DOT # 360

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APPROVED ENGINEERING TEST LABORATORIES / 1536 EAST VALENCIA / FULLERTON, CALIFORNIA 92631 / TEL. (714) 879-6110

A NATIONAL TECHNICAL SERVICES COMPANY

REPORT NOS. 212-AETL-81-020-971-3882-20
219-AETL-81-019-971-3882-19
301-AETL-81-042-971-3882-42

NEW VEHICLE ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS NOS. 212, 219, AND 301-75

FORD MOTOR COMPANY OF CANADA LTD.
1982 FORD EXP - 3 DOOR SPORTY COUPE
NHTSA 820201

APPROVED ENGINEERING TEST LABORATORIES
1536 EAST VALENCIA DRIVE
FULLERTON, CALIFORNIA 92631

JUNE 1981

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

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Prepared by D. W. Hand

Approved by D. J. Delaney

Date 3d June 1981

Report Accepted by:

Robert Krauss
Contract Technical Manager
Office of Vehicle Safety Compliance

8/21/81
Date

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
212-AETL-81-020 219-AETL-81-019 301-AETL-81-042		

4. Title and Subtitle	5. Report Date
New Vehicle Assessment and Standards Enforcement Indicant Testing, FMVSS 212, 219, and 301-75. 1982 Ford EXP - 3 Door Sporty Coupe - NHTSA 820201	5 August 1981
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
	971-3882-42

9. Performing Organization Name and Address	10. Work Unit. No.
Approved Engineering Test Laboratories 1536 East Valencia Drive Fullerton, California 92631 Phone No.: (714) 879-6110	11. Contract or Grant No. DOT-HS-9-02273

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
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	Final Report June 15 - June 18, 1981
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

New Vehicle Assessment and Standards Enforcement Indicant Test to the requirements of FMVSS 212, 219, and 301-75 on a 1982 Ford EXP - 3 Door Sporty Coupe, NHTSA 820201, VIN-2FABP0122CX107731 was conducted at Approved Engineering Test Laboratories test facility in Fullerton, California.

The average vehicle impact speed was 34.96 mph in the frontal (0°)mode. Test date was June 18, 1981, and the ambient temperature was 88°F.

The subject test vehicle appears to comply with all the requirements of FMVSS 212/219/301-75.

The passenger dummy experienced a HIC value of 2668; in excess of the limit specified in FMVSS 208. All other values for both test dummies appear to satisfy FMVSS 208.

17. Key Words	18. Distribution Statement
New Vehicle Assessment FMVSS 212 - Windshield Mounting FMVSS 219 - Windshield Zone Intrusion FMVSS 301-75 - Fuel System Integrity	

19. Security Class. (of this report)	20. Security Class. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	143	

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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 Research and Development (R&D) 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) No's. 212, 219 and 301-75. This test was performed under Contract Number DOT-HS-9-02273 by Approved Engineering Test Laboratories, 1536 East Valencia Drive, Fullerton, California, in accordance with the Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures (TP212-02).

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 2 contains general test and vehicle information, occupant/vehicle acceleration summary data, while Section 3 contains all compliance related data. Section 4 contains test dummy and vehicle measurements, along with camera positions. Section 5 discusses AETL's test facilities and data acquisition and reduction system. Appendix A contains additional

photographs not related to vehicle compliance. Appendix B contains the computer-generated plots, while Appendix C contains the dummy certification reports if applicable.

1.1 ADMINISTRATIVE DATA

A. References

1. Federal Motor Vehicle Safety Standard No. 212 "Windshield Mounting" as published in the Federal Register, Volume 41, No. 36493, dated 30 August 1976.

2. Federal Motor Vehicle Safety Standard No. 219 "Windshield Zone Intrusion" as published in the Federal Register, Volume 40, No. 25462, dated 16 June 1975.

3. Federal Motor Vehicle Safety Standard No. 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, TP 212-02, dated April 1, 1980.

SECTION 1

B. Description of Test Vehicle

1. 1982 Ford EXP - 3 Door Sporty Coupe
2. Vehicle Identification No.: 2FABP0122CX107731
3. NHTSA No.: 820201
4. Manufactured Date: March 1981
5. GVWR: 3,106 pounds

C. Dates

1. Vehicle Received: May 8, 1981
2. Start of Test: June 15, 1981
3. Completion of Test: June 18, 1981

SECTION 2

SECTION 2

2.0 GENERAL TEST INFORMATION AND SUMMARY DATA

The 1982 Ford EXP - 3 Door Sporty Coupe 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 and his knees were painted with red chalk. The passenger dummy head was painted with blue chalk and his knees were painted with yellow chalk to provide post-impact visual inspection of possible dummy head and knee contact with the interior components during the impact event.

TABLE I

SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION:

Manufacturer: Ford Motor Company of Canada LTD.

Make/Model: Ford EXP

Body Style: 3 Door Sporty Coupe Model Year: 1982

VIN: 2FABP0122CX107731 Build Date: March 1981

NHTSA No.: 820201 Color: Silver

Engine Data: Four (4) Cylinders; 1.6 Liter

Transmission Data: Four (4) Speed (X) Manual ( ) Automatic

Major Options: AM Radio

VEHICLE ATTITUDE:

Delivered Attitude: LF 25.8 in.; RF 25.8 in.; LR 25.1 in.; RR 25.2 in.

Test Attitude: LF 24.7 in.; RF 24.7 in.; LR 23.7 in.; RR 23.8 in.

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 30 psi

(Up to Vehicle Load Capacity) Rear = 30 psi

Recommended Tire Size: 165/80R13 Load Range: "B"

Tires on Vehicle: 165/80R13 - Michelin

Spare Tire: X Yes; ____ No; Space Saver: X Yes; ____ No

Note: Temporal Spare P155/80D13 - Goodyear @ 35 psi

TABLE Ia

SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS:

Date of Test: June 18, 1981 Time of Test: 1730

Ambient Temperature: 88 °F at Impact Area

VEHICLE CAPACITY:

Type of Seats: ____ Bench; X Bucket; ____ Split Bench

Designated Seating Capacity: Front 2
Center 0
Rear 0
Total 2

Cargo: 50 lbs.

Total 350 lbs. (Vehicle Capacity Weight)

GVWR: 3,106 lbs. (Taken From Certification Label)

GAWR: Front 1,704 lbs.; Rear 1,412 lbs.

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

Left Front 695 lbs. Left Rear 392 lbs.
Right Front 646 lbs. Right Rear 431 lbs.
Total Front Weight 1,341 lbs. (62.0 % of Total Vehicle Weight)
Total Rear Weight 823 lbs. (38.0 % of Total Vehicle Weight)
Total Delivered Weight 2,164 lbs.

CALCULATED VEHICLE TEST WEIGHT: 2,542 lbs.
(With Required Dummies and 50 lbs. Cargo)

ACTUAL VEHICLE TEST WEIGHT:

Left Front 782 lbs. Left Rear 509 lbs.
Right Front 720 lbs. Right Rear 534 lbs.
Total Front Weight 1,502 lbs. (59.0 % of Total Vehicle Weight)
Total Rear Weight 1,043 lbs. (41.0 % of Total Vehicle Weight)
Total Test Weight 2,545 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: 11.30 gals. (NFC)

Test Volume: 10.51 gals. (92-94% of NFC)

Fuel System Capacity: 11.30 gals.
(Data from Owner's Manual)

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

Does Electric Fuel Pump Operate with Ignition Switch "On"
And the Engine Not Operating: ____Yes; ____No; X N/A

Details of Fuel System: Fuel filler located on right rear fender aft of wheel opening recessed behind a hinged door, fuel tank located horizontally between frame side rails forward of rear suspension under cargo floor pan.

VEHICLE TEST CONDITIONS:

Temperature in Occupant Compartment: 72 °F

Temperature of Windshield Glazing/Moulding: 79 °F

VEHICLE CRUSH AND REBOUND:

Overall Length of Test Vehicle: Pre-Test - Left 167.7 in.; Right 167.8 in.
Post-Test - Left 150.9 in.; Right 148.0 in.

Crush: Left 16.8 in.; Right 19.8 in.

Rebound (From Rigid Barrier Only): 16.35 in.

TABLE III

POST IMPACT SUMMARY

Vehicle 1982 Ford EXP

NHTSA No. 820201 Test Date June 18, 1981

TYPE OF TEST: [XXX] 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 = N/R mph

Trap 2 = 34.96 mph

Average 34.96 mph

Actual distance from vehicle front bumper to barrier face when entering timing trap 59.0 in.

Actual distance from vehicle front bumper to barrier face when exiting timing trap 35.0 in.

VEHICLE STATIC CRUSH: Driver's Side = 16.8 inches

Passenger's Side = 19.8 inches

Average = 18.3 inches

Crush Details: Windshield broken, both "A" posts buckled, roof buckled over both "A" and "B" posts, frame rails buckled under doors, driver dummy impacted steering wheel and dash assembly, passenger dummy impacted dash assembly.

VEHICLE REBOUND: (From rigid barrier only)

Driver's Side = 16.5 inches

Passenger's Side = 16.2 inches

Average = 16.35 inches

SECTION 3

SECTION 3

3.0 TEST DATA

The 1982 Ford EXP - 3 Door Sporty Coupe 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

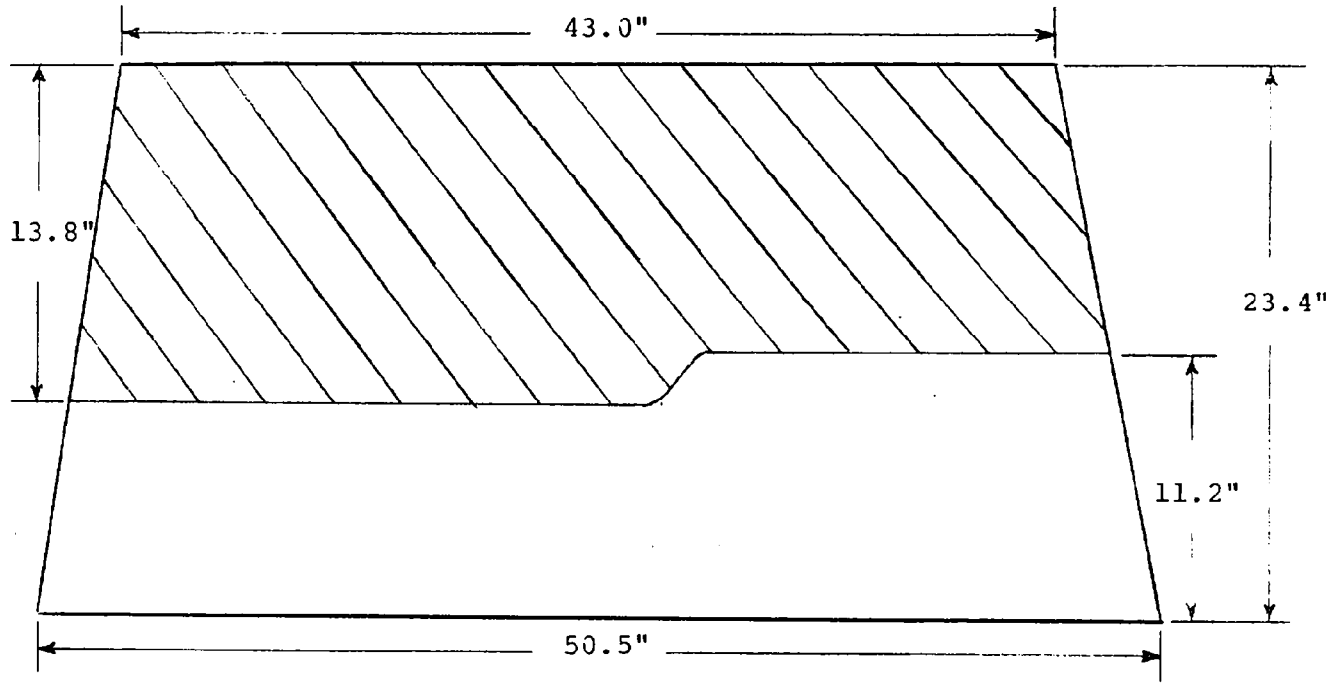
SUMMARY OF TEST CONDITIONS

WINDSHIELD ZONE INTRUSION - FMVSS 219

Vehicle 1982 Ford EXP

NHTSA No. 820201 Test Date June 18, 1981

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

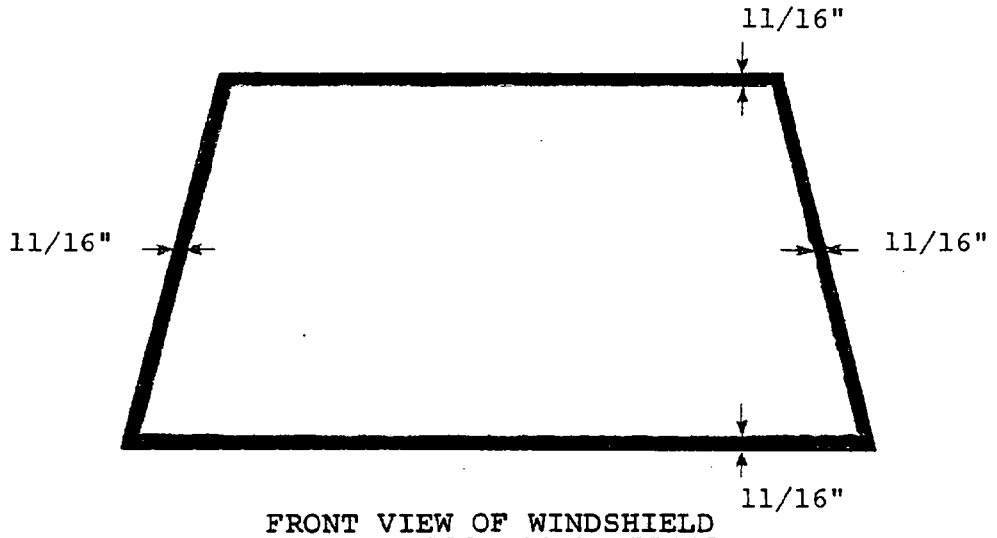
TABLE IV

POST IMPACT SUMMARY

WINDSHIELD RETENTION - FMVSS 212

Vehicle 1982 Ford EXP

NHTSA No. 820201 Test Date June 18, 1981



FRONT VIEW OF WINDSHIELD

	Windshield Periphery	
	Pre Test	Post Test
Left Side	70.4 in.	70.4 in.
Right Side	70.0 in.	70.0 in.
Total	140.4 in.	140.4 in.

Type of Occupant Restraints: Continuous Loop Lap/Shoulder Belt System

Windshield Retention:	Actual	Min. Allow
Left Side	100.0	37.5 percent
Right Side	100.0	37.5 percent
Total	100.0	75.0 percent

Details of Windshield Mounting: A black trim moulding encompasses the windshield glass and apparent adhesive is used between the glass and body opening

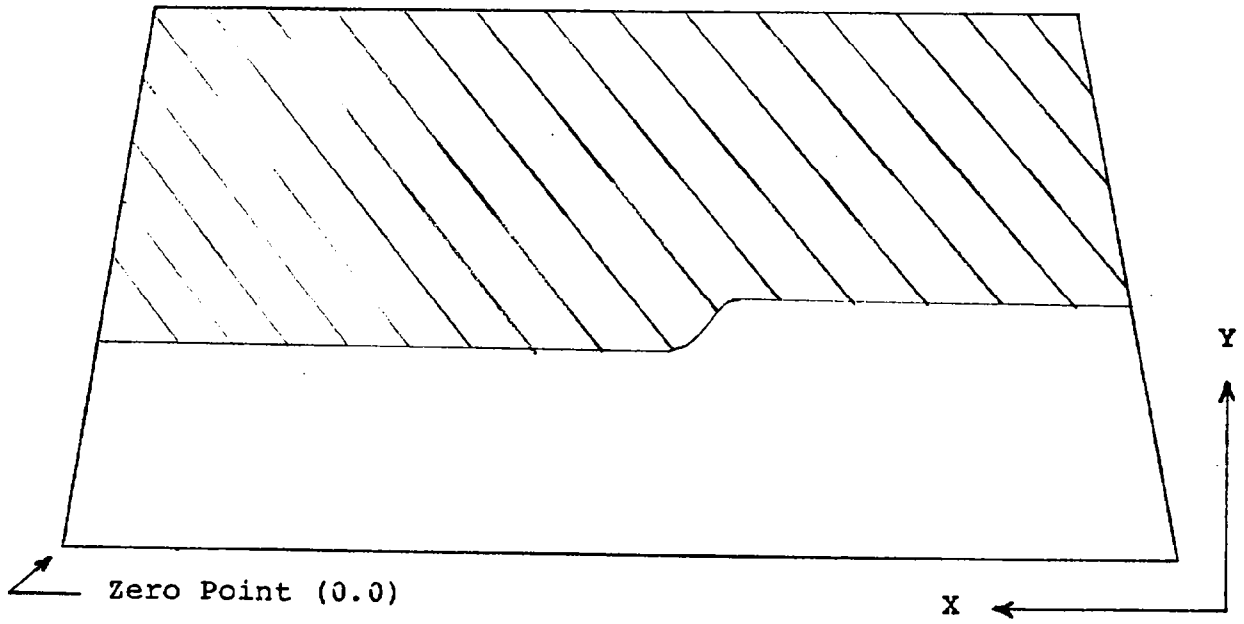
TABLE V

POST IMPACT SUMMARY

WINDSHIELD ZONE INTRUSION - FMVSS 219

Vehicle 1982 Ford EXP

NHTSA No. 820201 Test Date June 18, 1981



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 Ford EXP

NHTSA No. 820201 Test Date June 18, 1981

	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.	30 minutes	30 minutes

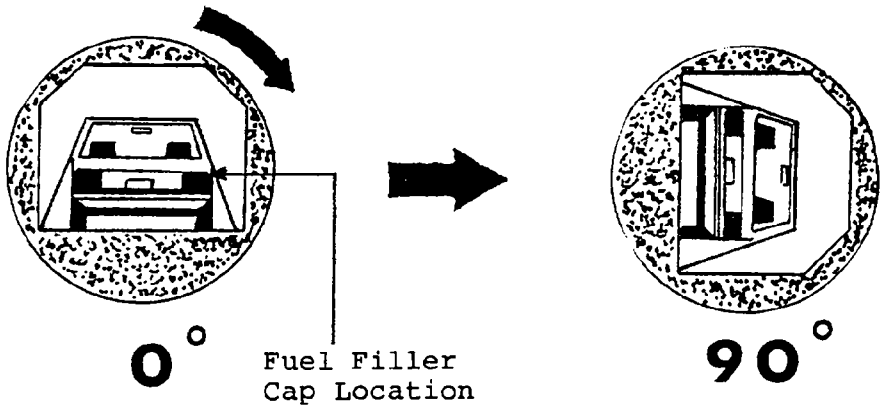
Fuel Spillage Location: Not Applicable

TABLE VII

FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Ford EXP NHTSA No. 820201



	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 13 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

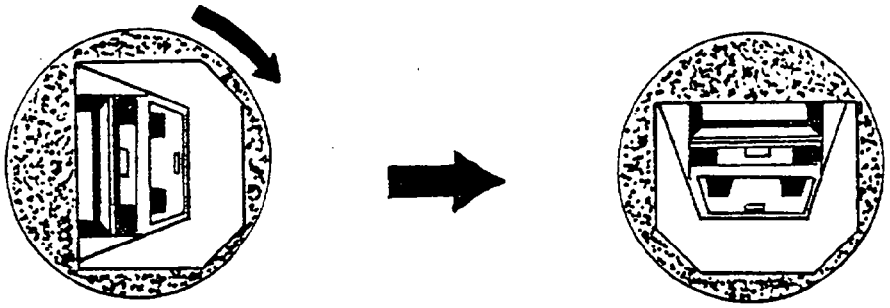
Fuel Spillage Location: Not Applicable

TABLE VIII

FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Ford Exp NHTSA No. 820201



	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	immeasureable	5 ounces
Fuel spillage during 6th minute period from onset of rotation	immeasureable	1 ounce
Fuel spillage during 7th minute period from onset of rotation	immeasureable	1 ounce

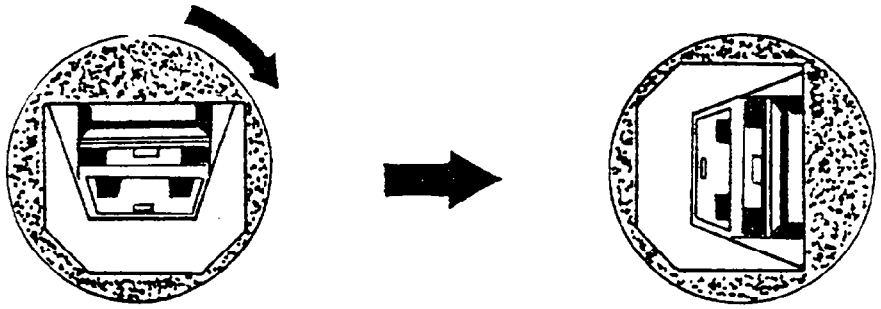
Fuel Spillage Location: Carburetor air cleaner assembly area

TABLE IX

FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Ford EXP NHTSA No. 820201



	Actual	Max. Allowed
Rollover fixture 90° rotation time	2 min. 18 sec.	1 to 3 Minutes
Fuel spillage during 5 minute period from onset of rotation	0.17 ounce	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

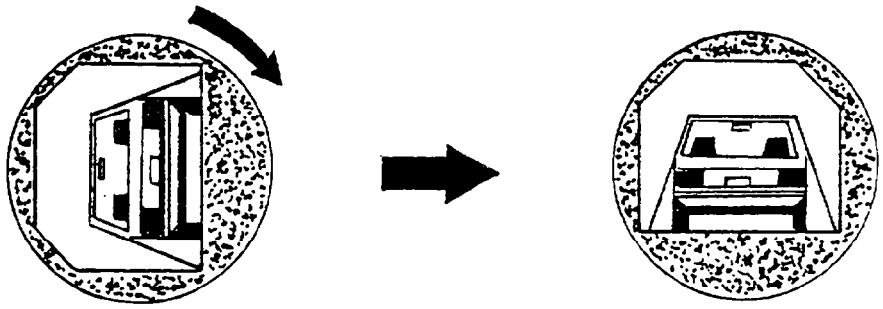
Fuel Spillage Location: Carburetor air cleaner assembly area

TABLE X

FUEL SYSTEM INTEGRITY - FMVSS 301-75

STATIC ROLLOVER

Vehicle 1982 Ford EXP NHTSA No. 820201



	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

SECTION 3

3.1 TEST RESULTS AND PHOTOGRAPHS

Post-impact inspection of the test vehicle revealed almost all crush occurred forward of the doors. The roof buckled over both left and right "A" and "B" post. The left and right frame rail buckled under the door and both "A" posts buckled above the cowl plane. 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 black trim moulding encompasses the windshield glass, retained in the body opening with body clips. Apparent adhesive is used between the body opening and the windshield glass.

