

DOT 184

Dynamic Science Report No. 301-DYS-79-010

NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT
TESTING

FMVSS 301-75

CHRYSLER CORPORATION
1979 DODGE DIPLOMAT 4-DOOR SEDAN
NHTSA NO. 790315

Prepared by:

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



FINAL REPORT

August 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:

NHTSA Contract Technical Manager
FMVSS 301-75

Date of Report Acceptance

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16. Abstract FMVSS 301-75 New Vehicle Assessment and Standards Enforcement Testing of a 1979 Dodge Diplomat 4-door Sedan, NHTSA No. 790315, VIN GH4169F126461, was conducted at the Dynamic Science, Inc. Phoenix test facility. The vehicle was tested using test parameter values in excess of the current upper limits of FMVSS 301-75, in order to obtain research and vehicle rating. This test, therefore, can only be viewed as an indicant test by the Office of Vehicle Safety Compliance. The impact test speed was 35.09 mph. The test was conducted June 6, 1979. There was a massive leakage (estimated greater than 275 oz/min) in the first 5 minutes after impact. By the 6th minute after impact, the tank had been completely drained. Testing was discontinued at that time.			
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METRIC CONVERSION FACTORS

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

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

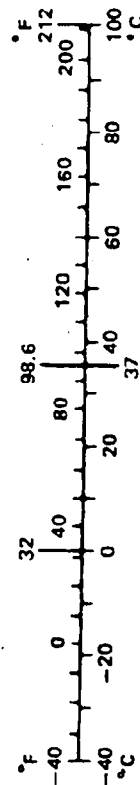


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SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE:

The purpose of the test was to subject a 1979 Dodge Diplomat 4-Door Sedan to the indicant test requirements of DOT Test Plan TP-212-01, March 20, 1979, Standard Enforcement Indicant Testing for FMVSS 301-75, "Fuel System Integrity." The vehicle was tested using test parameters which are in excess of the current upper limits of FMVSS 301-75, 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 301-75 are contained in Appendix A. Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains Compliance Related Data for FMVSS 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: Chrysler Corporation
 Make/Model: Dodge Diplomat
 Body Style: 4-door Sedan Model Year: 1979
 VIN: GH4169F126461 Build Date: 9/78
 NHTSA No.: 790315 Color: Blue
 Engine Data: 8 cylinders; 318 in.³ displacement
 Transmission Data: 3 speed () Manual (X) Automatic
 Date Vehicle Received by Laboratory: 3/9/79
 Dealer Name & Address: Valley Dodge Inc.
4240 W. Glendale Ave., Phoenix, AZ 85021

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

Vehicle Manufactured By: Chrysler Corporation
 Date of Manufacture: 9/78; VIN: GH4169F126461
 GVWR: 5095 lb; GAWR: Front = 2590 lb; Rear = 2555 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Up to Capacity	<u>28</u> psi	<u>28</u> psi	TIRE SIZE:	
Vehicle Capacity:			<u>FR78-15</u>	<u>B</u>

Type of Seats -	<u>X</u> Bench	Number of Occupants =	<u>3</u> Front
	<u> </u> Bucket	(Designated Seating	<u>3</u> Rear
	<u> </u> Split Bench	Capacity)	<u>6</u> Total

CARGO LOAD = 200 lbTOTAL = 1100 lb

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

Right Front = 1086 lbRight Rear = 717 lbLeft Front = 1024 lbLeft Rear = 830 lbTOTAL FRONT WEIGHT = 2110 lb (58 % of Total Vehicle Weight)TOTAL REAR WEIGHT = 1547 lb (42 % of Total Vehicle Weight)TOTAL DELV. WEIGHT = 3657 lbWEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 200 lb CARGO:Right Front = 1205 lbRight Rear = 870 lbLeft Front = 1144 lbLeft Rear = 973 lbTOTAL FRONT WEIGHT = 2349 lb (56 % of Total Vehicle Weight)TOTAL REAR WEIGHT = 1843 lb (44 % of Total Vehicle Weight)TOTAL TEST WEIGHT = 4192 lbWeight of ballast secured in vehicle trunk area = 0 lbTARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 4185 lb

SECTION 2
GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

TEST CONDITIONS:

Date of Test: June 6, 1979 Time of Test: 0855
Ambient Temperature: 82 °F at impact area.
Temperature in Windshield Molding
Occupant Compartment: 81 °F Temperature: 81 °F

VEHICLE ATTITUDE: (all dimensions in inches)

Delivered Attitude: RF 32.0 LF 32.0 RR 32.0 LR 32.0
Test Attitude: RF 31.3 LF 31.25 RR 30.4 LR 30.5

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 28 psi
Rear = 28 psi

Recommended Tire Size: FR78-15
Load Range: B

Tires on Vehicle: FR78-15
Is Spare Tire a "Space Saver": No (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: 18.54 Gallons (SPV)
Test Volume: 16.9 Gallons (90 to 91% of SPV)
Fuel System Capacity (data from Owner's Manual): 19.5 gallons
Details of Fuel System: The fuel tank is mounted beneath the
trunk floor just aft of rear axle, and supported by two tank
straps. The filler tube extends through a grommet on the left
top side of the tank and terminates at the body on the left side
behind the rear wheel. The tube is sealed by a locking gas 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: No (yes/no)

VEHICLE REBOUND AND CRUSH:

Overall Length of Pre-test = R 199.8 L 200.3 inches
Test Vehicle Post-test = R 180.5 L 182.4 inches
CRUSH = R 19.3 L 17.9

FOR FRONTAL IMPACTS, distance from front of test vehicle to the
barrier after impact = NA 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>None</u>	<u>None</u>	<u>None</u>
Chest	<u>None</u>	<u>None</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>	<u>None</u>
Left Knee	<u>None</u>	<u>None</u>	<u>Front seat back</u>
Right Knee	<u>None</u>	<u>None</u>	<u>Front seat back</u>

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

SEAT BACK

Failure	<u>X</u>	<u>X</u>
---------	----------	----------

GLAZING DAMAGE

Windshield	<u>None</u>	
Backlight	<u>None</u>	
Others	<u>None</u>	<u>None</u>

OTHER NOTABLE IMPACT EFFECTS: Rear seat pushed forward slightly.
Front bench seat moved 2" aft in seat track. Filler neck pulled .
out approximately 2", but still inserted in tank. Large puncture
observed in left front bottom side of tank due to apparent impact
with left rear shock absorber and mounting bracket for same.
Immediate leakage on impact. Vehicle moved 45 feet downrange after
impact. Right front tire located in monorail trench. Right rear
tire 14" to right of monorail.

L5996

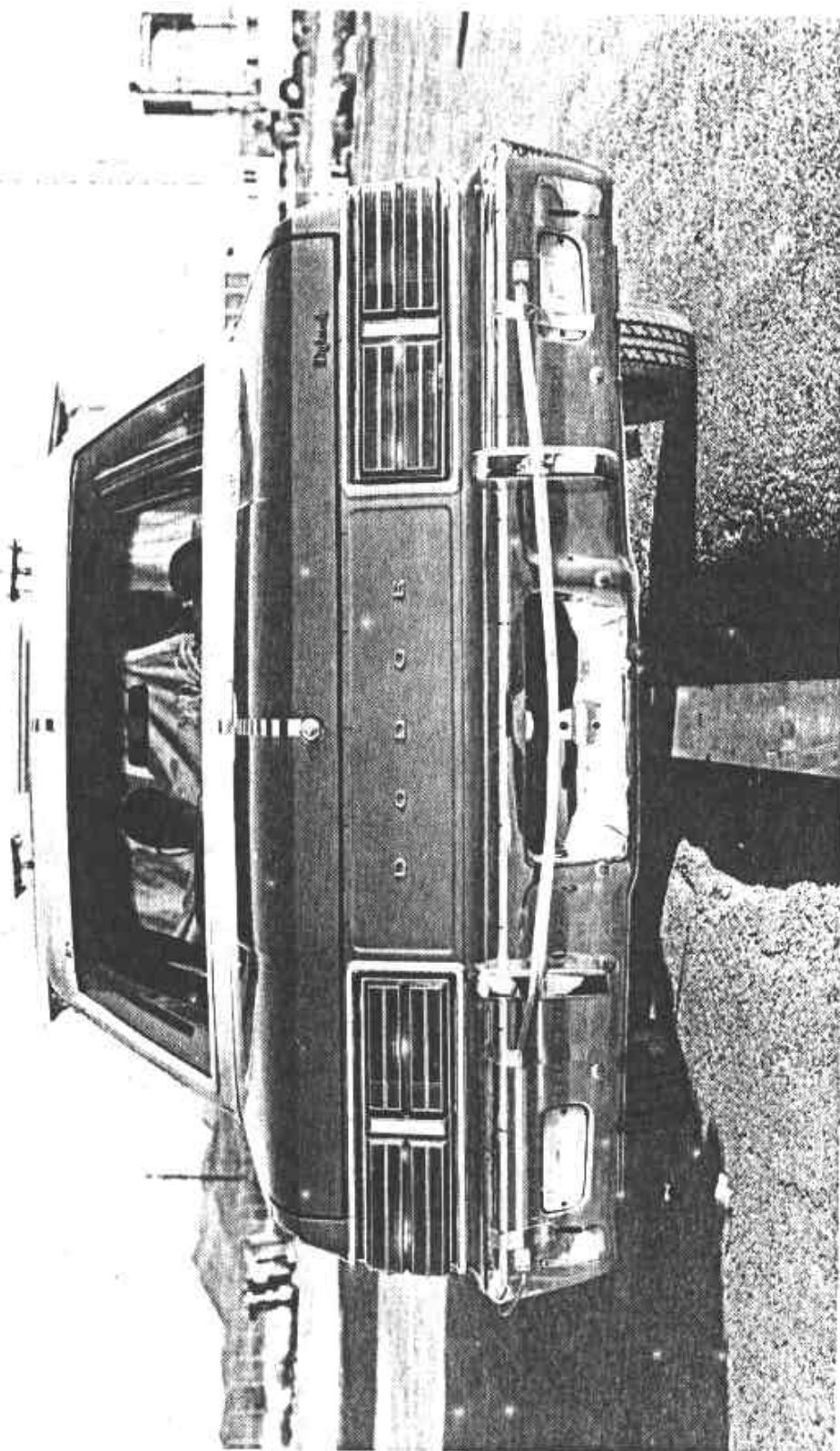


Figure 2-1. Pre-test Rear View.

28996

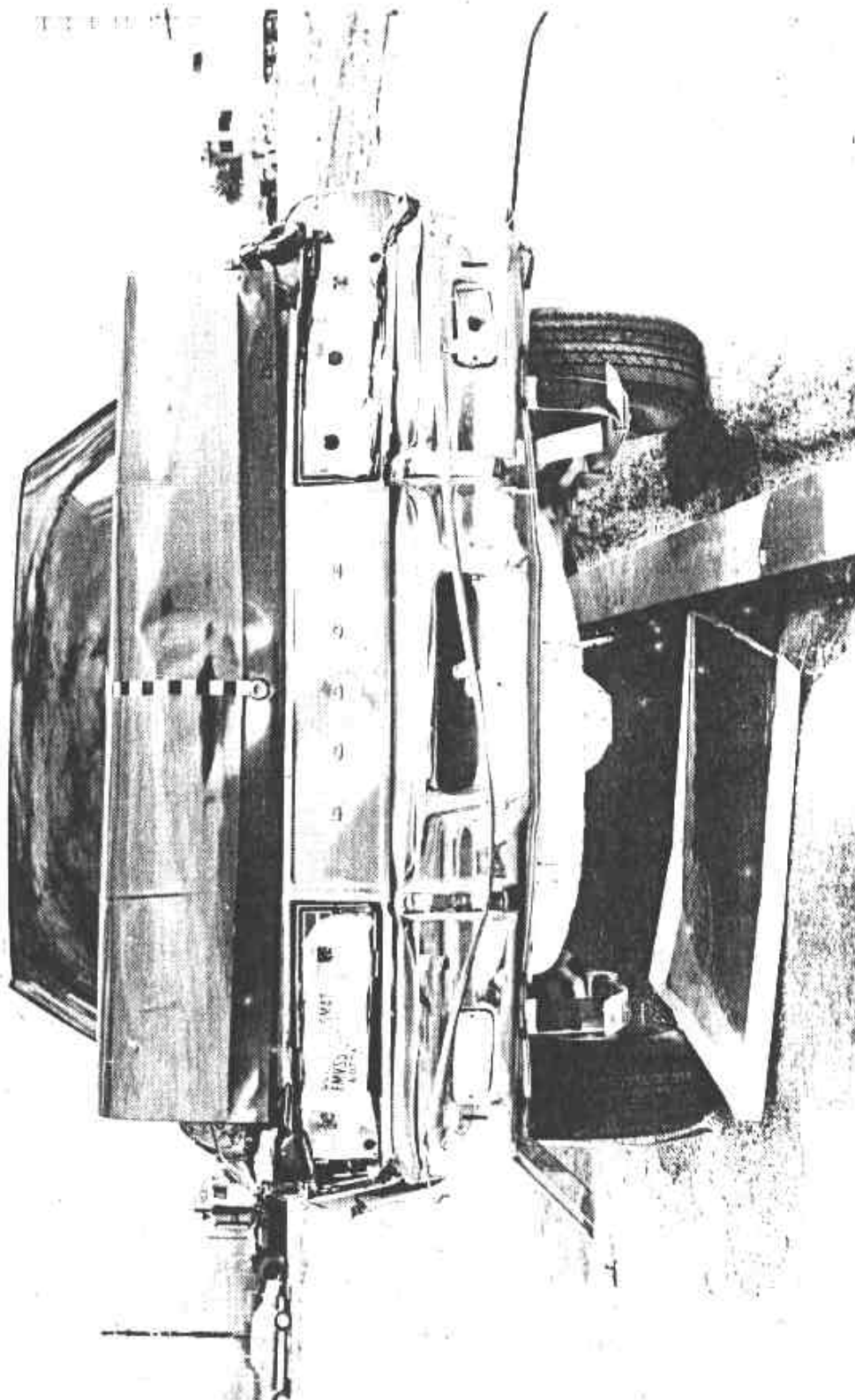


Figure 2-2. Post-test Rear View.

55996

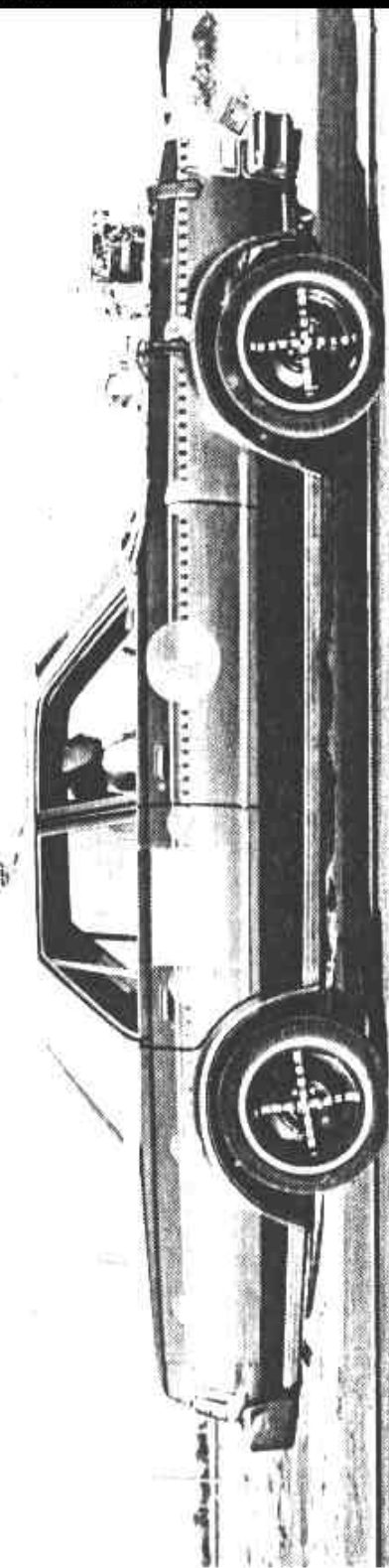


Figure 2-3. Pre-test Side View.

48996

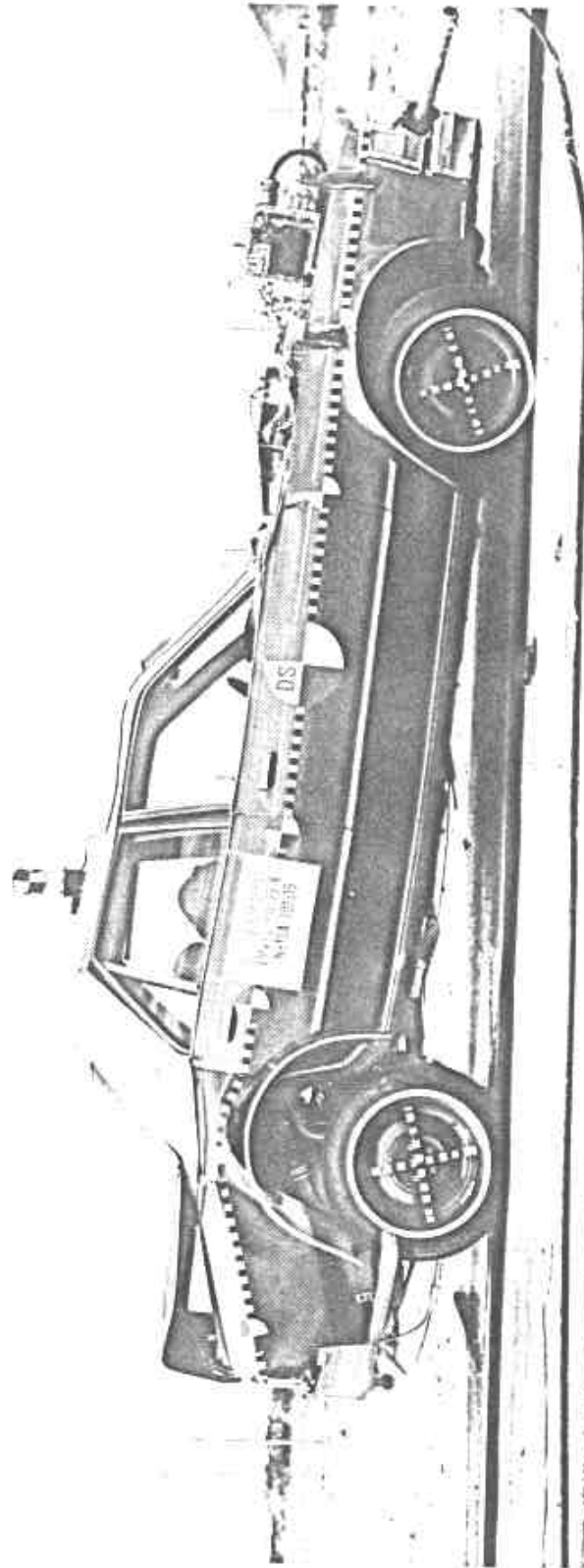


Figure 2-4. Post-test Side View.

