

Dynamic Science Report No. 212-DYS-79-014
Dynamic Science Report No. 219-DYS-79-013
Dynamic Science Report No. 301-DYS-79-027

DOT 199

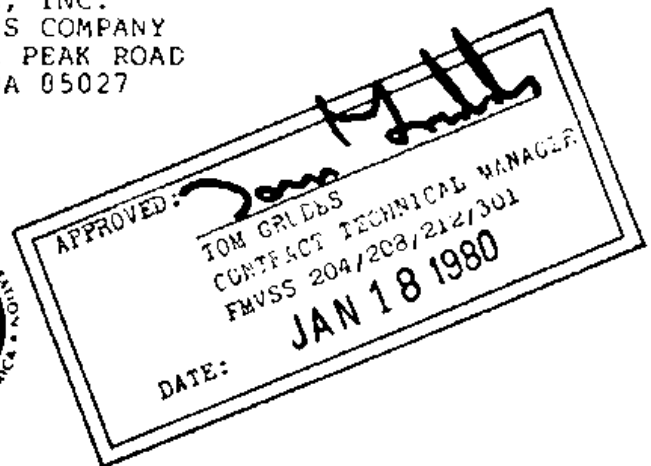
NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT
TESTING

FMVSS 212, 219, AND 301-75

GENERAL MOTORS CORPORATION
1979 OLDSMOBILE CUTLASS 2-DOOR SEDAN
NHTSA NO. 790107

Prepared by:

DYNAMIC SCIENCE, INC.
A TALLEY INDUSTRIES COMPANY
1850 WEST PINNACLE PEAK ROAD
PHOENIX, ARIZONA 85027



FINAL REPORT

DECEMBER 1979

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
-----ENFORCEMENT-----
OFFICE OF VEHICLE SAFETY COMPLIANCE
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FINAL REPORT ACCEPTED BY:

TOM GRUBBS

NHTSA Contract Technical Manager
FMVSS 212/219/301-75

JAN 18 1980

Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

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7. Author(s) M. Pozzi, Project Engineer <i>Mark Pozzi</i>		6. Performing Org. Code
9. Performing Organization Name and Address Dynamic Science, Inc. A Talley Industries Company 1850 West Pinnacle Peak Road Phoenix, Arizona 85027		8. Performing Org. Rpt. No. 3066-79-200
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		13. Type of Report and Period Covered Final Report October 1979
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15. Supplementary Notes Approved: <i>E. [Signature]</i> , Director, Test Operations		
16. Abstract The vehicle was tested using test parameter values which are in excess of the current upper limits of the subject FMVSS in order to obtain research and vehicle rating data. This test, therefore, can only be viewed as an "indicant" test by the Office of Vehicle Safety Compliance. The front of the test vehicle impacted the fixed collision barrier at a speed of 34.84 mph. The test was conducted at the Dynamic Science, Inc. Deer Valley facility on October 11, 1979, with the following results: a) FMVSS 212 - Loss of windshield retention was within FMVSS 212 specifications. b) FMVSS 219 - No intrusion noted. c) FMVSS 301 - No fuel leakage noted.		
17. Key Words Frontal Impact, Fuel System Integrity, Windshield Testing		18. Distribution Statement Copies of this report are available from Technical Reference Division, National Highway Traffic Safety Administration, Room 510B, Nassif Building, 400 7th Street, S.W., Washington, D.C. 20590
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
acres	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in ³	cubic inches	16	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions from Metric Measures

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

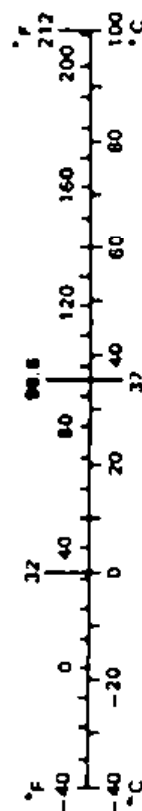


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SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE:

The purpose of the test was to subject a 1979 Oldsmobile Cutlass to the indicant test requirements of DOT Test Plan TP-212-01, March 20, 1979, Standard Enforcement Indicant Testing for FMVSS No. 212, "Windshield Mounting," FMVSS No. 219, "Windshield Zone Intrusion," and FMVSS 301-75, "Fuel System Integrity." The vehicle was tested using test parameters which are in excess of the current upper limits of the subject FMVSS, in order to obtain research and vehicle rating data. This test, therefore, can only be viewed as an "indicant" test by the Office of Vehicle Safety Compliance (OVSC).

INTRODUCTION:

The test procedure describing the facilities used and the test checklists completed for each vehicle indicant tested for FMVSS 212, 219, 301-75 are contained in Appendix A. Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains Compliance Related Data for FMVSS 212, 219, 301-75 Indicant Testing, together with photographs related to these tests. Appendix B contains Calcomp plots.

SECTION 2
GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets and photographs describe the General Test and Vehicle Parameter Data.

SECTION 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Vehicle Manufacturer: General Motors Corporation
Make/Model: Cutlass Supreme
Body Style: 2-Door Sedan Model Year: 1979
VIN: 3R47A92439298 Build Date: 12-78
NHTSA No.: 790107 Color: Light Green
Engine Data: V6 cylinders; 3.8 Litre displacement
Transmission Data: 3 speed () Manual (X) Automatic
Date Vehicle Received by Laboratory: 9-24-79
Dealer Name & Address: General Environments Corp., Hartwood Va.
Olenstead Olds, 2000 Wilson Blvd.,
Arlington, Va. 22201

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

Vehicle Manufactured By: General Motors Corporation
Date of Manufacture: 12-78 ; VIN: 3R47A92439298
GVWR: 4453 lb; GAWR: Front = 2094 lb; Rear = 2359 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Up to Capacity	<u>32</u> psi	<u>32</u> psi	TIRE SIZE:	
Vehicle Capacity:			<u>P195/75-R14</u>	<u>B</u>
Type of Seats -	<u> </u> Bench	Number of Occupants =	<u>3</u>	Front
	<u> </u> Bucket	(Designated Seating	<u>3</u>	Rear
	<u> X </u> Split Bench	Capacity)	<u>6</u>	Total
CARGO LOAD =	<u>150</u> lb			
TOTAL =	<u>1050</u> lb			

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with max. fluids)
(UDW)

Right Front =	<u>948</u> lb	Right Rear =	<u>721</u> lb
Left Front =	<u>910</u> lb	Left Rear =	<u>719</u> lb
TOTAL FRONT WEIGHT =	<u>1858</u> lb (<u>56.3%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1440</u> lb (<u>43.7%</u> of Total Vehicle Weight)		
TOTAL DELV. WEIGHT =	<u>3298</u> lb		

TARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 3776 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 150 lb CARGO:

Right Front =	<u>991</u> lb	Right Rear =	<u>922</u> lb
Left Front =	<u>966</u> lb	Left Rear =	<u>920</u> lb
TOTAL FRONT WEIGHT =	<u>1957</u> lb (<u>51.5%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1842</u> lb (<u>48.5%</u> of Total Vehicle Weight)		
TOTAL TEST WEIGHT =	<u>3799</u> lb		
Weight of ballast secured in vehicle trunk area =	<u>0</u> lb		

SECTION 2
GENERAL TEST AND VEHICLE PARAMETER DATA (CONTO)

TEST CONDITIONS:

Date of Test: October 11, 1979 Time of Test: 11:22

Ambient Temperature: 86 °F at impact area.

Temperature in Windshield Molding
Occupant Compartment: 73 °F Temperature: 73 °F

VEHICLE ATTITUDE: (all dimensions in inches)

Delivered Attitude: RF 30.0 LF 30.0 RR 30.0 LR 30.0

Test Attitude: RF 29.9 LF 30.0 RR 28.4 LR 28.3

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 32 psi
Rear = 32 psi

Recommended Tire Size: P195/75-R14
Load Range: B

Tires on Vehicle: Uniroyal SBR 4-ply
Is Spare Tire a "Space Saver": yes (yes/no)
Is Spare Tire standard equipment: yes (yes/no)

TEST FLUID DATA:

Test Fluid Type: Red Stoddard Solvent; Spec. Grav.: 0.764
Kinematic Viscosity: 0.99 centistokes
Spill Point Volume: 18.9 Gallons (SPV)
Test Volume: 17.2 Gallons (90 to 91% of SPV)
Fuel System Capacity (data from Owner's Manual): 18.2 gallons
Details of Fuel System: Rectangular fuel tank is held in place
aft of rear axle by two tank straps. Tank is 70% off-center to
vehicle left. Sender tube grommet is on top side of tank.
Filler tube exits rear vertical side of tank on vehicle center-
line and exits under rear license plate bracket. Tube is sealed
by a twist-type cap.
Electric Fuel Pump: No (yes/no); Fuel Injection: No (yes/no)
Does electric fuel pump operate with ignition switch "on" and
the engine not operating: N/A (yes/no)

VEHICLE REBOUND AND CRUSH:

Overall Length of Pre-test = R 199.0 L 199.0 inches
Test Vehicle Post-test = R 168.8 L 169.5 inches
CRUSH = R 30.2 L 29.5

FOR FRONTAL IMPACTS, distance from front of test vehicle to the
barrier after impact = 25.5 inches

SECTION 2

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>	<u>Child</u>
Head	<u>Steering Wheel</u>	<u>None</u>	<u>Passenger Seat back,</u> <u>Knees</u>
Chest	<u>None</u>	<u>None</u>	<u>Knees</u>
Abdomen	<u>None</u>	<u>None</u>	<u>None</u>
Left Knee	<u>Dash Panel</u>	<u>Dash Panel</u>	<u>Head</u>
Right Knee	<u>Dash Panel</u>	<u>Dash Panel</u>	<u>Head</u>

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
<u>DOOR OPENING</u>				
Easy	<u>X</u>	<u>X</u>	<u>NA</u>	<u>NA</u>
Difficult				
Tools Required				

SEAT BACK

Failure	<u>No</u>	<u>No</u>	<u>Rear seat bottom</u> <u>came loose.</u>
---------	-----------	-----------	---

GLAZING DAMAGE

Windshield	<u>Cracked</u>		
Backlight			<u>None</u>
Others	<u>No</u>	<u>No</u>	<u>No</u> <u>No</u>

OTHER NOTABLE IMPACT EFFECTS: Steering column shear capsule broken
during impact; column was loose post-test. Turn signal arm broken
off. Rear seat bottom shifted forward on right, touching front
seat back. Dash panel sections separated slightly but did not
fall out of place.

6E966

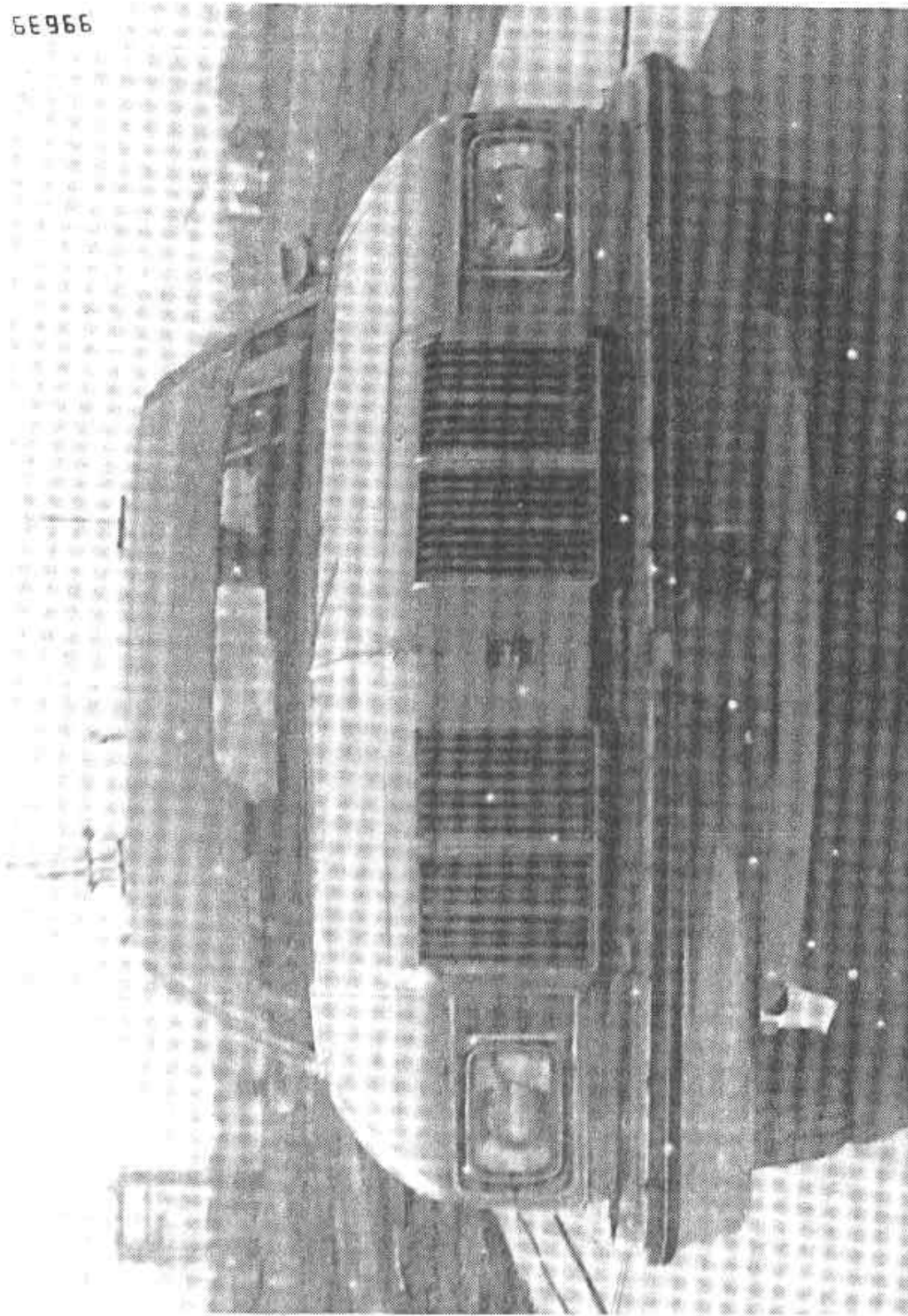


Figure 2-1. Pre-test Front View - 1979 Oldsmobile Cutlass - NHTSA 790107.

92966

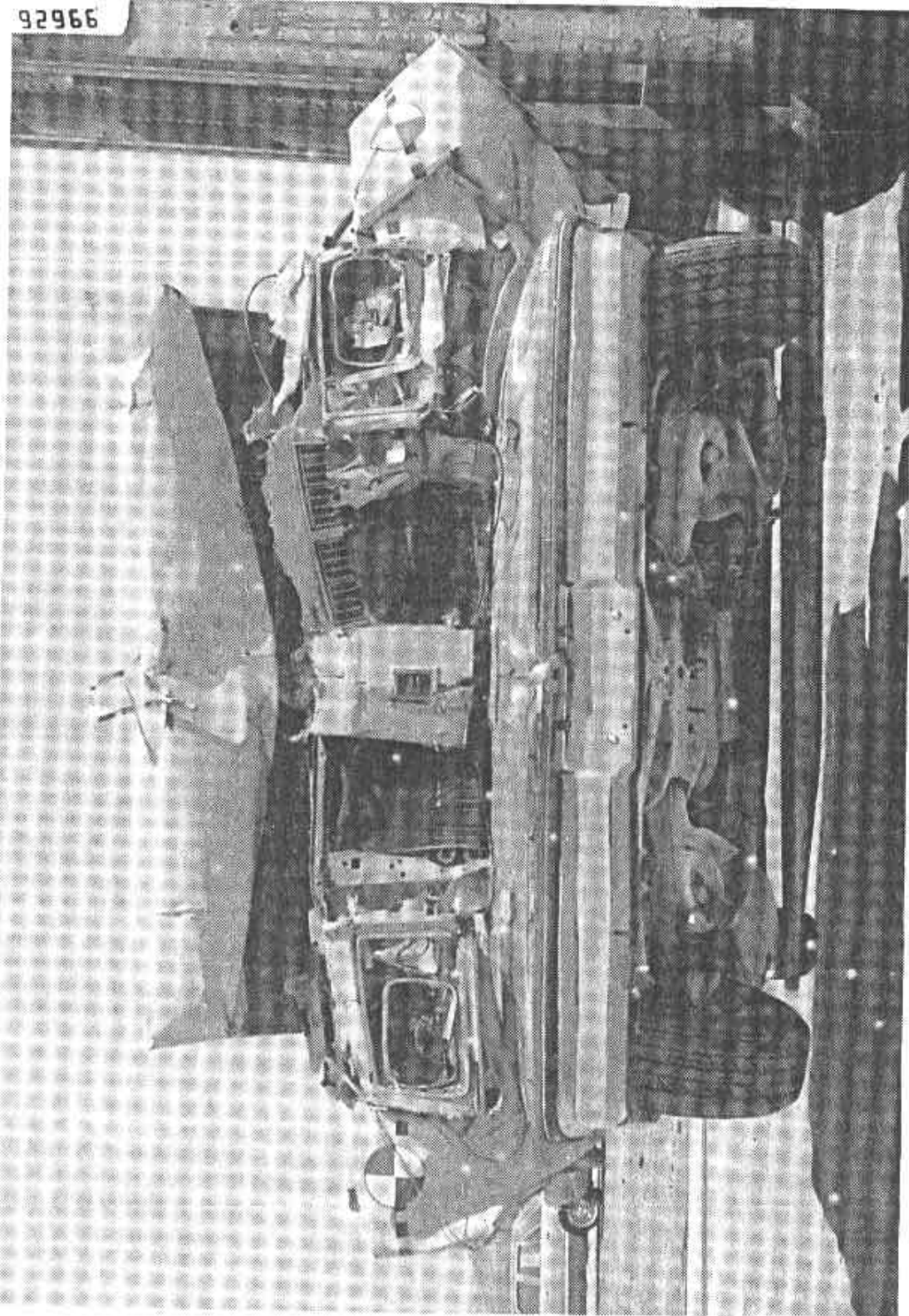


Figure 2-2. Post-test Front View - 1979 Oldsmobile Cutlass - NHTSA 790107.

80966

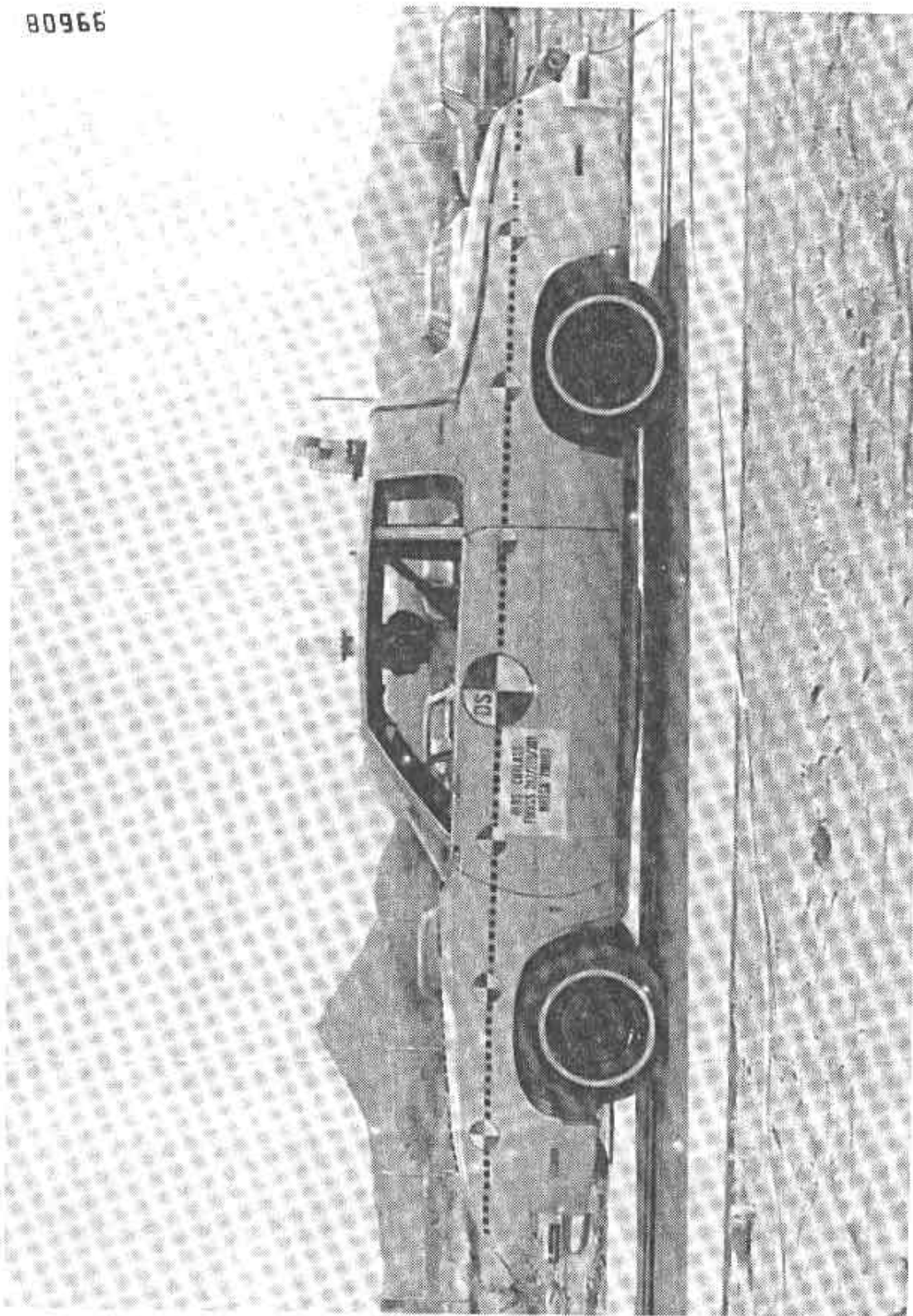


Figure 2-3. Pre-test Side View - 1979 Oldsmobile Cutlass - NHTSA 790107.

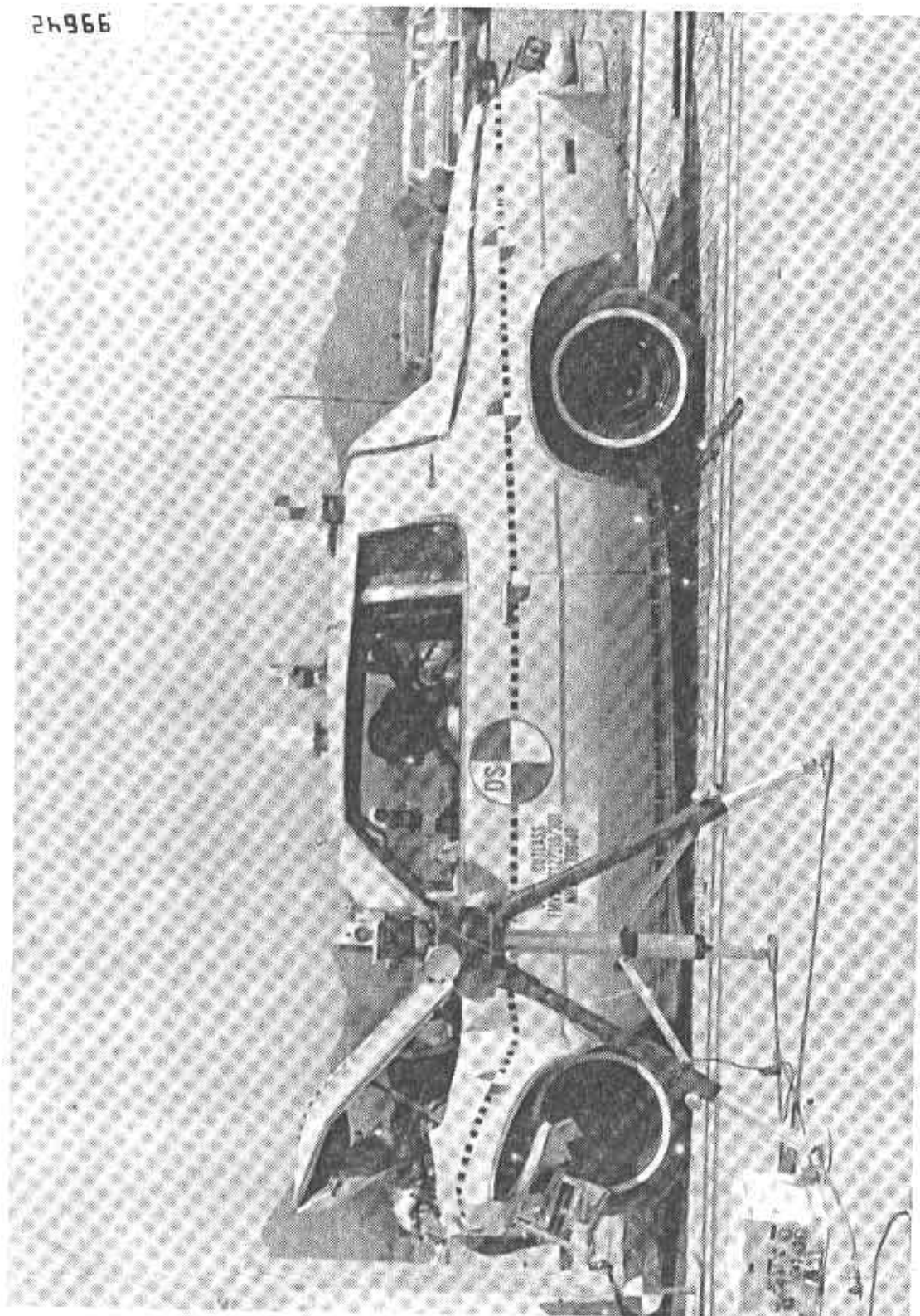


Figure 2-4. Post-test Side View - 1979 Oldsmobile Cutlass - NHTSA 790107.

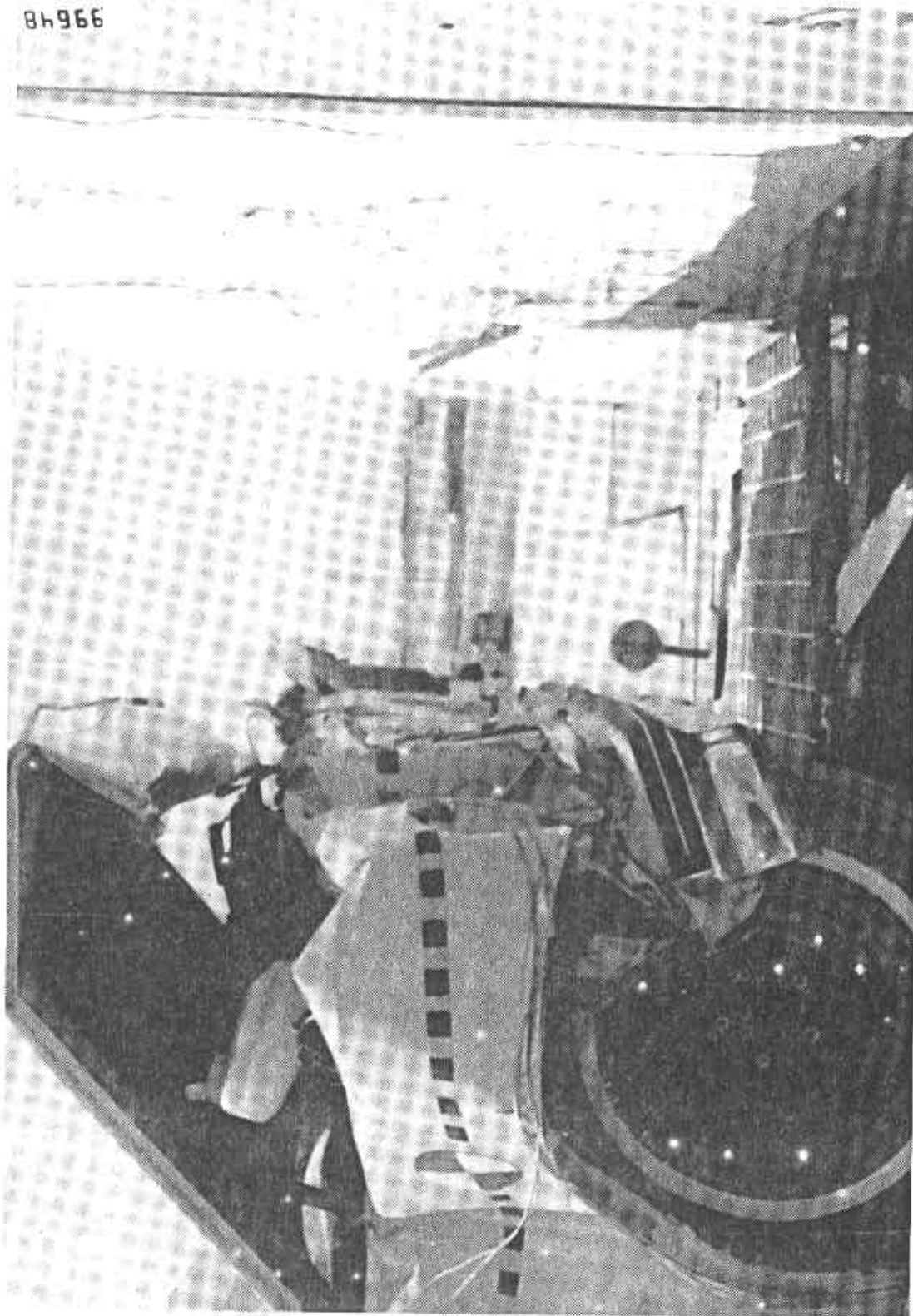


Figure 2-5. Post-test Side View - 1979 Oldsmobile Cutlass - NHTSA 790107.

