

REPORT NO.: MGA-93-21410

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

HYUNDAI MOTORS
1995 HYUNDAI SONATA 4 DOOR SEDAN
NHTSA NO: CS0500

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



MGA Ref. No.: G93A-02

Test Date: June 21, 1994

Report Date: July 15, 1994

FINAL REPORT

Prepared For:

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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 1995 Hyundai Sonata 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 1995 Hyundai Sonata 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 21, 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 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 72.7 g's. Maximum pelvic Y acceleration was 92 g's.

The left rear passenger's TTI was 82.5 g's. Maximum pelvic Y acceleration was 135 g's.

TEST NOTES

The left mid B Post accelerometer separated from the vehicle at 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: 1995/Hyundai/Sonata/4 Door Sedan
 Vehicle NHTSA No.: CS0500 VIN: KMHCF21F7SU127605
 Vehicle Body Color: Green Month & Year of Manufacture: 03-94
 Engine Data: 4 cylinders; CID; 2.0 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 147 miles
 Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; Pwr. Windows
 Power Seats; X Tilt Wheel; Power Door Locks; Self Leveling System

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 psi FRONT
30 psi REAR
 Recommended Tire Size: P195/70R14
 Tires on Test Vehicle: P195/70R14 Manufacturer: Michelin

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; N/A 3rd Seat 5 Total
 Type of Front Seats: X Bucket; Bench; Split Bench
 Type of Front Seat Back: Fixed; X Adjustable with X Lever
 Vehicle Maximum Capacity Loading* = 860 lbs (A)
 No. of Occupants x 150 lbs. = 750 lbs (B)
 Cargo Capacity (A-B) = 110 lbs

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>886</u> lbs	Right Rear	=	<u>561</u> lbs
Left Front	=	<u>908</u> lbs	Left Rear	=	<u>550</u> lbs
TOTAL FRONT	=	<u>1794</u> lbs	TOTAL REAR	=	<u>1111</u> lbs
% of Total Vehicle Weight	=	<u>62.0</u> %;	% of Total Weight	=	<u>38.0</u> %
TOTAL WEIGHT	=	<u>2905</u> lbs			

* Supplied by manufacturer

TABLE 2
TEST VEHICLE DATA

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 2905 lbs

Maximum Cargo Carrying Capacity of Test Vehicle = 110 lbs

Weight of 2 Side Impact Dummies (2 x 178 lbs.) = 356 lbs

TEST VEHICLE TARGET WEIGHT: = 3371 lbs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 944 lbs Right Rear = 668 lbs

Left Front = 1018 lbs Left Rear = 724 lbs

TOTAL FRONT = 1962 lbs TOTAL REAR = 1392 lbs

% of Total Weight = 58.5 % % of Total Weight = 41.5 %

TOTAL TEST WEIGHT = 3354 lbs

TEST VEHICLE ATTITUDE (all dimensions in inches):

CURB WEIGHT ATTITUDE: (in)

Right Front 28.1 Left Front 28.3 Right Rear 27.4 Left Rear 27.3

FULLY LOADED WEIGHT ATTITUDE: (in)

Right Front 28.0 Left Front 27.3 Right Rear 25.9 Left Rear 25.3

TEST ATTITUDE: (in)

Right Front 27.8 Left Front 27.3 Right Rear 25.8 Left Rear 25.4

Test Vehicle Wheelbase: 106.1 inches

C.G. = 44 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 175.9 in

Centerline = 183.4 in

Left Side = 175.9 in

FIGURE 1
PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

FRONT SEAT CUSHION PLACEMENT:

Total Number of Adjustment Positions or Detents: 16

Adjustment Position: 9th from front

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 26.3° 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

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 = 17.2 gallons

Test Volume: 16.0 gallons (93% of capacity)

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

Wheelbase: = 106.1 in

Impact Point is 16.0 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: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

Overall Length = 183.4 in; Overall Width = 69.6 in

TEST WEIGHT:

Right Front	=	<u>944</u> lbs	Right Rear	=	<u>668</u> lbs
Left Front	=	<u>1018</u> lbs	Left Rear	=	<u>724</u> lbs
TOTAL FRONT	=	<u>1962</u> lbs	TOTAL REAR	=	<u>1392</u> lbs
TOTAL VEHICLE WEIGHT <u>3354</u> lbs					
Wheelbase = <u>106.1</u> in					
Longitudinal C.G. front Center of Front Axle = <u>44</u> in					
Impact Angle with Respect to Impactor = <u>90°</u> degrees					

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (10.0 in above ground) = 9.6 in
 2. LEVEL 2 (18.4 in above ground) = 16.3 in
 3. LEVEL 3 (23.0 in above ground) = 15.7 in
 4. LEVEL 4 (34.0 in above ground) = 11.0 in
 5. LEVEL 5 (51.1 in above ground) = 3.3 in
 Maximum Post-Test Intrusion = 16.3 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>17</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: 1995/Hyundai/Sonata/4 Door Sedan
Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 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: 32.85 mph Secondary: 32.90 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Top of Stack (33 in)	= <u>1.7</u> in
2. Row B Mid Stack (27 in)	= <u>3.4</u> in
3. Row C Top of Bumper (21 in)	= <u>1.0</u> in
4. Row D Center of Bumper (17 in)	= <u>1.5</u> in

INSTRUMENTATION:

Number of MDB Data Channels = 7

TABLE 5
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to "B" Post</u>	<u>to "C" Post</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 right knee</u>	<u>to right 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: 0.6 inches rearward Vertical: 1.1 inches high

ARM REST LOCATIONS:

Front: 9.3 inches below window opening
Rear: 9.4 inches below window opening

SEAT CRUSH:

Driver Seat Back: 1.5 inches Driver Seat Cushion: 5.5 inches
Left Rear Seat Back: 6.6 inches Left Rear Seat Cushion: 10.8 inches

GLAZING DAMAGE:

Both front and rear left side door glass broken: Windshield cracked

PILLAR PERFORMANCE:

No separation evident

SILL SEPARATION:

No sill separation noted

OTHER NOTABLE IMPACT EFFECTS:

Driver and passenger airbags deployed

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

TABLE 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARYYear/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 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)
RIB ACCELERATIONS: Upper Rib Lateral.....Y Upper Rib Lateral....Y(R) Lower Rib Lateral.....Y Lower Rib Lateral.....Y(R)	75.5	39	-21.4	77	89.4	46
	75.0	39	-22.9	77	89.3	46
	75.6	40	-14.7	90	78.5	45
	72.0	40	-14.8	90	80.7	45
SPINE ACCELERATIONS: Lower Lateral.....Y Lower Lateral.....Y(R)	69.8	37	-13.2	78	75.6	48
	72.2	37	-12.8	78	78.6	48
PELVIC ACCELERATIONS: Lateral.....Y Lateral.....Y(R)	91.7	43	-24.2	142	134.8	38
	93.8	43	-23.6	142	138.9	38
					-36.6	80
					-36.5	80
					-12.6	88
					-13.0	88

REFERENCE:

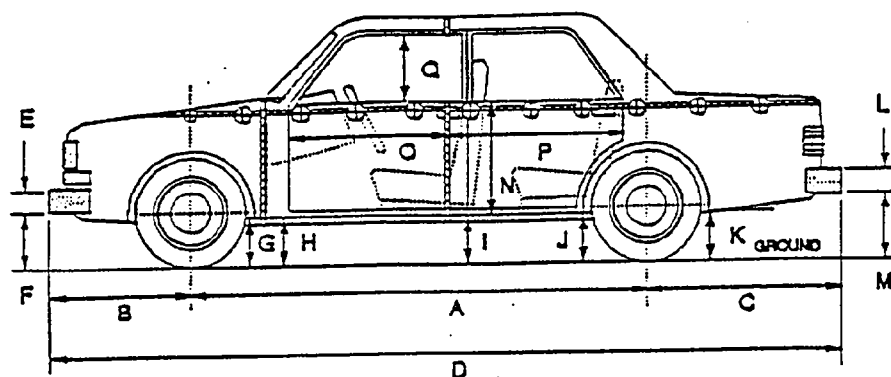
Positive Direction - Longitudinal (X) = forward

Lateral (Y) = to right

Vertical (Z) = up

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

FIGURE 2
PRE- AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

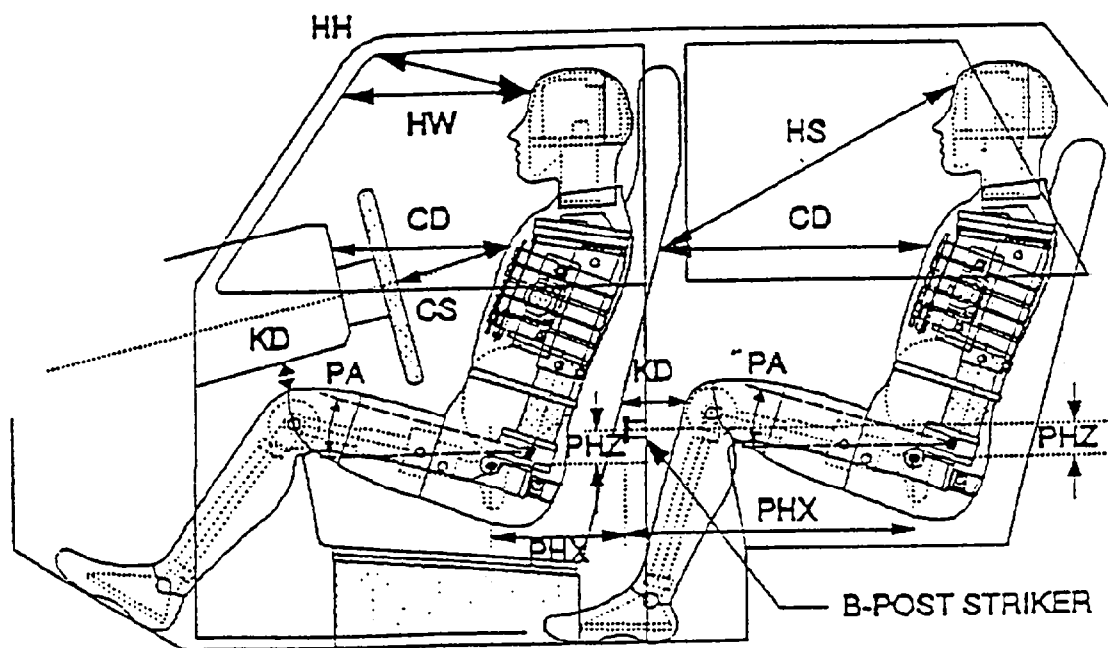
D = Length at Centerline
R = Right Side Length
S = Left Side Length
T = Width at B Post
E & L = Bumper Thickness

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

Units: in

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	186.1	184.1	2.0
B	36.2	36.2	0
C	41.1	41.3	0.2
D	183.4	181.7	1.7
E	12.2	11.6	0.6
F	9.0	11.0	2.0
G	8.3	10.0	1.7
H	6.5	9.5	3.0
I	6.5	9.7	3.2
J1/J2	6.4/6.4	8.5/6.2	2.1/0.2
K	8.6	8.8	0.2
L	12.7	12.4	0.3
M	10.0	12.0	2.0
N	25.0	20.4	4.6
O	28.7	26.9	1.8
P	47.2	48.5	1.3
Q	15.5	15.2	0.3
R	175.9	178.0	2.1
S	175.7	173.8	1.9
T	69.6	57.3	12.3

FIGURE 3
SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



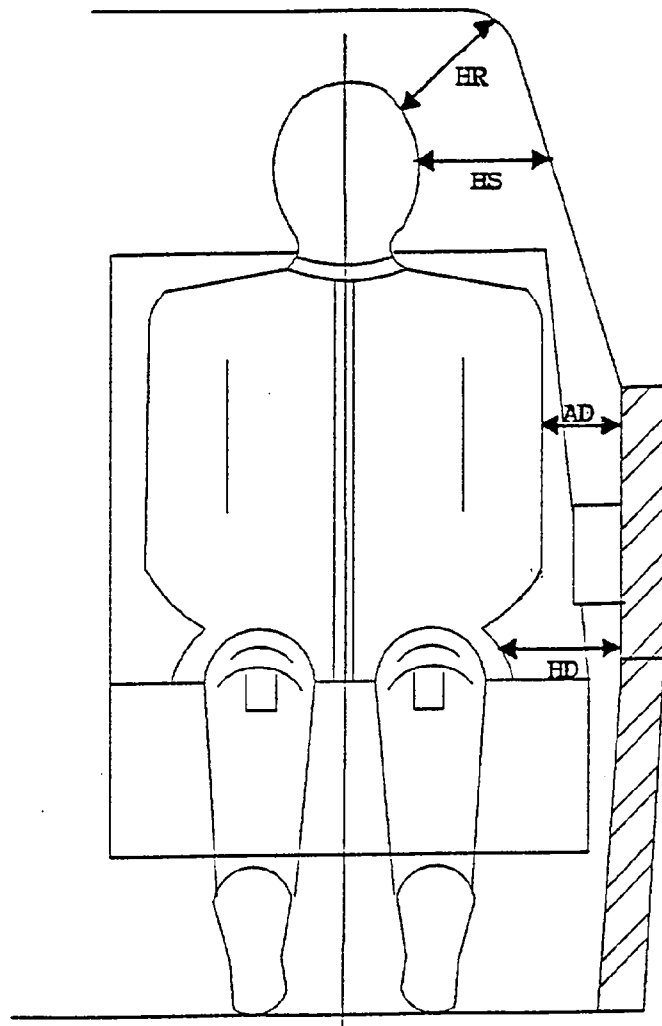
LEFT SIDE VIEW

NOTE: All dimensions are in inches

	DRIVER ID #270	LEFT REAR PASSENGER ID #272
HH	15.3	---
HW	23.8	---
HS	---	28.3
CD	22.4	22.4
CS	14.5	---
KDL	7.0	8.4
KDR	7.3	8.6
PA°	23.2°	23.8°
PHX	9.5	11.5
PHZ	5.4	11.3

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



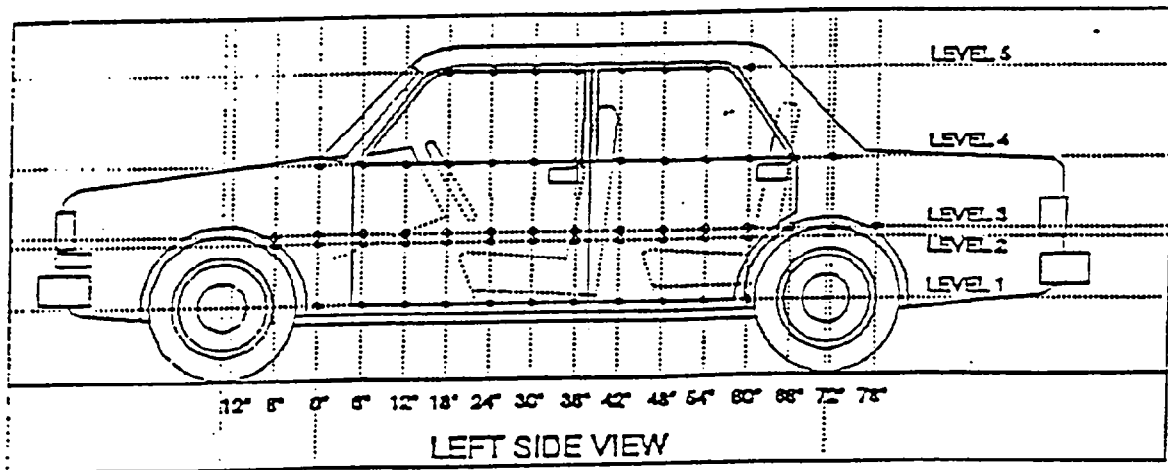
NOTE: All dimensions are in inches

	DRIVER ID #270	LEFT REAR PASSENGER ID #272
HR	5.3	4.9
HS	10.5	6.9
AD	5.4	4.8
HD	6.8	7.6

FIGURE 5
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994



Height measurements are with respect to ground along the vertical 33" line shown above:

<u>33" Side Profile</u>	
Level 5 @ Window Top	= <u>51.1</u> in
Level 4 @ Window Sill	= <u>34.0</u> in
Level 3 @ Mid Door	= <u>23.0</u> in
Level 2 @ Occupant H-Point	= <u>18.4</u> in
Level 1 @ Axle Centerline Height (or Sill Top Height	= <u>10.0</u> in

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

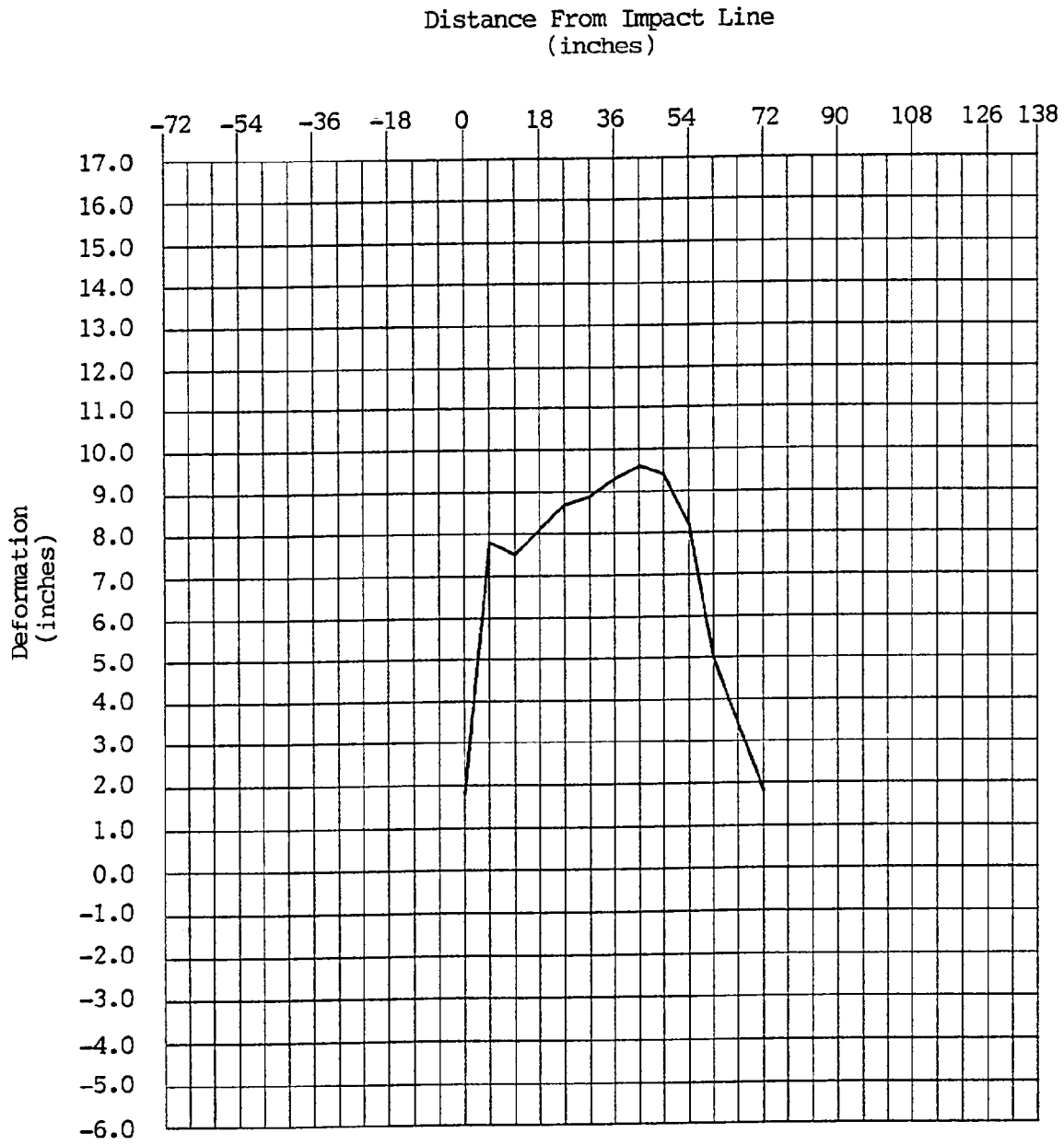
LEVEL 1 AT AXLE CENTER LINE

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 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	33.3	31.5	1.8 (impact point)
6	39.3	31.5	7.8
12	39.2	31.7	7.5
18	39.8	31.7	8.1
24	40.4	31.7	8.7
30	40.7	31.8	8.9
36	41.1	31.8	9.3
42	41.5	31.9	9.6
48	41.3	31.9	9.4
54	40.2	32.0	8.2
60	37.0	32.0	5.0
66	35.4	32.0	3.4
72	33.7	31.9	1.8
78	---	---	---
84	---	---	---
90	---	---	---
96	---	---	---
102	---	---	---
108	---	---	---
114	---	---	---
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---

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

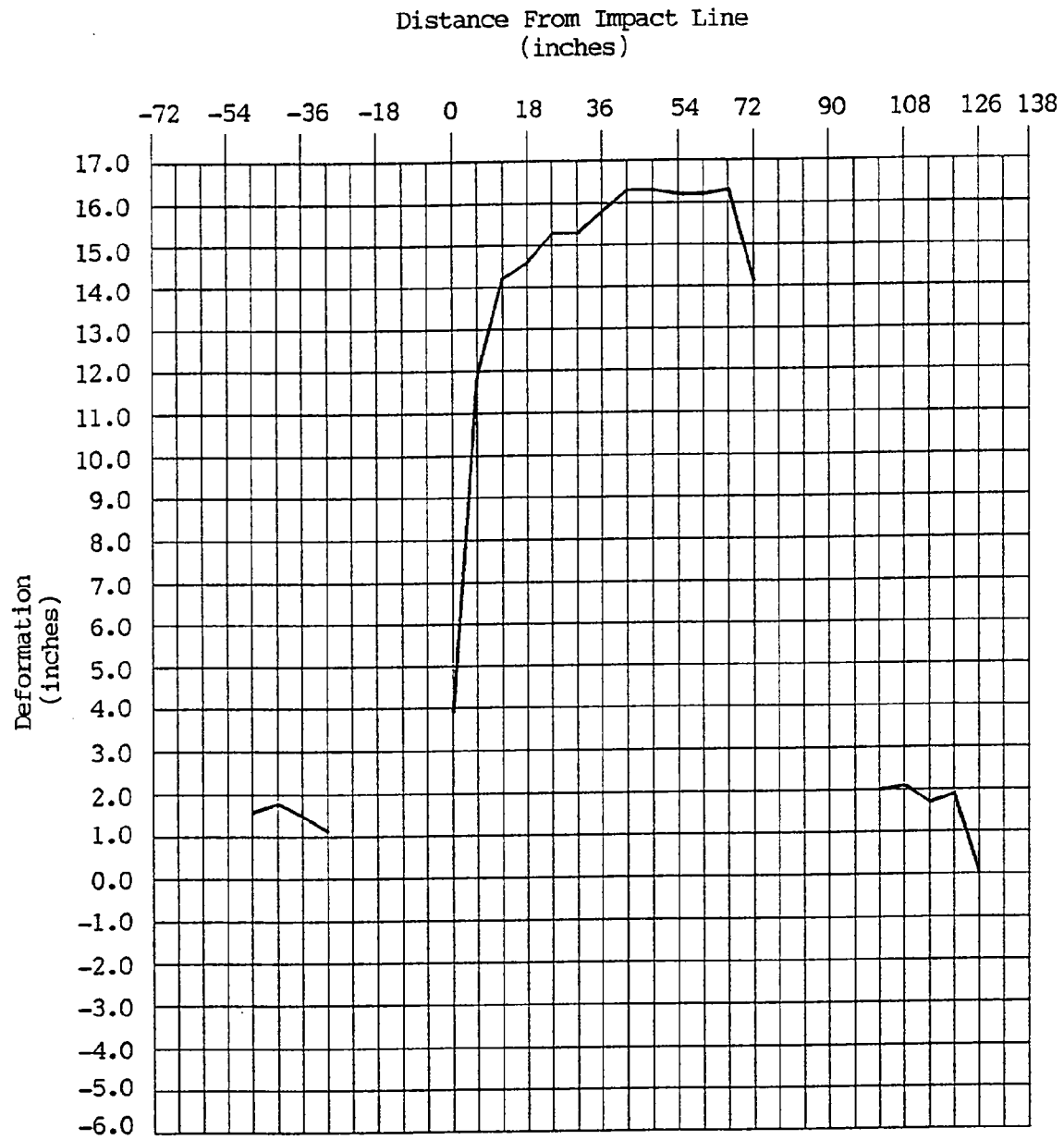
LEVEL 2 AT OCCUPANT H-POINT

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	36.6	35.0	1.6
-42	34.6	32.8	1.8
-36	33.3	31.8	1.5
-30	32.1	31.0	1.1
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	34.3	30.4	3.9 (impact point)
6	42.3	30.4	11.9
12	44.5	30.3	14.2
18	44.9	30.3	14.6
24	45.5	30.2	15.3
30	45.5	30.2	15.3
36	45.9	30.1	15.8
42	46.3	30.0	16.3
48	46.3	30.0	16.3
54	46.3	30.1	16.2
60	46.3	30.1	16.2
66	46.5	30.2	16.3
72	44.5	30.4	14.1
78	---	---	---
84	---	---	---
90	---	---	---
96	---	---	---
102	32.7	30.9	2.0
108	33.7	31.6	2.1
114	34.1	32.4	1.7
120	35.4	33.5	1.9
126	36.0	36.0	0
132	---	---	---
138	---	---	---

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

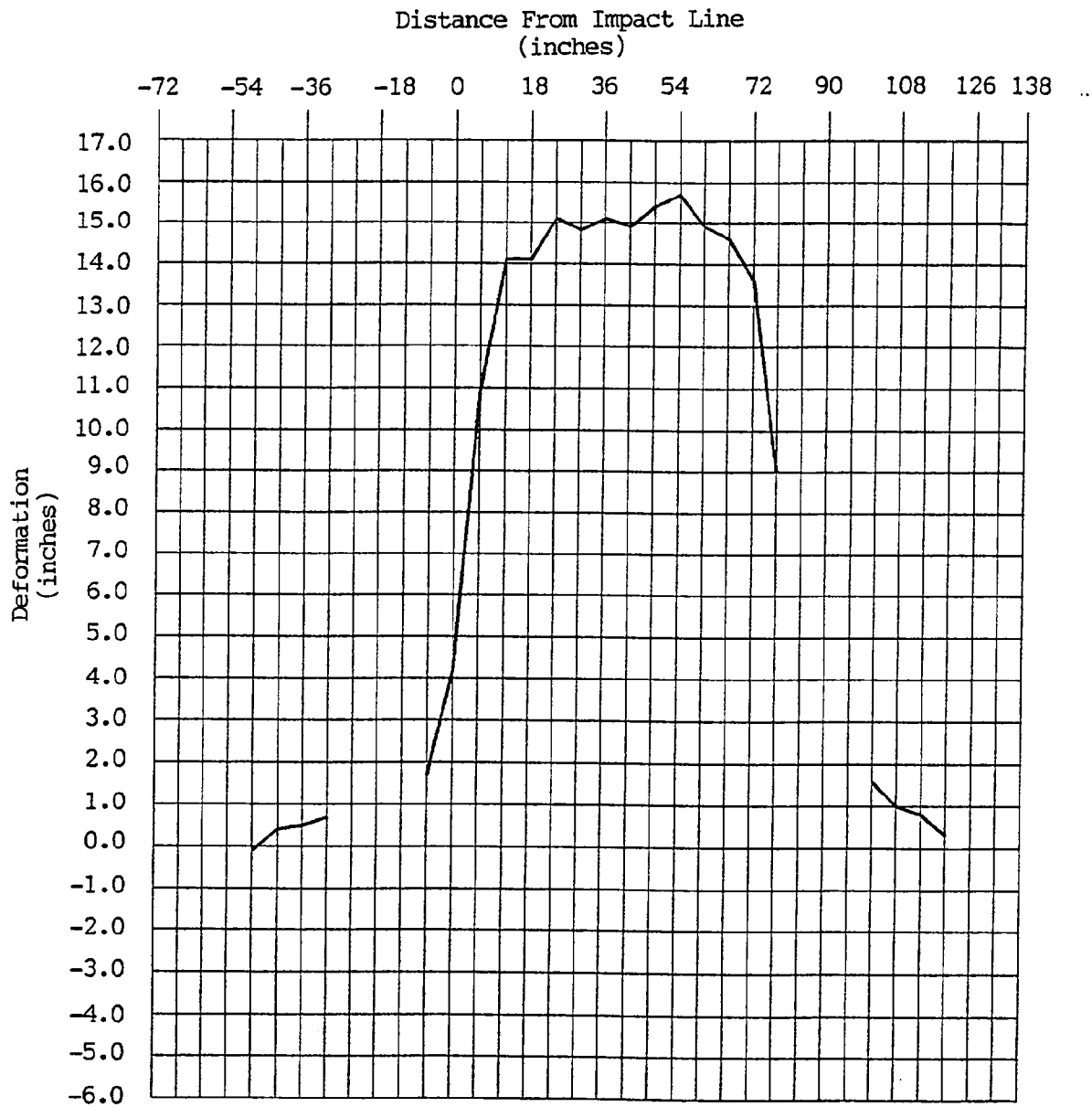
LEVEL 3 AT MID-DOOR

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	36.2	36.6	-0.1
-42	34.6	34.2	0.4
-36	33.4	32.9	0.5
-30	32.2	31.5	0.7
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	32.0	30.3	1.7
0	35.0	30.8	4.2 (impact point)
6	41.7	30.8	10.9
12	44.7	30.6	14.1
18	44.6	30.5	14.1
24	45.5	30.4	15.1
30	45.2	30.4	14.8
36	45.5	30.2	15.1
42	45.1	30.2	14.9
48	45.6	30.2	15.4
54	45.9	30.2	15.7
60	45.1	30.2	14.9
66	45.0	30.4	14.6
72	44.1	30.5	13.6
78	39.5	30.5	9.0
84	---	---	---
90	---	---	---
96	---	---	---
102	33.4	31.8	1.6
108	33.4	32.4	1.0
114	34.3	33.5	0.8
120	35.0	34.7	0.3
126	---	---	---
132	---	---	---
138	---	---	---

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

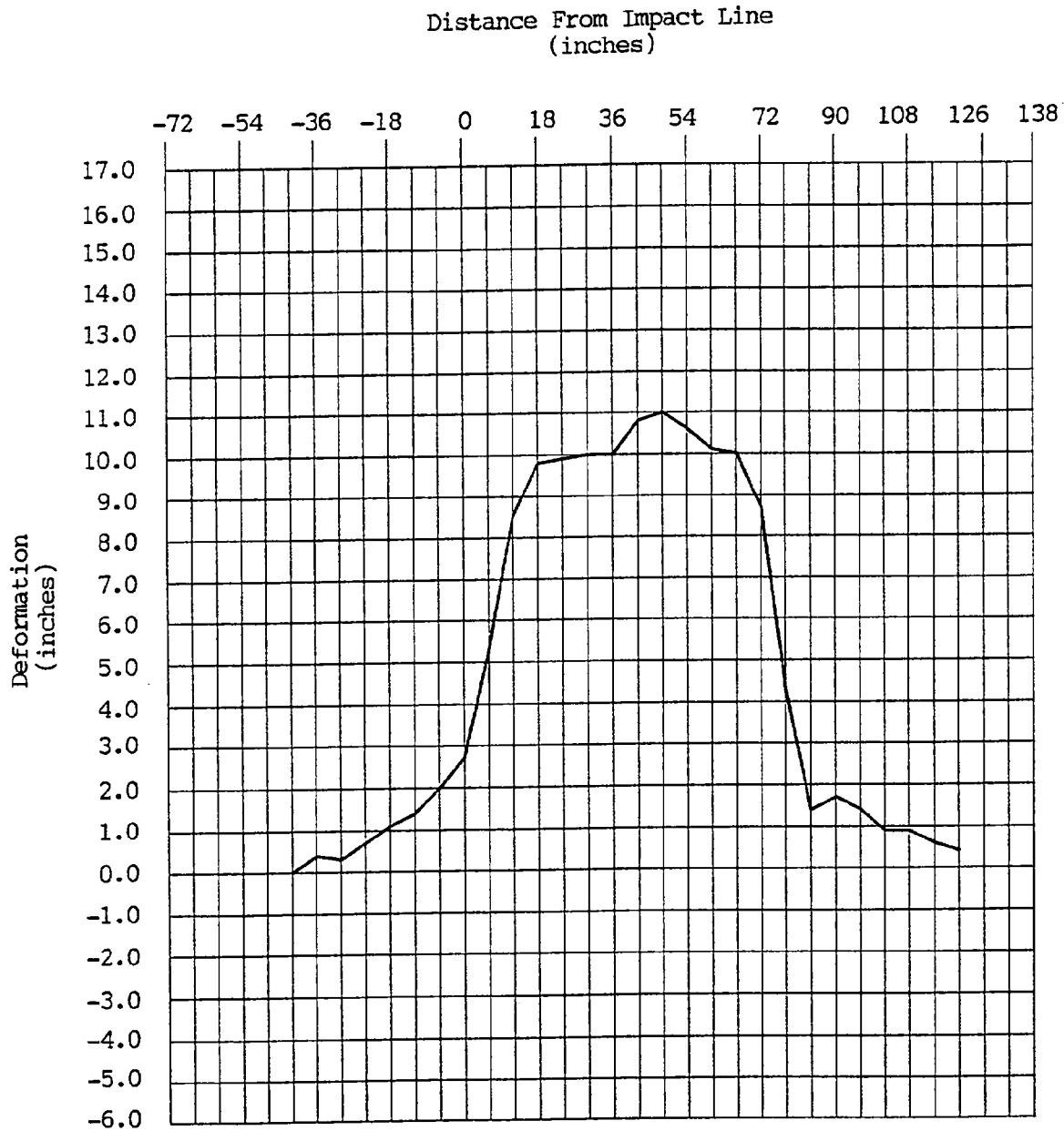
Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	36.6	36.6	0
-36	35.4	35.0	0.4
-30	34.8	34.5	0.3
-24	34.6	33.9	0.7
-18	34.6	33.5	1.1
-12	34.6	33.2	1.4
-6	35.0	33.0	2.0
0	35.6	32.9	2.7 (impact point)
6	38.0	32.7	5.3
12	41.1	32.6	8.5
18	42.3	32.5	9.8
24	42.3	32.4	9.9
30	42.3	32.3	10.0
36	42.4	32.4	10.0
42	43.3	32.5	10.8
48	43.8	32.8	11.0
54	43.4	32.8	10.6
60	43.1	33.0	10.1
66	43.1	33.1	10.0
72	41.9	33.2	8.7
78	37.8	33.5	4.3
84	35.3	33.9	1.4
90	36.0	34.3	1.7
96	36.0	34.6	1.4
102	36.3	35.4	0.9
108	36.6	35.7	0.9
114	37.0	36.4	0.6
120	37.7	37.3	0.4
126	---	---	---
132	---	---	---
138	---	---	---

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

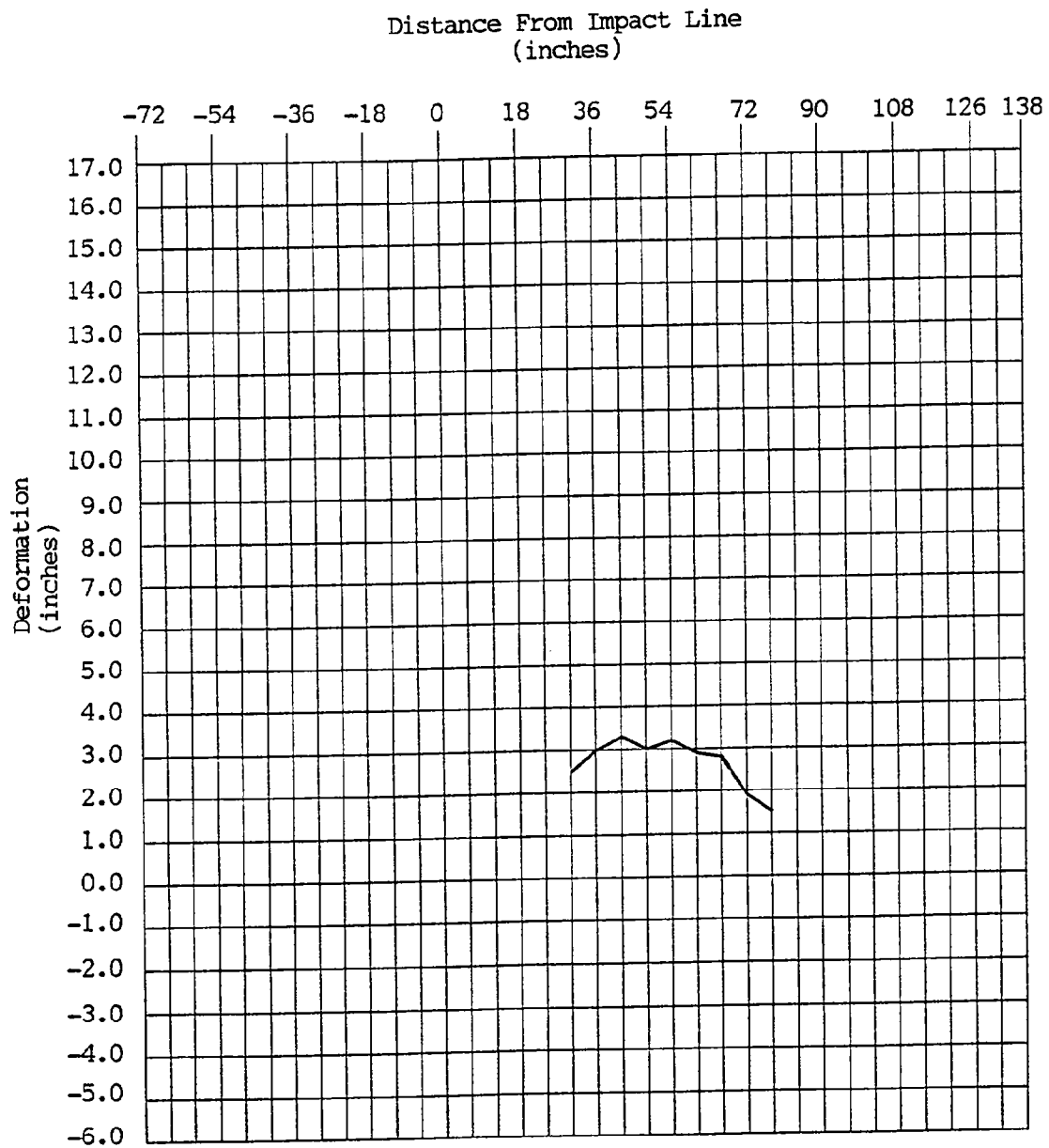
LEVEL 5 AT WINDOW TOP

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 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	---	---	---	(impactpoint)
6	---	---	---	
12	---	---	---	
18	---	---	---	
24	---	---	---	
30	44.4	41.9	2.5	
36	45.0	42.0	3.0	
42	45.5	42.2	3.3	
48	45.3	42.3	3.0	
54	45.5	42.3	3.2	
60	45.7	42.8	2.9	
66	45.5	42.7	2.8	
72	44.9	43.0	1.9	
78	45.0	43.5	1.5	
84	---	---	---	
90	---	---	---	
96	---	---	---	
102	---	---	---	
108	---	---	---	
114	---	---	---	
120	---	---	---	
126	---	---	---	
132	---	---	---	
138	---	---	---	

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: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994

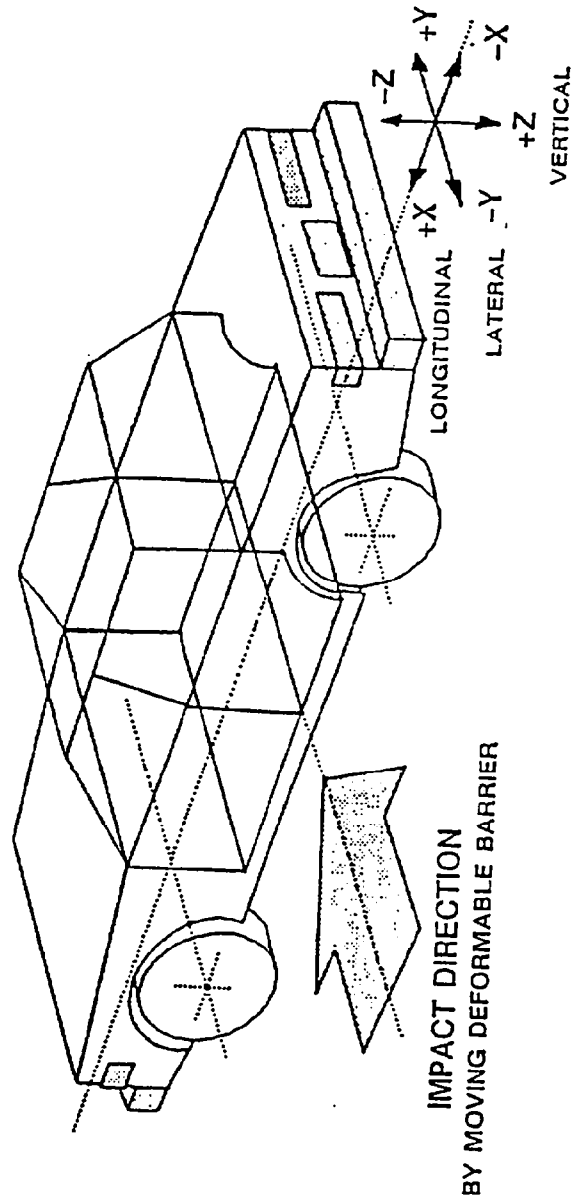
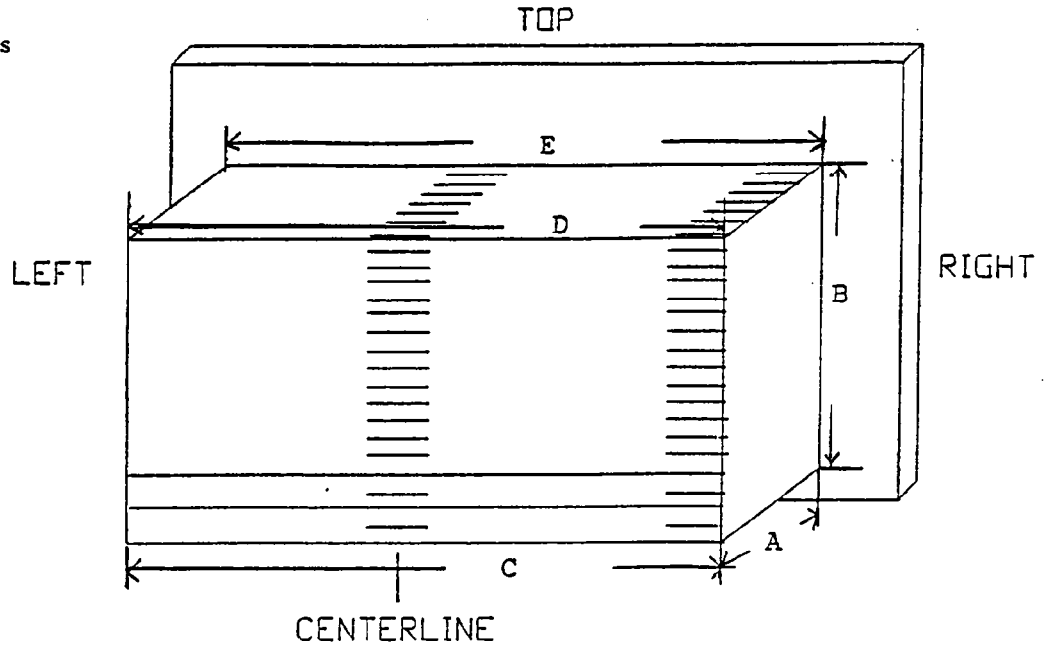


FIGURE 8
MDB FACE DIMENSIONS

Measurements in inches

A = 15.1
B = 22.1
C = 66.1
D = 66.1
E = 66.2



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>21.1</u>	<u>21.1</u>
D =	<u>33.0</u>	<u>33.0</u>

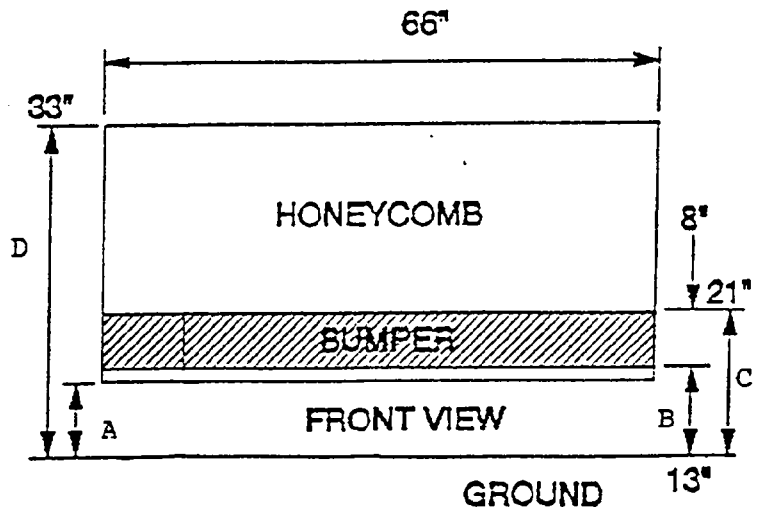


TABLE 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTORYear/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 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"	1.6	3.4	1.0	1.5
28"	0.1	0.6	0.6	1.4
24"	0.1	0.1	0.3	0.8
20"	0.1	0.1	0.1	0.4
16"	0.1	0.1	0	0.3
12"	0.1	0.1	0	0.2
8"	0.1	0.1	-0.1	0.2
4"	0.1	0.1	-0.1	0.1
0"	0.1	0	-0.1	0.1
4"	0.1	0	-0.2	0.1
8"	0.1	0	-0.2	0.1
12"	0	0	-0.2	0.1
16"	0	0	-0.3	0.1
20"	0	0	-0.3	0.1
24"	0	0	-0.3	0.1
28"	0	0	0.3	0.4
32"	1.7	0.5	0	0.4

Left Side

Right Side

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door SedanVehicle NHTSA No.: CS0500 TEST DATE: June 21, 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	108.9	27.5	9.8	2.2	-5.3	12.8	-1.8	4.3	-4.1	13.5
2	Rt. Side Sill @ Rear Seat	76.3	28.5	9.6	1.9	-6.2	17.3	-1.7	3.6	-6.7	17.9
3	Rr. Floorpan Above Axle	40.3	0	20.9	2.1	-6.1	15.0	-1.8	12.3	-6.7	16.6
4	Left Side Sill @ Rr. Seat	71.4	-28.9	8.3	---	---	32.4	-13.9	---	---	---
5	Left Side Sill @ Frt. Seat	106.5	-28.9	8.0	---	---	24.9	-1.4	---	---	---
6	Driver Left Seat Track	90.0	-23.8	11.0	---	---	35.9	-13.1	---	---	---
7	Right Rear Occupant Compartment	72.8	12.0	11.8	---	---	17.5	-1.8	---	---	---
8	Left A-Post Lower	124.8	-29.5	15.3	---	---	99.4	-26.3	---	---	---
9	Left B-Post Lower	84.0	-29.5	24.0	---	---	200.5	-47.6	---	---	---
10	Left B-Post Mid**	84.0	-29.5	11.8	---	---	212.3	-139.0	---	---	---

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

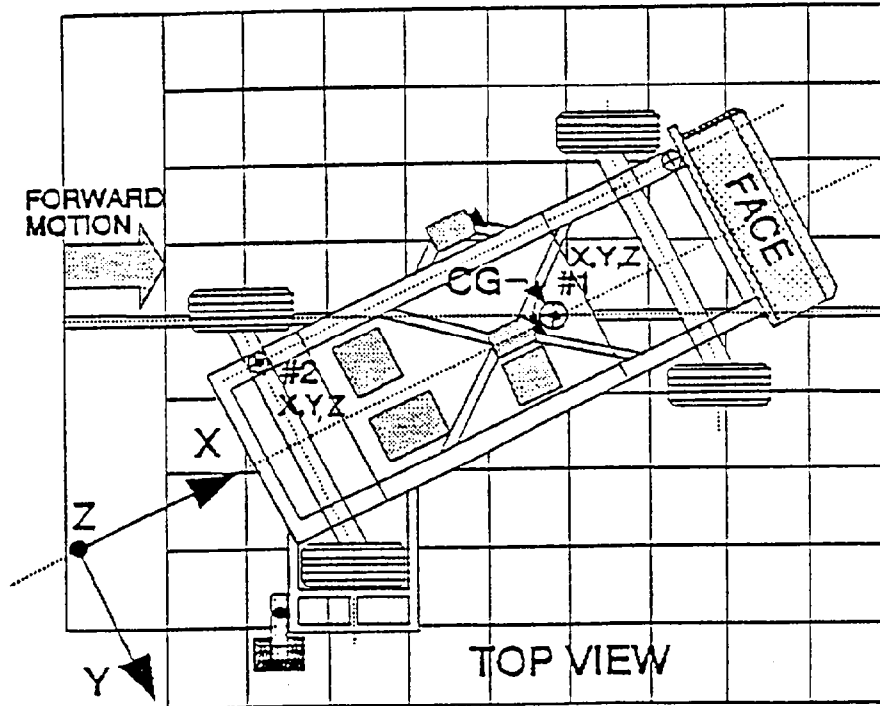
** Accelerometer separated during impact

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994



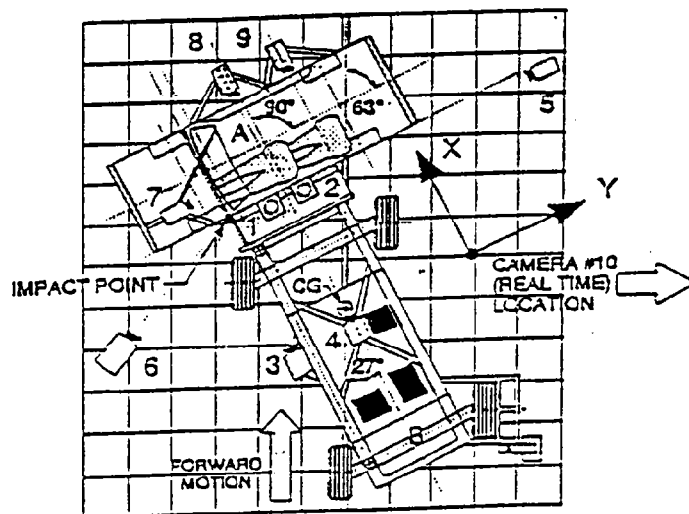
Accel. No.	Location	Coordinates (in)			Pos. Direct.		Neg. Direct.	
					Max (g)	Time (msec)	Max (g)	Time (msec)
		X	Y	Z				
1	MDB Center of Gravity							
	Longitudinal ... X				5.0	193	-14.8	36
	Lateral Y	-43.0	0	19.0	4.8	177	-7.2	35
	Vertical Z				12.2	37	-16.7	144
	Resultant R				19.6	37	---	---
2	Rear Frame Member							
	Longitudinal ... X	-102.0	-24.6	24.5	9.0	145	-18.4	35
	Lateral Y				4.8	1	-3.4	121

* 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: 1995/Hyundai/Sonata/4 Door Sedan

Vehicle NHTSA No.: CS0500 TEST DATE: June 21, 1994



Camera No.	View	Coordinates (in)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
	Real Time					10	24
1	Top Pointer	0	15.0	193.7		13	1064
2	Top Wide	15.7	0	211.0		8	1111
3	Cart Pointer					35	1000
4	Cart					13	1010
5	Right Impact	20.1	335.8	31.1	45°	35	1005
6	Left Impact	-95.3	112.2	52.0	45°	13	1176
7	Onboard Hood					13	1000
8	Onboard Driver					7.5	833
9	Onboard Passenger					8	990

* Reference: (from point of impact)

+X = Forward

+Y = To Right

+Z = Upward

APPENDIX A - PHOTOGRAPHS

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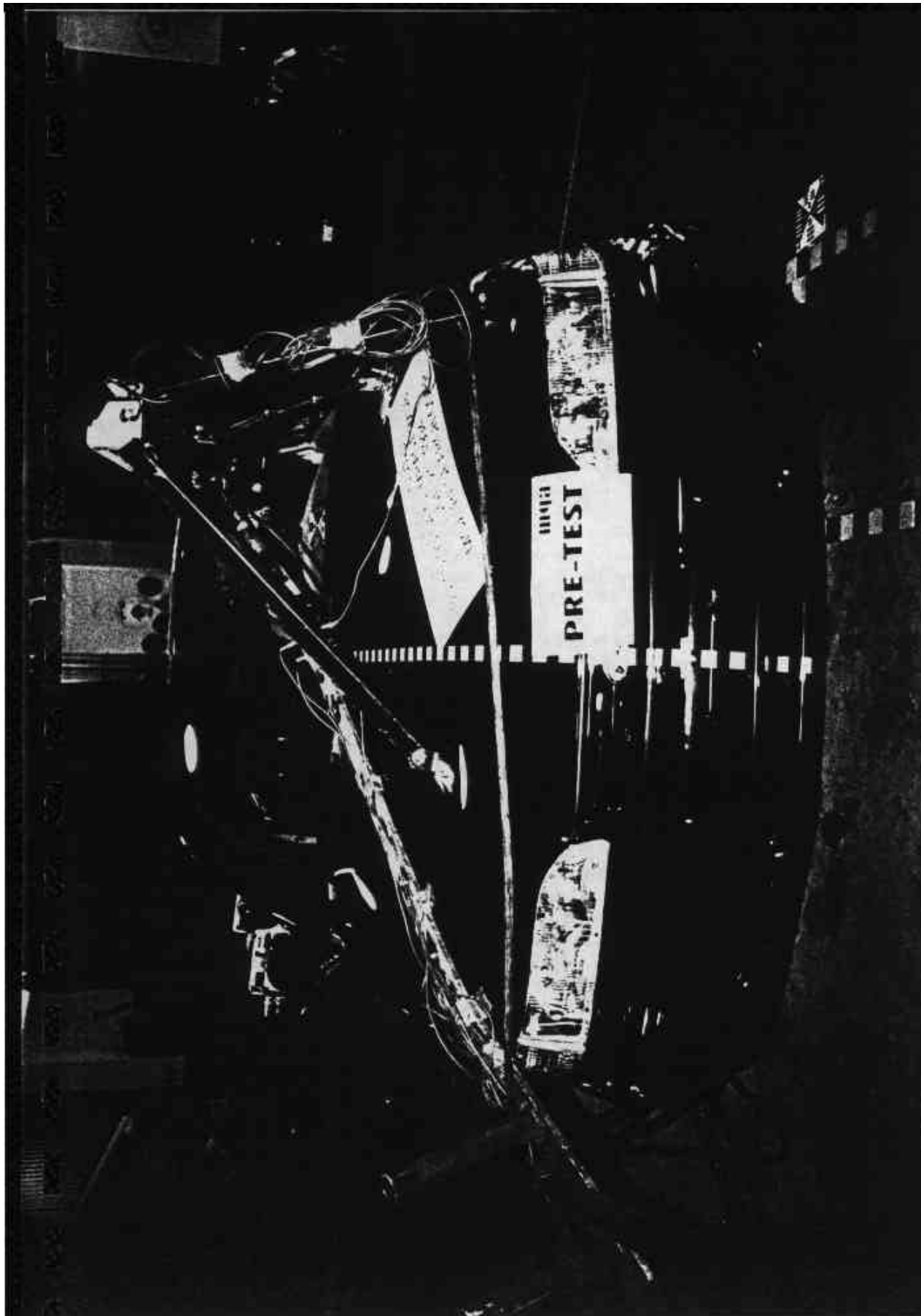


