



5014524

National
Technical
Systems

Scientific
Services
Group

Testing Division
1536 East Valencia Drive
Fullerton, California 92631-4797
Tel: 714 879 6110

REPORT NOS. 212-NTW-82-030-971-3882-63
219-NTW-82-029-971-3882-63
301-NTW-82-063-971-3882-63

NEW VEHICLE ASSESSMENT
AND
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS NOS. 212, 219, AND 301-75

MITSUBISHI MOTORS CORPORATION
1982 DODGE COLT - 4 DOOR HATCHBACK
NHTSA 820515

NATIONAL TECHNICAL SYSTEMS
1536 EAST VALENCIA DRIVE
FULLERTON, CALIFORNIA 92631-4797



JANUARY 1983

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
- ENFORCEMENT -
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET S. W.
WASHINGTON, D. C. 20590



Prepared for the Department of Transportation, National Highway Traffic Safety Administration under Contract No. DOT-HS-9-02273, DTNH22-82-C-02022, and DTNH22-82-C-07238. This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared by D. H. Hand

Approved by S. J. Valenzuela

Date 14 December 1982

Report Accepted by:

Robert Krauss
Contract Technical Manager
Office of Vehicle Safety Compliance

1/20/83
Date

Contract Technical Manager
Office of Automotive Ratings

Date

Contract Technical Manager
Office of Passenger Vehicle Research

Date

1. Report No. 212-NTW-82-030 219-NTW-82-029 301-NTW-82-063		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle New Vehicle Assessment and Standards Enforcement Indicant Testing - FMVSS 212, 219 and 301-75. 1982 Dodge Colt - 4 Door Hatchback - NHTSA 820515				5. Report Date 12 January 1983	
				6. Performing Organization Code	
7. Author(s)				8. Performing Organization Report No. 971-3882-63	
9. Performing Organization Name and Address National Technical Systems 1536 East Valencia Drive Fullerton, California 92631-4797 Phone No.: (714) 879-6110				10. Work Unit. No.	
				11. Contract or Grant No. DOT-HS-9-02273, DTNH22-82-C-02022, and DTNH22-82-C-07238	
12. Sponsoring Agency Name and Agency U. S. Department of Transportation National Highway Traffic Safety Admin. Enforcement Office of Vehicle Safety Compliance 400 Seventh Street S. W. Washington, D. C. 20590				13. Type of Report and Period Covered Final Report October 21 - November 17, 1982	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract New Vehicle Assessment and Standards Enforcement Indicant Test to the requirement of FMVSS 212, 219, and 301-75 on a 1982 Dodge Colt - 4 Door Hatchback, NHTSA 820515, VIN-JB3BE2828CU500269 was conducted at National Technical Systems test facility in Fullerton, California. The average vehicle impact speed was 34.92 mph in the frontal (0°) mode. Test date was November 17, 1982, and the ambient temperature was 69°F. The subject test vehicle appears to comply with all the requirements of FMVSS 212/219/301-75. The driver dummy experienced a chest acceleration (72.3g - 3 msec clip) and the passenger dummy experienced a HIC value of 1673, both are in excess of the limit specified in FMVSS 208 injury criteria.					
17. Key Words New Vehicle Assessment FMVSS 212 - Windshield Mounting FMVSS 219 - Windshield Zone Intrusion FMVSS 301-75 - Fuel System Integrity				18. Distribution Statement	
19. Security Class. (of this report) Unclassified	20. Security Class. (of this page) Unclassified	21. No. of Pages 188	22. Price		

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 (2000 lb)	0.9	tonnes	t
VOLUME				
teaspoon	teaspoons	5	milliliters	ml
tablespoon	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

* 1 in = 2.54 inches, for other exact conversions and more detailed tables see NBS Mon. Publ. 230, Units of Weights and Measures, Price \$2.75, SD Catalog No. C13 10 230.

Approximate Conversions from Metric Measures

When You Know	Multiply by	To Find	Symbol
LENGTH			
millimeters	0.04	inches	in
centimeters	0.4	inches	in
meters	3.3	feet	ft
meters	1.1	yards	yd
kilometers	0.6	miles	mi
AREA			
square centimeters	0.16	square inches	in ²
square meters	1.2	square yards	yd ²
square kilometers	0.4	square miles	mi ²
hectares (10,000 m ²)	2.6	acres	
MASS (weight)			
grams	0.035	ounces	oz
kilograms	2.2	pounds	lb
tonnes (1000 kg)	1.1	short tons	
VOLUME			
milliliters	0.03	fluid ounces	fl oz
liters	2.1	pints	pt
liters	1.06	quarts	qt
liters	0.26	gallons	gal
cubic meters	35	cubic feet	ft ³
cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)			
Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

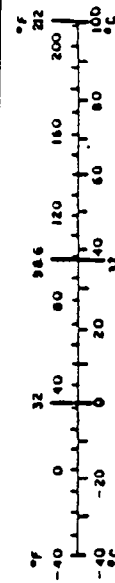




TABLE OF CONTENTS

<u>Section</u>	<u>Paragraph</u>	<u>Description</u>	<u>Page</u>
1	1.0	Introduction	2
	1.1	Administrative Data	4
2	2.0	General Test Information and Summary Data	7
3	3.0	Test Data	13
	3.1	Test Results and Photographs	22
4	4.0	Occupant Response, Vehicle Acceleration and Load Cell Barrier Summary Data	45
5	5.0	Test Facilities and Equipment	59
	5.1	Frontal Collision Barrier Facility	59
	5.2	Load Cell Barrier	62
	5.3	Oblique Angle Collision Barrier	62
	5.4	Moving Collision Barrier	63
	5.5	Vehicle Static Rollover Machine	64
	5.6	Impact Velocity Measurement	64
	5.7	Photographic Coverage	66
	5.8	Data Acquisition and Reduction	69
Appendix A		Pre and Post Test Dummy Photographs	82
Appendix B		Computer Plots	100
Appendix C		Dummy Calibration Test Data	181



TABLES

<u>Table</u>	<u>Description</u>	<u>Page</u>
I	Summary of Test Conditions	3
III	Post-Impact Summary	11
II	Summary of Test Conditions - FMVSS 219	14
IV	Post-Impact Summary - FMVSS 212	15
V	Post-Impact Summary - FMVSS 219	16
VI	Post-Impact Summary - FMVSS 301-75	17
VII	Fuel System Integrity - Static Rollover	18
VIII	Fuel System Integrity - Static Rollover	19
IX	Fuel System Integrity - Static Rollover	20
X	Fuel System Integrity - Static Rollover	21
4-1	Part 572 Dummy In-Vehicle Position	47
4-2	Part 572 Dummy Pre-Test Clearance Distances	48
4-3	Manufacturers Seat Belt Instructions	49
4-4	Part 572 Dummy Data	50
4-5	Vehicle Structural Data	51
4-6	Pre-Test - Vehicle Measurement Data	52
4-7	Post-Test - Vehicle Measurement Data	53
4-8	Pre-Test and Post-Test Vehicle Dimensions	54
4-9	Load Cell Barrier Data	55
4-10	Camera Positions	56
4-11	Camera Positions	57
5-1	Instrumentation for Crash Test	76
5-2	Data Acquisition and Reduction Process	77
5-3	Data Designations for Vehicle Crash Impact Data Acquisition	78



ILLUSTRATIONS

<u>Figure</u>	<u>Description</u>	<u>Page</u>
3-1	Pre-Test, Windshield View	24
3-2	Pre-Test, Windshield Template View	26
3-3	Pre-Test, Left Side View	28
3-4	Pre-Test, Right Side View	30
3-5	Post-Impact, Full Front View	32
3-6	Post-Impact, Windshield View	34
3-7	Post-Impact, Left Side View	36
3-8	Post-Impact, Right Side View	38
3-9	Post-Impact, Rollover Test, 90 Increment	40
3-10	Post-Impact, Rollover Test, 270 Increment	42
5-1	Vehicle and Occupant Crash Impact Data Acquisition System	75
5-2	Comparison Plot of SAE Filters	80
A-1	Pre-Test, Driver Dummy View	83
A-2	Pre-Test, Passenger Dummy View	85
A-3	Post-Impact, Driver Dummy View	87
A-4	Post-Impact, Driver Dummy View	89
A-5	Post-Impact, Driver Dummy Contact Area	91
A-6	Post-Impact, Passenger Dummy View	93
A-7	Post-Impact, Passenger Dummy View	95
A-8	Post-Impact, Passenger Dummy Contact Area	97



SECTION 1



SECTION 1

1.0 INTRODUCTION

This report contains information regarding a joint program for the Office of Vehicle Safety Compliance (OVSC), Office of Automotive Ratings (OAR), and Office of Passenger Vehicle Research (OPVR) for a vehicle assessment and standards enforcement indicant tests of windshield mounting, windshield zone intrusion, and fuel system integrity relative to Federal Motor Vehicle Safety Standard (FMVSS) Nos. 212, 219, and 301-75 respectively, in addition, vehicle acceleration and force-crush data. This test was performed under Contract Number DOT-HS-9-02273, DTNH22-82-C-02022, and DTNH22-82-C-07238 by National Technical Systems, 1536 East Valencia Drive, Fullerton, California, in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures (IP212-02).

The specific purpose of this test was to obtain research and vehicle rating data in conjunction with windshield mounting, windshield zone intrusion, and fuel system integrity indicant data, when a vehicle is impacted in excess of the velocity (30 mph) requirement of FMVSS 212, 219, and 301-75.



SECTION 1

Section 2 contains general test and vehicle information, along with vehicle summary data, while Section 3 contains all compliance related data. Section 4 contains occupant/ vehicle acceleration and load cell barrier summary data, in addition, test dummy and vehicle measurements, along with camera positions. Section 5 discusses NTS test facilities and data acquisition and reduction system. Appendix A contains additional photographs not related to vehicle compliance. Appendix B contains all the computer-generated plots, while Appendix C contains the dummy certification reports if applicable.



SECTION 1

1.1 ADMINISTRATIVE DATA

A. References

1. Federal Motor Vehicle Safety Standard 212 -
"Windshield Mounting," as published in the
Federal Register, Volume 41, No. 36493, dated
30 August 1976.
2. Federal Motor Vehicle Safety Standard 219 -
"Windshield Zone Intrusion," as published in
the Federal Register, Volume 40, No. 25462,
dated 16 June 1975
3. Federal Motor Vehicle Safety Standard 301-75 -
"Fuel System Integrity," as published in the
Federal Register, Volume 40, No. 48352, dated
15 October 1975.
4. National Highway Traffic Safety Administration,
Office of Vehicle Safety Compliance Laboratory
Procedures for Vehicle Assessment and Standards
Enforcement Indicant Testing for "Windshield
Mounting", FMVSS 212 - "Windshield Zone Intrusion",
FMVSS 219 - "Fuel System Integrity", FMVSS 301-75,
IP 212-02, dated, 1 April 1980.



SECTION 1

B. Description of Test Vehicle

1. 1982 Dodge Colt - 4 Door Hatchback
2. Vehicle Identification No. JB3BE2828CU500269
3. NHTSA No.: 820515
4. Manufactured Date: November 1981
5. GVWR: 3,086 pounds

C. Dates

1. Vehicle Received: February 8, 1982
2. Start of Test: October 21, 1982
3. Completion of Test: November 17, 1982



SECTION 2



SECTION 2

2.0 GENERAL TEST INFORMATION AND SUMMARY DATA

The 1982 Dodge Colt - 4 Door Hatchback was subjected to a frontal fixed barrier impact and a static rollover maneuver as required by Federal Motor Vehicle Safety Standards Nos. 212/219/301-75.

Two (2) Part 572 test dummies were positioned in each front designated outboard seating position and were restrained by the belt system in the test vehicle. Just prior to the impact event, the driver dummy head was painted with yellow chalk; chest with white chalk; left knee with yellow, and the right knee with white chalk. The passenger dummy head was painted with red chalk and the left knee with yellow, right knee with white chalk to provide post-impact visual inspection of possible dummy contact with the interior components during the impact event.

TABLE I
SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION:

Manufacturer: Mitsubishi Motors Corporation
Make/Model: Dodge Colt
Body Style: 4 Door Hatchback Model Year: 1982
VIN: JB3BE2828CU500269 Build Date: November 1981
NHTSA No.: 820515 Color: Blue
Engine Data: Four (4) Cylinders; 86.0 Cu. In. Displ.
Transmission Data: Four (4) Speed (X) Manual () Automatic
Major Options: None

VEHICLE ATTITUDE:

Delivered Attitude: LF 25.9 in.; RF 25.4 in.; LR 24.2 in.; RR 24.6 in.
Test Attitude: LF 24.5 in.; RF 24.8 in.; LR 22.4 in.; RR 22.6 in.

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 26 psi
(Up to Vehicle Load Capacity) Rear = 26 psi

Recommended Tire Size: 155/SR13 Load Range: "B"
Tires on Vehicle: 155/SR13 - w/s/w - Firestone
Spare Tire: X Yes; No; Space Saver: X Yes; No

Note: T105/70D14 - B.F. Goodrich
Minispare @ 60 psi

TABLE Ia

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS:

Date of Test: November 17, 1982 Time of Test: 1424

Ambient Temperature: 65 °F at Impact Area

VEHICLE CAPACITY:

Type of Seats: Bench; X Bucket; Split Bench

Designated Seating Capacity:	Front	<u> 2 </u>
	Center	<u> 0 </u>
	Rear	<u> 3 </u>
	Total	<u> 5 </u>

Cargo: 150 lbs.

Total 900 lbs. (Vehicle Capacity Weight)

GVWR: 3,086 lbs. (Taken From Certification Label)

GAWR: Front 1,605 lbs.; Rear 1,481 lbs.

VEHICLE DELIVERED WEIGHT: (Fuel - 93% of NFC)

Left Front	<u> 573 </u> lbs.	Left Rear	<u> 403 </u> lbs.
Right Front	<u> 616 </u> lbs.	Right Rear	<u> 355 </u> lbs.
Total Front Weight	<u> 1,189 </u> lbs.	(<u>61.1</u> % of Total Vehicle Weight)	
Total Rear Weight	<u> 758 </u> lbs.	(<u>38.9</u> % of Total Vehicle Weight)	
Total Delivered Weight	<u> 1,947 </u> lbs.		

CALCULATED VEHICLE TEST WEIGHT: 2,425 lbs.

(With Required Dummies and 150 lbs. Cargo)

ACTUAL VEHICLE TEST WEIGHT:

Left Front	<u> 718 </u> lbs.	Left Rear	<u> 556 </u> lbs.
Right Front	<u> 656 </u> lbs.	Right Rear	<u> 558 </u> lbs.
Total Front Weight	<u> 1,374 </u> lbs.	(<u>55.2</u> % of Total Vehicle Weight)	
Total Rear Weight	<u> 1,114 </u> lbs.	(<u>44.8</u> % of Total Vehicle Weight)	
Total Test Weight	<u> 2,488 </u> lbs.		

TABLE Ib

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST FLUID DATA:

Test Fluid Type: Red Stoddard Solvent ; Specific Gravity: 0.764

Kinematic Viscosity: 1.31

Nominal Fuel Capacity: 10.10 gals. (NFC)

Test Volume: 9.39 gals. (92-94% of NFC)

Fuel System Capacity: 10.60 gals.
(Data from Owner's Manual)

Electric Fuel Pump: X Yes; No; Fuel Injection: Yes; X No

Does Electric Fuel Pump Operate with Ignition Switch "On"

And the Engine Not Operating: Yes; X No; N/A

Details of Fuel System: Fuel filler located on left rear quarter panel
above wheel opening recessed behind a hinged door, fuel tank located
horizontally between frame side rails under rear seat cushion and
spare tire well floor pan.

VEHICLE TEST CONDITIONS:

Temperature in Occupant Compartment: 72 °F

Temperature of Windshield Glazing/Moulding: 73/75 °F

VEHICLE CRUSH AND REBOUND:

Overall Length of Test Vehicle: Pre-Test - Left 153.3 in.; Right 153.4 in.

Post-Test - Left 129.2 in.; Right 129.9 in.

Crush: Left 24.1 in.; Right 23.5 in.

Rebound (From Rigid Barrier Only): 11.9 in.

TABLE III

POST IMPACT SUMMARY

Vehicle 1982 Dodge Colt

NHTSA No. 820515 Test Date November 17, 1982

TYPE OF TEST: ☒ 0° Frontal Impact
☐ 30° Oblique Impact (Driver/Passenger) Side
☐ Rear Impact

REQUIRED IMPACT VELOCITY RANGE: 34.5 to 35.5 mph

IMPACT VELOCITY: (Traps within 5 feet of impact event)

Trap 1 = 34.93 mph

Trap 2 = 34.91 mph

Average 34.92 mph

Actual distance from vehicle front bumper to barrier face when entering timing trap 58.0 in.

Actual distance from vehicle front bumper to barrier face when exiting timing trap 34.0 in.

VEHICLE STATIC CRUSH: Driver's Side = 24.1 inches
Passenger's Side = 23.5 inches
Average = 23.8 inches

Crush Details: Windshield broken, roof buckled over both "B" posts,
front floor pan buckled, driver dummy impacted steering wheel and dash
assembly, passenger dummy impacted dash assembly.

VEHICLE REBOUND: (From rigid barrier only)

Driver's Side = 11.0 inches

Passenger's Side = 12.8 inches

Average = 11.9 inches



SECTION 3



SECTION 3

3.0 TEST DATA

The 1982 Dodge Colt - 4 Door Hatchback was subjected to a frontal fixed barrier impact and a static rollover maneuver as required by Federal Motor Vehicle Safety Standard Nos. 212/219/301-75.

Color motion picture coverage of the impact along with the static rollover test are considered part of the accumulated pertinent data. Where applicable still photographs are presented in this report; while the motion picture coverage is submitted separately.

TABLE II

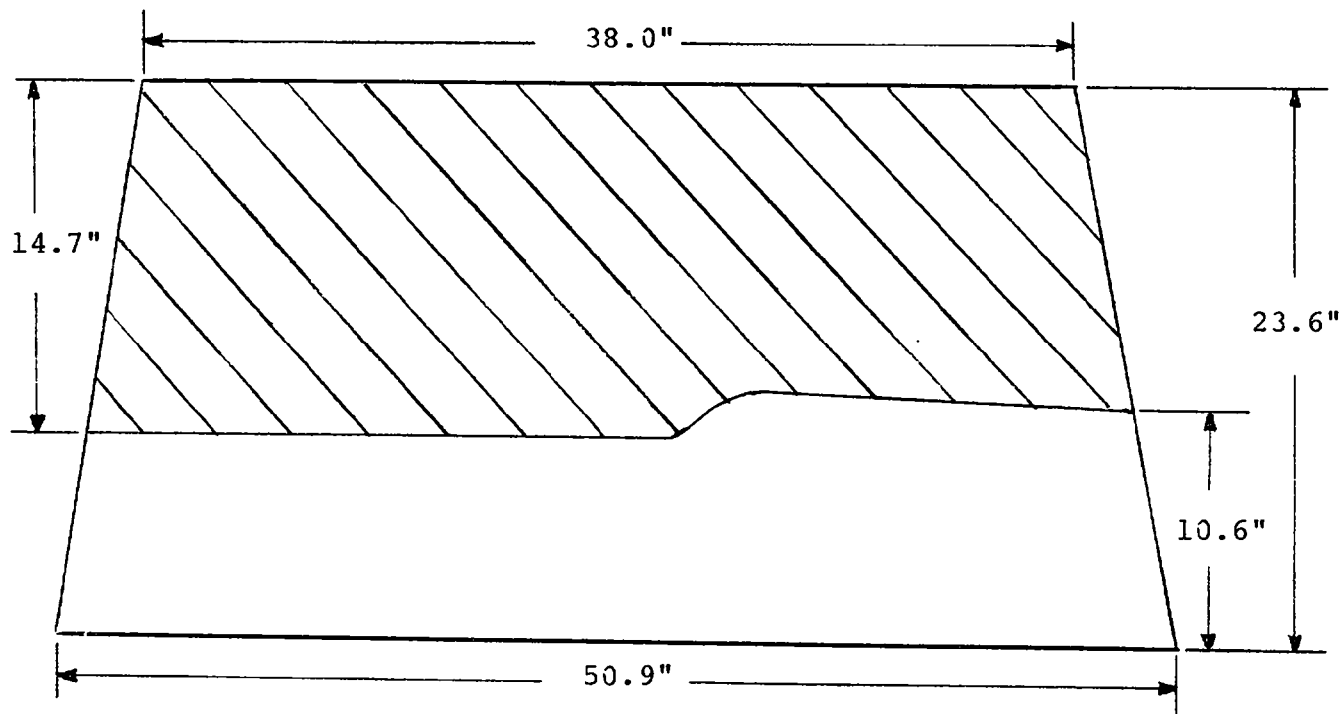
SUMMARY OF TEST CONDITIONS - FMVSS 219

Vehicle 1982 Dodge Colt

NHTSA No. 820515

Test Date November 17, 1982

PROTECTED AREA



FRONT VIEW OF WINDSHIELD

Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield _____

Panel and Foam Adhesive

Details of Special Windshield Retention Clips (If Applicable) _____

Not Applicable

TABLE IV

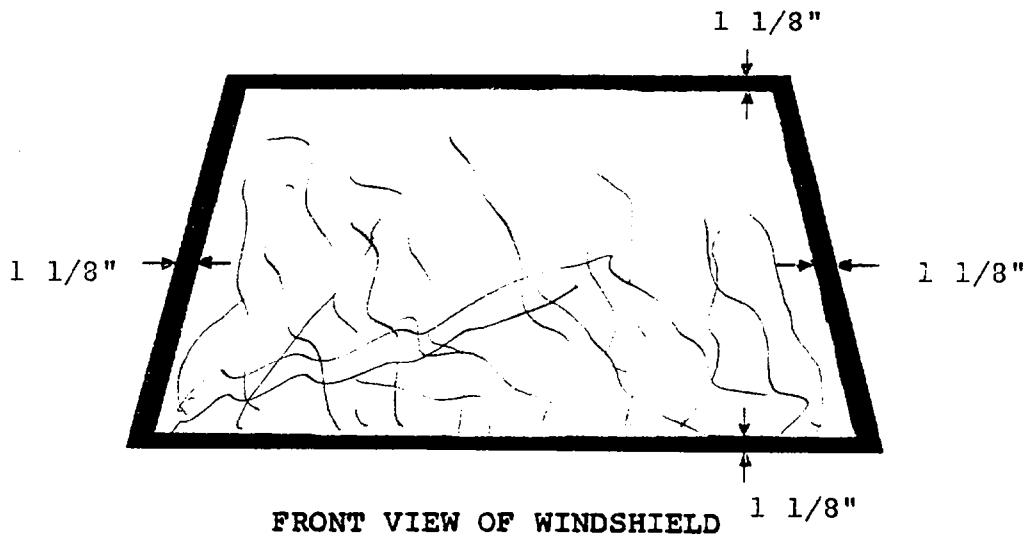
POST IMPACT SUMMARY

WINDSHIELD MOUNTING - FMVSS 212

Vehicle 1982 Dodge Colt

NHTSA No. 820515

Test Date November 17, 1982



	Windshield Periphery	
	Pre Test	Post Test
<u>Left Side</u>	67.2 in.	67.2 in.
<u>Right Side</u>	70.1 in.	70.1 in.
<u>Total</u>	137.3 in.	137.3 in.

Type of Occupant Restraints: Combination Shoulder/Lap Belt

Windshield Retention:	Actual	Min. Allow
<u>Left Side</u>	100.0	37.5 percent
<u>Right Side</u>	100.0	37.5 percent
<u>Total</u>	100.0	75.0 percent

Details of Windshield Mounting: A rubber moulding with a chrome insert encompasses the windshield glass, apparently random adhesive is used between rubber moulding and body opening

TABLE V

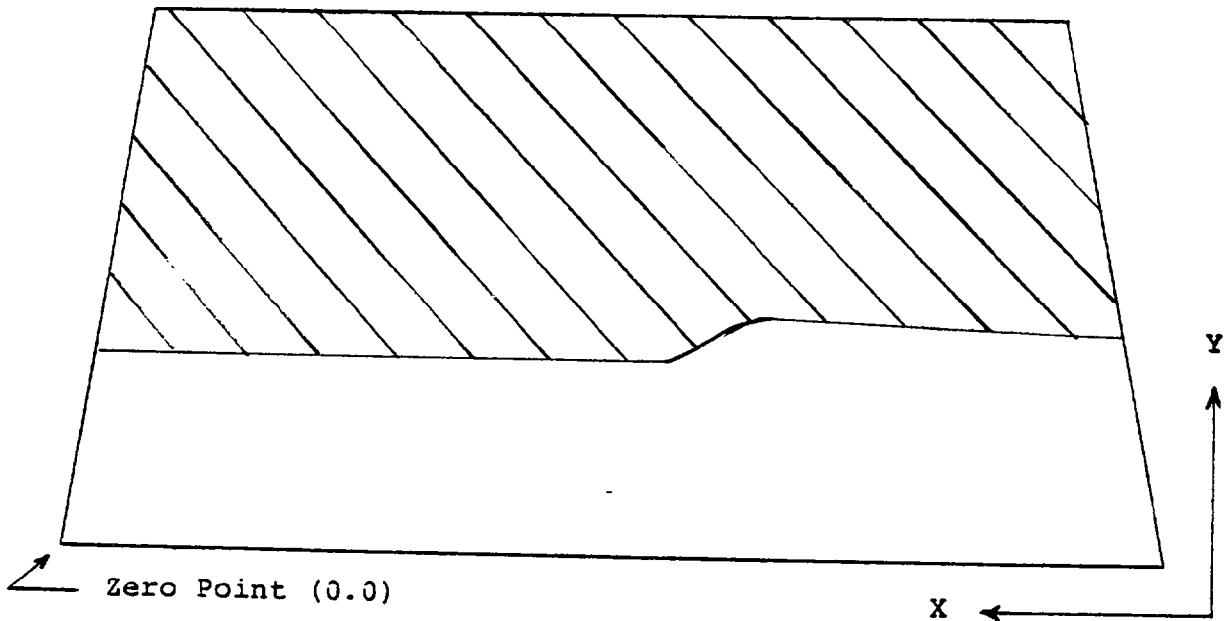
POST IMPACT SUMMARY

WINDSHIELD ZONE INTRUSION - FMVSS 219

Vehicle 1982 Dodge Colt

NHTSA No. 820515

Test Date November 17, 1982



FRONT VIEW OF WINDSHIELD

- (A) The area that the "Protected Zone" template was penetrated more than 0.25 inches by a vehicle component other than one which is normally in contact with the windshield

Not Applicable

Coordinates

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

- (B) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

Not Applicable

Coordinates

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

TABLE VI

POST IMPACT SUMMARY

FUEL SYSTEM INTEGRITY - FMVSS 301-75

Vehicle 1982 Dodge Colt

NHTSA No. 820515

Test Date November 17, 1982

	Actual	Max. Allow.
Fuel spillage from impact until vehicle motion ceases.	- 0 -	1 ounce
Fuel spillage for 5 minute period following cessation of vehicle motion after impact.	- 0 -	5 ounces
Fuel spillage for next 25 minute period.	- 0 -	1 ounce/ 1 minute
Time duration from impact until start of rollover test periods.	27 minutes	30 minutes

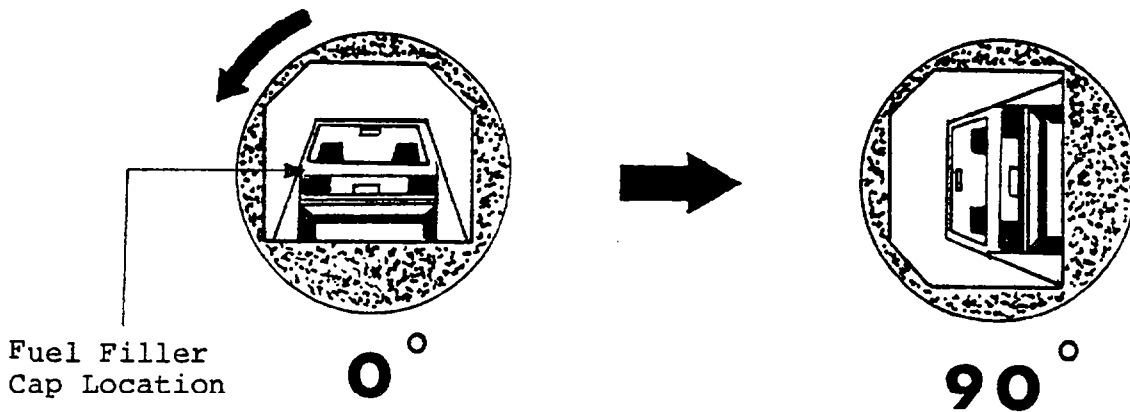
Fuel Spillage Location: Not Applicable

TABLE VII
FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Dodge Colt

NHTSA No. 820515



	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 14 sec.	1 to 3 Minutes
Fuel spillage during 5 minute period from onset of rotation	- 0 -	5 ounces
Fuel spillage during 6th minute period from onset of rotation	- 0 -	1 ounce
Fuel spillage during 7th minute period from onset of rotation	- 0 -	1 ounce

Fuel Spillage Location: Not Applicable

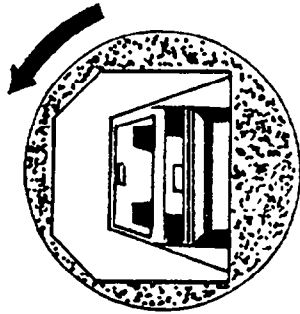
TABLE VIII

FUEL SYSTEM INTEGRITY - FMVSS 301-75

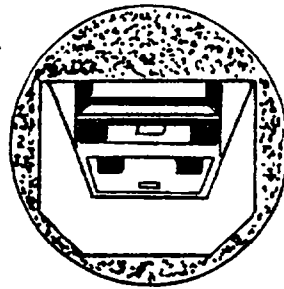
STATIC ROLLOVER

Vehicle 1982 Dodge Colt

NHTSA No. 820515



90°



180°

	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 16 sec.	1 to 3 Minutes
Fuel spillage during 5 minute period from onset of rotation	- 0 -	5 ounces
Fuel spillage during 6th minute period from onset of rotation	- 0 -	1 ounce
Fuel spillage during 7th minute period from onset of rotation	- 0 -	1 ounce

Fuel Spillage Location: Not Applicable

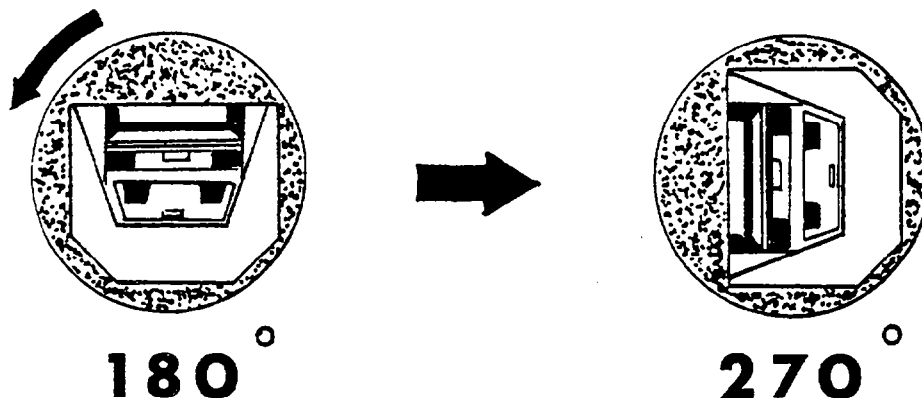
TABLE IX

FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Dodge Colt

NHTSA No. 820515

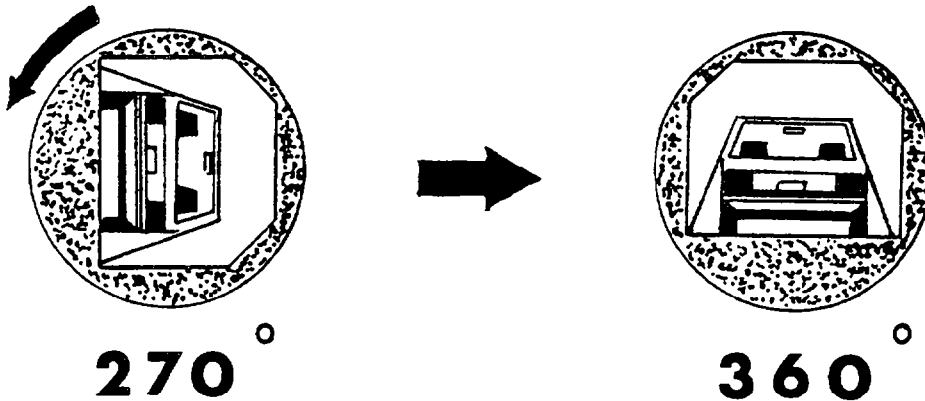


	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 15 sec.	1 to 3 Minutes
Fuel spillage during 5 minute period from onset of rotation	0.53 oz.	5 ounces
Fuel spillage during 6th minute period from onset of rotation	- 0 -	1 ounce
Fuel spillage during 7th minute period from onset of rotation	- 0 -	1 ounce

Fuel Spillage Location: Carburetor emission hose cut

TABLE X
FUEL SYSTEM INTEGRITY - FMVSS 301-75
STATIC ROLLOVER

Vehicle 1982 Dodge Colt NHTSA No. 820515



	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 12 sec.	1 to 3 Minutes
Fuel spillage during 5 minute period from onset of rotation	- 0 -	5 ounces
Fuel spillage during 6th minute period from onset of rotation	- 0 -	1 ounce
Fuel spillage during 7th minute period from onset of rotation	- 0 -	1 ounce

Fuel Spillage Location: Not Applicable



SECTION 3

3.1 TEST RESULTS AND PHOTOGRAPHS

Post-impact inspection of the test vehicle revealed almost all crush occurred forward of the rear doors. The roof buckled over both left and right "B" post and both "A" posts were deformed. The front passenger compartment floor pan buckled and all four doors were jammed. The driver dummy head and chest made contact with the steering wheel assembly and both knees impacted the dash assembly. The passenger dummy head and both knees impacted the dash assembly.

The windshield assembly revealed no apparent retention loss during the impact event. The windshield had numerous cracks developed by the apparent cowl/body deformation. A rubber moulding with a chrome insert encompasses the windshield glass. Apparently random adhesive is used between the body opening and rubber moulding as well as the windshield glass and rubber moulding.



SECTION 3

No windshield zone intrusion was recorded following the test vehicle impact. The protected windshield zone area did not appear to have been contacted by an object sufficiently to penetrate the styrofoam template outer surface. The unprotected windshield zone area was not penetrated by an object, although the windshield experienced numerous cracks developed by the apparent cowl/body deformation.

No fuel spillage was recorded following the test vehicle impact, nor during the time period before the start of the rollover test. No fuel spillage was recorded during the 90° and 180° test increment time periods. However, fuel spillage was noted emitting from an emission to carburetor fuel line (cut) after initiation of the 270° rotation (right side down). No other fuel spillage was recorded during the remaining rollover test increment time periods.

The 1982 Dodge Colt - 4 Door Hatchback test vehicle appears to comply with all the requirements of FMVSS 212/219/301-75.



Figure 3-1
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Windshield View





Figure 3-2
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Windshield Template View

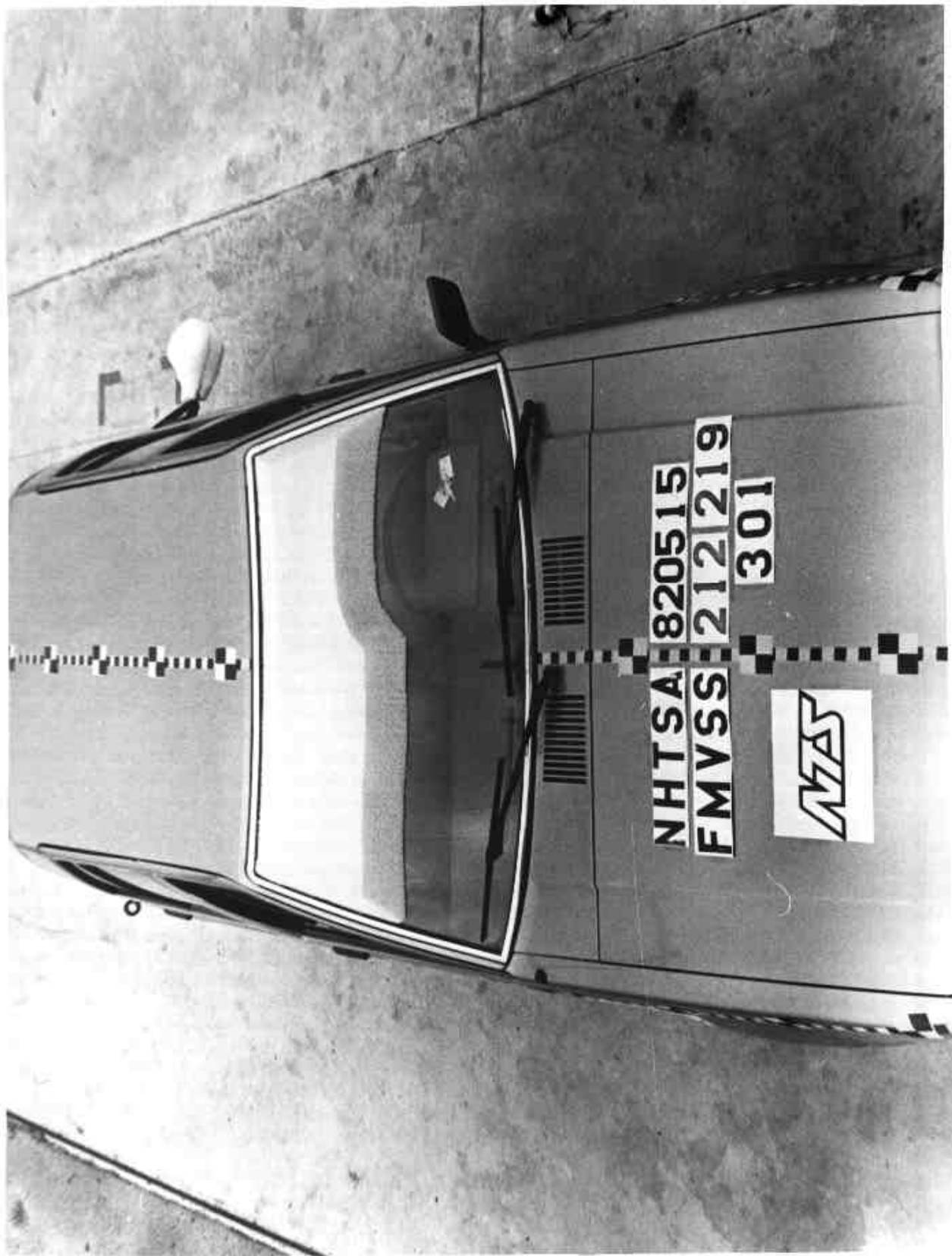




Figure 3-3
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Left Side View





Figure 3-4
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Right Side View





Figure 3-5
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Full Front View

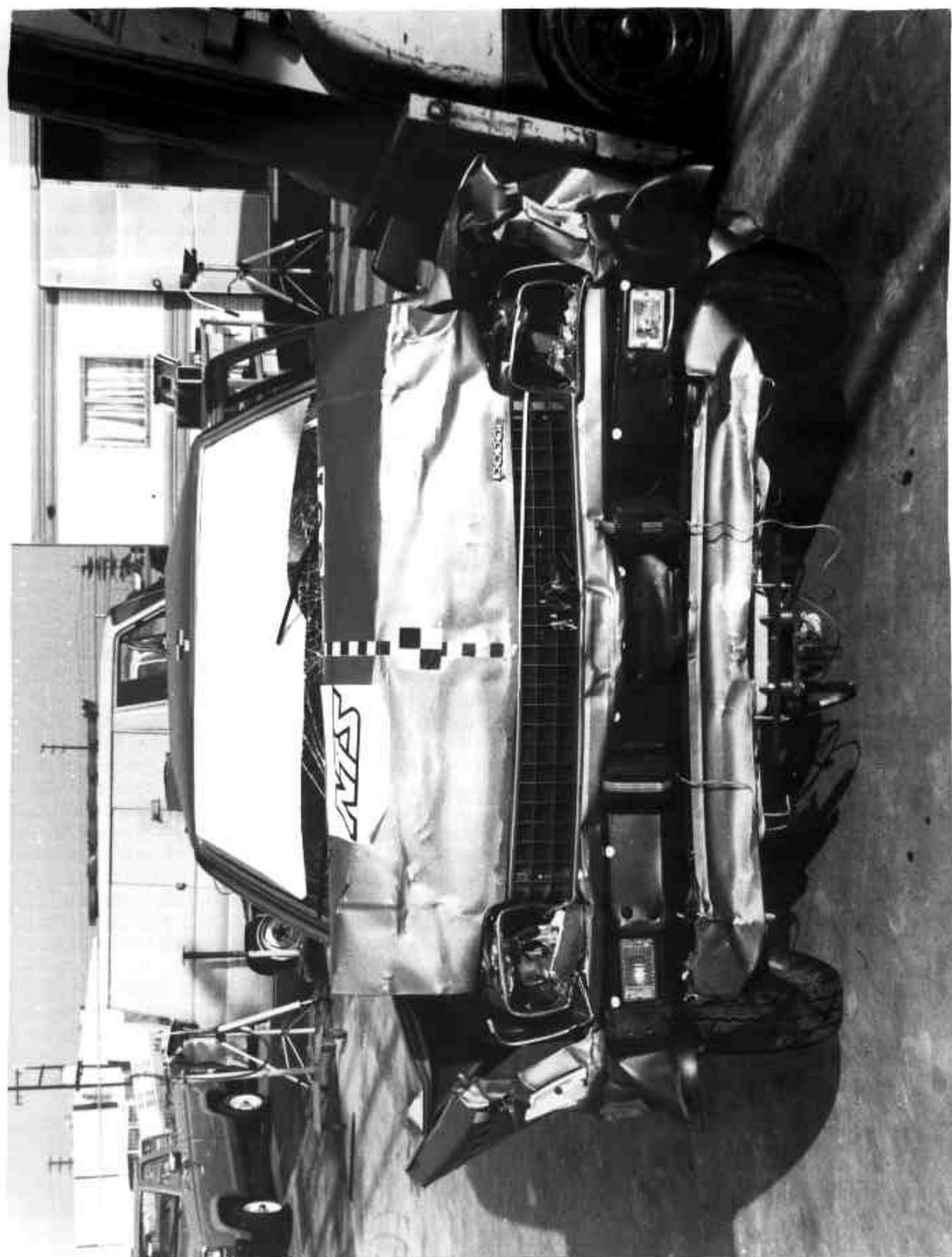




Figure 3-6
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Windshield View





Figure 3-7
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Left Side View





Figure 3-8
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Right Side View





Figure 3-9
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Rollover Test, 90° Increment