59996

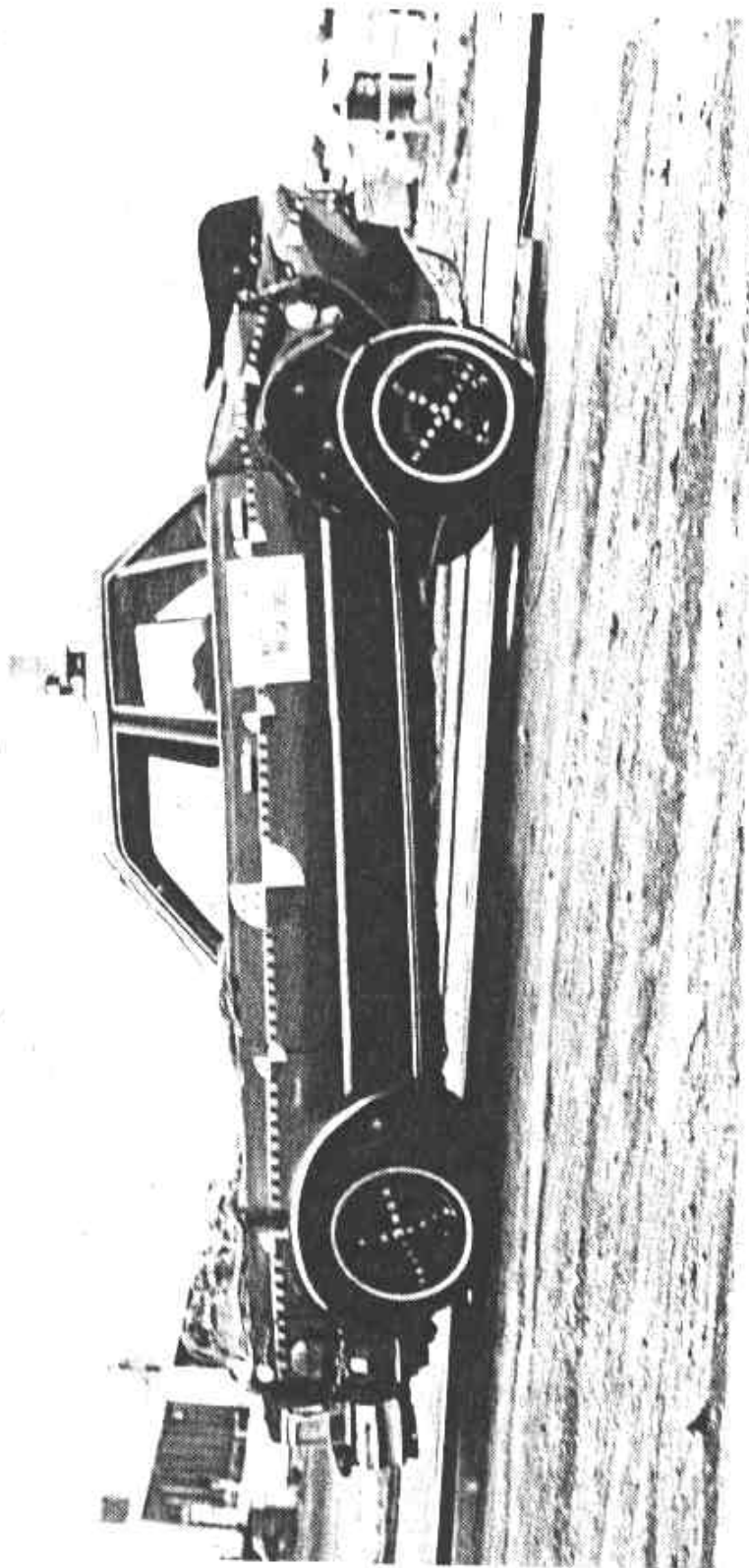


Figure 2-5. Post-test Side View.

18996

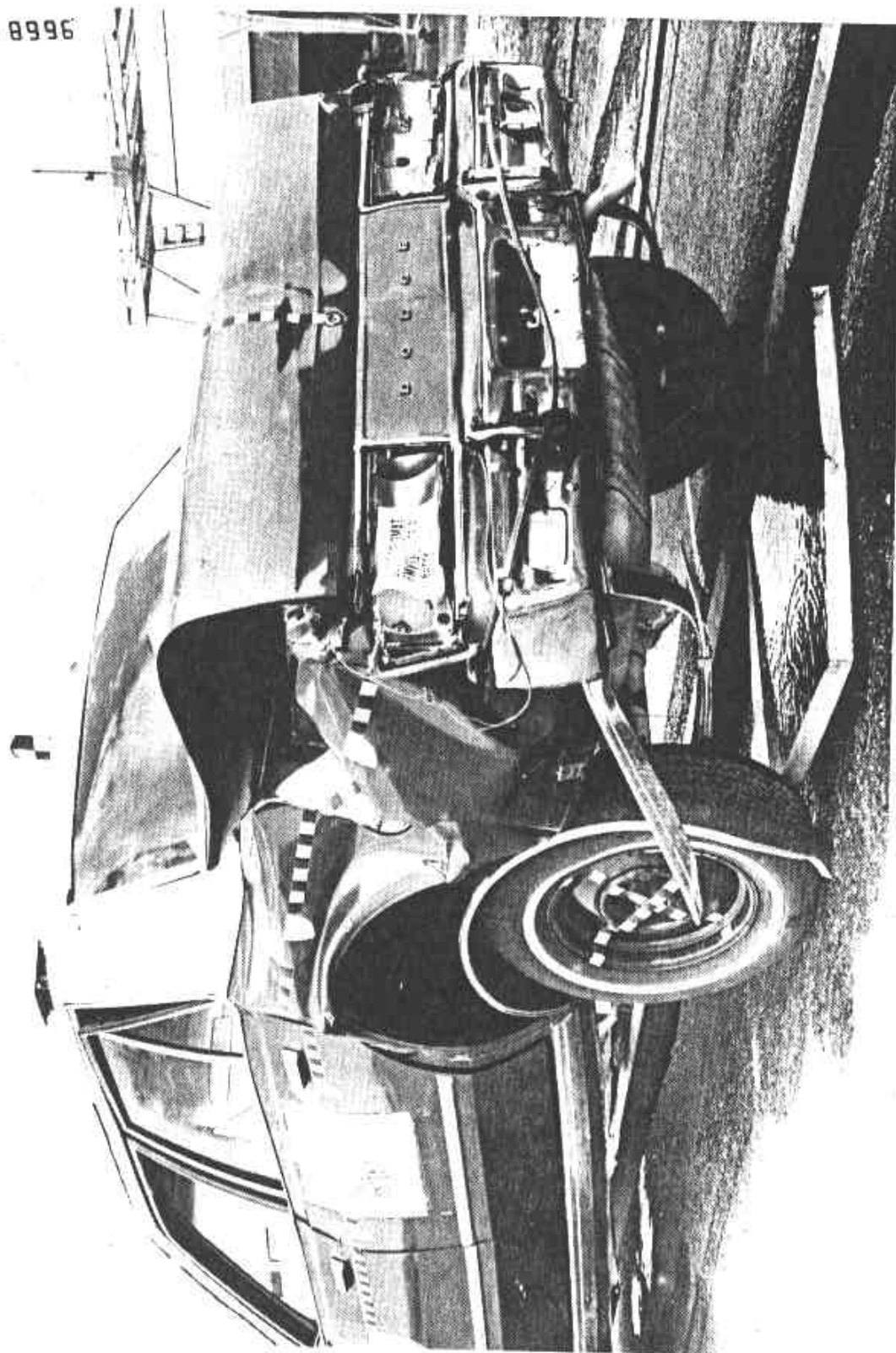


Figure 2-6. Post-test Left Rear Quarter View.

E8996

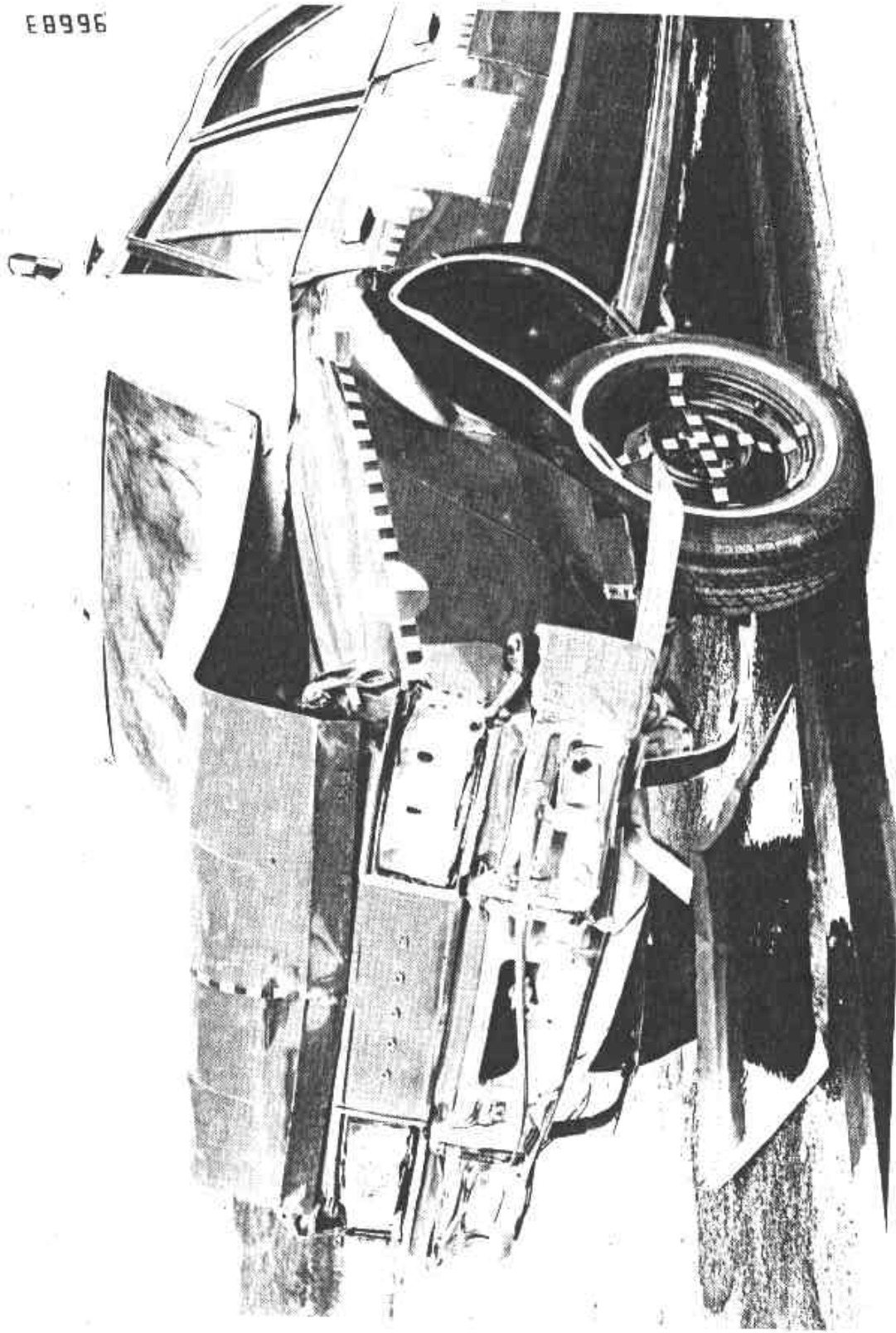


Figure 2-7. Post-test Right Rear Quarter View.

91358

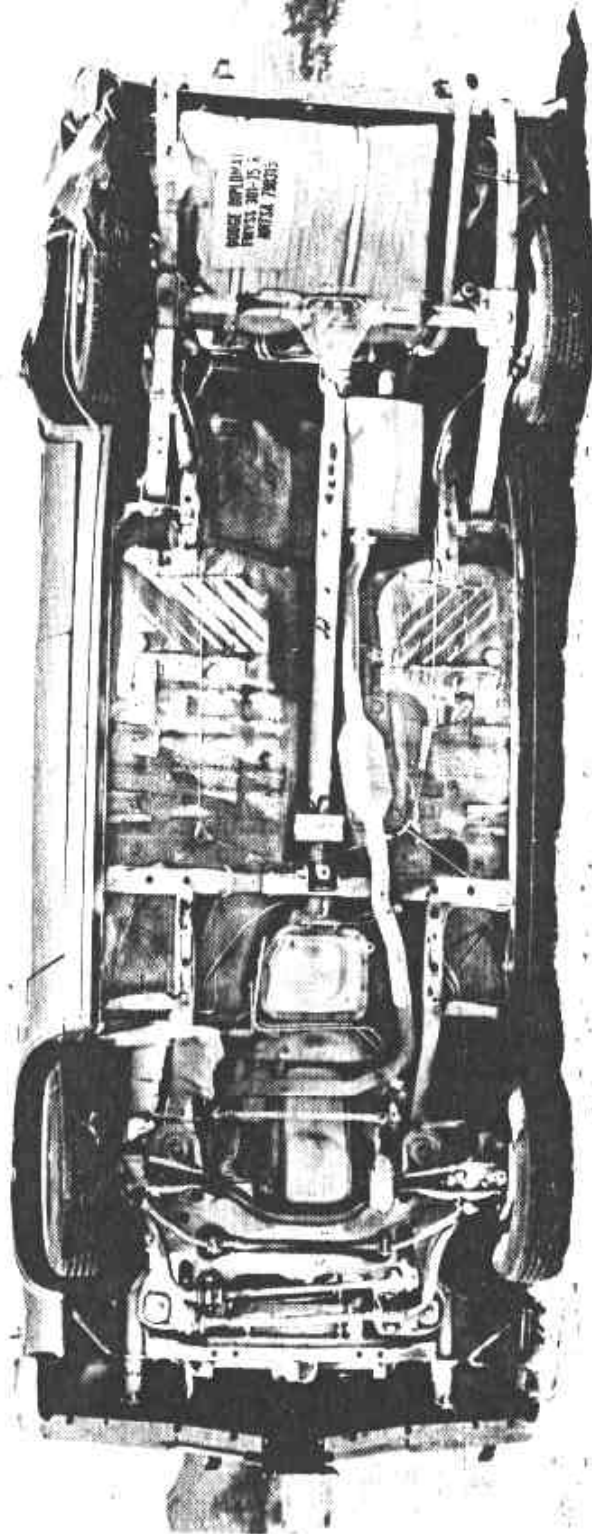


Figure 2-8. Post-test Overall Underside View.

ALL FMVSS 301-75 COMPLIANCE-RELATED DATA
HAS BEEN DELETED AND SENT TO
OFFICE OF VEHICLE SAFETY COMPLIANCE
AS REPORT 3066-79-134/1488A

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>
Dummy Centerline to Vehicle Centerline	<u>15.1</u>	<u>15.5</u>
Chest to Hub of Steering Wheel	<u>10.8</u>	<u>--</u>
Nose to Windshield (Horizontal Distance)	<u>21.5</u>	<u>22.1</u>
Left Knee to Closest Point on Lower Panel	<u>5.2</u>	<u>6.0</u>
Right Knee to Closest Point on Lower Panel	<u>5.2</u>	<u>6.5</u>
Ankle Distance	<u>13.8</u>	<u>10.0</u>
Knee Distance	<u>10.3</u>	<u>9.0</u>
Nose to Seatback	<u>--</u>	<u>--</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.: 790315

Manufacturer: Chrysler Corporation

Make/Model: Dodge Diplomat

Model Year: 1979

SEAT TYPE:

☒ Bench ☐ Bucket
☐ Split Bench

ADJUSTER TYPE:

☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:

☐ Adjustable
☐ Reclining
☒ Fixed

AMBIENT TEMPERATURE: 79 °F; TIME: 0715

POSITIONING

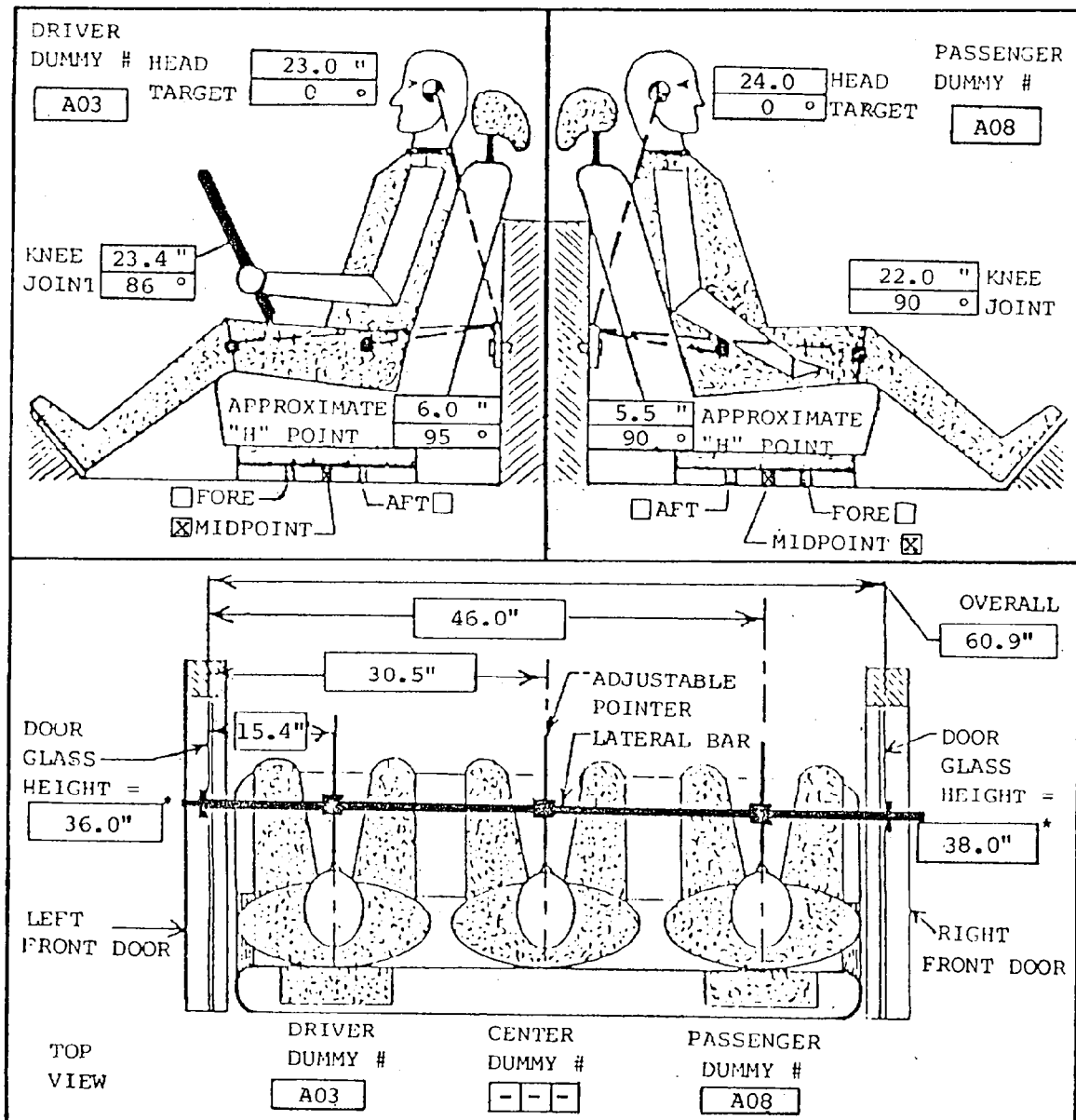
DATE: 6/6/79

TECHNICIANS:

1. R. Pirtle

2. M. Pozzi

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



*Door glass height is equal on the right and left side of 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	4.3	138	-5.6	172	117.7	121	-6.4	148
Lateral	4.8	45	-4.4	130	33.2	121	-11.5	149
Vertical	7.4	34	-5.7	130	33.1	122	-37.3	127
Resultant	8.1	51	0.6	150	124.7	121	0.7	16
HIC	263.7 @ 154-164 msec				469.2 @ 119-126 msec			
Chest Acceleration								
Longitudinal	18.4	174	-0.3	24	24.1	107	-1.3	200
Lateral	1.0	162	-3.8	138	5.0	147	-1.8	121
Vertical	9.7	130	-0.1	2	12.8	125	-0.4	1
Resultant (Max)	19.0	174			25.2	107		
Resultant (clip)	18.3	176			21.2	109		
SEVERITY INDEX	46.7 @ 200 msec				53.9 @ 200 msec			
TIME > 60 G	0 msec				0 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left								
Right								
Belt Loads								
Lap								
Torso								
Vehicle Impact Speed (mph): 35.09								
*Longitudinal:	Forward							
Lateral:	Rightward							
Vertical:	Downward							
**Longitudinal:	Rearward							
Lateral:	Leftward							
Vertical:	Upward							

SECTION 4
DUMMY KINEMATIC SUMMARY

DRIVER - Smooth transition from normal upright position to near reclining position. Very little lateral motion noted.

PASSENGER - Smooth transition from normal upright position to near reclining position. Very little lateral motion noted.

CHILD - Seated in upright post-test position (longitudinally).
Right shoulder resting against door trim with head leaning into window. No evidence of violent motion.

OTHER COMMENTS: Child dummy was uninstrumented.

