

REPORT NO.: MGA-94-21407

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

GENERAL MOTORS CORPORATION
1994 BUICK ROADMASTER 4 DOOR SEDAN
NHTSA NO: CR0109

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



MGA Ref. No.: G93A-02

Test Date: June 9, 1994

Report Date: September 24, 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

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. MGA-94-21487	2. Government Accession No.	3. Recipient's Catalog No.																			
4. Title and Subtitle Final Report for FMVSS 214 Compliance Testing of a 1994 Buick Roadmaster 4 Door Sedan NHTSA NO. CR0109		5. Report Date September 24, 1994																			
		6. Performing Organization Code MGA																			
7. Author(s) John Fleck and Homyoung Kim		8. Performing Organization Report No. MGA-DOT-214-87																			
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 July 1994																			
		14. Sponsoring Agency Code NEF-30																			
15. Supplementary Notes																					
16. Abstract Compliance tests were conducted on the subject 1994 Buick Roadmaster 4 Door Sedan 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 June 9, 1994. The impact velocity of the Moving Barrier (MDB) was 32.8 mph and the ambient temperature of the struck side (driver's) of the target vehicle at the time of impact was 76°F. The maximum static crush of the impacted vehicle was 16.9 inches at the occupant H-Point level. 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>Thoracic Trauma Index (TTI)</td> <td>44 g's</td> <td>46 g's</td> </tr> <tr> <td>Pelvis Acceleration</td> <td>45 g's</td> <td>72 g's</td> </tr> <tr> <td>Upper Rib Acceleration</td> <td>39.4 g's</td> <td>45.7 g's</td> </tr> <tr> <td>Lower Rib</td> <td>40.1 g's</td> <td>51.9 g's</td> </tr> <tr> <td>Lower Spine</td> <td>47.7 g's</td> <td>40.8 g's</td> </tr> </tbody> </table>					<u>Driver's SID</u>	<u>Left Rear SID</u>	Thoracic Trauma Index (TTI)	44 g's	46 g's	Pelvis Acceleration	45 g's	72 g's	Upper Rib Acceleration	39.4 g's	45.7 g's	Lower Rib	40.1 g's	51.9 g's	Lower Spine	47.7 g's	40.8 g's
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17. Key Words Side Impact Dummy (SID) Compliance Test FMVSS 214 Side Impact Protection		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 244	22. Price																		

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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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 Buick Roadmaster 4 Door Sedan.

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 Buick Roadmaster 4 Door Sedan 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 June 9, 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. 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 summary of the side impact dummy (SID) configuration and performance verification test data are shown in Appendix C.

The driver's Thoracic Trauma Index (TTI) was 44 g's. Maximum pelvic Y acceleration was 45 g's.

The left rear passenger's TTI was 46 g's. Maximum pelvic Y acceleration was 72 g's.

TEST NOTES

Due to a bad umbilical cable connection, the barrier Y acceleration above the left rear axle was intermittent during the test. The Z acceleration above the rear axle data is only valid for approximately 30 msec following impact.

SECTION 3
SUMMARY OF TEST DATA

TABLE 1
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan
 Vehicle NHTSA No.: CR0109 VIN: 1G4BN52P1RR412112
 Vehicle Body Color: Green Month & Year of Manufacture: 1-94
 Engine Data: 8 cylinders; CID; 5.7 Liter; cc
 Placement X Longitudinal; or Lateral
 Transmission: 4 speed; Manual; X Automatic; X Overdrive
 Final Drive: X Rear Wheel Drive; Frt. Wheel Drive; Four Wheel Drive
 Odometer Reading 97 miles
 Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; X Pwr. Windows
X Power Seats; X Tilt Wheel; X Power Door Locks; Self Leveling System

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 psi FRONT
30 psi REAR
 Recommended Tire Size: P235/70R15
 Tires on Test Vehicle: P235/70R15 Manufacturer: Uniroyal

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 Lever
 Vehicle Maximum Capacity Loading = 1100 lbs (A)
 No. of Occupants x 150 lbs. = 900 lbs (B)
 Cargo Capacity (A-B) = 200 lbs

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>1124</u> lbs	Right Rear	=	<u>938</u> lbs
Left Front	=	<u>1153</u> lbs	Left Rear	=	<u>913</u> lbs
TOTAL FRONT	=	<u>2277</u> lbs	TOTAL REAR	=	<u>1851</u> lbs
% of Total Vehicle Weight	=	<u>55</u> %;	% of Total Weight	=	<u>45</u> %
TOTAL WEIGHT	=	<u>4128</u> lbs			

TABLE 2
TEST VEHICLE DATA

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 4128 lbs

Maximum Cargo Carrying Capacity of Test Vehicle = 200 lbs

Weight of 2 Side Impact Dummies (2 x 168 lbs.) = 336 lbs

TEST VEHICLE TARGET WEIGHT: = 4664 lbs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 1261 lbs Right Rear = 1056 lbs

Left Front = 1250 lbs Left Rear = 1087 lbs

TOTAL FRONT = 2511 lbs TOTAL REAR = 2143 lbs

% of Total Weight = 54 % % of Total Weight = 46 %

TOTAL TEST WEIGHT = 4654 lbs

TEST VEHICLE ATTITUDE (all dimensions in inches):

CURB WEIGHT ATTITUDE: (in)

Right Front 29.2 Left Front 29.2 Right Rear 22.0 Left Rear 22.0

FULLY LOADED WEIGHT ATTITUDE: (in)

Right Front 29.4 Left Front 28.6 Right Rear 20.9 Left Rear 19.3

TEST ATTITUDE: (in)

Right Front 28.5 Left Front 28.6 Right Rear 20.5 Left Rear 20.2

Test Vehicle Wheelbase: 115.9 inches

C.G. = 53.4 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 205.0 in

Centerline = 215.8 in

Left Side = 205.0 in

FIGURE 1
PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 8.3 in

Total Number of Adjustment Positions or Detents: X Power Seats

Test Position: Mid Position 4.2 inches from front

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 26.0° 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 (2nd 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 = 21.8 gallons

Test Volume: 20.5 gallons (94.0% of capacity)

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

Wheelbase: = 115.9 in

Impact Point is 20.0 in rearward of front axle centerline

TABLE 3
CRASH TEST SUMMARY FOR TEST VEHICLE

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Overall Length = 215.8 in; Overall Width = 78.1 in

TEST WEIGHT:

Right Front	=	<u>1124</u> lbs	Right Rear	=	<u>938</u> lbs
Left Front	=	<u>1153</u> lbs	Left Rear	=	<u>913</u> lbs
TOTAL FRONT	=	<u>2277</u> lbs	TOTAL REAR	=	<u>1851</u> lbs
TOTAL VEHICLE WEIGHT <u>4128</u> lbs					
Wheelbase = <u>115.9</u> in					
Longitudinal C.G. front Center of Front Axle = <u>53.4</u> in					
Impact Angle with Respect to Impactor = <u>90°</u> degrees					

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (12.5 in above ground) = 13.8 in
2. LEVEL 2 (19.1 in above ground) = 16.9 in
3. LEVEL 3 (23.4 in above ground) = 14.9 in
4. LEVEL 4 (34.8 in above ground) = 12.8 in
5. LEVEL 5 (53.0 in above ground) = 4.4 in

Maximum Post-Test Intrusion = 16.9 in

OCCUPANTS:

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

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>16</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/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 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>-0.3</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: 32.8 mph Secondary: 32.7 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Top of Stack (33 in)	= <u>4.9</u> in
2. Row B Mid Stack (27 in)	= <u>3.4</u> in
3. Row C Top of Bumper (21 in)	= <u>3.2</u> in
4. Row D Center of Bumper (17 in)	= <u>3.3</u> in

INSTRUMENTATION:

Number of MDB Data Channels = 7

TABLE 5
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to side window</u>	<u>to "C" Post</u>
Arm	<u>to door trim panel</u>	<u>to door trim panel</u>
Pelvis	<u>to lower door panel</u>	<u>to lower door 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: 0.5 in rearward Vertical: 1.0 in high

ARM REST LOCATIONS:

Front: Bottom of window opening to top of armrest 9.3 inches
Rear: Bottom of window opening to top of armrest 9.3 inches

SEAT CRUSH:

Driver Seat Back: 5.0 inches Driver Seat Cushion: 2.6 inches
Left Rear Seat Back: 4.9 inches Left Rear Seat Cushion: 0.9 inches

GLAZING DAMAGE:

Bottom left side door glass broken and windshield cracked

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 SUMMARYYear/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

	Front Dummy ID # 270				Rear Dummy ID # 272			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS: Upper Rib Lateral.....Y Upper Rib Lateral...Y(R) Lower Rib Lateral.....Y Lower Rib Lateral.....Y(R)	39.4	36	-8.8	85	45.7	56	-14.8	123
	40.5	36	-8.8	85	45.7	56	-16.1	123
	40.1	38	-7.4	110	51.9	55	-19.8	83
	40.3	38	-7.8	110	51.8	55	-21.2	83
SPINE ACCELERATIONS: Lower Lateral.....Y Lower Lateral.....Y(R)	47.7	40	-7.9	78	40.8	50	-15.3	76
	47.8	41	-8.5	117	40.7	50	-15.8	75
PELVIC ACCELERATIONS: Lateral.....Y Lateral.....Y(R)	45.4	41	-9.3	118	72.1	46	-22.6	68
	46.5	41	-10.1	117	71.1	46	-21.6	68

REFERENCE:

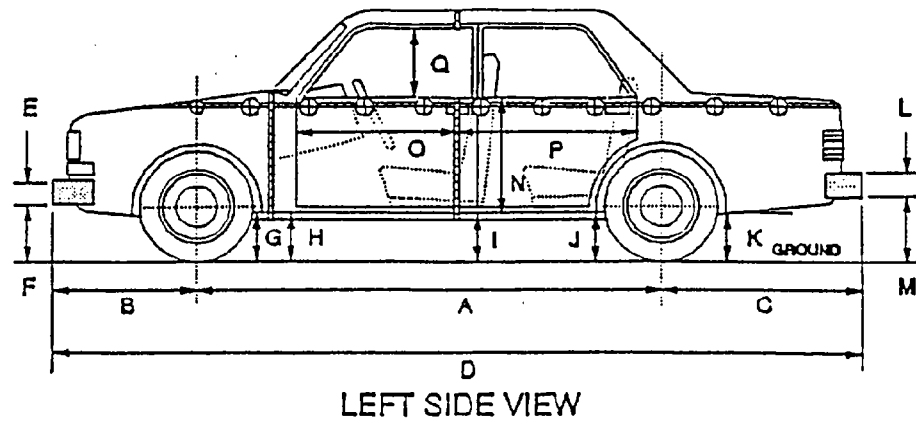
Positive Direction - Longitudinal (X) = forward

Lateral (Y) = to right

Vertical (Z) = up

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

J1 = To Pinch Weld

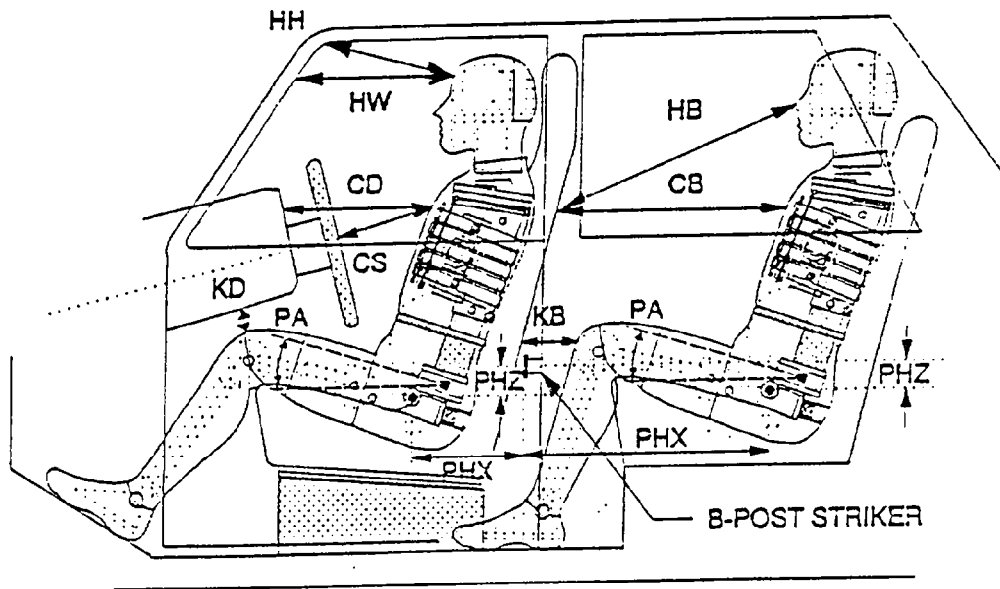
J2 = To Sill

Units: in

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	115.9	115.9	0
B	44.0	43.1	0.9
C	53.8	54.0	0.2
D	215.8	214.9	0.9
E	9.9	10.3	0.4
F	9.8	11.6	1.8
G	9.9	11.5	1.6
H	8.6	9.8	1.2
I	8.4	10.0	1.6
J1/J2	8.3/8.3	11.0/10.8	2.7/2.5
K	9.4	13.0	3.6
L	9.0	9.1	0.1
M	12.3	14.1	1.8
N	27.3	26.6	0.7
O	31.4	30.3	1.1
P	54.0	49.3	4.7
Q	17.5	18.0	0.5
R	205.0	205.0	0
S	205.0	202.5	2.5
T	78.1	66.1	12.0

FIGURE 3

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

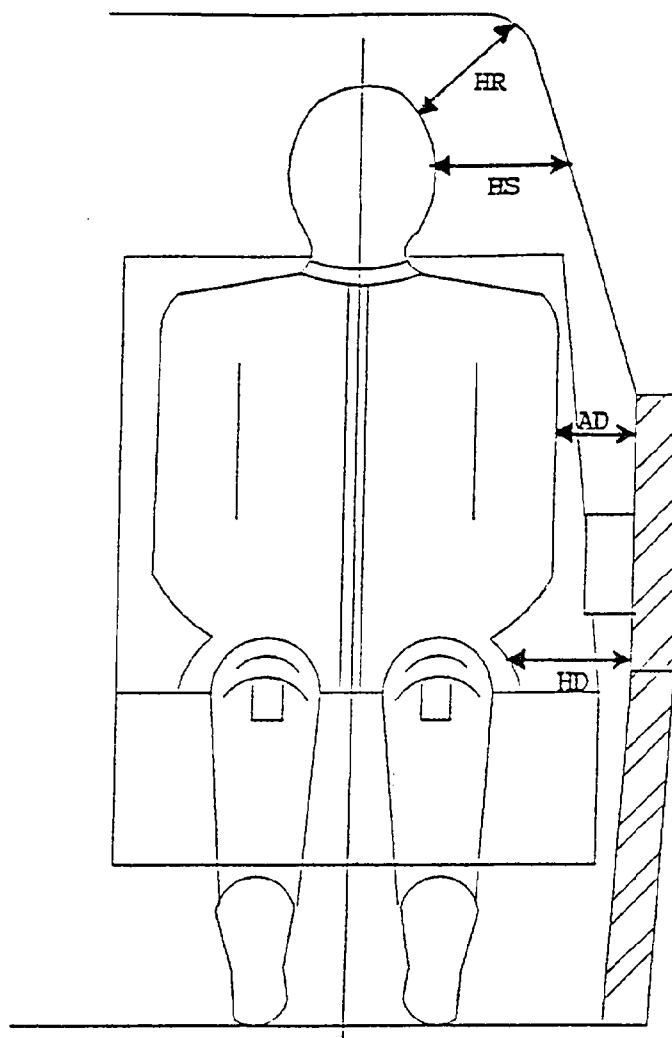
NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

NOTE: All dimensions are in inches

	DRIVER ID #270	LEFT REAR PASSENGER ID #272	
HH	16.0	---	
HW	26.1	---	
HB	---	22.4	
CD	19.5	CB	19.8
CS	10.8	---	
KDL	5.0	KBL	9.1
KDR	4.8	KBR	8.9
PA°	23.4°	23.3°	
PHX	8.8	7.6	
PHZ	4.5	10.0	

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



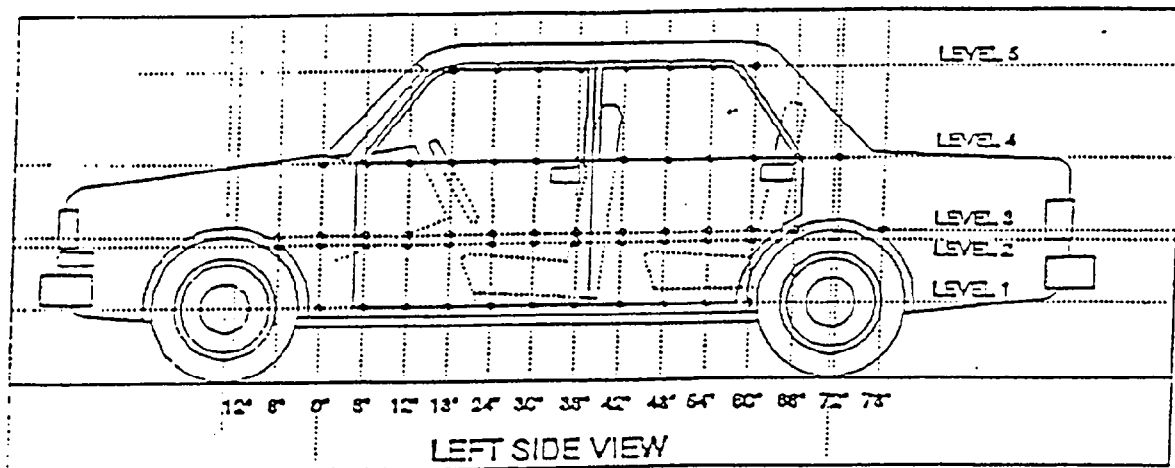
NOTE: All dimensions are in inches

	DRIVER ID #270	LEFT REAR PASSENGER ID #272
HR	6.5	5.3
HS	15.0	9.1
AD	7.0	7.0
HD	6.8	5.4

FIGURE 5
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994



As tested height measurements are with respect to ground along the vertical 33" line shown above:

<u>33" Side Profile</u>	
Level 5 @ Window Top	= <u>53.0</u> in
Level 4 @ Window Sill	= <u>34.8</u> in
Level 3 @ Mid Door	= <u>23.4</u> in
Level 2 @ Occupant H-Point	= <u>19.1</u> in
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>12.5</u> in

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH
LEVEL 1 AT AXLE CENTER LINE

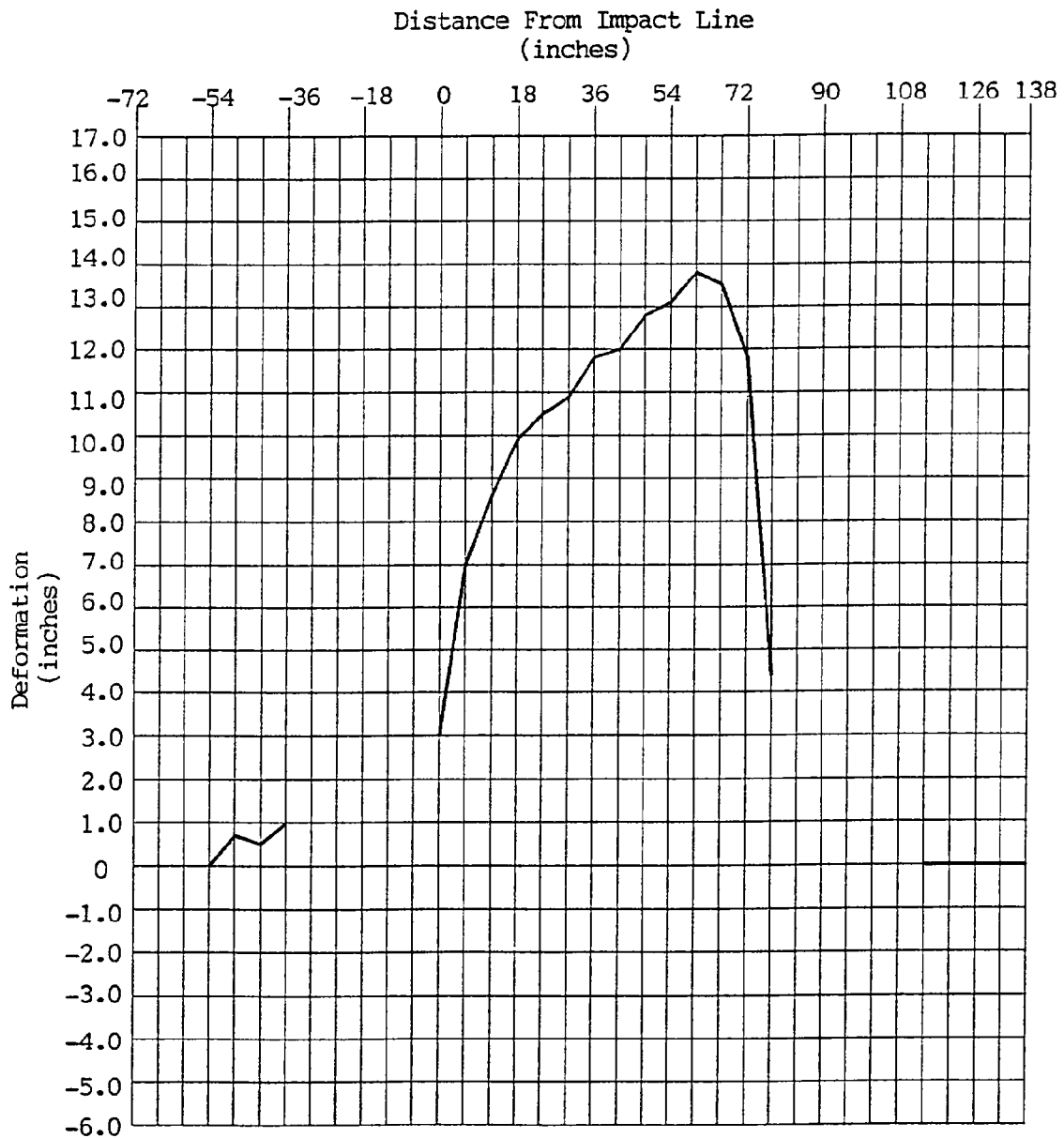
Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	36.8	36.8	0
-48	35.0	35.7	0.7
-42	34.8	35.3	0.5
-36	34.3	35.3	1.0
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	32.6	35.6	3.0 (impact point)
6	32.6	39.6	7.0
12	32.5	41.1	8.6
18	32.3	42.2	9.9
24	32.1	42.6	10.5
30	32.0	42.9	10.9
36	31.9	43.7	11.8
42	31.9	43.9	12.0
48	31.7	44.5	12.8
54	31.7	44.8	13.1
60	31.7	45.5	13.8
66	31.7	45.2	13.5
72	31.8	43.6	11.8
78	32.0	36.4	4.4
84	---	---	---
90	---	---	---
96	---	---	---
102	---	---	---
108	---	---	---
114	33.9	33.9	0
120	34.3	34.3	0
126	34.6	34.6	0
132	34.6	34.6	0
138	35.7	35.7	0

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/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	34.2	34.6	0.4
-48	33.1	33.9	0.8
-42	32.9	33.9	1.0
-36	32.7	33.9	1.2
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	31.0	33.7	2.7 (impact point)
6	30.8	39.3	8.5
12	30.6	42.6	12.0
18	30.5	43.3	12.8
24	30.3	43.7	13.4
30	30.1	44.4	14.3
36	30.0	45.0	15.0
42	29.8	45.5	15.7
48	29.8	45.7	15.9
54	29.7	45.2	15.5
60	29.8	46.7	16.9
66	29.8	46.3	16.5
72	29.9	43.7	13.8
78	29.9	39.1	9.2
84	29.9	33.9	4.0
90	30.3	32.8	2.5
96	30.4	32.2	1.8
102	30.6	31.9	1.3
108	30.7	31.8	1.1
114	30.9	30.9	0
120	31.3	31.7	0.4
126	31.5	31.7	0.2
132	32.0	32.0	0
138	33.2	34.6	0.4

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

FIGURE 6 (Cont'd)
VEHICLE EXTERIOR STATIC CRUSH

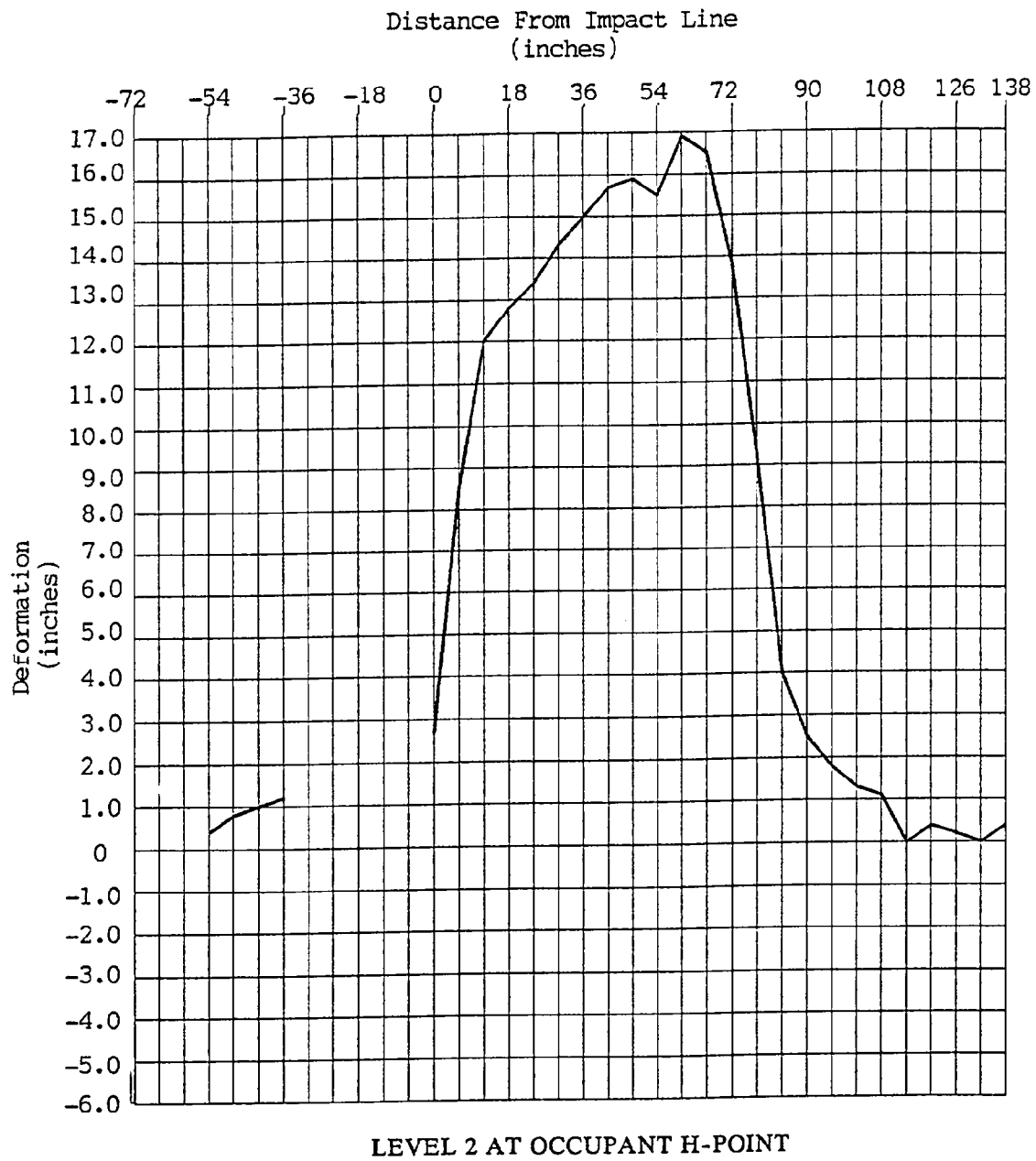


TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

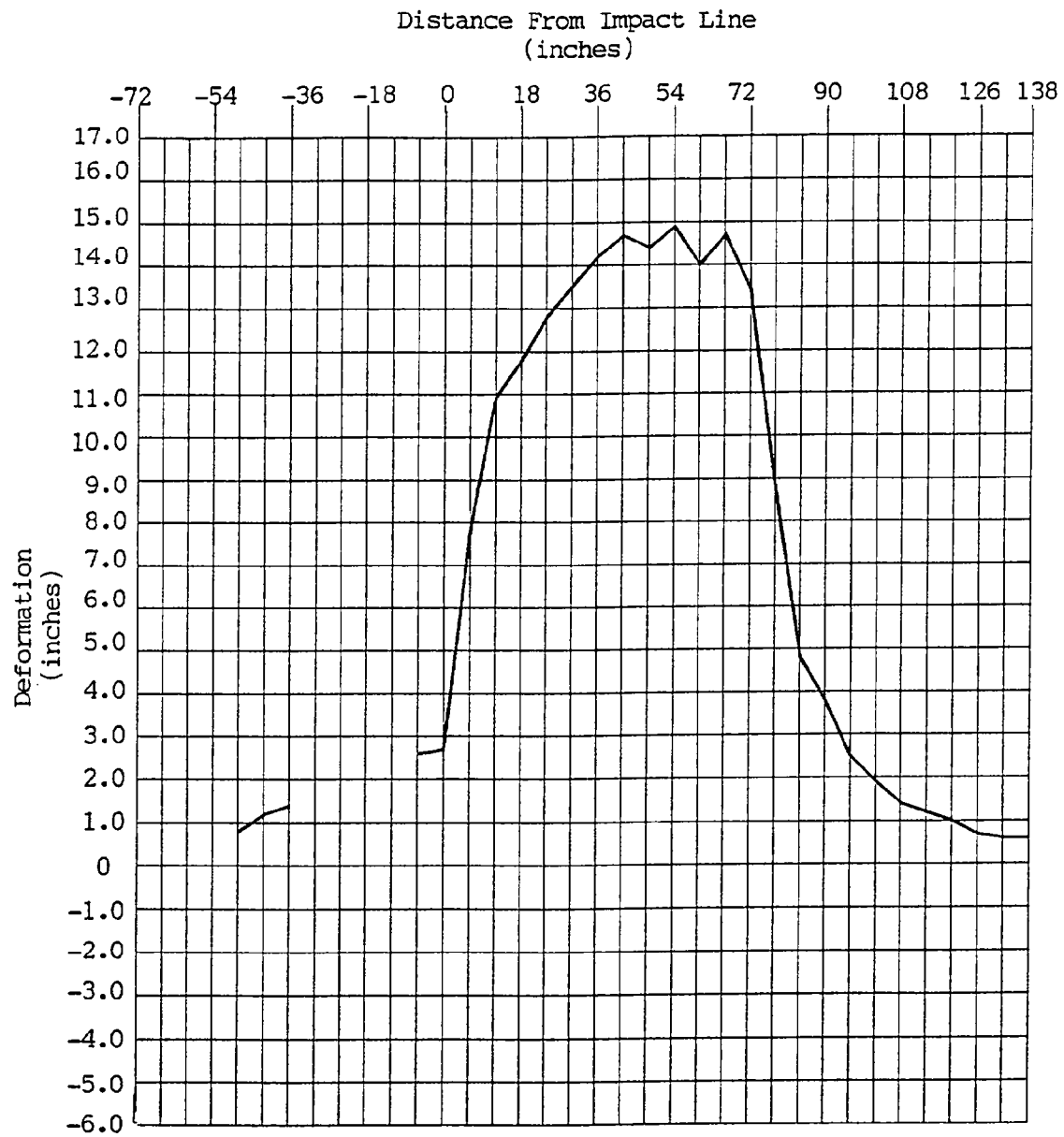
LEVEL 3 AT MID-DOOR

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	35.6	36.4	0.8
-42	34.3	35.5	1.2
-36	33.8	35.2	1.4
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	31.7	34.2	2.6
0	31.6	34.3	2.7 (impact point)
6	31.3	39.1	7.8
12	31.1	42.0	10.9
18	30.9	42.7	11.8
24	30.7	43.5	12.8
30	30.5	44.0	13.5
36	30.4	44.6	14.2
42	30.3	45.0	14.7
48	30.3	44.7	14.4
54	30.2	45.1	14.9
60	30.2	44.2	14.0
66	30.2	44.9	14.7
72	30.3	43.7	13.4
78	30.4	39.3	8.9
84	30.5	35.3	4.8
90	30.6	34.4	3.8
96	30.8	33.3	2.5
102	31.0	32.9	1.9
108	31.4	32.8	1.4
114	31.6	32.8	1.2
120	32.0	33.0	1.0
126	32.6	33.3	0.7
132	33.0	33.6	0.6
138	35.0	35.6	0.6

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

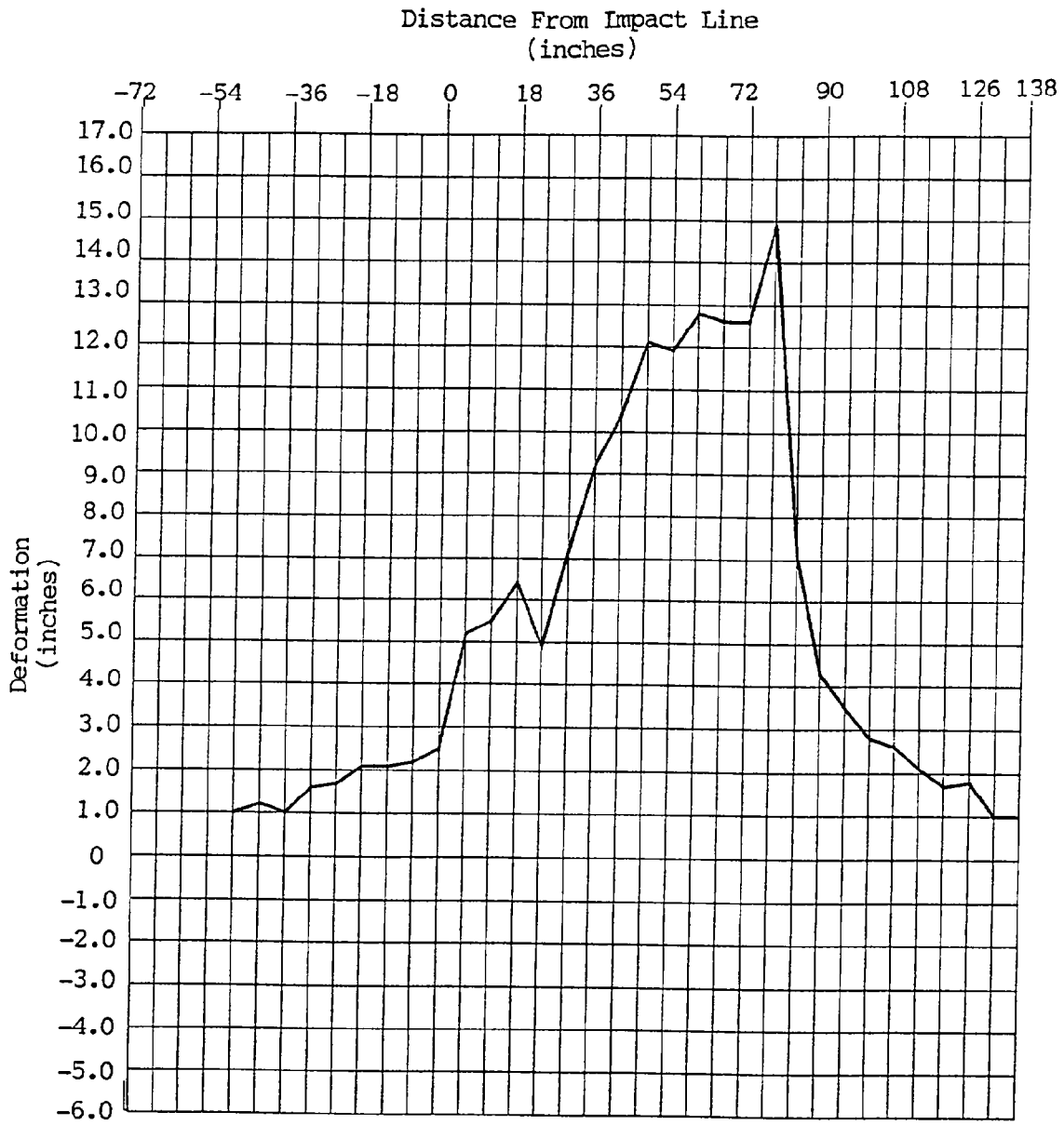
Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	36.4	37.4	1.0
-42	35.5	36.7	1.2
-36	35.1	36.1	1.0
-30	34.4	36.0	1.6
-24	34.0	35.7	1.7
-18	33.5	35.6	2.1
-12	33.3	35.4	2.1
-6	33.0	35.2	2.2
0	32.6	35.1	2.5 (impact point)
6	32.4	37.6	5.2
12	32.1	37.6	5.5
18	30.9	37.3	6.4
24	31.7	36.6	4.9
30	31.7	38.9	7.2
36	31.5	40.7	9.2
42	31.2	41.6	10.4
48	31.2	43.3	12.1
54	31.1	43.0	11.9
60	31.1	43.9	12.8
66	31.3	43.9	12.6
72	31.4	44.0	12.6
78	31.4	46.3	14.9
84	31.9	39.0	7.1
90	31.9	36.2	4.3
96	32.1	35.6	3.5
102	32.4	35.2	2.8
108	32.4	35.0	2.6
114	33.2	35.3	2.1
120	33.6	35.3	1.7
126	33.7	35.5	1.8
132	35.0	36.0	1.0
138	35.7	36.7	1.0

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

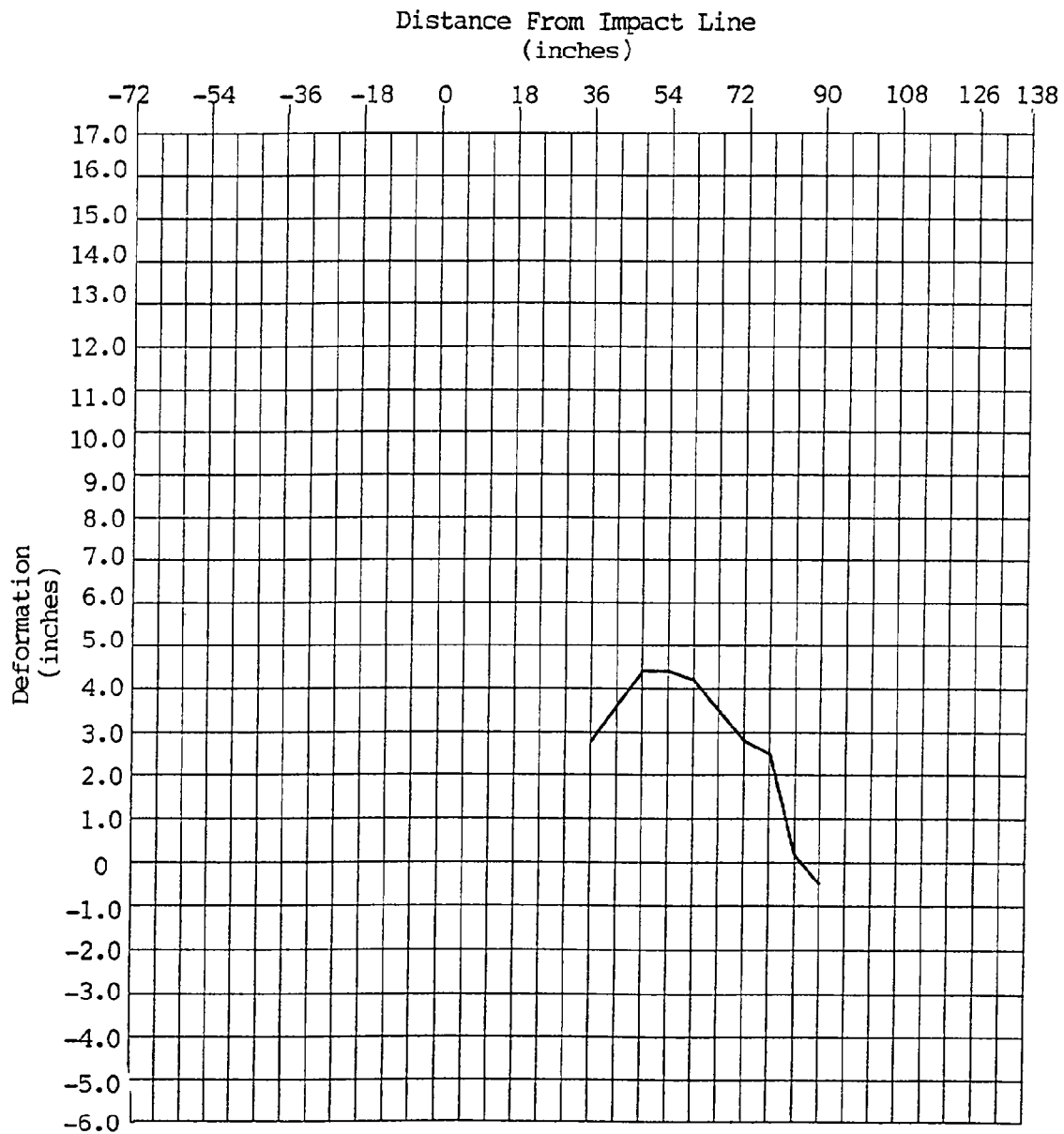
Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	---	---	---
6	---	---	---
12	---	---	---
18	---	---	---
24	---	---	---
30	---	---	---
36	43.3	46.1	2.8
42	43.0	46.6	3.6
48	42.8	47.2	4.4
54	42.9	47.3	4.4
60	42.9	47.1	4.2
66	43.2	46.7	3.5
72	43.2	46.0	2.8
78	43.3	45.8	2.5
84	43.6	43.8	0.2
90	44.0	43.5	-0.5
96	---	---	---
102	---	---	---
108	---	---	---
114	---	---	---
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---

(impactpoint)

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/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

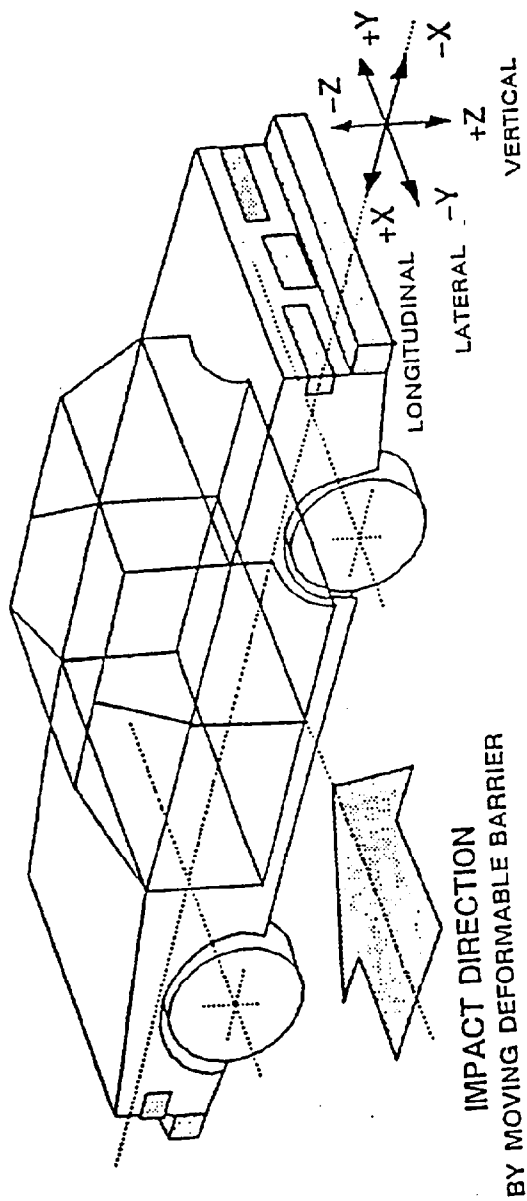
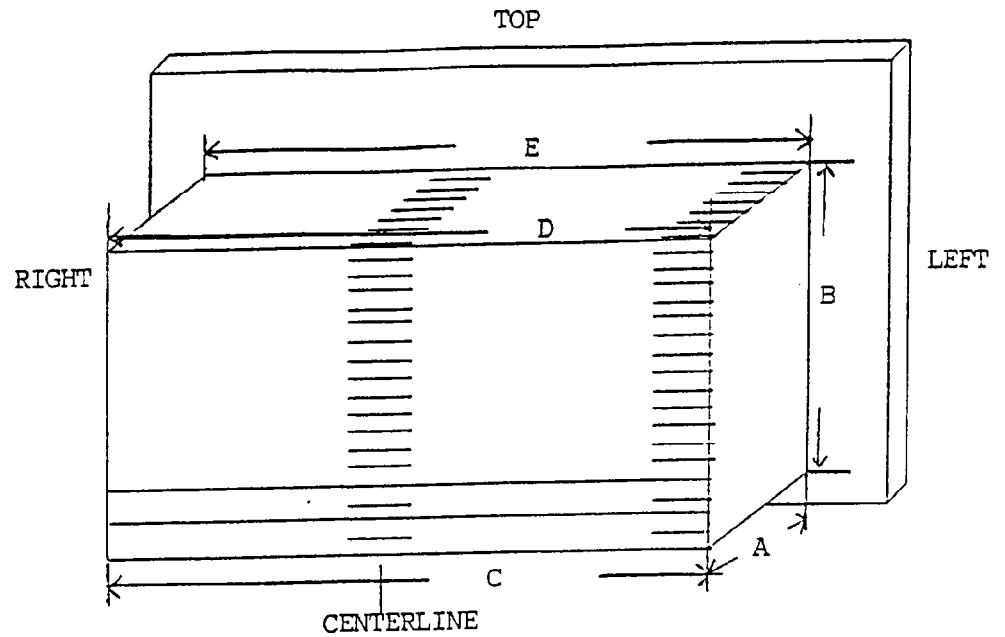


FIGURE 8
MDB FACE DIMENSIONS

Measurements in inches

A = 15.1
B = 22.1
C = 66.4
D = 66.4
E = 66.3



Measurements in inches

Right	Left
A = <u>11.0</u>	<u>11.0</u>
B = <u>13.1</u>	<u>13.0</u>
C = <u>21.0</u>	<u>21.1</u>
D = <u>33.0</u>	<u>33.1</u>

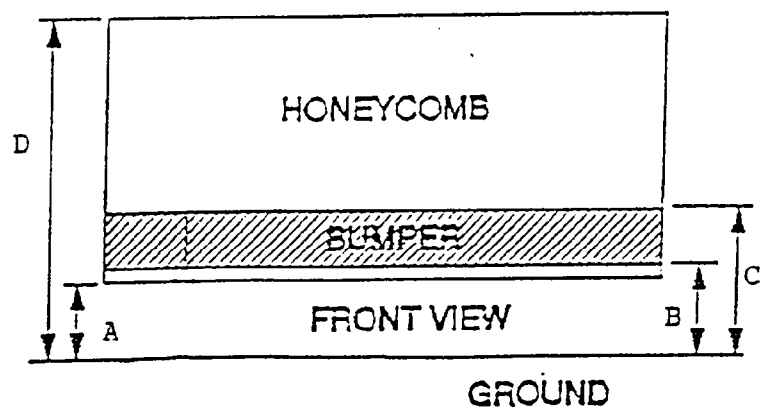


TABLE 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTORYear/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 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"	4.9	3.4	2.8	3.3
28"	3.4	1.6	3.2	3.0
24"	2.5	0.4	2.7	2.2
20"	1.9	0.2	2.1	1.7
16"	1.5	0.2	1.9	1.4
12"	0.6	0.1	1.6	1.2
8"	0.5	0	1.2	1.0
4"	0.4	0	1.0	0.8
0"	0.1	0	0.7	0.5
4"	0	0	0.6	0.6
8"	0	0	0.7	0.9
12"	0	0	0.9	1.0
16"	0	0	0.9	1.2
20"	0	0	0.6	0.5
24"	0	0	0.5	0.2
28"	0	0	0.4	0.6
32"	1.4	0	0.4	1.1

Left Side

Right Side

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 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	132.0	26.3	13.5	7.1	-6.2	16.8	-2.7	7.8	-9.7	18.4
2	Rt. Side Sill @ Rear Seat	98.9	27.4	15.0	7.1	-6.9	17.3	-2.1	11.5	-6.7	17.4
3	Rr. Floorpan Above Axle*	39.9	0	18.8	6.3	-7.4	16.5	-3.5	29.0	-27.5	30.0
4	Left Side Sill @ Rr. Seat	82.5	-30.8	10.2	---	---	51.5	-30.2	---	---	---
5	Left Side Sill @ Frt. Seat	125.5	-30.8	10.2	---	---	85.3	-58.2	---	---	---
6	Driver Left Seat Track	112.3	-16.8	13.6	---	---	43.2	-14.5	---	---	---
7	Right Rear Occupant Compartment	98.8	16.8	9.0	---	---	22.4	-3.2	---	---	---
8	Left Lower "A" Post	140.0	-30.5	20.5	---	---	80.1	-24.9	---	---	---
9	Left Mid "B" Post	101.0	-31.3	23.6	---	---	121.9	-23.1	---	---	---
10	Left Lower "B" Post	100.8	-30.8	17.0	---	---	77.3	-14.2	---	---	---

*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To right)

Z - Ground Level (+ Up)

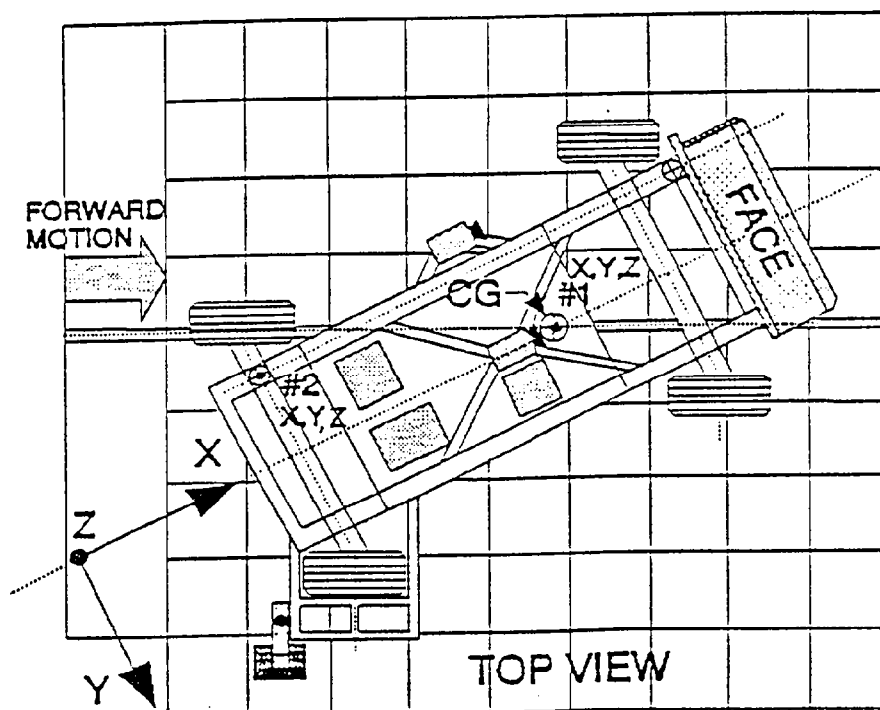
* Z Acceleration not valid after approximately 30 msec.

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994



Accel. No.	Location	Coordinates (in)			Pos. Direct.		Neg. Direct.	
		X	Y	Z	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal ... X				1.2	147	-16.2	39
	Lateral Y	-43.0	0	19.0	0.5	-0.2	-5.3	43
	Vertical Z				13.3	40	-11.4	33
	Resultant R				21.4	40	---	---
2	Rear Frame Member							
	Longitudinal ... X	-102.0	-24.6	24.5	1.6	178	-18.9	43
	Lateral Y				*	*	*	*

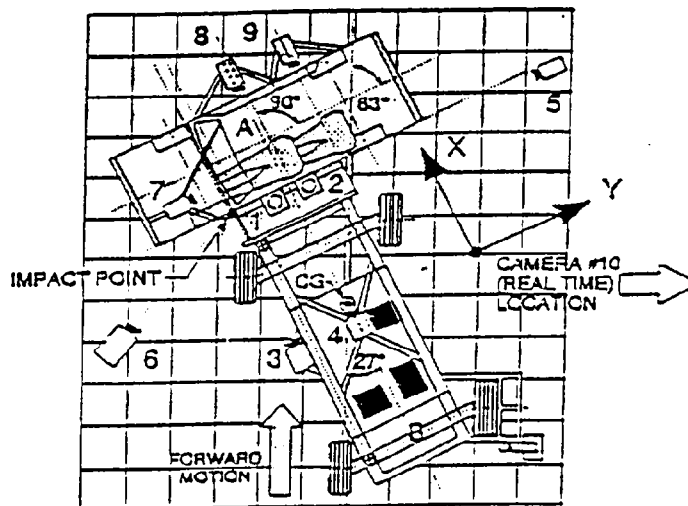
Reference: X = Front Axle (+Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)

* No valid data collected

FIGURE 10
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1994/Buick/RoadMaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994



Camera No.	View	Coordinates (in)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
	Real Time					10	24
1	Top Pointer	0	14.9	19.7		13	1111
2	Top Wide	15.7	0	211		8	1087
3	Cart Pointer					35	935
4	Cart					13	1010
5	Right Impact	20	335.8	30.6	45°	35	1000
6	Left Impact	95.3	112.2	51.9		7.5	870
7	Onboard Hood					13	1000
8	Onboard Driver					7.5	870
9	Onboard Passenger					8	930

* 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/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 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 (32.8 mph)

FUEL SPILLAGE MEASUREMENT:

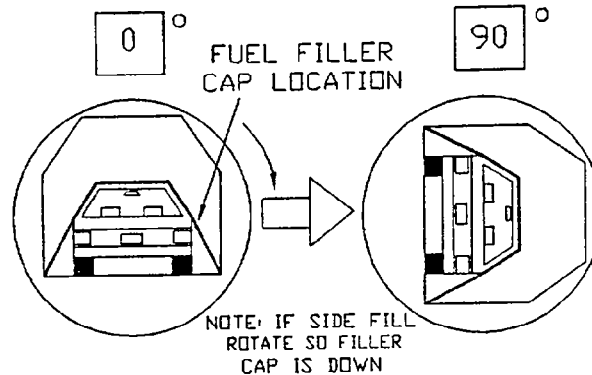
1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

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/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994TEST PHASE: 0° - 90°I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 44 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 44 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.

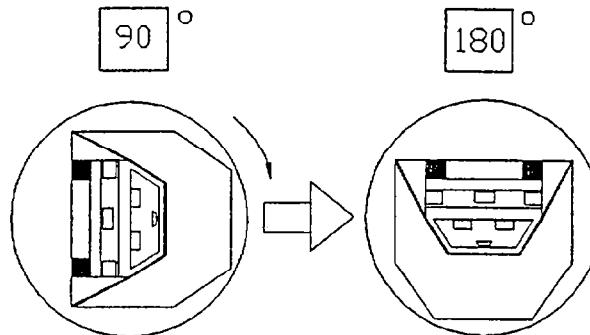
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

TEST PHASE: 90° - 180°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 32 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 32 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
----------	---------	---------	---------

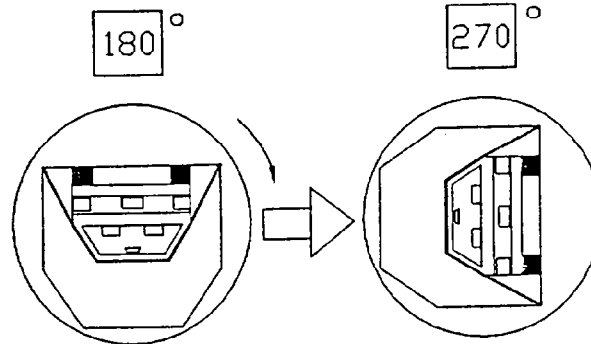
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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/Buick/Roadmaster/4 Door SedanVehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994TEST PHASE: 180° - 270°I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 27 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 27 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.

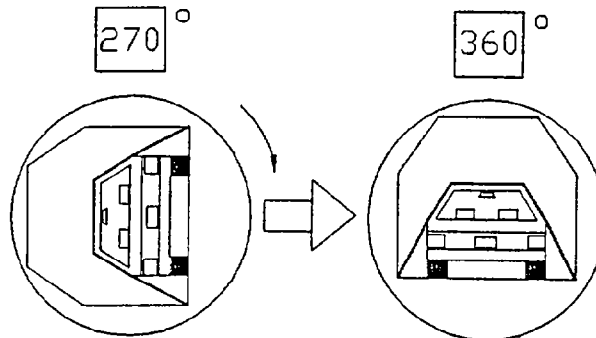
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1994/Buick/Roadmaster/4 Door Sedan

Vehicle NHTSA No.: CR0109 TEST DATE: June 9, 1994

TEST PHASE: 270° - 360°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 36 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 36 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

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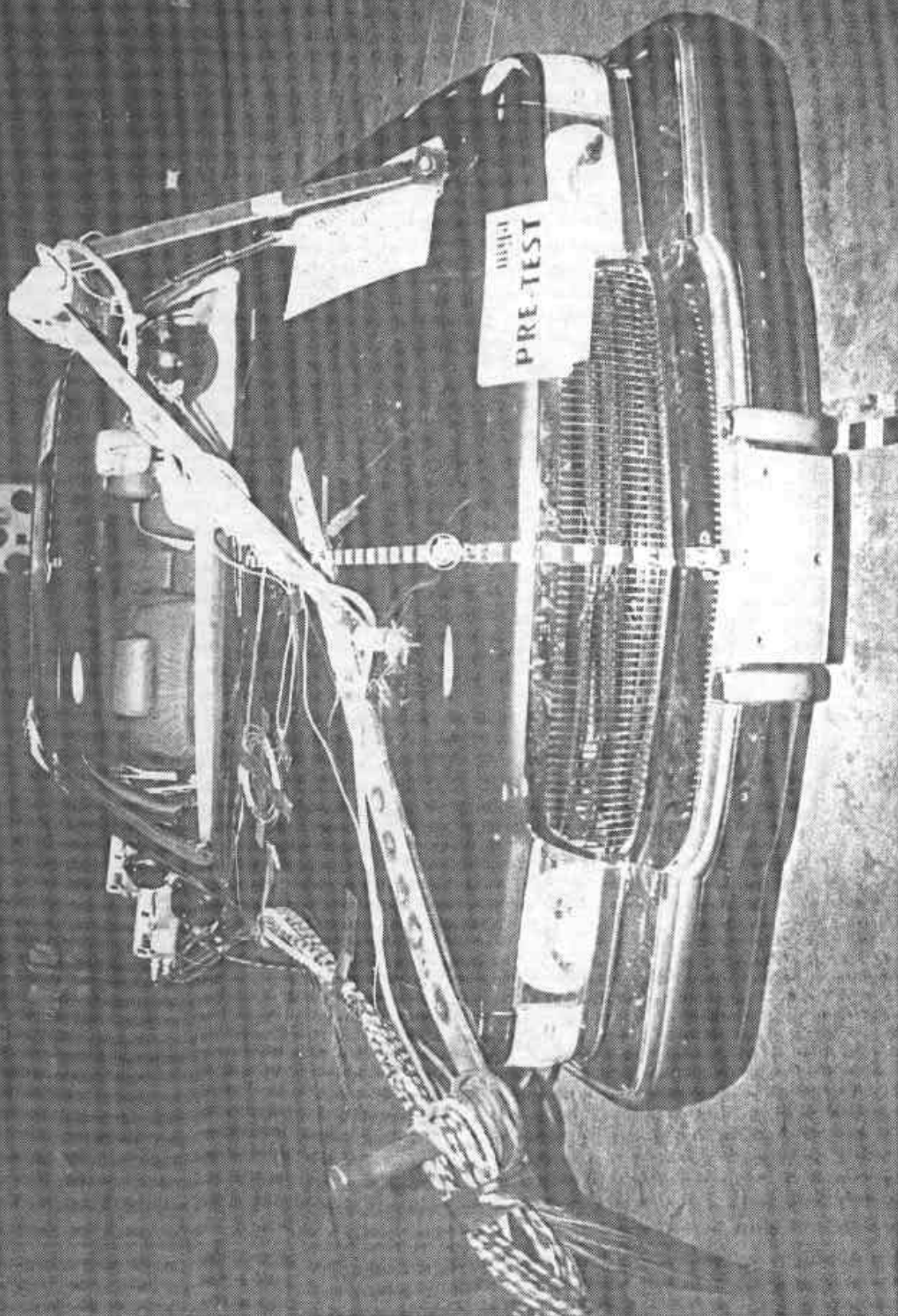


Photo No. A-1 - Pre-Test Front View of Test Vehicle

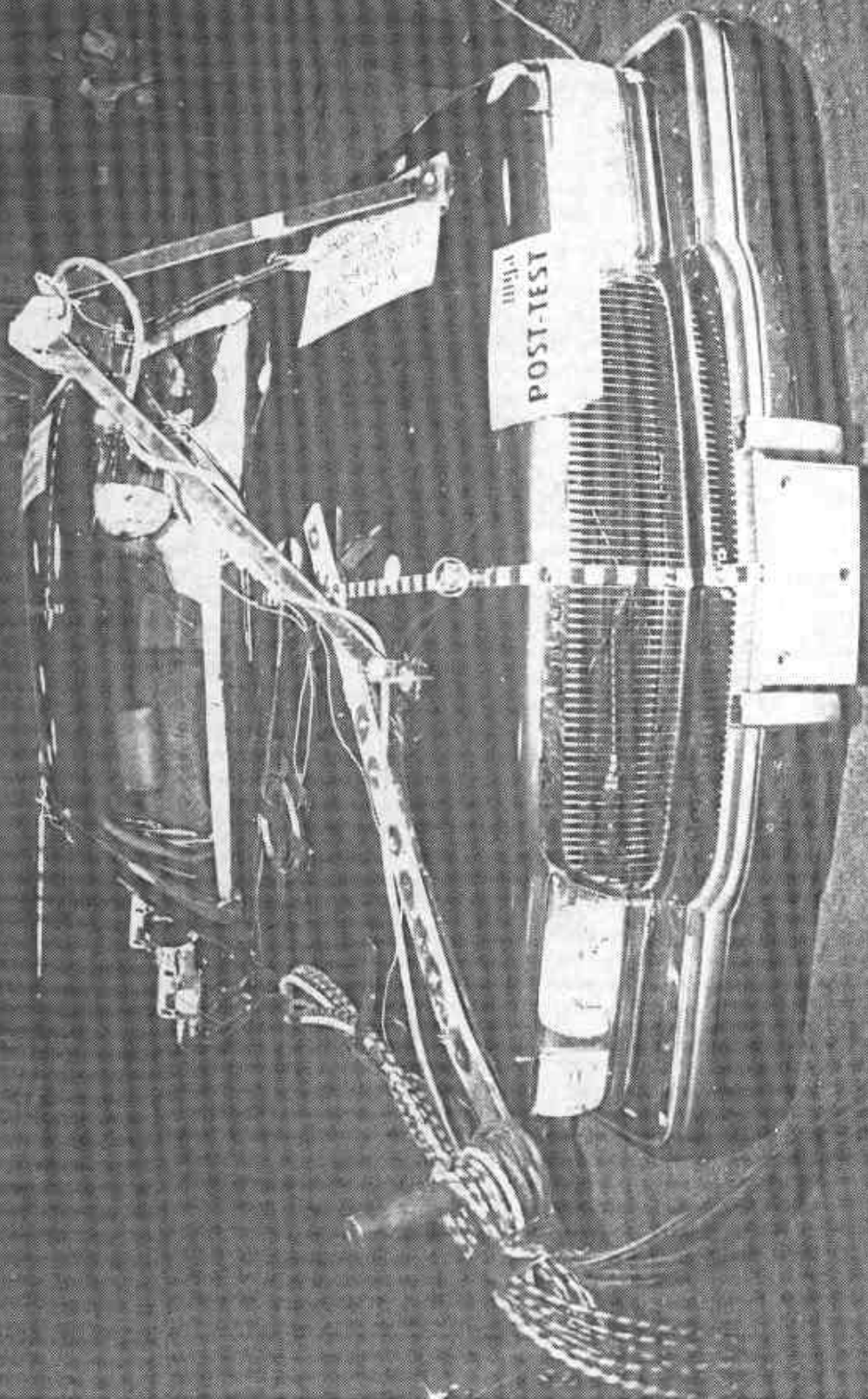


Photo No. A-2 - Post-Test Front View of Test Vehicle

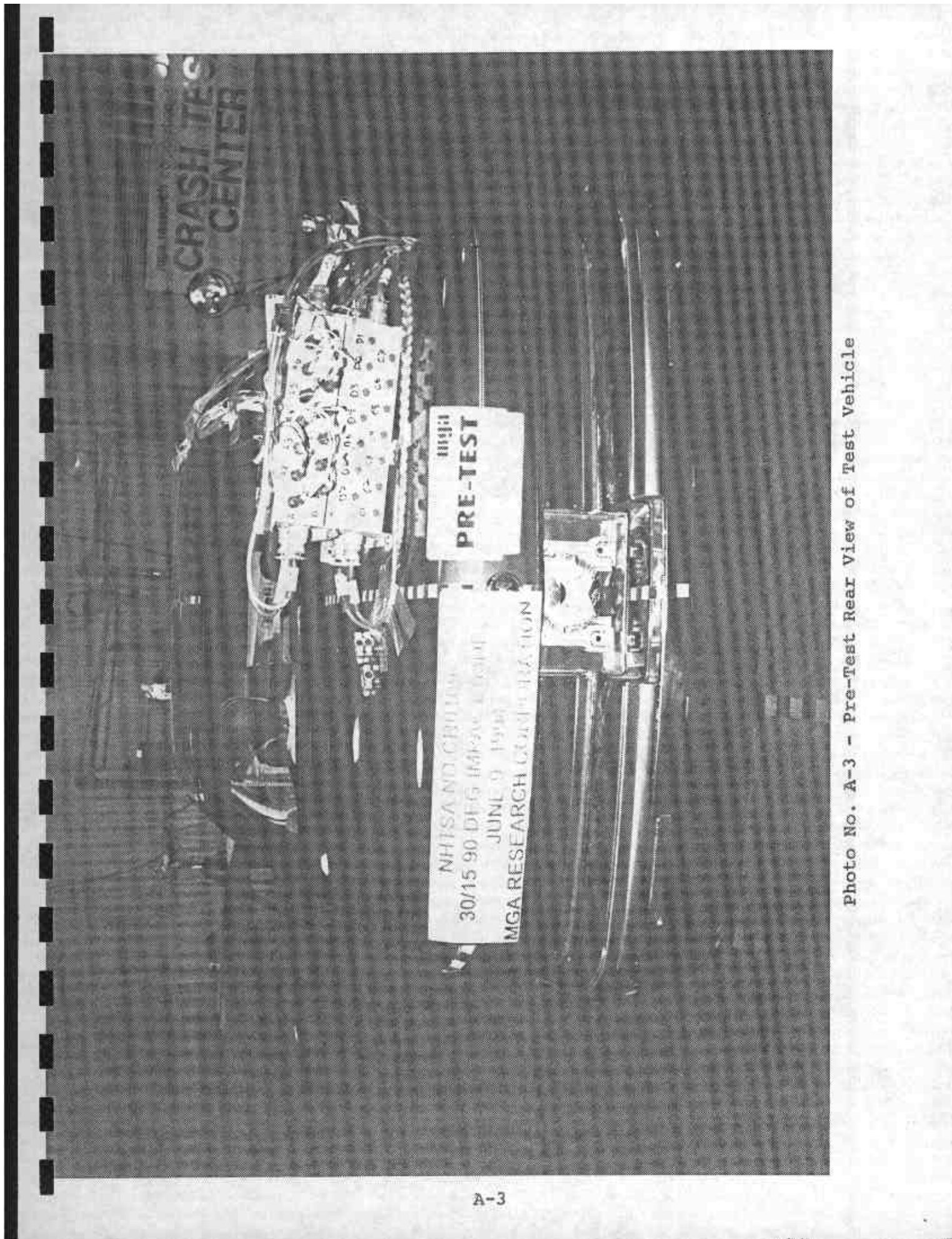
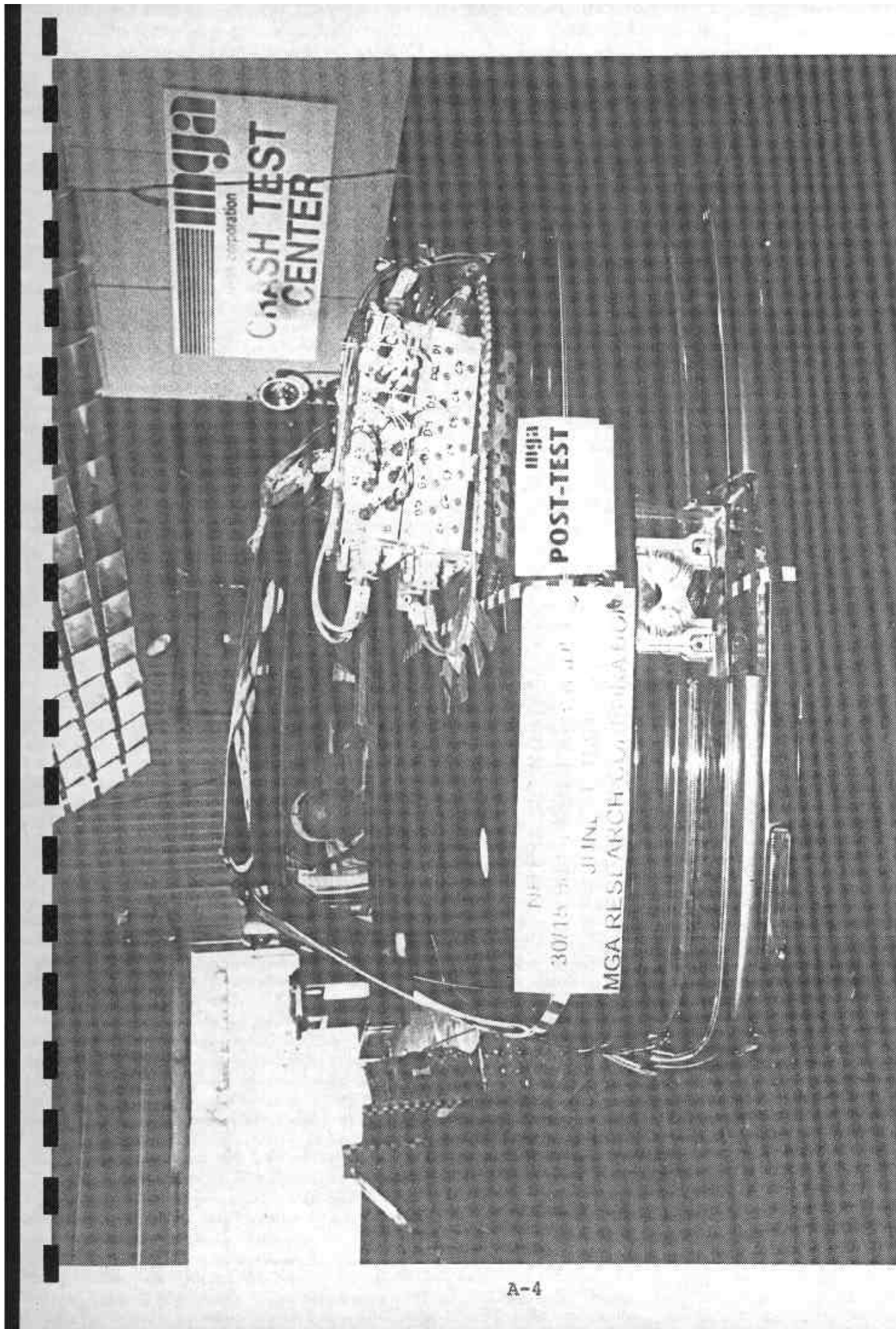


