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REPORT NO.: MGA-93-21401

SAFETY COMPLIANCE TESTING FOR FMVSS 214
"SIDE IMPACT PROTECTION STUDY - PASSENGER CARS"

GENERAL MOTORS CORPORATION
1994 CADILLAC SEDAN DEVILLE
NHTSA NO: CR0110

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



MGA Ref. No.: G93A-02

Test Date: May 10, 1994

Report Date: June 17, 1994

FINAL REPORT

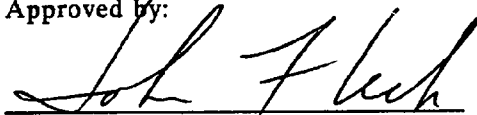
Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NEF-30
400 SEVENTH STREET, SW ROOM 6115

This Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-93-C-02047.

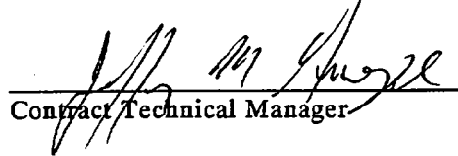
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Approved by:



John Fleck, Project Engineer

FINAL REPORT ACCEPTED BY:



Contract Technical Manager



Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. MGA-94-21401	2. Government Accession No.	3. Recipient's Catalog No.																			
4. Title and Subtitle Final Report for FMVSS 214 Compliance Testing of a 1994 Cadillac Sedan Deville 4 Door NHTSA NO. CR0110		5. Report Date June 17, 1994																			
		6. Performing Organization Code MGA																			
7. Author(s) John Fleck		8. Performing Organization Report No. MGA-DOT-214-01																			
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																			
		11. Contract or Grant No. DTNH22-93-C-02047																			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (Mail Code: NEF-30) 400 Seventh St., S.W., Room 6115 Washington, D.C. 20590		13. Type of Report and Period Covered Final Report June 1994																			
		14. Sponsoring Agency Code NEF-30																			
15. Supplementary Notes																					
16. Abstract Compliance tests were conducted on the subject 1994 Cadillac Sedan Deville 4 door in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure for the determination of FMVSS 214 compliance. The test was conducted at the MGA Research Proving Grounds and Crash Test Center in Burlington, Wisconsin on May 10, 1994. The impact velocity of the Moving Barrier (MDB) was 32.8 mph and the ambient temperature of the target vehicle at the time of impact was 74°F. The test or target vehicle's performance is given below: <table border="0"> <thead> <tr> <th></th> <th><u>Driver's SID</u></th> <th><u>Left Rear SID</u></th> </tr> </thead> <tbody> <tr> <td>Upper Rib</td> <td>34.1 g's</td> <td>48.8 g's</td> </tr> <tr> <td>Lower Rib</td> <td>40.1 g's</td> <td>51.7 g's</td> </tr> <tr> <td>Lower Spine</td> <td>59.3 g's</td> <td>44.4 g's</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>49.7 g's</td> <td>48.0 g's</td> </tr> <tr> <td>Pelvis Acceleration</td> <td>78.0 g's</td> <td>72.4 g's</td> </tr> </tbody> </table>					<u>Driver's SID</u>	<u>Left Rear SID</u>	Upper Rib	34.1 g's	48.8 g's	Lower Rib	40.1 g's	51.7 g's	Lower Spine	59.3 g's	44.4 g's	Thoracic Trauma Index (TTI)	49.7 g's	48.0 g's	Pelvis Acceleration	78.0 g's	72.4 g's
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17. Key Words Side Impact Dummy (SID)		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division, Room 5108 (NAD-52), 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 Attn: Robert Hornickle																			
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages	22. Price																		

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF SIDE IMPACT TEST	2-1
3	SUMMARY OF TEST DATA	3-1
4	OCCUPANT AND VEHICLE INFORMATION	4-1
APPENDIX A	PHOTOGRAPHS	
APPENDIX B	DATA PLOTS	
APPENDIX C	SID CONFIGURATION AND PERFORMANCE VERIFICATION	

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	PRE-TEST CONDITIONS	3-4
2	PRE- AND POST-TEST MEASUREMENTS	4-3
3	SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS	4-4
4	SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS	4-5
5	VEHICLE SIDE MEASUREMENT	4-6
6	VEHICLE EXTERIOR STATIC CRUSH	4-8
7	TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	4-17
8	MDB FACE DIMENSIONS	4-18
9	MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS	4-21
10	HIGH SPEED CAMERA LOCATIONS AND DATA	4-22

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	GENERAL TEST AND VEHICLE PARAMETER DATA	3-2
2	TEST VEHICLE DATA	3-3
3	CRASH TEST SUMMARY FOR TEST VEHICLE	3-5
4	CRASH TEST SUMMARY FOR SIDE IMPACTOR	3-6
5	POST-TEST OBSERVATIONS	3-7
6	SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY	4-2
7	TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH	4-7
8	EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR	4-19
9	TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY	4-20
10	FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA	4-23
11	FMVSS NO. 301 ROLLOVER DATA SHEET	4-24

Section 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 94 FMVSS 214 "Dynamic" compliance test program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-93-C-02047. The purpose of this test was to evaluate side impact protection in a 1994 Cadillac Sedan Deville.

This test was conducted using the Office of Vehicle Safety Compliance's FMVSS 214 test procedure (TP-214D-03, dated May 17, 1993).

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes only.

SECTION 2
SUMMARY OF SIDE IMPACT TEST

A stationary 1994 Cadillac Sedan Deville was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 32.8 mph on May 10, 1994. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are shown in Appendix A.

Two restrained Side Impact Dummies (SIDs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions according to instructions specified in the Laboratory Test Procedure which is dated May 17, 1993. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report. Appendix B contains the vehicle and dummy response data traces.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

The driver's Thoracic Trauma Index (TTI) was 49.7 g's. Maximum pelvic Y acceleration was 78.0 g's.

The left rear passenger's TTI was 48.0 g's. Maximum pelvic Y acceleration was 72.4 g's.

TEST NOTES

The driver seat track accelerometer became detached during impact (at approximately 30 msec) which caused a shift in the recorded data after this time interval.

The MDB bumper section became detached from the barrier face during impact. Due to this, there are no post test barrier face bumper measurements.

SECTION 3
SUMMARY OF TEST DATA

TABLE 1
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
 Vehicle NHTSA No.: CR0110 VIN: 1G6KD52B4RU251699
 Vehicle Body Color: Green Month & Year of Manufacture: 1-94
 Engine Data: 8 cylinders; CID; 4.9 Liter; cc
 Placement Longitudinal; or X Lateral
 Transmission: 4 speed; Manual; X Automatic; X Overdrive
 Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four
 Wheel Drive
 Odometer Reading 178 miles
 Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; X Pwr. Windows
 X Power Seats; X Tilt Wheel; X Power Door Locks; X Self Leveling System

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 32 psi FRONT
 32 psi REAR
 Recommended Tire Size: P21570R15
 Tires on Test Vehicle: P21570R15 Manufacturer: Michelin

Vehicle Capacity Data:

Number of Occupants: 3 Front; 3 Rear; N/A 3rd Seat 6 Total
 Type of Front Seats: Bucket; Bench; X Split Bench
 Type of Front Seat Back: Fixed; X Adjustable with X Power
 Vehicle Maximum Capacity Loading = 1102 lbs (A)
 No. of Occupants x 150 lbs. = 900 lbs (B)
 Cargo Capacity (A-B) = 202 lbs

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	= <u>1167</u> lbs	Right Rear	= <u>700</u> lbs
Left Front	= <u>1141</u> lbs	Left Rear	= <u>720</u> lbs
TOTAL FRONT	= <u>2308</u> lbs	TOTAL REAR	= <u>1420</u> lbs
% of Total Vehicle Weight =	<u>61.9</u> %;	% of Total Weight	= <u>38.1</u> %
TOTAL WEIGHT	= <u>3728</u> lbs		

TABLE 2
TEST VEHICLE DATA

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 3728 lbs
Maximum Cargo Carrying Capacity of Test Vehicle = 202 lbs
Weight of 2 Side Impact Dummies (2 x 168 lbs.) = 336 lbs
TEST VEHICLE TARGET WEIGHT: = 4266 lbs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front	= <u>1205</u> lbs	Right Rear	= <u>863</u> lbs
Left Front	= <u>1227</u> lbs	Left Rear	= <u>962</u> lbs
TOTAL FRONT	= <u>2432</u> lbs	TOTAL REAR	= <u>1825</u> lbs
% of Total Weight	= <u>57.1</u> %	% of Total Weight	= <u>42.9</u> %
TOTAL TEST WEIGHT	= <u>4257</u> lbs		

TEST VEHICLE ATTITUDE (all dimensions in inches):

CURB WEIGHT ATTITUDE: (in)

Right Front 28.0 Left Front 27.8 Right Rear 21.0 Left Rear 21.0

FULLY LOADED WEIGHT ATTITUDE: (in)

Right Front 27.9 Left Front 27.3 Right Rear 19.6 Left Rear 19.1

TEST ATTITUDE: (in)

Right Front 27.6 Left Front 27.7 Right Rear 20.5 Left Rear 20.1

Test Vehicle Wheelbase: 111 inches

C.G. = 47.6 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 198.6 in
Centerline = 205 in
Left Side = 198.6 in

FIGURE 1
PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 7.9 in

Total Number of Adjustment Positions or Detents: N/A Power Seats

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 26° degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: Non Adjustable

Seat Back Adjustment Position: Non Adjustable

ADJUSTABLE STEERING COLUMN POSITION:

Adjusted to mid position (3rd position from full down)

WINDOW POSITIONS:

Left Front closed Left Rear closed

Right Front removed Right Rear removed

Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK: Fuel system usable capacity = 20 gallons

Test Volume: 18.5 gallons (92.5% of capacity)

LOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase: = 111 in

Impact Point is 18.5 in rearward of front axle centerline (which is 37 inches forward of the wheelbase midpoint)

TABLE 3
CRASH TEST SUMMARY FOR TEST VEHICLE

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Overall Length = 205 in; Overall Width = 74.2 in

TEST WEIGHT:

Right Front	=	<u>1205</u> lbs	Right Rear	=	<u>863</u> lbs
Left Front	=	<u>1227</u> lbs	Left Rear	=	<u>962</u> lbs
TOTAL FRONT	=	<u>2432</u> lbs	TOTAL REAR	=	<u>1825</u> lbs
TOTAL VEHICLE WEIGHT <u>4257</u> lbs					
Wheelbase = <u>111</u> in					
Longitudinal C.G. front Center of Front Axle = <u>47.6</u> in					
Impact Angle with Respect to Impactor = <u>90°</u> degrees					

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (10.1 in above ground) = 10.1 in
2. LEVEL 2 (18.3 in above ground) = 16.7 in
3. LEVEL 3 (22.1 in above ground) = 16.1 in
4. LEVEL 4 (35.5 in above ground) = 12.3 in
5. LEVEL 5 (52.5 in above ground) = 2.2 in

Maximum Post-Test Intrusion = 16.7 in

OCCUPANTS:

	<u>Front Passenger</u>	<u>Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>3 pt. lap & shoulder belt</u>	<u>3 pt. lap & shoulder belt</u>

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>13</u>
Number of Cameras: Onboard Vehicle	=	<u>3</u>
Offboard Vehicle	=	<u>4</u>
Deformable Barrier	=	<u>2</u>
TOTAL	=	<u>9</u>

TABLE 4
CRASH TEST SUMMARY FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>49.3</u>	in
Overall Length of MDB (incl. honeycomb impact face)	=	<u>162</u>	in
Wheelbase of Framework Carriage	=	<u>102</u>	in
Tread of Framework Carriage (Front & Rear)	=	<u>74</u>	in
C.G. Location Rearward of Front Axle	=	<u>43.4</u>	in
C.G. Location From Center Line	=	<u>-.3</u>	in
C.G. Location Above Ground Level	=	<u>19.2</u>	in

MDB WEIGHT:

Left Front	=	<u>1095</u>	lbs	Left Rear	=	<u>413</u>	lbs
Right Front	=	<u>624</u>	lbs	Right Rear	=	<u>858</u>	lbs
TOTAL FRONT	=	<u>1719</u>	lbs	TOTAL REAR	=	<u>1271</u>	lbs
TOTAL MDB WEIGHT = <u>2990</u> lbs							

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degrees

Impact Speed = Primary: 32.90 mph Secondary: 32.86 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1.	Row A Top of Stack (33 in)	=	<u>4.3</u>	in
2.	Row B Mid Stack (27 in)	=	<u>2.8</u>	in
3.	Row C Top of Bumper (21 in)	=	<u>2.5</u>	in
4.	Row D Center of Bumper (17 in)	=	<u>*</u>	in

INSTRUMENTATION:

Number of MDB Data Channels = 7

* Bumper separated during impact

TABLE 5
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to side glass</u>	<u>to side glass</u>
Arm	<u>to door trim panel</u>	<u>to door trim panel</u>
Pelvis	<u>to door trim panel</u>	<u>to door trim panel</u>
Left Knee	<u>to door trim panel</u>	<u>to door trim panel</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

	<u>LEFT SIDE</u>	<u>RIGHT SIDE</u>
Front	<u>remained closed</u>	<u>remained closed</u>
Rear	<u>remained closed</u>	<u>remained closed</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 1.0 in forward Vertical: .5 in high

ARM REST LOCATIONS:

Front: 9.6 inches below window sill
Rear: 10.8 inches below window sill

SEAT MOVEMENT:

Driver cushion crush approximately 4.6 in. Passenger cushion crush 6.5 in
Driver seat back crush approximately 1.8 in. Passenger seat back crush 3 in

GLAZING DAMAGE:

Windshield cracked, both front and rear door glass broken

PILLAR PERFORMANCE:

No "A" or "B" pillar separation evident

SILL SEPARATION:

No sill separation noted

OTHER NOTABLE IMPACT EFFECTS:

None

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

TABLE 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

	Front Dummy ID # 272			Rear Dummy ID # 271		
	Pos. Direct.		Neg. Direct	Pos. Direct.		Neg. Direct
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS:						
Upper Rib Lateral.....Y	34.1	30	-18.8	155	48.8	56
Upper Rib Lateral....Y(R)	33.5	30	-18.9	155	45.3	56
Lower Rib Lateral.....Y	40.1	28	-18.9	155	51.7	56
Lower Rib Lateral.....Y(R)	41.1	28	-19.4	155	51.1	56
SPINE ACCELERATIONS:						
Lower Lateral.....Y	59.3	46	-11.8	95	44.4	53
Lower Lateral.....Y(R)	58.6	46	-12.2	95	44.7	53
PELVIC ACCELERATIONS:						
Lateral.....Y	78.0	41	-12.1	81	72.4	46
Lateral.....Y(R)	77.5	41	-12.4	80	75.2	46

REFERENCE:

Positive Direction - Longitudinal (X) = forward Negative Direction - Longitudinal (X) = rearward

Lateral (Y) = to right

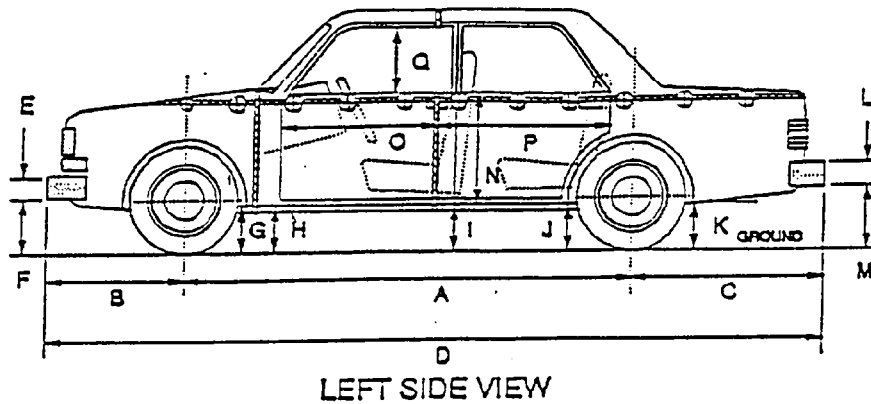
Lateral (Y) = to left

Vertical (Z) = up

Vertical (Z) = down

Note: Y(R) denotes redundant Y direction accelerometer.

FIGURE 2
PRE- AND POST-TEST MEASUREMENTS



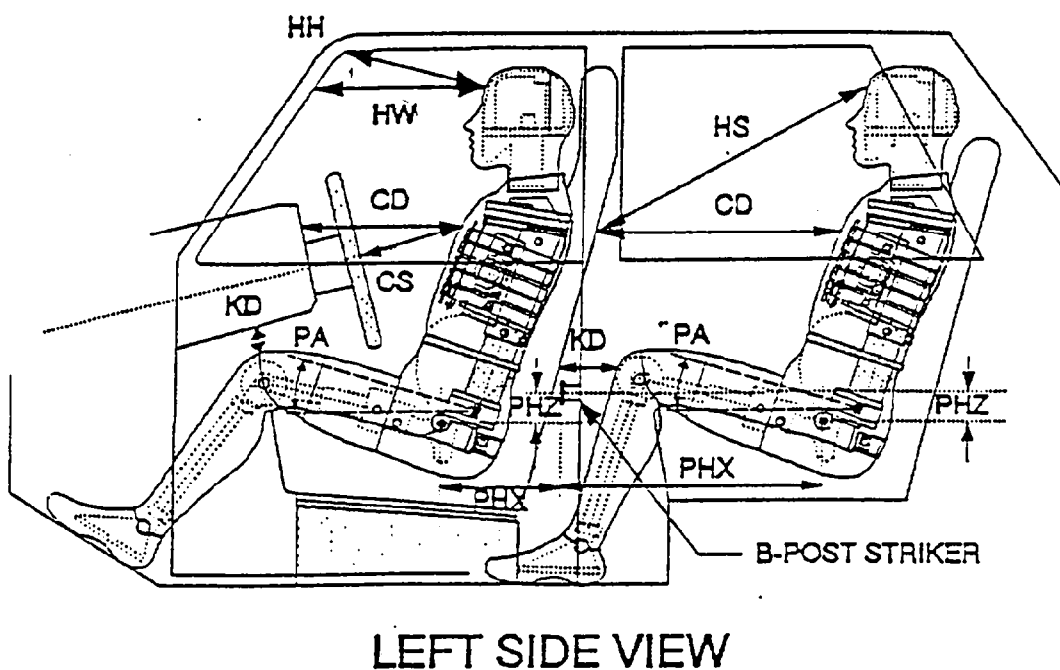
D = Length at Centerline
R = Right Side Length
S = Left Side Length
T = Width at B Post
E & L = Bumper Thickness

U = A Post to Outer Door Skin
J1 = To Pinch Weld
J2 = To Sill

Units: in

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	111.0	111.1	.1
B	43.4	47.5	4.1
C	50.5	51.3	.8
D	205.0	210.0	5.0
E	10.0	10.0	0
F	10.4	11.9	1.5
G	6.8	7.3	.5
H	7.0	7.0	0
I	6.5	6.3	.2
J1/J2	6.3/6.7	9.0/9.3	2.7/2.6
K	10.5	12.7	2.2
L	9.4	9.0	.4
M	13.0	14.7	1.7
N	26.1	25.1	1.0
O	32.0	31.0	1.0
P	56.0	54.3	1.7
Q	17.2	17.4	.2
R	198.7	201.0	2.3
S	198.7	195.8	2.9
T	74.2	63.5	10.7
U	3.2	3.8	.6

FIGURE 3
SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

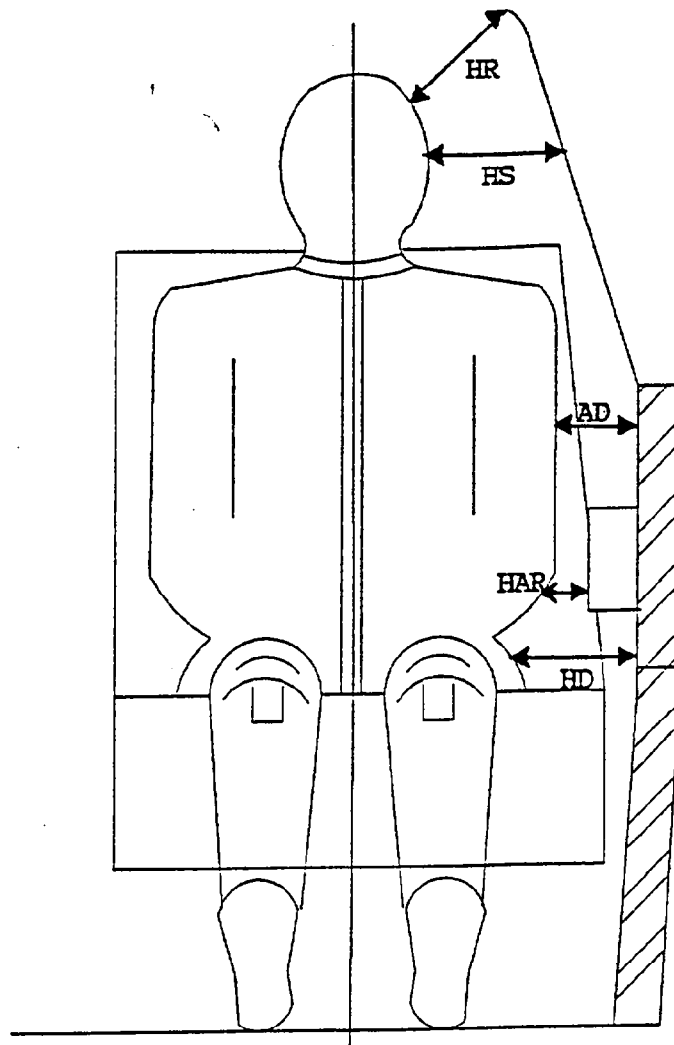


NOTE: All dimensions are in inches

	DRIVER ID #272	LEFT REAR PASSENGER ID #271
HH	16.0	---
HW	28.0	---
HS	---	26.6
CD	20.6	23.0
CS	12.0	---
KDL	5.0	9.8
KDR	5.8	10.0
PA*	24.0	23.3
PHX	10.0	7.9
PHZ	5.9	5.9

NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

FIGURE 4
SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS



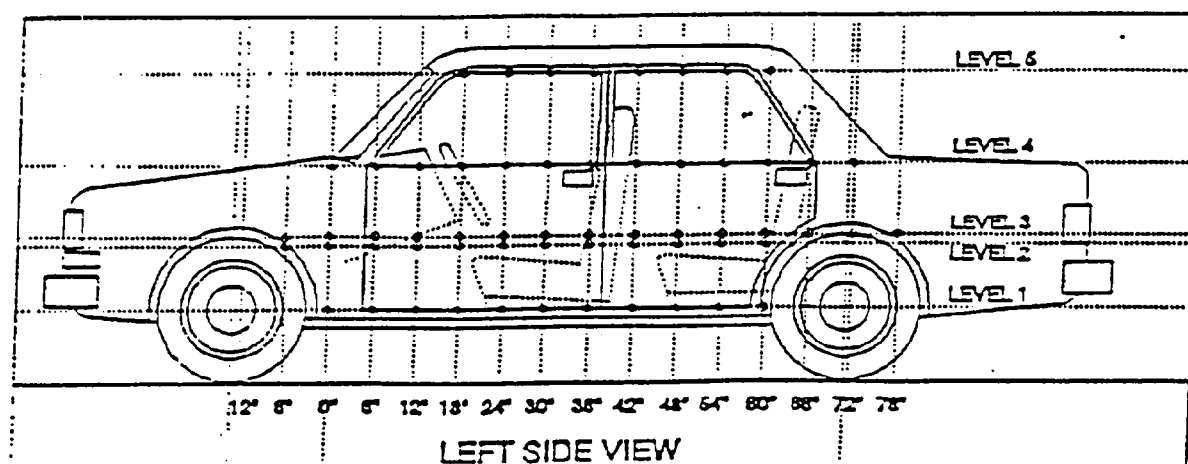
NOTE: All dimensions are in inches

	DRIVER ID #272	LEFT REAR PASSENGER ID #271
HR	7.1	6.0
HS	13.0	13.4
AD	3.6	6.6
HD	8.0	7.5

FIGURE 5
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994



Height measurements are with respect to ground along the vertical 30" line shown above:

30" Side Profile

Level 5 @ Window Top	= <u>52.5</u> in
Level 4 @ Window Sill	= <u>35.5</u> in
Level 3 @ Mid Door	= <u>22.1</u> in
Level 2 @ Occupant H-Point	= <u>18.3</u> in
Level 1 @ Axle Centerline Height (or Sill Top Height	= <u>10.1</u> in

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

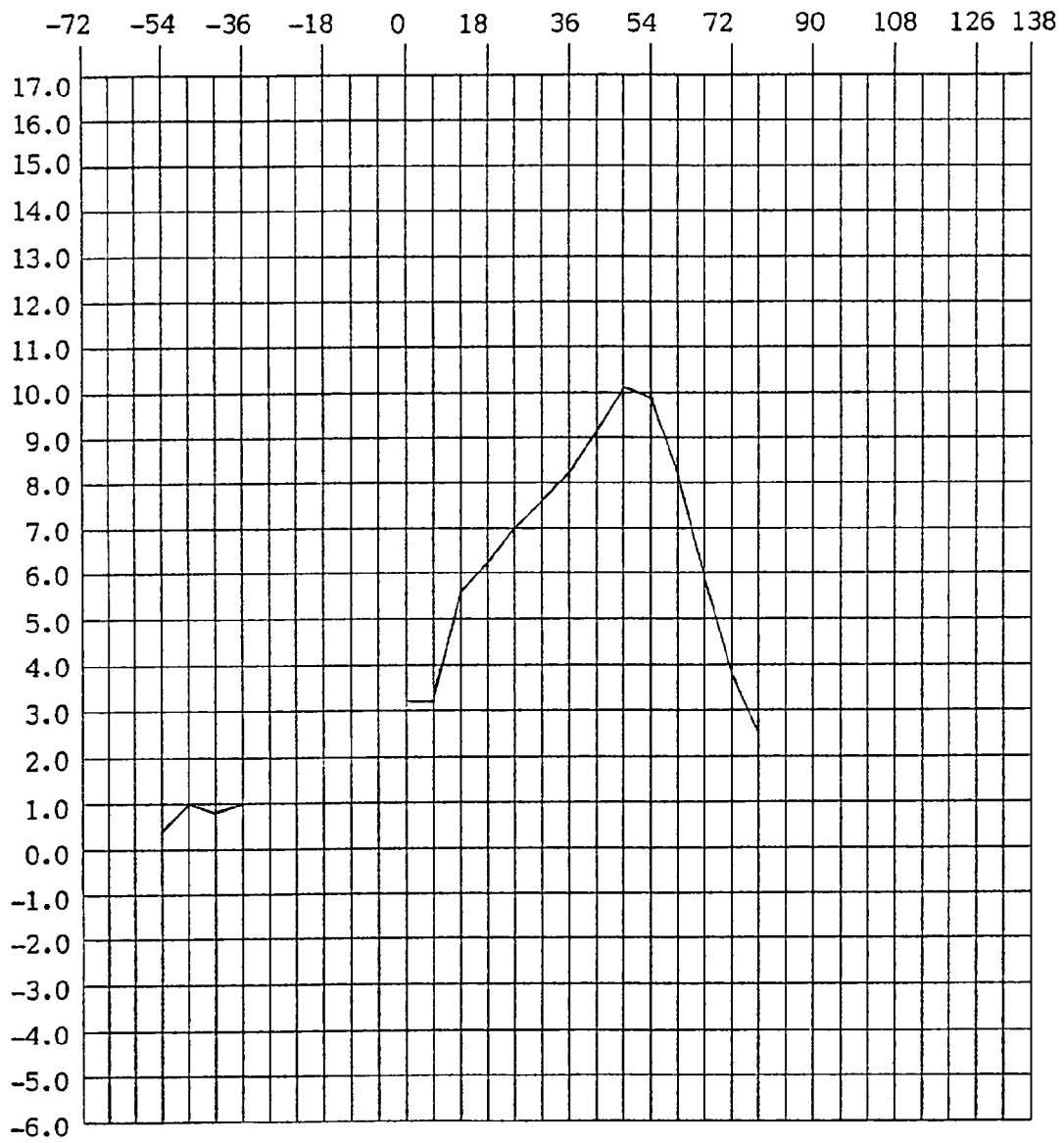
LEVEL 1 AT AXLE CENTER LINE

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-66	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-60	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-54	<u>37.4</u>	<u>37.8</u>	<u>0.4</u>
-48	<u>36.1</u>	<u>37.1</u>	<u>1.0</u>
-42	<u>35.5</u>	<u>36.3</u>	<u>0.8</u>
-36	<u>35.1</u>	<u>36.1</u>	<u>1.0</u>
-30	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-24	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-18	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-12	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-6	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
0	<u>33.4</u>	<u>36.6</u>	<u>3.2</u> (impact point)
6	<u>33.4</u>	<u>36.6</u>	<u>3.2</u>
12	<u>33.4</u>	<u>39.0</u>	<u>5.6</u>
18	<u>33.4</u>	<u>39.6</u>	<u>6.2</u>
24	<u>33.4</u>	<u>40.4</u>	<u>7.0</u>
30	<u>33.3</u>	<u>40.9</u>	<u>7.6</u>
36	<u>33.1</u>	<u>41.3</u>	<u>8.2</u>
42	<u>33.1</u>	<u>42.2</u>	<u>9.1</u>
48	<u>33.1</u>	<u>43.2</u>	<u>10.1</u>
54	<u>33.1</u>	<u>43.0</u>	<u>9.9</u>
60	<u>32.9</u>	<u>41.1</u>	<u>8.2</u>
66	<u>33.1</u>	<u>39.0</u>	<u>5.9</u>
72	<u>33.3</u>	<u>37.1</u>	<u>3.8</u>
78	<u>33.1</u>	<u>35.6</u>	<u>2.5</u>
84	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
90	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
96	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
102	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
108	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
114	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
120	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
126	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
132	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
138	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = reference plane to car body

FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 1 AT AXLE CENTER LINE

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

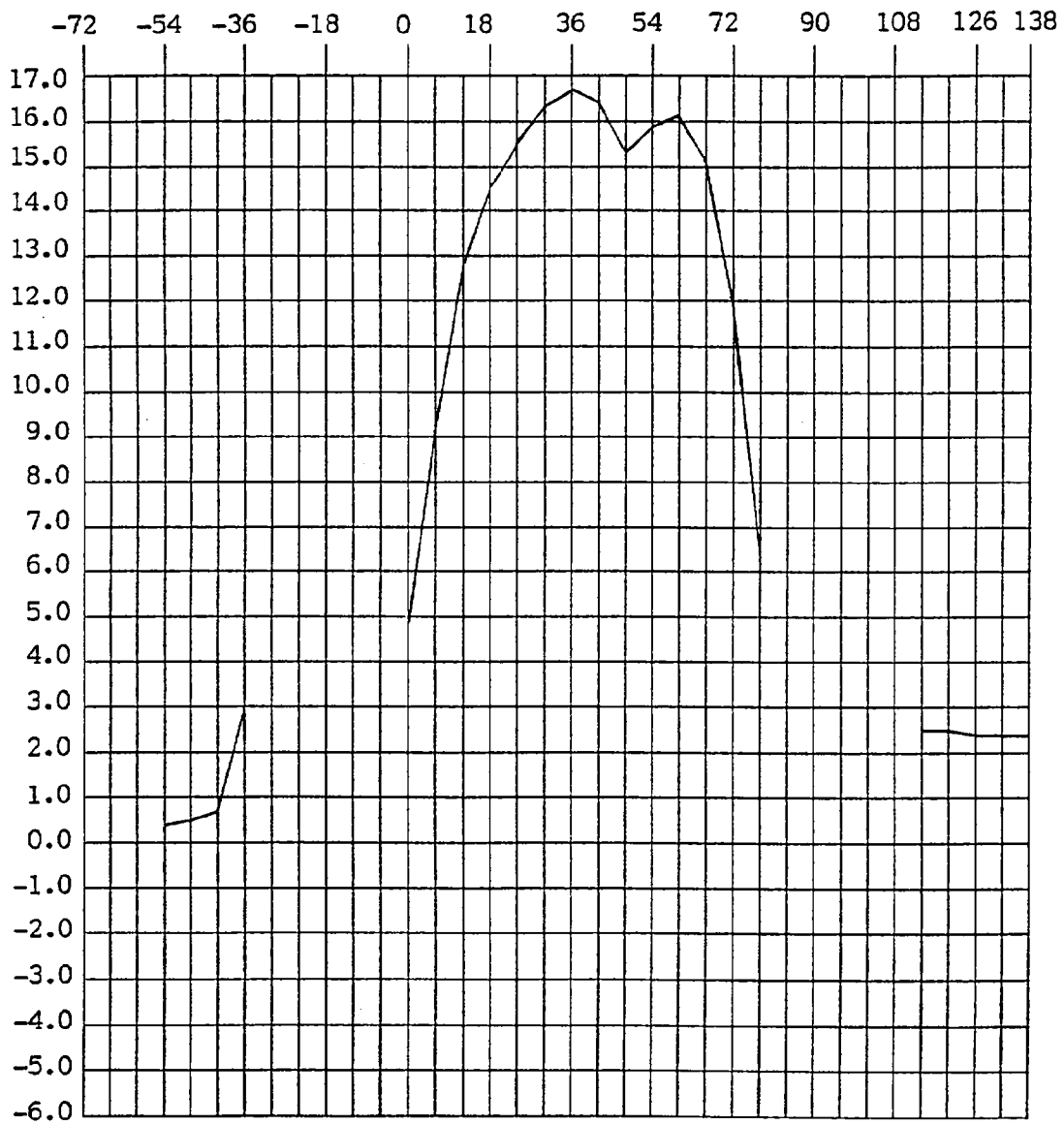
LEVEL 2 AT OCCUPANT H-POINT

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-66	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-60	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-54	<u>35.4</u>	<u>35.8</u>	<u>0.4</u>
-48	<u>33.9</u>	<u>34.4</u>	<u>0.5</u>
-42	<u>32.0</u>	<u>33.7</u>	<u>0.7</u>
-36	<u>32.2</u>	<u>35.2</u>	<u>3.0</u>
-30	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-24	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-18	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-12	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-6	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
0	<u>30.0</u>	<u>34.8</u>	<u>4.8</u> (impact point)
6	<u>30.0</u>	<u>39.2</u>	<u>9.2</u>
12	<u>29.8</u>	<u>42.6</u>	<u>12.8</u>
18	<u>29.6</u>	<u>44.1</u>	<u>14.5</u>
24	<u>29.4</u>	<u>44.9</u>	<u>15.5</u>
30	<u>29.3</u>	<u>45.6</u>	<u>16.3</u>
36	<u>29.1</u>	<u>45.8</u>	<u>16.7</u>
42	<u>29.1</u>	<u>45.5</u>	<u>16.4</u>
48	<u>29.1</u>	<u>44.4</u>	<u>15.3</u>
54	<u>29.1</u>	<u>45.0</u>	<u>15.9</u>
60	<u>29.1</u>	<u>45.2</u>	<u>16.1</u>
66	<u>29.1</u>	<u>44.2</u>	<u>15.1</u>
72	<u>29.1</u>	<u>41.0</u>	<u>11.9</u>
78	<u>29.2</u>	<u>35.5</u>	<u>6.3</u>
84	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
90	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
96	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
102	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
108	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
114	<u>31.0</u>	<u>33.5</u>	<u>2.5</u>
120	<u>31.6</u>	<u>34.1</u>	<u>2.5</u>
126	<u>32.2</u>	<u>34.6</u>	<u>2.4</u>
132	<u>33.0</u>	<u>35.4</u>	<u>2.4</u>
138	<u>33.9</u>	<u>36.3</u>	<u>2.4</u>

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = reference plane to car body

FIGURE 6 (Cont'd)
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 AT OCCUPANT H-POINT

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

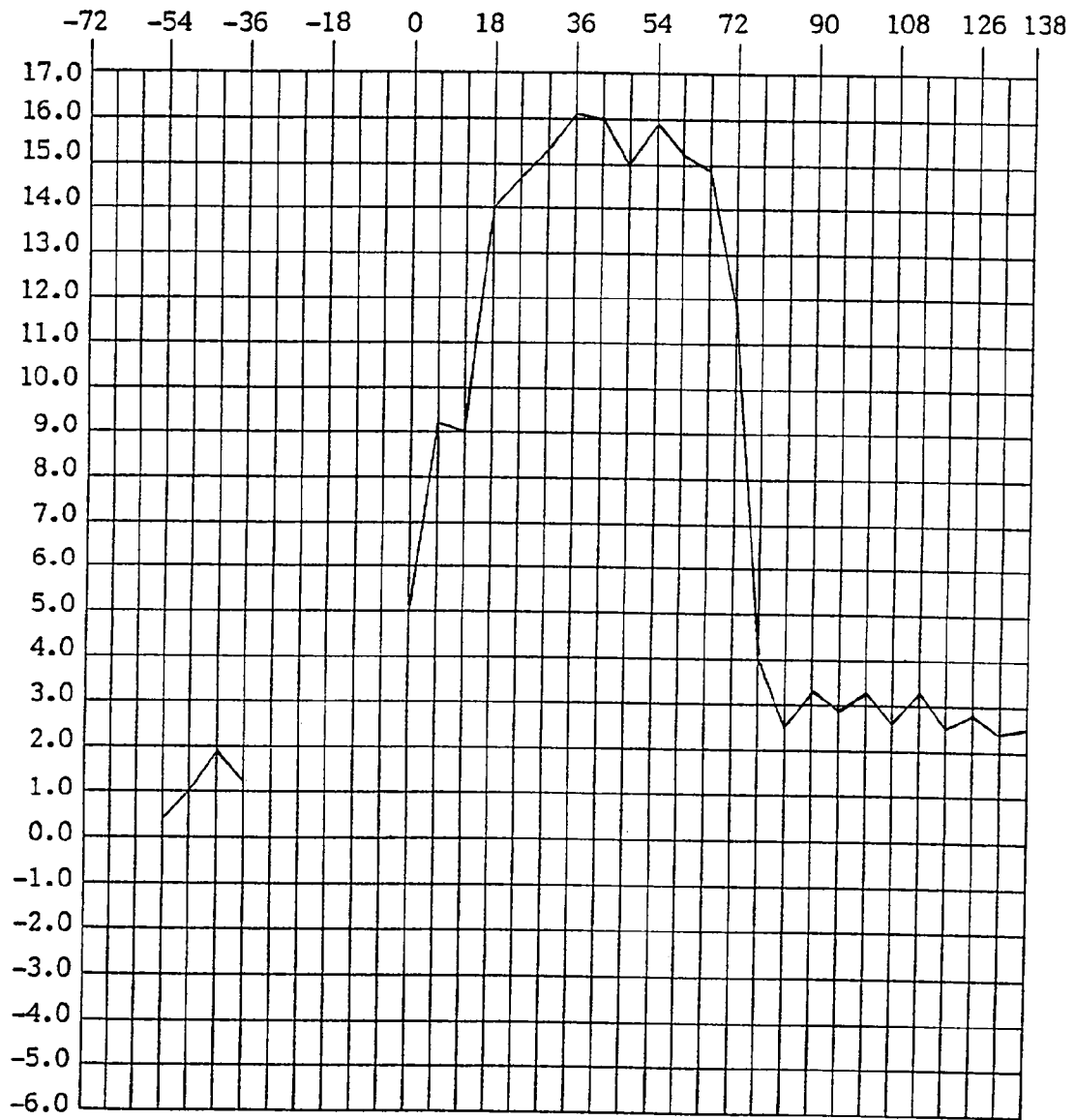
LEVEL 3 AT MID-DOOR

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	N/A	N/A	N/A
-66	N/A	N/A	N/A
-60	N/A	N/A	N/A
-54	36.1	36.5	0.4
-48	34.1	35.1	1.0
-42	32.1	34.0	1.9
-36	32.0	33.2	1.2
-30	N/A	N/A	N/A
-24	N/A	N/A	N/A
-18	N/A	N/A	N/A
-12	N/A	N/A	N/A
-6	N/A	N/A	N/A
0	30.0	35.0	5.0 (impact point)
6	30.0	39.2	9.2
12	29.8	39.1	9.0
18	29.5	43.3	14.0
24	29.4	44.1	14.7
30	29.2	44.5	15.3
36	29.1	45.2	16.1
42	29.0	45.0	16.0
48	29.0	44.0	15.0
54	29.1	45.0	15.9
60	29.1	44.3	15.2
66	29.1	44.0	14.9
72	29.2	41.0	11.8
78	33.0	37.0	4.0
84	29.5	32.0	2.5
90	29.8	33.1	3.3
96	30.0	32.9	2.9
102	30.3	33.6	3.3
108	31.0	33.6	2.6
114	31.1	34.4	3.3
120	32.0	34.5	2.5
126	32.2	35.0	2.8
132	33.0	35.4	2.4
138	34.0	36.5	2.5

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = reference plane to car body

FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 3 AT MID-DOOR

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

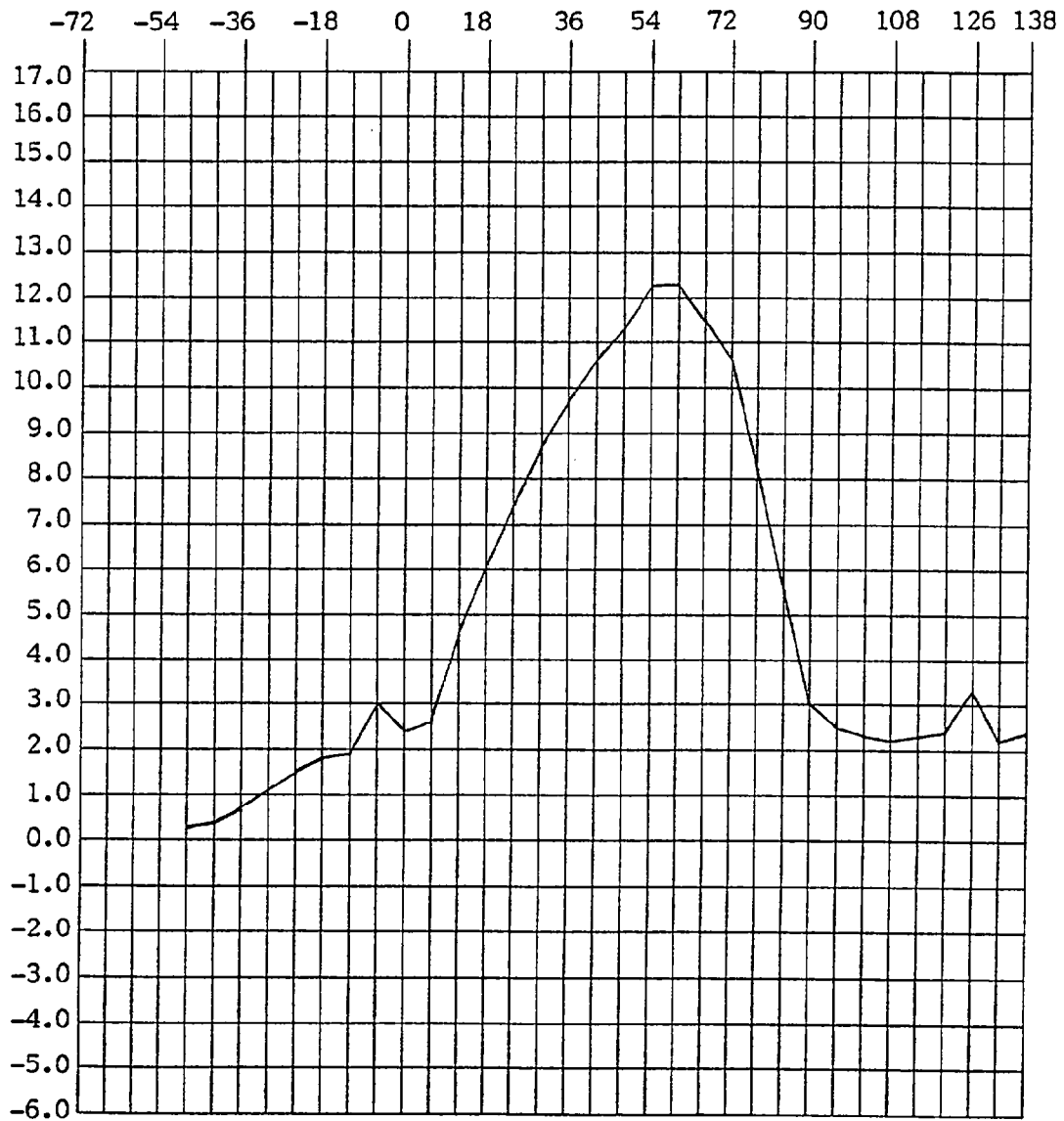
LEVEL 4 AT WINDOW SILL

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-66	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-60	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-54	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
-48	<u>36.3</u>	<u>36.6</u>	<u>0.3</u>
-42	<u>35.4</u>	<u>35.8</u>	<u>0.4</u>
-36	<u>34.7</u>	<u>35.4</u>	<u>0.7</u>
-30	<u>34.0</u>	<u>35.2</u>	<u>1.1</u>
-24	<u>33.5</u>	<u>35.0</u>	<u>1.5</u>
-18	<u>33.0</u>	<u>34.8</u>	<u>1.8</u>
-12	<u>32.7</u>	<u>34.6</u>	<u>1.9</u>
-6	<u>32.3</u>	<u>35.3</u>	<u>3.0</u>
0	<u>32.3</u>	<u>34.7</u>	<u>2.4</u> (impact point)
6	<u>32.2</u>	<u>34.8</u>	<u>2.6</u>
12	<u>32.0</u>	<u>36.6</u>	<u>4.6</u>
18	<u>31.9</u>	<u>38.0</u>	<u>6.1</u>
24	<u>31.9</u>	<u>39.3</u>	<u>7.4</u>
30	<u>31.8</u>	<u>40.5</u>	<u>8.7</u>
36	<u>31.6</u>	<u>41.3</u>	<u>9.7</u>
42	<u>31.5</u>	<u>42.1</u>	<u>10.6</u>
48	<u>31.5</u>	<u>42.8</u>	<u>11.3</u>
54	<u>31.5</u>	<u>43.8</u>	<u>12.3</u>
60	<u>31.5</u>	<u>43.8</u>	<u>12.3</u>
66	<u>31.5</u>	<u>43.0</u>	<u>11.5</u>
72	<u>31.7</u>	<u>42.3</u>	<u>10.6</u>
78	<u>31.8</u>	<u>40.0</u>	<u>8.2</u>
84	<u>32.0</u>	<u>37.6</u>	<u>5.6</u>
90	<u>32.2</u>	<u>35.2</u>	<u>3.0</u>
96	<u>32.5</u>	<u>35.0</u>	<u>2.5</u>
102	<u>32.9</u>	<u>35.2</u>	<u>2.3</u>
108	<u>33.3</u>	<u>35.5</u>	<u>2.2</u>
114	<u>33.7</u>	<u>36.0</u>	<u>2.3</u>
120	<u>34.1</u>	<u>36.5</u>	<u>2.4</u>
126	<u>34.7</u>	<u>38.0</u>	<u>3.3</u>
132	<u>35.3</u>	<u>37.5</u>	<u>2.2</u>
138	<u>36.1</u>	<u>38.5</u>	<u>2.4</u>

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = reference plane to car body

FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 4 AT WINDOW SILL

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

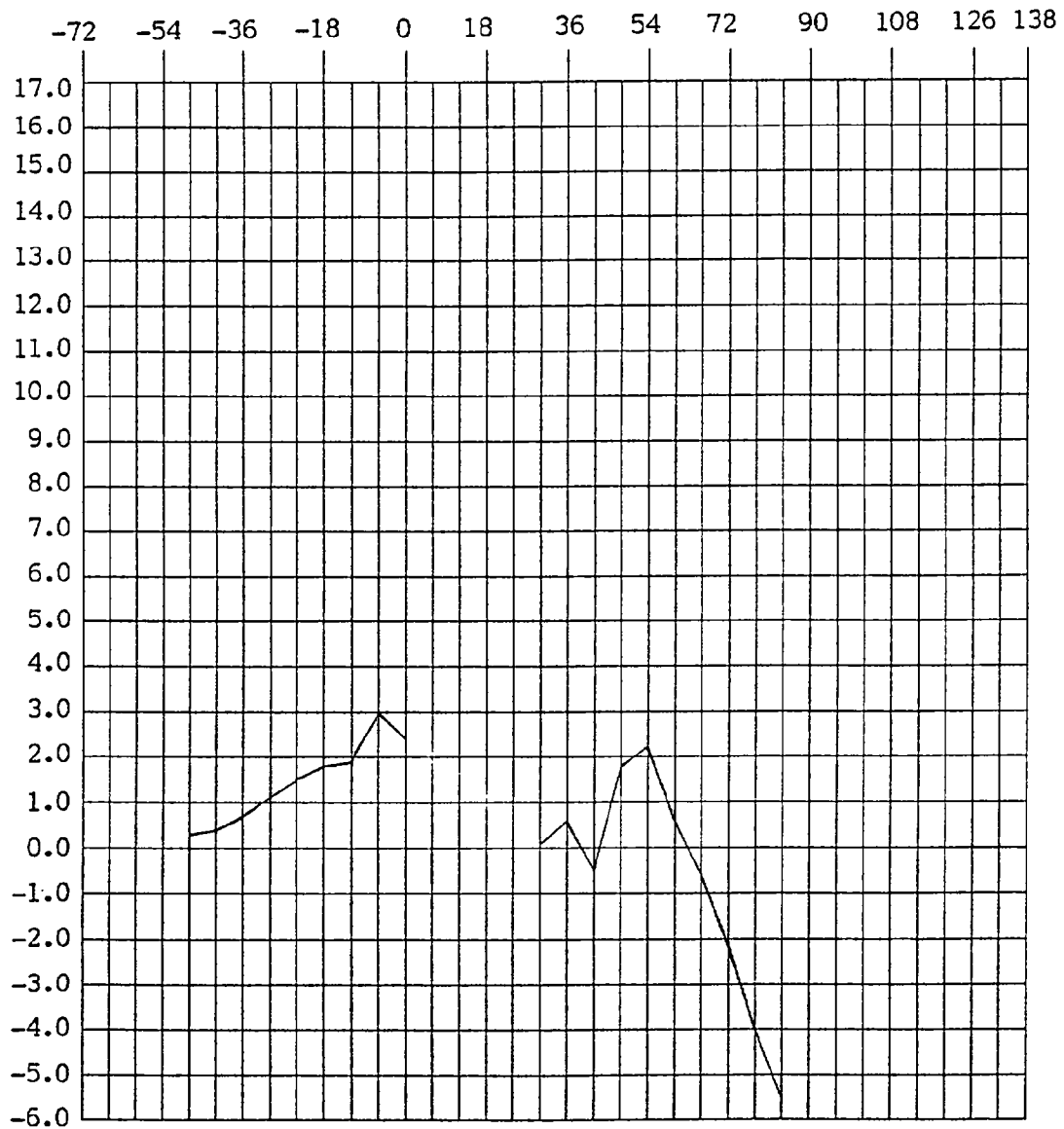
LEVEL 5 AT WINDOW TOP

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	N/A	N/A	N/A
-66	N/A	N/A	N/A
-60	N/A	N/A	N/A
-54	N/A	N/A	N/A
-48	N/A	36.6	0.3
-42	N/A	35.8	0.4
-36	N/A	35.4	0.7
-30	N/A	35.2	1.1
-24	N/A	35.0	1.5
-18	N/A	34.8	1.8
-12	N/A	34.6	1.9
-6	N/A	35.3	3.0
0	N/A	34.7	2.4 (impact point)
6	N/A	N/A	N/A
12	N/A	N/A	N/A
18	N/A	N/A	N/A
24	N/A	N/A	N/A
30	42.8	42.9	.1
36	42.8	43.4	.6
42	42.7	42.2	-.5
48	42.8	44.6	1.8
54	42.8	45.0	2.2
60	43.1	43.7	.6
66	43.1	42.6	-.6
72	43.2	41.1	-2.1
78	43.8	39.8	-4.0
84	44.4	38.9	-5.5
90	N/A	N/A	N/A
96	N/A	N/A	N/A
102	N/A	N/A	N/A
108	N/A	N/A	N/A
114	N/A	N/A	N/A
120	N/A	N/A	N/A
126	N/A	N/A	N/A
132	N/A	N/A	N/A
138	N/A	N/A	N/A

Reference plane is parallel to test vehicle longitudinal centerline
 Given dimensions = reference plane to car body

FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 5 AT WINDOW TOP

FIGURE 7

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

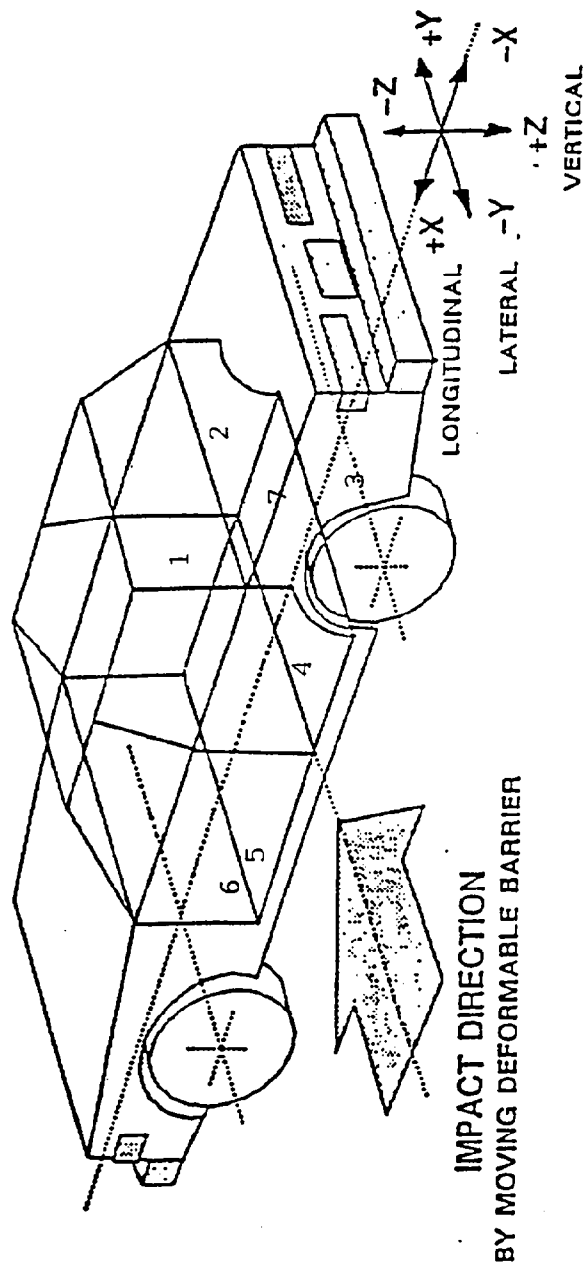
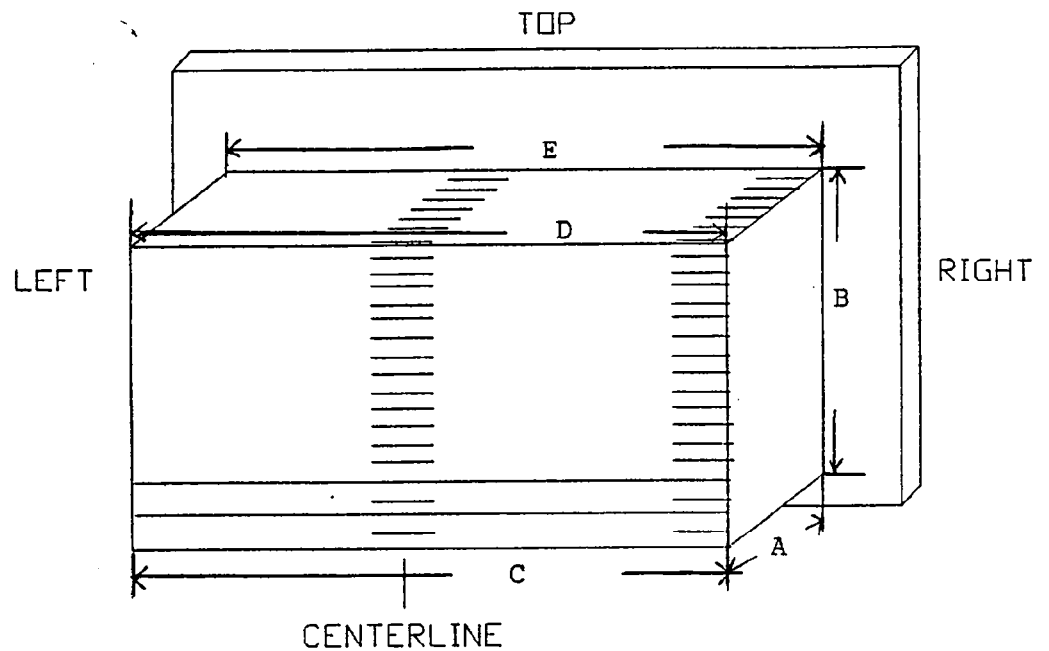


FIGURE 8
MDB FACE DIMENSIONS

Measurements in inches

A = 15
 B = 22
 C = 66
 D = 66
 E = 66



Measurements in inches

A = 10.9
 B = 12.9
 C = 20.9
 D = 32.9

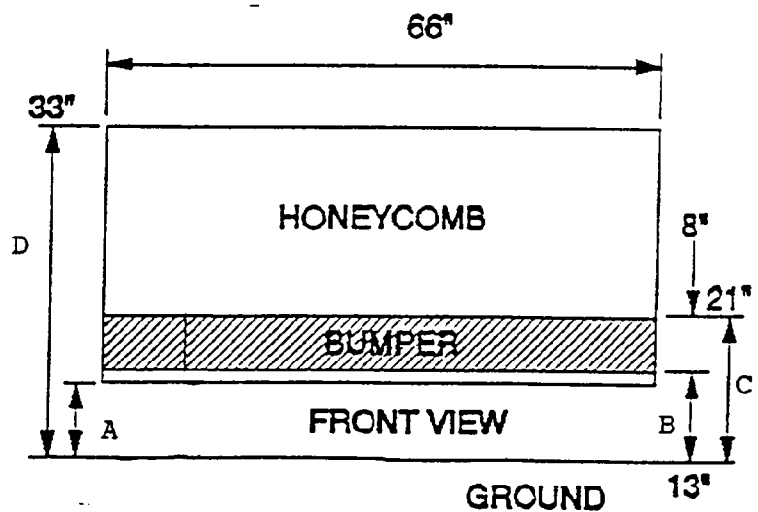


TABLE 8
EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Location	Top of Stack (33 inches)	Mid-Stack (27 inches)	Top of Bumper (21 inches)	Center of Bumper (17 inches)
Horizontal Distance From Center	Crush (inches)	Crush (inches)	Crush (inches)	Crush (inches)
32"	2	1.9	2.5	*
28"	0.5	0.8	1.4	*
24"	0.1	0.1	0.8	*
20"	0.2	0	0.7	*
16"	1.0	0.6	0.7	*
12"	0.4	0.7	0.7	*
8"	1.0	0.2	0.7	*
4-19 4"	0.1	0.2	0.6	*
0"	0.1	0.2	0.6	*
4"	0.1	0.2	0.7	*
8"	0.2	0.2	0.8	*
12"	0.3	0.3	0.9	*
16"	0.6	0.2	1.0	*
20"	1.5	0.3	1.2	*
24"	2.4	0.4	1.5	*
28"	3.1	1.1	1.9	*
32"	4.3	2.8	2.4	*

Left Side

Right Side

* Post-test measurements not available due to the bumper falling off during impact.

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Accel. No.	Description	Coordinates (in)			Long. (X) Maximums		Lat. (Y) Maximums		Vert. (Z) Maximums		Resultant
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Rt. Side Sill @ Front Seat	128.3	28.1	11.7	2.6	-3.0	19.6	-2.8	2.8	-7.2	20.1
2	Rt. Side Sill @ Rear Seat	87.1	27.4	10.8	2.4	-2.0	19.2	-2.4	3.3	-4.4	19.3
3	Rr. Floorpan Above Axle	52.7	1.4	19.8	2.2	-6.7	18.5	-2.1	15.1	-9.9	21.2
4	Left Side Sill @ Rr. Seat	84.8	-1.4	7.0	---	---	67.8	-6.9	---	---	---
5	Left Side Sill @ Frt. Seat	121.0	-27.0	8.1	---	---	34.5	-6.6	---	---	---
6	Driver Left Seat Track*	11.4	-21.3	9.8	---	---	29.2	-36.4	---	---	---
7	Right Rear Occupant Compartment	86	14.6	11.4	---	---	19.4	-12.3	---	---	---

*Reference: X - Rear Bumper (+ Forward)
Y - Vehicle Centerline (+ To right)
Z - Ground Level (+ Up)

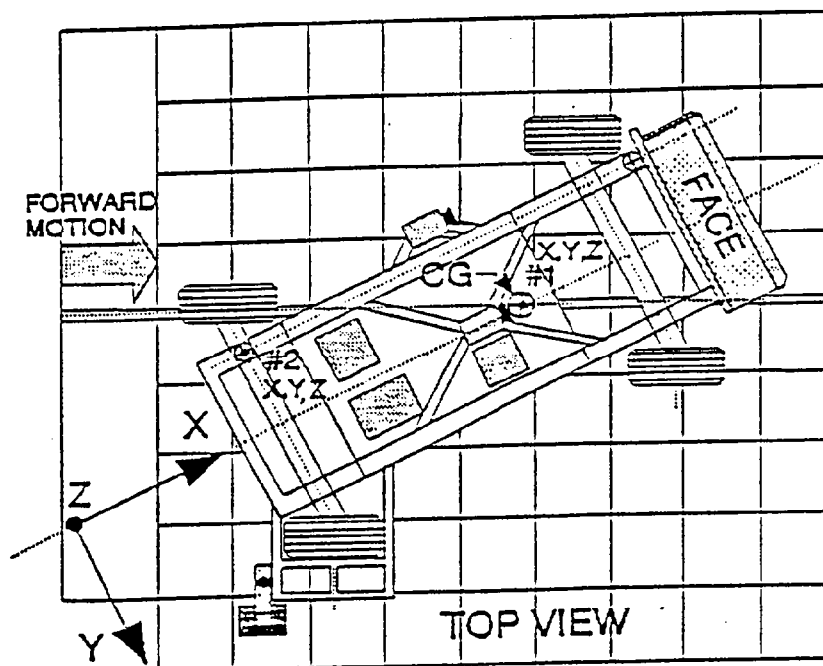
* Data shift during impact

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994



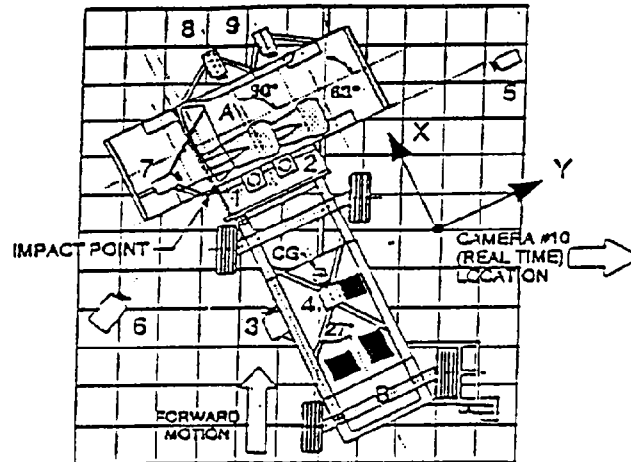
Accel. No.	Location	Coordinates (in)			Pos. Direct.		Neg. Direct.	
					Max (g)	Time (msec)	Max (g)	Time (msec)
		X	Y	Z				
1	MDB Center of Gravity							
	Longitudinal ... X				1.1	151	-14.5	48
	Lateral Y	-43	0	19.0	0	0	-7.7	45
	Vertical Z				19.4	42	-12.3	37
	Resultant R				24.2	48	---	---
2	Rear Frame Member							
	Longitudinal ... X	-102	-24.6	24.5	1.4	171	-20.4	45
	Lateral Y				5.1	42	-2.1	86

* Reference: X = Front Axle (+Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)

FIGURE 10
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994



Camera No.	View	Coordinates (in)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
	Real Time					10	24
6	Left Impact	-3260	3875	2045	45°	13	1156
8	Onboard Driver					7.5	1015
7	Onboard Hood					13	1000
9	Onboard Passenger					8	1010
5	Right Impact	4560	-8425	1015	45°	25	1010
2	Top Wide	400	0	5360		8	752
1	Top Pointer	0	380	4920		13	962
4	Cart					13	408
3	Cart Pointer					35	456

* Reference: (from point of impact)
 +X = Forward
 +Y = To Right
 +Z = Upward

TABLE 10
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

Test vehicle fuel tank filled to 92% to 94% of manufacturer's "useable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE: X Side Impact MDB (33.3 mph)

FUEL SPILLAGE MEASUREMENT:

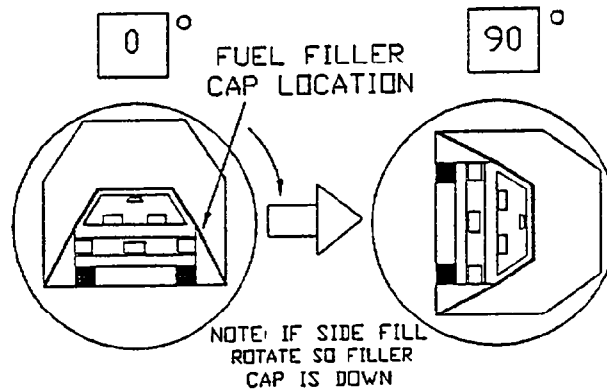
1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

ACTUAL	MAX ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./1 MIN

SOLVENT SPILLAGE DETAILS:

None

TABLE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETYear/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 DoorVehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994TEST PHASE: 0° - 90°Vehicle NHTSA ID No.: CR0110I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time 2 minutes 47 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 secondsTOTAL 7 minutes 47 secondsNext whole minute interval 8 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

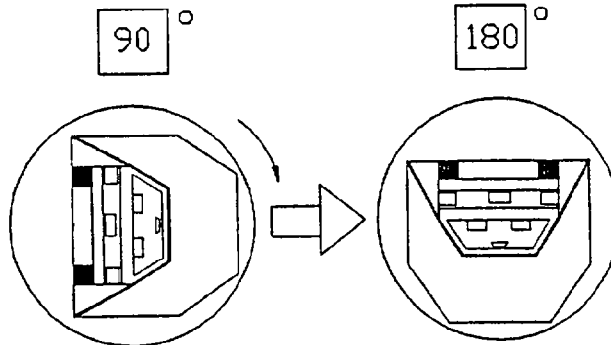
TABLE 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door

Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

TEST PHASE: 90° - 180°

Vehicle NHTSA ID No.: CR0110



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 31 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 31 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record Spillage for whole minute intervals only as determined above.

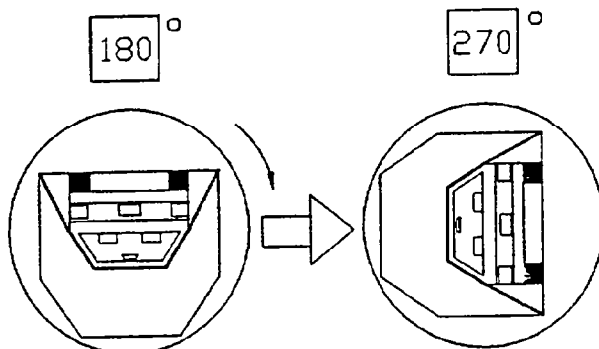
IV. SOLVENT SPILLAGE LOCATIONS(S): None

TABLE 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
 Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

TEST PHASE: 180° - 270°

Vehicle NHTSA ID No.: CR0110



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 19 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
 TOTAL 7 minutes 19 seconds
 Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

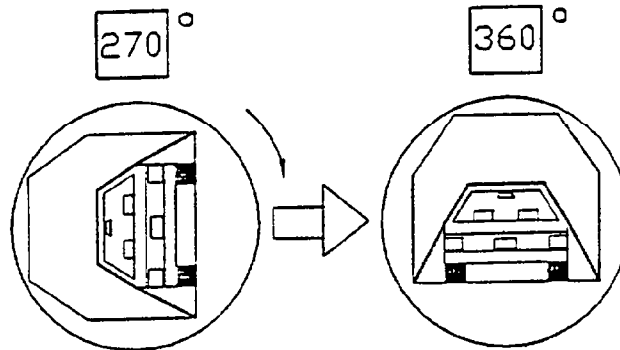
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

TABLE 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1994/Cadillac/Sedan Deville/4 Door
 Vehicle NHTSA No.: CR0110 TEST DATE: May 10, 1994

TEST PHASE: 270° - 360°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 37 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
 TOTAL 7 minutes 37 seconds
 Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

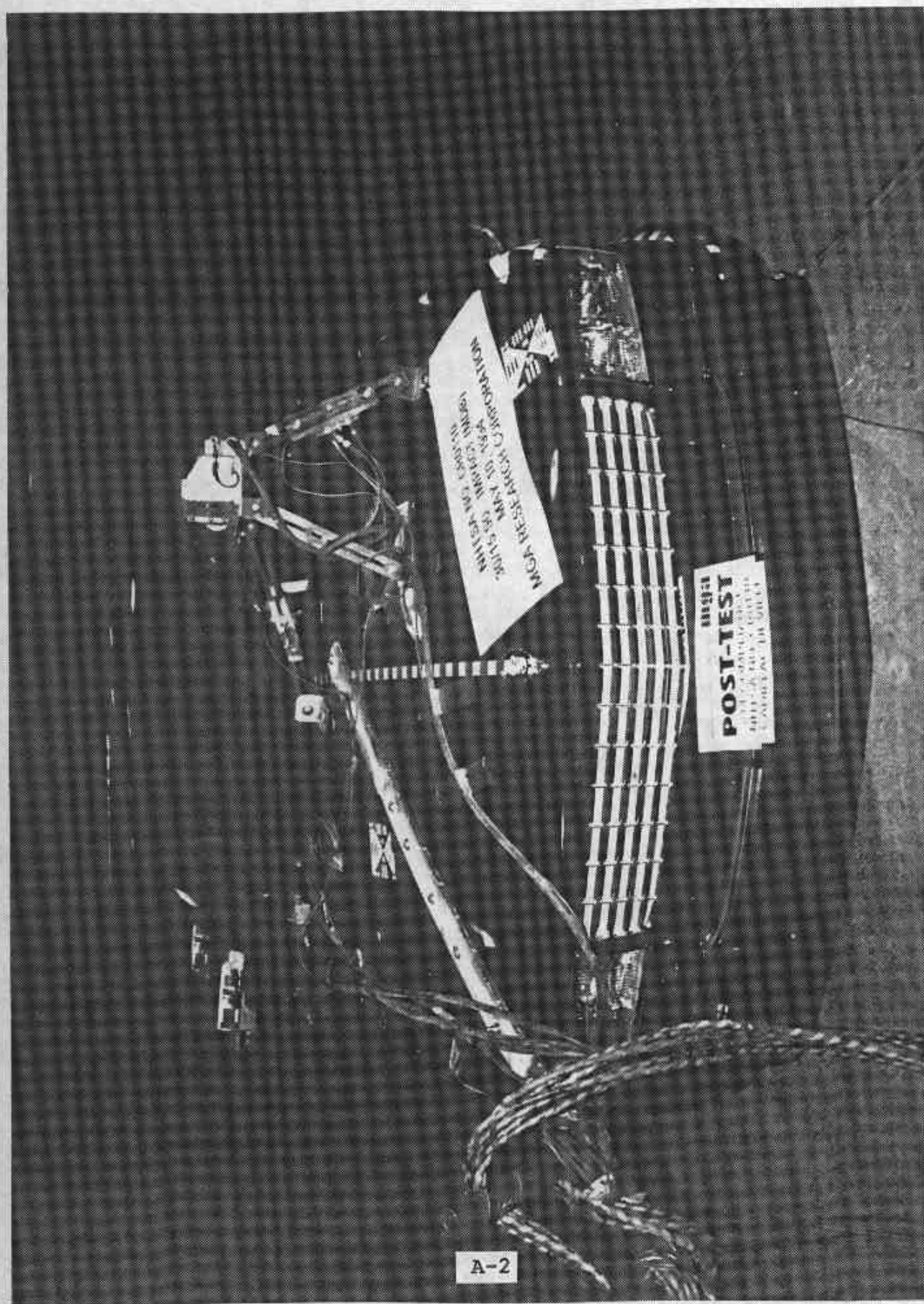
APPENDIX A - PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

	<u>Page No.</u>
Photo No. A-1 - Pre-Test Front View of Test Vehicle	A-1
Photo No. A-2 - Post-Test Front View of Test Vehicle	A-2
Photo No. A-3 - Pre-Test Rear View of Test Vehicle	A-3
Photo No. A-4 - Pre-Test Left Side View of Test Vehicle	A-4
Photo No. A-5 - Post-Test Left Side View of Test Vehicle	A-5
Photo No. A-6 - Pre-Test MDB Positioned Against Vehicle (left side)	A-6
Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (right side)	A-7
Photo No. A-8 - Pre-Test MDB Position Against Vehicle Overhead View	A-8
Photo No. A-9 - Post-Test MDB and Vehicle Left Side Front View	A-9
Photo No. A-10 - Post-Test MDB and Vehicle Right Side Rear View	A-10
Photo No. A-11 - Pre-Test MDB Top View	A-11
Photo No. A-12 - Post-Test MDB Top View	A-12
Photo No. A-13 - Pre-Test MDB Front View	A-13
Photo No. A-14 - Post-Test MDB Front View	A-14
Photo No. A-15 - Pre-Test MDB Left Side View	A-15
Photo No. A-16 - Post-Test MDB Left Side View	A-16
Photo No. A-17 - Pre-Test MDB Right Side View	A-17
Photo No. A-18 - Post-Test MDB Right Side View	A-18
Photo No. A-19 - Post-Test MDB and Vehicle Overhead View	A-19
Photo No. A-20 - Pre-Test Driver Dummy Right Side View	A-20
Photo No. A-21 - Post-Test Driver Dummy Right Side View	A-21
Photo No. A-22 - Pre-Test Driver Dummy Left Side View	A-22
Photo No. A-23 - Post-Test Driver Dummy Left Side View	A-23
Photo No. A-24 - Pre-Test Driver Dummy Front Oblique View	A-24
Photo No. A-25 - Post-Test Driver Dummy Front Oblique View	A-25
Photo No. A-26 - Pre-Test Driver Dummy Left Side View (Door Open)	A-26
Photo No. A-27 - Pre-Test Passenger Dummy Right Side View	A-27
Photo No. A-28 - Post-Test Passenger Dummy Right Side View	A-28
Photo No. A-29 - Pre-Test Passenger Dummy Left Side View	A-29
Photo No. A-30 - Post-Test Passenger Dummy Left Side View	A-30
Photo No. A-31 - Pre-Test Passenger Dummy Front Oblique View	A-31

TABLE OF PHOTOGRAPHS

	<u>Page No.</u>
Photo No. A-32 - Post-Test Passenger Dummy Front Oblique View	A-32
Photo No. A-33 - Pre-Test Passenger Dummy Left Side View (Door Open)	A-33
Photo No. A-34 - Pre-Test Driver Dummy Front View	A-34
Photo No. A-35 - Post-Test Driver Dummy Front View	A-35
Photo No. A-36 - Driver Impact Marks	A-36
Photo No. A-37 - Passenger Impact Marks	A-37
Photo No. A-38 - Rollover 0°	A-38
Photo No. A-39 - Rollover 90°	A-39
Photo No. A-40 - Rollover 180°	A-40
Photo No. A-41 - Rollover 270°	A-41
Photo No. A-42 - Tire Placard and Vehicle Certification Label	A-42
Photo No. A-43 - Impact	A-43



A-2

Photo No. A-2 - Post-Test Front View of Test Vehicle



Photo No. A-3 - Pre-Test Rear View of Test Vehicle

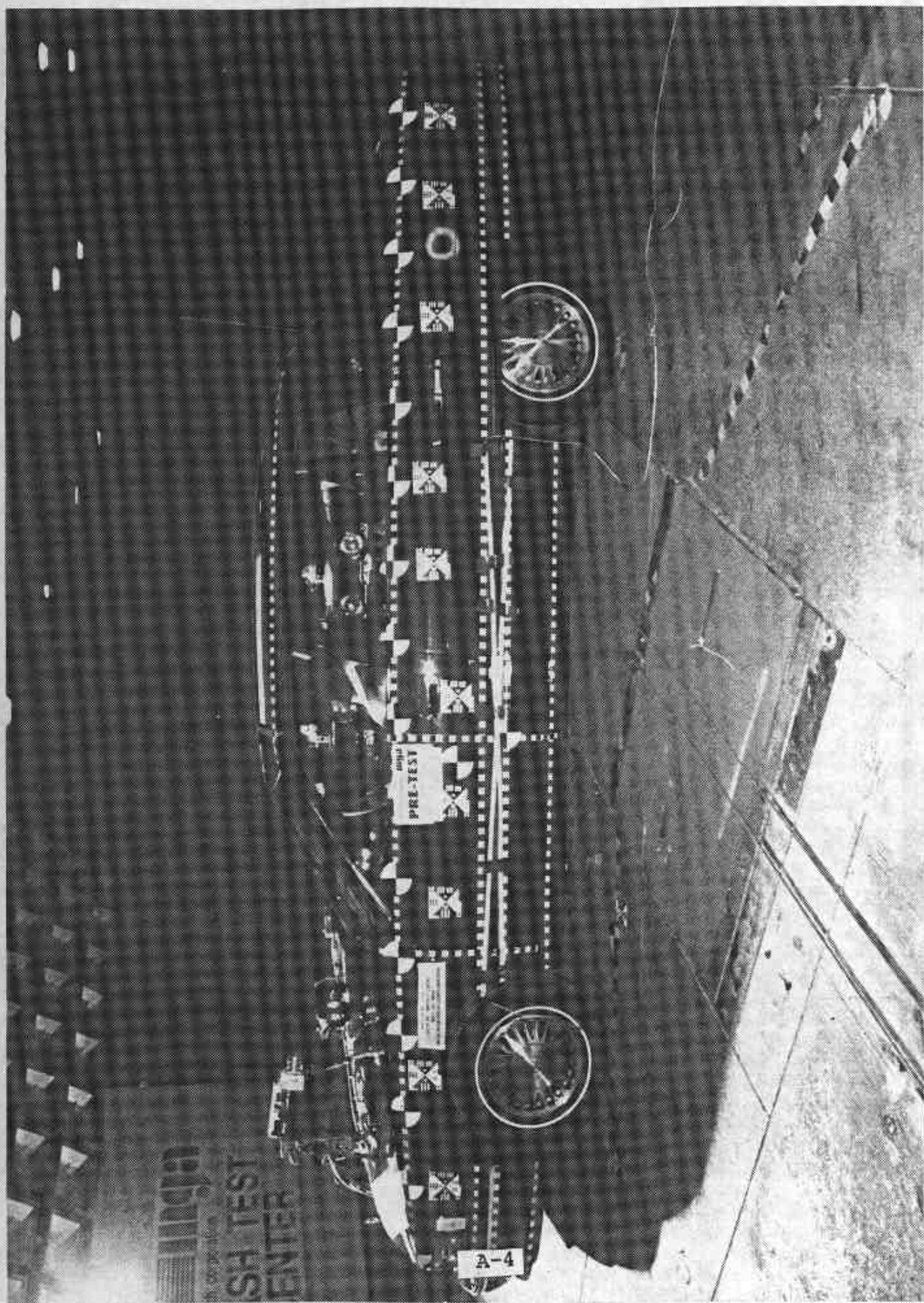


Photo No. A-4 - Pre-Test Left Side View of Test Vehicle

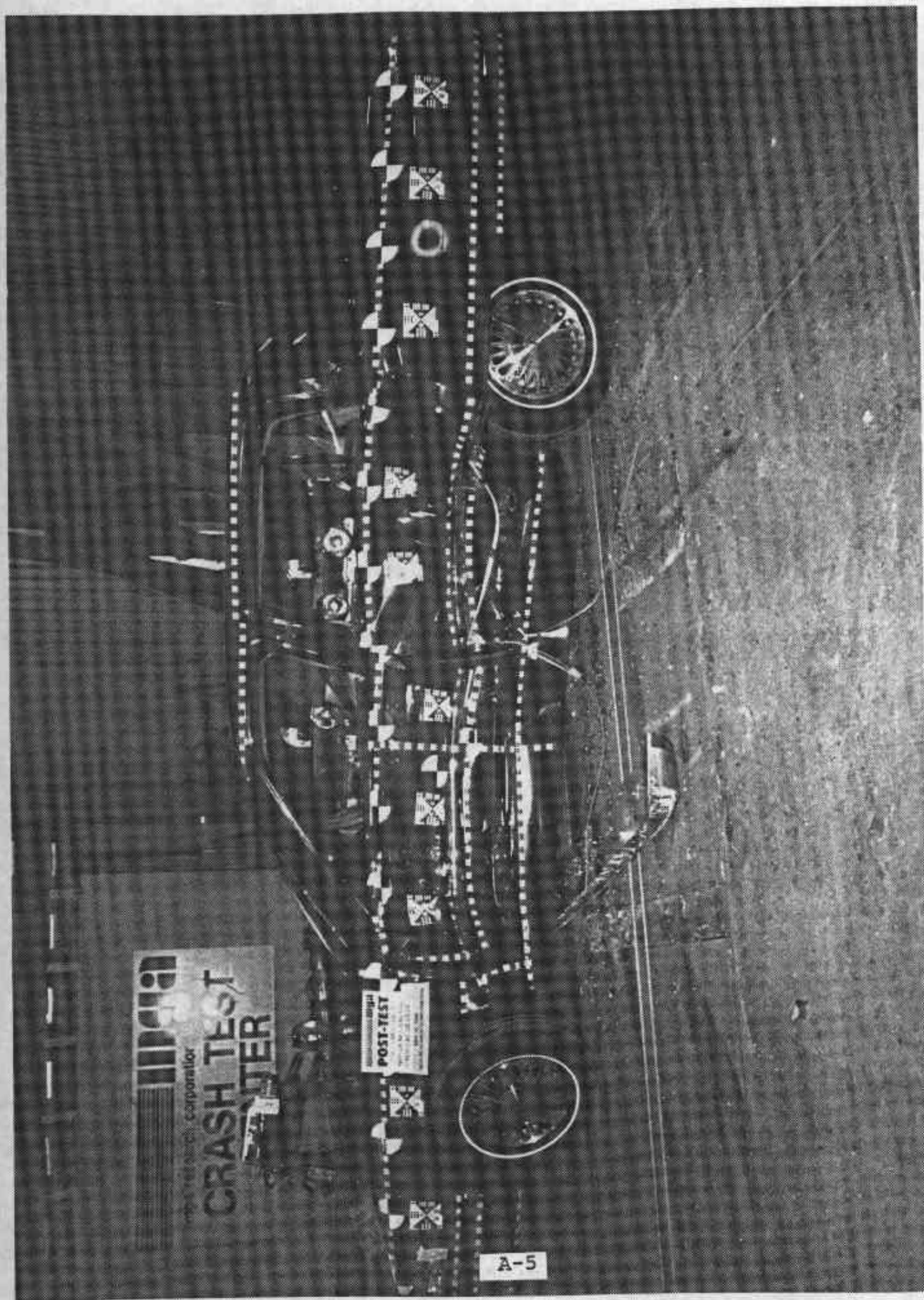


Photo No. A-5 - Post-Test Left Side View of Test Vehicle



Photo No. A-6 - Pre-Test MDB Positioned Against Vehicle (left side)



Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (right side)

Photo No. A-8 - Pre-Test MDB Position Against Vehicle Overhead View



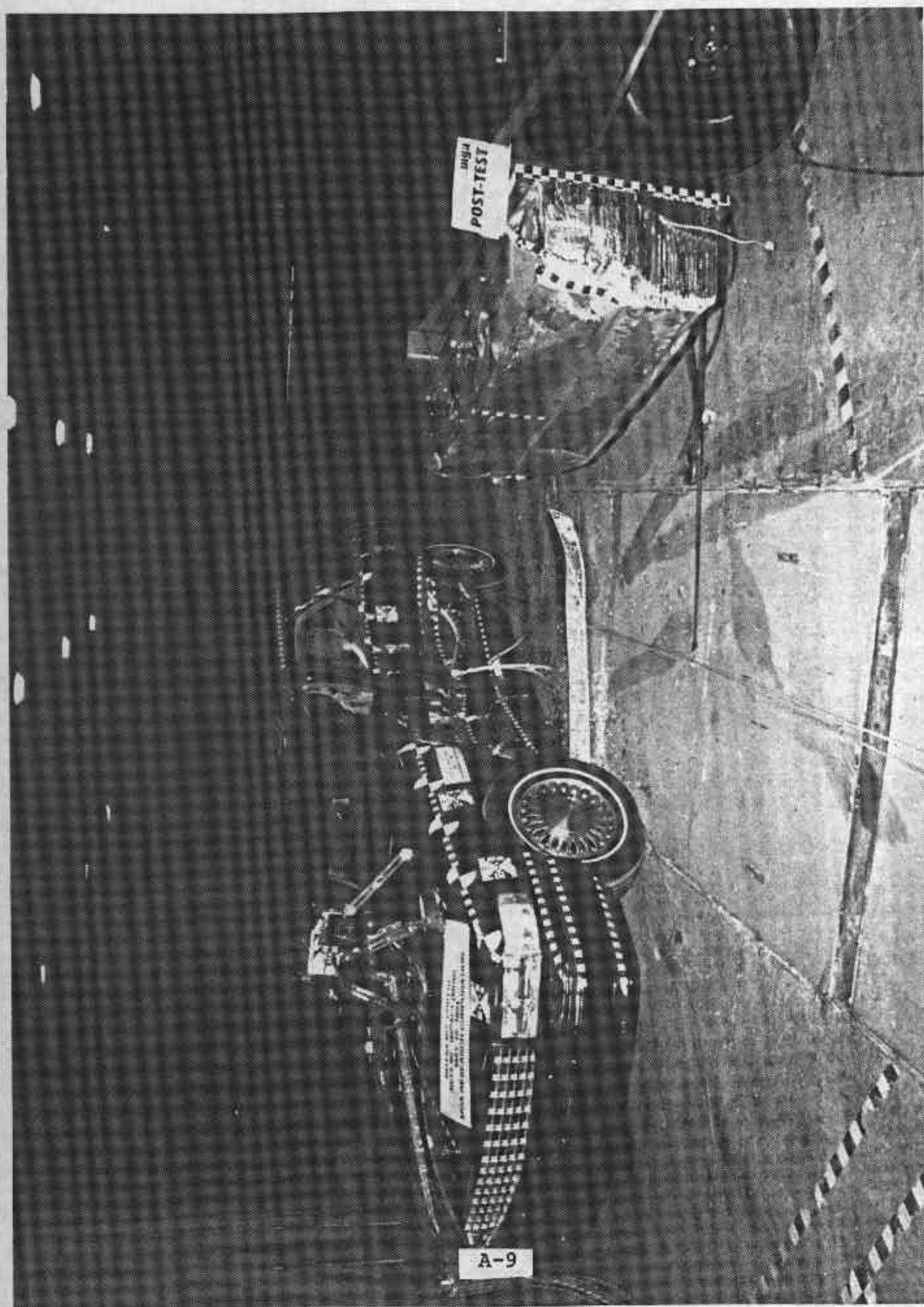


Photo No. A-9 - Post-Test MDB and Vehicle Left Side Front View

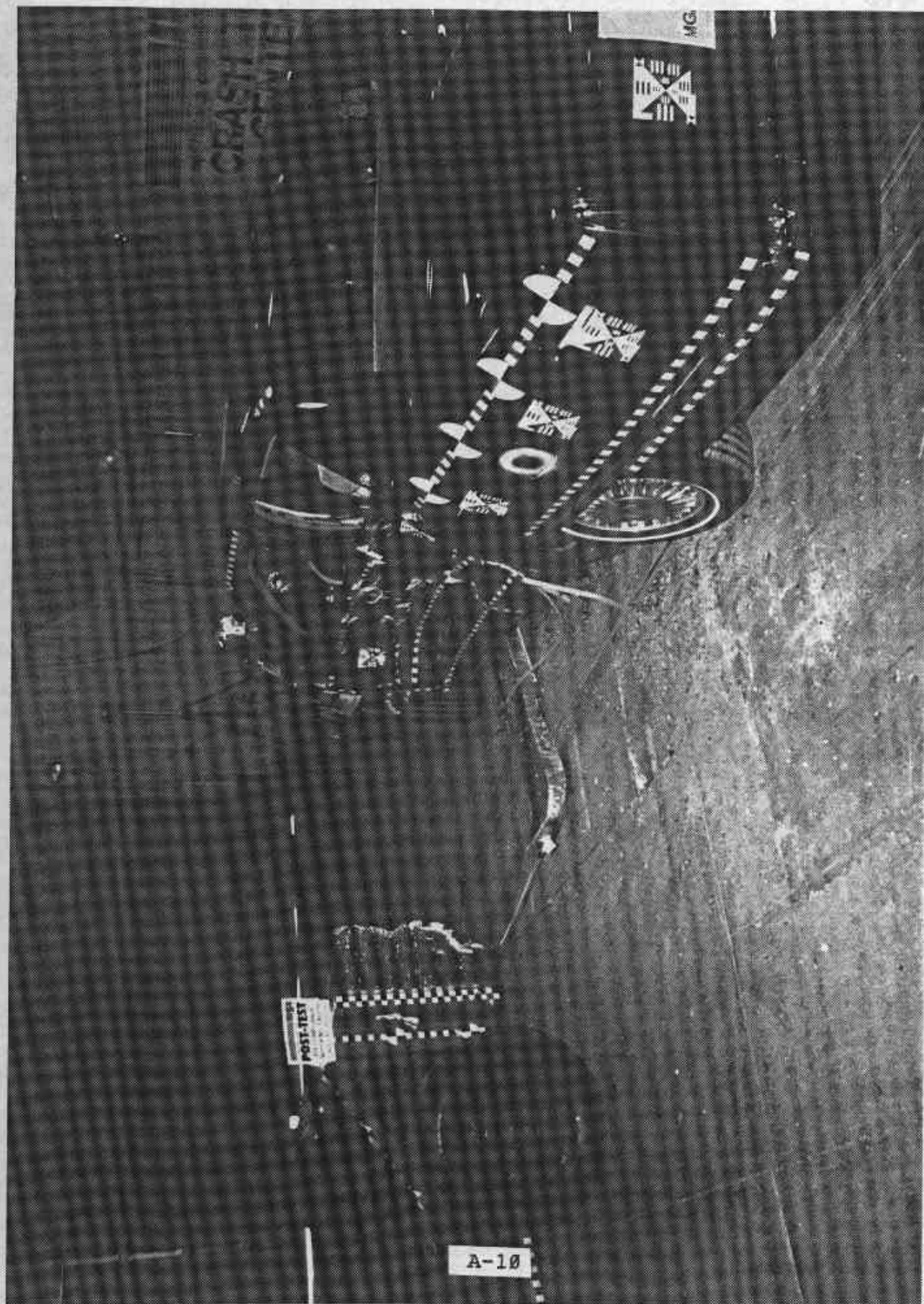


Photo No. A-10 - Post-Test MDB and Vehicle Right Side Rear View

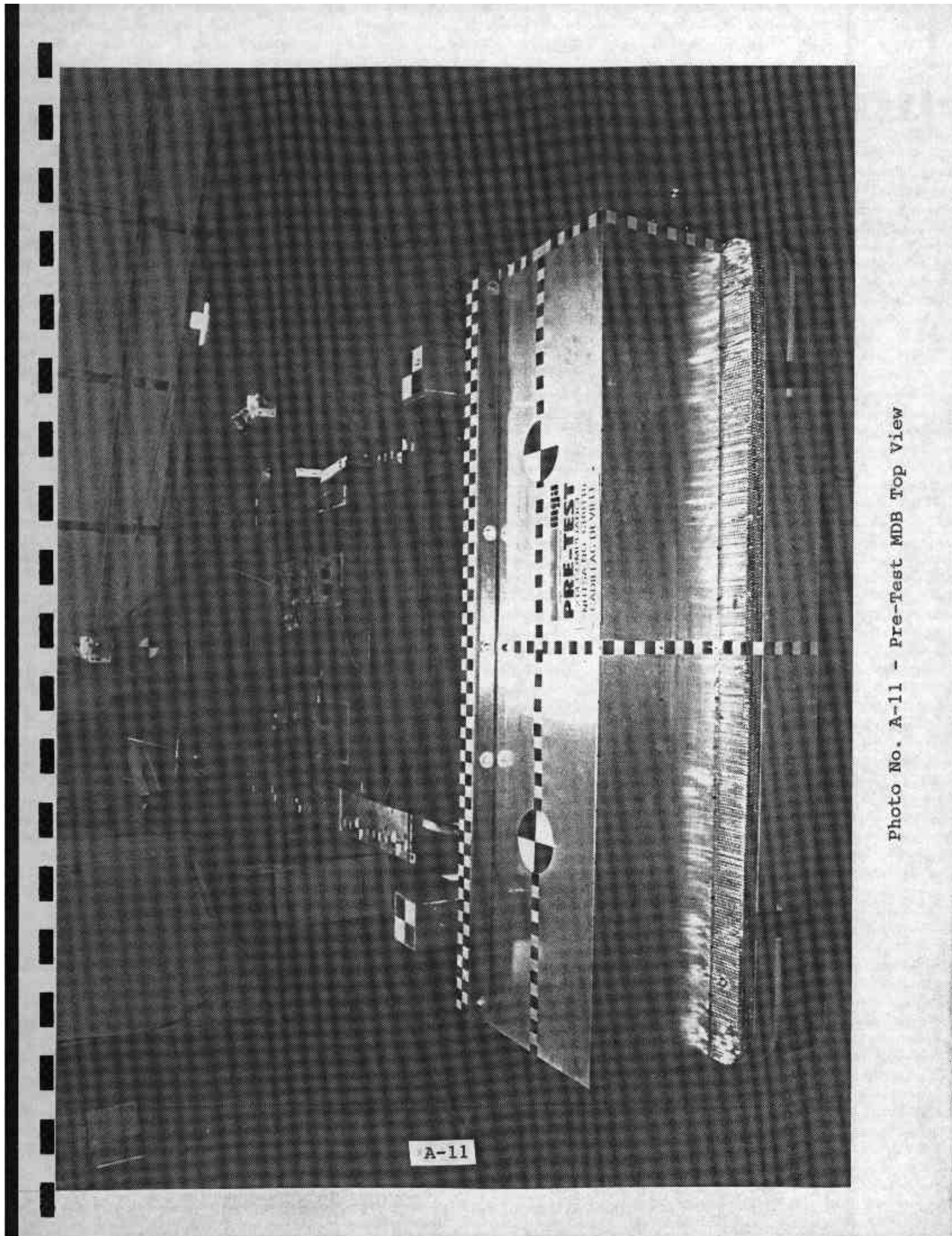
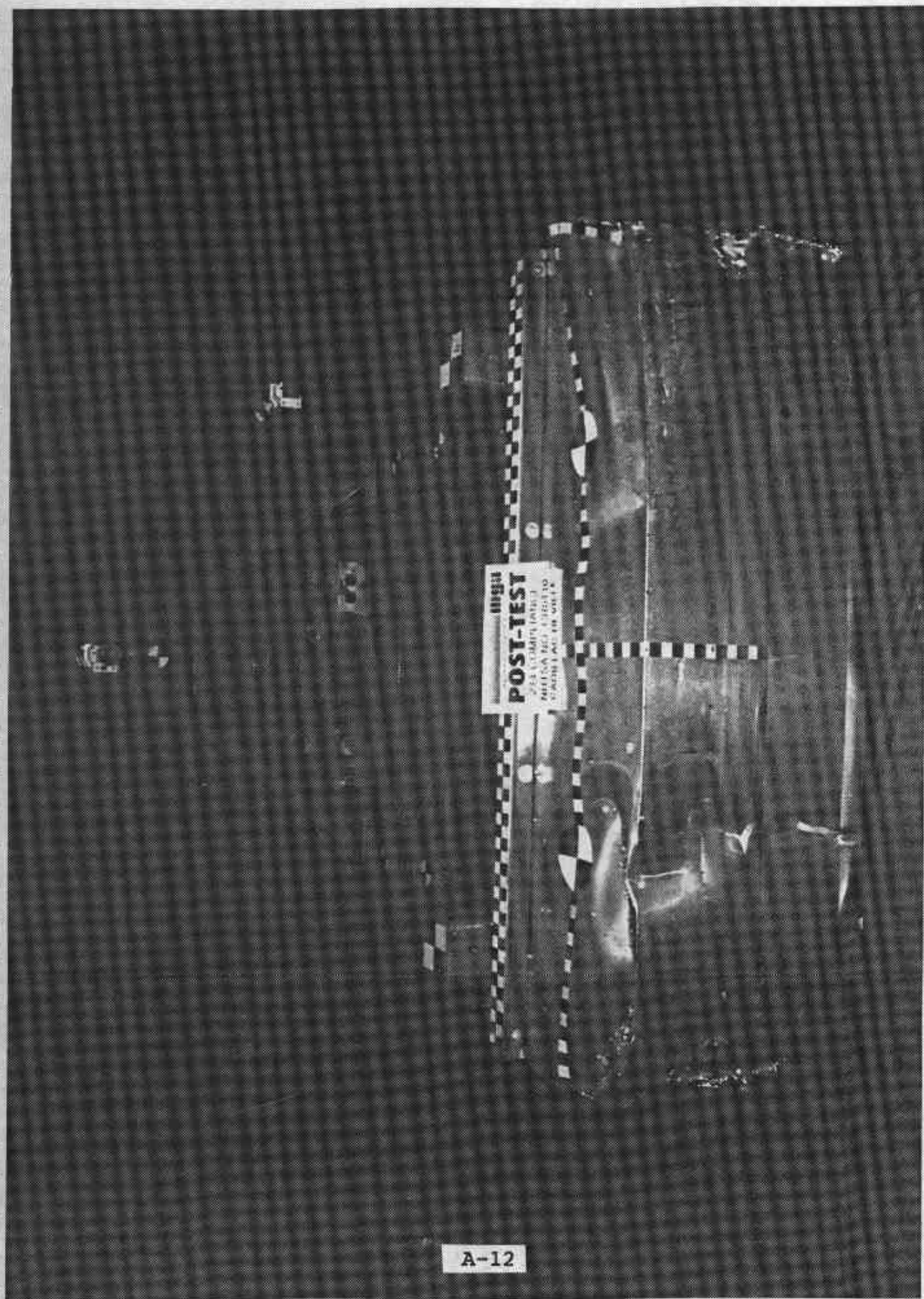


Photo No. A-11 - Pre-Test MDB Top View



A-12

Photo No. A-12 - Post-Test MDB Top View

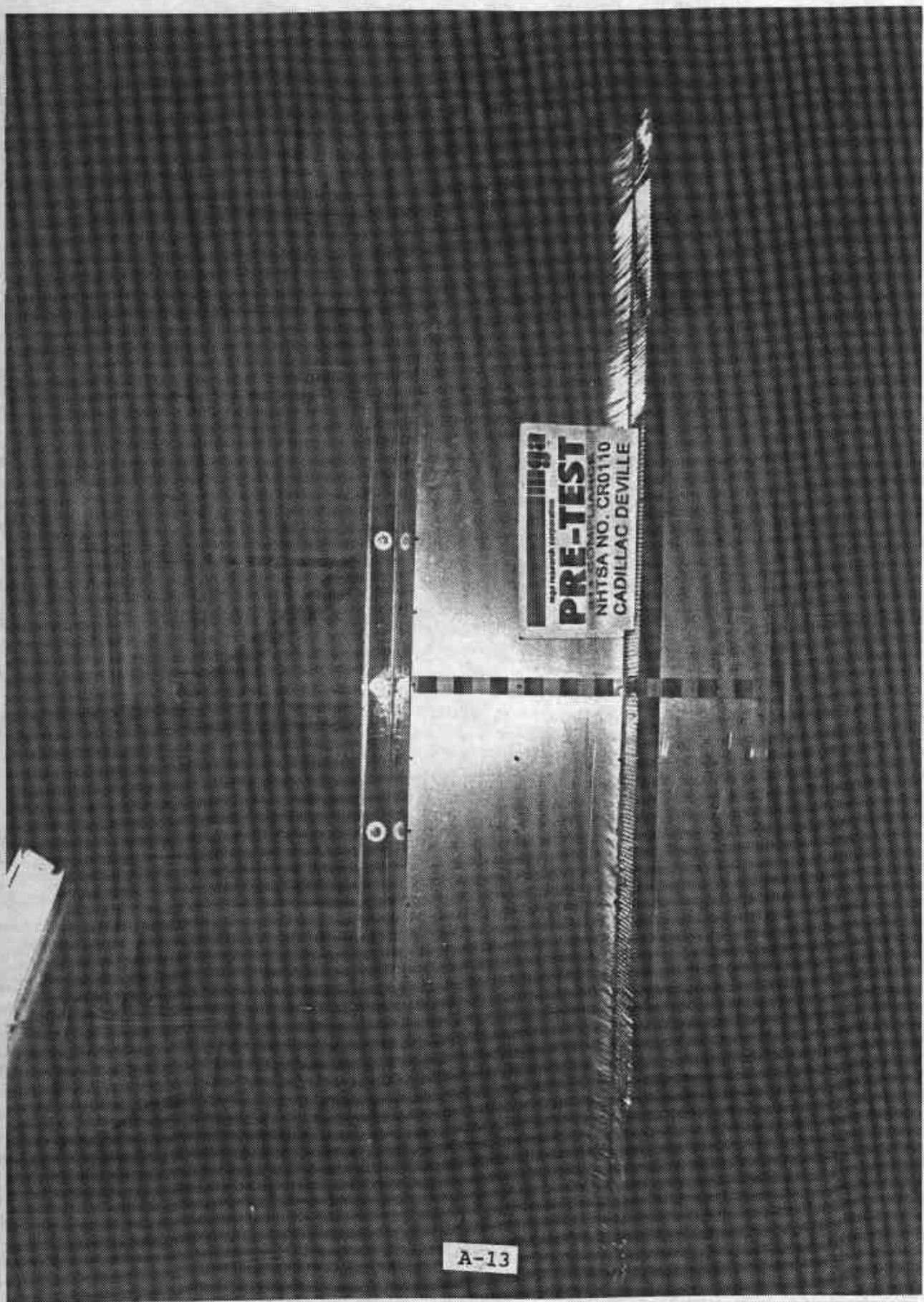


Photo No. A-13 - Pre-Test MDB Front View

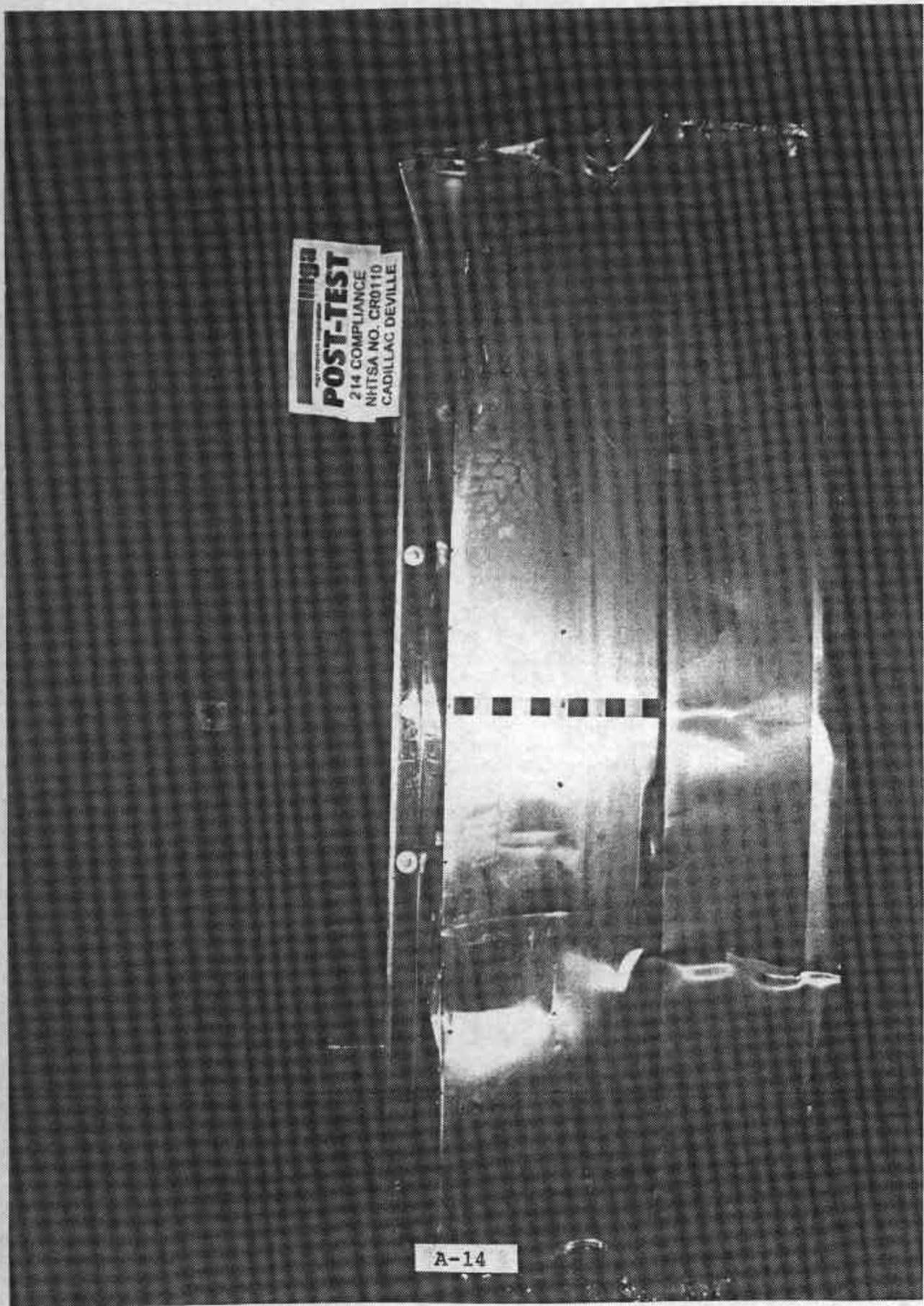


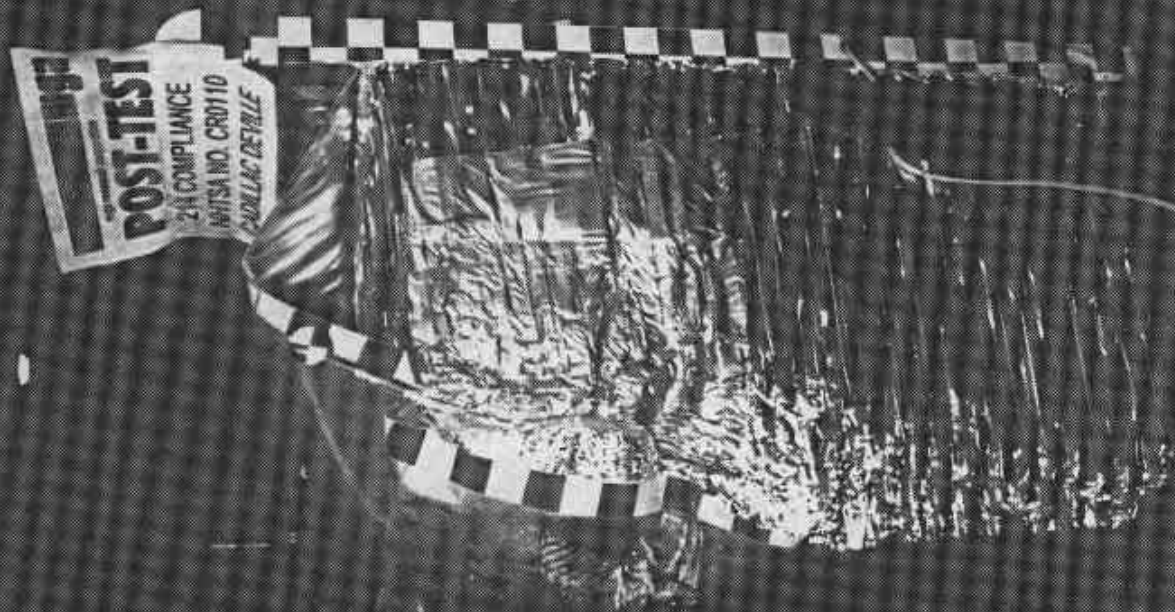
Photo No. A-14 - Post-Test MDB Front View

PRE-TEST
214 COMPLIANCE
NHTSA NO. CR0110
CADILLAC DEVILLE



A-15

Photo No. A-15 - Pre-Test MDB Left Side View



A-16

Photo No. A-16 - Post-Test MDB Left Side View

ingra
ingra research corporation
PRE-TEST
214 COMPLIANCE
NHTSA NO. CR0110
CADILLAC DEVILLE

A-17

Photo No. A-17 - Pre-Test MDB Right Side View

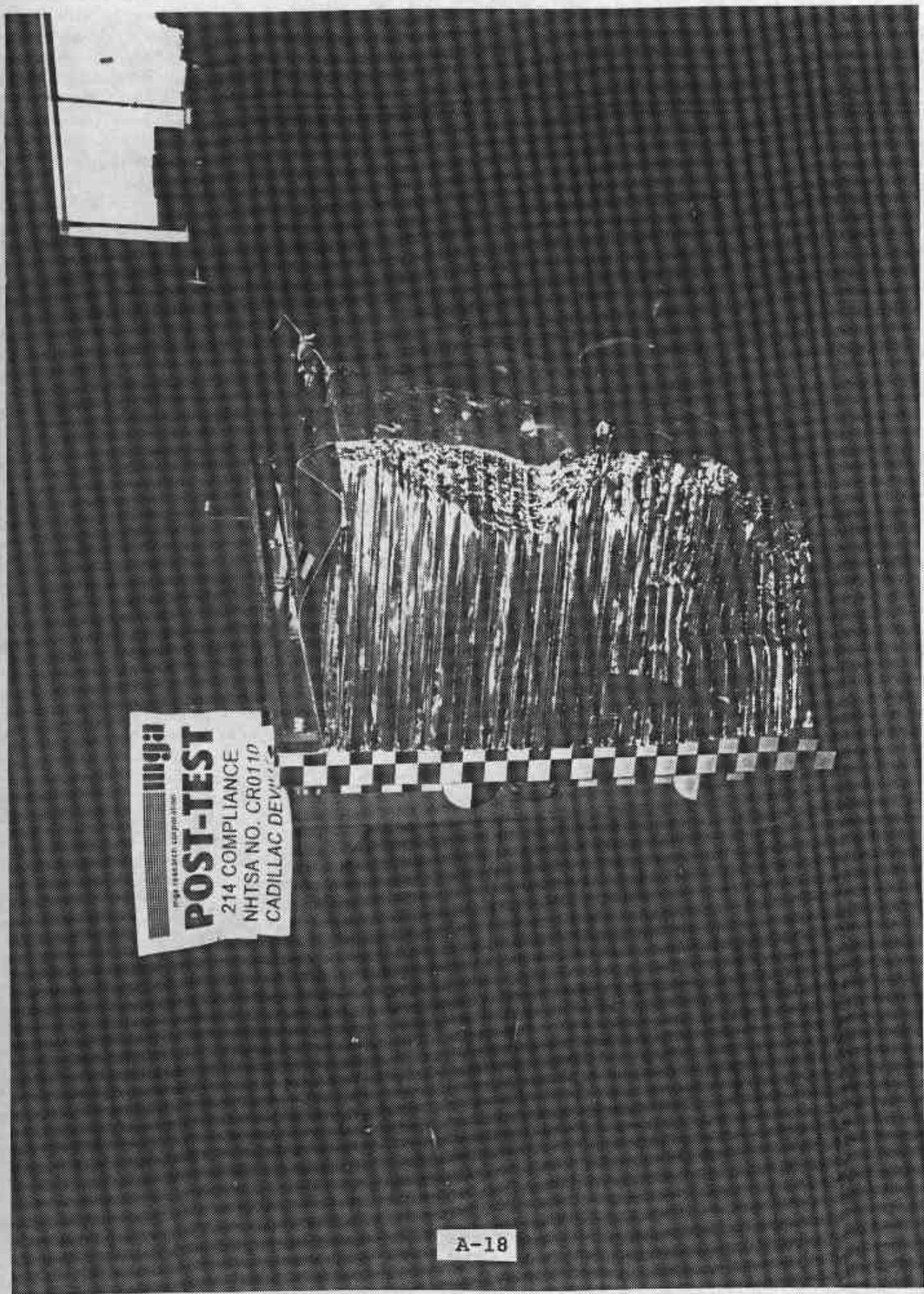


Photo No. A-18 - Post-Test MDB Right Side View

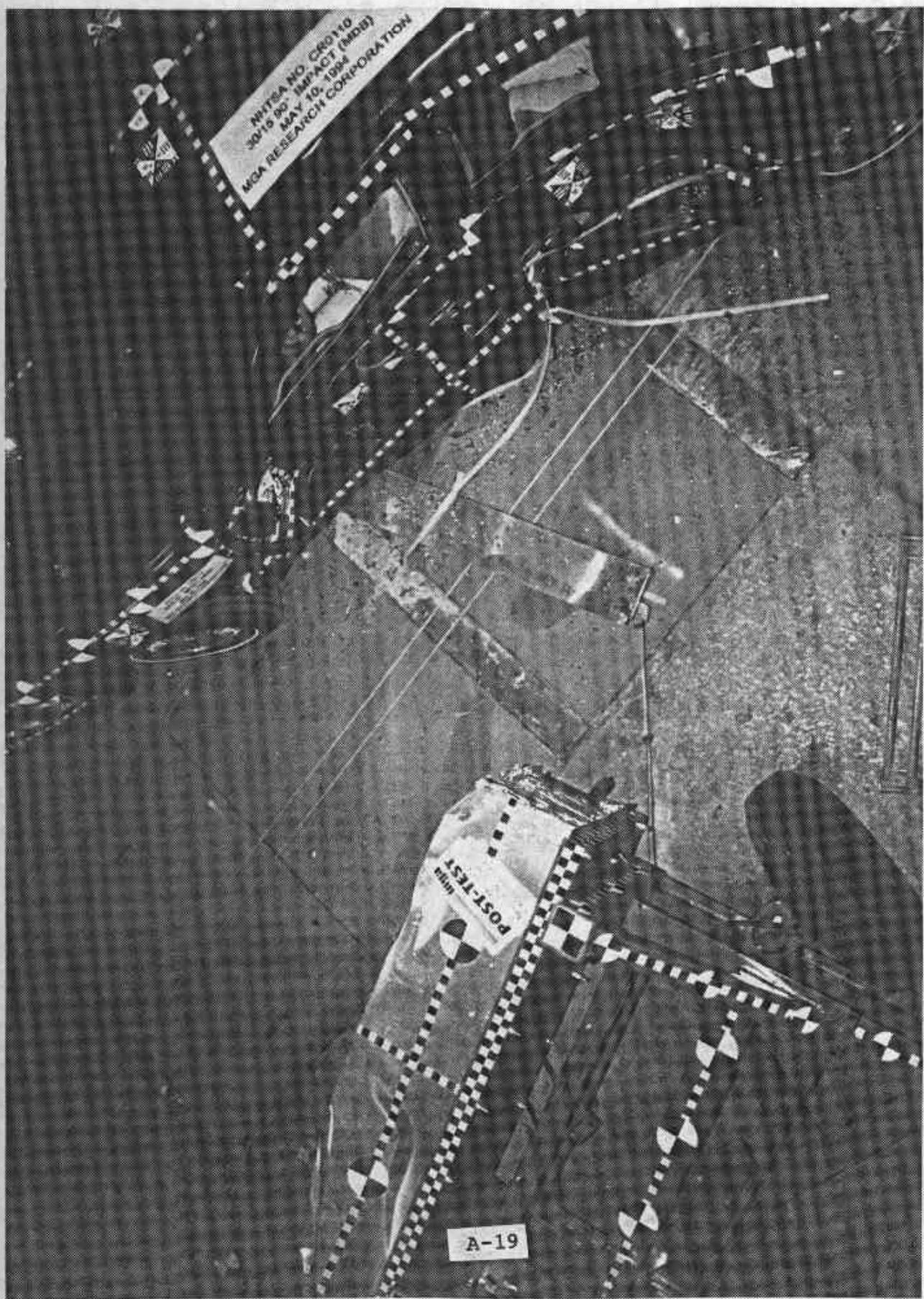


Photo No. A-19 - Post-Test MDB and Vehicle Overhead View



Photo No. A-20 - Pre-Test Driver Dummy Right Side View

A-20



Photo No. A-21 - Post-Test Driver Dummy Right Side View

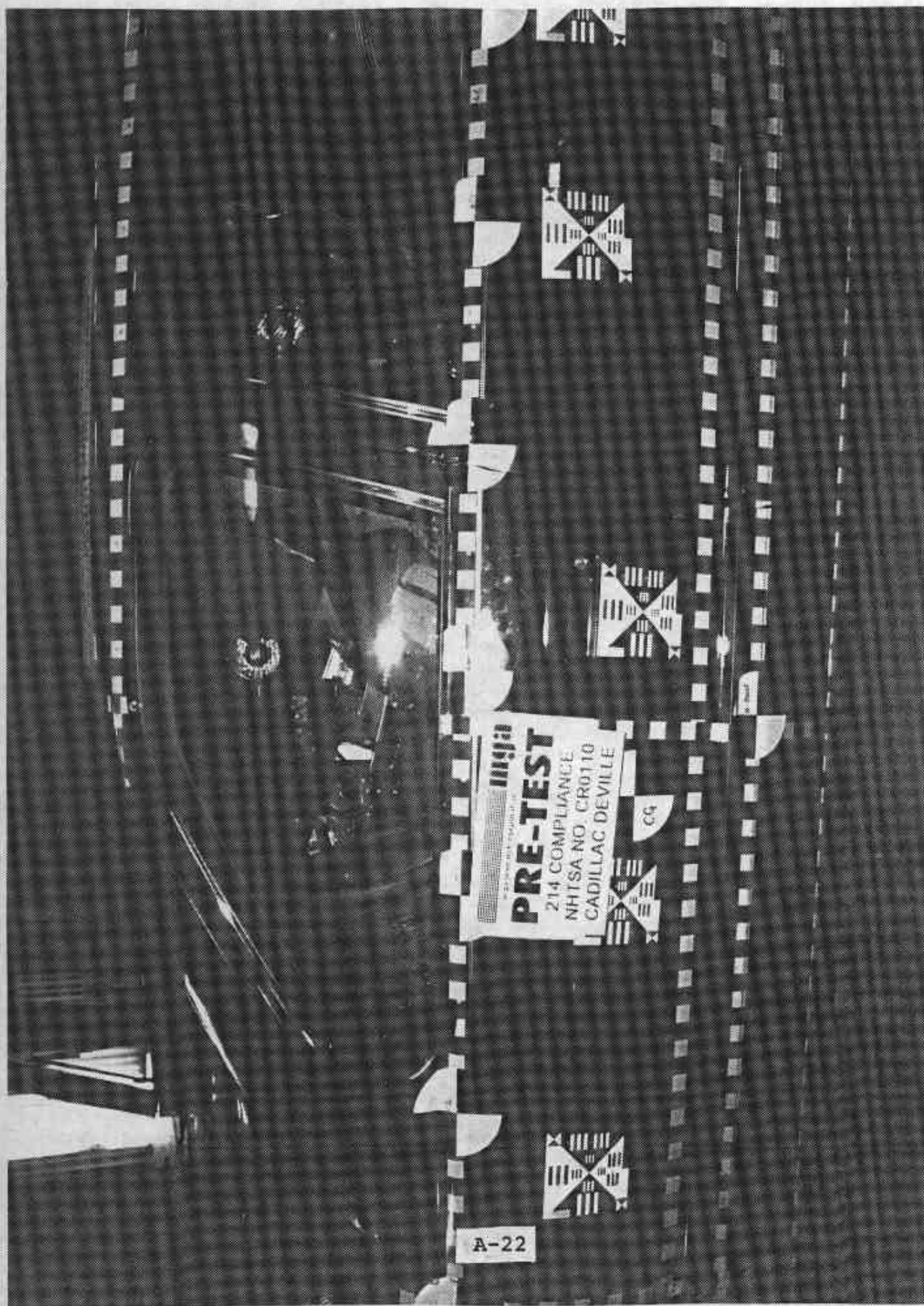


Photo No. A-22 - Pre-Test Driver Dummy Left Side View

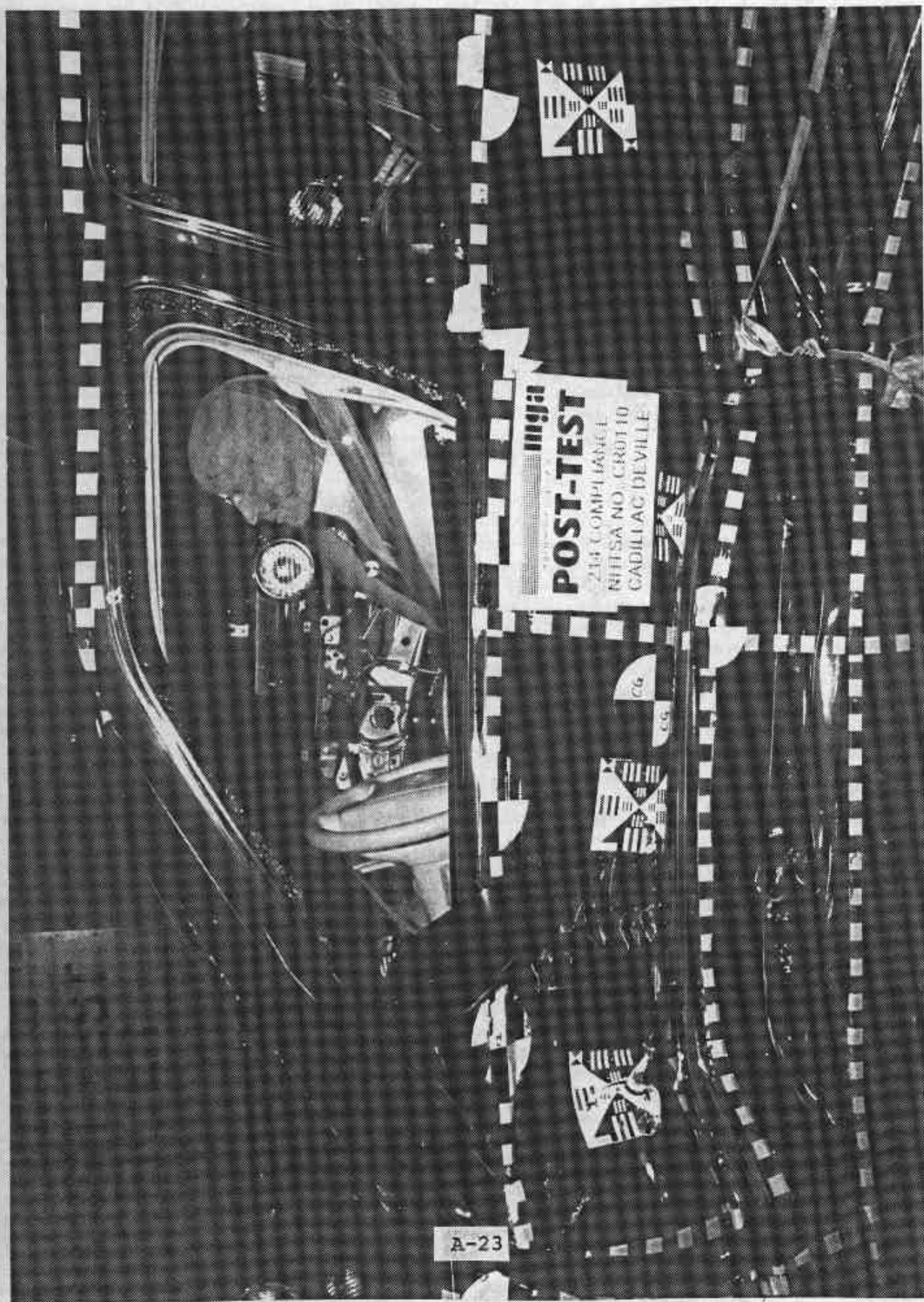


Photo No. A-23 - Post-Test Driver Dummy Left Side View

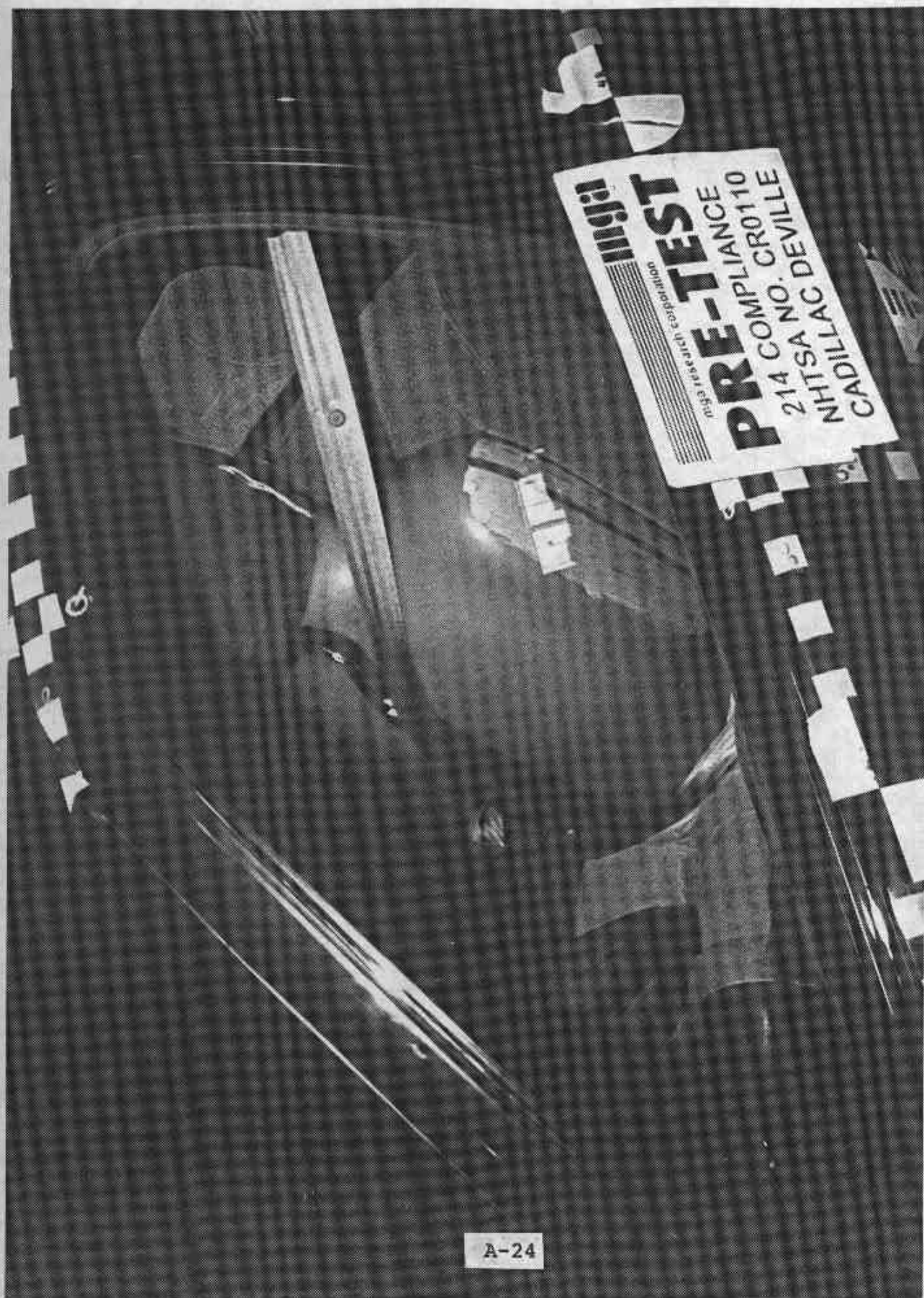


Photo No. A-24 - Pre-Test Driver Dummy Front Oblique View



Photo No. A-25 - Post-Test Driver Dummy Front Oblique View



Photo No. A-26 - Pre-Test Driver Dummy Left Side View (Door Open)

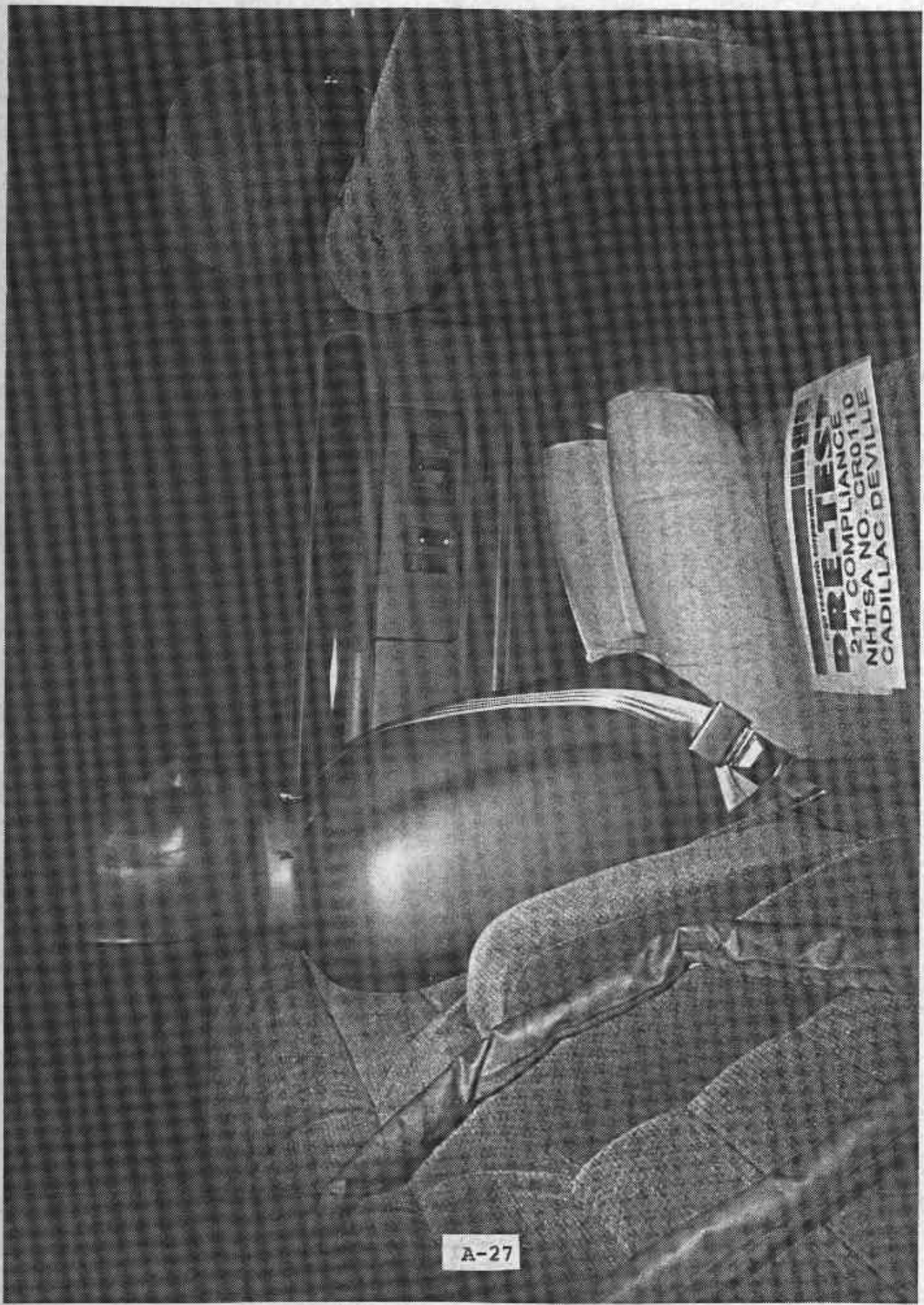


Photo No. A-27 - Pre-Test Passenger Dummy Right Side View

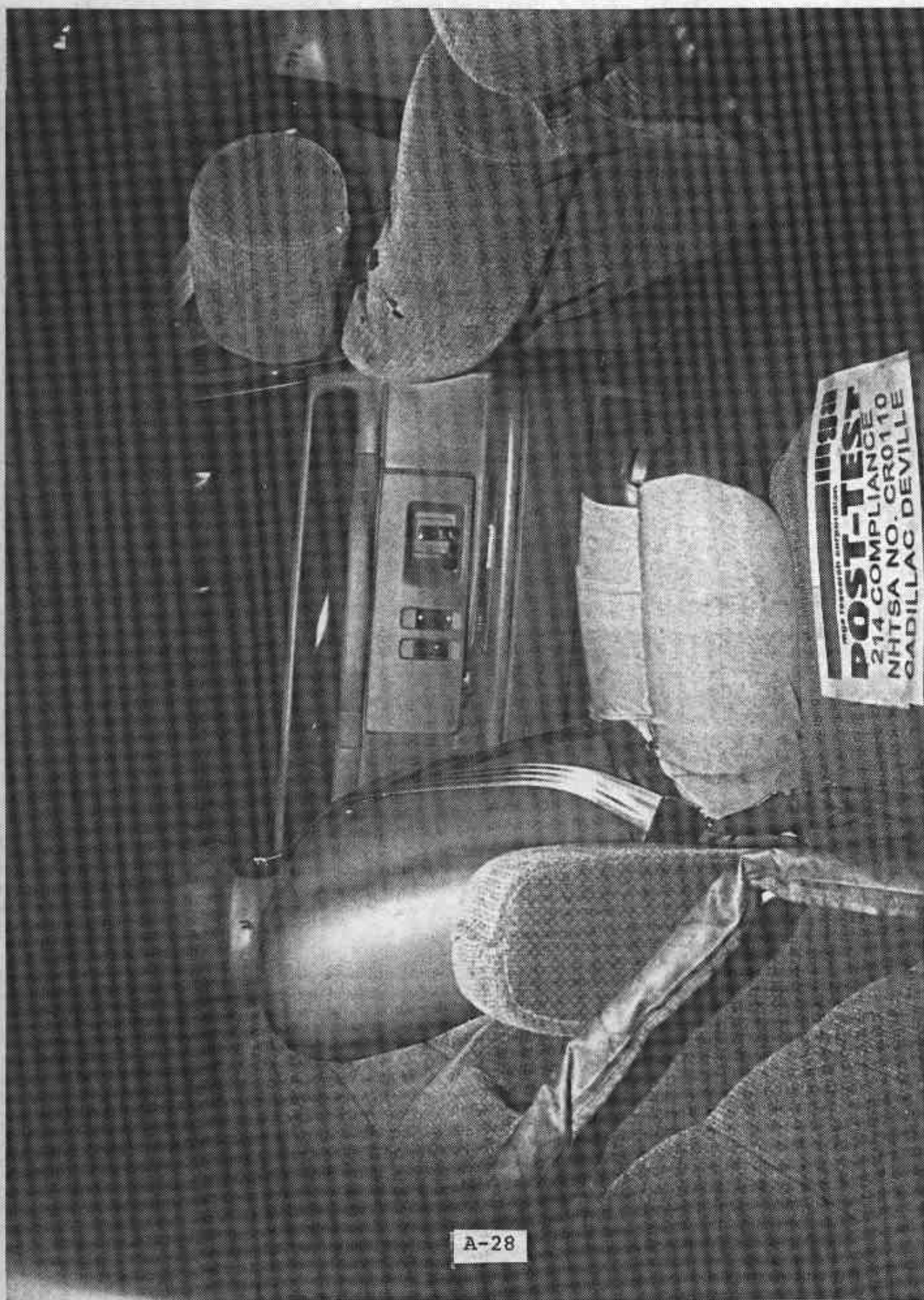


Photo No. A-28 - Post-Test Passenger Dummy Right Side View

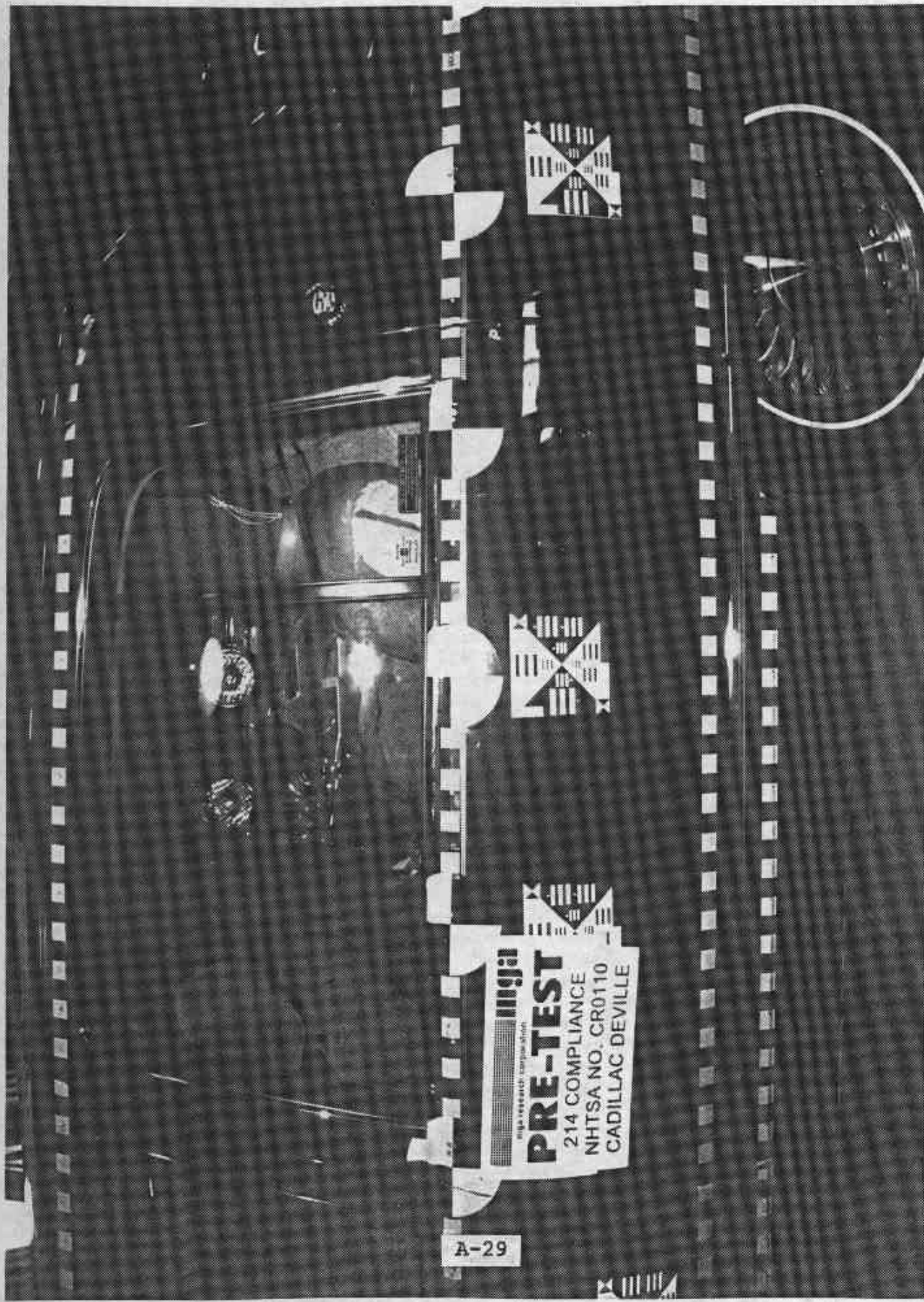


Photo No. A-29 - Pre-Test Passenger Dummy Left Side View

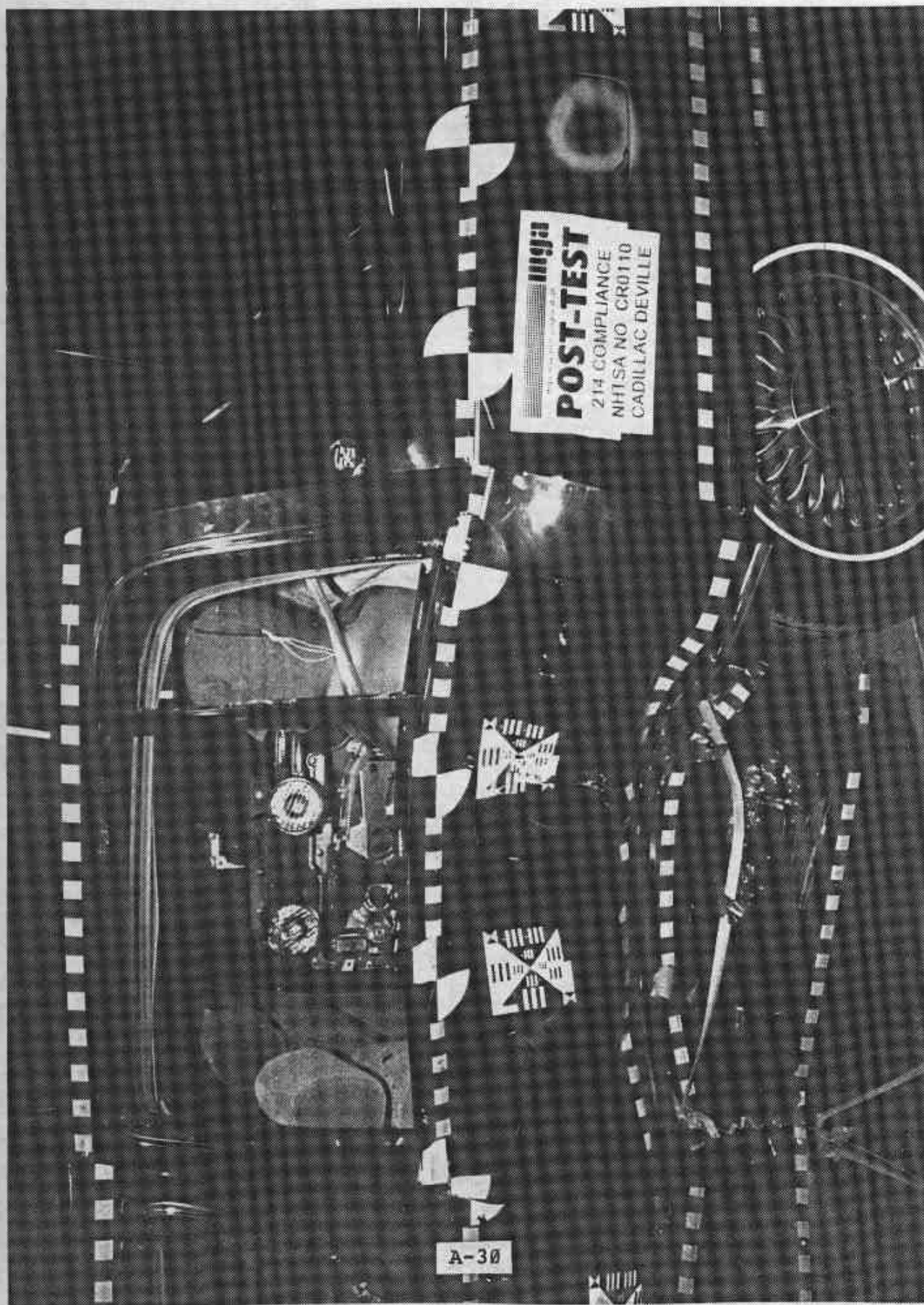


Photo No. A-30 - Post-Test Passenger Dummy Left Side View



Photo No. A-31 - Pre-Test Passenger Dummy Front Oblique View

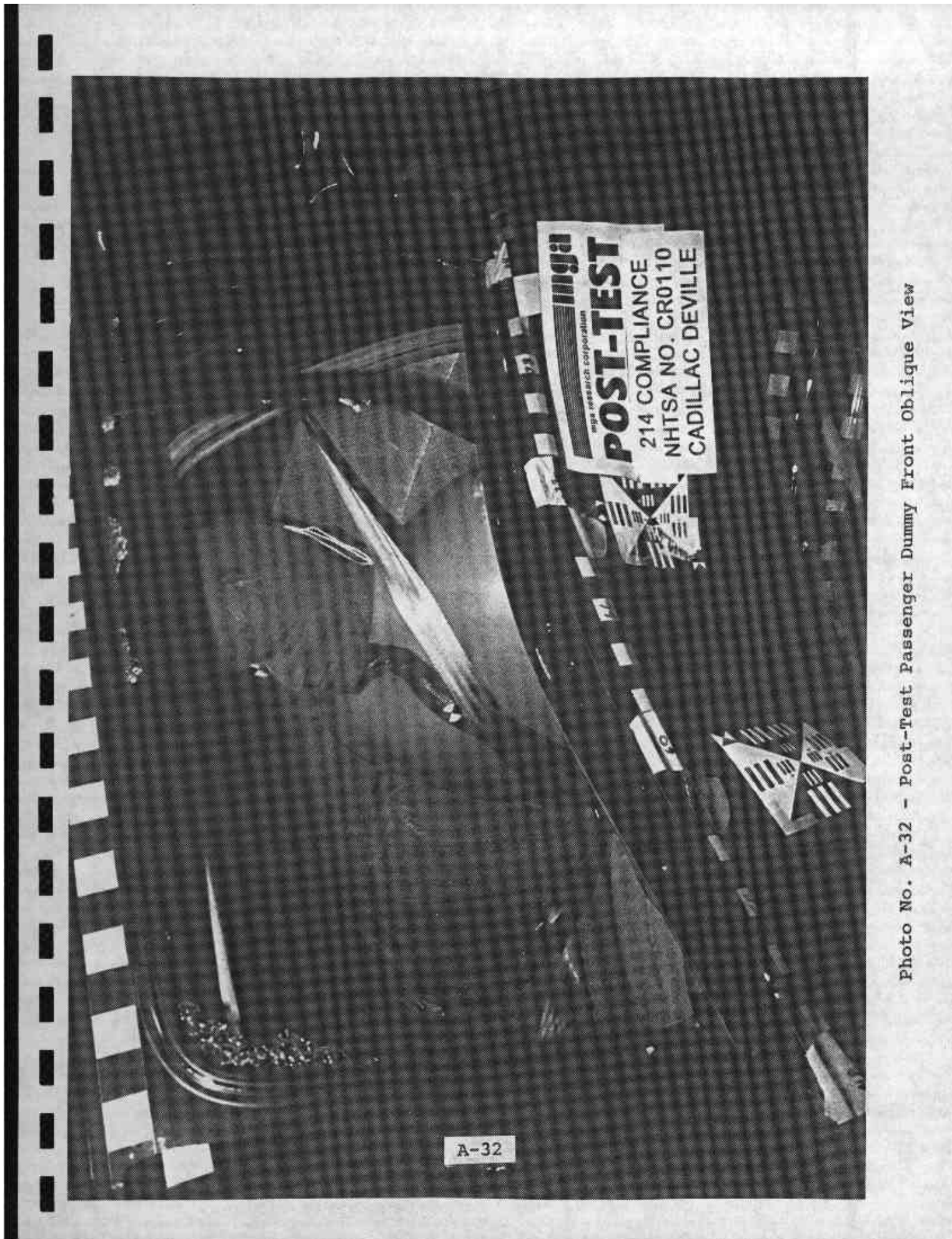


Photo No. A-32 - Post-Test Passenger Dummy Front Oblique View

Photo No. A-33 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-34 - Pre-Test Driver Dummy Front View

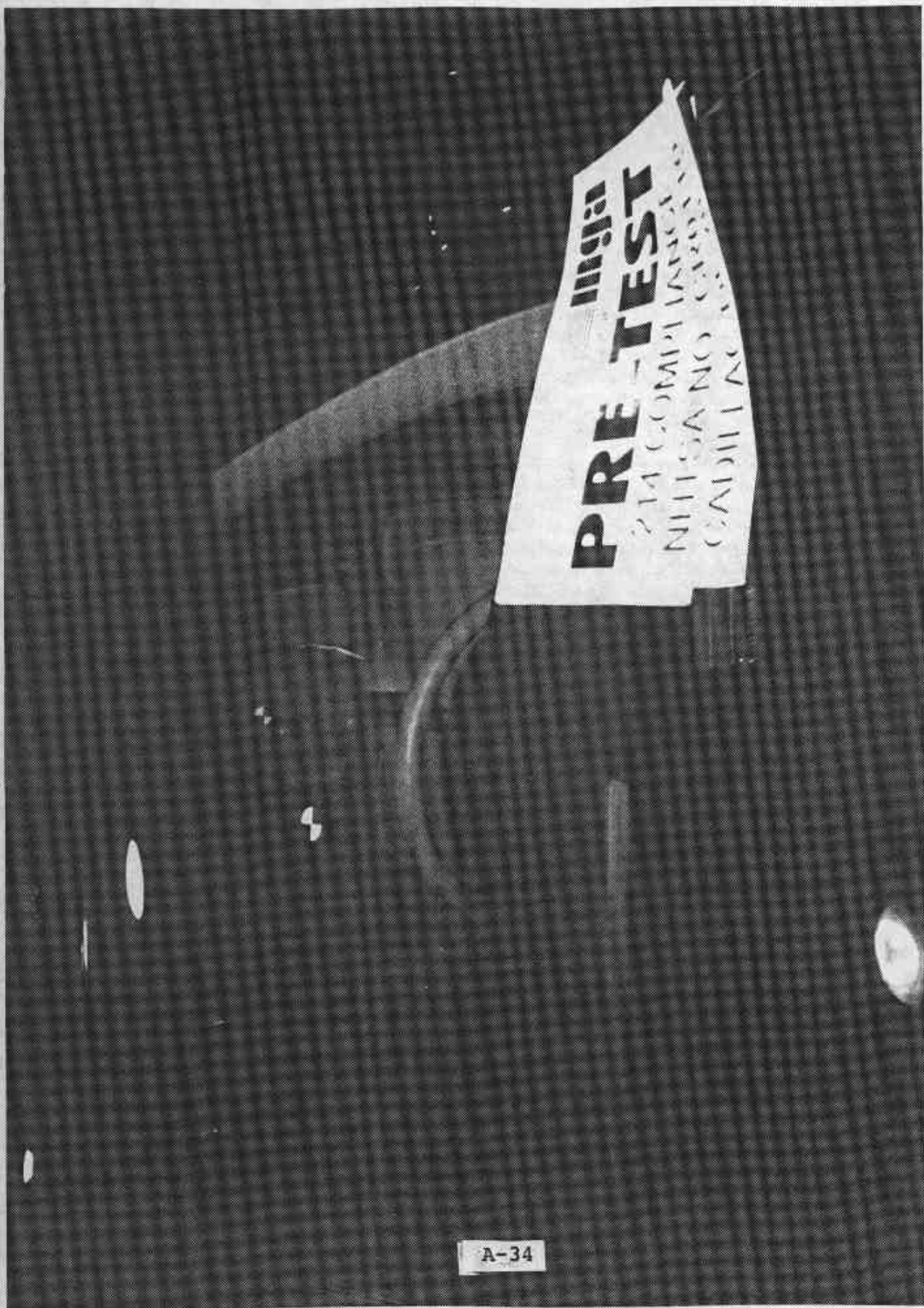


Photo No. A-35 - Post-Test Driver Dummy Front View



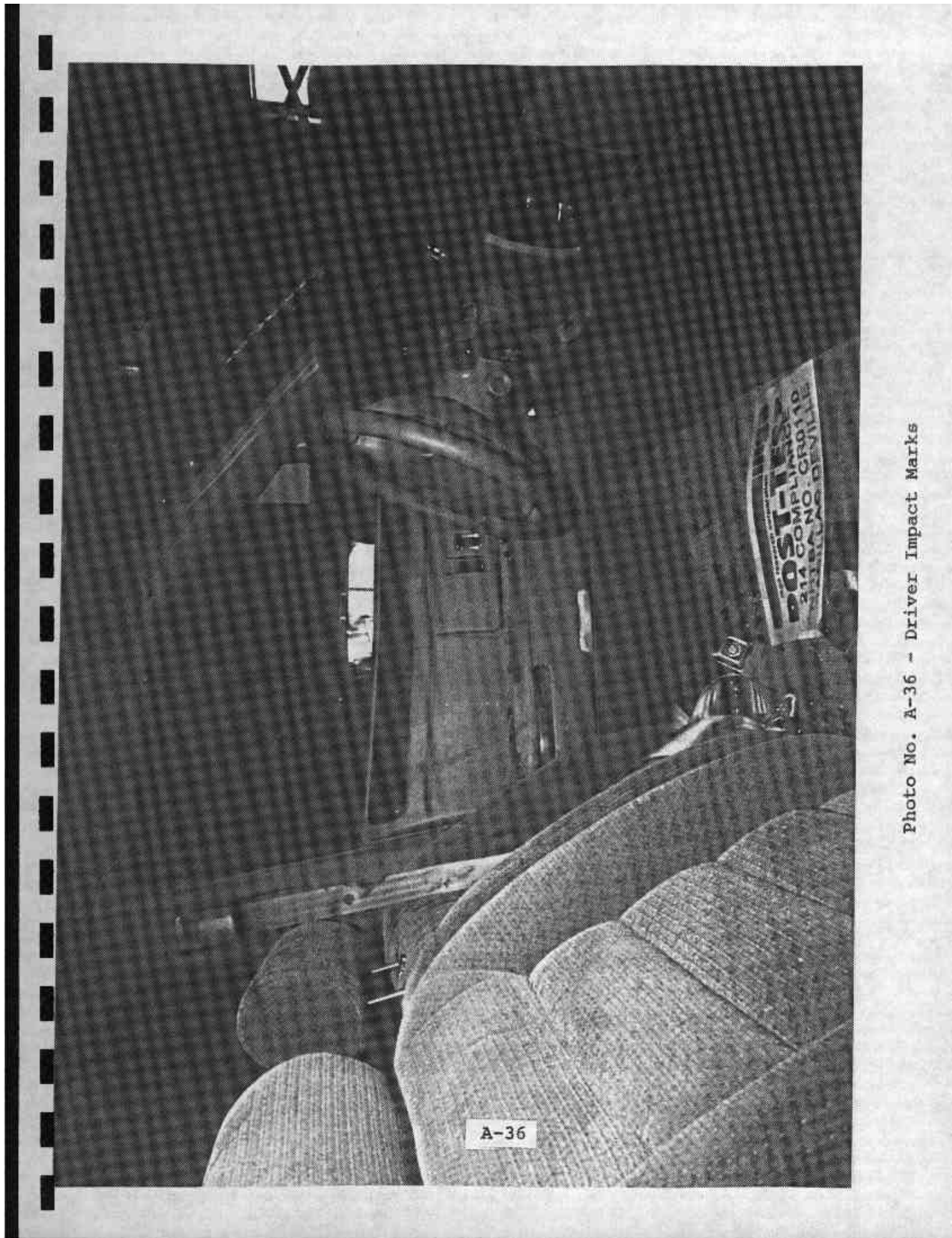
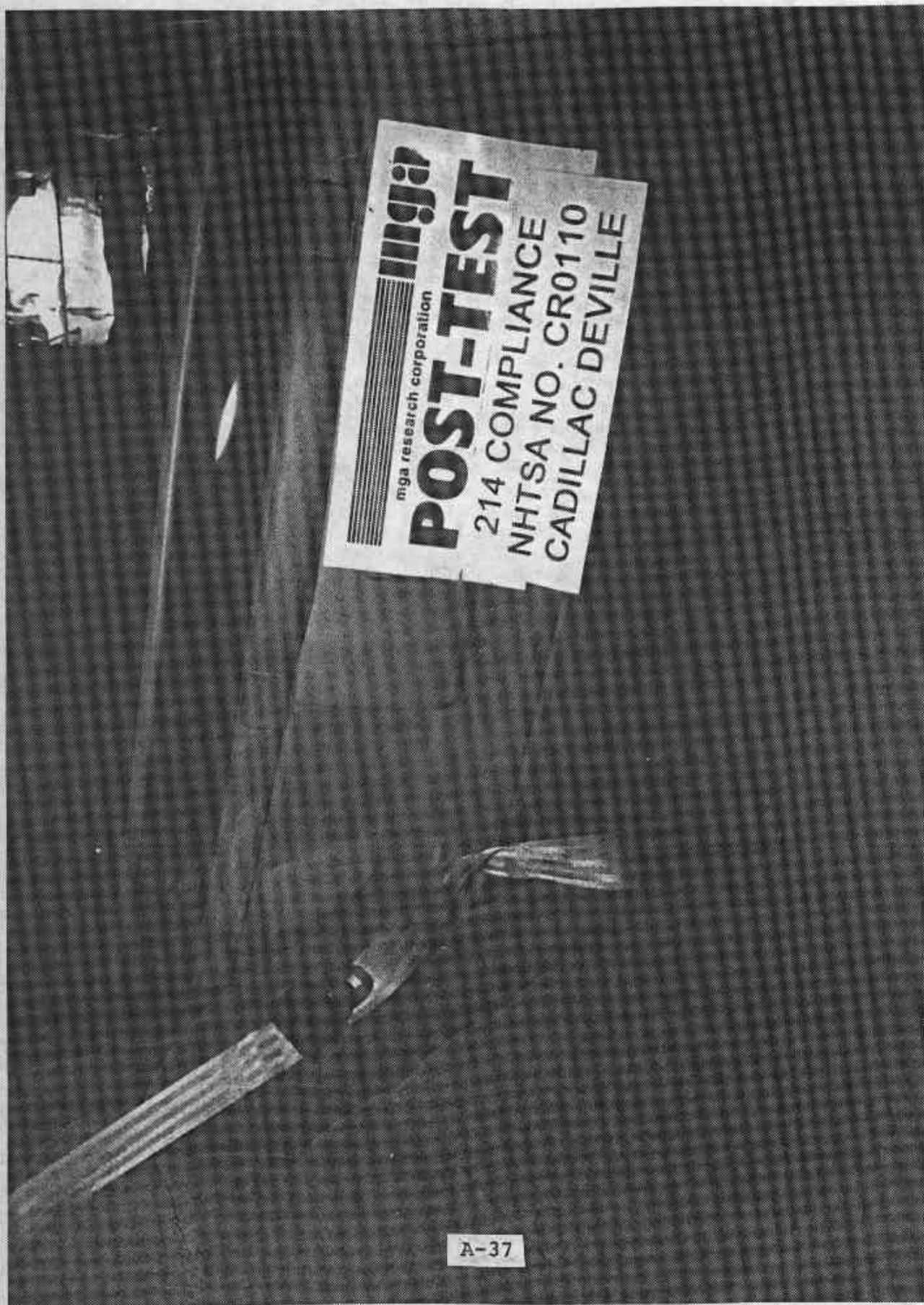