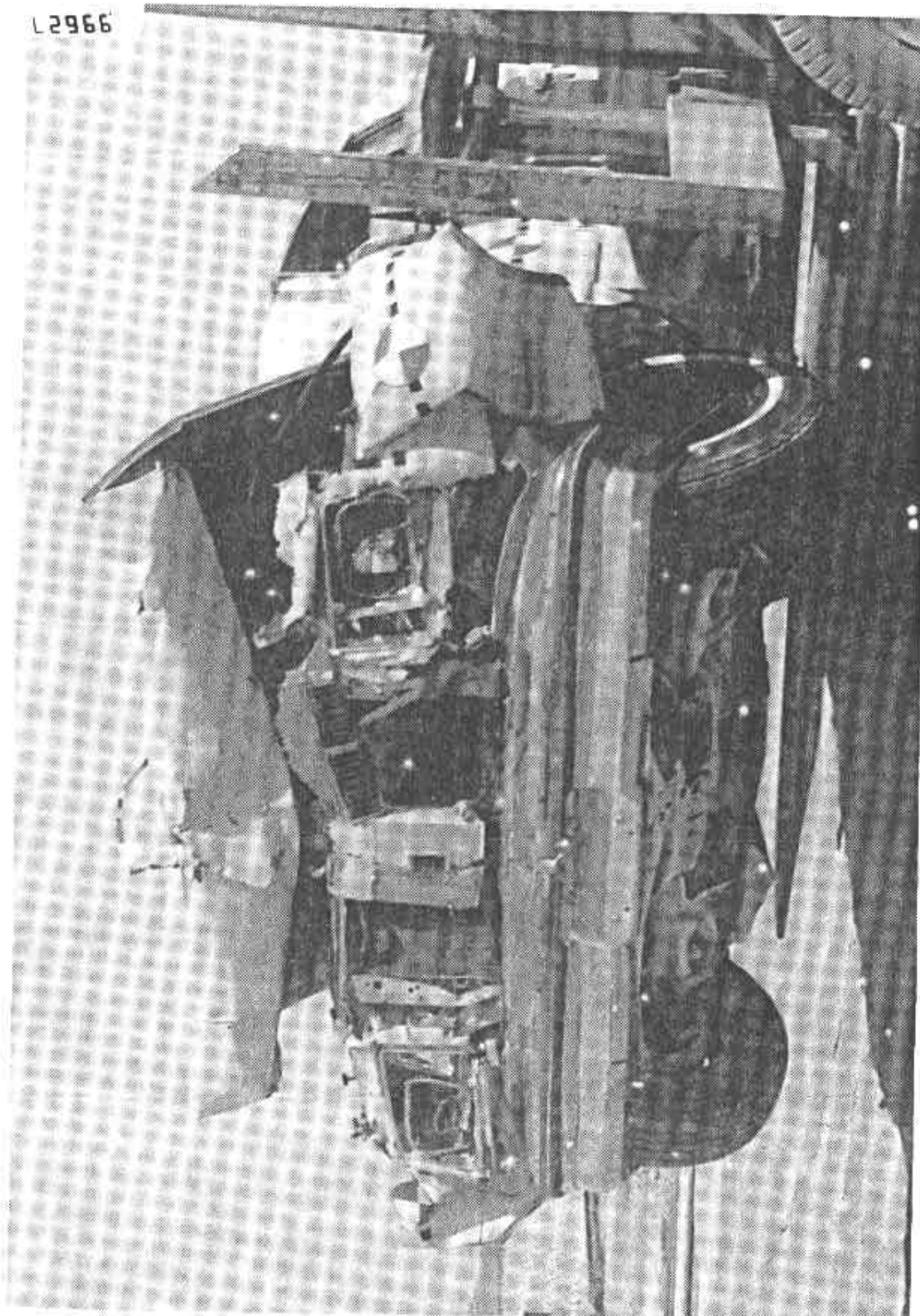


Figure 2-6. Post-test Left Front Quarter View - 1979 Oldsmobile Cutlass -
NHTSA 790107.

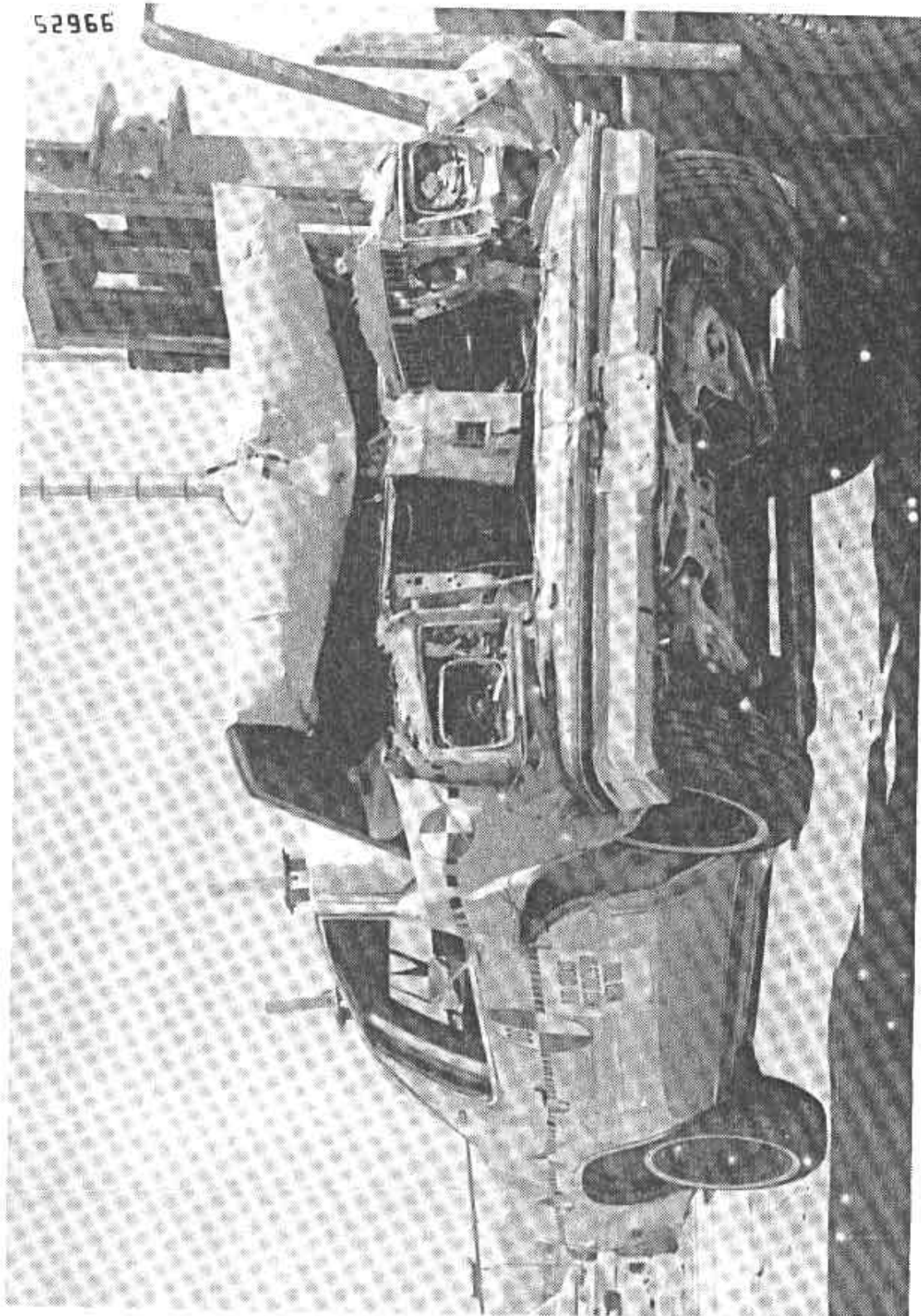


Figure 2-7. Post-test Right Front Quarter View - 1979 Oldsmobile Cutlass - NHTSA 790107.

886 6

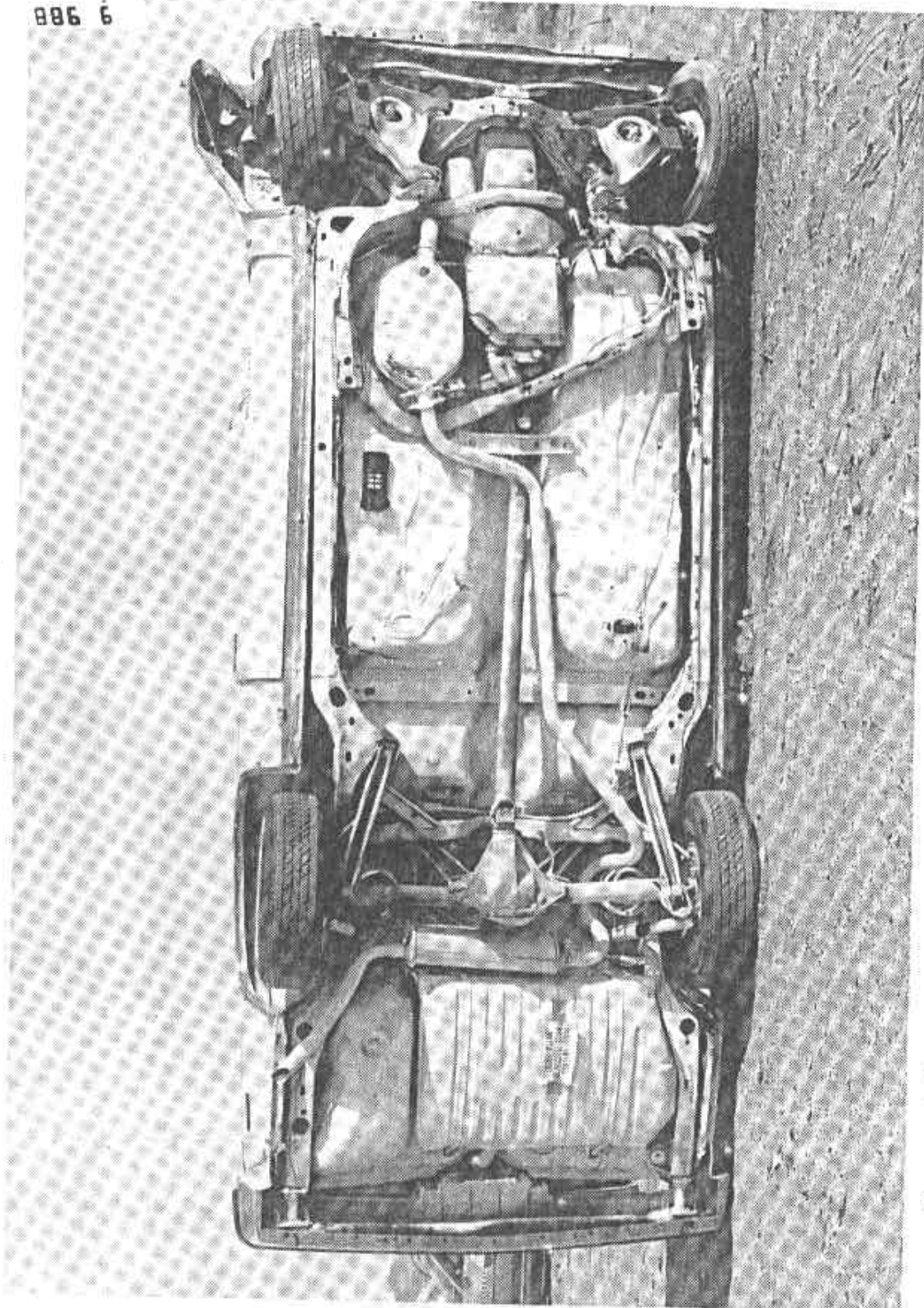


Figure 2-8. Post-test Overall Underside View - 1979 Oldsmobile Cutlass -
NHTSA 790107.

SECTION 3
COMPLIANCE-RELATED DATA
FMVSS 212, 219, 301-75 INDICANT TESTING

The following data sheets and photographs document compliance data related to FMVSS 212, 219, and 301-75.

SECTION 3
SUMMARY OF RESULTS
FMVSS 212 INDICANT DATA

VEHICLE DATA:

Manufacturer: General Motors Corp. Model Year: 1979
Make/Model: Cutlass Supreme
Body Style: 2-Door Sedan Manufacture Date: 12-78
VIN: 3R47A92439298 NHTSA No.: 790107
Delivery Weight: 3298 lb; Test Weight: 3799 lb; GVWR: 4453 lb
Engine: No. of Cylinders V6 Displacement 3.8 Litre
Vehicle Mileage: 74.5 miles
Remarks: Automatic Transmission, Tinted Glass, Radio,
Power Steering, Air Conditioning, Front Disc Power Brakes

GENERAL TEST CONDITIONS:

Vehicle Impact Speed:

Primary 34.84 mph; Secondary 34.83 mph
Speed Range Specified by CTM: 34.5 to 35.5 mph
Ambient Temperature at Time of Test: 86 °F
Date of Test: 10-11-79 Time: 1122
Windshield Molding Temperature: 73 °F

SUMMARY FOR FMVSS NO. 212:

		Actual Data	Standard Requirement	Pass/Fail
1. Pre-test Windshield	Right	<u>101.4</u>		
Periphery (in.)	Left	<u>101.4</u>		
	Total	<u>202.8</u>		
2. Post-test Windshield	Right	<u>101.4</u>		
Periphery (in.)	Left	<u>101.4</u>		
	Total	<u>202.8</u>	75% Minimum	<u>Pass</u>

LABORATORY INFORMATION:

Project Engineer: M. Pozzi Date: October 1979
Project Manager: E. Enserink Date: October 1979

SECTION 3
TEST DATA SHEET FOR
FMVSS 212 INDICANT DATA

VEHICLE DATA:

NHTSA No.: 790107

Tire Size and Type: Uniroyal P195/75 R14
Steel Radial

Cold Tire Inflation
Pressure (psi):

RF	<u>26.0</u>	LF	<u>26.0</u>	
RR	<u>26.0</u>	LR	<u>26.0</u>	Spare <u>26.0</u>

Delivered Vehicle Attitude (in.):

RF	<u>30.0</u>	LF	<u>30.0</u>	RR	<u>30.0</u>	LR	<u>30.0</u>
----	-------------	----	-------------	----	-------------	----	-------------

Vehicle Test Attitude (in.):

RF	<u>29.9</u>	LF	<u>30.0</u>	RR	<u>28.4</u>	LR	<u>28.3</u>
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Static Crush: 30.2 in. (Right Side) 29.5 in. (Left Side)

Rebound Distance: Right 24.5 in. Left 26.5 in.

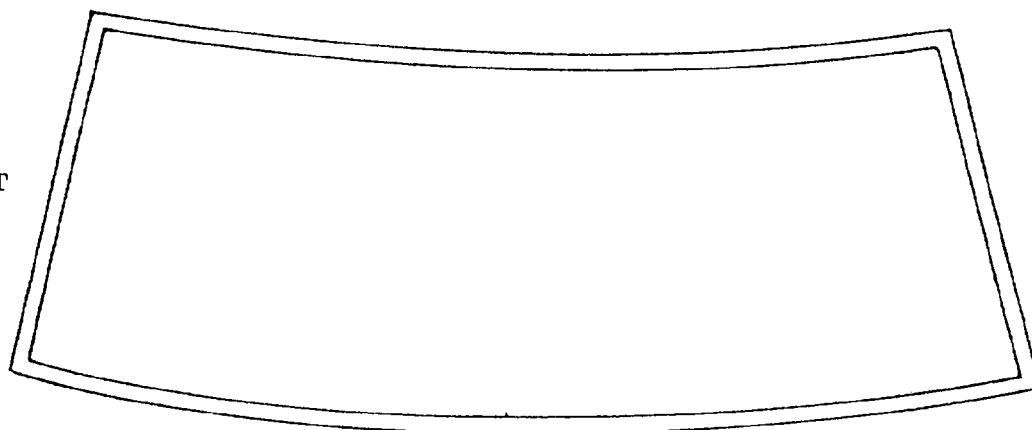
SPECIFIC TEST DATA FOR FMVSS 212:

Details of Windshield Mounting: Windshield glass is glued in place by a black mastic around its entire periphery. A one-inch wide rubber-lined metal strip borders windshield on top and sides while a four-inch wide rubber-lined metal strip borders the bottom. This bottom strip is held in place by four bolts, two of which serve as anchor points for windshield wiper rests.

Area of Retention Failure (as noted): None.

RIGHT
SIDE

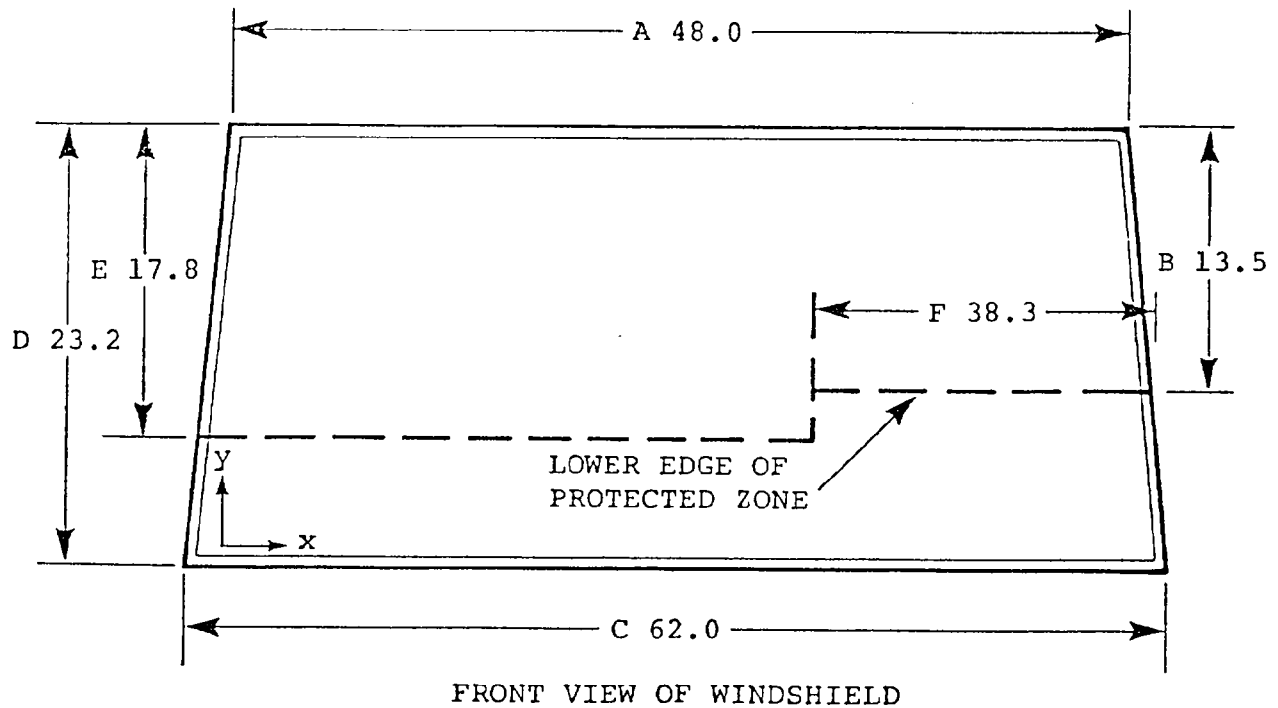
LEFT
SIDE



FRONT VIEW

SECTION 3
FMVSS 219 INDICANT DATA

1. PROTECTED ZONE DEFINITION:



Method of adhering styrofoam to the windshield:

One-half inch cut cell foam panels glued on with 3M cement and at least 24 hours of compression. Template then undergoes final 45° contouring and is recovered to protect template.

2. TEST RESULTS:

Zone Intrusion Description/Cause: None

	Coordinates		Depth (in.)
	X	Y	
1.	NA	NA	NA
2.	NA	NA	NA
3.	NA	NA	NA

SECTION 3
FMVSS 301-75 INDICANT DATA

GENERAL TEST CONDITIONS:

Vehicle Impact Speed:

Primary 34.84 mph Secondary 34.83 mph
Speed Range Specified by CTM: 34.5 to 35.5 mph
Ambient Temperature at Time of Test: 86 °F
Date of Test: 10-11-79 Time: 1122

FUEL SYSTEM DATA:

Test Fluid: Stoddard Solvent No. 2 Specific Gravity: 0.764
Kinematic Viscosity: 0.99 centistokes
Spill Point Volume: 18.9 U.S. gal/lb Liquid Temp: 72 °F
Test Volume: 17.2 U.S. gal/lb Liquid Temp: 72 °F
Details of Fuel Tank, Filler Pipes, and Connections: Rectangular
fuel tank is held in place aft of rear axle by two tank straps.
Tank is 70% off-center to vehicle left. Sender tube grommet is on
top side of tank. Filler tube exits rear vertical side of tank on
vehicle centerline and exits under rear license plate bracket. Tube
is sealed by a twist-type cap.

PERFORMANCE SUMMARY FOR FMVSS NO. 301-75:

	Actual Data	Standard Requirement	Pass/Fail
1. Transimpact Fluid Loss (oz)	<u>0</u>	<u>1 oz maximum</u>	<u>Pass</u>
2. Post-impact Fluid Loss (oz) (30-minute period post- impact)	<u>0</u>	<u>1 oz/ minute maximum</u>	<u>Pass</u>

Details of Leakage: None

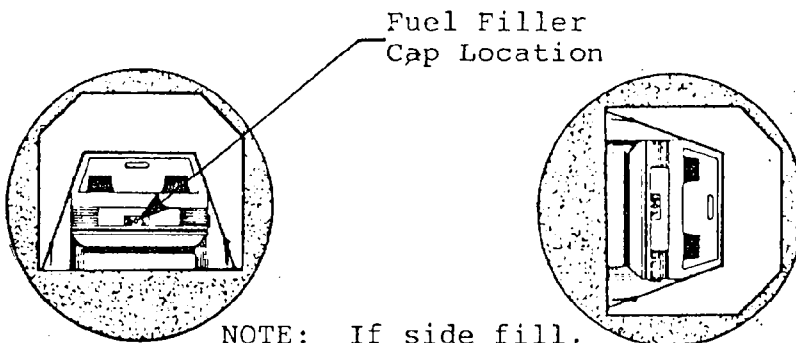
3. Static Rollover: See following four pages

LABORATORY INFORMATION:

Project Engineer: M. Pozzi Date: October 1979
Project Manager: E. Enserink Date: October 1979

SECTION 3
FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 790107



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

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 40 sec +
(Spec. Range = 1 to 3 min)
FMVSS 301 Position Hold Time..... = 5 min, 00 sec =
Total..... = 6 min, 40 sec
Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

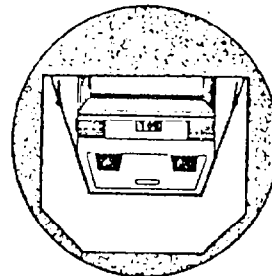
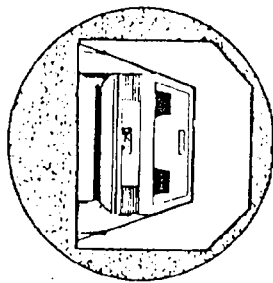
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	0

NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S):

SECTION 3
FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 790107



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 37 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 00 sec =

Total..... = 6 min, 37 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

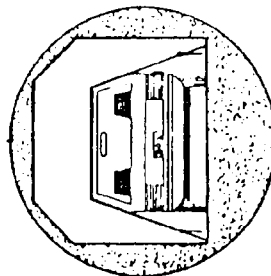
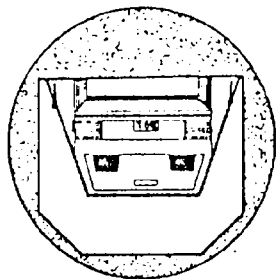
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	0

NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S):

SECTION 3
FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 790107



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 35 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 00 sec =

Total..... = 6 min, 35 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

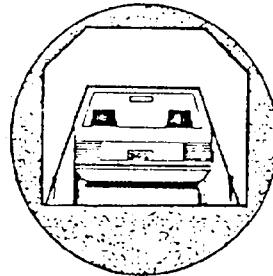
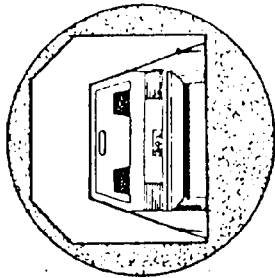
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	0

NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S):

SECTION 3
FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° to 360° VEHICLE NHTSA NO. 790107



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 37 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 00 sec =

Total..... = 6 min, 37 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	-

NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S):

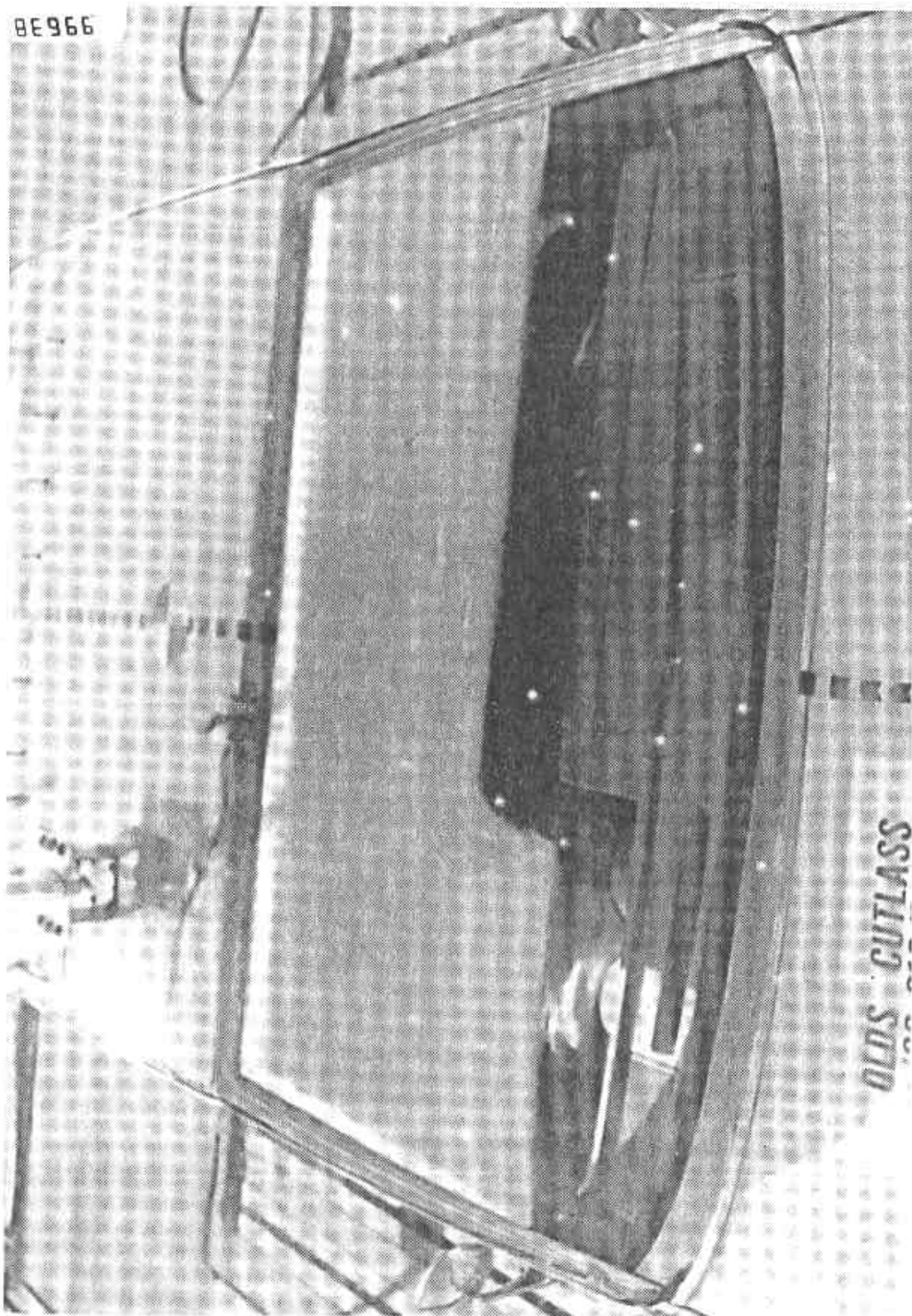


Figure 3-1. Pre-test Windshield - Overall View - 1979 Oldsmobile Cutlass - NHTSA 790107.