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.

SECTION 3

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° test increment, however fuel spillage was noted emitting from the carburetor air cleaner assembly area during the 180° and 270° test increments. No other fuel spillage was recorded during the remaining rollover test increment time periods.

The 1982 Ford EXP - 3 Door Sporty Coupe test vehicle appears to comply with all the requirements of FMVSS 212/219/301-75.

Figure 3-1

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Windshield View

820201

Figure 3-2

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Windshield Template View

FMVSS

Figure 3-3

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Left Side View


NHTSA 820201
AETL
42
FMVSS
301 212 219

Figure 3-4

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Full Front View


NHTSA
820201
AETL
42
FMVSS
Ford

Figure 3-5

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Right Side View


NHTSA820201
FMVSS
301219212
AETL
42

Figure 3-6

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Windshield View

FMVSS
AETL
42
820201

Figure 3-7

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Left Side View


NHTSA 820201
AETL
42
FMVSS
301 212 219

Figure 3-8

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Full Front View


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Figure 3-9

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Right Side View


NHTSA 820201
FMVSS
301 219 212
AETL
42

Figure 3-10

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Rollover Test, 90° Increment

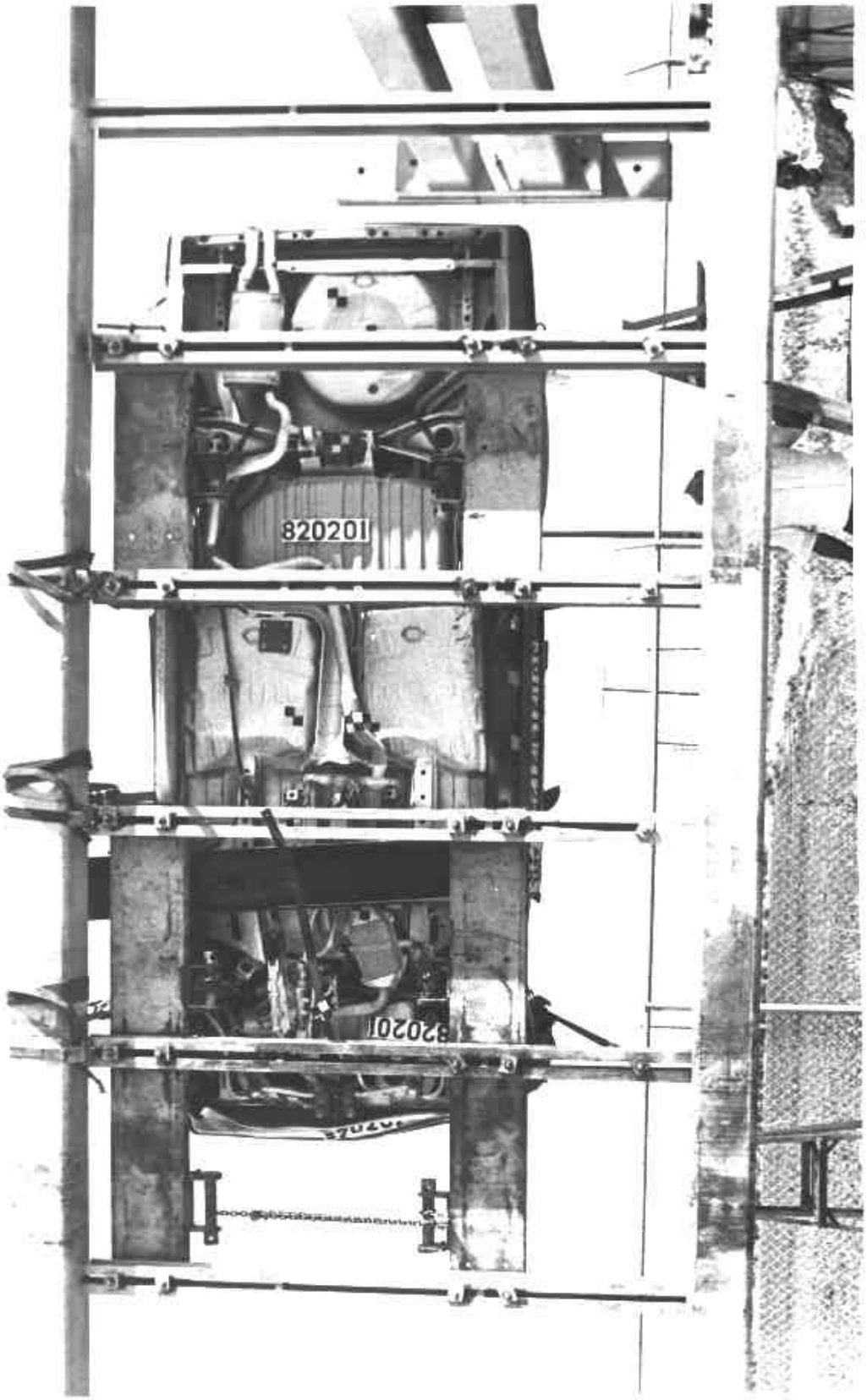
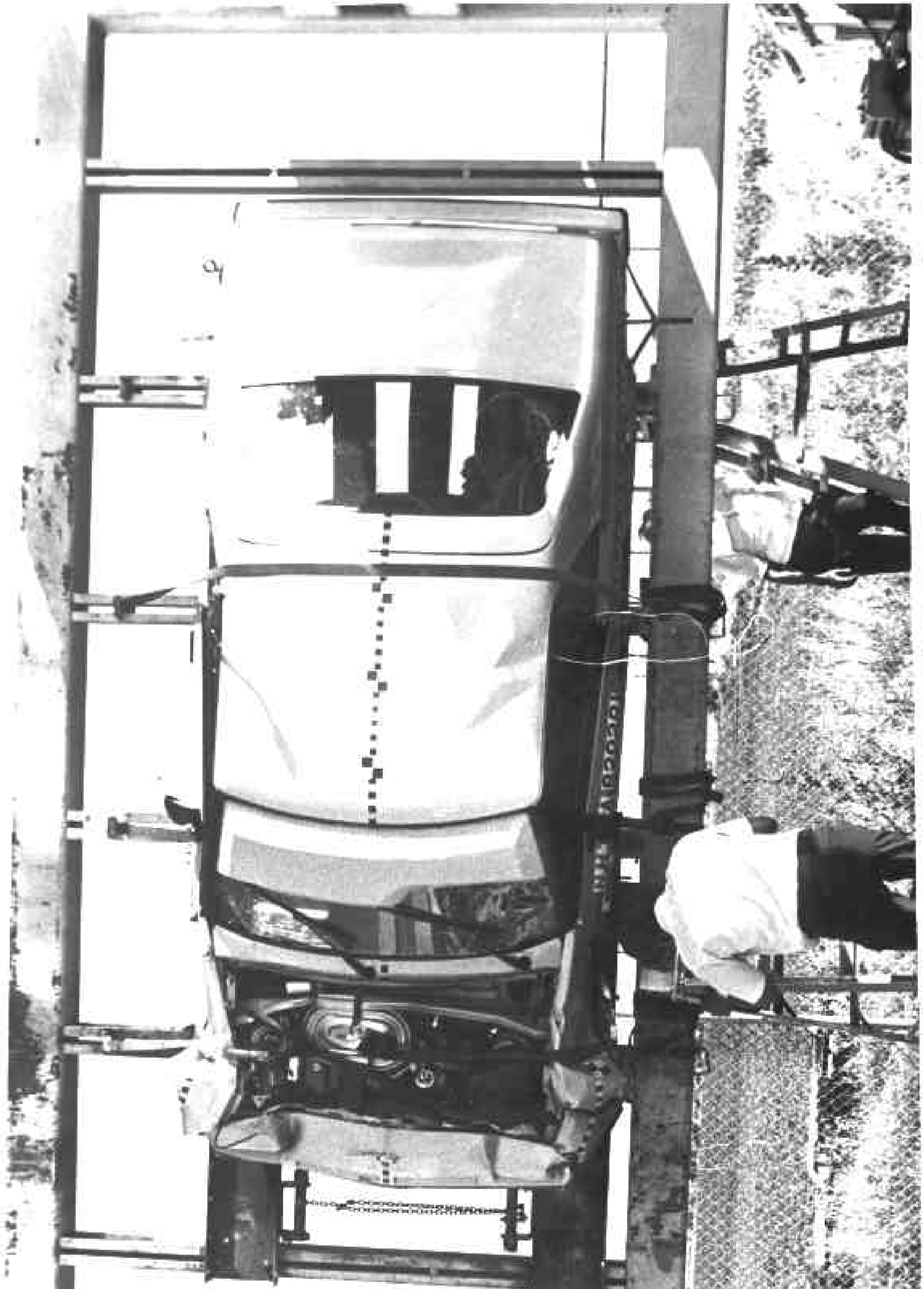

820201
82020

Figure 3-11

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Rollover Test, 270° Increment



SECTION 4

SECTION 4

4.0 OCCUPANT RESPONSE AND VEHICLE ACCELERATION SUMMARY DATA

The following data sheets summarize:

A. The Dummy Position Data (Part 572 Dummy In-Vehicle Position/Part 572 Dummy Pre-Test Clearence 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)

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

SECTION 4

The passenger dummy experienced a HIC value of 2668; in excess of the limit specified in FMVSS 208 injury criteria. All other values from both test dummies satisfy the FMVSS 208 requirements.

In addition to the occupant and vehicle data, 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 -4.0 inch and the passenger shoulder belt was +2.4 inch.

TABLE 4-1

PART 572 DUMMY IN-VEHICLE POSITION

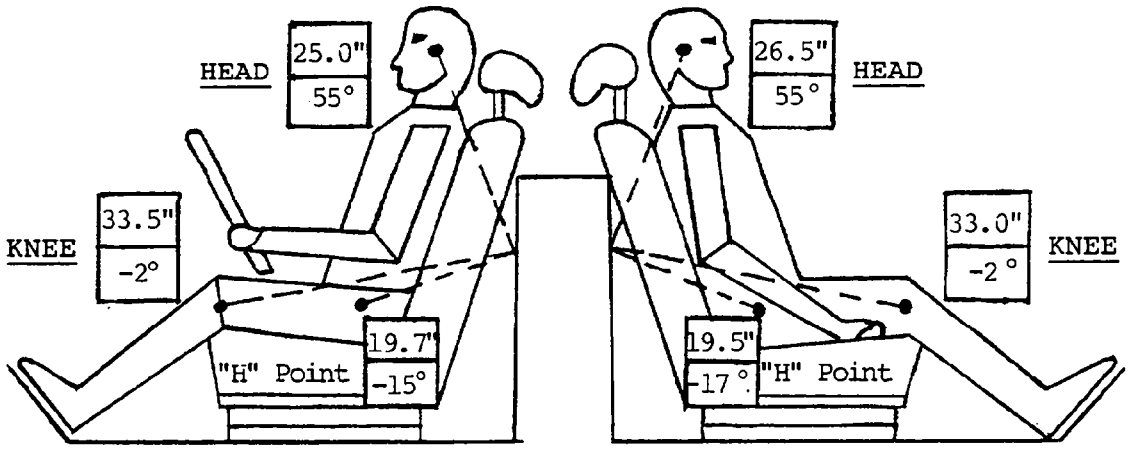
VEHICLE 1982 Ford EXP NHTSA NO. 820201

POSITIONING DATE: June 18, 1981 AMBIENT TEMP: 72 °F TIME 1717

SEAT TYPE: ____ Bench
X Bucket
____ Split Bench

ADJUSTER TYPE: X Manual
____ Power

BUCKET SEAT BACK TYPE: ____ Fixed
X Adjustable Reclining



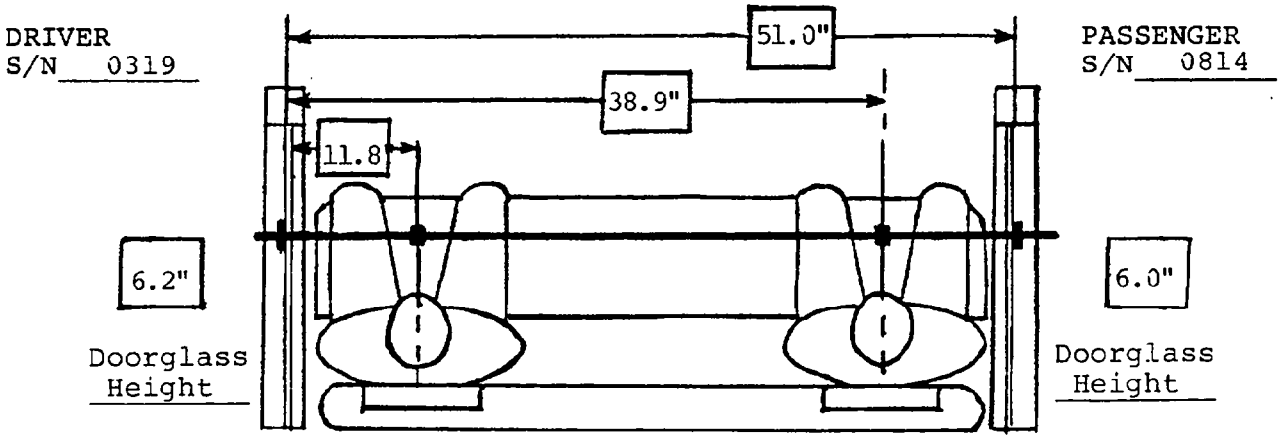


TABLE 4-2

PART 572 DUMMY PRE-TEST CLEARANCE DISTANCES

DRIVER

HH = 13.0 in.

HW = 17.5 in.

HR = 7.1 in.

HS = 8.0 in.

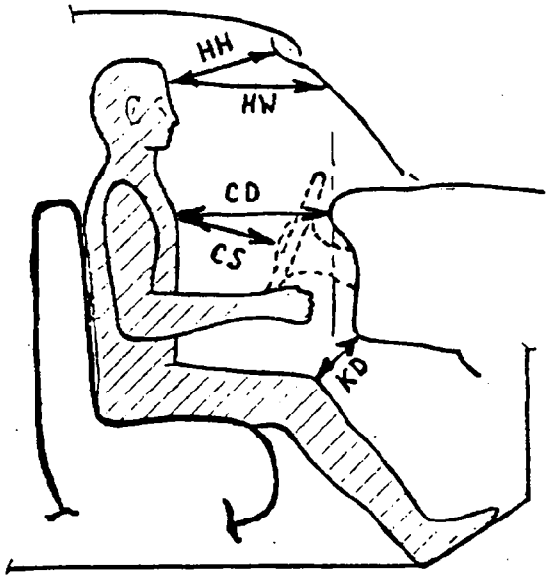
CD = 20.2 in.

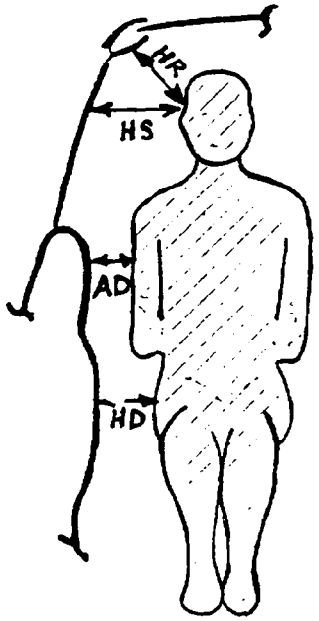
CS = 11.1 in.

AD = 2.6 in.

HD = 6.3 in.

KD = 4.5 in.





PASSENGER

HH = 9.9 in.

HW = 15.0 in.

HR = 7.0 in.

HS = 9.3 in.

CD = 18.6 in.

AD = 3.5 in.

HD = 5.4 in.

KD = 5.3 in.

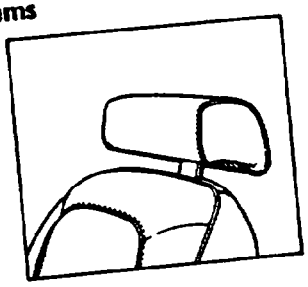
TABLE 4-3

MANUFACTURERS SEAT BELT INSTRUCTIONS

Occupant Restraint Systems

Head Restraints (Optional Low Back Seats)

Raise the head restraint by lifting up on it. Lower the head restraint by pressing down on it with enough force to overcome the retaining friction.



WARNING–Adjust the head restraint so that it is just behind your head and never behind your neck.

Continuous Loop Lap-Shoulder Belt System

Ford Motor Company recommends that you always "buckle up" for safety. In some areas seat belt use is required by law.

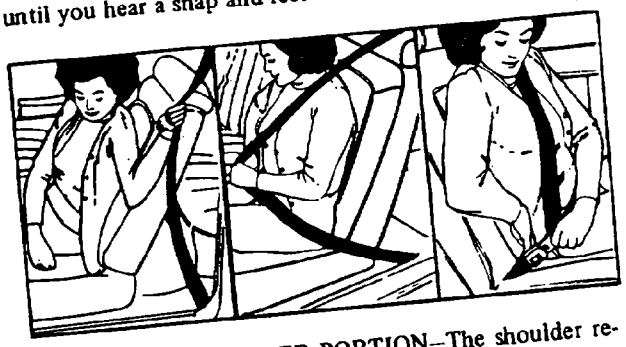
Your new vehicle is equipped with a Continuous Loop Lap-Shoulder Belt system for the front seat outboard occupants and a seat belt warning system for the driver's seating position (see illustration). For infants up to 20 lbs., approximately one year of age, we recommend the Ford Infant Carrier. For children 20 to 50 lbs., approximately one to five years of age, we recommend the Ford Tot-Guard (for details, see page 72). Both units are secured with front seat lap-shoulder belts. All other passengers should use the belts as provided.

Front Lap-Shoulder Belts

FASTENING BELTS–After entering your vehicle, adjust the front seat to obtain the best position for your driving comfort and visibility. Then use the following procedure for fastening belts.

GETTING TO KNOW YOUR VEHICLE

Pull the lap-shoulder belt from the retractor so that the shoulder portion of the belt crosses your shoulder and chest and insert the belt tongue into the proper buckle until you hear a snap and feel it latch.



ADJUSTING SHOULDER PORTION–The shoulder restraint portion of the belt adjusts automatically to a snug position. The inertia reel allows freedom of movement, locking tight only on hard braking or impacts of approximately 5 mph (8 km/h) or more. The reel cannot be made to lock by jerking on the webbing.

To relieve belt pressure on your shoulder after the belt is fastened, a shoulder harness comfort regulator is provided in the shoulder retractor. This regulator allows you to adjust your shoulder belt length for optimum comfort. This comfort regulator works like a window shade:

- The adjacent front door must be closed.
- Pull a minimum of 6 inches (150mm) of shoulder belt away from your body and release.
- Slowly pull the shoulder belt a few inches away from your body and release.
- If the desired setting is not achieved repeat the above procedure.

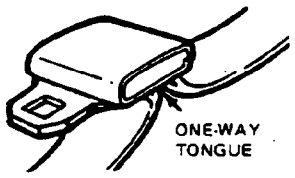
TABLE 4-3

MANUFACTURERS SEAT BELT INSTRUCTIONS

(Continued)

GETTING TO KNOW YOUR VEHICLE

WARNING—Never allow more slack than is required to insert a fist between the shoulder belt and the chest. Never wear the shoulder belt under the arm. This practice may reduce the retraint system effectiveness. Use shoulder belt on outside shoulder only. Never swing it around your neck over the inside shoulder.



The comfort regulator is designed to automatically release when the respective front door is opened. As the seat belt is unbuckled, it should be hand-guided back to the retractors to prevent the belt tongue from striking occupants or objects nearby during retraction.

ADJUSTING LAP PORTION—Adjust the lap portion of the belt across the hips (never across the waist). The lap portion of the belt adjusts automatically to a snug position when you allow the excess belt to return into the retractor.

WARNING—Never allow occupants to ride in the area behind the front seat.