SECTION 4

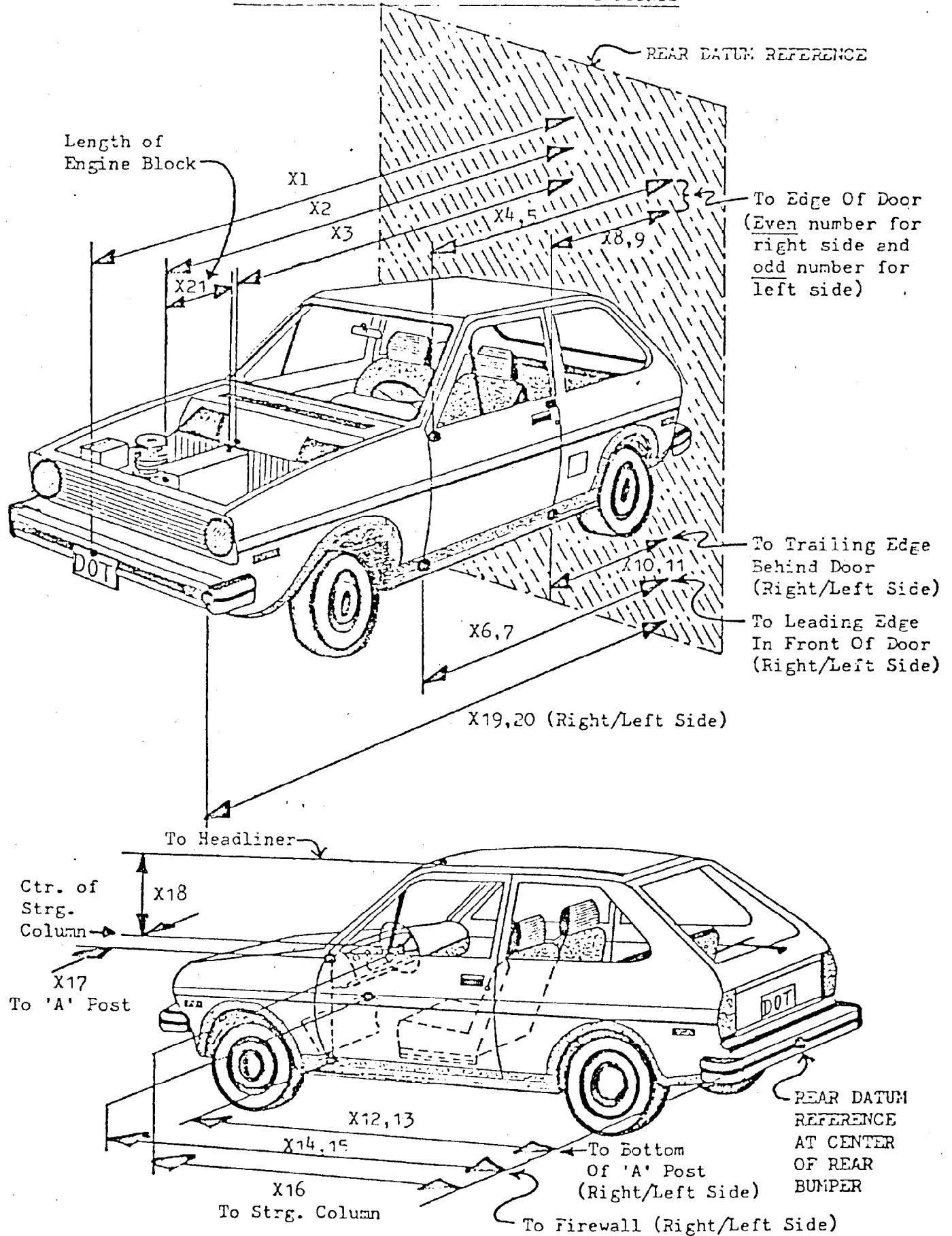
PRE-/POST-TEST STATIC MEASUREMENT DATA
(See Following Page for Dimension Definition)

Vehicle: Dodge DiplomatNHTSA No.: 790315Test Date: 6/6/79 D.S. No.: 859

<u>Reference Dimension</u>	<u>Pre-test Measurement</u>	<u>Post-test Measurement</u>	<u>Change</u>
X ₁ *	204.0	180.5	23.5
X ₂			
X ₃			
X ₄			
X ₅			
X ₆			
X ₇			
X ₈ *	140.0	139.5	0.5
X ₉ *	140.5	140.4	0.1
X ₁₀			
X ₁₁			
X ₁₂			
X ₁₃			
X ₁₄			
X ₁₅			
X ₁₆			
Y ₁₇			
Z ₁₈			
X ₁₉ *	199.8	180.5	19.3
X ₂₀ *	200.3	182.4	17.9
X ₂₁			

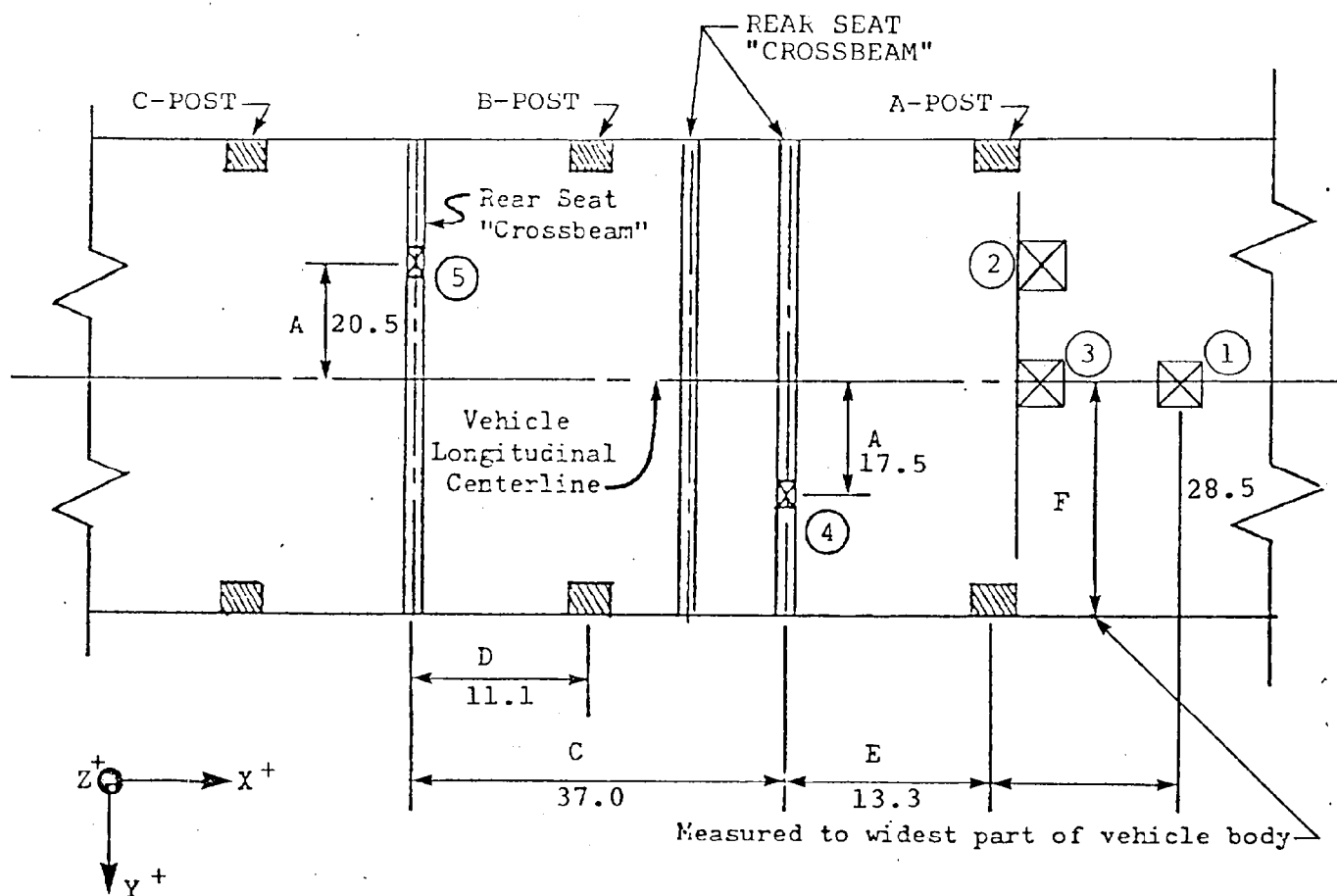
*Rear impact data requirements.

PRE-TEST AND POST-TEST MEASUREMENT POINTS



SECTION 4

TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY



No.	Location Description	Component Direction			Data Summary					
					Peak G @ MSEC					
		X	Y	Z	"+" X	"-" X	"+" Y	"-" Y	"+" Z	"-" Z
1	Front seat "crossbeam"	X	X	X	23.4 @ 9	-3.0 @ 14	7.5 @ 17	-11.5 @ 23	16.9 @ 25	-21.2 @ 33
2	Rear seat "crossbeam"	X		X	12.4 @ 14	-32.0 @ 9	@	@	32.8 @ 18	-32.1 @ 28

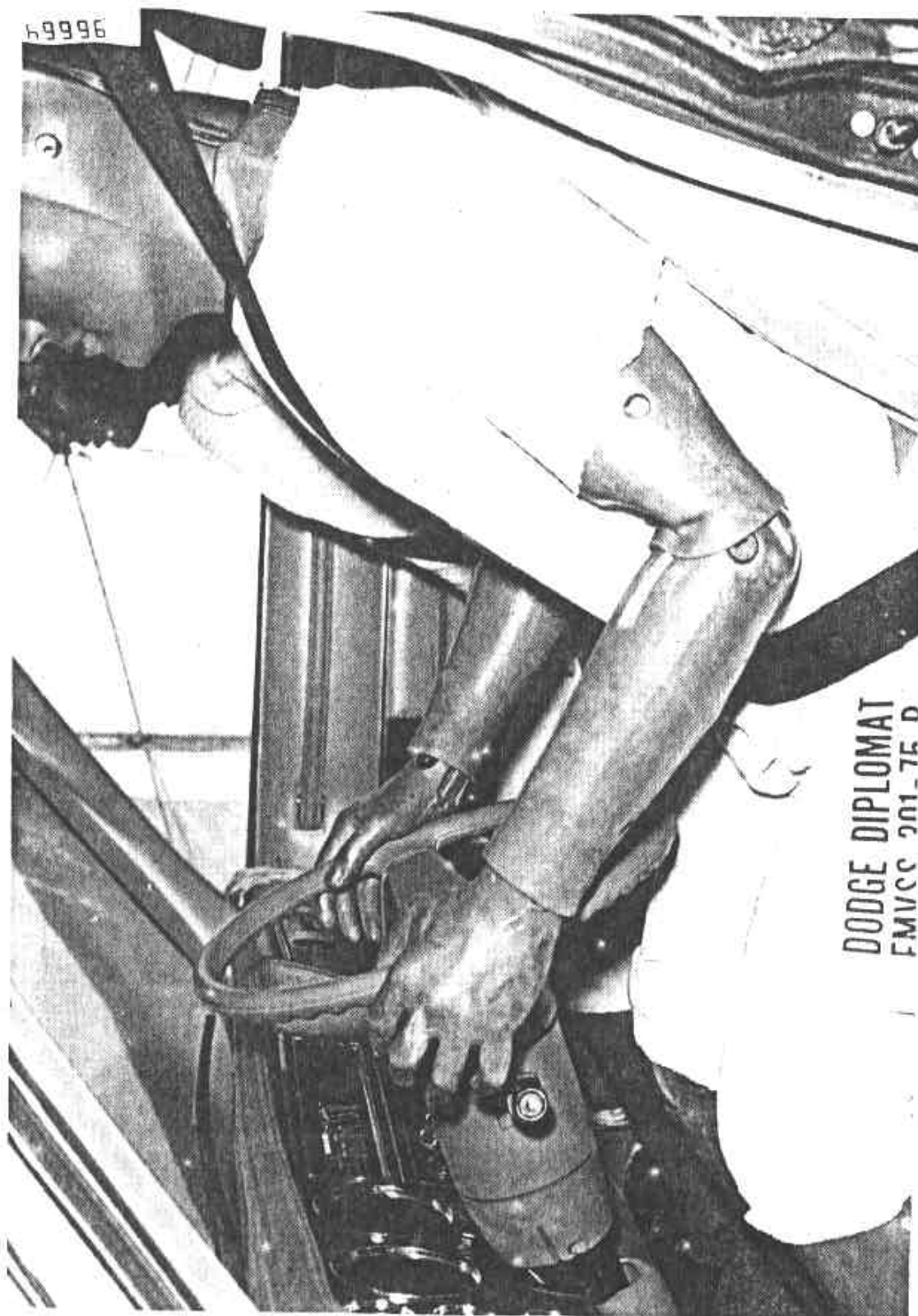


Figure 4-1. Pre-test Driver Dummy Position.

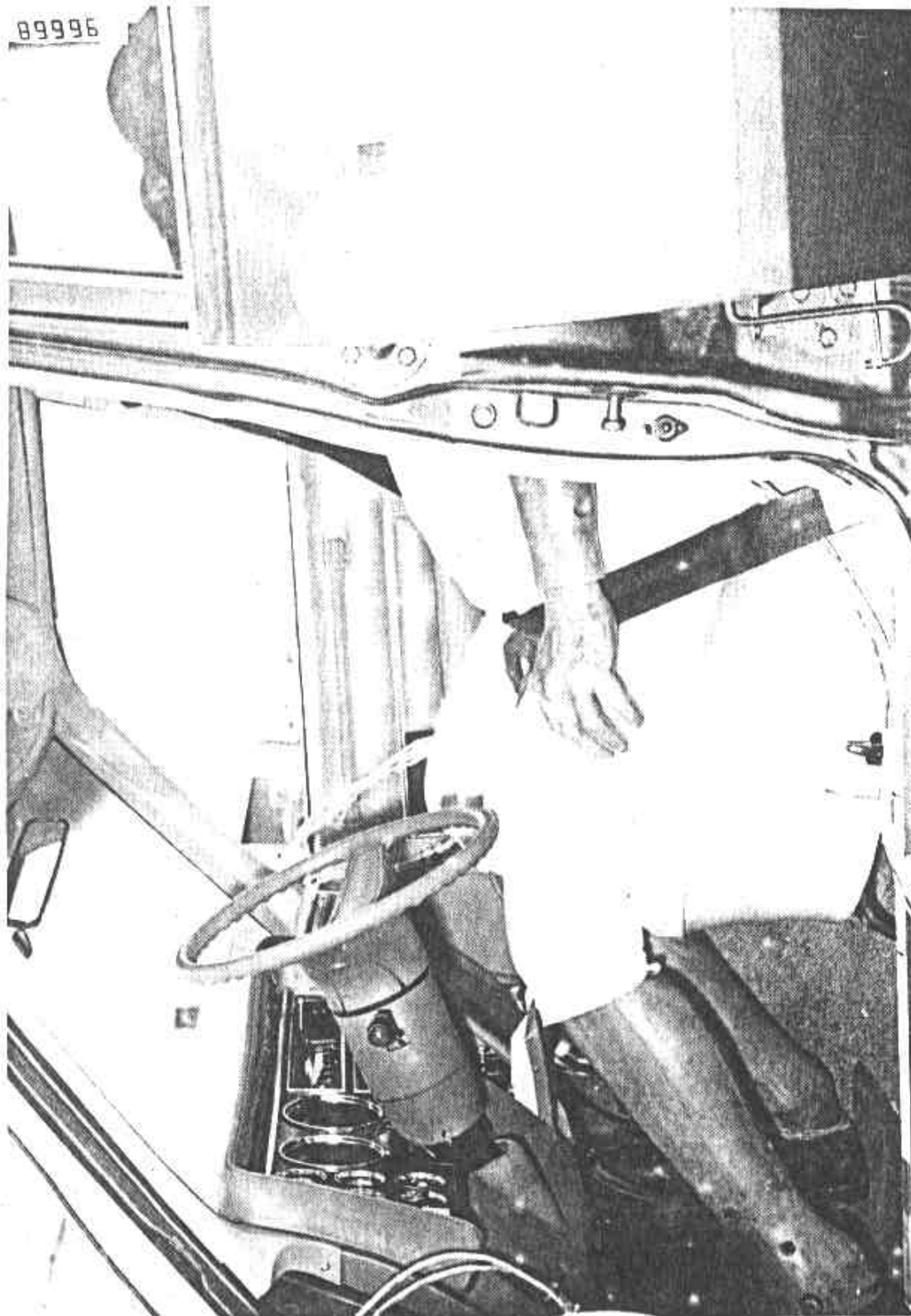


Figure 4-2. Post-test Driver Dummy Position.



Figure 4-3. Post-test Driver Location with Dummy Removed.

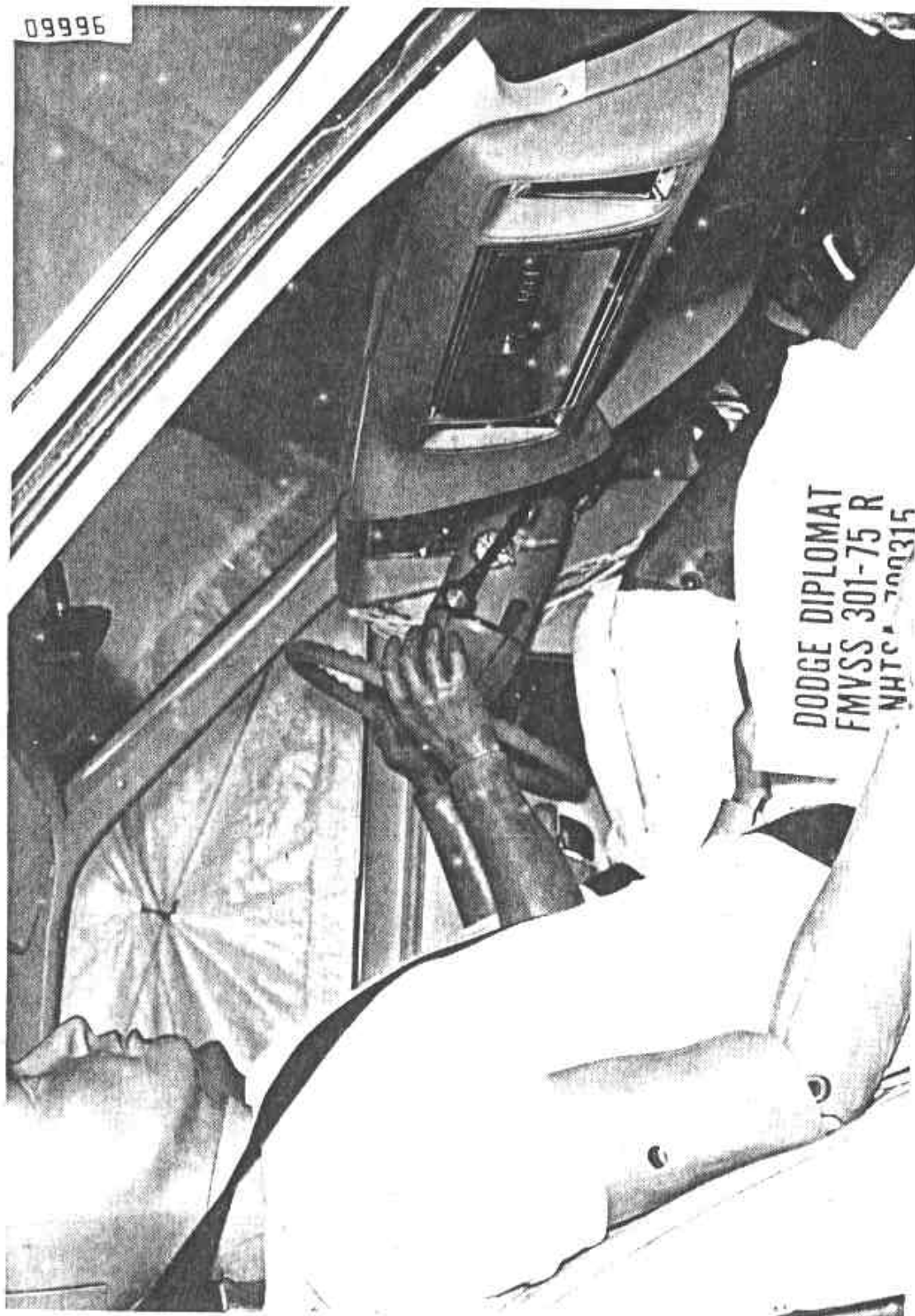


Figure 4-4. Pre-test Passenger Dummy.