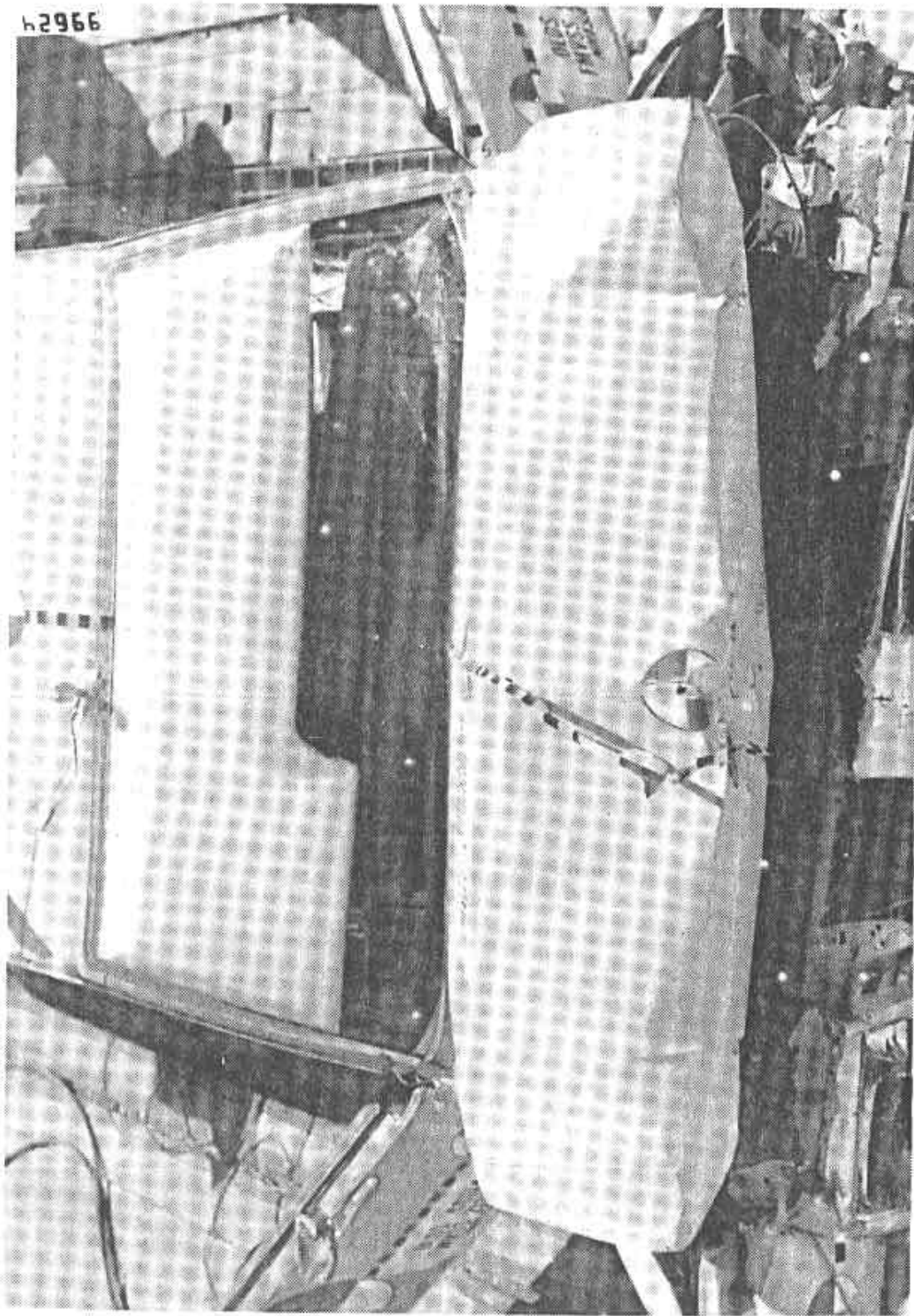


Figure 3-2. Post-test Windshield - Overall View - 1979 Oldsmobile Cutlass - NHTSA 790107.

BEH66

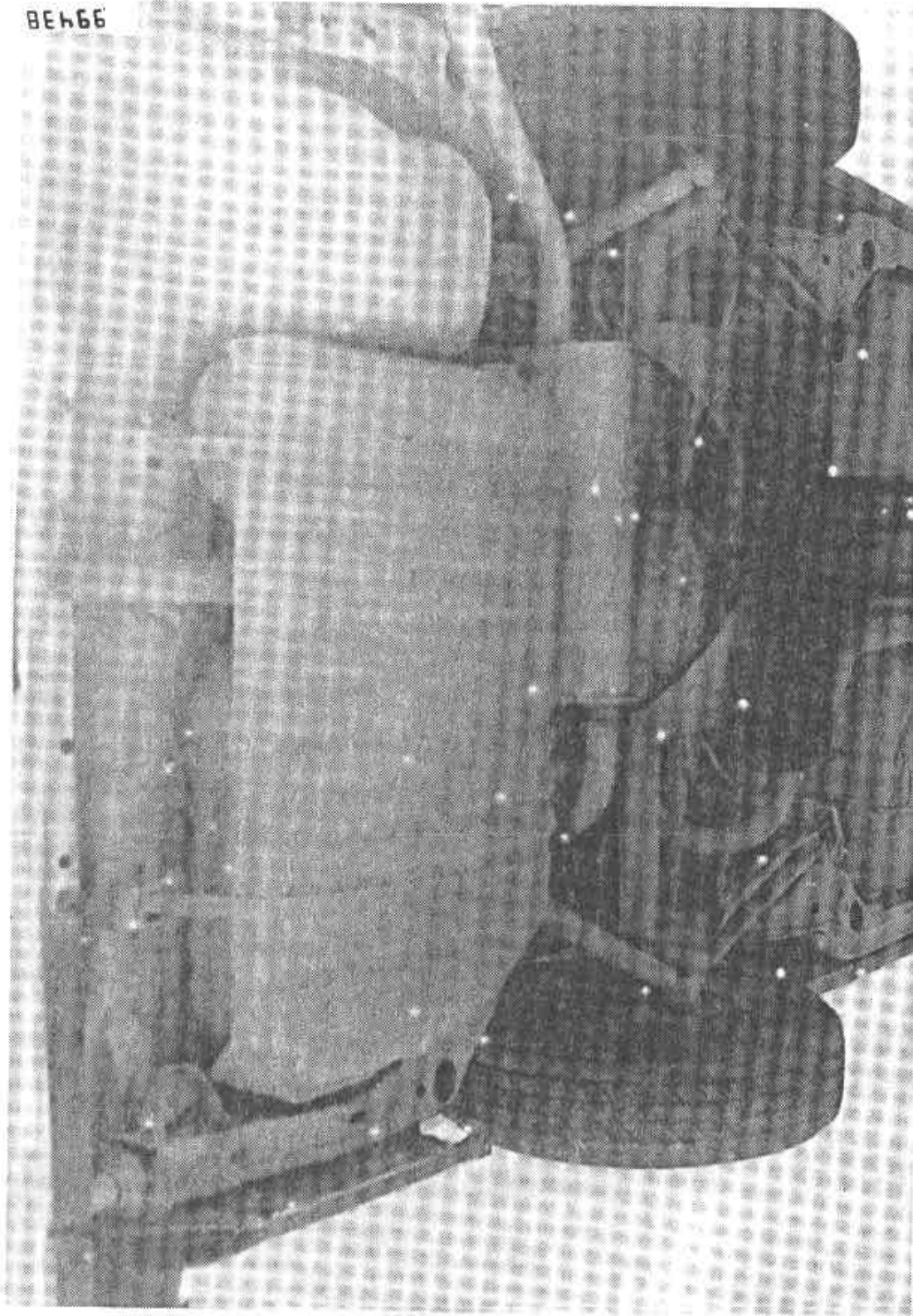


Figure 3-3. Pre-test View of Fuel Tank - 1979 Oldsmobile Cutlass - NHTSA 790107.

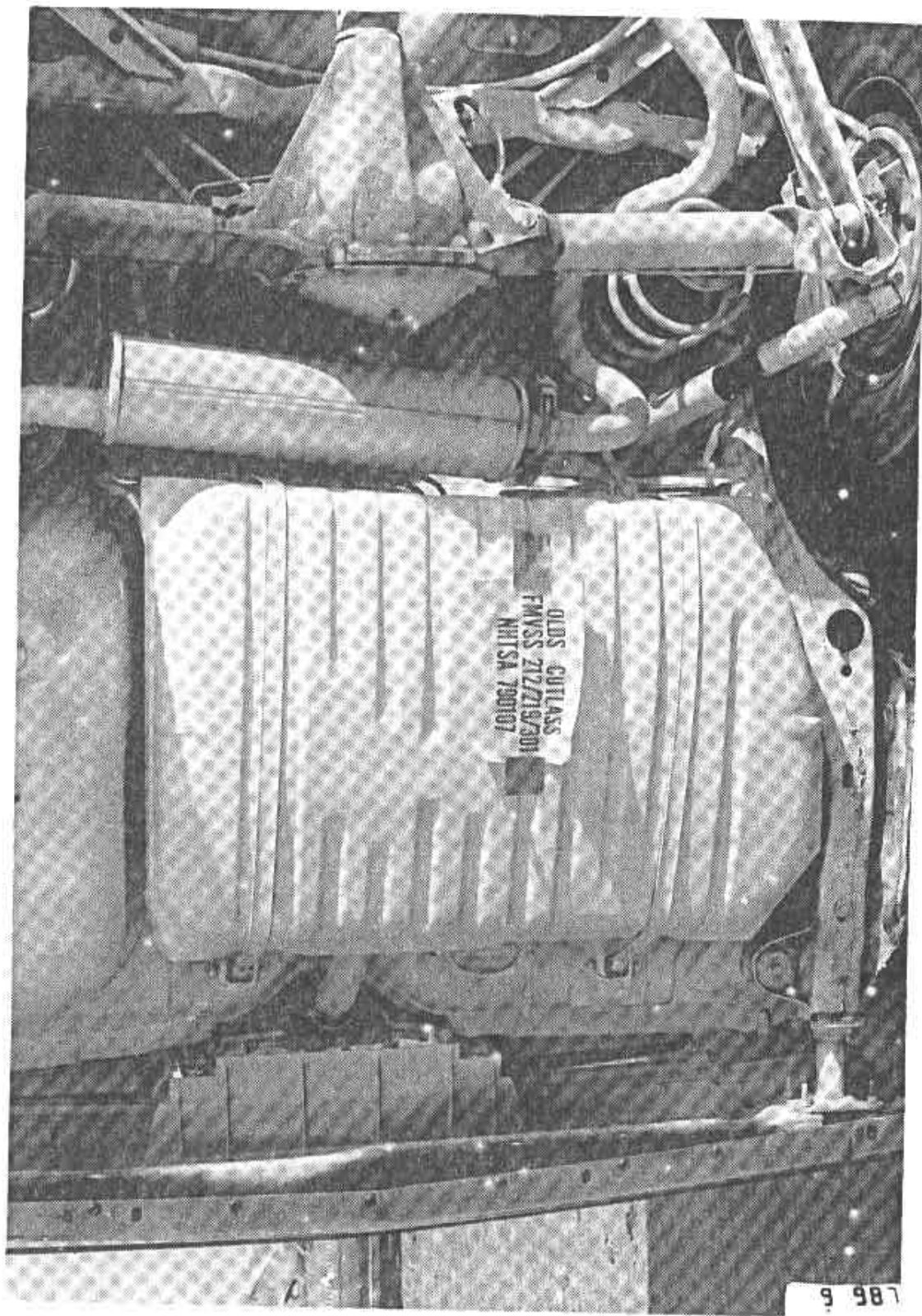


Figure 3-4. Post-test View of Fuel Tank - 1979 Oldsmobile Cutlass - NHTSA 790107.

Section 4
DATA REQUIRED BY R&D AND OAR

The following pages are included in this section:

1. Dummy positional data
2. Dummy injury summaries
3. Vehicle crush data
4. Accelerometer location and data summary
5. Photographs pertinent to R&D and OAR

Calcomp plots of dummy and vehicle accelerometer data are presented in Appendix B.

SECTION 4
DUMMY POSITIONING

Pre-test Dummy Positions

<u>Measurement</u>	<u>Driver (in.)</u>	<u>Passenger (in.)</u>	<u>Child (in.)</u>
Dummy Centerline to Vehicle Centerline	<u>11.2</u>	<u>13.5</u>	<u>N/A</u>
Nose to Upper Rim Steering Wheel	<u>15.3</u>	<u>N/A</u>	<u>N/A</u>
Nose to Windshield (Horizontal Distance)	<u>19.0</u>	<u>18.7</u>	<u>N/A</u>
Left Knee to Closest Point on Lower Panel	<u>8.5</u>	<u>8.7</u>	<u>N/A</u>
Right Knee to Closest Point on Lower Panel	<u>8.2</u>	<u>8.7</u>	<u>N/A</u>
Ankle Distance	<u>10</u>	<u>10</u>	<u>N/A</u>
Knee Distance	<u>9</u>	<u>9</u>	<u>N/A</u>
Nose to Seatback	<u>N/A</u>	<u>N/A</u>	<u>20.5</u>
Head to Windshield Header	<u>13.0</u>	<u>12.8</u>	<u>N/A</u>
Chest to Dash	<u>22.7</u>	<u>27.2</u>	<u>N/A</u>
Chest to Steering Wheel	<u>13.5</u>	<u>N/A</u>	<u>N/A</u>
Head to Side Header	<u>5.5</u>	<u>5.2</u>	<u>N/A</u>
Head to Side Window	<u>9.2</u>	<u>8.7</u>	<u>N/A</u>
Arm to Door	<u>5.7</u>	<u>5.0</u>	<u>N/A</u>
Hip to Door	<u>6.0</u>	<u>5.5</u>	<u>N/A</u>

Additional dummy positioning information is presented in the
PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET which follows.

SECTION 4
PART 572 DUMMY IN-VEHICLE POSITION
RECORDING SHEET

NHTSA No.: 790107

Manufacturer: General Motors Corp.

Make/Model: Cutlass Supreme

Model Year: 1979

SEAT TYPE:

☐ Bench ☐ Bucket
☒ Split Bench

ADJUSTER TYPE:

☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:

☐ Adjustable Reclining
☒ Fixed

AMBIENT TEMPERATURE: 74 °F; TIME: 1122

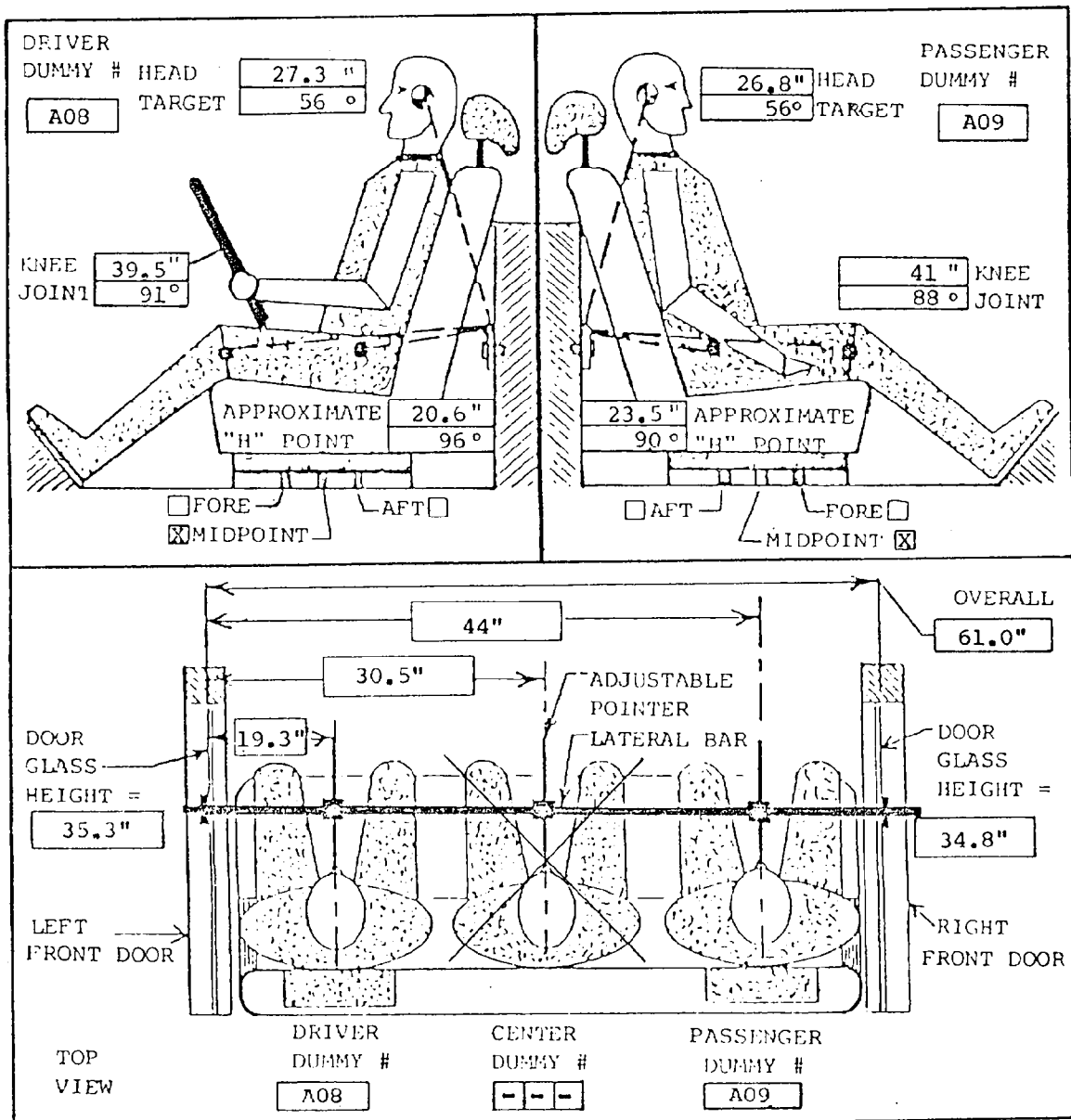
POSITIONING

DATE: 10-11-79

TECHNICIANS: 1. Mark Pozzi

2. _____

All front seat dummies shall be positioned according to the procedure "OSE RECOMMENDED PROCEDURE FOR POSITIONING PART 572 DUMMIES IN TEST VEHICLE."



SECTION 4
PART 572 DUMMY DATA SUMMARY

	Driver Dummy				Passenger Dummy			
	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 ¹	4.1	200	57.1	104	4.5	39	33.2	117
Lateral	4.8	78	14.8	112	12.9	179	12.6	104
Vertical	41.3	104	2.8	3	43.0	110	3.9	188
Resultant ¹	71.1	104	+ .4	4	50.3	111	+0.5	0.0
HIC	694.6 from 85 to 129 msec				500.5 from 76 to 123 msec			
Chest Acceleration								
Longitudinal	1.9	172.0	43.7	88.0	13.4	157.0	39.4	100.0
Lateral	8.5	63.0	12.1	136.0	5.3	90.0	12.6	109.0
Vertical	1.9	151.0	12.5	86.0	5.9	87.0	24.1	117.0
Resultant (Max)	45.0	88.0			40.3	109.0		
Resultant (clip)	41.5	86.0			39.7	116.0		
TIME > 60 G	0				0			
SEVERITY INDEX	365.4 @ 200 msec				400.6 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left	90.7	123.0	1130.1	81.0	132.6	65.0	567.0	86.0
Right	51.5	47.0	2082.0	76.0	130.1	106.0	523.3	70.0
Belt Loads								
Lap	1439.8	102.0	19.0	28.0	1989.2	109.0	15.9	3.0
Torso	1088.8	78.0	13.0	142.0	1276.4	97.0	7.6	2.0
Vehicle Impact Speed (mph): 34.84								
*Longitudinal:	Forward							
Lateral:	Rightward							
Vertical:	Downward							
**Longitudinal:	Rearward							
Lateral:	Leftward							
Vertical:	Upward							
¹ No data past 117 msec (passenger head location)								

SECTION 4
CHILD DUMMY DATA SUMMARY

	Child Dummy			
	Positive Direction*		Negative Direction**	
	Peak G	Time (msec)	Peak G	Time (msec)
Head Acceleration				
Longitudinal	61.4	172	186.0	143
Lateral	23.3	145	92.1	143
Vertical	183.1	125	70.3	143
Resultant	219.2	143		
HIC	1547.0 between 96 and 160 msec			
Chest Acceleration				
Longitudinal	83.5	147	25.9	131
Lateral	30.1	146	37.9	132
Vertical	115.4	129	31	190
Resultant (Maximum)	117.0	129		
Resultant (clip)	90.5	147		
TIME > 60 G	9 msec			
SEVERITY INDEX	1164.9 @ 200 msec			
Vehicle Impact Speed (mph): <u>34.84</u>				
*Longitudinal:	Forward			
Lateral:	Rightward			
Vertical:	Downward			
**Longitudinal:	Rearward			
Lateral:	Leftward			
Vertical:	Upward			

SECTION 4

PRE-/POST-TEST STATIC MEASUREMENT DATA (See Following Page for Dimension Definition)

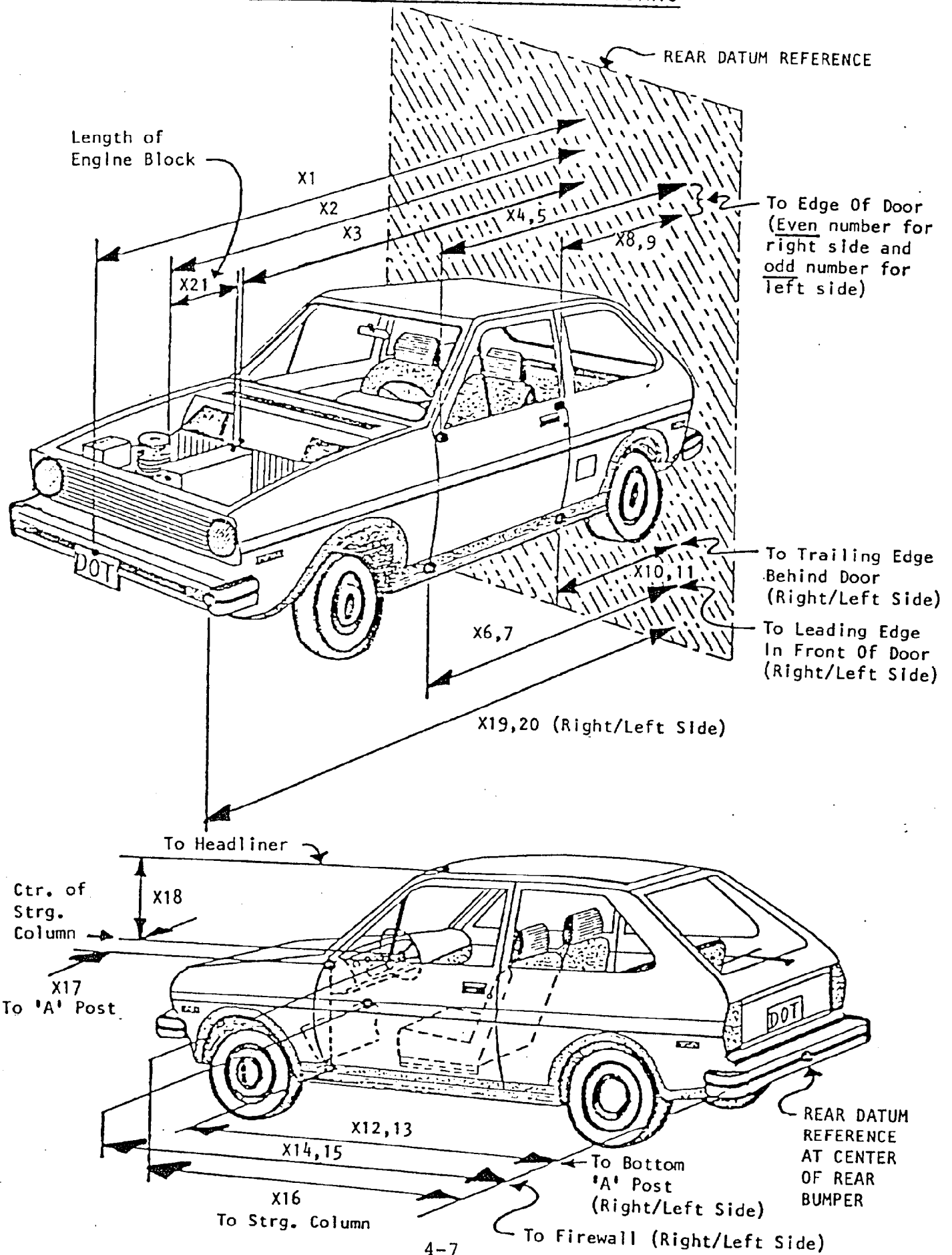
Vehicle: 1979 Oldsmobile Cutlass NHTSA No.: 790107

Test Date: October 11, 1979 D.S. No.: 974

<u>Reference Dimension</u>	<u>Pre-test Measurement</u>	<u>Post-test Measurement</u>	<u>Change</u>
X ₁ *	200.0	169.1	30.9
X ₂	162.0	156.8	5.2
X ₃	143.0	140.8	2.2
X ₄	133.3	131.4	1.9
X ₅	133.3	131.8	1.5
X ₆	136.7	133.5	3.2
X ₇	136.7	133.5	3.2
X ₈ *	81.5	79.1	2.4
X ₉ *	81.3	80.0	1.3
X ₁₀	79.9	76.8	3.1
X ₁₁	79.8	77.2	2.6
X ₁₂	133.5	130.5	3.0
X ₁₃	133.5	130.5	3.0
X ₁₄	145.0	137.0	8.0
X ₁₅	148.5	141.0	7.5
X ₁₆	116.5	114.3	2.2
Y ₁₇	15.2	16.0	+0.8
Z ₁₈	16.4	22.2	+5.8
X ₁₉ *	199.0	169.5	29.5
X ₂₀ *	199.0	168.8	30.2
X ₂₁	19.0	16.0	3.0

*Rear impact data requirements.

PRE-TEST AND POST-TEST MEASUREMENT POINTS



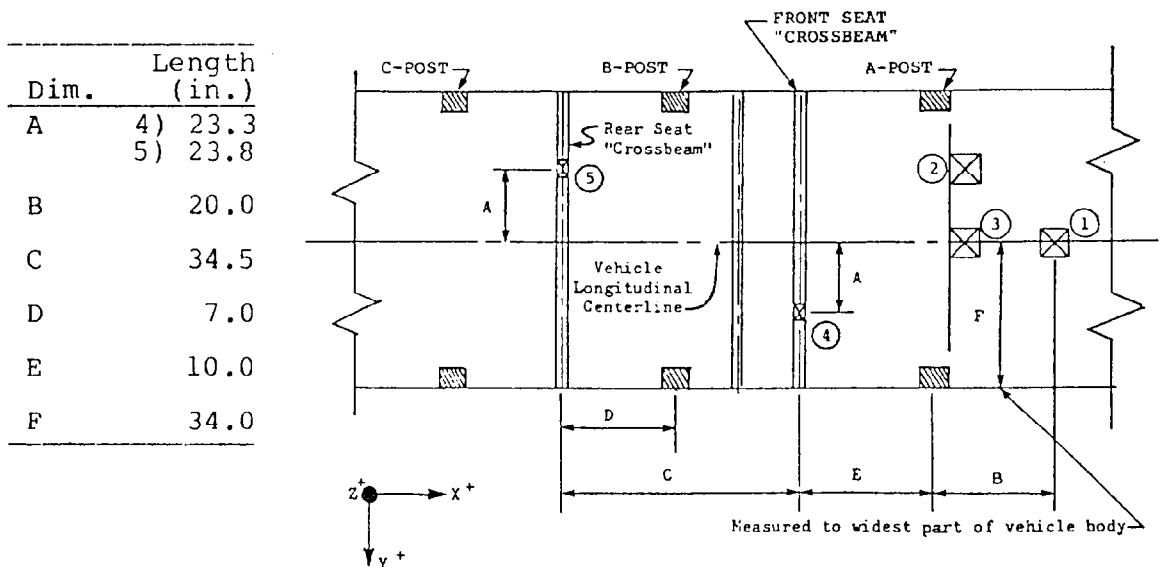
SECTION 4

VEHICLE PROFILE DATA SHEET

Vehicle: 1979 Oldsmobile Cutlass D.S. No.: 974 Test Date: October 11, 1979
 Measurement Date: Pre-test: October 11, 1979 Post-test November 5, 1979
 Exterior Measurements Referenced to Plane: 17 feet Forward of: Rear Bumper

Location	Height	Vehicle Left (in.)						Vehicle Right (in.)					
		30	24	18	12	6	0	6	12	18	24	30	
Pre-test Profile (in.)													
Top of Front Bumper	20.4	6.8	6.3	5.5	5.0	4.5	4.0	4.5	5.0	5.5	6.3	6.8	
Front of Hood	32.3	11.0	10.2	9.2	8.8	8.2	7.6	8.2	8.8	9.2	10.2	11.0	
Post-test Profile (in.)													
Top of Front Bumper	19.3	36.0	35.6	35.6	35.4	35.3	34.9	35.3	35.1	35.1	35.1	35.6	
Front of Hood	36.4	36.9	35.0	32.7	Missing Data Points	31.8		Missing Data Points			34.3	34.3	
Post-test Static Crush (in.)													
Top of Front Bumper	-1.1	29.2	29.3	30.1	30.4	30.8	30.9	30.8	30.1	29.6	28.8	28.8	
Front of Hood	+4.1	25.9	24.8	33.5	-	-	24.2	-	-	-	24.1	23.3	

SECTION 4 TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY



No.	Location Description	Component Direction			Data Summary Peak G @ msec							
		X	Y	Z	X		Y		Z			
					"+" "	"-" "	"+" "	"-" "	"+" "	"-" "		
✓ 1	Engine	✓	✓		31.4 @ 79	81.0 @ 69	@	@	19.5 @ 60	24.4 @ 85		
2	Firewall above* steering column	✓	✓		6.5 @ 46	25.5 @ 20	@	@	17.8 @ 39	23.3 @ 23		
3	Firewall @ vehicle centerline	✓	✓		23.7 @ 79	55.6 @ 69	@	@	13.4 @ 13	35.7 @ 85		
✓ 4	Below front seat area	✓	✓	✓	4.4 @ 167	55.6 @ 83	19.5 @ 94	22.6 @ 78	38.4 @ 77	44.5 @ 82		
✓ 5	Below rear seat area	✓	✓		4.5 @ 159	43.1 @ 78	@	@	24.0 @ 80	18.1 @ 63		

*No data past 70 msec.