TABLE 4-4

PART 572 DUMMY DATA

Vehicle 1982 Ford EXP NHTSA No. 820201

Driver S/N 0319 Passenger S/N 0814	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	5.0	189.0	160.8	73.0	6.8	204.0	70.2	84.2
Lateral	9.2	72.4	10.1	89.4	5.8	158.2	23.4	92.6
Vertical	14.1	74.0	62.5	78.2	16.0	204.6	172.4	84.2
Resultant	161.1	73.0			185.0	84.0		
HIC	745 (66 - 93 msec)				2668 (71 - 96 msec)			
CHEST ACCELERATION								
Longitudinal	2.9	127.0	51.4	87.0	6.8	204.4	51.4	83.2
Lateral	6.5	66.0	1.1	192.0	17.6	93.8	2.4	203.4
Vertical	14.2	61.2	5.1	47.8	11.0	77.6	22.0	95.0
Resultant	51.6	87.0			55.1	91.0		
CSI	389 (48.9 g - 3 msec clip)				717 (52.9 g - 3 msec clip)			
	(lb)	Time (msec)	(lb)	Time (msec)	(lb)	Time (msec)	(lb)	Time (msec)
FEMUR LOAD								
Left	53	199.8	857	59.8	149	55.6	320	37.4
Right	49	6.6	19	124.6	115	114.4	189	35.2
BELT LOAD								
Torso	1623	84.0			2262	83.2		
Lap	806	53.2			1467	62.8		

Average Vehicle Impact Speed 34.96 mph

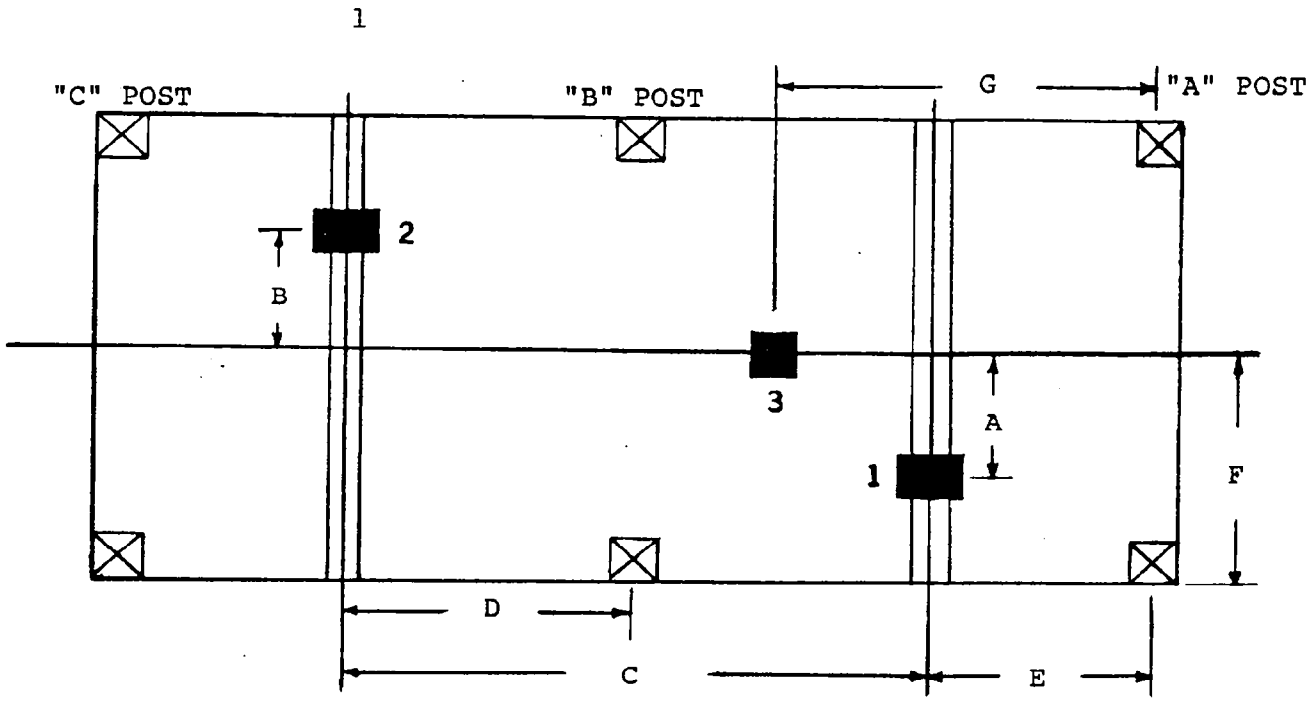
*Positive Direction - Longitudinal: Forward
Lateral: Leftward
Vertical: Upward
Femur: Tension

*Negative Direction - Longitudinal: Rearward
Lateral: Rightward
Vertical: Downward
Femur: Compression

TABLE 4-5

VEHICLE STRUCTURAL DATA

VEHICLE 1982 Ford EXP NHTSA NO. 820201



DIMENSIONS			
LOCATION	MEASUREMENT (IN.)	LOCATION	MEASUREMENT (IN.)
A	9.7	E	8.5
B	9.4	F	31.7
C	29.8	G	17.0
D	-4.8		

ACCELERATION PEAKS				
ACCELEROMETER LOCATION	POSITIVE* DIRECTION		NEGATIVE* DIRECTION	
	PEAK "G"	TIME (MSEC)	PEAK "G"	TIME (MSEC)
NO. 1 LONGITUDINAL	13.0	59.6	81.5	43.2
NO. 2 LONGITUDINAL	3.1	154.0	39.5	63.0
NO. 3 LONGITUDINAL	72.1	40.2	144.3	38.2

*POSITIVE - LONGITUDINAL: FORWARD DIRECTION

*NEGATIVE - LONGITUDINAL: REARWARD DIRECTION

TABLE 4-6

PRE-TEST

VEHICLE MEASUREMENT DATA

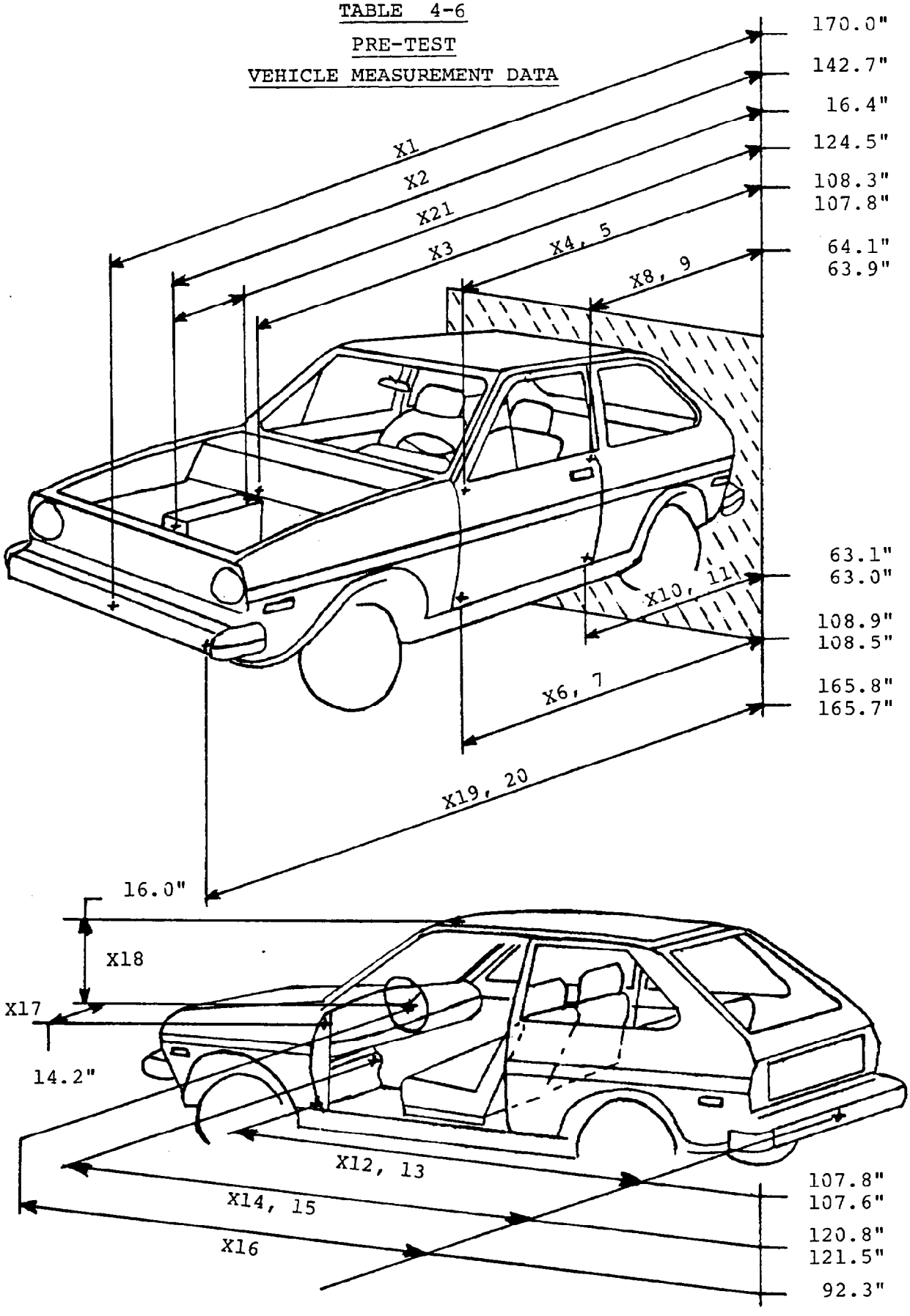


TABLE 4-7

POST-TEST

VEHICLE MEASUREMENT DATA

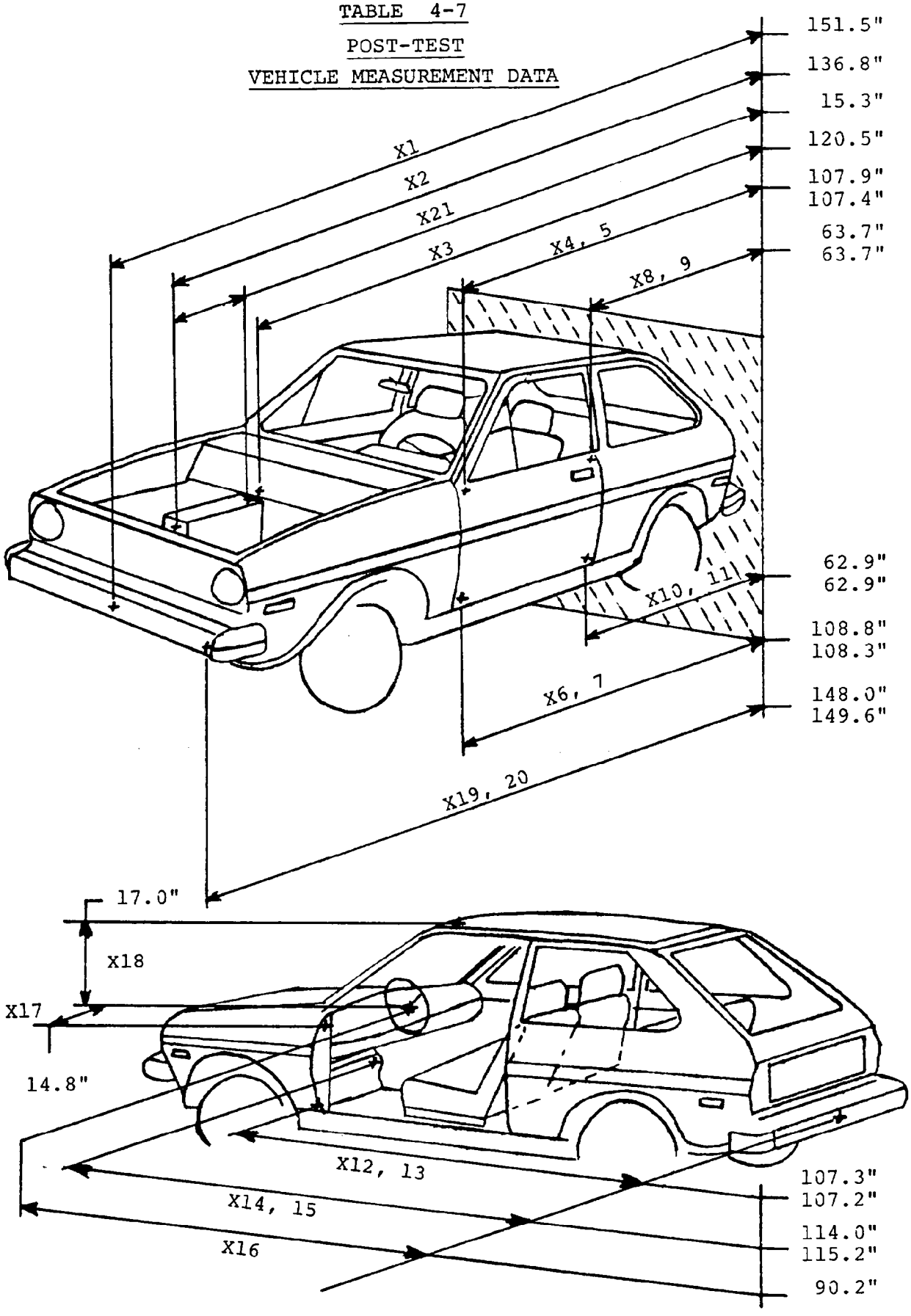


TABLE 4-8

SUMMARY

PRE-TEST AND POST-TEST VEHICLE DIMENSIONS

Measurement Point	Pre-Test	Post-Test	Difference
X1	170.0"	151.5"	18.5"
X2	142.7"	136.8"	5.9"
X3	124.5"	120.5"	4.0"
X4	108.3"	107.9"	0.4"
X5	107.8"	107.4"	0.4"
X6	108.9"	108.8"	0.1"
X7	108.5"	108.3"	0.2"
X8	64.1"	63.7"	0.4"
X9	63.9"	63.7"	0.2"
X10	63.1"	62.9"	0.2"
X11	63.0"	62.9"	0.1"
X12	107.8"	107.3"	0.5"
X13	107.6"	107.2"	0.4"
X14	120.8"	114.0"	6.8"
X15	121.5"	115.2"	6.3"
X16	92.3"	90.2"	2.1"
X17	14.2"	14.8"	+0.6"
X18	16.0"	17.0"	+1.0"
X19	165.8"	148.0"	17.8"
X20	165.7"	149.6"	16.1"
X21	16.4"	15.3"	1.1"

TABLE 4-9
FMVSS 212/219/301-75
CAMERA POSITIONS

VEHICLE 1982 Ford EXP

NHTSA NO. 820201 TEST DATE June 18, 1981

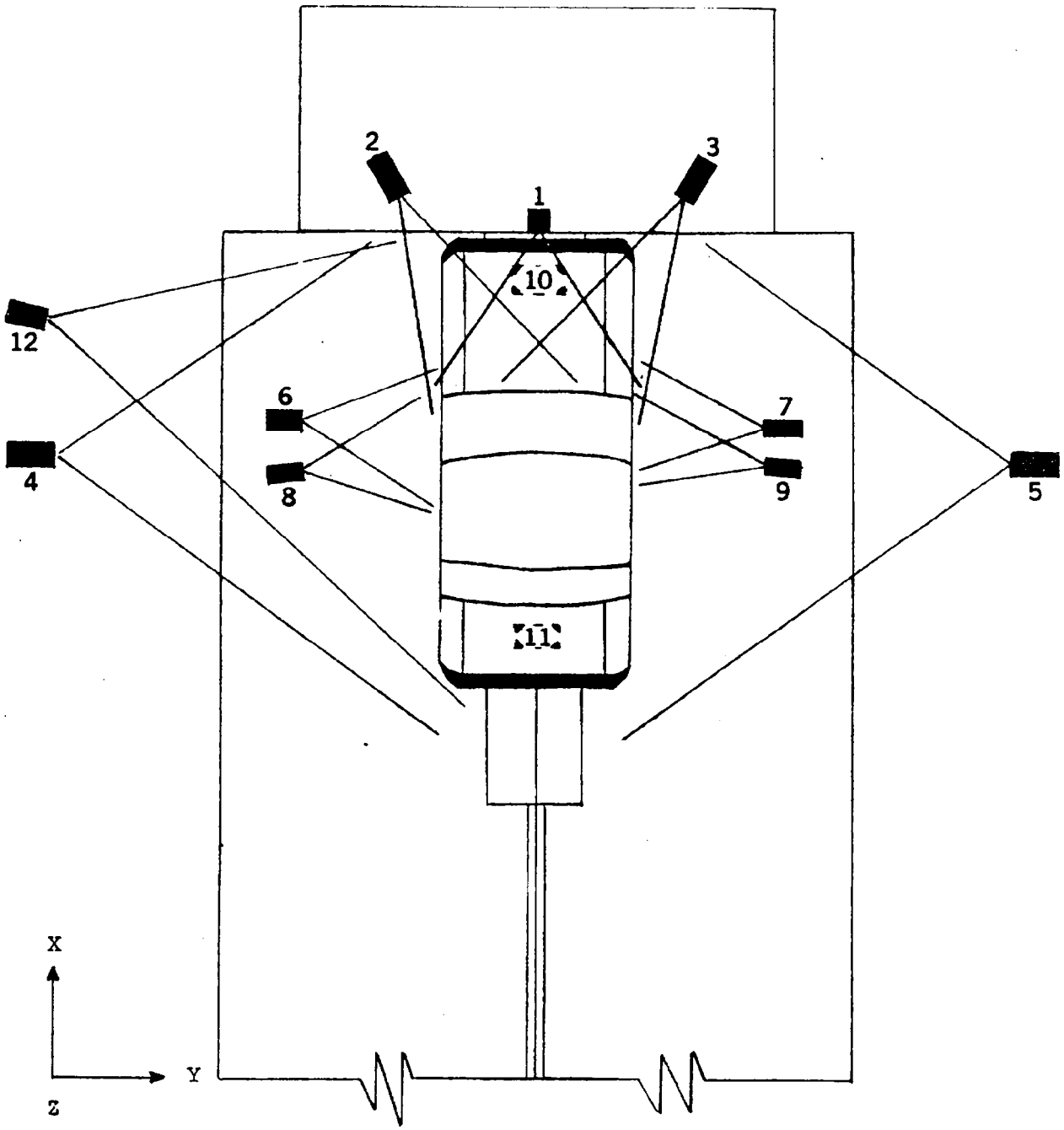


TABLE 4-10
FMVSS 212/219/301-75
CAMERA POSITIONS

VEHICLE 1982 Ford EXP

NHTSA NO. 820201 TEST DATE June 18, 1981

1.	Photo-Sonics 13mm 500FPS	X 11.0" Y - 0 - Z 238.0"	2.	Photo-Sonics 13mm 500FPS	X -9.0" Y 2.0" Z 96.0"
3.	Hycam 10mm 500FPS	X -20.0" Y 12.0" Z 110.0"	4.	Photo-Sonics 25mm 500FPS	X 61.0" Y 475.0" Z 41.0"
5.	Photo-Sonics 13mm 500FPS	X 42.0" Y 192.0" Z 49.0"	6.	Locam 12.5mm 500FPS Dummy Head	X 82.5" Y 108.5" Z 61.0" 94.0"
7.	Photo-Sonics 13mm 500FPS Dummy Head	X 97.0" Y 106.5" Z 57.0" 91.0"	8.	Photo-Sonics 13mm 500FPS Dummy Head	X 90.5" Y 109.5" Z 59.0" 94.5"
9.	Locam 12.5mm 500FPS Dummy Head	X 106.0" Y 103.5" Z 59.0" 89.0"	10.	Photo-Sonics 13mm 500FPS	X 3.0" Y 4.5" Z -44.0"
11.	Photo-Sonics 13mm 500FPS	X 168.0" Y 7.0" Z -42.0"	12.	Canon Scoopic 12.5 - 75mm 24FPS - Documentary -	

SECTION 5

SECTION 5

5.0 TEST FACILITIES AND EQUIPMENT

Approved Engineering Test Laboratories (AETL) 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.

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. synchrouous 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

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.

5.2 OBLIQUE ANGLE COLLISION BARRIER

5.2.1 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.

5.2.2 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.

5.3 MOVING COLLISION BARRIER

5.3.1 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.

5.3.2 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 symetrical structure. A camera boom extends above the barrier face plane to provide a view of barrier to vehicle impact. The barrier assembly weighs 3,977 pounds and has a four wheel electric brake system.

SECTION 5

5.4 VEHICLE STATIC ROLLOVER MACHINE

5.4.1 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.

5.4.2 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.

5.5 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

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

5.6 PHOTOGRAPH COVERAGE

5.6.1 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.

5.6.2 FIXED BARRIER IMPACT TEST

Motion picture coverage of the event employs eight (8) 16mm 1B Photo-Sonics cameras and two (2) 16mm 51 Redlake Locam cameras and one (1) 16mm 41 Redlake Hycam camera 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 their field of view concentrating on the windshield area (FMVSS 212/219). The fourth and fifth camera each have a side view of the test vehicle at impact. The sixth, seventh, eight, and ninth camera are located adjacent to the test vehicle front passenger compartment and positioned to photograph motion of each test dummy at impact. The tenth and eleventh camera are located in the pit and positioned to photograph the underside of the engine compartment and fuel tank area.

5.6.3 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 camera each have a side view of the test vehicle at impact.

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

5.6.4 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 adge. 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

5.7 DATA ACQUISITION AND REDUCTION

The data acquisition and analysis system used for acquiring occupant response and vehicle acceleration 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 on 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 data analog devices including the FM magnetic tape recorders. The moment of impact trigger switch attached to the vehicle is 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 predigitizing filter capability of 48 db/octave above 1250 Hz.

SECTION 5

The DFA is a hard disc based system with standard HP design software for performing data acquisition and analysis functions. The HP software is programmed using direct keyboard functions 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 and passenger tape recorder groups to facilitate simultaneous data acquisition for the head, chest and vehicle accelerometers to assure appropriate calibration of injury criteria and vehicle dynamics. At the time of entry, test personnel enter the appropriate calibration for each data channel and the computer then scales the data appropriately. When all data has been acquired it is moved as a vehicle set to permanent storage on a removable magnetic disc. (Nine vehicle sets are stored on each magnetic disc. All magnetic discs and FM recorder tapes are retained on file at AETL).

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 (1250 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-

priate label and vehicle designation. As the data is recalled, the DFA is programmed to automatically filter 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 Fast Fourier Transform (FFT) of the data, frequency domain multiplication, and 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. 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. The modification of class 1000 data, by predigitizing filter, is attenuation of 48 db/octave above

1250 Hz instead of 24 db/octave above 1650 Hz. Examination of typical class 1000 data shows the high frequency components between 1250 Hz and 1650 Hz are uniformily less than 3 percent of the largest components at lower frequencies. The effect of the predigitizing filter has a very slight smoothing of the plotted data.

Class 60 filters are applied to the vehicle acceleration and belt restraint forces, while the class 180 filter is applied to the chest acceleration forces. The class 600 filter is applied to the femur forces and class 1000 filter is applied to the head acceleration forces.

5.7.1 IMPACT DATA

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

5.7.1.2 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 interations 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. Listing of data value and HIC calculations are available, but not provided in the final report.