Photo No. A-3 - Pre-Test Rear View of Test Vehicle



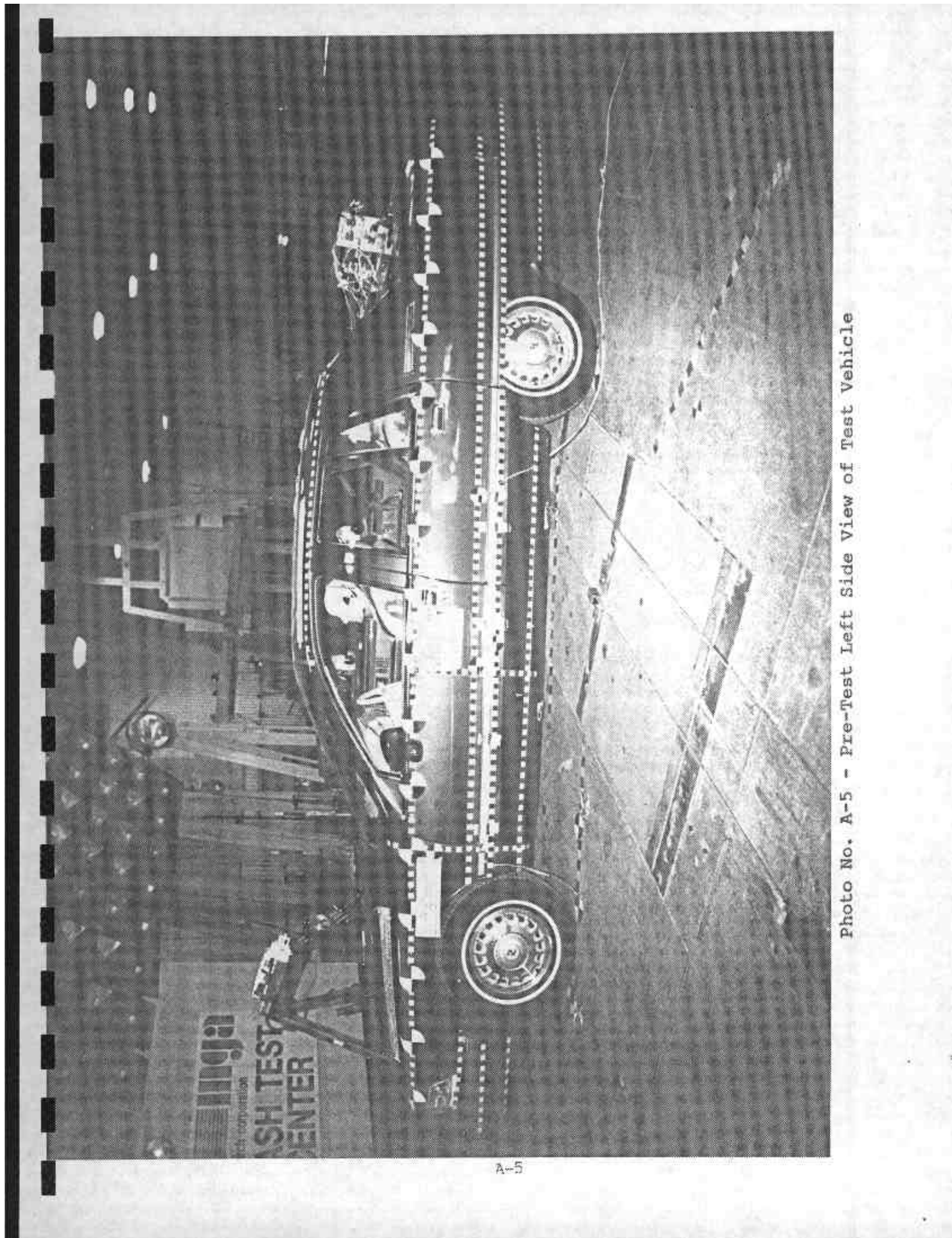


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

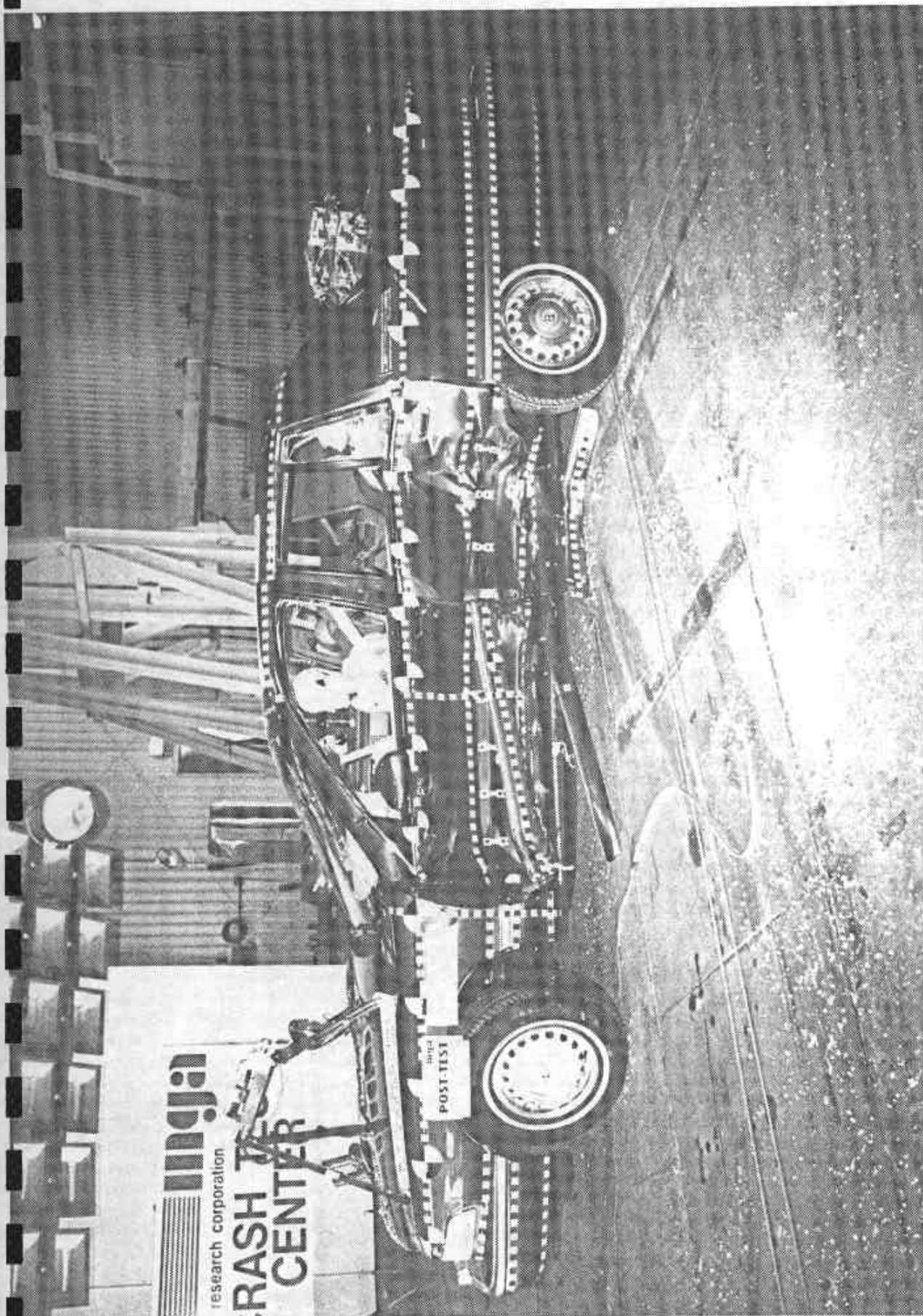


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

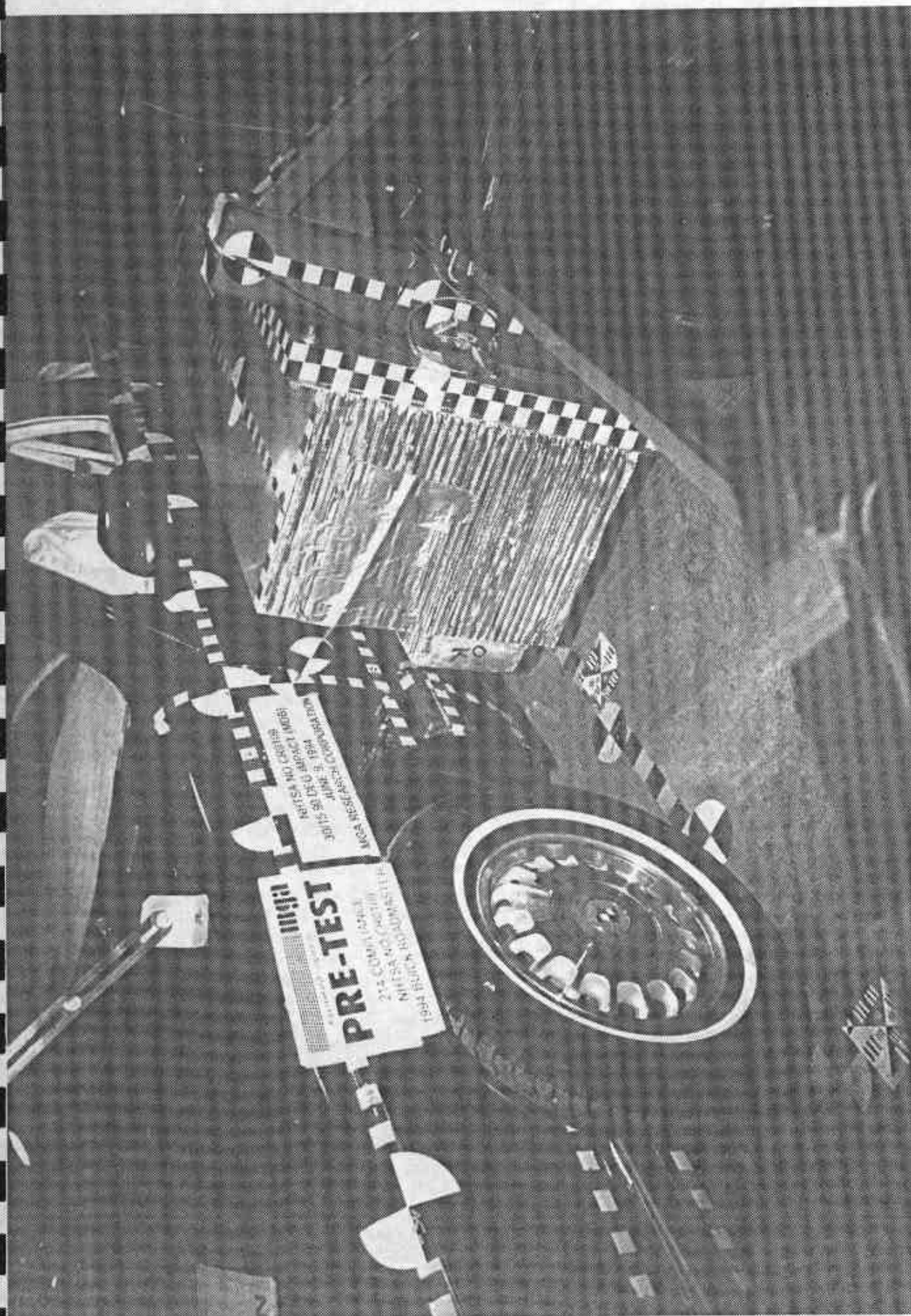


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

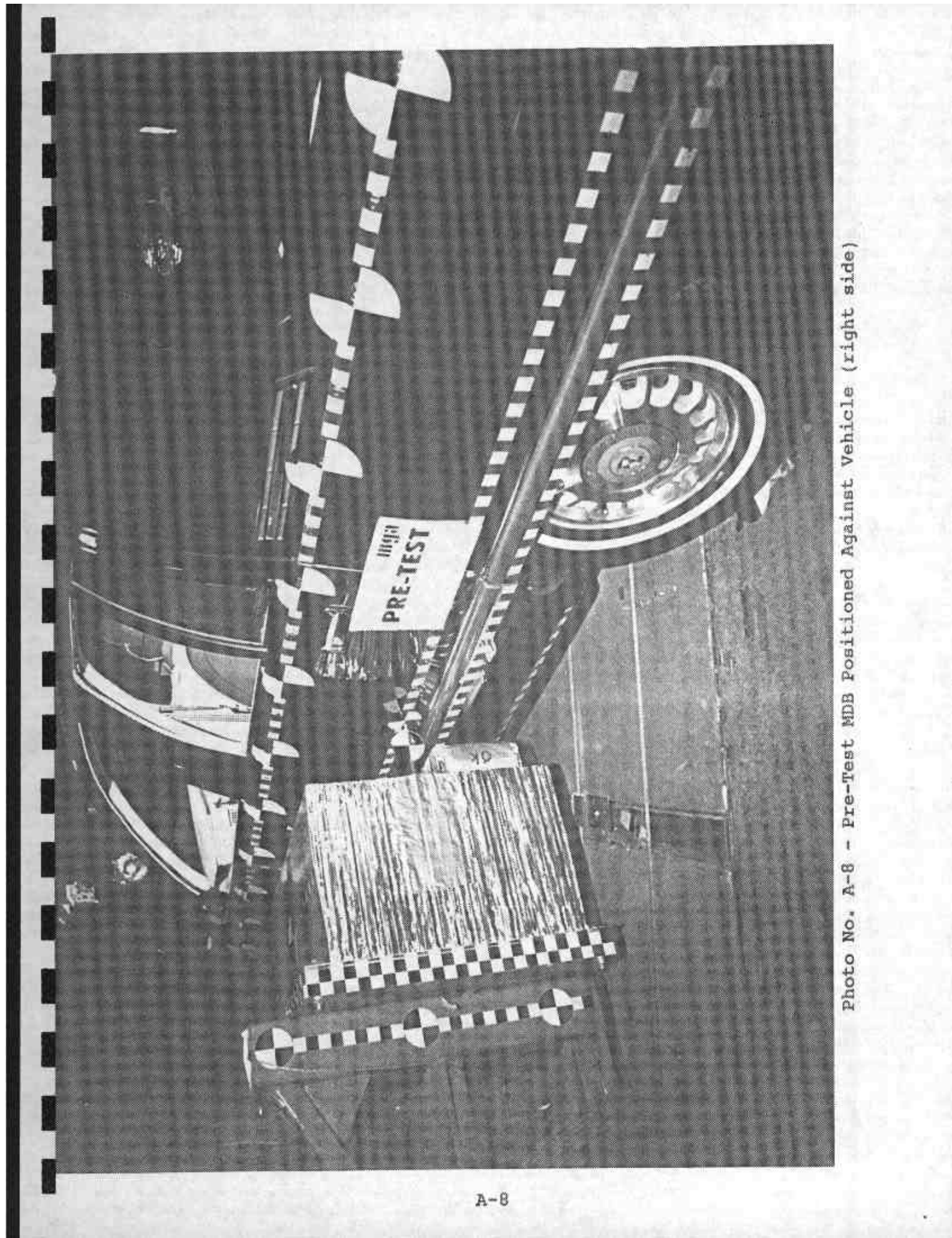


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

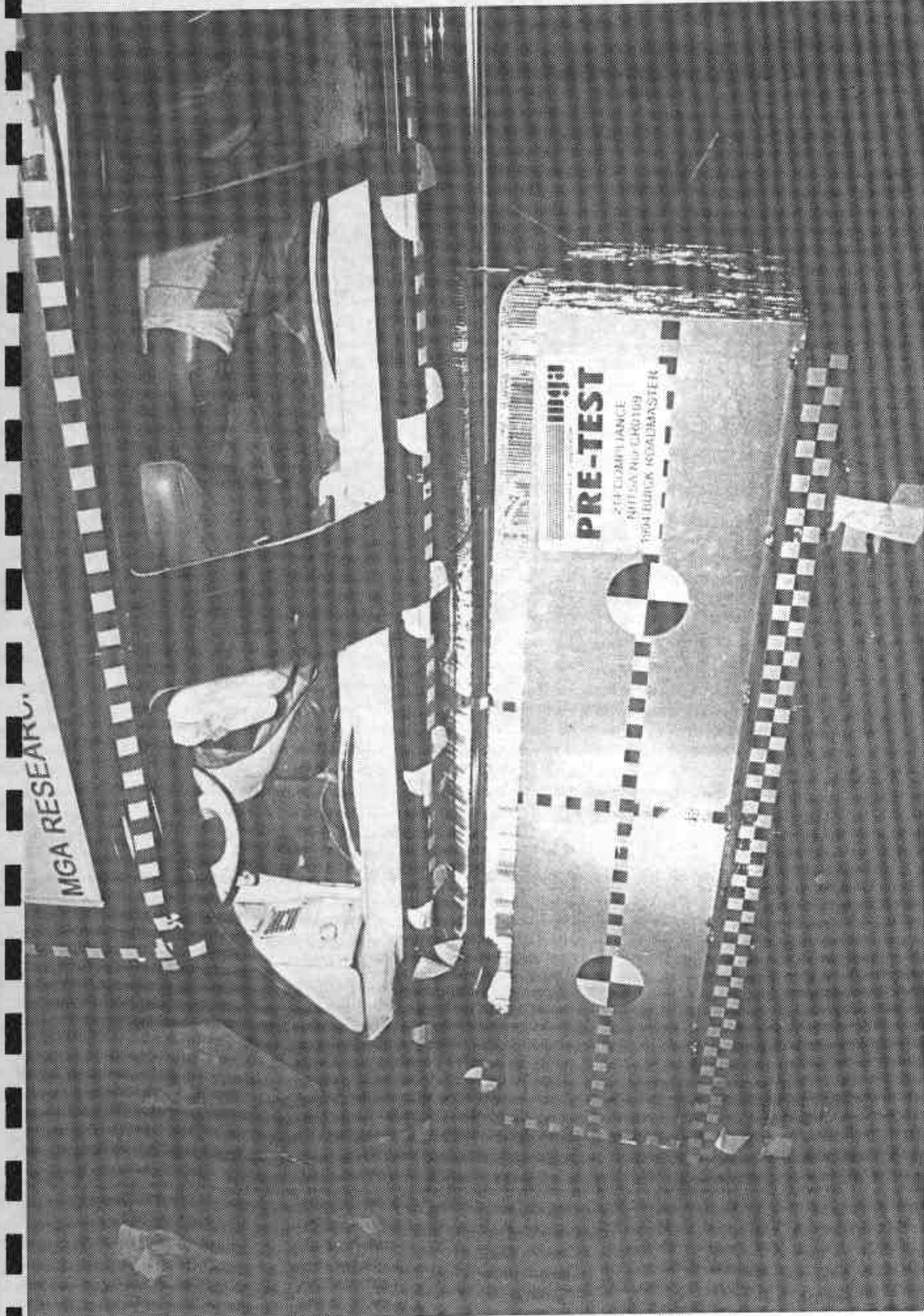


Photo No. A-9 - Pre-Test MDB Position Against Vehicle Overhead View

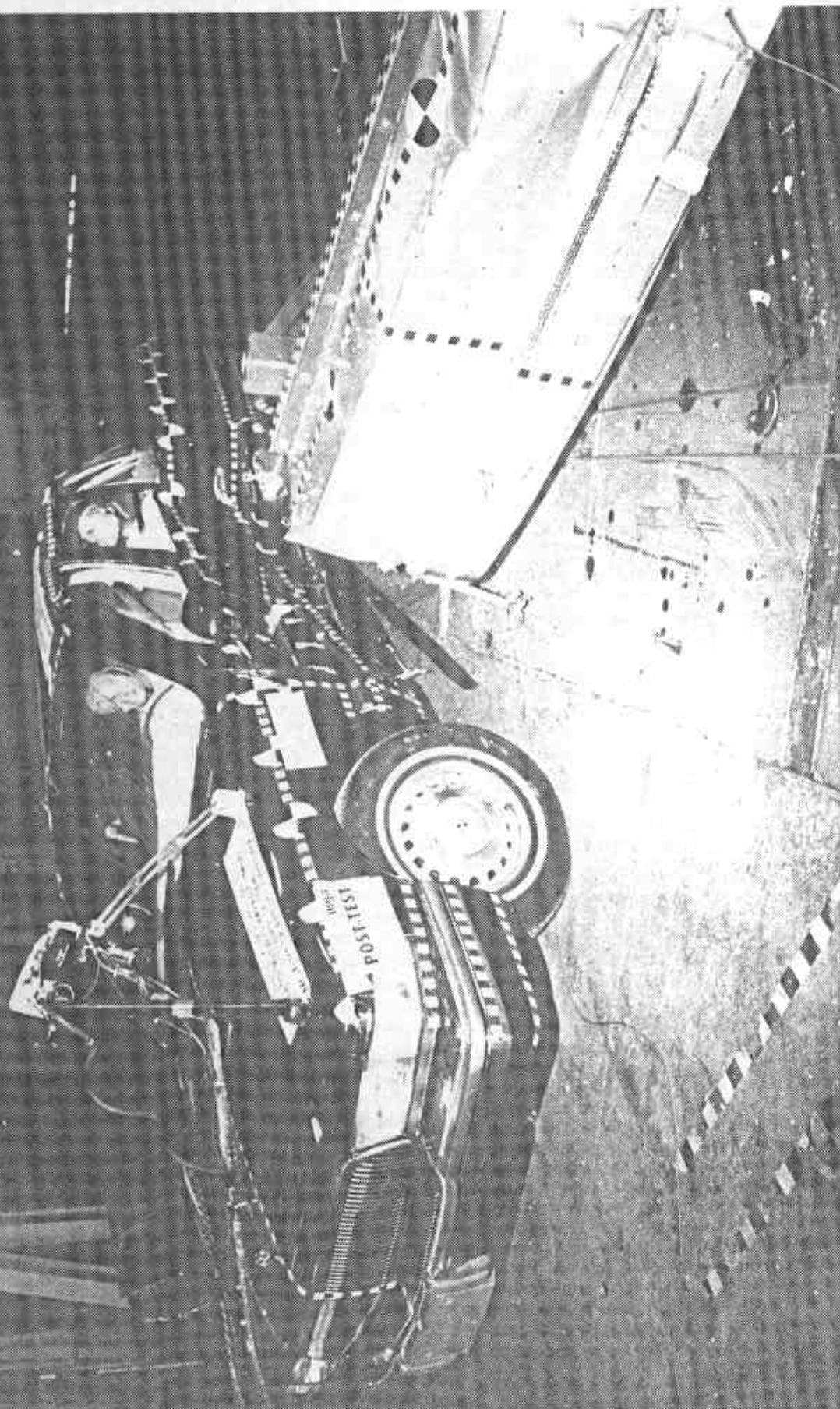


Photo No. A-10 - Post-Test MDB and Vehicle Left Side Front View

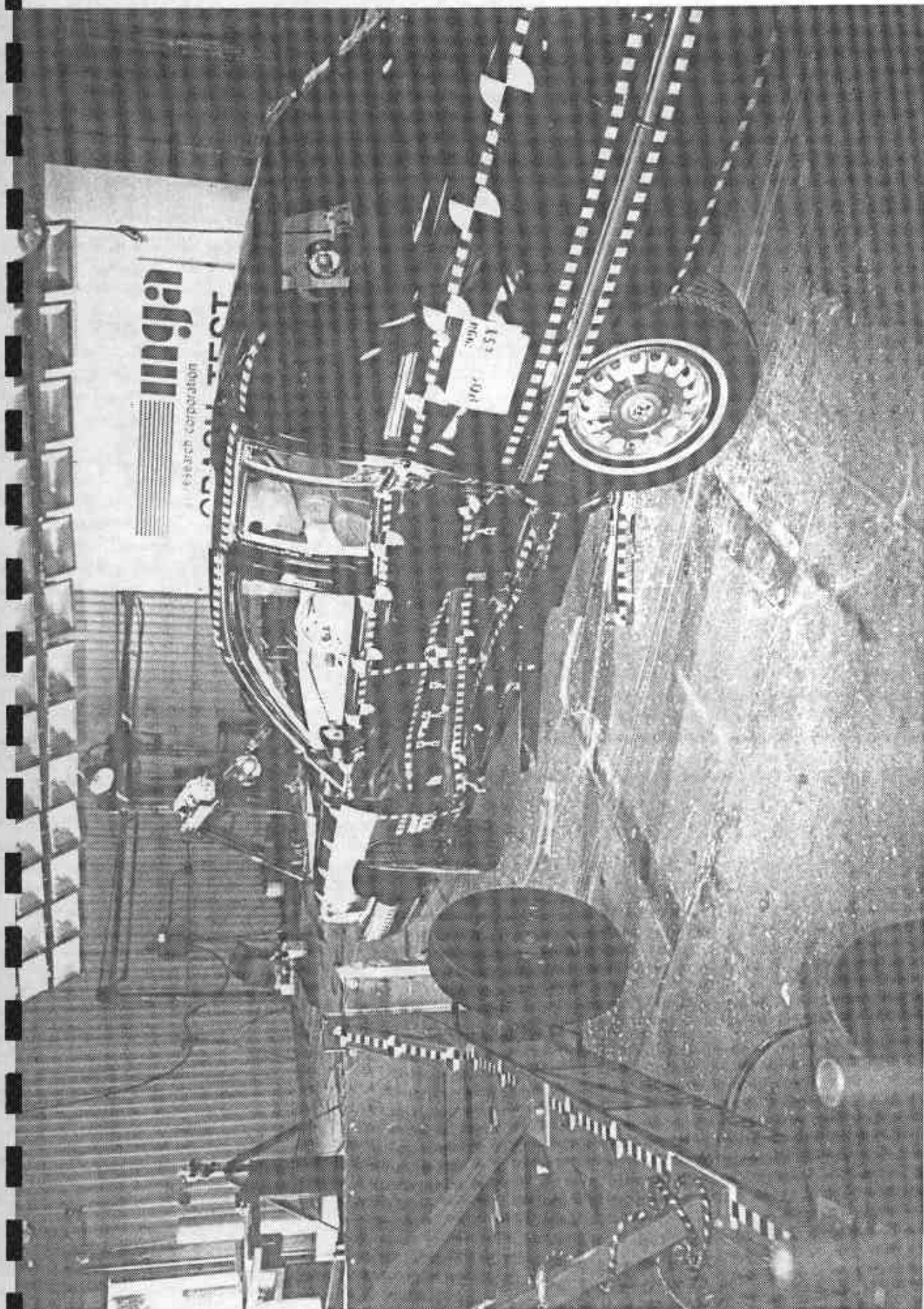


Photo No. A-11 - Post-Test MDB and Vehicle Right Side Rear View

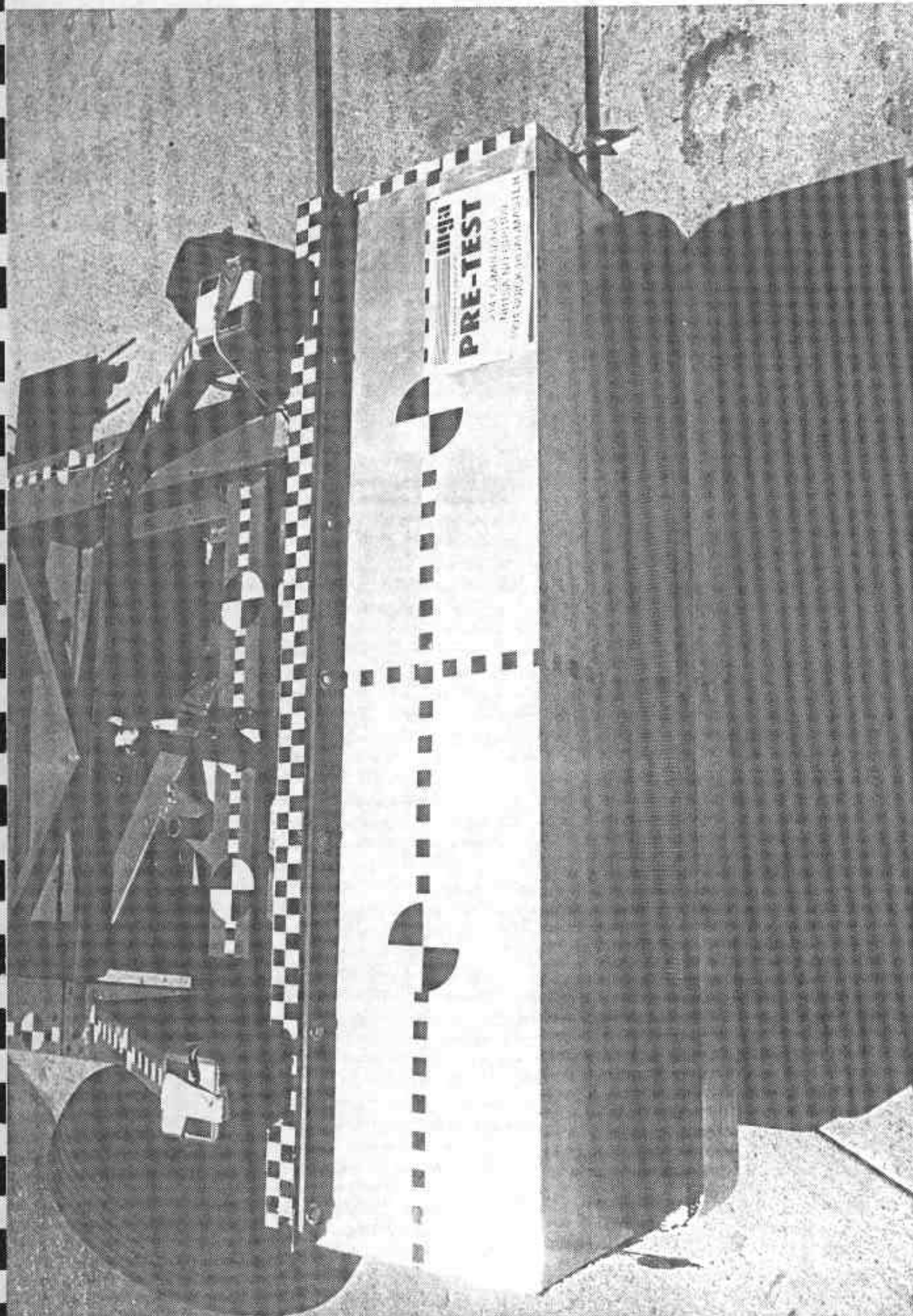


Photo No. A-12 - Pre-Test MDB Top View

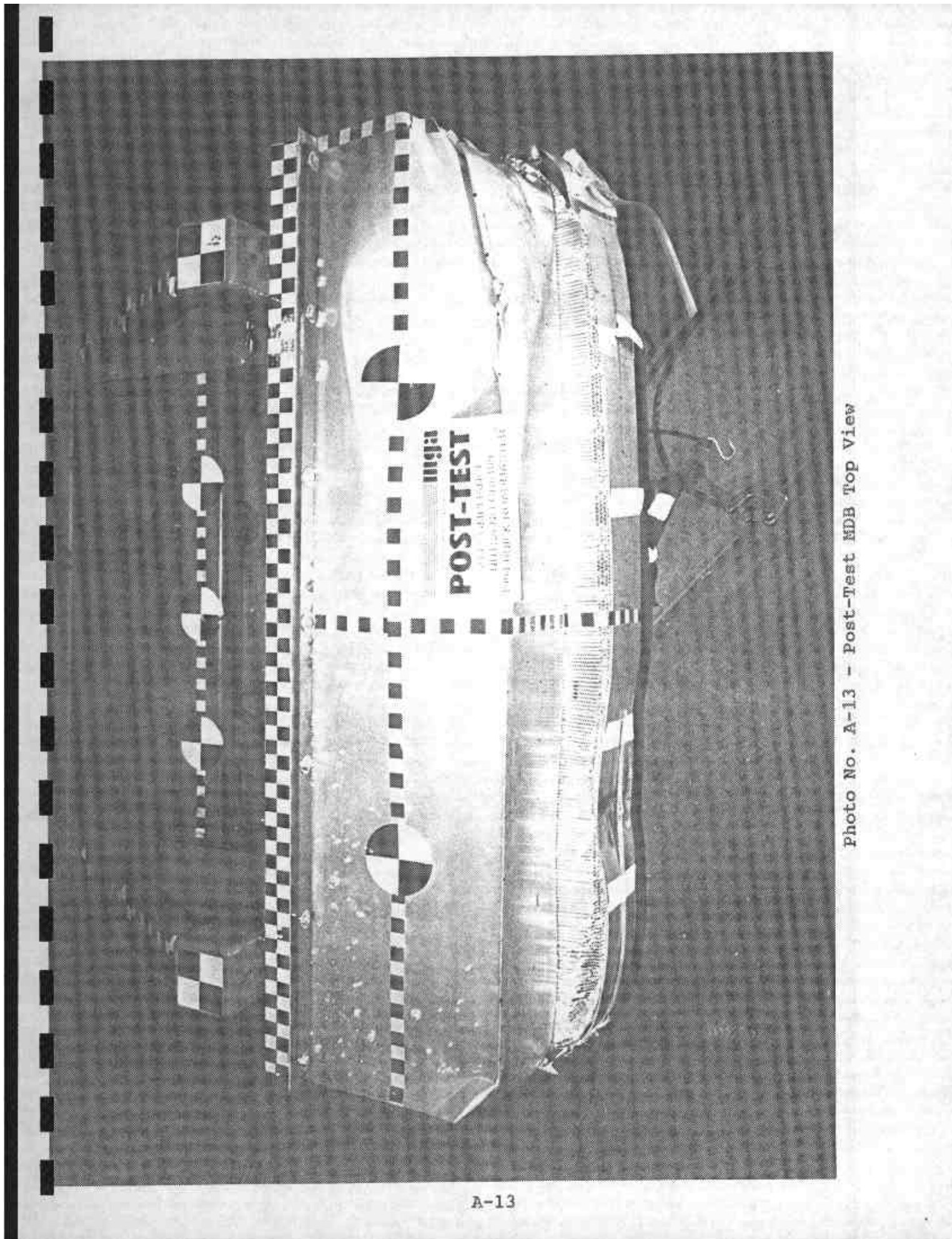


Photo No. A-13 - Post-Test NDB Top View

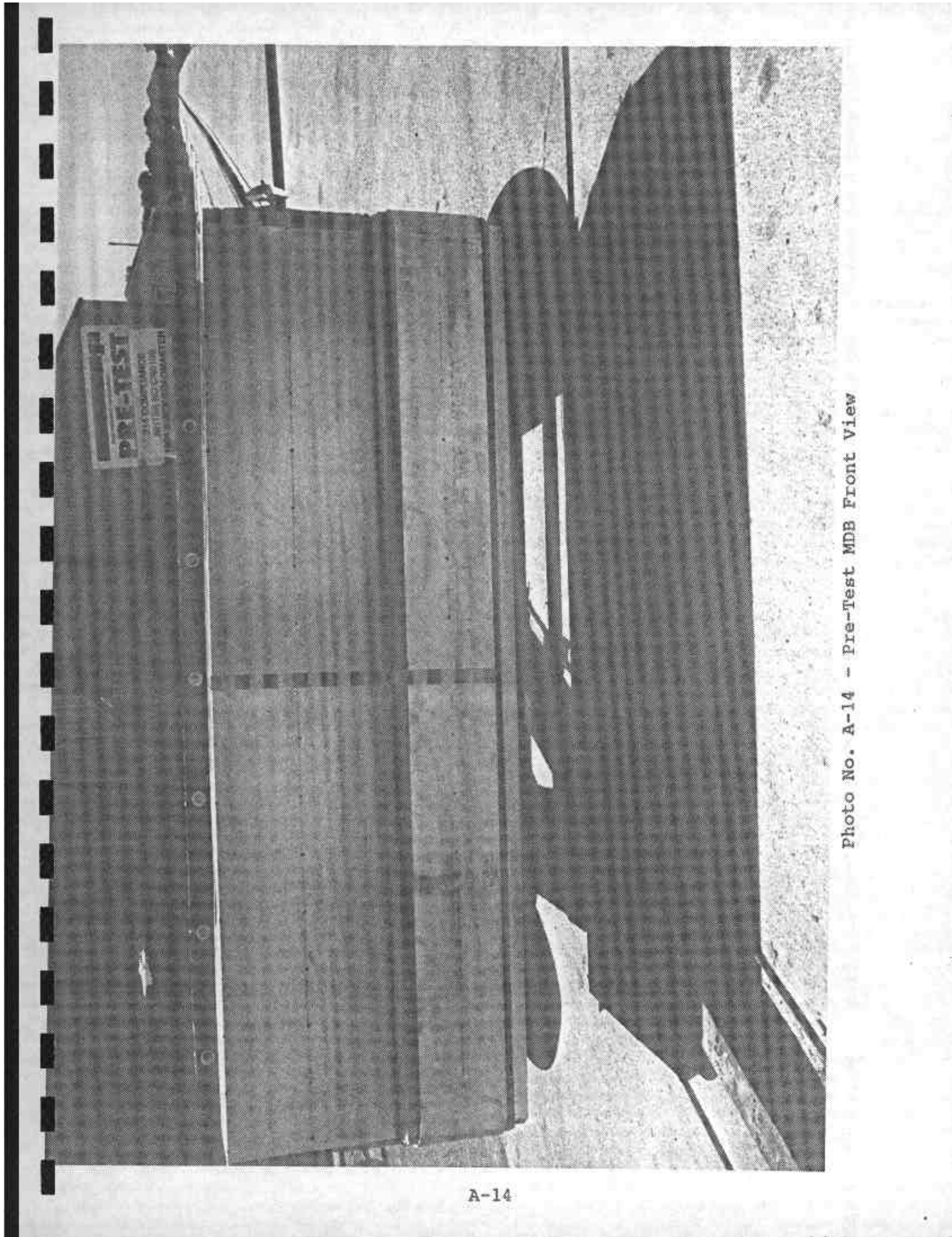


Photo No. A-14 - Pre-Test MDB Front View

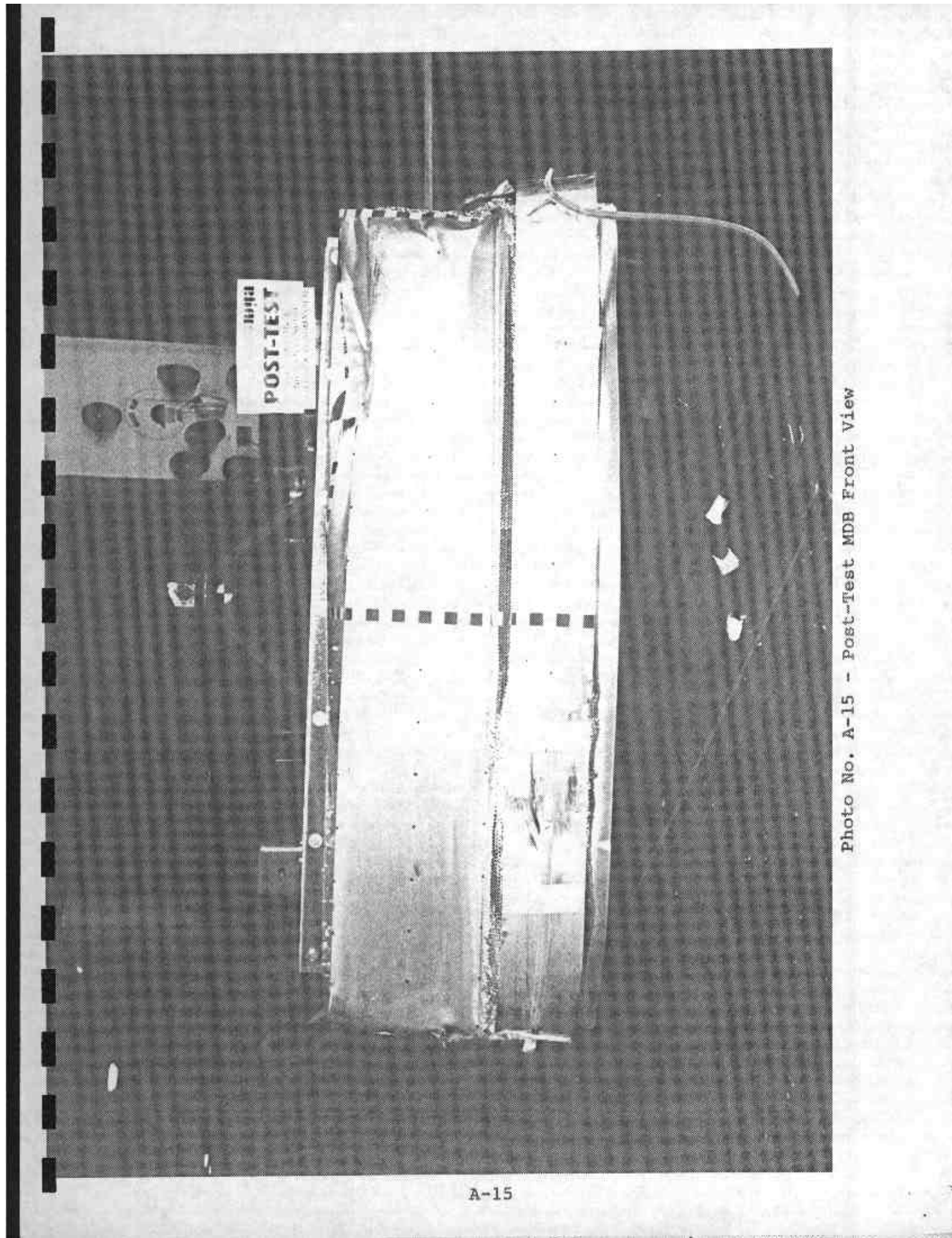


Photo No. A-15 - Post-Test MDB Front View

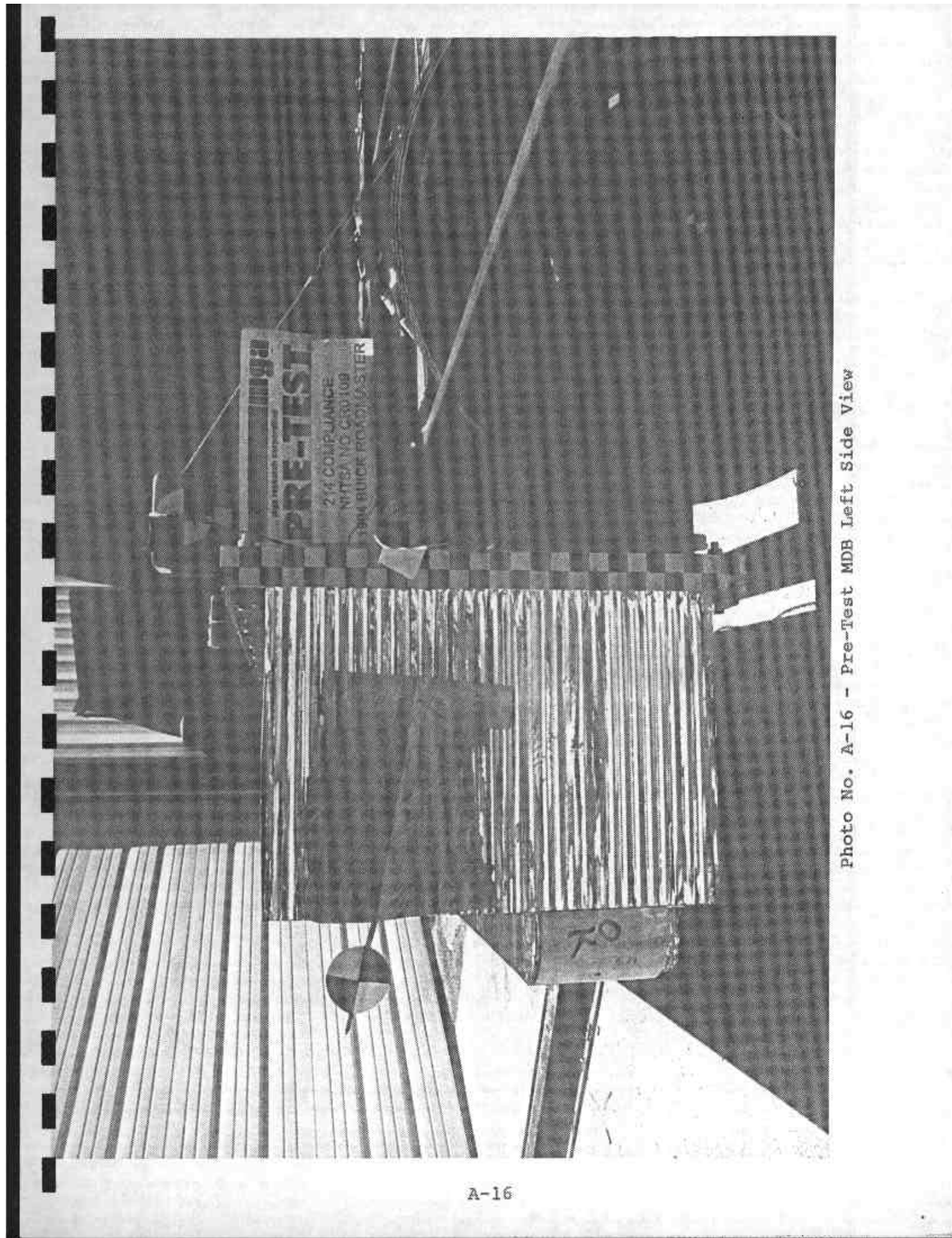


Photo No. A-16 - Pre-Test MDB Left Side View

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Photo No. A-17 - Post-Test MDB Left Side View

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

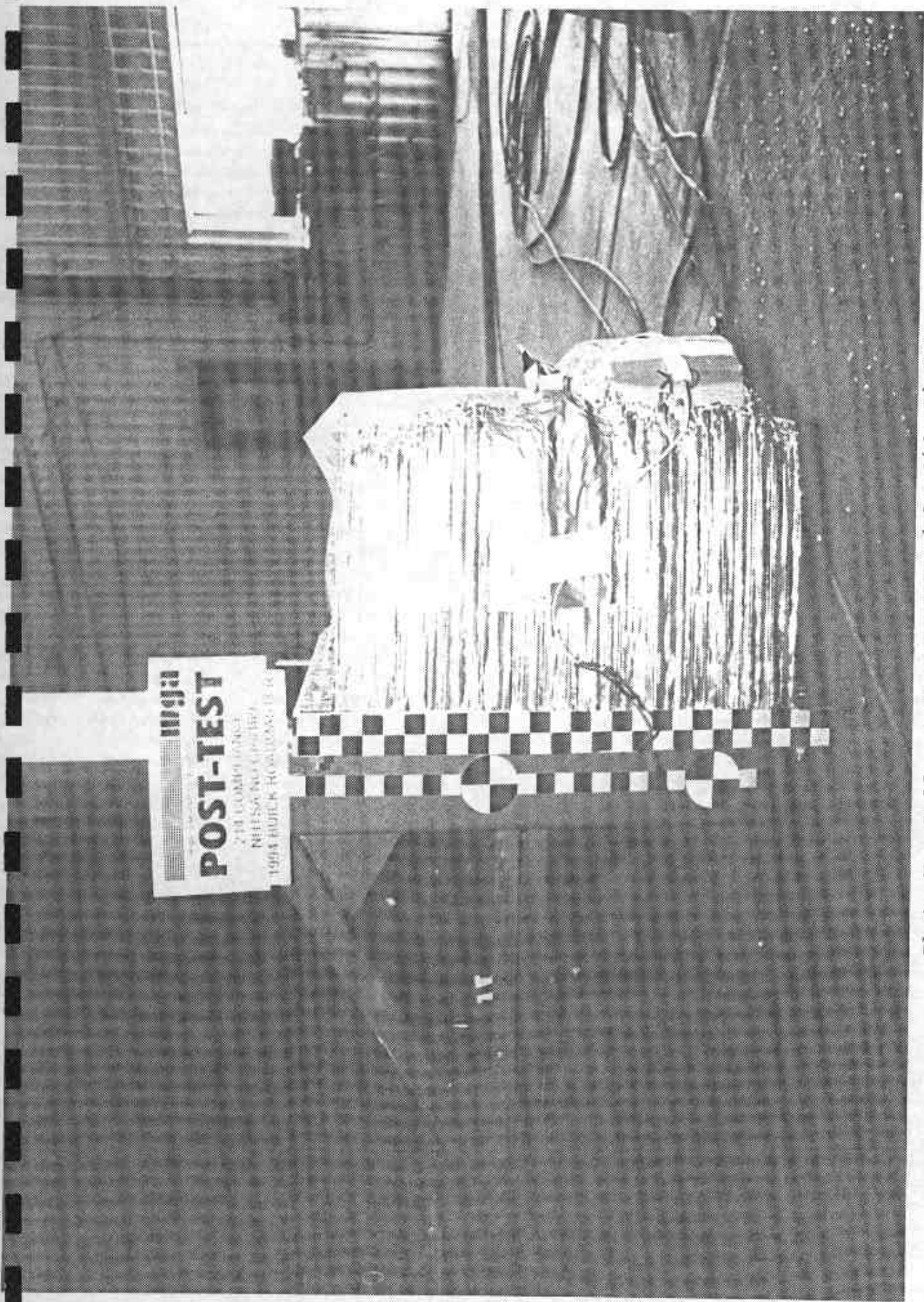


Photo No. A-19 - Post-Test MDB Right Side View

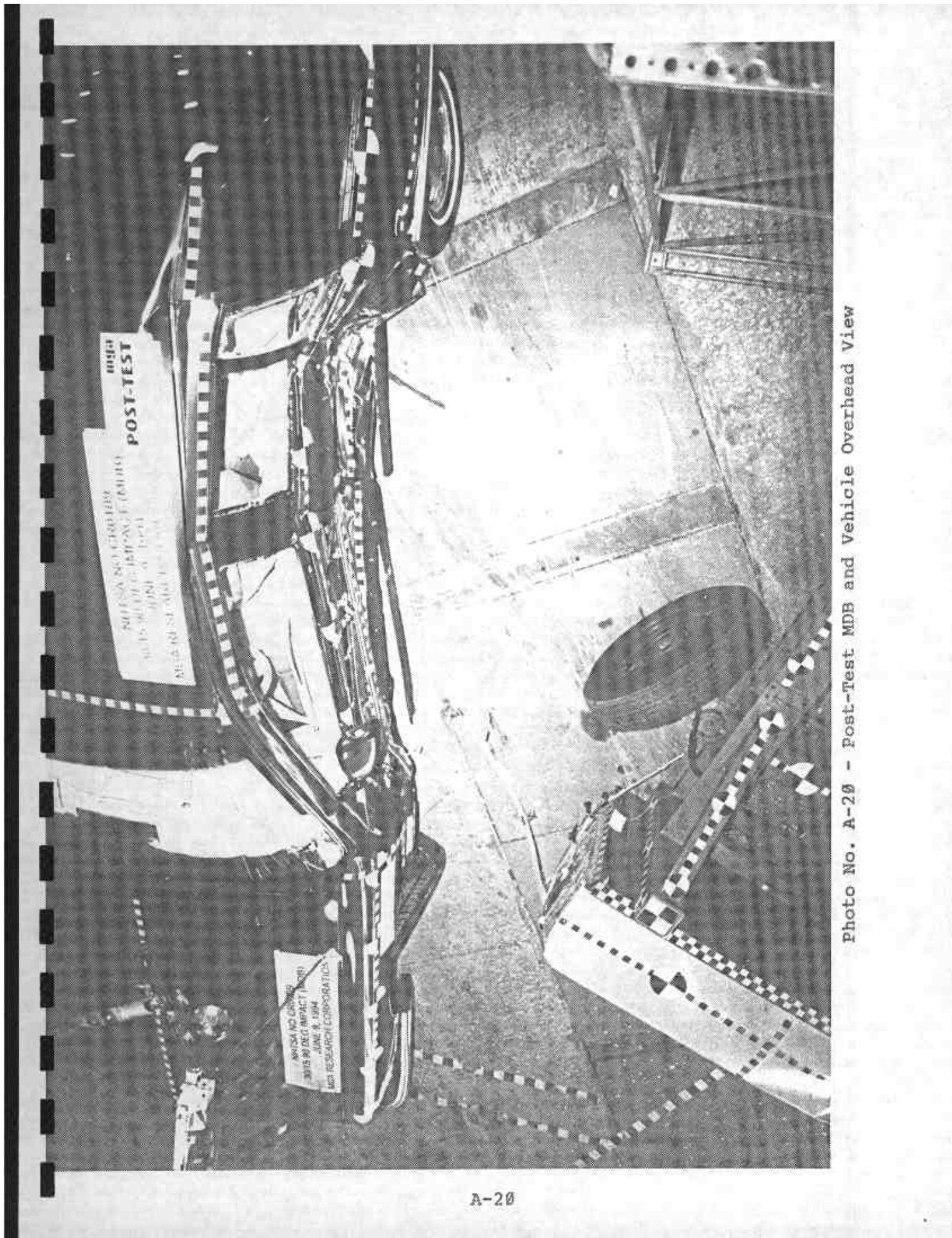


Photo No. A-20 - Post-Test MDB and Vehicle Overhead View

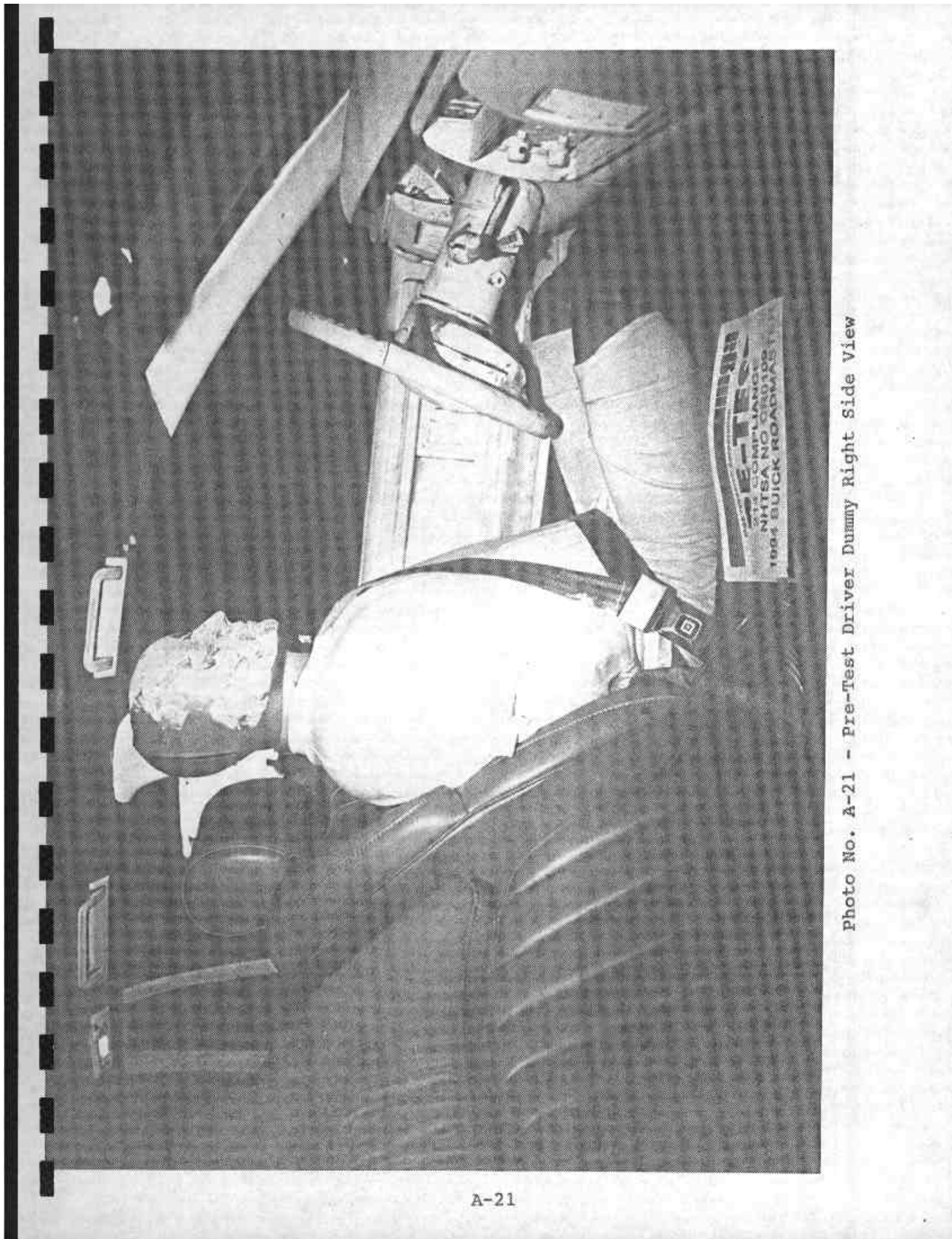


Photo No. A-21 - Pre-Test Driver Dummy Right Side View

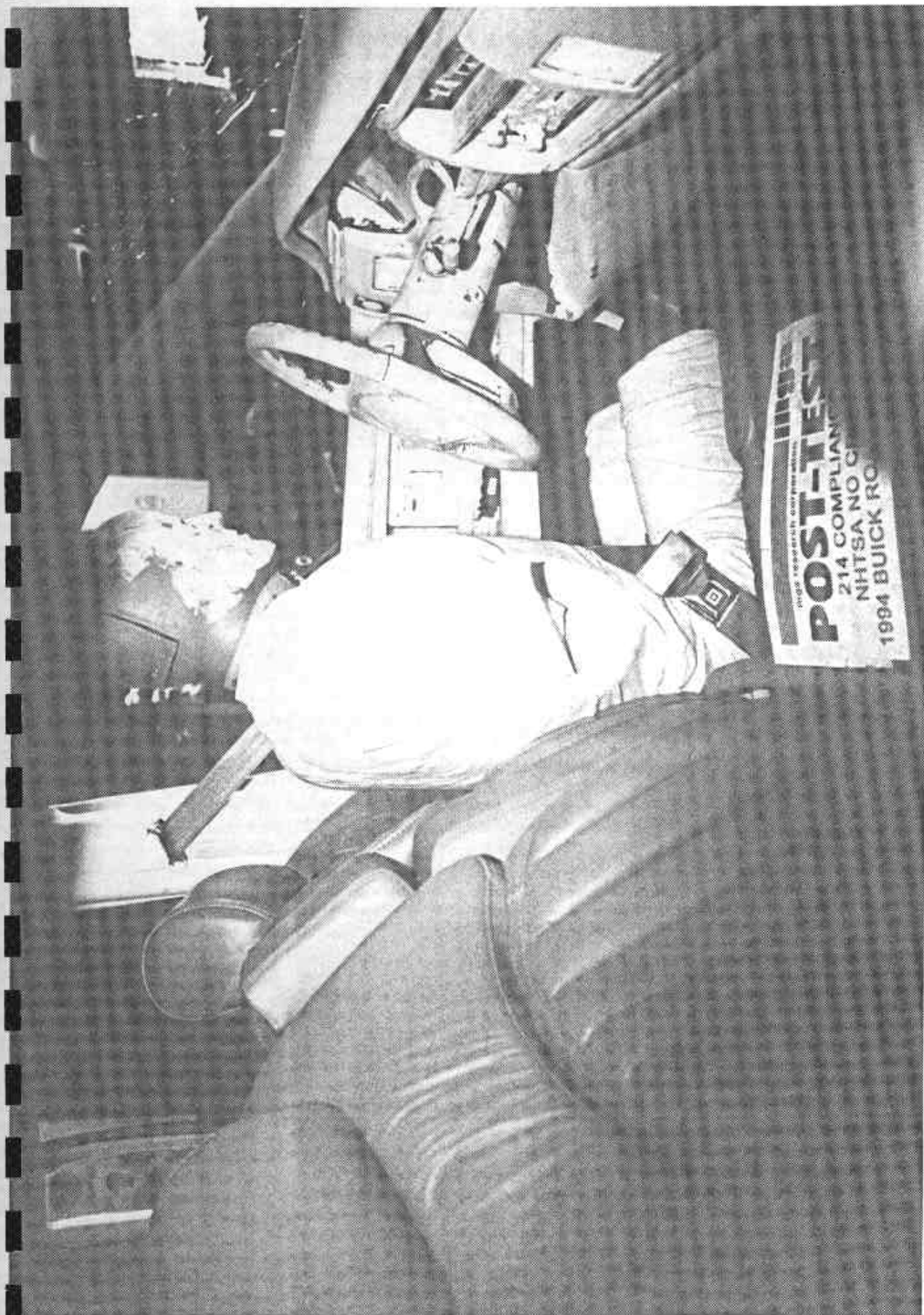


Photo No. A-22 - Post-Test Driver Dummy Right Side View

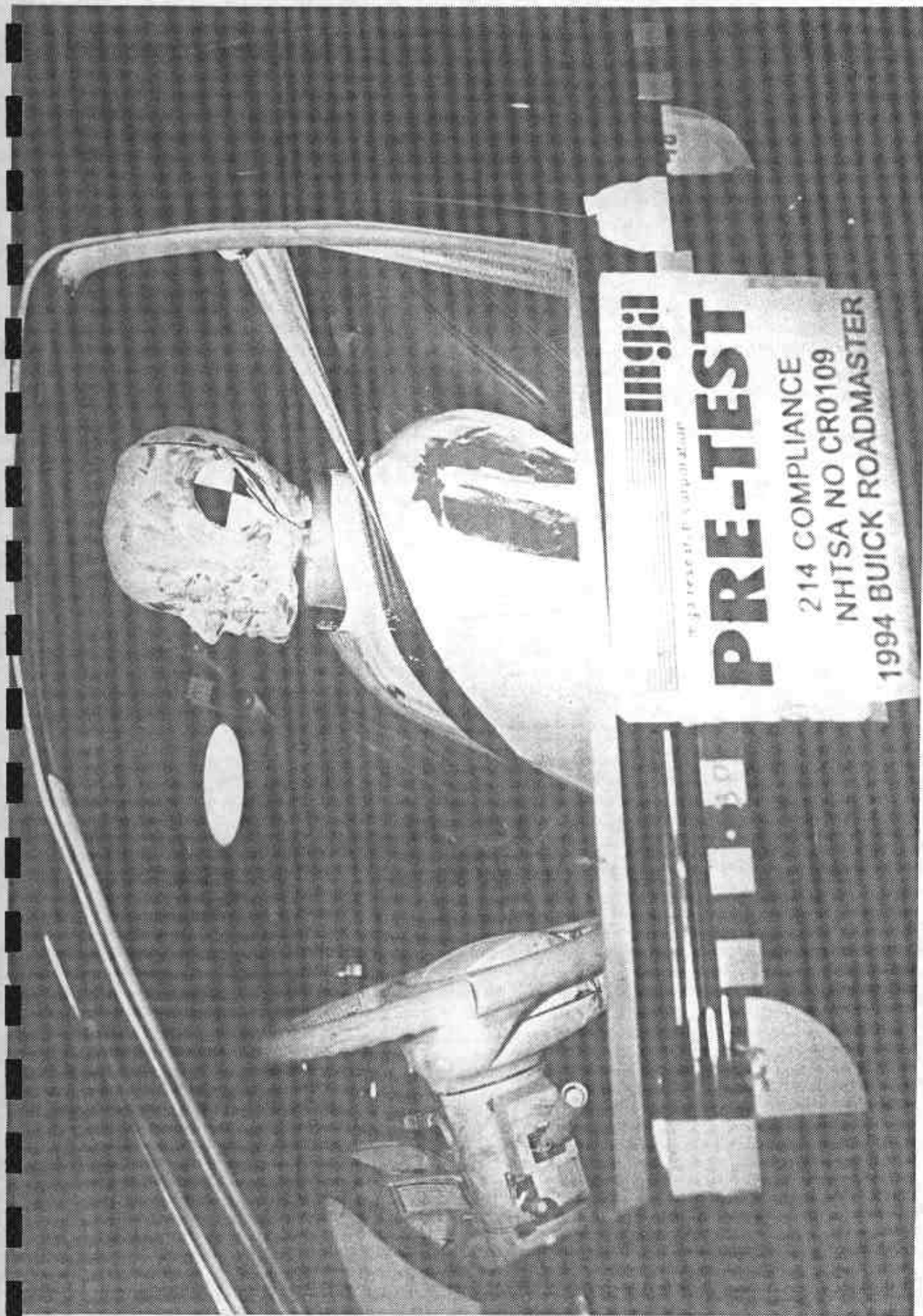


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

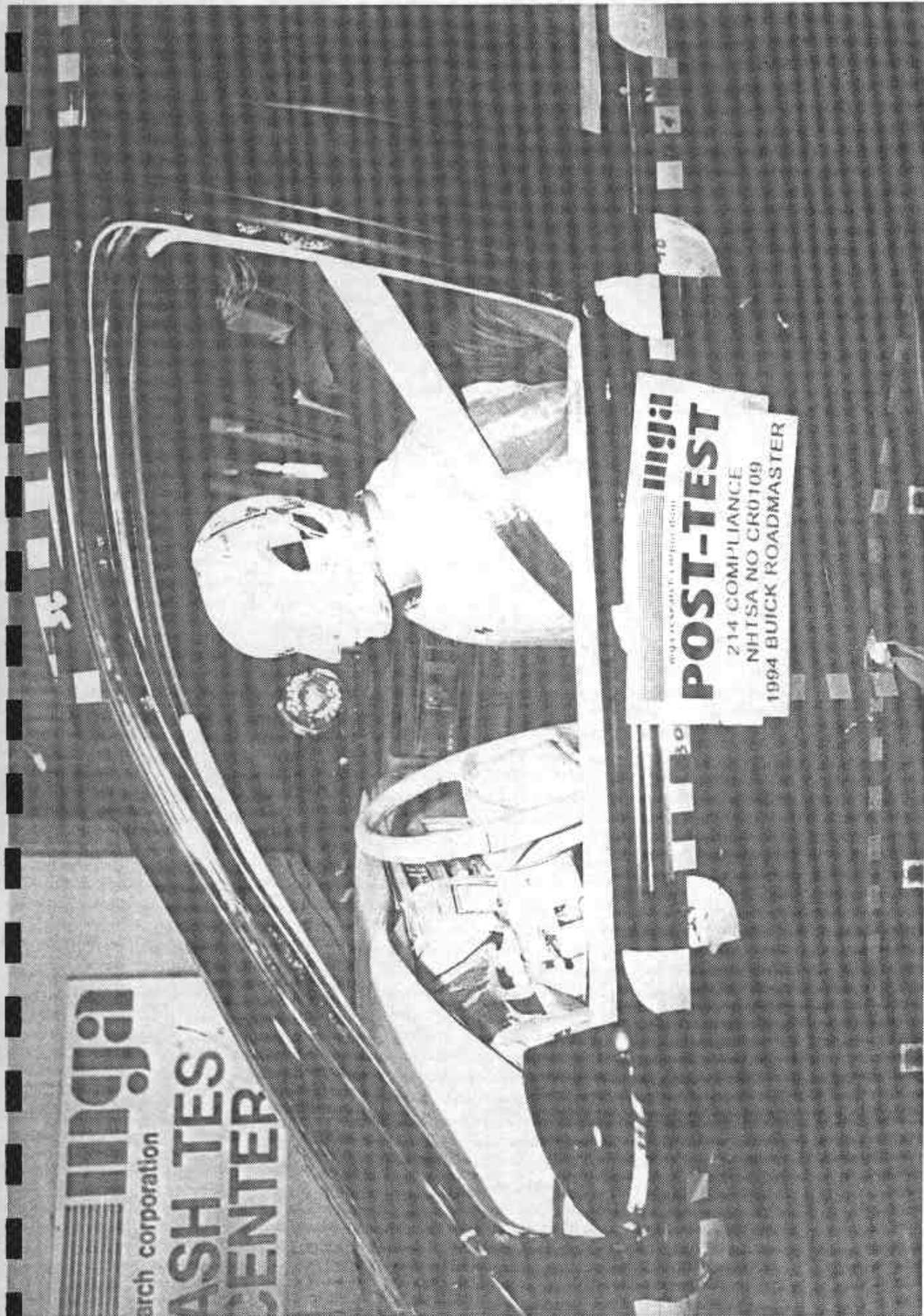


Photo No. A-24 - Post-Test Driver Dummy Left Side View



Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)

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Photo No. A-26 - Post-Test Driver Dummy Impact

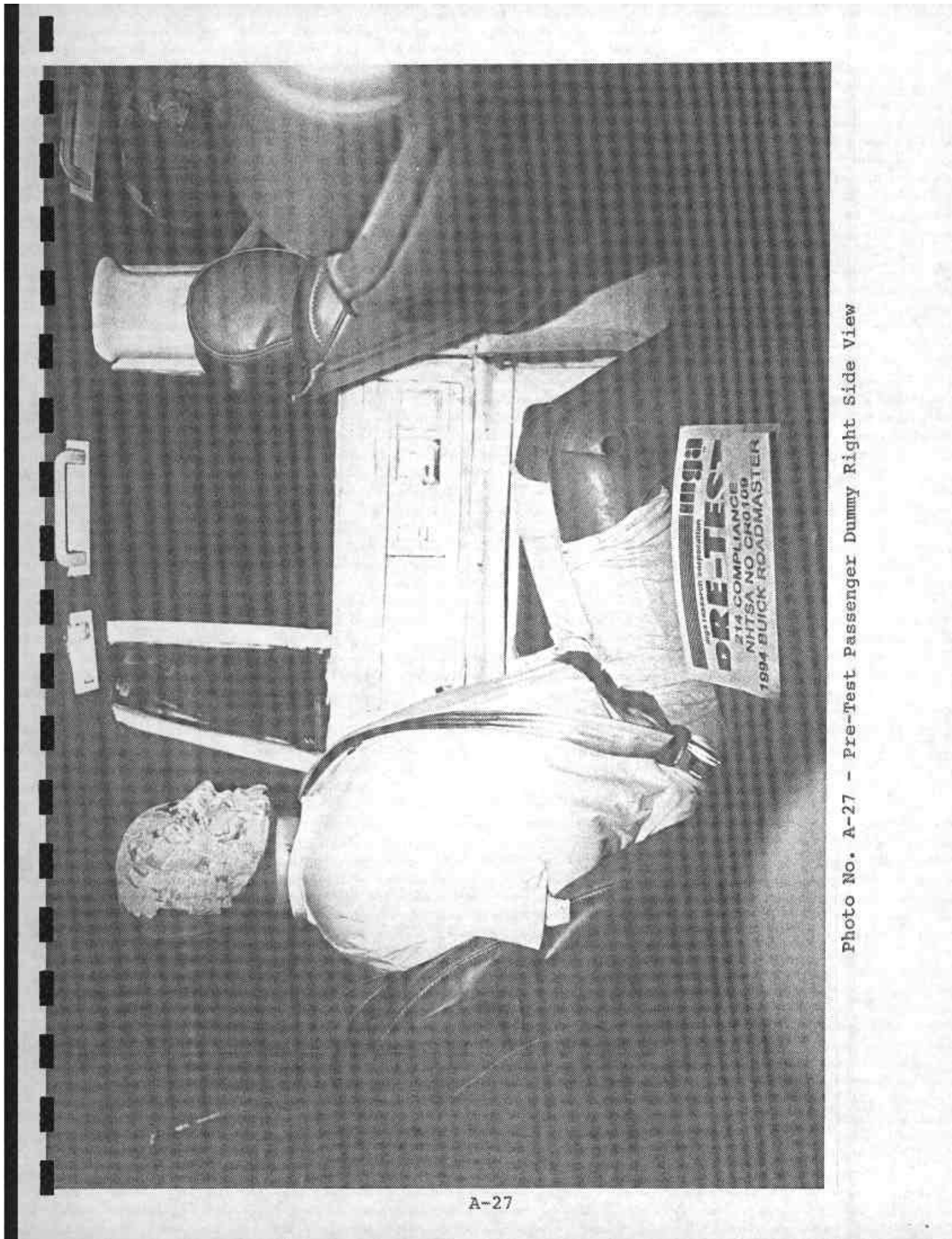


Photo No. A-27 - Pre-Test Passenger Dummy Right Side View



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



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

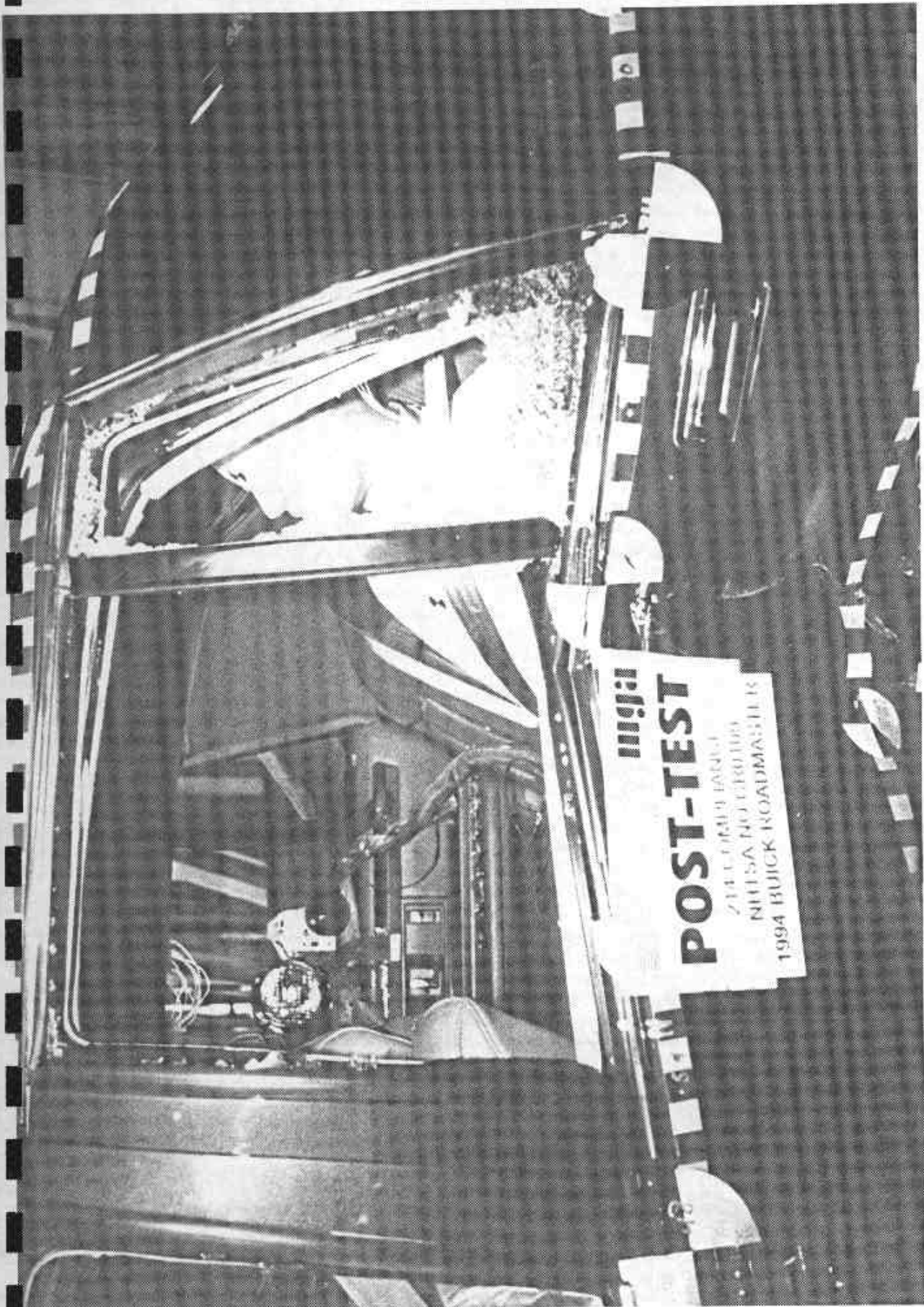


Photo No. A-30 - Post-Test Passenger Dummy Left Side View



Photo No. A-31 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-32 - Post-Test Passenger Dummy Impact

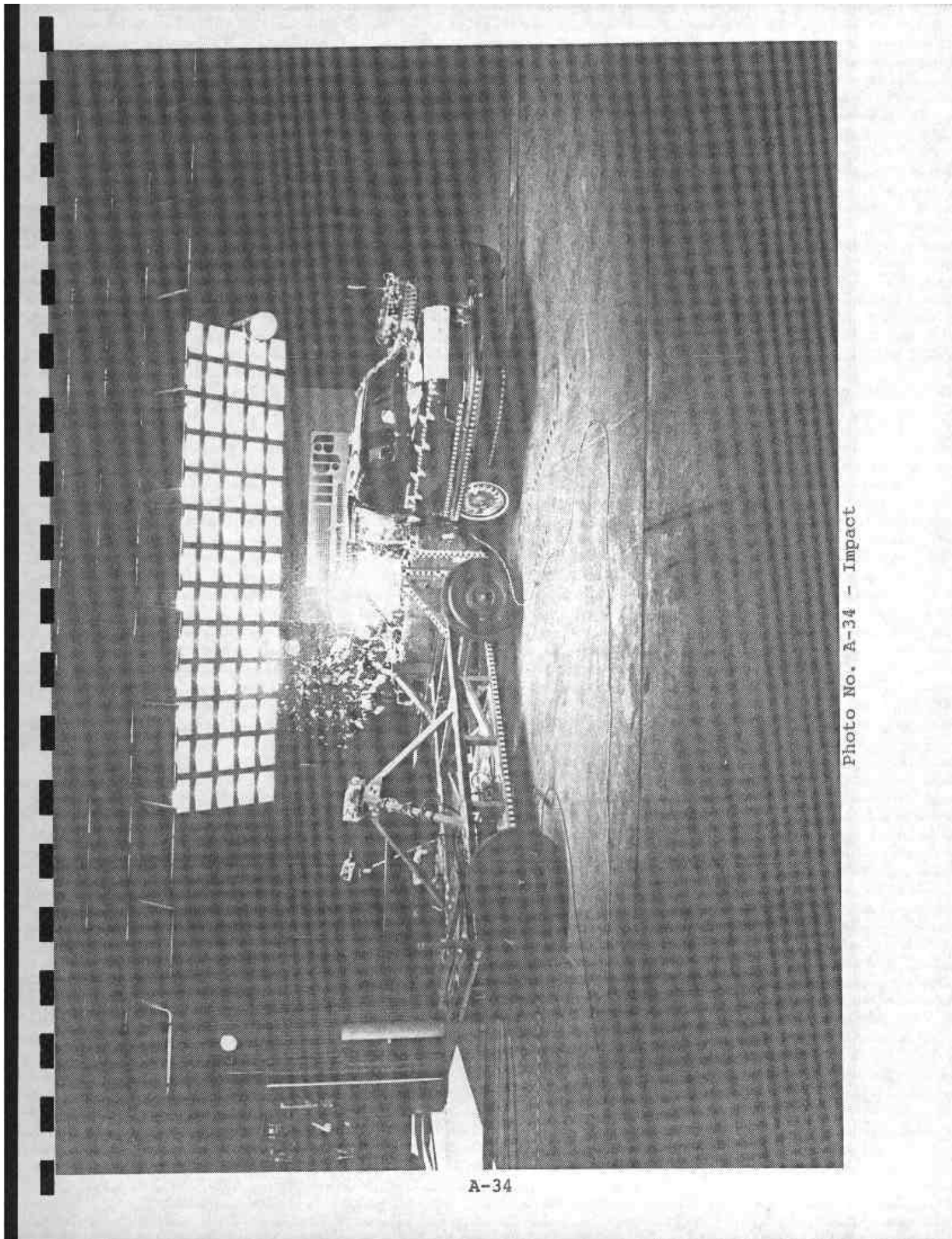


Photo No. A-34 - Impact

A-34

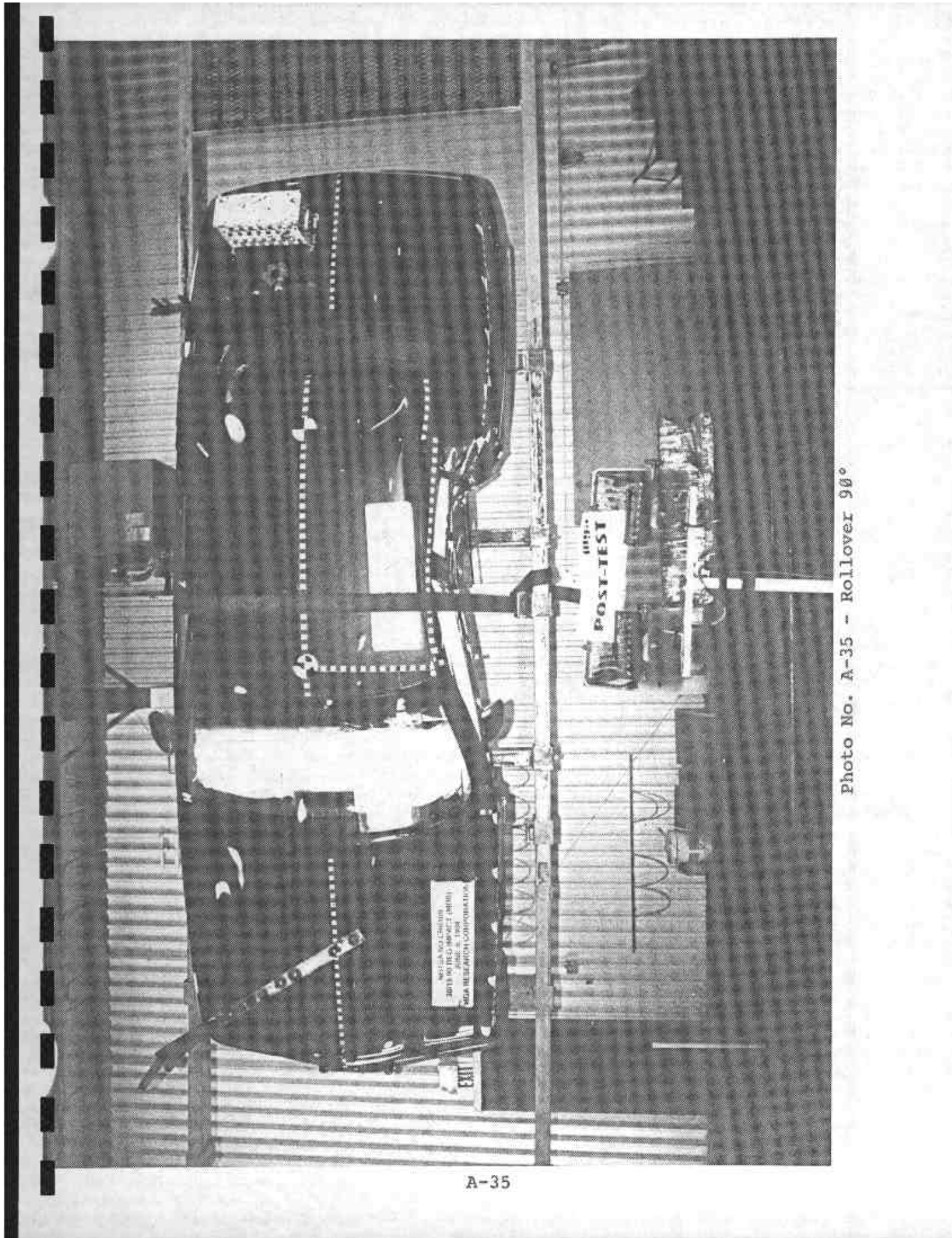


Photo No. A-35 - Rollover 90°

A-35

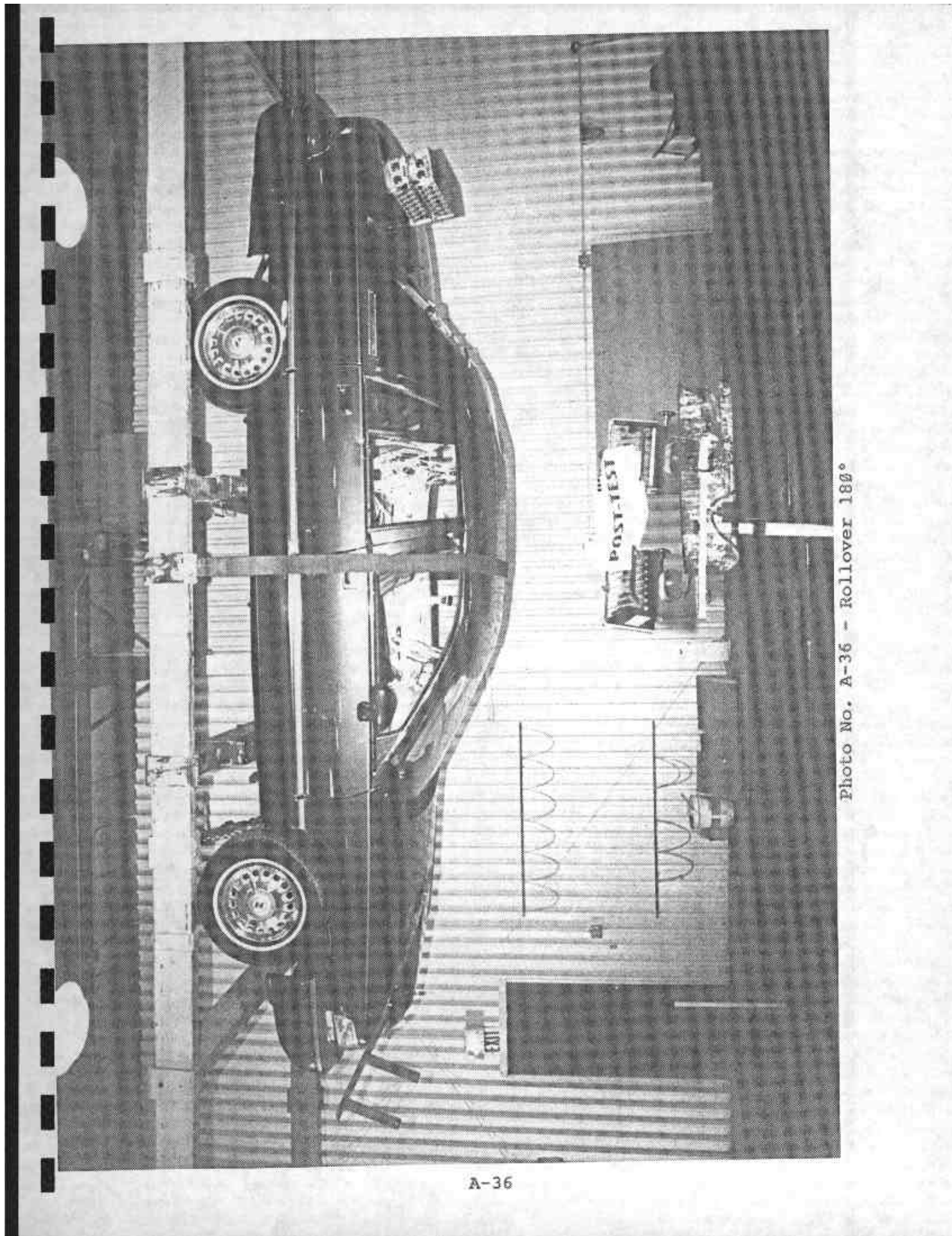


Photo No. A-36 - Rollover 180°

A-36

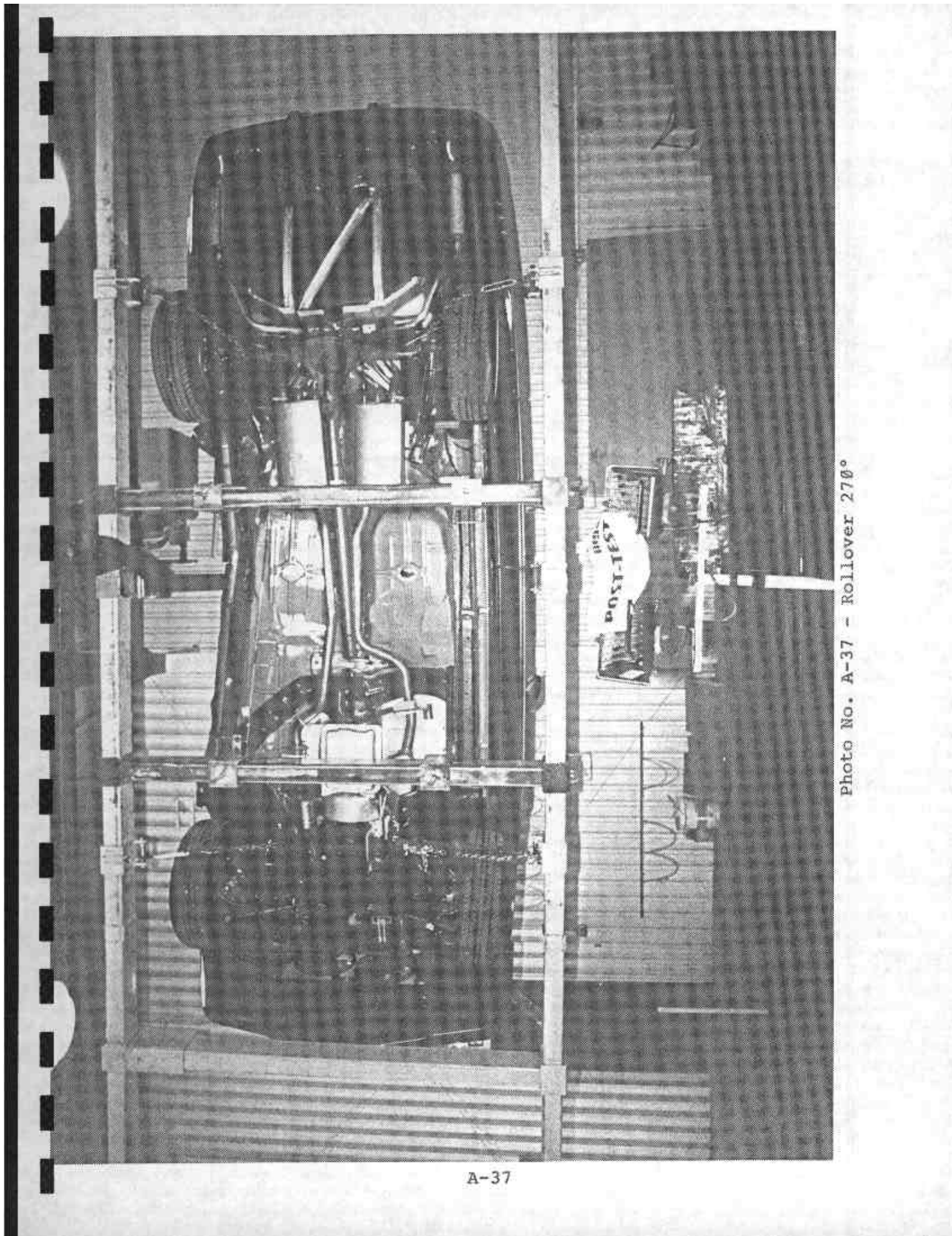
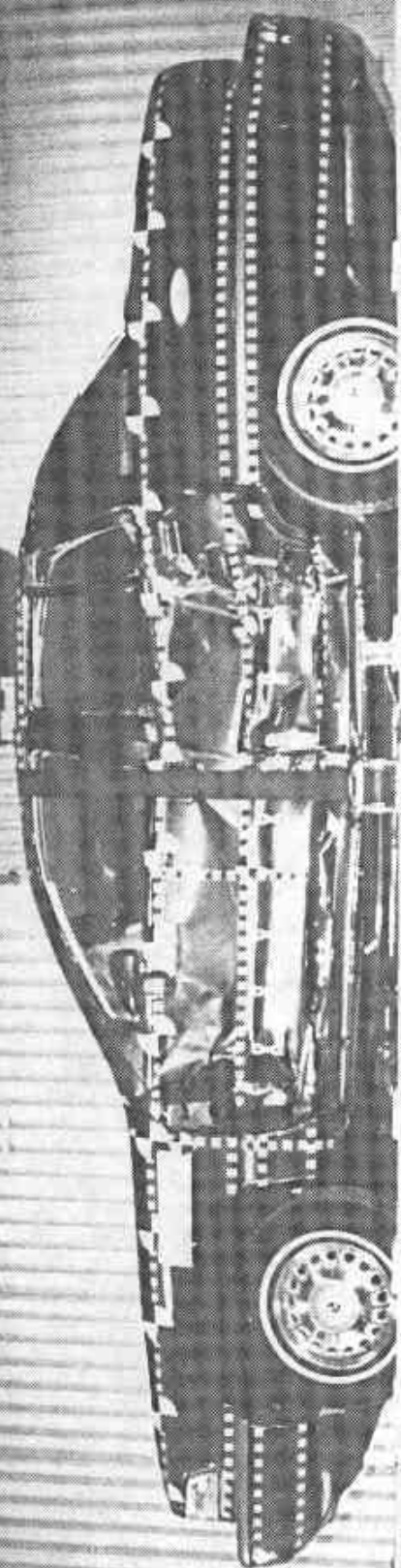