SECTION 4
DUMMY KINEMATIC SUMMARY

DRIVER - Struck lower steering wheel rim with abdomen, and then struck upper rim with forehead. Dummy rebounded into seat back with substantial force and came to rest upright, leaning medially.

PASSENGER - During forward movement there was no discernible torso rotation. Torso belt prevented dummy from striking dash with head. Dummy rebounded into seat back, then moved upward and toward vehicle centerline. Dummy came to rest upright, leaning medially.

CHILD - Struck Framework of passenger seat bottom with forehead, as well as striking its own legs. Dummy head grazed upper passenger seat back on rebound, and came to rest upright with left arm overhead and right arm flung to the side.

OTHER COMMENTS:

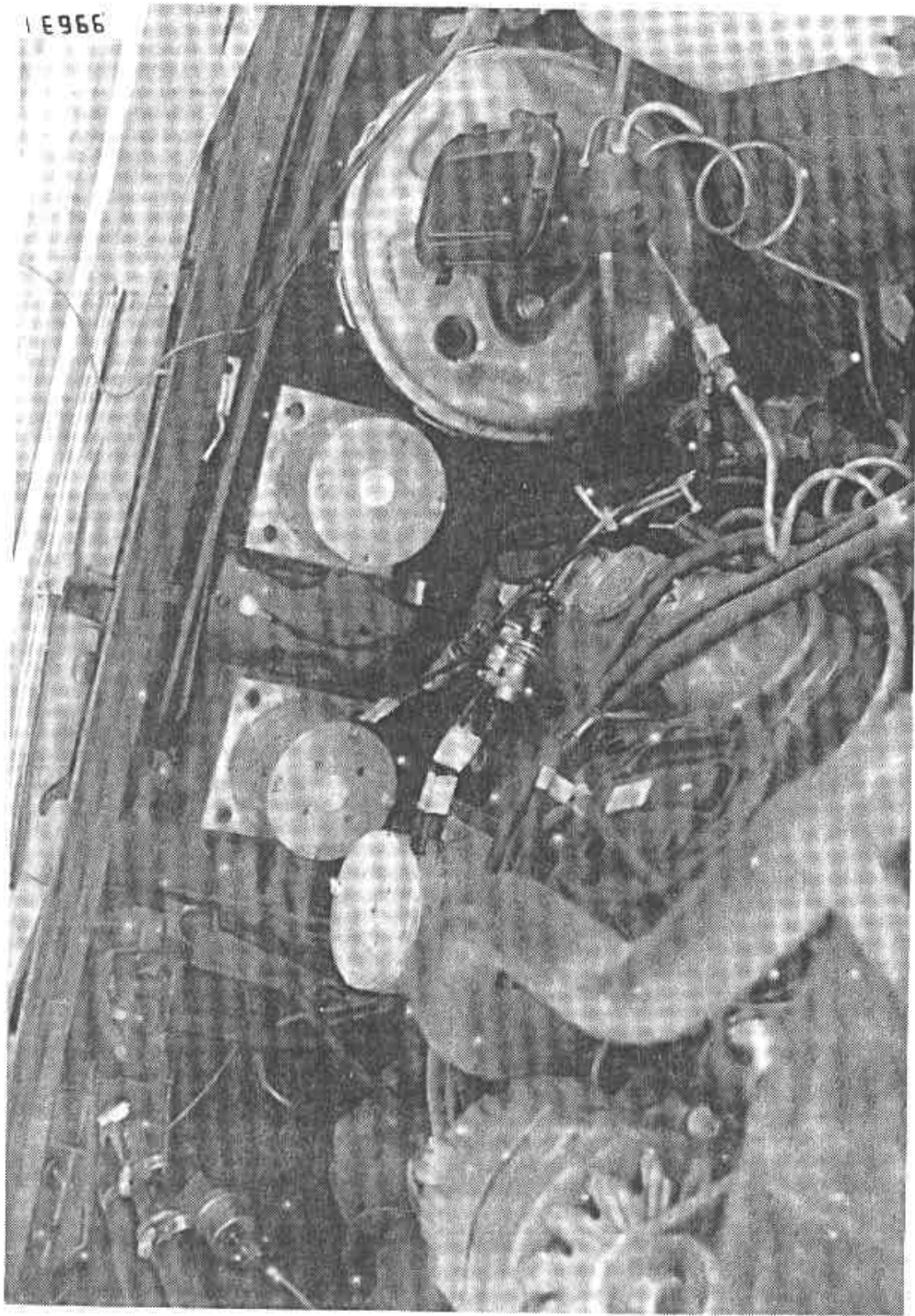


Figure 4-1. Engine Compartment Accelerometer Location - 1979 Oldsmobile Cutlass - NHTSA 790107.



Figure 4-2. Pre-test Driver Dummy Position - 1979 Oldsmobile Cutlass -
NHTSA 790107.

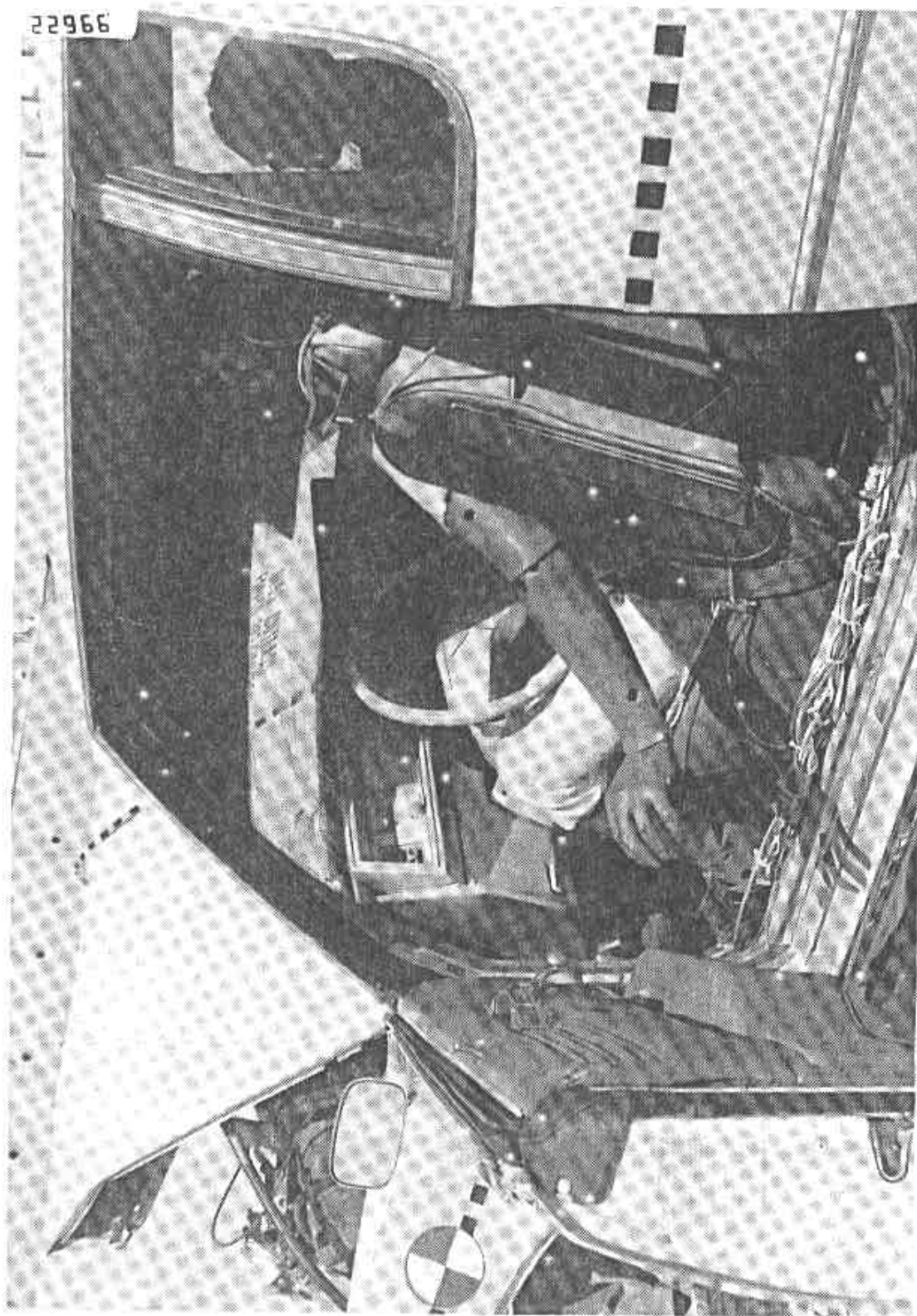


Figure 4-3. Post-test Driver Dummy Position - 1979 Oldsmobile Cutlass -
NHTSA 790107.

hh966



Figure 4-4. Post-test Driver Dummy Position - 1979 Oldsmobile Cutlass -
NHSTA 790107.



Figure 4-5. Post-test Driver Compartment - 1979 Oldsmobile Cutlass -
NHTSA 790107.

51 966



Figure 4-6. Pre-test Passenger Position - 1979 Oldsmobile Cutlass - NHTSA 790107.

82966



Figure 4-7. Post-test Passenger Position - 1979 Oldsmobile Cutlass - NHTSA 790107.

14966



Figure 4-8. Post-test Passenger Position - 1979 Oldsmobile Cutlass - NHTSA 790107.

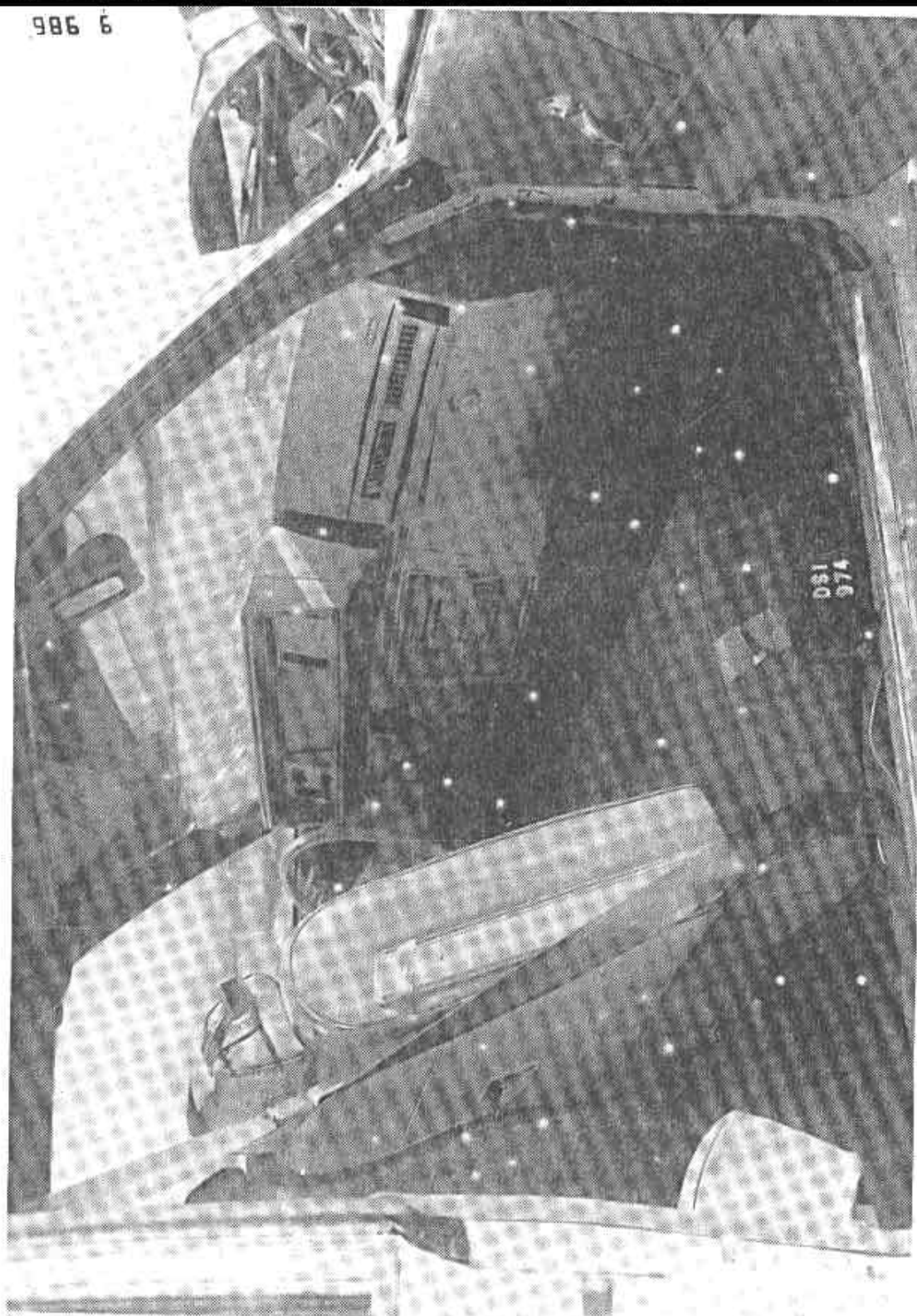


Figure 4-9. Post-test Passenger Compartment - 1979 Oldsmobile Cutlass - NHTSA 790107.

0E966



Figure 4-10. Pre-test Child Dummy Position - 1979 Oldsmobile Cutlass - NHTSA 790107.



Figure 4-11. Post-test Child Dummy Position - 1979 Oldsmobile Cutlass - NHTSA 790107.

81 965



Figure 4-12. Post-test Child Dummy Position - 1979
Oldsmobile Cutlass - NHTSA 790107.

APPENDIX A
TEST FACILITIES AND PROCEDURE

APPENDIX A TEST FACILITY AND EQUIPMENT FOR FRONTAL BARRIER IMPACT TESTS

General Test Facility Description

Frontal Barrier impact tests are conducted at the Dynamic Science, Inc. Phoenix Facility in Phoenix, Arizona. Figure A-1 is an overall aerial view of that facility.

More specifically, the Monorail Impact Facility shown schematically in Figure A-2 is used. As indicated in Figure A-2, the Monorail Impact Facility accommodates a variety of test modes and configurations.

Test Track and Guidance System

The test track consists of 1,200 feet of asphalt pavement (SN = 75 $\pm$ 5), 14 feet in width. The length allows sufficient acceleration distance to accommodate impact speeds in excess of 60 mph with sufficient distance remaining to abort the test if necessary. Guidance for the test vehicle is provided by a sliding shoe attached to the vehicle. The sliding shoe rides on the monorail embedded in the test track. Prior to impact, the shoe is mechanically released from the test vehicle.

Tow System and Velocity Control

The tow system consists of a drum-driven endless cable powered by a pair of 390-cubic-inch engines driven in tandem driving a modified three-speed C-6 automatic truck transmission. The tow system can propel a 6,000-pound vehicle into the fixed barrier at 75 mph. Velocity control is achieved through a manually controlled throttle system. A visual readout of speed versus distance is provided and compared with the "ideal curve." Velocity control under ± 0.5 mph is realizable down to 20 mph and ± 2.0 percent down to zero mph.



1. ENGINEERING/ADMINISTRATION CENTER
2. MECHANICAL/INSTRUMENTATION SHOPS
3. DUMMY CALIBRATION LABORATORY
4. GARAGE/MAINTENANCE SHOP
5. ENVIRONMENTAL CHAMBER
6. STATIC CRUSH FACILITY
7. TWO-MILE OVAL
8. TURNAROUND (TYPICAL OF TWO)
9. BARRIER IMPACT FACILITY
10. DROP TOWER/SLED TEST FACILITY
11. CENTRAL DATA ACQUISITION AND CONTROL STATION
12. PENDULUM FACILITY
13. NONMETALLICS LABORATORY
14. TEST SERVICE FACILITY
15. VEHICLE-TO-VEHICLE TEST FACILITY
16. ROLLOVER TEST FACILITY
17. RIDE QUALITY COURSE
18. SKID PAD
19. HIGH AND LOW SKID NUMBER BRAKING LANES
20. SALT WATER TROUGH
21. BELGIAN BLOCK
22. PARKING BRAKE TEST RAMP
23. PULL-OFF AREA (TYPICAL OF THIRTEEN)
24. BALLISTIC TEST RANGE

Figure A-1. The Dynamic Science, Inc. Phoenix Facility.

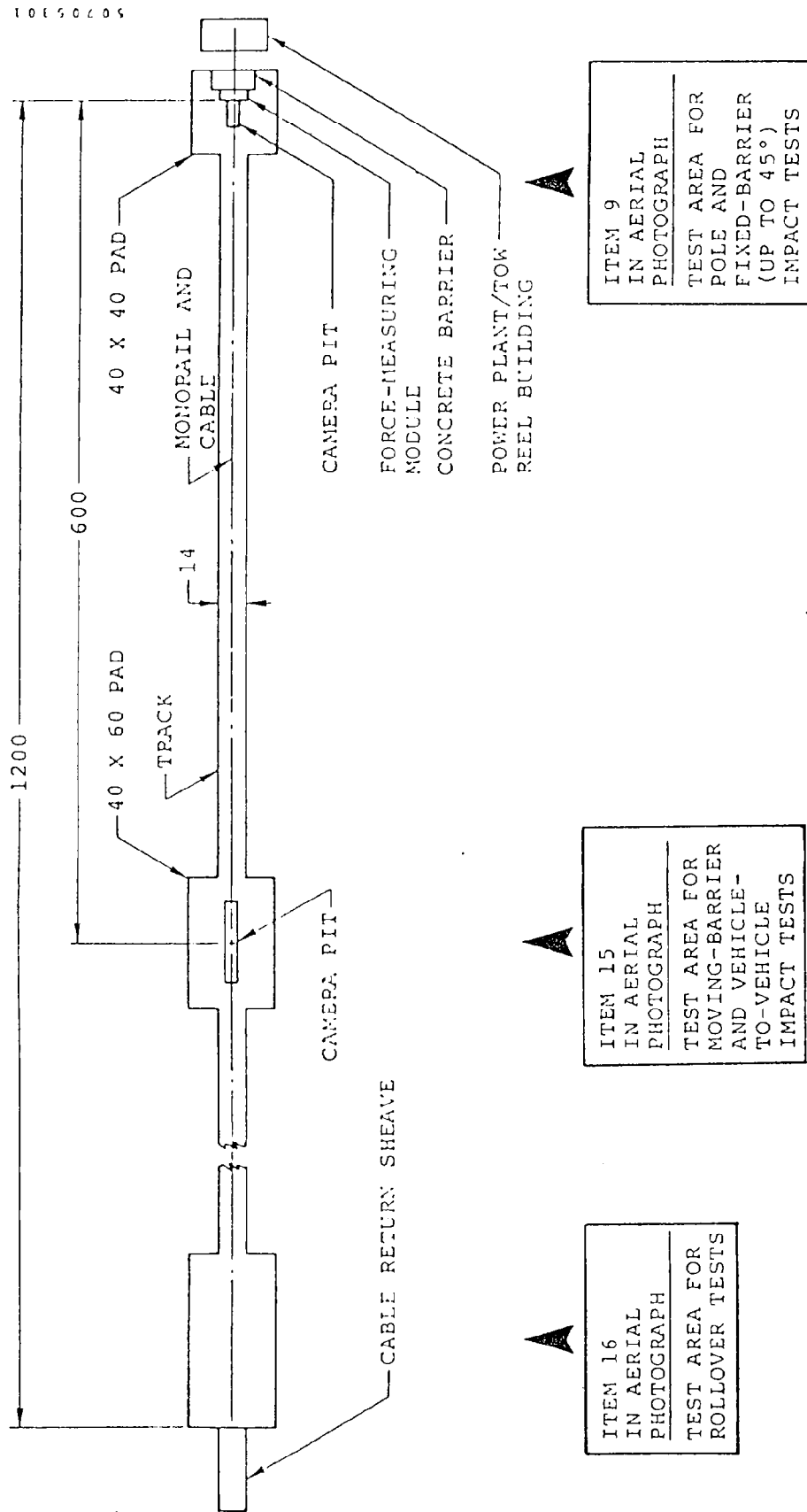


Figure A-2. Monorail Impact Facility.

Automatic abort capability is provided through the vehicle service brakes which are actuated by releasing high-pressure air into the hydraulic system. Abort criteria consist of vehicle speed, data acquisition and instrumentation system readiness, and stability of the vehicle on the test track. The first two criteria are automatically monitored by the test control system, while the third criterion is visually monitored by the test conductor. Manual abort provisions are available to the test conductor. Upon verifying vehicle speed, the test control system automatically deactivates the abort system to preclude inadvertent test abort immediately prior to impact.

Control System

The master control system used for impact tests controls and monitors all primary system functions that must operate throughout a predetermined interval during a test. This includes the starting and stopping of the tape recorder, high-speed cameras, and oscillograph, and control of the power winch which propels the test vehicle. The operation of the various devices is confirmed, including vehicle velocity and tape recorder speed synchronization, before it passes through a "commit" window. When the vehicle is committed, the abort system is disarmed, preventing an accidental abort after the point of no return is reached.

Any system malfunction, including improper vehicle velocity up to the commit window, generates an abort. The control system uses the pulse output from the IRIG time base generator as a clock with a manual push button defining time zero. The logic circuits compare pulse counts from time zero to preset values dialed in at the control panel. As each control circuit gets an equal comparison, that circuit is turned on. If the self-test circuit does not verify, the abort system is automatically activated. After successful vehicle test, the last control circuit shuts the entire system down. The manual backup control system provides the test conductor the option for manually aborting the test if the need arises.

Fixed Collision Barrier

The basic fixed collision barrier conforms to the definition in Part 571-1, Paragraph 571.3 - Definitions, 36 F.R. 11242, dated July 14, 1970 and effective September 1, 1970. The fixed impact barrier is a reinforced concrete structure, 6-feet high, 6-feet thick, 12-feet wide, and weighing approximately 100,000 pounds. The barrier face is adjustable for conducting 30-degree oblique impact tests.

Fuel Simulation

As prescribed in the FMVSS 301-75 Laboratory Procedure, the vehicle fuel system is filled to 90-91 percent of capacity with Stoddard Solvent.

The fuel is pumped out of the fuel tank, and the residual fuel in the fuel lines and the carburetor is burned by operating the vehicle engine. The fuel system is filled with Stoddard Solvent No. 2. The solvent is then pumped into the fuel lines, up to the carburetor. The weight of the Stoddard Solvent added and removed is determined with two Western Beam Scales (Model No. WP 2000).

The solvent used, Stoddard Solvent No. 2, has a specific gravity of 0.764 at 75°F and a viscosity of 0.99 centistokes.

Windshield Zone Intrusion Template

A windshield zone intrusion template is laid out and fabricated for each vehicle to spatially define the windshield protected zone.

Windshield Protected Zone Boundaries

The lower boundary of the protected zone is determined as follows:

1. A 6.5-inch diameter rigid sphere, weighing 15 pounds, is positioned so it simultaneously contacts the inner surface of the windshield glazing and the surface of the instrument panel, and the locus of points contacted by the sphere is marked. The line is then extended horizontally to the edge of the glazing material.
2. A line is drawn on the inner surface of the windshield below and one-half inch distant from the locus of points determined in Step 1.

The top and side boundaries of the zone are the top and sides of the windshield opening. The protected zone extends three inches outward from the outer surface of the windshield measured perpendicular to any point along the outer boundary of the zone. The protected zone is shown in Figure A-3.

Fabrication of Windshield Zone Intrusion Template

In order to determine whether or not there is any penetration into the protected zone, FMVSS No. 219 specifies that a template be formed of Styrofoam, type DB, cut cell, conforming to the shape of the zone and attached to the windshield. The Styrofoam exhibits essentially only plastic deformation characteristics, making it excellent for recording possible intrusion but difficult to shape to the windshield contour. The ultimate thickness of 3 inches is achieved by laminating six 1/2-inch-thick layers which can be individually bent to the windshield curvature, an operation not possible with 3-inch-thick Styrofoam because of its brittleness. The laminations are glued together in place on the windshield and the 45° bevel is applied to the perimeter of the template after it is bonded to the windshield.

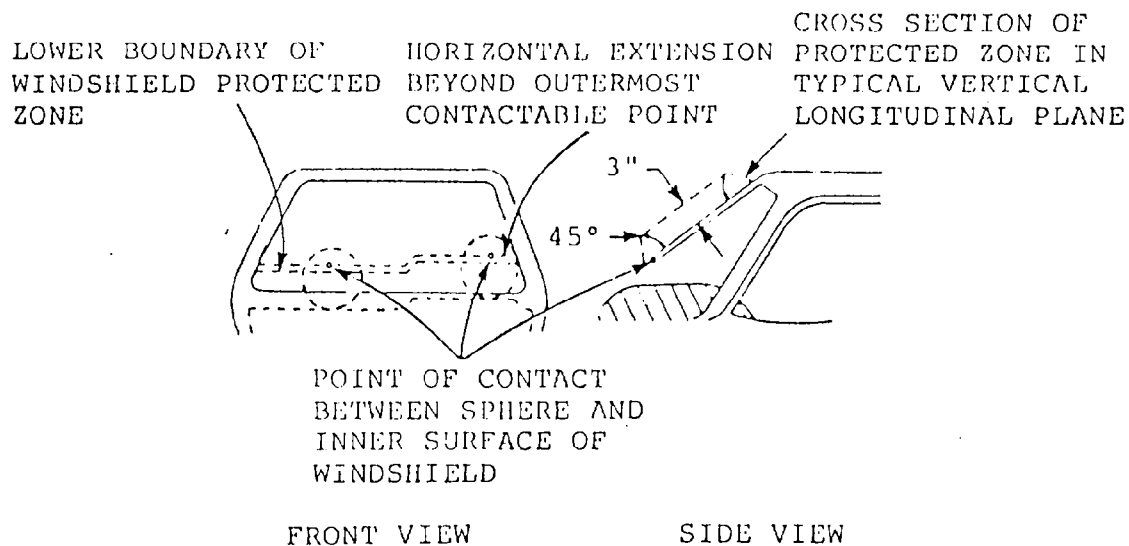


Figure A-3. Windshield Protected Zone.

Camera Coverage

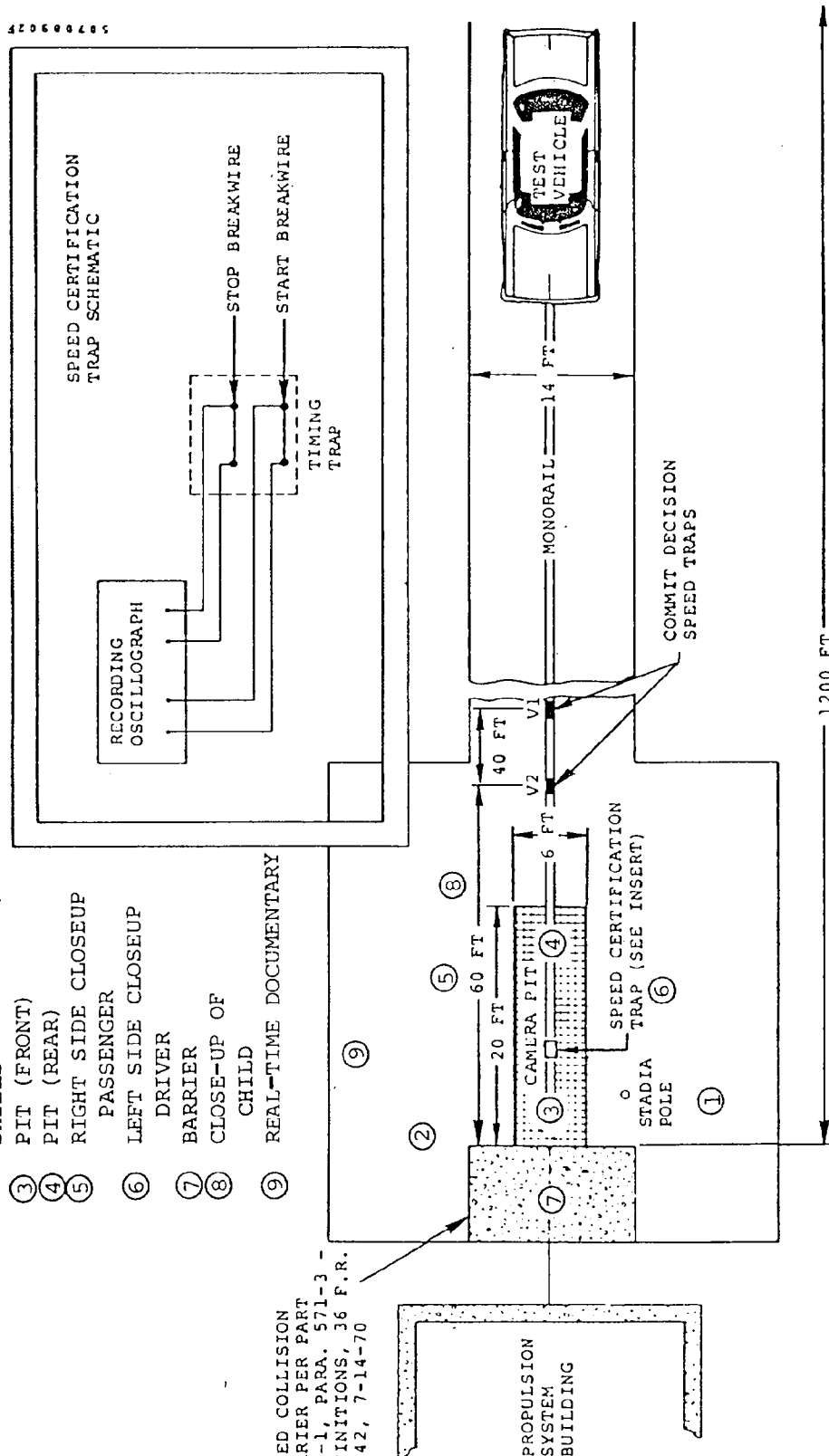
Eight high-speed cameras are positioned on and around the impact barrier and test vehicle to provide total coverage of the barrier impact (Figure A-4). Specific locations are:

1. Left side overall
2. Offboard vehicle right side to view windshield.
3. At the front end of the pit to view possible fuel spillage in the engine compartment.
4. In the pit under the fuel tank to view possible fuel spillage from the tank.
5. Right side closeup of dummy motion and the windshield zone template.
6. Left side closeup of dummy motion and the windshield zone template.
7. On the barrier to provide a front view of the windshield template.