5.7.1.3 DUMMY CHEST DATA

The dummy chest accelerations are processed as class 180 data, and direct 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 the form of computer plots with the 3 ms clip calculations.

5.7.1.4 FEMUR LOAD DATA

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

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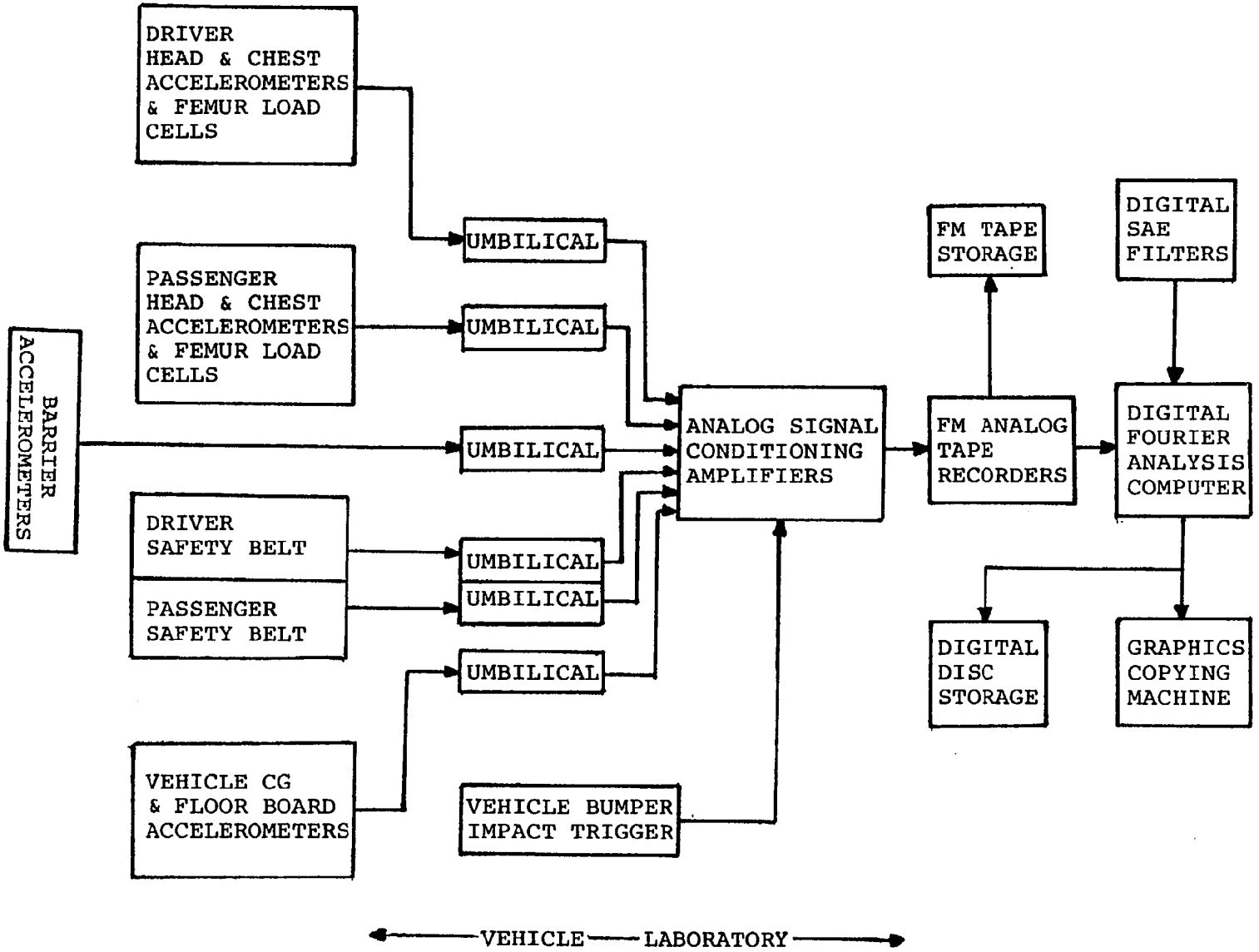
5.7.1.5 RESTRAINT LOAD DATA

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

5.7.1.6 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.



VEHICLE AND OCCUPANT CRASH IMPACT DATA ACQUISITION SYSTEM

FIGURE 5-1

TABLE 5-1 INSTRUMENTATION FOR CRASH TEST

Instrument	Manufacturer	Model No.	Full Scale	Accuracy	Frequency Max.
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	AETL	-	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	-	-

TABLE 5-2

DATA ACQUISITION AND REDUCTION PROCESS

STEP	DESCRIPTION
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 b) Data digitized at 200 ms sample rate c) Data sychronized by impact trigger signal
7	Digitized Data Examined
8	Data Transfered Permanent Disc Storage
9	Appropriate SAE Filters Are Applied
10	Each Data Signal Plotted With Lables
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

DATA SET	TAPE NO.	CHANNEL NO.	DESCRIPTION
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
3	1	12	Vehicle Longitudinal CG 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

DOT CRASH PROGRAM APPROVED ENGINEERING TEST LABS

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

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

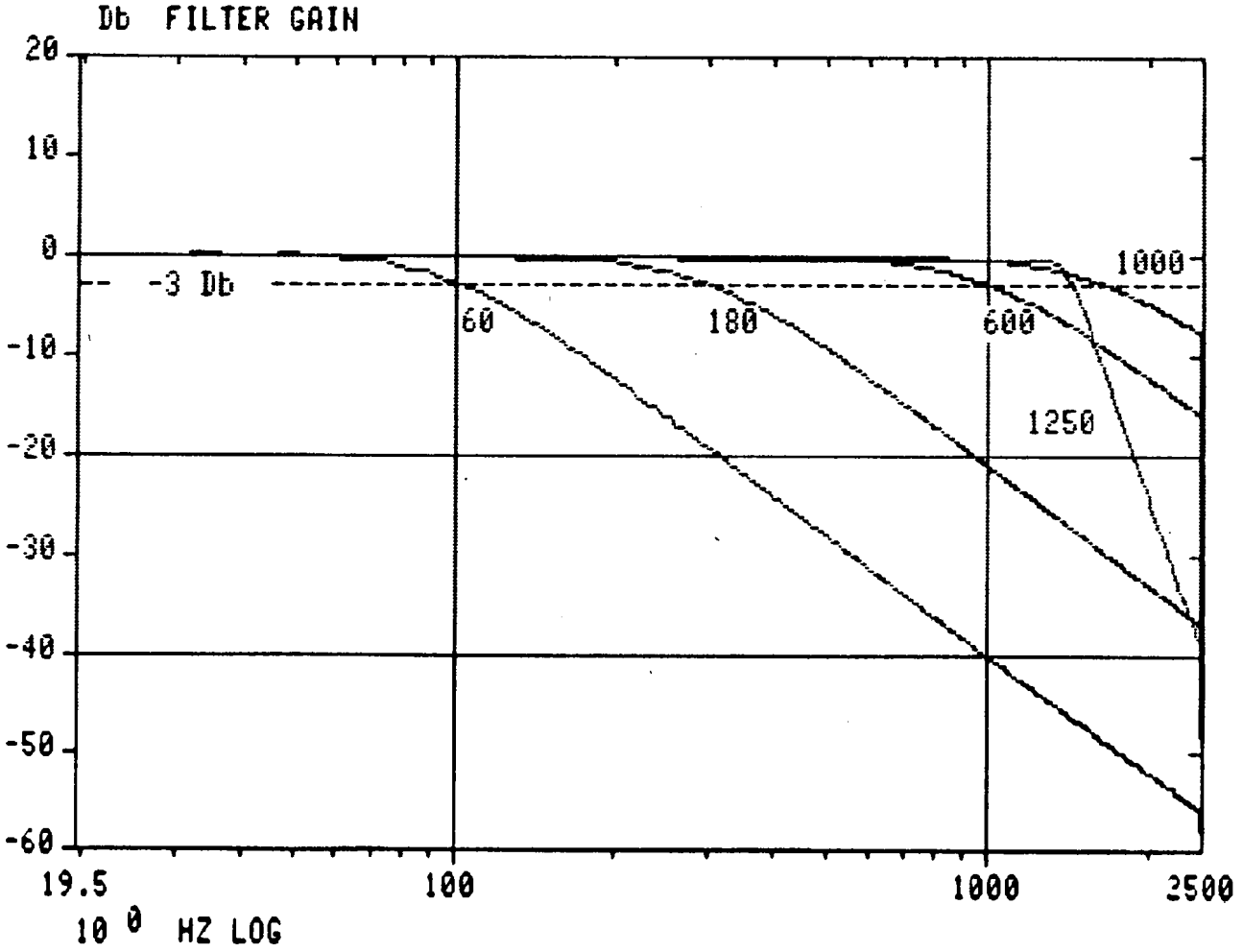


FIGURE 5-2

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 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Driver Dummy View

820201

Figure A-2

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Pre-Test, Passenger Dummy View


820201

Figure A-3

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Driver Dummy View


820201

Figure A-4

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Driver Dummy Contact Area

Figure A-5

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Passenger Dummy View


201

Figure A-6

1982 Ford EXP - 3 Door Sporty Coupe

NHTSA 820201

Post-Impact, Passenger Dummy Contact Area

APPENDIX B

APPENDIX B

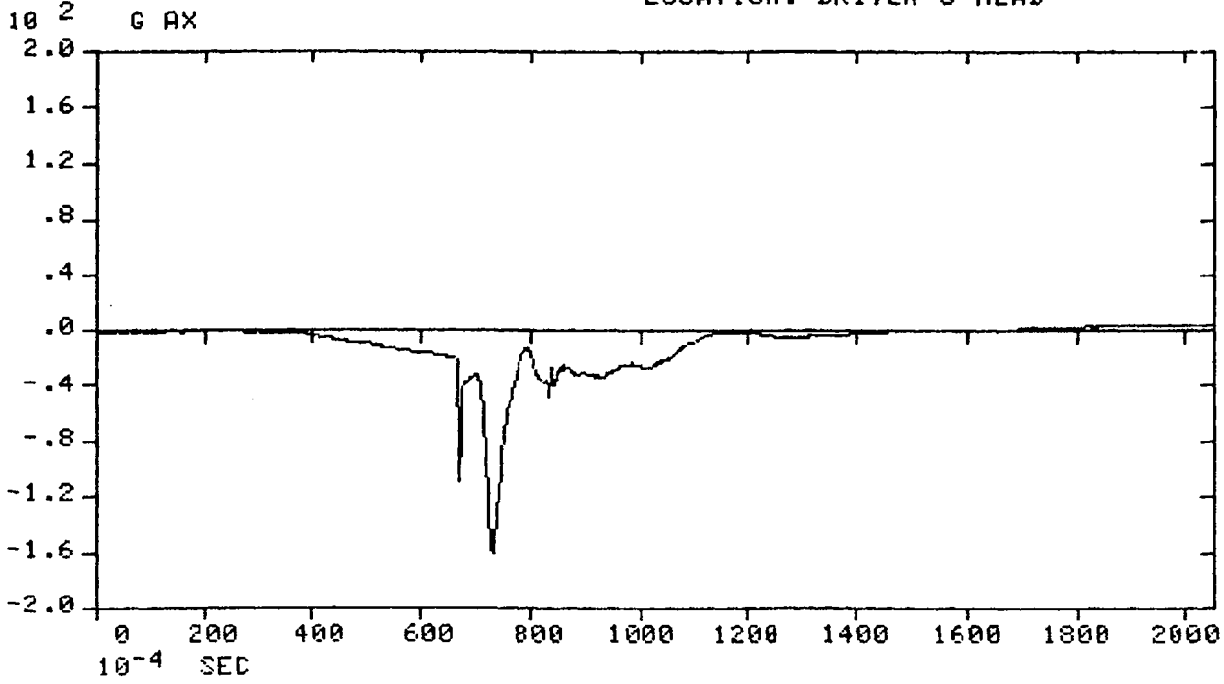
The following computer plots provide complete and comprehensive occupant response and vehicle acceleration during the frontal fixed barrier impact test of a 1982 Ford EXP - 3 Door Sporty Coupe - NHTSA 820201.

DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH 1
DIRECTION: FORWARD
LOCATION: DRIVER'S HEAD

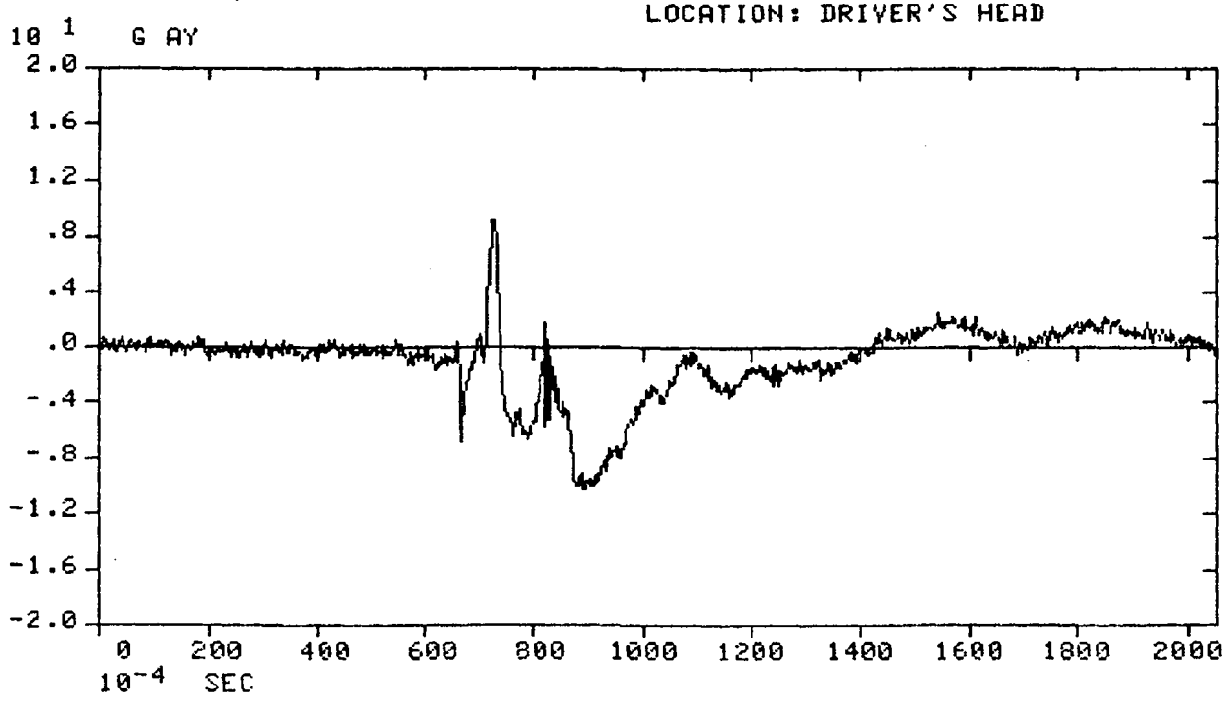


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER : CLASS 1000
ACCELEROMETER: TAPR 1, CH 2
DIRECTION: LEFT
LOCATION: DRIVER'S HEAD

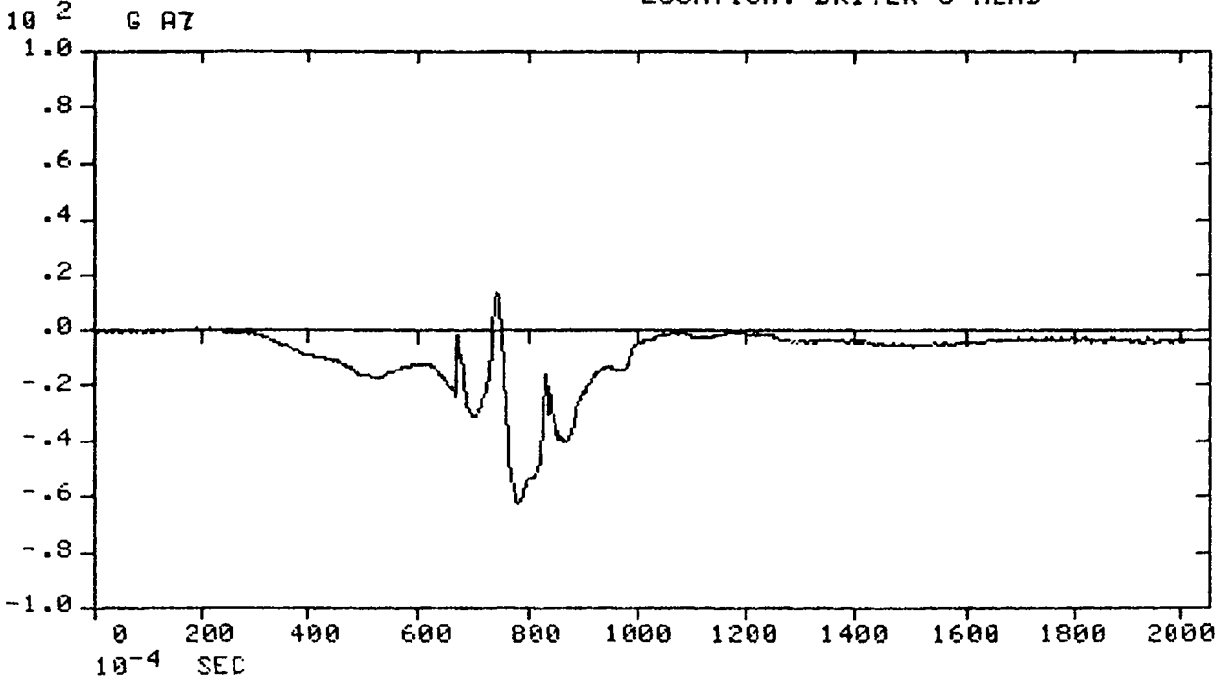


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH3
DIRECTION: UPWARD
LOCATION: DRIVER'S HEAD

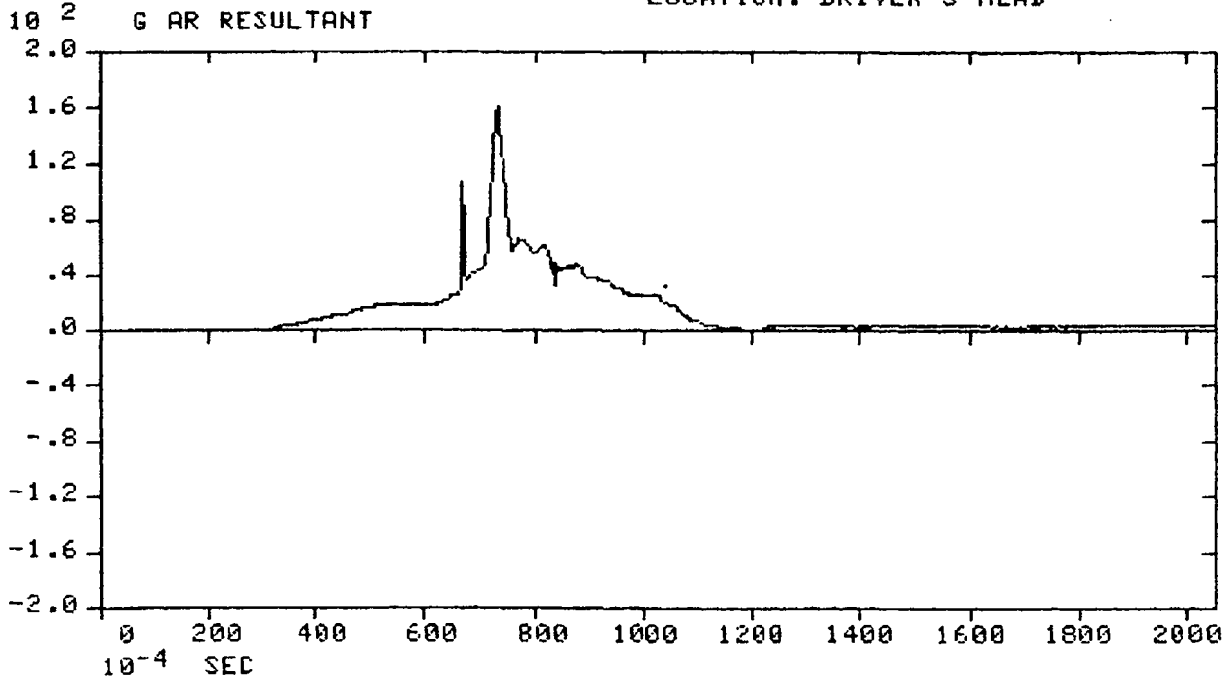


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH 1-3
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S HEAD

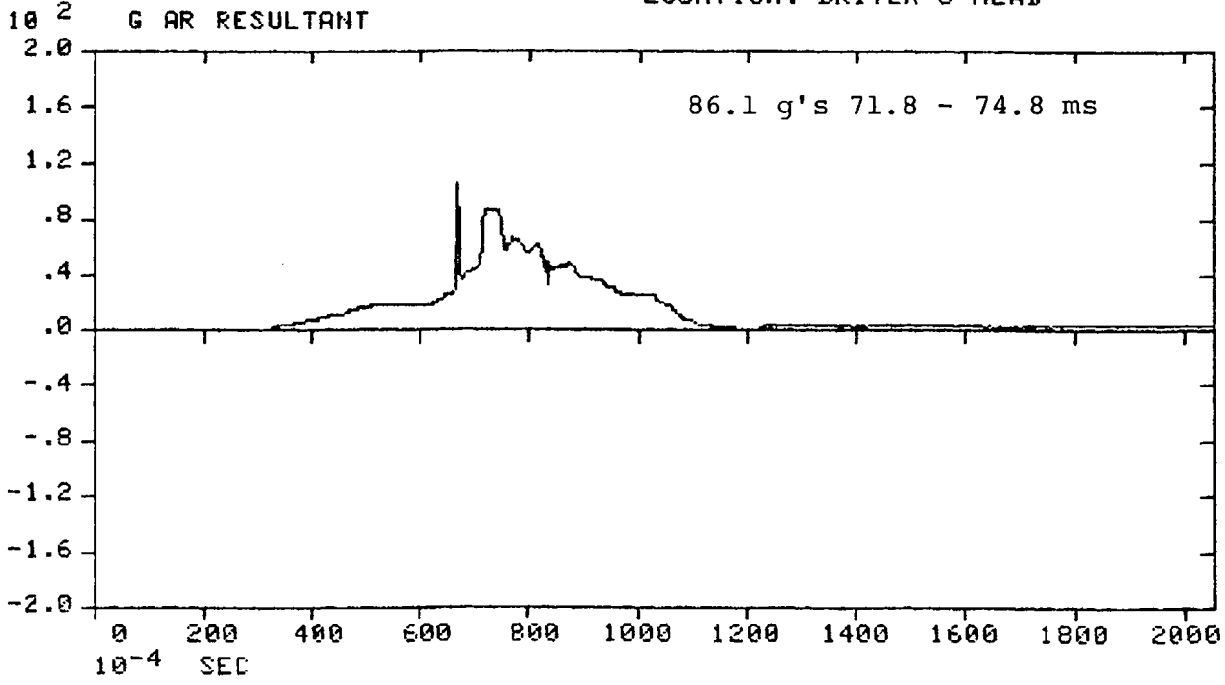


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 1, CH 1-3
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S HEAD

