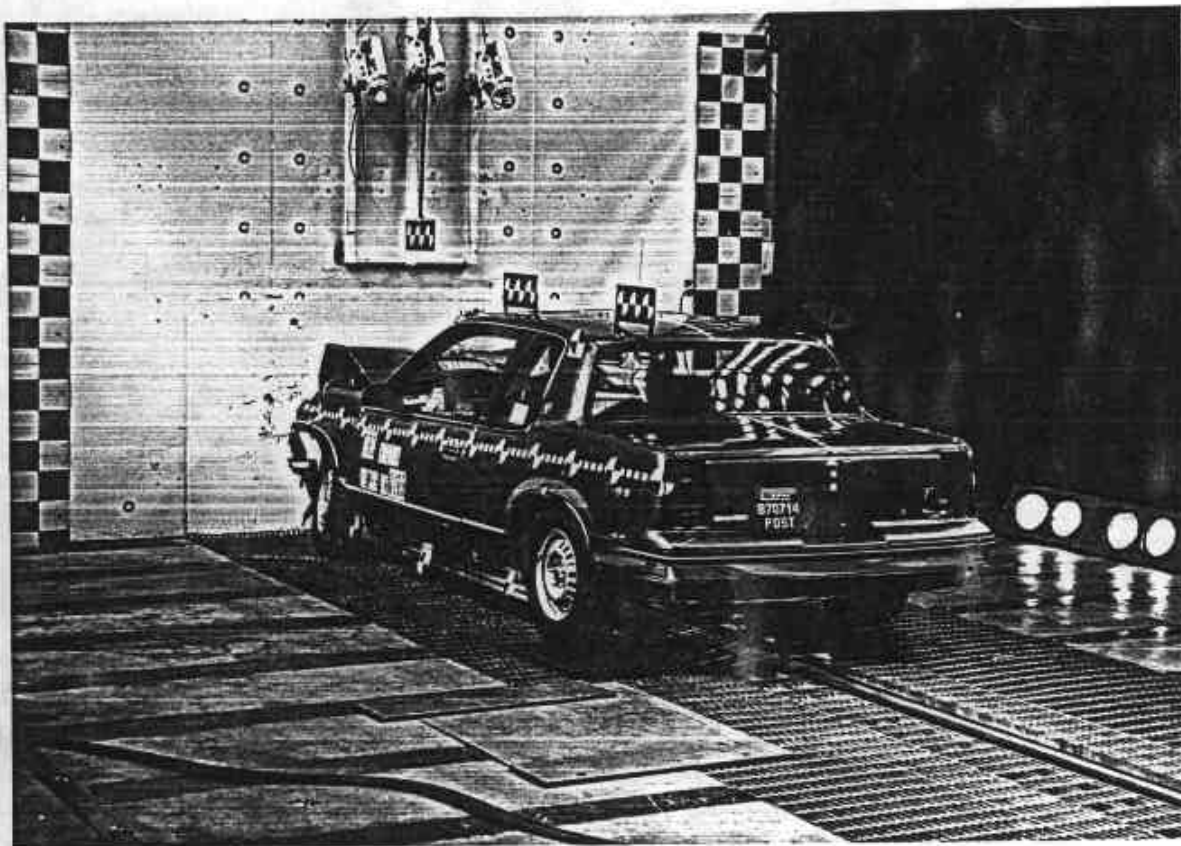


Figure 10. POST-TEST LEFT REAR THREE-QUARTER VIEW
A-7

870714



Figure 11. PRE-TEST REAR VIEW



Figure 12. POST-TEST REAR VIEW
A-8

870714

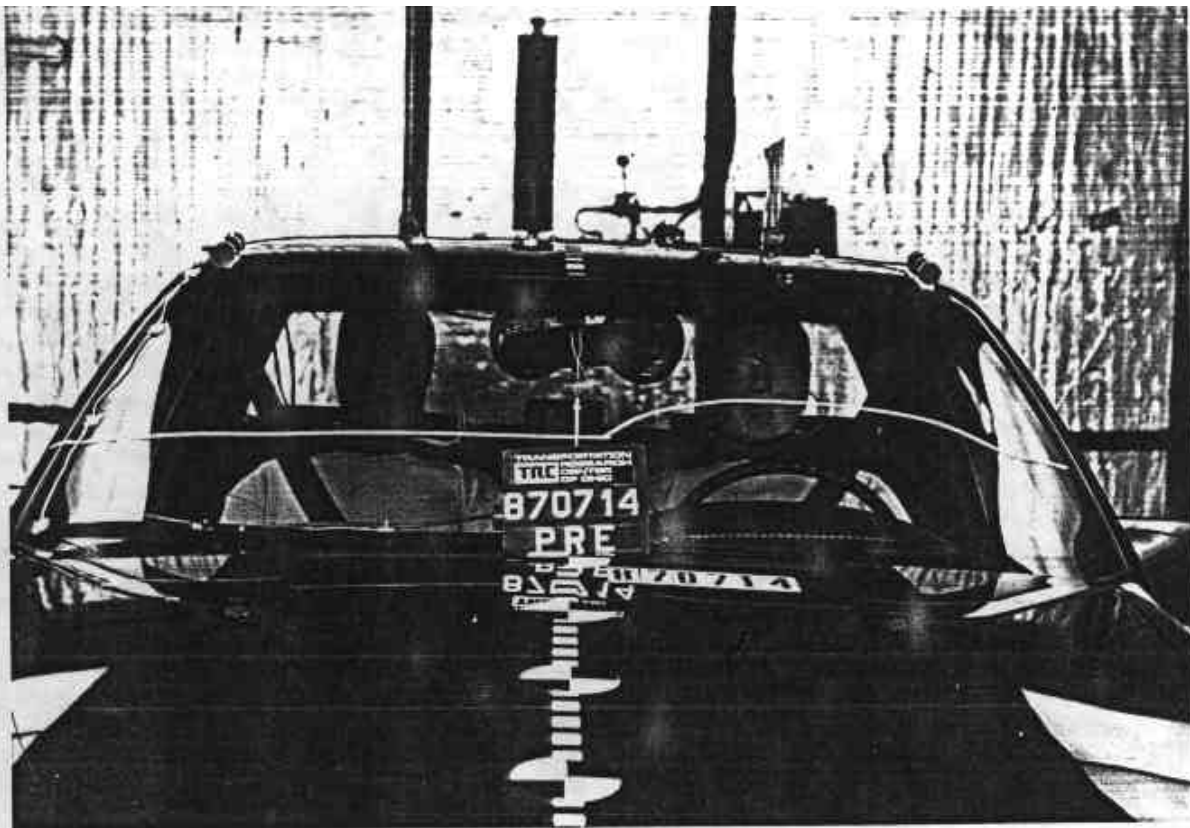


Figure 13. PRE-TEST WINDSHIELD VIEW

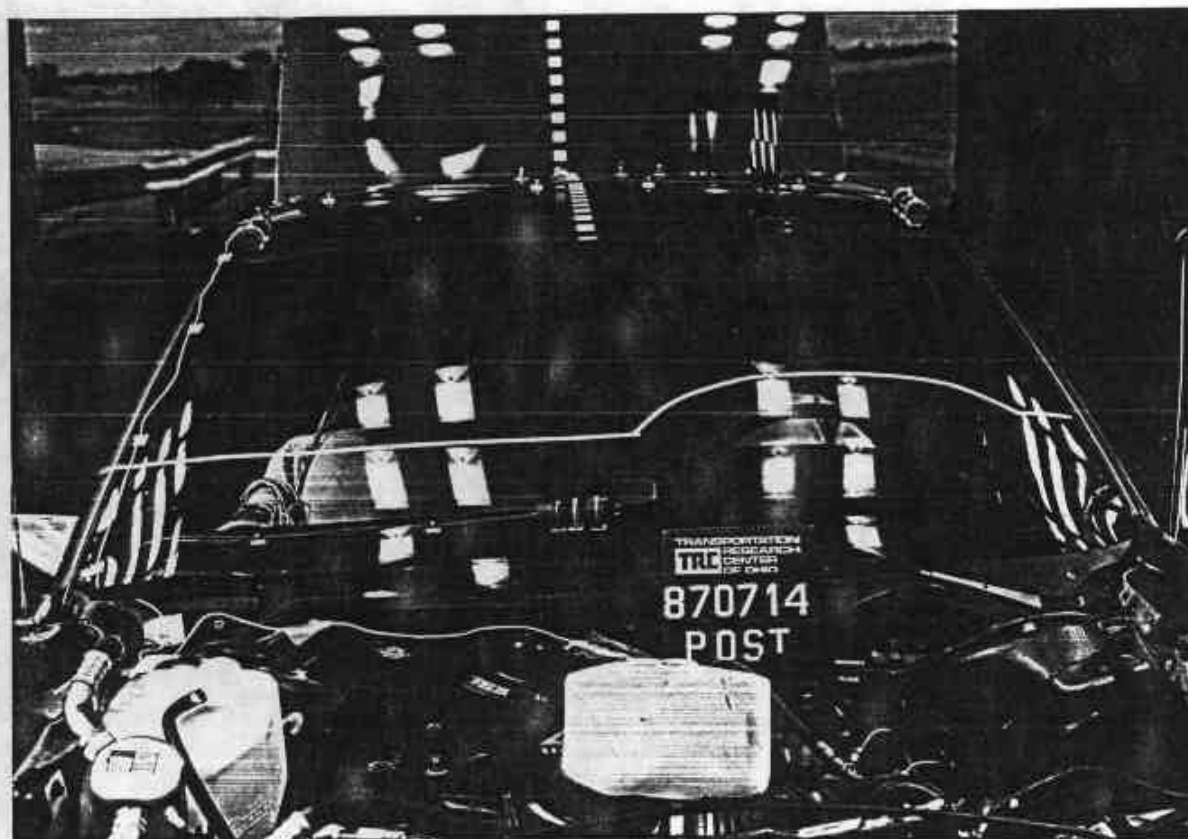


Figure 14. POST-TEST WINDSHIELD VIEW
A-9

870714

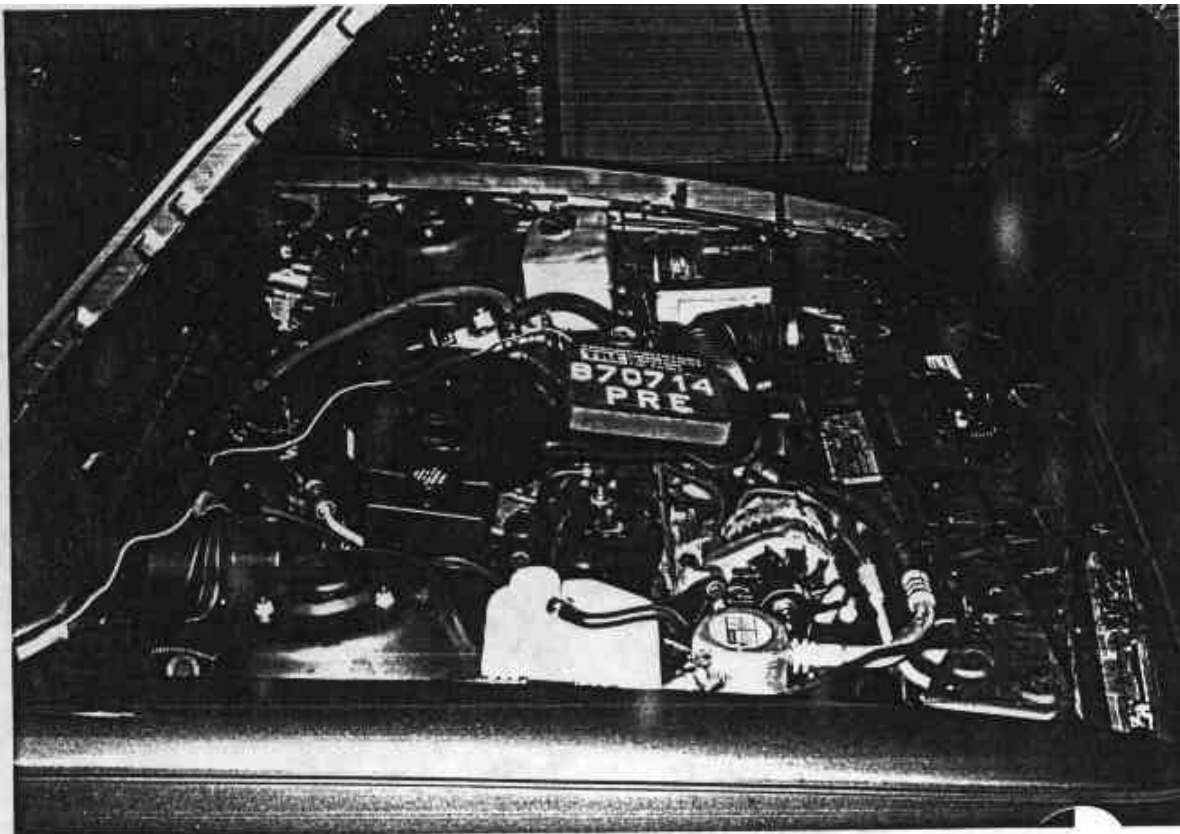


Figure 15. PRE-TEST ENGINE COMPARTMENT VIEW



Figure 16. POST-TEST ENGINE COMPARTMENT VIEW
A-10

870714



Figure 17. PRE-TEST FUEL FILLER CAP VIEW



Figure 18. POST-TEST FUEL FILLER CAP VIEW
A-11

870714

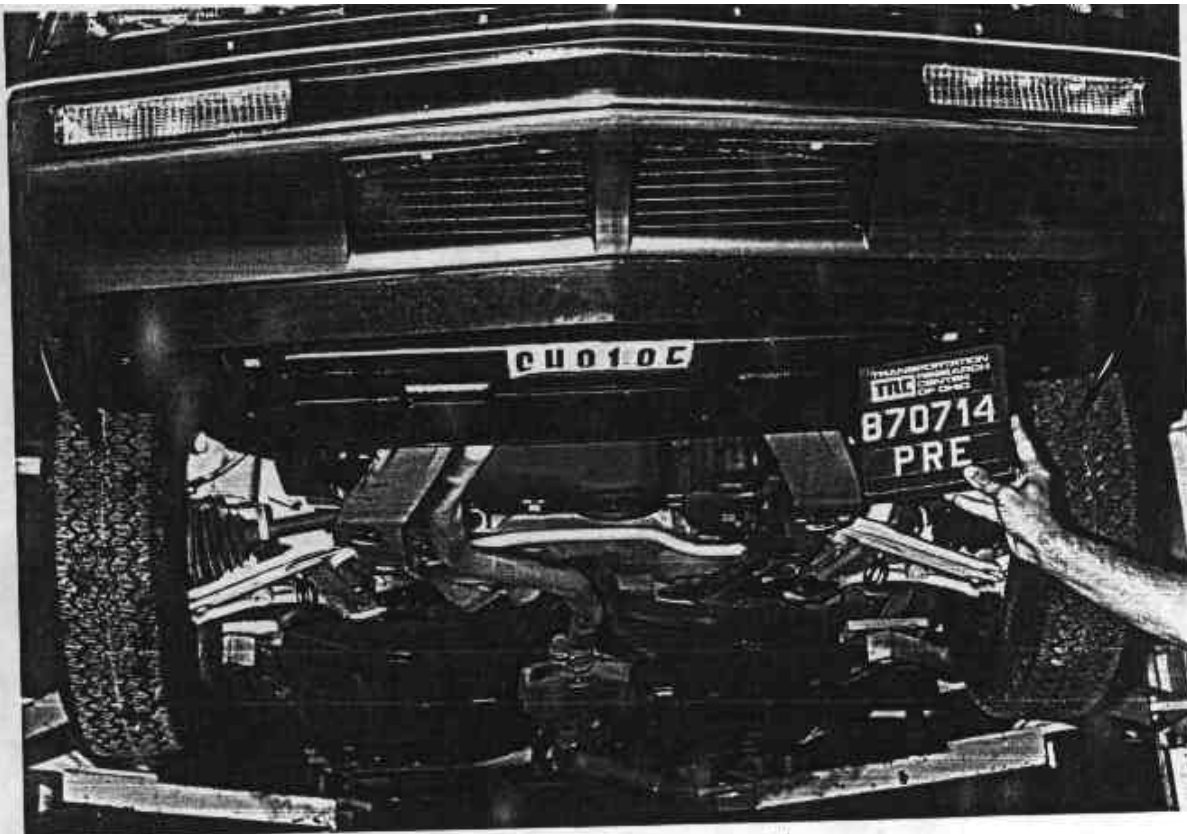


Figure 19. PRE-TEST FRONT UNDERBODY VIEW

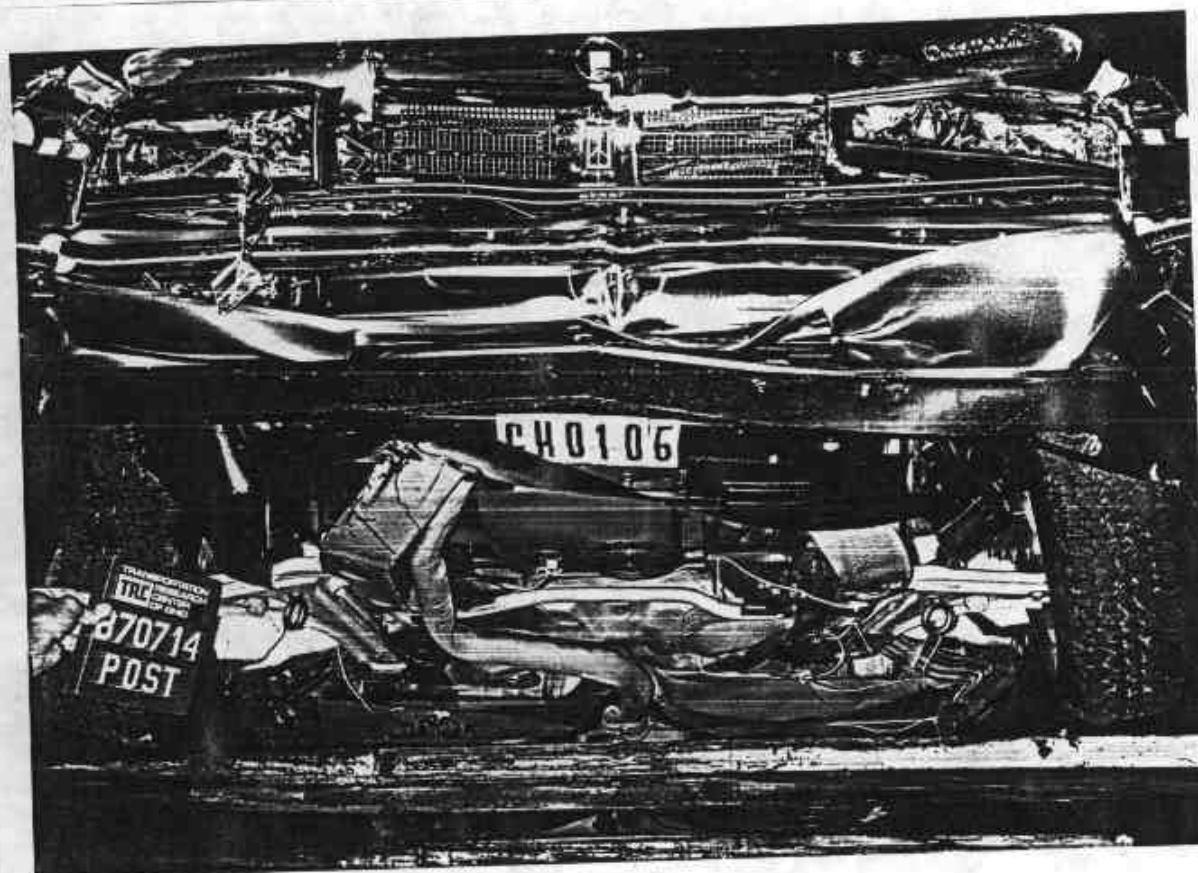


Figure 20. POST-TEST FRONT UNDERBODY VIEW
A-12

870714

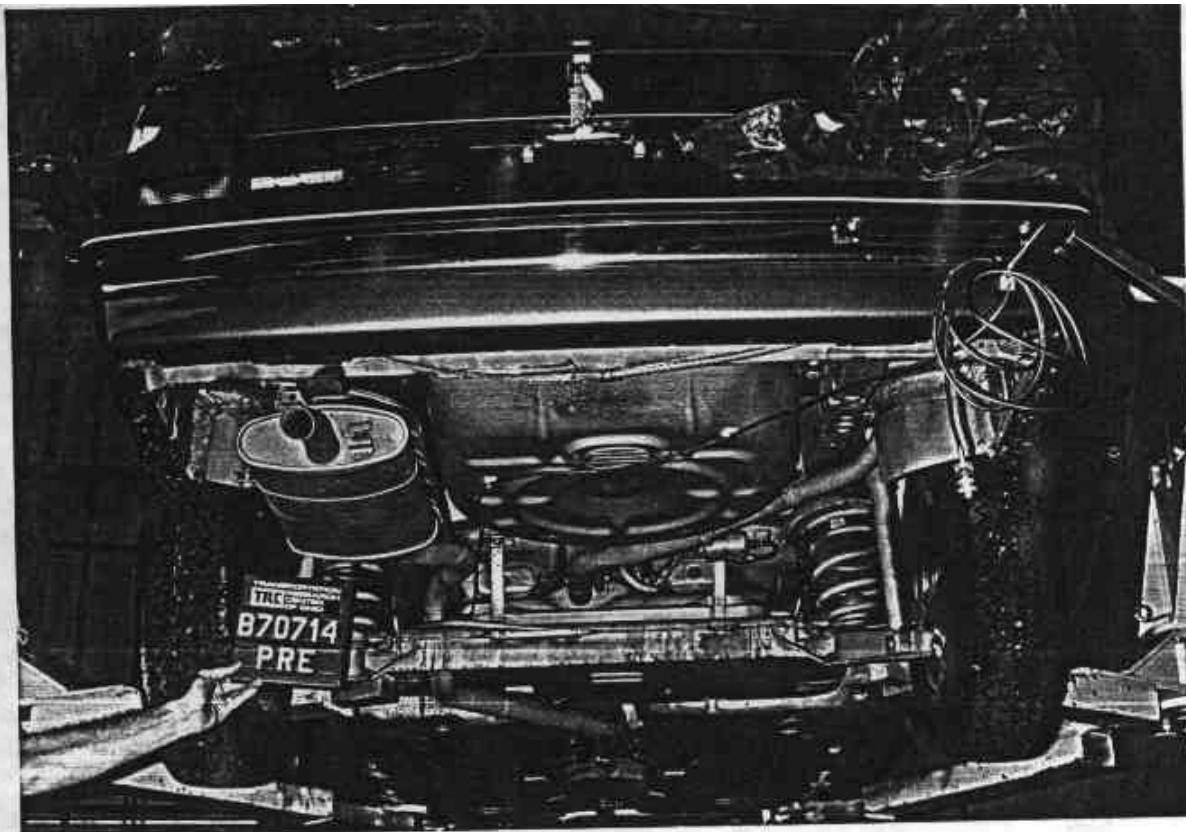


Figure 21. PRE-TEST REAR UNDERBODY VIEW

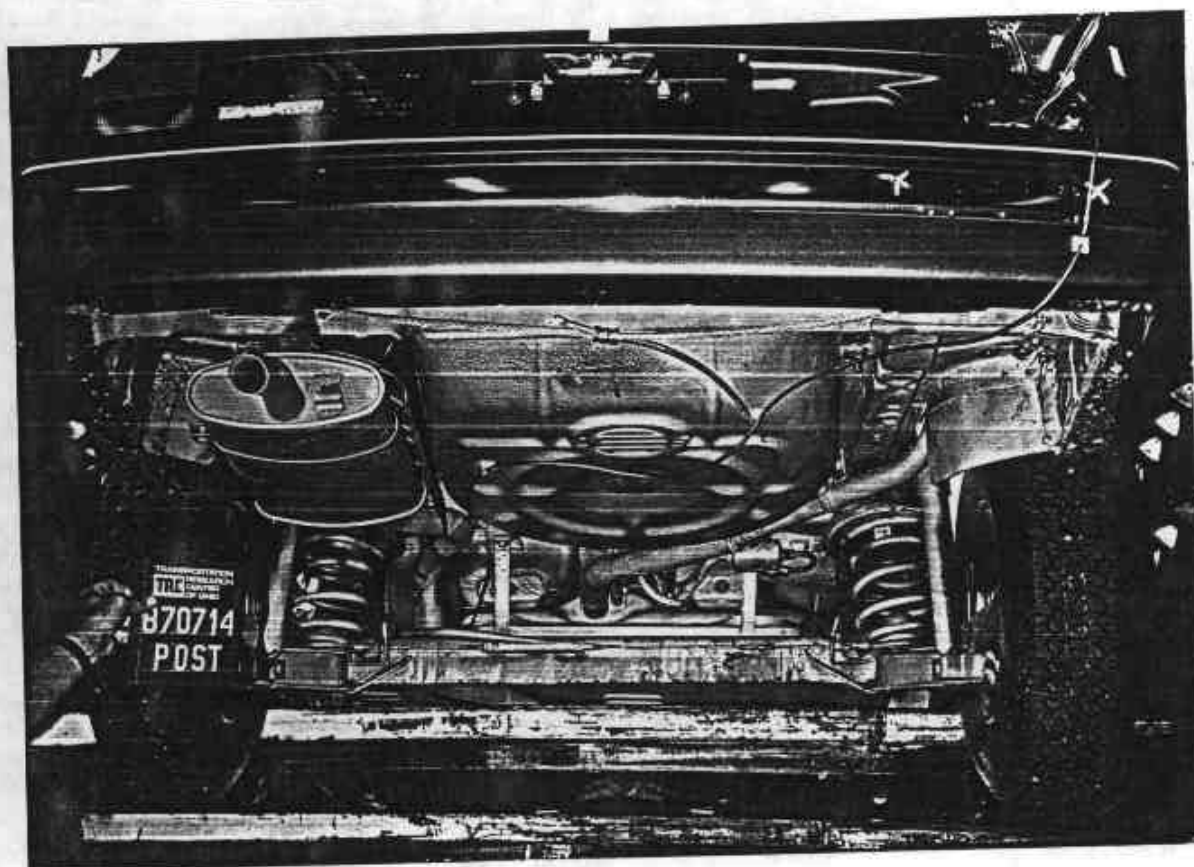


Figure 22. POST-TEST REAR UNDERBODY VIEW
