

V2097

REPORT NO.: MGA-94-21408

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

FORD MOTOR COMPANY
1994 LINCOLN TOWNCAR 4 DOOR SEDAN
NHTSA NO: CR0205

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



MGA Ref. No.: G93A-02

Test Date: June 15, 1994

Report Date: September 28, 1994

FINAL REPORT

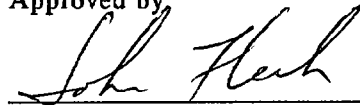
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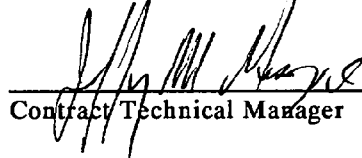
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SECTION 1
PURPOSE AND TEST PROCEDURE

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 Lincoln Towncar 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 Lincoln Towncar 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 15, 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 61 g's. Maximum pelvic Y acceleration was 58 g's.

The left rear passenger's TTI was 32 g's. Maximum pelvic Y acceleration was 47 g's.

TEST NOTES

The accelerometers mounted at the left front and rear sill Y detached at approximately 40 msec. following impact.

Due to overexposure of the photographs taken during the FMVSS 301 Static Rollover Test, these photographs are not included in this report.

SECTION 3
SUMMARY OF TEST DATA

TABLE 1
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan
 Vehicle NHTSA No.: CR0205 VIN: 1LNLM81WGRY696974
 Vehicle Body Color: Silver Month & Year of Manufacture: 1-94
 Engine Data: 8 cylinders; CID; 4.6 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 72 miles
 Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; X Pwr. Windows
 X Power Seats; X Tilt Wheel; X Power Door Locks; X Self Leveling System

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 psi FRONT
 34 psi REAR
 Recommended Tire Size: P215/70R15
 Tires on Test Vehicle: P125/70R15 Manufacturer: Michelin

Vehicle Capacity Data:

Number of Occupants: 3 Front; 3 Rear; N/A 3rd Seat 6 Total
 Type of Front Seats: Bucket; Bench; X Split Bench
 Type of Front Seat Back: Fixed; X Adjustable with X 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>1099</u> lbs	Right Rear	=	<u>912</u> lbs
Left Front	=	<u>1138</u> lbs	Left Rear	=	<u>896</u> lbs
TOTAL FRONT	=	<u>2237</u> lbs	TOTAL REAR	=	<u>1808</u> lbs
% of Total Vehicle Weight	=	<u>55</u> %;	% of Total Weight	=	<u>45</u> %
TOTAL WEIGHT	=	<u>4045</u> lbs			

TABLE 2
TEST VEHICLE DATA

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 4045 lbs

Maximum Cargo Carrying Capacity of Test Vehicle = 200 lbs

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

TEST VEHICLE TARGET WEIGHT: = 4601 lbs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 1185 lbs Right Rear = 1113 lbs

Left Front = 1172 lbs Left Rear = 1115 lbs

TOTAL FRONT = 2357 lbs TOTAL REAR = 2228 lbs

% of Total Weight = 51.4 % % of Total Weight = 48.6 %

TOTAL TEST WEIGHT = 4585 lbs

TEST VEHICLE ATTITUDE (all dimensions in inches):*

CURB WEIGHT ATTITUDE: (in)

Right Front 29.0 Left Front 29.0 Right Rear 29.3 Left Rear 29.0

FULLY LOADED WEIGHT ATTITUDE: (in)

Right Front 29.2 Left Front 28.5 Right Rear 29.4 Left Rear 28.1

TEST ATTITUDE: (in)

Right Front 28.2 Left Front 28.7 Right Rear 29.0 Left Rear 29.4

Test Vehicle Wheelbase: 117.5 inches

C.G. = 57.1 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 207.6 in

Centerline = 219.4 in

Left Side = 207.6 in

* Vehicle equipped with self-leveling system.

FIGURE 1
PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan
Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 9.1 in
Total Number of Adjustment Positions or Detents: N/A
Test Position: Mid Position (4.6 inches)

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 23.1° 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 = 20 gallons

Test Volume: 18.5 gallons (92.5% of capacity)

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

Wheelbase: = 117.5 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/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

Overall Length = 219.4 in; Overall Width = 76.0 in

TEST WEIGHT:

Right Front	=	<u>1185</u> lbs	Right Rear	=	<u>1113</u> lbs
Left Front	=	<u>1172</u> lbs	Left Rear	=	<u>1115</u> lbs
TOTAL FRONT	=	<u>2357</u> lbs	TOTAL REAR	=	<u>2228</u> lbs
TOTAL VEHICLE WEIGHT <u>4585</u> lbs					
Wheelbase = <u>117.5</u> in					
Longitudinal C.G. front Center of Front Axle = <u>57.1</u> in					
Impact Angle with Respect to Impactor = <u>90°</u> degrees					

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (11.0 in above ground) = 10.0 in
2. LEVEL 2 (22.4 in above ground) = 15.2 in
3. LEVEL 3 (24.1 in above ground) = 14.5 in
4. LEVEL 4 (36.0 in above ground) = 11.0 in
5. LEVEL 5 (54.3 in above ground) = 4.2 in

Maximum Post-Test Intrusion = 15.2 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 &</u> <u>shoulder belt</u> <u>with airbag</u>	<u>3 pt. lap &</u> <u>shoulder belt</u>

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>15</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/Lincoln/Towncar/4 Door Sedan
 Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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: 32.85 mph Secondary: 32.75 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Top of Stack (33 in)	= <u>5.7</u> in
2. Row B Mid Stack (27 in)	= <u>2.9</u> in
3. Row C Top of Bumper (21 in)	= <u>2.7</u> in
4. Row D Center of Bumper (17 in)	= <u>4.8</u> in

INSTRUMENTATION:

Number of MDB Data Channels = 7

TABLE 5
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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: .75 in forward Vertical: 0.9 in high

ARM REST LOCATIONS:

Front: 8.75 inches below window opening

Rear: 8.75 inches below window opening

SEAT CRUSH:

Driver Seat Back: 1.1 inches Driver Seat Cushion: 2.5 inches

Left Rear Seat Back: 0.5 inches Left Rear Seat Cushion: 3.8 inches

GLAZING DAMAGE:

Both 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:

Impact caused fuel filler door to open

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

TABLE 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARYYear/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

	Front Dummy ID # 269				Rear Dummy ID # 271			
	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	38	-11.0	90	34.7	68	-3.9	197
	Upper Rib Lateral....Y(R)	38	-12.0	90	30.1	68	-10.3	131
	Lower Rib Lateral.....Y	38	-12.4	110	35.4	64	-6.8	121
	Lower Rib Lateral.....Y(R)	38	-12.8	110	34.3	64	-6.9	121
SPINE ACCELERATIONS:								
	Lower Lateral.....Y	42	-13.2	109	28.7	63	-9.9	87
	Lower Lateral.....Y(R)	42	-12.9	109	28.0	63	-10.5	87
PELVIC ACCELERATIONS:								
	Lateral.....Y	38	-17.4	101	47.4	51	-8.5	116
	Lateral.....Y(R)	38	-17.2	106	47.3	52	-8.5	116

REFERENCE:

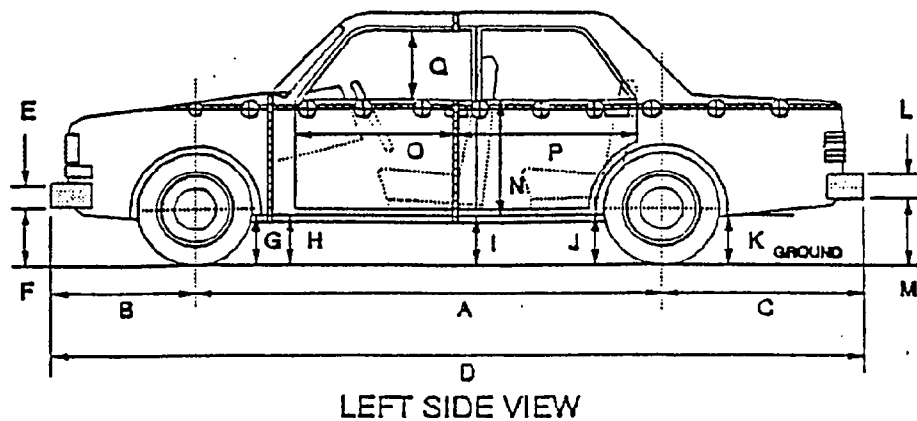
Positive Direction - Longitudinal (X) = forward

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

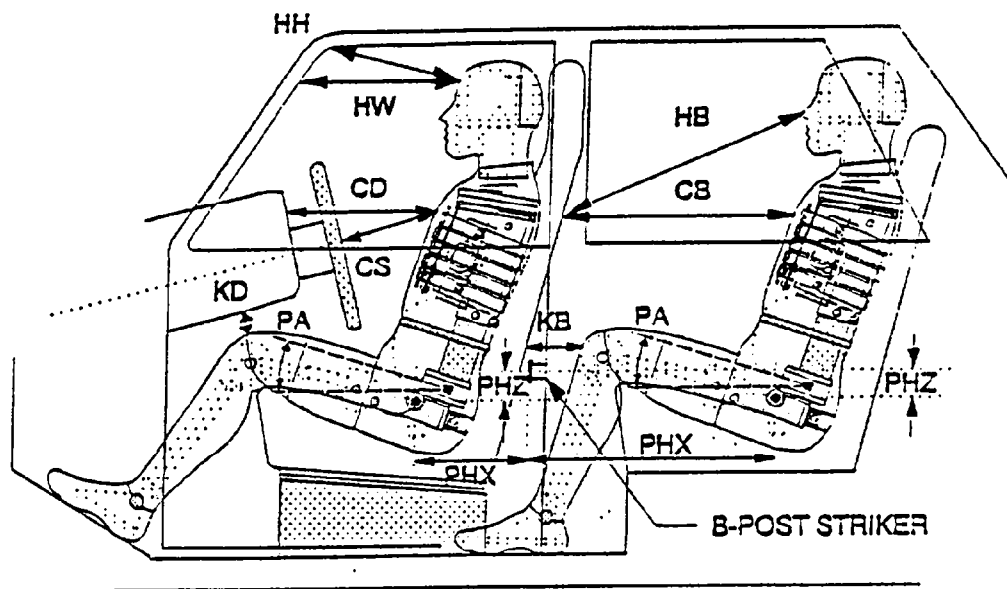
J1 = To Pinch Weld

J2 = To Sill

Units: in

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	117.5	117.1	0.4
B	45.6	45.6	0
C	56.3	55.9	0.4
D	219.4	218.6	0.8
E	10.6	10.6	0
F	12.6	13.5	0.9
G	11.3	11.6	0.3
H	7.6	7.5	0.1
I	9.0	9.0	0
J1/J2	8.1/8.4	9.5/9.0	1.4/0.6
K	13.1	14.3	1.2
L	10.2	10.3	0.1
M	12.0	13.1	1.1
N	25.5	22.3	3.2
O	28.1	27.7	0.4
P	52.3	49.0	3.3
Q	18.3	17.5	0.8
R	207.6	208.0	0.4
S	207.6	205.1	2.5
T	76.0	62.3	13.7

FIGURE 3
SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



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

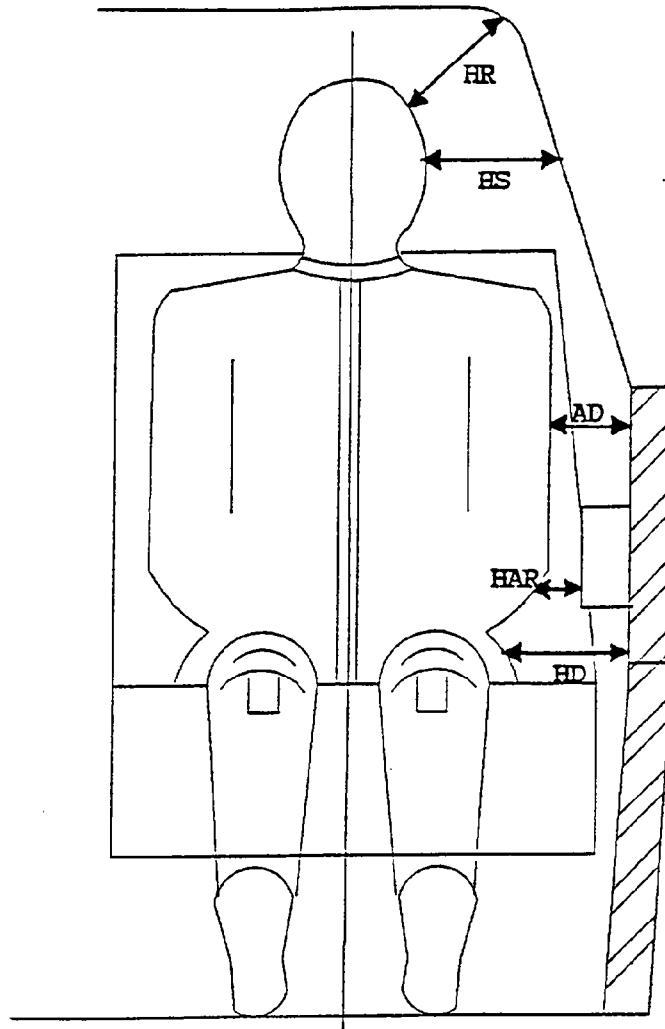
LEFT SIDE VIEW

NOTE: All dimensions are in inches

	DRIVER ID #269	LEFT REAR PASSENGER ID #271	
HH	17.3	---	
HW	25.4	---	
HB	---	29.5	
CD	22.5	CB	24.4
CS	12.8	---	
KDL	4.5	KBL	12.6
KDR	4.5	KBR	12.5
PA°	23.1°	24.3°	
PHX	9.5	4.8	
PHZ	5.3	7.3	

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



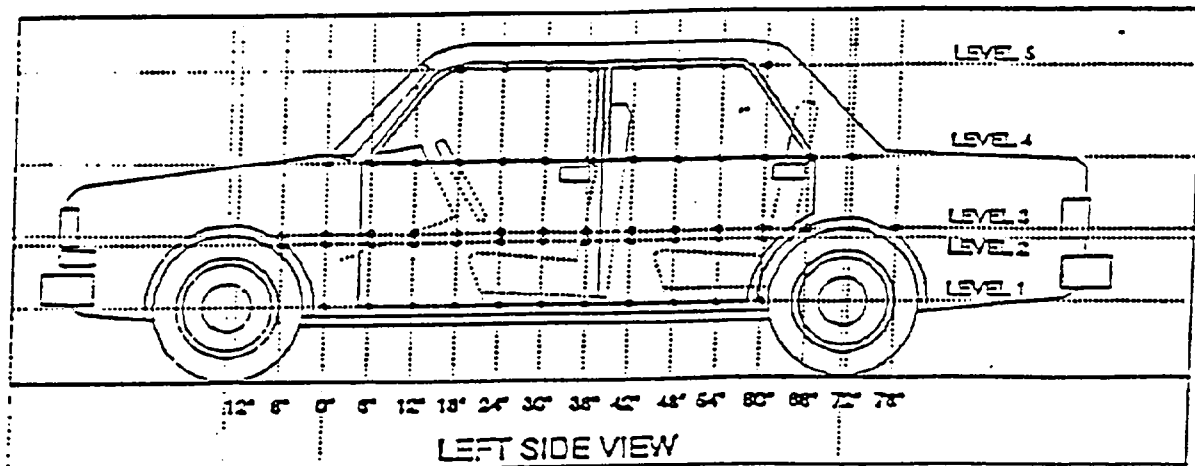
NOTE: All dimensions are in inches

	DRIVER ID #269	LEFT REAR PASSENGER ID #271
HR	6.1	6.1
HS	11.9	12.4
AD	5.5	6.9
HD	6.5	8.0

FIGURE 5
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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>54.3</u> in
Level 4 @ Window Sill	= <u>36.0</u> in
Level 3 @ Mid Door	= <u>24.1</u> in
Level 2 @ Occupant H-Point	= <u>22.4</u> in
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>11.1</u> in

TABLE 7

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

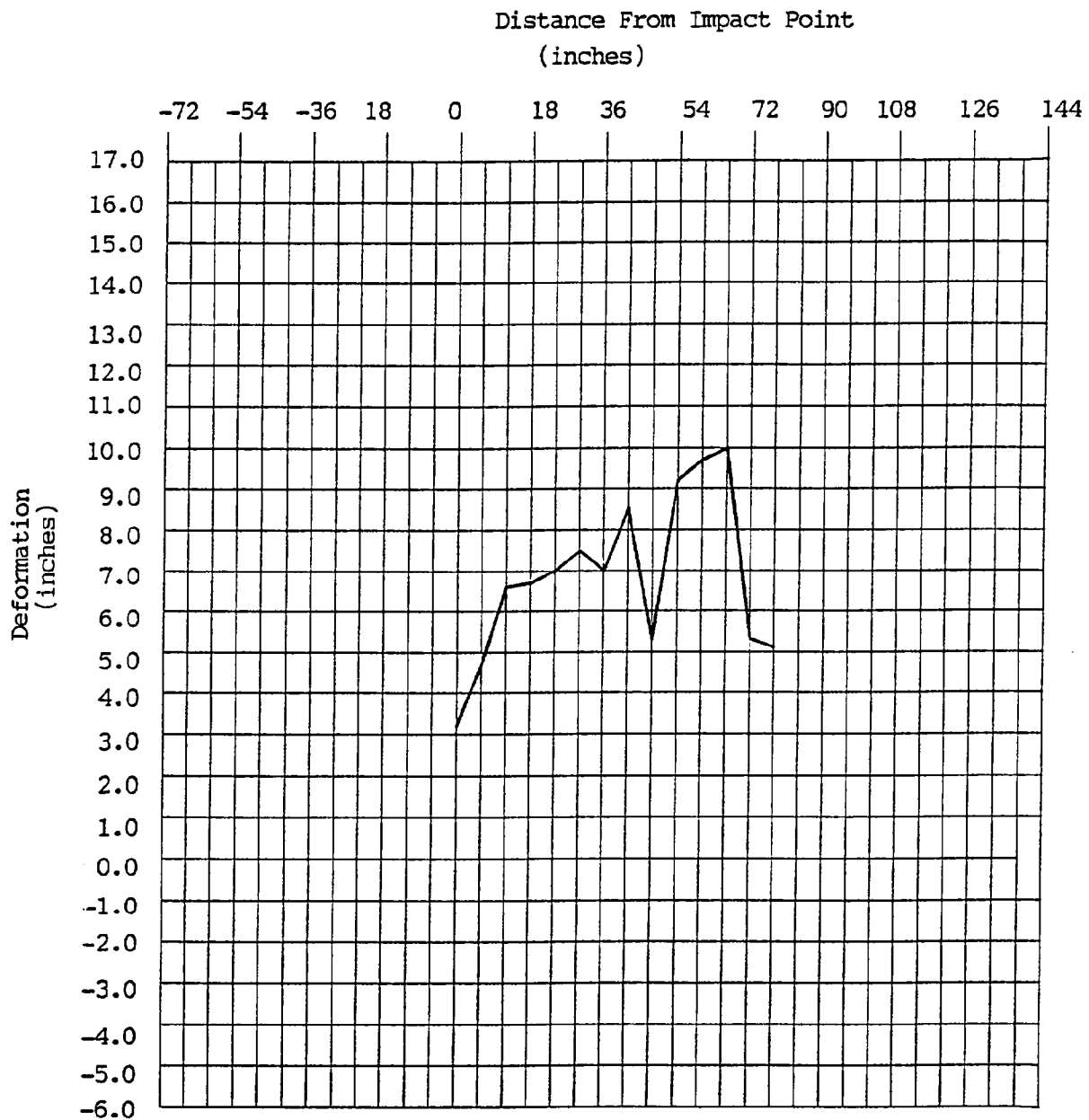
Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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	<u>32.0</u>	<u>35.2</u>	<u>3.2</u> (impact point)
6	<u>32.0</u>	<u>36.7</u>	<u>4.7</u>
12	<u>31.8</u>	<u>38.4</u>	<u>6.6</u>
18	<u>31.6</u>	<u>38.3</u>	<u>6.7</u>
24	<u>31.6</u>	<u>38.6</u>	<u>7.0</u>
30	<u>31.6</u>	<u>39.1</u>	<u>7.5</u>
36	<u>31.5</u>	<u>39.5</u>	<u>7.0</u>
42	<u>31.5</u>	<u>40.0</u>	<u>8.5</u>
48	<u>31.5</u>	<u>36.8</u>	<u>5.3</u>
54	<u>31.5</u>	<u>40.7</u>	<u>9.2</u>
60	<u>31.5</u>	<u>41.2</u>	<u>9.7</u>
66	<u>31.5</u>	<u>41.5</u>	<u>10.0</u>
72	<u>31.9</u>	<u>37.2</u>	<u>5.3</u>
78	<u>31.9</u>	<u>37.0</u>	<u>5.1</u>
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: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

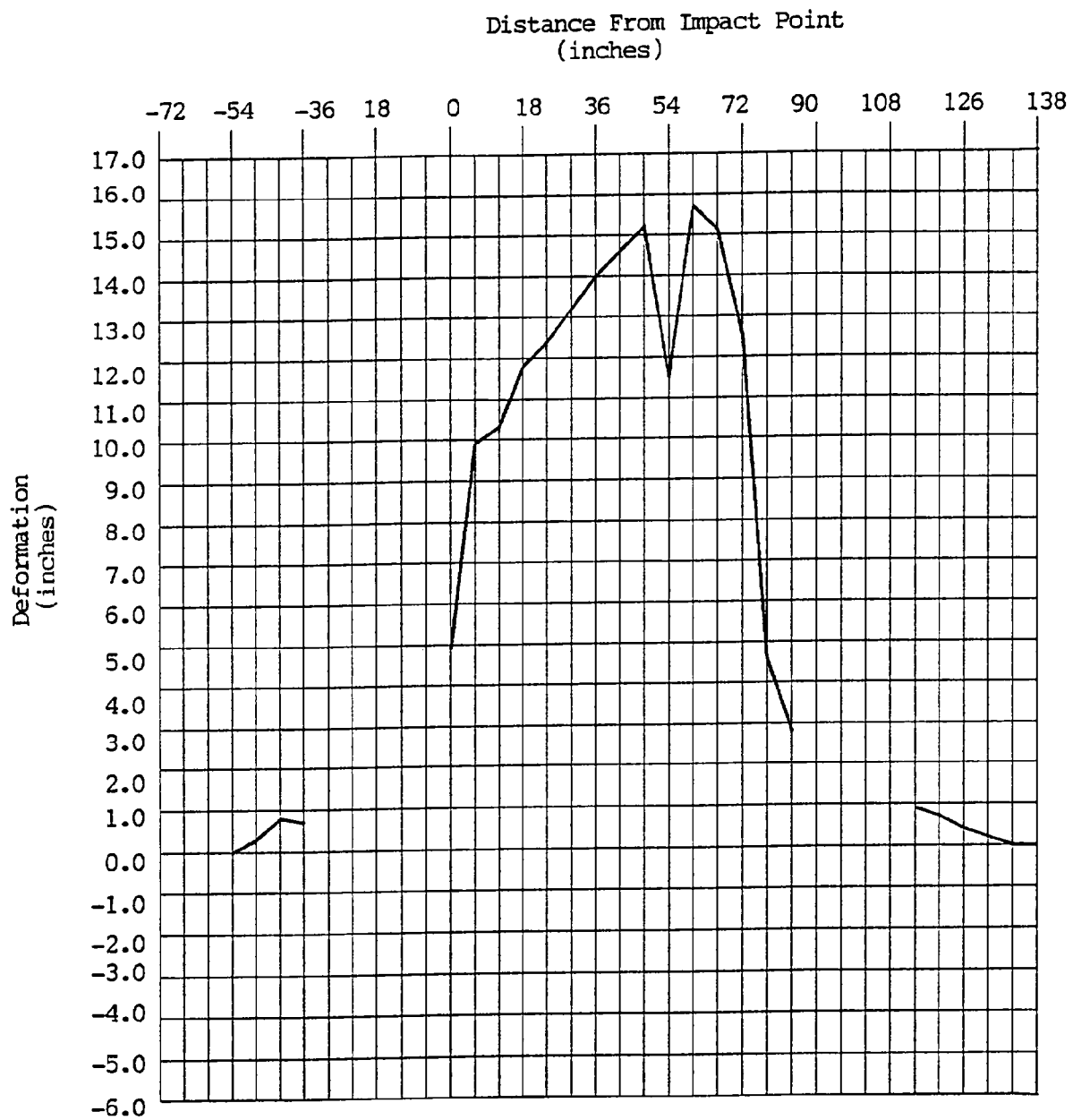
Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	33.9	33.9	0
-48	32.9	33.2	0.3
-42	31.9	32.7	0.8
-36	31.4	32.1	0.7
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	29.4	34.3	4.9 (impact point)
6	29.1	39.0	9.9
12	28.9	39.2	10.3
18	28.8	40.6	11.8
24	28.7	41.1	12.4
30	28.6	41.8	13.2
36	28.6	42.6	14.0
42	28.5	43.1	14.6
48	28.5	43.7	15.2
54	28.4	39.9	11.5
60	28.4	44.1	15.7
66	28.5	43.6	15.1
72	28.6	41.1	12.5
78	28.6	33.2	4.6
84	28.7	31.5	2.8
90	---	---	---
96	---	---	---
102	---	---	---
108	---	---	---
114	29.8	30.7	0.9
120	30.2	30.9	0.7
126	30.5	30.9	0.4
132	30.8	31.0	0.2
138	31.3	31.3	0
144	32.0	32.0	0

Reference plane is parallel to test vehicle longitudinal centerline

Given dimensions = reference plane to car body

* Side trim separated from vehicle. All post-test measurements have .5 inches (average trim thickness) added to measured values.

FIGURE 6 (Cont'd)
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 AT OCCUPANT H-POINT

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

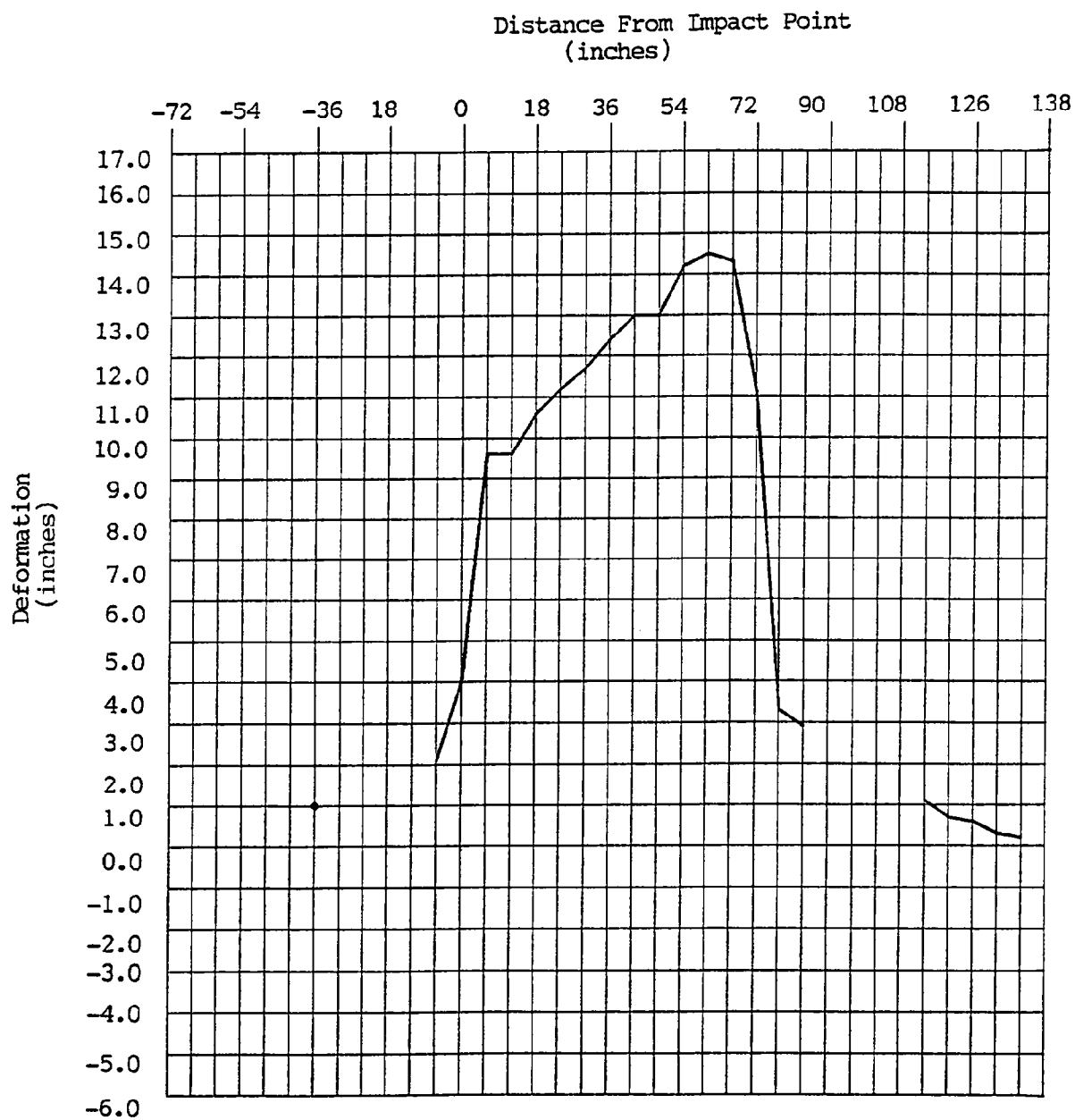
LEVEL 3 AT MID-DOOR

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	32.0	33.0	1.0
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	29.9	32.0	2.1
0	29.5	33.5	4.0 (impact point)
6	29.5	39.1	9.6
12	29.4	39.0	9.6
18	29.3	39.9	10.6
24	29.1	40.3	11.2
30	29.1	40.8	11.7
36	28.9	41.3	12.4
42	28.8	41.8	13.0
48	28.8	41.8	13.0
54	28.8	43.0	14.2
60	28.8	43.3	14.5
66	28.8	43.1	14.3
72	28.9	40.0	11.1
78	28.9	32.2	3.3
84	29.1	32.0	2.9
90	---	---	---
96	---	---	---
102	---	---	---
108	---	---	---
114	30.2	31.3	1.1
120	30.6	31.3	0.7
126	30.9	31.5	0.6
132	31.3	31.6	0.3
138	31.8	32.0	0.2

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/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

Longitudinal Distance (in)	PRE-TEST (in)	POST-TEST (in)	STATIC CRUSH (in)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	33.3	35.2	1.9
-42	34.5	34.8	0.3
-36	33.9	34.4	0.5
-30	33.5	34.3	0.8
-24	33.0	34.1	1.1
-18	32.5	33.9	1.4
-12	32.2	33.9	1.7
-6	31.9	33.9	2.0
0	31.5	33.8	2.3 (impact point)
6	31.4	33.8	2.4
12	31.1	36.0	4.9
18	31.0	37.0	6.0
24	30.9	39.0	8.1
30	30.7	39.2	8.5
36	30.7	39.8	9.1
42	30.6	40.3	9.7
48	30.6	40.9	10.3
54	30.7	41.7	11.0
60	30.7	41.7	11.0
66	30.9	41.5	10.6
72	30.9	38.2	7.3
78	30.9	35.1	4.2
84	31.0	34.1	3.1
90	31.2	33.7	2.5
96	31.5	33.5	2.0
102	31.7	33.5	1.8
108	32.0	33.5	1.5
114	32.2	33.3	1.1
120	32.4	33.3	0.9
126	32.7	33.3	0.6
132	33.1	33.3	0.2
138	33.5	33.5	0
144	33.9	33.9	0

Reference plane is parallel to test vehicle longitudinal centerline

Given dimensions = reference plane to car body

FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH

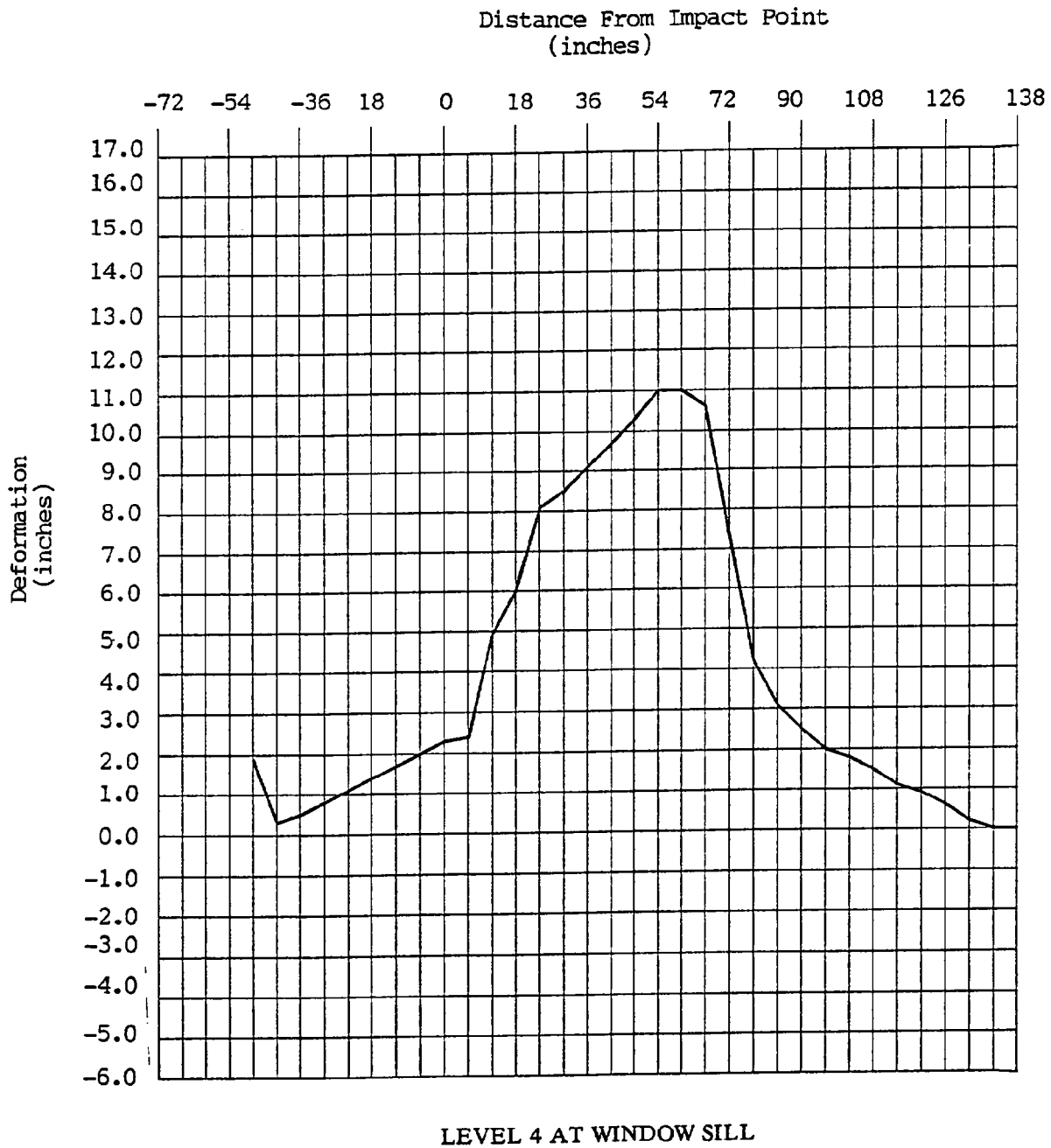


TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

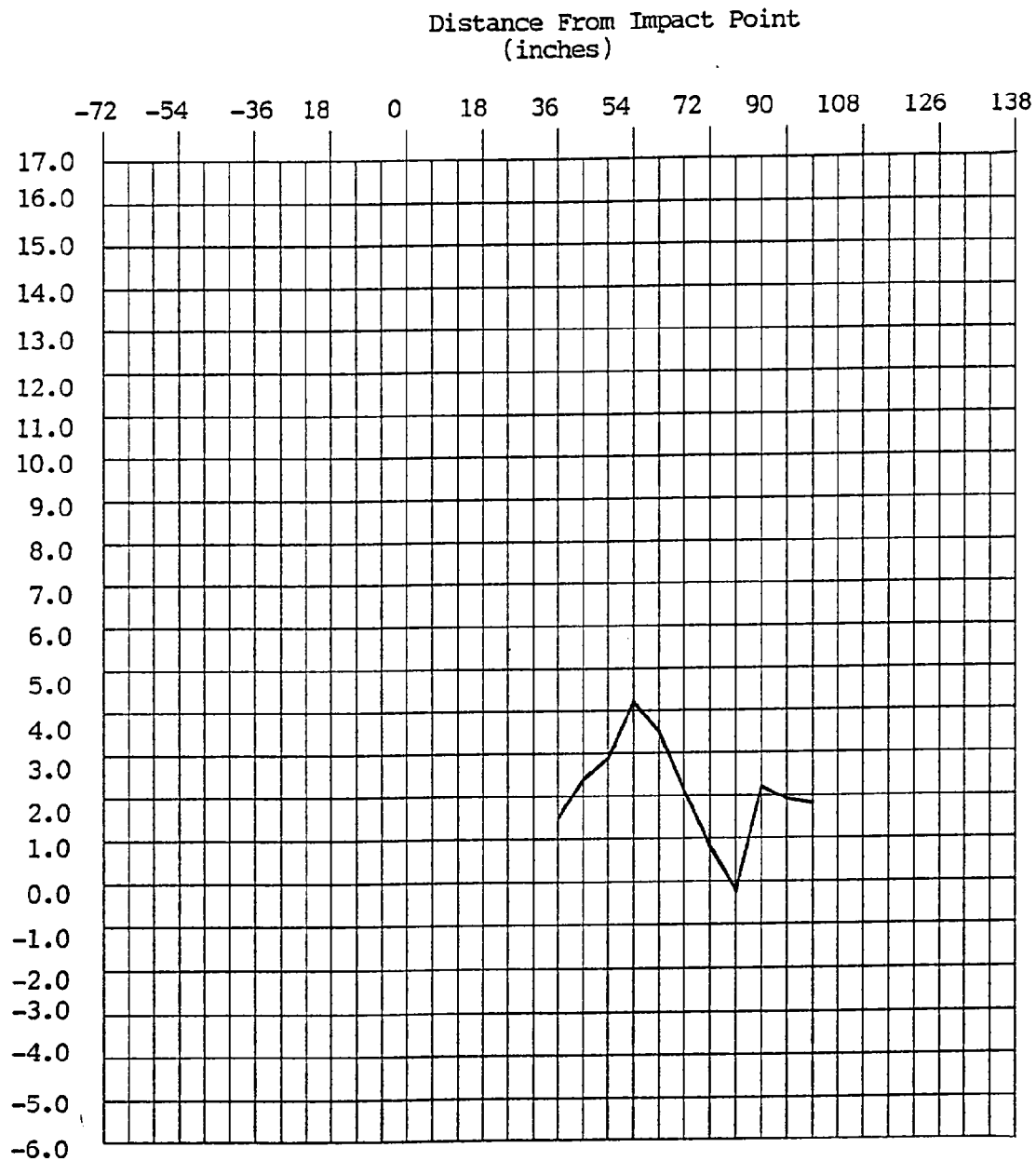
LEVEL 5 AT WINDOW TOP

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 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	---	---	---	(impactpoint)
6	---	---	---	
12	---	---	---	
18	---	---	---	
24	---	---	---	
30	---	---	---	
36	40.9	42.4	1.5	
42	40.9	43.3	2.4	
48	40.9	43.8	2.9	
54	41.0	45.2	4.2	
60	40.9	44.4	3.5	
66	41.0	43.1	2.1	
72	41.1	41.9	0.8	
78	41.2	41.0	-0.2	
84	41.3	43.5	2.2	
90	41.6	43.5	1.9	
96	41.8	43.6	1.8	
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

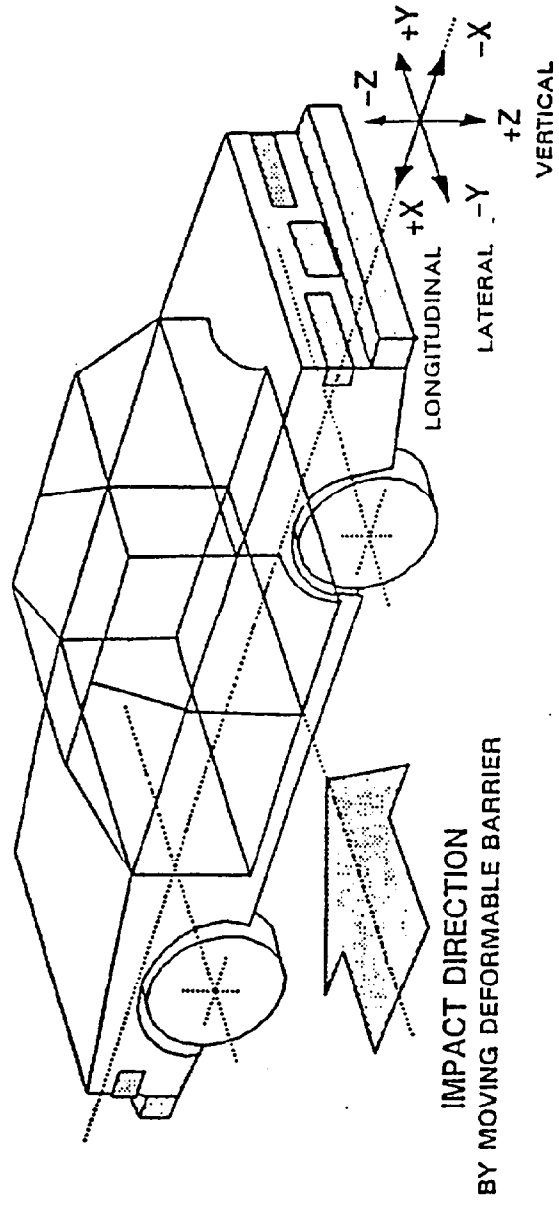


LEVEL 5 AT WINDOW TOP

FIGURE 7
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994



1. *Chlorophyll a* (Chl *a*)

2. *Chlorophyll b* (Chl *b*)

3. *Carotenoids*

4. *Phaeophytin a* (Pheo *a*)

5. *Phaeophytin b* (Pheo *b*)

6. *Phaeoerythrin* (Pheo *ery*)

7. *Phaeoxanthophyll* (Pheo *xanth*)

8. *Phaeo-zeaxanthin* (Pheo *zeax*)

9. *Phaeo-lutein* (Pheo *lutein*)

10. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

11. *Phaeo-peridinin* (Pheo *peridinin*)

12. *Phaeo-zeaxanthin* (Pheo *zeax*)

13. *Phaeo-lutein* (Pheo *lutein*)

14. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

15. *Phaeo-peridinin* (Pheo *peridinin*)

16. *Phaeo-zeaxanthin* (Pheo *zeax*)

17. *Phaeo-lutein* (Pheo *lutein*)

18. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

19. *Phaeo-peridinin* (Pheo *peridinin*)

20. *Phaeo-zeaxanthin* (Pheo *zeax*)

21. *Phaeo-lutein* (Pheo *lutein*)

22. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

23. *Phaeo-peridinin* (Pheo *peridinin*)

24. *Phaeo-zeaxanthin* (Pheo *zeax*)

25. *Phaeo-lutein* (Pheo *lutein*)

26. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

27. *Phaeo-peridinin* (Pheo *peridinin*)

28. *Phaeo-zeaxanthin* (Pheo *zeax*)

29. *Phaeo-lutein* (Pheo *lutein*)

30. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

31. *Phaeo-peridinin* (Pheo *peridinin*)

32. *Phaeo-zeaxanthin* (Pheo *zeax*)

33. *Phaeo-lutein* (Pheo *lutein*)

34. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

35. *Phaeo-peridinin* (Pheo *peridinin*)

36. *Phaeo-zeaxanthin* (Pheo *zeax*)

37. *Phaeo-lutein* (Pheo *lutein*)

38. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

39. *Phaeo-peridinin* (Pheo *peridinin*)

40. *Phaeo-zeaxanthin* (Pheo *zeax*)

41. *Phaeo-lutein* (Pheo *lutein*)

42. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

43. *Phaeo-peridinin* (Pheo *peridinin*)

44. *Phaeo-zeaxanthin* (Pheo *zeax*)

45. *Phaeo-lutein* (Pheo *lutein*)

46. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

47. *Phaeo-peridinin* (Pheo *peridinin*)

48. *Phaeo-zeaxanthin* (Pheo *zeax*)

49. *Phaeo-lutein* (Pheo *lutein*)

50. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

51. *Phaeo-peridinin* (Pheo *peridinin*)

52. *Phaeo-zeaxanthin* (Pheo *zeax*)

53. *Phaeo-lutein* (Pheo *lutein*)

54. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

55. *Phaeo-peridinin* (Pheo *peridinin*)

56. *Phaeo-zeaxanthin* (Pheo *zeax*)

57. *Phaeo-lutein* (Pheo *lutein*)

58. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

59. *Phaeo-peridinin* (Pheo *peridinin*)

60. *Phaeo-zeaxanthin* (Pheo *zeax*)

61. *Phaeo-lutein* (Pheo *lutein*)

62. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

63. *Phaeo-peridinin* (Pheo *peridinin*)

64. *Phaeo-zeaxanthin* (Pheo *zeax*)

65. *Phaeo-lutein* (Pheo *lutein*)

66. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

67. *Phaeo-peridinin* (Pheo *peridinin*)

68. *Phaeo-zeaxanthin* (Pheo *zeax*)

69. *Phaeo-lutein* (Pheo *lutein*)

70. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

71. *Phaeo-peridinin* (Pheo *peridinin*)

72. *Phaeo-zeaxanthin* (Pheo *zeax*)

73. *Phaeo-lutein* (Pheo *lutein*)

74. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

75. *Phaeo-peridinin* (Pheo *peridinin*)

76. *Phaeo-zeaxanthin* (Pheo *zeax*)

77. *Phaeo-lutein* (Pheo *lutein*)

78. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

79. *Phaeo-peridinin* (Pheo *peridinin*)

80. *Phaeo-zeaxanthin* (Pheo *zeax*)

81. *Phaeo-lutein* (Pheo *lutein*)

82. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

83. *Phaeo-peridinin* (Pheo *peridinin*)

84. *Phaeo-zeaxanthin* (Pheo *zeax*)

85. *Phaeo-lutein* (Pheo *lutein*)

86. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

87. *Phaeo-peridinin* (Pheo *peridinin*)

88. *Phaeo-zeaxanthin* (Pheo *zeax*)

89. *Phaeo-lutein* (Pheo *lutein*)

90. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

91. *Phaeo-peridinin* (Pheo *peridinin*)

92. *Phaeo-zeaxanthin* (Pheo *zeax*)

93. *Phaeo-lutein* (Pheo *lutein*)

94. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

95. *Phaeo-peridinin* (Pheo *peridinin*)

96. *Phaeo-zeaxanthin* (Pheo *zeax*)

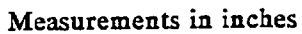
97. *Phaeo-lutein* (Pheo *lutein*)

98. *Phaeo-fucoanthoxanthin* (Pheo *fuco*)

99. *Phaeo-peridinin* (Pheo *peridinin*)

100. *Phaeo-zeaxanthin* (Pheo *zeax*)

A = 15.0
B = 22.0
C = 66.0
D = 66.0
E = 66.0



Right	Left
A = <u>11.0</u>	<u>11.0</u>
B = <u>13.1</u>	<u>13.0</u>
C = <u>20.9</u>	<u>20.9</u>
D = <u>32.9</u>	<u>32.9</u>



TABLE 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTORYear/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 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"	5.7	2.7	2.4	4.2
28"	4.1	2.9	2.7	4.8
24"	2.4	1.1	2.1	3.1
20"	2.3	0.4	1.6	2.4
16"	1.6	0.2	1.3	1.9
12"	0.9	0.1	1.1	1.6
8"	0.4	0.1	1.1	1.7
4"	0.4	0	0.7	1.2
0"	0.2	0.1	0.6	1.1
4"	0.1	0.1	0.4	0.9
8"	0	-0.1	0.4	0.7
12"	0	0	0.1	0.6
16"	0	-0.2	0.1	0.6
20"	0	-0.4	0.1	0.4
24"	0	0	0.2	0.4
28"	0	0	0.4	0.6
32"	0.3	0	0.2	0.9

Left Side

Right Side

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 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	127.5	27.8	11.0	3.3	-6.4	14.1	-8.1	13.9	-15.7	20.0
2	Rt. Side Sill @ Rear Seat	87.1	26.5	11.8	2.4	-5.6	15.8	-3.4	5.7	-14.2	19.7
3	Rr. Floorpan Above Axle	53.5	0	25.0	5.0	-7.6	13.2	-1.8	10.8	-8.3	14.6
4	Left Side Sill @ Rr. Seat ¹	89.3	31.8	8.6	---	---	47.5	-29.8	---	---	---
5	Left Side Sill @ Frt. Seat ¹	125.4	31.8	8.6	---	---	94.9	-57.2	---	---	---
6	Left A-Post Lower	144.3	29.5	16.5	---	---	87.8	-71.3	---	---	---
7	Left B-Post Lower	102.9	31.3	23.0	---	---	94.7	-16.7	---	---	---
8	Left B-Post Mid	104.0	31.3	17.0	---	---	231.5	-99.2	---	---	---
9	Right Rear Occupant Compartment	88.4	14.8	10.5	---	---	17.5	-5.9	---	---	---
10	Driver Left Seat Track	120.0	26.1	17.1	---	---	49.2	-17.6	---	---	---

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

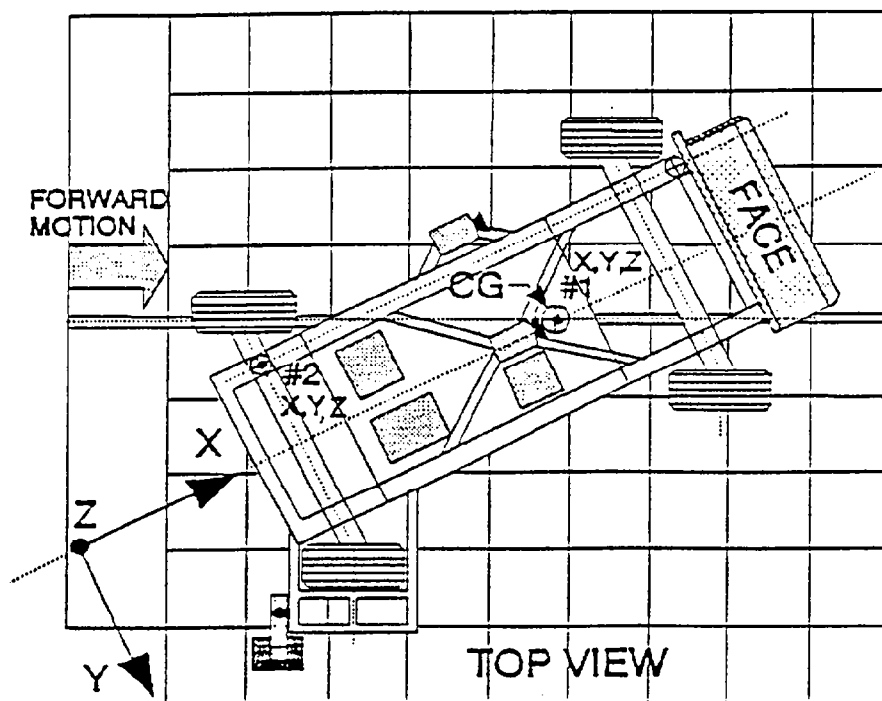
¹ Data not valid after approximately 40 msec.

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994



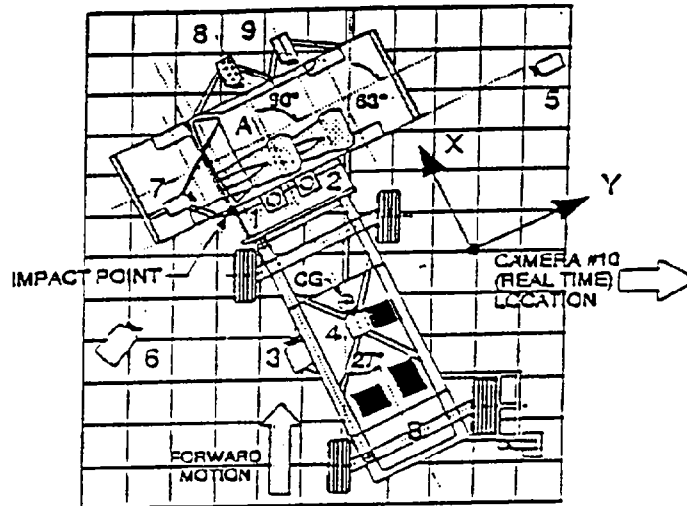
Accel. No.	Location	Coordinates (in)			Pos. Direct.		Neg. Direct.	
					Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal ... X				1.7	-3.2	14.3	35
	Lateral Y	-43.0	0	19.0	1.4	46.0	-4.5	31
	Vertical Z				13.3	55.0	-10.0	60
	Resultant R				18.4	45.0	---	---
2	Rear Frame Member							
	Longitudinal ... X	-102.0	-24.6	24.5	6.8	10	-5.9	91
	Lateral Y				1.1	196	-10.3	32

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

FIGURE 10
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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	1111
2	Top Wide	15.7	0	211.0		8	1117
3	Cart Pointer					35	385
4	Cart					35	465
5	Right Impact	20	335.8	31.0	45°	35	1015
6	Left Impact	95.3	112.2	520	45°	13	917
7	Onboard Hood					13	1000
8	Onboard Driver					7.5	1005
9	Onboard Passenger					8	769

* 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/Lincoln/Towncar/4 Door Sedan
Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 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:

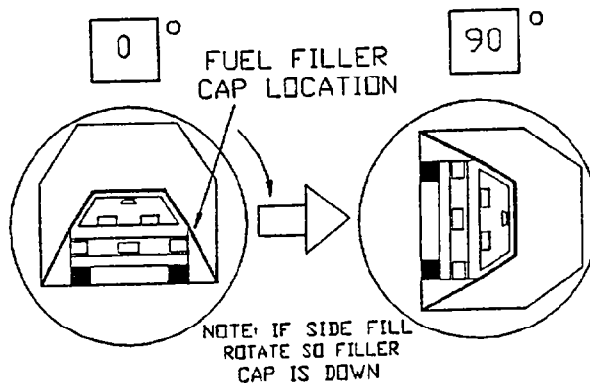
1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

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/Lincoln/Towncar/4 Door SedanVehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994TEST PHASE: 0° - 90°I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 50 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 50 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.

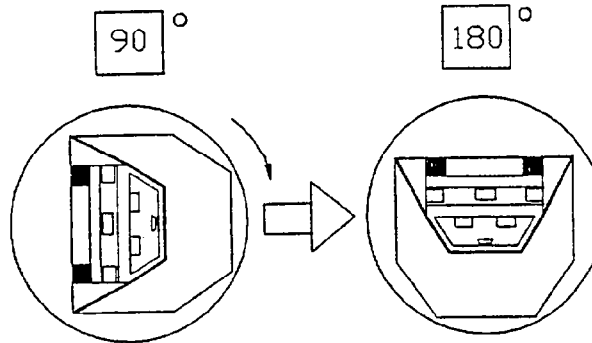
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

TEST PHASE: 90° - 180°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 40 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 40 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
---	---	---	---

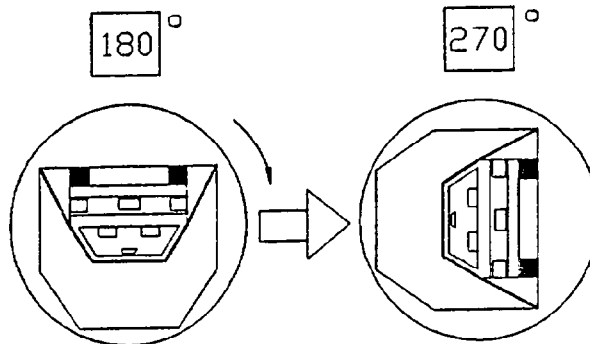
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan
Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

TEST PHASE: 180° - 270°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 23 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 23 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
---	---	---	---

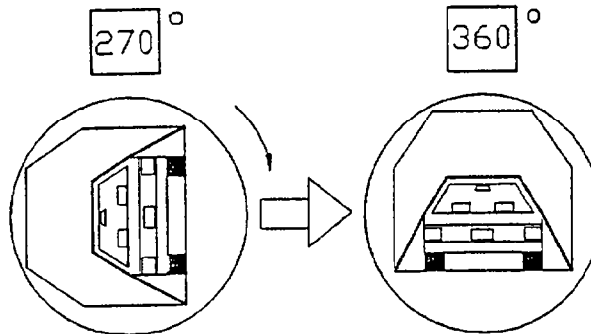
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1994/Lincoln/Towncar/4 Door Sedan
Vehicle NHTSA No.: CR0205 TEST DATE: June 15, 1994

TEST PHASE: 270° - 360°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 38 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 38 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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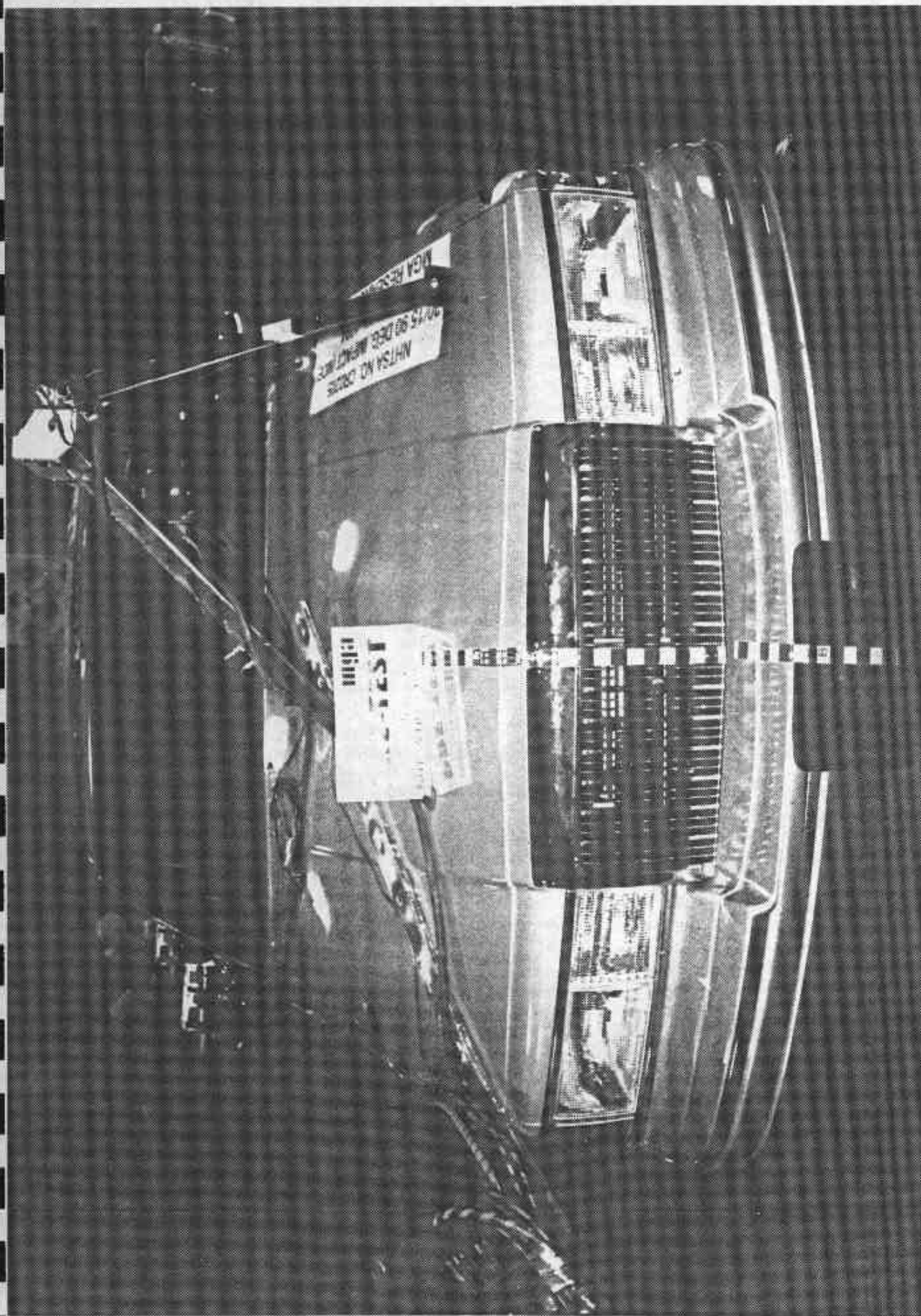


Photo No. A-1 - Pre-Test Front View of Test Vehicle

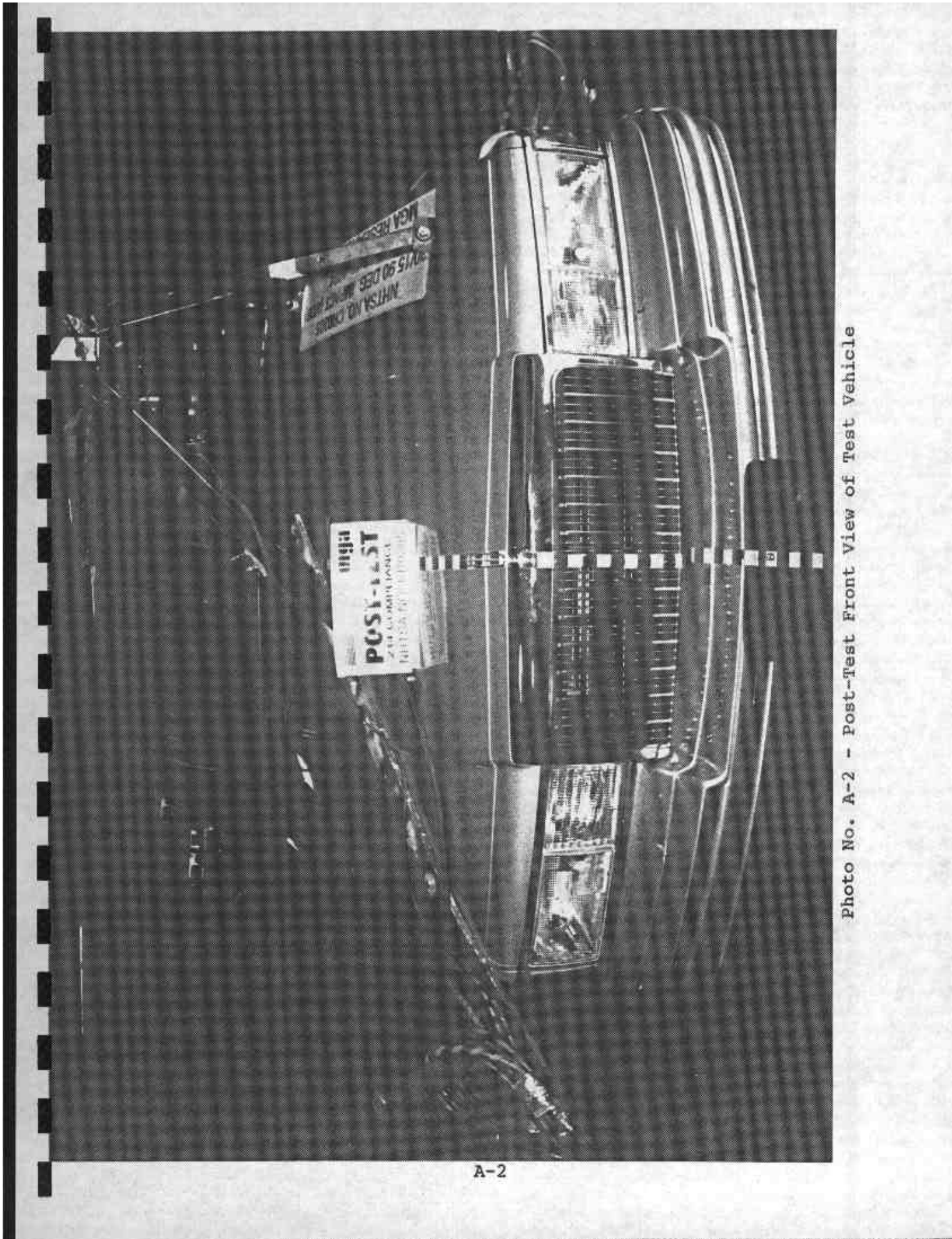


Photo No. A-2 - Post-Test Front View of Test Vehicle

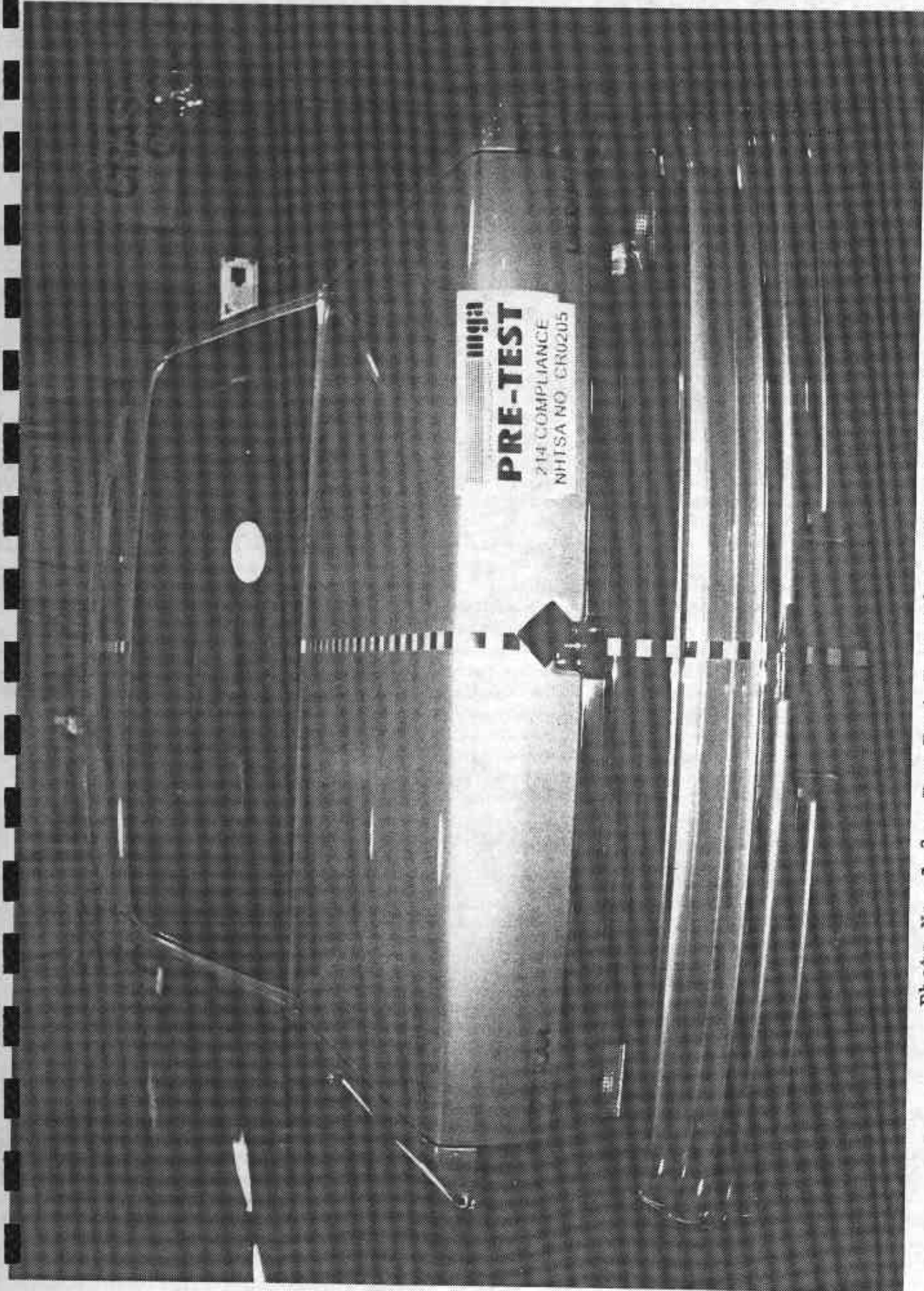


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

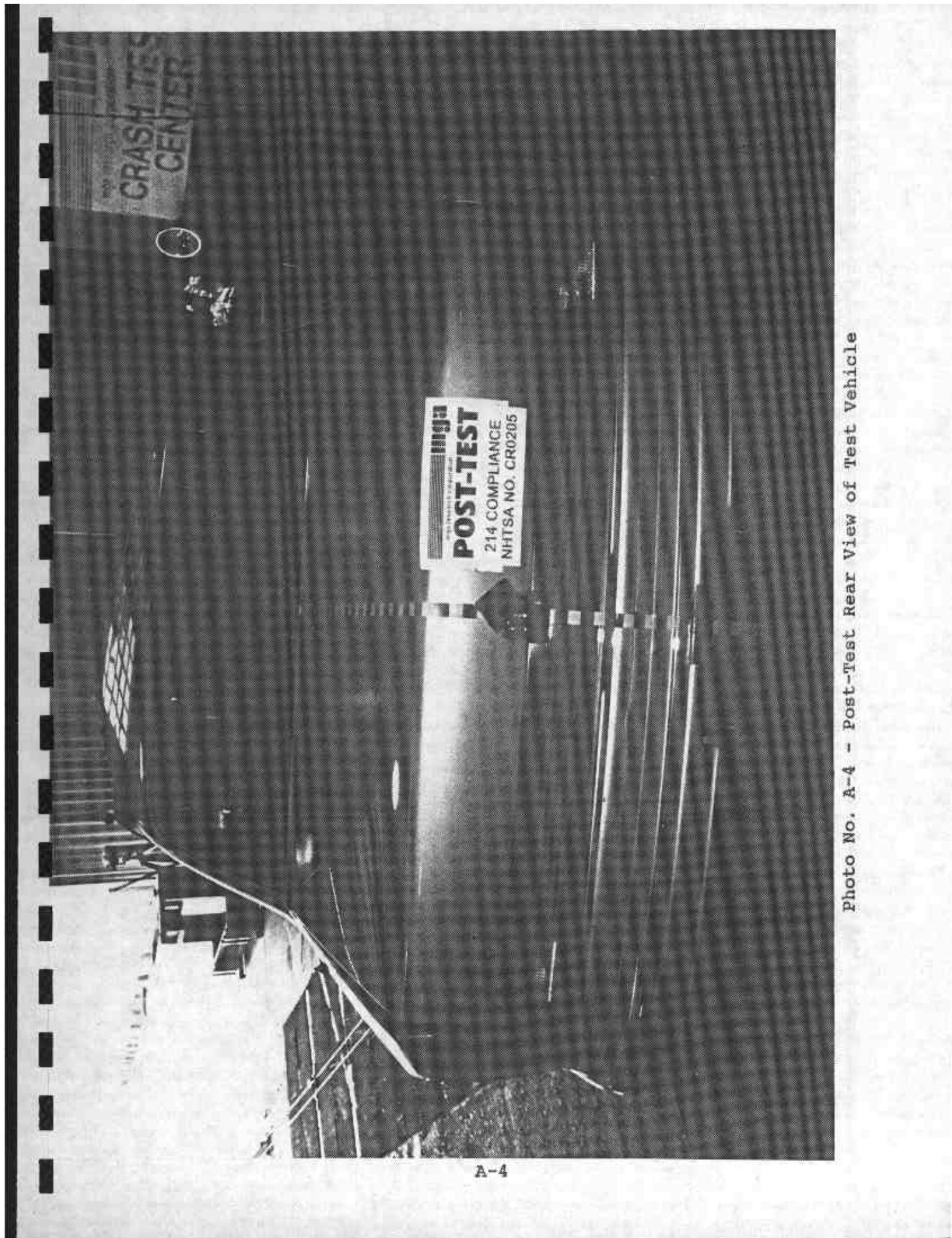


Photo No. A-4 - Post-Test Rear View of Test Vehicle

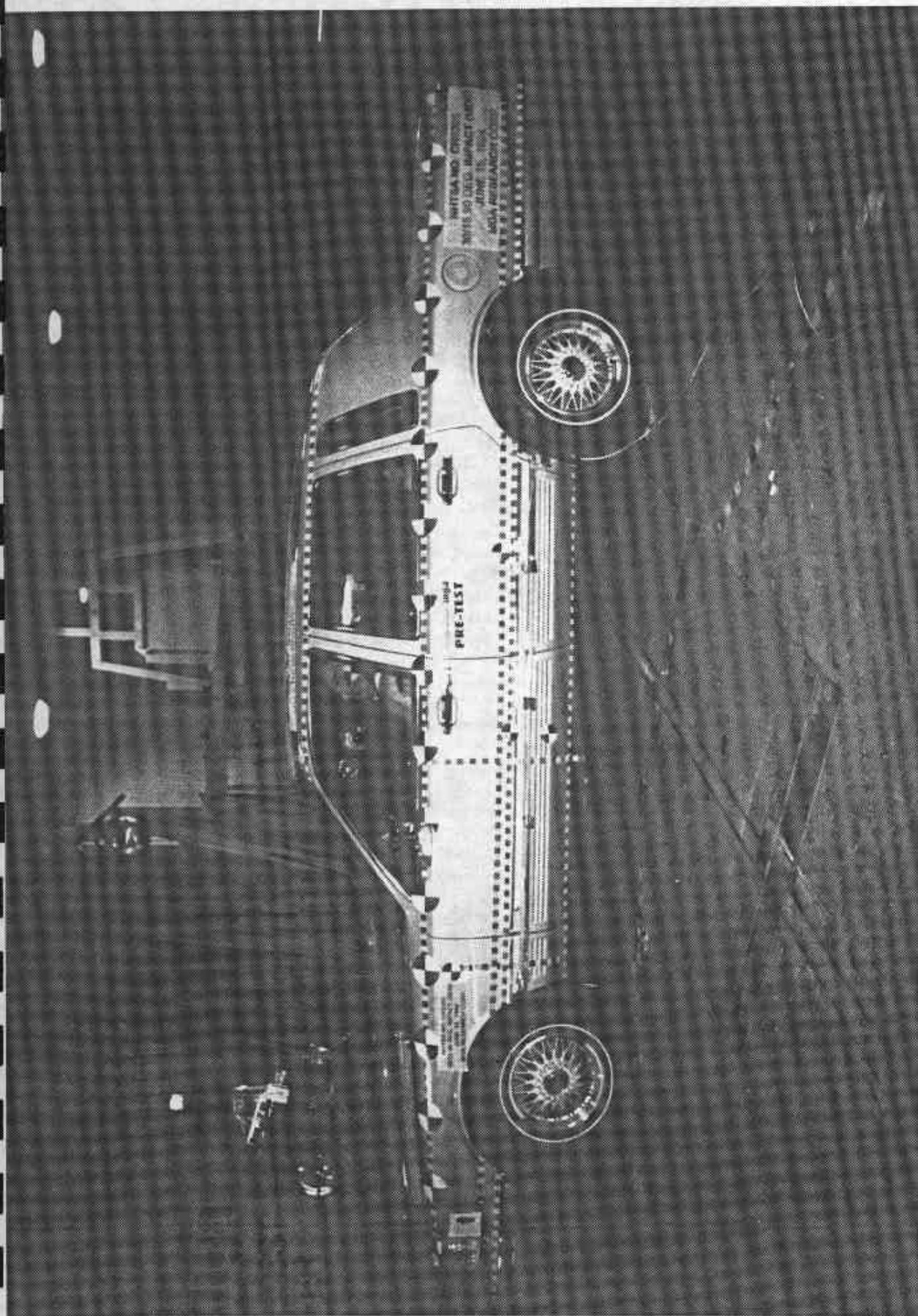


Photo No. A-5 - pre-Test Left Side View of Test Vehicle



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

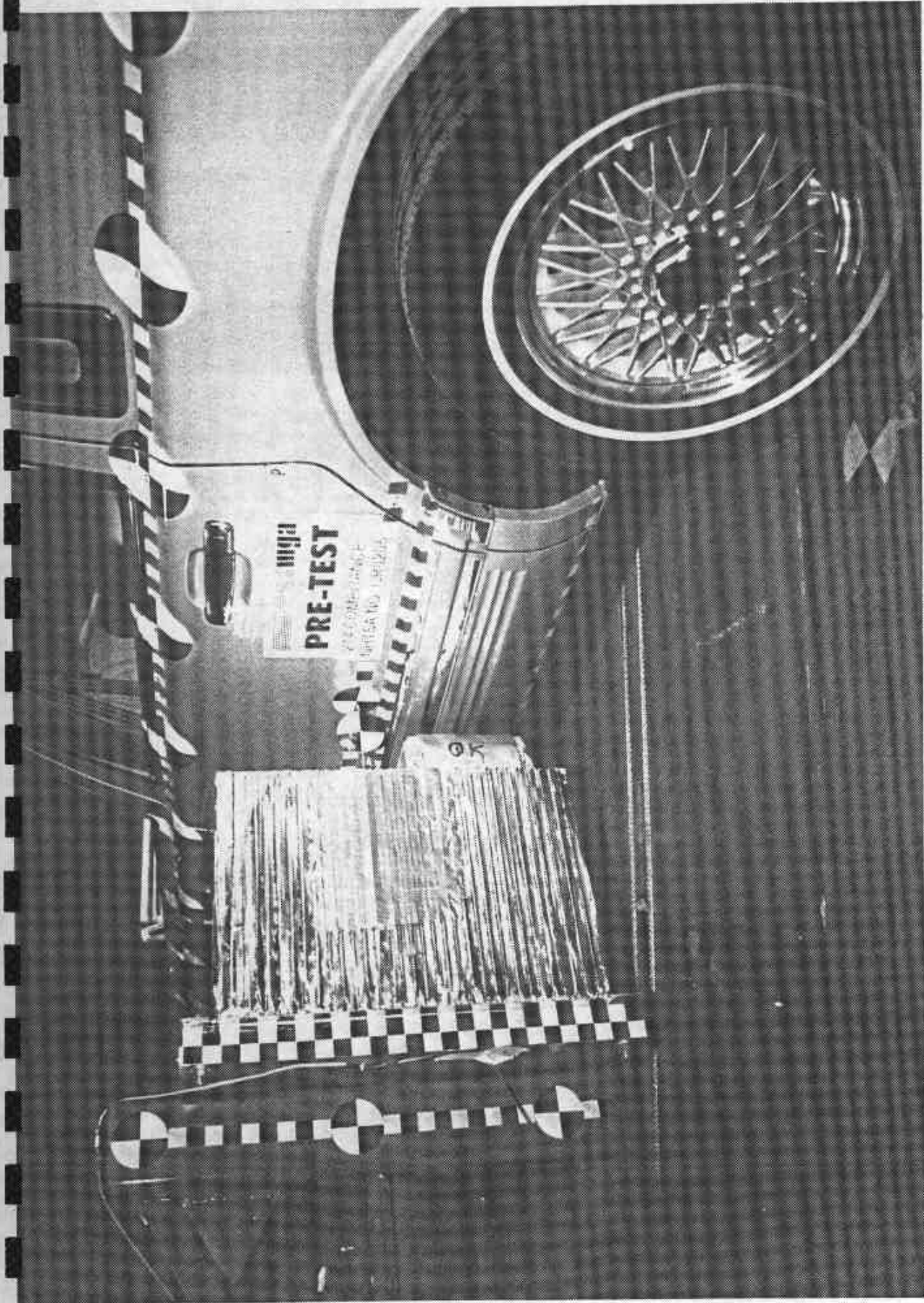


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)