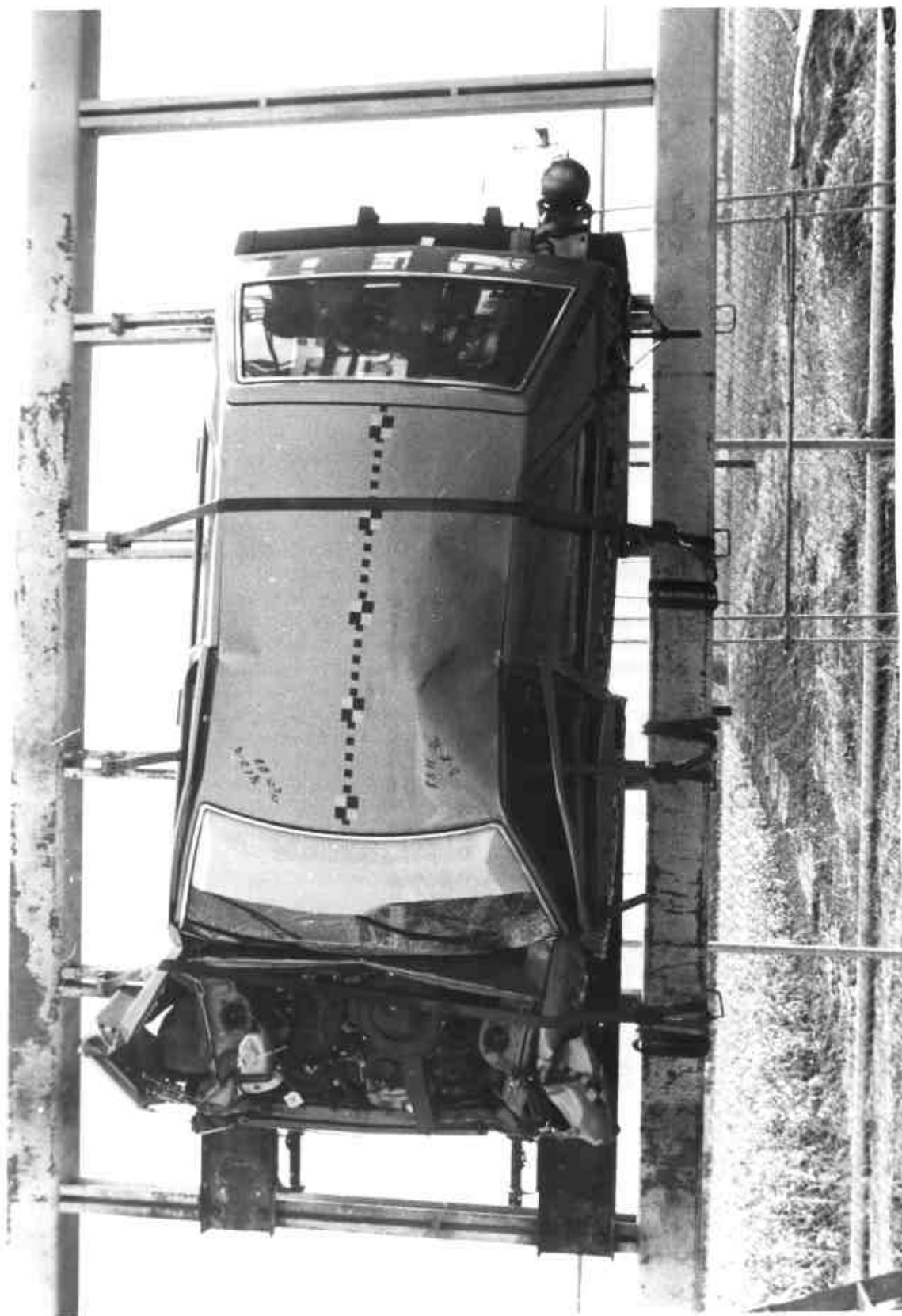


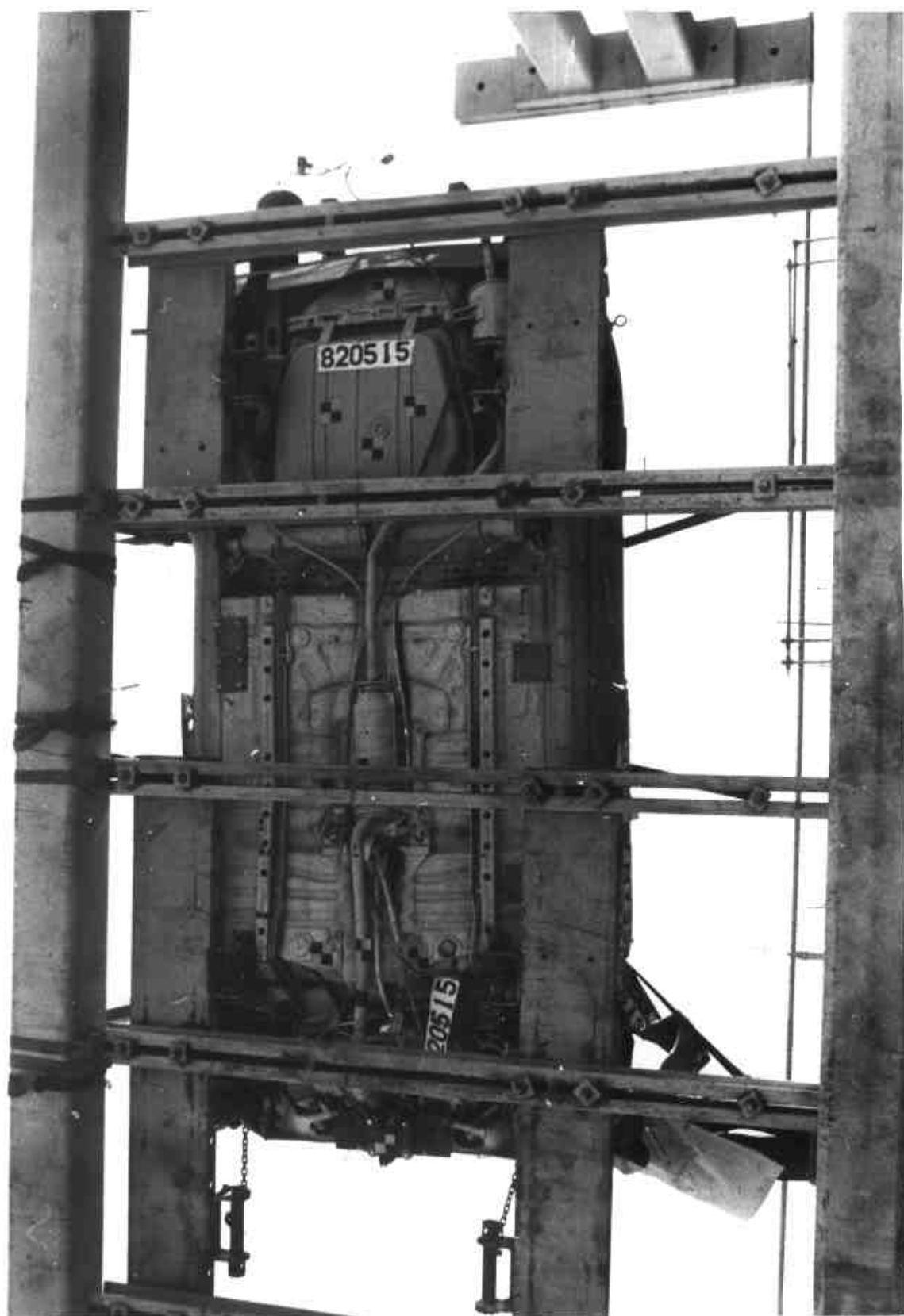


Figure 3-10

1982 Dodge Colt - 4 Door Hatchback

NHTSA 820515

Post-Impact, Rollover Test, 270° Increment



NTS

SECTION 4



SECTION 4

4.0 OCCUPANT RESPONSE, VEHICLE ACCELERATION AND LOAD CELL
BARRIER SUMMARY DATA

The following data sheets summarize:

- A. The Dummy Position Data (Part 572 Dummy In-Vehicle Position/Part 572 Dummy Pre-Test Clearance Distances Sheets)
- B. The Occupant Response Data (Part 572 Dummy Data Sheet)
- C. The Vehicle Acceleration Data (Vehicle Structural Data Sheet)
- D. The Pre and Post-Test Vehicle Dimensions Data (Vehicle Measurement Data Sheet)
- E. The Force-Crush Data (Load Cell Barrier Data Sheet)

More comprehensive data is presented in Appendix B in the form of computer-generated plots.



SECTION 4

In addition to the occupant and vehicle data, a full face load cell barrier was used to assess aggressivity by defining force levels and regions.

The driver and passenger seat belt restraint system were instrumented and photographed to provide belt spool-out and belt stretch data during the impact event. The driver side belt retractor spool-out was determined to be 4.2 inch, while the belt stretch was determined to be 10.7 percent with 1,119 pound belt load. The passenger side belt retractor spool-out was determined to be 4.9 inch, while the belt stretch was determined to be 5.7 percent with 1,504 pound belt load.

Each shoulder belt was marked at the D-ring after dummy positioning to provide a static measurement of belt position after the impact event. Post-impact measurement of the driver shoulder belt was 3.5 inch and the passenger shoulder belt was 1.8 inch.

The driver dummy experienced a chest acceleration three (3) millisecond duration of 72.3g and the passenger dummy experienced a HIC value of 1673, both are in excess of the limit specified in FMVSS 208 injury criteria. All other values from the driver and passenger dummy satisfy the FMVSS 208 requirements.

TABLE 4-1
PART 572 DUMMY IN-VEHICLE POSITION

VEHICLE 1982 Dodge Colt NHTSA NO. 820515

POSITIONING DATE: Nov. 17, 1982 AMBIENT TEMP: 73 °F TIME 1412

SEAT TYPE: Bench
 X Bucket
 Split Bench

ADJUSTER TYPE: X Manual
 Power

BUCKET SEAT BACK TYPE: Fixed
 X Adjustable Reclining

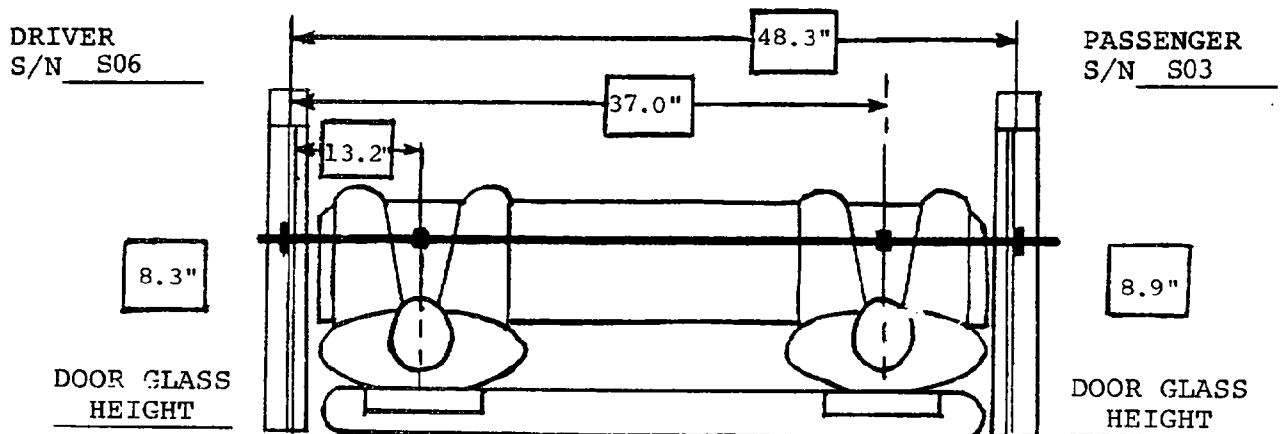
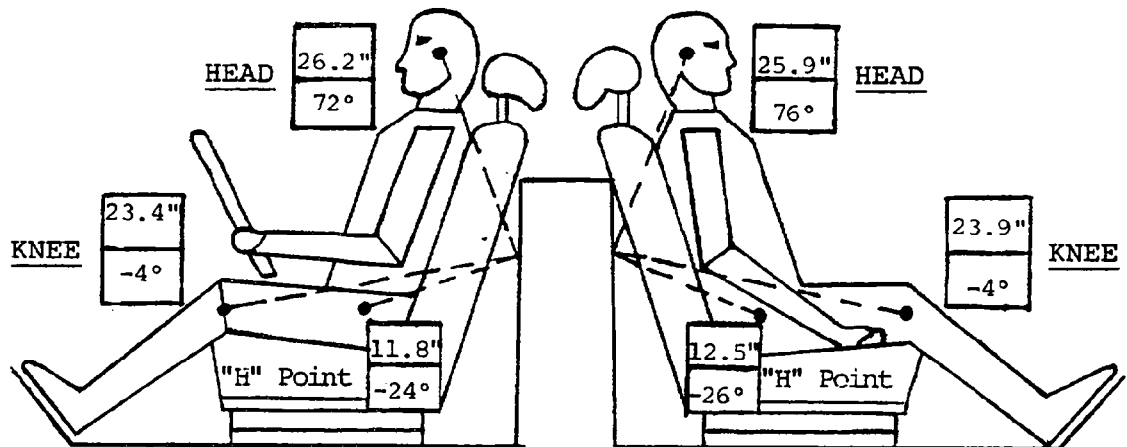


TABLE 4-2

PART 572 DUMMY PRE-TEST CLEARANCE DISTANCES

DRIVER

HH = 11.6 in.

HW = 15.7 in.

HR = 15.8 in.

HS = 7.4 in.

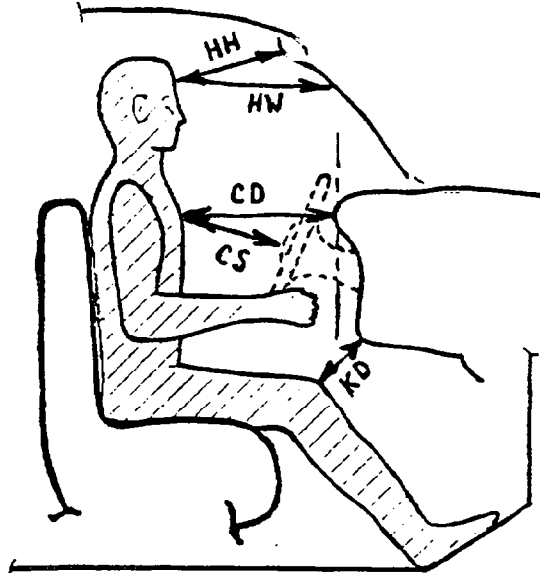
CD = 19.3 in.

CS = 12.8 in.

AD = 3.9 in.

HD = 7.7 in.

KD = 7.4 in.



PASSENGER

HH = 14.2 in.

HW = 18.5 in.

HR = 6.3 in.

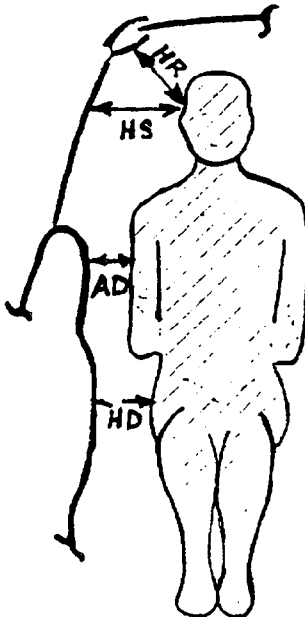
HS = 9.1 in.

CD = 20.1 in.

AD = 4.5 in.

HD = 6.1 in.

KD = 5.7 in.



MANUFACTURERS SEAT BELT INSTRUCTIONS**Seat Belts**

Seat belts are installed in your car for the protection of driver and passengers. Use the seat belt regularly.

The chance of serious injury is greatly reduced when both lap and shoulder belts are properly used.

Seat belts provide protection against being thrown from the vehicle as well as reducing the risk of an injury caused by striking the interior of the vehicle.

The following pages contain the recommended procedure for fastening, adjusting, and wearing the belts for maximum comfort and safety.

FRONT SEAT - UNIBELT RESTRAINT SYSTEM

Both front seats are equipped with a UNIBELT system which uses a single belt and an emergency locking retractor. This system is designed to provide maximum comfort and safety by permitting full extension and automatic retraction of the belts during normal vehicle operation. In an emergency involving an abrupt change in vehicle motion a sensing device in the retractor will automatically LOCK UP the belt retractor.

UNIBELT OPERATING INSTRUCTIONS

1. Enter the car and adjust the seat.



2. Grasp the running latch plate and slide it up the webbing as far as necessary so that it will be easy to pull across your body. A couple of tries and this will become an automatic one handed operation.



3. Pull the webbing, move the running latch plate toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle-up". Push the latch plate into the buckle until a "click" is heard.



4. Pull up on the shoulder belt to insure that there is no slack in the lap belt. The lap belt will not tighten during use; therefore you can set it right now to safe, comfortable snugness.



5. Check the belt slackness. The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6" or 8" of webbing, let it return to your chest and repeat the above motion. The shoulder belt will allow unrestricted movement under normal conditions. The belt will lock in the event of an accident.



6. To release the belt, push the button on the buckle. To return the belt to its stowed position, pull the shoulder belt down slightly and release immediately.

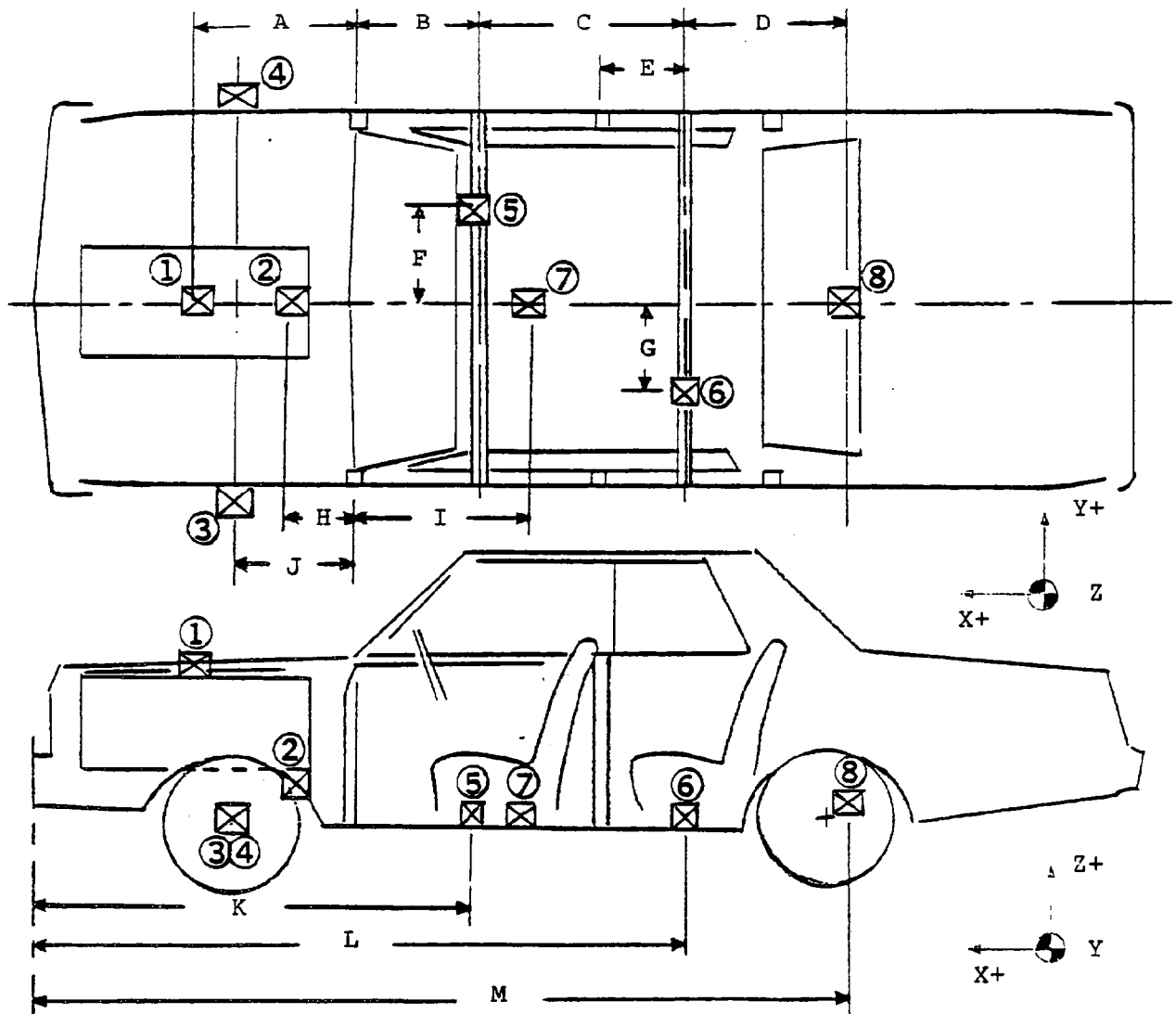
TABLE 4-4
PART 572 DUMMY DATA

Vehicle 1982 Dodge Colt NHTSA No. 820515

Driver S/N <u>S06</u> Passenger S/N <u>S03</u>	DRIVER				PASSENGER			
	Positive* Direction		Negative* Direction		Positive* Direction		Negative* Direction	
	Peak G	Time (msec)	Peak G	Time (msec)	Peak G	Time (msec)	Peak G	Time (msec)
HEAD ACCELERATION								
Longitudinal	83.6	166.6	178.7	62.4	3.1	46.8	222.4	85.8
Lateral	39.0	61.2	4.5	67.2	6.9	108.0	66.4	85.4
Vertical	7.1	92.0	62.4	83.0	6.6	135.2	99.1	86.0
Resultant	177.4	62.4			249.0	85.8		
HIC	897.1 (62 - 101 msec)				1673.0 (85 - 94 msec)			
CHEST ACCELERATION								
Longitudinal	42.7	171.2	79.6	68.4	5.1	143.6	36.6	100.6
Lateral	10.9	181.6	10.8	64.4	1.0	44.0	24.7	106.0
Vertical	6.1	78.8	11.7	65.2	4.5	85.4	13.3	102.0
Resultant	79.9	68.2			44.1	103.0		
CSI	687 (72.3 G - 3 msec clip)				389 (43.8 G - 3 msec clip)			
	(1b)	Time (msec)	(1b)	Time (msec)	(1b)	Time (msec)	(1b)	Time (msec)
FEMUR LOAD								
Left	116	147.4	517	84.8	242	124.8	506	51.6
Right	118	114.2	782	48.6	105	46.8	276	56.0
BELT LOAD								
Torso	1119	75.2			1504	81.0		
Lap	1072	66.8			875	62.8		
Average Vehicle Impact Speed <u>34.92</u> mph								
*Positive Direction - Longitudinal: Forward Lateral: Leftward Vertical: Upward Femur: Tension *Negative Direction - Longitudinal: Rearward Lateral: Rightward Vertical: Downward Femur: Compression								

TABLE 4-5
VEHICLE STRUCTURAL DATA

VEHICLE 1982 Dodge Colt NHTSA NO. 820515



DIMENSIONS (IN.)		ACCELERATION SUMMARY					
A	31.6	NO.	LOCATION	X+	msec	X-	msec
B	6.7	1	Engine Top	40.6	43.4	174.4	34.0
C	35.1	2	Engine Bottom	11.8	77.8	312.4	69.2
D	N/A	3	Left Brake Caliper	32.4	73.8	67.9	49.0
E	6.4	4	Right Brake Caliper	66.0	69.2	82.5	31.6
F	19.2	5	Below Front Seat	3.6	164.2	34.1	42.2
G	21.3	6	Below Rear Seat	5.1	164.0	28.6	40.0
H	29.2	7	Center of Gravity	72.3	43.6	116.9	36.0
I	18.4	8	Rear Axle Housing	N/A	N/A	N/A	N/A
J	27.4						
K	60.1						
L	94.8						
M	N/A						

TABLE 4-6
PRE-TEST
VEHICLE MEASUREMENT DATA

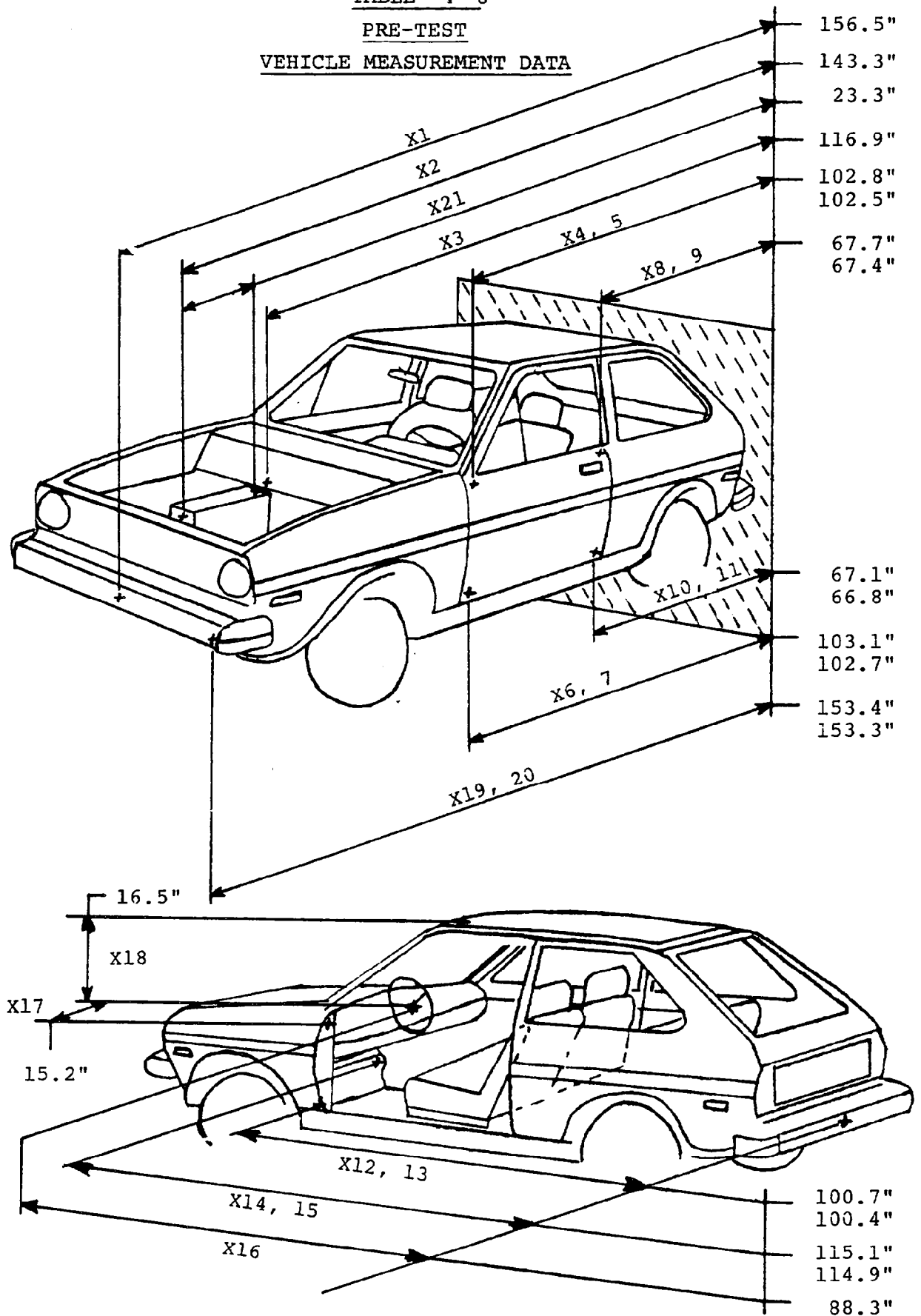


TABLE 4-7
POST-TEST
VEHICLE MEASUREMENT DATA

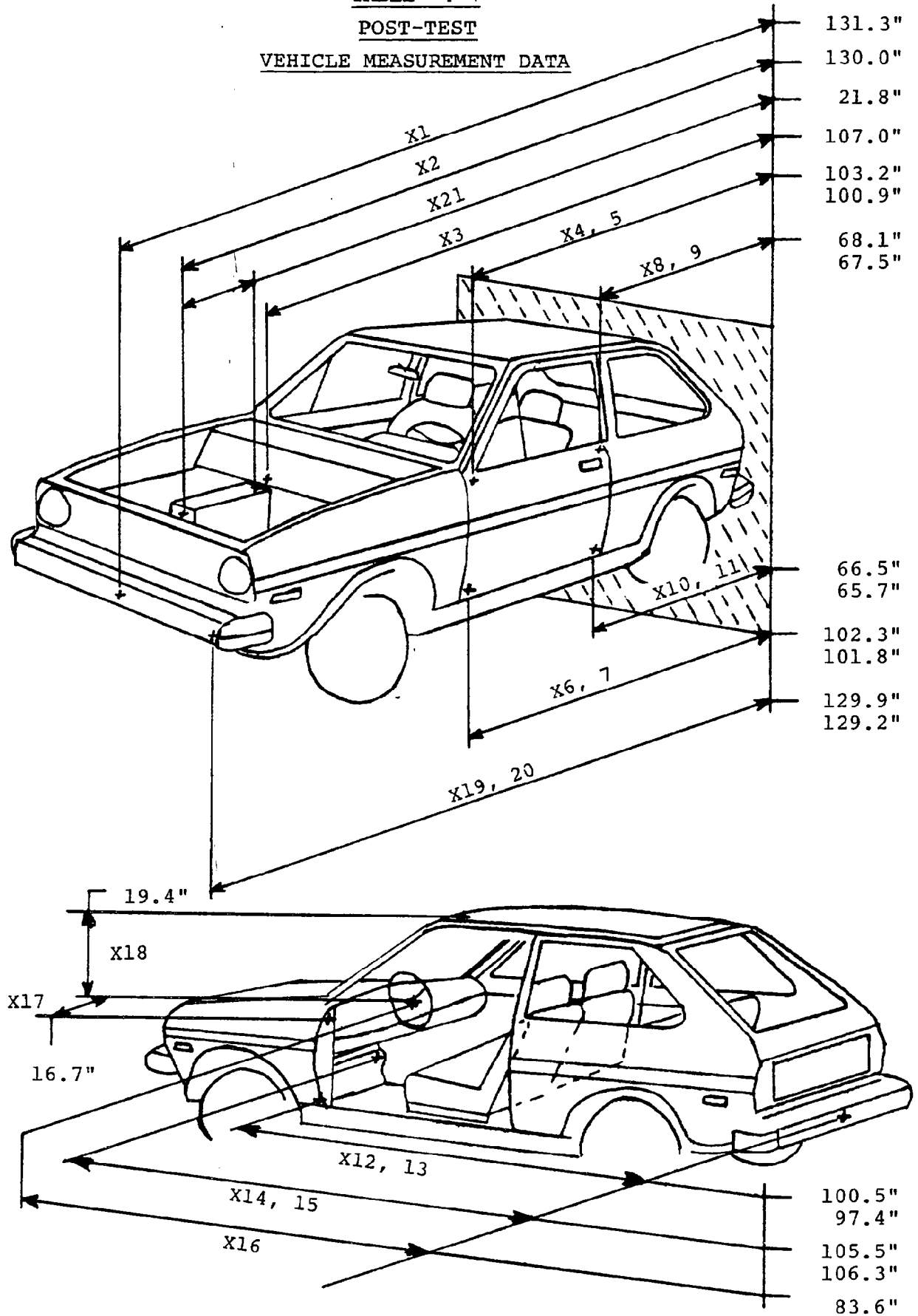




TABLE 4-8

SUMMARY

PRE-TEST AND POST-TEST VEHICLE DIMENSIONS

<u>Measurement Point</u>	<u>Pre-Test</u>	<u>Post-Test</u>	<u>Difference</u>
X1	156.5"	131.3"	25.2"
X2	143.3"	130.0"	13.3"
X3	116.9"	107.0"	9.9"
X4	102.8"	103.2"	+0.4"
X5	102.5"	100.9"	1.6"
X6	103.1"	102.3"	0.8"
X7	102.7"	101.8"	0.9"
X8	67.7"	68.1"	+0.4"
X9	67.4"	67.5"	+0.1"
X10	67.1"	66.5"	0.6"
X11	66.8"	65.7"	1.1"
X12	100.7"	100.5"	0.2"
X13	100.4"	97.4"	3.0"
X14	115.1"	105.5"	9.6"
X15	114.9"	106.3"	8.6"
X16	88.3"	83.6"	4.7"
X17	15.2"	16.7"	+1.5"
X18	16.5"	19.4"	+2.9"
X19	153.4"	129.9"	23.5"
X20	153.3	129.2"	24.1"
X21	23.3"	21.8"	1.5"

TABLE 4-9

LOAD CELL BARRIER DATA

D1	D2	D3	D4	D5	D6	D7	D8	D9
C1	C2	C3	C4	C5	C6	C7	C8	C9
B1	B2	B3	B4	B5	B6	B7	B8	B9
A1	A2	A3	A4	A5	A6	A7	A8	A9

SUMMARY

ROW D

738	81	2,471	1,256	815	504	1,733	506	299	lbs.
43.0	46.8	40.0	42.0	32.6	65.4	36.8	36.6	44.0	msec

ROW C

516	2,335	2,959	2,439	16,880	1,119	3,912	4,342	578	lbs.
42.8	33.0	27.8	22.0	35.0	29.2	22.0	37.8	32.8	msec

ROW B

340	4,442	12,080	13,780	25,260	7,310	11,520	6,475	715	lbs.
43.2	12.8	25.2	34.0	34.4	42.0	26.8	15.2	42.4	msec

ROW A

453	313	413	2,784	11,080	3,267	2,845	416	620	lbs.
43.6	35.0	28.6	35.8	26.6	27.6	37.2	35.4	42.4	msec

Upper Section (D + C) Load: 76,600 lbs. 35.2 msec
 Lower Section (B + A) Load: 32,690 lbs. 35.0 msec
 Total Barrier Load: 109,300 lbs. 35.0 msec

TABLE 4-10
FMVSS 212/219/301-75
CAMERA POSITIONS

VEHICLE 1982 Dodge Colt

NHTSA NO. 820515 TEST DATE November 17, 1982

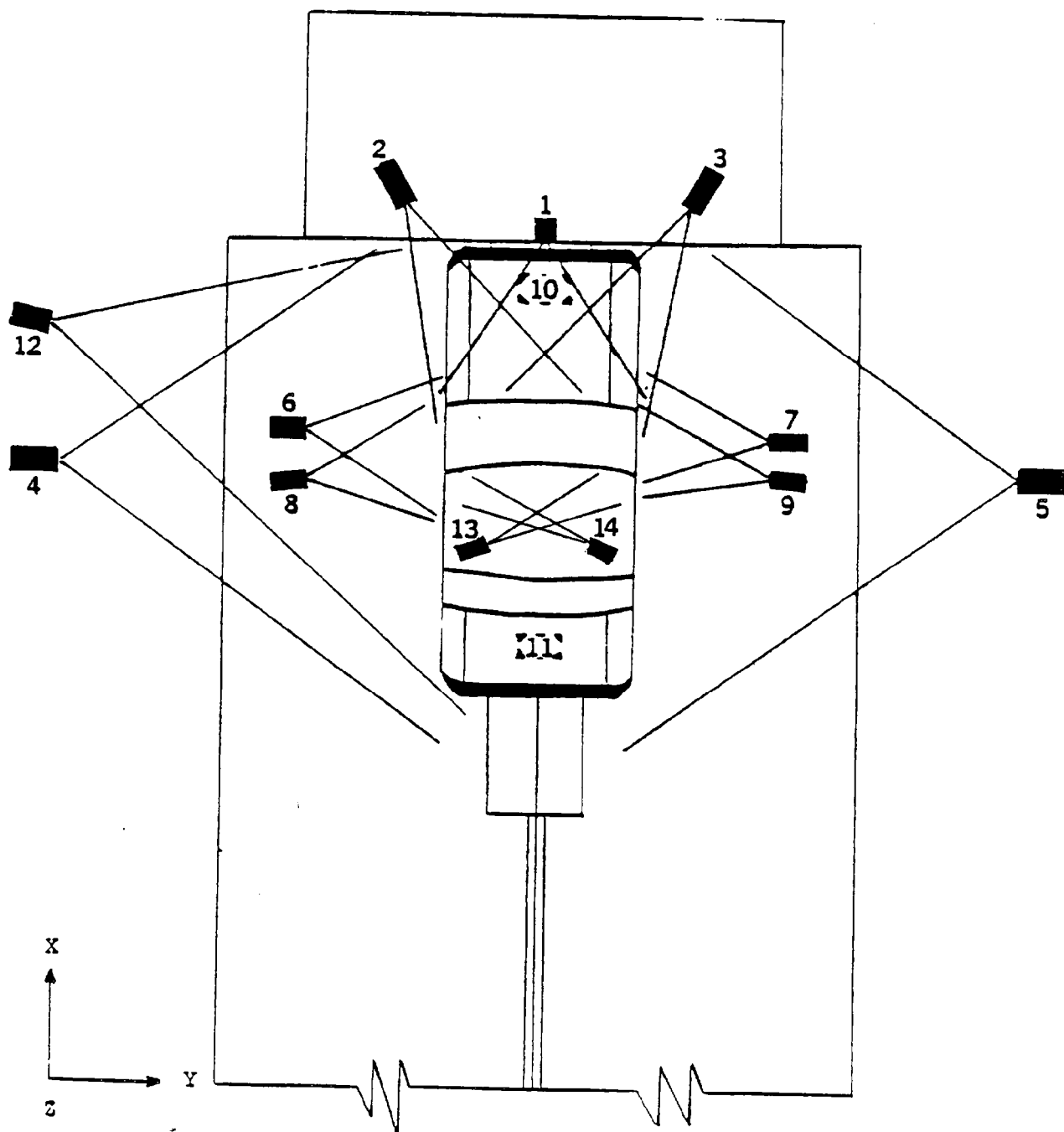


TABLE 4-11
FMVSS 212/219/301-75
CAMERA POSITIONS

VEHICLE 1982 Dodge Colt

NHTSA NO. 820515 TEST DATE November 17, 1982

1. Photo-Sonics	X <u>-6.0"</u>	2. Photo-Sonics	X <u>-32.0"</u>
13mm 500FPS	Y <u>- 0 -</u>	13mm 500FPS	Y <u>21.0"</u>
	Z <u>236.0"</u>		Z <u>110.0"</u>
3. Photo-Sonics	X <u>-30.0"</u>	4. Locam	X <u>27.0"</u>
13mm 500FPS	Y <u>28.0"</u>	15mm 500FPS	Y <u>292.0"</u>
	Z <u>101.0"</u>		Z <u>52.5"</u>
5. Locam	X <u>35.0"</u>	6. Locam	X <u>80.0"</u>
10mm 500FPS	Y <u>192.0"</u>	10mm 500FPS	Y <u>94.0"</u>
	Z <u>56.0"</u>		Z <u>55.5"</u>
		Dummy Head	<u>79.0"</u>
7. Locam	X <u>79.0"</u>	8. Locam	X <u>87.0"</u>
13mm 500FPS	Y <u>96.0"</u>	12.5mm 500FPS	Y <u>91.0"</u>
	Z <u>54.5"</u>		Z <u>55.5"</u>
Dummy Head	<u>81.0"</u>	Dummy Head	<u>76.0"</u>
9. Locam	X <u>86.0"</u>	10. Photo-Sonics	X <u>-13.0"</u>
12.5mm 500FPS	Y <u>94.0"</u>	13mm 500FPS	Y <u>- 0 -</u>
	Z <u>54.5"</u>		Z <u>-37.0"</u>
Dummy Head	<u>78.0"</u>		
11. Photo-Sonics	X <u>173.0"</u>	12. Canon Scoopic	
13mm 500FPS	Y <u>9.0"</u>	12.5 - 75mm 24FPS	
	Z <u>-27.0"</u>	- Documentary -	

NTS

SECTION 5



SECTION 5

5.0 TEST FACILITIES AND EQUIPMENT

National Technical Systems (NTS) collision barriers, vehicle static rollover machine, and data processing/computer analysis test facilities are located at the Fullerton, California Division.

This section discusses these specialized facilities, along with associated equipment and instrumentation required for the performance of this test.

5.1 FRONTAL COLLISION BARRIER FACILITY

5.1.1 The frontal (fixed) collision barrier conforms to the requirements as set by the NHTSA Office of Vehicle Safety Compliance (OVSC) and as defined in the Laboratory Procedures for FMVSS 212/219/301-75, TP219-02, dated January 9, 1979, with the following special characteristics.

5.1.2 The fixed collision barrier is a steel clad, steel reinforced concrete block with a 6'4" x 12' face. The face is 1" steel plate faced with 3/4 inch plywood. The total mass of the structure is approximately 200,000 pounds, with a substantial portion below ground to provide resistance against sliding or tipping of the barrier during impact.



SECTION 5

5.1.3 The facility consists of a 500 foot concrete paved runway, with a steel monorail embedded in the approach surface. Two camera pits are provided to allow photographing the test vehicle at impact. One pit is located immediately in front of the fixed collision barrier and is 36 inches wide (expandable to 48 inches), 7 feet deep, and 23 feet long (3 feet of the pit length extends under the barrier face). The second (mid) pit with removable monorail section is located approximately 160 feet from the fixed collision barrier and is 43 inches wide, 7 feet deep, and 23 feet long.

5.1.4 Tow propulsion is provided by a fixed prime mover and continuous cable drive system located near the mid camera pit position. The power plant for the tow cable system is a 200 h.p. synchronous electric motor, coupled to an electronically controlled Eddy Current Clutch and a 4:1 gear reduction transfer assembly.