Photo No. A-1 - Pre-Test Front View of Test Vehicle

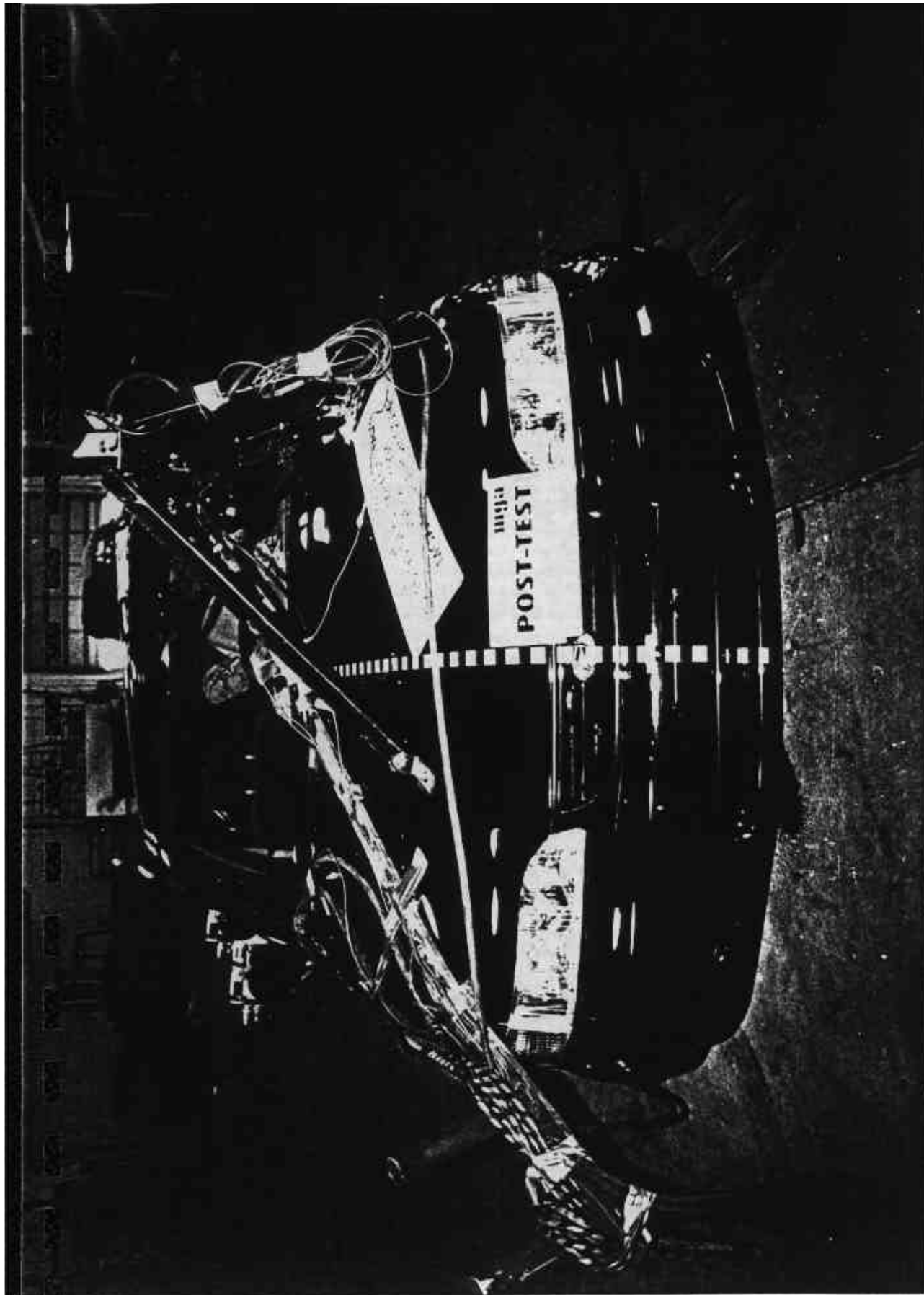


Photo No. A-2 - Post-Test Front View of Test Vehicle

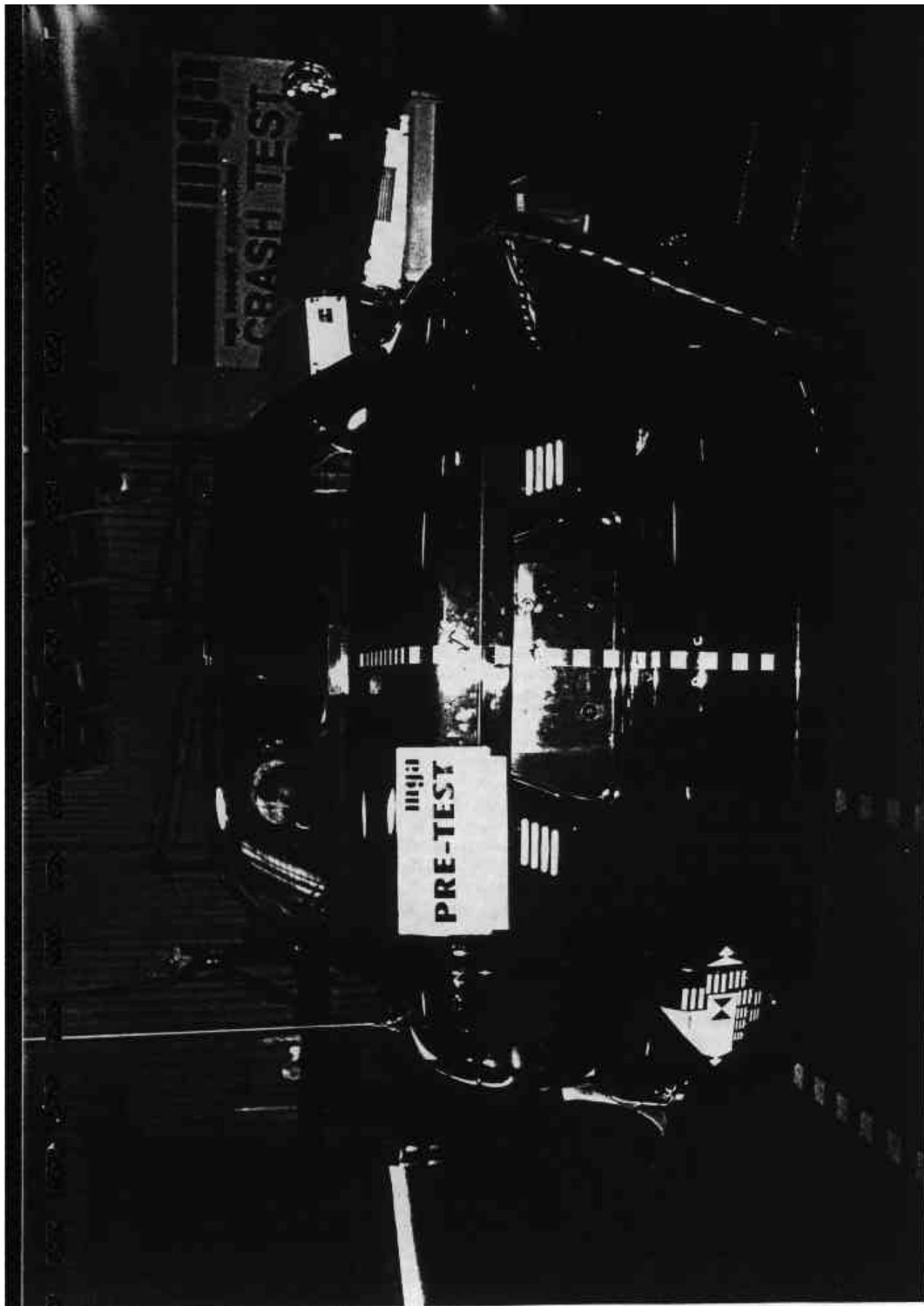


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

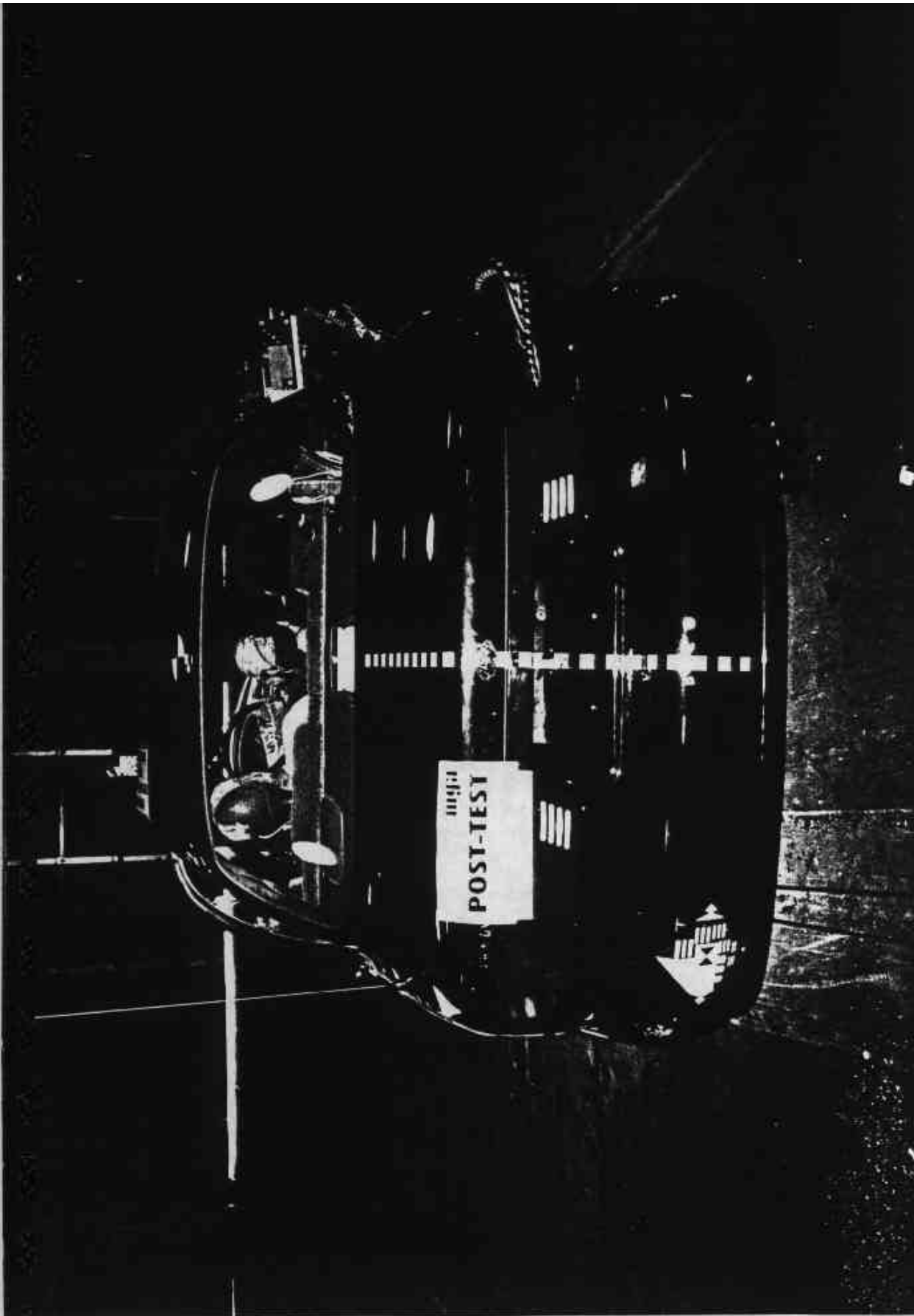


Photo No. A-4 - Post-Test Rear View of Test Vehicle

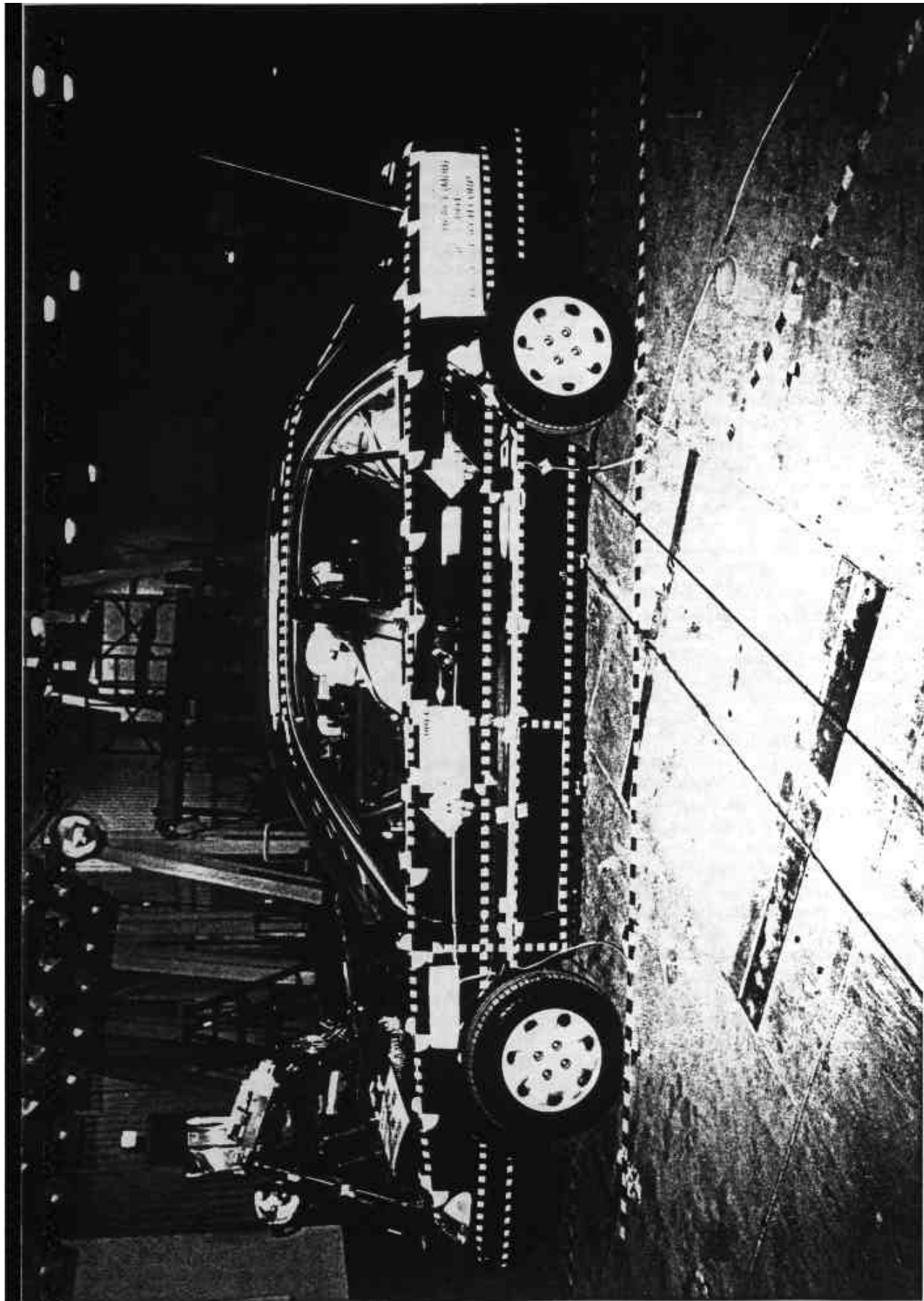


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

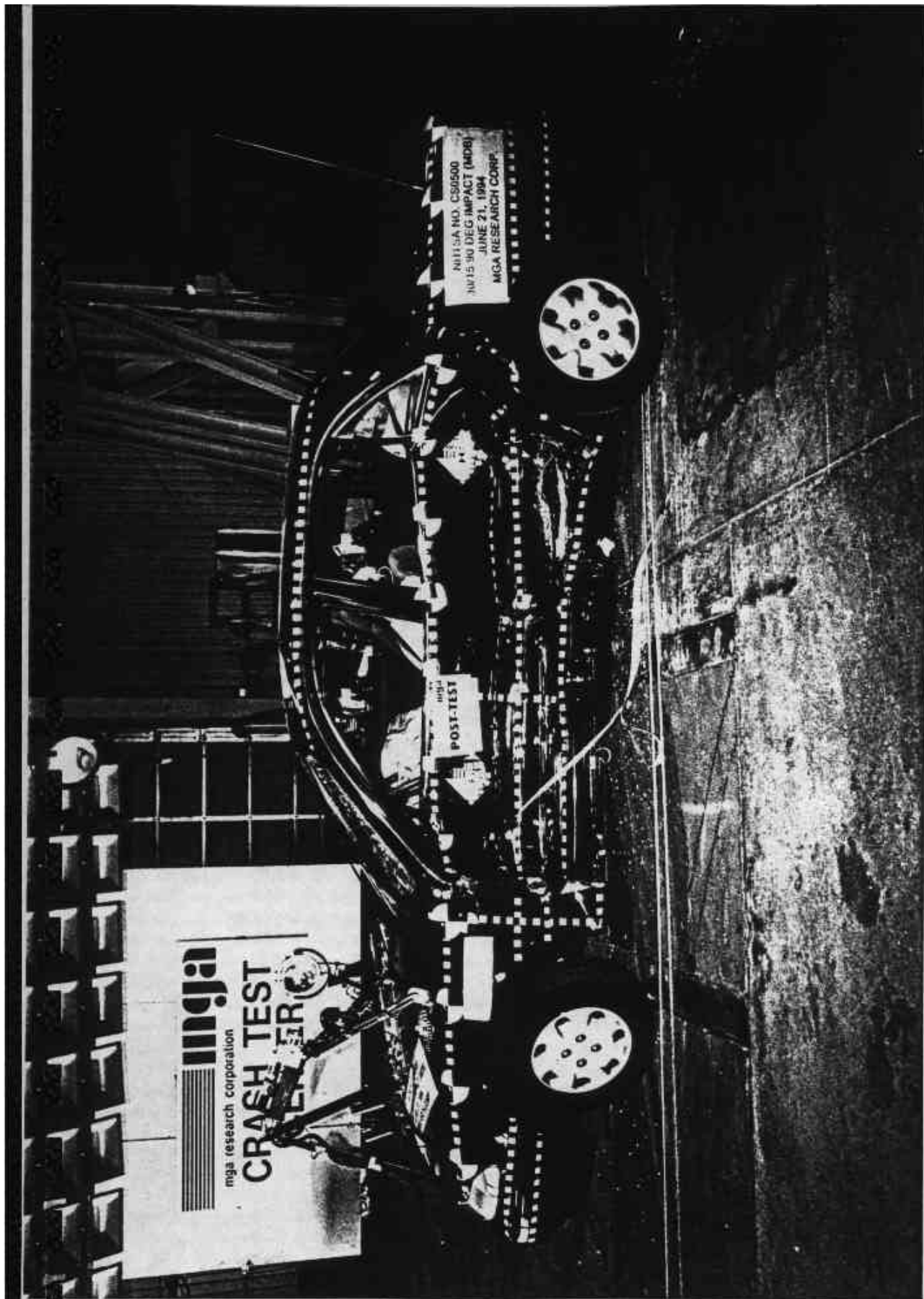


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

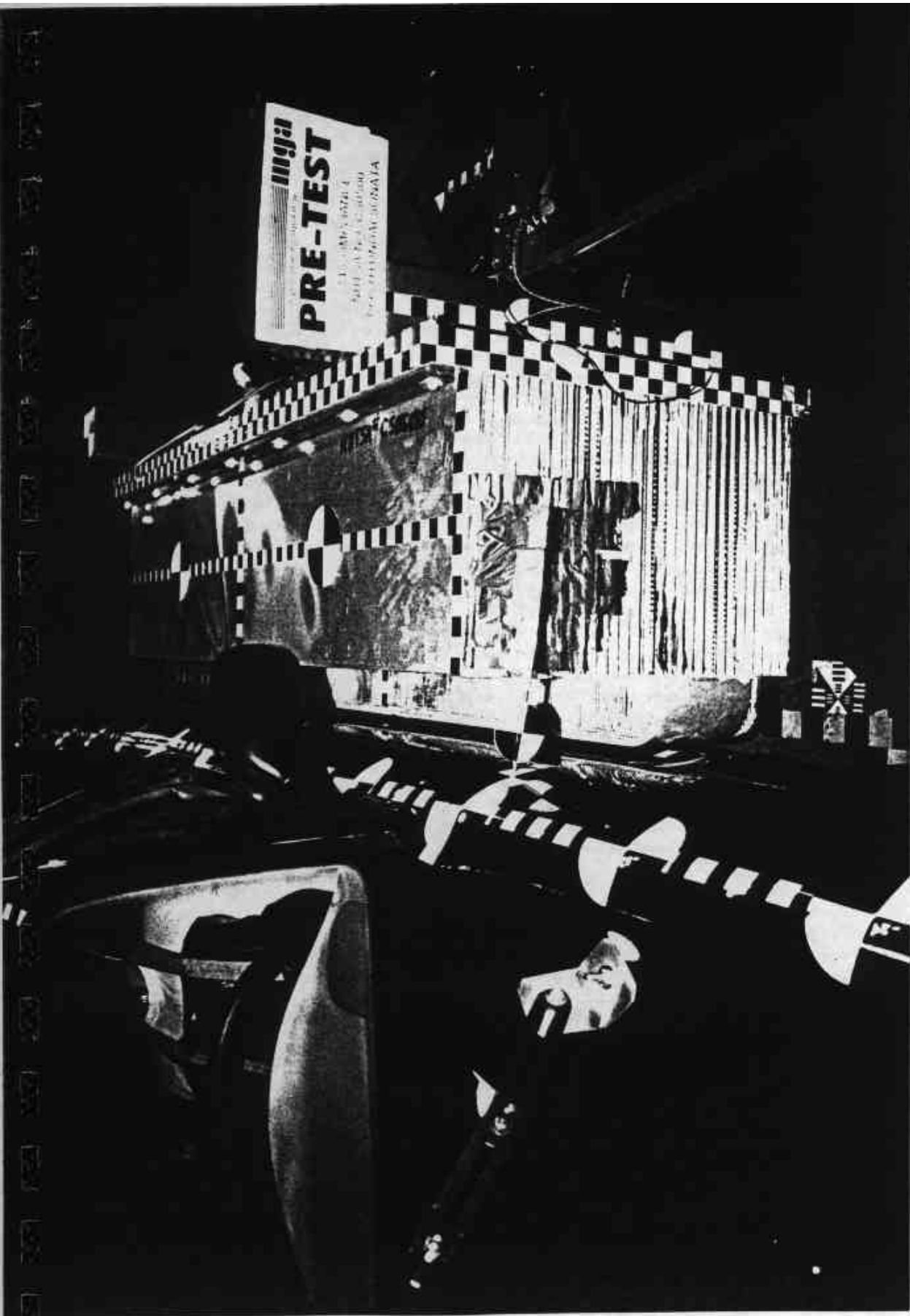


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

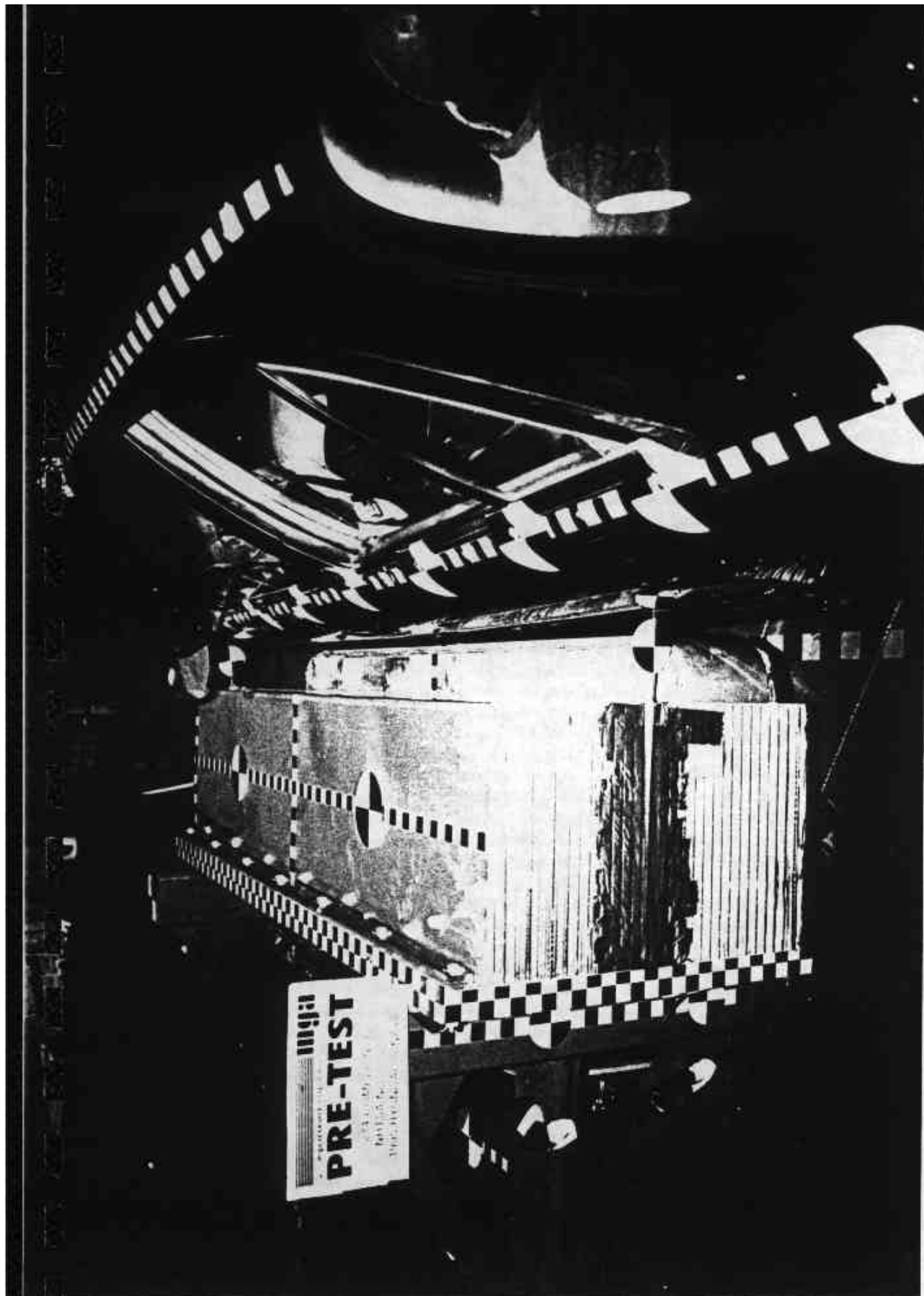


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

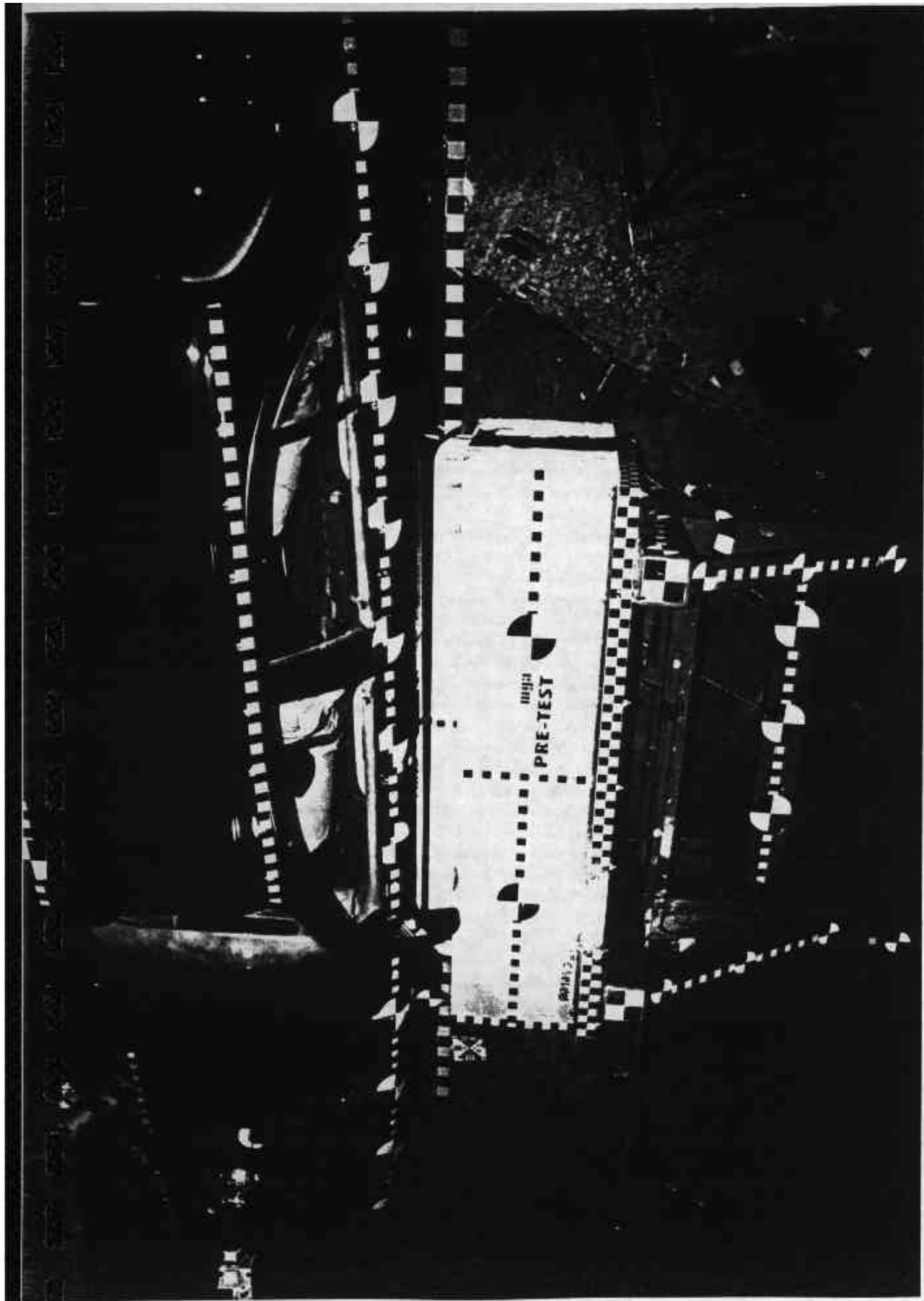


Photo No. A-9 - Pre-Test MDB Position Against Vehicle Overhead View

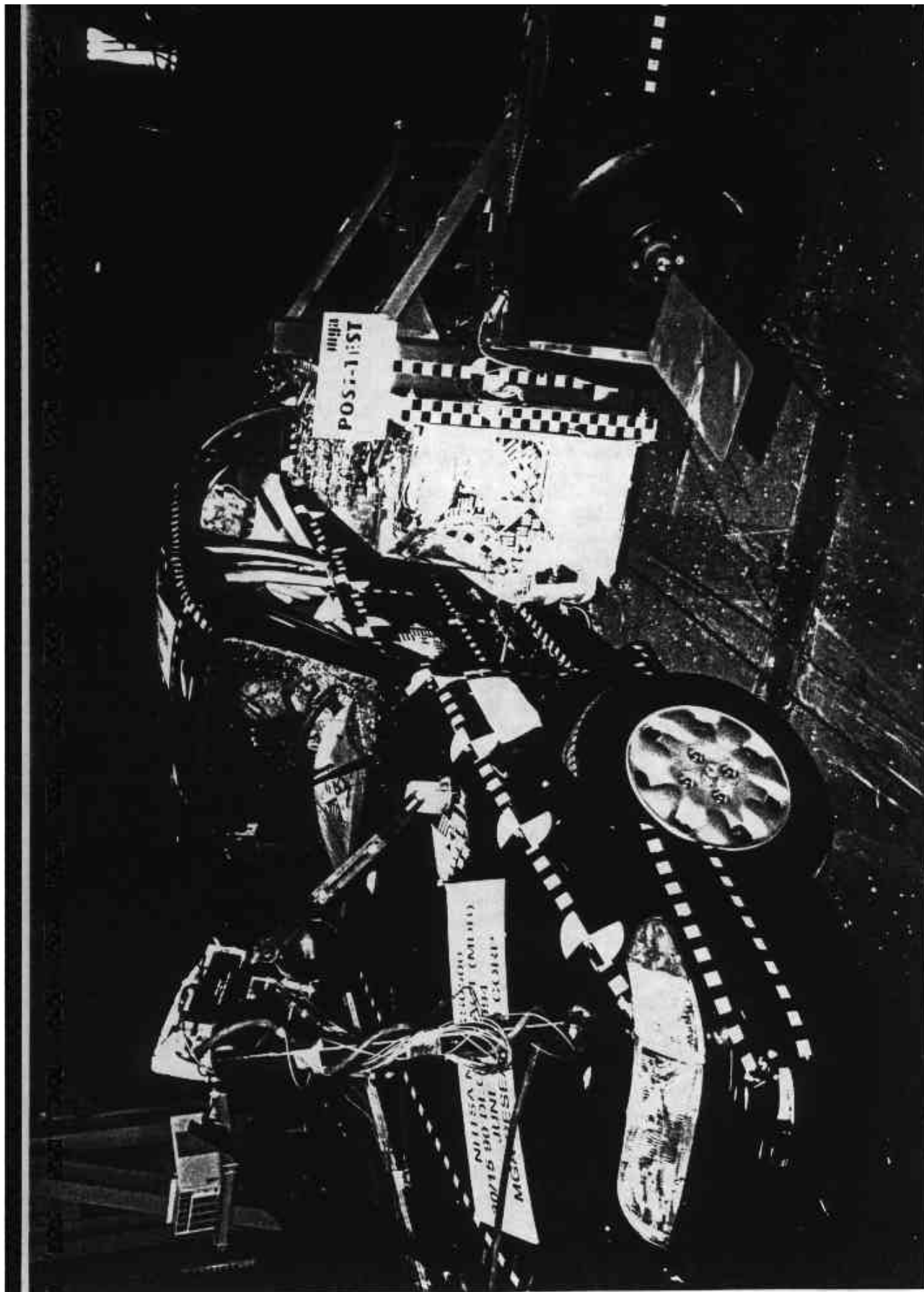


Photo No. A-10 - Post-Test MDB and Vehicle Left Side Front View



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

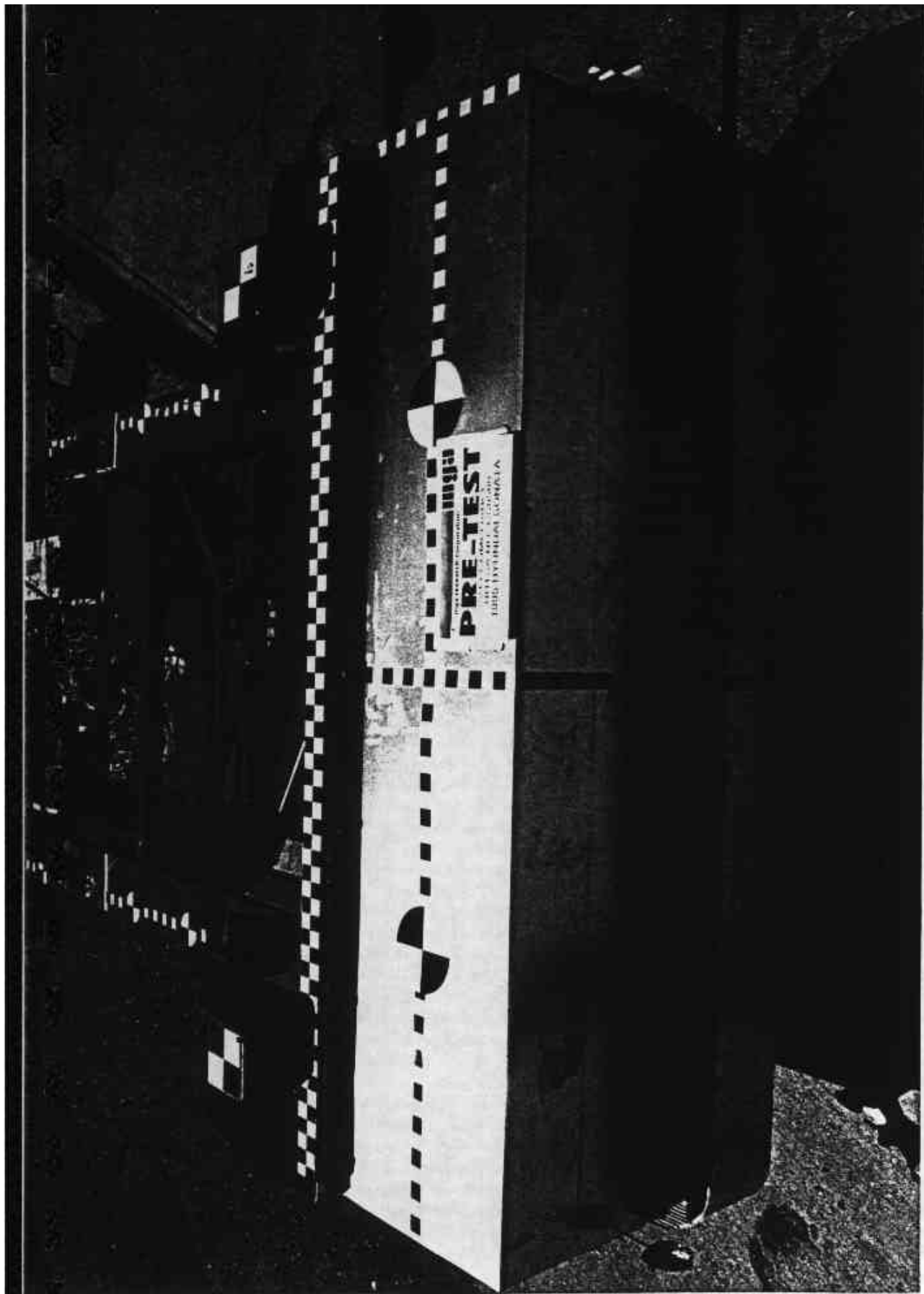


Photo No. A-12 - Pre-Test MDB Top View

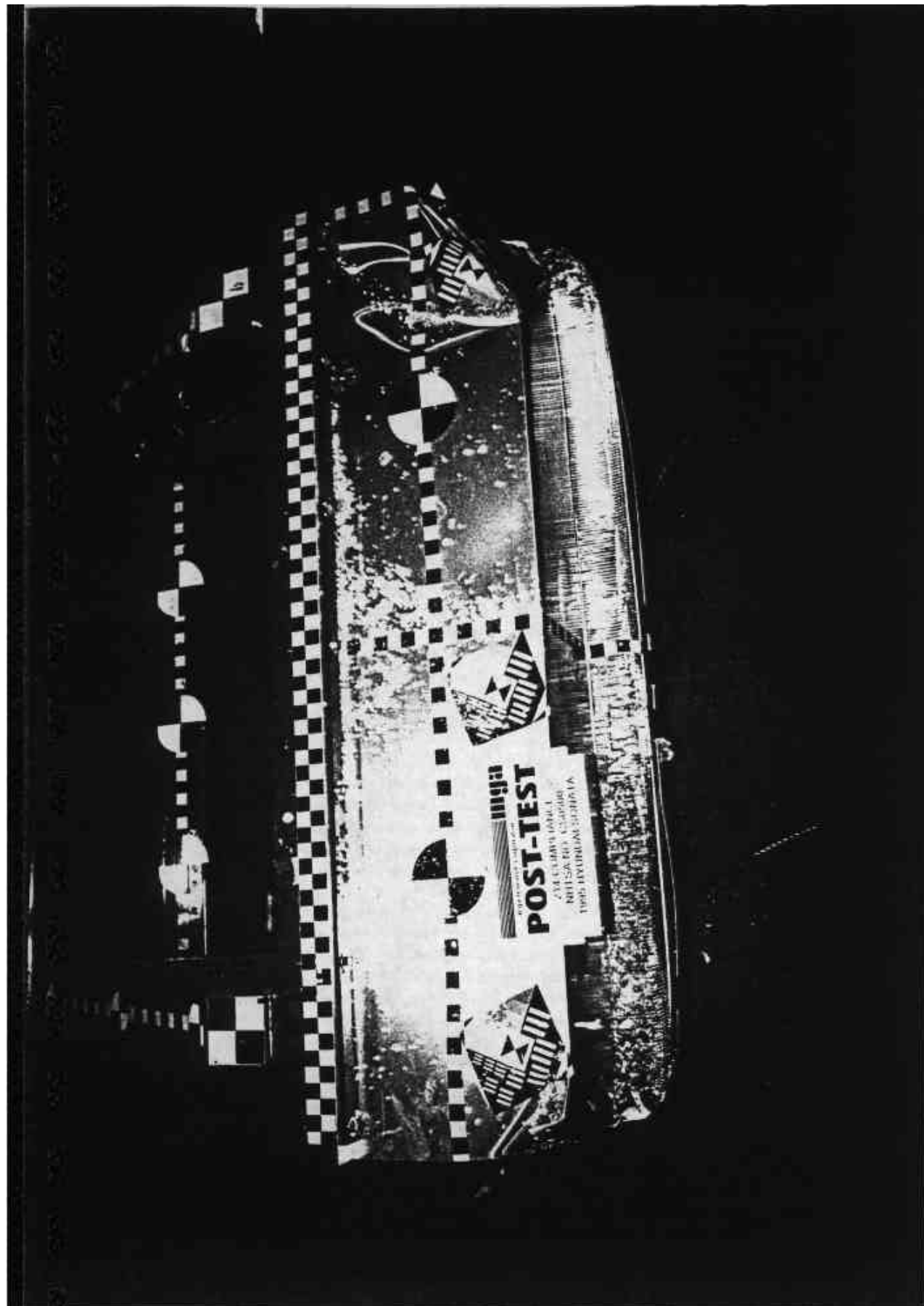


Photo No. A-13 - Post-Test MDB Top View

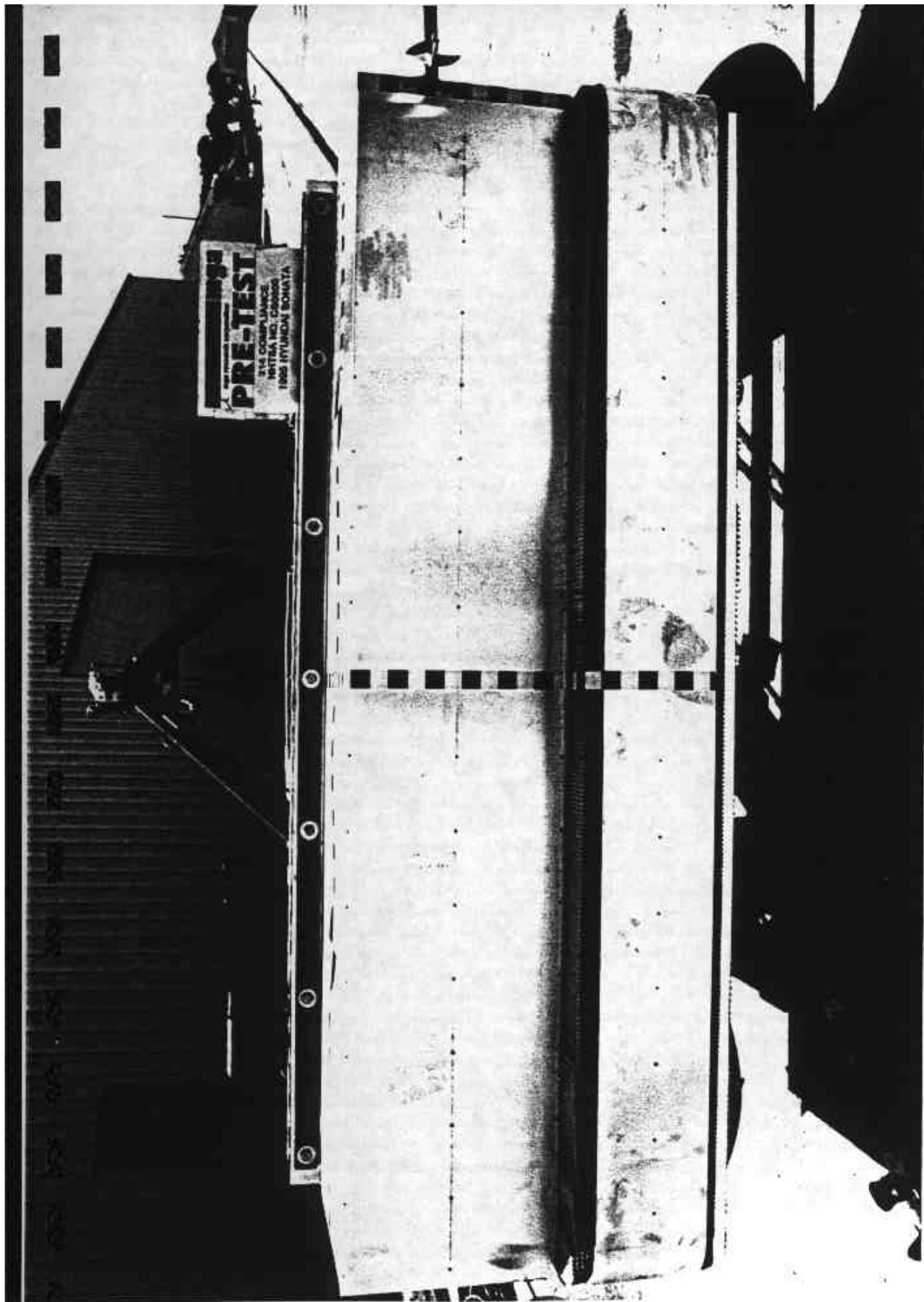
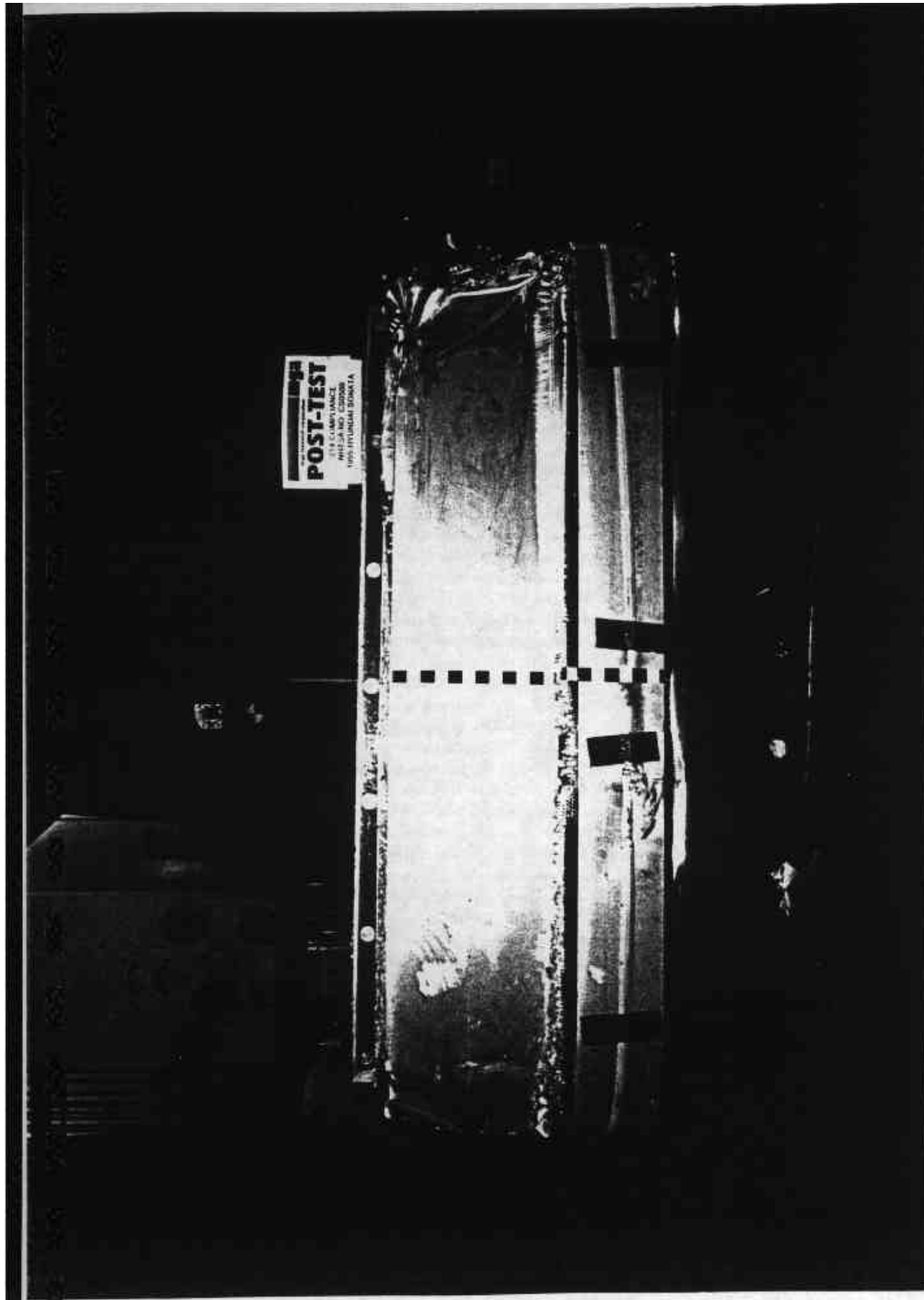


Photo No. A-14 - Pre-Test MDB Front View



POST-TEST
118 COMPLIANCE
WHEEL NO. 120008
1995 HYUNDAI SONATA

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

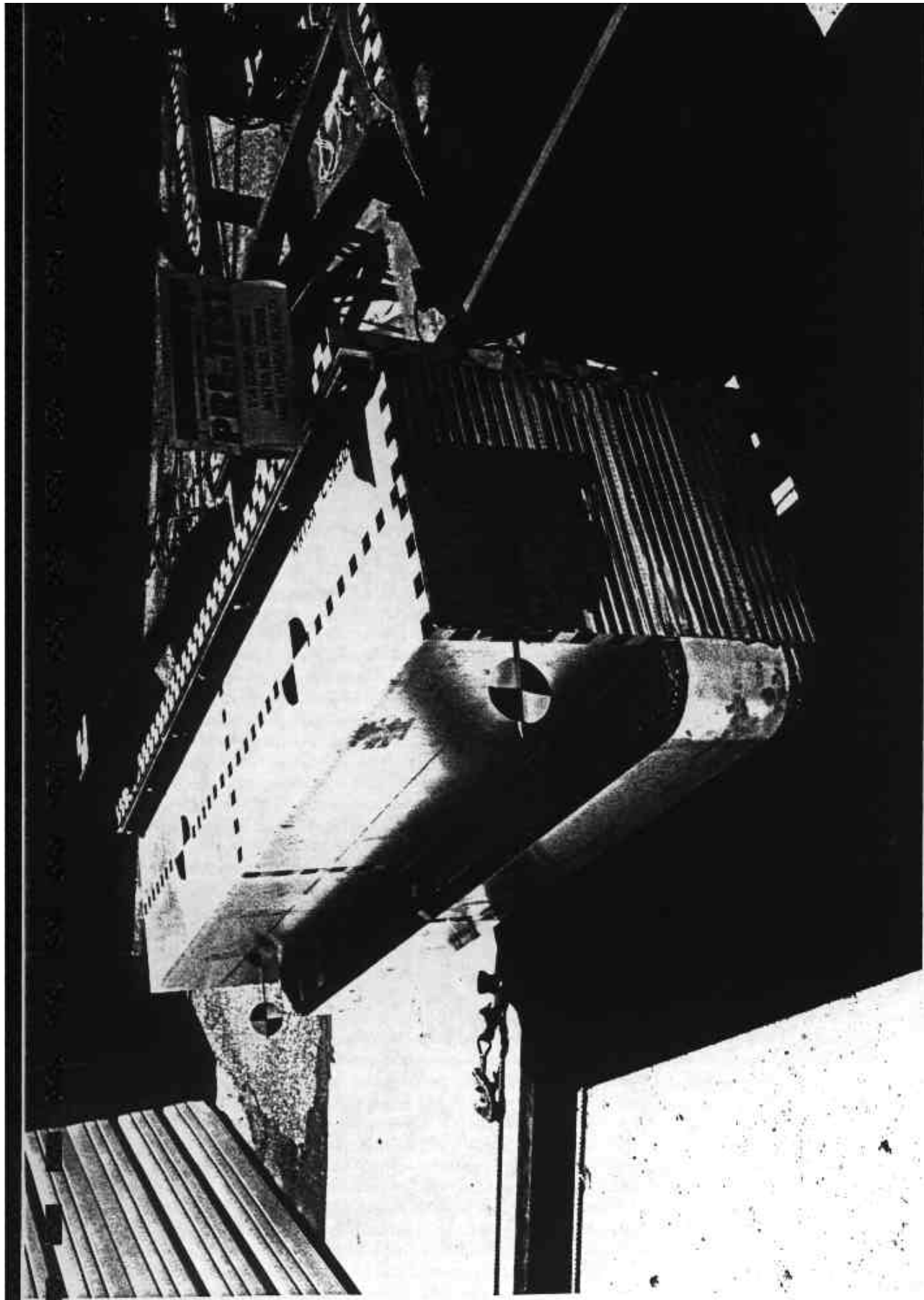


Photo No. A-16 - Pre-Test MDB Left Side View

ingra
POST-TEST
214 COMPLIANCE
NHTSA NO. CS0500
1995 HYUNDAI SONATA

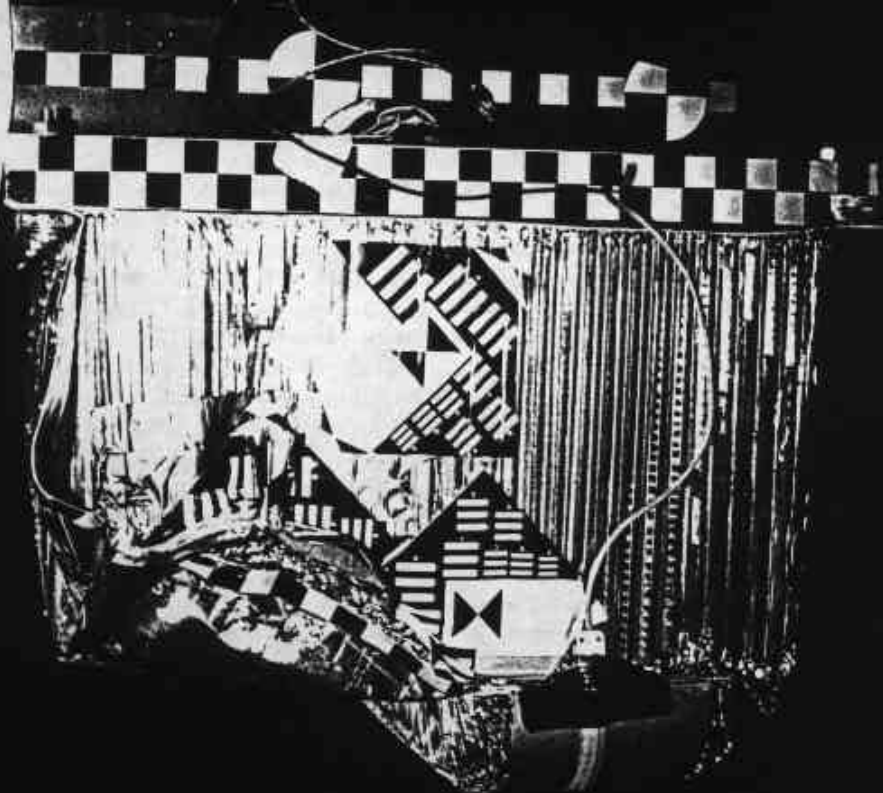


Photo No. A-17 - Post-Test MDB Left Side View

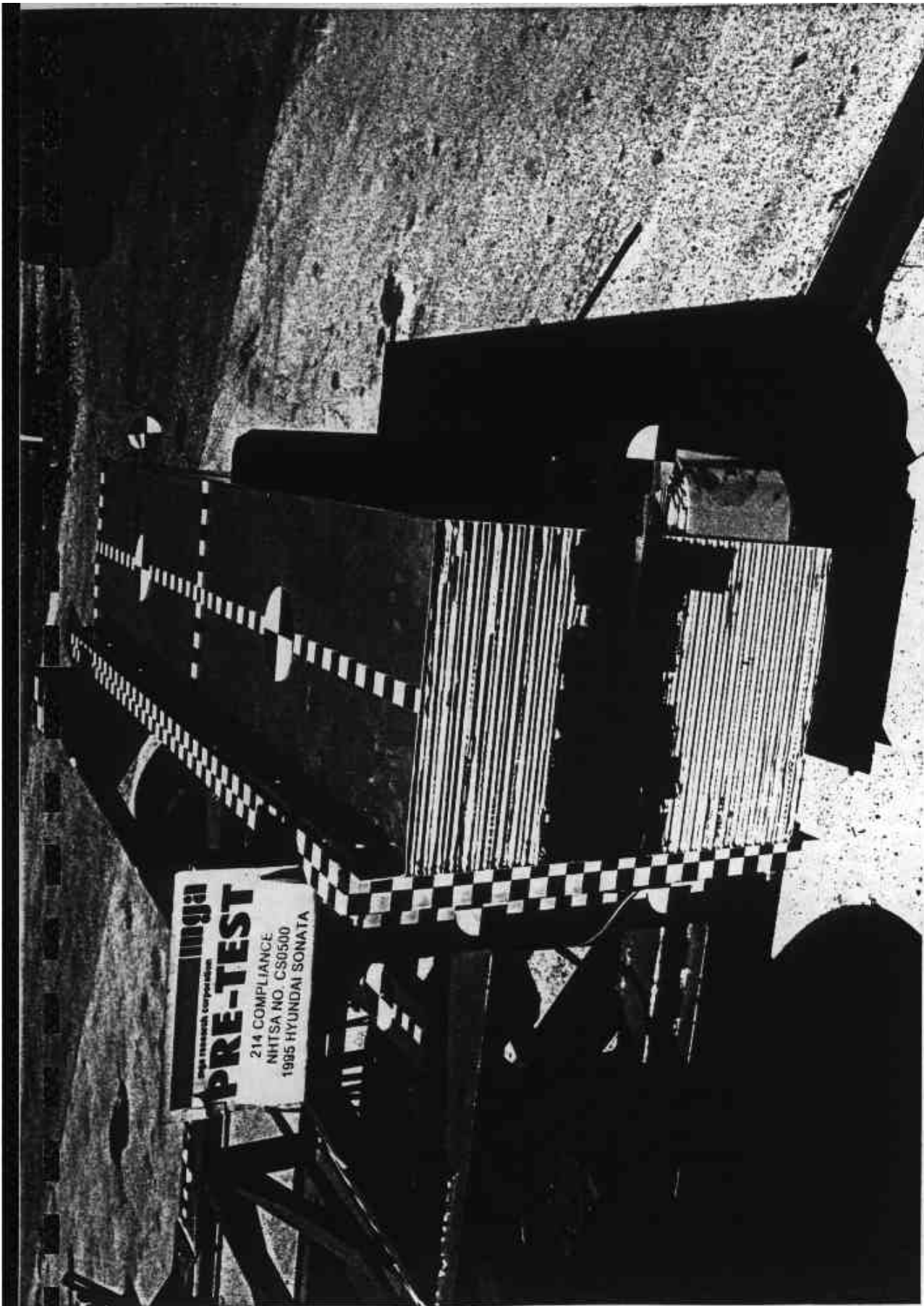


Photo No. A-18 - Pre-Test MDB Right Side View

mg
mg research corporation
POST-TEST
214 COMPLIANCE
NHTSA NO. CSE00
1995 HYUNDAI SONATA

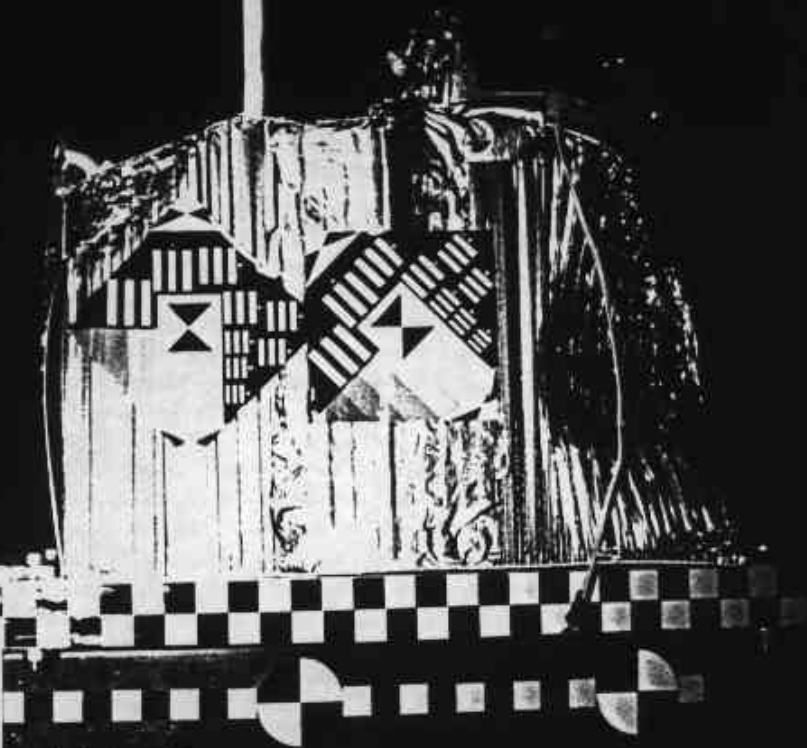


Photo No. A-19 - Post-Test MDB Right Side View

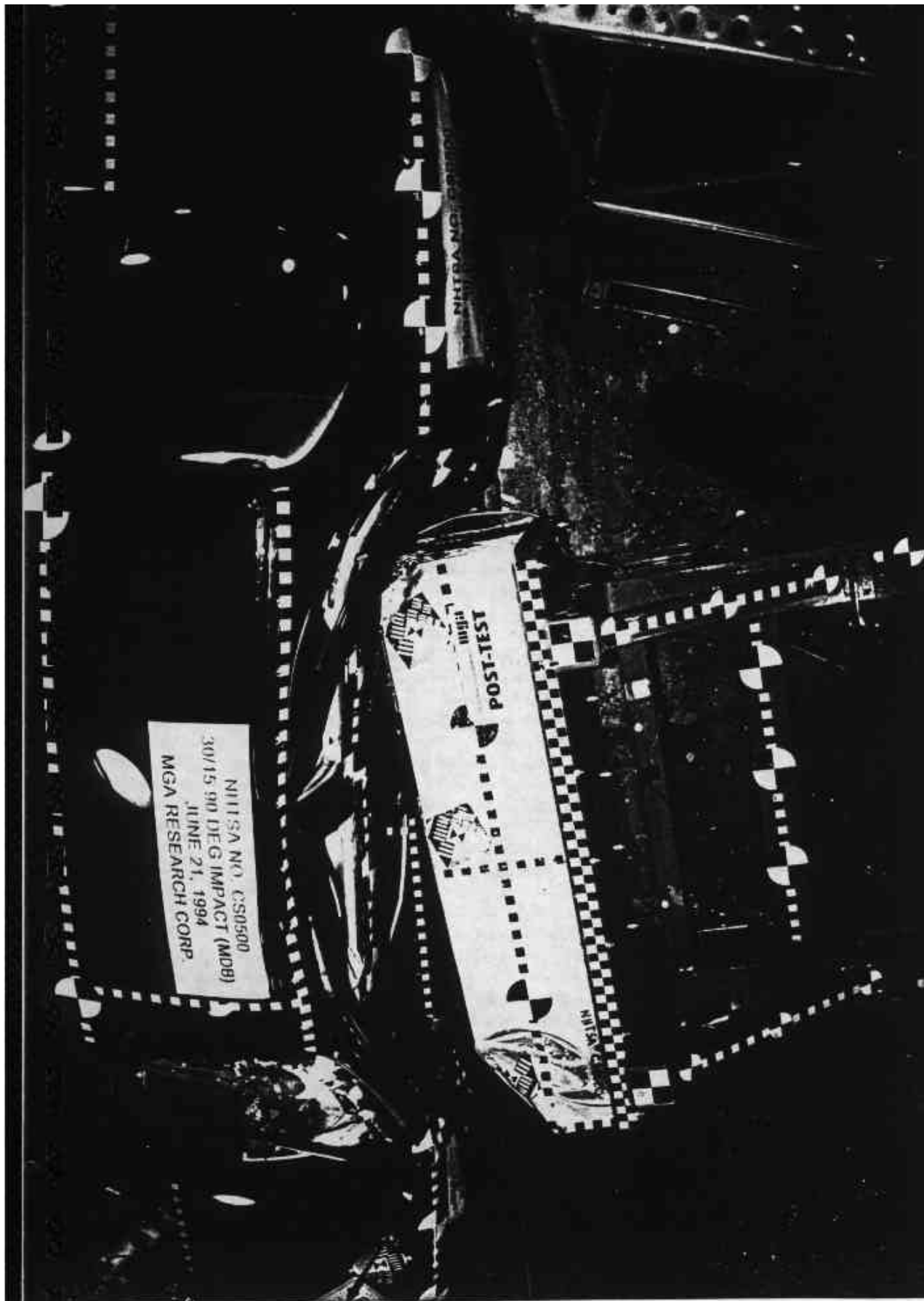


Photo No. A-20 - Post-Test MDB and Vehicle Overhead View



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



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

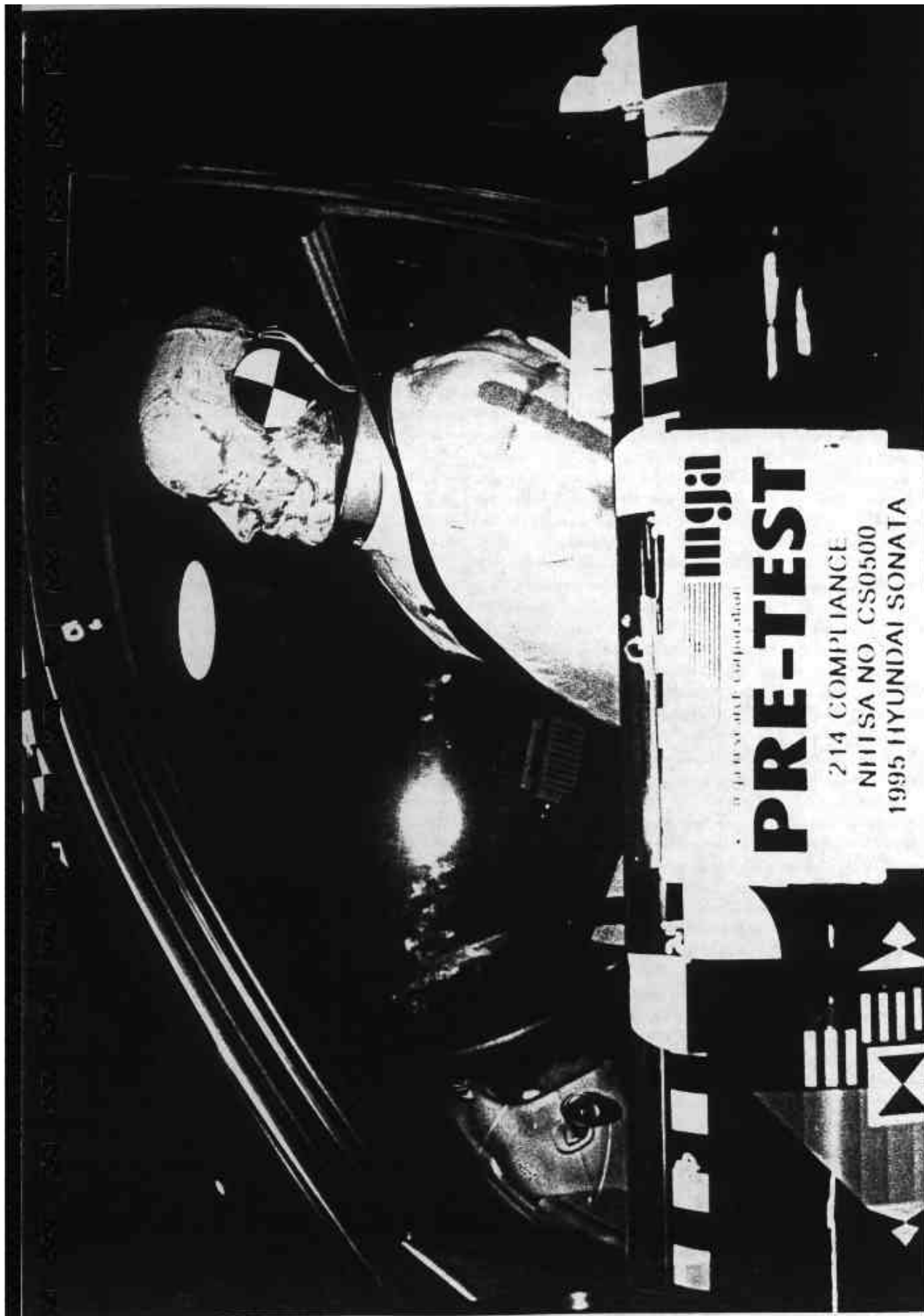


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

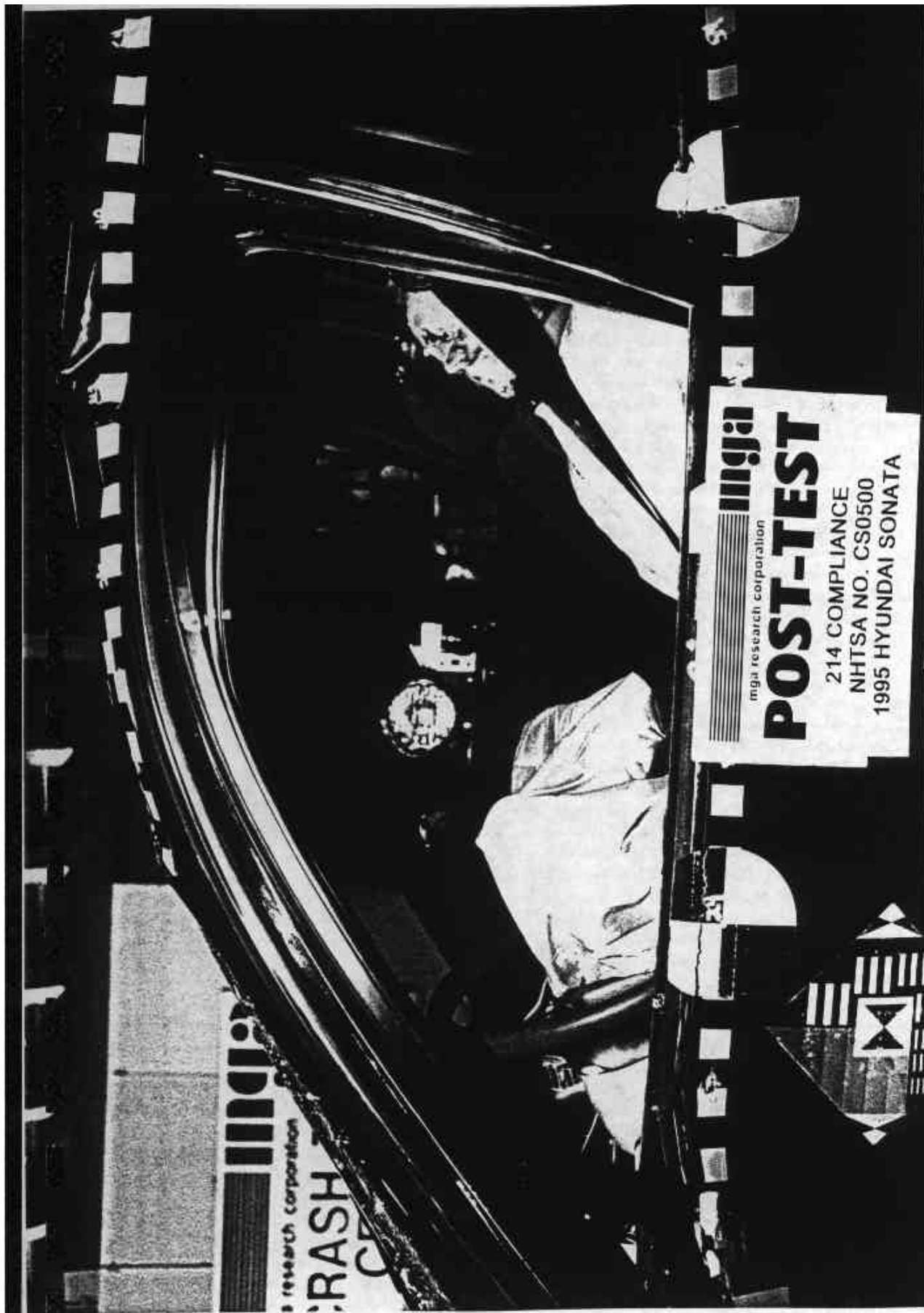


Photo No. A-24 - Post-Test Driver Dummy Left Side View

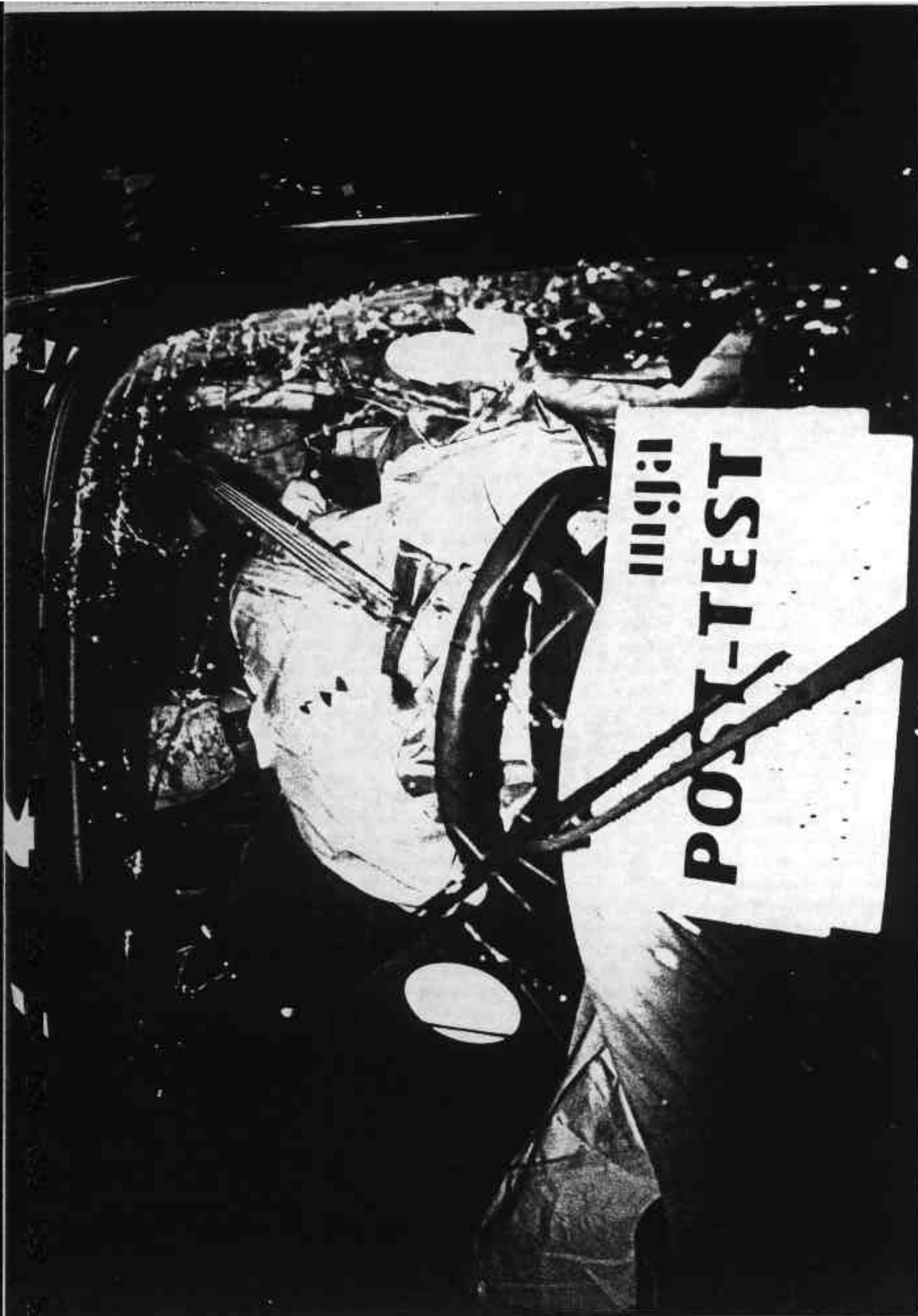


Photo No. A-25 - Post-Test Driver Dummy Front View

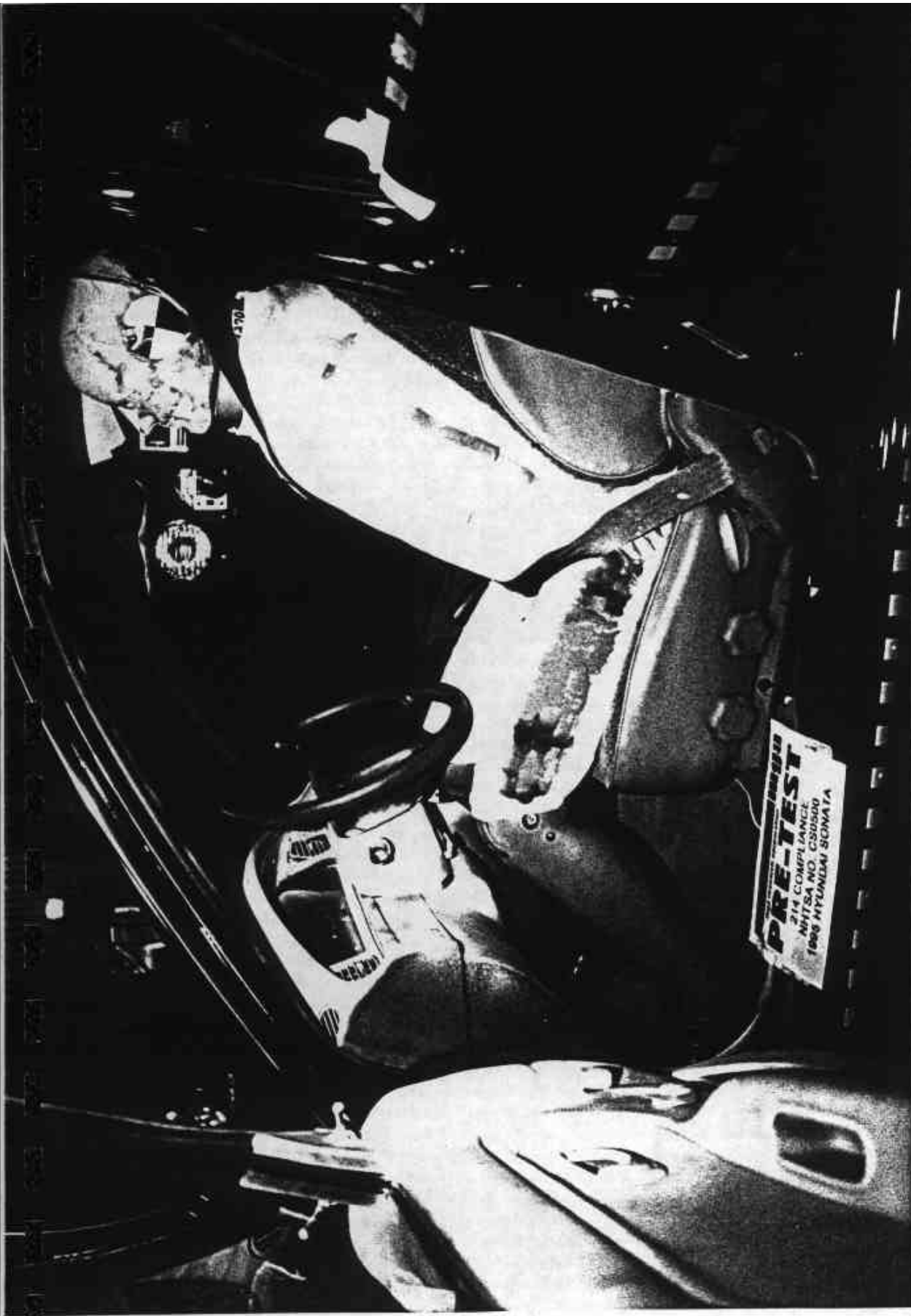


Photo No. A-26 - Pre-Test Driver Dummy Left Side View (Door Open)



Photo No. A-27 - Post-Test Driver Dummy Impact Point



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



Photo No. A-29 - Post-Test Passenger Dummy Right Side View



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

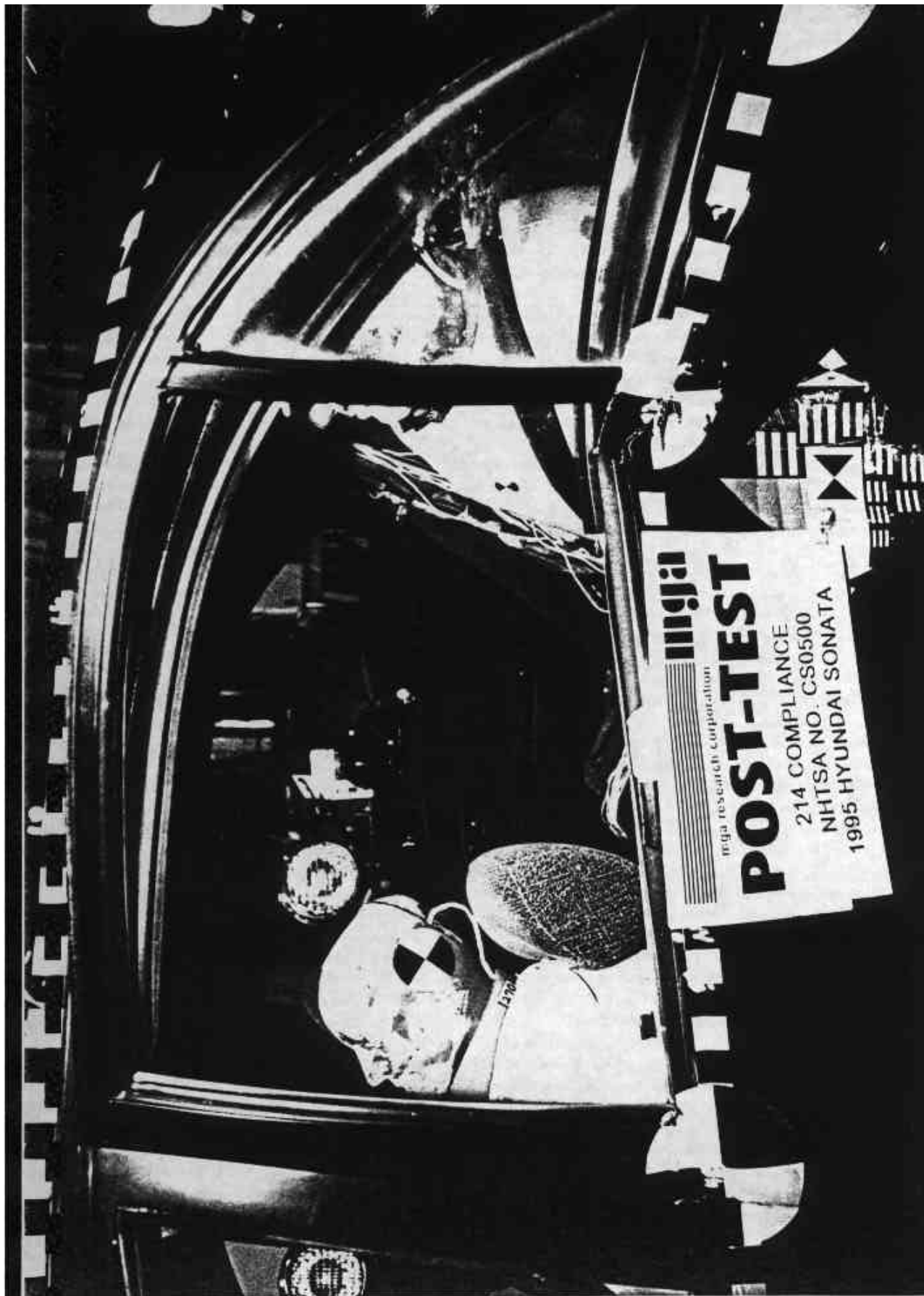


Photo No. A-31 - Post-Test Passenger Dummy Left Side View



Photo No. A-32 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-33 - Post-Test Passenger Dummy Impact Point

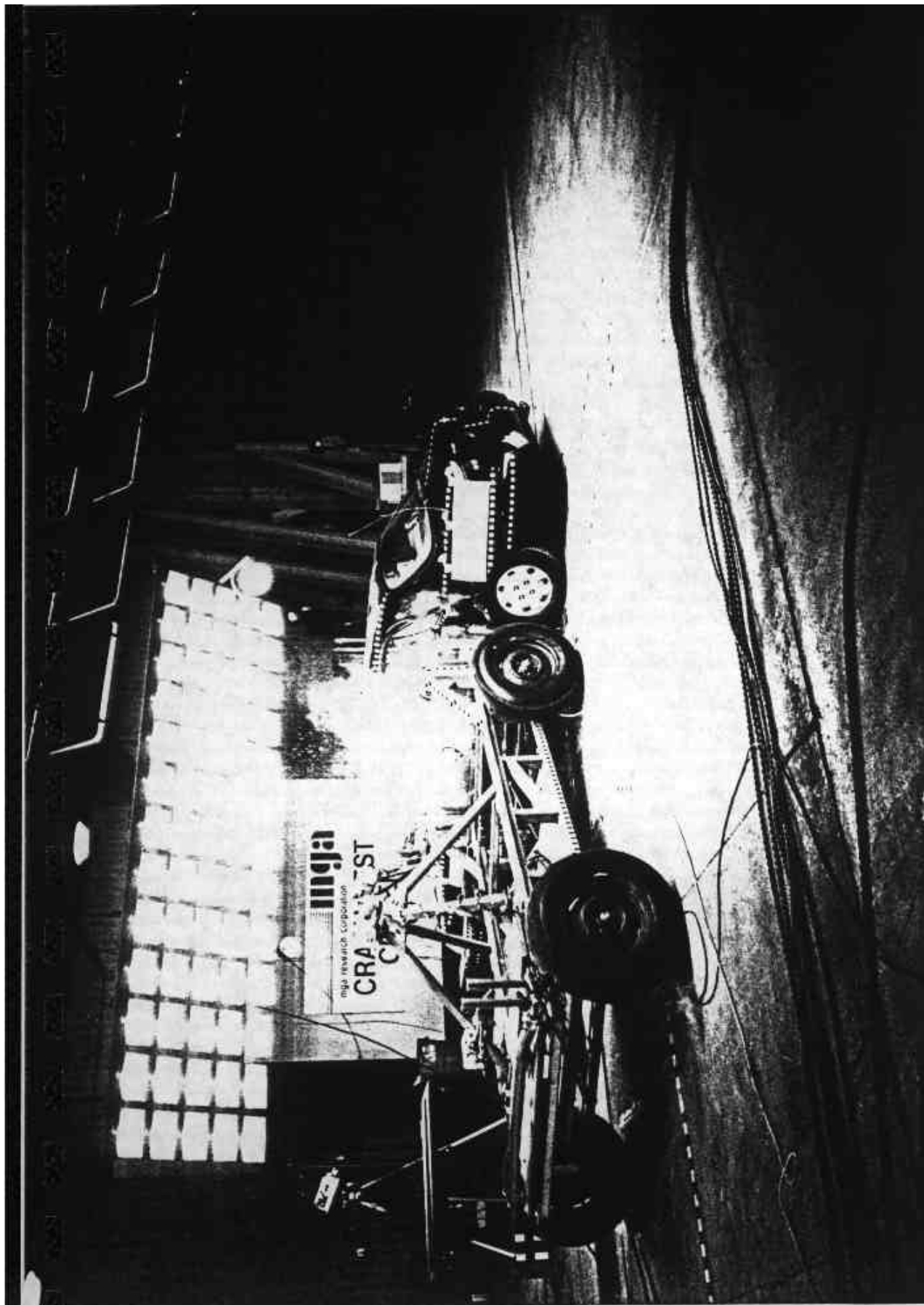


Photo No. A-34 - Impact

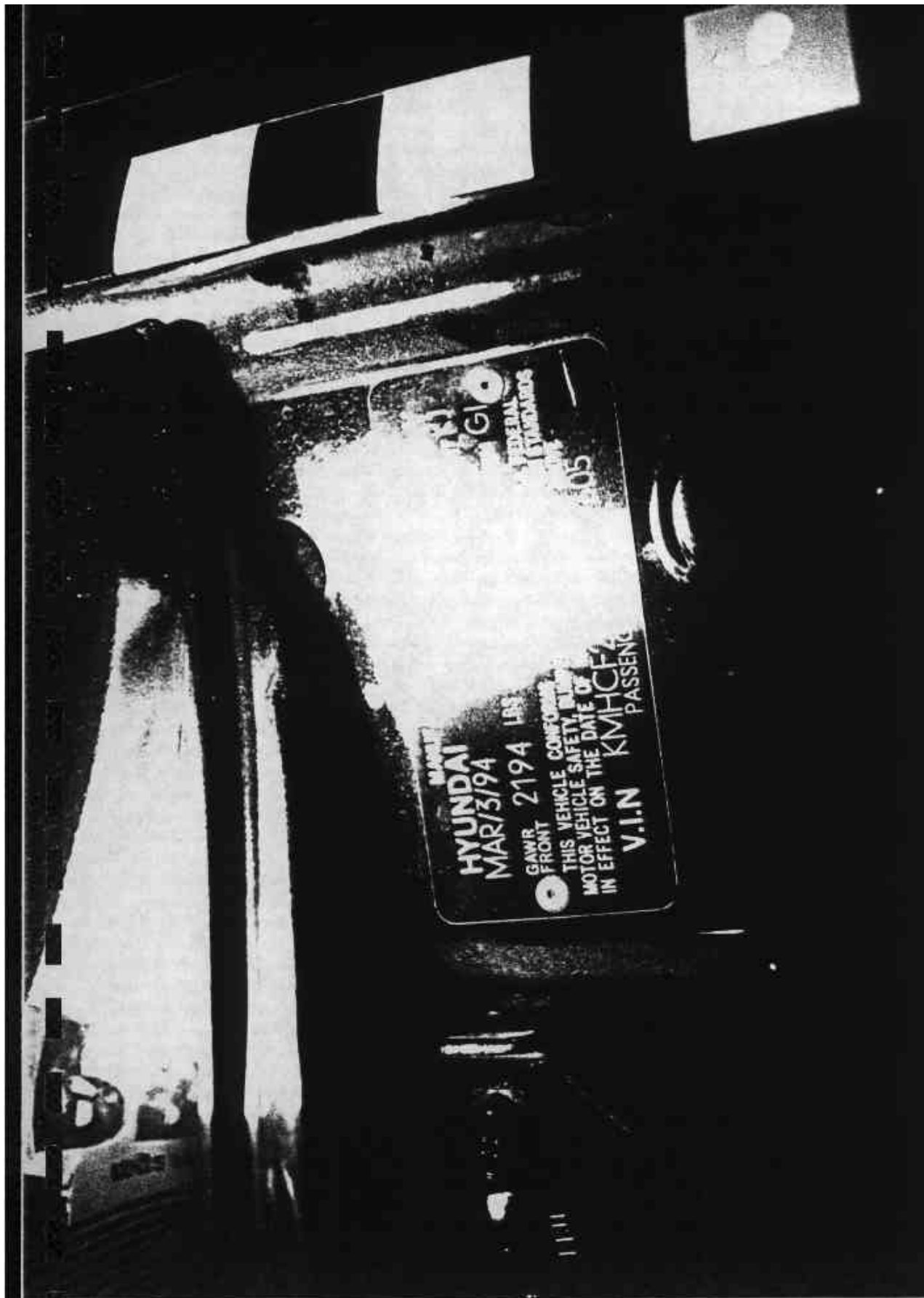


Photo No. A-35 - Vehicle Certification Label

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Filter: Class 180 (300 Hz)