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

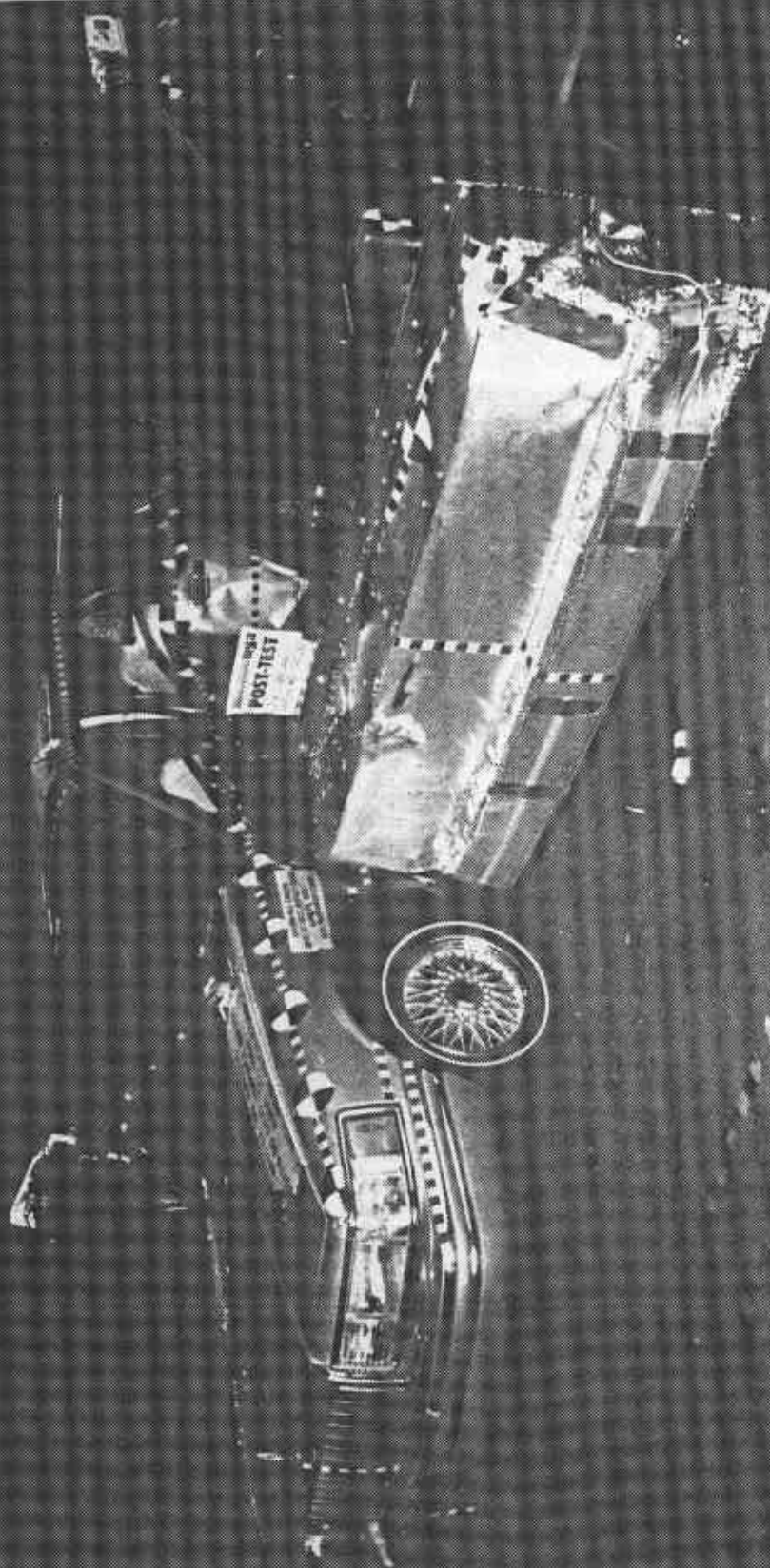


Photo No. A-10 - Post-Test MDB and Vehicle Left Side Front View

A-10

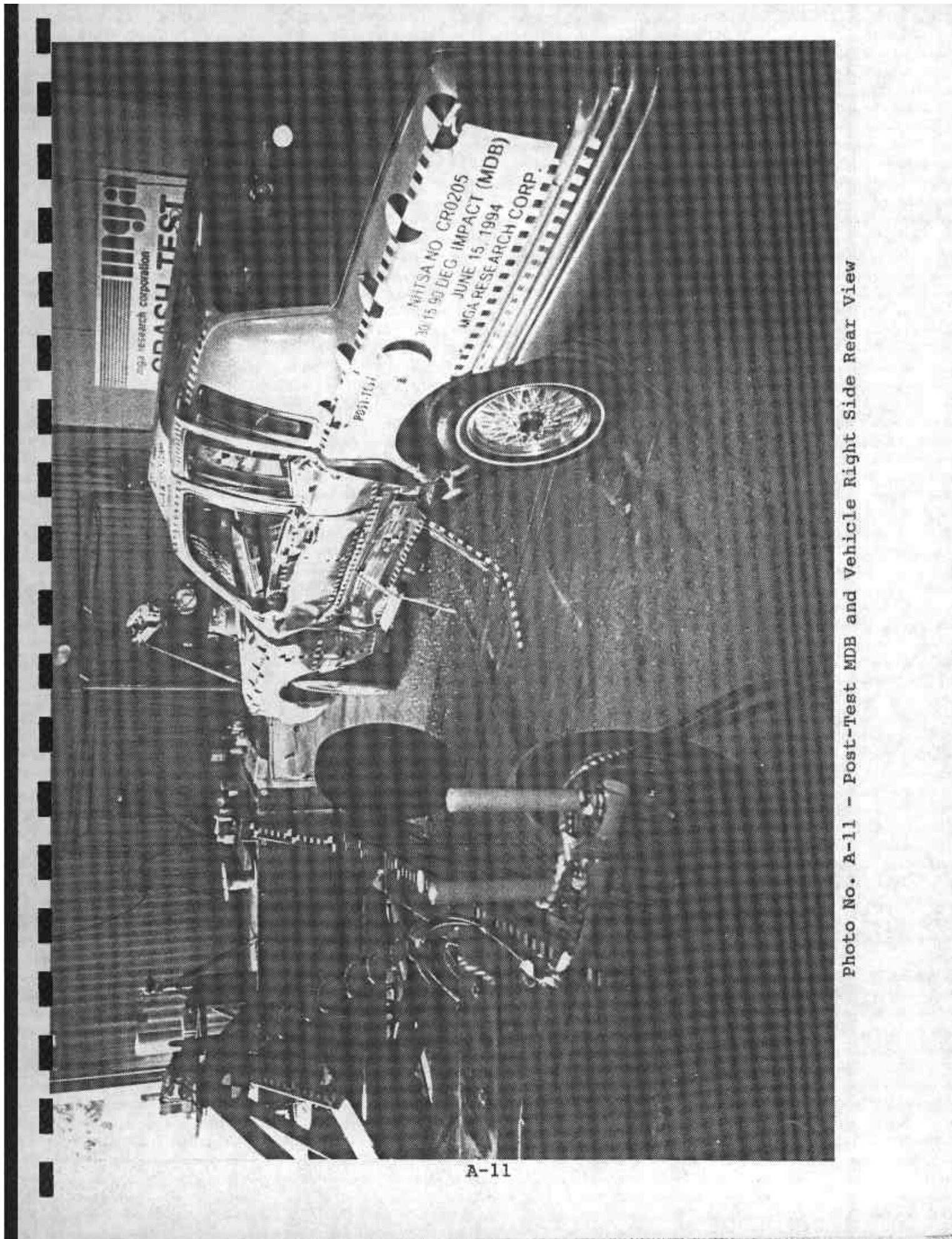


Photo No. A-11 - Post-Test MDB and Vehicle Right Side Rear View

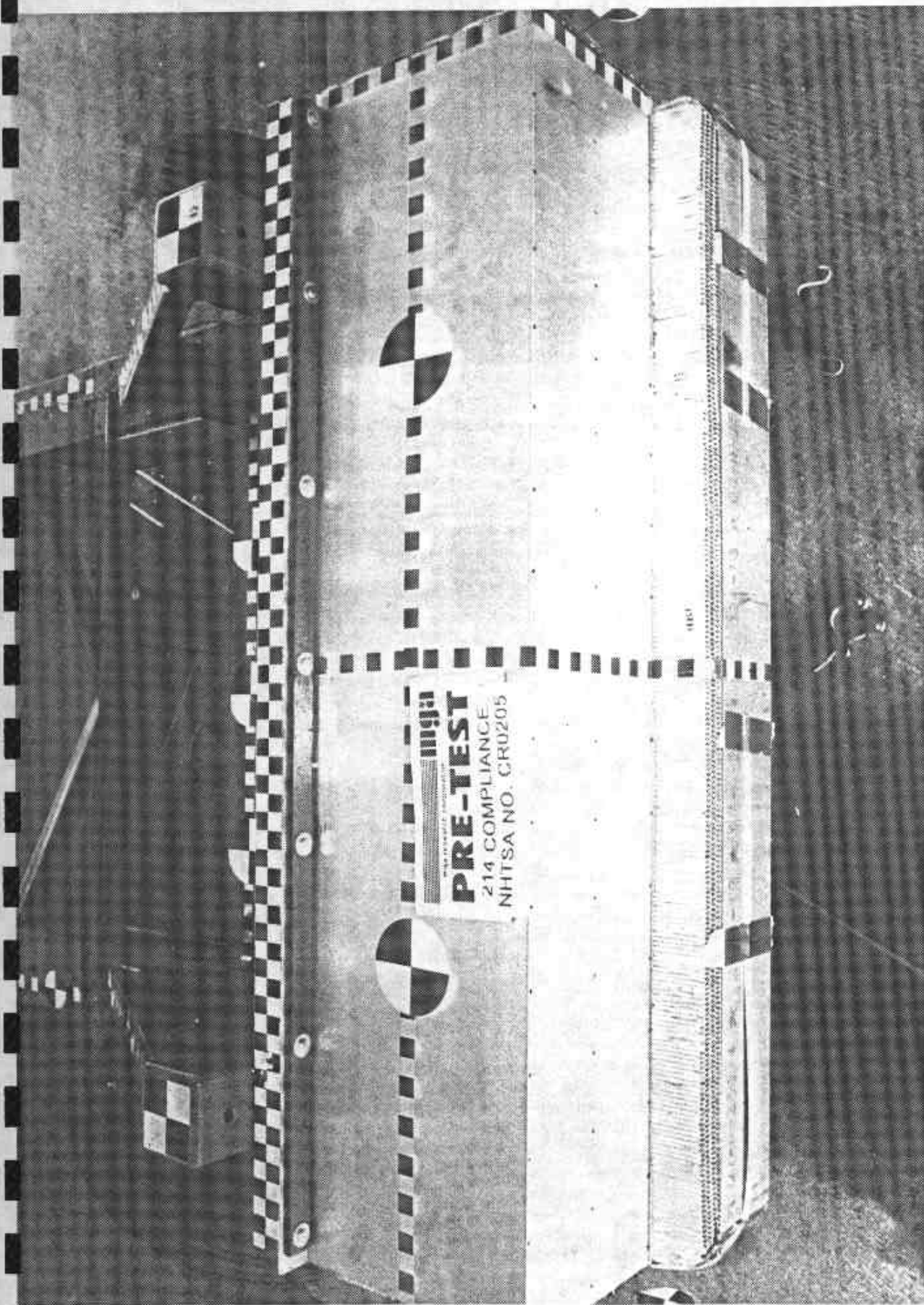


Photo No. A-12 - Pre-Test MDB Top View

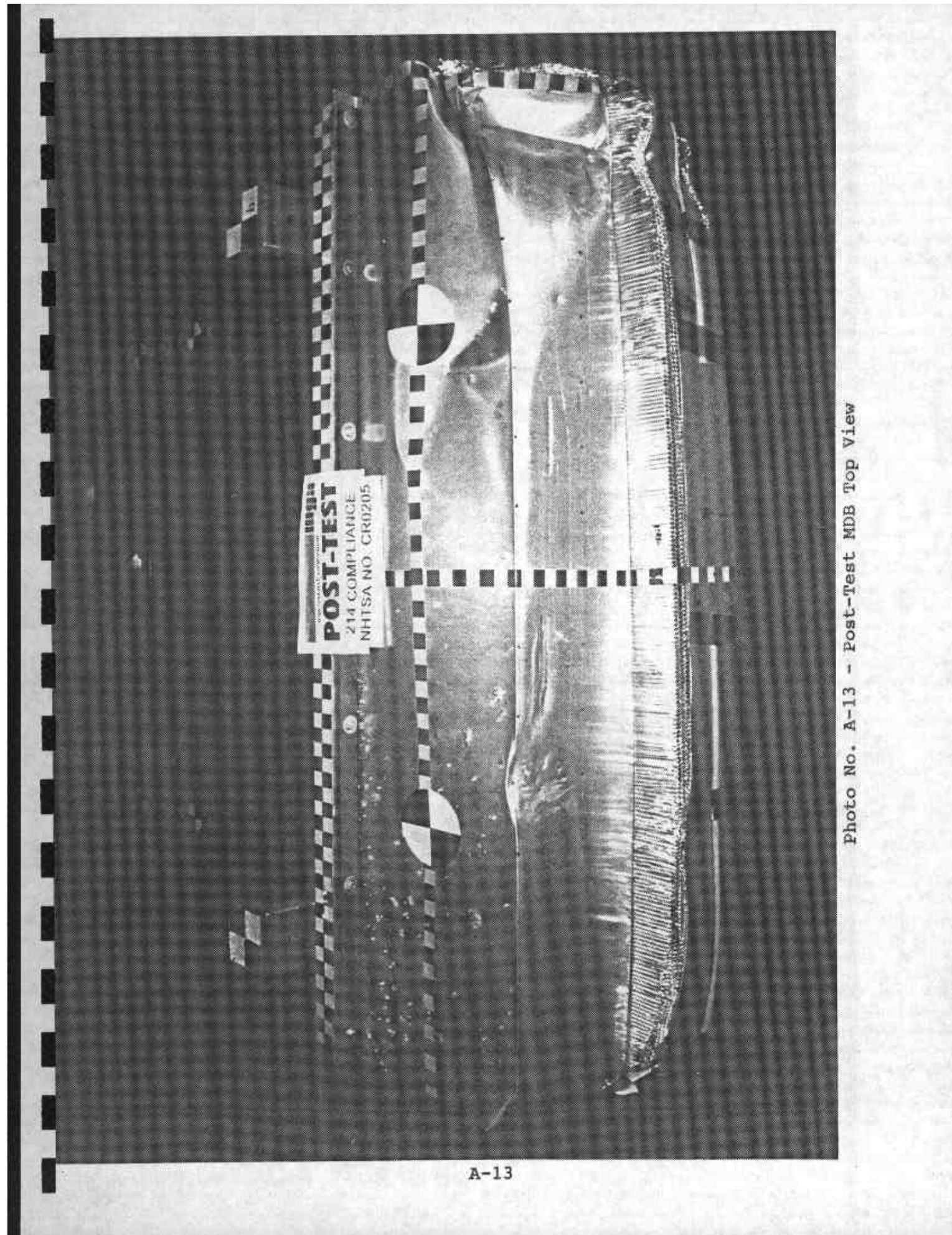
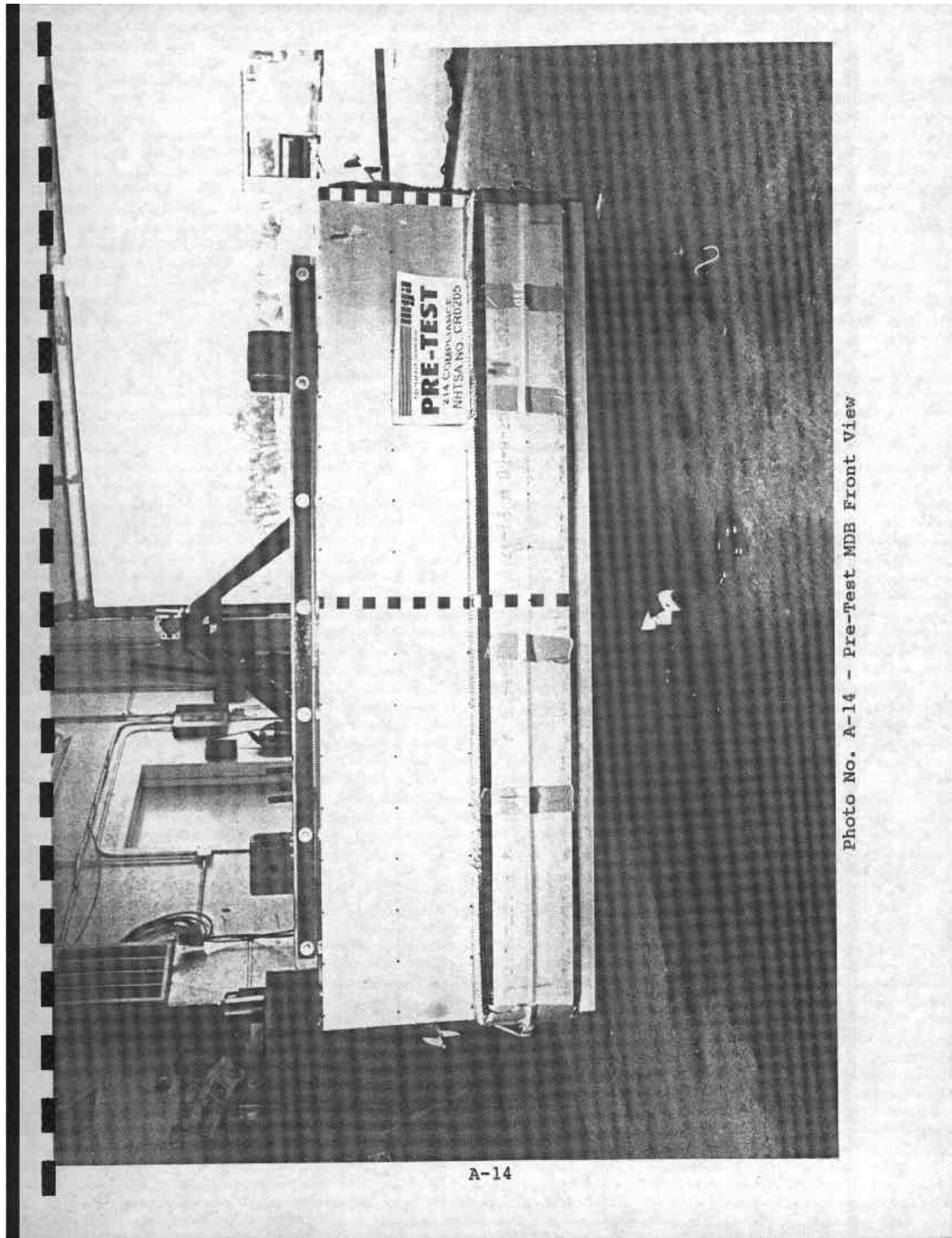


Photo No. A-13 - Post-Test MDB Top View

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PRE-TEST
214 COMBINATION
NHTSA NO. CR0205

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

POST-TEST
214 COMPLIANCE
NHTSA NO. CR0205

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

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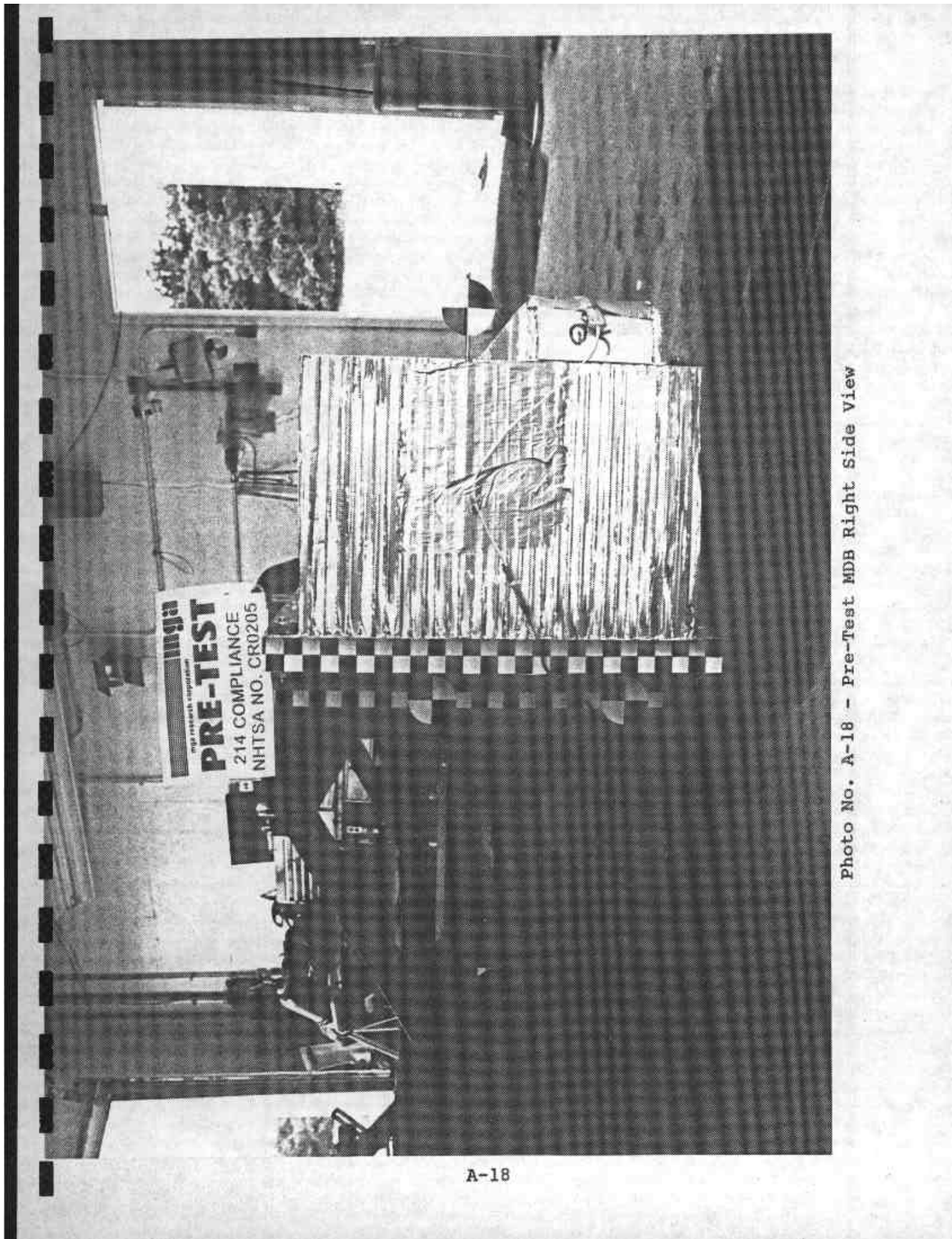
mgai
mega research corporation
PRE-TEST
214 COMPLIANCE
NHTSA NO. CR0205

A-16

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

POST-TEST
214 COMPLIANCE
NHTSA NO. CR0205

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



A-18

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

POST-TEST
214 COMPLIANCE
NHTSA NO. CR0205

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

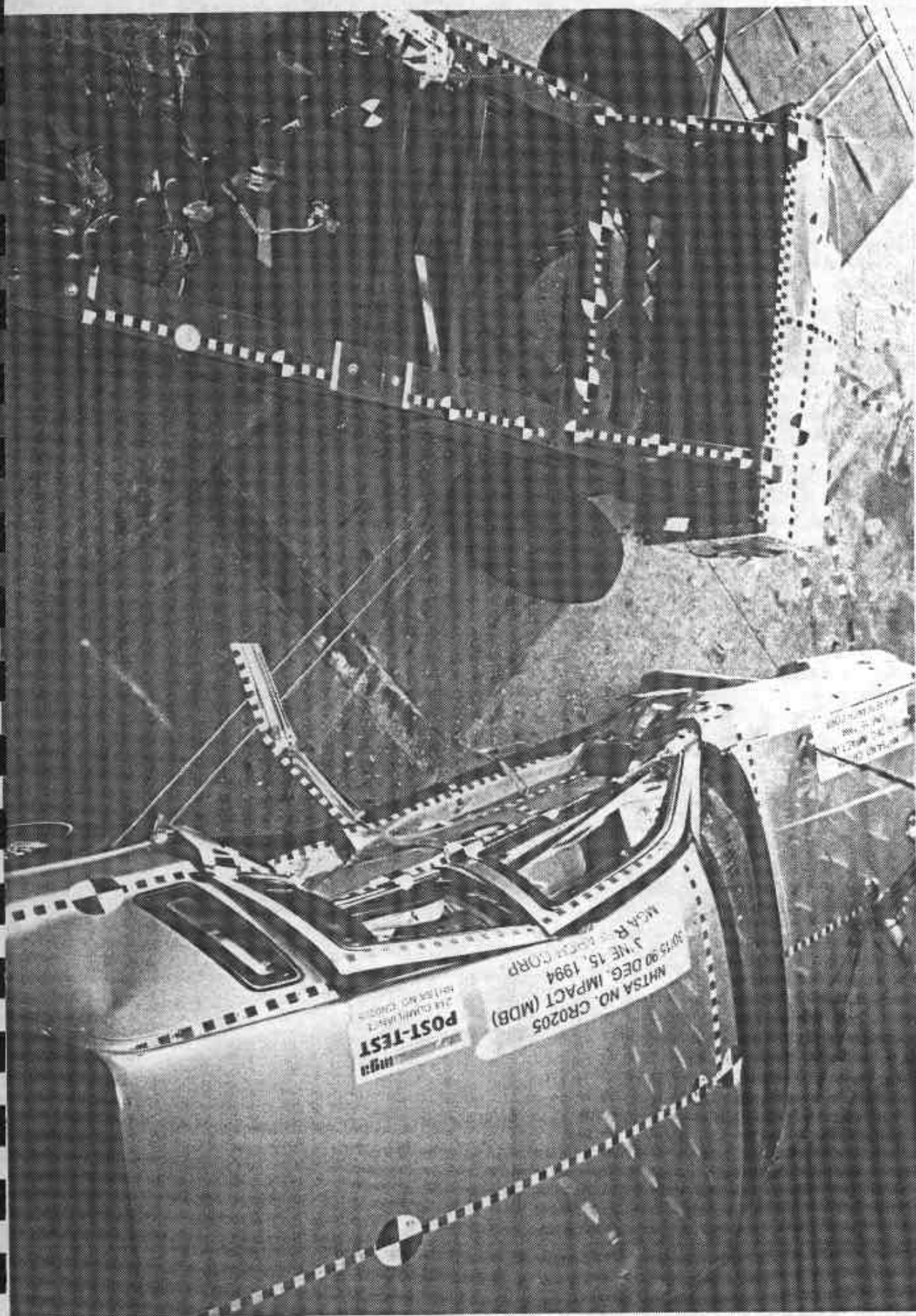


Photo No. A-20 - Post-Test MDB and Vehicle Overhead View



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



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

A-22

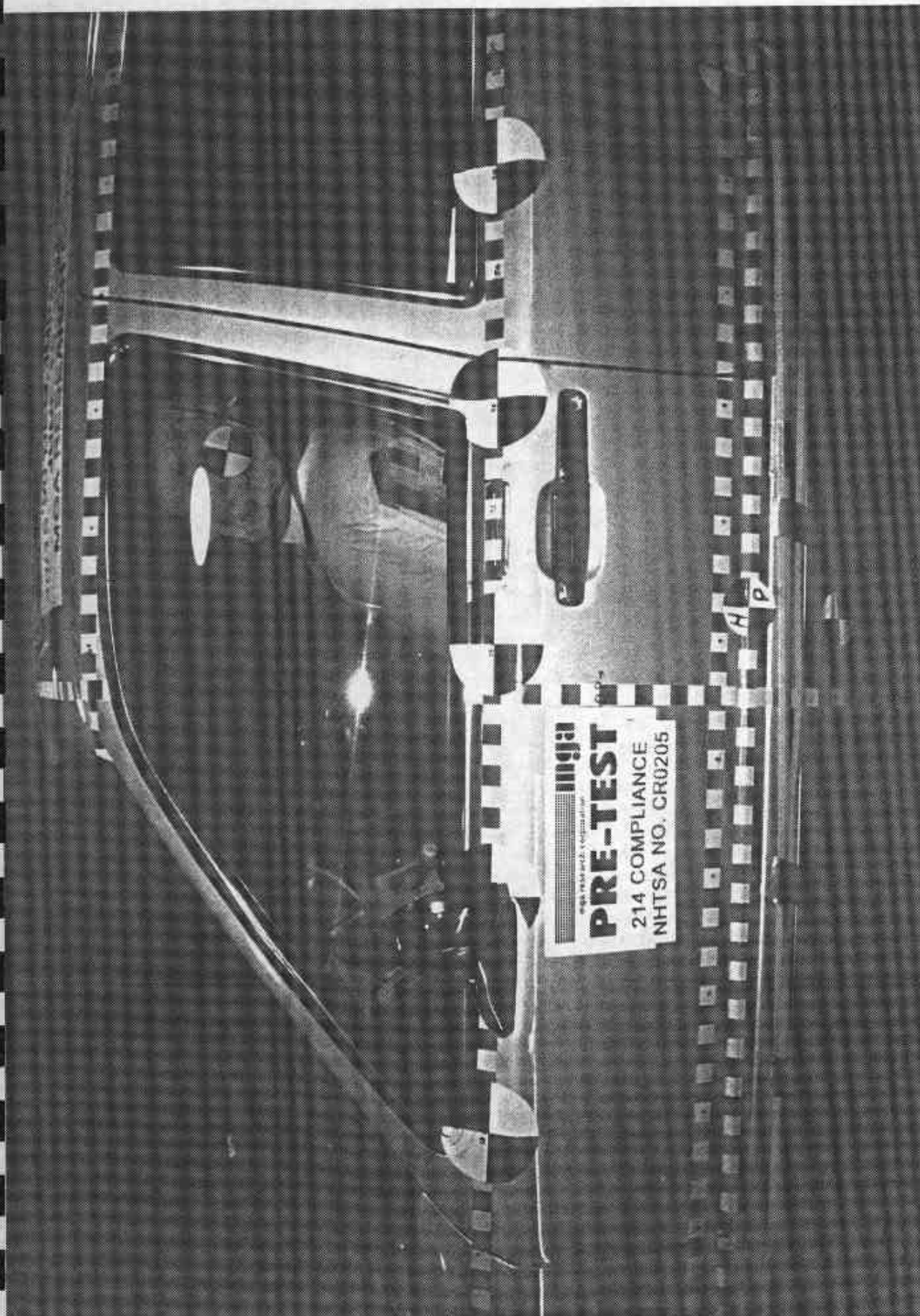


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

JUNE 1964
MGA RESEARCH CORP.

POST-TEST
214 COMPLIANCE
NHTSA NO. CR0205

205
T (MDB)
ORP

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



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



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

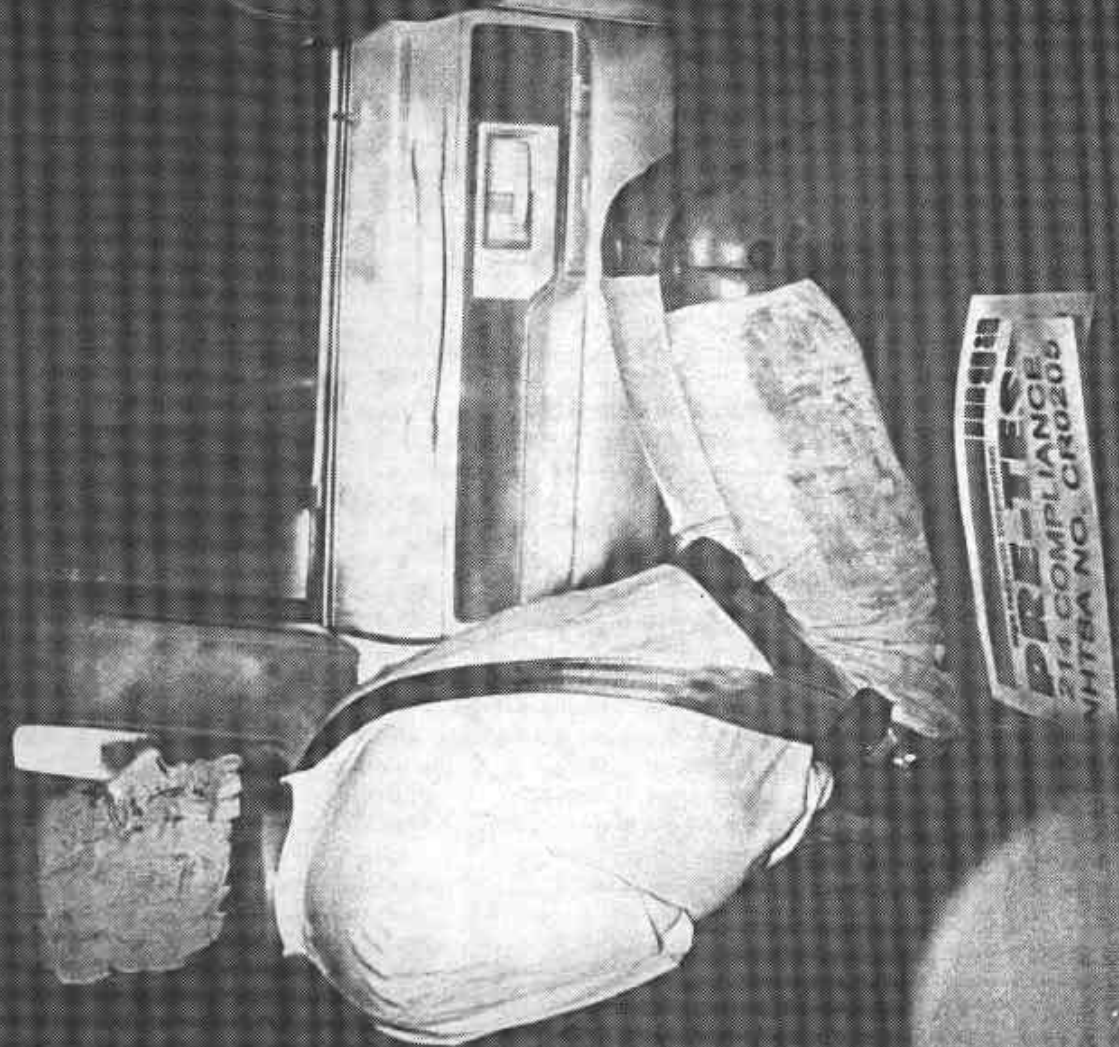


Photo No. A-27 - Pre-Test Passenger Dummy Right Side View

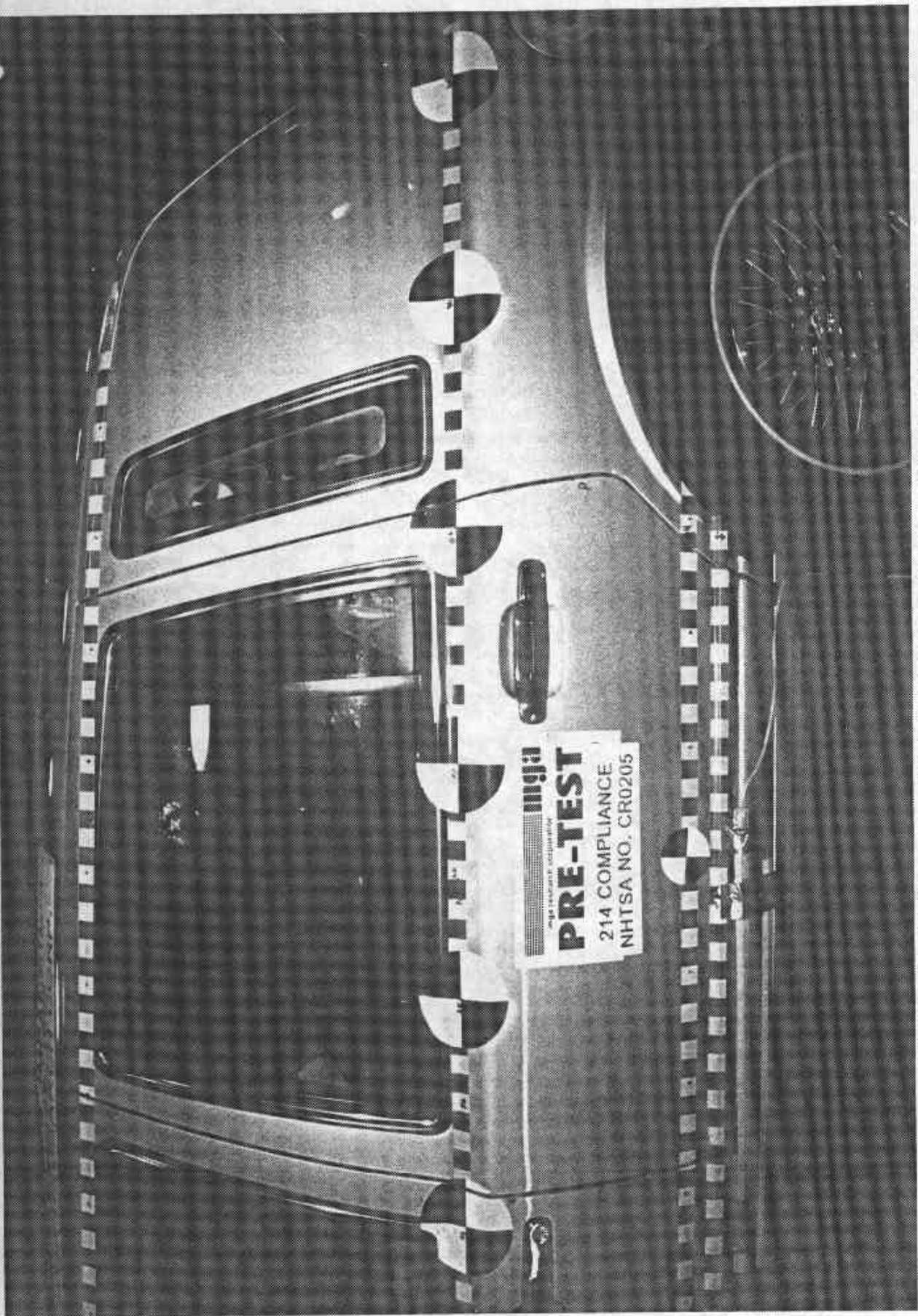


Photo No. A-29 - Pre-Test Passenger Dummy Left Side View

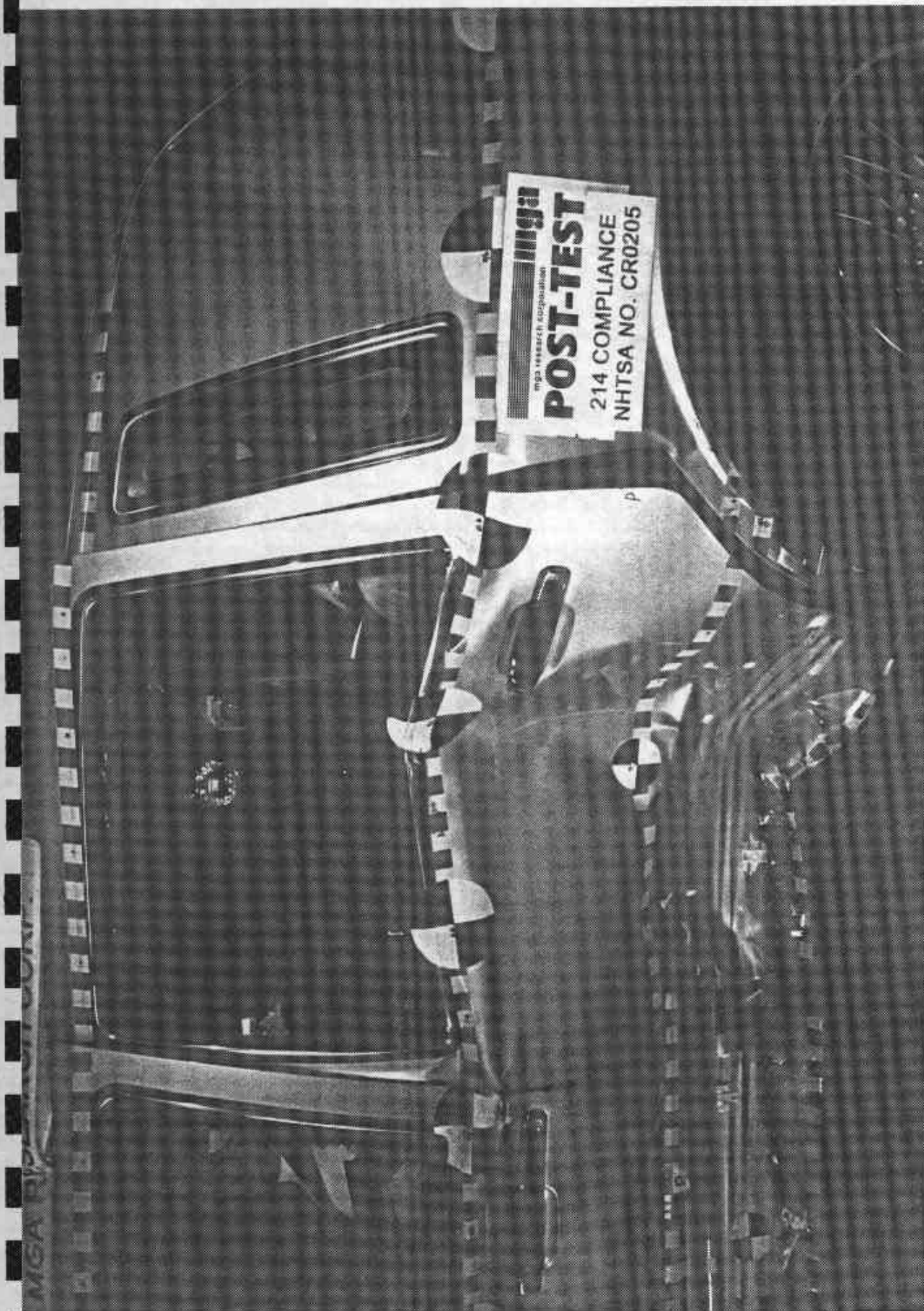


Photo No. A-30 - Post-Test Passenger Dummy Left Side View

A-30

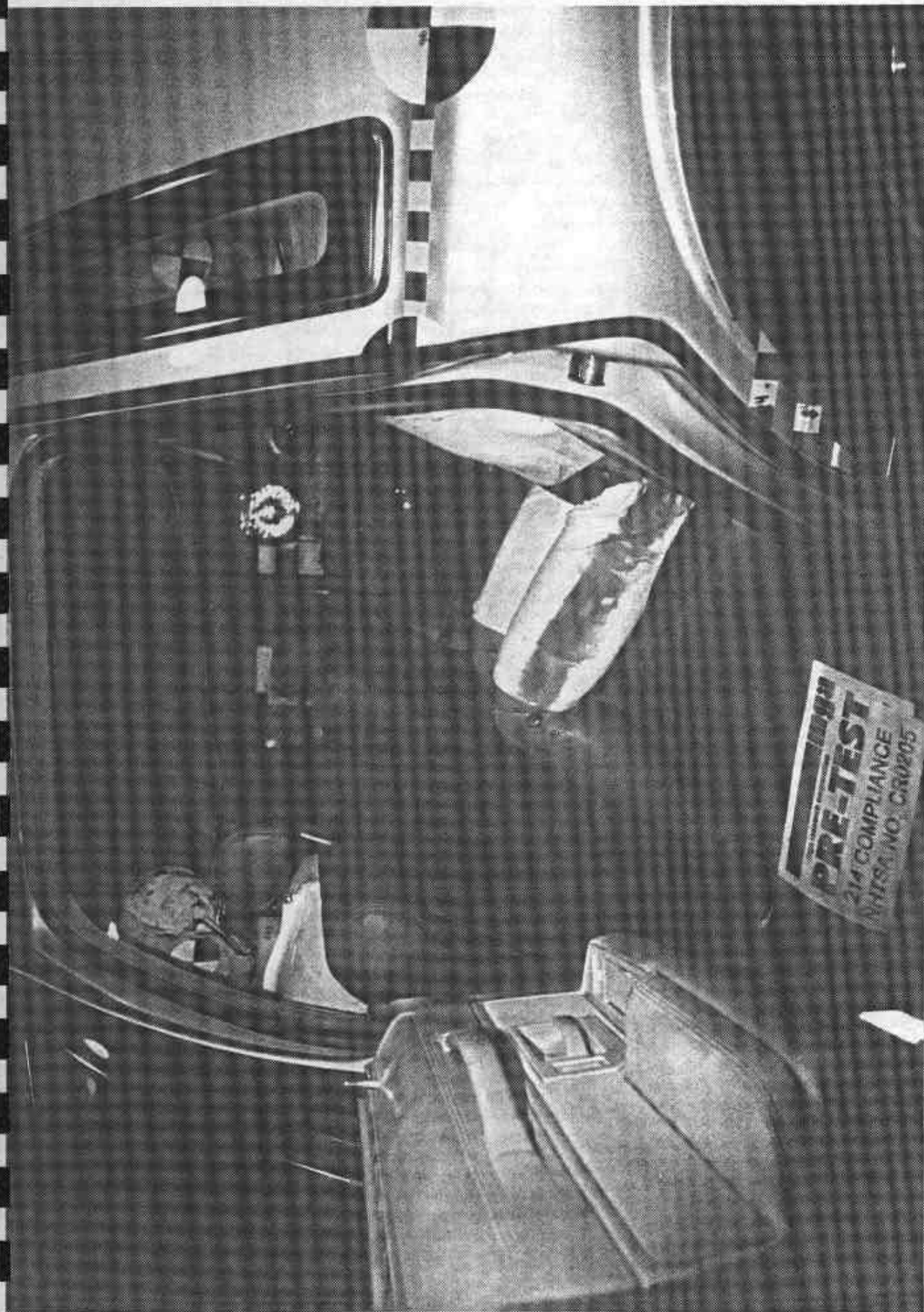
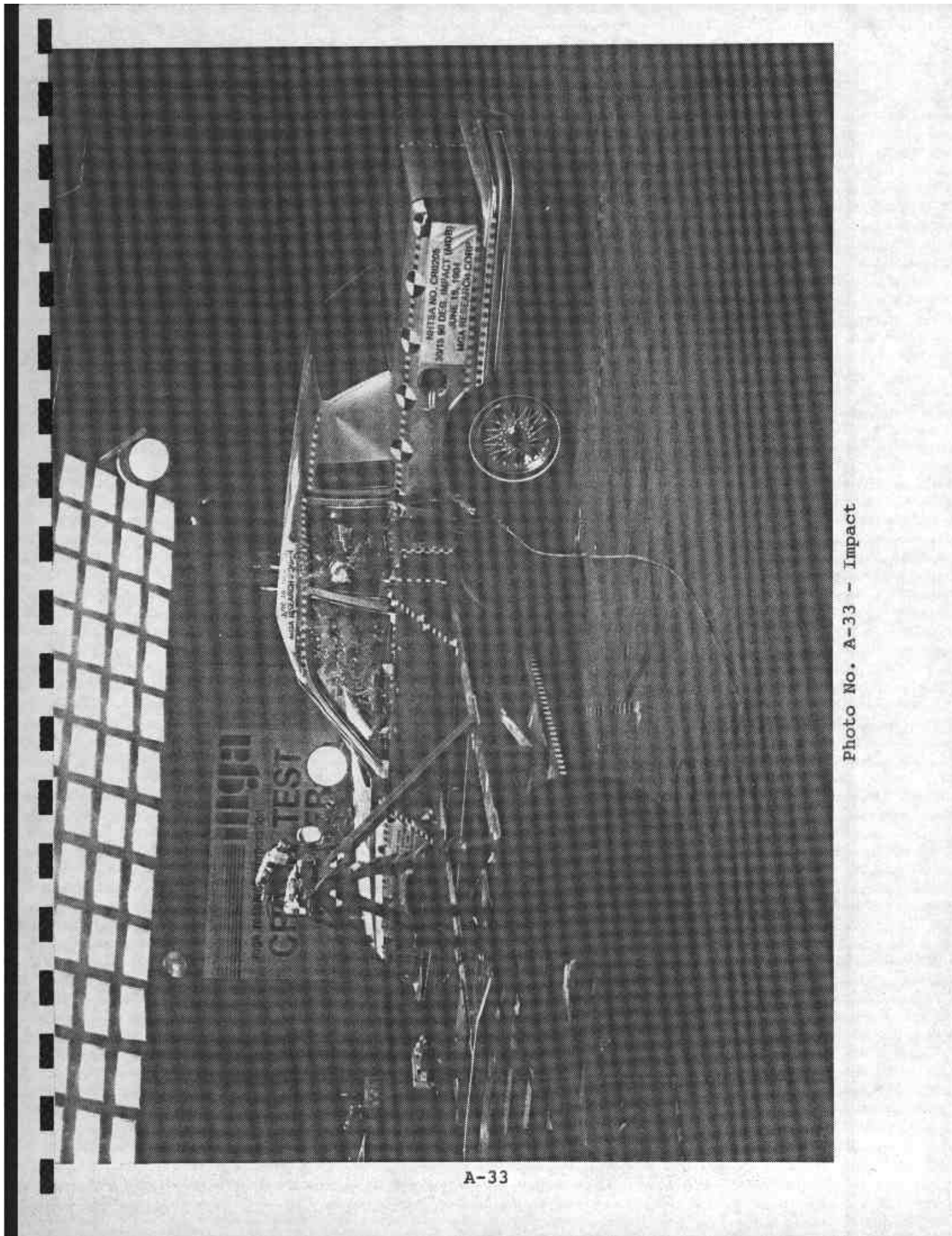


Photo No. A-31 - Pre-Test Passenger Dummy Left Side View (Door Open)