Photo No. A-37 - Rollover 270°

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Photo No. A-38 - Rollover 360°

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* No valid data collected

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Filter: Class 180 (300 Hz)

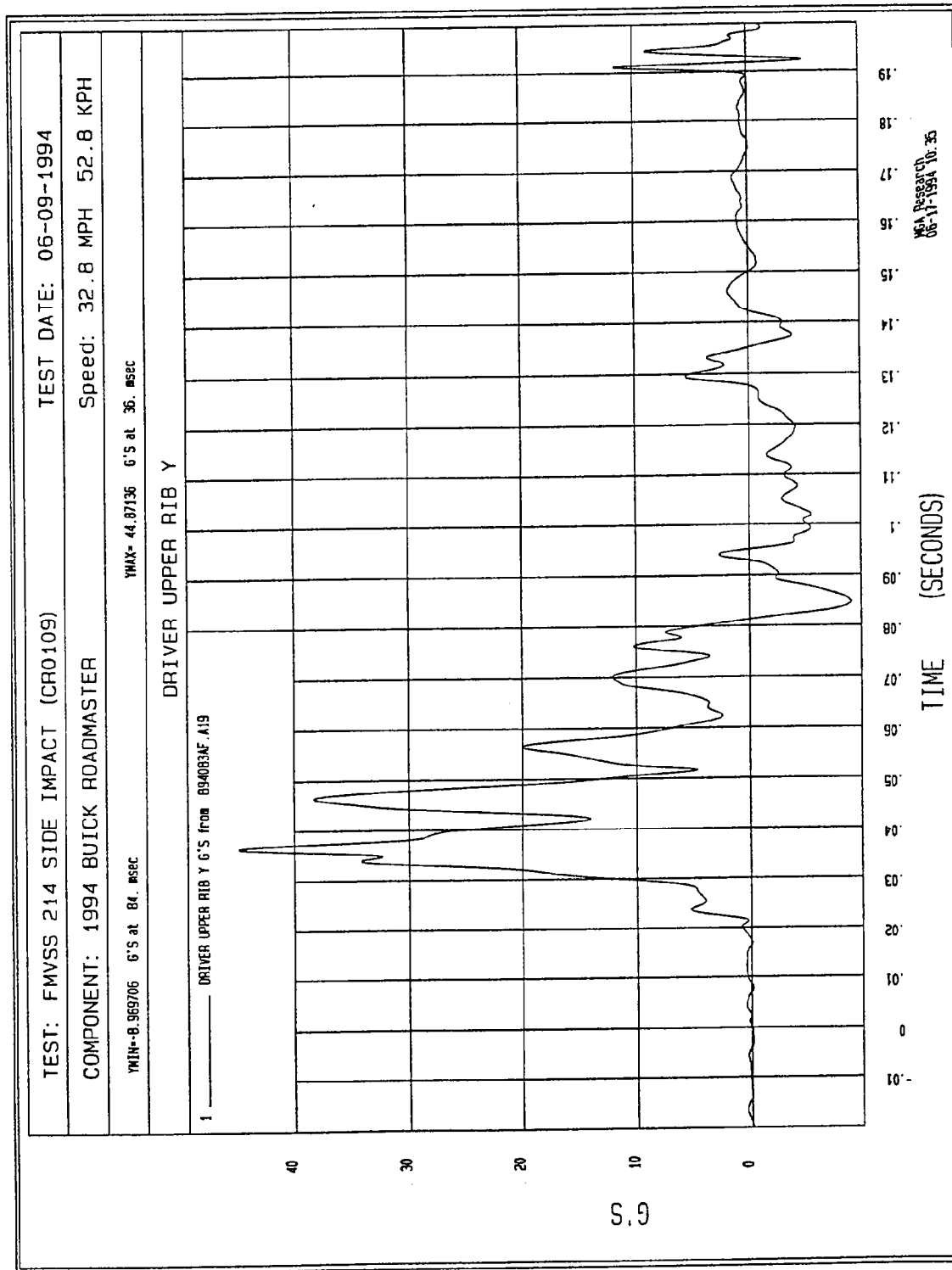


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

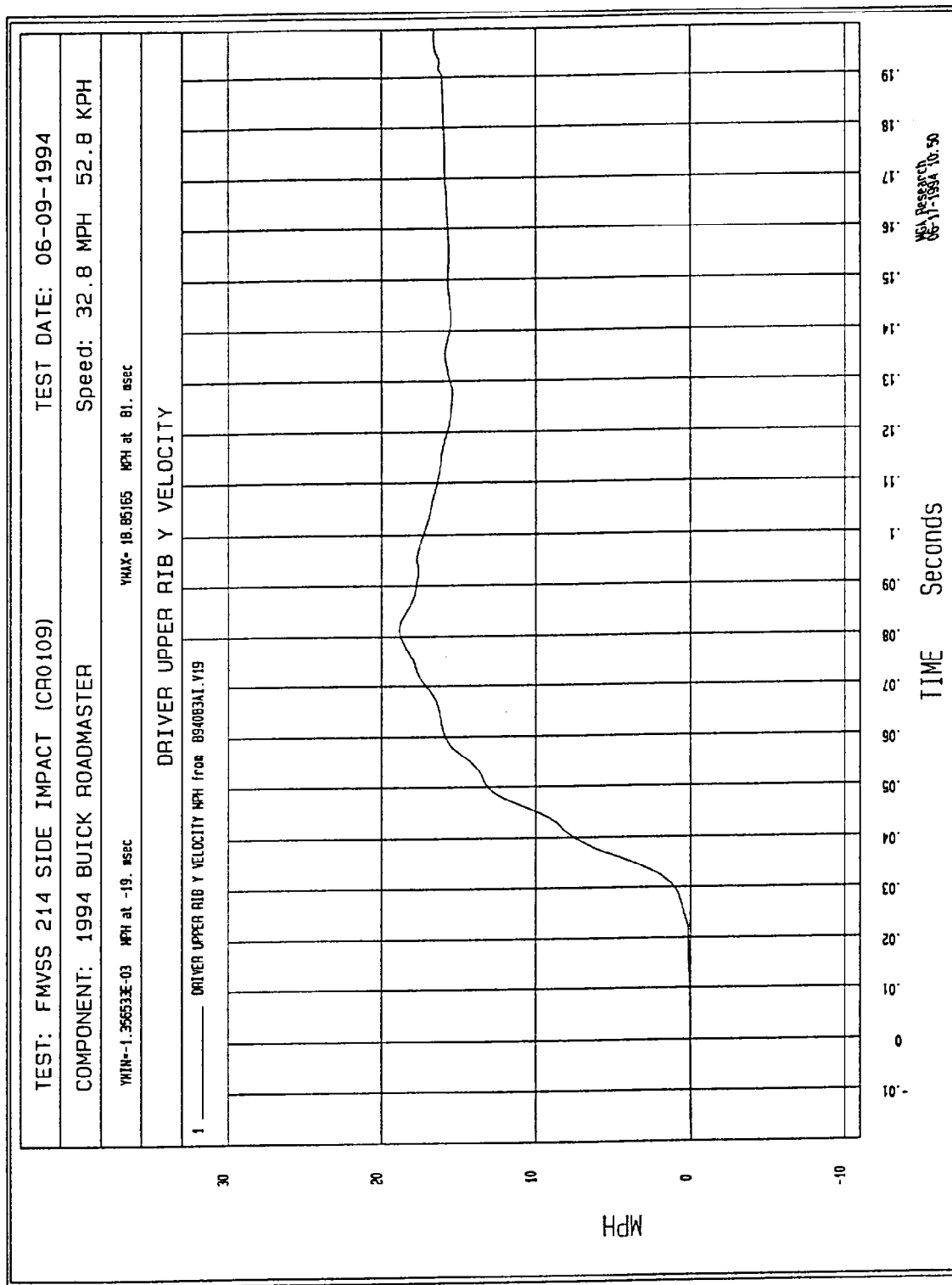


Figure B-2 - Driver Upper Rib Y Velocity vs. Time

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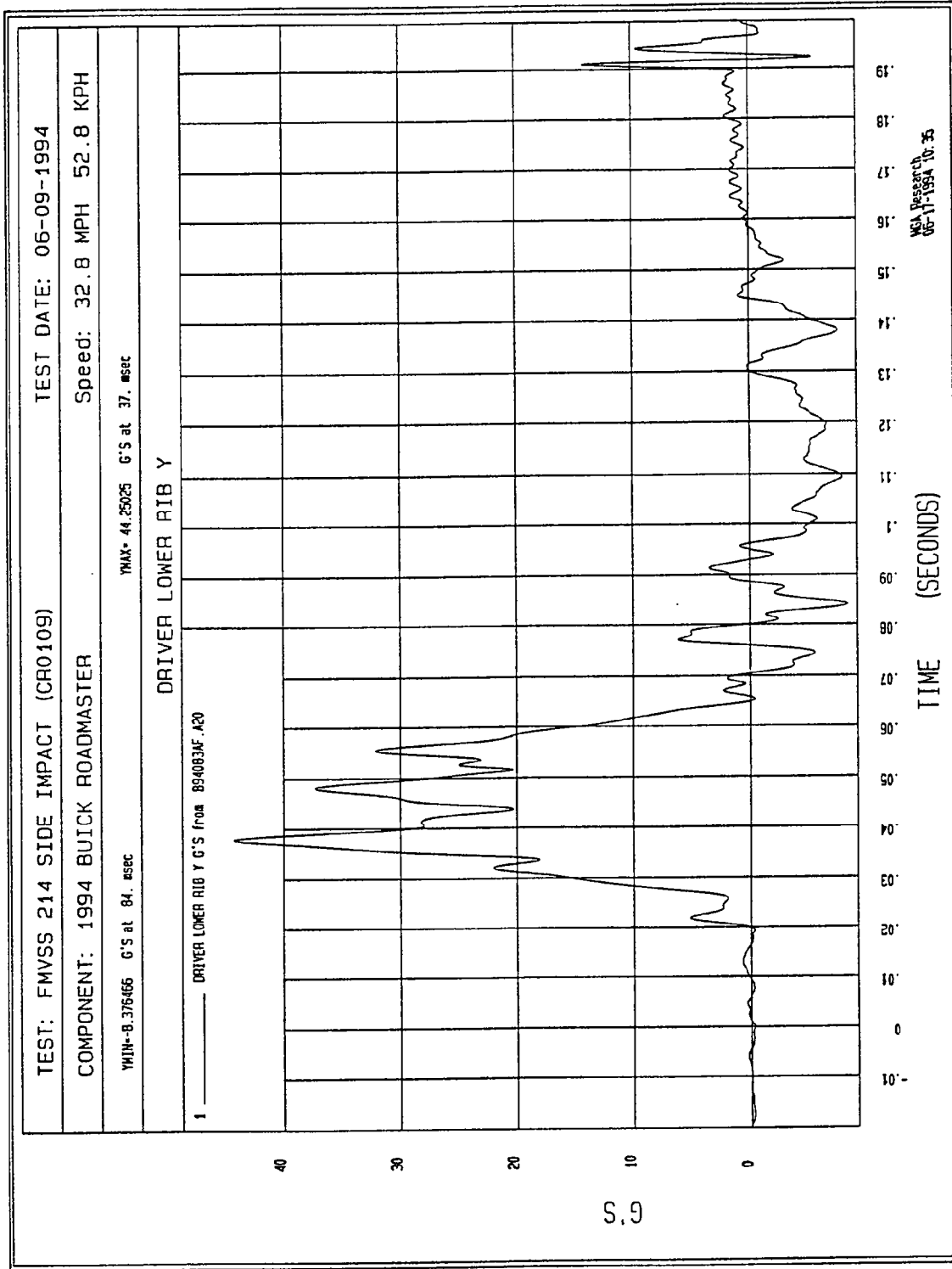


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

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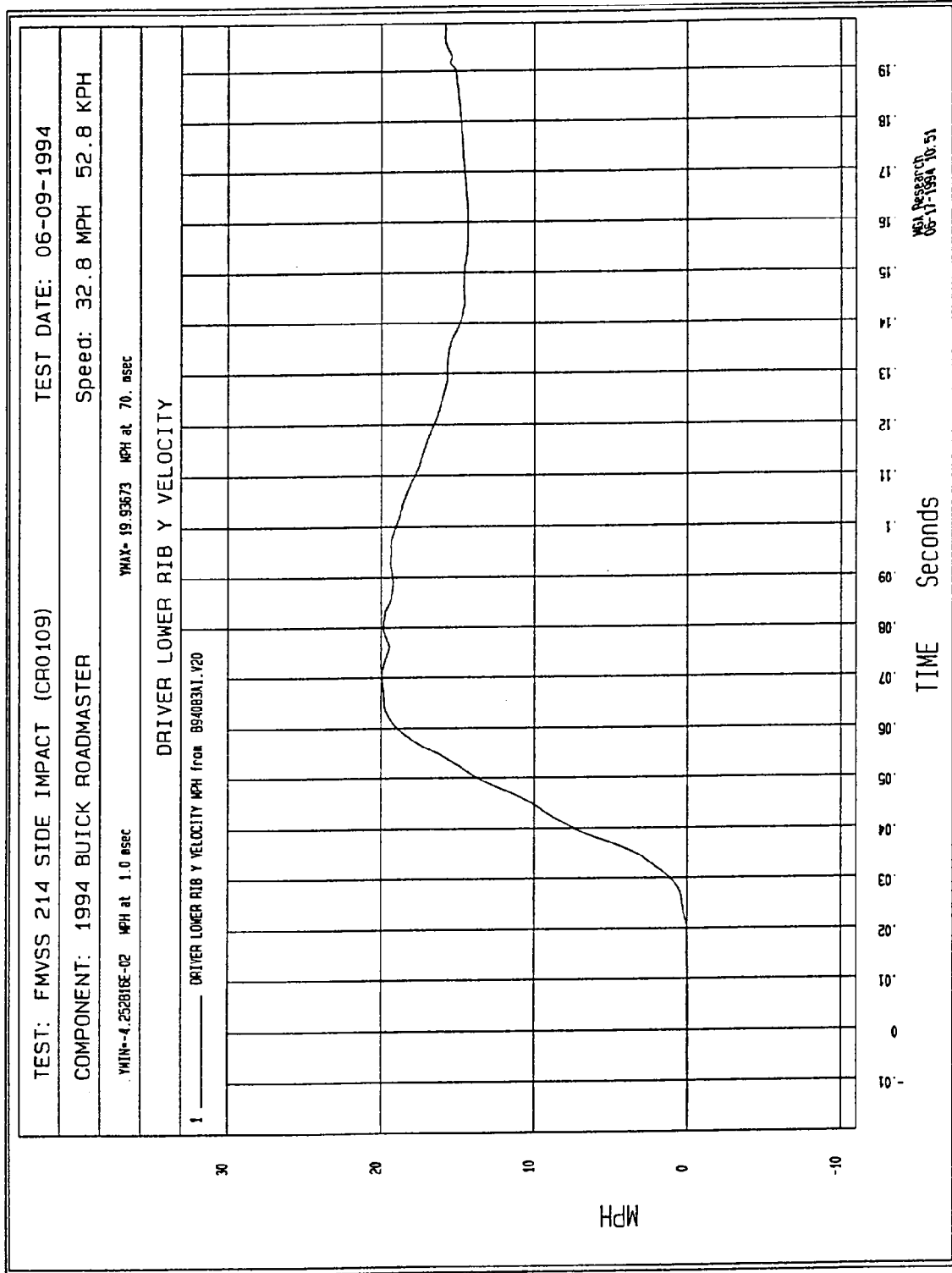


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

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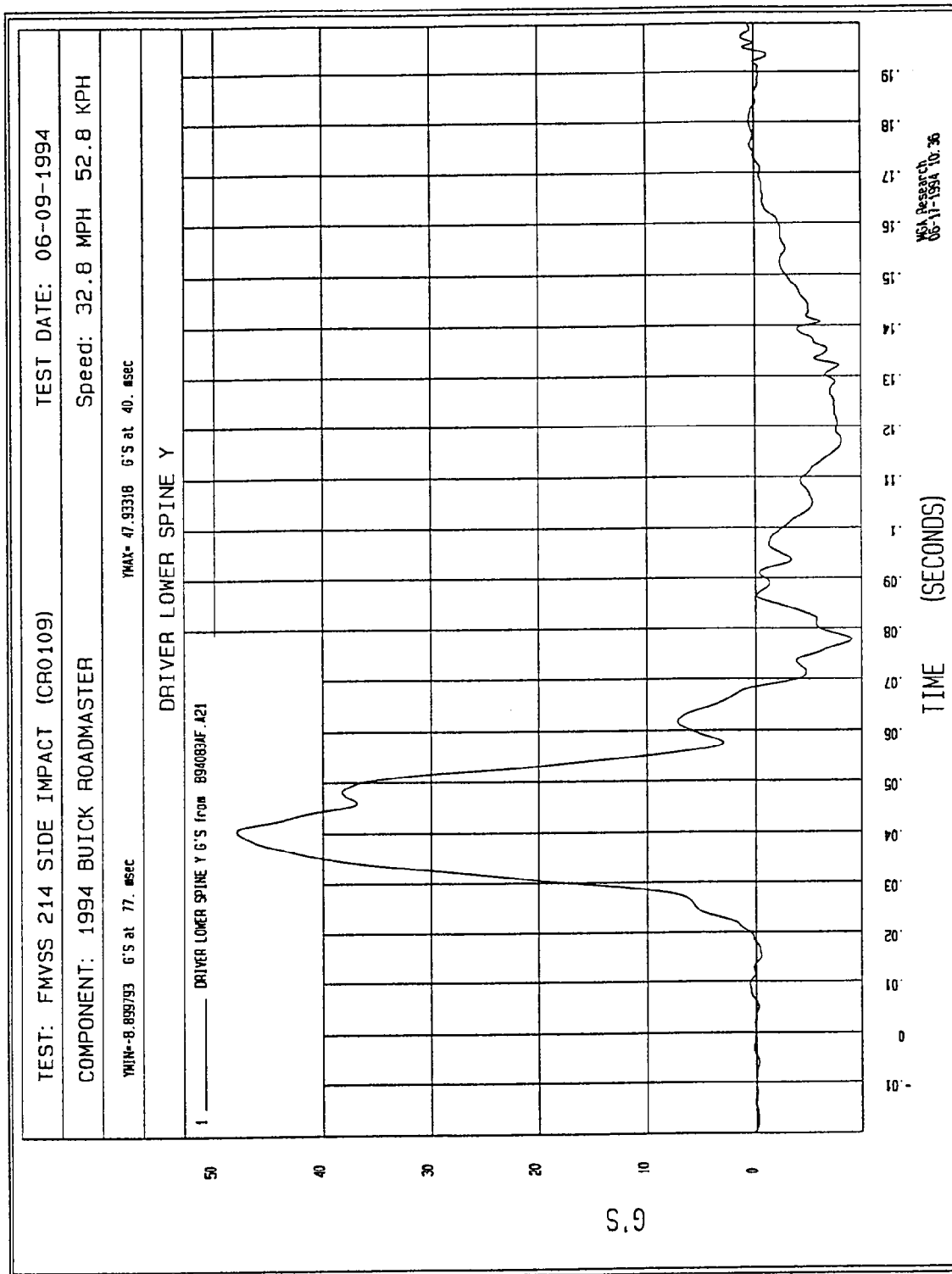


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

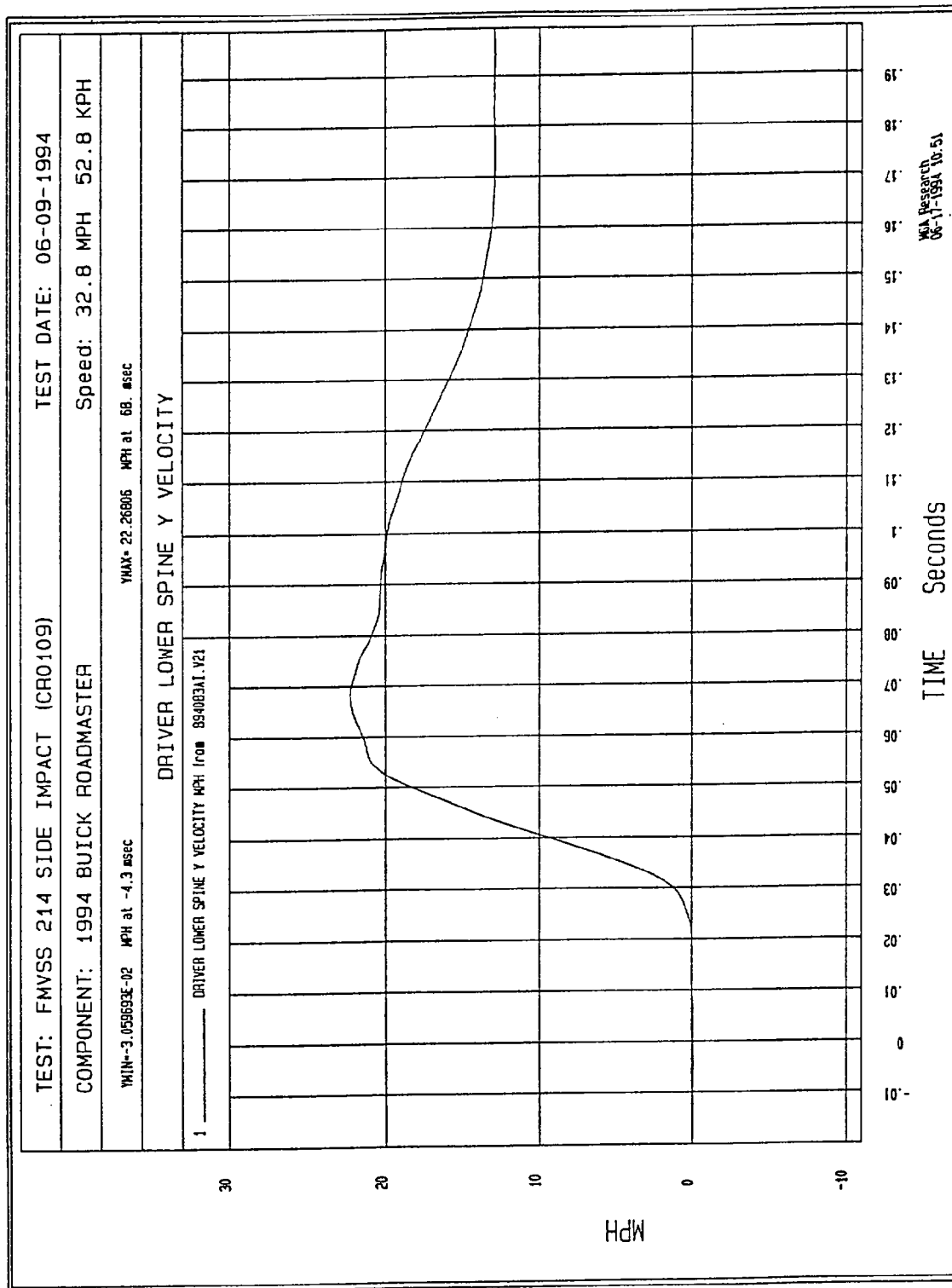


Figure B-6 - Driver Lower Spine y Velocity vs. Time

Filter: Class 180 (300 Hz)

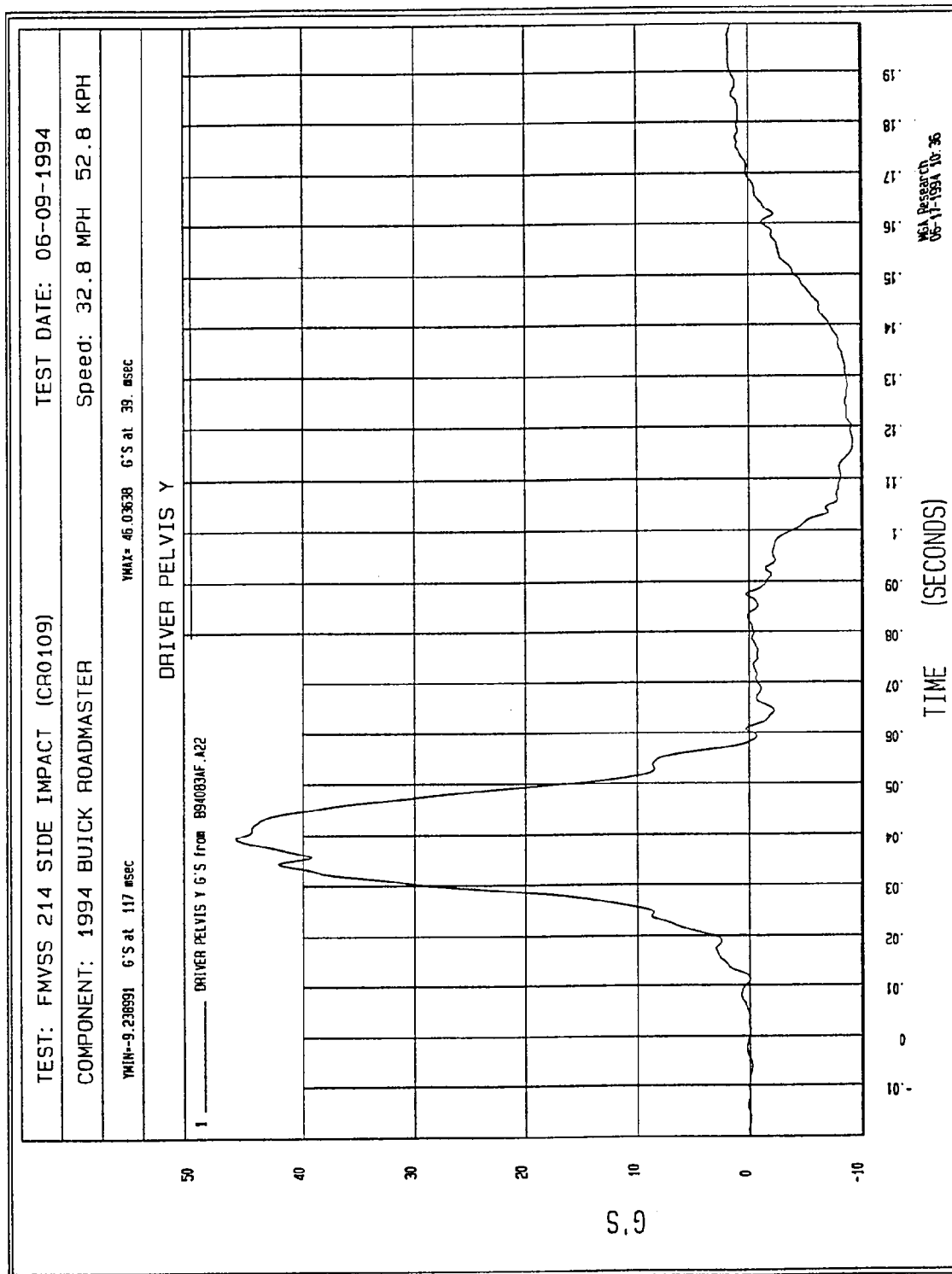


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

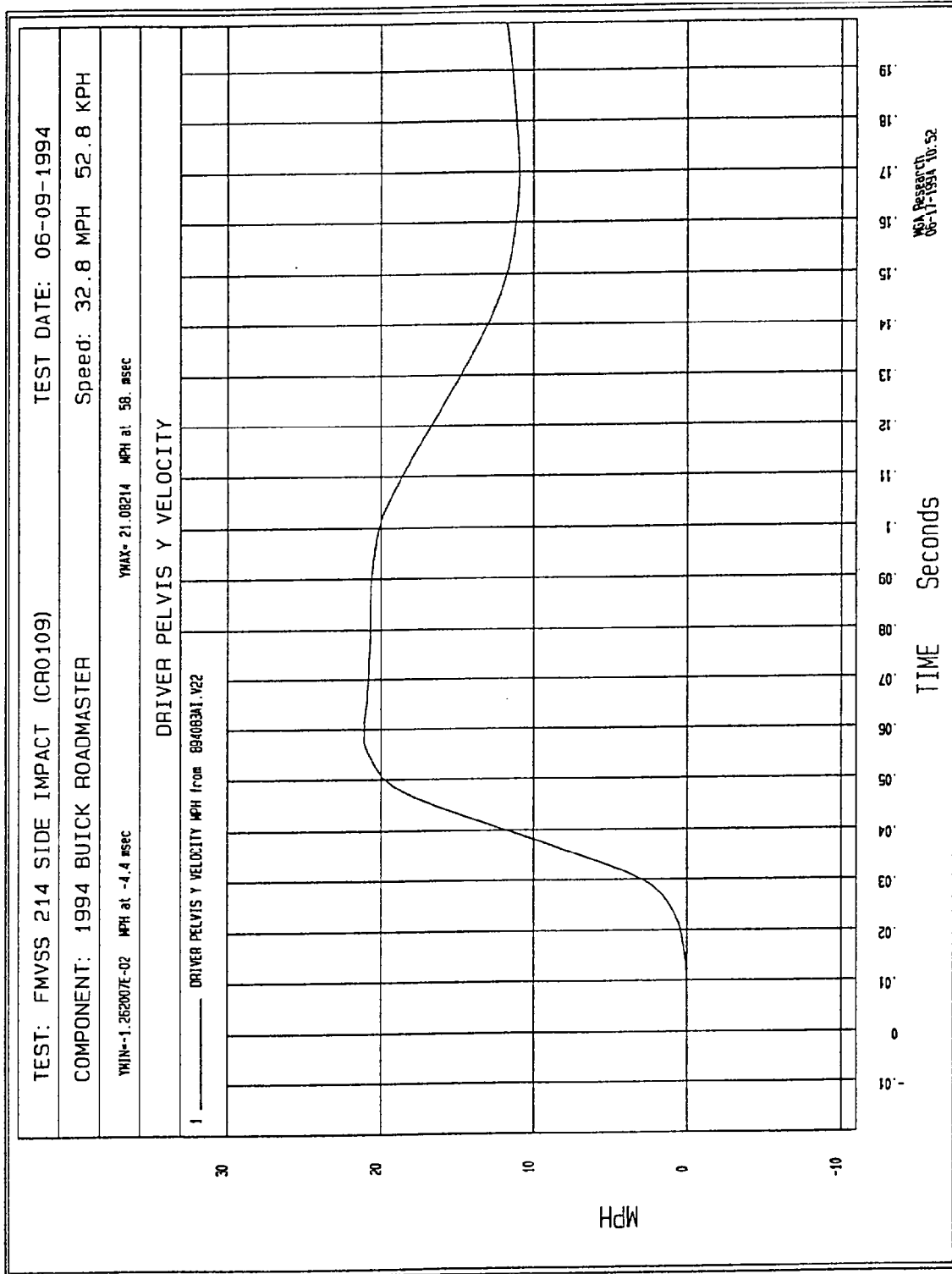


Figure B-8 - Driver Pelvis Y Velocity vs. Time

Filter: Class 180 (300 Hz)

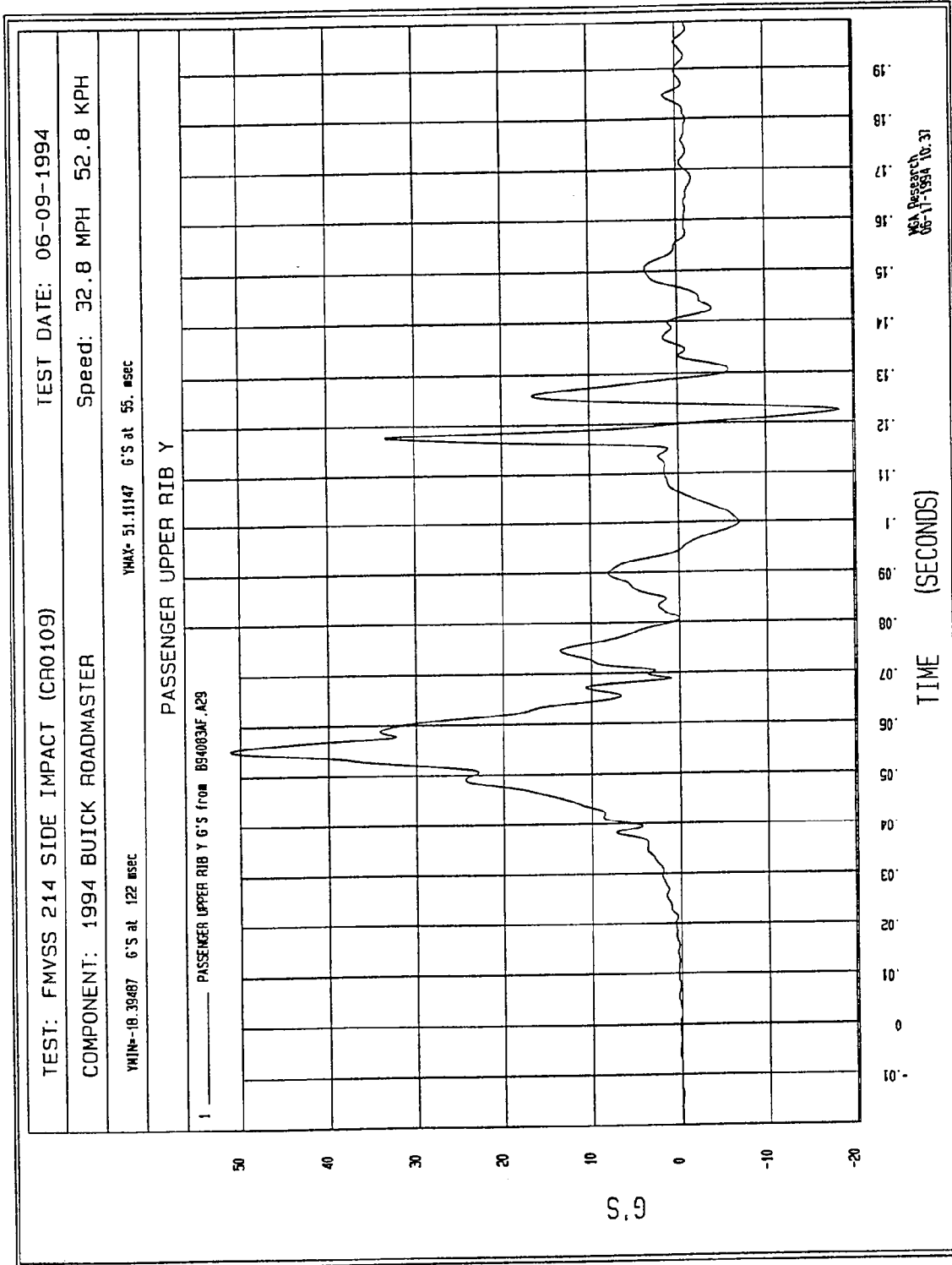


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

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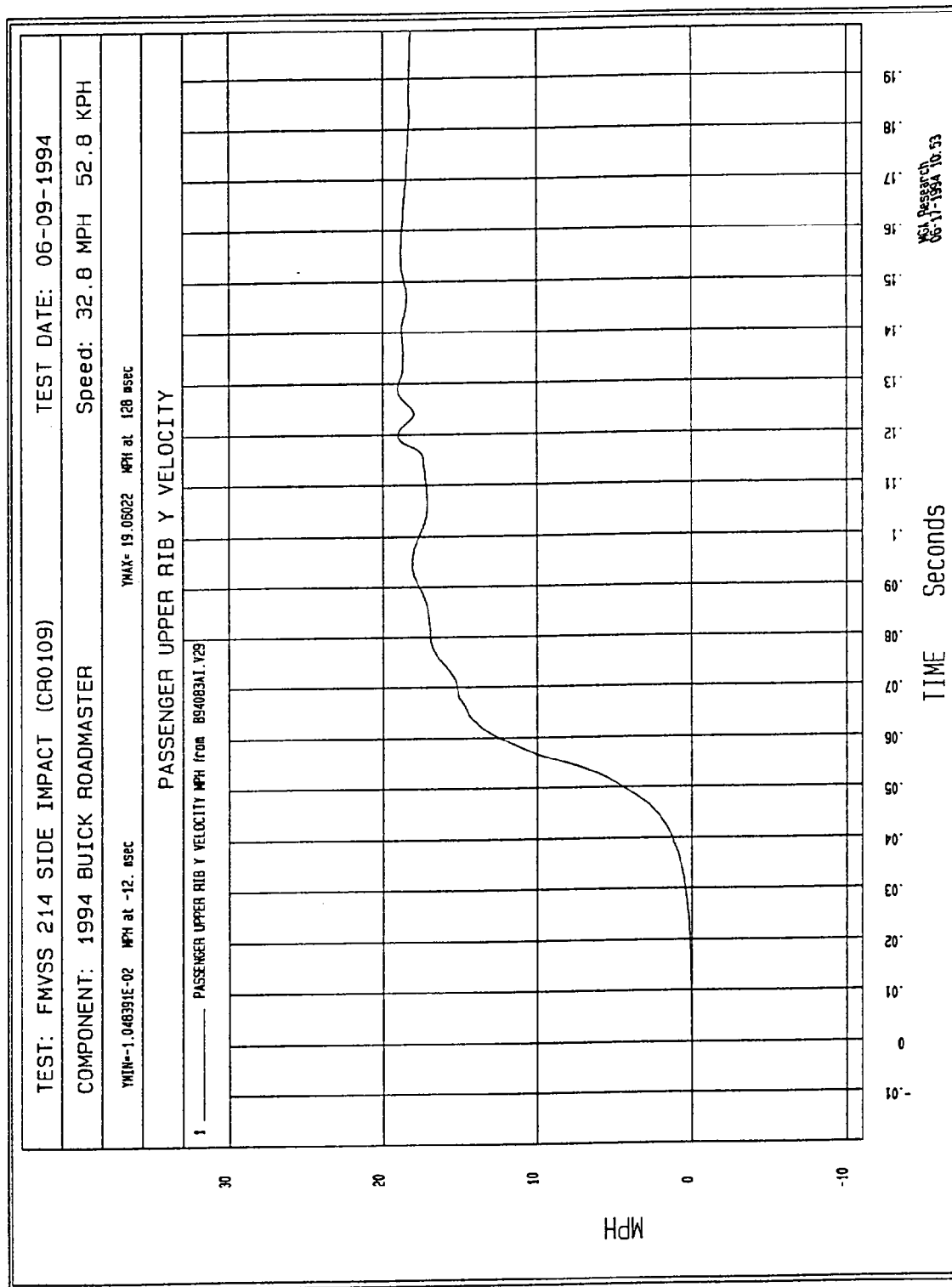


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

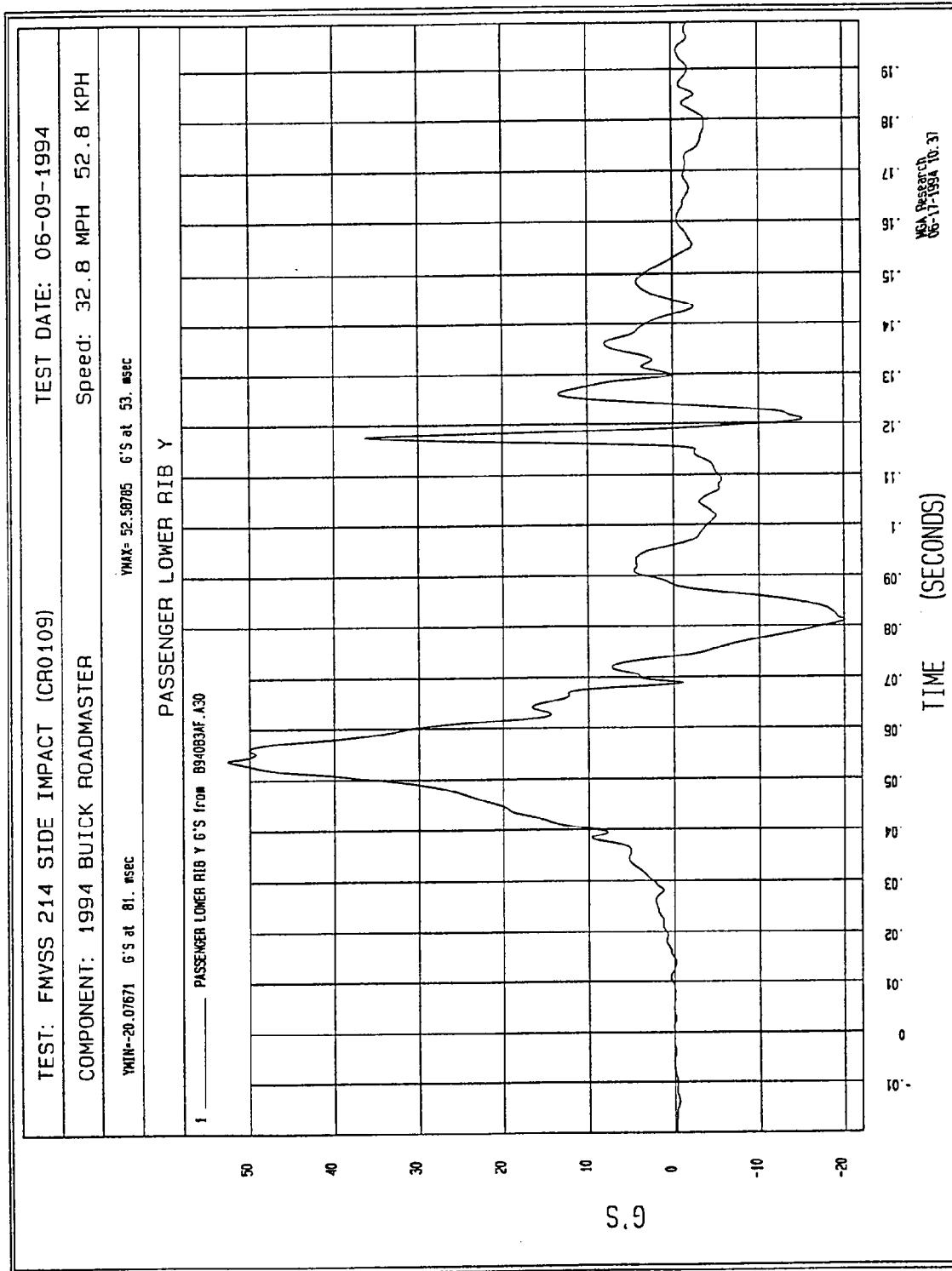
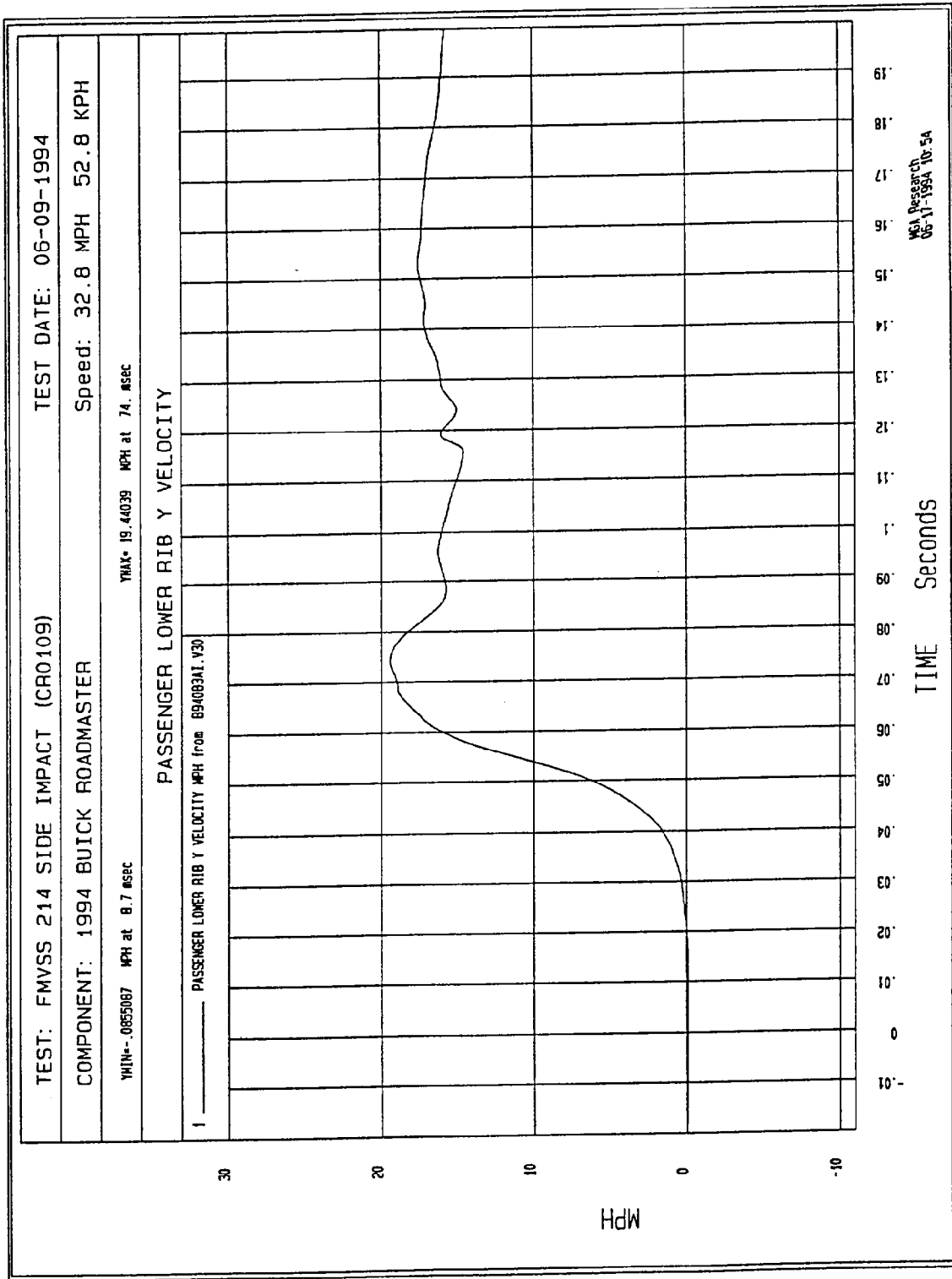


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



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

Filter: Class 180 (300 Hz)

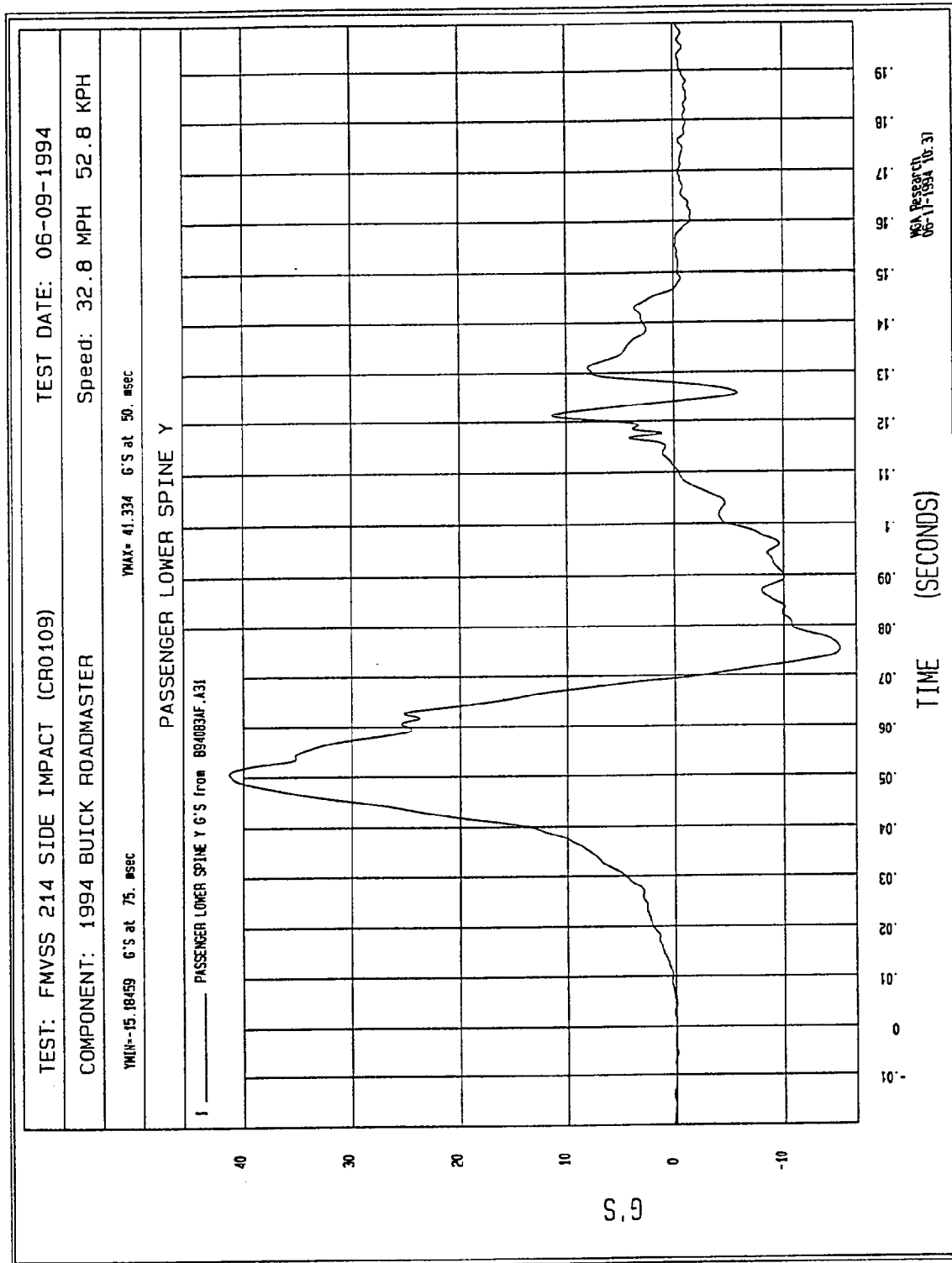


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

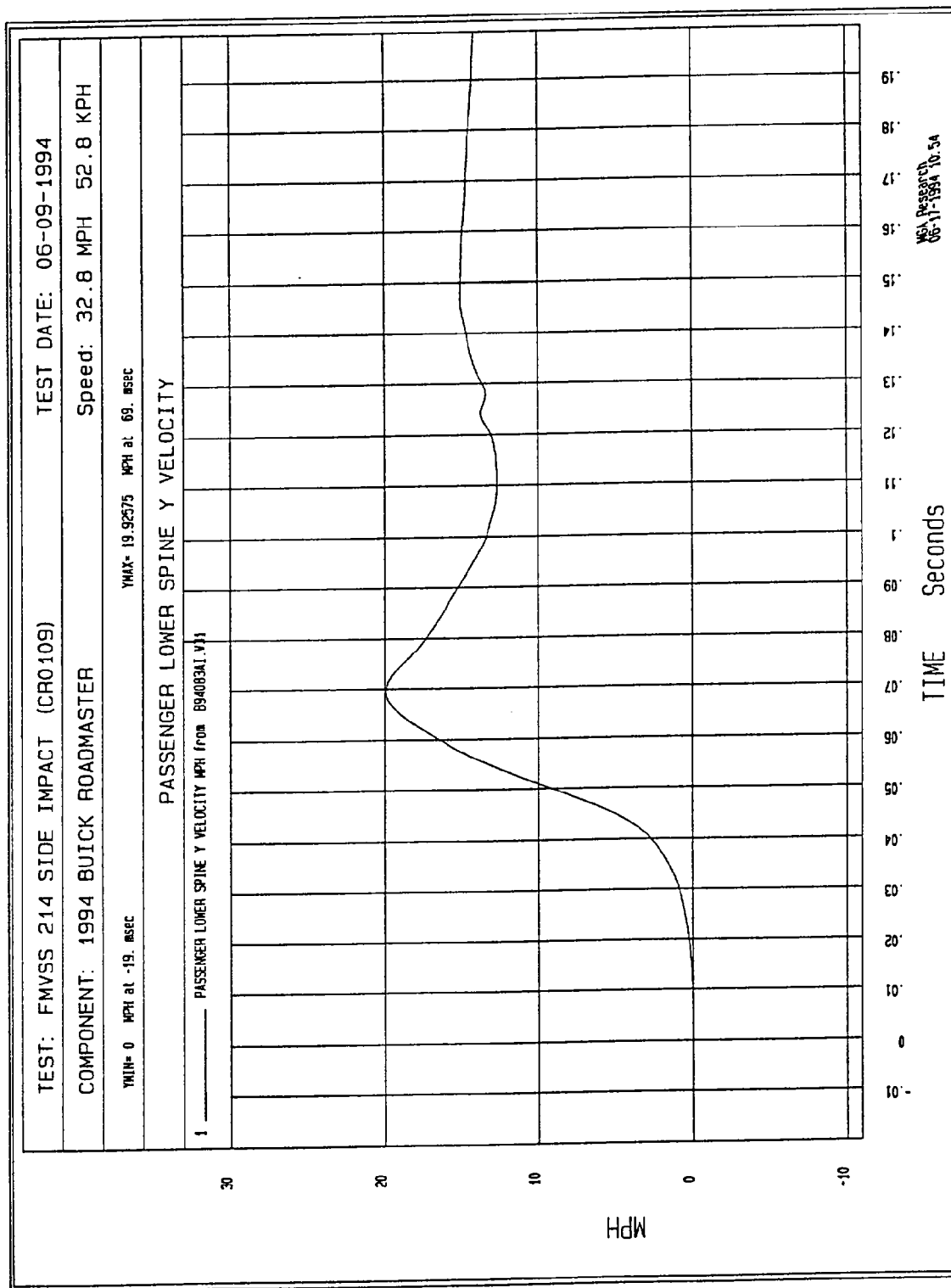


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

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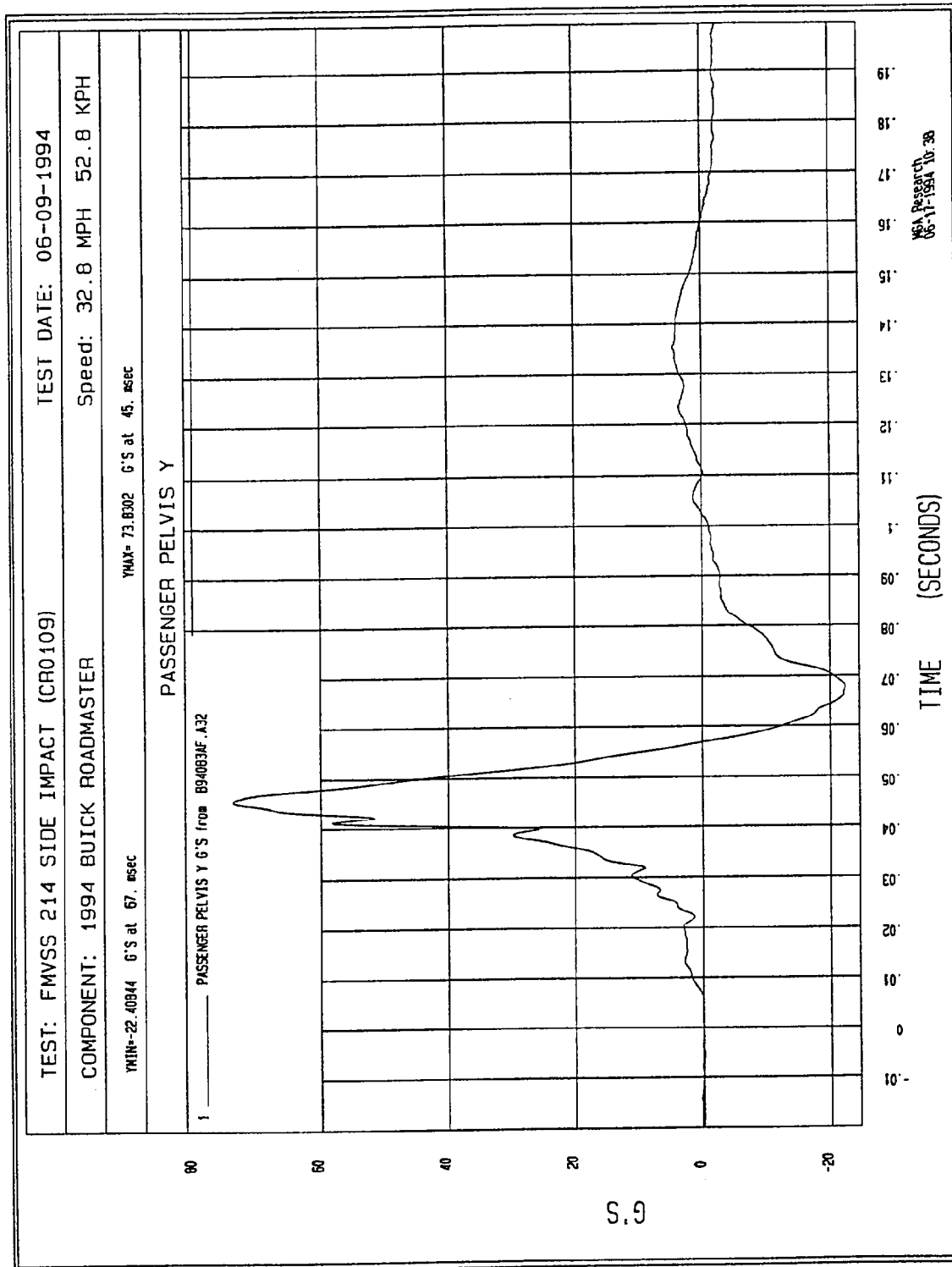


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

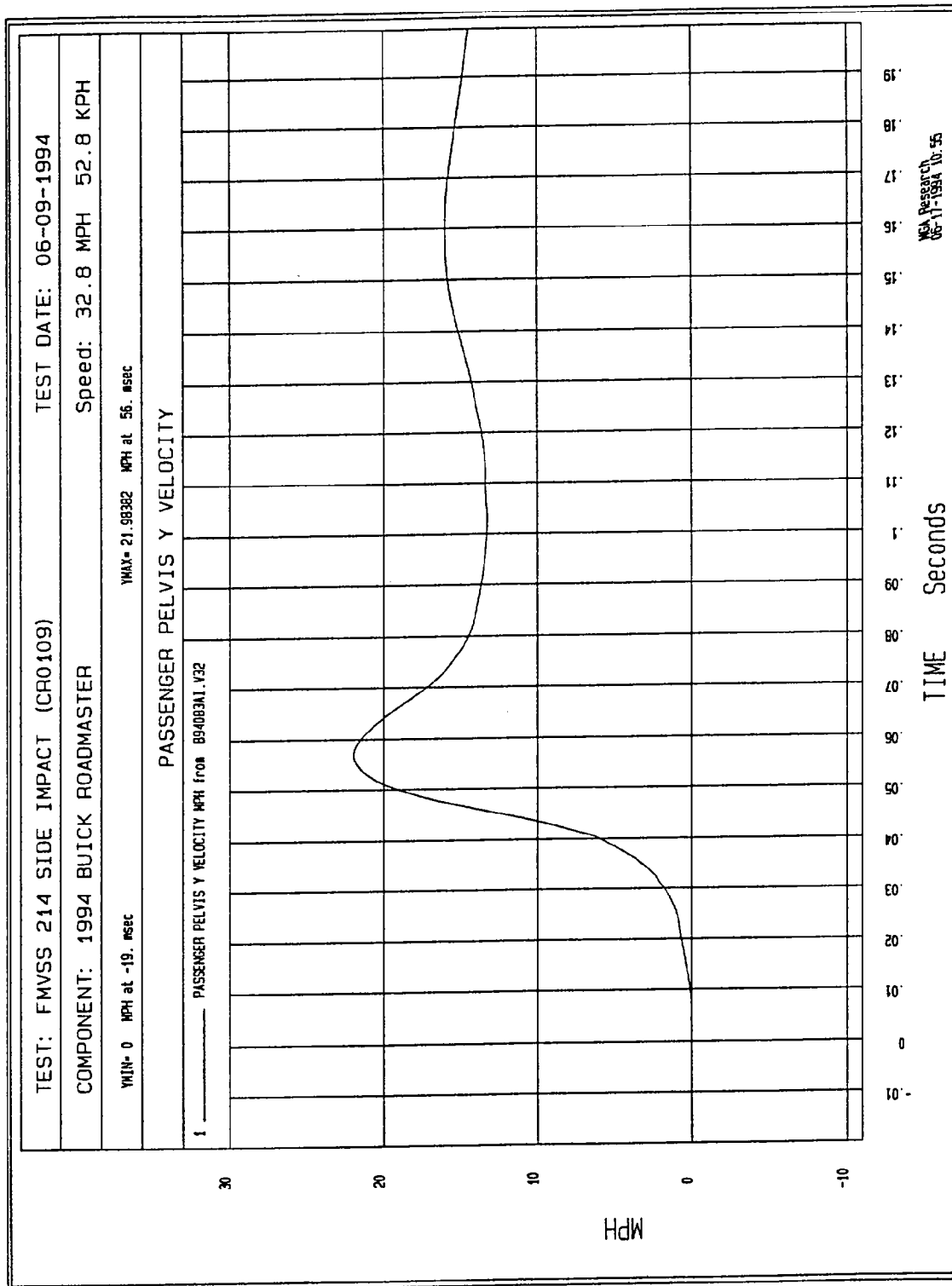


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

Filter: Class 60 (100 Hz)

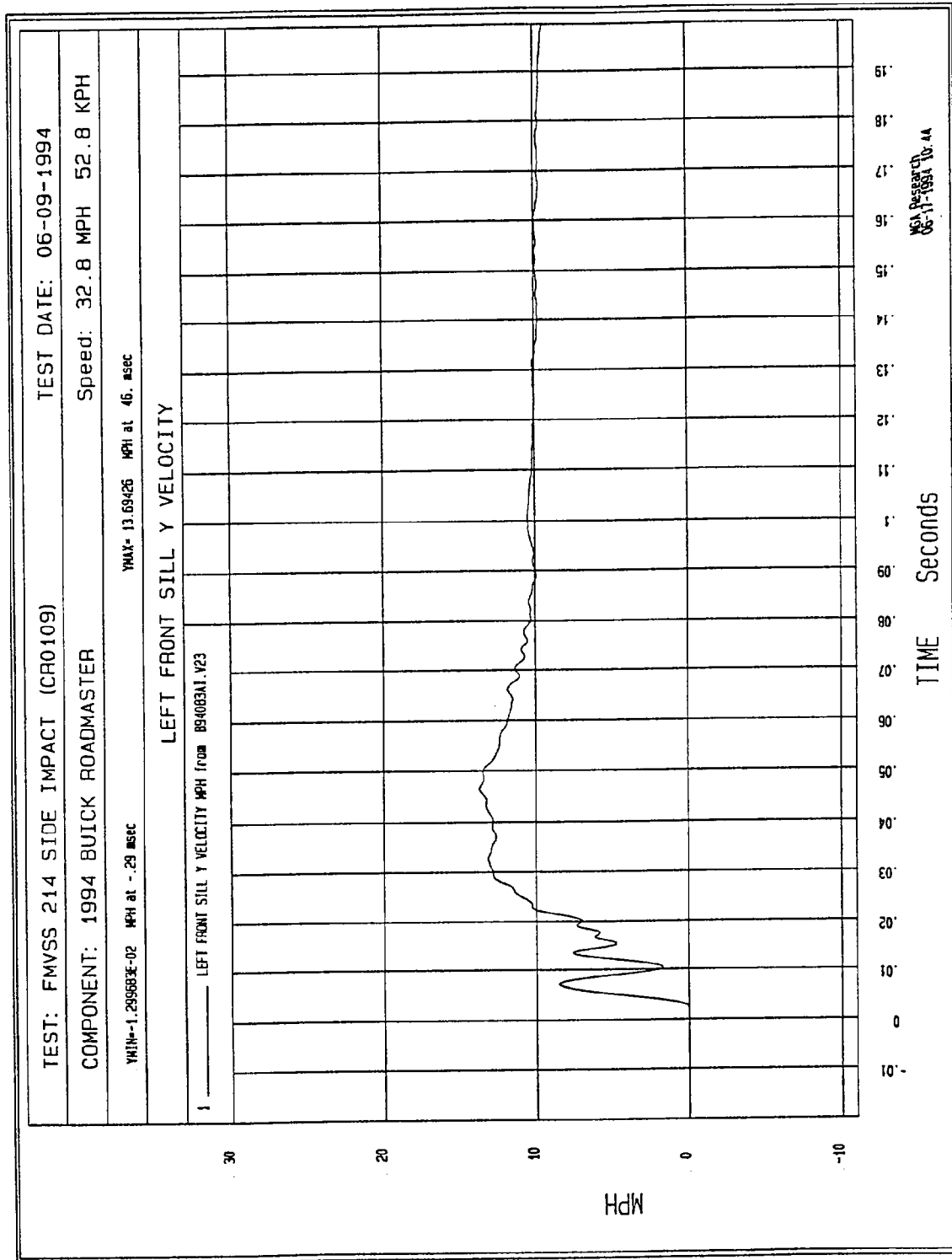


Figure B-17 - Left Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

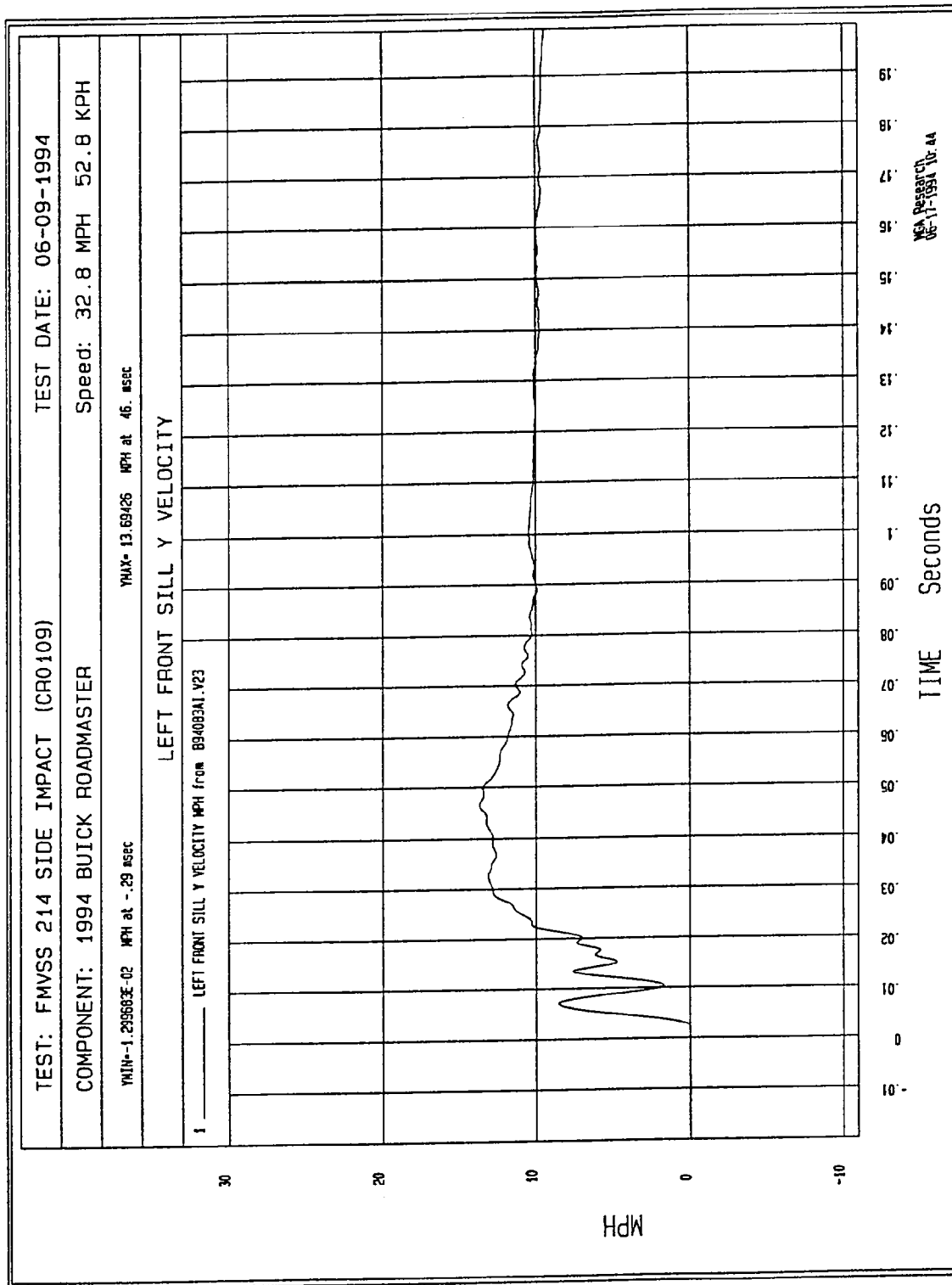


Figure B-18 - Left Front Sill Y Velocity vs. Time

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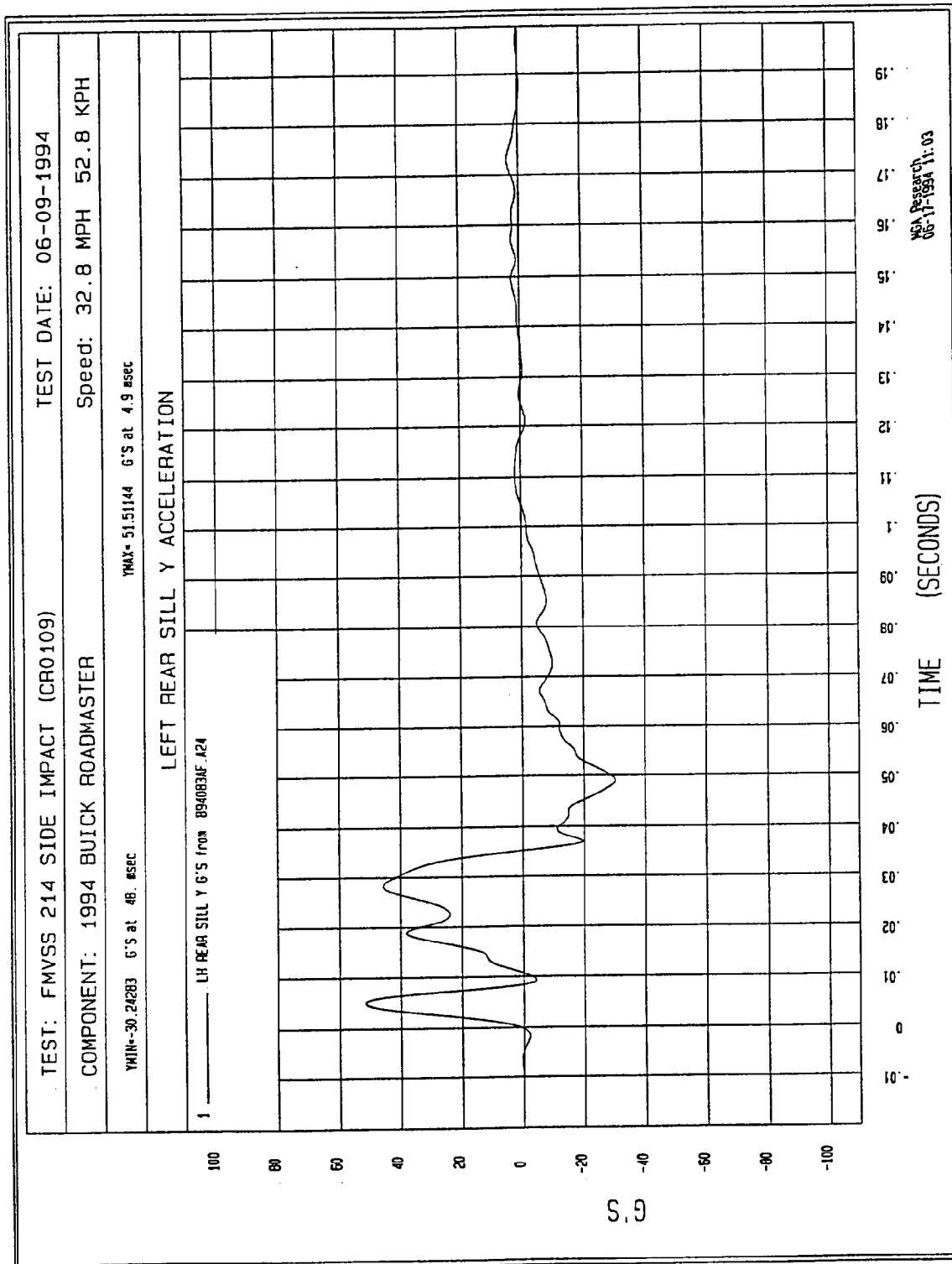