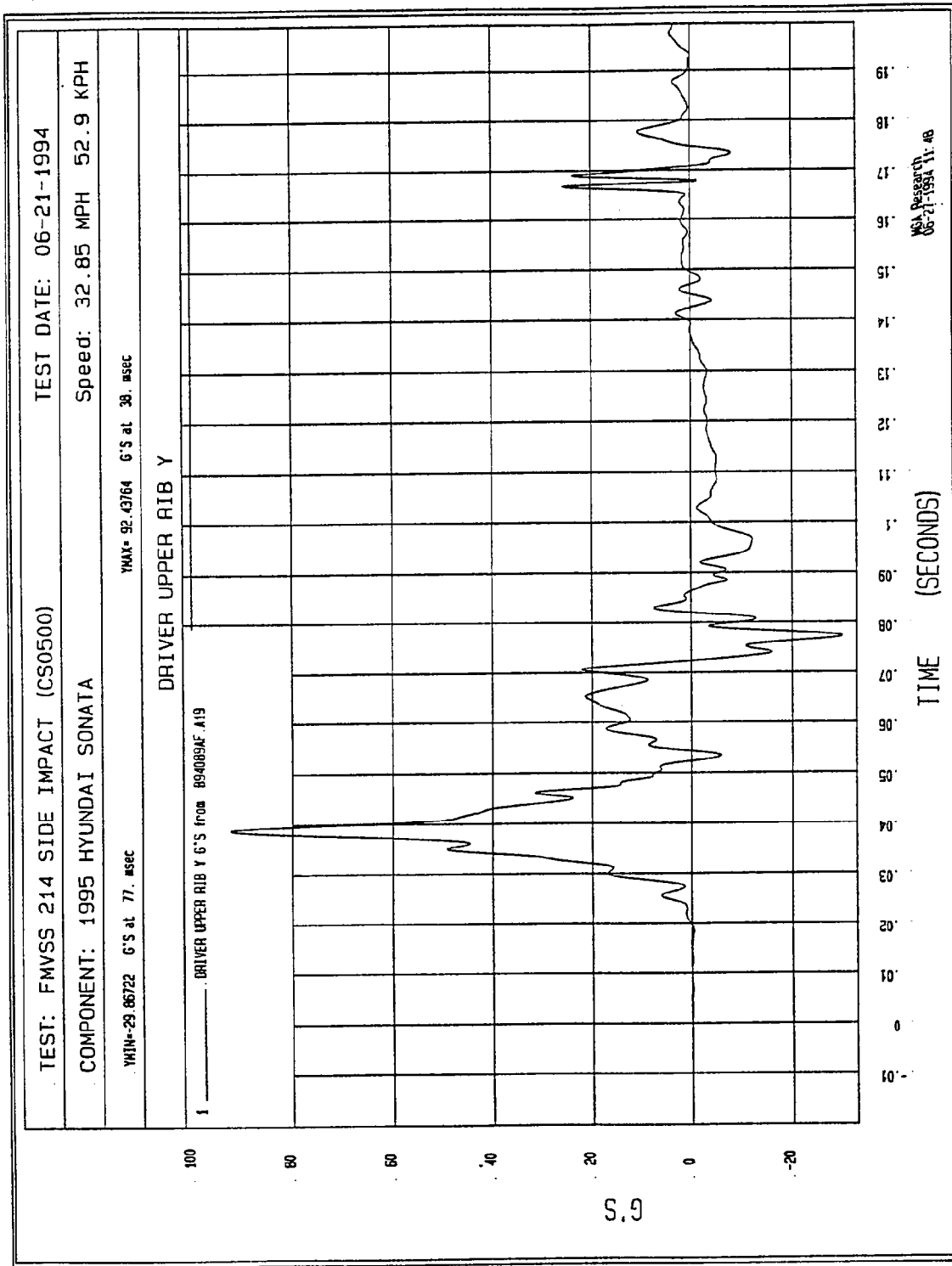


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

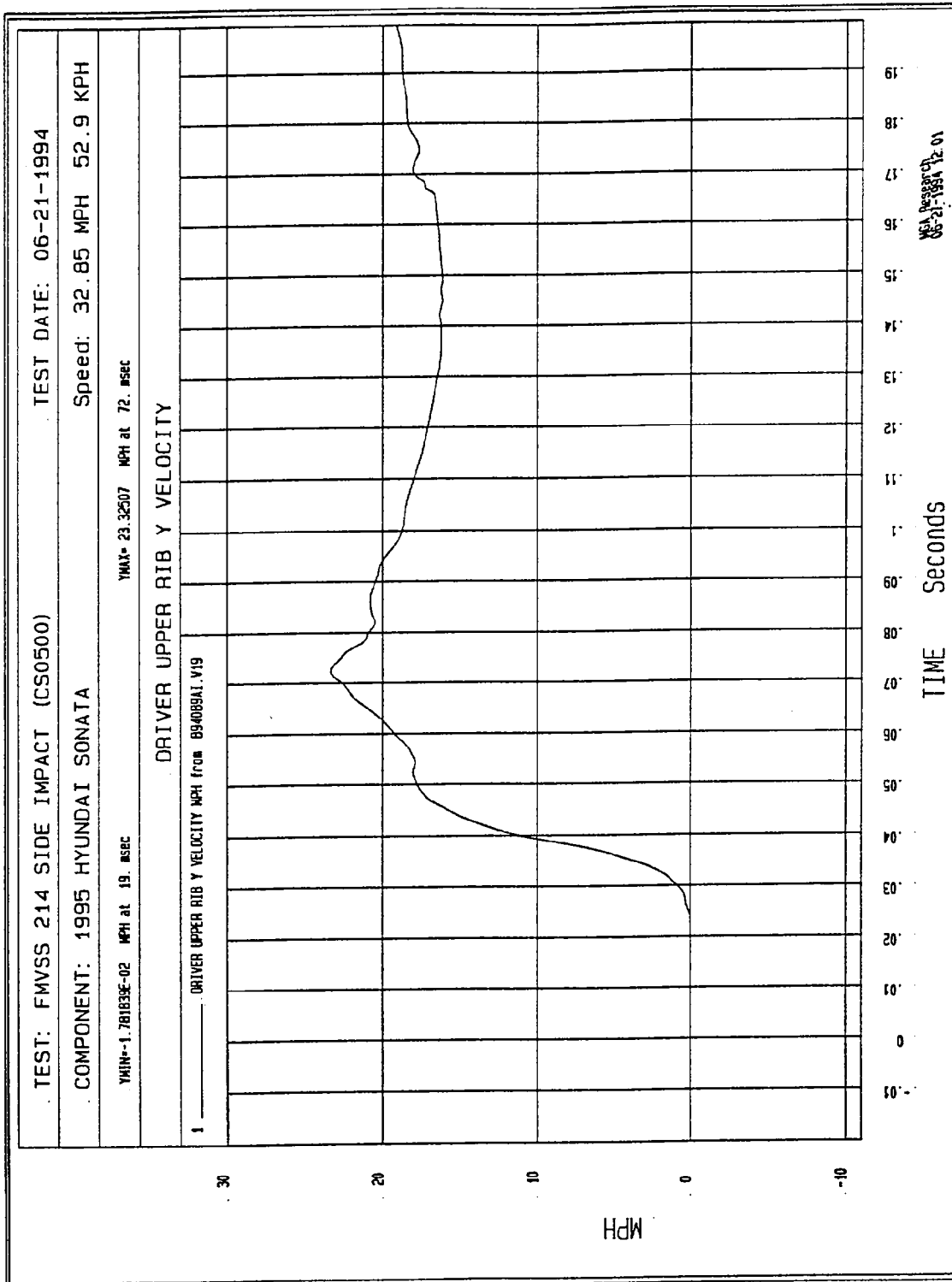


Figure B-2 - Driver Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

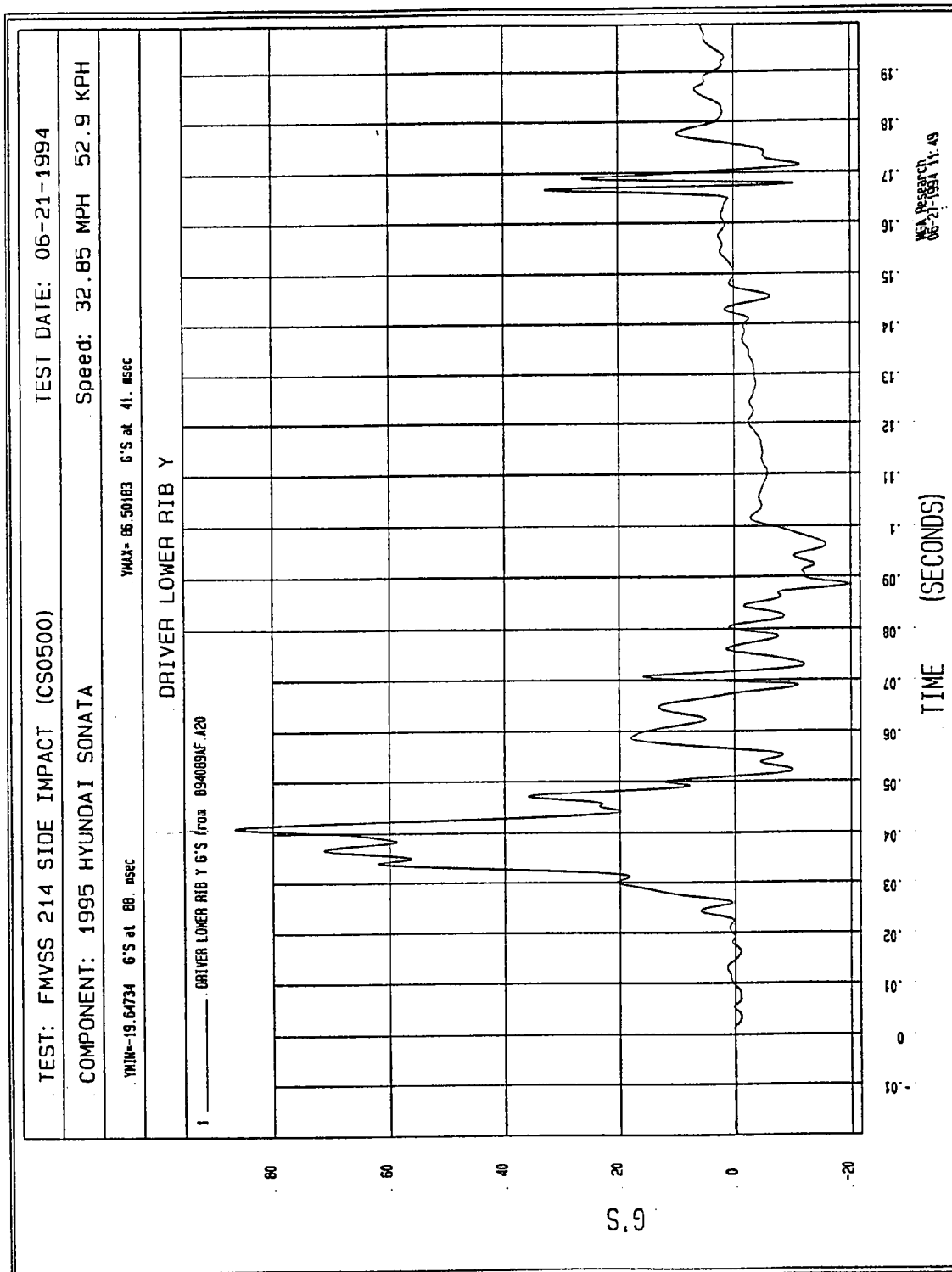


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

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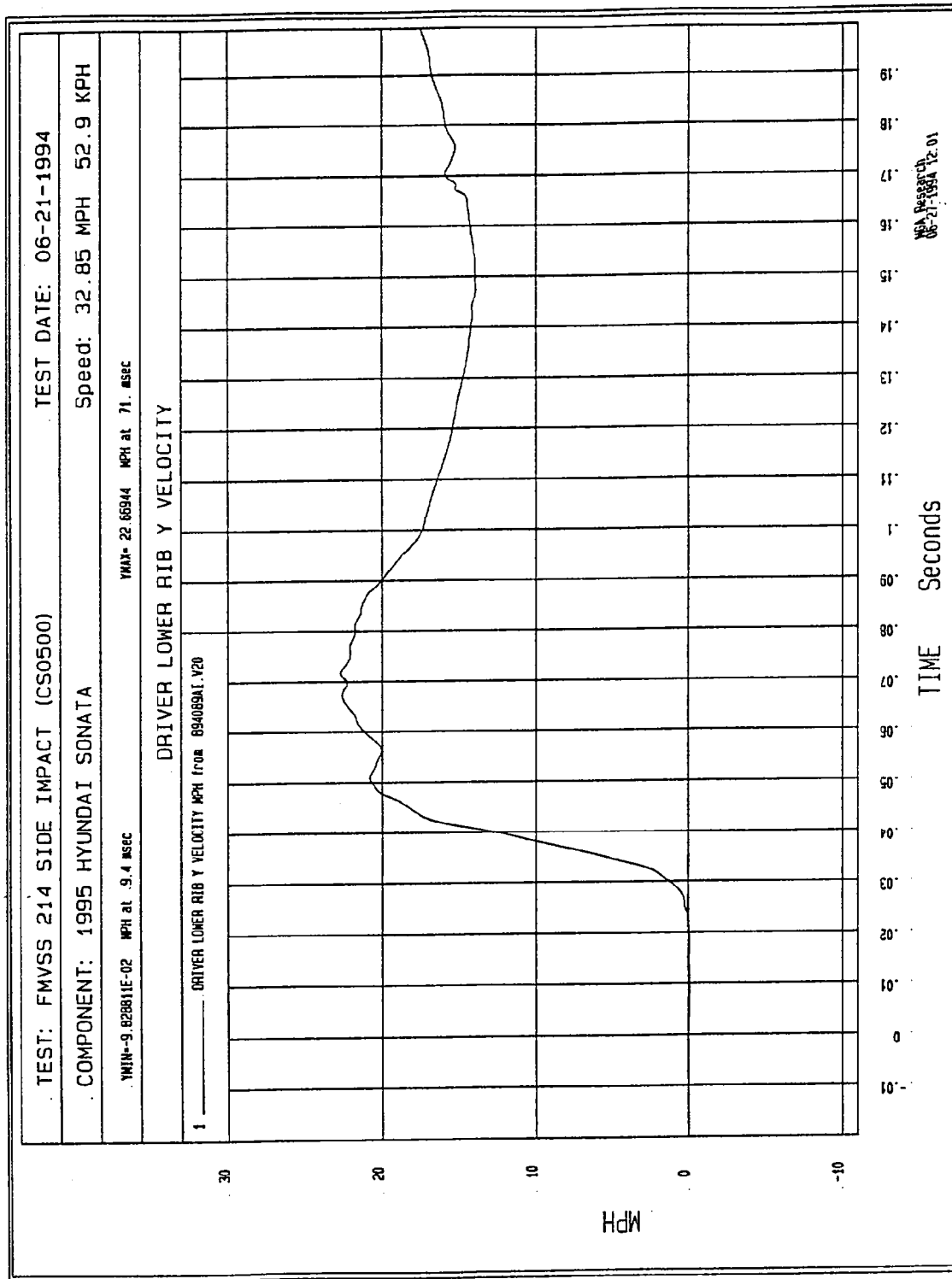


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

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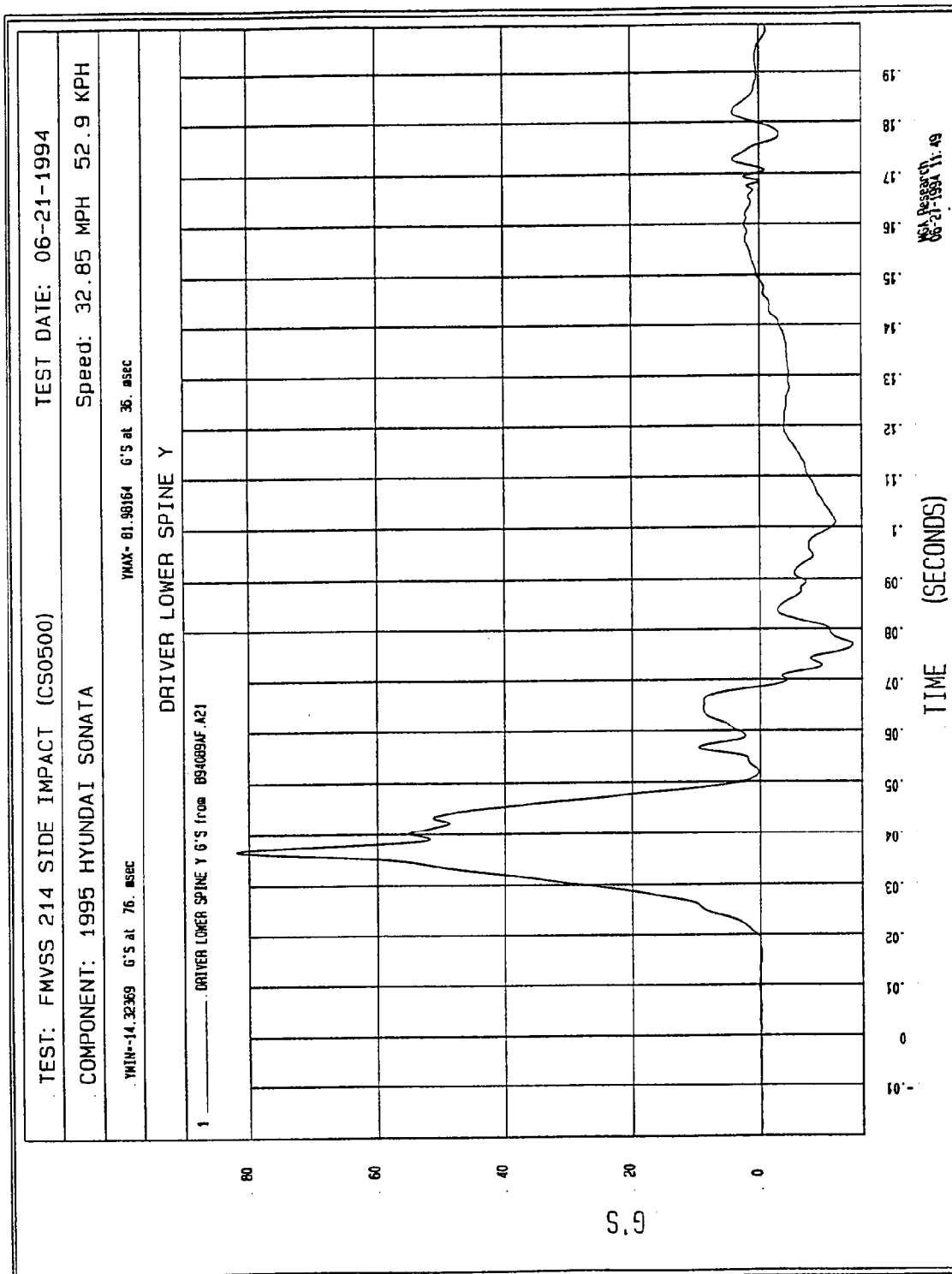


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

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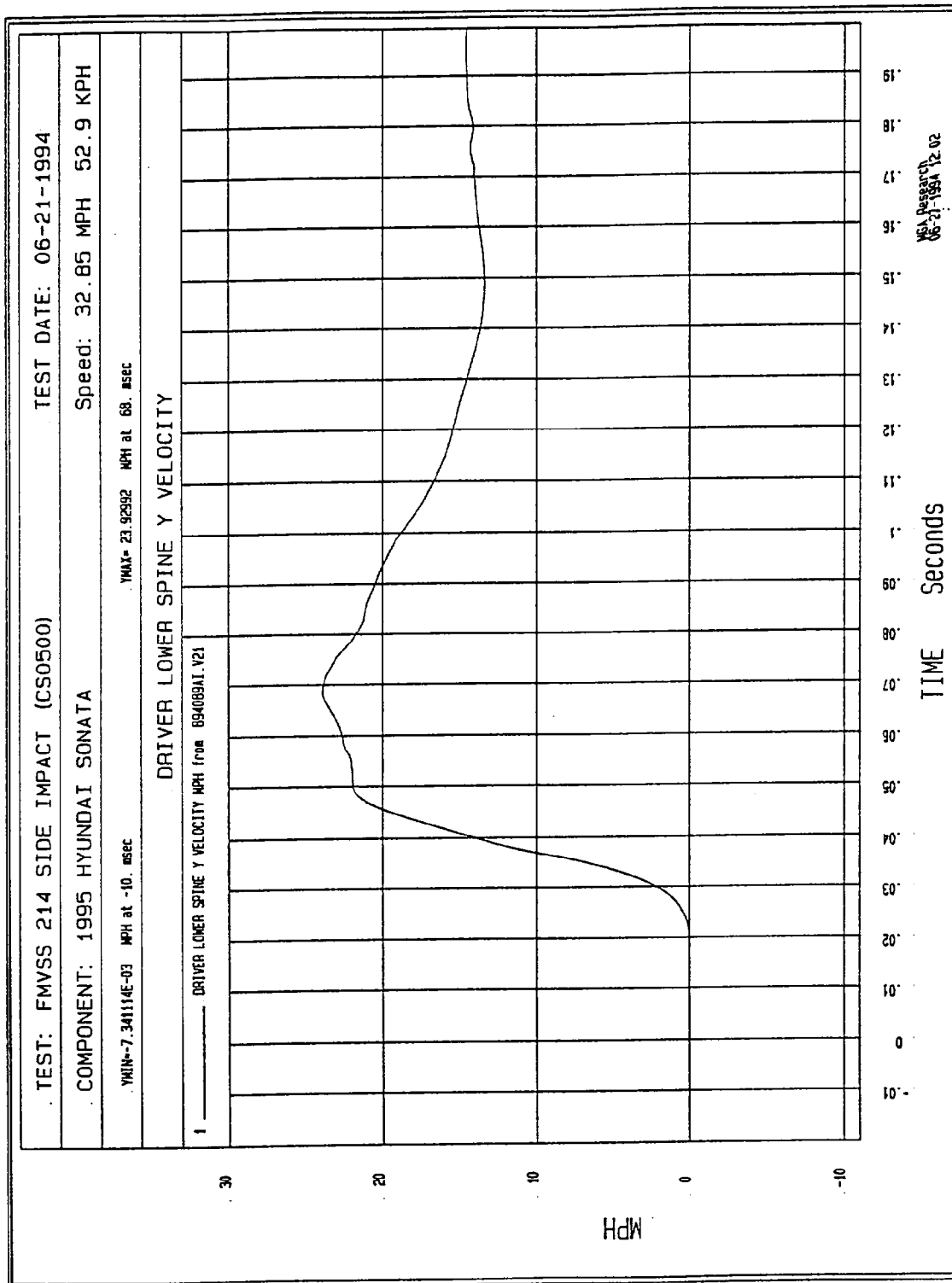


Figure B-6 - Driver Lower Spine Y Velocity vs. Time

Filter: Class 180 (300 Hz)

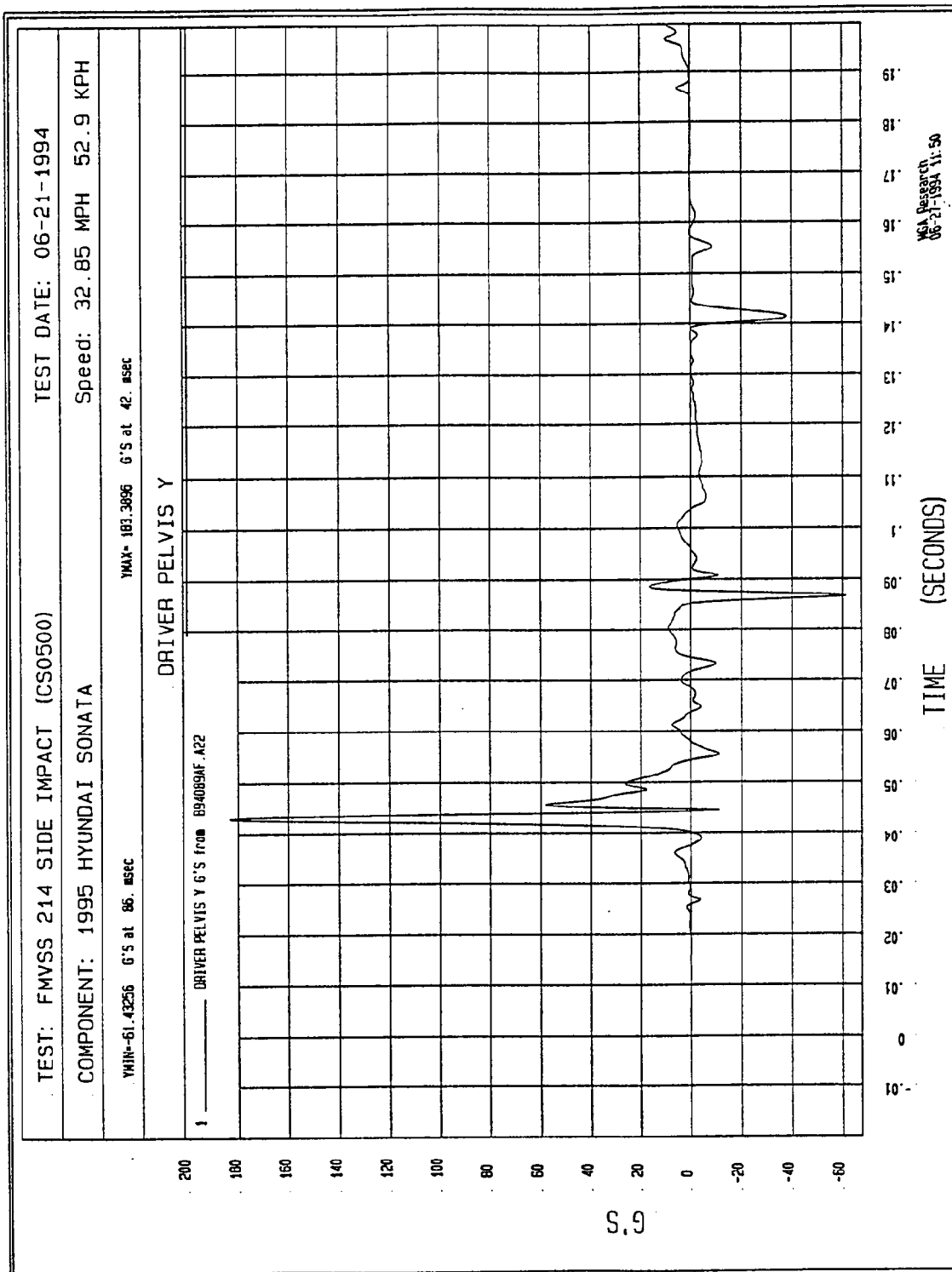


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

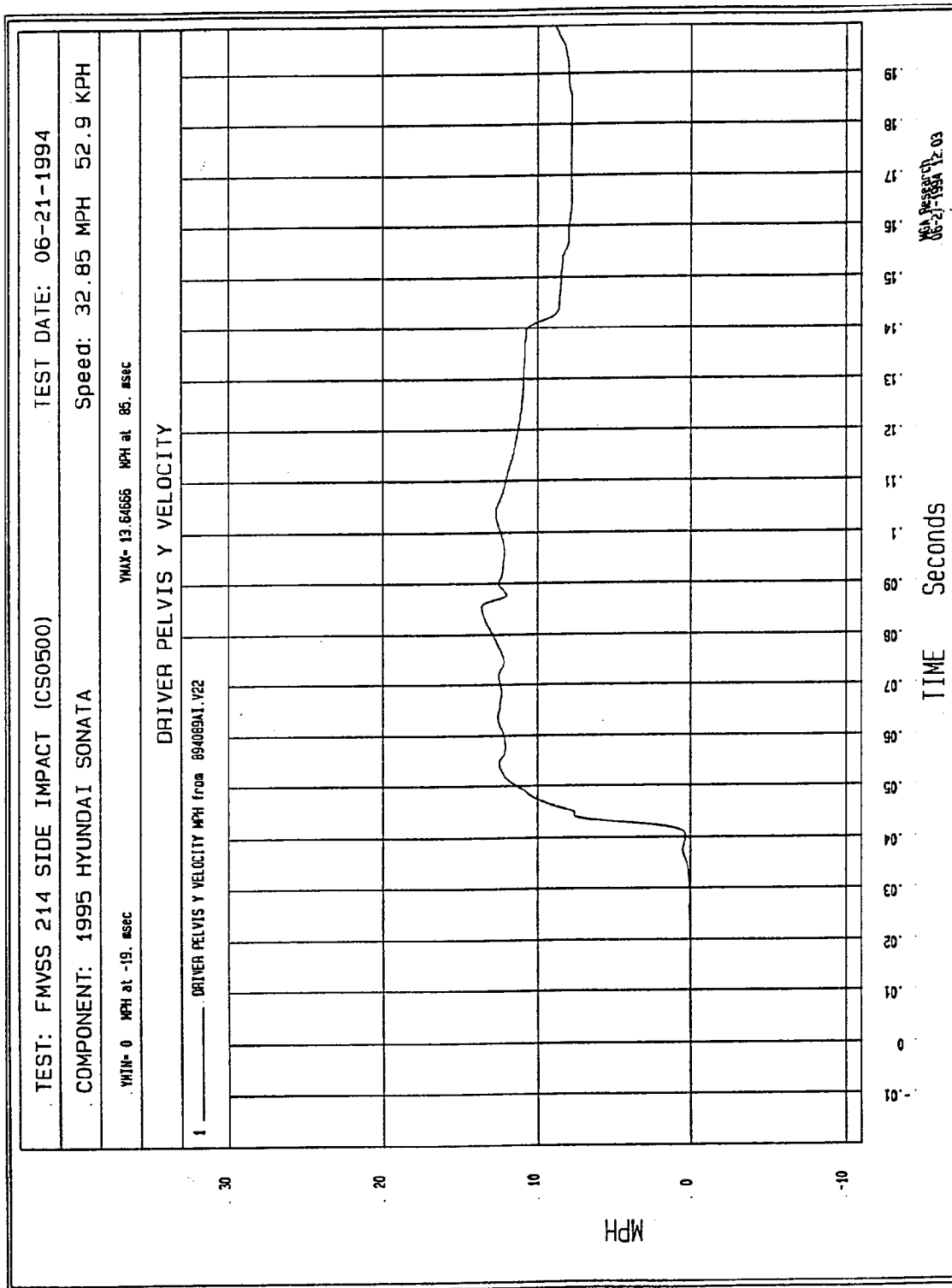


Figure B-8 - Driver Pelvis Y Velocity vs. Time

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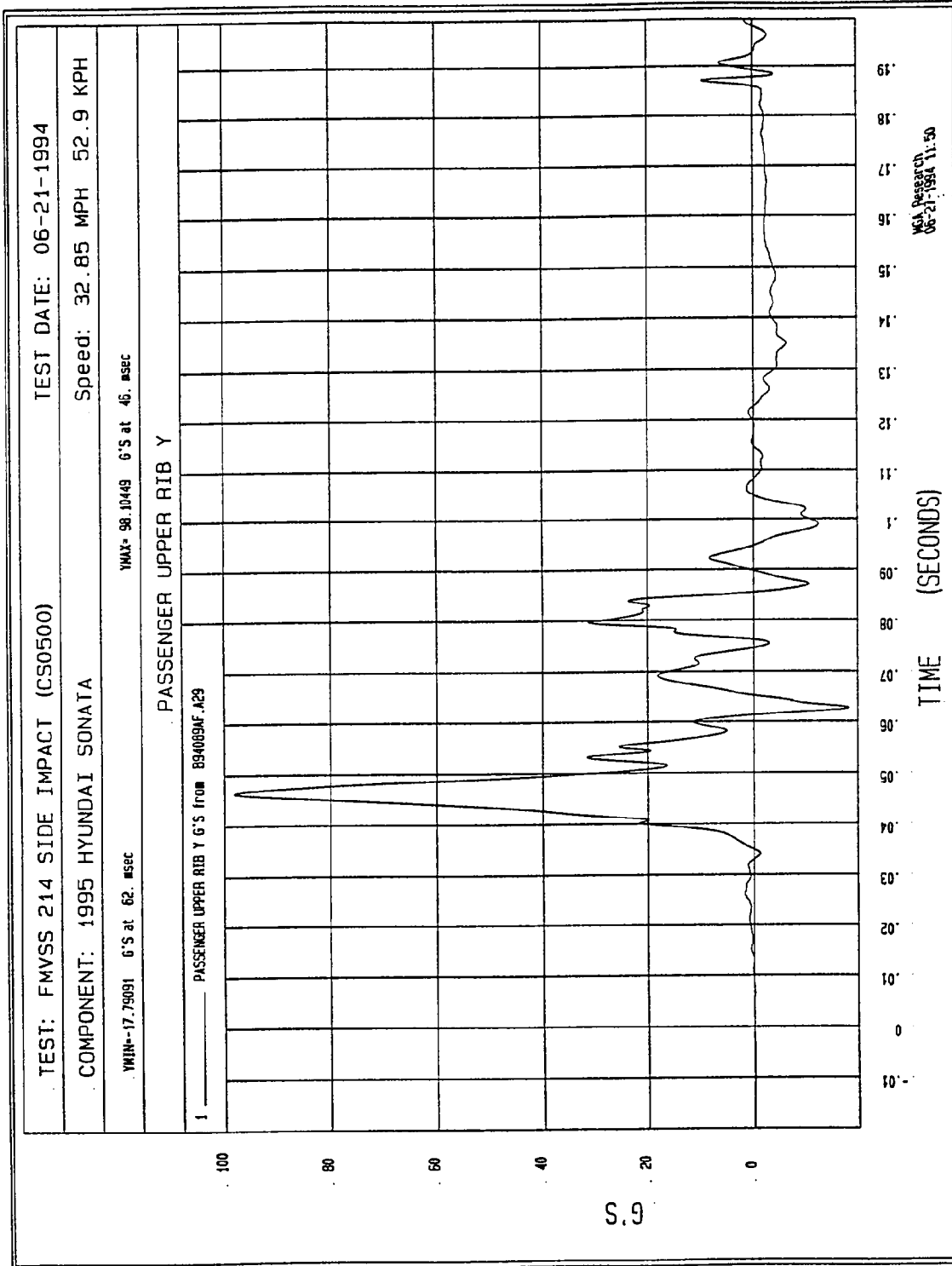


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

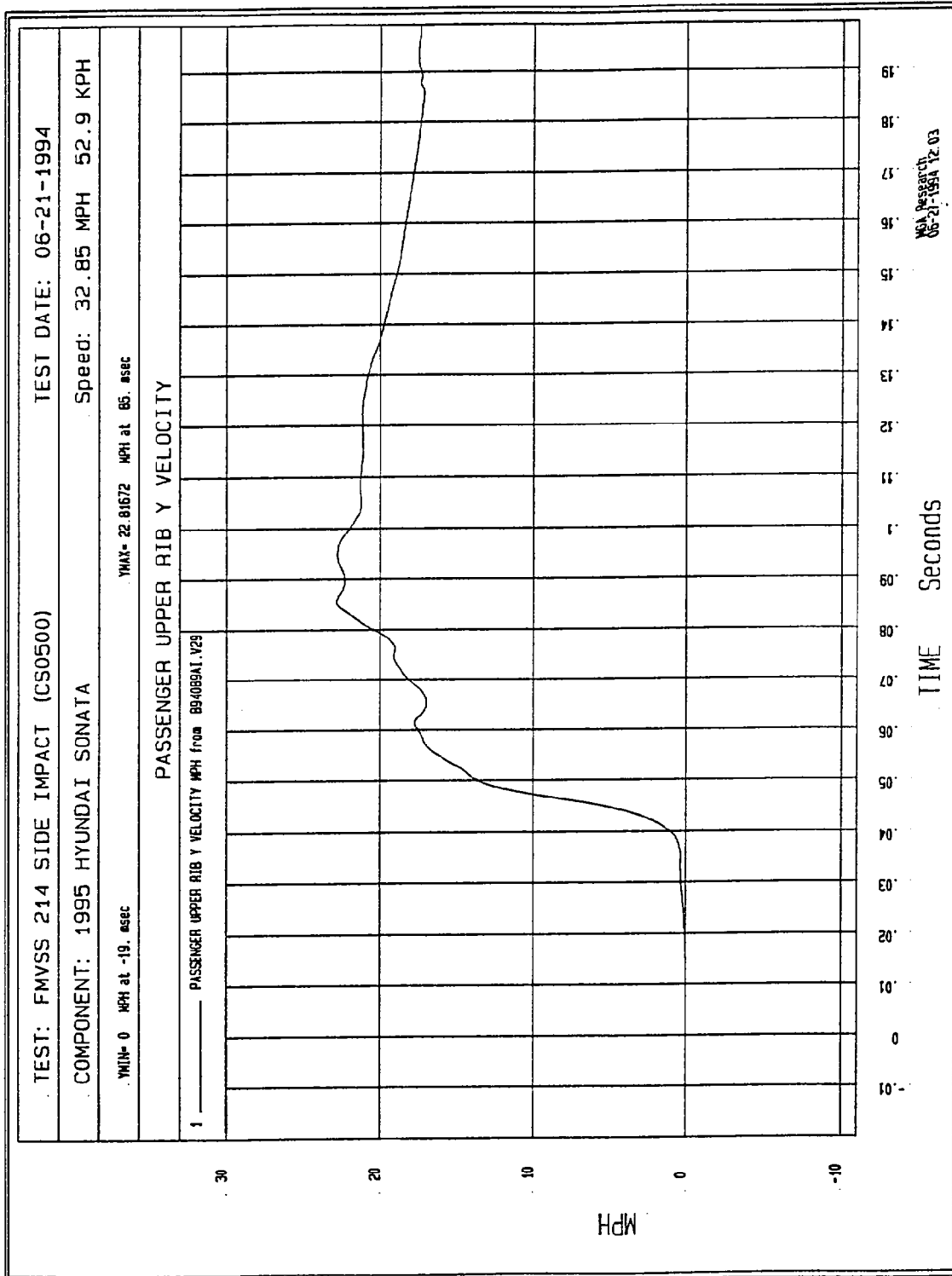


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

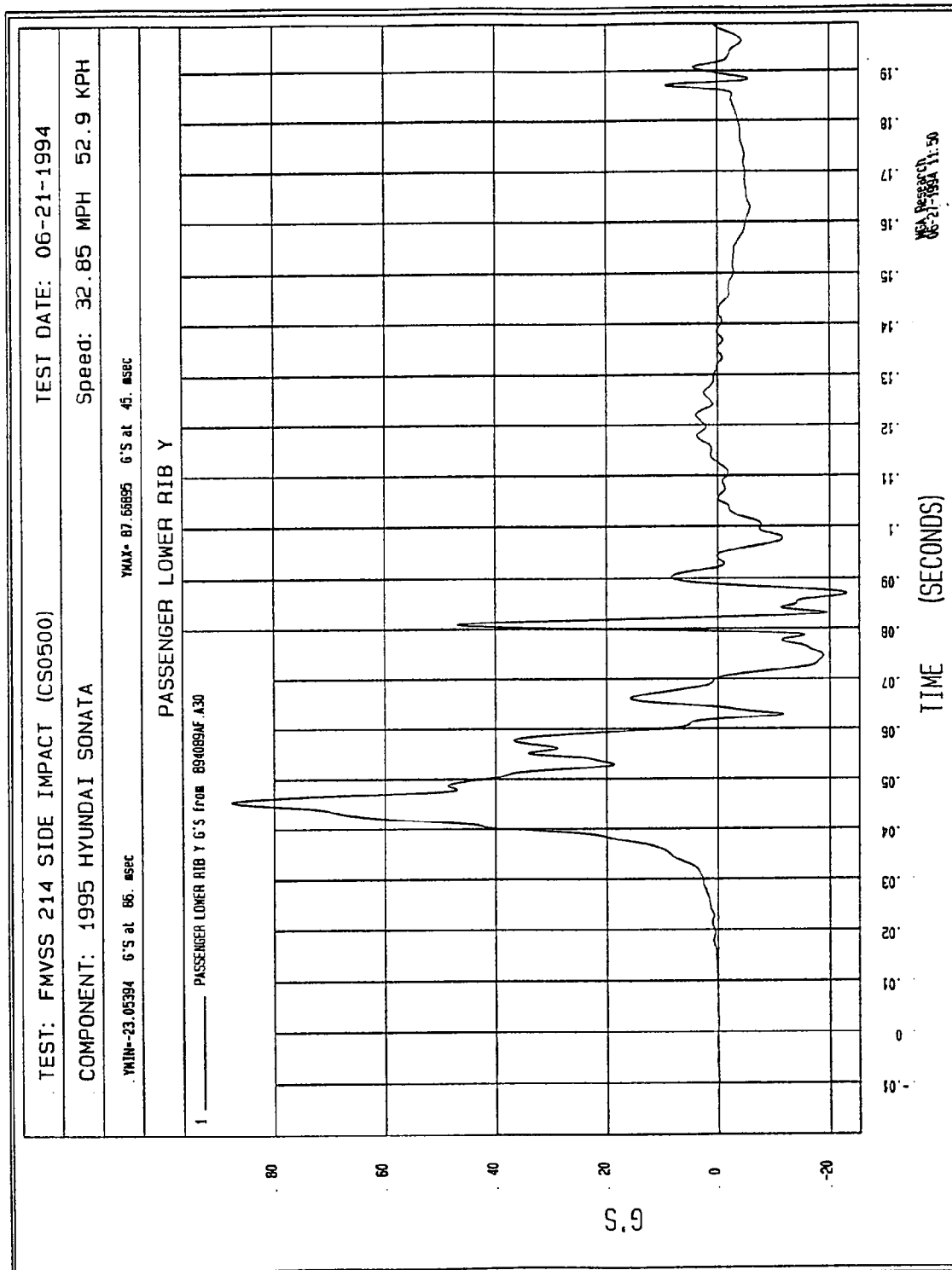


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

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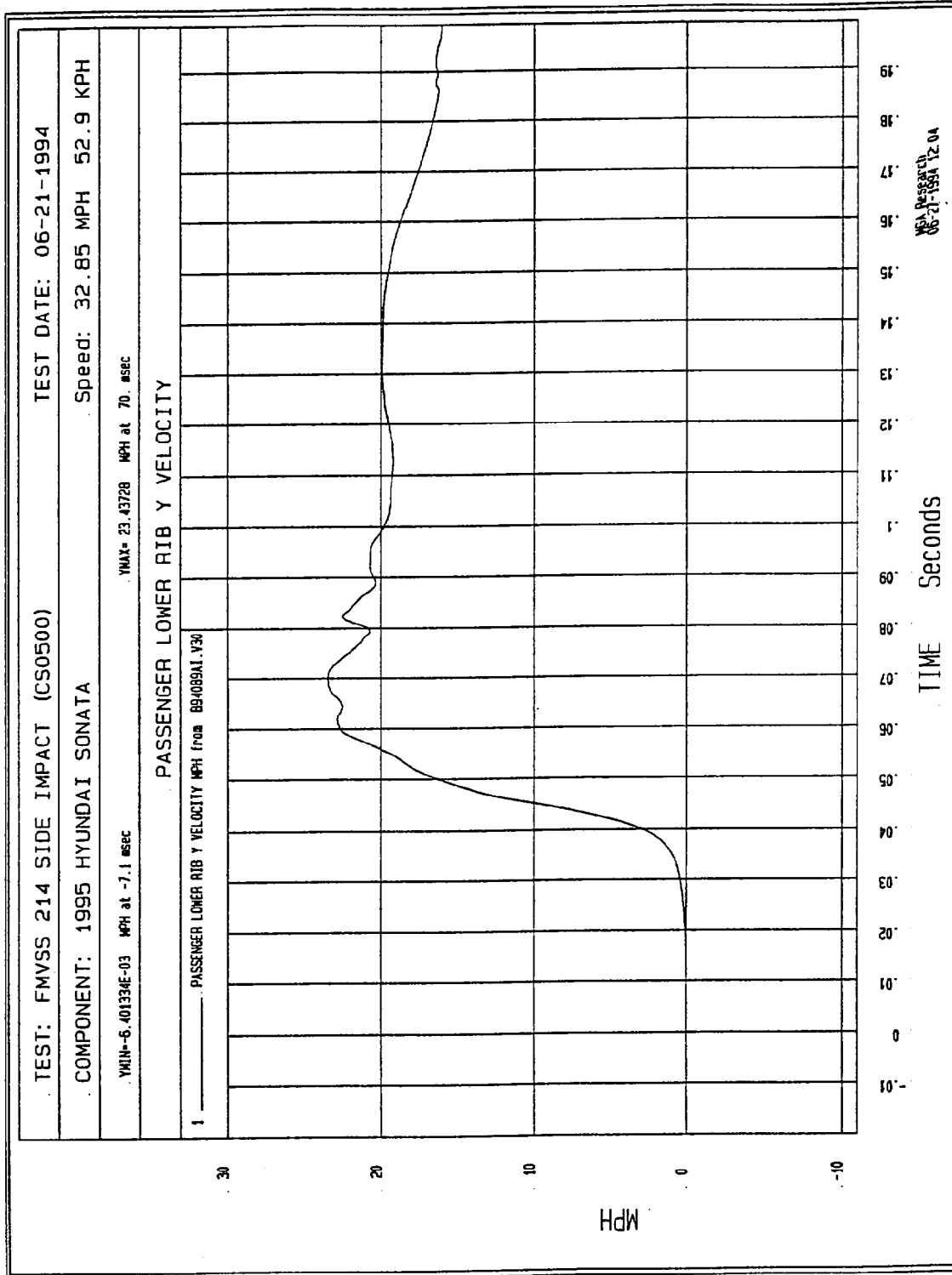


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz).

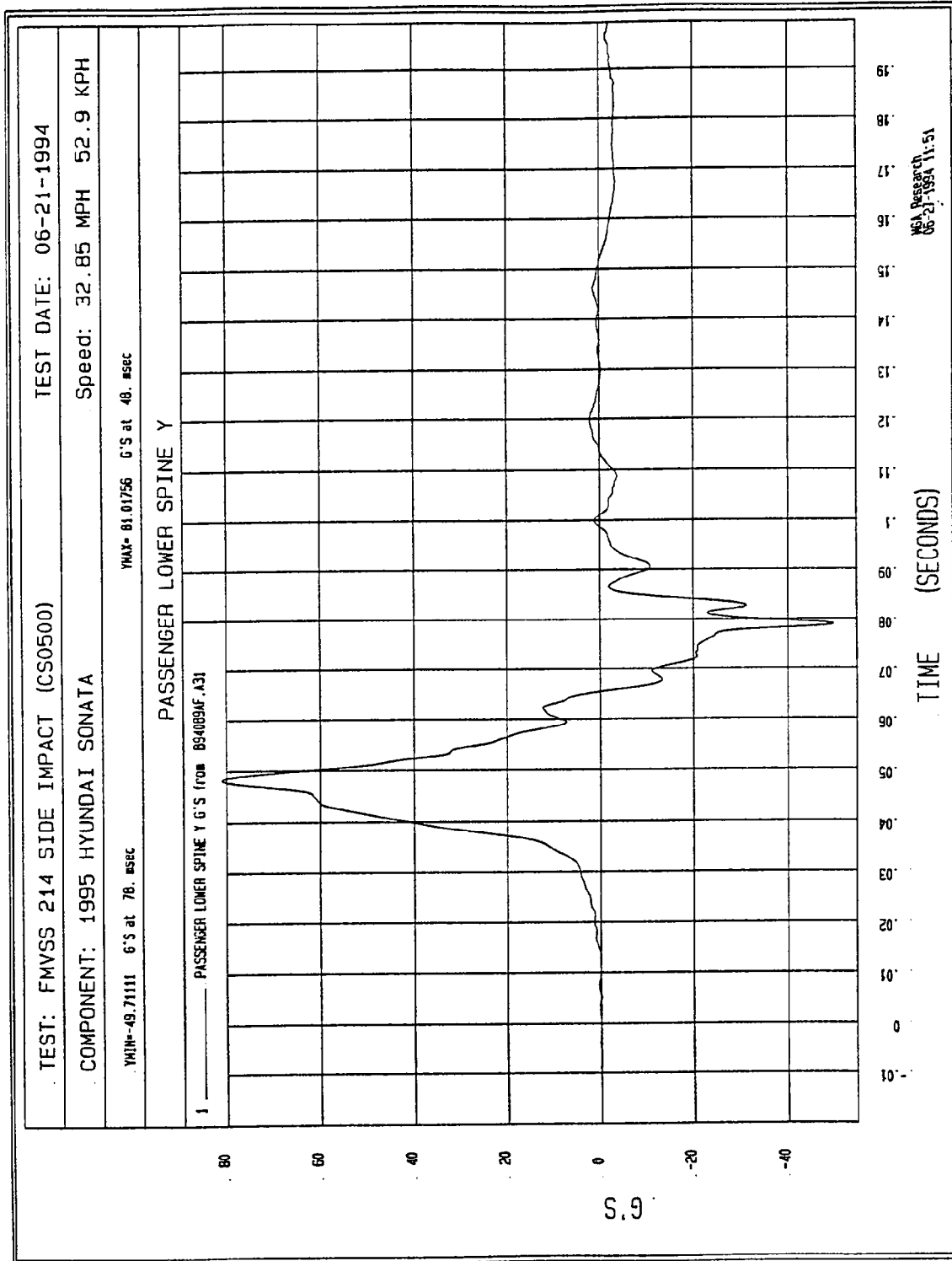


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

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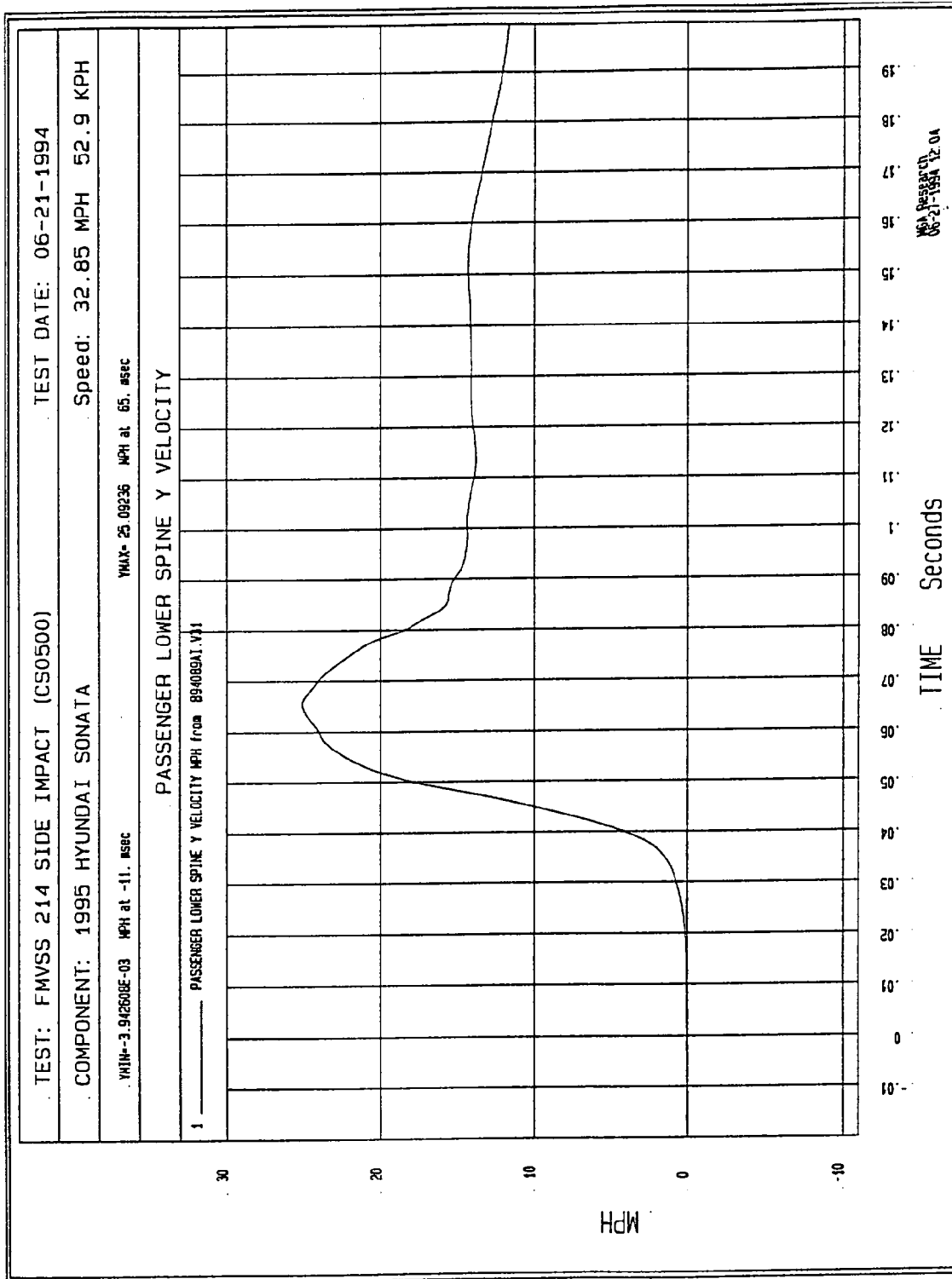


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

Filter: Class 180 (300 Hz)

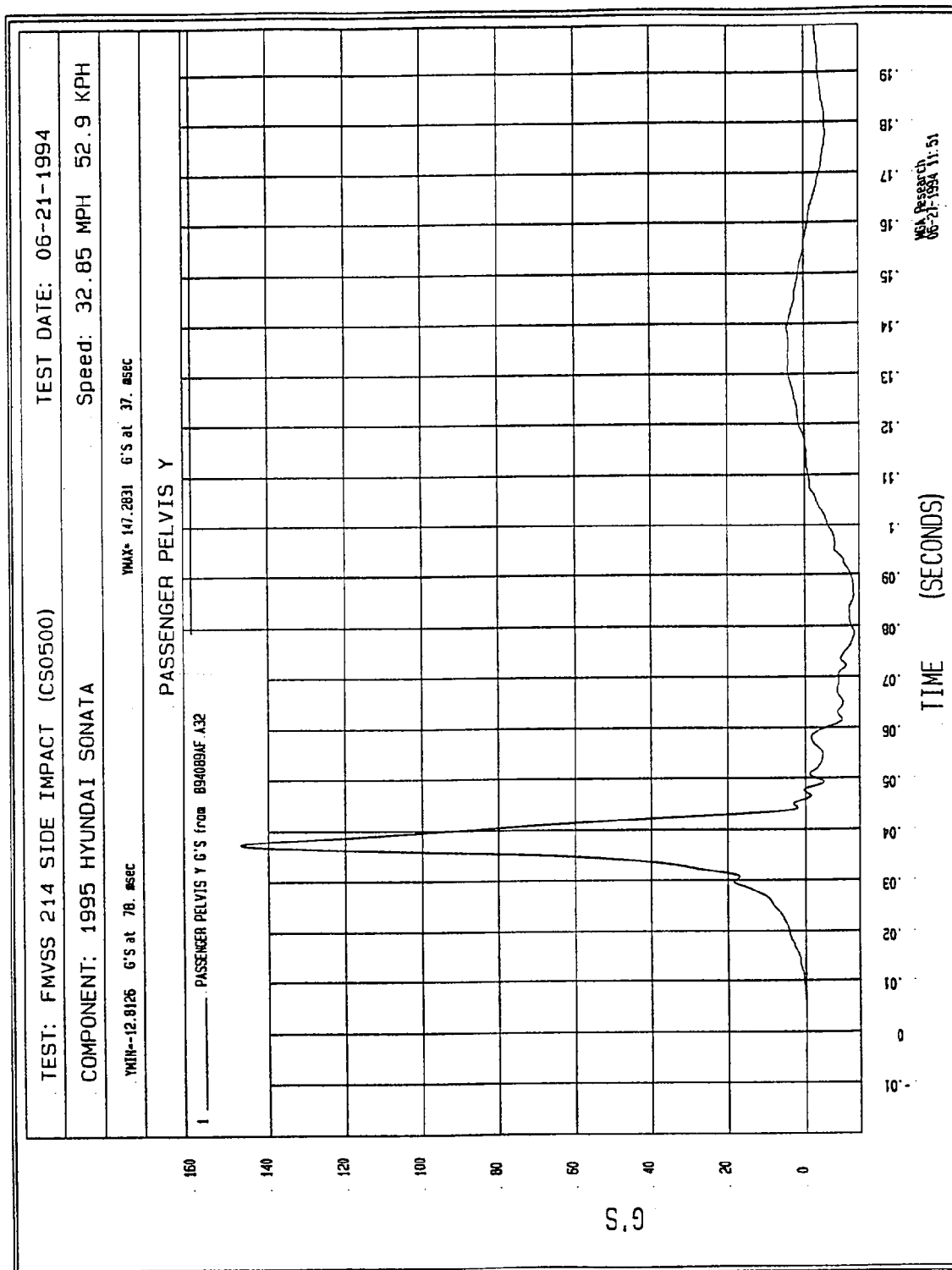


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

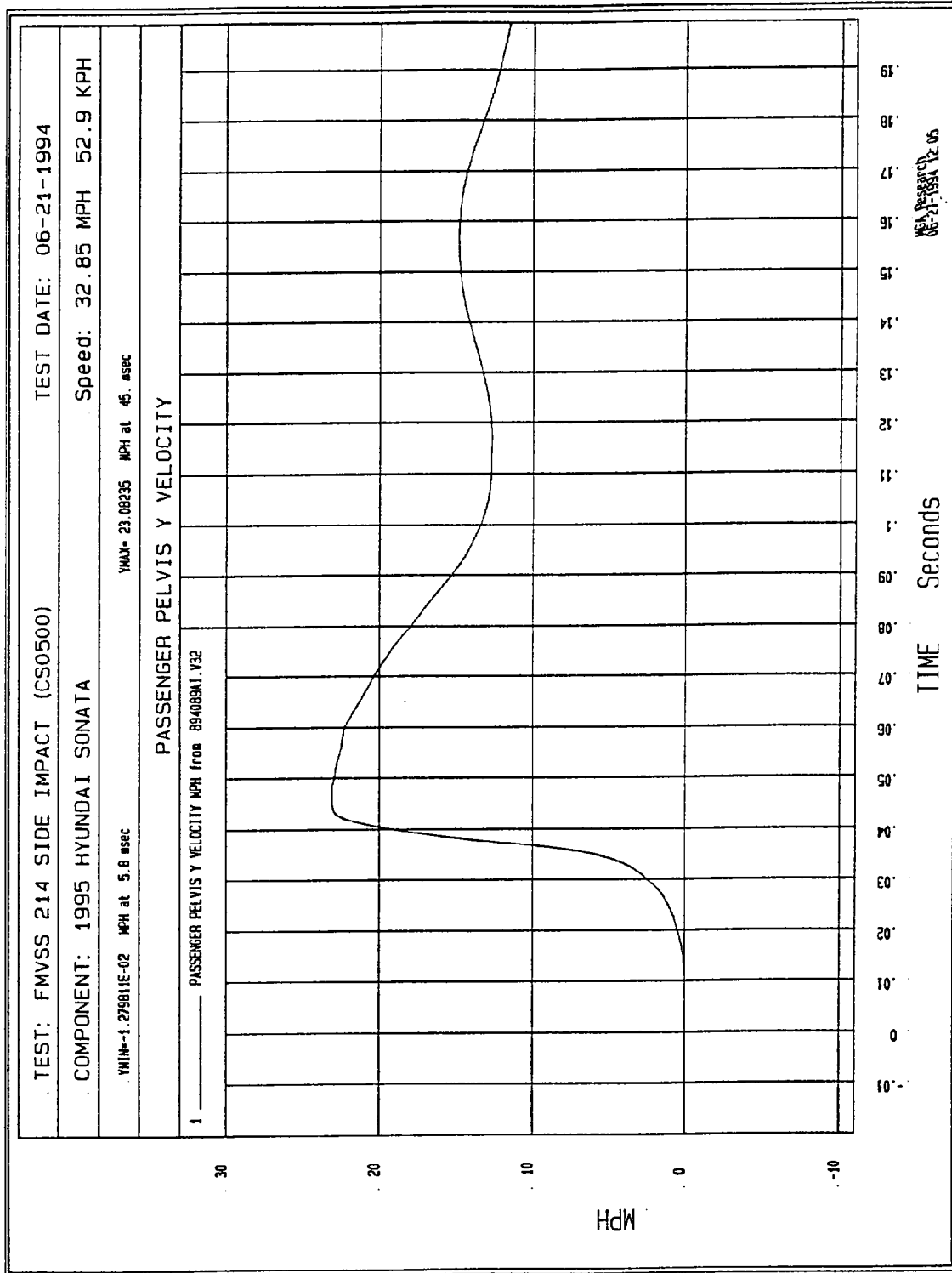


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

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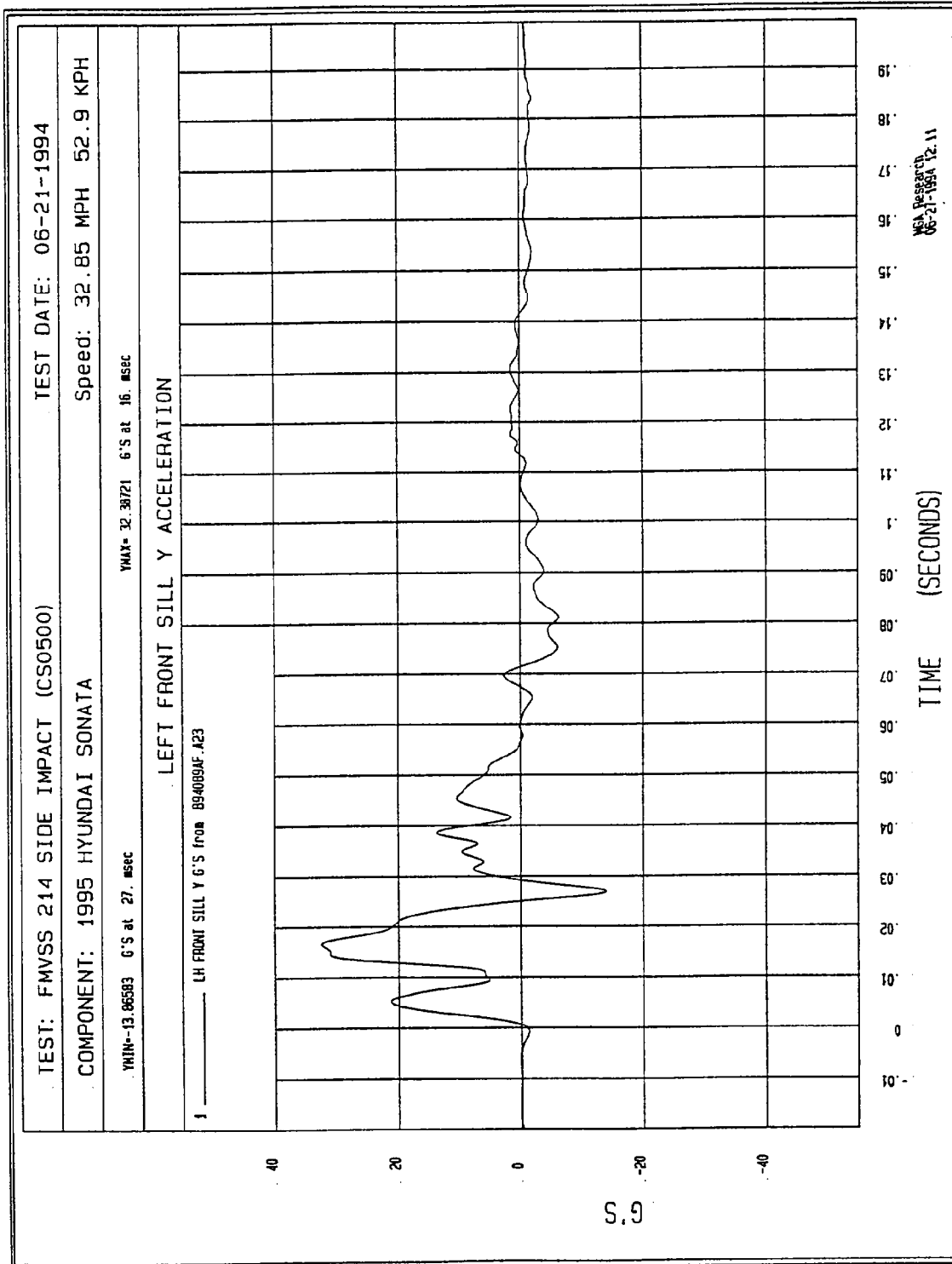


