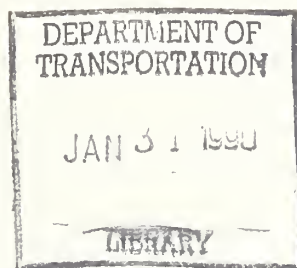


TL
242
- 5253
1989



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**



DOT HS 807 404
Final Report

March 1989

Final Report of A Flat Frontal Barrier Impact of A Ford Mustang Containing A Retrofit Driver's Airbag System

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear only because they are considered essential to the object of this report.

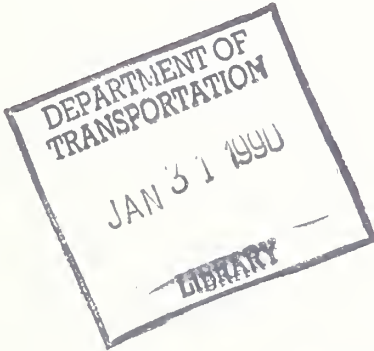
1. Report No. DOT HS 807 404		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle FINAL REPORT OF A FLAT FRONTAL BARRIER IMPACT OF A FORD MUSTANG CONTAINING A RETROFIT DRIVER'S AIRBAG SYSTEM,				5. Report Date MARCH 1989	
				6. Performing Organization Code	
7. Author(s) J.W. Sankey, Supervisor, Laboratory Engineering, TRC				8. Performing Organization Report No. 890216	
9. Performing Organization Name and Address Vehicle Research and Test Center U.S. Rt. 33, Logan County East Liberty, Ohio 43319				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. DTNH22-88-C-07292	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-31) 400 Seventh St., S.W., Washington, DC 20590				13. Type of Report and Period Covered FINAL REPORT FEBRUARY - MARCH 1989	
				14. Sponsoring Agency Code DOT/NHTSA/NRD/VRTC	
15. Supplementary Notes This test was conducted as a part of Project VRTC-87-0078: Seat belt/Airbag Phasing Study.					
16. Abstract A 30 mph flat frontal barrier impact test was conducted on a 1986 Ford Mustang 3-door hatchback, VIN 1FABP28M7GF239937, at the Transportation Research Center of Ohio on February 16, 1989. A Retrofit driver's airbag system was installed in the vehicle prior to the impact test. The barrier impact velocity was 30.1 mph. The ambient temperature was 70° F 					
17. Key Words Frontal Impact Seatbelt/Airbag Phasing Retrofit Driver's Airbag System			18. Distribution Statement This document is available to the public from the National Technical Information Service, Springfield, Virginia 22161		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 86	22. Price



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	2-1
3.0	CAMERA INFORMATION	3-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	DATA PLOTS	B-1
APPENDIX C	DUMMY CALIBRATION INFORMATION	C-1
APPENDIX D	MISCELLANEOUS TEST INFORMATION	D-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	1-10
4	VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	1-13
5	IMPACTED VEHICLE MEASUREMENTS	1-17
6	DUMMY DATA SUMMARY	2-2
7	HIGH SPEED CAMERA LOCATIONS	3-3

LIST OF FIGURES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1	IMPACT VELOCITY MEASUREMENT SYSTEM	1-11
2	VEHICLE ACCELEROMETER PLACEMENT	1-12
3	VEHICLE CRUSH	1-14
4	PRE-TEST AND POST-TEST MEASUREMENT POINTS	1-15
5	DUMMY POSITIONING DATA	2-5
6	DUMMY IN-VEHICLE POSITION RECORDING SHEET	2-6
7	DRIVER DUMMY TO STEERING COLUMN ASSEMBLY REFERENCE DIMENSIONS	2-7
8	CAMERA POSITIONS	3-2

LIST OF PHOTOGRAPHS

<u>DESCRIPTION</u>	<u>FIGURE</u>
PRE-TEST FRONT VIEW	A-1
POST-TEST FRONT VIEW	A-2
PRE-TEST LEFT SIDE VIEW	A-3
POST-TEST LEFT SIDE VIEW	A-4
PRE-TEST RIGHT SIDE VIEW	A-5
POST-TEST RIGHT SIDE VIEW	A-6
PRE-TEST RIGHT FRONT THREE-QUARTER VIEW	A-7
POST-TEST RIGHT FRONT THREE-QUARTER VIEW	A-8
PRE-TEST LEFT REAR THREE-QUARTER VIEW	A-9
POST-TEST LEFT REAR THREE-QUARTER VIEW	A-10
PRE-TEST REAR VIEW	A-11
POST-TEST REAR VIEW	A-12
PRE-TEST ENGINE COMPARTMENT VIEW	A-13
POST-TEST ENGINE COMPARTMENT VIEW	A-14
PRE-TEST FRONT UNDERBODY VIEW	A-15
POST-TEST FRONT UNDERBODY VIEW	A-16
PRE-TEST DRIVER DUMMY POSITION VIEW	A-17
POST-TEST DRIVER DUMMY POSITION VIEW	A-18
PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1	A-19
POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1	A-20
PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2	A-21
POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2	A-22
POST-TEST DRIVER DUMMY HEAD CONTACT	A-23
PRE-TEST DRIVER DUMMY KNEE BLOCKER MODIFICATION	A-24
POST-TEST DRIVER DUMMY KNEE CONTACT	A-25

SECTION 1.0

PURPOSE AND TEST SUMMARY

PURPOSE

This 30 mph frontal barrier impact test was conducted as a part of the Seat Belt/Airbag Phasing Study, VRTC Project Number VRTC-87-0078. The purpose of this test was to determine the performance of a Romeo retrofit driver's airbag system in the subject vehicle, a 1986 Ford Mustang GT 3-door hatchback.

TEST SUMMARY

The 1986 Ford Mustang GT 3-door hatchback was equipped with a 5.0 liter, inline V-8 engine, manual transmission, power steering, and power brakes. The test weight of the vehicle was 3553 pounds. The Head Injury Criteria (HIC) calculation was 571.5, the resultant acceleration of the thorax was 47.7 g's, and the compressive forces transmitted through the right and left femurs were 1035.1 pounds and 1505.3 pounds, respectively.

One Part 572 B, 50th percentile, adult male anthropomorphic test device (ATD) was seated in the left front outboard designated seating position. The dummy was positioned according to the dummy placement procedures specified in NHTSA's Notice 46 of the Federal Motor Vehicle Safety Standard No. 208.

The ATD was 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 five (5) accelerometers oriented to measure longitudinal axis acceleration.

The crash event was recorded by one (1) real-time panning camera, seven (7) high-speed motion picture cameras operating at approximately 1,000 frames per second, and one (1) high-speed motion picture camera operating at approximately 3,000 frames per second.

The thirteen (13) channels of data were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 8,000 samples per second and digitally processed per sections 12.8 and 12.9 of Laboratory Procedure TP-208-07.

The vehicle was impacted into the rigid, flat frontal barrier at the Transportation Research Center of Ohio on February 16, 1989. The test vehicle's impact speed was 30.1 mph. The vehicle sustained 12.0 inches of static crush.

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. Appendix C contains the dummy calibration information. Appendix D contains miscellaneous test information.

TABLE 1 CRASH TEST SUMMARY

```
PROJECT:  Seat Belt/Airbag Phasing Study          DATE:  2/16/89
VEHICLE:  Ford Mustang GT                          TIME:  1041      TEMP:  70° F
VEHICLE TEST WEIGHT (LBS):  3553
IMPACT ANGLE (DEG)*:  0
IMPACT VELOCITY (MPH)**:  PRIMARY = 30.1          SECONDARY = 30.1
MAXIMUM STATIC CRUSH (IN):  12.0
VEHICLE REBOUND (IN):  1.5
DUMMIES:  Driver #830
TYPE:  Part 572 B
LOCATION:  Left Front
RESTRAINT:  Romeo Retrofit Driver's
              Airbag System
NUMBER OF DATA CHANNELS:  13
NUMBER OF CAMERAS:  HIGH-SPEED      8          REAL-TIME      1
```

*With respect to tow track centerline.

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

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company MAKE/MODEL: Ford Mustang GT
VIN: 1FABP28M7GF239937 BODY STYLE: 3-door hatchback
MODEL YEAR: 1986 COLOR: Silver
ENGINE DATA: TYPE: inline V-8 CYLINDERS: 8 DISPLACEMENT: 5.0 liter
TRANSMISSION DATA: 5 SPEED, X MANUAL, ___ AUTOMATIC, ___ FWD, X RWD, ___ 4WD
DATE VEHICLE RECEIVED: 2/07/89 ODOMETER READING: 44,903.0
DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

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

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

VEHICLE MANUFACTURED BY: Ford Motor Company

DATE OF MANUFACTURE: 4/86

GVWR: 4075 LBS.

CAWR: FRONT 2206 LBS., REAR 1996 LBS.

*Vehicle was modified to include a Romeo Retrofit driver's airbag system.

TABLE 2 TEST VEHICLE INFORMATION CONTINUED

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

RIGHT FRONT	911 LBS.	RIGHT REAR	637 LBS.
LEFT FRONT	958 LBS.	LEFT REAR	620 LBS.
TOTAL FRONT WEIGHT	1869 LBS.	(59.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1257 LBS.	(40.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT: 3126 LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES:

DELIVERED ATTITUDE:	LF	27.2	;RF	27.2	;LR	27.8	;RR	27.8
PRE-TEST ATTITUDE:	LF	27.1	;RF	27.1	;LR	26.6	;RR	26.6
POST-TEST ATTITUDE:	LF	26.8	;RF	30.0	;LR	25.2	;RR	26.7

WHEELBASE: 100.8 INCHES

MAX. WIDTH: 69.2 INCHES

CG = 44.9 INCHES REARWARD OF FRONT WHEEL CENTERLINE

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 99 LBS. OF CARGO:

RIGHT FRONT	959 LBS.	RIGHT REAR	805 LBS.
LEFT FRONT	1011 LBS.	LEFT REAR	778 LBS.
TOTAL FRONT WEIGHT	1970 LBS.	(55.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1583 LBS.	(44.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT 3553 LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE: 90 lbs. behind passenger's seat
50 lbs. behind driver's seat

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

TABLE 2 TEST VEHICLE INFORMATION CONTINUED

VEHICLE TIRE DATA:

RECOMMENDED COLD TIRE PRESSURE: 35 psi

TIRES ON VEHICLE (MFR., LINE, SIZE): Starfire Radial GV 235/60SR15

BIAS PLY, BELTED, OR RADIAL: Radial

SIDEWALL PLY RATING: 2 PLY

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

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

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

RECOMMENDED TIRE SIZE: 225/60VR15 LOAD RANGE X B, C, D

VEHICLE CAPACITY DATA: TYPES OF SEATS: FRONT - Buckets
REAR - Buckets

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT

CARGO LOAD 100 LBS. 2 REAR
4 TOTAL

TOTAL 700 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONTINUED

TEST FLUID DATA

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

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: NA GALLONS

TEST VOLUME: 0.0 GALLONS (92-94% OF USEABLE)

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

DETAILS OF FUEL SYSTEM: NA

ELECTRIC FUEL PUMP: NA FUEL INJECTION: NA

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? NA

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 175.0; C 176.6; R 175.1

POST-TEST: L 163.0; C 165.0; R 165.0

TOTAL CRUSH: L 12.0; C 11.6; R 10.1

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: L: 2.8; C: 1.8; R: 0.0; AVG: 1.5

*WITH ENTIRE FUEL SYSTEM FILLED.

TABLE 3 TEST CONDITIONS

TEST NUMBER: 890216

DATE OF TEST: 2/16/89

TIME OF TEST: 1041

WIND VELOCITY: 3-4 mph @ 342° NW

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 70° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 68° F

DRIVER DUMMY TEMPERATURE: 71° F

PASSENGER DUMMY TEMPERATURE: NA

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3553	3554
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph)	30.1	30.0
MAXIMUM CRUSH (in.): STATIC:	12.0	

DUMMIES

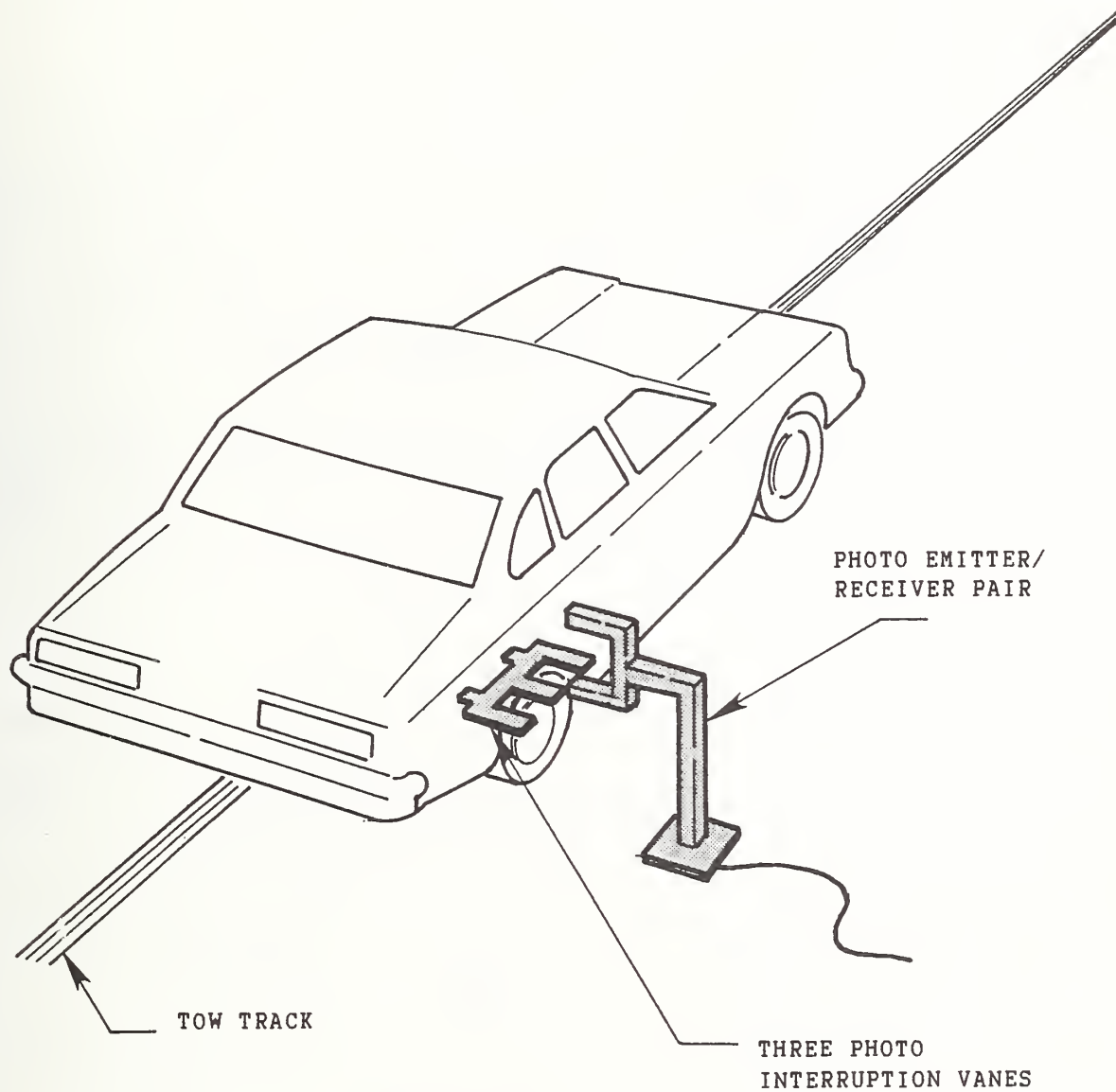
DRIVER

TYPE: Part 572 B
SERIAL NO.: 830
INSTRUMENTATION:
HEAD ACCEL.: 3
CHEST ACCEL.: 3
FEMUR L.C.'S: 2
OTHER:

RESTRAINT SYSTEM: Romeo Retrofit
Driver's
Airbag System

REMARKS:

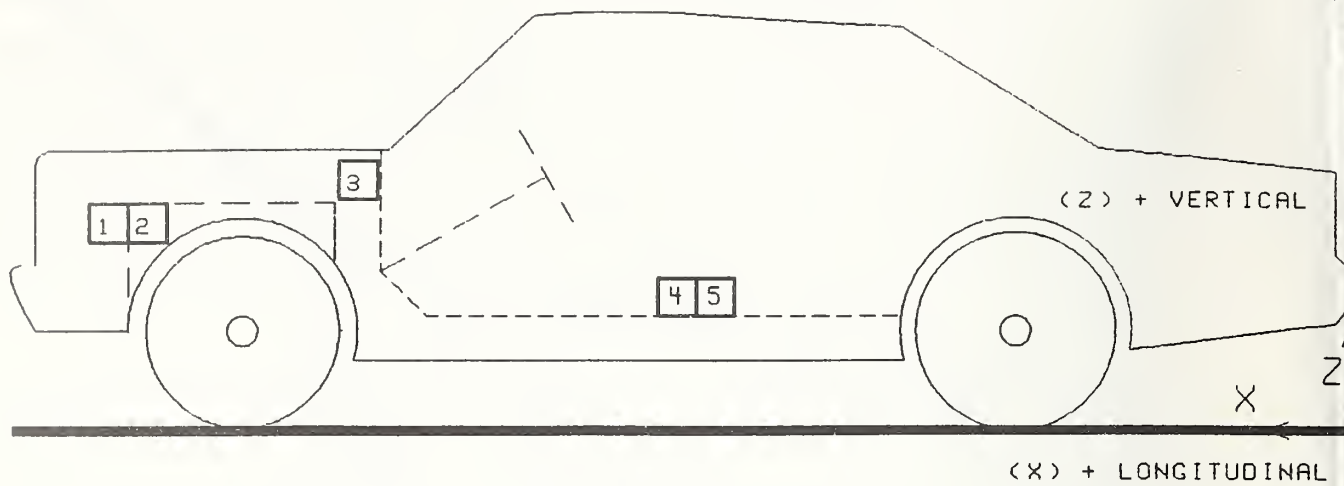
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



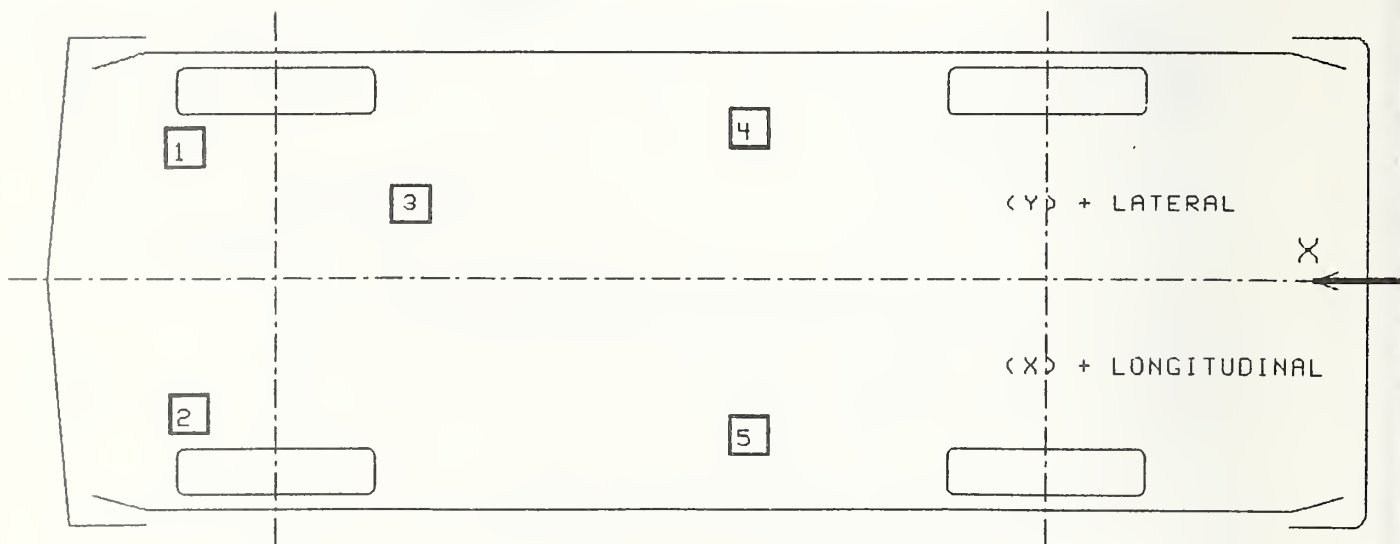
The final vane clears emitter/receiver two inches before impact.

The vanes have one foot spacing.