CAMERA LEGEND*

- ① LEFT SIDE OVERALL
- ② OFFBOARD RIGHT WIND-SHIELD
- ③ PIT (FRONT)
- ④ PIT (REAR)
- ⑤ RIGHT SIDE CLOSEUP PASSENGER
- ⑥ LEFT SIDE CLOSEUP DRIVER
- ⑦ BARRIER
- ⑧ CLOSE-UP OF CHILD
- ⑨ REAL-TIME DOCUMENTARY

FIXED COLLISION BARRIER PER PART 571-1, PARA. 571-3 - DEFINITIONS, 36 F.R. 11242, 7-14-70



*Cameras 6, 7, and 8 are used only for tests in which instrumented dummies are used. All 301-75 frontal barrier impact tests use cameras 1 through 5.

Figure A-4. Frontal Barrier Impact Test Site Layout.

8. Closeup right to view child in rear seat.
9. Real-time documentation.

Ballast Weight

The ballast used in this program is weighed on a Howe platform scale prior to installation in the test vehicle.

The platform scale is calibrated by placing precision weights thereon and recording the scale reading. The accuracy of the ballast weights is:

- $\pm 1/2$ pound for 0 to 300-pound weights
- ± 1 pound for 300 to 1000-pound weights.

Vehicle Weight

The weights of the test vehicle are determined by placing each wheel on a Western Model WP 2000 beam scale, certified with test weights scaled to National Bureau of Standards Class B tolerances.

Dummy Positioning

The following table summarizes the steps taken to position the instrumented, calibrated dummies in the test vehicle. The dummies were kept in a temperature-controlled enclosure at the head of the track until t-30 seconds. The temperatures both in the enclosure, and the outside ambient temperature were recorded immediately prior to rollout.

DUMMY PLACEMENT AND POSITIONING

Part 572 Dummy	Driver DSP	Passenger DSP
HEAD	Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.	Surface of transverse instrument mounting platform is horizontal & midsagittal plane falls in longitudinal plane.
UPPER TORSO	Placed against seat back. Midsagittal plane is vertical & longitudinal & passes through center point of steering wheel rim.	Placed against seat back. Midsagittal plane is vertical, longitudinal, & the same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.
UPPER ARMS	Initially placed against seat back & tangent to side of Upper Torso. Push arms rearward into seat back with bending at elbows.	Initially placed against seat back & tangent to side of Upper Torso. Push arms rearward into seat back with bending at elbows. Remains tangent.
LOWER ARMS	Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.	Initially placed against the outside of the thighs. Centerline as close as possible in a vertical plane.
HAND PALMS	Palms contact outer part of steering wheel rim at horizontal centerline.	Palms contact the outsides of the thighs.
HAND THUMBS	Placed over steering wheel rim.	
HAND LITTLE FINGERS		Barely in contact with the seat cushion.

DUMMY PLACEMENT AND POSITIONING (CONTD)

Part 572 Dummy	Driver DSP	Passenger DSP
LOWER TORSO	Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical & longitudinal & passes through center point of plane described by steering wheel rim.	Centered on bucket seat cushion. Midsagittal plane is vertical & longitudinal. For bench seat, midsagittal plane is vertical, longitudinal, and same distance from vehicle longitudinal centerline as driver dummy midsagittal plane.
UPPER LEGS (thighs or femurs)	Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.	Placed against seat cushion. Plane defined by femur and tibia centerlines is as close as possible to vertical.
RIGHT KNEE	Knees initially set 14.5" apart between pivot bolt head outer surfaces.	Located so that plane defined by femur and tibia centerlines is as close as possible to vertical.
LEFT KNEE	Outer surface of pivot bolt head is 5.9" from midsagittal plane of dummy.	Located as above.
LOWER LEGS (tibias)	Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.	Plane defined by femur and tibia centerlines is as close as possible to vertical longitudinal plane.
RIGHT FOOT	Placed on undepressed accelerator pedal--rearmost point of heel on floorpan in plane of pedal.	Centerline falls in vertical longitudinal plane. Placed on toeboard--rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.
LEFT FOOT	Placed on toeboard--rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan. Centerline falls in vertical longitudinal plane.	Centerline falls in vertical longitudinal plane. Placed on toeboard--rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan.

Test Equipment List and Function

<u>Item</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Purpose</u>
Timing Trap	Dynamic Science	None	Determine impact speed by furnishing a start and stop signal to recording oscillograph.
Oscillograph	Bell and Howell	5-134	Records timing start and stop signals from timing traps, cable drum drive rpm, and impact switch.
Speed Control	Dynamic Science	None	Precision control of cable drive drum rpm.
Beam Scales	Western	WP 2000	Used to determine vehicle test weights.
High-speed Motion Picture Cameras	Photosonics Milliken Red Lake Labs	16-1B 5A 164-5AC	Used for front, side, overhead, and underside film coverage.
Motion Picture Camera	Canon Scoopic		Panning and documentation.
Still Camera	Mamiya	RB 67	Documentary photo coverage.
100 and 1000 Hz Time Code Generators	Dynamic Science	None	Furnish timing signal for high-speed cameras and a 1 second timing for velocity determination.
Stop Watch	Brietling	None	Time for collection of fuel leak samples.
Containers	-	-	Collection for fuel leak samples.
Graduated Cylinder	Pyrex	3022	Fuel volume measurement.
Graduated Cylinder	Kimax	-	Fuel volume measurement.
Calibrated Steel Rule	Starret	48 in.	Precision measurement of velocity trap spacing.
Anthropomorphic Dummies	Alderson Research Labs	Hybrid II	To ballast the vehicle and to gather occupant response data.

APPENDIX B CALCOMP PLOT PRESENTATION

Calcomp plots generated from the crash test data are presented on the following pages. All data will be recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data was filtered according to SAE J211. Plot legends and test anomalies are listed below:

PLOT LEGEND

Dummy Data*

<u>Driver</u>	<u>RF Outboard Passenger</u>	<u>RR 6-year- Child</u>	<u>Data Description</u>
501	503	506	Head Acceleration
1101	1103	1106	Chest Acceleration
2111	2131		Left Femur Load
2112	2132		Right Femur Load
4101	4103		Torso Belt Load

Vehicle Data**

	<u>Location</u>
101	Engine
102	Firewall
103	Firewall at Vehicle Centerline
104	Front Seat Area
105	Rear Seat Area

*Dummy Injury Summary presented on pages 4-4 and 4-5.

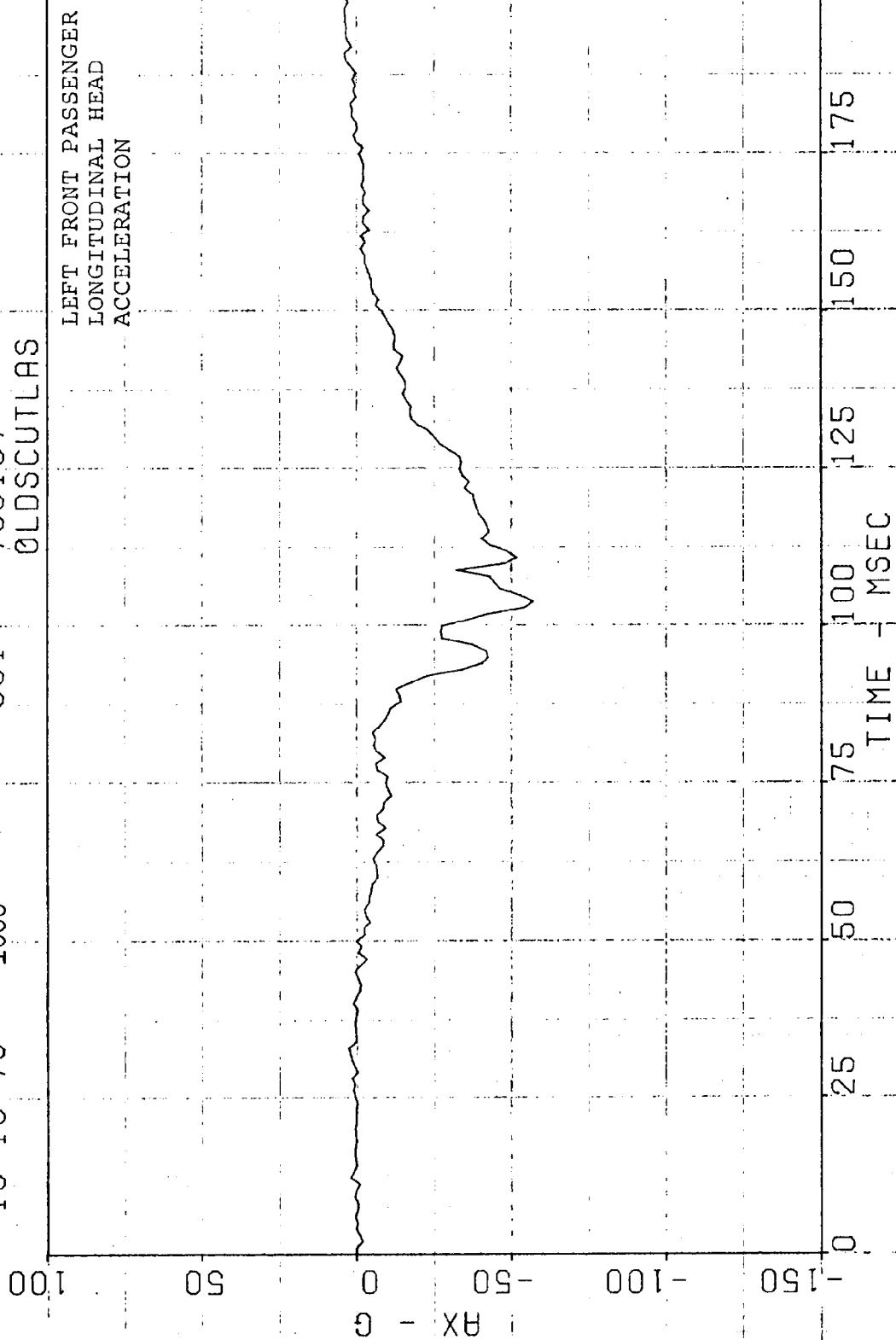
**Vehicle accelerometer location and data summarized on page 4-9.

APPENDIX B (CONTD)

Test Anomalies:

- 1) Location 102 vehicle firewall accelerometer longitudinal and vertical acceleration. No data past 70 msec due to severed arteries.
- 2) Location 503 passenger head longitudinal acceleration and resultant acceleration. No data past 117 msec due to sensor malfunction.

DATE 10-10-79 FILTER 1600 LOCATION 501 TEST NO 790107 102979
0LDSCUTLAS



DATE 10-10-79
 FILTER 1600
 LOCATION 501
 TEST NO 790107
 OLDSCUTLAS
 102979

LEFT FRONT PASSENGER
 LATERAL (Y) AND VERTICAL
 (Z) HEAD ACCELERATION

60

40

20

0

-20

-40

ACCELERATION - G

0

25

50

75

100

125

150

175

200

TIME - MSEC

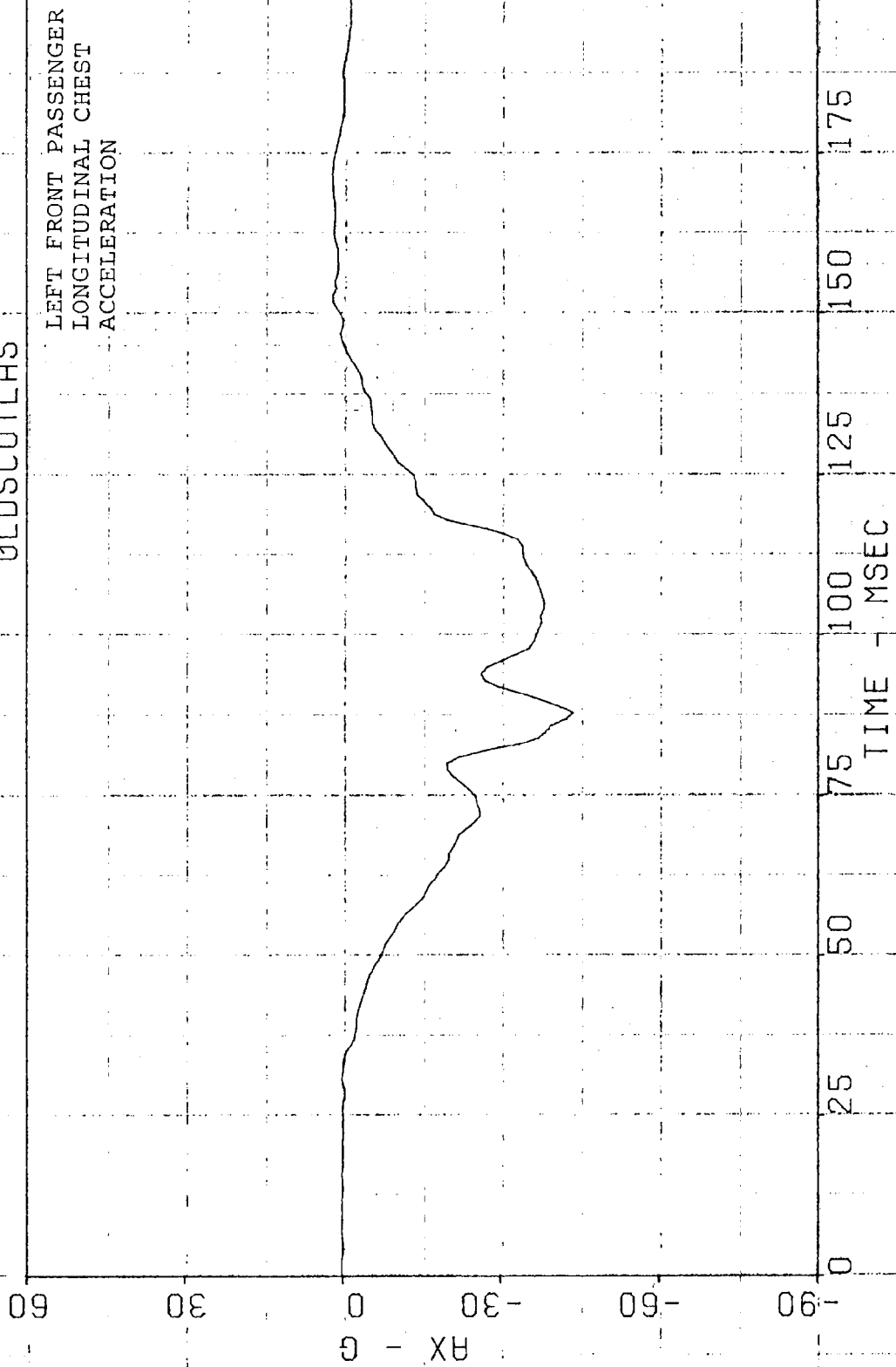
DATE 10-10-79
FILTER 1600
LOCATION 501
TEST NO 790107
102979
0LDSCUTLAS