L9996

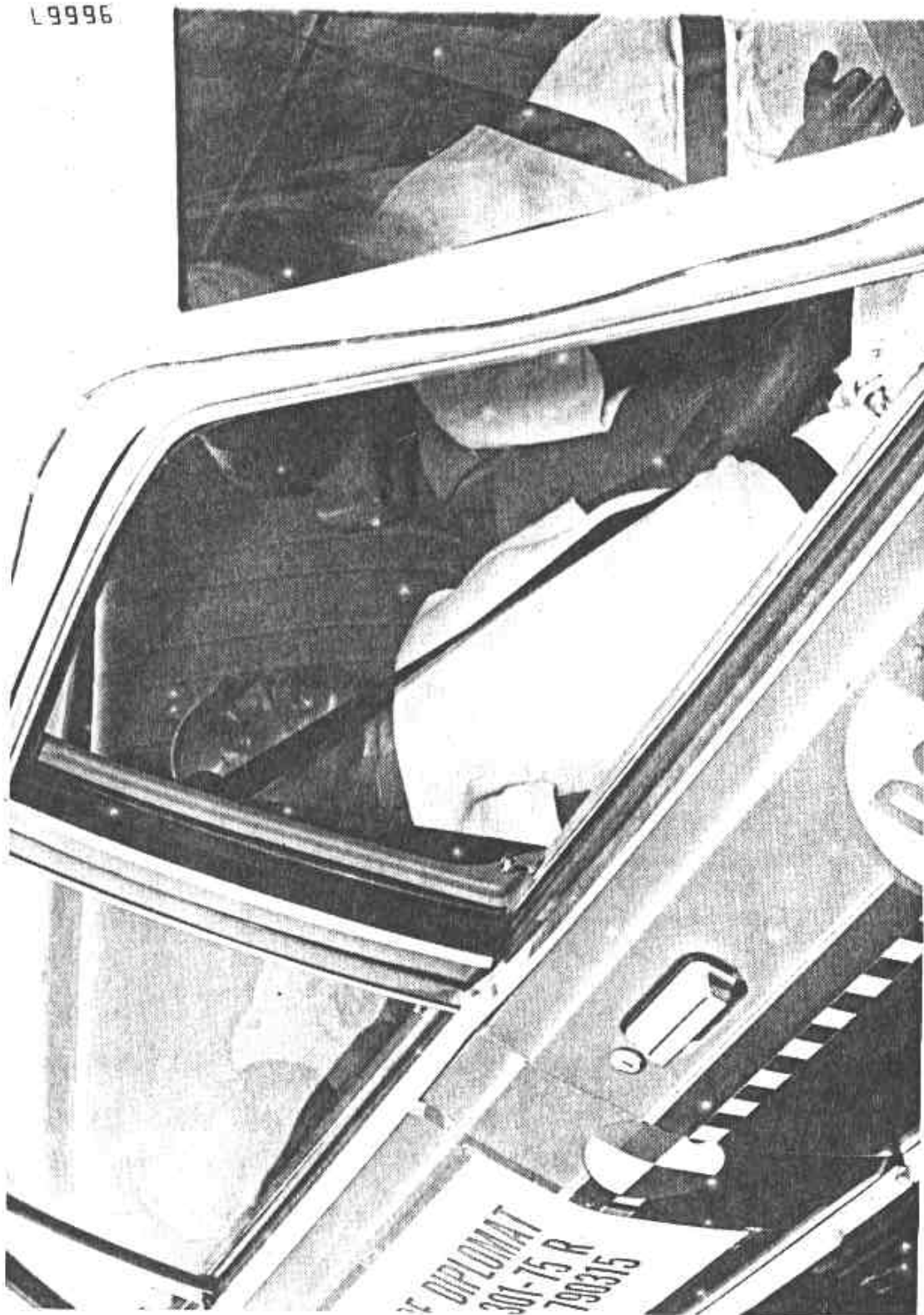


Figure 4-5. Post-test Passenger Position.

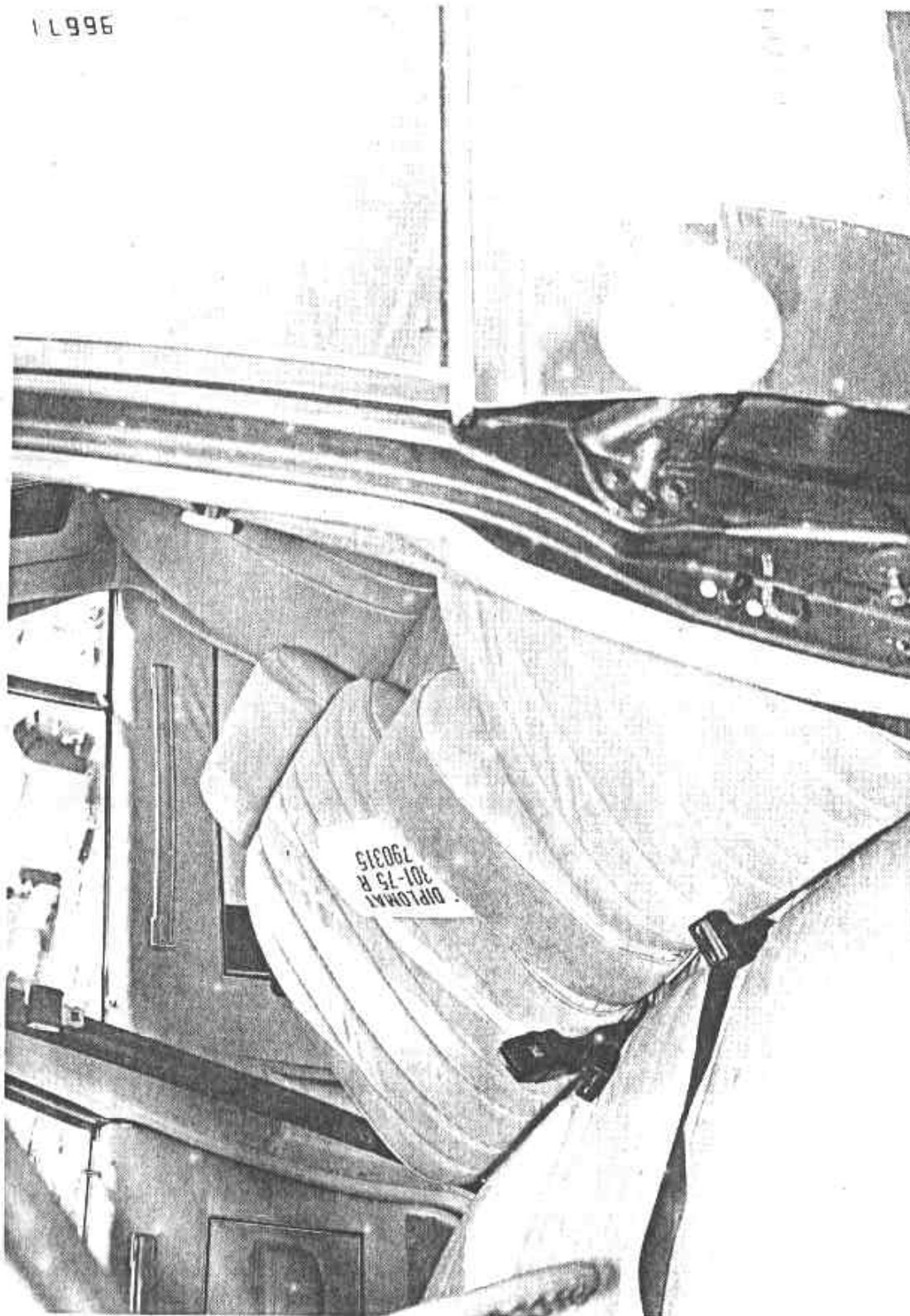


Figure 4-6. Post-test Passenger Position with Dummy Removed.

APPENDIX A
TEST FACILITIES AND PROCEDURE

A.0 TEST FACILITY AND EQUIPMENT FOR FMVSS 301-75 REAR IMPACT TESTS

General Test Facility Description

FMVSS 301-75 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 PARKING BRAKE TEST RAMP
22. PULL-OFF AREA (TYPICAL OF THIRTEEN)
23. BALLISTIC TEST RANGE

Figure A-1. The Dynamic Science, Inc. Deer Valley Facility.

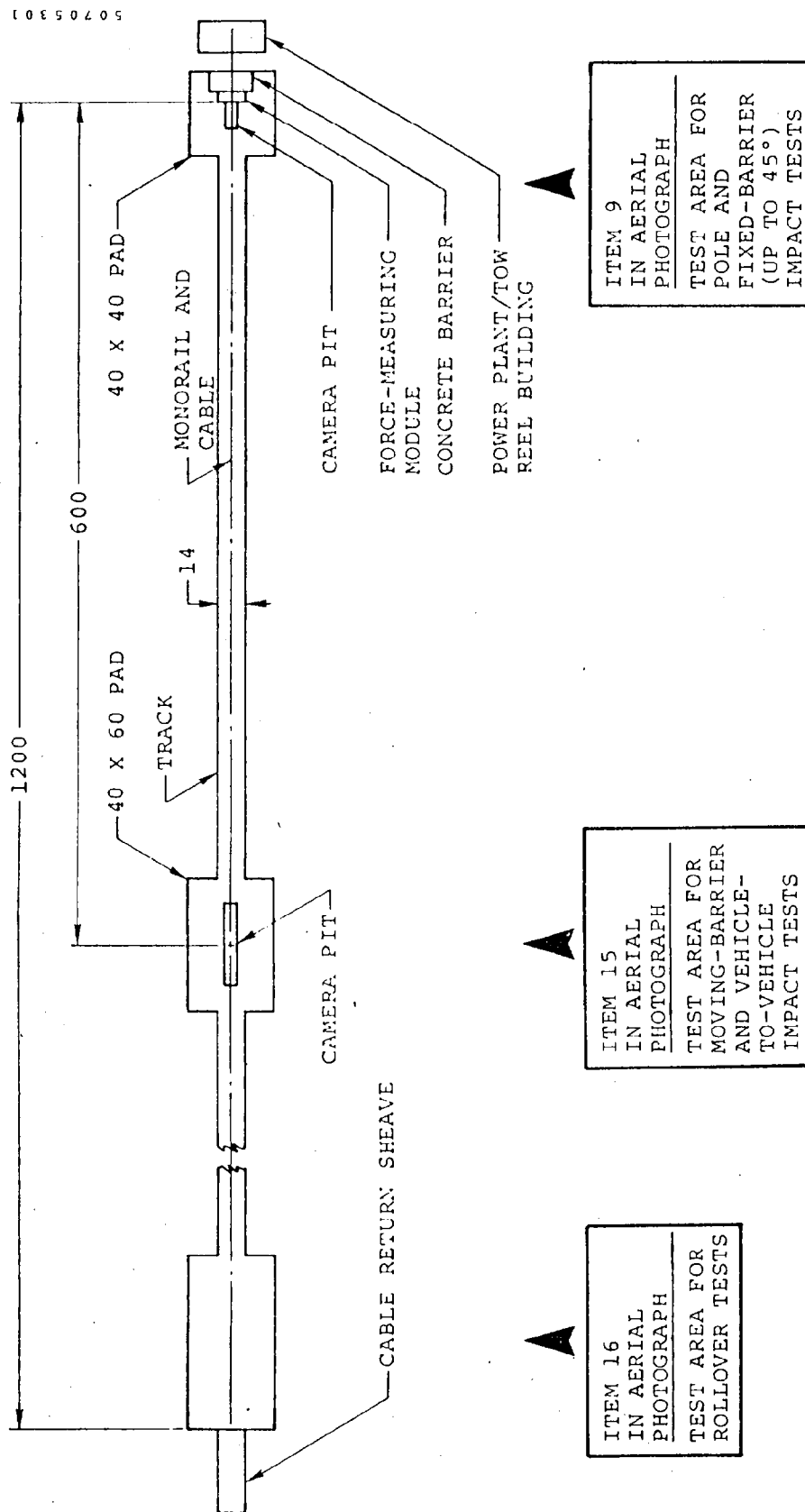


Figure A-2. Monorail Impact Facility.

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.

Moving Barrier

The moving barrier used by Dynamic Science conforms to all the requirements of paragraph S8.2 of FMVSS 208, "Occupant Crash Protection." It is rigid and has a solid suspension so it undergoes no significant amount of dynamic or static deformation and absorbs no significant portion of the energy dissipated in the impact.

The impact surface is a vertical, rigid, flat rectangle, 78 inches wide and 60 inches high, perpendicular to the barrier's direction of travel. The lower edge of the barrier face is horizontal and 5 inches above the ground surface.

The nominal weight of the moving barrier is 4,000 pounds. The actual measured weight of the barrier is 3,996 pounds distributed as follows:

LF	1536 lb	RF	1415 lb
LR	427 lb	RR	618 lb

The tires are size J60-15, inflated to 24 psi in the front and 10 psi in the rear.

A guide at the back of the moving barrier which rides along the monorail ensures that the barrier travels in a straight line with no significant lateral, vertical, or rotational movement.

Fuel Simulation

As prescribed in the FMVSS 301 Laboratory Procedure, the vehicle fuel system is filled to 90 to 95 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. Stoddard 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.

High-Speed Motion Photography

Seven high-speed (1,000 frames per second) motion cameras with 100 Hz timing marks are used for photographic test documentation. The general location of the cameras is diagrammed in Figure A-3. Precise positioning is accomplished through bore sighting with the vehicle at the impact point prior to the test.

Test No: _____ Test Date: _____

Test Type: FMVSS 301 Rear Indicant Tests

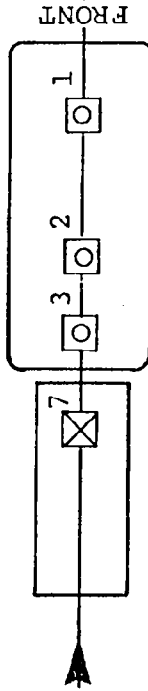
Vehicle A (Away): _____

Vehicle B (Barrier): Certified Moving Barrier

Comments: _____

MOVING BARRIER

VEHICLE



- CAMERA SYMBOLS
- ☐ PIT
- ☐ GROUND
- ☐ BARRIER
- ☒ OVERHEAD
- ☐ ON-BOARD
- FRAME RATE
1. 1000 fr/sec
2. 200 fr/sec
3. Other 24 fr/sec
4. 400 fr/sec
5. 500 fr/sec
- TIMING LIGHT SPEED
1. 100 Hz (10 msec/light)
2. 200 Hz (5 msec/light)
3. Other

CAMERA	YES
STILLS	X
SLIDES	
MOVIE	X
POLAROID	
VIDEO	

Loc. No.	Location	Field of View	Lens Size	Frm Rate	Tmng Spd	Ser No	Impact Dist-X	C.L. Dist-Y	CAM Hght
1	Pit	Underside forward engine compartment		>500					
2	Pit	Underside mid-car		>500					
3	Pit	Underside fuel tank		>500					
4	Hand-held	Real time documentary							
5	Ground	Complete left side of vehicle		>500					
6	Ground/right side	Contact area between barrier and car		>500					
7	On moving barrier	Contact area between barrier and car		>500					

Figure A-3. Camera Locations.

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.

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.

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 LECS (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.

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*

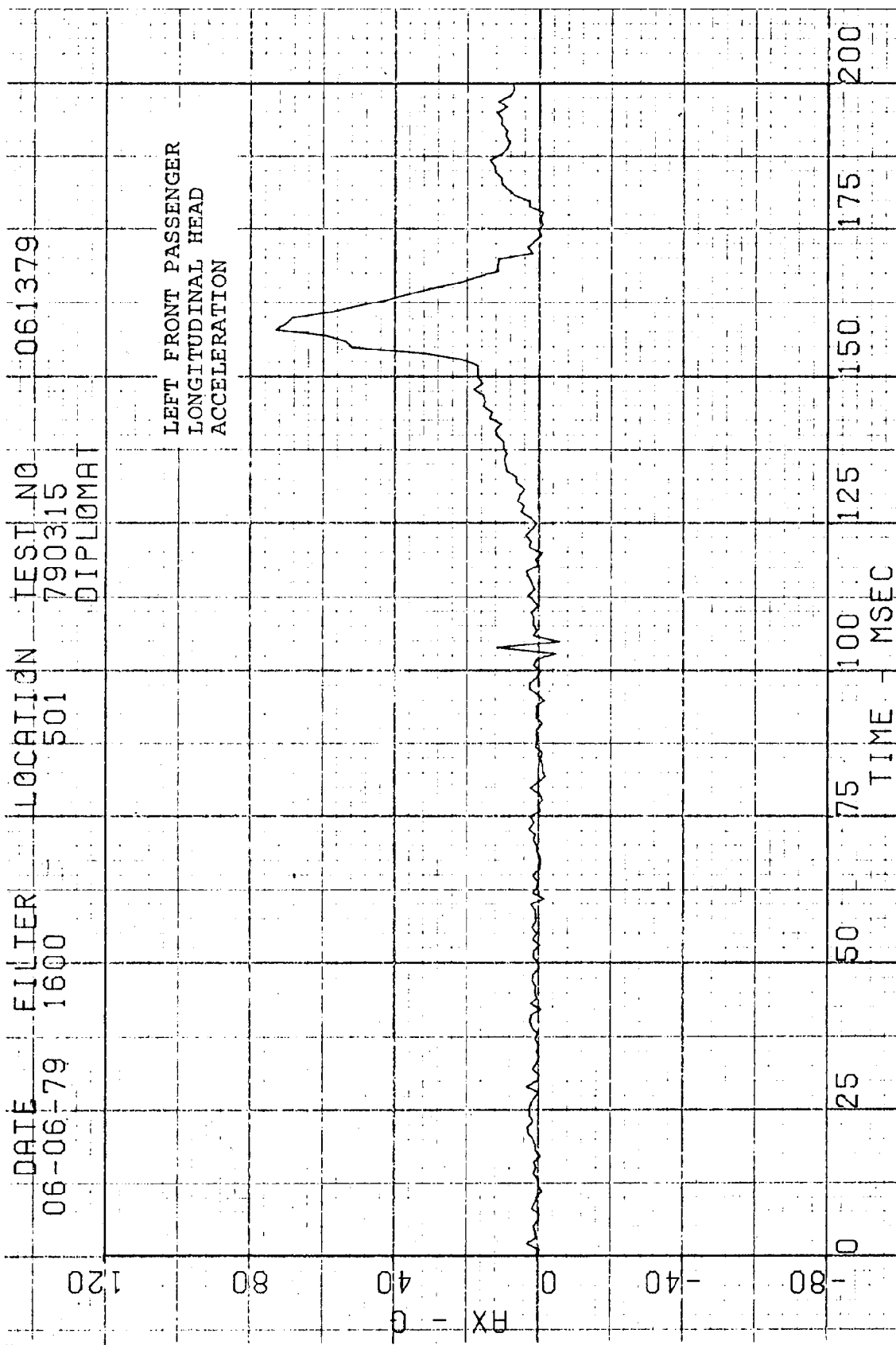
<u>Driver</u>	<u>RF Outboard Passenger</u>	<u>Data Description</u>
501	503	Head Acceleration
1101	1103	Chest Acceleration
2111	2131	Left Femur Load