Figure B-17 - Left Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

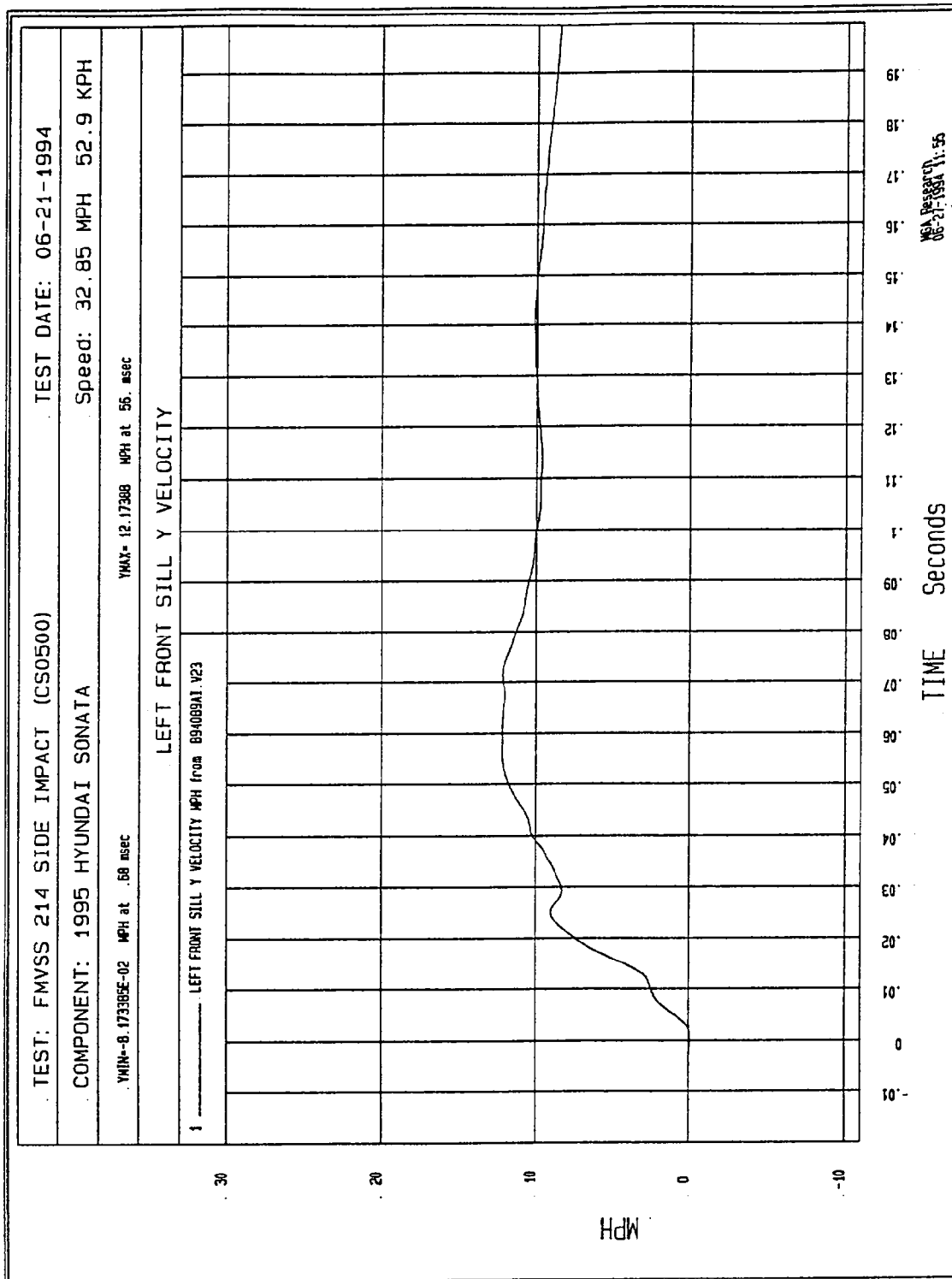


Figure B-18 - Left Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

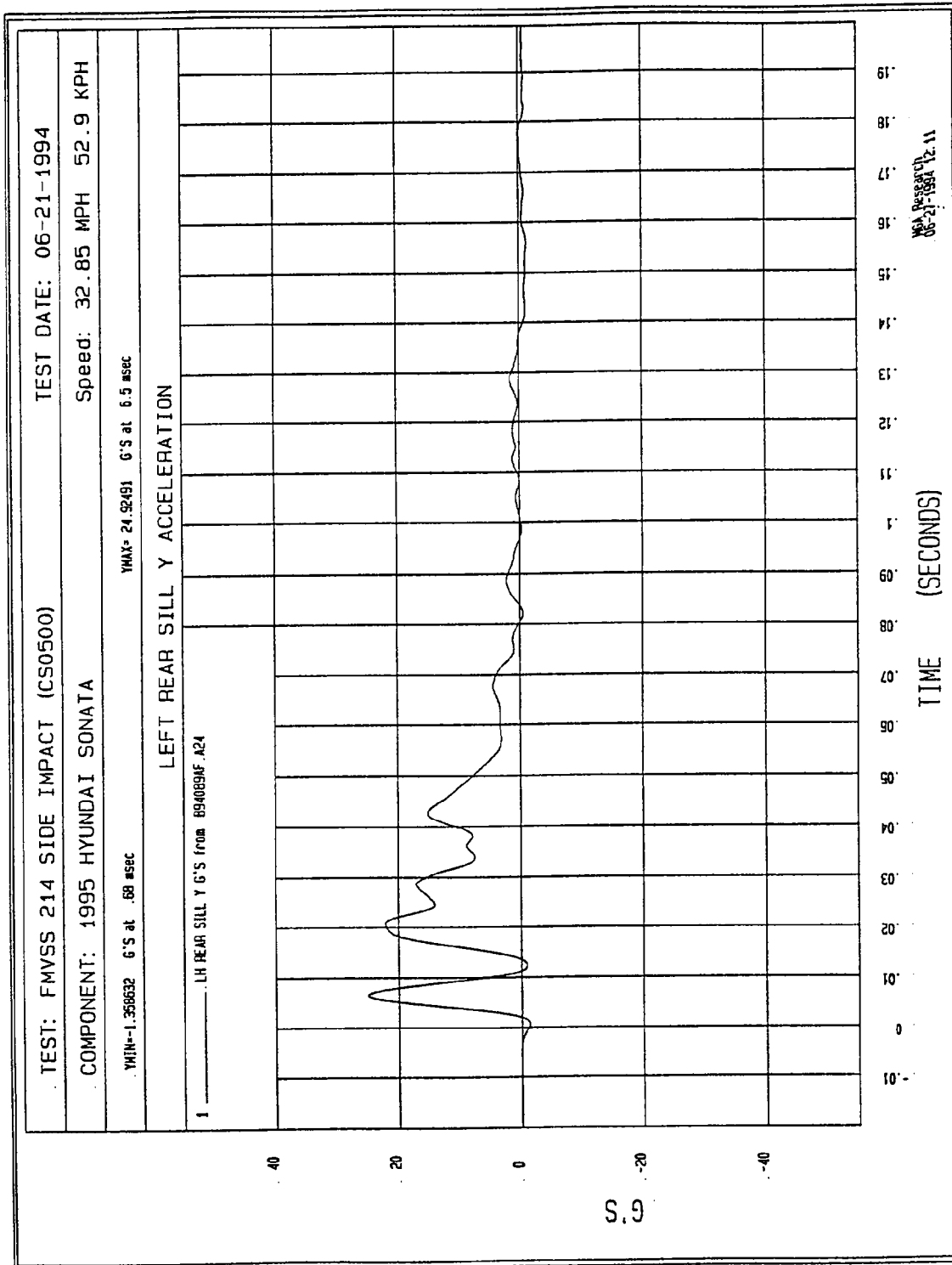


Figure B-19 - Left Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

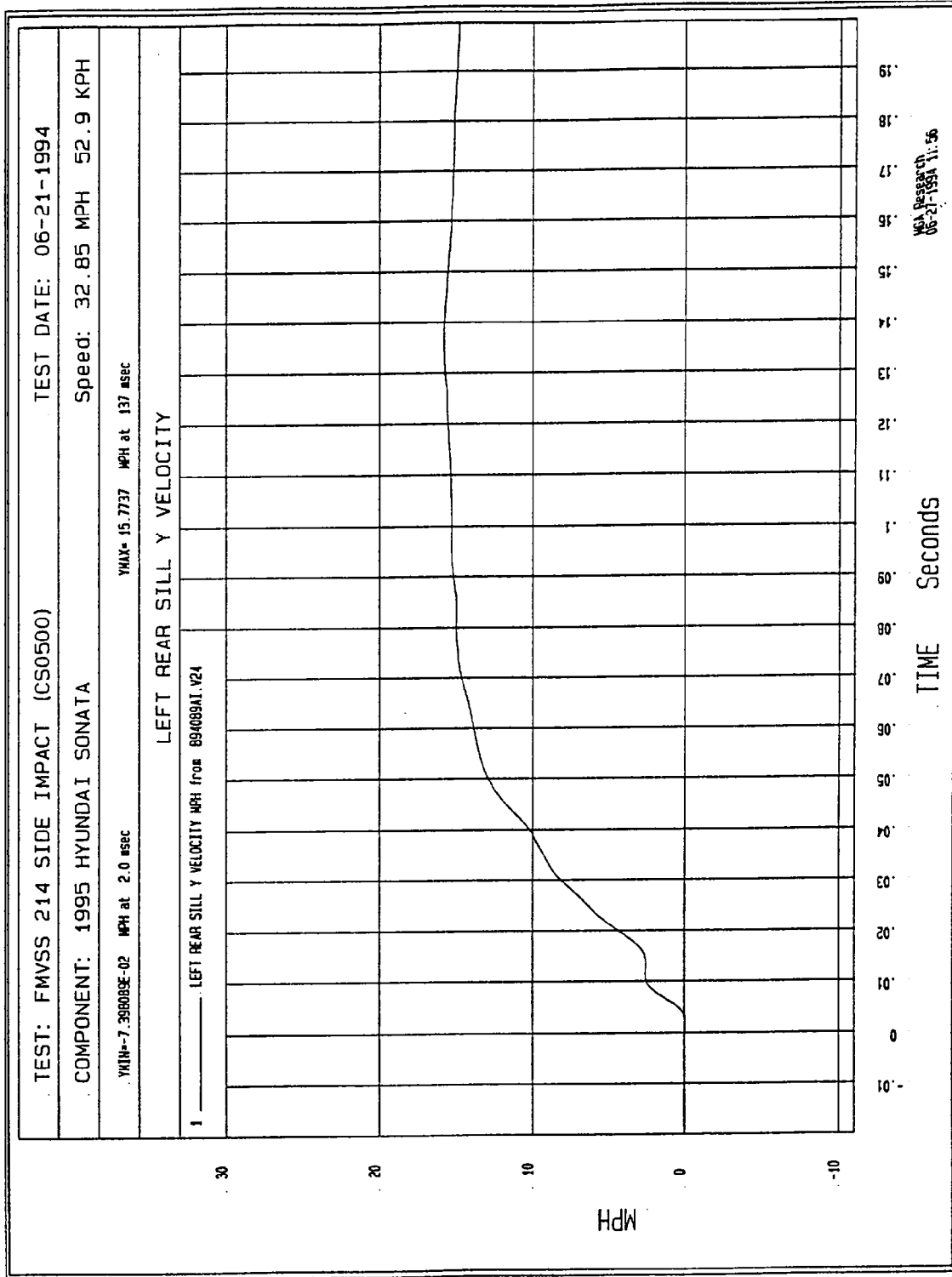


Figure B-20 - Left Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

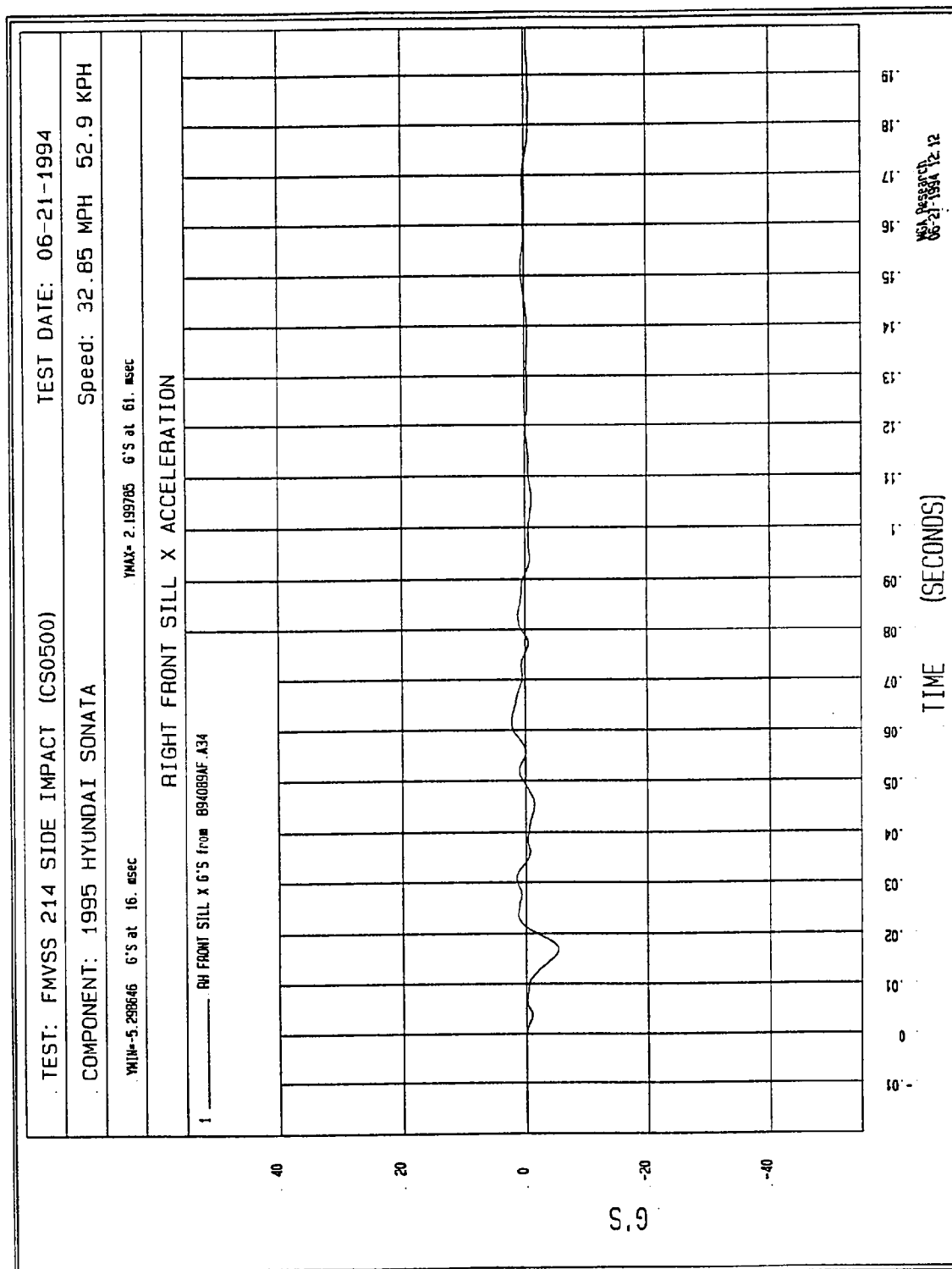


Figure B-21 - Right Front Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

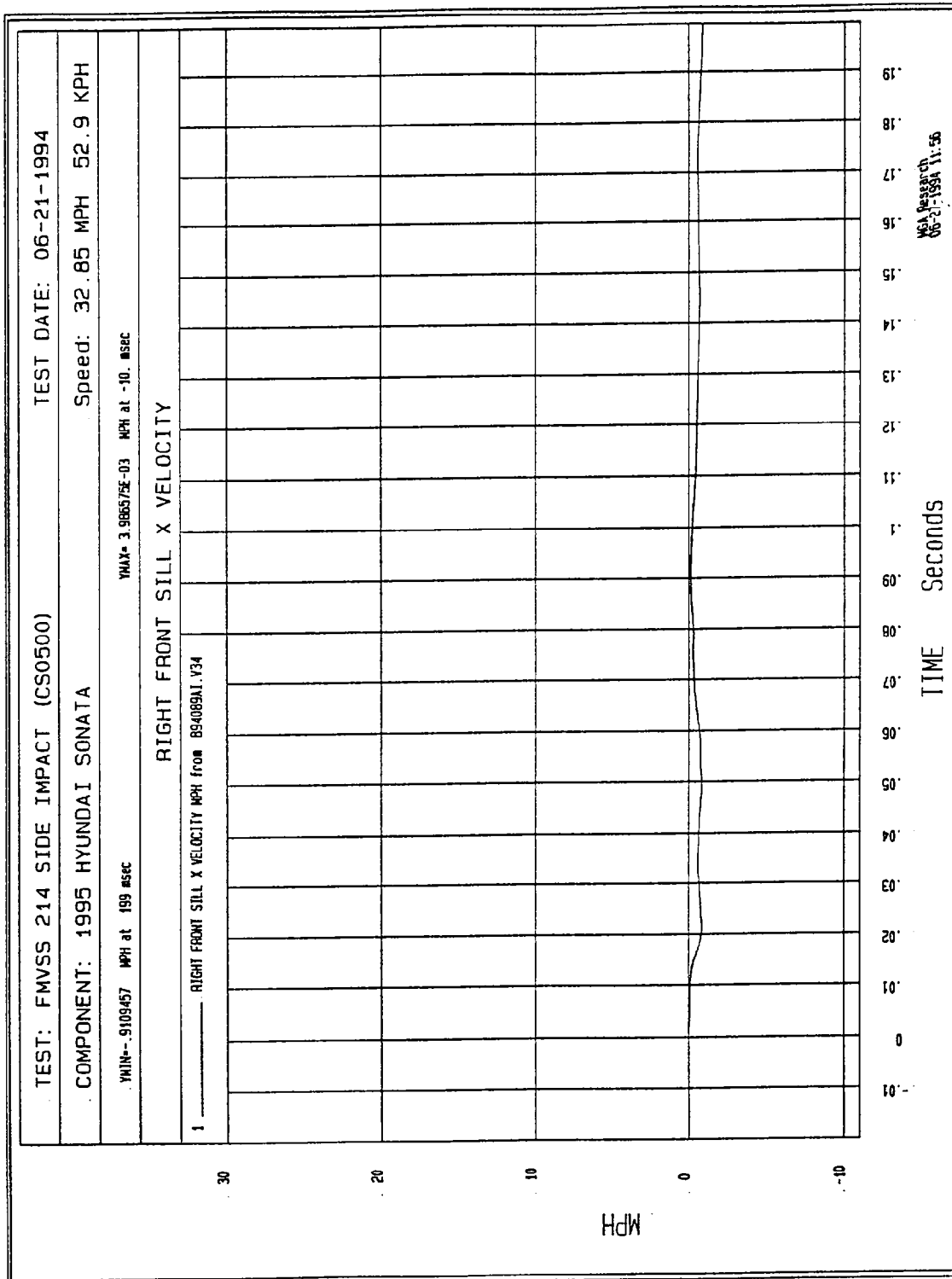


Figure B-22 - Right Front Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

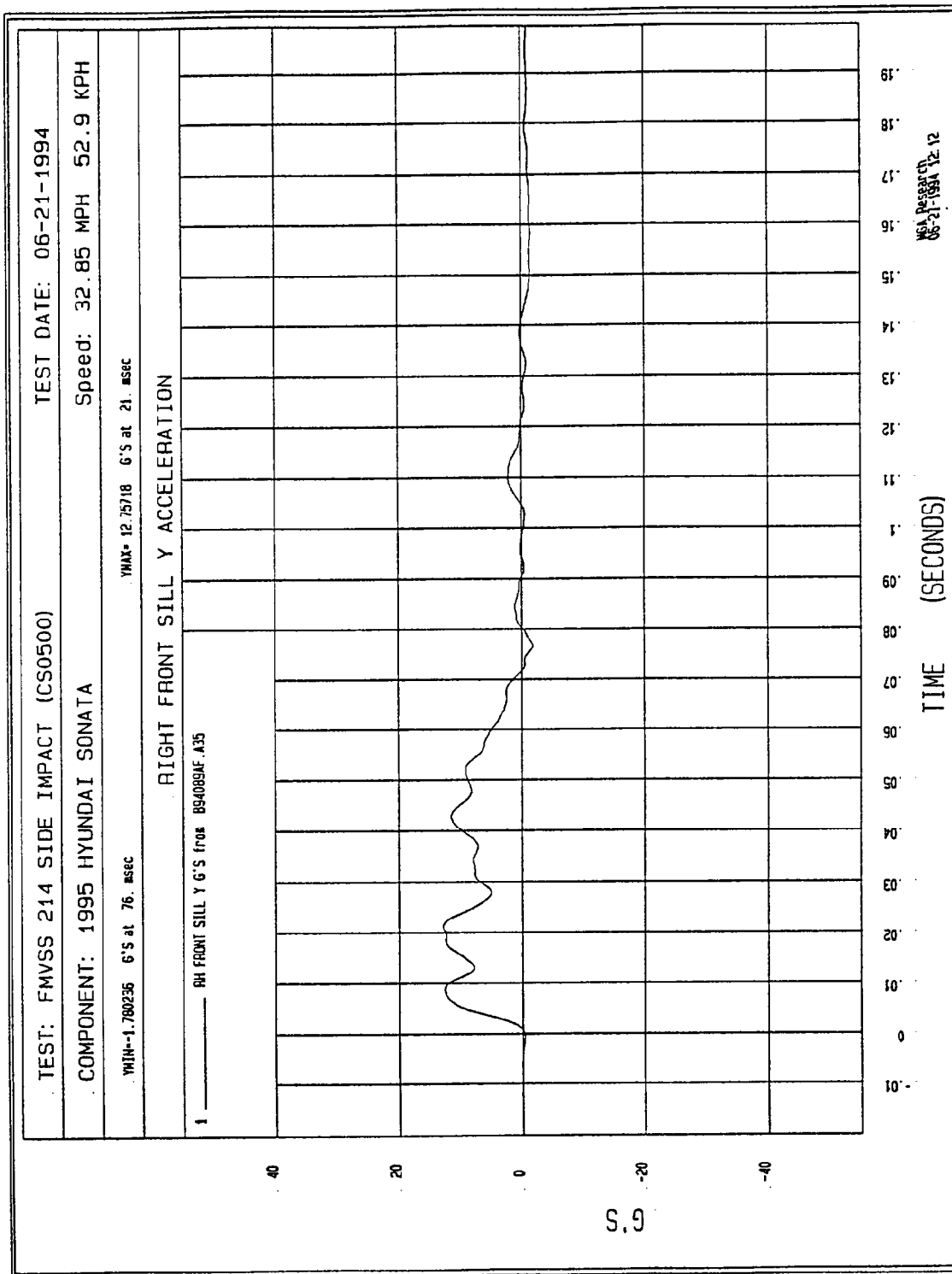


Figure B-23 - Right Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

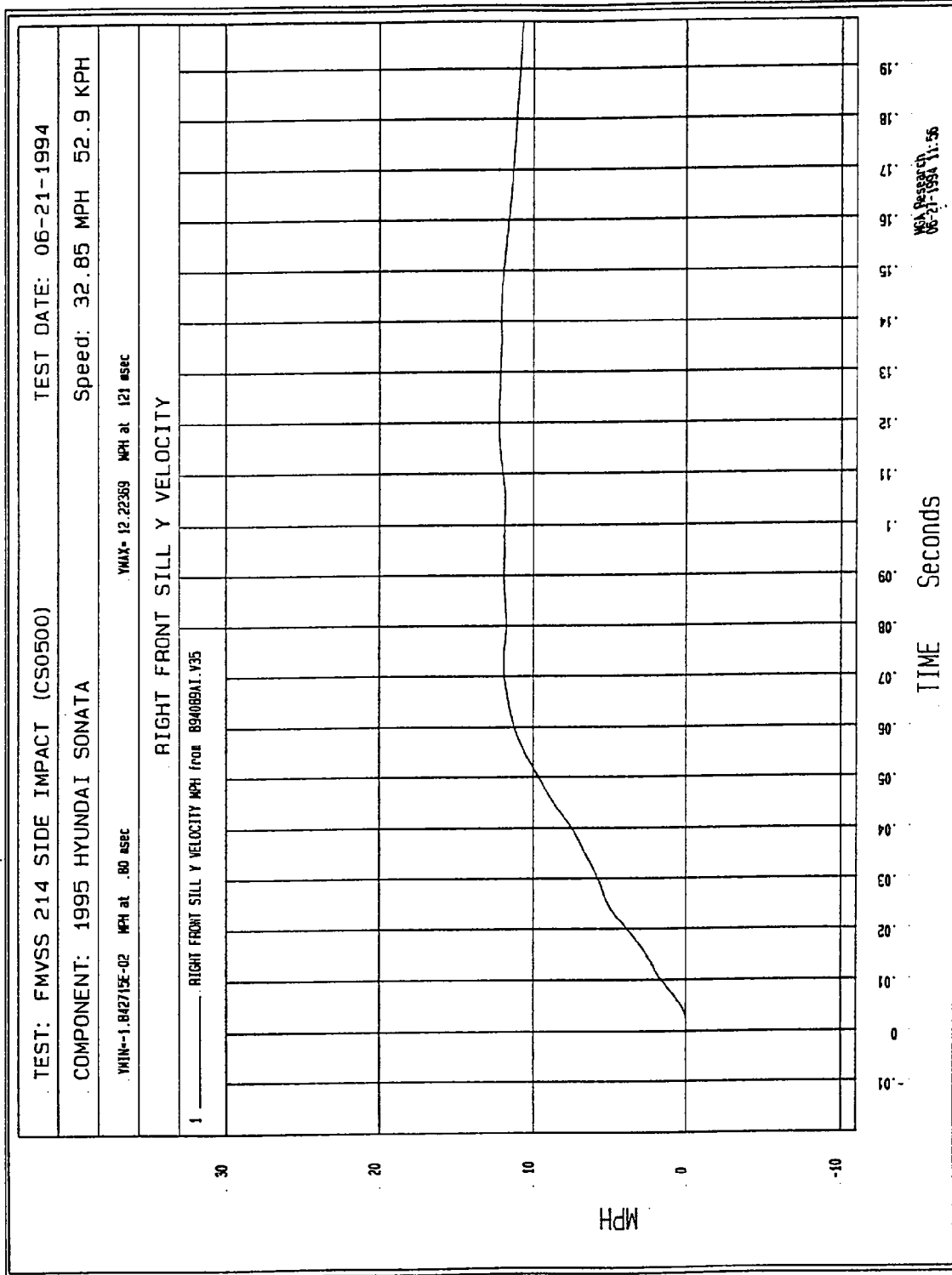


Figure B-24 - Right Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

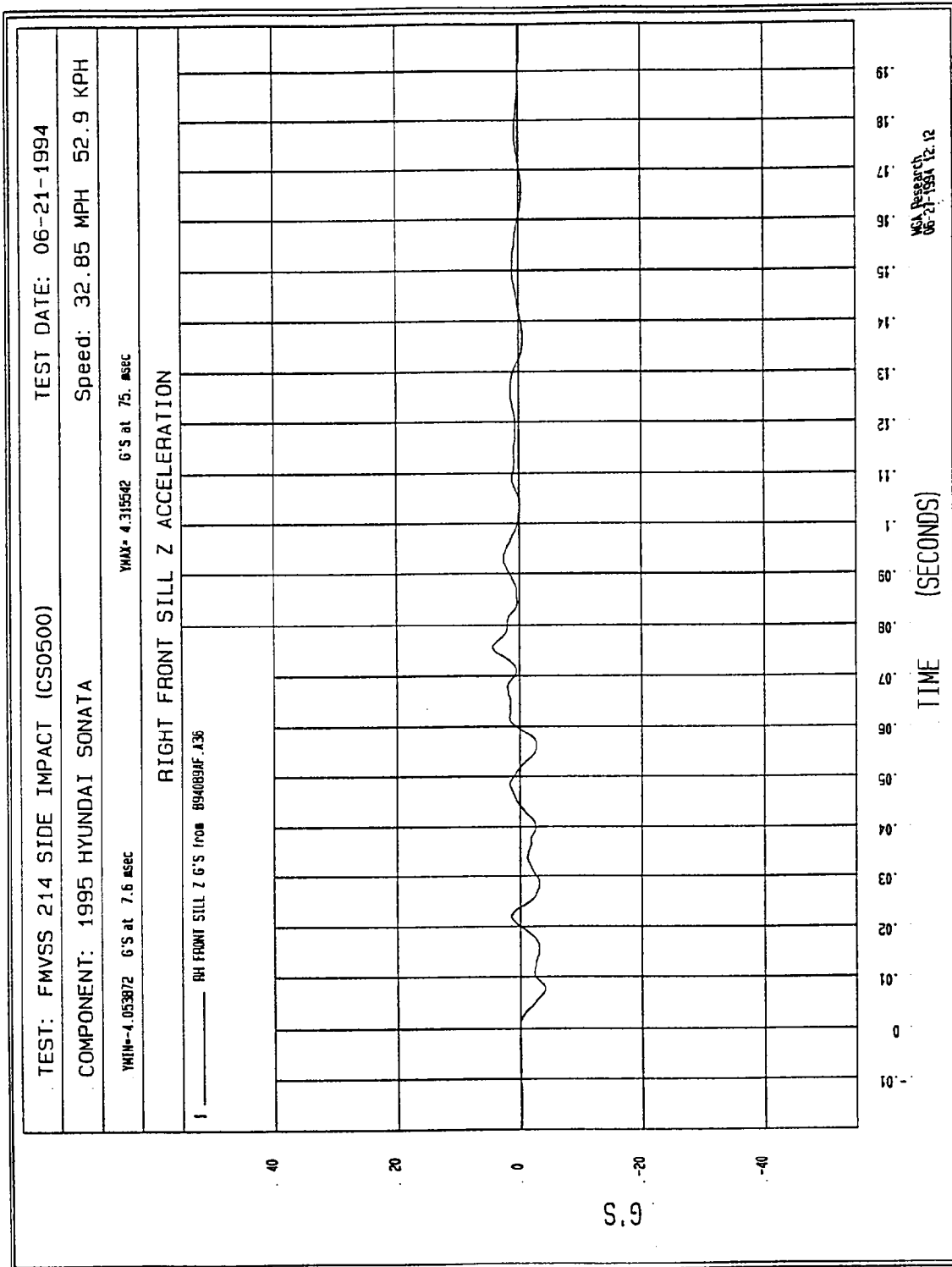


Figure B-25 - Right Front Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

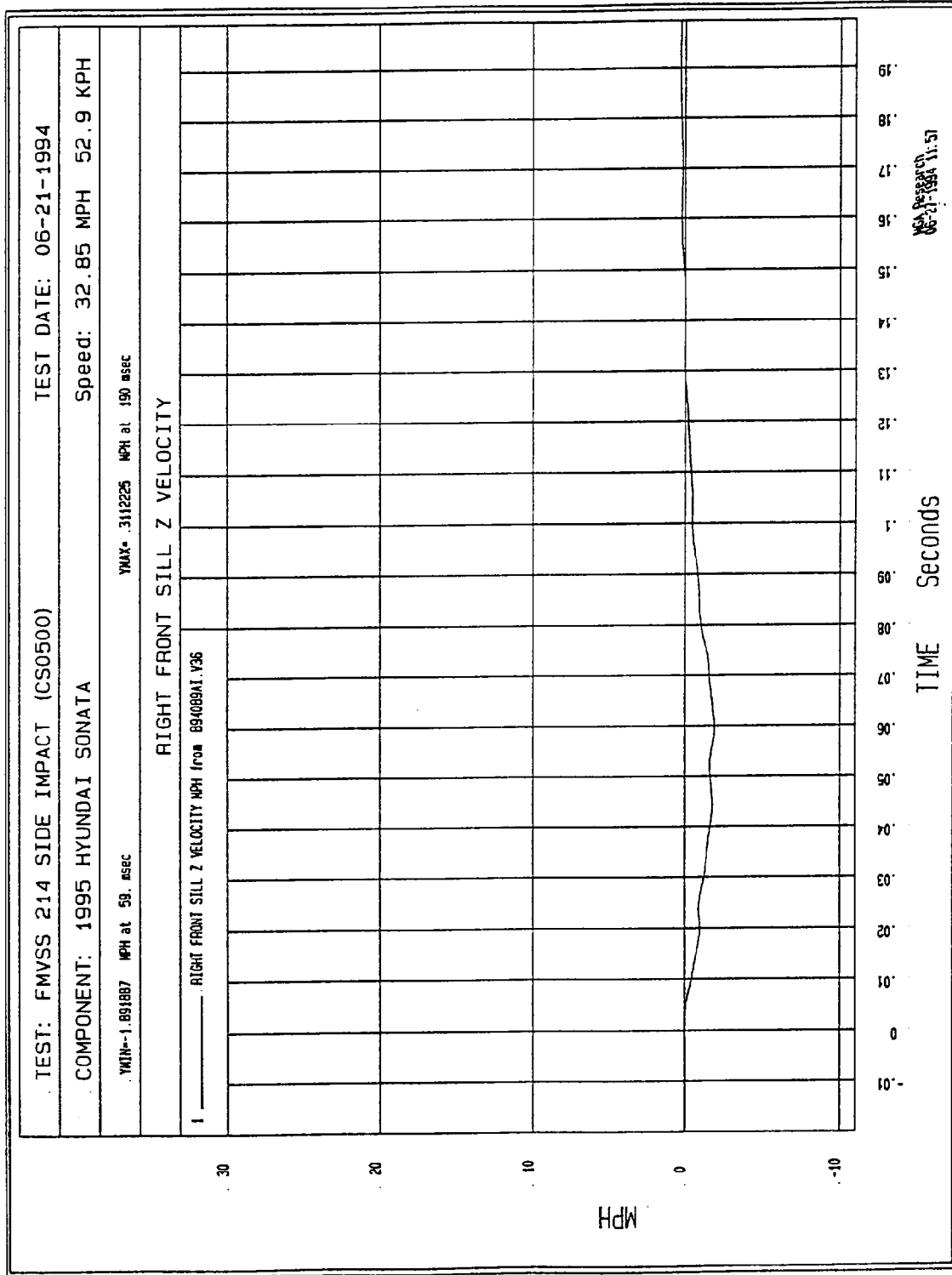


Figure B-26 - Right Front Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)

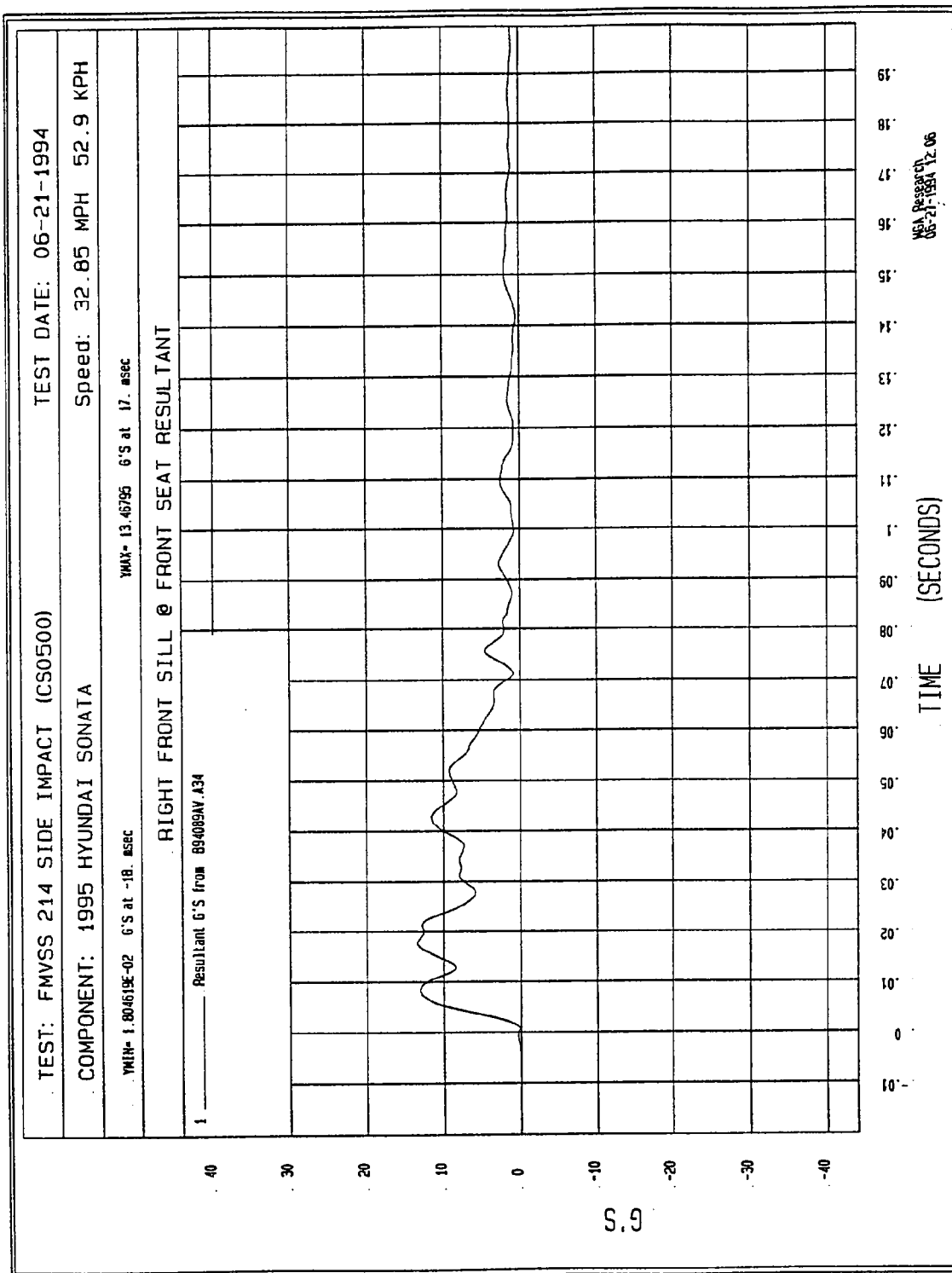


Figure B-27 - Right Front Sill at Front Seat Resultant vs. Time

Filter: Class 60 (100 Hz)

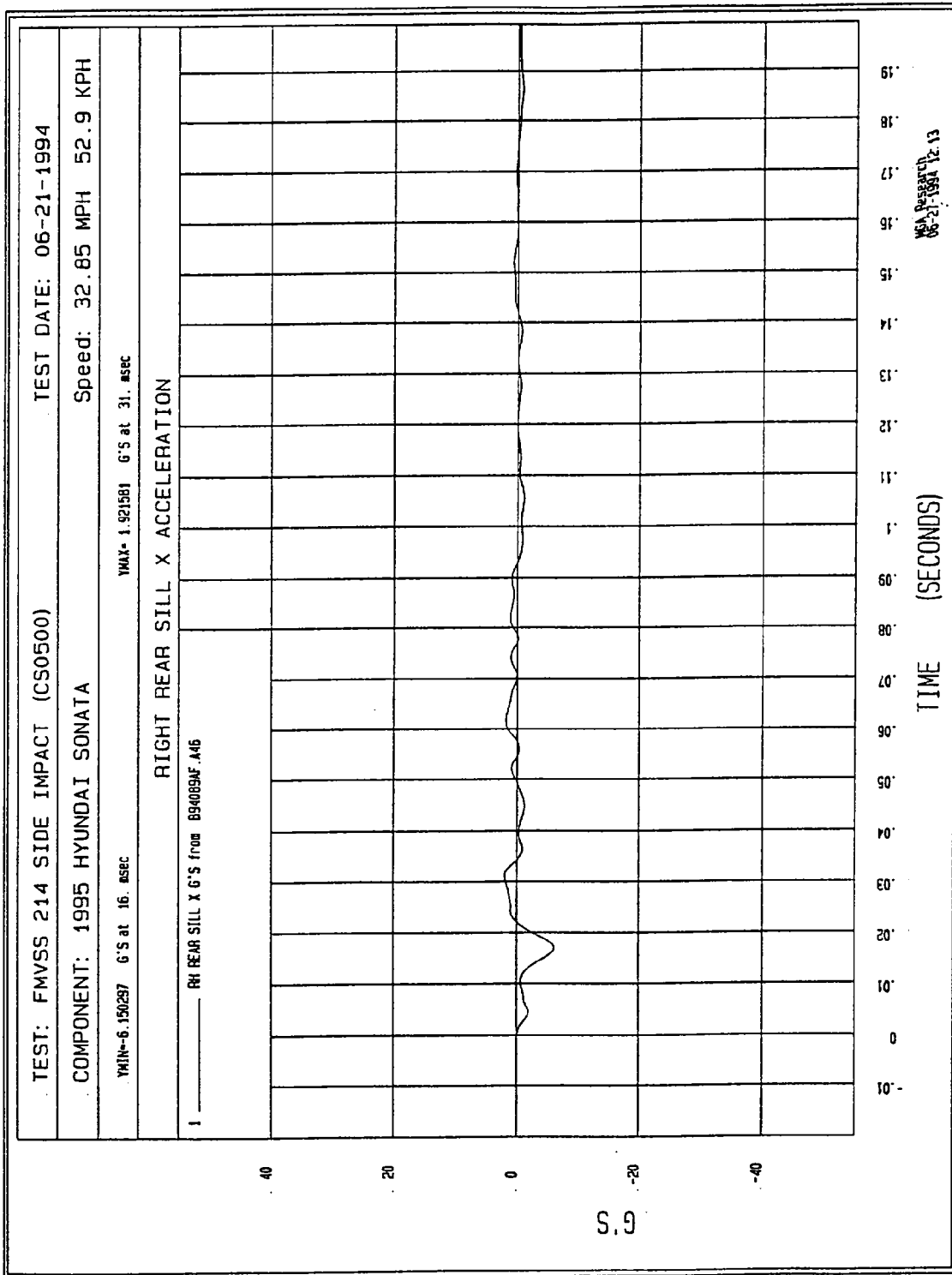


Figure B-28 - Right Rear Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

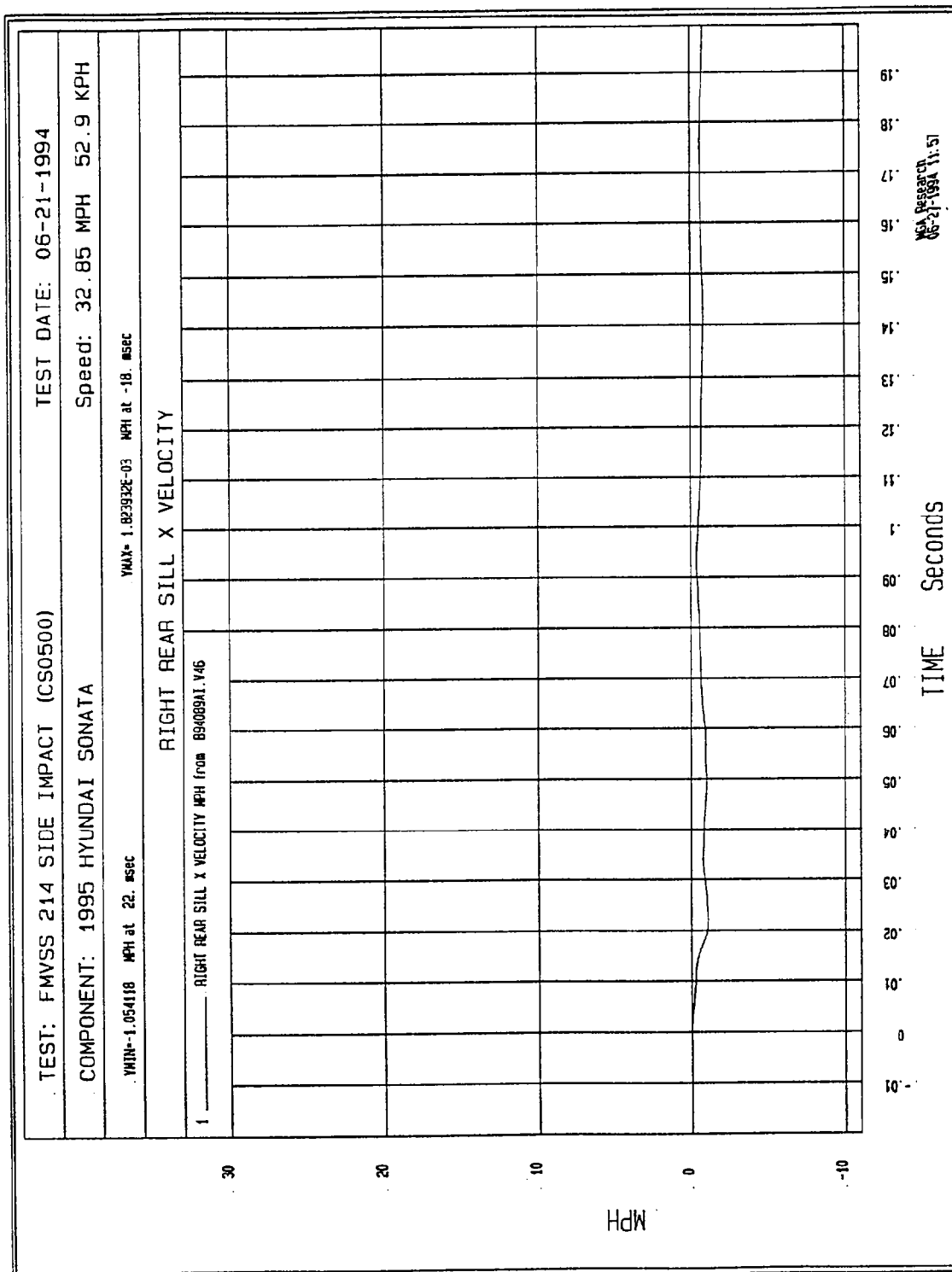


Figure B-29 - Right Rear Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

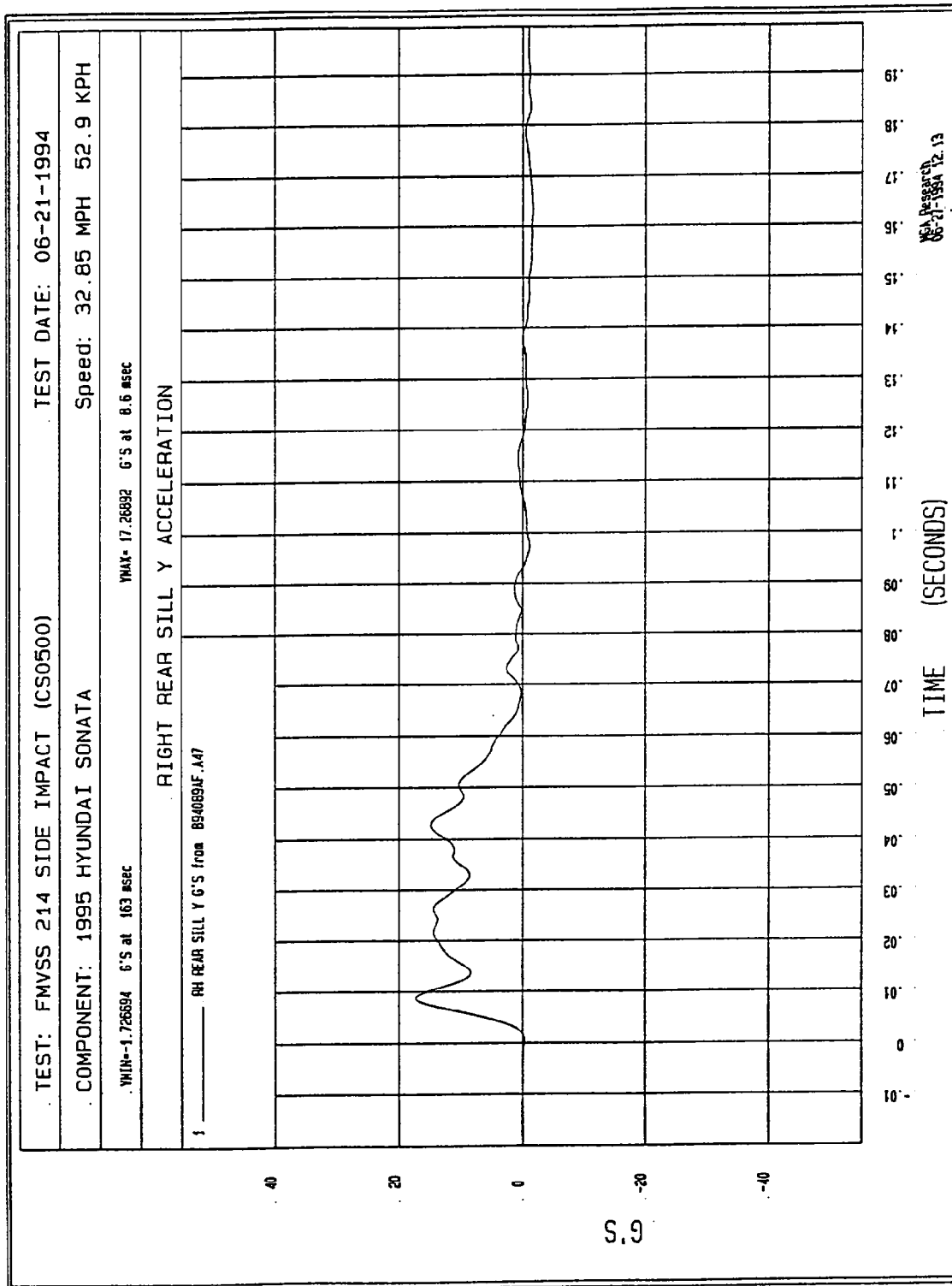


Figure B-30 - Right Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

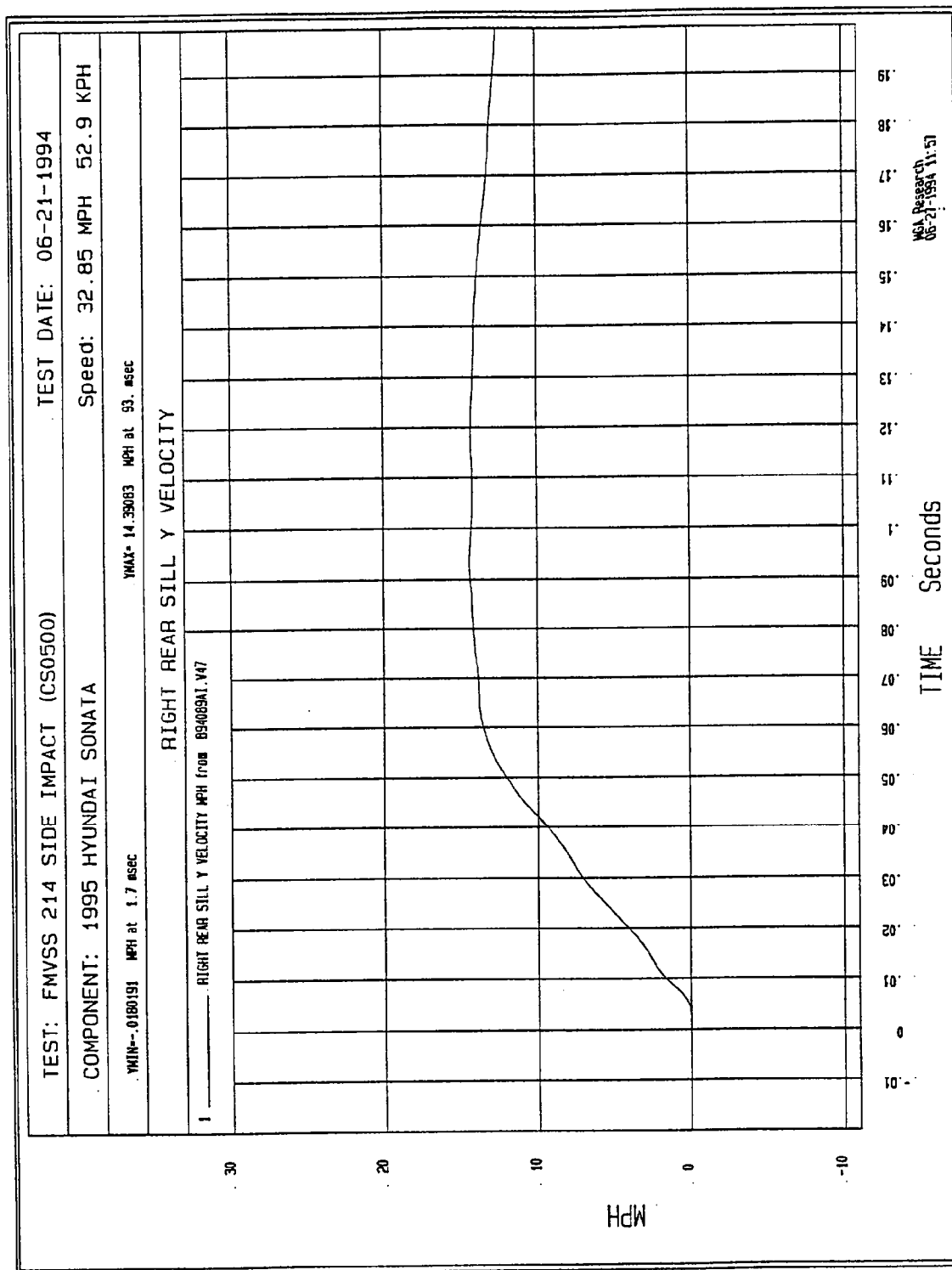


Figure B-31 - Right Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

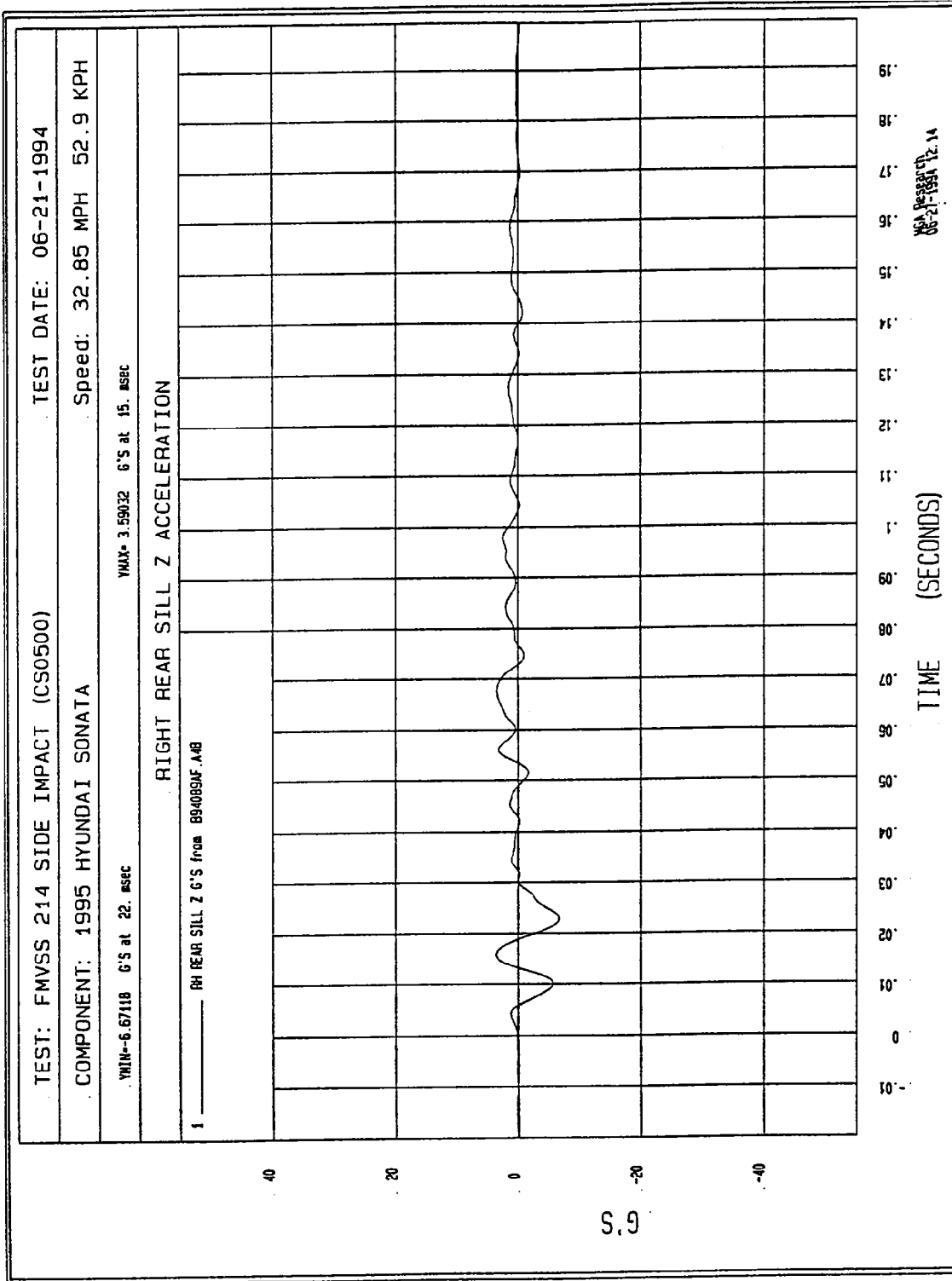


Figure B-32 - Right Rear Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

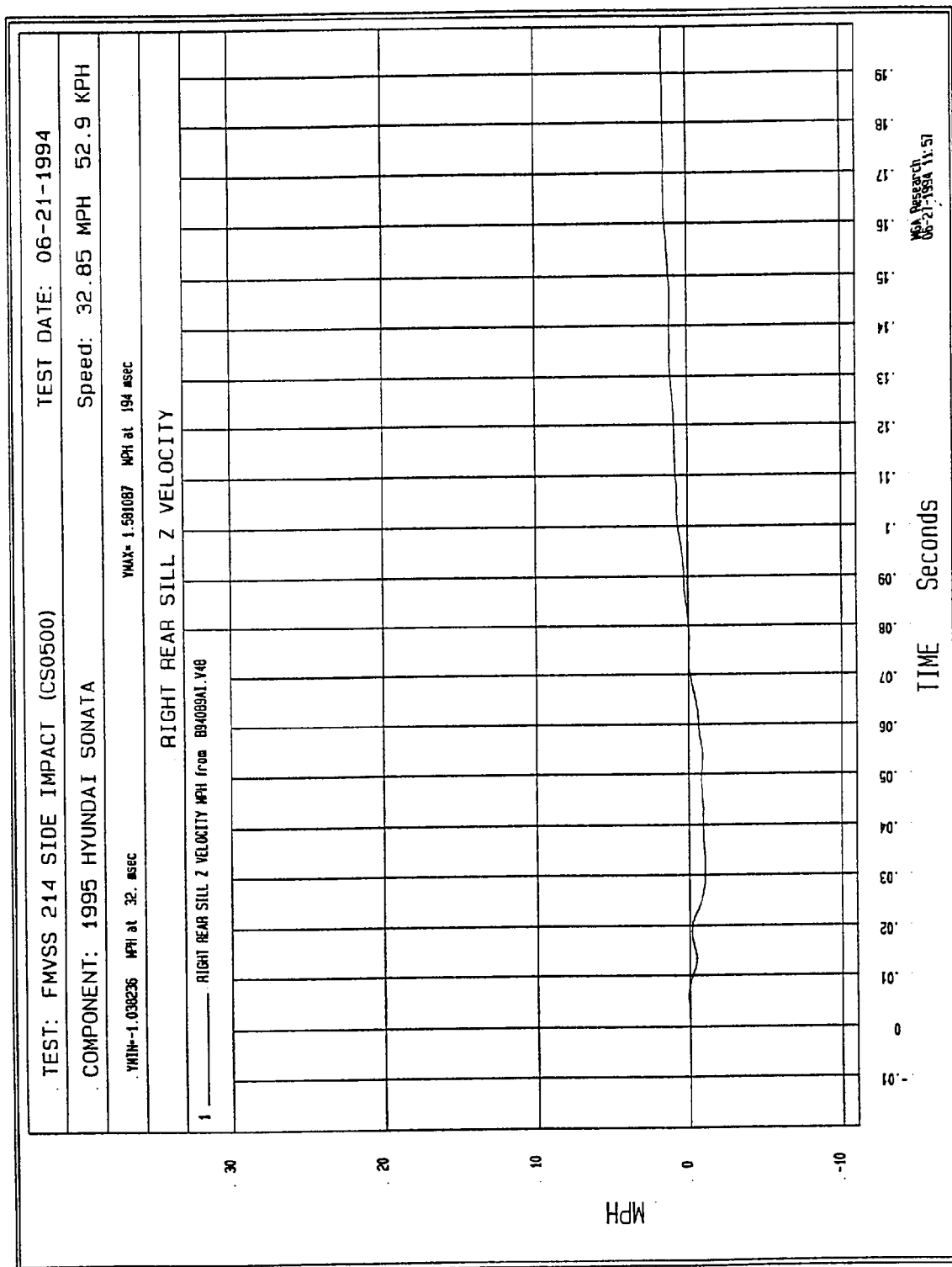


Figure B-33 - Right Rear Sill Z Velocity vs. Time

Filter: Class 60 (100 Hz)

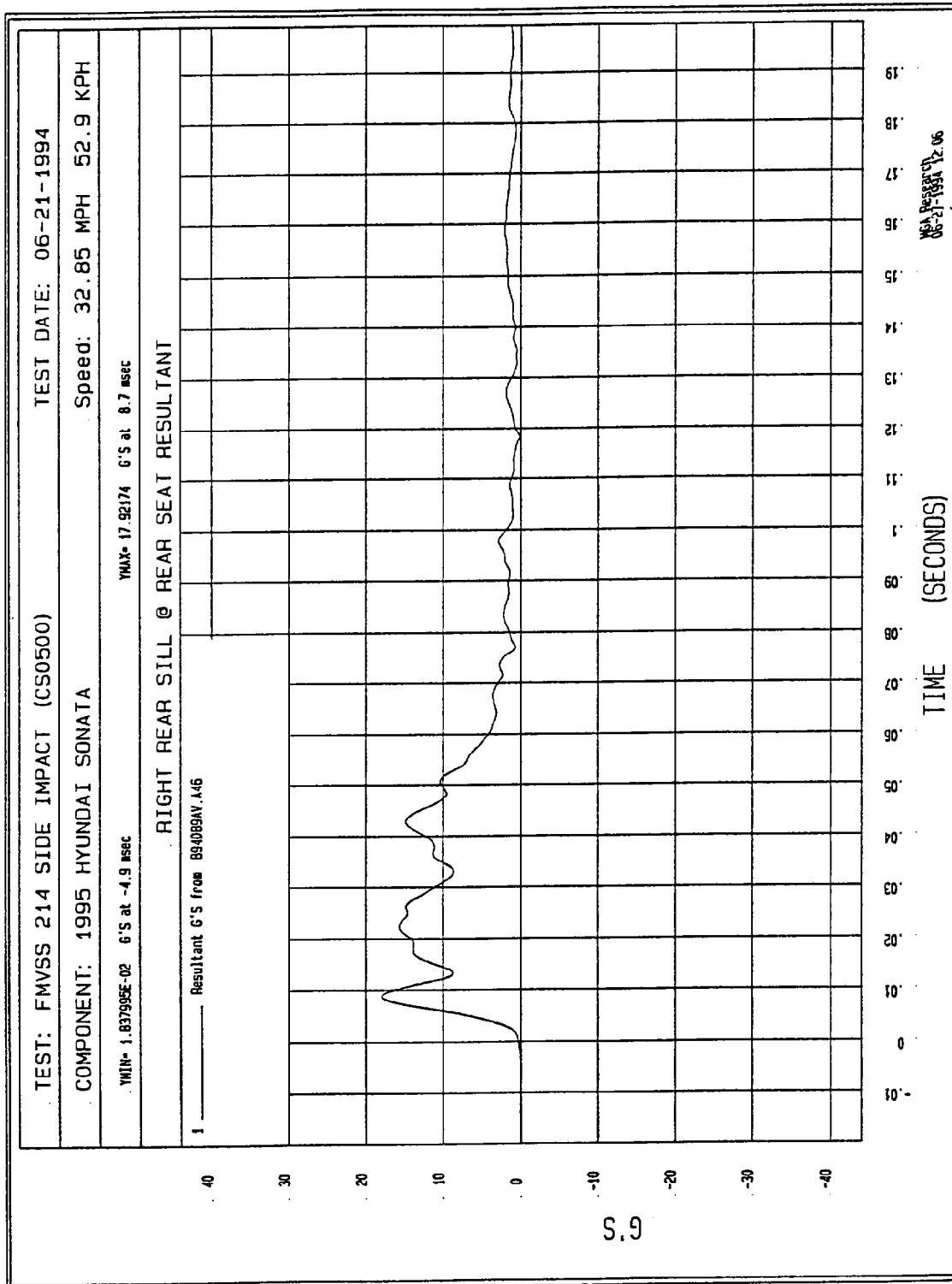


Figure B-34 - Right Rear Sill at Rear Seat Resultant vs. Time

Filter: Class 60 (100 Hz)

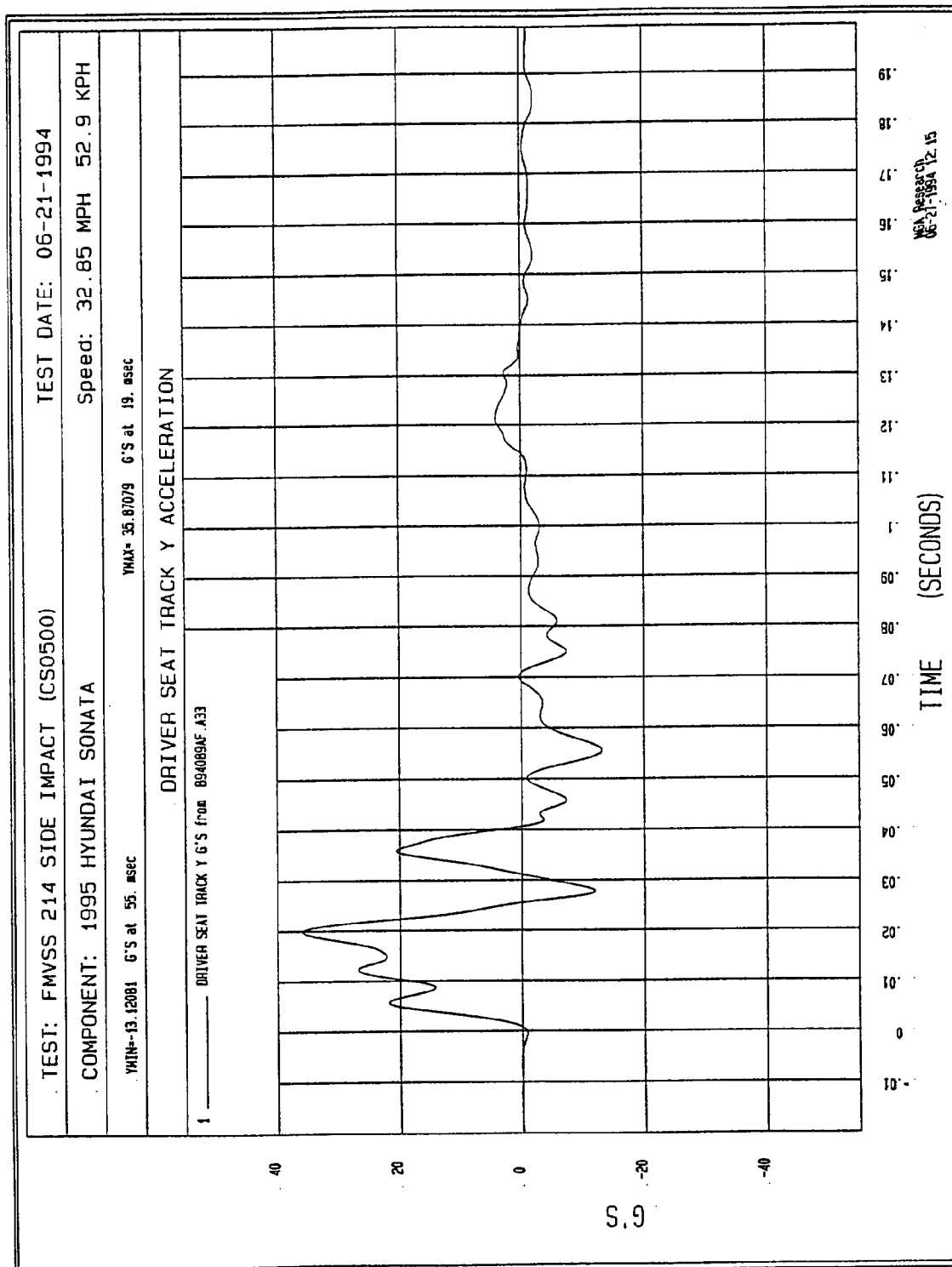


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

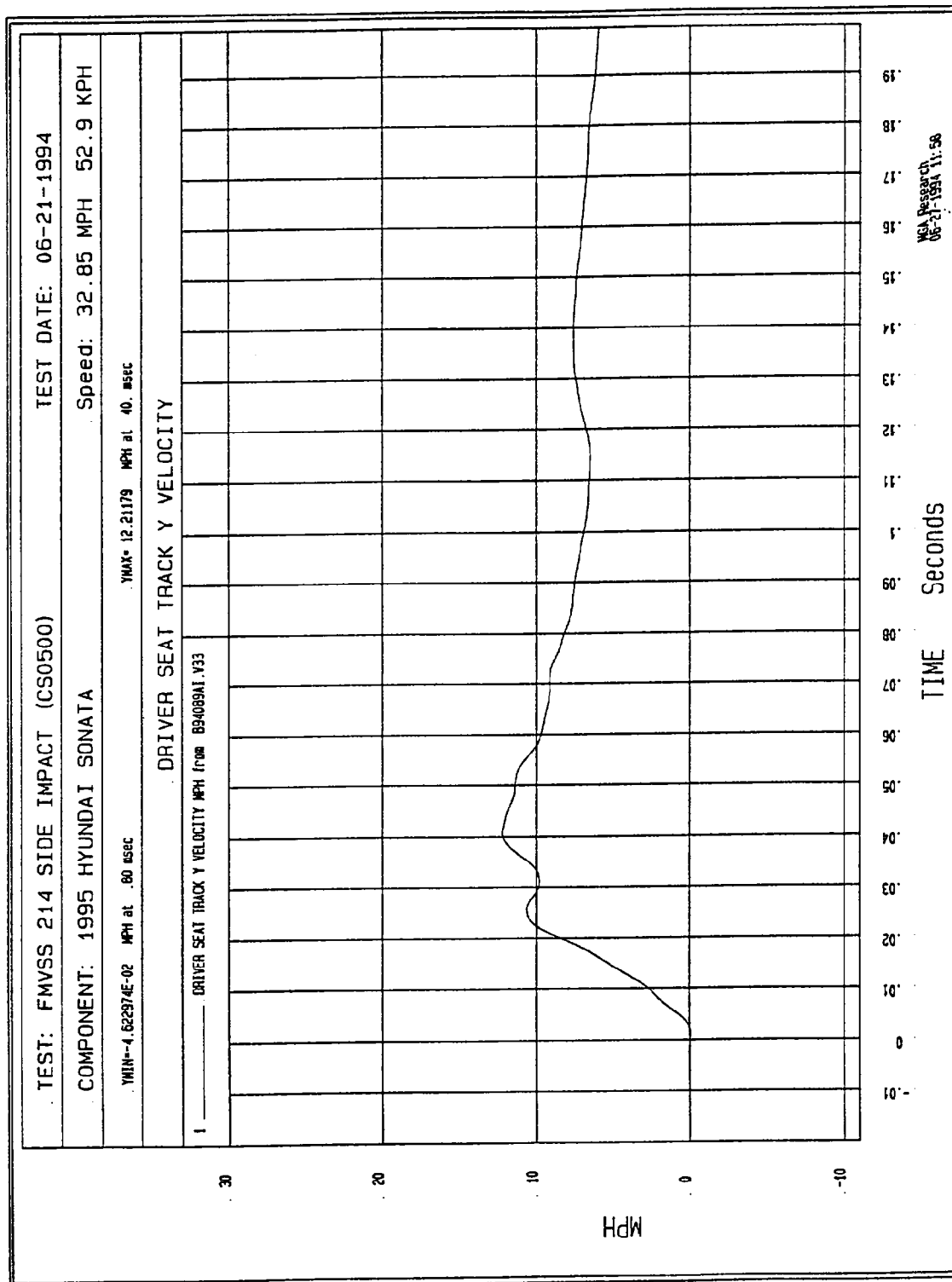


Figure B-36 - Driver Seat Track Y Velocity vs. Time

Filter: Class 60 (100 Hz)

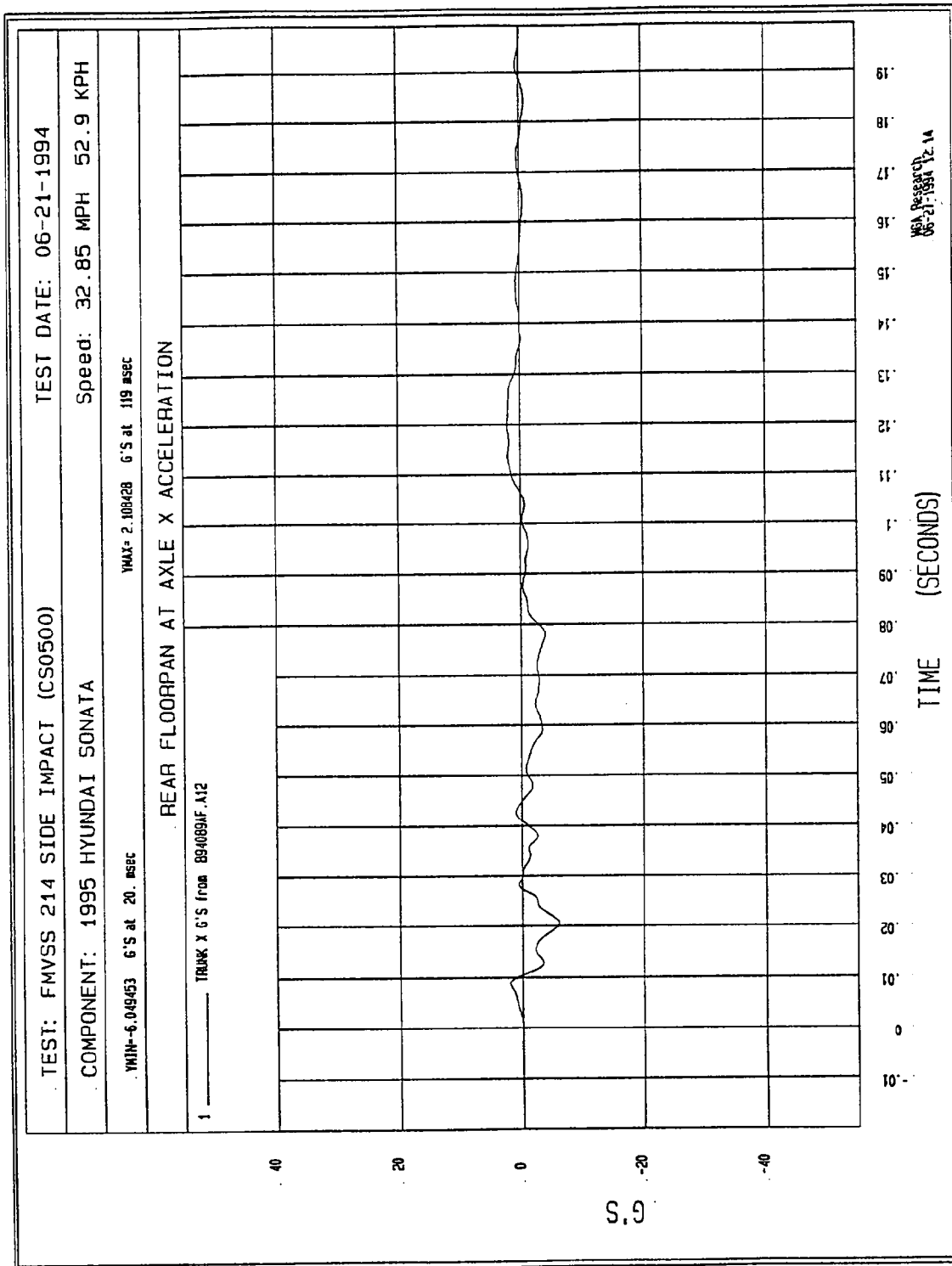


Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

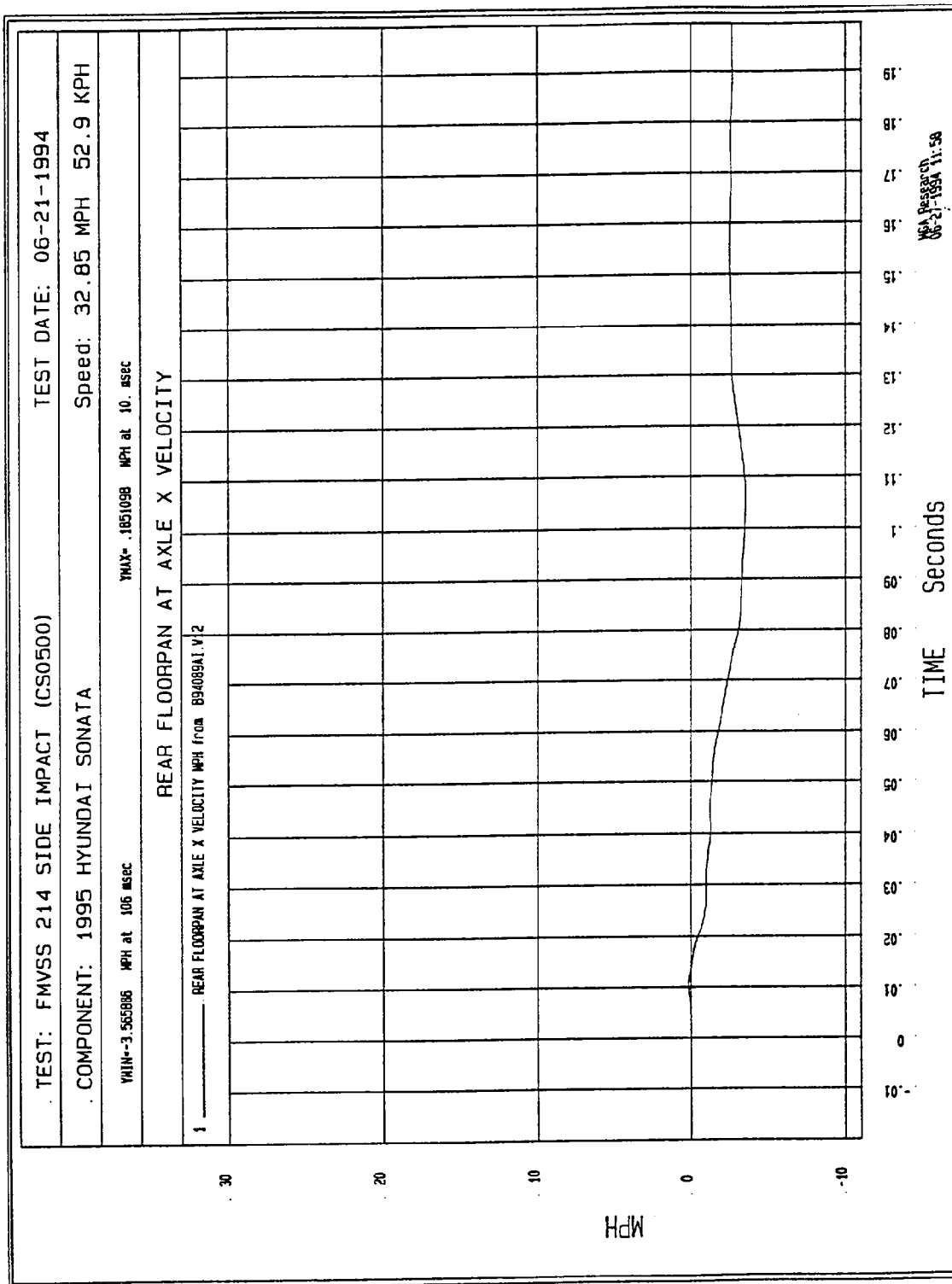


Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

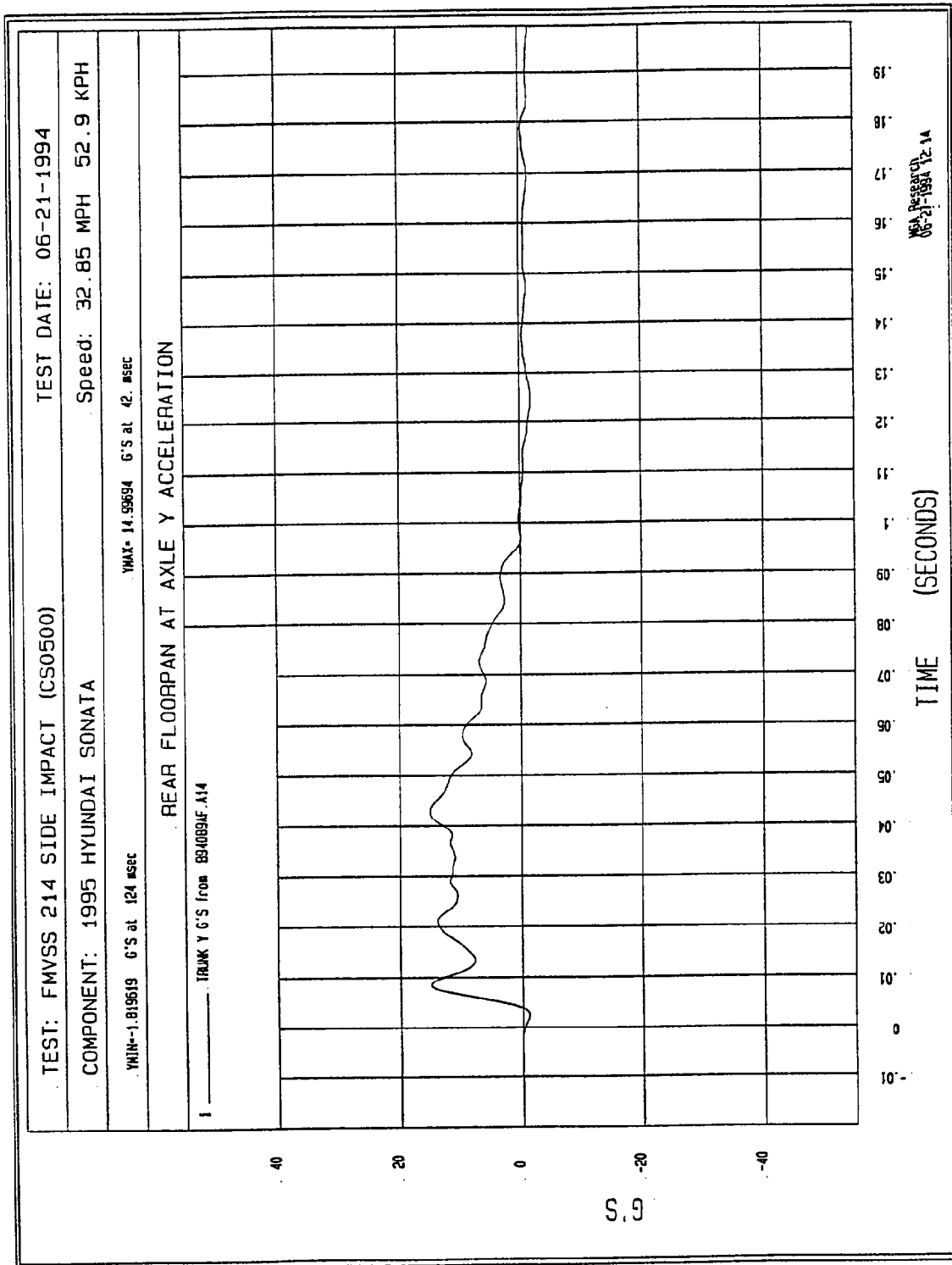


Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

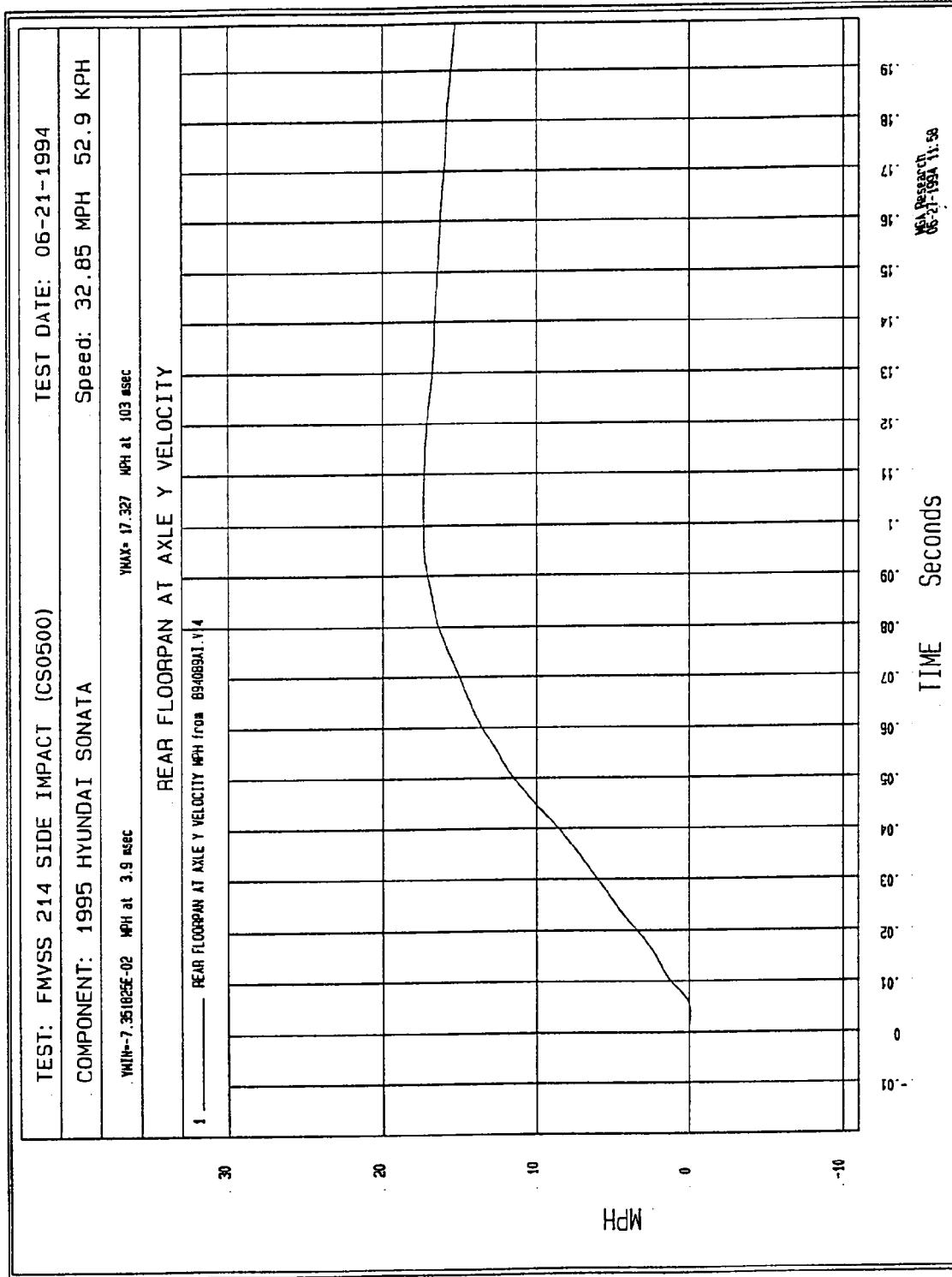


Figure B-40 - Rear Floorpan at Axle Y Velocity vs. Time

Filter: Class 60 (100 Hz)

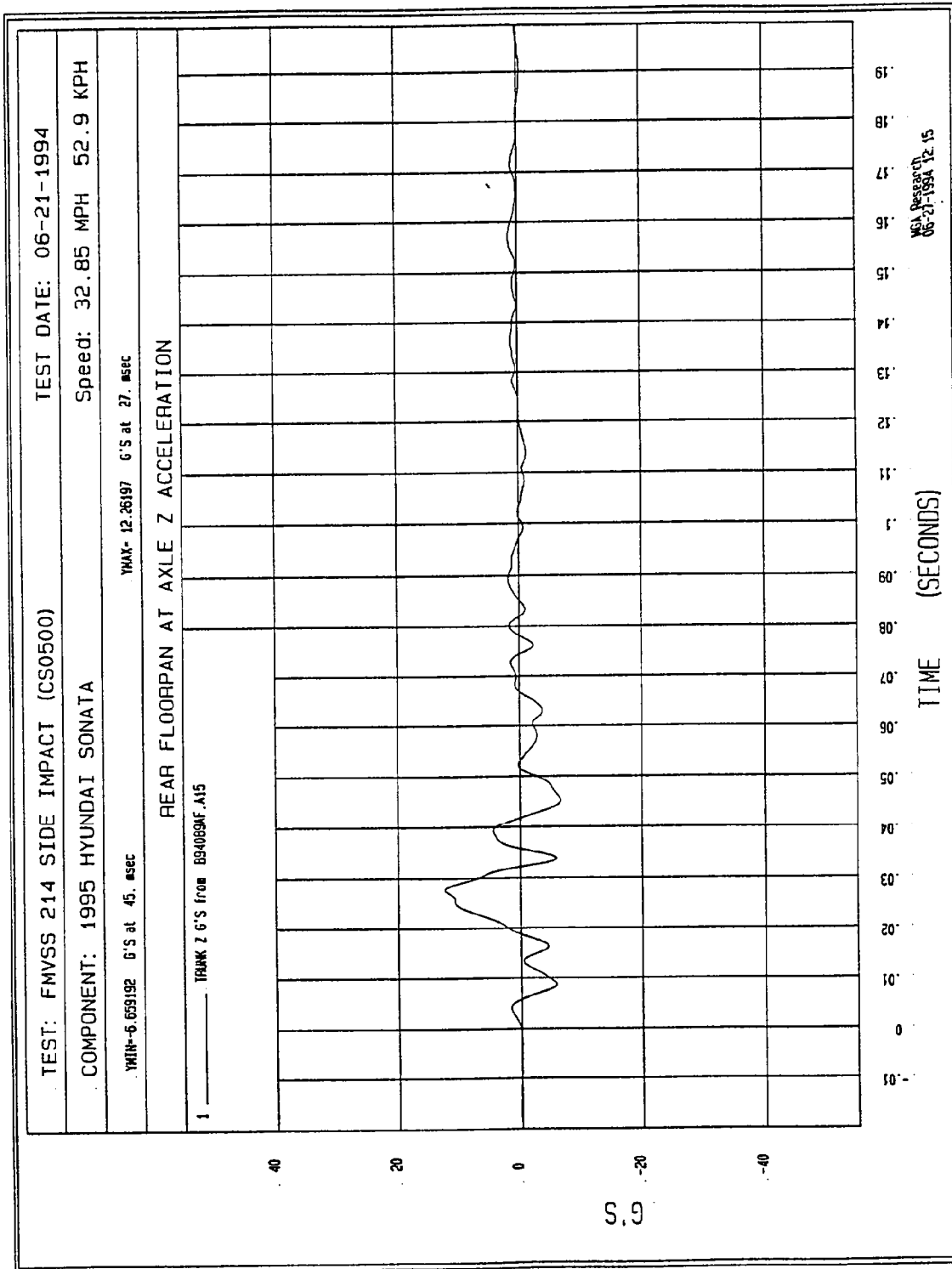


Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

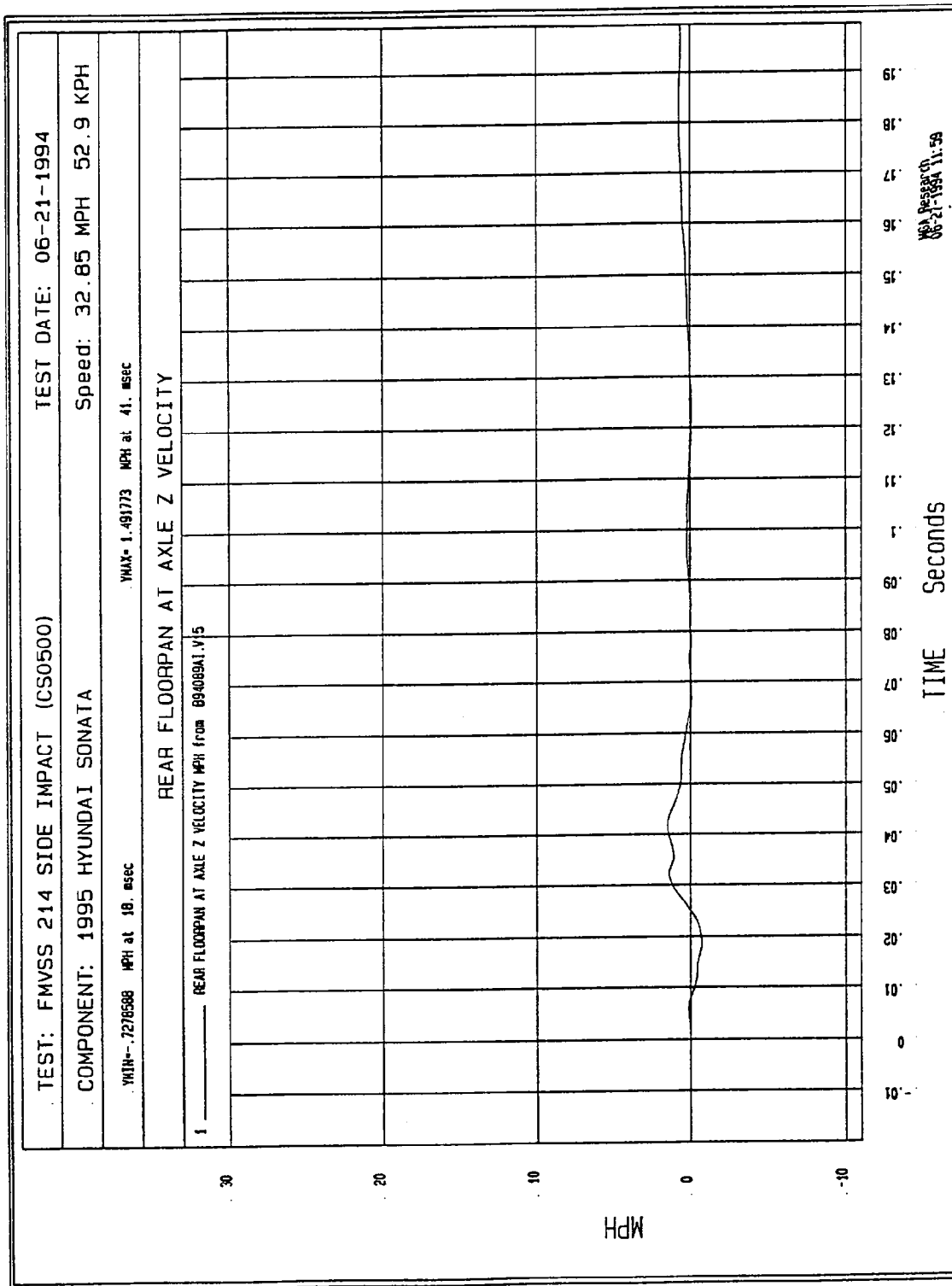


Figure B-42 - Rear Floorpan at Axle Z Velocity vs. Time

Filter: Class 60 (100 Hz)