LEFT FRONT PASSENGER
RESULTANT HEAD
ACCELERATION

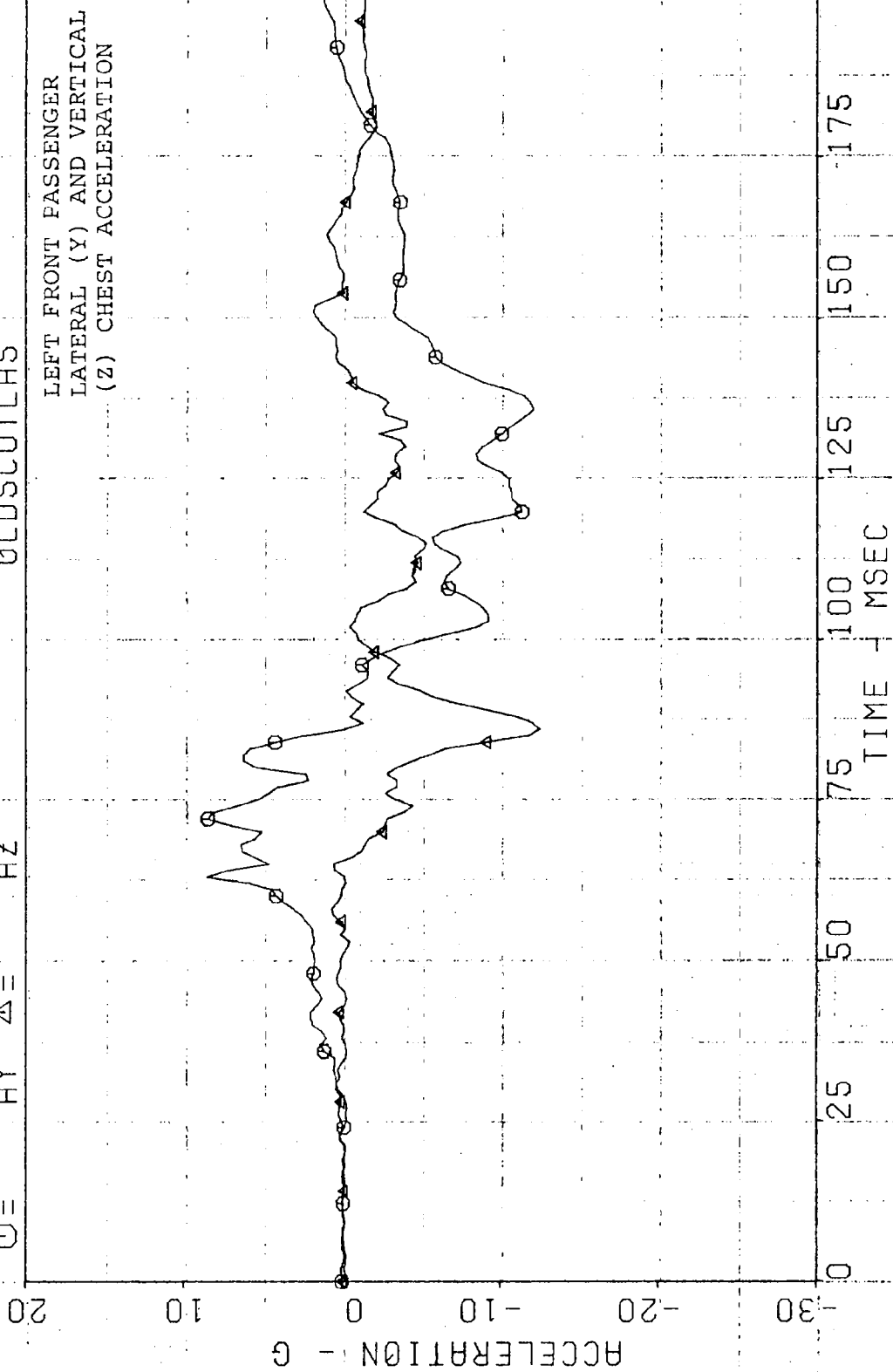
RR - G
250
200
150
100
50
0

TIME - MSEC
0 25 50 75 100 125 150 175 200

DATE 10-10-79 FILTER 315 LOCATION 1101 TEST NO 102979
0LDSCUTLAS



DATE 10-10-79
 FILTER 315
 LOCATION 1101
 TEST NO 102979
 OLDSCUTLAS
 AY Δ= AZ



DATE 10-10-79
FILTER 315
LOCATION 1101
TEST NO 102979
790107
0LDSCUTLAS

LEFT FRONT PASSENGER
RESULTANT CHEST
ACCELERATION

250

200

150

100

50

0

AR - G

25

50

75

100

125

150

175

200

TIME - MSEC

DATE 10-10-79 FILTER 315 LOCATION 1101 TEST NO 102979
790107 0LDSCUTLAS

LEFT FRONT PASSENGER
CHEST SEVERITY INDEX

1250

1000

750

500

250

0

SI

200

175

150

125

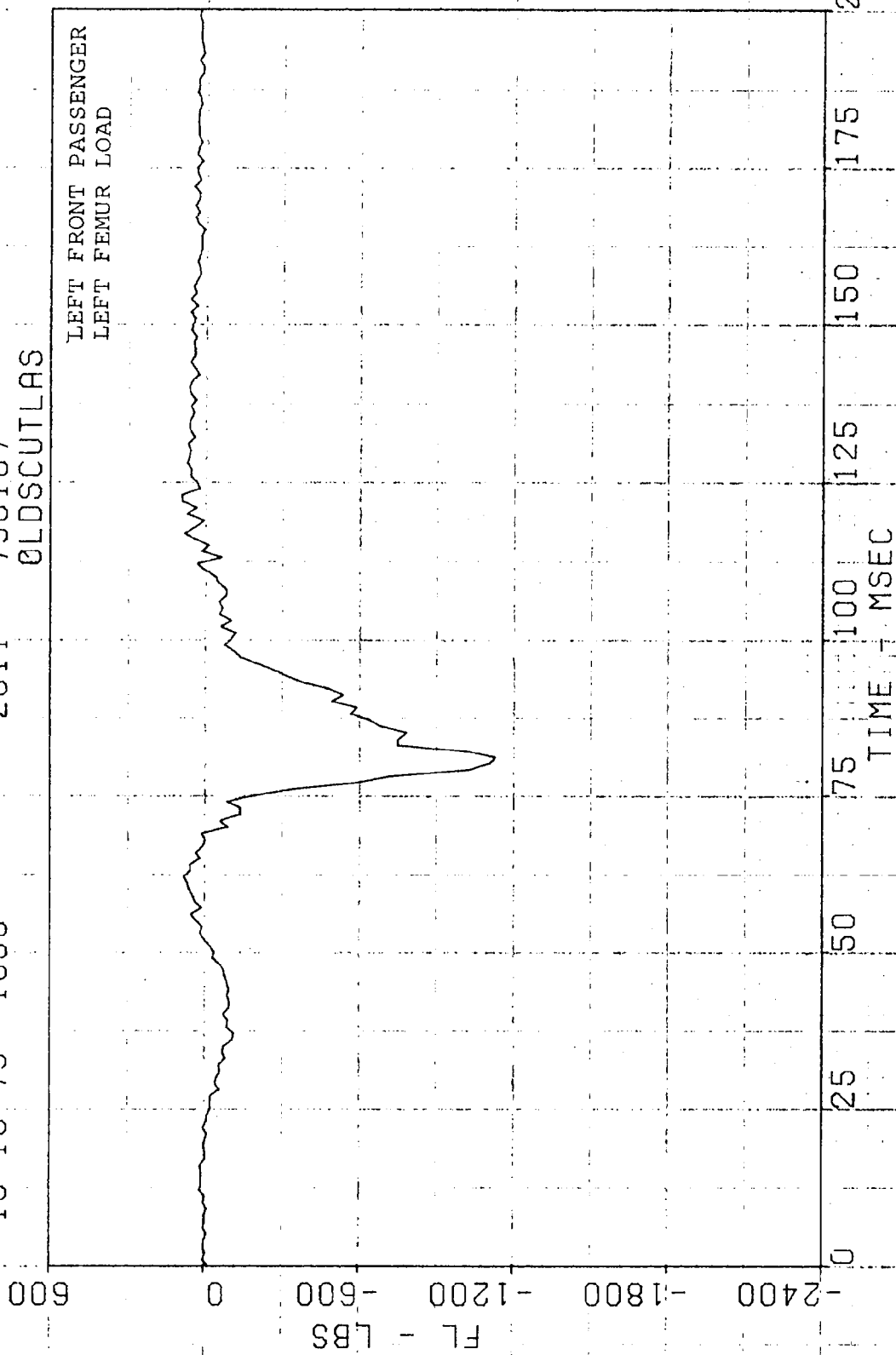
100

75
TIME - MSEC

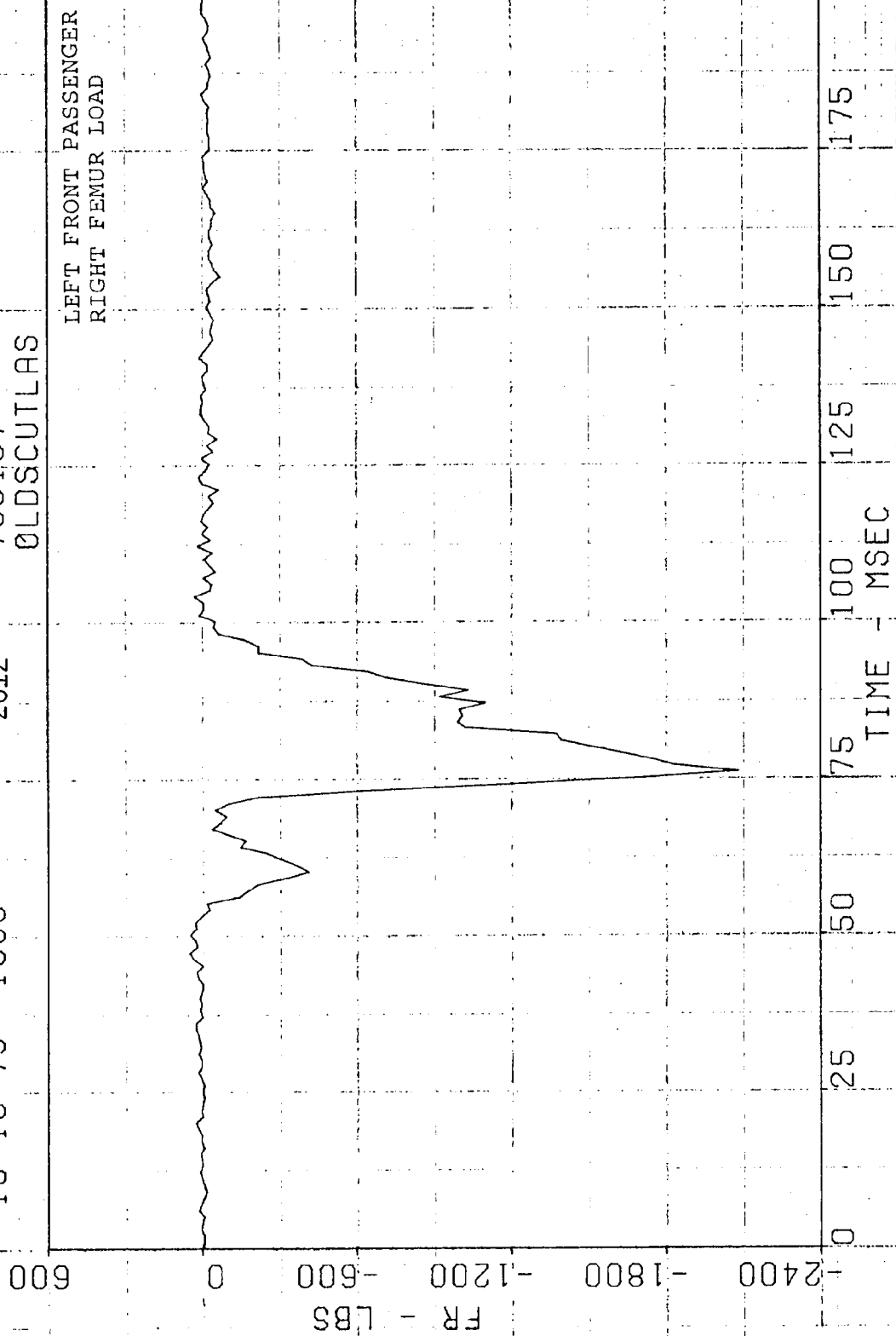
50

25

DATE 10-10-79 FILTER 1000 LOCATION 2011 TEST NO 110179
790107
0LDSCUTLAS

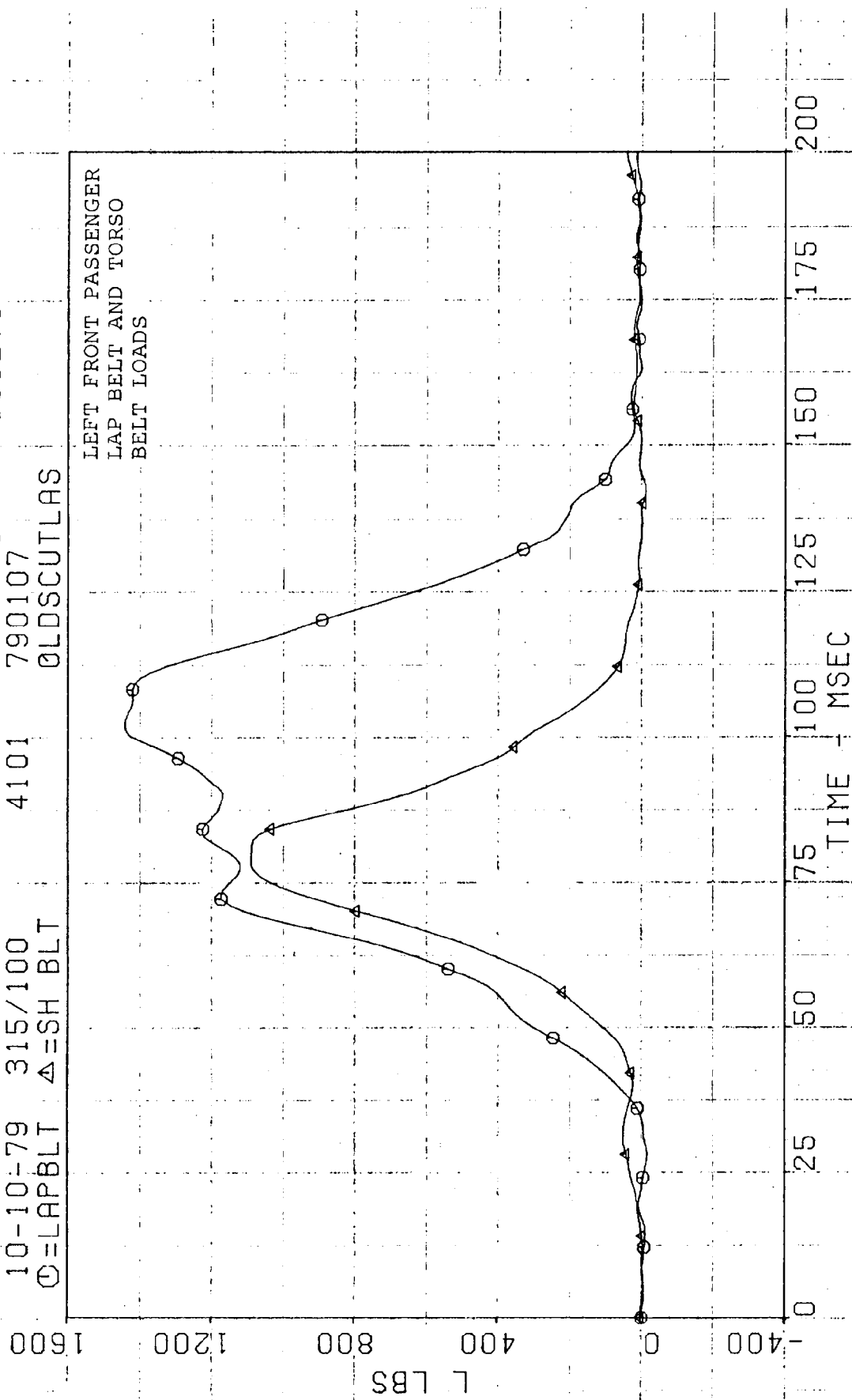


DATE 10-10-79 FILTER 1000 LOCATION 2012 TEST NO 790107 110279
0LDSCUTLAS

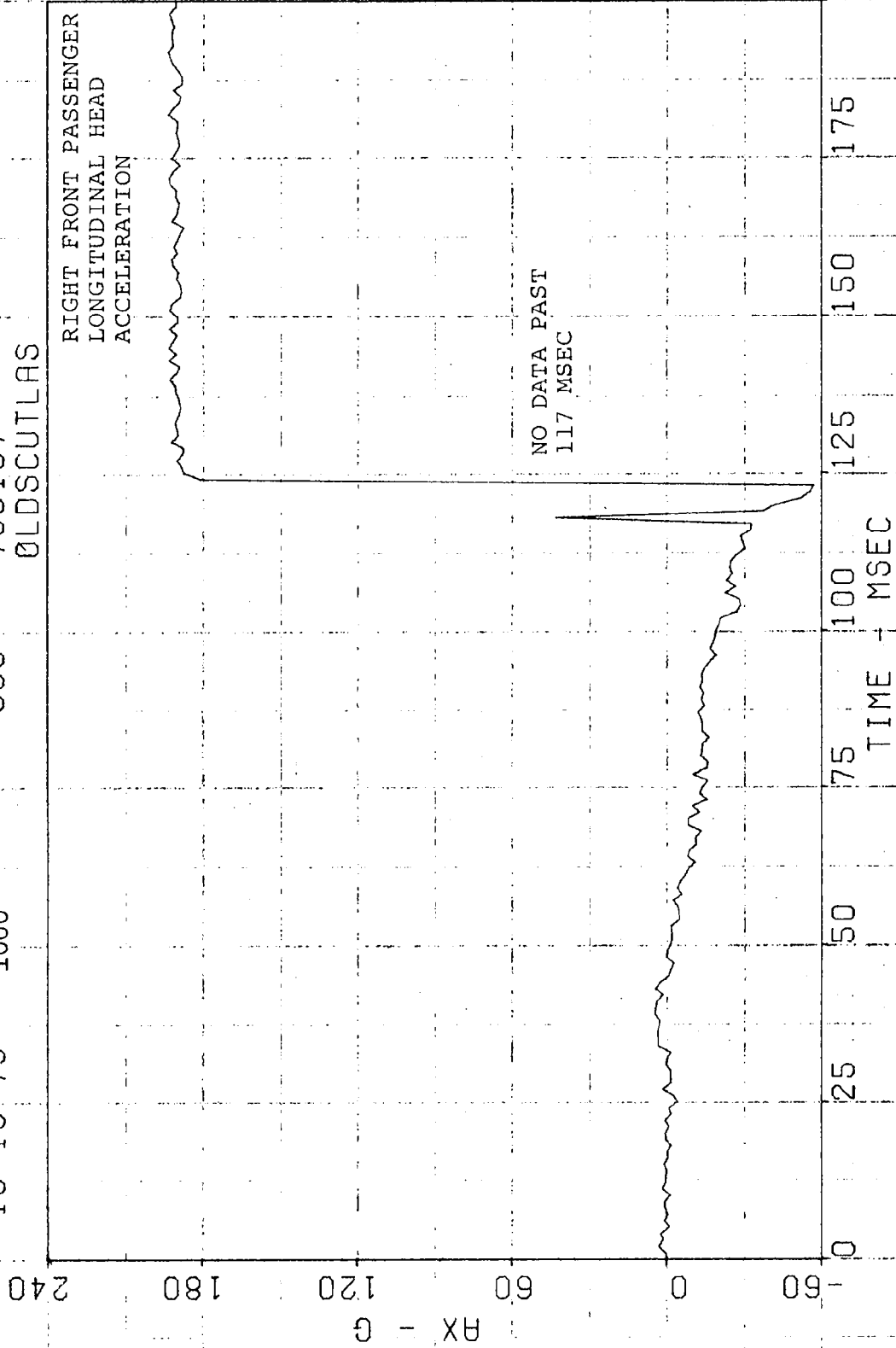


DATE 10-10-79
 FILTER 315/100
 LOCATION 4101
 TEST NO 790107
 111279
 OLDSCUTLAS
 O=LAPBLT Δ=SH BLT

LEFT FRONT PASSENGER
 LAP BELT AND TORSO
 BELT LOADS

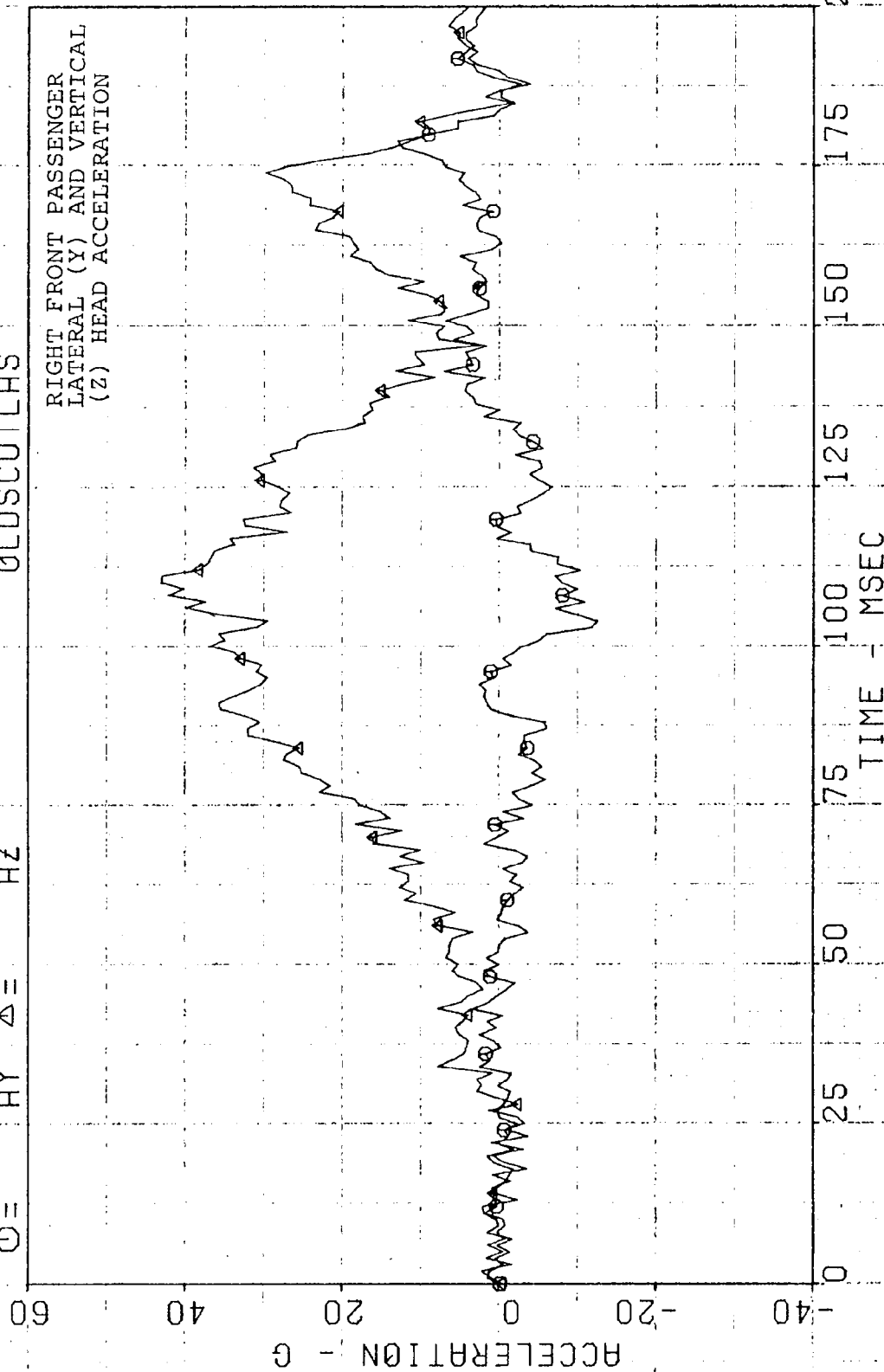


DATE 10-10-79 FILTER 1600 LOCATION 503 TEST NO 102979
ØLDSCUTLAS

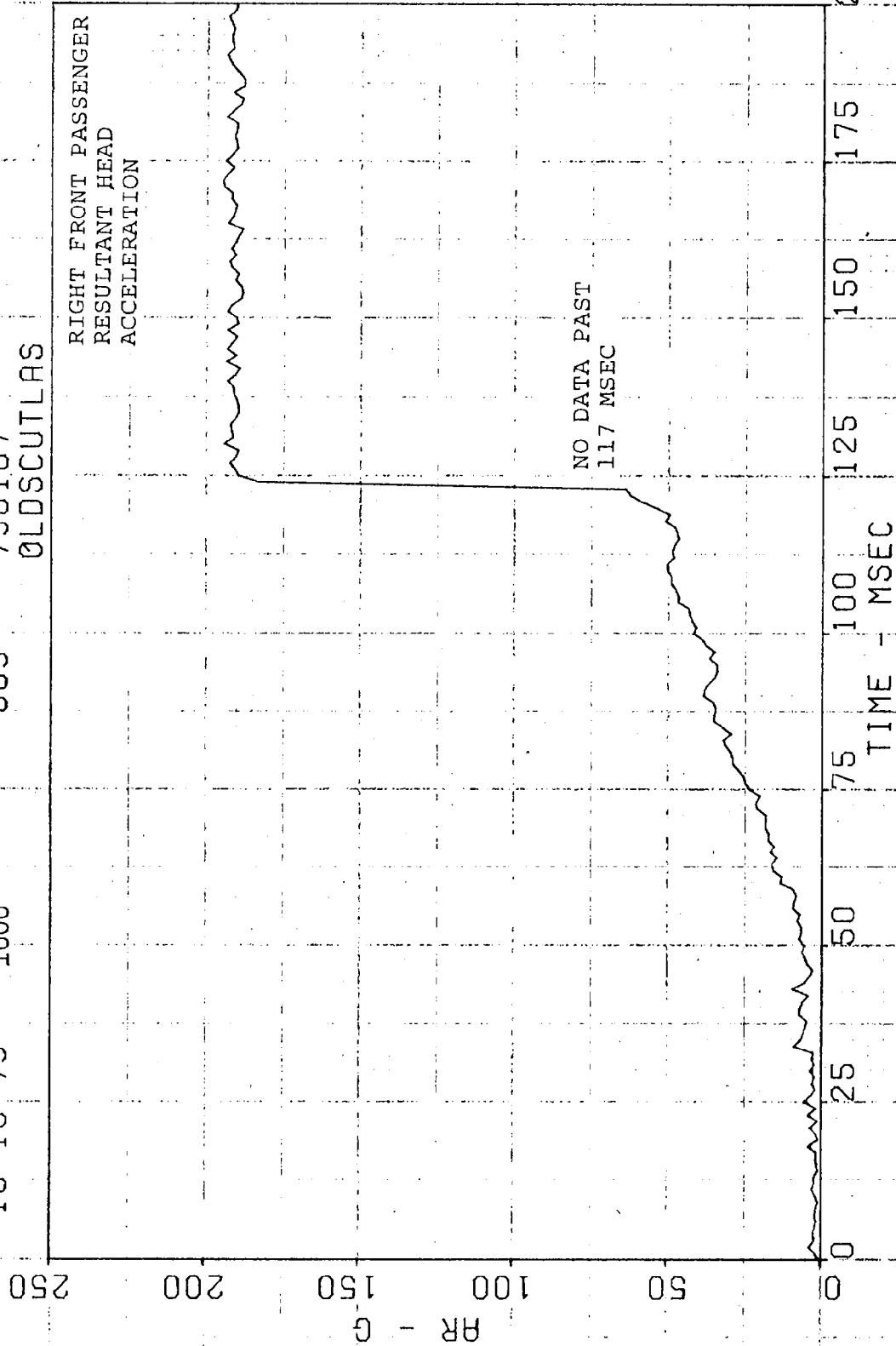


DATE 10-10-79
 FILTER 1600
 LOCATION 503
 TEST NO 790107
 OLDSCUTLAS
 102979

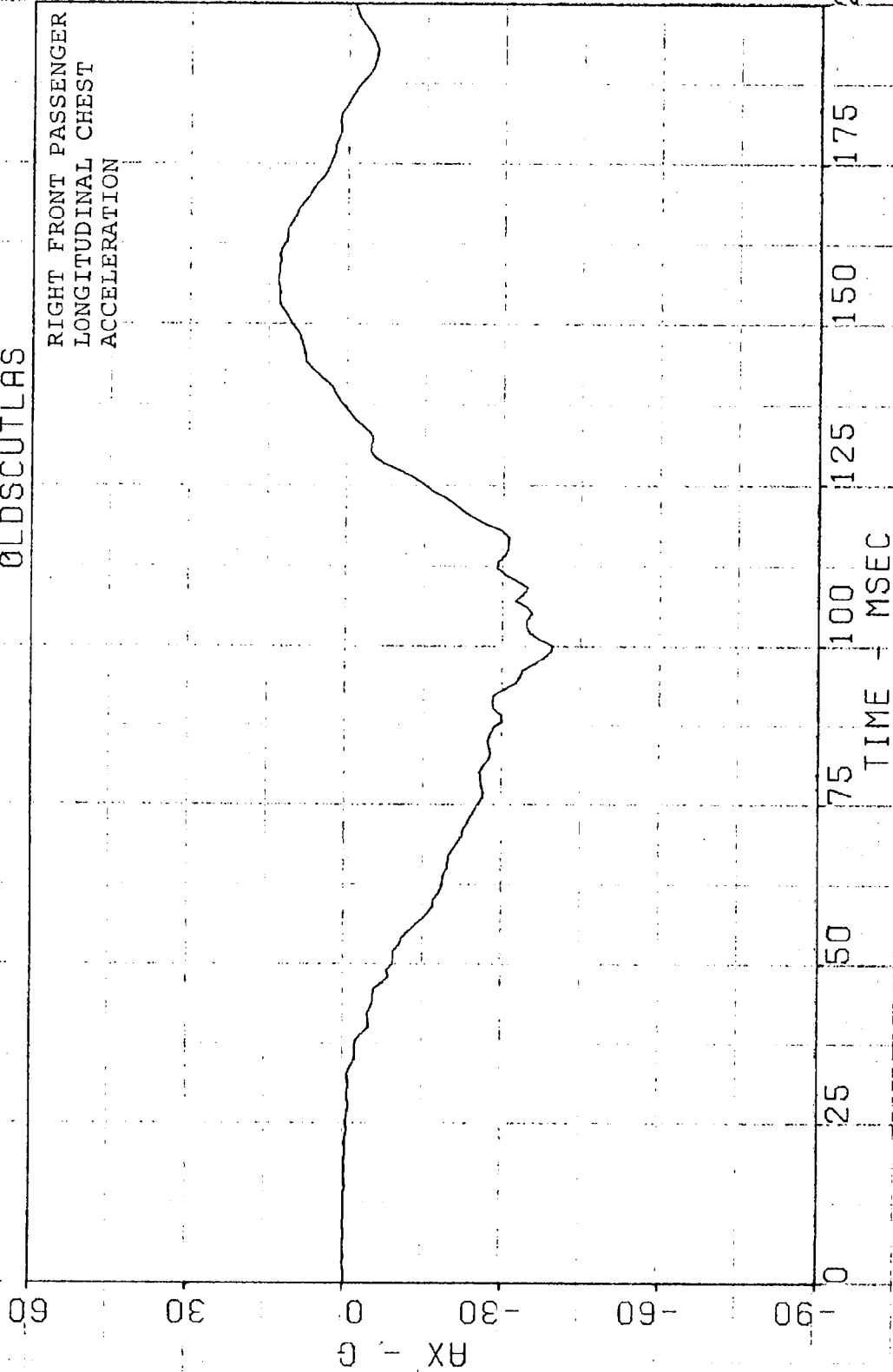
RIGHT FRONT PASSENGER
 LATERAL (Y) AND VERTICAL
 (Z) HEAD ACCELERATION



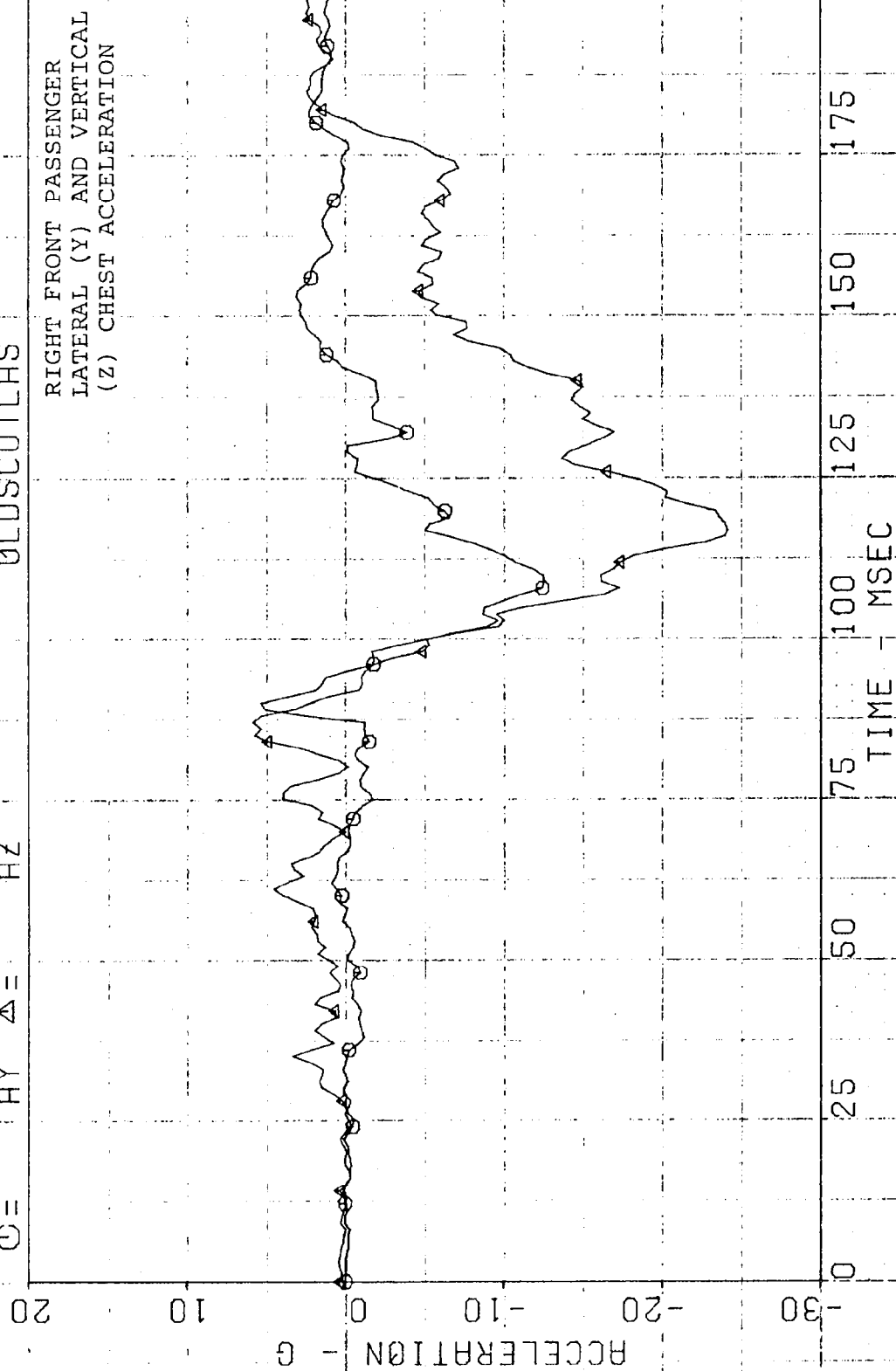
DATE 10-10-79 FILTER 1600 LOCATION 503 TEST NO 102979
790107 OLDSCUTLAS