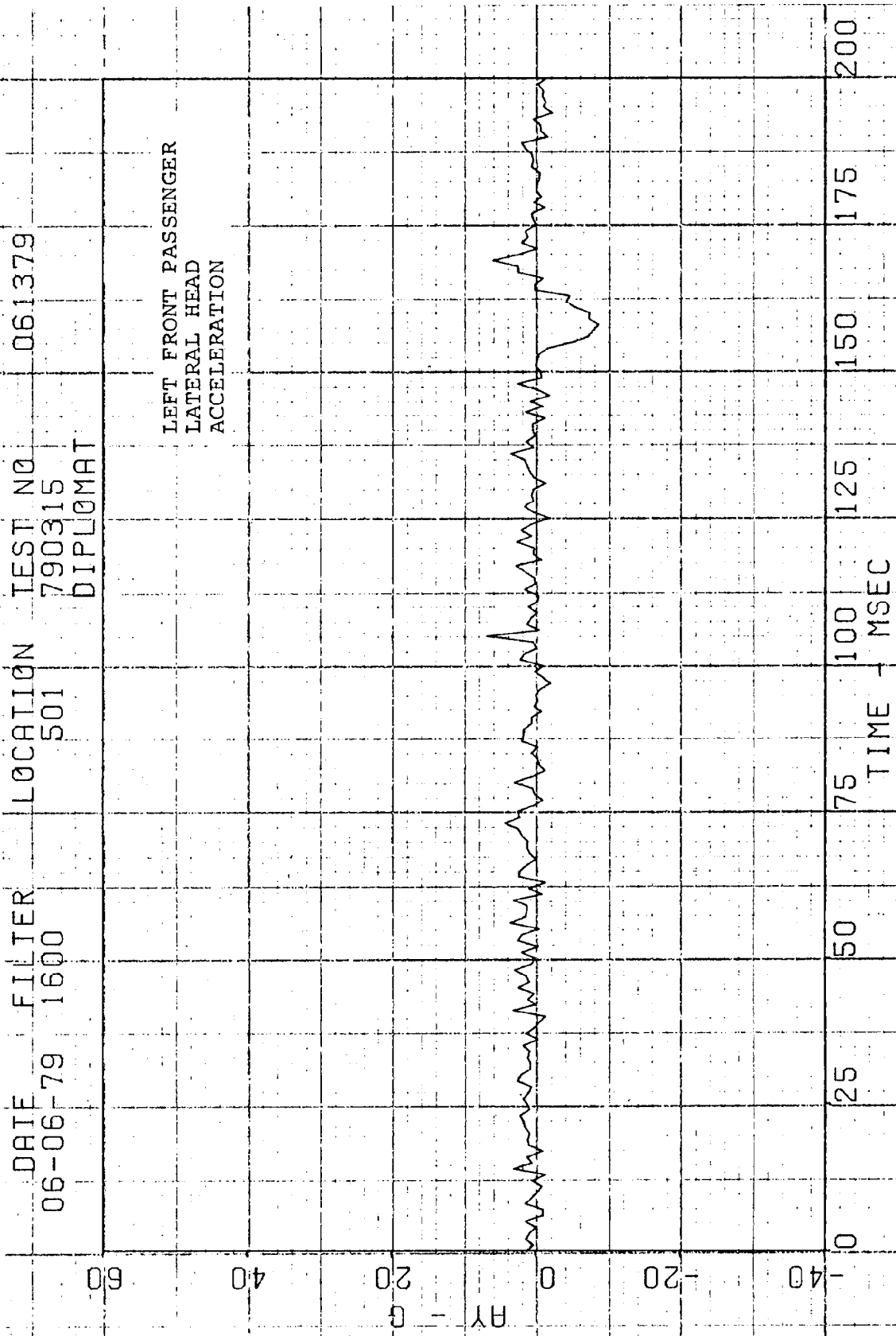
Vehicle Data**

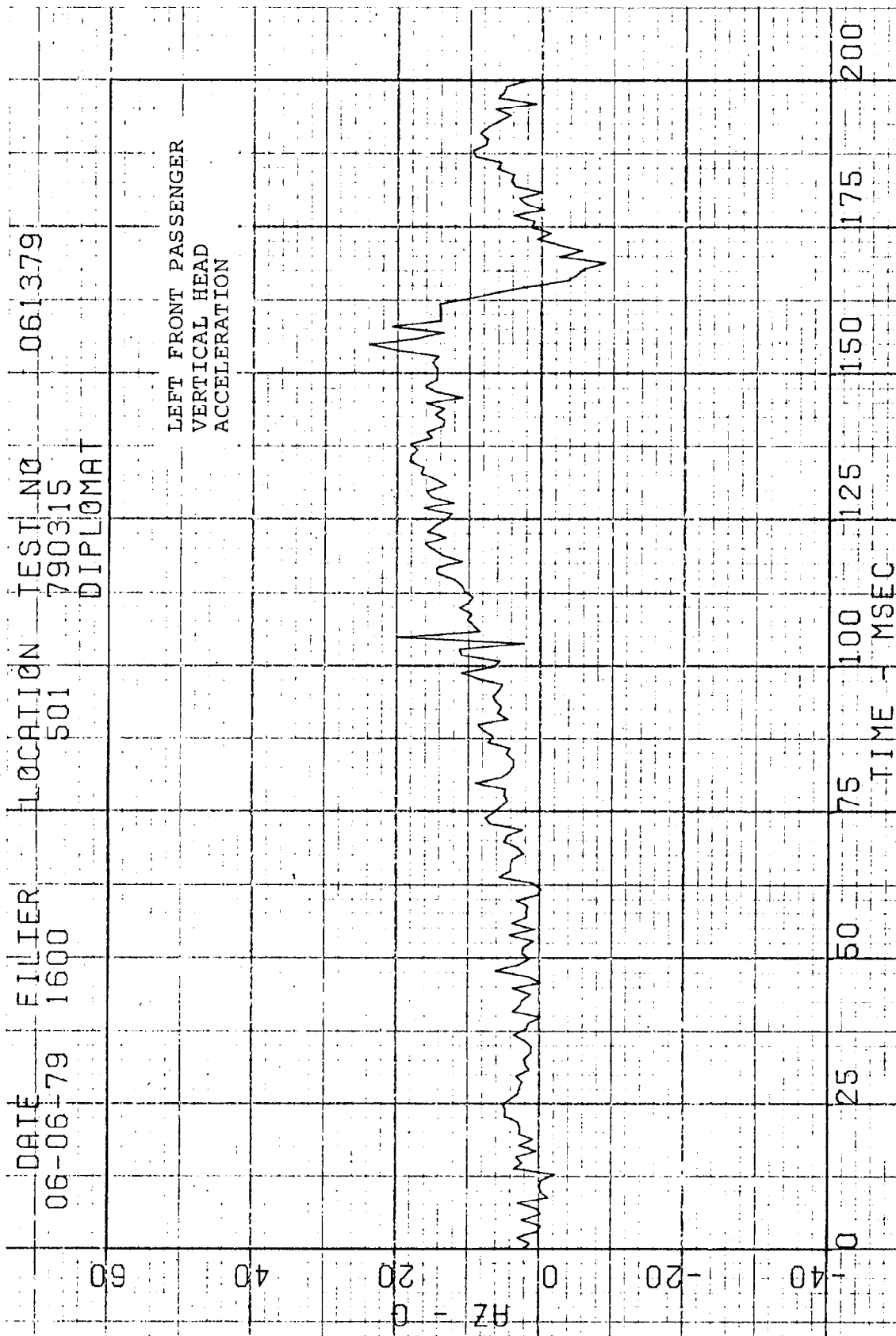
	<u>Location</u>
101	Front Seat Area
102	Rear Seat Area

*Dummy Injury Summary presented on page 4-4.

**Vehicle accelerometer location and data summarized on page 4-8.

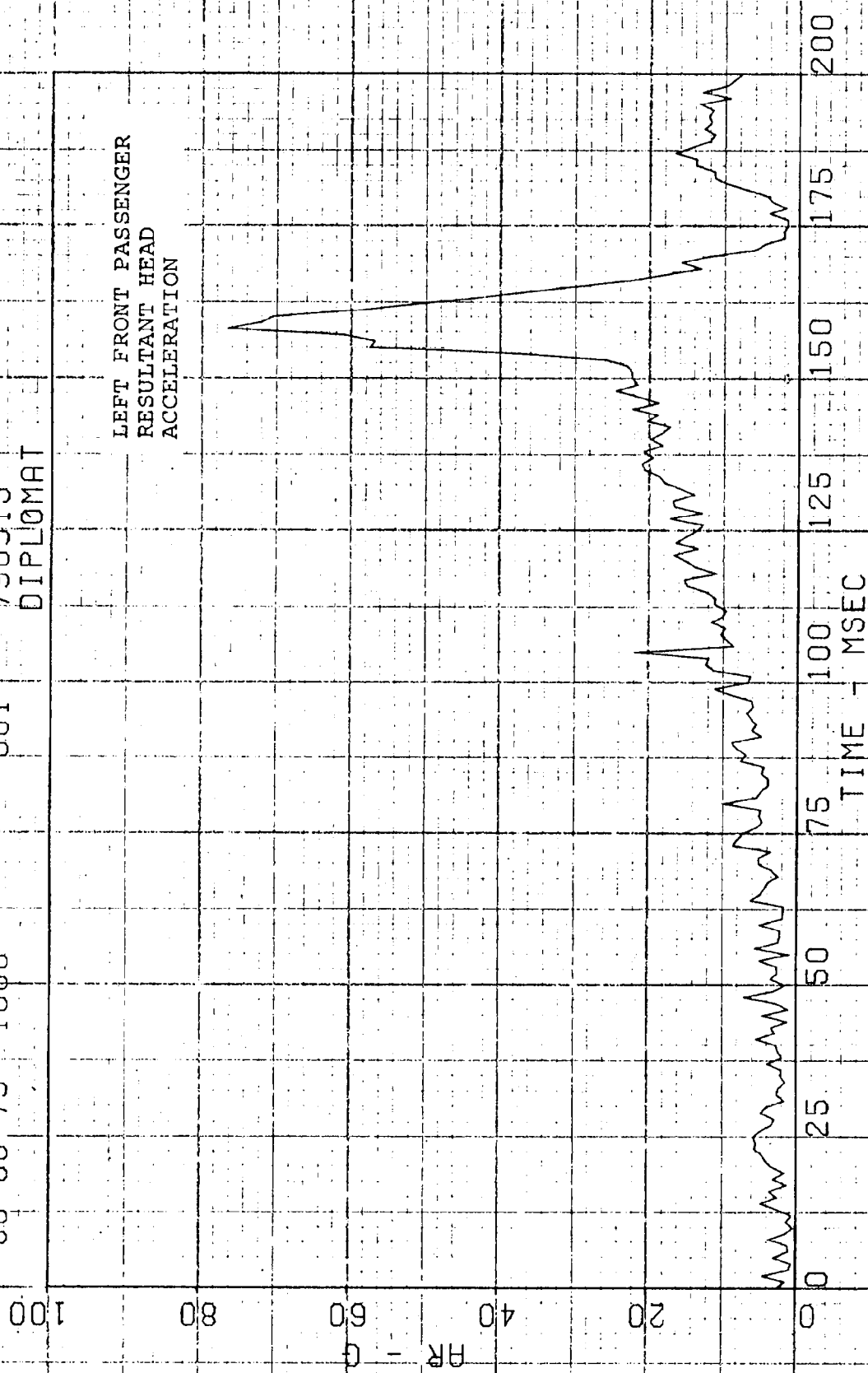




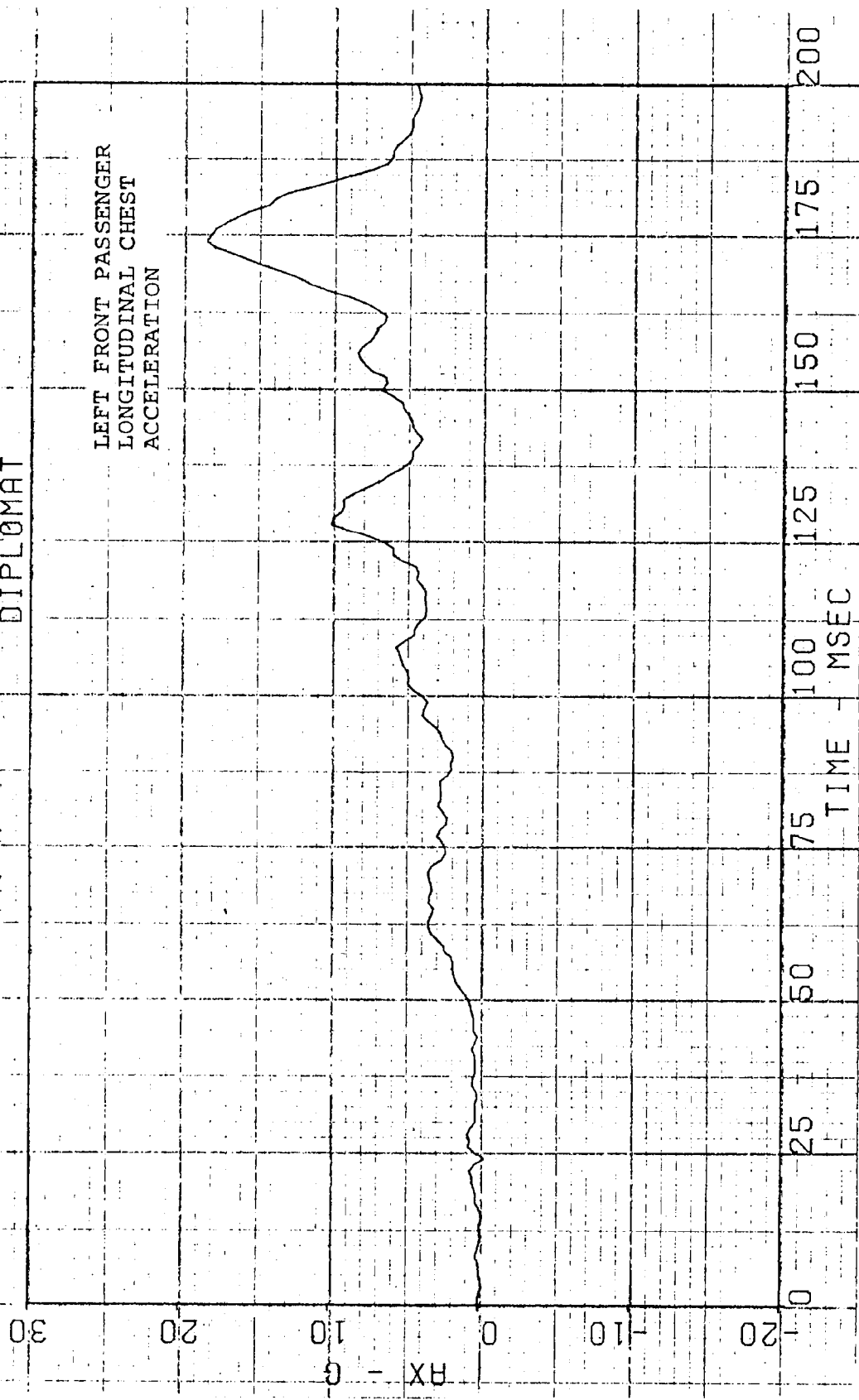


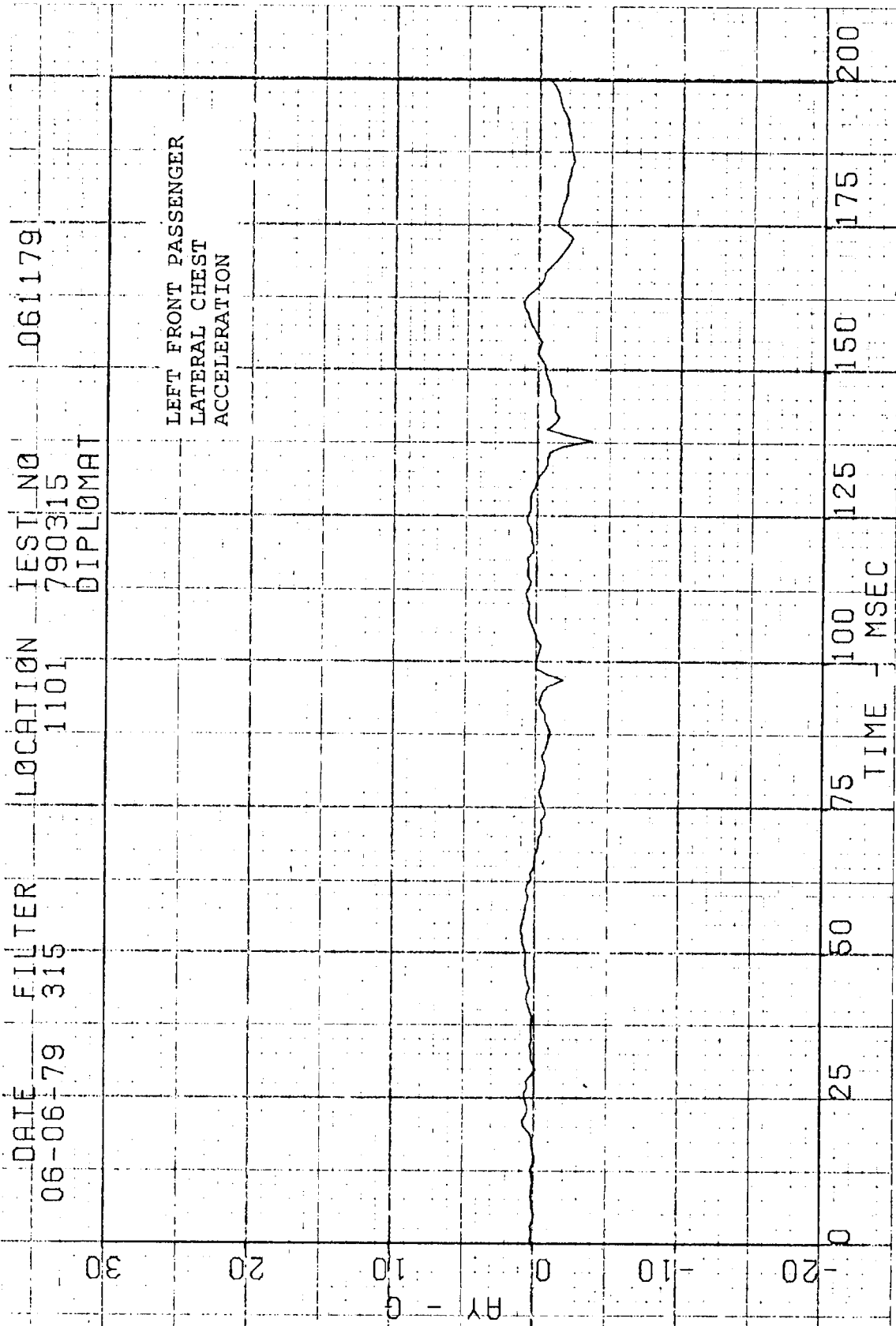
DATE 06-06-79
 FILTER 1600
 LOCATION 501
 TEST NO 790315
 061379
 DIPLOMAT

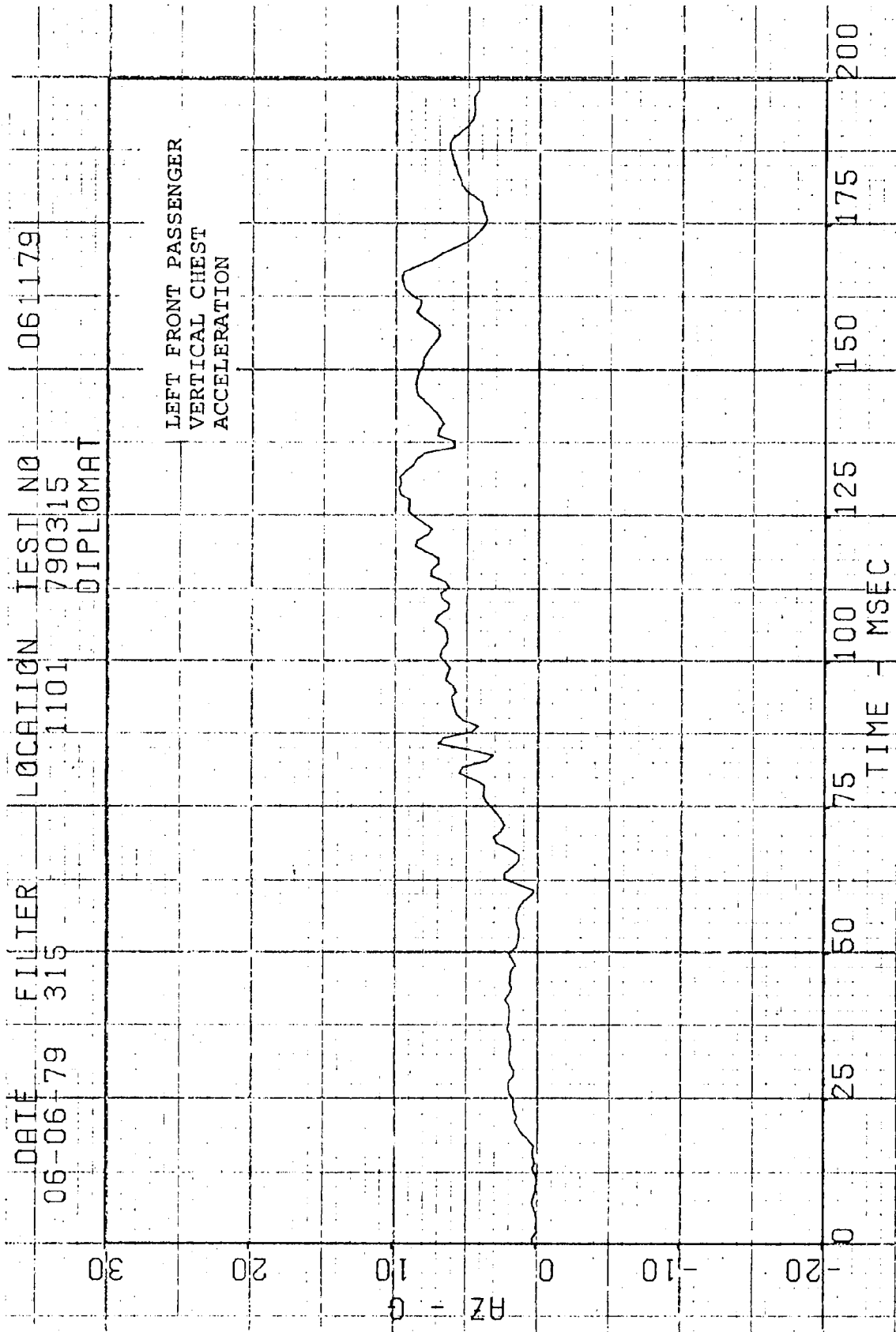
LEFT FRONT PASSENGER
 RESULTANT HEAD
 ACCELERATION