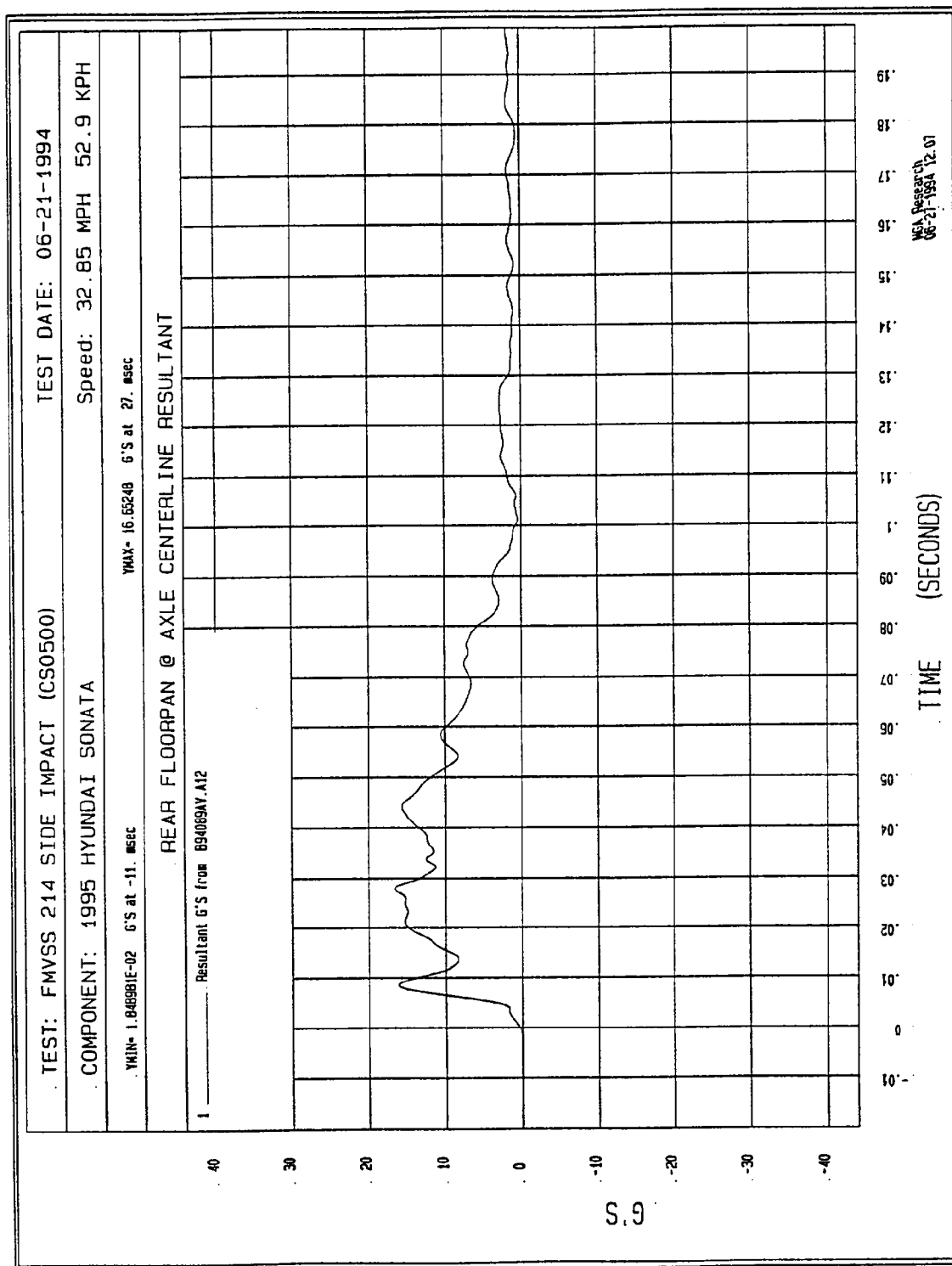


Figure B-43 - Rear Floorpan at Axle Centerline Resultant vs. Time

Filter: Class 60 (100 Hz)

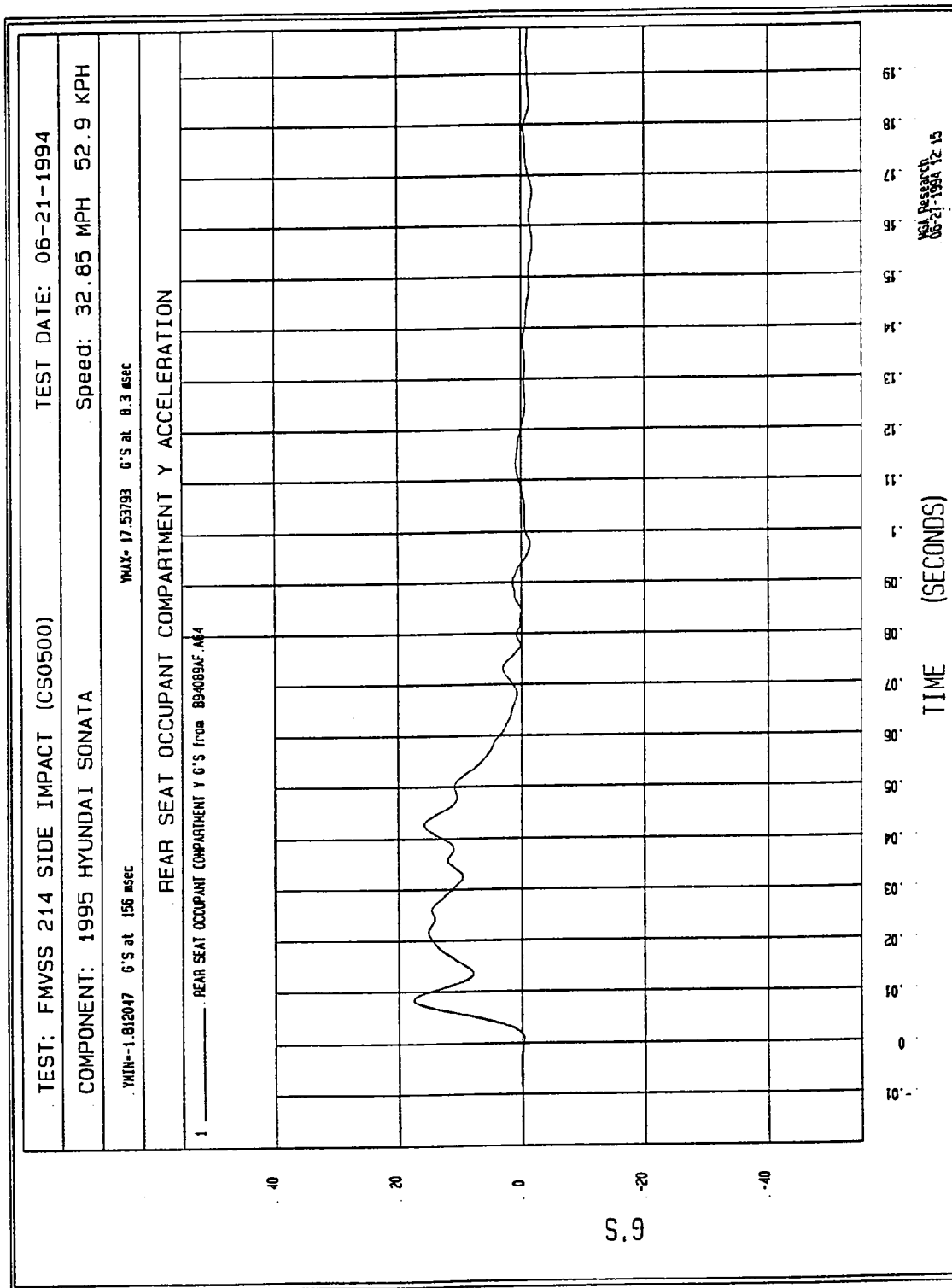


Figure B-44 - Rear Seat Occupant Compartment Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

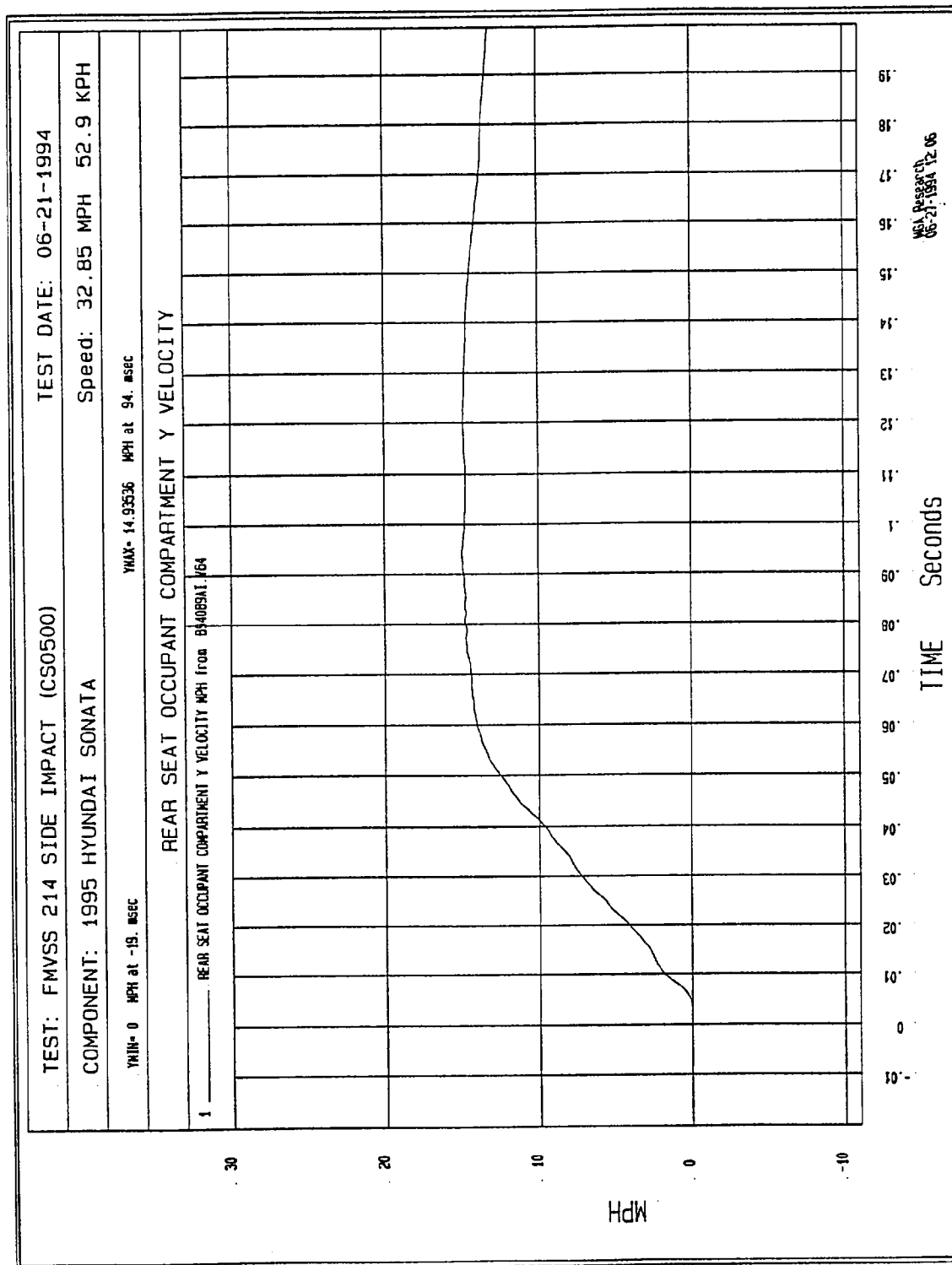


Figure B-45 - Rear Seat Occupant Compartment Y Velocity vs. Time

Filter: Class 60 (100 Hz)

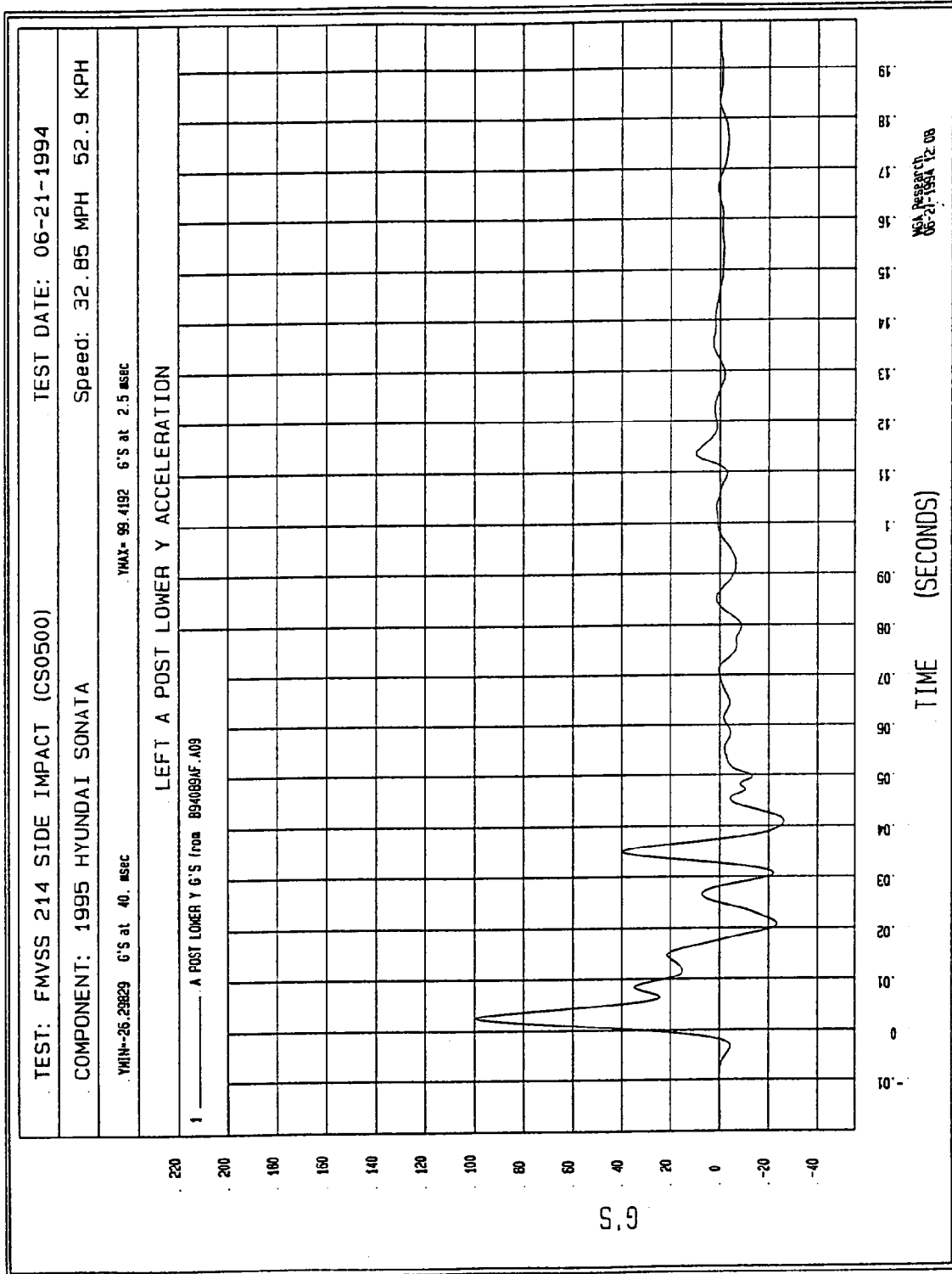


Figure B-46 - Left A Post Lower Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

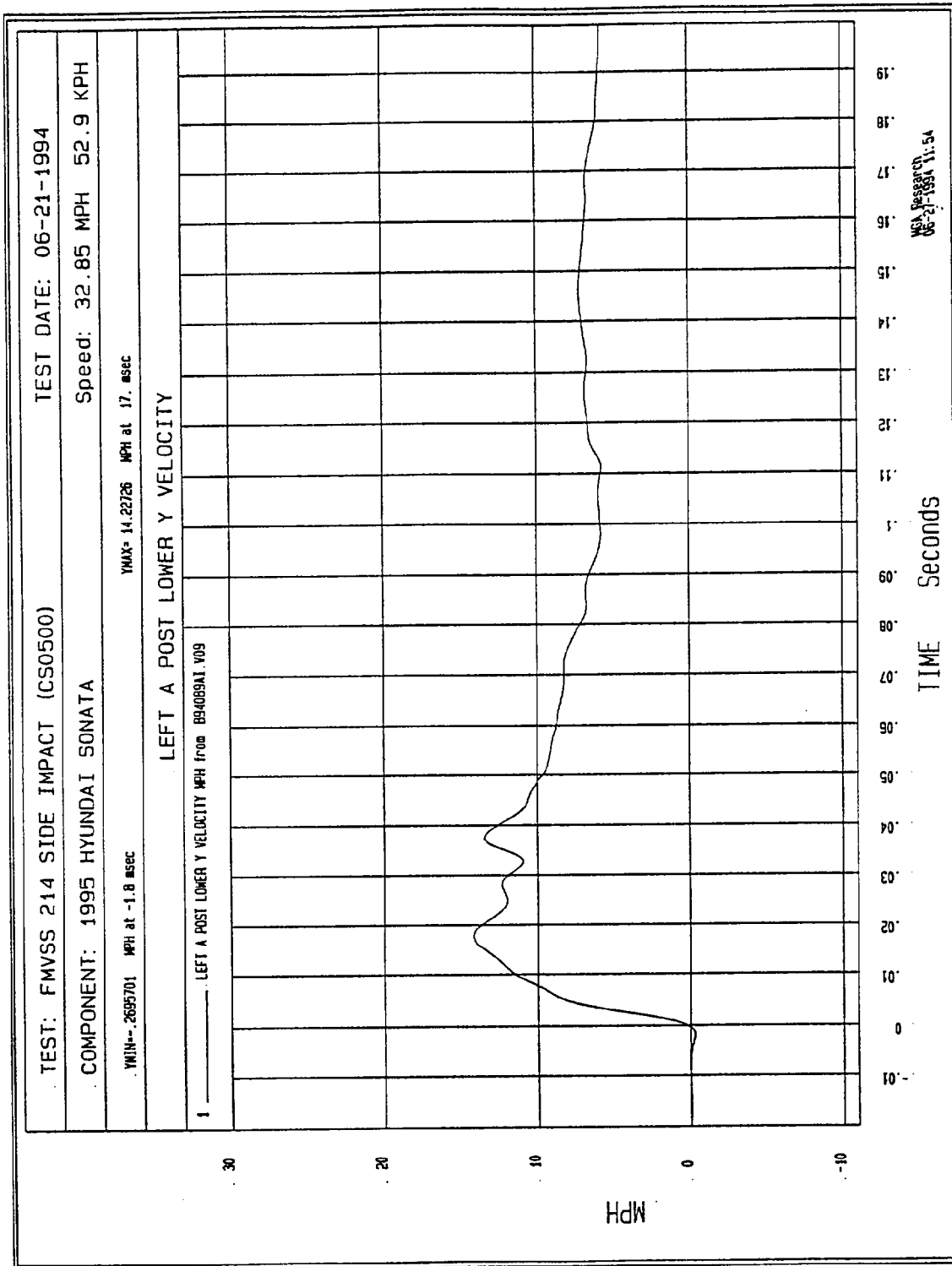


Figure B-47 - Left A Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

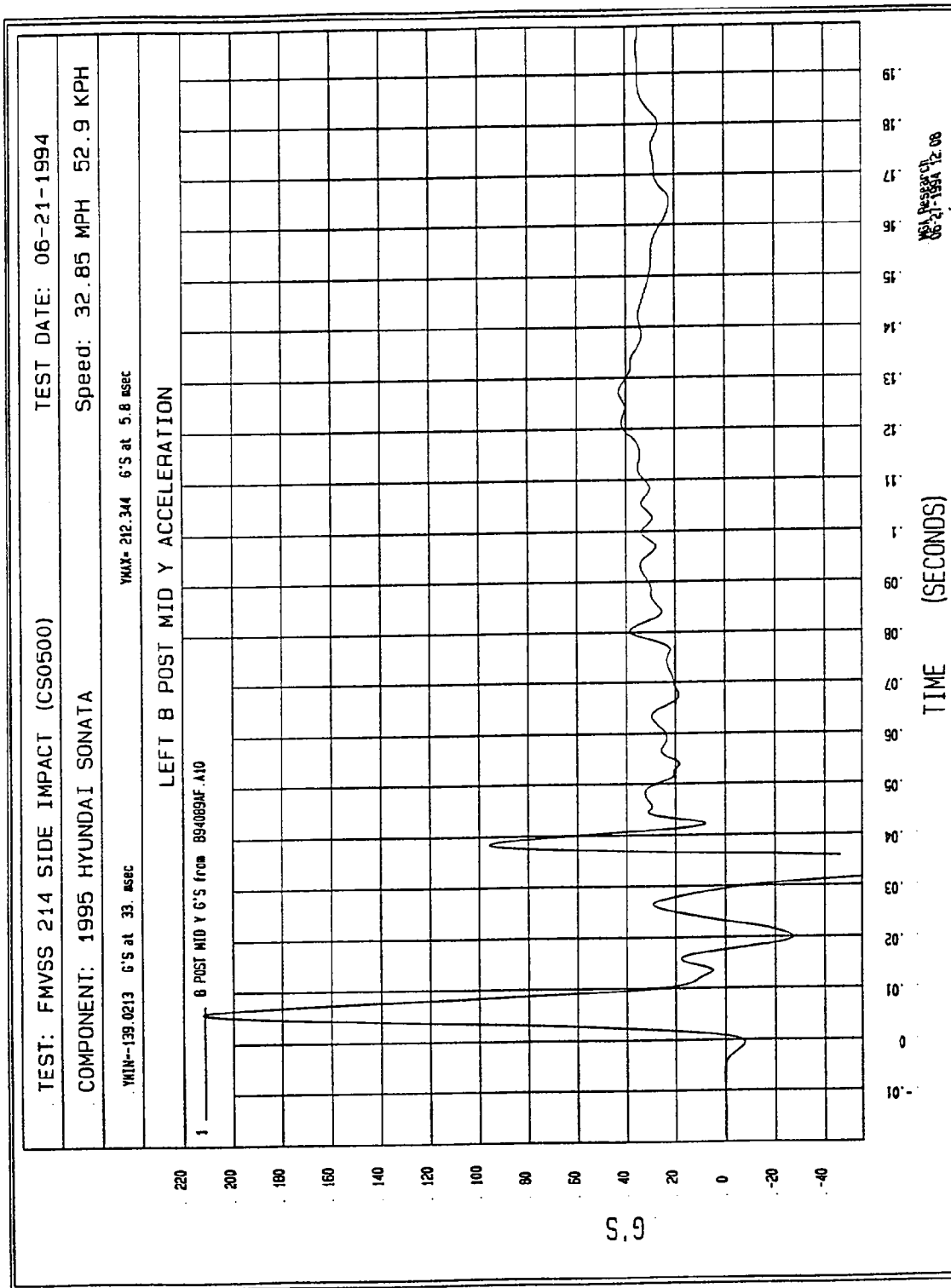


Figure B-48 - Left B Post Mid Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

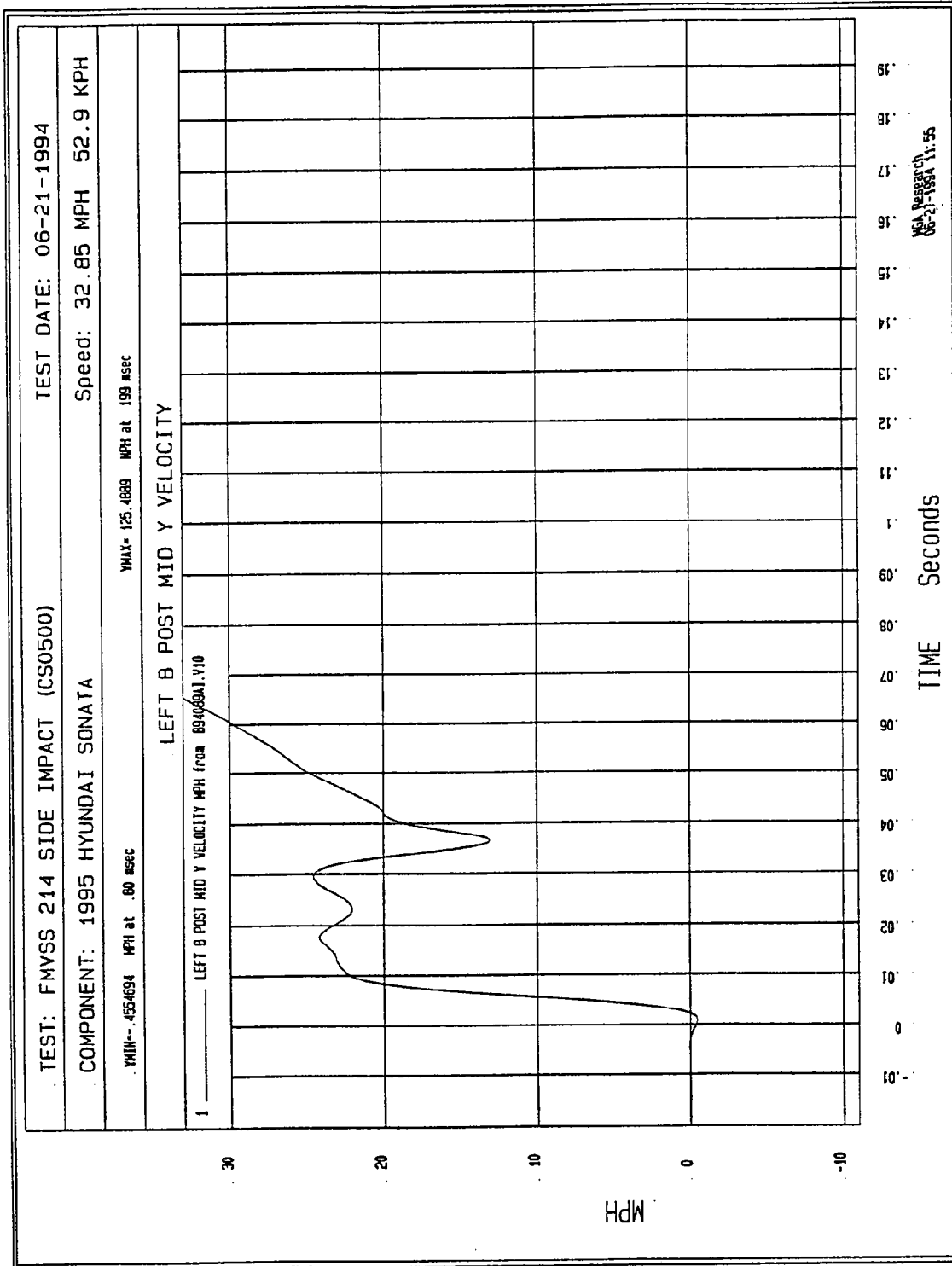


Figure B-49 - Left B Post Mid Y Velocity vs. Time

Filter: Class 60 (100 Hz)

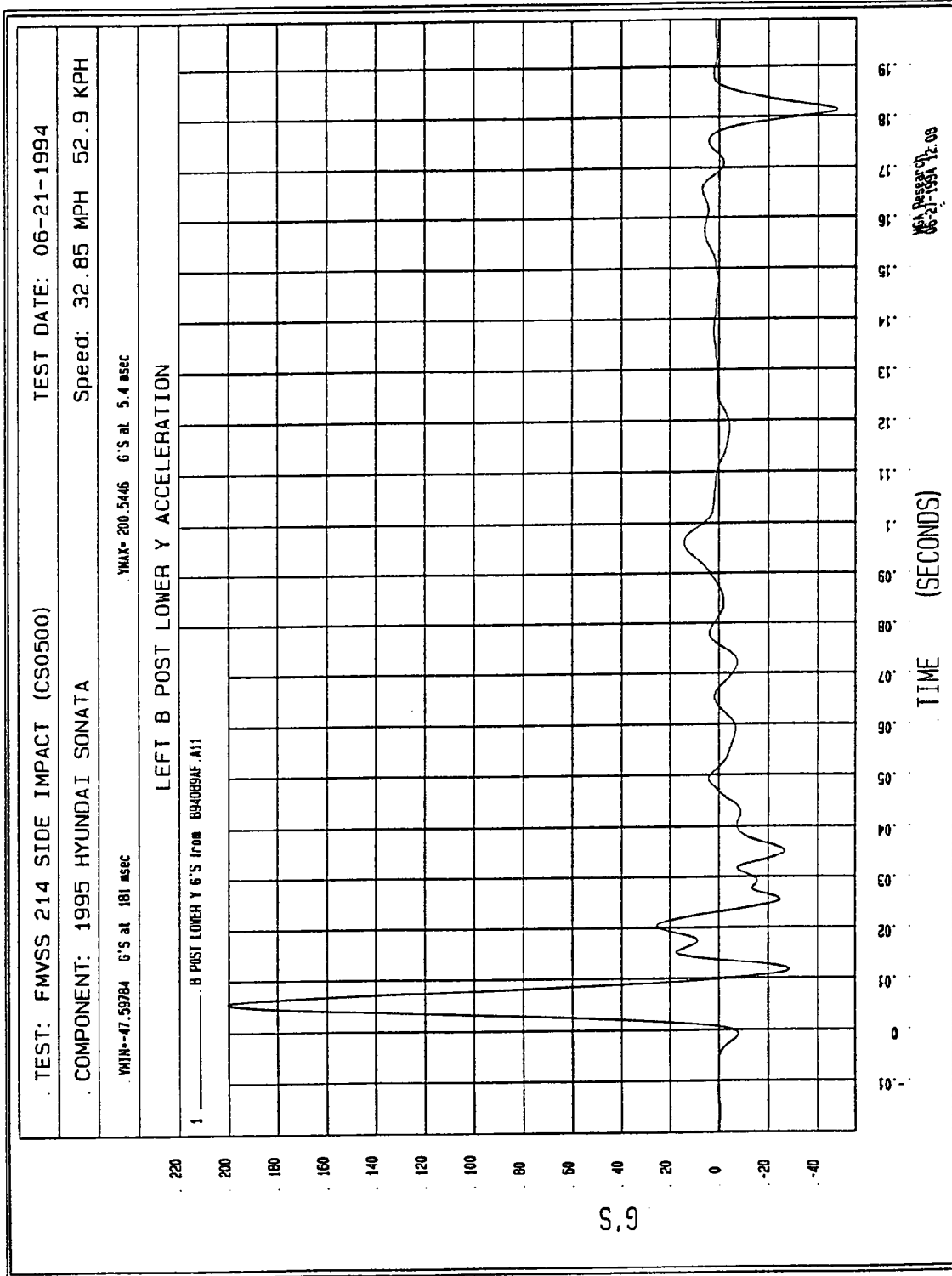


Figure B-50 - Left B Post Lower Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

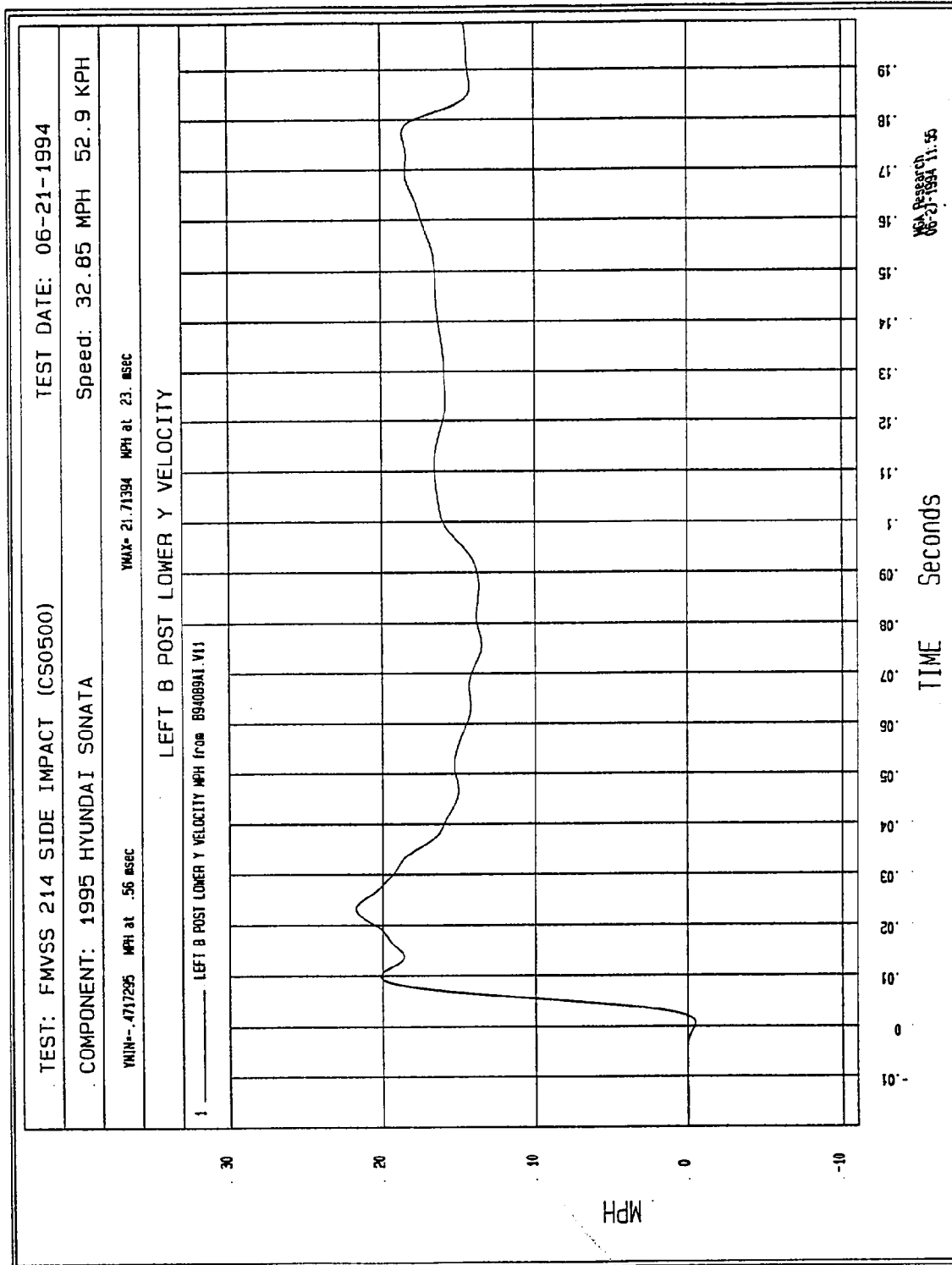


Figure B-51 - Left B Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

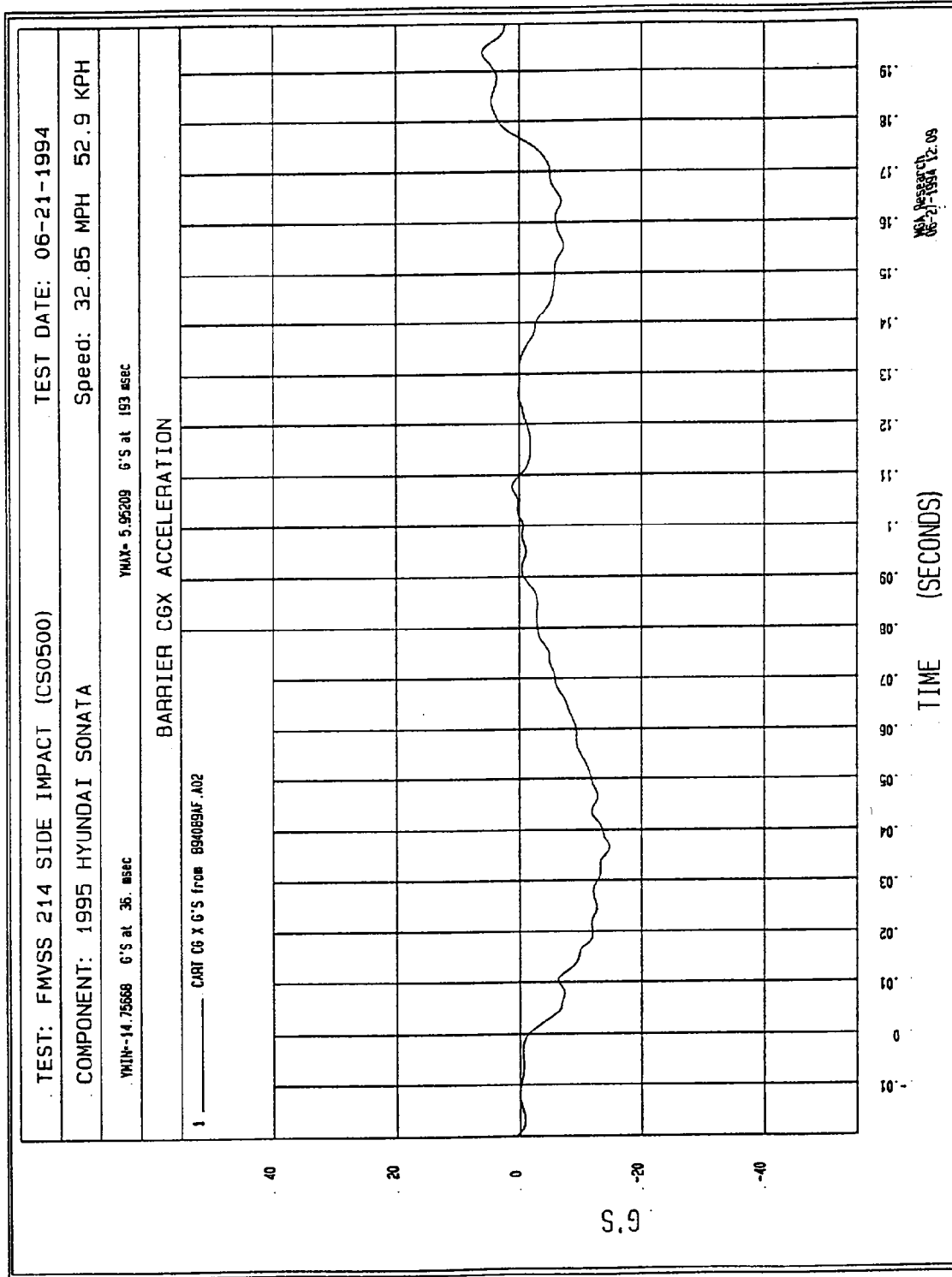


Figure B-52 - Moving Barrier Center of Gravity X Acceleration vs. Time

Filter: Class 180 (300 Hz)

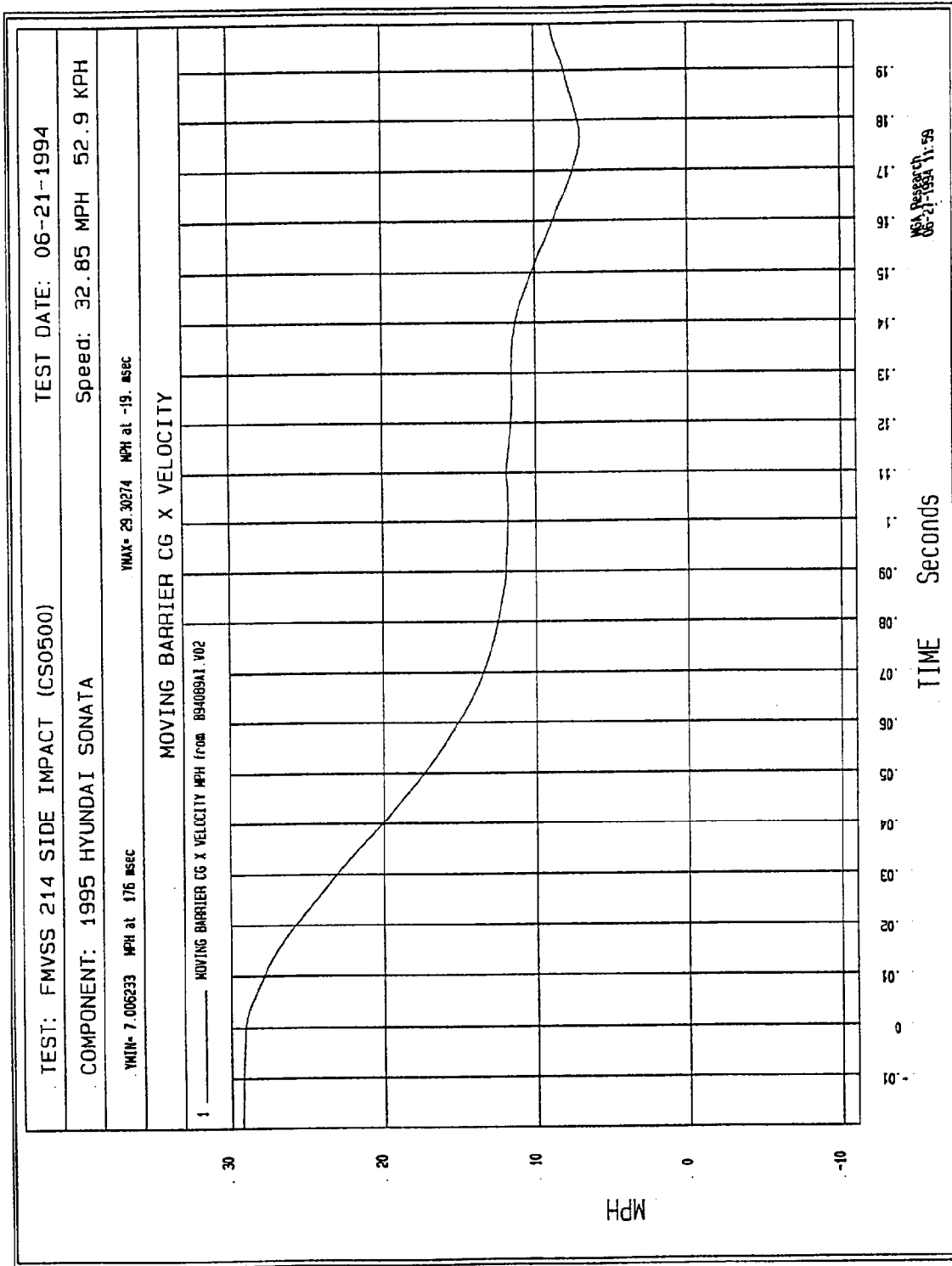


Figure B-53 - Moving Barrier Center of Gravity X Velocity vs. Time

Filter: Class 60 (100 Hz)

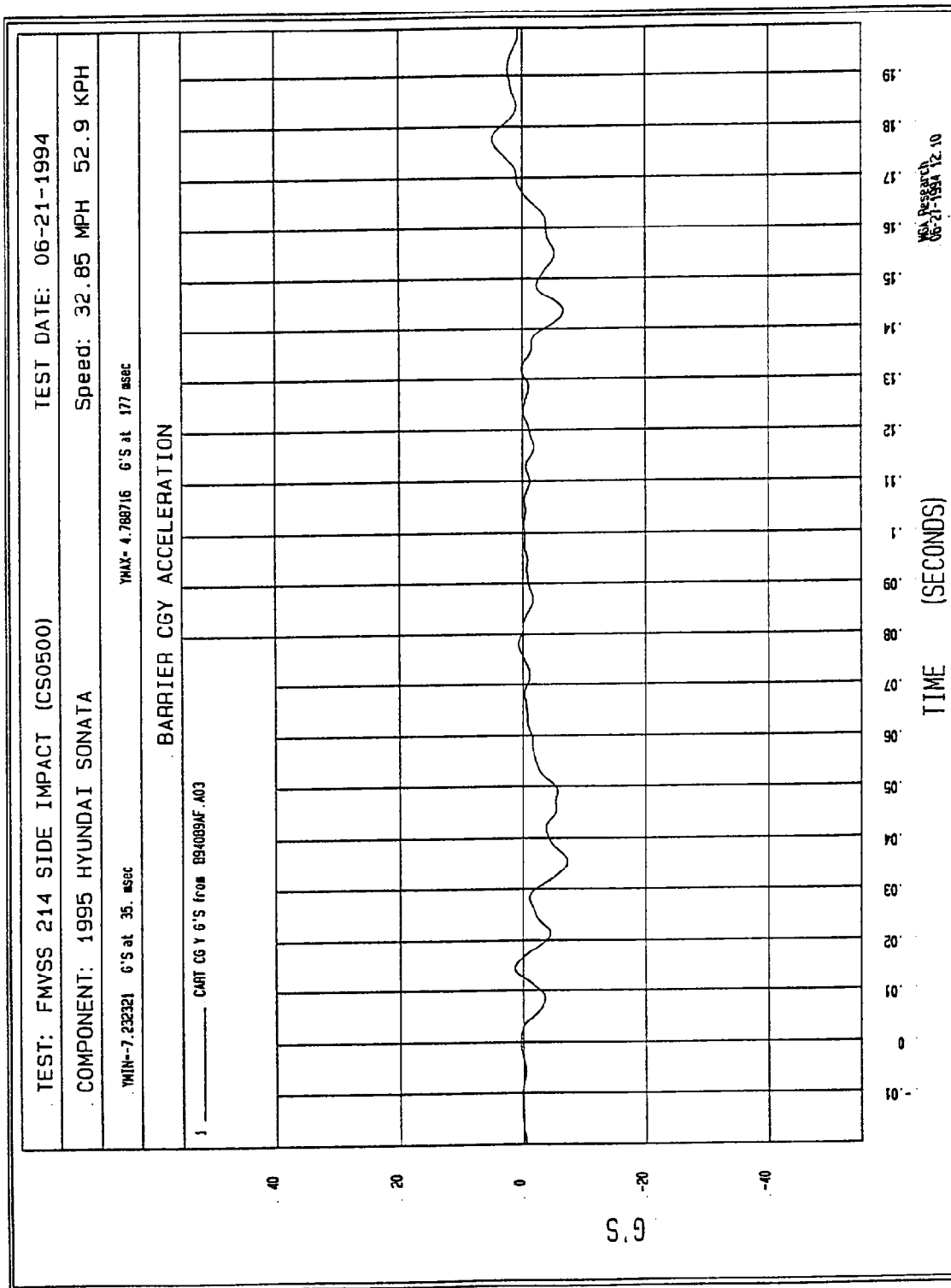


Figure B-54 - Moving Barrier Center of Gravity Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

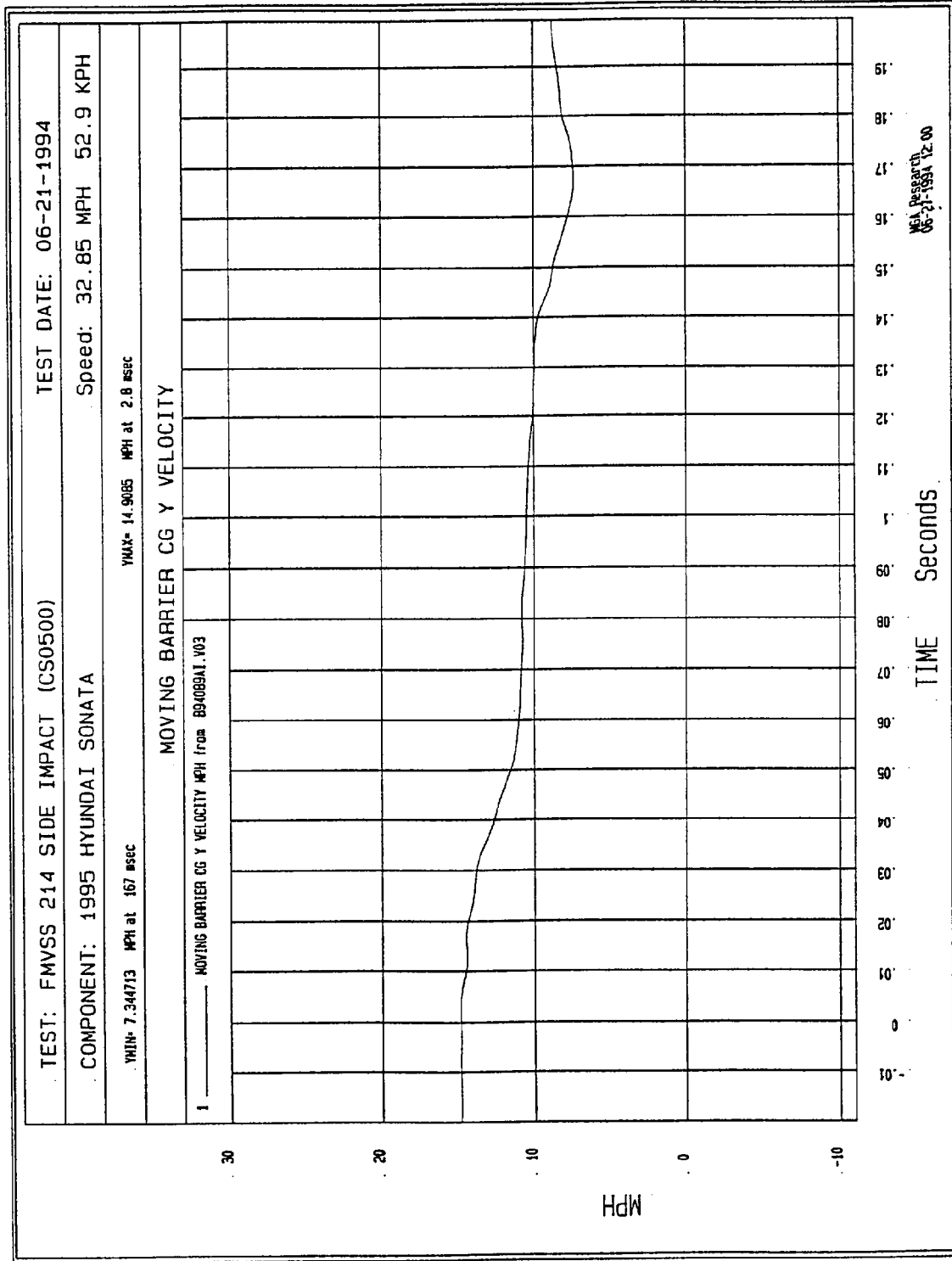


Figure B-55 - Moving Barrier Center of Gravity Y Velocity vs. Time

Filter: Class 60 (100 Hz)

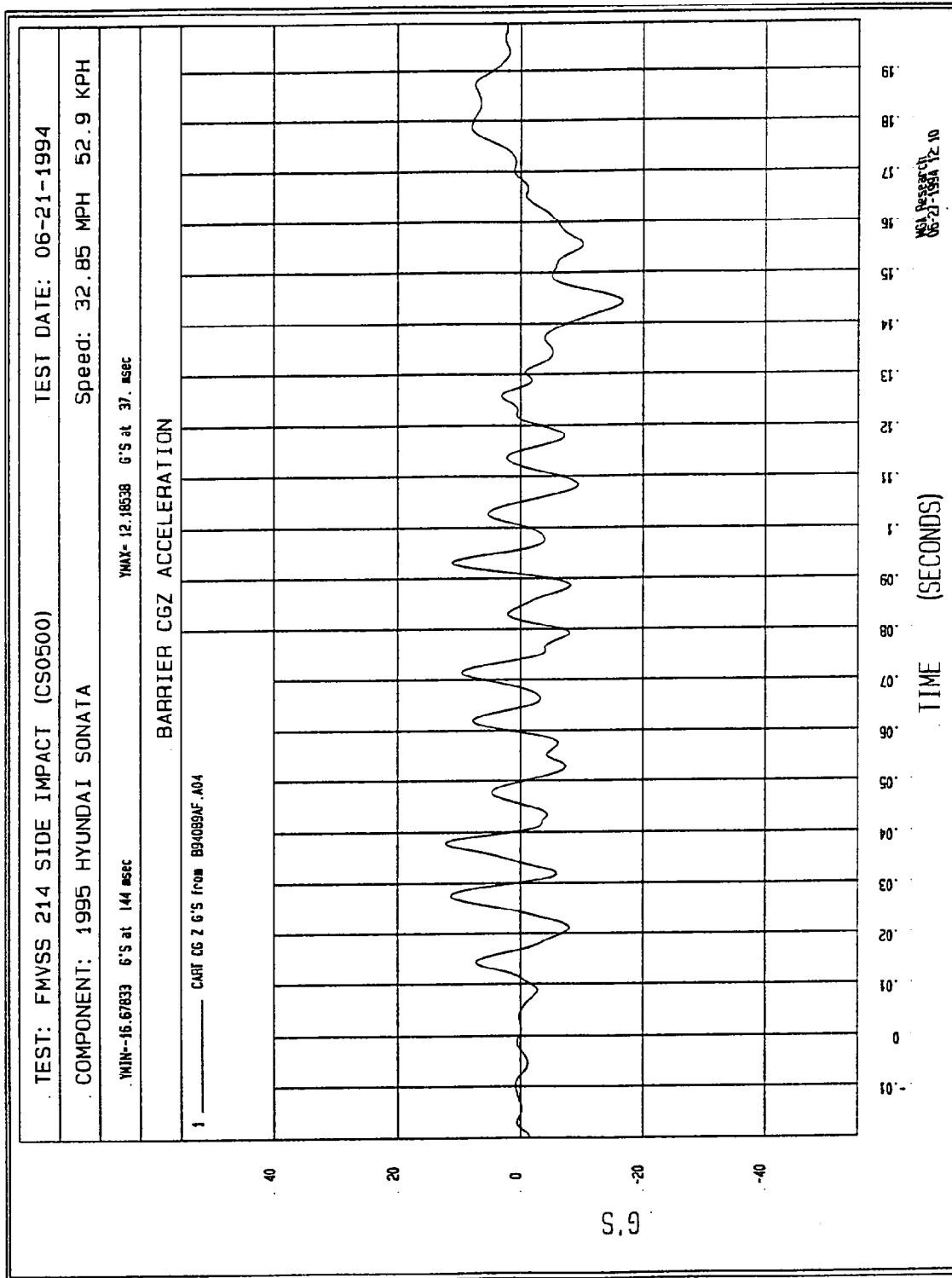


Figure B-56 - Moving Barrier Center of Gravity Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

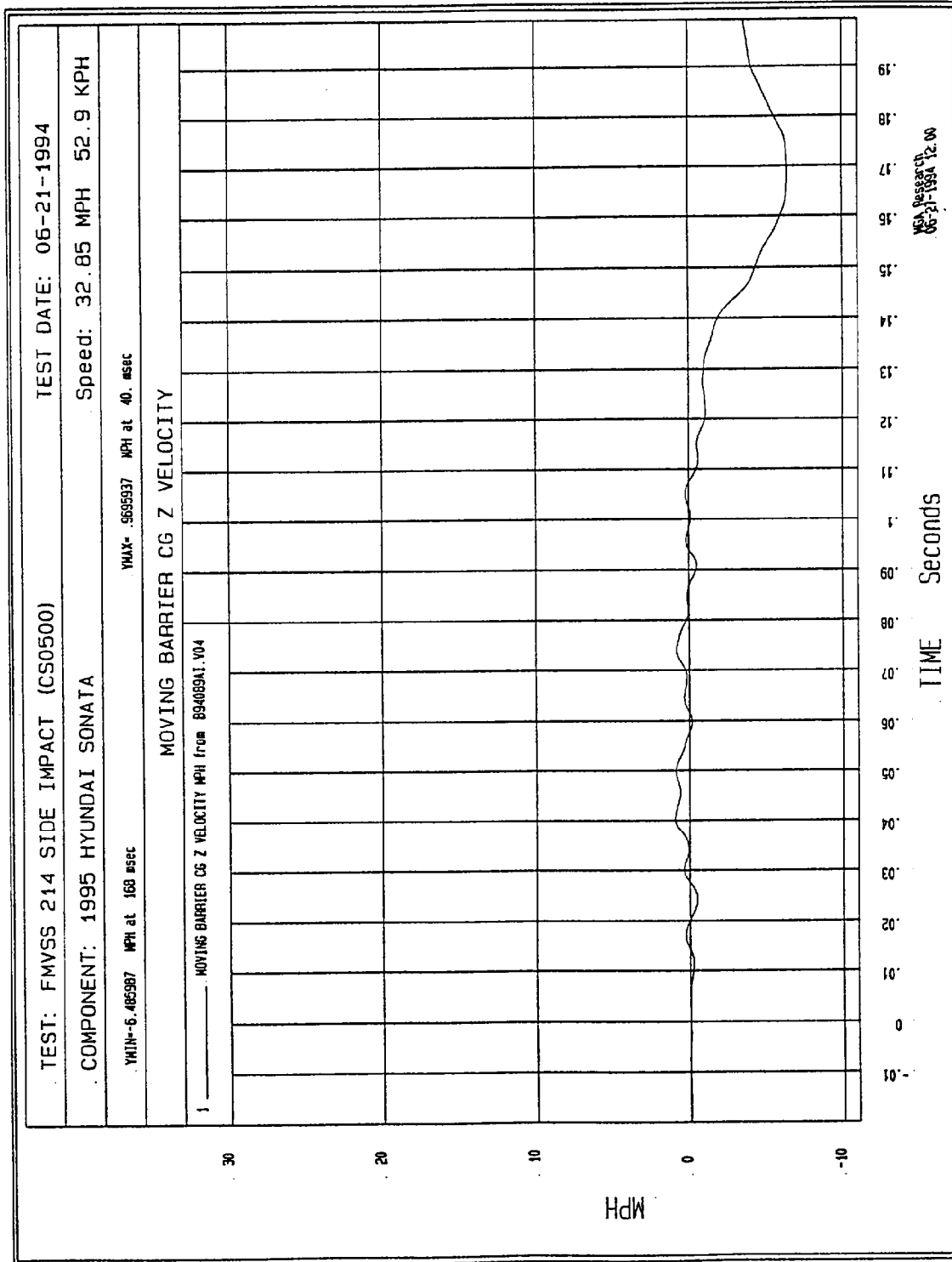


Figure B-57 - Moving Barrier Center of Gravity Z Velocity vs. Time

Filter: Class 60 (100 Hz)

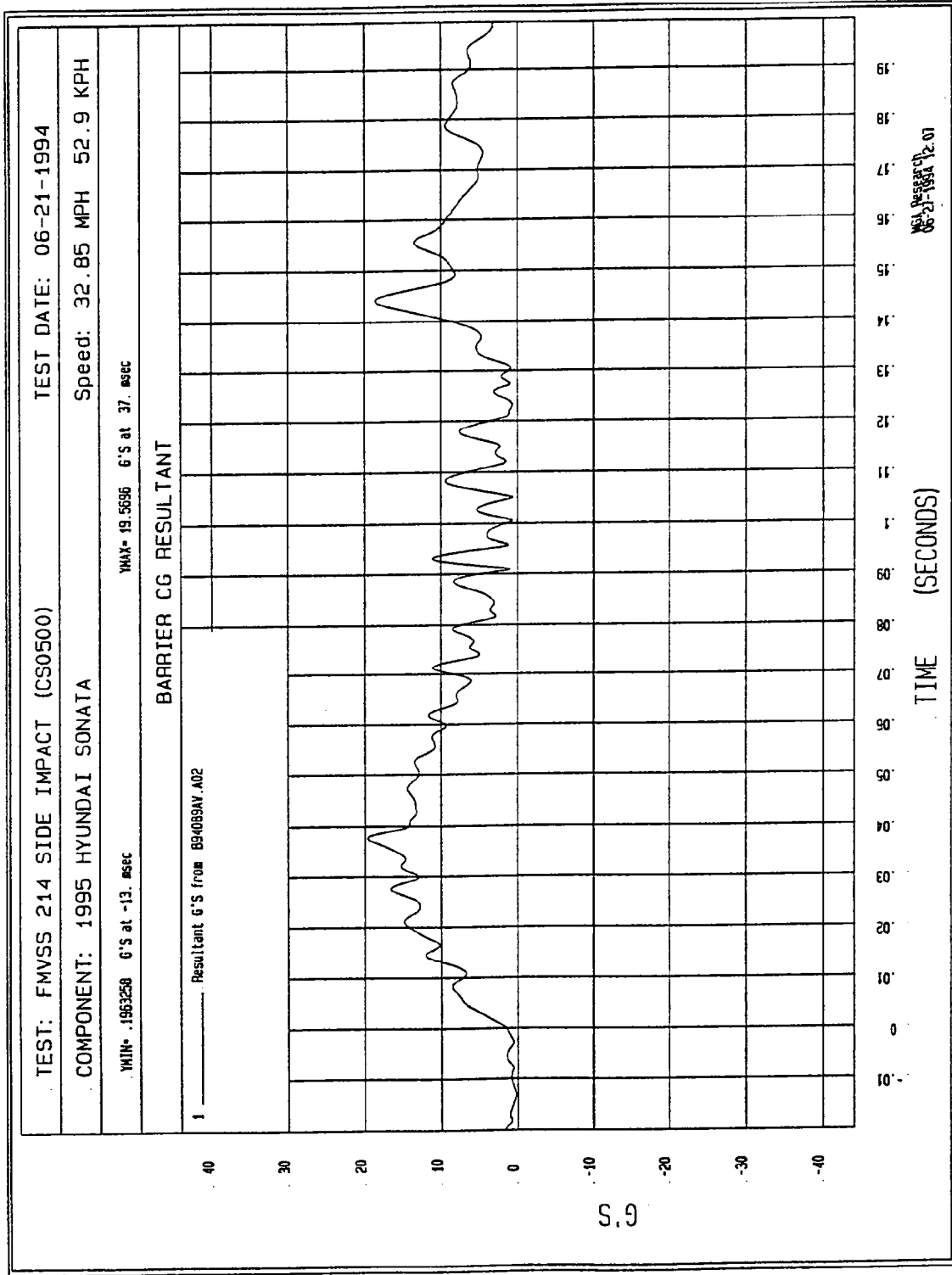


Figure B-58 - Moving Barrier Center of Gravity Resultant vs. Time

Filter: Class 60 (100 Hz)

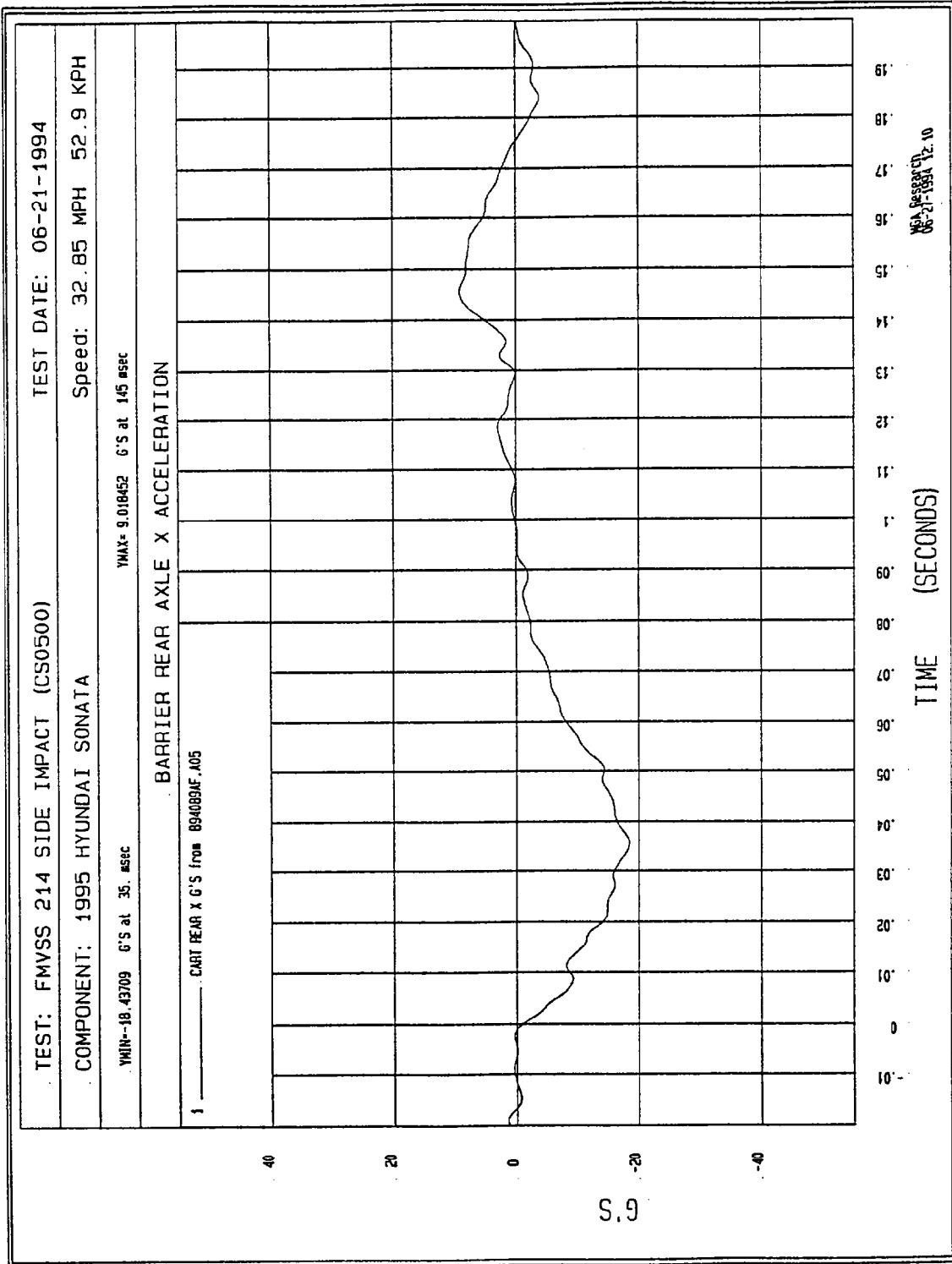


Figure B-59 - Moving Barrier Rear Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

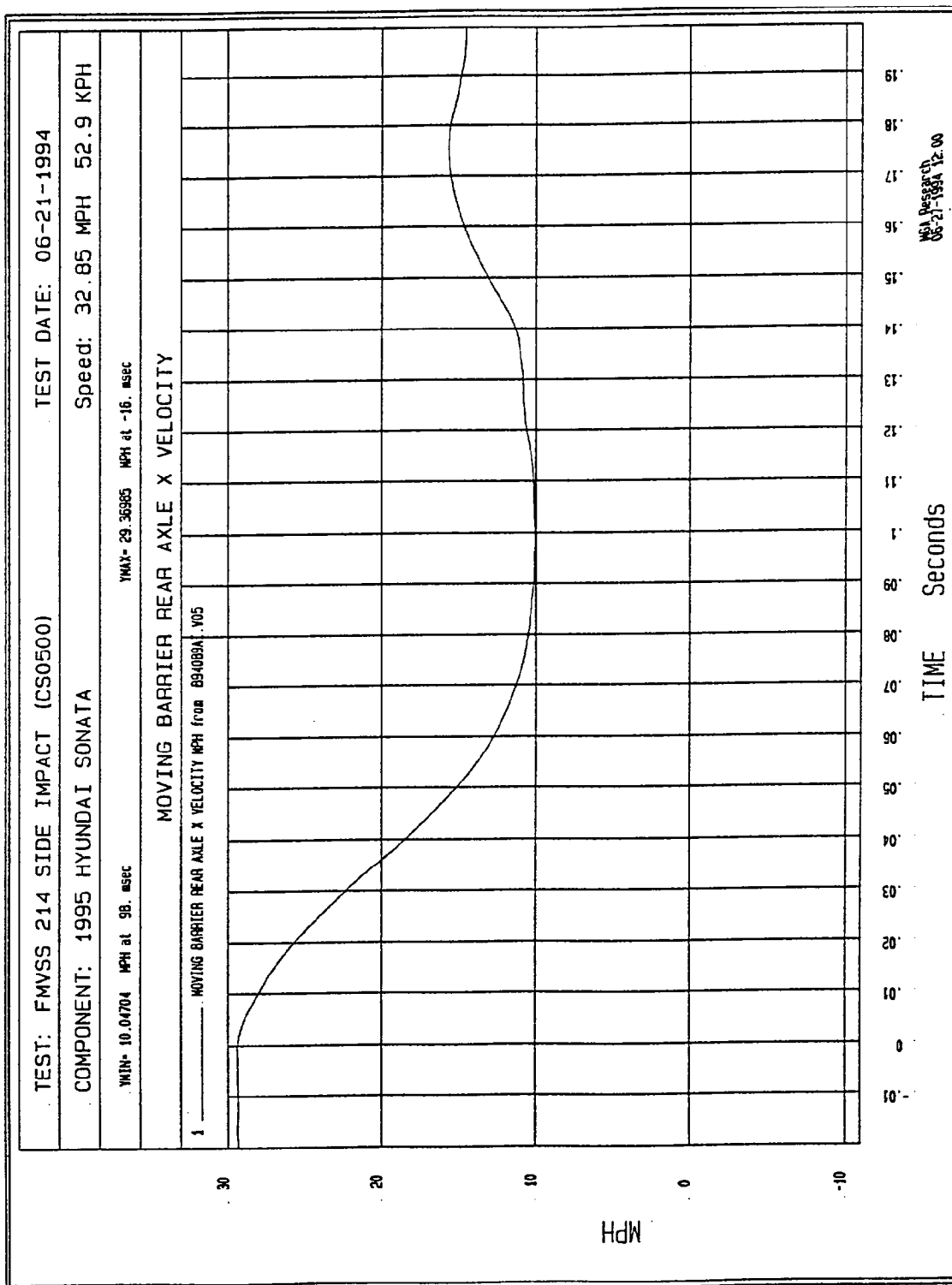


Figure B-60 - Moving Barrier Rear Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

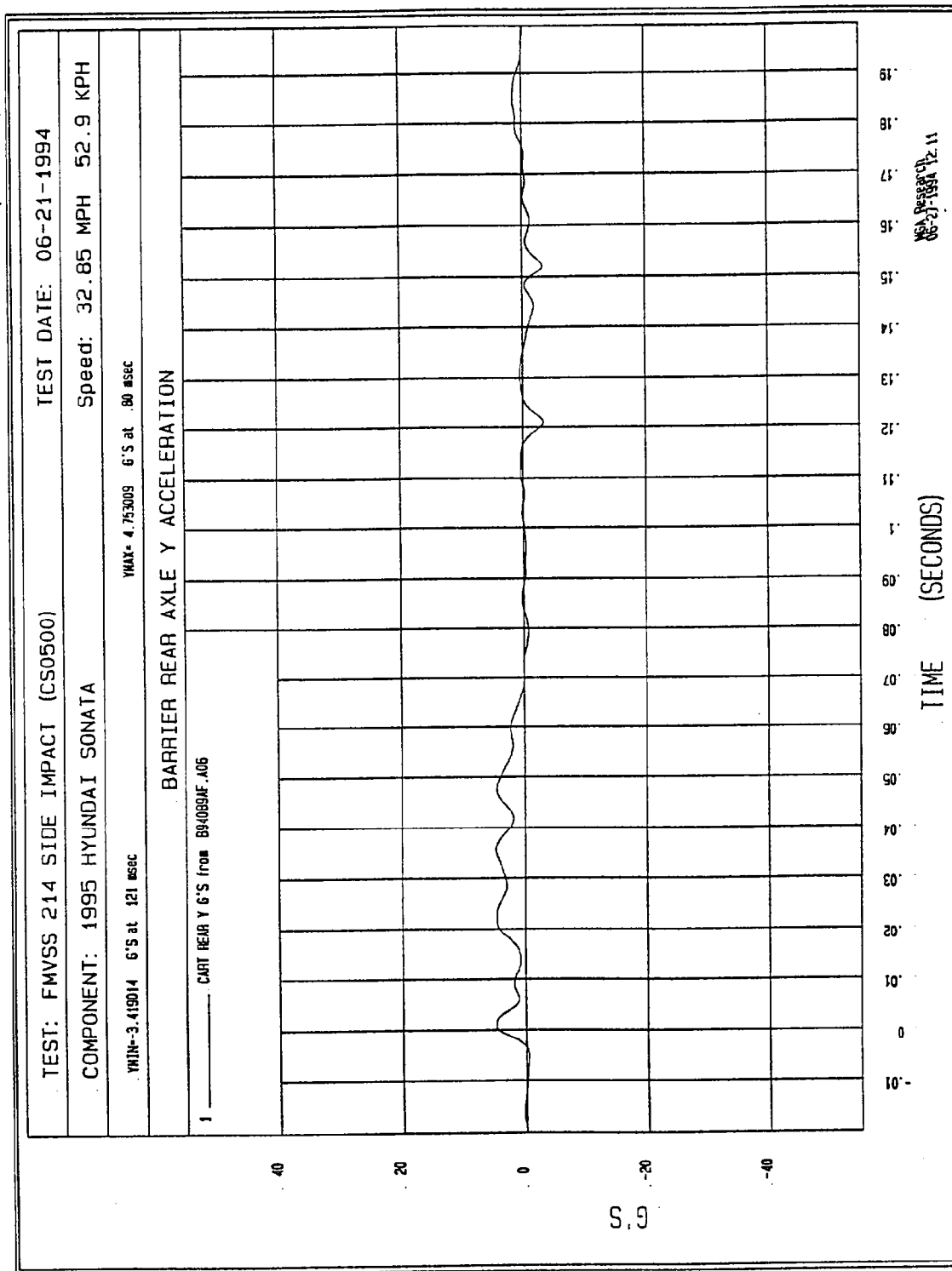


Figure B-61 - Moving Barrier Rear Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

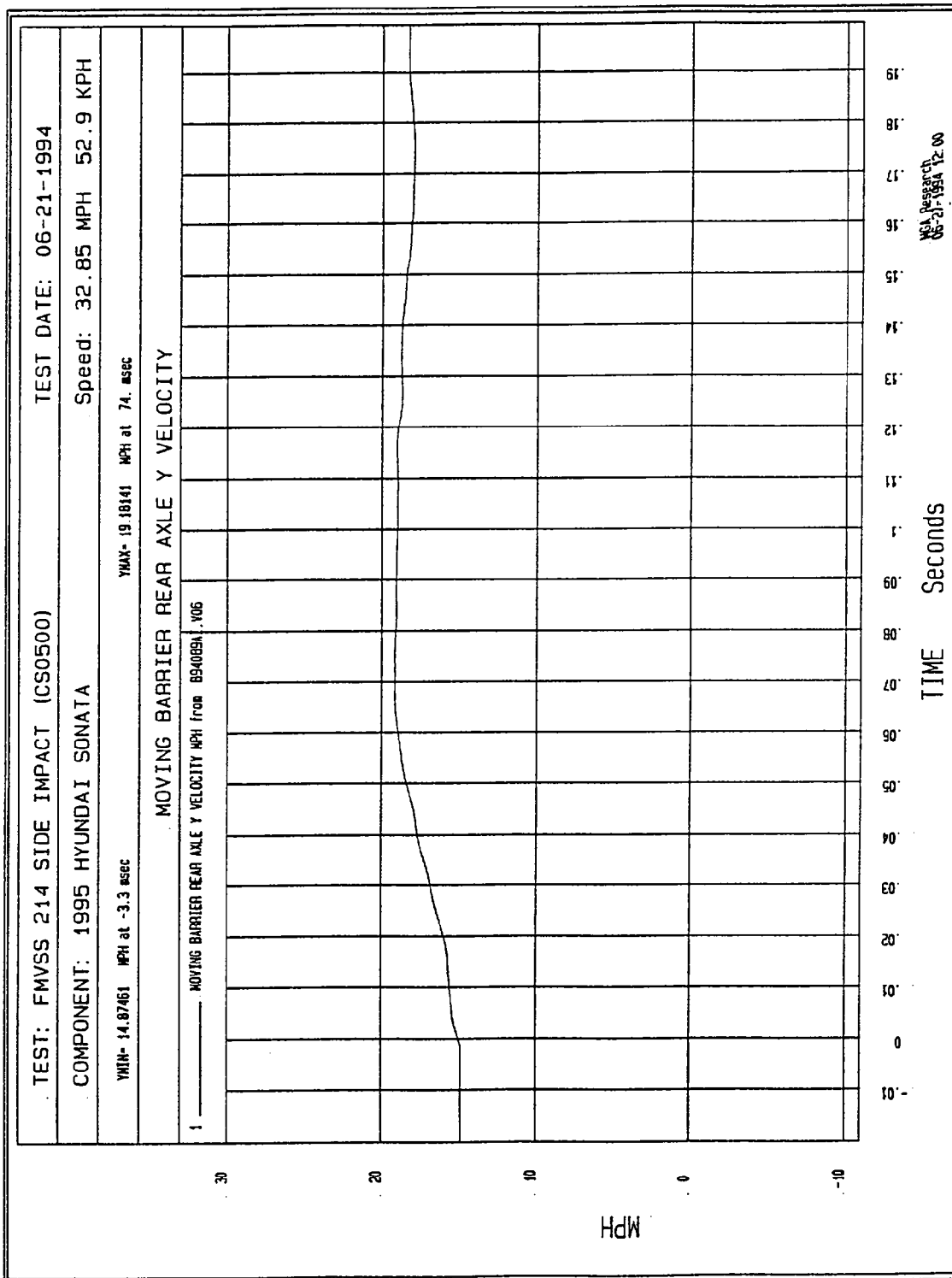


Figure B-62 - Moving Barrier Rear Axle Y Velocity vs. Time

Filter: Class 1000 (1650 Hz)