Photo No. A-36 - Driver Impact Marks

Photo No. A-37 - Passenger Impact Marks



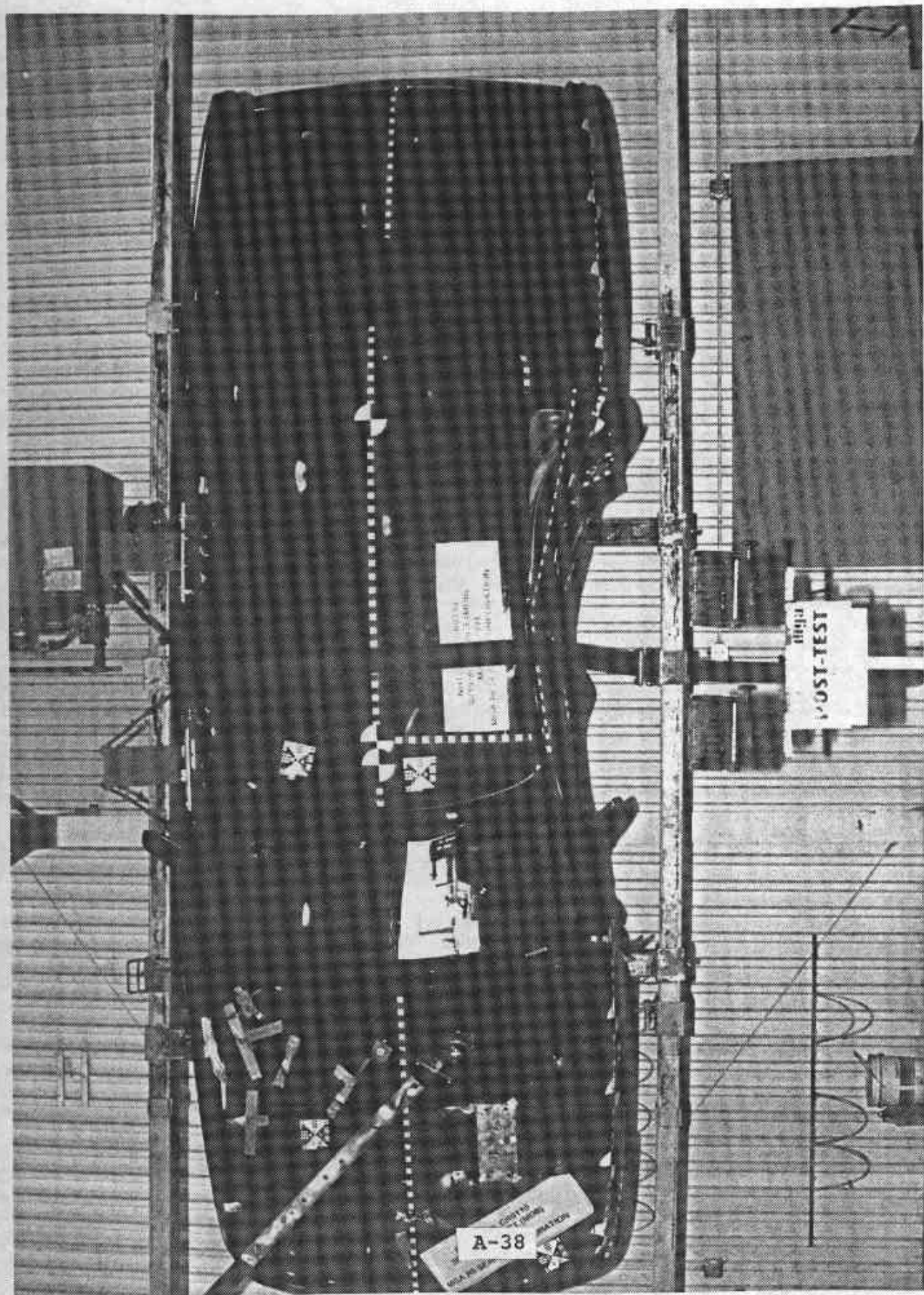


Photo No. A-38 - Rollover 8°

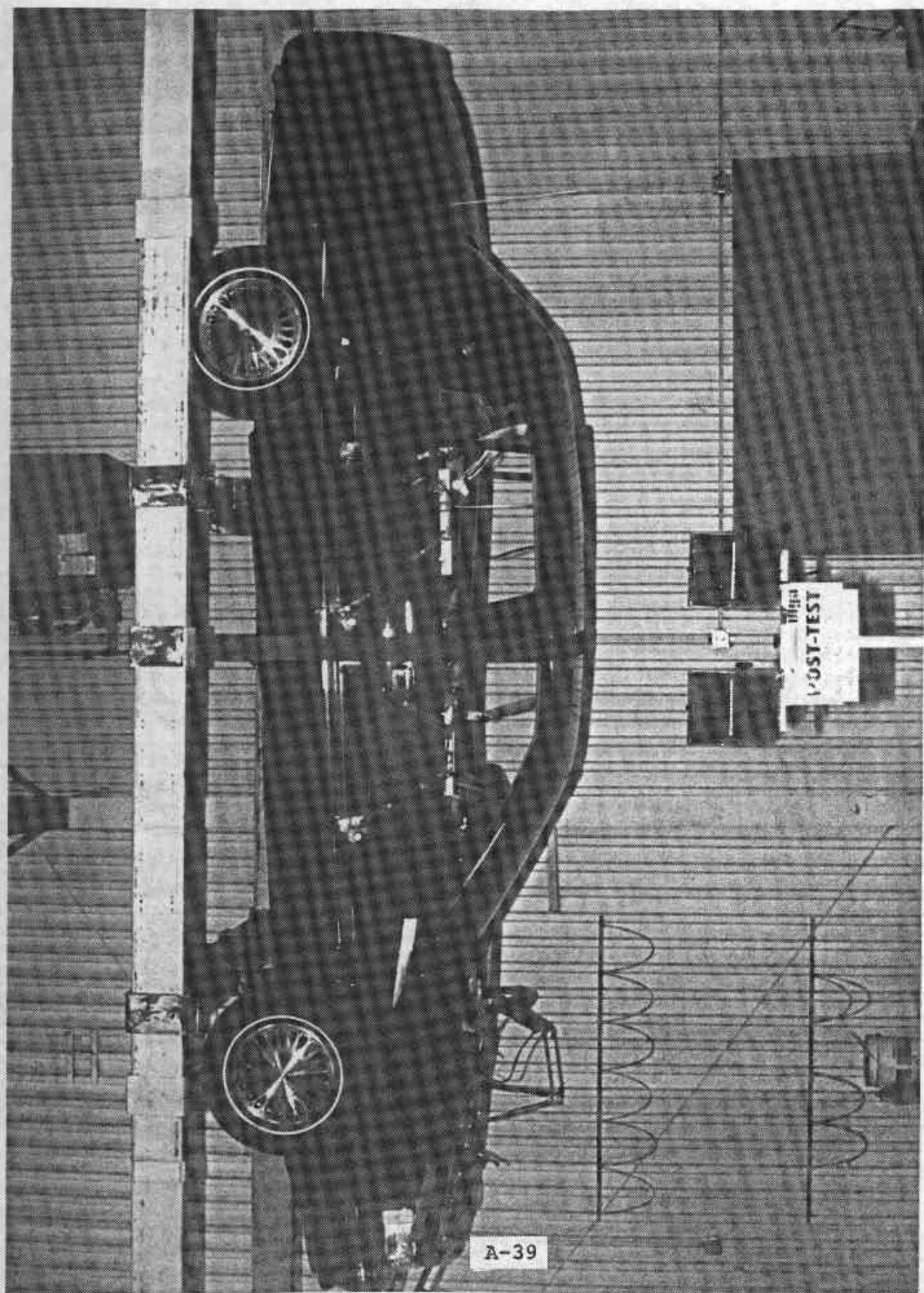


Photo No. A-39 - Rollover 90°

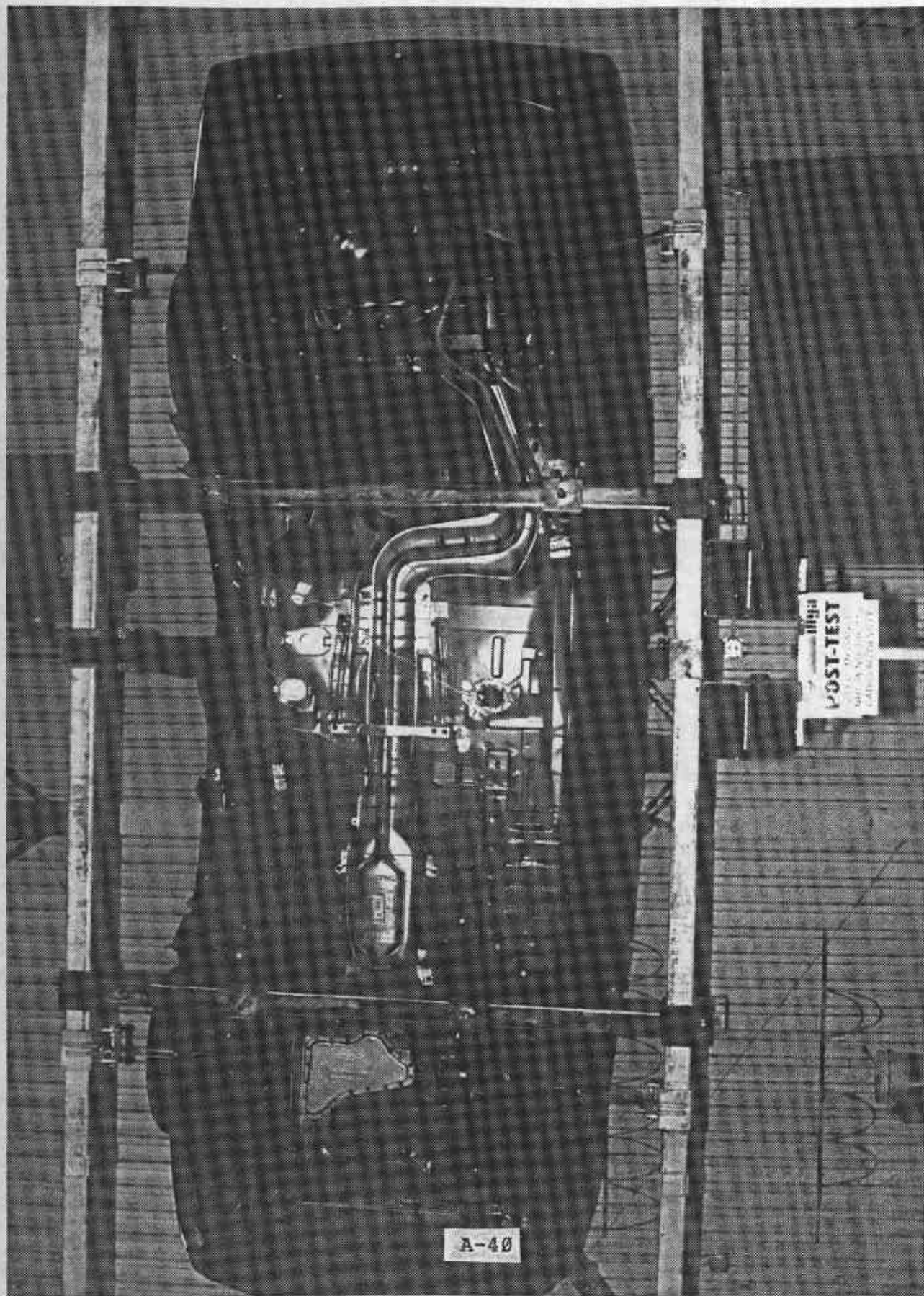


Photo No. A-40 - Rollover 180°

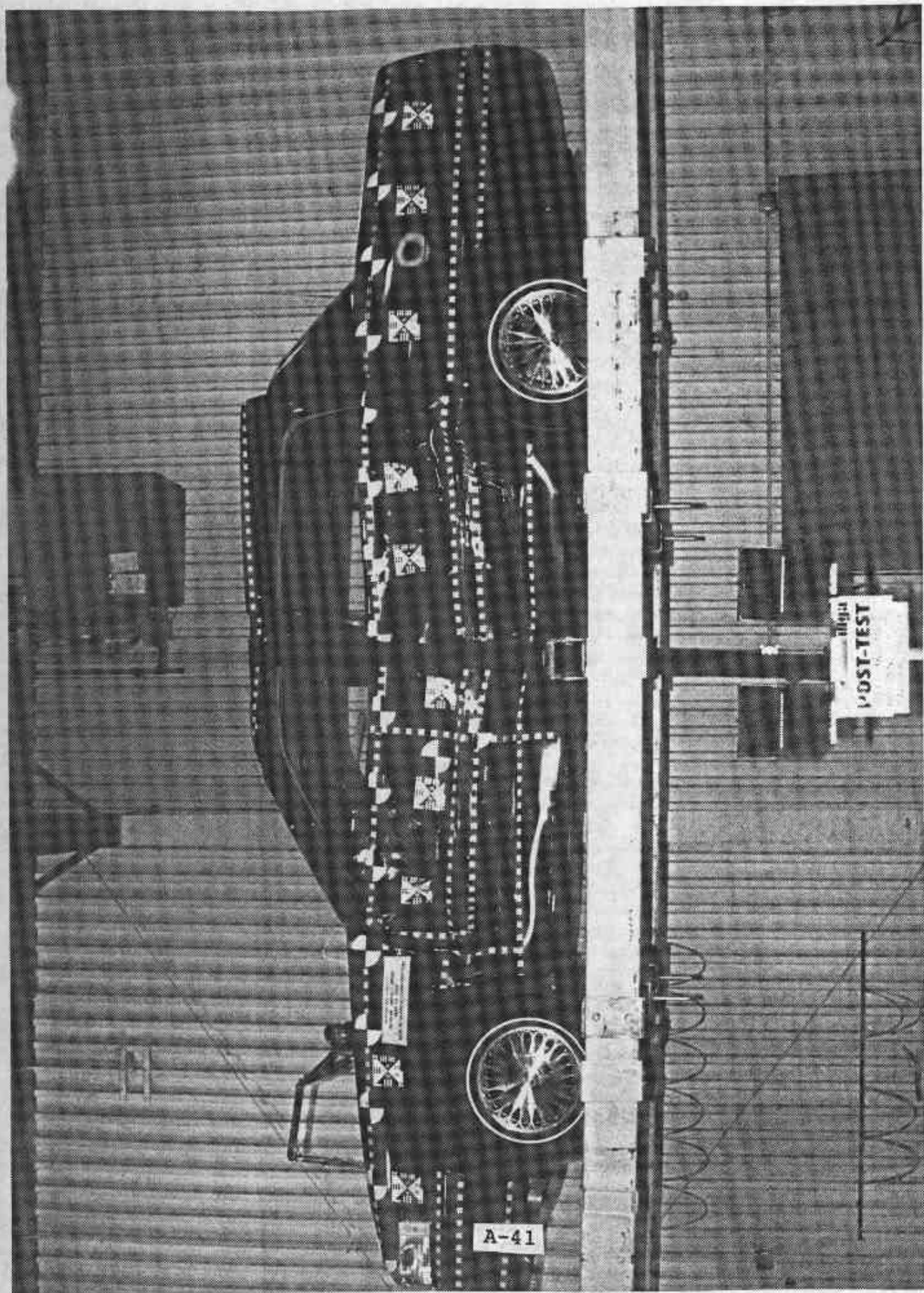


Photo No. A-41 - Rollover 270°

☐ MET BY GENERAL MOTORS CORP.
 DATE 03/94
 VIN 1G8518 250668 222918
 221060 118240 103460
 THIS VEHICLE CONFORMS TO ALL APPLI-
 CABLE U.S. FEDERAL MOTOR VEHICLE
 SAFETY, BURNING, AND THEFT PREVENTION
 STANDARDS IN EFFECT ON THE DATE OF
 MANUFACTURE SHOWN ABOVE.
 1G8518250668222918
 PASS CAR
 GEB-040

mga

mga research corporation

PRE-TEST

214 COMPLIANCE

NHTSA NO. CR0110

CADILLAC DEVILLE

A-42

Photo No. A-42 - Tire Placard and Vehicle Certification Label

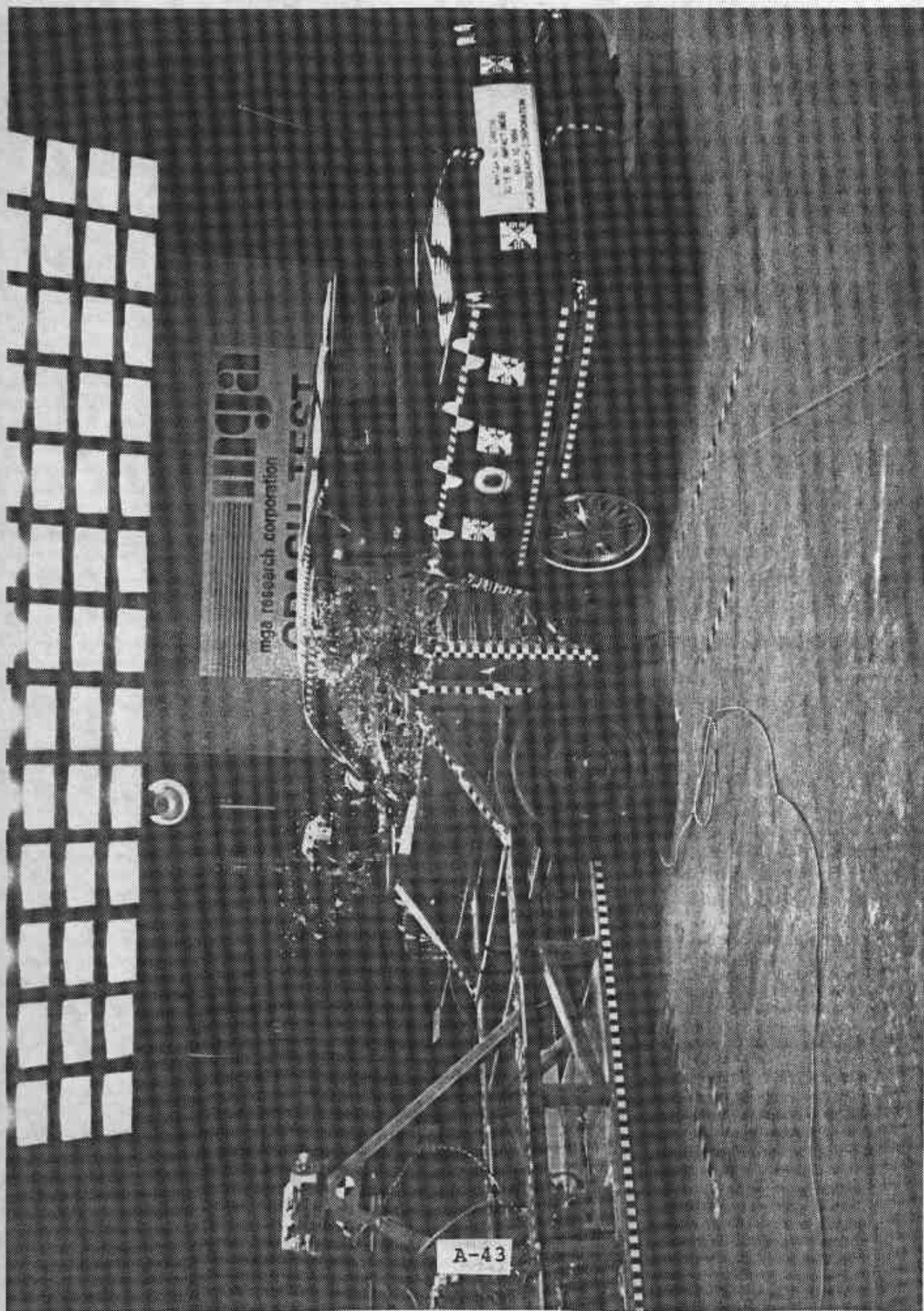


Photo No. A-43 - Impact

APPENDIX B - DATA PLOTS

Table of Data Plots

<u>Occupant:</u>	<u>Page No.</u>
Figure B-1 - Driver Upper Rib Y Acceleration vs. Time	B-1
Figure B-2 - Driver Upper Rib Y Velocity vs. Time	B-2
Figure B-3 - Driver Lower Rib Y Acceleration vs. Time	B-3
Figure B-4 - Driver Lower Rib Y Velocity vs. Time	B-4
Figure B-5 - Driver Lower Spine Y Acceleration vs. Time	B-5
Figure B-6 - Driver Lower Spine Y Velocity vs. Time	B-6
Figure B-7 - Driver Pelvis Y Acceleration vs. Time	B-7
Figure B-8 - Driver Pelvis Y Velocity vs. Time	B-8
Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time	B-9
Figure B-10 - Passenger Upper Rib Y Velocity vs. Time	B-10
Figure B-11 - Passenger Lower Rib Y Accel. vs. Time	B-11
Figure B-12 - Passenger Lower Rib Y Velocity vs. Time	B-12
Figure B-13 - Passenger Lower Spine Y Accel. vs. Time	B-13
Figure B-14 - Passenger Lower Spine Y Velocity vs. Time	B-14
Figure B-15 - Passenger Pelvis Y Acceleration vs. Time	B-15
Figure B-16 - Passenger Pelvis Y Velocity vs. Time	B-16
 <u>Vehicle:</u>	
Figure B-17 - Left Front Sill Y Acceleration vs. Time	B-17
Figure B-18 - Left Front Sill Y Velocity vs. Time	B-18
Figure B-19 - Left Rear Sill Y Acceleration vs. Time	B-19
Figure B-20 - Left Rear Sill Y Velocity vs. Time	B-20
Figure B-21 - Right Front Sill X Acceleration vs. Time	B-21
Figure B-22 - Right Front Sill X Velocity vs. Time	B-22
Figure B-23 - Right Front Sill Y Acceleration vs. Time	B-23
Figure B-24 - Right Front Sill Y Velocity vs. Time	B-24
Figure B-25 - Right Front Sill Z Acceleration vs. Time	B-25
Figure B-26 - Right Front Sill Z Velocity vs. Time	B-26
Figure B-27 - Right Front Sill at Front Seat Res. vs. Time	B-27
Figure B-28 - Right Rear Sill X Acceleration vs. Time	B-28
Figure B-29 - Right Rear Sill X Velocity vs. Time	B-29
Figure B-30 - Right Rear Sill Y Acceleration vs. Time	B-30
Figure B-31 - Right Rear Sill Y Velocity vs. Time	B-31

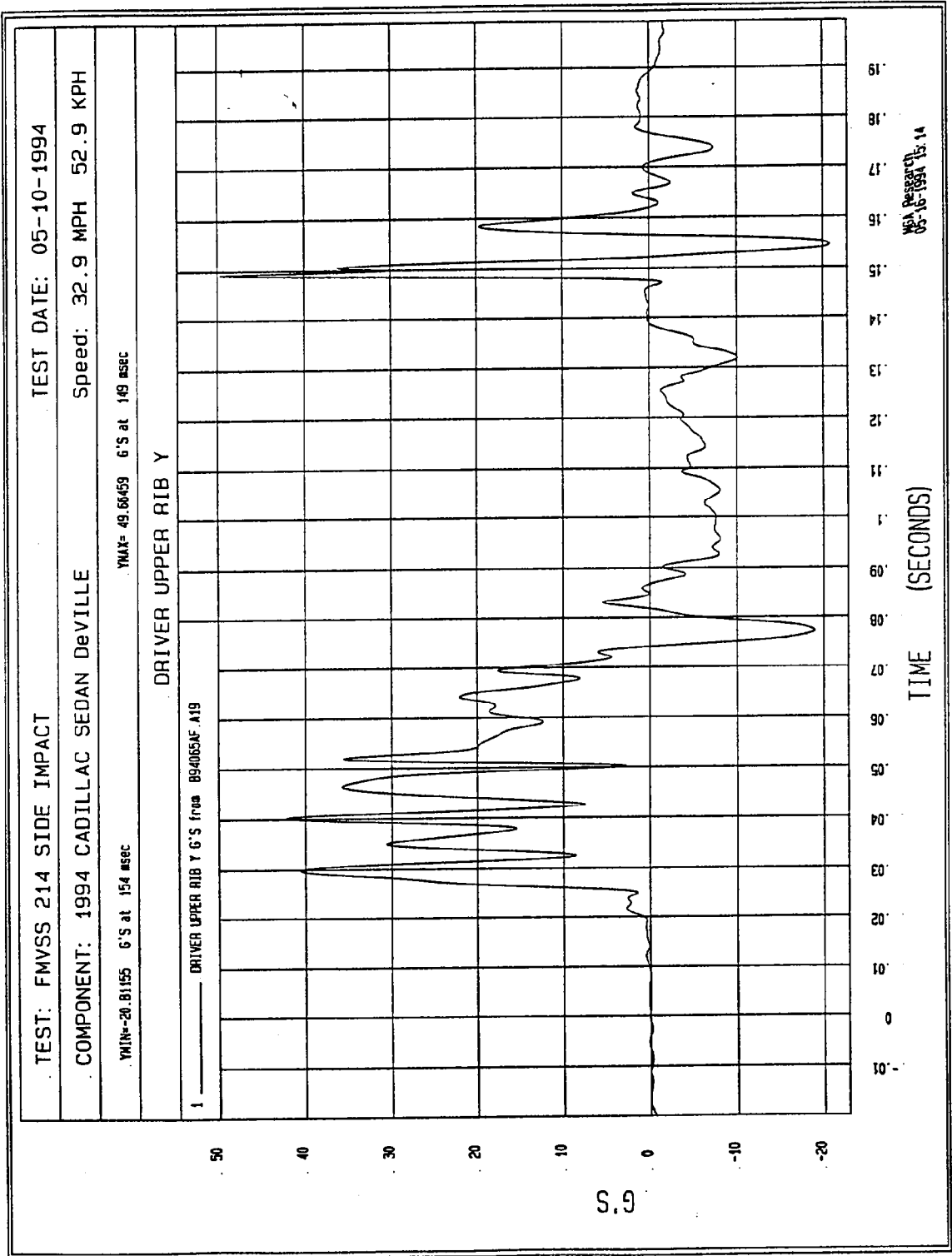
Table of Data Plots

	<u>Page No.</u>
<u>Vehicle (Cont'd):</u>	
Figure B-32 - Right Rear Sill Z Acceleration vs. Time	B-32
Figure B-33 - Right Rear Sill Z Velocity vs. Time	B-33
Figure B-34 - Right Rear Sill at Rear Seat Res. vs. Time	B-34
Figure B-35 - Driver Seat Track Y Acceleration vs. Time	B-35
Figure B-36 - Driver Seat Track Y Velocity vs. Time	B-36
Figure B-37 - Rear Floorpan at Axel X Accel. vs. Time	B-37
Figure B-38 - Rear Floorpan at Axel X Velocity vs. Time	B-38
Figure B-39 - Rear Floorpan at Axel Y Acceleration vs. Time	B-39
Figure B-40 - Rear Floorpan at Axel Y Velocity vs. Time	B-40
Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time	B-41
Figure B-42 - Rear Floorpan at Axle Center Resultant vs. Time	B-42
Figure B-43 - Rear Seat Occupant Compartment Y Acceleration vs. Time	B-43
Figure B-44 - Rear Seat Occupant Compartment Y Velocity vs. Time	B-44
Figure B-45 - Moving Barrier Center of Gravity X Acceleration vs. Time	B-45
Figure B-46 - Moving Barrier Center of Gravity X Velocity vs. Time	B-46
Figure B-47 - Moving Barrier Center of Gravity Y Acceleration vs. Time	B-47
Figure B-48 - Moving Barrier Center of Gravity Y Velocity vs. Time	B-48
Figure B-49 - Moving Barrier Center of Gravity Z Acceleration vs. Time	B-49
Figure B-50 - Moving Barrier Center of Gravity Z Velocity vs. Time	B-50
Figure B-51 - Moving Barrier Center of Gravity Resultant vs. Time	B-51
Figure B-52 - Moving Barrier Rear Axle X Acceleration vs. Time	B-52
Figure B-53 - Moving Barrier Rear Axle X Velocity vs. Time	B-53
Figure B-54 - Moving Barrier Rear Axle Y Acceleration vs. Time	B-54
Figure B-55 - Moving Barrier Rear Axle Y Velocity vs. Time	B-55
Figure B-56 - Right Hand Barrier Contact	B-56
Figure B-57 - Left Hand Barrier Contact	B-57

Table of Data Plots

	<u>Page No.</u>
<u>Redundant:</u>	
Figure B-58 - Driver Upper Rib Y Redundant Acceleration vs. Time	B-58
Figure B-59 - Driver Upper Rib Y Redundant Velocity vs. Time	B-59
Figure B-60 - Driver Lower Rib Y Redundant Acceleration vs. Time	B-60
Figure B-61 - Driver Lower Rib Y Redundant Velocity vs. Time	B-61
Figure B-62 - Driver Lower Spine Y Redundant Acceleration vs. Time	B-62
Figure B-63 - Driver Lower Spine Y Redundant Velocity vs. Time	B-63
Figure B-64 - Driver Pelvis Y Redundant Acceleration vs. Time	B-64
Figure B-65 - Driver Pelvis Y Redundant Velocity vs. Time	B-65
Figure B-66 - Passenger Upper Rib Y Redundant Acceleration vs. Time	B-66
Figure B-67 - Passenger Upper Rib Y Redundant Velocity vs. Time	B-67
Figure B-68 - Passenger Lower Rib Y Redundant Acceleration vs. Time	B-68
Figure B-69 - Passenger Lower Rib Y Redundant Velocity vs. Time	B-69
Figure B-70 - Passenger Lower Spine Y Redundant Acceleration vs. Time	B-70
Figure B-71 - Passenger Lower Spine Y Redundant Velocity vs. Time	B-71
Figure B-72 - Passenger Pelvis Y Redundant Acceleration vs. Time	B-72
Figure B-73 - Passenger Pelvis Y Redundant Velocity vs. Time	B-73

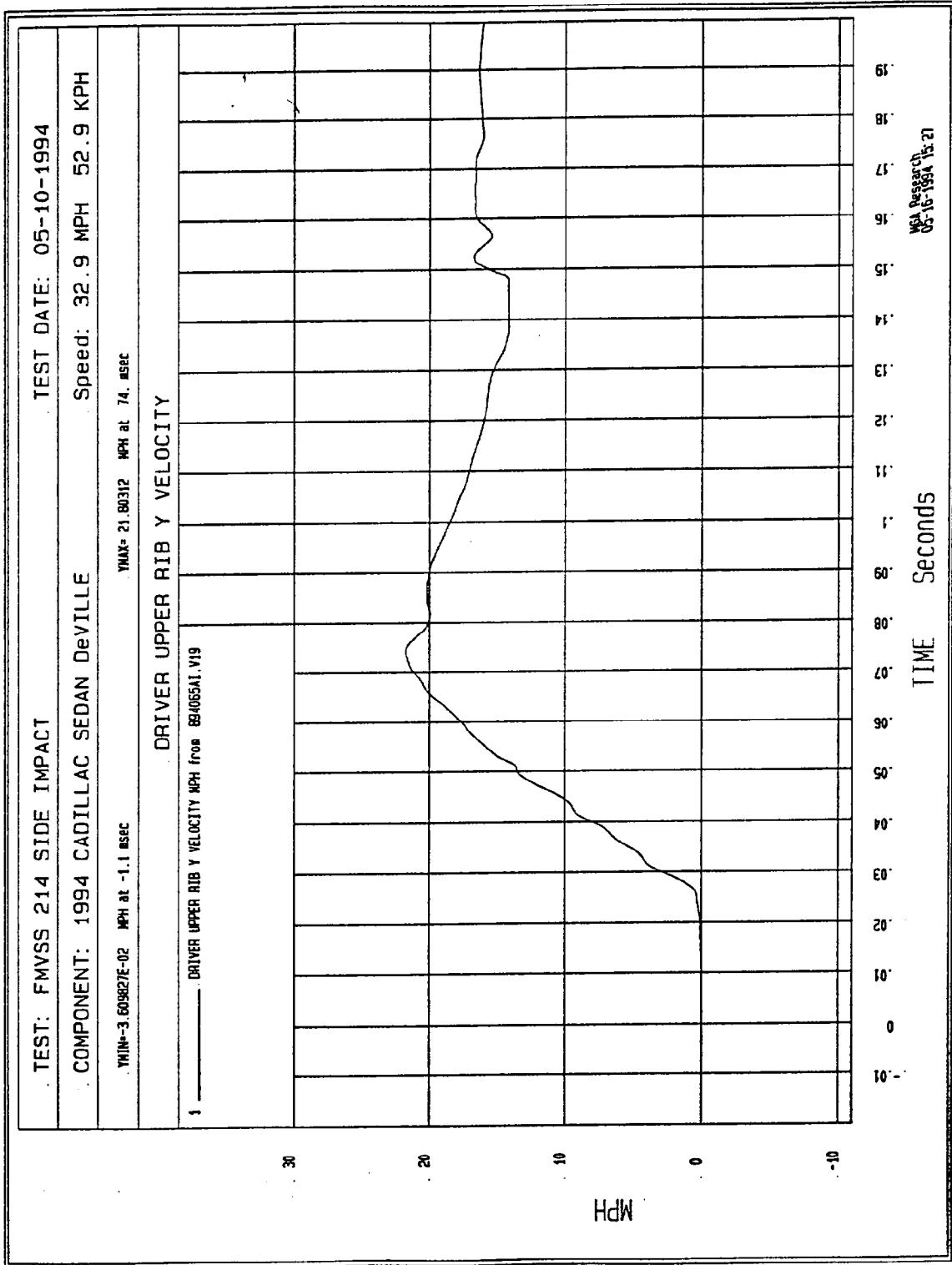
Filter: Class 180 (300 Hz)



B-1

Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-2

Figure B-2 - Driver Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

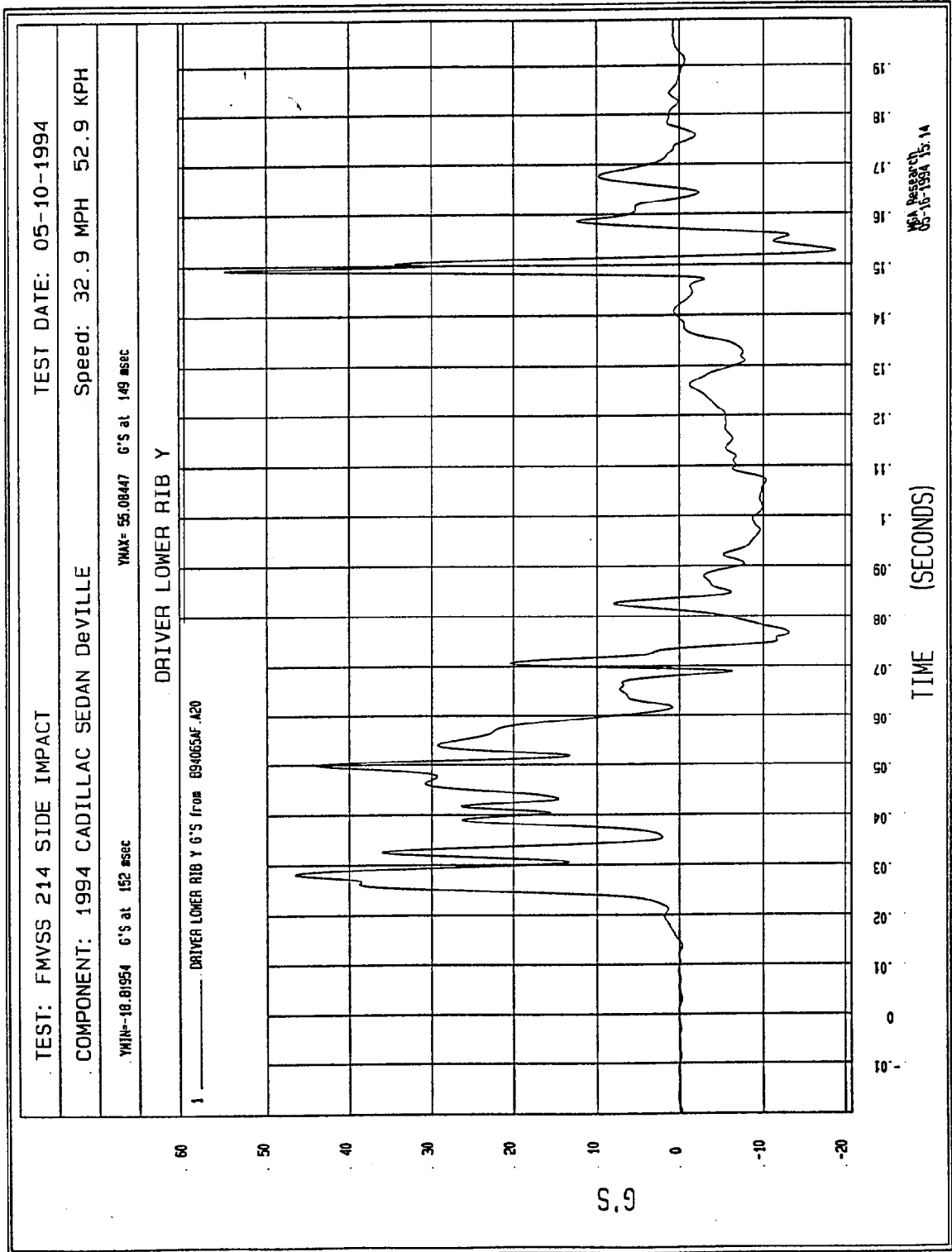


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

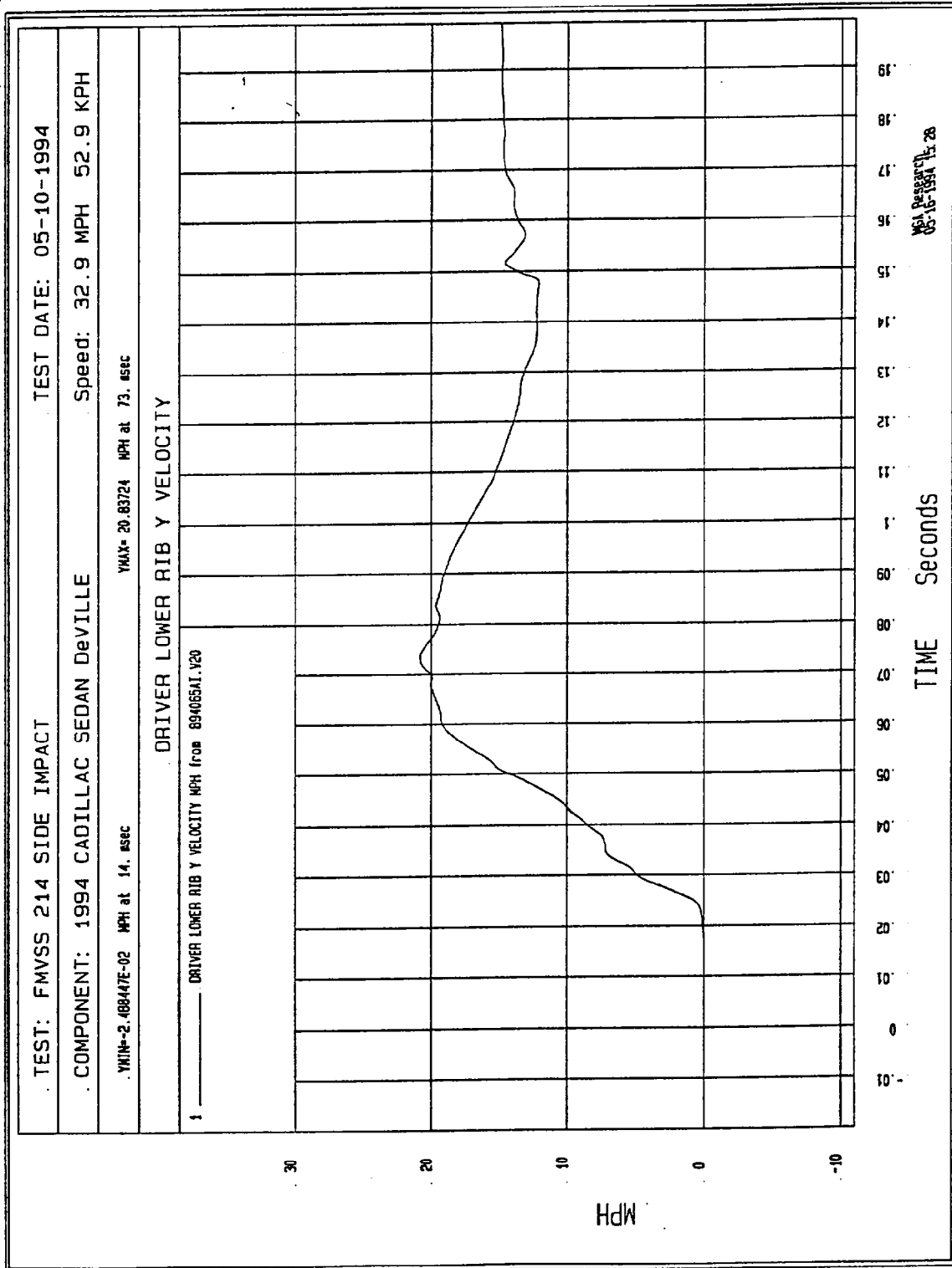


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

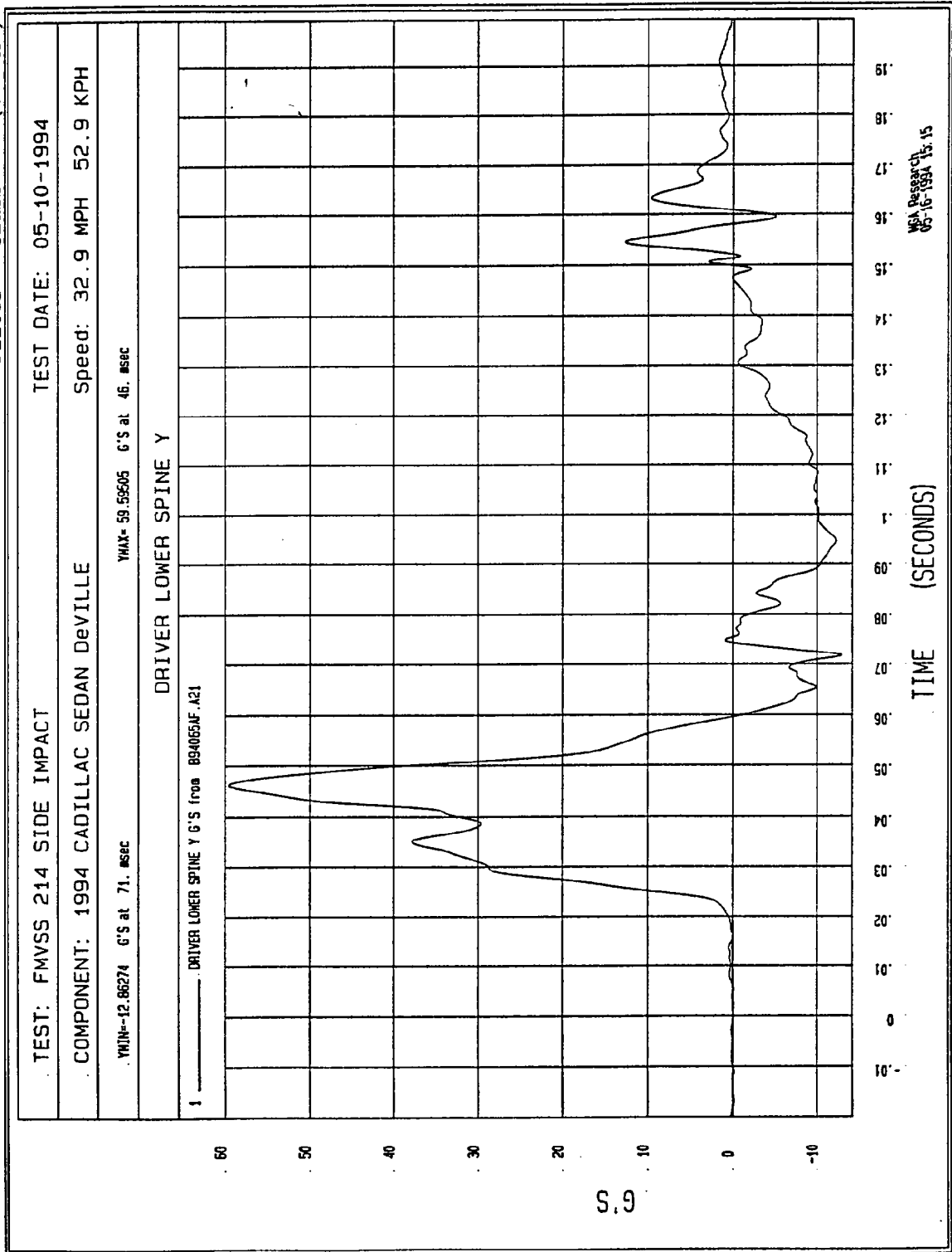


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

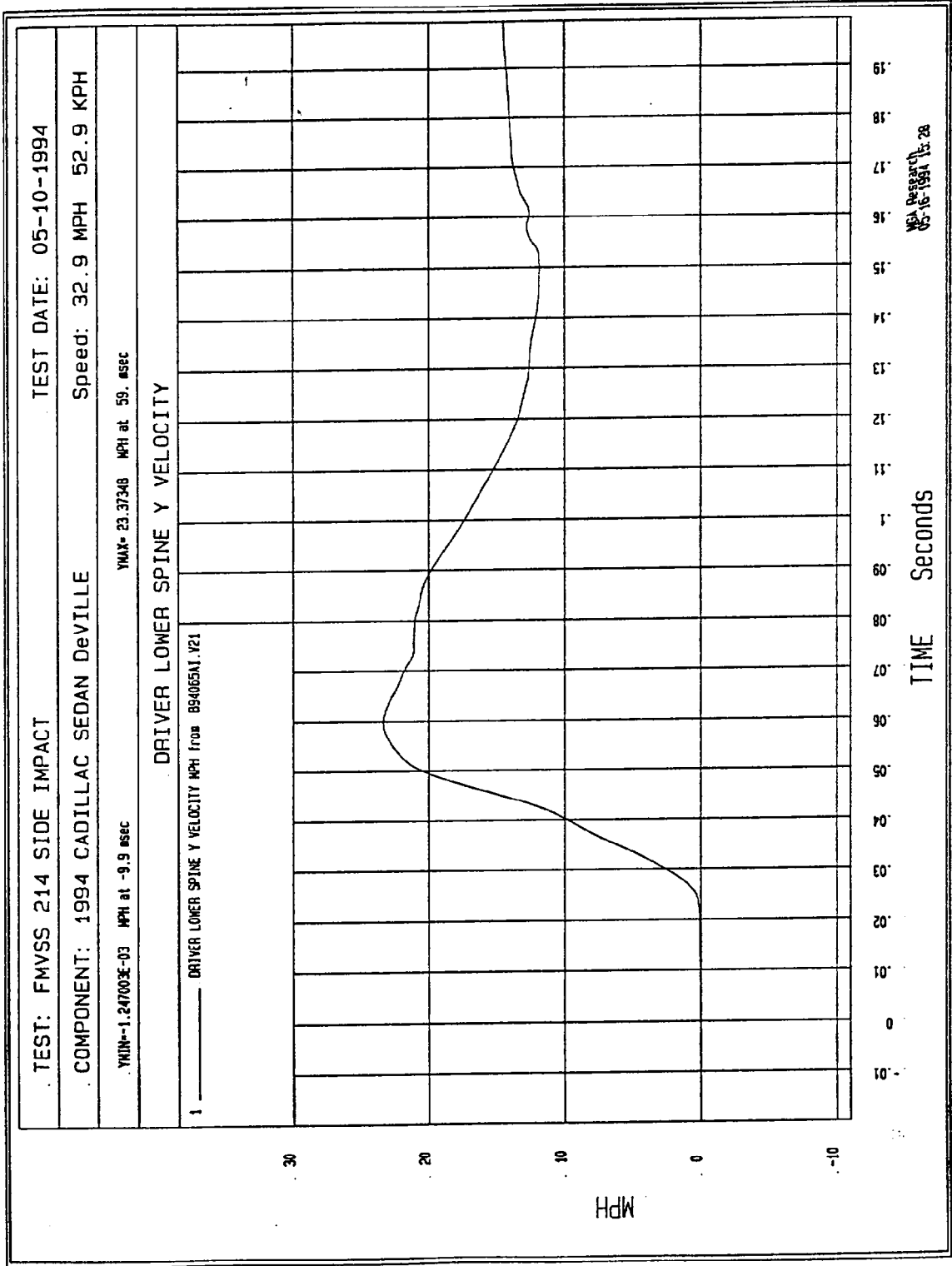


Figure B-6 - Driver Lower Spine Y Velocity vs. Time

Filter: Class 180 (300 Hz)

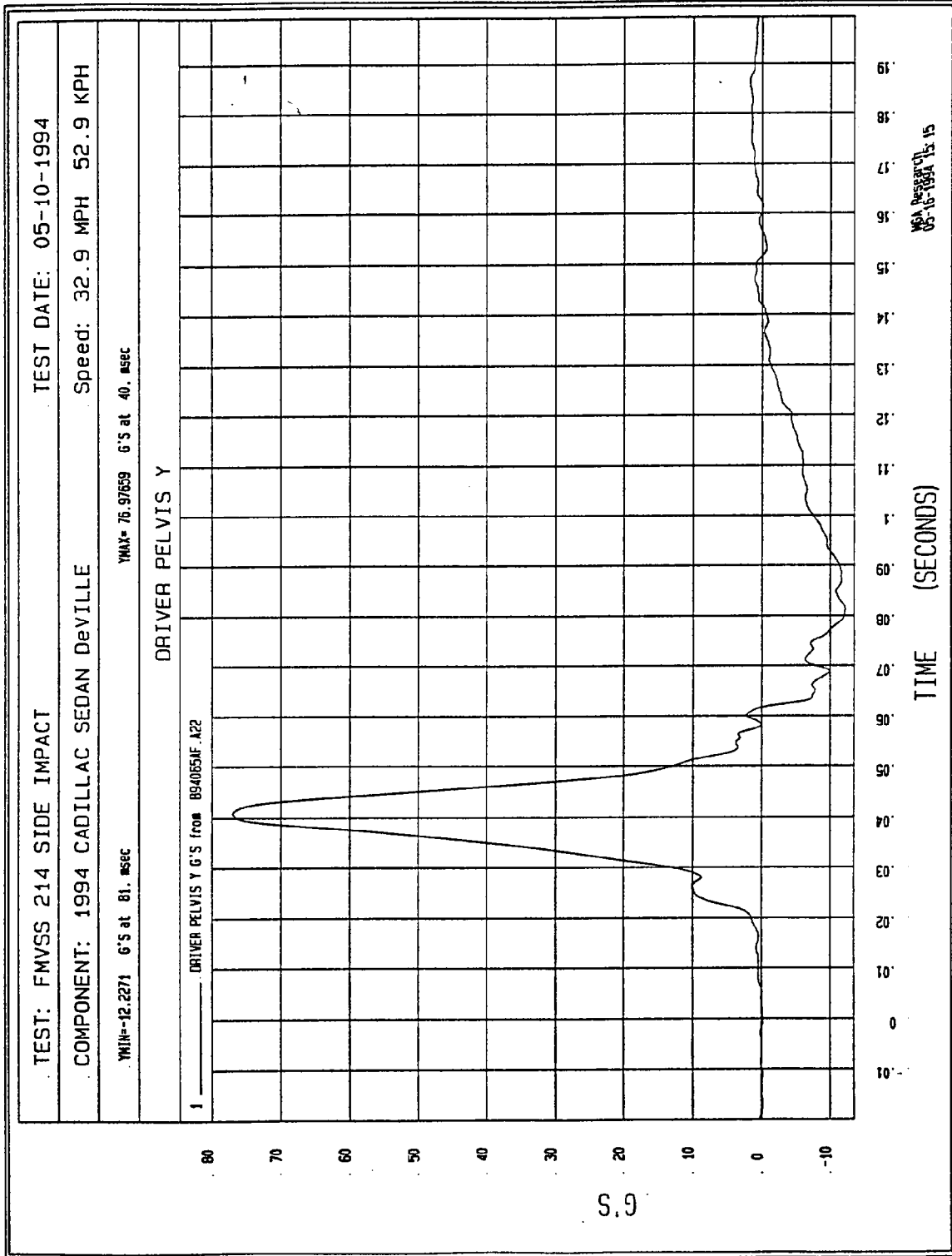


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

Filter: Class 180. (300 Hz)

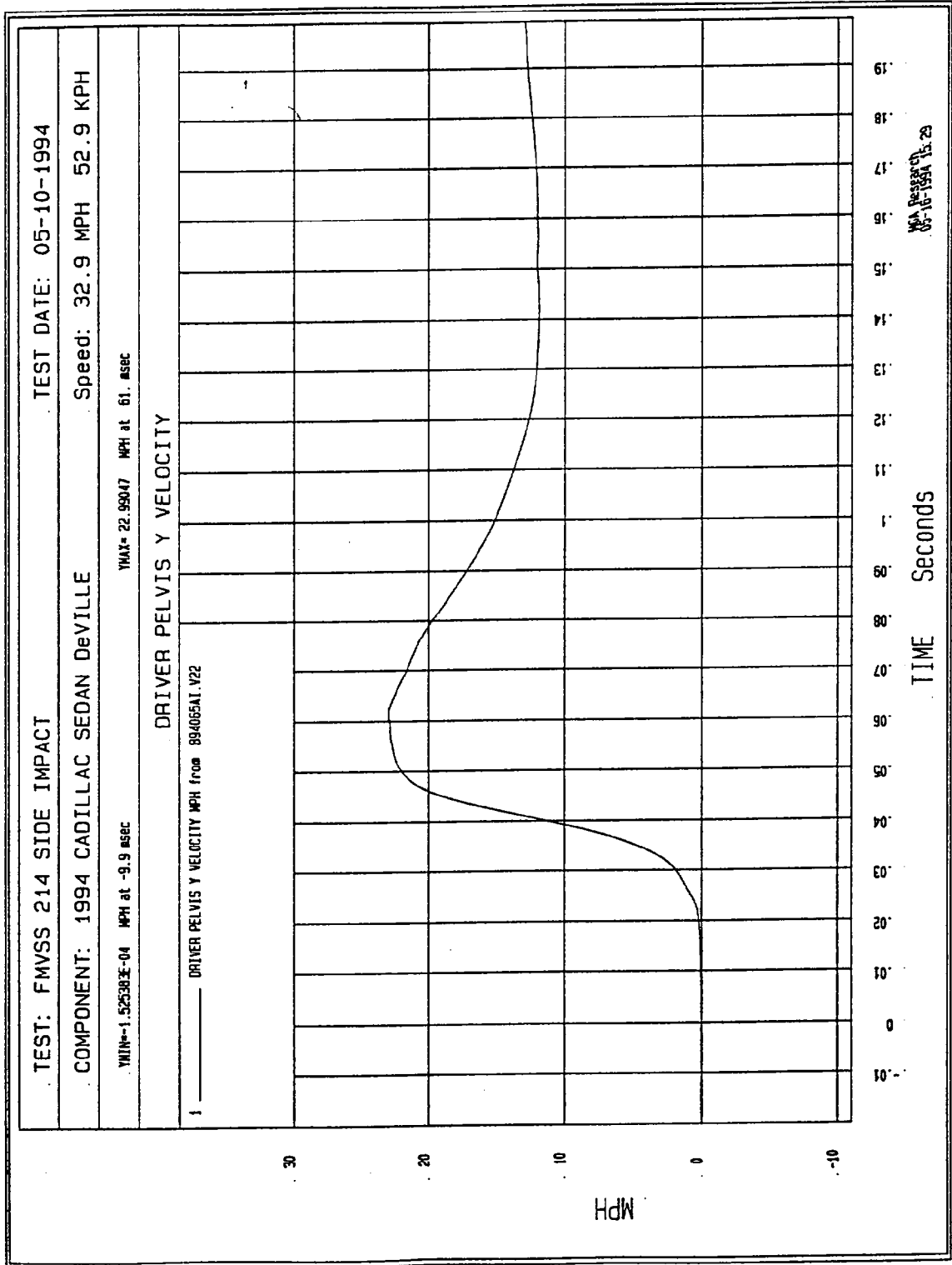


Figure B-8 - Driver Pelvis Y Velocity vs. Time

Filter: Class 180 (300 Hz)

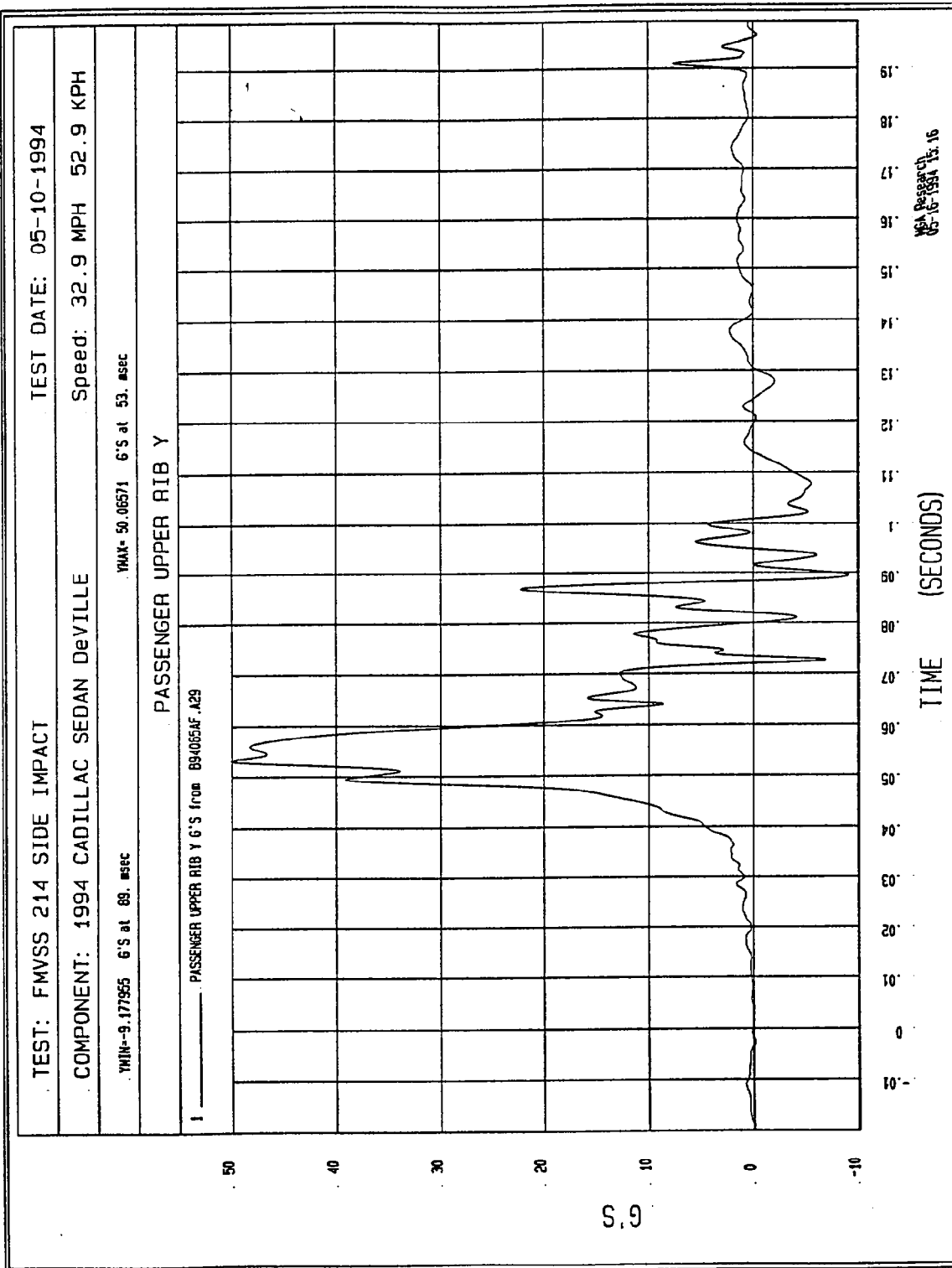
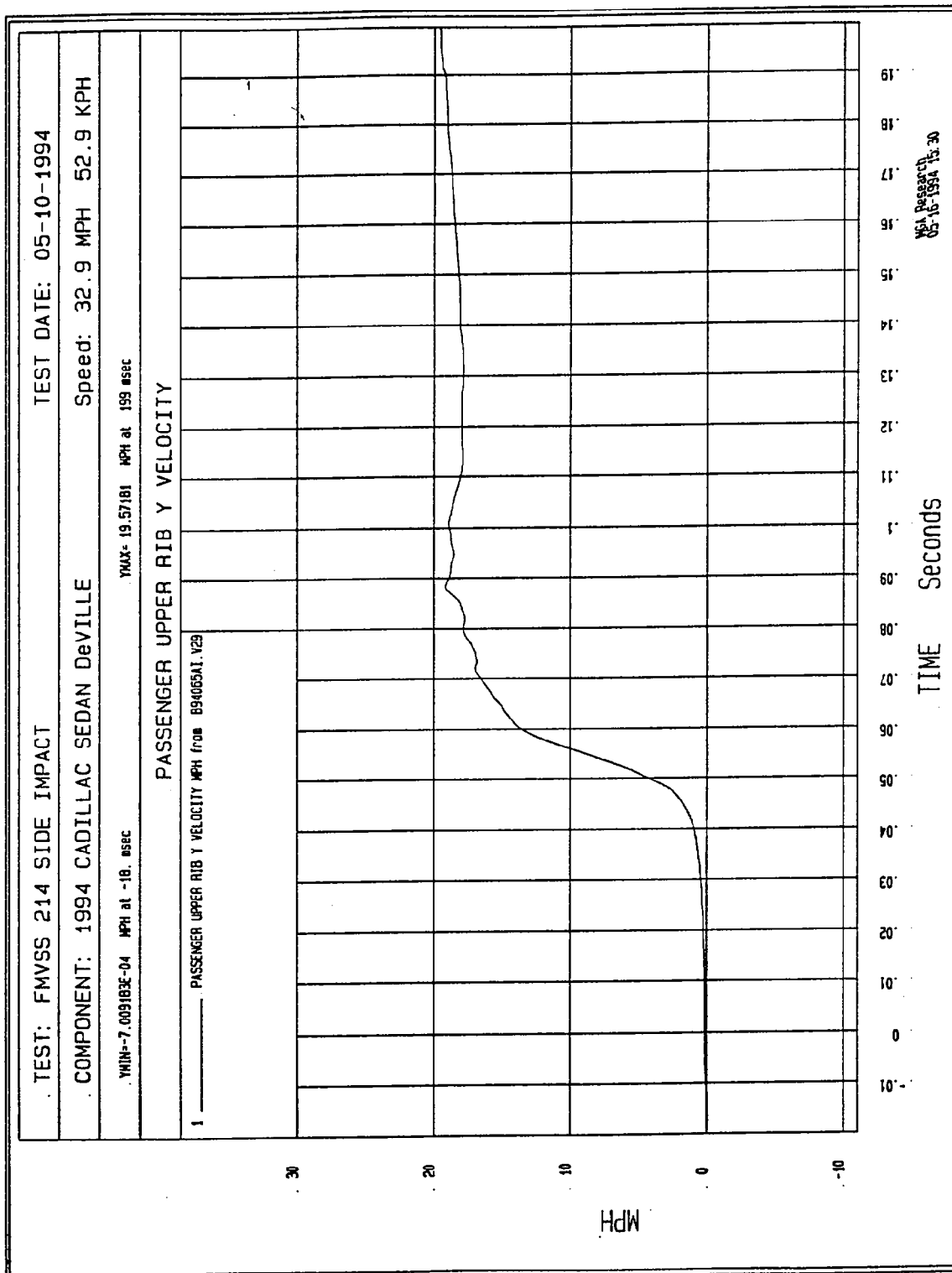


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-10

Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

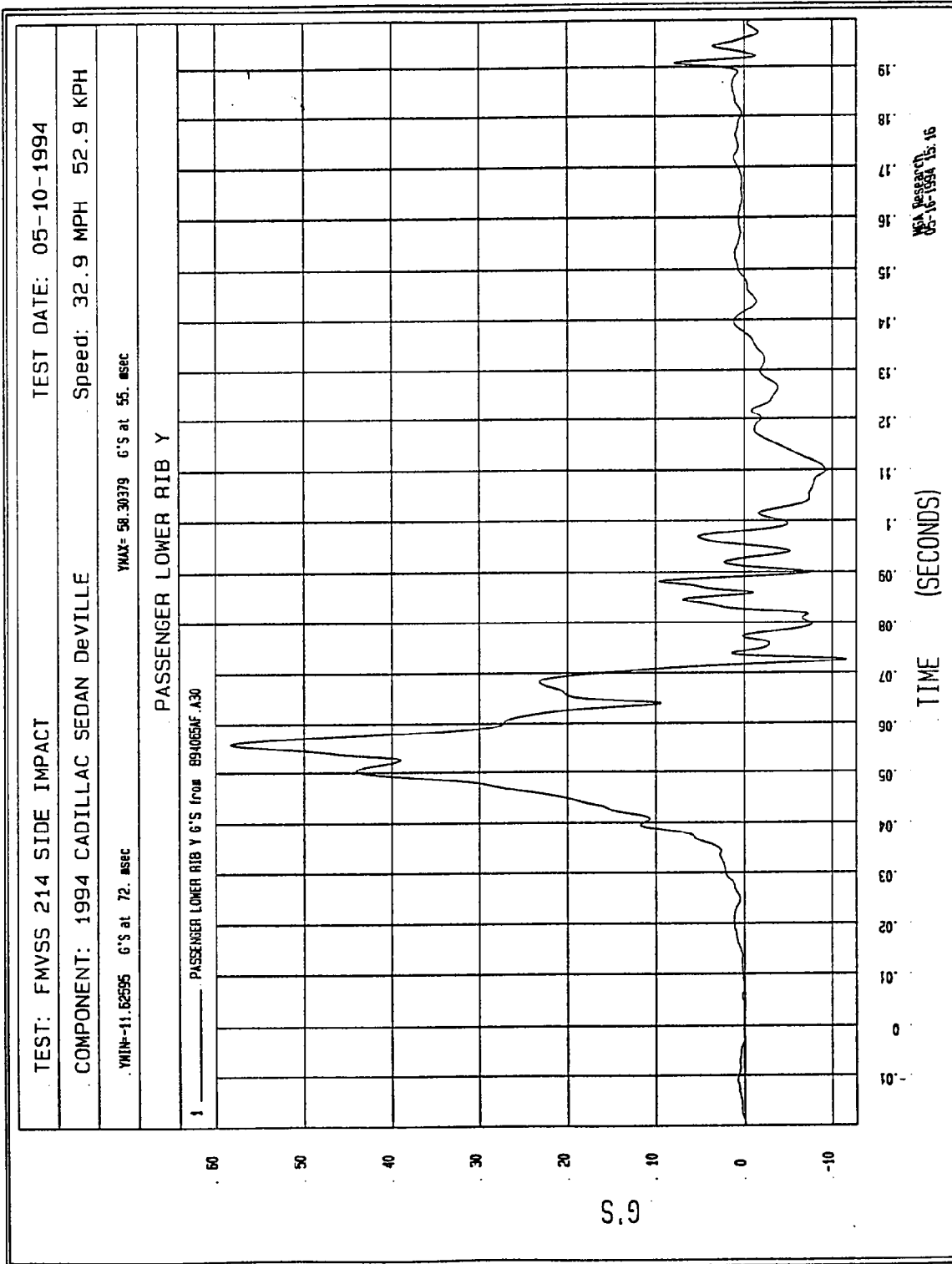


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

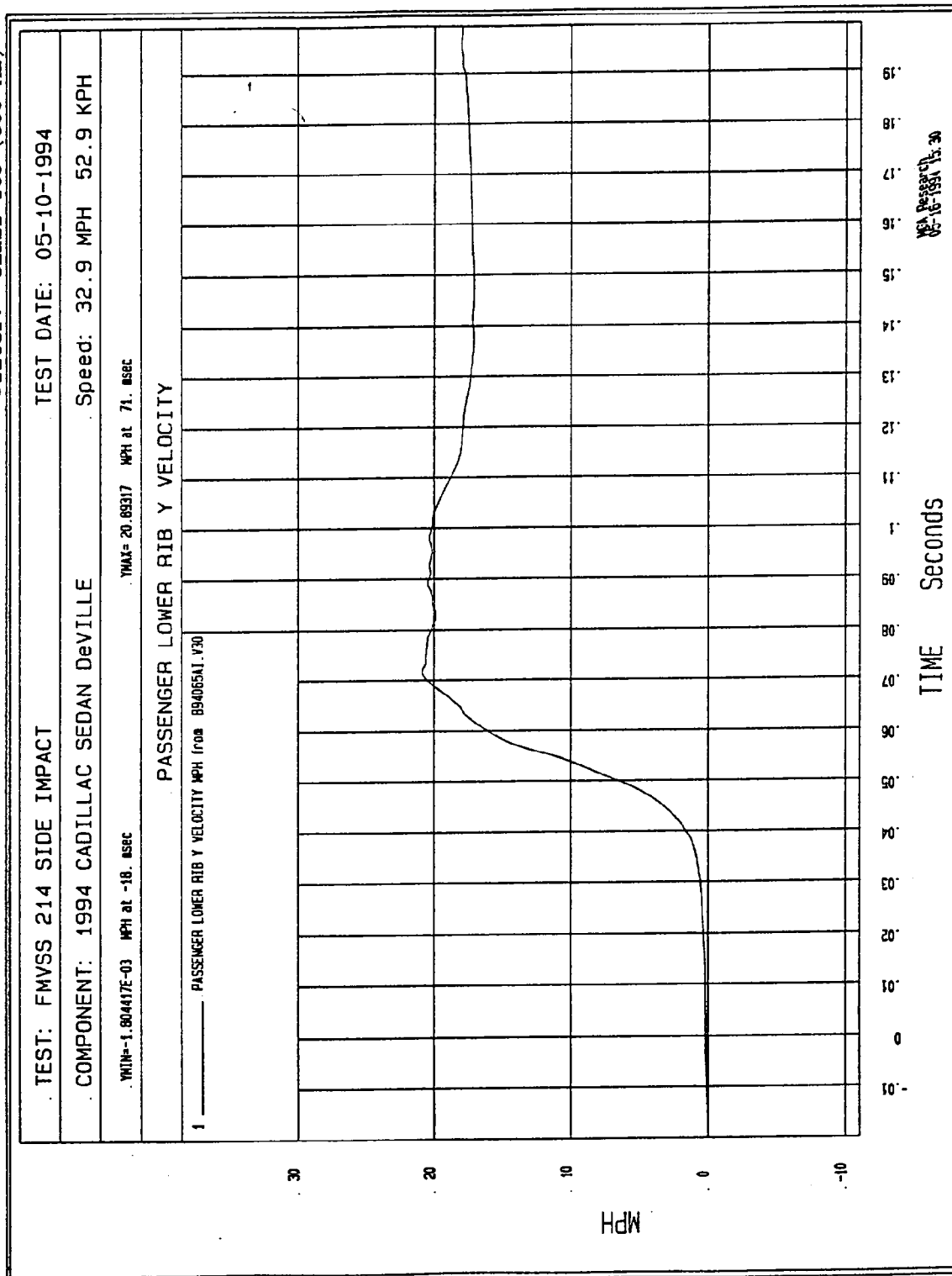


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

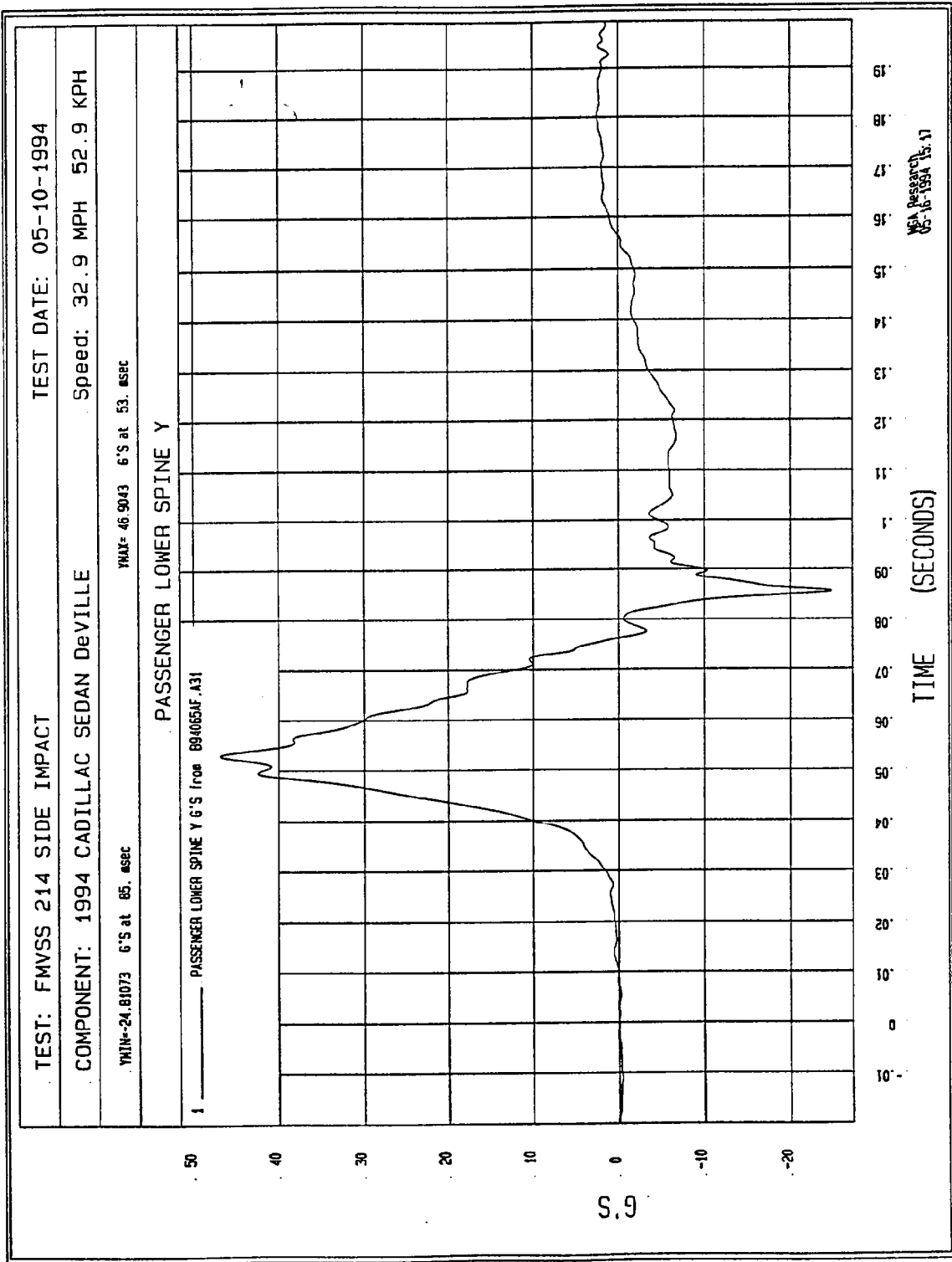


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

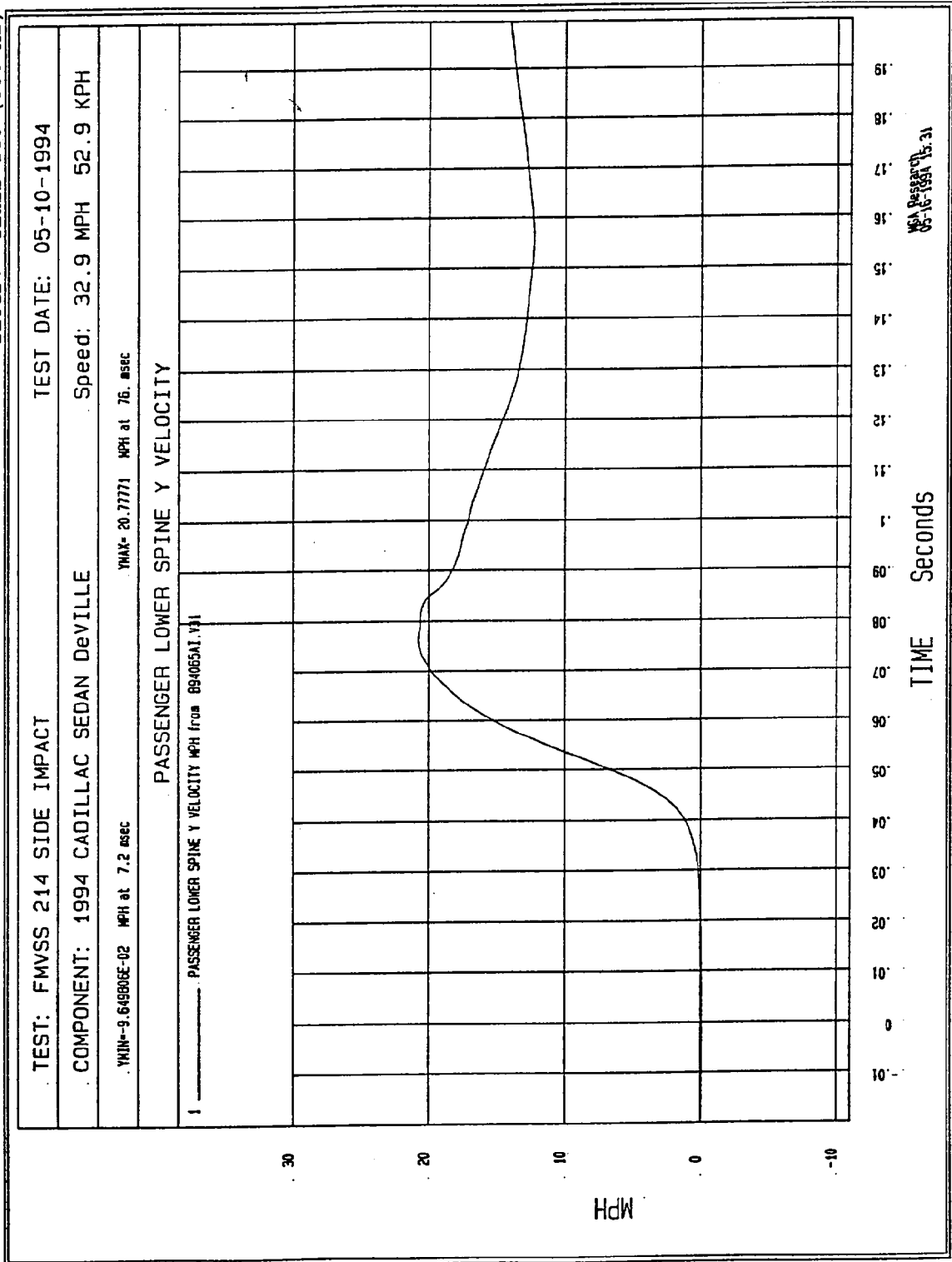


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

Filter: Class 180 (300 Hz)