Figure B-19 - Left Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

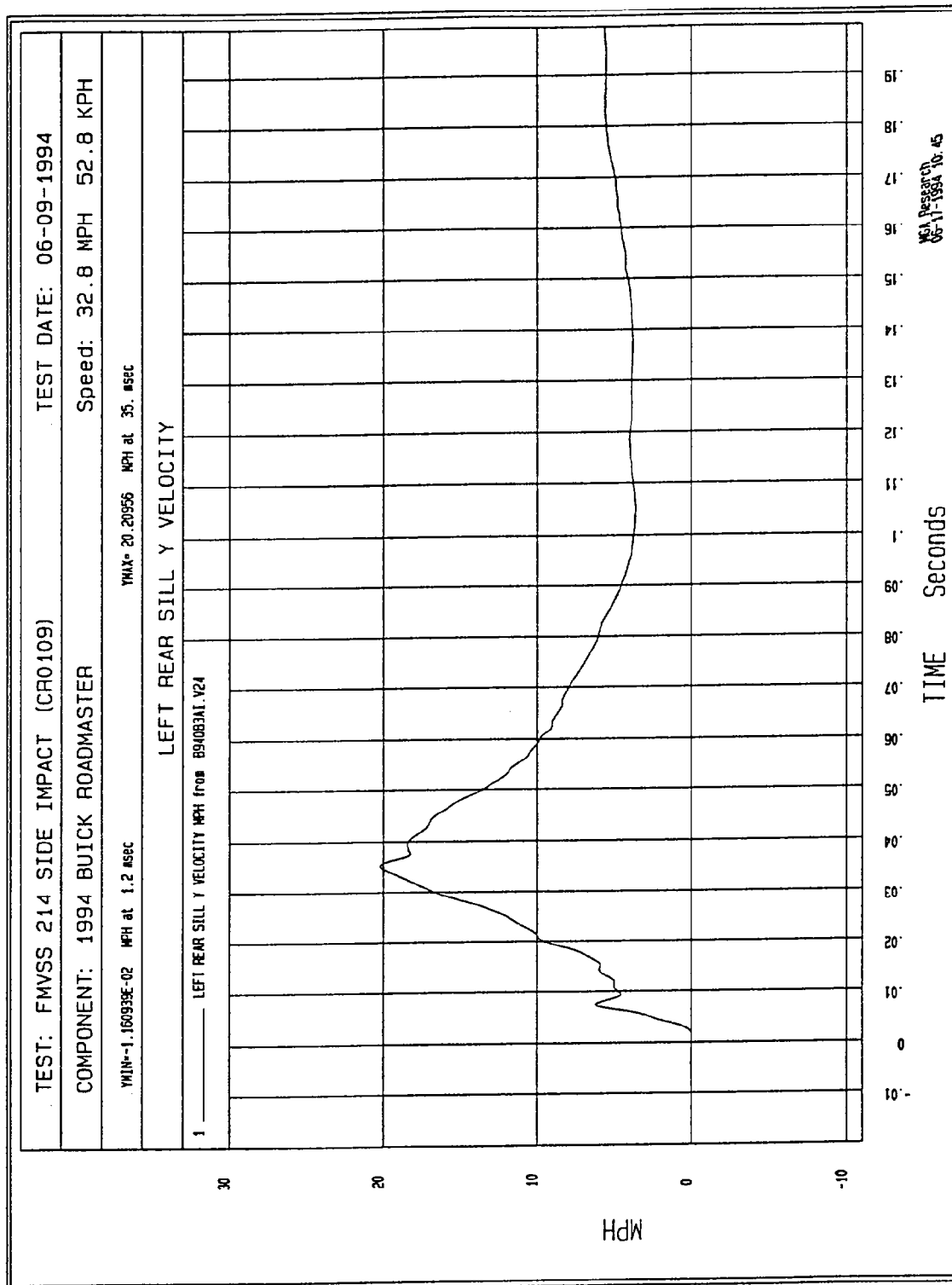


Figure B-20 - Left Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

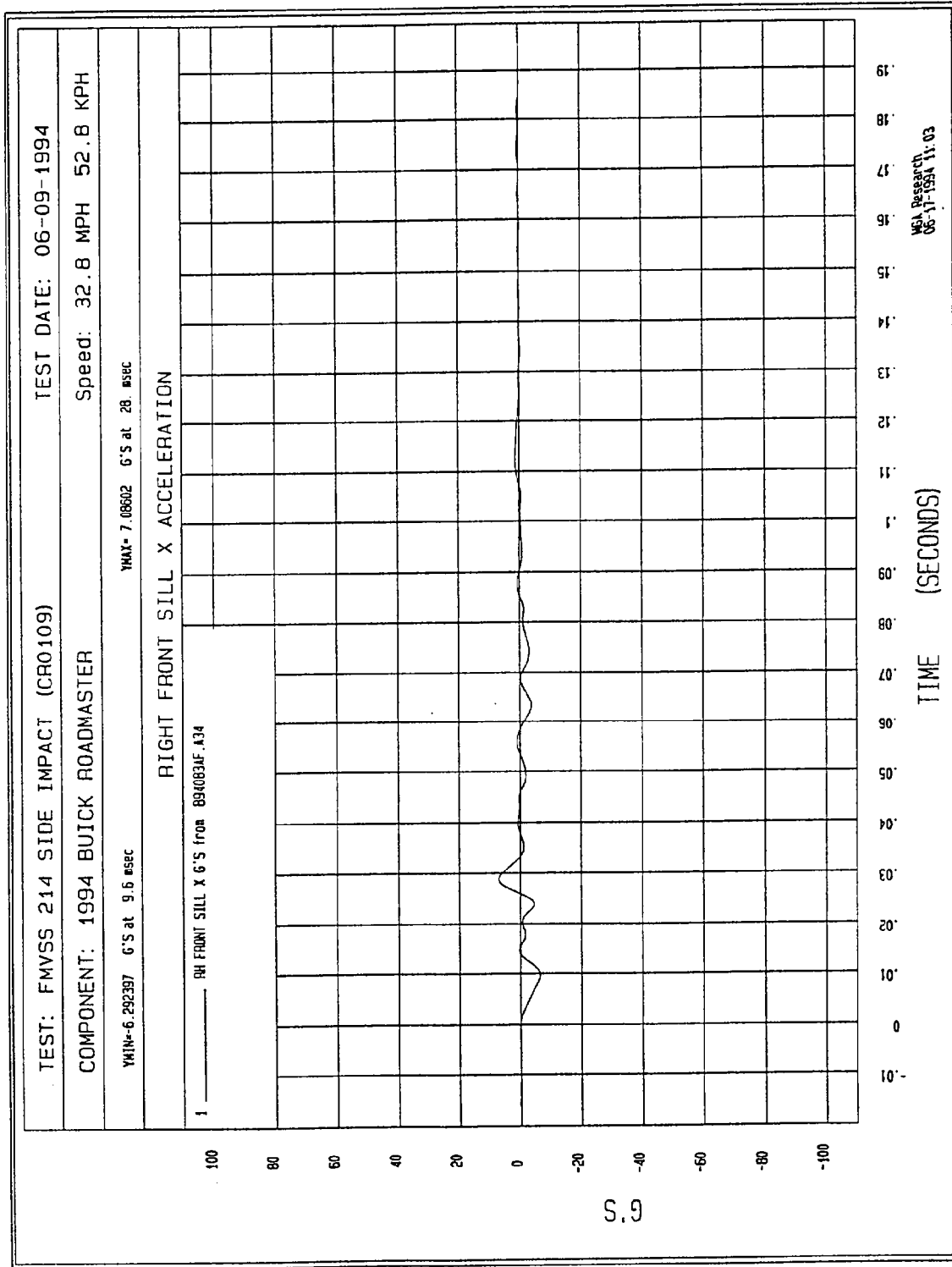


Figure B-21 - Right Front Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

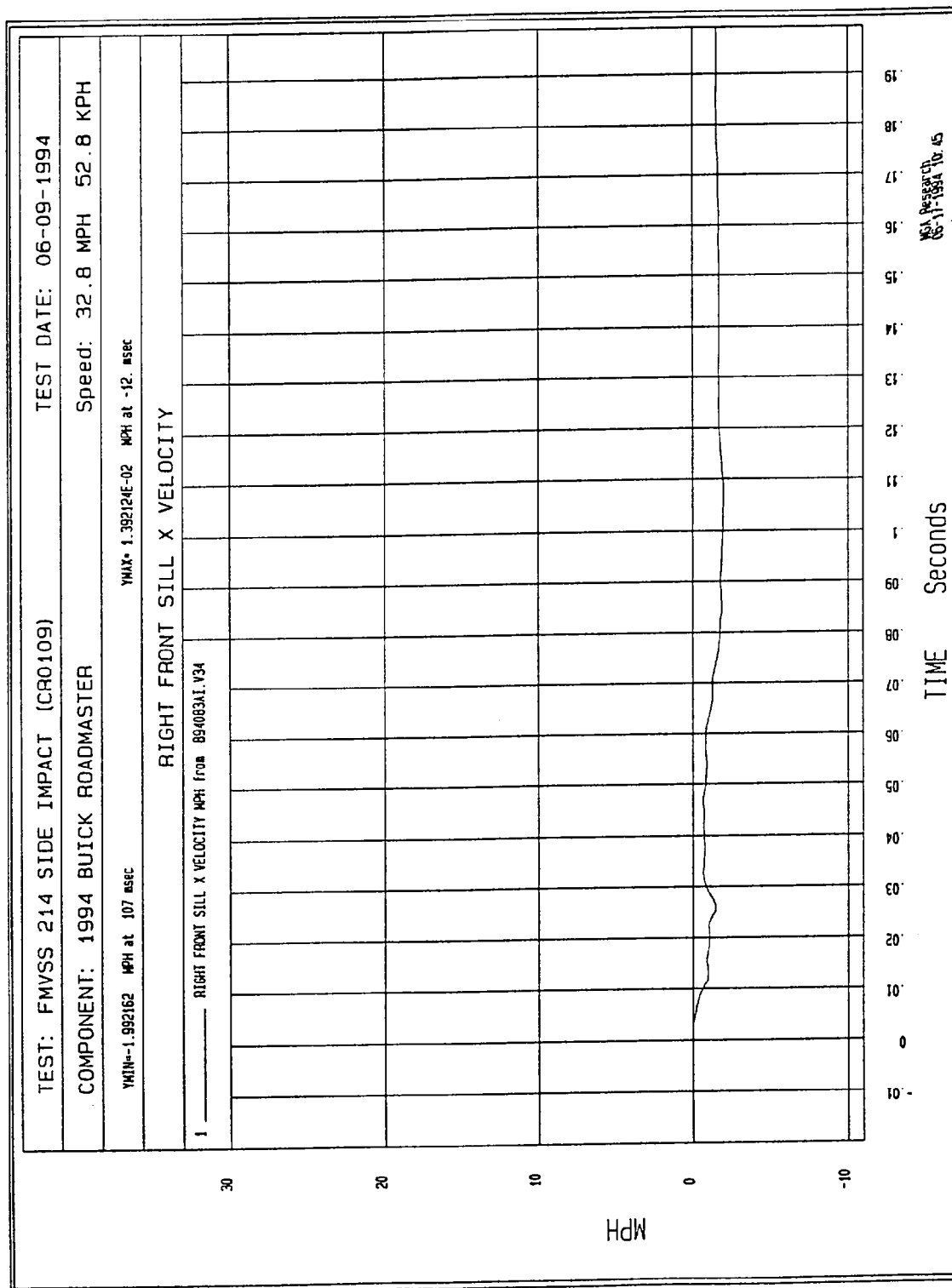


Figure B-22 - Right Front Sill X Velocity vs. Time

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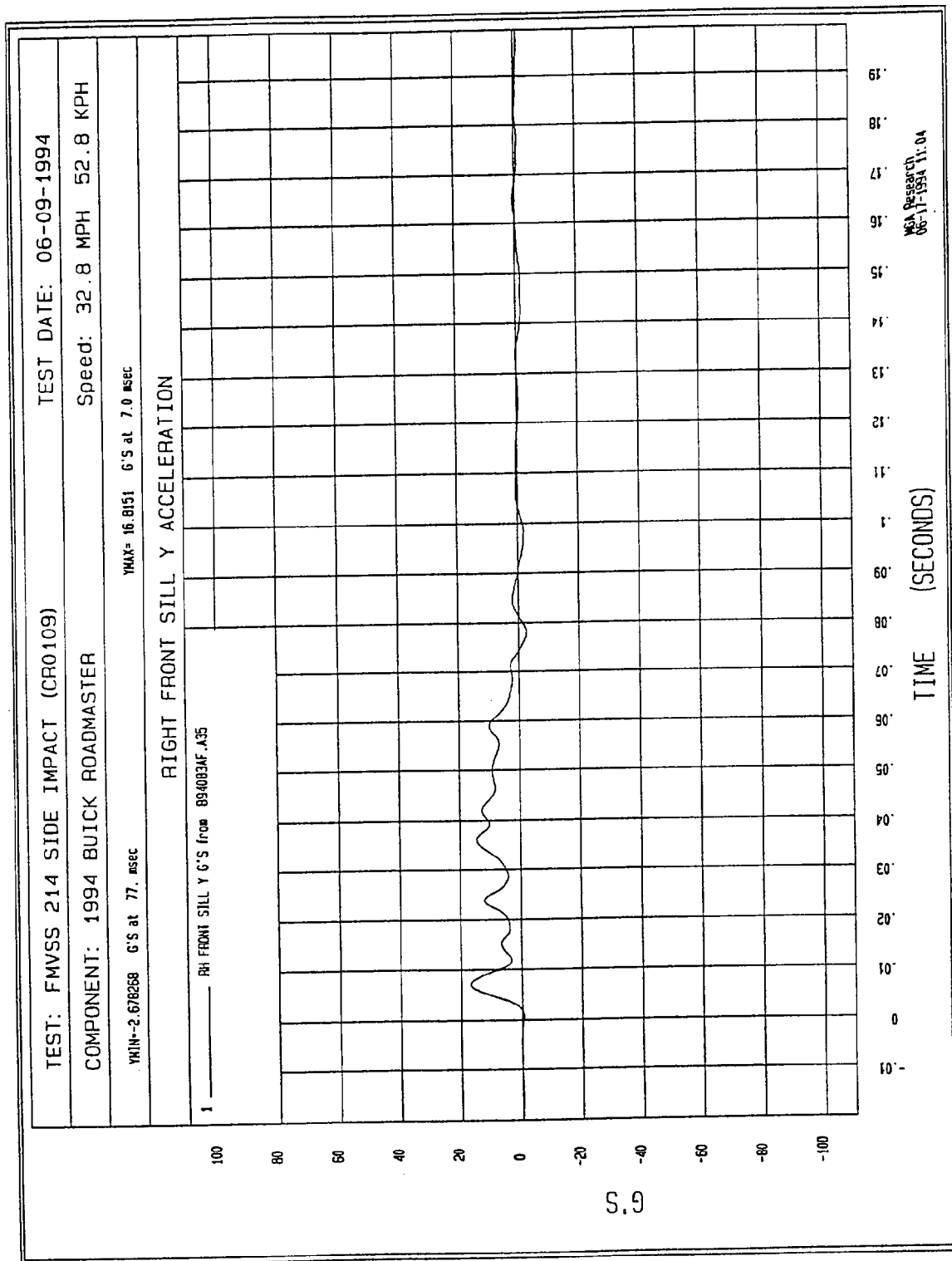


Figure B-23 - Right Front Sill Y Acceleration vs. Time

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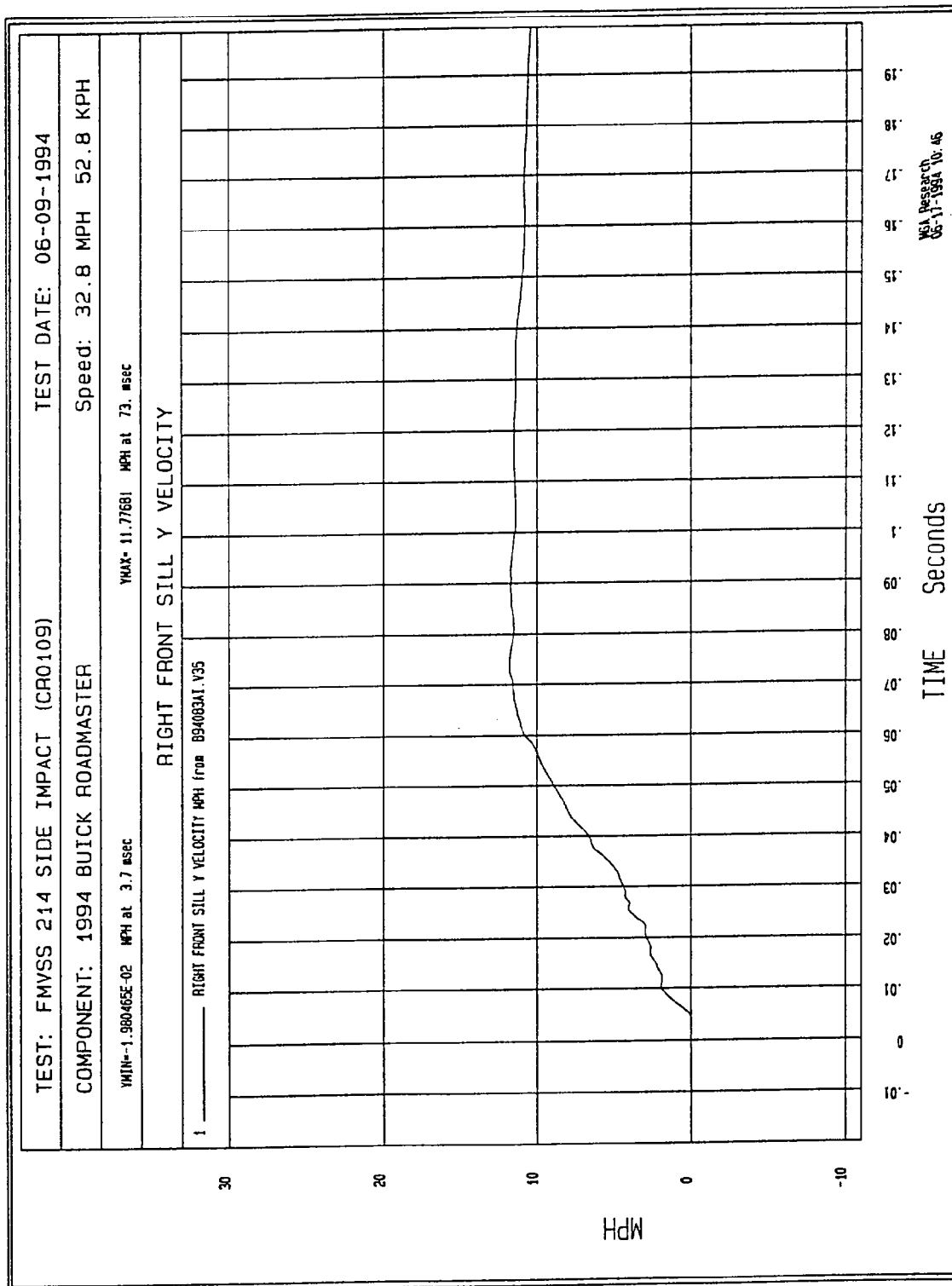


Figure B-24 - Right Front Sill Y Velocity vs. Time

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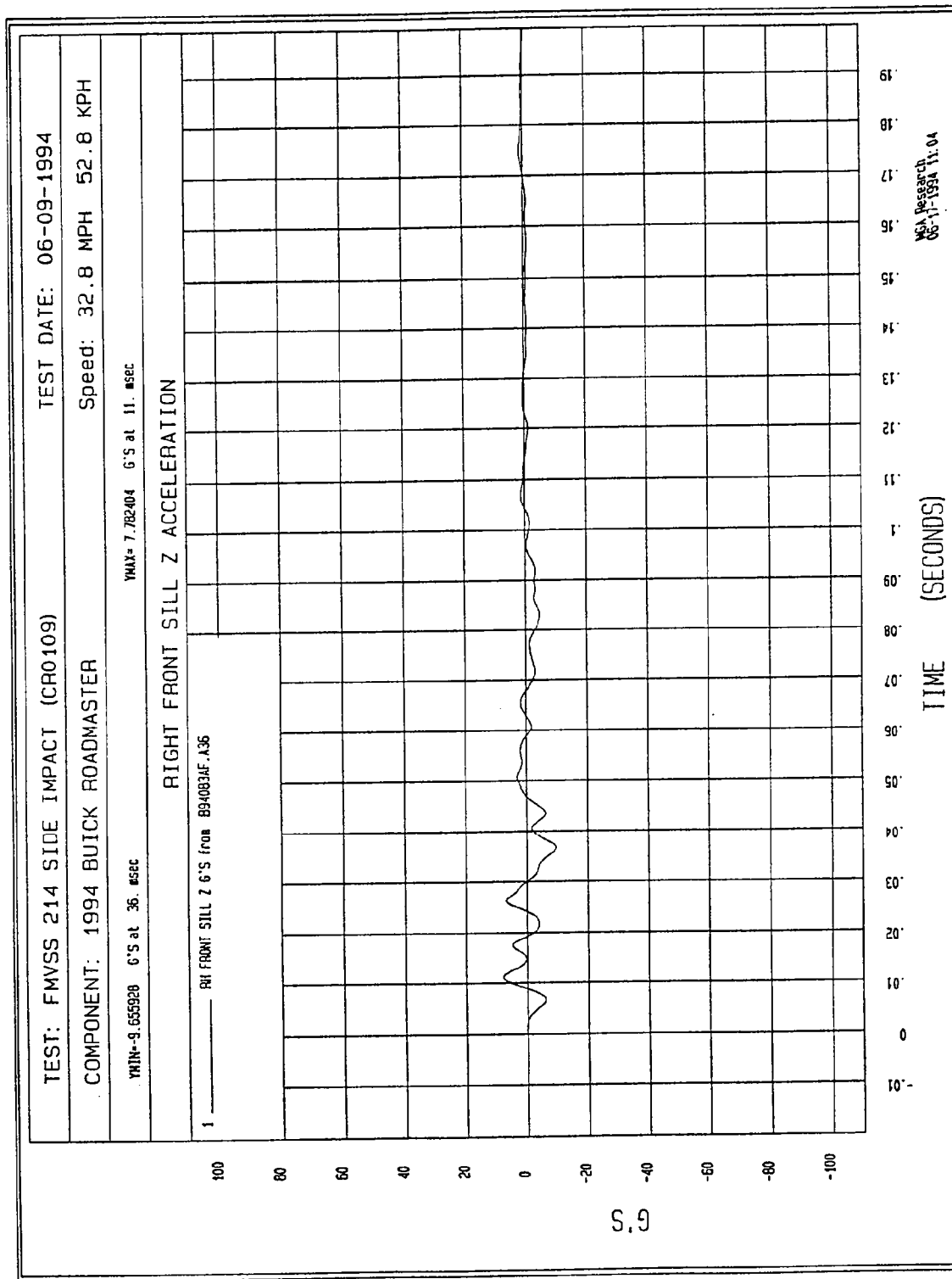


Figure B-25 - Right Front Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

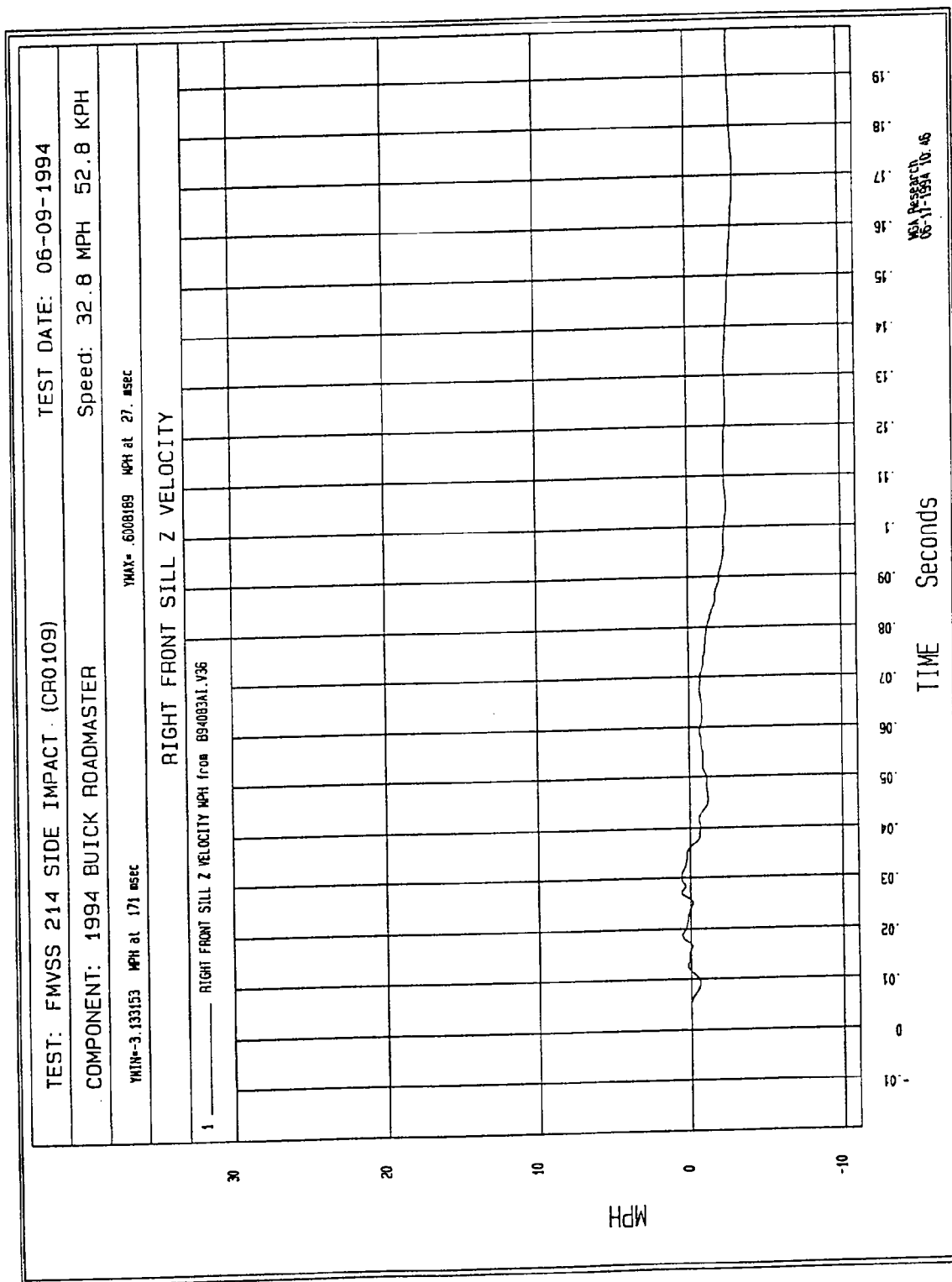
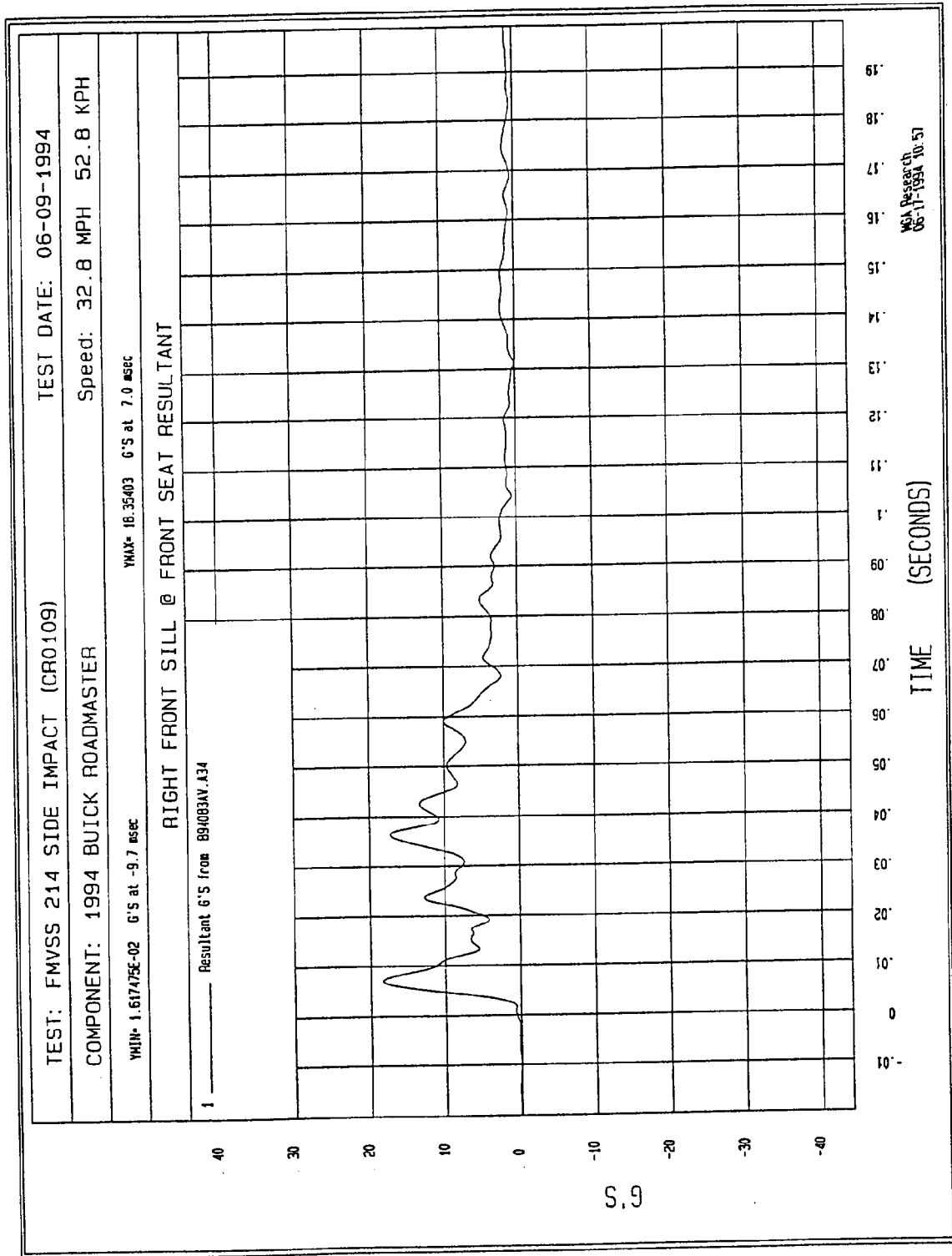


Figure B-26 - Right Front Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)



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

Filter: Class 60 (100 Hz)

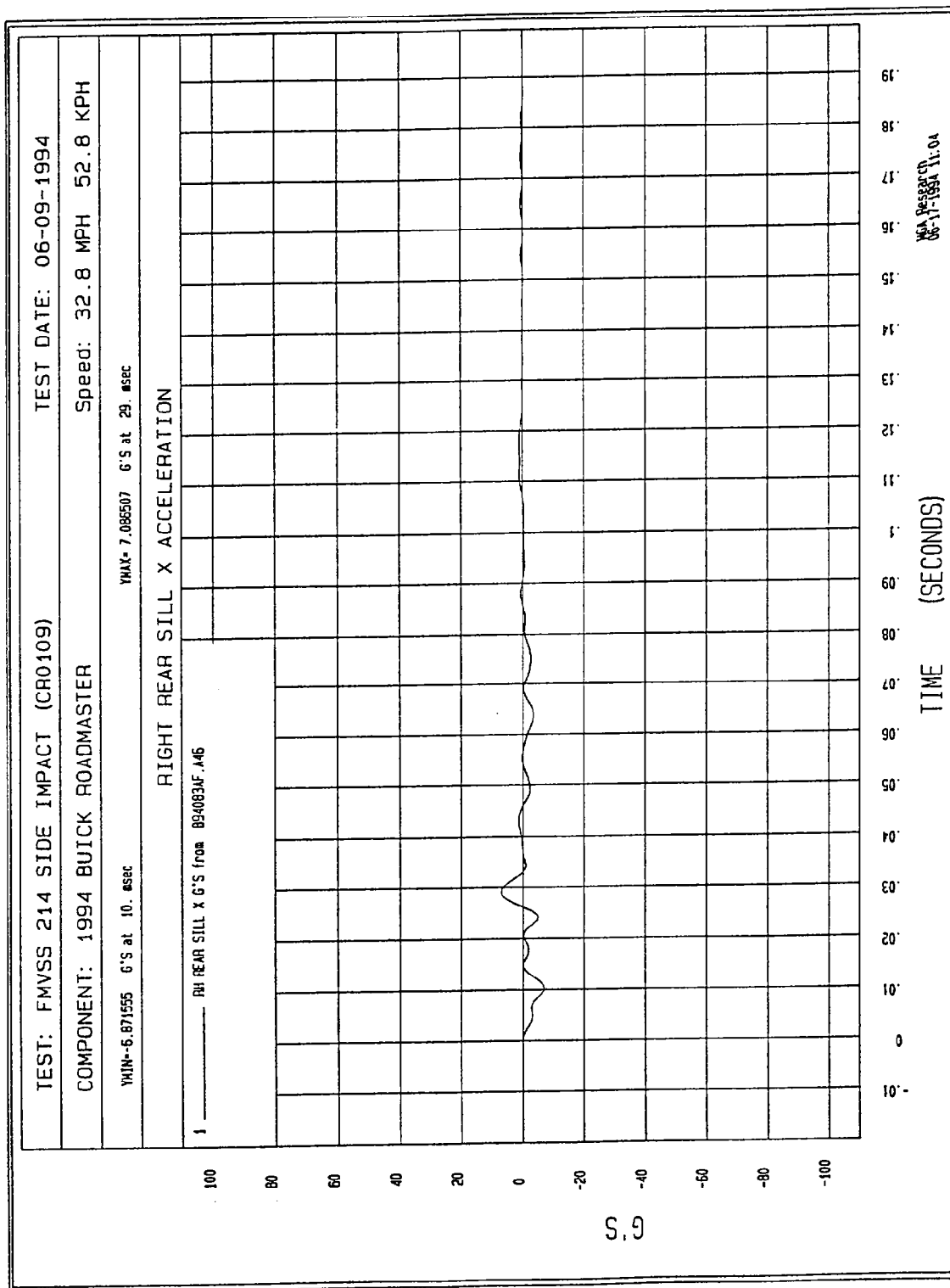


Figure B-28 - Right Rear Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

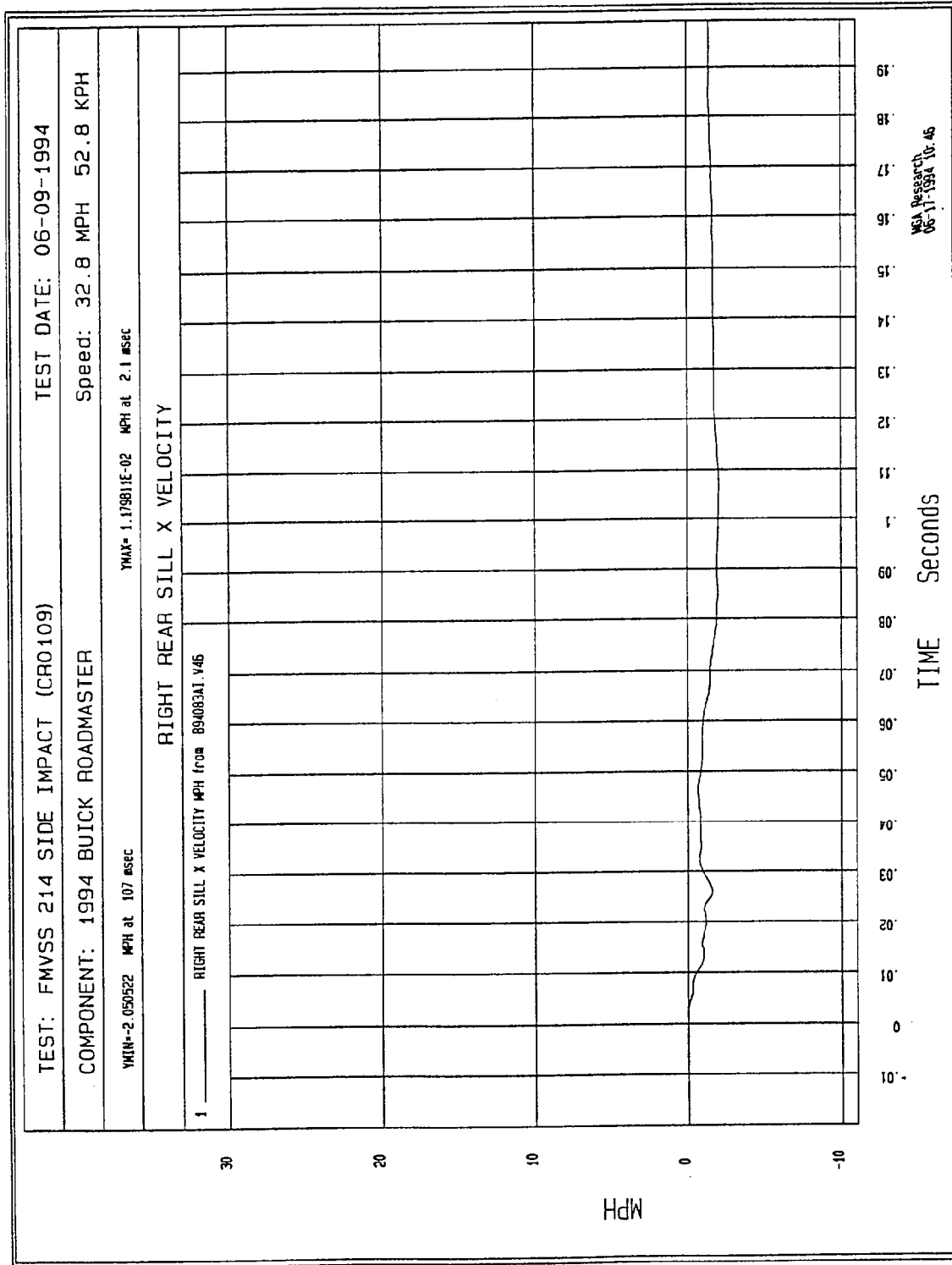


Figure B-29 - Right Rear Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

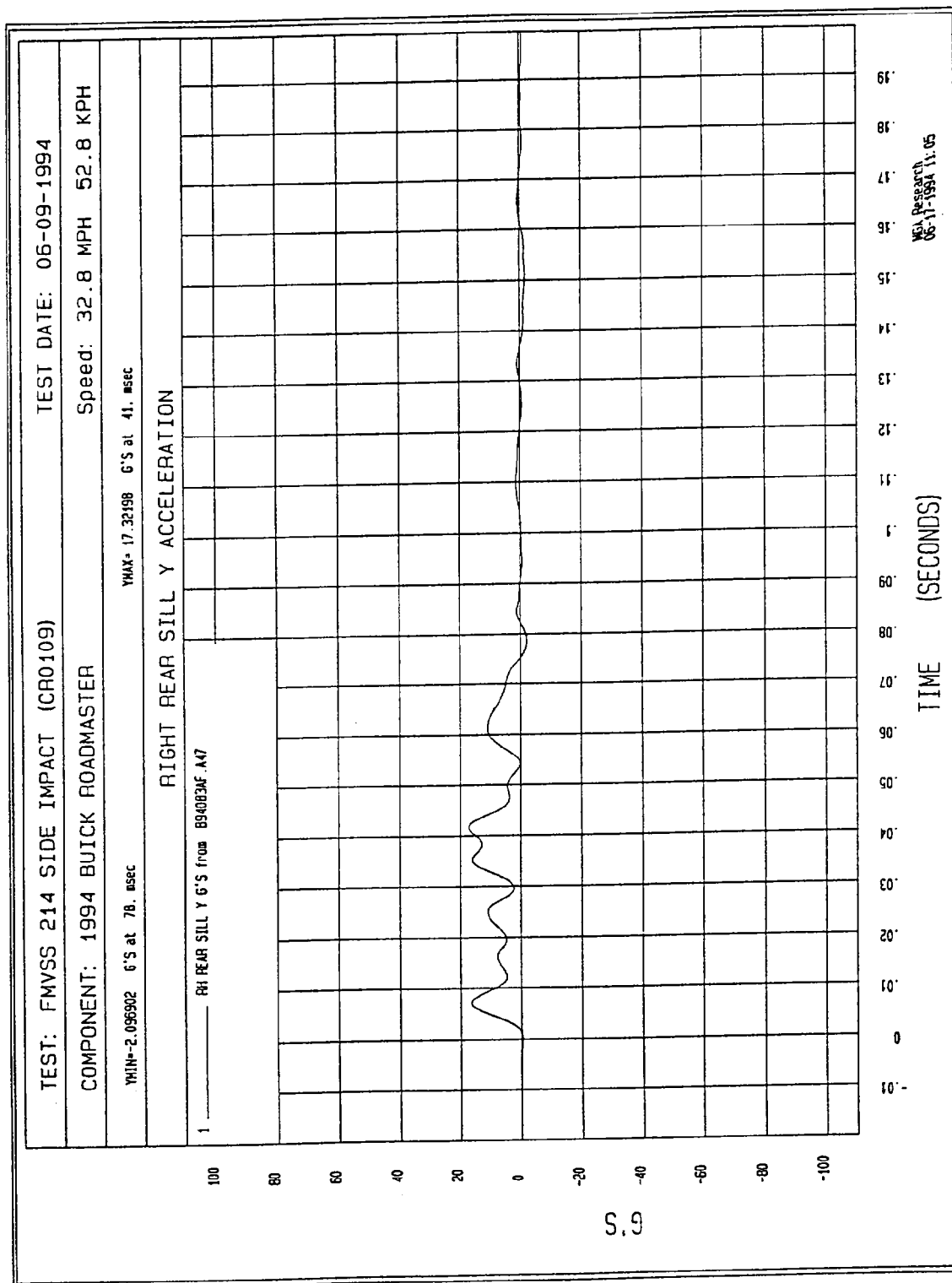


Figure B-30 - Right Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

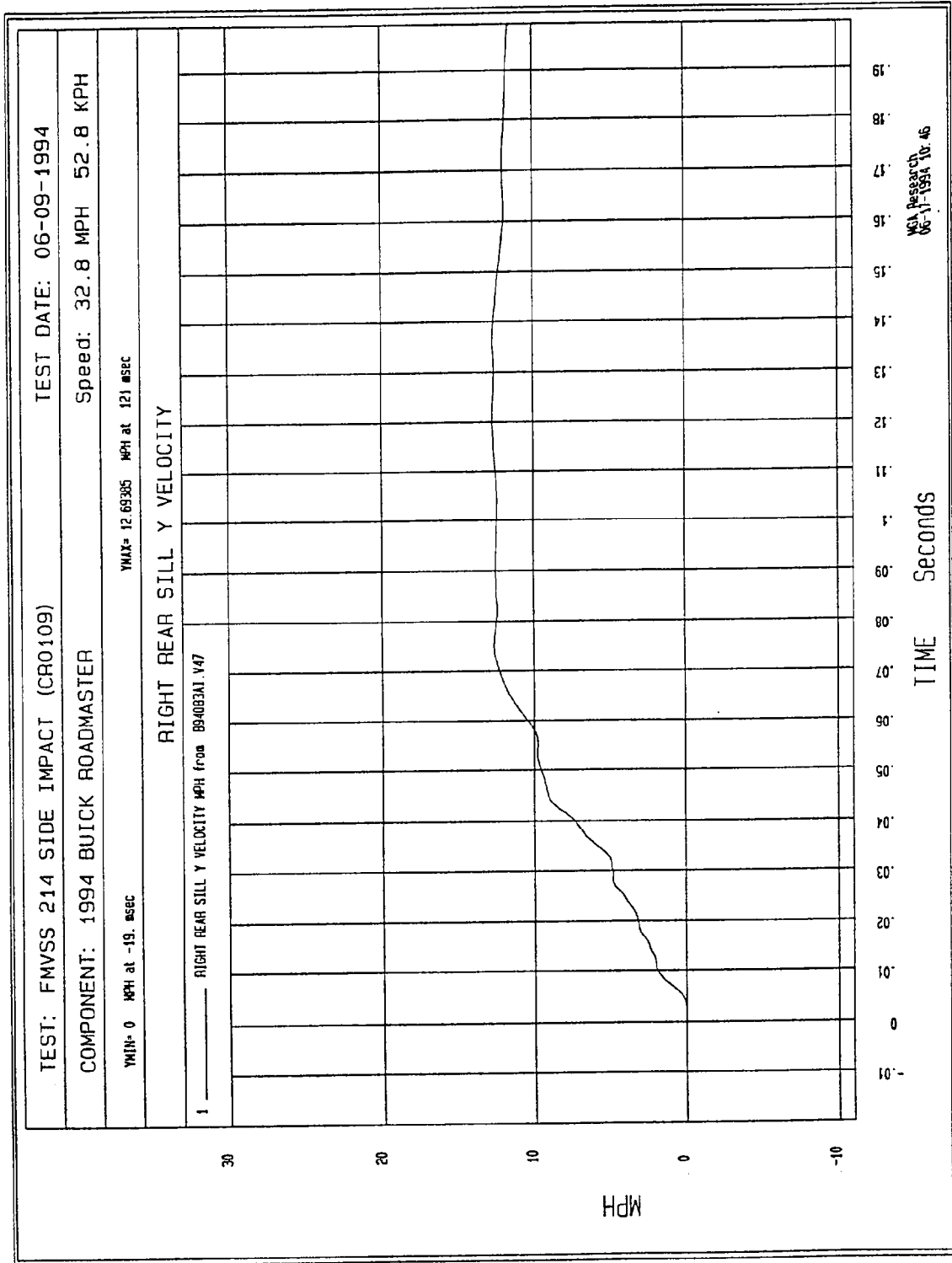


Figure B-31 - Right Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

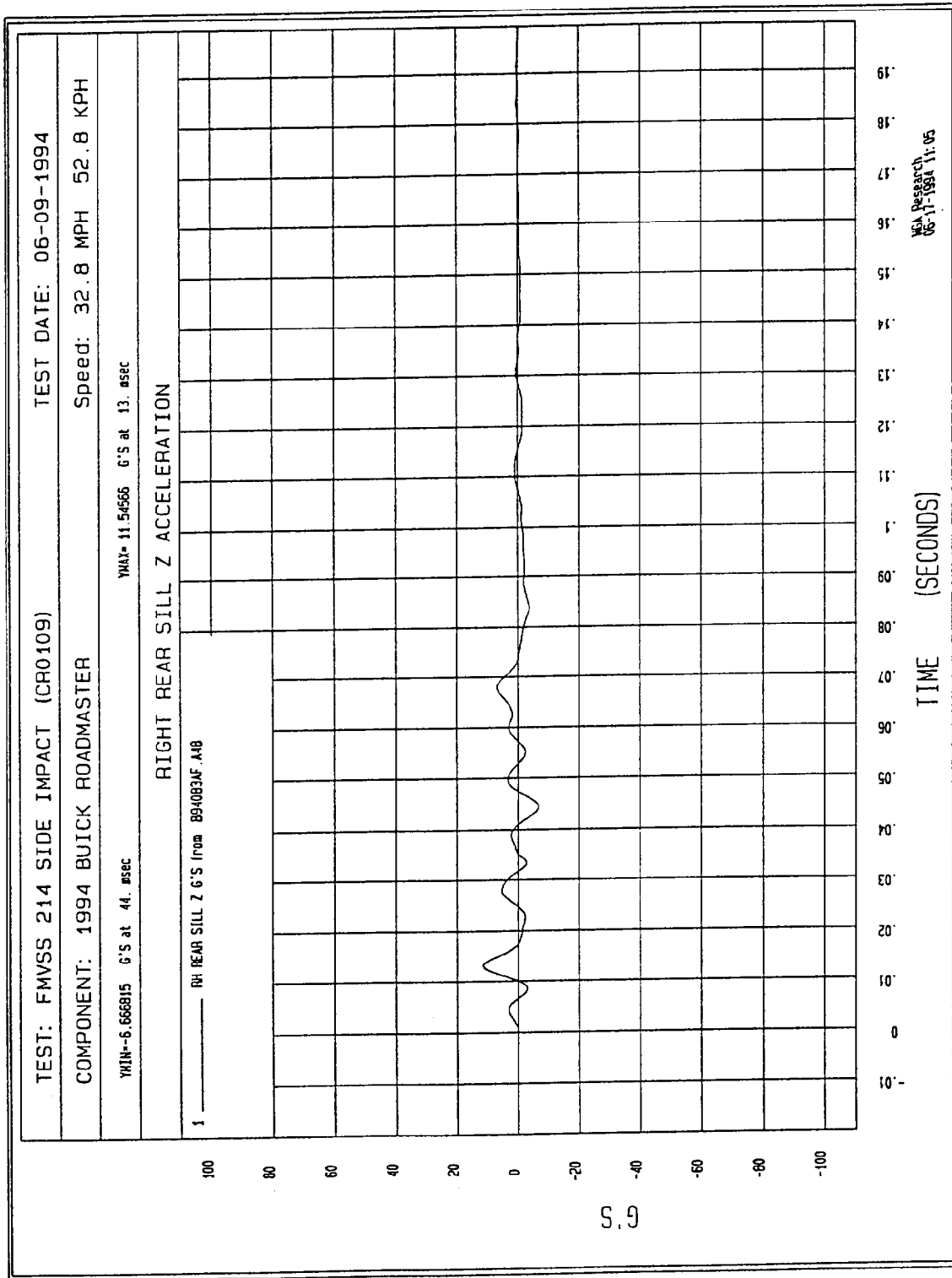


Figure B-32 - Right Rear Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

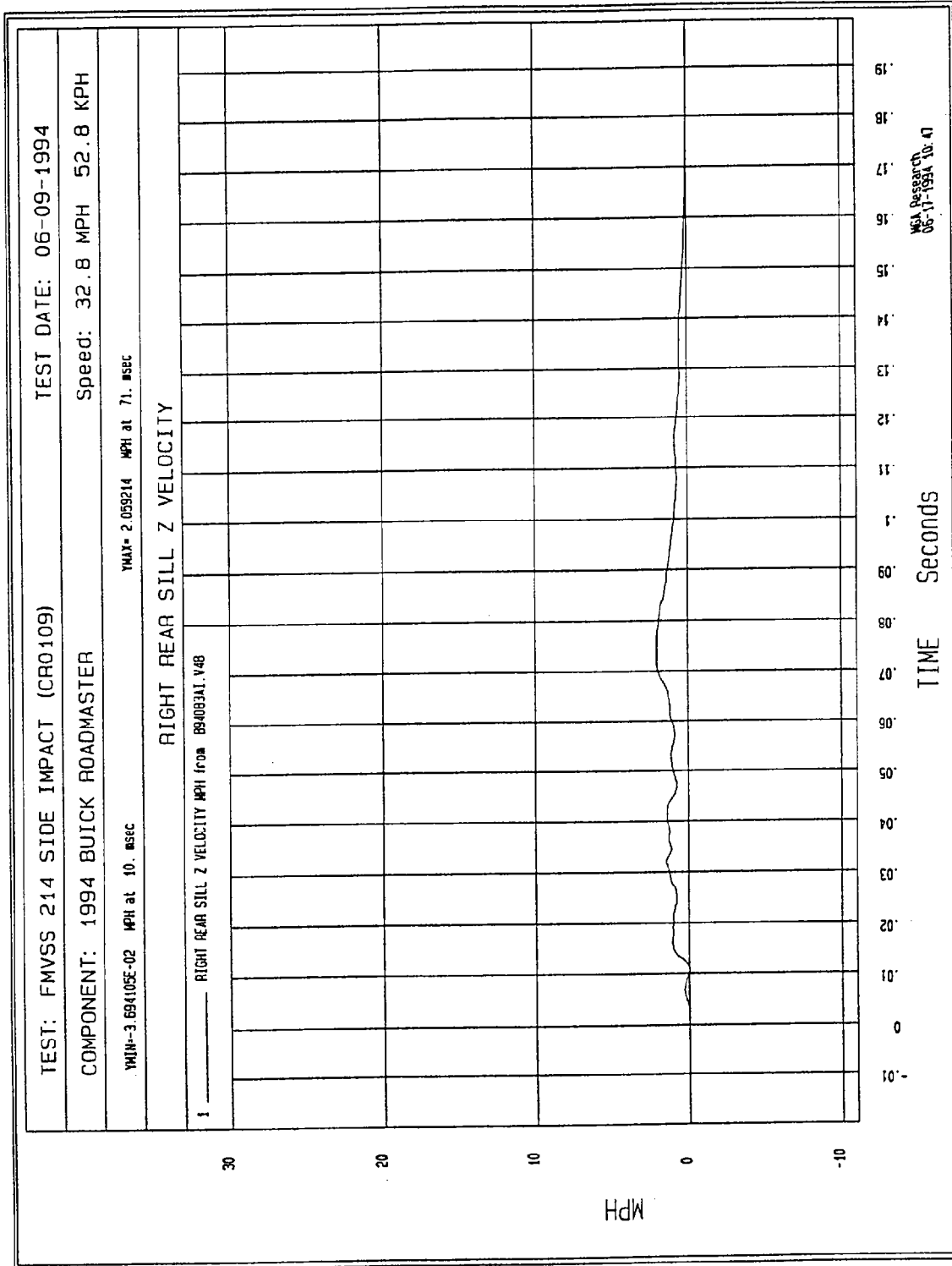


Figure B-33 - Right Rear Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)

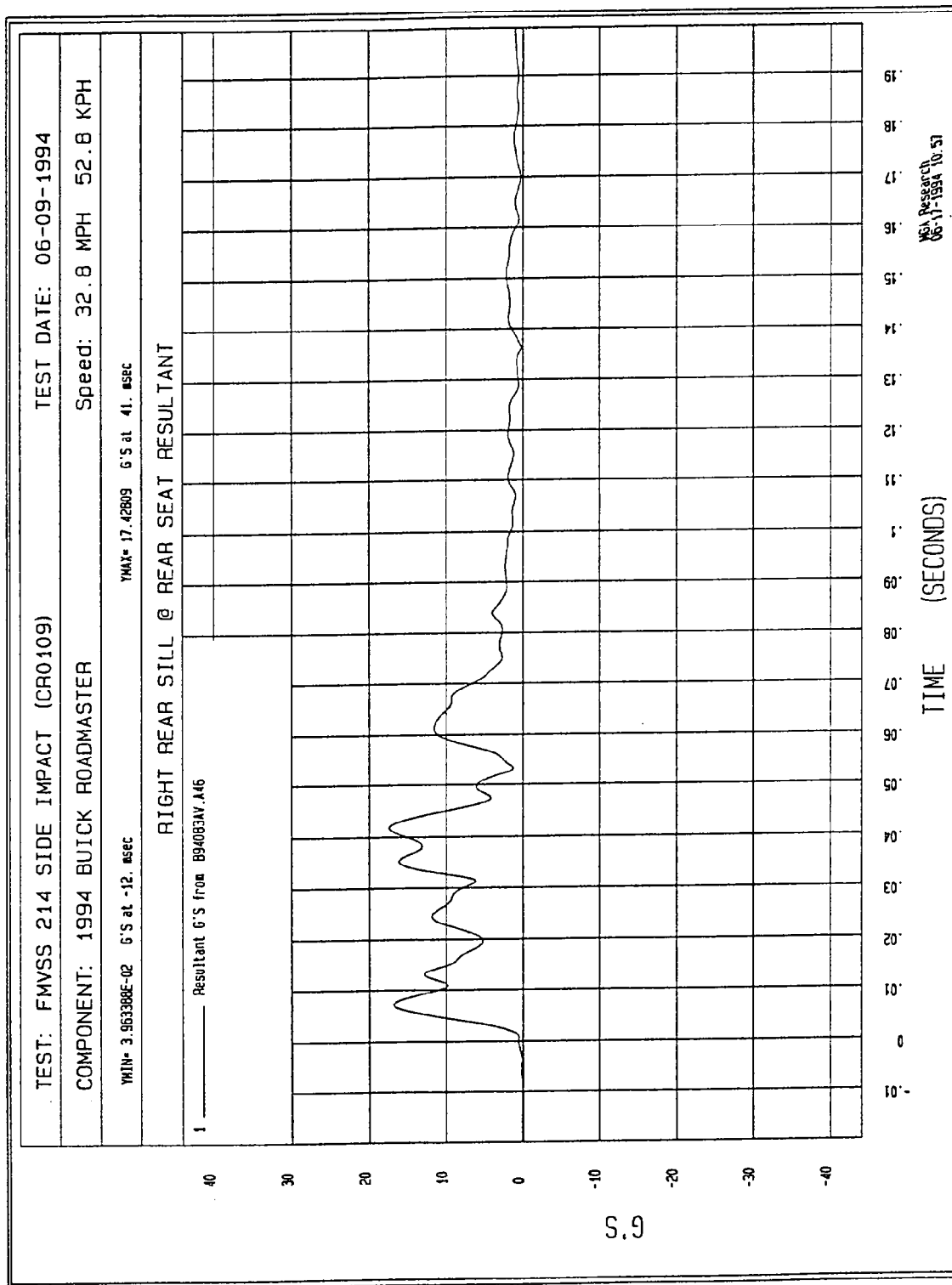


Figure B-34 - Right Rear Sill at Rear Seat Resultant vs. Time

Filter: Class 60 (100 Hz)

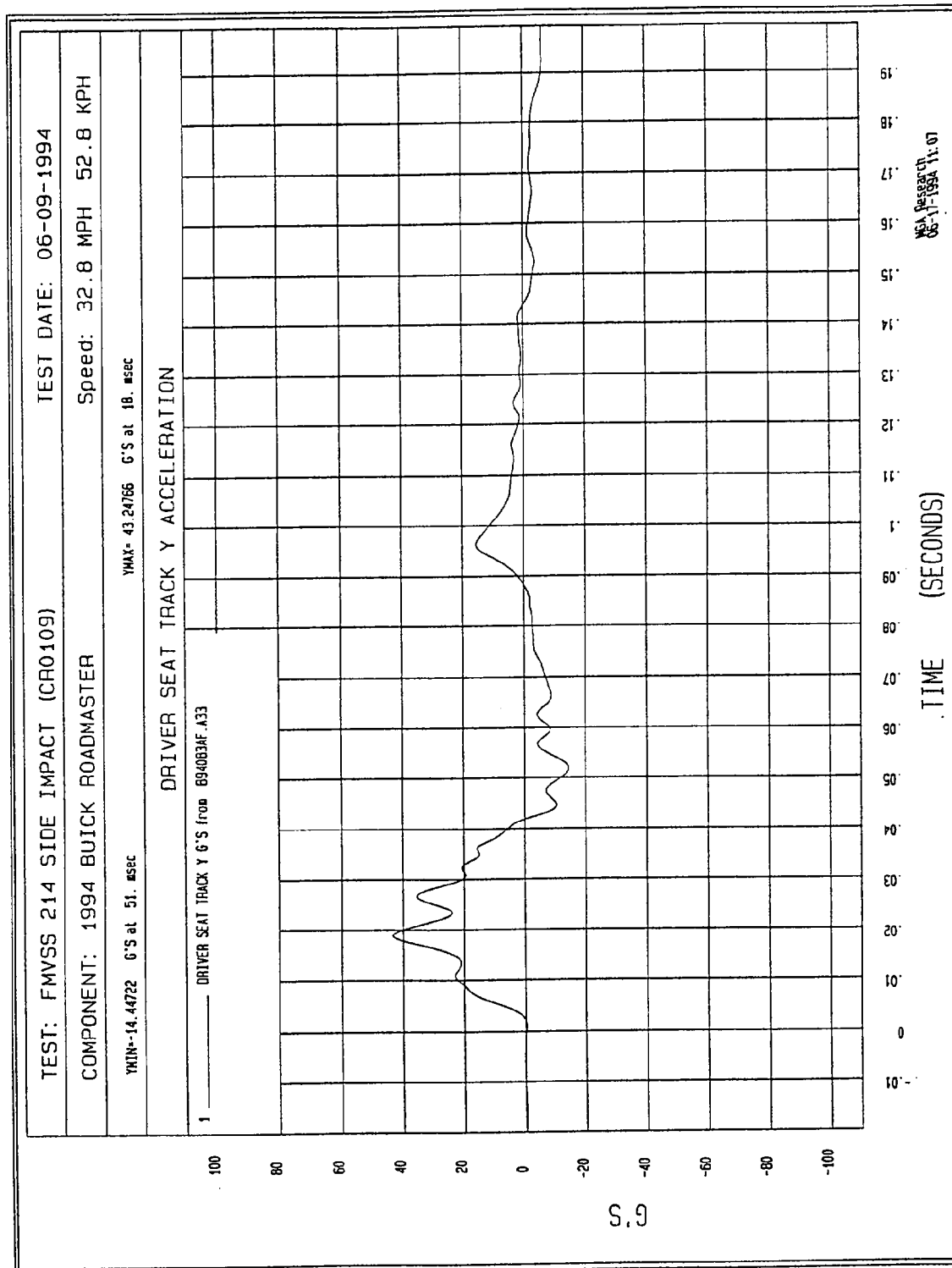
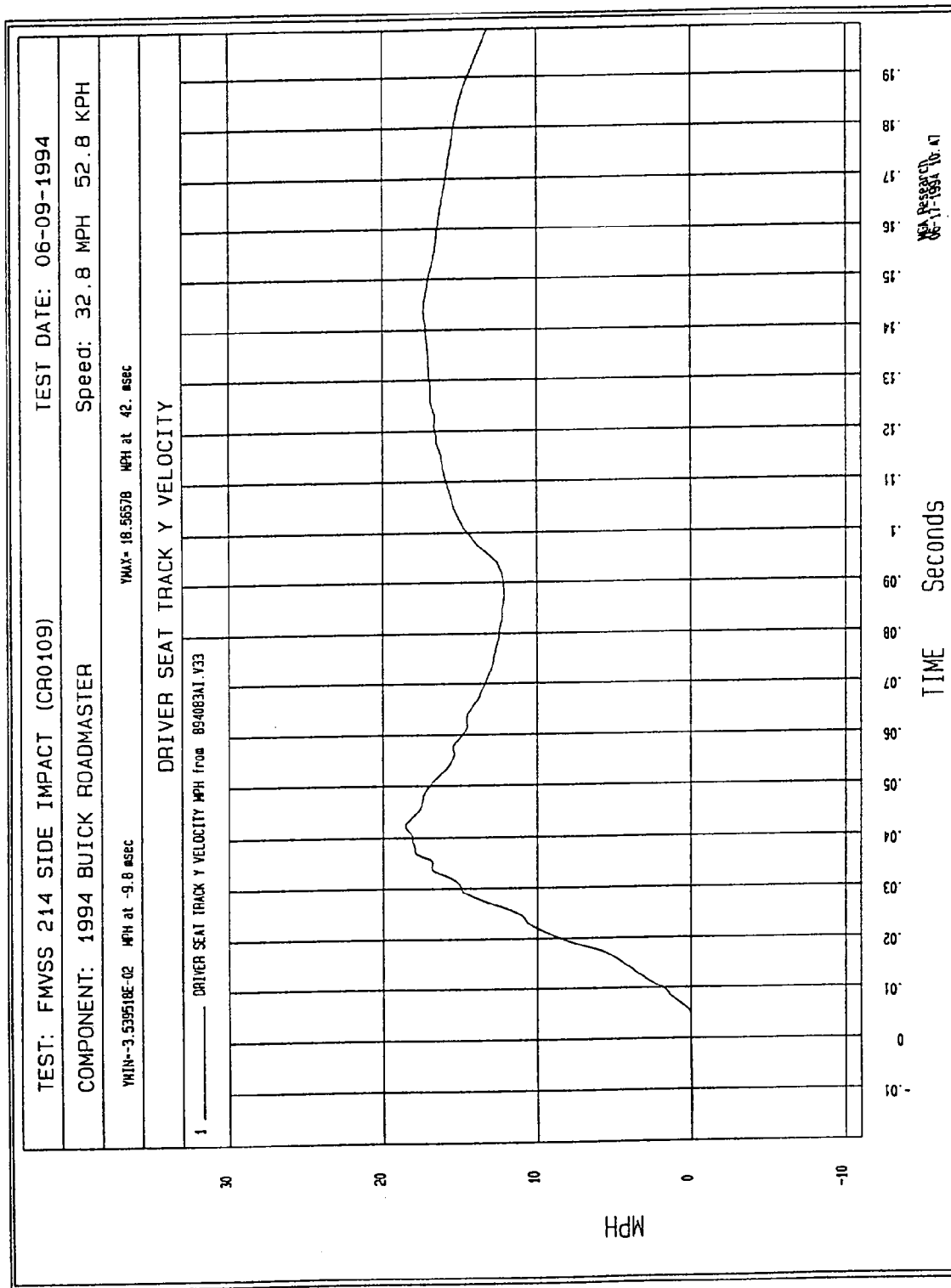


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



Filter: Class 60 (100 Hz)

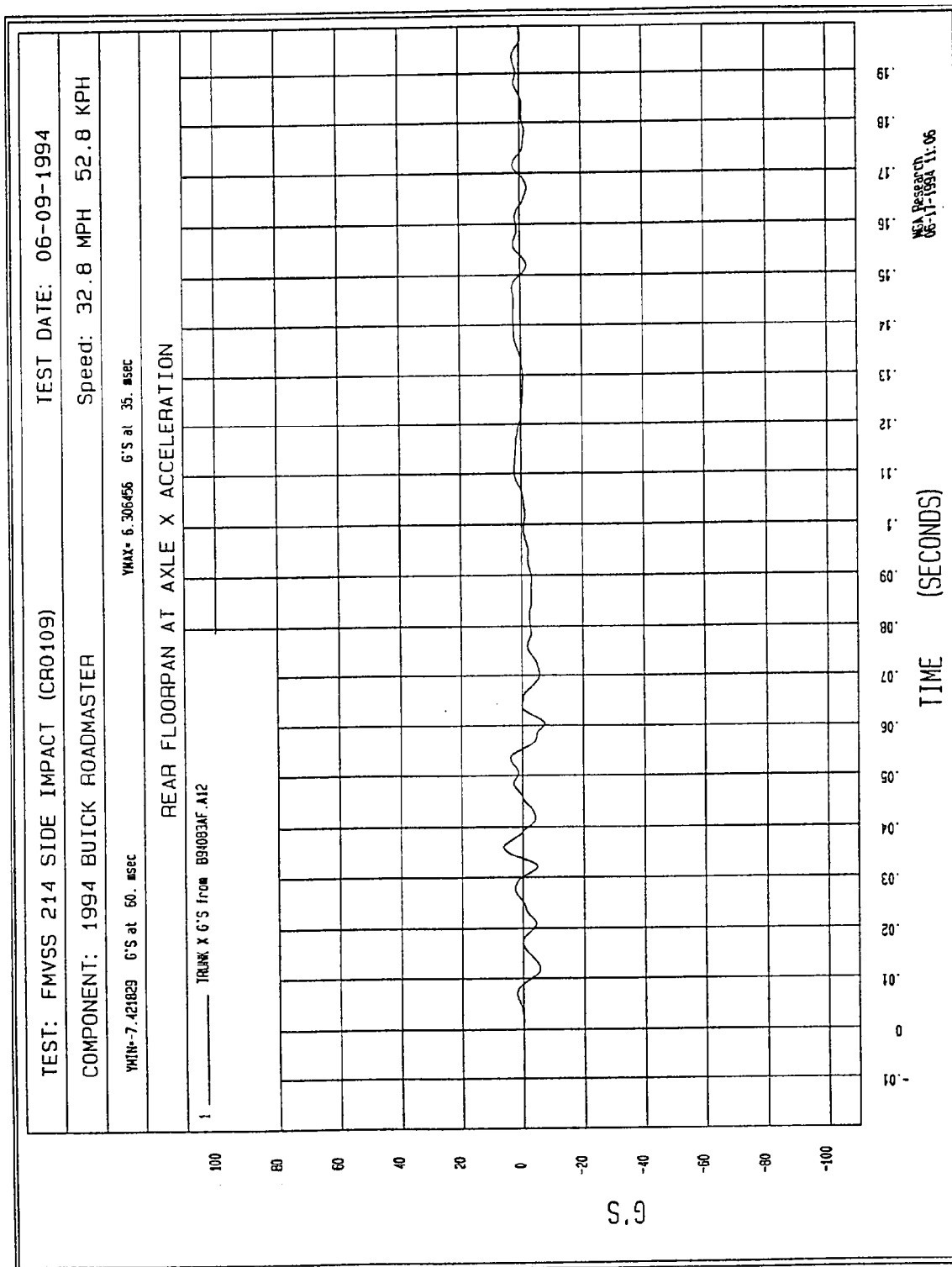


Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

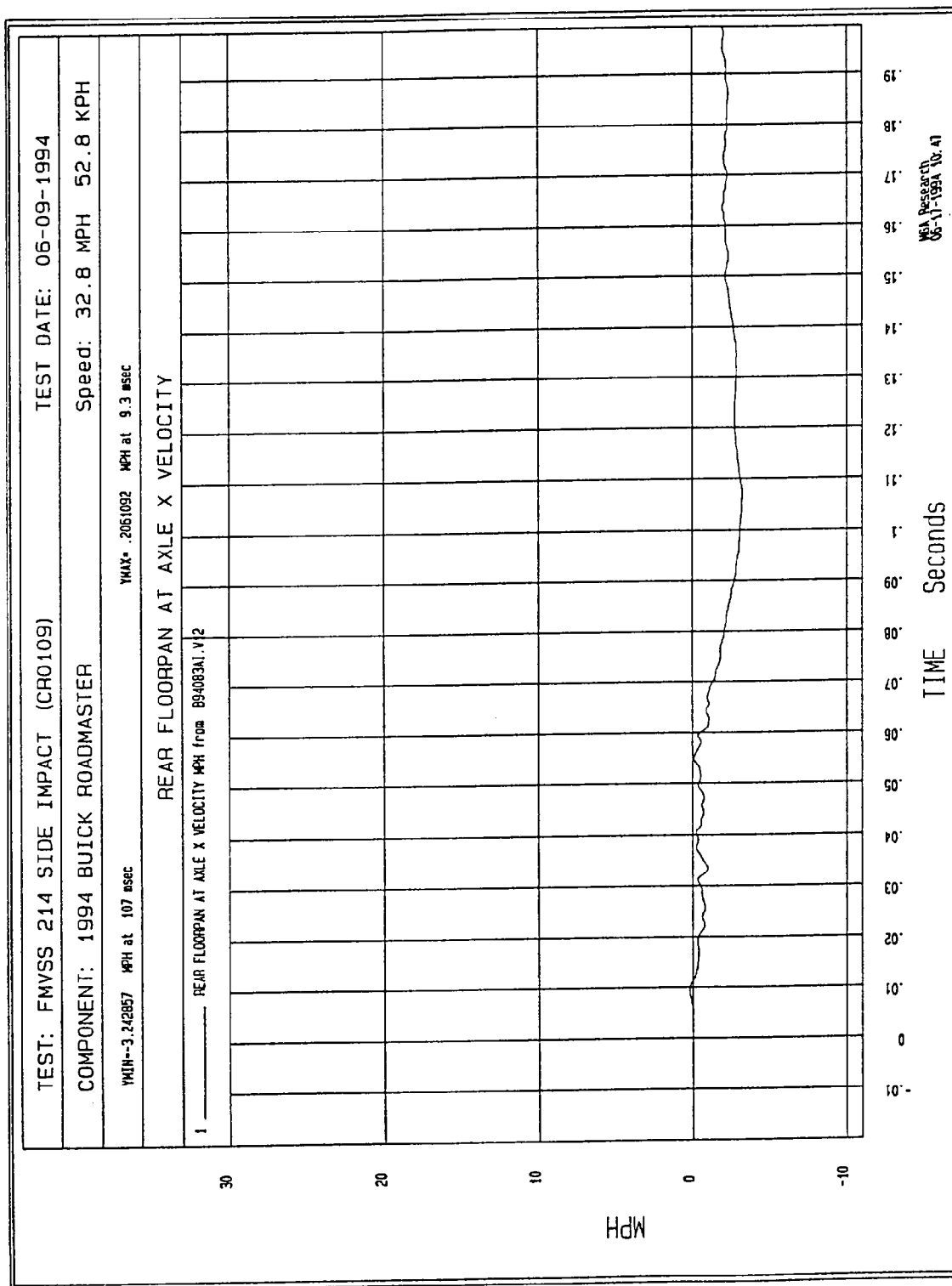


Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

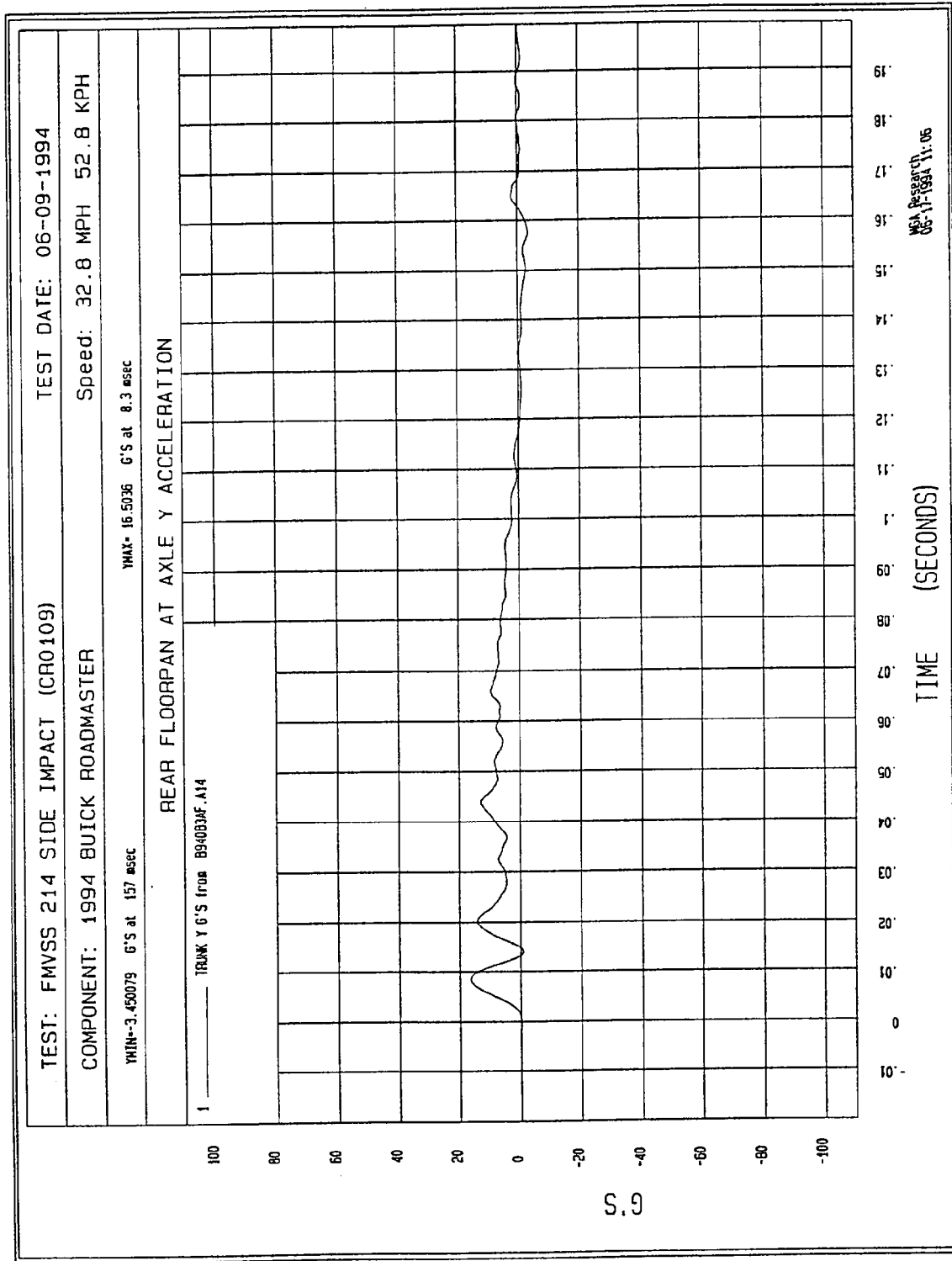


Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

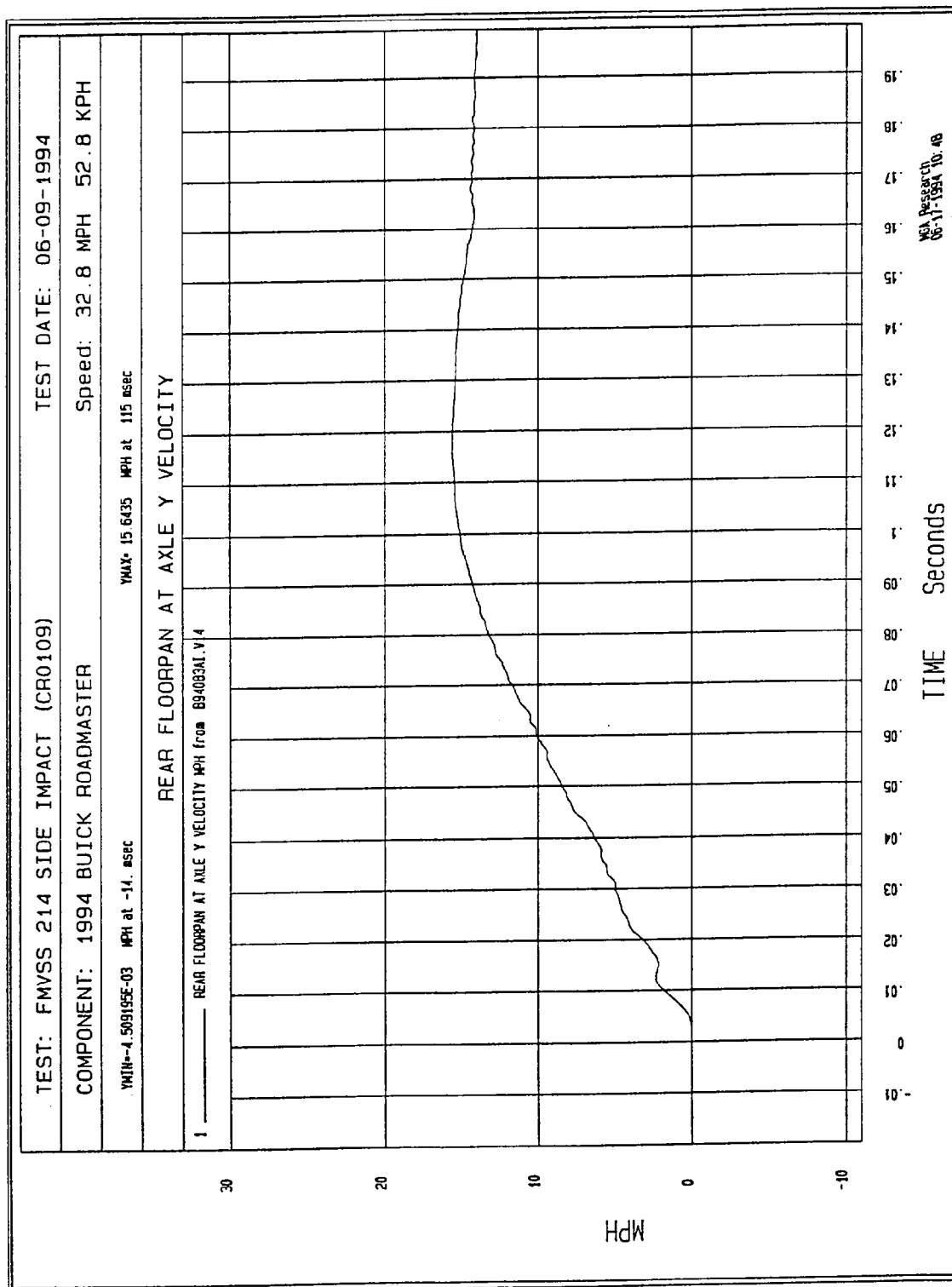


Figure B-40 - Rear Floorpan at Axle Y Velocity vs. Time

Filter: Class 60 (100 Hz)