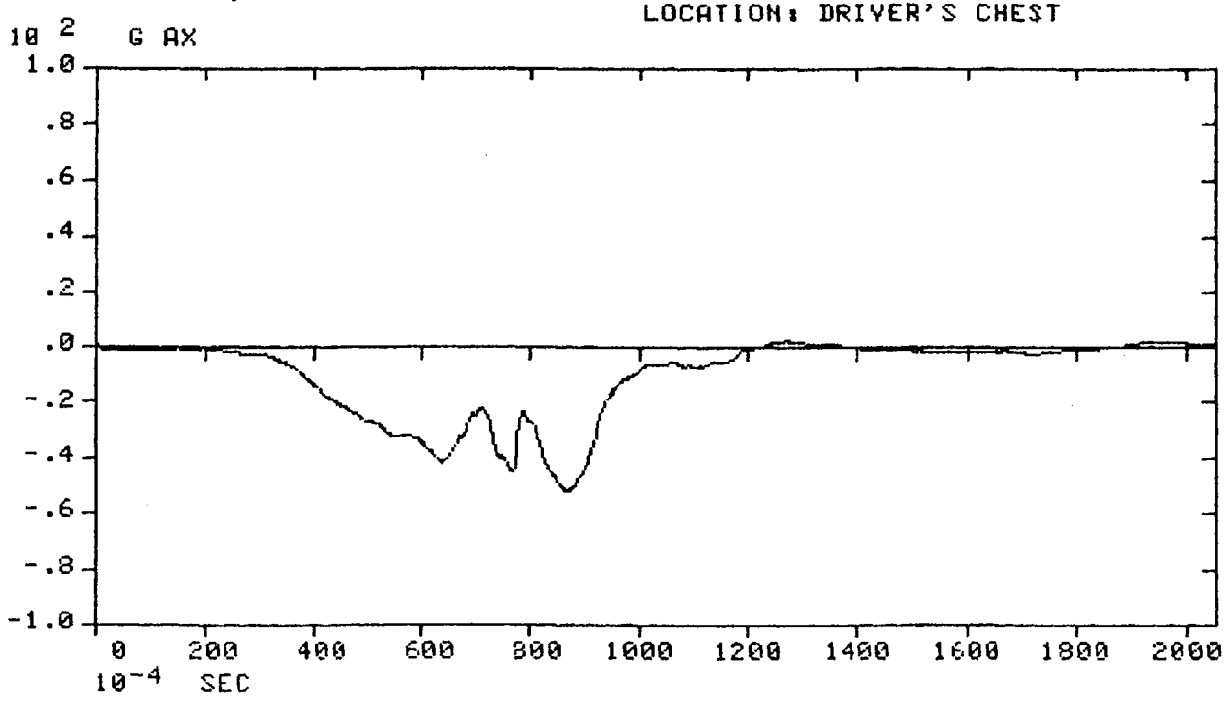


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 5
DIRECTION: FORWARD
LOCATION: DRIVER'S CHEST

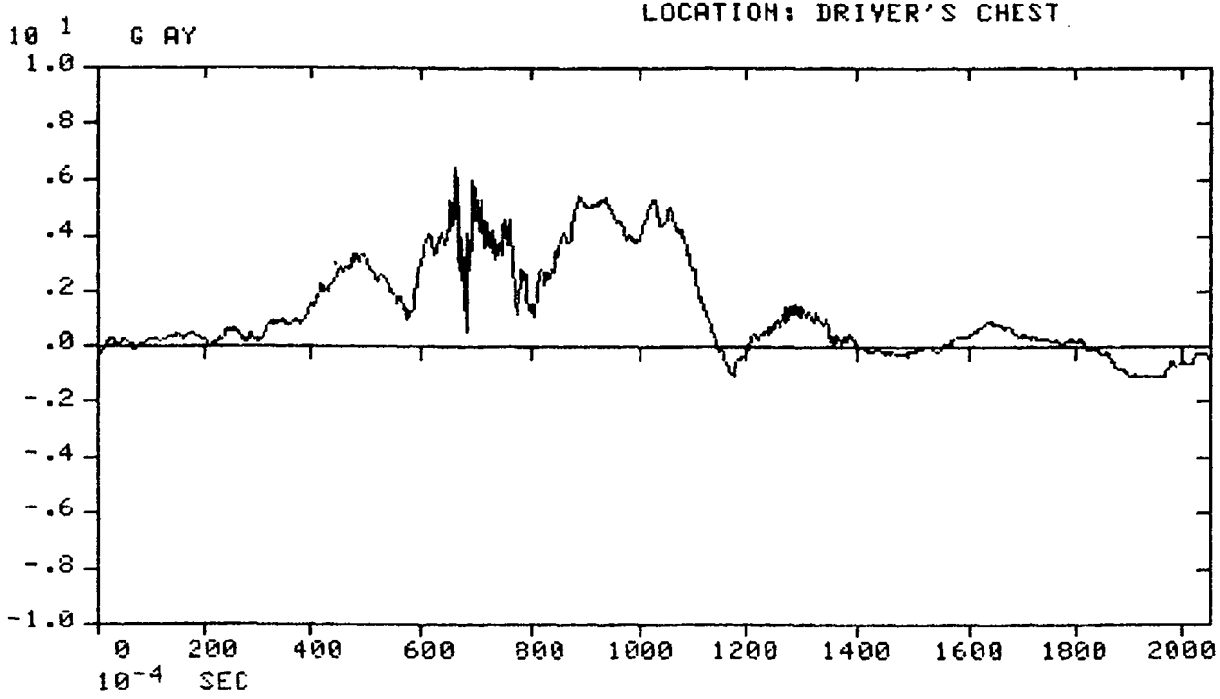


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 6
DIRECTION: LEFT
LOCATION: DRIVER'S CHEST

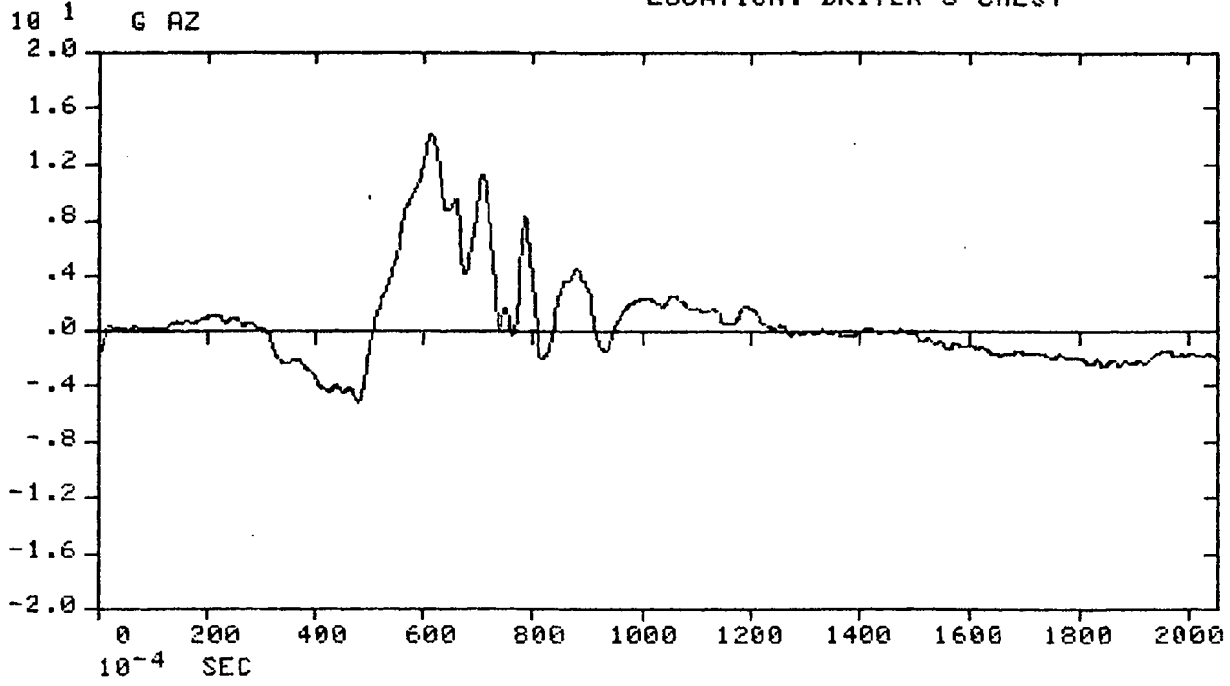


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 7
DIRECTION: UPWARD
LOCATION: DRIVER'S CHEST

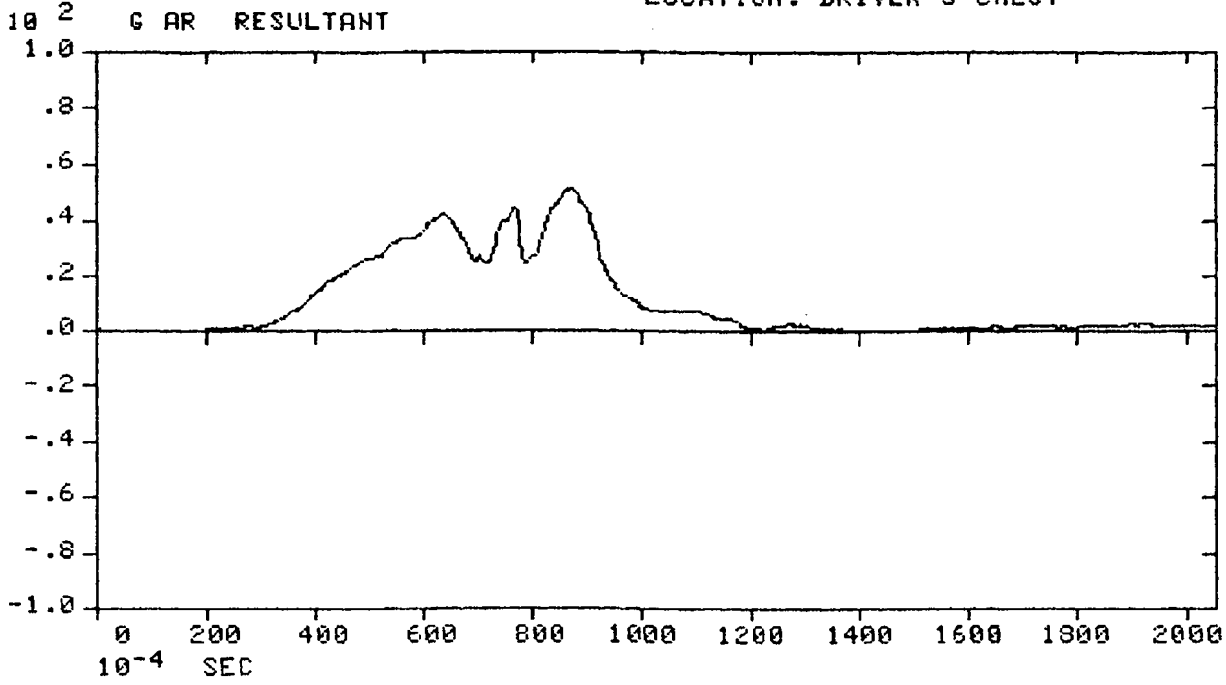


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 5-7
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S CHEST

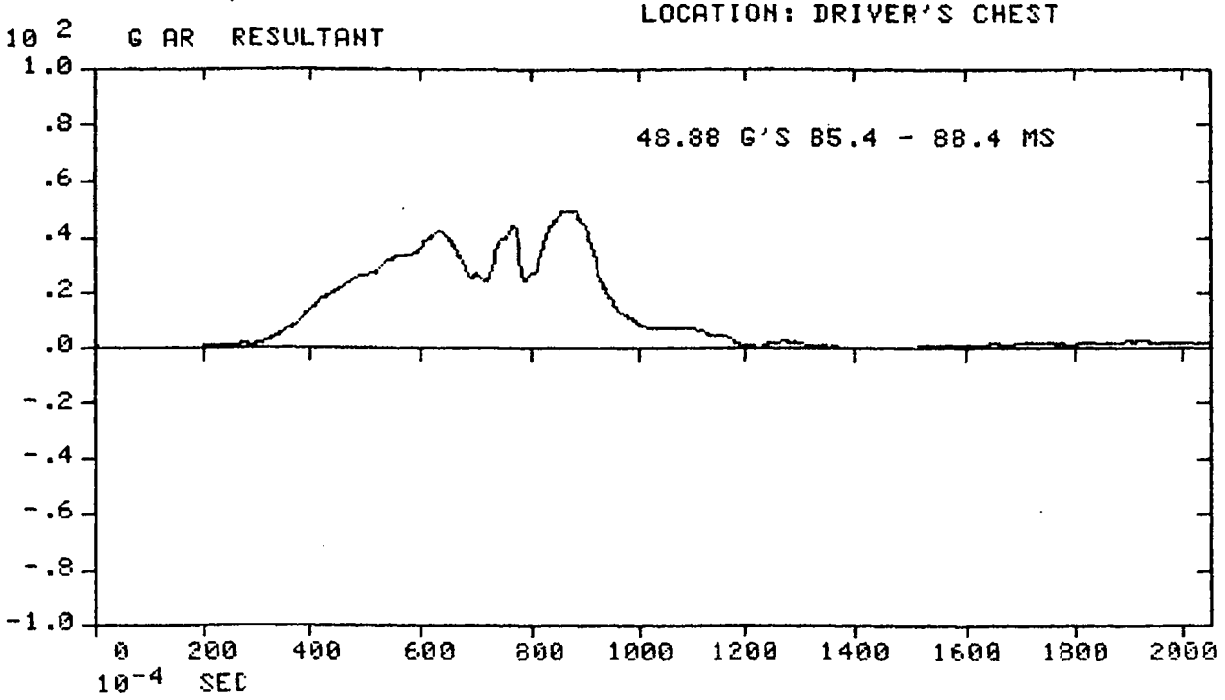


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 1, CH 5-7
DIRECTION: RESULTANT OF XYZ
LOCATION: DRIVER'S CHEST

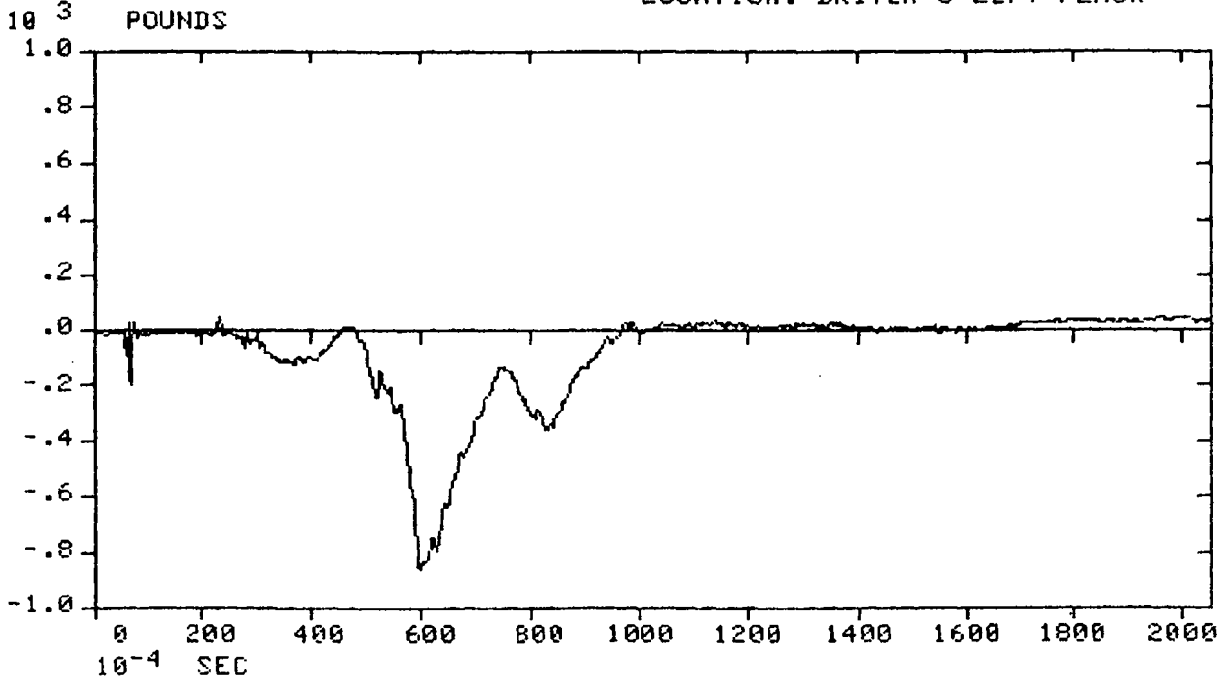


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 600
LOAD CELL: TAPE 1, CH 8
DIRECTION: TENSION
LOCATION: DRIVER'S LEFT FEMUR

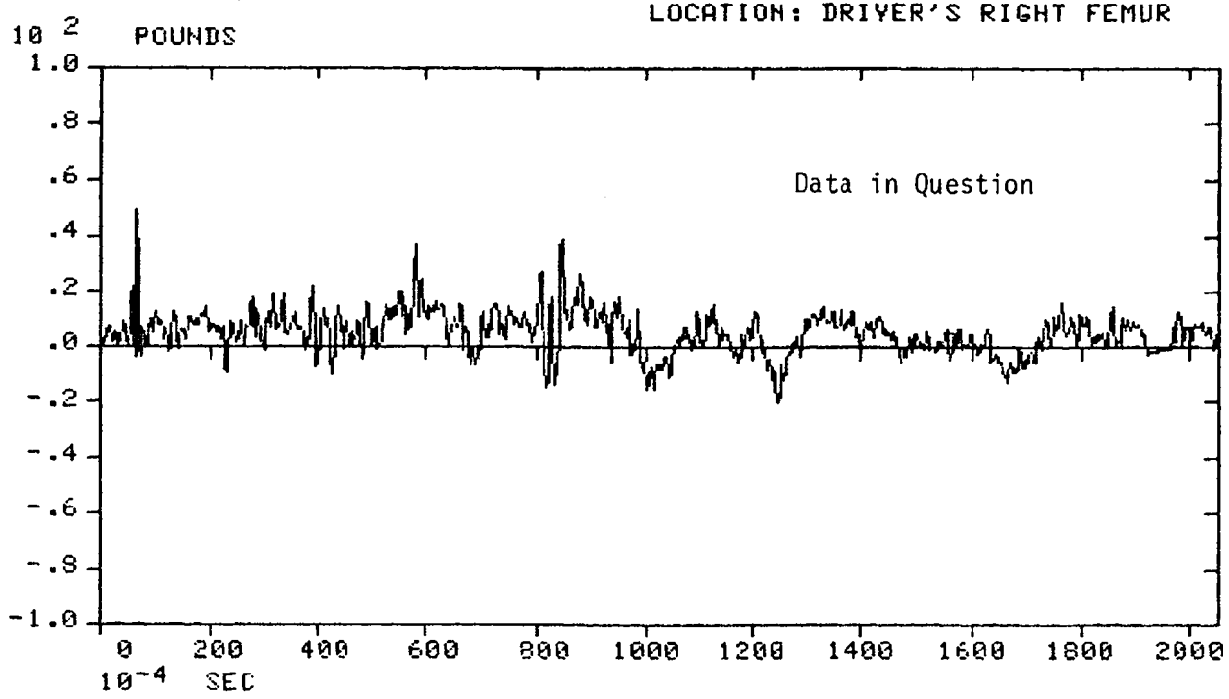


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 600
LOAD CELL: TAPE 1, CH 4
DIRECTION: TENSION
LOCATION: DRIVER'S RIGHT FEMUR