FIGURE 2
VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4
TEST NUMBER 890216

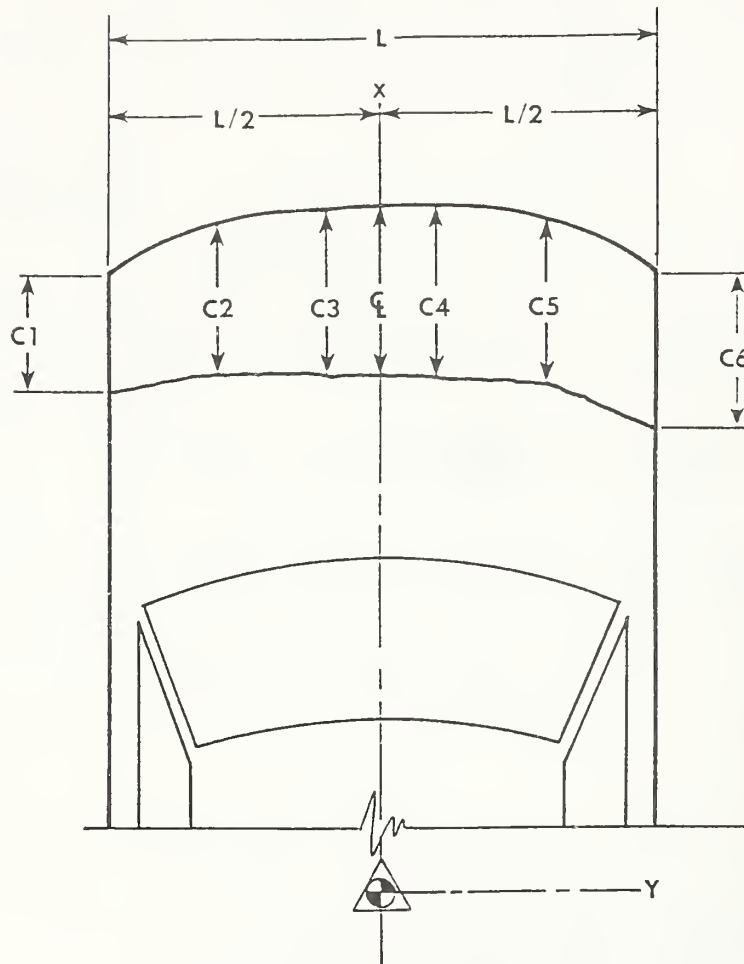
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	G MSEC	MAX	G MSEC
1	LEFT FRAME RAIL LONGITUDINAL	151.7	16.4	21.4	74.6	32.1	176.2	21.3
2	RIGHT FRAME RAIL LONGITUDINAL	153.2	-18.8	22.0	47.9	52.8	110.0	11.0
3	FIREWALL LONGITUDINAL	125.0	8.8	35.1	5.0	42.5	70.2	51.9
4	LEFT B-PILLAR LONGITUDINAL	66.9	27.6	14.4	1.6	151.6	35.7	58.8
5	RIGHT B-PILLAR LONGITUDINAL	66.8	-27.6	15.1	1.5	171.5	38.7	56.0

* 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 VEHICLE CRUSH



NOTES: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.
All measurements are in inches.

Vehicle Ford Mustang

PRE-TEST	POST-TEST	CRUSH
L <u>57.6</u>		
C1 <u>175.0</u>	C1 <u>163.0</u>	C1 <u>12.0</u>
C2 <u>175.2</u>	C2 <u>164.6</u>	C2 <u>10.6</u>
C3 <u>176.2</u>	C3 <u>165.2</u>	C3 <u>11.0</u>
C4 <u>176.2</u>	C4 <u>165.2</u>	C4 <u>11.0</u>
C5 <u>175.2</u>	C5 <u>164.2</u>	C5 <u>11.0</u>
C6 <u>175.1</u>	C6 <u>165.0</u>	C6 <u>10.1</u>
CL <u>176.6</u>	CL <u>165.0</u>	CL <u>11.6</u>

FIGURE 4
PRE-TEST AND POST-TEST MEASUREMENT POINTS

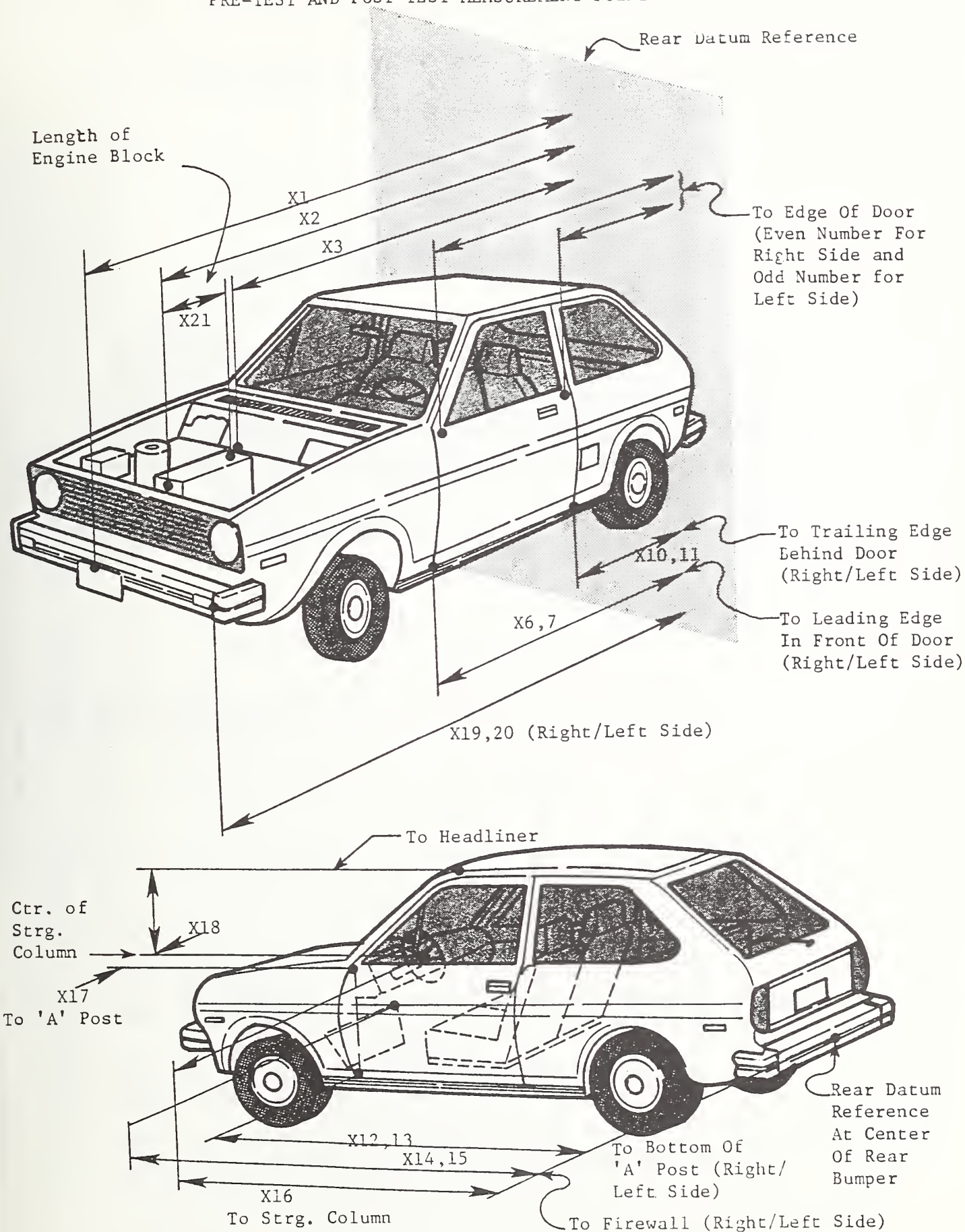


FIGURE 4
PRE-TEST AND POST-TEST MEASUREMENT POINTS CONTD.

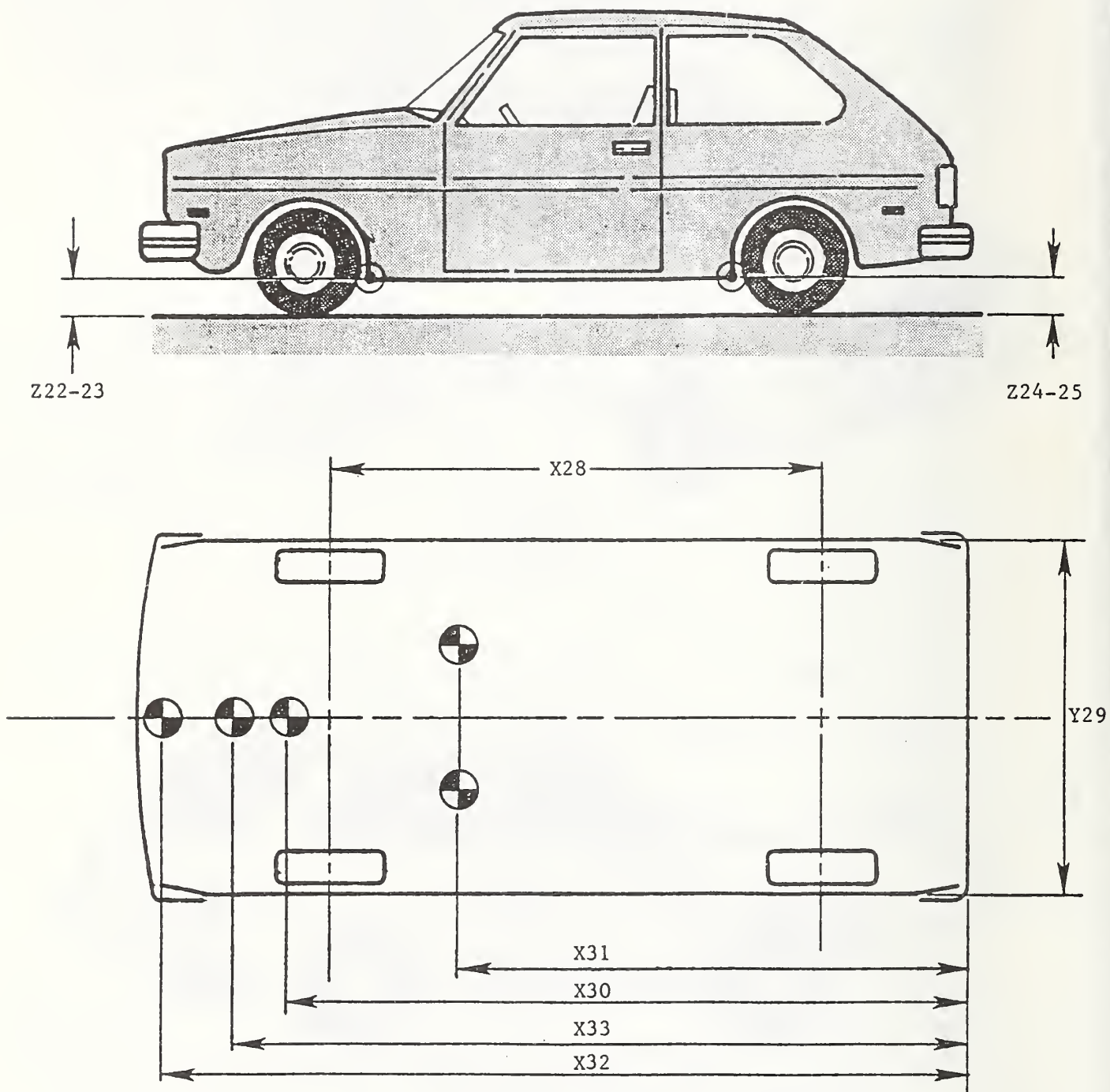


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL:	TEST NUMBER:	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
			PRE-TEST	POST-TEST	DIFF.
Ford/Mustang	890216	X1 TOTAL LENGTH OF VEHICLE AT CENTERLINE	176.6	165.0	11.6
		X2 REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	143.8	148.0	-4.2
		X3 REAR SURFACE OF VEHICLE TO FIREWALL	124.9	123.8	1.1
		X4 REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	112.8	111.8	1.0
		X5 REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	112.4	112.8	-0.4
		X6 REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	115.5	114.4	1.1
		X7 REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	115.2	114.9	0.3
		X8 REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	65.0	64.9	0.1
		X9 REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	65.0	65.2	-0.2
		X10 REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	65.2	64.0	1.2
		X11 REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	64.8	64.5	0.3
		X12 REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	114.3	113.5	0.8
		X13 REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	114.2	114.2	0.0
		X14 REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	127.6	125.1	2.5
		X15 REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	127.7	126.8	0.9
		X16 REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	88.6	87.2	1.4
		X17 CENTER OF STEERING COLUMN TO "A" POST	11.1	13.9	-2.8

TABLE 5 IMPACTED VEHICLE MEASUREMENTS, CONT'D.

VEHICLE MAKE/MODEL: Ford/Mustang

TEST NUMBER: 890216

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
Z18	REAR OF WINDSHIELD HEADER TO STEERING WHEEL CENTER	16.3	14.4	1.9
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	175.1	165.0	10.1
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	175.0	163.0	12.0
X21	LENGTH OF ENGINE BLOCK	17.5	17.5	0.0
Z22	RIGHT FRONT SILL TO GROUND PLANE	9.6	7.6	2.0
Z23	LEFT FRONT SILL TO GROUND PLANE	9.3	6.1	3.2
Z24	RIGHT REAR SILL TO GROUND PLANE	9.8	10.1	-0.3
Z25	LEFT REAR SILL TO GROUND PLANE	9.2	9.0	0.2
X26	FIREWALL TO ENGINE OR TRANSAXLE	4.0	0.0	4.0
Z27	VERTICAL DIMENSION FROM DOOR SILL TO CENTERLINE OF STEERING COLUMN	20.6	22.4	-1.8
X28	WHEELBASE OF VEHICLE	100.8	100.0	0.8
Y29	WIDTH OF VEHICLE AT MAXIMUM WIDTH POINT	69.2	78.1	-8.9
X30	REAR SURFACE OF VEHICLE TO ENGINE TARGET	136.1	133.8	2.3
X31	REAR SURFACE OF VEHICLE TO COMPARTMENT TARGET	108.1	105.9	2.2
X32	REAR SURFACE OF VEHICLE TO BUMPER TARGET	170.9	156.1	14.8
X33	REAR SURFACE OF VEHICLE TO FRAME CROSSMEMBER	144.1	143.0	1.1

SECTION 2.0

SUMMARY OF RESULTS

TABLE 6
DUMMY DATA SUMMARY
TEST NUMBER 890216

DRIVER DUMMY

SN: 830

POSITIVE DIRECTION	MAX	MSEC	NEGATIVE DIRECTION	MAX	MSEC
-----------------------	-----	------	-----------------------	-----	------

HEAD ACCELERATION (g)

LONGITUDINAL	31.4	74.0	58.3	97.3	
LATERAL	7.9	115.6	8.2	74.8	
VERTICAL	9.0	125.4	49.0	78.8	
RESULTANT	65.4	95.3			
HIC	571.5 FROM 75.6 TO 109.8				

CHEST ACCELERATION (g)

LONGITUDINAL	7.2	235.6	48.2	96.4	
LATERAL	5.1	32.3	5.9	88.3	
VERTICAL	7.3	124.8	11.1	88.6	
RESULTANT	48.2	96.4			
3 MSEC	47.7				

FEMUR LOAD (lb)

LEFT	293.4	30.0	1505.3	78.3	
RIGHT	162.9	30.1	1035.1	74.6	

POSITIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD
FORCE: TENSION

NEGATIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD
FORCE: COMPRESSION

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 upper torso rotated forward as the driver's head and chest were restrained by the driver's airbag. The dummy rebounded into the seat back and came to rest seated upright in the driver's seat.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #830	PASSENGER #NA
Head	<u>Airbag</u>	<u>NA</u>
Chest	<u>Airbag</u>	<u>NA</u>
Abdomen	<u>None</u>	<u>NA</u>
Left knee	<u>Instrument panel</u>	<u>NA</u>
Right knee	<u>Instrument panel</u>	<u>NA</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Easy</u>	<u>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:

The windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

FIGURE 5 DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Ford Mustang

SEAT TYPE: Bench

ADJUSTER TYPE: X Manual

X Bucket

 Power

 Split bench

 Non-adjustable

TECHNICIANS:

BUCKET SEAT BACK TYPE: Non-adjustable

1. B. Crabtree

X Adjustable reclining

2. B. Fishbaugh

POSITIONING DATE: 2/16/89

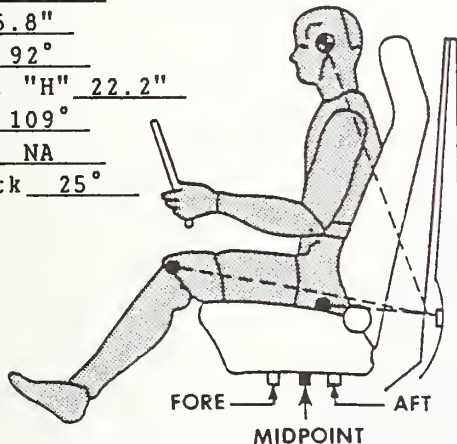
3.

AMBIENT TEMP. 70° F TIME: 0830

4.

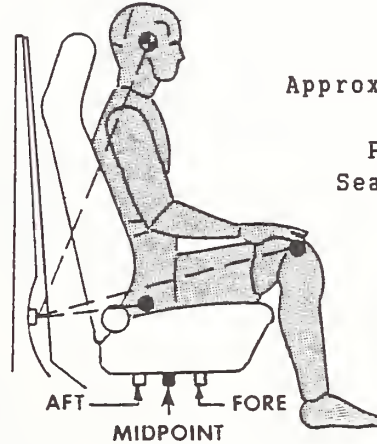
DRIVER DUMMY* # 830 TYPE: HII

Head 22.8"
Target 59°
Knee 36.8"
Joint 92°
Approx. "H" 22.2"
Point 109°
Pelvis NA
Seatback 25°



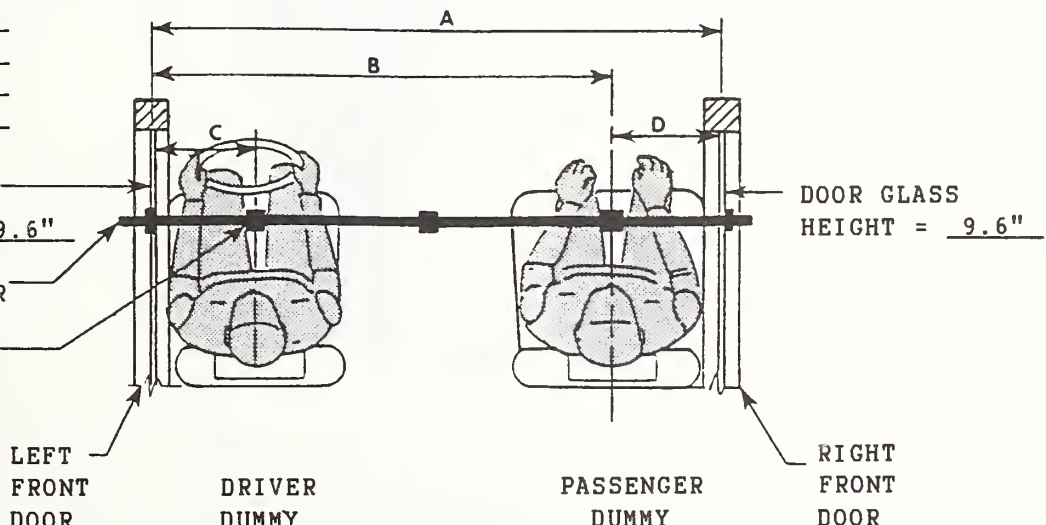
PASSENGER DUMMY* # NA TYPE: NA

Head
Target
Knee
Joint
Approx. "H"
Point
Pelvis
Seatback



A = 52.2"
B = NA
C = 11.0"
D = NA

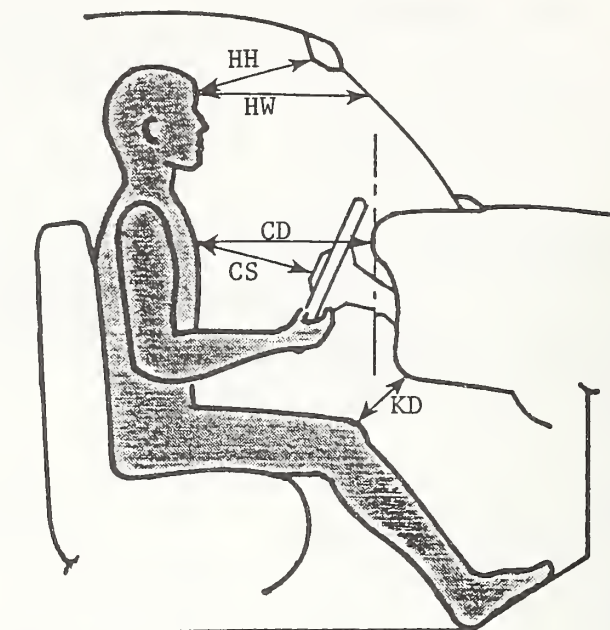
DOOR GLASS
HEIGHT = 9.6"
LATERAL BAR
ADJUSTABLE
POINTER



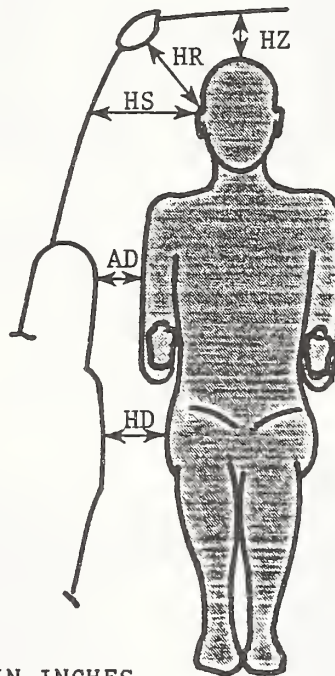
*Dummy measurements are referenced to top of striker bolt and all angles are referenced to vertical.