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



A-33

Photo No. A-33 - Impact

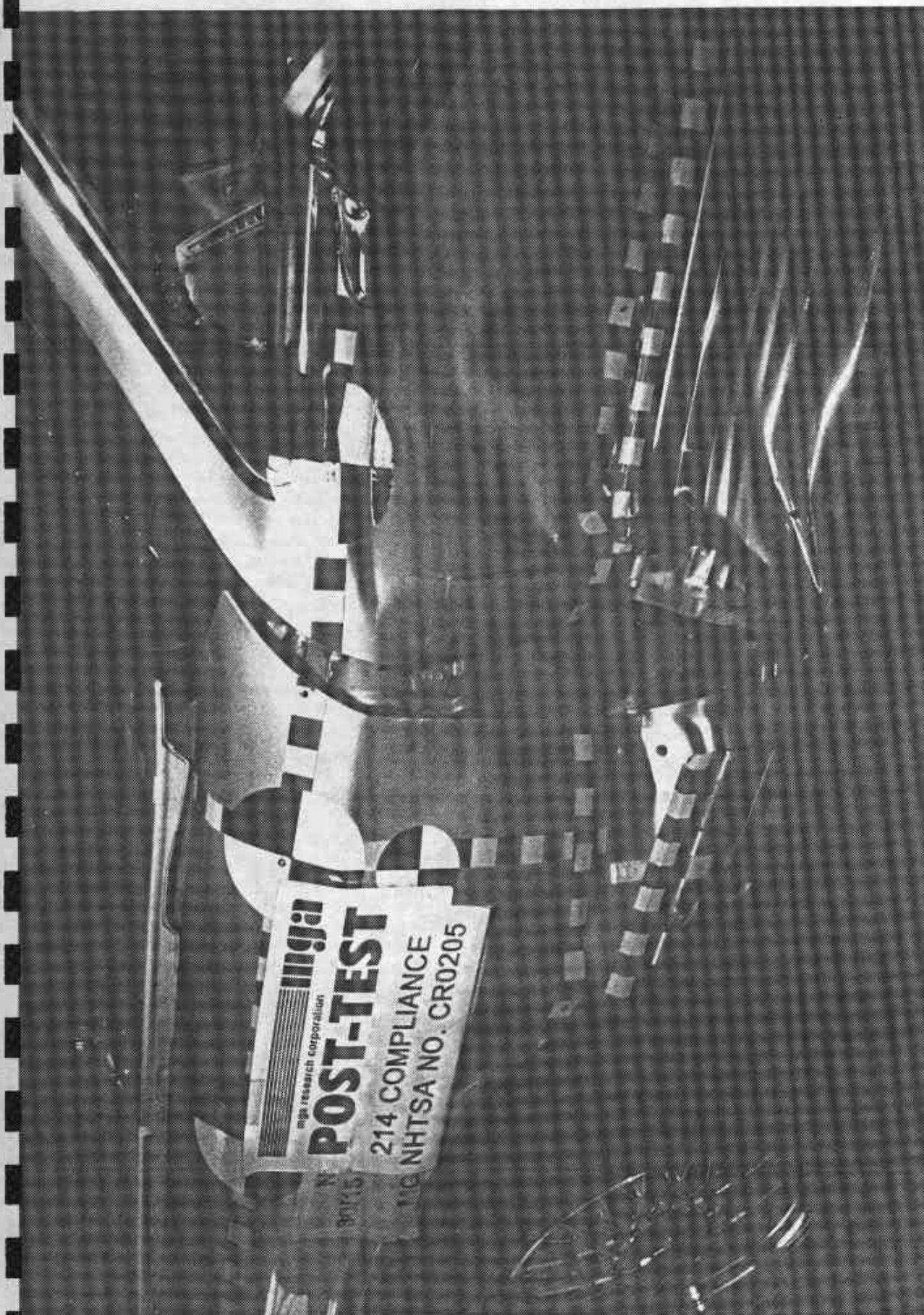


Photo No. A-34 - Left Front Impact Point on Vehicle



Photo No. A-35 - Left Rear Impact Point on Vehicle

WED BY FORD MOTOR CO. IN U.S.A.
 DATE: 01/04
 CHN: 8445LD/2478KG
 REMT CASH: 2831LB 1193KG
 REMT CASH: 2878LB 1388KG
 1916 VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR
 VEHICLE SAFETY, BUMPER, AND TRAFFIC PREVENTION STANDARDS
 IN EFFECT ON THE DATE OF MANUFACTURE. OTHER MODEL
 VIN: 11 ALLIGES 126WY694974
 TYPE: PASSENGER

Photo No. A-36 - Vehicle Certification Label and Tire Placard

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Filter: Class 180 (300 Hz)

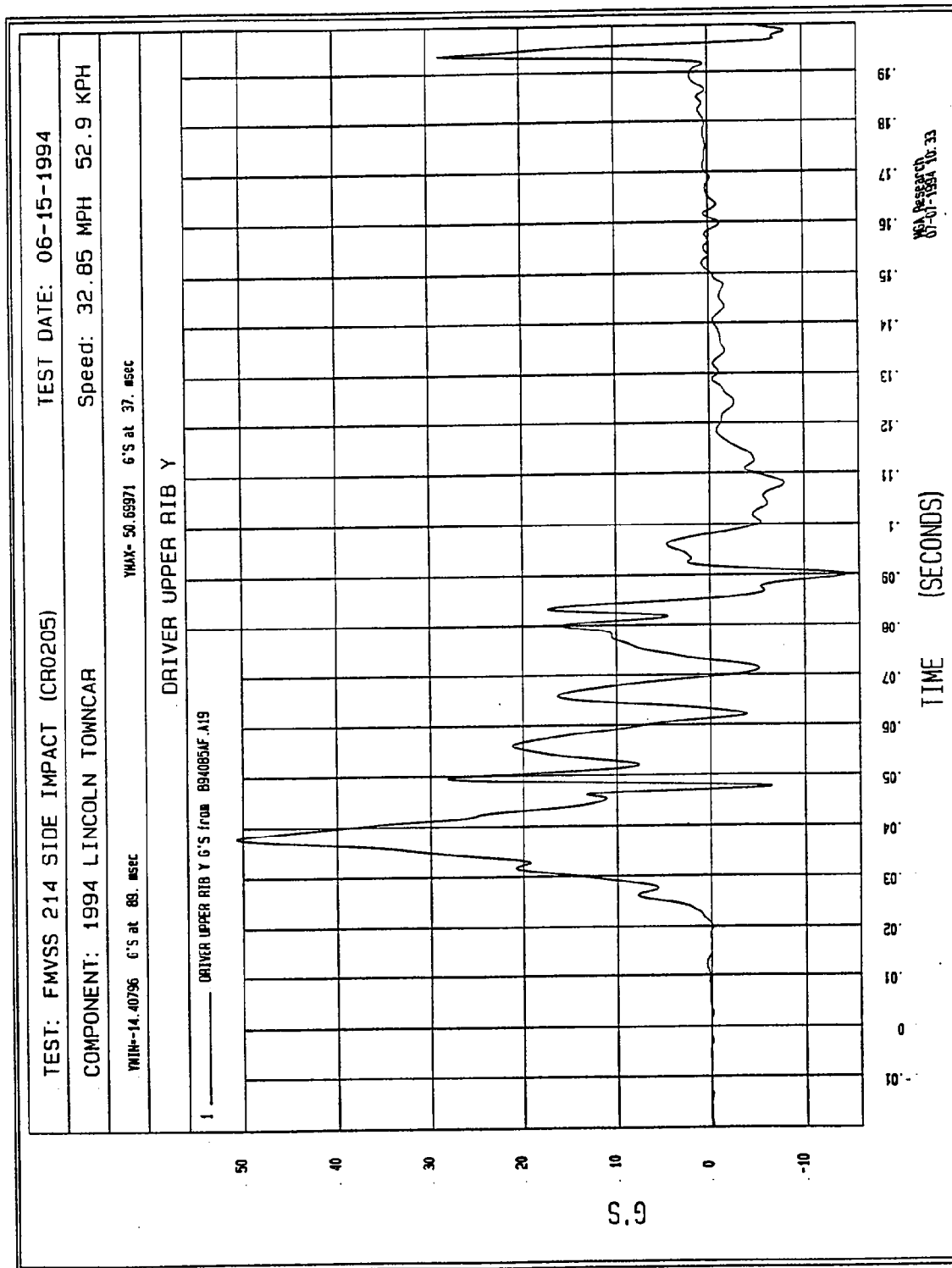


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

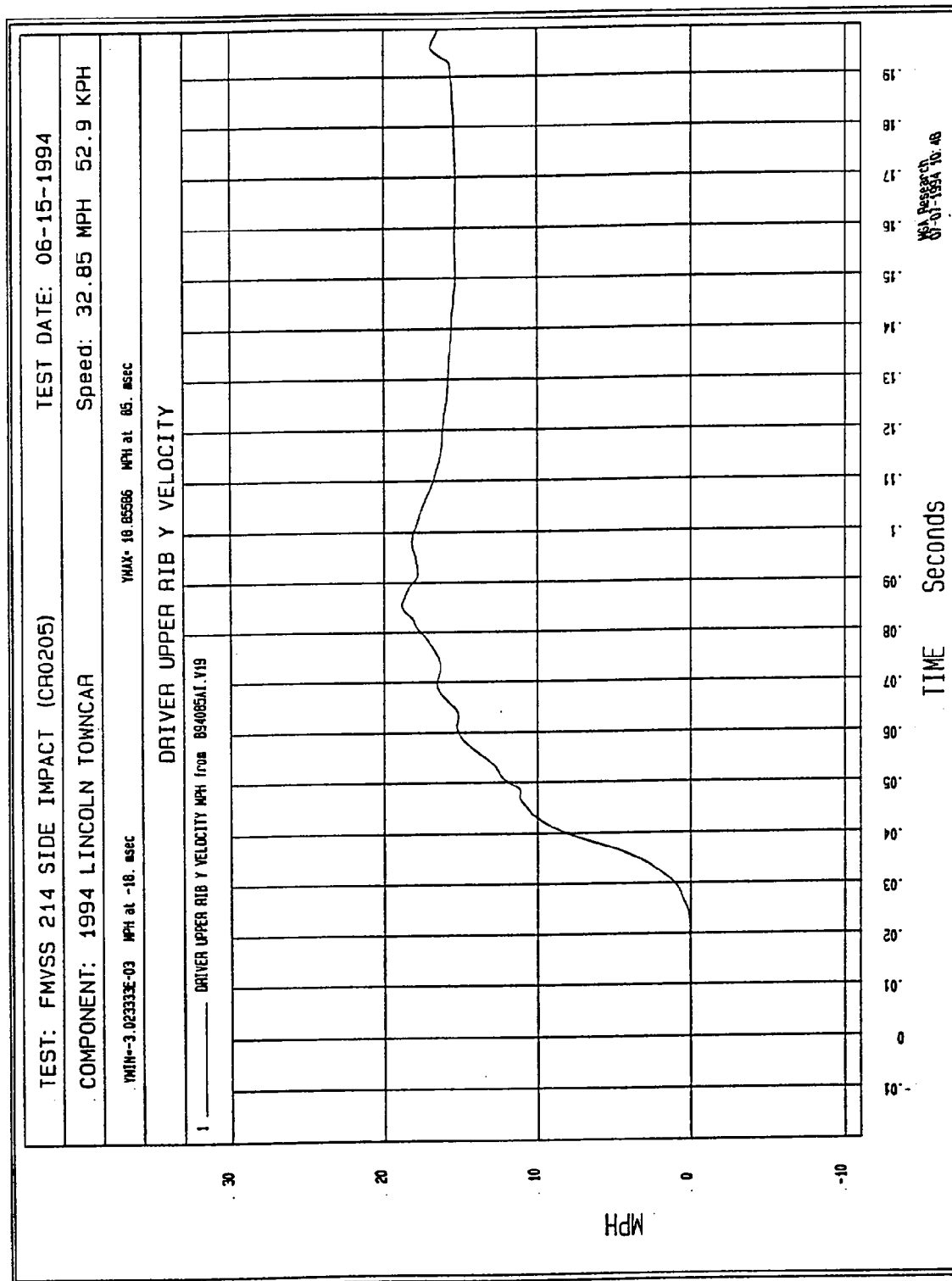


Figure B-2 - Driver Upper Rib Y Velocity vs. Time

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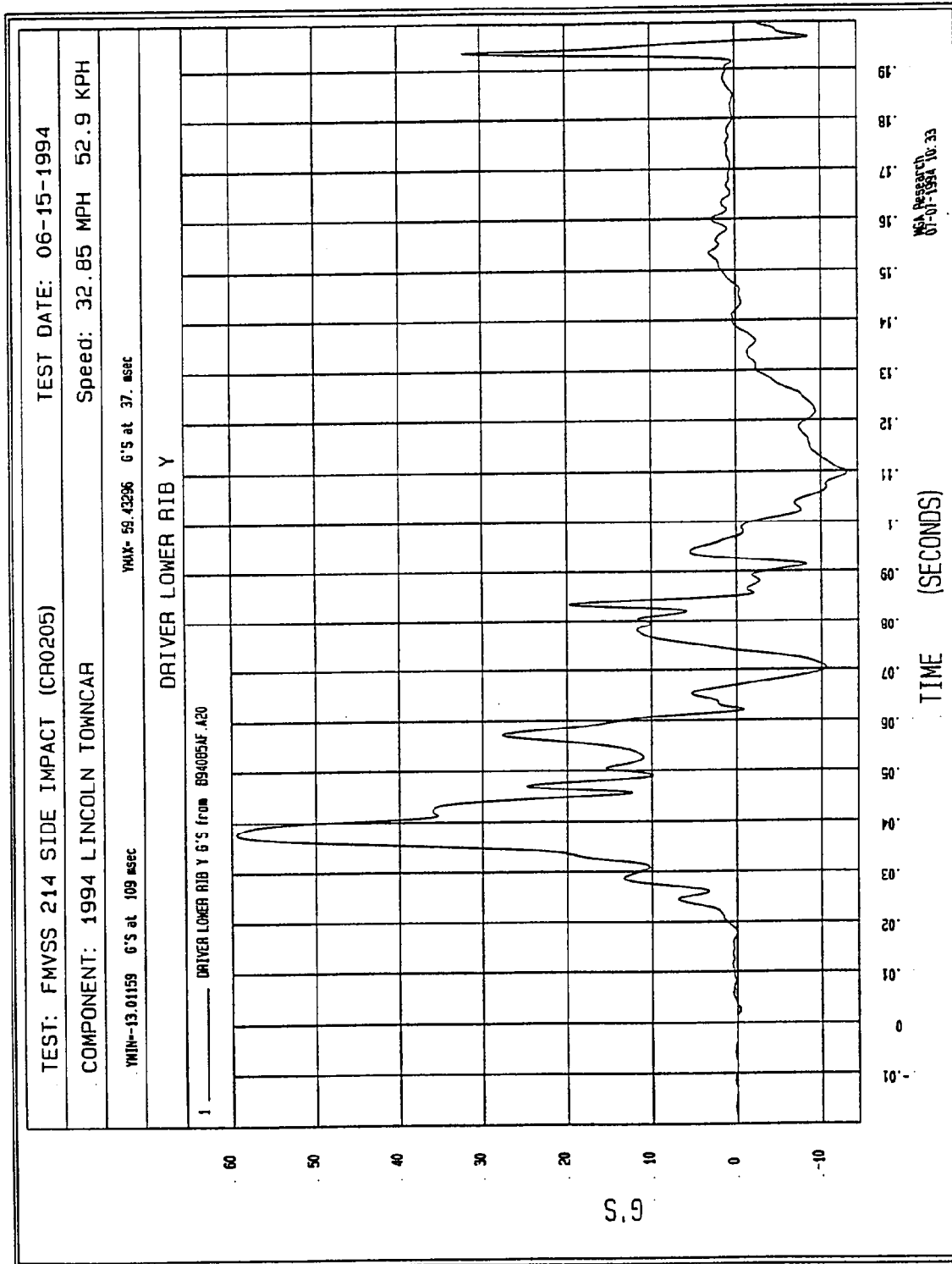


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

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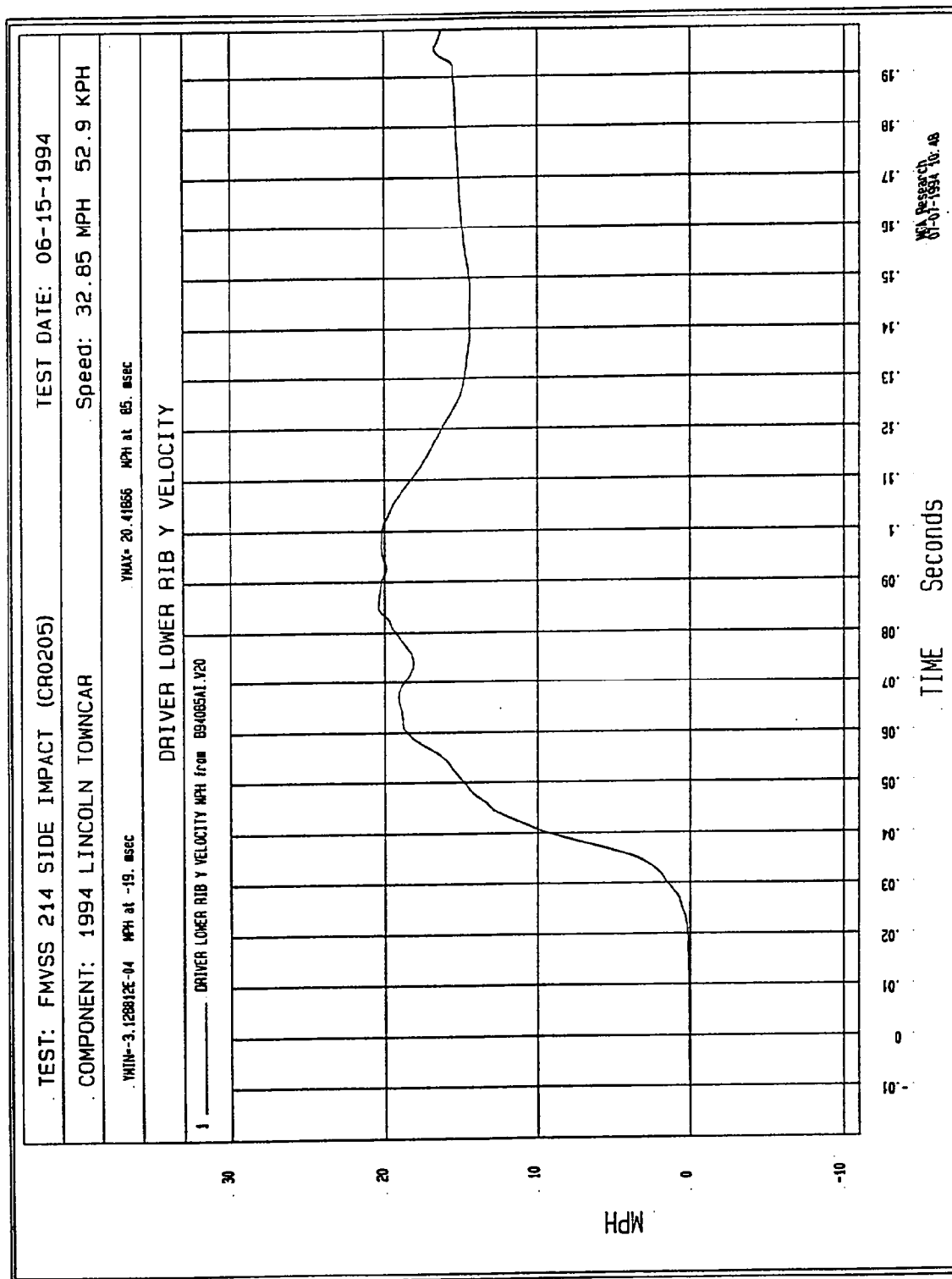


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

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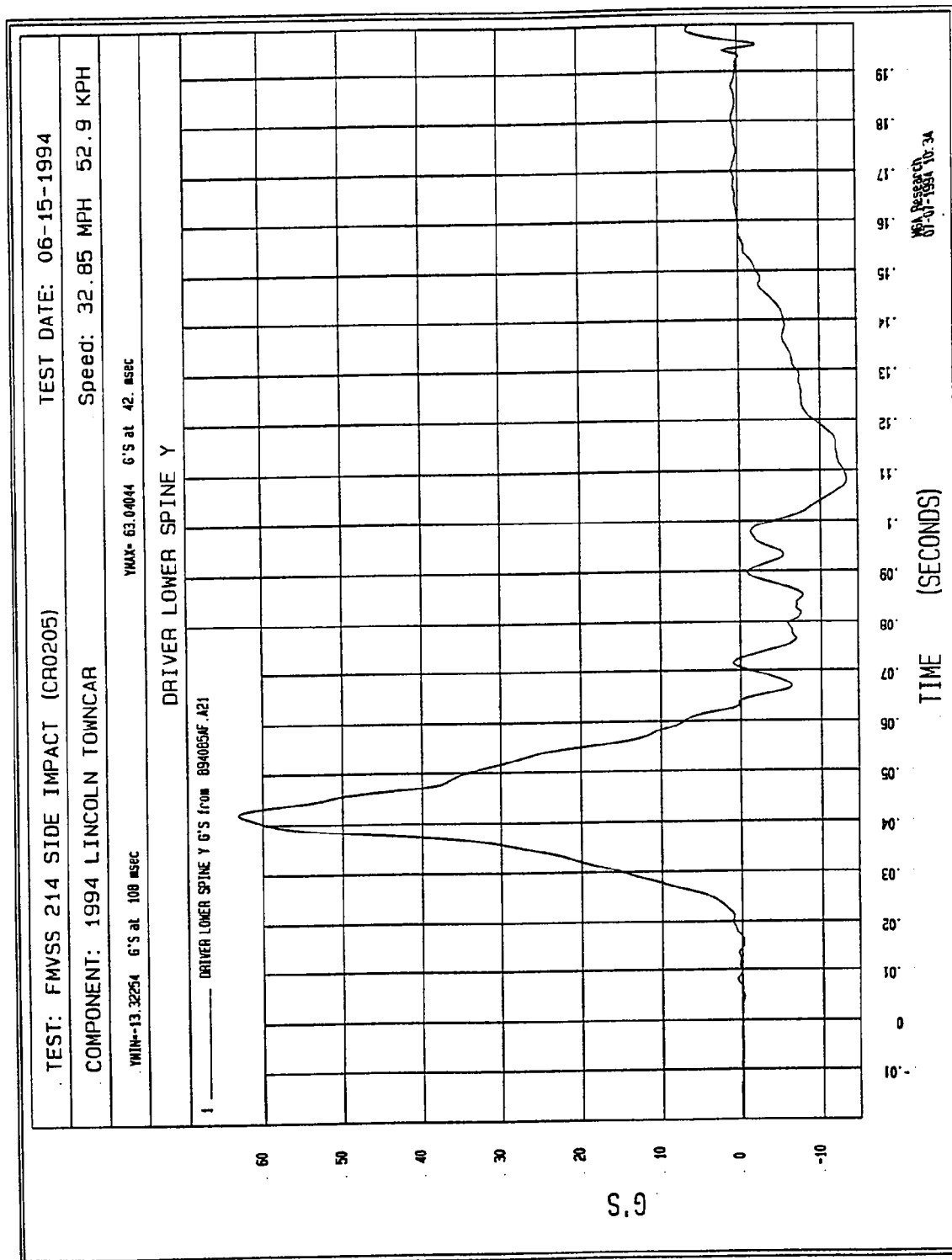


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

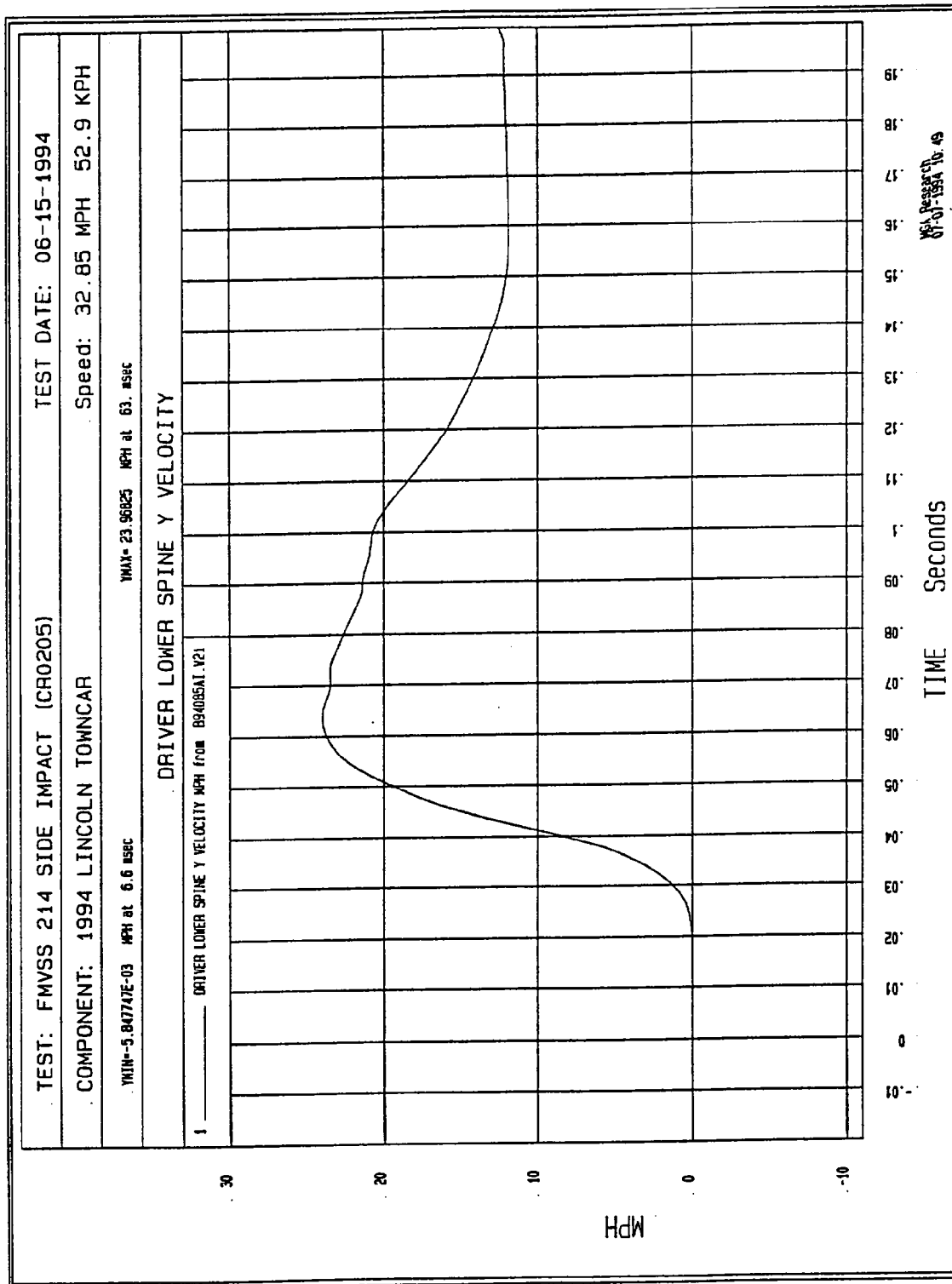


Figure B-6 - Driver Lower Spine Y velocity vs. Time

Filter: Class 180 (300 Hz)

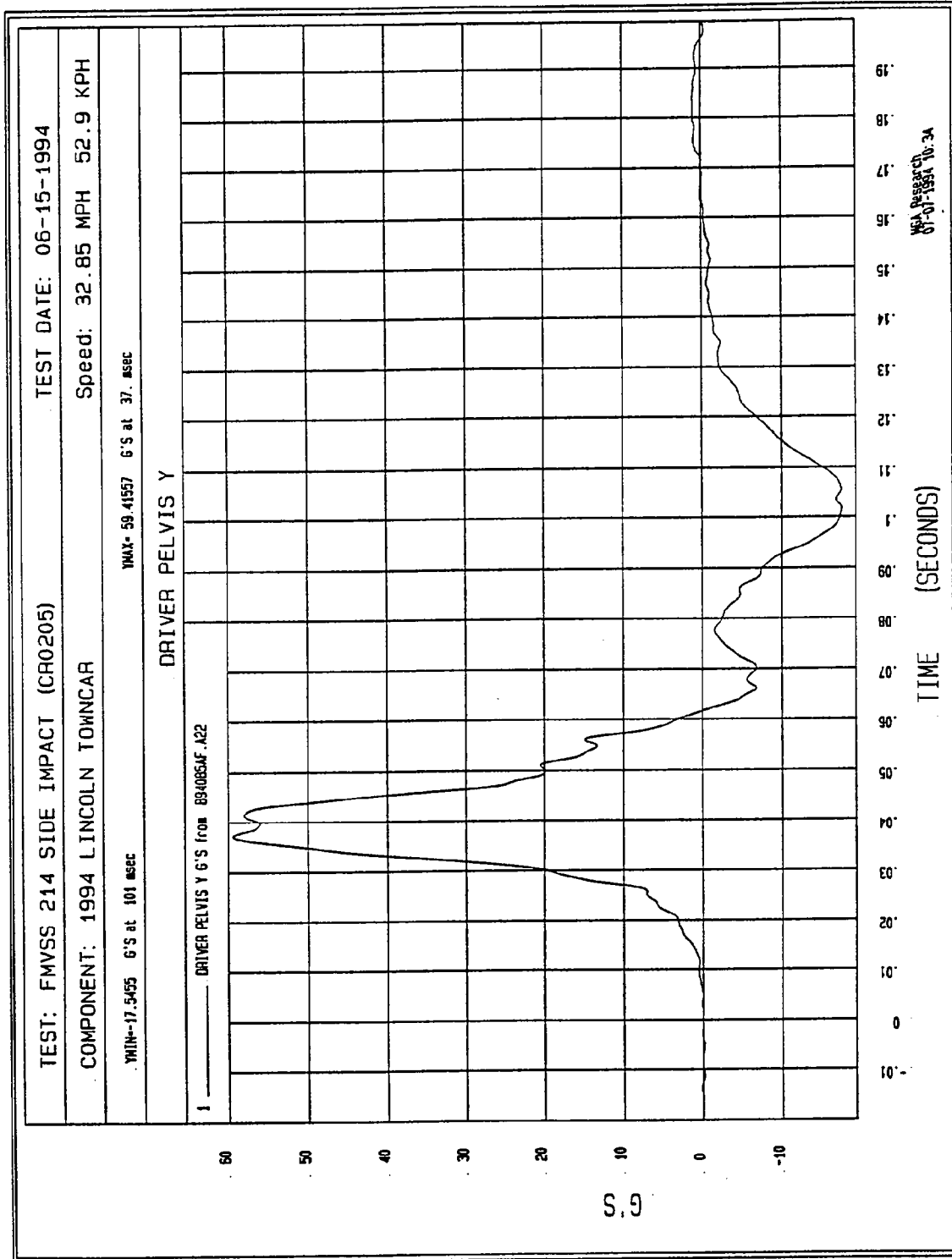


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

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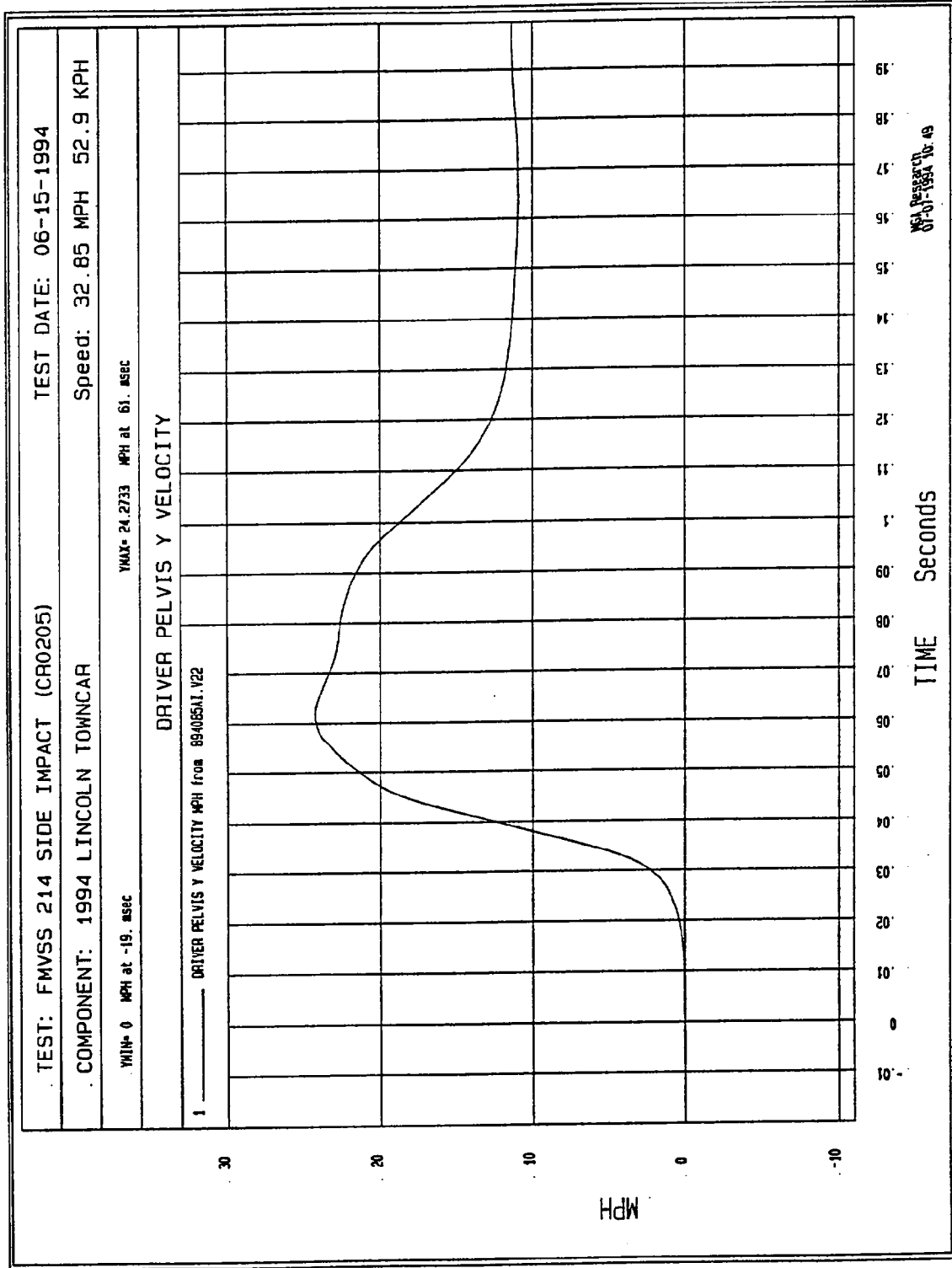


Figure B-8 - Driver Pelvis Y Velocity vs. Time

Filter: Class 180 (300 Hz)

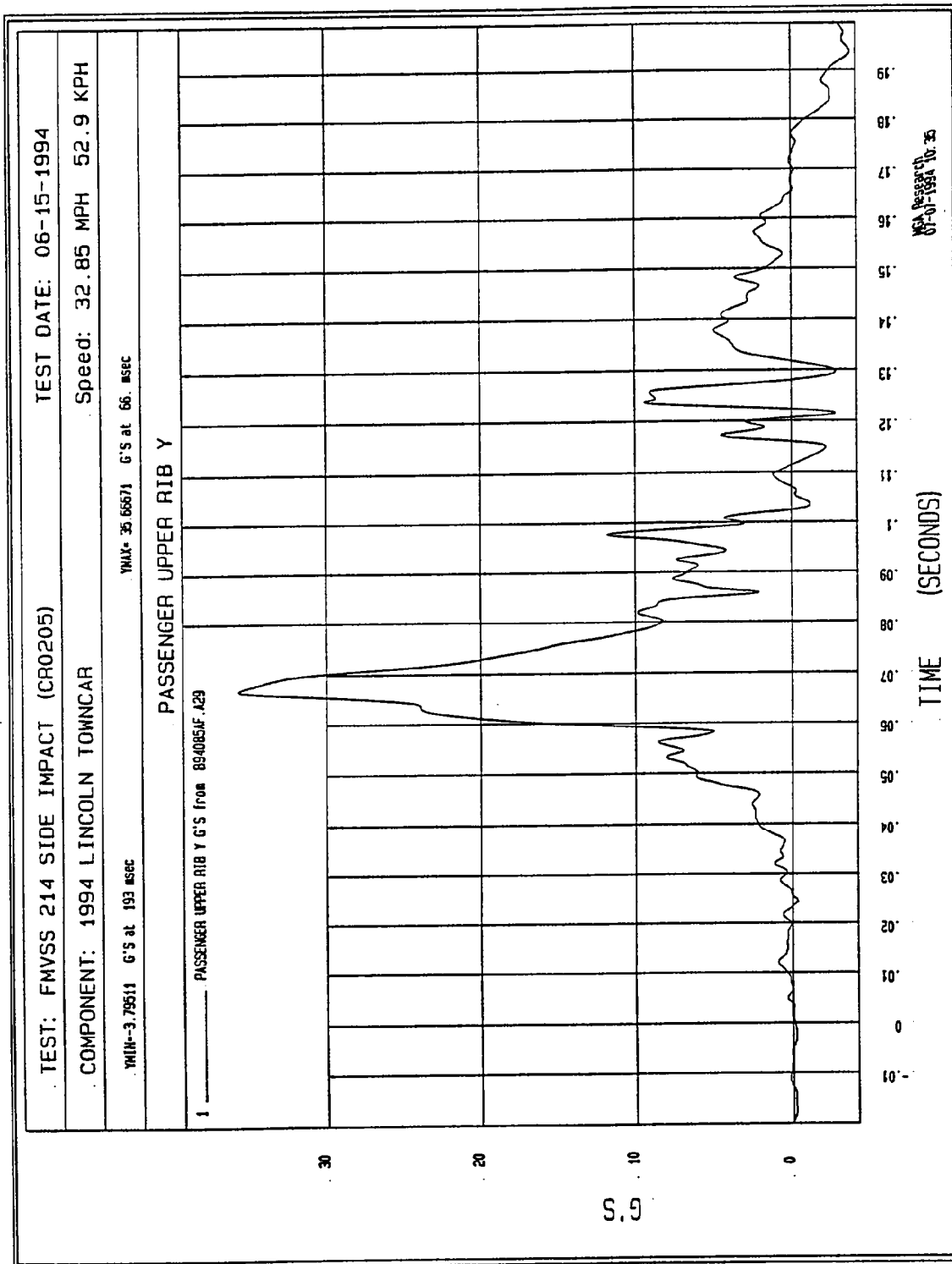


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

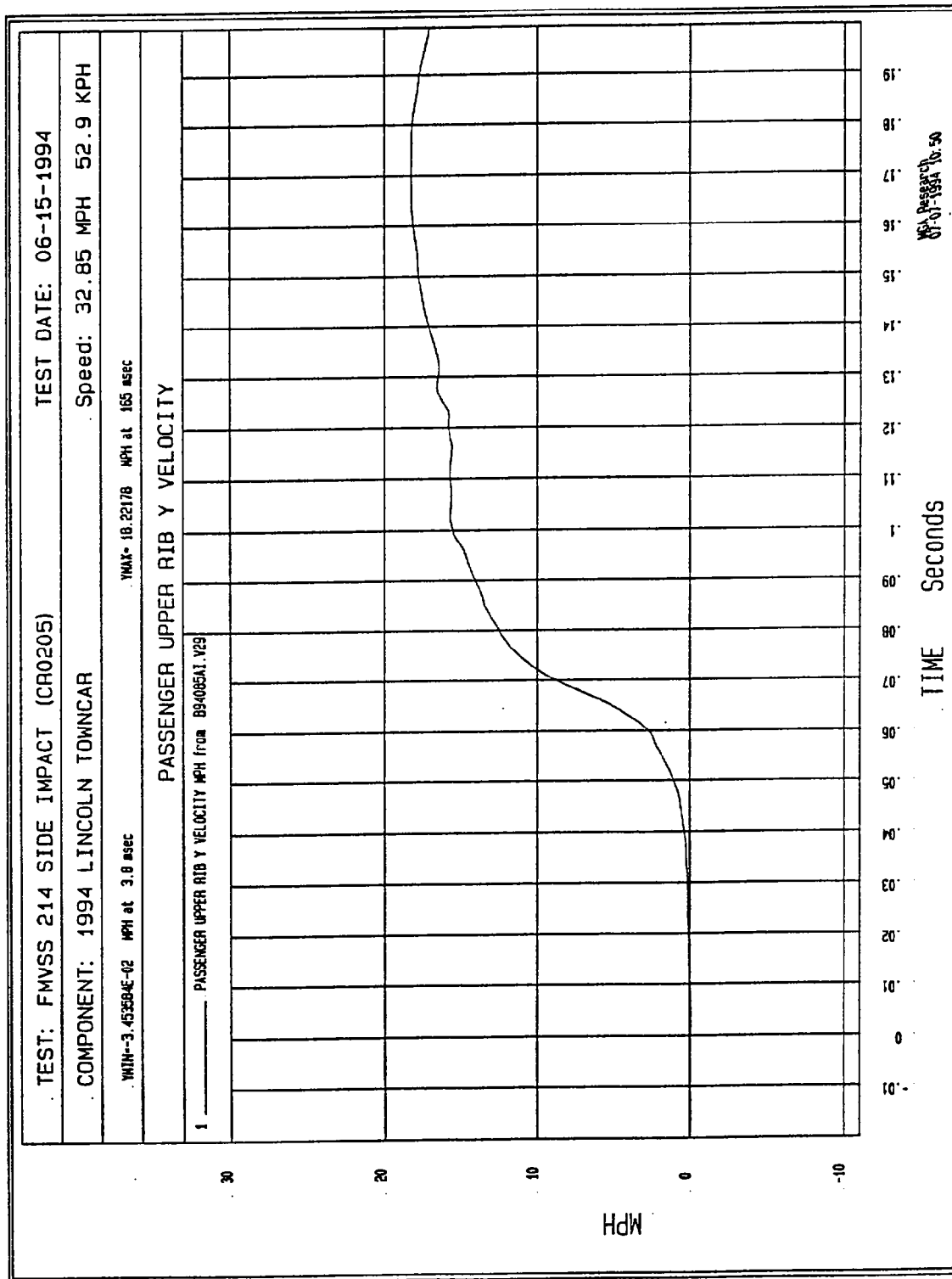


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

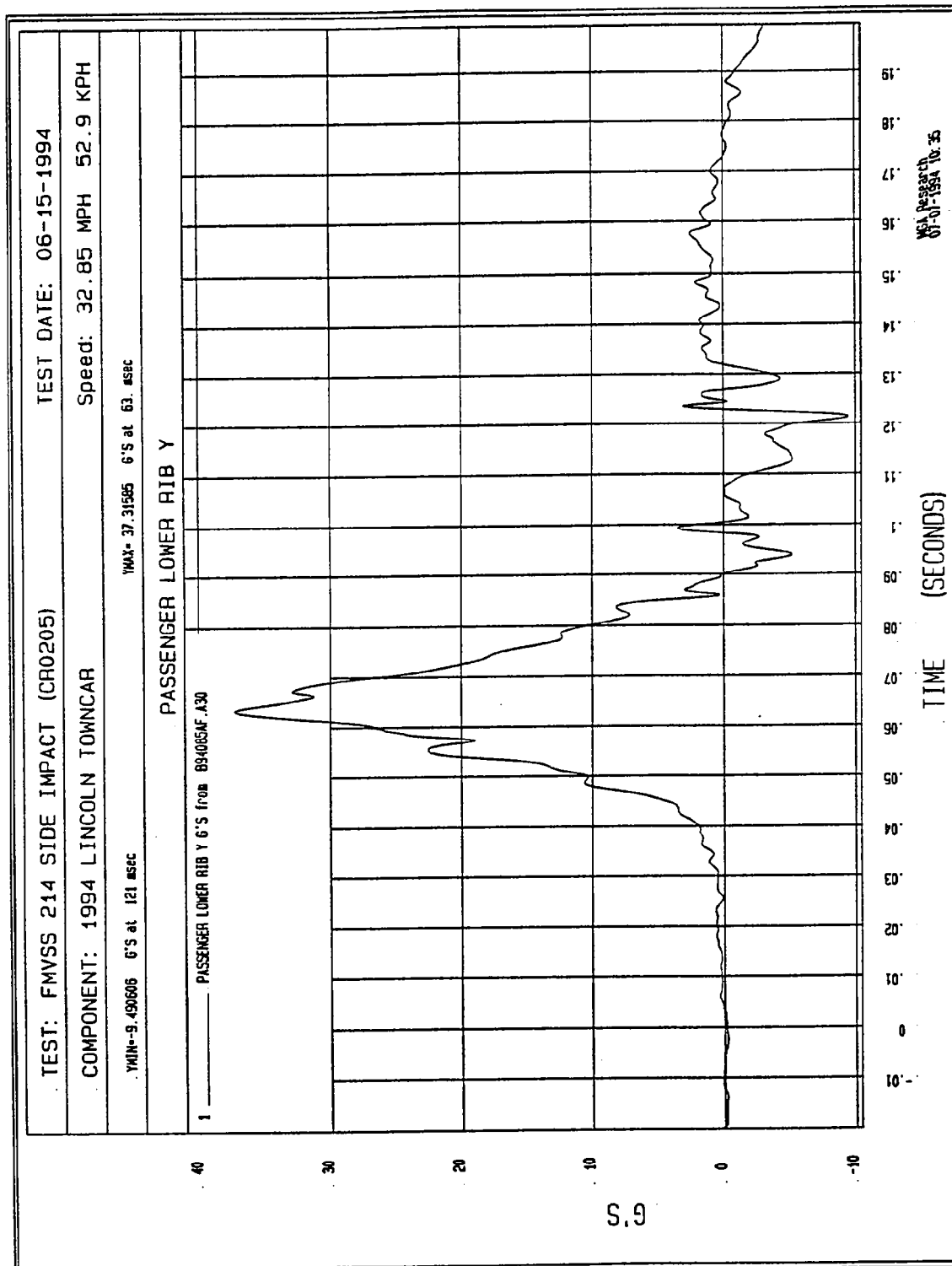


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

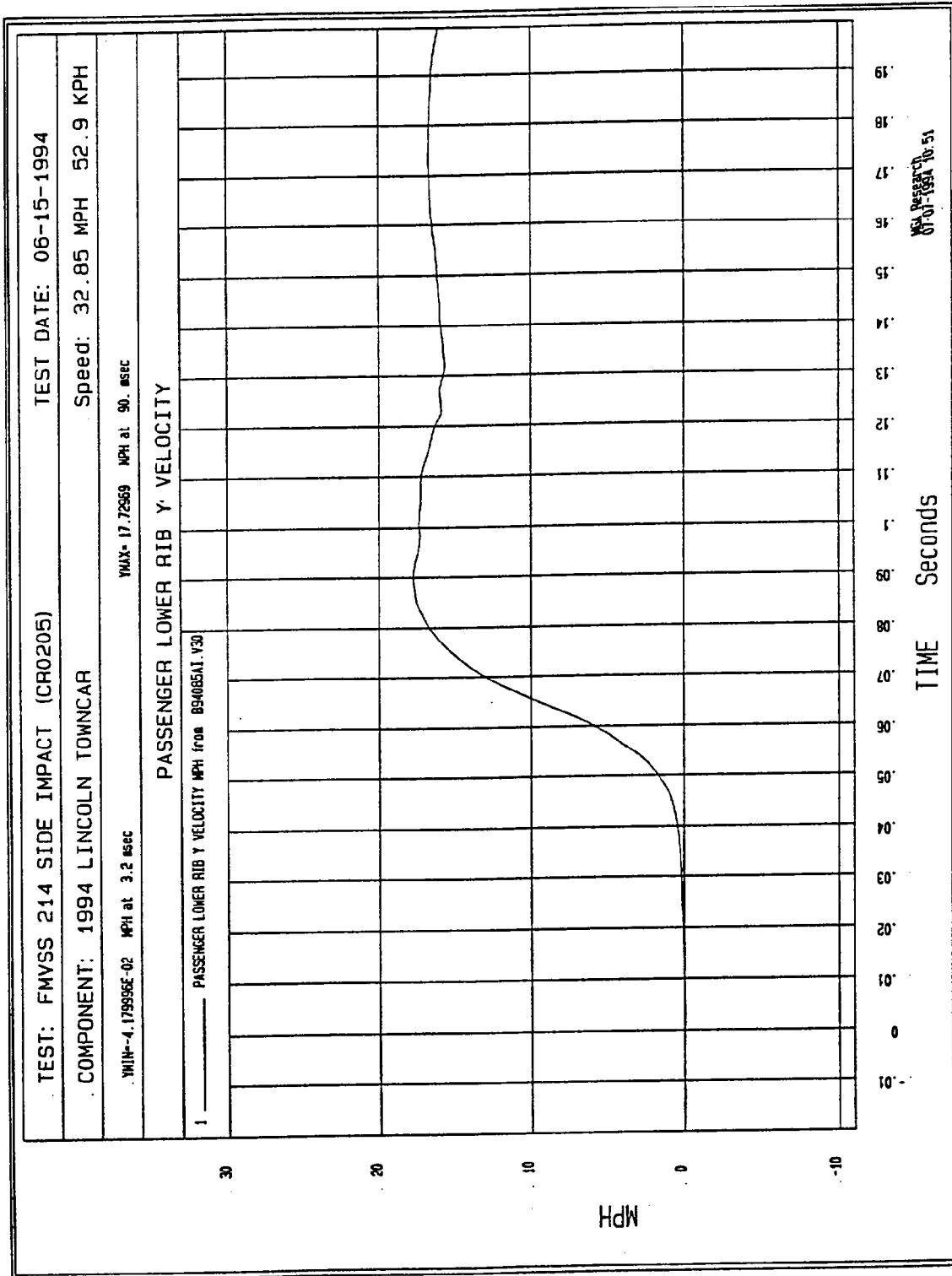


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

Filter: Class 180 (300 Hz)