A-13

870714

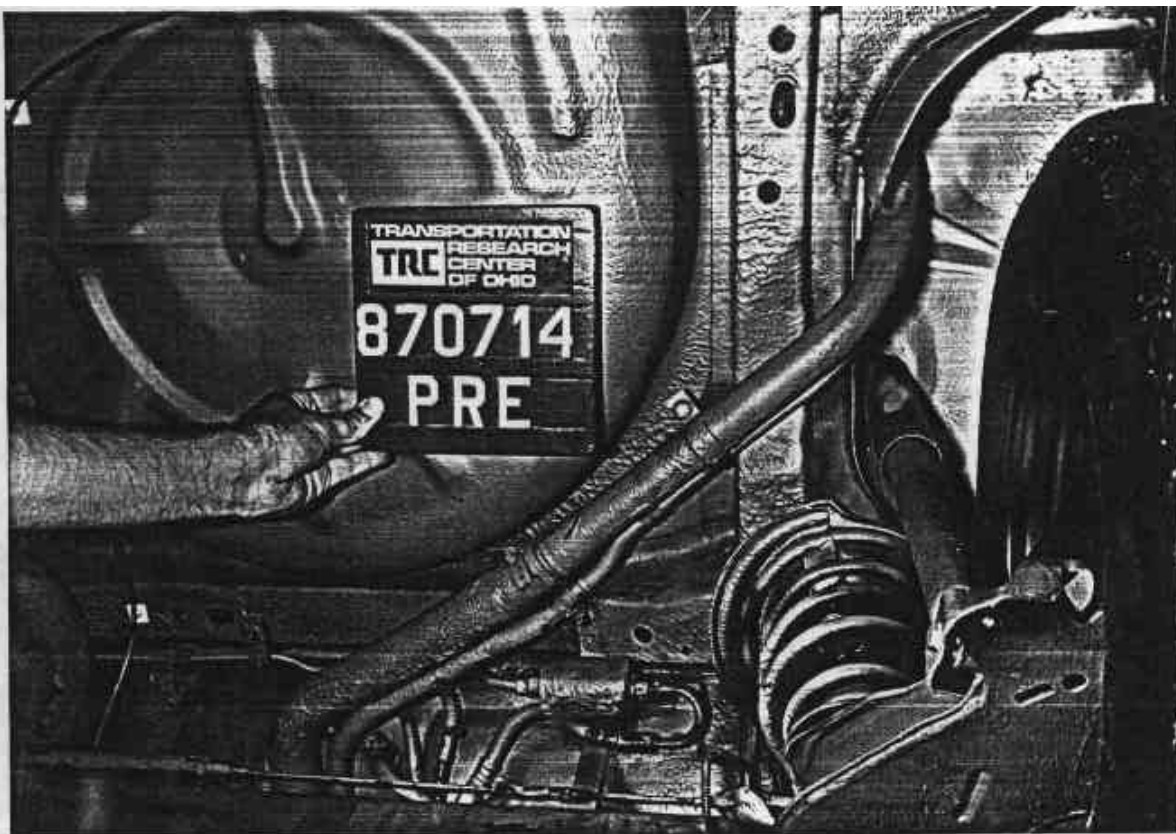


Figure 23. PRE-TEST FUEL LINES - VIEW 1

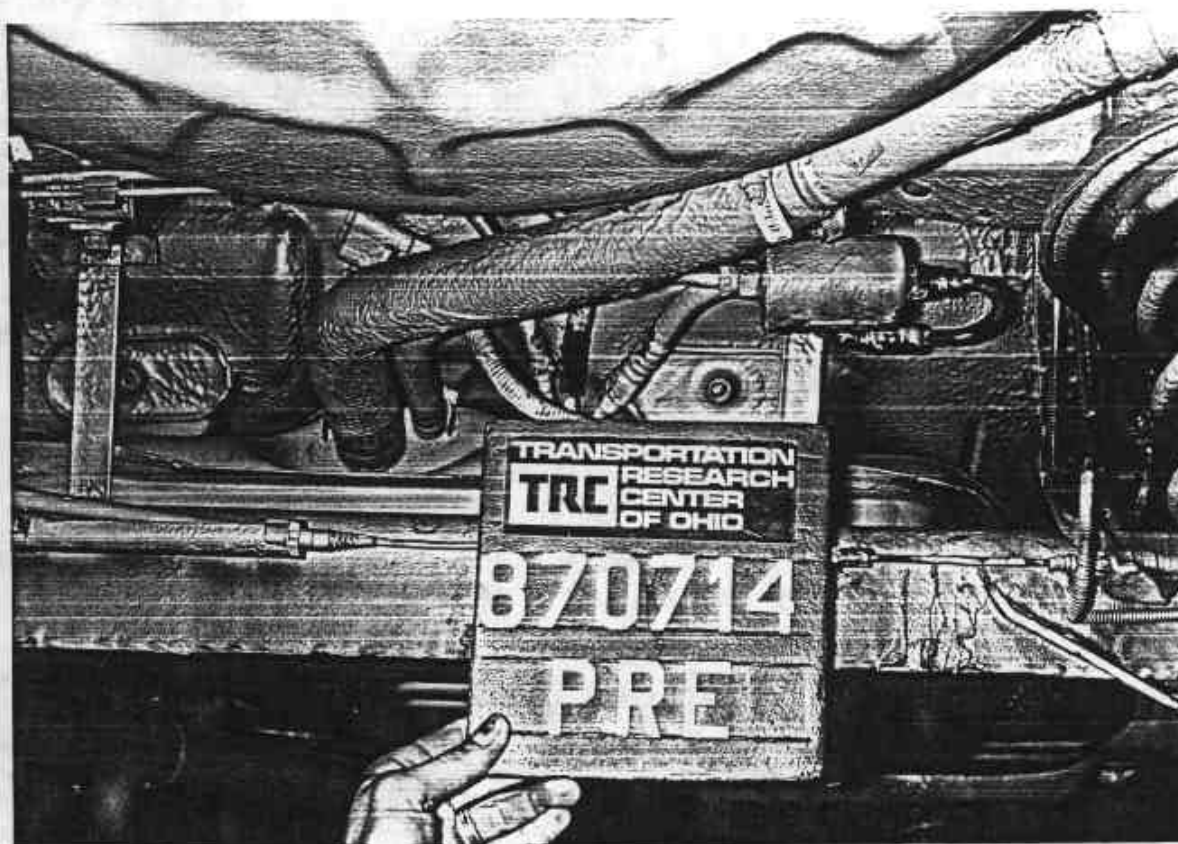


Figure 24. PRE-TEST FUEL LINES - VIEW 2



Figure 25. PRE-TEST DRIVER DUMMY POSITION VIEW



Figure 26. POST-TEST DRIVER DUMMY POSITION VIEW
A-15

870714

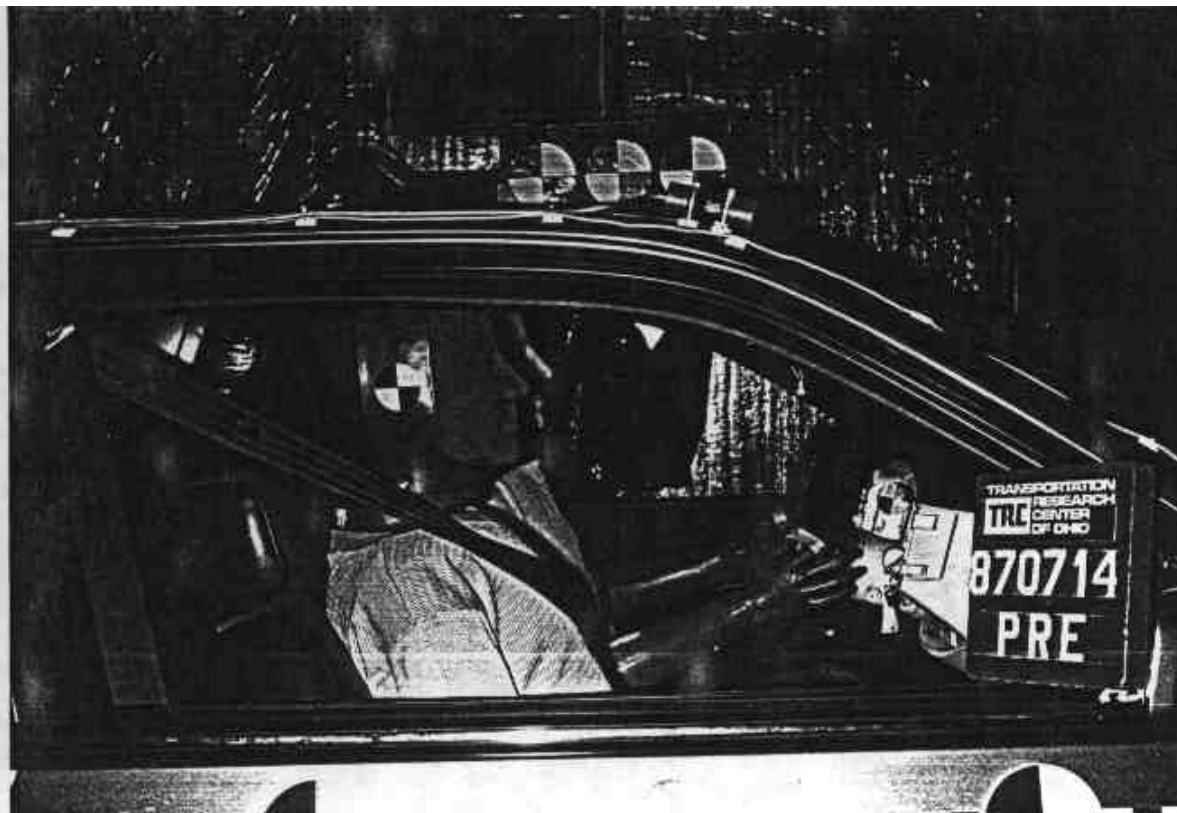


Figure 27. PRE-TEST PASSENGER DUMMY POSITION VIEW



Figure 28. POST-TEST PASSENGER DUMMY POSITION VIEW
A-16

870714



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

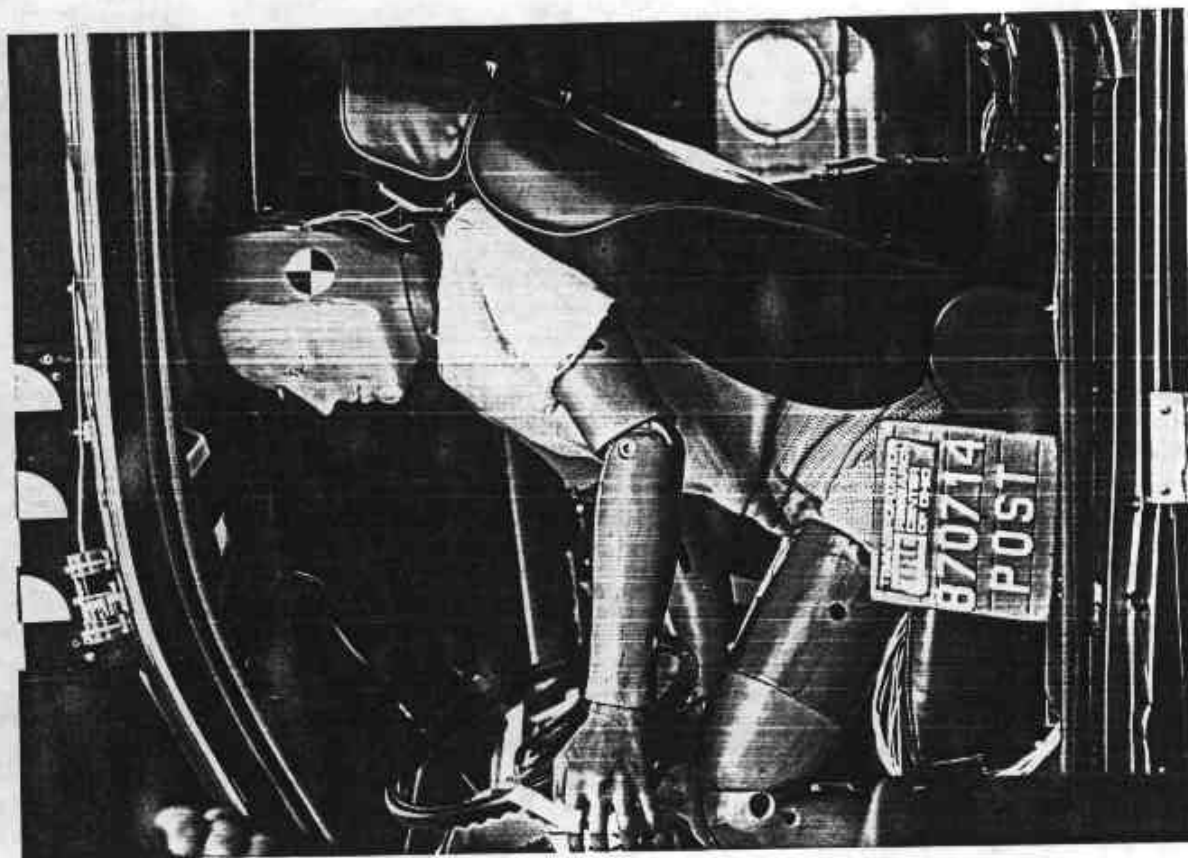


Figure 30. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 1

A-17

870714

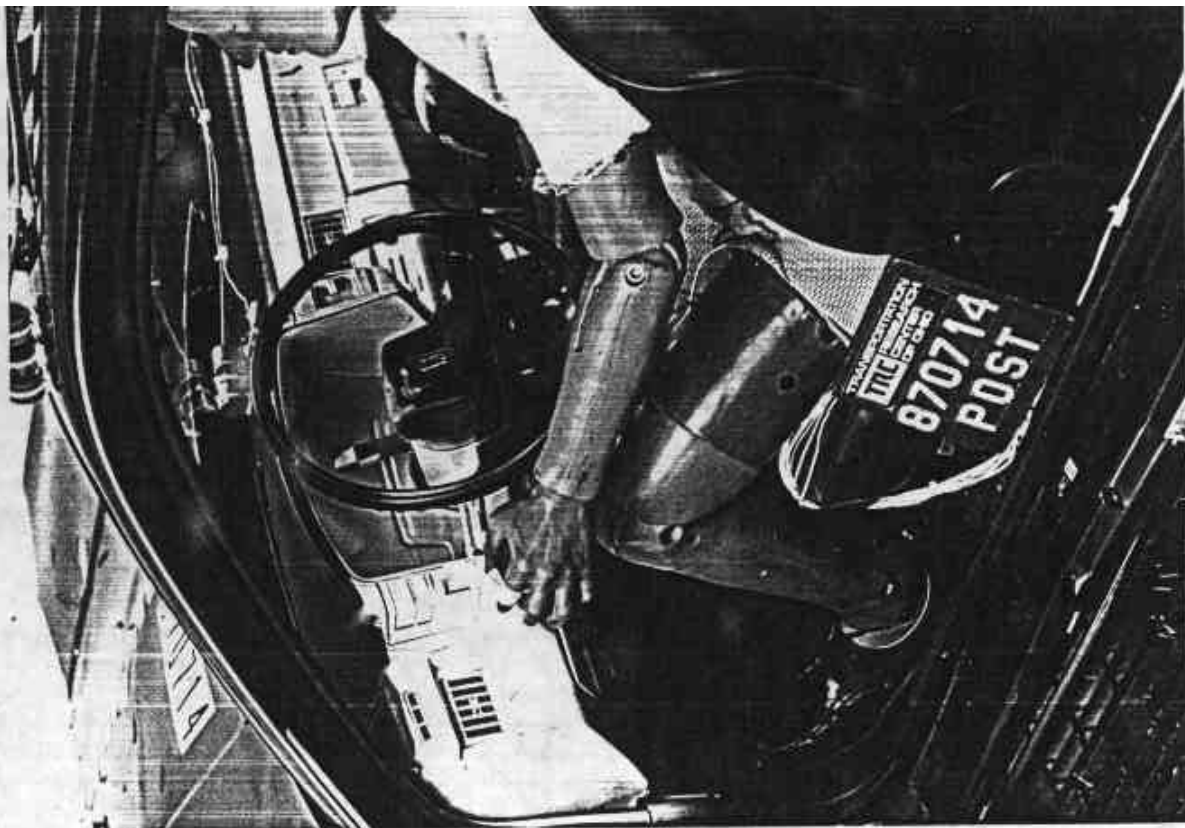


Figure 31. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW 2

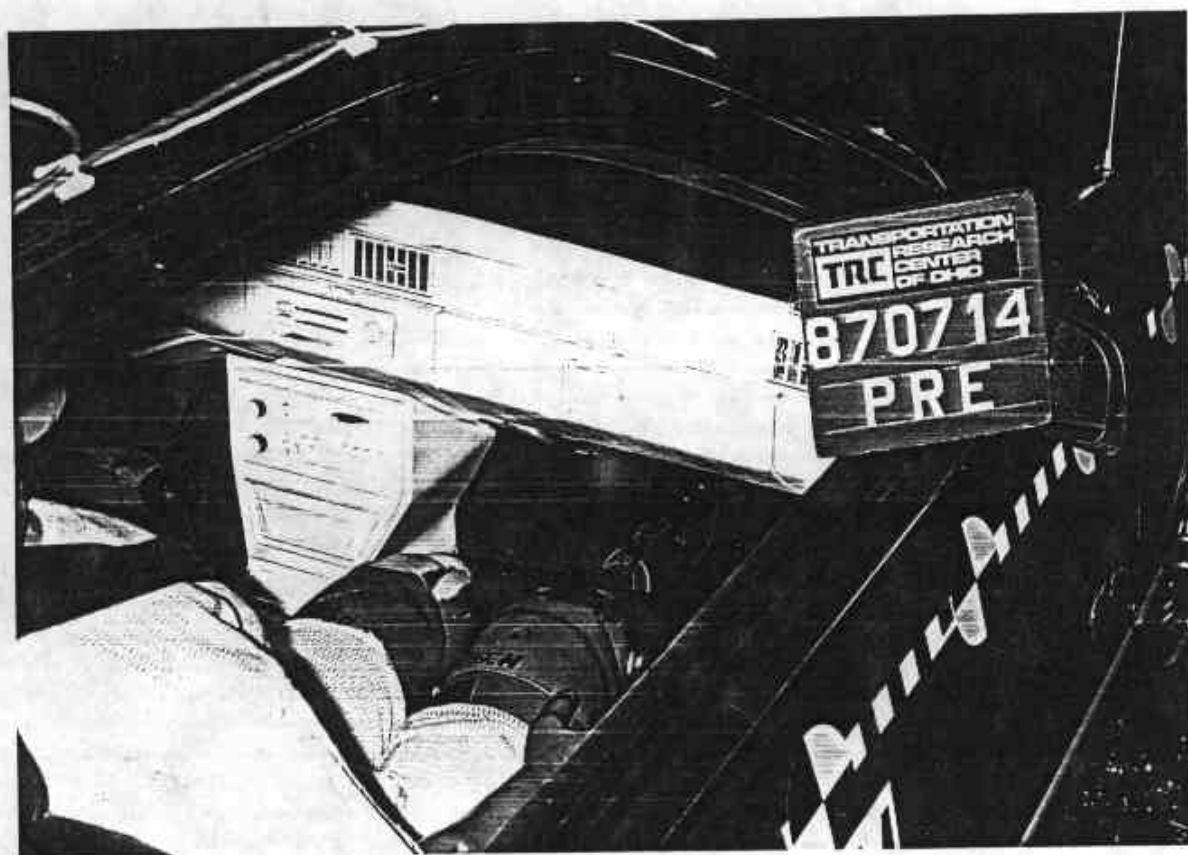


Figure 32. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW

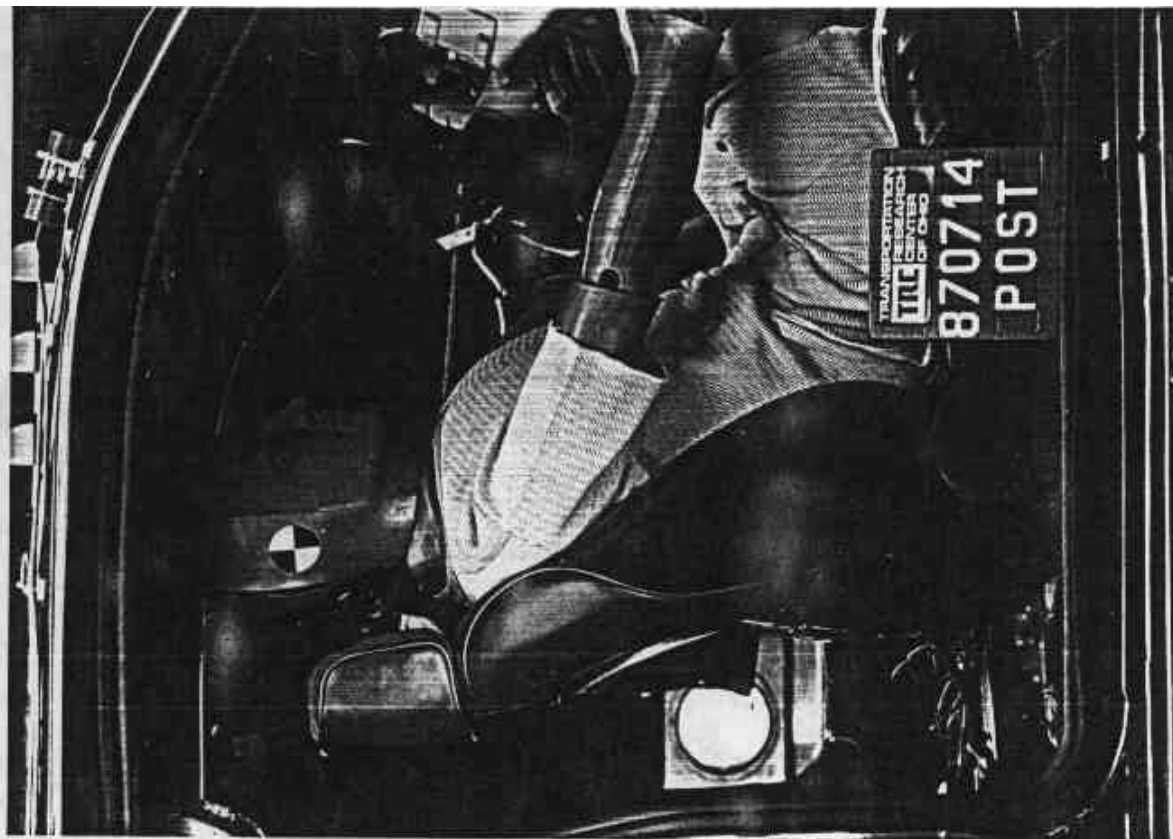