FIGURE 6 DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
HH	15.2	NA
HW	21.5	NA
CD	21.4	NA
CS	11.6	NA
KDL	4.4	NA
KDR	4.6	NA

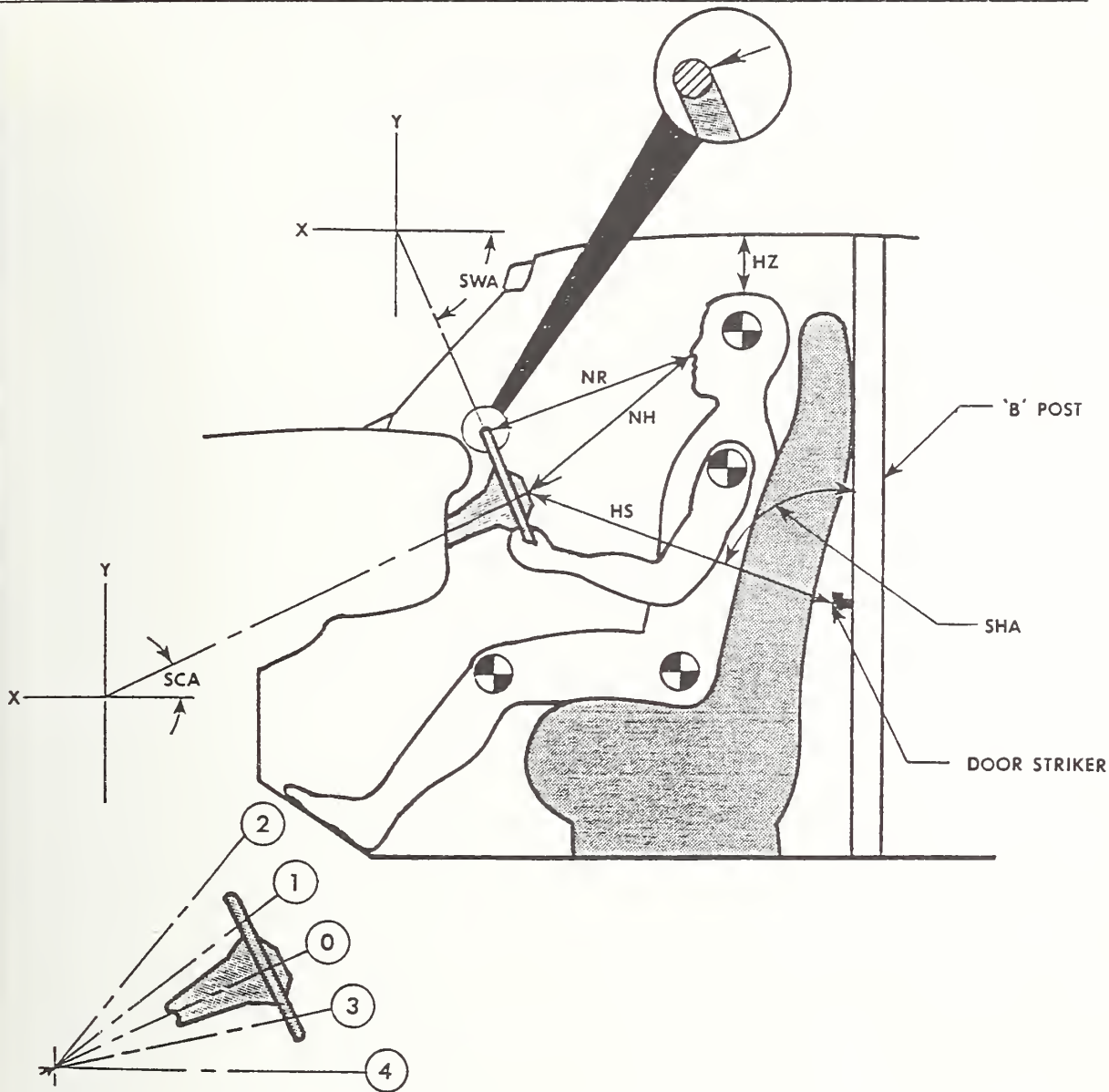


	DRIVER	PASSENGER
HR	5.4	NA
HS	7.9	NA
AD	4.0	NA
HD	6.6	NA
HZ	2.4	NA



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

FIGURE 7 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



PRE-TEST	
NR	16.4
NH	16.5
HS	31.8
SCA	23°
SWA	67°
HZ	2.4
SHA	25°

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

SECTION 3.0

CAMERA INFORMATION

FIGURE 8
CAMERA POSITIONS

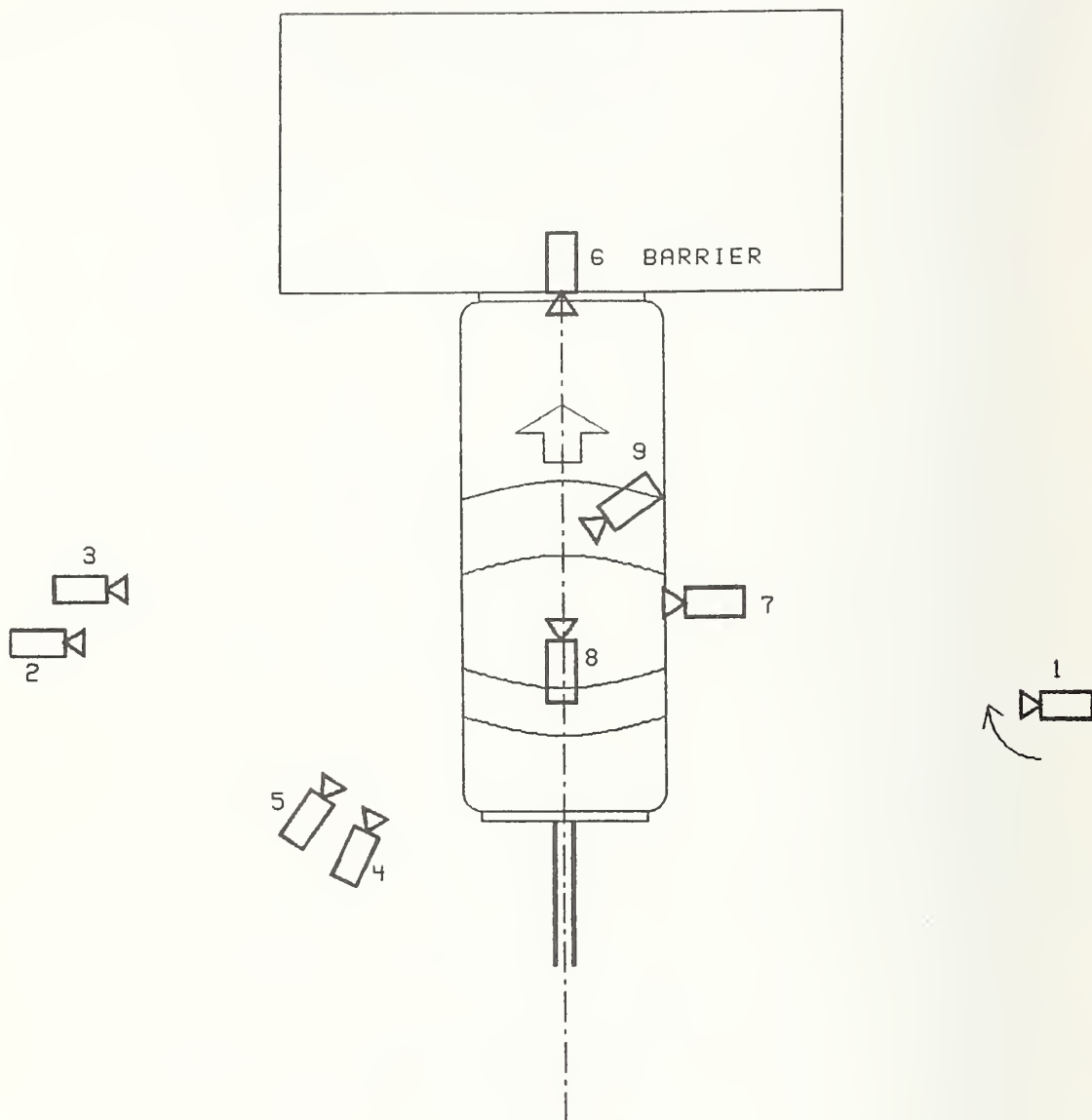


TABLE 7 CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Real-time panning	Kodak	17	24	Real-time documentation
2	Left wide	Photosonic 1B	13	998	Vehicle crush
3	Left medium tight	Hycam	25	995	Dummy kinematics
4	Left angle	Photosonic 1B	25	998	Dummy kinematics
5	Left airbag	Hycam	16	2990	Airbag inflation
6	Barrier	Photosonic 1B	13	998	Dummy/airbag kinematics
7	Onboard door	Photosonic 1B	8	972	Dummy/airbag kinematics
8	Onboard roof	Photosonic 1B	8	1000	Dummy/airbag kinematics
9	Onboard floor	Photosonic 1B	8	995	Dummy/airbag kinematics