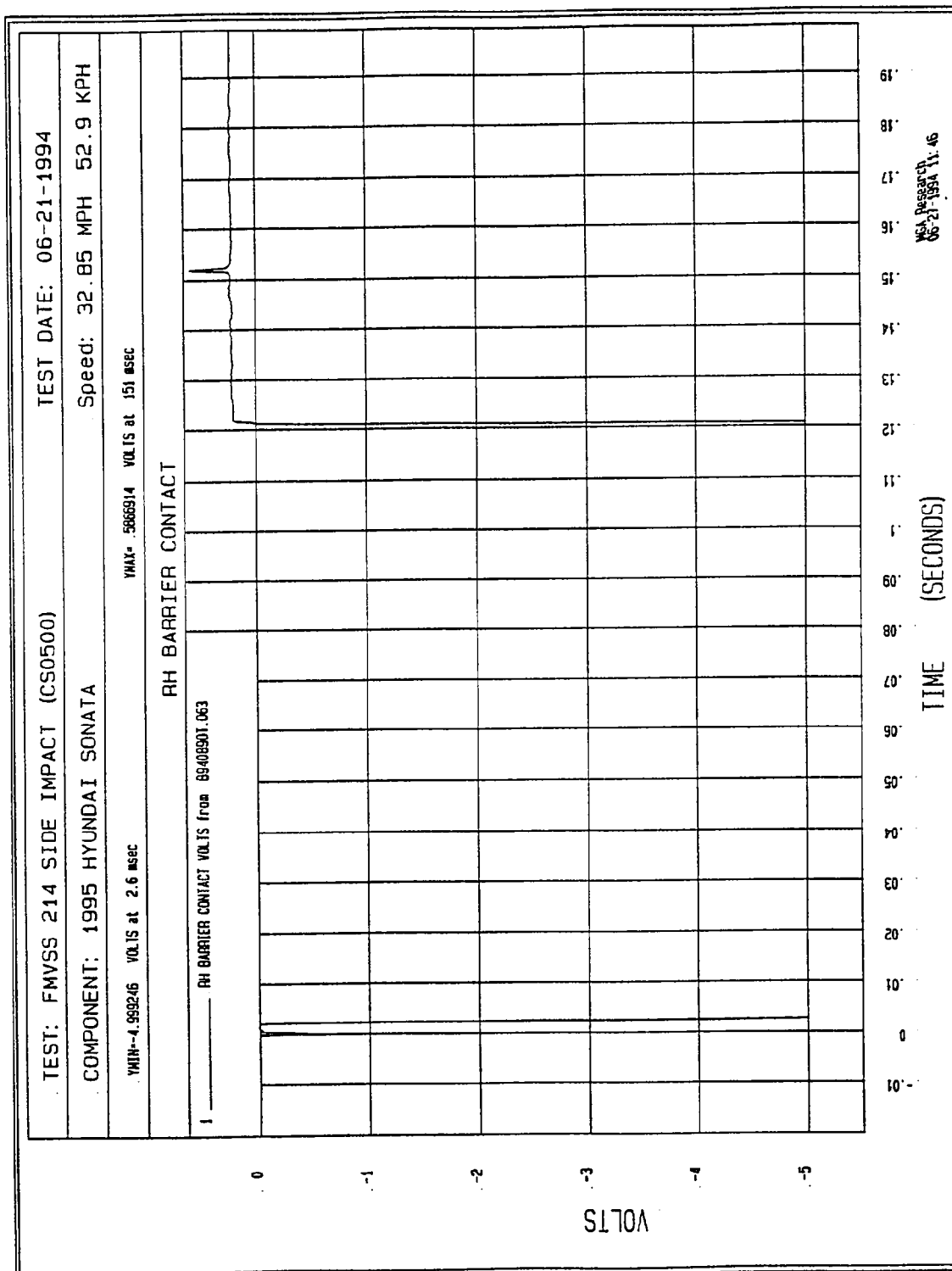


Figure B-63 - Right Hand Barrier Contact

Filter: Class 1000 (1650 Hz)

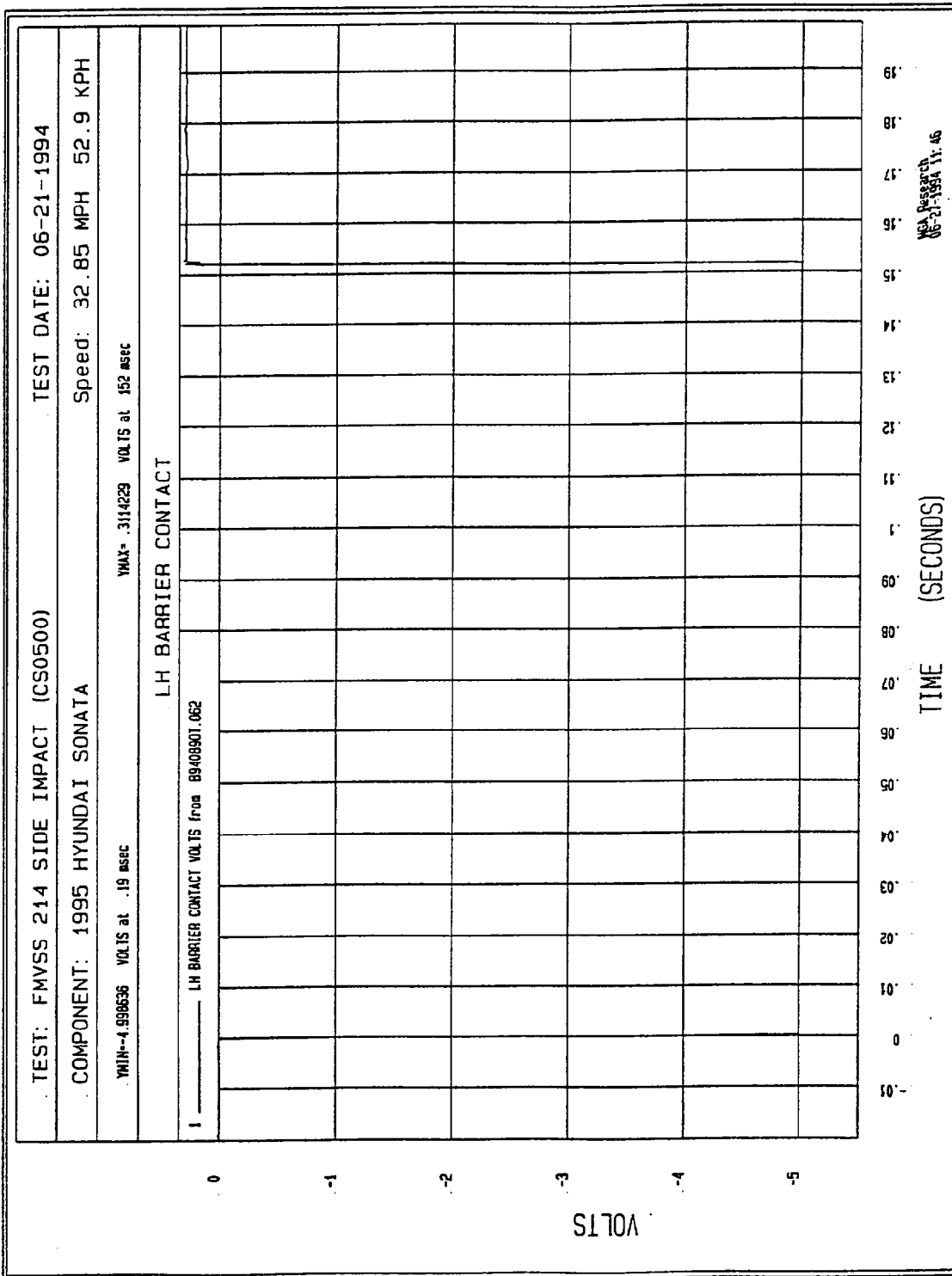


Figure B-64 - Left Hand Barrier Contact

Filter: Class 180 (300 Hz)

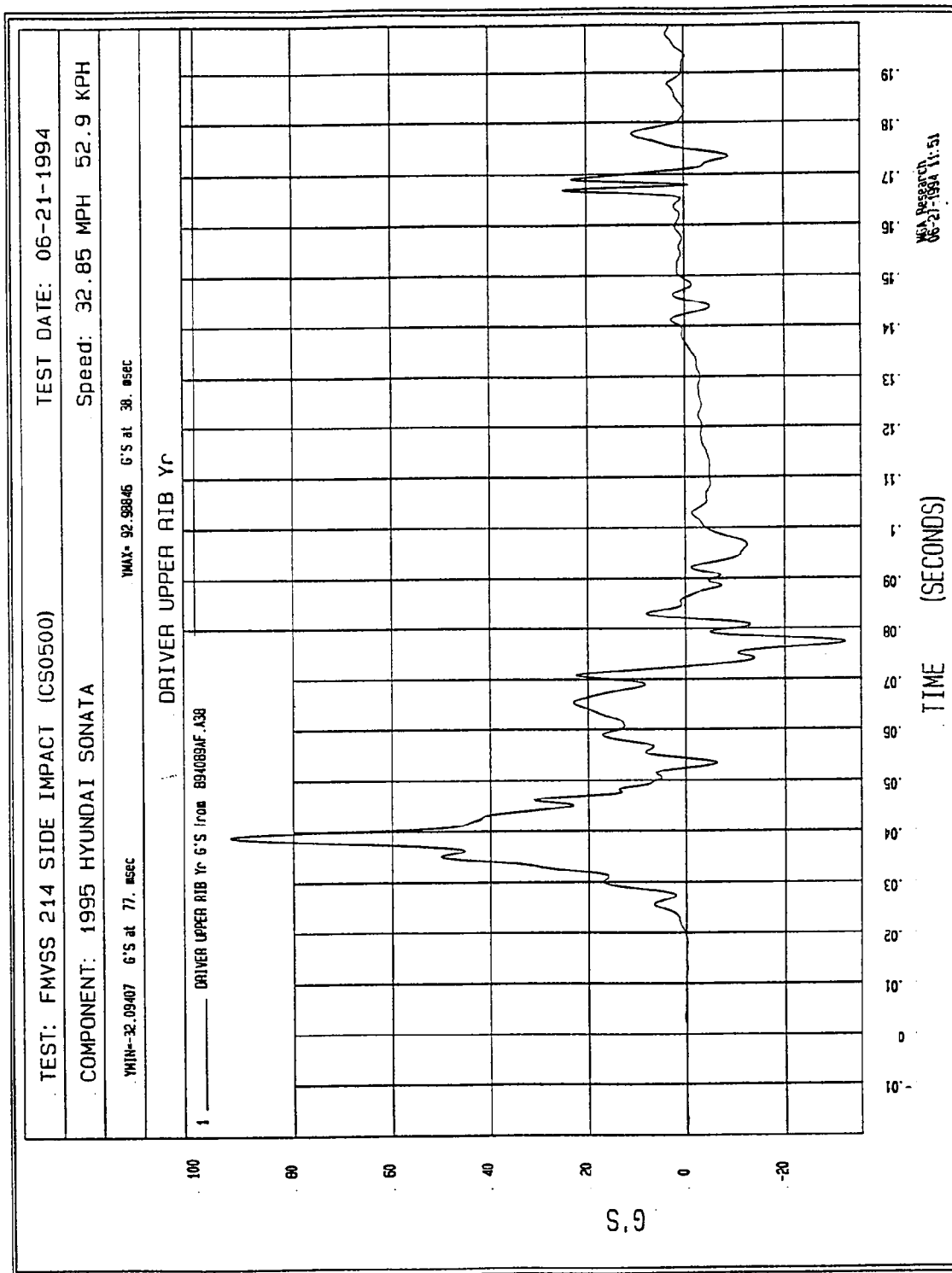


Figure B-65 - Driver Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

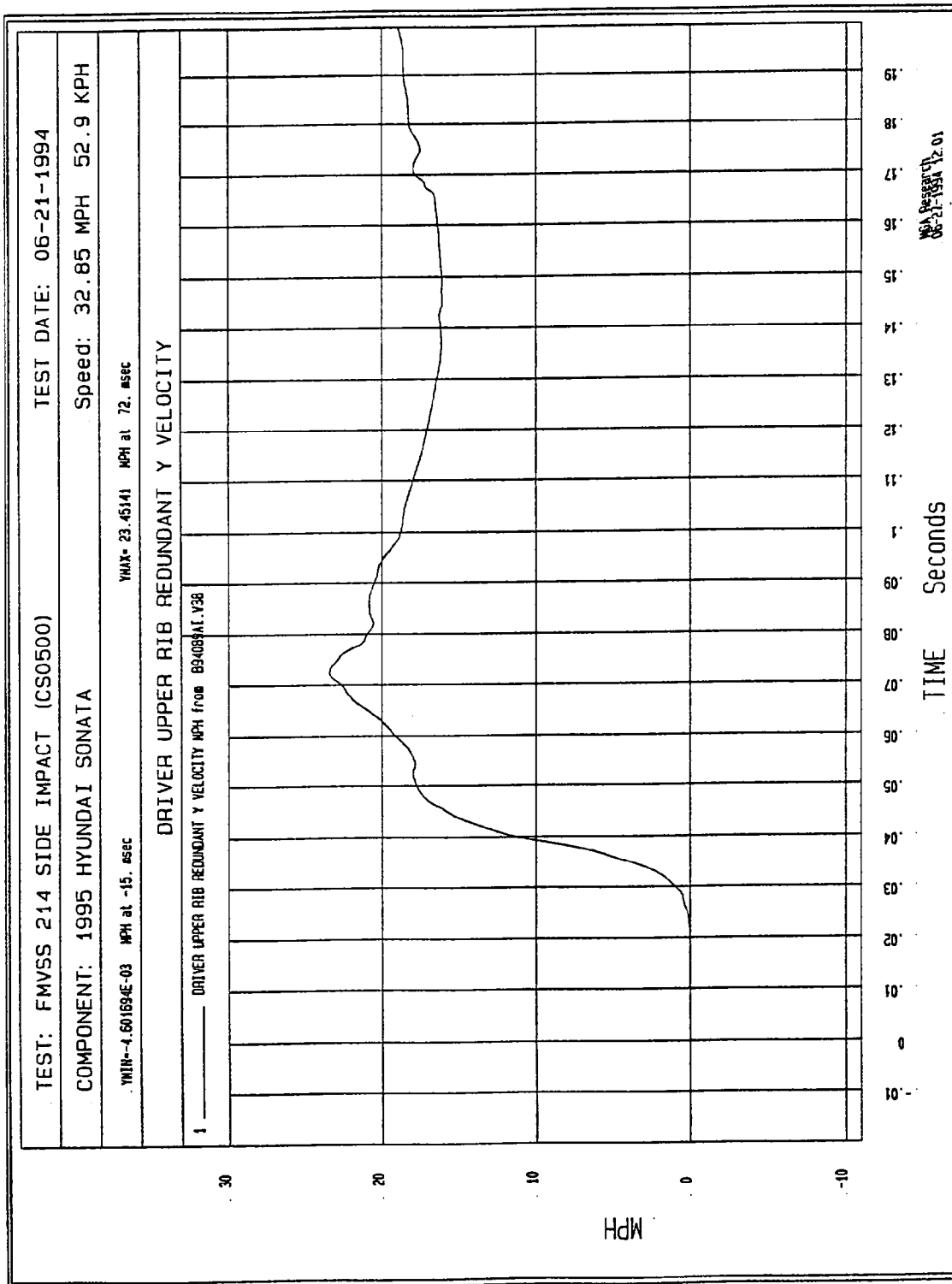


Figure B-66 - Driver Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

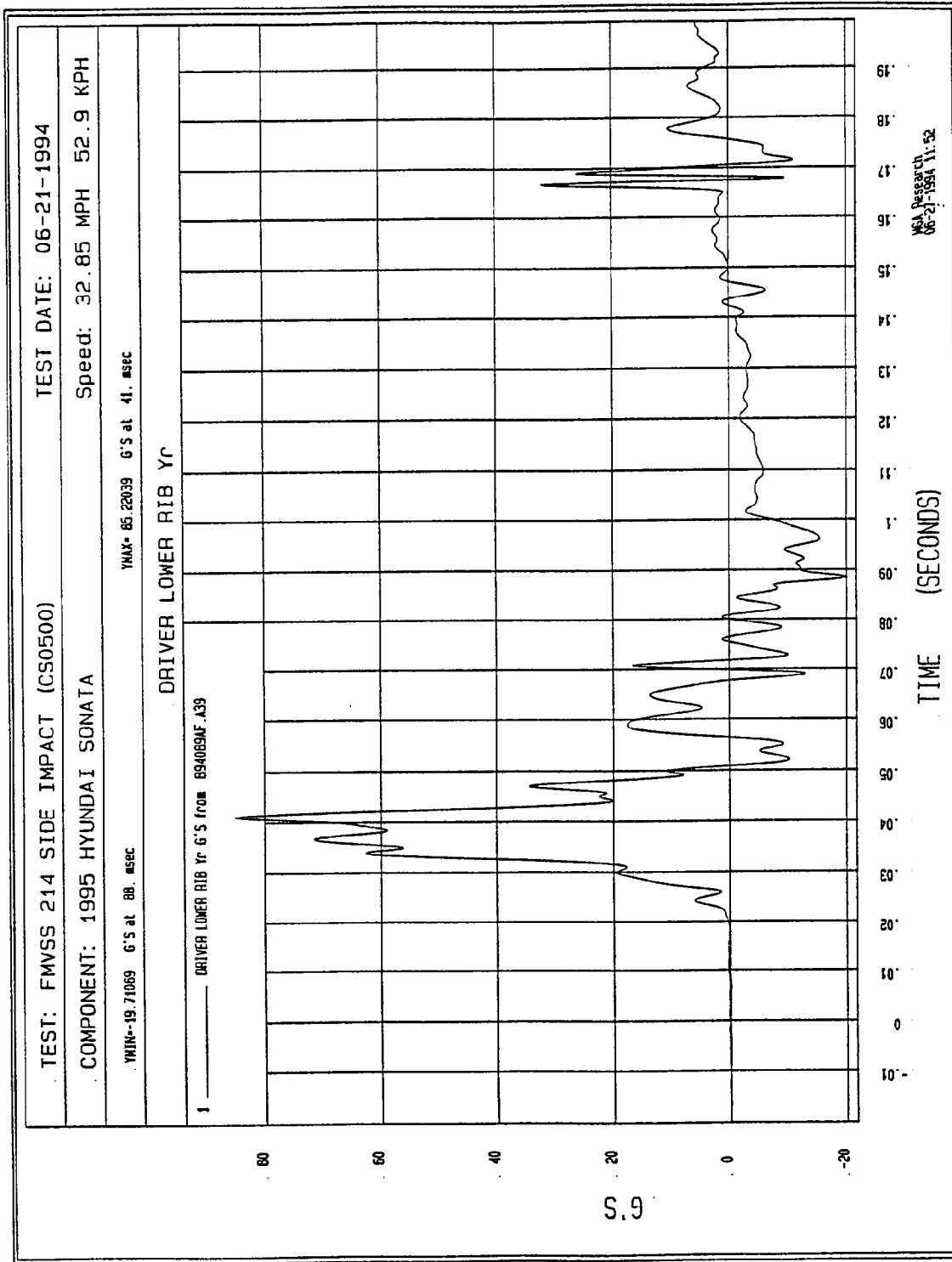


Figure B-67 - Driver Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

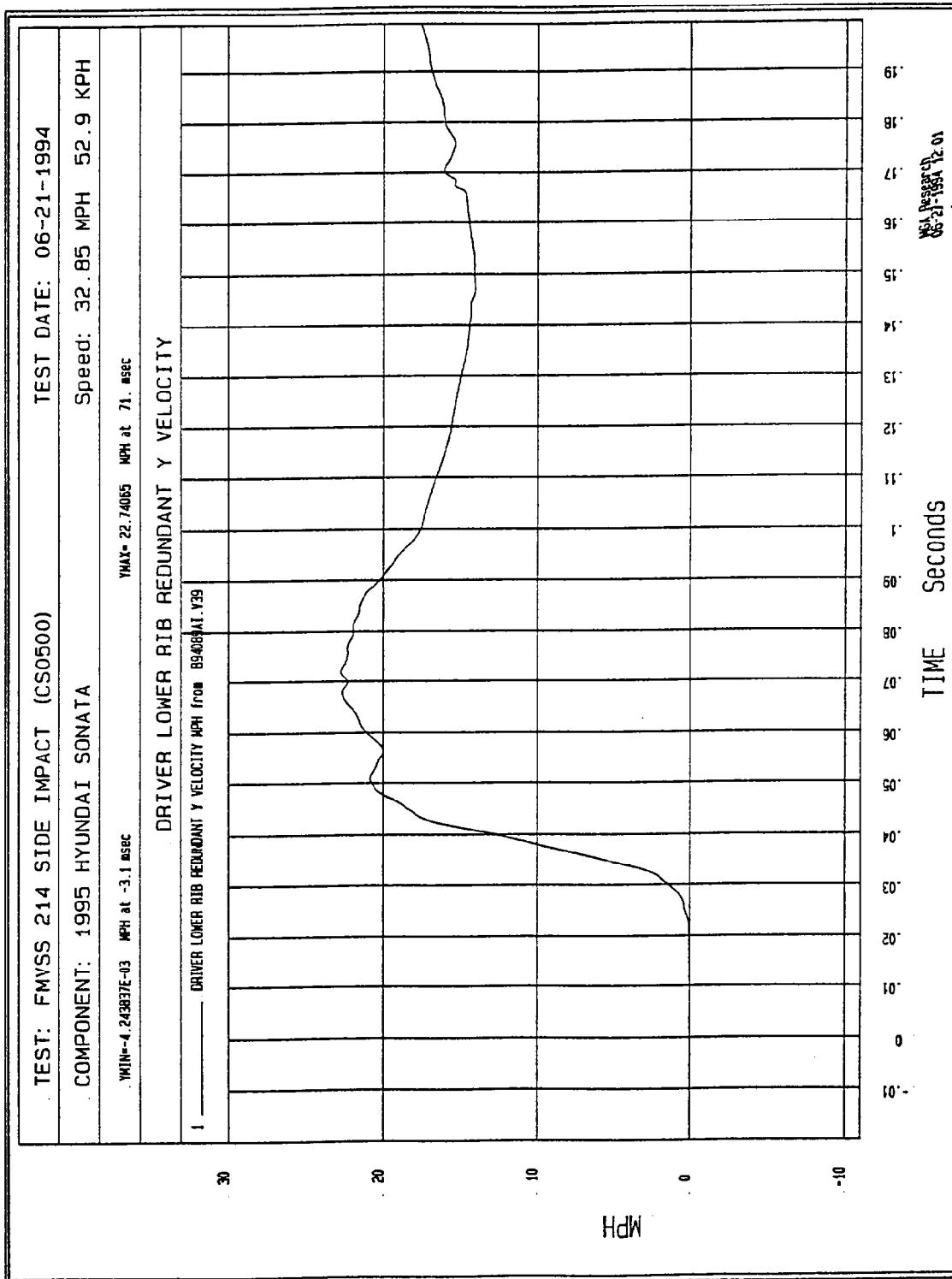


Figure B-68 - Driver Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

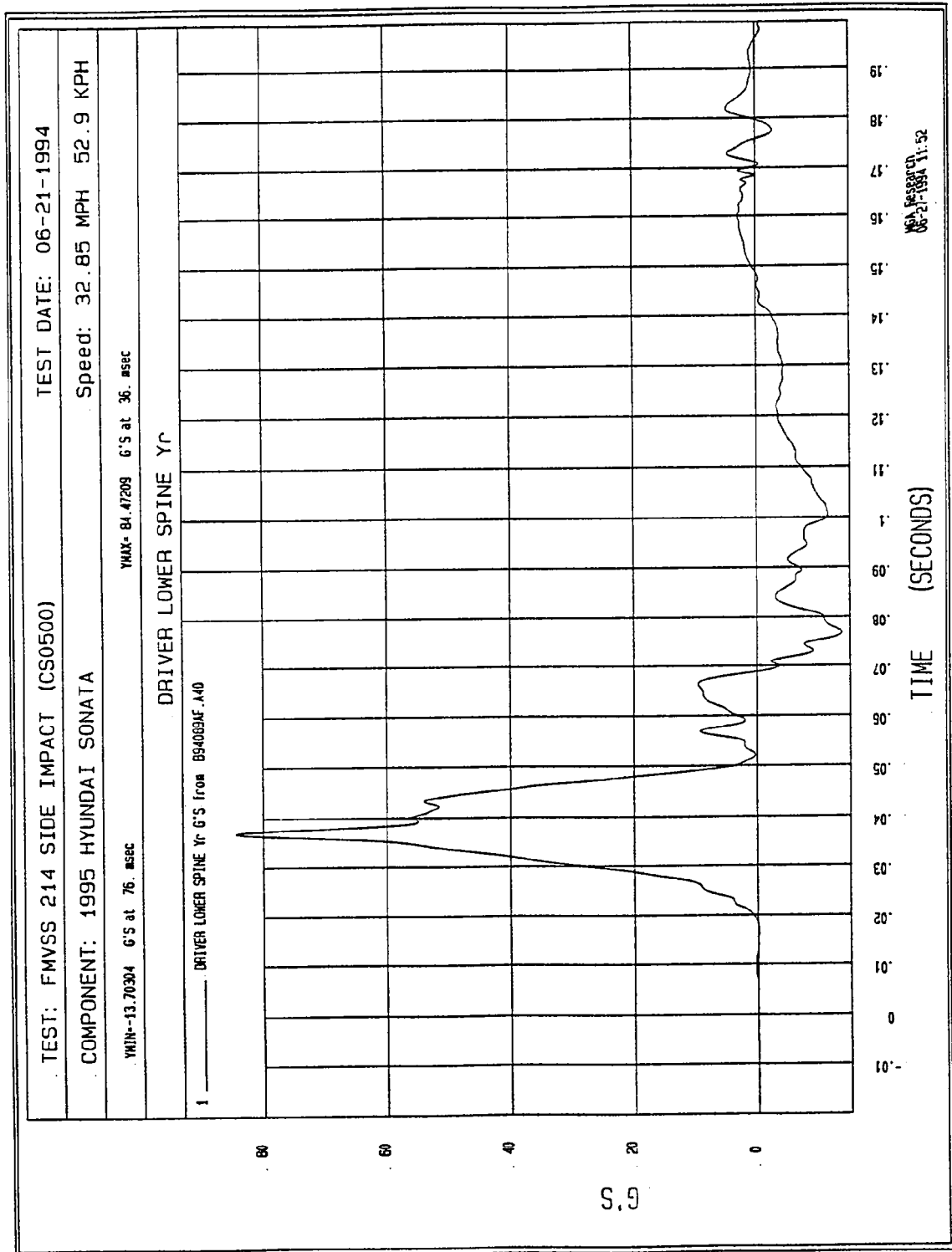


Figure B-69 - Driver Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

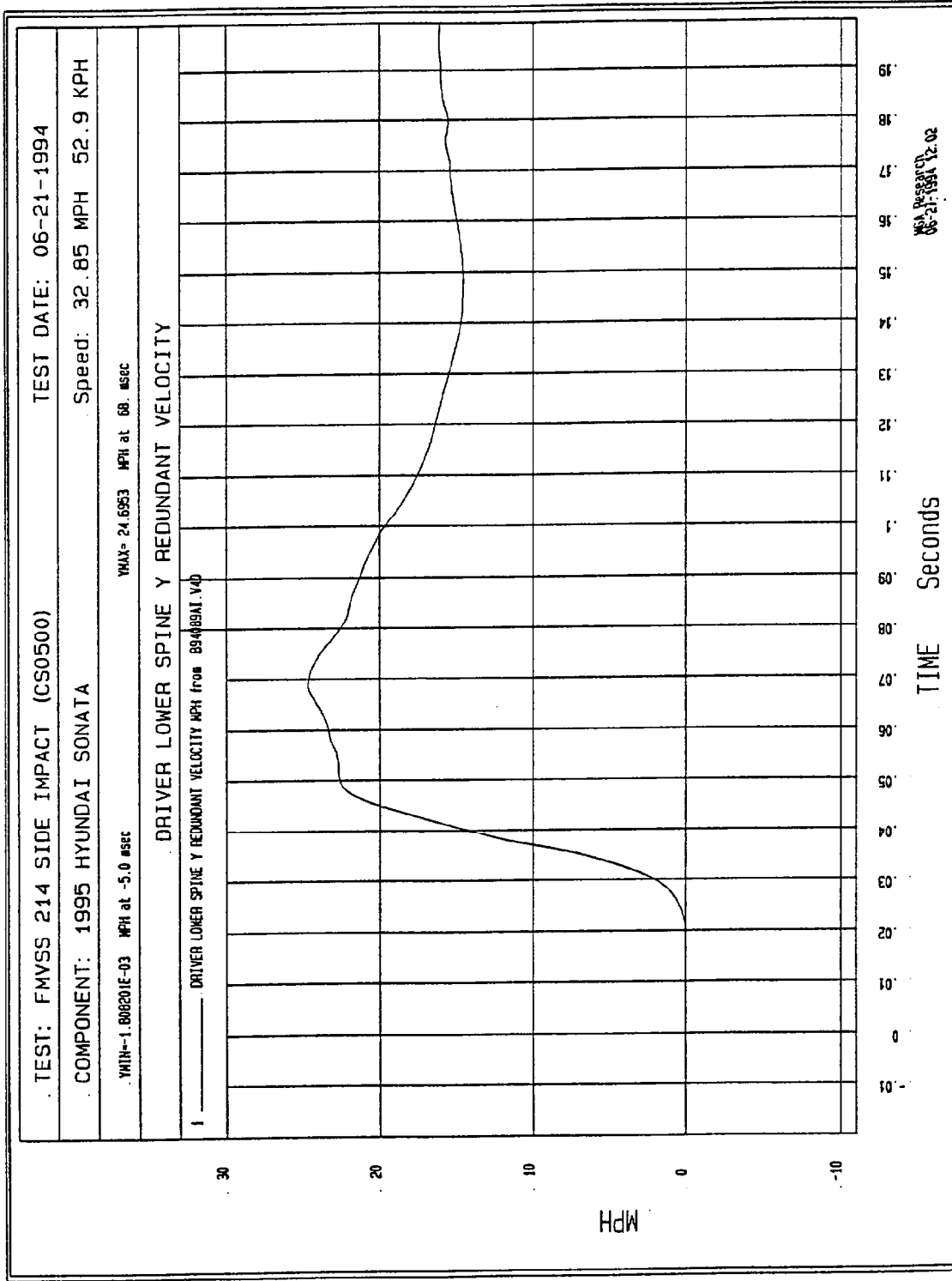


Figure B-70 - Driver Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

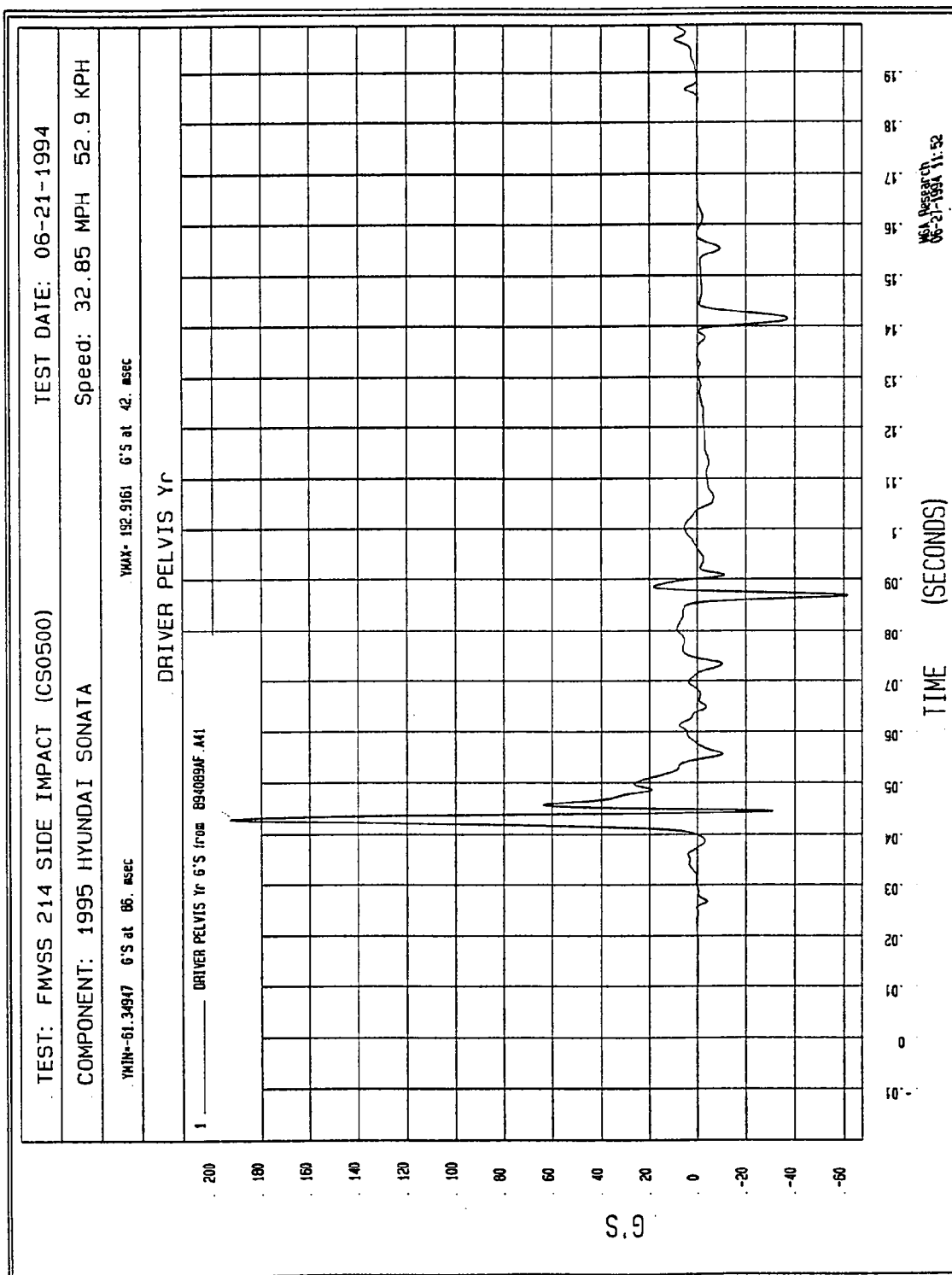


Figure B-71 - Driver Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

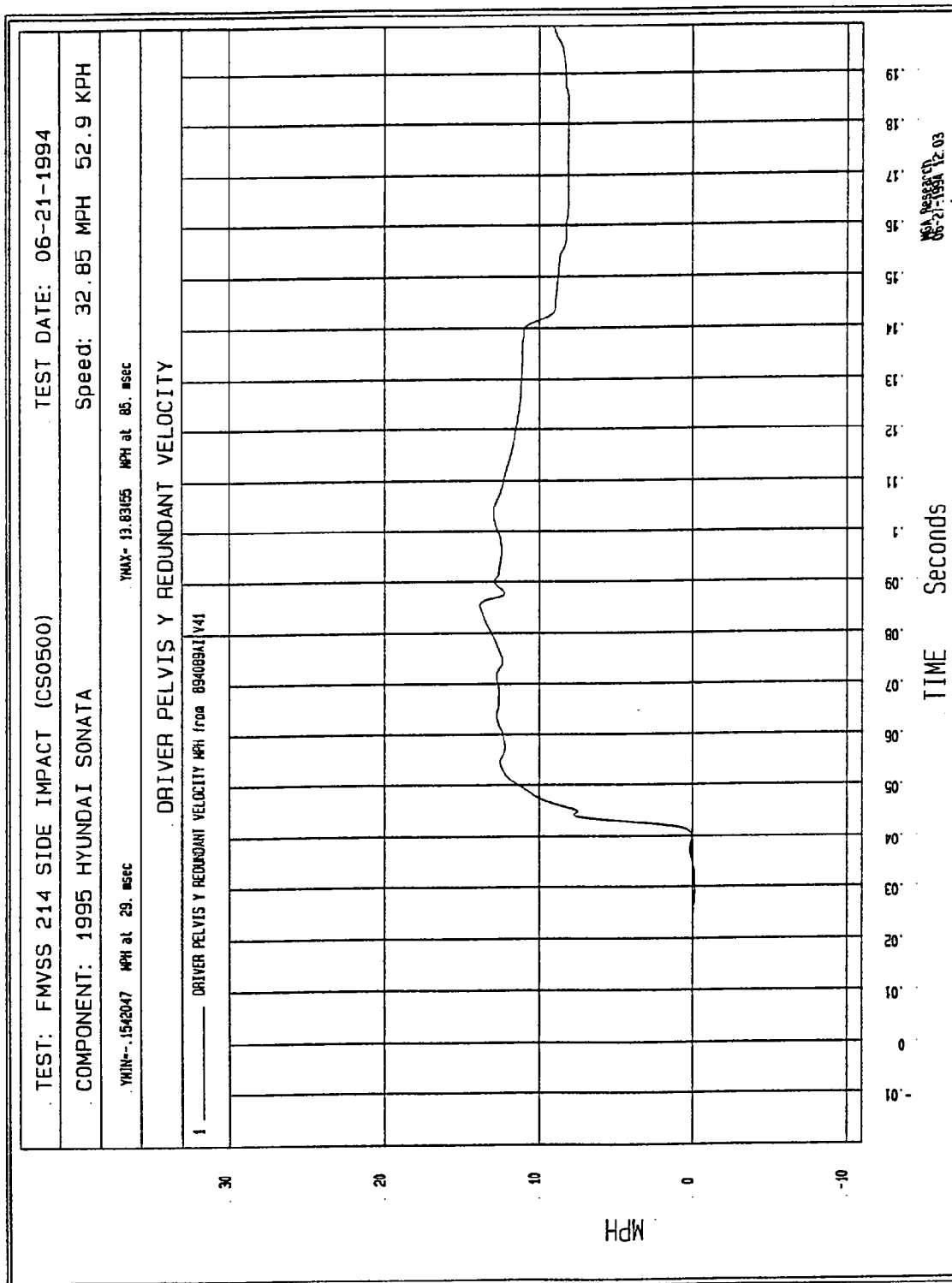


Figure B-72 - Driver Pelvis Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

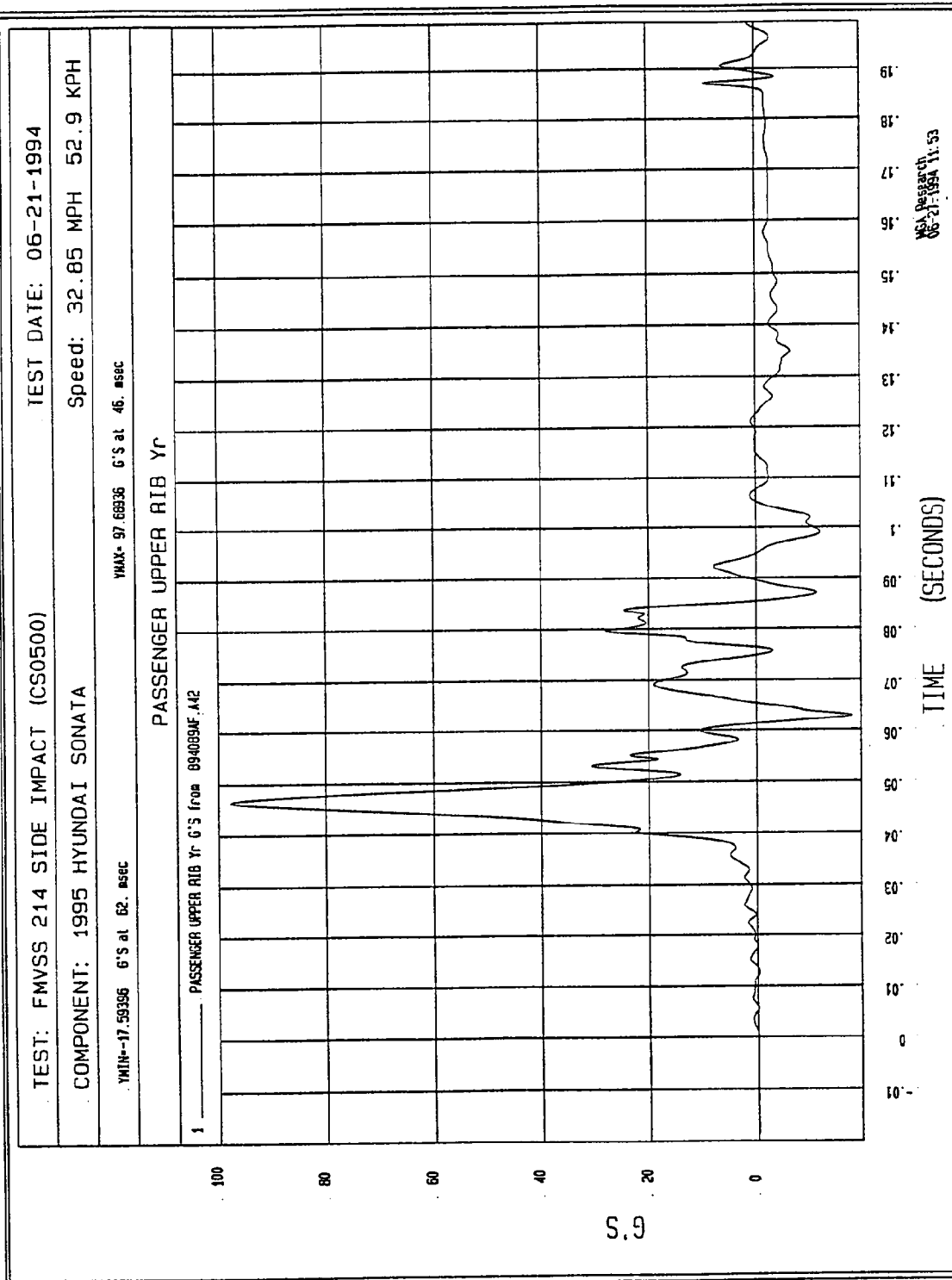


Figure B-73 - Passenger Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

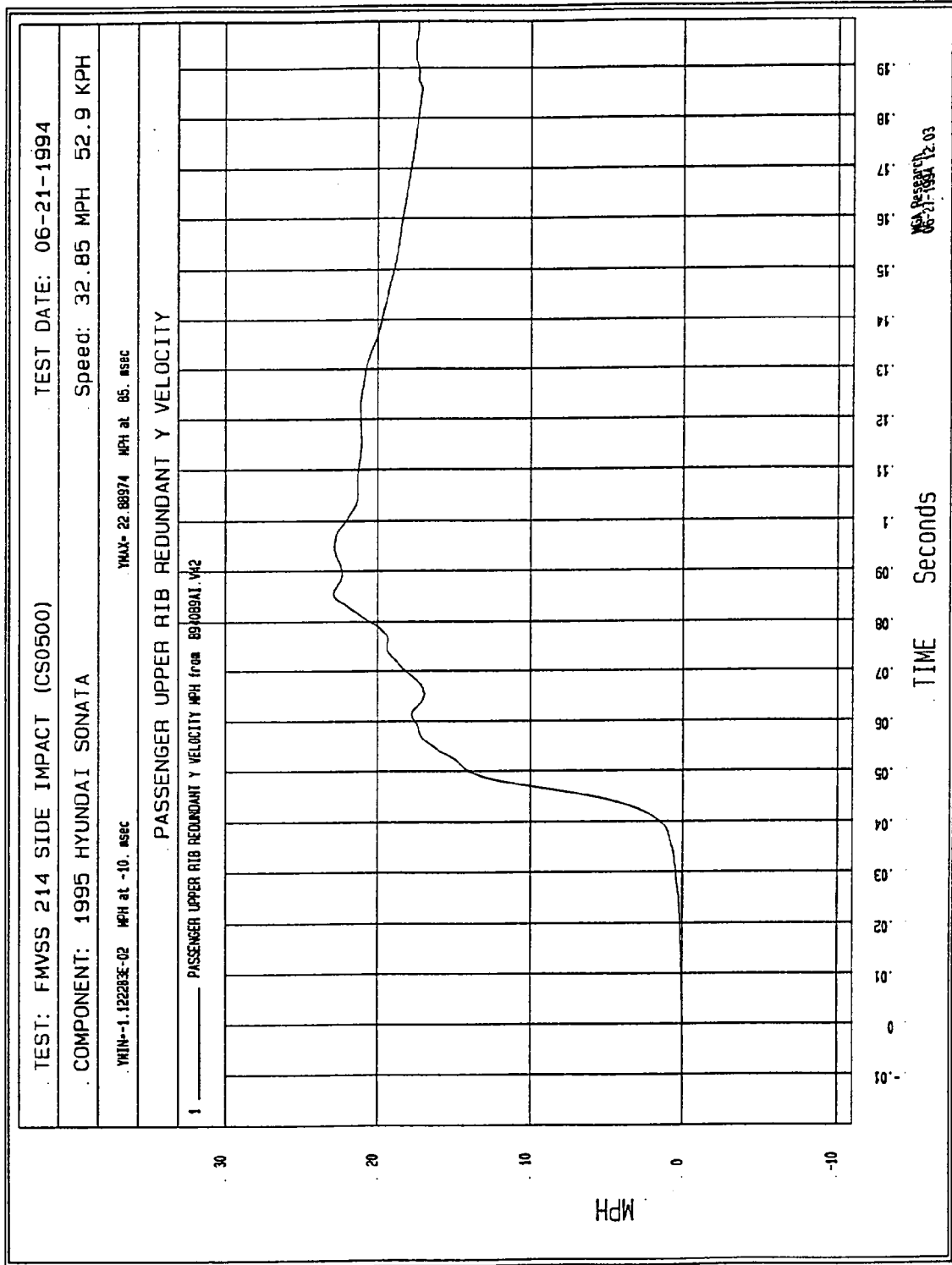


Figure B-74 - Passenger Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

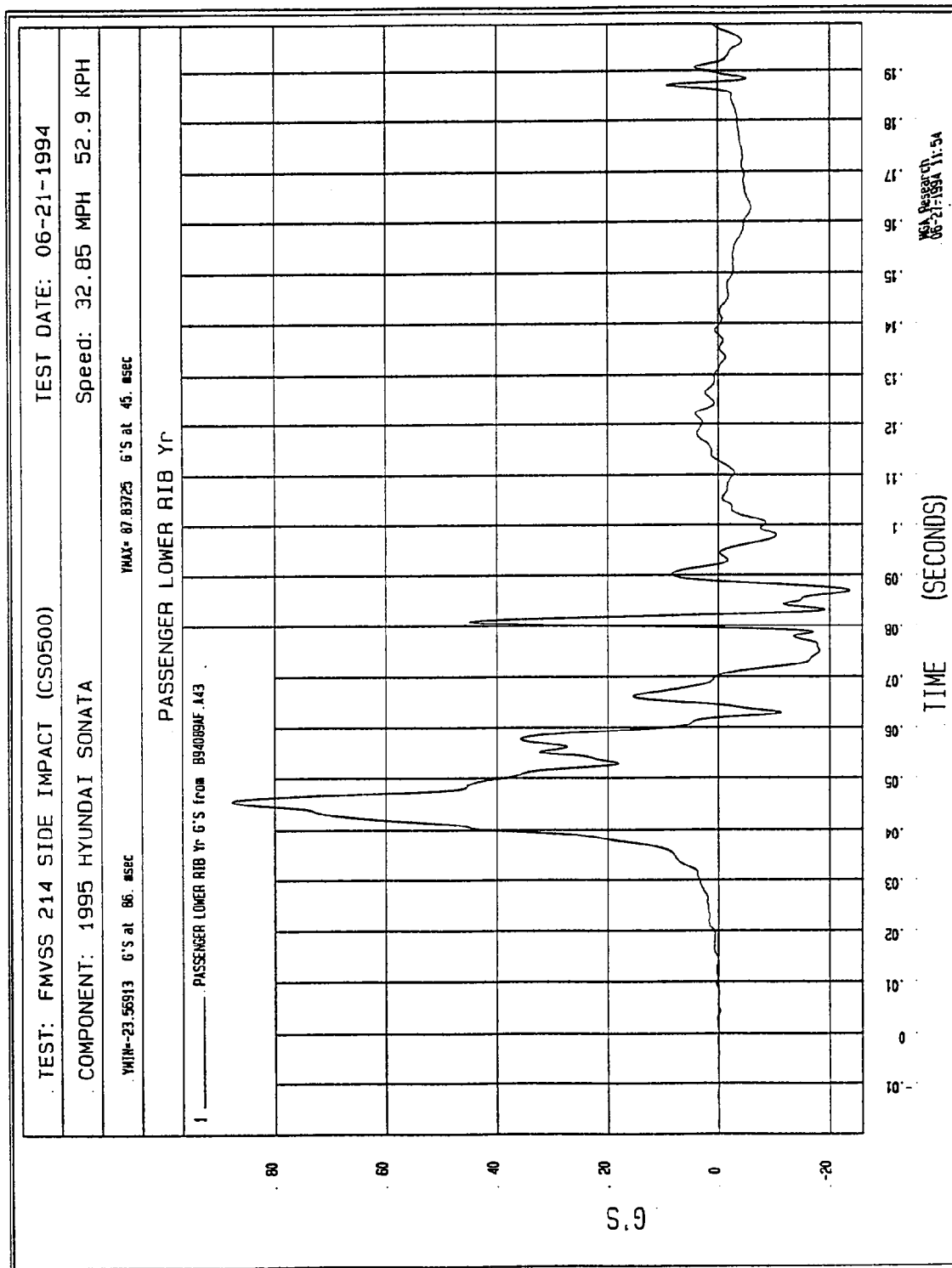


Figure B-75 - Passenger Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

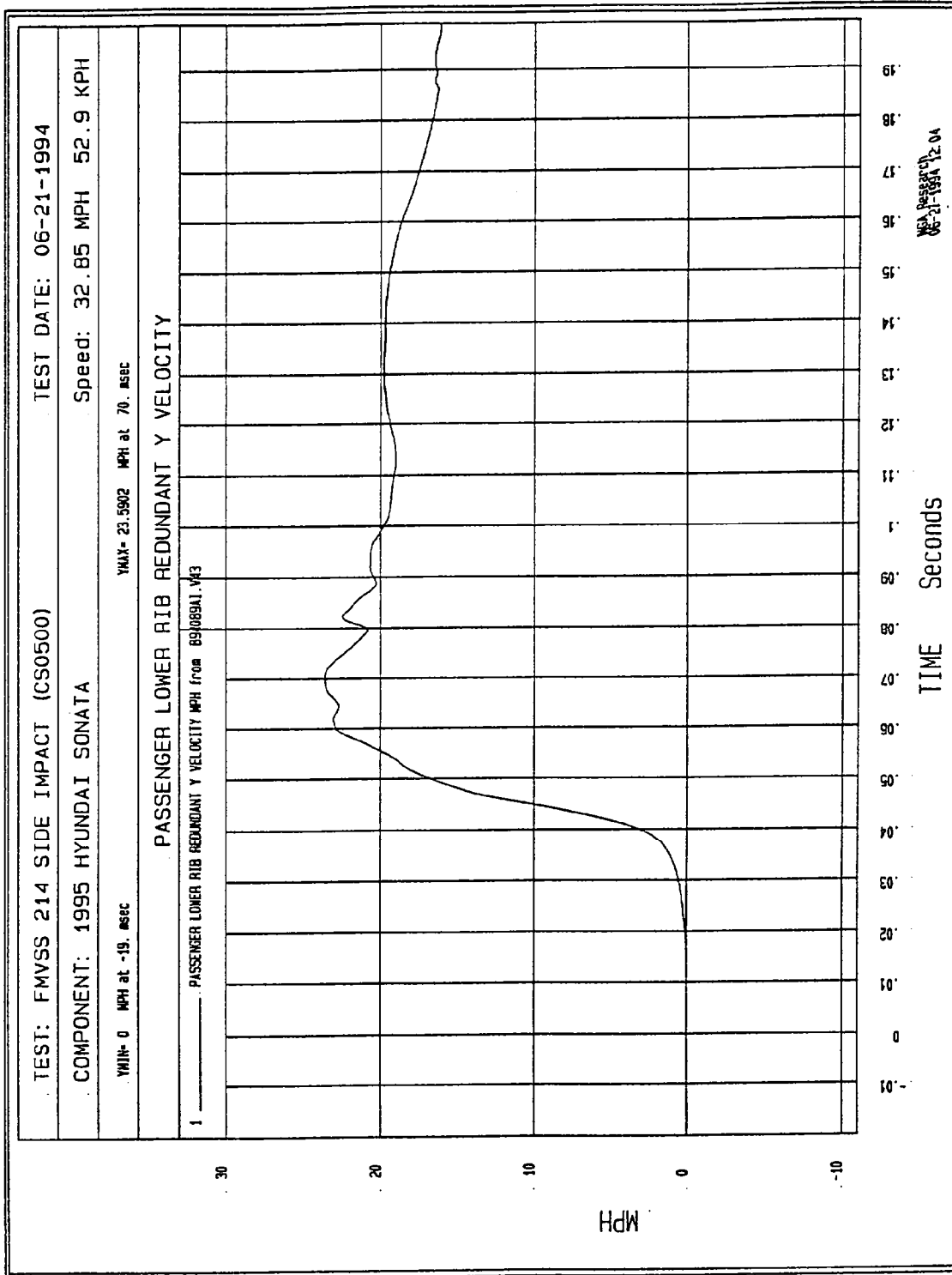


Figure B-76 - Passenger Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

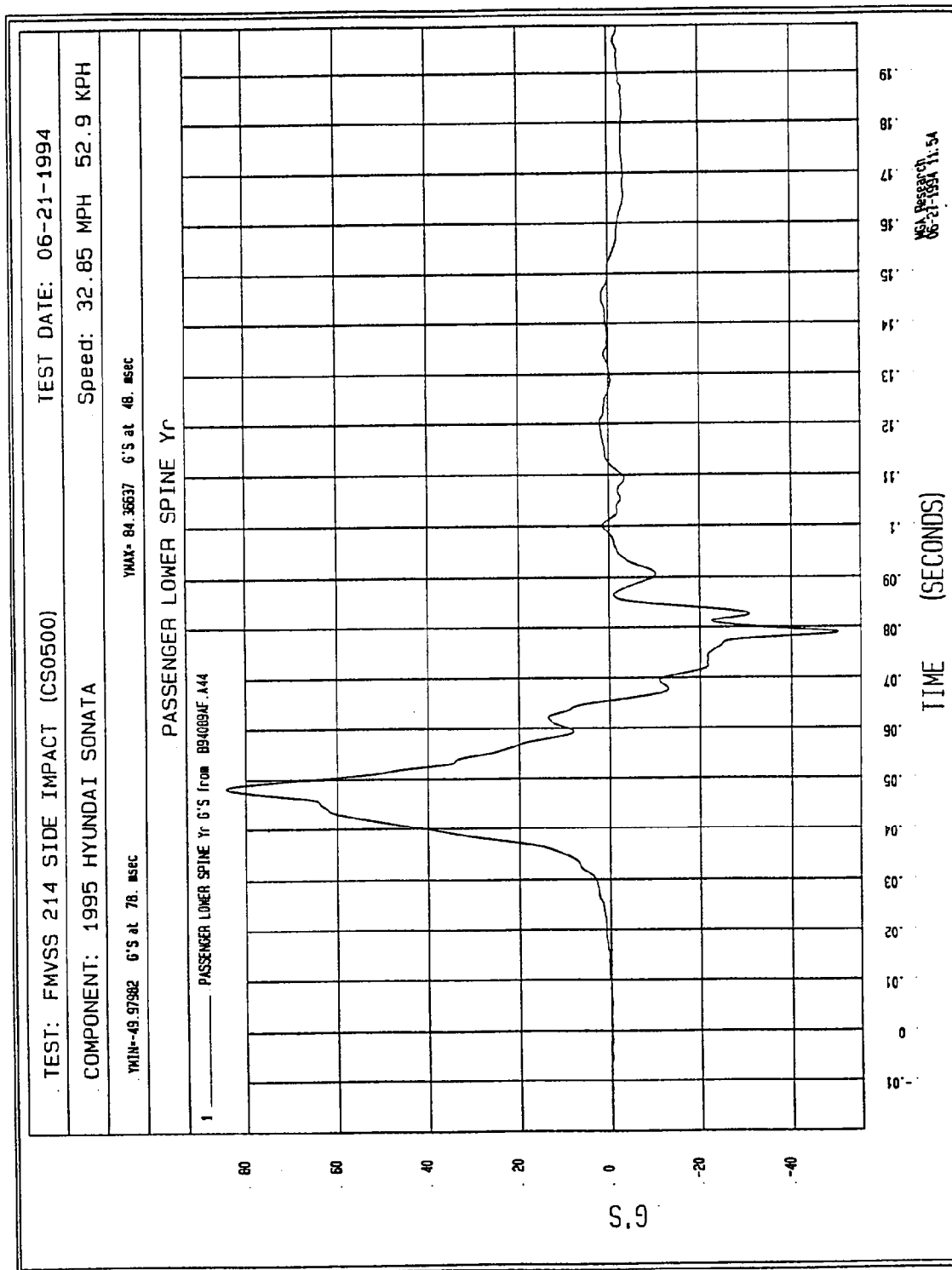


Figure B-77 - Passenger Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

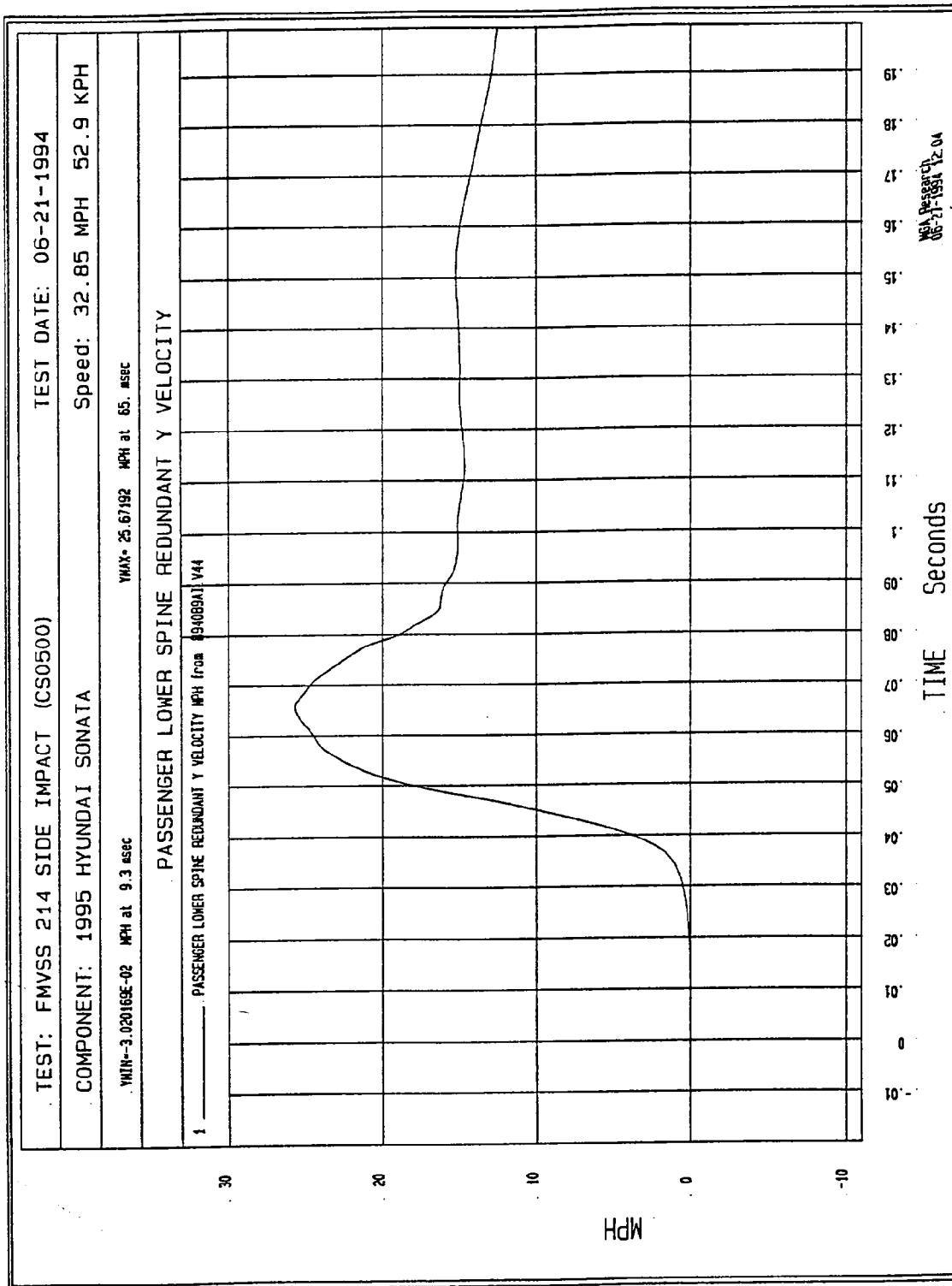


Figure B-78 - Passenger Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

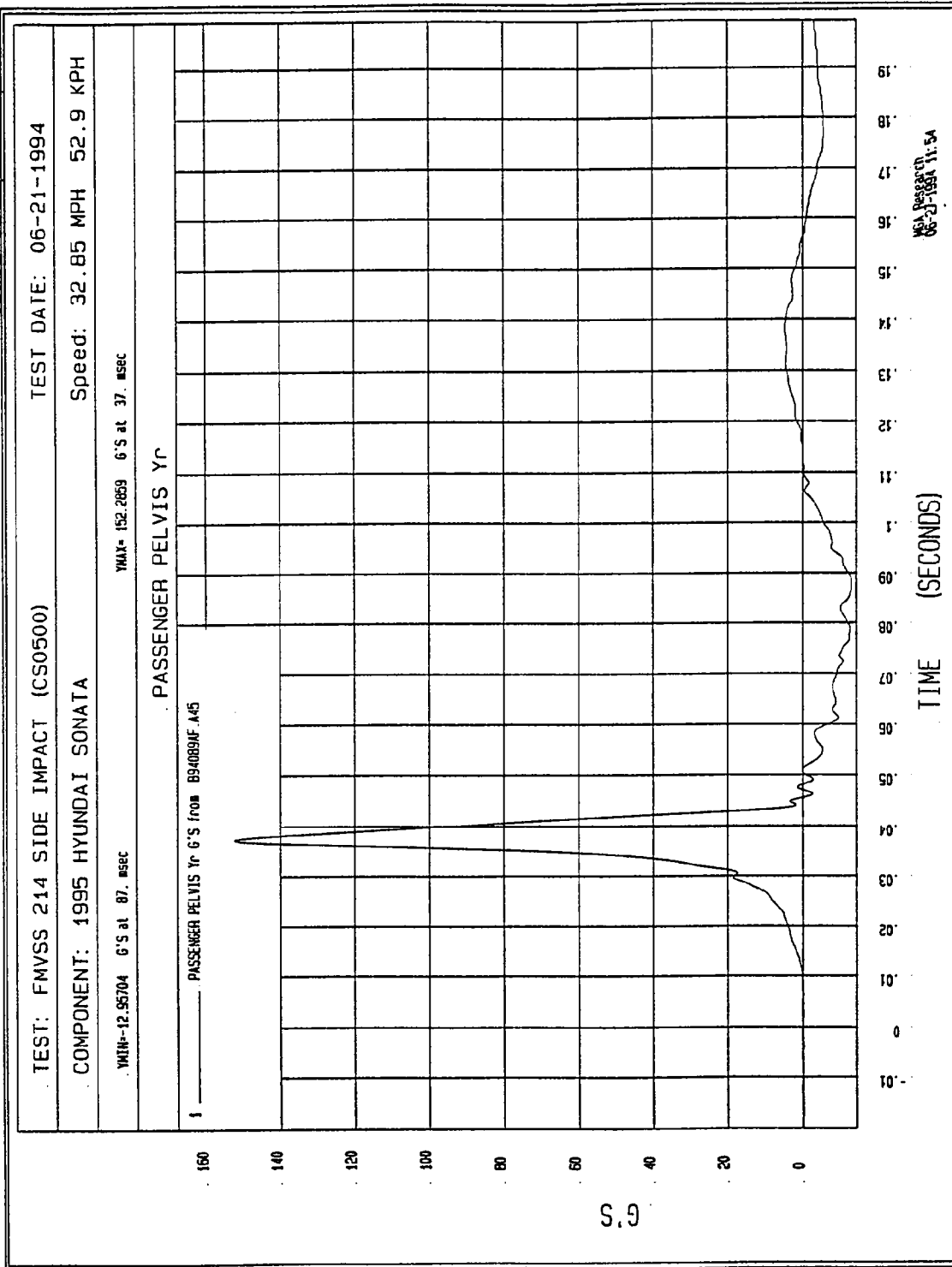


Figure B-79 - Passenger Pelvis Y Redundant Acceleration vs. Time

Filter; Class 180 (300 Hz)

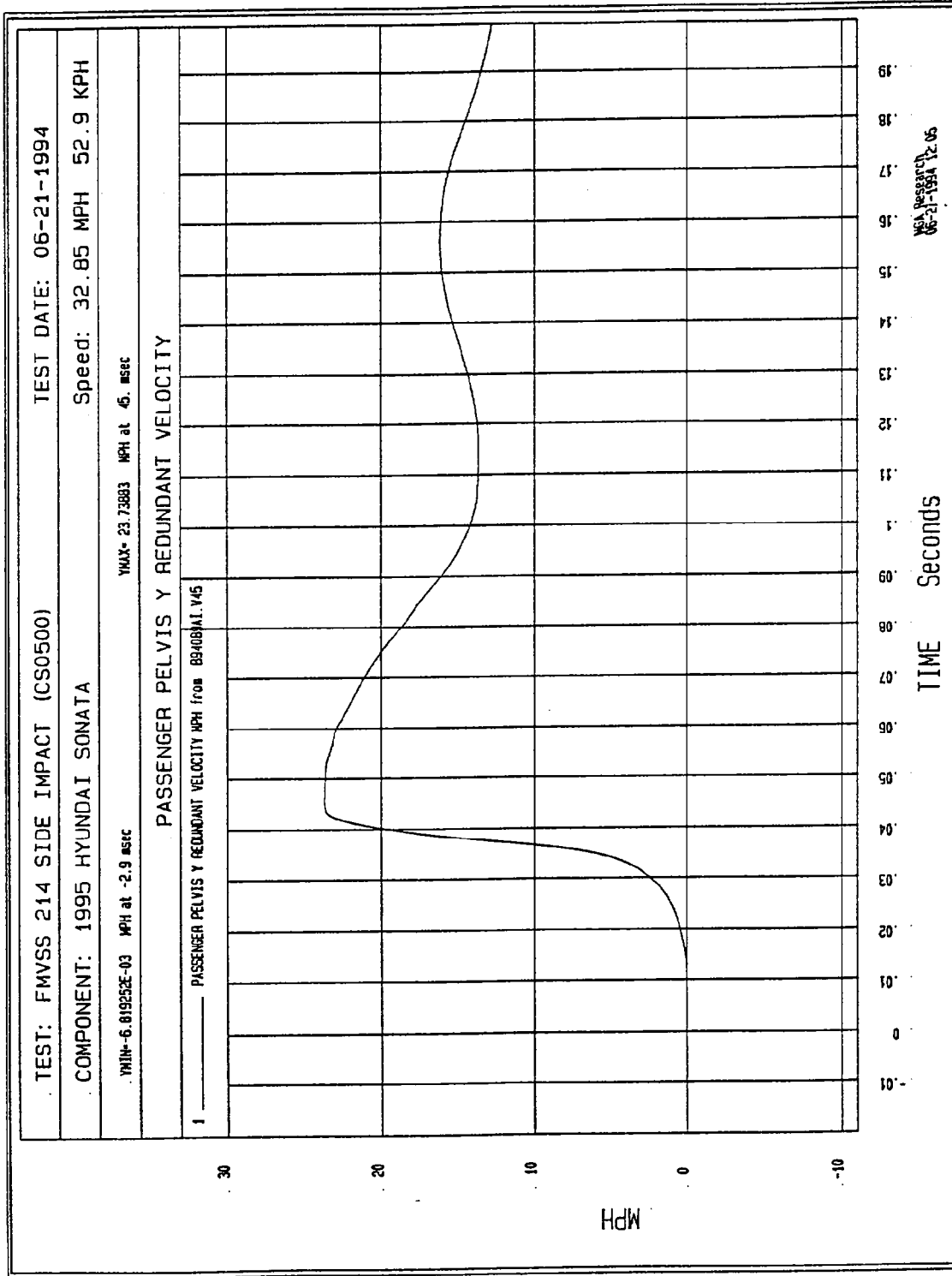


Figure B-80 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

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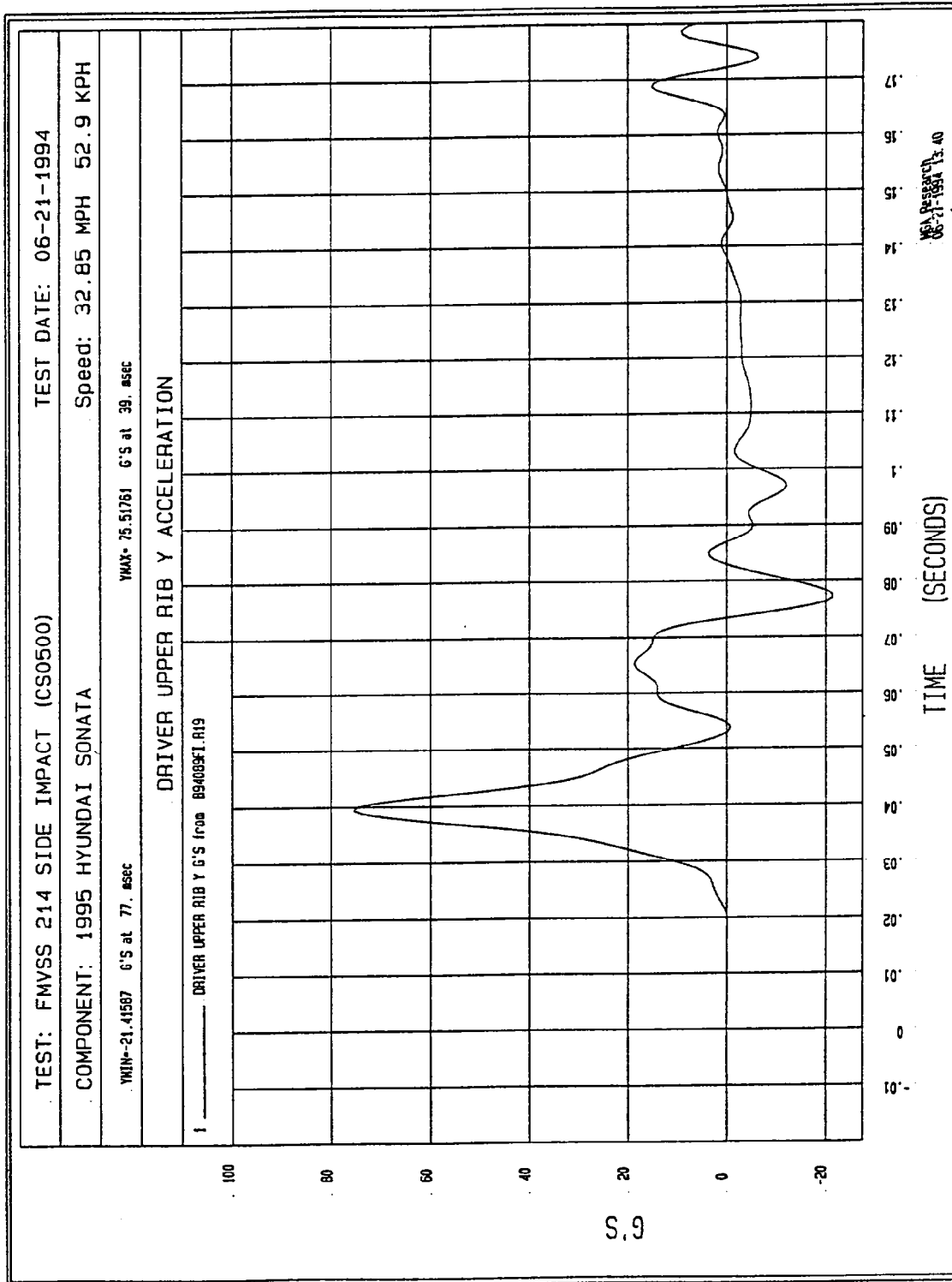