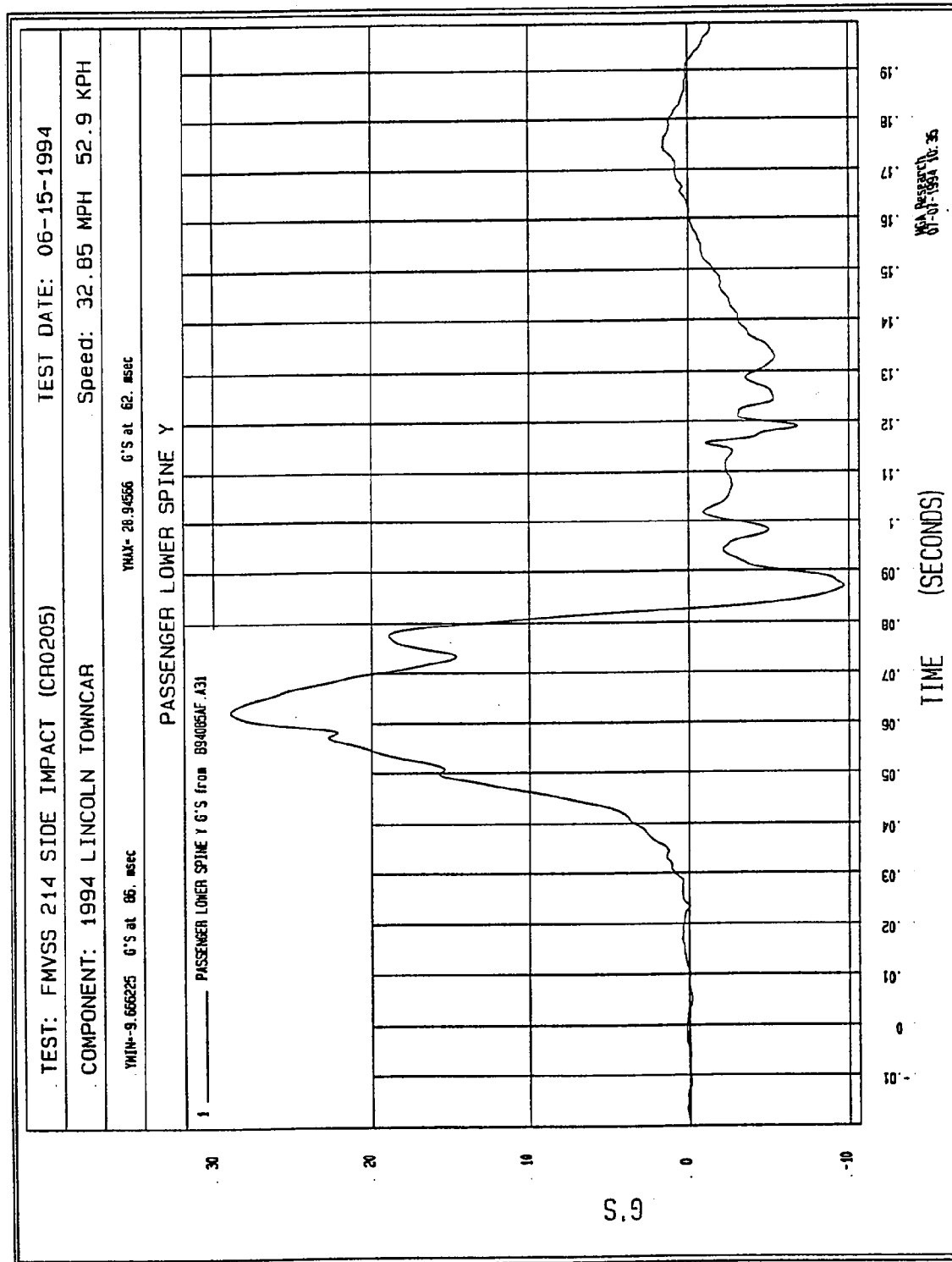


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

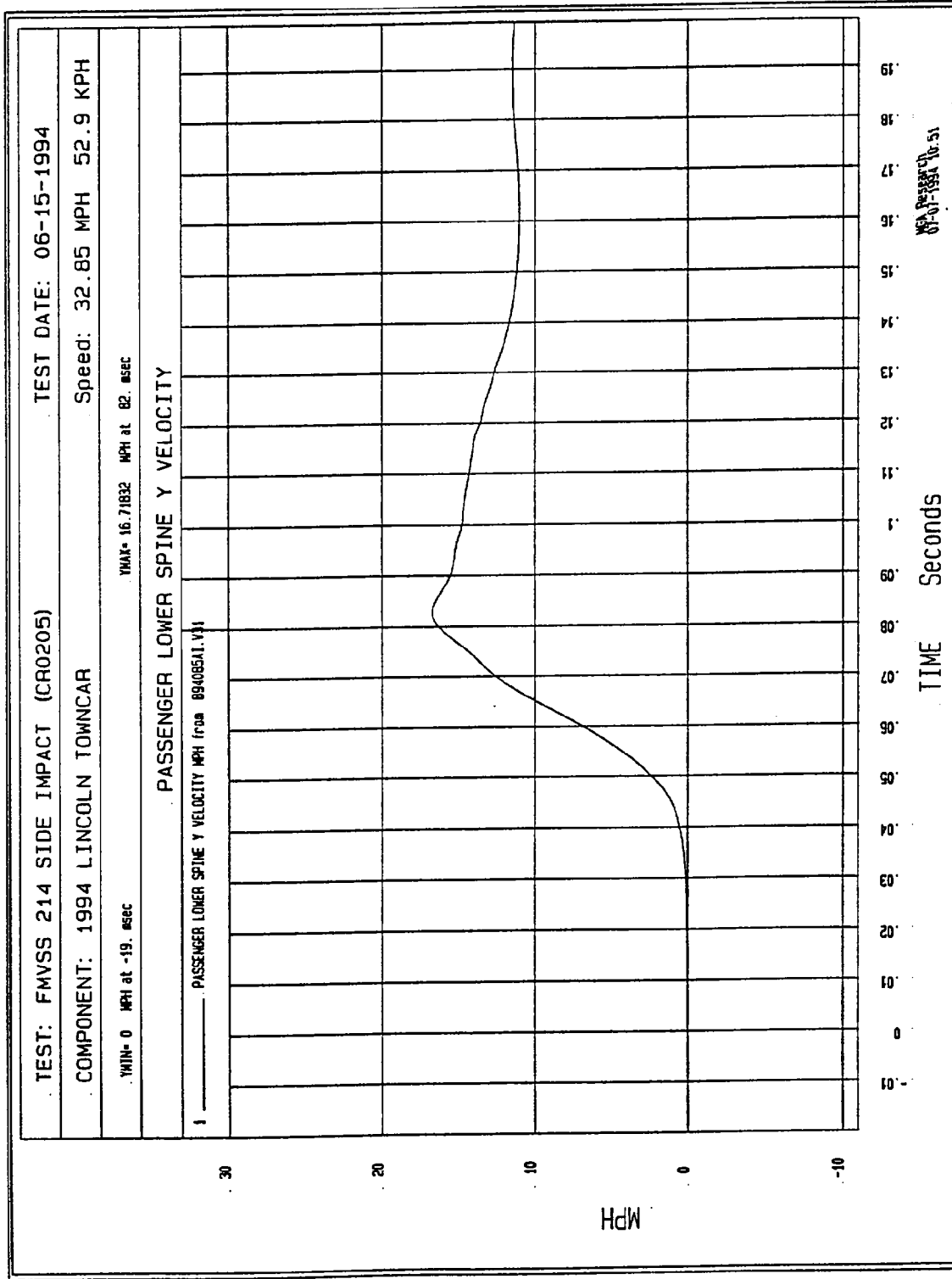


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

Filter: Class 180 (300 Hz)

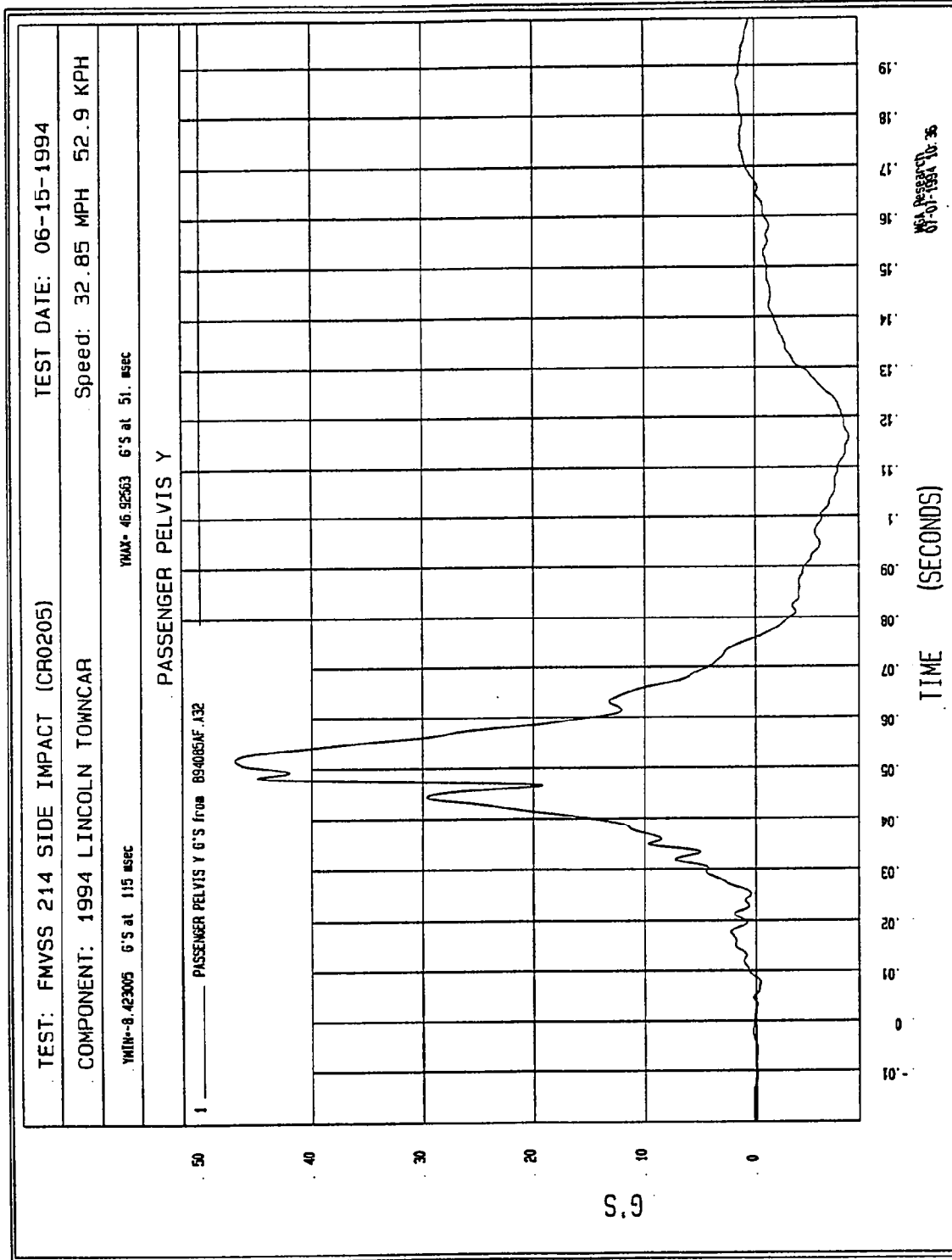


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

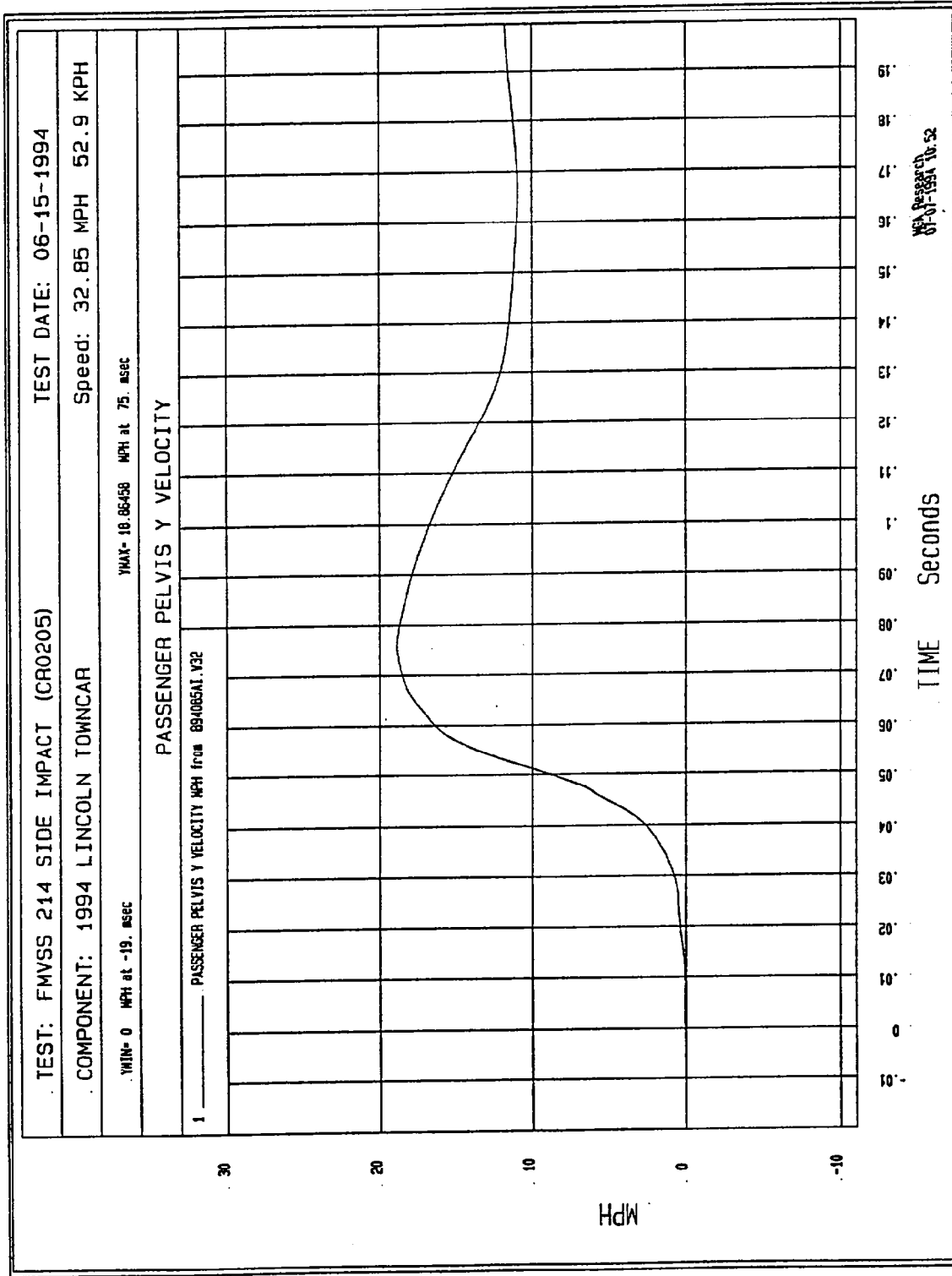


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

Filter: Class 60 (100 Hz)

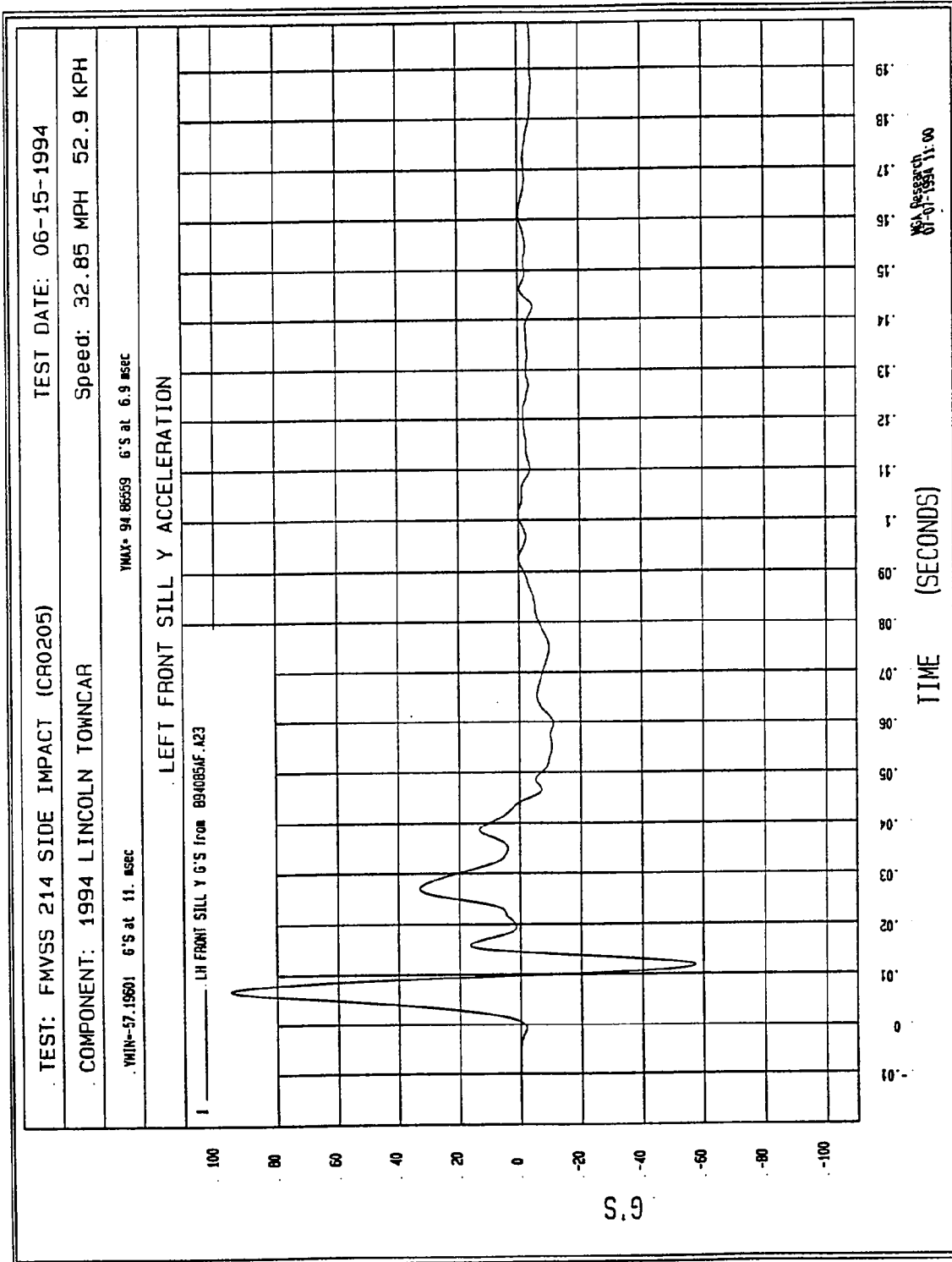


Figure B-17 - Left Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

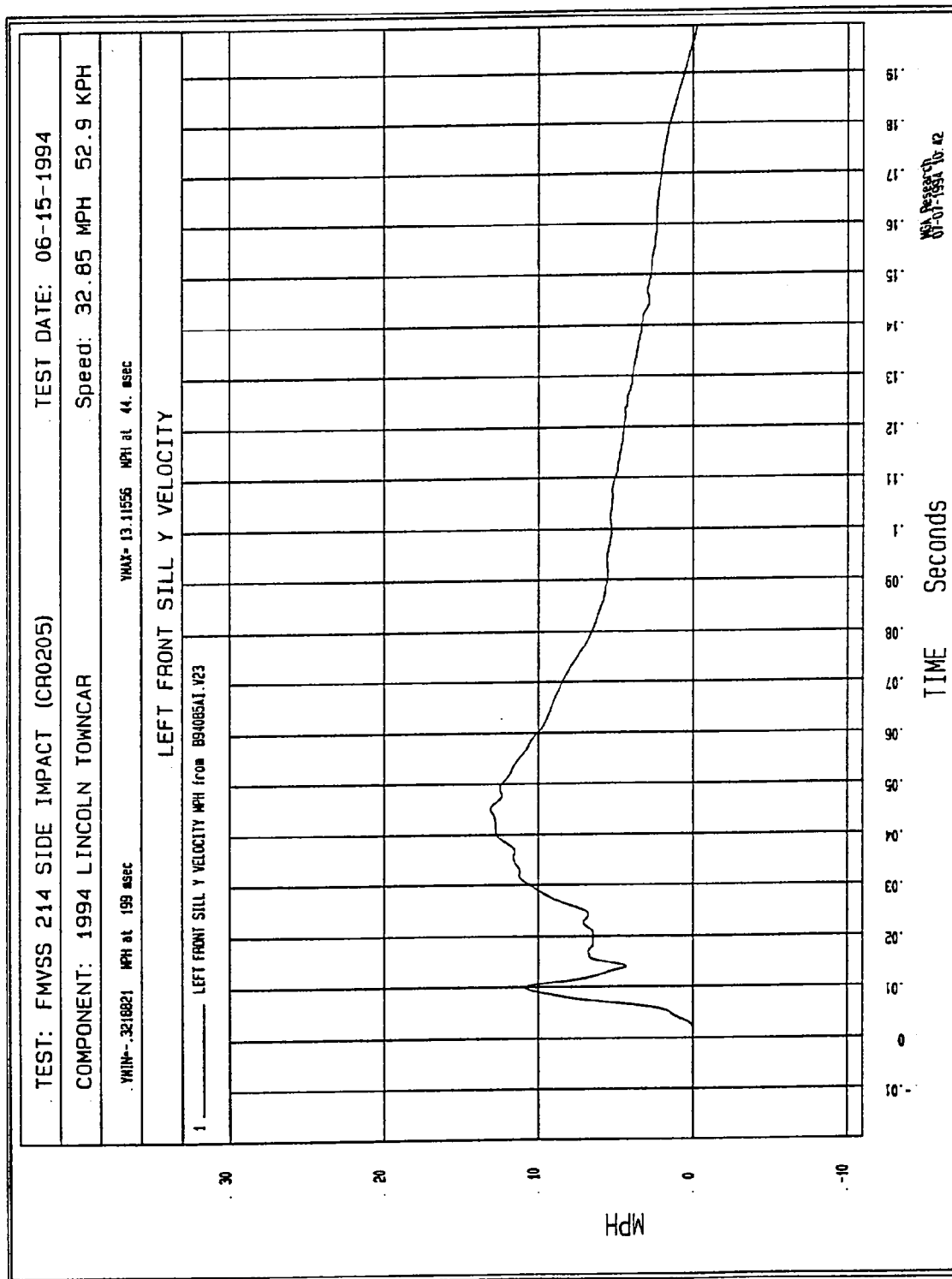


Figure B-18 - Left Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

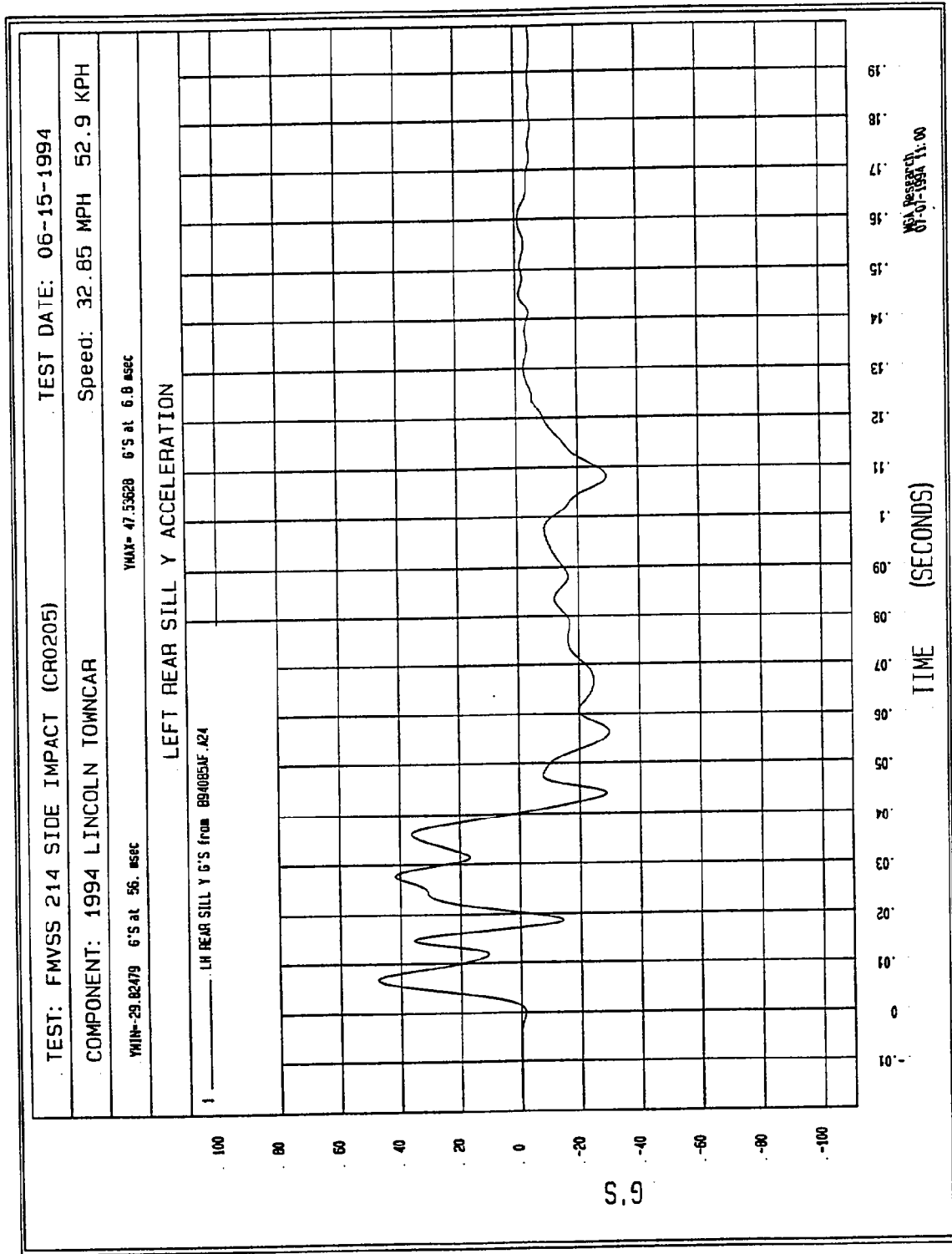


Figure B-19 -- Left Rear Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

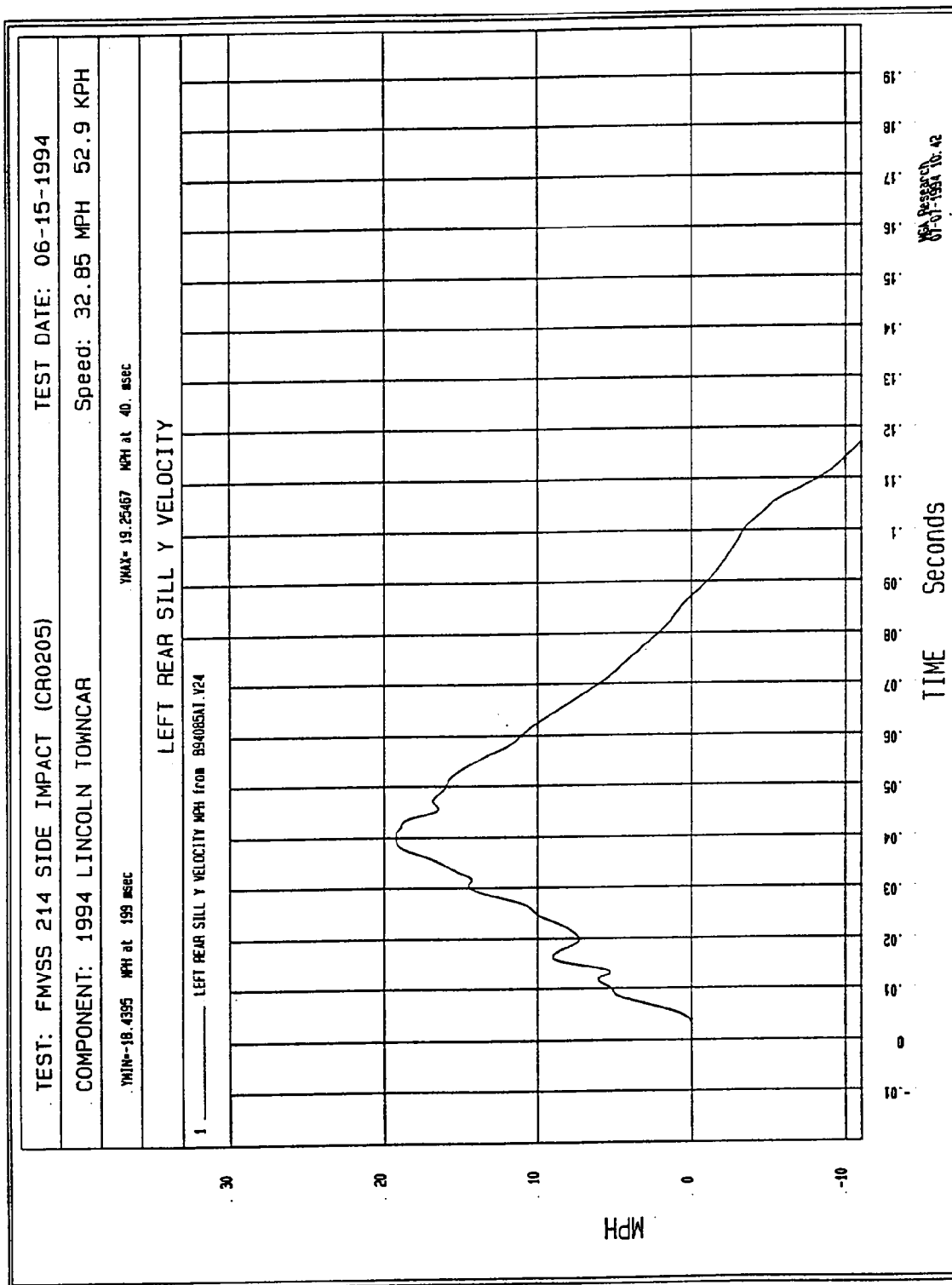


Figure B-20 - Left Rear Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

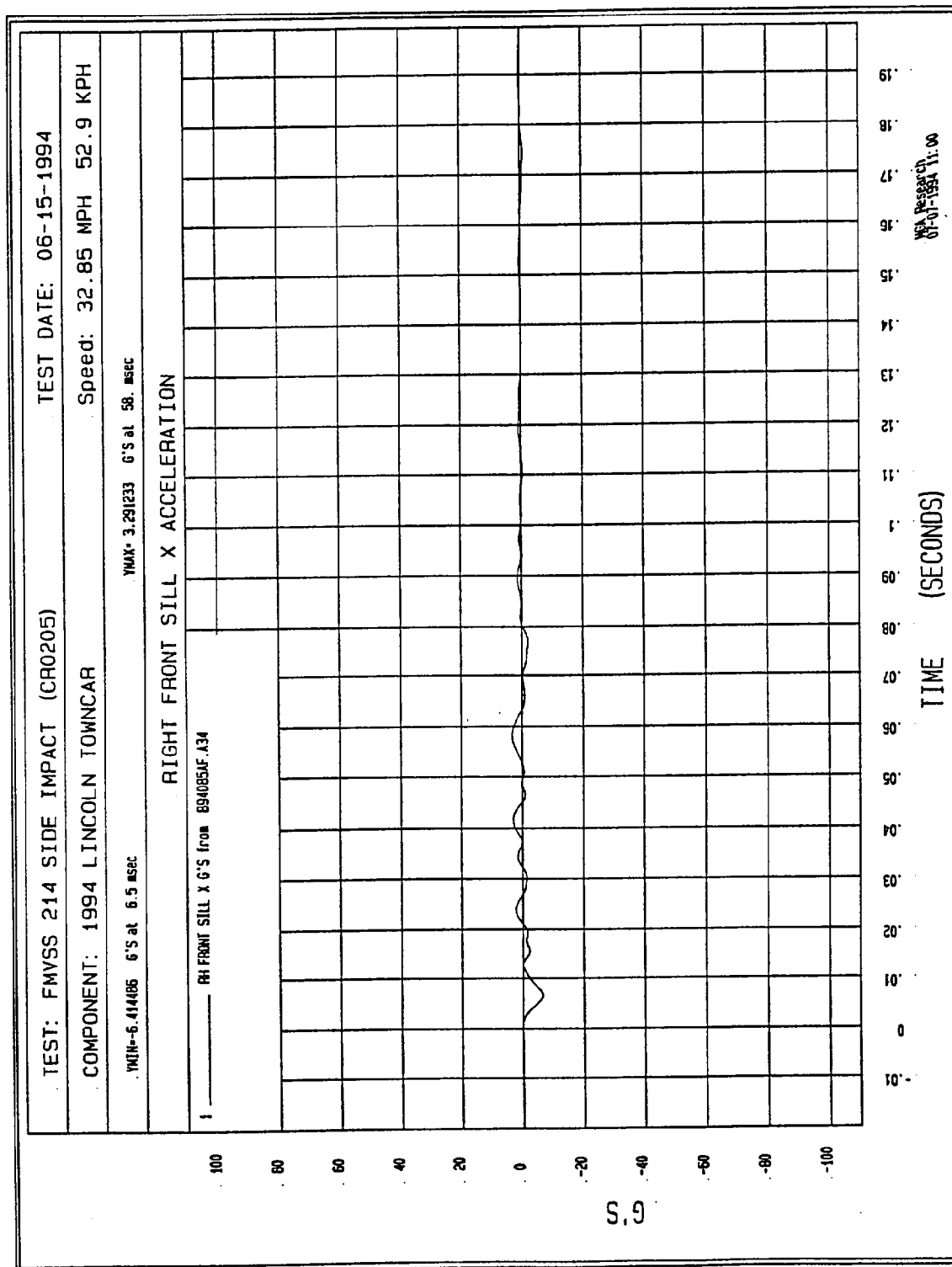


Figure B-21 - Right Front Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

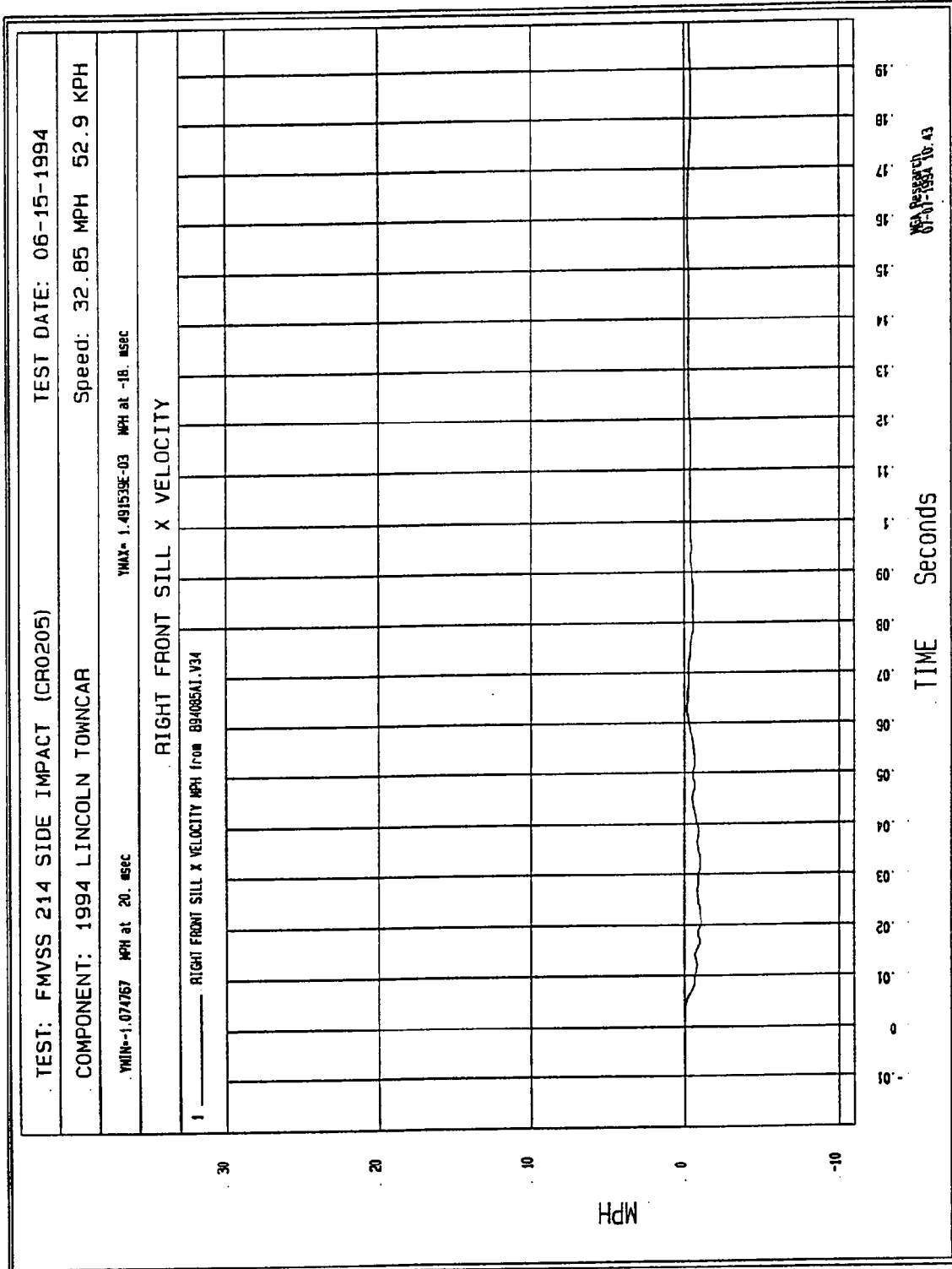


Figure B-22 - Right Front Sill X Velocity vs. Time

Filter: Class 60 (100 Hz)