APPENDIX A

PHOTOGRAPHS

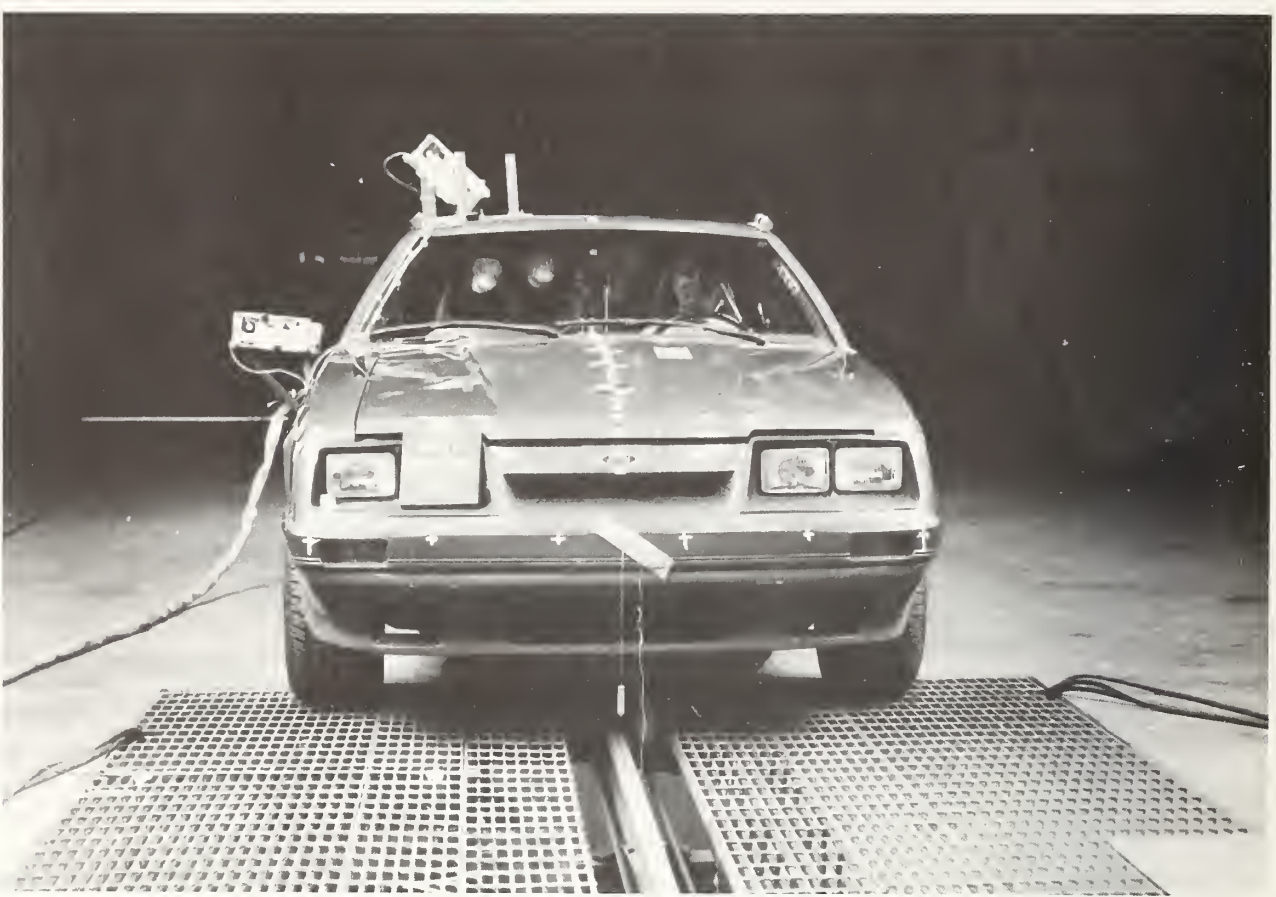


Figure A-1. PRE-TEST FRONT VIEW



Figure A-2. POST-TEST FRONT VIEW



Figure A-3. PRE-TEST LEFT SIDE VIEW

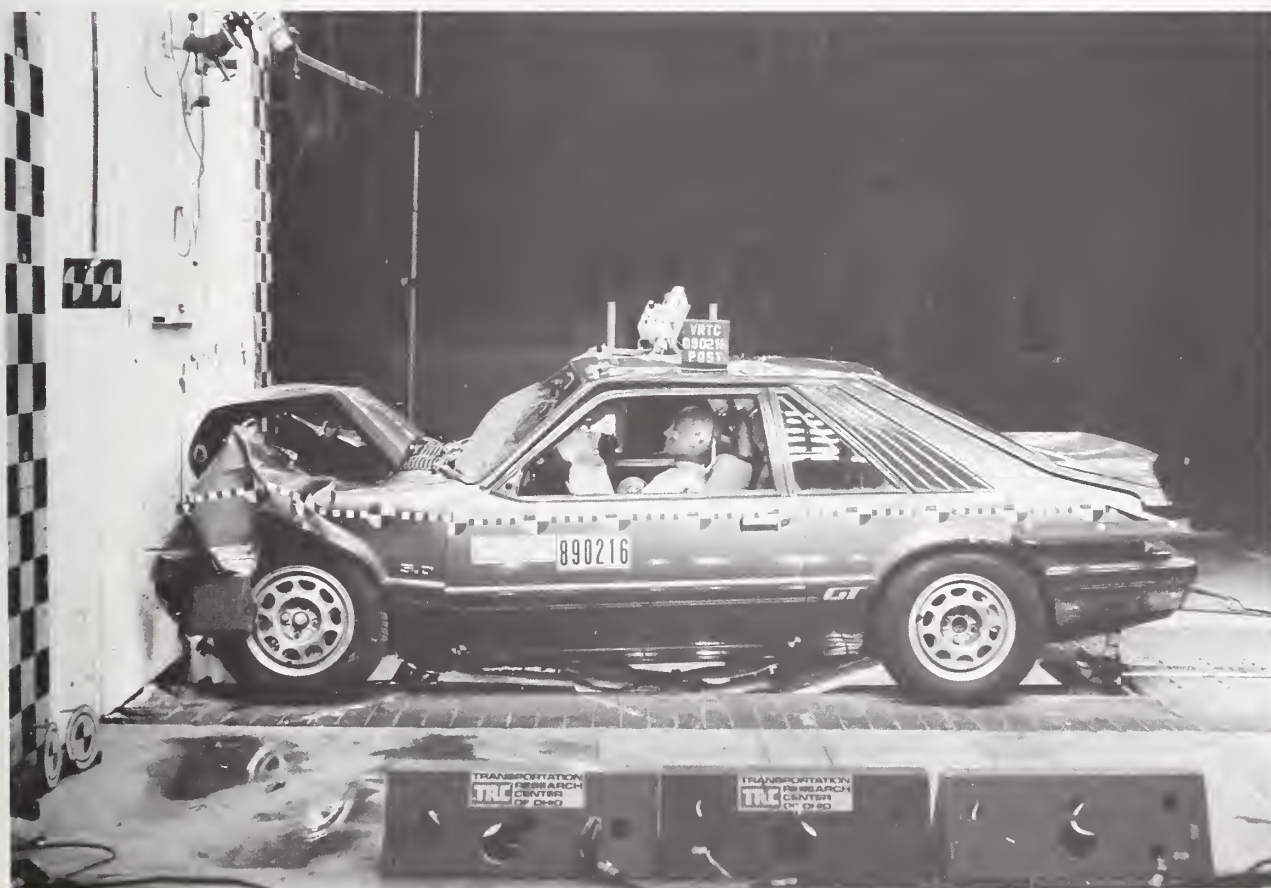


Figure A-4. POST-TEST LEFT SIDE VIEW

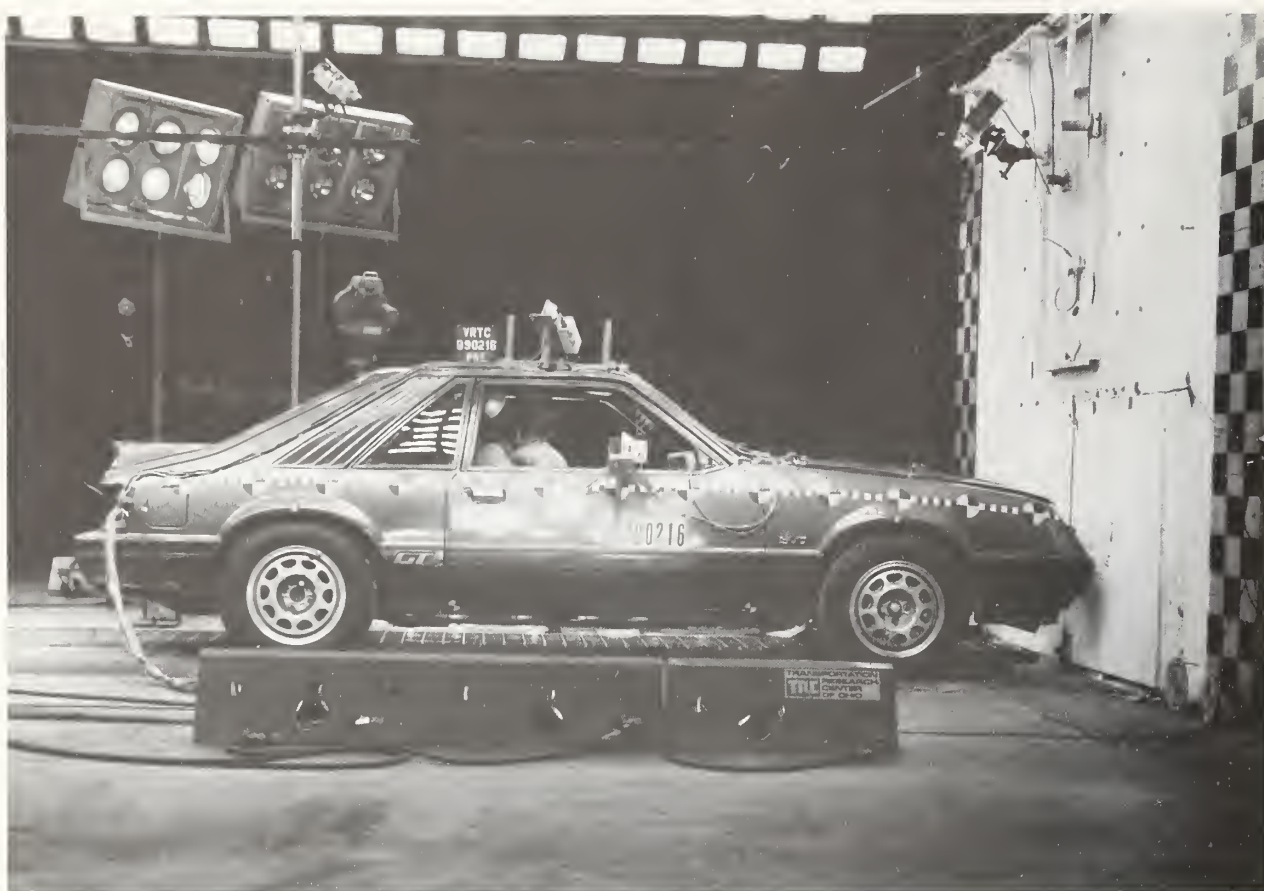


Figure A-5. PRE-TEST RIGHT SIDE VIEW

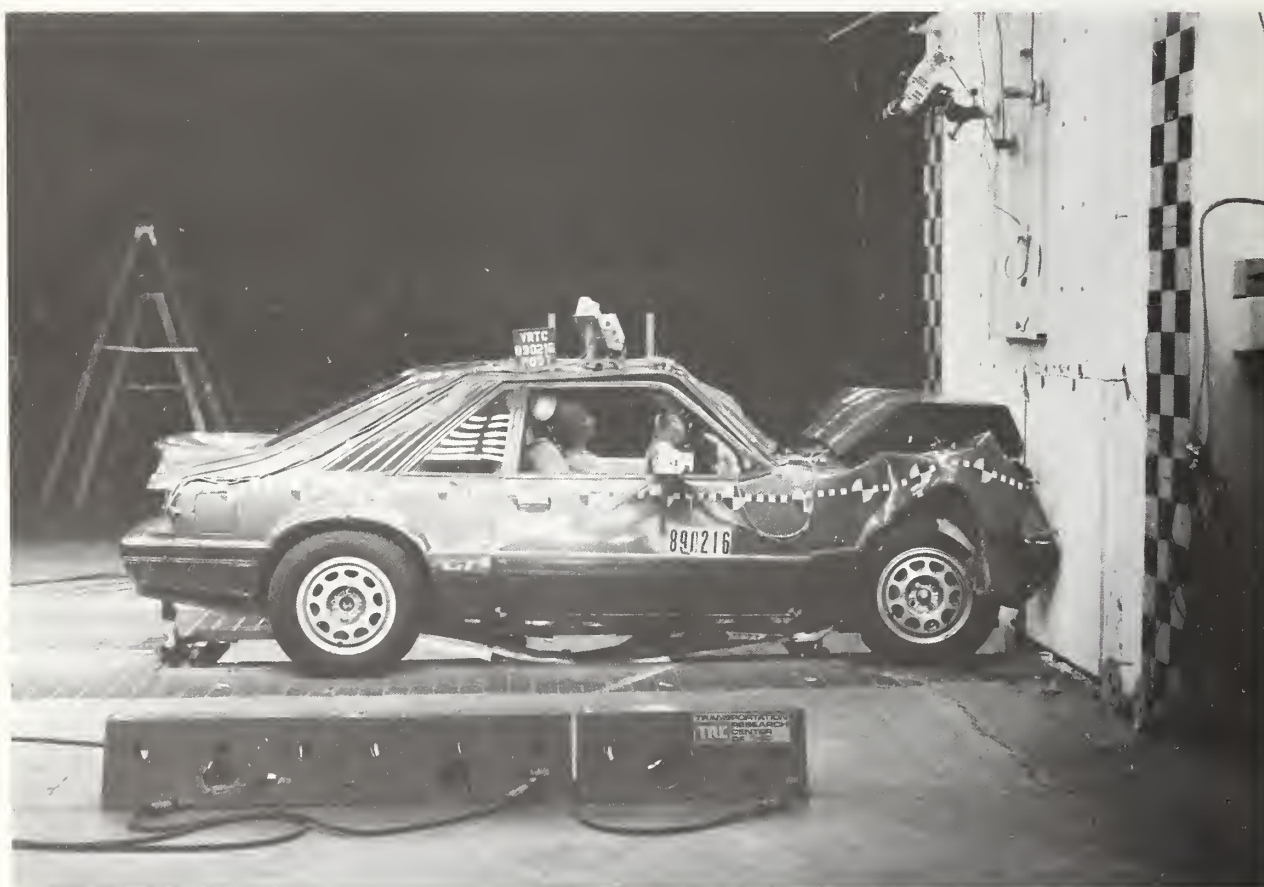


Figure A-6. POST-TEST RIGHT SIDE VIEW



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

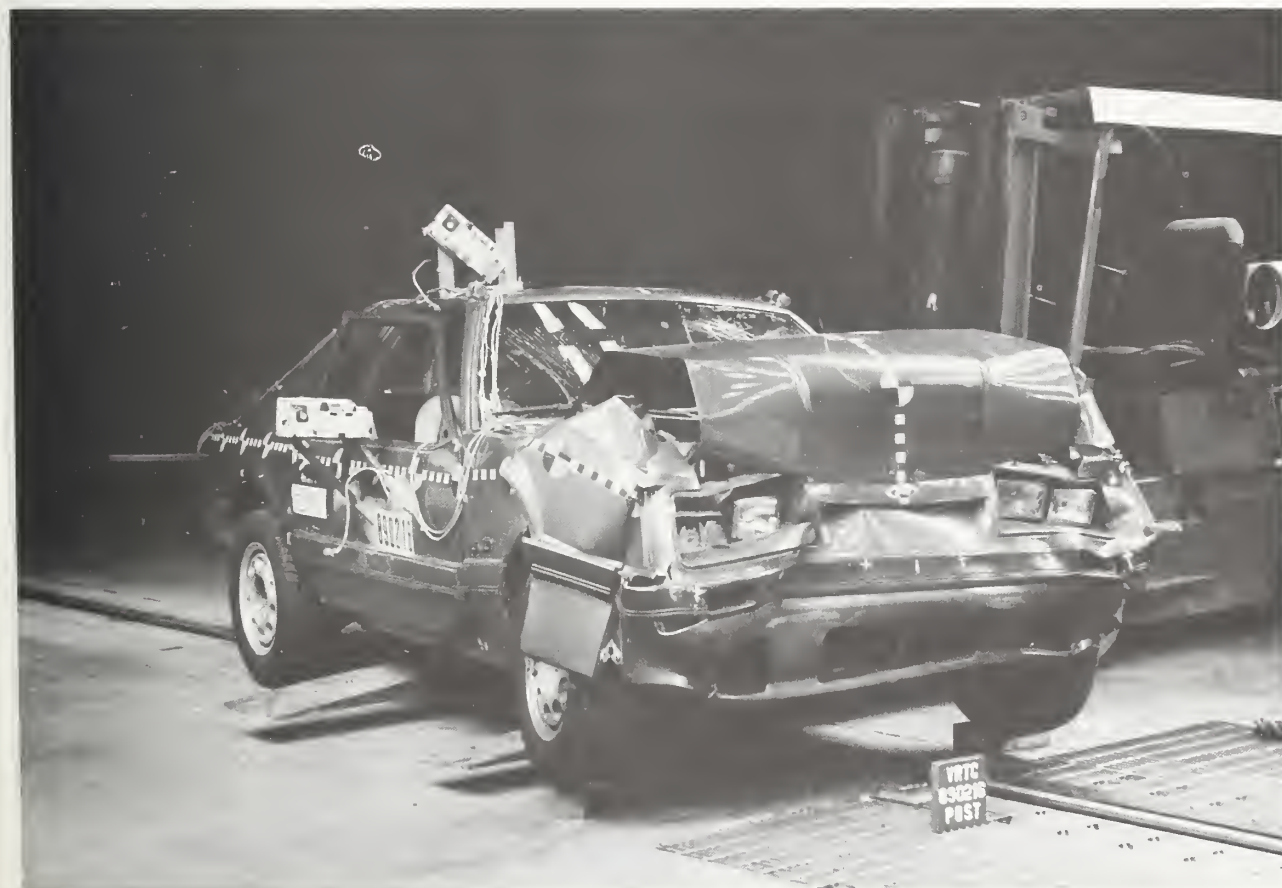


Figure A-8. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

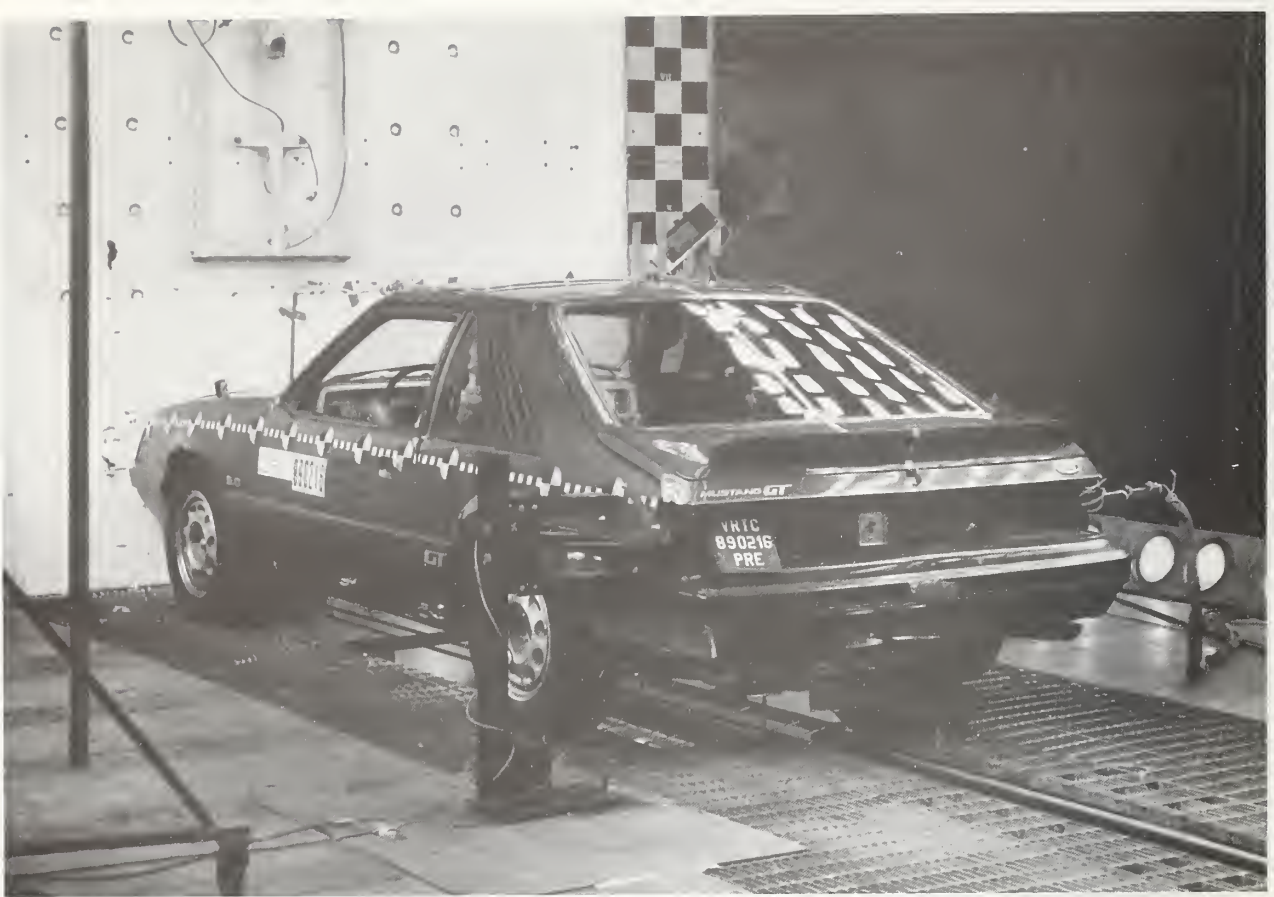


Figure A-9. PRE-TEST LEFT REAR THREE-QUARTER VIEW



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

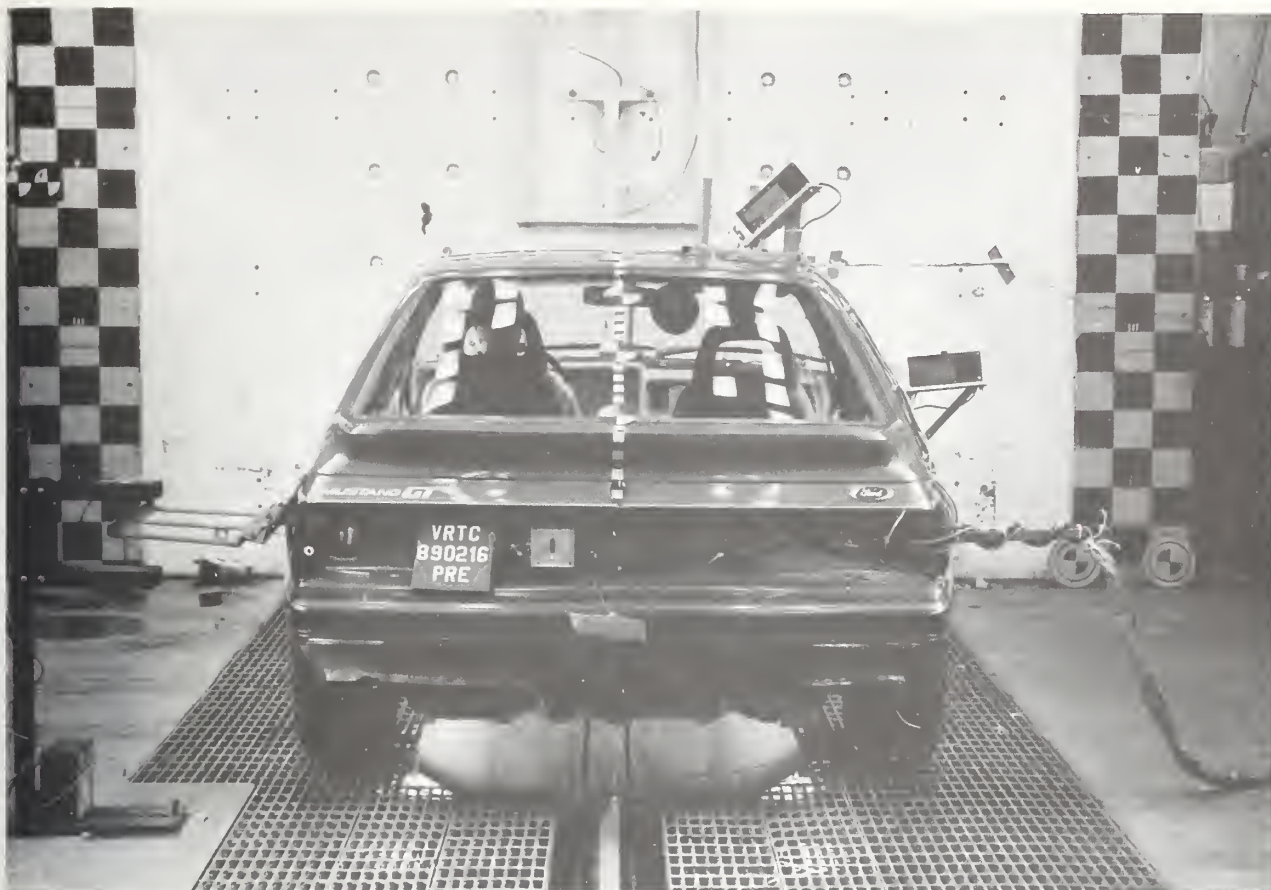


Figure A-11. PRE-TEST REAR VIEW



Figure A-12. POST-TEST REAR VIEW

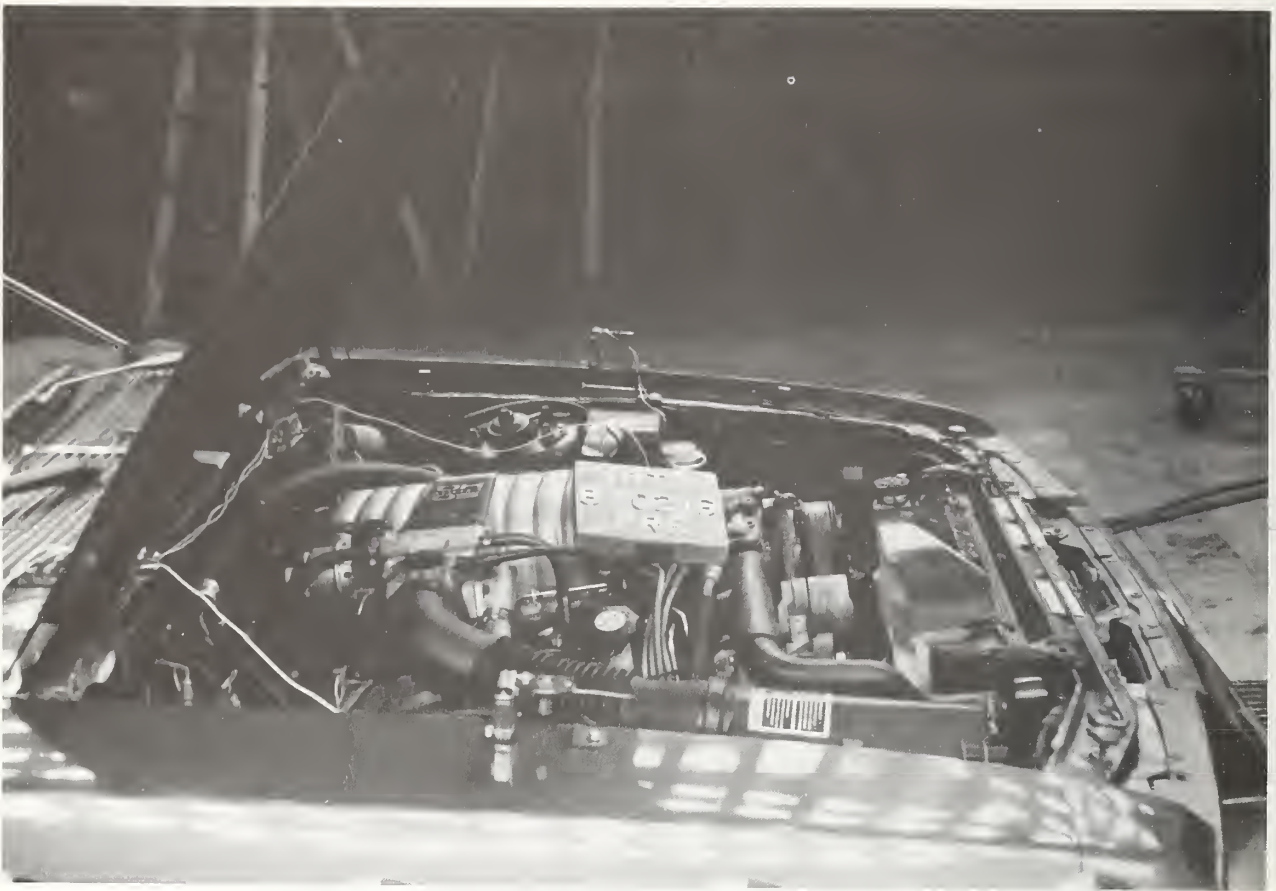


Figure A-13. PRE-TEST ENGINE COMPARTMENT VIEW

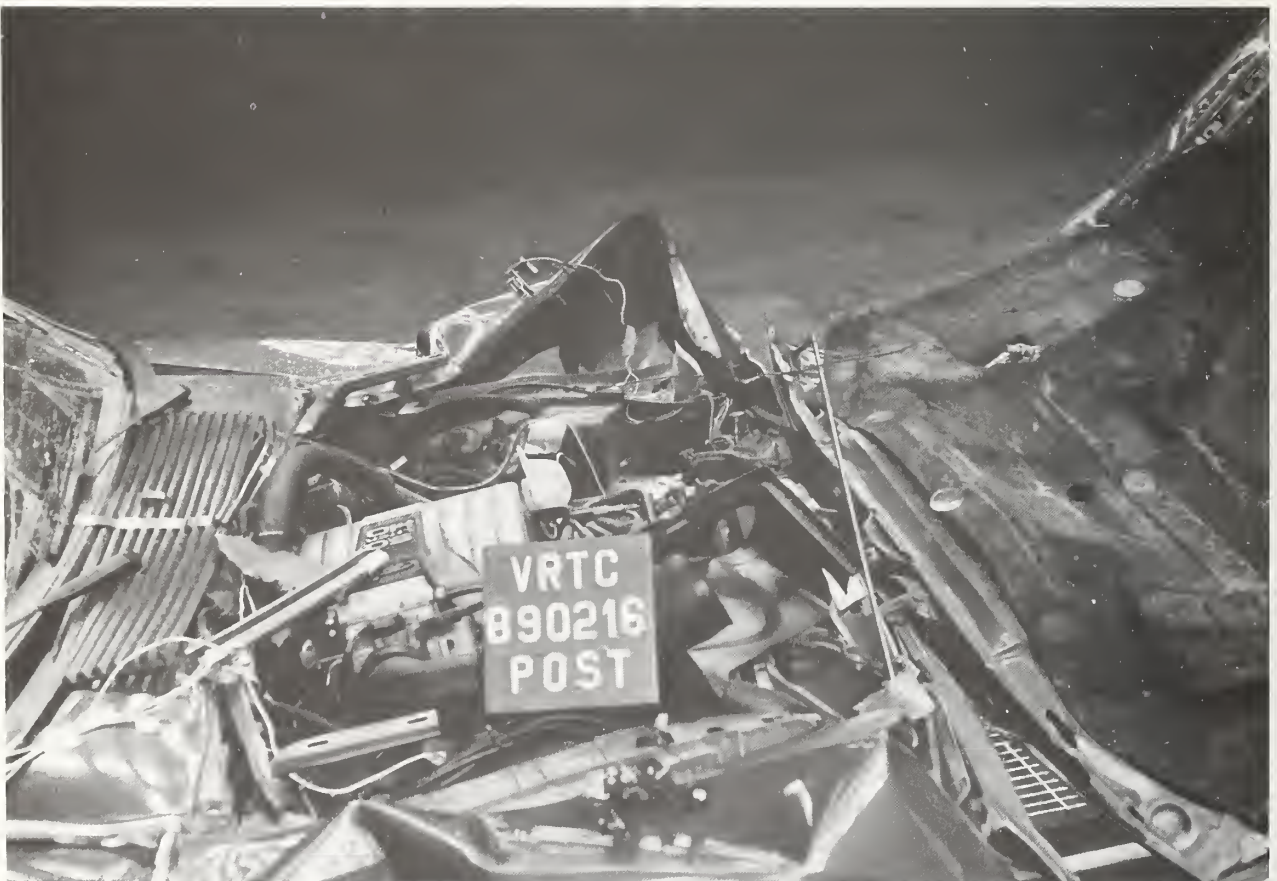


Figure A-14. POST-TEST ENGINE COMPARTMENT VIEW

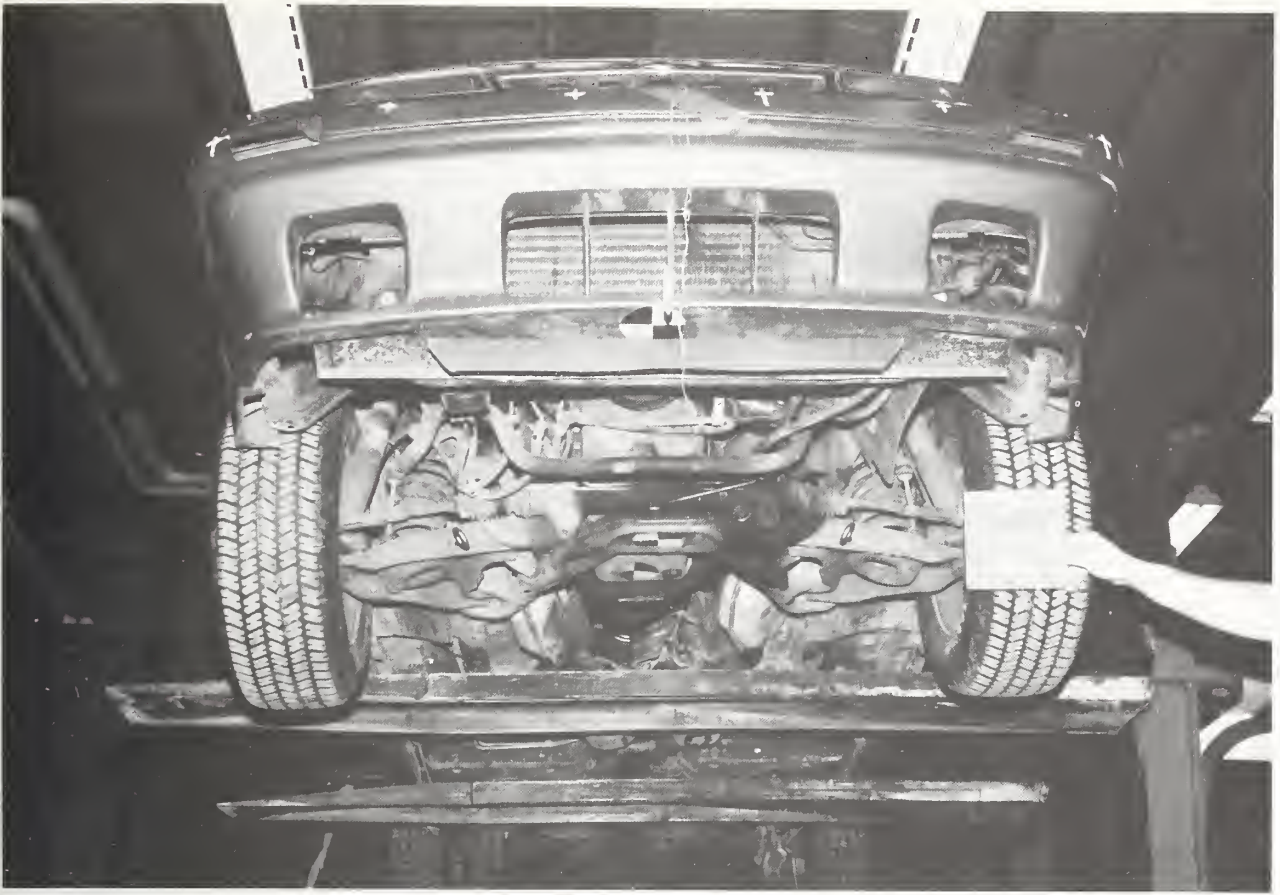


Figure A-15. PRE-TEST FRONT UNDERBODY VIEW

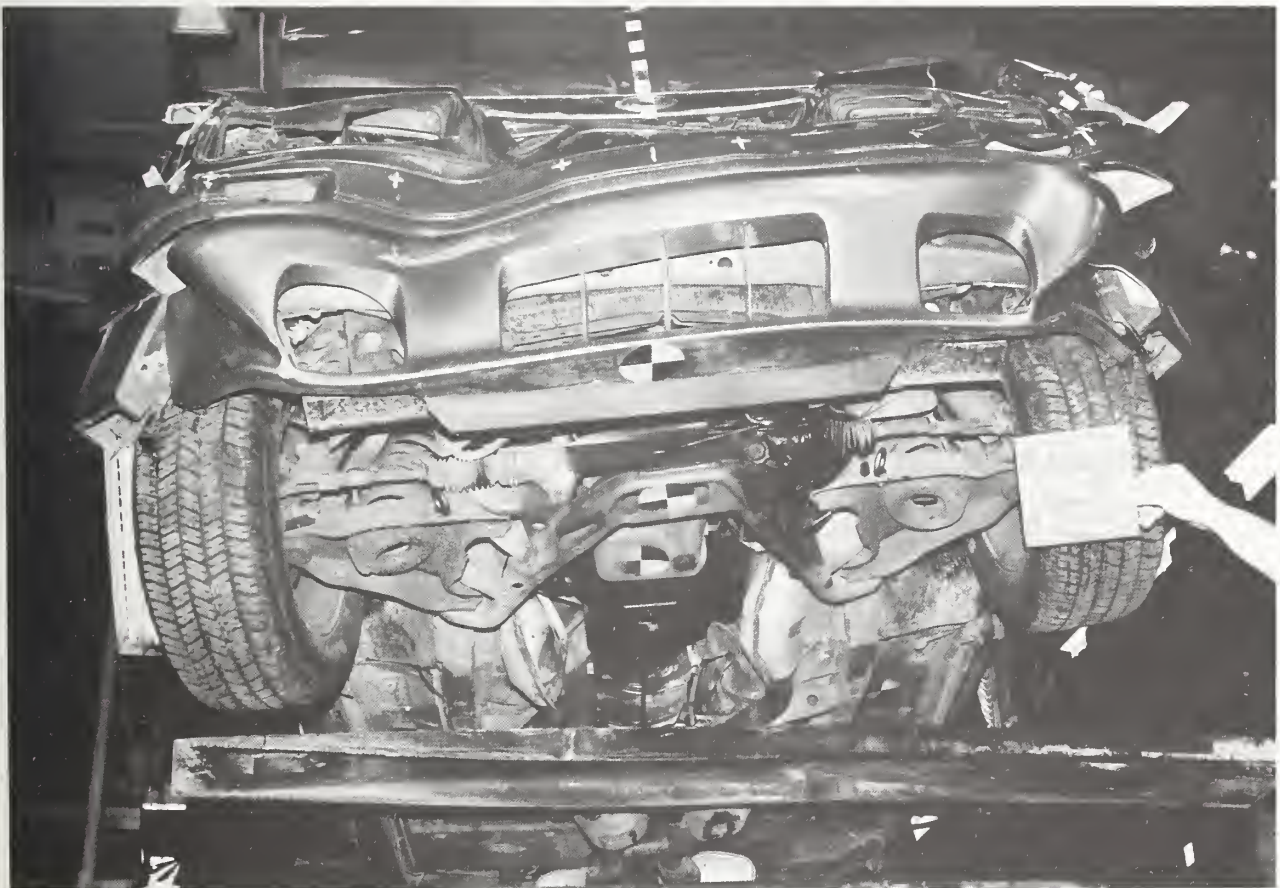


Figure A-16. POST-TEST FRONT UNDERBODY VIEW