Figure 33. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW 1



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

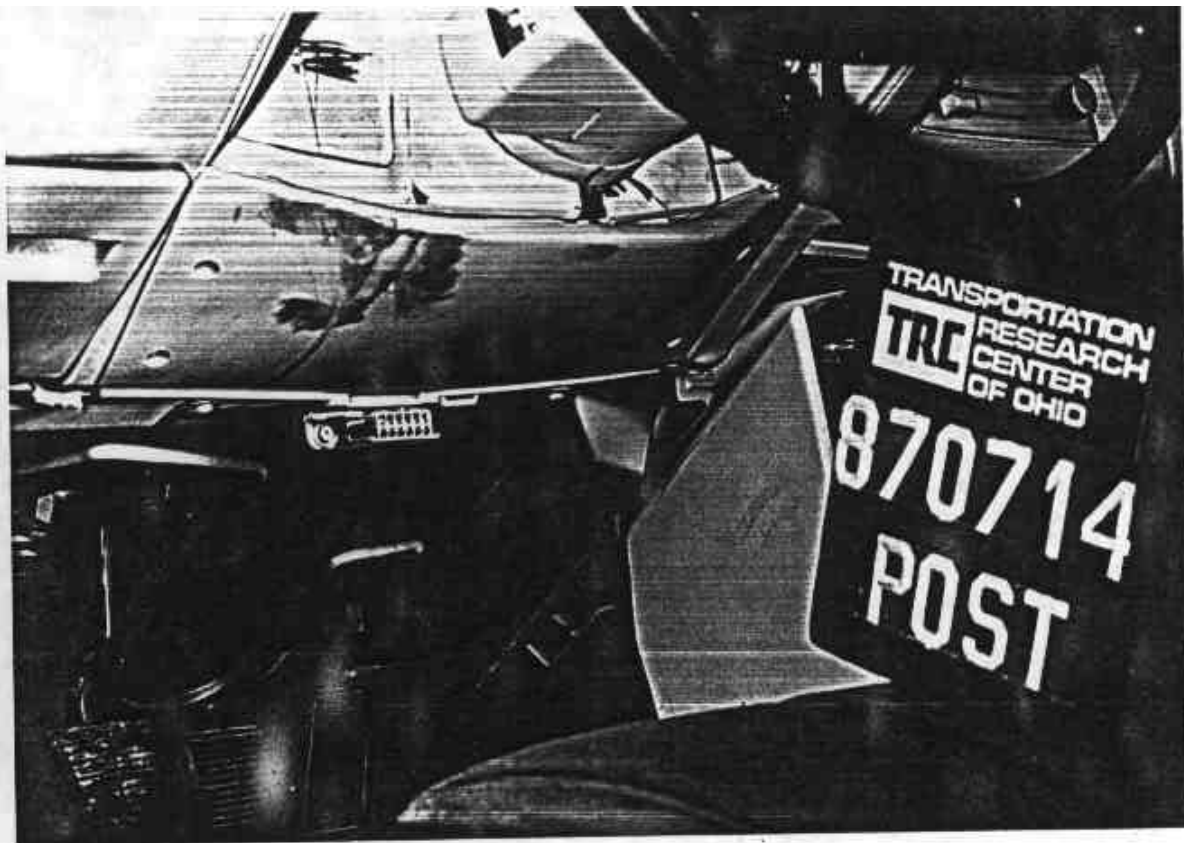


Figure 35. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 1

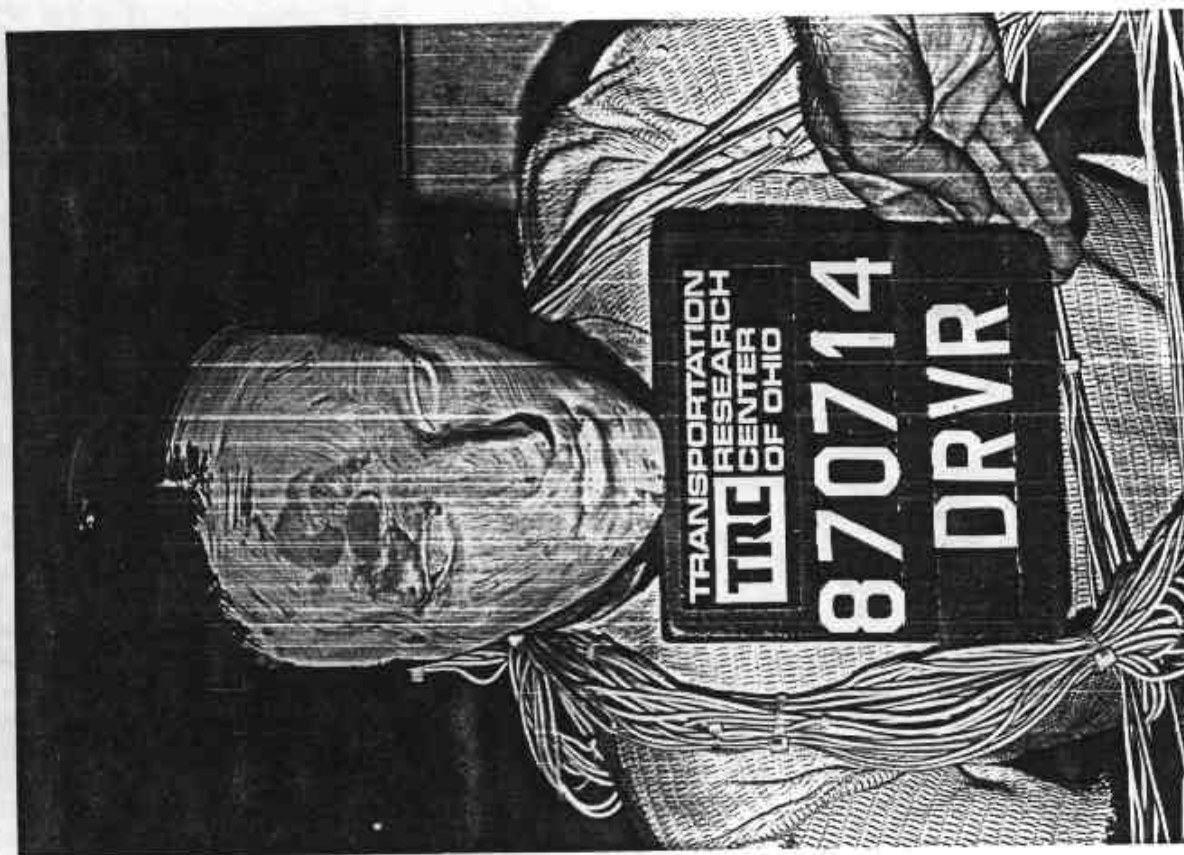


Figure 36. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 2

A-20

870714

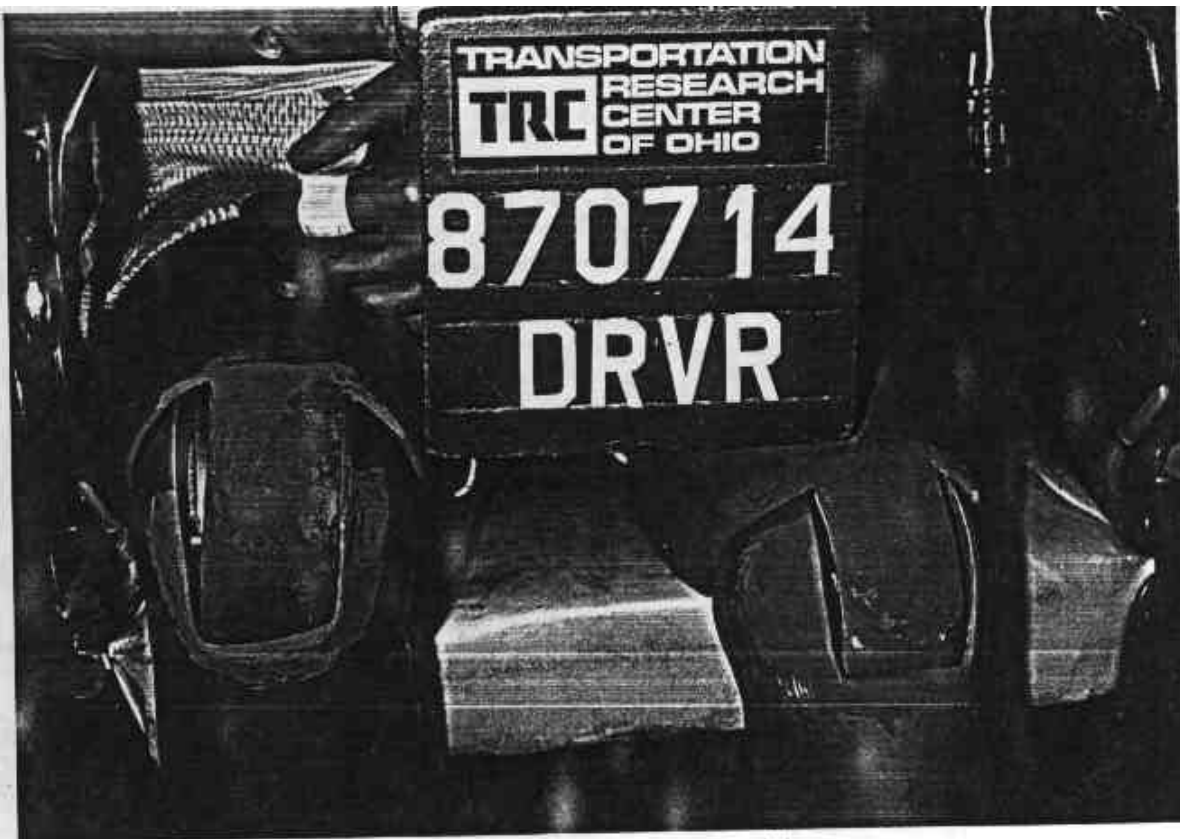


Figure 37. POST-TEST DRIVER DUMMY HEAD/KNEE CONTACT - VIEW 3

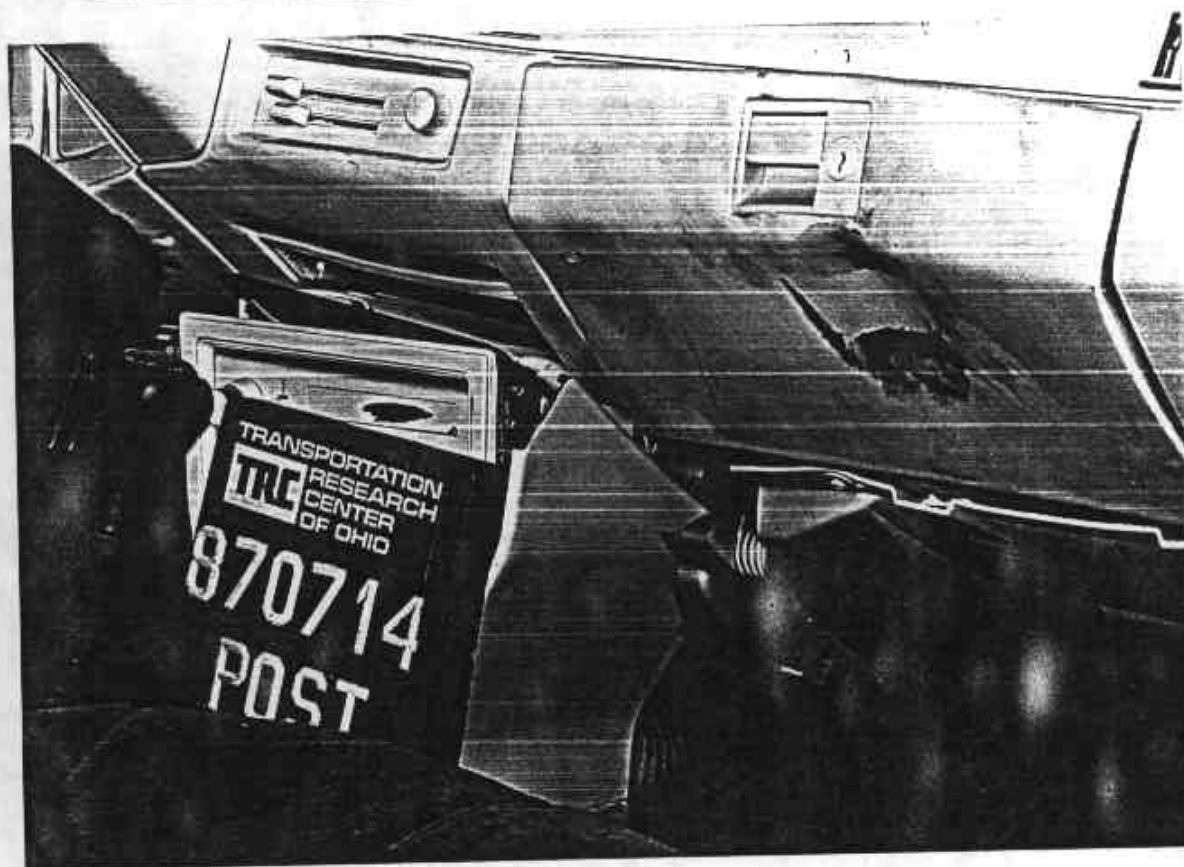


Figure 38. POST-TEST PASSENGER HEAD/KNEE CONTACT - VIEW 1

A-21

870714



Figure 39. POST-TEST PASSENGER HEAD/KNEE CONTACT - VIEW 2



Figure 40. PRE-TEST VEHICLE CERTIFICATION LABEL VIEW A-22

870714

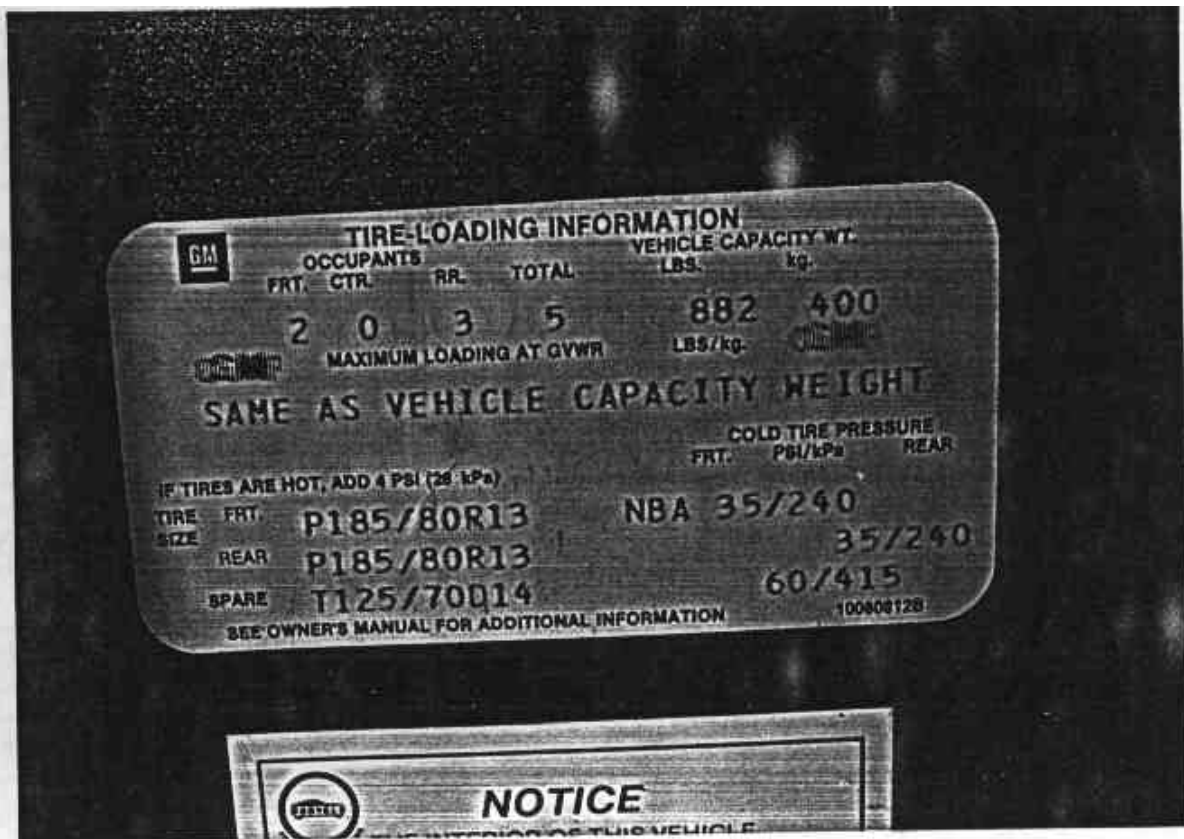


Figure 41. PRE-TEST VEHICLE TIRE LOAD LABEL VIEW

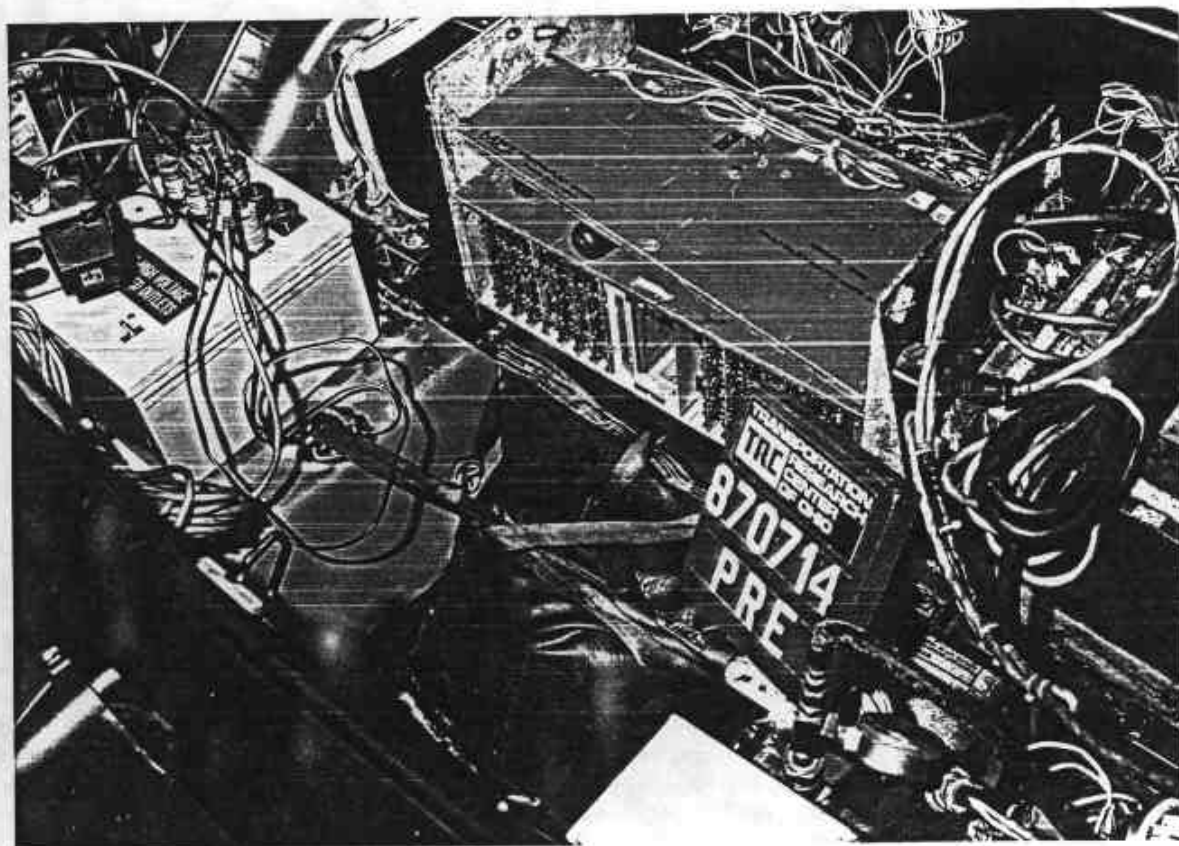


Figure 42. PRE-TEST VEHICLE BALLAST VIEW

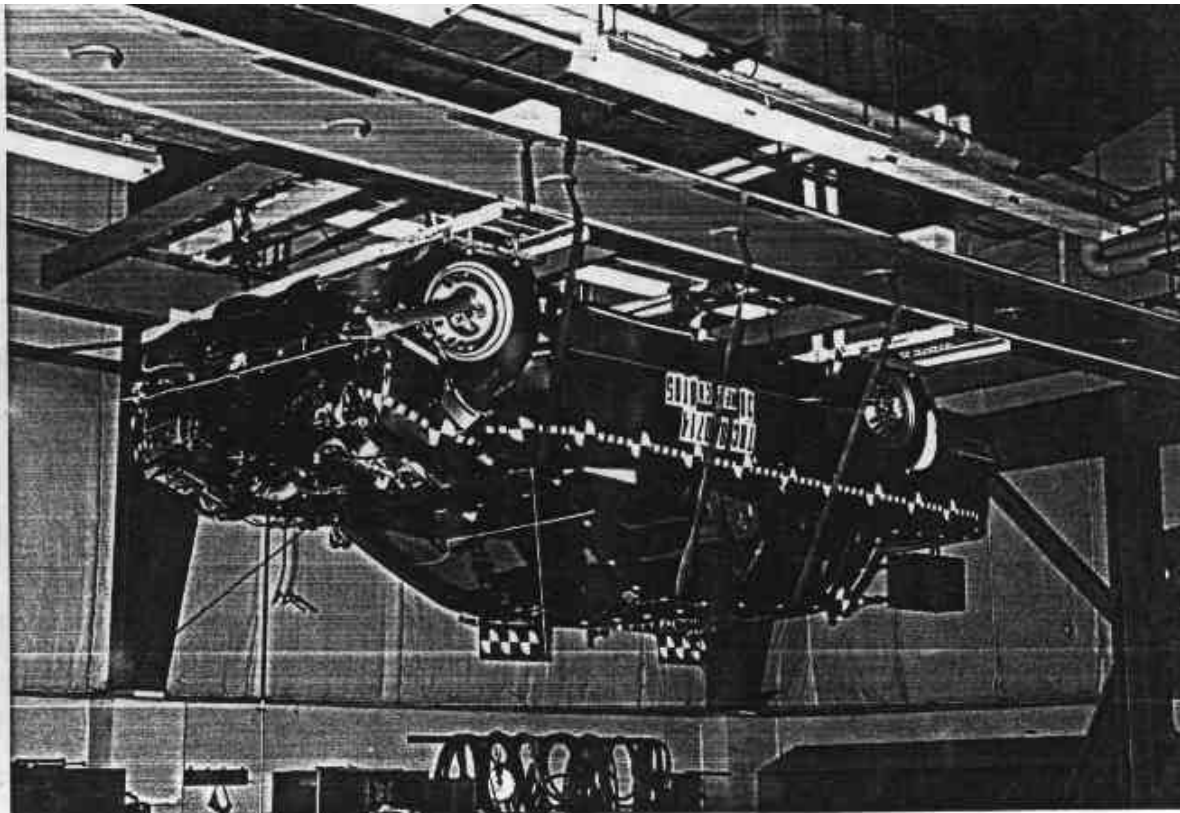


Figure 43. POST-TEST VEHICLE ON STATIC ROLLOVER MACHINE VIEW