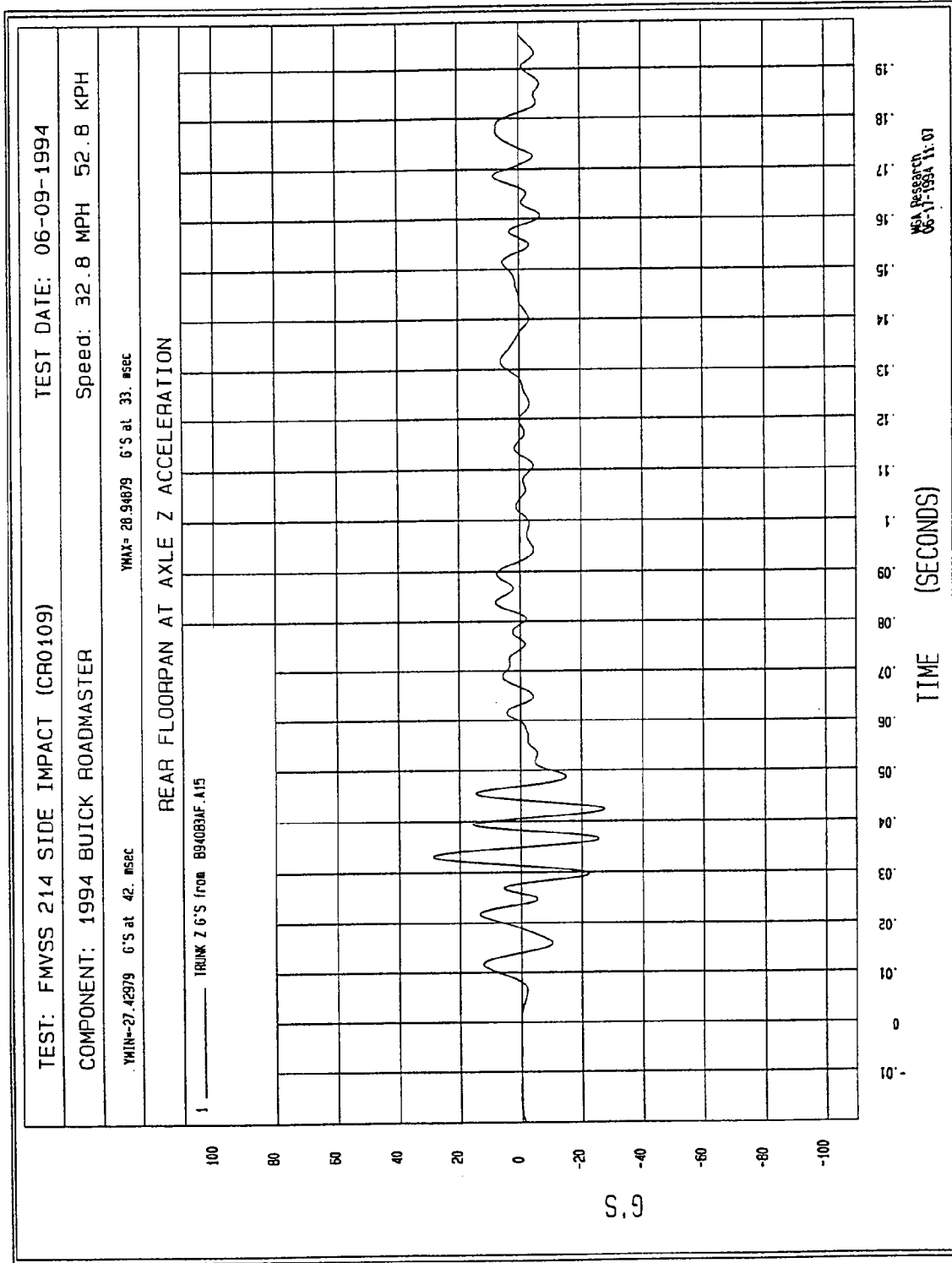


Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

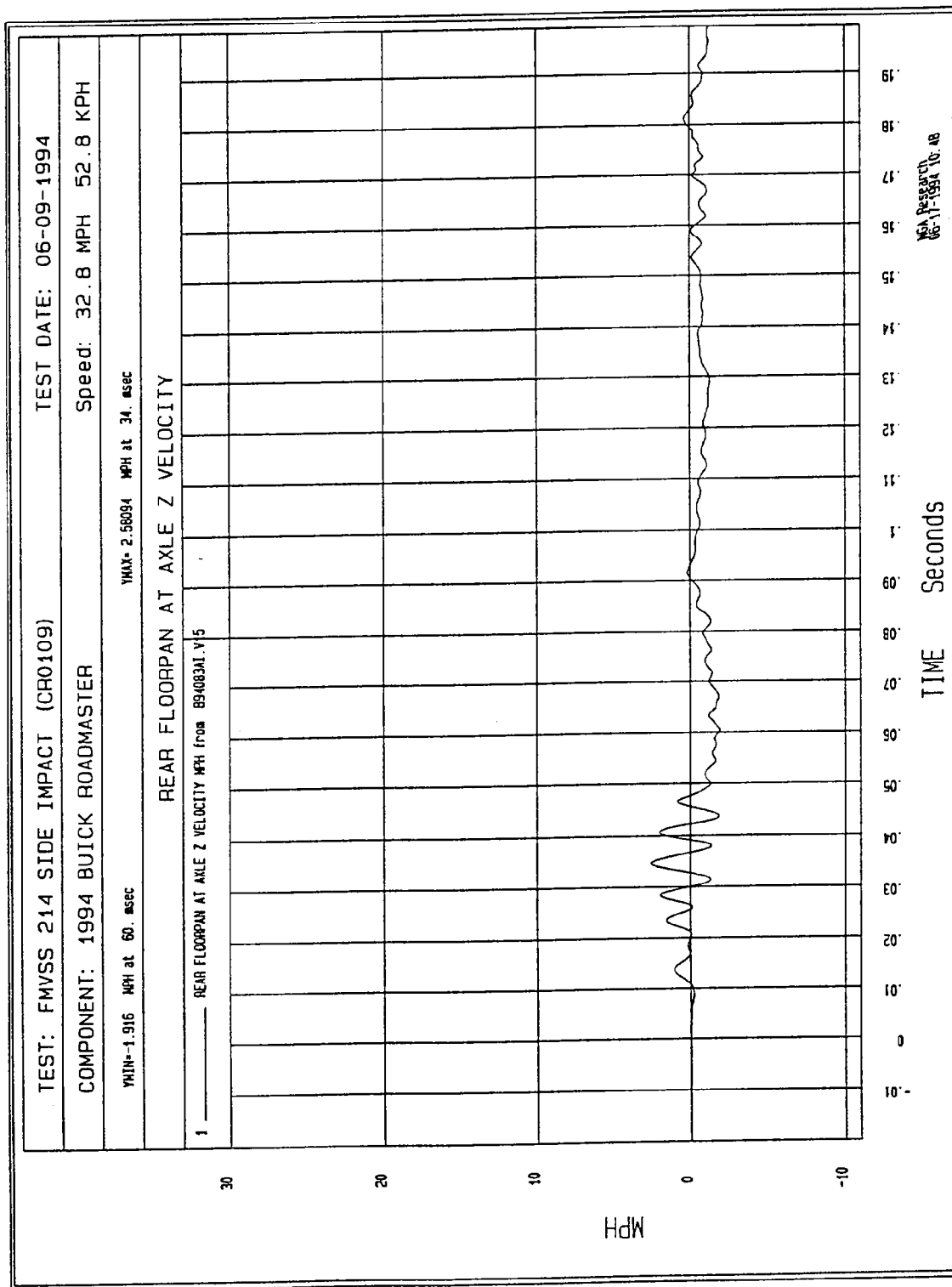


Figure B-42 - Rear Floorpan at Axle Z Velocity vs. Time

Filter: Class 60 (100 Hz)

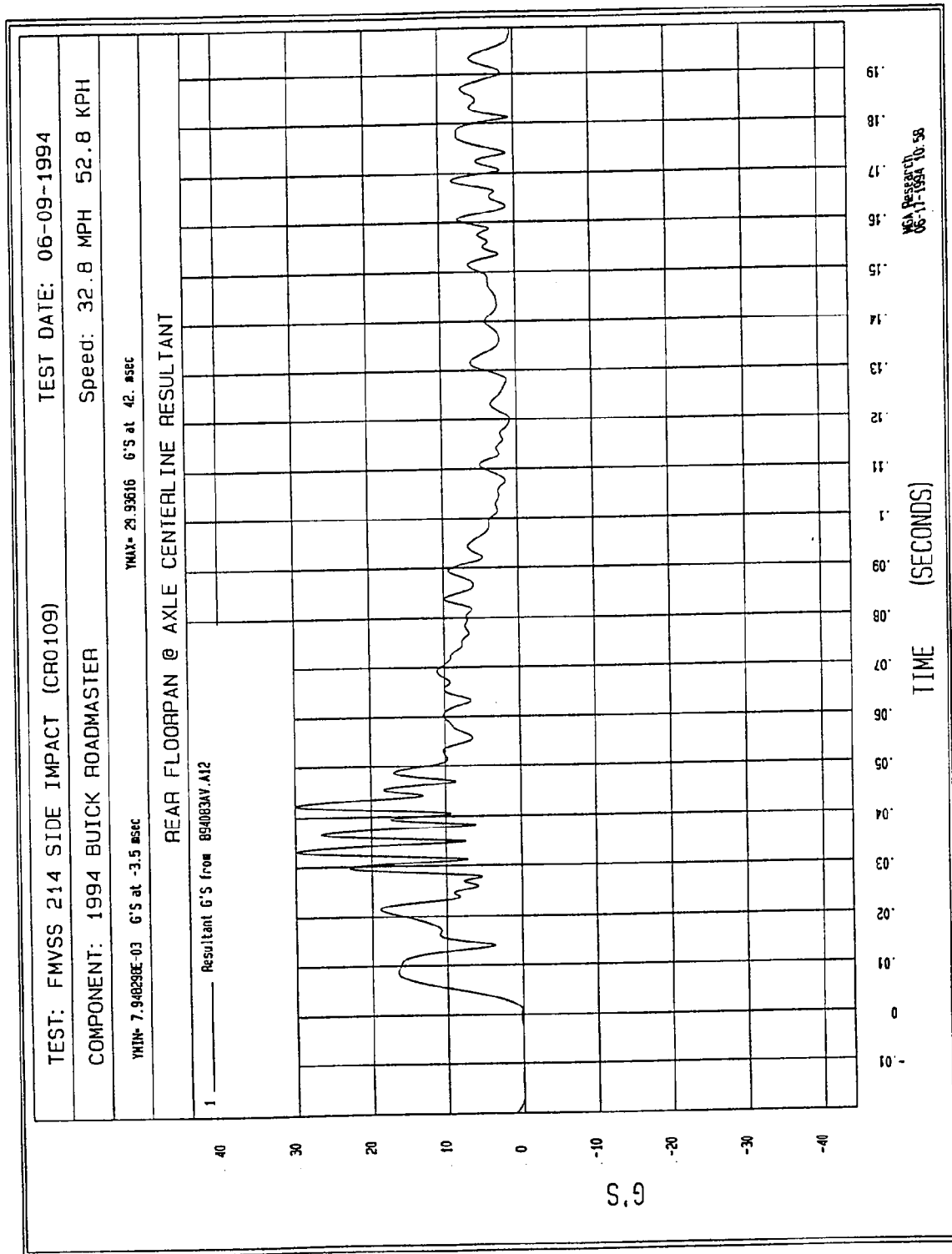
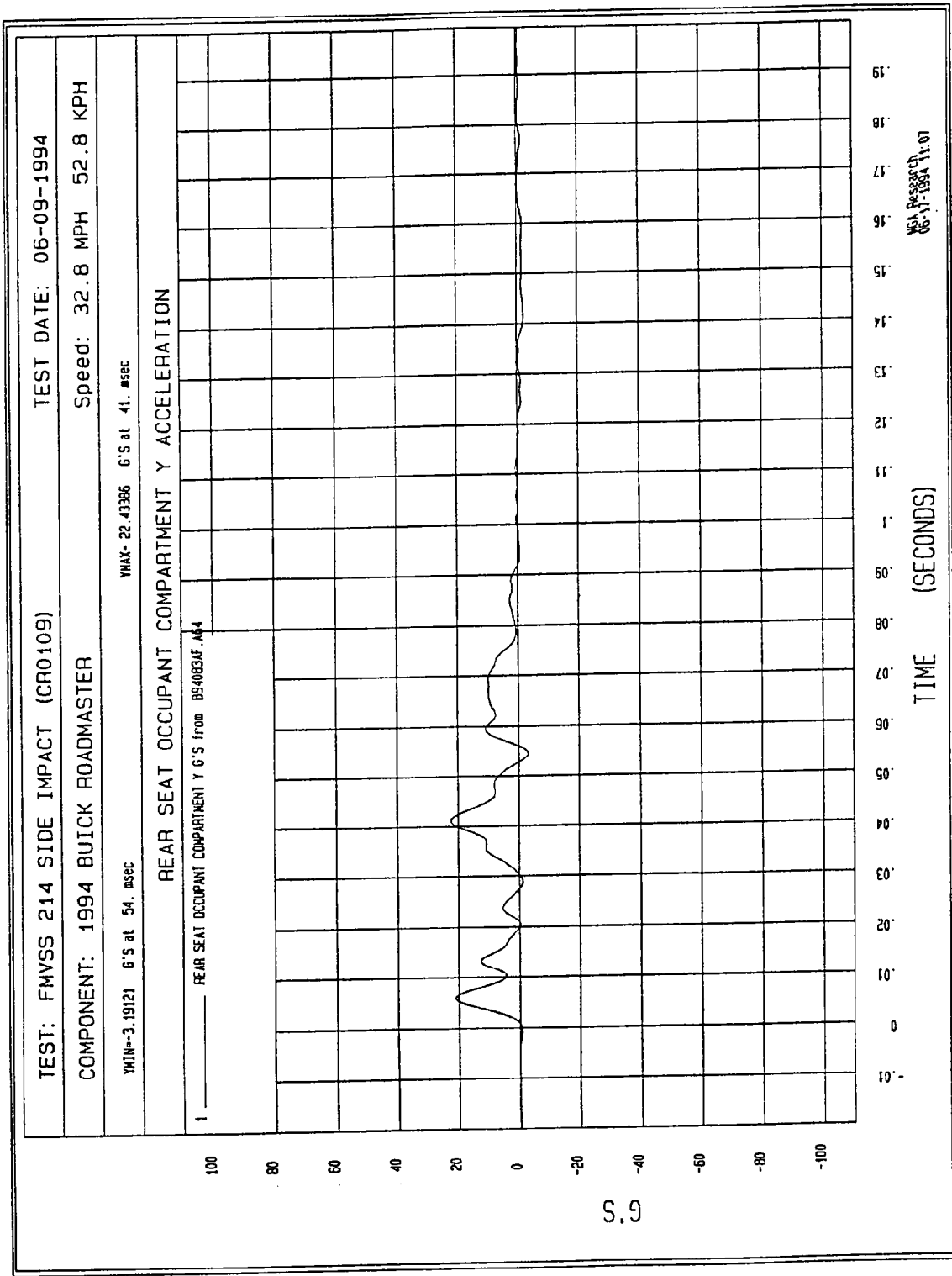


Figure B-43 - Rear Floorpan at Axle Centerline Resultant vs. Time

Filter: Class 60 (100 Hz)



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

Filter: Class 180 (300 Hz)

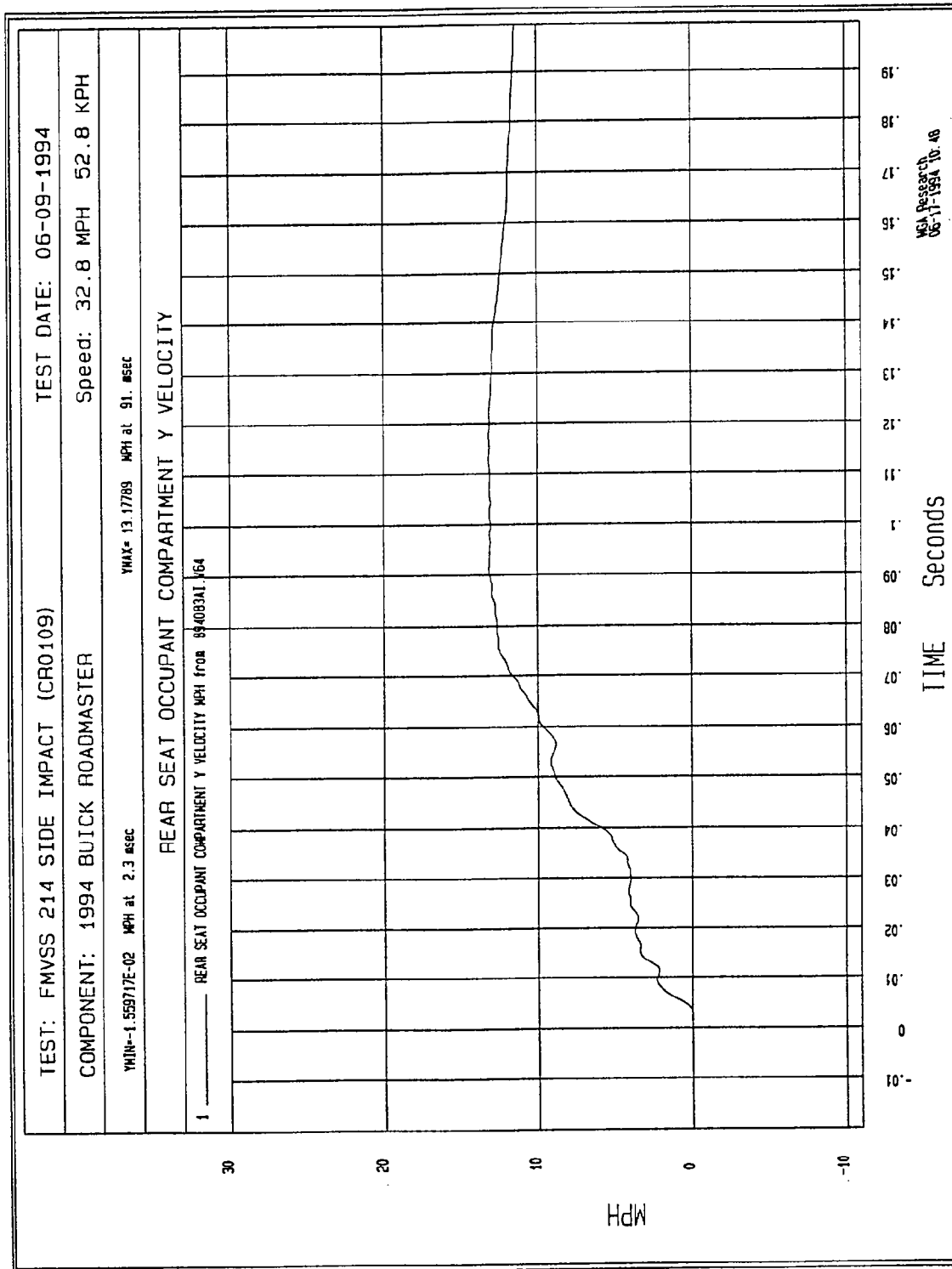


Figure B-45 - Rear Seat Occupant Compartment Y Velocity vs. Time

Filter: Class 60 (100 Hz)

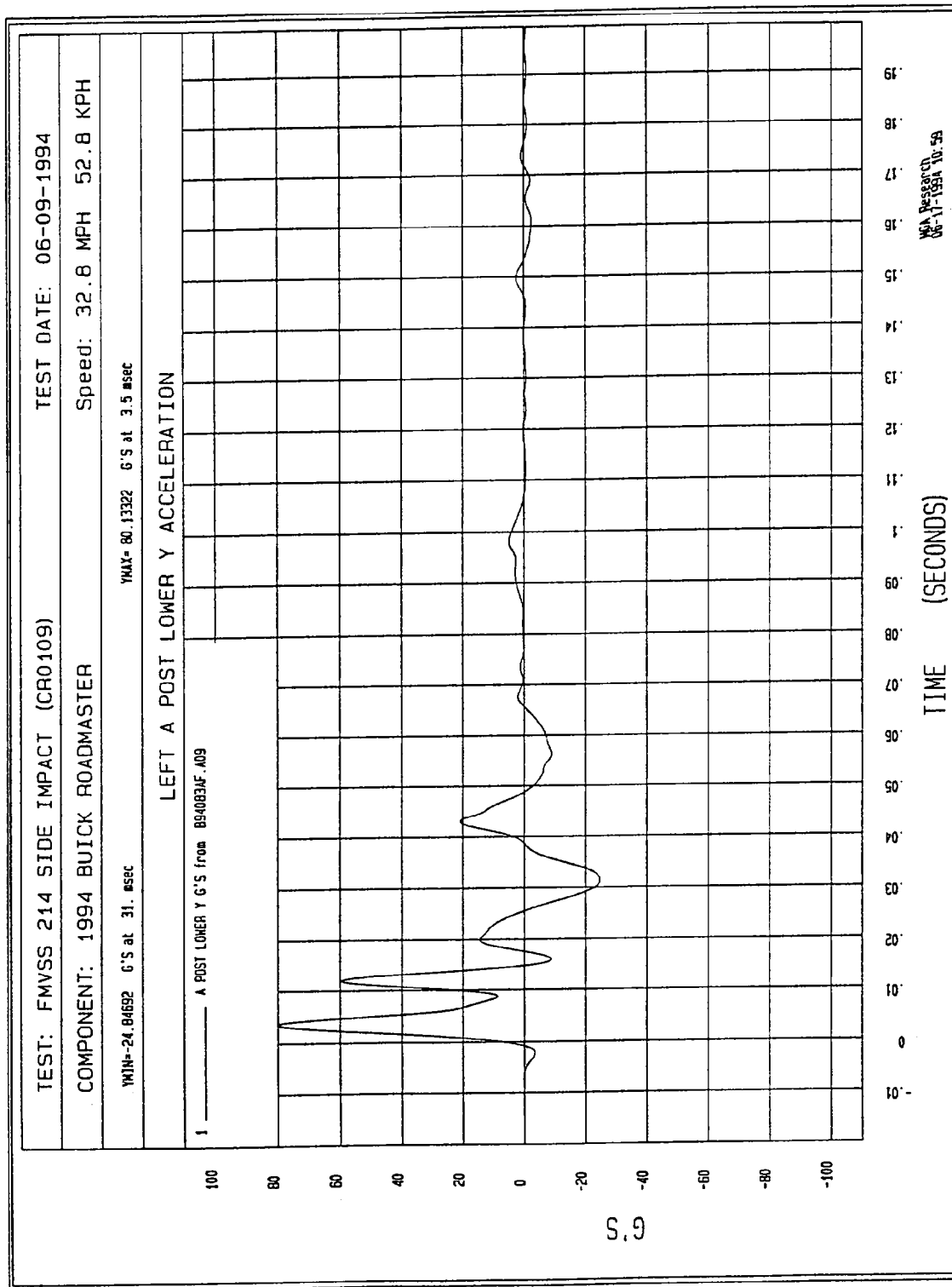


Figure B-46 - Left A Post Lower Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

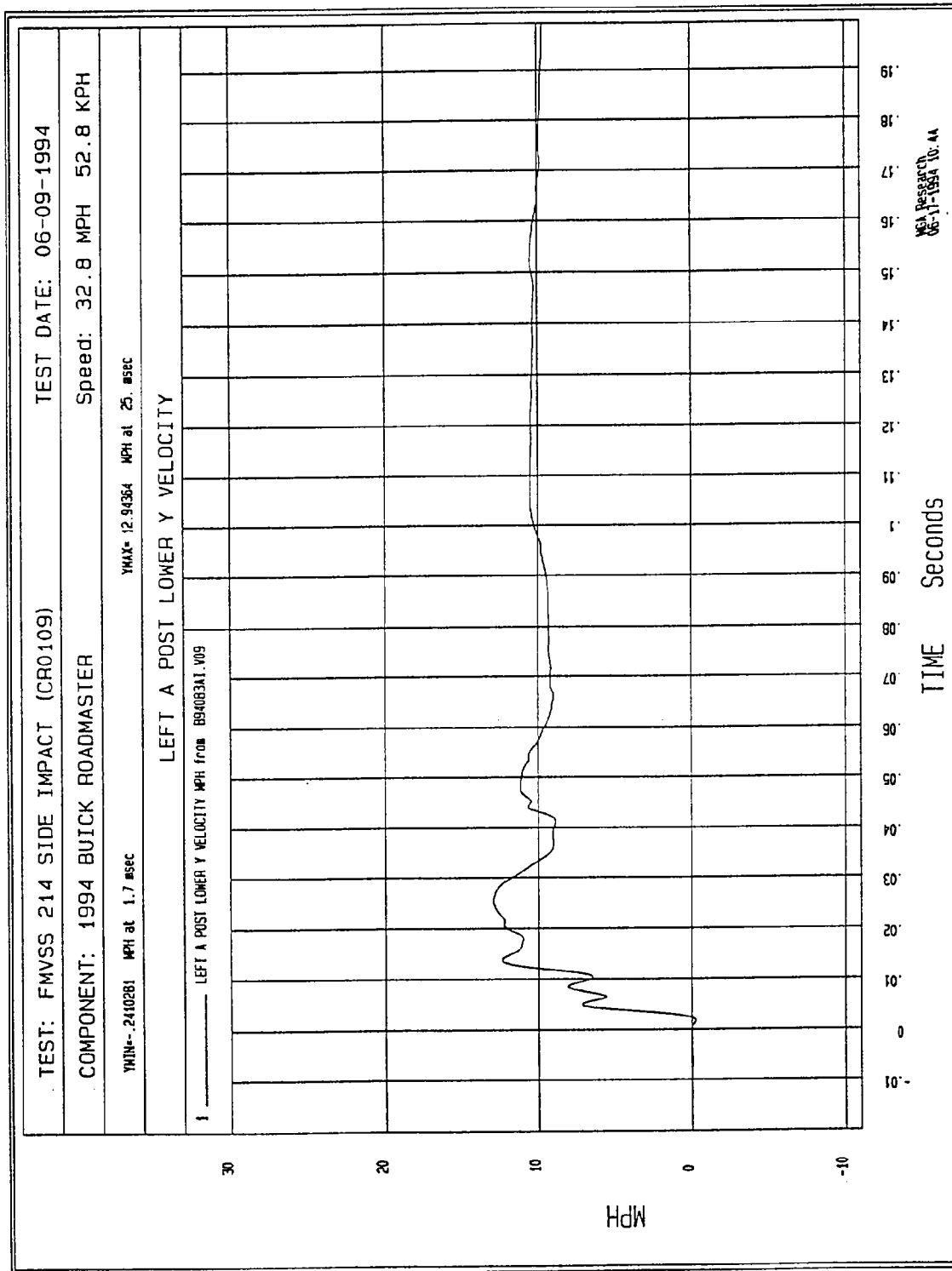


Figure B-47 - Left A Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

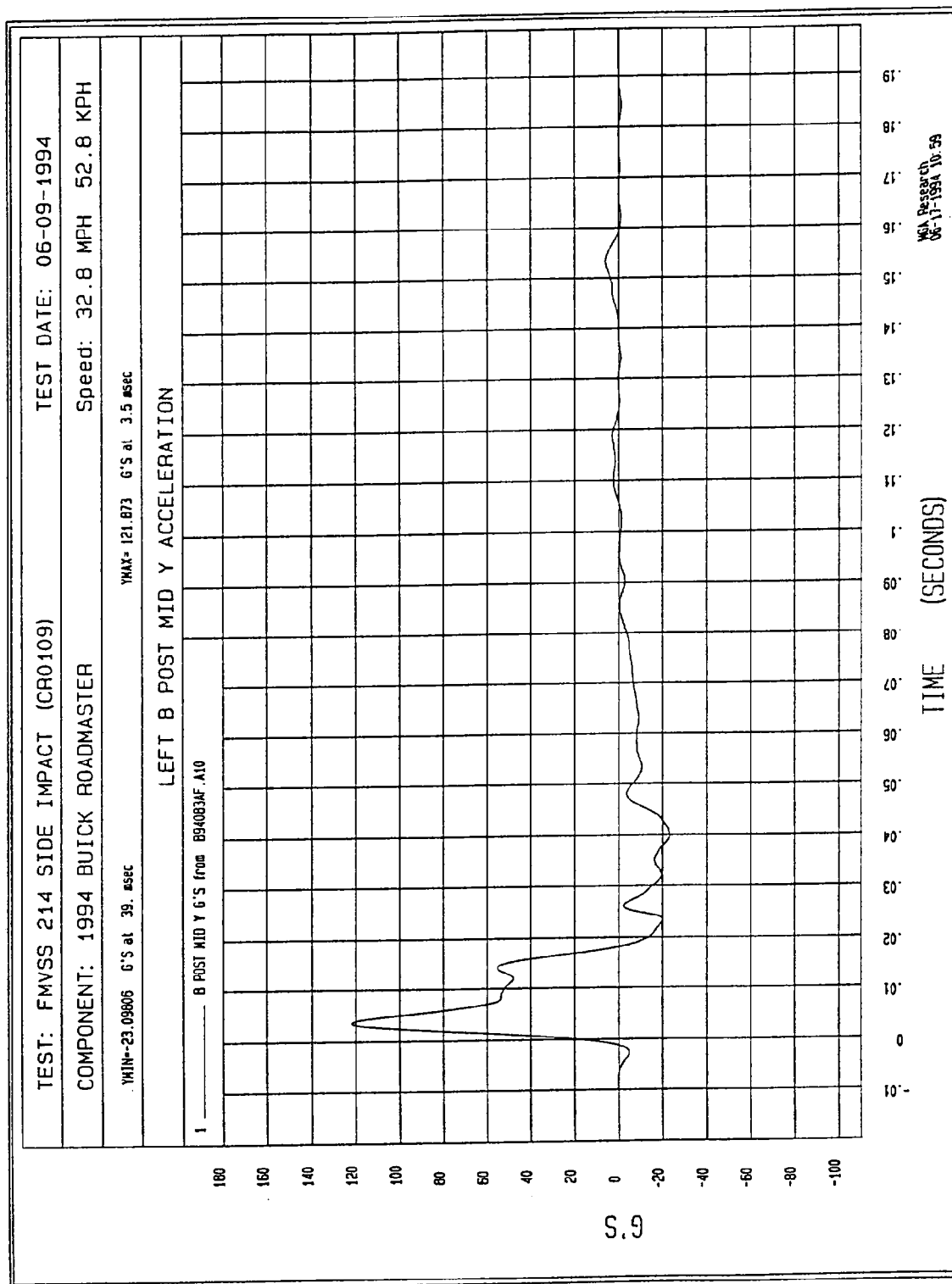


Figure B-48 - Left B Post Mid Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

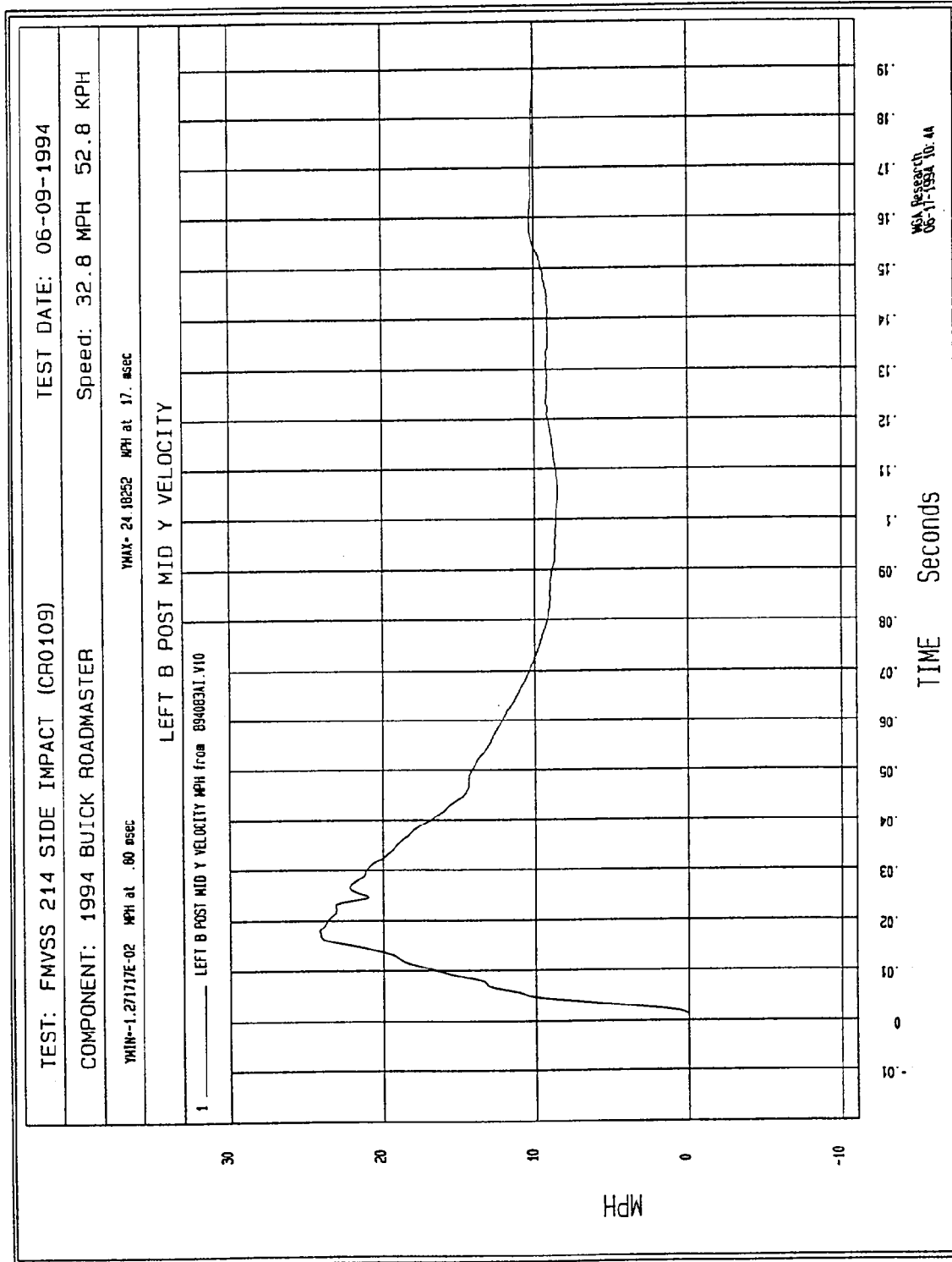


Figure B-49 - Left B Post Mid Y Velocity vs. Time

Filter: Class 60 (100 Hz)

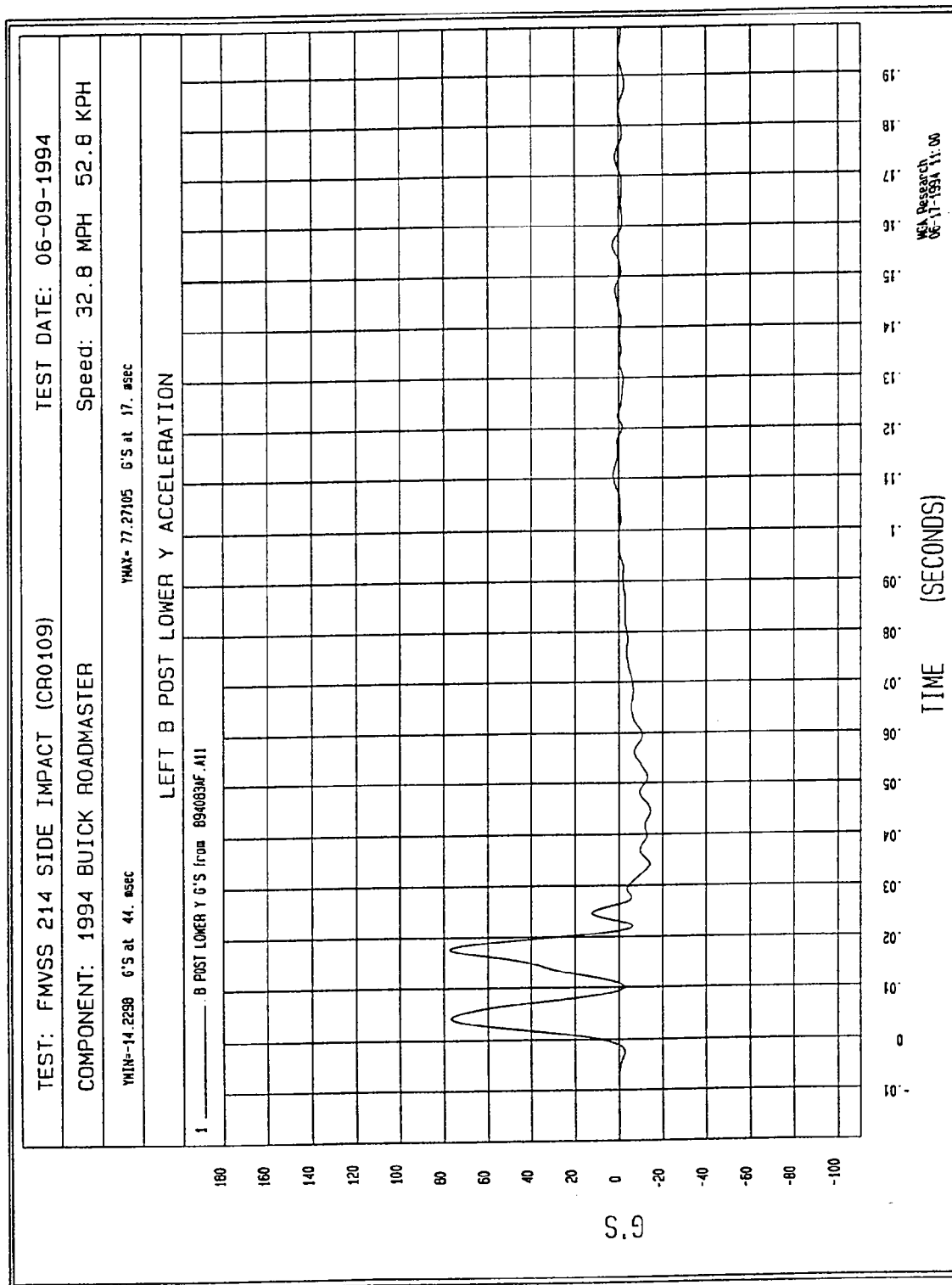


Figure B-50 - Left B Post Lower Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

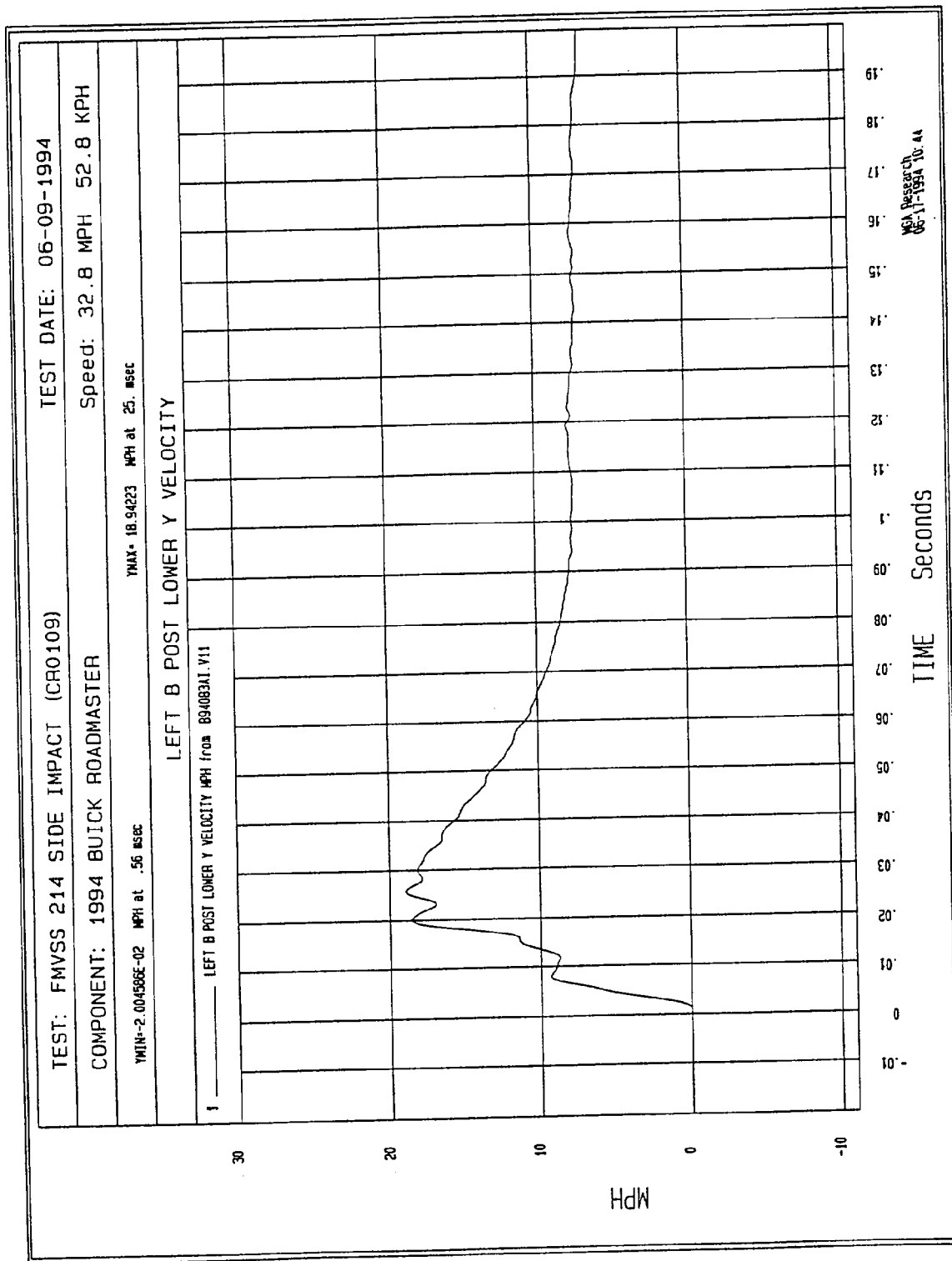


Figure B-51 - Left B Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

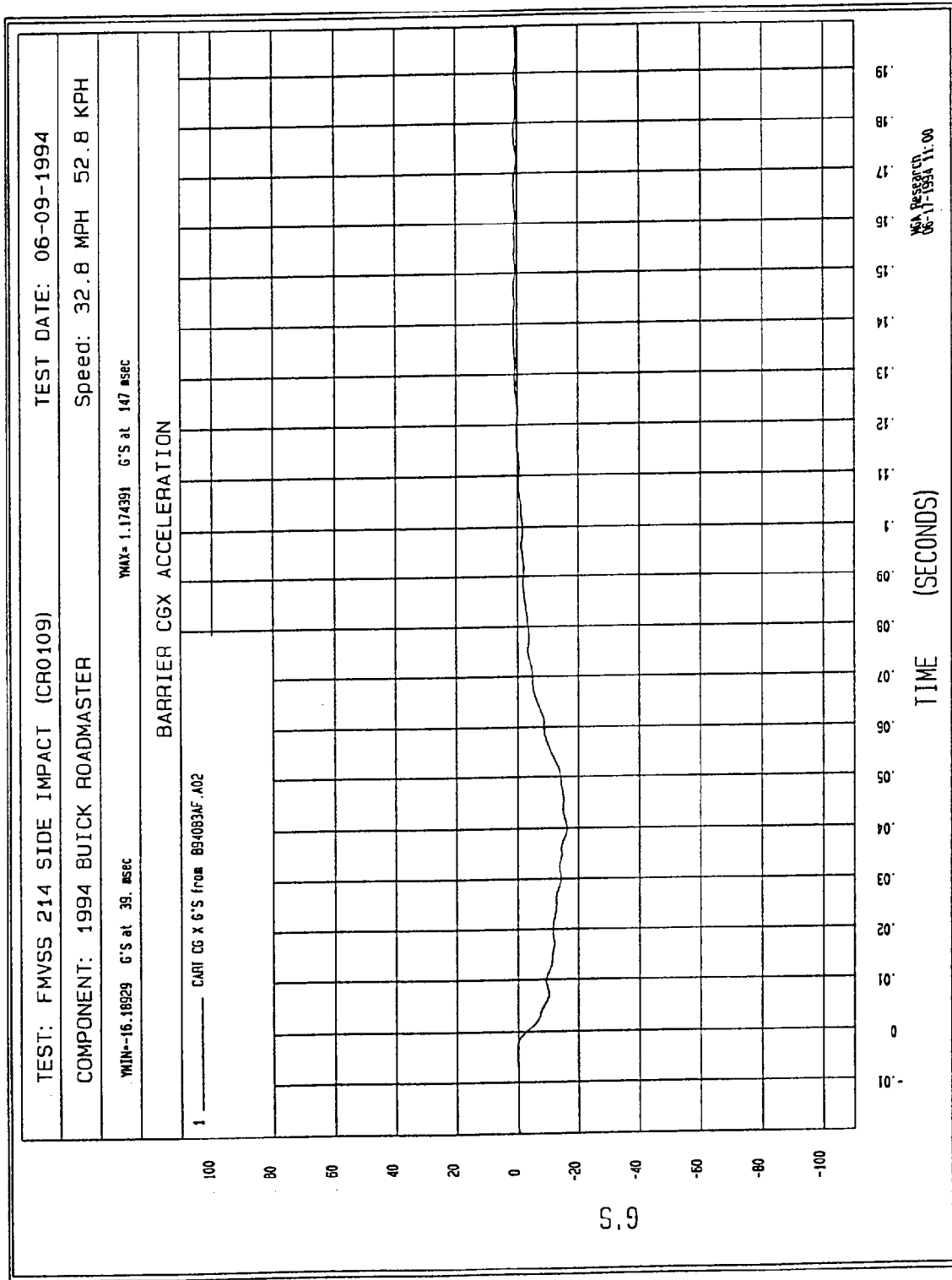


Figure B-52 - Moving Barrier Center of Gravity X Acceleration vs. Time

Filter: Class 180 (300 Hz)

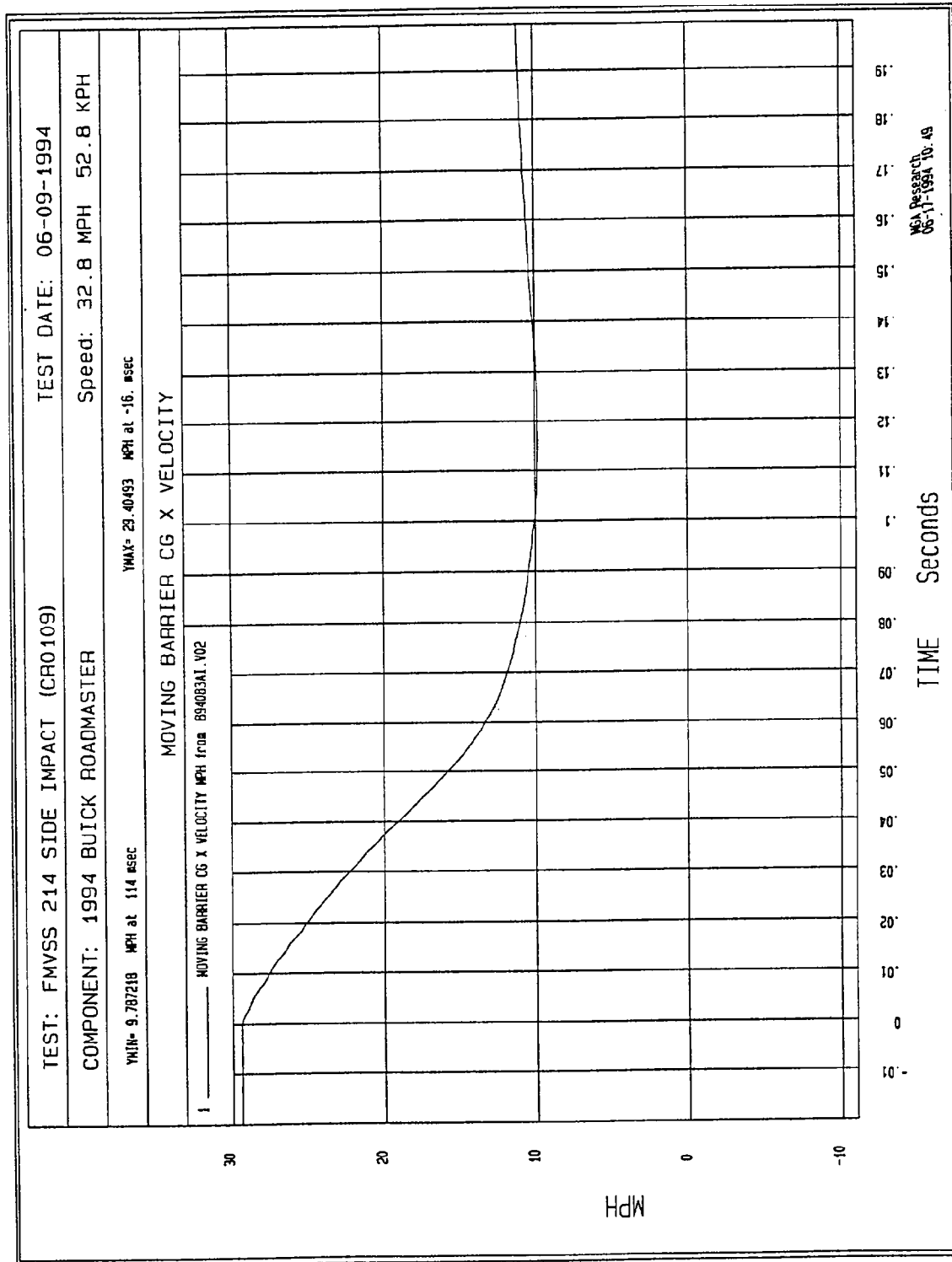


Figure B-53 - Moving Barrier Center of Gravity X Velocity vs. Time

Filter: Class 60 (100 Hz)

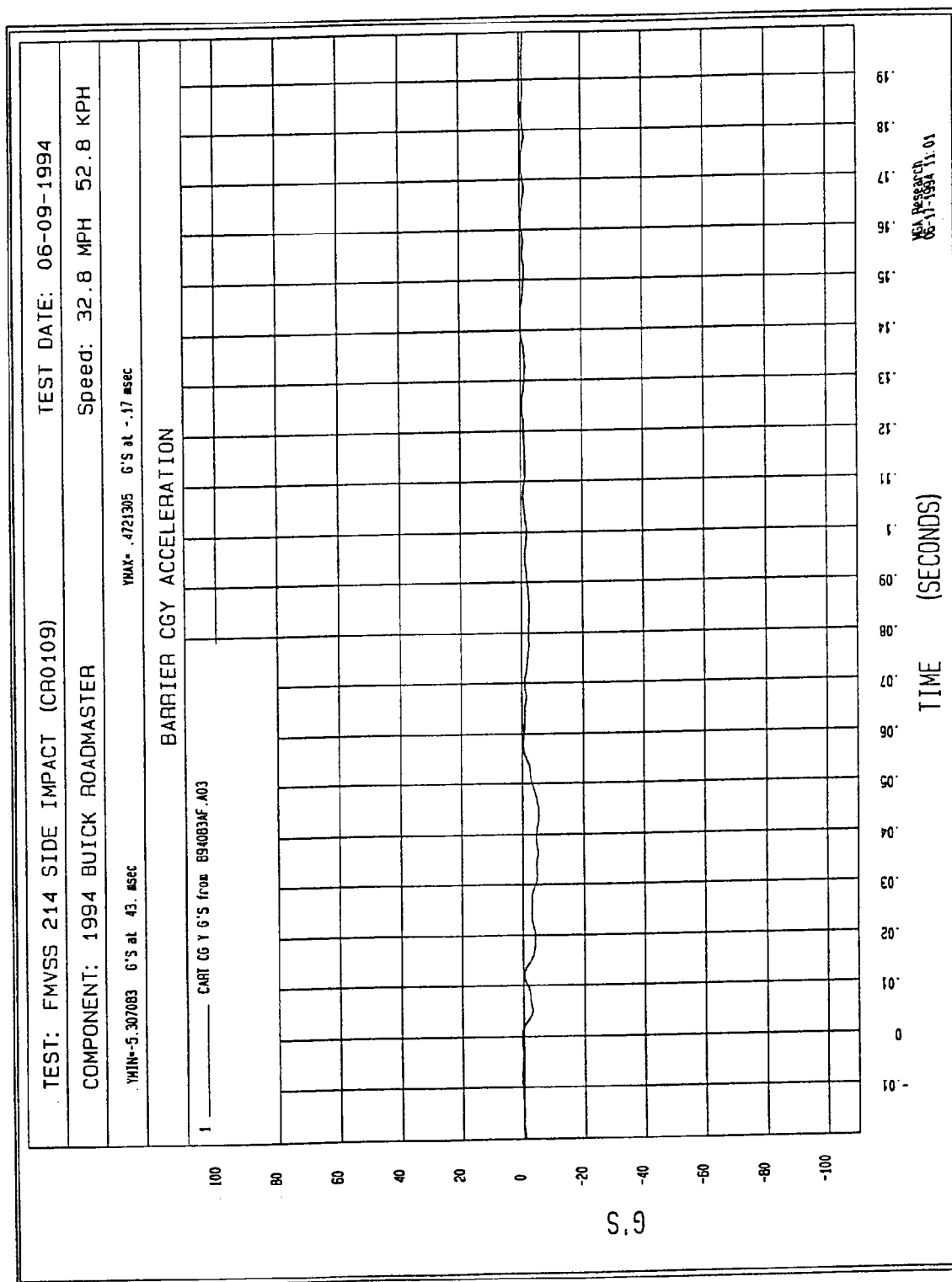


Figure B-54 - Moving Barrier Center of Gravity Acceleration vs. Time

Filter: Class 180 (300 Hz)

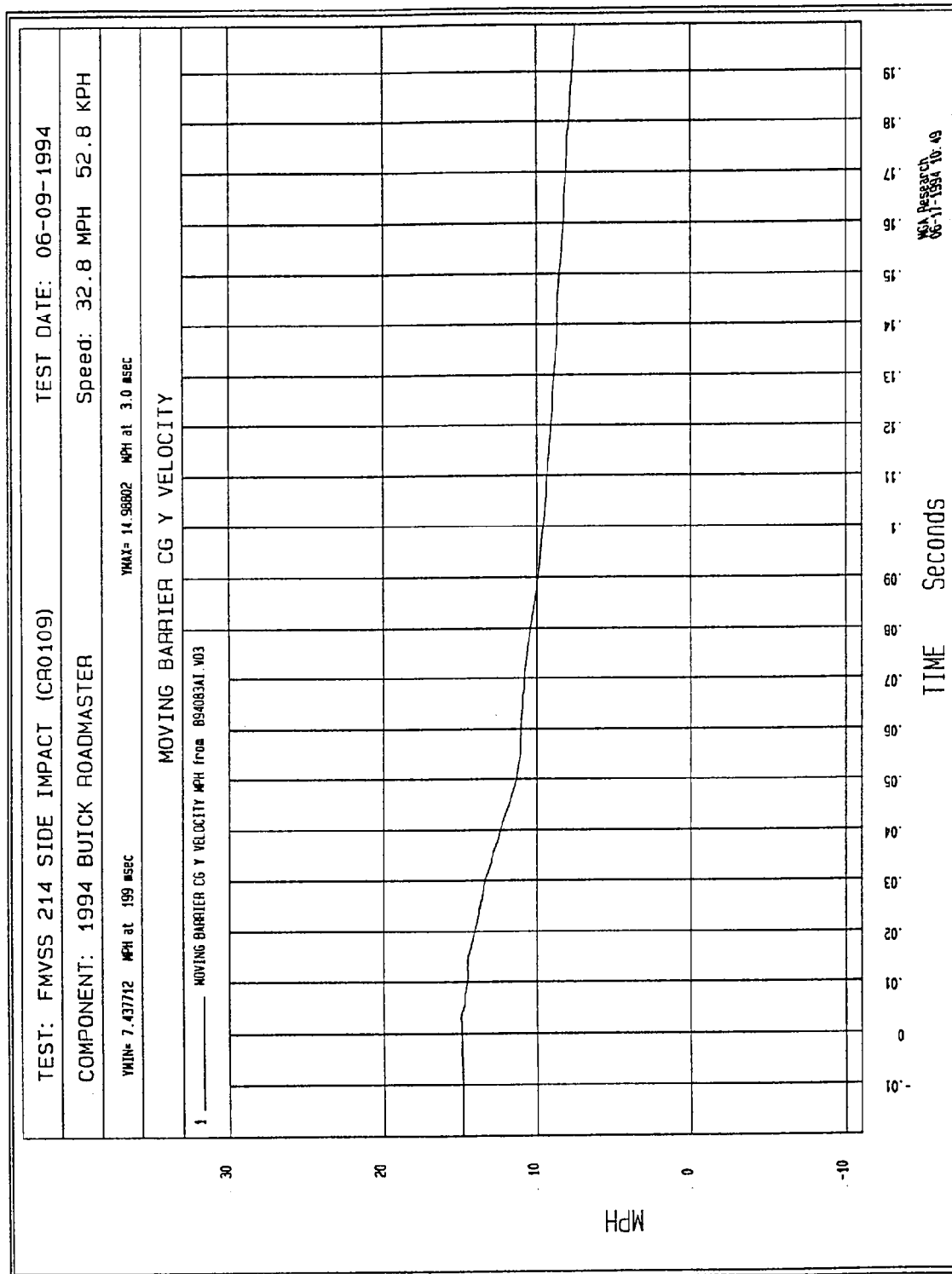


Figure B-55 - Moving Barrier Center of Gravity Y Velocity vs. Time

Filter: Class 60 (100 Hz)

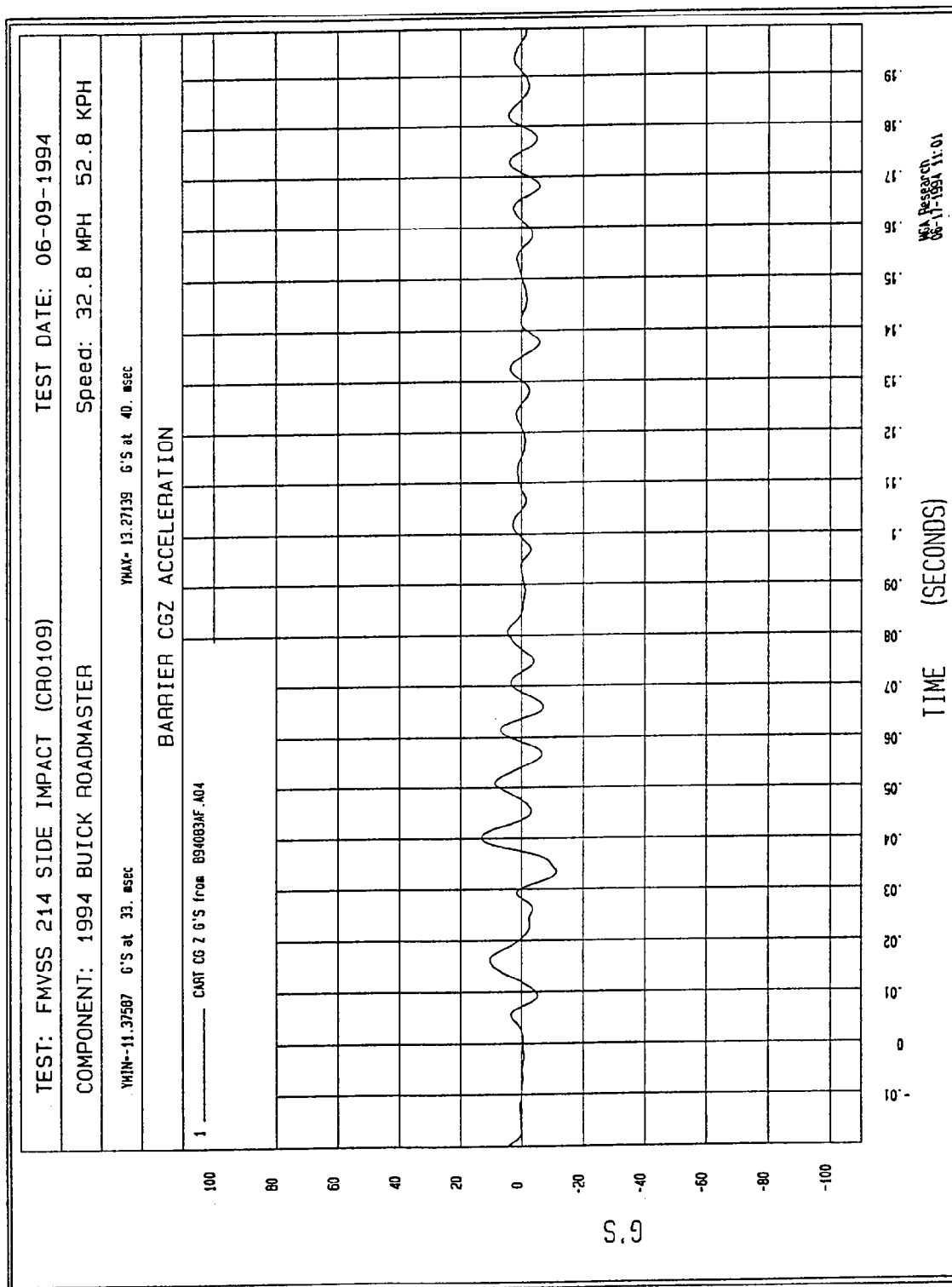


Figure B-56 - Moving Barrier Center of Gravity Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

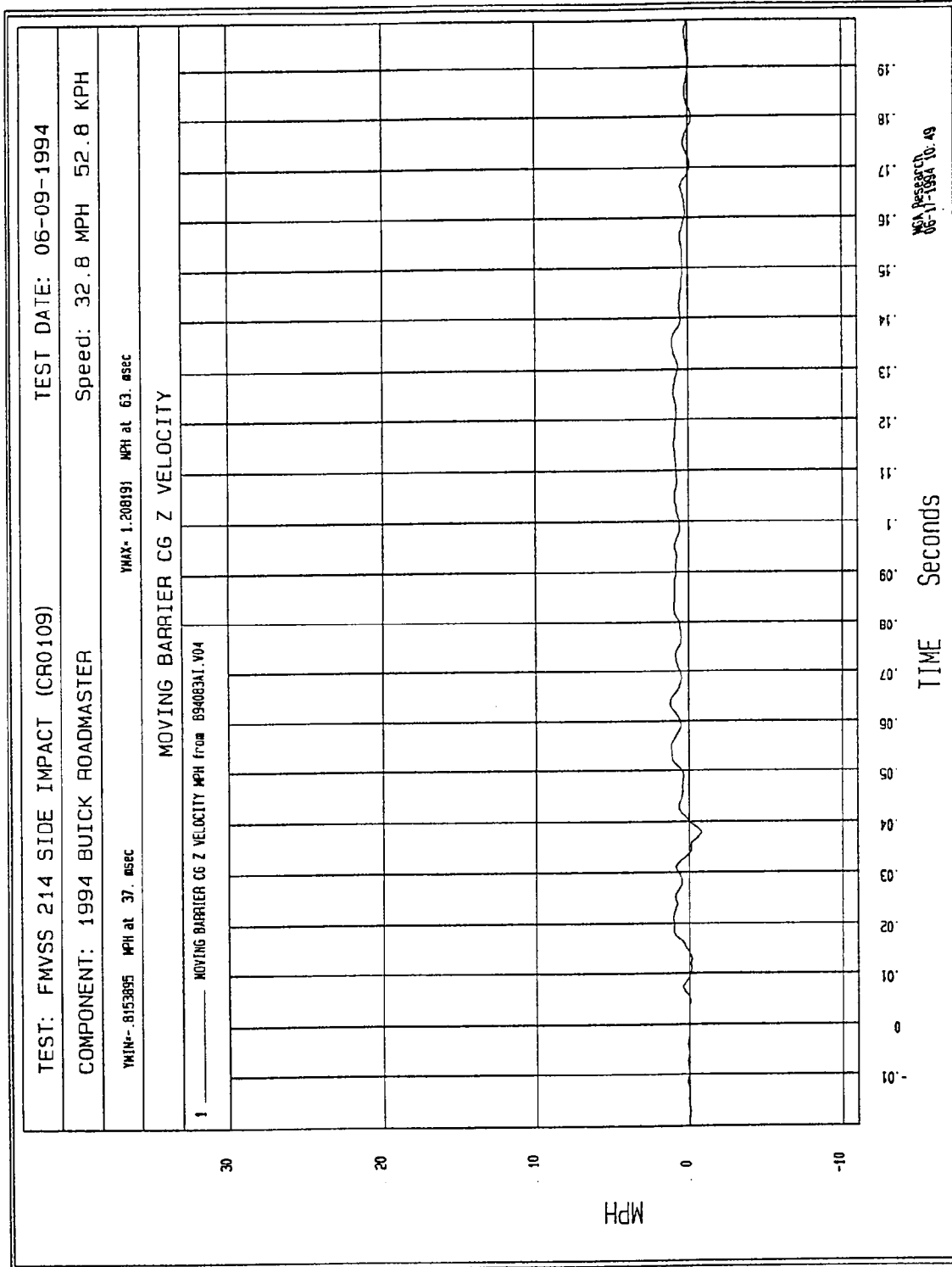


Figure B-57 - Moving Barrier Center of Gravity Z Velocity vs. Time

Filter: Class 60 (100 Hz)

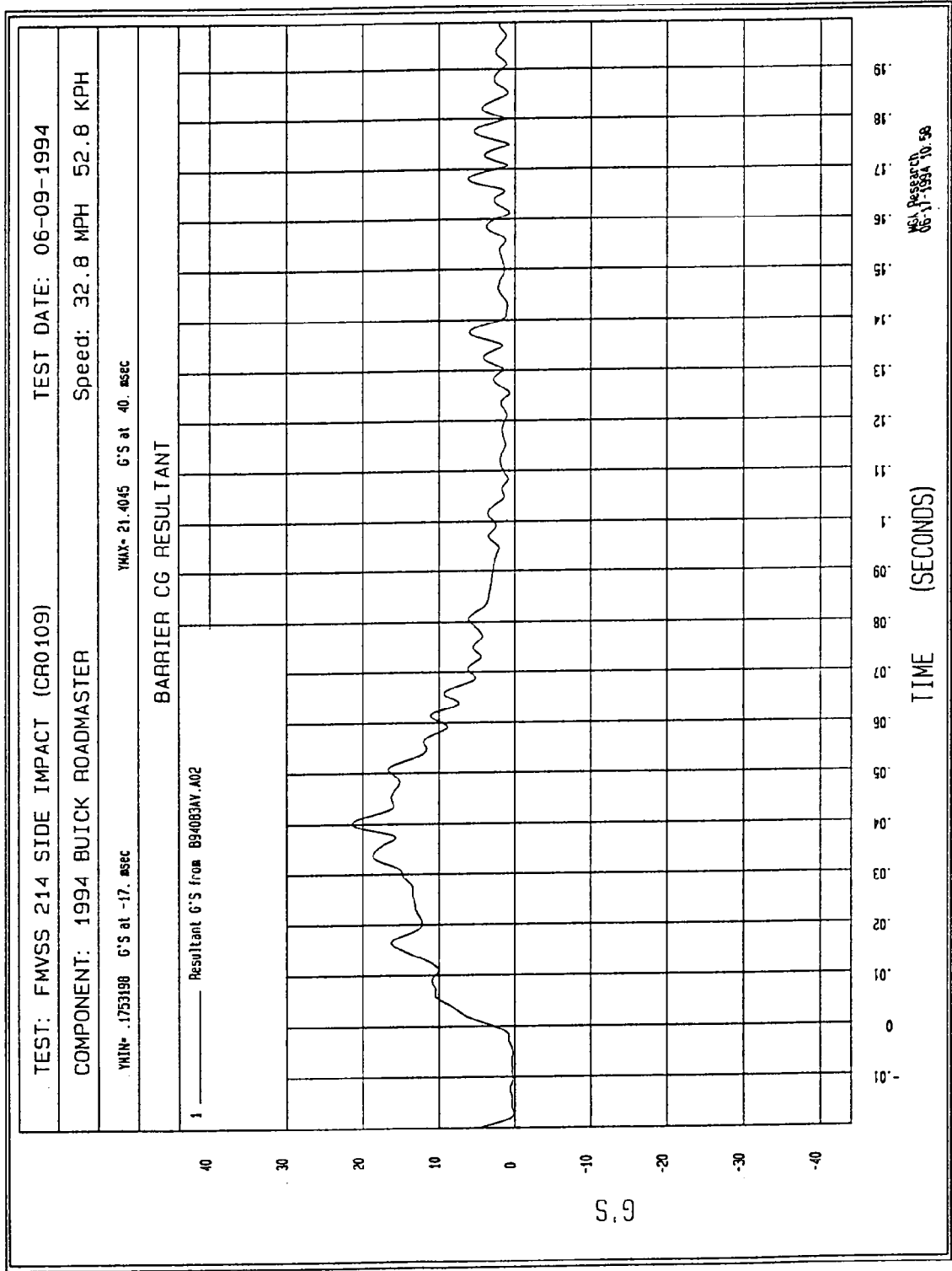


Figure B-58 - Moving Barrier Center of Gravity Resultant vs. Time

Filter: Class 60 (100 Hz)

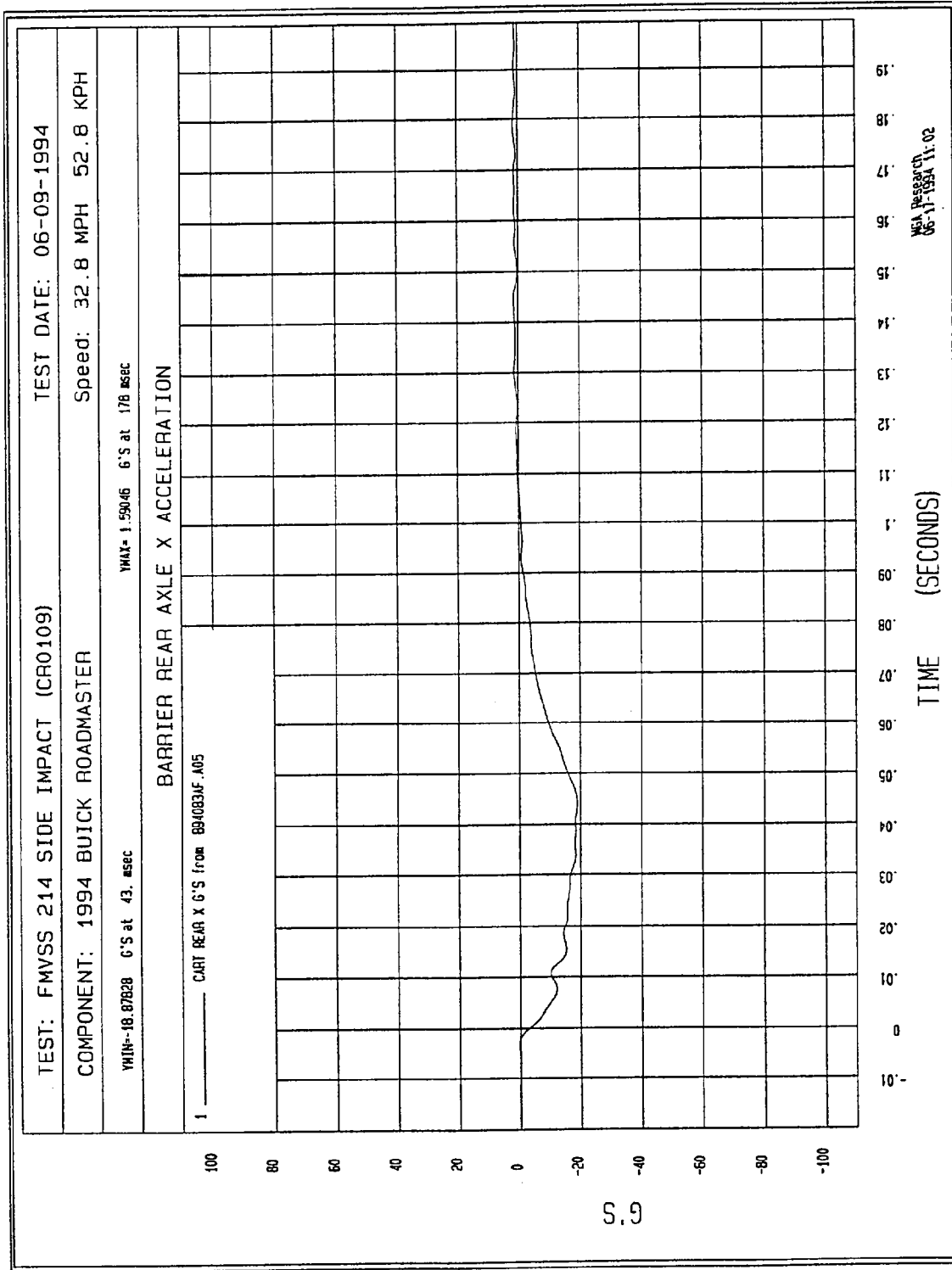


Figure B-59 - Moving Barrier Rear Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