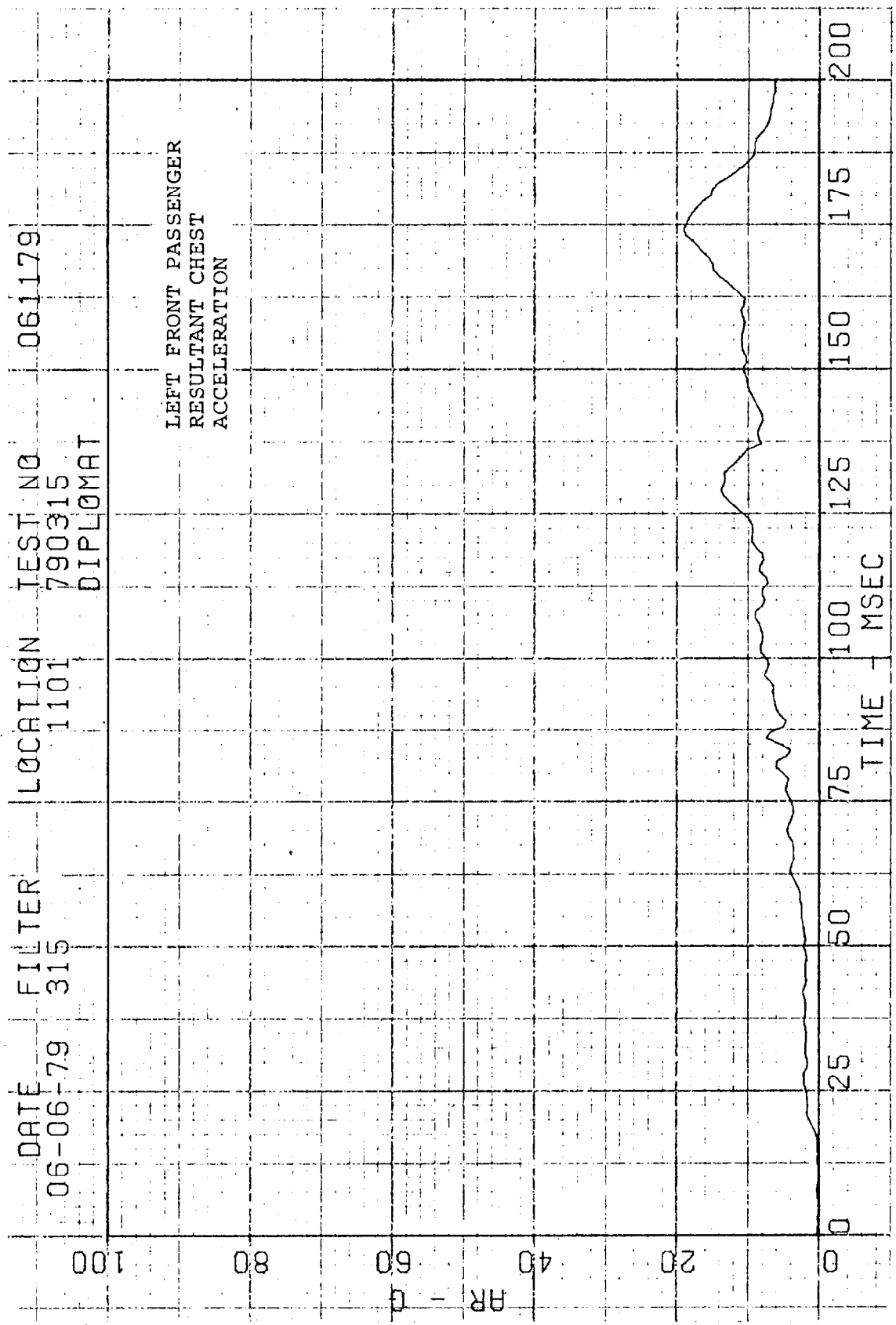


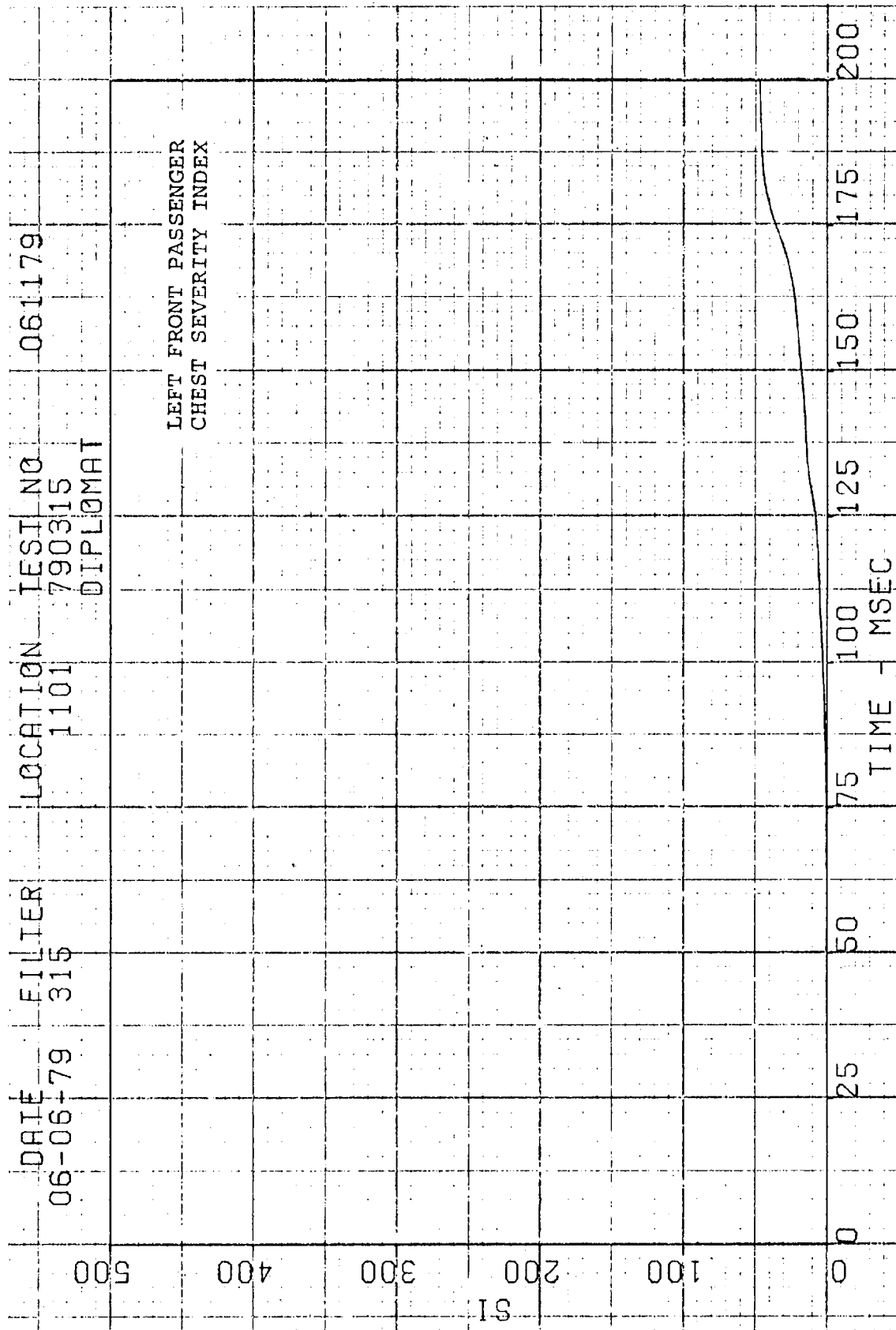
DATE 06-06-79
 FILTER 315
 LOCATION 1101
 TEST NO 790315
 061179
 DIPLOMAT