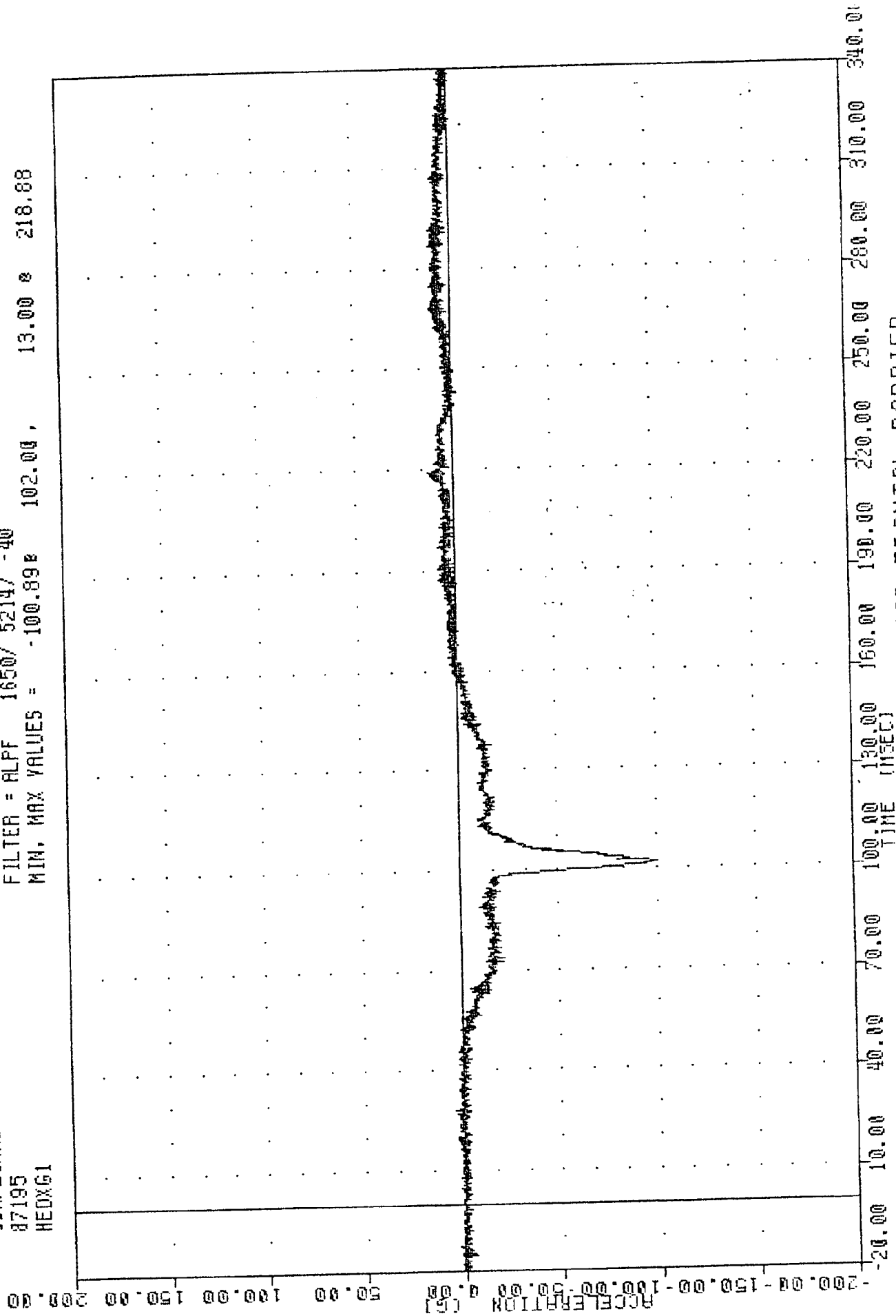
APPENDIX B

DATA PLOTS

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

TRC
COMPLIANCE TEST PROGRAM
87195
HEDXG1

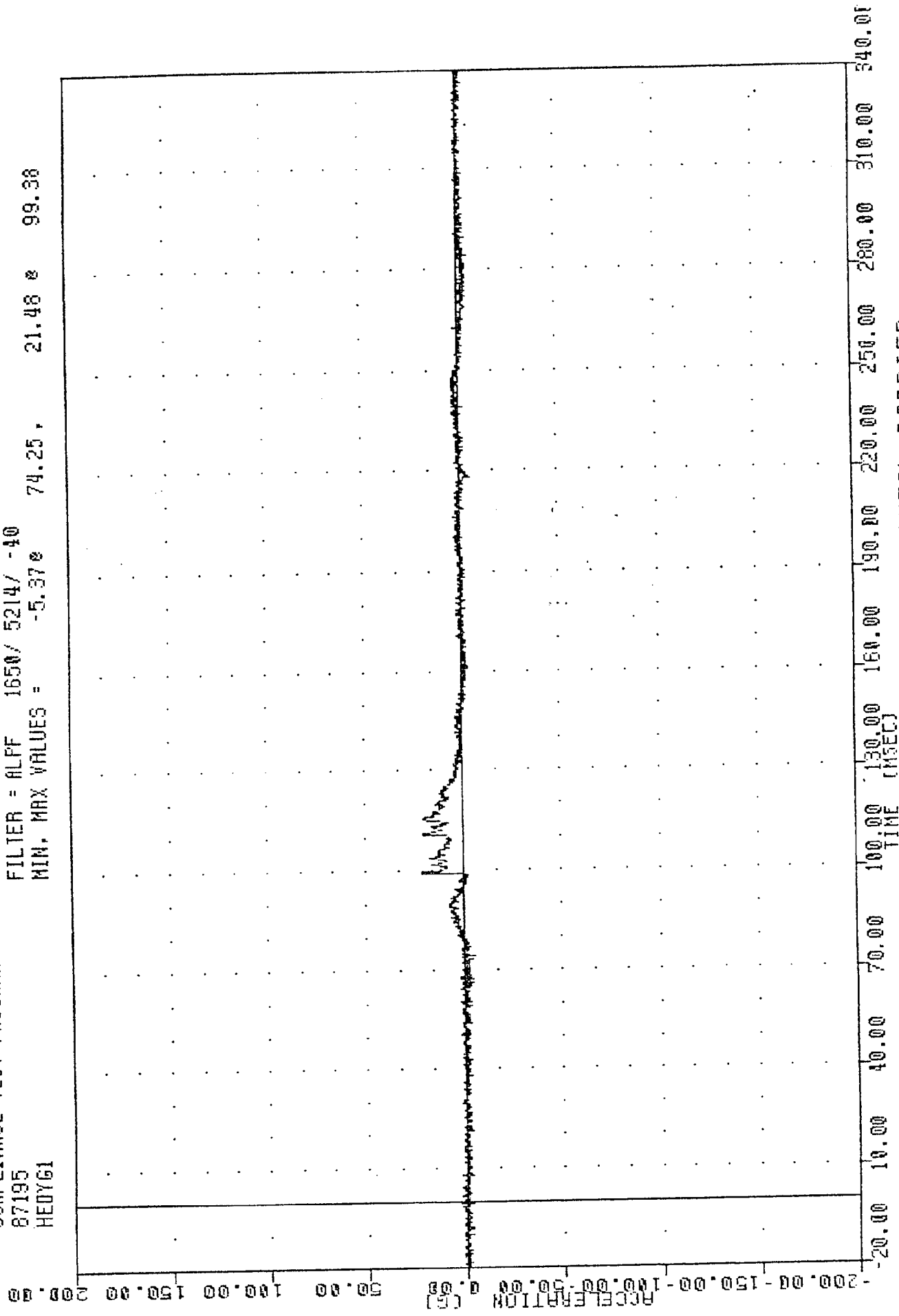
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -100.898 102.00, 13.00 & 218.88



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER HEAD X AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
HEDY61

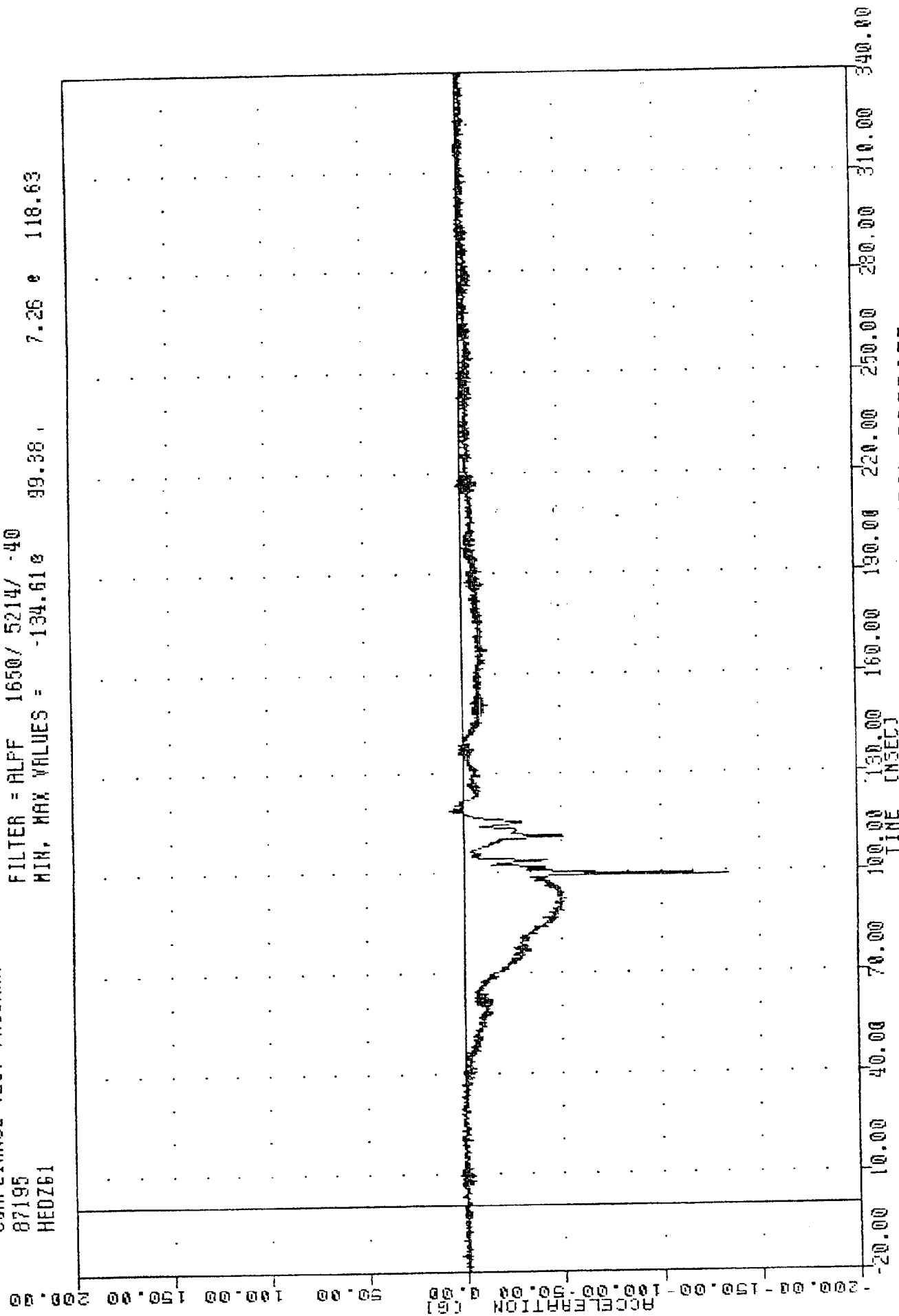
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -5.370 74.25 21.48 99.38



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER HEAD Y AXIS ACCELERATION

TAC
COMPLIANCE TEST PROGRAM
87195
HEDZ61

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -134.61 99.38 7.26 118.63

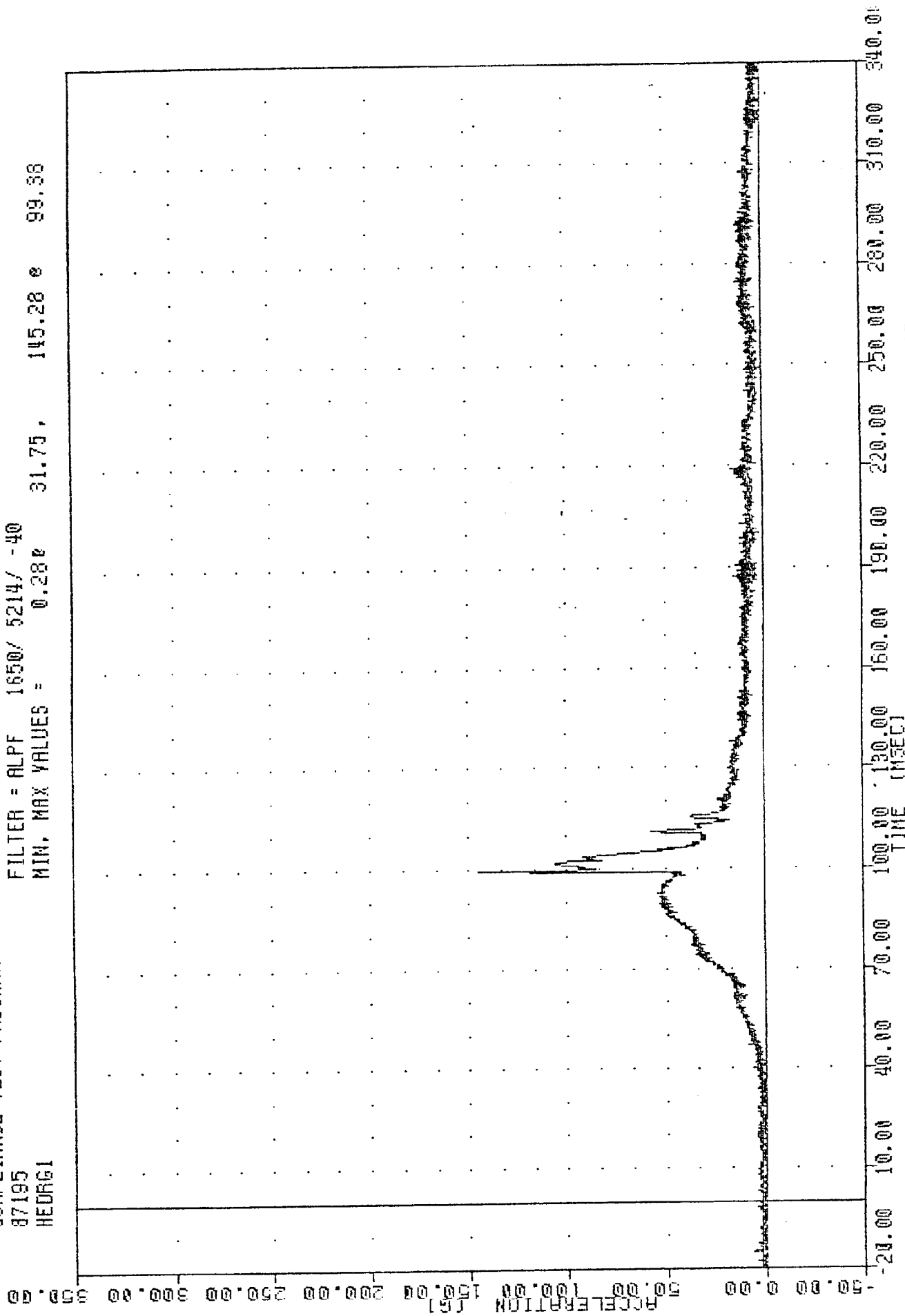


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER HEAD Z AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
HEDRG1