The endless 1/2 inch diameter steel tow cable is wrapped around the drive pulley and is tensioned by a pneumatic loaded idler wheel. The tow cable passes through the fixed collision barrier and around fixed idler pulleys to complete the loop. The test vehicle or moving collision barrier is towed by a dolly assembly attached to the vehicle



SECTION 5

or moving collision barrier by a shear pin release mechanism. For a fixed collision barrier test, the test vehicle is towed within 20 feet of the fixed barrier, at which point the towing dolly assembly is disconnected from the test vehicle and the test vehicle proceeds under its own momentum for the final 20 feet to impact. For a moving collision barrier test, the moving collision barrier is towed within 5 feet of the test vehicle, at which point the towing dolly is disconnected from the moving collision barrier and the moving collision barrier proceeds under its own momentum for the final 5 feet to impact. Heavy steel stops actuate the tow cable release mechanism and prevent the towing dolly from continuing past the point of impact. The towing dolly is designed to fit inside the monorail such that it is constrained in the vertical and lateral directions, and capable of sliding freely along the monorail.



SECTION 5

5.2 LOAD CELL BARRIER

5.2.1 The full-face load cell barrier is a National Highway Traffic Safety Administration (NHTSA) furnished load measuring device to be utilized for selected frontal tests with the following special characteristics.

5.2.2 The full-face load cell barrier is a 39" x 83" flat face configuration consisting of thirty-six (36) individual load cells faced with 1-3/4 inch plywood. The barrier assembly is rigidly attached to the frontal (fixed) collision barrier to form a rigid buttress structure. The load cell barrier will be used to compare force distributions over the front structure of vehicles in a crash and to assess aggressivity by defining force levels and regions.

5.3 OBLIQUE ANGLE COLLISION BARRIER

The oblique angle collision barrier conforms to the requirements as set by NHTSA Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures TP219-02, with the following special characteristics.



SECTION 5

5.3.2 The oblique angle collision barrier is constructed of a flat 1 1/2 inch steel plate faced with 3/4 inch plywood. The barrier face is 6' X 12' and is adjustable for left or right angle impacts by means of seven tubular gussets that attach to the standard fixed frontal collision barrier to form a rigid buttress structure.

5.4 MOVING COLLISION BARRIER

5.4.1 The moving collision barrier conforms to the requirements as set by Federal Motor Vehicle Safety Standard No. 208, Paragraph S8.2 with the following special characteristics.

5.4.2 The chassis is constructed of 12 inch steel channel with tubular frame gussets. The flat impacting face plate is 1/2 inch steel plate faced with 3/4 inch plywood. The face plate is reinforced with 6 inch steel channel horizontally welded to the chassis to form a rigid symmetrical structure. A camera boom extends above the barrier face plane to provide a view of barrier to vehicle impact. The barrier assembly weighs 3,987 pounds and has a four wheel electric brake system.



SECTION 5

5.5 VEHICLE STATIC ROLLOVER MACHINE

5.5.1 The vehicle static rollover machine conforms to the requirements as set by the NHTSA Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures TP219-02 with the following special characteristics.

5.5.2 The vehicle static rollover machine is constructed of 10 inch square tube with adjustable wheelbase and tread width platforms to accommodate the various test vehicles. The total usable platform area is 8 feet wide and 25 feet long with special design feature to accomodate vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less with various body configuration heights to 12 feet. The test vehicle can be rotated left or right and can turn each 90° rotational increment in approximately two (2) minutes.

5.6 IMPACT VELOCITY MEASUREMENT

The test vehicle impact velocity is measured by two (2) separate certification timing trap systems located within five (5) feet of the vehicle to fixed collision barrier face and to one side on the approach apron. Each timing



SECTION 5

trap system contains two (2) optical beams, mounted twenty four (24) inches apart, in a mechanical housing assembly providing a start-stop signal to a digital display counter. As the test vehicle traverses the impact apron, a blade attached to the test vehicle rear fender interrupts each optical beam providing the precise measurement of time interval for the test vehicle to advance the known distance between the optical beams. Each interval of time measurement is stored in the digital display counter and photographically recorded.

The moving collision barrier impact velocity is measured by two (2) separate certification timing trap systems located within five (5) feet of the moving collision barrier to vehicle impact location and to one side on the approach apron. Each timing trap system contains two (2) optical beams, mounted twenty-four (24) inches apart, in a mechanical housing assembly providing a start-stop signal to a digital display counter. As the moving barrier traverses the impact apron, a blade attached to the moving barrier side interrupts each optical beam providing the precise measurement of time interval for the moving barrier to advance the known distance between the optical beams. Each interval of time measurement is stored in the digital display counter and photographically recorded.



SECTION 5

5.7 PHOTOGRAPH COVERAGE

5.7.1 Because FMVSS 212/219/301-75 may be a combined test, it is necessary that all photographic coverage of the test vehicle be done at one time with specific photographs to document the areas for Vehicle Safety Compliance consideration; windshield area and the fuel system. Each report will utilize only those photographs pertaining to the Vehicle Safety Compliance Test being reported.

5.7.2 FIXED BARRIER IMPACT TEST

Motion picture coverage of the event employs five (5) 16mm 1B Photo-Sonics cameras and six (6) 16mm 51 Redlake Locam cameras using color film at 500 frames per second (fps). Also a 16mm Canon Scoopic 24 frames per second (fps) camera with color film is used to record vehicle pre-test condition, vehicle in-run, impact, and post-impact vehicle conditions including the rollover increments for documentary purposes. The eleven (11) high speed cameras are located at stationary positions near the point of impact. One is an overhead camera mounted on a tower above the fixed barrier face on centerline of the test vehicle at impact. Its field of view includes the barrier face and the front of the vehicle to a point about one foot aft of the windshield. A second and third camera are mounted on top of the fixed barrier with



SECTION 5

their field of view concentrating on the windshield area (FMVSS 212/219). The fourth and fifth cameras each have a side view of the test vehicle at impact. The sixth, seventh, eighth, and ninth cameras are located adjacent to the test vehicle front passengers compartment and positioned to photograph motion of each test dummy at impact. The tenth and eleventh cameras are located in the pit and positioned to photograph the underside of the engine compartment and fuel tank area.

5.7.3 MOVING BARRIER IMPACT TEST

Motion picture coverage of the event employs four (4) 16mm 1B Photo Sonics cameras and two (2) 16mm 51 Redlake Locam cameras using color film at 500 frames per second (fps). Also a 16mm Canon Scoopic 24 frames per second (fps) camera with color film is used to record vehicle pre-test condition, barrier in-run, impact, and post-impact vehicle conditions including the rollover increments for documentary purposes. Five (5) of the high speed cameras are located at stationary positions near the point of impact. Three (3) cameras are located in the pit and positioned to photograph the underside of the engine compartment, with overlapping field of views, aft to the fuel tank area. The fourth and fifth cameras each have a side view of the test vehicle at impact.



SECTION 5

The sixth camera is attached to the moving collision barrier to photograph the contact between the barrier and the test vehicle.

5.7.4 TIME PULSE GENERATOR

Time data from two (2) sources are contained in the high speed film coverage. The first is a time reference of 100 pulse per second (pps) light emitting diode event mark along the film edge. This pulse is generated by the time pulse generator and fed to all high speed cameras. Thus, it is possible to relate film data to a real time base. The second time record is an indication of time zero (moment of impact). This is accomplished by a trip switch and event mark system. The trip switch is positioned at the impact point so that it triggers the light emitting diode event mark along the film edge at the moment of bumper-barrier contact. Thus, the particular film frame corresponding to the point of impact is clearly indicated on all the high speed film.



SECTION 5

5.8 DATA ACQUISITION AND REDUCTION

The data acquisition and analysis system used for acquiring occupant response, vehicle acceleration, and load cell barrier force data are shown schematically in Figure 5-1. A complete list of instrumentation is provided in Table 5-1. An itemized procedure for acquiring data is provided in Table 5-2.

Prior to the vehicle impact test the onboard instrumentation package is installed and a calibration and null reference check is performed to checkout all analog data devices including the onboard package, the load cell barrier, and the FM magnetic tape recorders. The moment of impact trigger switch attached to the vehicle and the the load cell barrier are also checked out. Immediately following vehicle impact a post-impact calibration and null reference check is performed.

The analog data is then played back into a Hewlett Packard Digital Fourier Analyzer (DFA) system using a HP 2100S mini computer with 32K word core storage. This system uses four program controlled analog filters which provides pre-digitizing filter capability of 48 db/octave above 1250 Hz.



SECTION 5

The DFA is a hard disc based system with standard HP software for performing data acquisition and analysis functions. The HP software is programmed to automate the data reduction process. The data is entered into temporary storage, four channels (one set) at a time. Table 5-3 defines each data channel and data set. The data sets are divided into driver, passenger, and load cell barrier tape recorder groups to facilitate simultaneous data acquisition for the head, chest, vehicle, and load cell barrier transducers and to assure appropriate calibration of injury criteria and vehicle dynamics. Test personnel enter the appropriate calibration for each data channel as the data is read into the computer. When all data has been acquired it is moved as a vehicle set to permanent storage on a removable magnetic disc. (All magnetic discs and FM recorder tapes are retained on file at NTS).

The only modifications to the data at the time of permanent storage is the filtering and digitizing process of the FM tape recorder (2500 Hz) and the DFA (5000 Hz sampling for a 200 ms window). After the data is moved to permanent storage it is recalled by test personnel and plotted with the appro-



SECTION 5

priate label and vehicle designations. As the data is recalled, the DFA automatically filters the data with the appropriate SAE filter.

Figure 5-2 illustrates the SAE class 60, 180, 600 and 1000 filters applied to the data. These filters are in accordance with SAE J211a, Instrumentation for Impact Tests. These recommended filters are quadratic double pole with 65% damping and a 12 db/octave rolloff. They are applied to the data using a frequency domain multiplication of the Fast Fourier Transform (FFT) of the data followed by an inverse Fast Fourier Transform (FFT) of the product.

It should be noted that in Figure 5-2 the predigitizing analog filter attenuates all signals above the 1250 Hz cutoff frequency at a rate of 48 db/octave. This has no effect on the class 60 or class 180 data. The class 600 data is within SAE J211a recommendation to 1900 Hz and -20 db. Above 1900 Hz the class 600 data is attenuated at 48 db/octave instead of 24 db/octave. This has very negligible effect on the class 600 data. Class 1000 data is filtered at 24 db/octave above 1650 Hz. Exami-



SECTION 5

nation of typical class 1000 data shows the high frequency components between 1250 Hz and 1650 Hz are uniformly less than 3 percent of the largest components at lower frequencies. The effect of the predigitizing filter is a very slight smoothing of the plotted data.

Class 60 filters are applied to the vehicle acceleration, barrier loads, and belt restraint forces, while the class 180 filter is applied to the chest acceleration forces and class 1000 filter is applied to the head acceleration forces.

5.8.1 IMPACT DATA

All impact data is presented in computer plots of data digitized at 200 microseconds per sample. SAE filters are applied as required to the appropriate data sets. Each data plot includes labeling, defining the test vehicle, filter class, and the complete identification of the data plotted.



SECTION 5

5.8.1.2 DUMMY HEAD DATA

The dummy head accelerations are processed as class 1000 data, and the Head Injury Criteria (HIC) calculation is performed. The HIC calculations are maximized for start time (T1) and end time (T2), using a manual iteration routine, usually requiring about ten iterations and between 5,000 and 10,000 combinations of start and end times. Data output is in the form of computer plots with the final HIC calculations. Listings of data value and HIC calculations are available, but not provided in the final report.

5.8.1.3 DUMMY CHEST DATA

The dummy chest accelerations are processed as class 180 data. Chest Severity Index (CSI) calculations and the highest acceleration value of at least three millisecond duration (3 ms clip) are performed. Data output is in form of computer plots with the 3 ms clip calculations.

5.8.1.4 FEMUR LOAD DATA

The dummy femur loads are processed as class 600 data, and presented as computer plots.



SECTION 5

5.8.1.5 RESTRAINT LOAD DATA

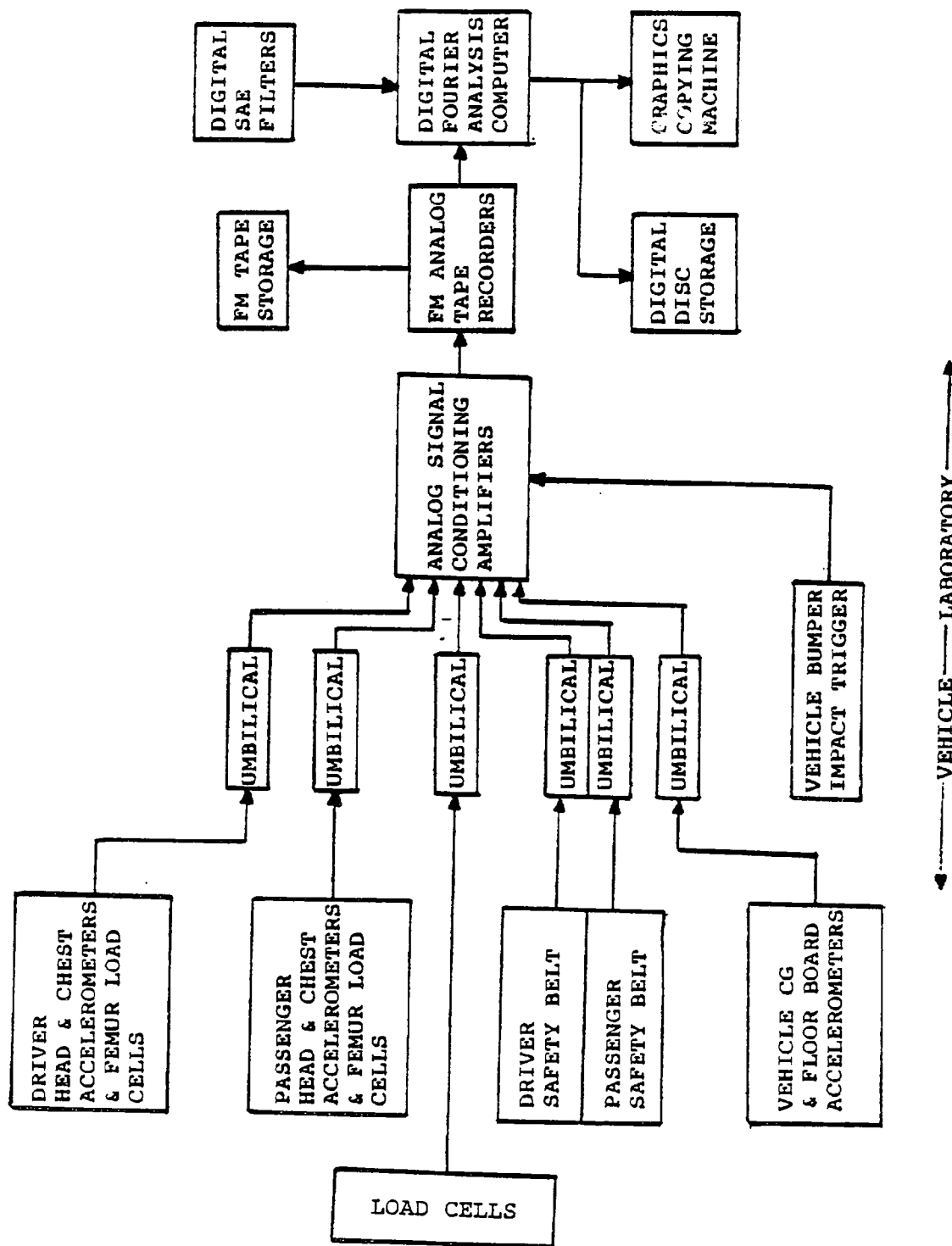
The dummy restraint loads are processed as class 60 data, and presented as computer plots.

5.8.1.6 VEHICLE ACCELERATION DATA

The vehicle accelerations are processed as class 60 data, and presented as computer plots. Additionally, the longitudinal vehicle acceleration is integrated to provide approximate vehicle velocity change and vehicle crush during the impact event.

5.8.1.7 LOAD CELL BARRIER FORCE DATA

The load cell barrier impact forces are processed as class 60 data. Data is presented as individual cell loads, upper barrier sum, lower barrier sum, and total barrier sum. Total load vs vehicle crush is also computed.



VEHICLE AND OCCUPANT CRASH IMPACT DATA ACQUISITION SYSTEM

FIGURE 5-1

TABLE 5-1 INSTRUMENTATION FOR CRASH TEST

<u>Instrument</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>Full Scale</u>	<u>Accuracy</u>	<u>Frequency Max.</u>
Accelerometers, Head, Chest, Vehicle	Endevco	2262C-200	200g	±1%	3600 Hz
Load Cells, Femurs	GSE	2430	3000 lb	±1%	>3600 Hz
Load Cells, Safety Belts	GSE	2500	3000 lb	±1%	>3600 Hz
Contact Switch, Impact	NTS	-	2 V	-	<200 us rise time
FM Tape Recorder	Bell & Howell	4020	±2.8 V	47 db SNR	2500 Hz WB
Programmable Filter, All Data	Hewlett Packard	54440A	-	0.5%	1250 Hz, 48 db/oct
Analog-Digital Converter, All Data	Hewlett Packard	5466B	-	0.5%	200 us sampling
Analysis Computer, All Analysis	Hewlett Packard	2100S	32 K Words	16 Bit Word	-
Disc Drive	Hewlett Packard	7900A	5 Meg Words	-	-
Load Cells, Full Face Barrier	Interface Inc.	1220	50,000 lb.	±1%	

TABLE 5-2

DATA ACQUISITION AND REDUCTION PROCESS

<u>STEP</u>	<u>DESCRIPTION</u>
1	DA System Installation
2	DA System Pre-Impact Calibration
3	Impact Trigger Checkout
4	Vehicle Impact Performed
5	DA System Post-Impact Calibration
6	Data Reproduced From FM Tape Into Computer a) Data analog filtered at 1250 Hz or 1650 Hz b) Data digitized at 200 ms sample rate c) Data sychronized by impact trigger signal
7	Digitized Data Examined
8	Data Transferred Permanent Disc Storage
9	Appropriate SAE Filters Are Applied
10	Each Data Signal Plotted With Labels
11	Chest Severity Index Values Determined
12	Head Injury Criteria Values Determined
13	Vehicle Dynamics Evaluated (MPH & Crush)

TABLE 5-3

DATA DESIGNATIONS FOR VEHICLE CRASH IMPACT DATA ACQUISITION

<u>DATA SET</u>	<u>TAPE NO.</u>	<u>CHANNEL NO.</u>	<u>DESCRIPTION</u>
1	1	1	Driver Longitudinal Head Acceleration Ax
1	1	2	Driver Lateral Head Acceleration Ay
1	1	3	Driver Vertical Head Acceleration Az
1	1	4	Driver Right Femur Force
2	1	5	Driver Longitudinal Chest Acceleration Ax
2	1	6	Driver Lateral Chest Acceleration Ay
2	1	7	Driver Vertical Chest Acceleration Az
2	1	8	Driver Left Femur Force
3	1	9	Driver Shoulder Belt Force
3	1	10	Driver Lap Belt Force
3	1	11	Left Rear Floor Pan Longitudinal Acceleration Ax
5	2	1	Passenger Longitudinal Head Acceleration Ax
5	2	2	Passenger Lateral Head Acceleration Ay
5	2	3	Passenger Vertical Head Acceleration Az
5	2	4	Passenger Right Femur Force
6	2	5	Passenger Longitudinal Chest Acceleration Ax
6	2	6	Passenger Lateral Chest Acceleration Ay
6	2	7	Passenger Vertical Chest Acceleration Az
6	2	8	Passenger Left Femur Force
7	2	9	Passenger Shoulder Belt Force
7	2	10	Passenger Lap Belt Force
7	2	11	Right Front Floor Pan Longitudinal Acceleration Ax
9	3	1	Right Front Brake Caliper Longitudinal Acceleration Ax
9	3	2	Left Front Brake Caliper Longitudinal Acceleration Ax
9	3	3	Vehicle Engine Top Longitudinal Acceleration Ax
9	3	4	Vehicle Engine Bottom Longitudinal Acceleration Ax
10	3	5	Vehicle Longitudinal CG Acceleration Ax
10	3	6	Rear Axle Longitudinal Acceleration Ax

TABLE 5-3

DATA DESIGNATIONS FOR VEHICLE CRASH IMPACT DATA ACQUISITION

<u>DATA SET</u>	<u>TAPE NO.</u>	<u>CHANNEL NO.</u>	<u>DESCRIPTION</u>
11	4	1	Barrier Impact (A1) Force
11	4	2	Barrier Impact (A2) Force
11	4	3	Barrier Impact (A3) Force
11	4	4	Barrier Impact (A4) Force
12	4	5	Barrier Impact (A5) Force
12	4	6	Barrier Impact (A6) Force
12	4	7	Barrier Impact (A7) Force
12	4	8	Barrier Impact (A8) Force
13	4	9	Barrier Impact (A9) Force
13	4	10	Barrier Impact (B1) Force
13	4	11	Barrier Impact (B2) Force
13	4	12	Barrier Impact (B3) Force
14	5	1	Barrier Impact (B4) Force
14	5	2	Barrier Impact (B5) Force
14	5	3	Barrier Impact (B6) Force
14	5	4	Barrier Impact (B7) Force
15	5	5	Barrier Impact (B8) Force
15	5	6	Barrier Impact (B9) Force
15	5	7	Barrier Impact (C1) Force
15	5	8	Barrier Impact (C2) Force
16	5	9	Barrier Impact (C3) Force
16	5	10	Barrier Impact (C4) Force
16	5	11	Barrier Impact (C5) Force
16	5	12	Barrier Impact (C6) Force
17	6	1	Barrier Impact (C7) Force
17	6	2	Barrier Impact (C8) Force
17	6	3	Barrier Impact (C9) Force
17	6	4	Barrier Impact (D1) Force
18	6	5	Barrier Impact (D2) Force
18	6	6	Barrier Impact (D3) Force
18	6	7	Barrier Impact (D4) Force
18	6	8	Barrier Impact (D5) Force
19	6	9	Barrier Impact (D6) Force
19	6	10	Barrier Impact (D7) Force
19	6	11	Barrier Impact (D8) Force
19	6	12	Barrier Impact (D9) Force
20	3	7	Driver Seat Belt Spool-Out
20	3	8	Driver Seat Belt Stretch
20	3	9	Passenger Seat Belt Spool-Out
20	3	10	Passenger Seat Belt Stretch

DOT CRASH PROGRAM

NATIONAL TECHNICAL SYSTEMS

COMPARISON PLOT OF SAE CLASS 60, 180, 600 AND 1000 FILTERS AND
THE DATA ANALYSIS 1250 HZ PREDICTITIZING ANALOG FILTER

SAE FILTER ROLL OFF IS 12 DB/OCTAVE, ANALOG FILTER ROLL OFF IS 48 DB/O

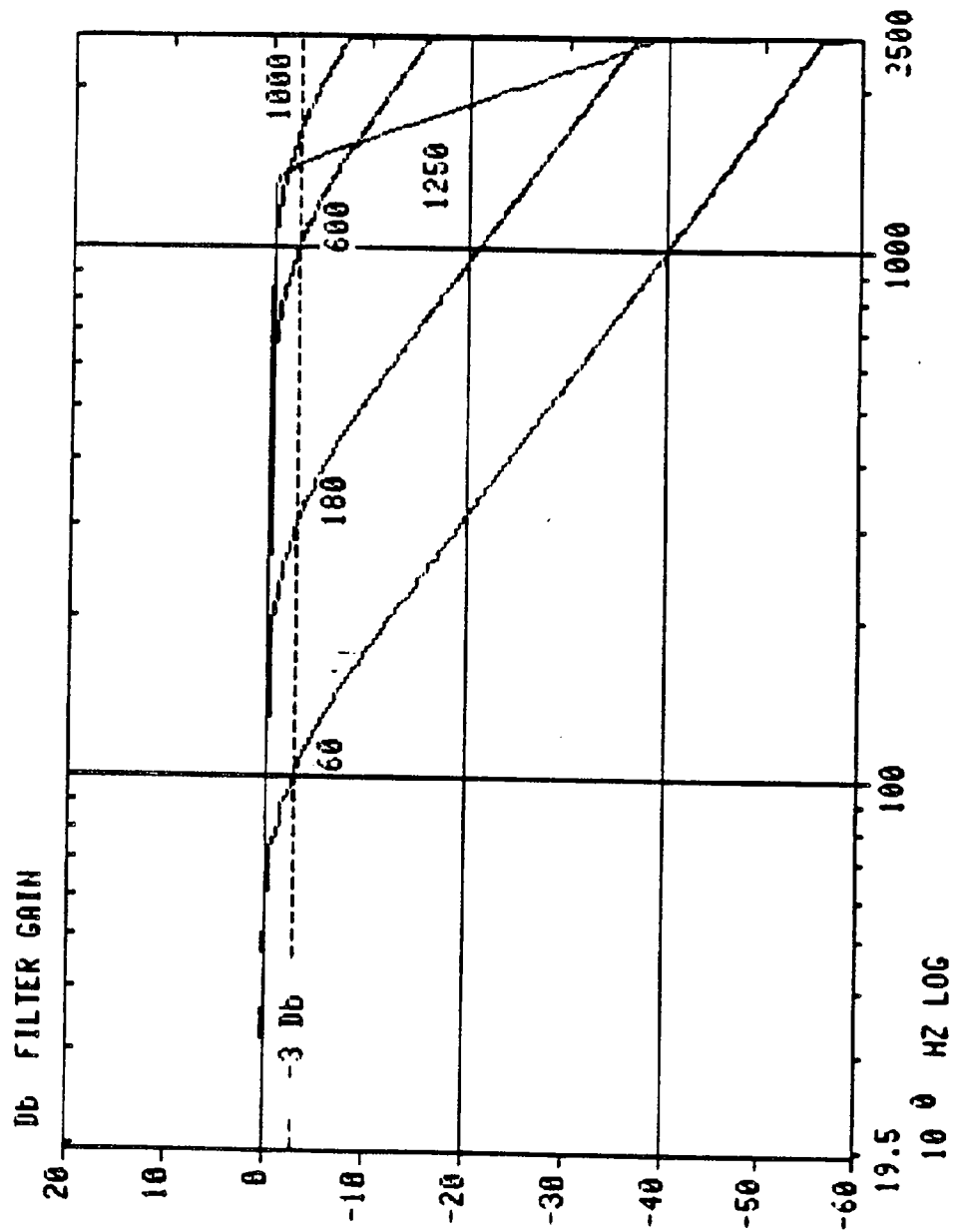


FIGURE 5-2

NTS

APPENDIX A



APPENDIX A

The following photographs are pre and post test dummy positions and interior compartment locations of dummy contact during the impact event.



Figure A-1
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Driver Dummy View





Figure A-2
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Pre-Test, Passenger Dummy View



NTS

Figure A-3
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Driver Dummy View



NTS

Figure A-4
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Driver Dummy View





Figure A-5
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Driver Dummy Contact Area





Figure A-6

1982 Dodge Colt --4 Door Hatchback

NHTSA 820515

Post-Impact, Passenger Dummy View





Figure A-7
1982 Dodge Colt --4 Door Hatchback
NHTSA 820515
Post-Impact, Passenger Dummy View





Figure A-8

1982 Dodge Colt --4 Door Hatchback

NHTSA 820515

Post-Impact, Passenger Dummy Contact Area





APPENDIX B



APPENDIX B

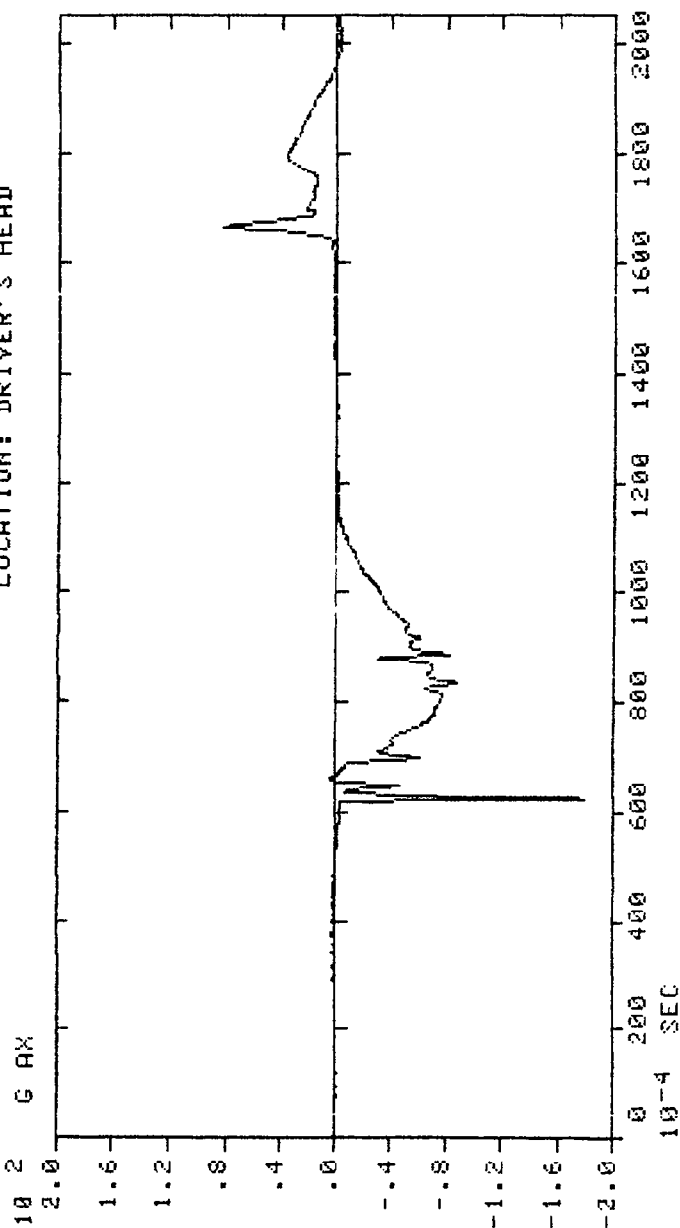
The following computer plots provide complete and comprehensive occupant response and vehicle acceleration along with the load cell barrier data during the frontal fixed barrier impact test of a 1982 Dodge Colt - 4 Door Hatchback, NHTSA 820515.

DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 1, CH 1
 DIRECTION: FORWARD
 LOCATION: DRIVER'S HEAD

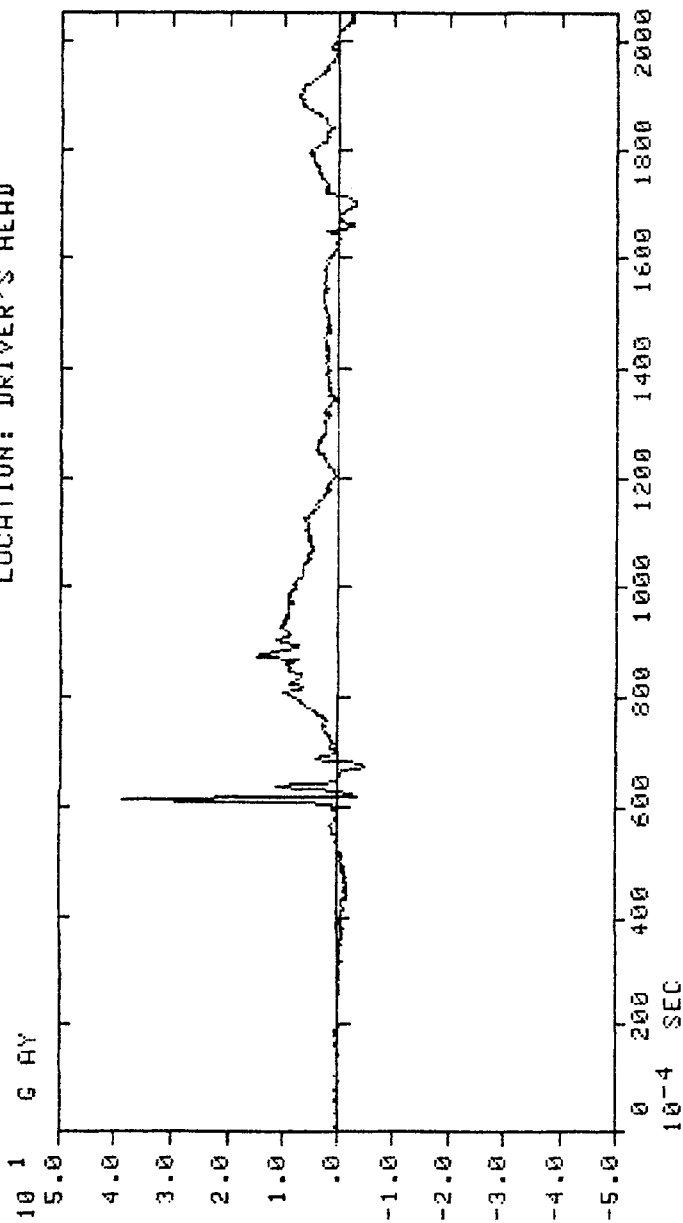


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 1, CH 2
 DIRECTION: LEFT
 LOCATION: DRIVER'S HEAD



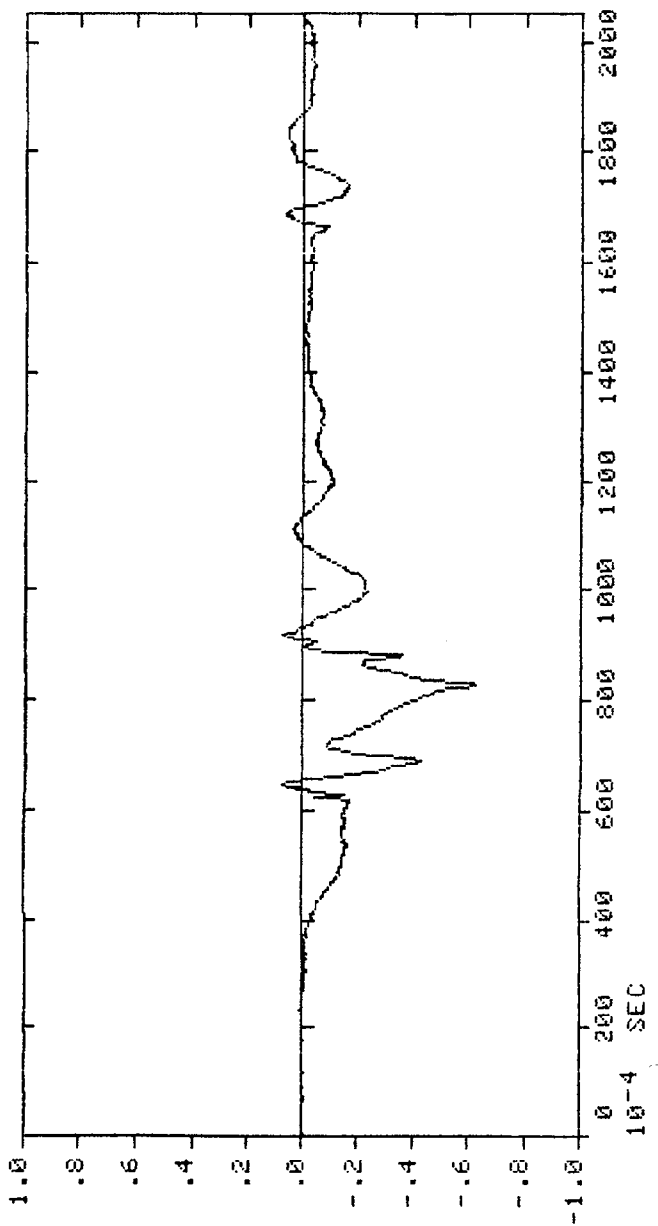
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

10 2 G AY

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH 3
DIRECTION: UPWARD
LOCATION: DRIVER'S HEAD



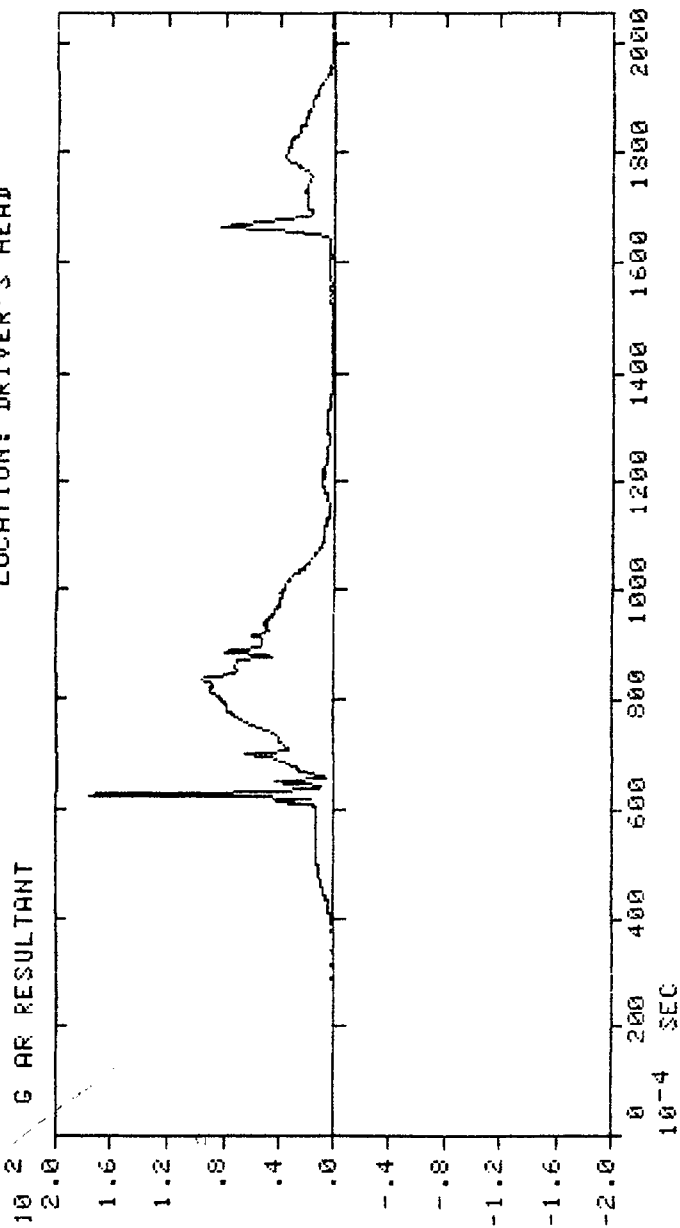
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH 1-3
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S HEAD

10 2 G AR RESULTANT



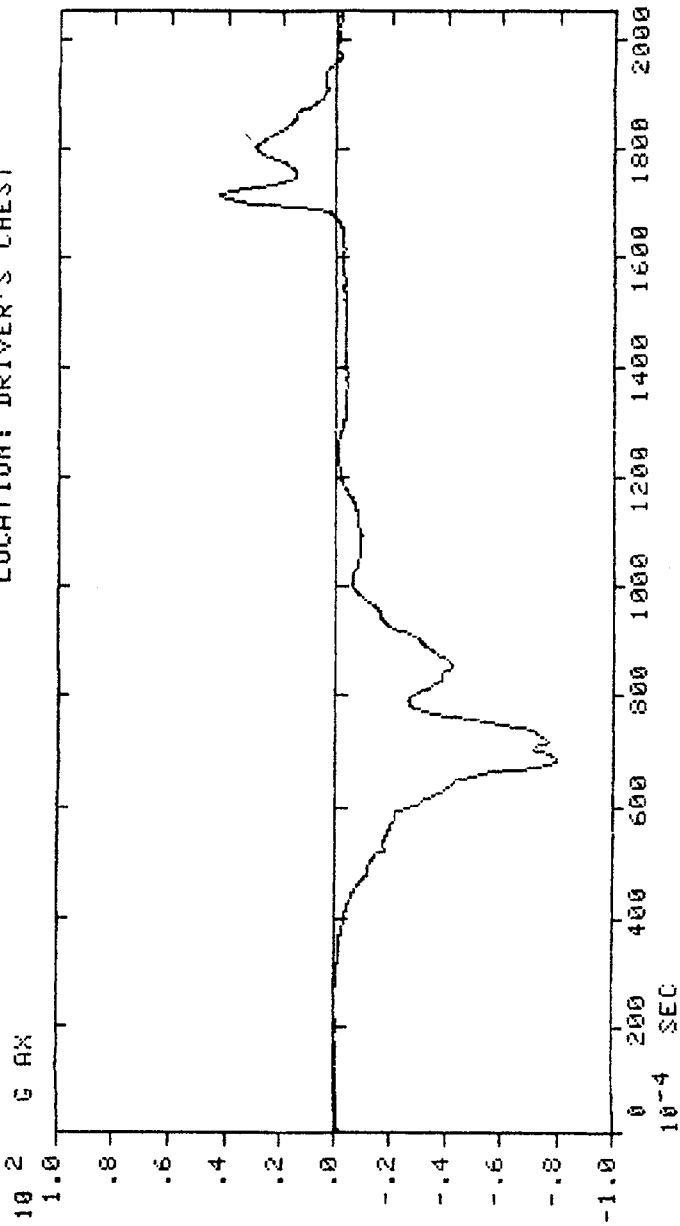
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

10 2 G AX

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 5
DIRECTION: FORWARD
LOCATION: DRIVER'S CHEST

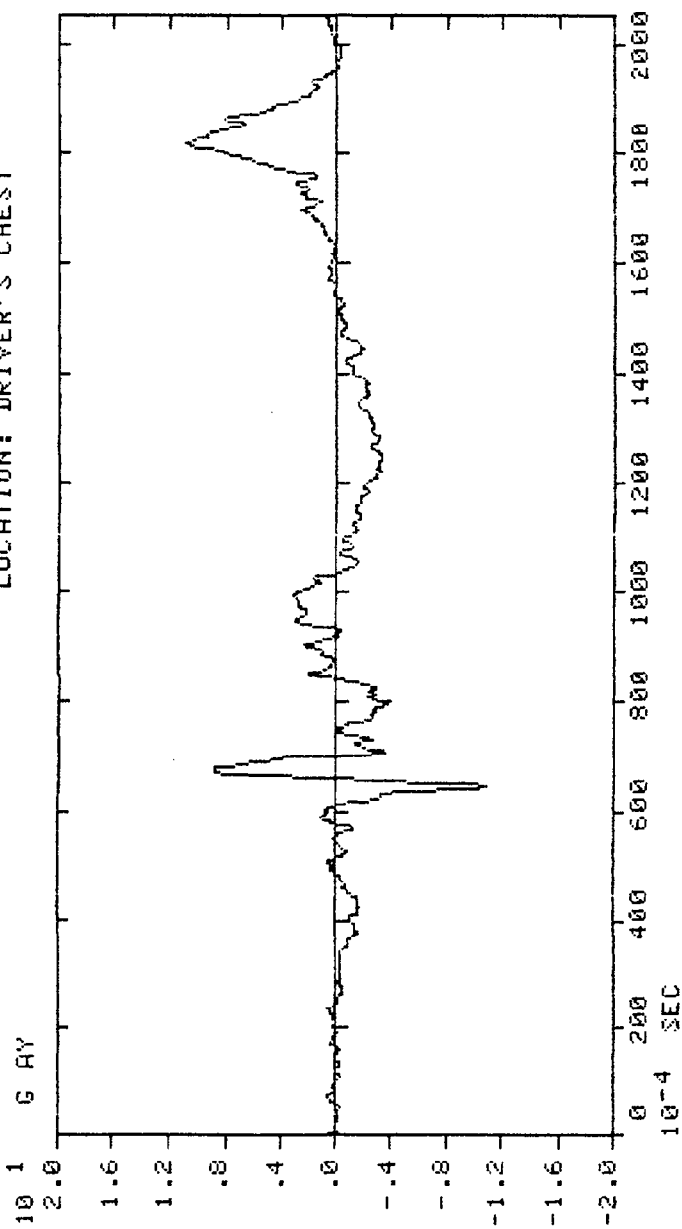


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 180
 ACCELEROMETER: TAPE 1, CH 6
 DIRECTION: LEFT
 LOCATION: DRIVER'S CHEST