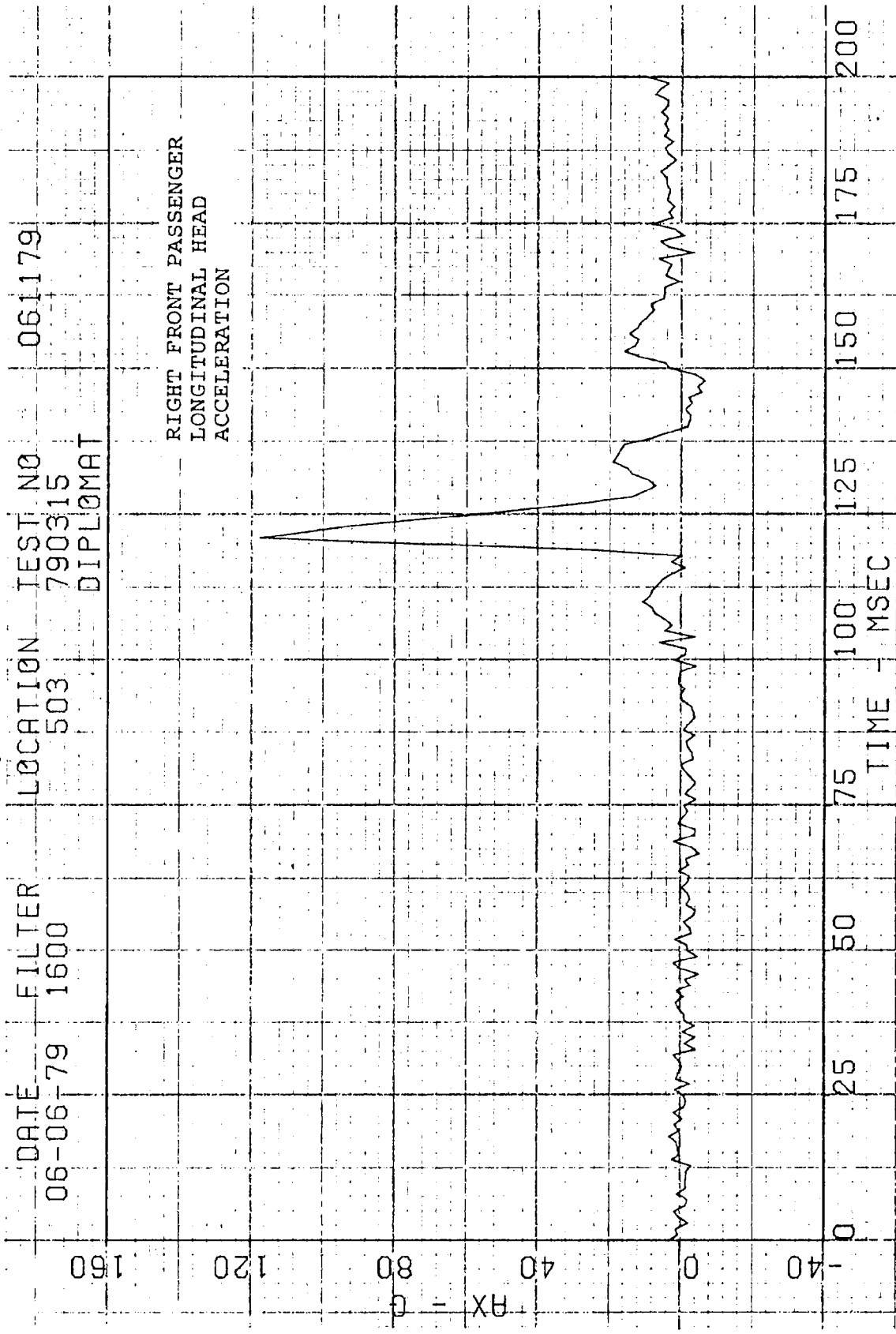


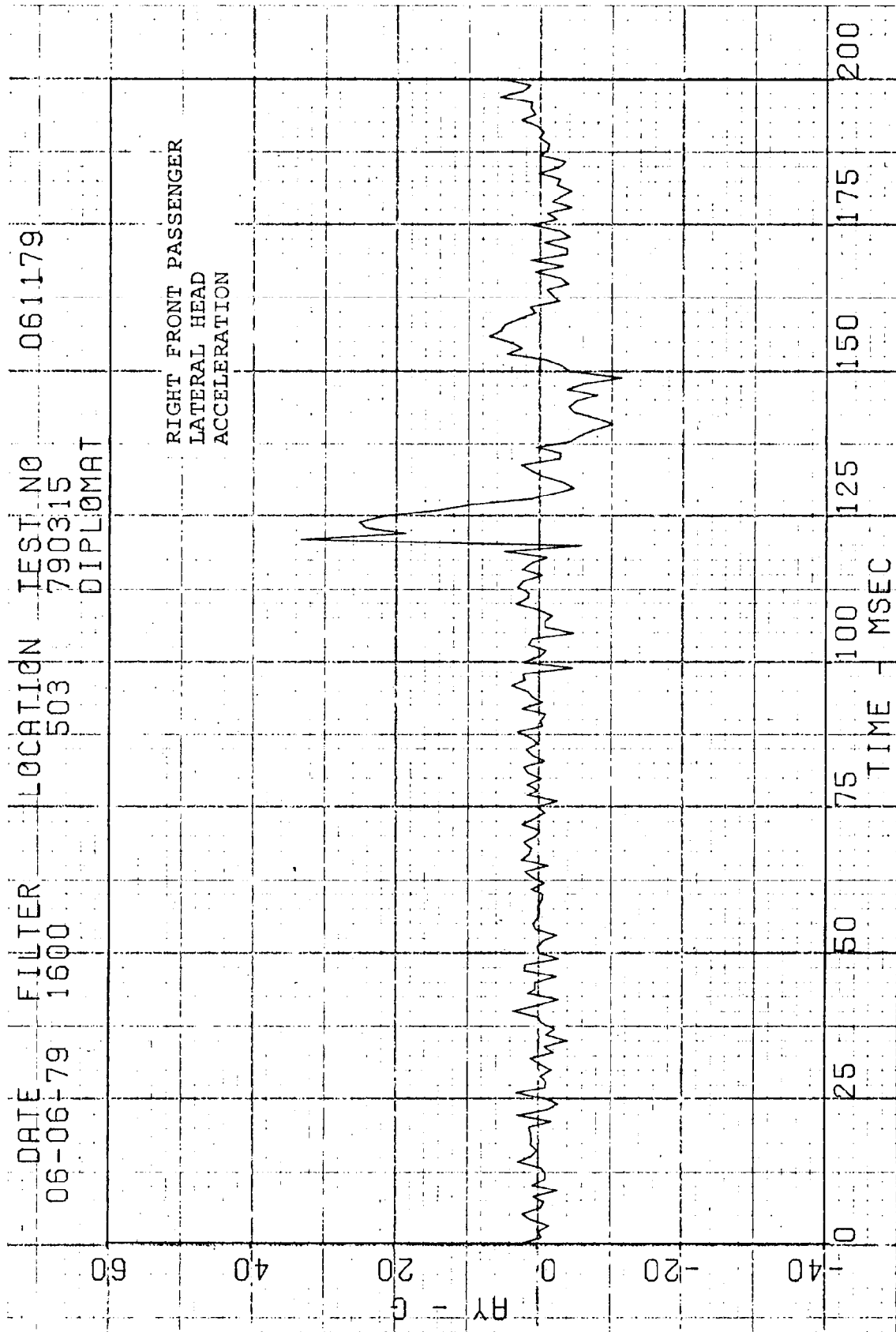


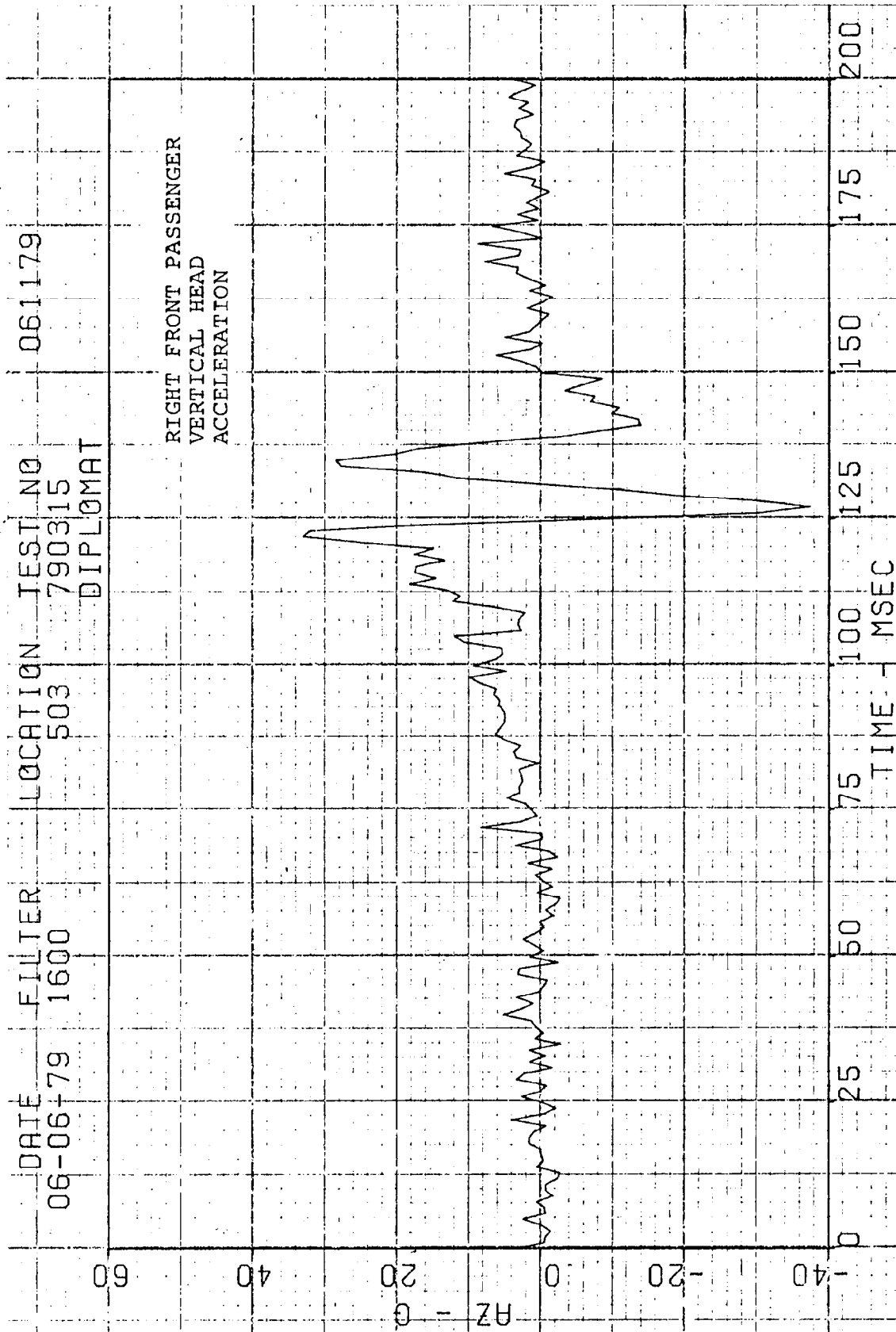


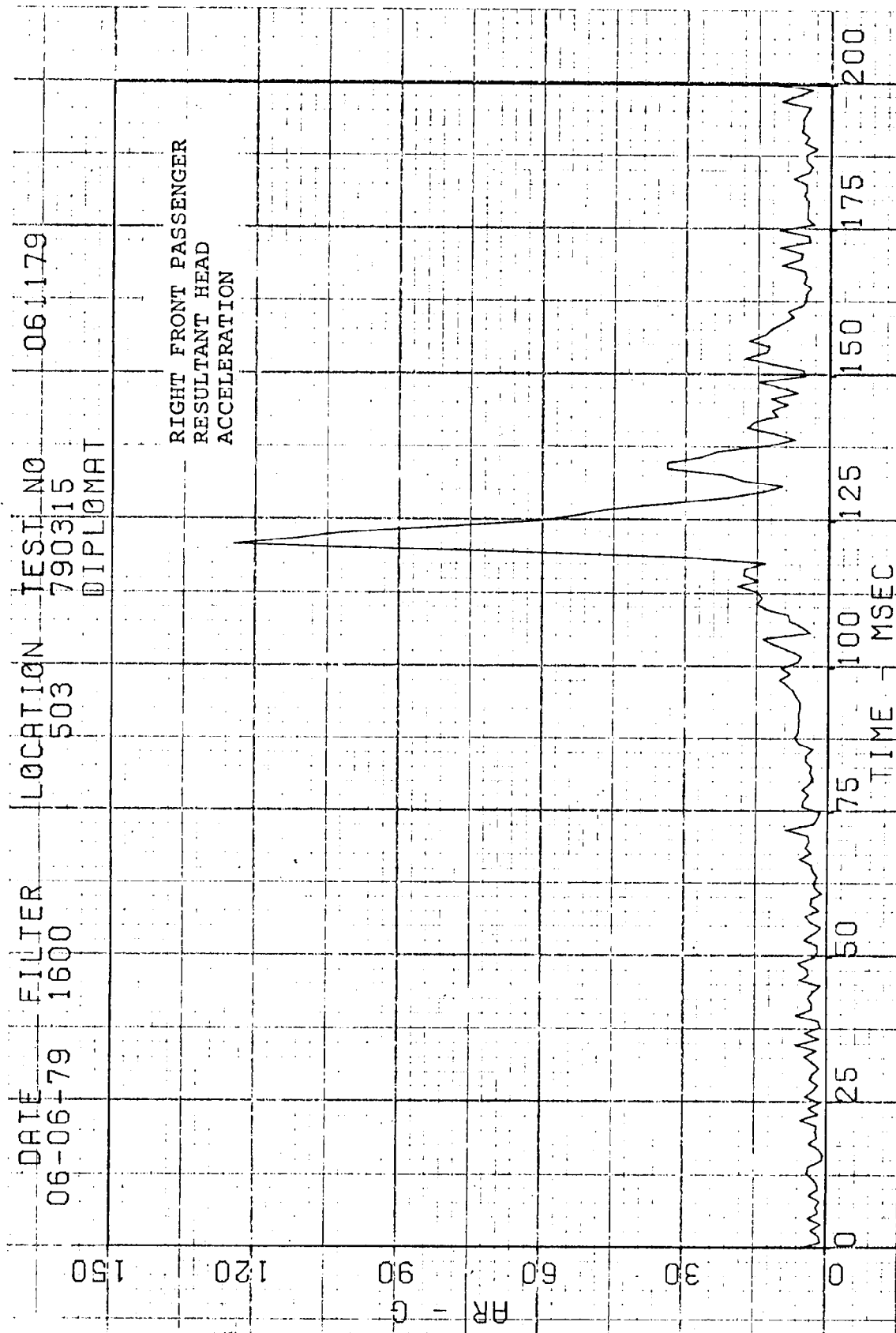


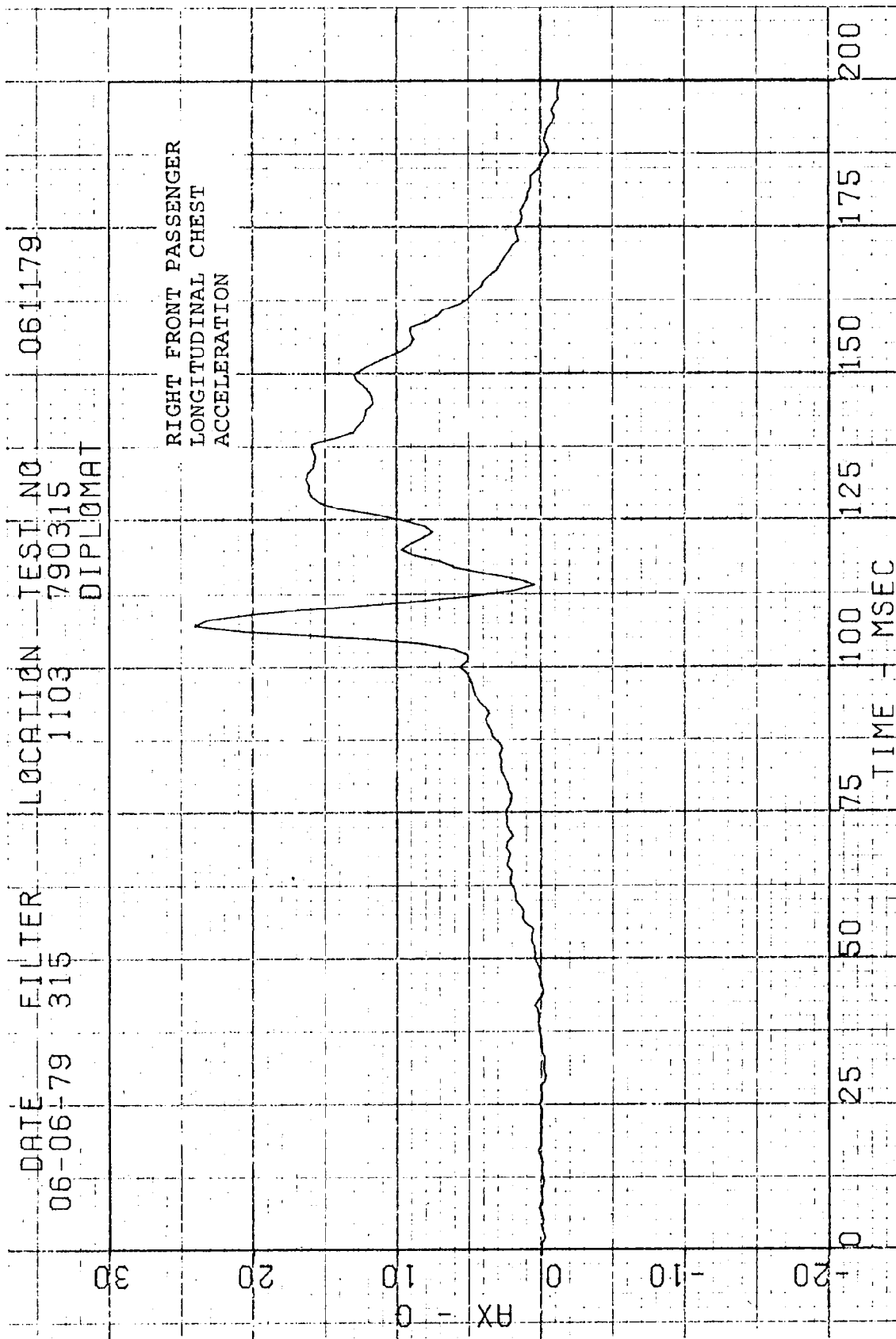


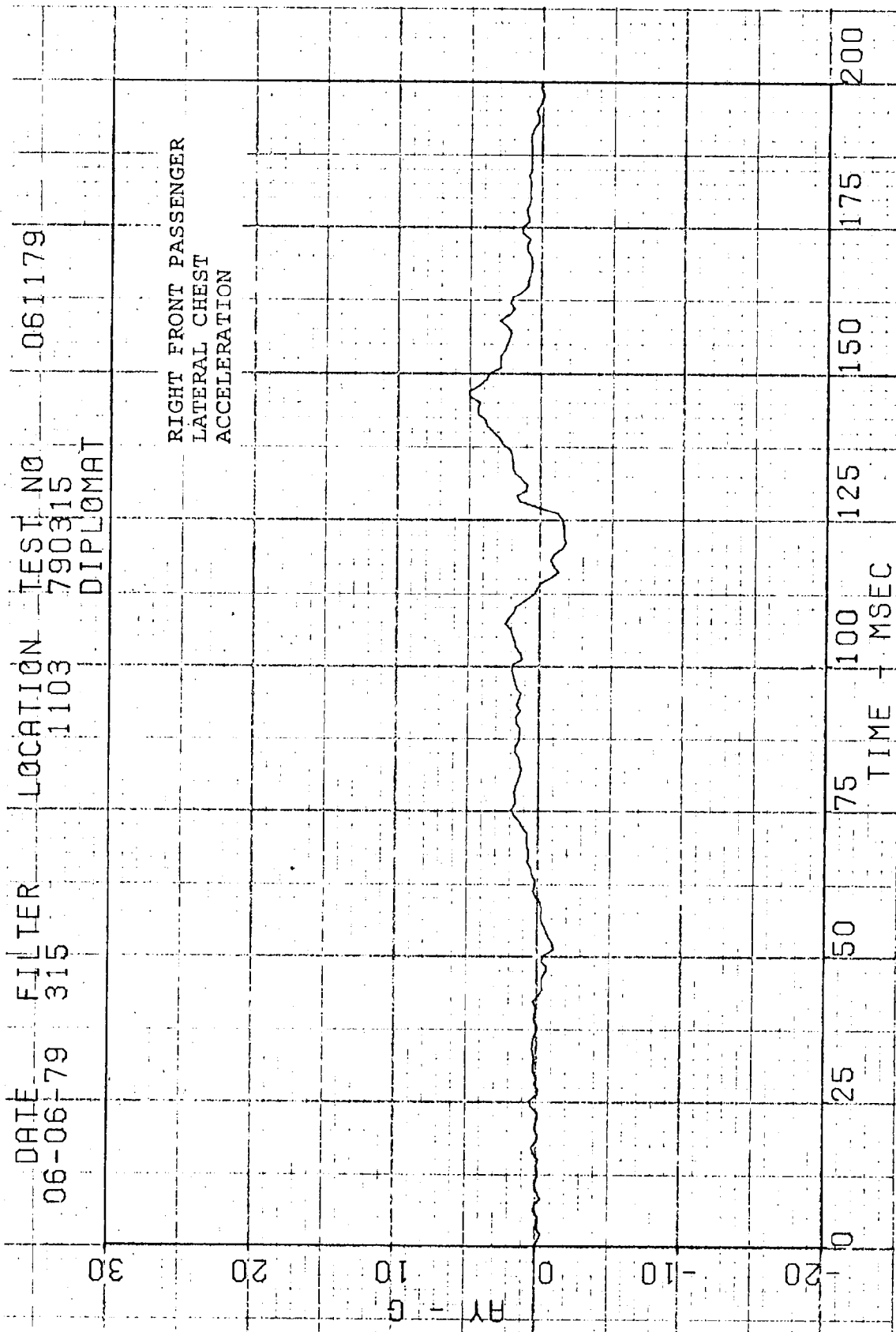


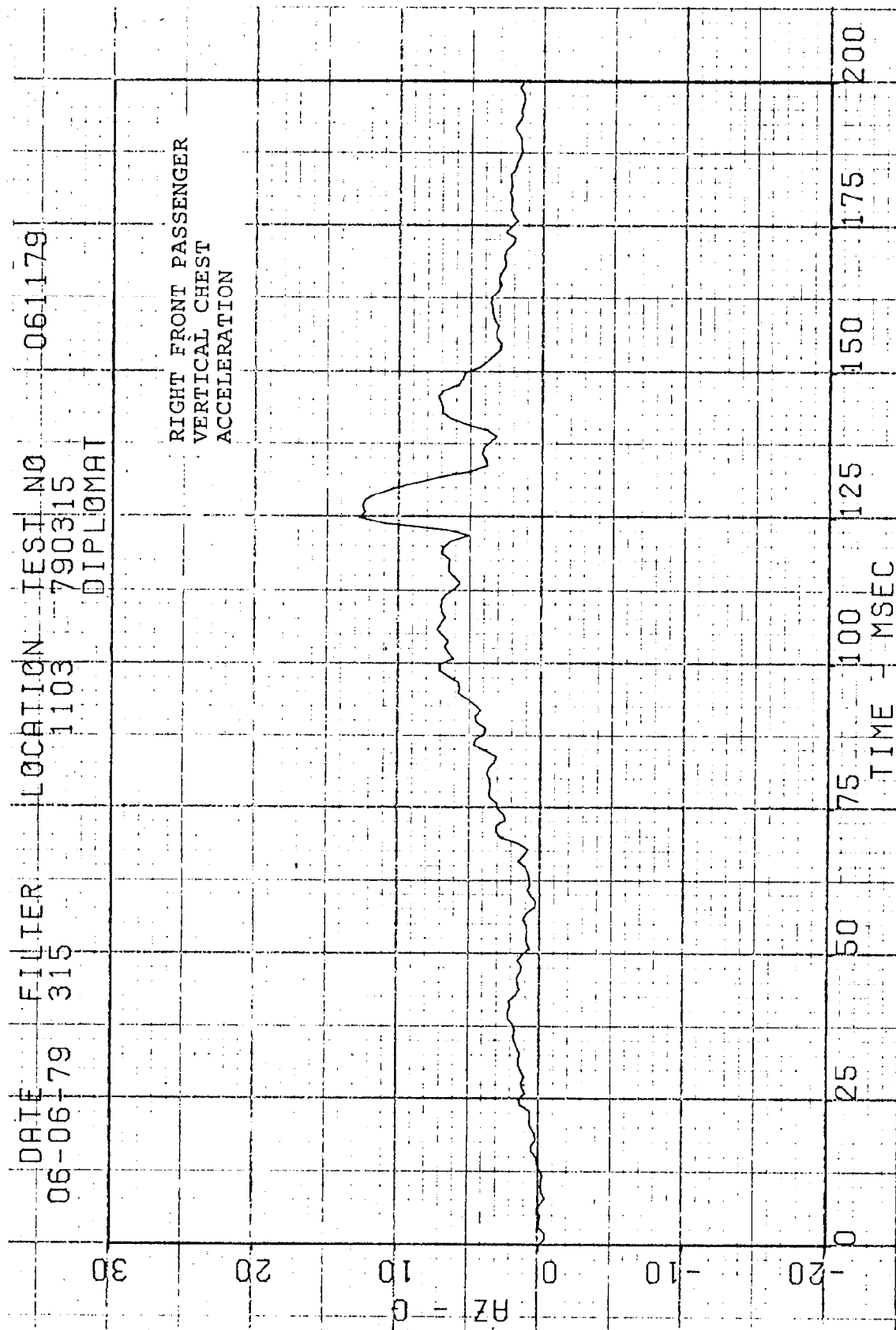


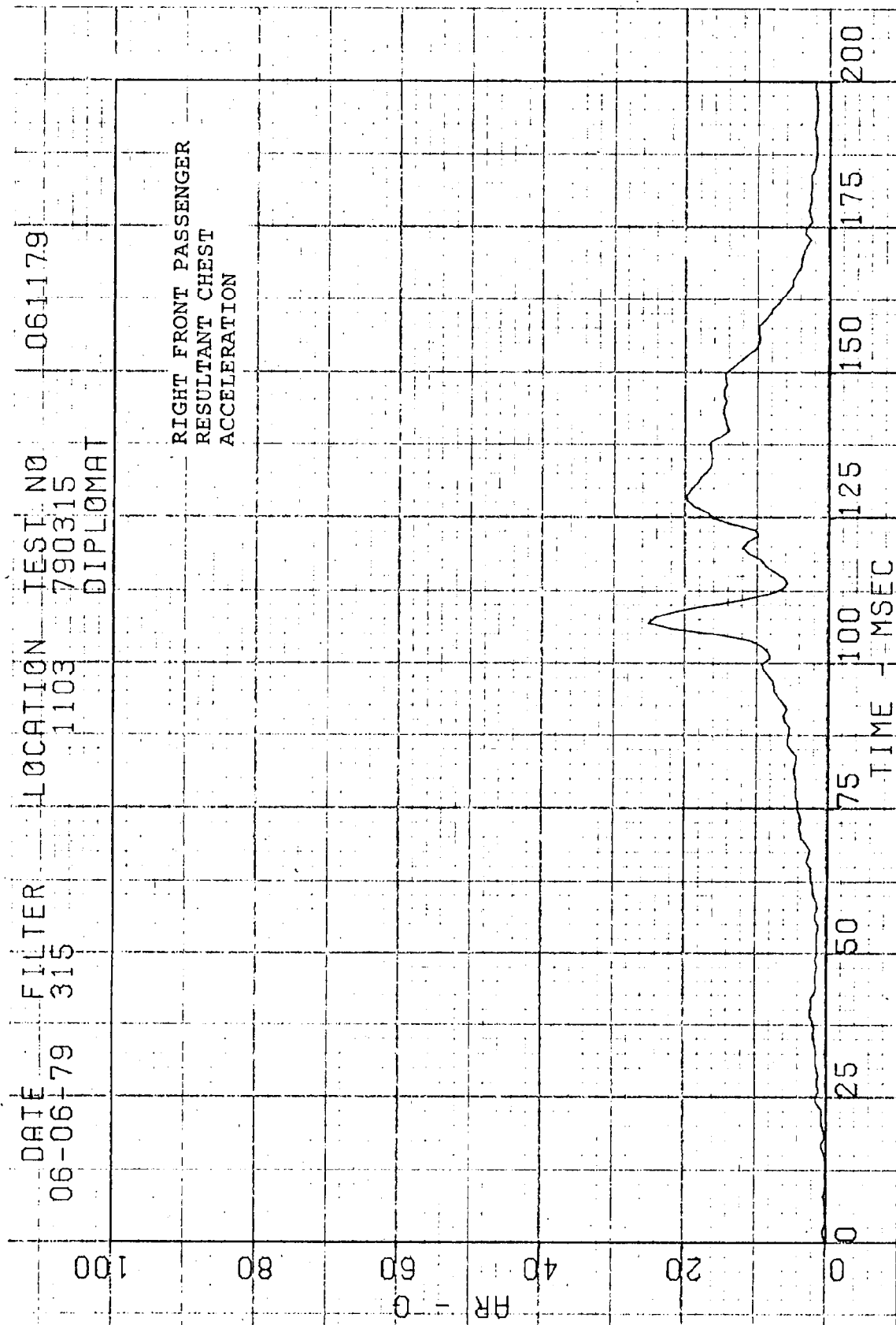