, 870714

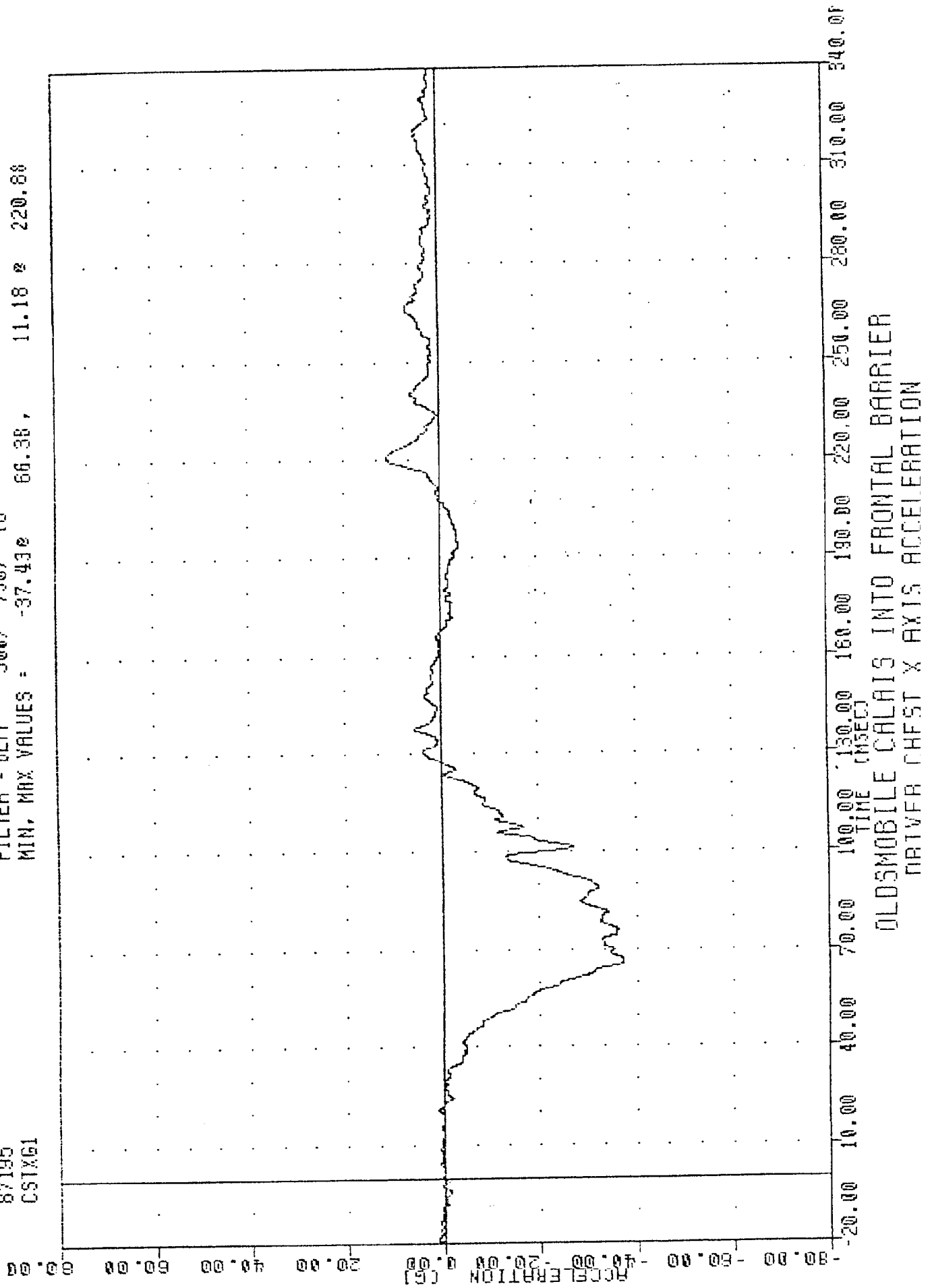
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.28 31.75, 145.28 99.38



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

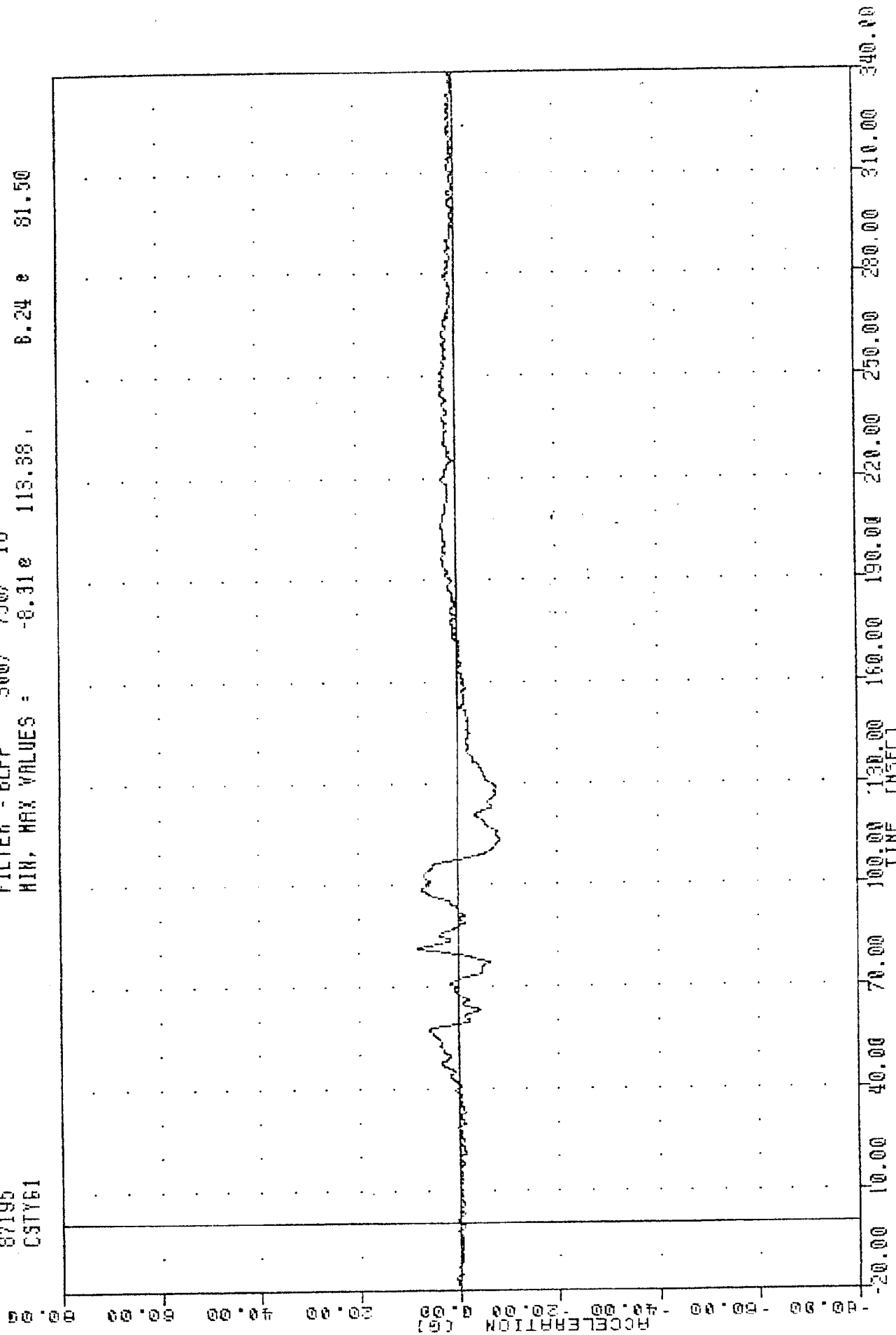
TRC
COMPLIANCE TEST PROGRAM
87195
CSIX61

FILTER = 6LPP 300/ 750/ -16
MIN. MAX VALUES = -37.43e 66.38, 11.18 2 220.88



TBC
COMPLIANCE TEST PROGRAM
87195
CSTYB1

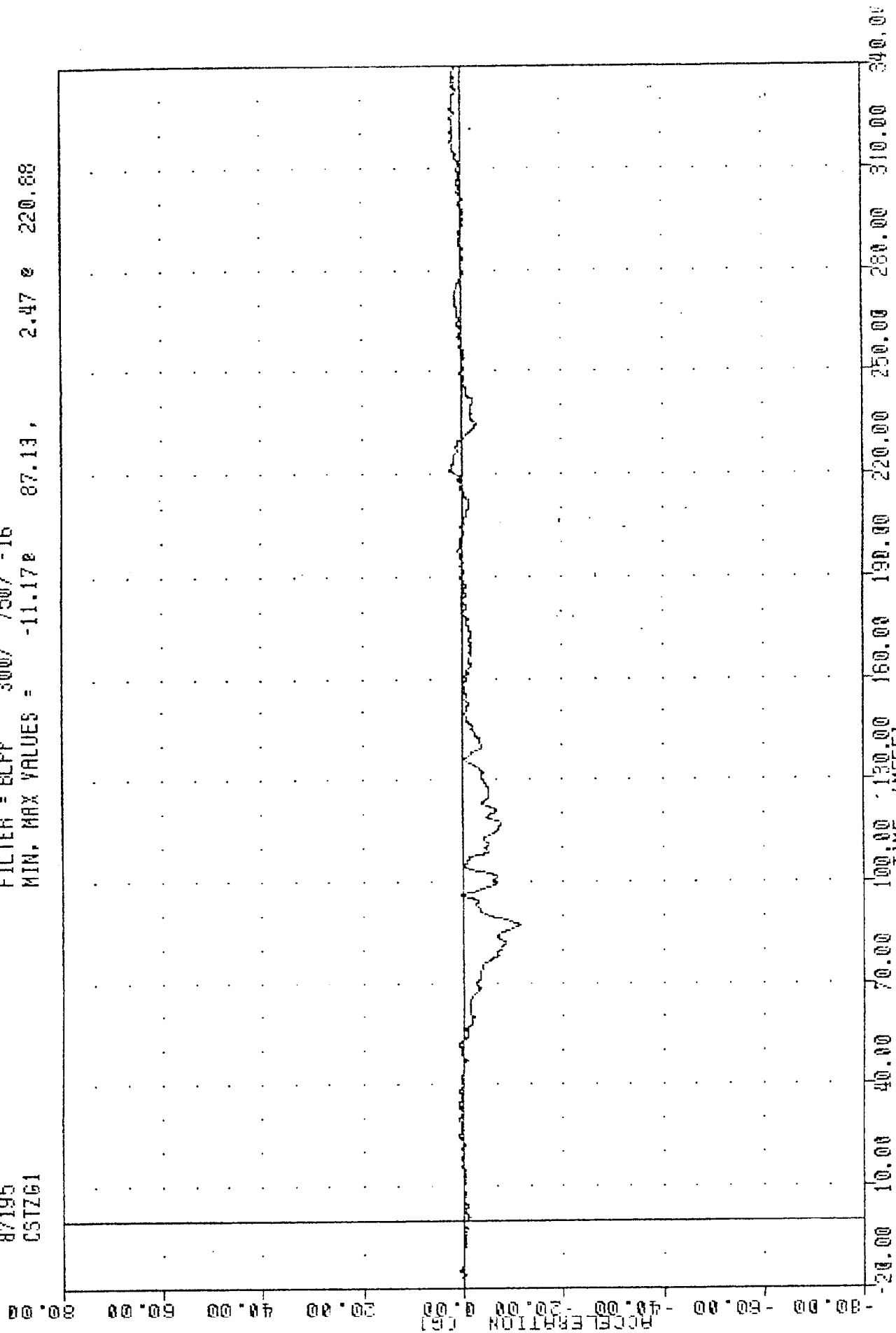
FILTER = 8LPP 300/ 750/ -16
MIN, MAX VALUES = -8.31e 113.38, 8.24 e 81.50



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER CHEST Y AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
CSTZG1

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -11.17e 87.13, 2.47 e 220.68

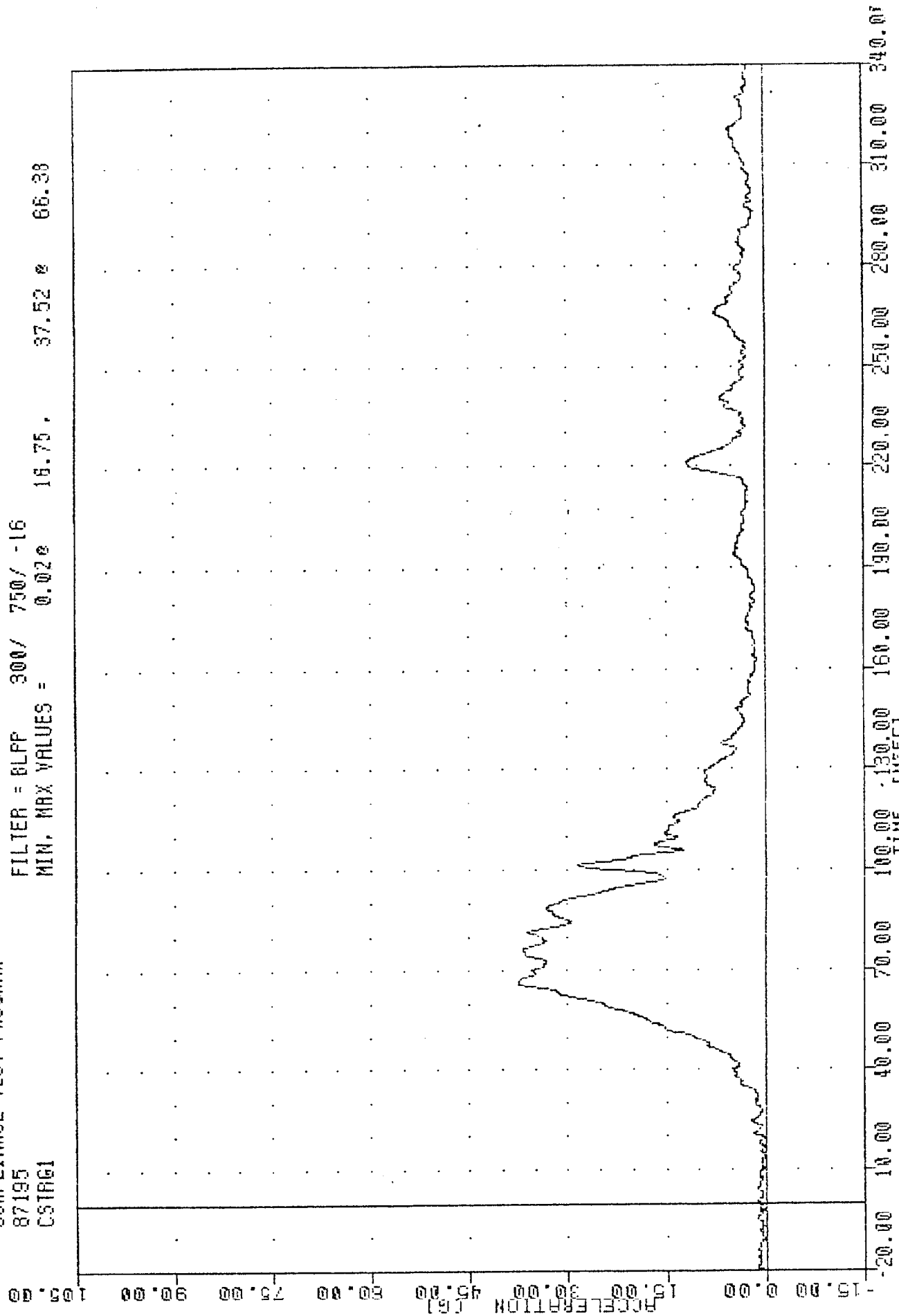


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER CHEST Z AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
CSTRG1

, 870714

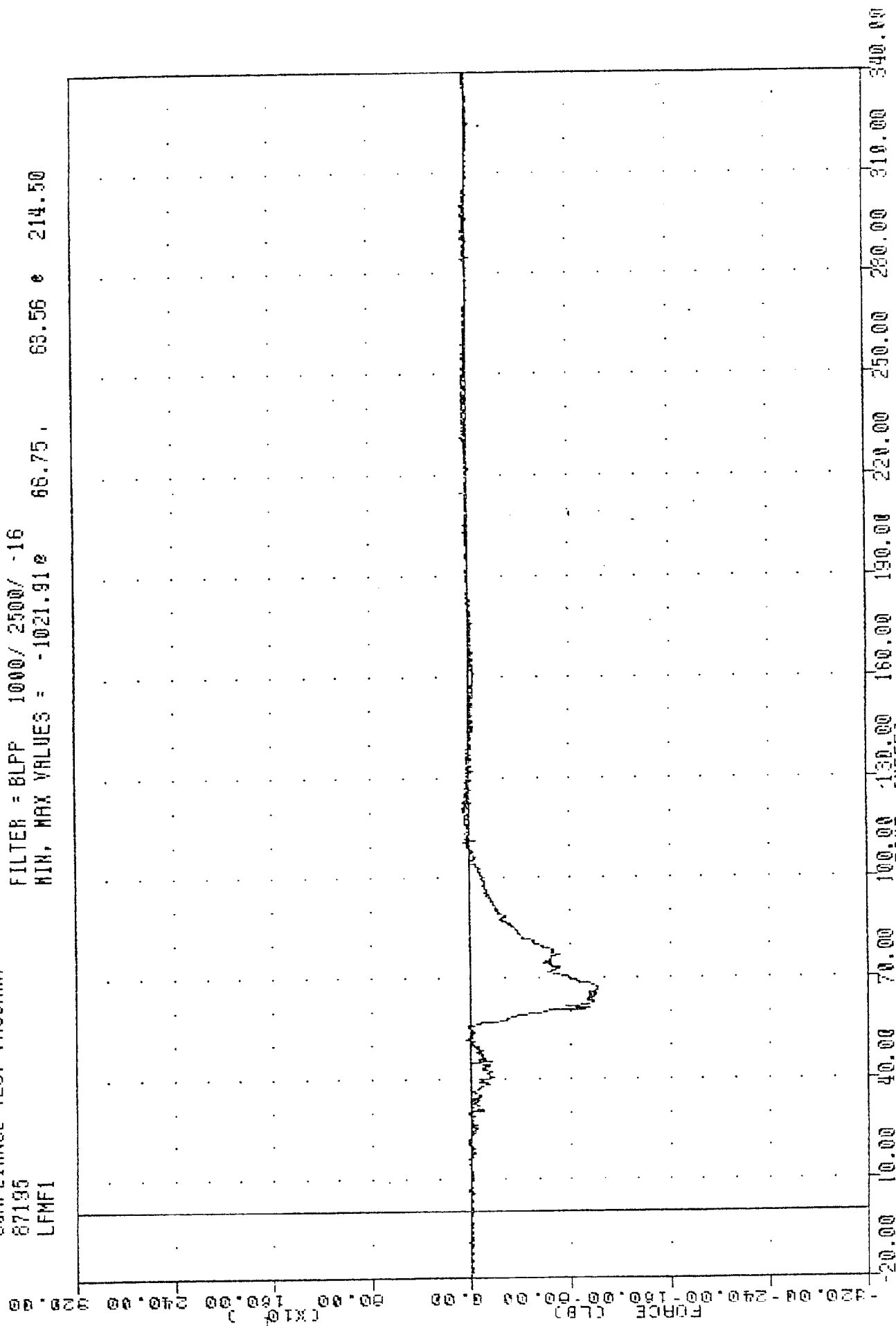
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = 0.020 16.75, 37.52 66.38



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

TAC
COMPLIANCE TEST PROGRAM
87195
LFMF1

FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = -1021.912 68.75 63.56 214.50