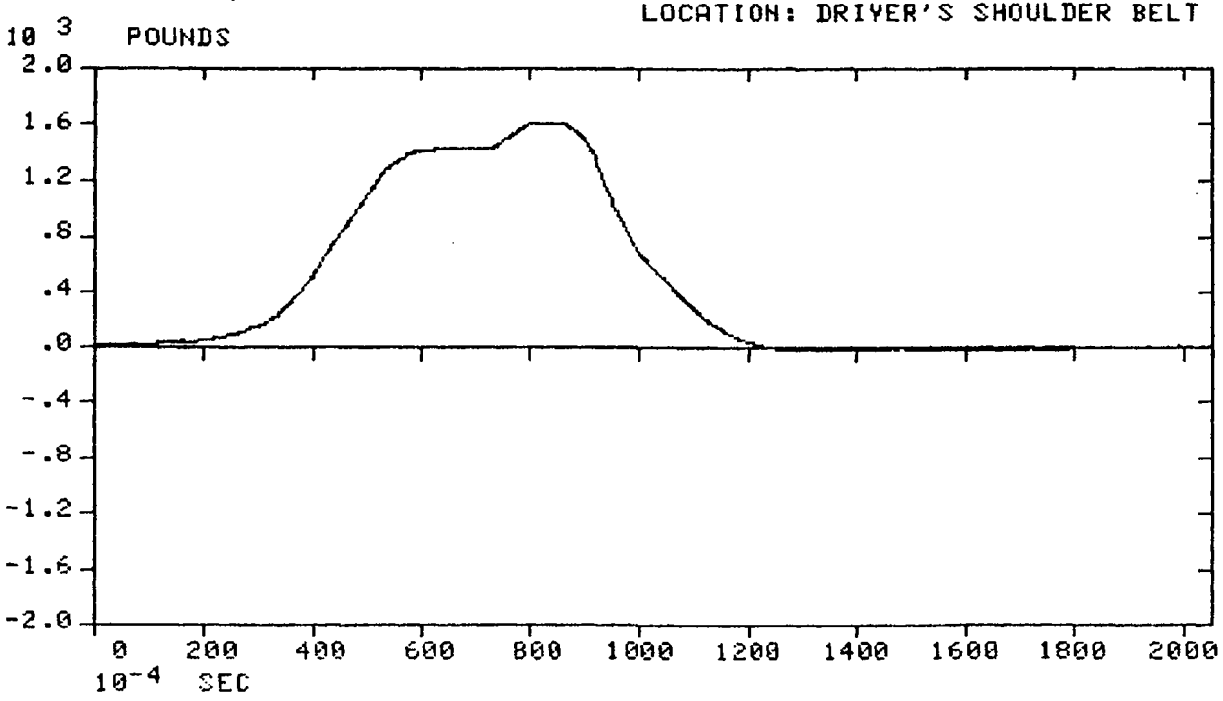


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
LOAD CELL: TAPE 1, CH 9
DIRECTION: TENSION
LOCATION: DRIVER'S SHOULDER BELT

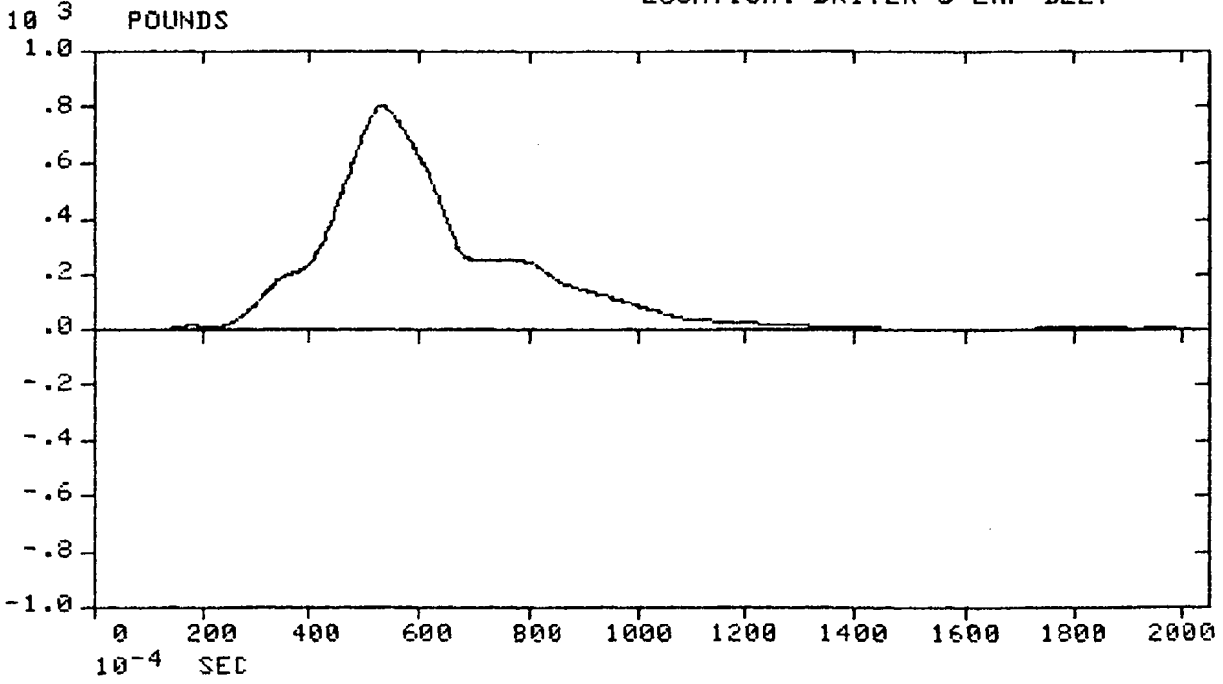


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
LOAD CELL: TAPE 1, CH 10
DIRECTION: TENSION
LOCATION: DRIVER'S LAP BELT

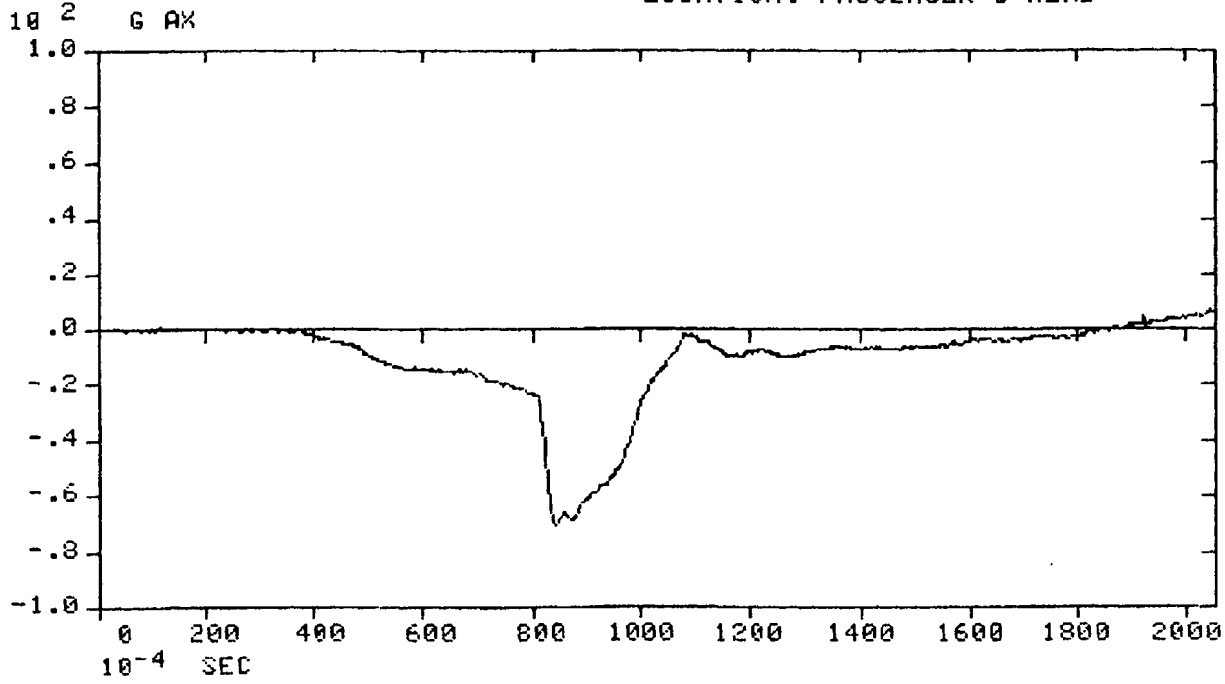


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 1
DIRECTION: FORWARD
LOCATION: PASSENGER'S HEAD

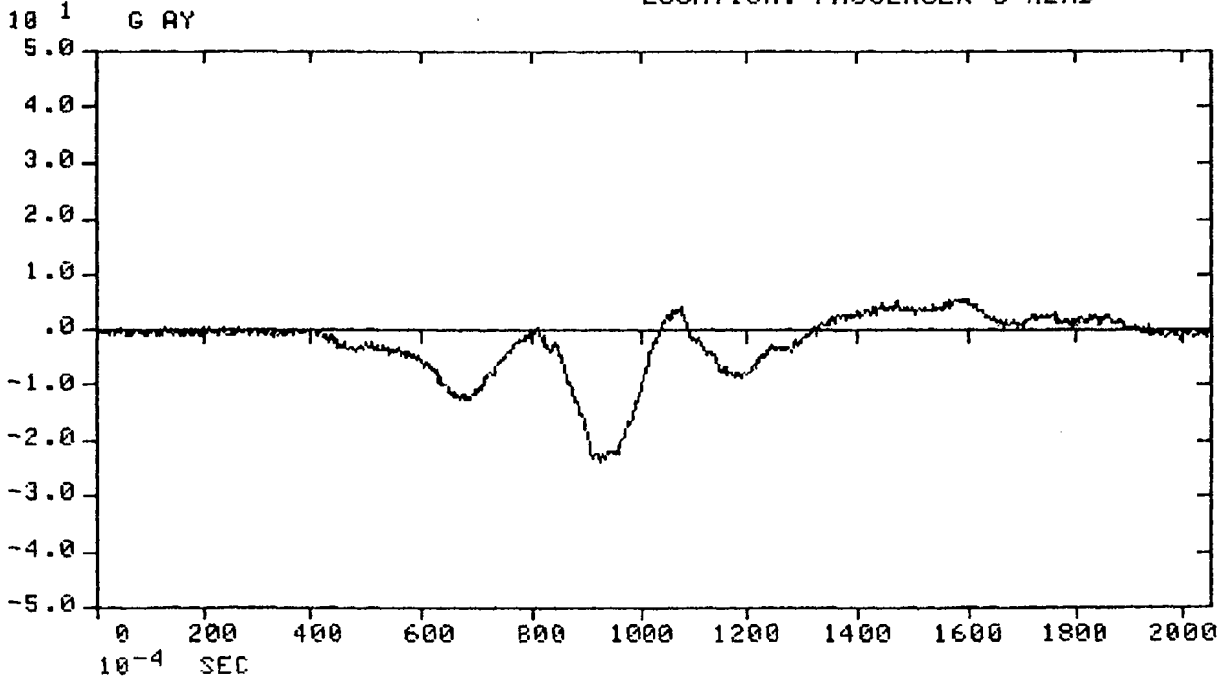


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 2
DIRECTION: LEFT
LOCATION: PASSENGER'S HEAD

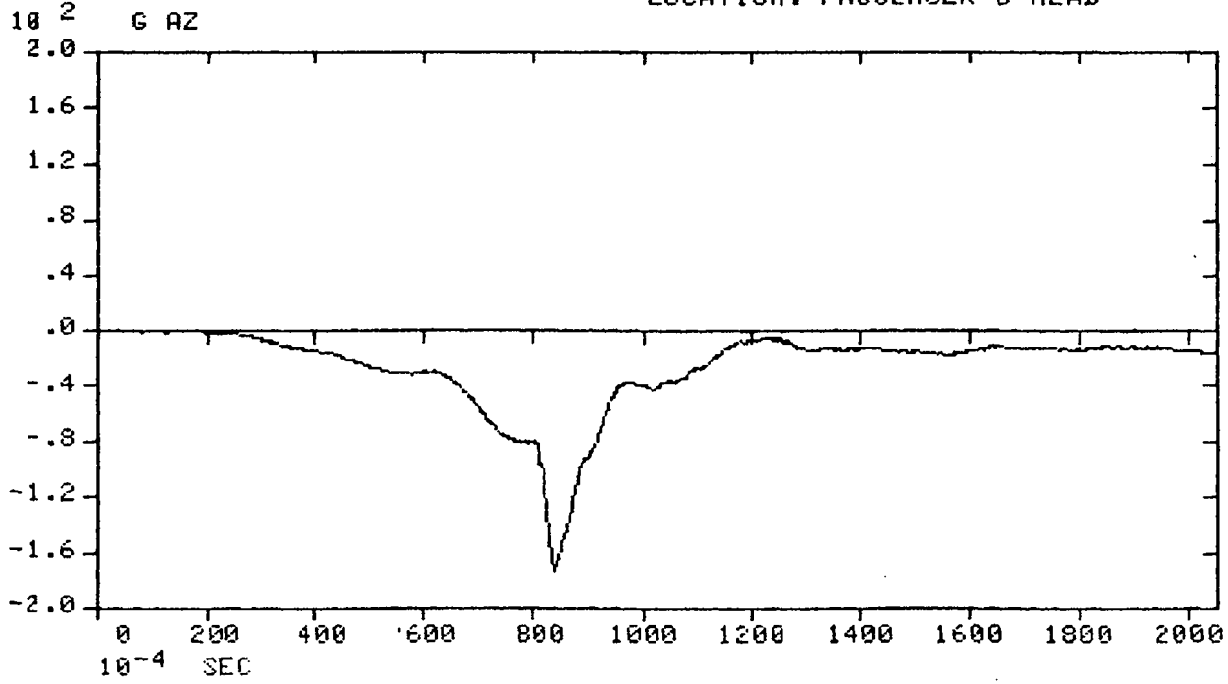


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 3
DIRECTION: UPWARD
LOCATION: PASSENGER'S HEAD

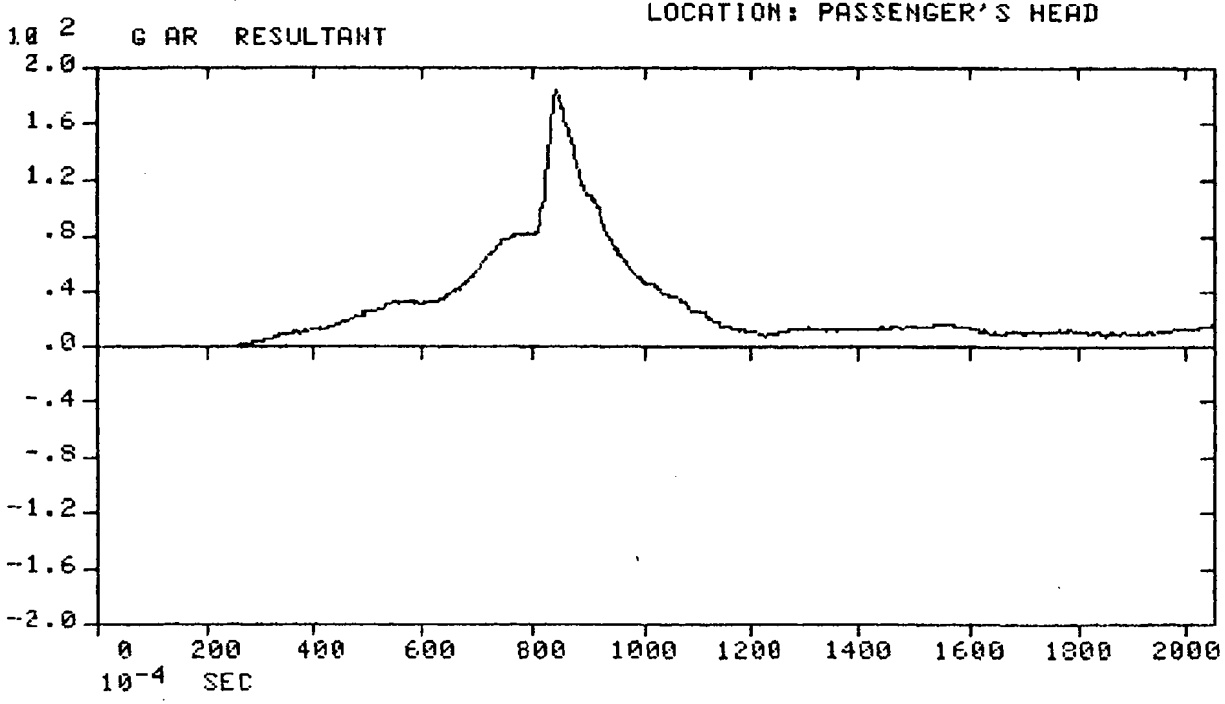


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA B20201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 1-3
DIRECTION: RESULTANT OF XYZ
LOCATION: PASSENGER'S HEAD