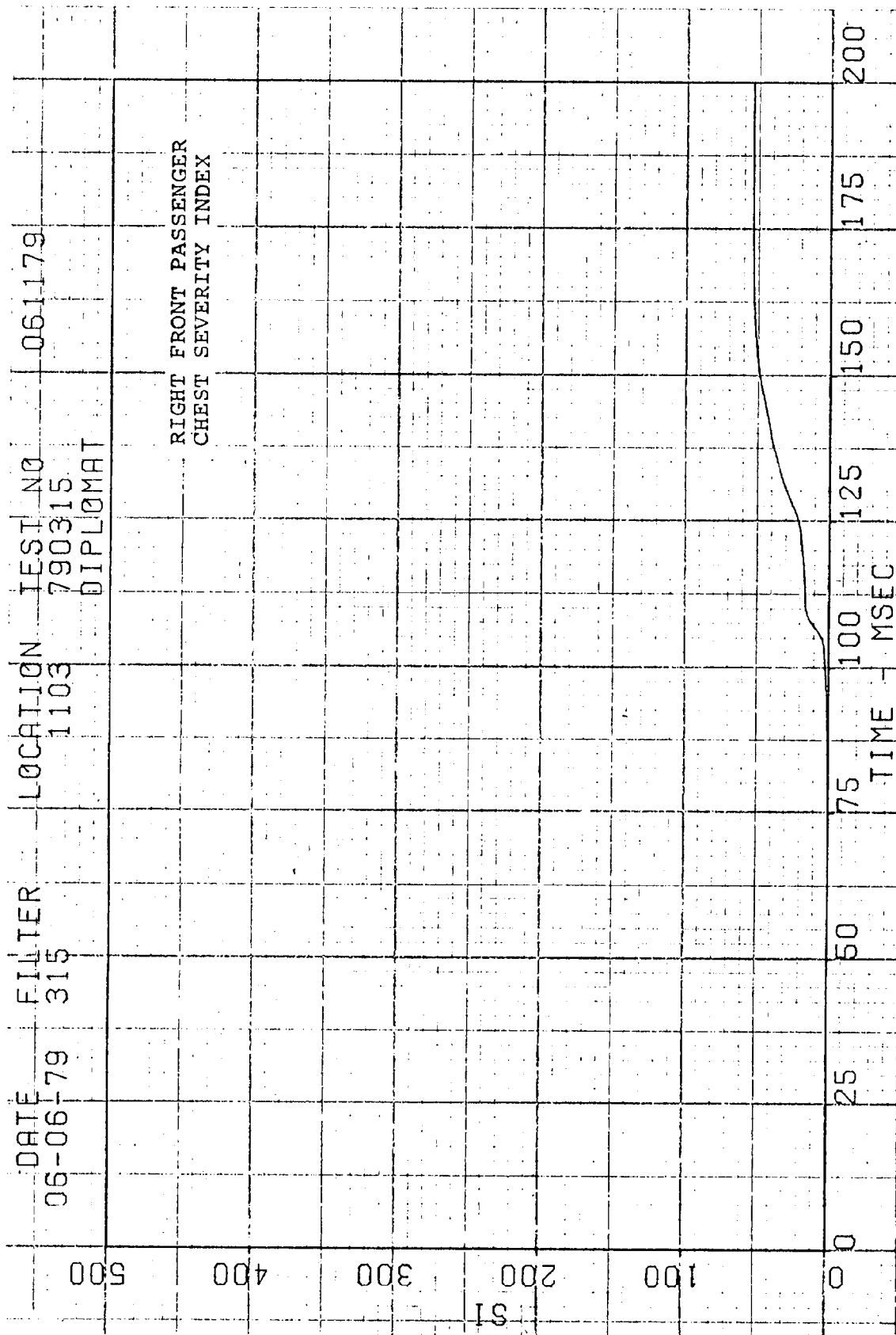


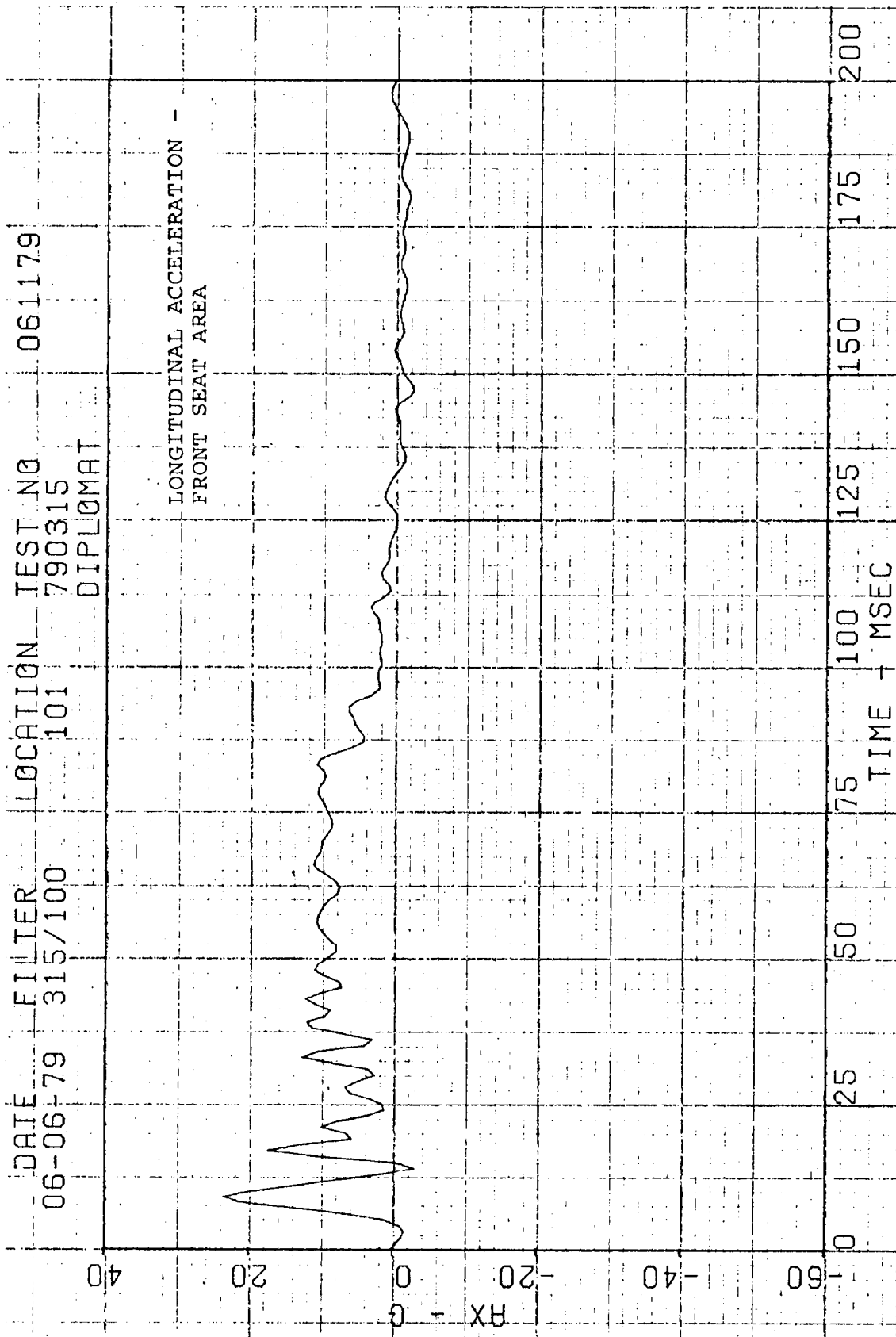


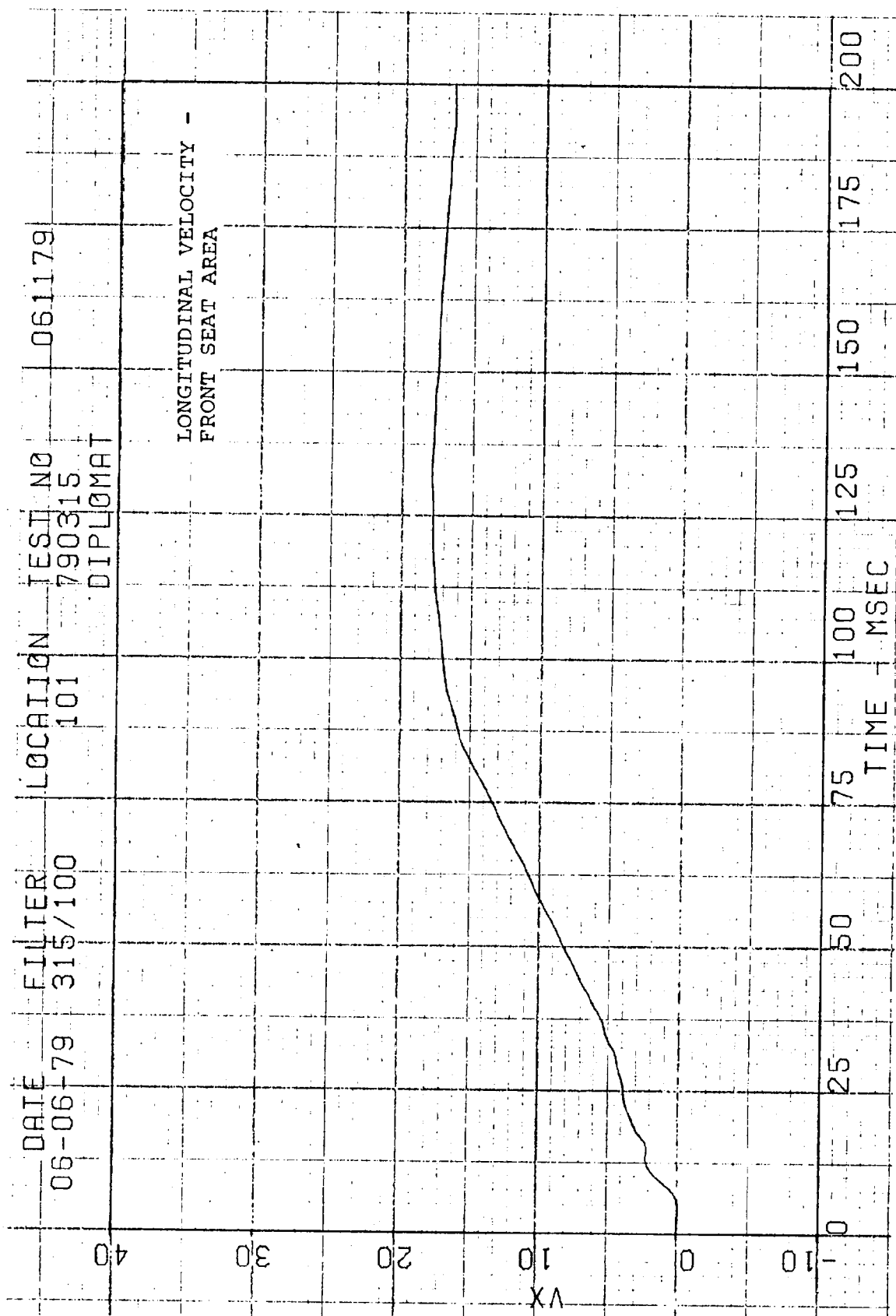


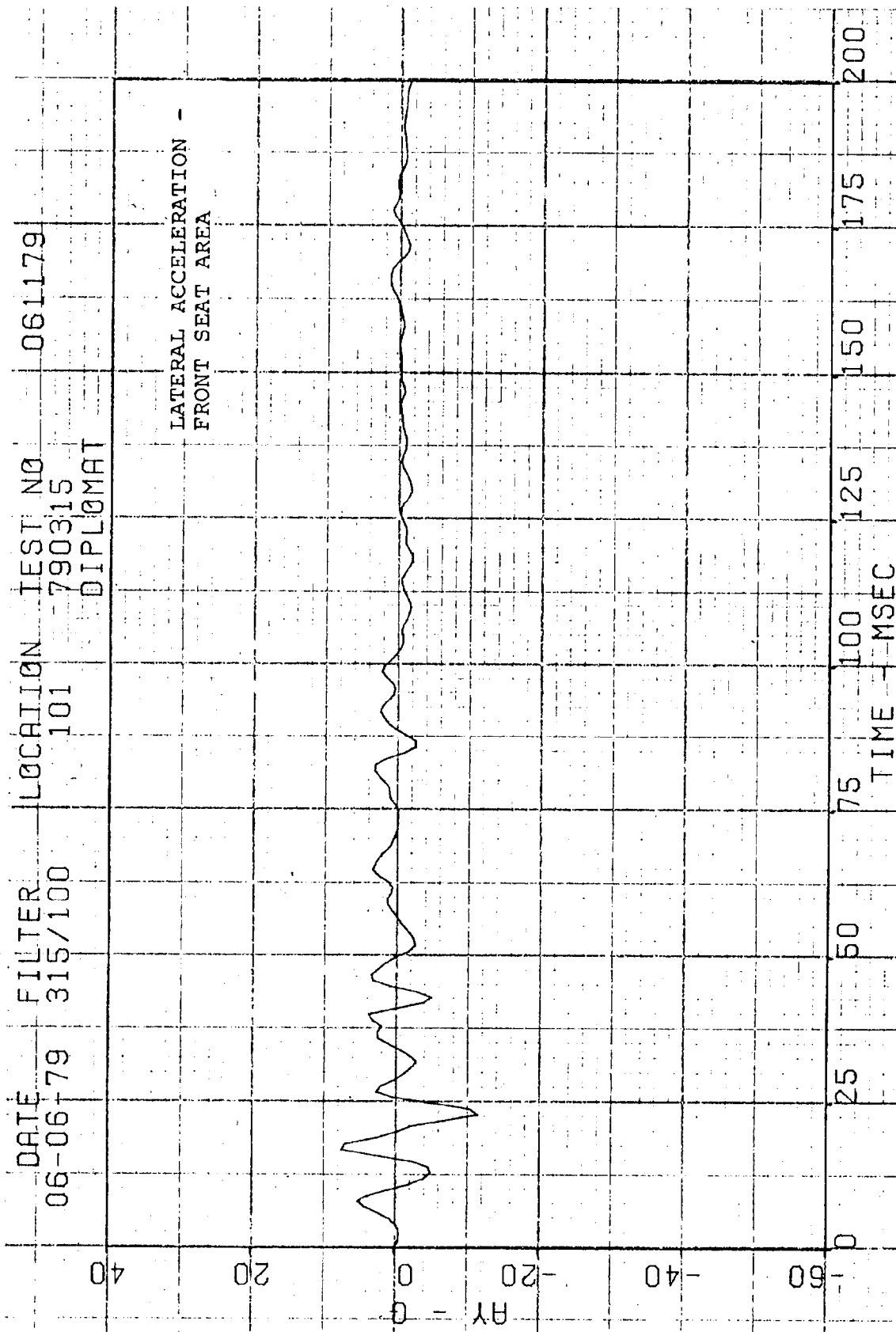


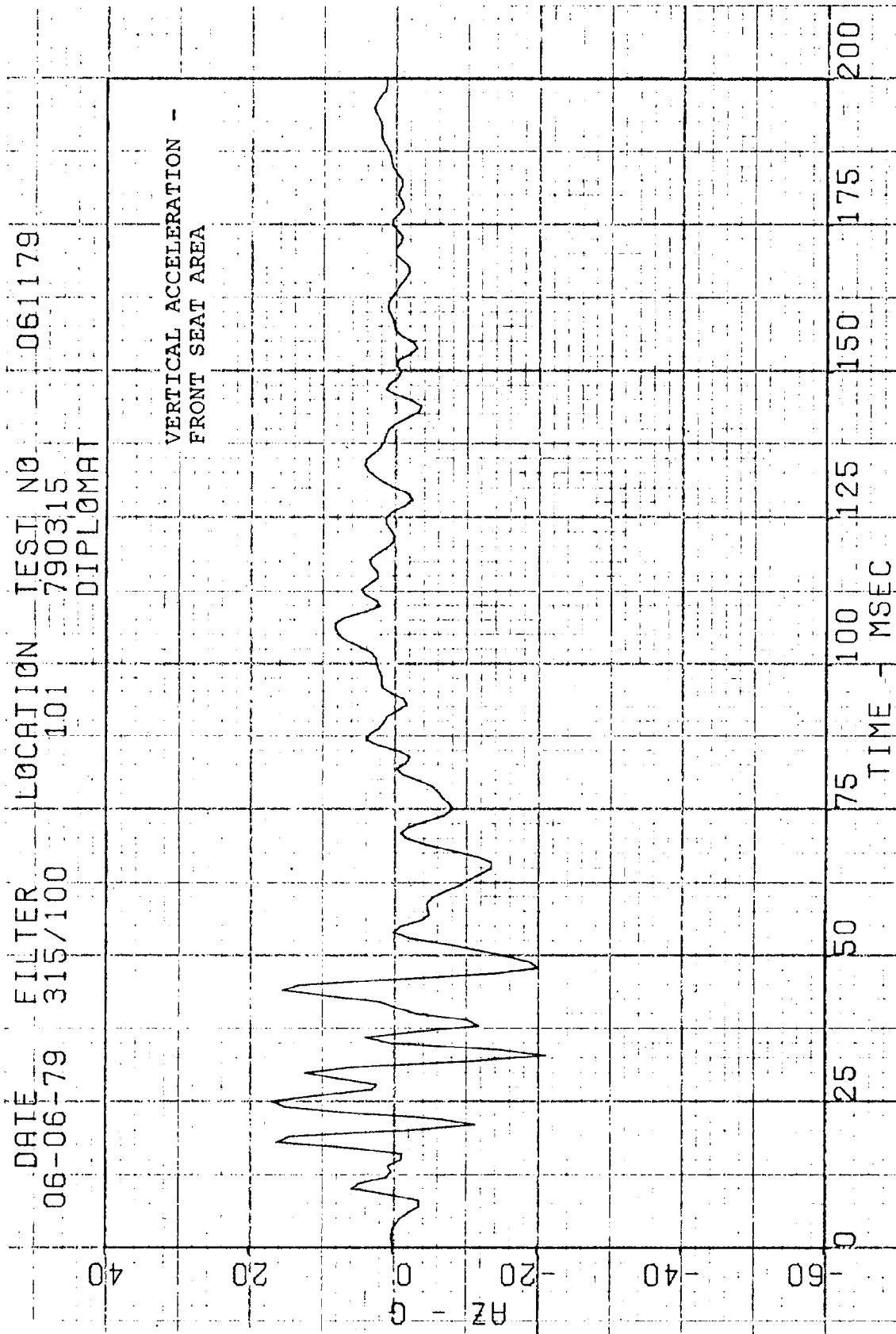


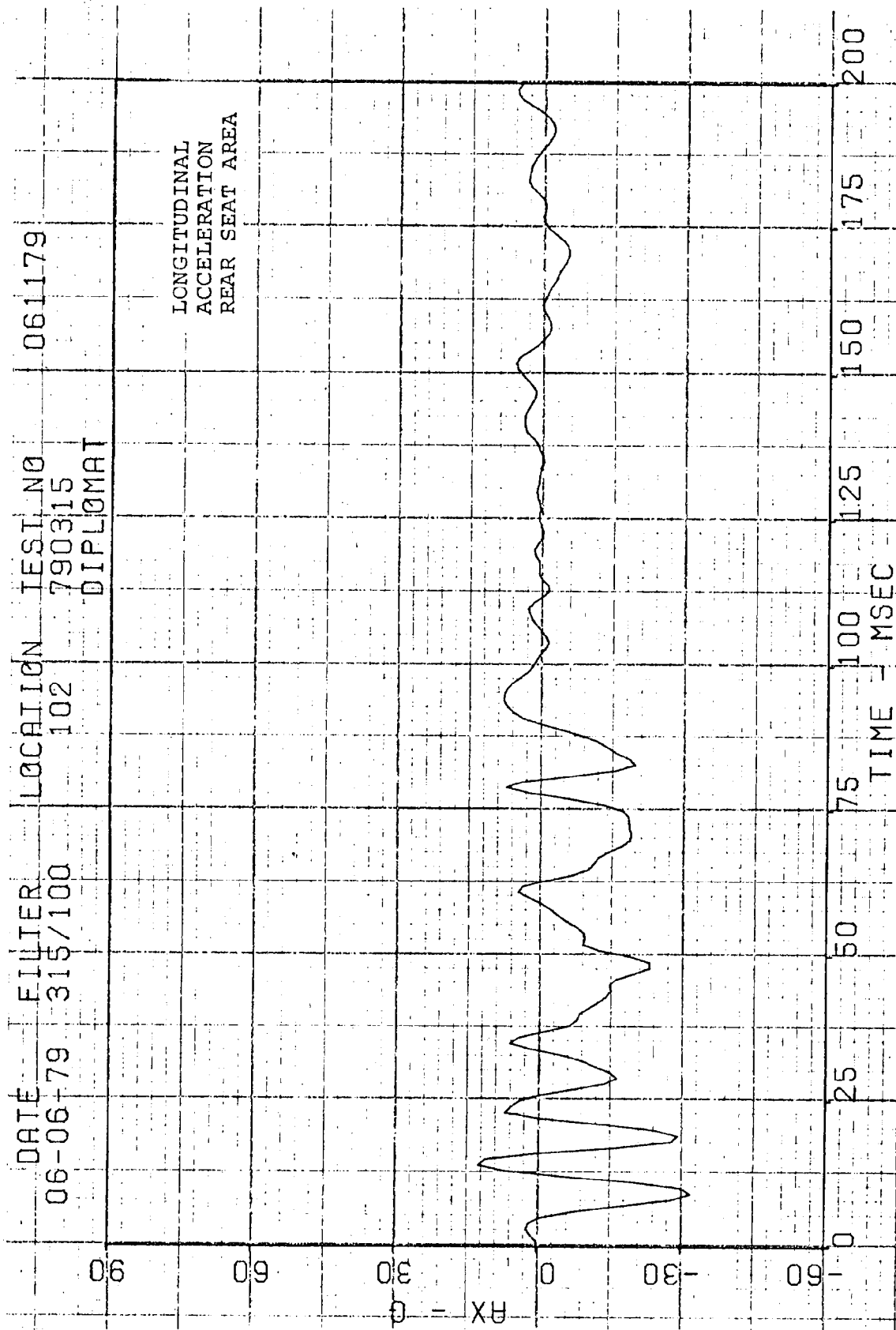


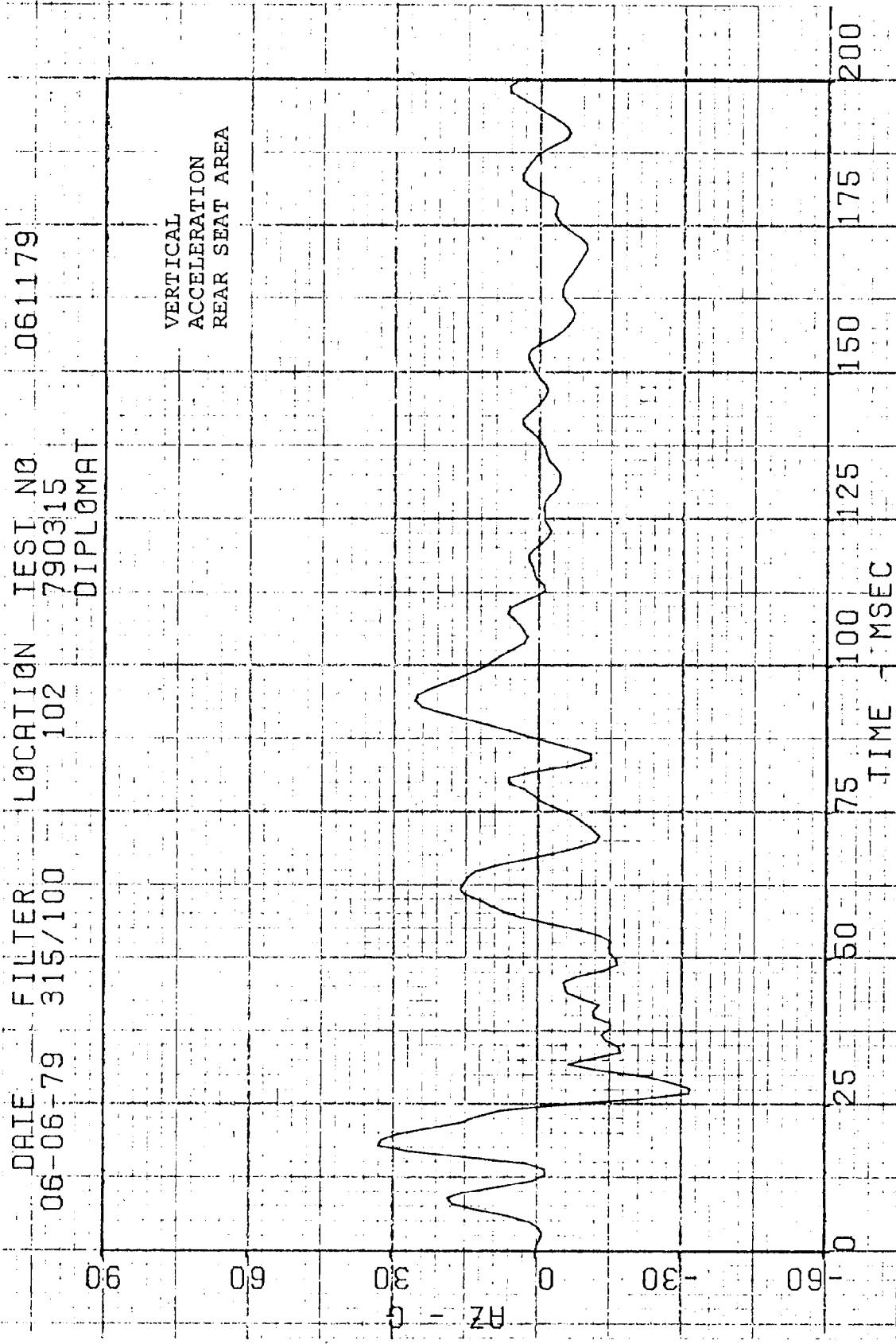












APPENDIX B (CONTD)

Test Anomalies: None