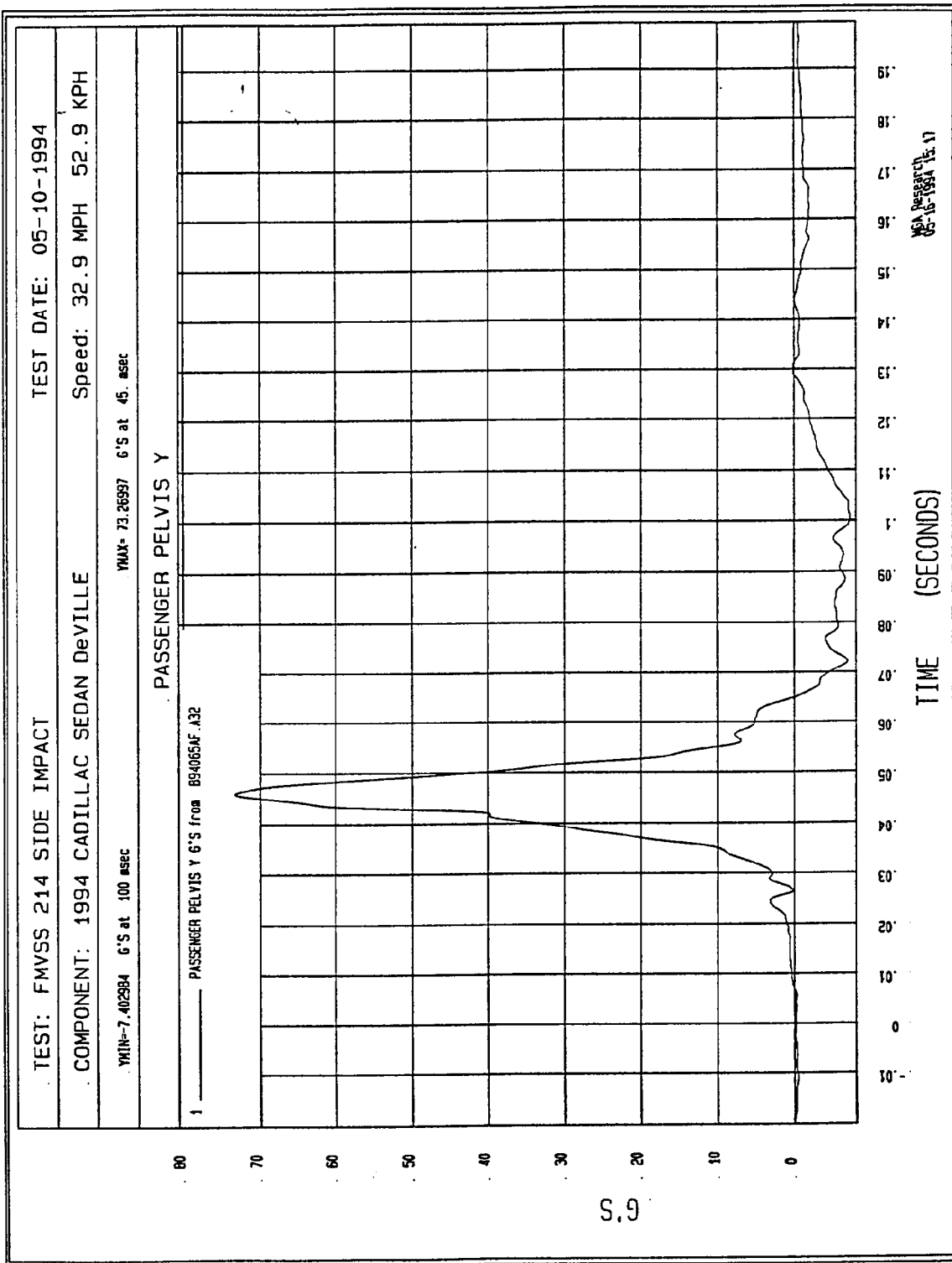


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

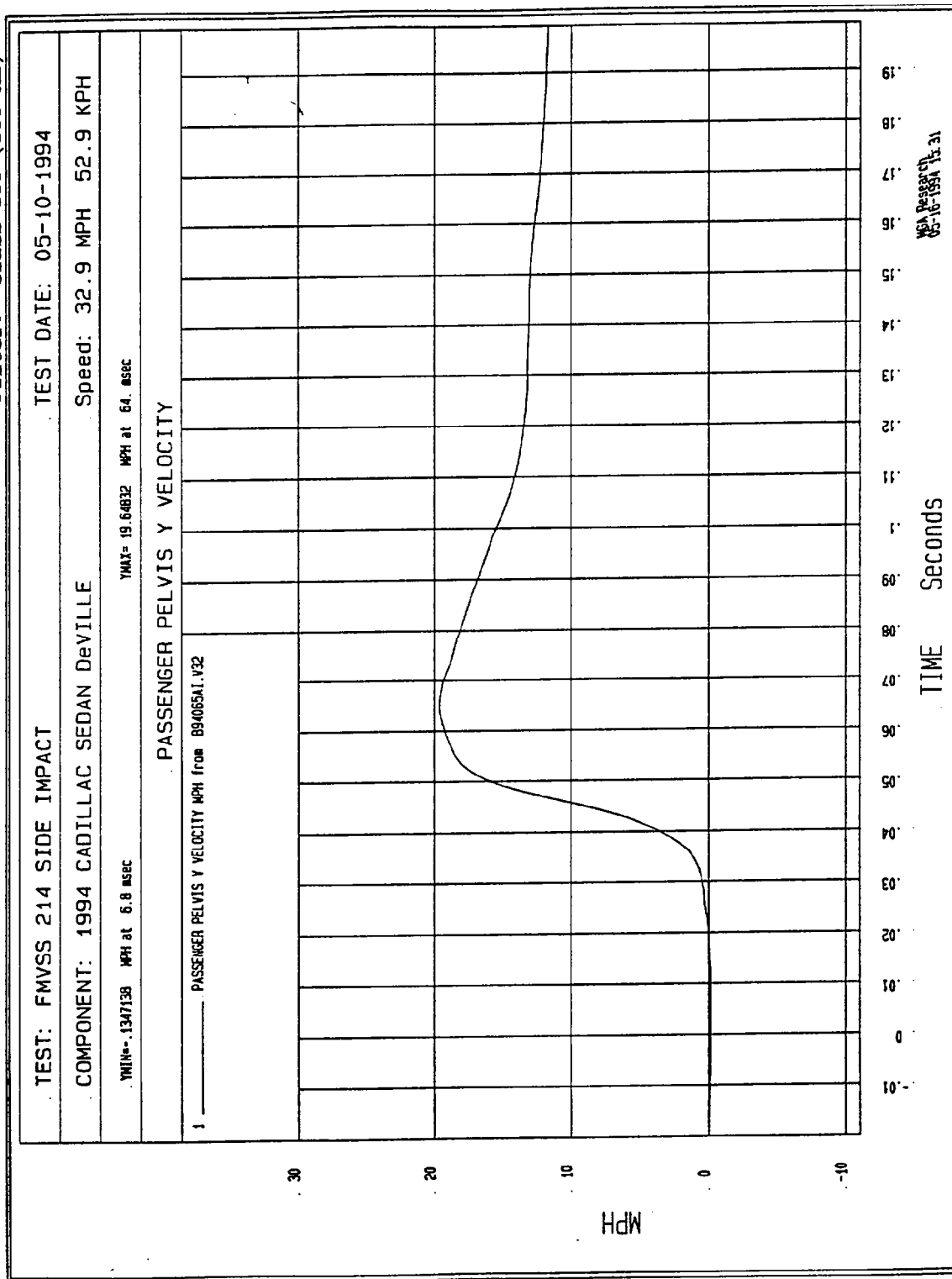


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

Filter: Class 60 (100 Hz)

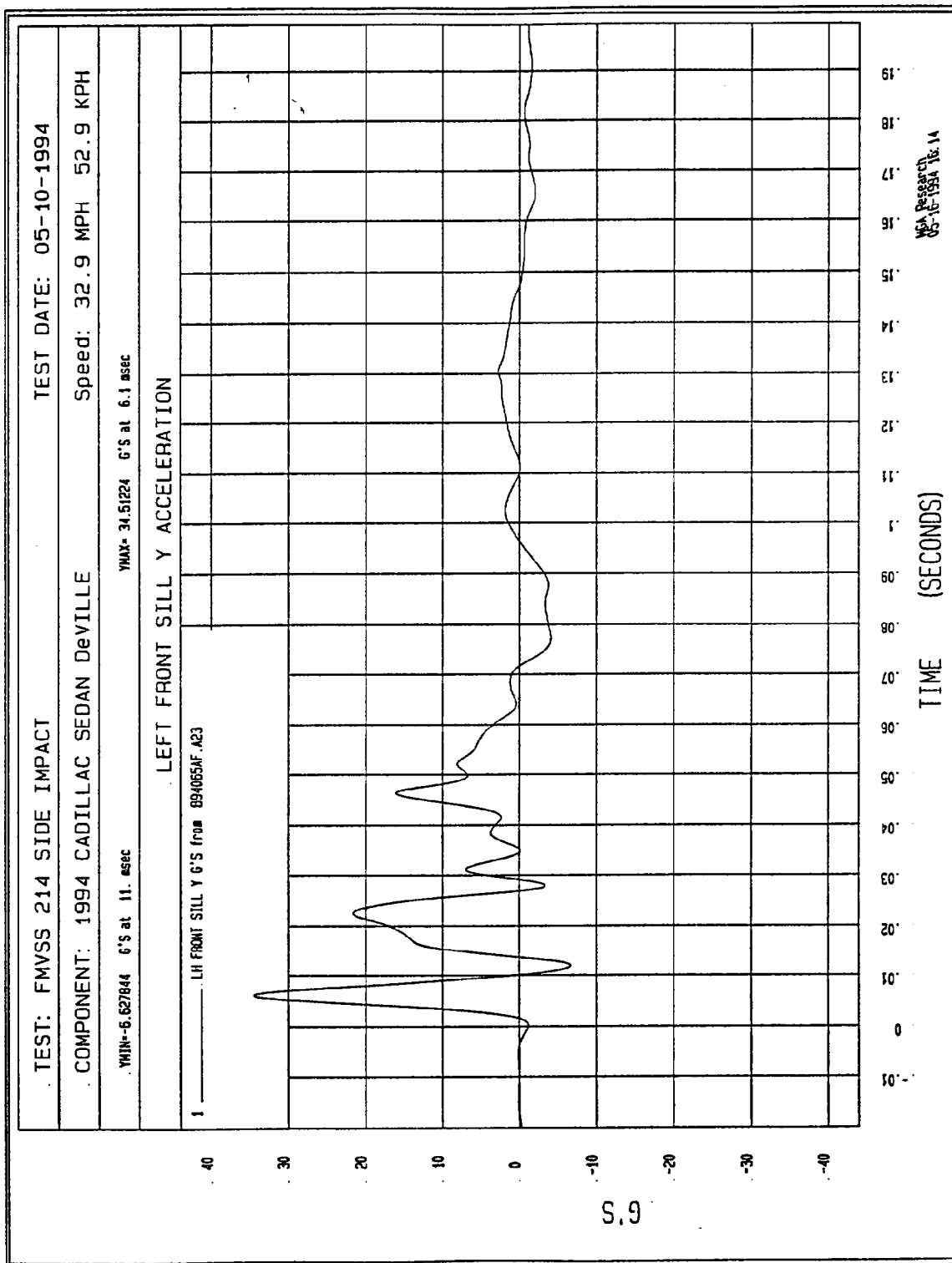


Figure B-17 - Left Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

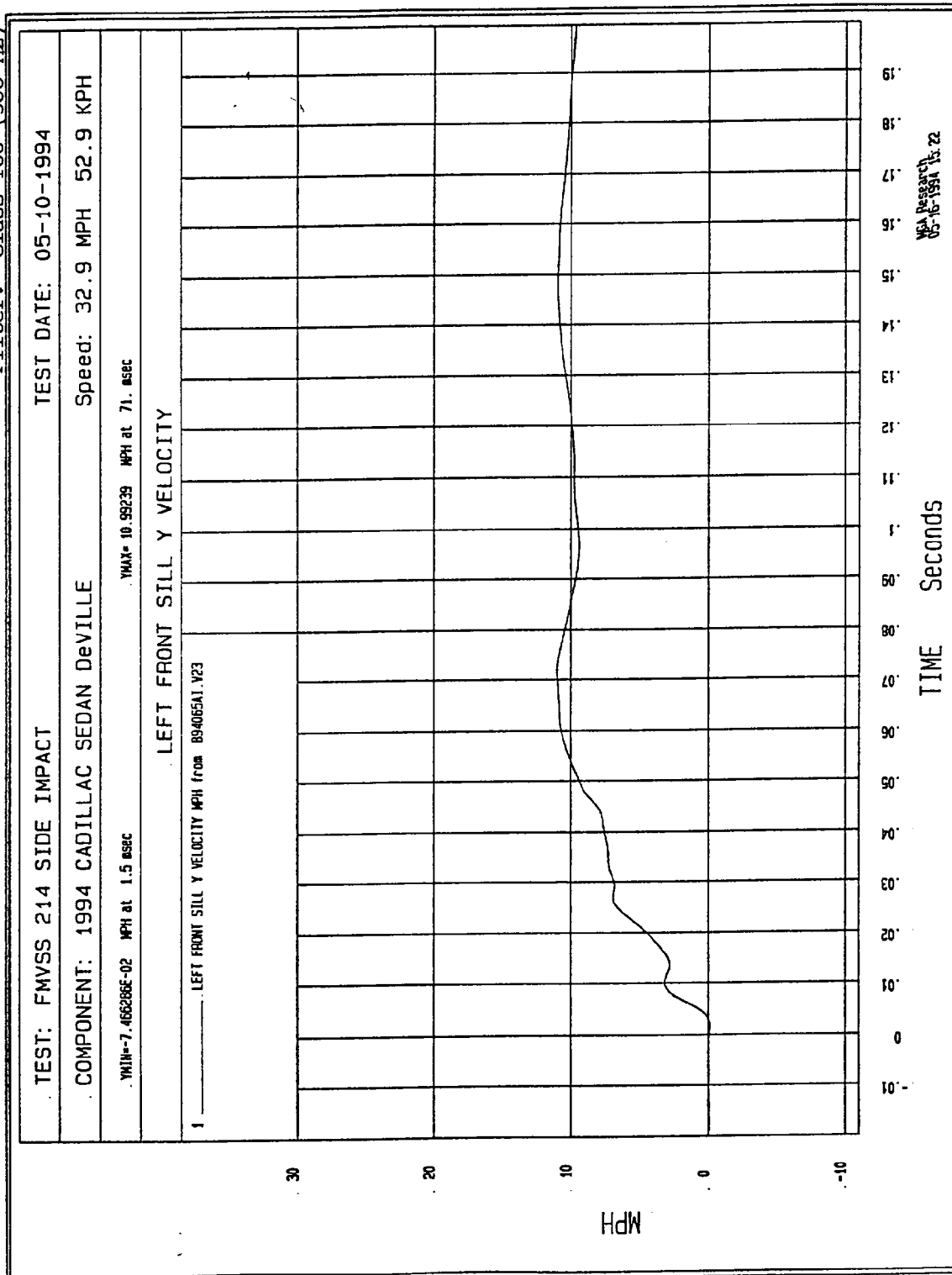


Figure B-18 - Left Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

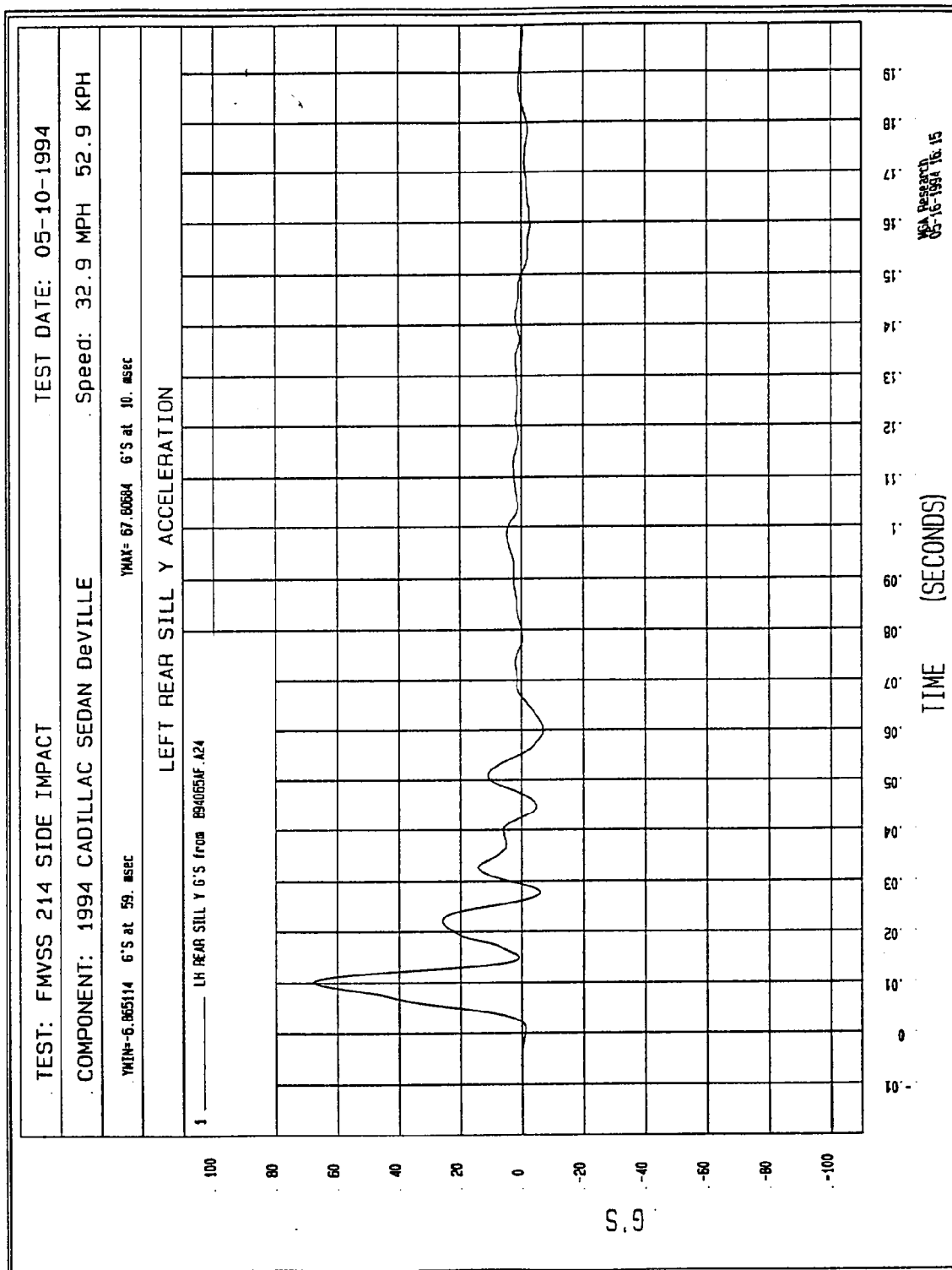
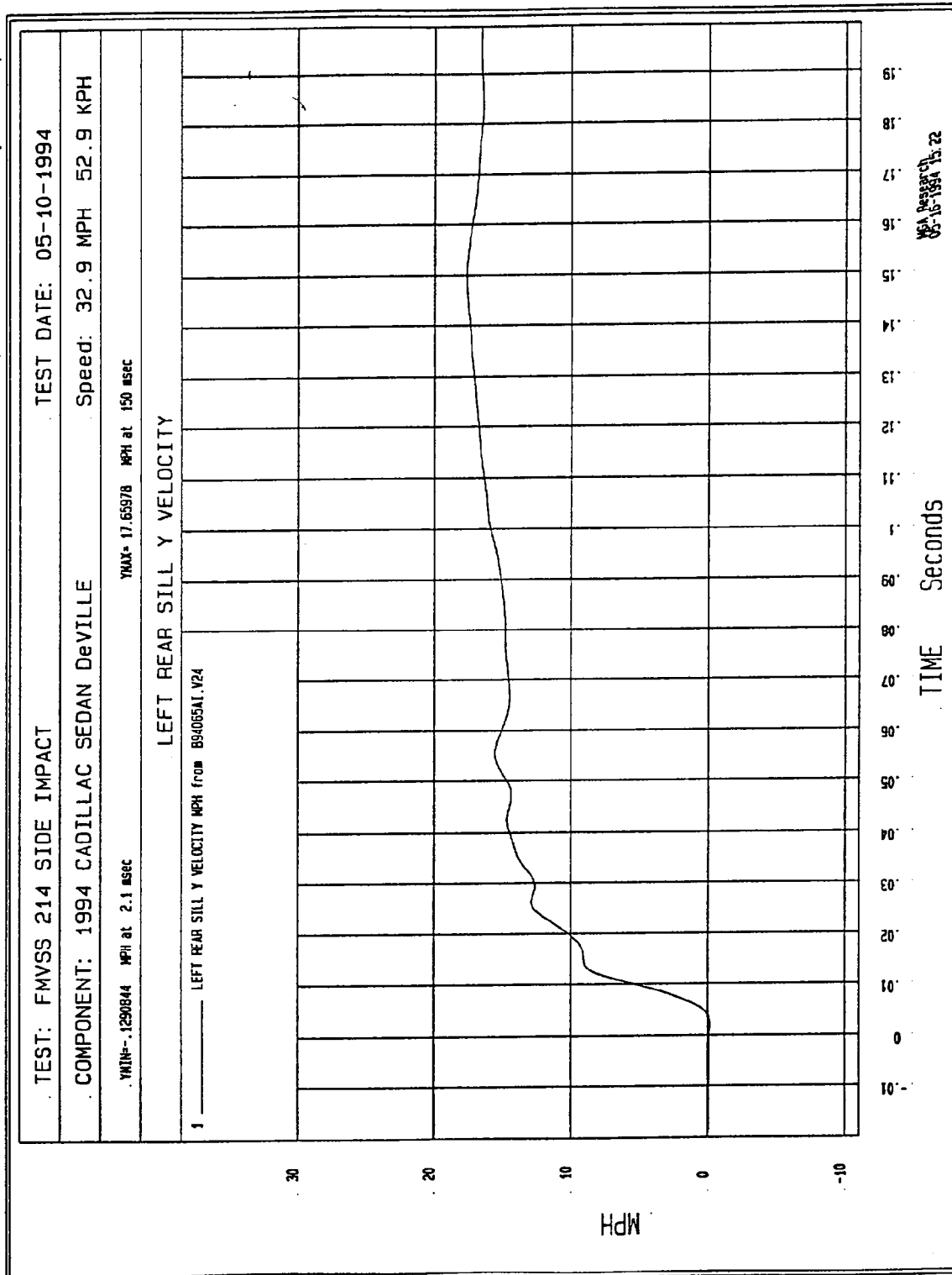


Figure B-19 - Left Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-20

Figure B-20 - Left Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

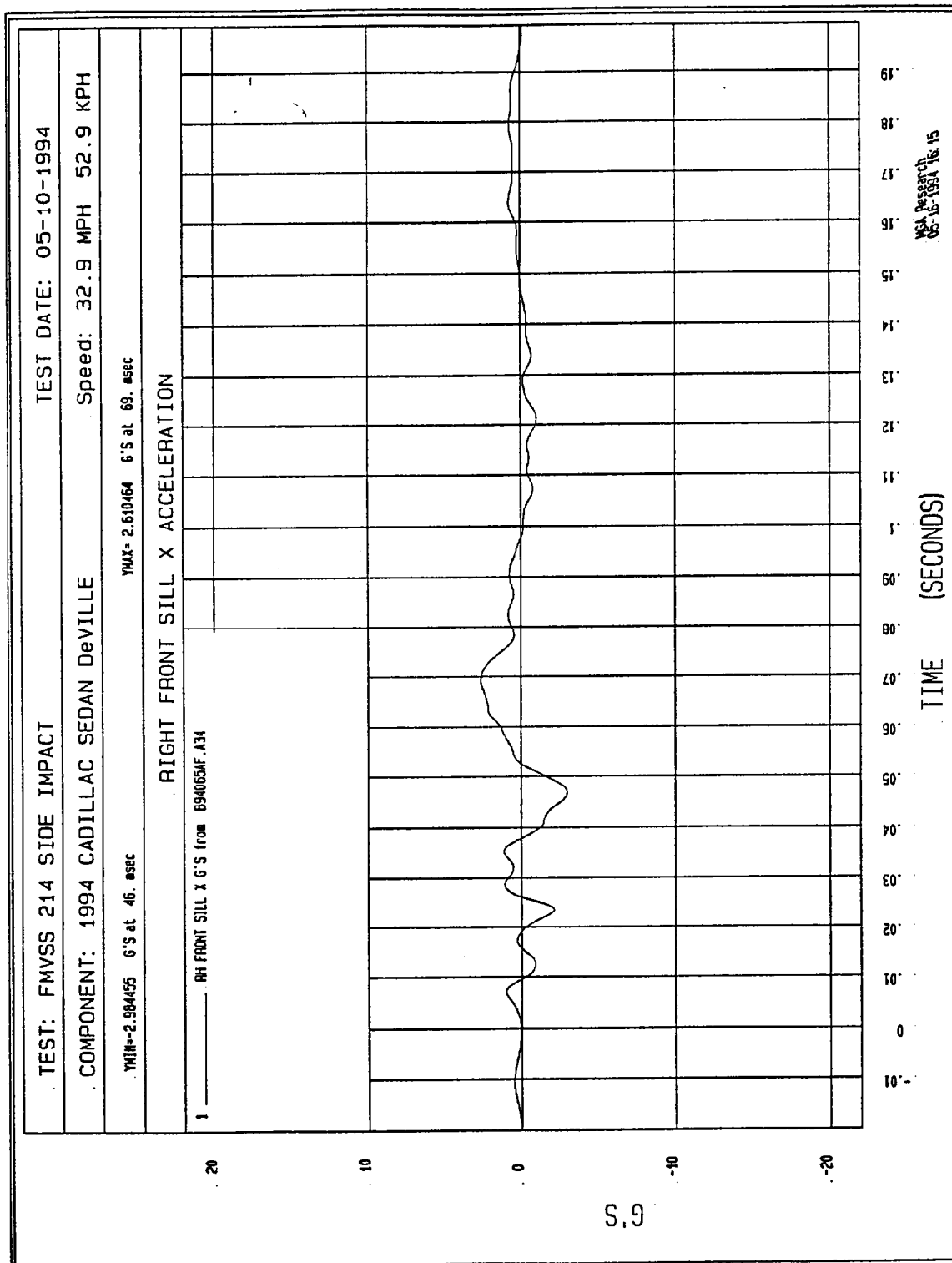


Figure B-21 - Right Front Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

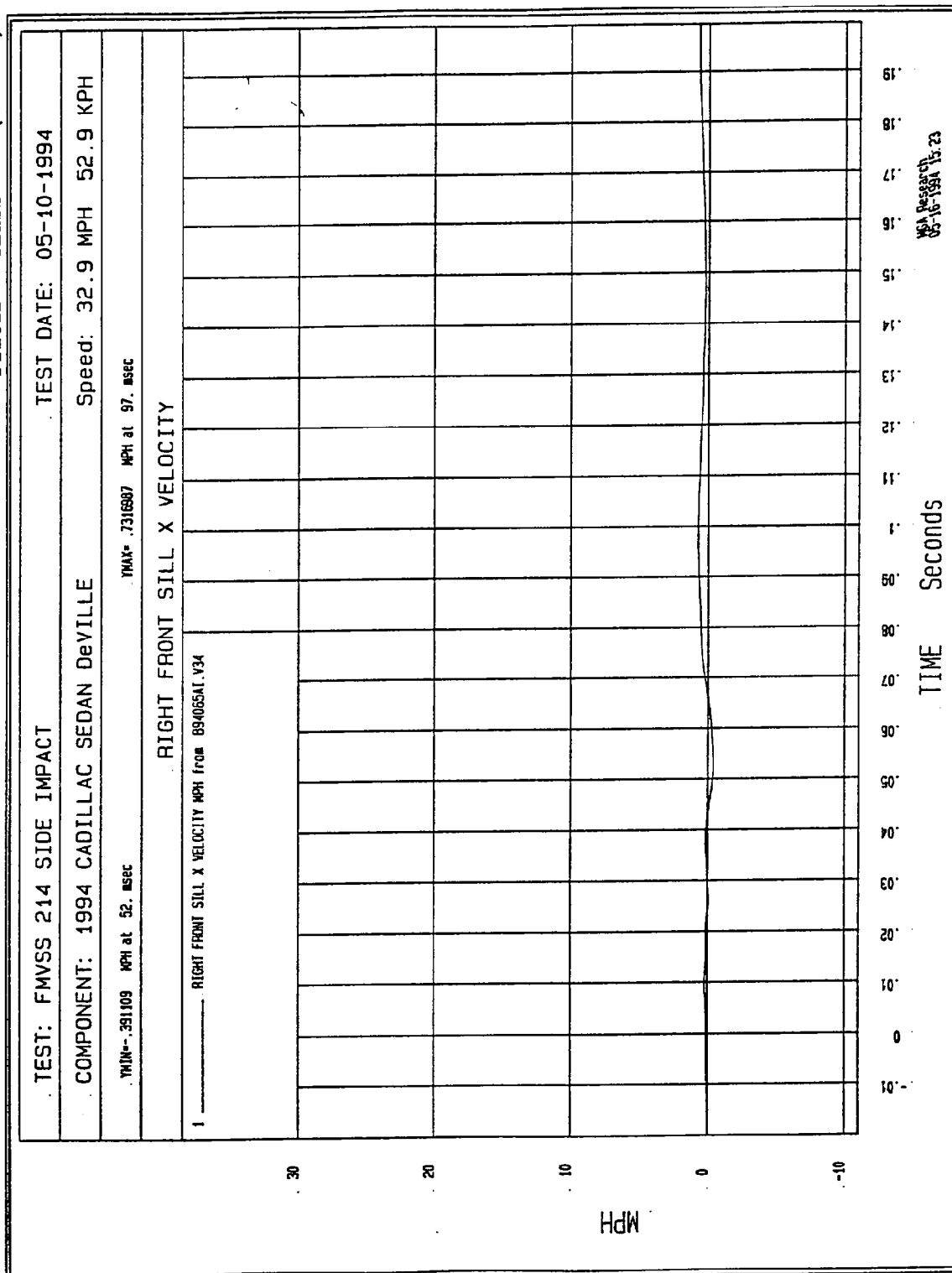


Figure B-22 - Right Front Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

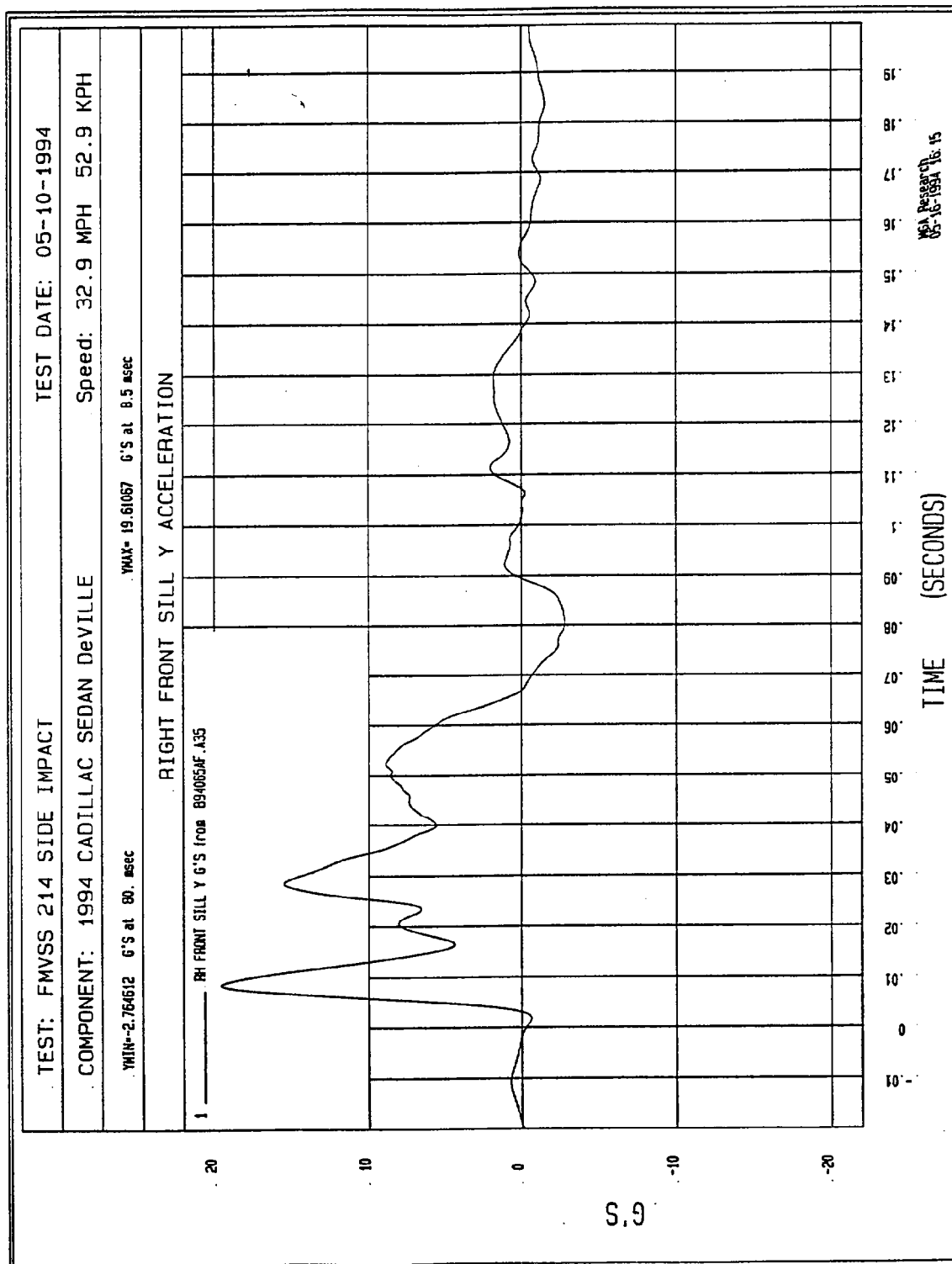


Figure B-23 - Right Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

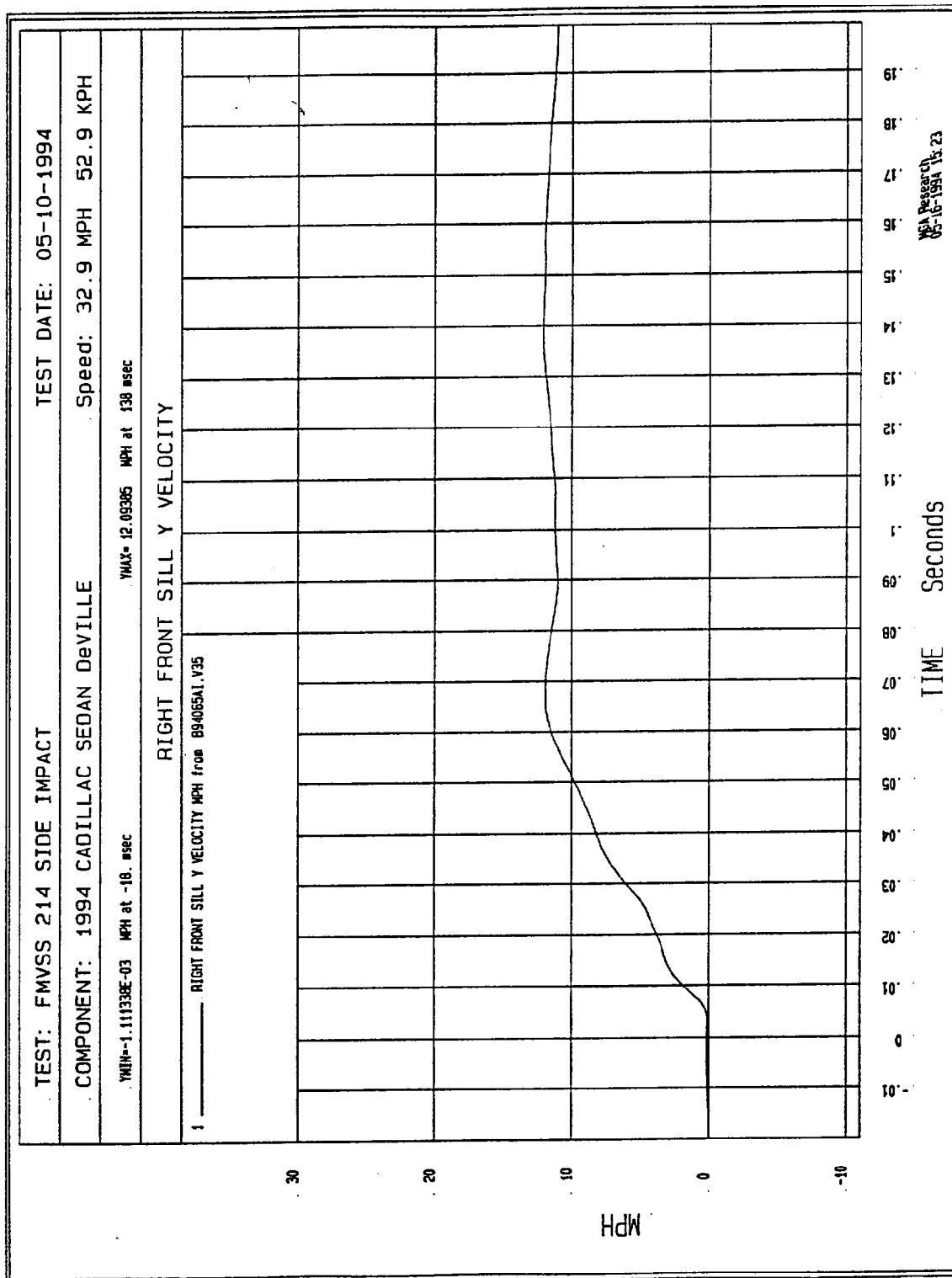


Figure B-24 - Right Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

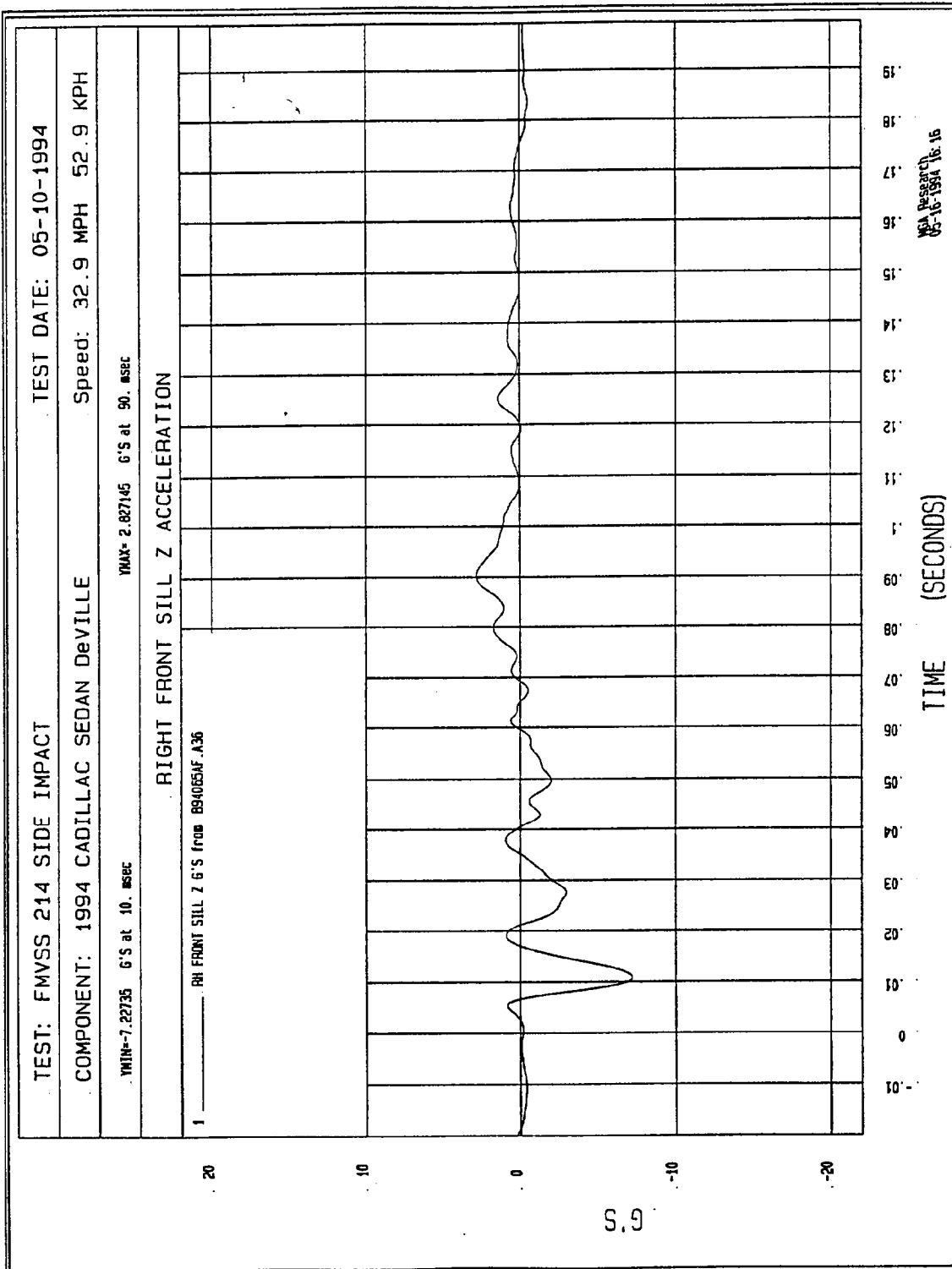


Figure B-25 - Right Front Sill Z Acceleration vs. Time

Filter: " Class 180 (300 Hz)

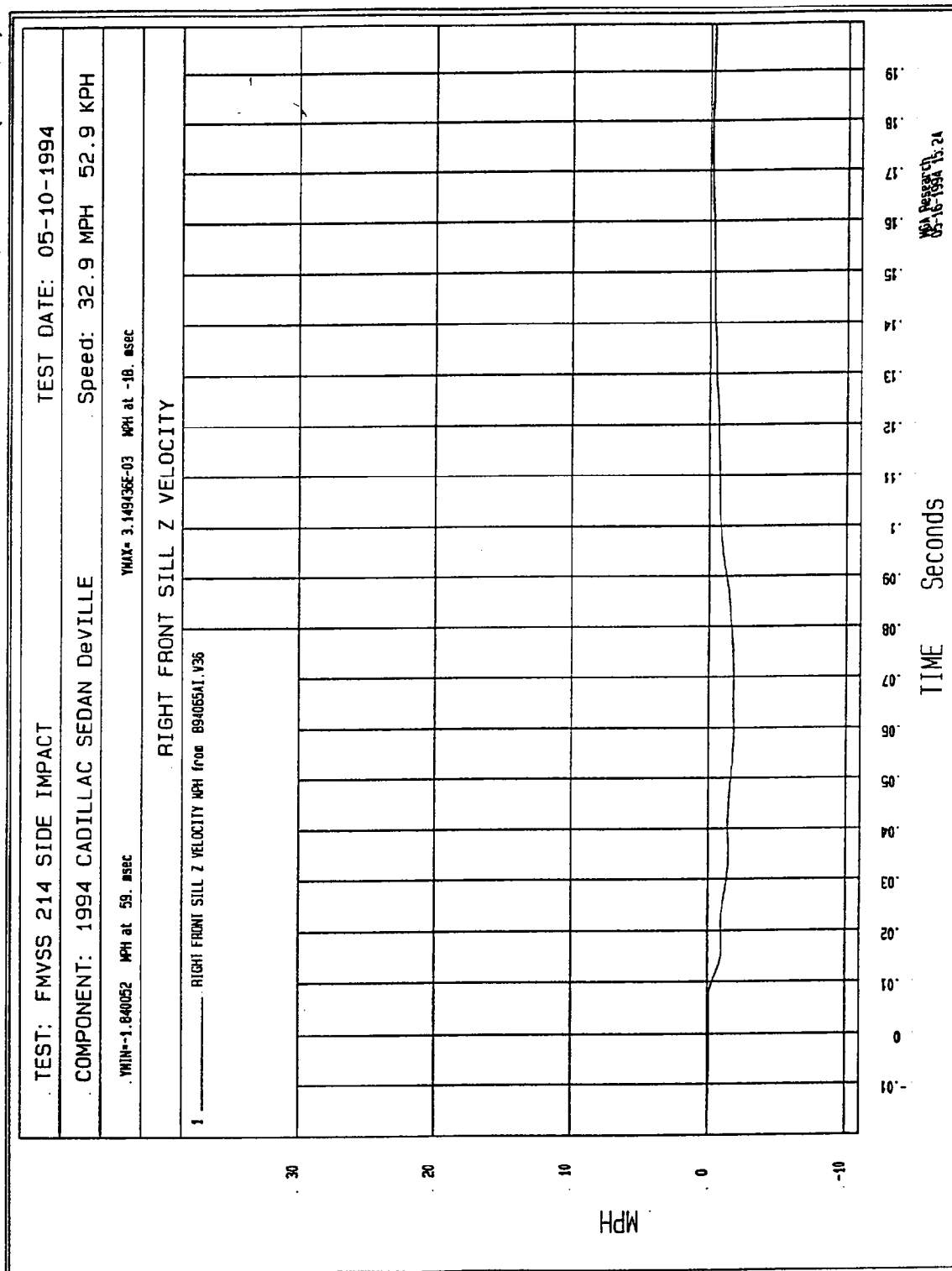


Figure B-26 - Right Front Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)

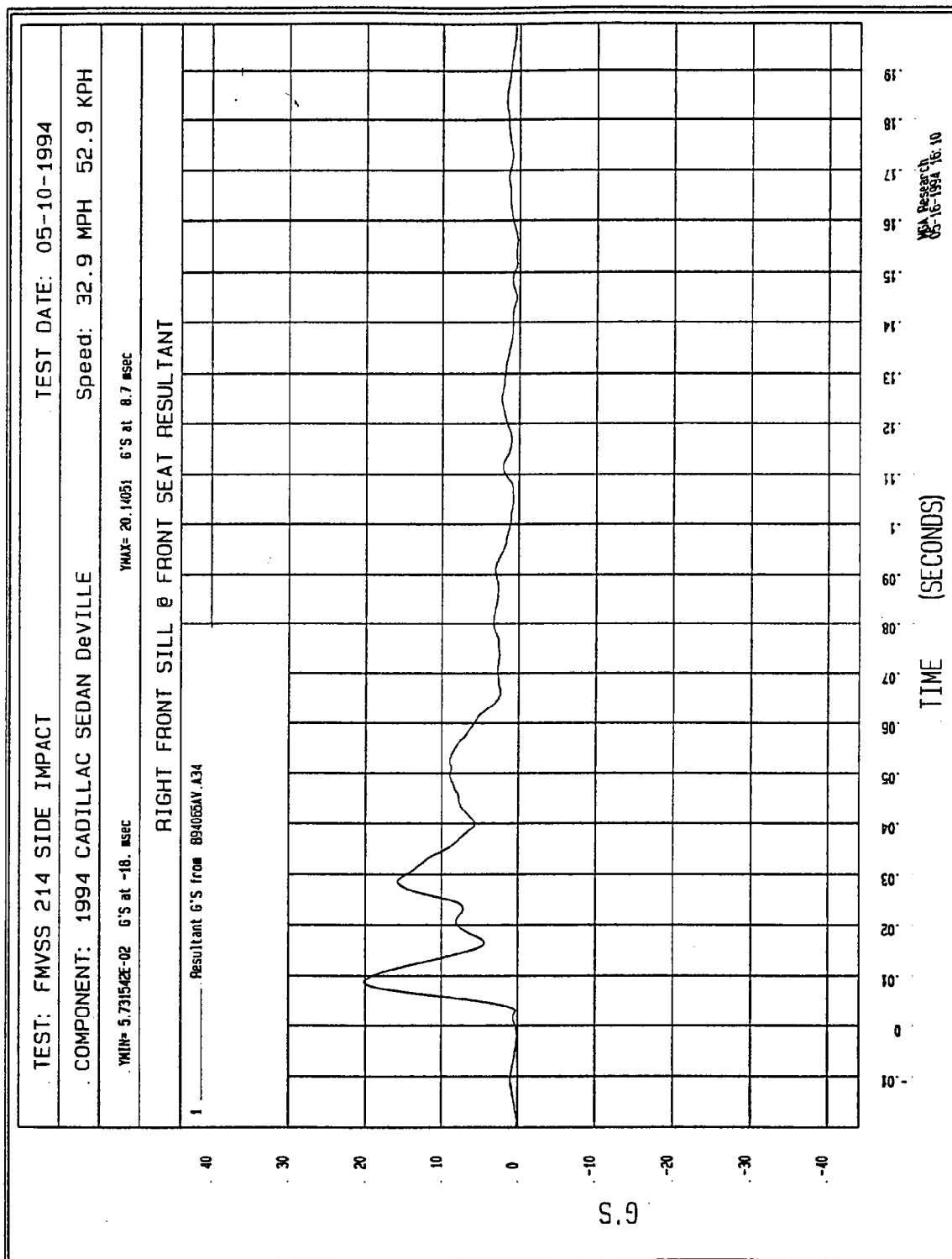
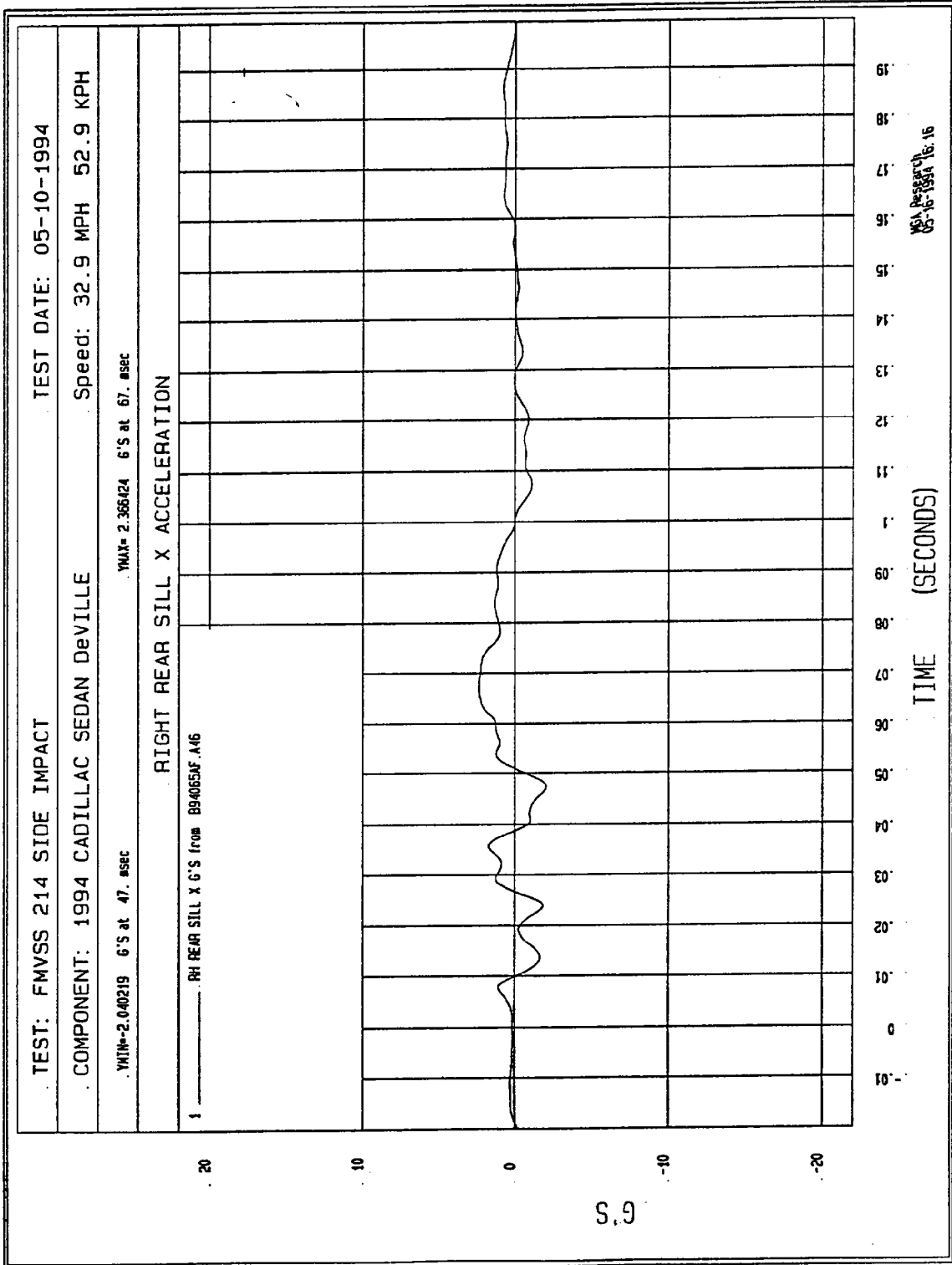


Figure B-27 - Right Front Sill at Front Seat Resultant vs. Time

Filter: Class 60 (100 Hz)



B-28

Figure B-28 - Right Rear Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

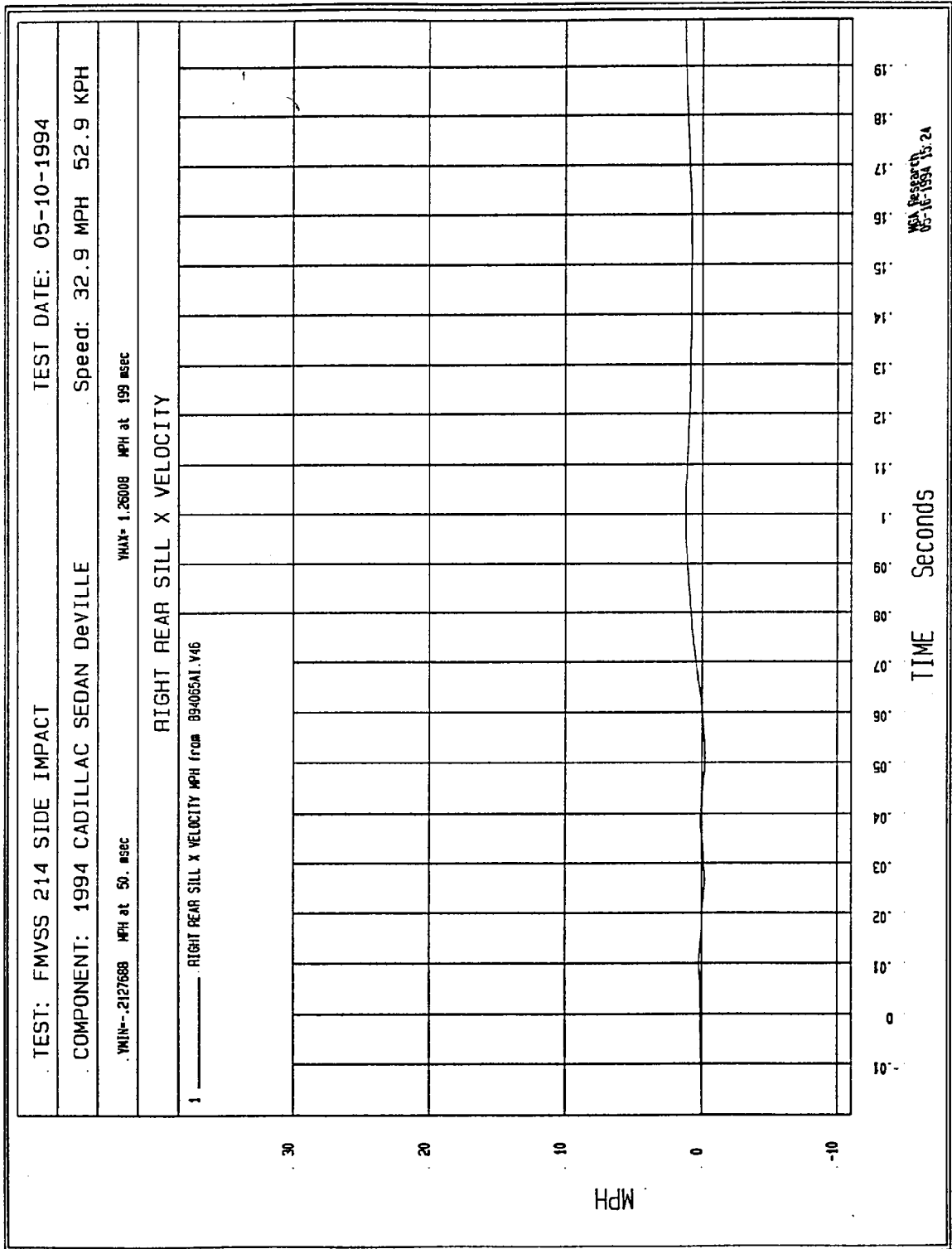


Figure B-29 - Right Rear Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

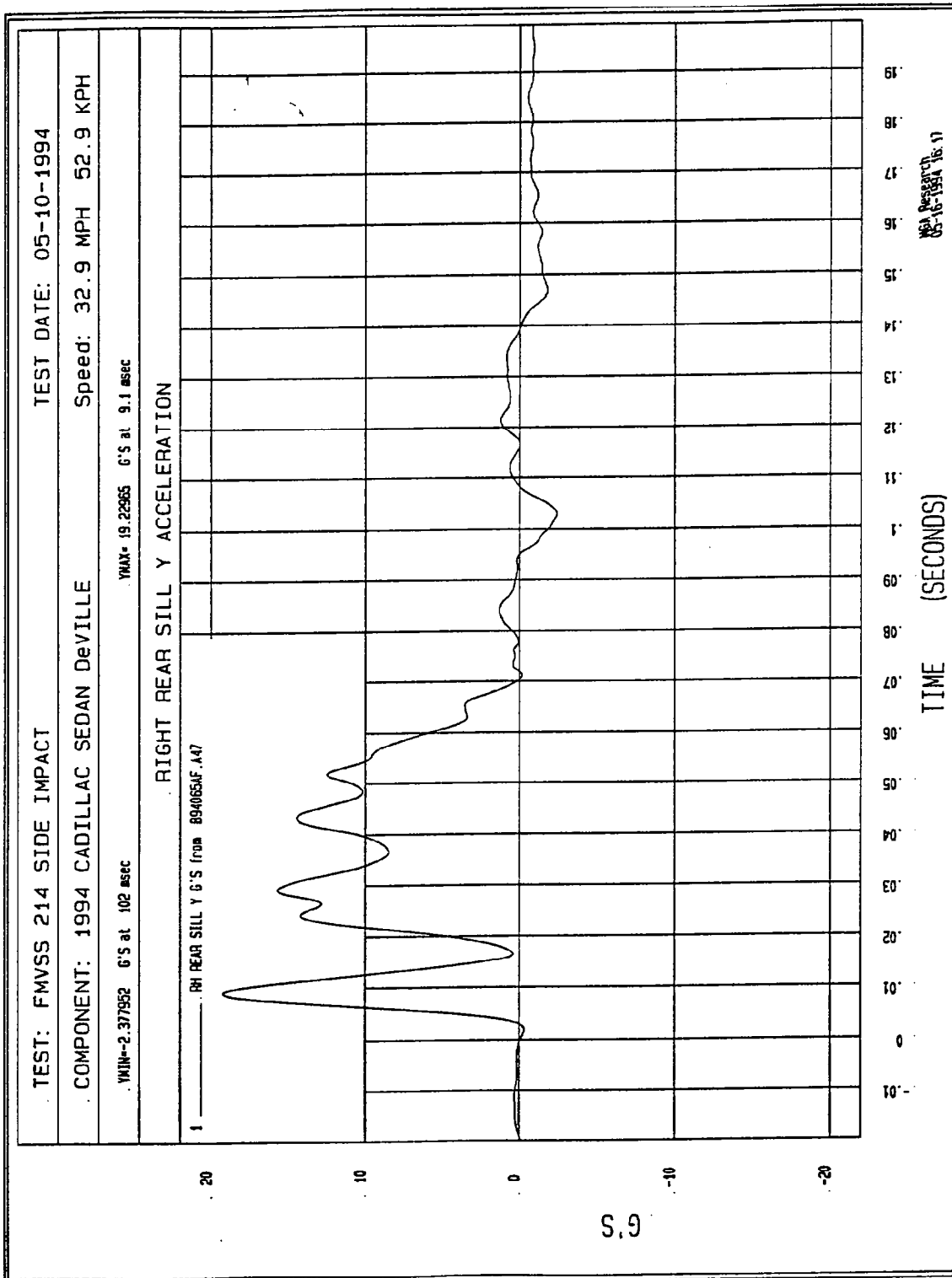


Figure B-30 - Right Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

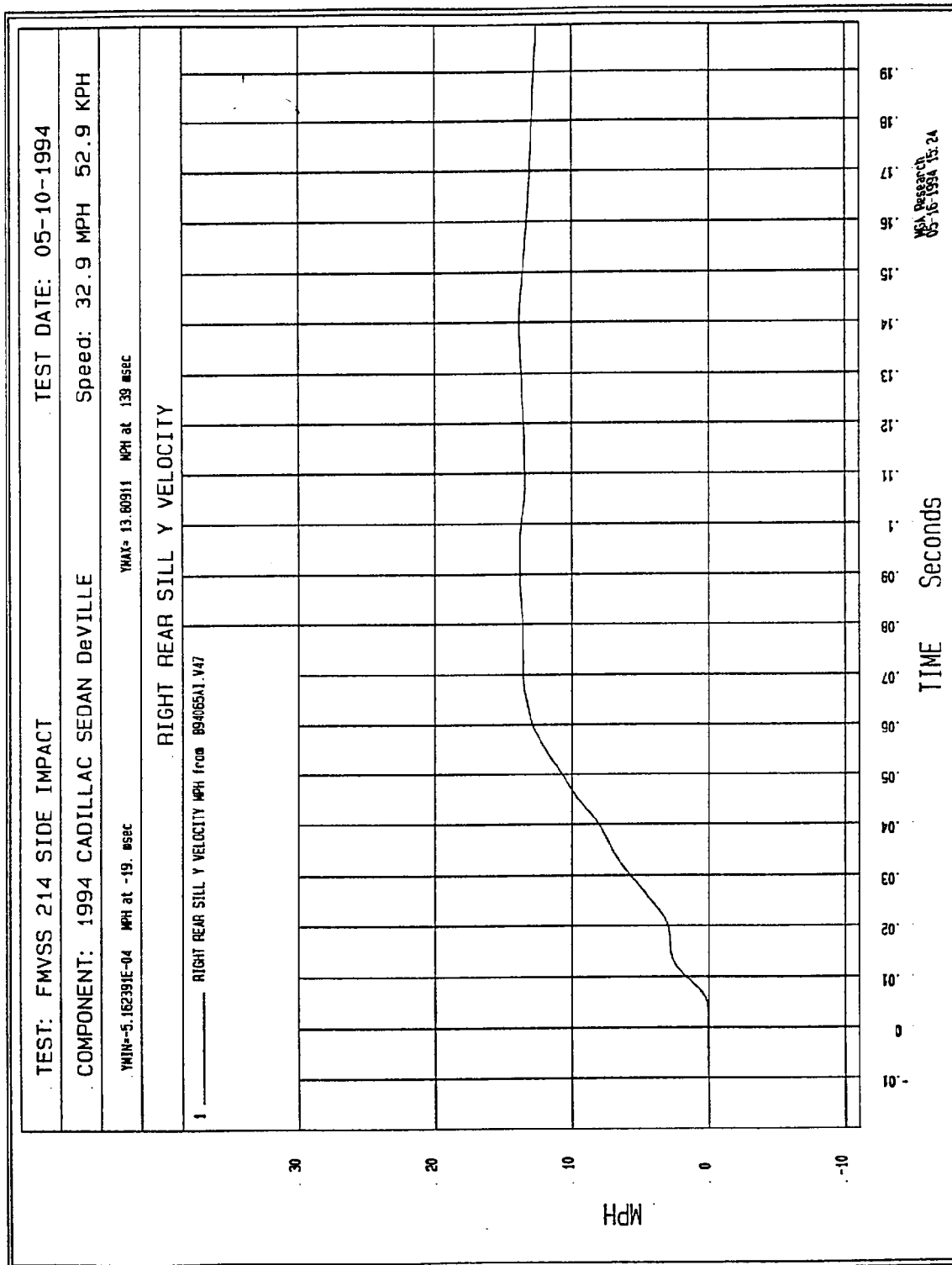


Figure B-31 - Right Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

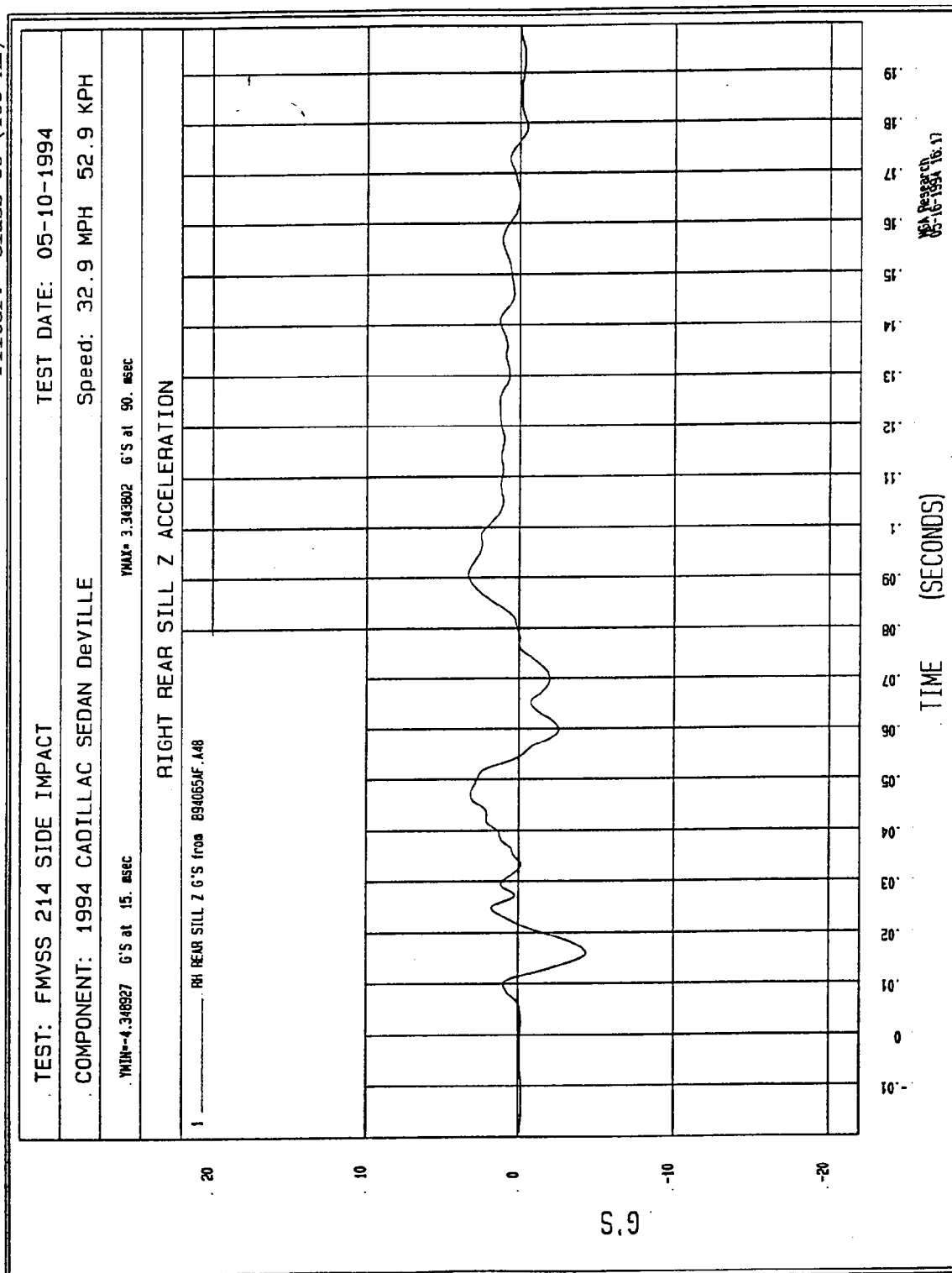


Figure B-32 - Right Rear Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

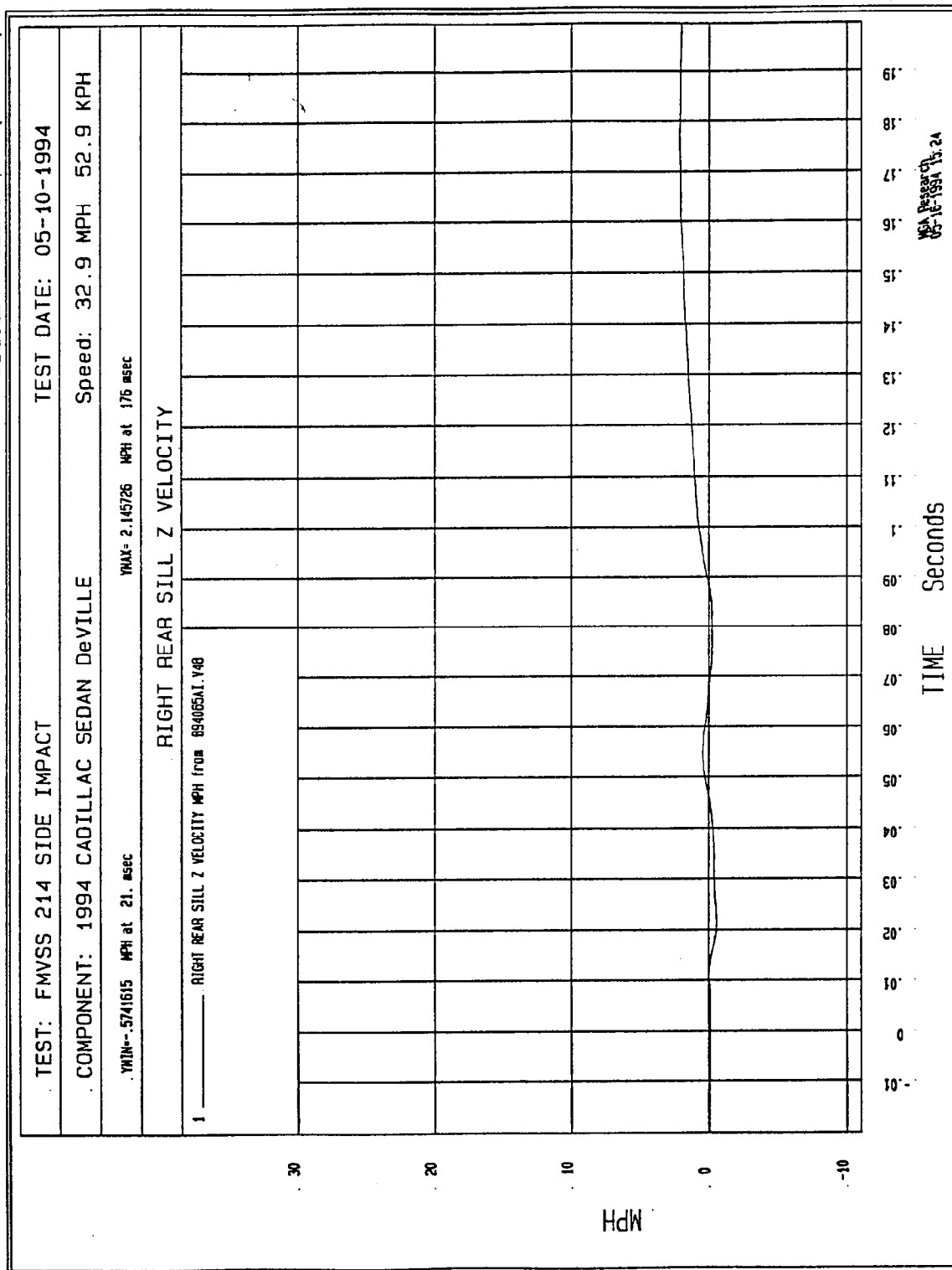


Figure B-33 - Right Rear Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)

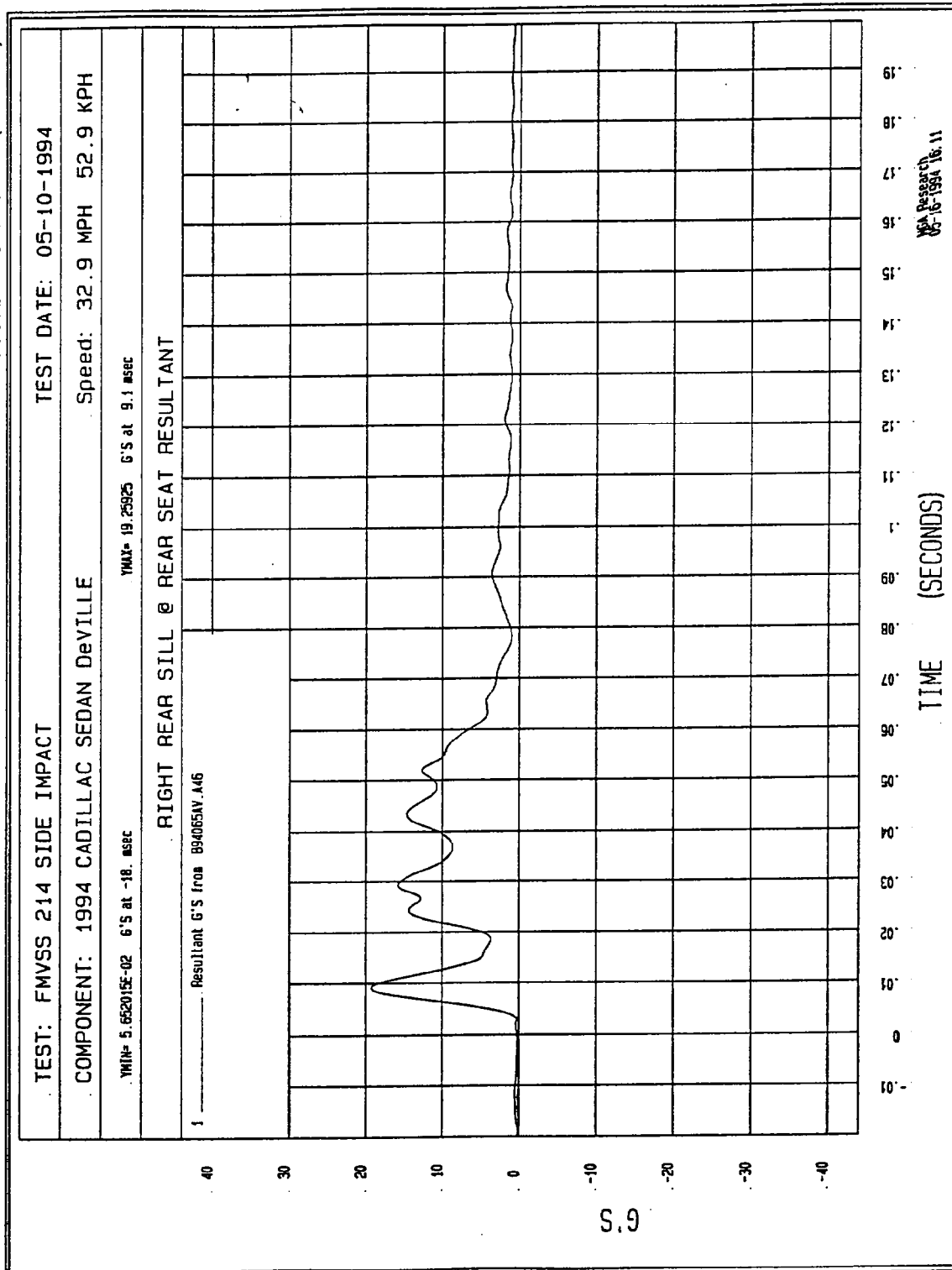


Figure B-34 - Right Rear Sill at Rear Seat Resultant vs. Time

Filter: Class 60 (100 Hz)

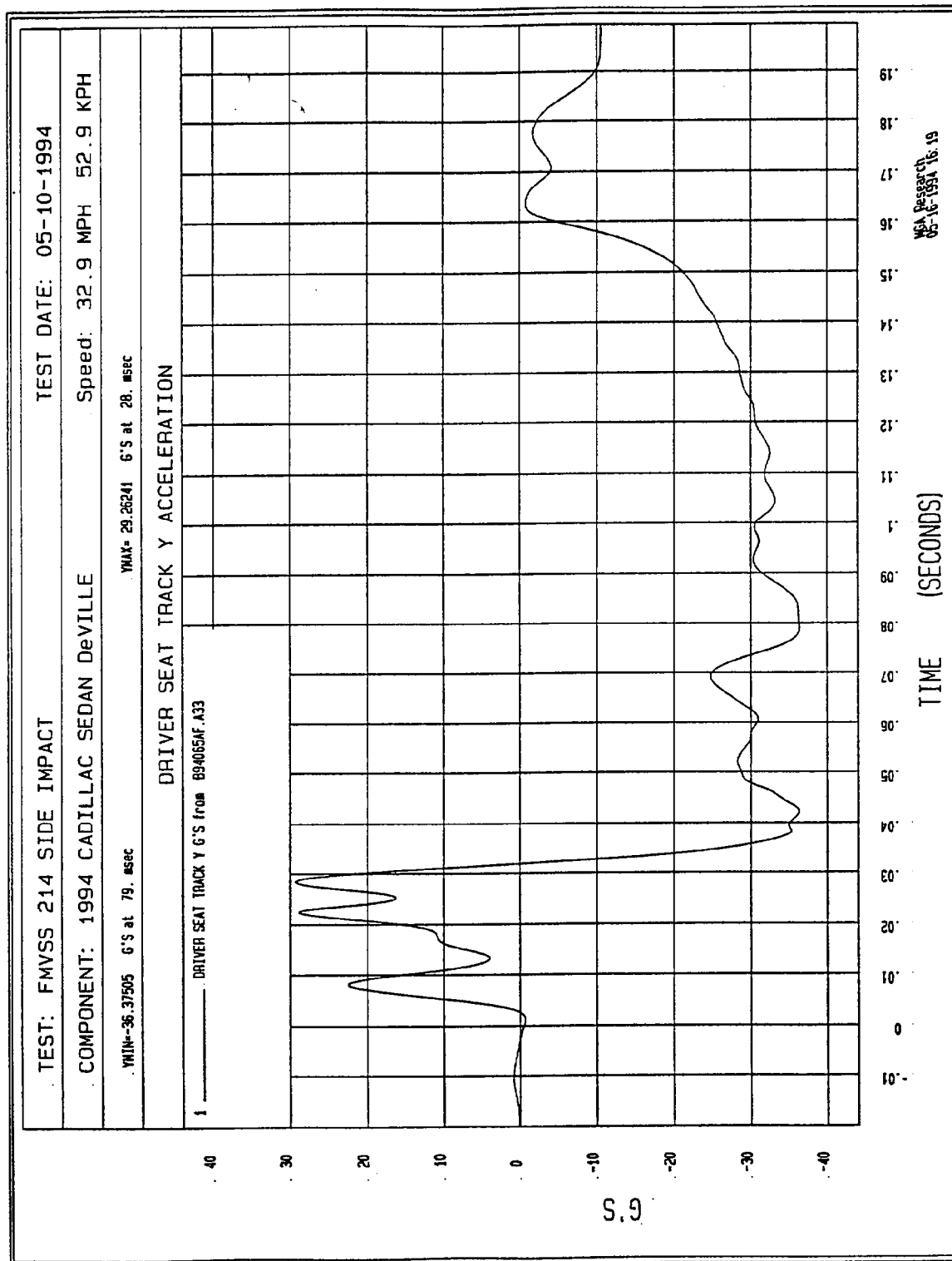


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

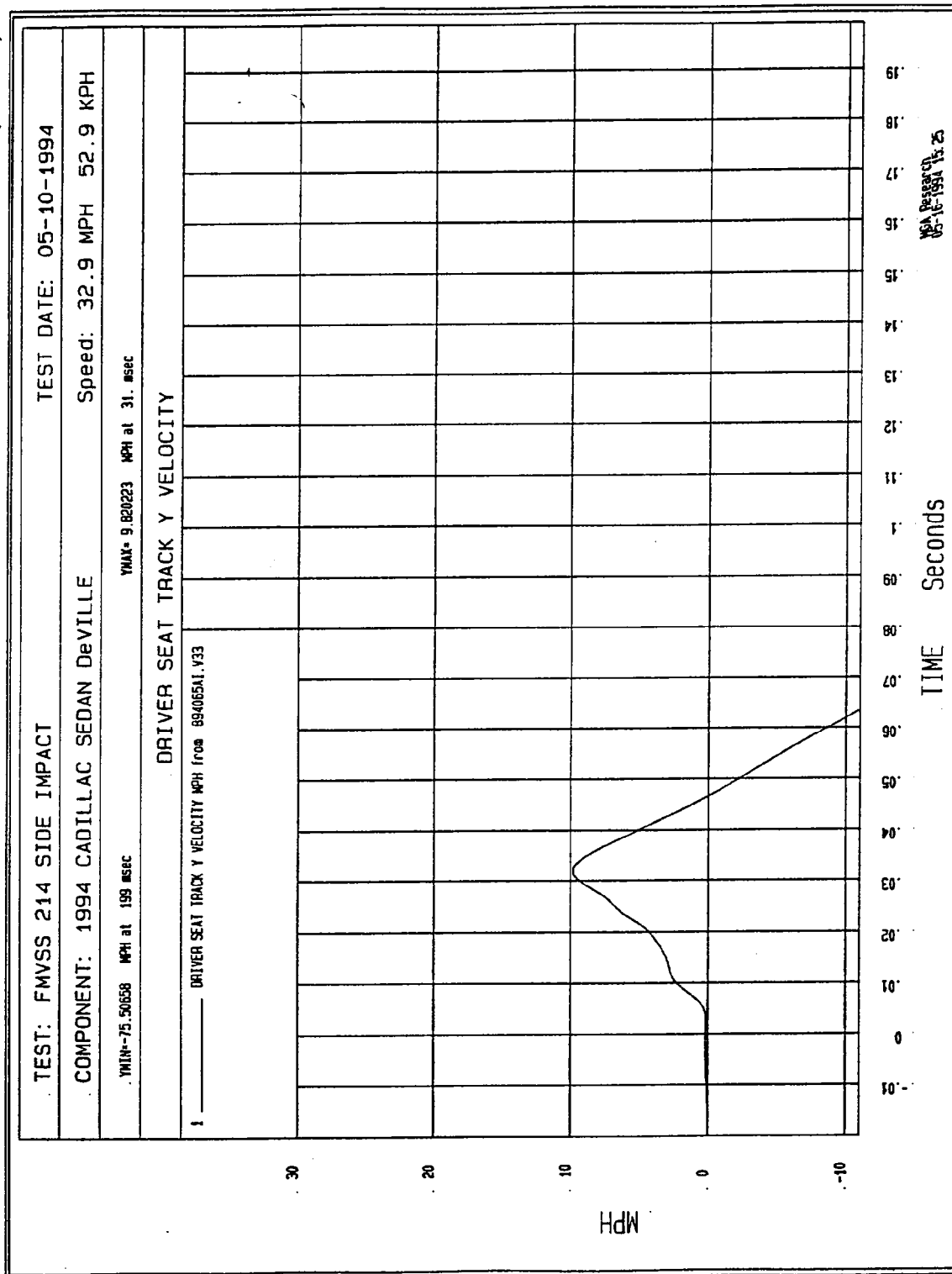
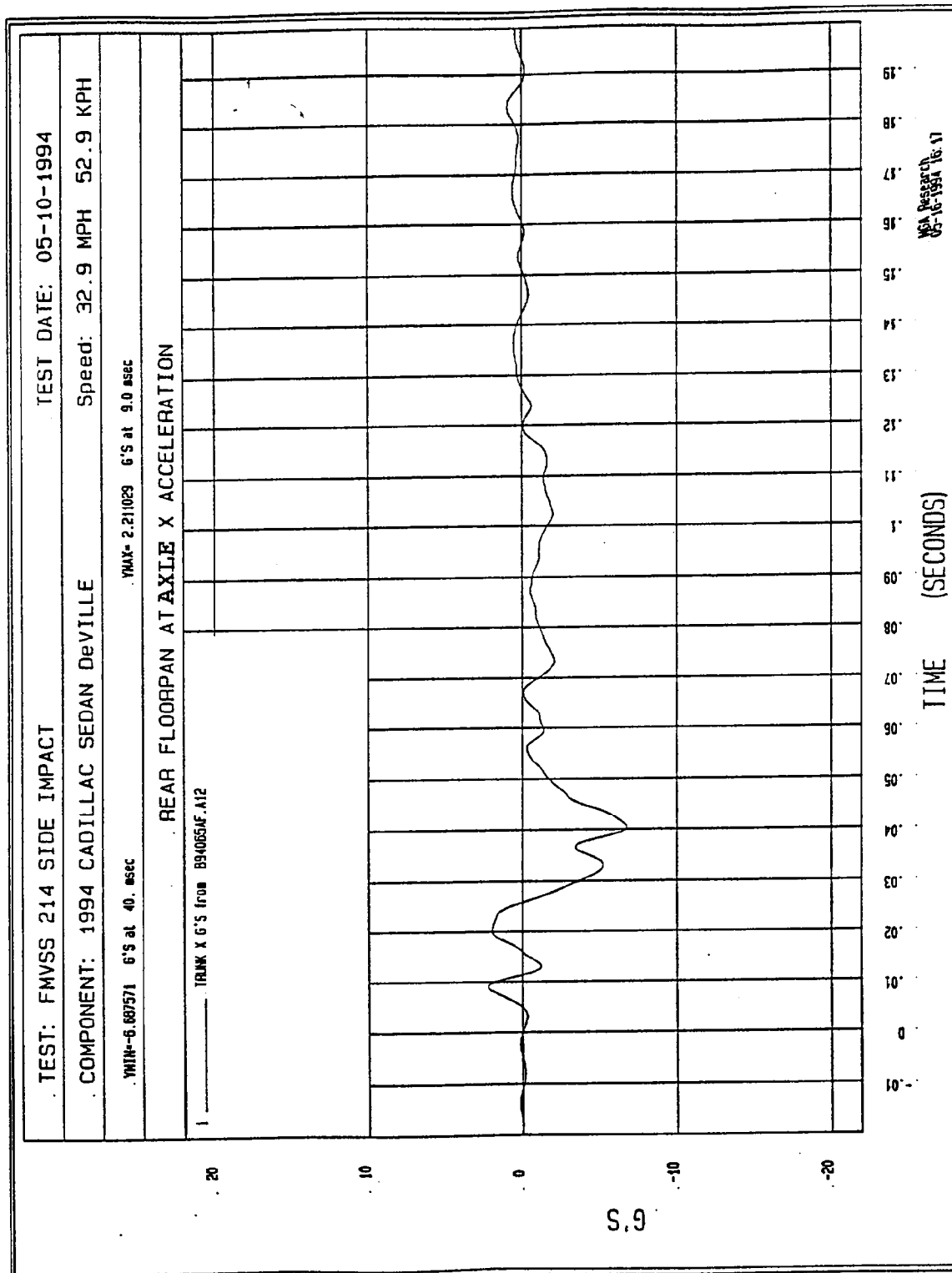