DATE 10-10-79 FILTER 315 LOCATION 1103 TEST NO 102979
790107 0LDSCUTLAS

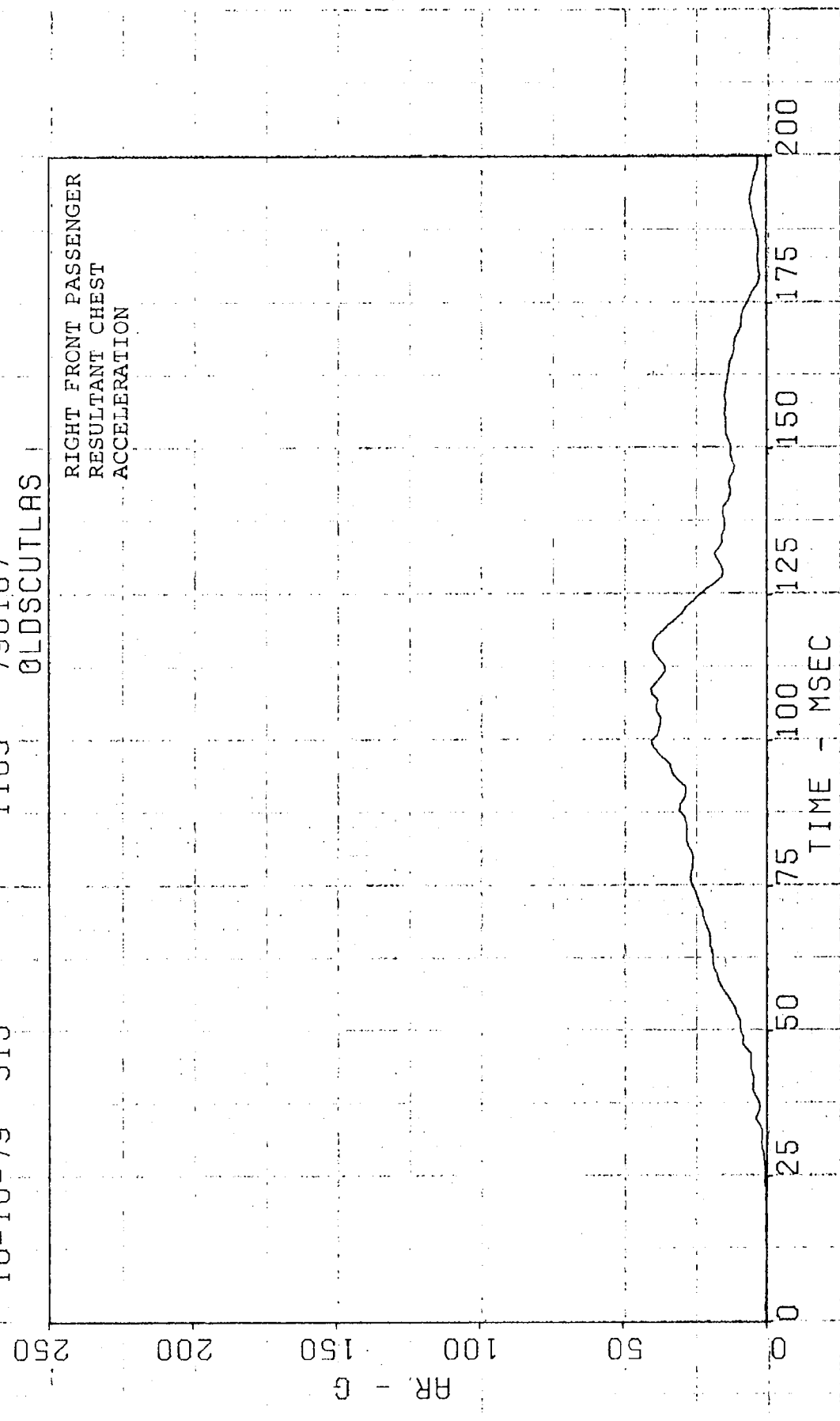


DATE 10-10-79
 FILTER 315
 LOCATION 1103
 TEST NO 111379
 0= AY Δ = AZ
 0LDSCUTLAS



DATE 10-10-79 FILTER 315 LOCATION 1103 TEST NO 102979
790107 0LDSCUTLAS

RIGHT FRONT PASSENGER
RESULTANT CHEST
ACCELERATION



DATE 10-10-79 FILTER 315 LOCATION 1103 TEST NO 790107 102979
0LDSCUTLAS

RIGHT FRONT PASSENGER
CHEST SEVERITY INDEX

1250

1000

750

500

250

0 0

SI

200

175

150

125

100

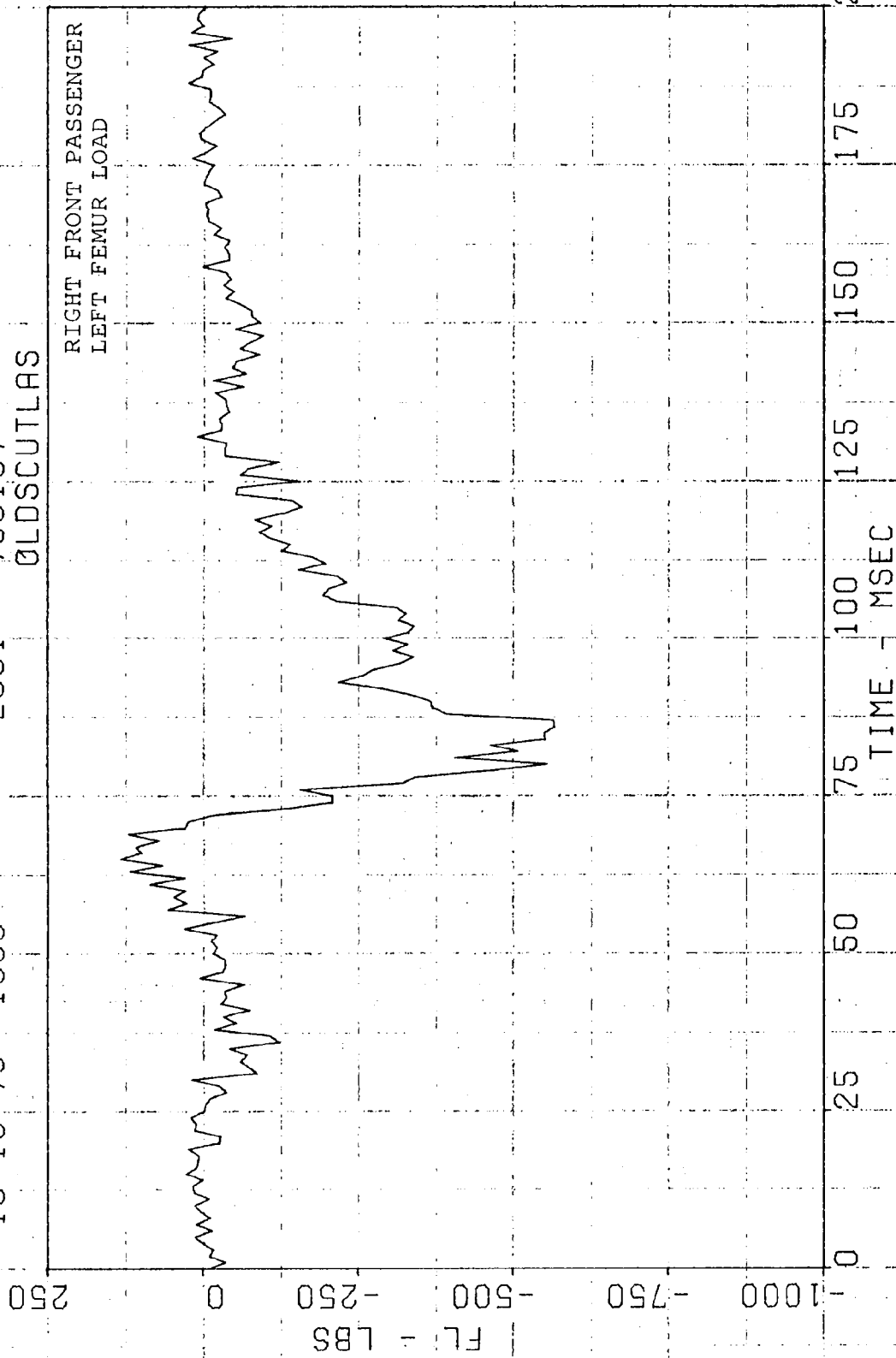
75

50

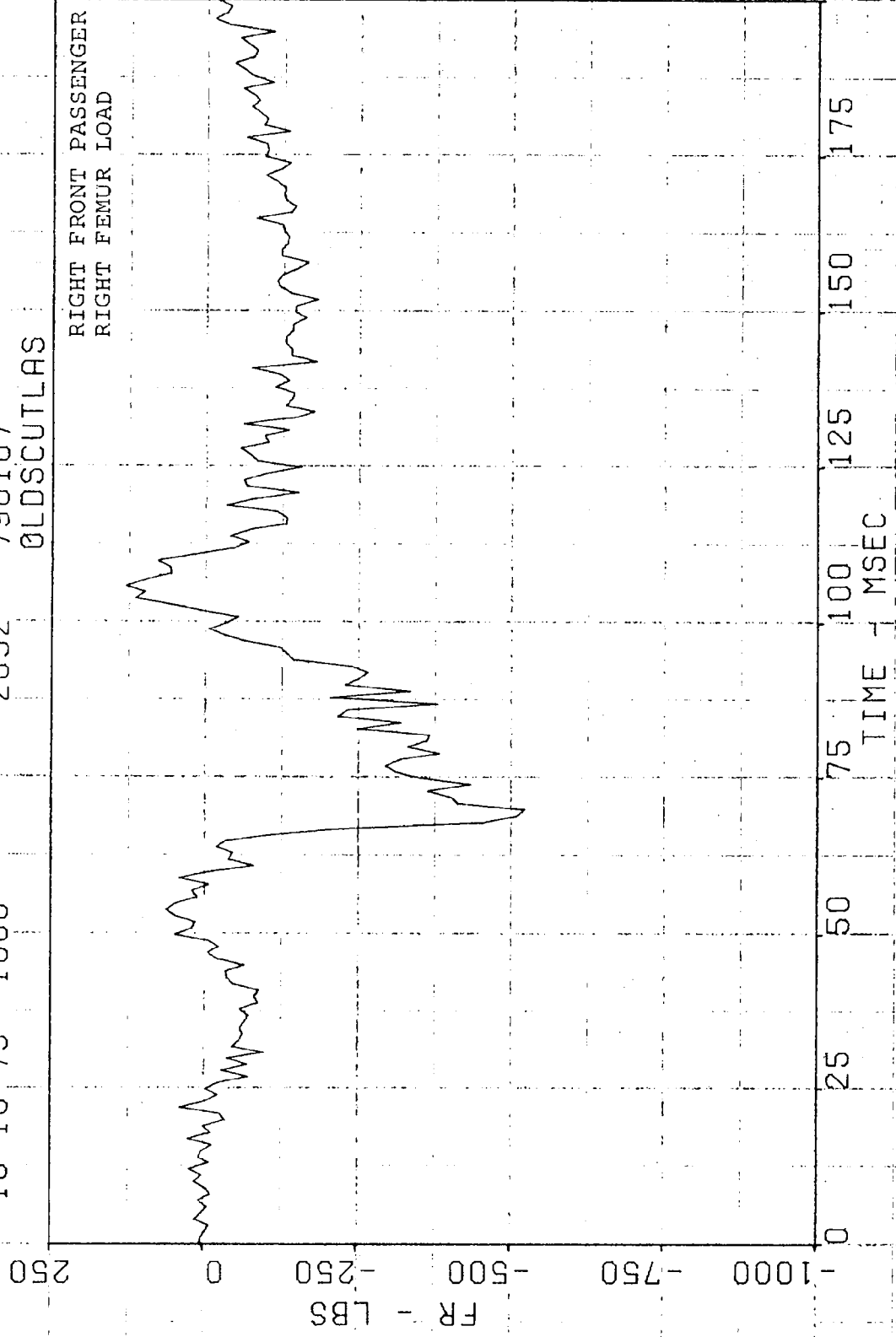
25

TIME - MSEC

DATE 10-10-79 FILTER 1000 LOCATION 2031 TEST NO 102979
790107
0LDSCUTLAS



DATE 10-10-79 FILTER 1000 LOCATION 2032 TEST NO 102979
ØLDSCUTLAS



DATE 10-10-79
10-10-79
O=LAPBLT
O=SH BLT
FILTER 315/100
LOCATION 4103
TEST NO 790107
102979
OLDSCUTLAS

RIGHT FRONT PASSENGER
LAP BELT AND TORSO
BELT LOADS

2400

1800

1200

600

0

600

R LBS

0

25

50

75

100

125

150

175

200

TIME - MSEC

DATE 10-10-79

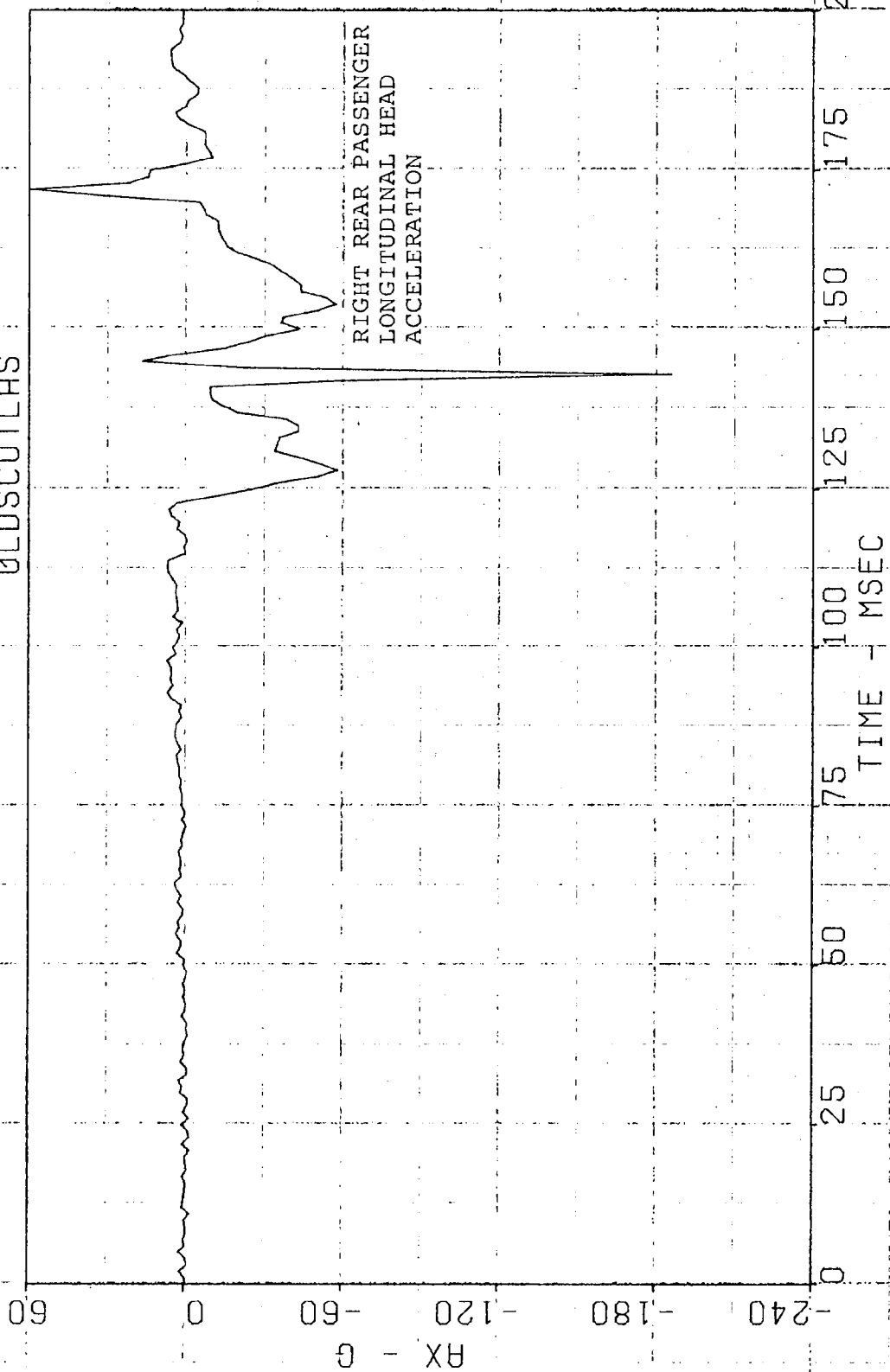
FILTER 1600

LOCATION 506

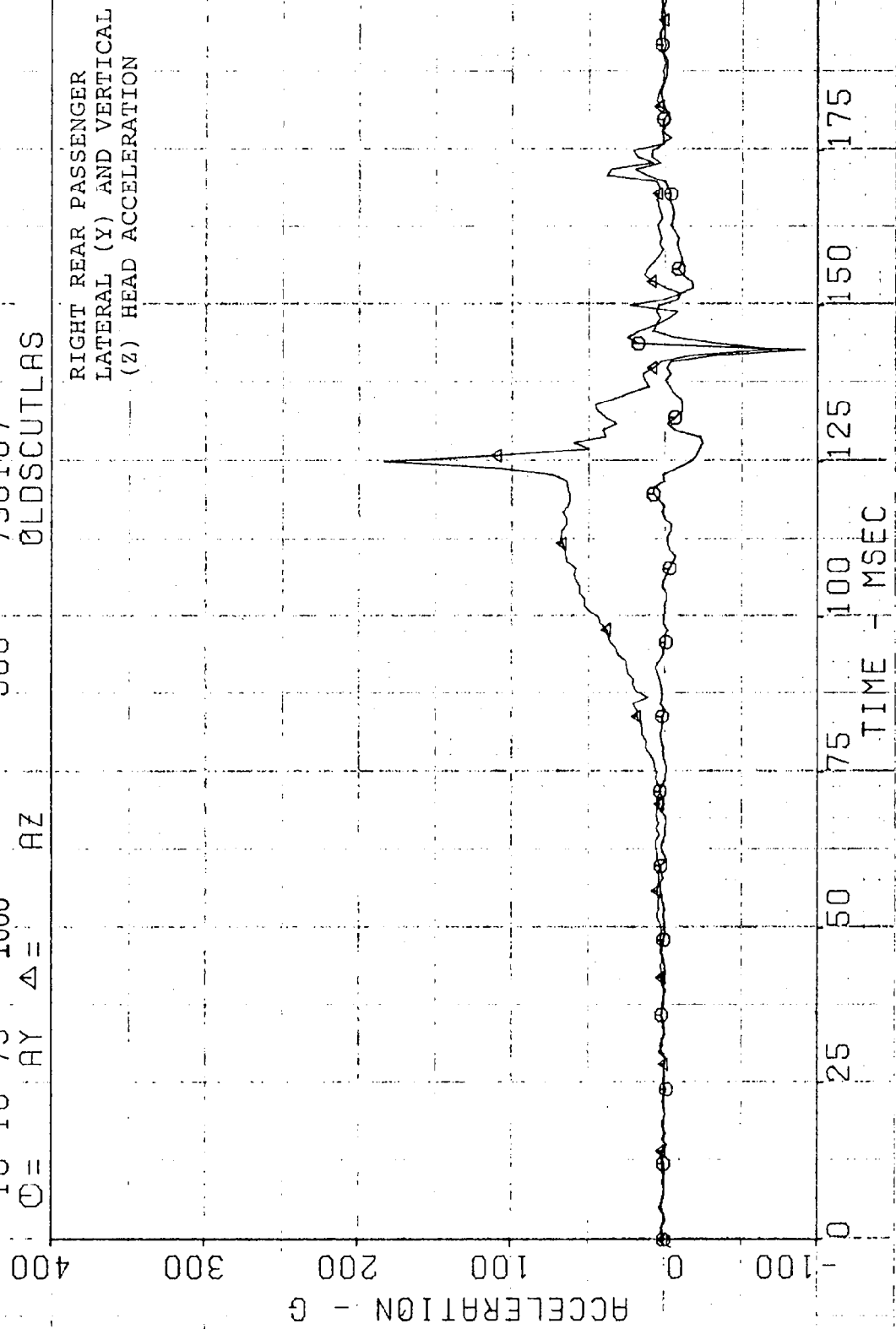
TEST NO
790107

102979

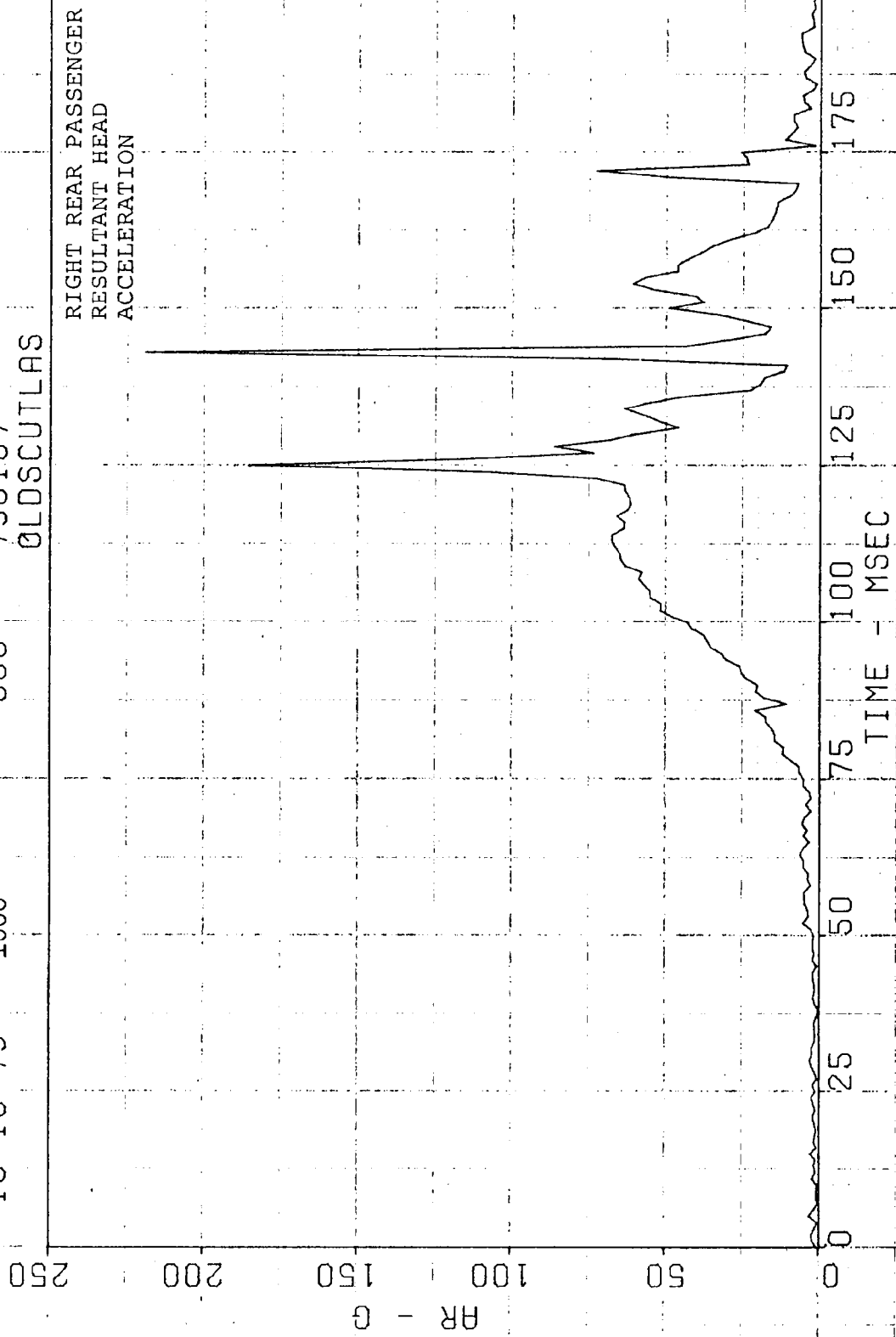
GLDSCUTLAS



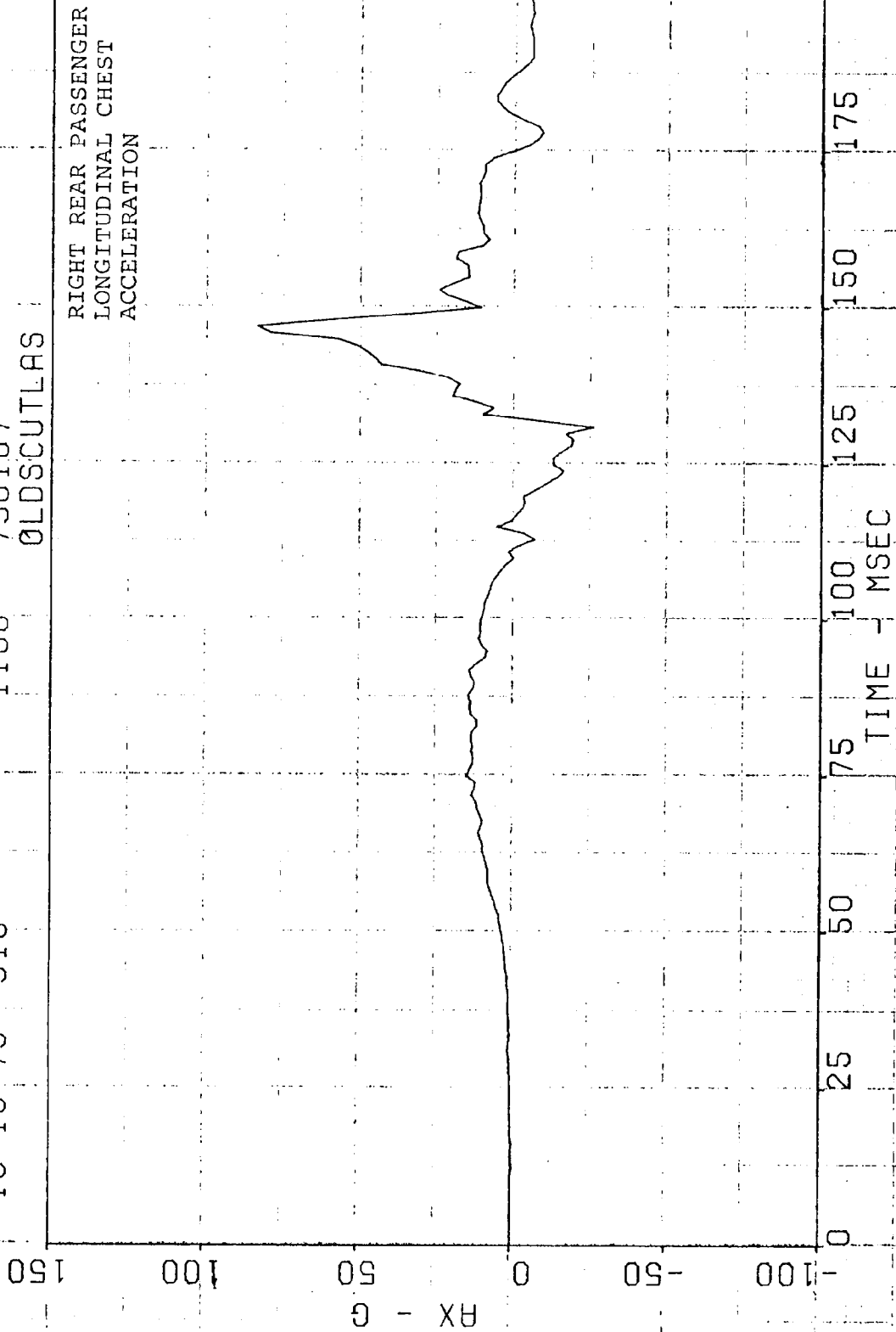
DATE 10-10-79
O= AY Δ = AZ
FILTER 1600
LOCATION 506
TEST NO 790107
102979
0LDSCUTLAS



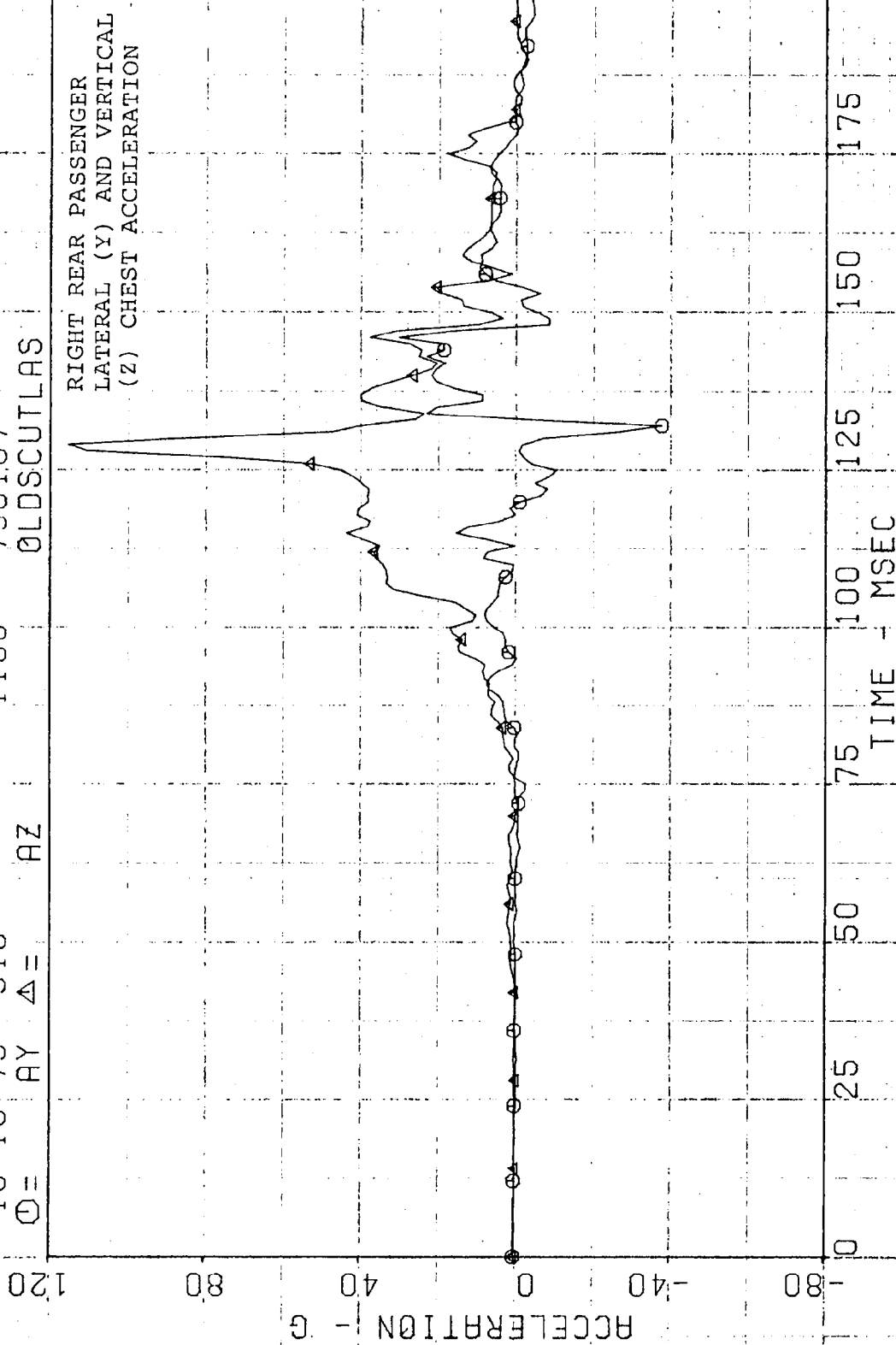
DATE 10-10-79
FILTER 1600
LOCATION 506
TEST NO 102979
790107
0LDSCUTLAS



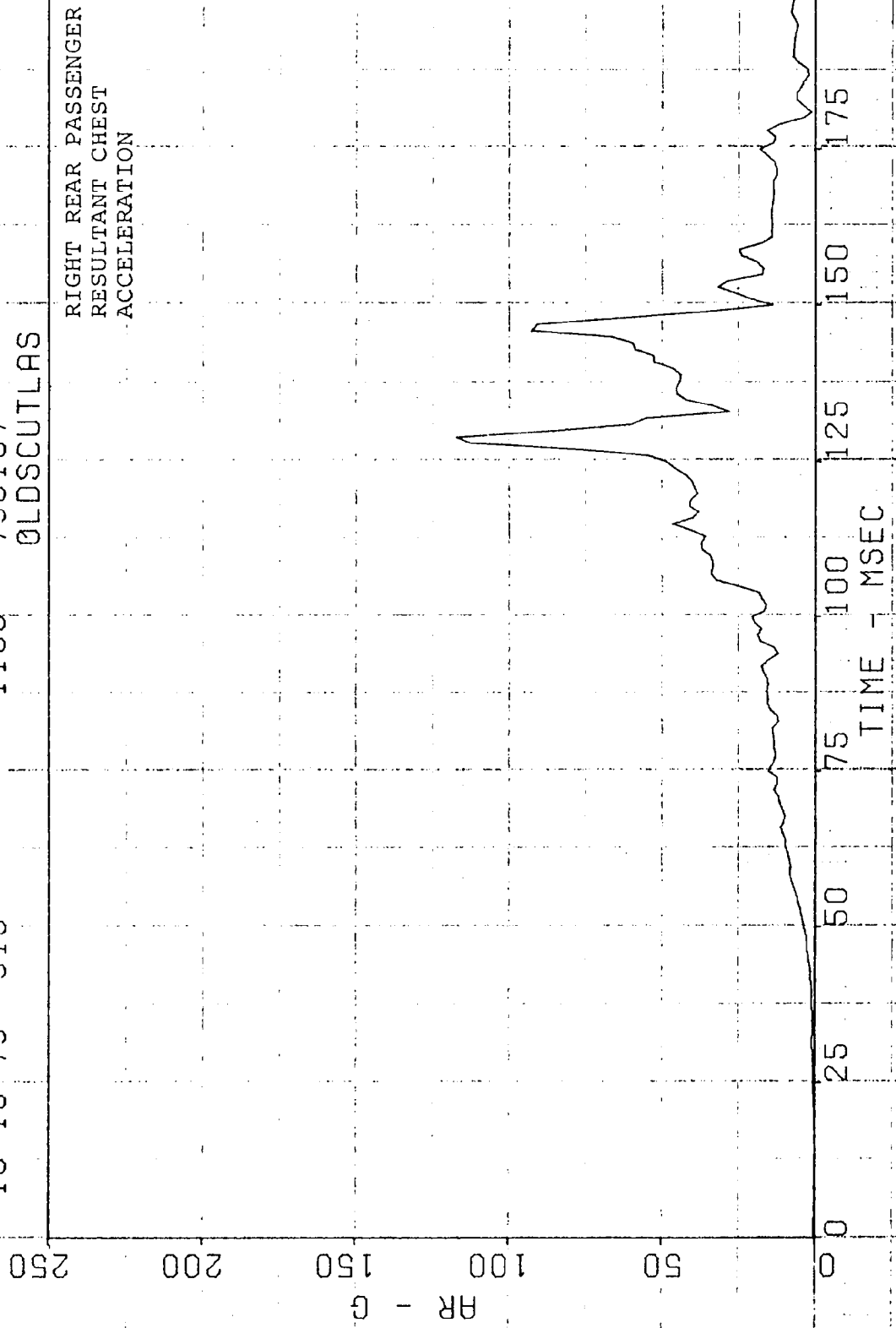
DATE 10-10-79 FILTER 315 LOCATION 1106 TEST NO 102979
790107 0LDSUTLAS