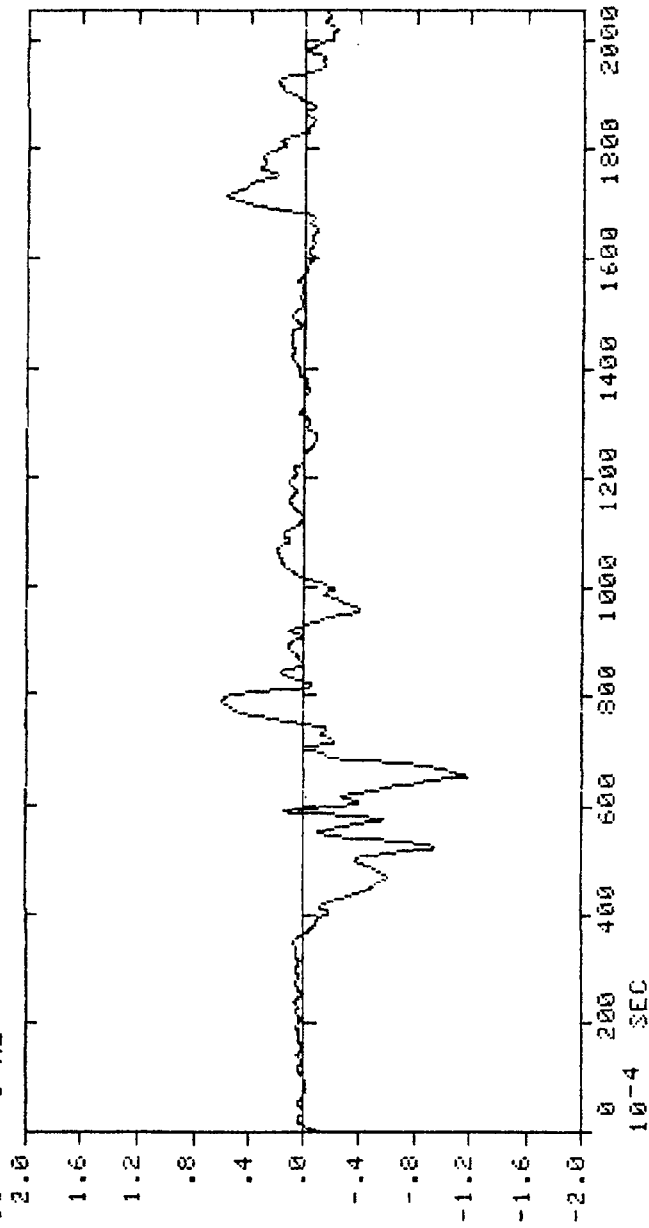
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 7
DIRECTION: UPWARD
LOCATION: DRIVER'S CHEST

10 1 6 AZ



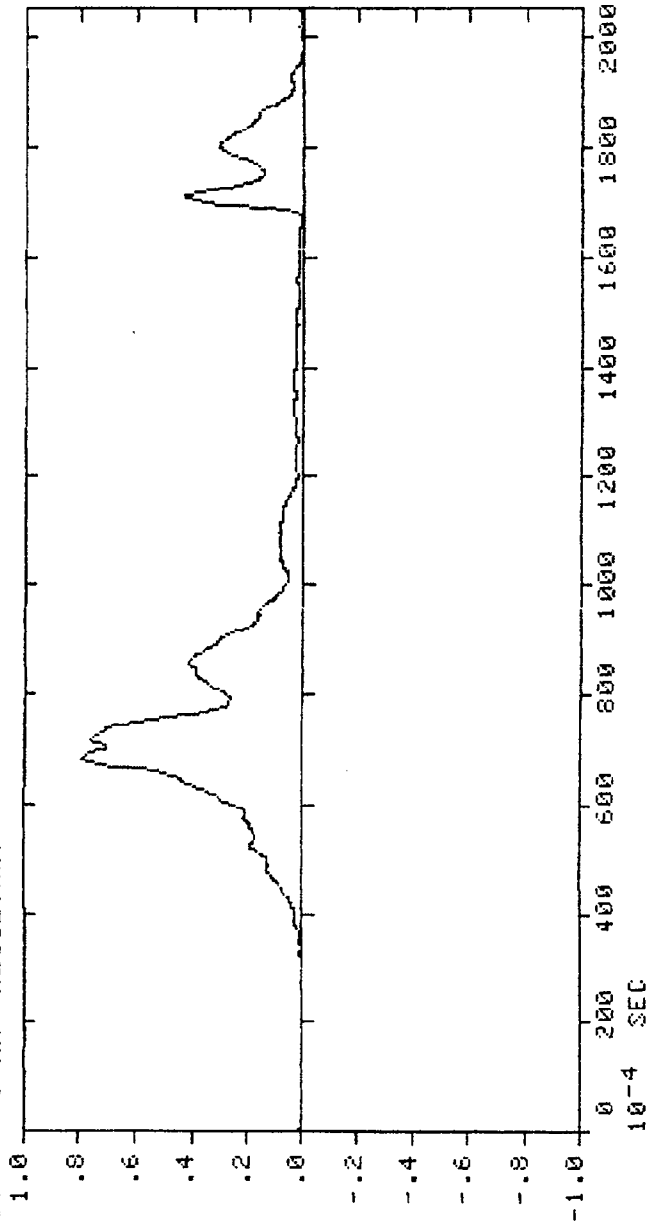
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 5-7
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S CHEST

10 2 G AR RESULTANT



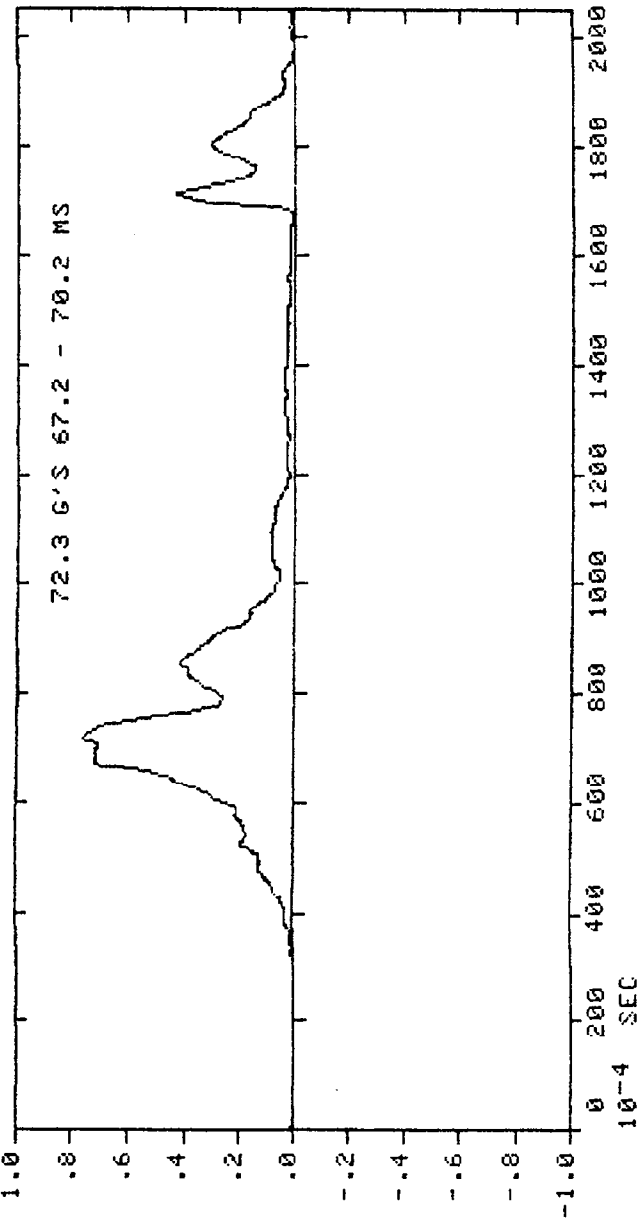
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 181-20 34.92 MPH
 DATE: NOV.17, 1982 FRONTAL

10 2 G AR RESULTANT

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 180
 ACCELEROMETER: TAPE 1, CH 5-7
 DIRECTION: RESULTANT OF XYZ
 LOCATION: DRIVER'S CHEST

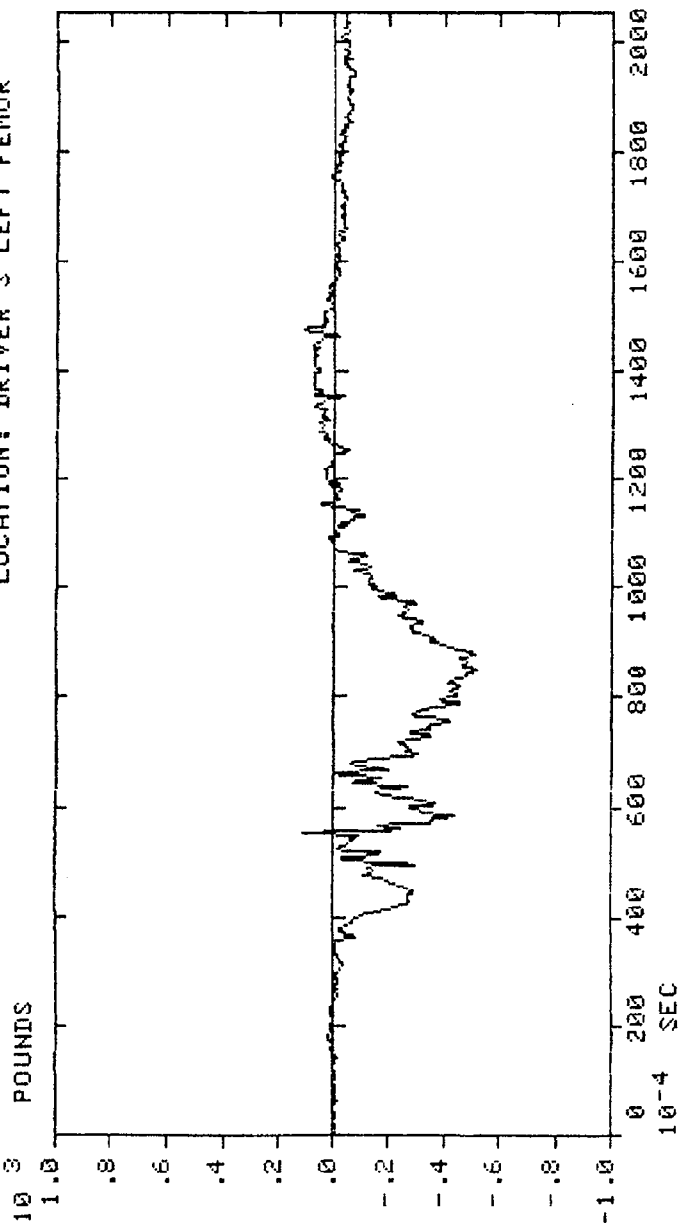


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 600
LOAD CELL: TAPE 1, CH 8
DIRECTION: TENSION
LOCATION: DRIVER'S LEFT FEMUR

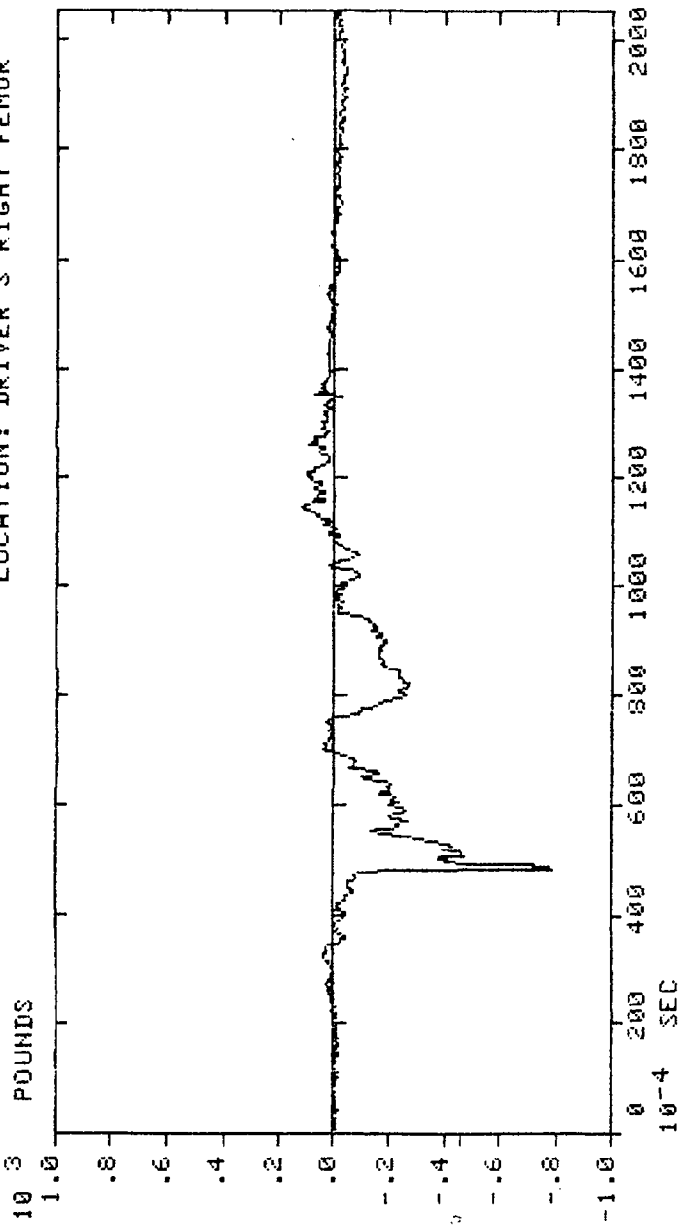


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 600
LOAD CELL: TAPE 1, CH 4
DIRECTION: TENSION
LOCATION: DRIVER'S RIGHT FEMUR

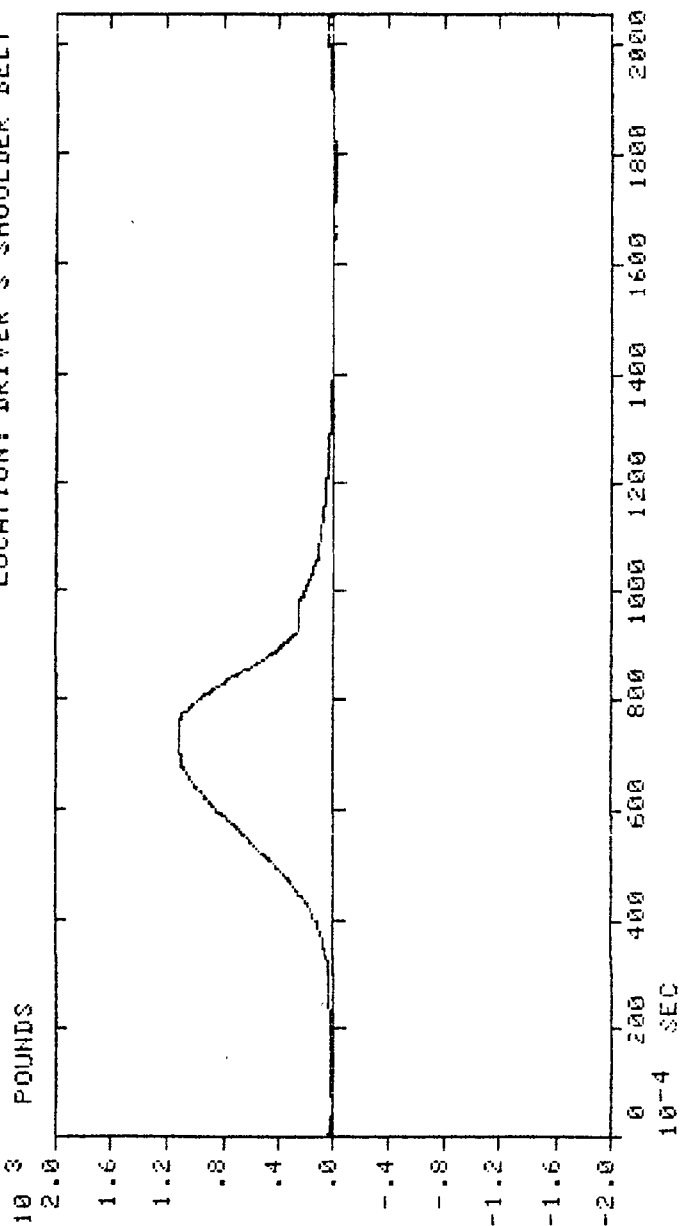


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 1, CH 9
 DIRECTION: TENSION
 LOCATION: DRIVER'S SHOULDER BELT

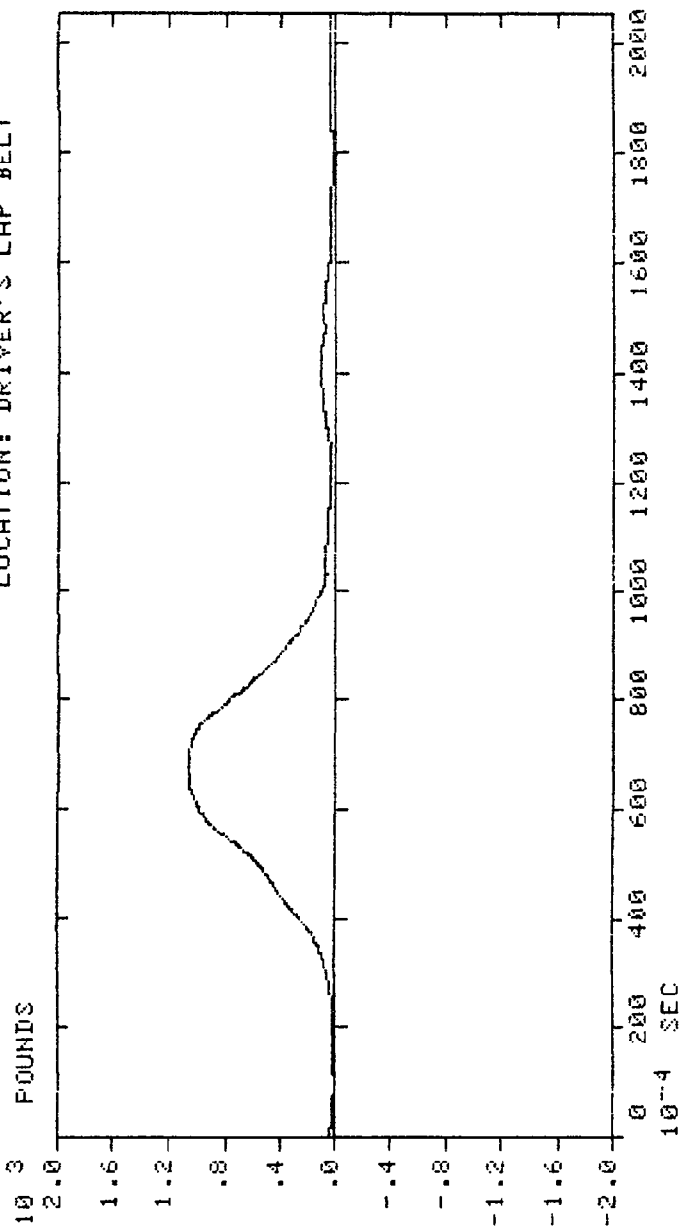


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 1, CH 10
 DIRECTION: TENSION
 LOCATION: DRIVER'S LAP BELT



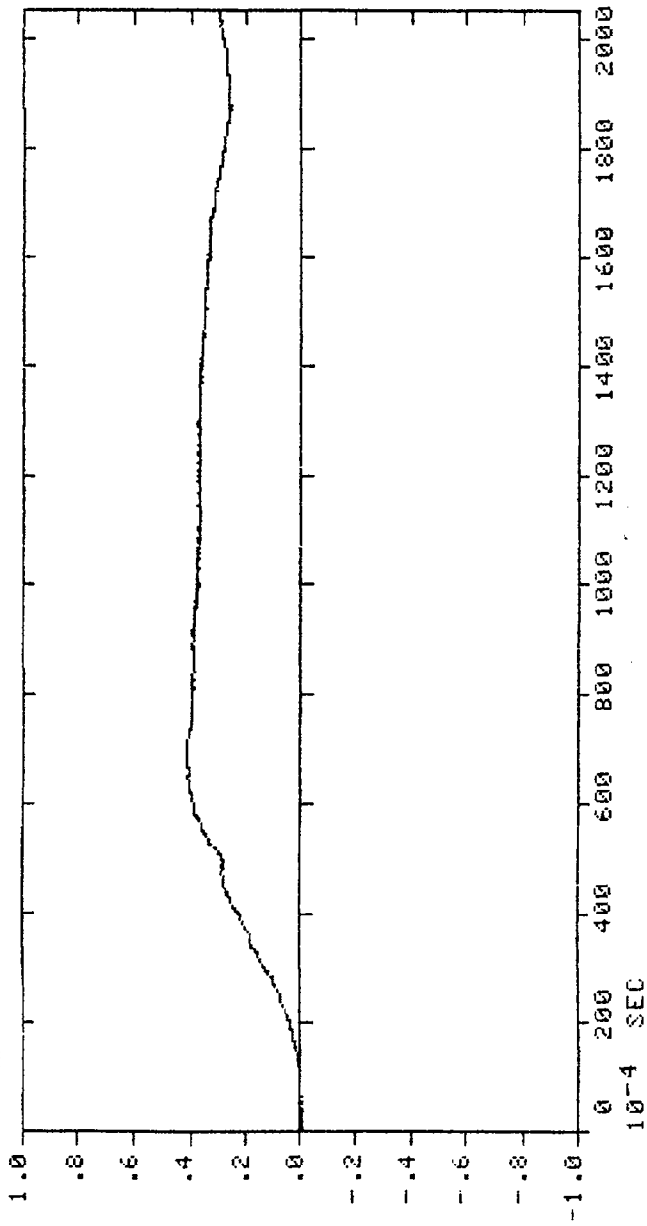
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSIONMETER: TAPE 3 CH 7
 DIRECTION: OUT
 LOCATION: DRIVER SEAT BELT

10 1 INCHES

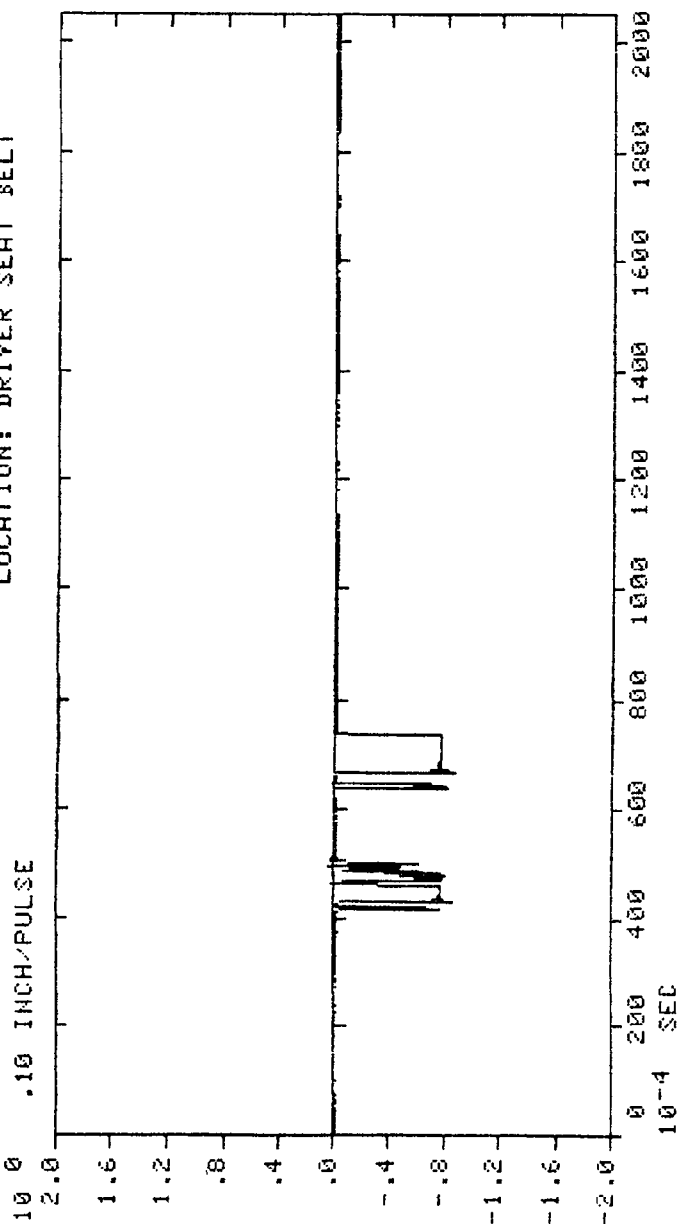


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSOMETER: TAPE 3 CH 8
 DIRECTION: STREICH
 LOCATION: DRIVER SEAT BELT

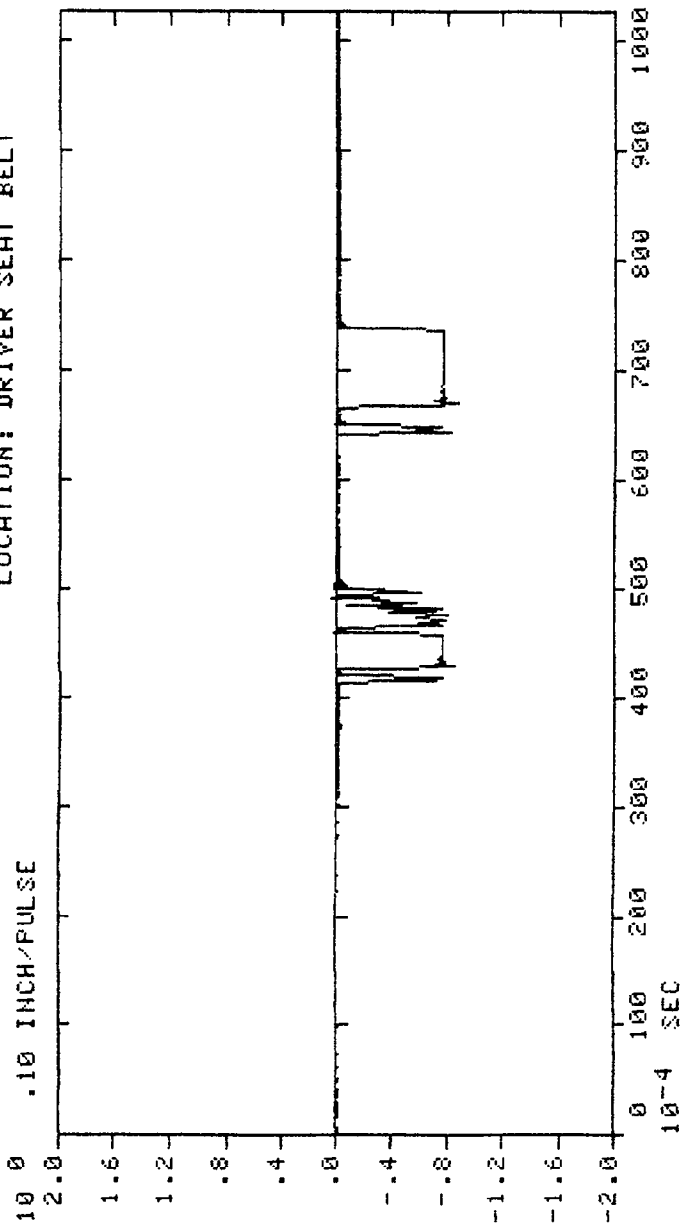


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSOMETER: TAPE 3 CH 8
 DIRECTION: STRETCH
 LOCATION: DRIVER SEAT BELT

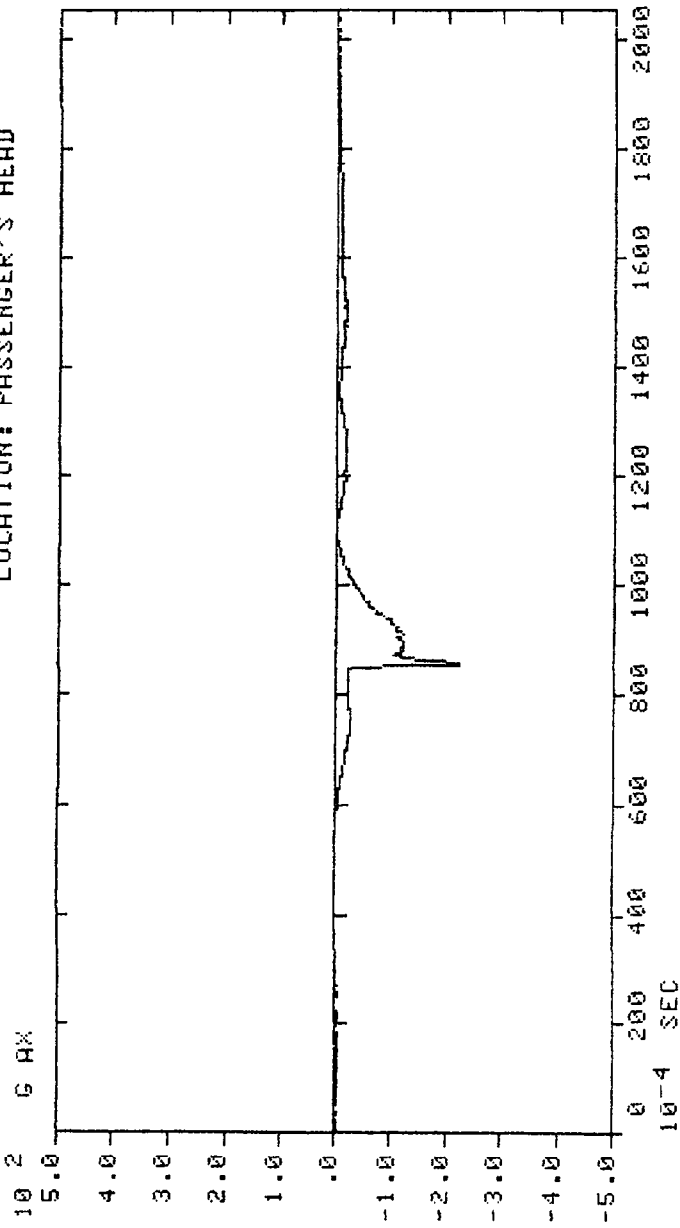


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 1
 DIRECTION: FORWARD
 LOCATION: PASSENGER'S HEAD



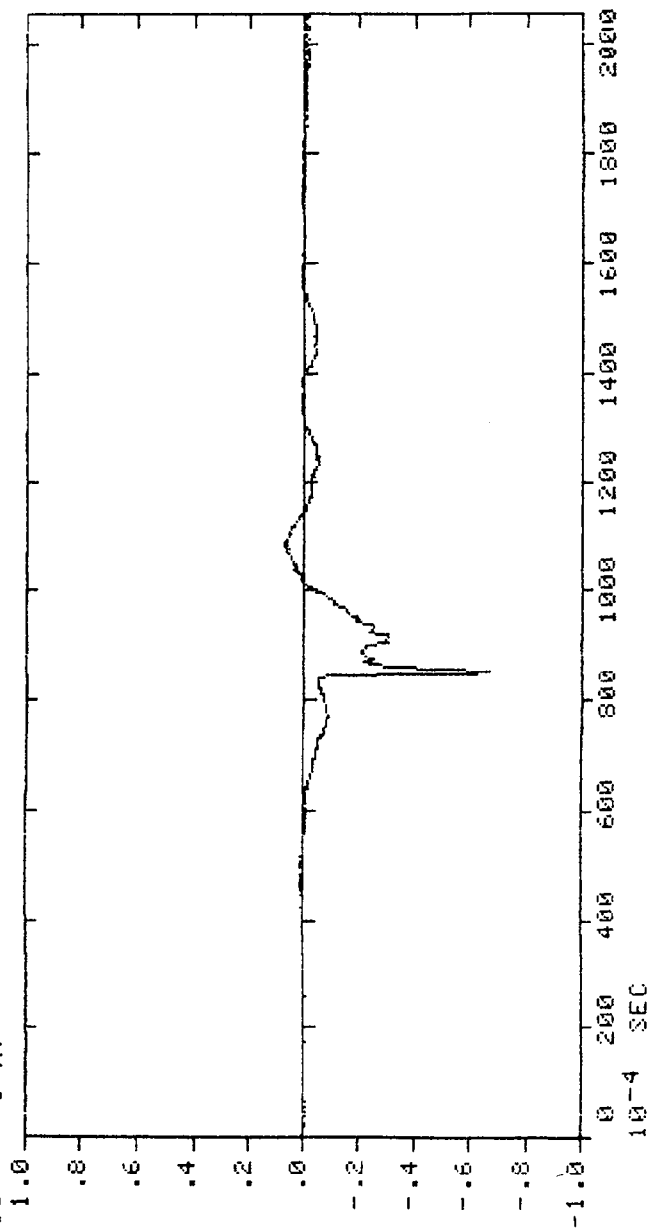
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

10 2 6 AY

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 2
 DIRECTION: LEFT
 LOCATION: PASSENGER'S HEAD



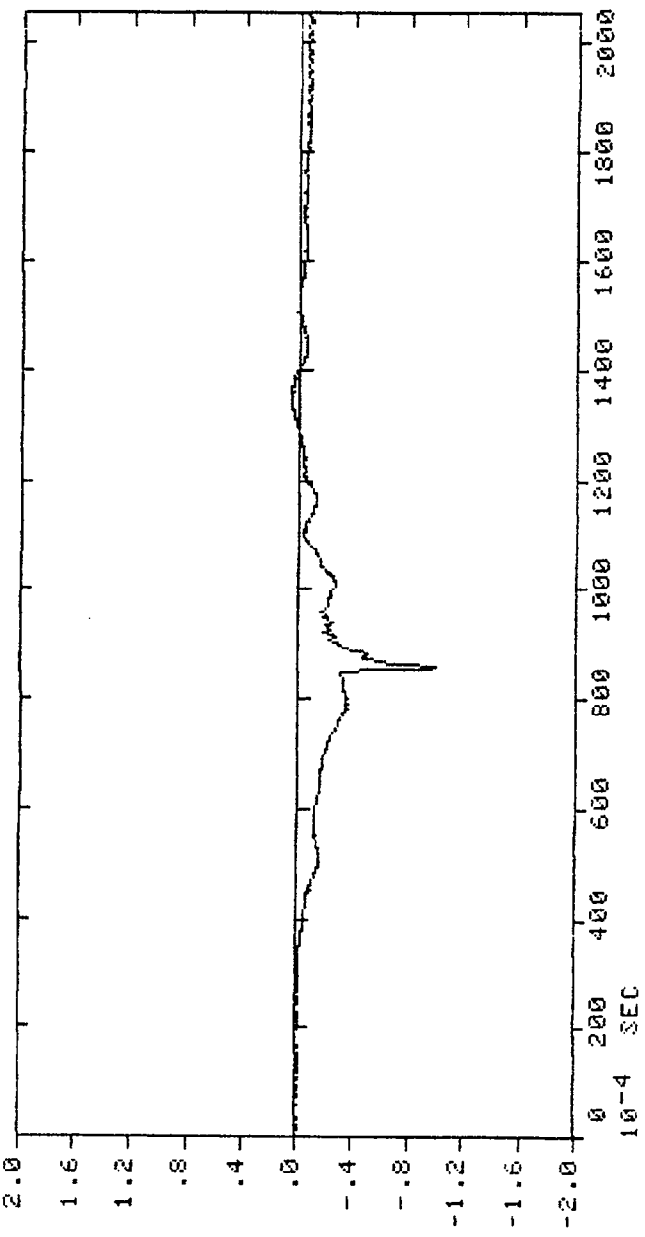
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

10 2 G AZ

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 3
 DIRECTION: UPWARD
 LOCATION: PASSENGER'S HEAD



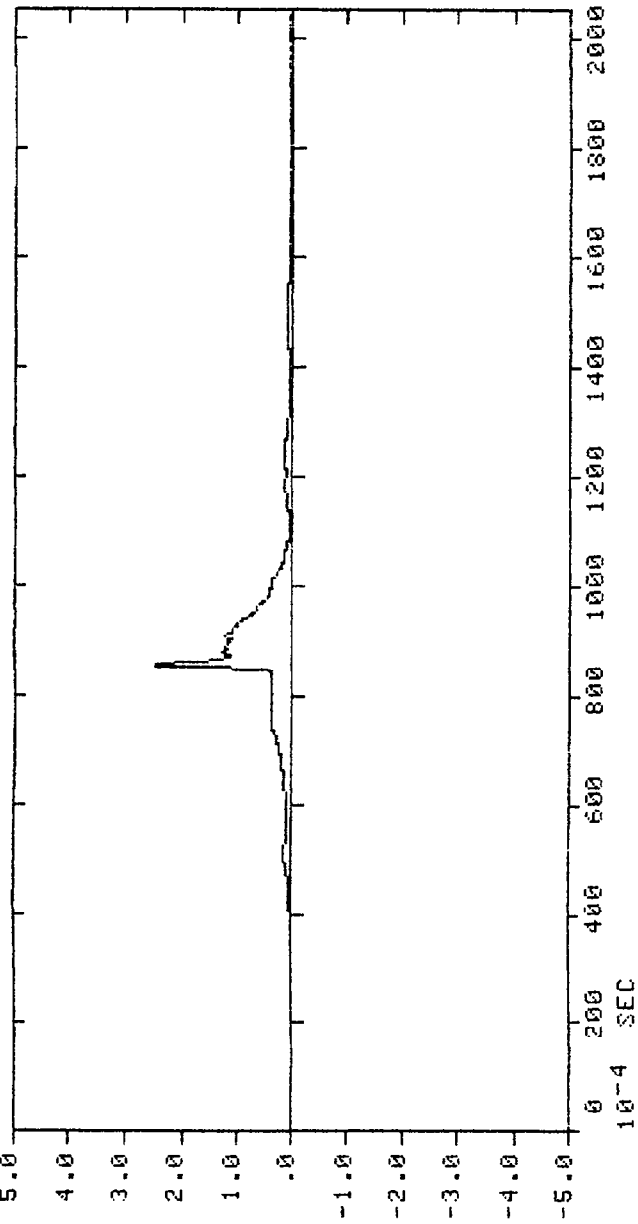
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

10 2 G AR RESULTANT

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 1-3
 DIRECTION: RESULTANT OF XYZ
 LOCATION: PASSENGER'S HEAD



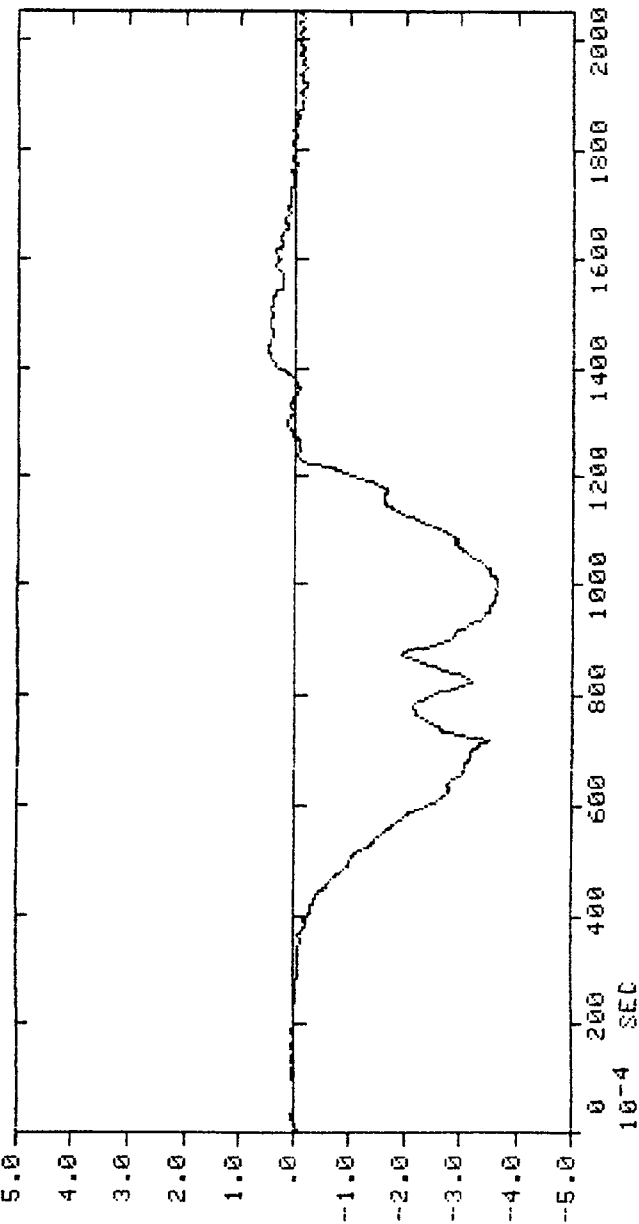
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 180
 ACCELEROMETER: TAPE 2, CH 5
 DIRECTION: FORWARD
 LOCATION: PASSENGER'S CHEST