Figure B-36 - Driver Seat Track Y Velocity vs. Time

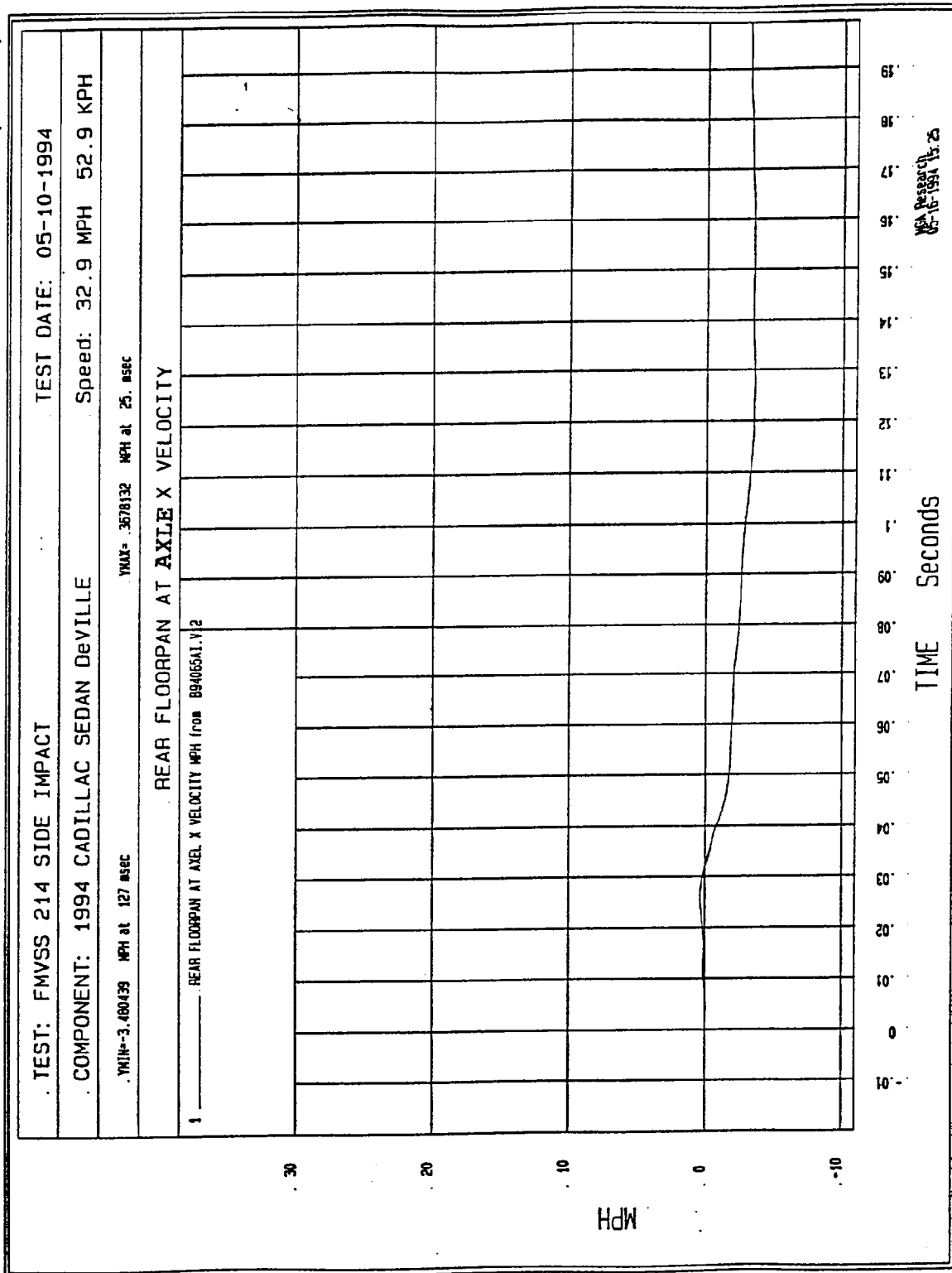
Filter: Class 60 (100 Hz)



B-37

Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

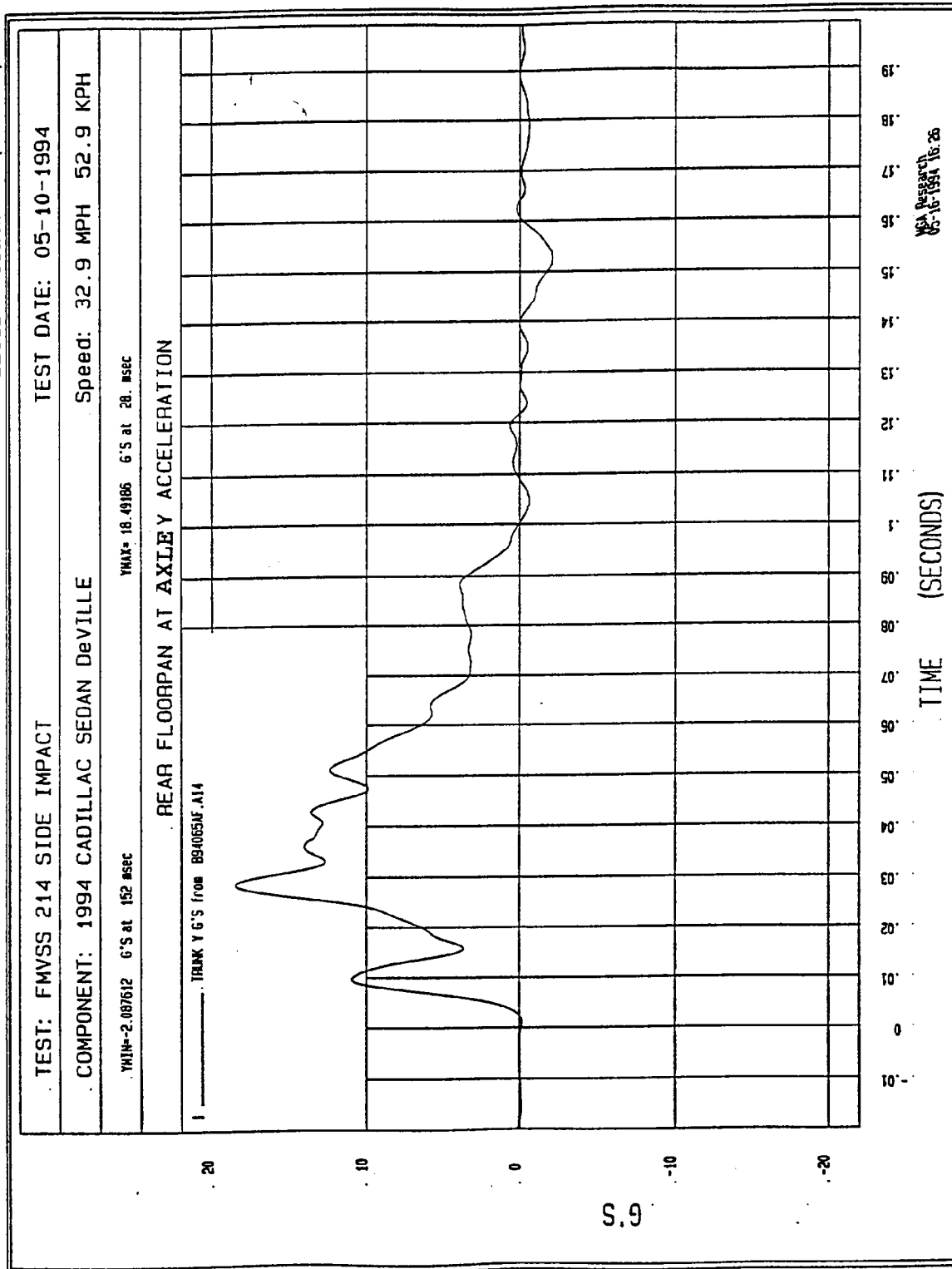
Filter: Class 180 (300 Hz)



B-38

Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)



B-39

Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

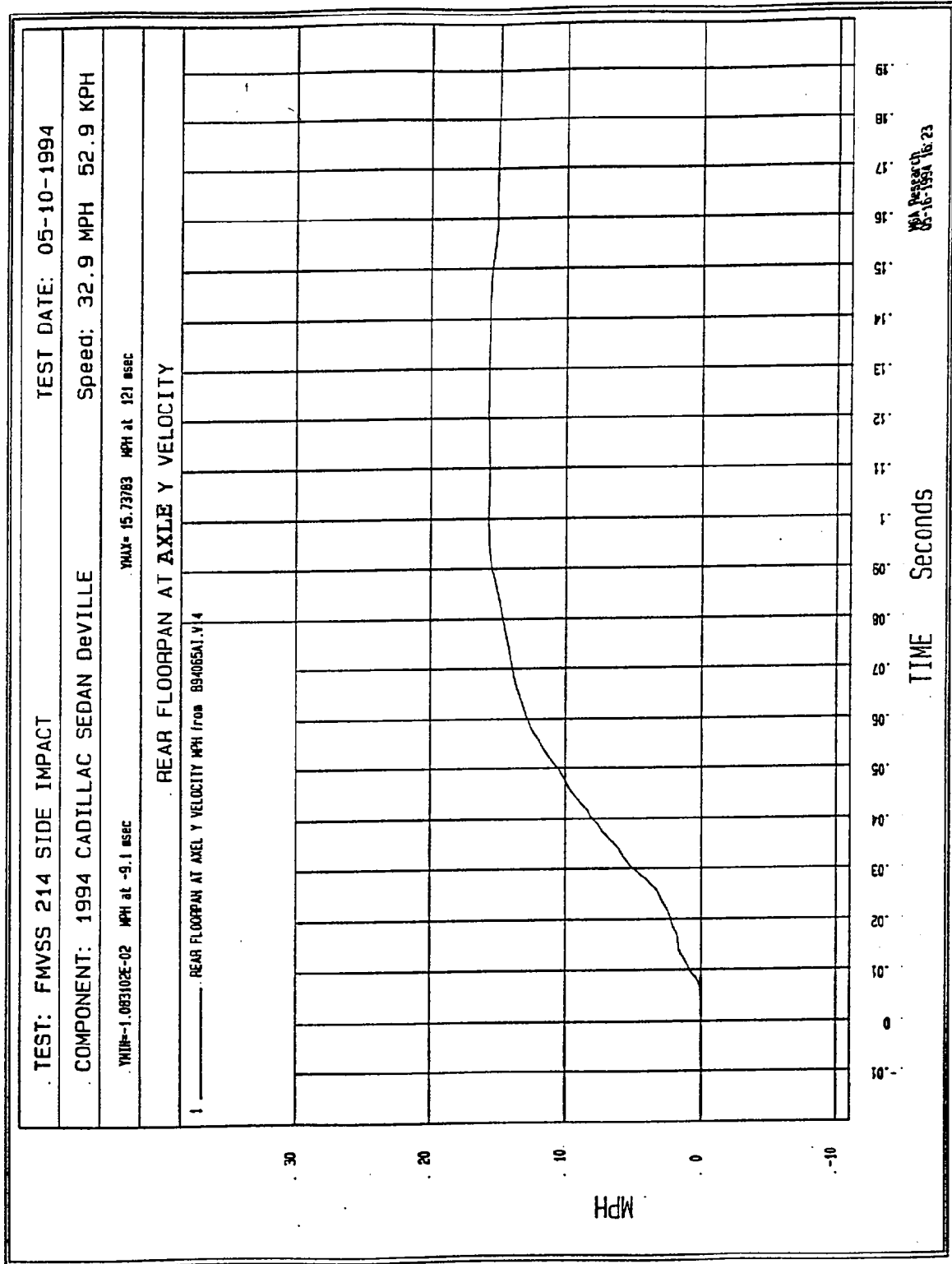
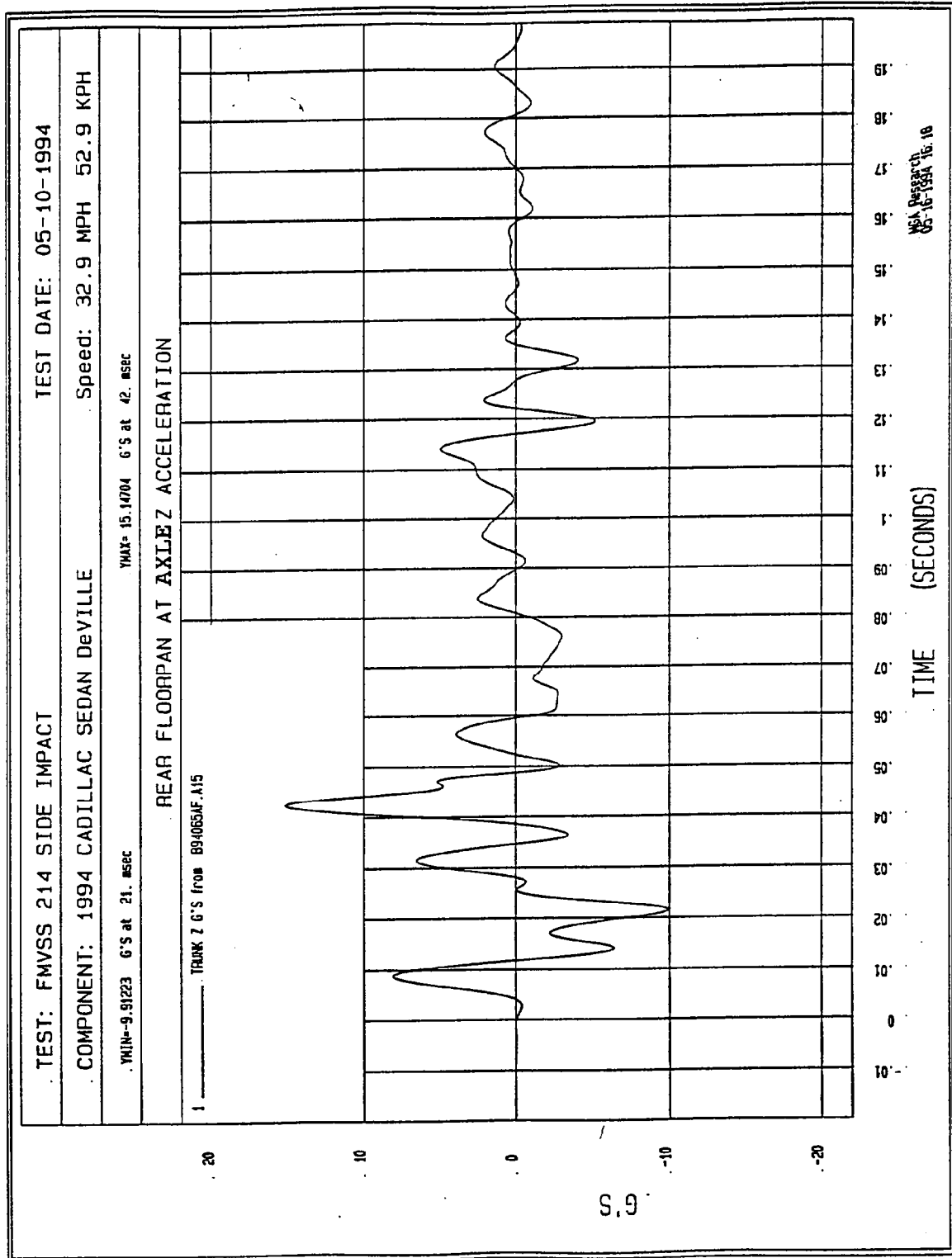


Figure B-40 - Rear Floorpan at Axle Y Velocity vs. Time

Filter: Class 60 (100 Hz)



B-41T

Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

Filter: Class 60 (100 Hz)

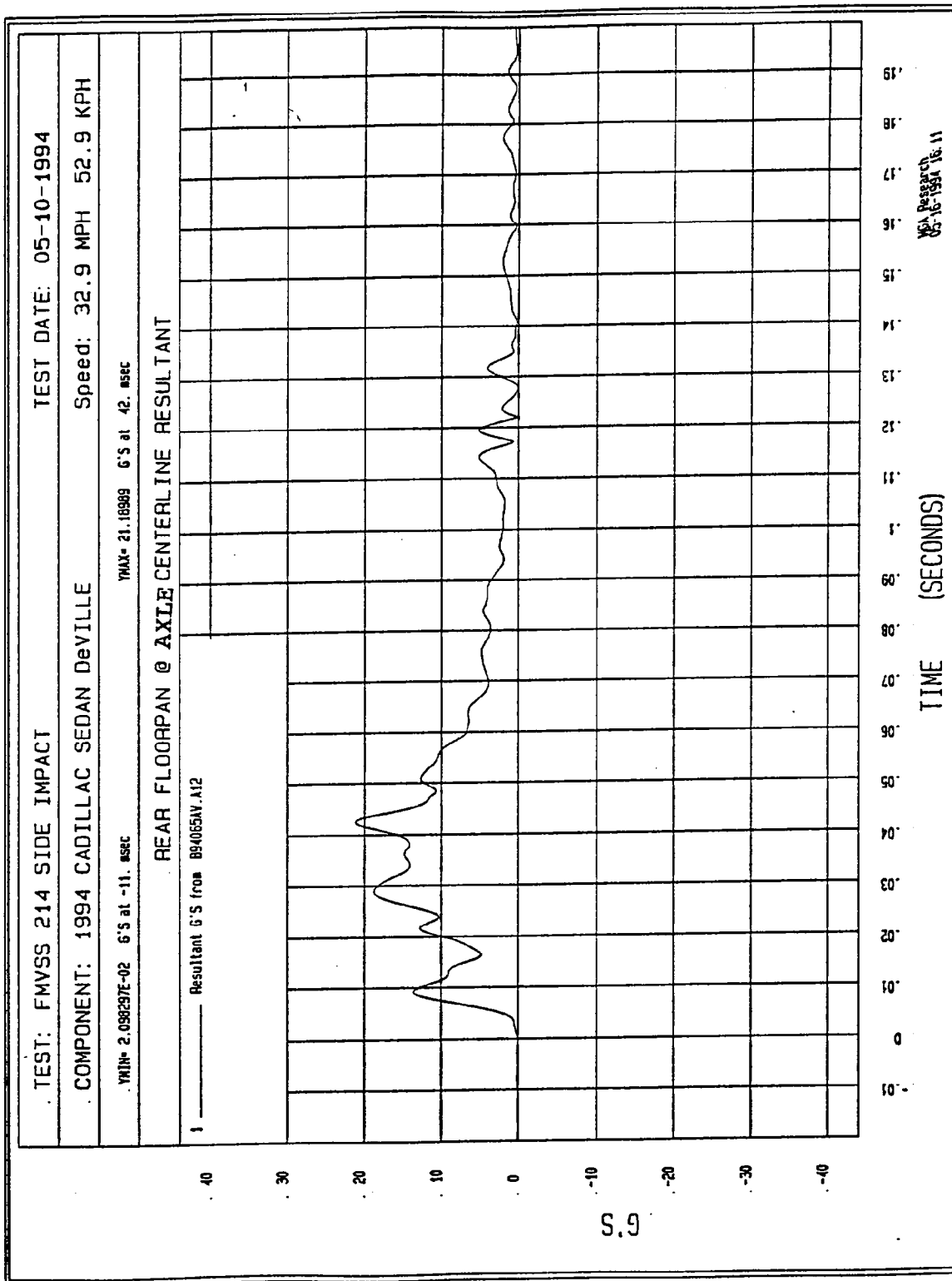


Figure B-42 - Rear Floorpan at Axle Centerline Resultant vs. Time

Filter: Class 60 (100 Hz)

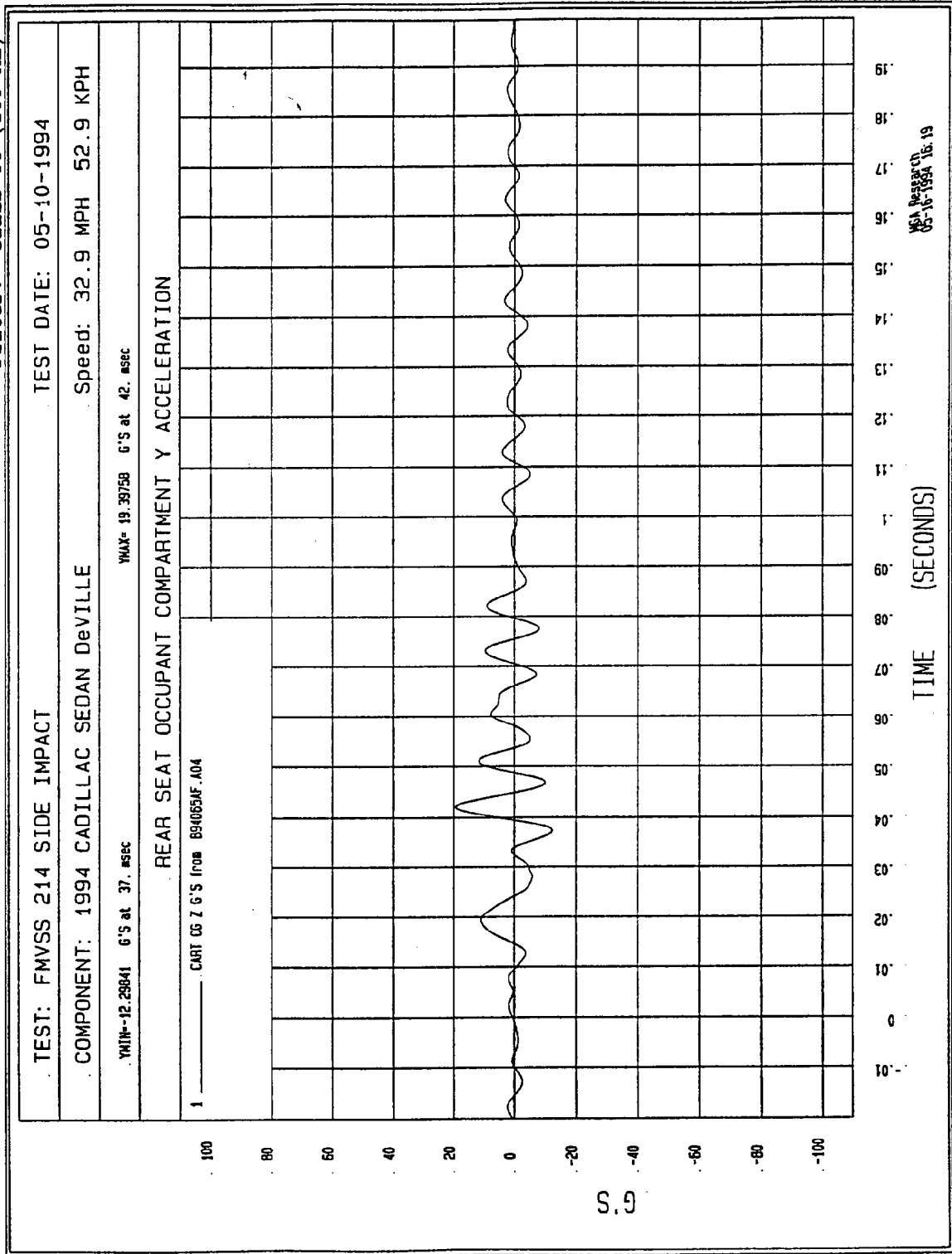


Figure B-43 - Rear Seat Occupant Compartment Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

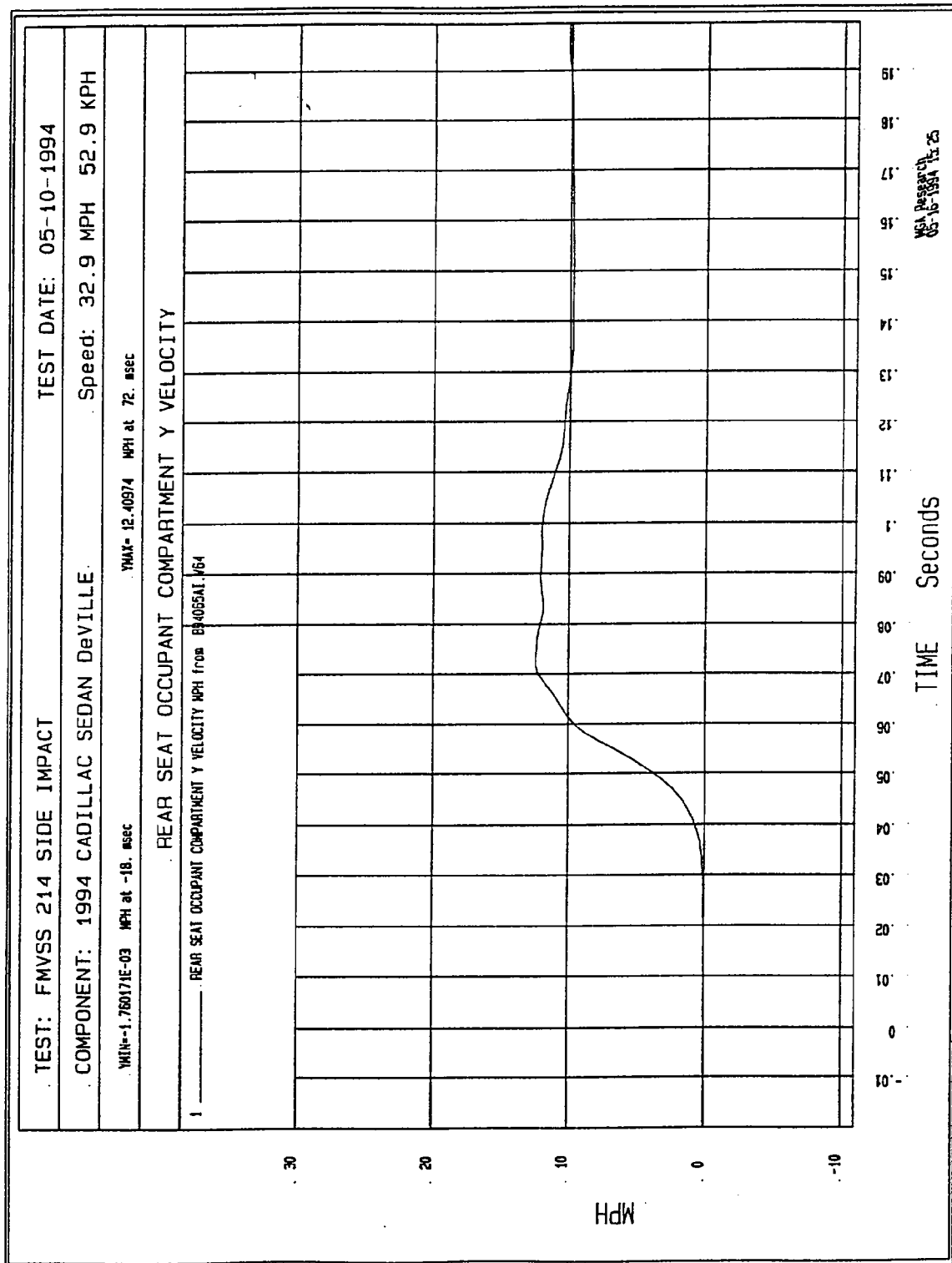


Figure B-44 - Rear Seat Occupant Compartment Y Velocity vs. Time

Filter: Class 60 (100 Hz)

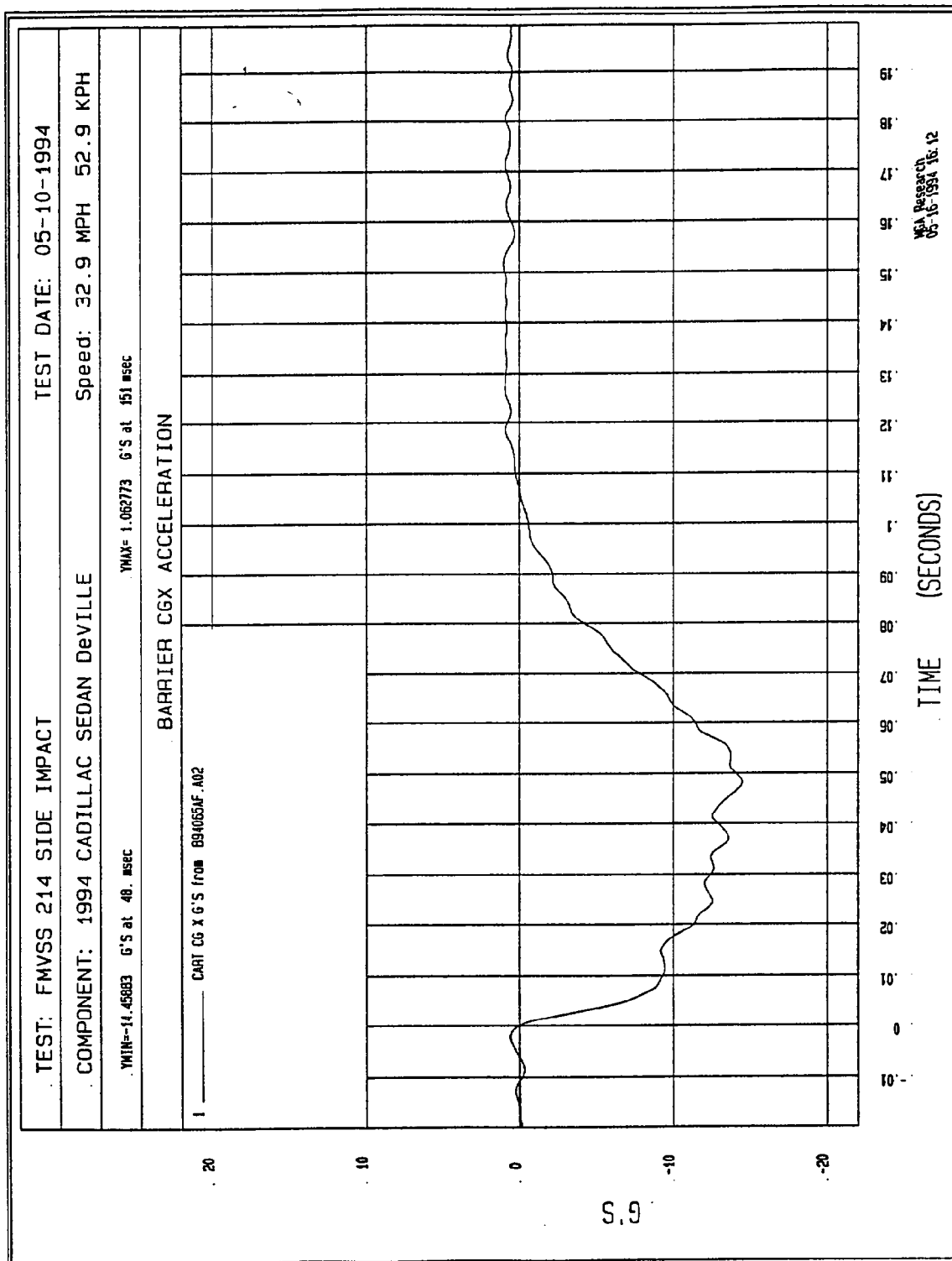


Figure B-45 - Moving Barrier Center of Gravity X Acceleration vs. Time

Filter: Class 180 (300 Hz)

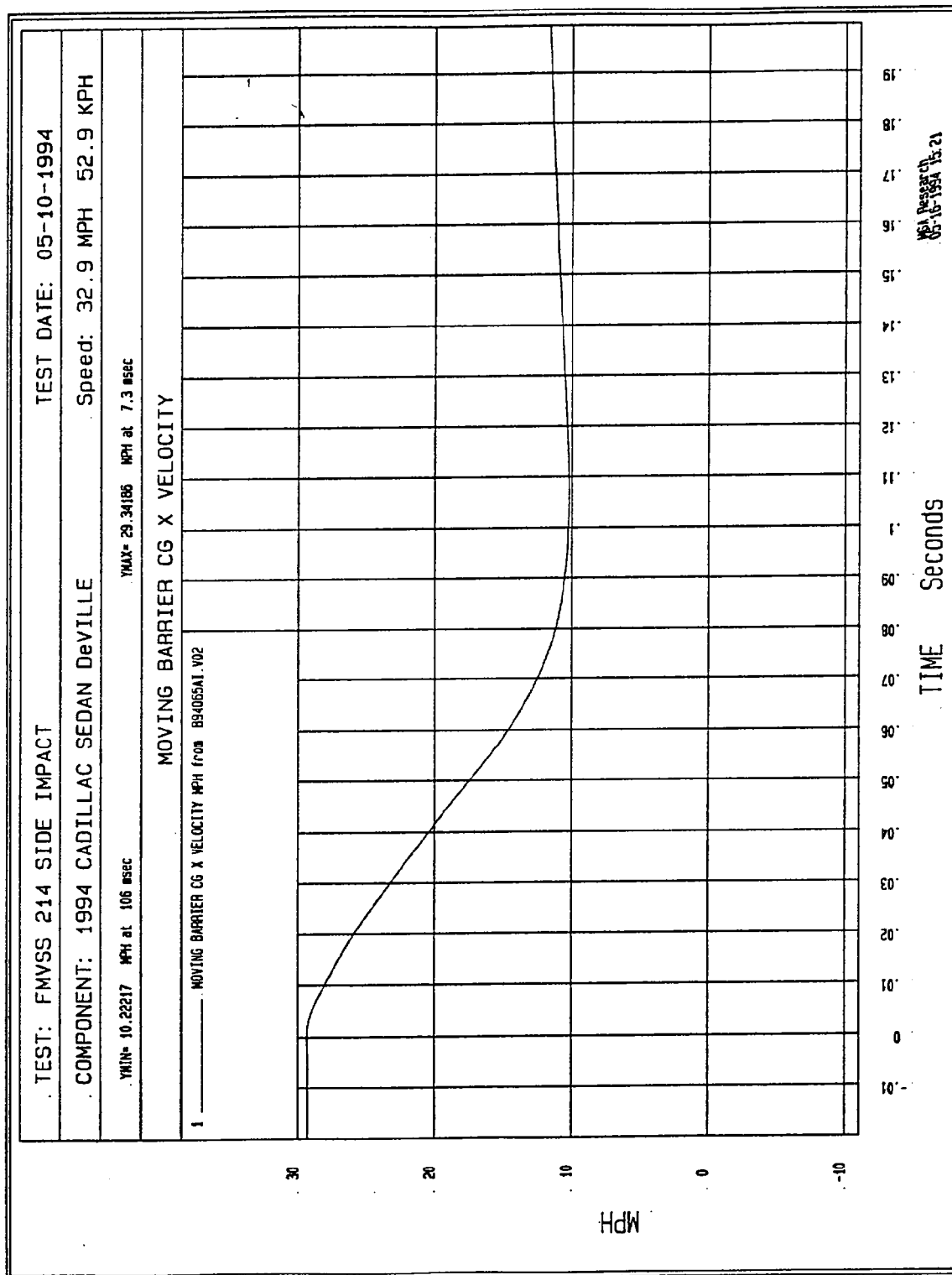


Figure B-46 - Moving Barrier Center of Gravity X Velocity vs. Time

Filter: Class 60 (100 Hz)

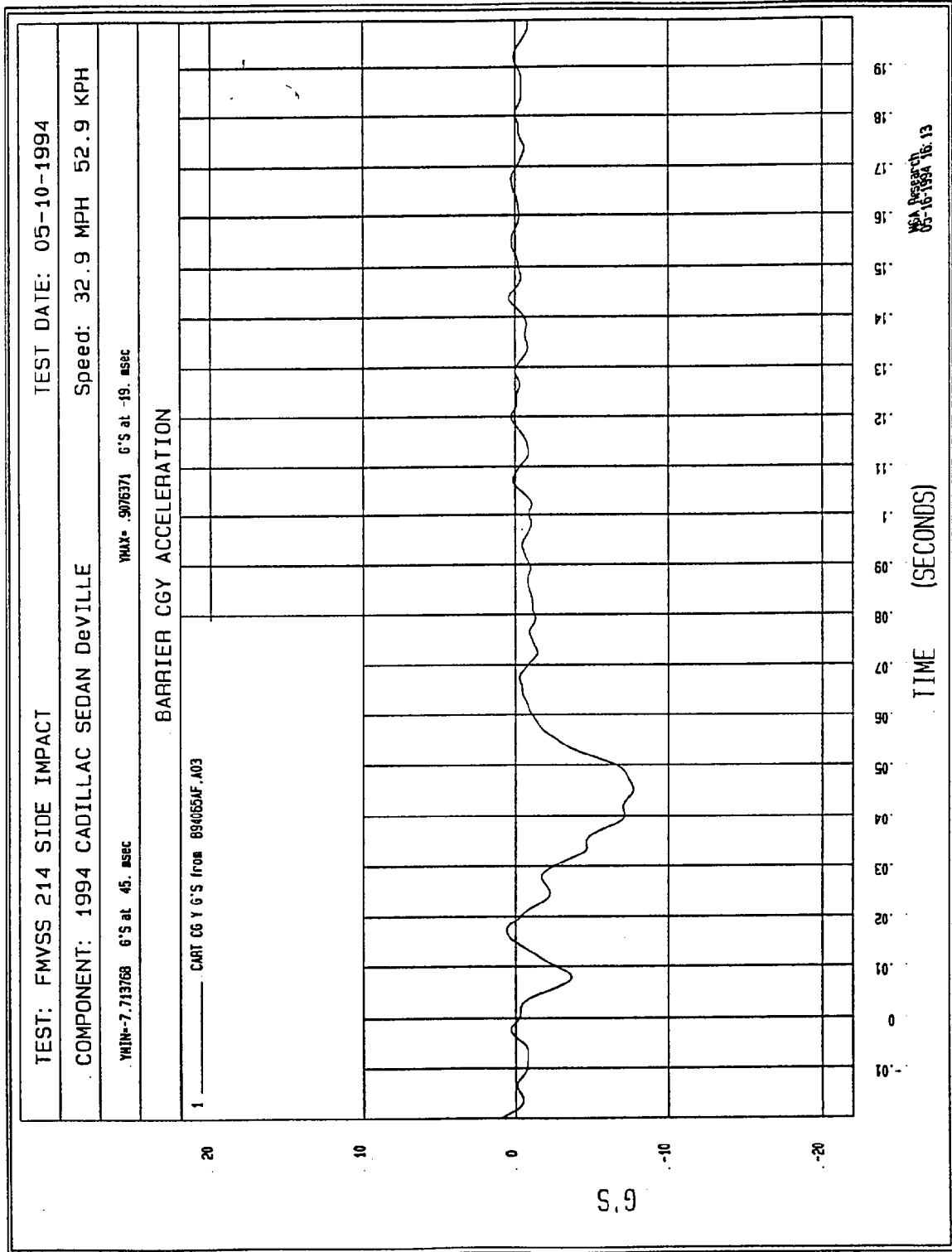


Figure B-47 - Moving Barrier Center of Gravity Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

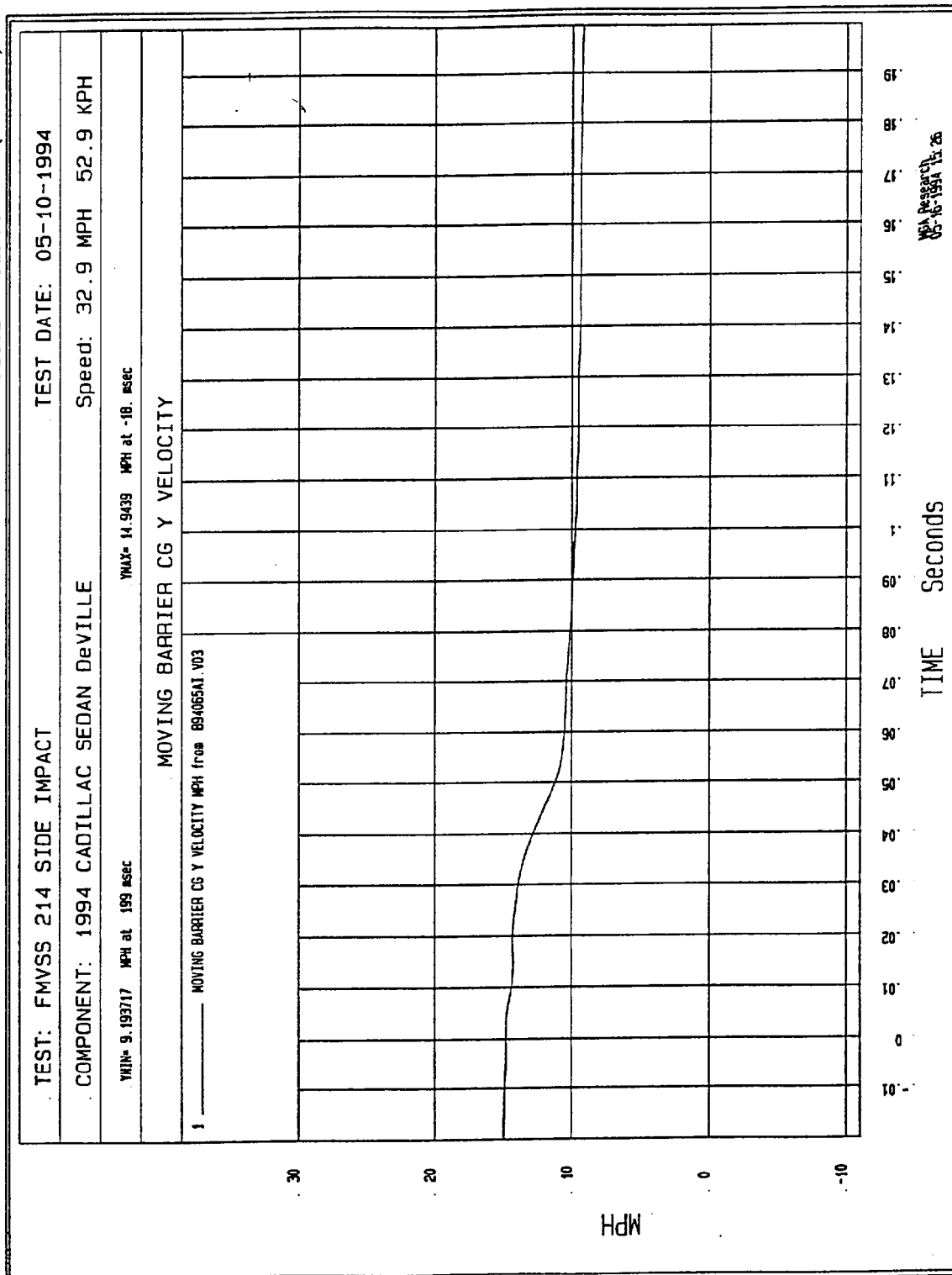


Figure B-48 - Moving Barrier Center of Gravity Y Velocity vs. Time

Filter: Class 60 (100 Hz)

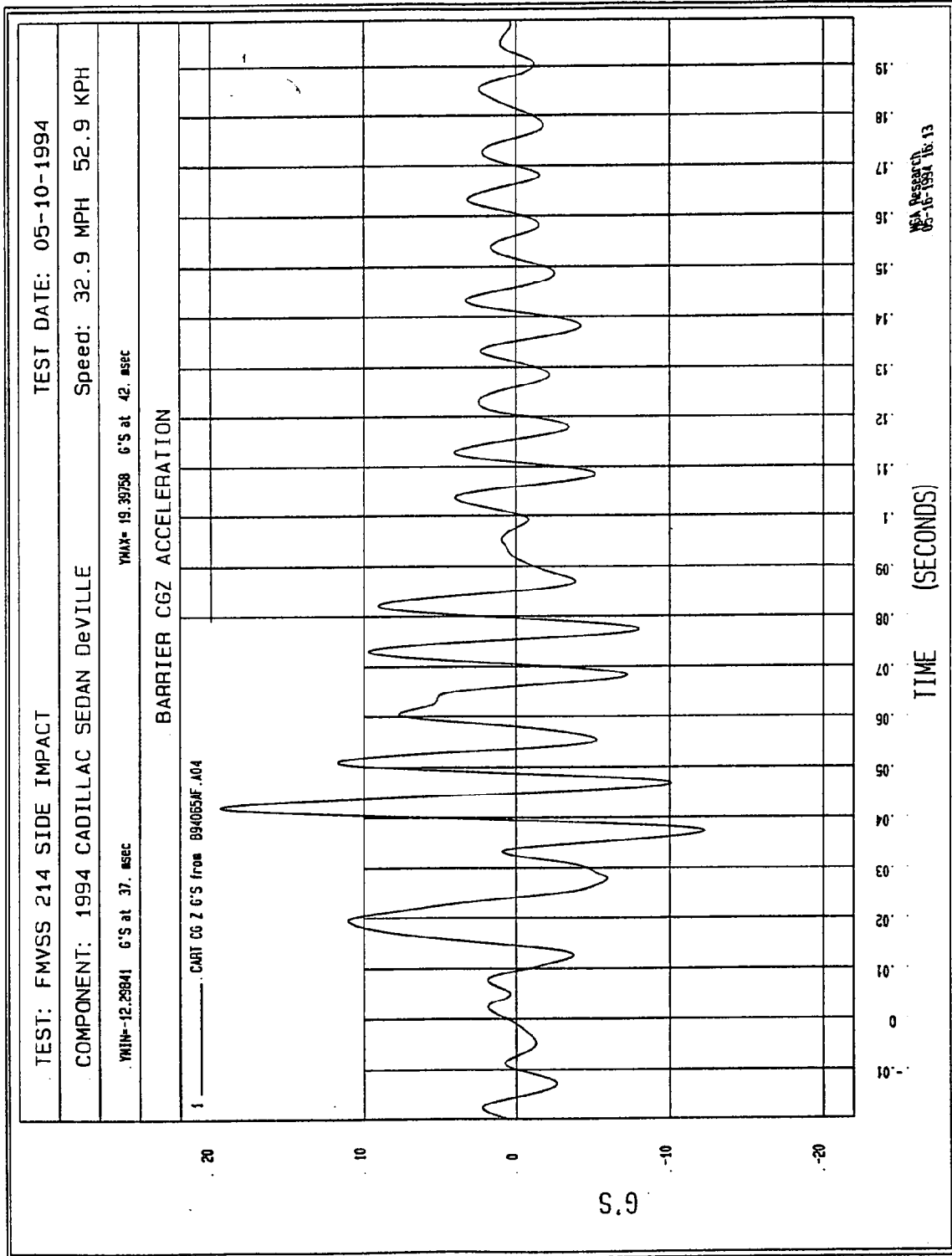


Figure B-49 - Moving Barrier Center of Gravity Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

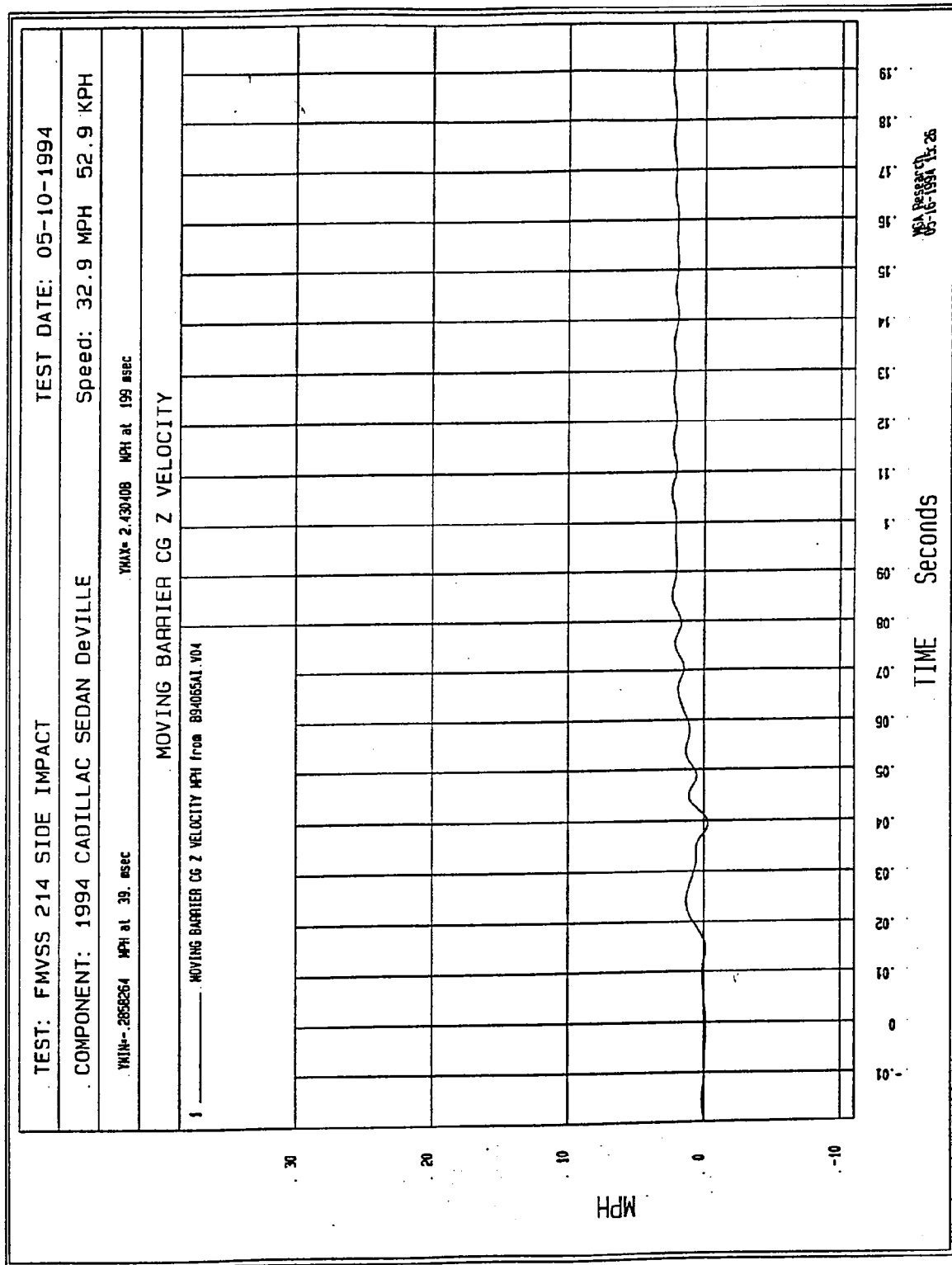


Figure B-50 - Moving Barrier Center of Gravity Z Velocity vs. Time

Filter: Class 60 (100 Hz)

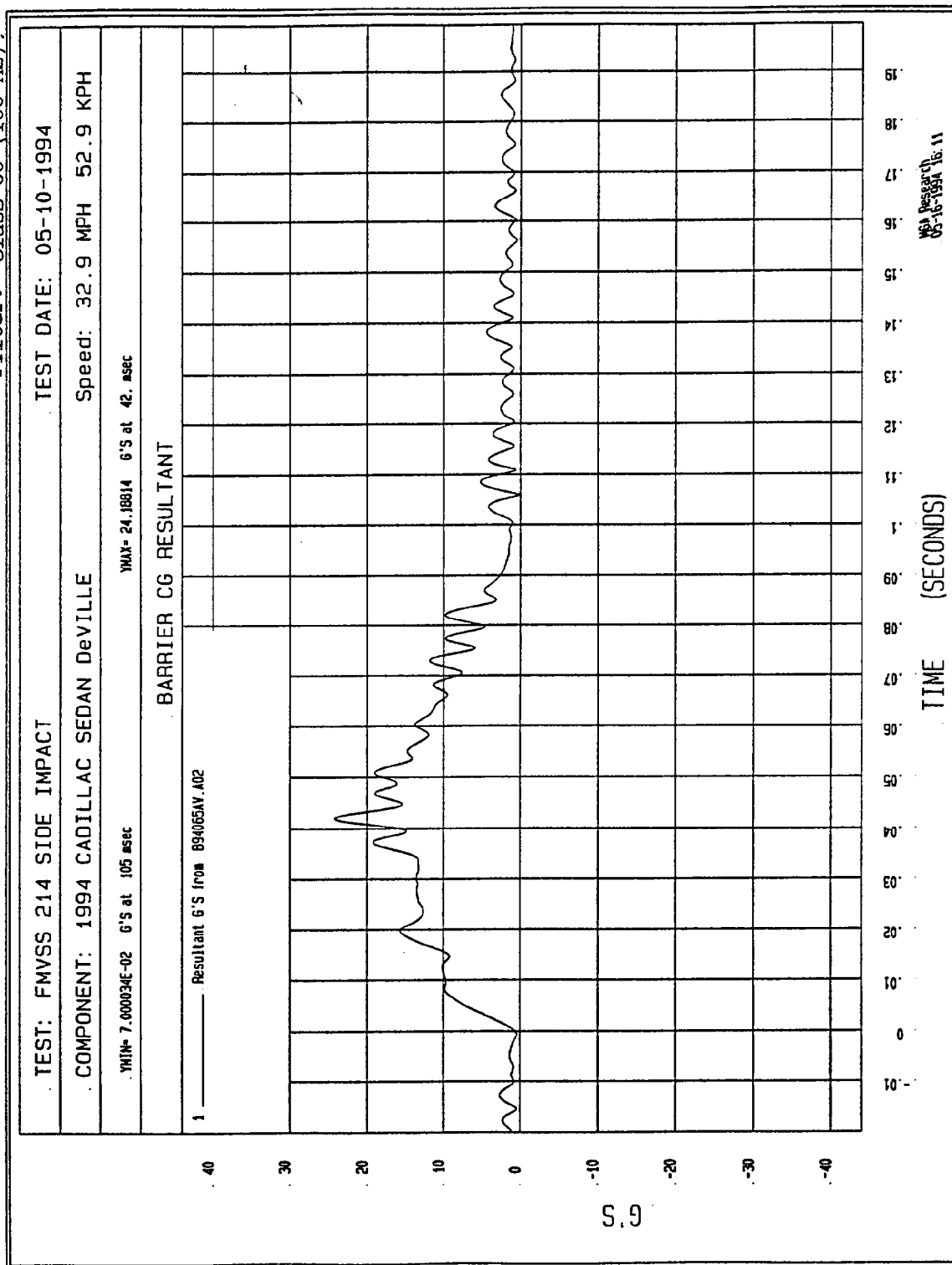


Figure B-51 - Moving Barrier Center of Gravity Resultant vs. Time

Filter: Class 60 (100 Hz)

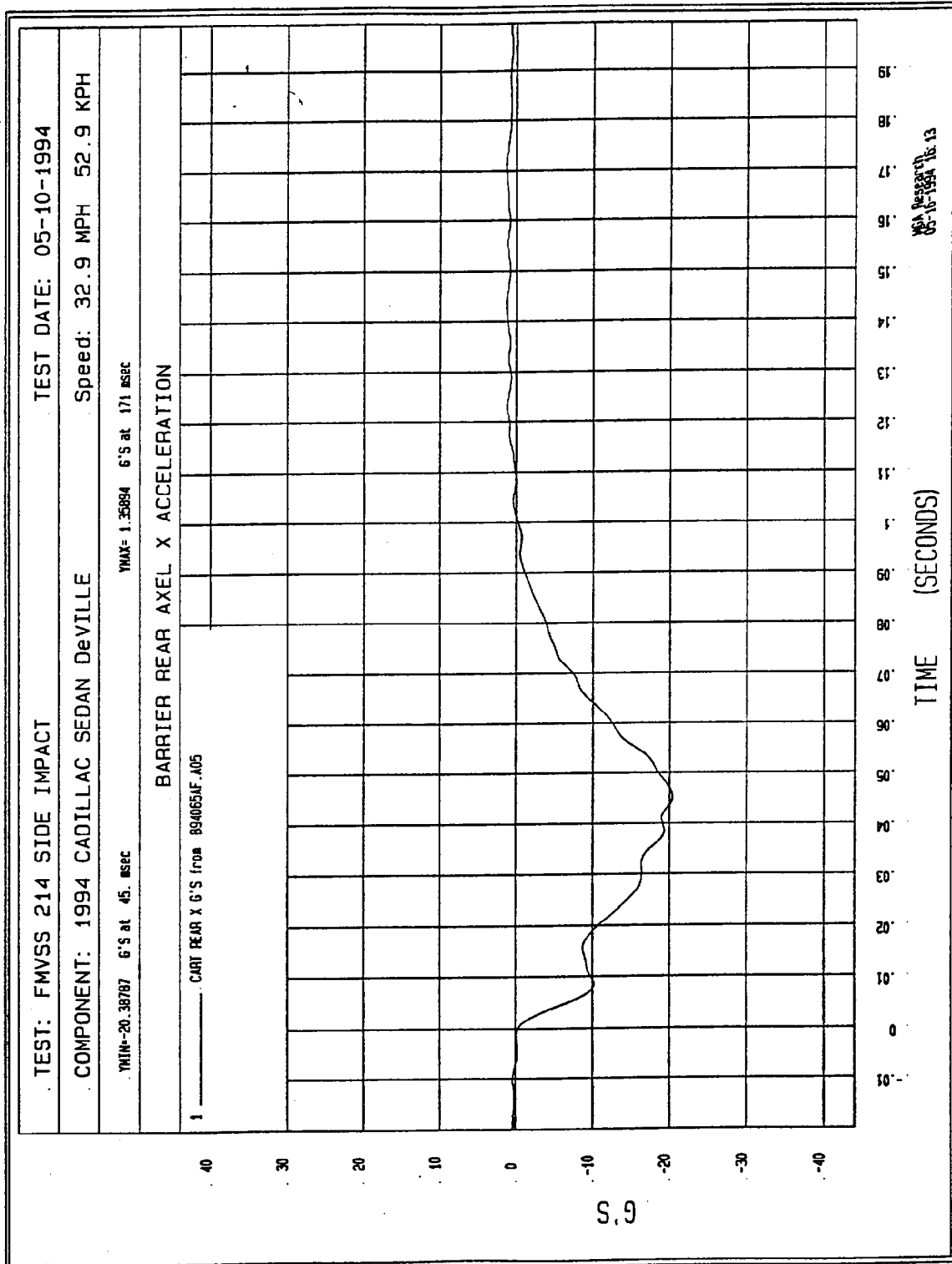


Figure B-52 - Moving Barrier Rear Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

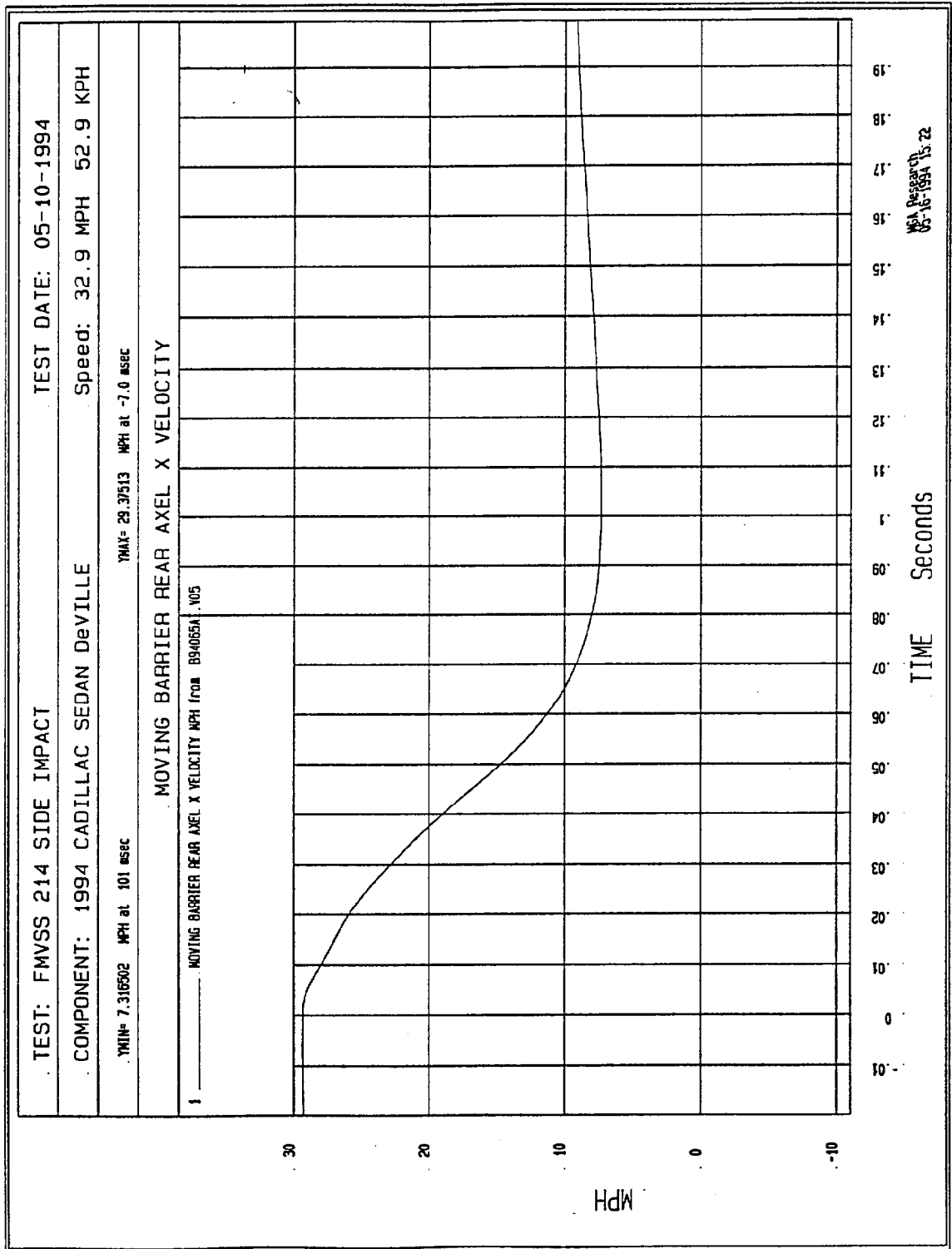


Figure B-53 - Moving Barrier Rear Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

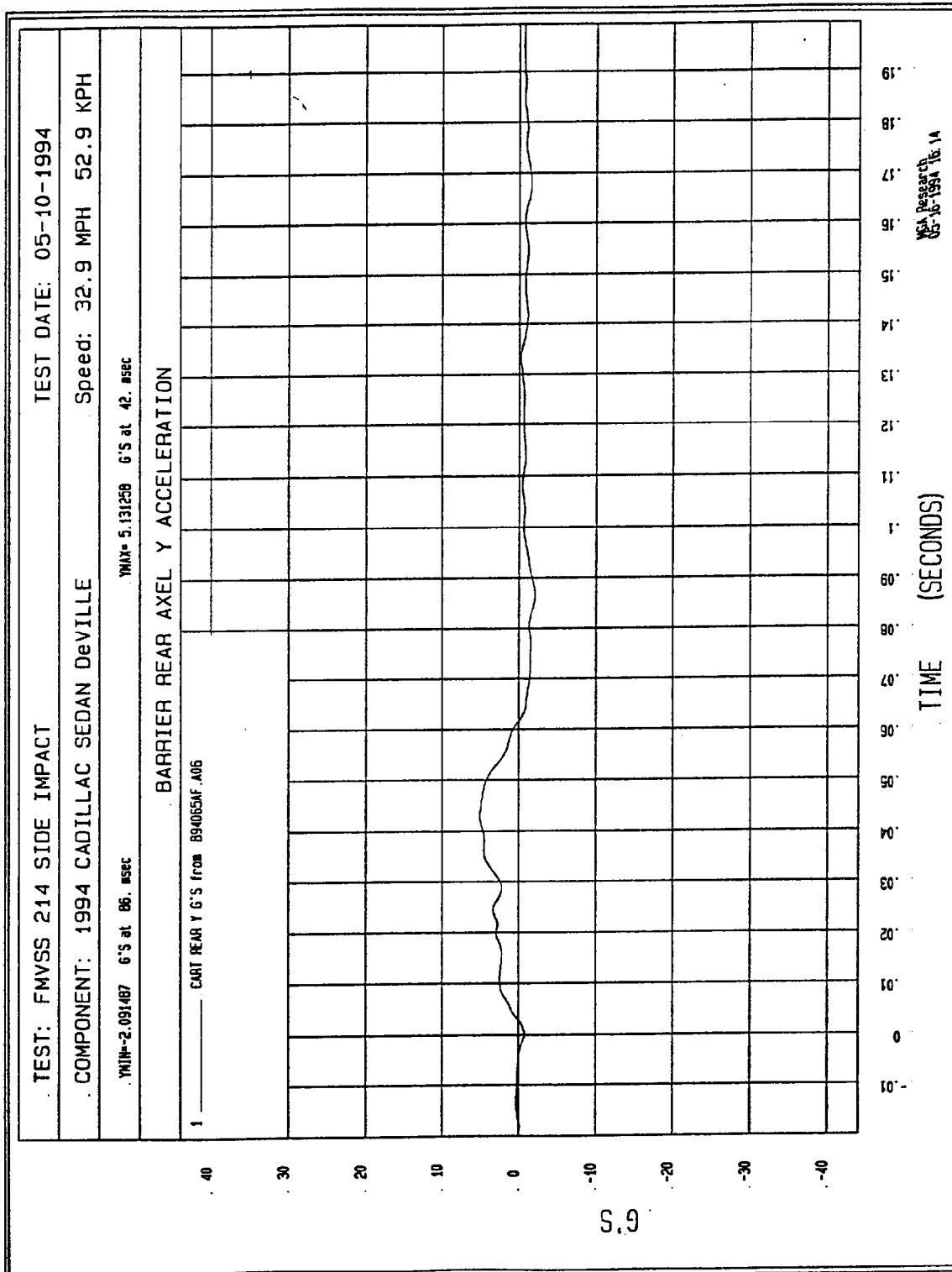
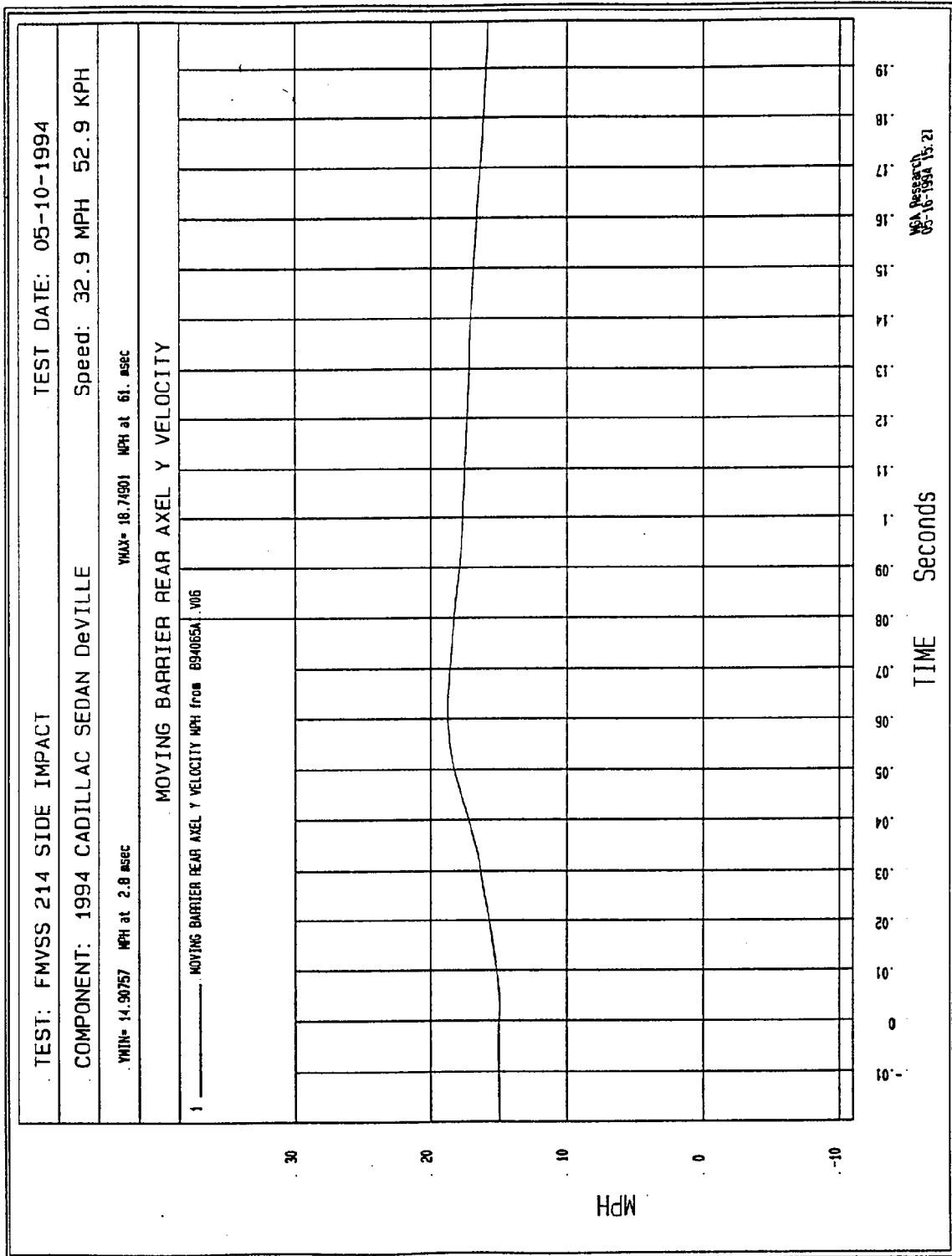


Figure B-54 - Moving Barrier Rear Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-55

Figure B-55 - Moving Barrier Rear Axle Y Velocity vs. Time

Filter: Class 1000 (1650 Hz)

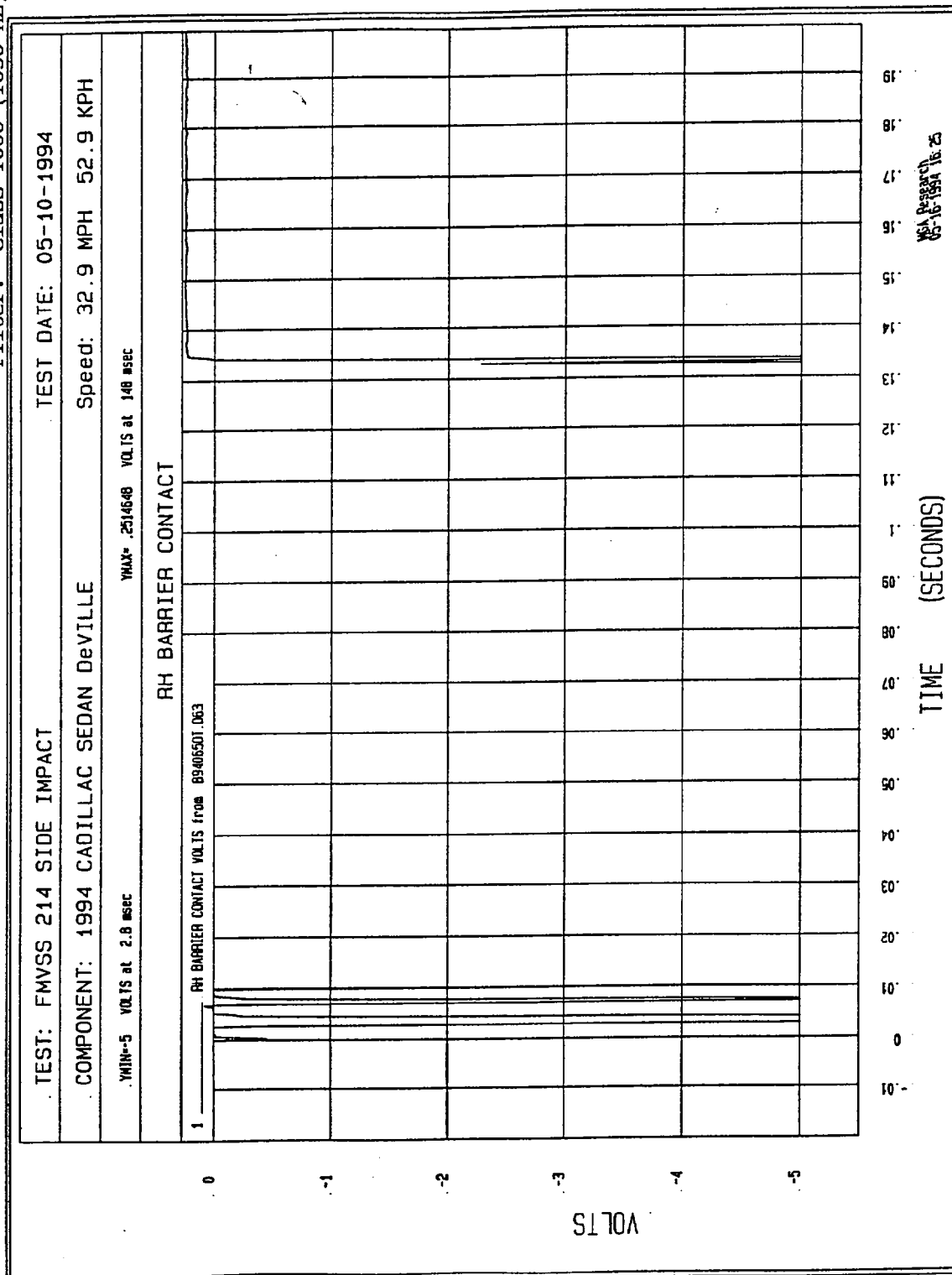


Figure B-56 - Right Hand Barrier Contact

Filter: Class 1000 (1650 Hz)