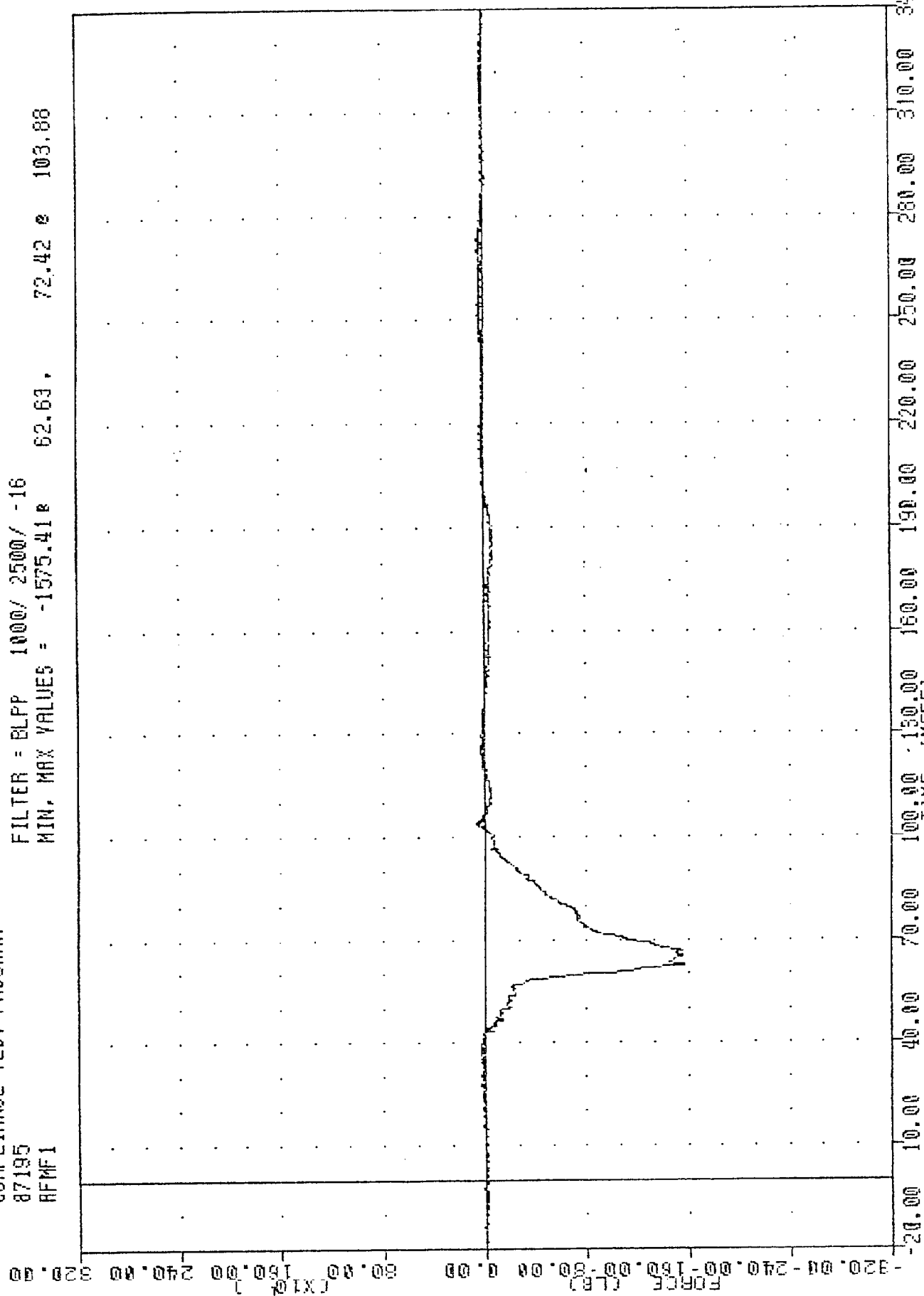


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE

TRC
COMPLIANCE TEST PROGRAM
87195
RFMF1

, 870714

FILTER = BLPP 1000/ 2500/ -16
MIN, MAX VALUES = -1575.418 62.63, 72.42 2 103.88

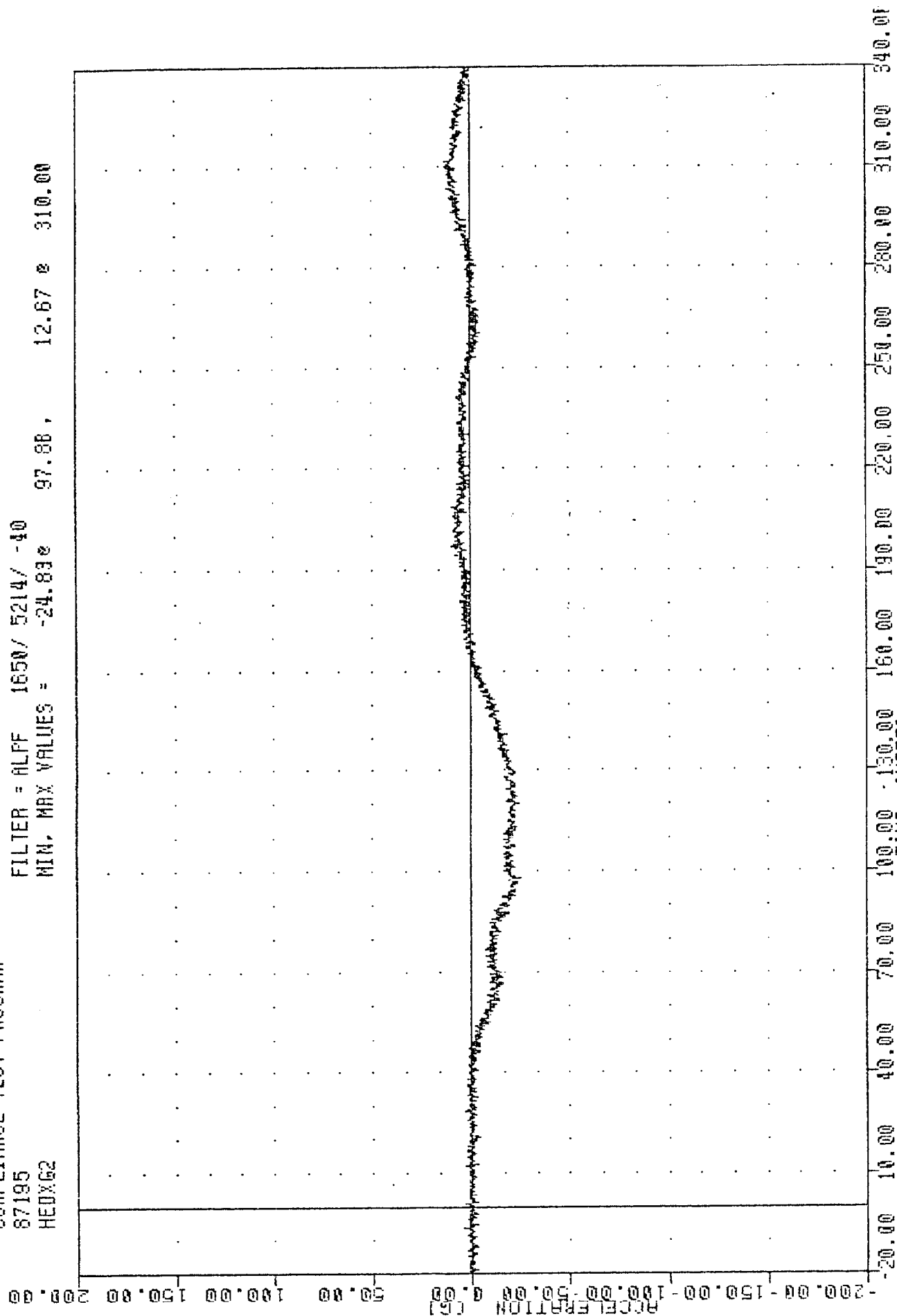


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

TRC
 COMPLIANCE TEST PROGRAM
 87195
 HEDX62

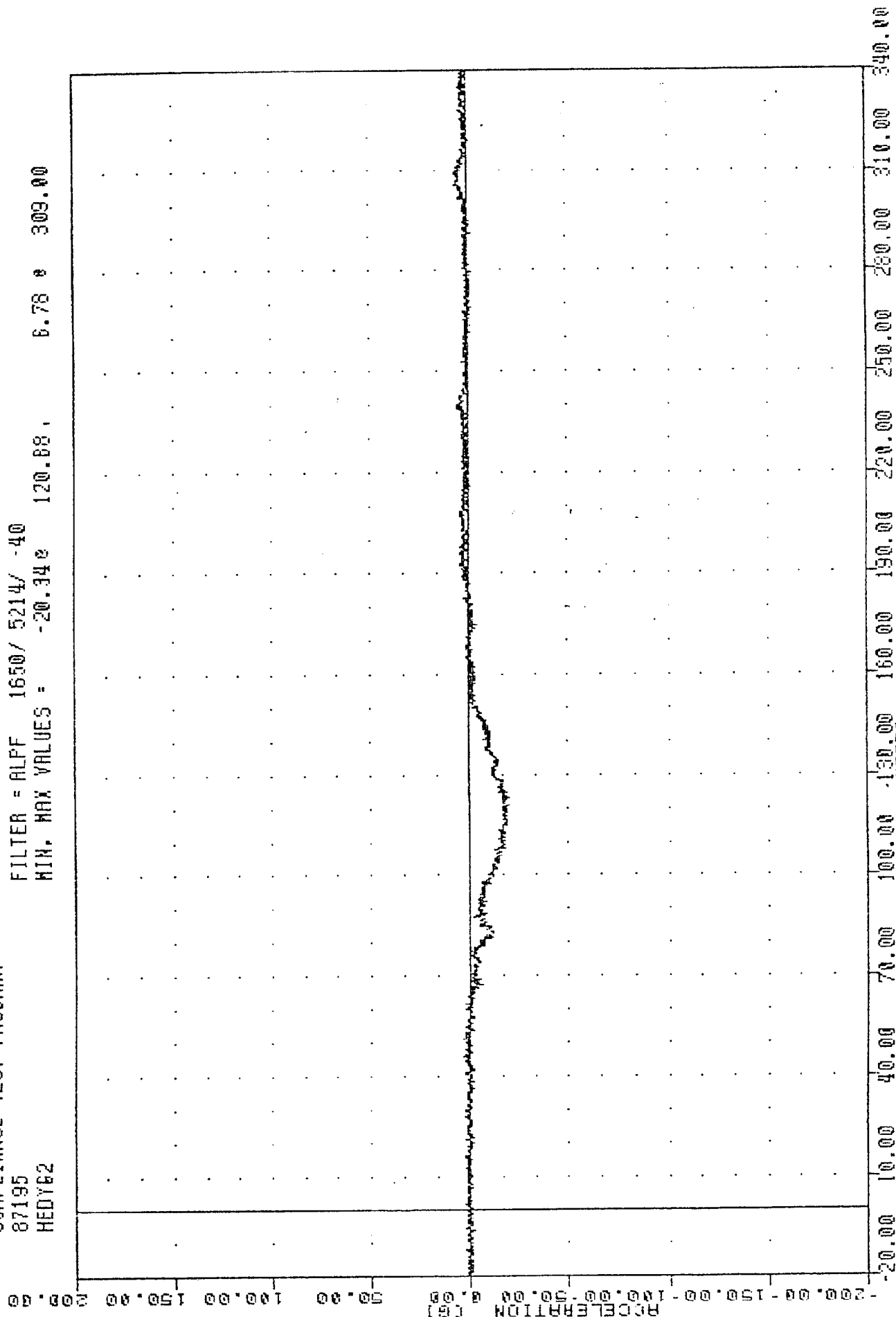
, 870714

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -24.83e 97.88, 12.67 e 310.00



TAC
 COMPLIANCE TEST PROGRAM
 87195
 HEDY62

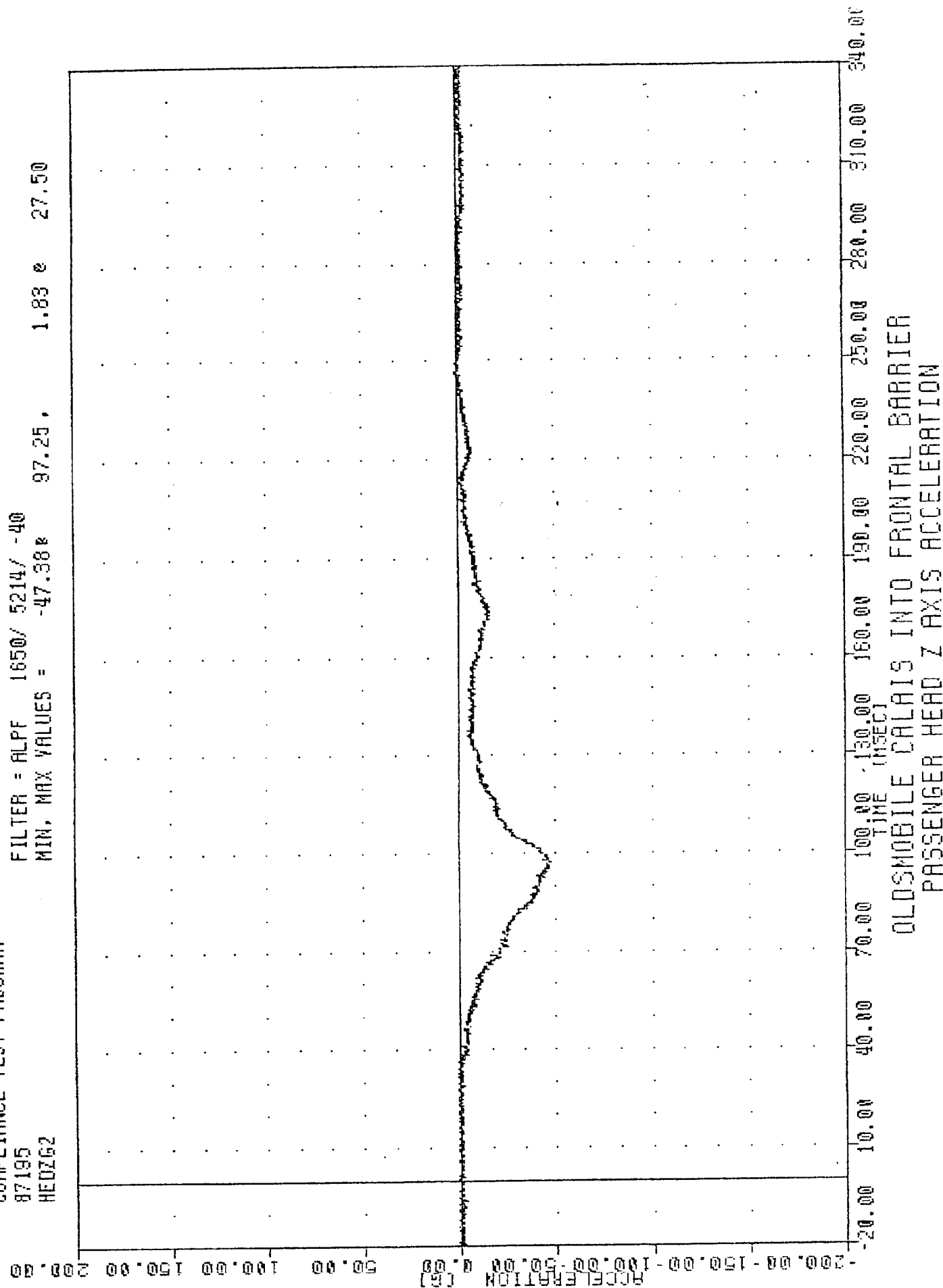
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -20.342 120.88 6.78 309.00



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
 PASSENGER HEAD Y AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
HEDZ62

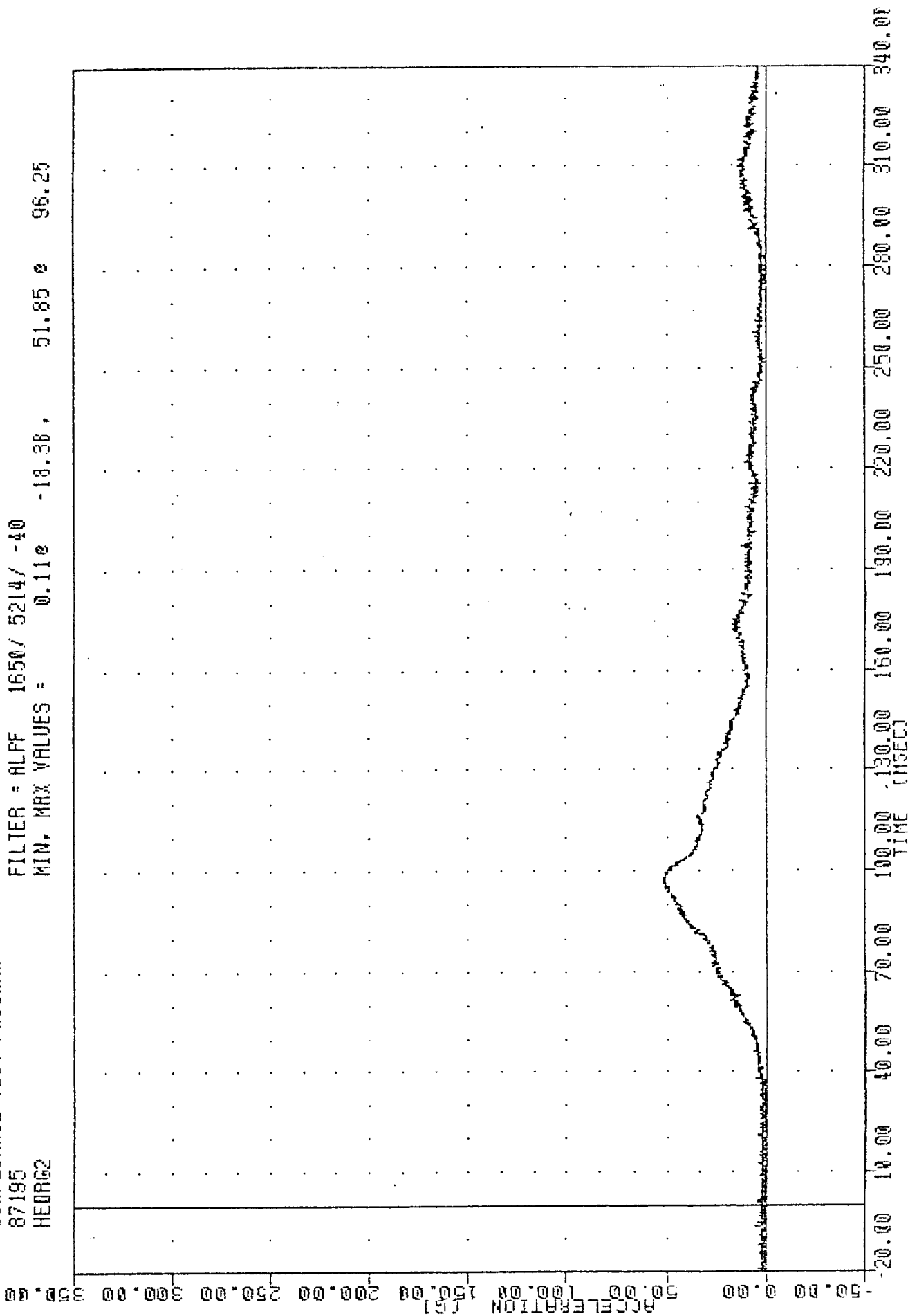
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -47.38 97.25, 1.83 e 27.50



TRC
COMPLIANCE TEST PROGRAM
87195
HEORG2

, 870714

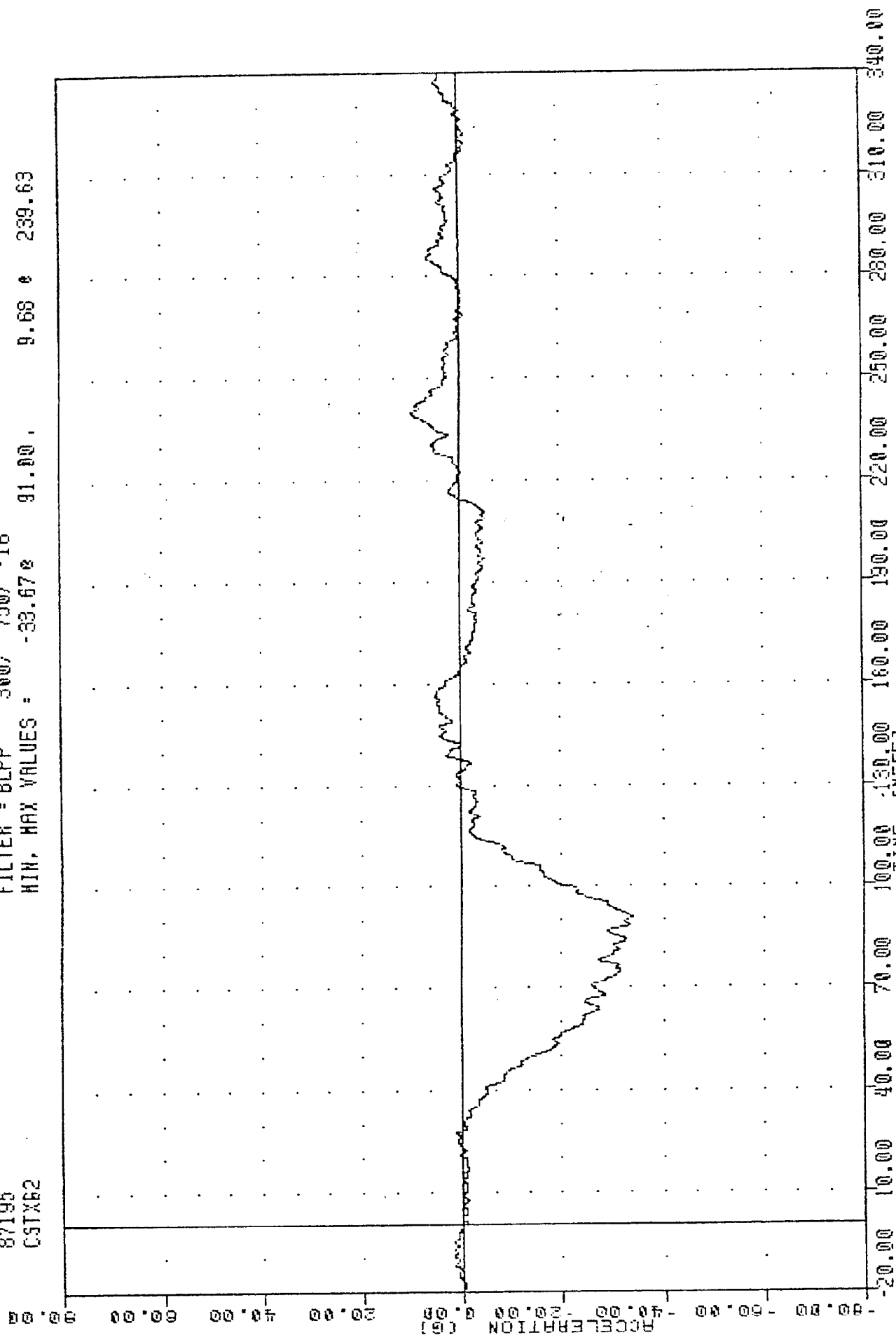
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.11e -18.38, 51.85 e 96.25



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
PASSENGER HEAD RESULTANT ACCELERATION

TBC
 COMPLIANCE TEST PROGRAM
 87195
 CSTX62

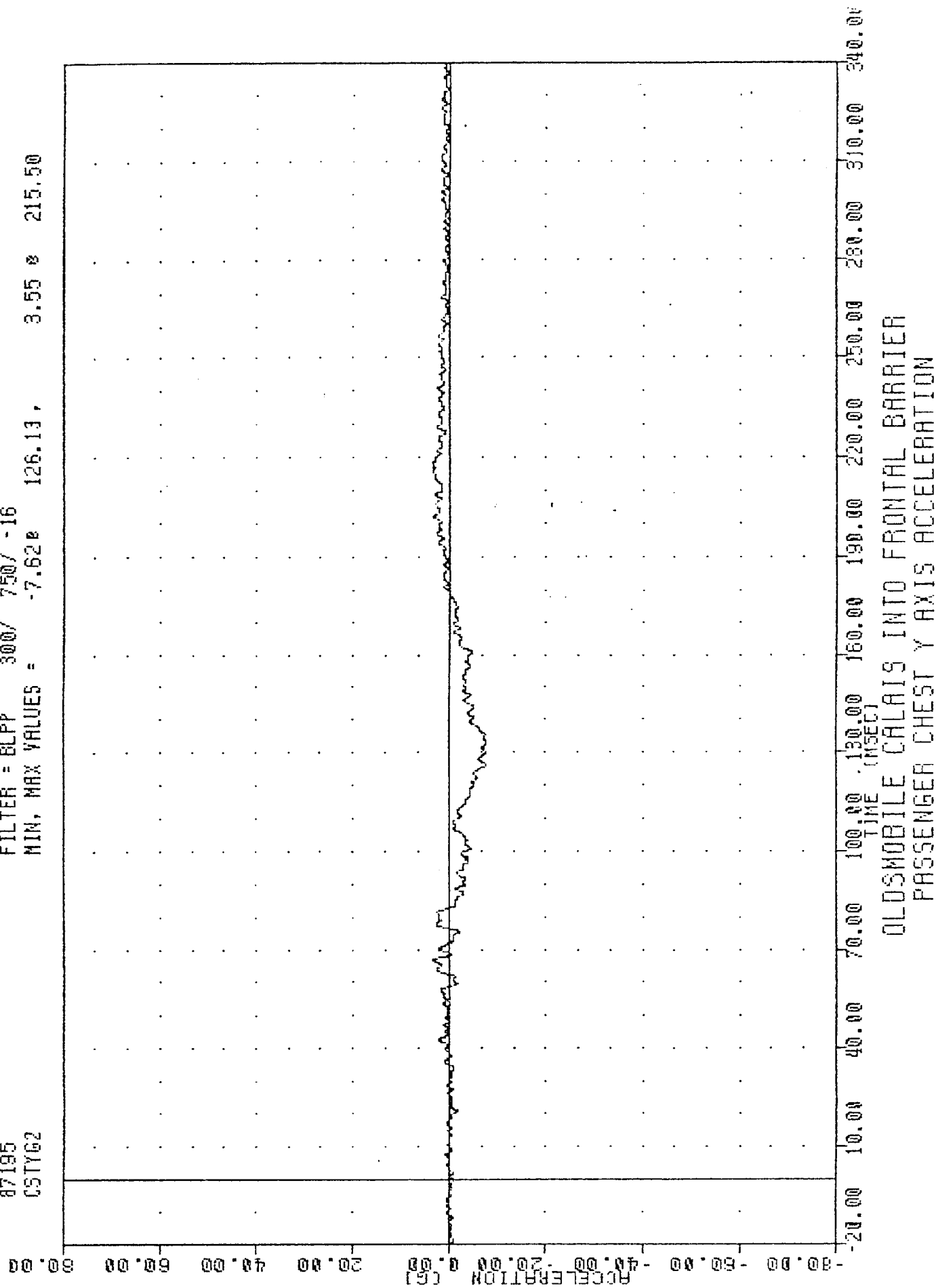
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -33.672 91.00 9.68 239.63