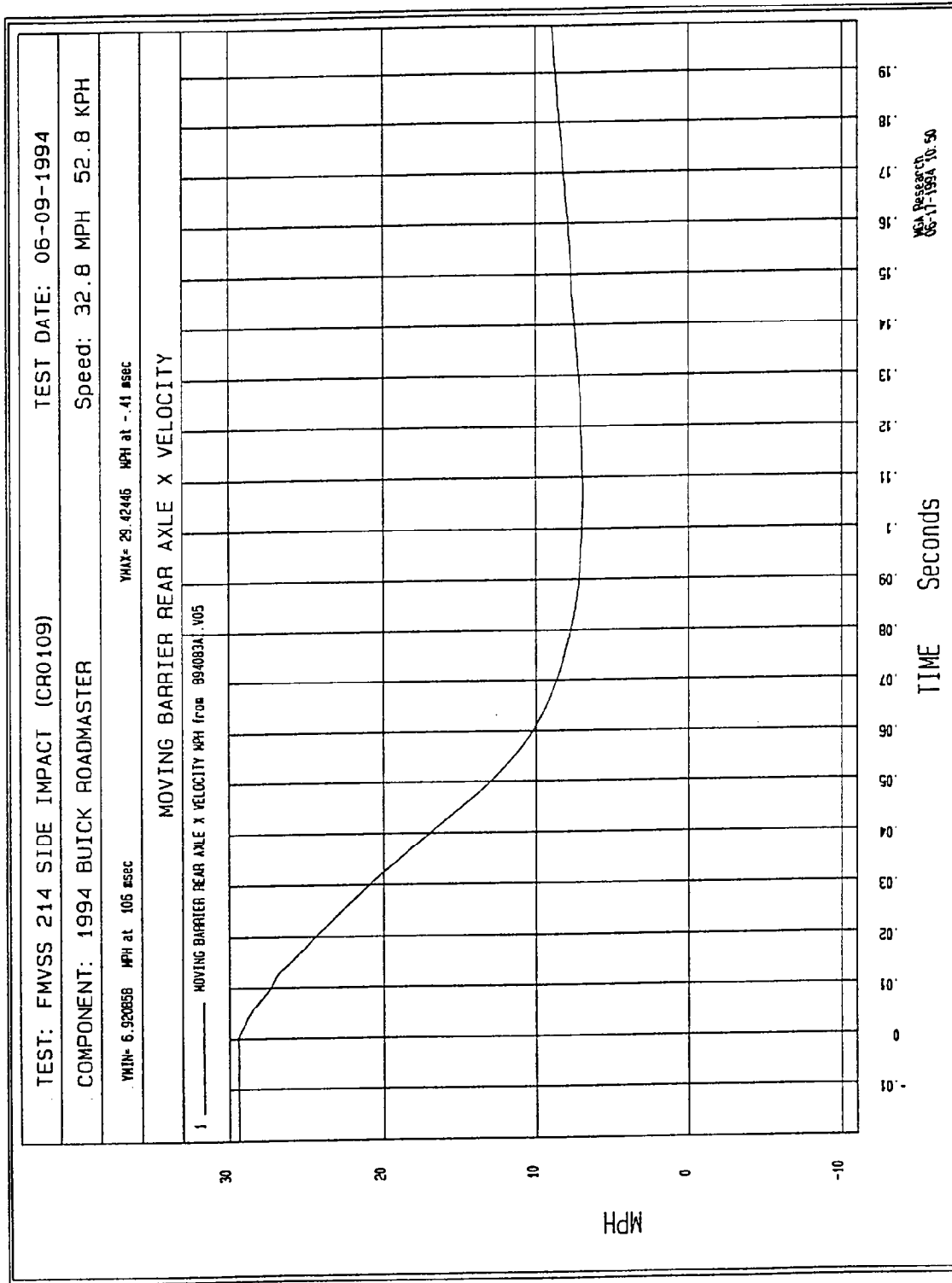


Figure B-60 - Moving Barrier Rear Axle X Velocity vs. Time

No Valid Data Collected

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Figure B-61 - Moving Barrier Rear Axle Y Acceleration vs. Time

No Valid Data Collected

B-62

Figure B-62 - Moving Barrier Rear Axle Y Velocity vs. Time

Filter: Class 1000 (1650 Hz)

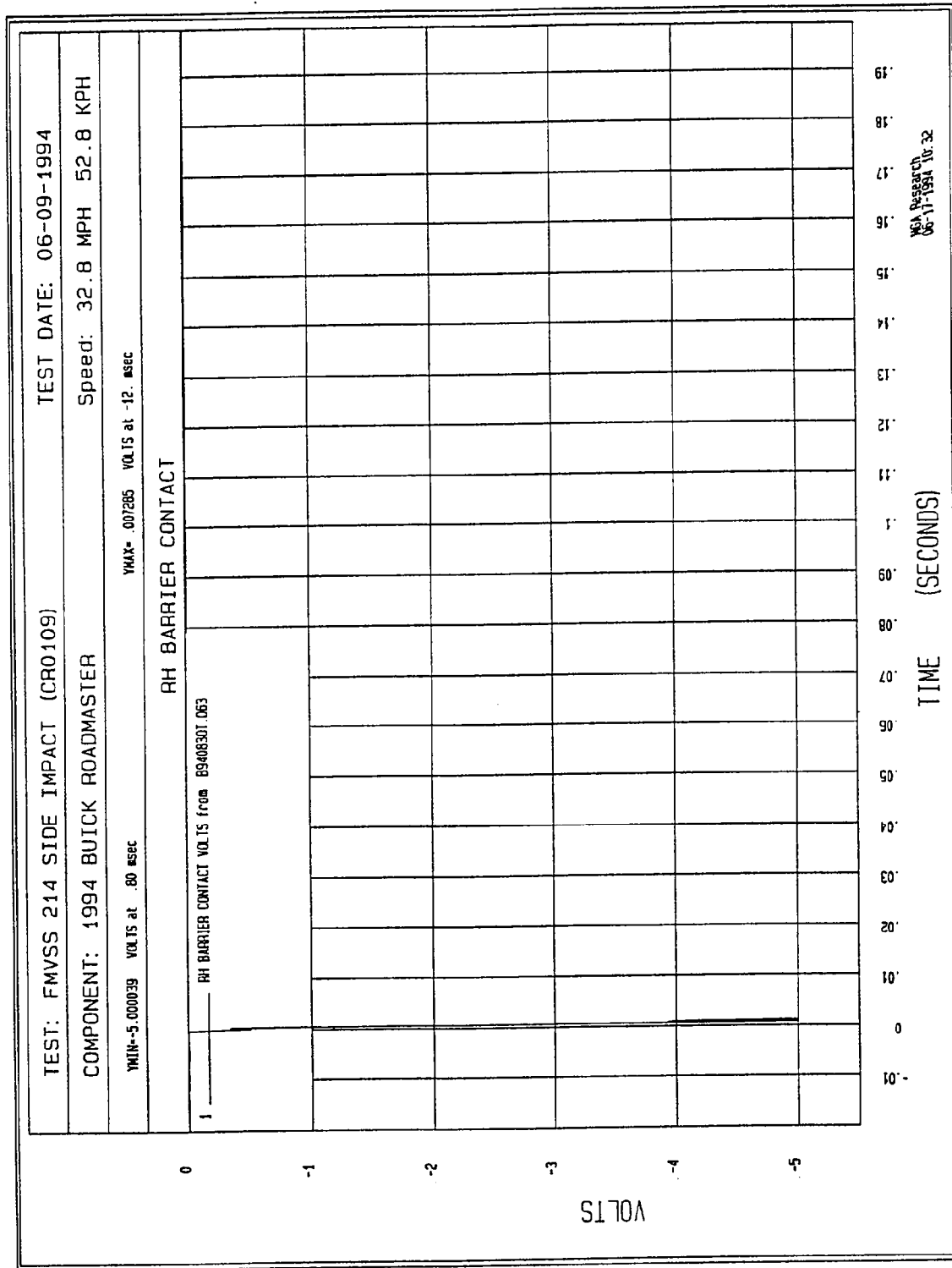


Figure B-63 - Right Hand Barrier Contact

Filter: Class 1000 (1650 Hz)

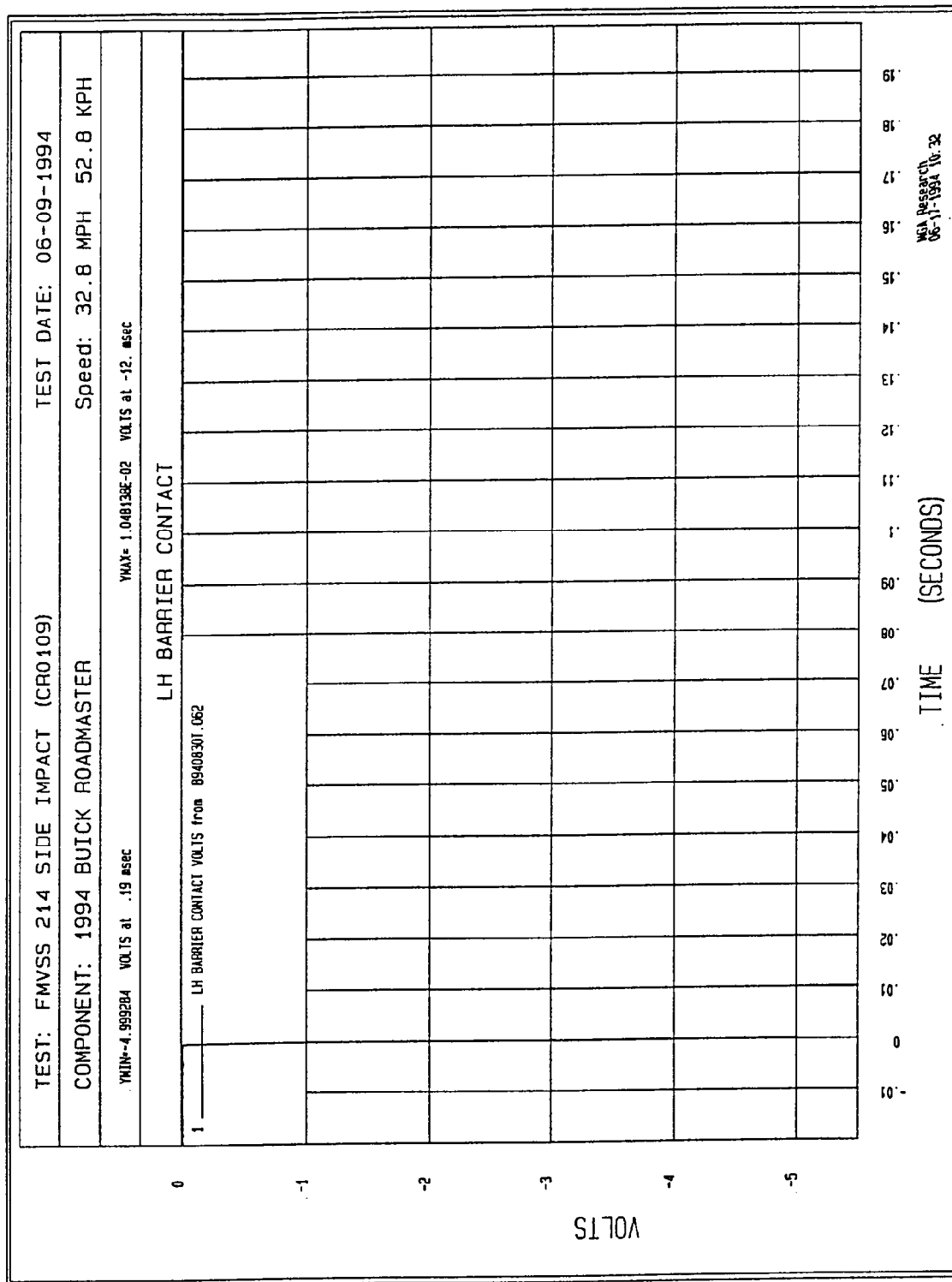


Figure B-64 - Left Hand Barrier Contact

Filter: Class 180 (300 Hz)

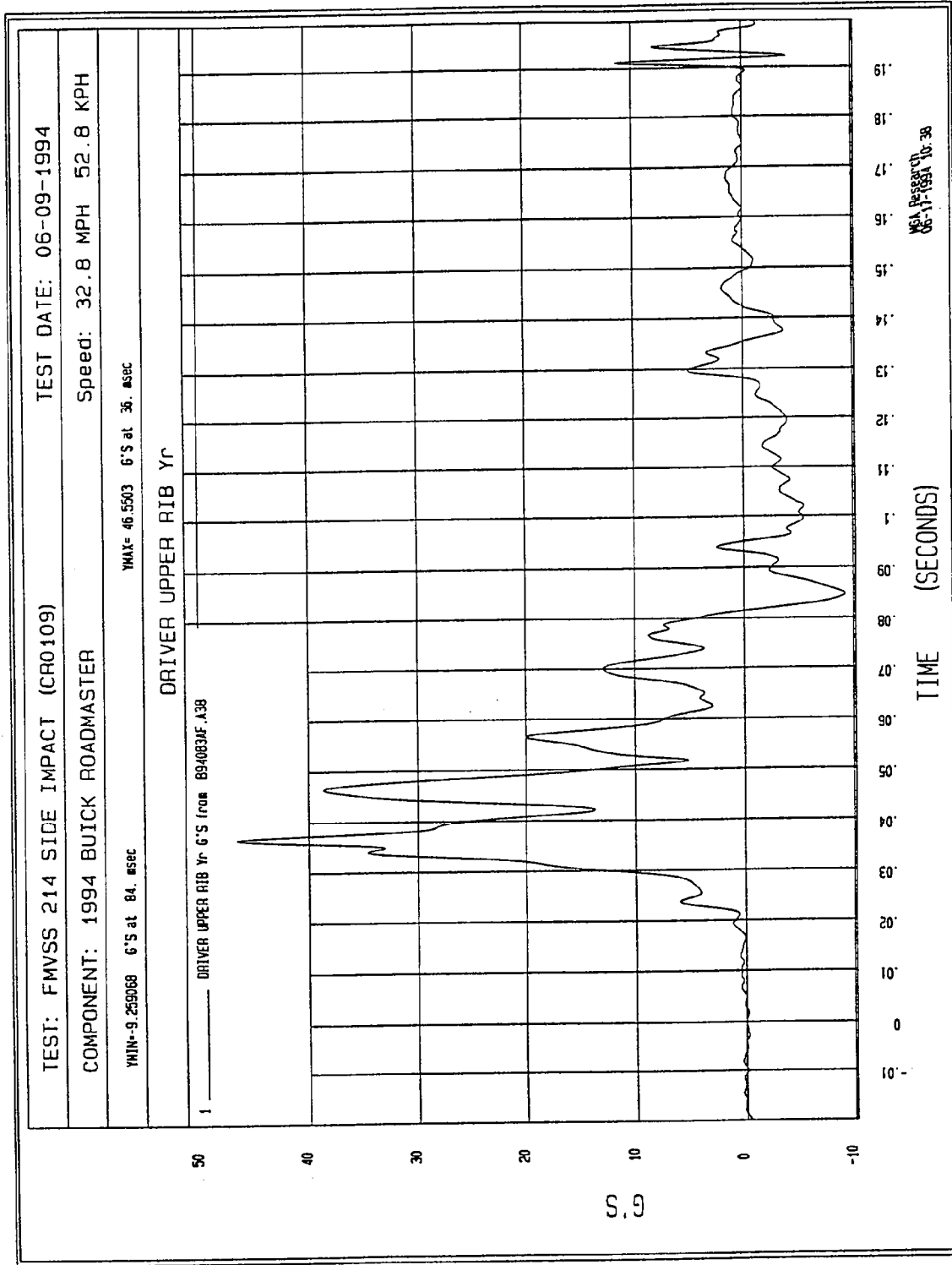


Figure B-65 - Driver Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

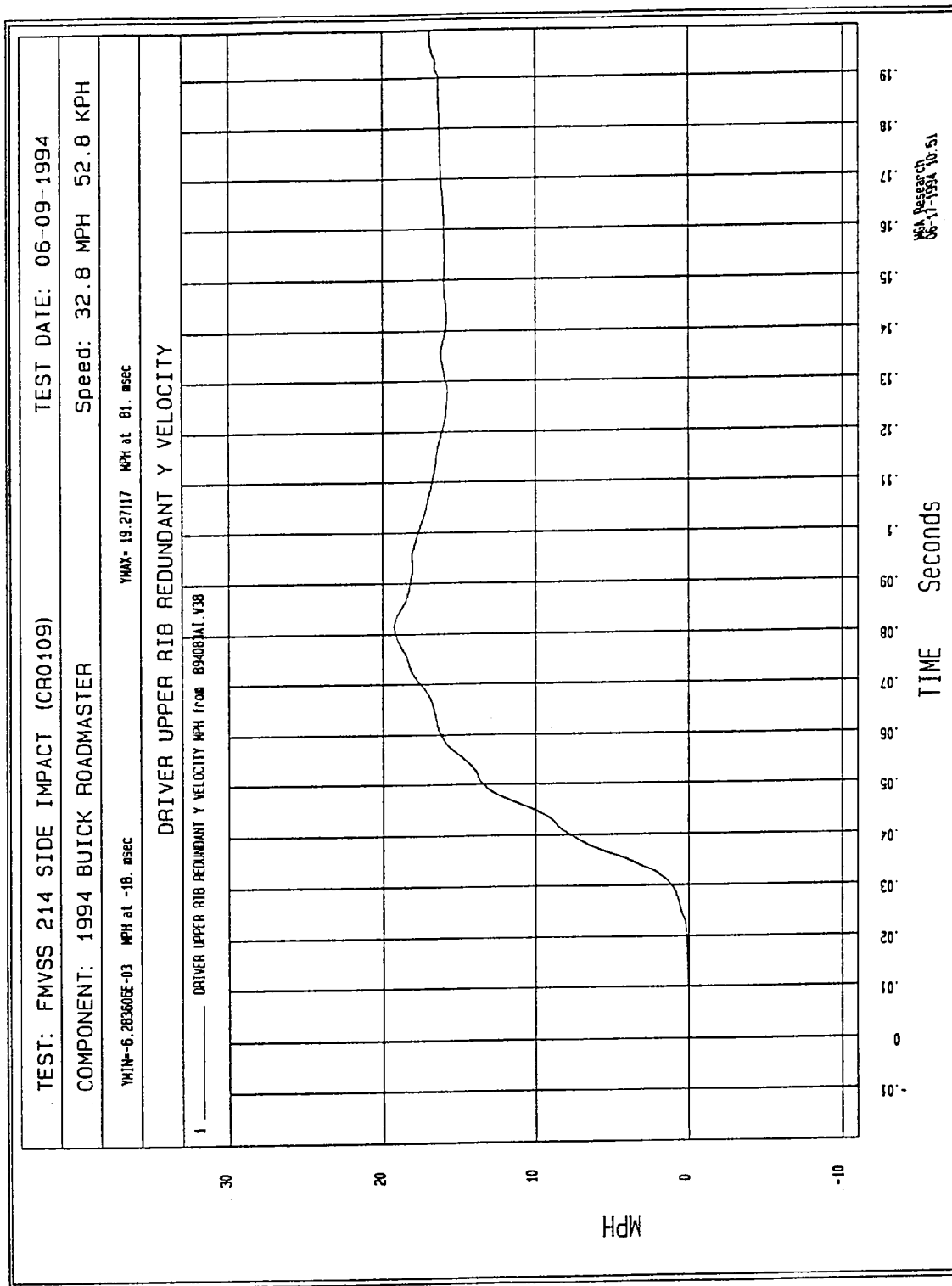
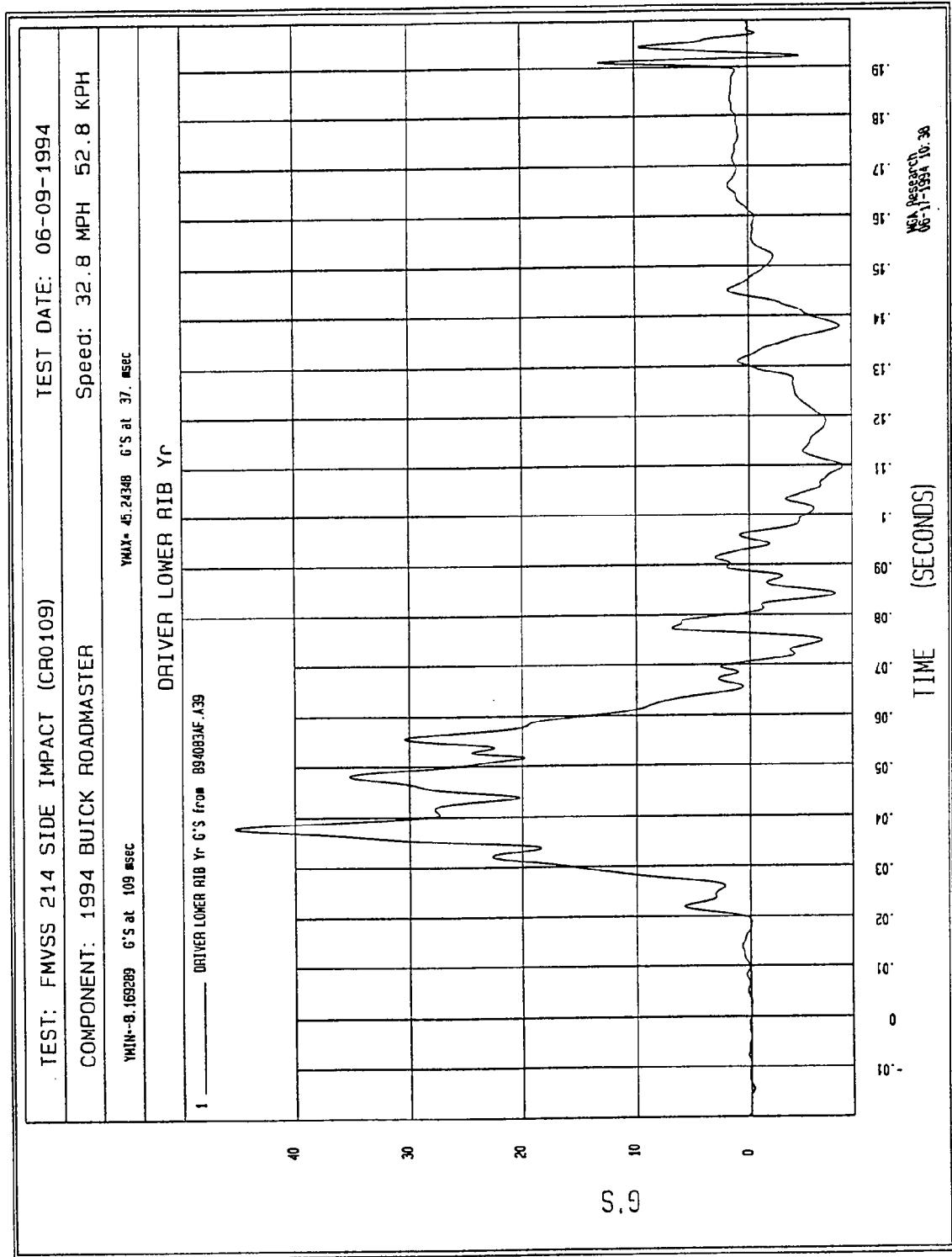


Figure B-66 - Driver Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)



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Figure B-67 - Driver Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

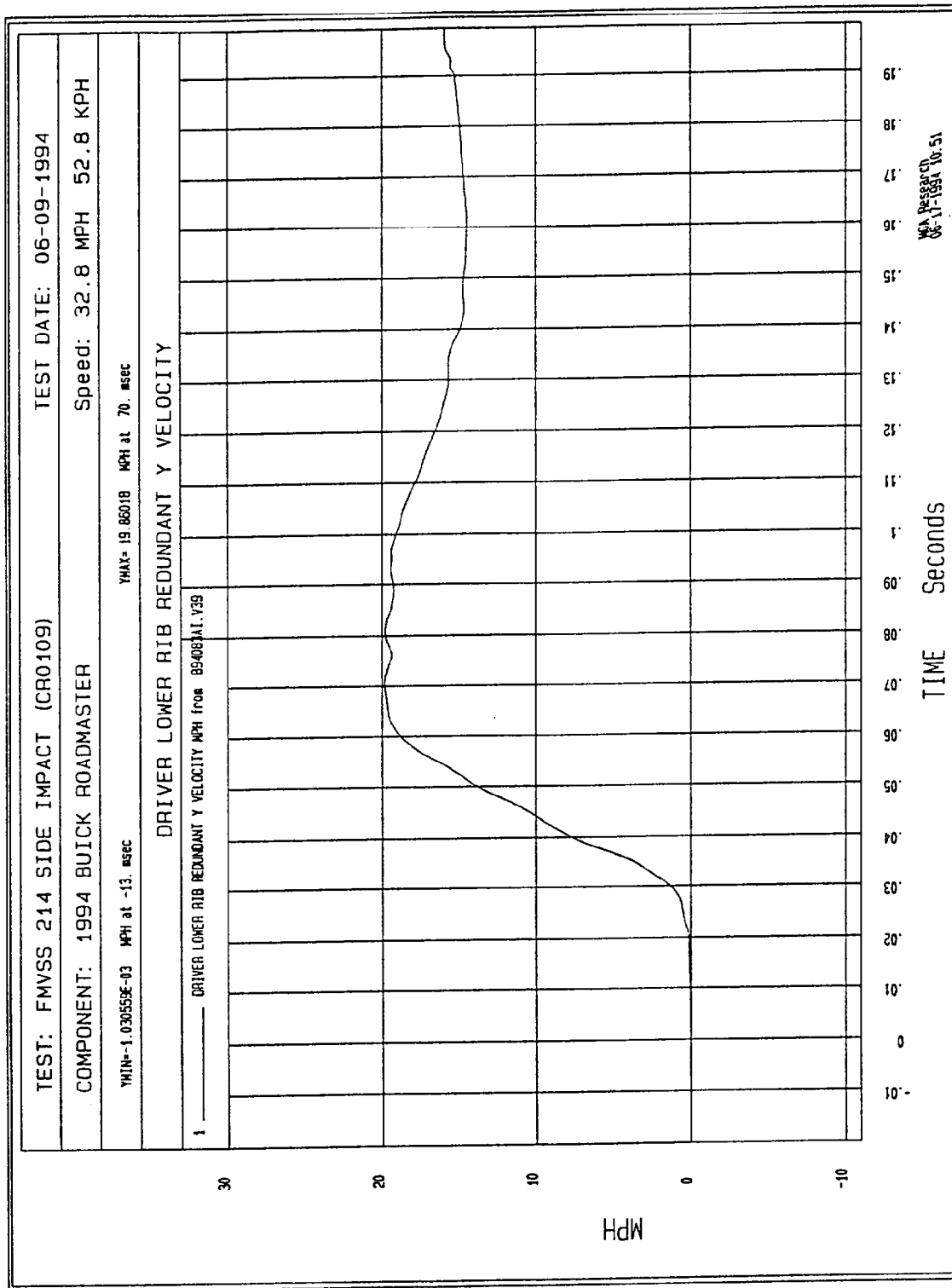


Figure B-68 - Driver Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

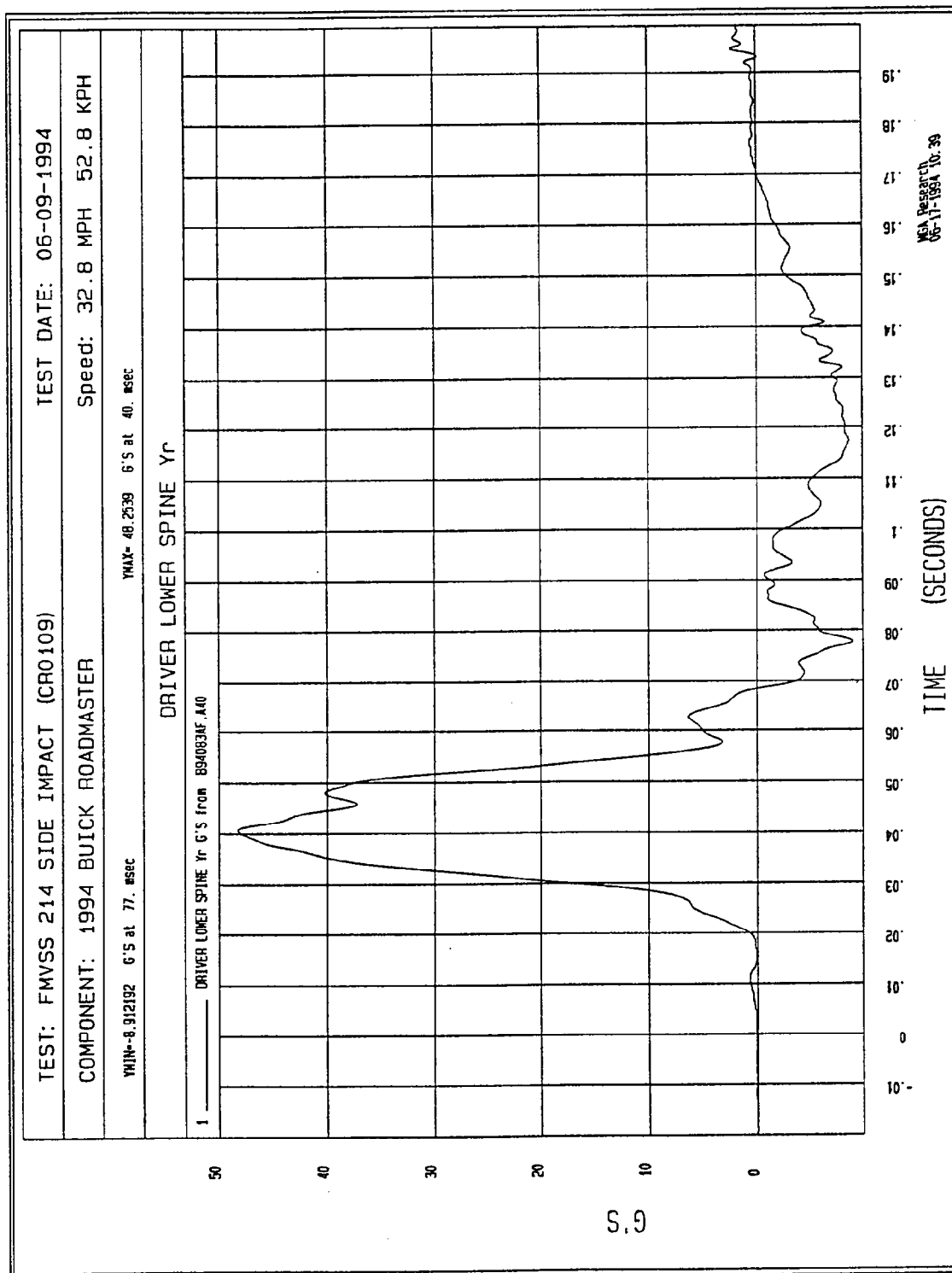


Figure B-69 - Driver Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

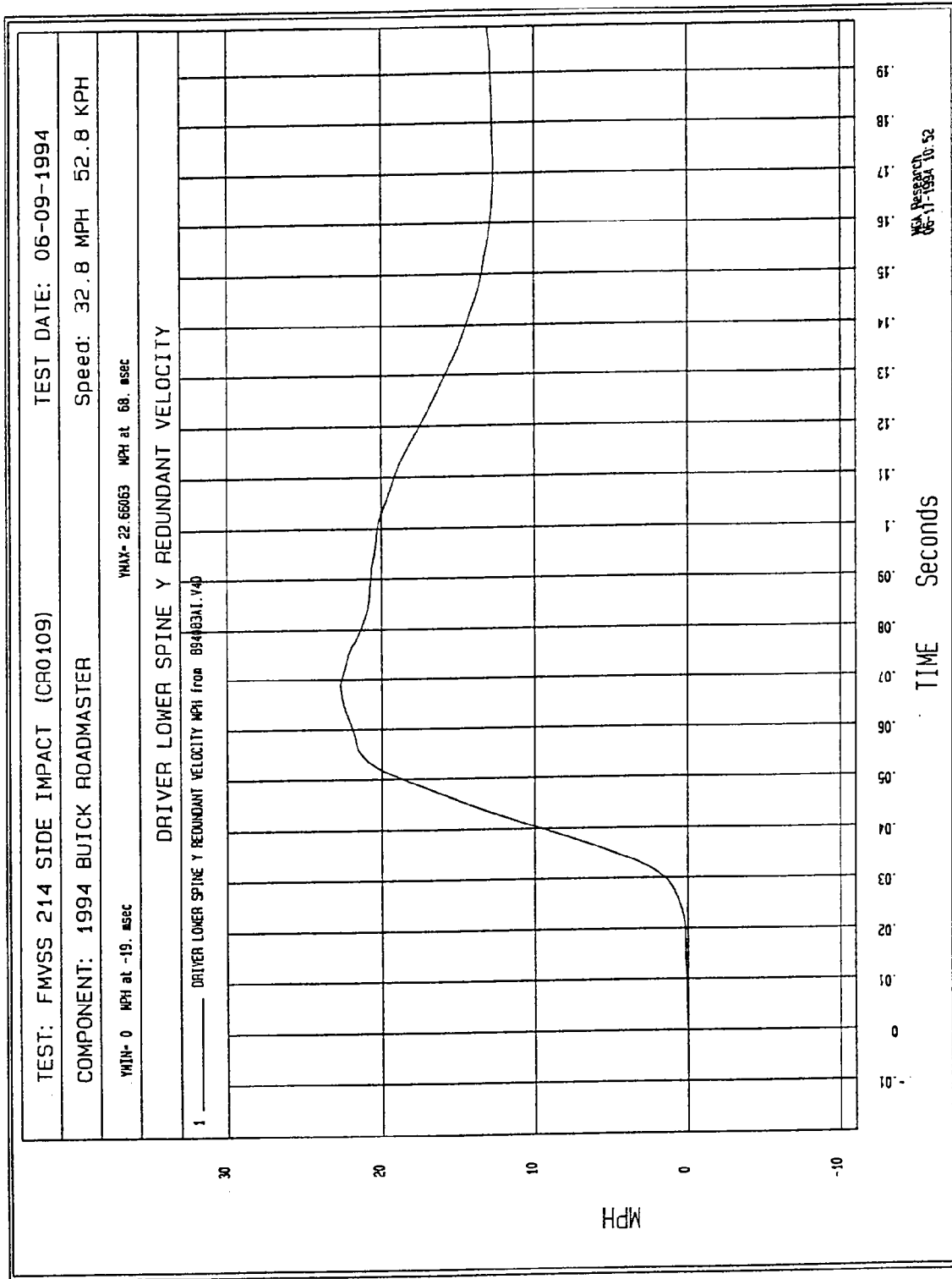


Figure B-70 - Driver Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

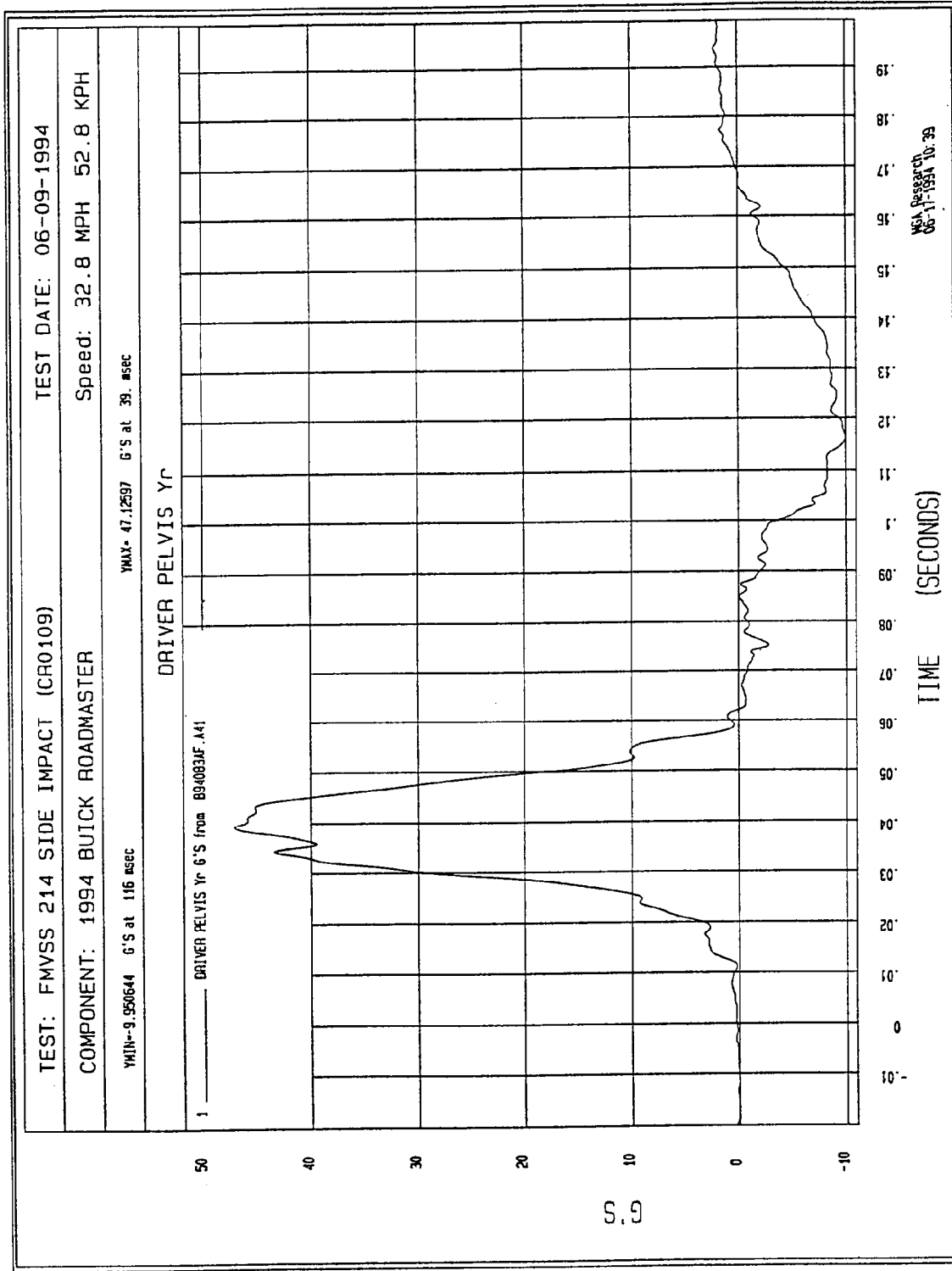


Figure B-71 - Driver Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

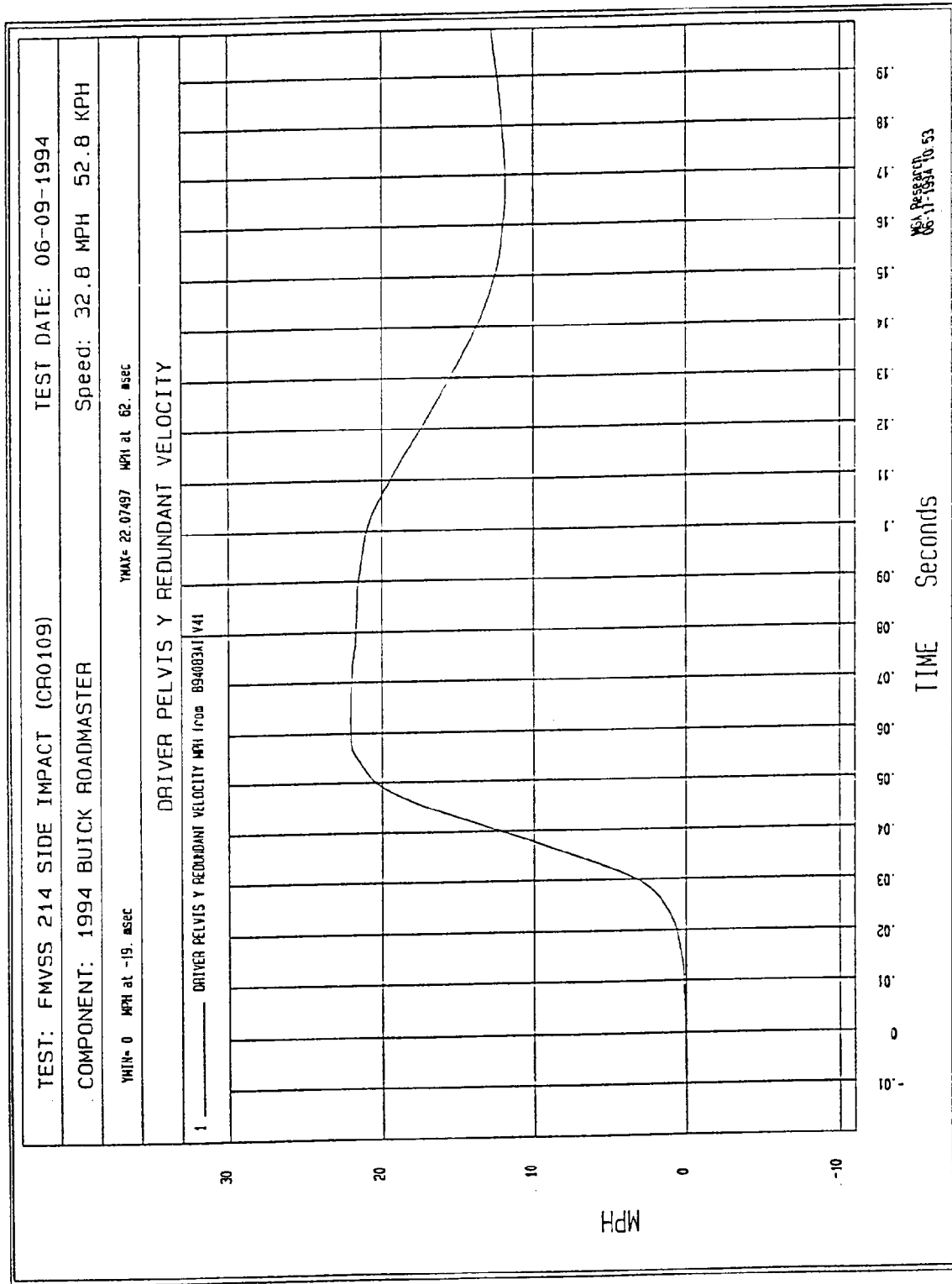


Figure B-72 - Driver Pelvis Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

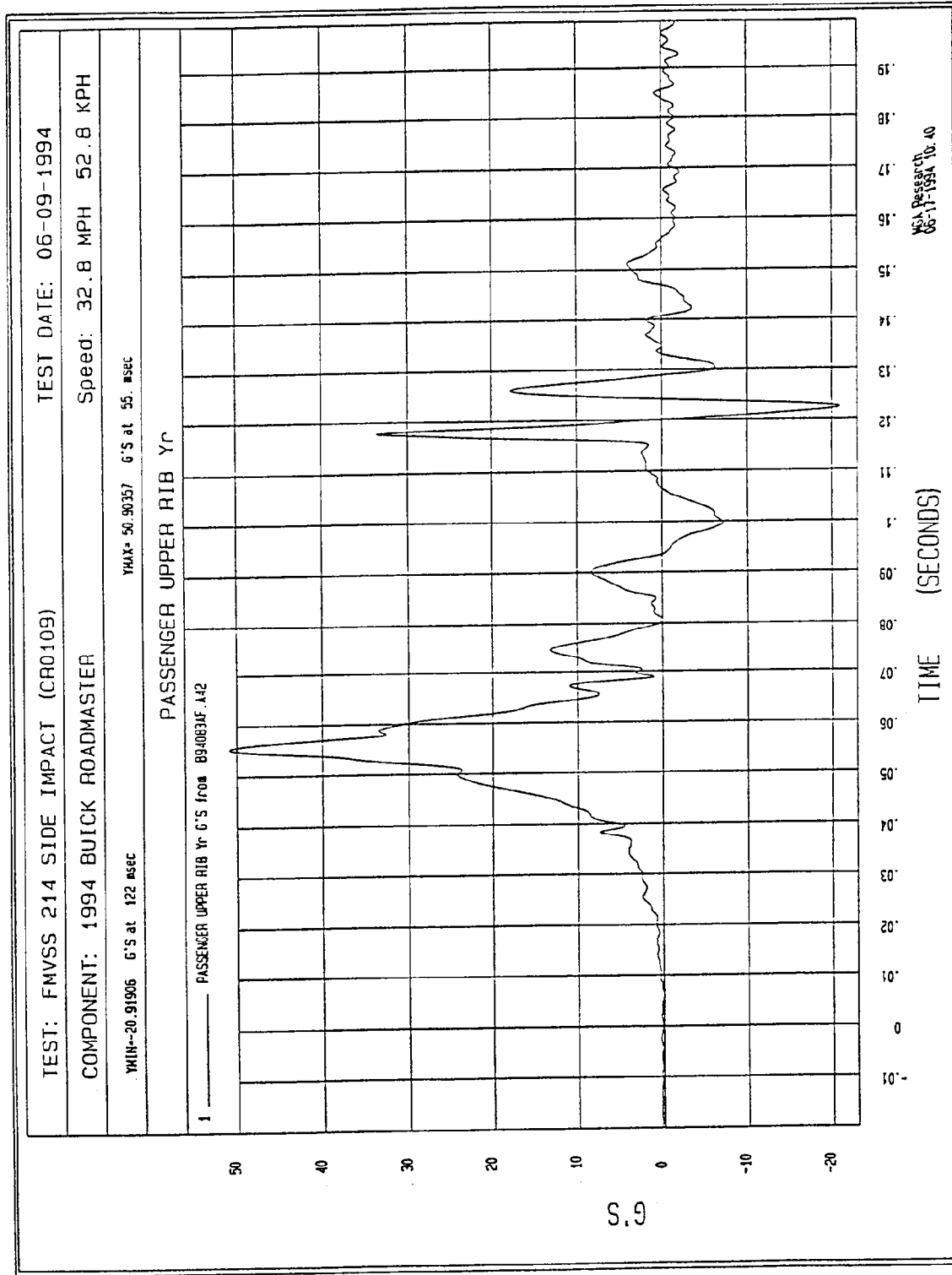


Figure B-73 - Passenger Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

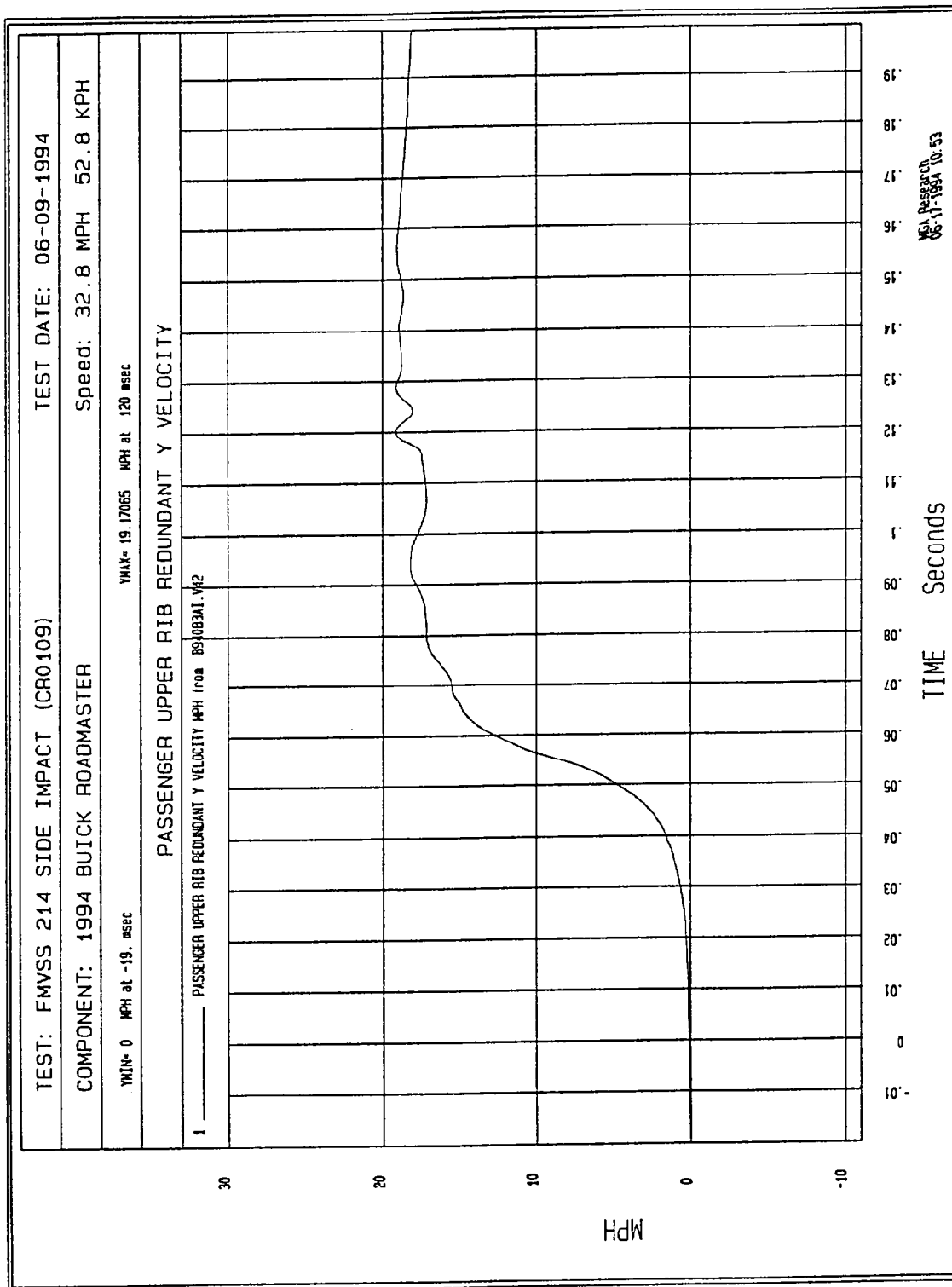


Figure B-74 - Passenger Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

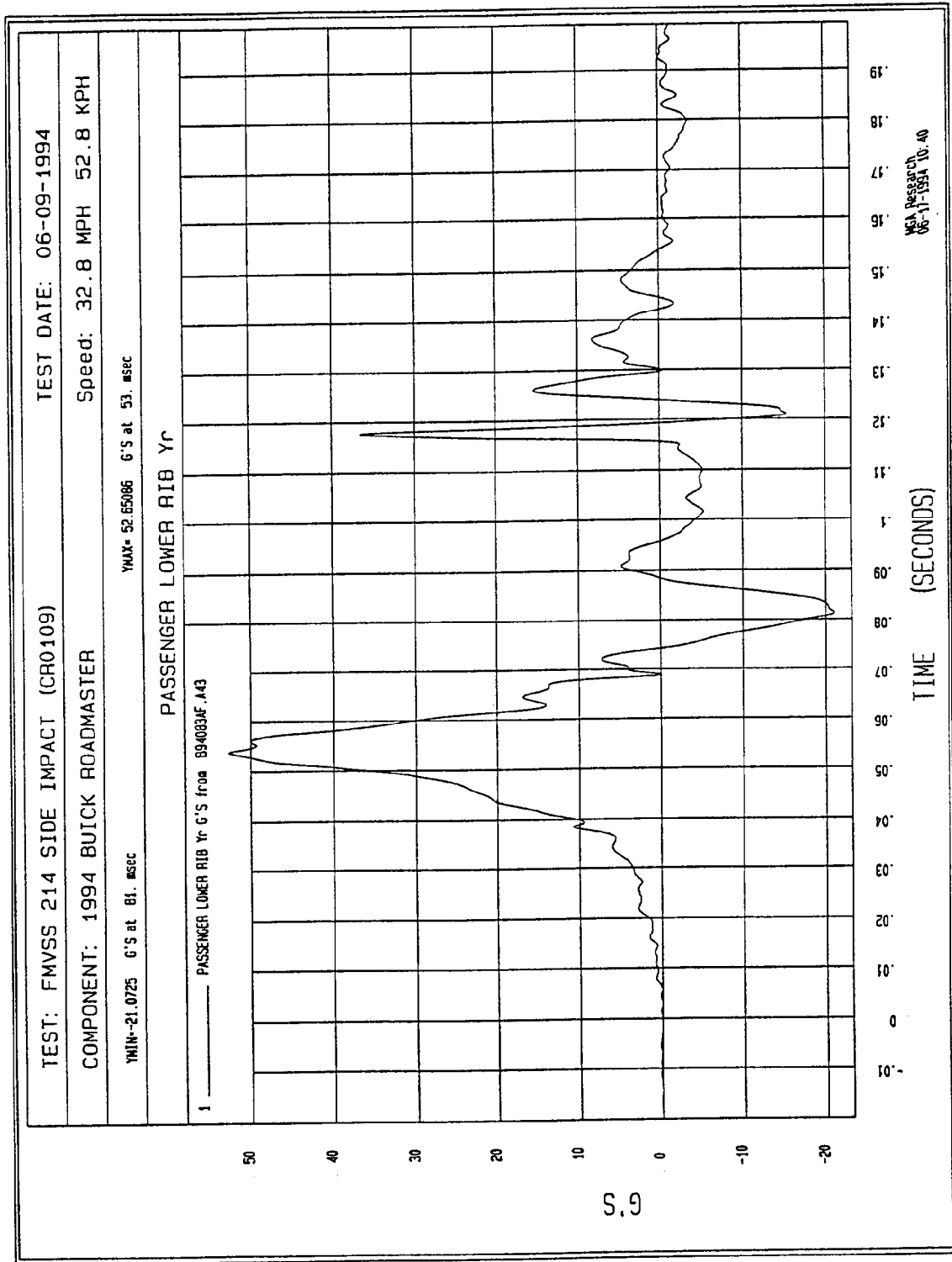
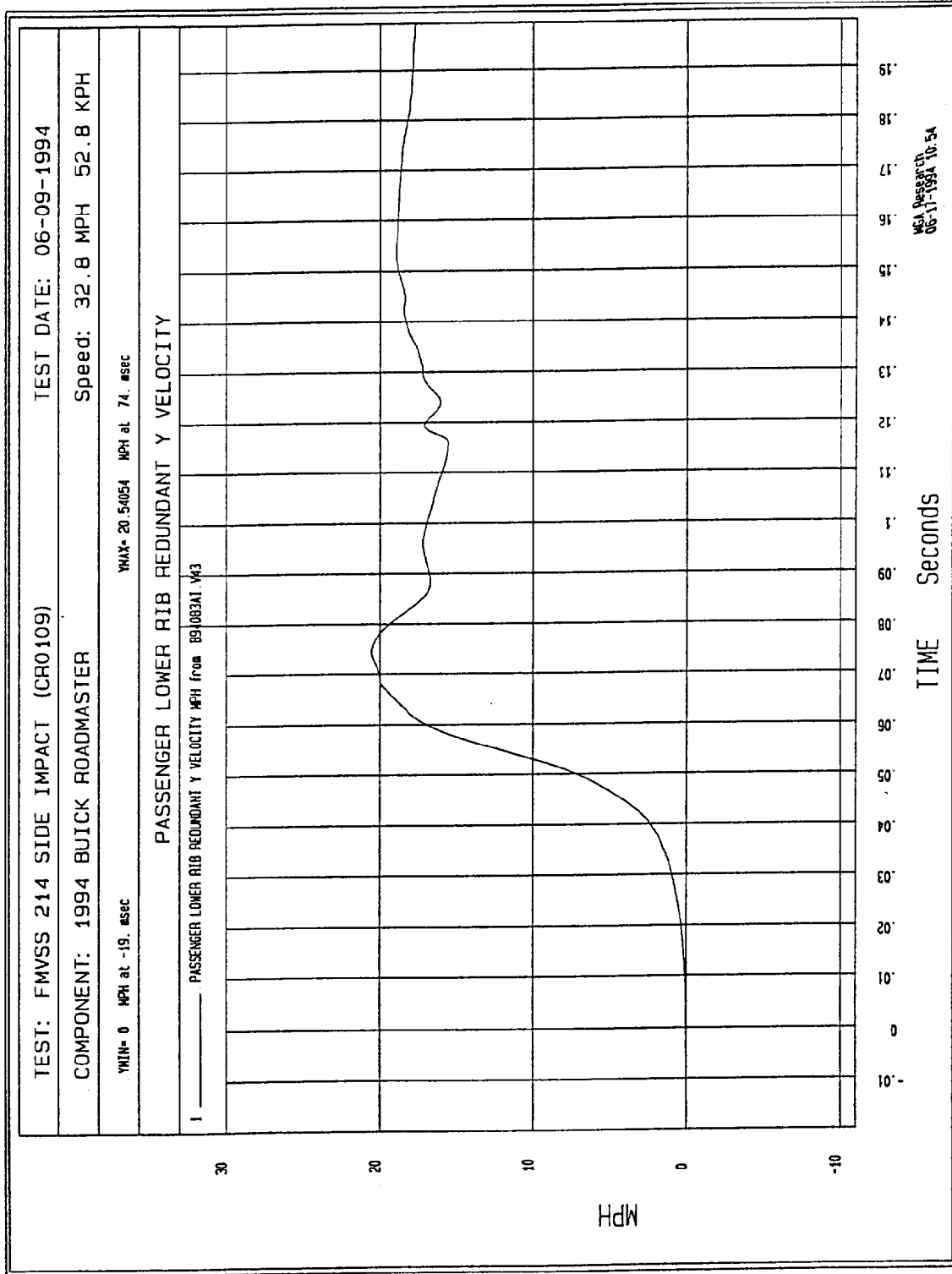


Figure B-75 - Passenger Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)



Filter: Class 180 (300 Hz)

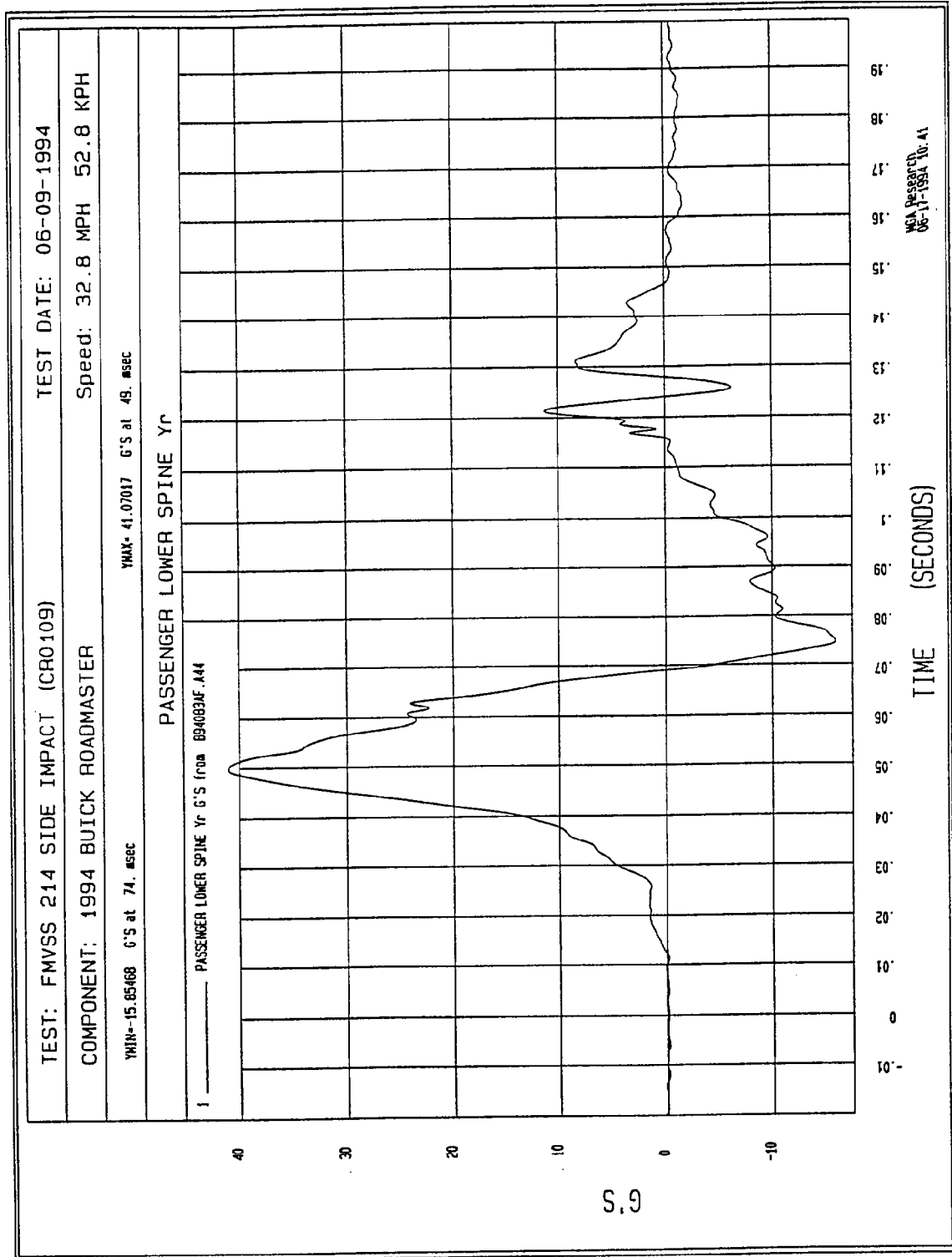


Figure B-77 - Passenger Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

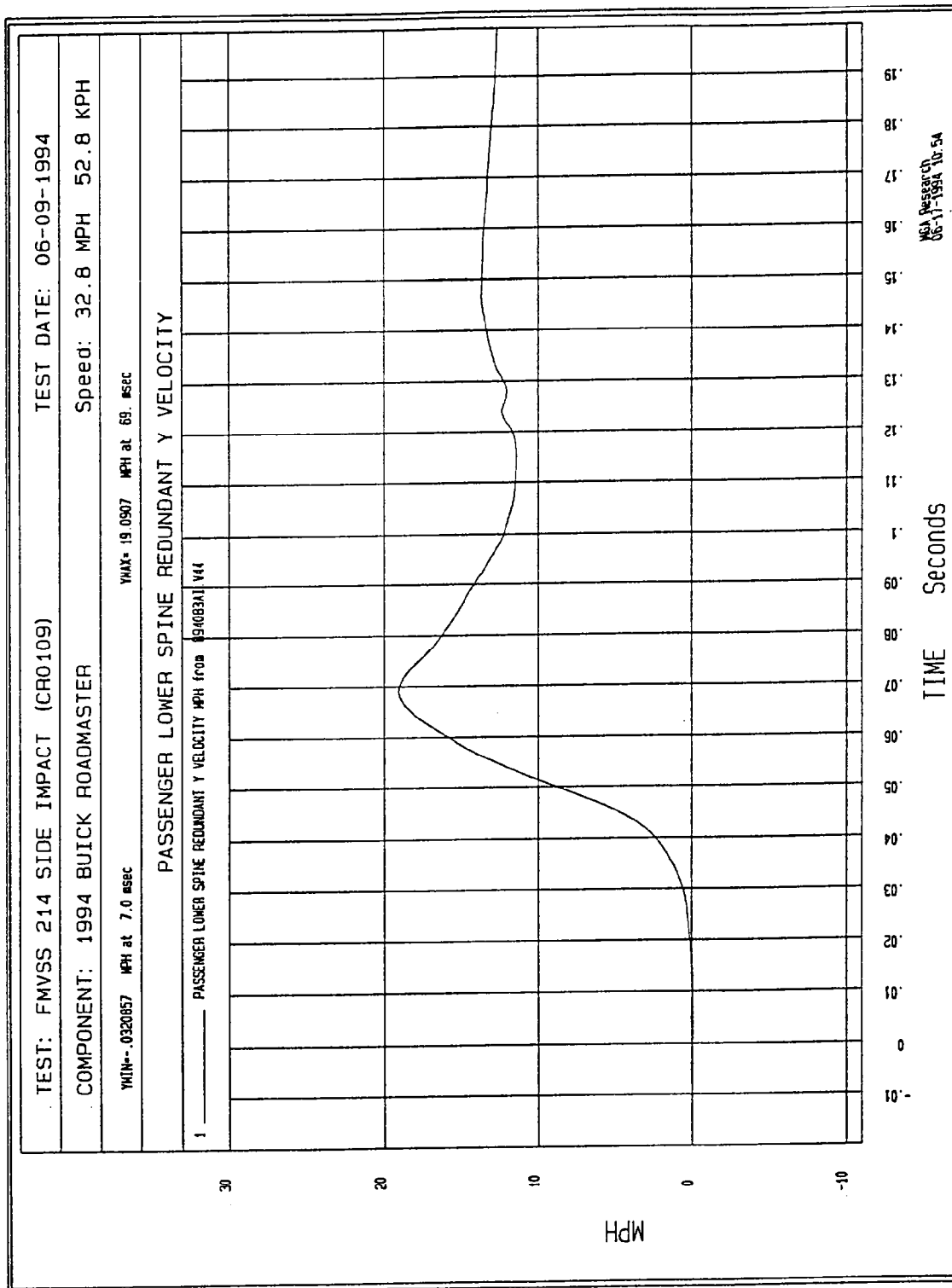


Figure B-78 - Passenger Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

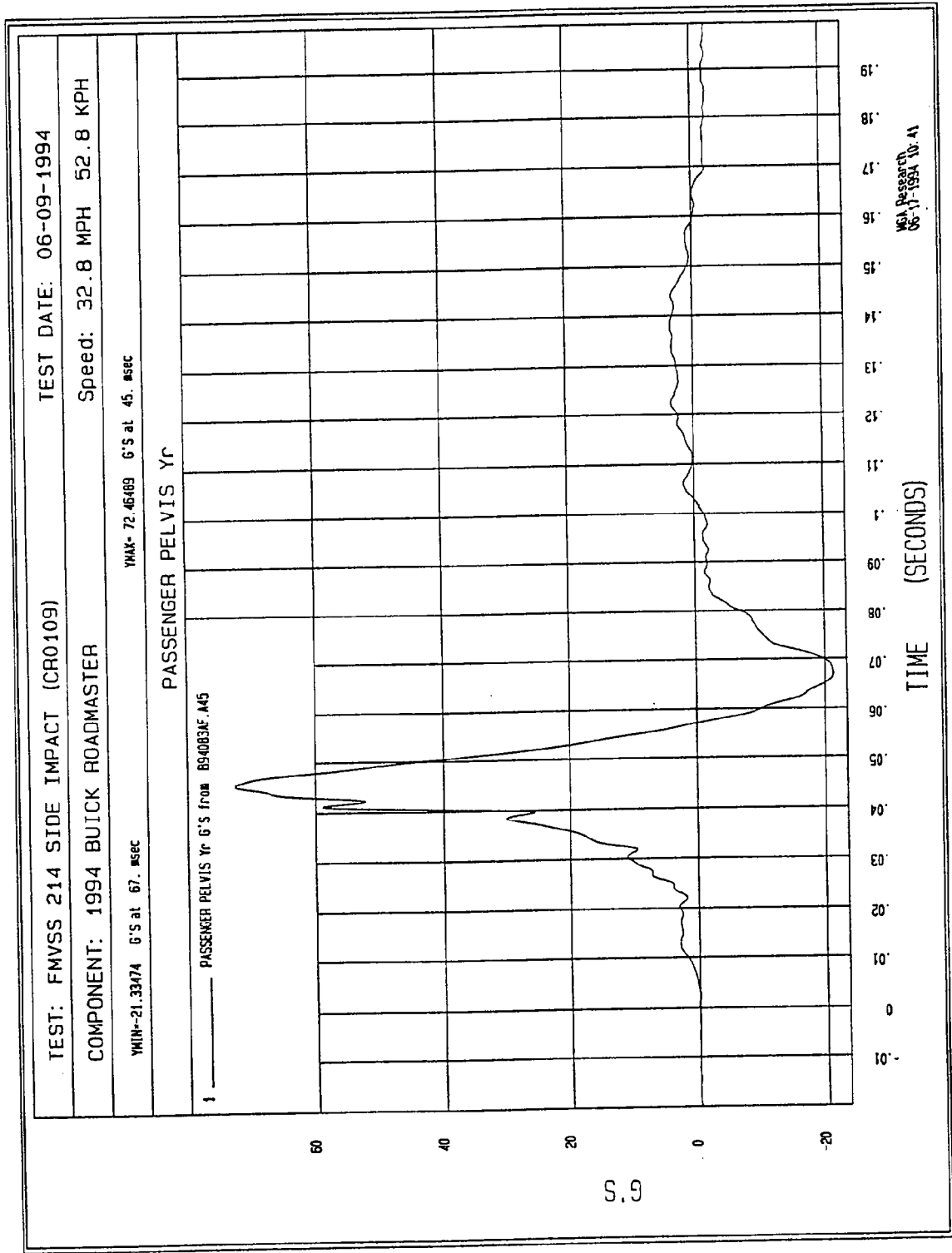


Figure B-79 - Passenger Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

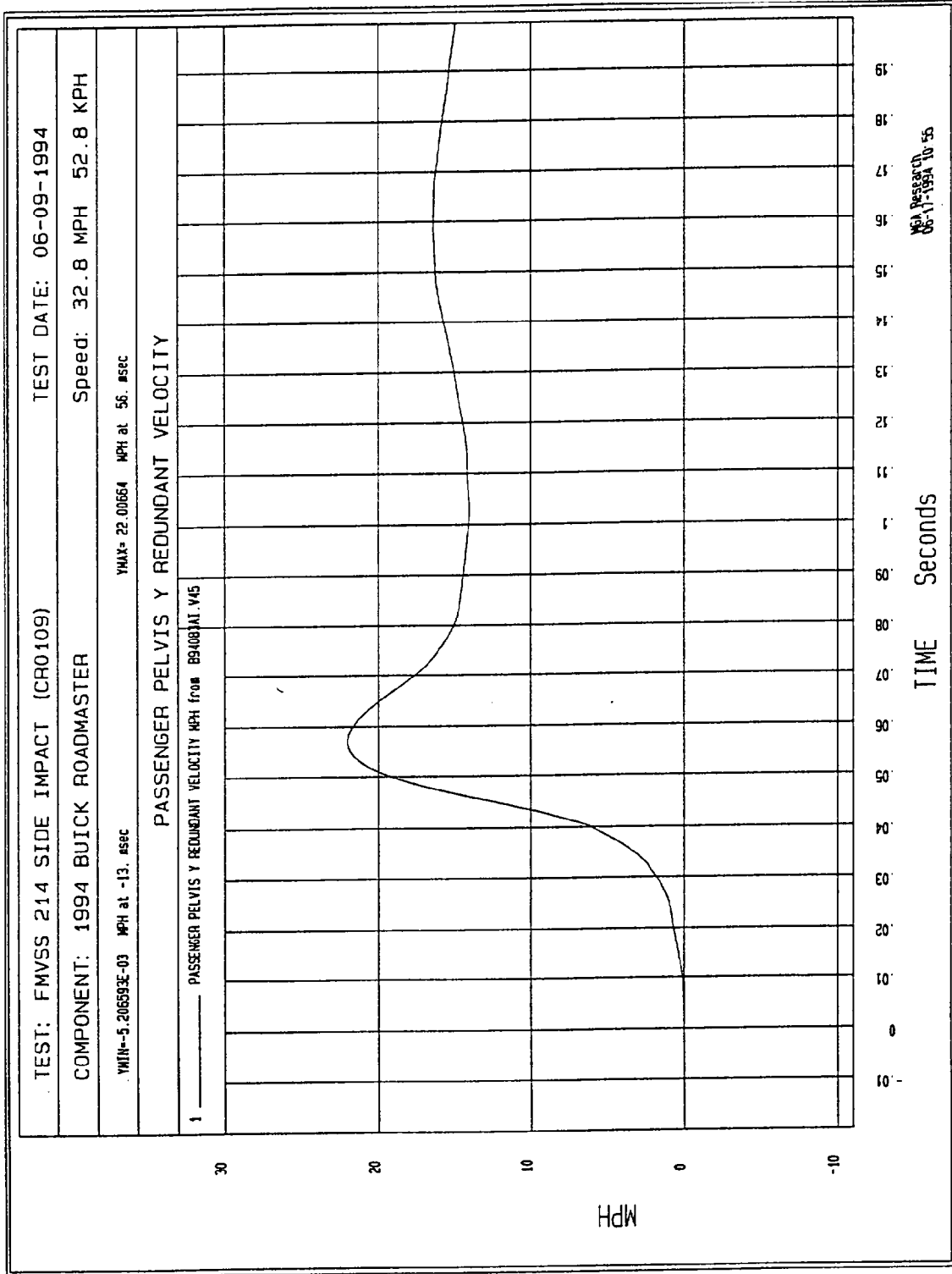


Figure B-80 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

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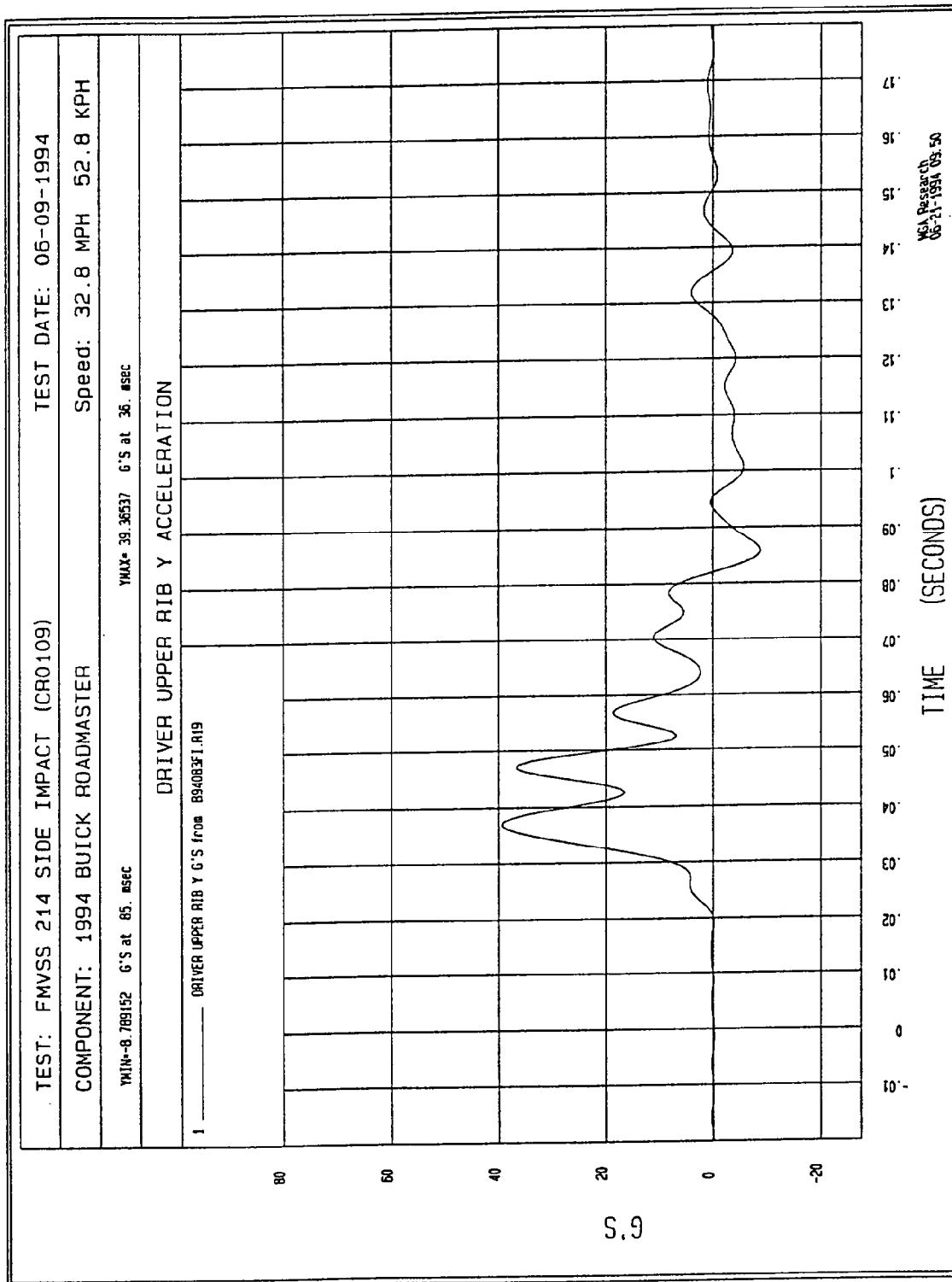