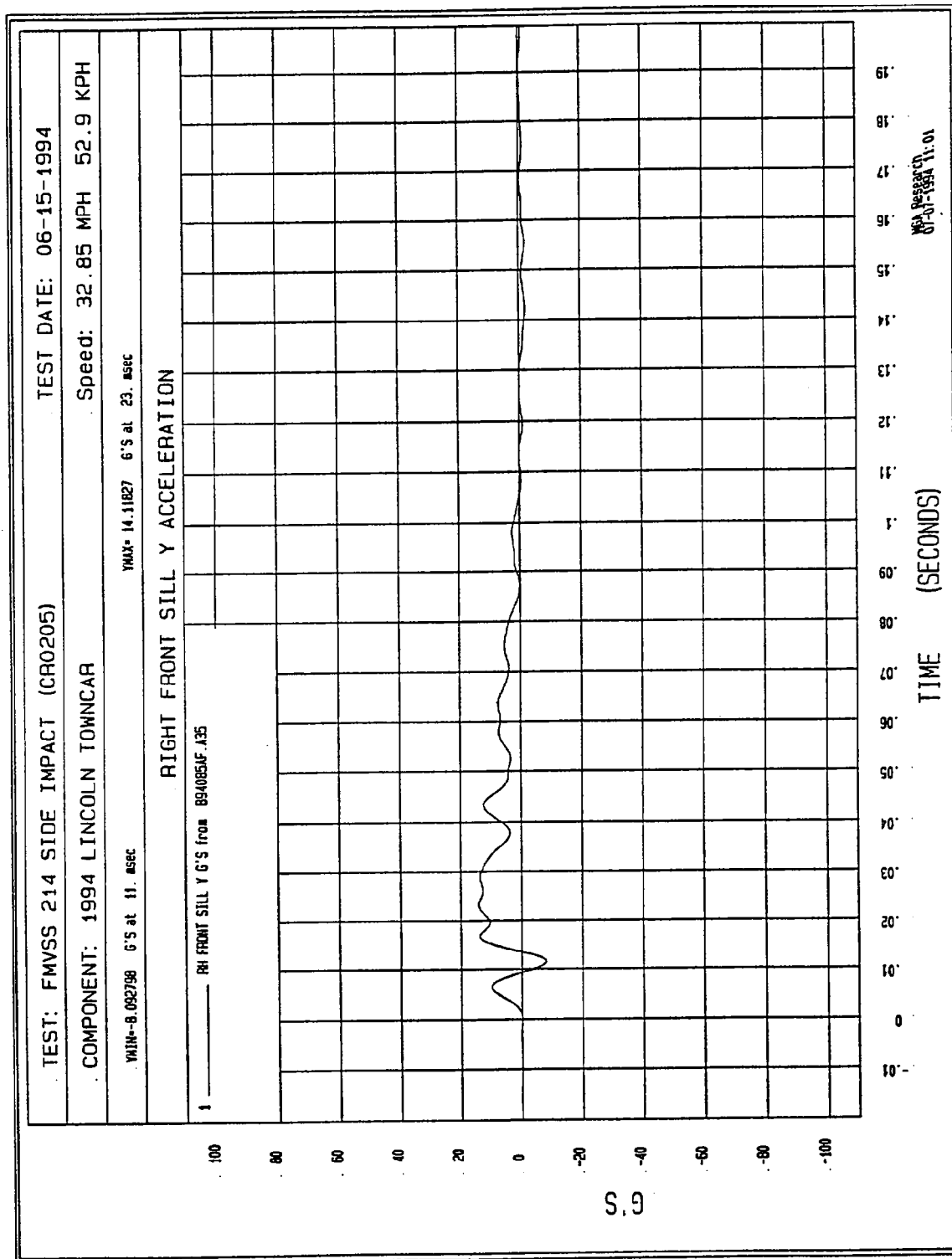


Figure B-23 - Right Front Sill Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

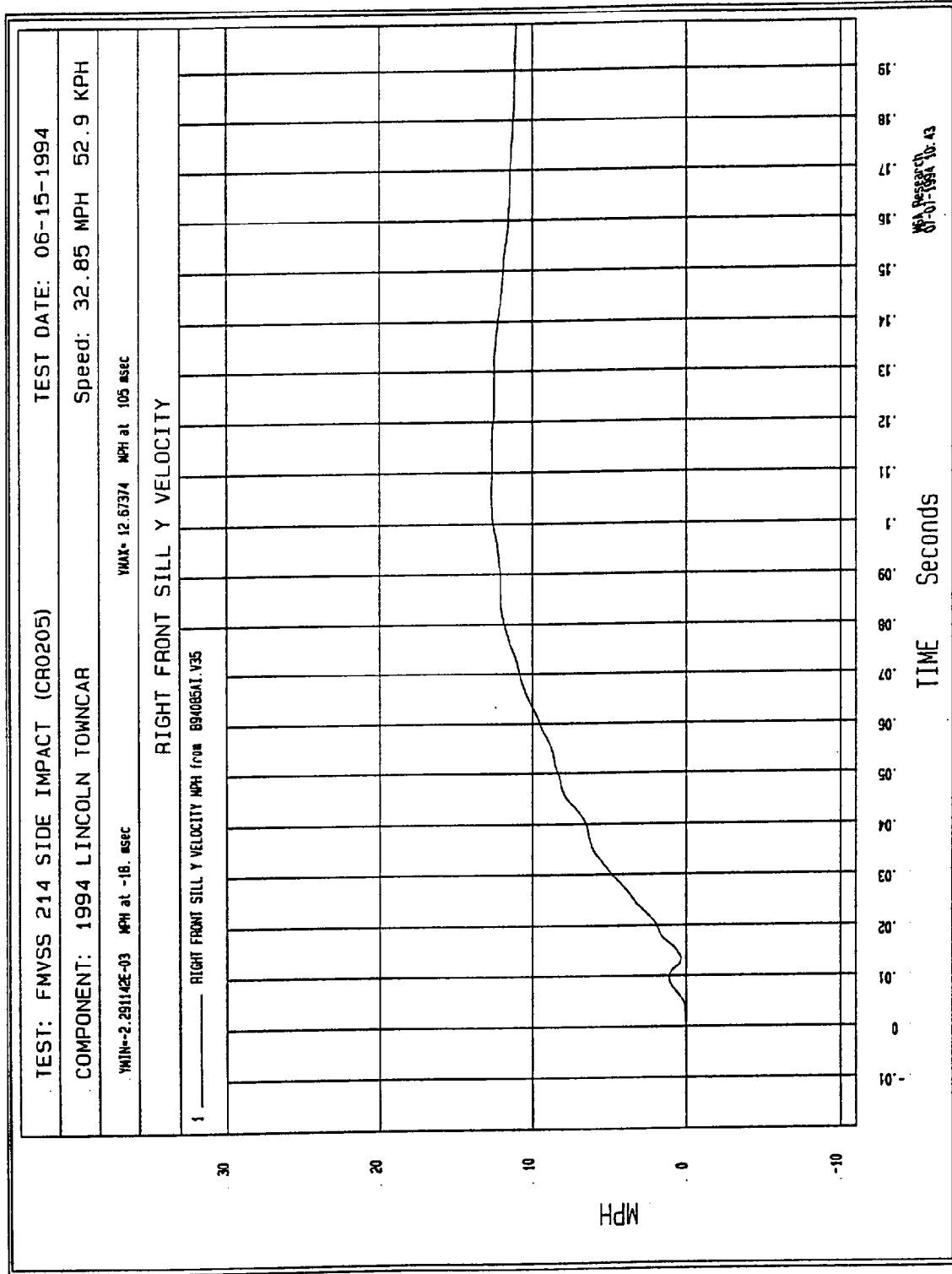


Figure B-24 - Right Front Sill Y Velocity vs. Time

Filter: Class 60 (100 Hz)

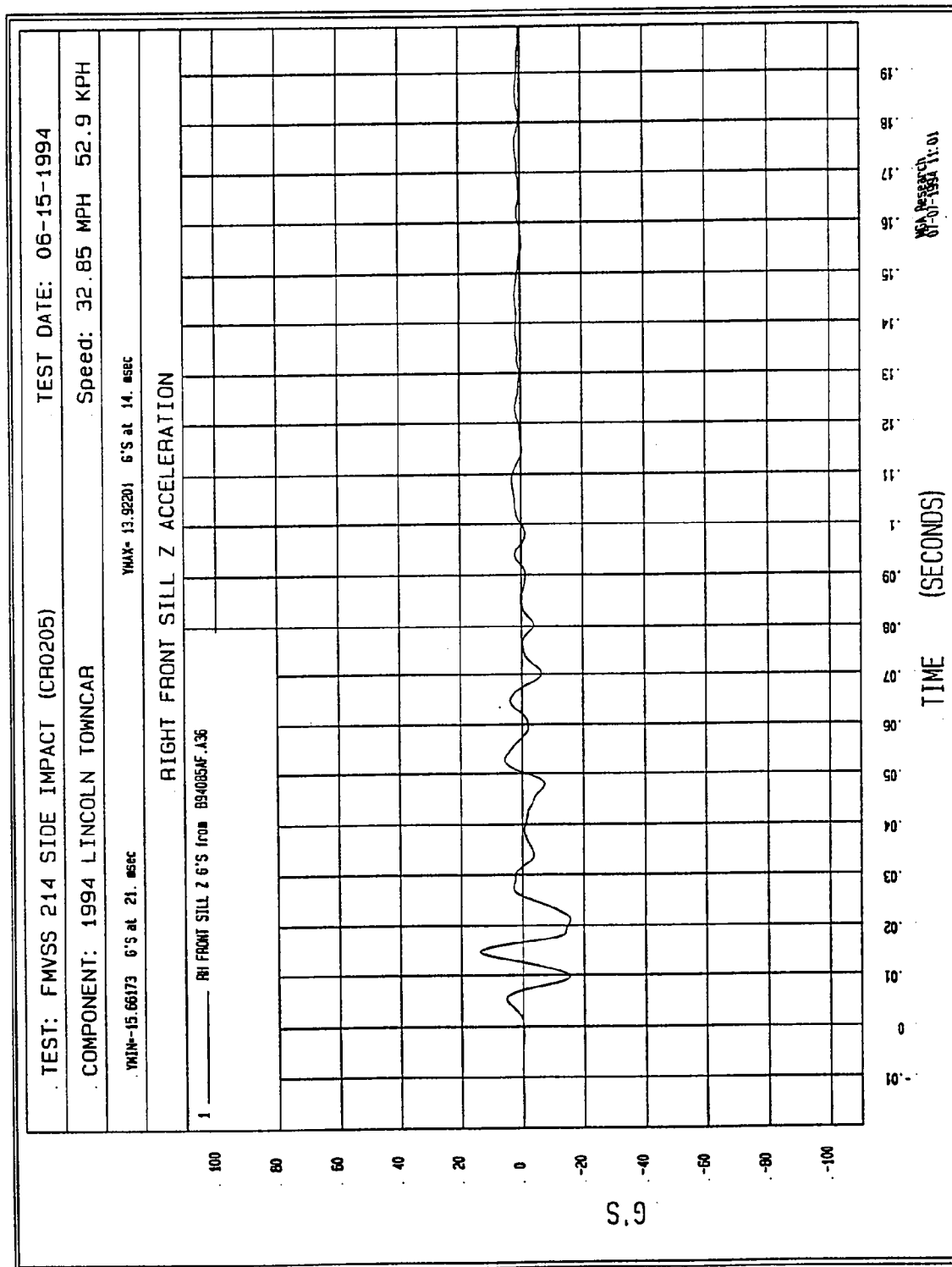


Figure B-25 - Right Front Sill Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

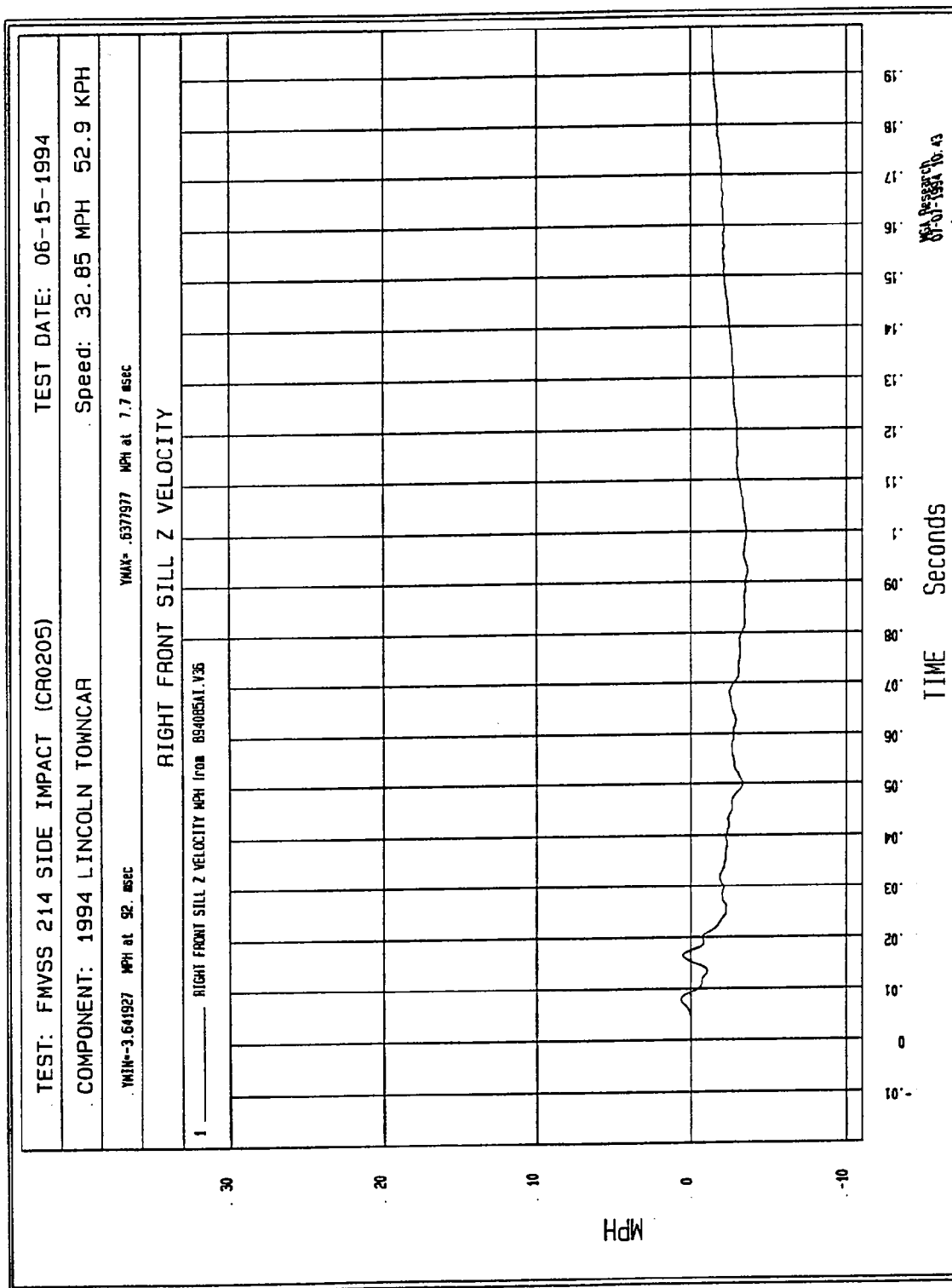


Figure B-26 - Right Front Sill Z Velocity vs. Time

TEST: FMVSS 214 SIDE IMPACT (CR0205) TEST DATE: 06-15-1994

COMPONENT: 1994 LINCOLN TOWNCAR Speed: 32.85 MPH 52.9 KPH

YMR= 1.90012E-02 6'S at -11. msec YMAX= 19.97927 6'S at 21. msec

RIGHT FRONT SILL @ FRONT SEAT RESULTANT

1 Resultant 6'S from 894085AV.A34

TIME (SECONDS)

6.9

SEA Research
07-01-1994 10:54

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

Filter: Class 60 (100 Hz)

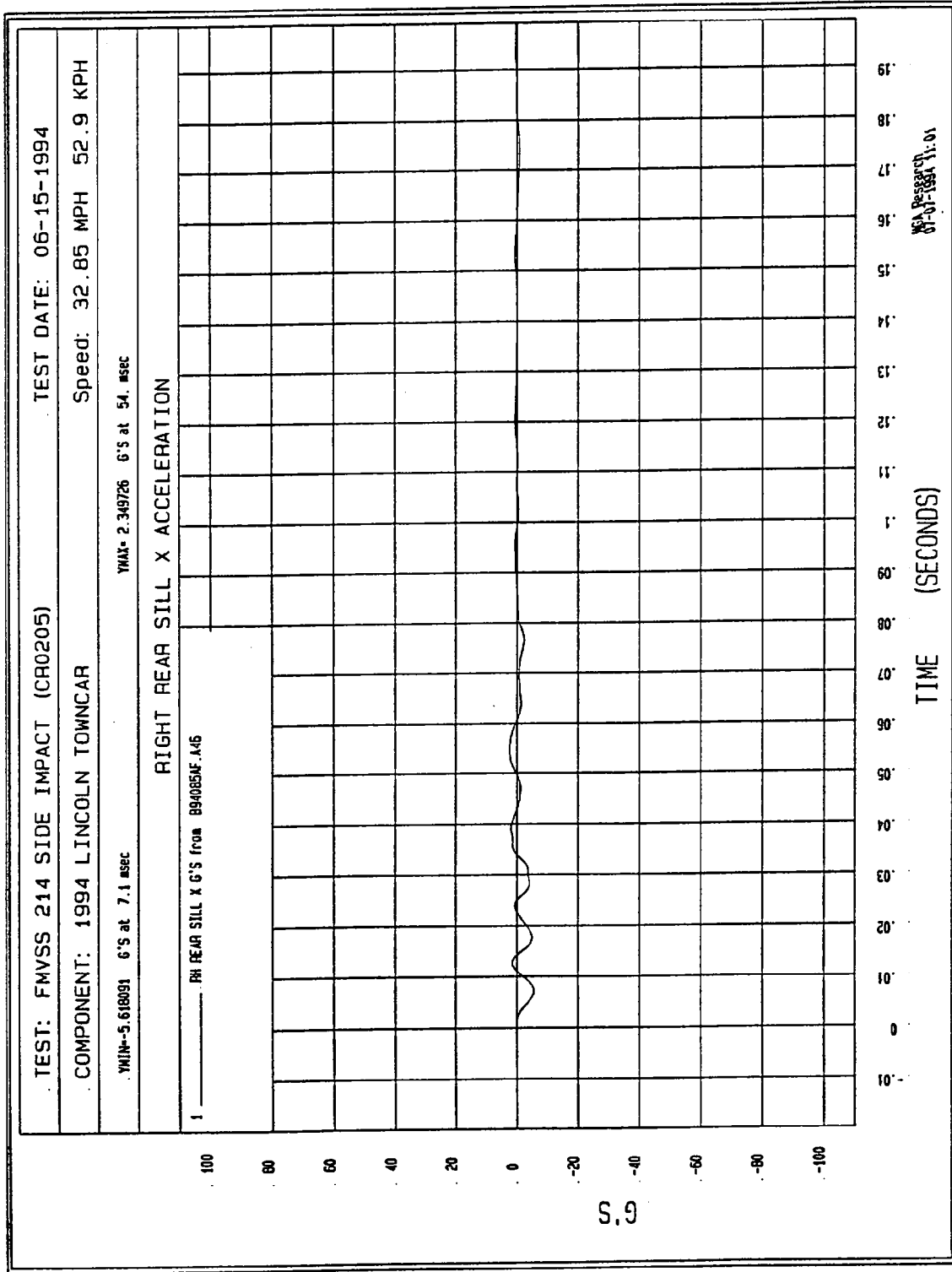


Figure B-28 - Right Rear Sill X Acceleration vs. Time

Filter: Class 180 (300 Hz)

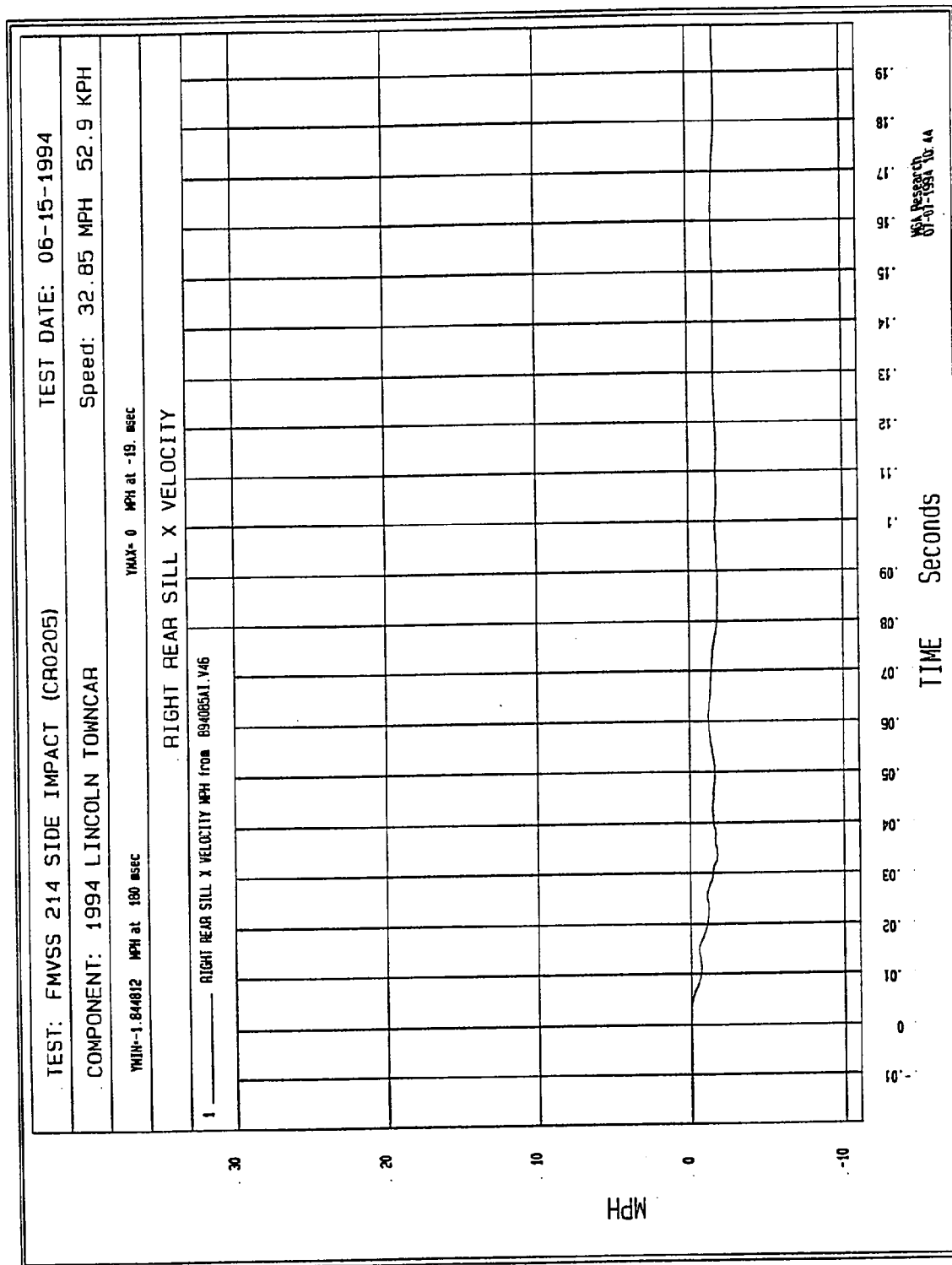
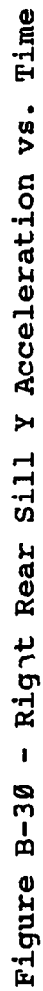


Figure B-29 - Right Rear Sill X Velocity vs. Time

[illegible]

Filter: Class 180 (300 Hz)

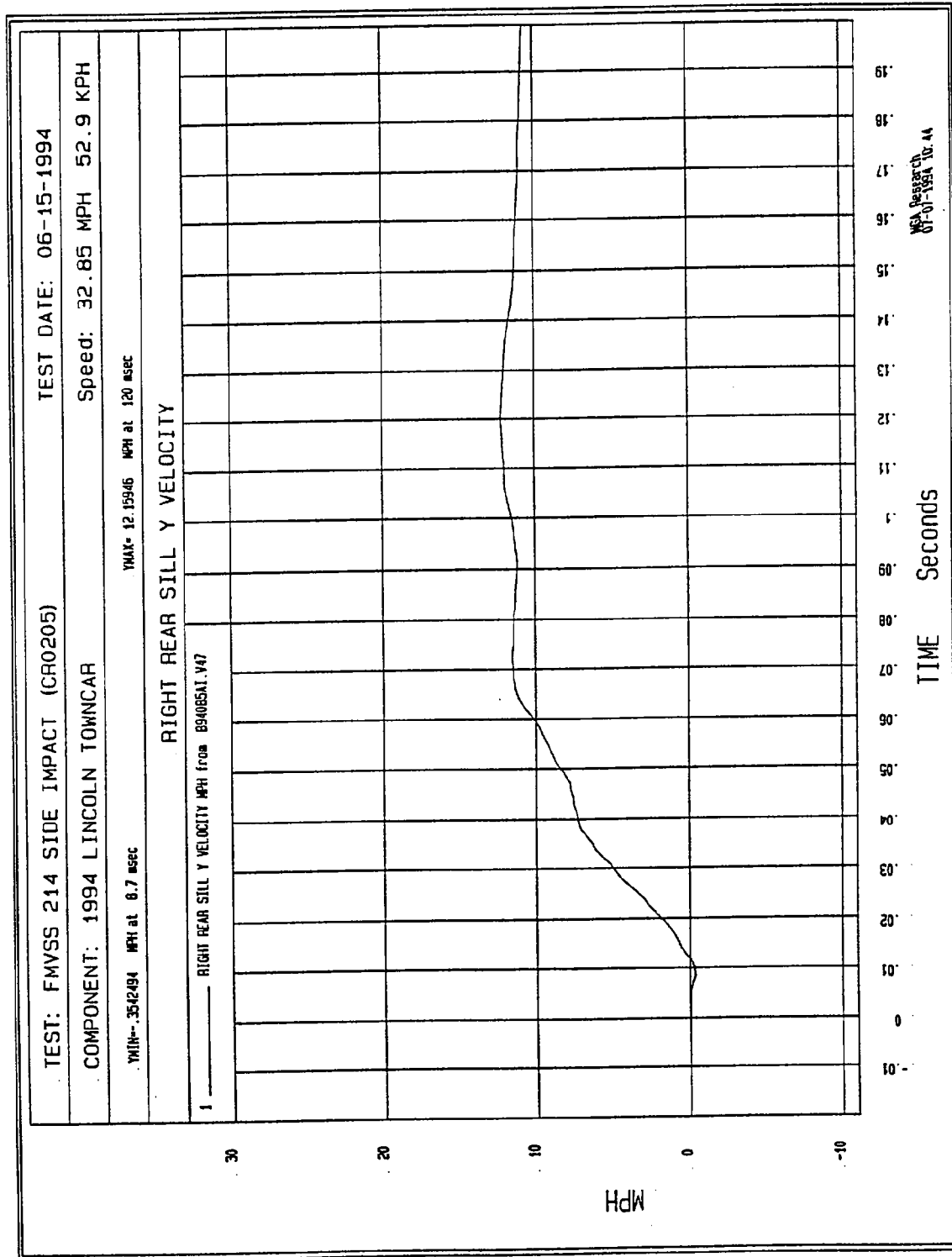


Figure B-31 - Right Rear Sill Y Velocity vs. Time

TEST: FMVSS 214 SIDE IMPACT (CR0205) TEST DATE: 06-15-1994

COMPONENT: 1994 LINCOLN TOWNCAR Speed: 32.85 MPH 52.9 KPH

YMH--14.20024 G'S at 29. msec YMAX= 5.704262 G'S at 34. msec

RIGHT REAR SILL Z ACCELERATION

1 _____ RH REAR SILL Z G'S from 894085AF.148

TIME (SECONDS)

NSA Research
01-01-1994 11:02

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

Filter: Class 180 (300 Hz)

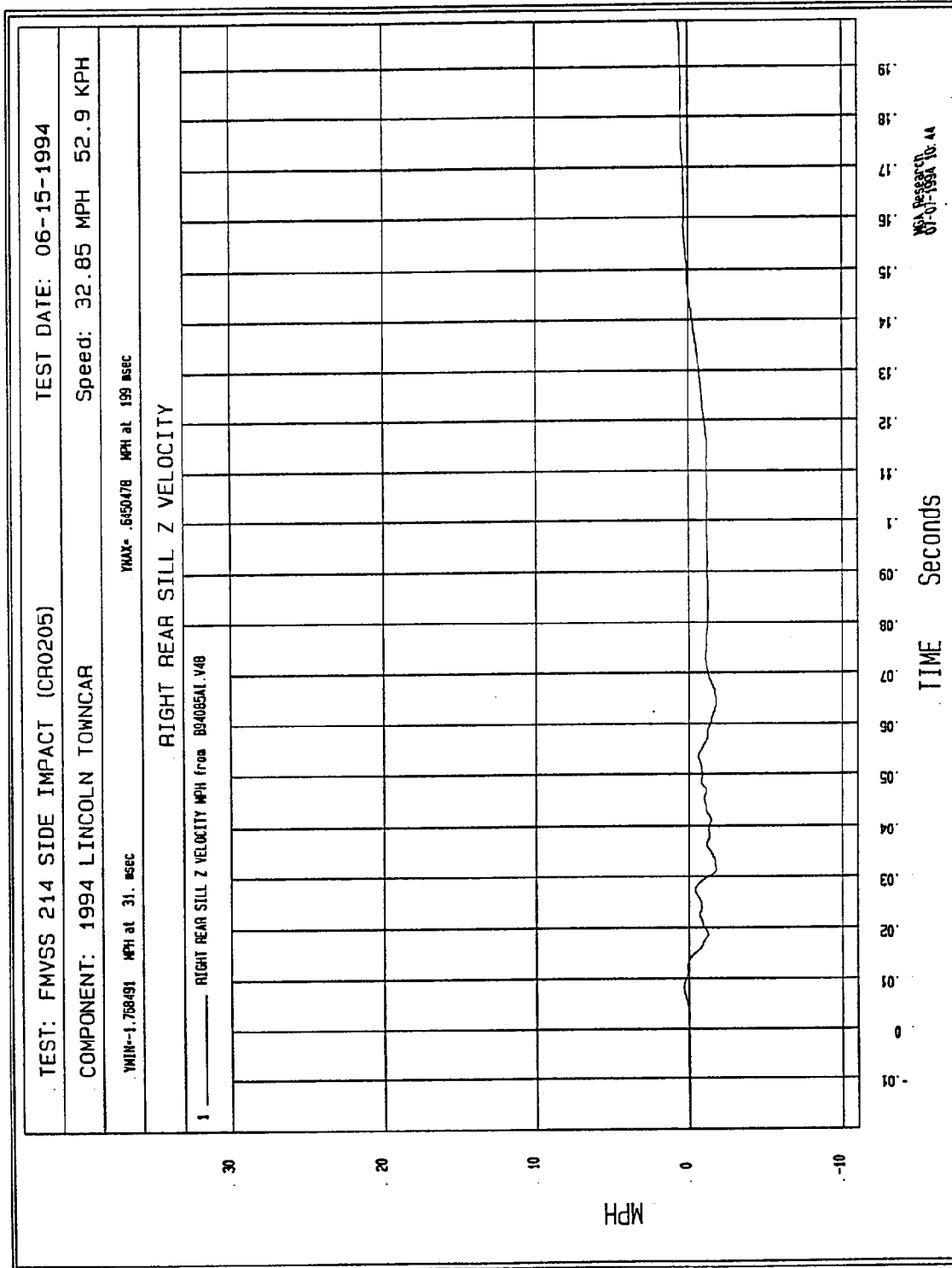


Figure B-33 - Right Rear Sil) Z Velocity vs. Time

TEST: FMVSS 214 SIDE IMPACT (CR0205) TEST DATE: 06-15-1994

COMPONENT: 1994 LINCOLN TOWNCAR Speed: 32.85 MPH 52.9 KPH

YMIN= 2.25128E-02 G'S at -3.4 msec YMAX= 19.71747 G'S at 29. msec

RIGHT REAR SILL @ REAR SEAT RESULTANT

1 Resultant G'S from B94085AV.A46

TIME (SECONDS)

MSA Research
07-01-1994 10:54

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

Filter: Class 60 (100 Hz)

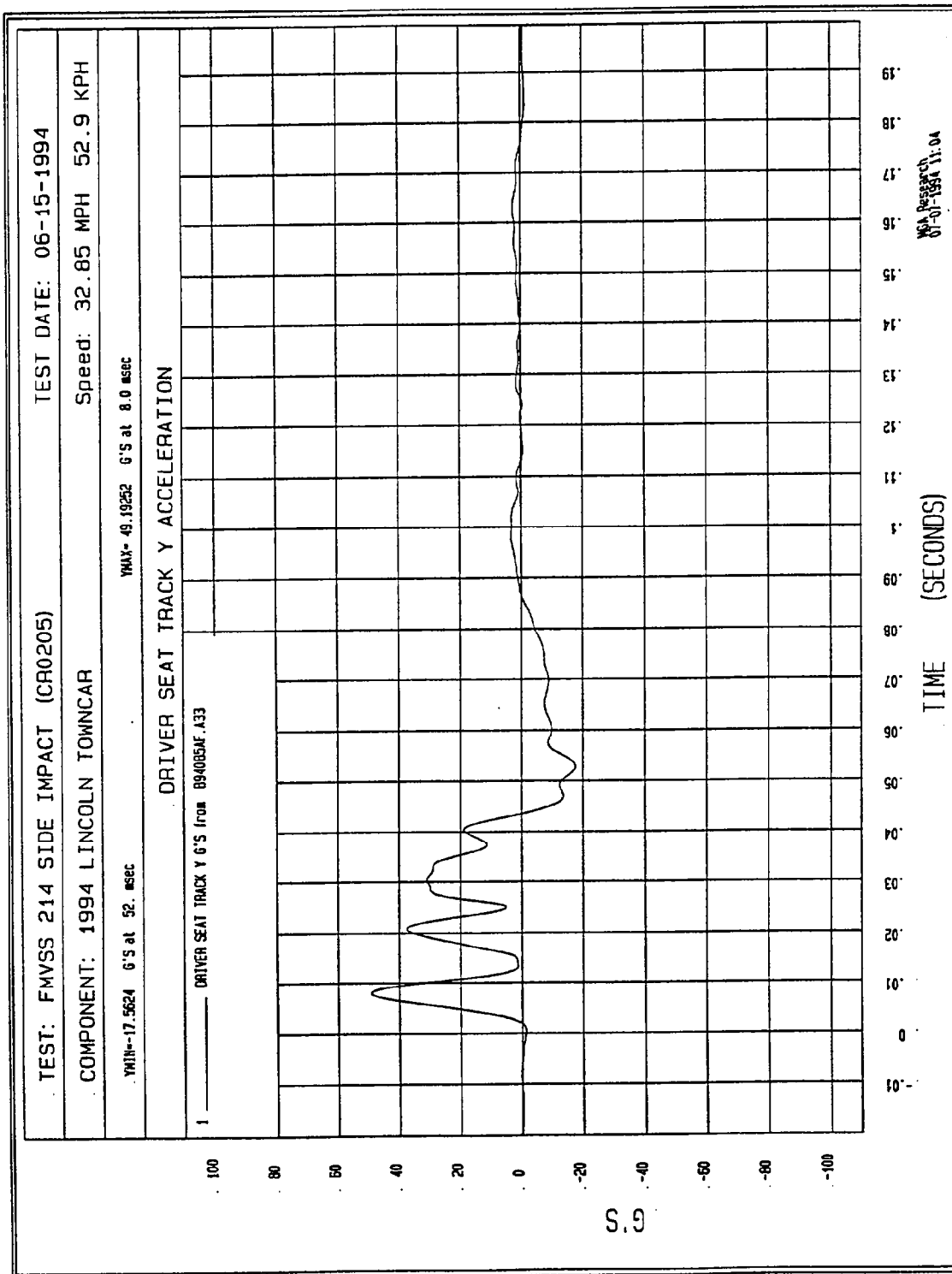
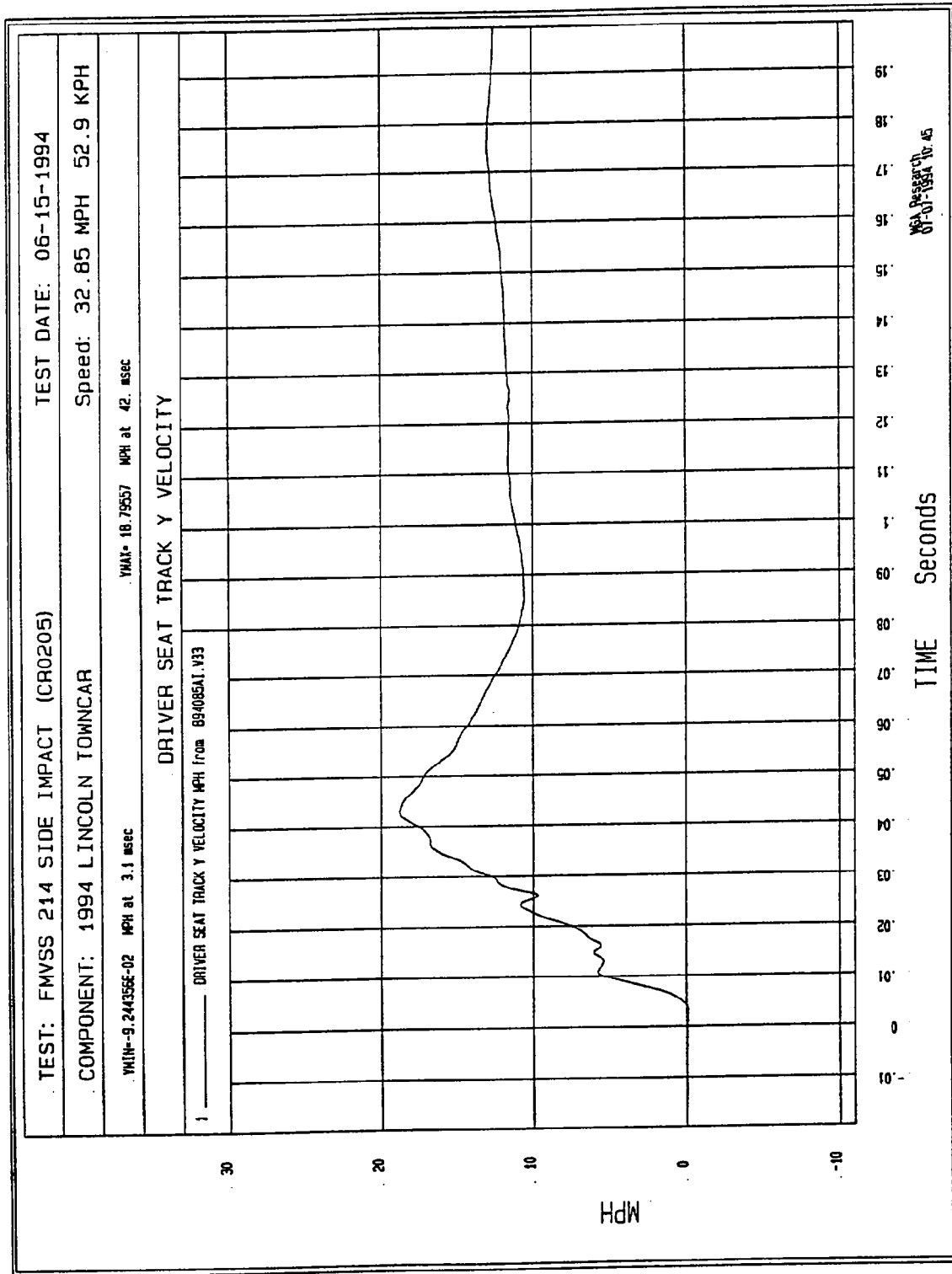


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



Filter: Class 60 (100 Hz)