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
 PASSENGER CHEST X AXIS ACCELERATION

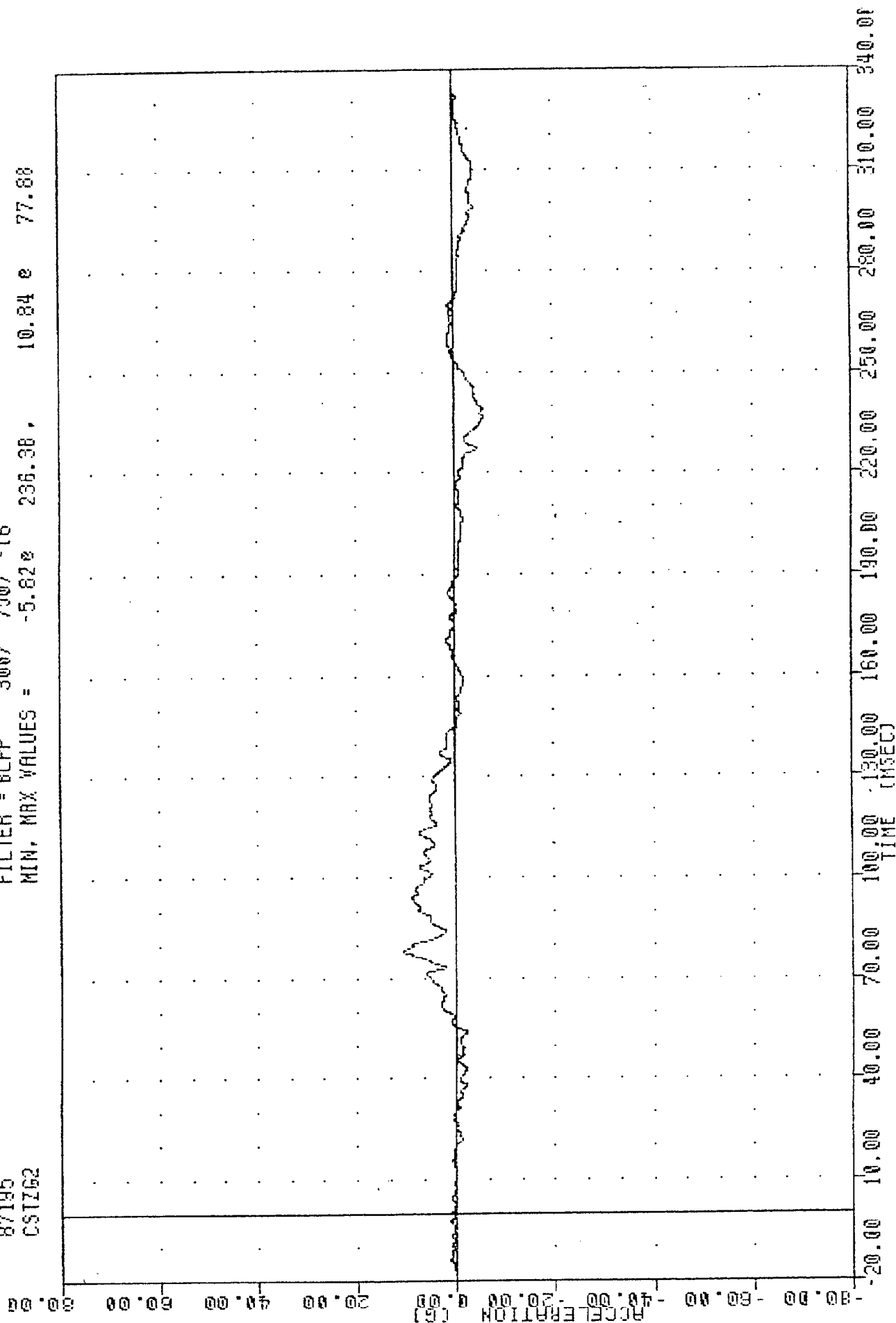
TRC
 COMPLIANCE TEST PROGRAM
 87195
 CSTY62

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -7.628 126.13, 3.55 8 215.50



TRC
 COMPLIANCE TEST PROGRAM
 87195
 CSTZ62

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -5.820 236.38, 10.84 e 77.80

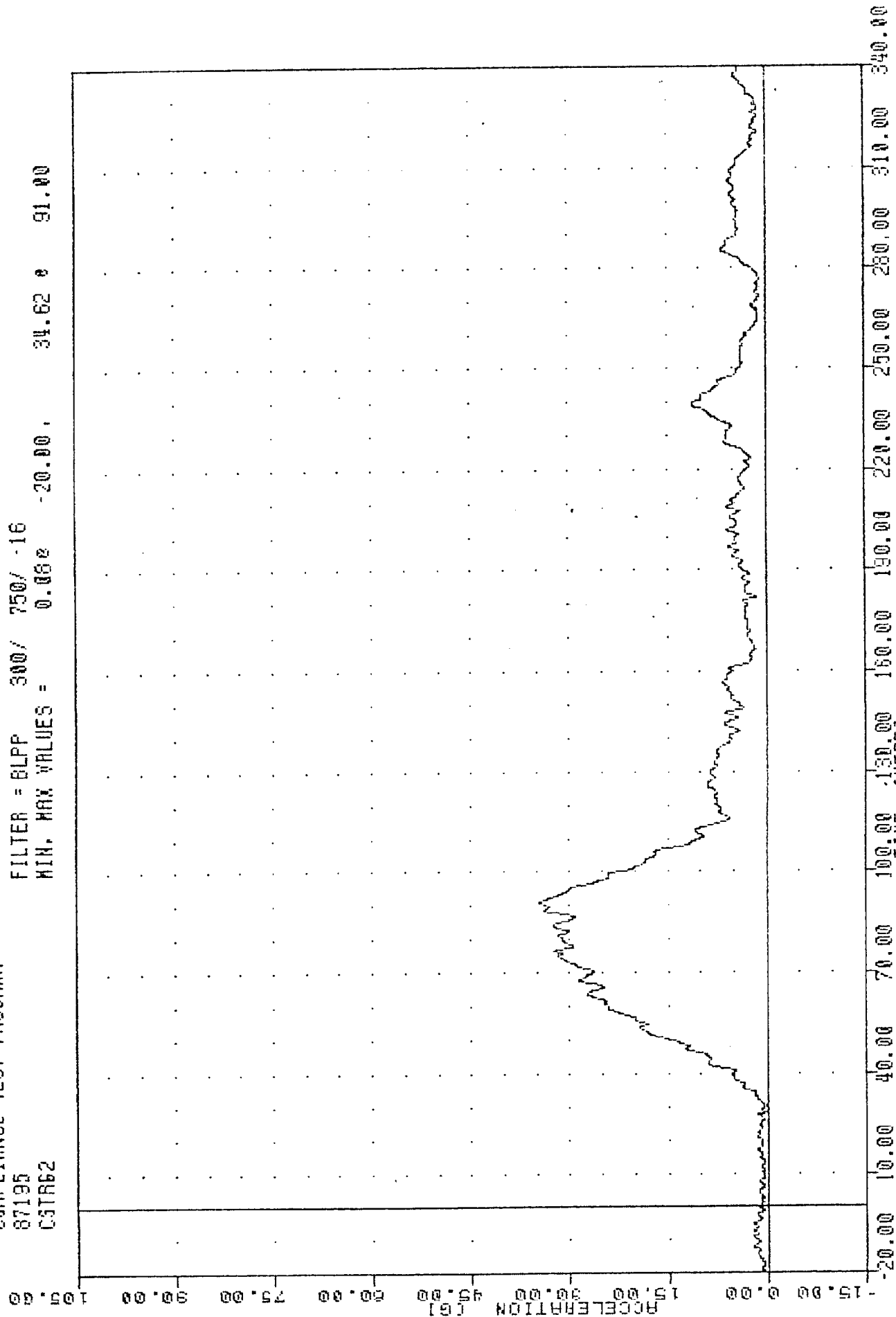


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
 PASSENGER CHEST Z AXIS ACCELERATION

TAC
COMPLIANCE TEST PROGRAM
87195
C3TR62

, 870714

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = 0.000 -20.00 34.62 0 91.00

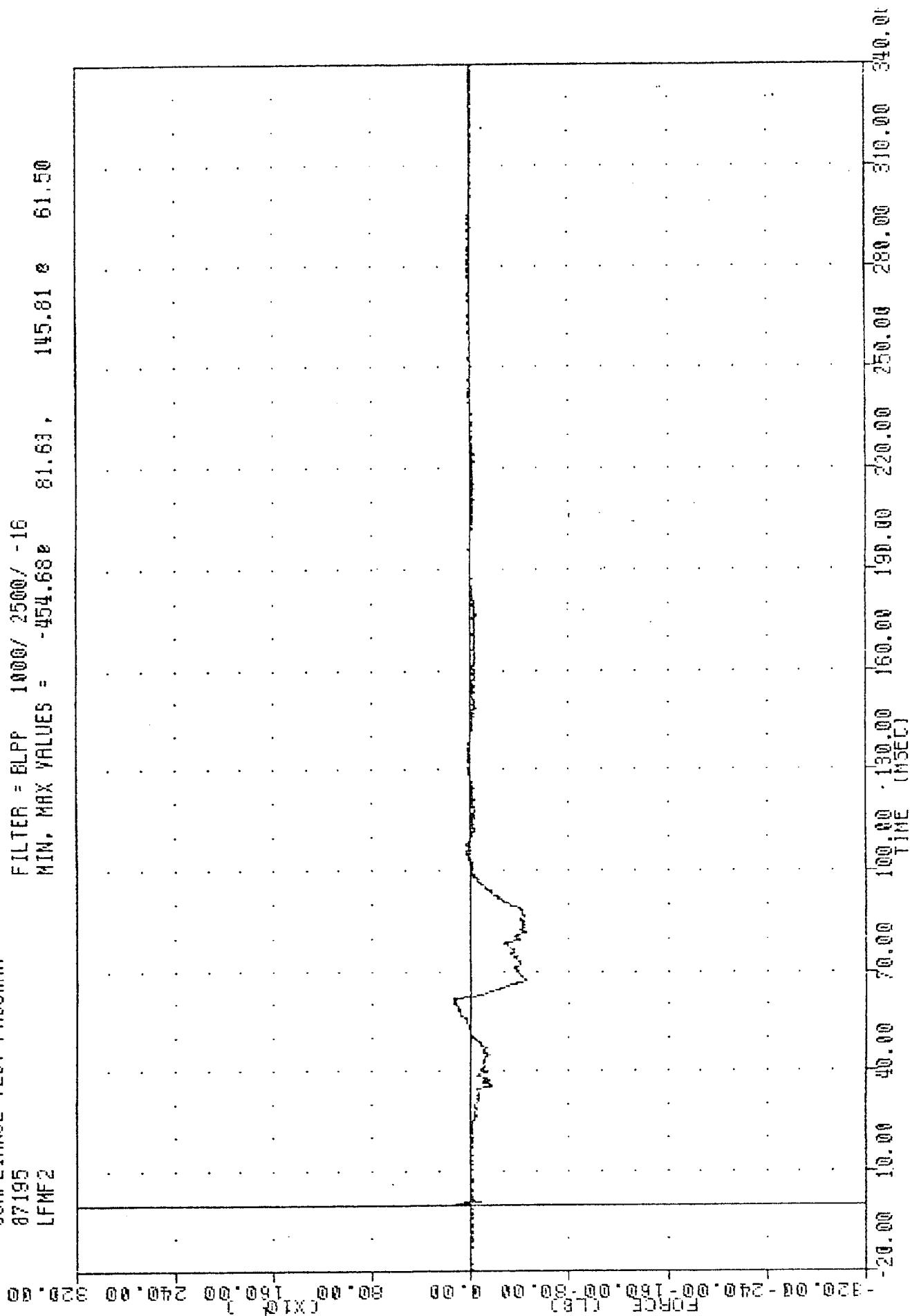


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
PASSENGER CHEST RESULTANT ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
LFMF2

870714

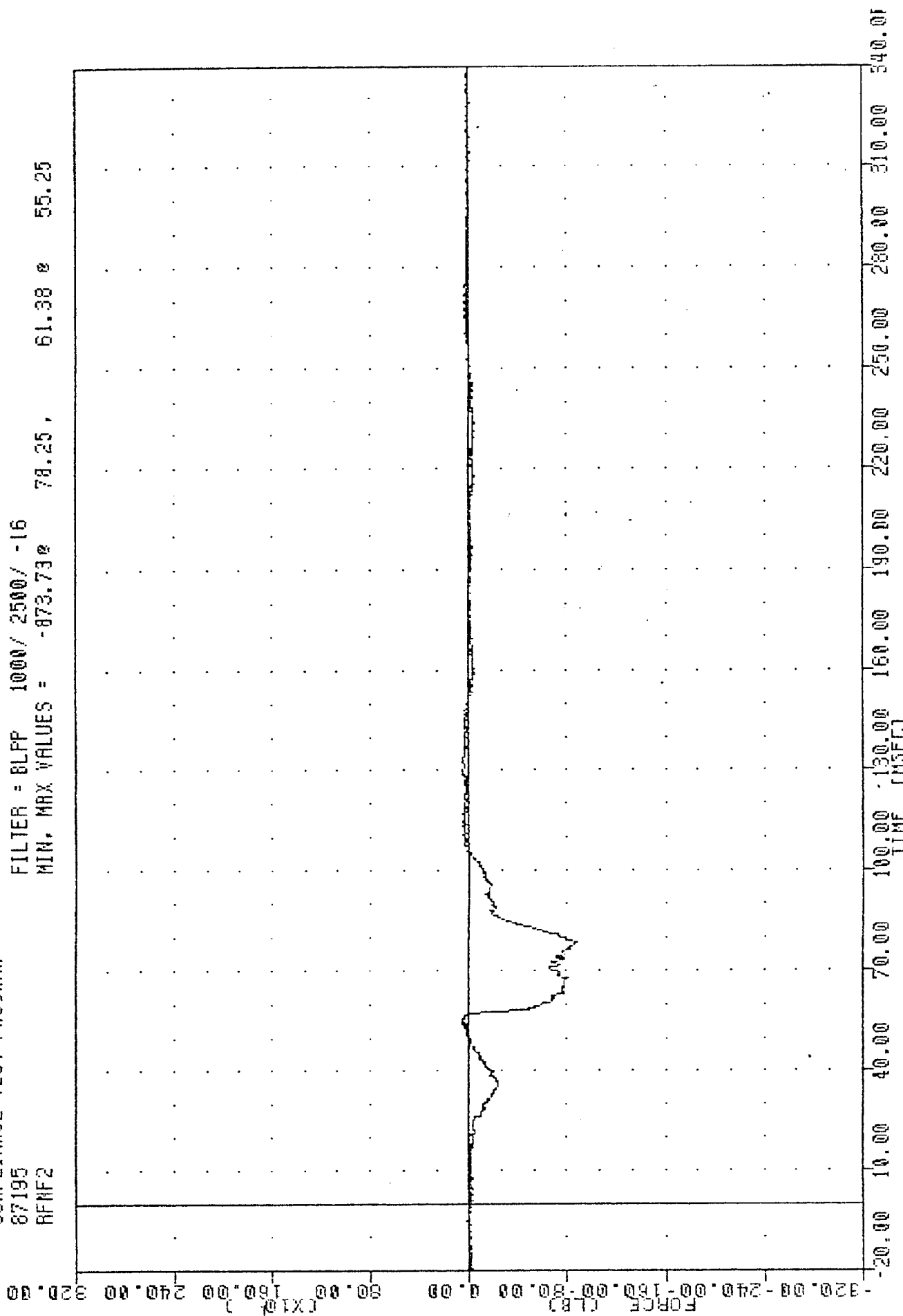
FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -454.68e 81.63, 145.81 e 61.50