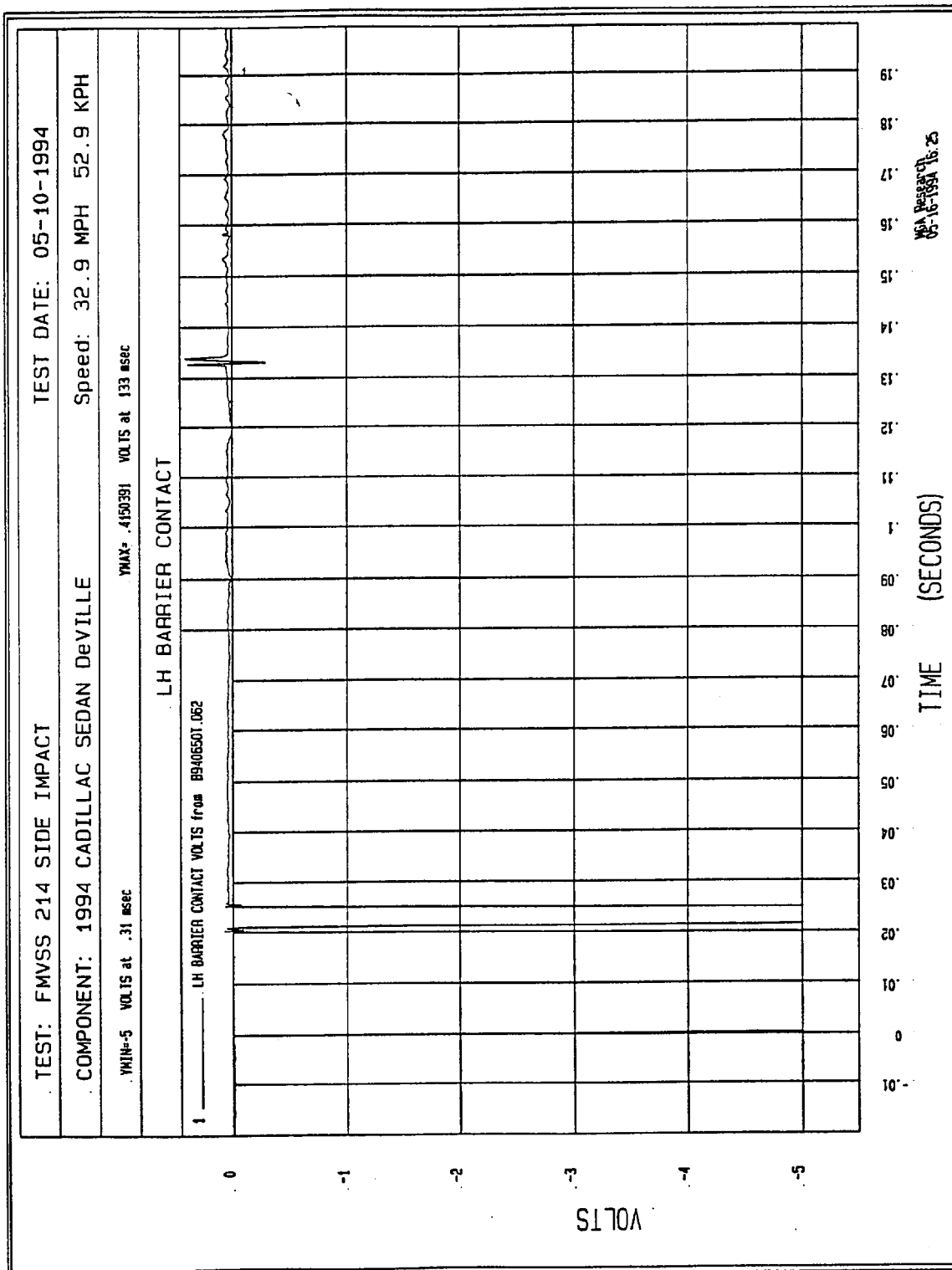


Figure B-57 - Left Hand Barrier Contact

Filter: Class 180 (300 Hz)

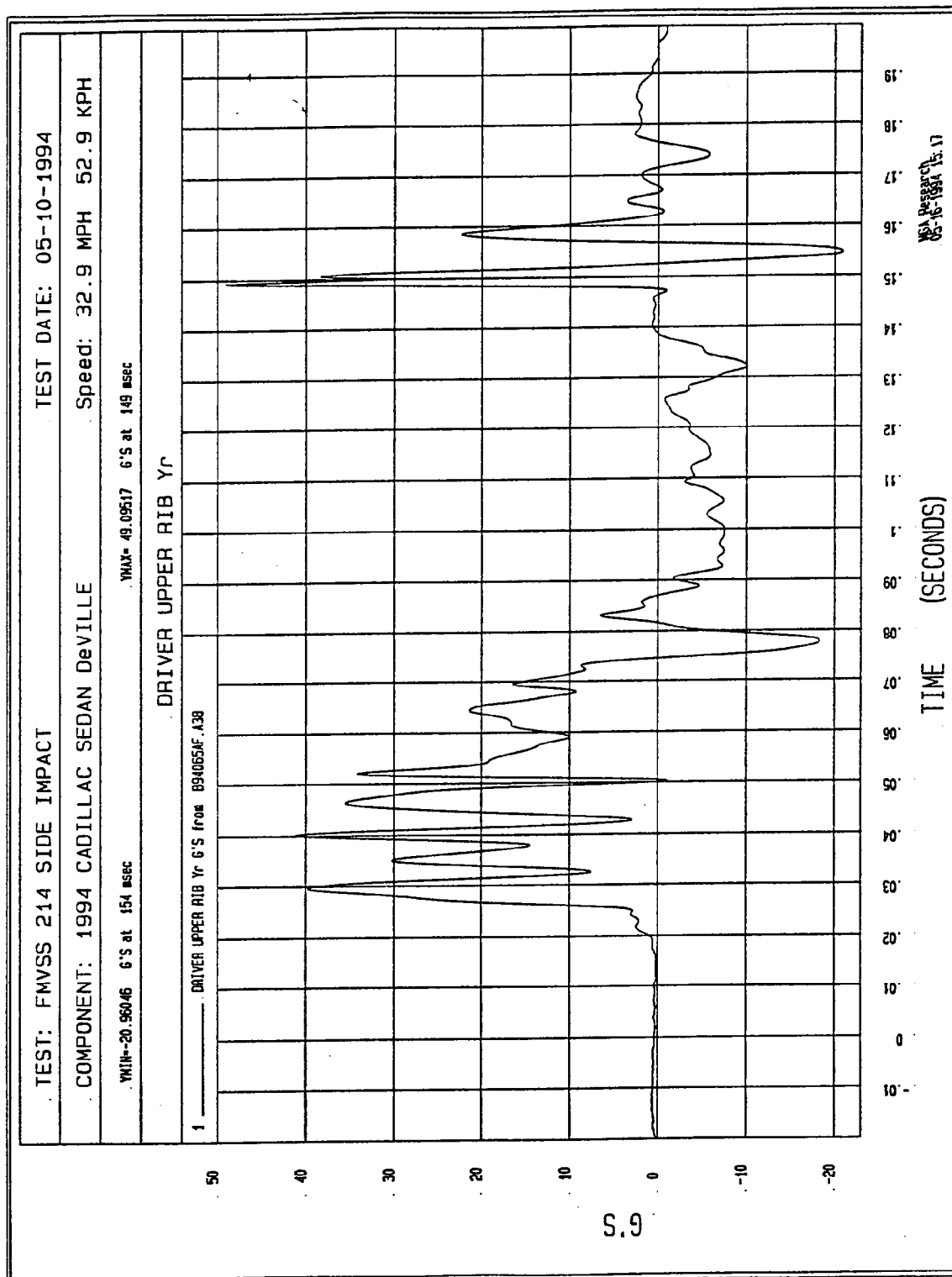


Figure B-58 - Driver Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

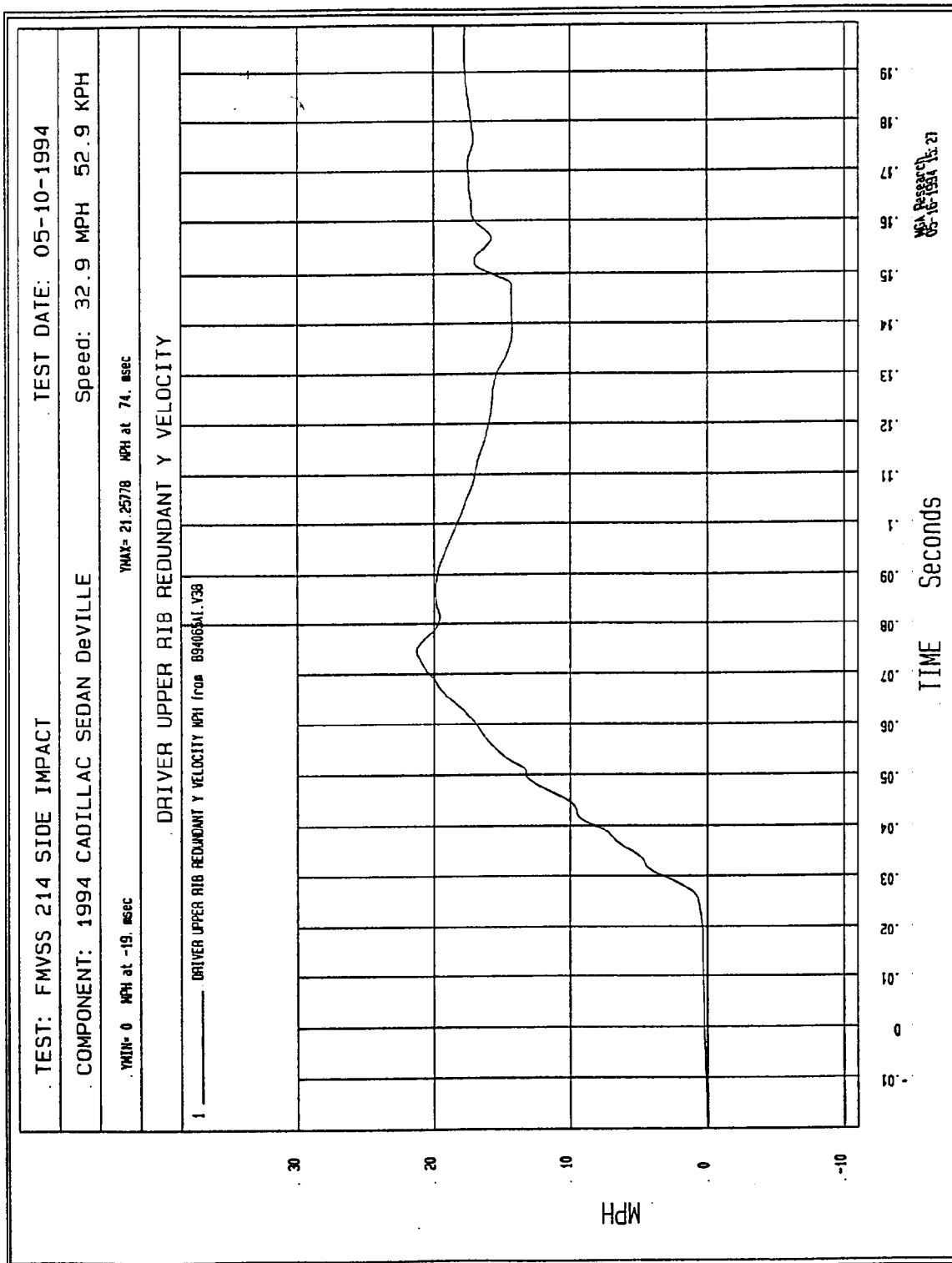
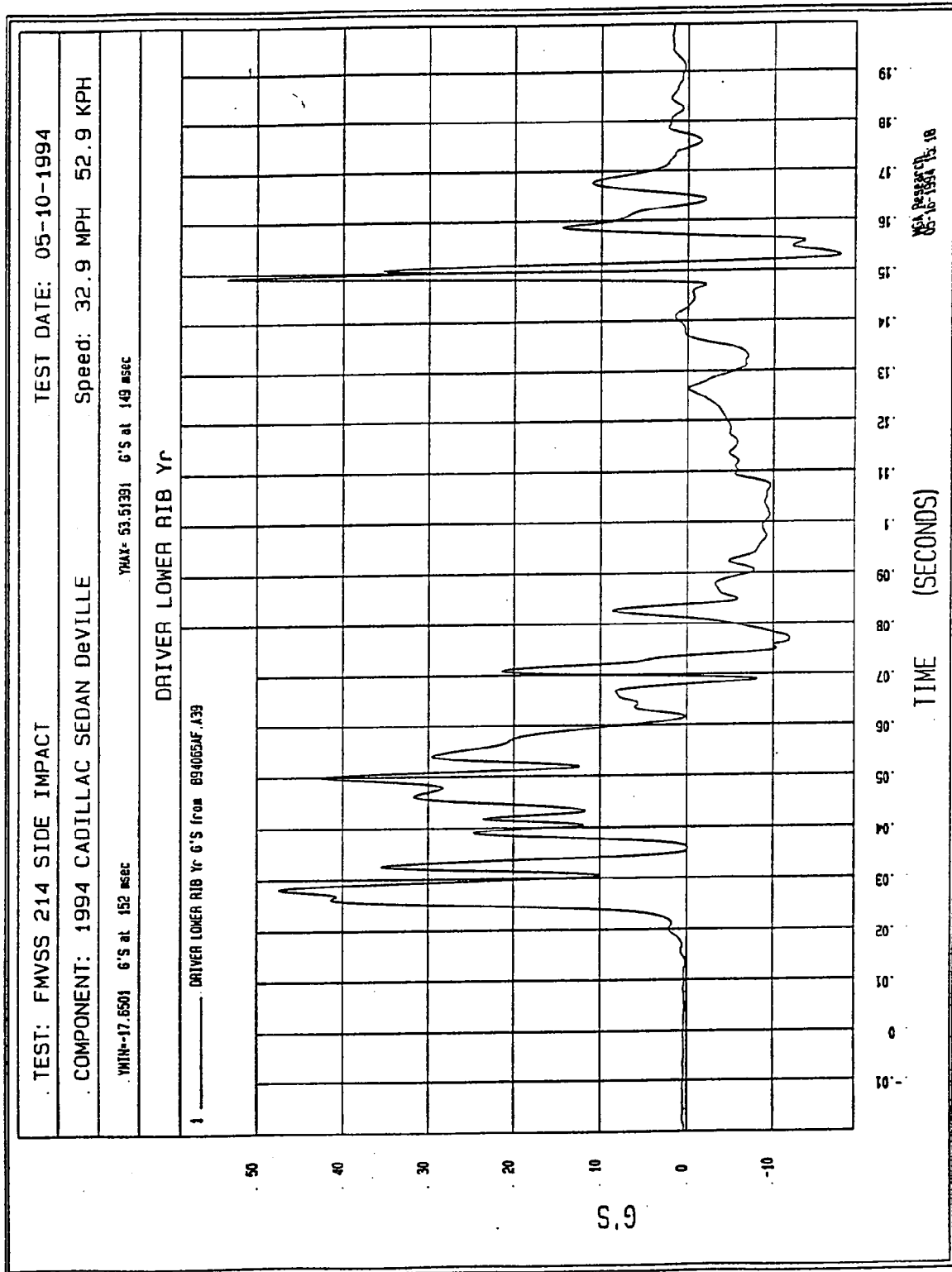


Figure B-59 - Driver Upper Rib Y Redundant Velocity vs. Time

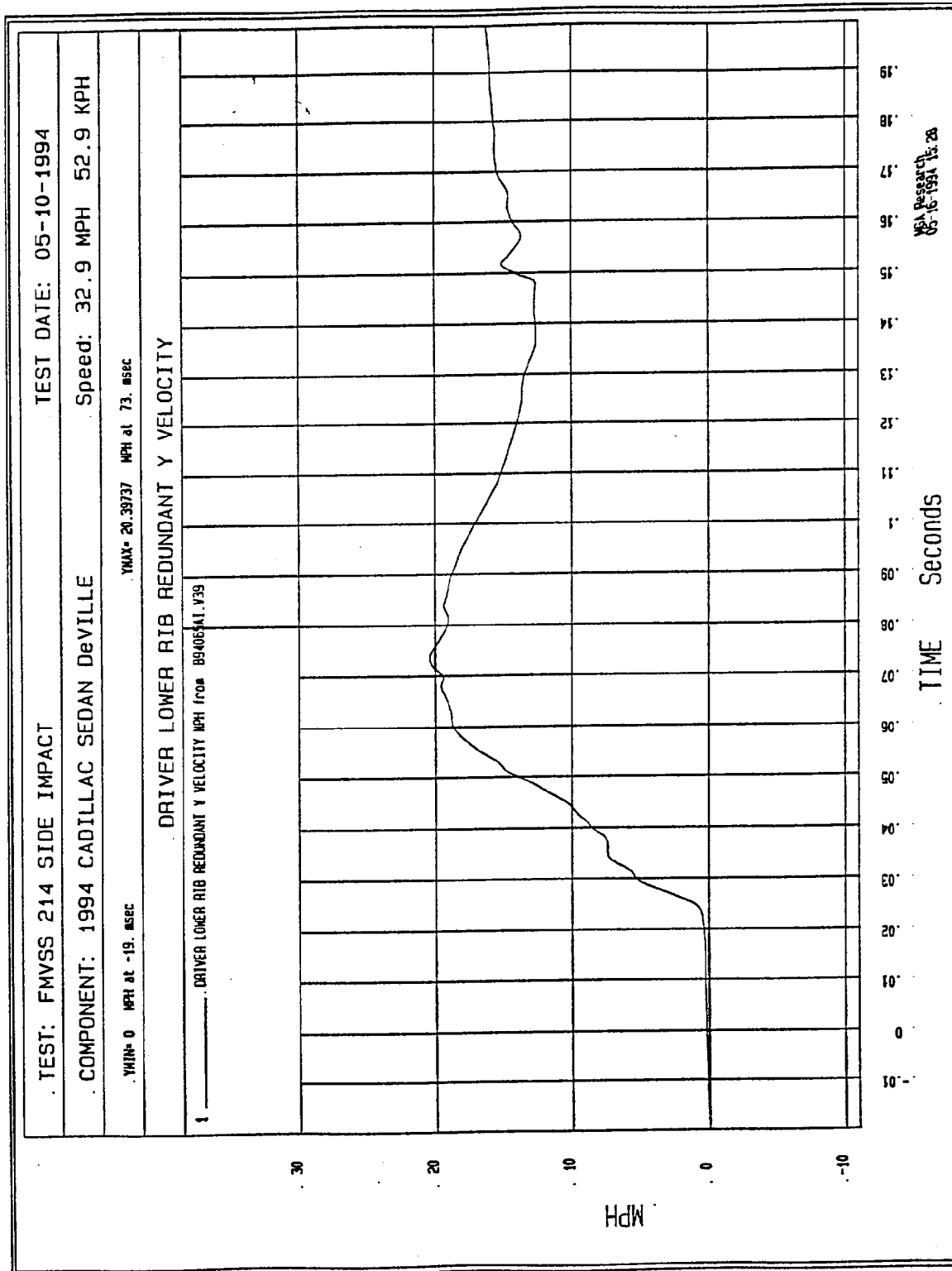
Filter: Class 180 (300. Hz)



B-60

Figure B-60 - Driver Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-61

Figure B-61 - Driver Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

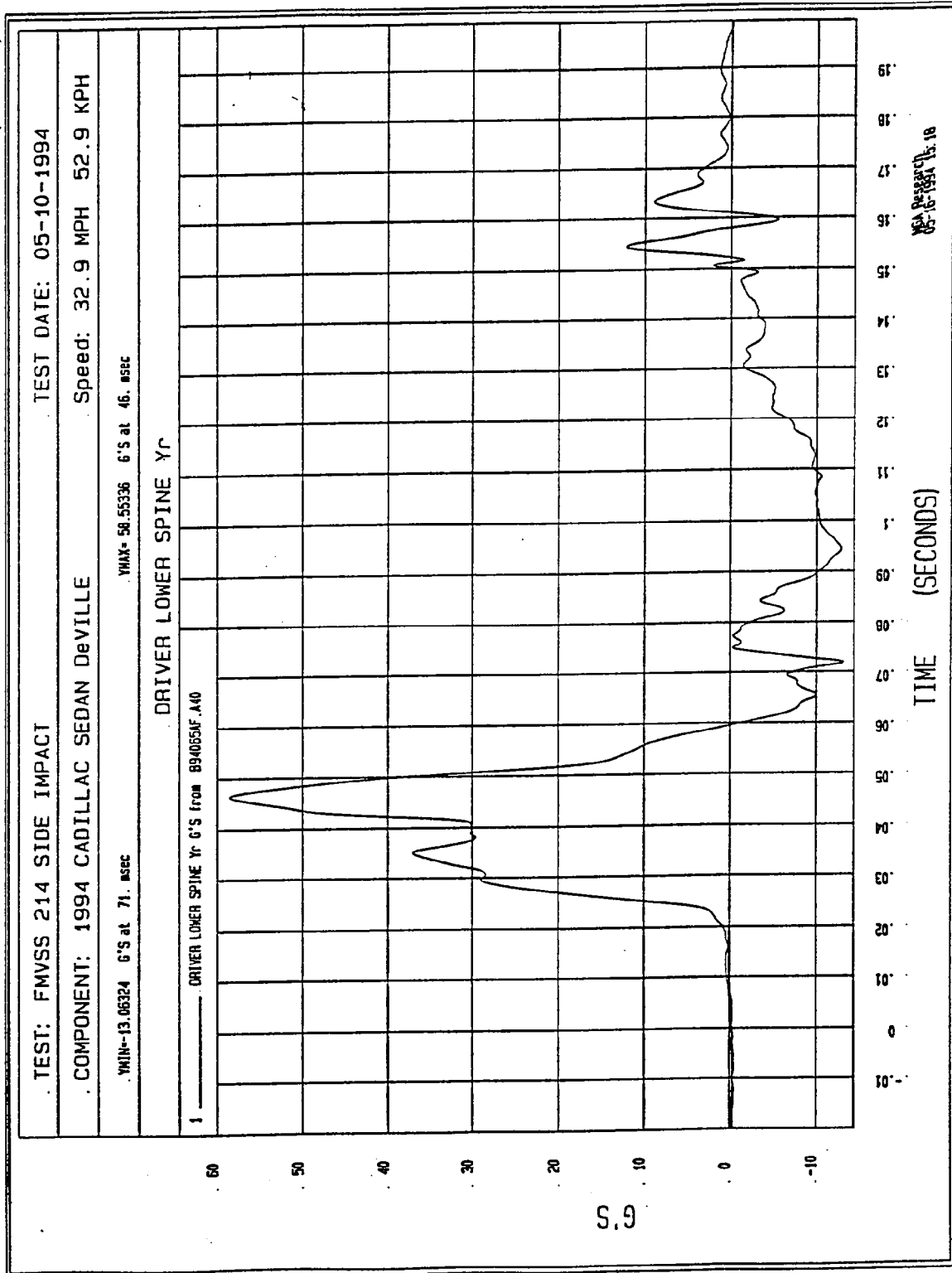
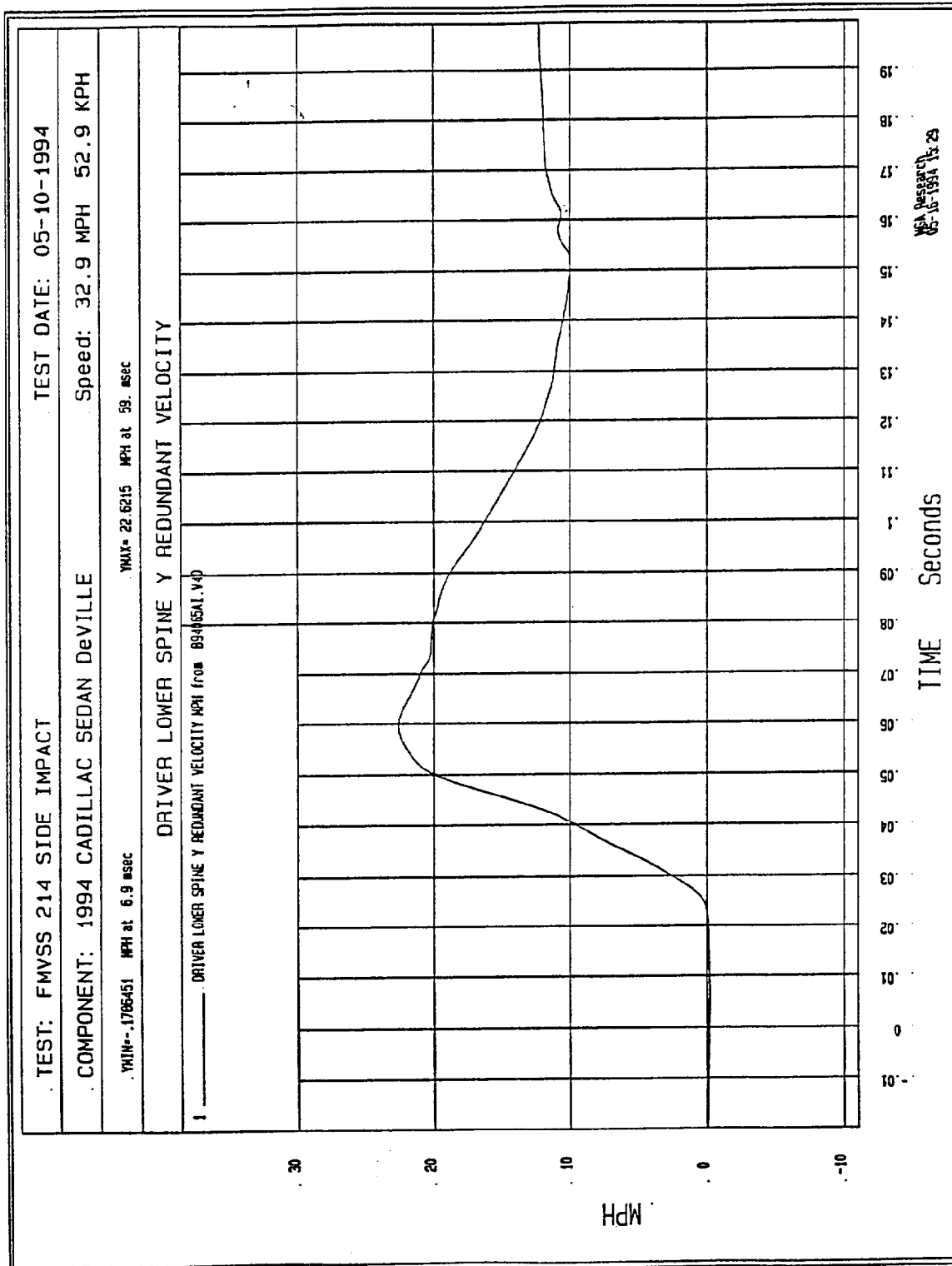


Figure B-62 - Driver Lower Spine Y Redundant Acceleration vs. Time

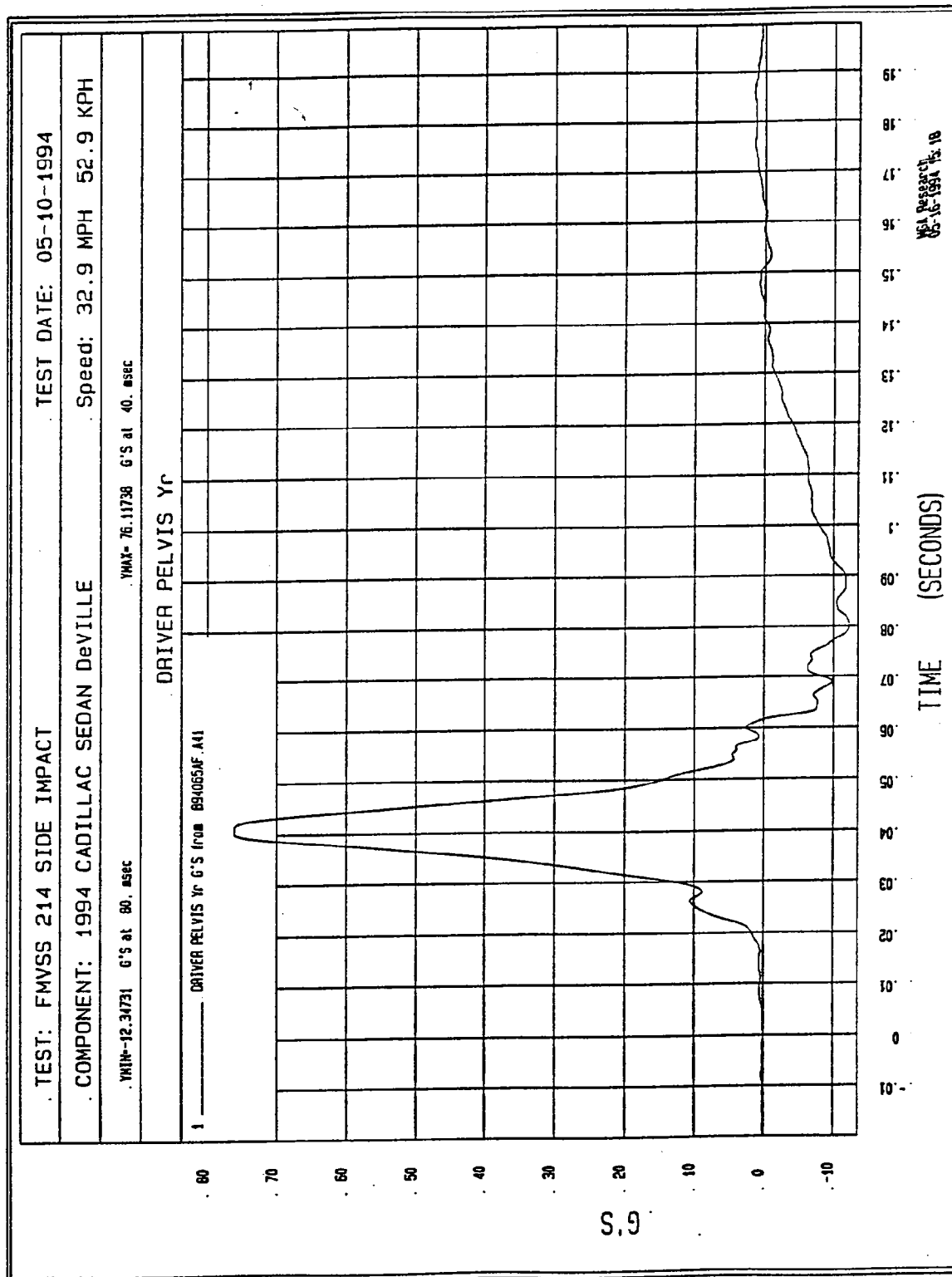
Filter: Class 180 (300 Hz)



B-63.

Figure B-63 - Driver Lower Spine Y Redundant Velocity vs. Time

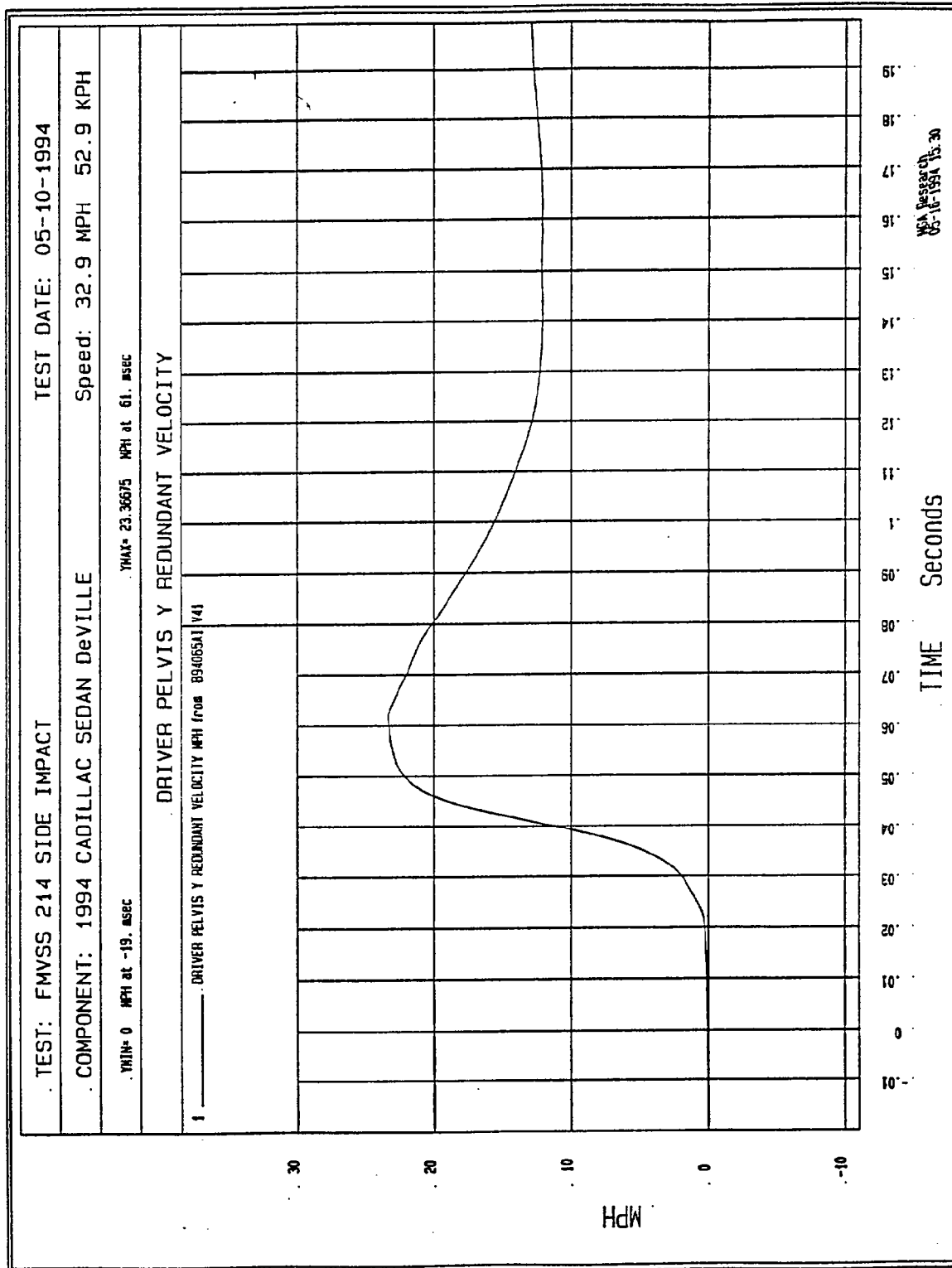
Filter: Class 180 (300 Hz)



B-64

Figure B-64 - Driver Pelvis Y Redundant Acceleration vs. Time

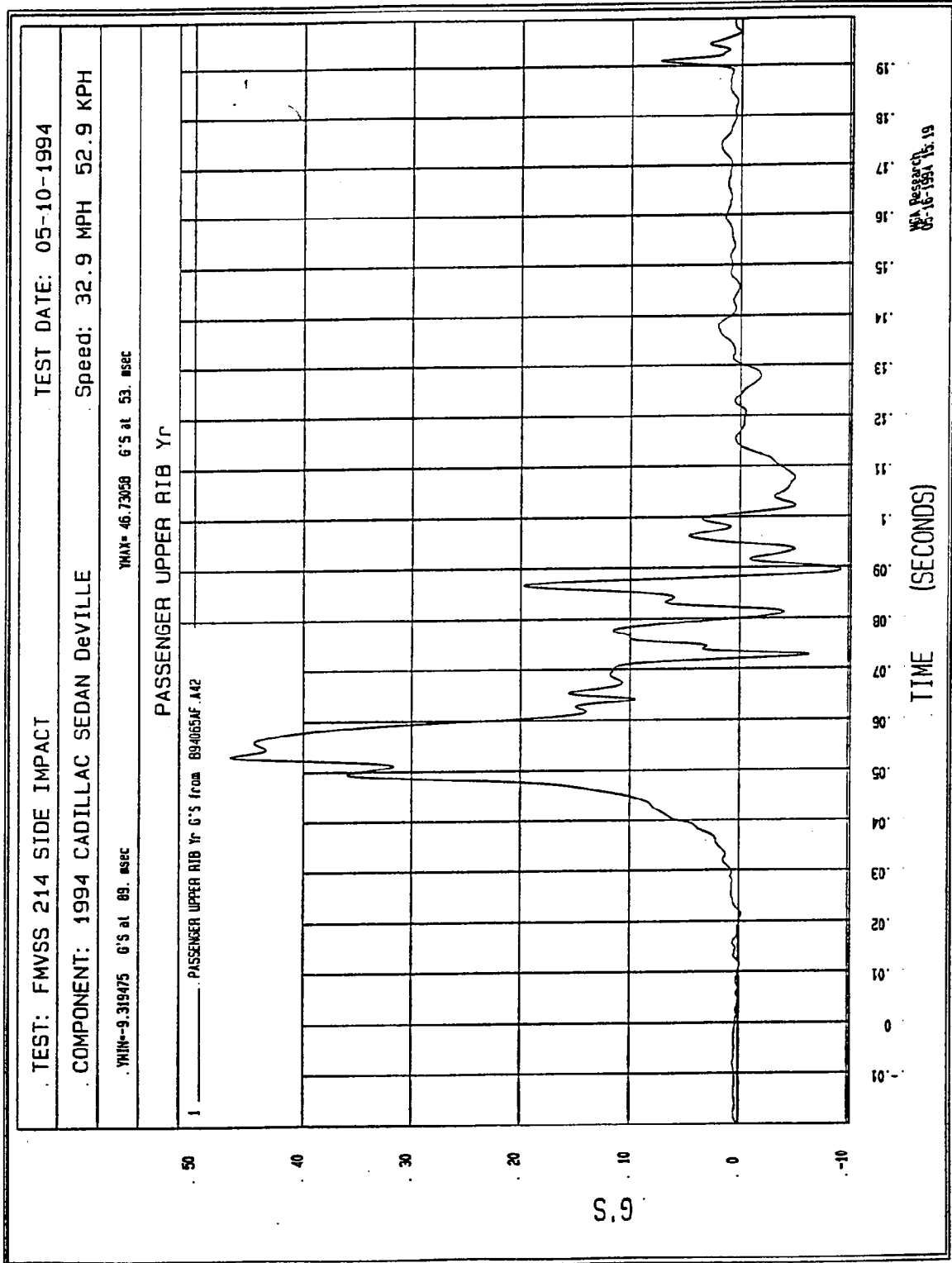
Filter: Class 180 (300 Hz)



B-65

Figure B-65 - Driver Pelvis Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)



B-66

Figure B-66 - Passenger Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

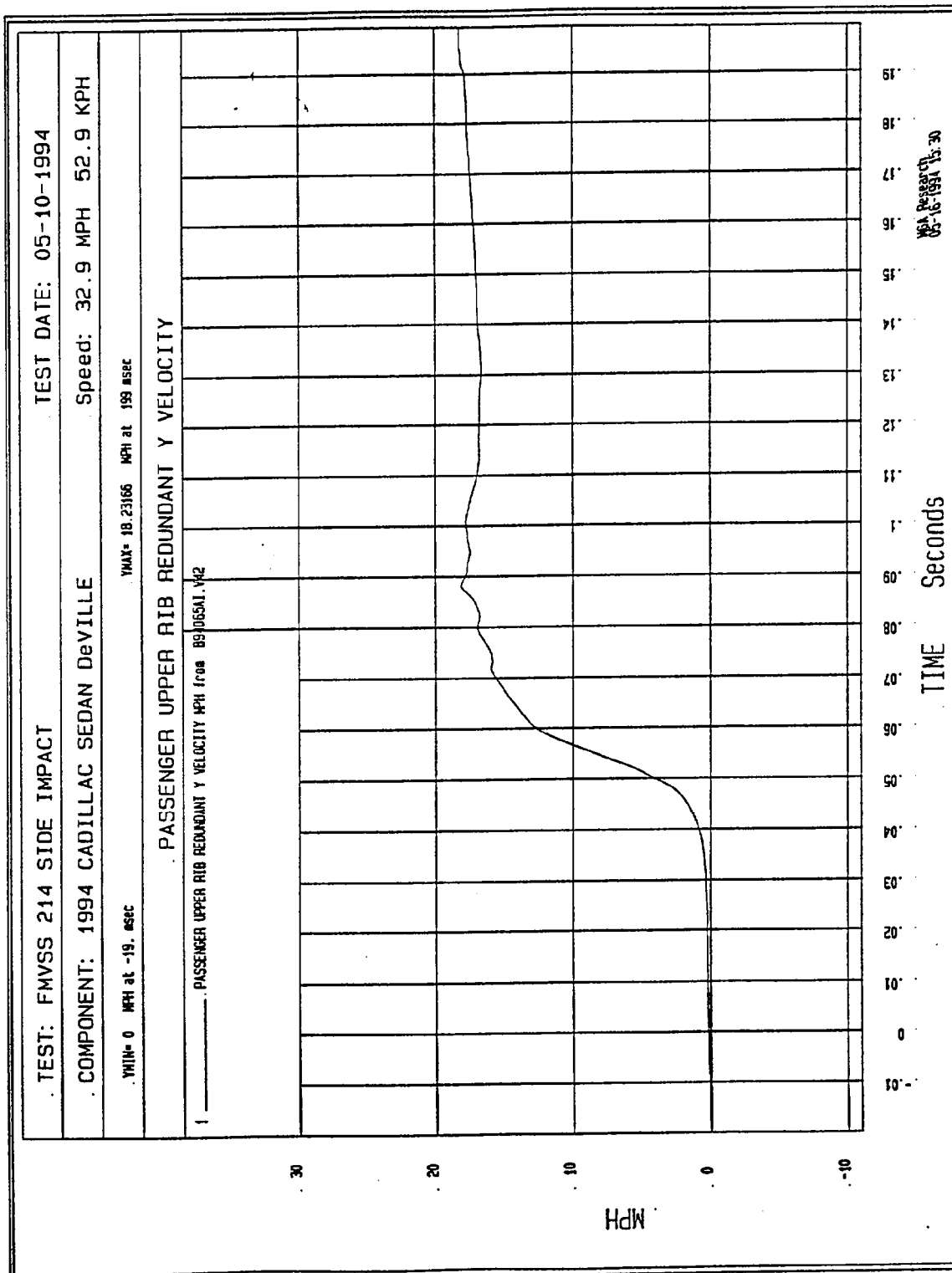


Figure B-67 - Passenger Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

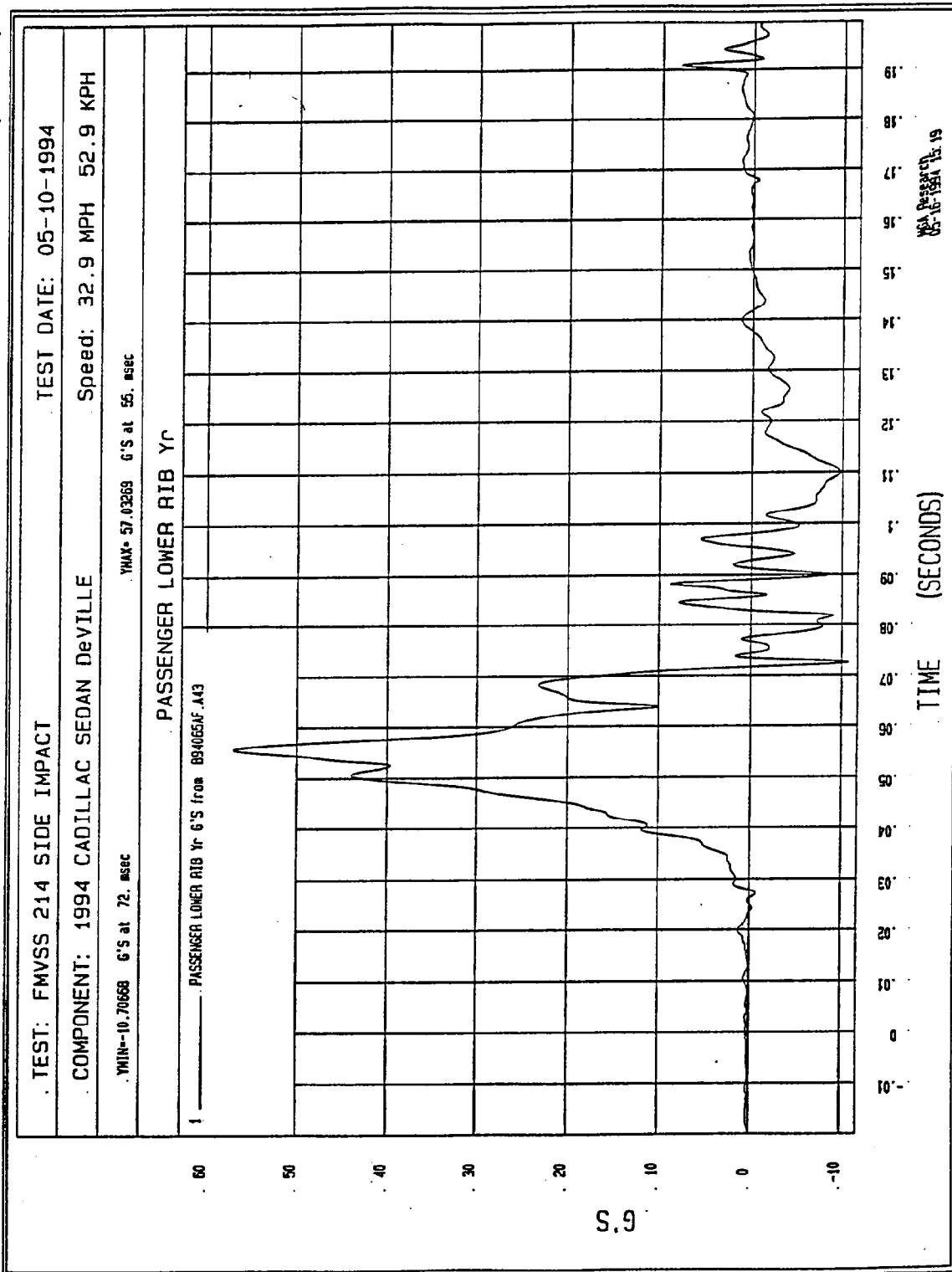


Figure B-68 - Passenger Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

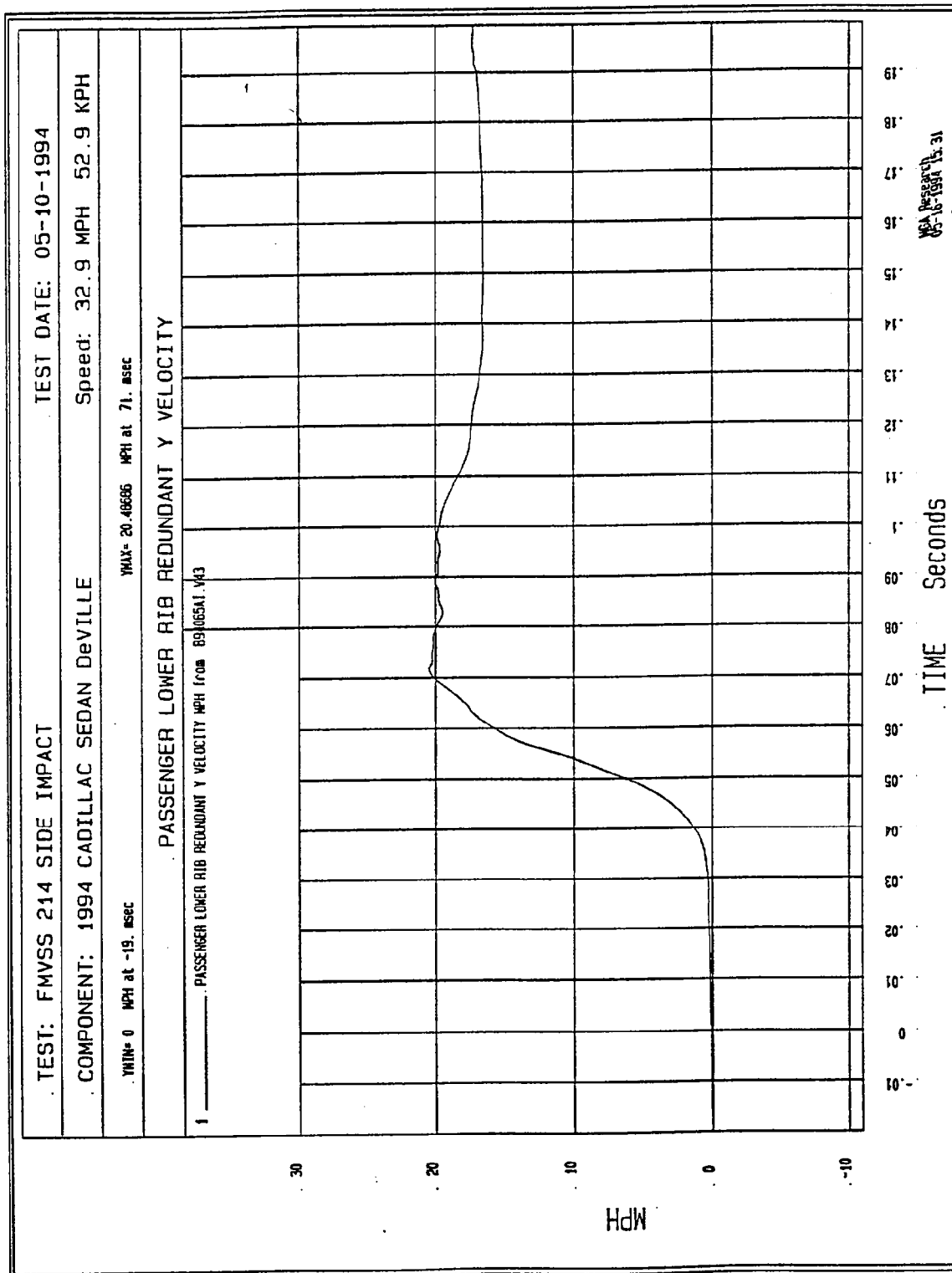


Figure B-69 - Passenger Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

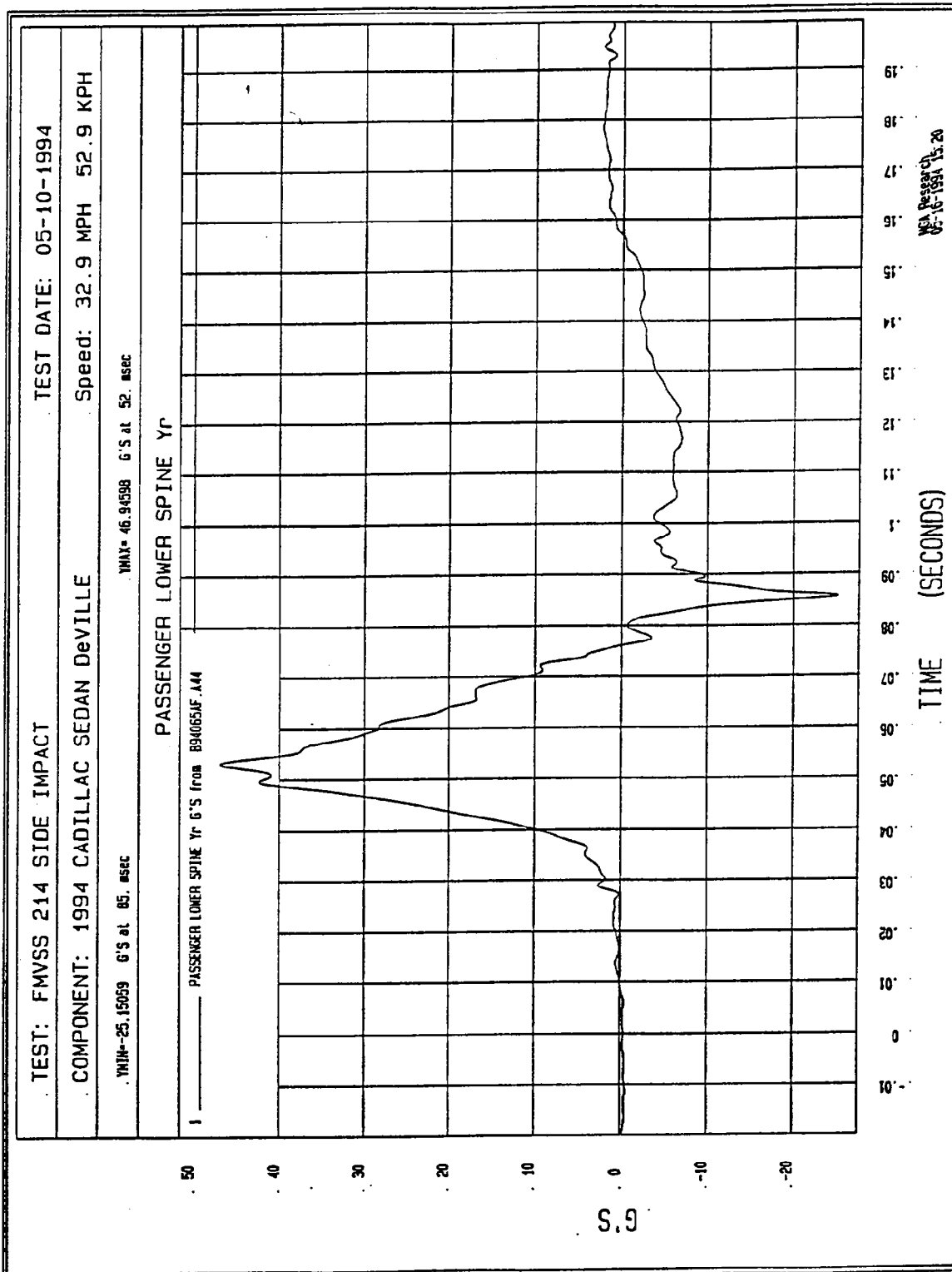
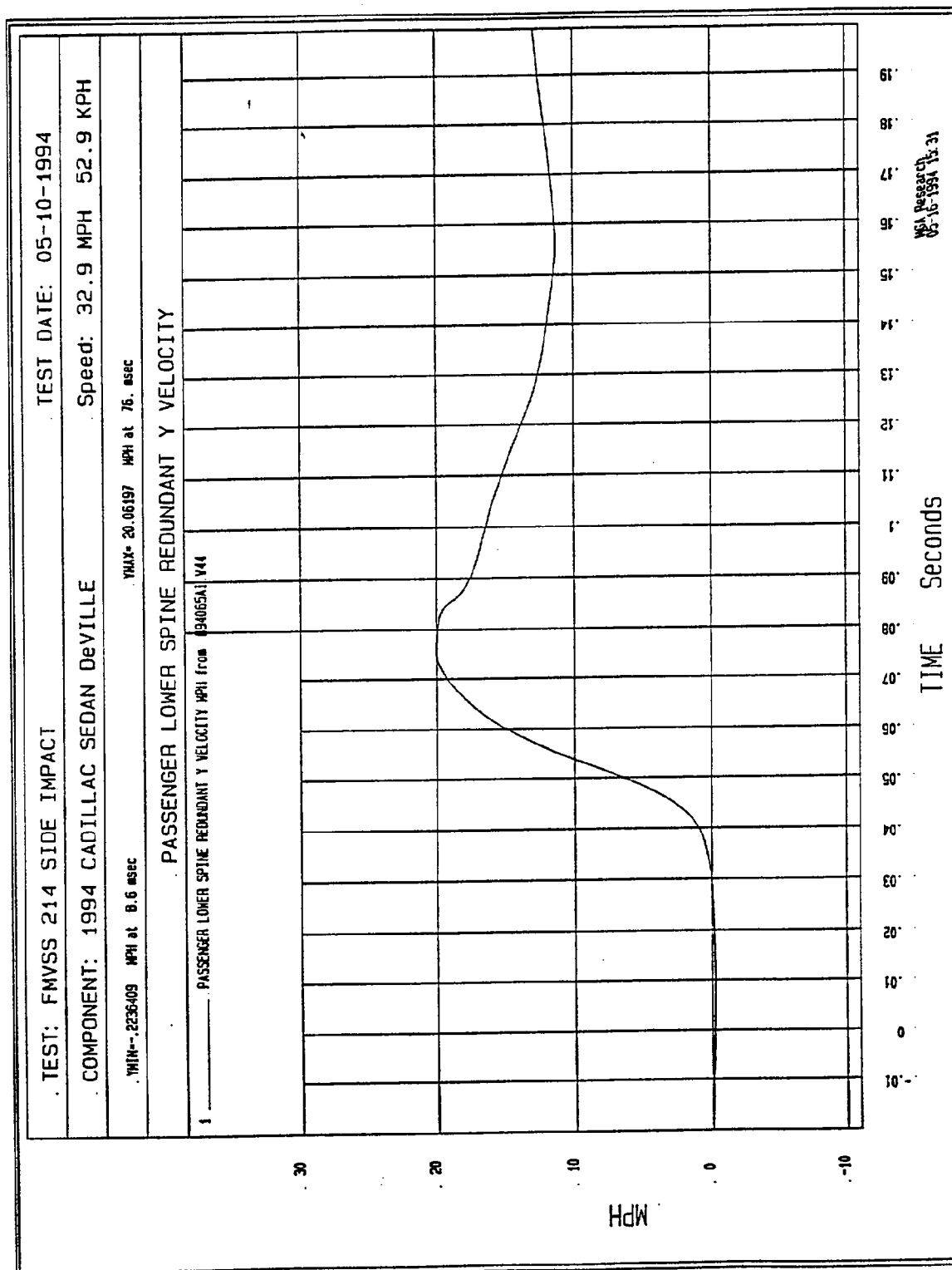


Figure B-70 - Passenger Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-71

Figure B-71 - Passenger Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

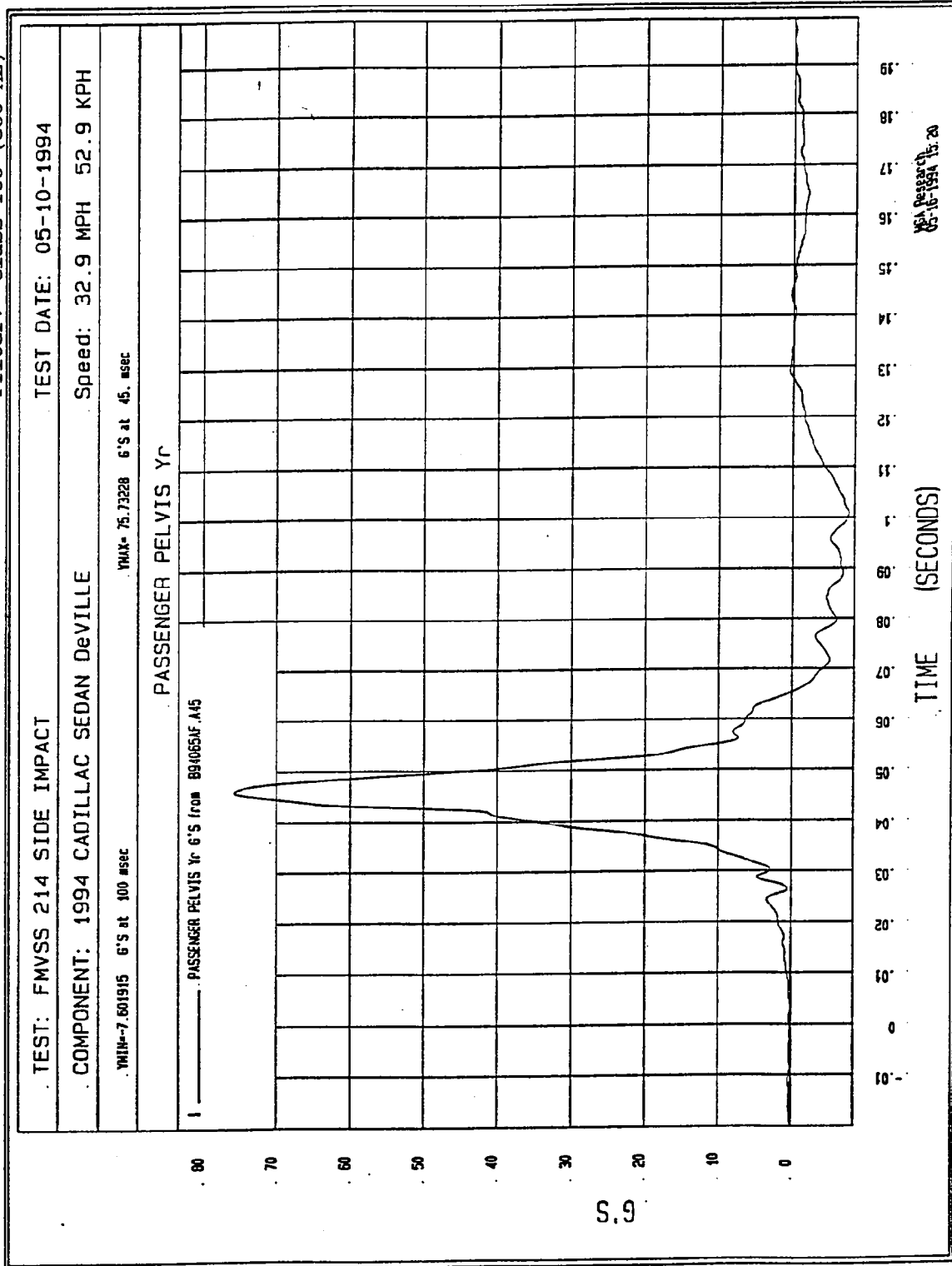


Figure B-72 - Passenger Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

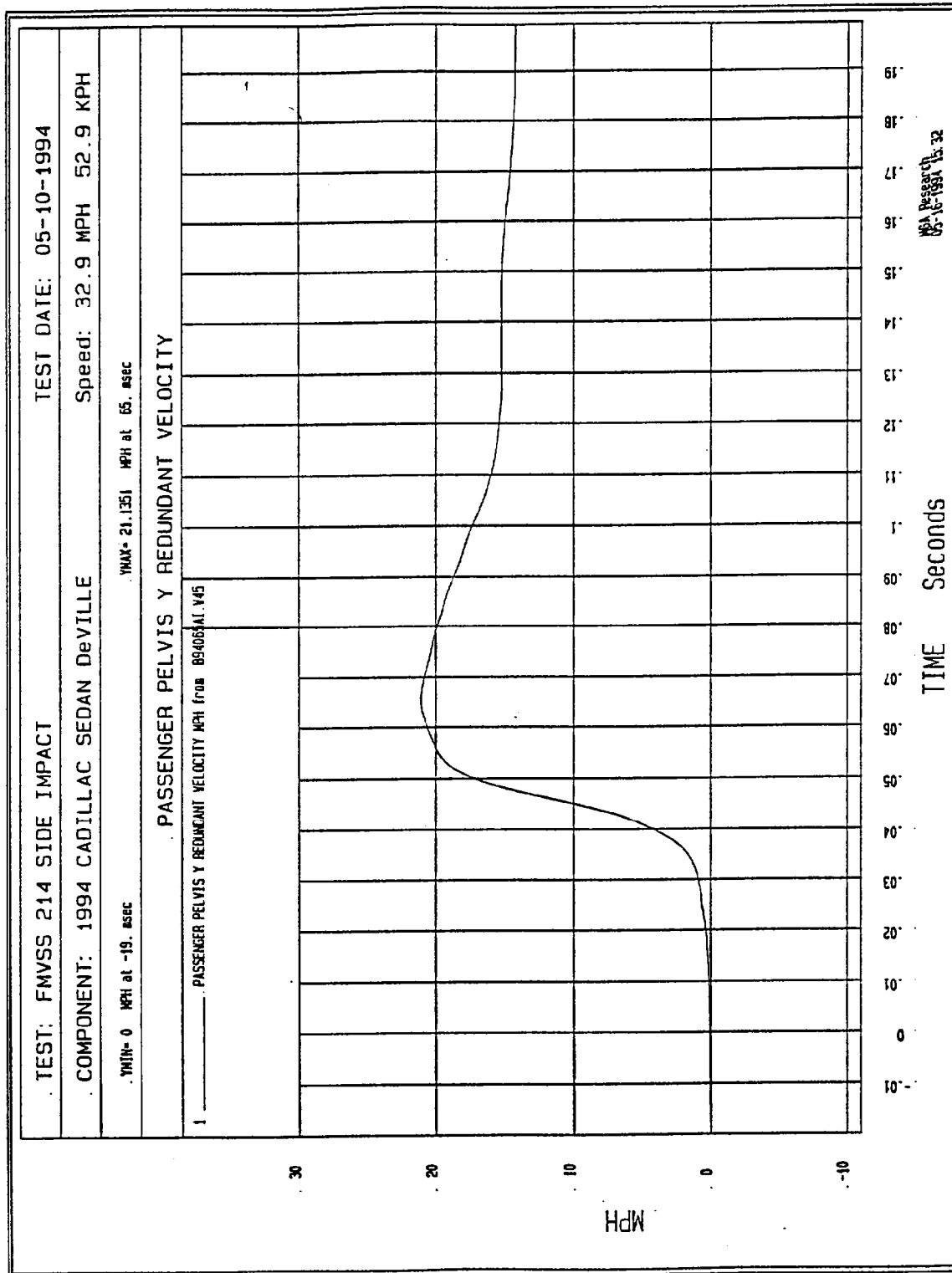


Figure B-73 - Passenger Pelvis Y Redundant Velocity vs. Time

**FINITE IMPULSE RESPONSE (FIR)
FILTERED DATA**

Table of Data Plots

	<u>Page No.</u>
Figure B-74 - Driver Upper Rib Y Acceleration vs. Time	B-74
Figure B-75 - Driver Upper Rib Y Redundant Acceleration vs. Time	B-75
Figure B-76 - Driver Lower Rib Y Acceleration vs. Time	B-76
Figure B-77 - Driver Lower Rib Y Redundant Acceleration vs. Time	B-77
Figure B-78 - Driver Lower Spine Y Acceleration vs. Time	B-78
Figure B-79 - Driver Lower Spine Y Redundant Acceleration vs. Time	B-79
Figure B-80 - Driver Pelvis Y Acceleration vs. Time	B-80
Figure B-81 - Driver Pelvis Y Redundant Acceleration vs. Time	B-81
Figure B-82 - Passenger Upper Rib Y Acceleration vs. Time	B-82
Figure B-83 - Passenger Upper Rib Y Redundant Acceleration vs. Time	B-83
Figure B-84 - Passenger Lower Rib Y Acceleration vs. Time	B-84
Figure B-85 - Passenger Lower Rib Y Redundant Acceleration vs. Time	B-85
Figure B-86 - Passenger Lower Spine Y Acceleration vs. Time	B-86
Figure B-87 - Passenger Lower Spine Y Redundant Acceleration vs. Time	B-87
Figure B-88 - Passenger Pelvis Y Acceleration vs. Time	B-88
Figure B-89 - Passenger Pelvis Y Redundant Acceleration vs. Time	B-89

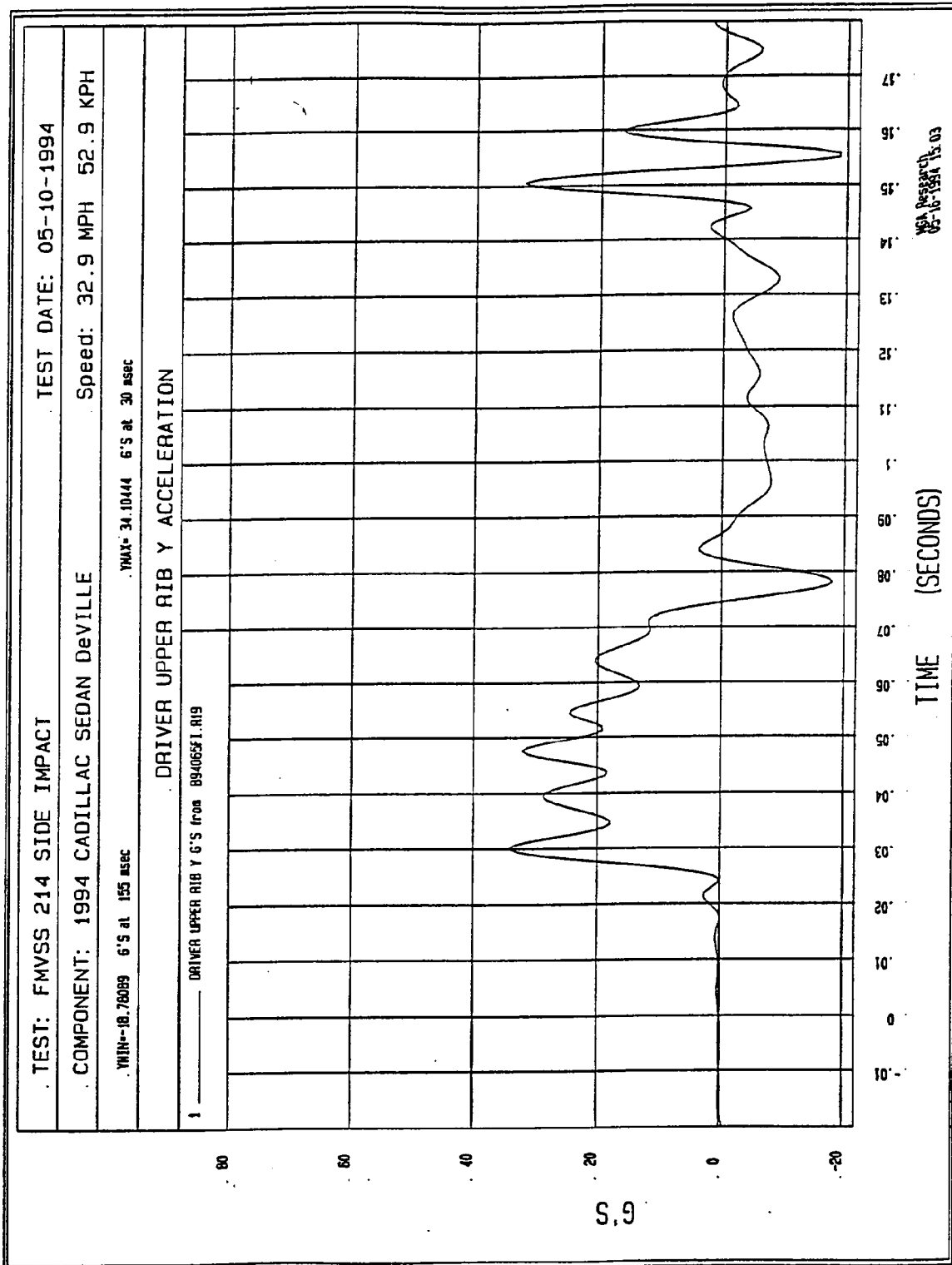


Figure B-74 - Driver Upper Rib Y Acceleration vs. Time

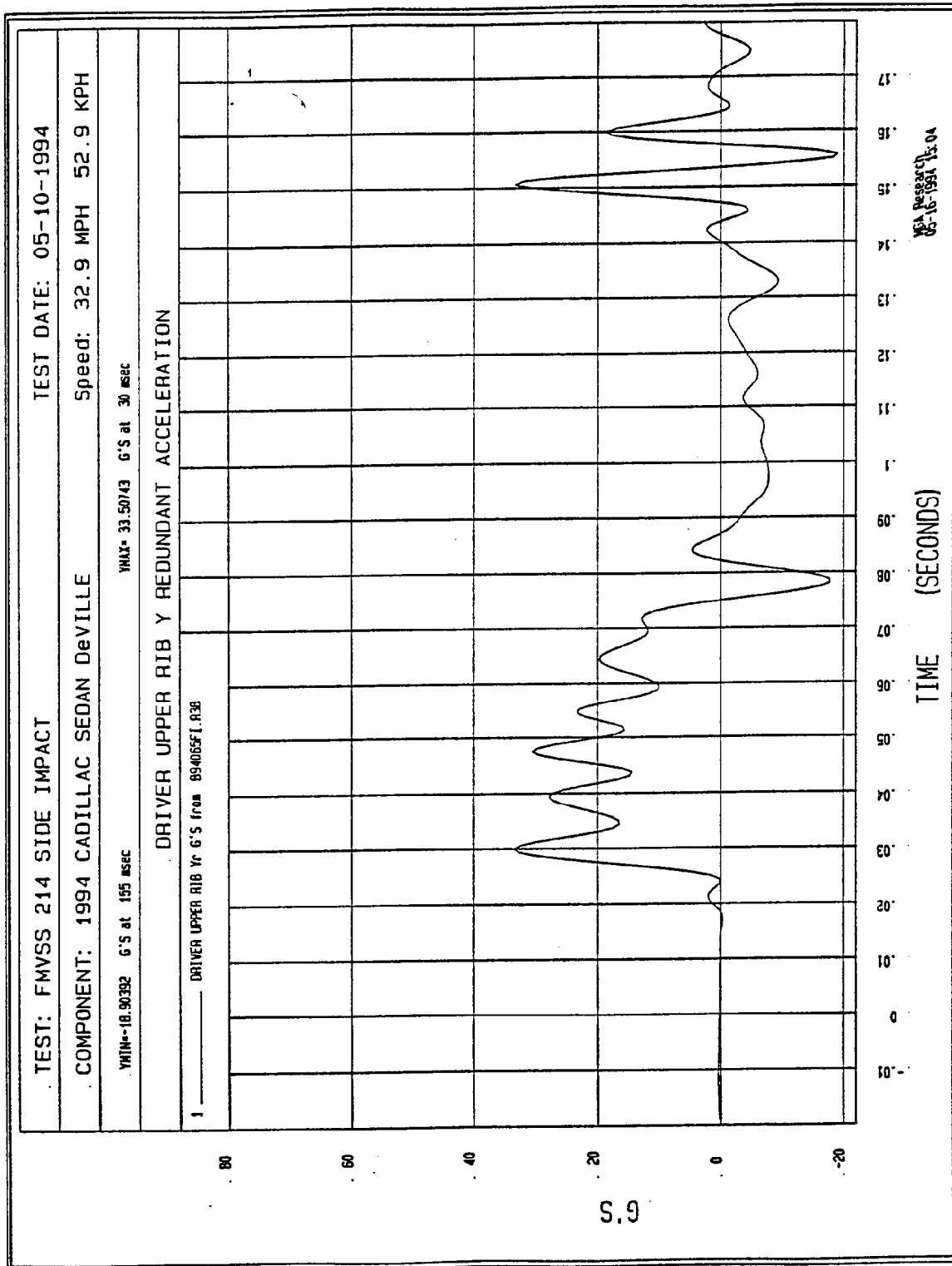


Figure B-75 - Driver Upper Rib Y Redundant Acceleration vs. Time

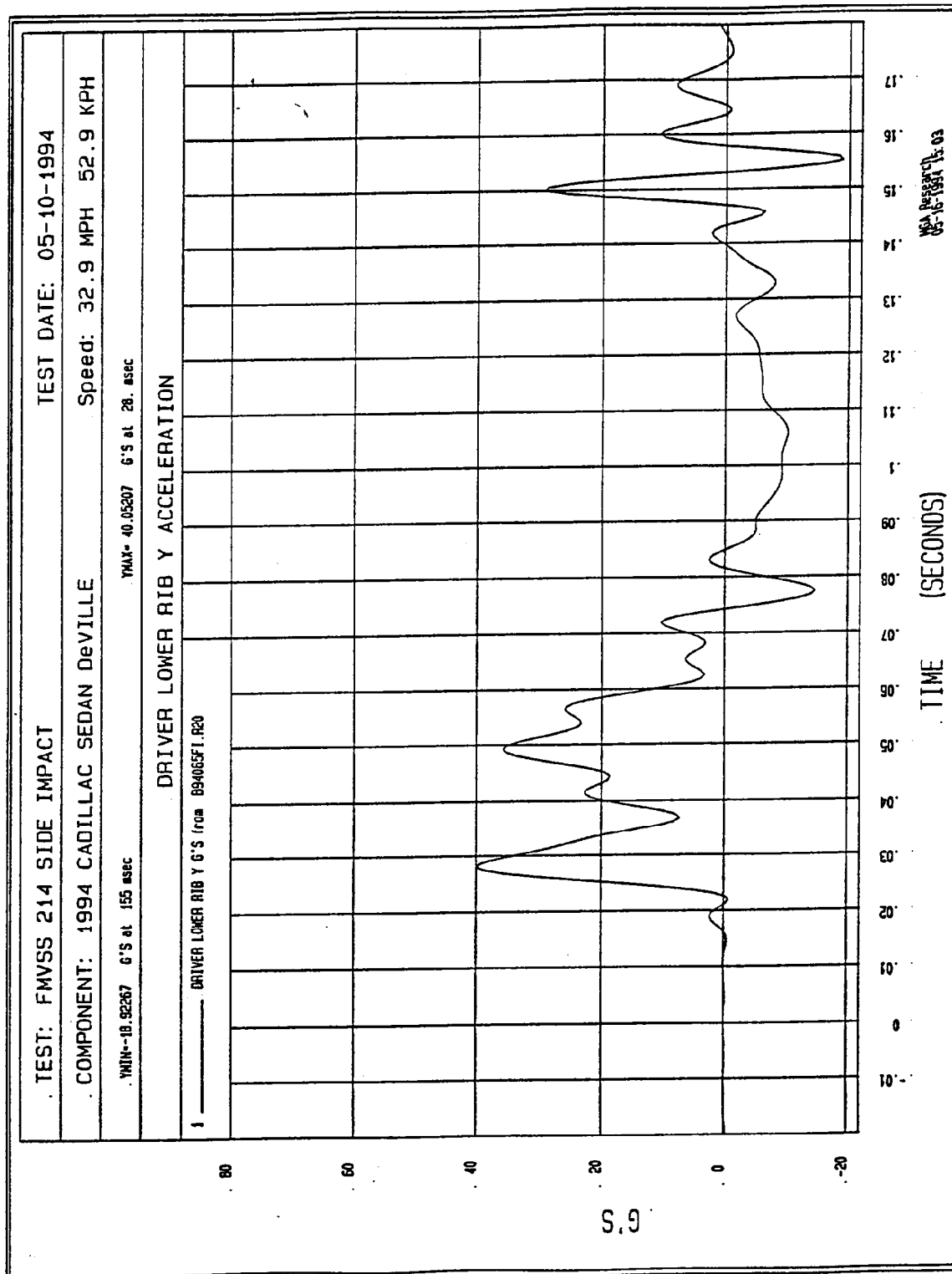
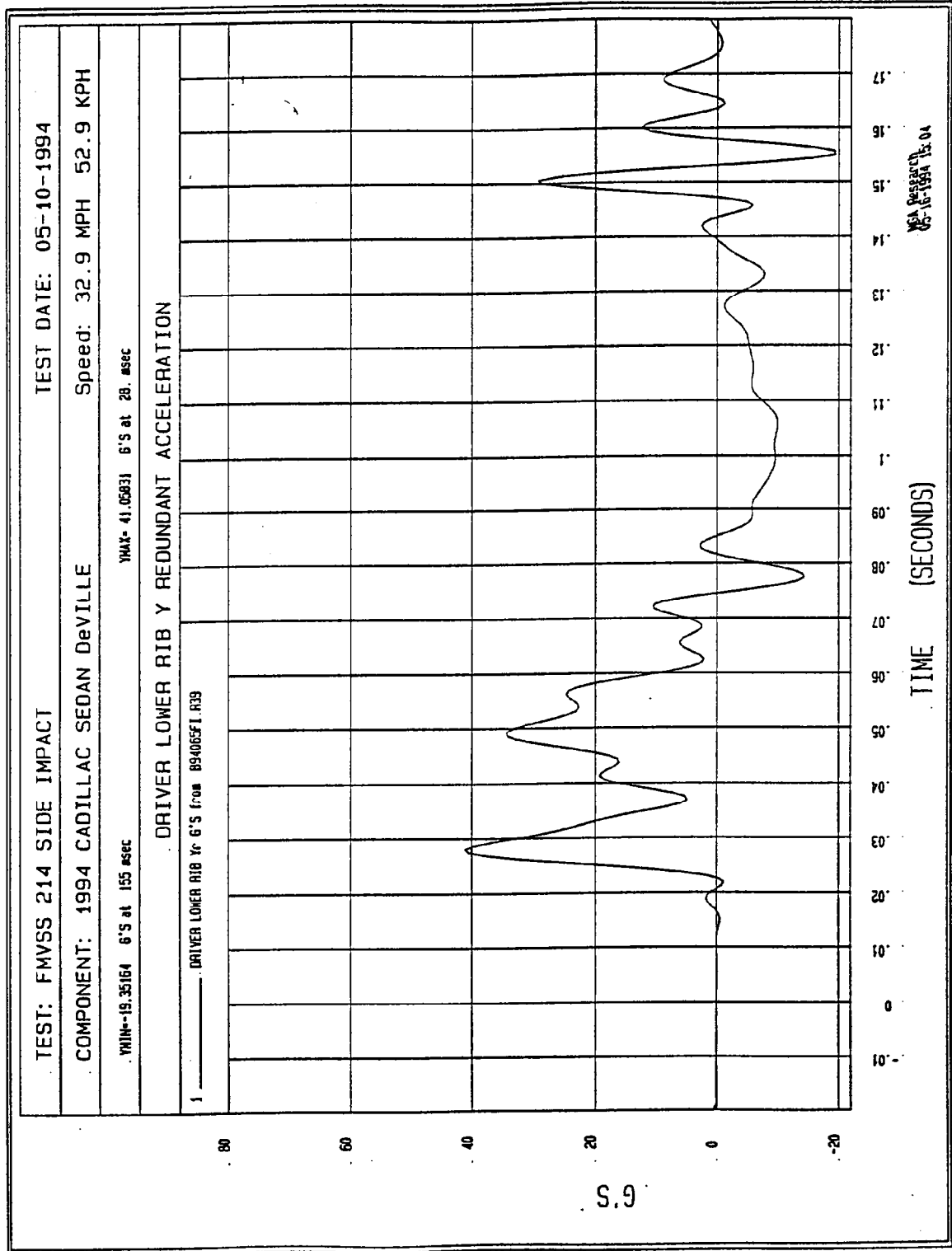