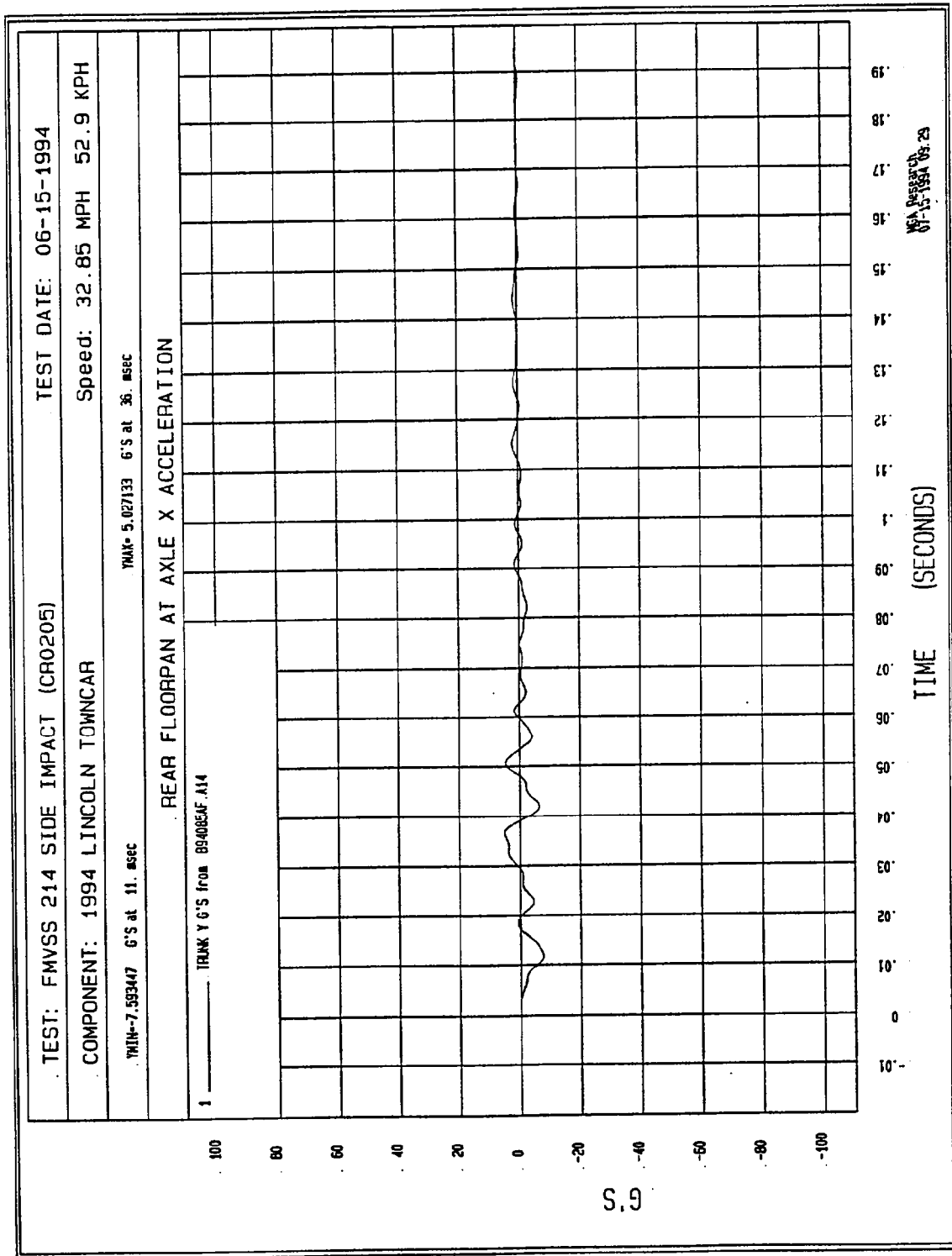


Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

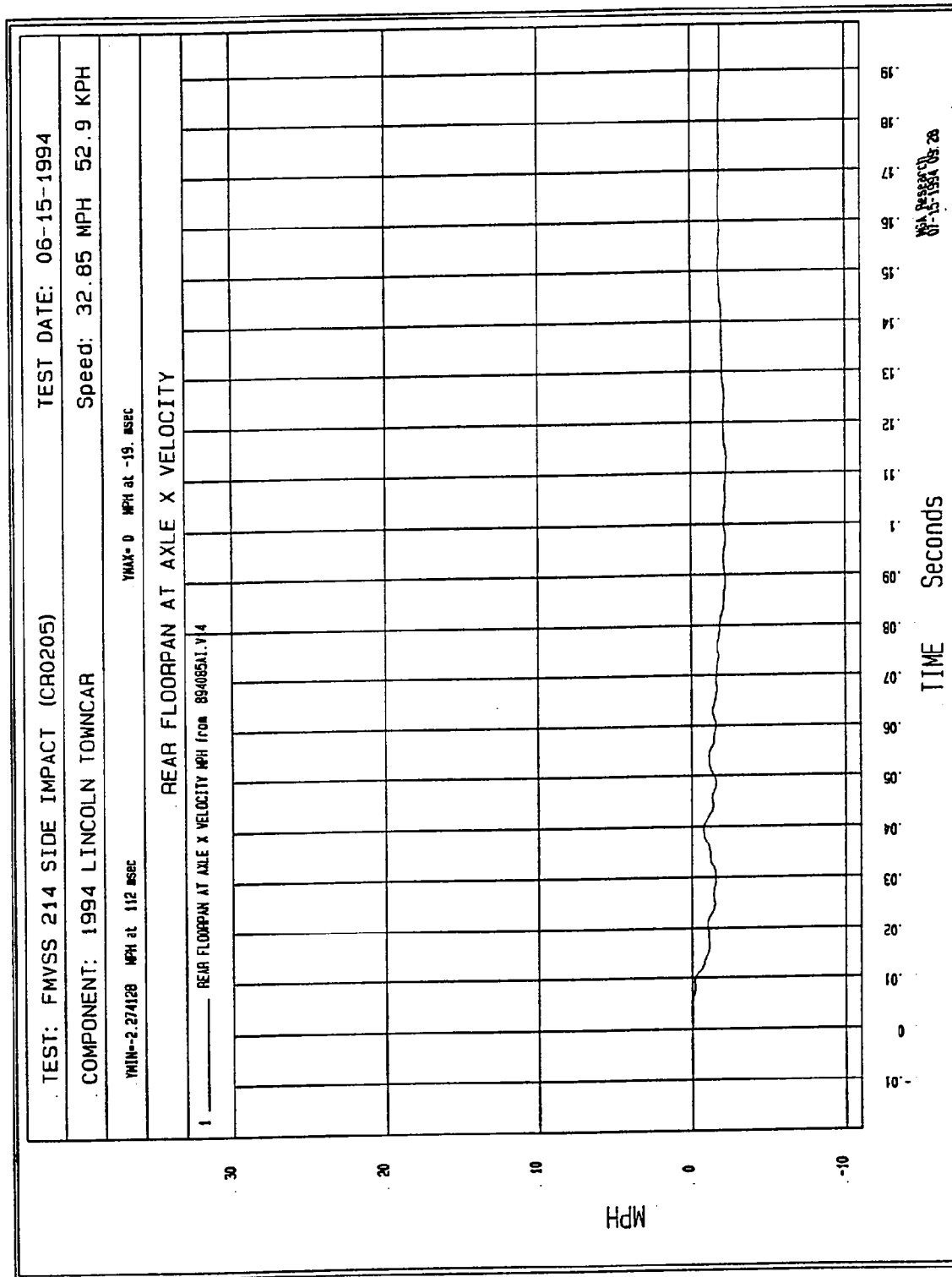


Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

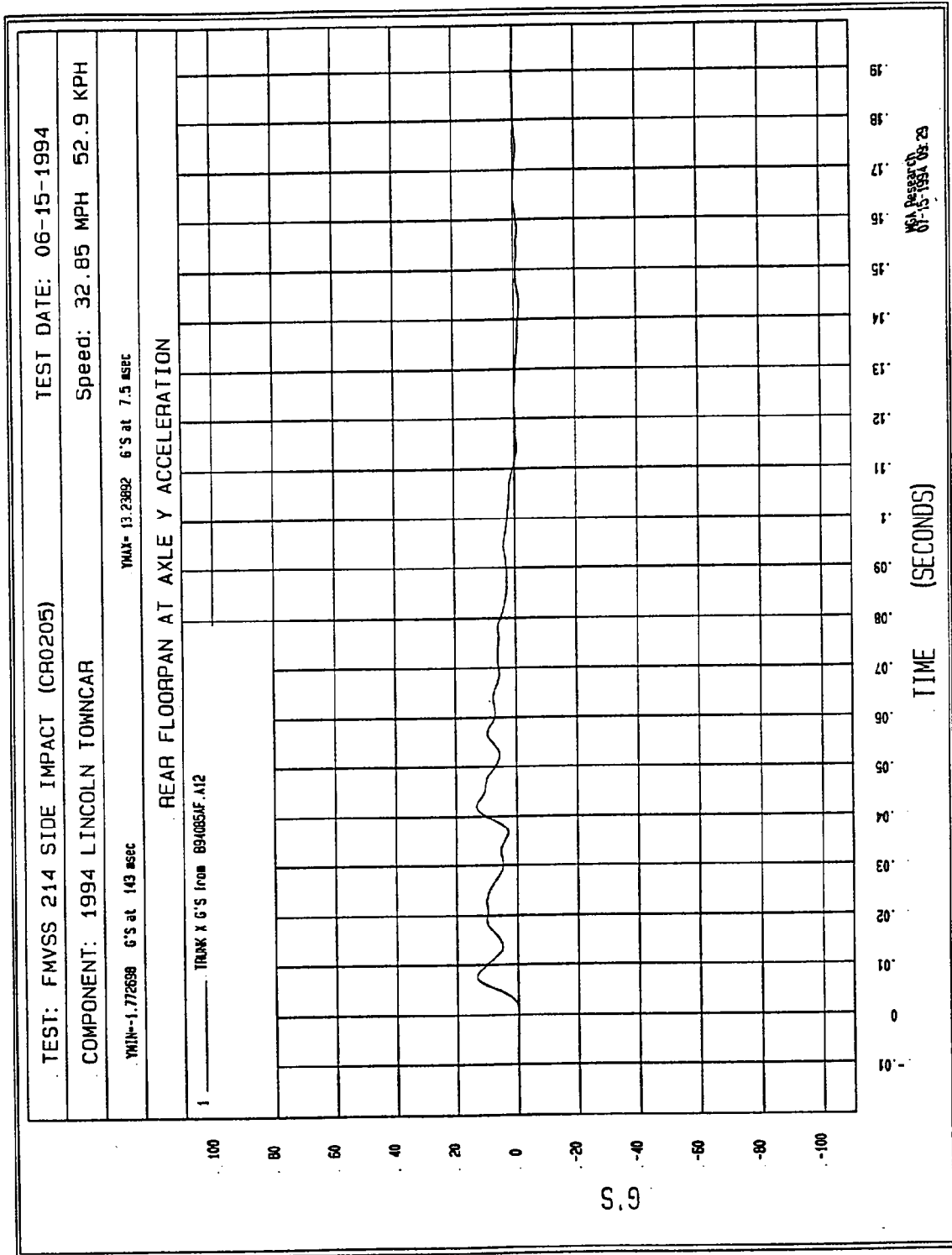


Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

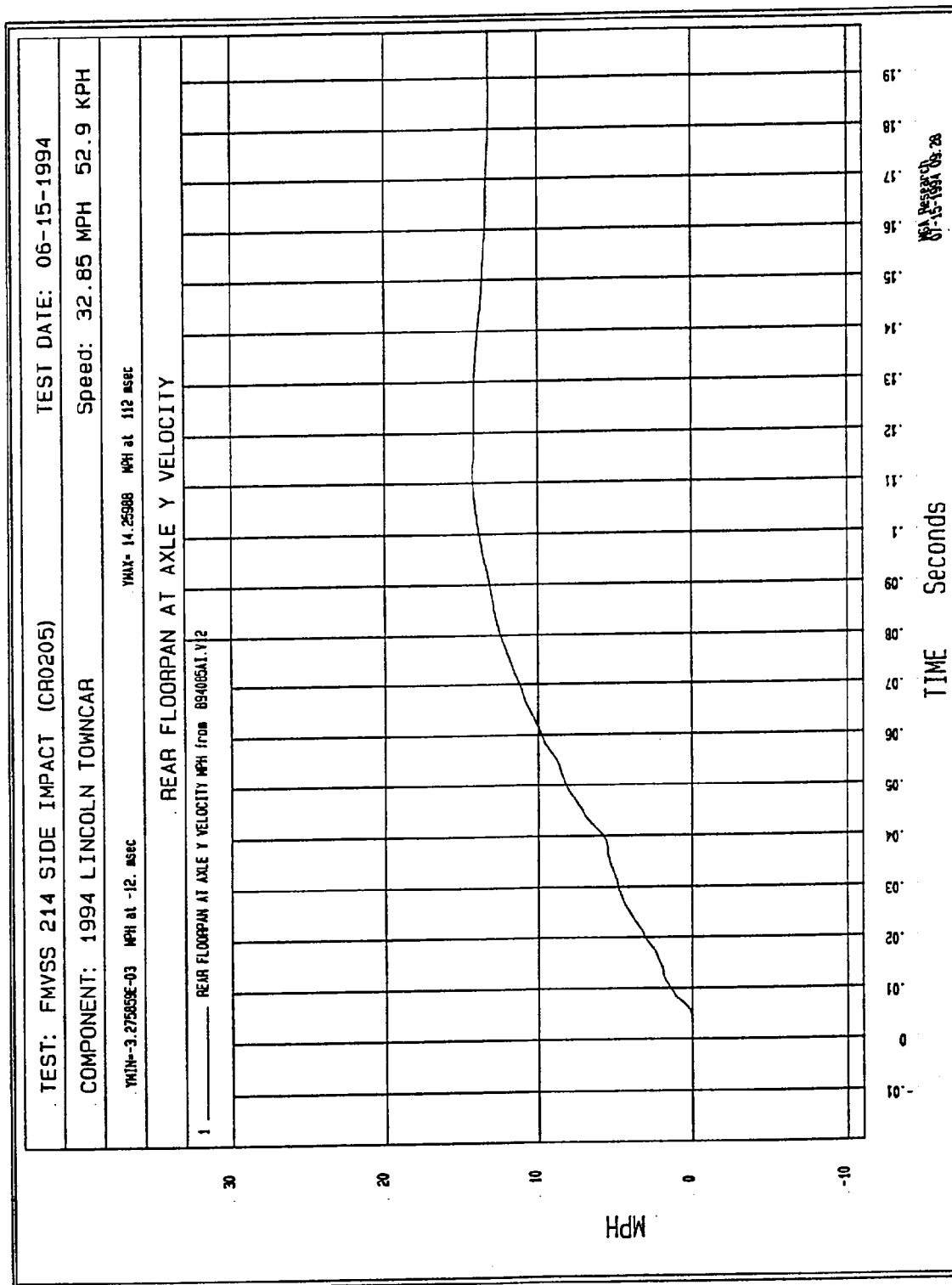


Figure B-40 - Rear Floorpan at Axle Y Velocity vs. Time

Filter: Class 60 (100 Hz)

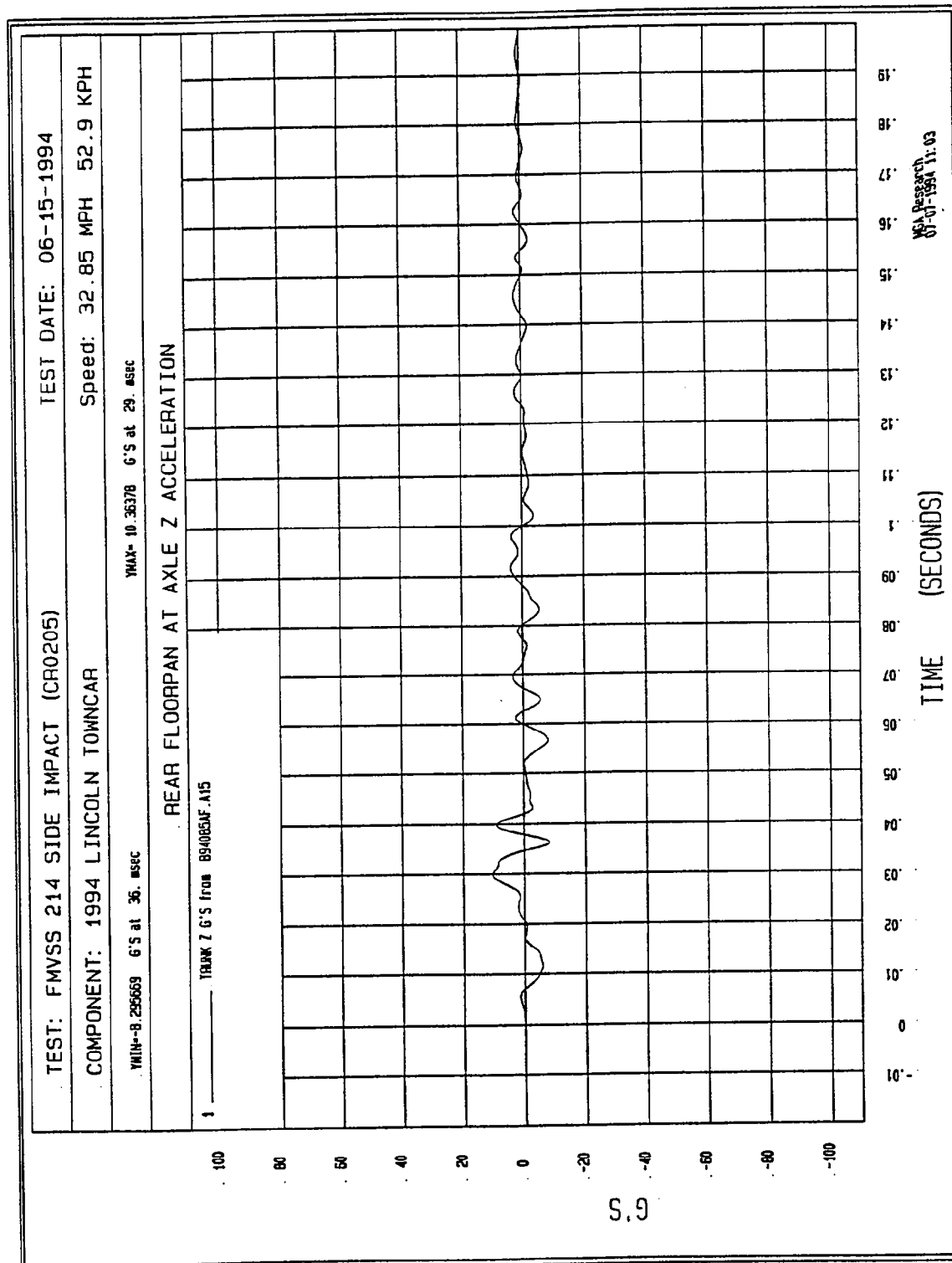


Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

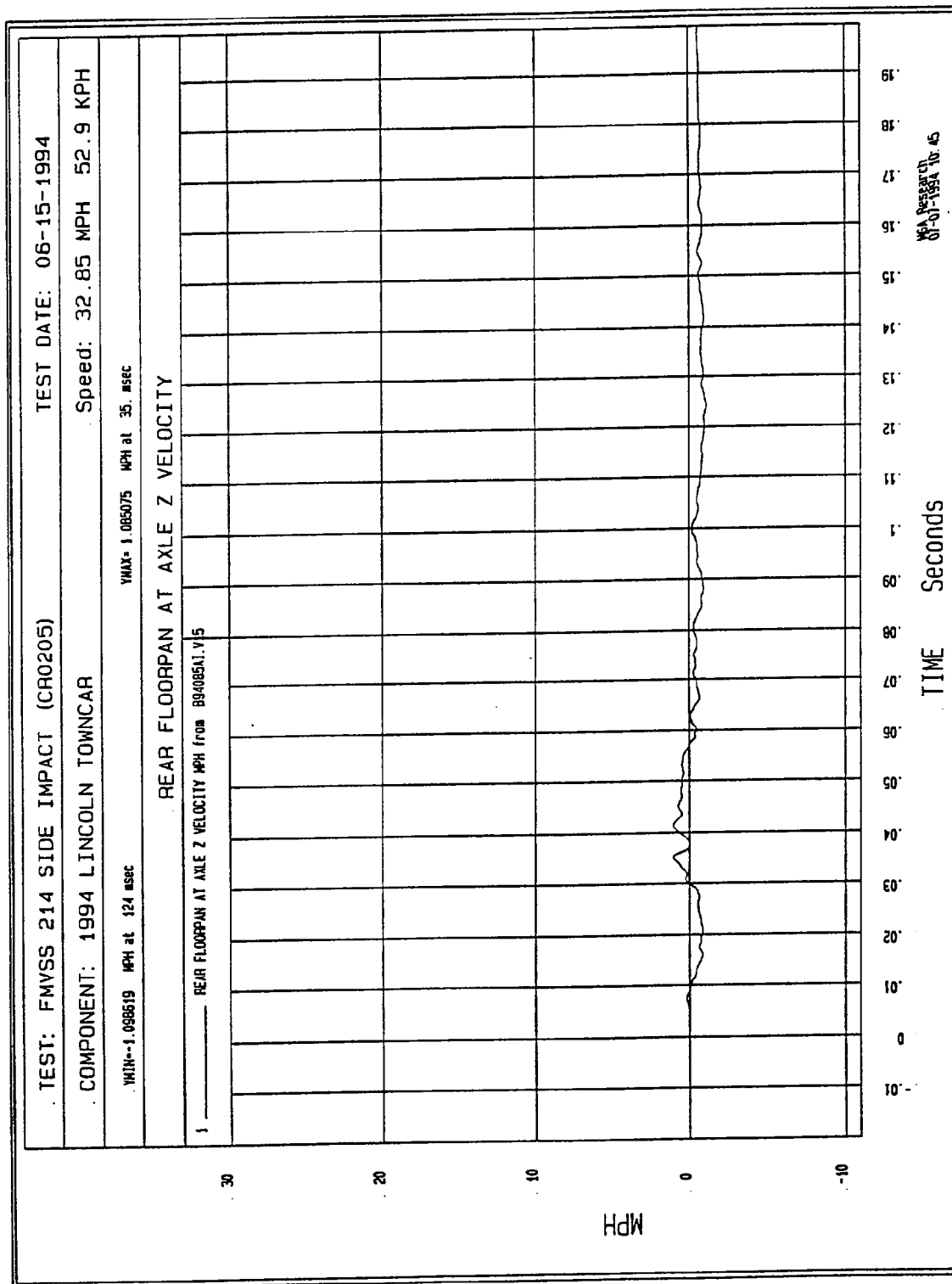


Figure B-42 - Rear Floorpan at Axle Z Velocity vs. Time

Filter: Class 60 (100 Hz)

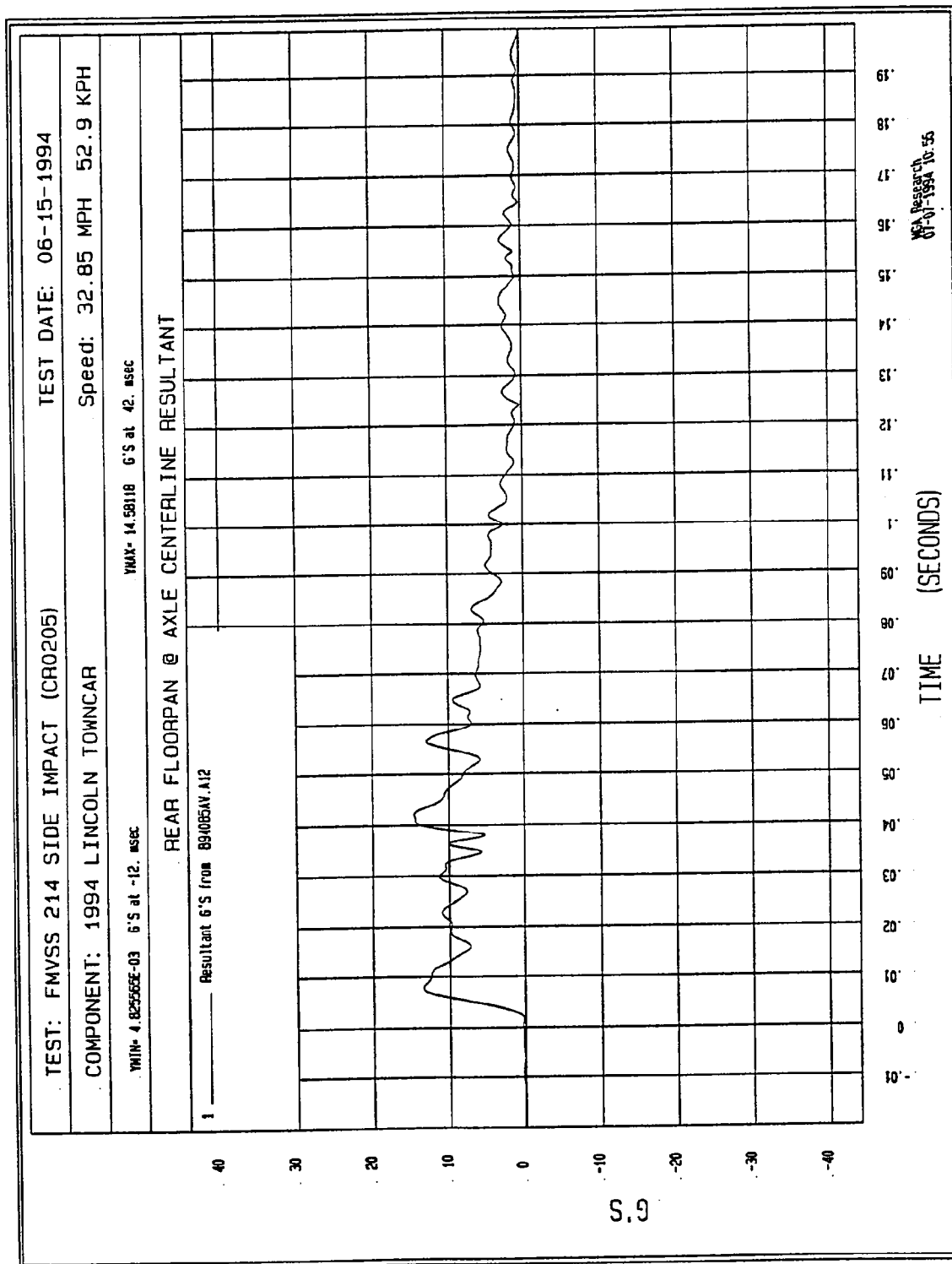


Figure B-43 - Rear Floorpan at Axle Centerline Resultant vs. Time

Filter: Class 60 (100 Hz)

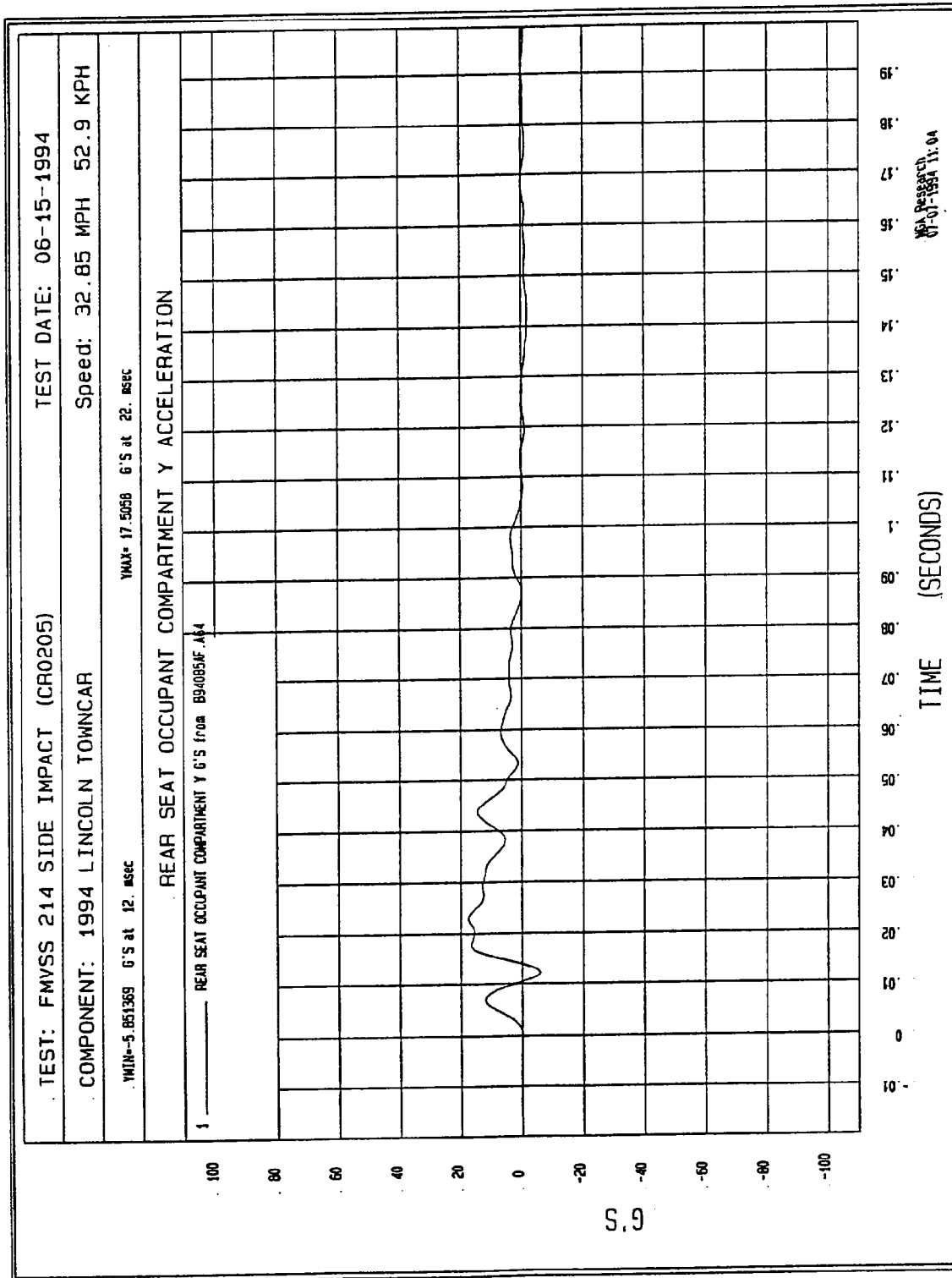
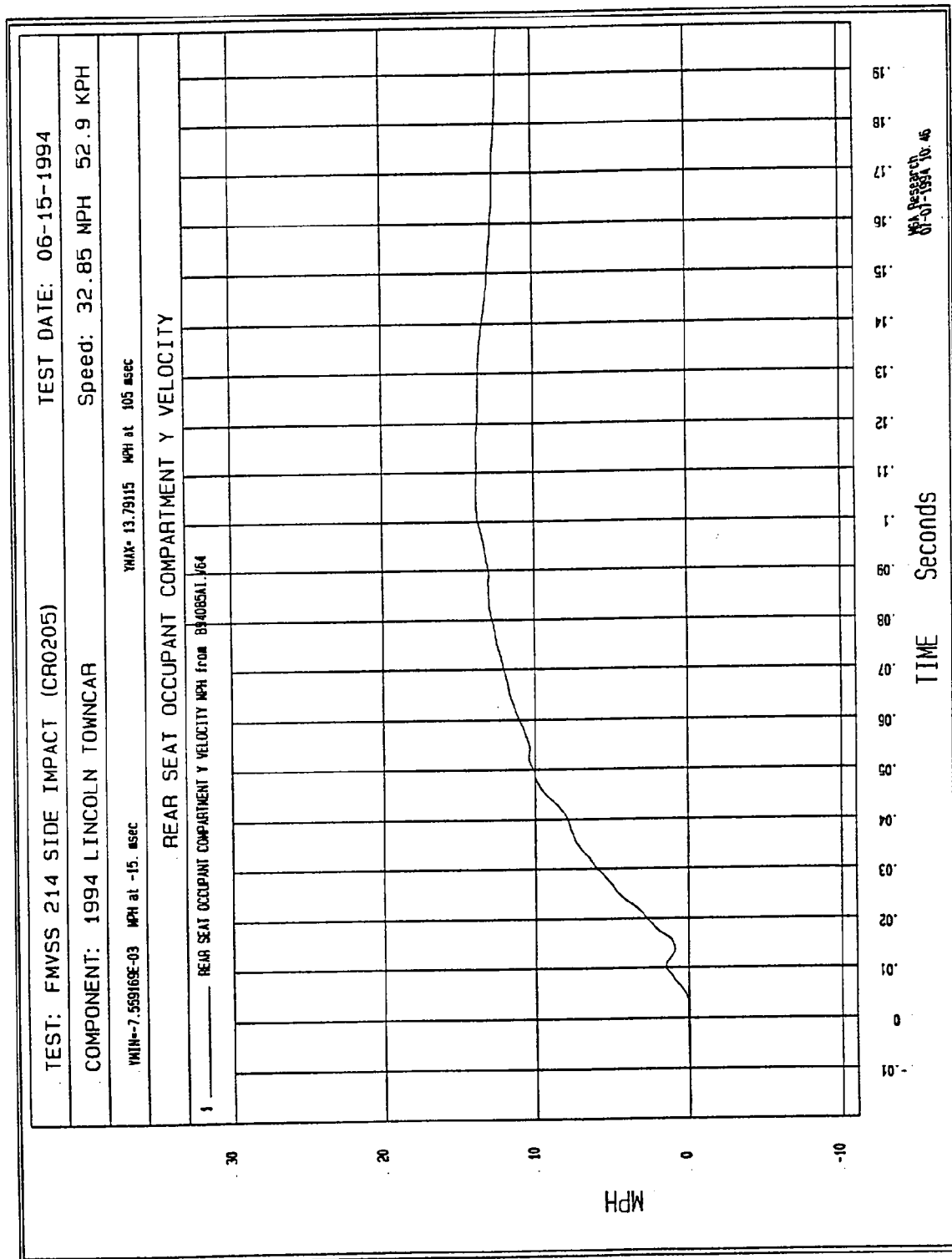


Figure B-44 - Rear Seat Occupant Compartment Y Acceleration vs. Time

Filter: Class 180 (300 Hz)



B-45

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

Filter: Class 60 (100 Hz)

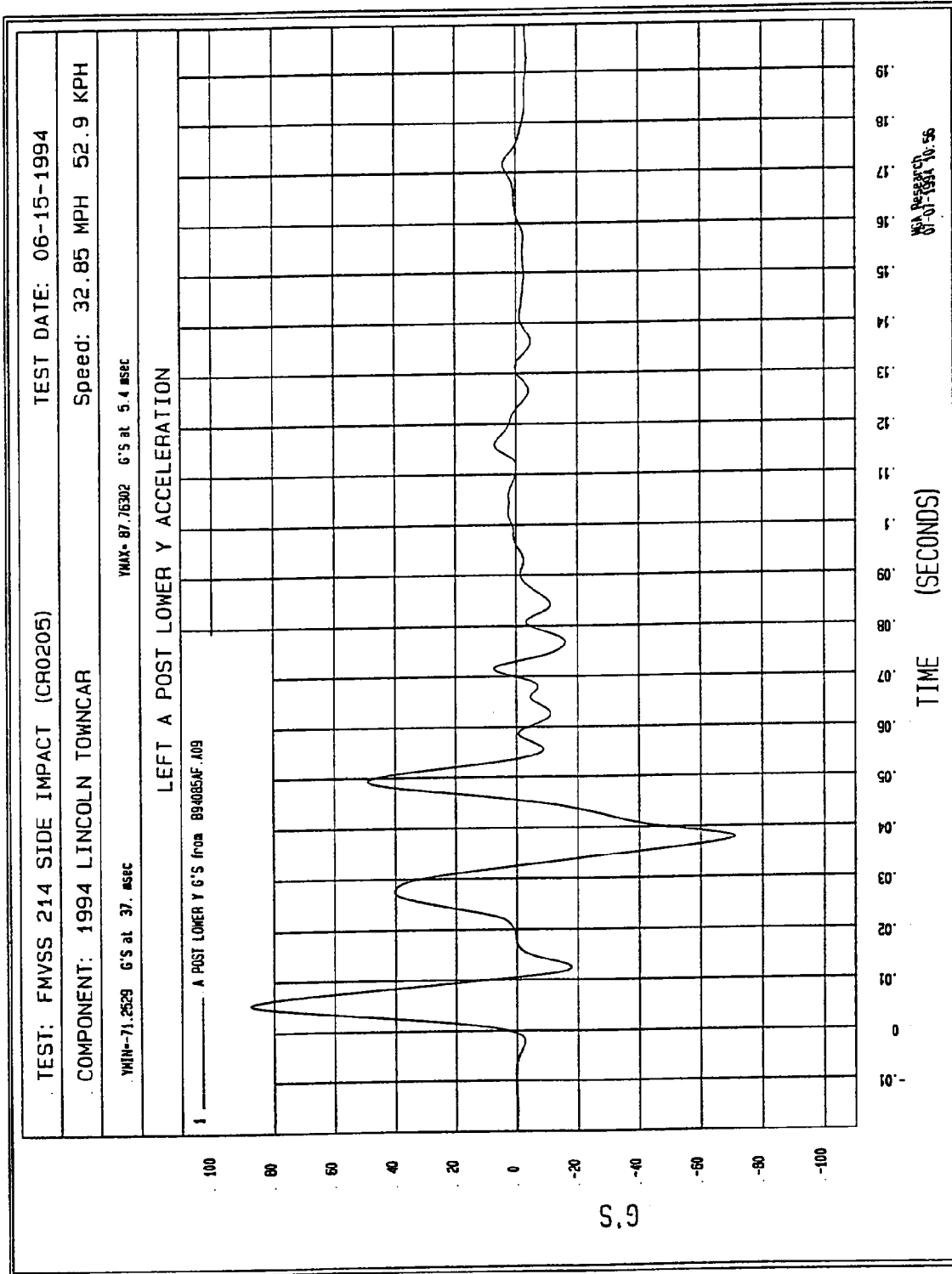


Figure B-46 - Left A Post Lower Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

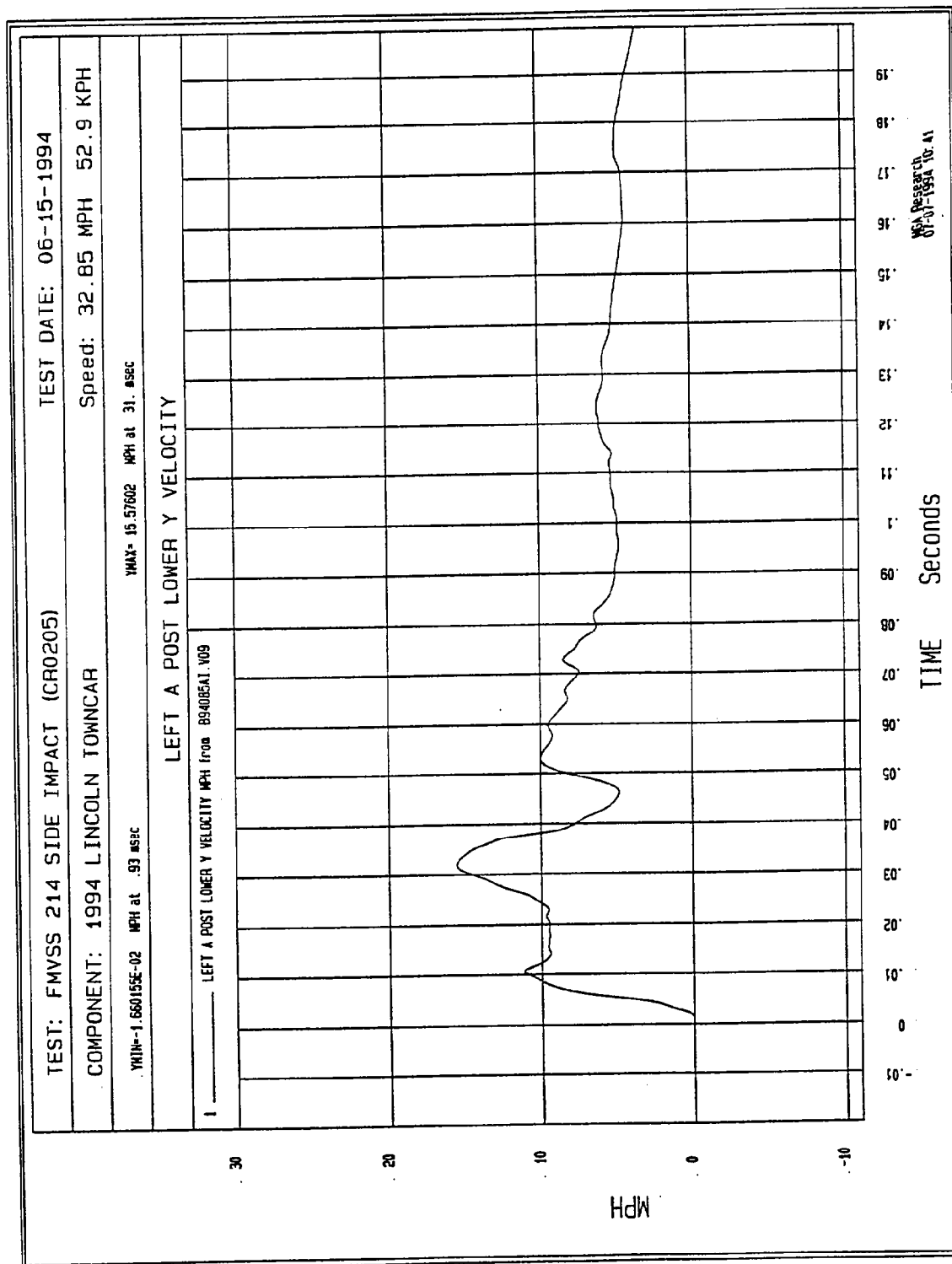


Figure B-47 - Left A Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

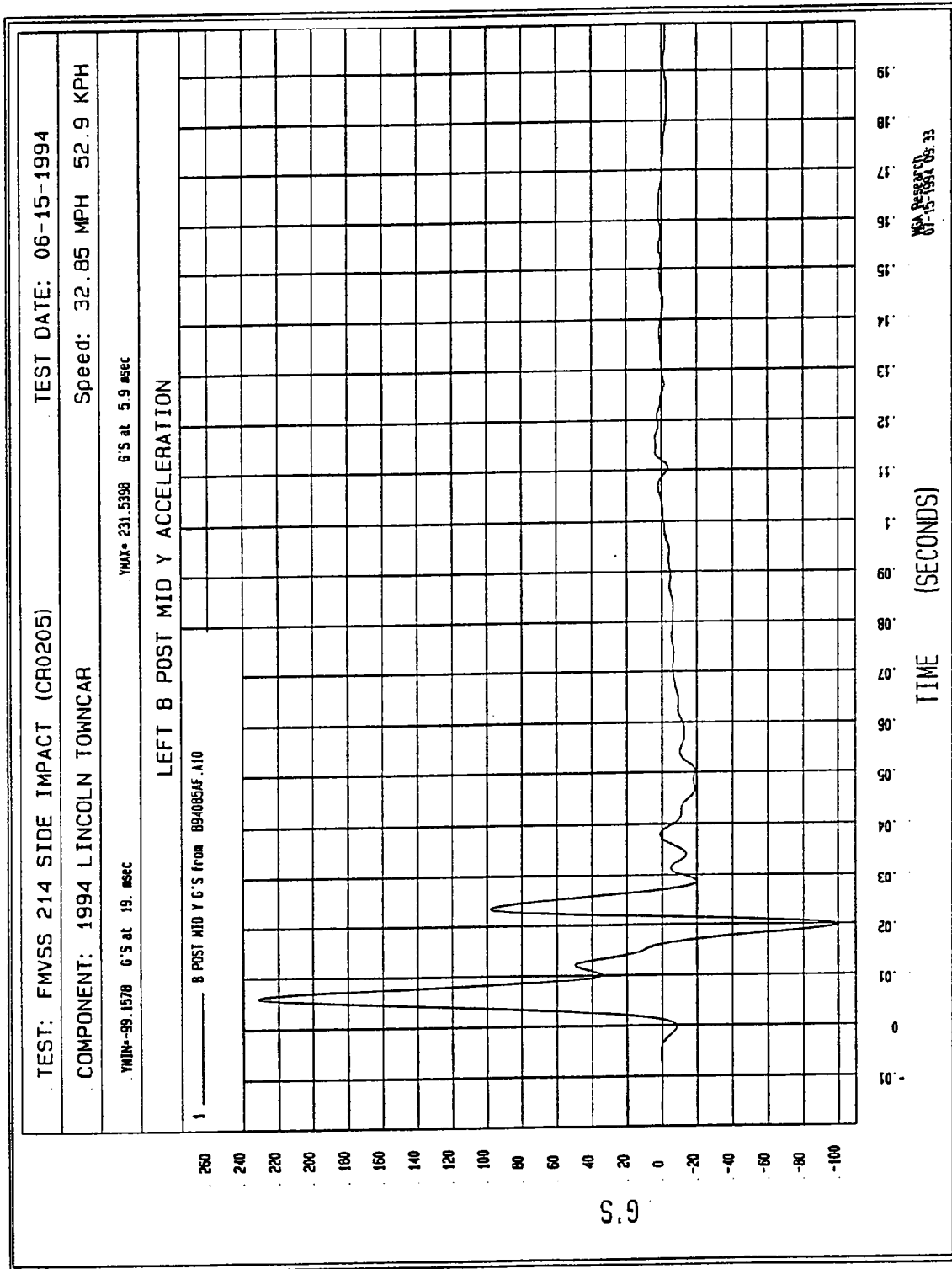


Figure B-48 - Left B Post Mid Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