10 1 G AX

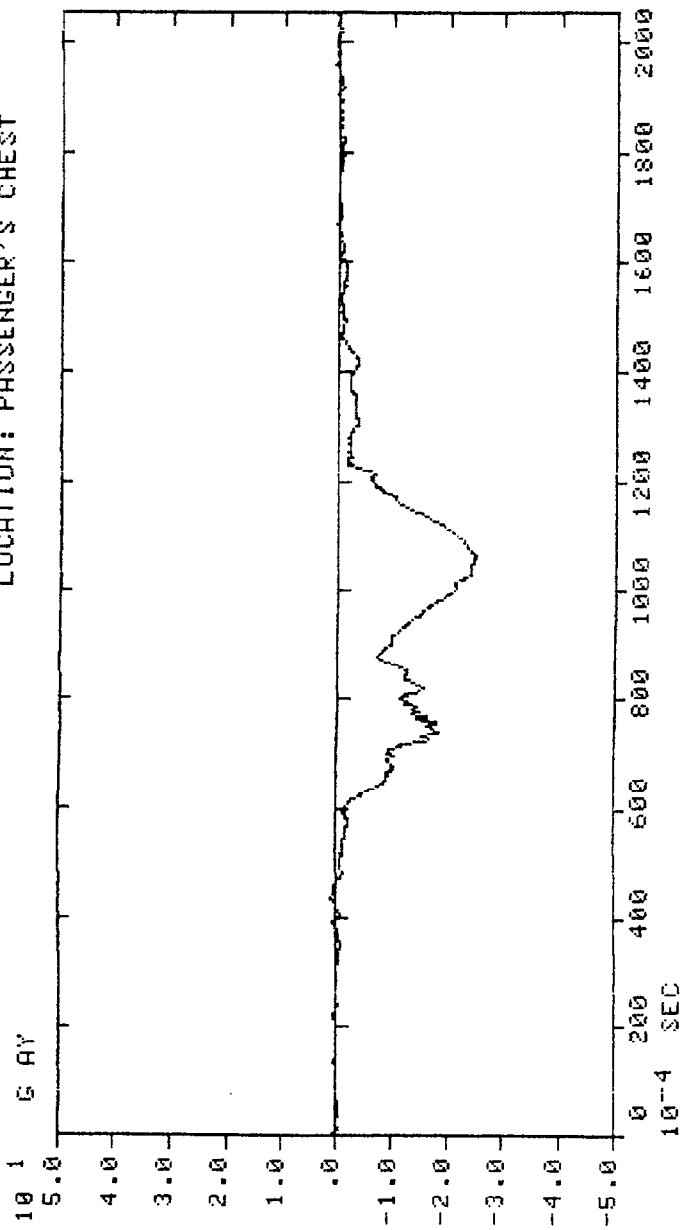


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 180
ACCELEROMETER: TAPE: 2, CH 6
DIRECTION: LEFT
LOCATION: PASSENGER'S CHEST

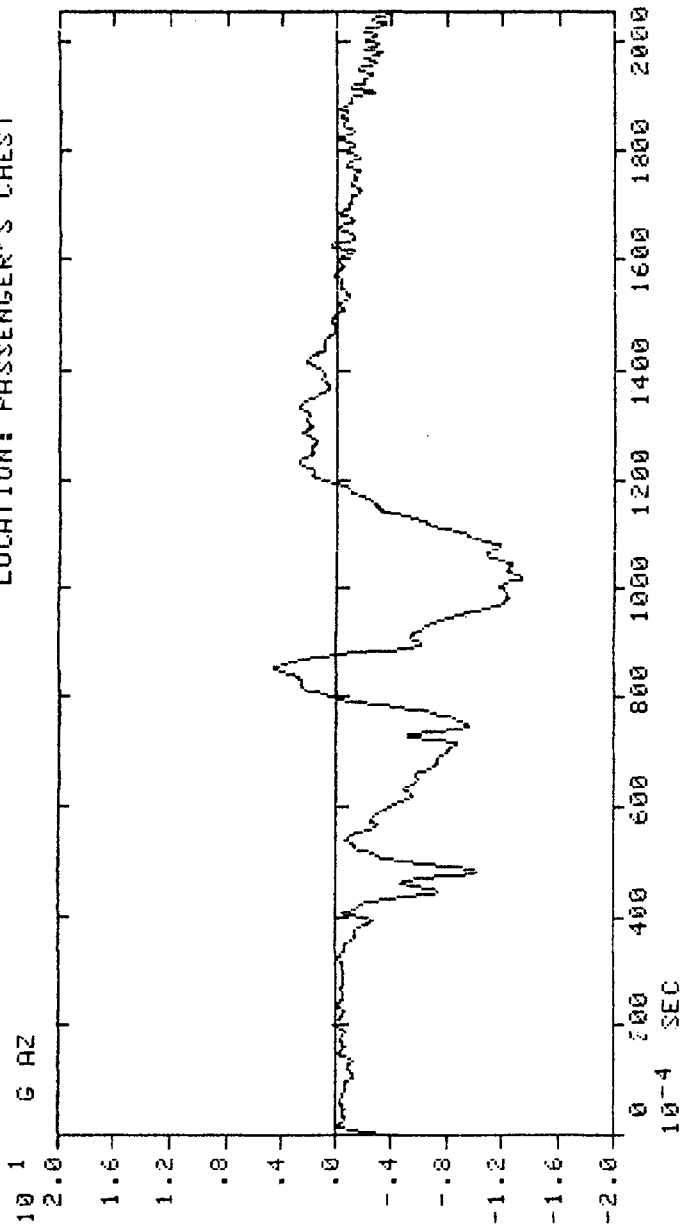


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

NJO NO.: 971-3882-63
 FILTER: CLASS 180
 ACCELEROMETER: TAPE 2, CH 7
 DIRECTION: UPWARD
 LOCATION: PASSENGER'S CHEST



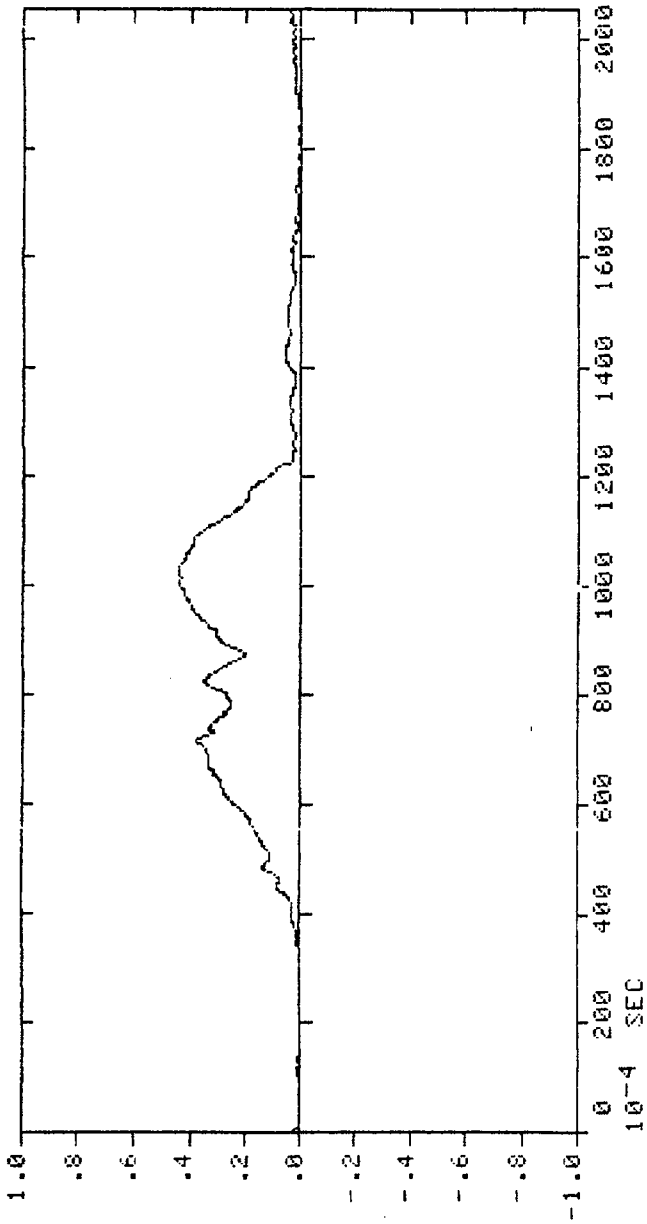
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

10 2 G AR

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 5-7
 DIRECTION: RESULTANT OF XYZ
 LOCATION: PASSENGER'S CHEST

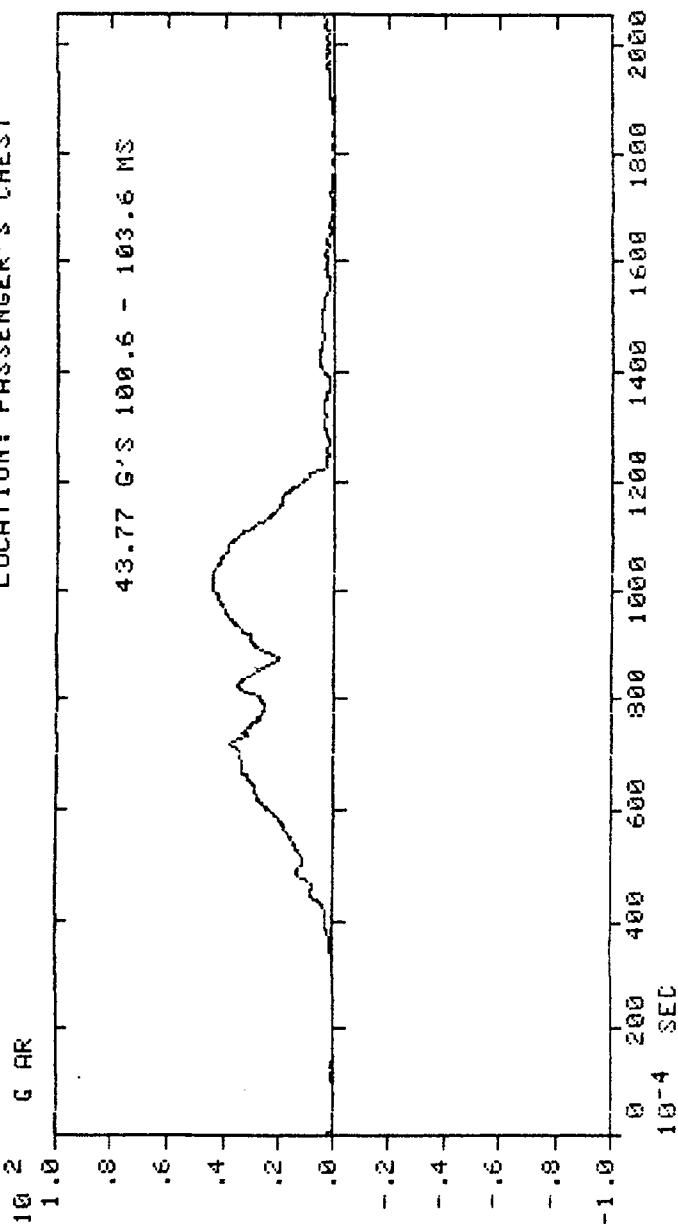


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 181-20 34.92 MPH
 DATE: NOV.17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 1000
 ACCELEROMETER: TAPE 2, CH 5-7
 DIRECTION: RESULTANT OF XYZ
 LOCATION: PASSENGER'S CHEST



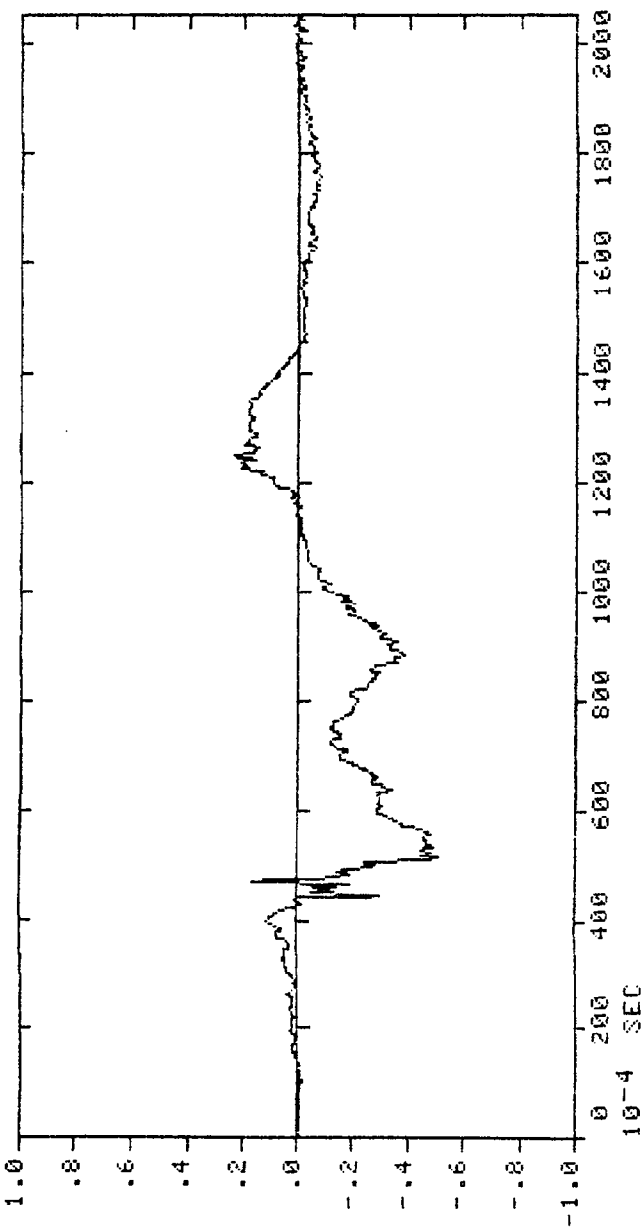
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 600
 LOAD CELL: TAPE 2, CH 8
 DIRECTION: TENSION
 LOCATION: PASSENGER'S LEFT FEMUR

10 3 POUNDS

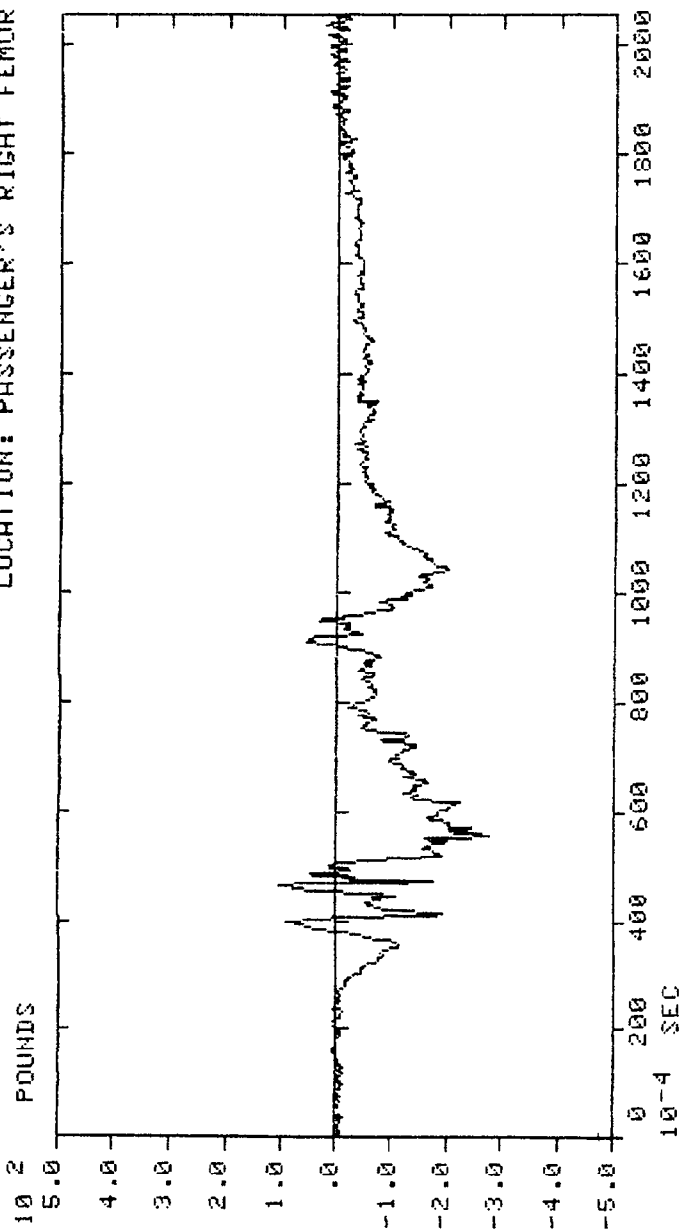


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 600
LOAD CELL: TAPE 2, CH 4
DIRECTION: TENSION
LOCATION: PASSENGER'S RIGHT FEMUR

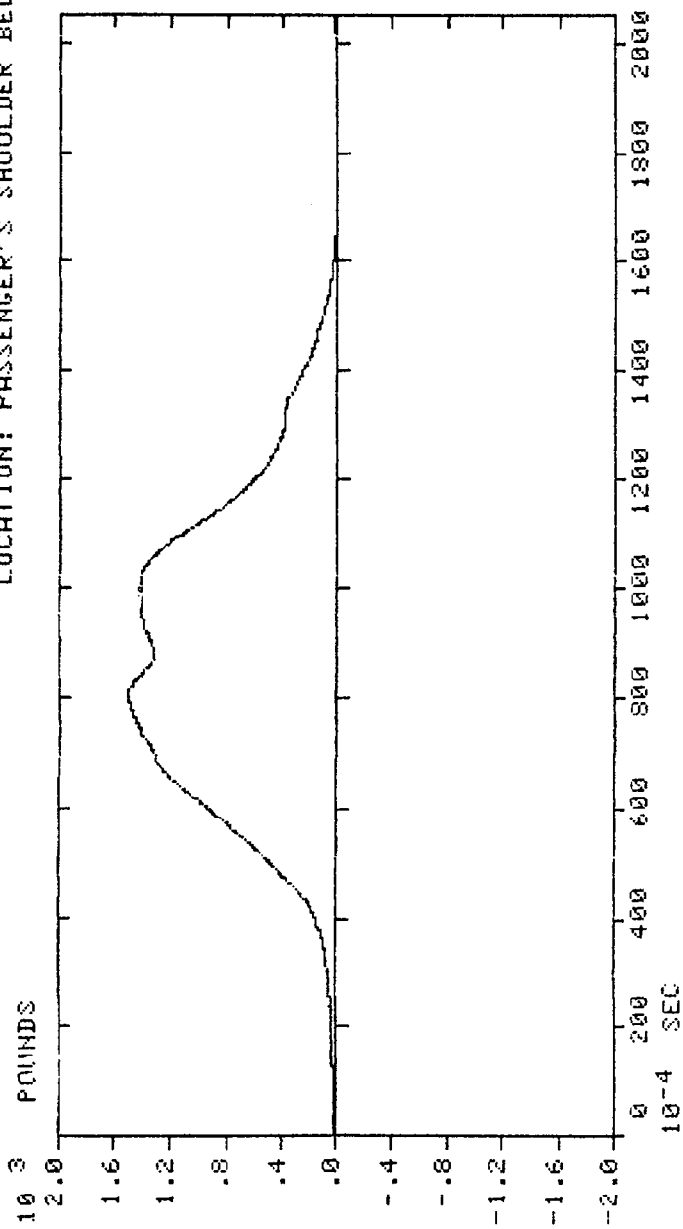


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 2, CH 9
 DIRECTION: TENSION
 LOCATION: PASSENGER'S SHOULDER BELT

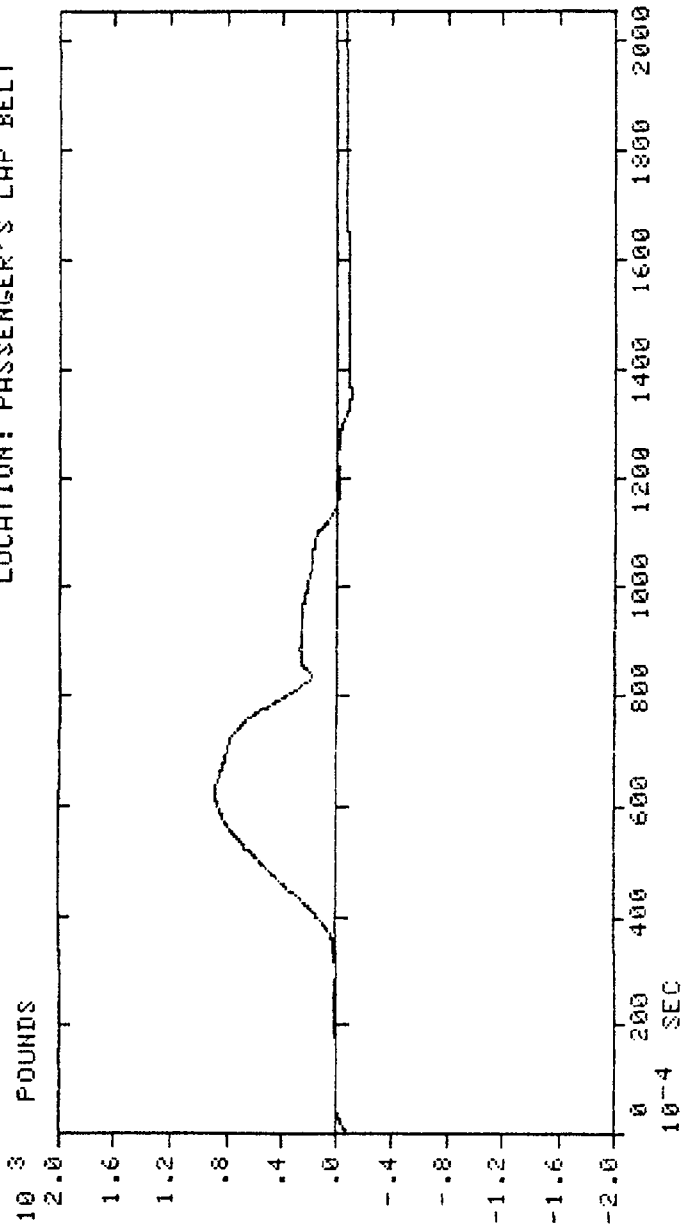


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA B20515
TEST FILE NO. : 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO. : 971-3882-63
FILTER: CLASS 60
LOAD CELL : TAPE 2, CH 10
DIRECTION: TENSION
LOCATION: PASSENGER'S LAP BELT

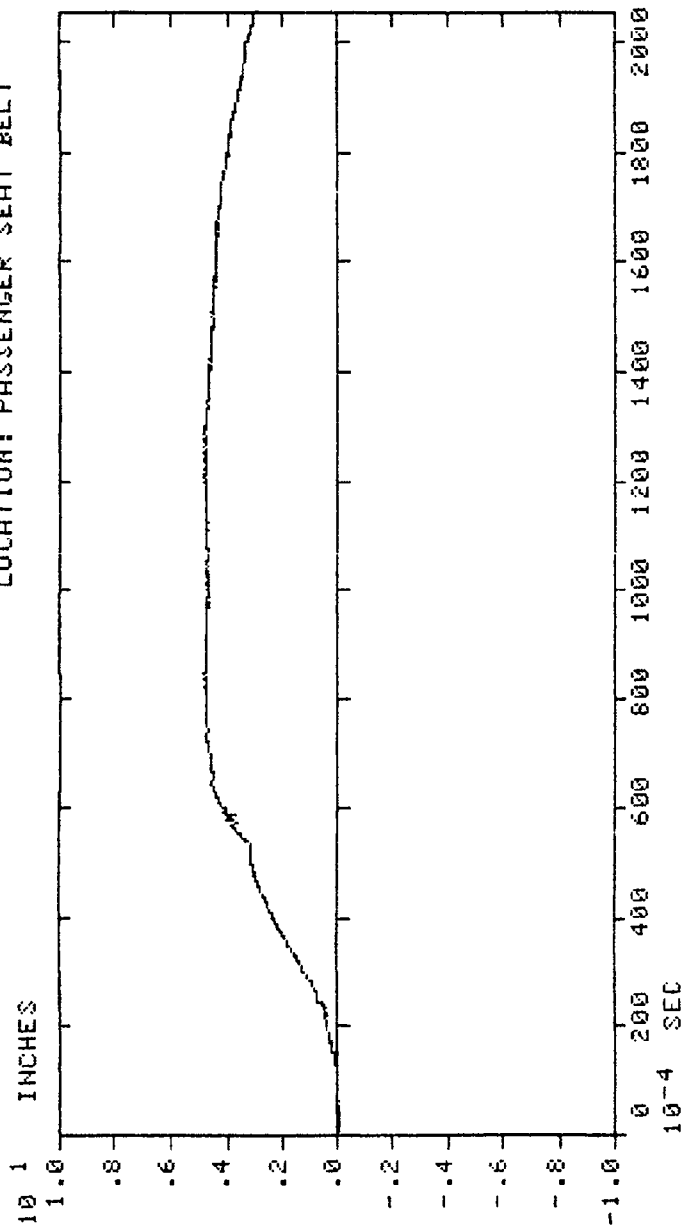


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSIONOMETER: TAPE 3 CH 9
 DIRECTION: OUT
 LOCATION: PASSENGER SEAT BELT

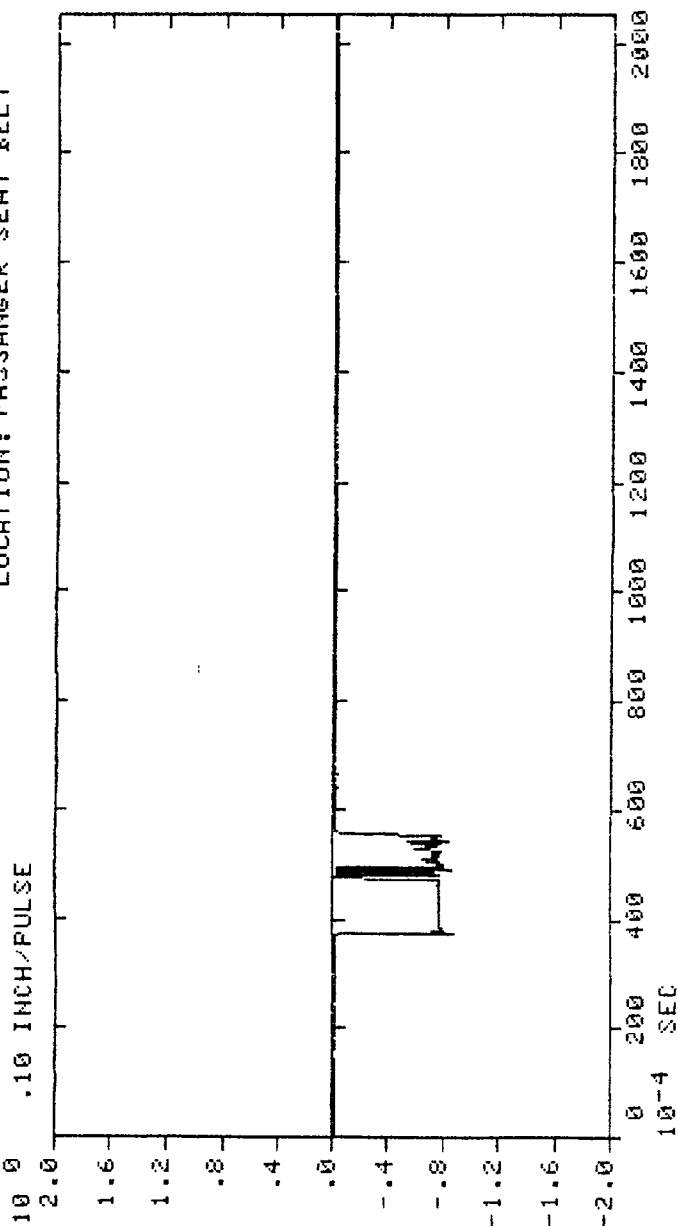


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSOMETER: TAPE 3 CH 9
 DIRECTION: STRETCH
 LOCATION: PASSENGER SEAT BELT

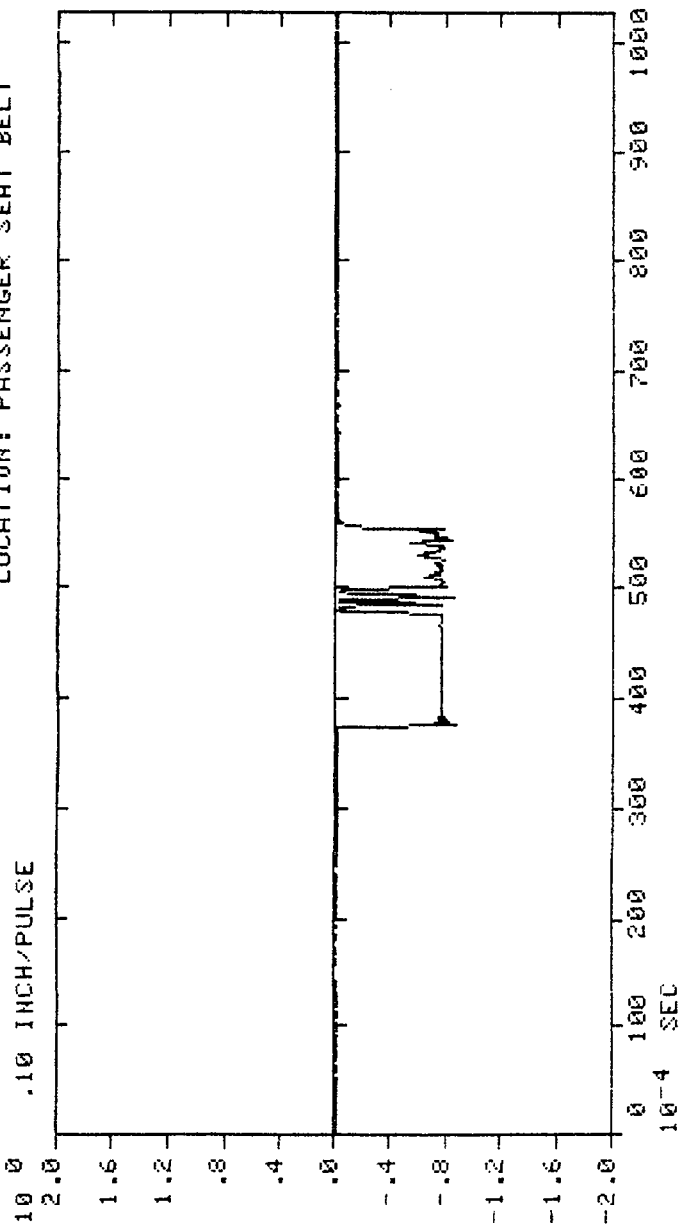


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: NONE
 EXTENSOMETER: TAPE 3 CH 10
 DIRECTION: STRETCH
 LOCATION: PASSENGER SEAT BELT

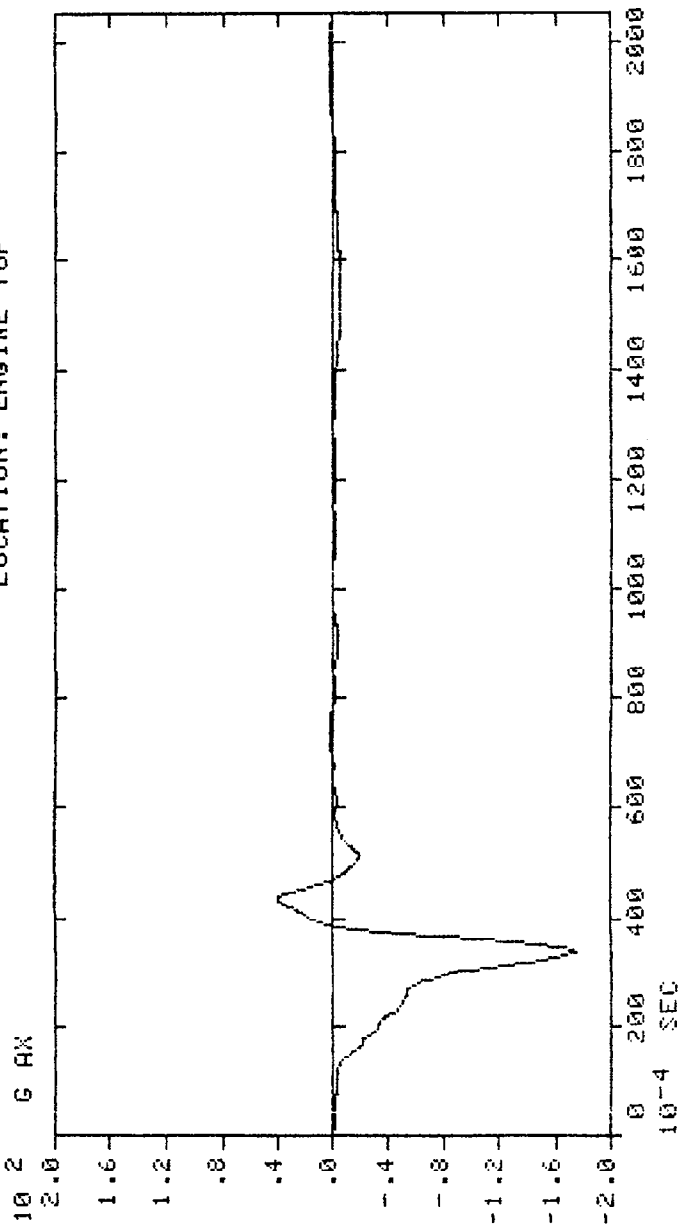


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 ACCELEROMETER: TAPE 3, CH 3
 DIRECTION: FORWARD
 LOCATION: ENGINE TOP

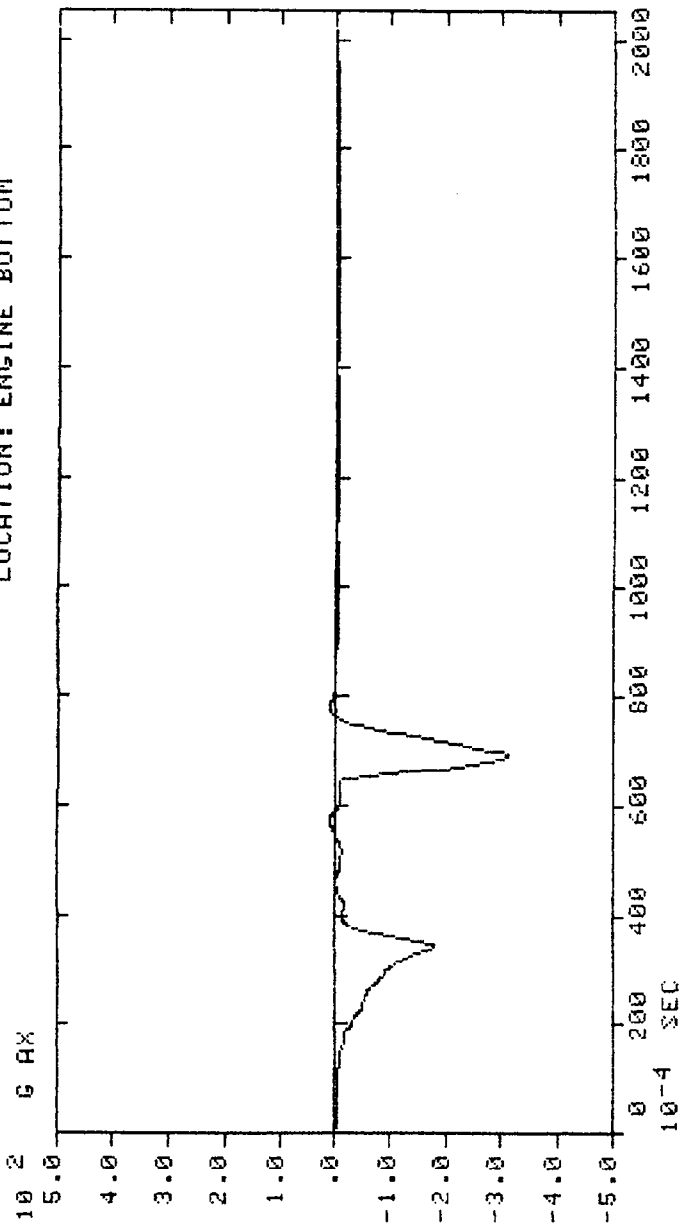


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
ACCELEROMETER: TAPE 3, CH 4
DIRECTION: FORWARD
LOCATION: ENGINE BOTTOM

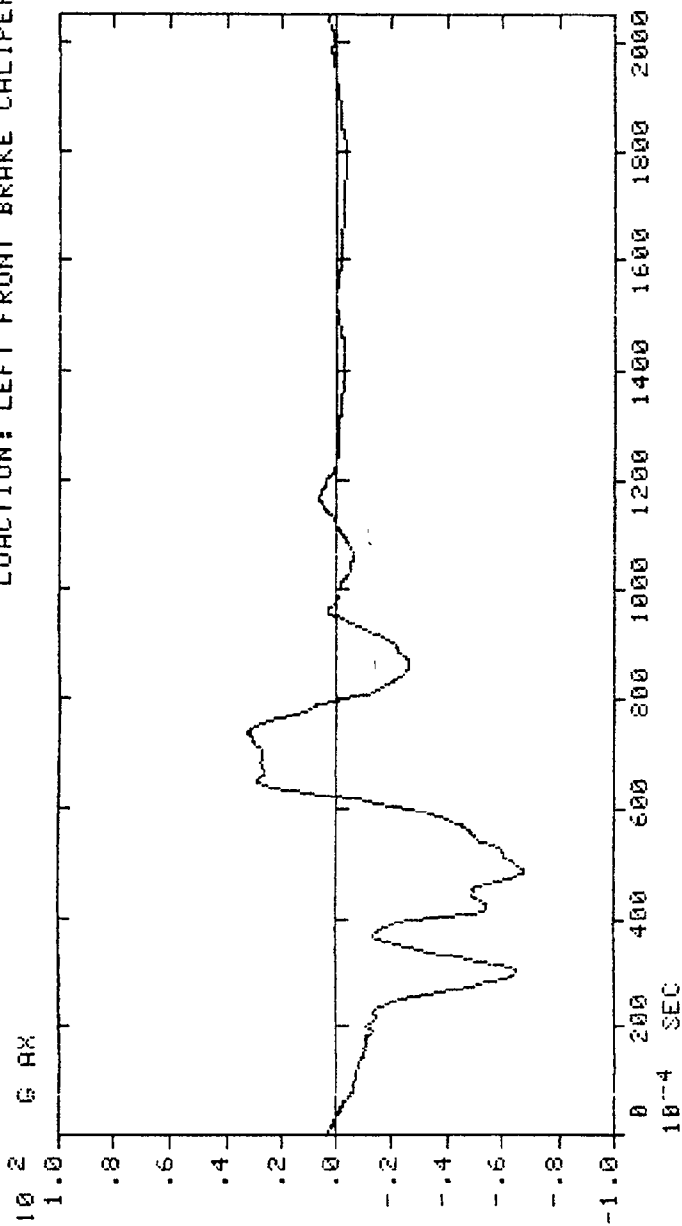


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 ACCELEROMETER: TAPE 3, CH 2
 DIRECTION: FORWARD
 LOCATION: LEFT FRONT BRAKE CALIPER



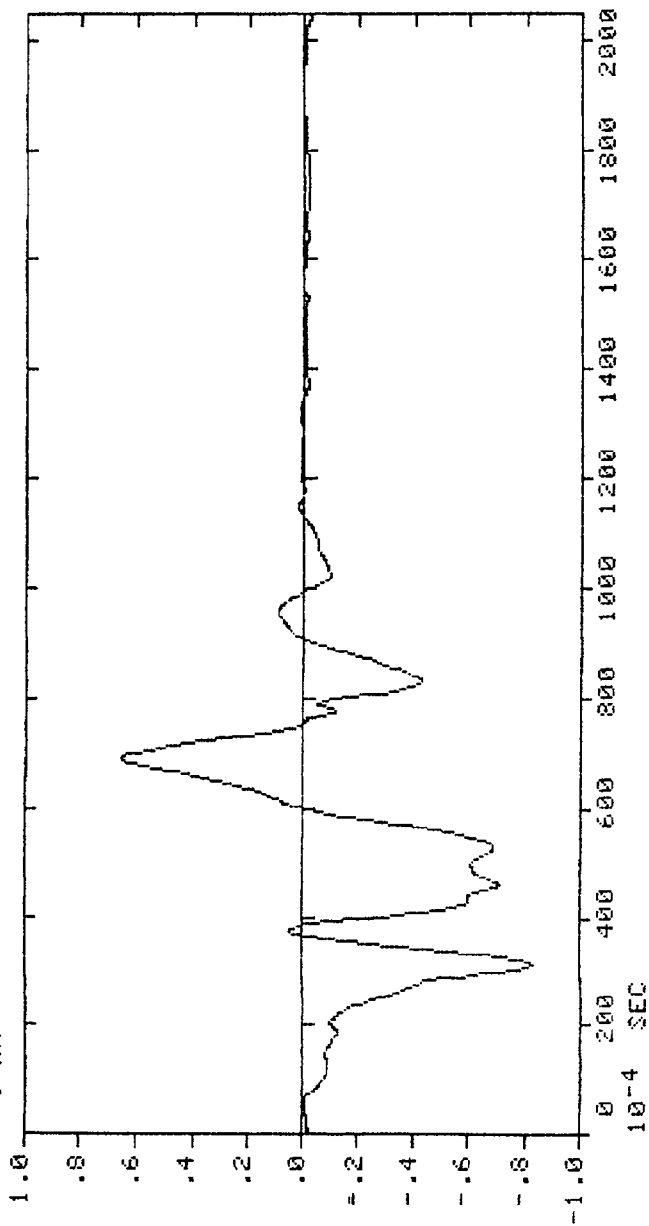
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

10 2 6 AX

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 ACCELEROMETER: TAPE 3, CH 1
 DIRECTION: FORWARD
 LOCATION: RIGHT FRONT BRAKE CALIPER