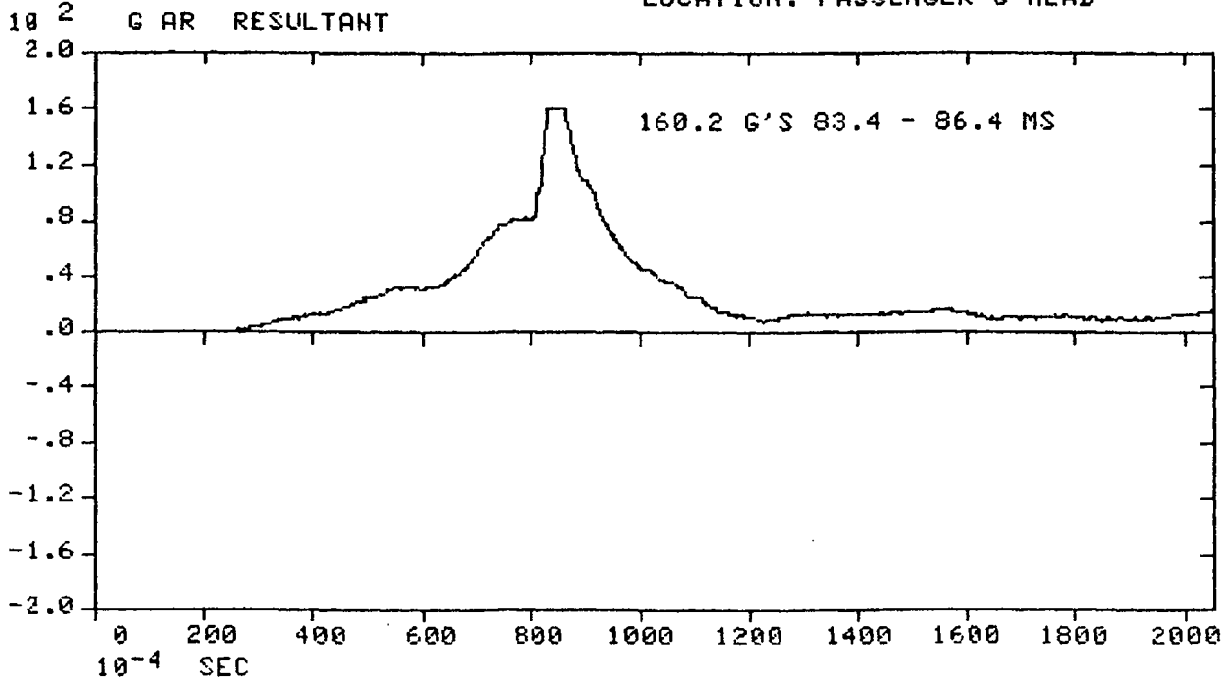


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 1-3
DIRECTION: RESULTANT OF XYZ
LOCATION: PASSENGER'S HEAD

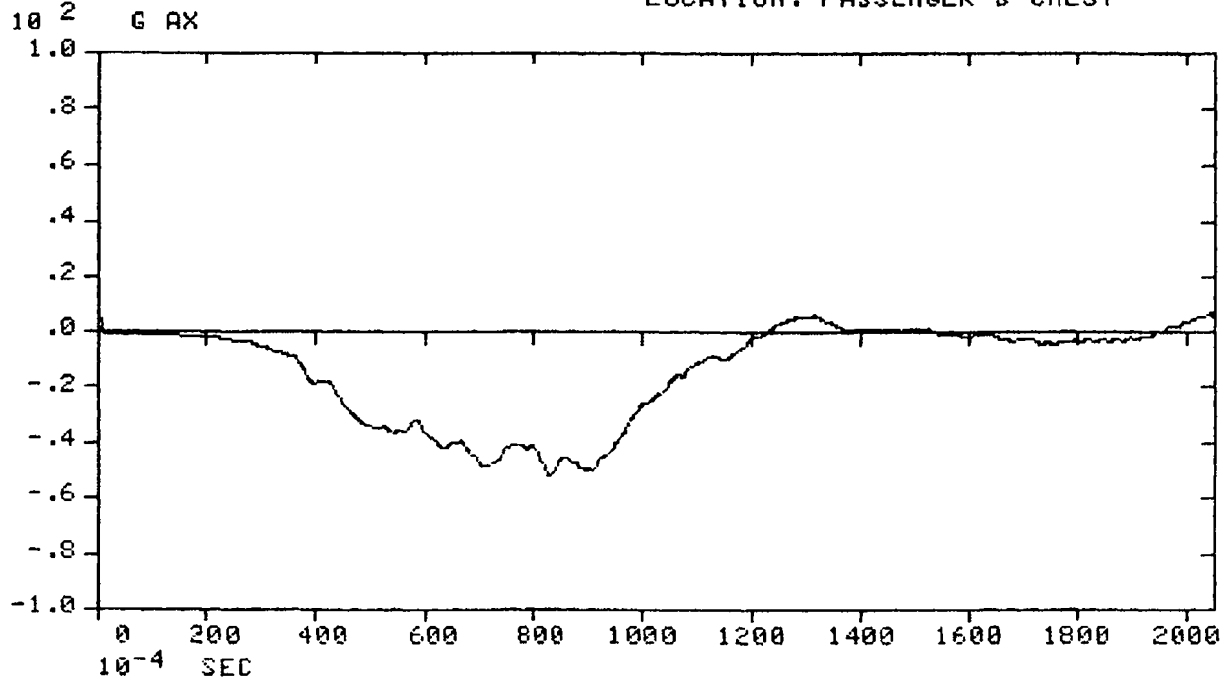


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 2, CH 5
DIRECTION: FORWARD
LOCATION: PASSENGER'S CHEST

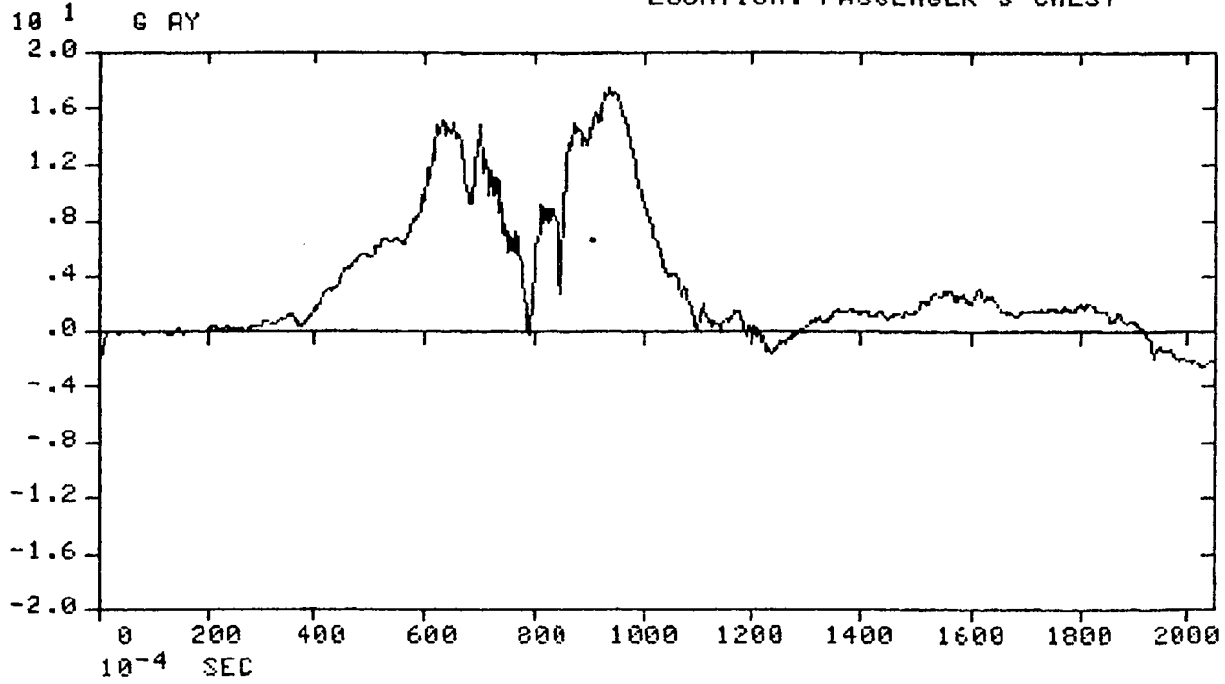


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE: 2, CH 6
DIRECTION: LEFT
LOCATION: PASSENGER'S CHEST

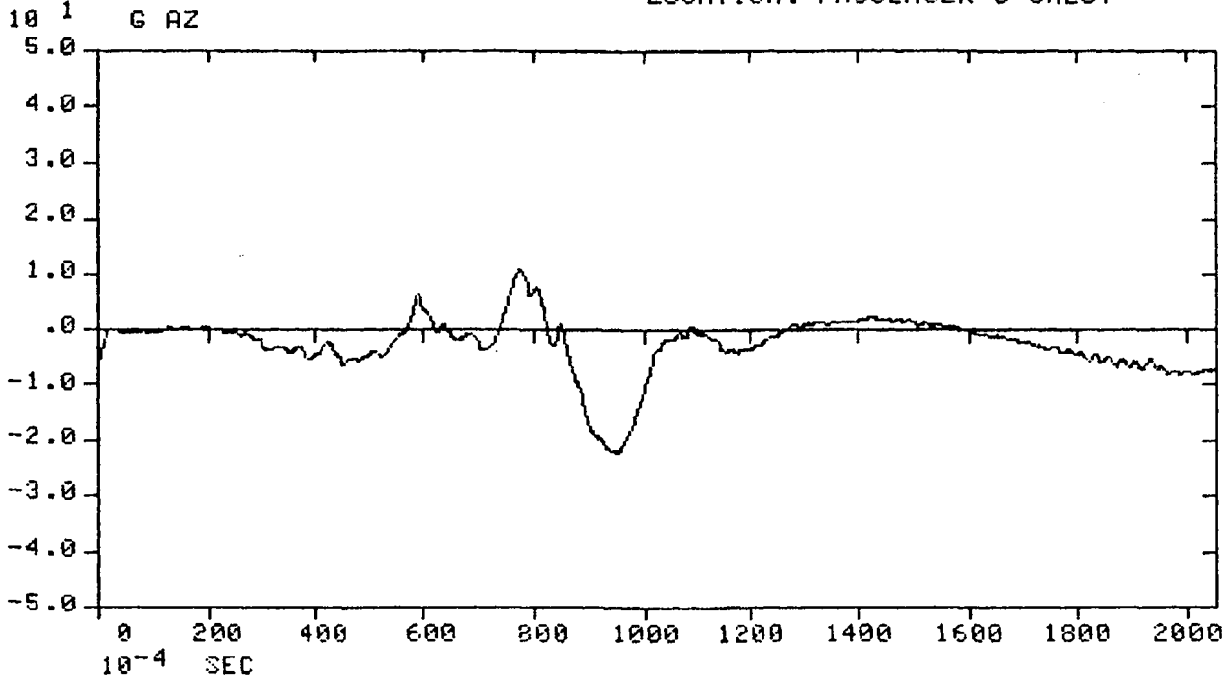


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 2, CH 7
DIRECTION: UPWARD
LOCATION: PASSENGER'S CHEST

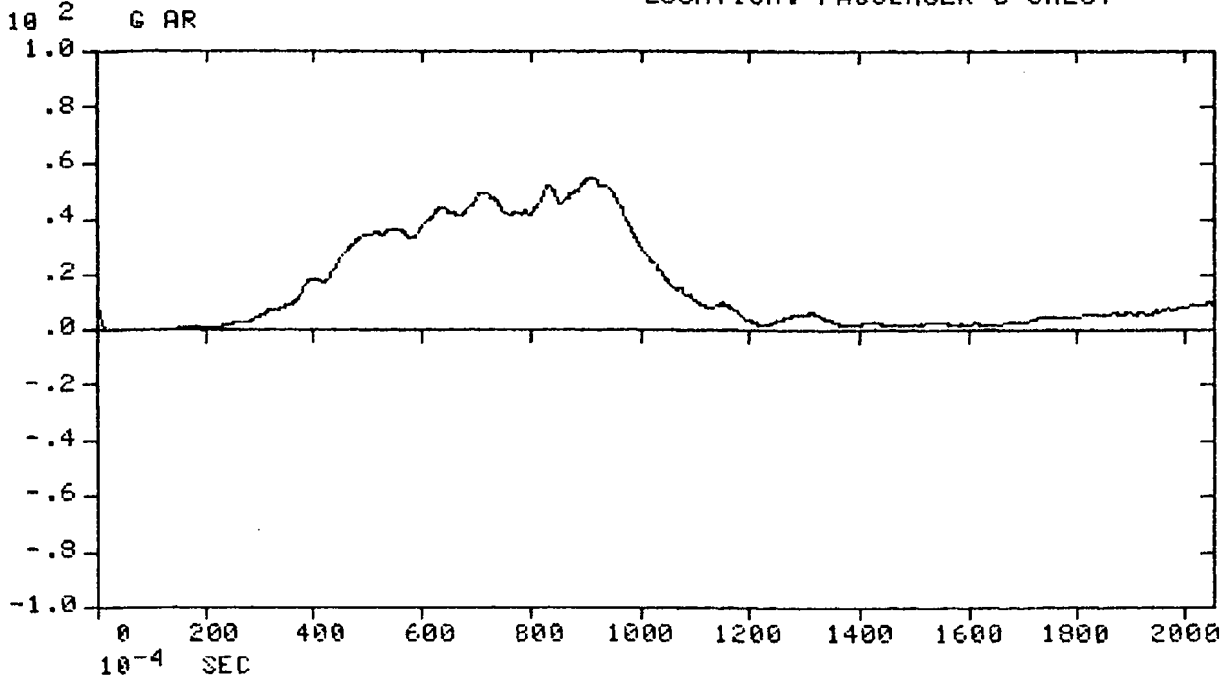


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 5-7
DIRECTION: RESULTANT OF XYZ
LOCATION: PASSENGER'S CHEST

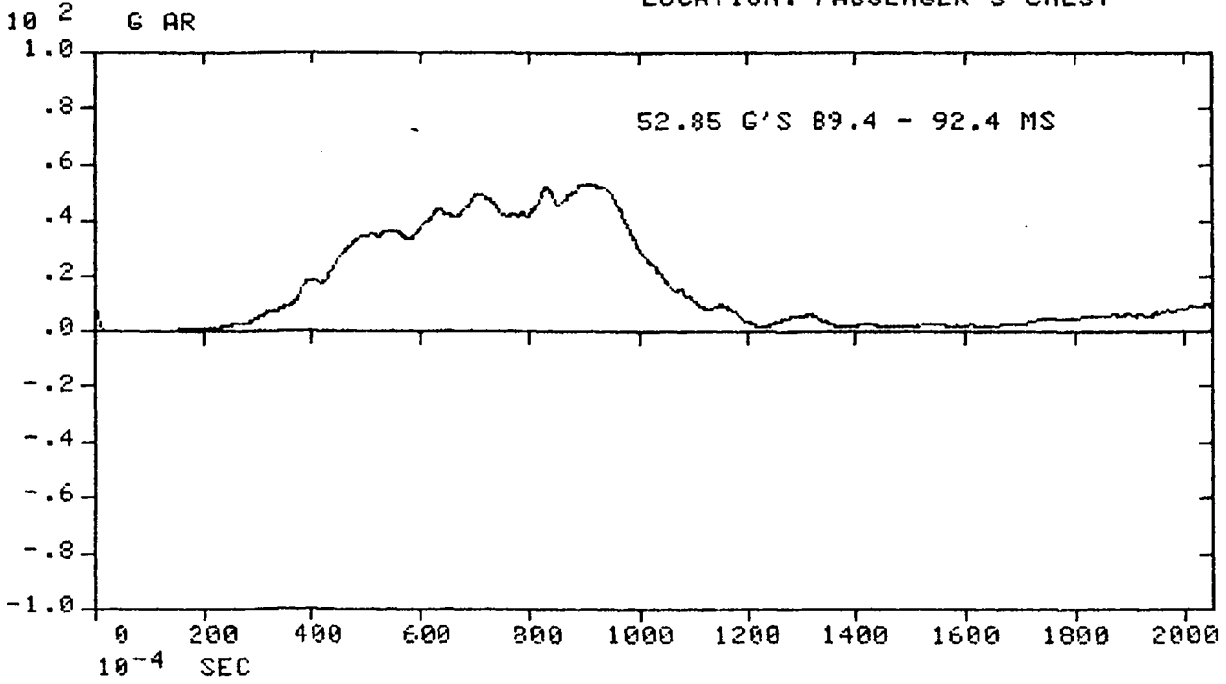


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 1000
ACCELEROMETER: TAPE 2, CH 5-7
DIRECTION: RESULTANT OF XYZ
LOCATION: PASSENGER'S CHEST

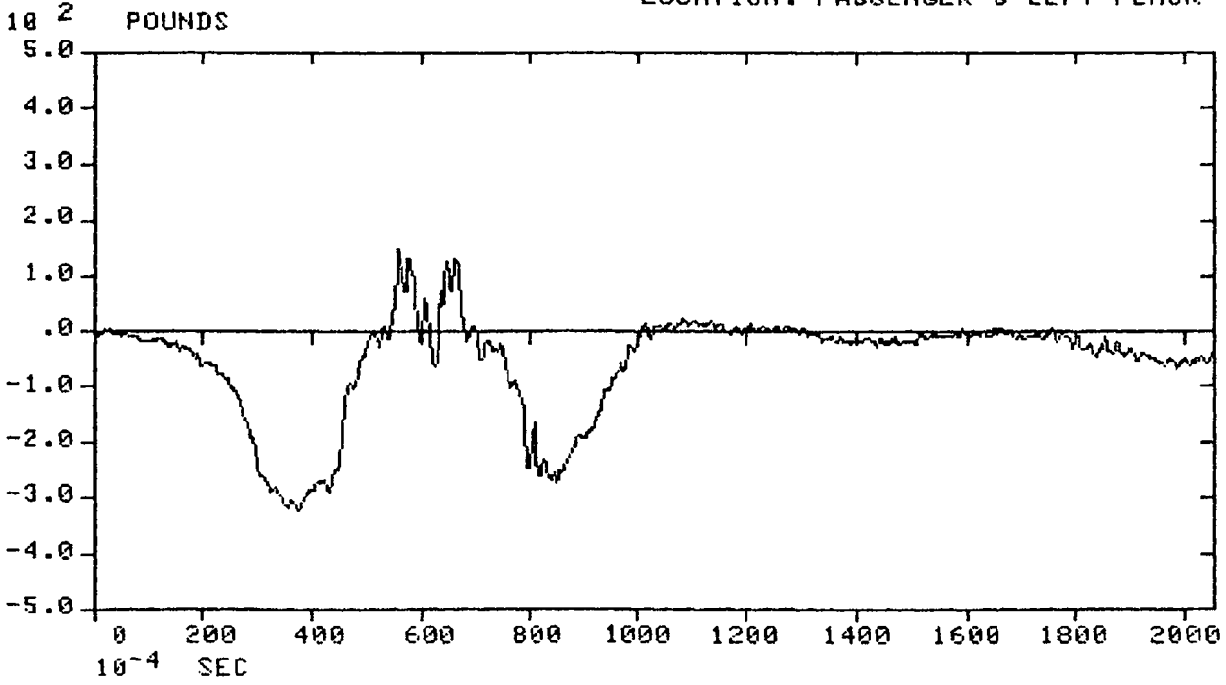


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 600
LOAD CELL: TAPE 2, CH 8
DIRECTION: TENSION
LOCATION: PASSENGER'S LEFT FEMUR

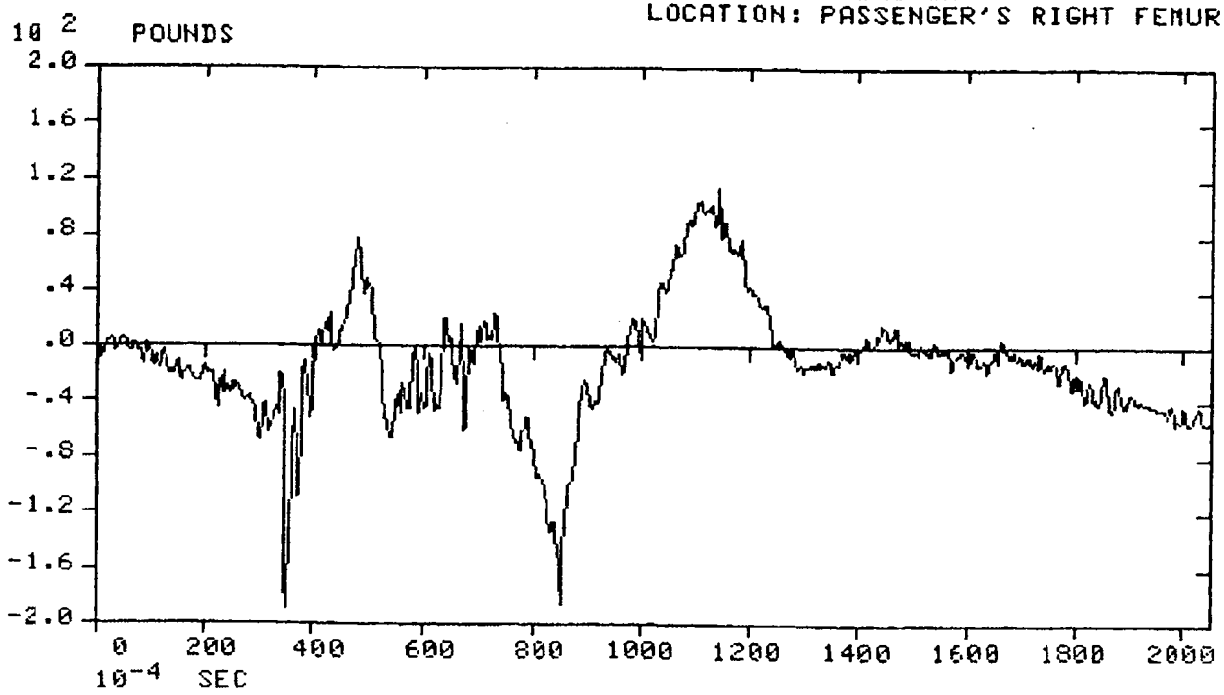


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 600
LOAD CELL: TAPE 2, CH 4
DIRECTION: TENSION
LOCATION: PASSENGER'S RIGHT FEMUR

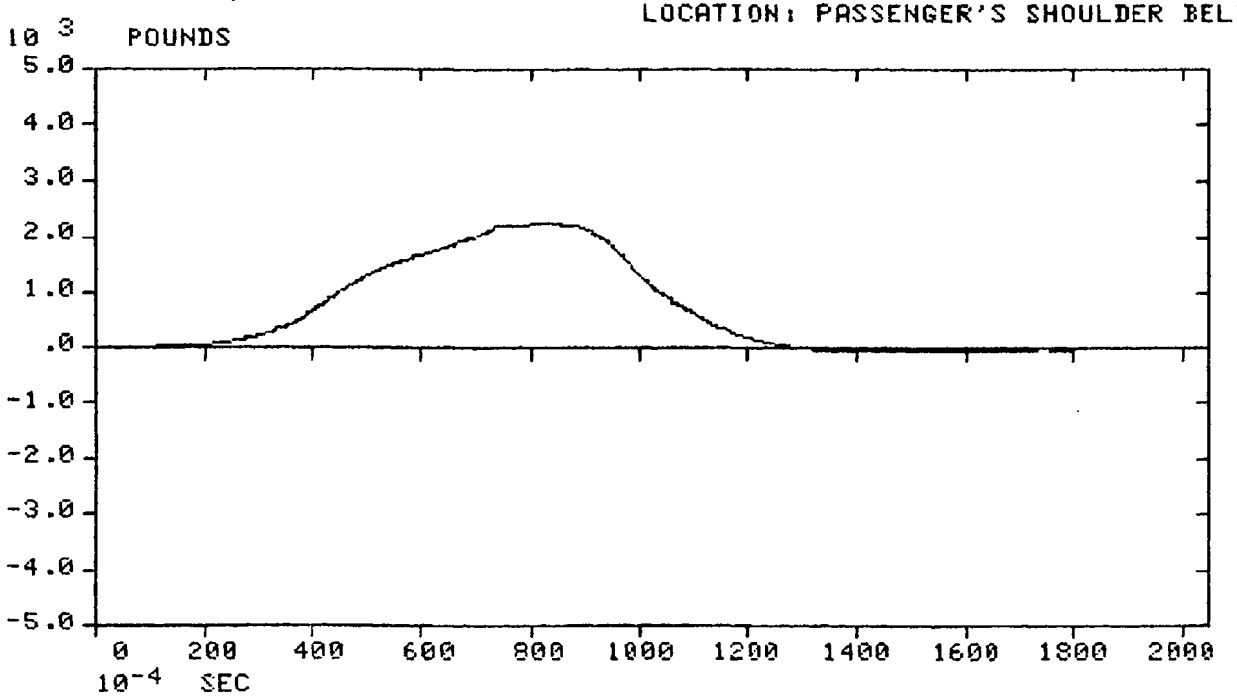


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
LOAD CELL: TAPE 2, CH 9
DIRECTION: TENSION
LOCATION: PASSENGER'S SHOULDER BELT

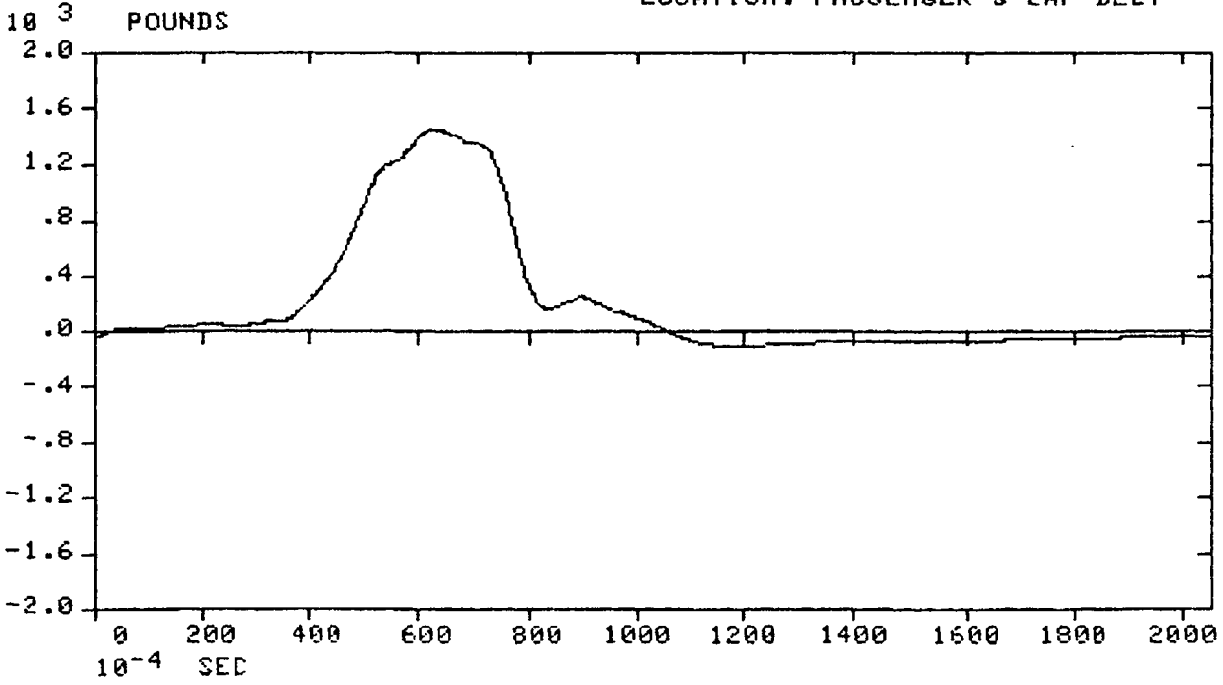


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
LOAD CELL : TAPE 2, CH 10
DIRECTION: TENSION
LOCATION: PASSENGER'S LAP BELT