Figure B-76 - Driver Lower Rib Y Acceleration vs. Time



B-77

Figure B-77 - Driver Lower Rib Y Redundant Acceleration vs. Time

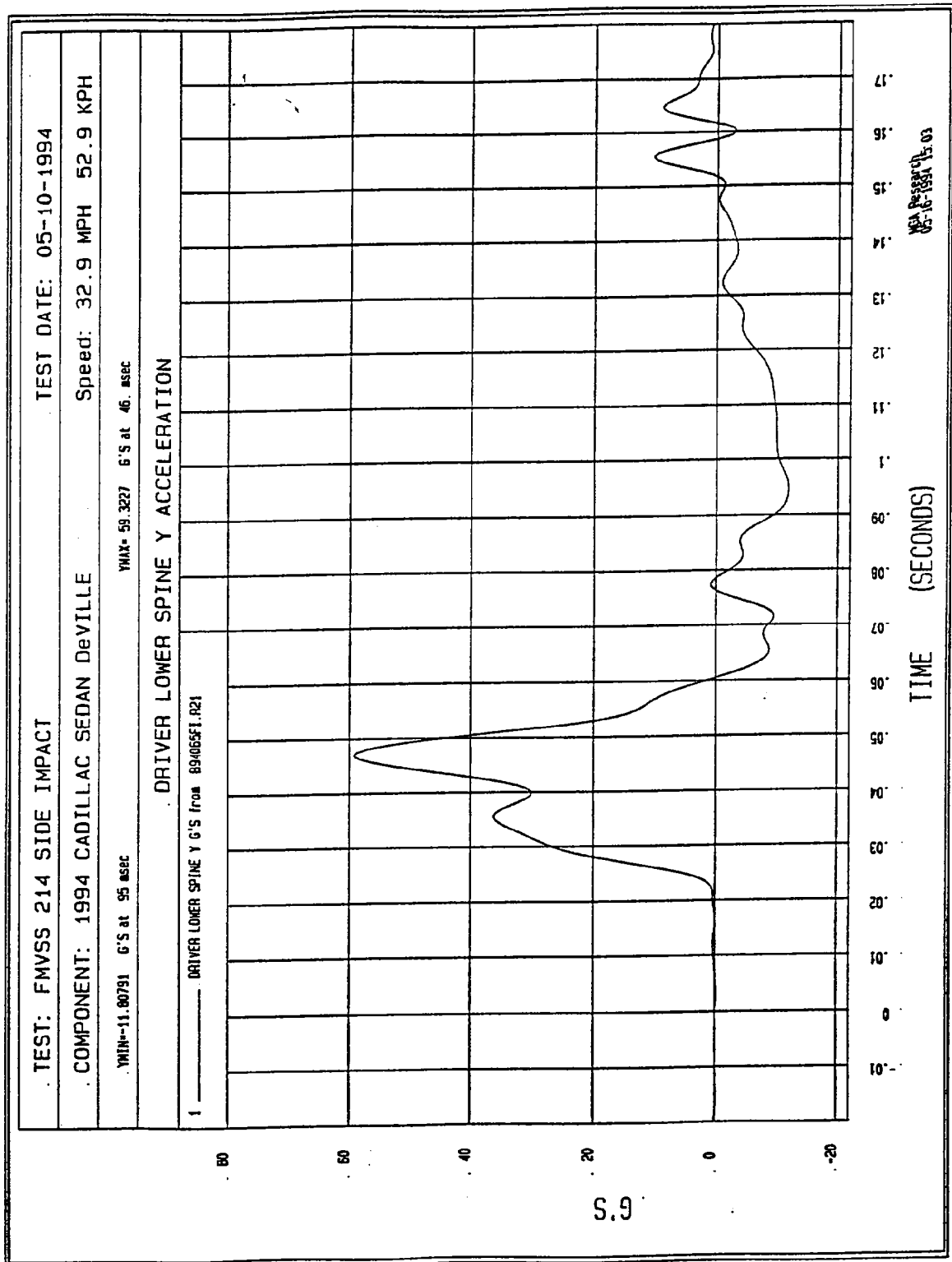


Figure B-78 - Driver Lower Spine Y Acceleration vs. Time

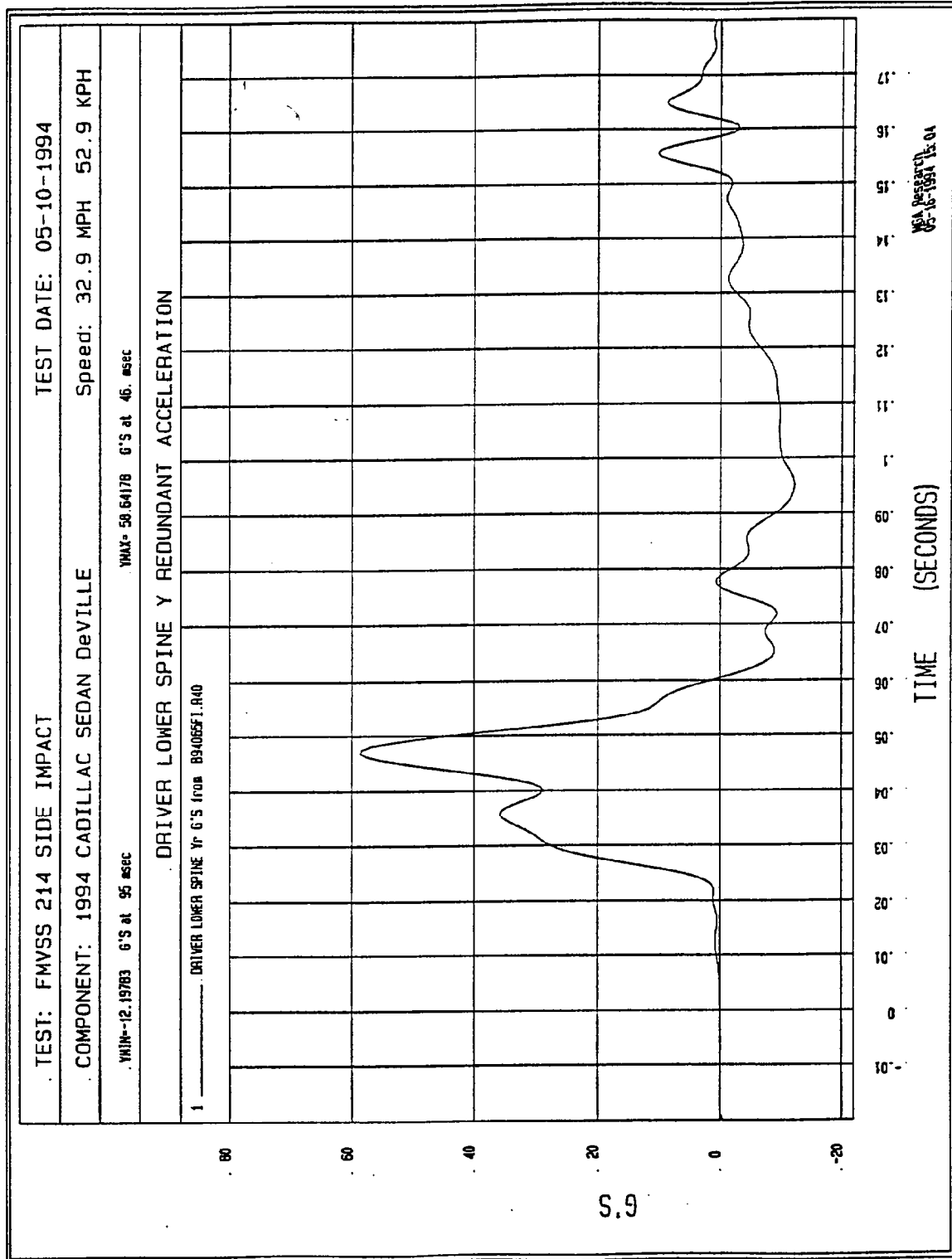


Figure B-79 - Driver Lower Spine Y Redundant Acceleration vs. Time

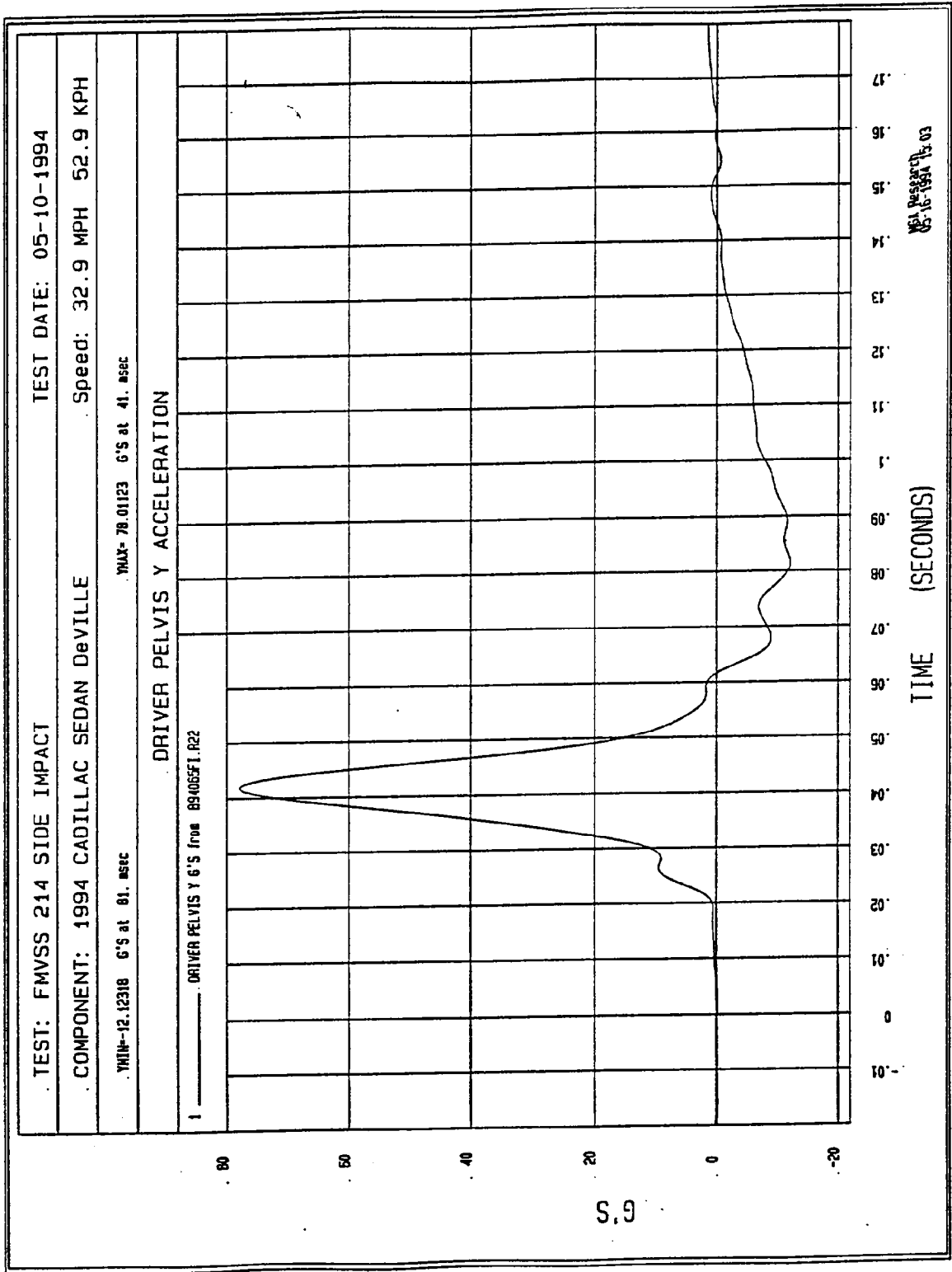


Figure B-80 - Driver Pelvis Y Acceleration vs. Time

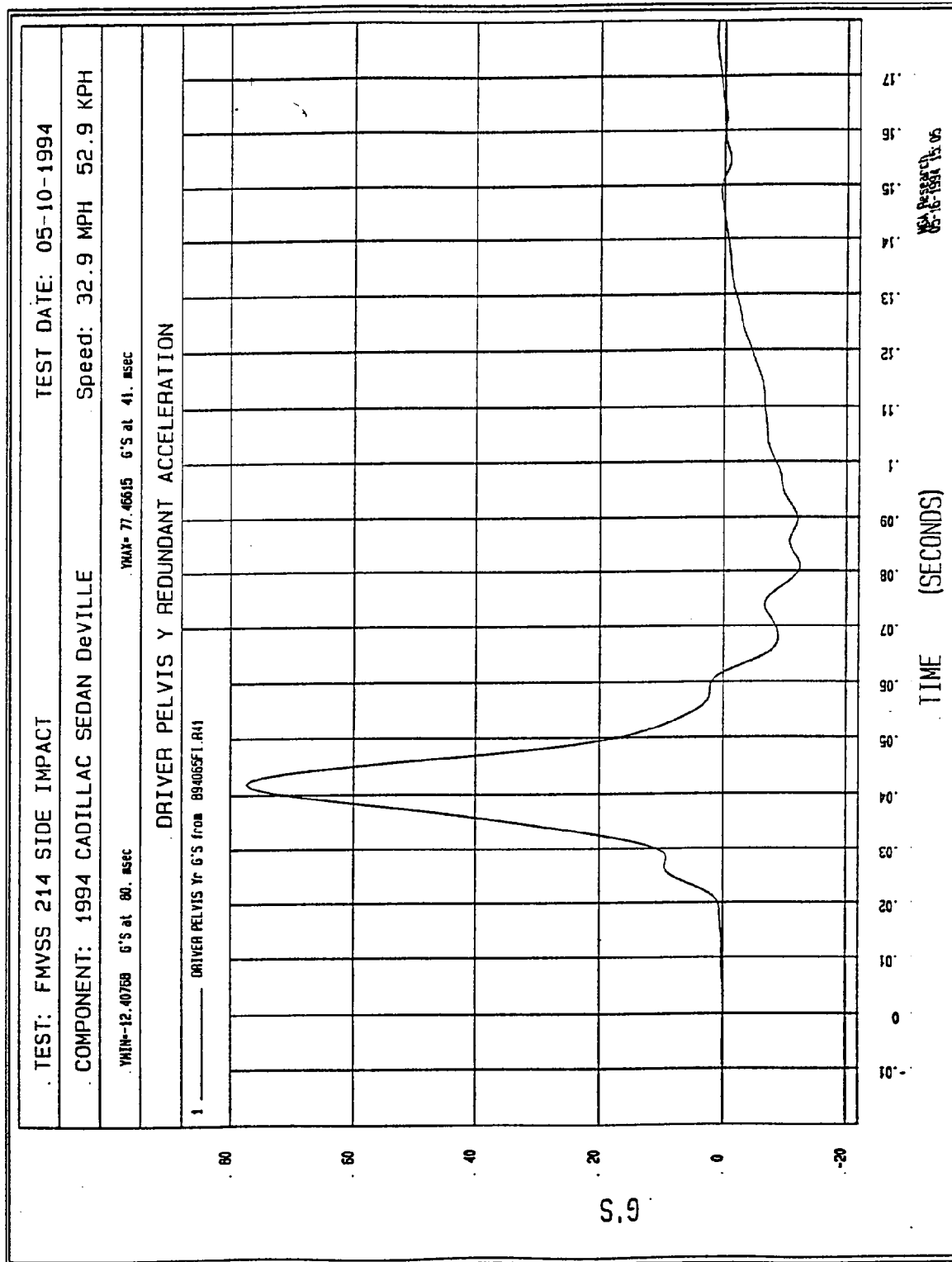


Figure B-81 - Driver Pelvis Y Redundant Acceleration vs. Time

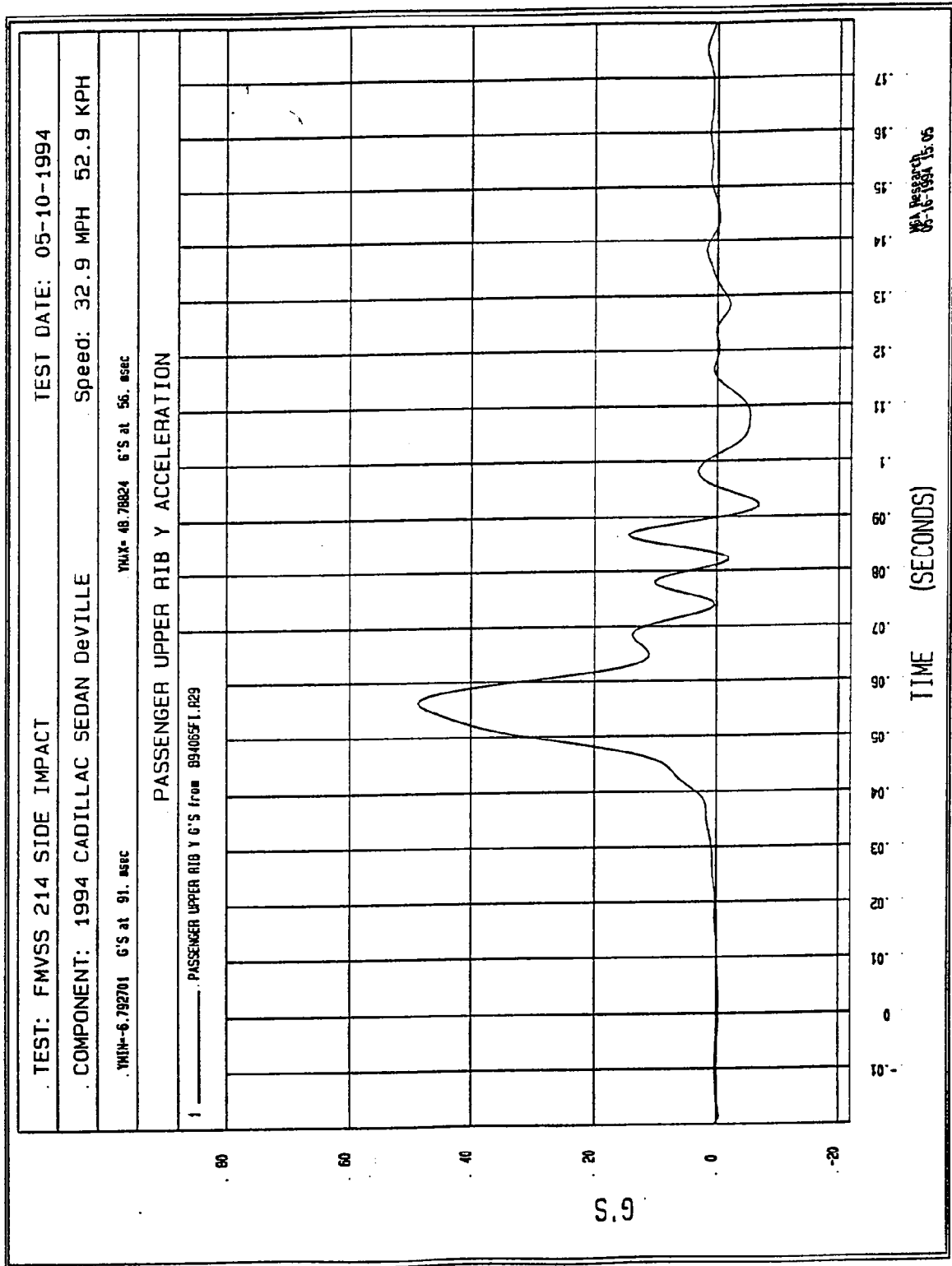
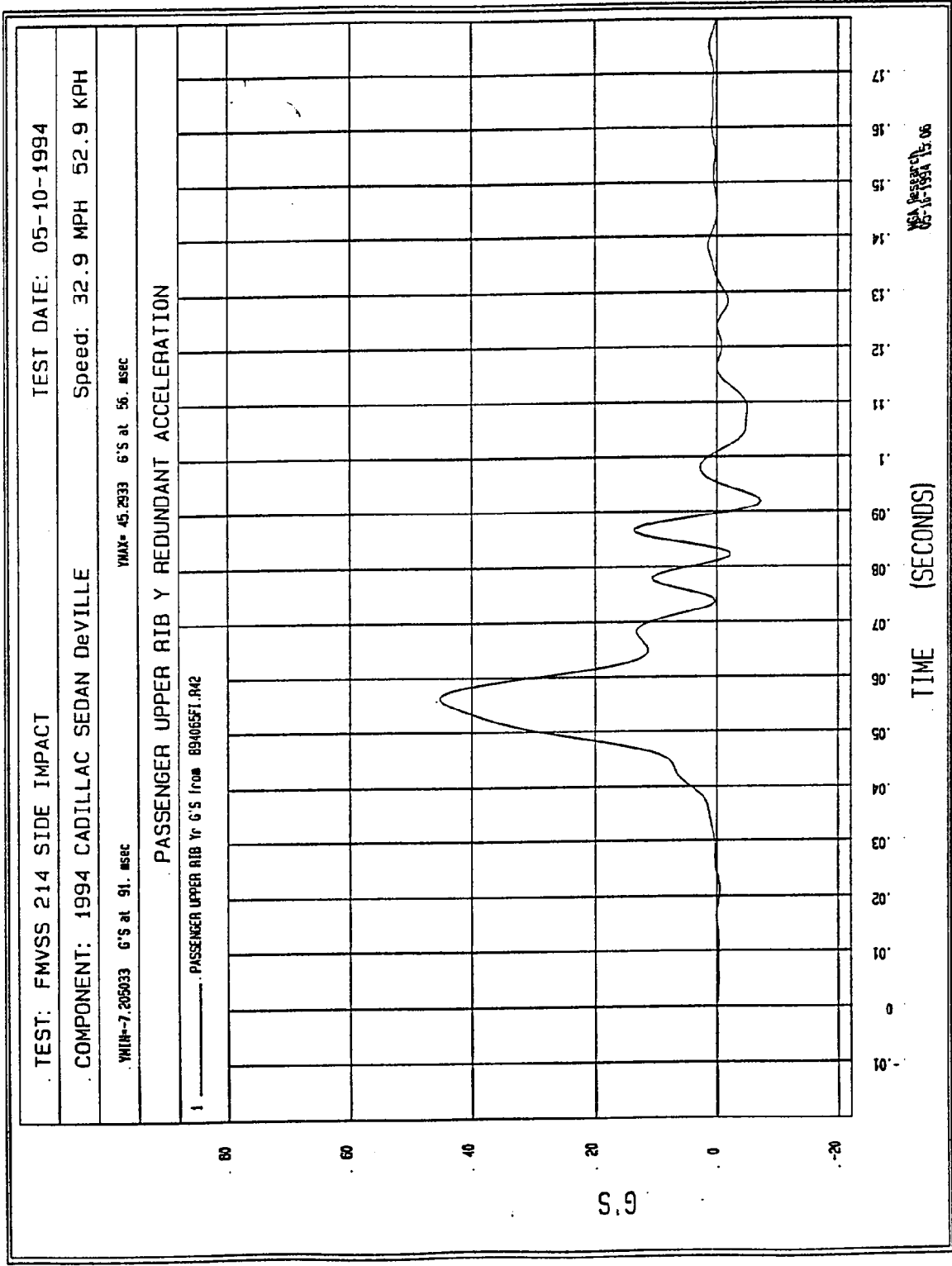


Figure B-82 - Passenger Upper Rib Y Acceleration vs. Time



B-83

Figure B-83 - Passenger Upper Rib Y Redundant Acceleration vs. Time

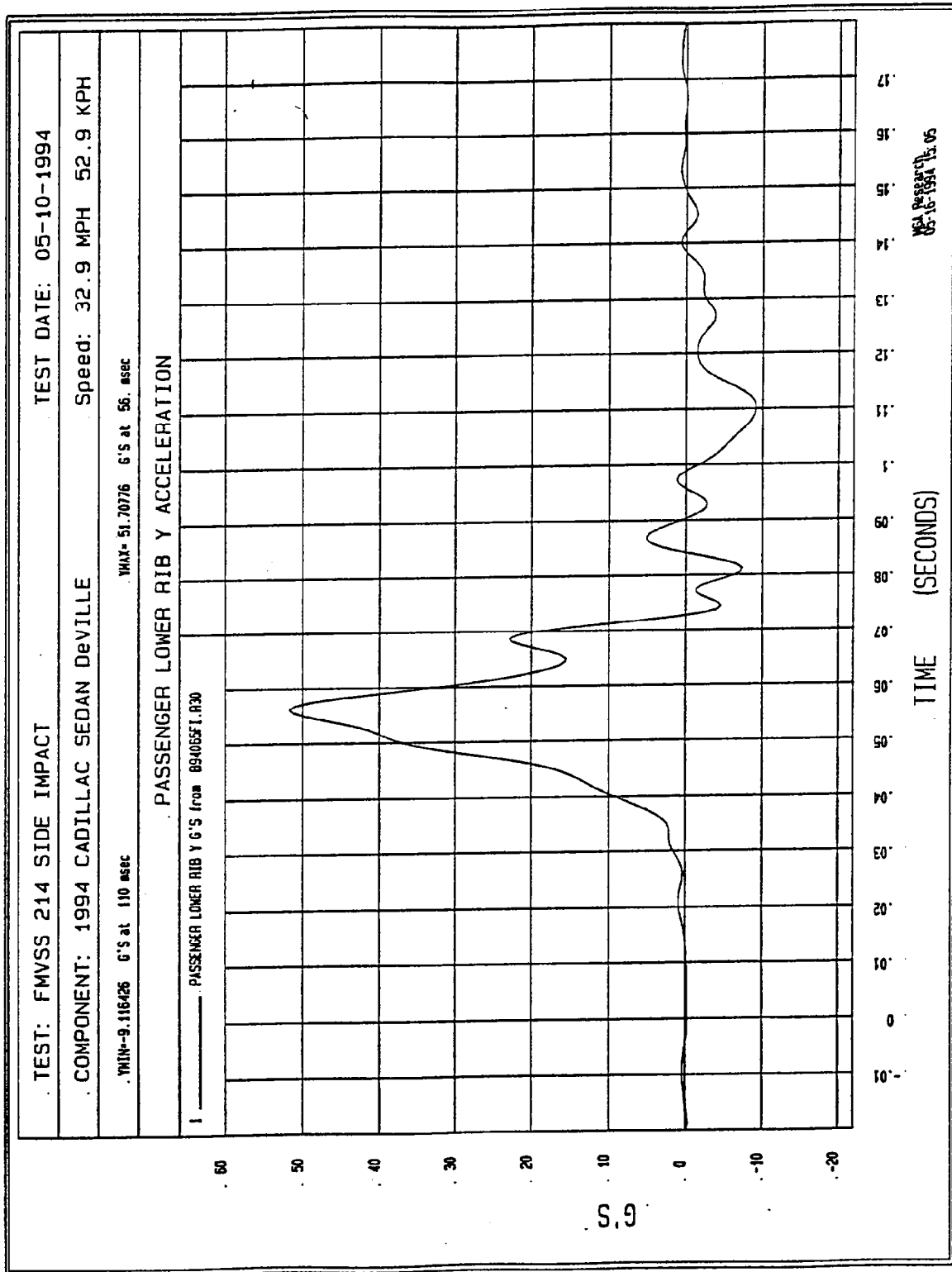


Figure B-84 - Passenger Lower Rib Y Acceleration vs. Time

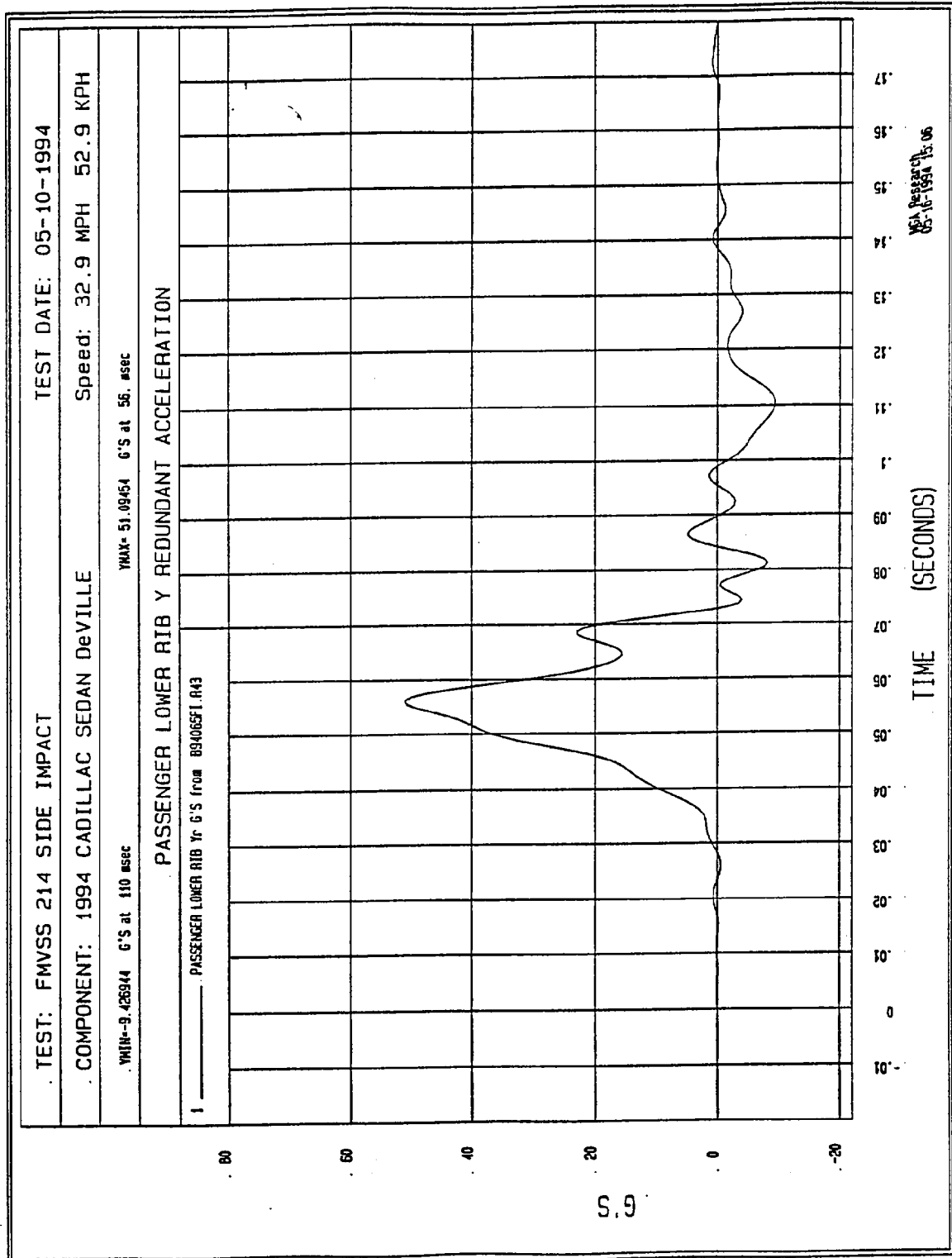


Figure B-85 - Passenger Lower Rib Y Redundant Acceleration vs. Time

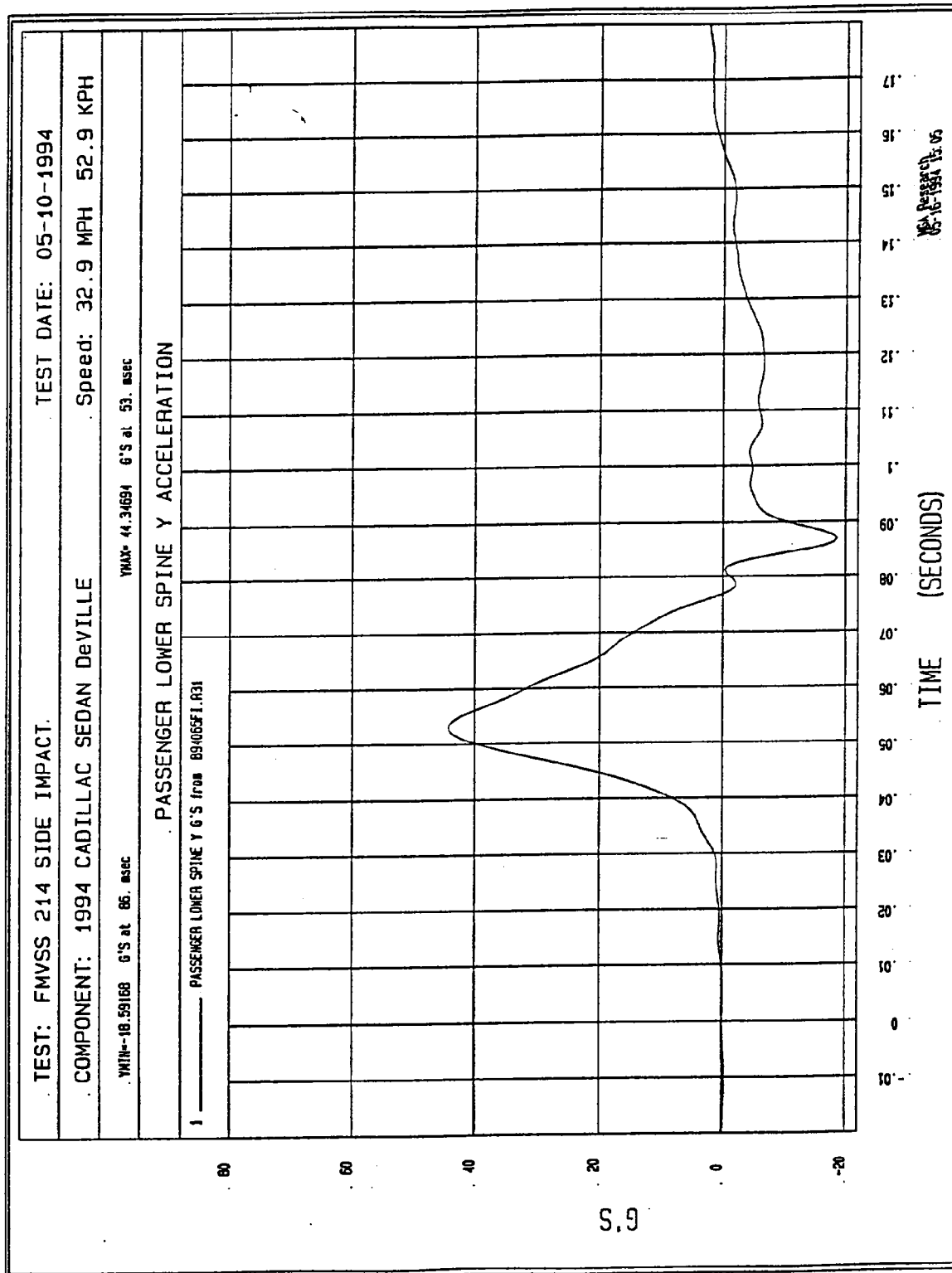


Figure B-86 - Passenger Lower Spine Y Acceleration vs. Time

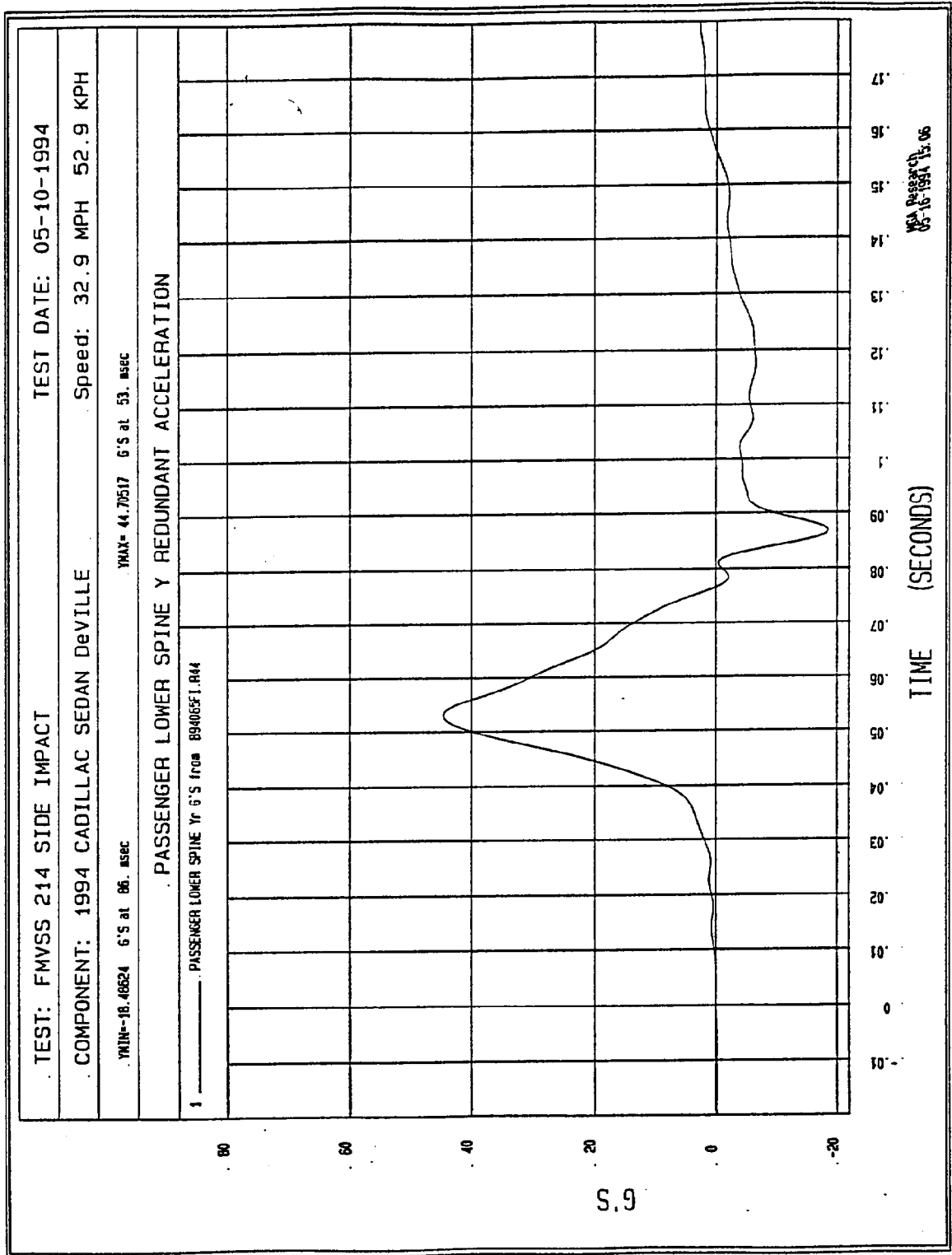


Figure B-87 - Passenger Lower Spine Y Redundant Acceleration vs. Time

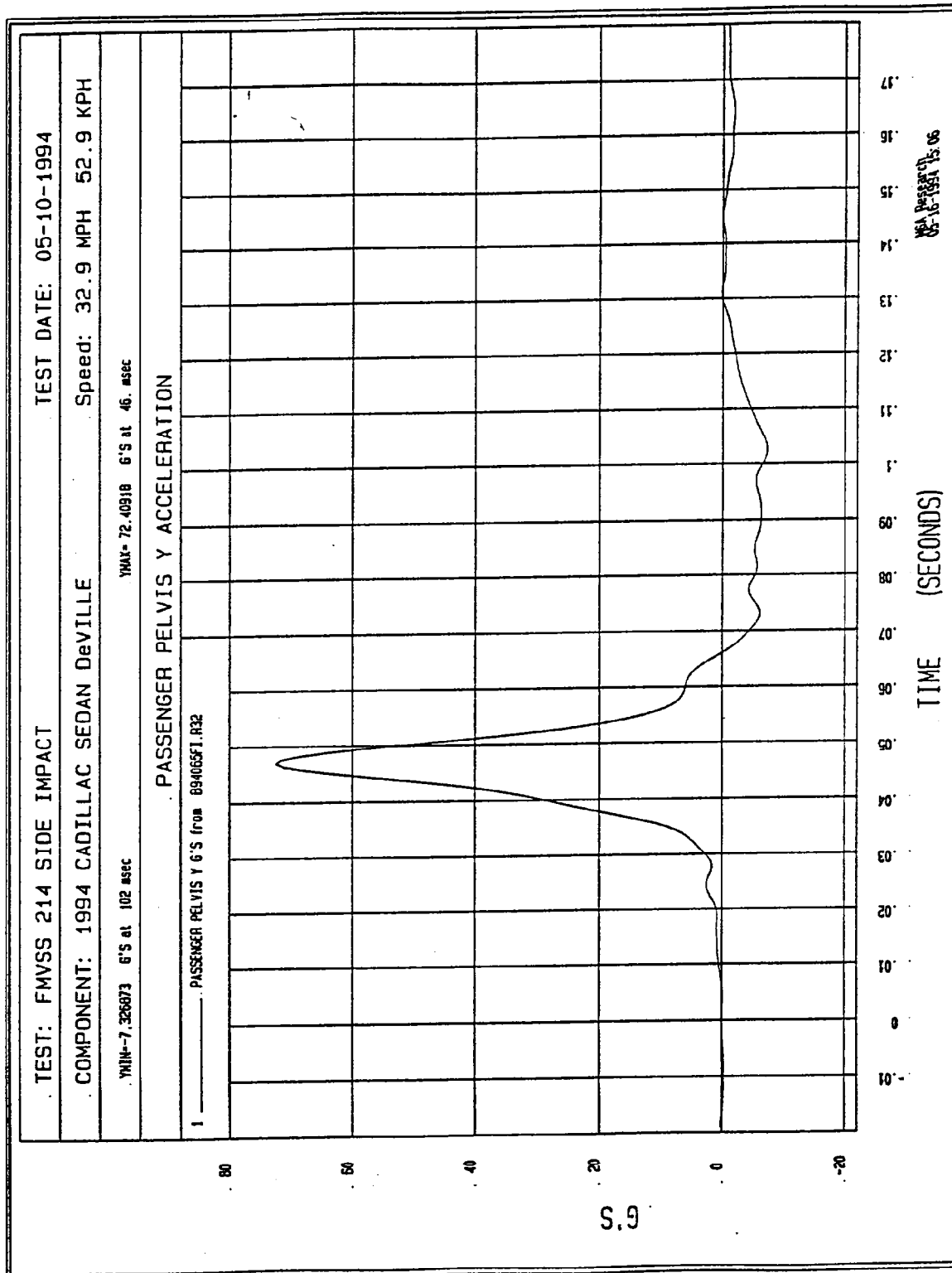
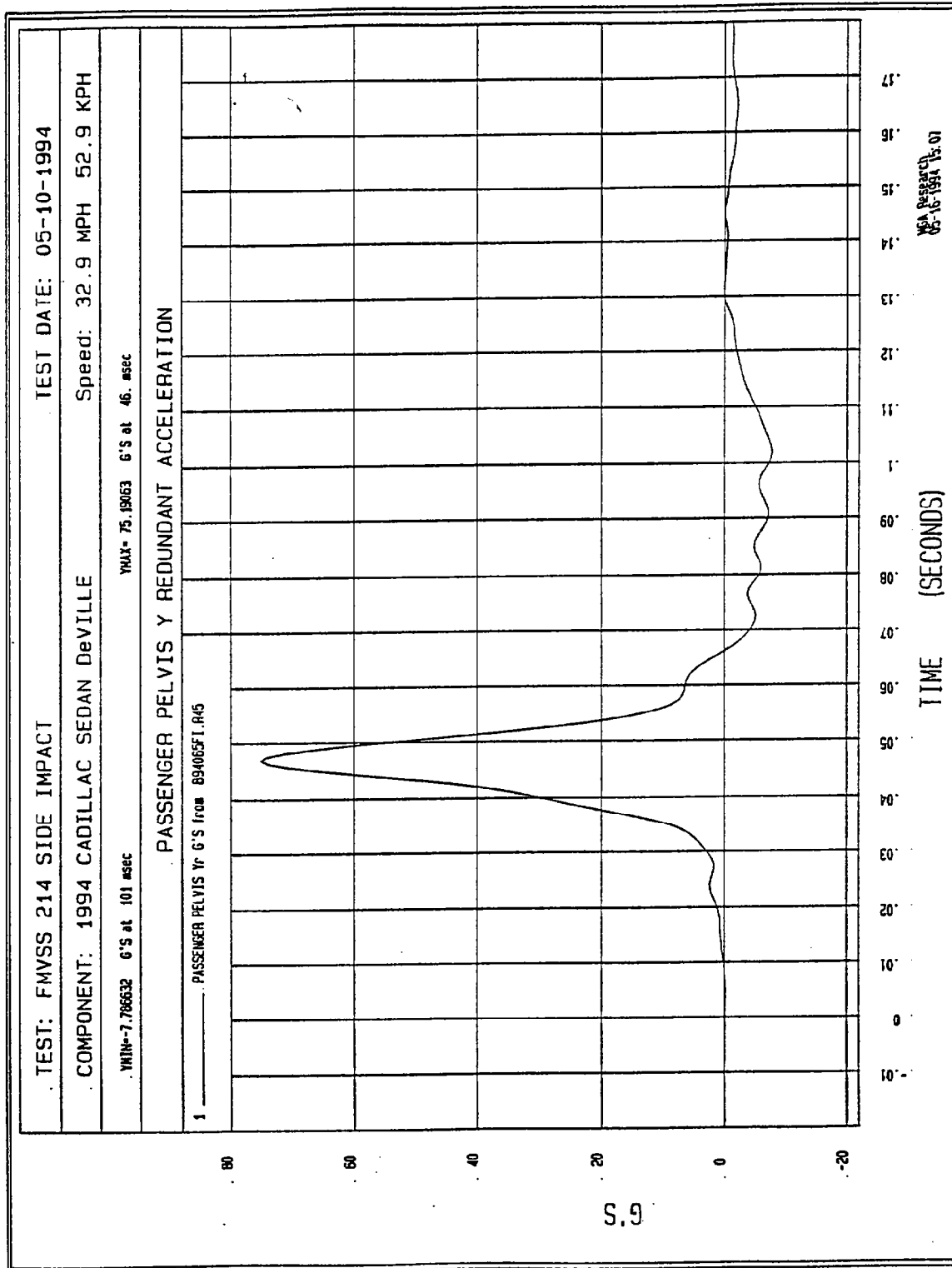


Figure B-88 - Passenger Pelvis Y Acceleration vs. Time



B-89

Figure B-89 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-94-DC001

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

Cadillac
1994 Cadillac Deville
NHTSA NO. CR0110

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: May 10, 1994

Report Date: June 17, 1994

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NEF-30
400 SEVENTH STREET, S.W., ROOM 6115
Washington, D.C. 20590

TABLE OF CONTENTS

		<u>Page No.</u>
DUMMY S/N: 272	PRE-TEST CERTIFICATION DATA	1-1
DUMMY S/N: 271	PRE-TEST CERTIFICATION DATA	2-1
DUMMY S/N: 272	POST-TEST CERTIFICATION DATA	3-1
DUMMY S/N: 271	POST-TEST CERTIFICATION DATA	4-1
DUMMY S/N: 272	POST-TEST INSPECTION CHECKLIST	5-1
DUMMY S/N: 271	POST-TEST INSPECTION CHECKLIST	6-1
	TEMPERATURE AND HUMIDITY GAUGE	7-1
	TEST DUMMY TEMPERATURE	7-2

PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Flexion Test:	The neck passed all flexion test requirements.
Neck Extension Test:	The neck passed all extension test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Knee Impact Tests:	Both knees passed all impact test requirements.

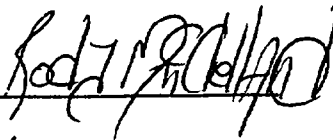
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: May 6, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.6" - 35.8"	35.7
RH - Rib Height	19.75 - 20.5"	20.5
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.2
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.4
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____



APPROVED BY: _____



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: April 27, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94572

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	73°
RELATIVE HUMIDITY	10 - 70%	35%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	38
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN Robert J. McAllister

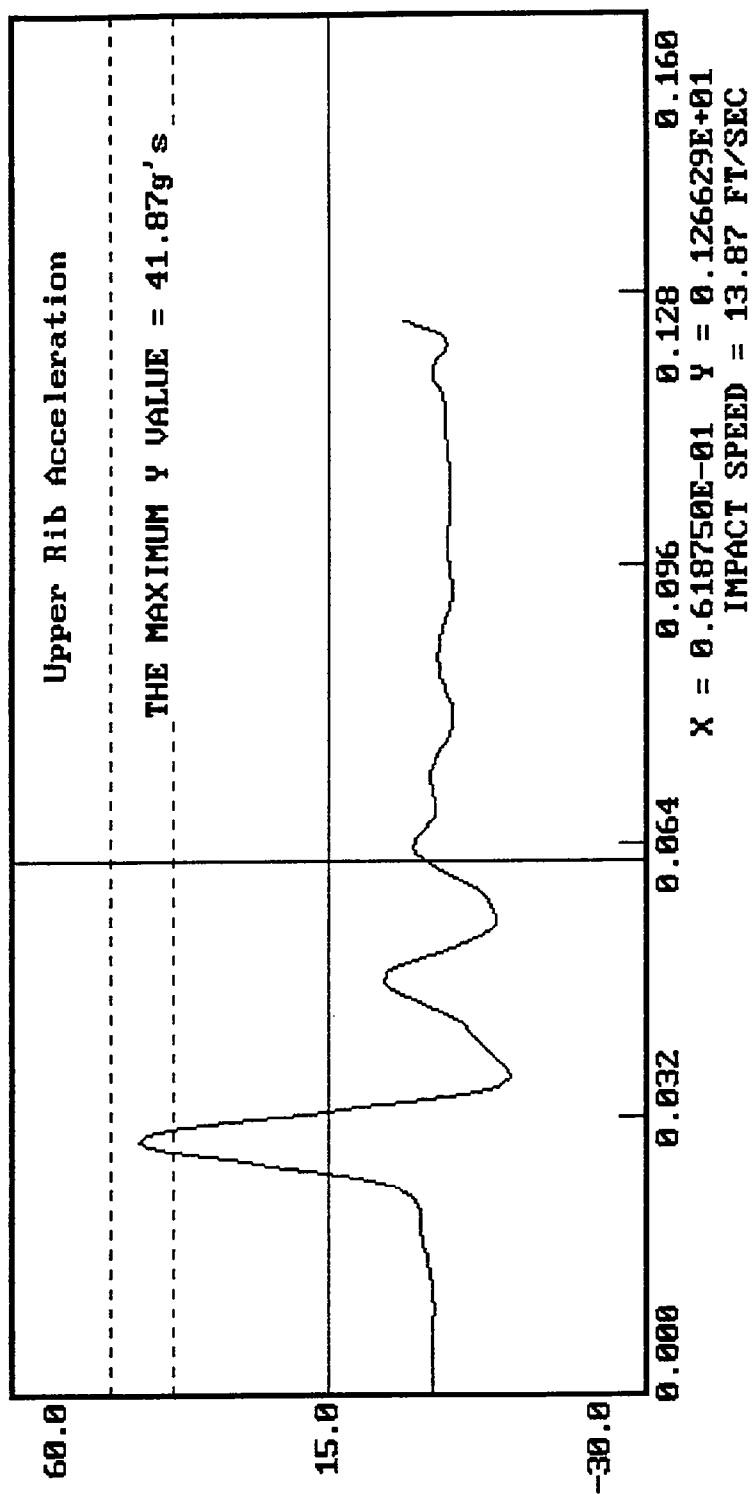
APPROVED BY Ed Rollins

04-27-1994 14:19

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

ACCELERATION (G'S) VS. TIME ((SECONDS))

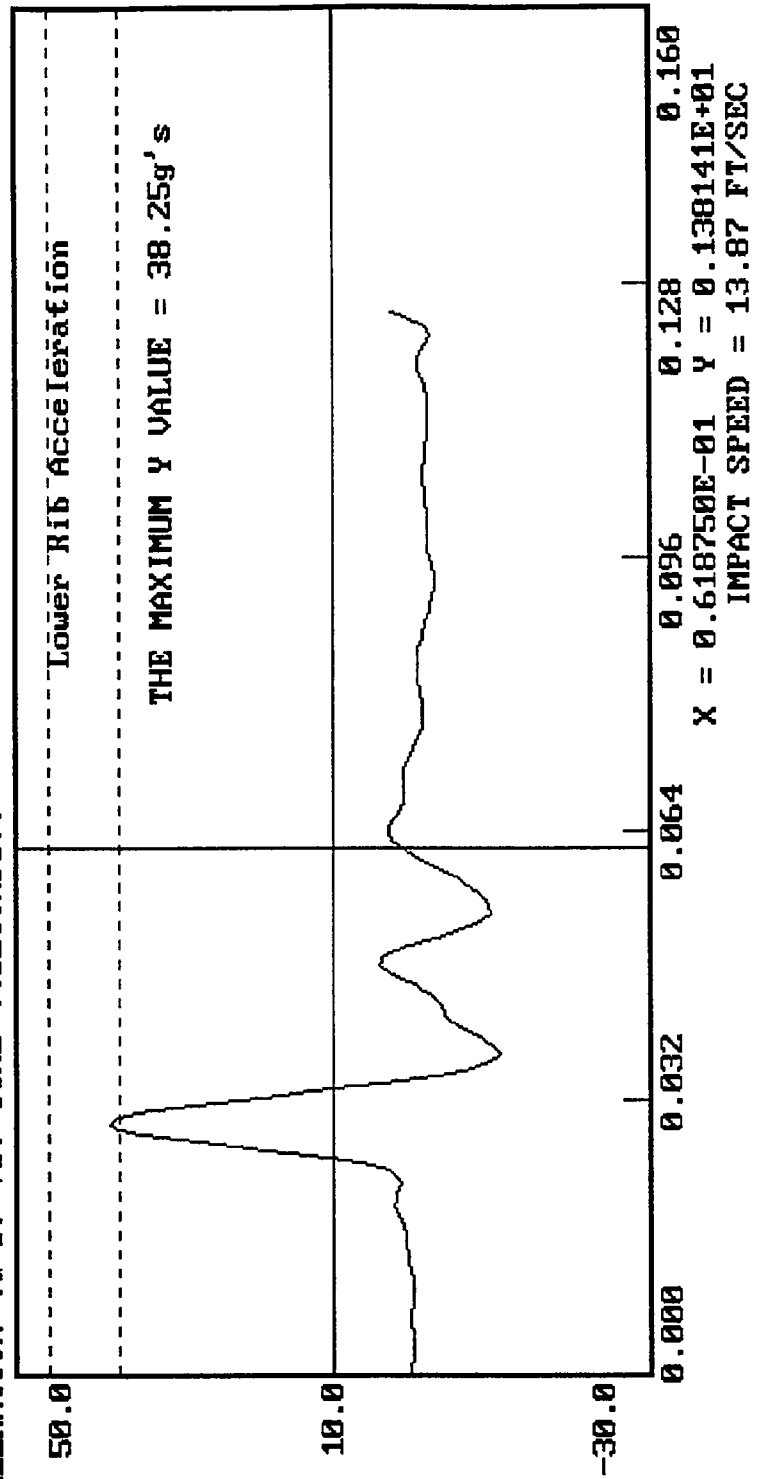


04-27-1994 14:19

DUMMY CALIBRATION - THORAX IMPACT

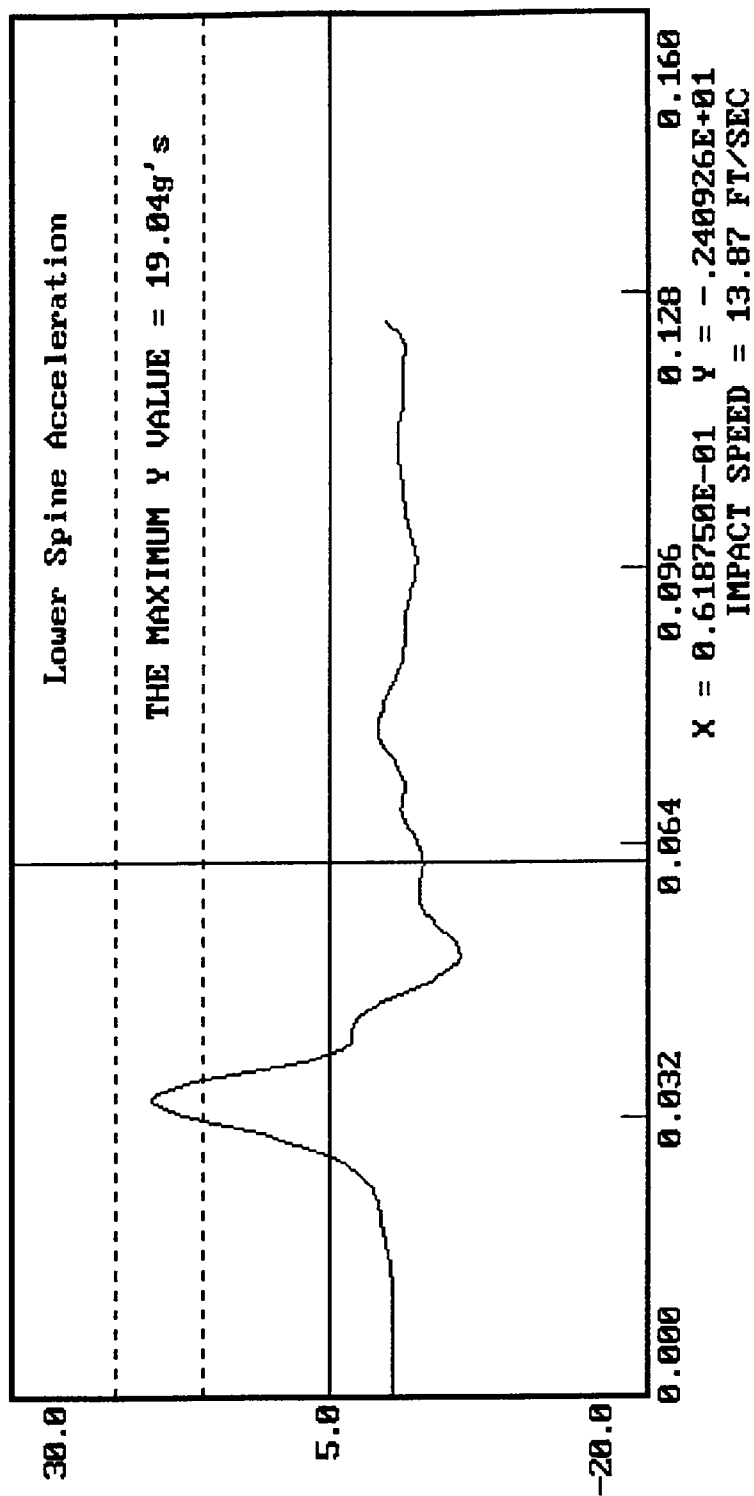
DUMMY # 272

ACCELERATION (G'S) VS. TIME ((SECONDS))



04-27-1994 14:19

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: April 27, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94573

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	73°
RELATIVE HUMIDITY	10 - 70%	35%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	47

TEST MEETS SPECIFICATIONS

TECHNICIAN

Ac. Chua

APPROVED BY

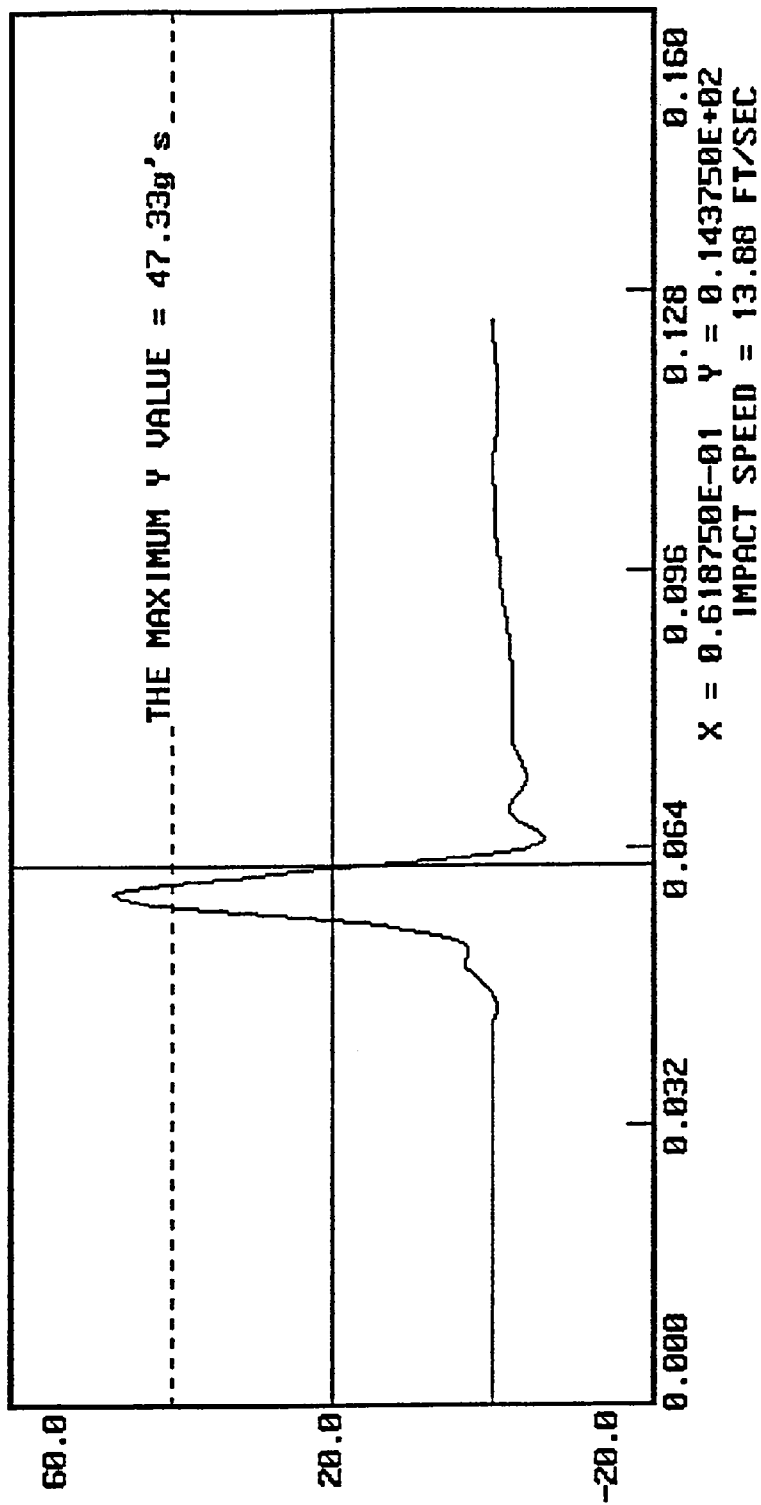
J. Robbins

04-27-1994 16:30

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 272

() VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: April 26, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94574

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	72°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.0
FORCE @ 0.75 in	36.7 - 49.8 lbs	44.2
FORCE @ 1.0 in	50 - 63 lbs	59
FORCE @ 1.3 in	73 - 88 lbs	81

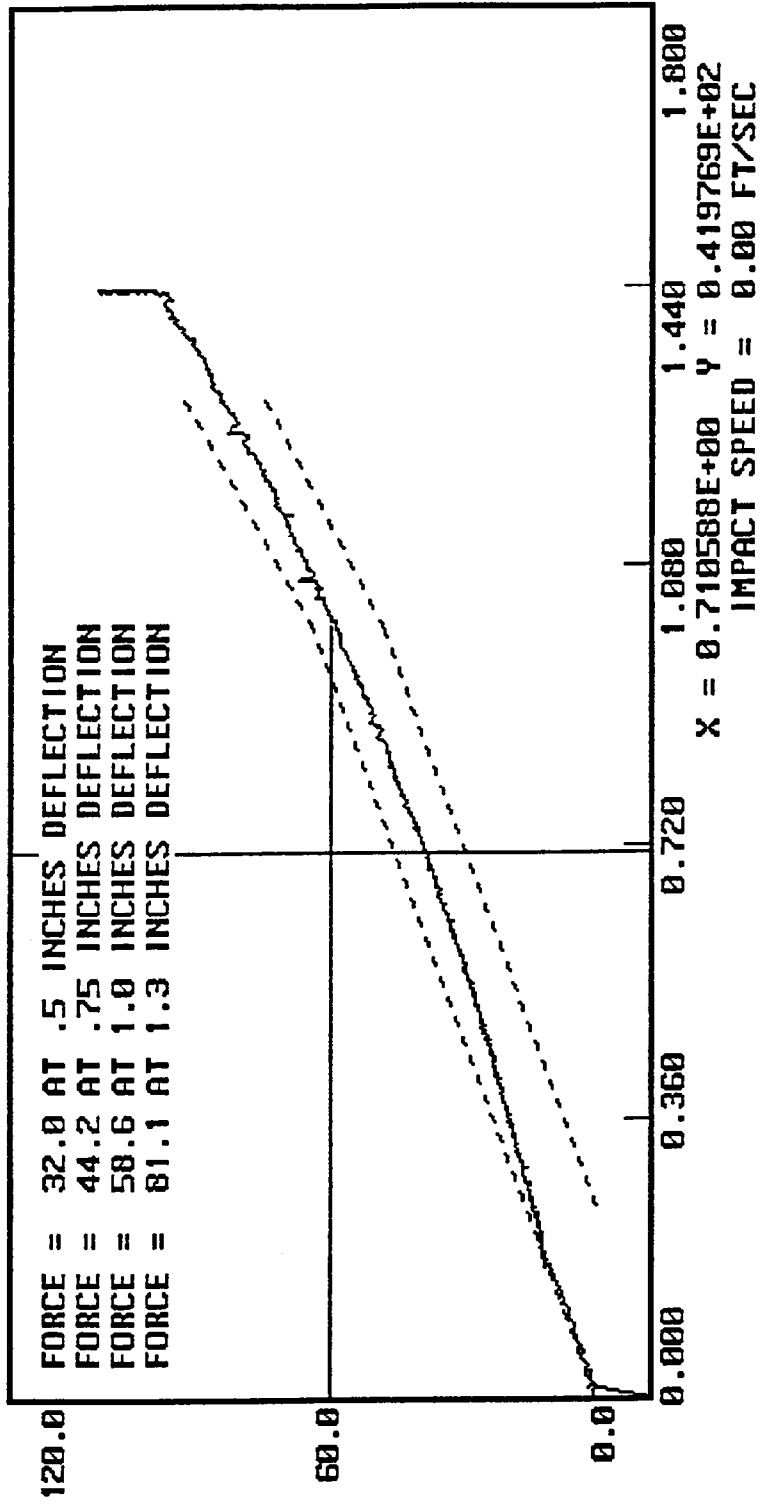
TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 272
 04-26-1994 19:00

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: April 26, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94575

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	72°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	27
FORCE @ 30°	34 - 46 lbs	41
FORCE @ 40°	46 - 58 lbs	49
RETURN ANGLE	12° maximum	6

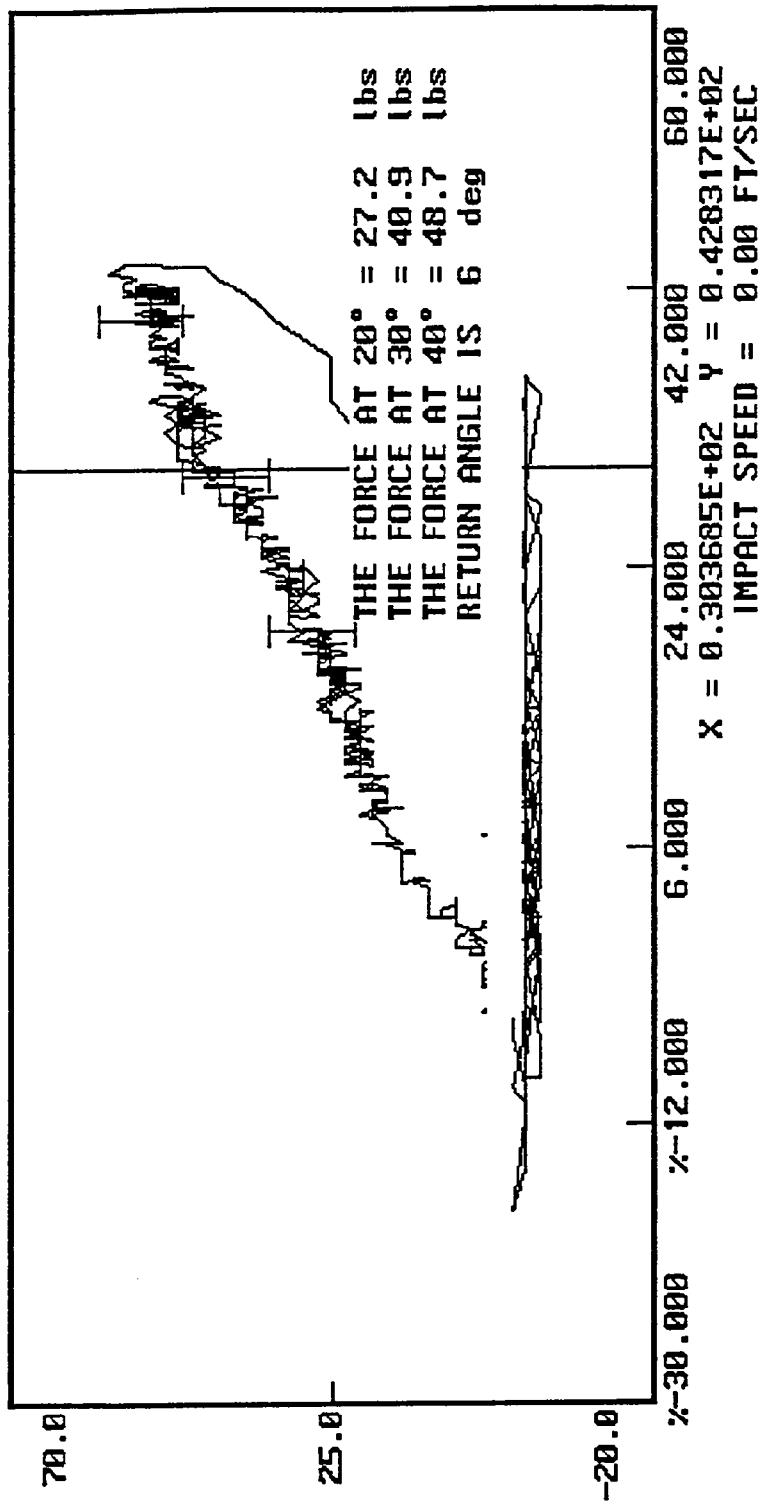
TEST MEETS SPECIFICATIONS

TECHNICIAN *Ala Chalmers*

APPROVED BY *J. H. Robbins*

DUMMY CALIBRATION - LUMBAR FLEXION
 DUMMY # 272
 FORCE () VS. TORSO ROTATION (DEGREES)

04-26-1994 19:22



PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 271

Calibration Test Results Summary

Passenger Serial Number: 271

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Flexion Test:	The neck passed all flexion test requirements.
Neck Extension Test:	The neck passed all extension test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Knee Impact Tests:	Both knees passed all impact test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: May 6, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.6" - 35.8"	35.6
RH - Rib Height	19.75 - 20.5"	20.5
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	14.5

MEASUREMENTS BY:

Ala Chalmers

APPROVED BY:

J. Robbins

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: April 27, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94562

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	73°
RELATIVE HUMIDITY	10 - 70%	35%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	45
LOWER RIB	37 - 46 g's	43
LOWER SPINE	15 - 22 g's	21

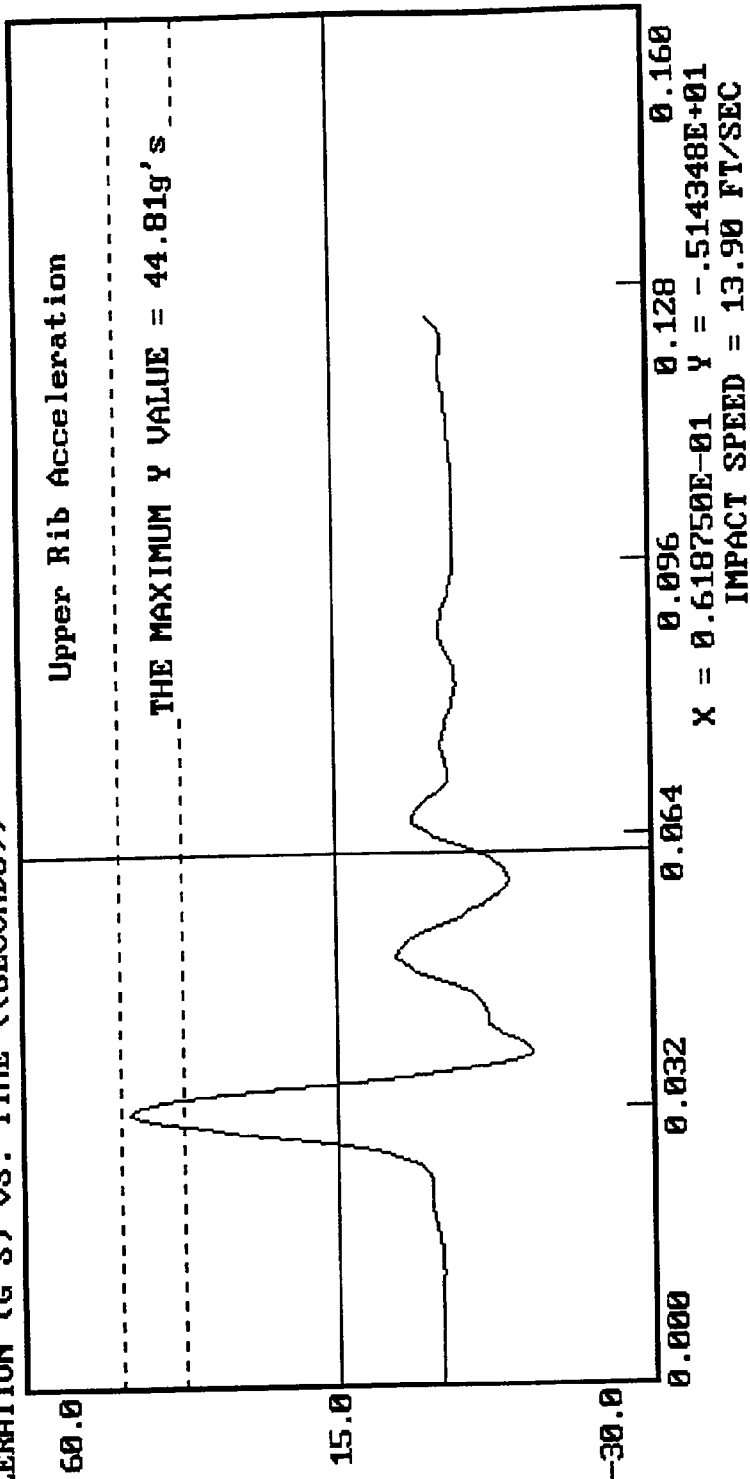
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

04-27-1994 12:23

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 271
ACCELERATION (G'S) VS. TIME ((SECONDS))

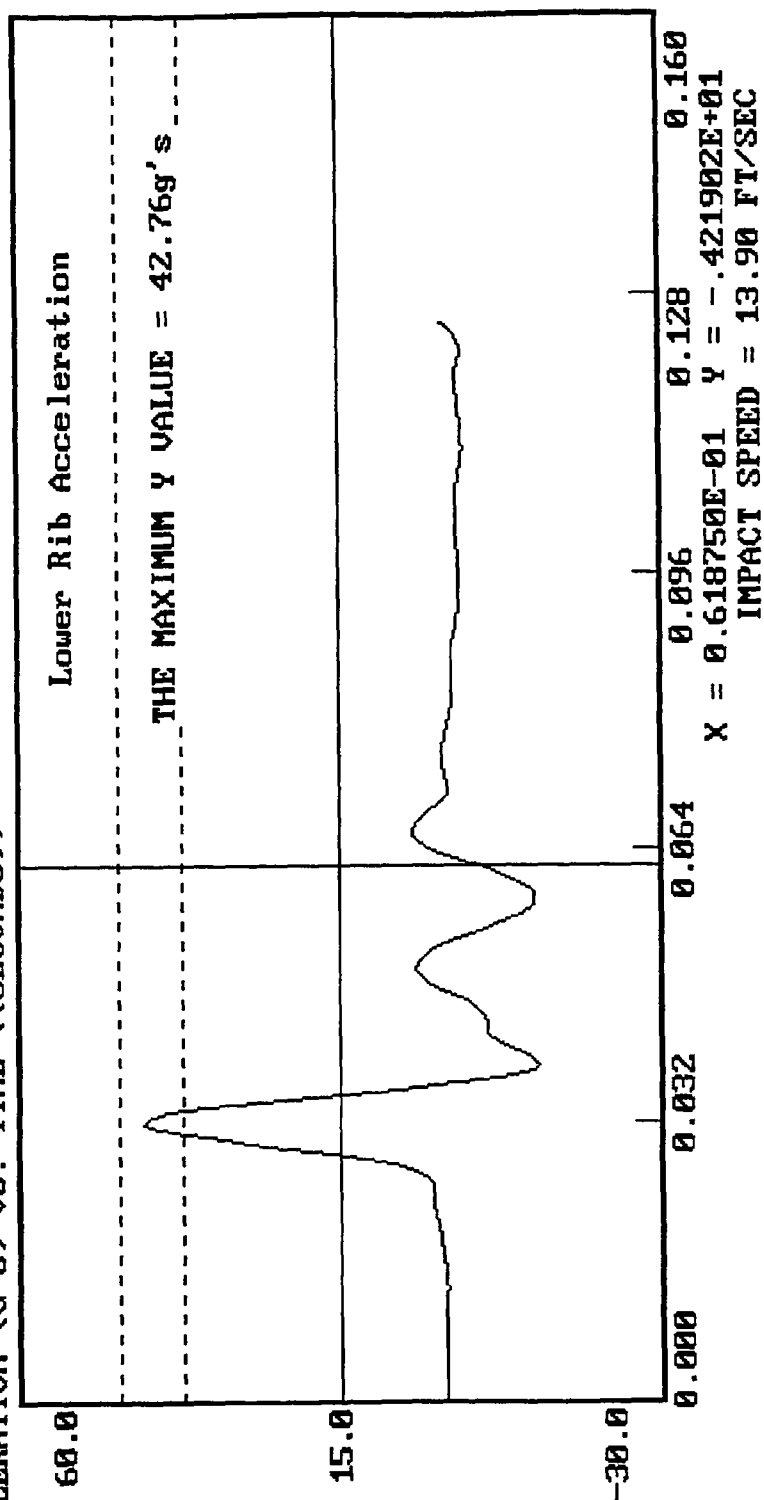


04-27-1994 12:23

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

ACCELERATION (G'S) VS. TIME ((SECONDS))