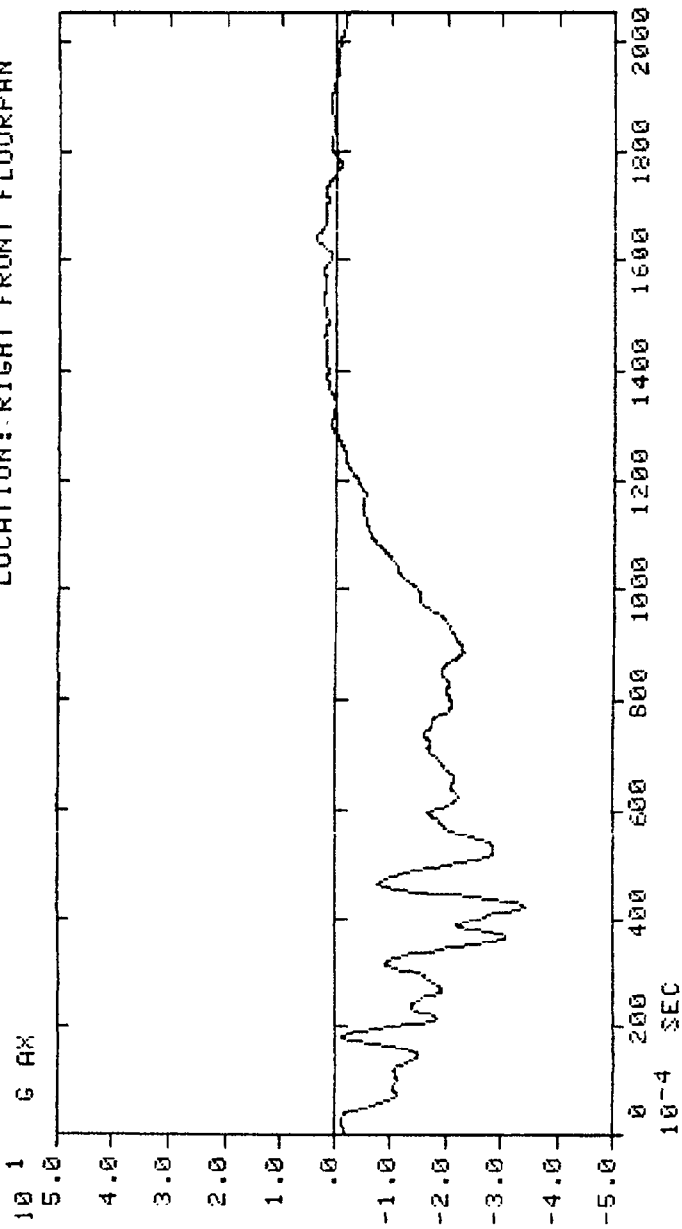


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820615
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
ACCELEROMETER: TAPE 2, CH 11
DIRECTION: FORWARD
LOCATION: RIGHT FRONT FLOORPAN

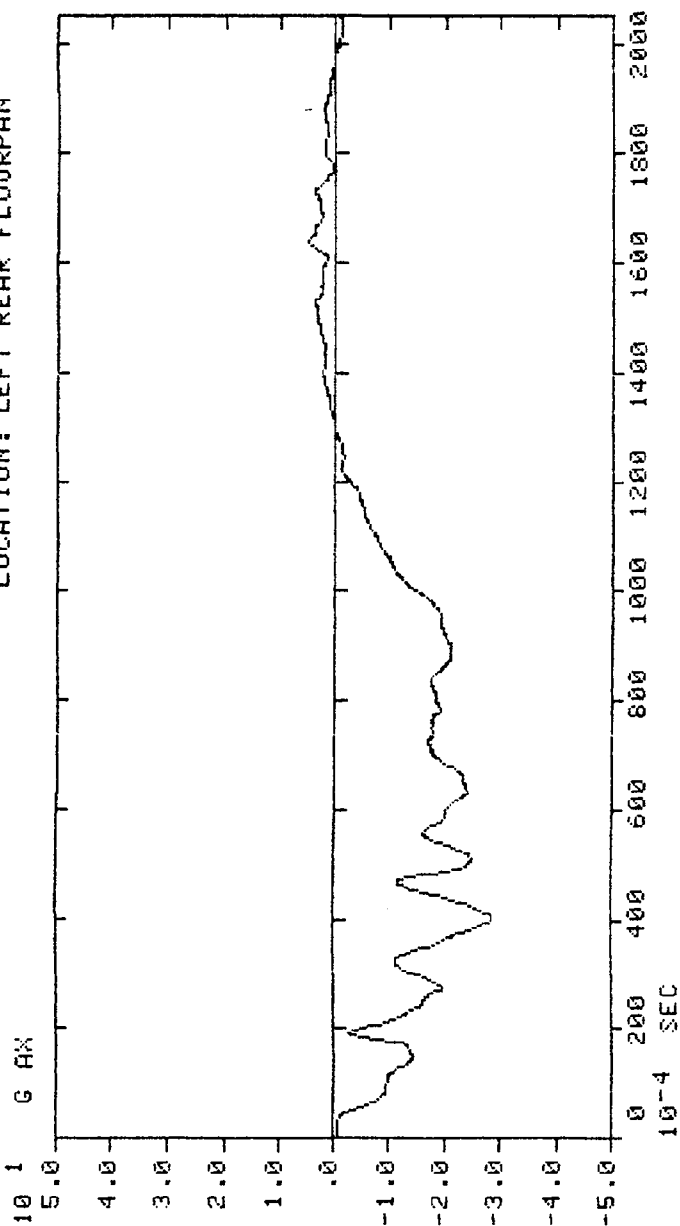


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 ACCELEROMETER: TAPE 1, CH 11
 DIRECTION: FORWARD
 LOCATION: LEFT REAR FLOORPAN



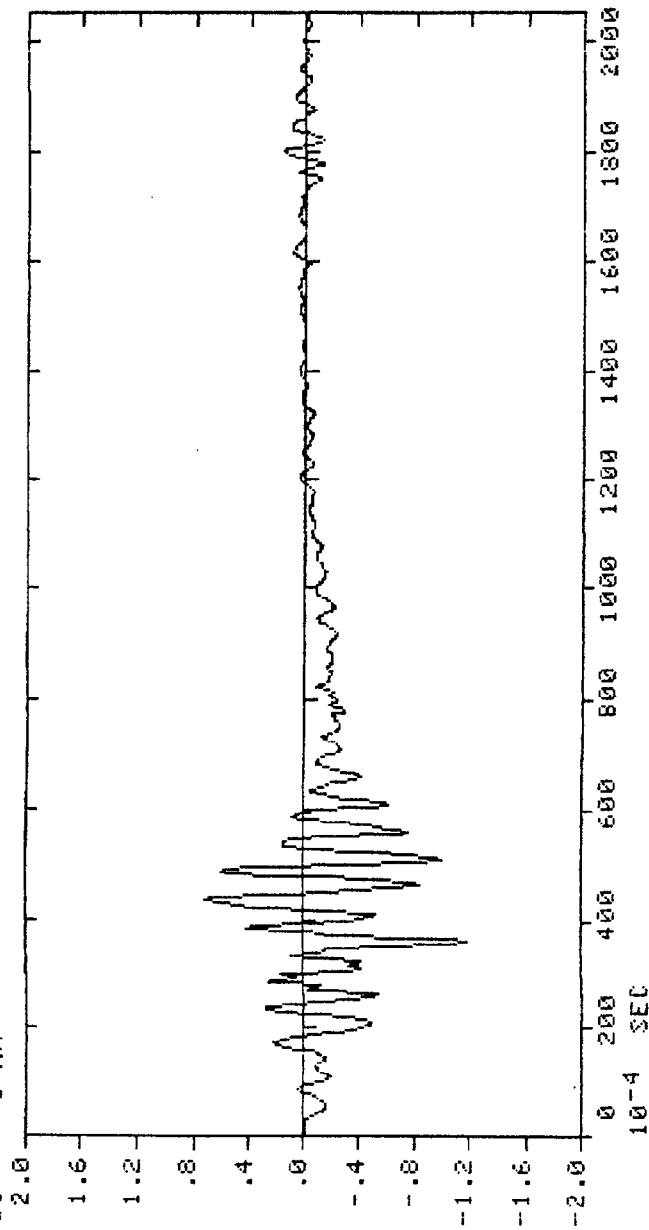
DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 180
ACCELEROMETER: TAPE 3, CH 5
DIRECTION: FORWARD
LOCATION: VEHICLE C.G.

10 2 G AX

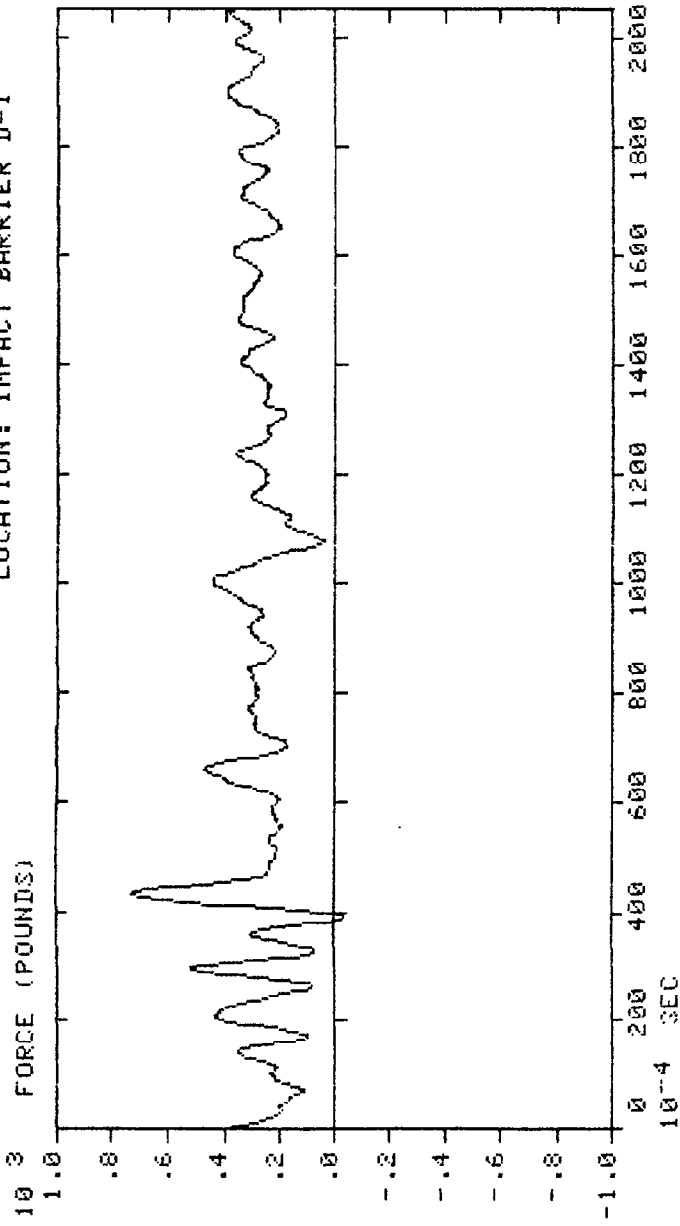


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 4
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-1

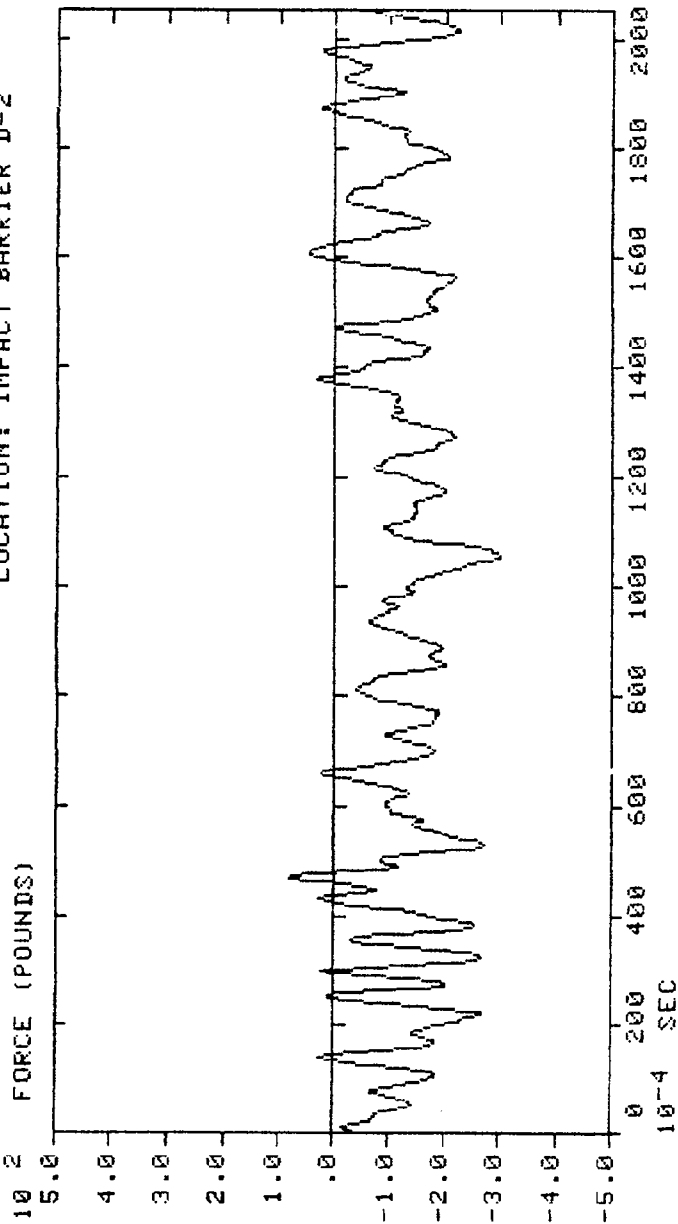


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 6 CH 5
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER D-2

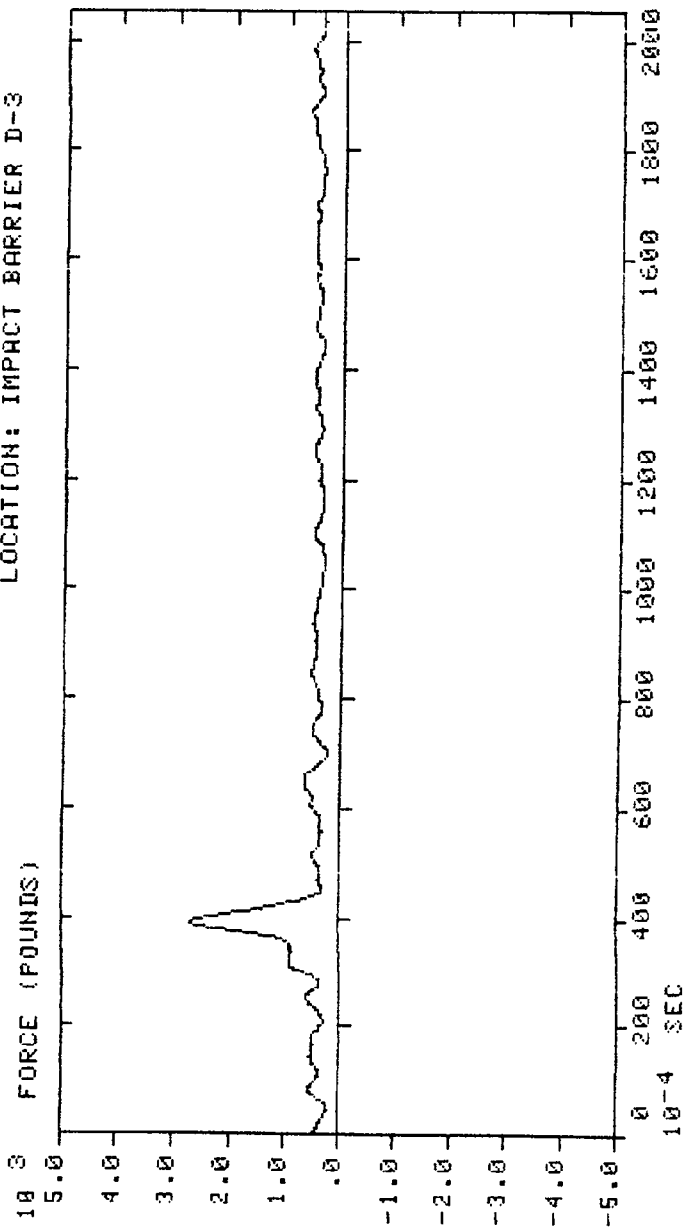


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA B20515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 6 CH 6
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER D-3

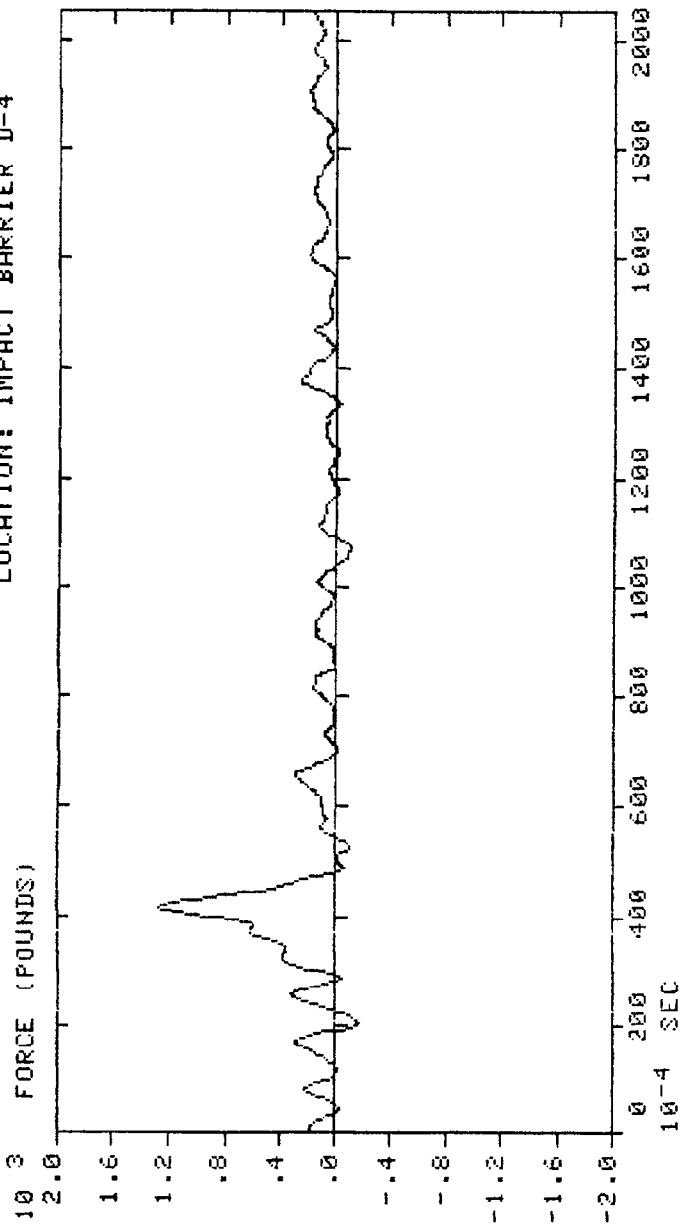


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 7
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-4

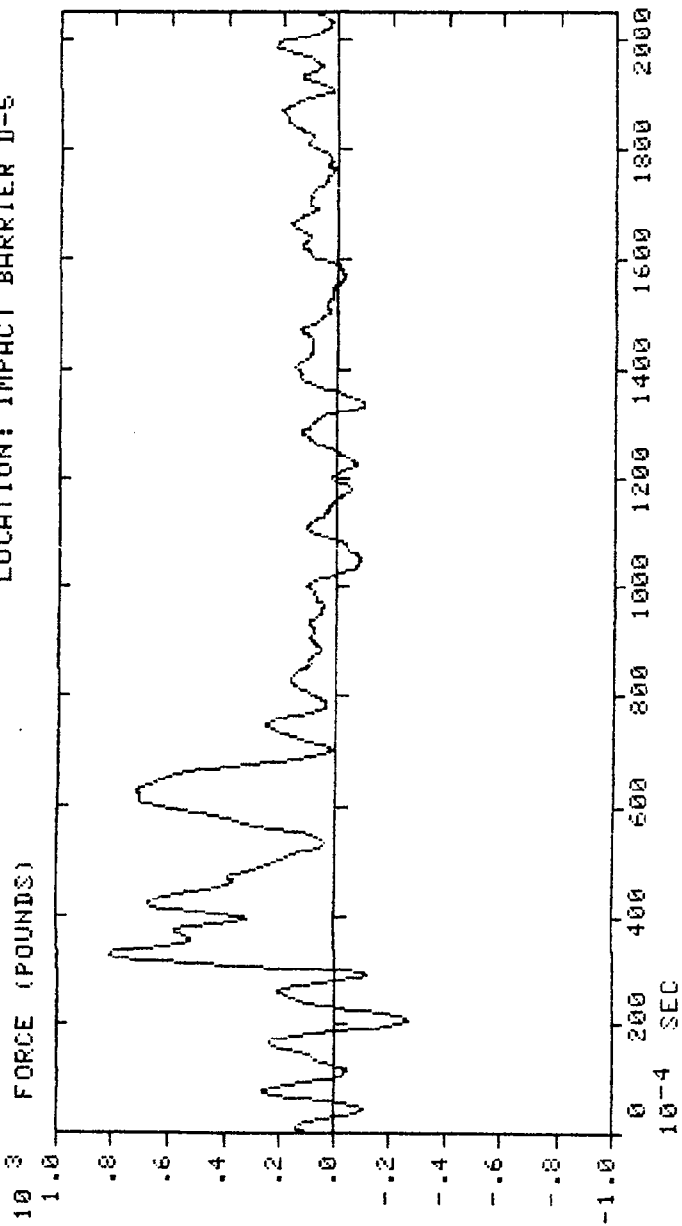


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 8
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-S

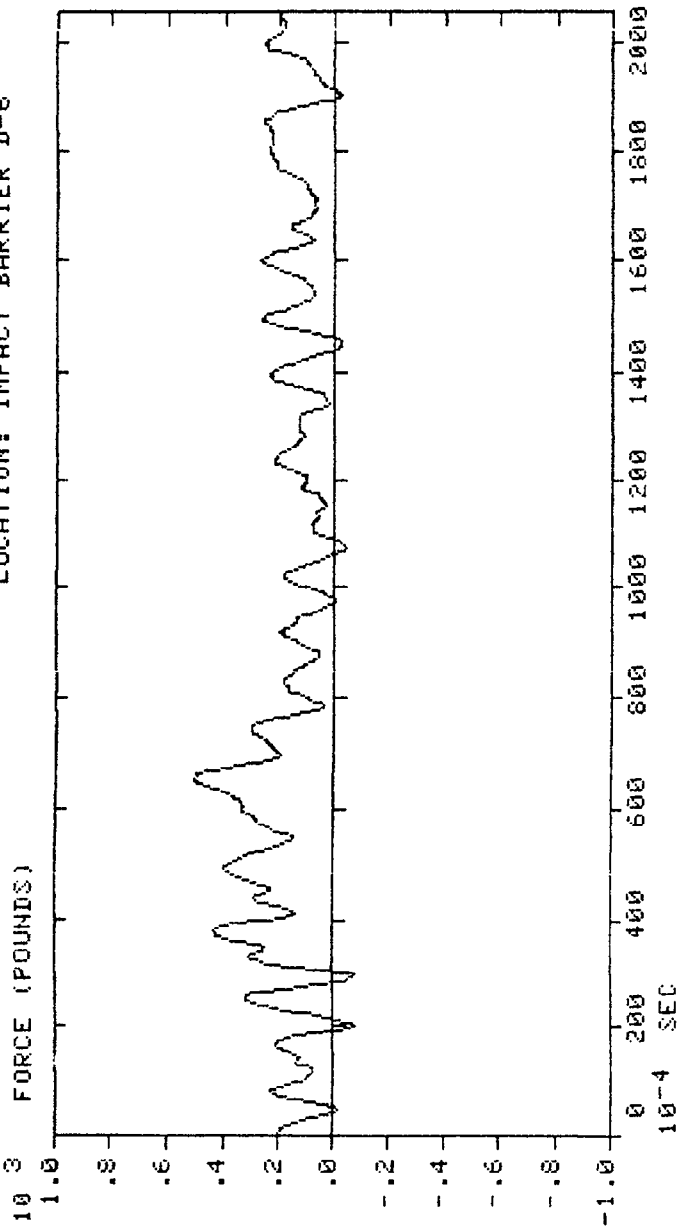


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 9
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-6

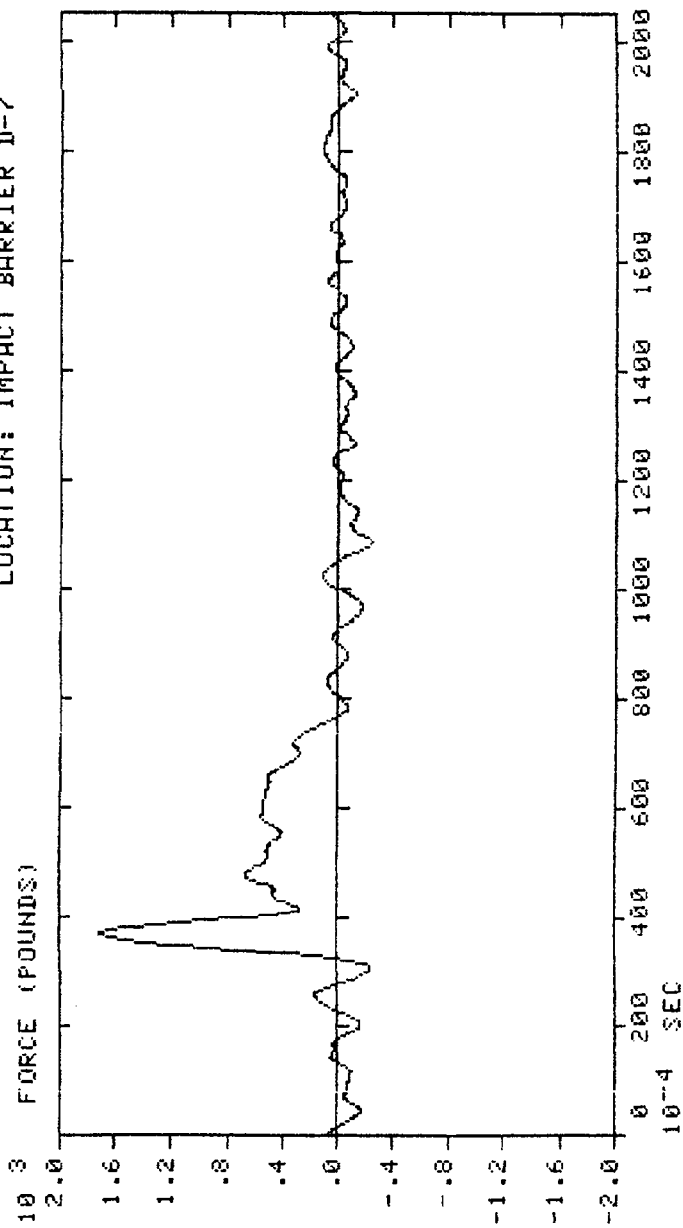


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 10
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-7

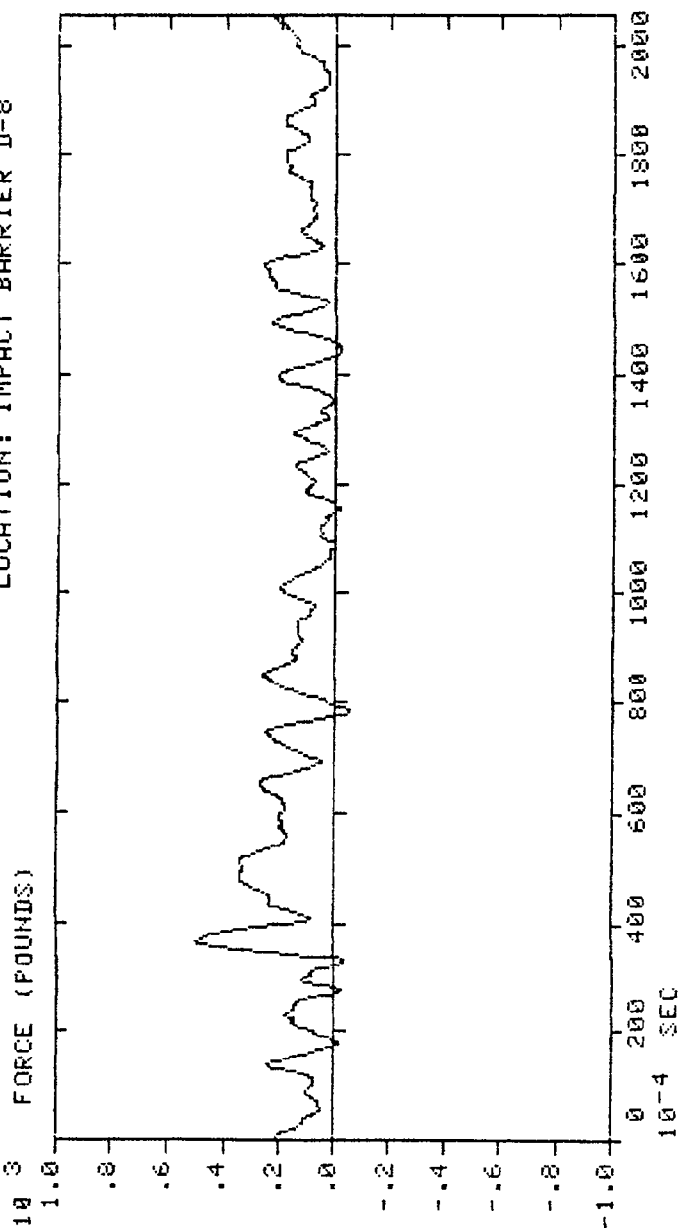


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 11
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER D-8

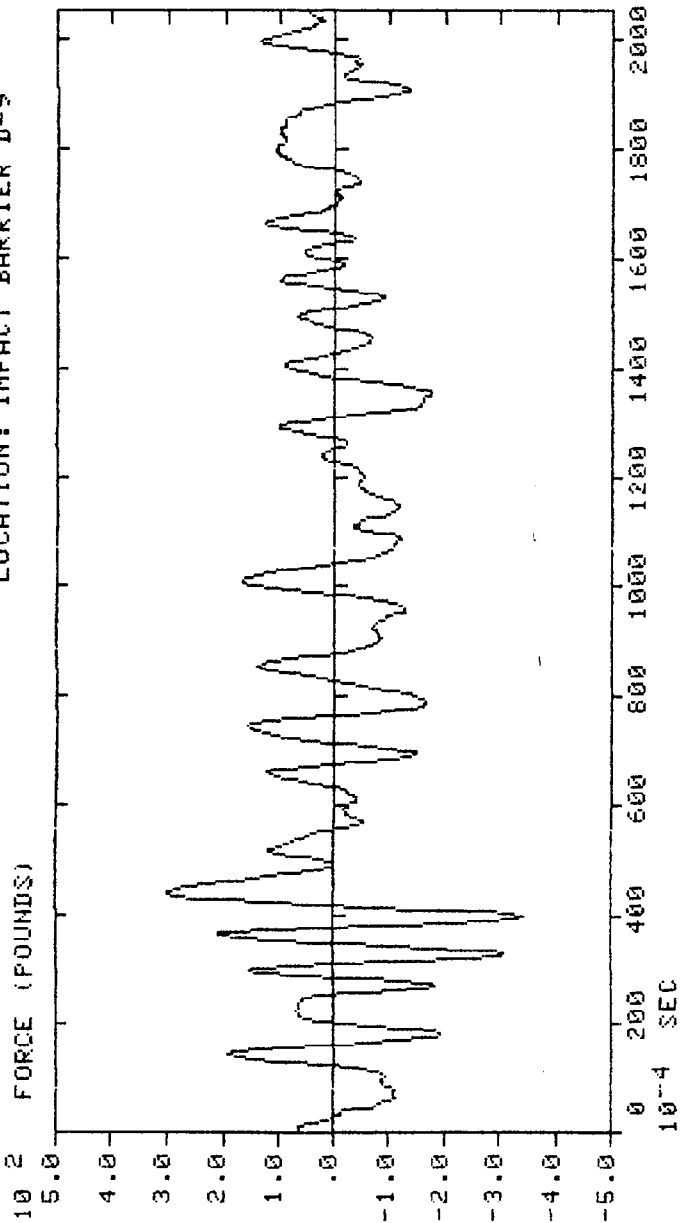


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 6 CH 12
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER D-9

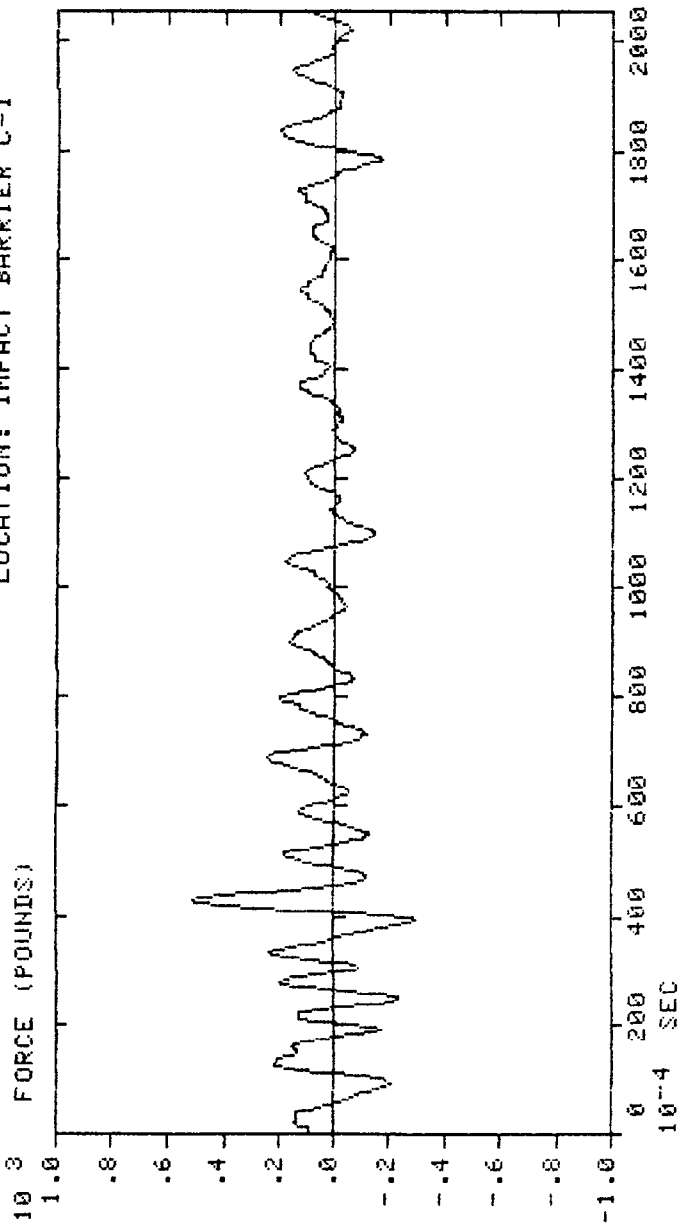


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 7
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-1

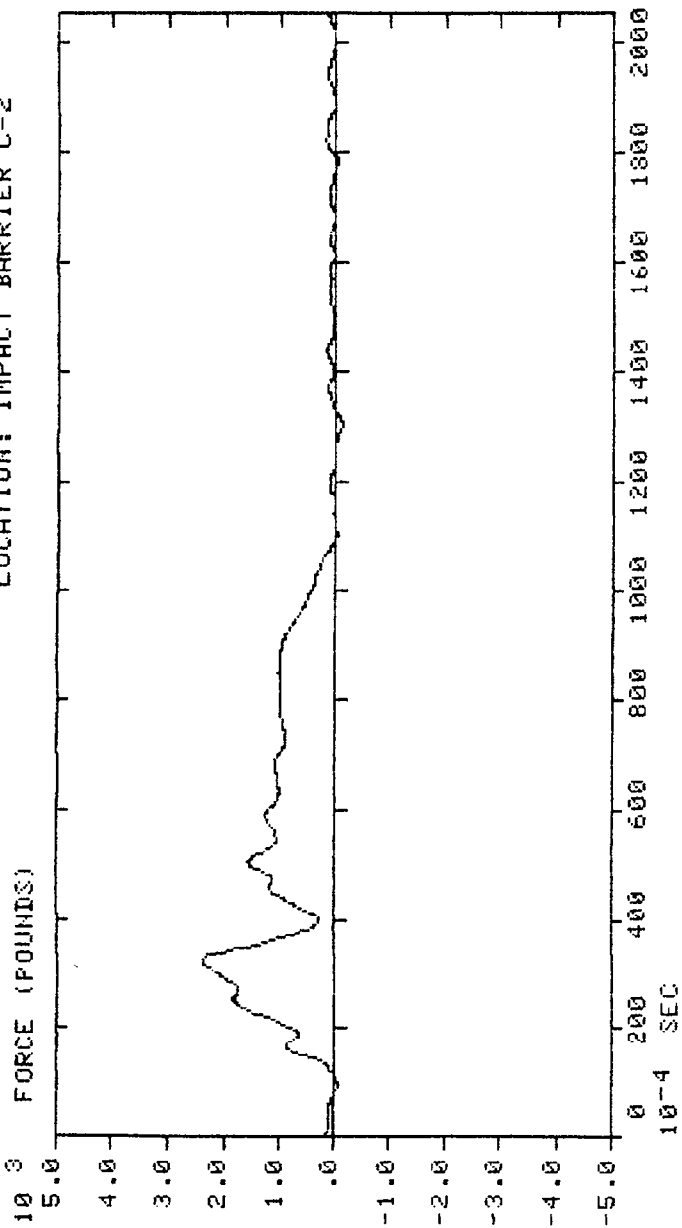


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 8
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-2

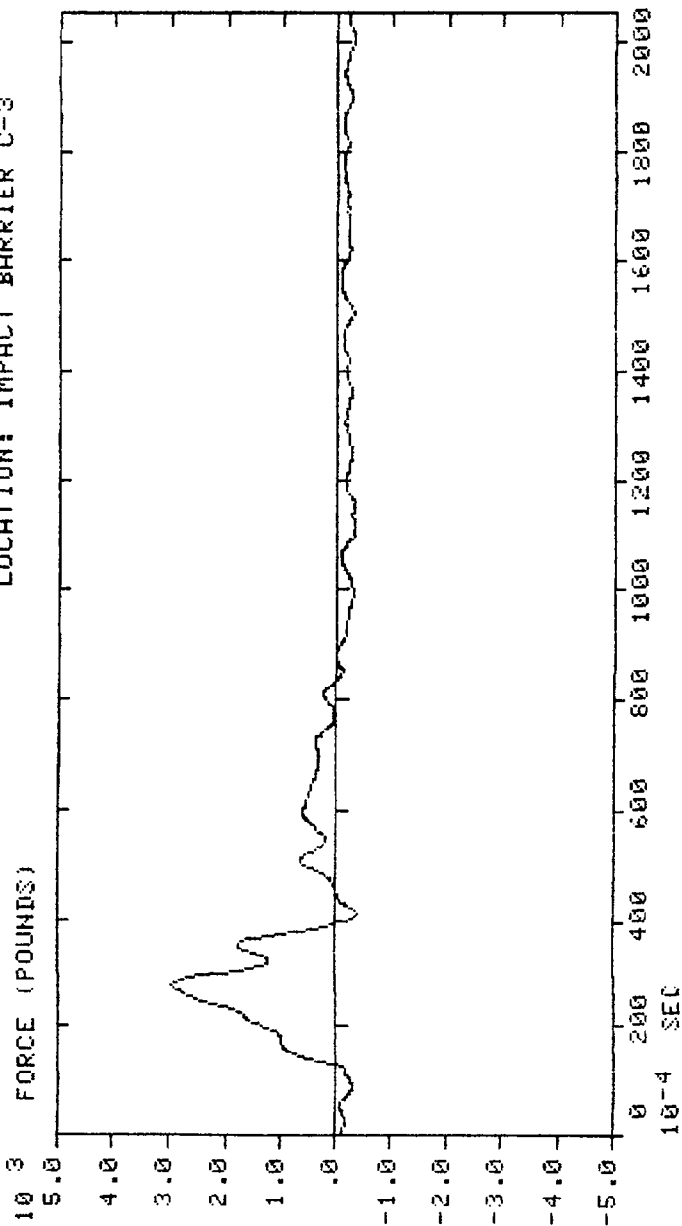


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 5 CH 9
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER C-3

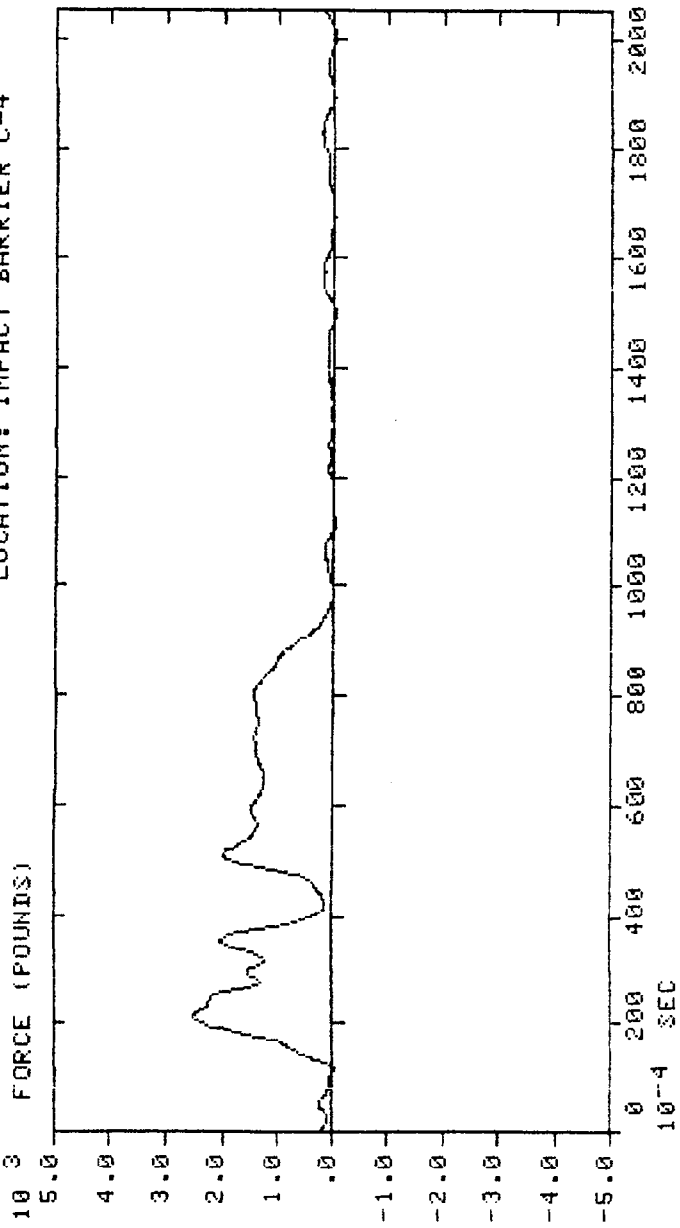


DOT CRASH PROGRAM

VEHICLE: DODGE CULT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 10
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-4