Figure B-81 - Driver Upper Rib Y Acceleration vs. Time

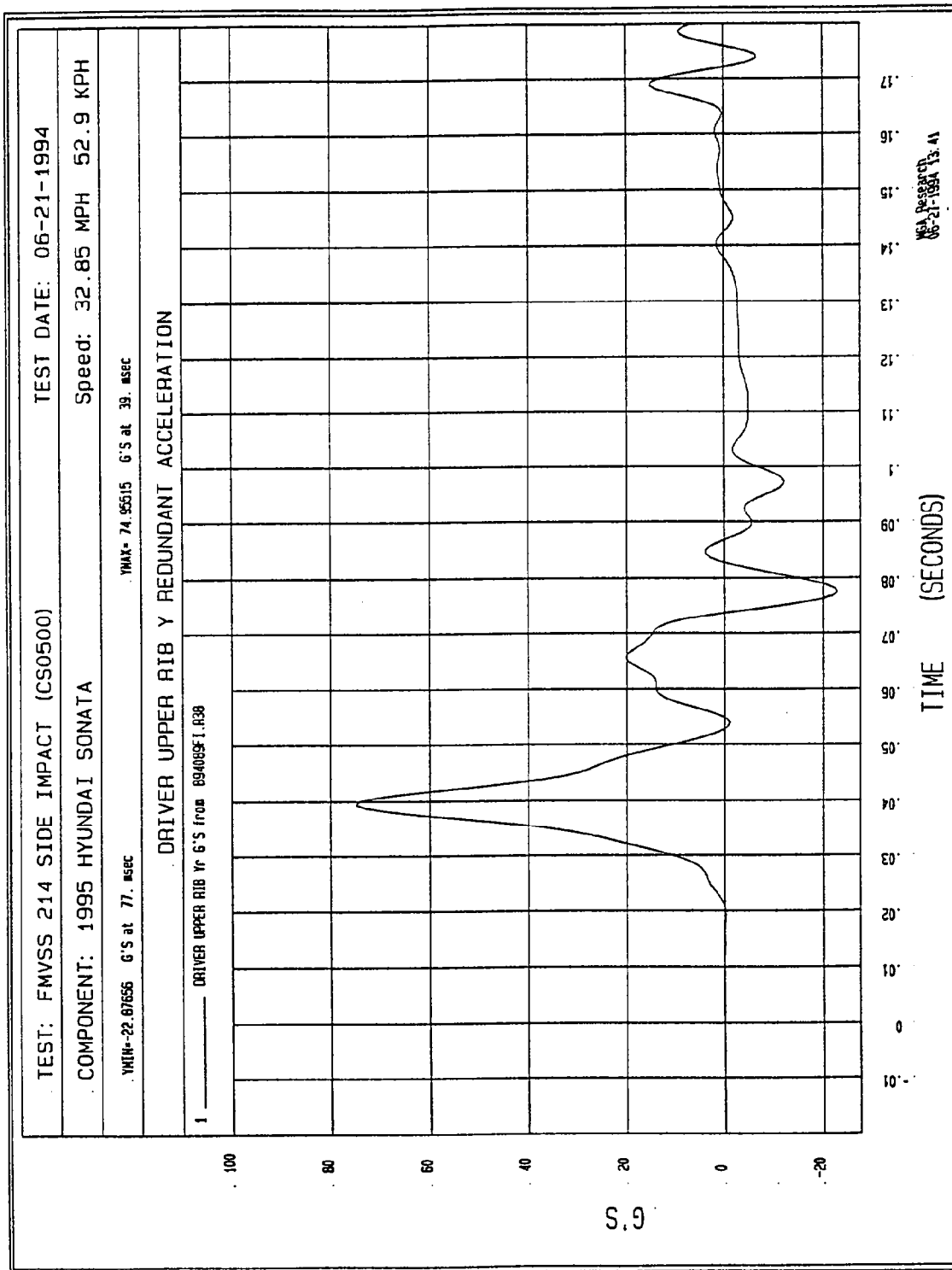


Figure B-82 - Driver Upper Rib Y Redundant Acceleration vs. Time

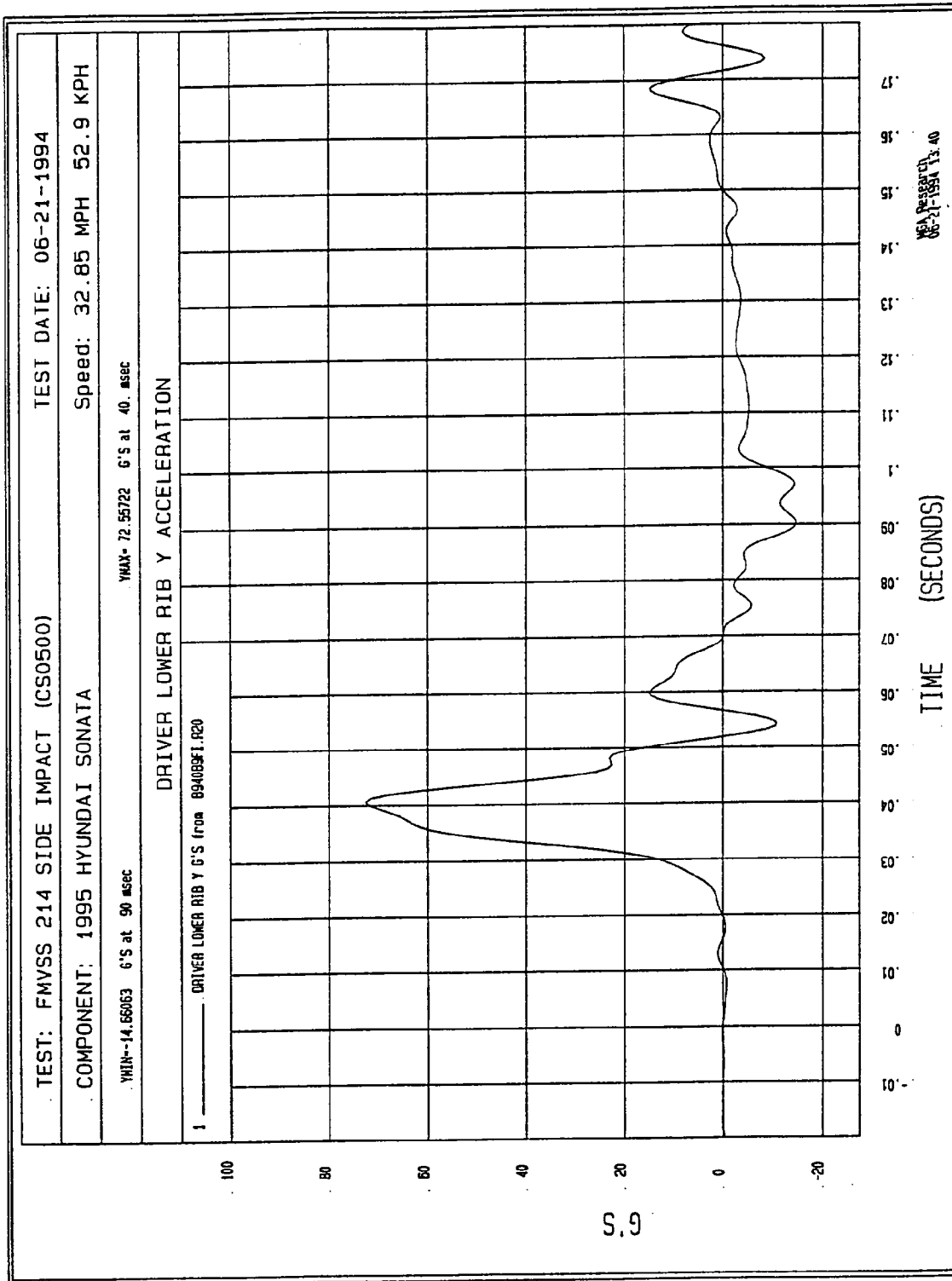


Figure B-83 - Driver Lower Rib Y Acceleration vs. Time

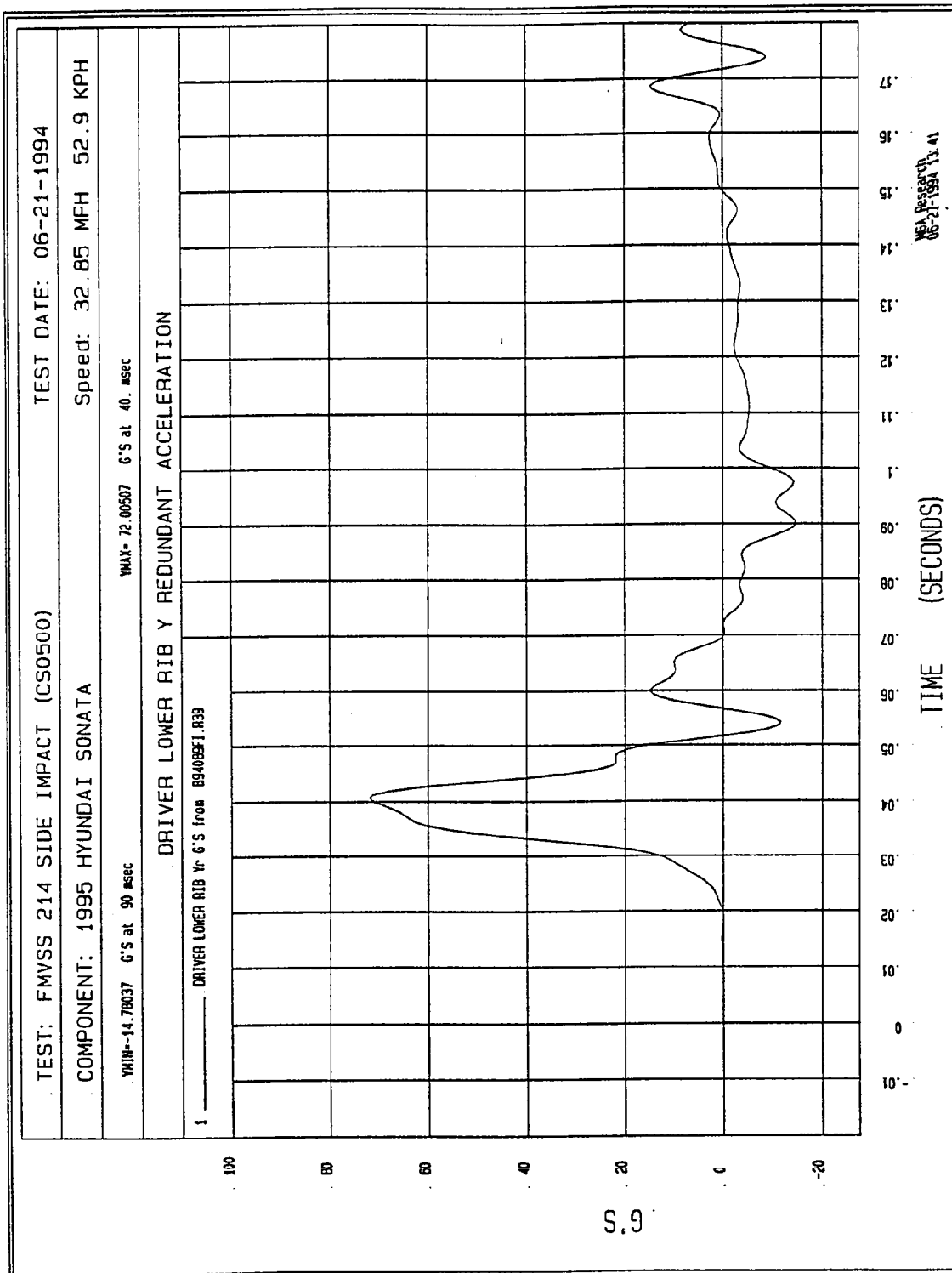


Figure B-84 - Driver Lower Rib Y Redundant Acceleration vs. Time

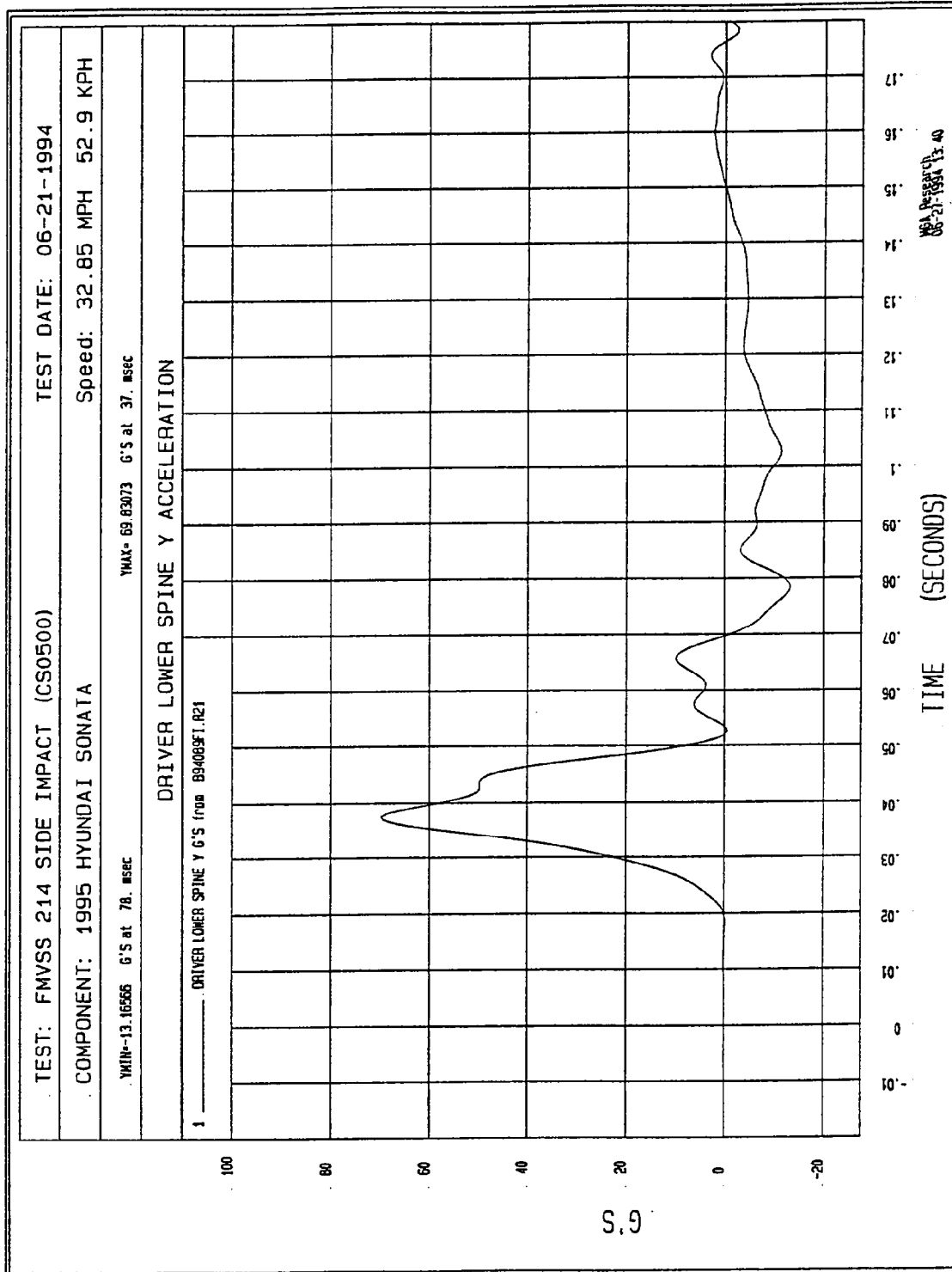


Figure B-85 - Driver Lower Spine Y Acceleration vs. Time

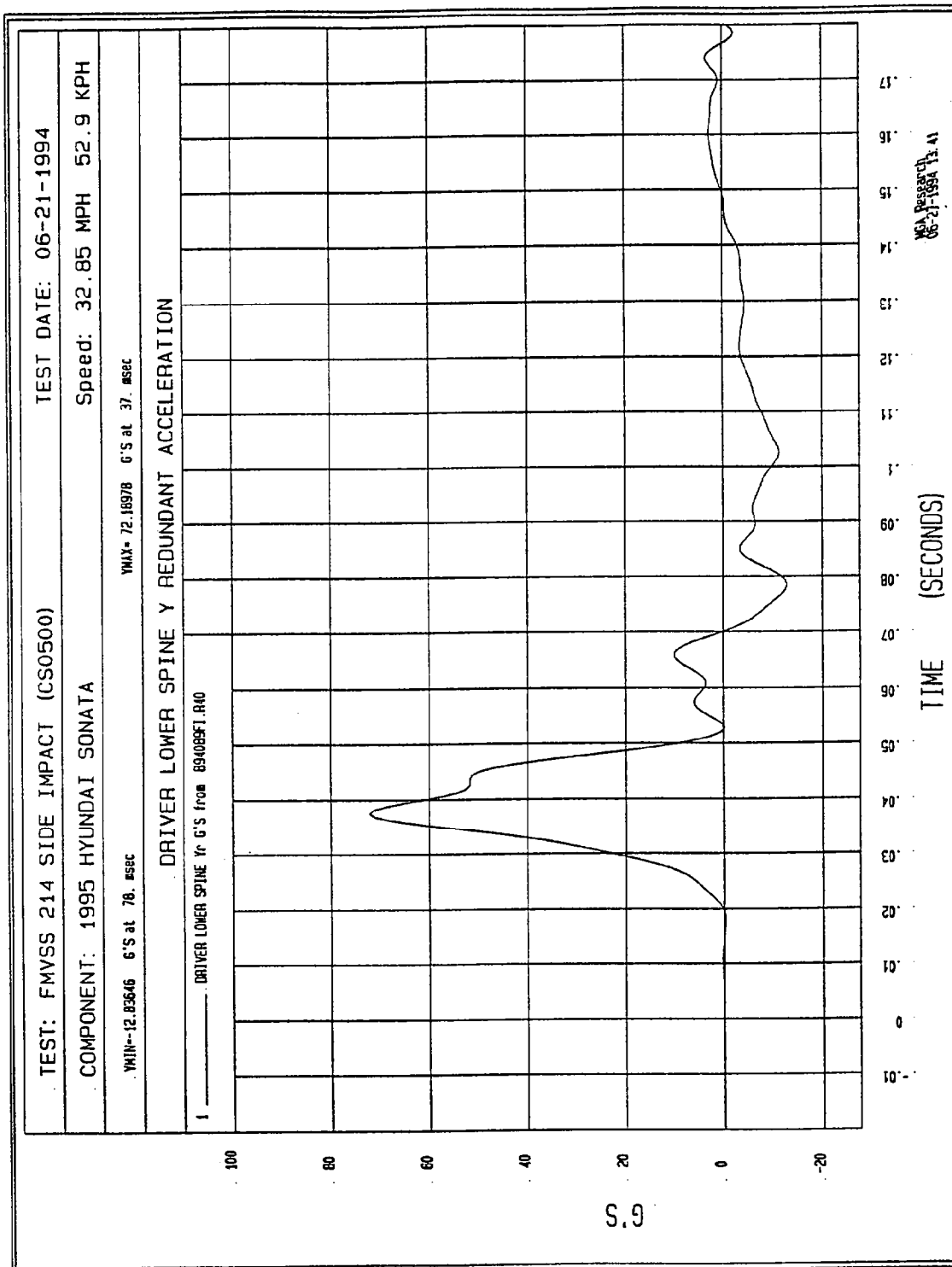


Figure B-86 - Driver Lower Spine Y Redundant Acceleration vs. Time

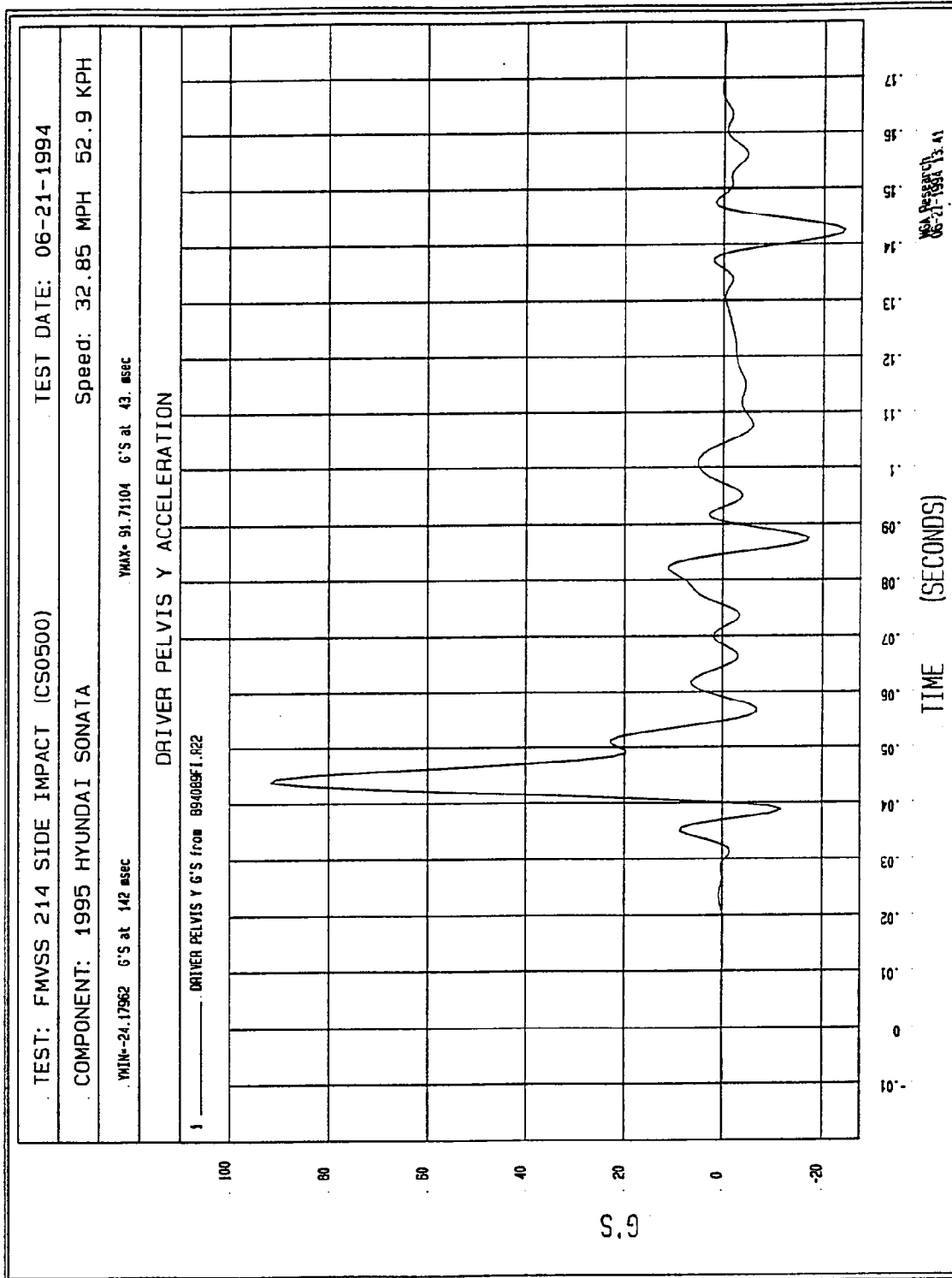


Figure B-87 - Driver Pelvis Y Acceleration vs. Time

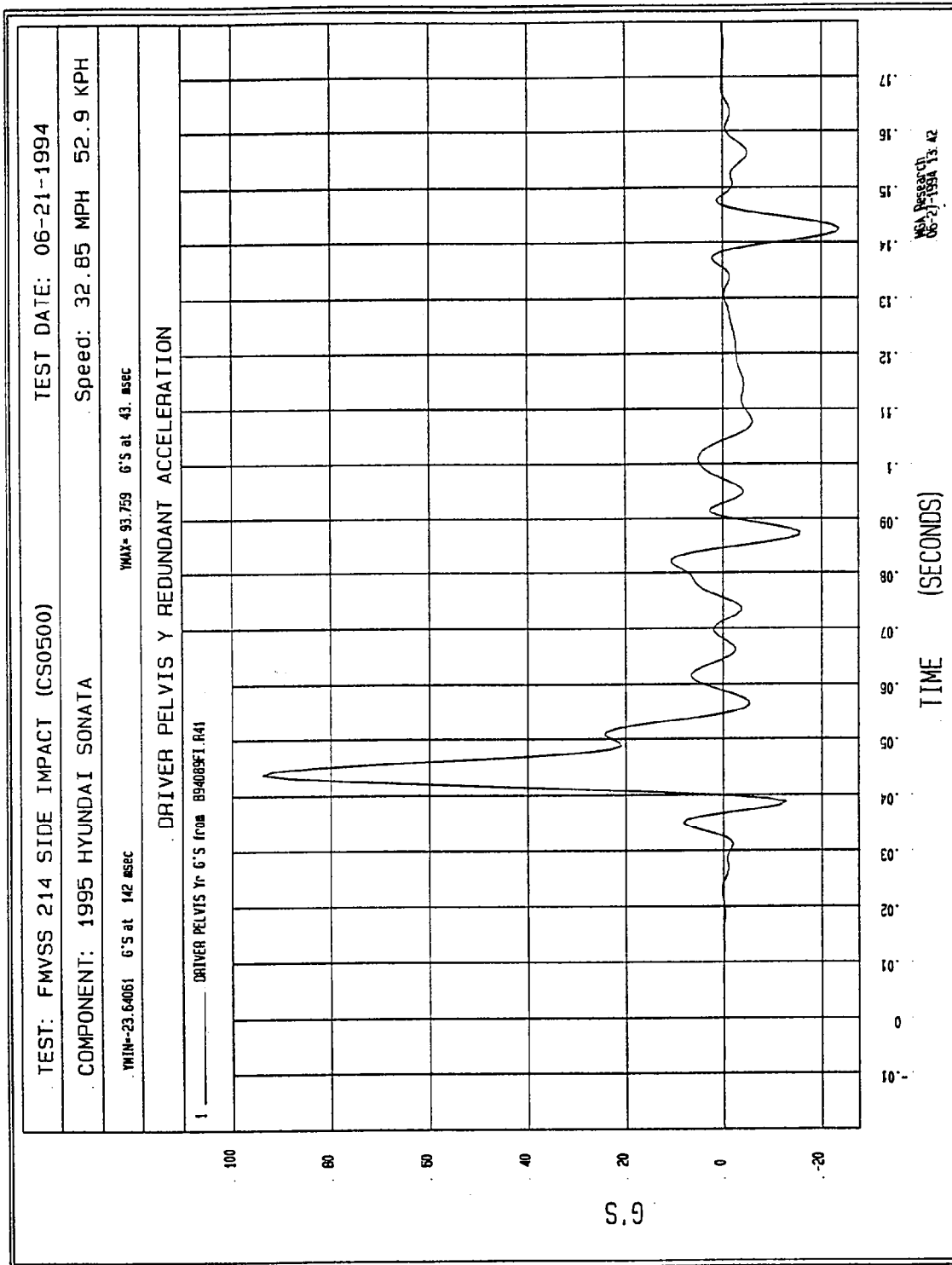


Figure B-88 - Driver Pelvis Y Redundant Acceleration vs. Time

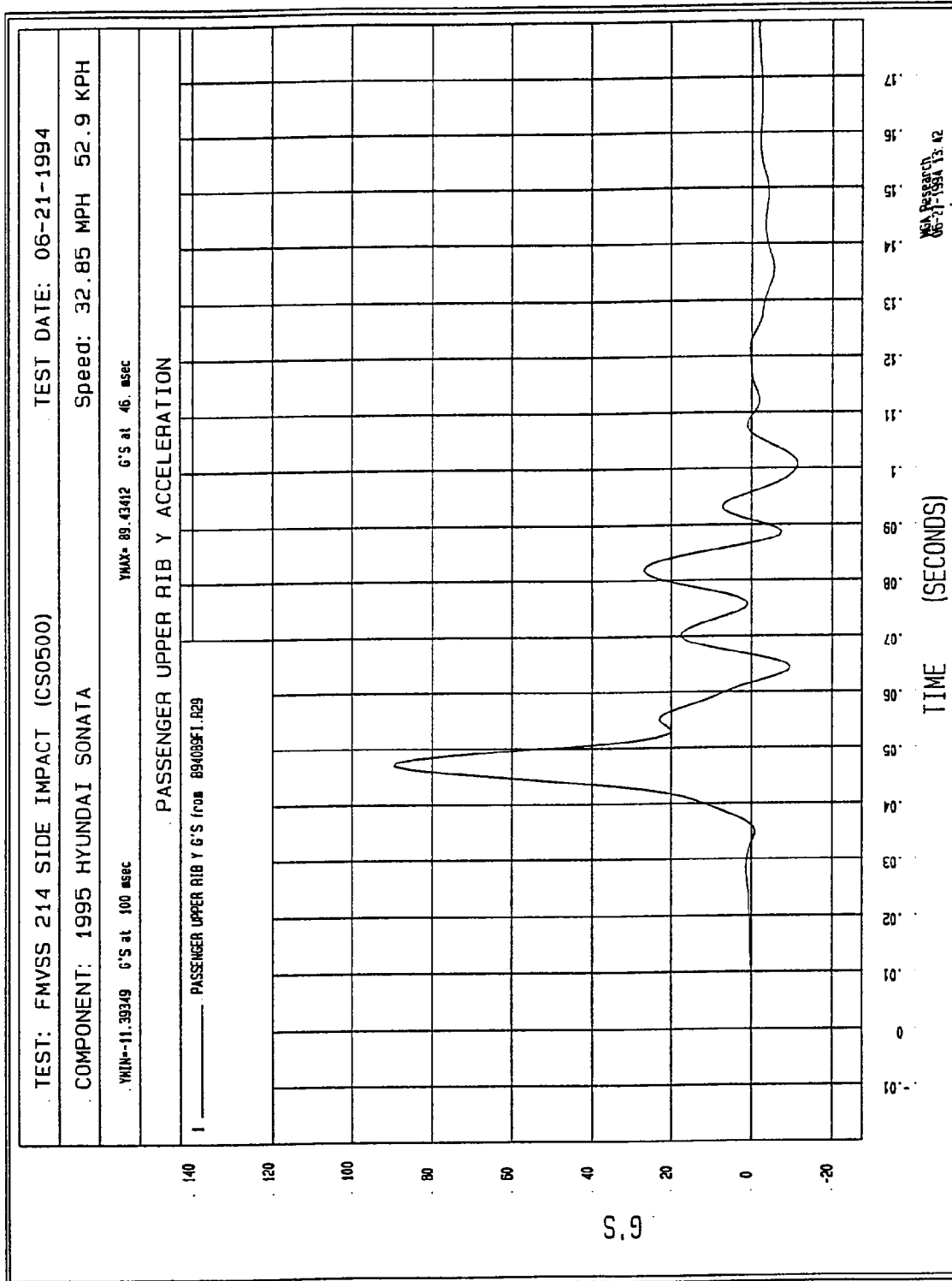
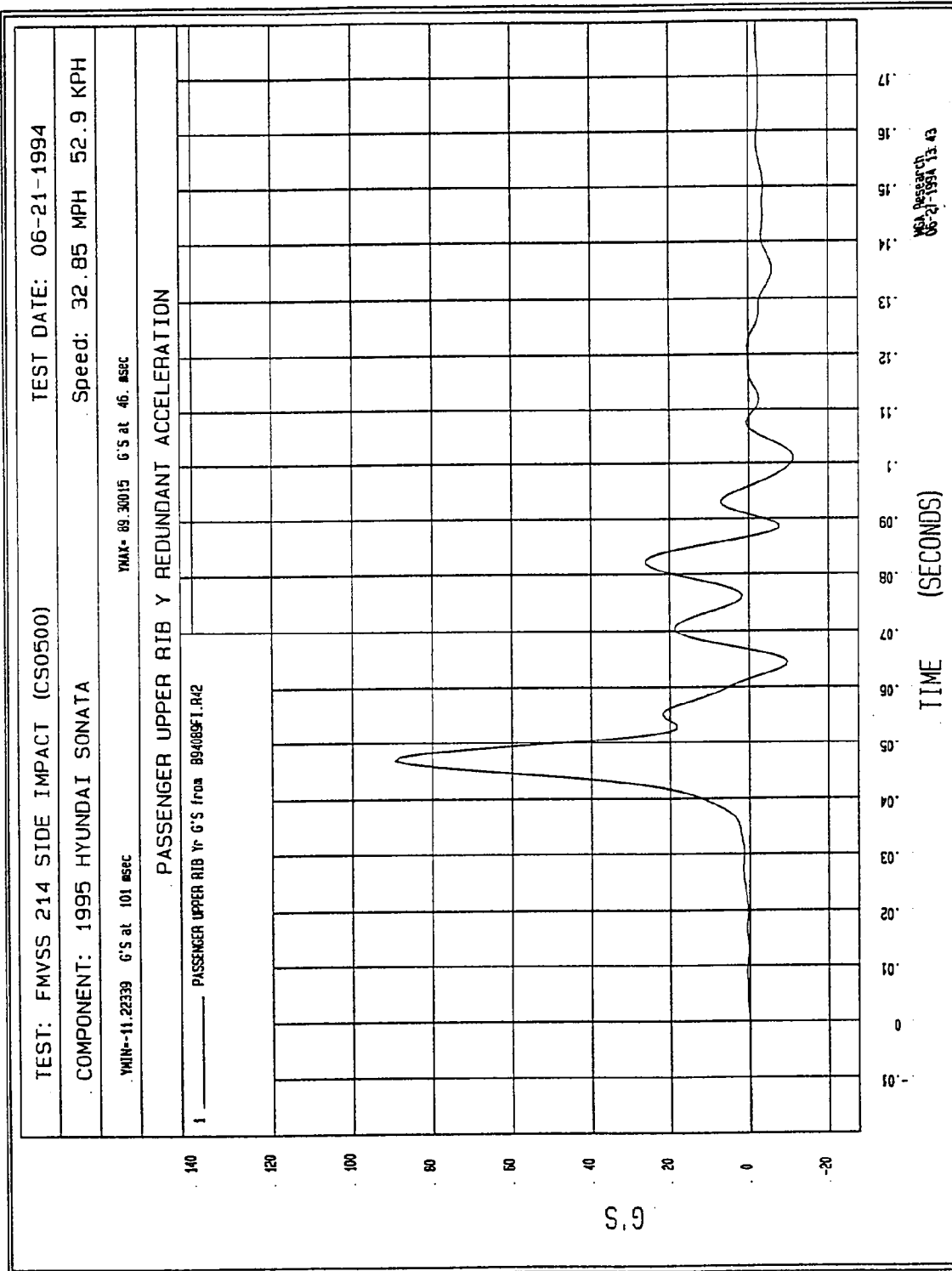


Figure B-89 - Passenger Upper Rib Y Acceleration vs. Time



B-90

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

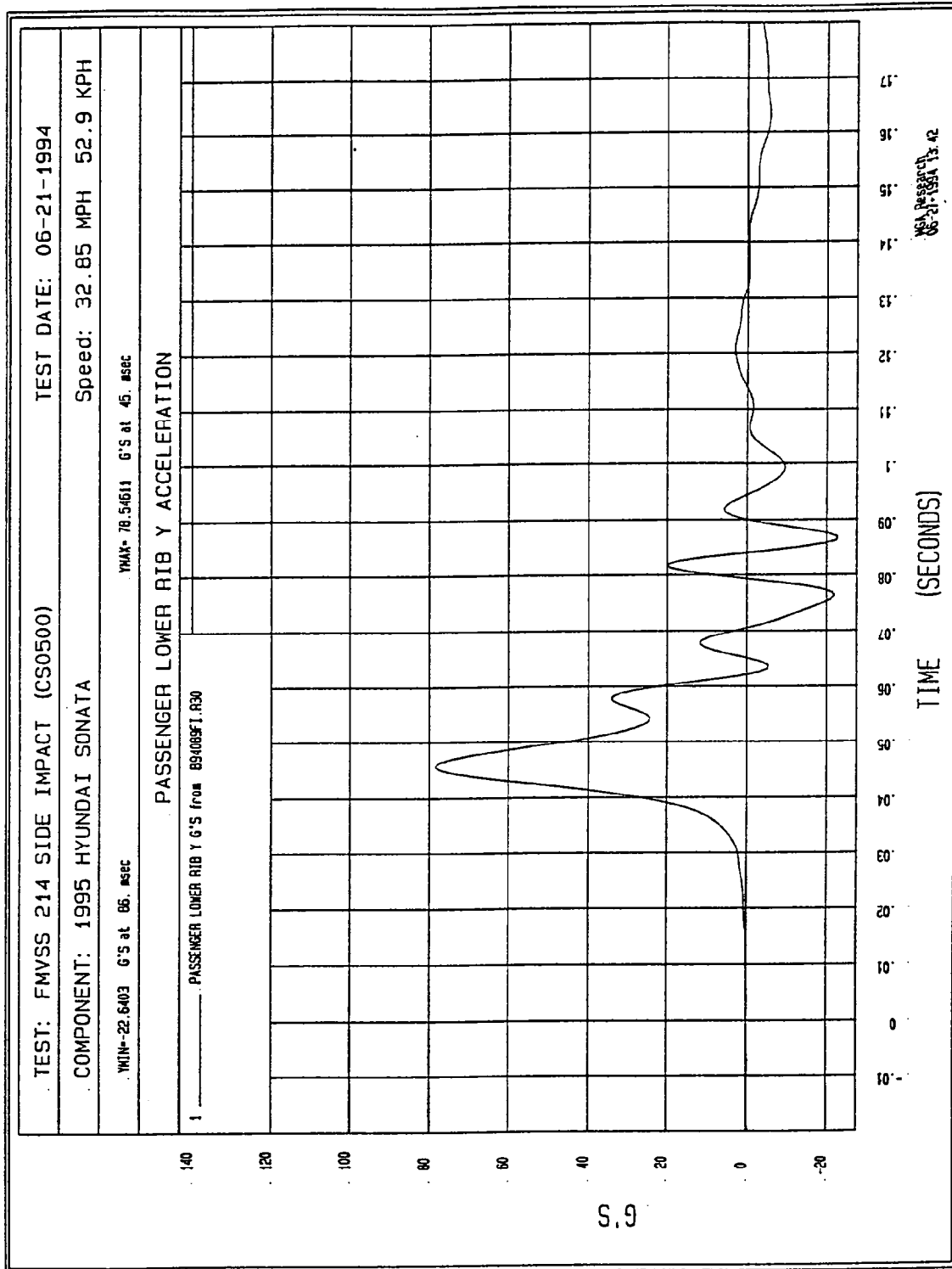


Figure B-91 - Passenger Lower Rib Y Acceleration vs. Time

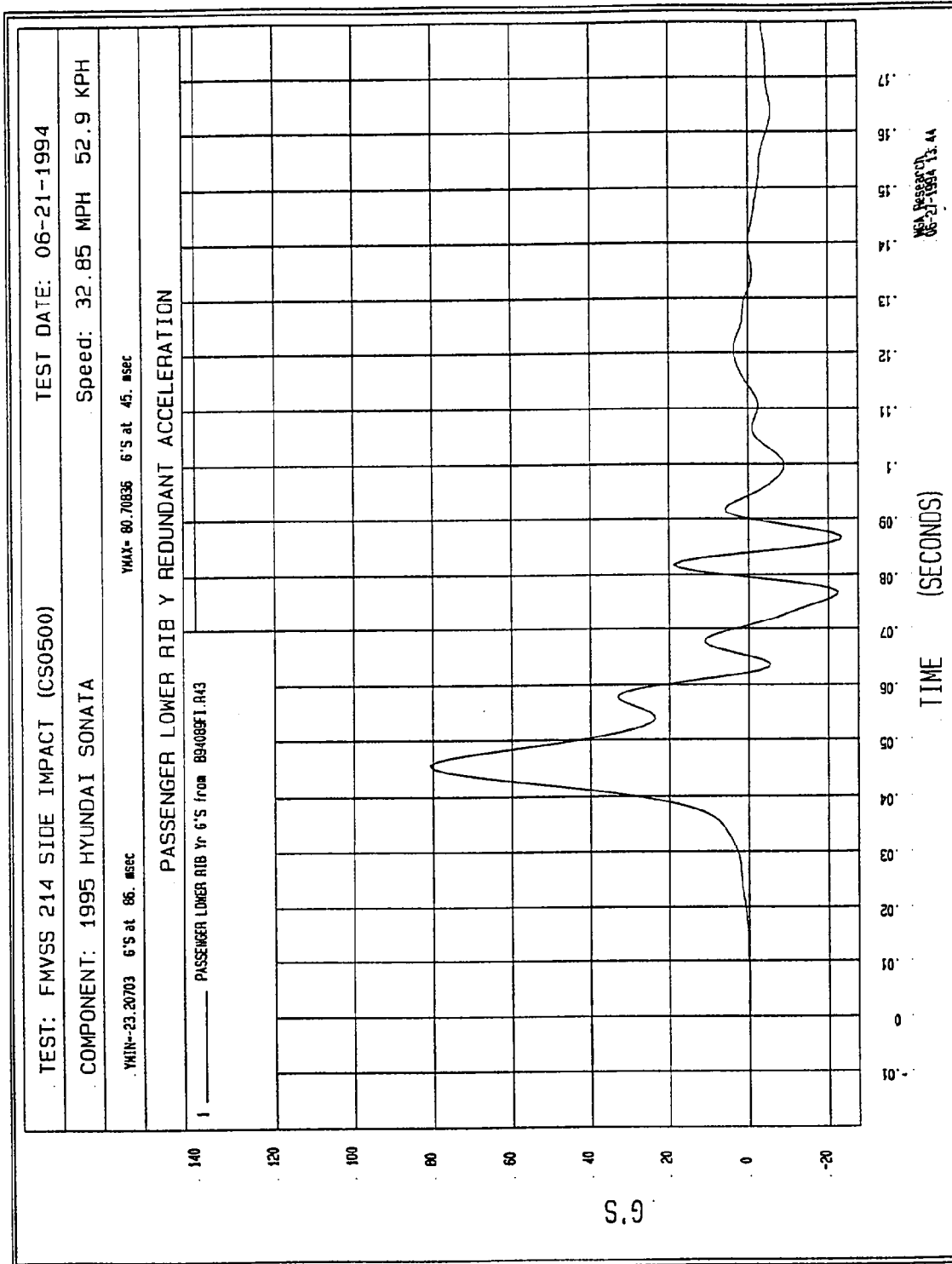


Figure B-92 - Passenger Lower Rib Y Redundant Acceleration vs. Time

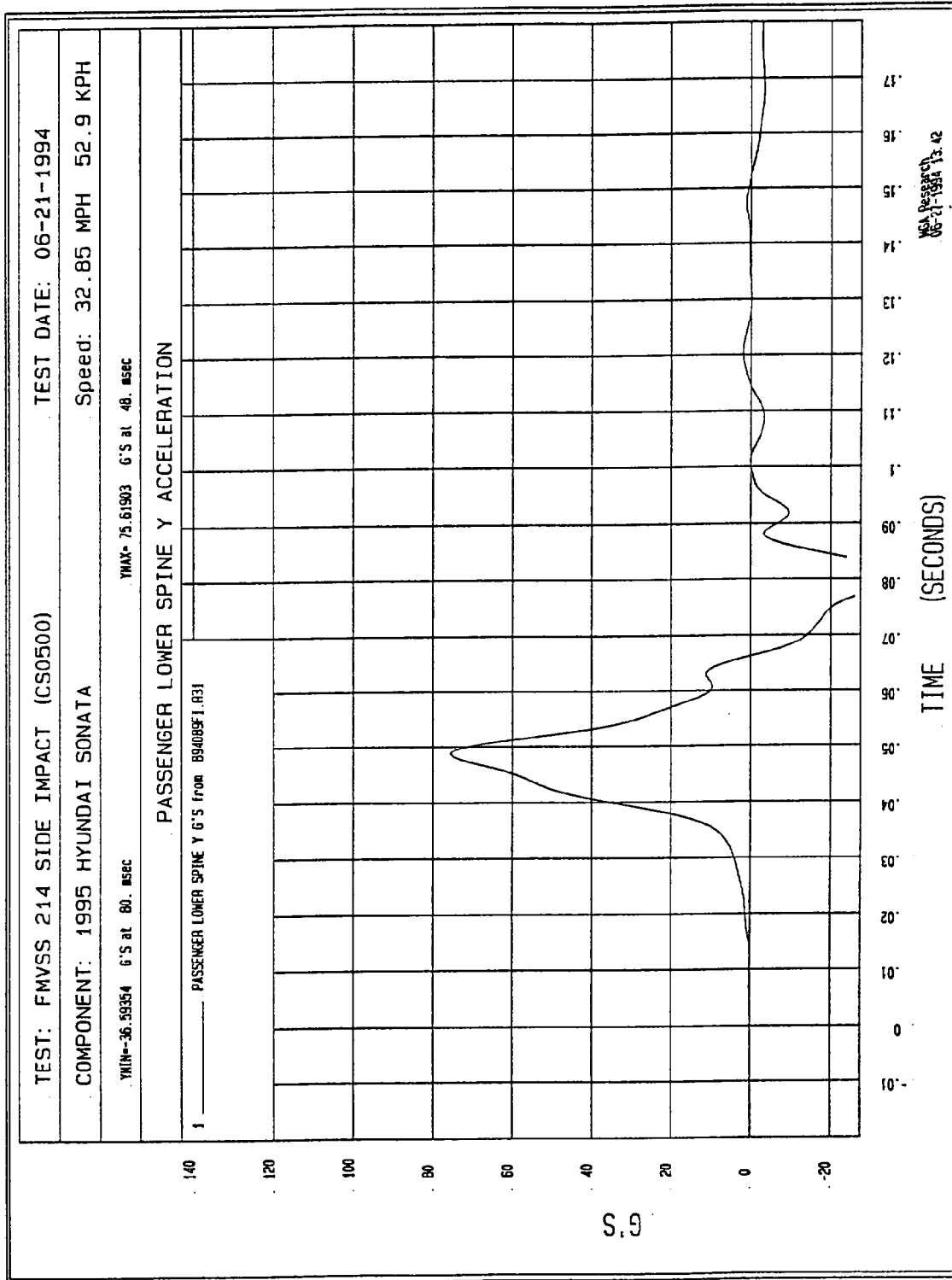


Figure B-93 - Passenger Lower Spine Y Acceleration vs. Time

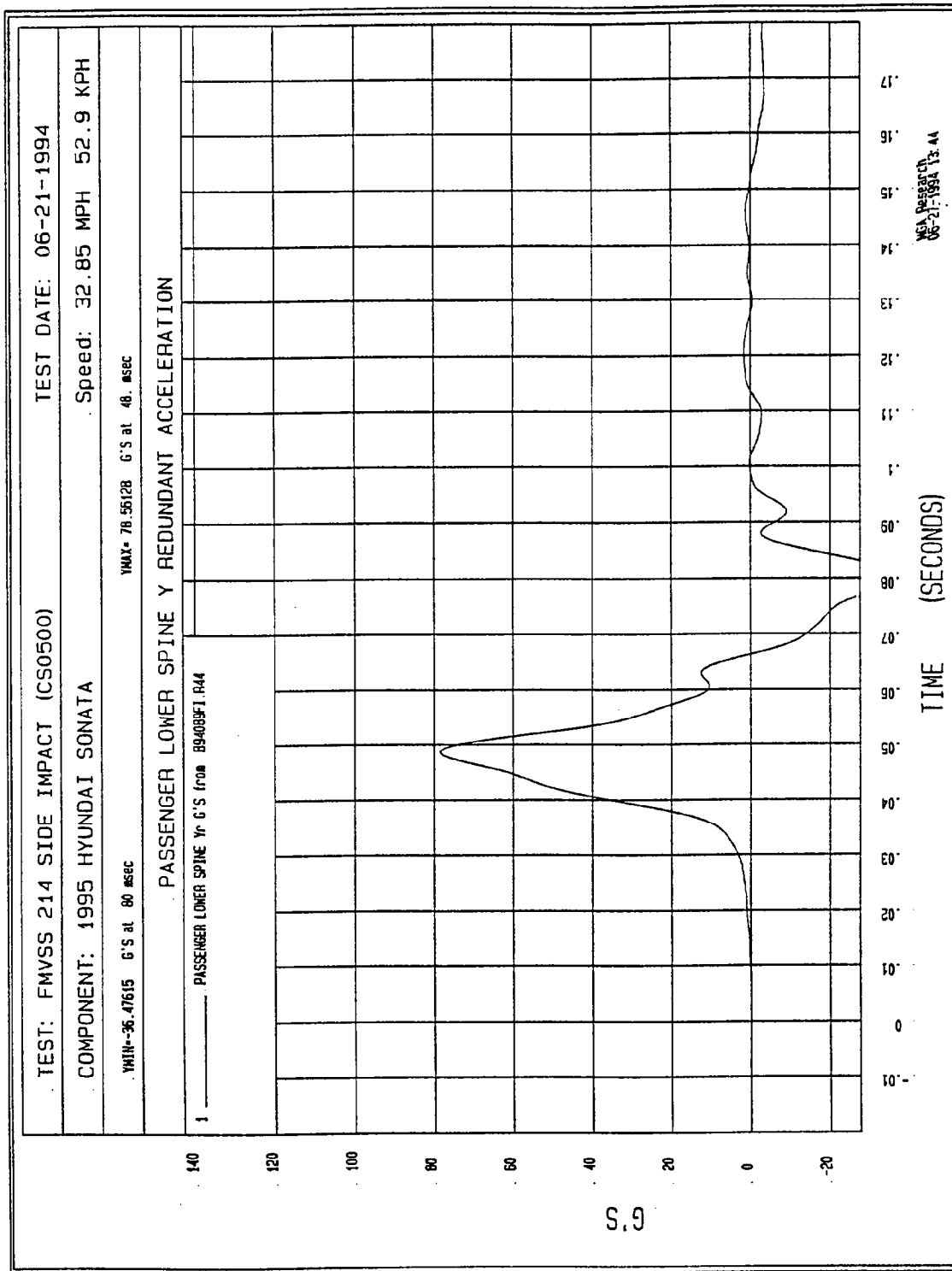


Figure B-94 - Passenger Lower Spine Y Redundant Acceleration vs. Time

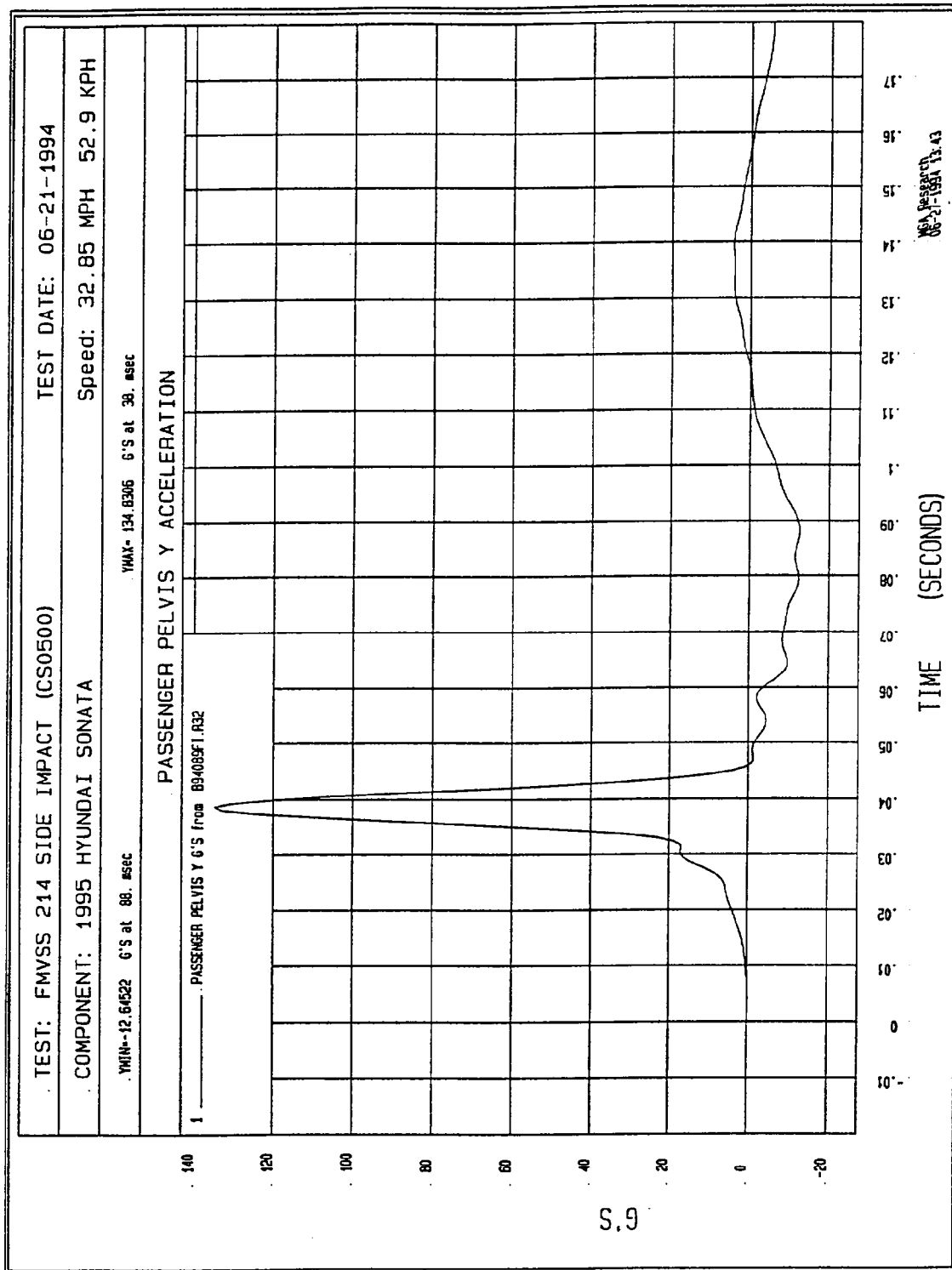


Figure B-95 - Passenger Pelvis Y Acceleration vs. Time

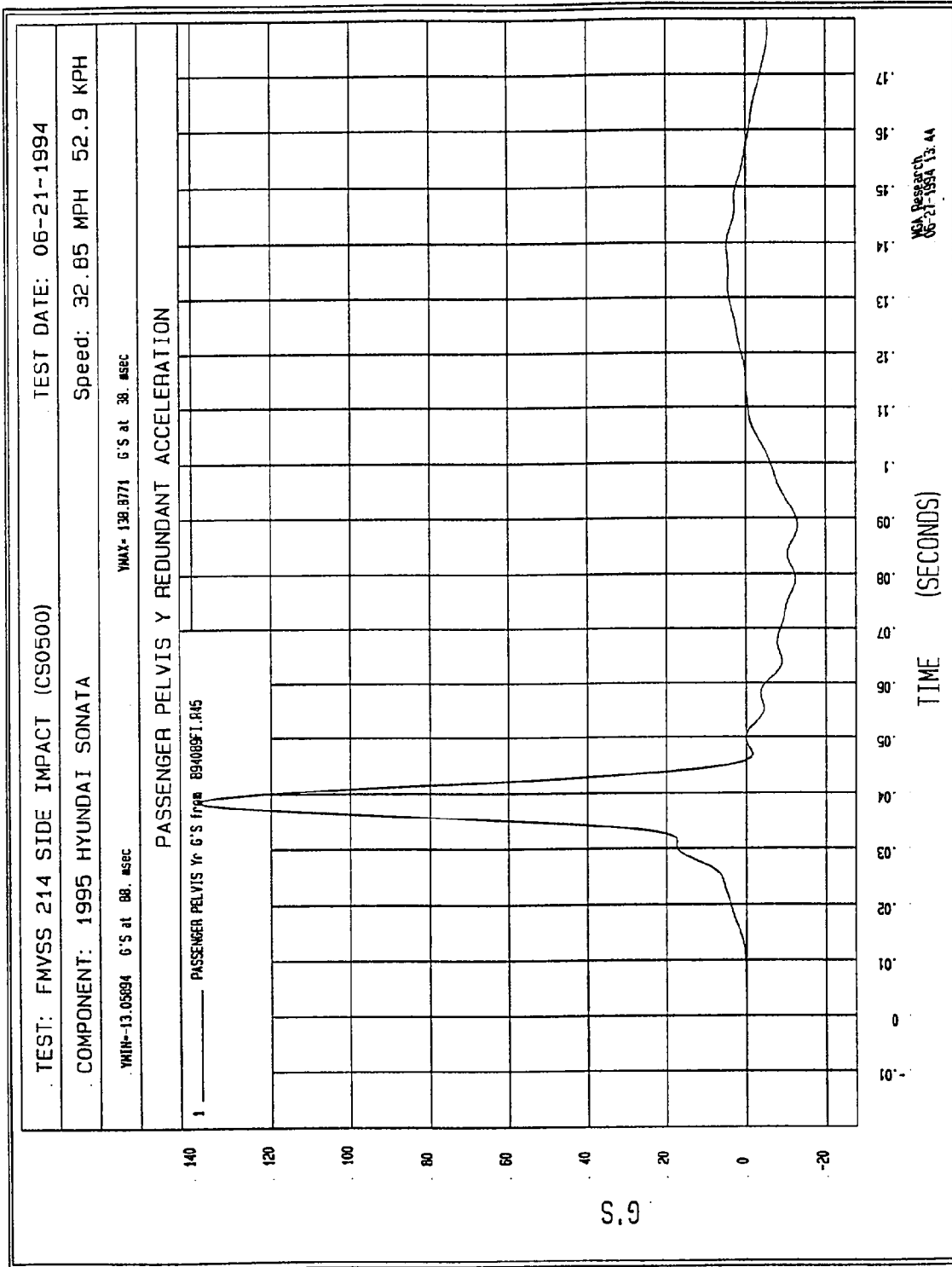


Figure B-96 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-94-DC010

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

HYUNDAI MOTORS
1995 HYUNDAI SONATA 4 DOOR SEDAN
NETSA NO. CS0500

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: June 21, 1994

Report Date: July 15, 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.
Pelvic Impact Tests:	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 17, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.5
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"	9.4
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.6
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)

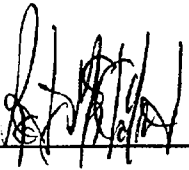
DATE: June 17, 1994

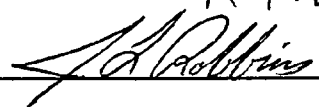
DUMMY NUMBER: 270

TEST NUMBER: D94192

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	71°
RELATIVE HUMIDITY	10 - 70%	54%
PROBE SPEED	13.8 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	41
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN 

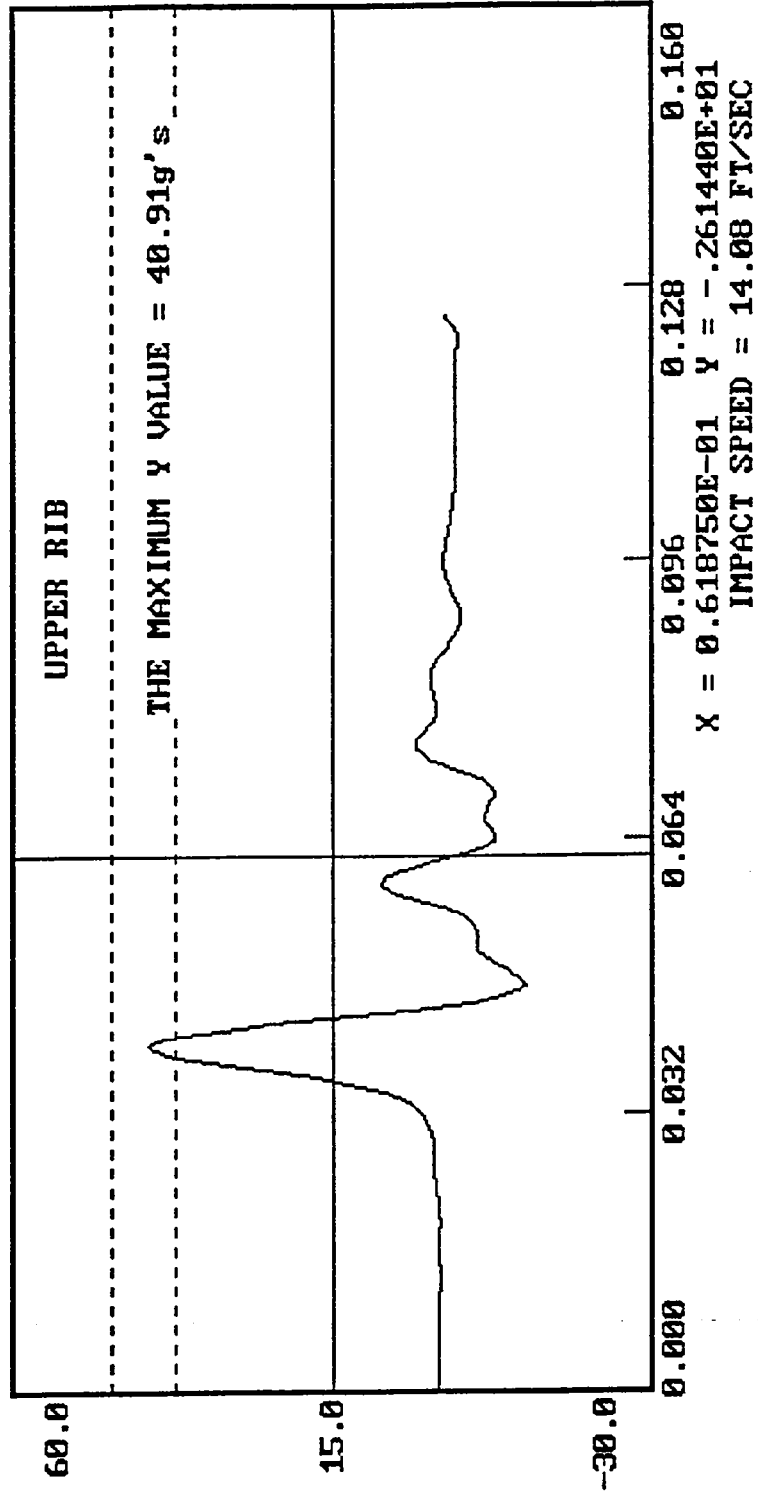
APPROVED BY 

06-17-1994 12:36

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

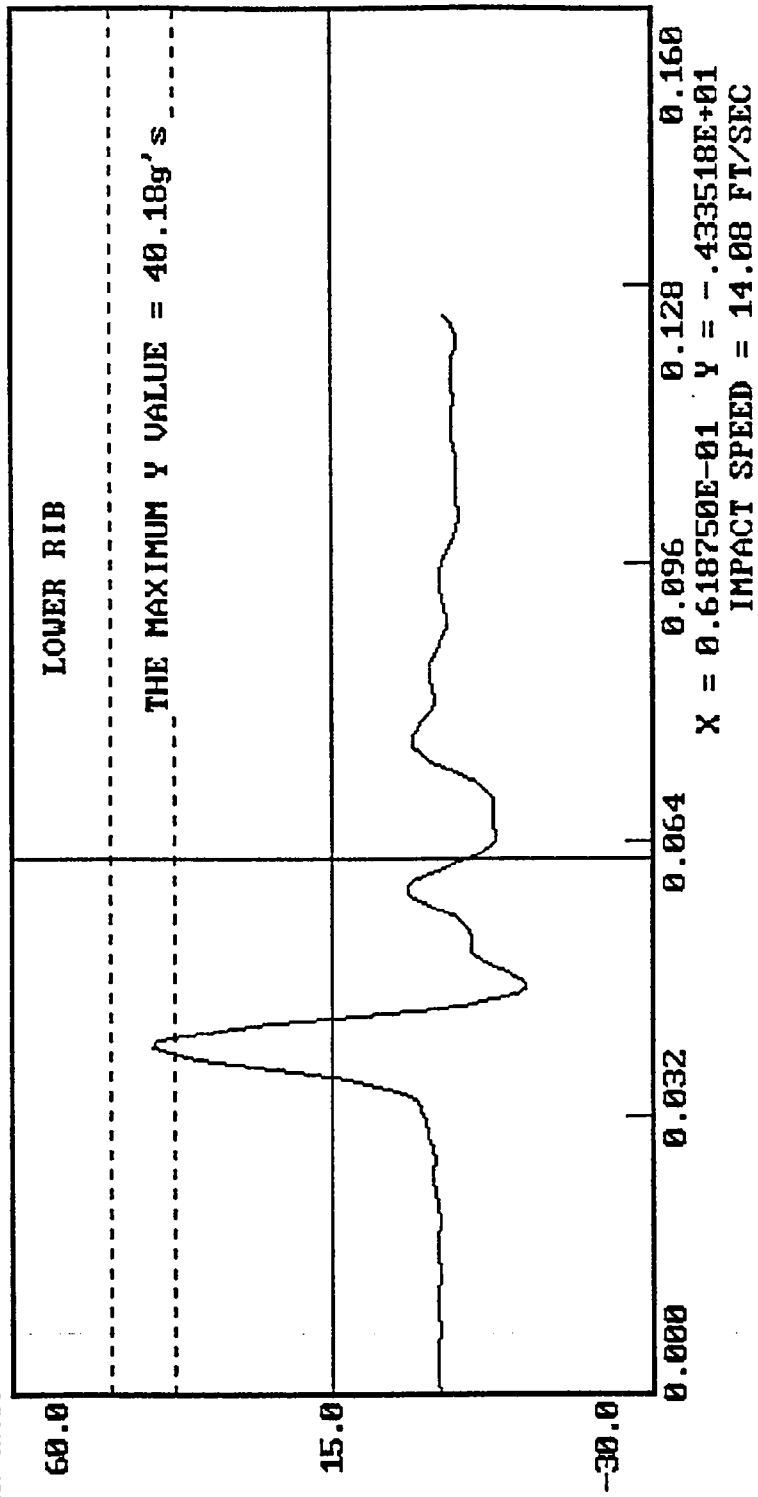
ACCELERATION (G'S) VS. TIME ((SECONDS))



06-17-1994 12:36

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 270

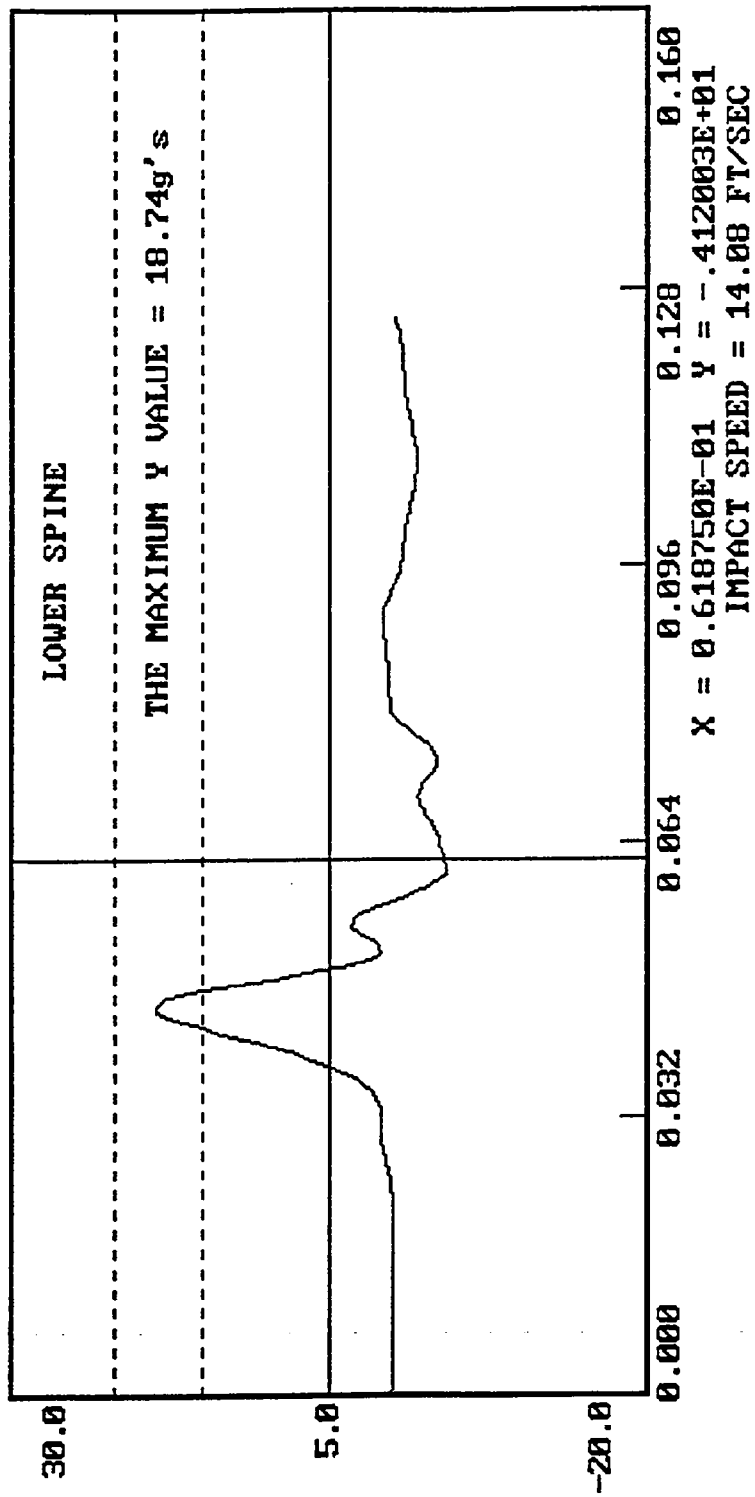
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 270

06-17-1994 12:36

() VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

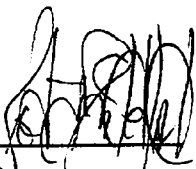
DATE: June 20, 1994

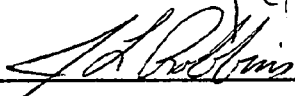
DUMMY NUMBER: 270

TEST NUMBER: D94193

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	62%
PROBE SPEED	13.8 - 14.2 fps	13.8
PELVIS ACCELERATION	40 - 60 g's	58

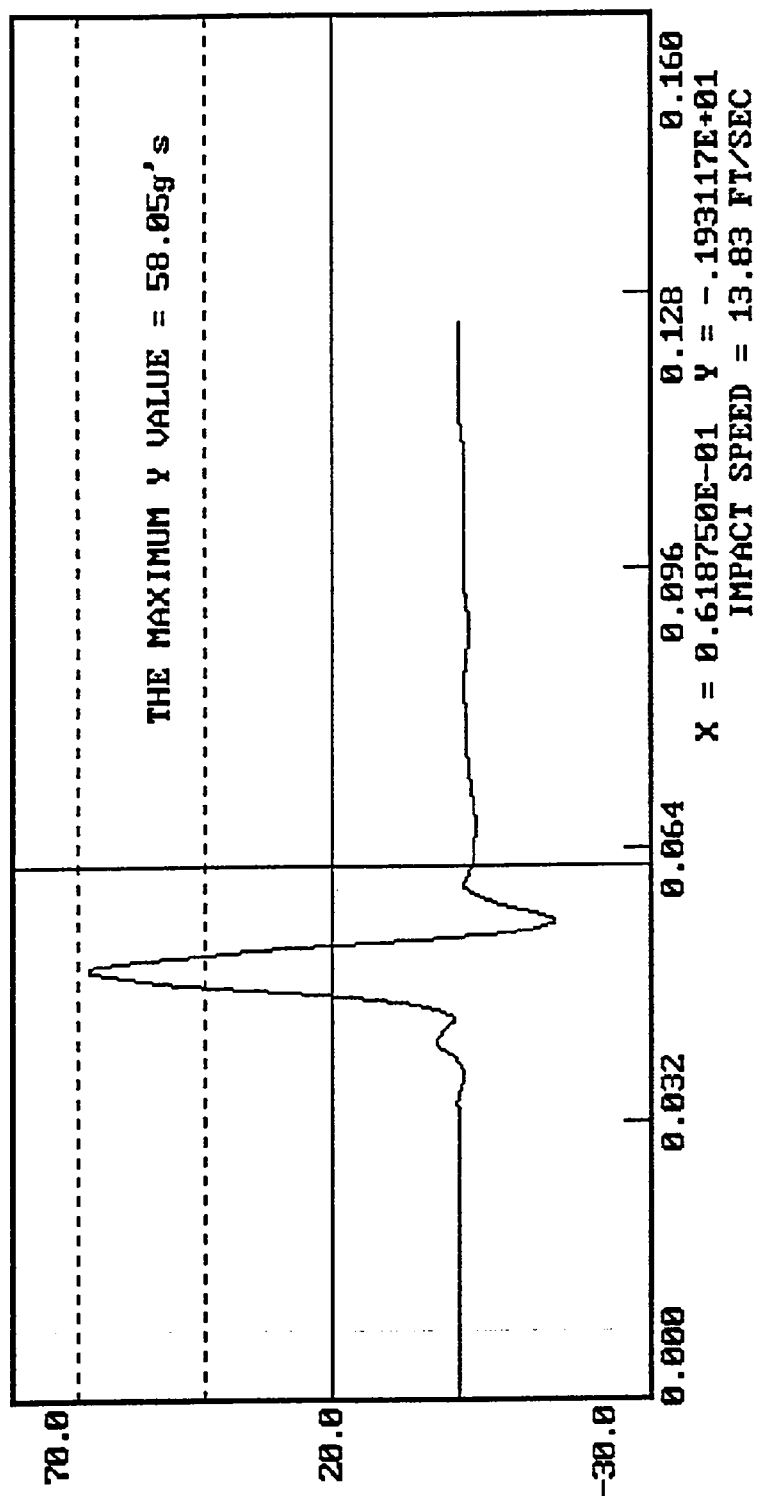
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

06-20-1994 14:49

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 20, 1994

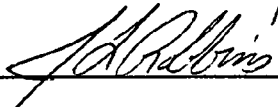
DUMMY NUMBER: 270

TEST NUMBER: D94194

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	60%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.3
FORCE @ 0.75 in	36.7 - 49.8 lbs	46.2
FORCE @ 1.0 in	50 - 63 lbs	60
FORCE @ 1.3 in	73 - 88 lbs	80

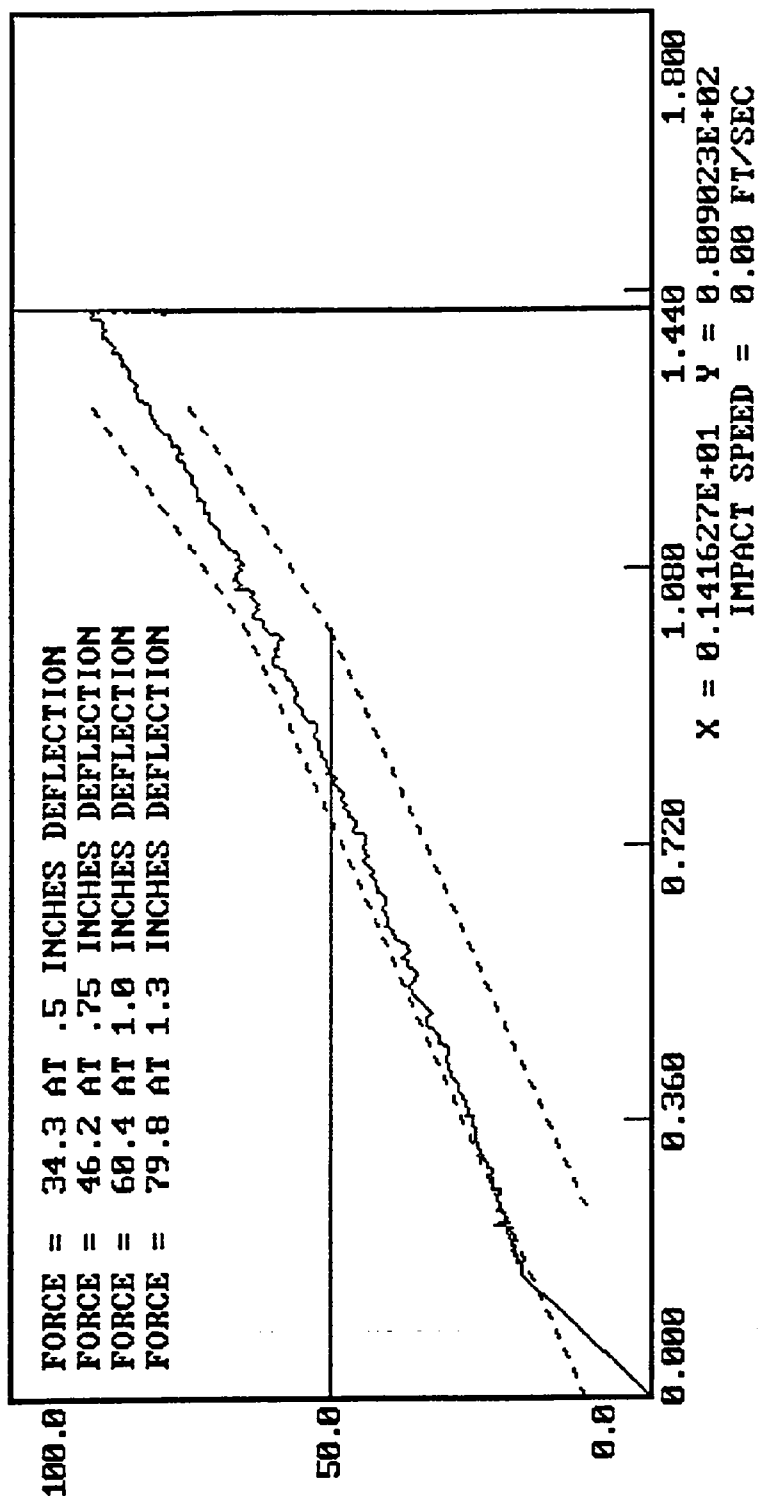
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 270
 06-20-1994 15:19

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 20, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94195

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	60%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	28
FORCE @ 30°	34 - 46 lbs	44
FORCE @ 40°	46 - 58 lbs	52
RETURN ANGLE	12° maximum	3°

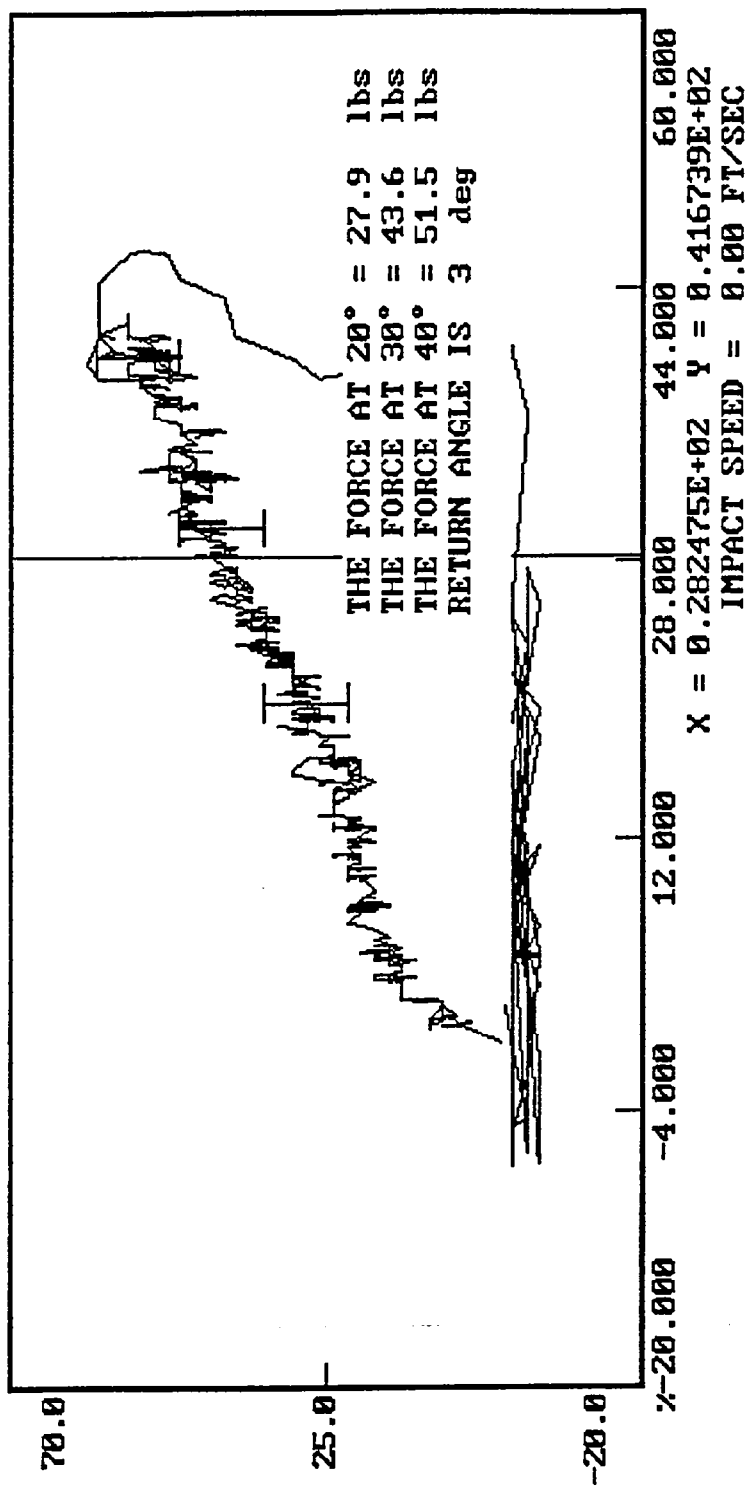
TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

06-28-1994 16:14

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.
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.