Figure B-81 - Driver Upper Rib Y Acceleration vs. Time

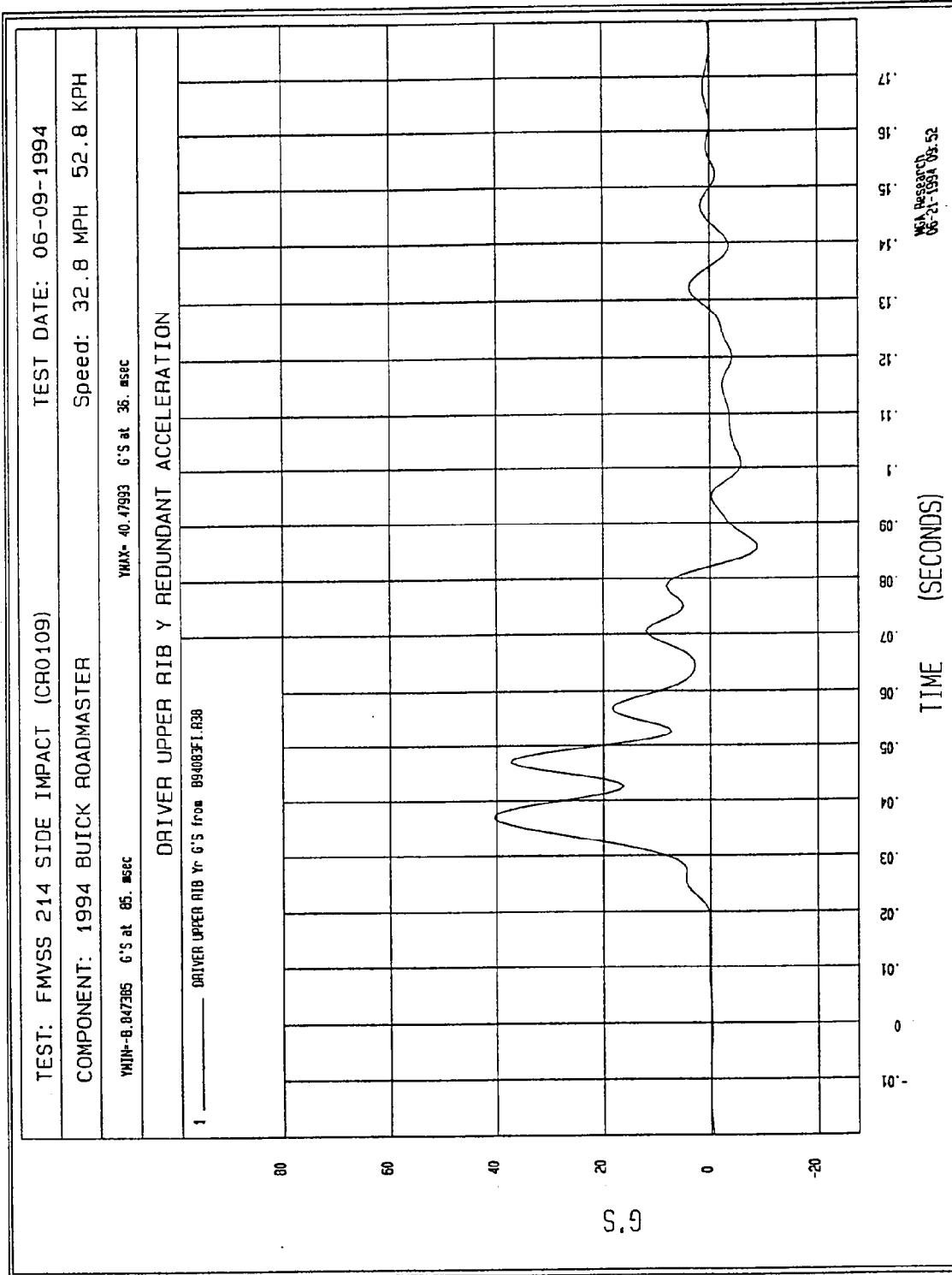


Figure B-82 - Driver Upper Rib Y Redundant Acceleration vs. Time

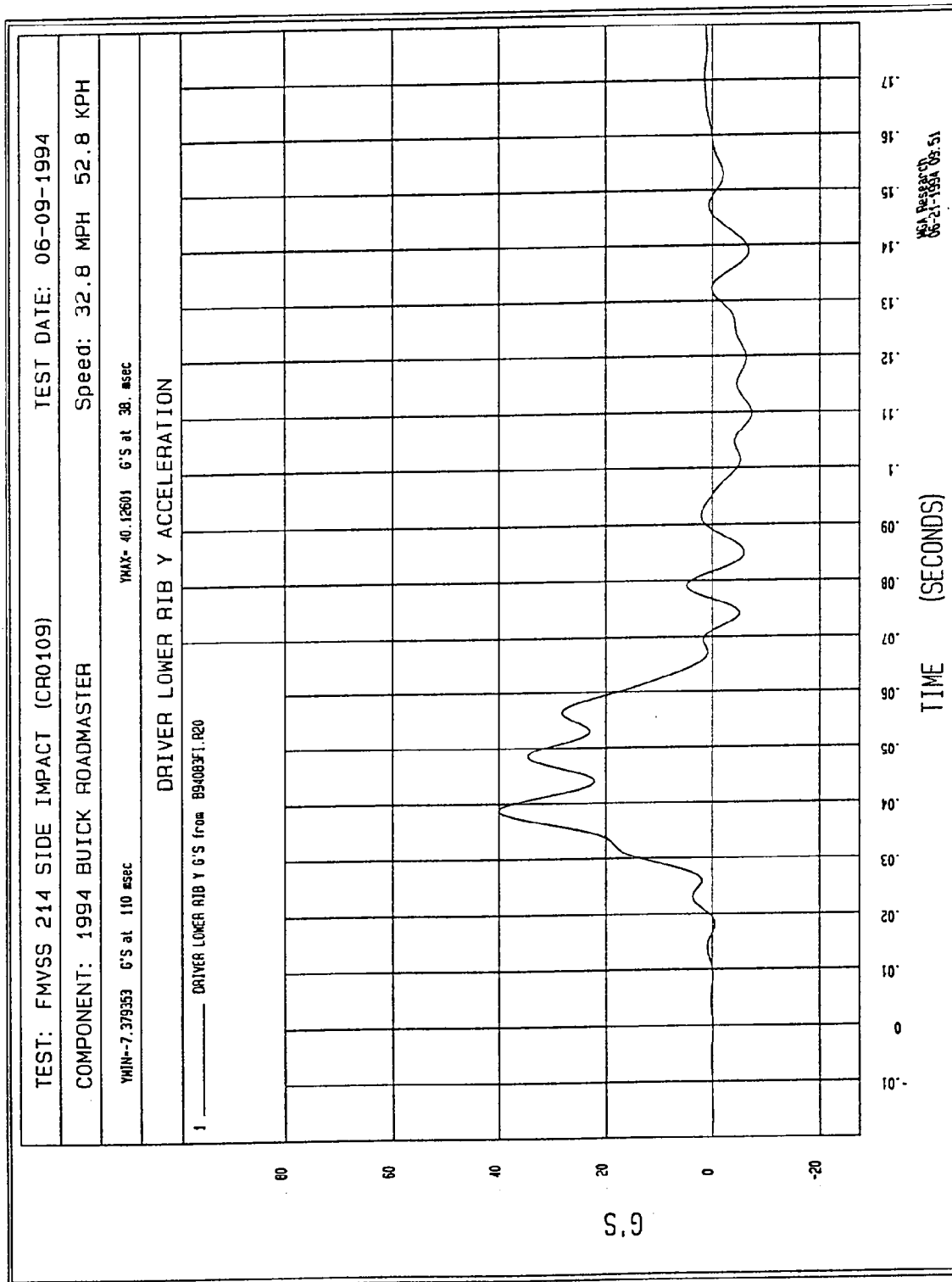


Figure B-83 - Driver Lower Rib Y Acceleration vs. Time

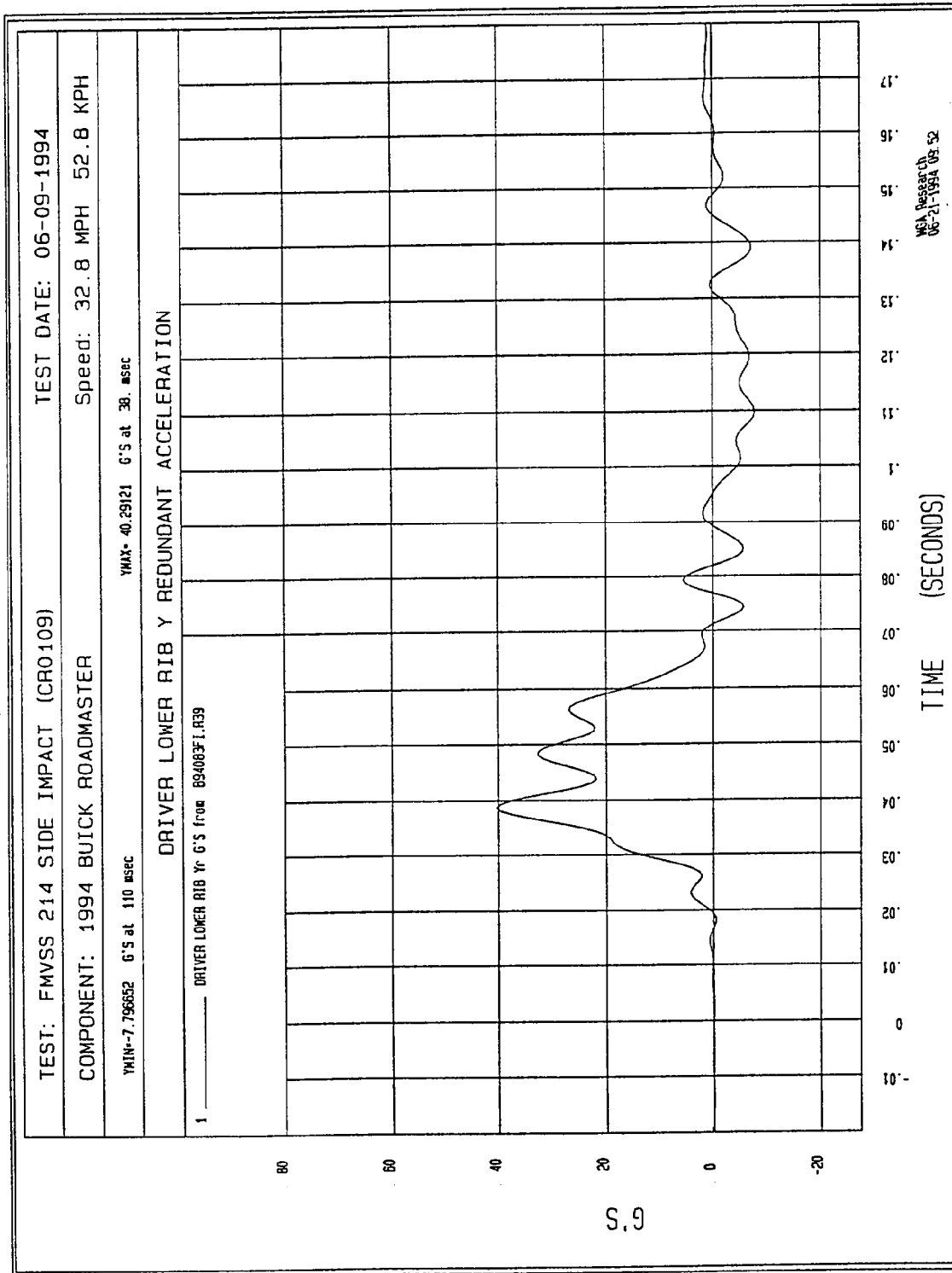


Figure B-84 - Driver Lower Rib Y Redundant Acceleration vs. Time

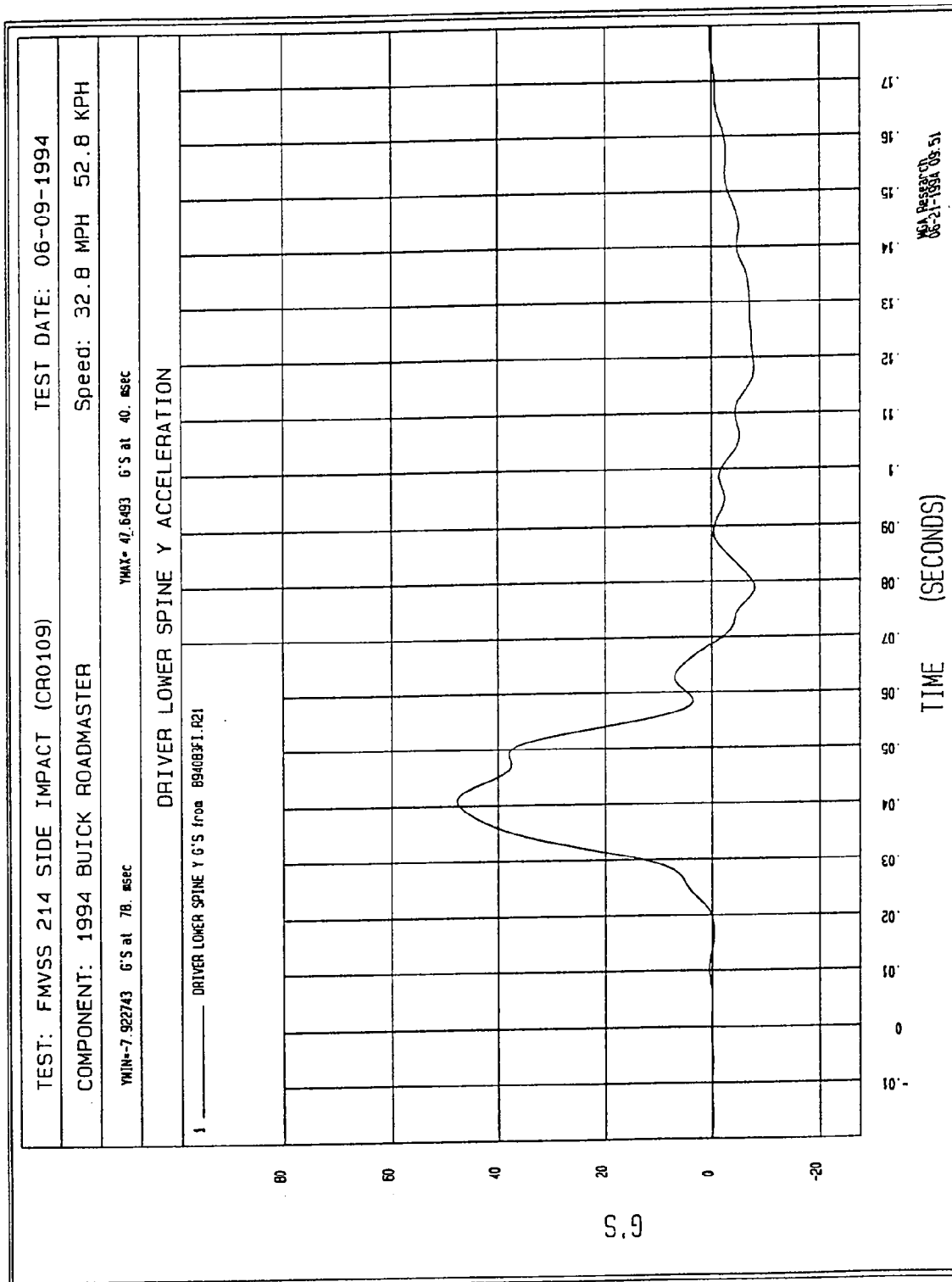


Figure B-85 - Driver Lower Spine Y Acceleration vs. Time

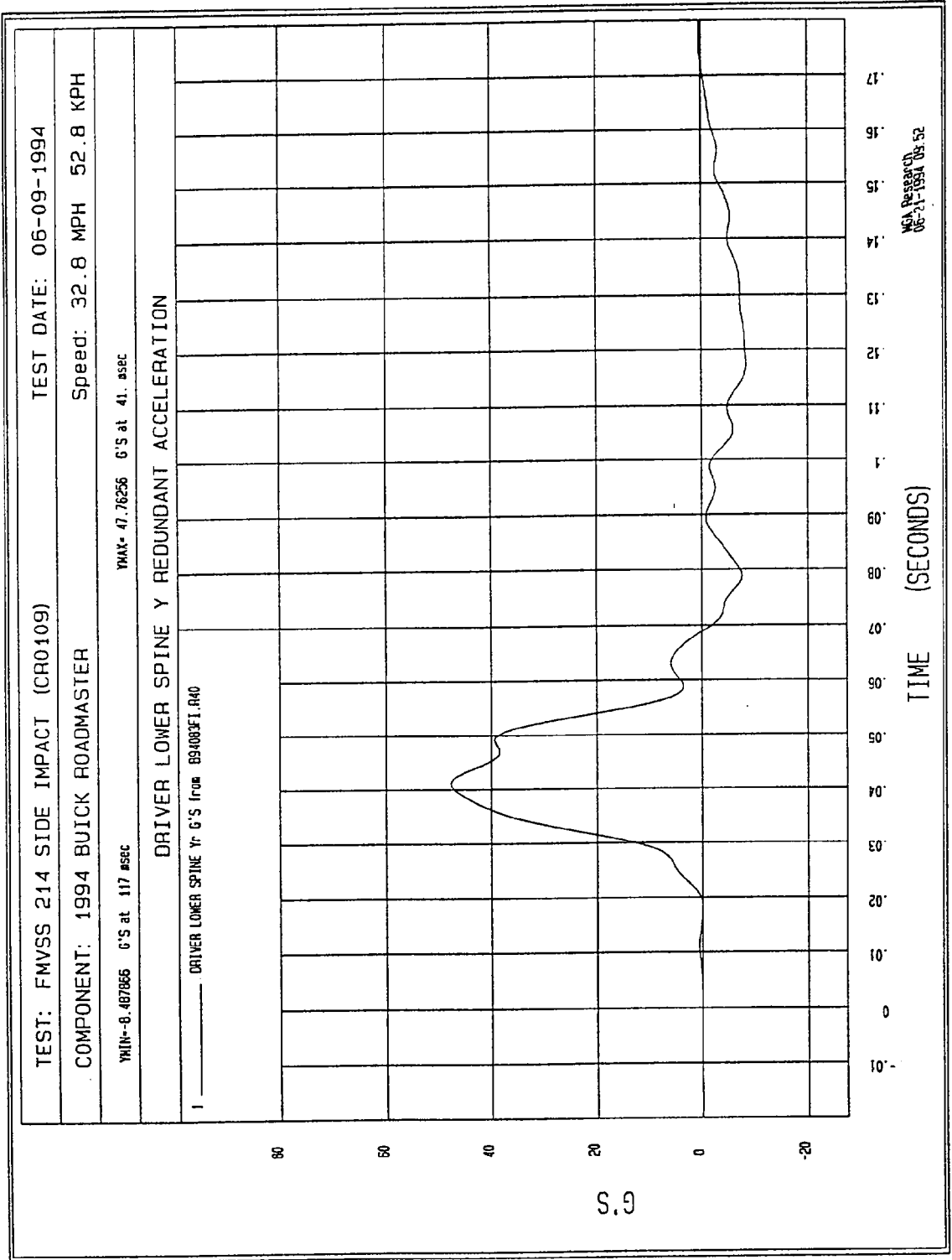


Figure B-86 - Driver Lower Spine Y Redundant Acceleration vs. Time

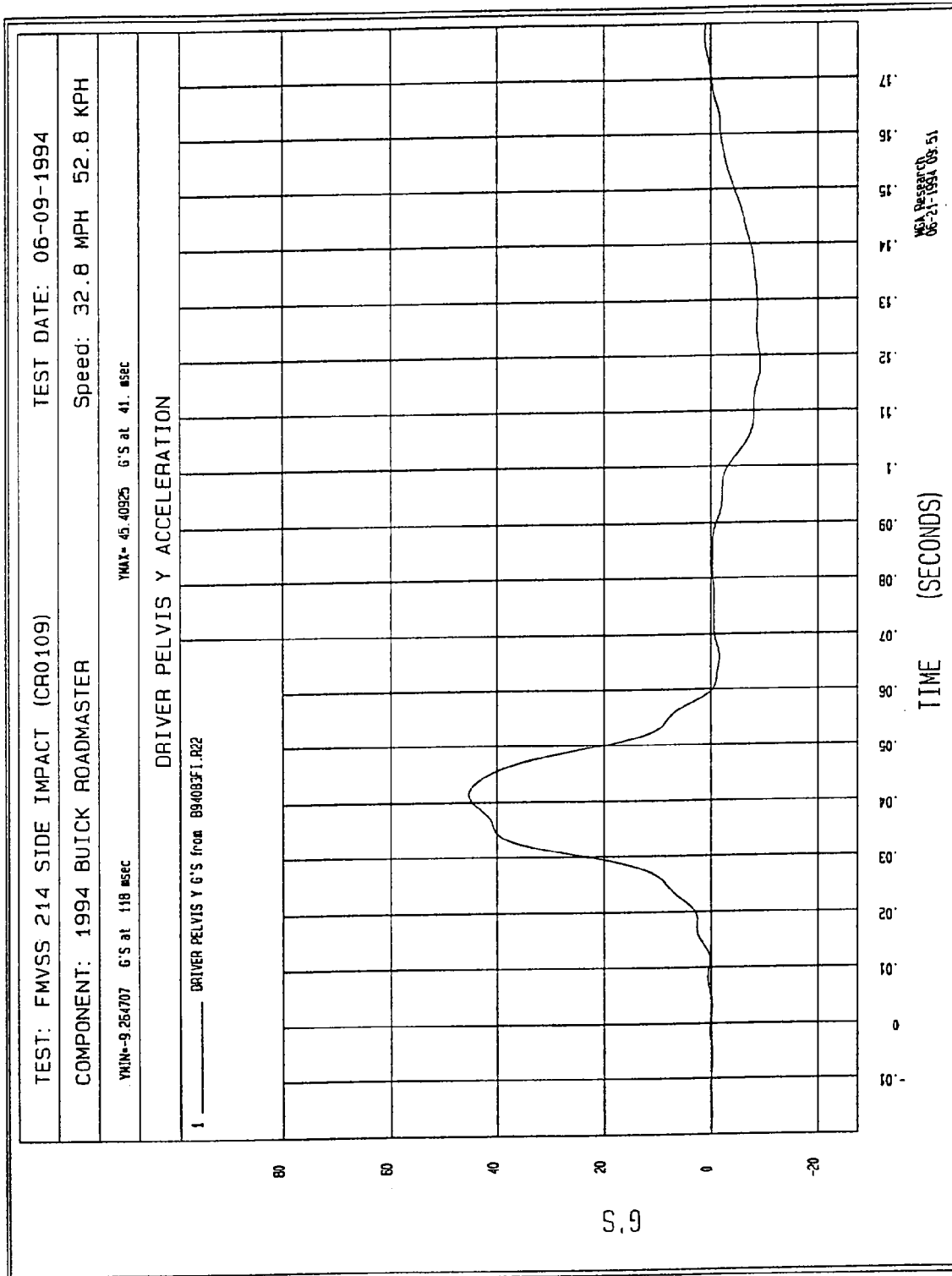
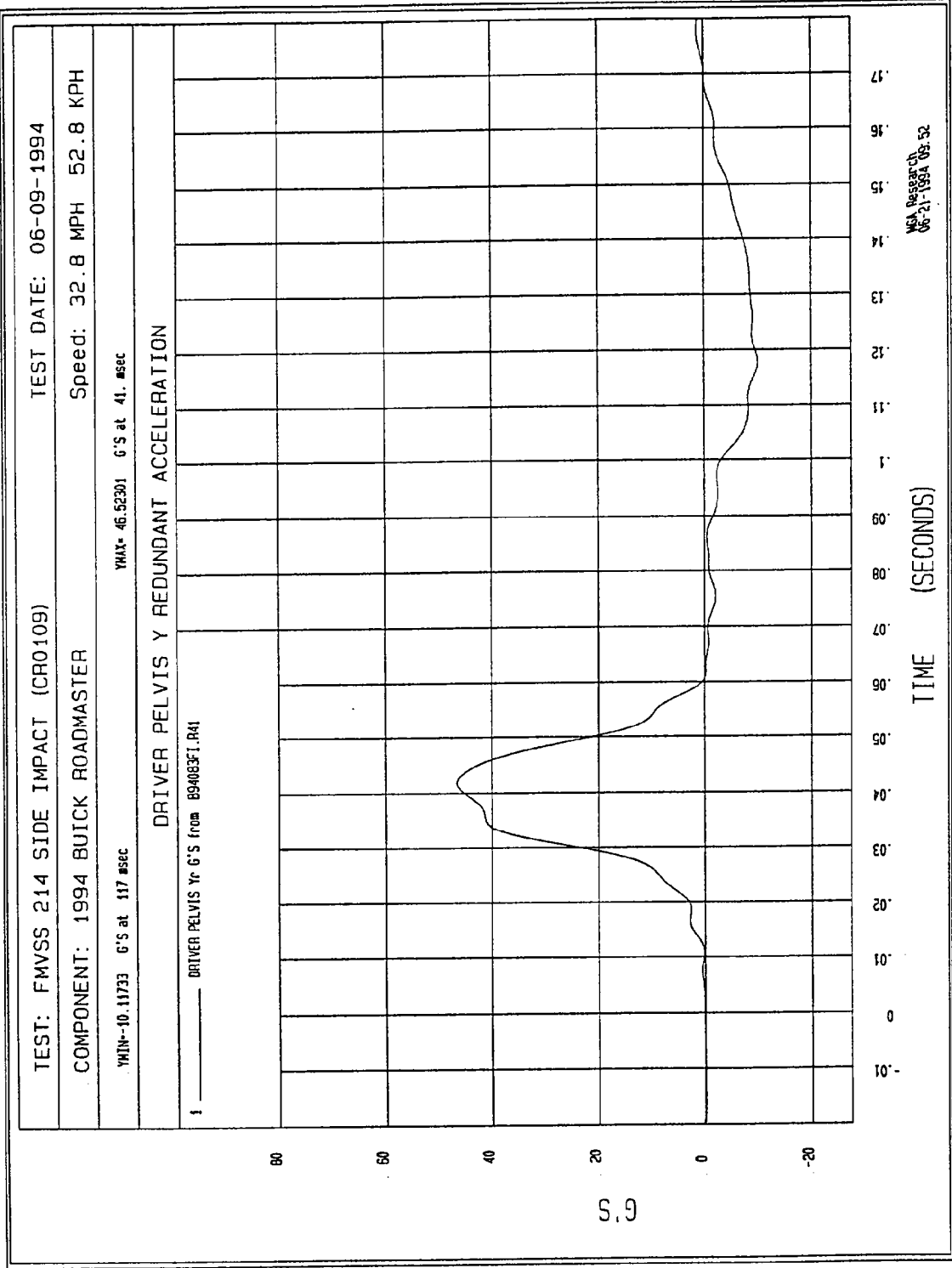


Figure B-87 - Driver Pelvis Y Acceleration vs. Time



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Figure B-88 - Driver Pelvis Y Redundant Acceleration vs. Time

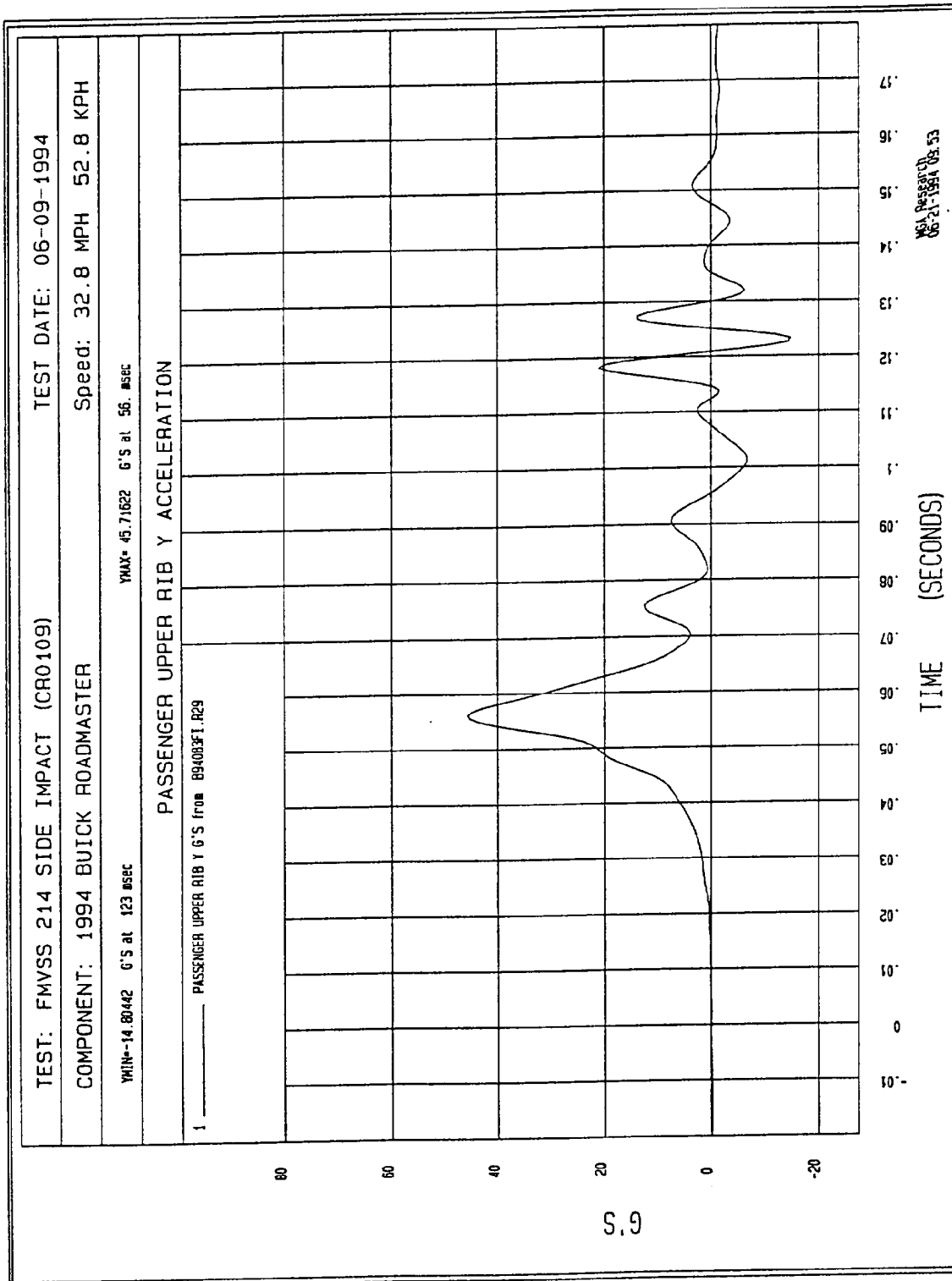
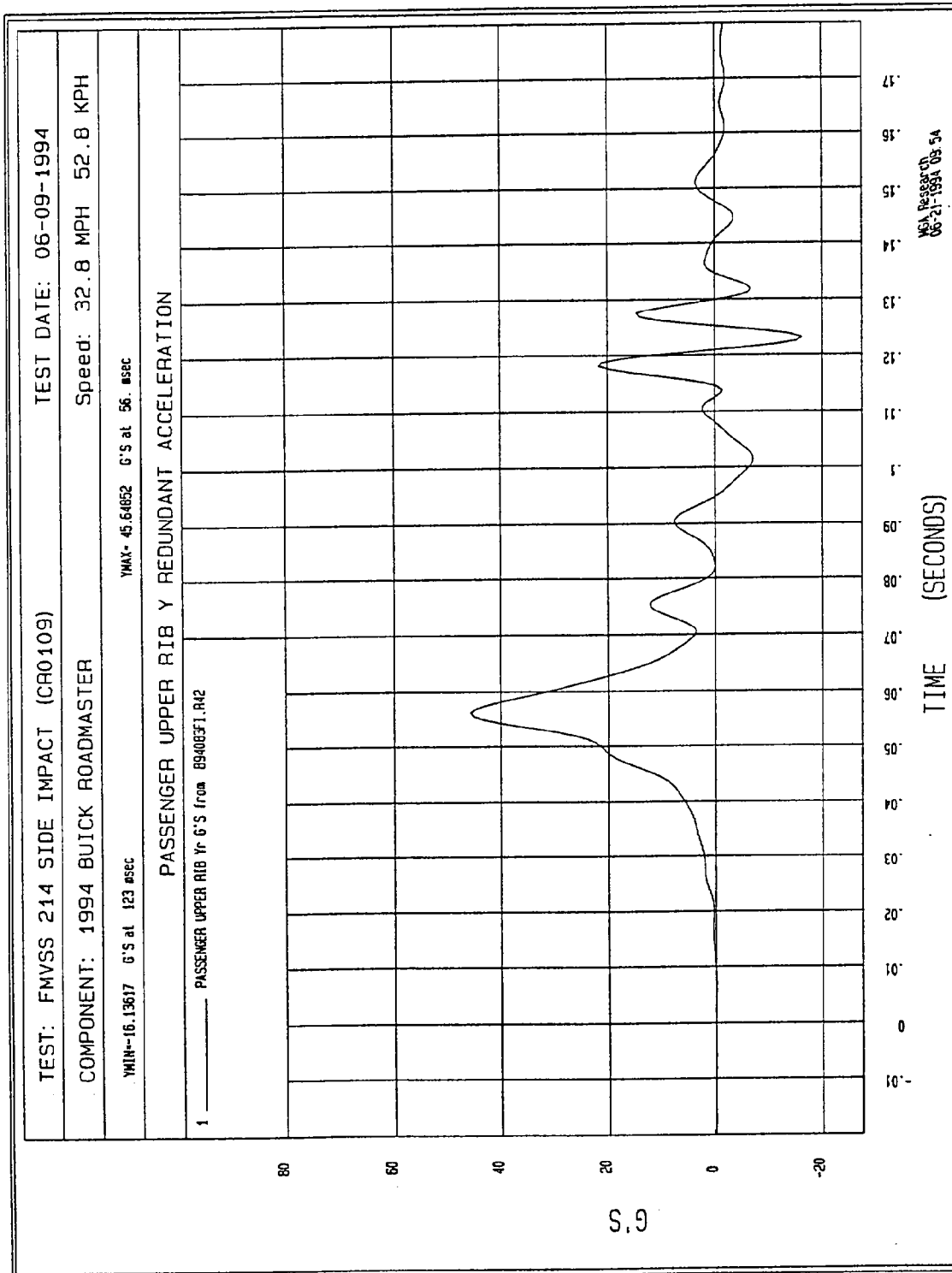


Figure B-89 - Passenger Upper Rib Y Acceleration vs. Time



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Figure B-90 - Passenger Upper Rib Y Redundant Acceleration vs. Time

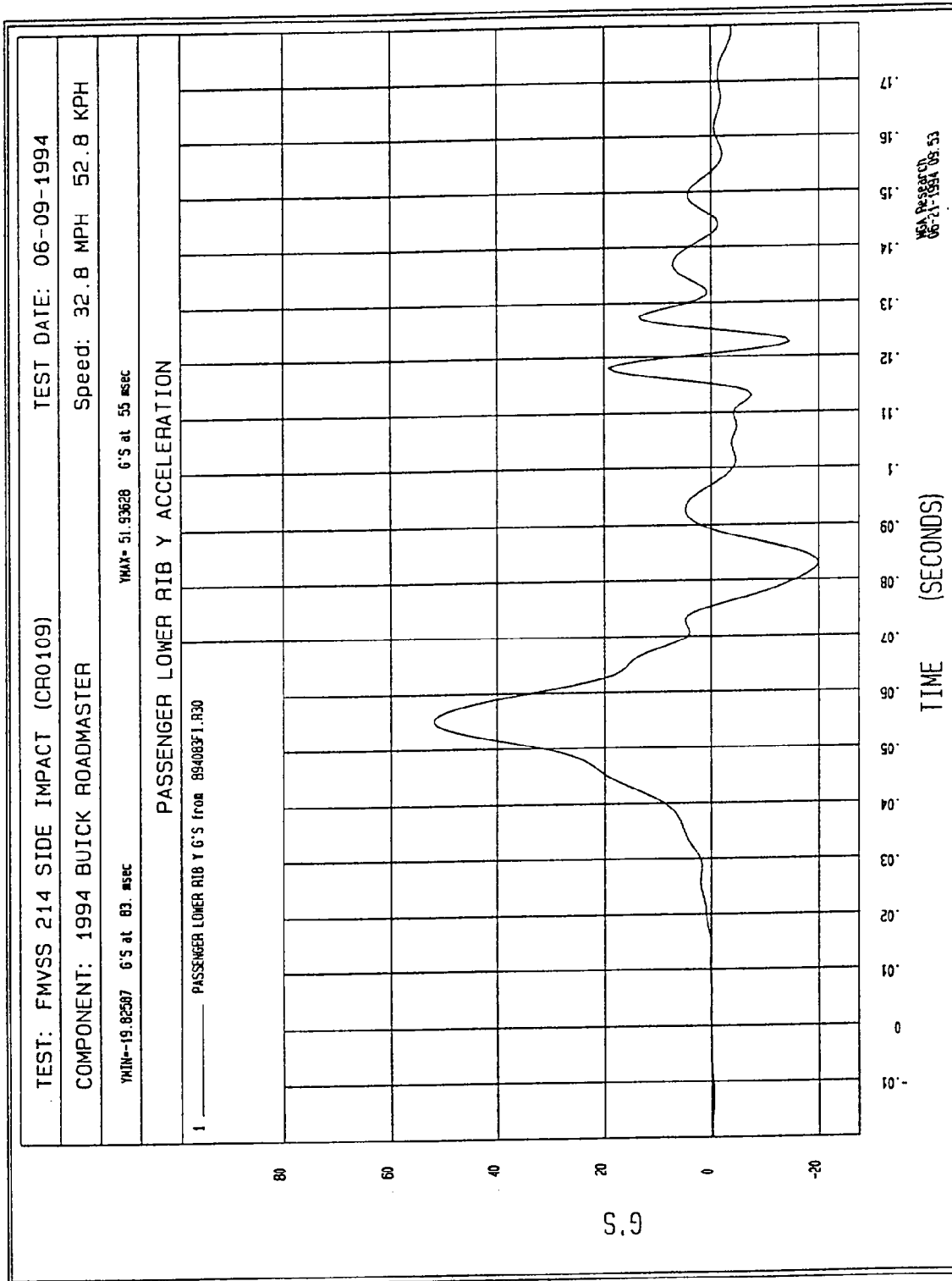


Figure B-91 - Passenger Lower Rib Y Acceleration vs. Time

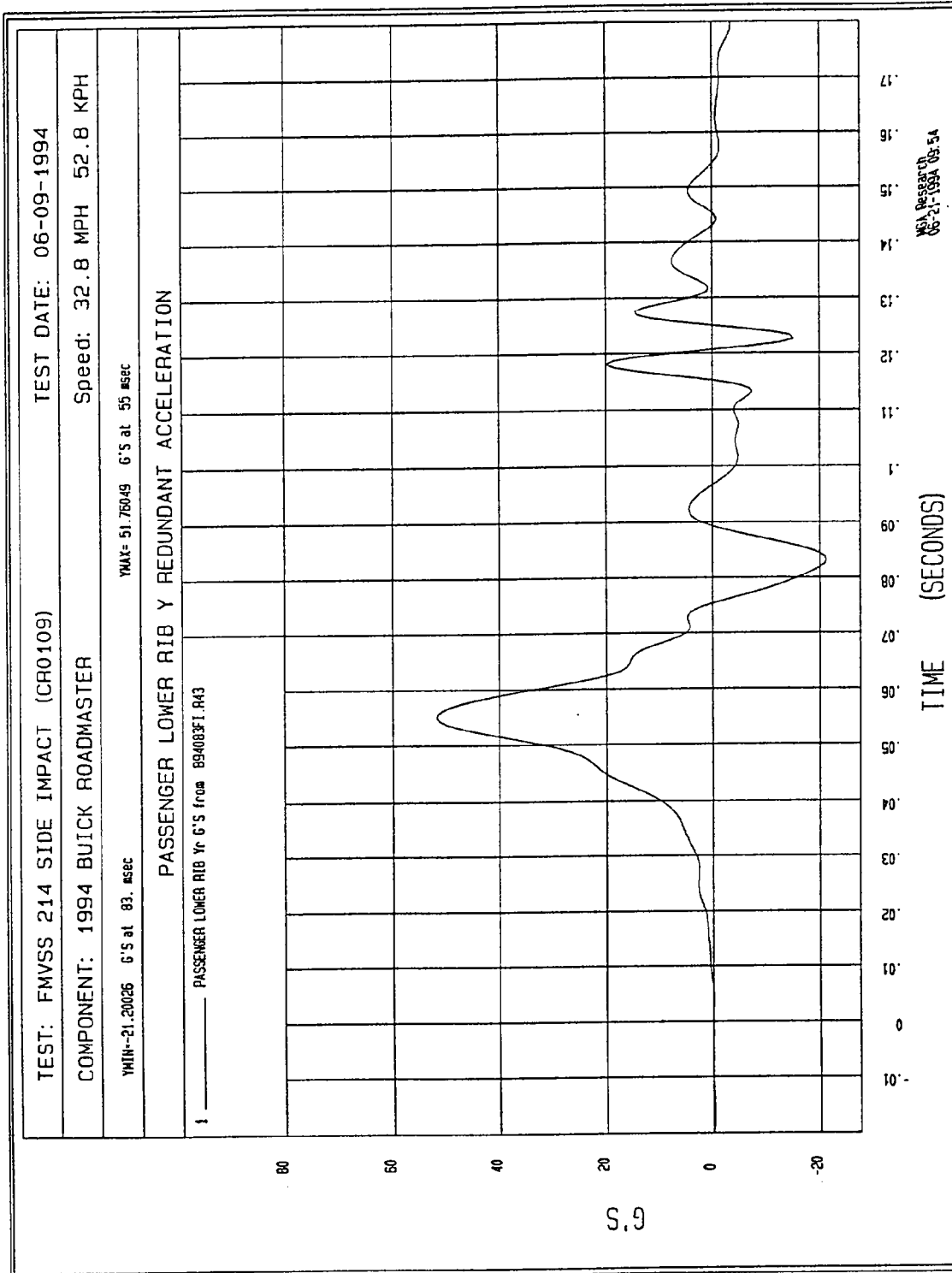


Figure B-92 - Passenger Lower Rib Y Redundant Acceleration vs. Time

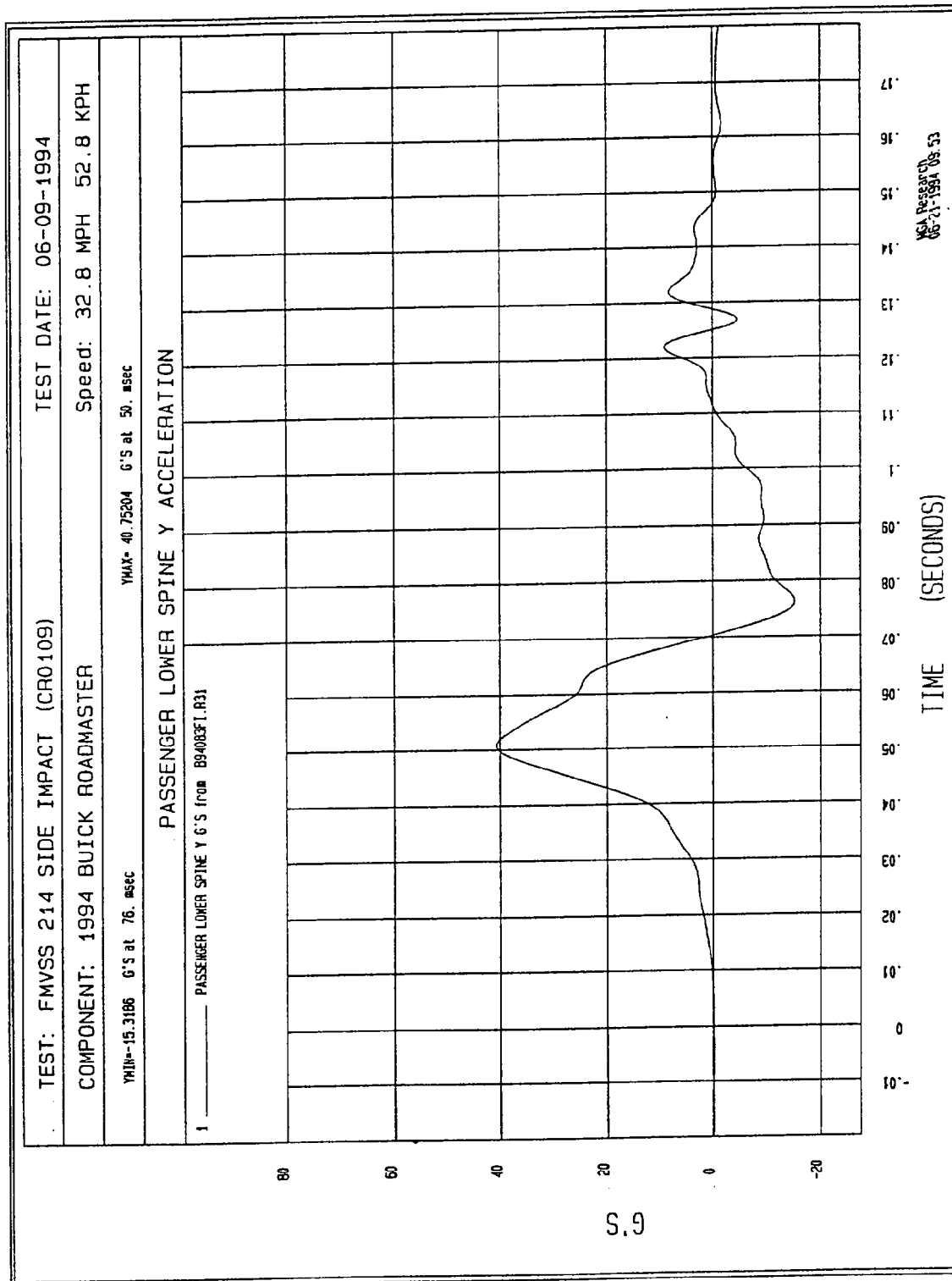


Figure B-93 - Passenger Lower Spine Y Acceleration vs. Time

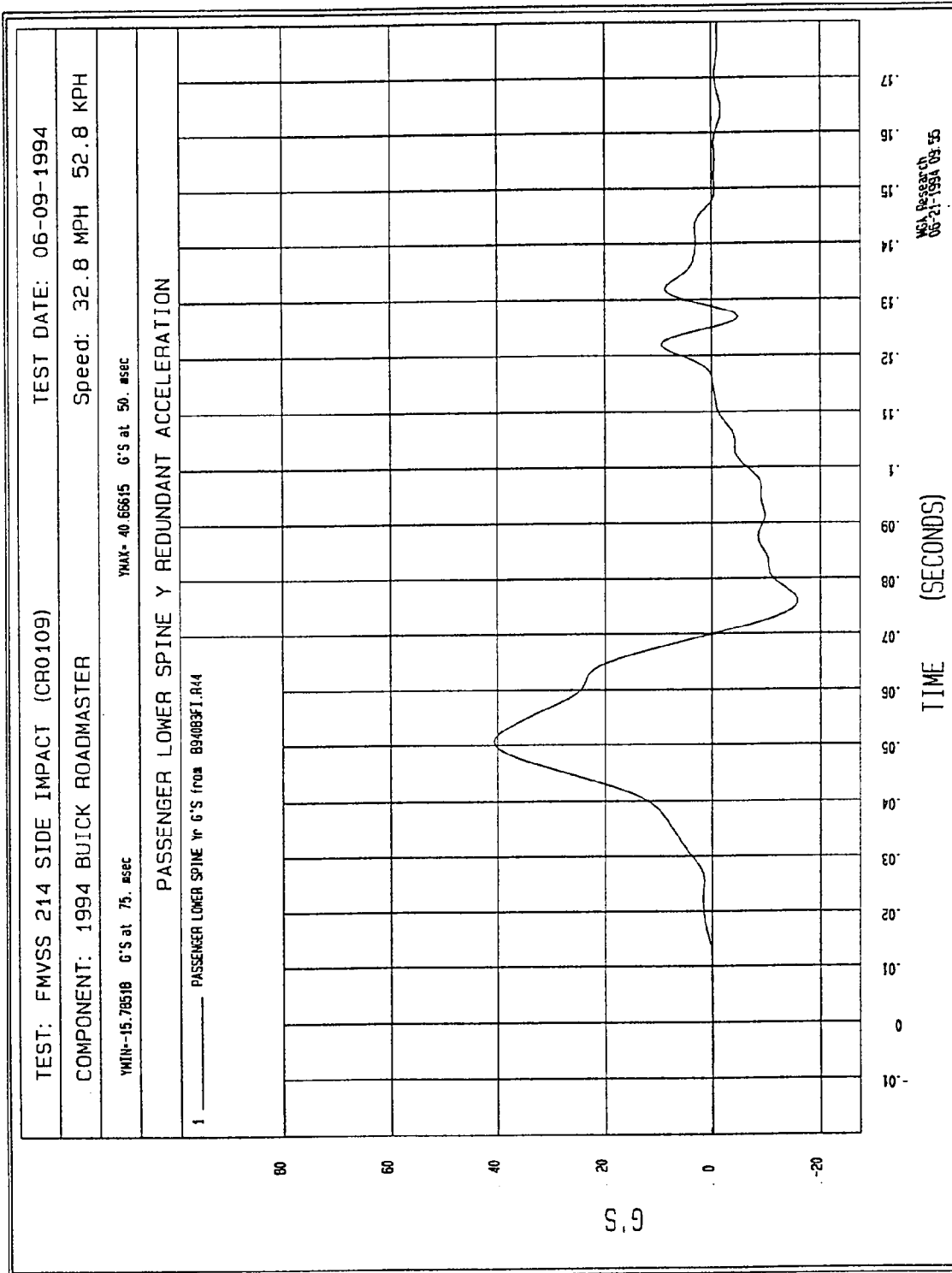


Figure B-94 - Passenger Lower Spine Y Redundant Acceleration vs. Time

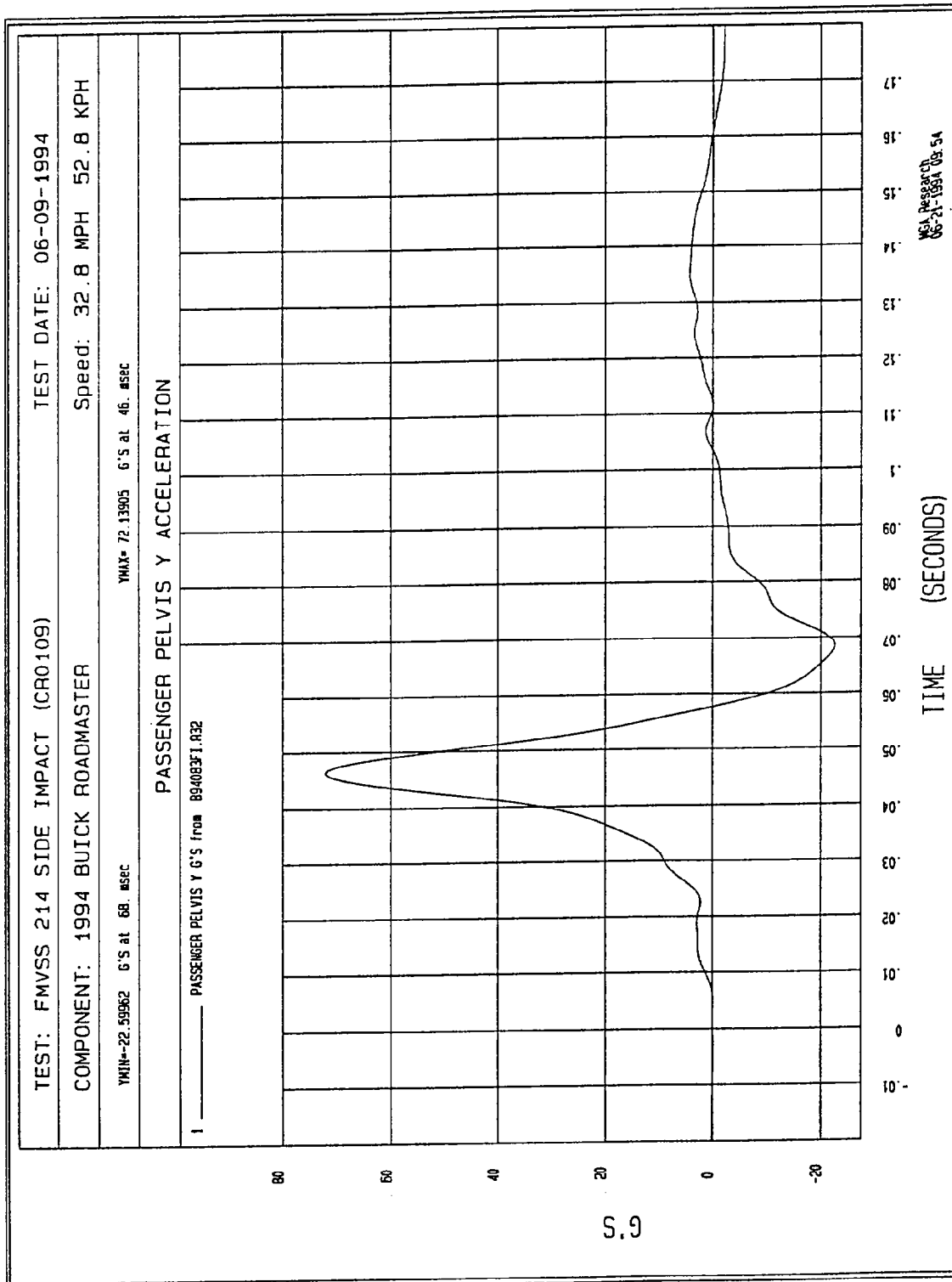


Figure B-95 - Passenger Pelvis Y Acceleration vs. Time

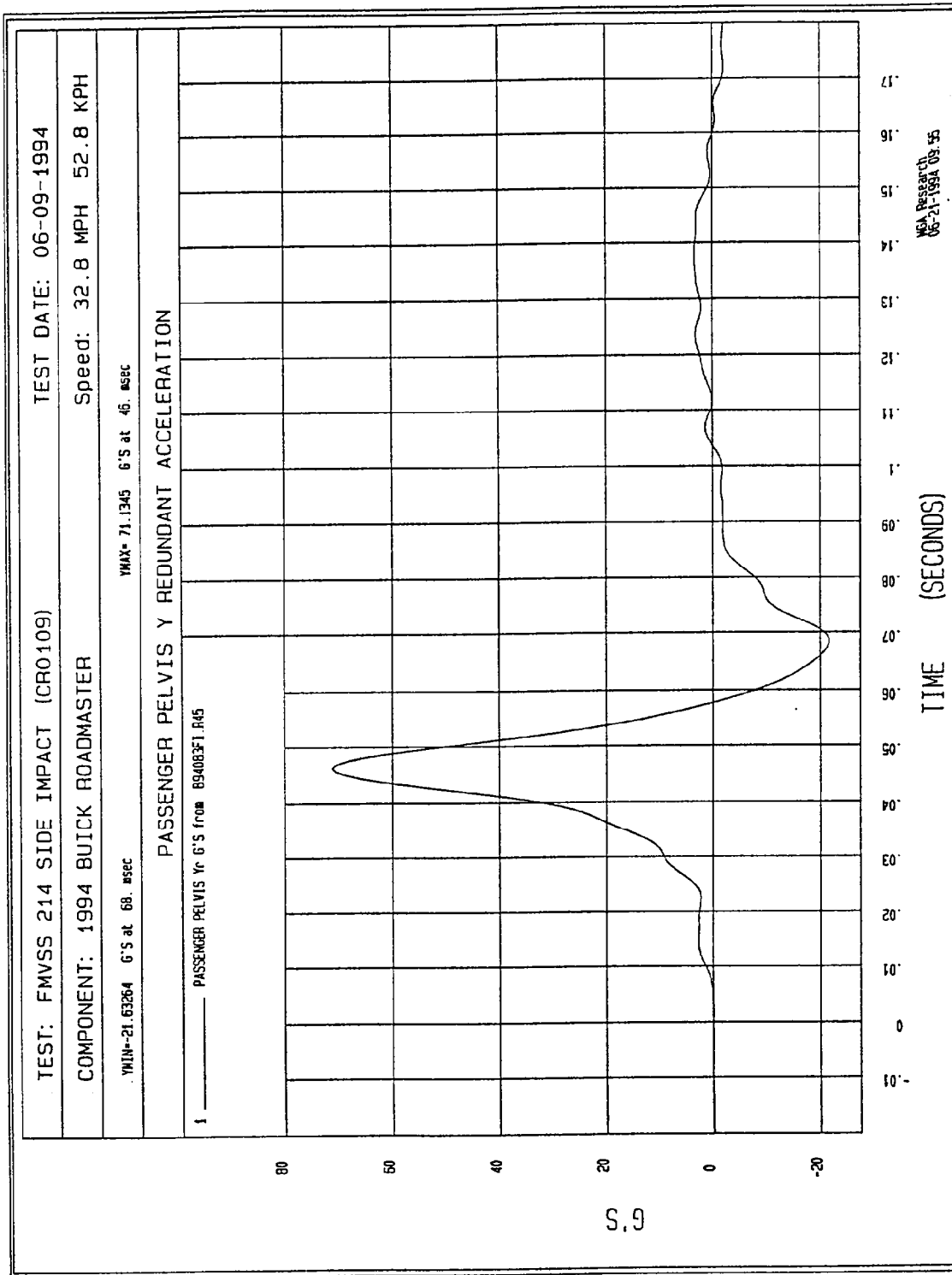


Figure B-96 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-94-DC007

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

GENERAL MOTORS CORPORATION
1994 BUICK ROADMASTER 4 DOOR SEDAN
NHTSA NO. CR0109

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: June 9, 1994

Report Date: September 24, 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

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PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 270

Calibration Test Results Summary

Dummy Serial Number: 270

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvis Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 270

DATE OF VERIFICATION: June 8, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 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"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.7
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	14.8

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 8, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94972

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	17

TEST MEETS SPECIFICATIONS

TECHNICIAN *He Chl*

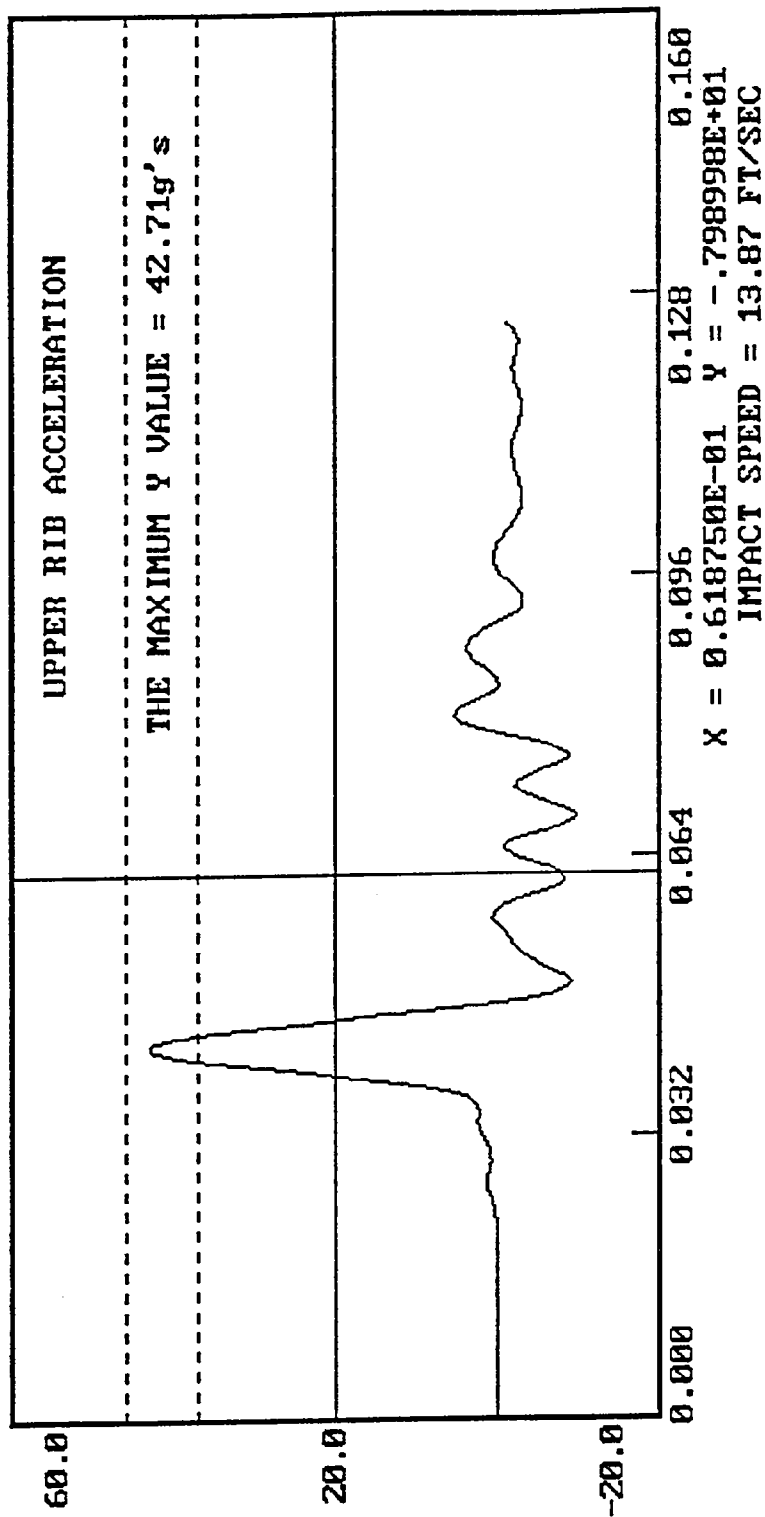
APPROVED BY *J. J. Bolling*

06-08-1994 11:04

DUMMY CALIBRATION - THORAX IMPACT

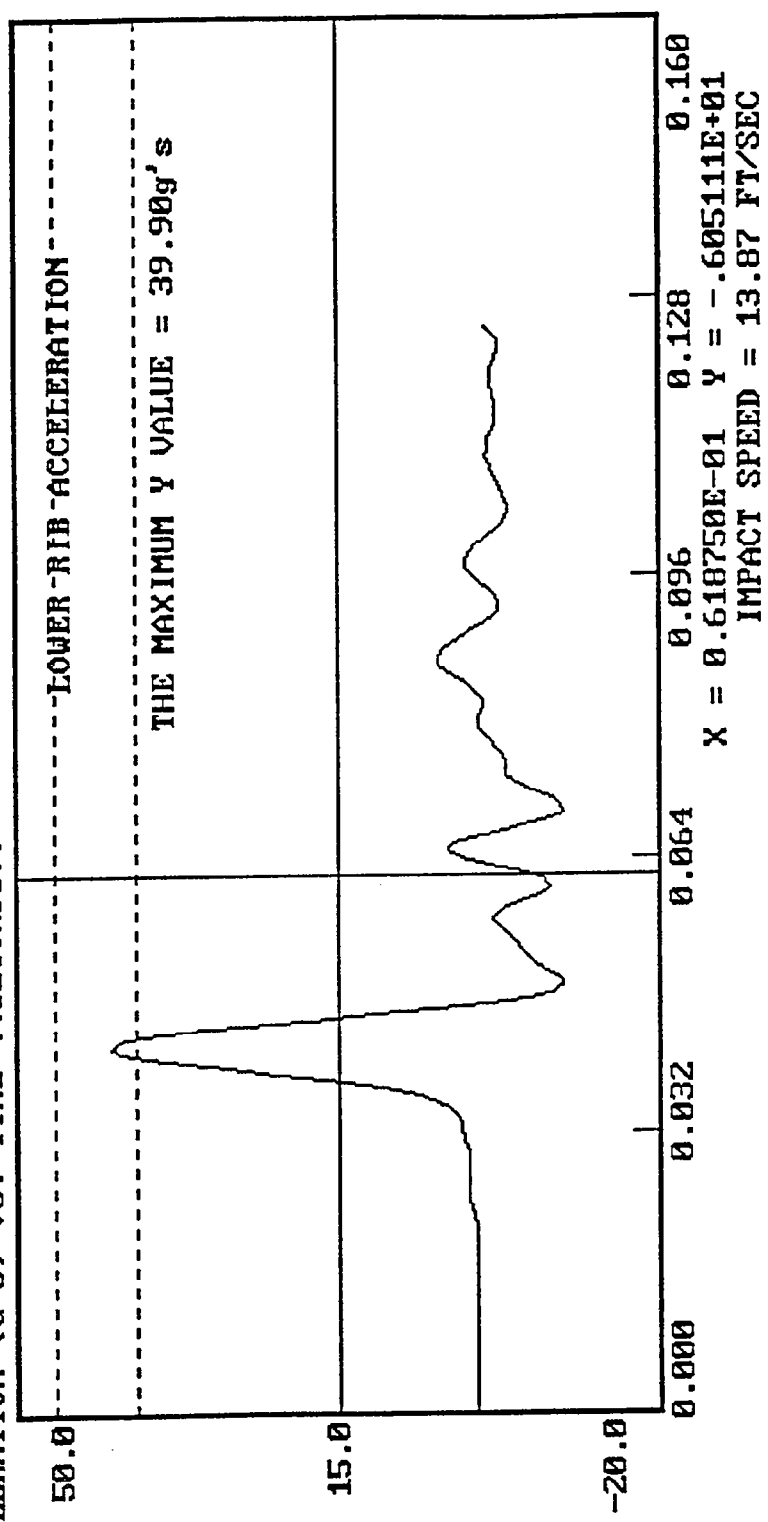
DUMMY # 270

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



06-08-1994 11:04

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 270
ACCELERATION (G'S) VS. TIME ((SECONDS))

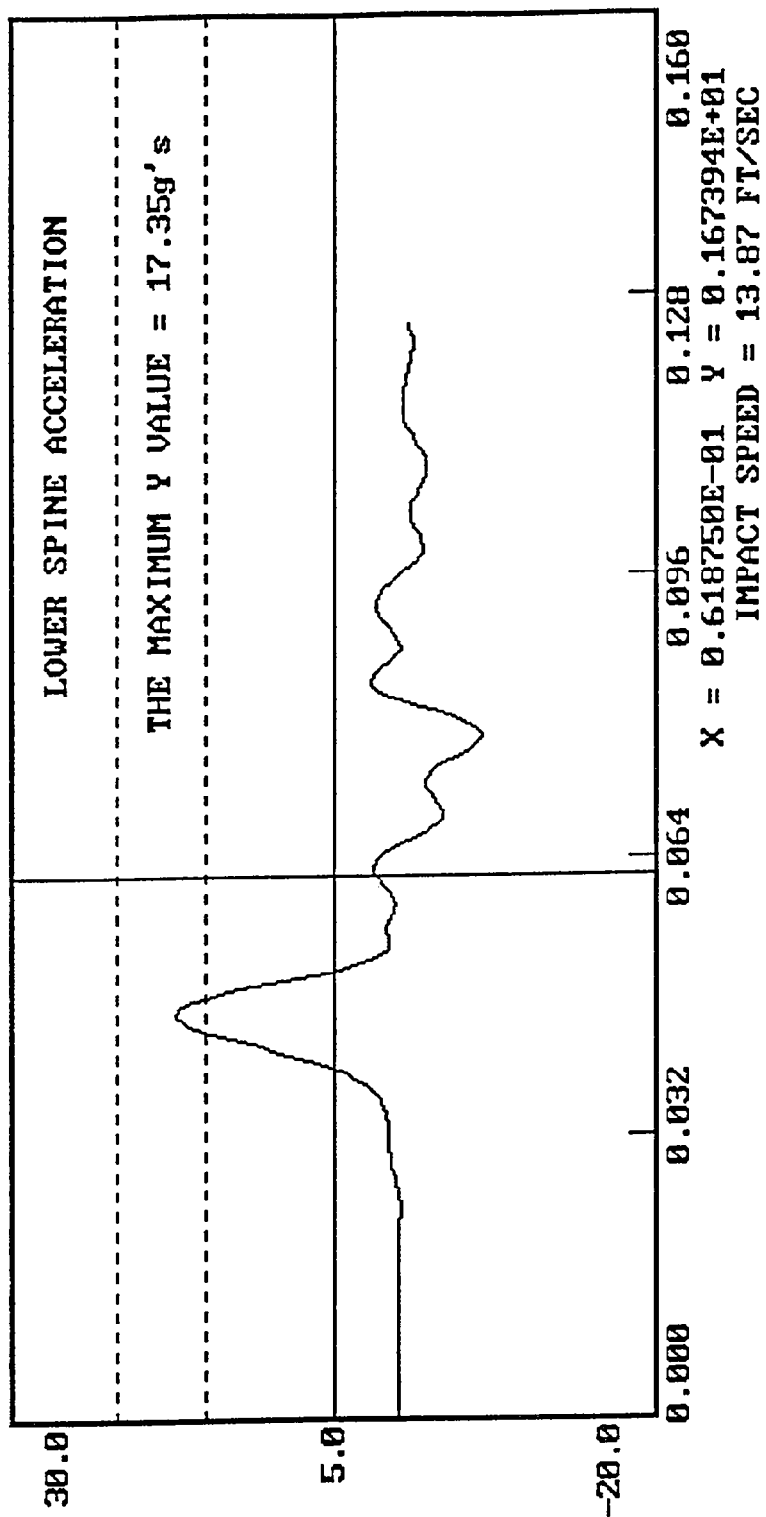


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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

06-08-1994 11:04



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

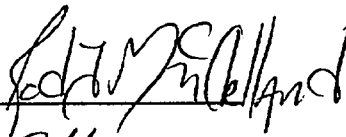
DUMMY NUMBER: 270

TEST NUMBER: D94973

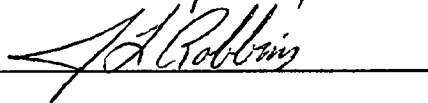
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	53

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

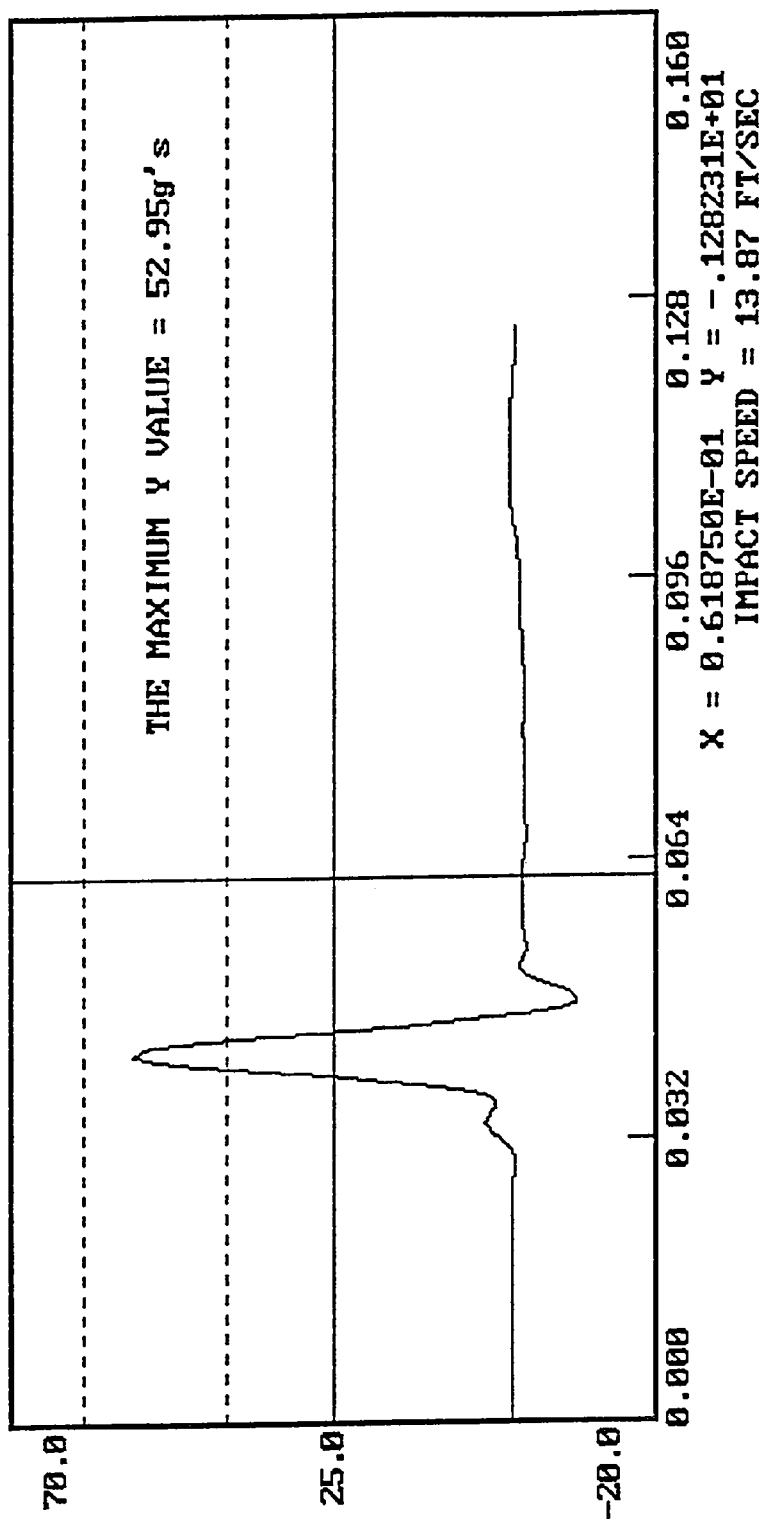


06-08-1994 11:17

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 270

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



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

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94974

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.7
FORCE @ 0.75 in	36.7 - 49.8 lbs	47.2
FORCE @ 1.0 in	50 - 63 lbs	62
FORCE @ 1.3 in	73 - 88 lbs	81

TEST MEETS SPECIFICATIONS

TECHNICIAN *Al Allen*

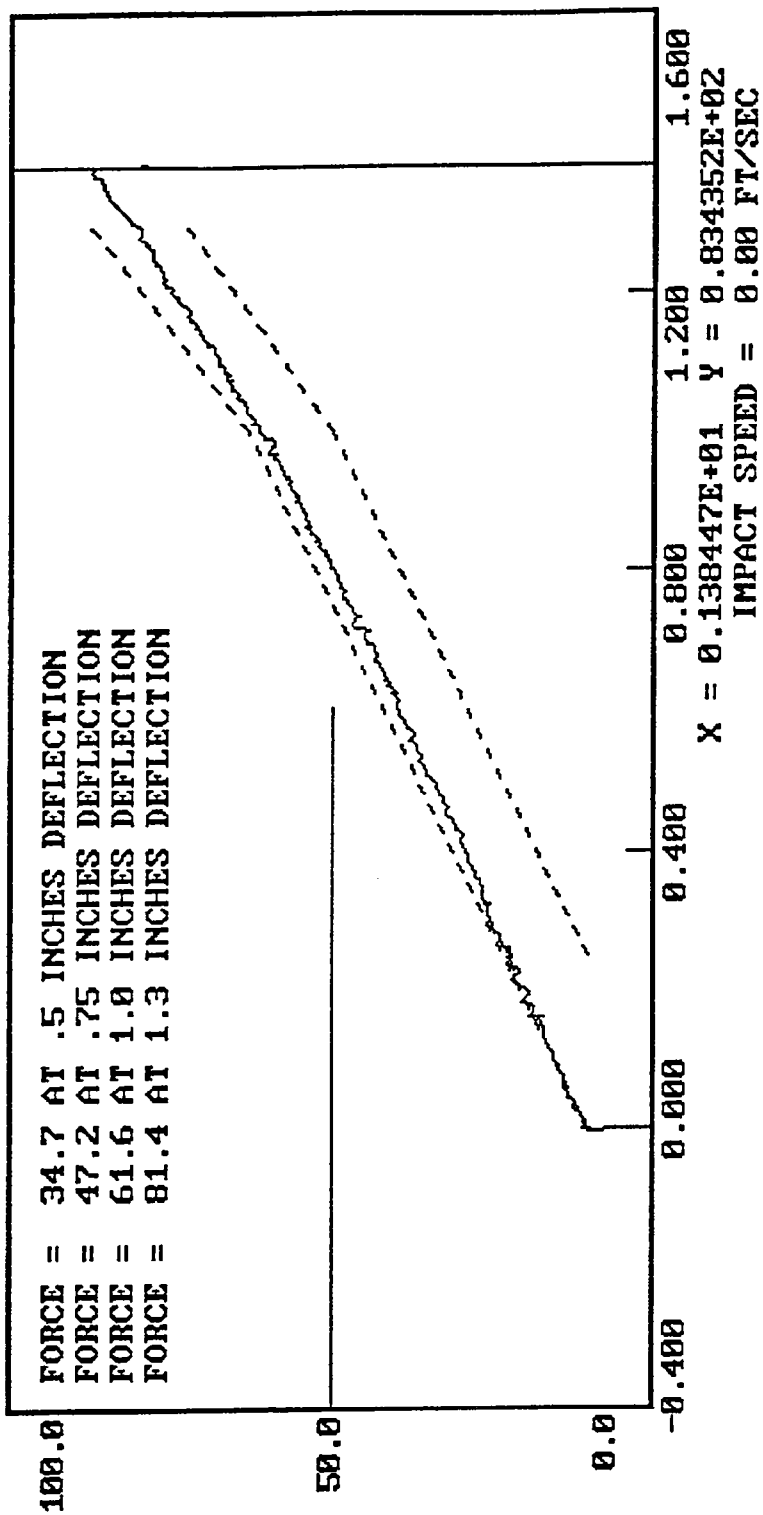
APPROVED BY *J. Robbins*

06-08-1994 14:51

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 270

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94975

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	32
FORCE @ 30°	34 - 46 lbs	42
FORCE @ 40°	46 - 58 lbs	58
RETURN ANGLE	12° maximum	3°

TEST MEETS SPECIFICATIONS

TECHNICIAN

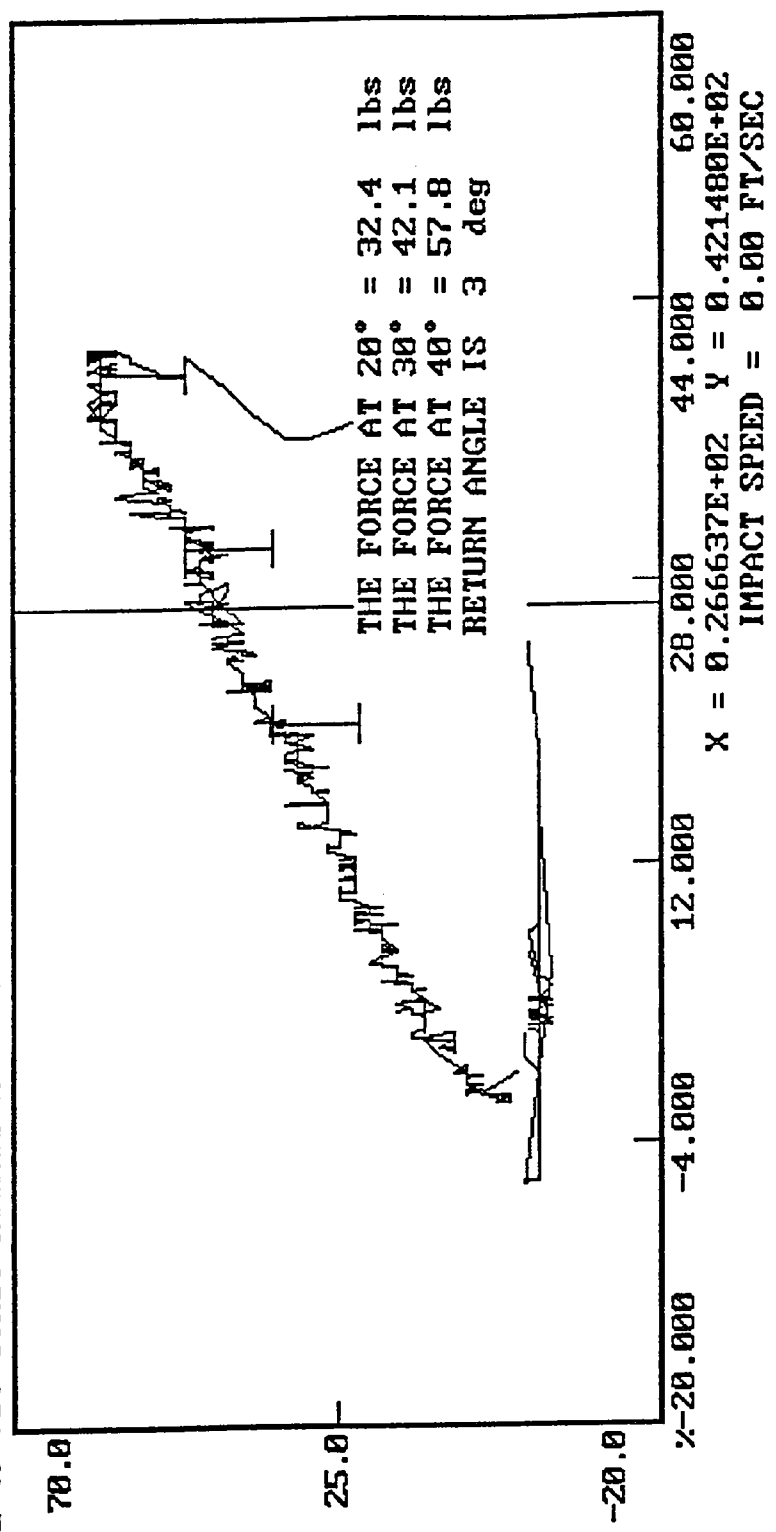
Scott W. Elland

APPROVED BY

J. Robbins

06-08-1994 15:23

DUMMY CALIBRATION - LUMBAR FLEXION
DUMMY # 270
FORCE () VS. TORSO ROTATION (DEGREES)



PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Passenger Serial Number: 272

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvis Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: June 8, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 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"	9.1
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: *He Chua*

APPROVED BY: *J Robbins*

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 8, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94982

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	41
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	20

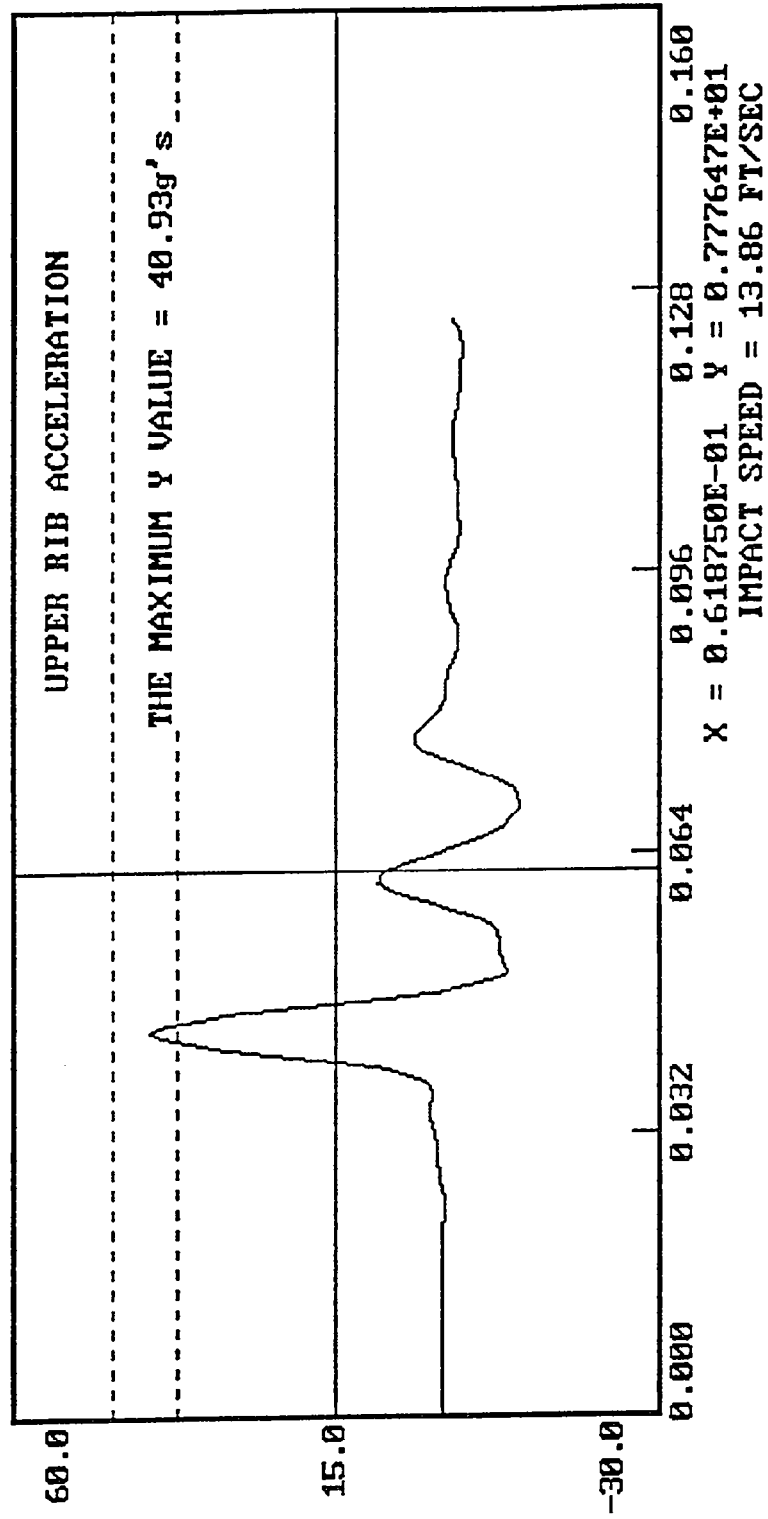
TEST MEETS SPECIFICATIONS

TECHNICIAN *R. Chen*

APPROVED BY *J. R. [Signature]*

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

06-08-1994 10:29

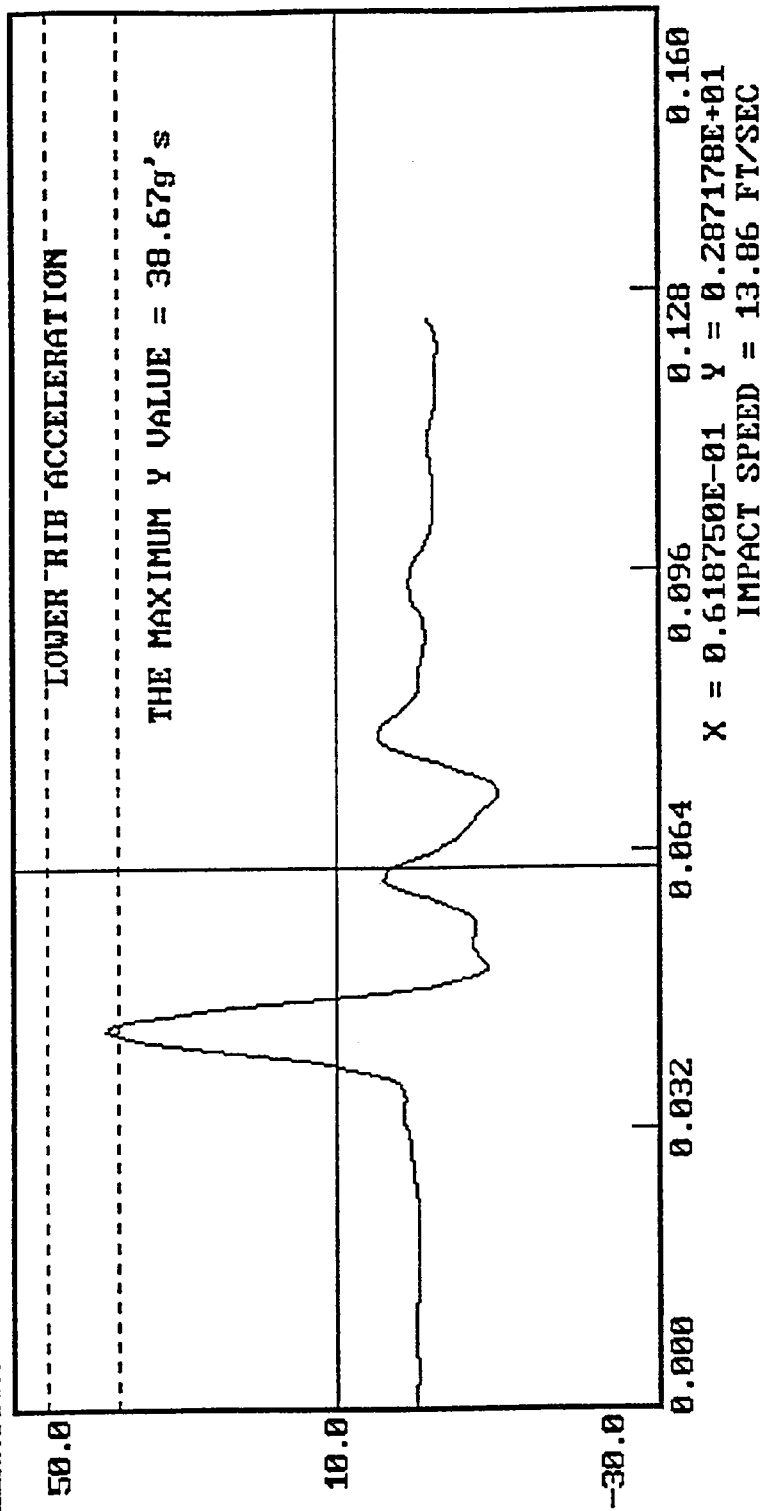


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

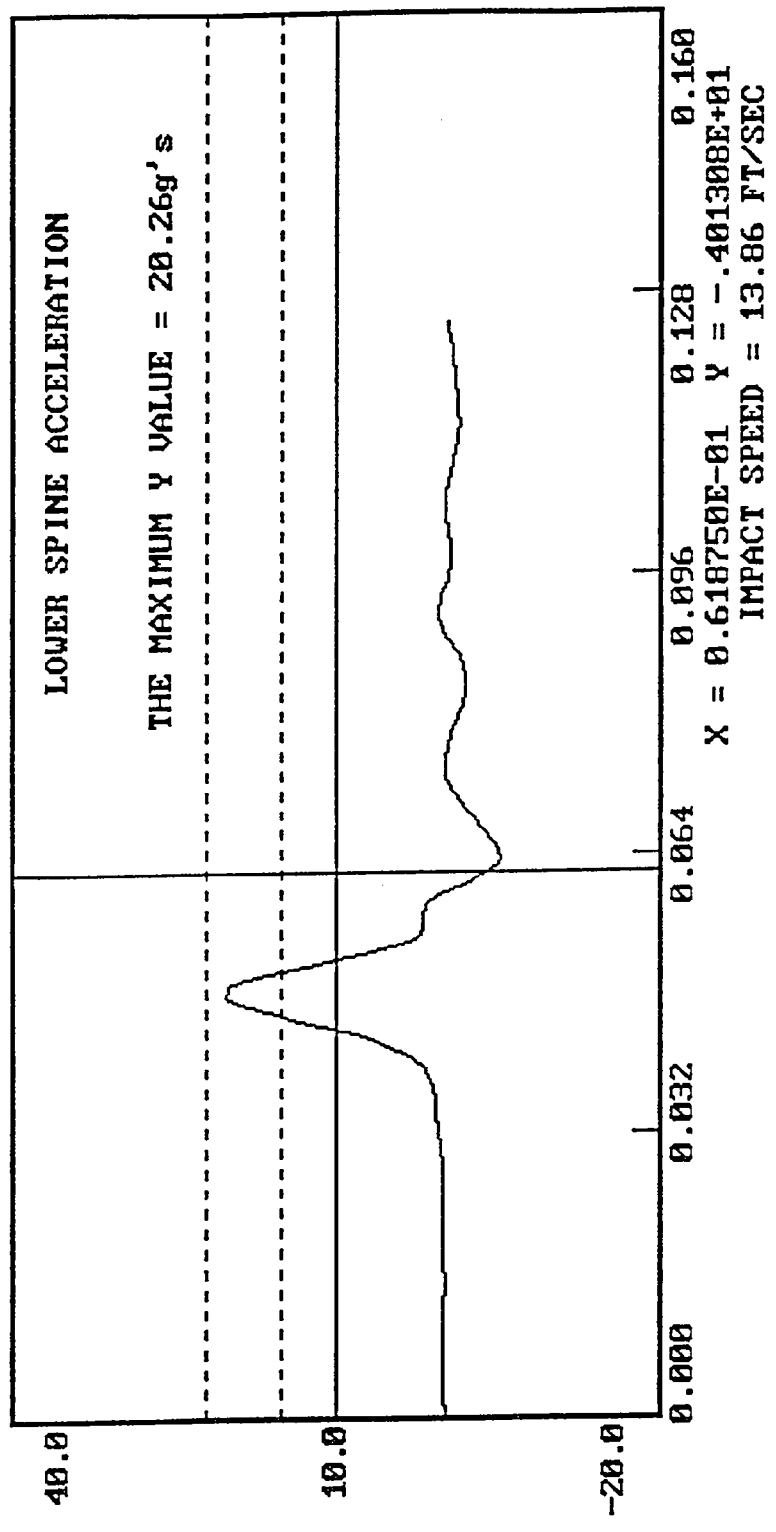
ACCELERATION (G'S) VS. TIME ((SECONDS))

06-08-1994 10:29



06-08-1994 10:29

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 8, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94983

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

TEST MEETS SPECIFICATIONS

TECHNICIAN

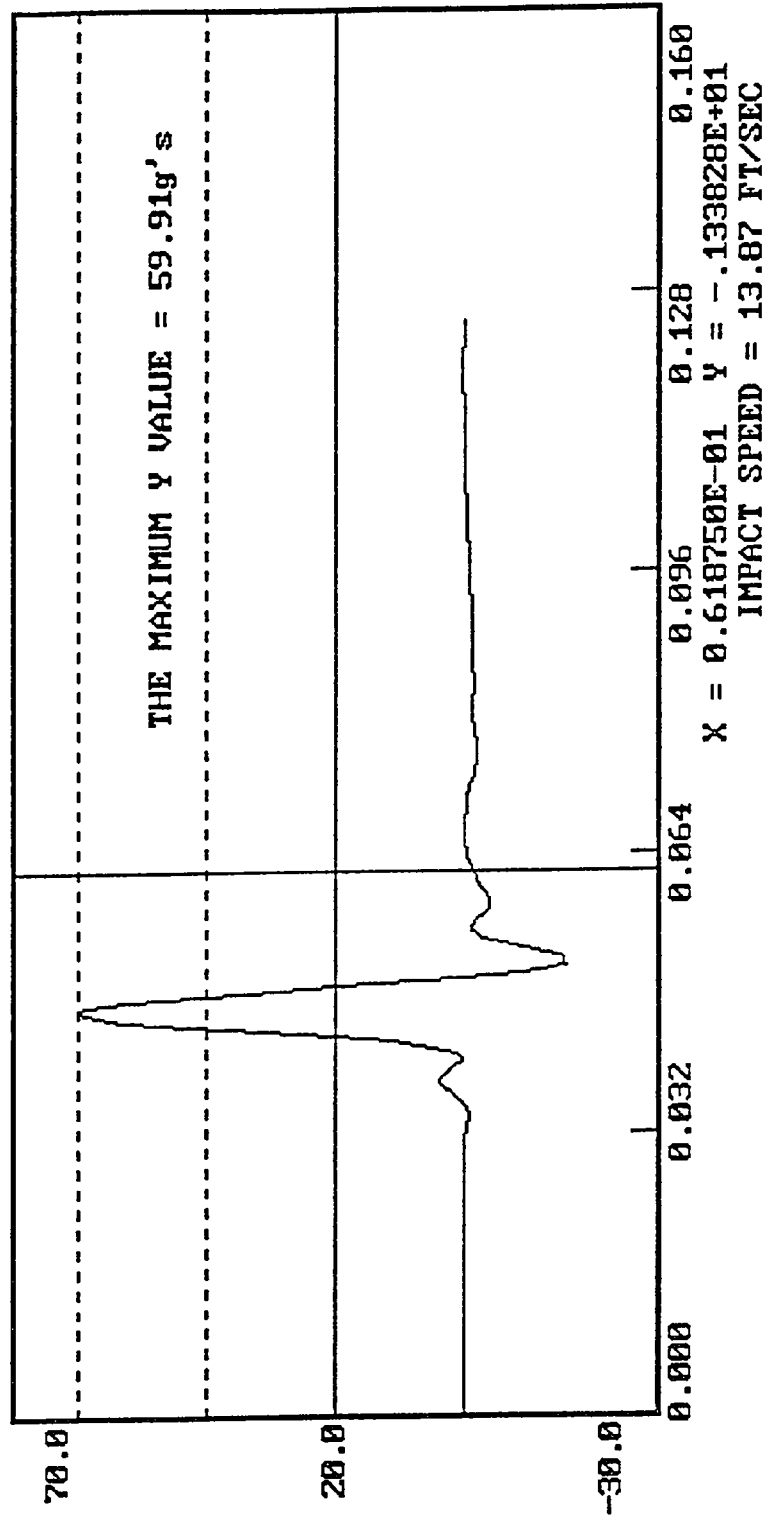
A. Chiu

APPROVED BY

J. Rollins

06-08-1994 11:26

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



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

DATE: June 8, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94984

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0.5 in	23.3 - 36.5 lbs	28.8
FORCE @ 0.75 in	36.7 - 49.8 lbs	41.3
FORCE @ 1.0 in	50 - 63 lbs	55
FORCE @ 1.3 in	73 - 88 lbs	83

TEST MEETS SPECIFICATIONS

TECHNICIAN

Robert E. Bell and

APPROVED BY

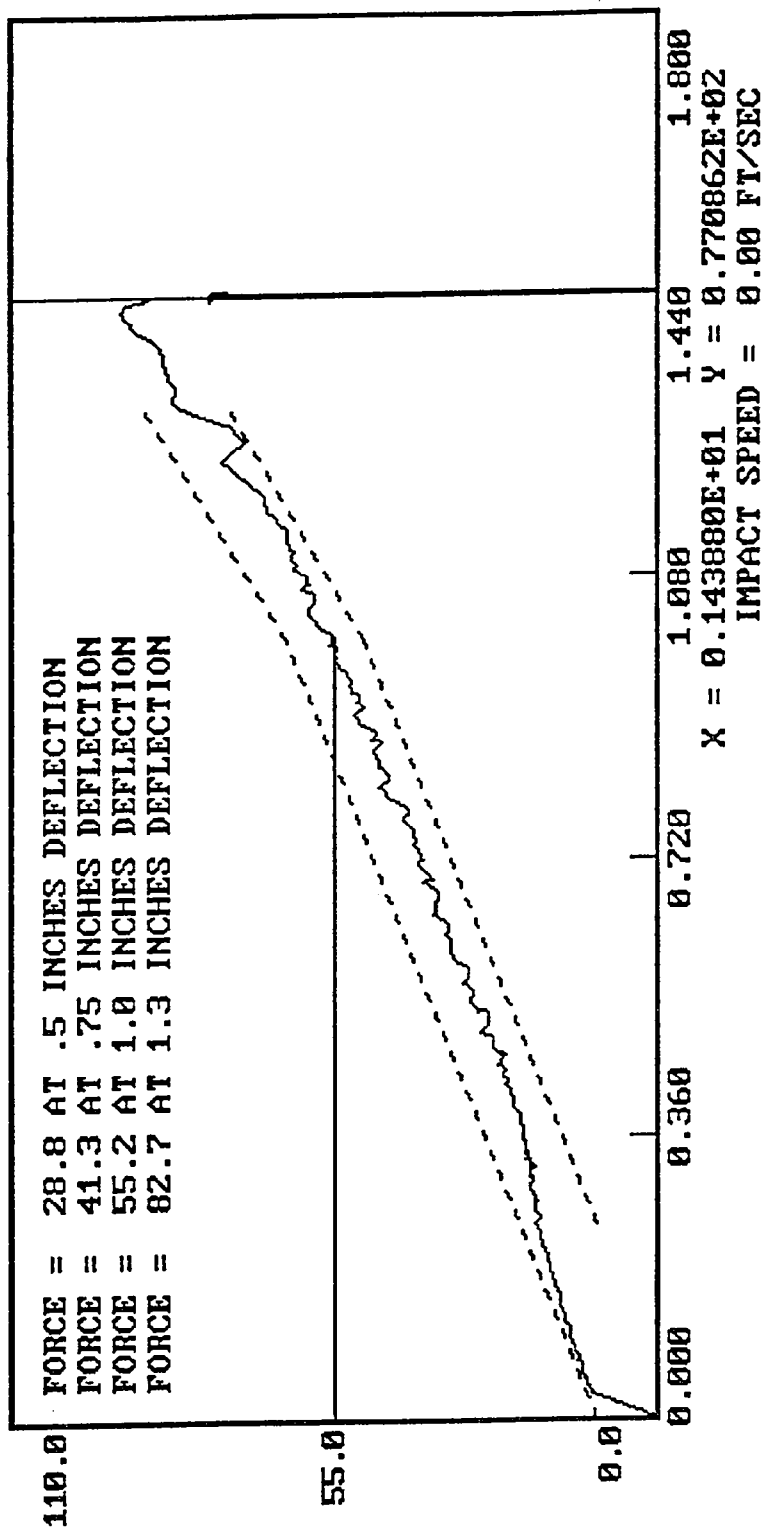
J. Robbins

06-08-1994 14:54

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 272

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 8, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94985

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	25
FORCE @ 30°	34 - 46 lbs	40
FORCE @ 40°	46 - 58 lbs	50
RETURN ANGLE	12° maximum	5°

TEST MEETS SPECIFICATIONS

TECHNICIAN

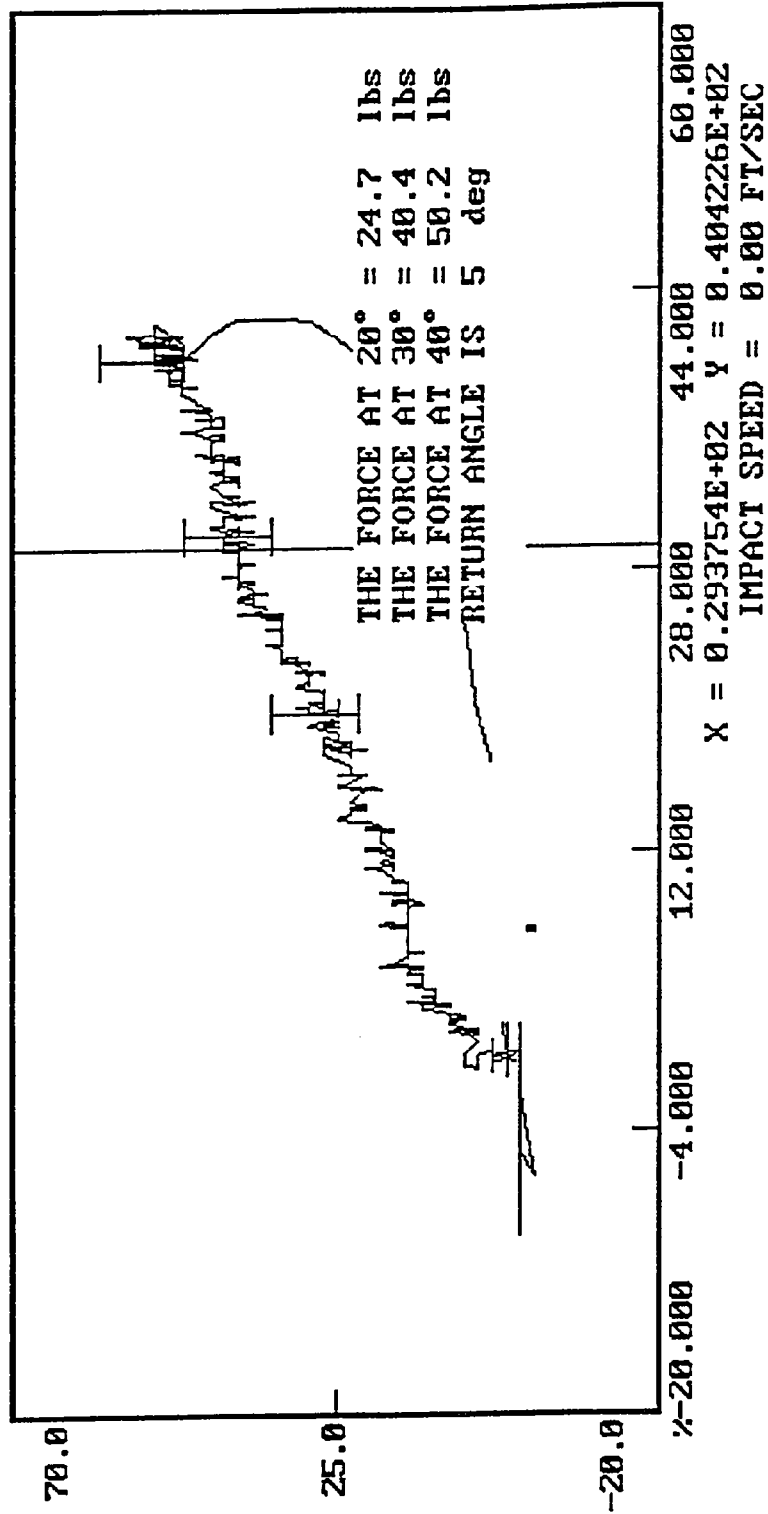
A. Chiu

APPROVED BY

J. Rollins

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

06-08-1994 14:59



POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 270

Calibration Test Results Summary

Dummy Serial Number: 270

Post-Test Calibration

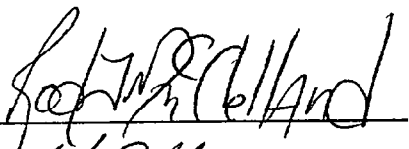
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

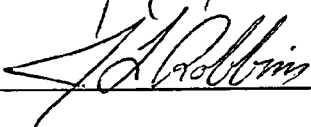
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 270

DATE OF VERIFICATION: June 10, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 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"	9.4
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.7
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	14.6

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94032

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	18

TEST MEETS SPECIFICATIONS

TECHNICIAN *A. Chlun*

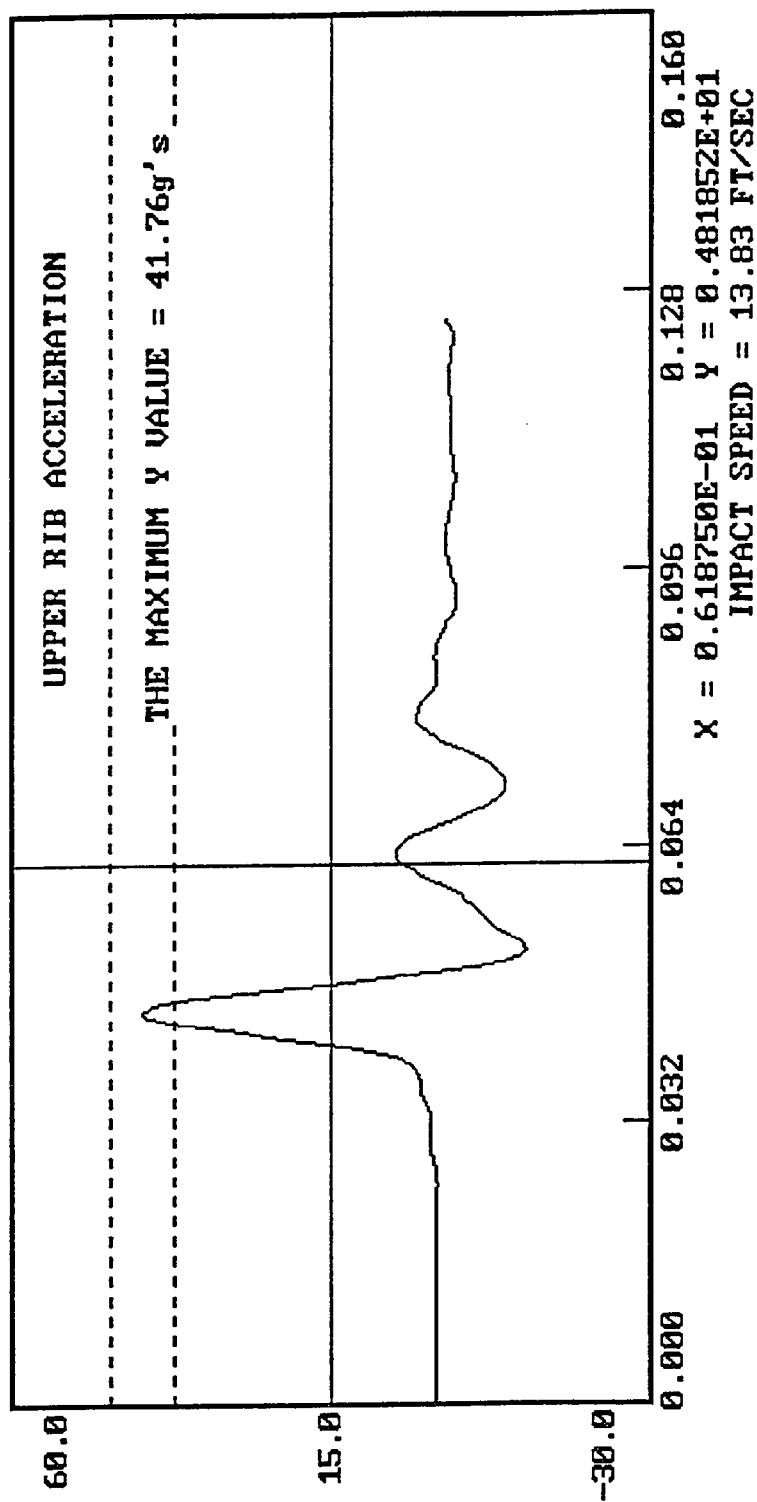
APPROVED BY *J. Robbins*

06-10-1994 08:56

DUMMY CALIBRATION - THORAX IMPACT

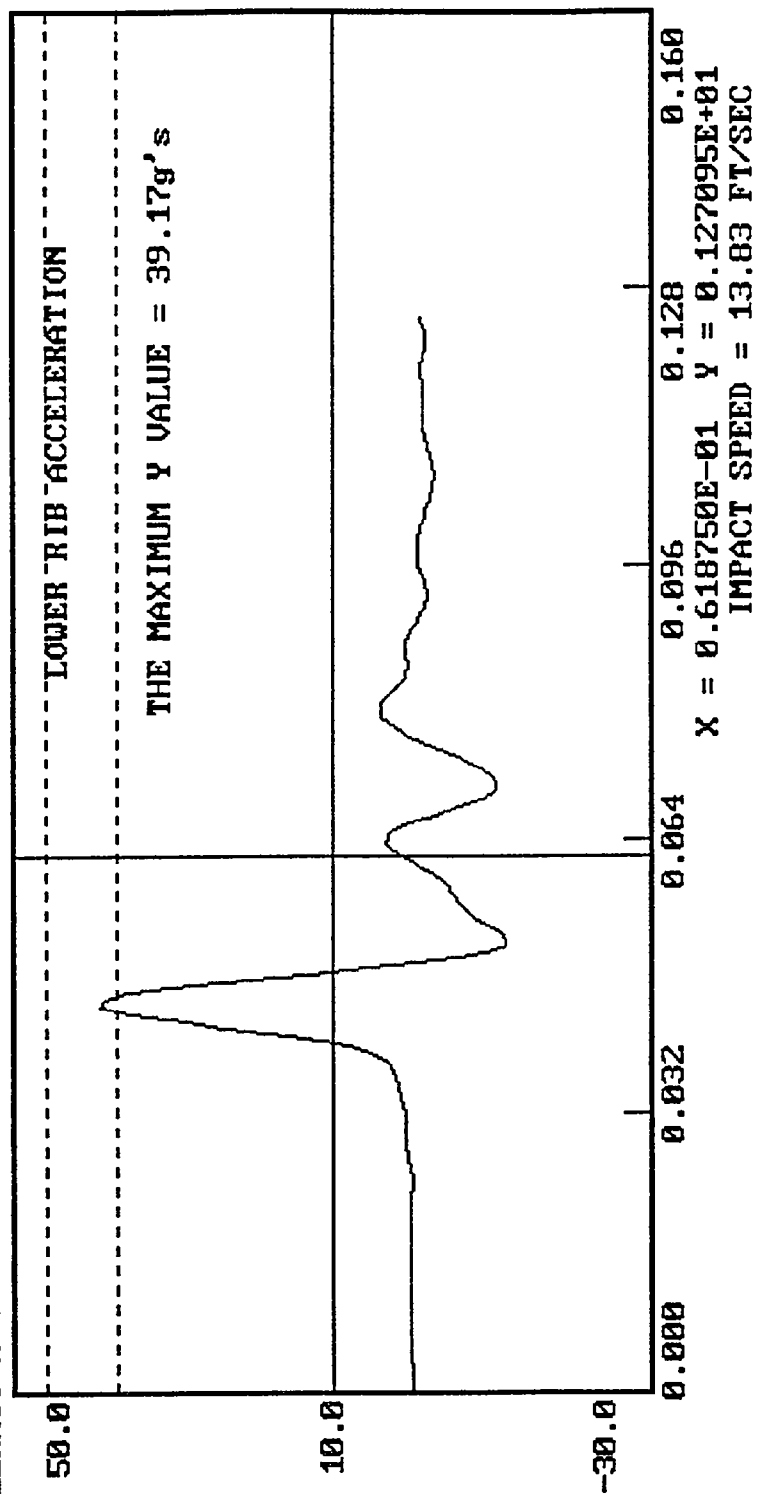
DUMMY # 270

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



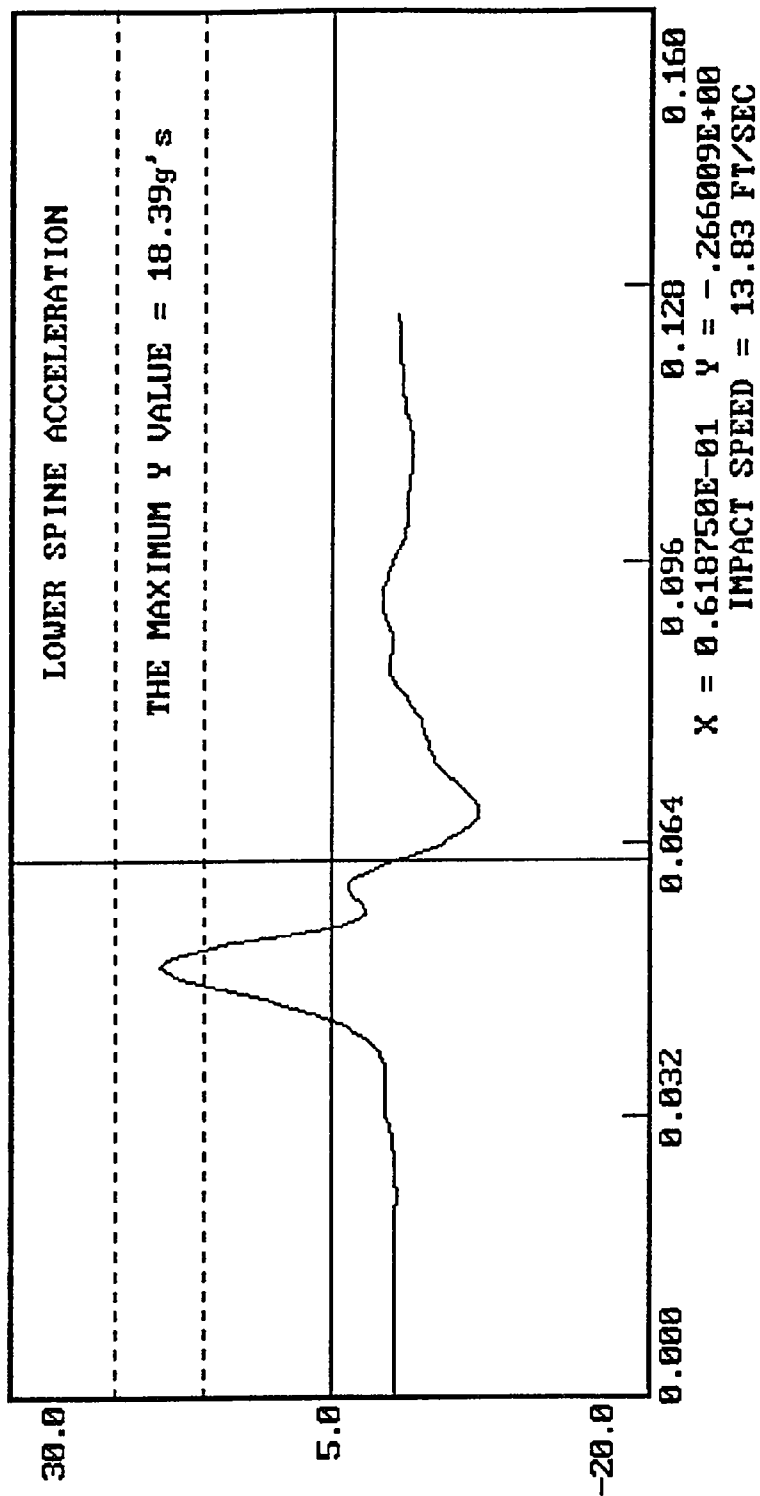
06-10-1994 08:56

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 270
ACCELERATION (G'S) VS. TIME ((SECONDS))



06-10-1994 08:56

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 270
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94033

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	51

TEST MEETS SPECIFICATIONS

TECHNICIAN

Robert J. Bell

APPROVED BY

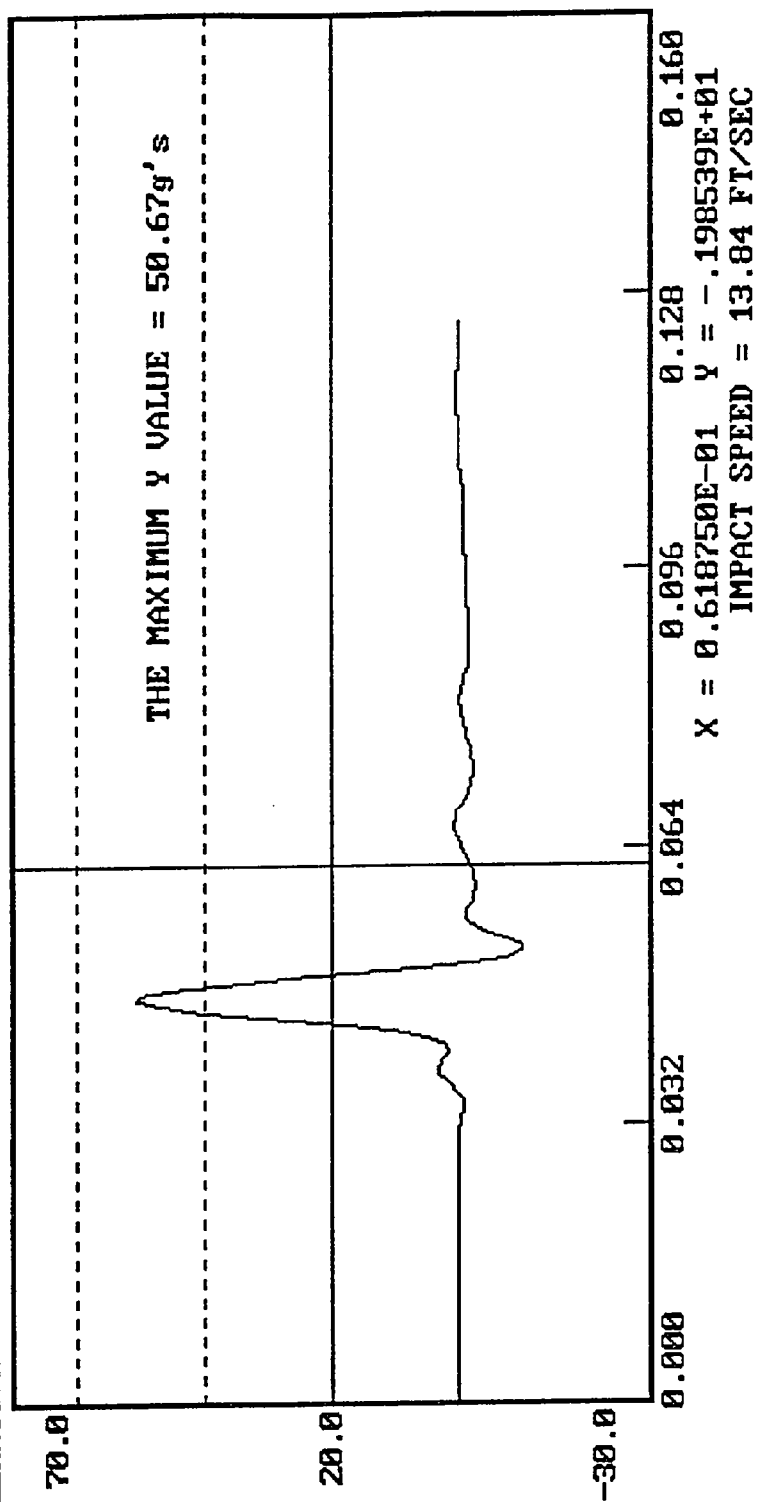
J. Robbins

06-10-1994 09:48

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 270

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



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

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94034

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	33.0
FORCE @ 0.75 in	36.7 - 49.8 lbs	44.9
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	80

TEST MEETS SPECIFICATIONS

TECHNICIAN *He Chen*

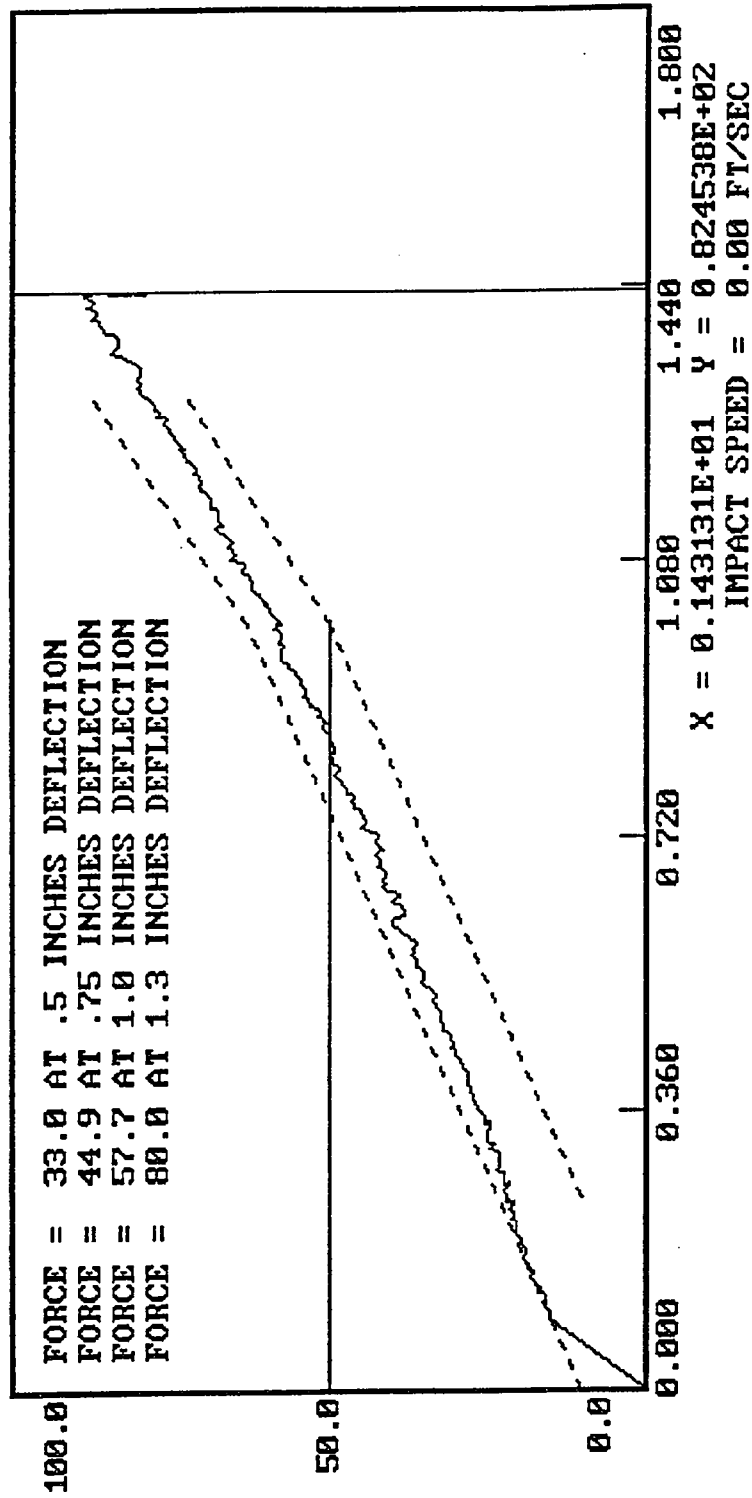
APPROVED BY *J. H. Ellis*

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 270

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)

06-10-1994 10:51



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94035

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	22
FORCE @ 30°	34 - 46 lbs	42
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	6°

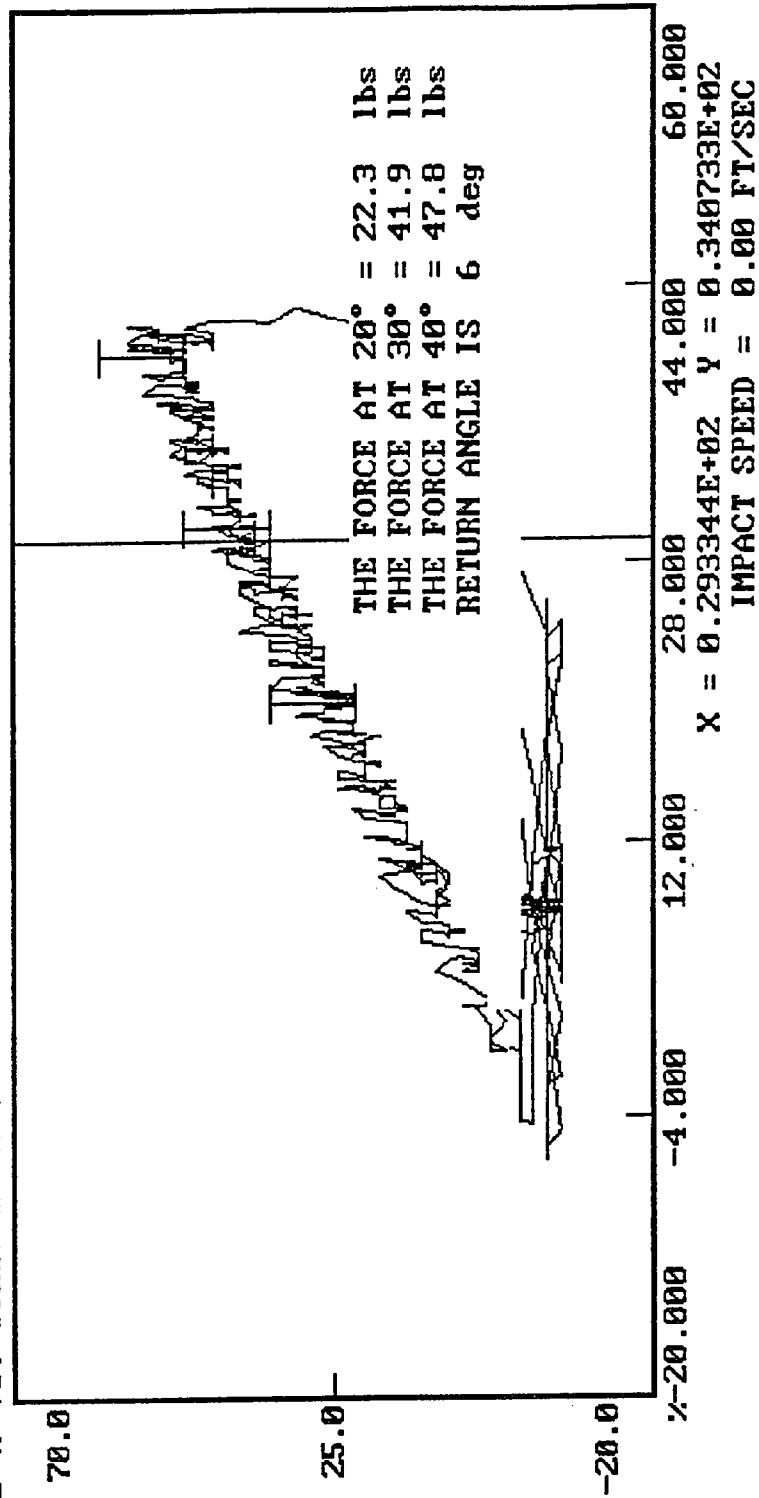
TEST MEETS SPECIFICATIONS

TECHNICIAN Al Cline

APPROVED BY J. Robbins

DUMMY CALIBRATION - LUMBAR FLEXION
 DUMMY # 270 I
 FORCE () VS. TORSO ROTATION (DEGREES)

06-10-1994 11:11



POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

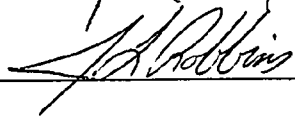
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: June 10, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 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"	20.3
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	15.1

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

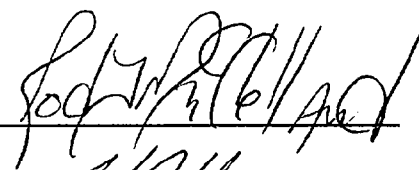
DATE: June 10, 1994

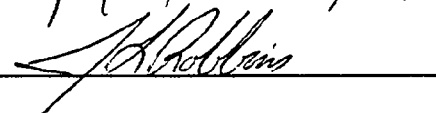
DUMMY NUMBER: 272

TEST NUMBER: D94042

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	20

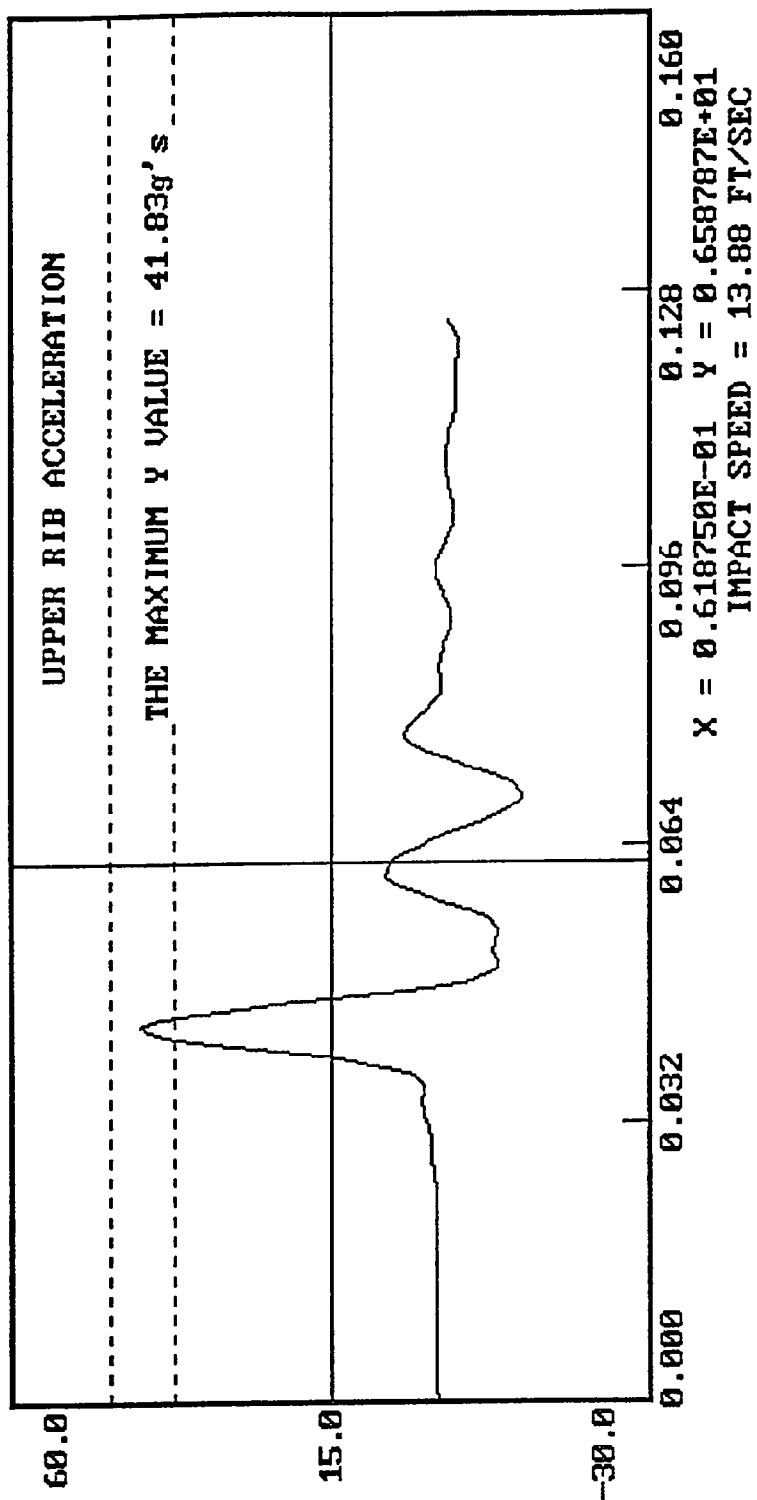
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

06-10-1994 09:16

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

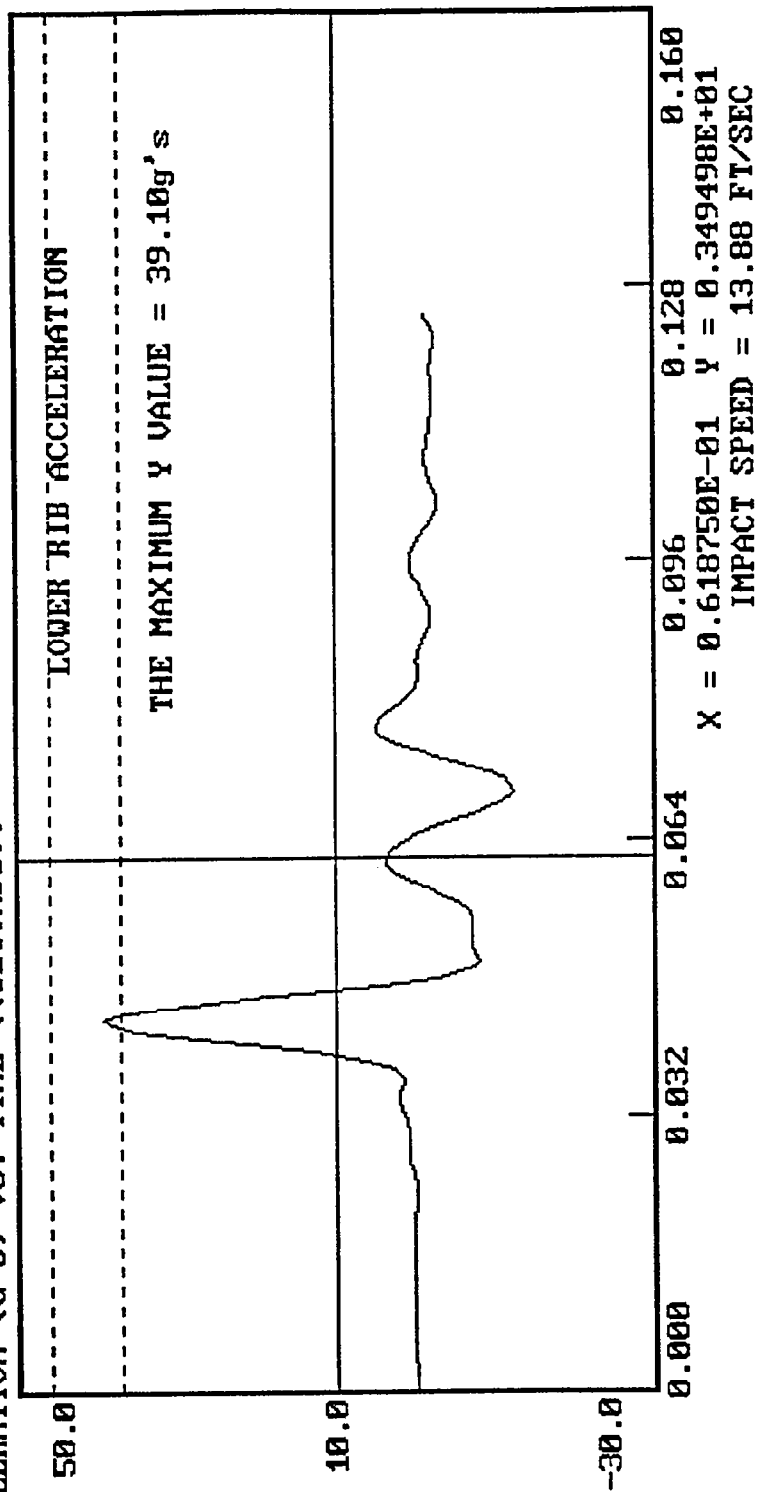


06-10-1994 09:16

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

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

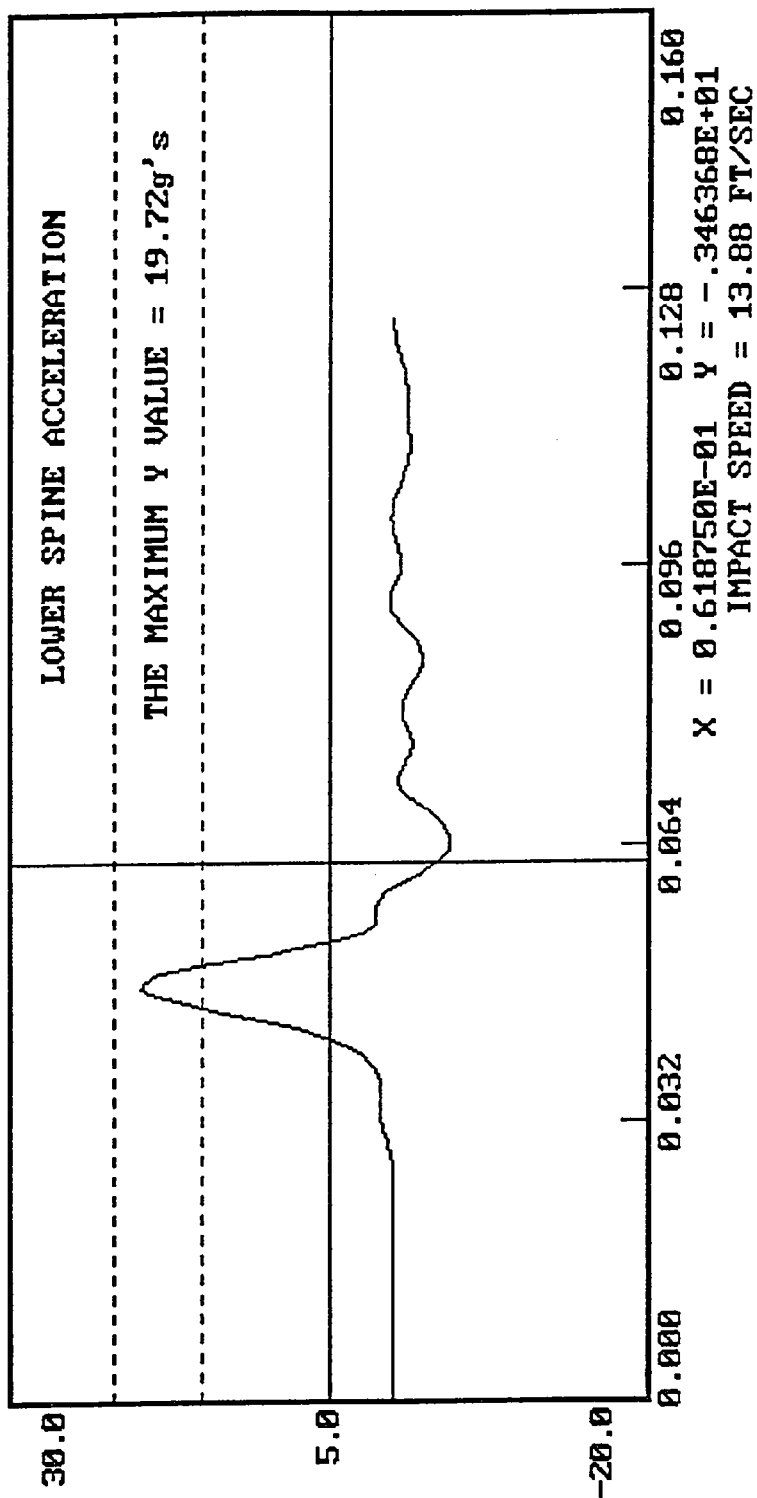


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

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

06-10-1994 09:16



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94043

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	49

TEST MEETS SPECIFICATIONS

TECHNICIAN

He Chen

APPROVED BY

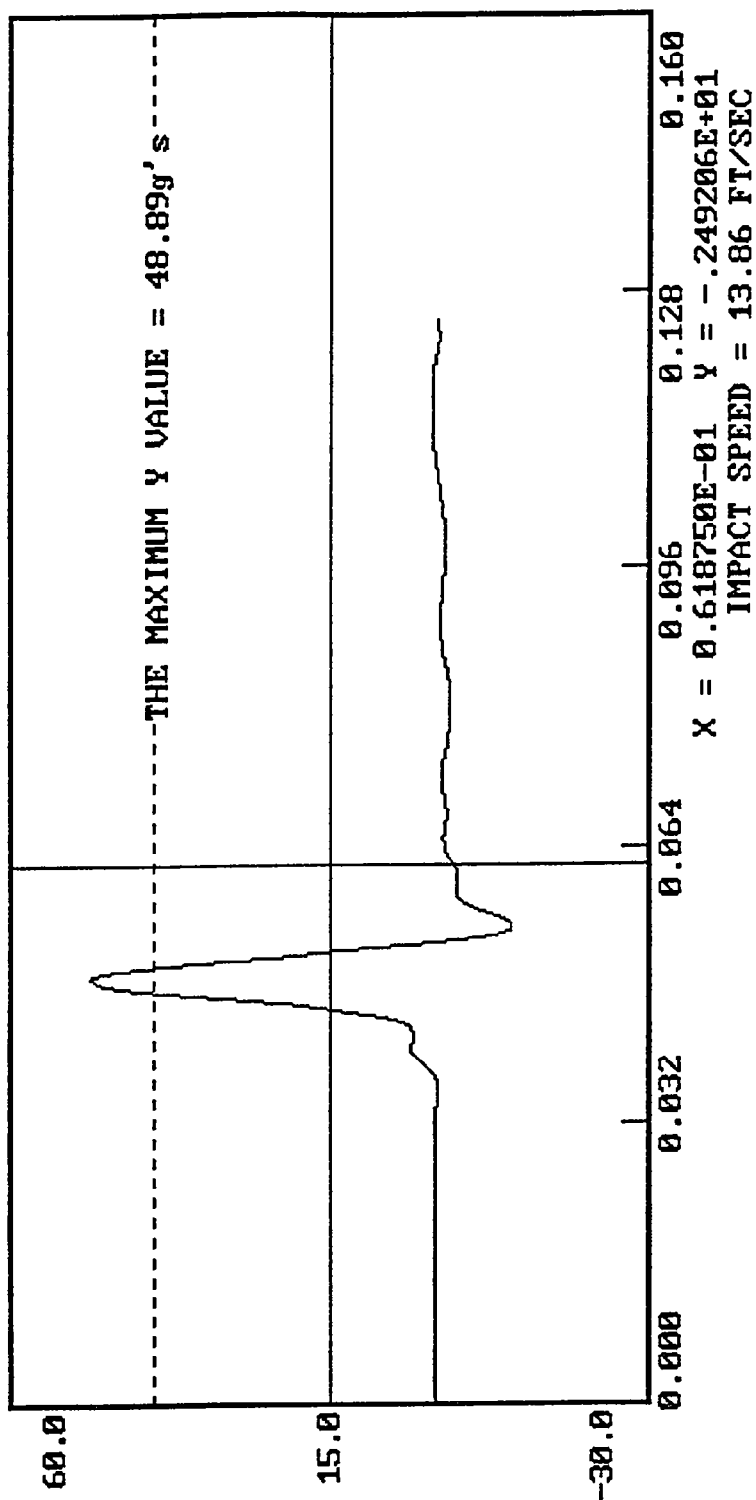
J. Robbins

06-10-1994 09:36

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 272

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



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

DATE: June 10, 1994

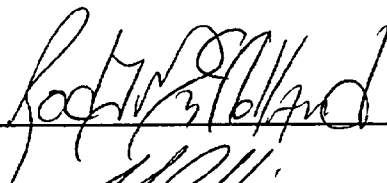
DUMMY NUMBER: 272

TEST NUMBER: D94044

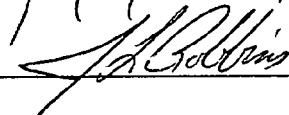
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.8
FORCE @ 0.75 in	36.7 - 49.8 lbs	46.6
FORCE @ 1.0 in	50 - 63 lbs	60
FORCE @ 1.3 in	73 - 88 lbs	83

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

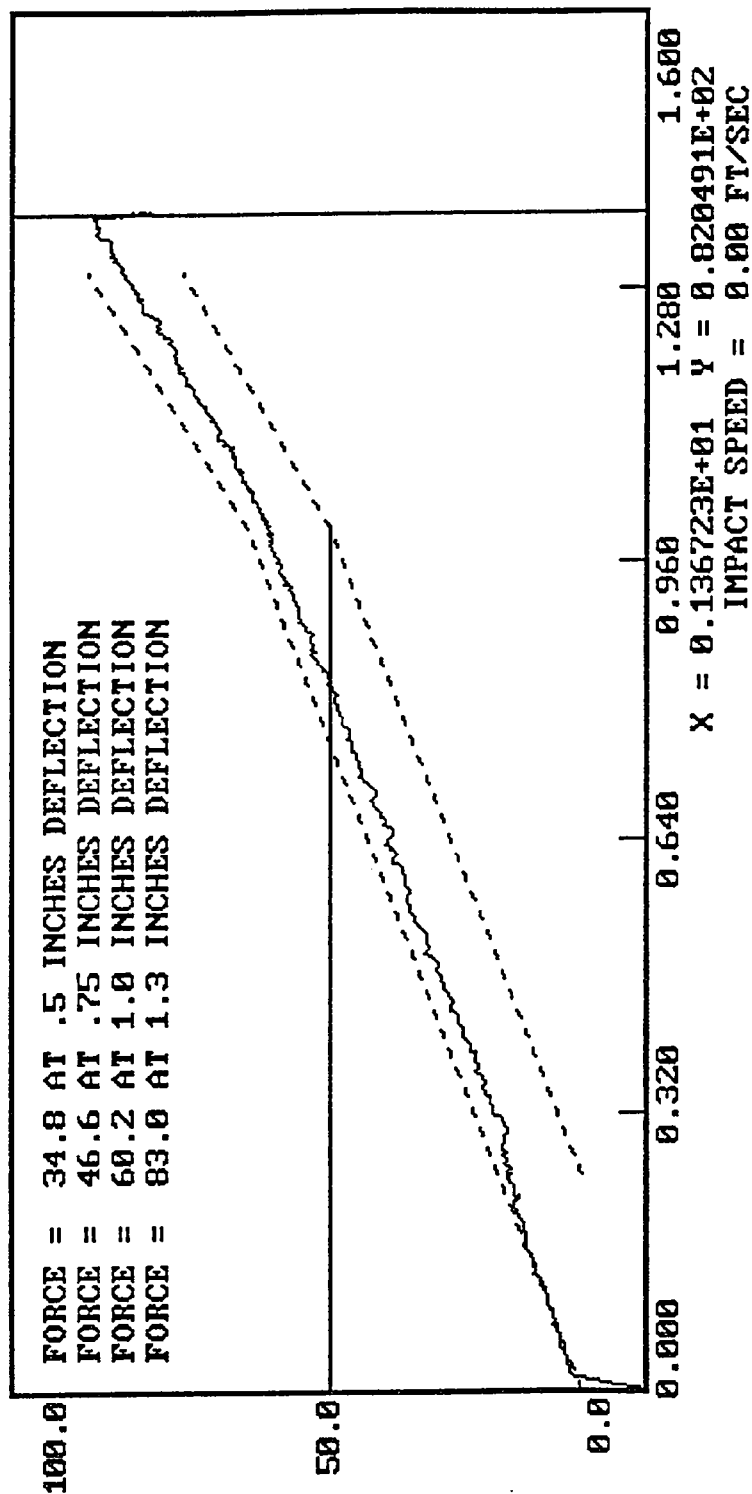


DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 272

06-10-1994 10:45

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 10, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94045

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	25
FORCE @ 30°	34 - 46 lbs	42
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	4°

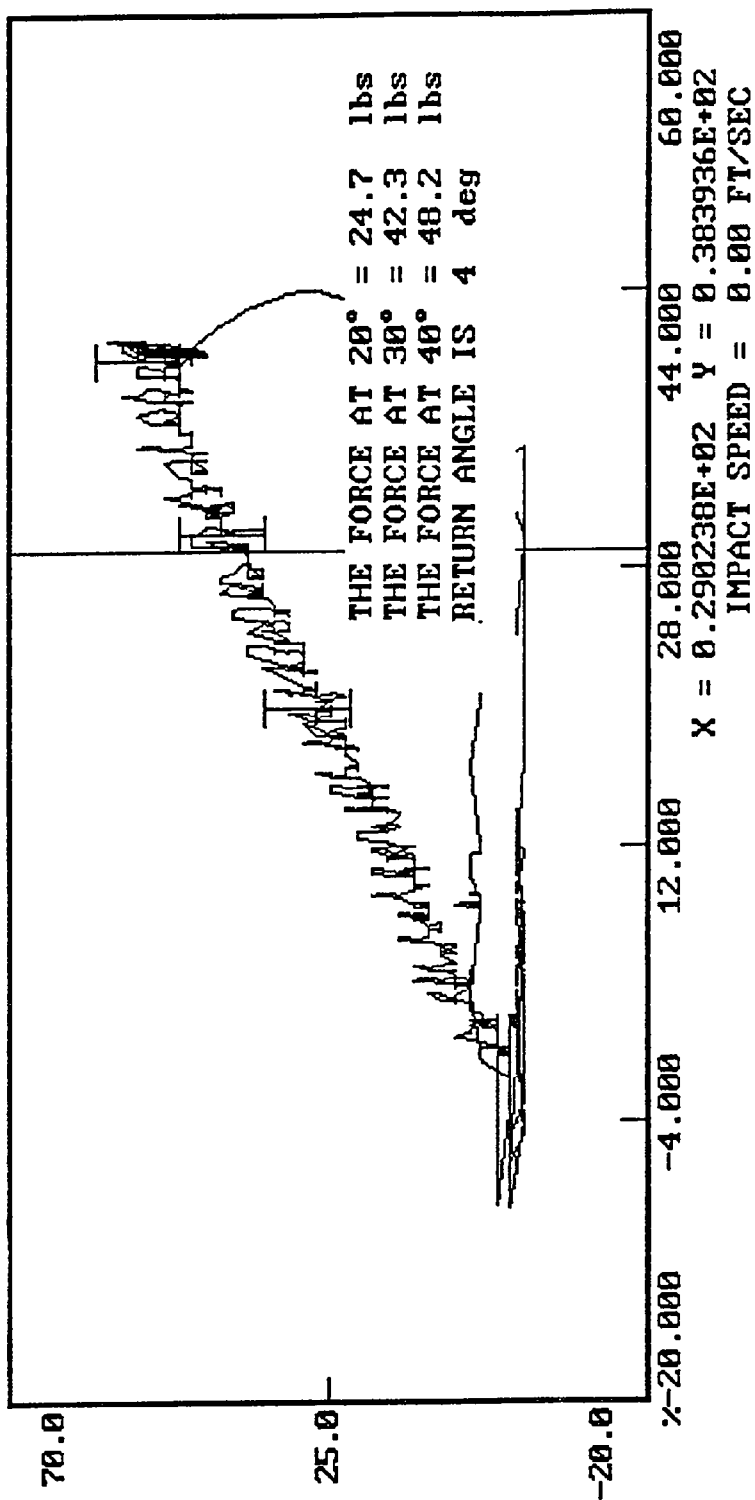
TEST MEETS SPECIFICATIONS

TECHNICIAN *Alan C. Allen*

APPROVED BY *J. R. Ellis*

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

06-10-1994 11:33



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 270

Inspected By: Jeff Robbins

Date: June 10, 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):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 272

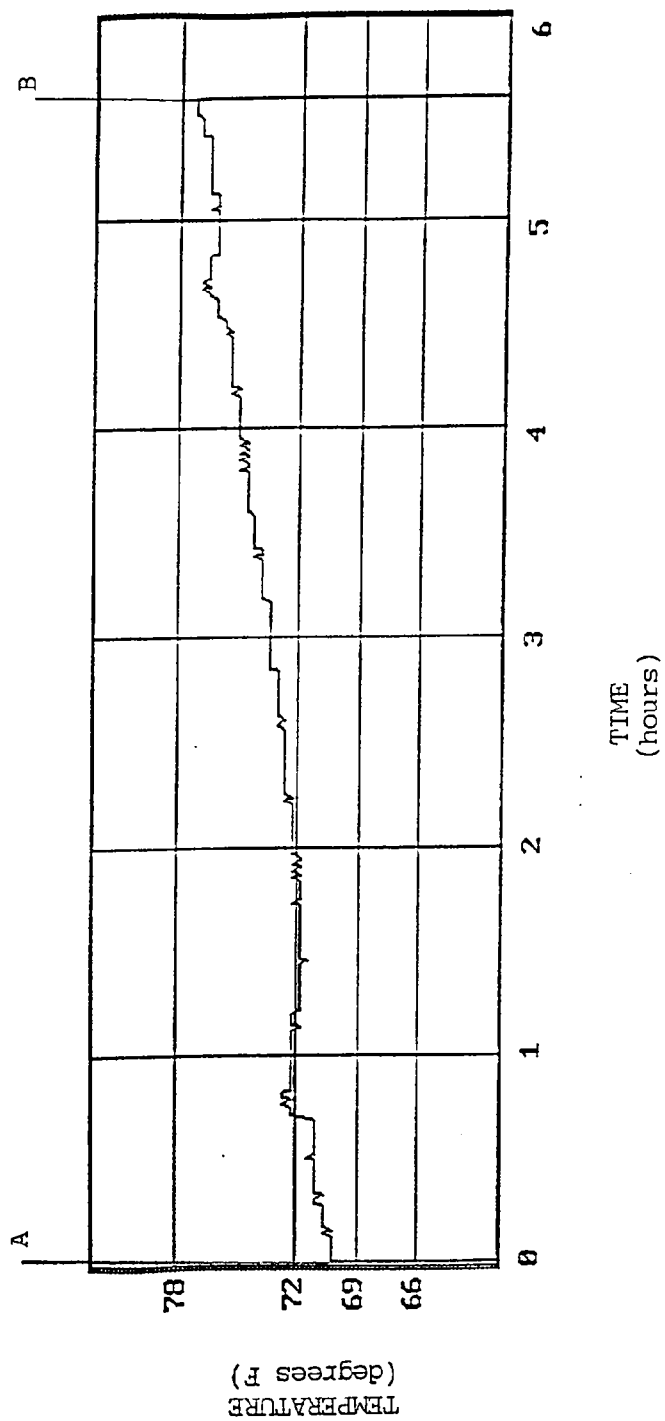
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Date: June 10, 1994

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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):

VEHICLE AND DUMMY TEMPERATURE



A = Dummy installed in vehicle
 B = Test conducted

APPENDIX D
DUMMY AND VEHICLE CALIBRATION DATA

**DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DRIVER DUMMY NO. 270**

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AGRW3	Endevco	May 25, 1994
Lower Rib	AHTW4	Endevco	May 24, 1994
Lower Spine	AGRD5	Endevco	May 24, 1994
Pelvis	AHTN3	Endevco	April 25, 1994
Upper Rib Redundant	AGTPG	Endevco	May 24, 1994
Lower Rib Redundant	AHWL7	Endevco	May 24, 1994
Lower Spine Redundant	AC8J4	Endevco	June 05, 1994
Pelvis Redundant	AE9C8	Endevco	May 25, 1994

INSTRUMENTS FOR PASSENGER DUMMY NO. 272

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AGTM2	Endevco	May 25, 1994
Lower Rib	ACCA3	Endevco	May 25, 1994
Lower Spine	AGR57	Endevco	May 25, 1994
Pelvis	AHTL9	Endevco	May 25, 1994
Upper Rib Redundant	AGTB5	Endevco	May 24, 1994
Lower Rib Redundant	AHTP3	Endevco	May 25, 1994
Lower Spine Redundant	AGTG8	Endevco	May 25, 1994
Pelvis Redundant	AC9B7	Endevco	May 25, 1994

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
MDB CG X	MGA079	Entran	May 06, 1994
MDB CG Y	MGA007	Entran	May 06, 1994
MDB CG Z	MGA016	Entran	May 06, 1994
MDB Rear Axle X	MGA134	Entran	April 27, 1994
MDB Rear Axle Y	MGA147	Entran	April 28, 1994
Lower Left A-Post Y	MGA144	Entran	May 16, 1994
Upper Left B-Post Y	AN47	Endevco	June 02, 1994
Lower Left B-Post Y	AALL9	Endevco	June 02, 1994
Trunk Centerline X	MGA130	Entran	March 31, 1994
Trunk Centerline Y	MGA122	Entran	May 24, 1994
Trunk Centerline Z	MGA160	Entran	May 26, 1994
Driver Seat Track Y	MGA027	Entran	April 25, 1994
Right Front Sill X	MGA084	Entran	May 24, 1994
Right Front Sill Y	MGA091	Entran	May 24, 1994
Right Front Sill Z	MGA035	Entran	May 24, 1994
Right Rear Sill X	MGA128	Entran	May 17, 1994
Right Rear Sill Y	MGA158	Entran	May 17, 1994
Right Rear Sill Z	MGA143	Entran	May 17, 1994
Right Rear Seat Occupant Compartment Y	MGA004	Entran	June 02, 1994
Left Front Sill Y	MGA137	Entran	May 06, 1994
Left Rear Sill Y	ADA34	Endevco	May 06, 1994

Note: All Endevco accelerometers are Model No. 7264-2000
All Entran accelerometers are Model No. EGE-72