Figure A-17. PRE-TEST DRIVER DUMMY POSITION VIEW



Figure A-18. POST-TEST DRIVER DUMMY POSITION VIEW

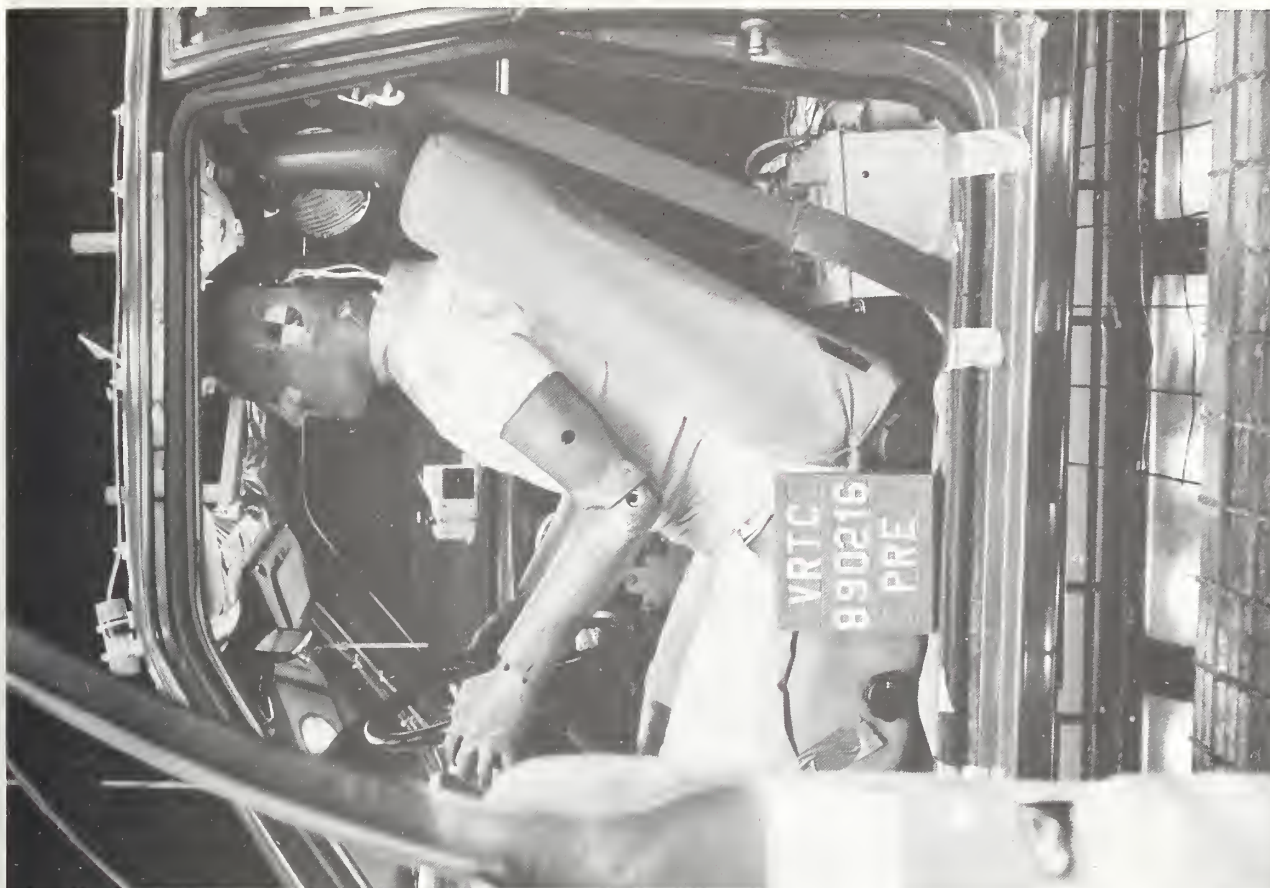


Figure A-19. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1



Figure A-20. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1



Figure A-21. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-22. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2



Figure A-23. POST-TEST DRIVER DUMMY HEAD CONTACT



Figure A-24. PRE-TEST DRIVER DUMMY KNEE BLOCKER MODIFICATION



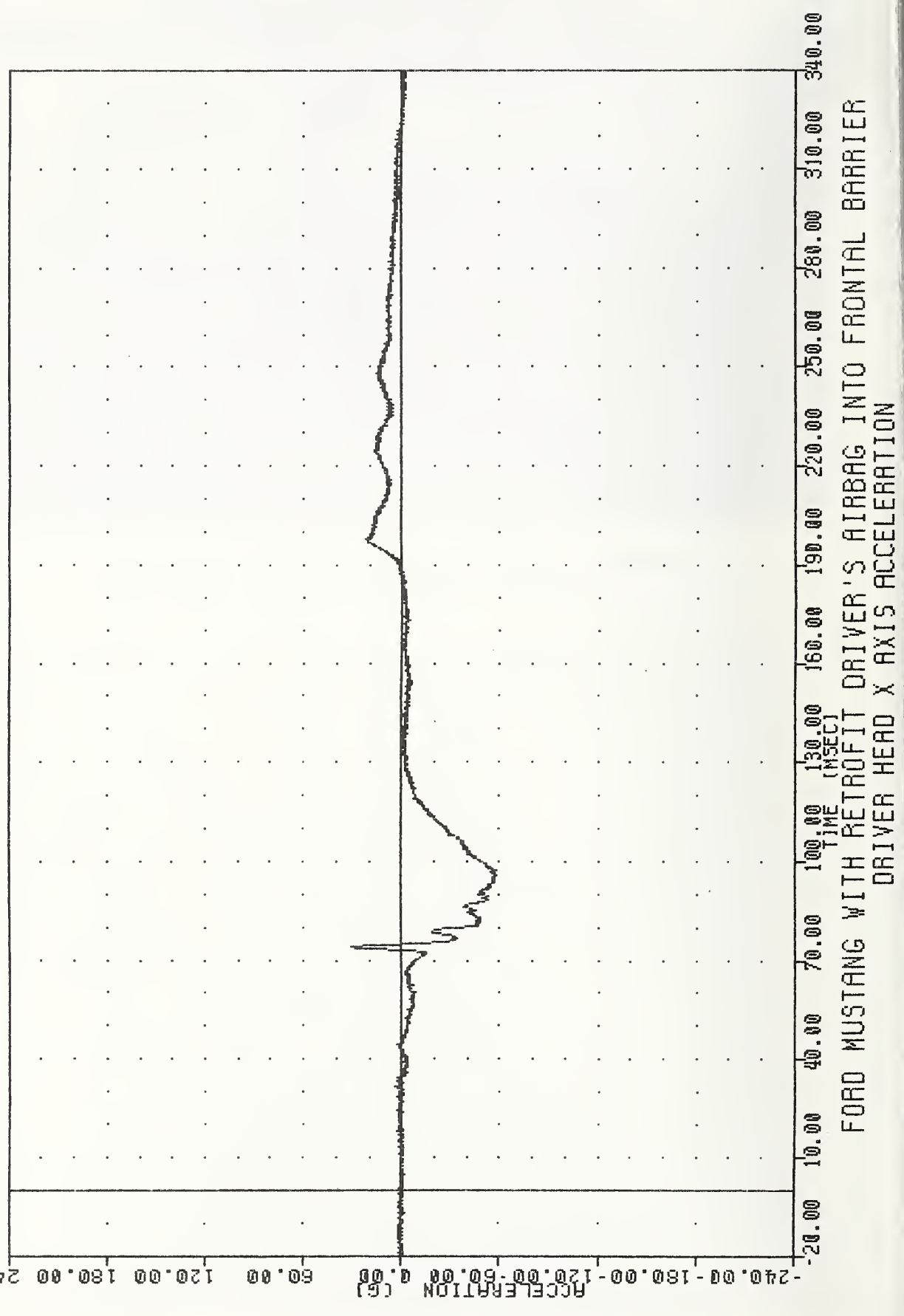
Figure A-25. POST-TEST DRIVER DUMMY KNEE CONTACT

APPENDIX B

DATA PLOTS

TRC ,890216
AIRBAG DEMONSTRATION
89047
HEDXG1

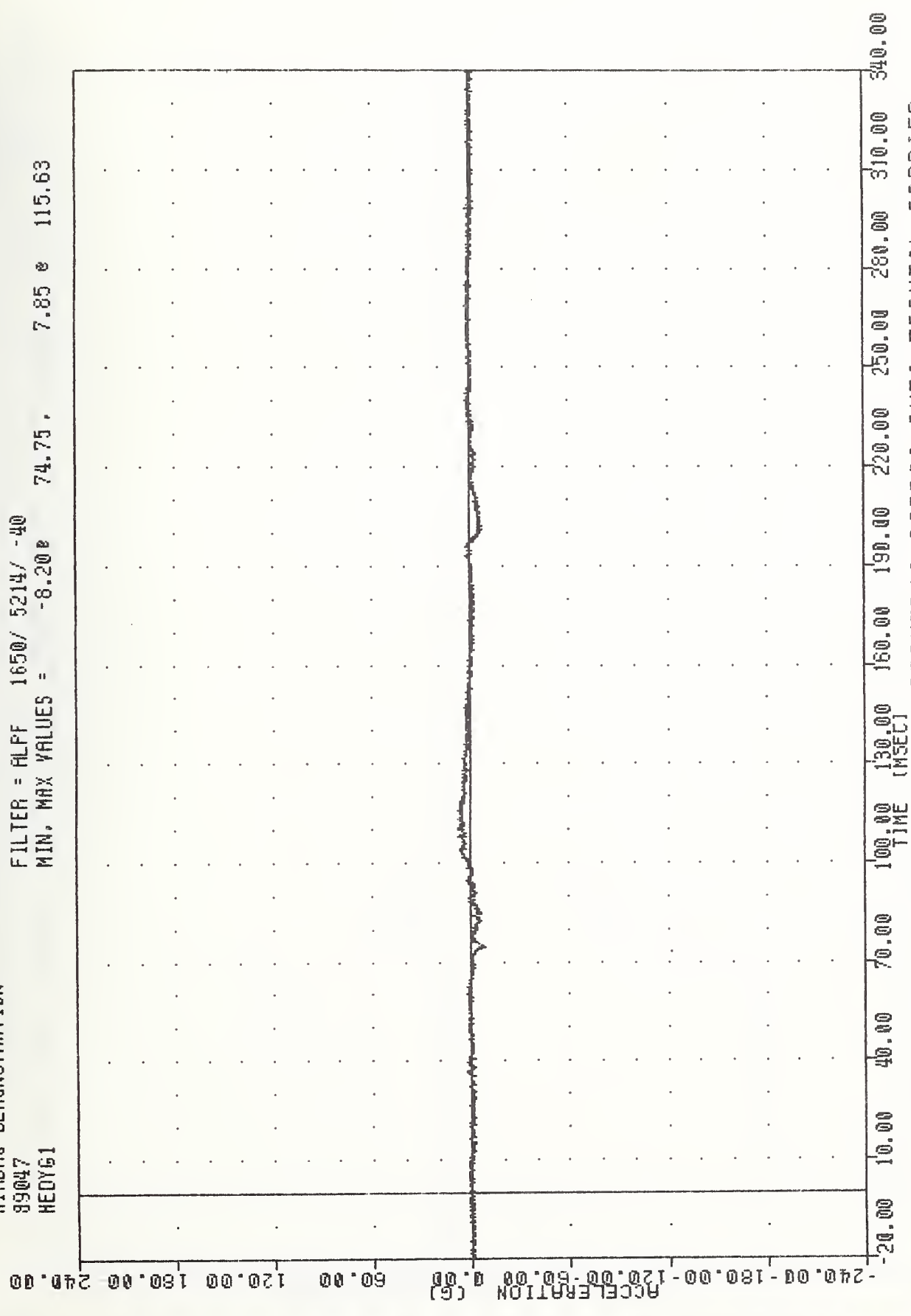
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -56.298 97.25. 31.45 e 74.00



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER HEAD X AXIS ACCELERATION

TRC , 890216
 AIRBAG DEMONSTRATION
 89047
 HEDY61

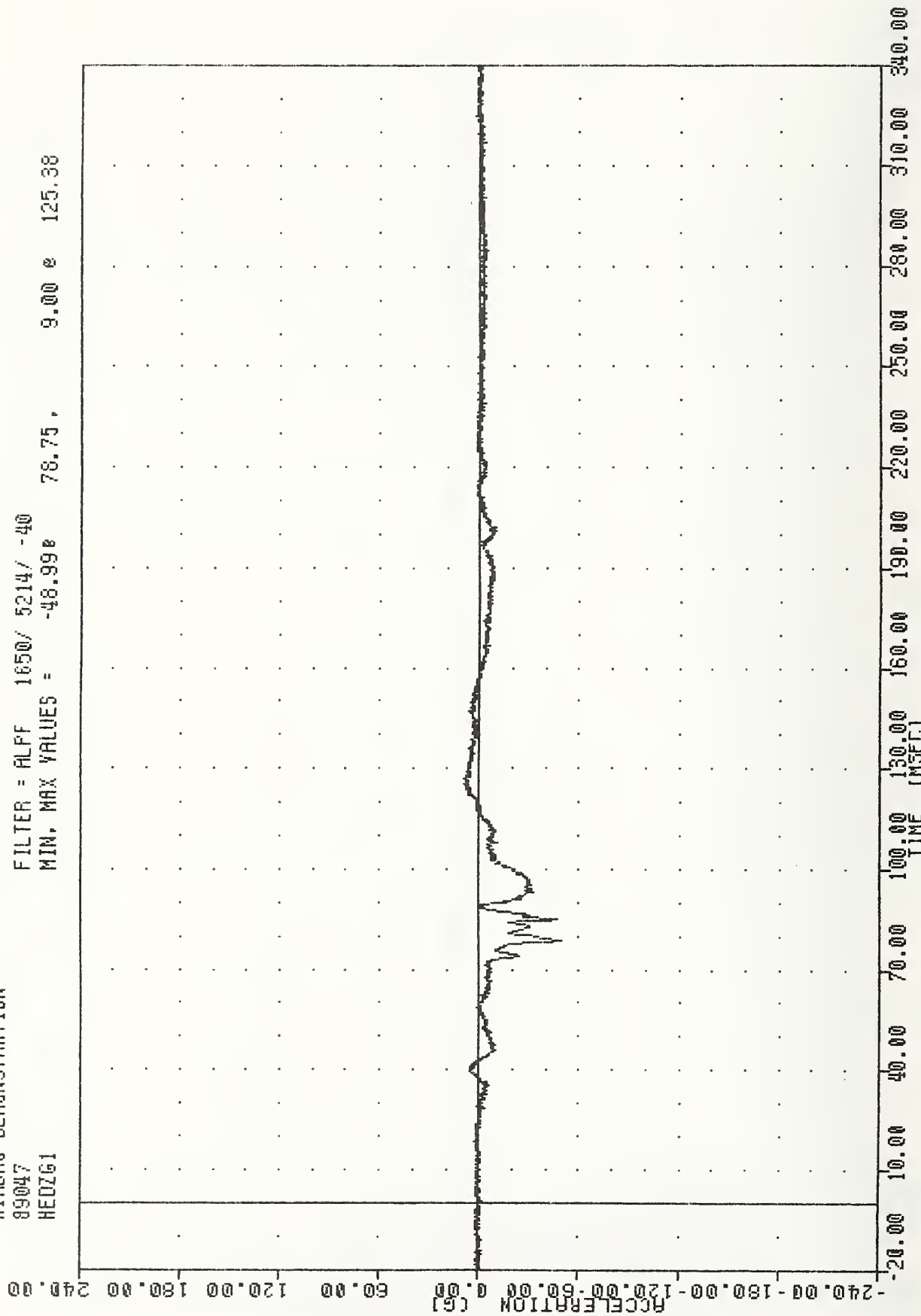
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -8.20e 74.75 , 7.85 e 115.63



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
 DRIVER HEAD Y AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
HE0261