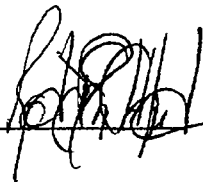
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

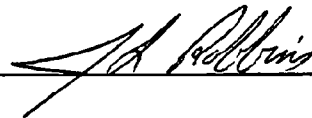
DATE OF VERIFICATION: June 17, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.5
RH - Rib Height	19.75 - 20.5"	20.3
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"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____



APPROVED BY: _____



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

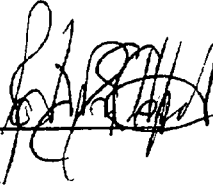
DATE: June 17, 1994

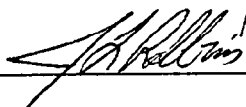
DUMMY NUMBER: 272

TEST NUMBER: D94202

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	50%
PROBE SPEED	13.8 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	44
LOWER RIB	37 - 46 g's	41
LOWER SPINE	15 - 22 g's	20

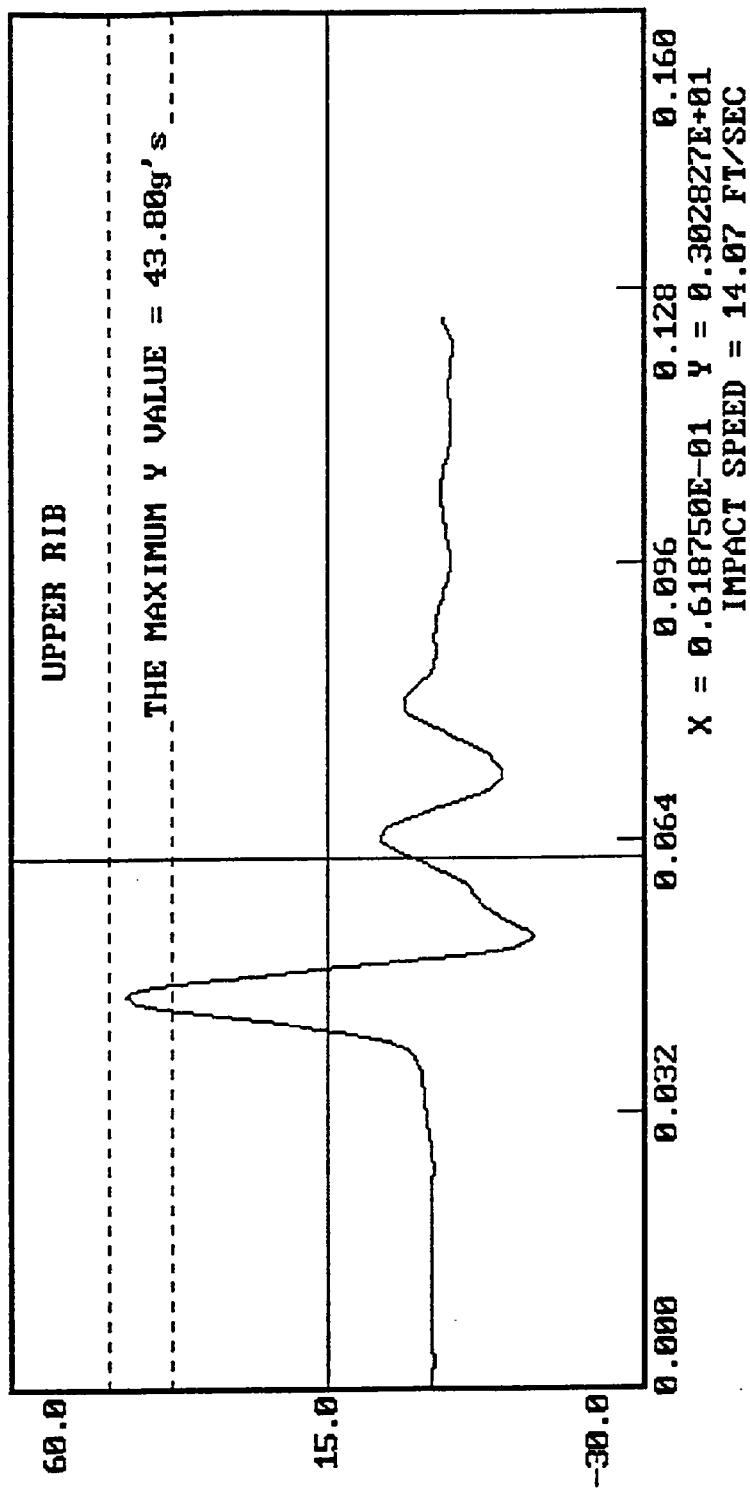
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

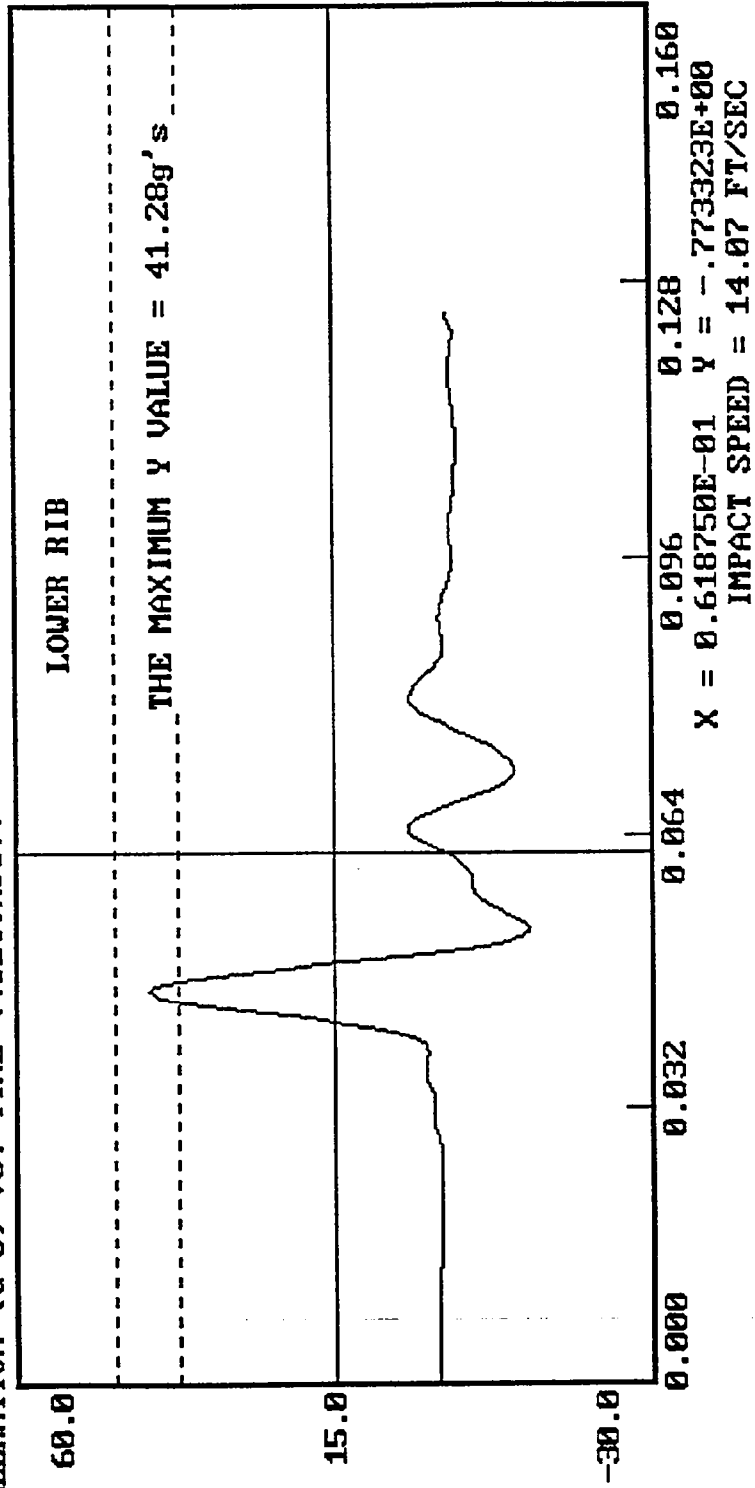
06-17-1994 13:29

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



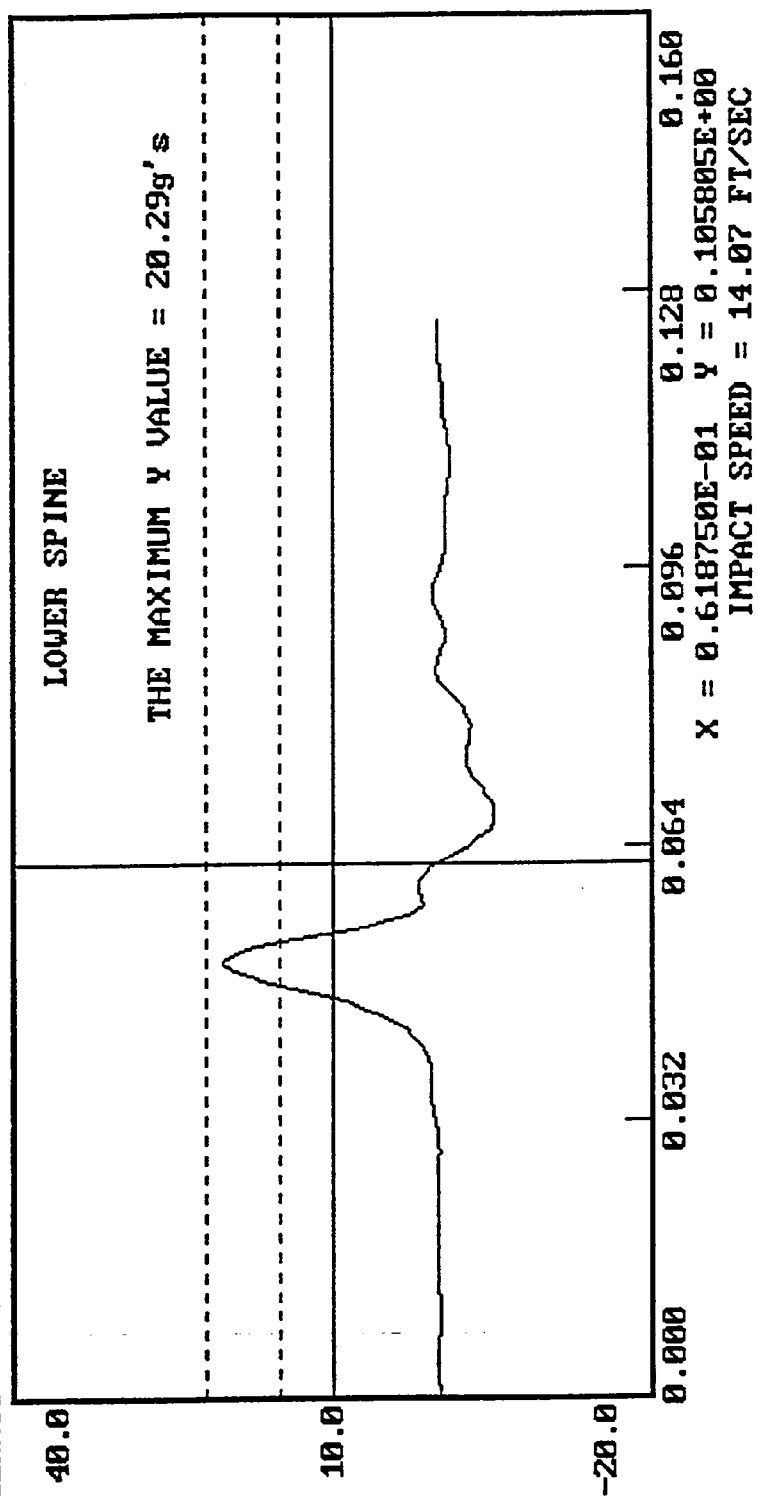
06-17-1994 13:29

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



06-17-1994 13:29

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

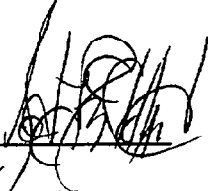
DATE: June 17, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94203

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	62%
PROBE SPEED	13.8 - 14.2 fps	13.8
PELVIS ACCELERATION	40 - 60 g's	55

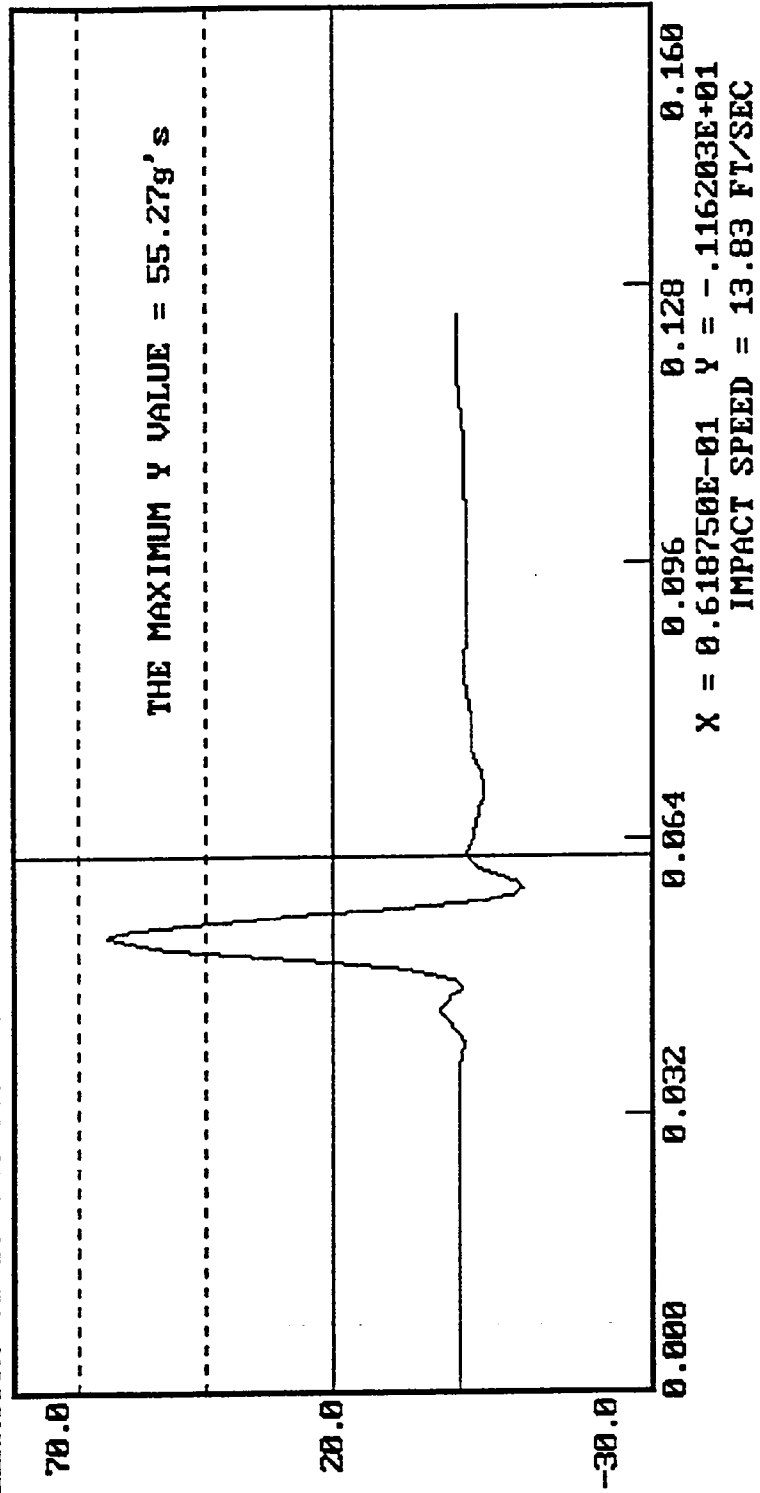
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

06-20-1994 14:42

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 20, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94204

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	60%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.4
FORCE @ 0.75 in	36.7 - 49.8 lbs	47.3
FORCE @ 1.0 in	50 - 63 lbs	62
FORCE @ 1.3 in	73 - 88 lbs	84

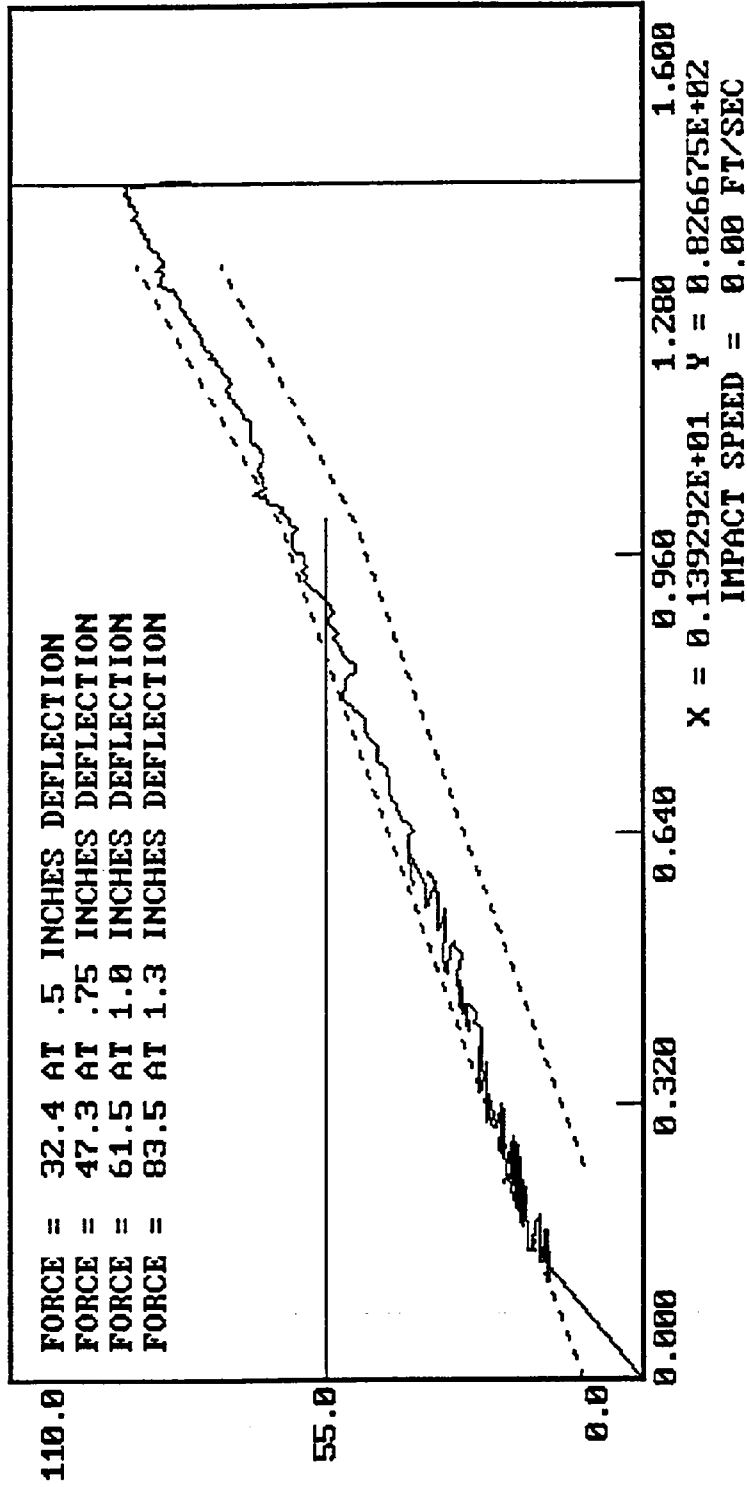
TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 272
 06-20-1994 15:15

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 20, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94205

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	60%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	25
FORCE @ 30°	34 - 46 lbs	37
FORCE @ 40°	46 - 58 lbs	47
RETURN ANGLE	12° maximum	7°

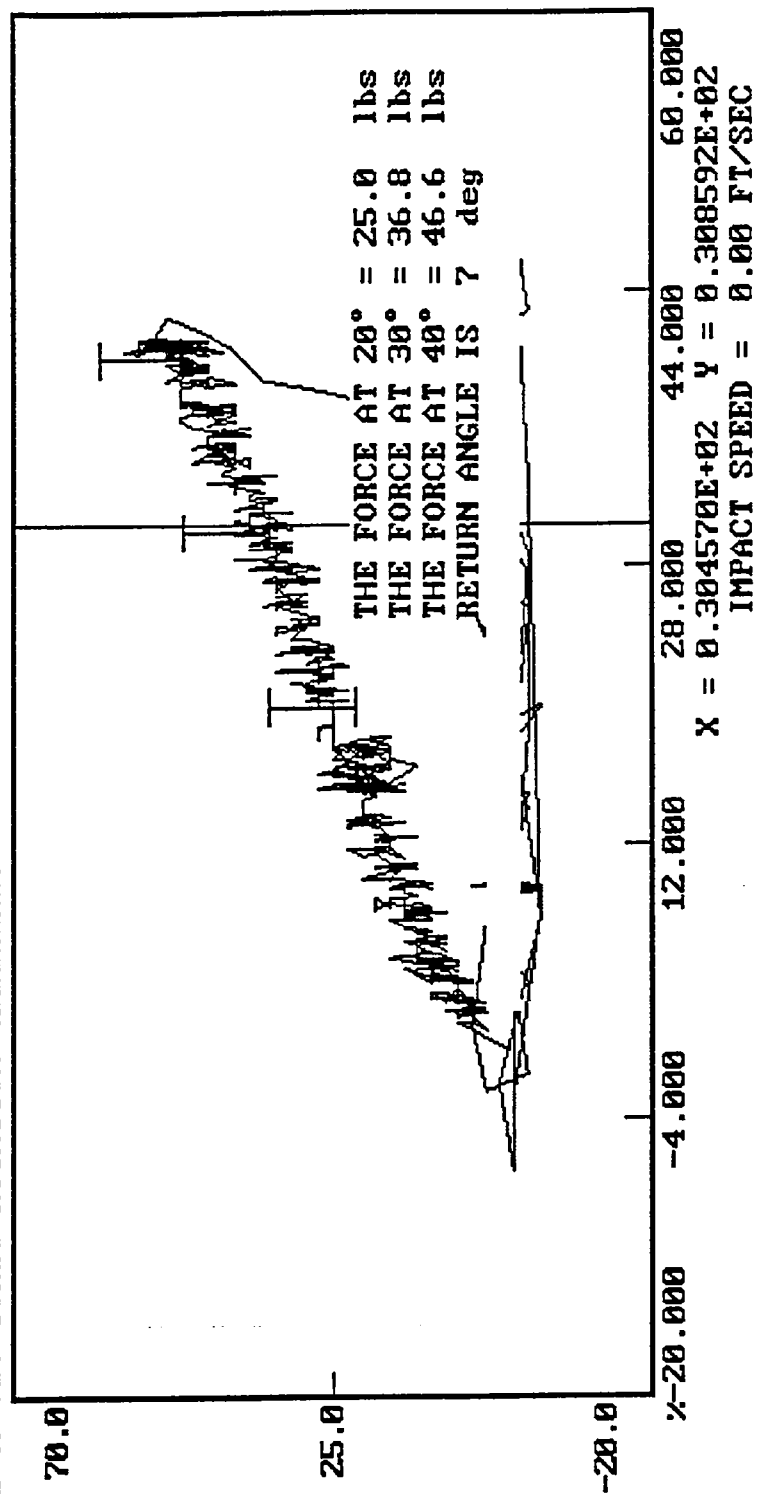
TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

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

06-20-1994 15:44



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.

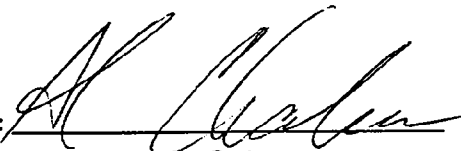
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 270

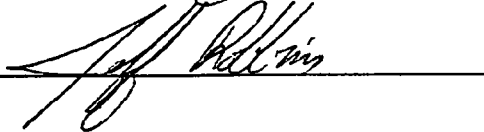
DATE OF VERIFICATION: June 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75 - 20.5"	20.3
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"	20.5
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)

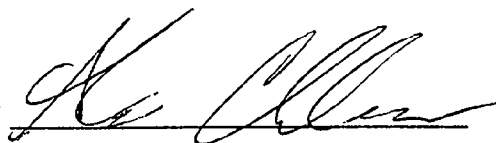
DATE: June 23, 1994

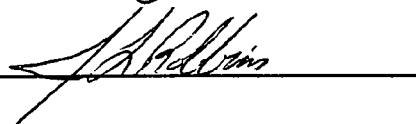
DUMMY NUMBER: 270

TEST NUMBER: D94232

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	50%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	39
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN 

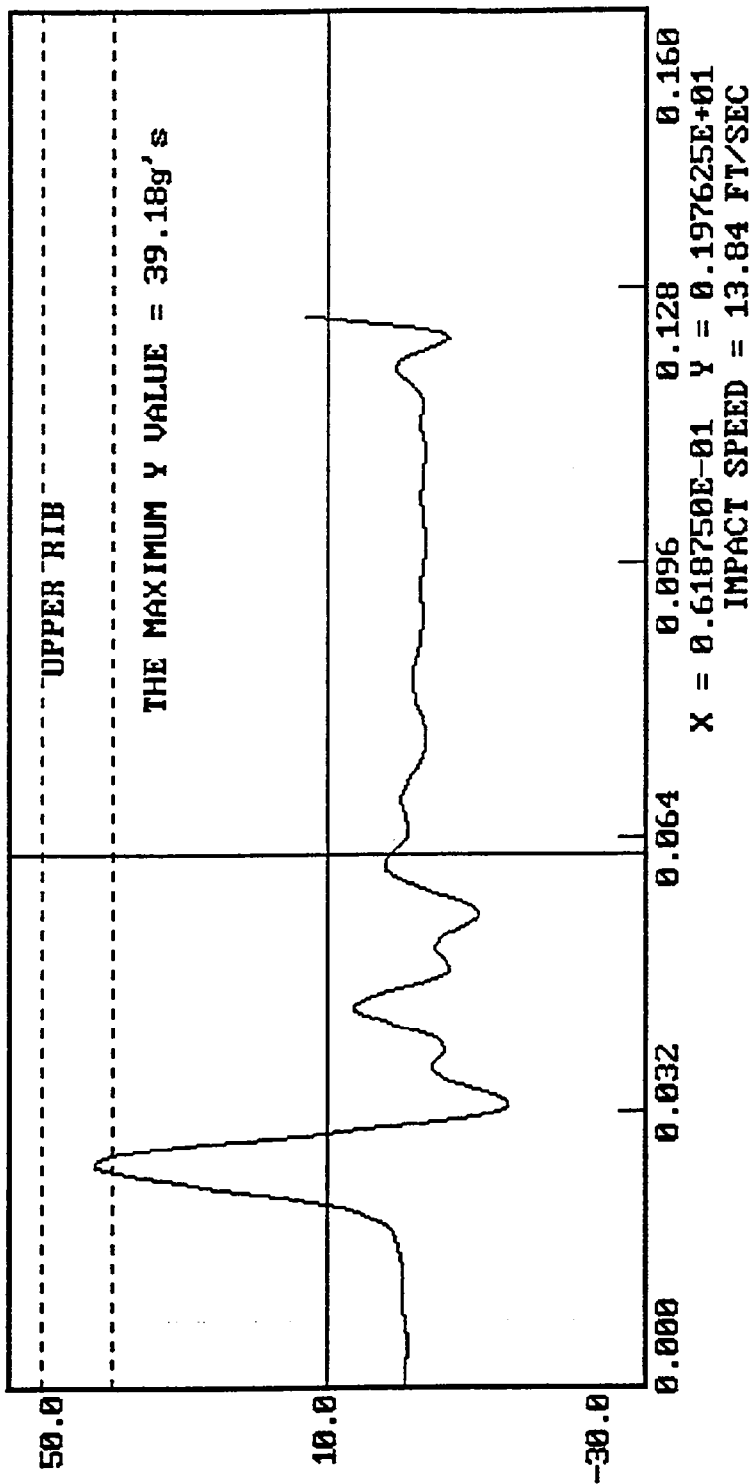
APPROVED BY 

06-23-1994 09:34

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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

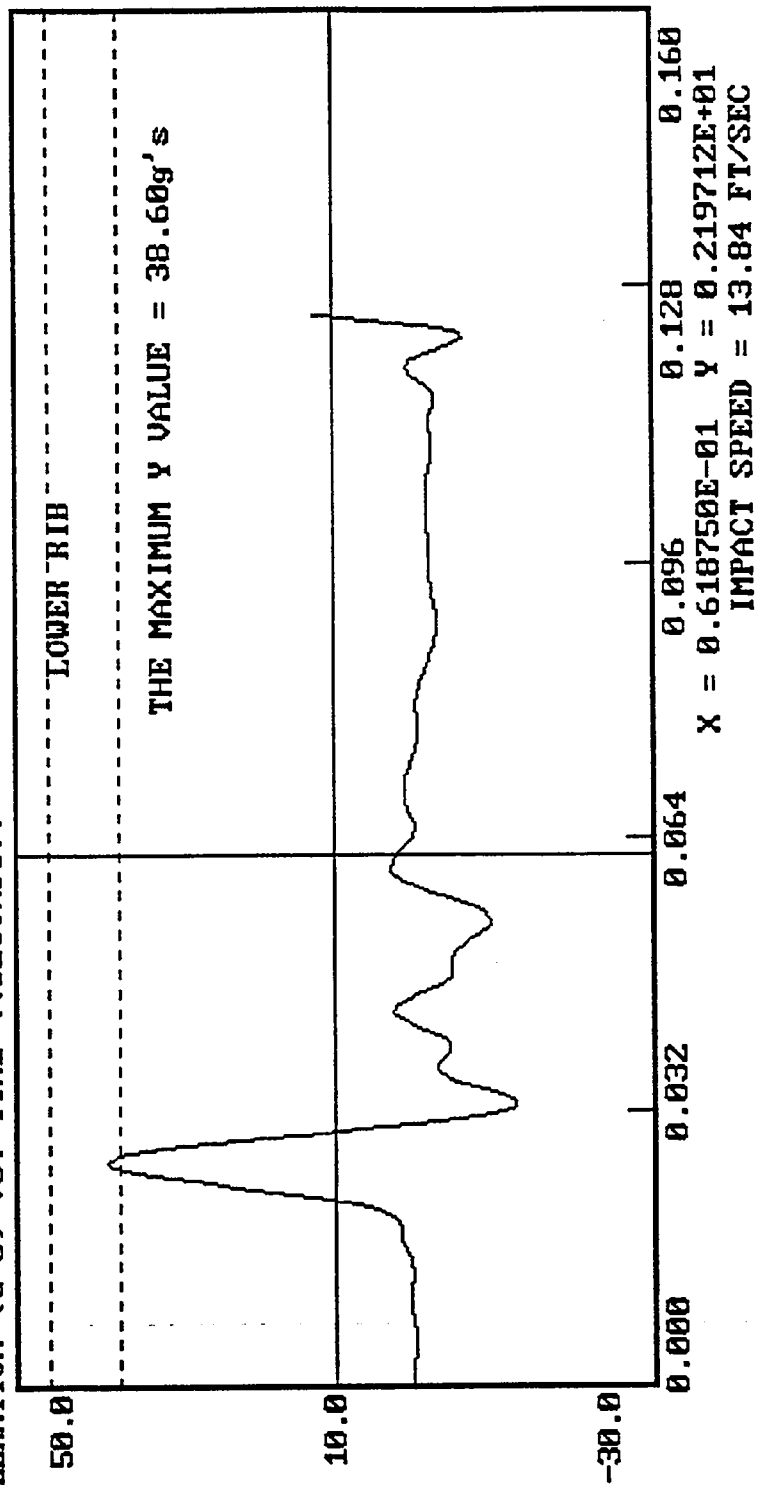


06-23-1994 09:34

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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

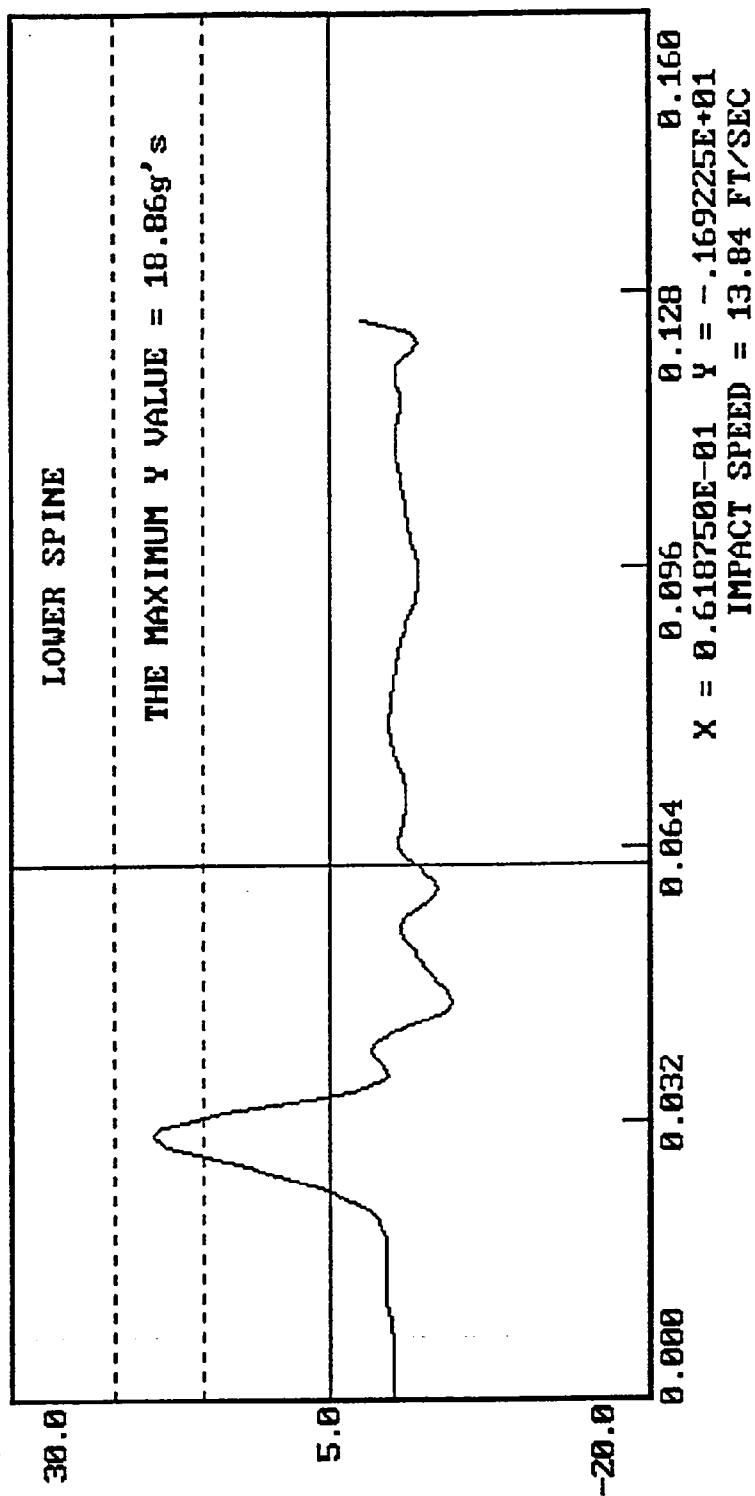


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

() VS. TIME ((SECONDS))

06-23-1994 09:34



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 22, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94233

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	42%
PROBE SPEED	13.8 - 14.2 fps	13.8
PELVIS ACCELERATION	40 - 60 g's	59

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

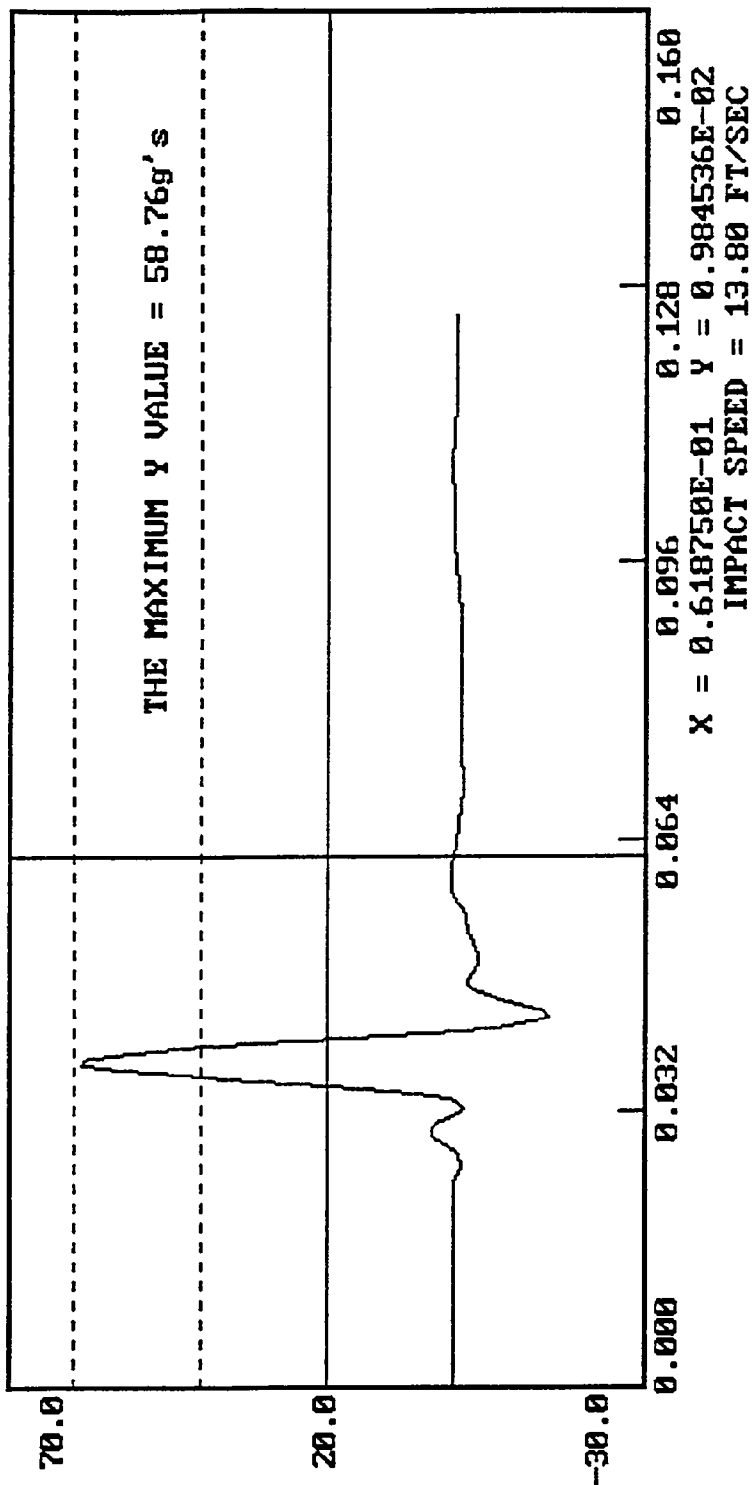


DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 270

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

06-22-1994 15:04



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

DATE: June 24, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94234

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	57%
FORCE @ 0.5 in	23.3 - 36.5 lbs	33.0
FORCE @ 0.75 in	36.7 - 49.8 lbs	45.5
FORCE @ 1.0 in	50 - 63 lbs	59
FORCE @ 1.3 in	73 - 88 lbs	81

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

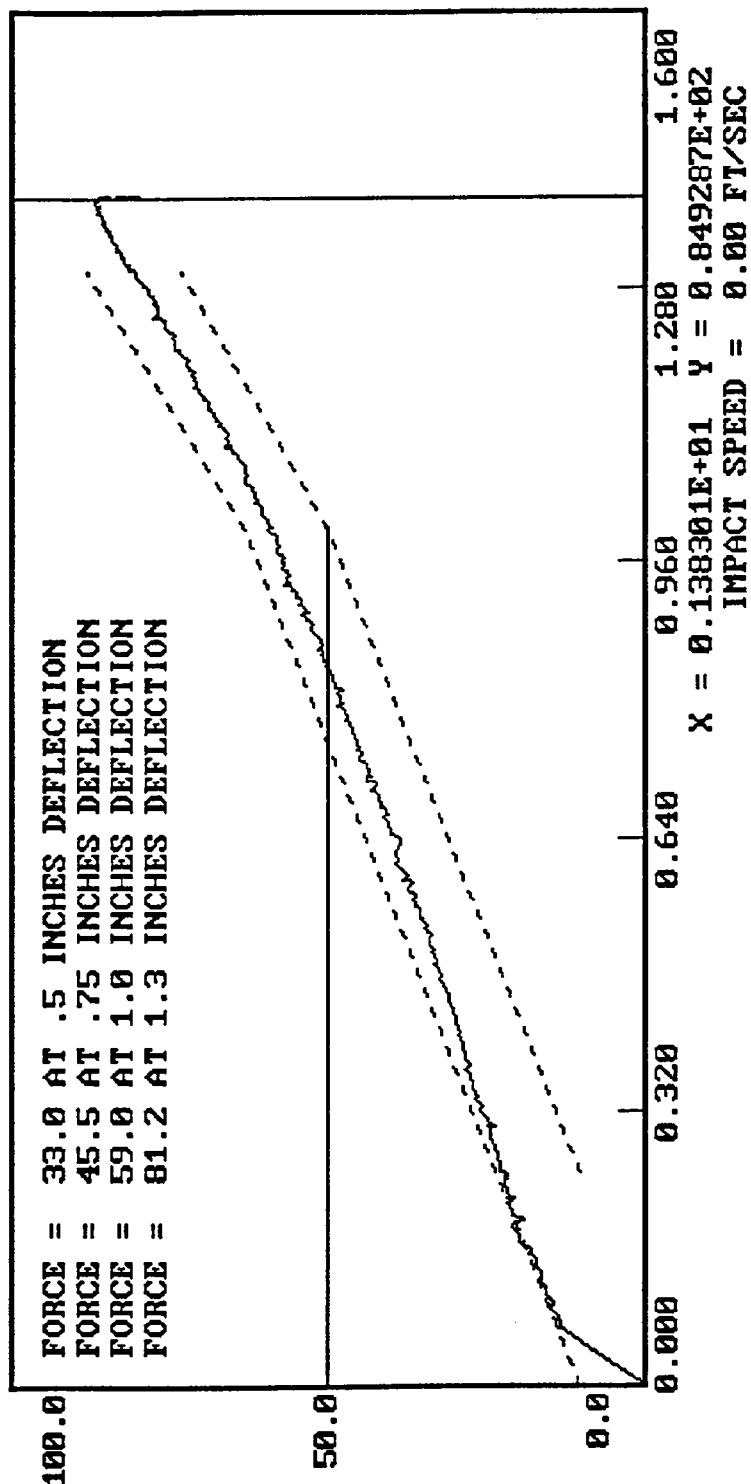


DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 270

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)

FORCE = 33.0 AT .5 INCHES DEFLECTION
FORCE = 45.5 AT .75 INCHES DEFLECTION
FORCE = 59.0 AT 1.0 INCHES DEFLECTION
FORCE = 81.2 AT 1.3 INCHES DEFLECTION



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 27, 1994

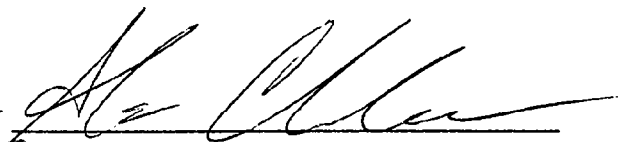
DUMMY NUMBER: 270

TEST NUMBER: D94235

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	58%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	37
FORCE @ 40°	46 - 58 lbs	53
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN

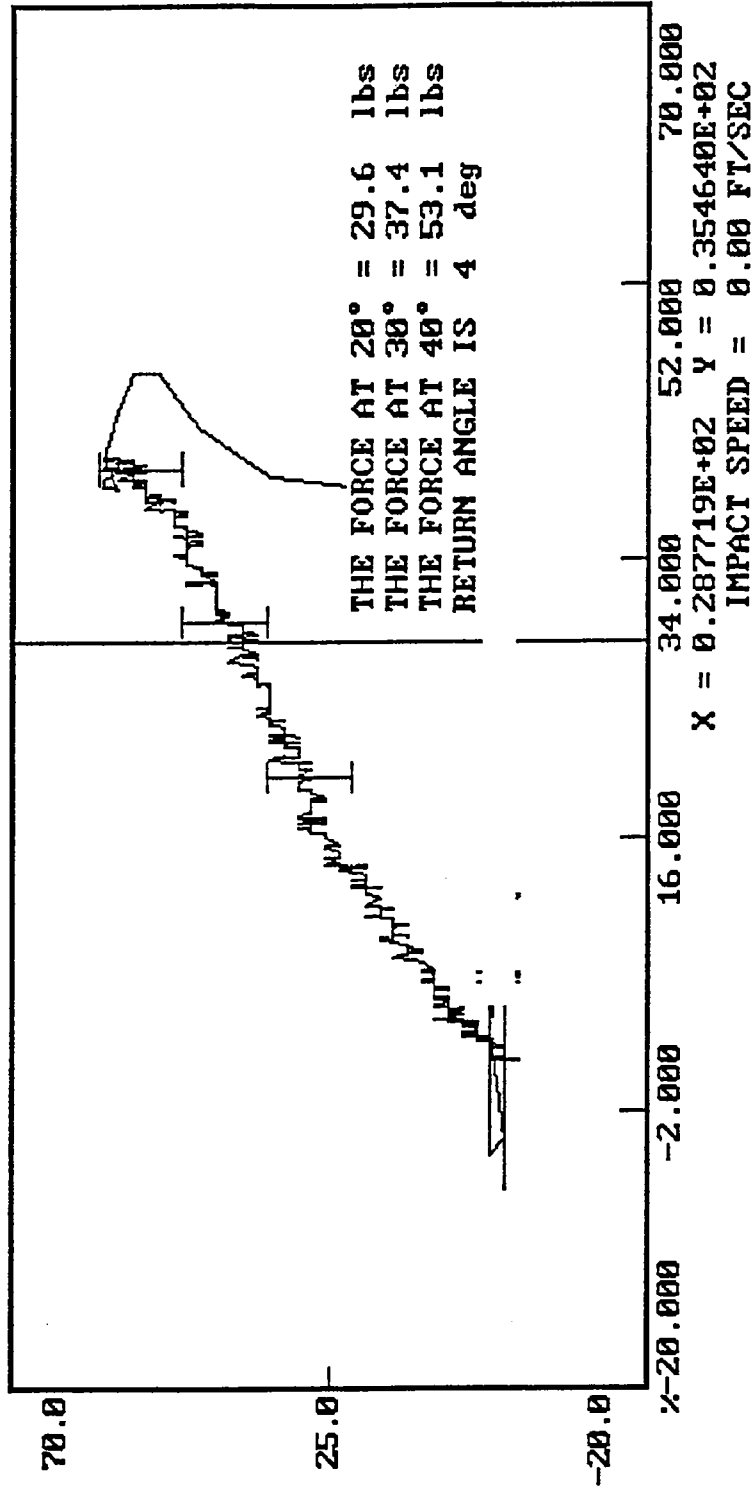


APPROVED BY



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

06-27-1994 09:38



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 failed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

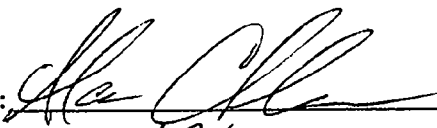
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: June 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.5
RH - Rib Height	19.75 - 20.5"	20.2
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"	20.4
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 23, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94222

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	50%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	40
LOWER RIB	37 - 46 g's	38
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

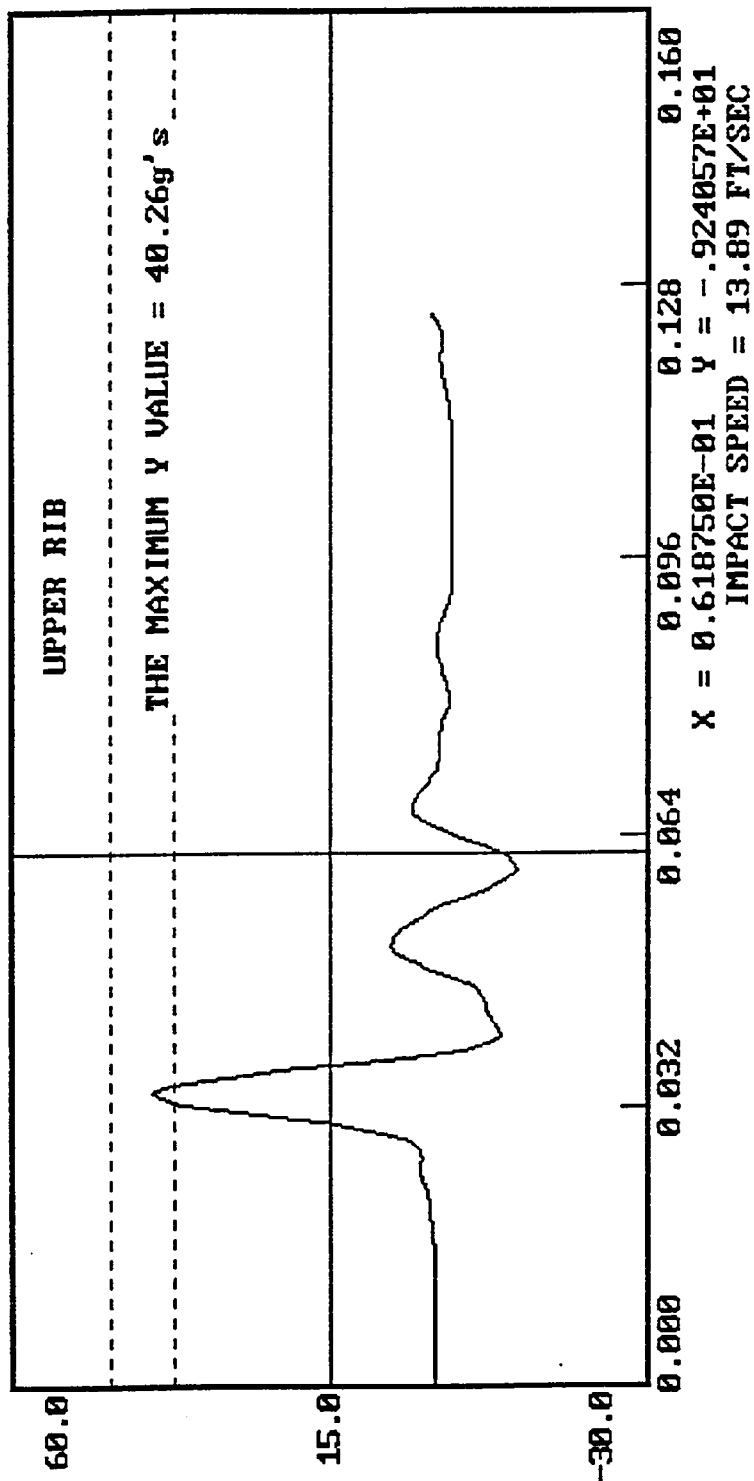


06-23-1994 10:20

DUMMY CALIBRATION -- THORAX IMPACT

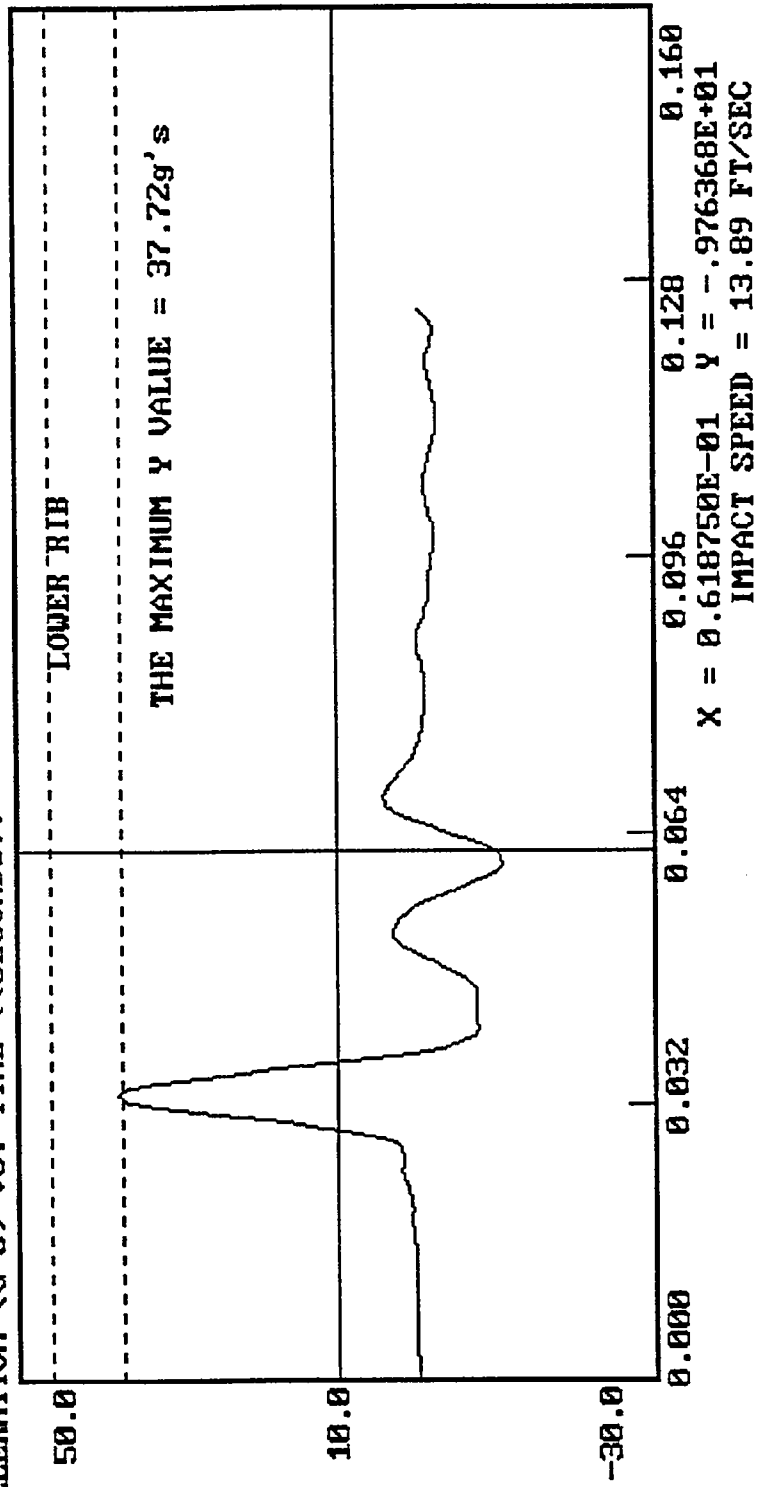
DUMMY # 272

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



06-23-1994 10:20

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

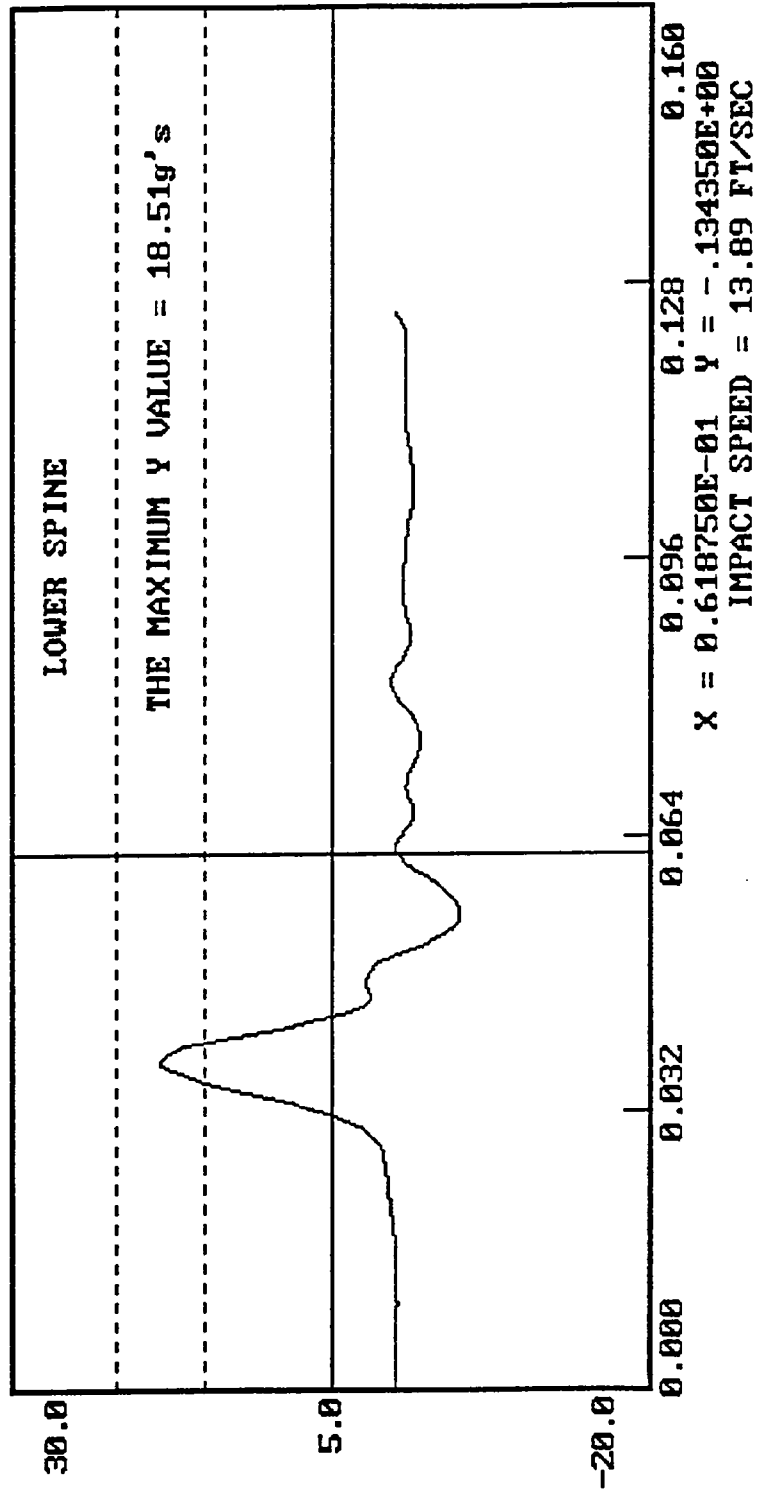


06-23-1994 10:20

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 272

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 22, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94223

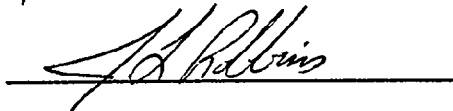
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	42%
PROBE SPEED	13.8 - 14.2 fps	13.9
PELVIS ACCELERATION	40 - 60 g's	62*

TEST MEETS SPECIFICATIONS

TECHNICIAN



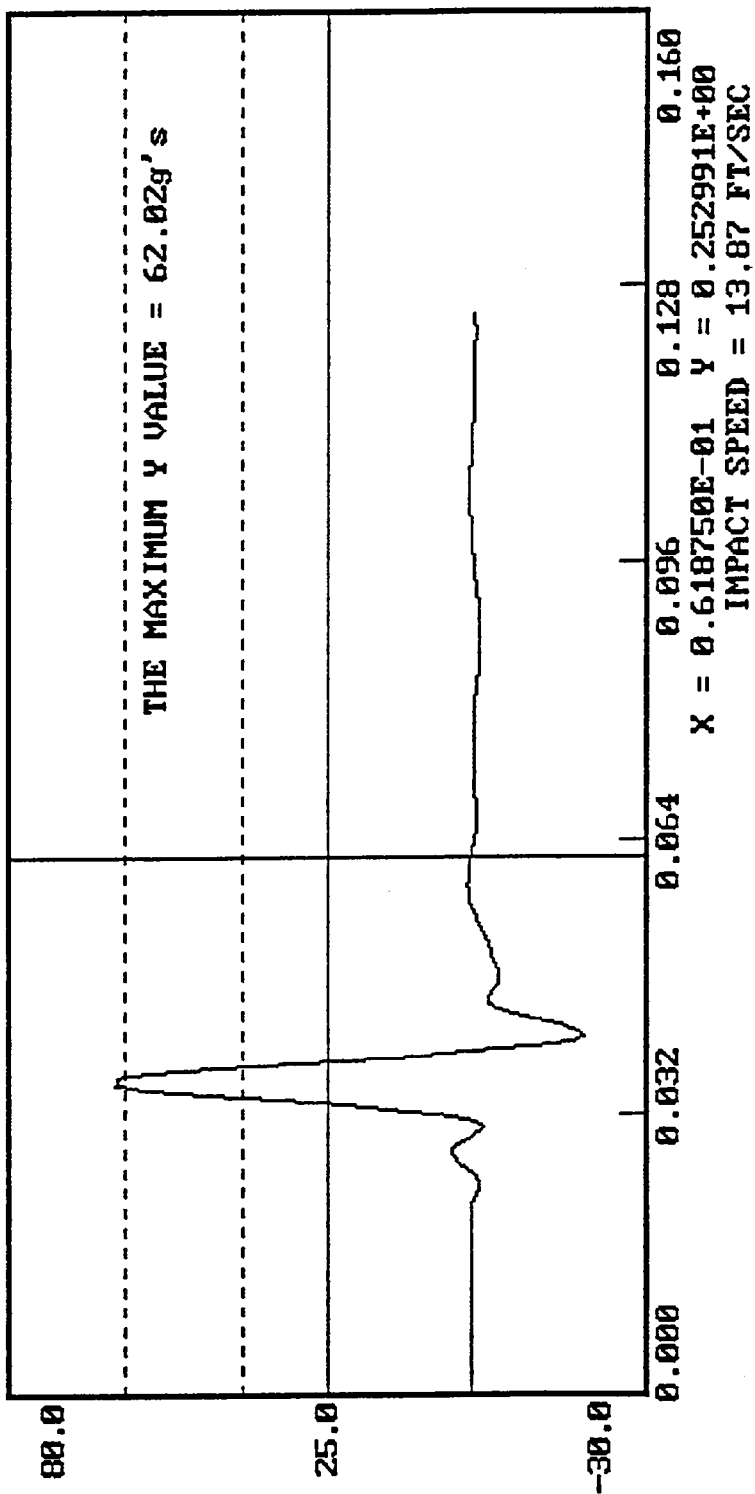
APPROVED BY



* Pelvis impact failed post test calibration.
(see Dummy Damage Checklist for explanation)

06-22-1994 14:27

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 24, 1994

DUMMY NUMBER: 272

TEST NUMBER: D94223

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	42%
FORCE @ 0.5 in	23.3 - 36.5 lbs	33.7
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

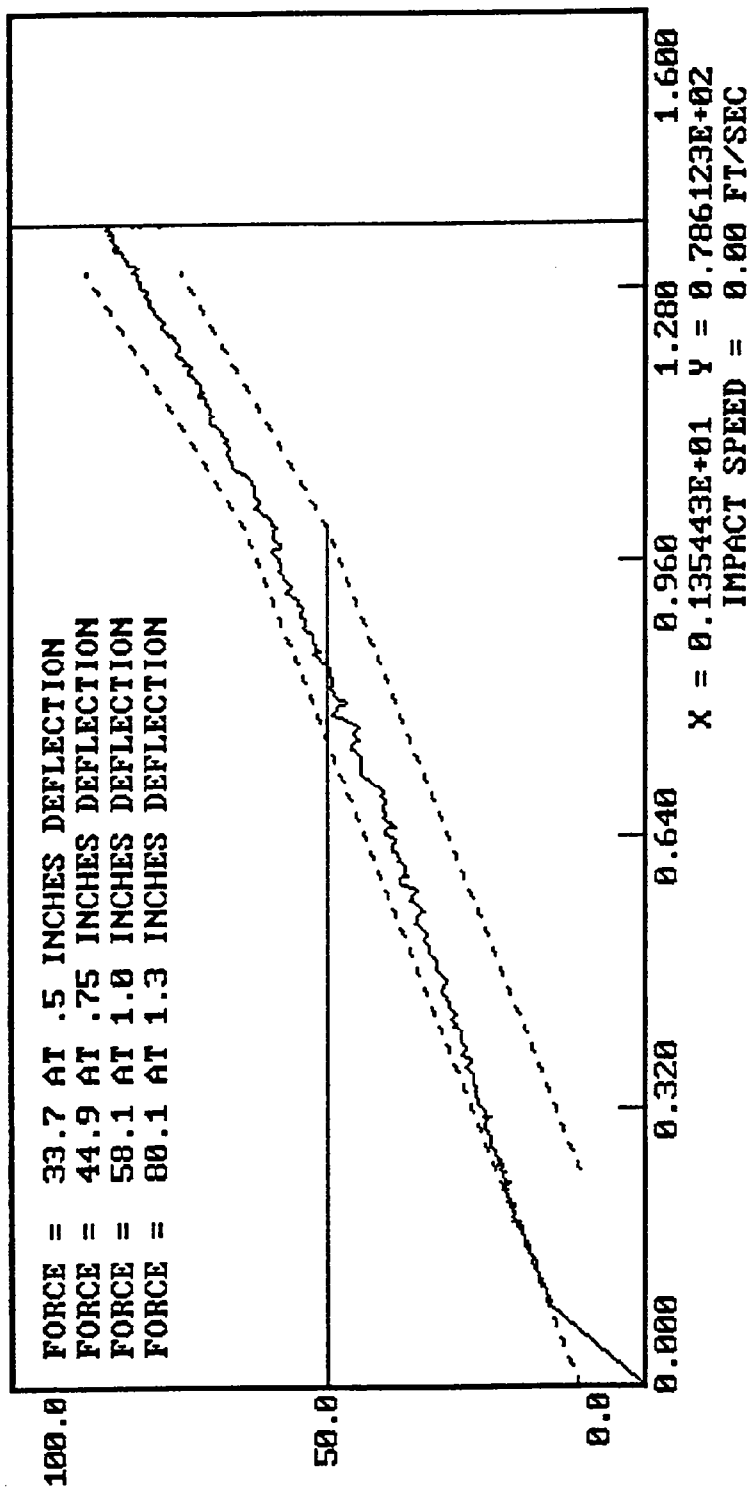
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

06-24-1994 16:11

DUMMY CALIBRATION - ABDOMEN COMPRESSION
DUMMY # 272
ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

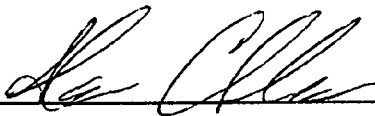
DATE: June 27, 1994

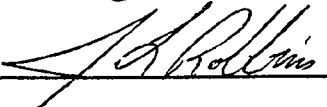
DUMMY NUMBER: 272

TEST NUMBER: D94225

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	58%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	23
FORCE @ 30°	34 - 46 lbs	34
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	6°

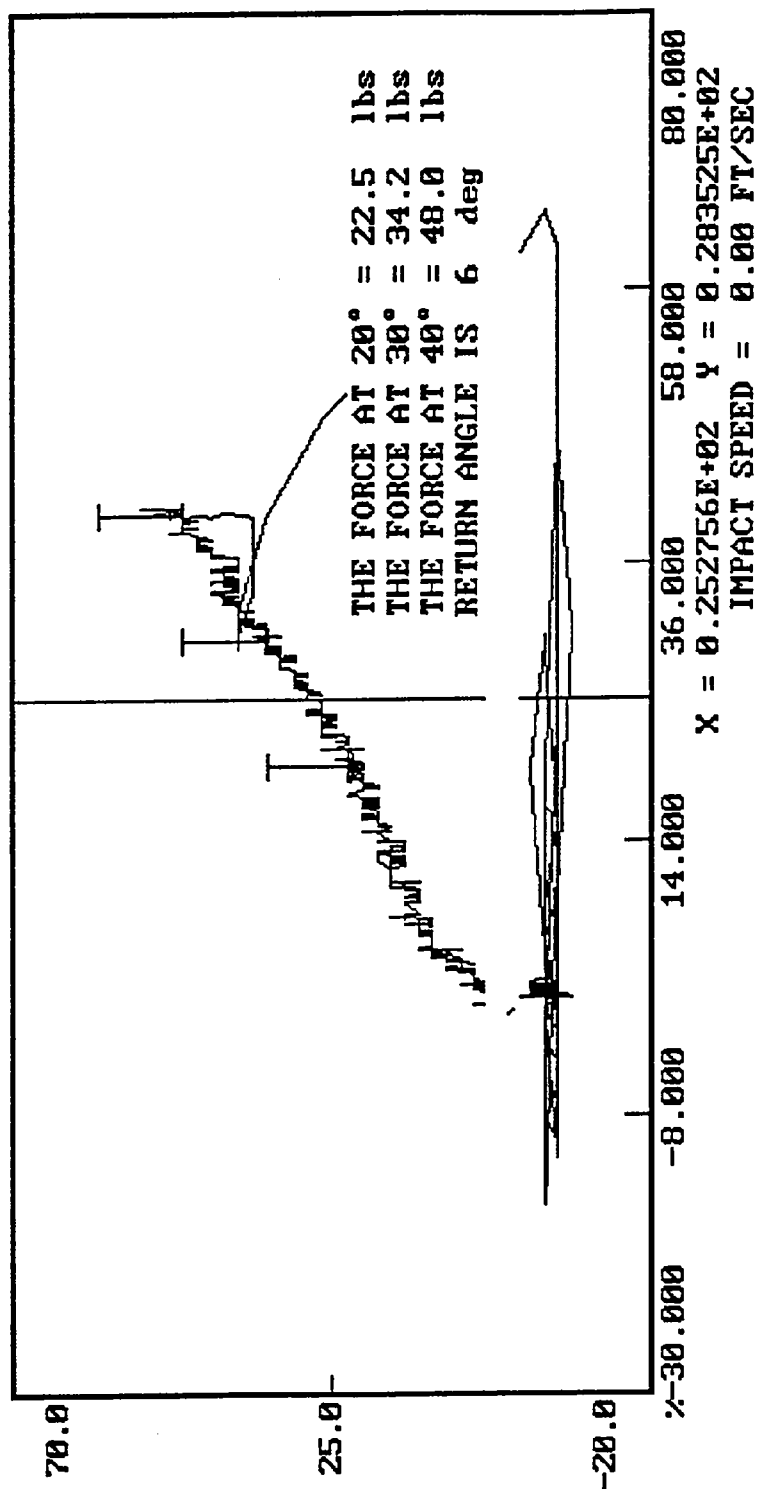
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

06-27-1994 09:46

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



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 270

Inspected By: Jeff Robbins

Date: June 22, 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

Inspected By: Jeff Robbins

Date: June 22, 1994

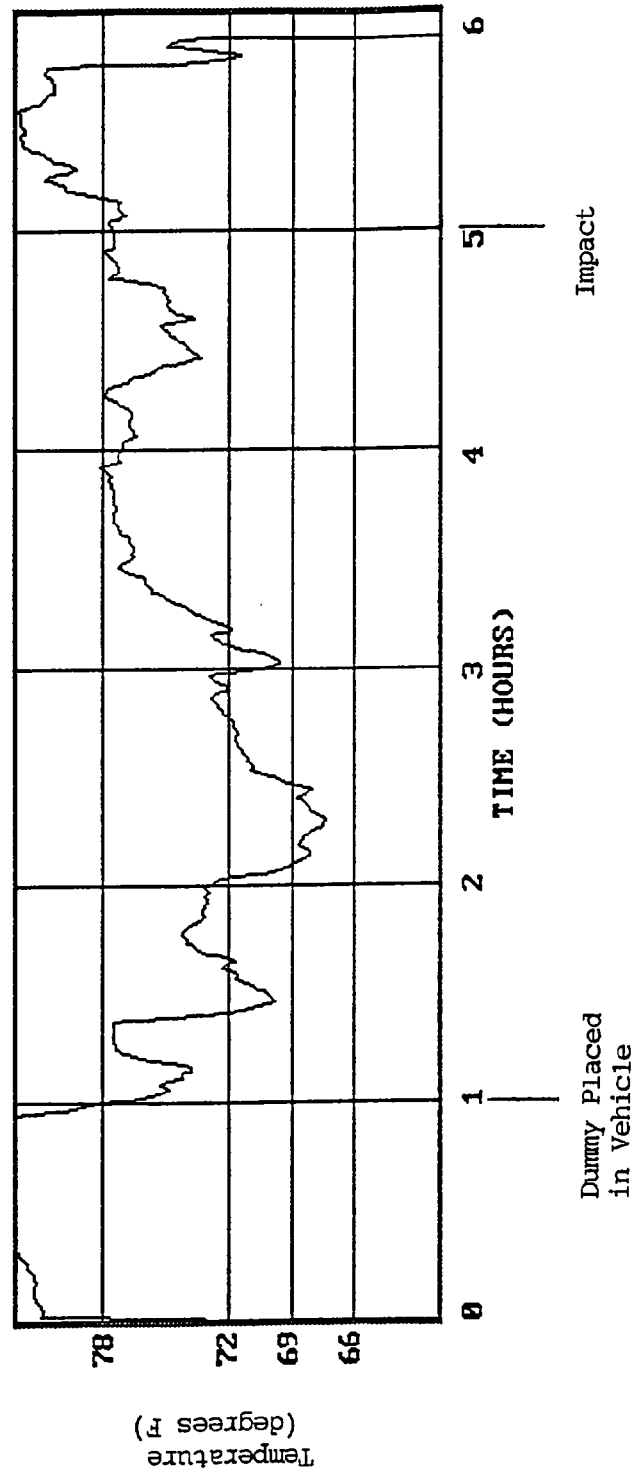
<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	Damaged
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 crash inspection of the pelvis found damage to the pelvic assembly in the area of the pelvic accelerometer mounting box. Damage included severe tearing of the rubber skin on both sides of the pelvis in the forementioned area. Pictures of the damage were taken by the CTOR. The pelvis assembly was replaced with a new assembly supplied by VRTC. The damaged pelvis was sent to Ron Hess at VRTC.

The damaged pelvis would not pass post test calibration.

VEHICLE AND DUMMY TEMPERATURE



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	June 10, 1994
Lower Rib	AHTW4	Endevco	June 10, 1994
Lower Spine	AGRD5	Endevco	June 10, 1994
Pelvis	AHTN3	Endevco	June 10, 1994
Upper Rib Redundant	AHOC3	Endevco	June 14, 1994
Lower Rib Redundant	AHWL7	Endevco	June 10, 1994
Lower Spine Redundant	AC6J4	Endevco	May 24, 1994
Pelvis Redundant	AE9C8	Endevco	June 10, 1994

INSTRUMENTS FOR PASSENGER DUMMY NO. 272

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AGTM2	Endevco	June 10, 1994
Lower Rib	ACCA3	Endevco	June 10, 1994
Lower Spine	AGR57	Endevco	June 10, 1994
Pelvis	AHTL9	Endevco	June 10, 1994
Upper Rib Redundant	AGTB5	Endevco	June 10, 1994
Lower Rib Redundant	AHTP3	Endevco	June 10, 1994
Lower Spine Redundant	AGTG8	Endevco	June 10, 1994
Pelvis Redundant	AC9B7	Endevco	June 10, 1994

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
MDB CG X	MGA135	Entran	June 13, 1994
MDB CG Y	MGA126	Entran	June 13, 1994
MDB CG Z	AZ02	Endevco	June 13, 1994
MDB Rear Axle X	MGA054	Entran	June 13, 1994
MDB Rear Axle Y	MGA165	Entran	June 13, 1994
Lower Left A-Post	MGA144	Entran	June 14, 1994
Lower Left B-Post	MGA122	Entran	June 14, 1994
Upper Left B-Post	MGA130	Entran	June 14, 1994
Trunk Centerline X	MGA007	Entran	June 14, 1994
Trunk Centerline Y	AC815	Endevco	June 13, 1994
Trunk Centerline Z	MGA124	Entran	June 12, 1994
Driver Seat Track	MGA125	Entran	April 25, 1994
Right Front Sill X	MGA146	Entran	May 24, 1994
Right Front Sill Y	MGA106	Entran	May 24, 1994
Right Front Sill Z	MGA134	Entran	May 24, 1994
Right Rear Sill X	MGA137	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	MGA131	Entran	June 02, 1994

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