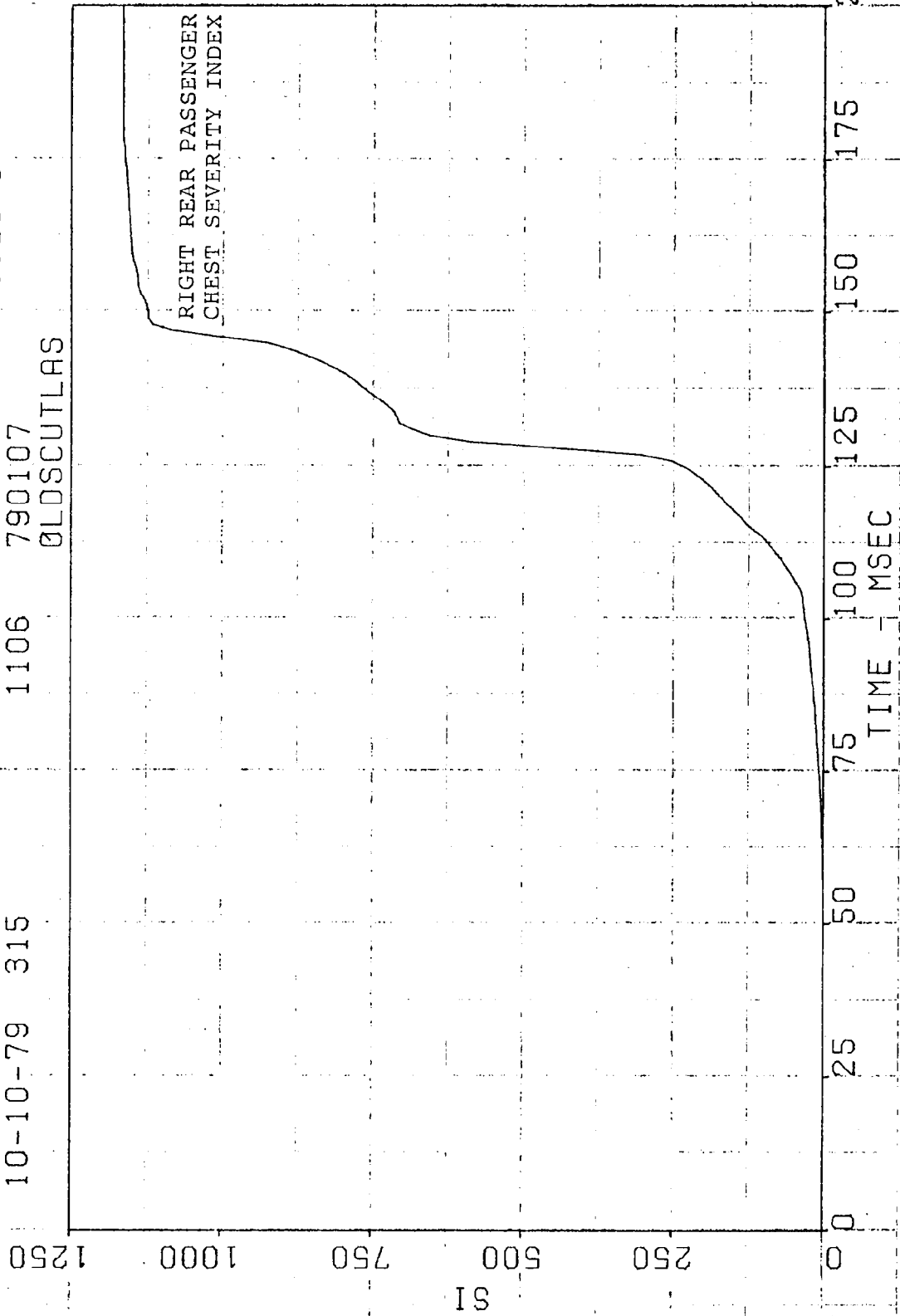
DATE 10-10-79
 Q= AY Δ = AZ
 FILTER 315
 LOCATION 1106
 TEST NO 790107
 112679
 OLDSCUTLAS



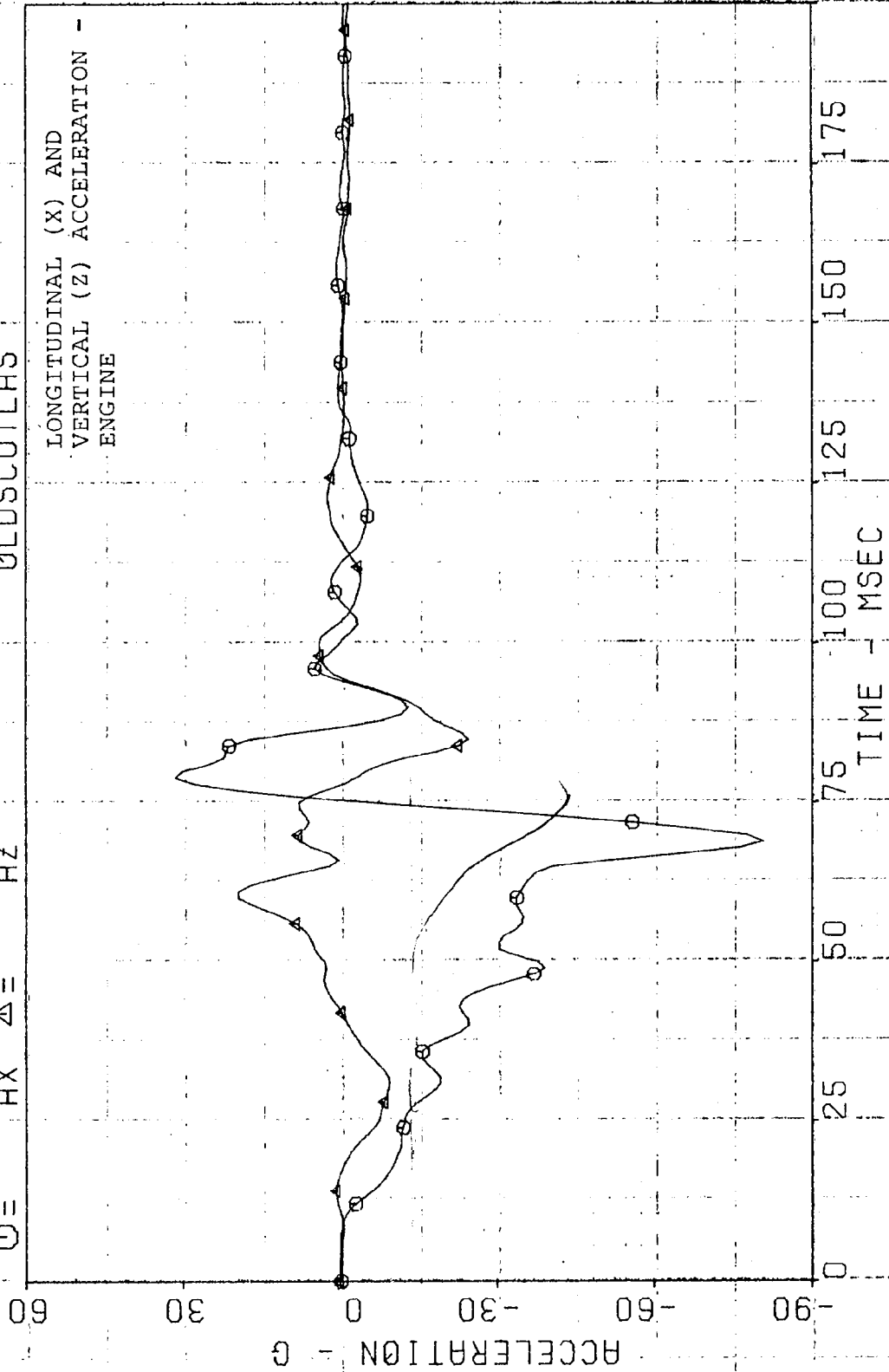
DATE 10-10-79 FILTER LOCATION TEST NO 102979
1106 790107 0LDSCUTLAS



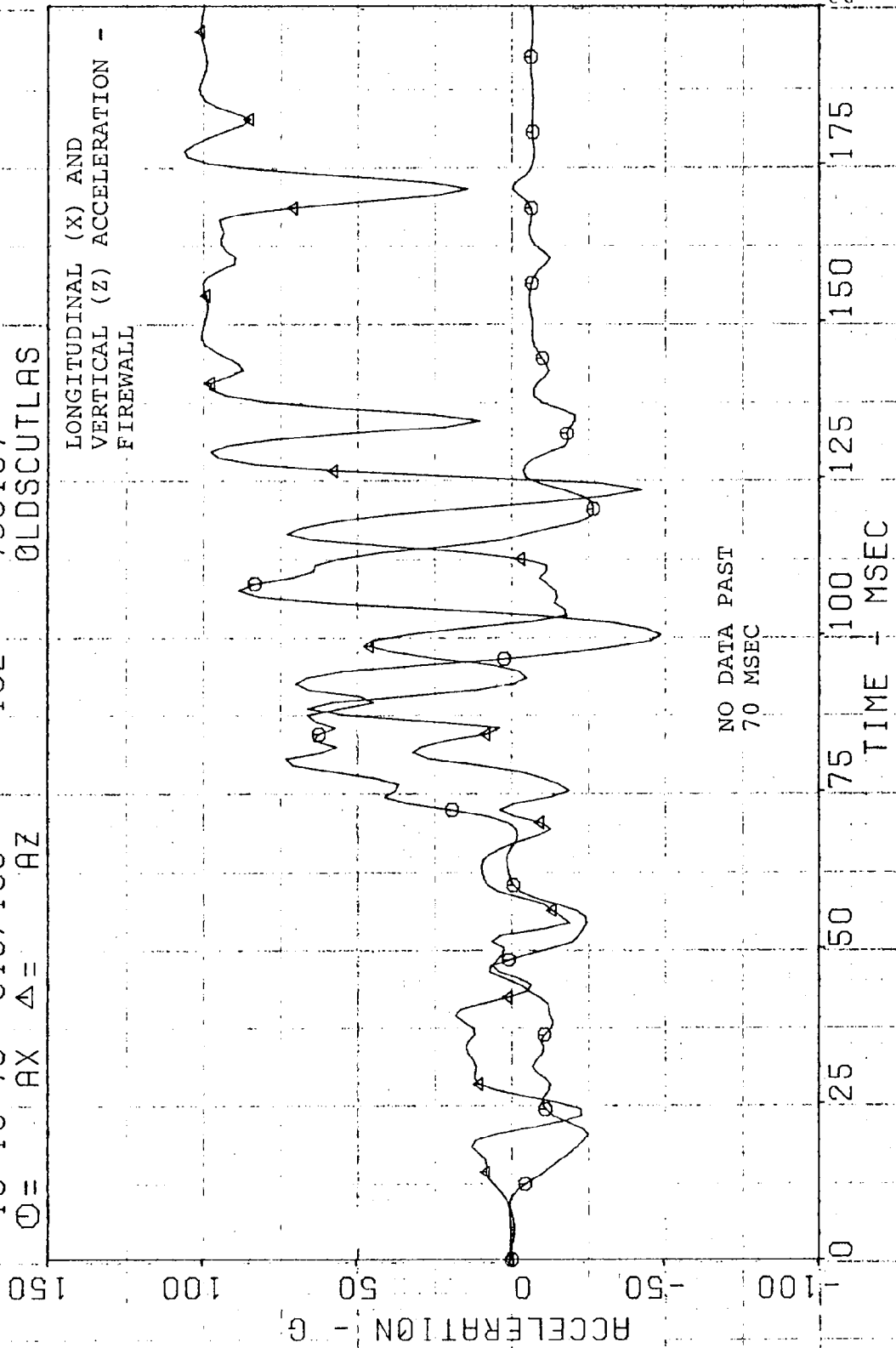
DATE 10-10-79 FILTER 315 LOCATION 1106 TEST NO 102979
790107
0LDSCUTLAS



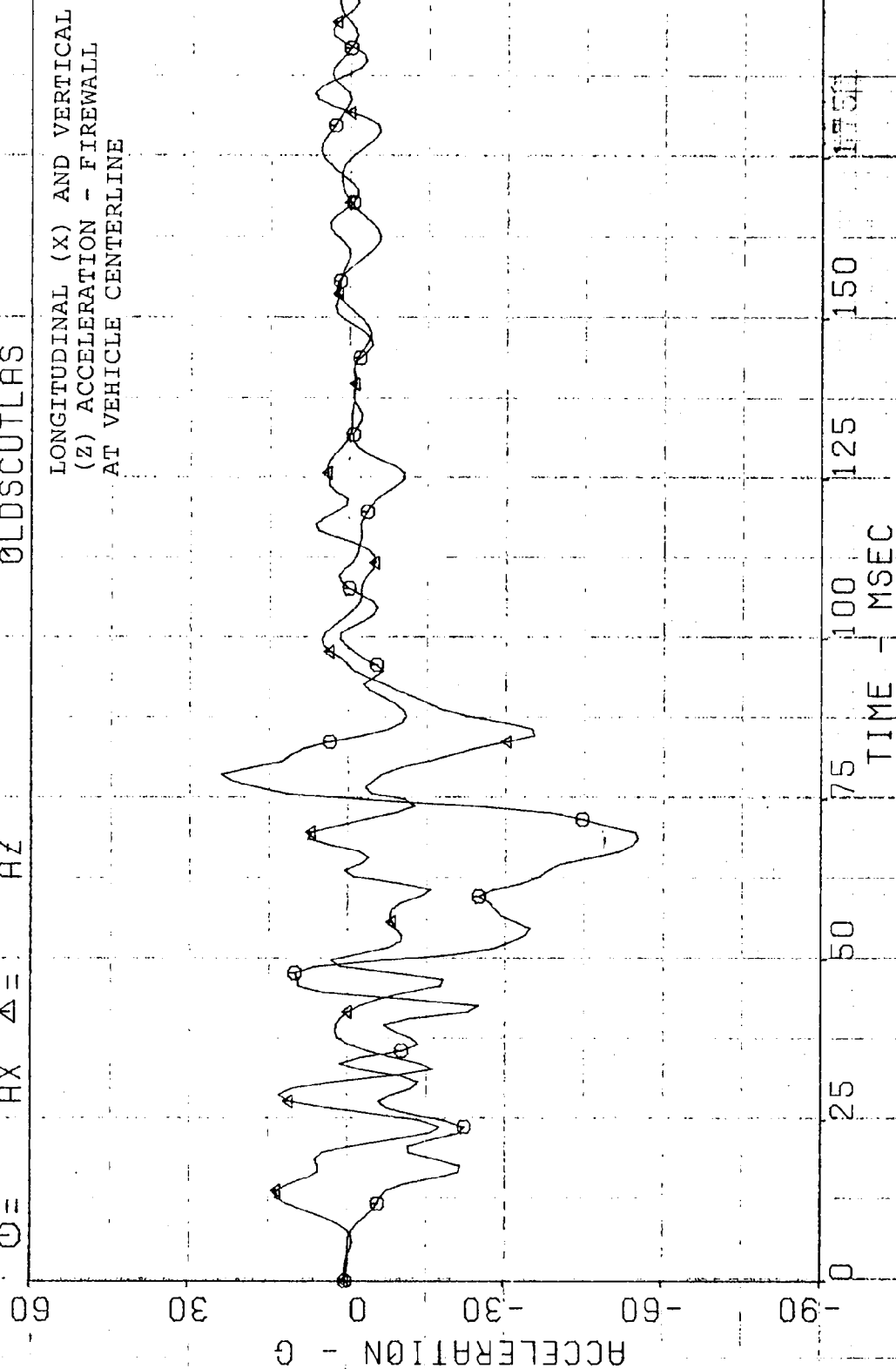
DATE 10-10-79
 FILTER 315/100
 LOCATION 101
 TEST NO 790107
 OLDSCUTLAS
 102979



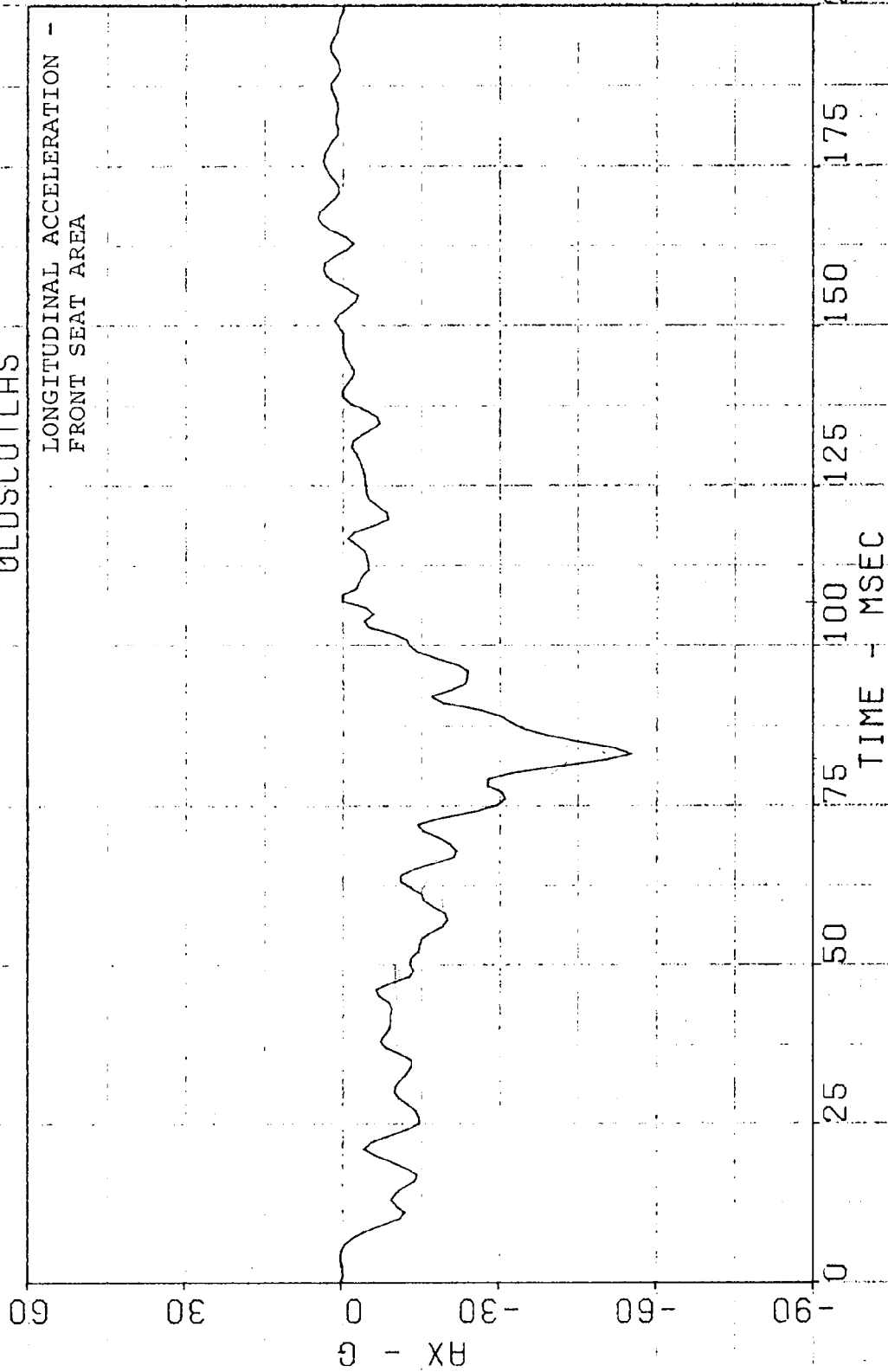
DATE 10-10-79
 FILTER 315/100
 LOCATION 102
 TEST NO 790107
 111279
 OLDSCUTLAS



DATE 10-10-79
 FILTER 315/100
 LOCATION 103
 TEST NO 790107
 0102979
 010SCUTLAS



DATE 10-10-79 FILTER 315/100 LOCATION 104 TEST NO 102979
0LDSCUTLAS



DATE 10-10-79
FILTER 315/100
LOCATION 104
TEST NO 102979
790107
0LDSCUTLAS

LONGITUDINAL VELOCITY -
FRONT SEAT AREA

40

30

20

VX

0

-10

0

25

50

75

100

125

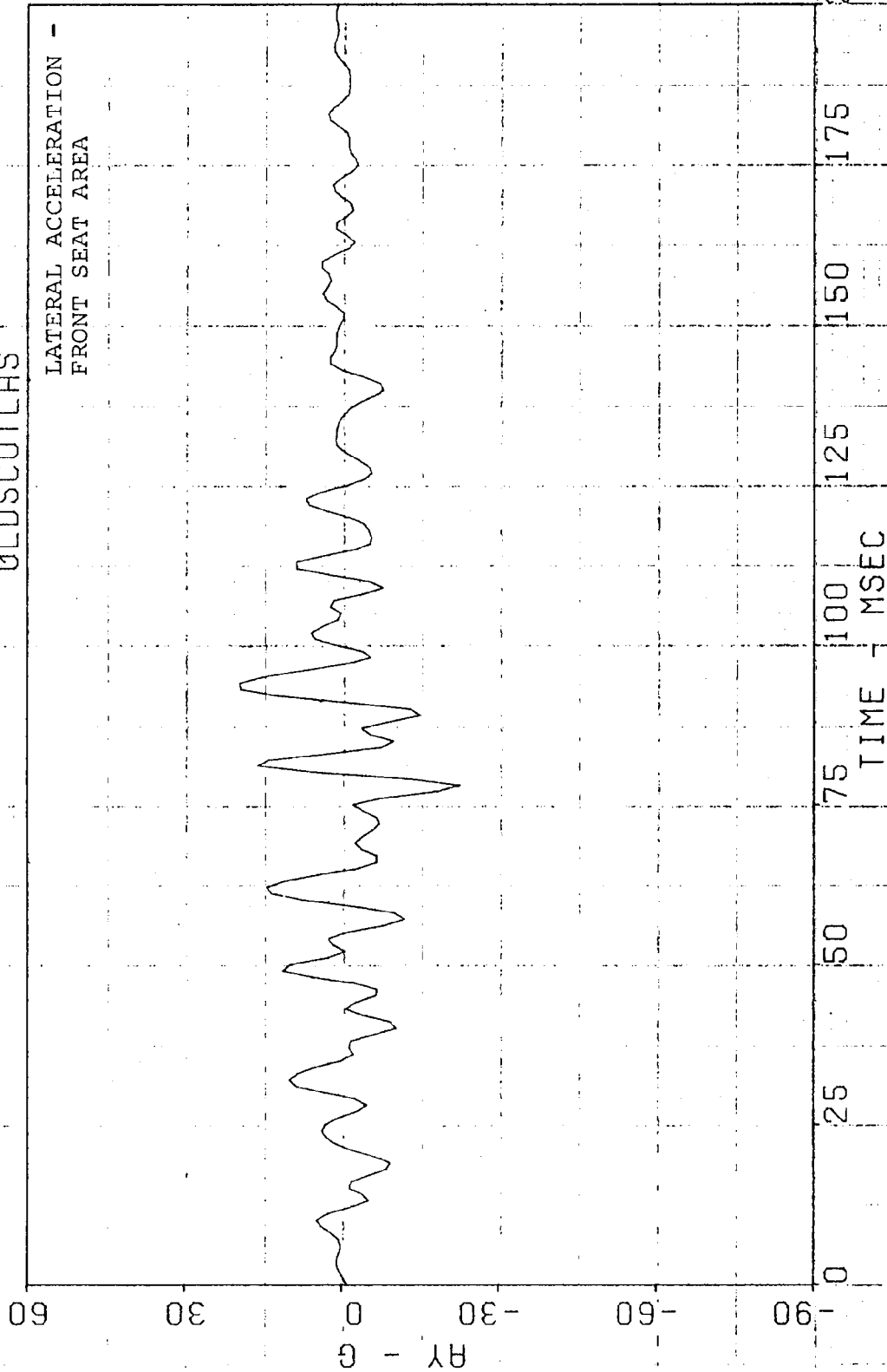
150

175

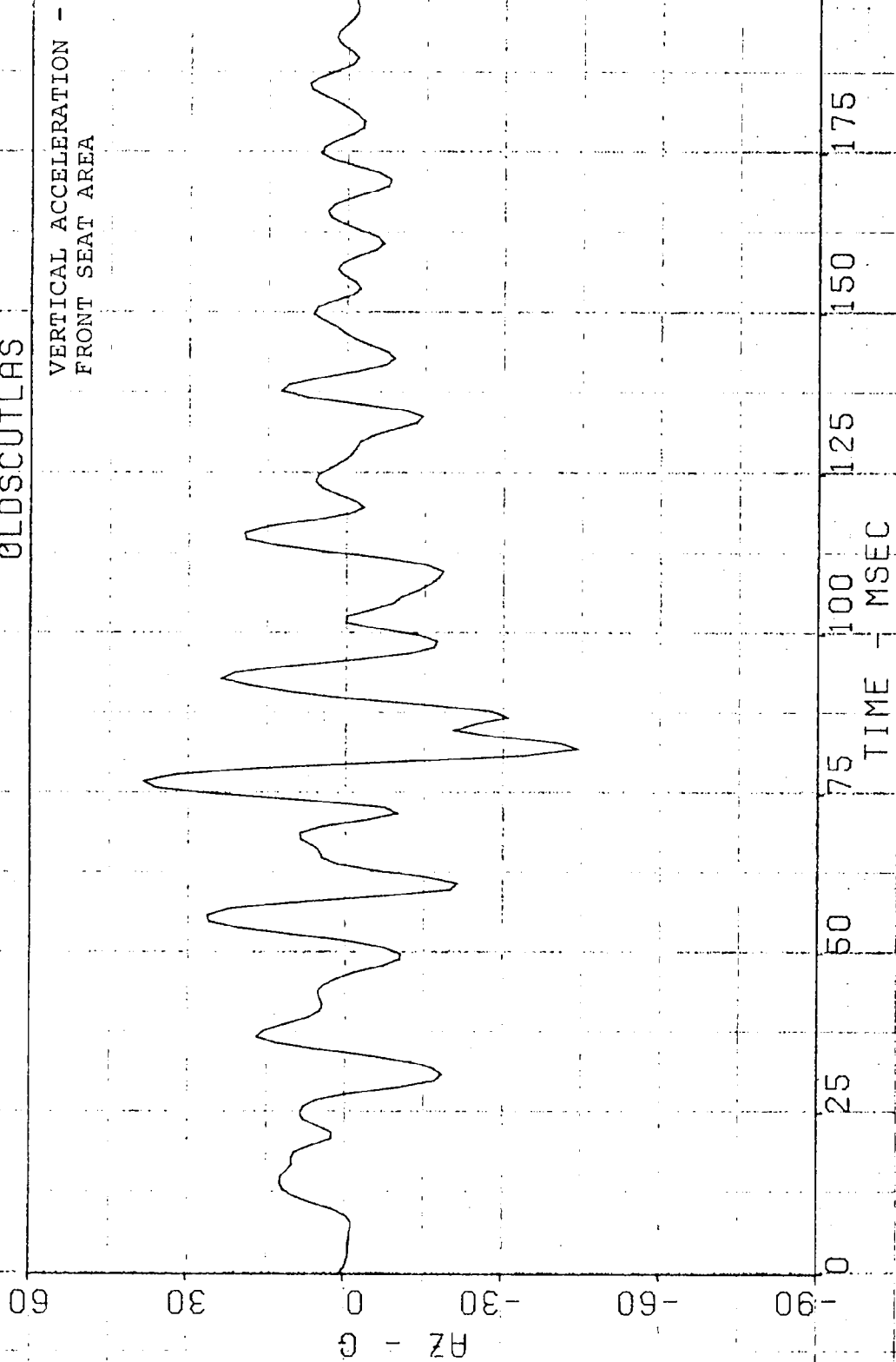
200

TIME - MSEC

DATE 10-10-79 FILTER 315/100 LOCATION 104 TEST NO 102979
0LDSCUTLAS



DATE 10-10-79 FILTER 315/100 LOCATION 104 TEST NO 790107 0LDSCUTLAS 102979



DATE 10-10-79
 FILTER 315/100
 LOCATION 105
 TEST NO 790107
 0102979
 01DSCUTLAS