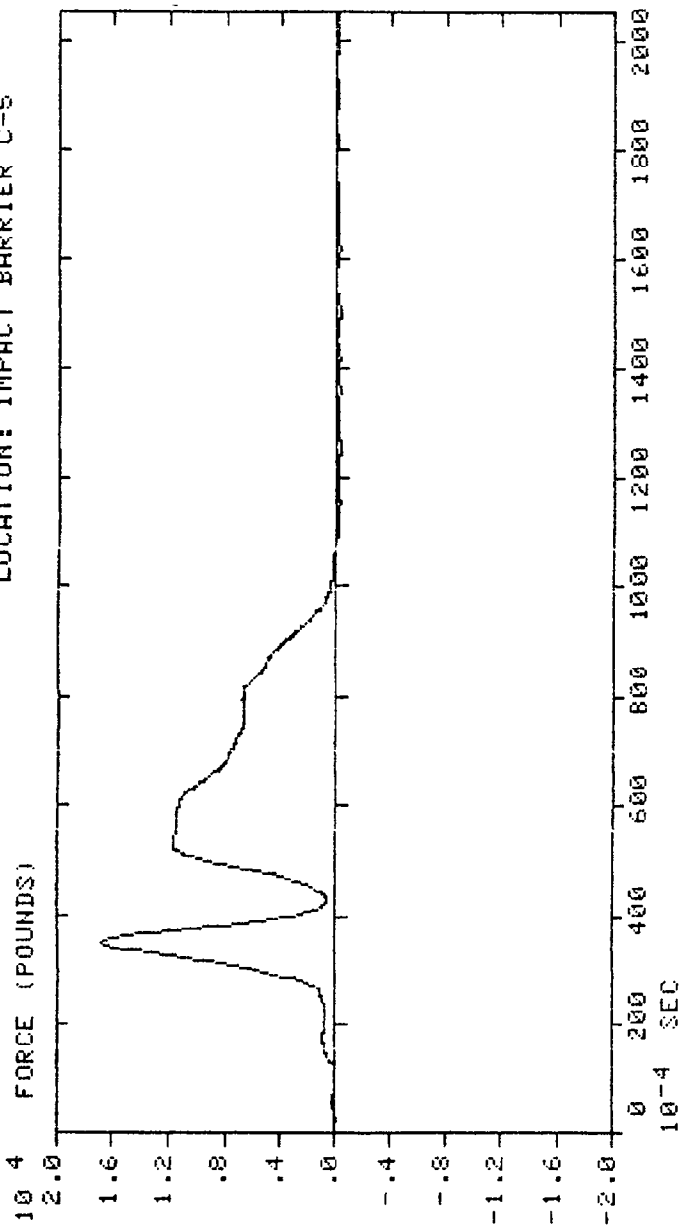


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 11
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-5

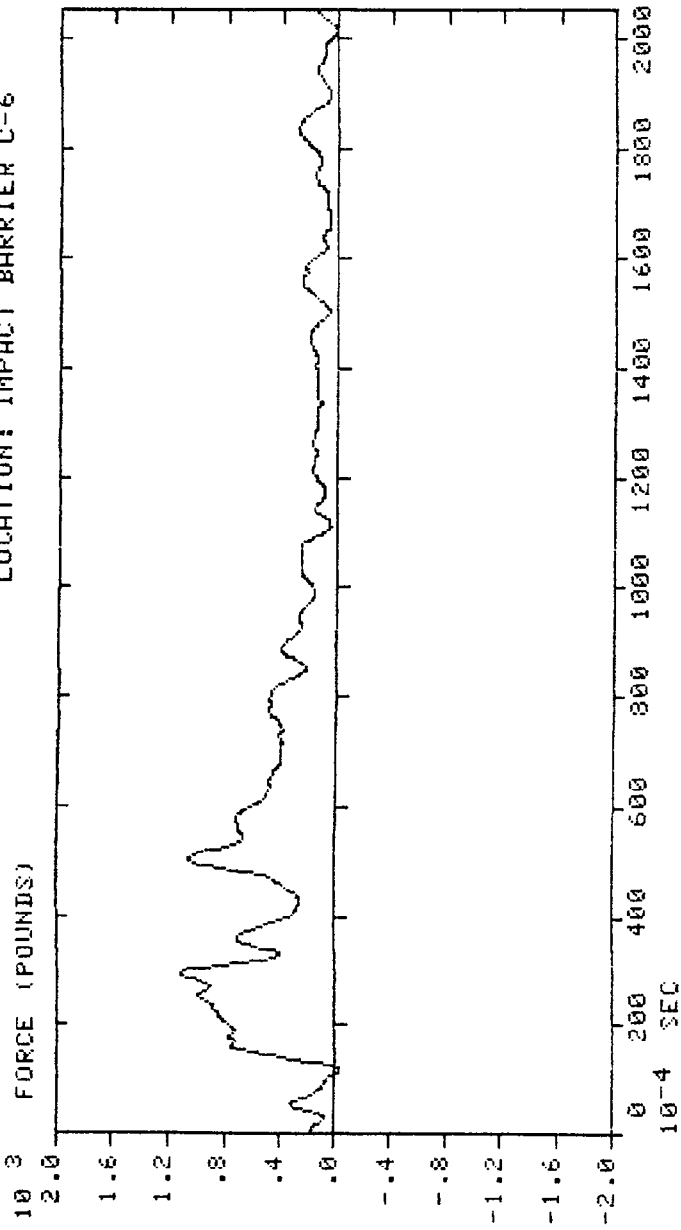


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 12
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-6

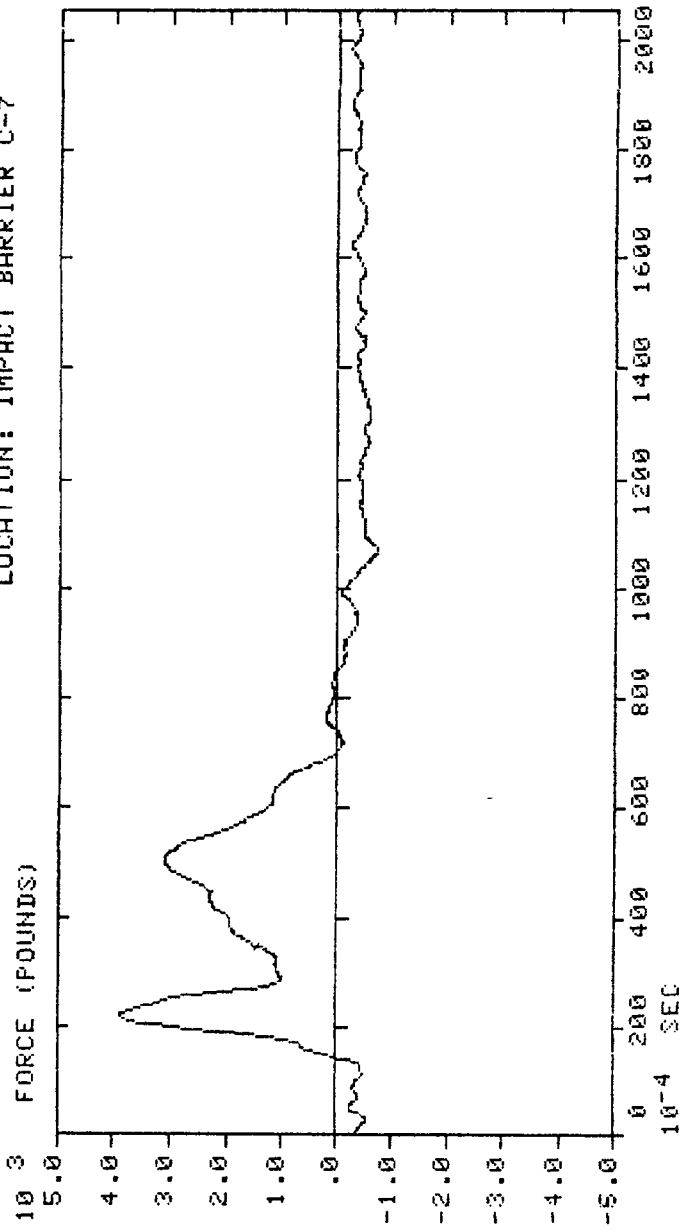


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 6 CH 1
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER C-7

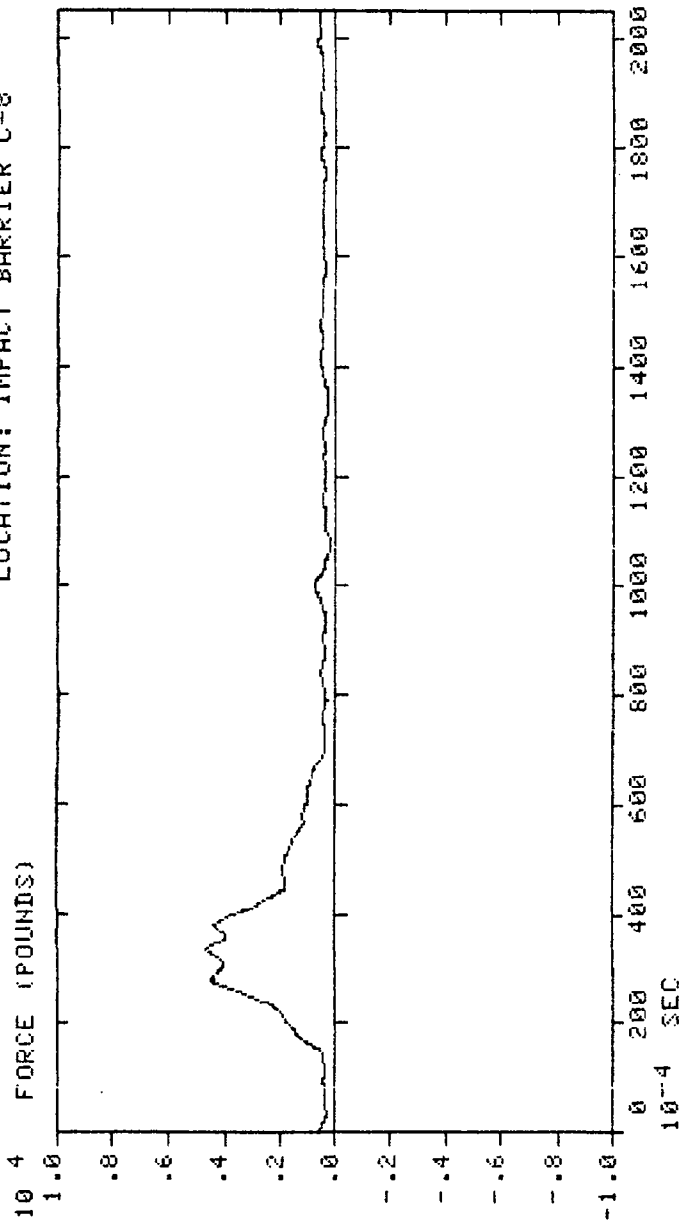


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 2
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-8

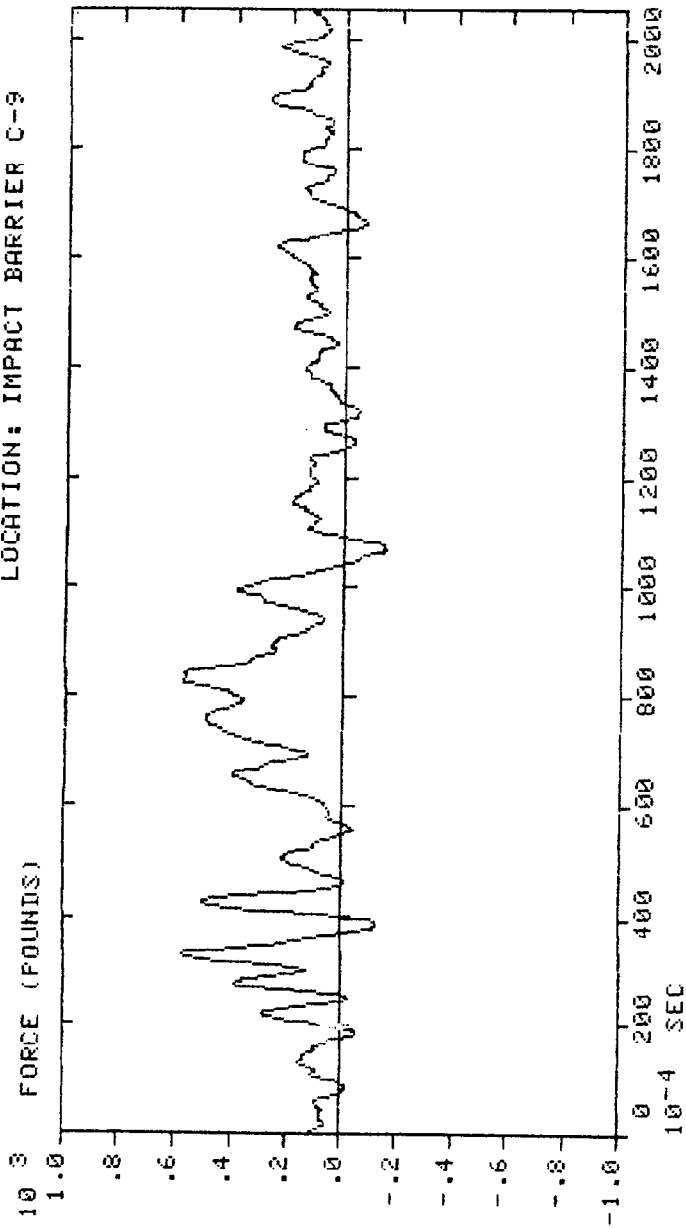


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 6 CH 3
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER C-9

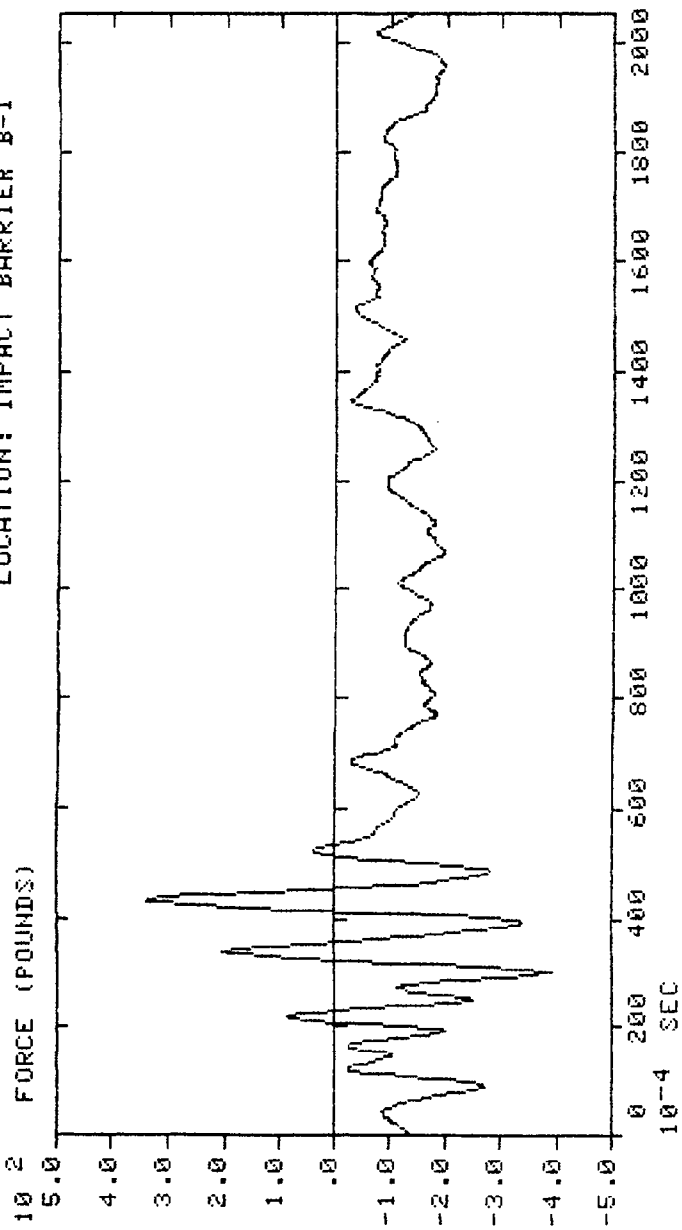


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 10
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-1

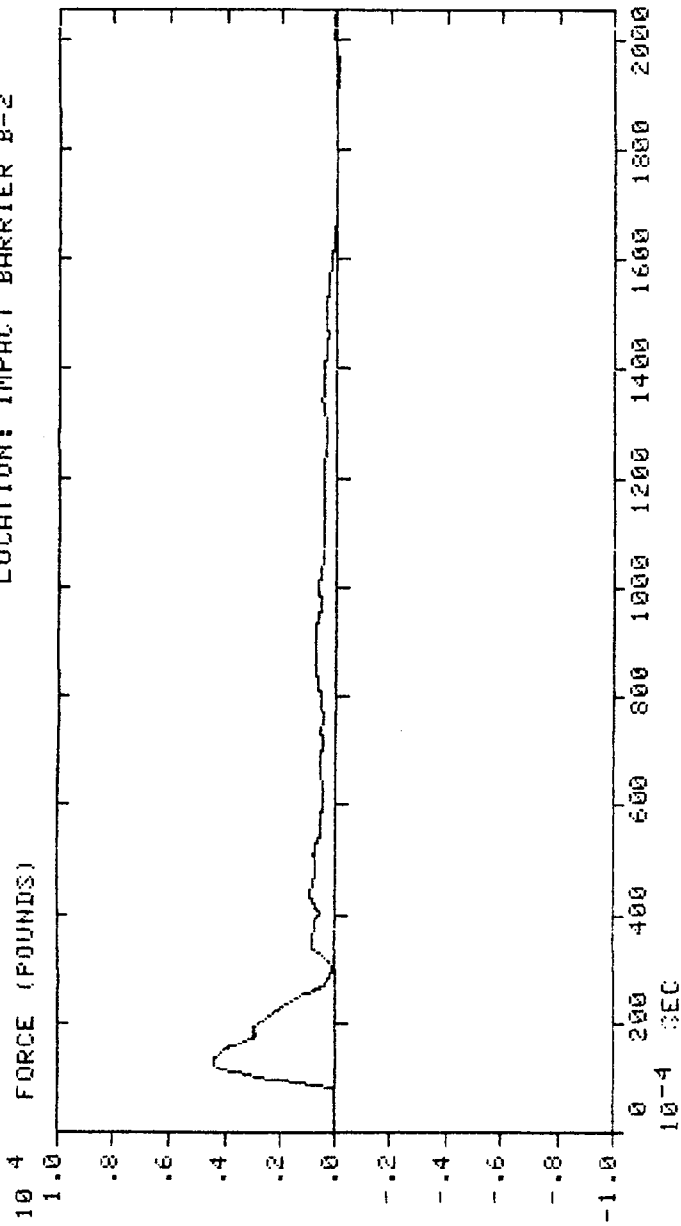


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 11
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER B-2

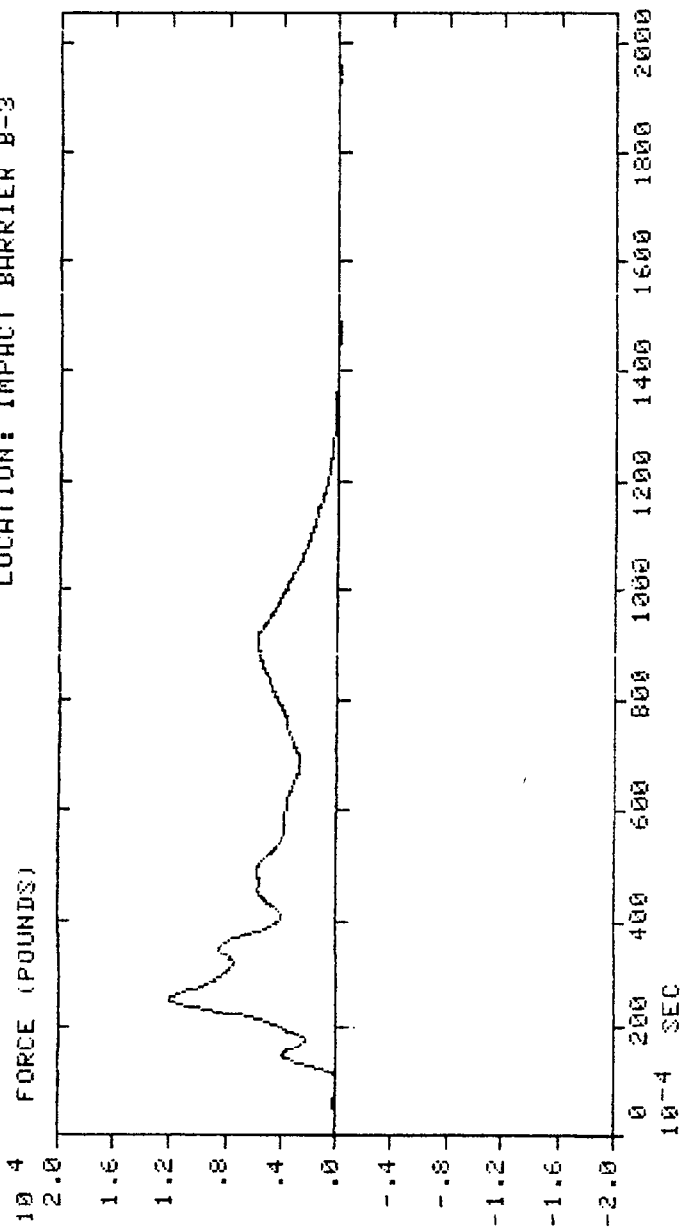


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 12
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-3

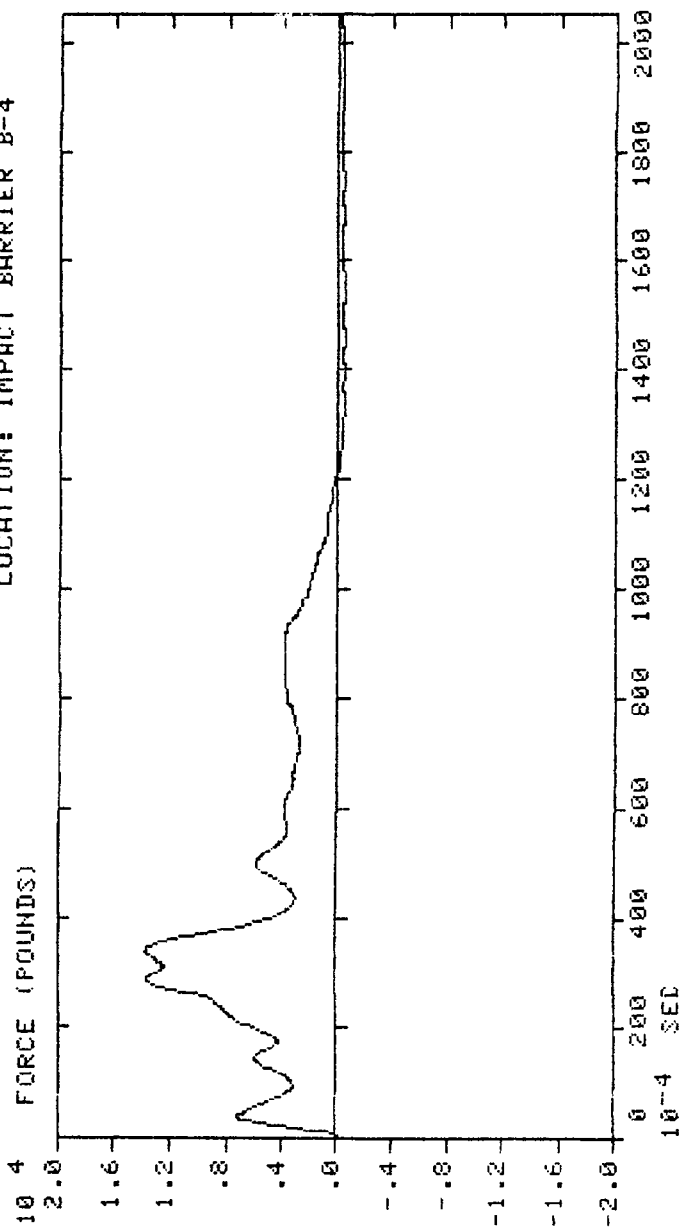


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 1
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER B-4

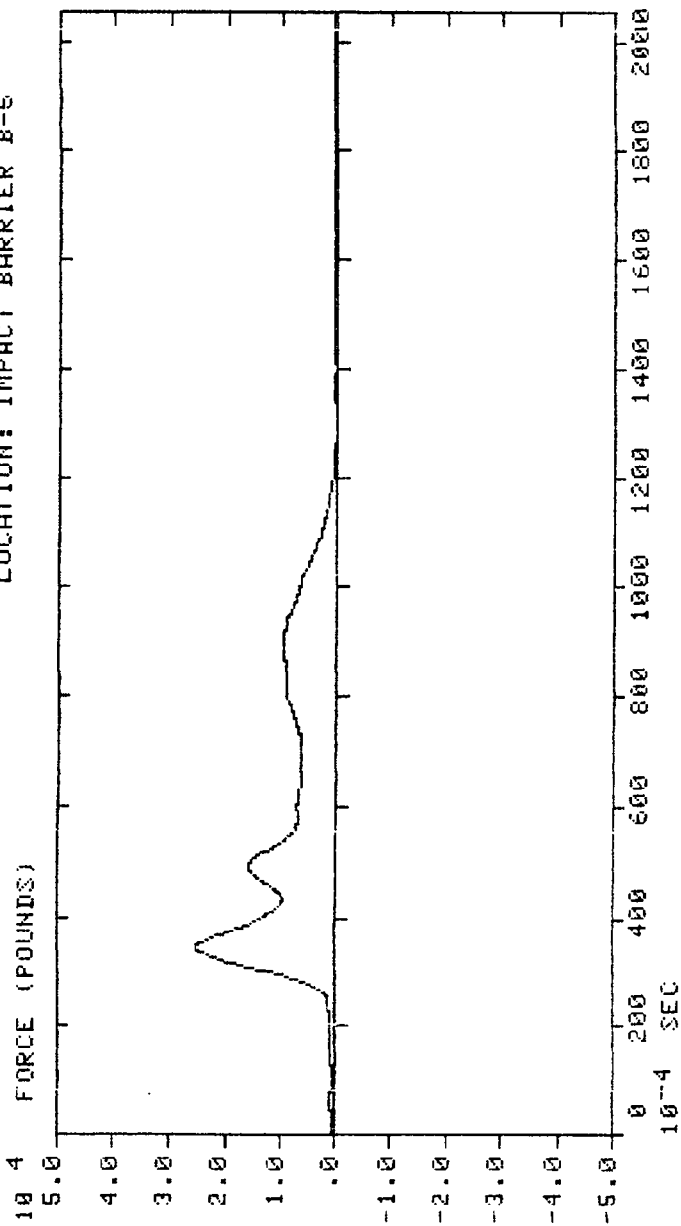


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 5 CH 2
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-S

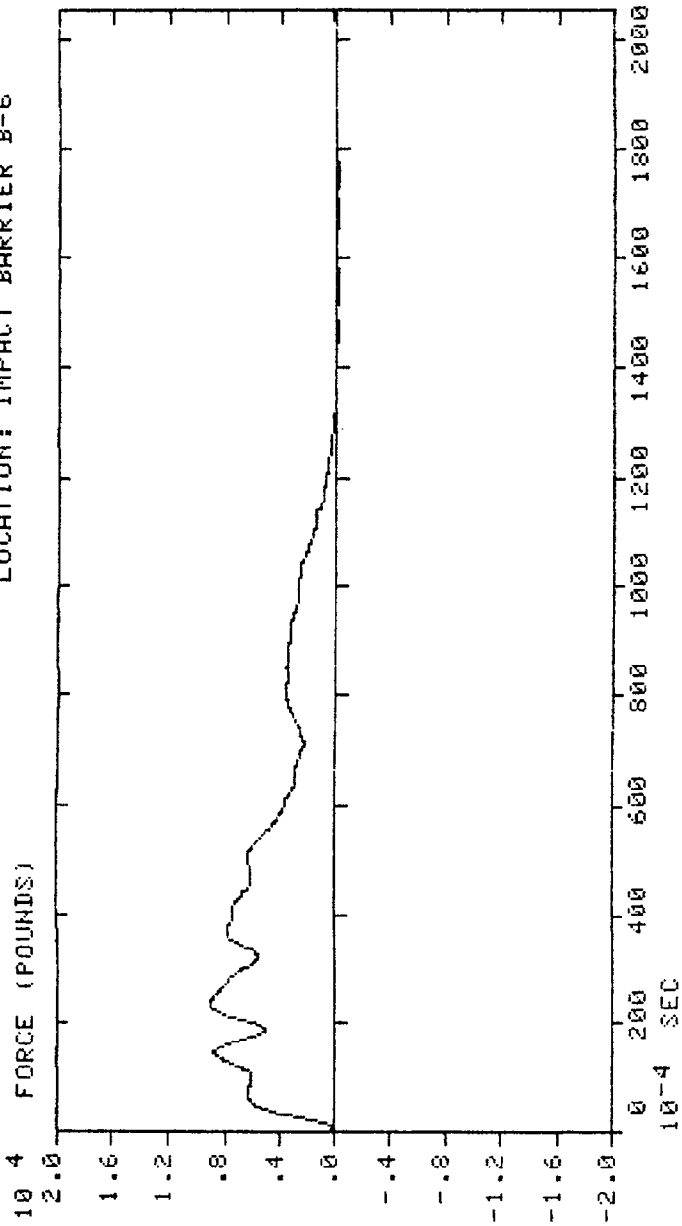


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5 CH 3
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER B-6

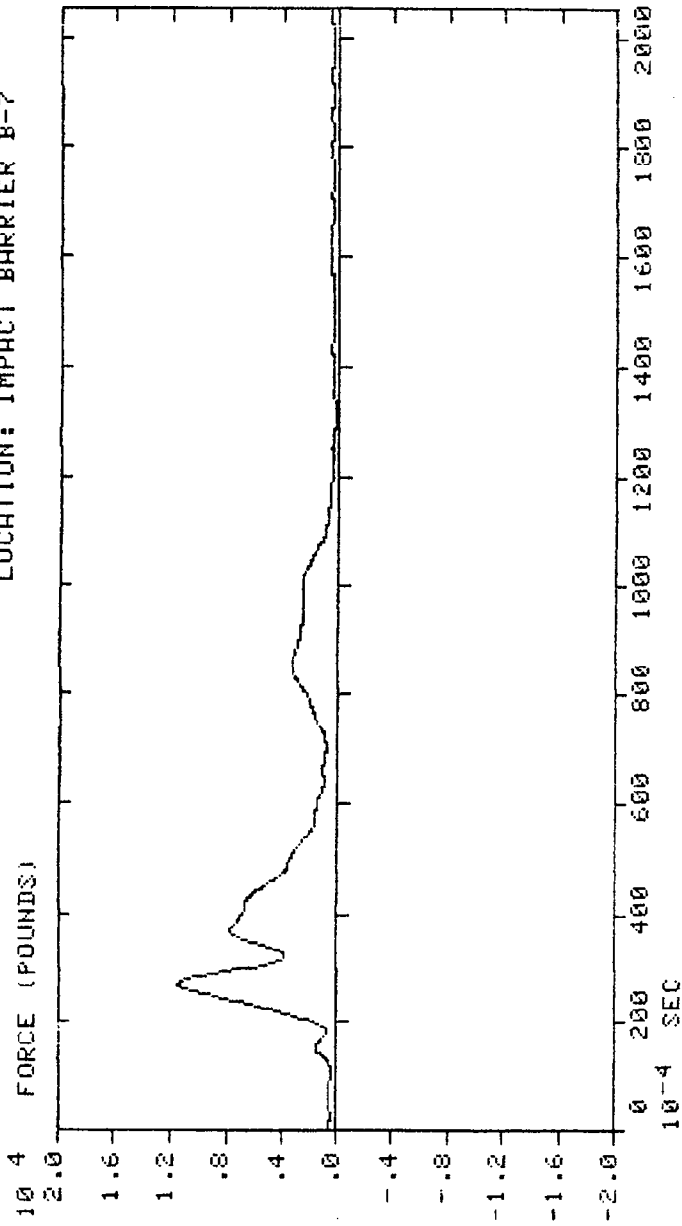


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 5 CH 4
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-7

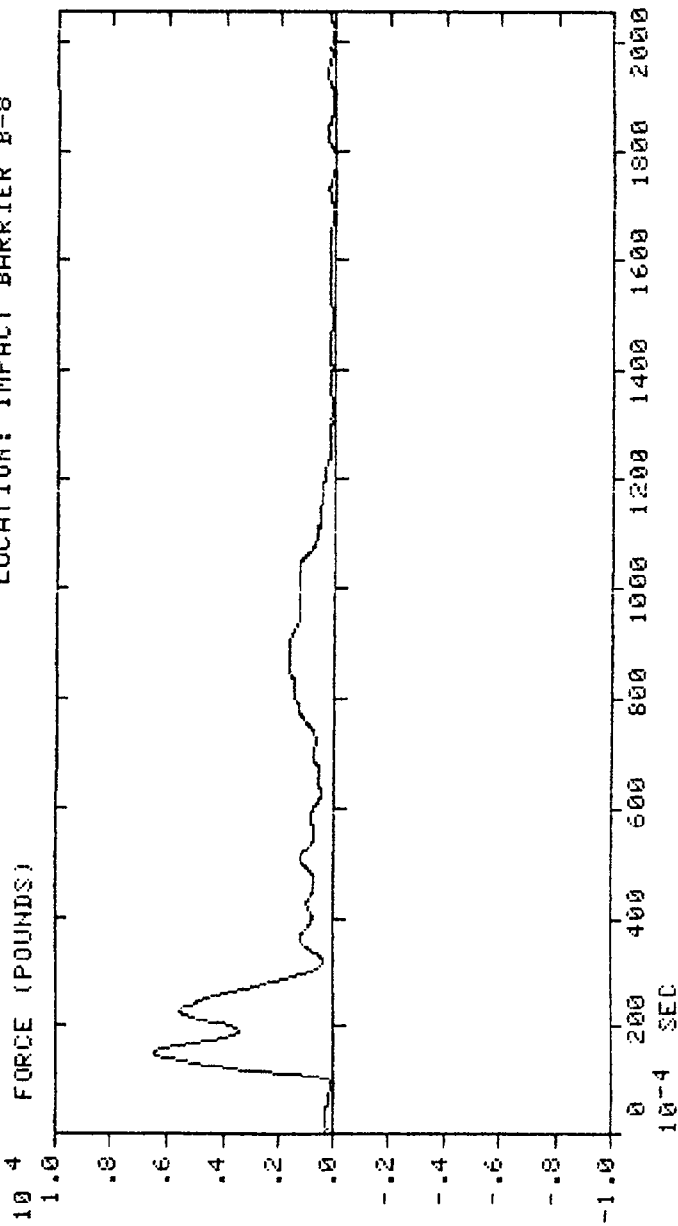


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 5 CH 5
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-8

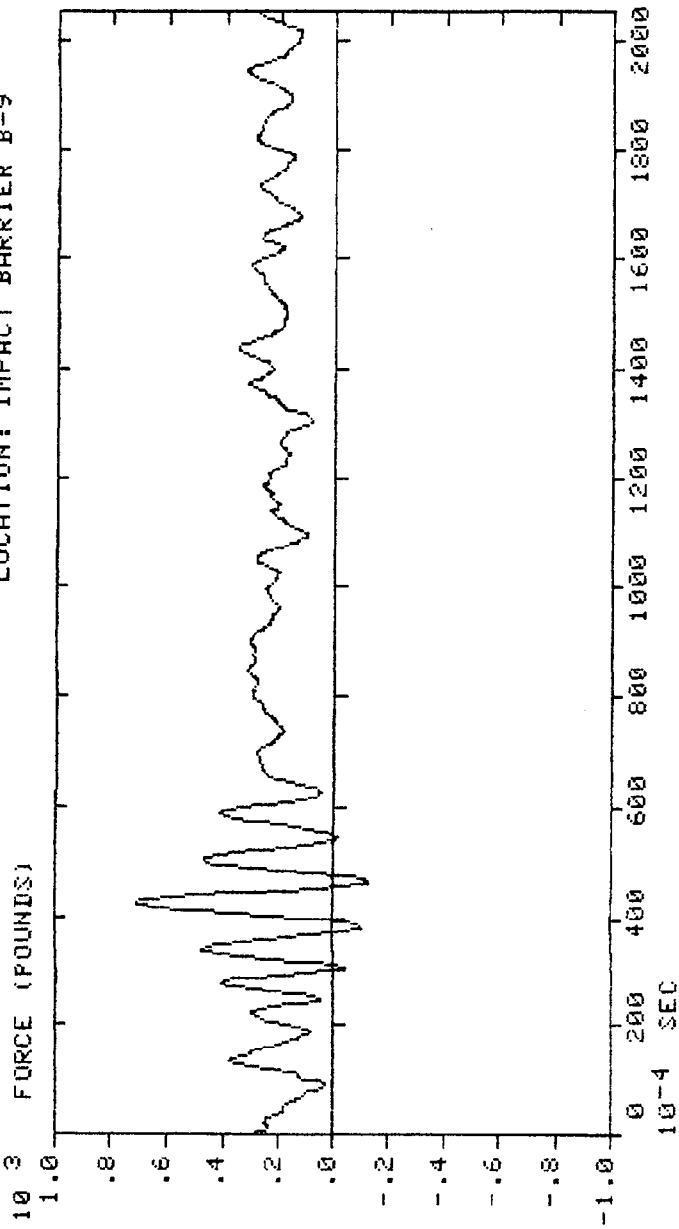


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 5 CH 6
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER B-9

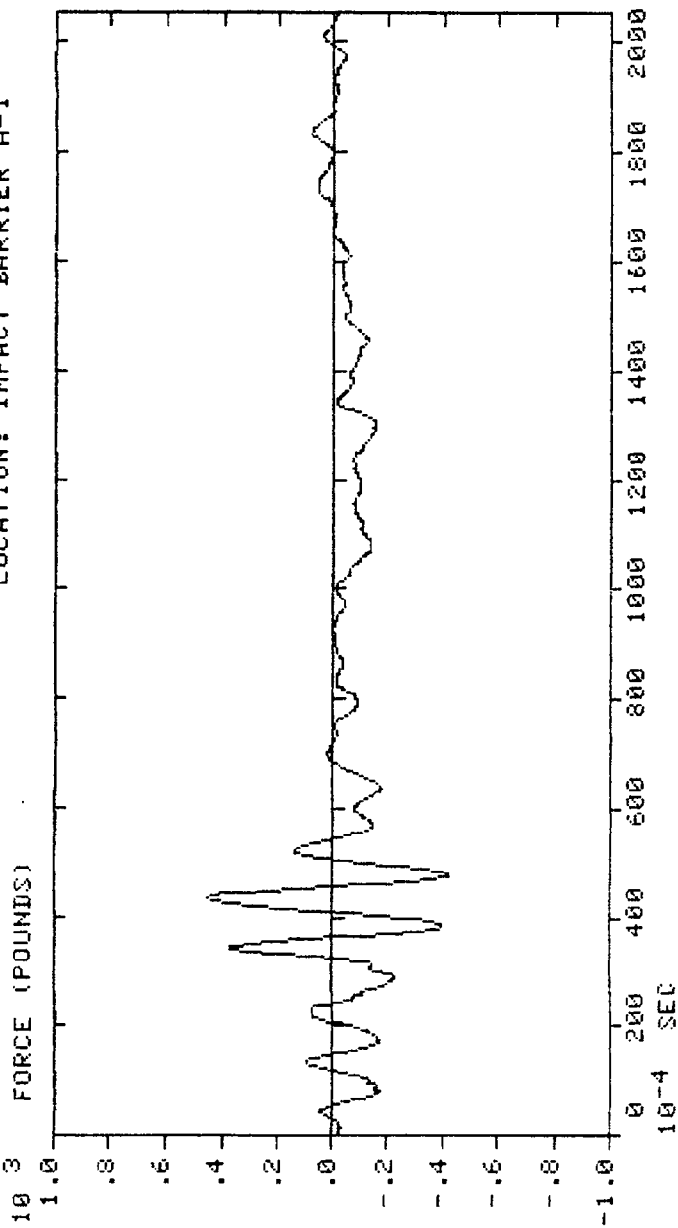


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJD NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 1
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER A-1

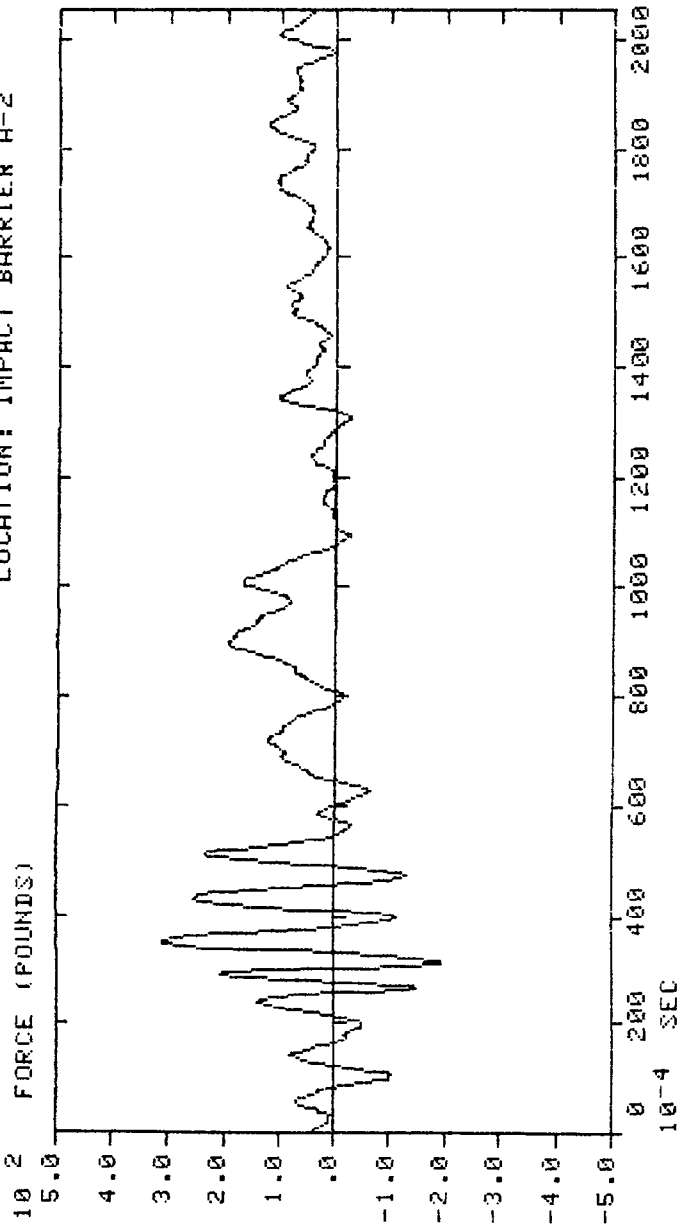


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 2
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER A-2