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -48.998 78.75, 9.00 125.38

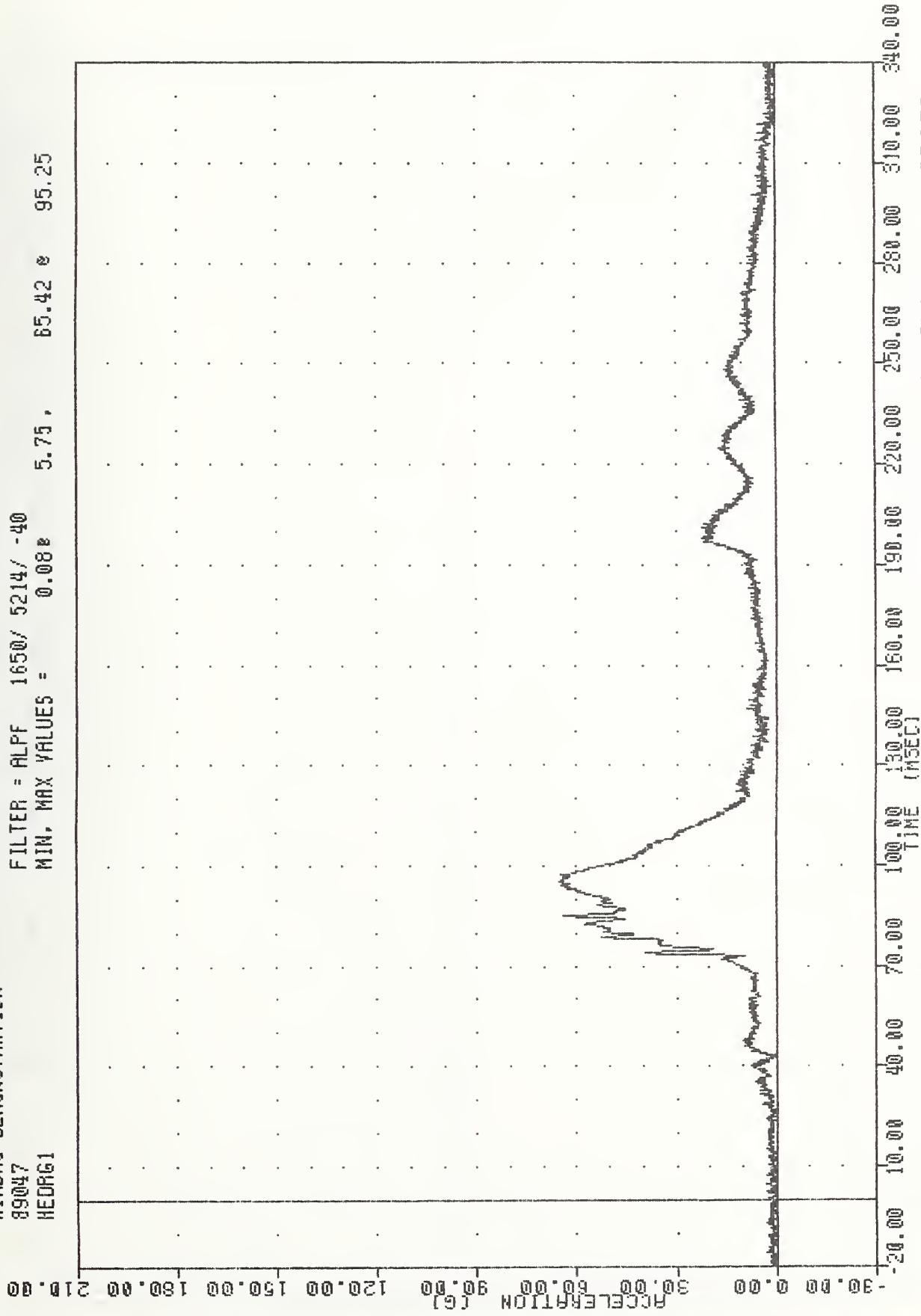


FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER HEAD Z AXIS ACCELERATION

TRC , 890216
AIRBAG DEMONSTRATION
89047
HEADG1

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.08e

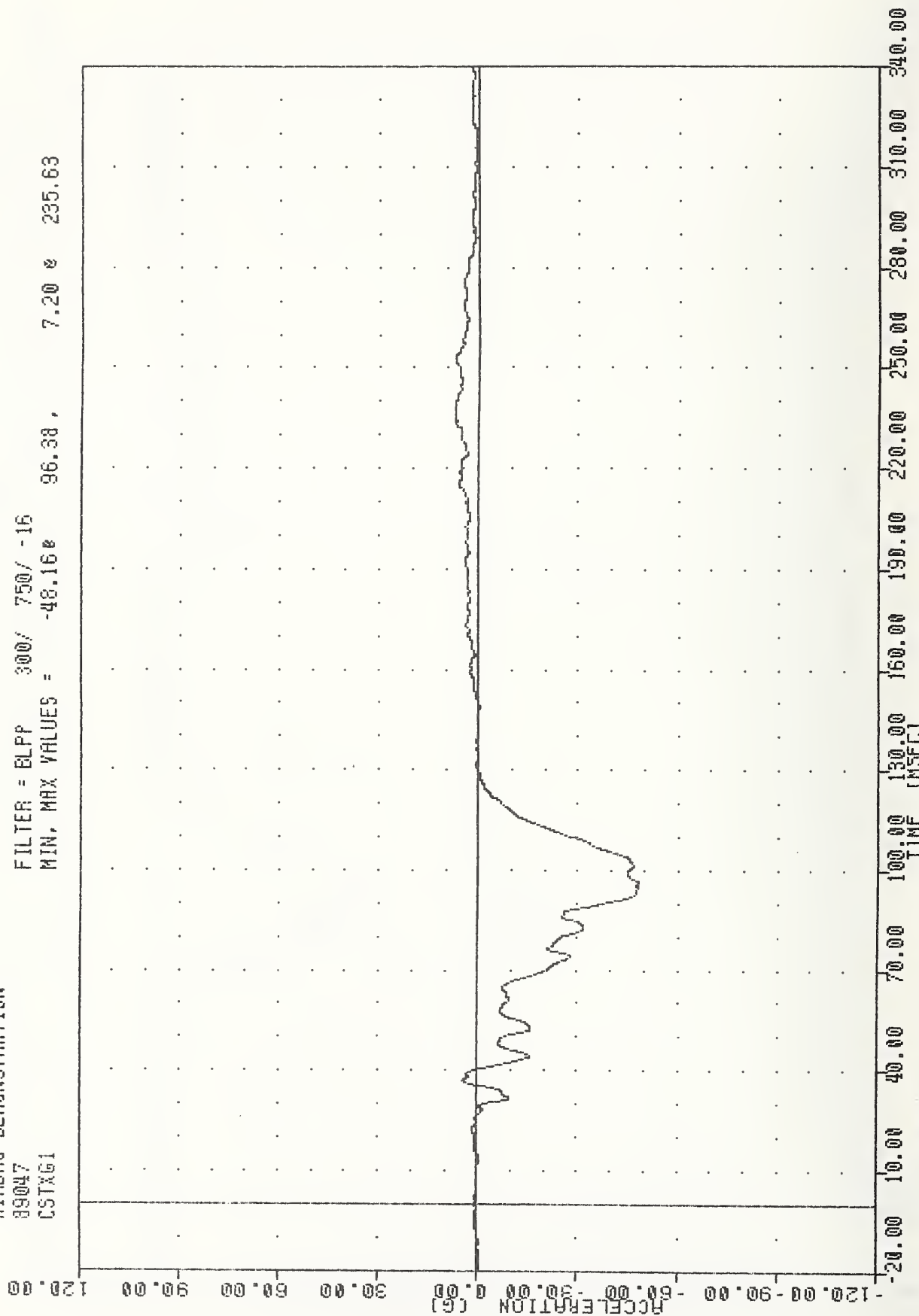
5.75 , 65.42 e 95.25



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
CSTXG1

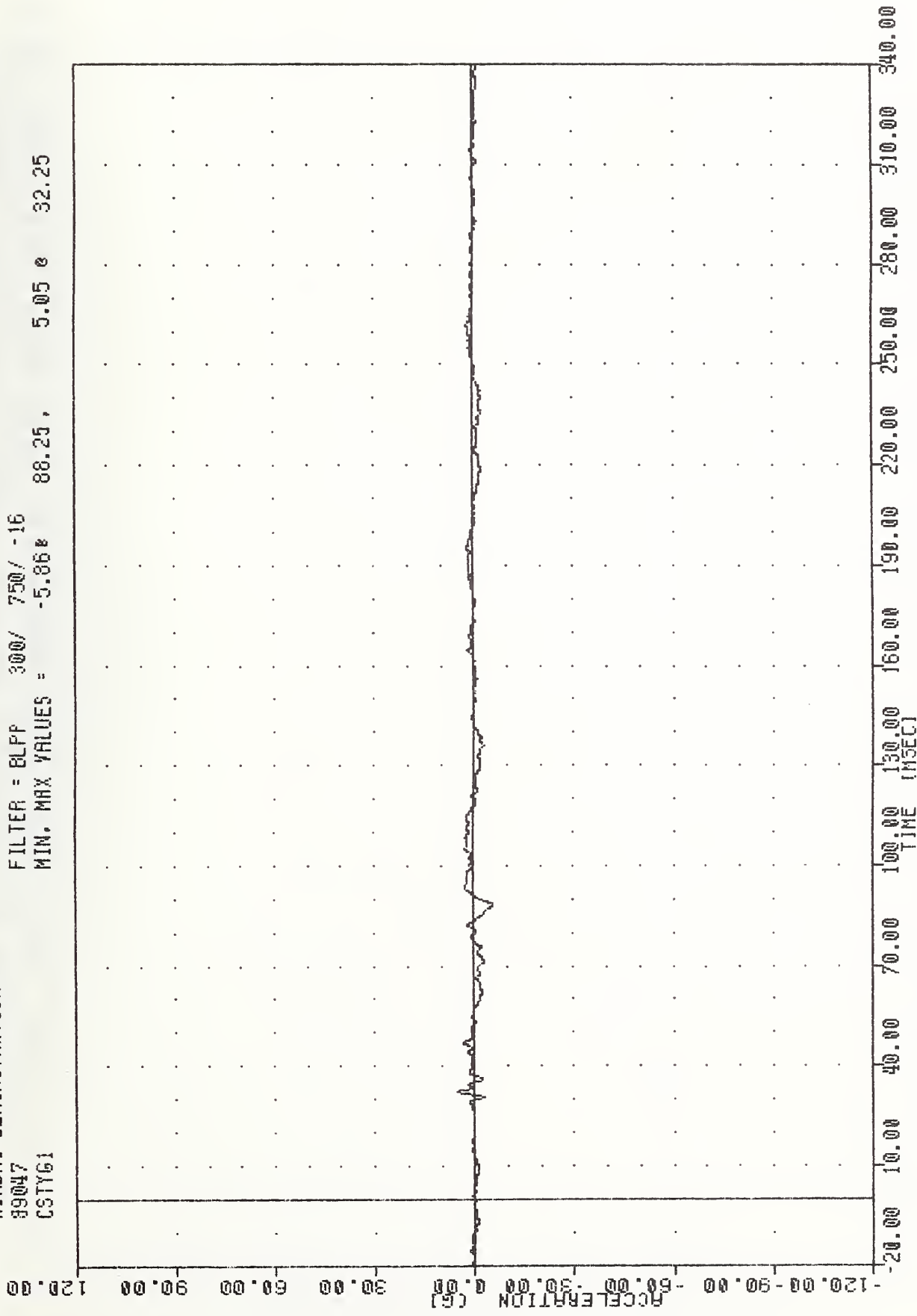
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -48.16 96.38, 7.20 235.63



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER CHEST X AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
CSTY61

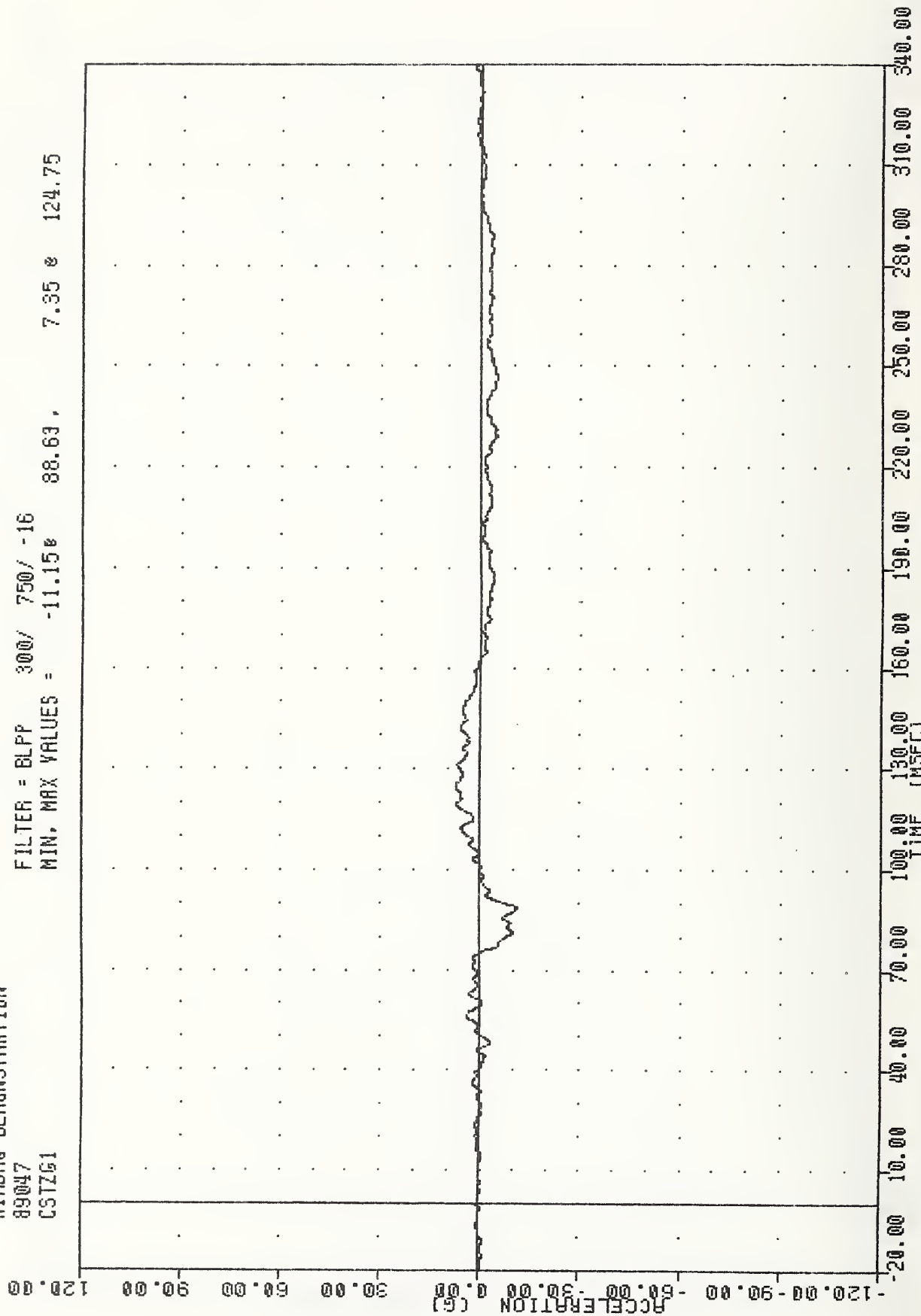
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -5.86 88.25 5.05 32.25



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER CHEST Y AXIS ACCELERATION

TRC , 890216
AIRBAG DEMONSTRATION
89047
CSTZG1

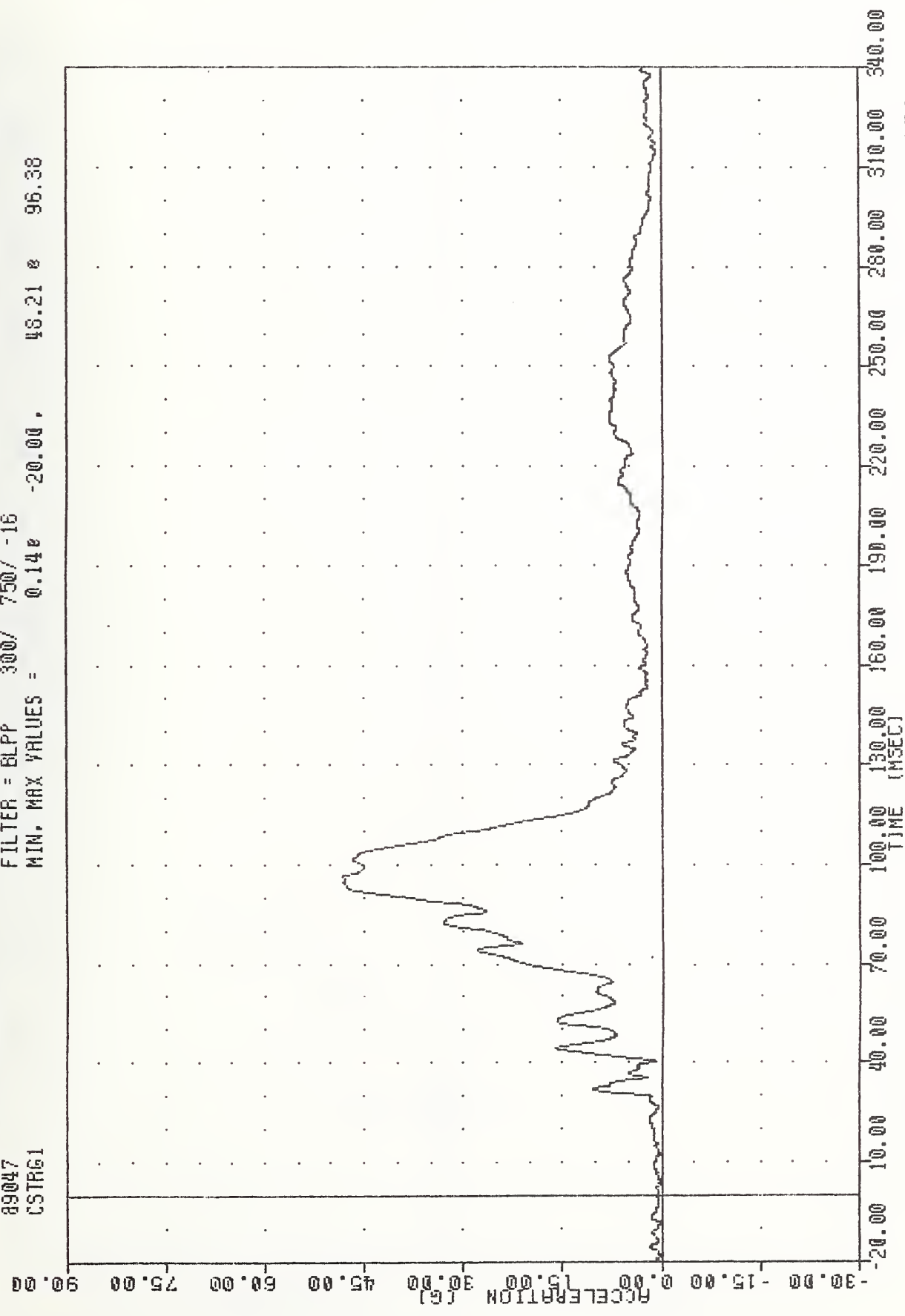
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -11.15e 88.63, 7.35 e 124.75



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER CHEST Z AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
CSTRG1

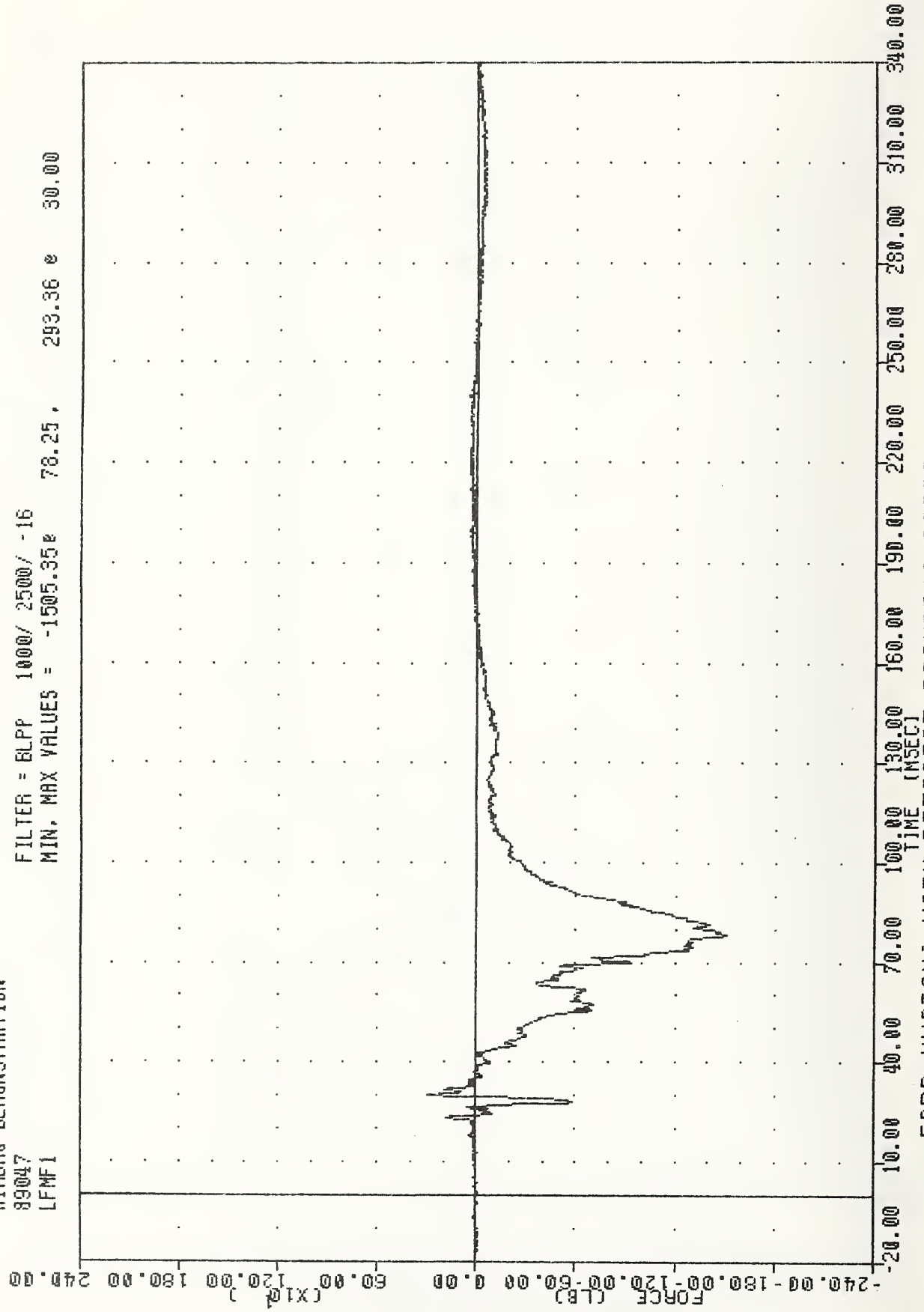
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = 0.14e -20.00 48.21 e 96.38