TRC
 COMPLIANCE TEST PROGRAM
 87195
 RNF2

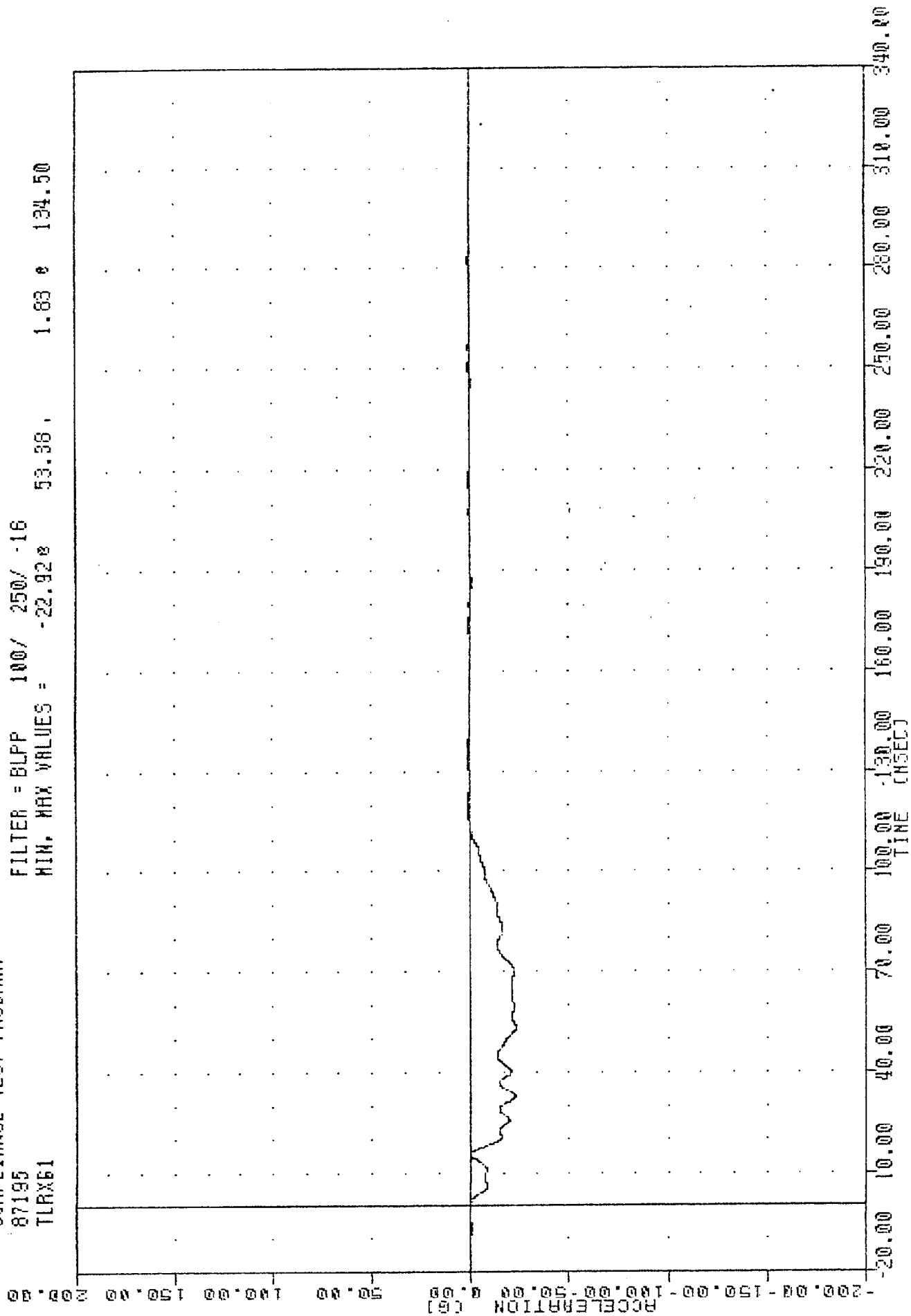
, 870714

FILTER = BLPP 1000/ 2500/ -16
 MIN. MAX VALUES = -873.730 78.25, 61.38 0 55.25



TAC
COMPLIANCE TEST PROGRAM
87195
TLRX61

FILTER = BLPP 100/ 250/ -18
MIN. MAX VALUES = -22.928 53.38 1.83 e 134.50

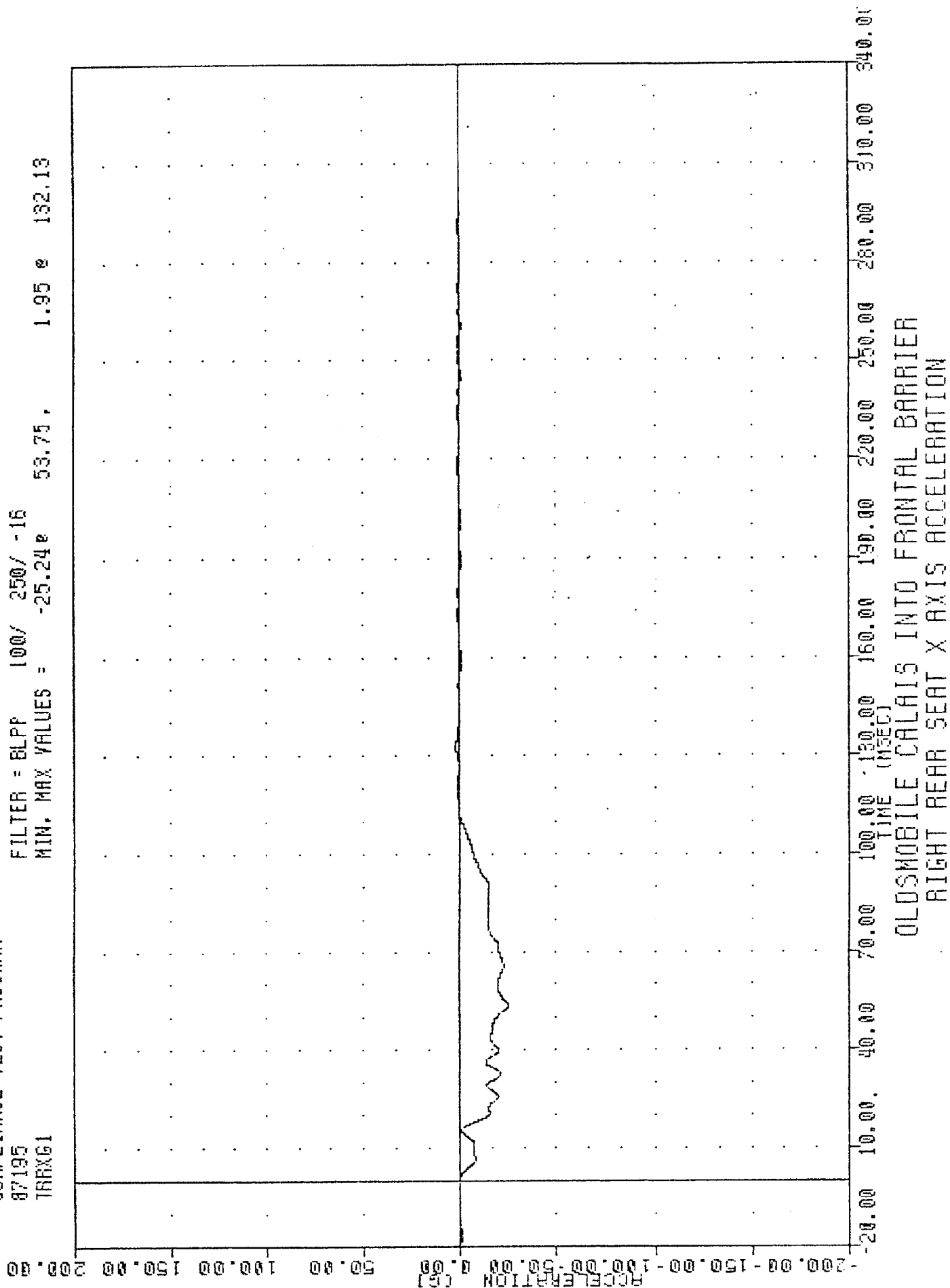


OLDSMOBILE CALAIS INTO FRONTAL BARRIER
LEFT REAR SEAT X AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
TRRXG1

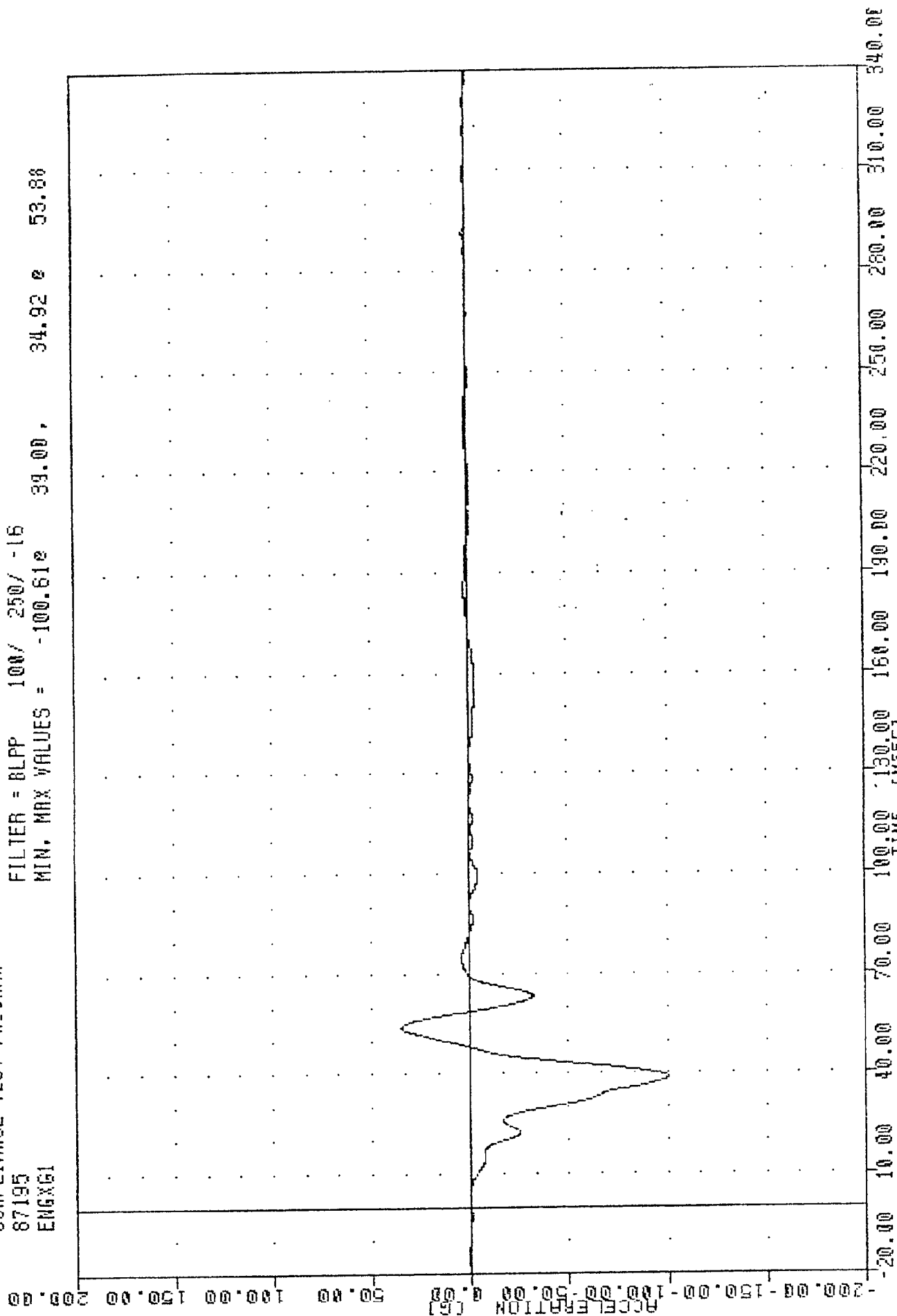
, 870714

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -25.24e 53.75, 1.95 e 132.13



TRC
COMPLIANCE TEST PROGRAM
87195
ENGXG1

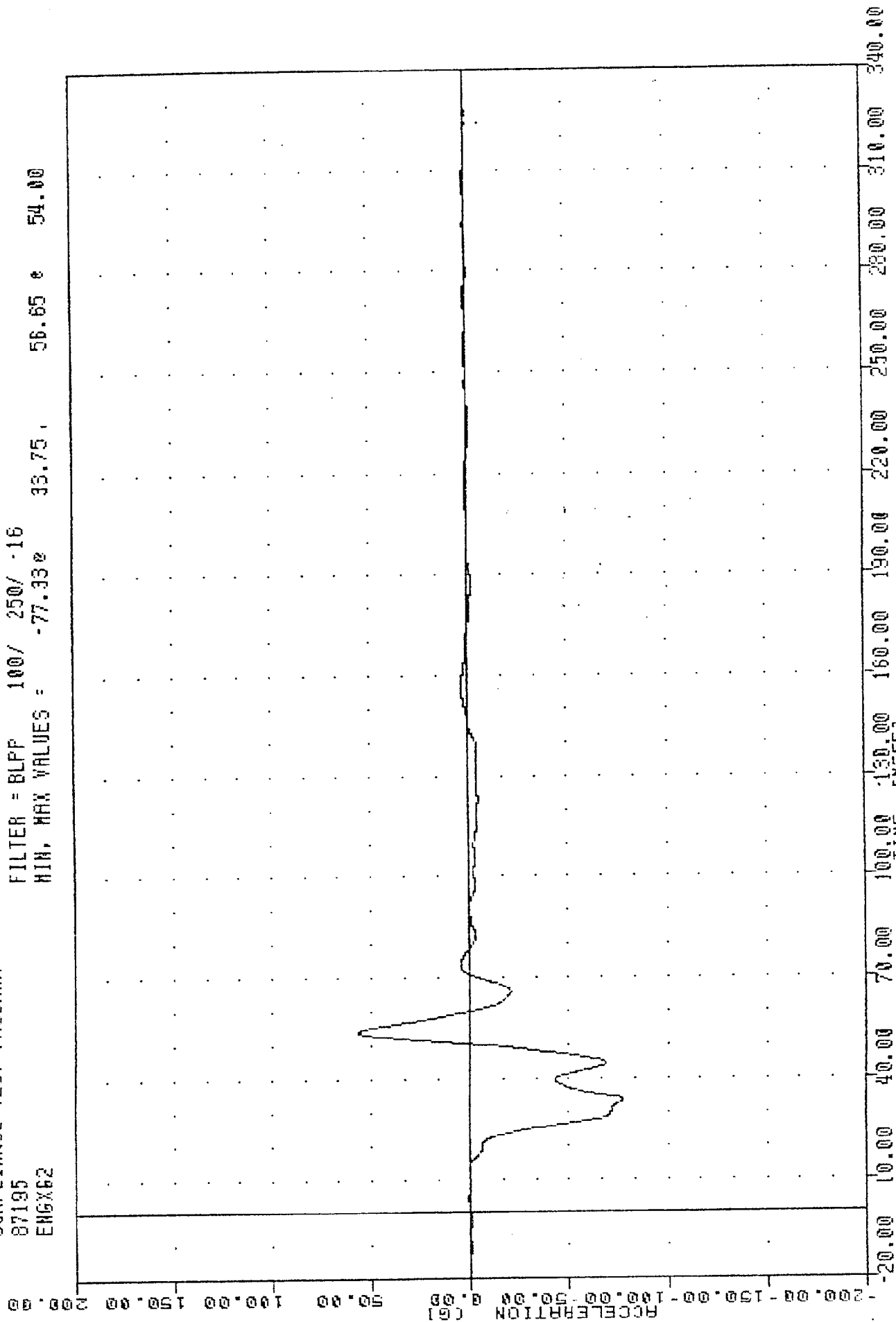
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -100.612 39.00, 34.92 53.88



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
ENGINE UPPER BLOCK X AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
ENGX62

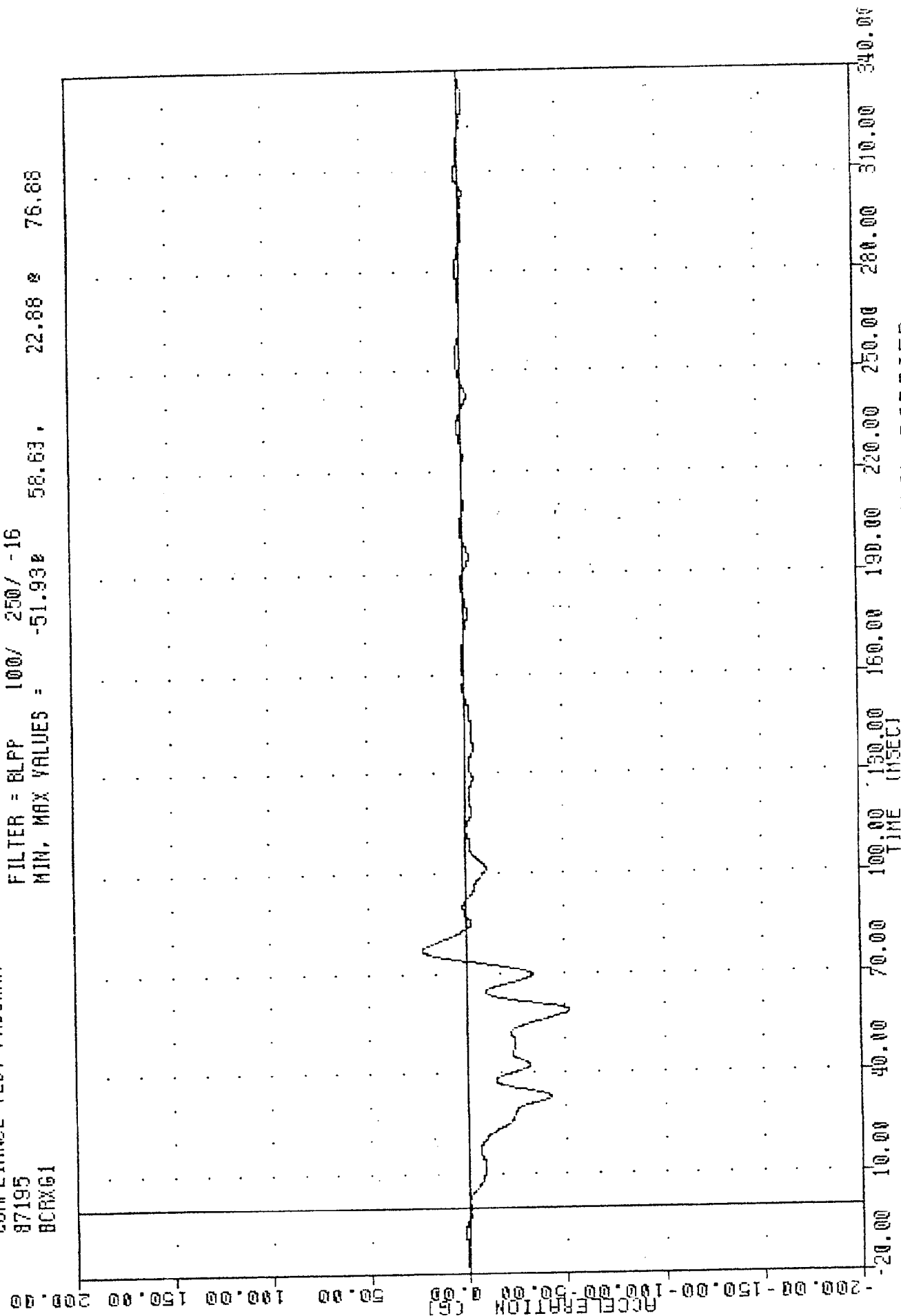
FILTER = BLPP 100/ 250/ -16
HIN, MAX VALUES = -77.33 33.75, 56.65 54.00



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
ENGINE BOTTOM X AXIS ACCELERATION

TRC
COMPLIANCE TEST PROGRAM
87195
BCRXG1

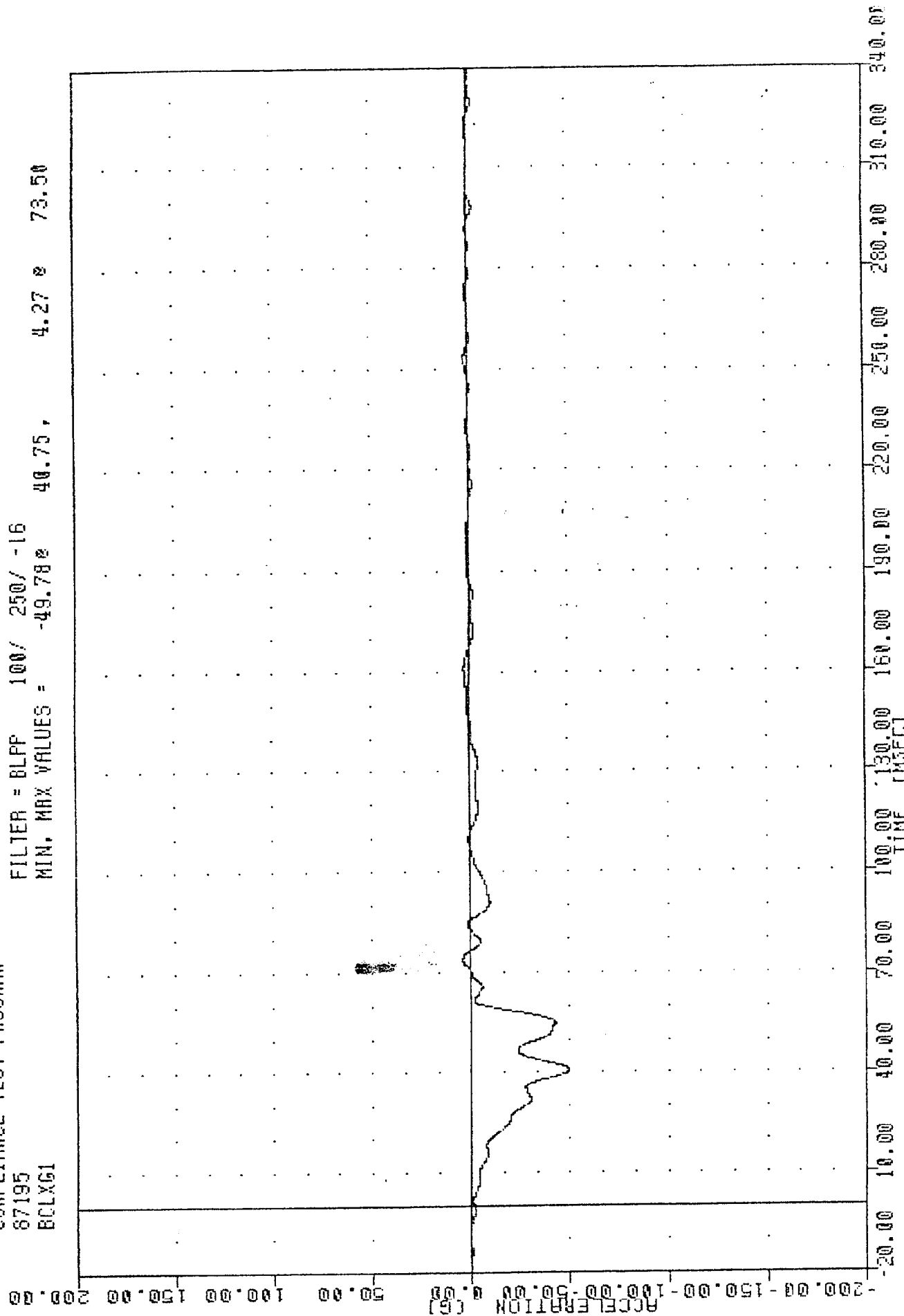
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -51.93 58.63 22.88 76.68



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
RIGHT BRAKE CALIPER X AXIS ACCELERATION

TRC , 870714
 COMPLIANCE TEST PROGRAM
 87195
 BCLXG1

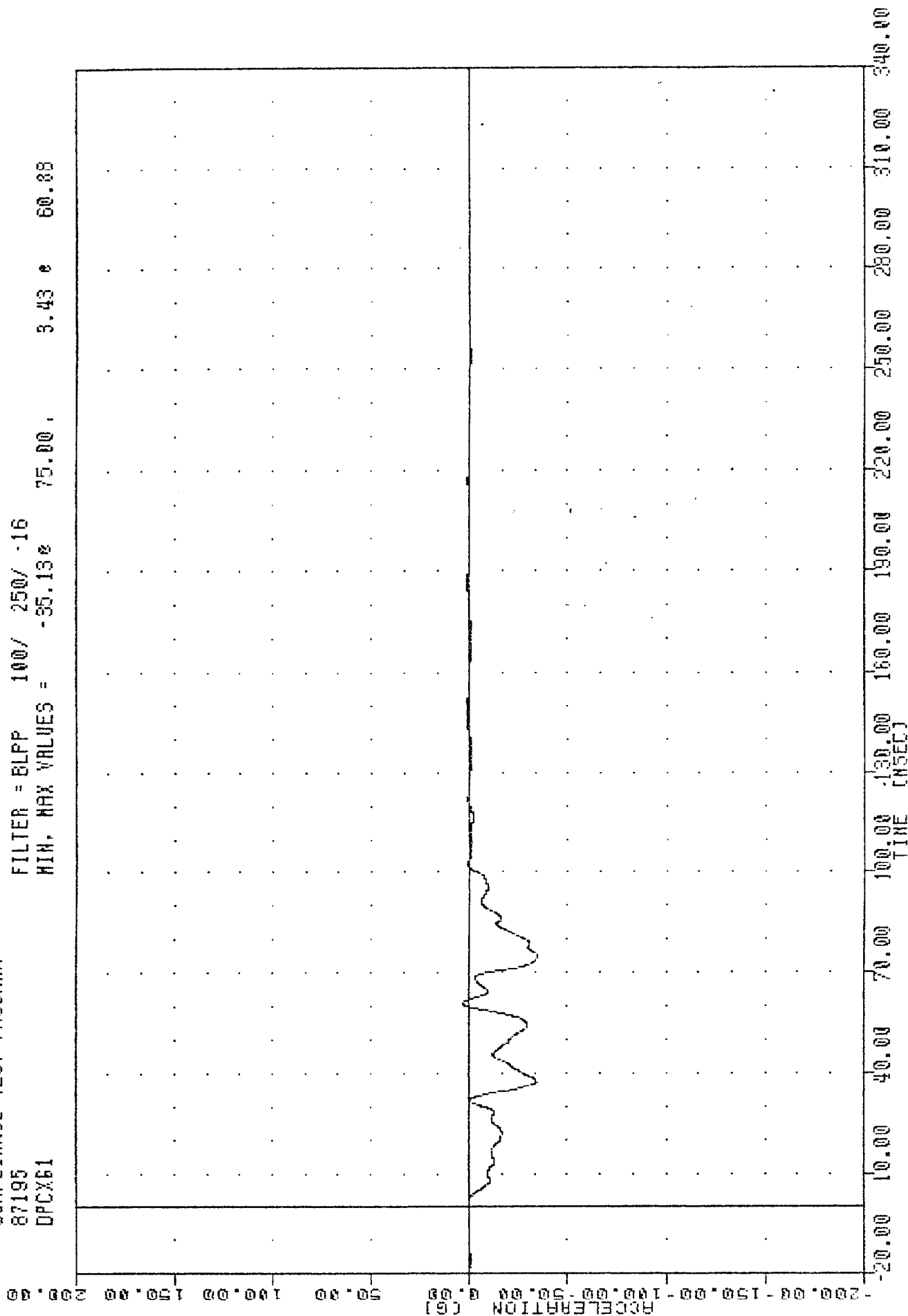
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -49.78 40.75 , 4.27 73.50



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
 LEFT BRAKE CALIPER X AXIS ACCELERATION

TAC
COMPLIANCE TEST PROGRAM
87195
DPCX61

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -35.13e 75.00, 3.43 e 60.88



OLDSMOBILE CALAIS INTO FRONTAL BARRIER
DASH PANEL CENTER X AXIS ACCELERATION