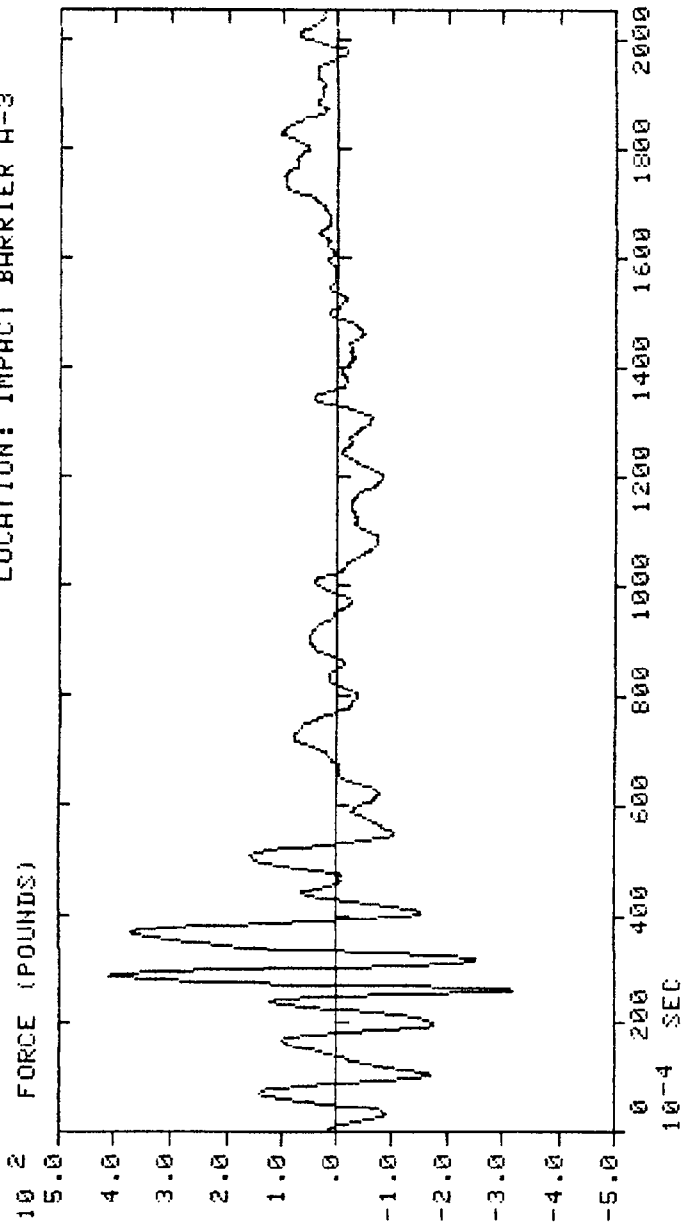


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 3
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER A-3

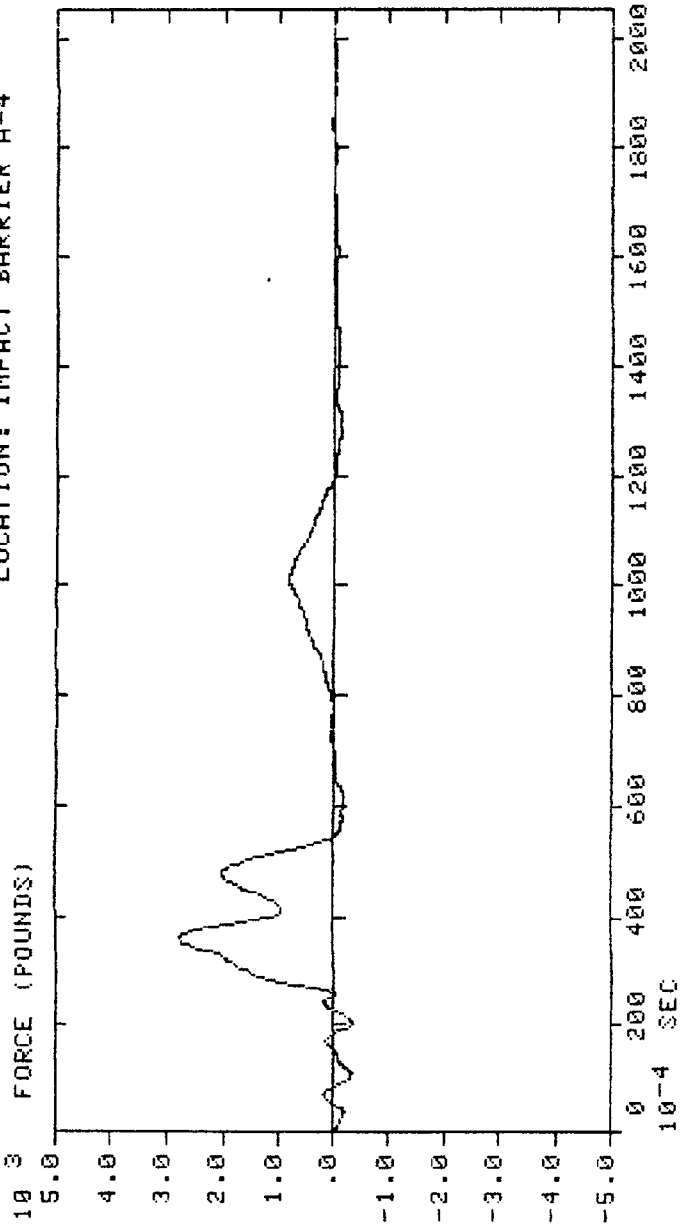


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 4
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER A-4

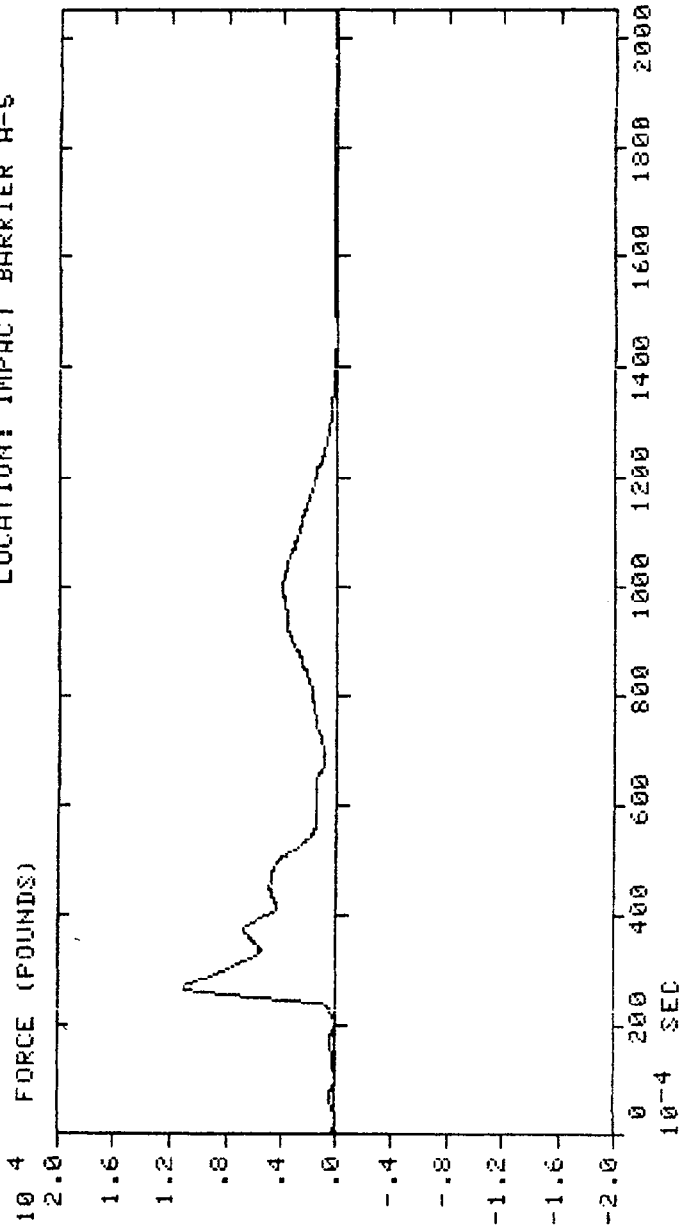


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 5
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER A-S

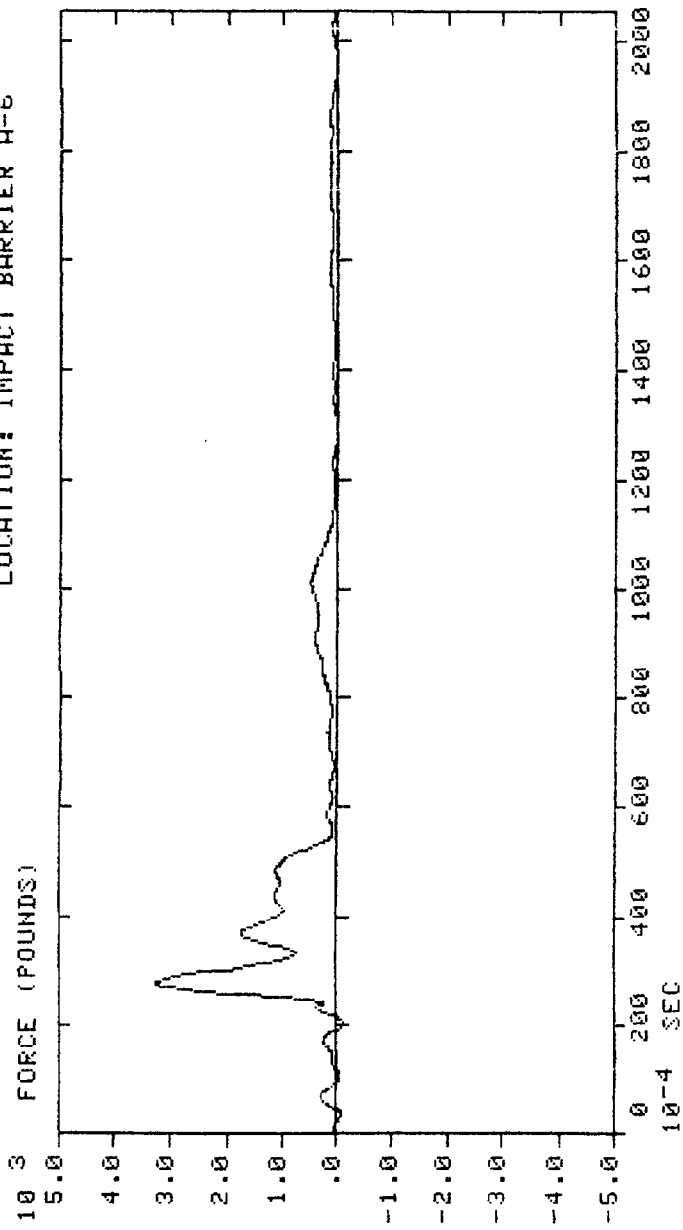


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 6
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER A-6

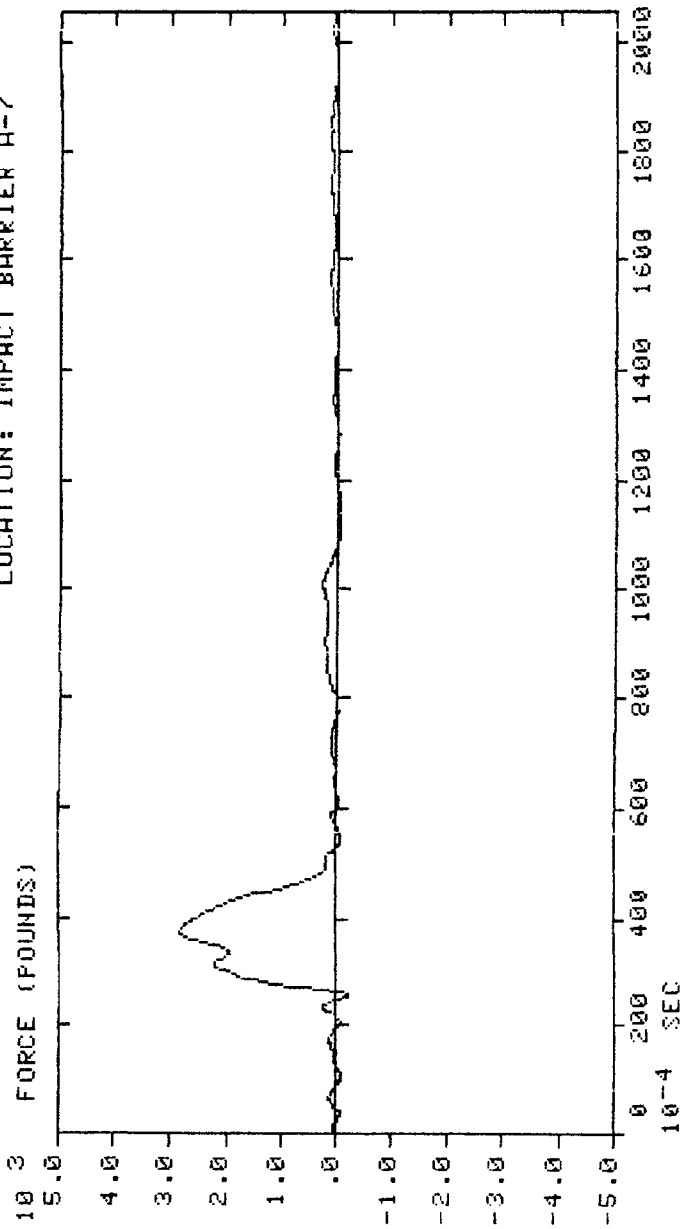


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4 CH 7
 DIRECTION: COMPRESSION
 LOCATION: IMPACT BARRIER A-7

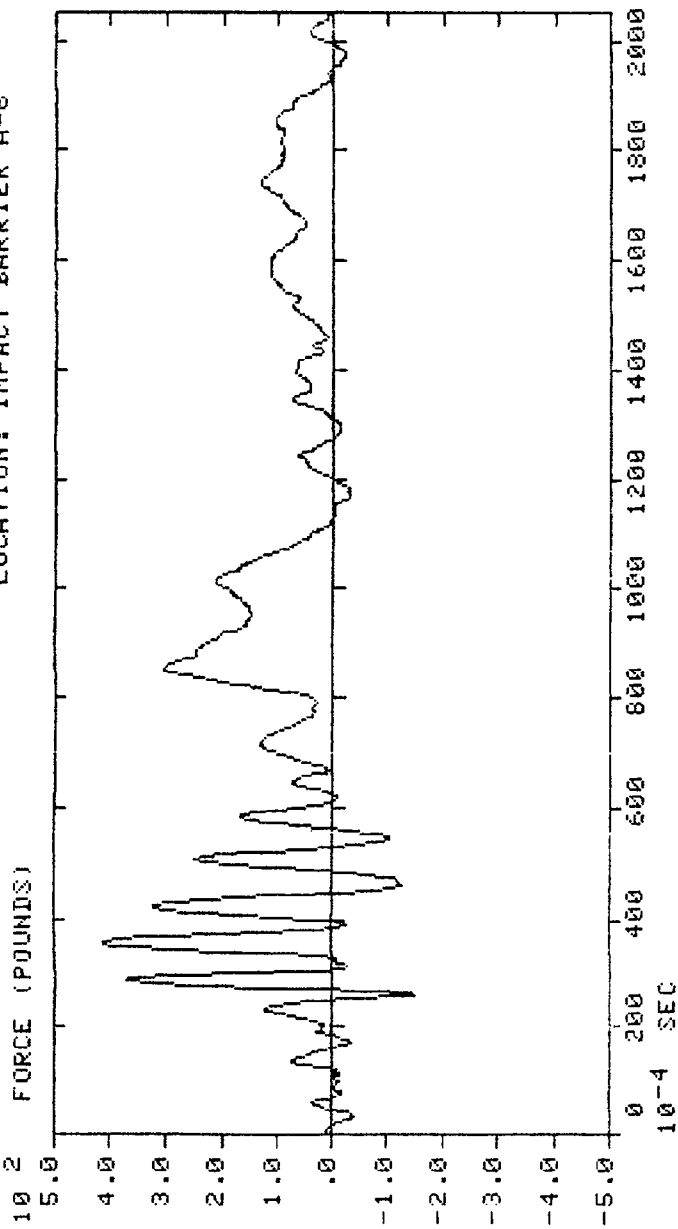


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 8
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER A-8

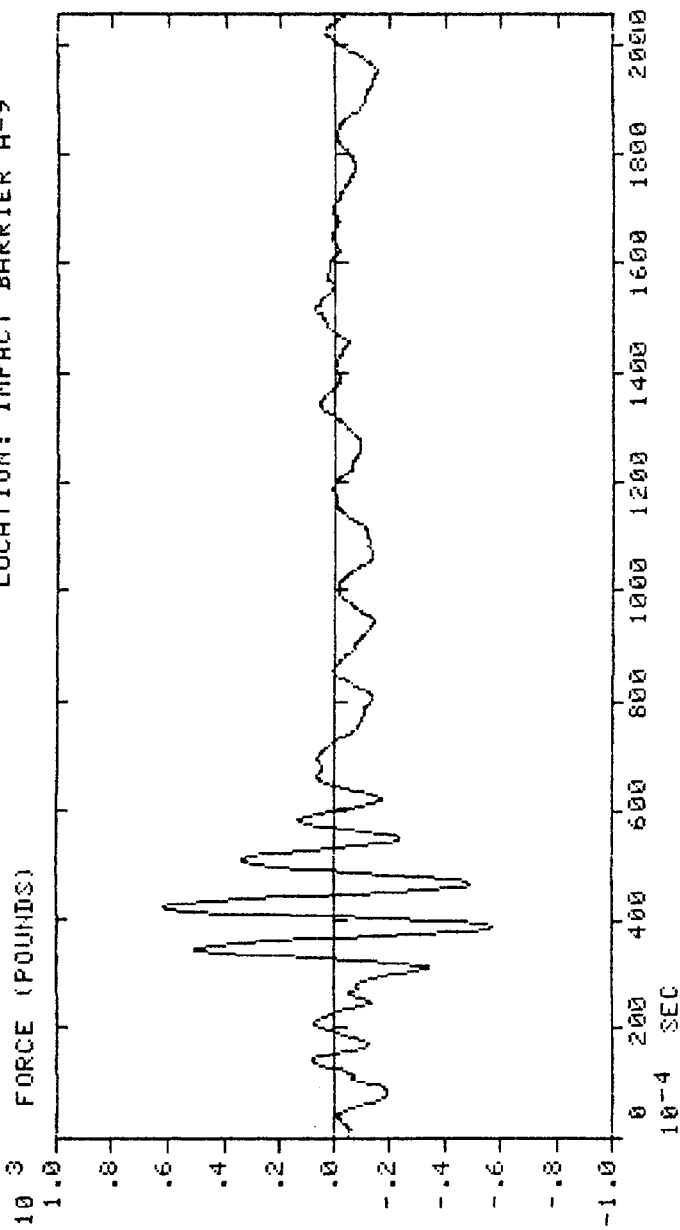


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 4 CH 9
DIRECTION: COMPRESSION
LOCATION: IMPACT BARRIER A-9

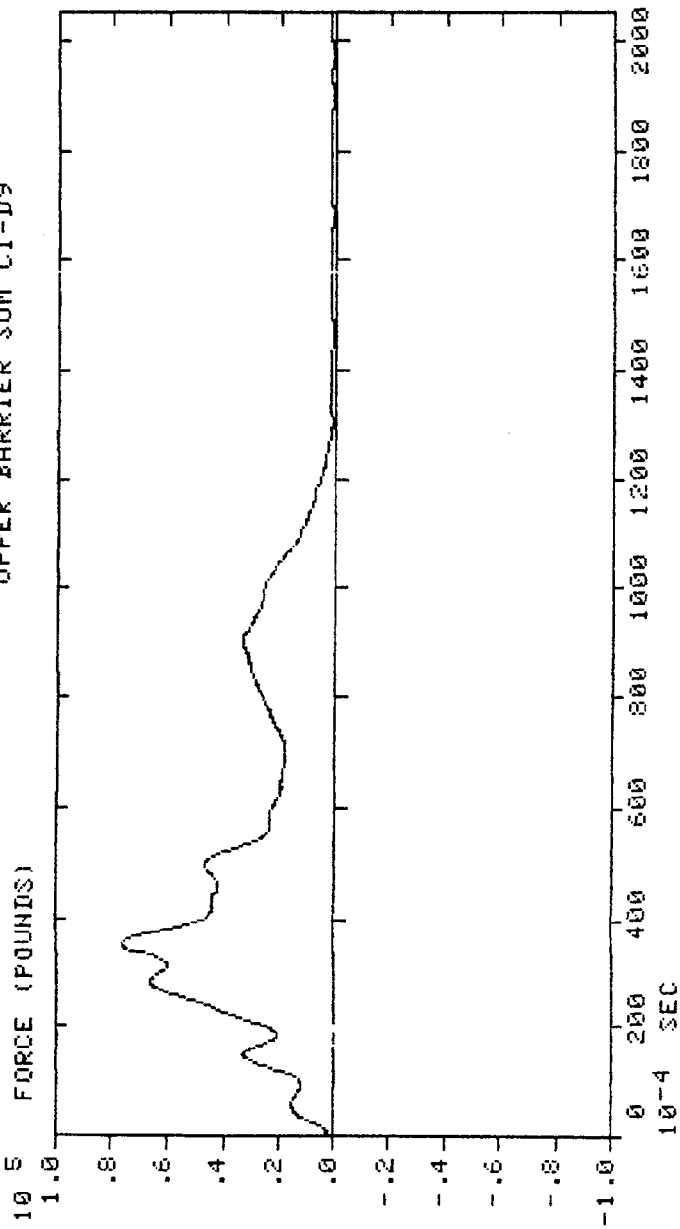


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
FILTER: CLASS 60
LOAD CELL: TAPE 5,6 CH 7-12, 1-12
DIRECTION: COMPRESSION
UPPER BARRIER SUM C1-D9

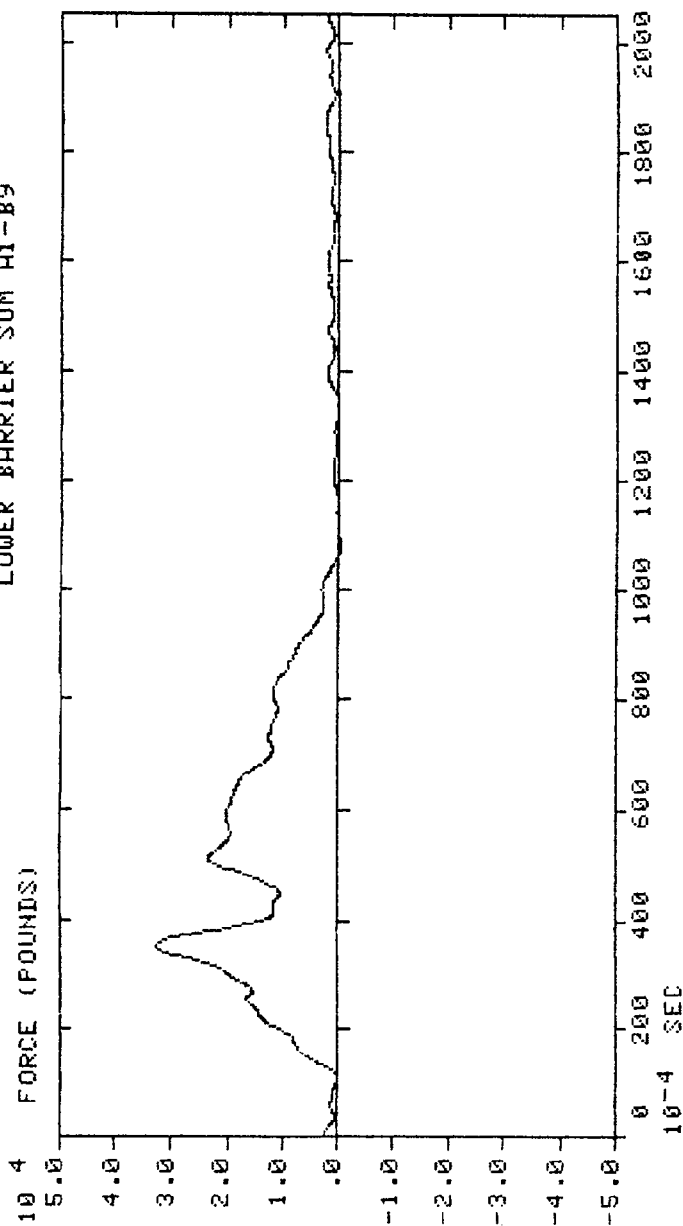


DOT CRASH PROGRAM

VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4,5 CH 1-12, 1-6
 DIRECTION: COMPRESSION
 LOWER BARRIER SUM A1-B9

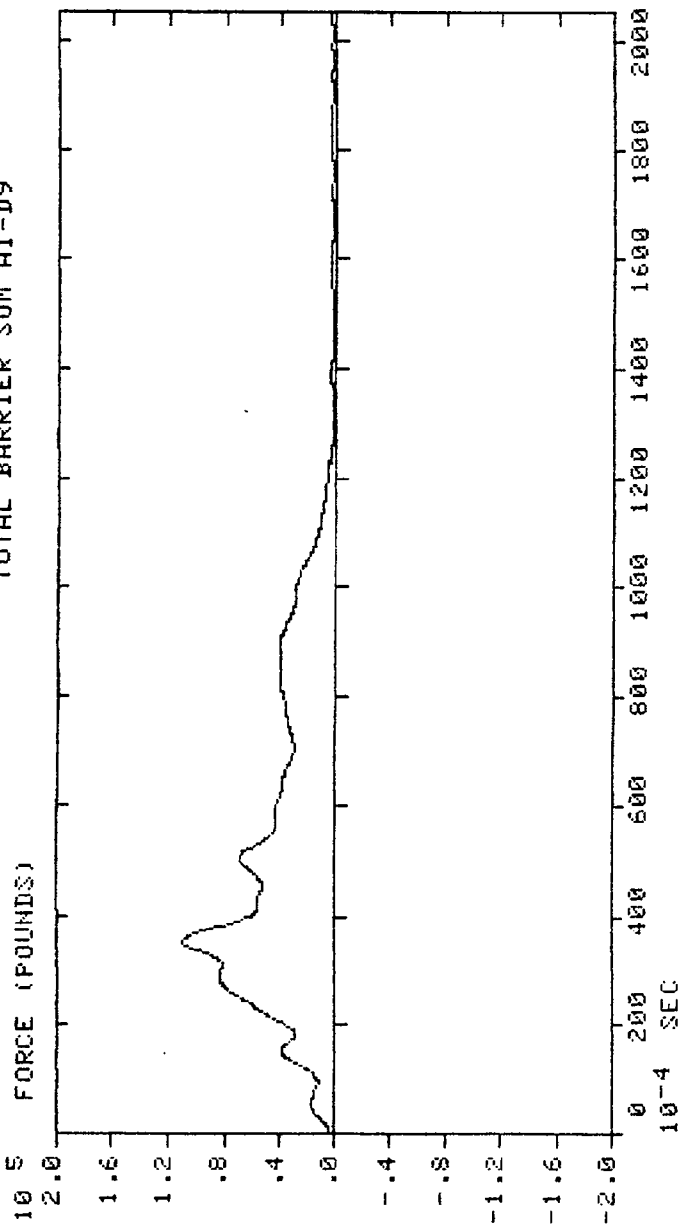


DOT CRASH PROGRAM

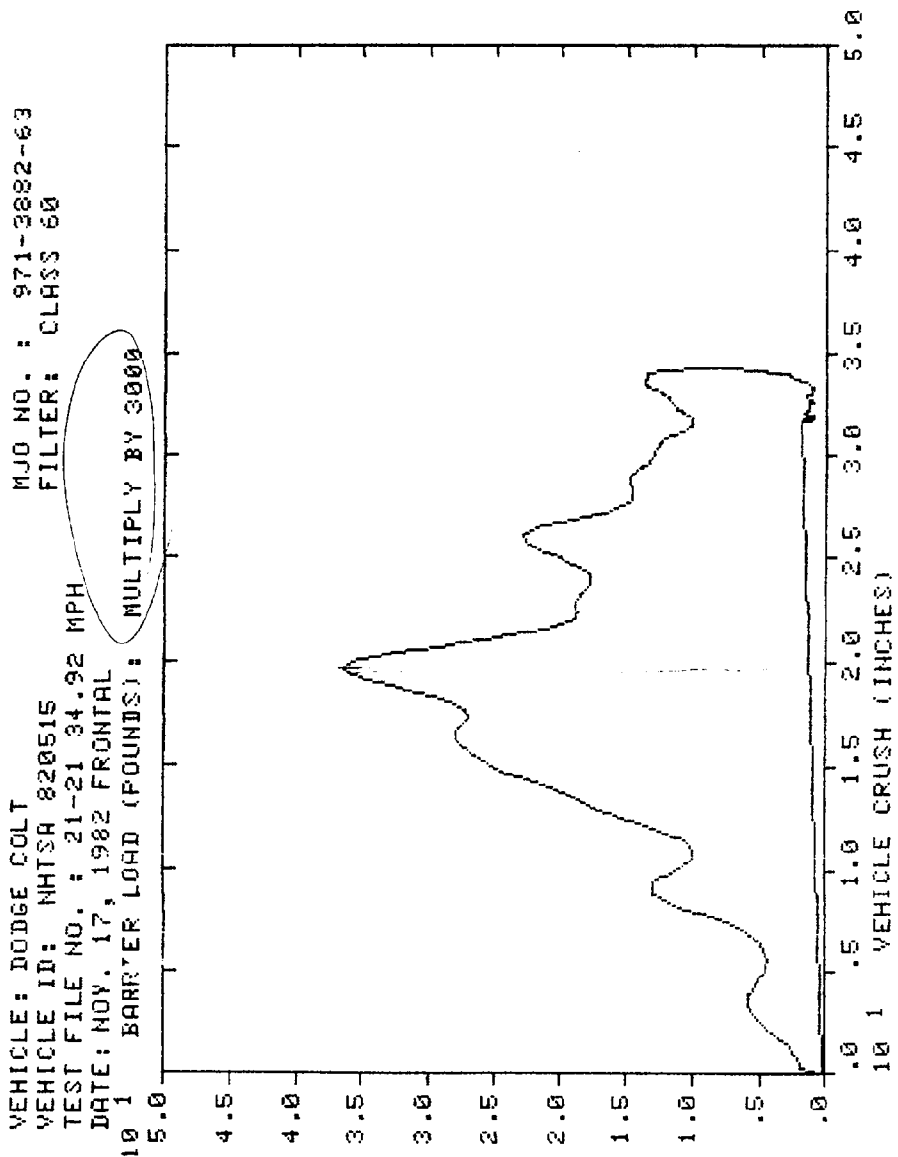
VEHICLE: DODGE COLT
 VEHICLE ID: NHTSA 820515
 TEST FILE NO.: 21-21 34.92 MPH
 DATE: NOV. 17, 1982 FRONTAL

NATIONAL TECHNICAL SYSTEMS

MJO NO.: 971-3882-63
 FILTER: CLASS 60
 LOAD CELL: TAPE 4,5,6 CH 1-12
 DIRECTION: COMPRESSION
 TOTAL BARRIER SUM A1-D9



VEHICLE: DODGE COLT
VEHICLE ID: NHTSA 820515
TEST FILE NO.: 21-21 34.92 MPH
DATE: NOV. 17, 1982 FRONTAL
10 1 BARRIER LOAD (POUNDS): MULTIPLY BY 3000



NTS

APPENDIX C



APPENDIX C

The following report sheets are the Part 572 test dummy calibration test data for the dummies used in the 1982 Dodge Colt - 4 Door Hatchback, NHTSA 820515 frontal fixed barrier impact.

PART 572 DUMMY CALIBRATION TEST DATA

Dummy S/N S06

Calibration Laboratory Humanoid Systems

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration		8-13-82	11-29-82
Calibration Sequential Number for Dummy		5	6
Temperature in Lab. (Spec. = 66 to 78°F)		69 - 72°F	68 - 71°F
Relative Humidity in Lab. (Spec. = 10 to 70%)		34 - 67%	49 - 65%
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel.	210 to 260G	263.22 G	239.05 G
b. Peak Lateral Accel.	$\leq 10G$	1.66 G	0.00 G
c. Time above 100G	0.9 to 1.5 ms	1.28 ms	1.19 ms
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed	21.5 to 25.5 fps	22.58 fps	22.37 fps
b. Pendulum Avg. Decel. (over $t_3 - t_2$)	20 to 24G	22.39 G	22.51 G
c. Peak Resultant Head Acceleration	26G maximum	24.14 G	23.23 G
d. Pendulum Decel. ($t_2 - t_1$)	≤ 3 ms	1.50 ms	1.56 ms
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	30.00 ms	26.81 ms
f. Pendulum Decel. ($t_4 - t_3$)	≤ 10 ms	4.41 ms	8.53 ms
g. Pendulum Direction Reversal Time	≥ 123 ms	124.92 ms	106.94 ms
h. Max. Head Rotation	63 to 73°	72.27°	67.87°
i. Chordal Displacement: Head Rotation Angle			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in.	0 in.
30°	Time	25.6 to 34.4 ms	29.25 ms
	Displ.	2.1 to 3.1 in.	2.88 in.

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N S06

Calibration Laboratory Humanoid Systems

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. <u>NECK BENDING TEST</u> <u>Continued:</u>				
i. Chordal Displacement: Head Rotation Angle				
60°	Time	40.3 to 51.7 ms	41.55 ms	41.94 ms
	Displ.	4.3 to 5.3 in.	4.93 in.	4.87 in.
Maximum (72.3°)	Time	53.2 to 66.8 ms	61.99 ms	58.10 ms
	Displ.	5.0 to 6.0 in.	6.00 in.	5.70 in.
60°	Time	67.0 to 83.0 ms	73.90 ms	68.14 ms
	Displ.	4.3 to 5.3 in.	4.96 in.	5.06 in.
30°	Time	85.4 to 104.6 ms	99.45 ms	91.35 ms
	Displ.	2.1 to 3.1 in.	2.54 in.	2.51 in.
0°	Time	101.0 to 123.0 ms	115.05 ms	107.00 ms
	Displ.	-.5 to 0.5 in.	+0.02 in.	+0.22 in.
3. <u>ABDOMINAL COMPRESSION TEST:</u> (Preload = 10 pounds)				
a. Force @ .5"		23 to 37 lbs.	28.0 lbs.	23.5 lbs.
b. Force @ .75"		37 to 50 lbs.	46.5 lbs.	43.0 lbs.
c. Force @ 1.0"		50 to 63 lbs.	56.5 lbs.	55.5 lbs.
d. Force @ 1.3"		73 to 88 lbs.	73.5 lbs.	75.5 lbs.
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20°		22 to 34 lbs.	33.3 lbs.	31.5 lbs.
b. Force @ 30°		34 to 46 lbs.	45.0 lbs.	45.0 lbs.
c. Force @ 40°		46 to 58 lbs.	53.3 lbs.	50.5 lbs.
d. Return Angle		12° maximum	6.0°	8.0°

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N S06

Calibration Laboratory Humanoid Systems

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
5. <u>CHEST IMPACT TESTS:</u>			
a. High Speed			
(1) Probe Speed	21.78-22.22 fps	21.92 fps	22.00 fps
(2) Peak Deflection	1.7" maximum	1.54 in.	1.38 in.
(3) Peak Resistive Force	2250 lbs. max.	2069.5 lbs.	2096.4 lbs.
(4) Internal Hysteresis	50 to 70%	64.71%	67.29%
b. Low Speed			
(1) Probe Speed	13.86-14.14 fps	13.90 fps	14.00 fps
(2) Peak Deflection	1.1" maximum	0.93 in.	0.94 in.
(3) Peak Resistive Force	1450 lbs. max.	1185.6 lbs.	1291.9 lbs.
(4) Internal Hysteresis	50 to 70%	60.80%	61.60%
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side			
(1) Probe Side	6.76 to 7.04 fps	6.90 fps	6.90 fps
(2) Maximum Force	1850 to 2500 lbs.	2425.5 lbs.	1909.5 lbs.
(3) Time Above 1000#	1.7 ms minimum	2.14 ms	2.11 ms
b. Left Side			
(1) Probe Speed	6.76 to 7.04 fps	6.90 fps	6.90 fps
(2) Maximum Force	1850 to 2500 lbs.	2410.0 lbs.	2138.1 lbs.
(3) Time Above 1000#	1.7 ms minimum	2.08 ms	1.87 ms

PART 572 DUMMY CALIBRATION TEST DATA

Dummy S/N S03

Calibration Laboratory Humanoid Systems

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration		8-13-82	11-29-82
Calibration Sequential Number for Dummy		5	6
Temperature in Lab. (Spec. = 66 to 78°F)		69 - 72°F	69 - 70°F
Relative Humidity in Lab. (Spec. = 10 to 70%)		52 - 69%	48 - 67%
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel.	210 to 260G	231.31 G	227.14 G
b. Peak Lateral Accel.	$\leq 10G$	4.96 G	0.00 G
c. Time above 100G	0.9 to 1.5 ms	1.12 ms	1.08 ms
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed	21.5 to 25.5 fps	22.54 fps	23.70 fps
b. Pendulum Avg. Decel. (over $t_3 - t_2$)	20 to 24G	23.30 G	22.50 G
c. Peak Resultant Head Acceleration	26G maximum	21.79 G	23.65 G
d. Pendulum Decel. ($t_2 - t_1$)	≤ 3 ms	1.83 ms	1.50 ms
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	23.25 ms	23.80 ms
f. Pendulum Decel. ($t_4 - t_3$)	≤ 10 ms	7.90 ms	5.50 ms
g. Pendulum Direction Reversal Time	≥ 123 ms	126.95 ms	0.00 ms
h. Max. Head Rotation	63 to 73°	64.67°	66.47°
i. Chordal Displacement: Head Rotation Angle			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in.	0 in.
30°	Time	25.6 to 34.4 ms	27.03 ms
	Displ.	2.1 to 3.1 in.	2.59 in.

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N S03

Calibration Laboratory Humanoid Systems

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. <u>NECK BENDING TEST</u> <u>Continued:</u>				
i. Chordal Displacement: Head Rotation Angle				
60°	Time	40.3 to 51.7 ms	45.93 ms	44.33 ms
	Displ.	4.3 to 5.3 in.	4.86 in.	4.92 in.
Maximum (66.5°)	Time	53.2 to 66.8 ms	58.81 ms	58.30 ms
	Displ.	5.0 to 6.0 in.	5.42 in.	5.53 in.
60°	Time	67.0 to 83.0 ms	67.63 ms	67.06 ms
	Displ.	4.3 to 5.3 in.	4.91 in.	4.93 in.
30°	Time	85.4 to 104.6 ms	91.48 ms	89.43 ms
	Displ.	2.1 to 3.1 in.	2.39 in.	2.41 in.
0°	Time	101.0 to 123.0 ms	108.13 ms	105.07 ms
	Displ.	-.5 to 0.5 in.	+0.04 in.	+0.08 in.
3. <u>ABDOMINAL COMPRESSION TEST:</u> (Preload = 10 pounds)				
a. Force @ .5"		23 to 37 lbs.	31.0 lbs.	27.5 lbs.
b. Force @ .75"		37 to 50 lbs.	42.5 lbs.	42.5 lbs.
c. Force @ 1.0"		50 to 63 lbs.	60.0 lbs.	59.5 lbs.
d. Force @ 1.3"		63 to 88 lbs.	88.0 lbs.	83.5 lbs.
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20°		22 to 34 lbs.	33.0 lbs.	30.5 lbs.
b. Force @ 30°		34 to 46 lbs.	40.0 lbs.	42.0 lbs.
c. Force @ 40°		46 to 58 lbs.	53.0 lbs.	53.5 lbs.
d. Return Angle		12° maximum	0.0°	4.5°

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N S03

Calibration Laboratory Humanoid Systems

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
5. <u>CHEST IMPACT TESTS:</u>			
a. High Speed			
(1) Probe Speed	21.78-22.22 fps	21.61 fps	22.00 fps
(2) Peak Deflection	1.7" maximum	1.44 in.	1.51 in.
(3) Peak Resistive Force	2250 lbs. max.	2123.5 lbs.	2241.0 lbs.
(4) Internal Hysteresis	50 to 70%	64.1%	54.3%
b. Low Speed			
(1) Probe Speed	13.86-14.14 fps	13.90 fps	14.00 fps
(2) Peak Deflection	1.1" maximum	0.59 in.	0.96 in.
(3) Peak Resistive Force	1450 lbs. max.	1162.5 lbs.	1411.9 lbs.
(4) Internal Hysteresis	50 to 70%	61.3%	54.3%
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side			
(1) Probe Side	6.76 to 7.04 fps	6.90 fps	6.90 fps
(2) Maximum Force	1850 to 2500 lbs.	2047.5 lbs.	2293.0 lbs.
(3) Time Above 1000#	1.7 ms minimum	1.85 ms	1.93 ms
b. Left Side			
(1) Probe Speed	6.76 to 7.04 fps	6.90 fps	6.90 fps
(2) Maximum Force	1850 to 2500 lbs.	2200.5 lbs.	2420.5 lbs.
(3) Time Above 1000#	1.7 ms minimum	1.84 ms	1.84 ms



SERVICE FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
400 Seventh Street S. W.
Washington, D. C. 20590

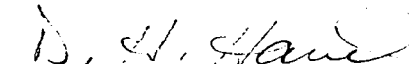
CONTRACT NUMBER:

DOT-HS-9-02273, DTNH22-82-C-02022,
and DTNH22-82-C-07238

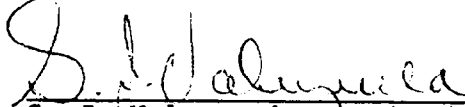
I hereby certify that the preceding report is true and correct to
the best of my knowledge.

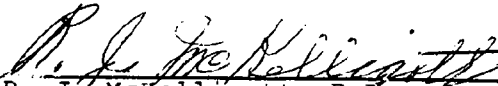
NATIONAL TECHNICAL SYSTEMS


G. D. Matteson, P.E.,
Division Manager


D. H. Hand, Project Engineer


P. C. MacDonald, Dynamics Engineer


G. J. Valenzuela, Mechanical
Department Supervisor


R. J. McKelligott, P.E.,
Quality Assurance Manager



rmh