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
LFMF1

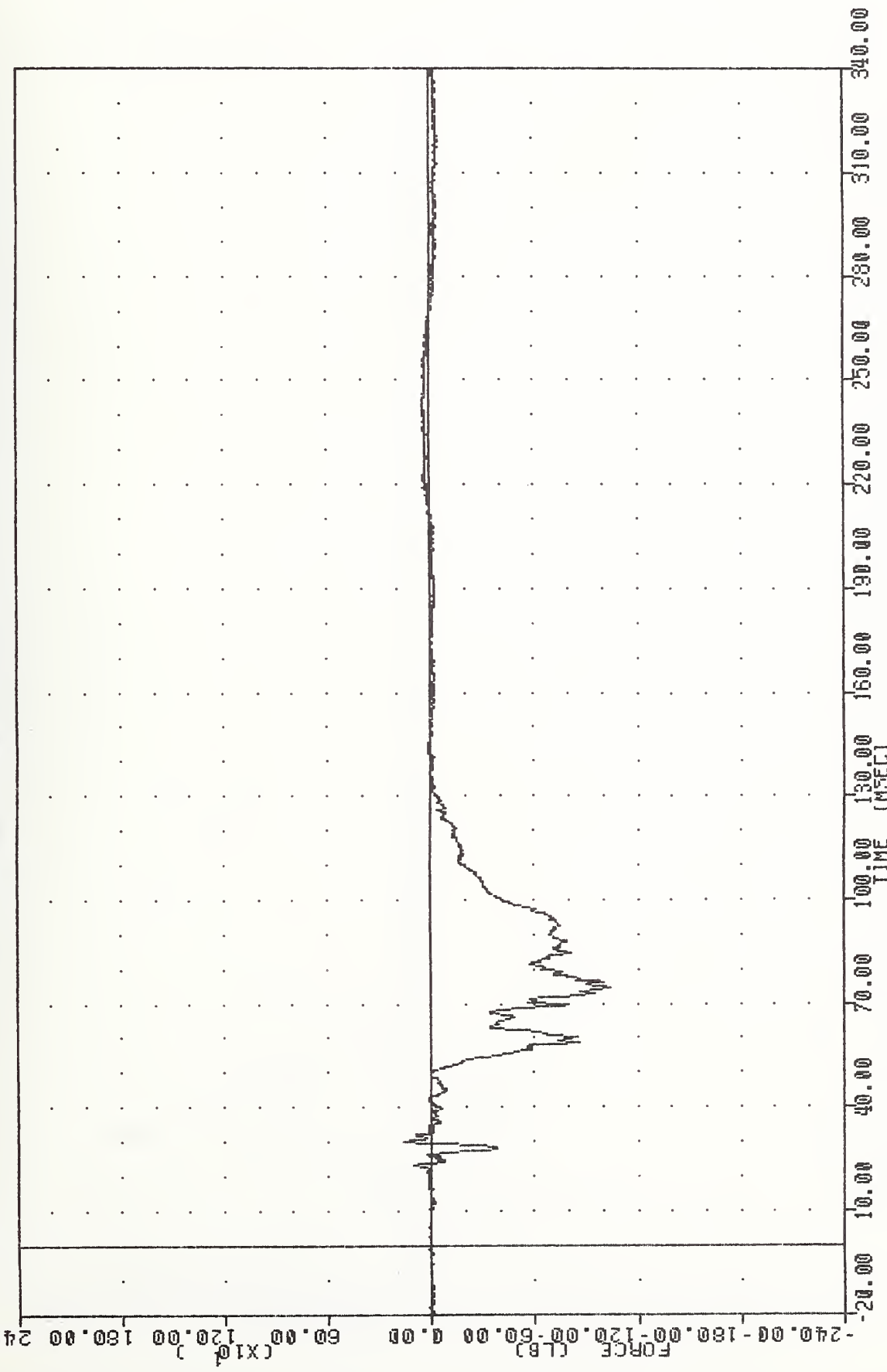
FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -1505.350 78.25, 293.36 0 30.00



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE

TRC
AIRBAG DEMONSTRATION
89047
AFMF1

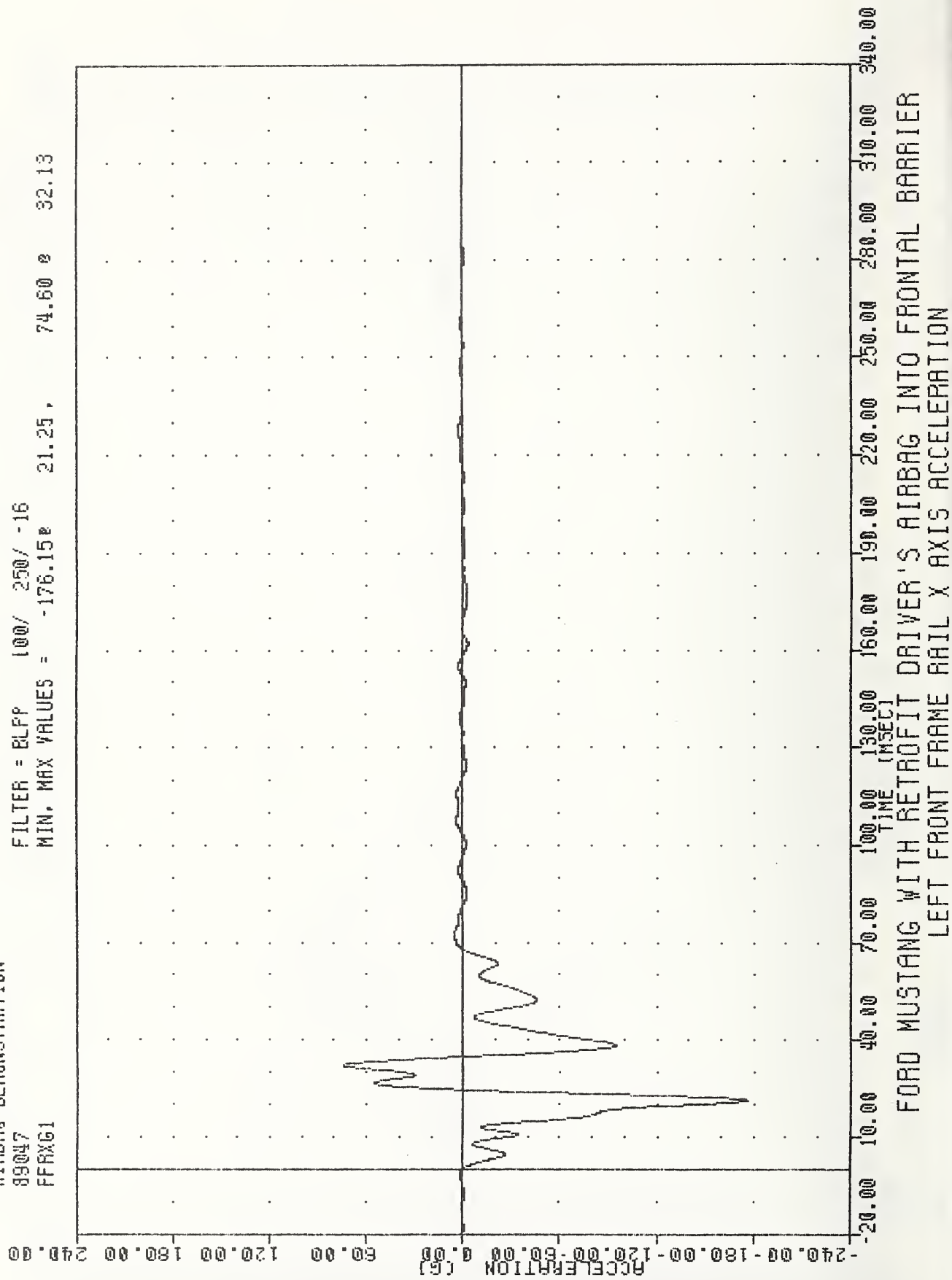
FILTER = BLPP 1000/ 2500/ -16
MIN. MAX VALUES = -1035.128 74.63. 162.95 30.13



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE

TRC , 890216
AIRBAG DEMONSTRATION
89047
FFRX61

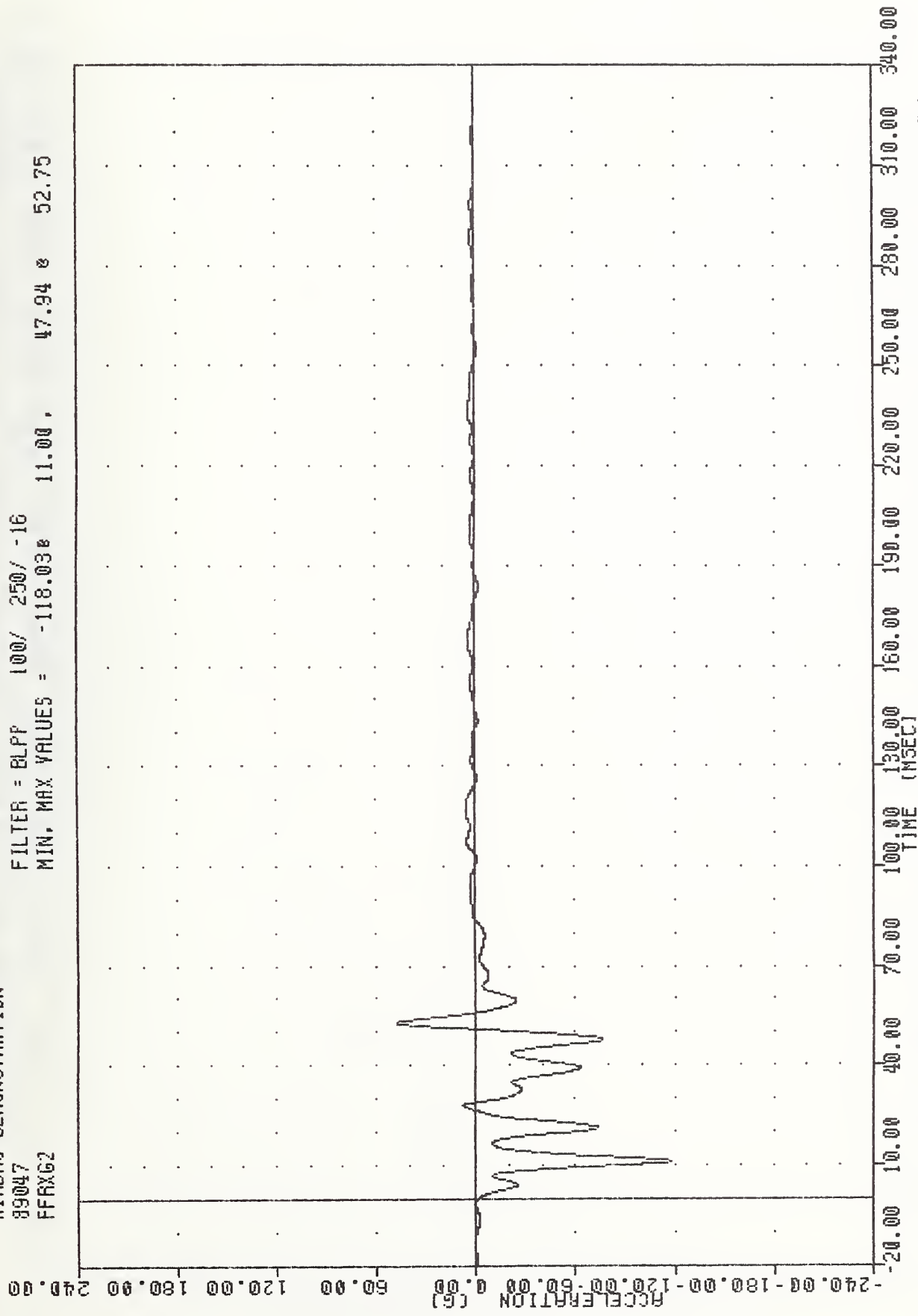
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -176.15 21.25 , 74.60 32.13



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
LEFT FRONT FRAME RAIL X AXIS ACCELERATION

TRC , 890216
AIRBAG DEMONSTRATION
89047
FFRX62

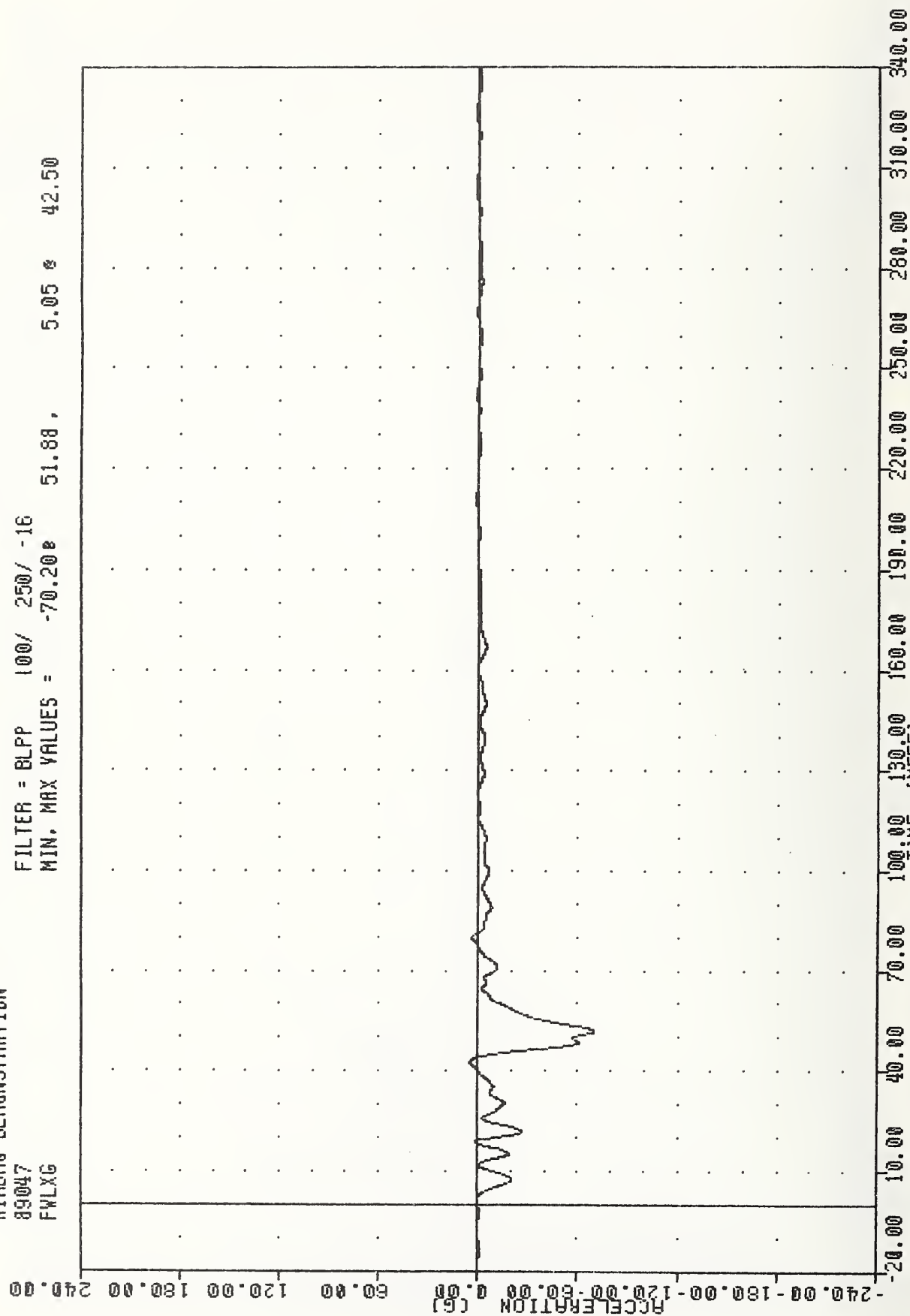
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -118.03g 11.00, 47.94 g 52.75



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
RIGHT FRONT FRAME RAIL X AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
FWLXG

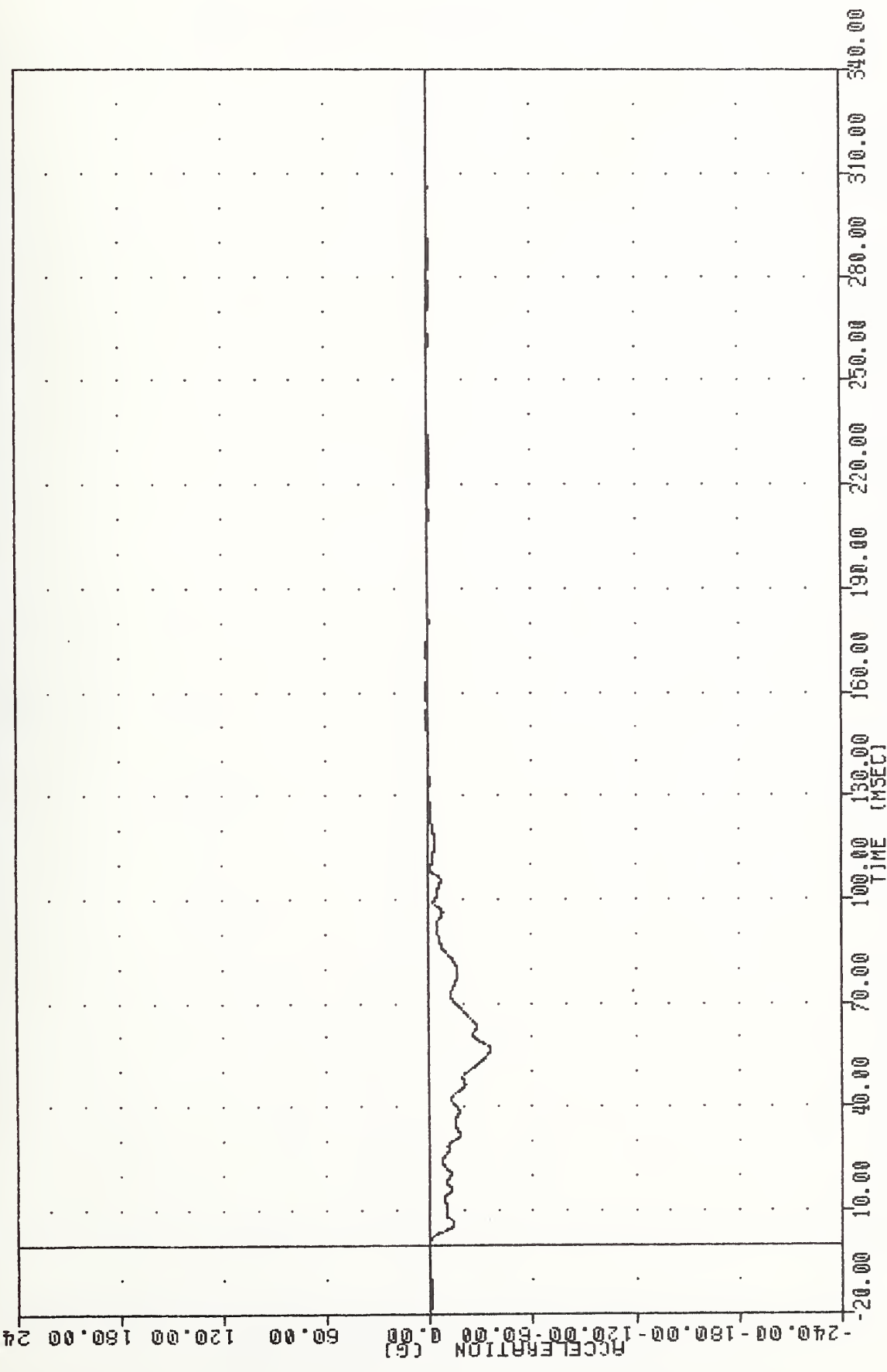
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -70.20 51.88 , 5.05 42.50



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
FIREWALL X AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
LPBXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -35.68 56.75 1.57 151.63

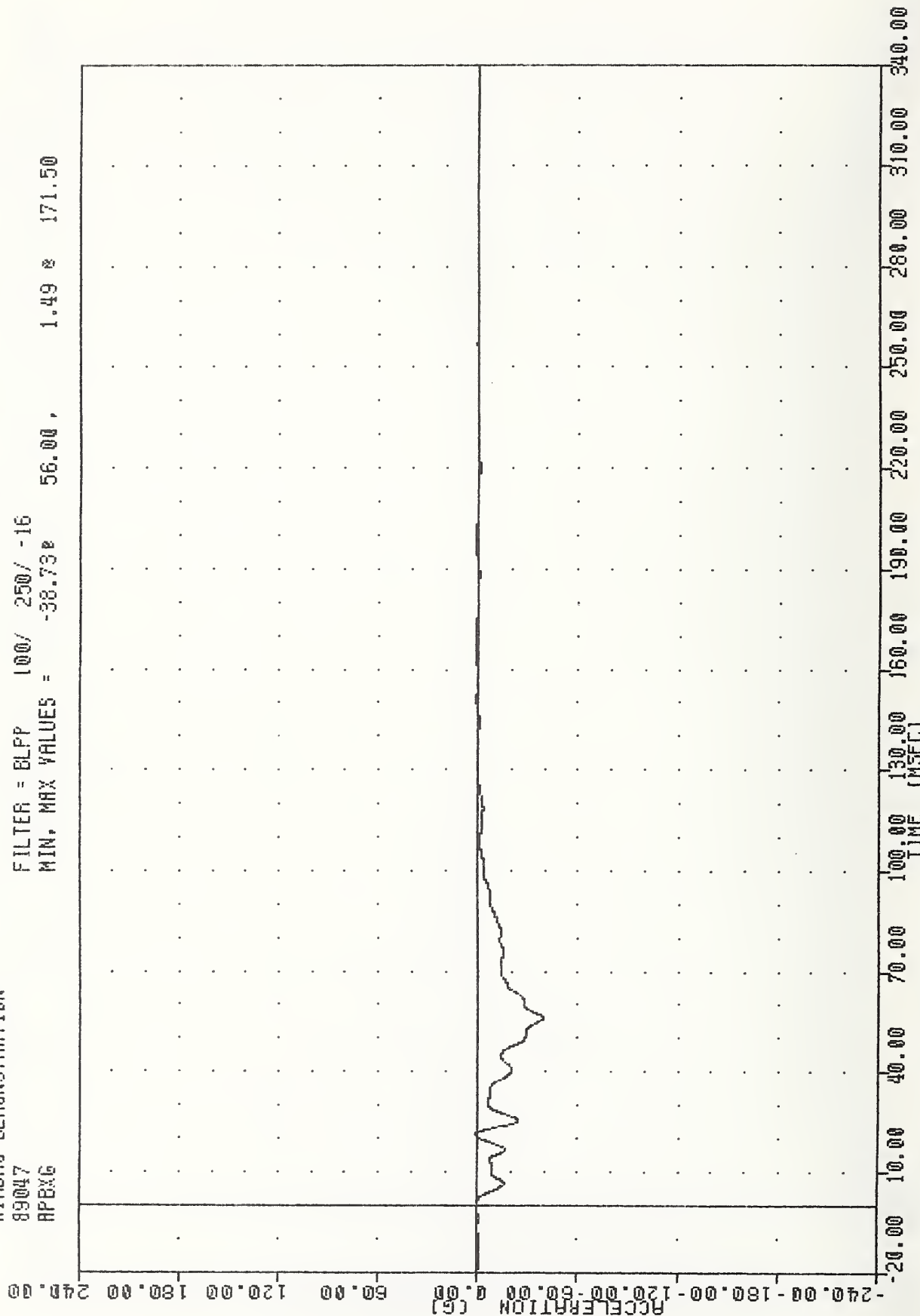


FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
LEFT B-PILLAR X AXIS ACCELERATION