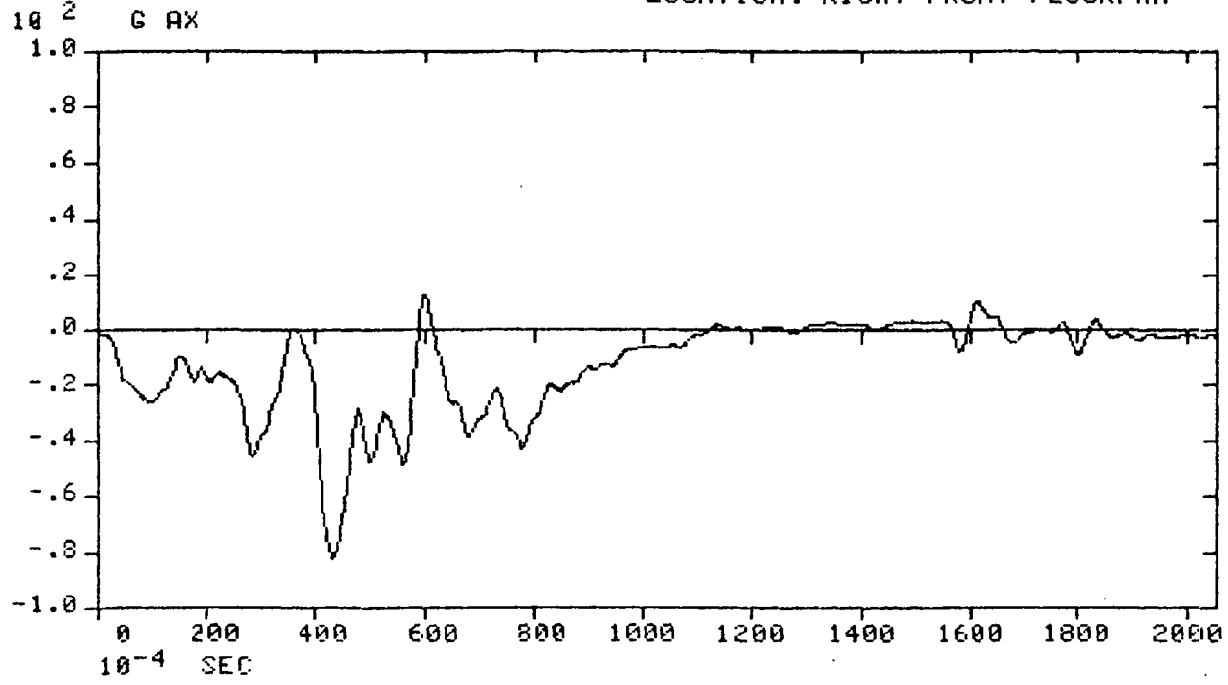


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
ACCELEROMETER: TAPE 1, CH 12
DIRECTION: FORWARD
LOCATION: RIGHT FRONT FLOORPAN

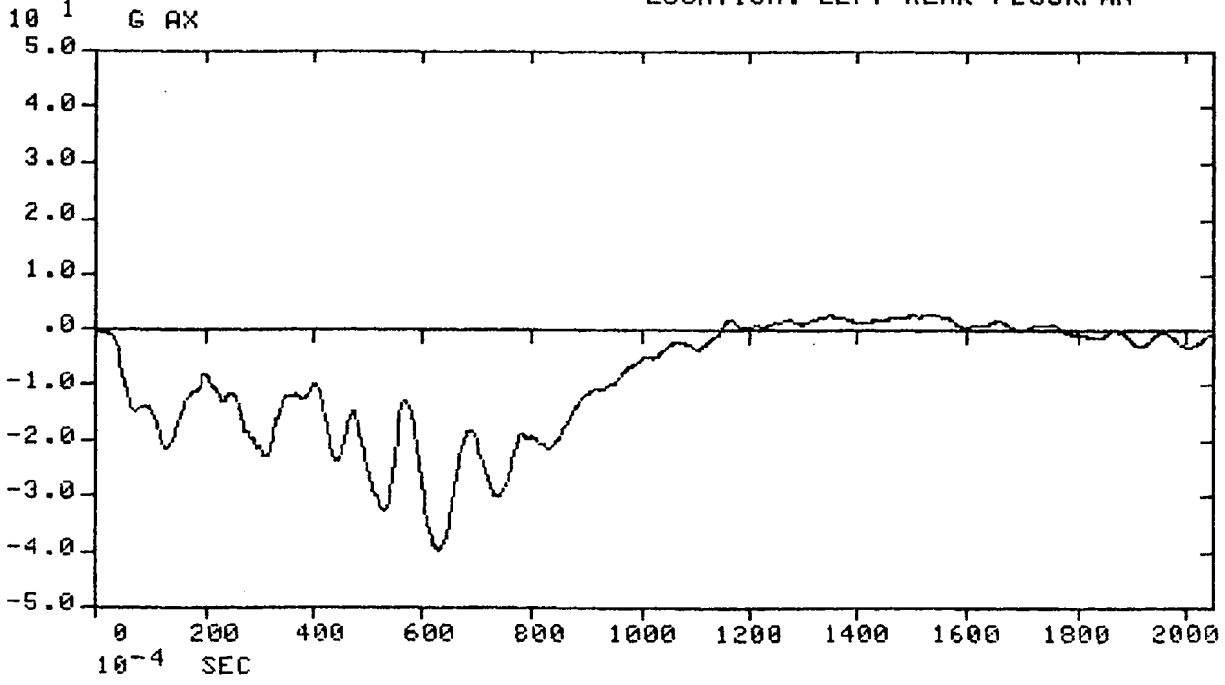


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 60
ACCELEROMETER: TAPE 1, CH 10
DIRECTION: FORWARD
LOCATION: LEFT REAR FLOORPAN

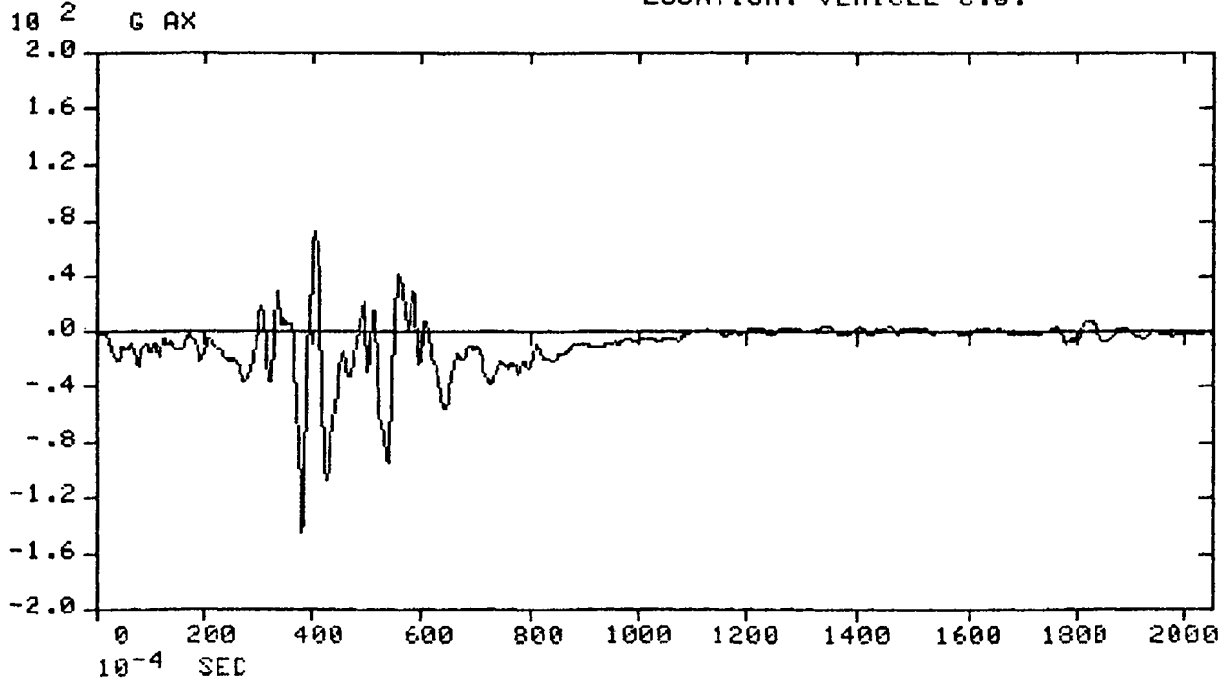


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 3, CH 5
DIRECTION: FORWARD
LOCATION: VEHICLE C.G.

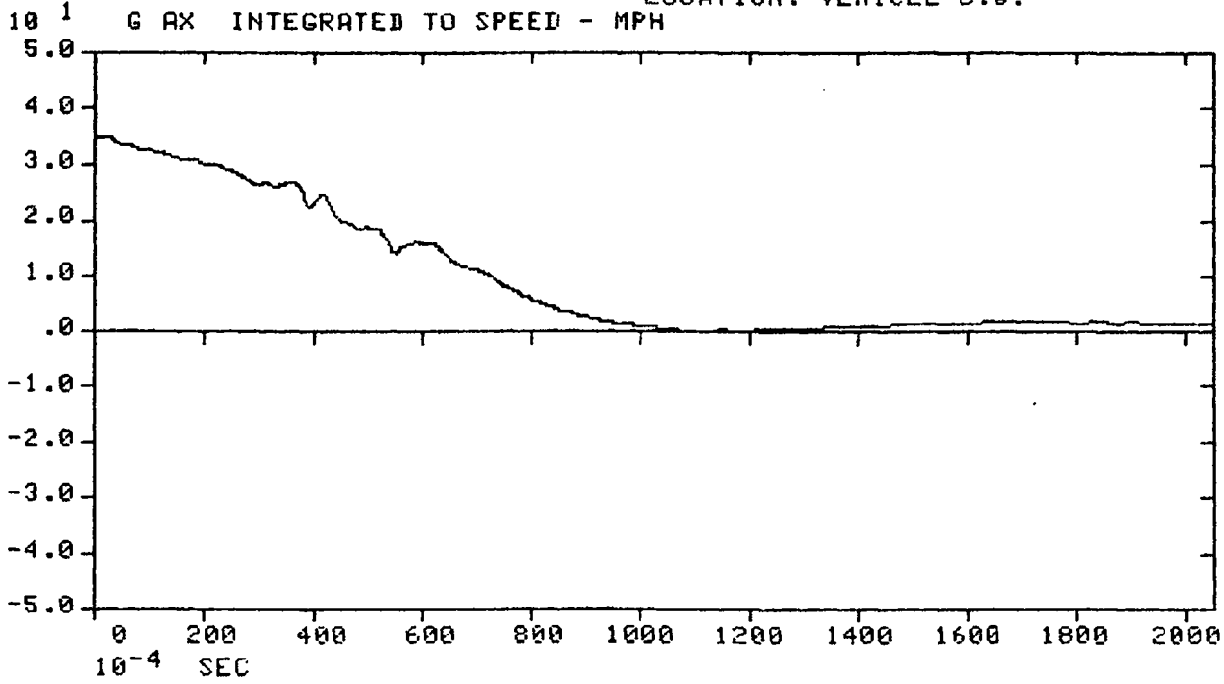


DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
DATE: JUNE 18, 1981 FRONTAL

APPROVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 3, CH 5
DIRECTION: FORWARD
LOCATION: VEHICLE C.G.



DOT CRASH PROGRAM

VEHICLE: FORD EXP
VEHICLE ID: NHTSA 820201
TEST FILE NO. : 189-14 34.96 MPH
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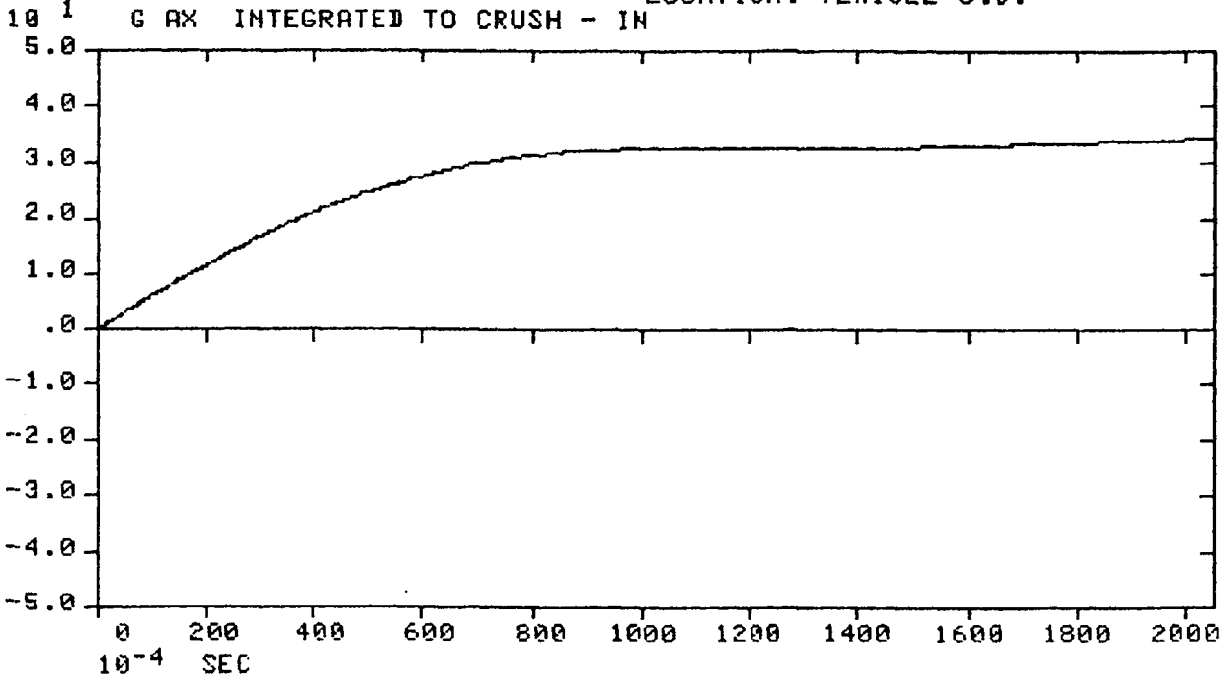
APPRDVED ENGINEERING TEST LABS

MJO NO. : 971-3882-42
FILTER: CLASS 180
ACCELEROMETER: TAPE 3, CH 5
DIRECTION: FDRWARD
LOCATION: VEHICLE C.G.



APPENDIX C

APPENDIX C

The following report sheets are the Part 572 test dummy calibration test data for the dummies used in the 1982 Ford EXP - 3 Door Sporty Coupe, NHTSA 820201 frontal fixed barrier impact test.

PART 572 DUMMY CALIBRATION TEST DATA

Dummy S/N 0319

Calibration Laboratory Humanoid Systems

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration		1-16-81	
Calibration Sequential Number for Dummy		14	
Temperature in Lab. (Spec. = 66 to 78°F)		71°F	
Relative Humidity in Lab. (Spec. = 10 to 70%)		67%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel.	210 to 260G	239.64 g	
b. Peak Lateral Accel.	≤ 10G	8.81 g	
c. Time above 100G	0.9 to 1.5 ms	1.27 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed	21.5 to 25.5 fps	22.0 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$)	20 to 24G	23.87 g	
c. Peak Resultant Head Acceleration	26G maximum	24.98 g	
d. Pendulum Decel. (t_2-t_1)	≤ 3 ms	1.51 ms	
e. Pendulum Decel. (t_3-t_2)	25 to 30 ms	26.60 ms	
f. Pendulum Decel. (t_4-t_3)	≤ 10 ms	2.65 ms	
g. Pendulum Direction Reversal Time	≥ 123 ms	121.96 ms	
h. Max. Head Rotation	63 to 73°	65.78°	
i. Chordal Displacement: Head Rotation Angle			
0° — Time	-2 to 2 ms	0 ms	
0° — Displ.	-.5 to .5 in.	0 in.	
30° — Time	25.6 to 34.4 ms	29.64 ms	
30° — Displ.	2.1 to 3.1 in.	3.03 in.	

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N 0319

Calibration Laboratory Humanoid Systems

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST Continued:				
i. Chordal Displacement: Head Rotation Angle				
60°	Time	40.3 to 51.7 ms	50.09 ms	
	Displ.	4.3 to 5.3 in.	5.11 in.	
Maximum (°)	Time	53.2 to 66.8 ms	59.04 ms	
	Displ.	5.0 to 6.0 in.	5.91 in.	
60°	Time	67.0 to 83.0 ms	71.65 ms	
	Displ.	4.3 to 5.3 in.	5.26 in.	
30°	Time	85.4 to 104.6 ms	95.14 ms	
	Displ.	2.1 to 3.1 in.	2.91 in.	
0°	Time	101.0 to 123.0 ms	111.14 ms	
	Displ.	-.5 to 0.5 in.	+0.20 in.	
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)				
a. Force @ .5"		23 to 37 lbs.	30.5 lbs.	
b. Force @ .75"		37 to 50 lbs.	41.0 lbs.	
c. Force @ 1.0"		50 to 63 lbs.	56.0 lbs.	
d. Force @ 1.3"		73 to 88 lbs.	77.5 lbs.	
4.. LUMBAR FLEXION TEST:				
a. Force @ 20°		22 to 34 lbs.	33.0 lbs.	
b. Force @ 30°		34 to 46 lbs.	43.0 lbs.	
c. Force @ 40°		46 to 58 lbs.	56.0 lbs.	
d. Return Angle		$\leq$ 12° maximum	7.5°	

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N 0319

Calibration Laboratory Humanoid Systems

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed	21.78-22.22 fps	22.00 fps	
(2) Peak Deflection	1.7" maximum	1.66 in.	
(3) Peak Resistive Force	2250 lbs. max.	2031.63 lbs.	
(4) Internal Hysteresis	50 to 70%	52.07%	
b. Low Speed			
(1) Probe Speed	13.86-14.14 fps	14.00 fps	
(2) Peak Deflection	1.1" maximum	1.06 in.	
(3) Peak Resistive Force	1450 lbs. max.	1206.89 lbs.	
(4) Internal Hysteresis	50 to 70%	58.58%	
6. KNEE IMPACT TESTS:			
a. Right Side			
(1) Probe Side	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force	1850 to 2500 lbs.	2306.12 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.79 ms	
b. Left Side			
(1) Probe Speed	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force	1850 to 2500 lbs.	2121.35 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.84 ms	

PART 572 DUMMY CALIBRATION TEST DATA

Dummy S/N 0814

Calibration Laboratory Humanoid Systems

			Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration			1-22-81	
Calibration Sequential Number for Dummy			9	
Temperature in Lab. (Spec. = 66 to 78°F)			71°F	
Relative Humidity in Lab. (Spec. = 10 to 70%)			67%	
TEST PARAMETER			**SPECIFICATION**	
1. HEAD DROP TEST:				
a. Peak Resultant Accel.			210 to 260G	217.54 g	
b. Peak Lateral Accel.			≤ 10G	8.86 g	
c. Time above 100G			0.9 to 1.5 ms	1.32 ms	
2. NECK BENDING TEST:				
a. Pendulum Speed			21.5 to 25.5 fps	22.0 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$)			20 to 24G	23.59 g	
c. Peak Resultant Head Acceleration			26G maximum	25.84 g	
d. Pendulum Decel. (t_2-t_1)			≤ 3 ms	1.10 ms	
e. Pendulum Decel. (t_3-t_2)			25 to 30 ms	26.08 ms	
f. Pendulum Decel. (t_4-t_3)			≤ 10 ms	3.17 ms	
g. Pendulum Direction Reversal Time			≥ 123 ms	131.14 ms	
h. Max. Head Rotation			63 to 73°	69.56°	
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	27.26 ms	
		Displ.	2.1 to 3.1 in.	3.05 in.	

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N 0814

Calibration Laboratory Humanoid Systems

TEST PARAMETER			SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST Continued:					
i. Chordal Displacement: Head Rotation Angle					
	60°	Time	40.3 to 51.7 ms	47.17 ms	
		Displ.	4.3 to 5.3 in.	5.22 in.	
	Maximum (°)	Time	53.2 to 66.8 ms	63.36 ms	
		Displ.	5.0 to 6.0 in.	5.96 in.	
	60°	Time	67.0 to 83.0 ms	80.55 ms	
		Displ.	4.3 to 5.3 in.	5.27 in.	
	30°	Time	85.4 to 104.6 ms	104.25 ms	
		Displ.	2.1 to 3.1 in.	2.76 in.	
	0°	Time	101.0 to 123.0 ms	119.25 ms	
		Displ.	-.5 to 0.5 in.	-0.22 in.	
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)					
a. Force @ .5"			23 to 37 lbs.	26.5 lbs.	
b. Force @ .75"			37 to 50 lbs.	39.0 lbs.	
c. Force @ 1.0"			50 to 63 lbs.	58.0 lbs.	
d. Force @ 1.3"			73 to 88 lbs.	84.0 lbs.	
4.. LUMBAR FLEXION TEST:					
a. Force @ 20°			22 to 34 lbs.	30.5 lbs.	
b. Force @ 30°			34 to 46 lbs.	43.0 lbs.	
c. Force @ 40°			46 to 58 lbs.	52.5 lbs.	
d. Return Angle			$\leq$ 12° maximum	11.8°	

PART 572 DUMMY CALIBRATION TEST DATA
(Continued)

Dummy S/N 0814

Calibration Laboratory Humanoid Systems

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed	21.78-22.22 fps	22.0 fps	
(2) Peak Deflection	1.7" maximum	1.40 in.	
(3) Peak Resistive Force	2250 lbs. max.	1928.0 lbs.	
(4) Internal Hysteresis	50 to 70%	64.80%	
b. Low Speed			
(1) Probe Speed	13.86-14.14 fps	14.00 fps	
(2) Peak Deflection	1.1" maximum	0.88 in.	
(3) Peak Resistive Force	1450 lbs. max.	1317.0 lbs.	
(4) Internal Hysteresis	50 to 70%	59.35%	
6. KNEE IMPACT TESTS:			
a. Right Side			
(1) Probe Side	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force	1850 to 2500 lbs.	2036.84 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.96 ms	
b. Left Side			
(1) Probe Speed	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force	1850 to 2500 lbs.	2087.17 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.83 ms	

APPROVED ENGINEERING TEST LABORATORIES

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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

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

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