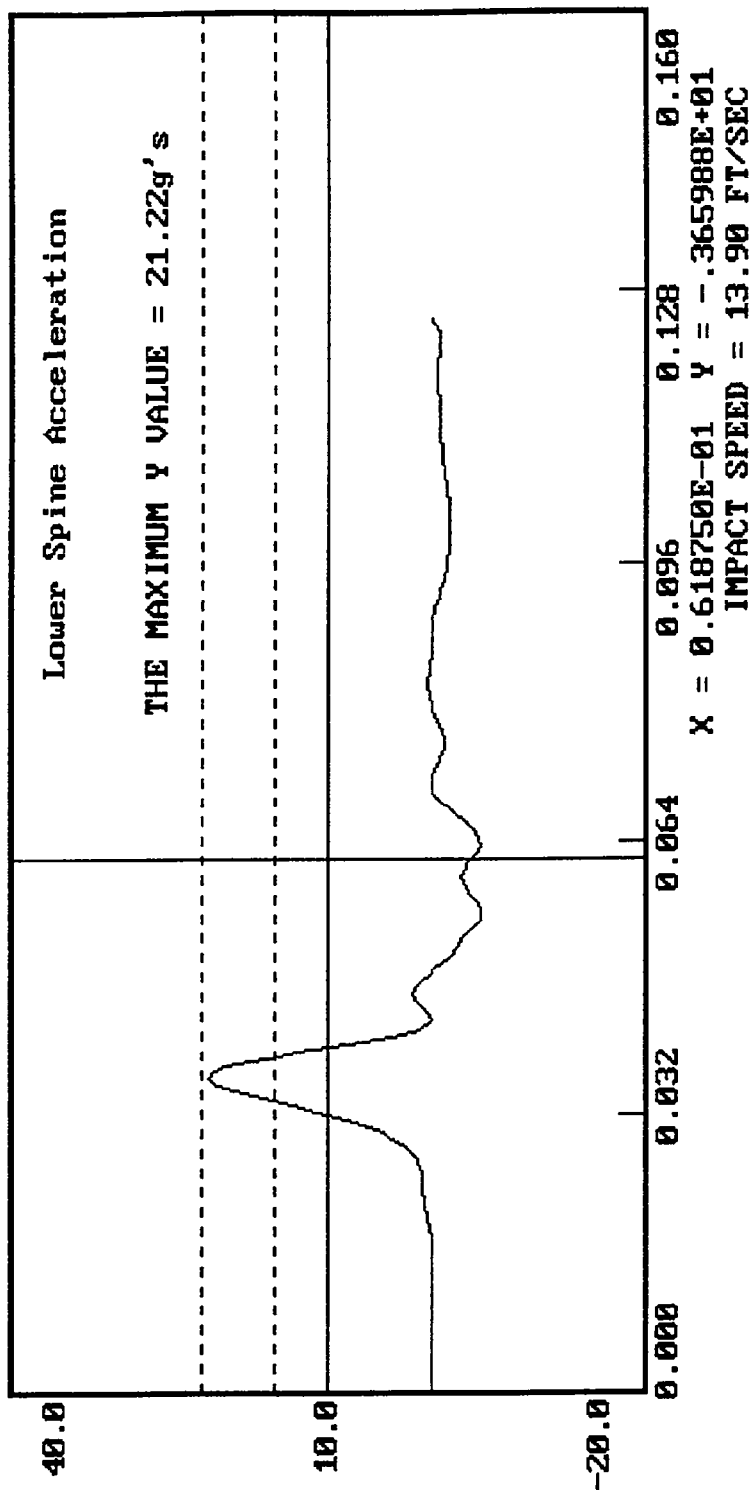


04-27-1994 12:23

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: April 27, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94563

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	73°
RELATIVE HUMIDITY	10 - 70%	35%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	49

TEST MEETS SPECIFICATIONS

TECHNICIAN

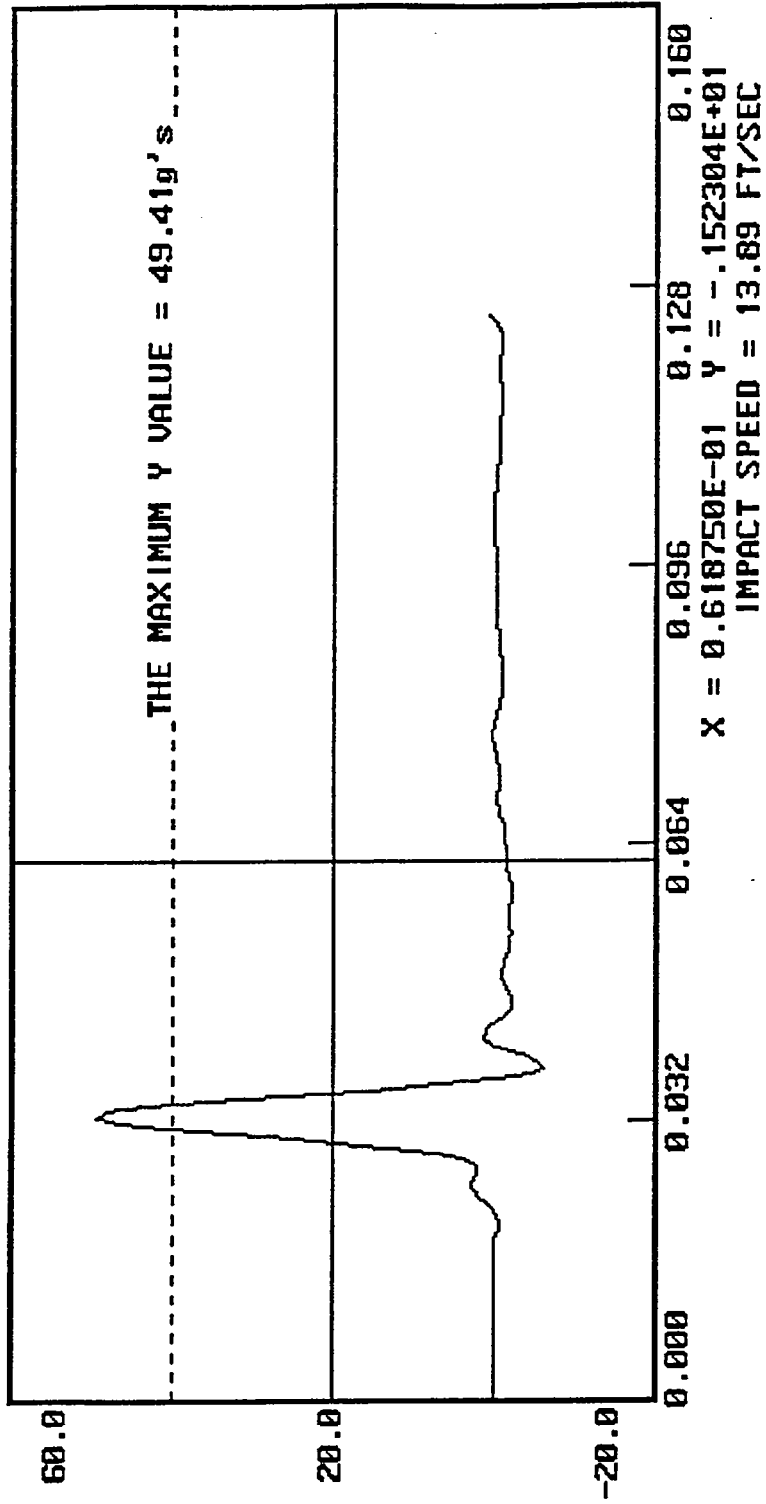


APPROVED BY



DUMMY CALIBRATION - PELVIS IMPACT
DUMMY # 271
ACCELERATION (G'S) VS. TIME ((SECONDS))

04-27-1994 16:38



MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

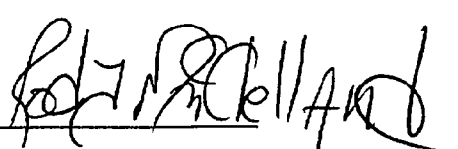
DATE: April 26, 1994

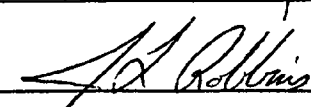
DUMMY NUMBER: 271

TEST NUMBER: D94564

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	72°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	27.8
FORCE @ 0.75 in	36.7 - 49.8 lbs	39.4
FORCE @ 1.0 in	50 - 63 lbs	56
FORCE @ 1.3 in	73 - 88 lbs	77

TEST MEETS SPECIFICATIONS

TECHNICIAN 

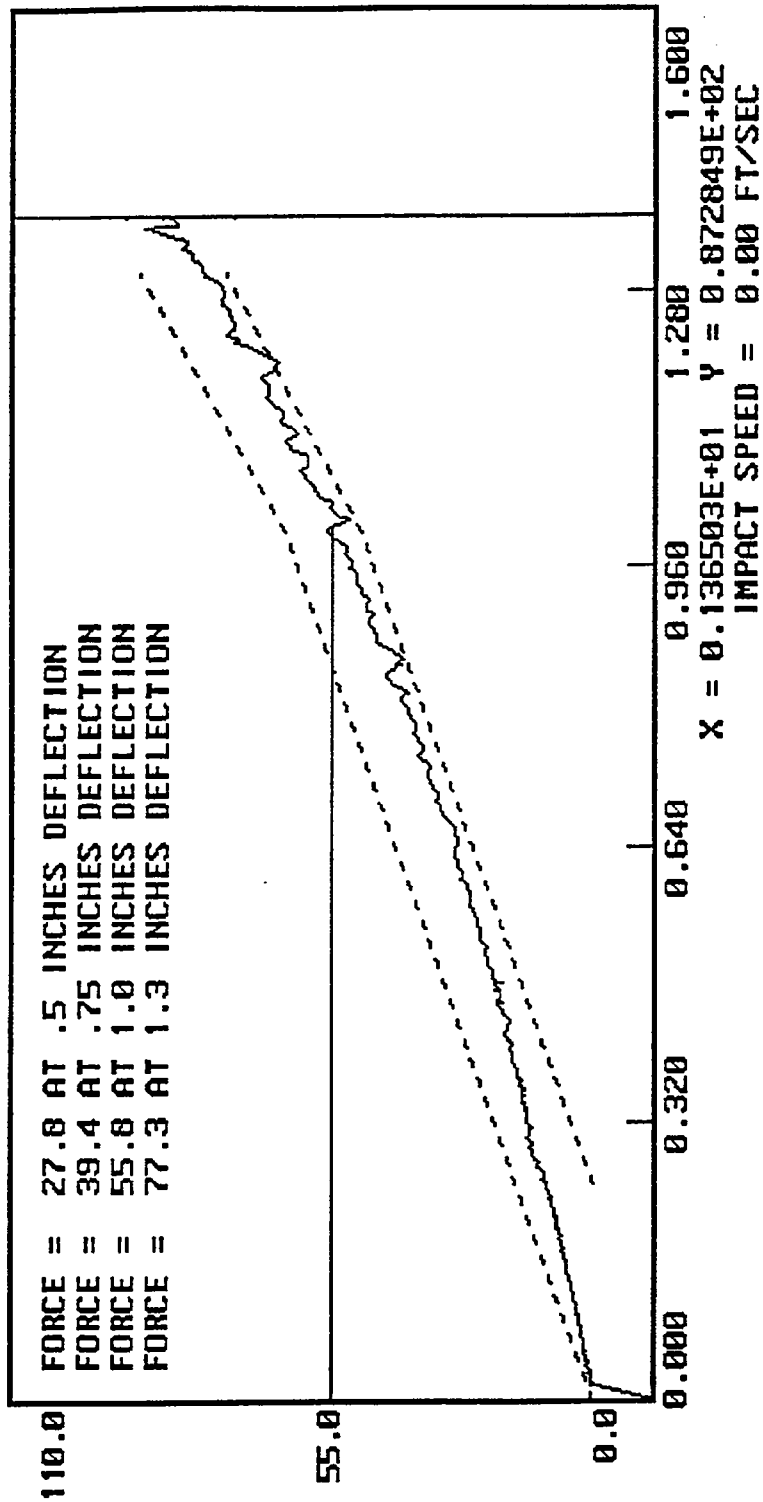
APPROVED BY 

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)

04-26-1994 19:03



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: April 26, 1994

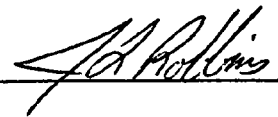
DUMMY NUMBER: 271

TEST NUMBER: D94565

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	72°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	26
FORCE @ 30°	34 - 46 lbs	37
FORCE @ 40°	46 - 58 lbs	47
RETURN ANGLE	12° maximum	7°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

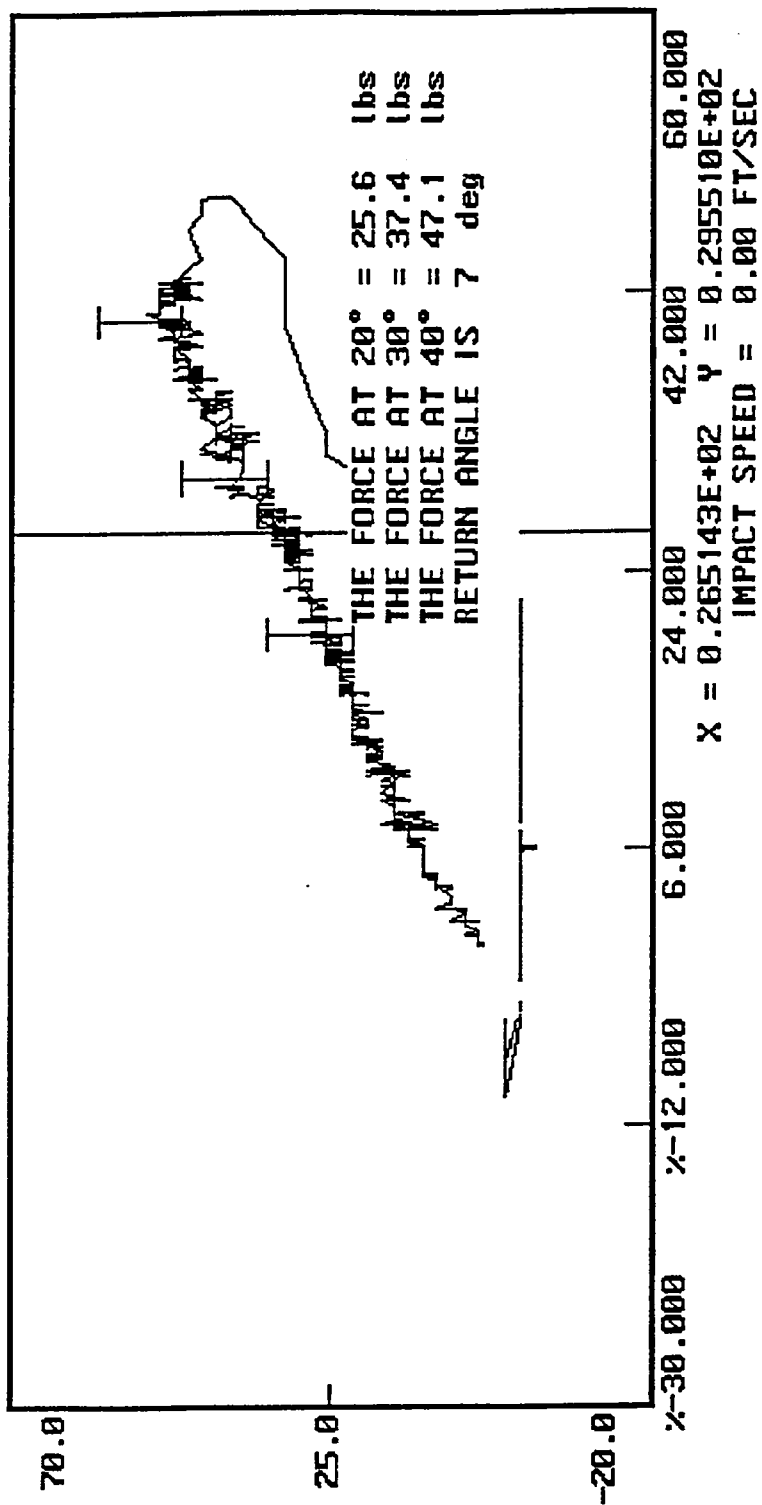
APPROVED BY 

04-26-1994 19:35

DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 271

FORCE () VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Flexion Test:	The neck passed all flexion test requirements.
Neck Extension Test:	The neck passed all extension test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.*
Knee Impact Tests:	Both knees passed all impact test requirements.

* After replacement of rib wrap assembly that was damaged during the impact test.

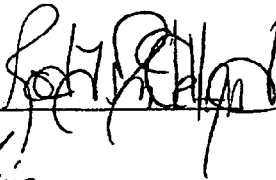
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

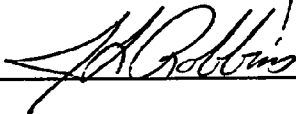
DATE OF VERIFICATION: May 16, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.6" - 35.8"	35.7
RH - Rib Height	19.75 - 20.5"	20.5
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.1
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.3
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____



APPROVED BY: _____



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: May 21, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94792

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	46
LOWER RIB	37 - 46 g's	42
LOWER SPINE	15 - 22 g's	21

TEST MEETS SPECIFICATIONS

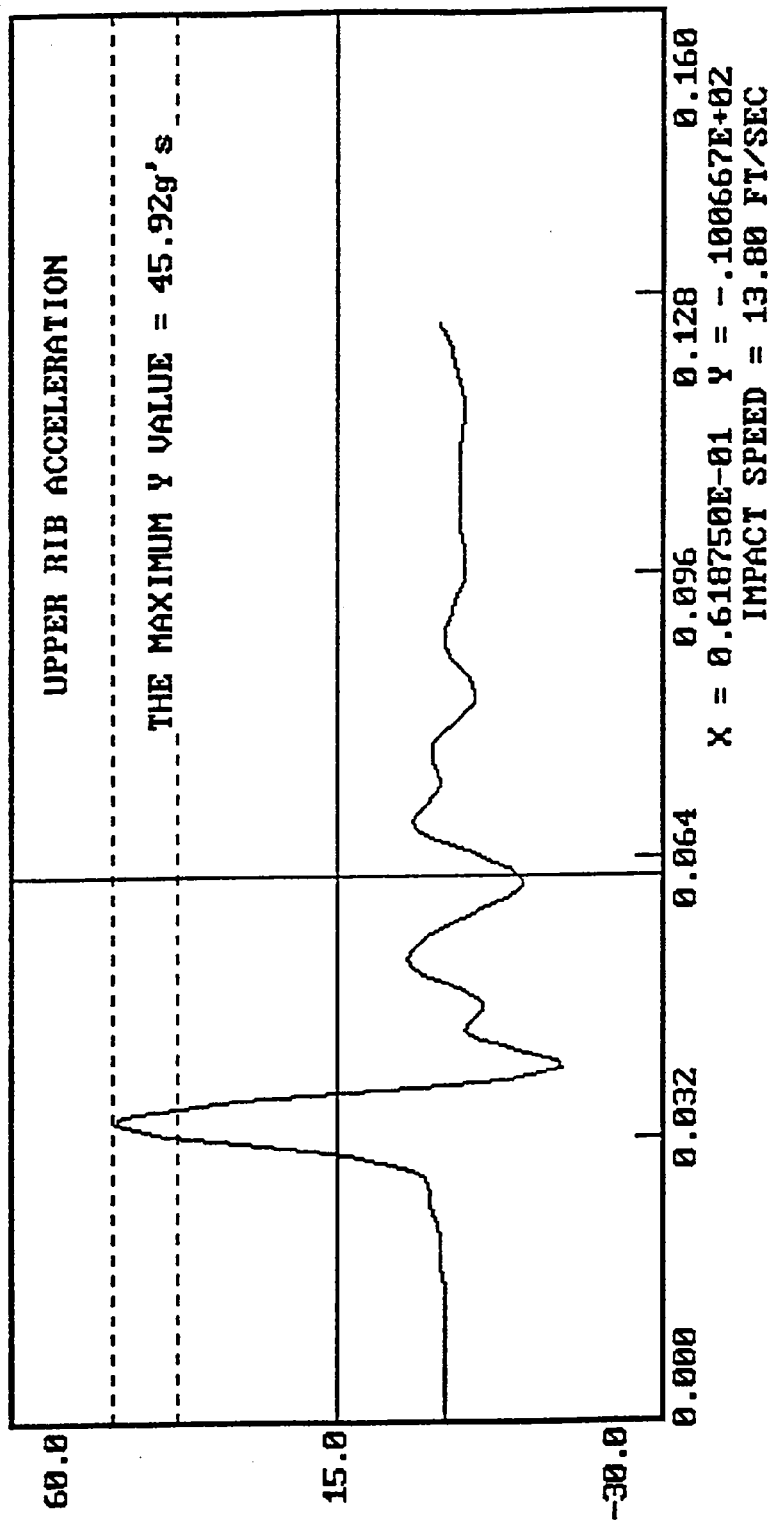
TECHNICIAN 

APPROVED BY 

Note: Data was obtained from impact after a new rib wrap assembly was installed. Post-test calibration data, with the damaged rib wrap assembly installed, is attached to the dummy damage checklist.

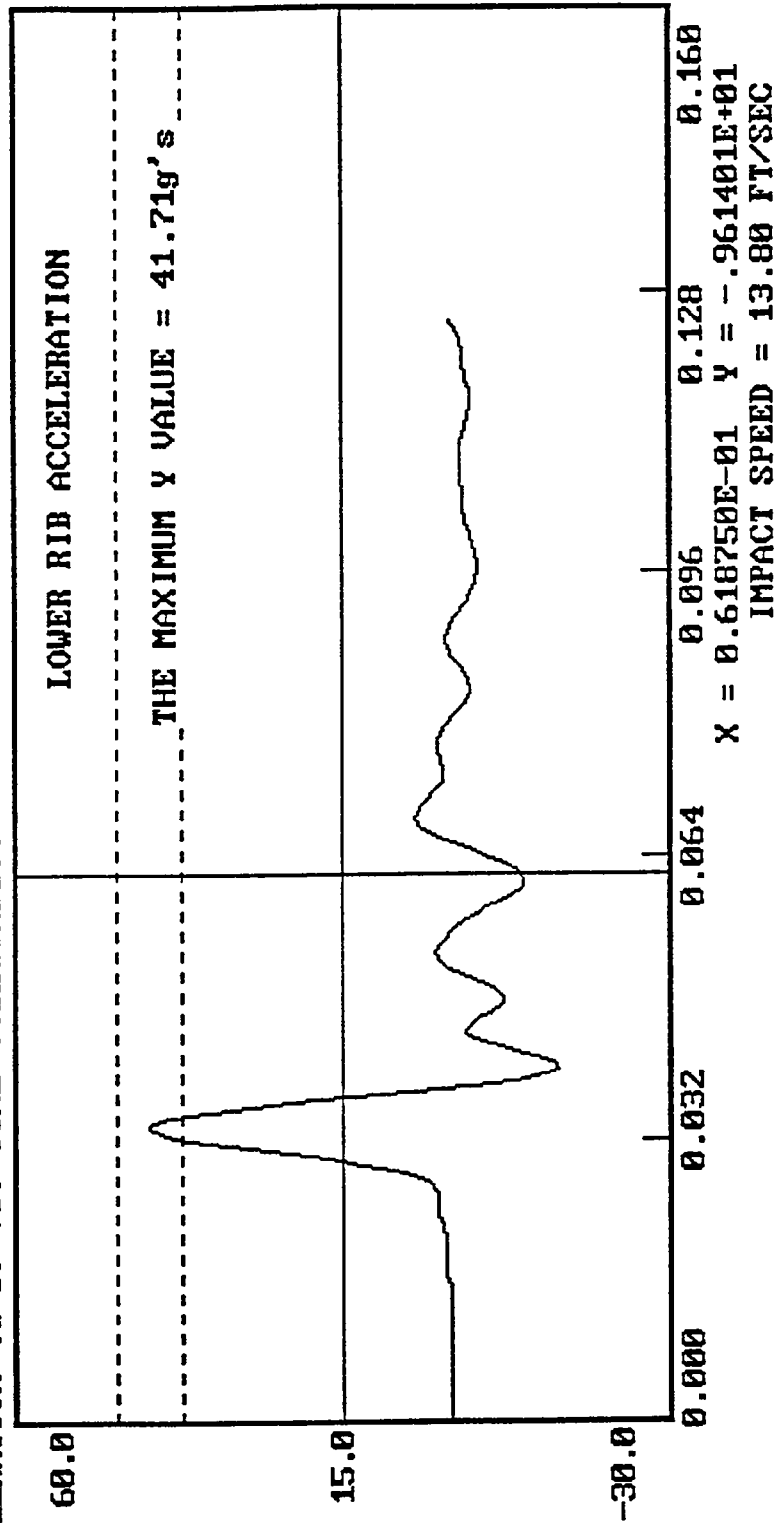
DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 ACCELERATION (G'S) VS. TIME ((SECONDS))

05-21-1994 14:35



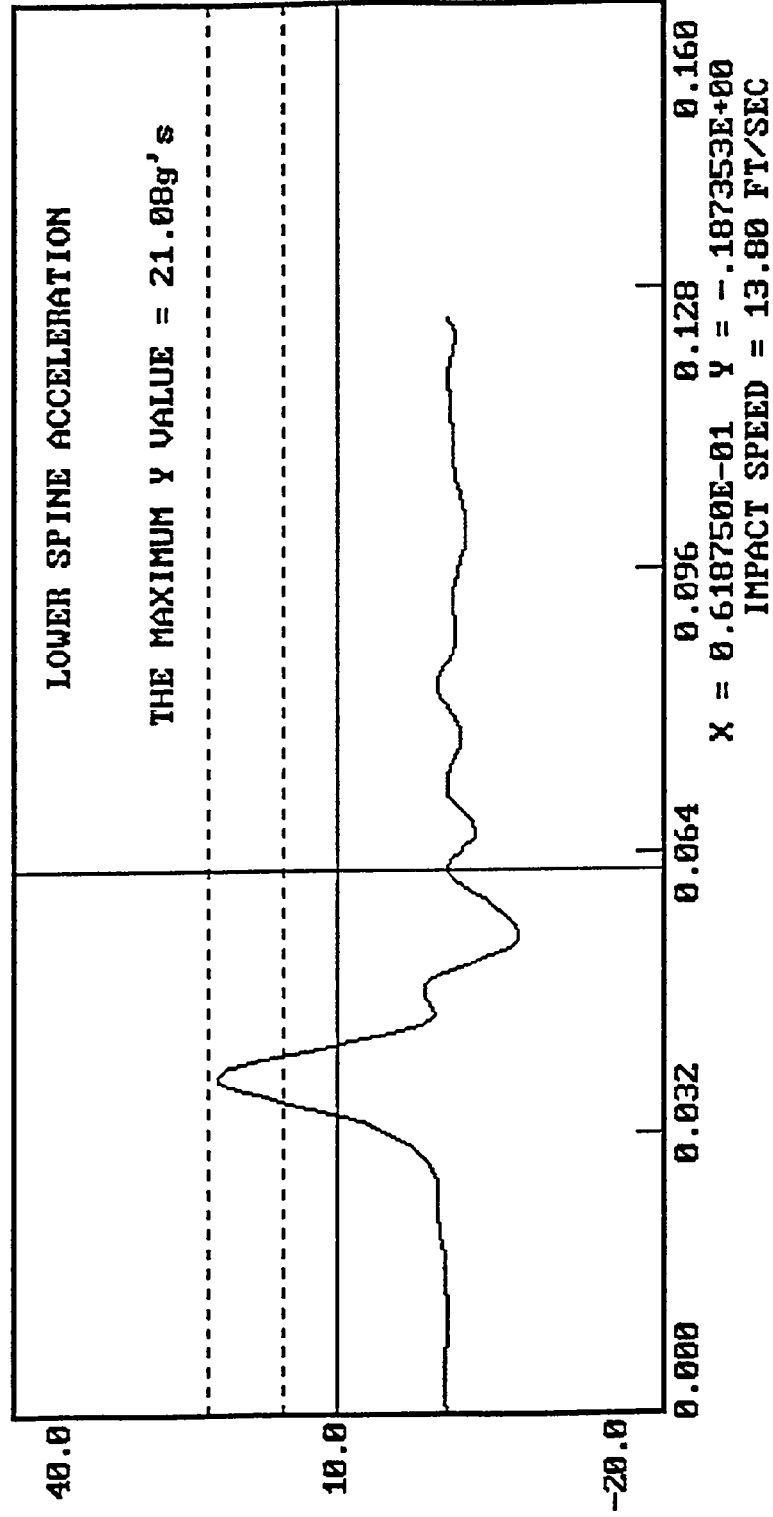
05-21-1994 14:35

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))

05-21-1994 14:35



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: May 21, 1994

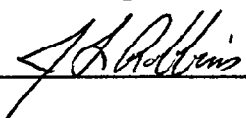
DUMMY NUMBER: 272

TEST NUMBER: D94723

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	58

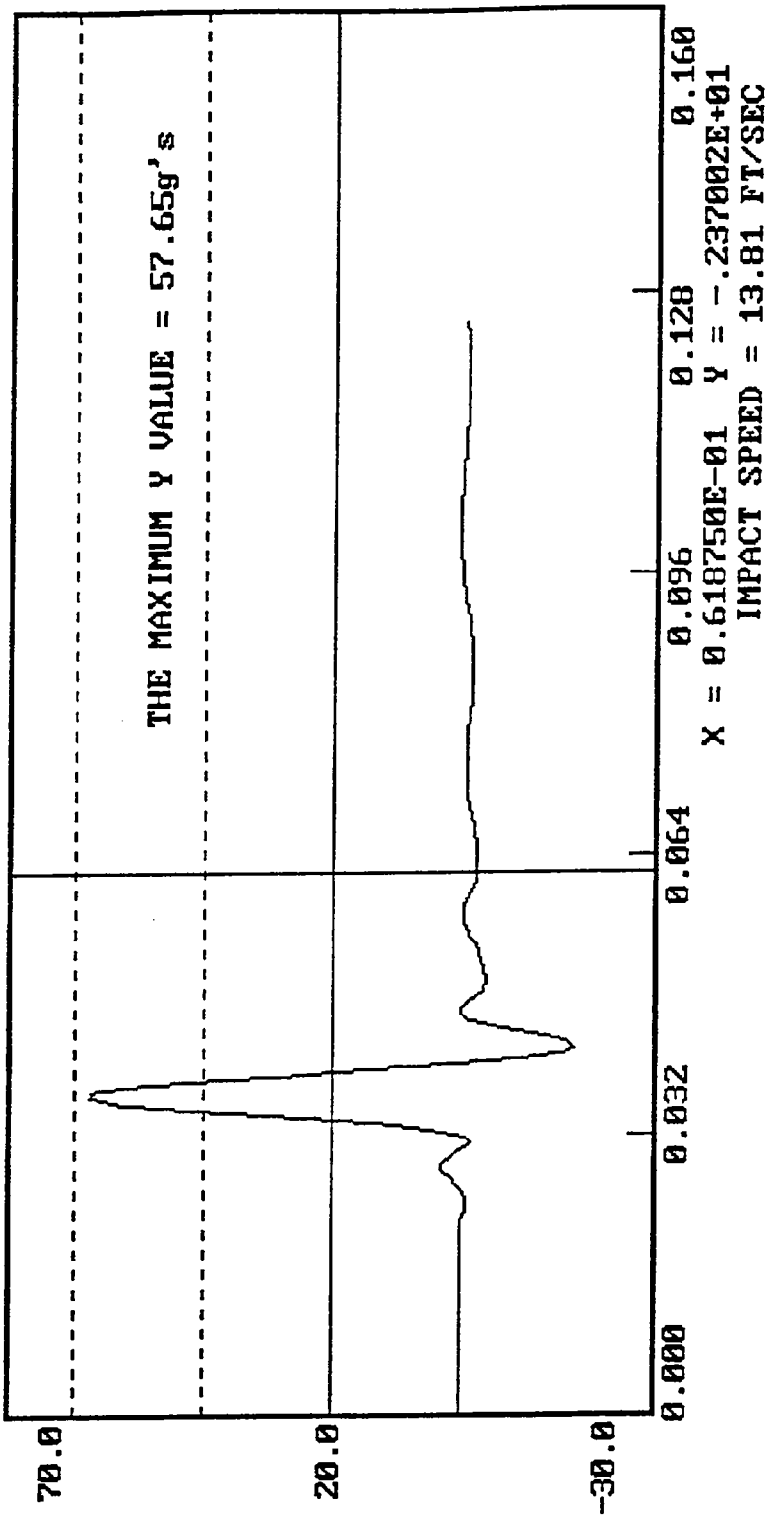
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - PELVIS IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))

05-24-1994 18:43



MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)
SIDE IMPACT DUMMY (SID)

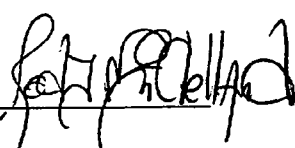
DATE: May 26, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94724

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	71°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.7
FORCE @ 0.75 in	36.7 - 49.8 lbs	45.3
FORCE @ 1.0 in	50 - 63 lbs	59
FORCE @ 1.3 in	73 - 88 lbs	79

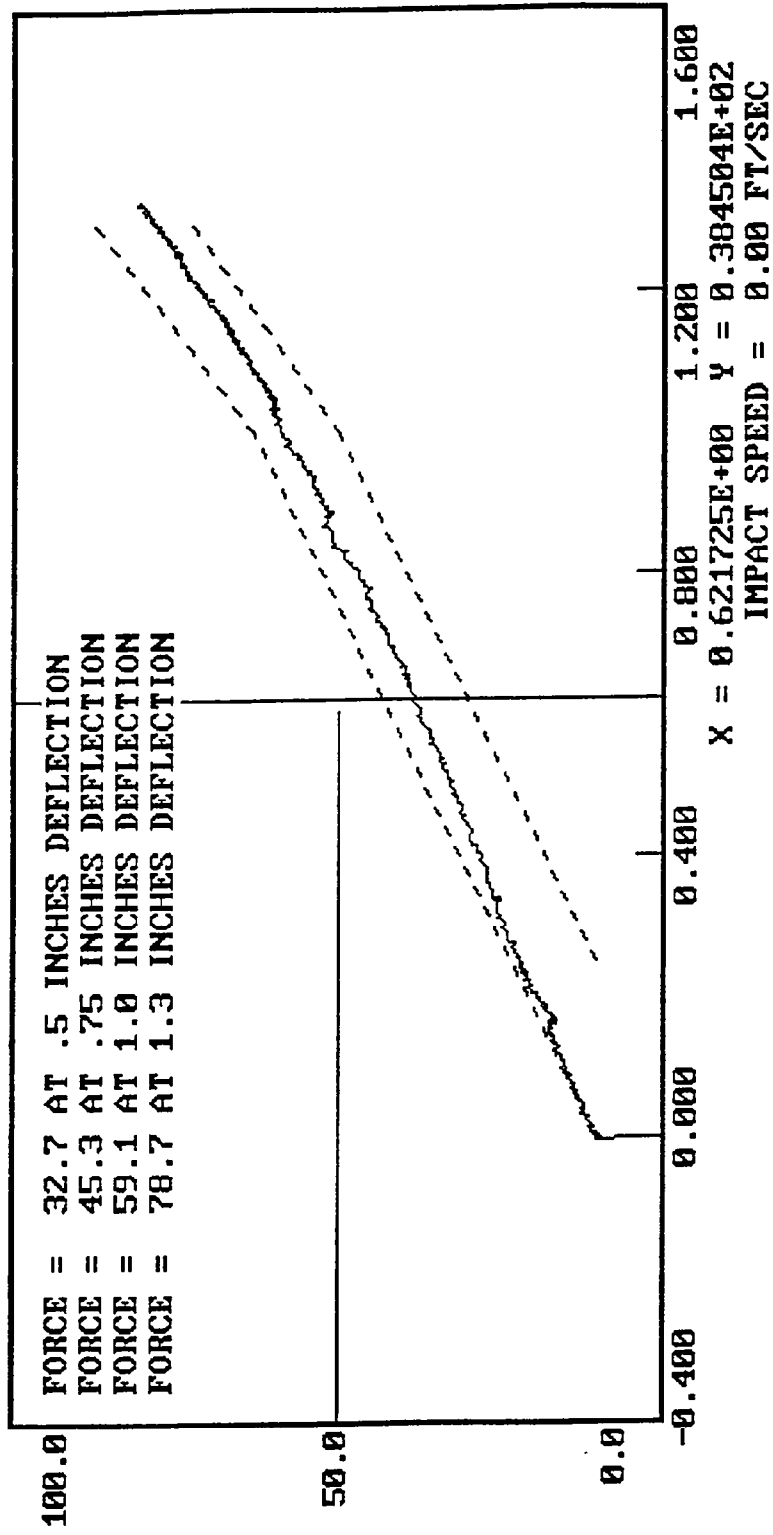
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 272
 05-26-1994 10:16

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: May 26, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94725

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	71°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	29
FORCE @ 30°	34 - 46 lbs	43
FORCE @ 40°	46 - 58 lbs	53
RETURN ANGLE	12° maximum	10°

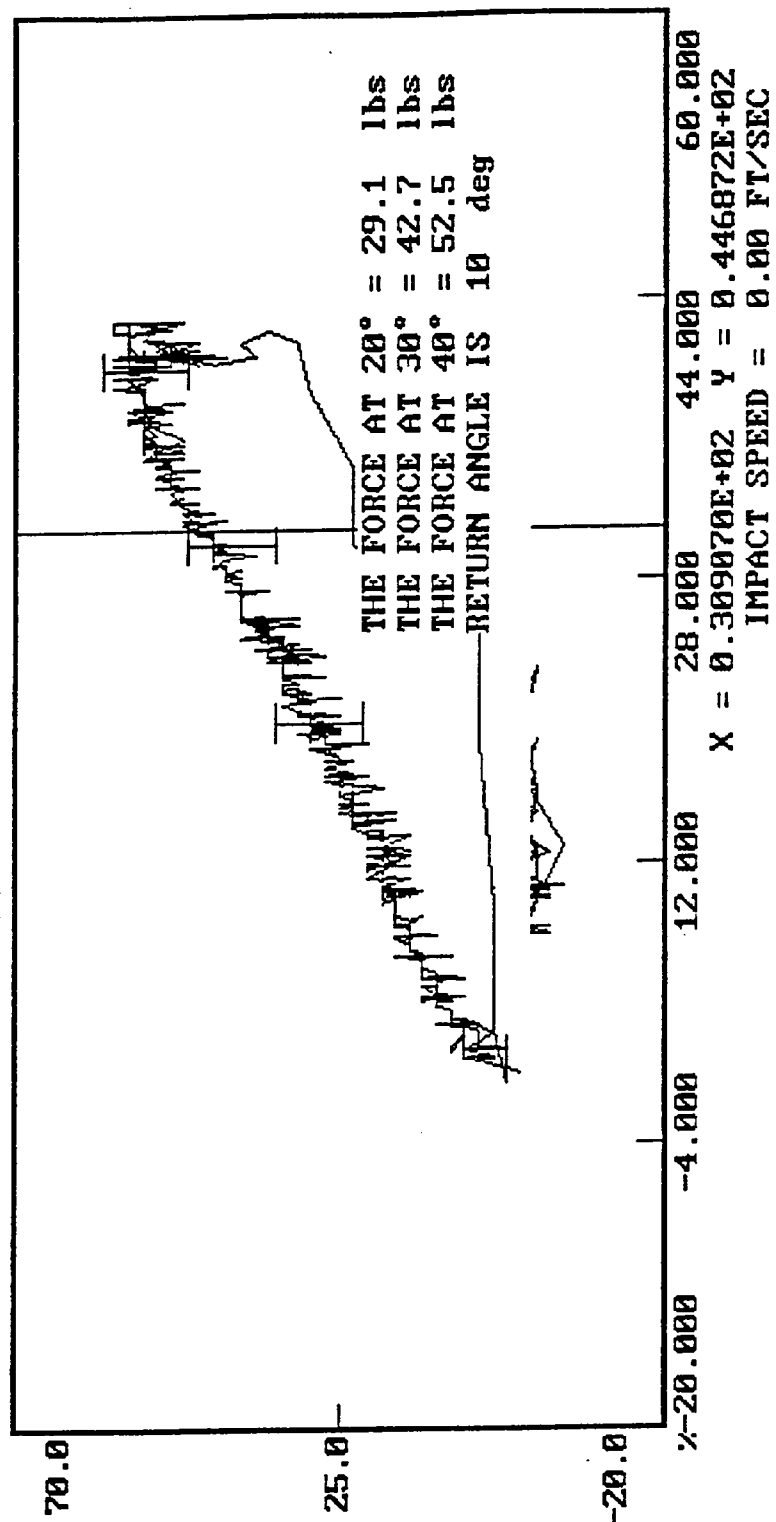
TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

05-26-1994 10:56

DUMMY CALIBRATION - LUMBAR FLEXION
DUMMY # 272
FORCE () VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Flexion Test:	The neck passed all flexion test requirements.
Neck Extension Test:	The neck passed all extension test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Knee Impact Tests:	Both knees passed all impact test requirements.

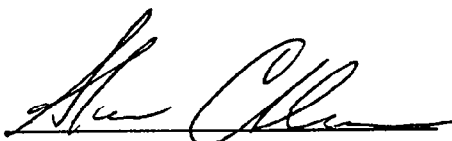
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

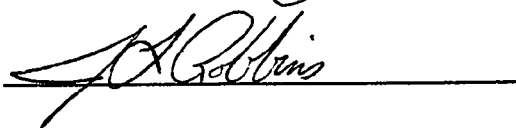
DATE OF VERIFICATION: May 16, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.6" - 35.8"	35.6
RH - Rib Height	19.75 - 20.5"	20.4
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.2
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.4
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	14.5

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: May 24, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94712

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

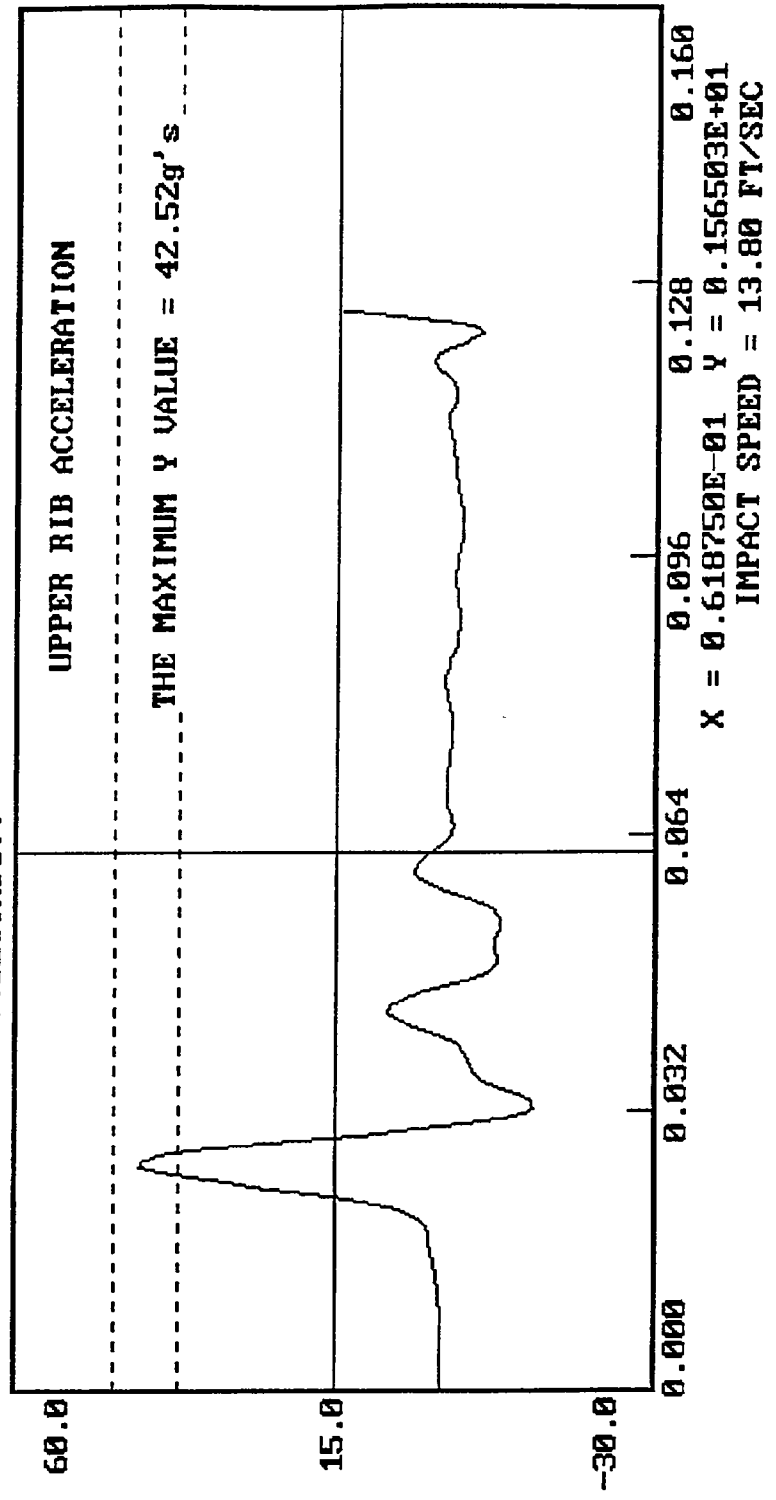
TECHNICIAN

APPROVED BY

Note: Data was obtained from impact after a new rib wrap assembly was installed. Post-test calibration data, with the damaged rib wrap assembly installed, is attached to the dummy damage checklist.

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 271
ACCELERATION (G'S) VS. TIME ((SECONDS))

05-24-1994 16:27

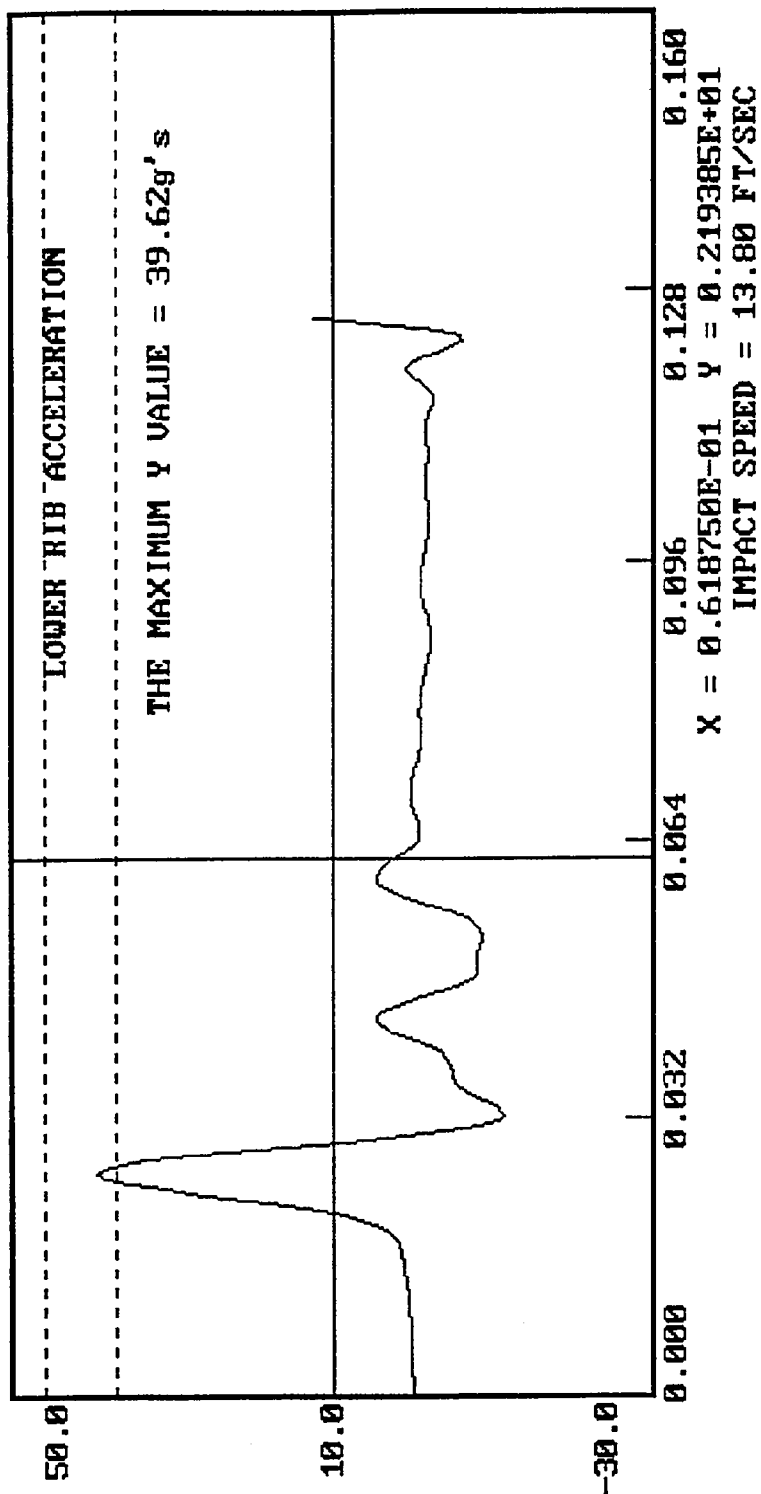


05-24-1994 16:27

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

ACCELERATION (G'S) VS. TIME ((SECONDS))

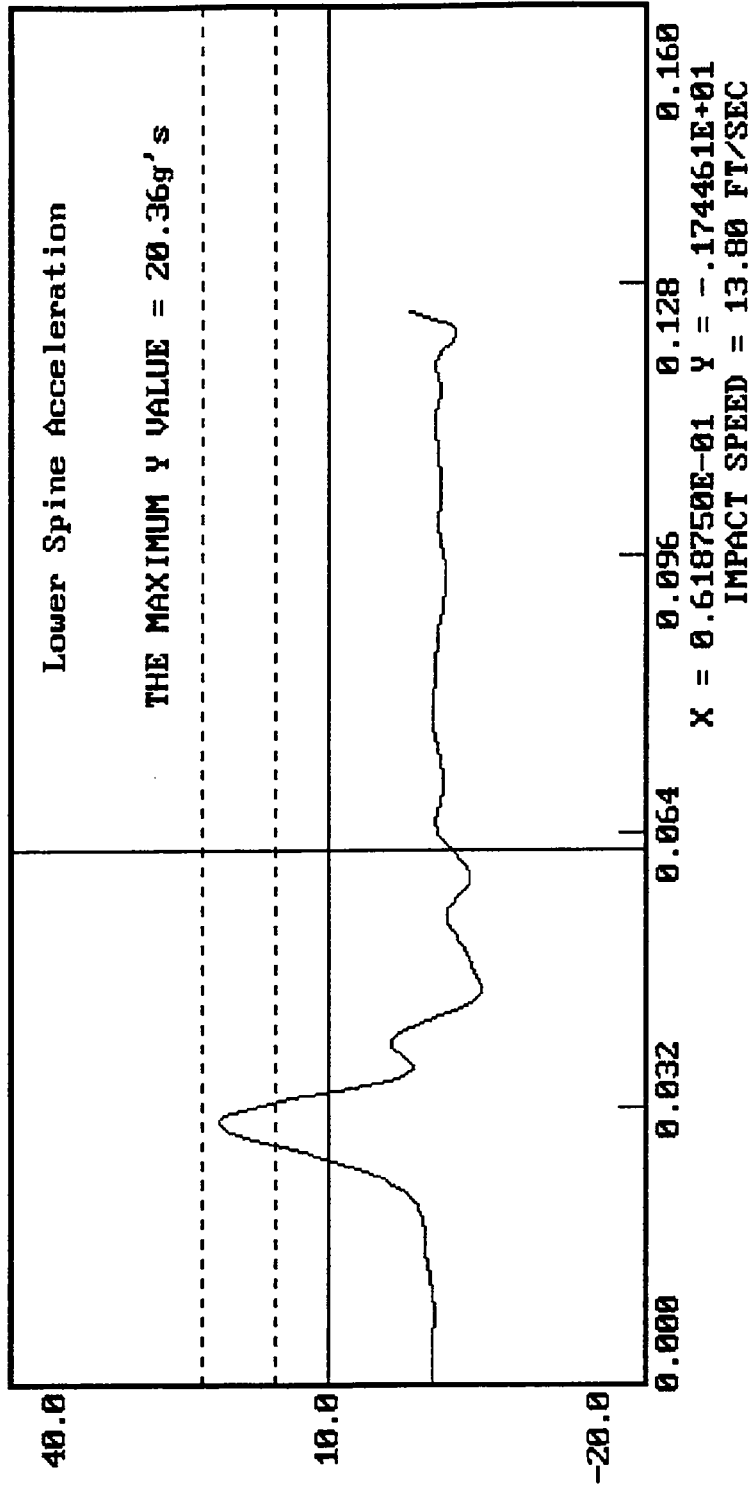


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

() US. TIME ((SECONDS))

05-24-1994 16:27



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: May 24, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94713

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	58

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

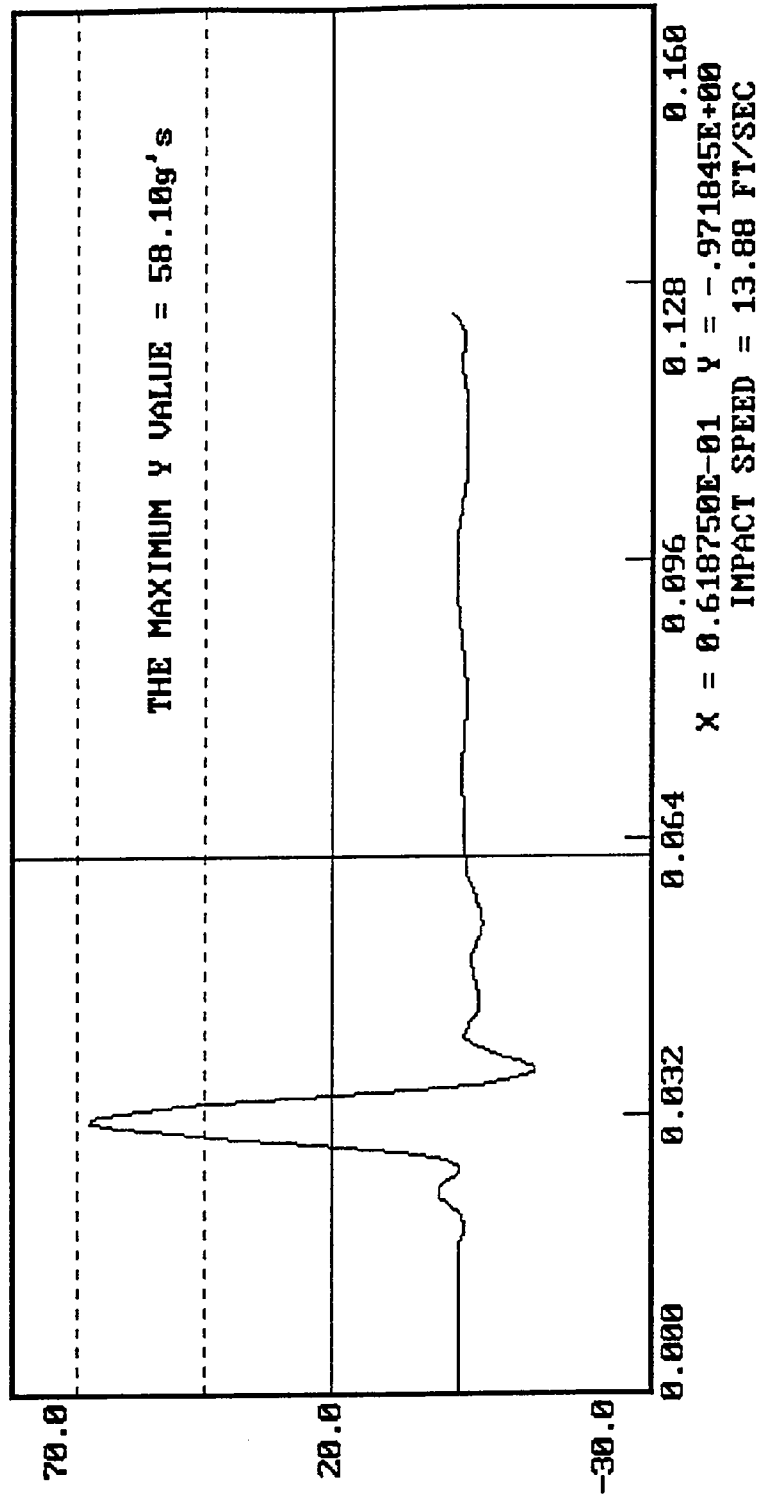


05-24-1994 19:15

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 271

ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: May 25, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94714

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	26.8
FORCE @ 0.75 in	36.7 - 49.8 lbs	38.3
FORCE @ 1.0 in	50 - 63 lbs	53
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

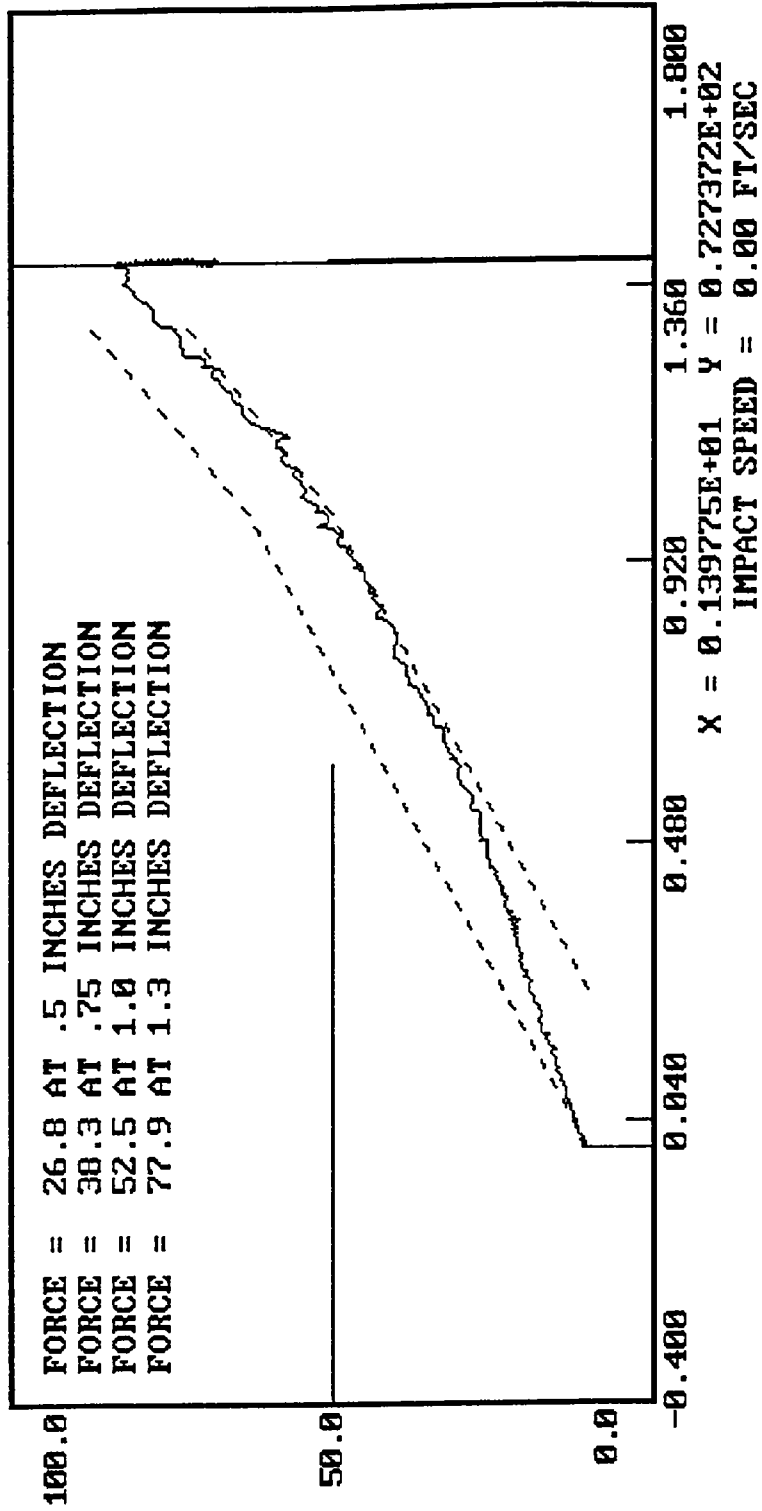
APPROVED BY _____

05-25-1994 16:53

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

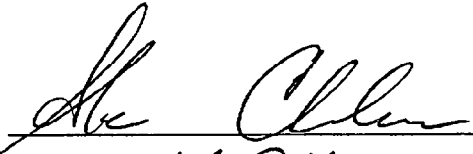
DATE: May 25, 1994

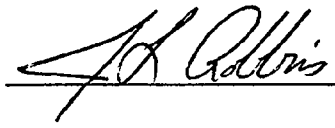
DUMMY NUMBER: 271

TEST NUMBER: D94715

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	31
FORCE @ 30°	34 - 46 lbs	44
FORCE @ 40°	46 - 58 lbs	46
RETURN ANGLE	12° maximum	10°

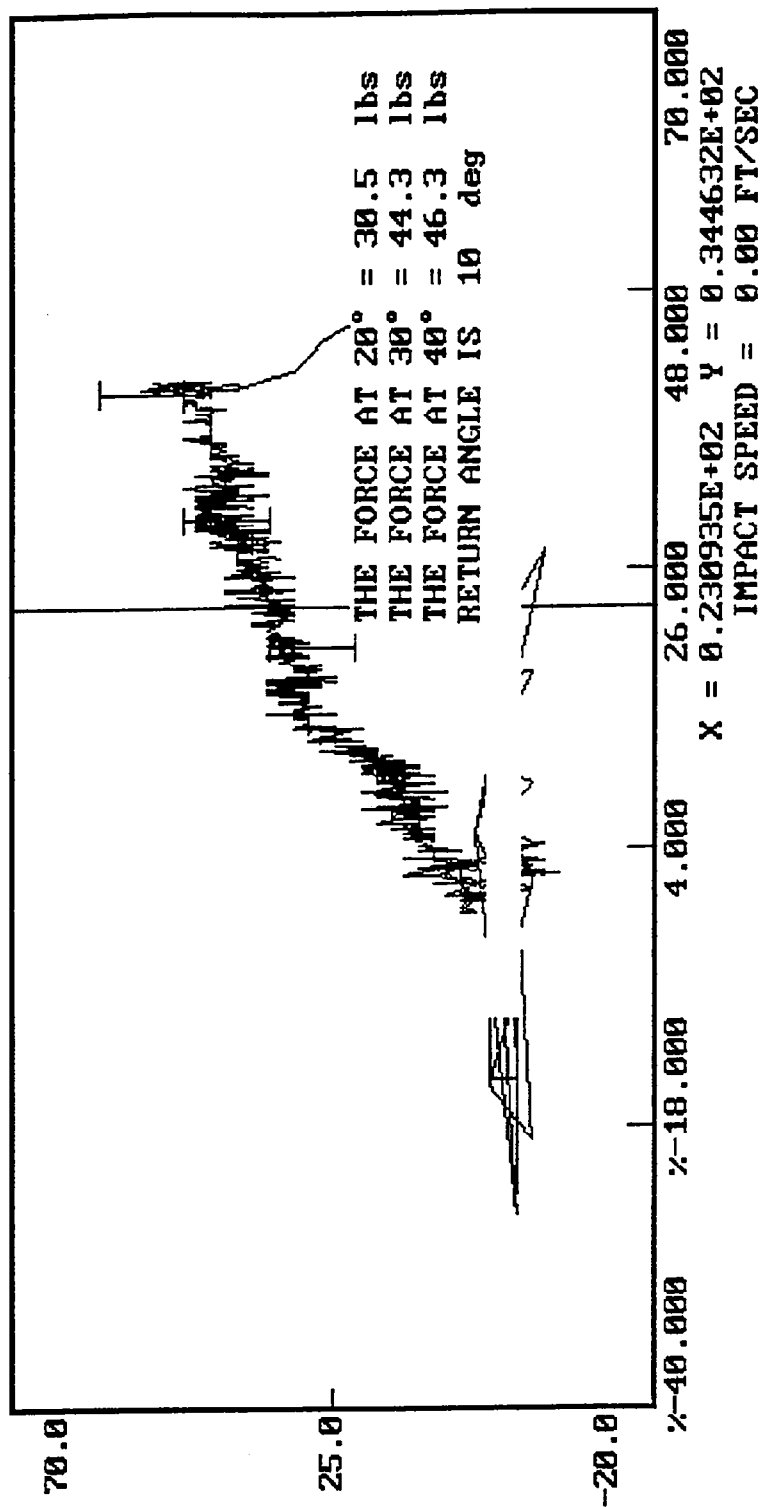
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION
 DUMMY # 271
 FORCE (US. TORSO ROTATION (DEGREES)

05-25-1994 15:26



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 272

Inspected By: Al Chalmers

Date: May 13, 1994

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	DAMAGED
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual, stops, inserts	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

Two rivets on the posterior side of the rib wrap assembly failed. Prior to replacement of the assembly, a post-test thoracic impact was performed on the dummy. Ron Hess (VRTC) was contacted and asked to send another replacement rib wrap assembly. The assembly was replaced with one of two rib wrap assemblies Ron sent to MGA Research prior to testing. The dummy passed thoracic impact calibration after replacing the damaged rib wrap assembly. Plots of the failed post-test impacts are attached.

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

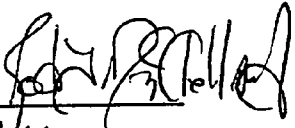
DATE: May 21, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94722

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	39
LOWER RIB	37 - 46 g's	35
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

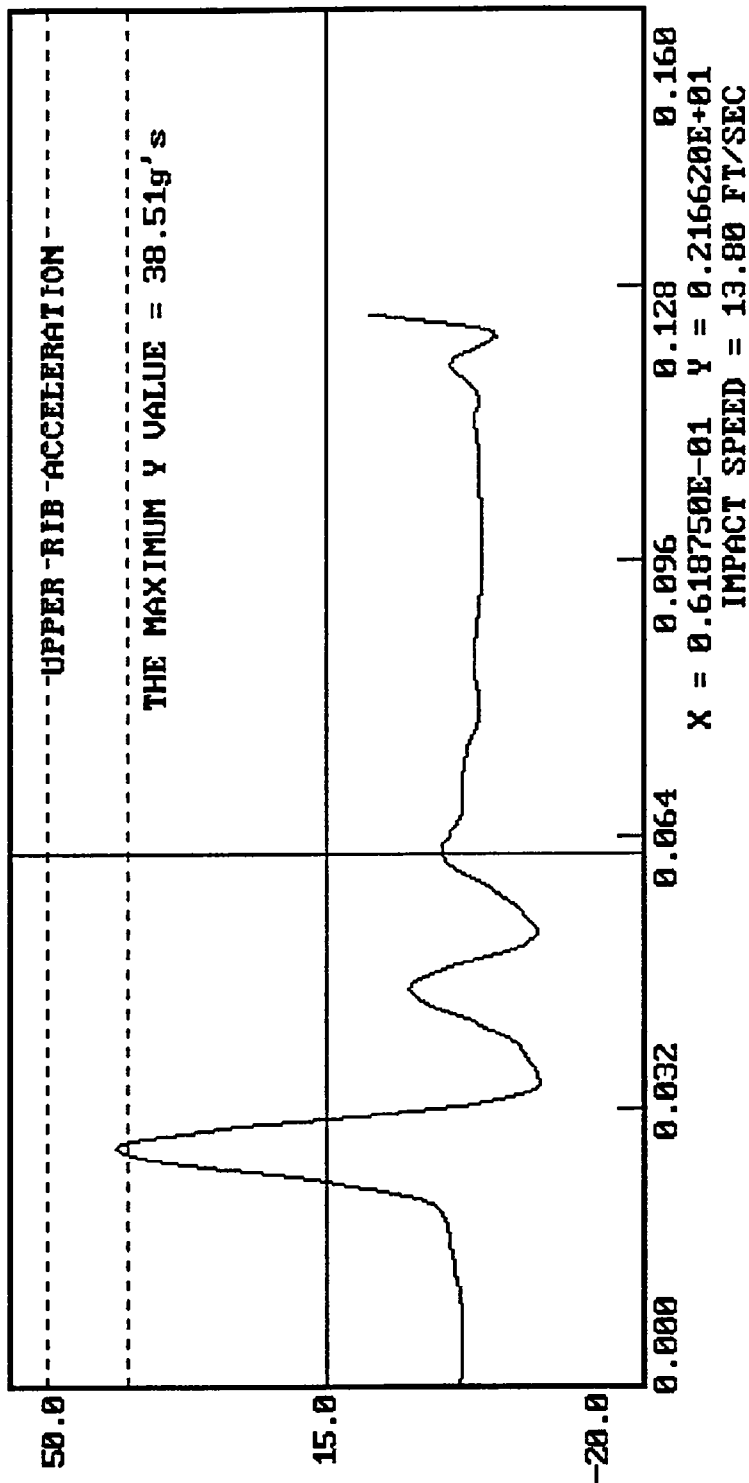
Note: Data was obtained from impact after a new rib wrap assembly was installed. Post-test calibration data, with the damaged rib wrap assembly installed, is attached to the dummy damage checklist.

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

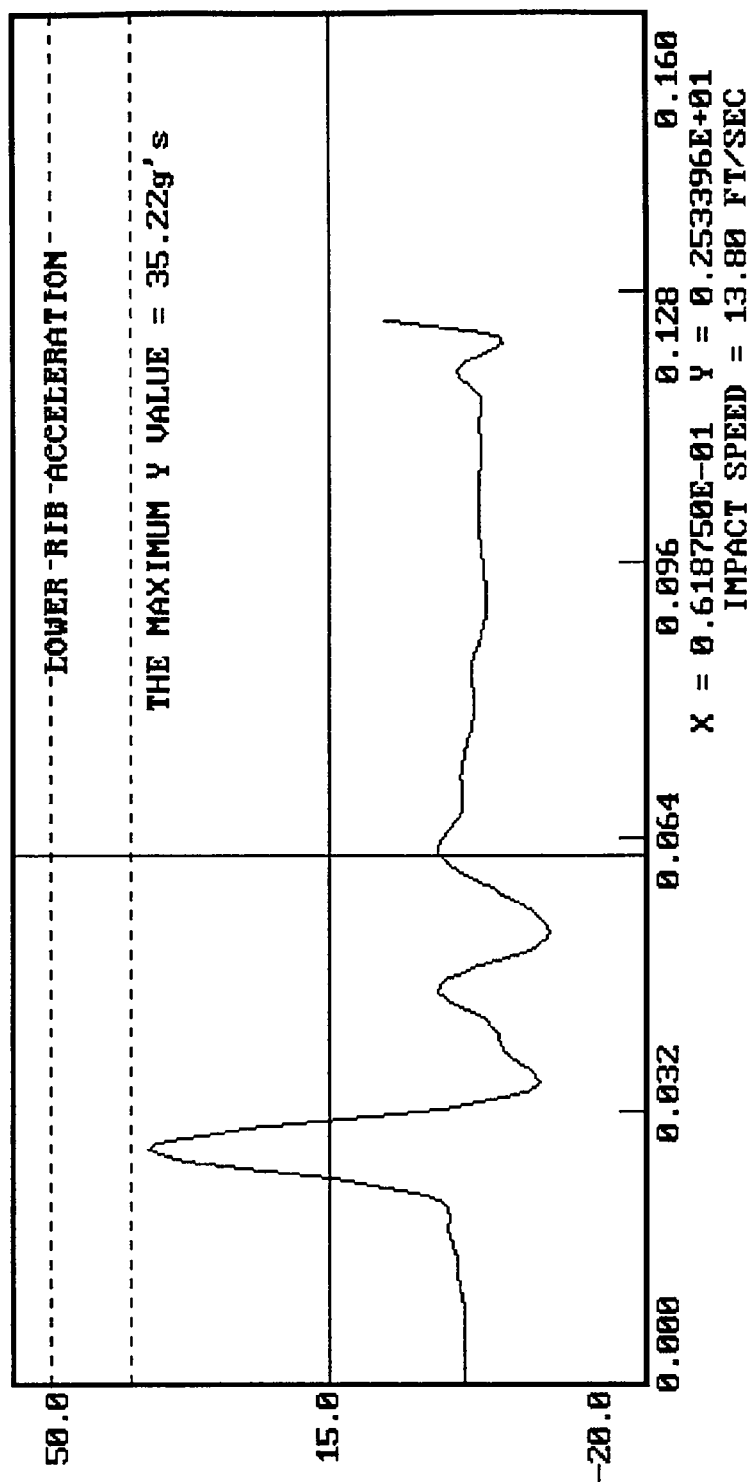
ACCELERATION (G'S) VS. TIME ((SECONDS))

05-21-1994 12:18



05-21-1994 12:18

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))

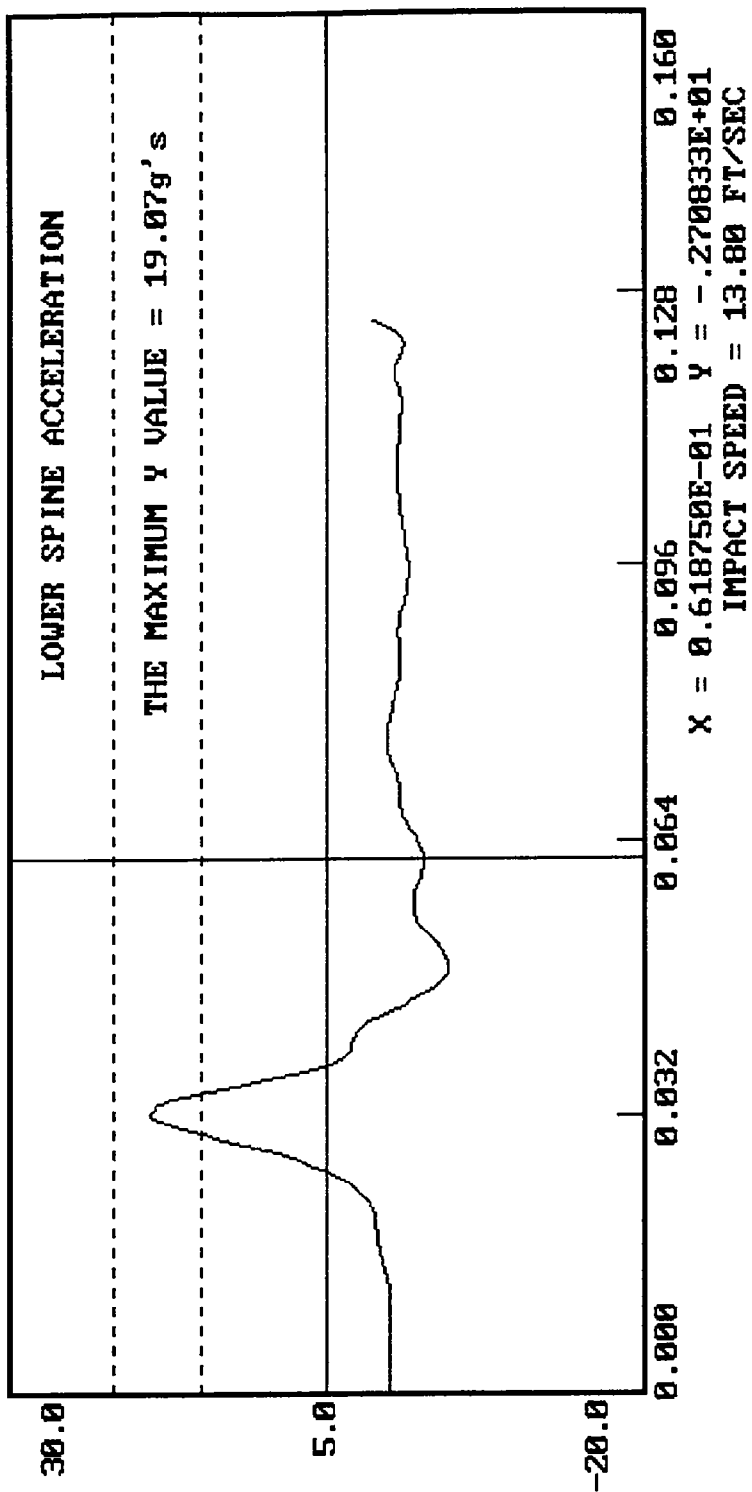


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

() VS. TIME ((SECONDS))

05-21-1994 12:18



POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 271

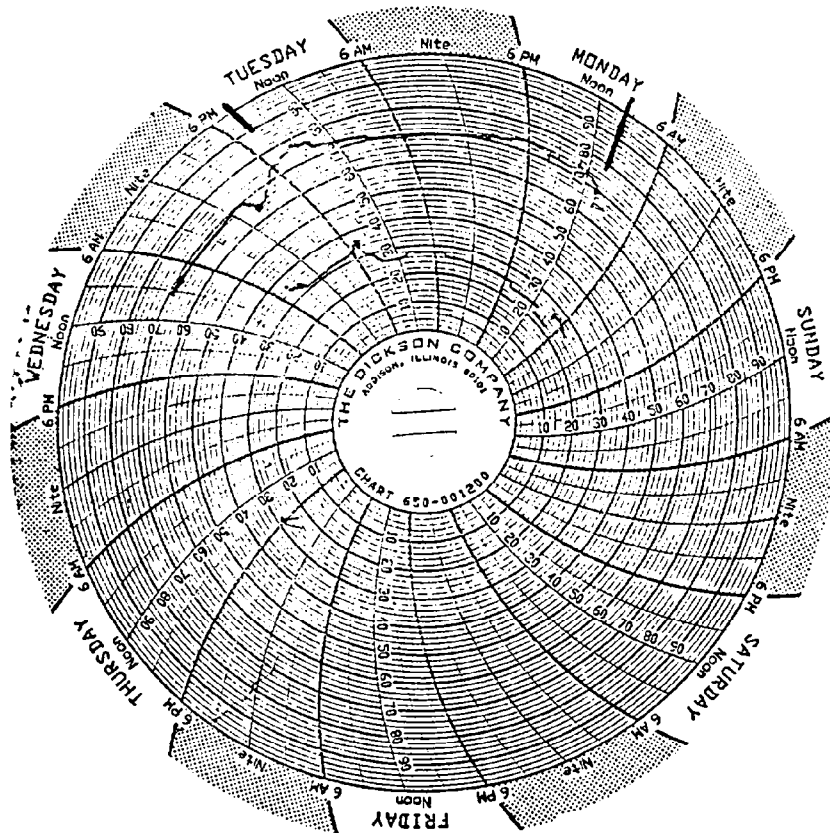
Inspected By: Al Chalmers

Date: May 13, 1994

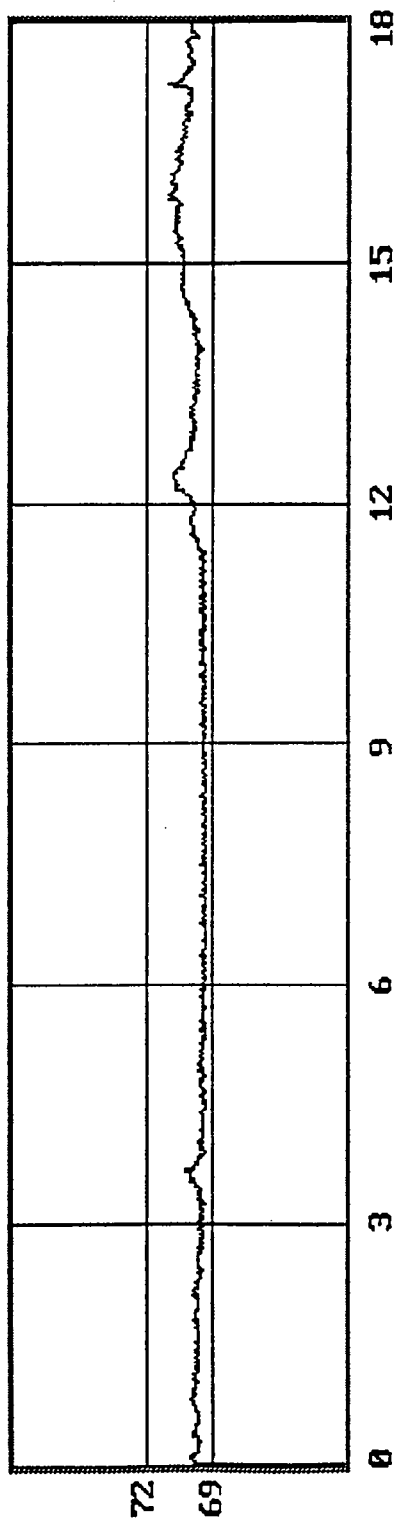
<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual, stops, inserts	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

TEMPERATURE AND HUMIDITY GAUGE



TEST DUMMY TEMPERATURE



ROOM TEMPERATURE

ENTER TO PLOT A DIFFERENT CHANNEL
 ENTER A -C- TO CLEAR THE PRESENT PLOT? █