TRC
AIRBAG DEMONSTRATION
89047
APBXG

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -38.73e 56.00, 1.49 e 171.50



FORD MUSTANG WITH RETROFIT DRIVER'S AIRBAG INTO FRONTAL BARRIER
RIGHT B-PILLAR X AXIS ACCELERATION

APPENDIX C

DUMMY CALIBRATION INFORMATION

PRE-TEST CALIBRATION

S/N: 830

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

08-FEB-89

TEMPERATURE 70 F
VRTC ED83018RELATIVE HUMIDITY 19 %
572B SN830 EXT. DIMENSION CAL18

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN 830 ALDERSON		
Sitting Height	35.6 - 35.8 IN	35.6 IN
Shoulder Pivot Height	21.8 - 22.4 IN	22.3 IN
Hip Pivot Height	3.9 IN (ref)	3.9 IN
Hip Pivot From Backline	4.8 IN (ref)	4.8 IN
Knee Pivot From Backline	20.1 - 20.7 IN	20.6 IN
Rear of Head From Backline	1.7 IN (ref)	1.7 IN
Chest Depth	9.1 - 9.6 IN	9.2 IN
Shoulder Width	17.8 - 18.4 IN	18.1 IN
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.3 IN
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.2 IN
Hip Width	14.0 - 15.4 IN	14.6 IN
Knee Pivot From Floor	19.3 - 19.9 IN	19.4 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

09-Feb-89

TEMPERATURE 71 F
VRTC HD83018RELATIVE HUMIDITY 19 %
572B SN 830 HEAD DROP CAL 18

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	246.00 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.22 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	-1.33 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

10-Feb-89

TEMPERATURE 72 F
VRTC HN83018

RELATIVE HUMIDITY 21 %
572B SN 830 HEAD/NECK CAL 18

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	21.5 to 25.5 ft/sec	24.74 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.51 msec
T2 - T3: 20 - 20 G	25 - 30 msec	26.27 msec
T3 - T4: 20 - 5 G	10 msec max	8.45 msec
Avg. G level T2 - T3	20 - 24 G	22.49 G
Maximum Rotation Angle	63 - 73 des	63.52 des
Peak Head Resultant Accel	26 G max	24.09 G

Test Parameter	Specification	Test Results
Rotation Angle	Time	Chordal Disp.
(degrees)	(msec)	(in)
0	-2.0 - +2.0	-0.5 - +0.5
30	25.6 - 34.4	2.1 - 3.1
60	40.3 - 51.7	4.3 - 5.3
max	53.2 - 66.8	5.0 - 6.0
60	67.0 - 83.0	4.3 - 5.3
30	85.4 - 104.6	2.1 - 3.1
0	101.0 - 123.0	-0.5 - +0.5

SND: 6.10 in

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

10-Feb-89

TEMPERATURE 72 F
VRTC TL83018RELATIVE HUMIDITY 21 %
572B SN 830 L.S.THORAX CAL 18

	LOW SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.04 FT/SEC

PEAK DEFLECTION	1.1 IN max.	0.95 IN

PEAK RESISTIVE FORCE	1,450. LB max.	1290. LB

INTERNAL HYSTERESIS	50% - 70%	67.4%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

10-Feb-89

TEMPERATURE 72 F
VRTC TH83018

RELATIVE HUMIDITY 21 %
572B SN 830 H.S. THORAX CAL 18

	HIGH SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC

PEAK DEFLECTION	1.7 IN max.	1.38 IN

PEAK RESISTIVE FORCE	2,250. LB max.	2025. LB

INTERNAL HYSTERESIS	50% - 70%	64.7%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton-----

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

09-Feb-89

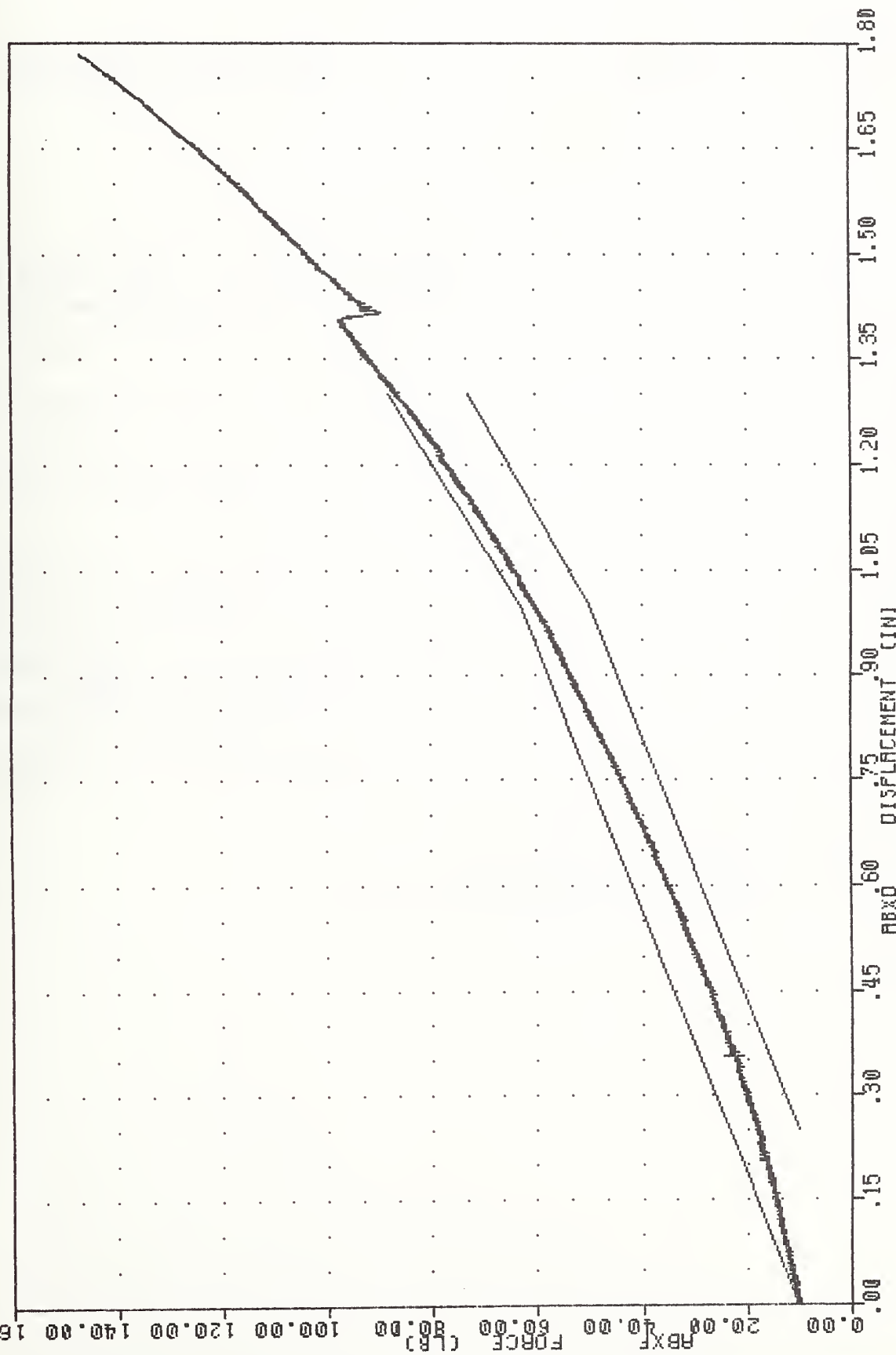
TEMPERATURE 71 F
VRTC AB83018RELATIVE HUMIDITY 19 %
572B SN 830 ABDOM COMPR CAL 18

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	29.72 LBS
0.75 IN	36.00 - 50.00 LBS	43.92 LBS
1.00 IN	50.00 - 63.00 LBS	60.50 LBS
1.30 IN	73.00 - 88.00 LBS	86.54 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middleton

VRIC 5728 SN 830 ABDOM COMPR CAL 18 89040
 ABXD 1650/ 5214/ -40 MIN, MAX = 0.00 146.83
 ABXF 1650/ 5214/ -40 MIN, MAX = 0.00 1.78



PART 572-B HYBRID II ABDOMEN CALIBRATION
 ABDOMINAL FORCE VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

09-FEB-89

TEMPERATURE 69 F
VRTC LF83018RELATIVE HUMIDITY 19 %
572B SN830 LUMBAR FLEX CAL18

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	34.00 LB
30 DEG	34.00 - 46.00 LB	44.00 LB
40 DEG	46.00 - 58.00 LB	56.00 LB
NET RETURN ANGLE	< 12 DEG	5.20 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

10-Feb-89

TEMPERATURE 72 F
LEFT KNEE
VRTC LK83018

RELATIVE HUMIDITY 21 %
572B SN 830 L.KNEE IMP CAL 18

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	2325.30 LB
DURATION ABOVE 1000 LB	>=1.7 MSEC	1.73 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

10-Feb-89

TEMPERATURE 72 F
RIGHT KNEE
VRTC RKB3018

RELATIVE HUMIDITY 21 %
572B SN 830 R.KNEE IMP CAL 18

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.91 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1858.76 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.99 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

POST-TEST CALIBRATION

S/N: 830

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

02-MAR-89

TEMPERATURE 72 F
VRTC ED83019RELATIVE HUMIDITY 22 %
572B SN830 EXT. DIMENSION CAL19

DESCRIPTION	SPECIFICATION	TEST RESULTS
SN 830 ALDERSON		
Sitting Height	35.6 - 35.8 IN	35.6 IN
Shoulder Pivot Height	21.8 - 22.4 IN	22.3 IN
Hip Pivot Height	3.9 IN (ref)	3.9 IN
Hip Pivot From Backline	4.8 IN (ref)	4.8 IN
Knee Pivot From Backline	20.1 - 20.7 IN	20.6 IN
Rear of Head From Backline	1.7 IN (ref)	1.7 IN
Chest Depth	9.1 - 9.6 IN	9.2 IN
Shoulder Width	17.8 - 18.4 IN	18.1 IN
Chest Circumference Over Nipples	36.8 - 40.0 IN	37.3 IN
Waist Circumference at Min. Girth	31.4 - 32.6 IN	32.2 IN
Hip Width	14.0 - 15.4 IN	14.6 IN
Knee Pivot From Floor	19.3 - 19.9 IN	19.4 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

02-Mar-89

TEMPERATURE 72 F
VRTC HD83019

RELATIVE HUMIDITY 22 %
572B SN 830 HEAD DROP CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PEAK RESULTANT ACCELERATION	210 - 260 G	223.15 G
TIME ABOVE 100 G LEVEL	0.9 - 1.5 MSEC	1.25 MSEC
PEAK LATERAL ACCELERATION	10 G MAX	-3.42 G
IS ACCELERATION CURVE UNIMODAL?		YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK PENDULUM TEST

PART 572

03-Mar-89

TEMPERATURE 72 F
VRTC HN83019RELATIVE HUMIDITY 27 %
572B SN 830 HEAD/NECK CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Pendulum velocity	21.5 to 25.5 ft/sec	25.00 ft/sec
Pendulum Deceleration:		
T1 - T2: 5 - 20 G	3 msec max	2.54 msec
T2 - T3: 20 - 20 G	25 - 30 msec	26.57 msec
T3 - T4: 20 - 5 G	10 msec max	7.56 msec
Avg. G level T2 - T3	20 - 24 G	23.47 G
Maximum Rotation Angle	63 - 73 deg	64.05 deg
Peak Head Resultant Accel	26 G max	24.54 G

Test Parameter	Specification	Test Results
Rotation Angle (degrees)	Time (msec)	Chordal Disp. (in)
0	-2.0 - +2.0	-0.5 - +0.5
30	25.6 - 34.4	2.1 - 3.1
60	40.3 - 51.7	4.3 - 5.3
max	53.2 - 66.8	5.0 - 6.0
60	67.0 - 83.0	4.3 - 5.3
30	85.4 - 104.6	2.1 - 3.1
0	101.0 - 123.0	-0.5 - +0.5

SND: 6.10 in

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

06-Mar-89

TEMPERATURE 70 F
VRTC TL83019

RELATIVE HUMIDITY 30 %
572B SN 830 L.S.THORAX CAL 19

	LOW SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
PENDULUM VELOCITY	13.86-14.14 FT/SEC	14.04 FT/SEC

PEAK DEFLECTION	1.1 IN max.	0.91 IN

PEAK RESISTIVE FORCE	1,450. LB max.	1354. LB

INTERNAL HYSTERESIS	50% - 70%	68.0%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

06-Mar-89

TEMPERATURE 69 F
VRTC THB3019

RELATIVE HUMIDITY 29 %
572B SN 830 H.S.THORAX CAL 19

	HIGH SPEED TEST	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
=====		
PENDULUM VELOCITY	21.78-22.22 FT/SEC	21.92 FT/SEC

PEAK DEFLECTION	1.7 IN max.	1.33 IN

PEAK RESISTIVE FORCE	2,250. LB max.	2101. LB

INTERNAL HYSTERESIS	50% - 70%	66.7%

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

03-Mar-89

TEMPERATURE 72 F
VRTC AB83019

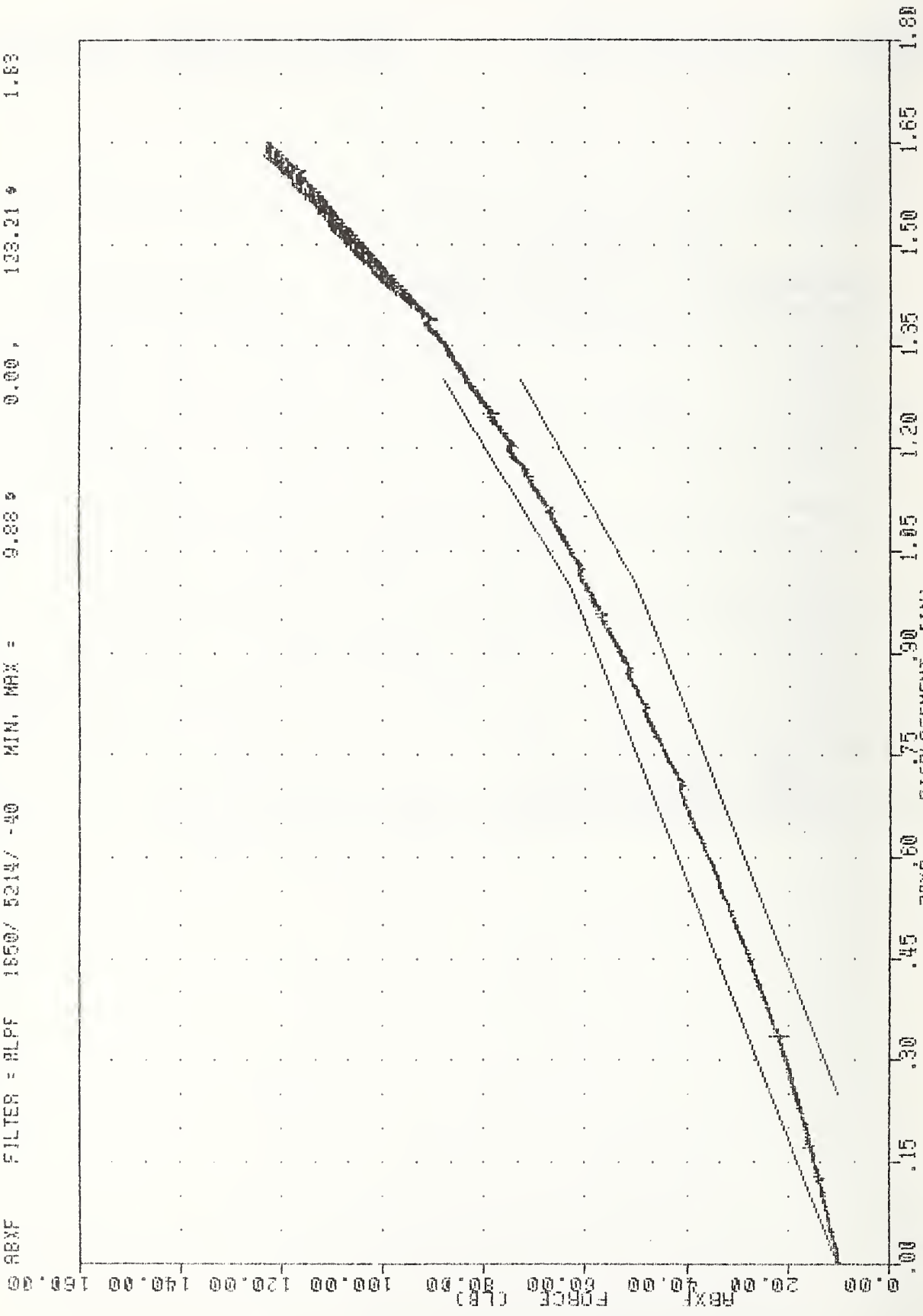
RELATIVE HUMIDITY 25 %
572B SN 830 ABDOM COMPR CAL 19

TEST CORRIDORS		
DISPLACEMENT	FORCE	TEST RESULTS
0.00 IN	10.00 LBS	10.00 LBS
0.50 IN	23.00 - 36.00 LBS	30.42 LBS
0.75 IN	36.00 - 50.00 LBS	44.02 LBS
1.00 IN	50.00 - 63.00 LBS	60.40 LBS
1.30 IN	73.00 - 88.00 LBS	83.03 LBS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

V81C 5728 SW 830 ABDOM COMP8 CRL 19 89062
 ABXD 1850/ 5214/ -40 MIN. MAX = 0.00 2 122.86
 ABXF 1850/ 5214/ -40 MIN. MAX = 0.00 2 123.21 1.83



PART 572-B HYBRID II ABDOMEN CALIBRATION
 ABDOMINAL FORCE VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

02-MAR-89

TEMPERATURE 72 F
VRTC LFB3019

RELATIVE HUMIDITY 22 %
572B SNB30 LUMBAR FLEX CAL19

DEFLECTION	SPECIFICATION	TEST RESULTS
0 DEG	0 LB	0.00 LB
20 DEG	22.00 - 34.00 LB	32.00 LB
30 DEG	34.00 - 46.00 LB	41.00 LB
40 DEG	46.00 - 58.00 LB	56.00 LB
NET RETURN ANGLE	< 12 DEG	6.36 DEG

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

06-Mar-89

TEMPERATURE 71 F
LEFT KNEE
VRTC LKB3019

RELATIVE HUMIDITY 28 %
572B SN 830 L.KNEE IMP CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.88 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1951.85 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.72 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

06-Mar-89

TEMPERATURE 70 F
RIGHT KNEE
VRTC RK83019

RELATIVE HUMIDITY 29 %
572B SN 830 R.KNEE IMP CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
PROBE VELOCITY	6.76 - 7.04 FT/SEC	6.88 FT/SEC
PEAK KNEE IMPACT FORCE	1850 - 2500 LB	1946.42 LB
DURATION ABOVE 1000 LB	≥ 1.7 MSEC	1.85 MSEC

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middleton



APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: ALDERSON RESEARCH LABS #830

SEATING POSITION: DRIVER

LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
HEAD ACCELERATION	X	ENDEVCO	7264	AL42	REAR
HEAD ACCELERATION	Y	ENDEVCO	7264	AJ03	LEFT
HEAD ACCELERATION	Z	ENDEVCO	7264	AP45	UP
CHEST ACCELERATION	X	ENDEVCO	7264	AJ11	FRONT
CHEST ACCELERATION	Y	ENDEVCO	7264	AL40	RIGHT
CHEST ACCELERATION	Z	ENDEVCO	7264	AN09	UP
LEFT FEMUR FORCE		GSE	2430	717	TENSION
RIGHT FEMUR FORCE		GSE	2430	739	TENSION

VEHICLE INSTRUMENTATION PLACEMENT

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	LEFT FRAME RAIL	X	ENDEVCO	2264	AR20	REAR
2	RIGHT FRAME RAIL	X	ENDEVCO	2264	AE42	REAR
3	FIREWALL	X	ENDEVCO	2264	AJ46	FRONT
4	LEFT B-PILLAR	X	ENDEVCO	7264	BY08J	FRONT
5	RIGHT B-PILLAR	X	ENDEVCO	7264	BP34J	FRONT

SIGN CONVENTION

ALL DUMMY AND VEHICLE CHANNELS:

+X: FORWARD

+Y: LEFTWARD

+Z: UPWARD

+FORCE: TENSION

FILTERING DATA

SAE J211b

Vehicle Structural Accelerations Class 60

Occupant

Head Accelerometer Class 1000

Chest Accelerometer Class 180

Chest Deflection Class 180

Femur Force Class 600

Pelvis Accelerometer Class 180

Lower Leg Class 600

TL 242 "9253

Sarkkey, J.

Final report
Frontal ba

Form DOT F 172
FORMERLY FORM D

DOT LIBRARY



00092583