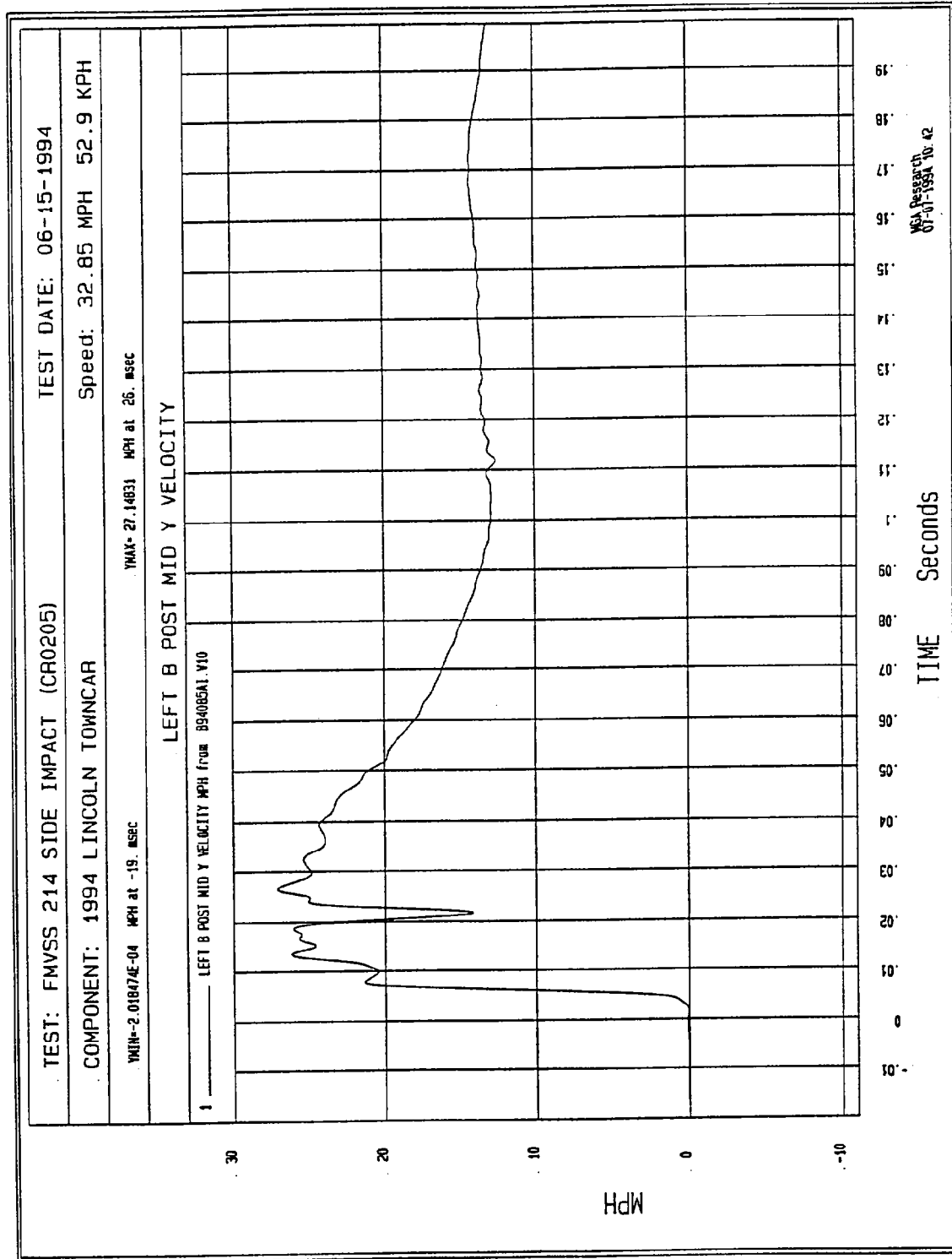
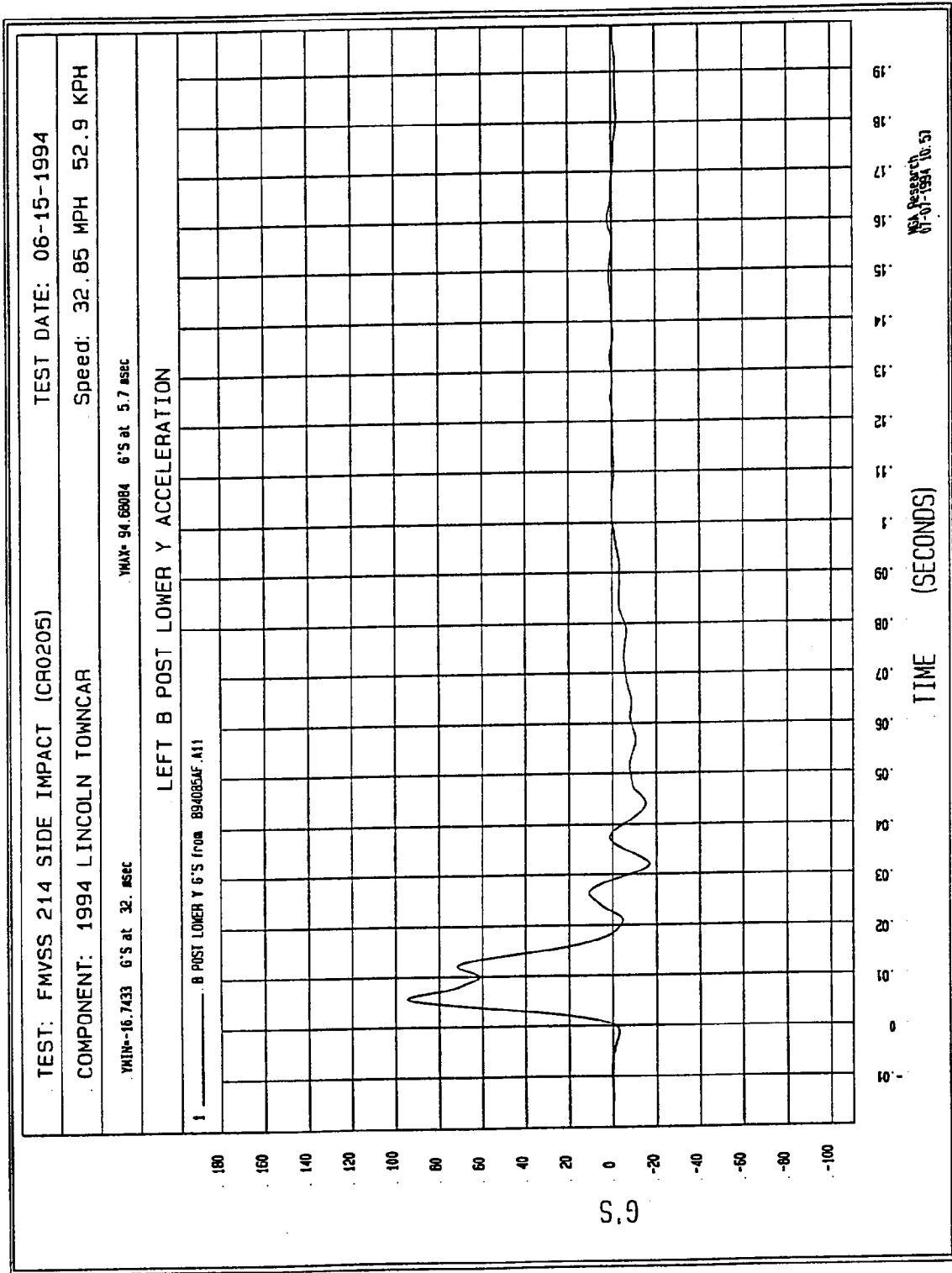


Figure B-49 - Left B Post Mid Y Velocity vs. Time

Filter: Class 60 (100 Hz)



B-50

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

Filter: Class 180 (300 Hz)

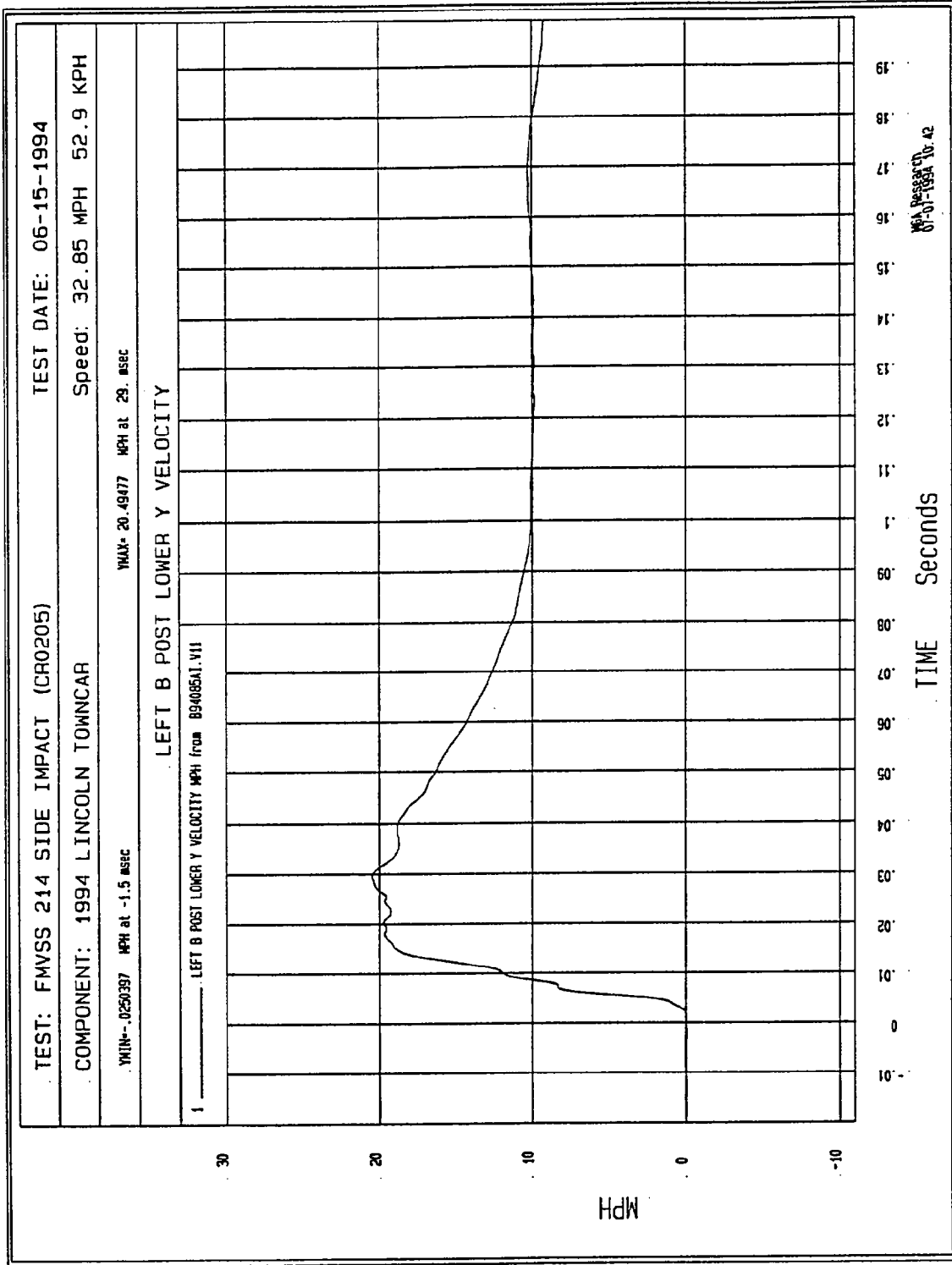


Figure B-51 - Left B Post Lower Y Velocity vs. Time

Filter: Class 60 (100 Hz)

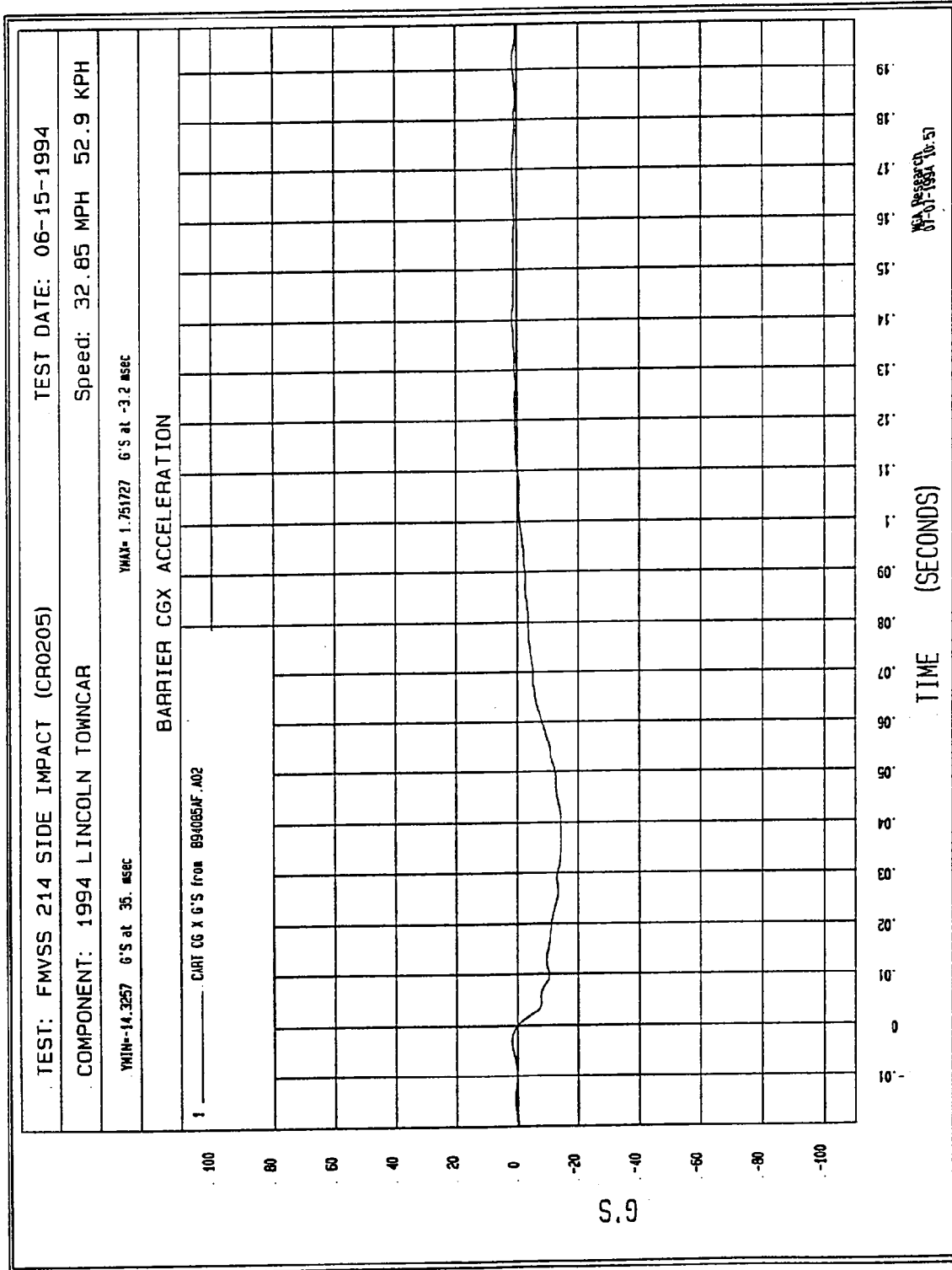


Figure B-52 - Moving Barrier Center of Gravity X Acceleration vs. Time

Filter: Class 180 (300 Hz)

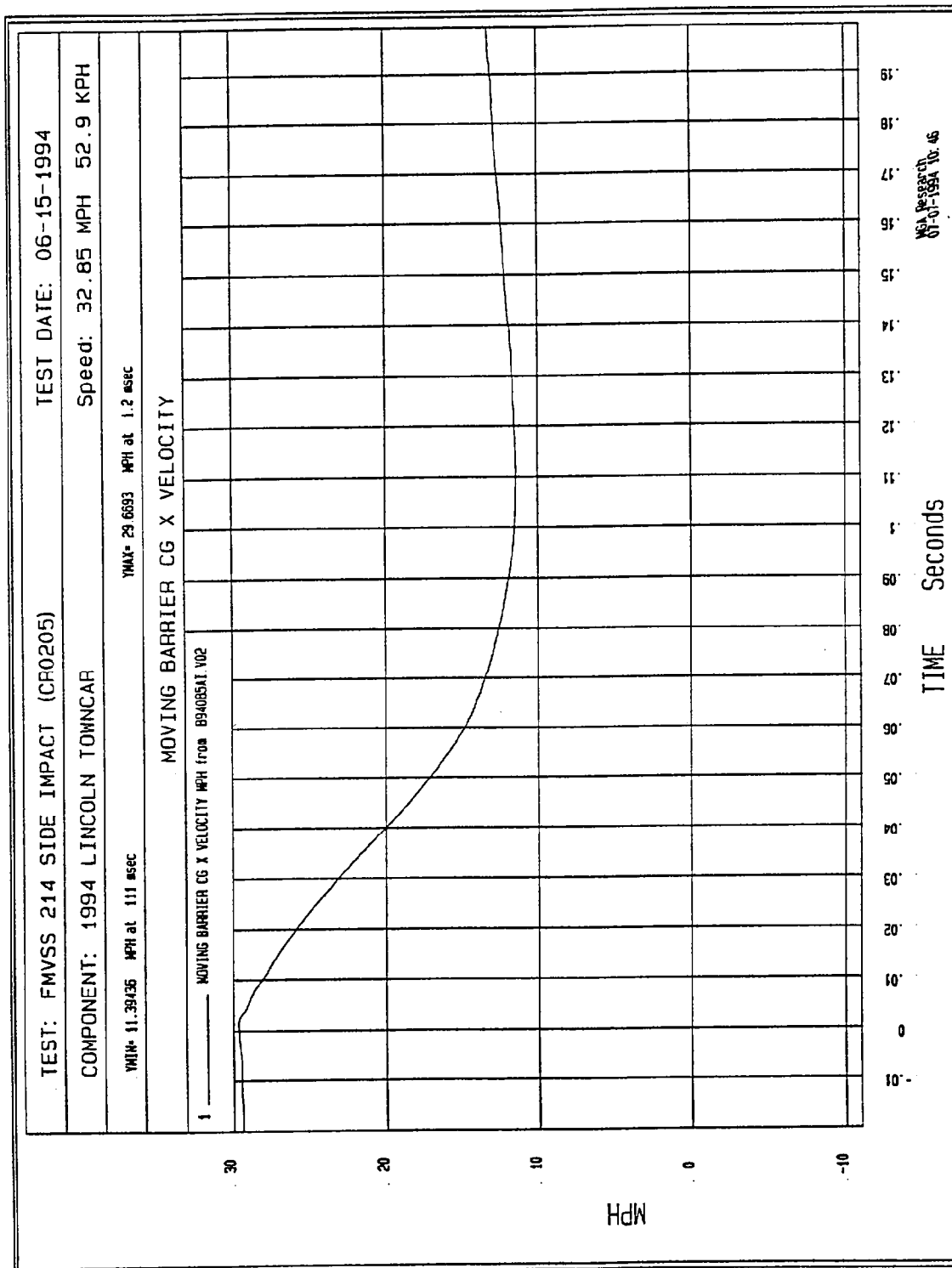


Figure B-53 - Moving Barrier Center of Gravity X Velocity vs. Time

Filter: Class 60 (100 Hz)

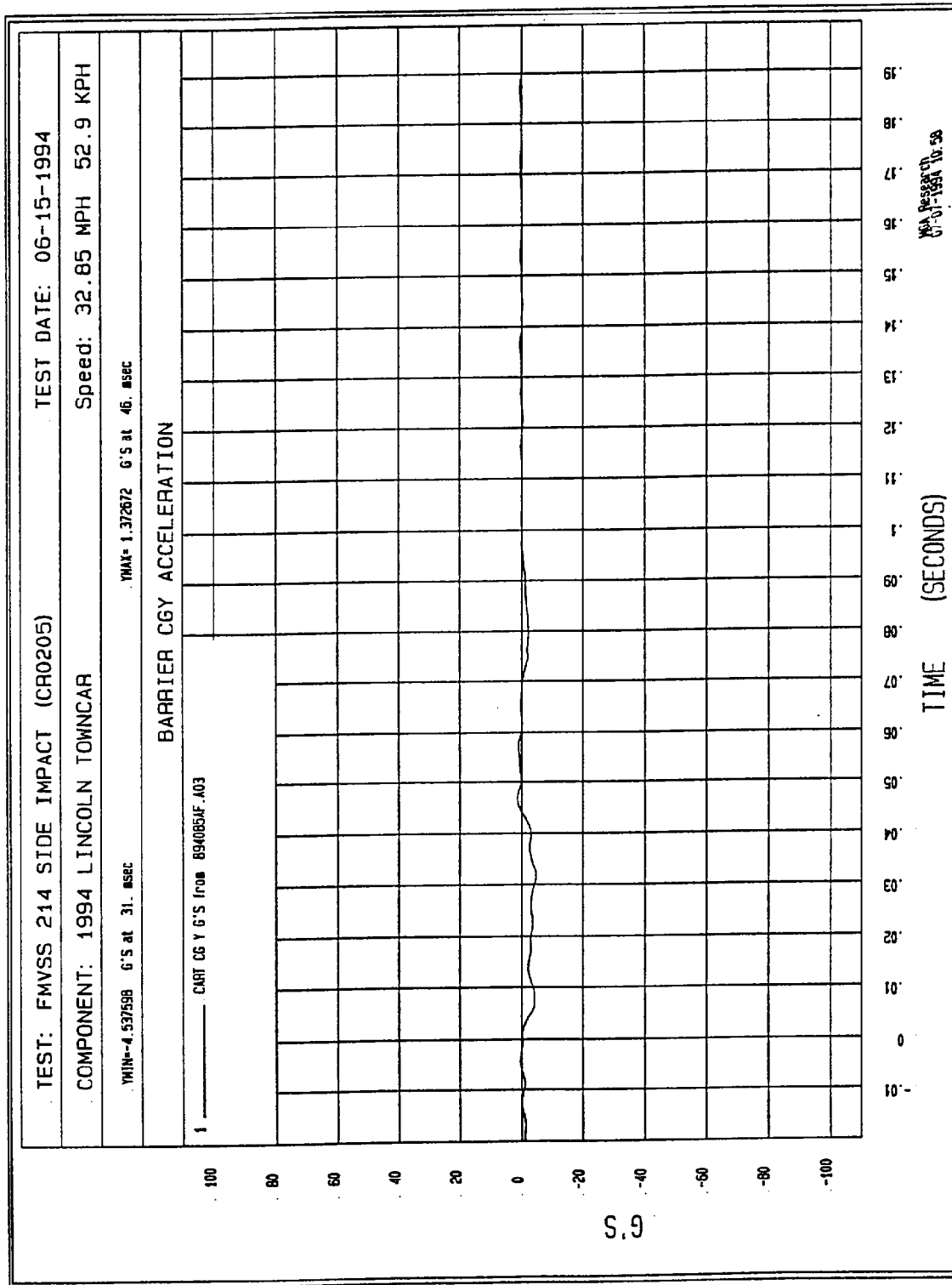


Figure B-54 - Moving Barrier Center of Gravity Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

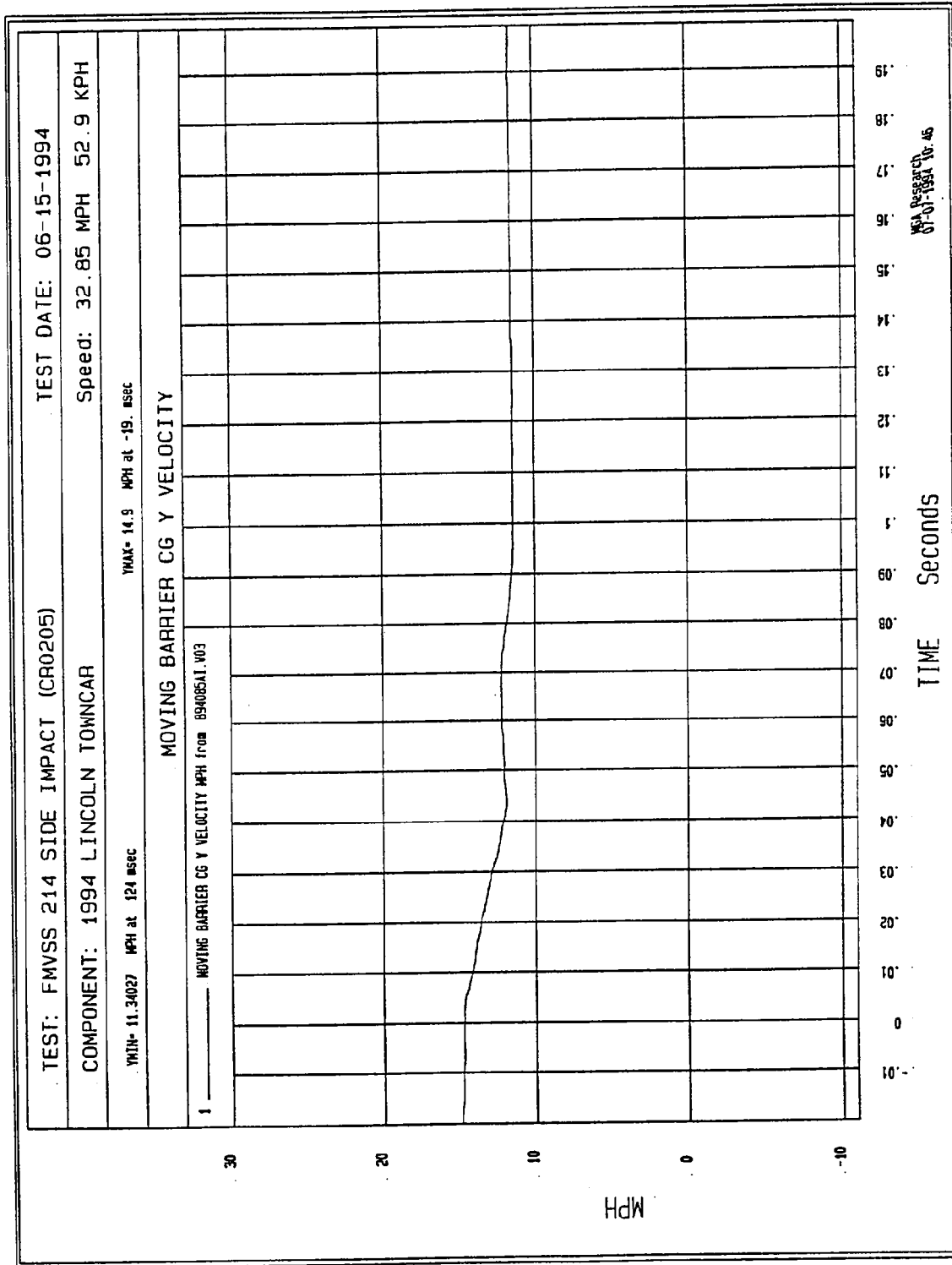


Figure B-55 - Moving Barrier Center of Gravity Y Velocity vs. Time

Filter: Class 60 (100 Hz)

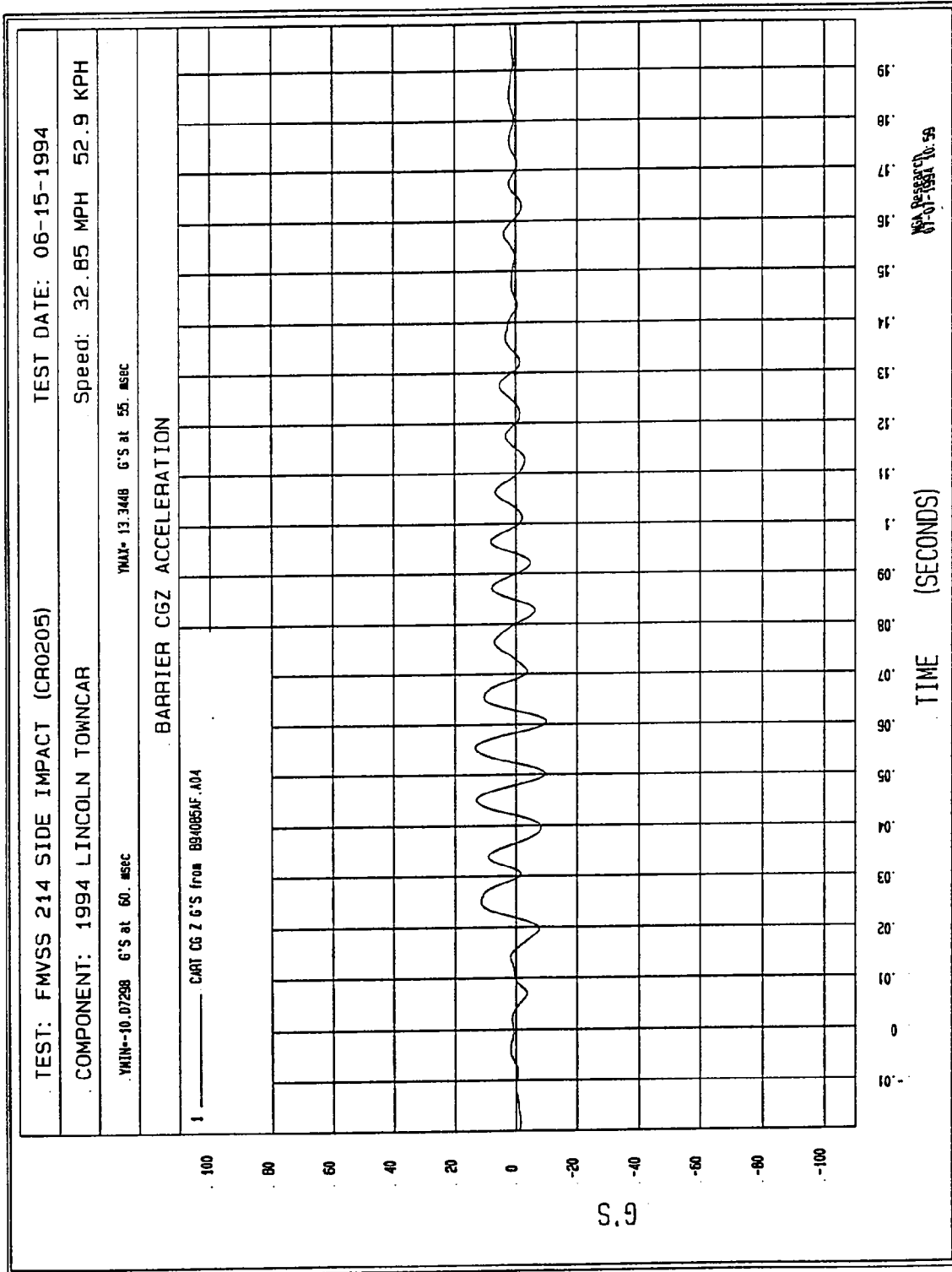


Figure B-56 - Moving Barrier Center of Gravity Z Acceleration vs. Time

Filter: Class 180 (300 Hz)

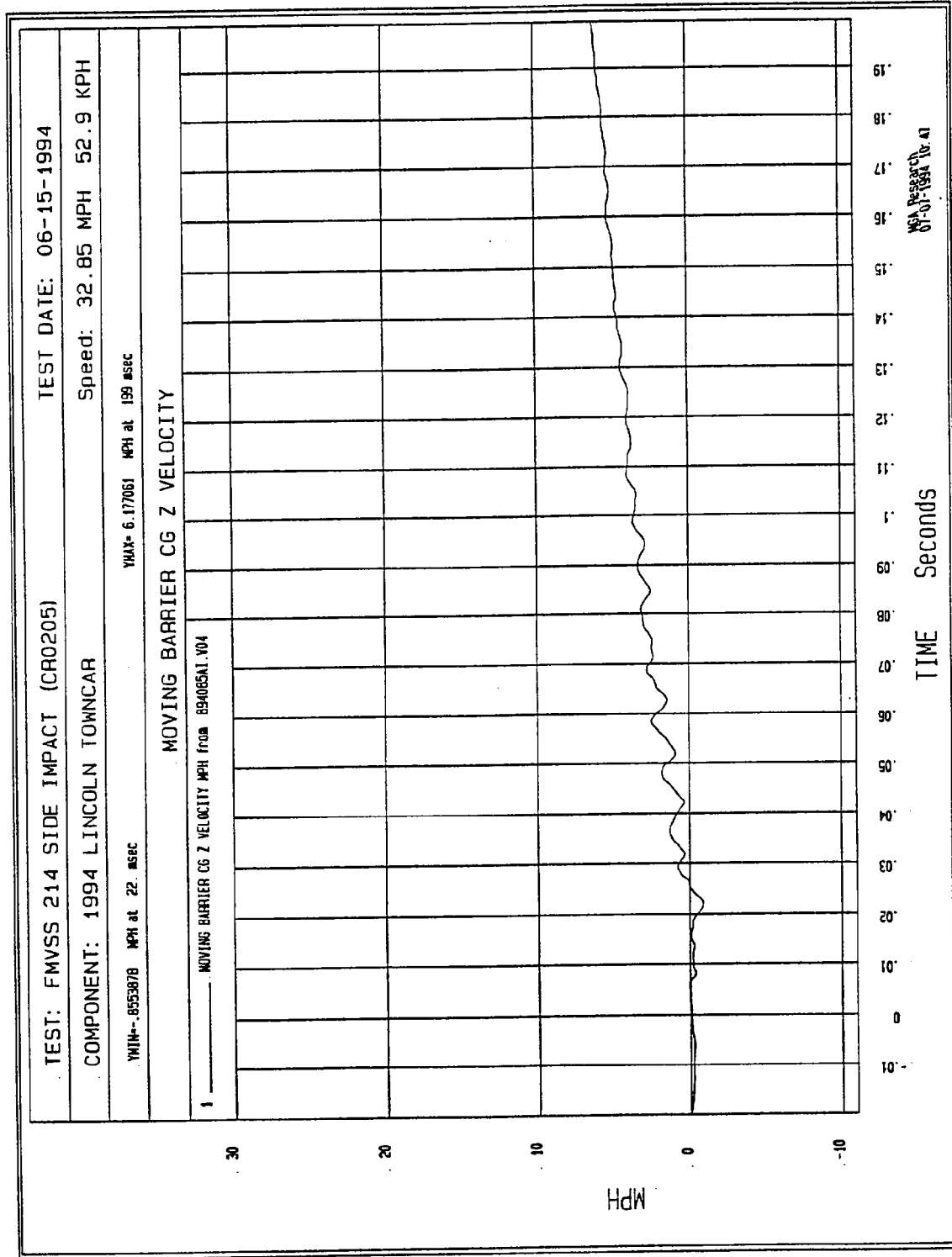


Figure B-57 - Moving Barrier Center of Gravity Z Velocity vs. Time

Filter: Class 60 (100 Hz)

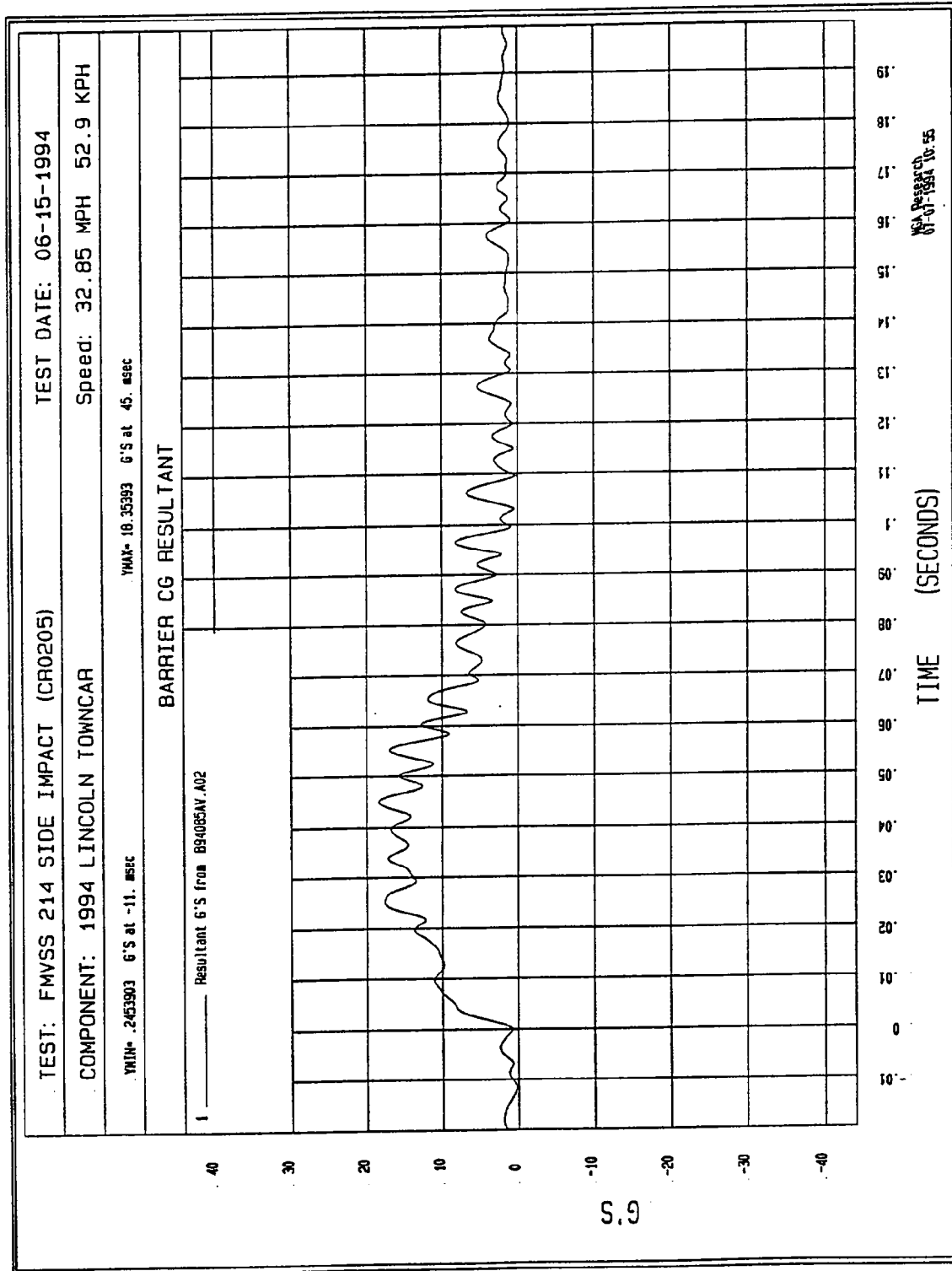


Figure B-58 - Moving Barrier Center of Gravity Resultant vs. Time

Filter: Class 60 (100 Hz)

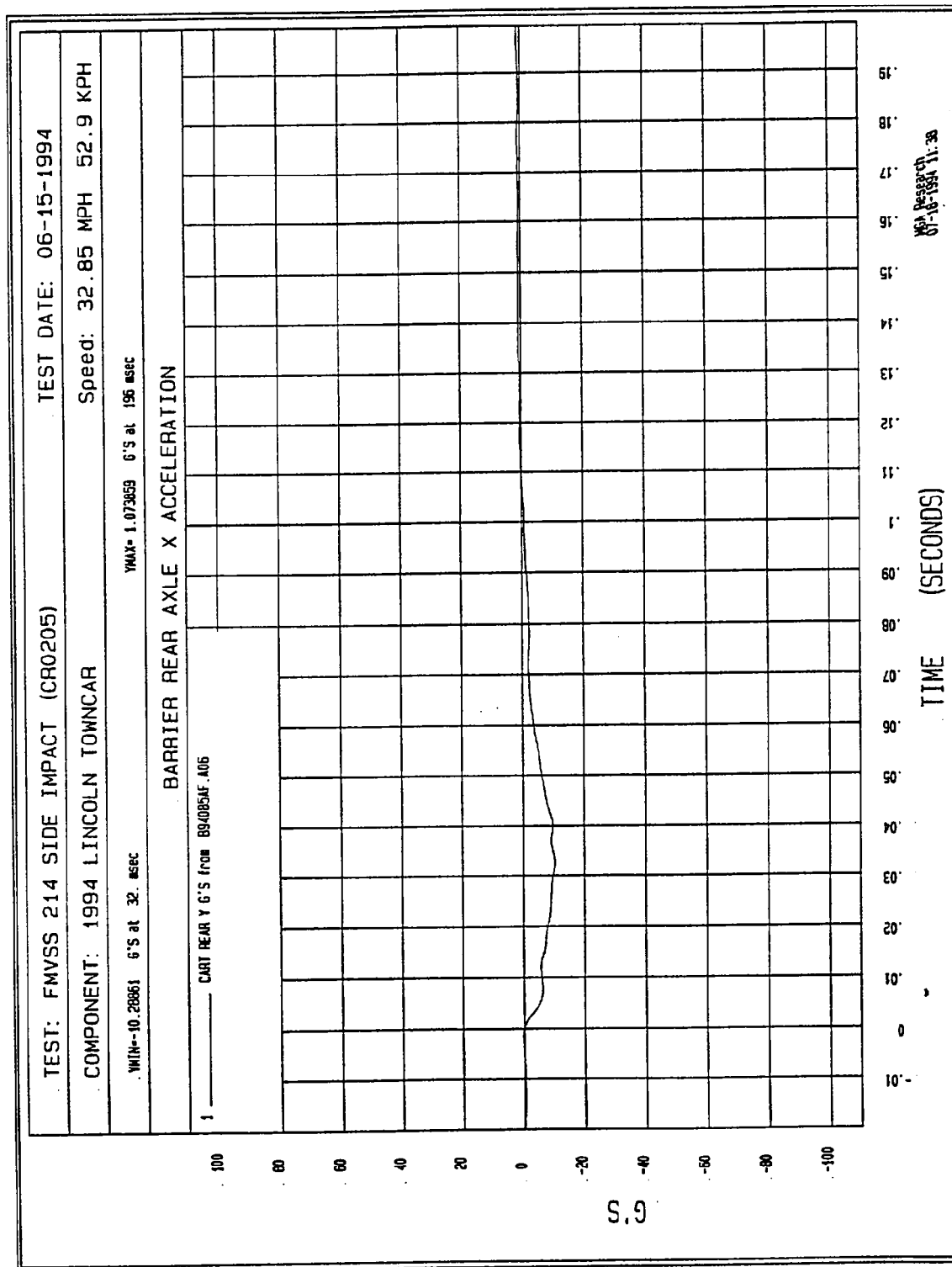


Figure B-59 - Moving Barrier Rear Axle X Acceleration vs. Time

Filter: Class 180 (300 Hz)

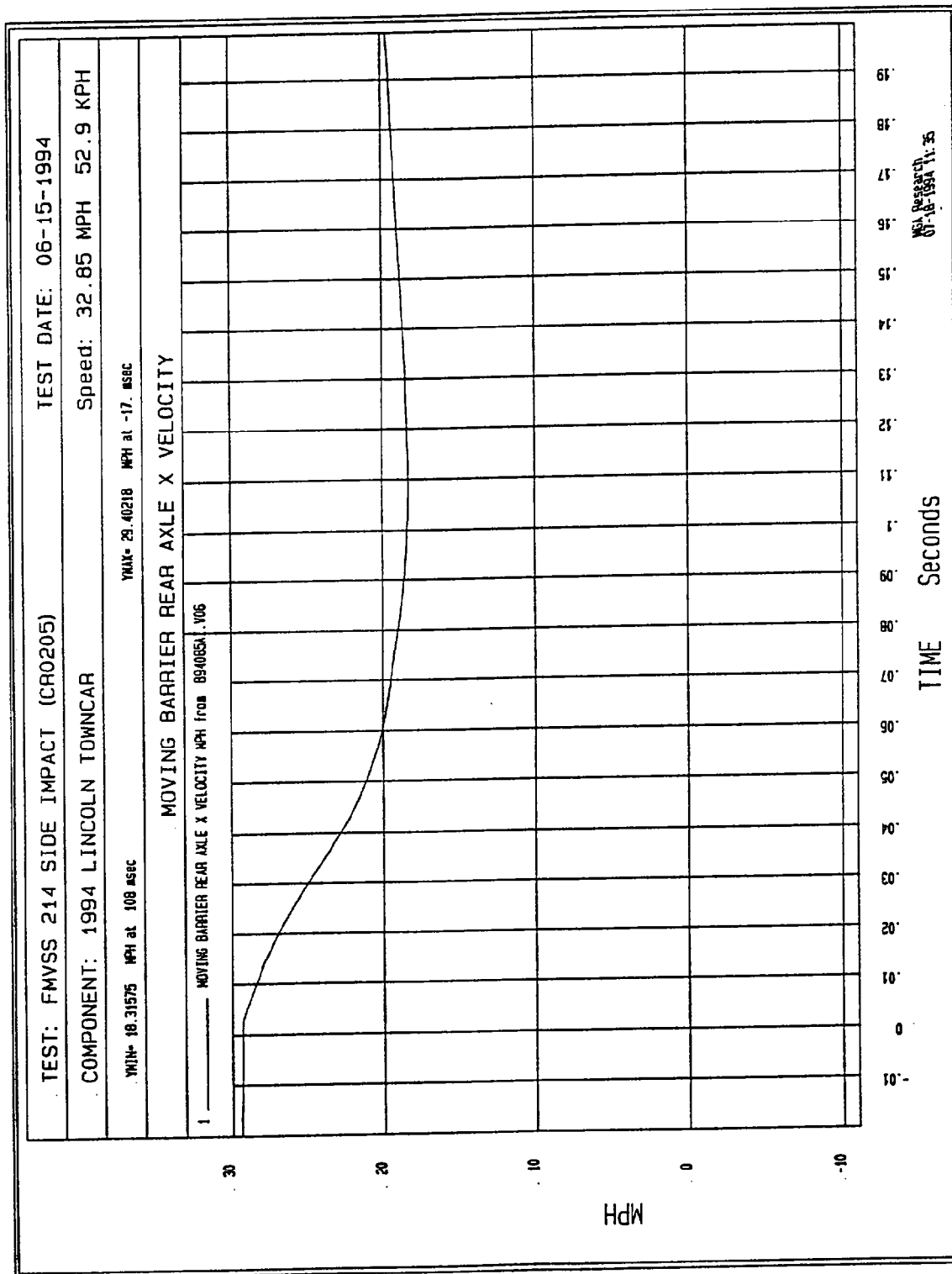


Figure B-60 - Moving Barrier Rear Axle X Velocity vs. Time

Filter: Class 60 (100 Hz)

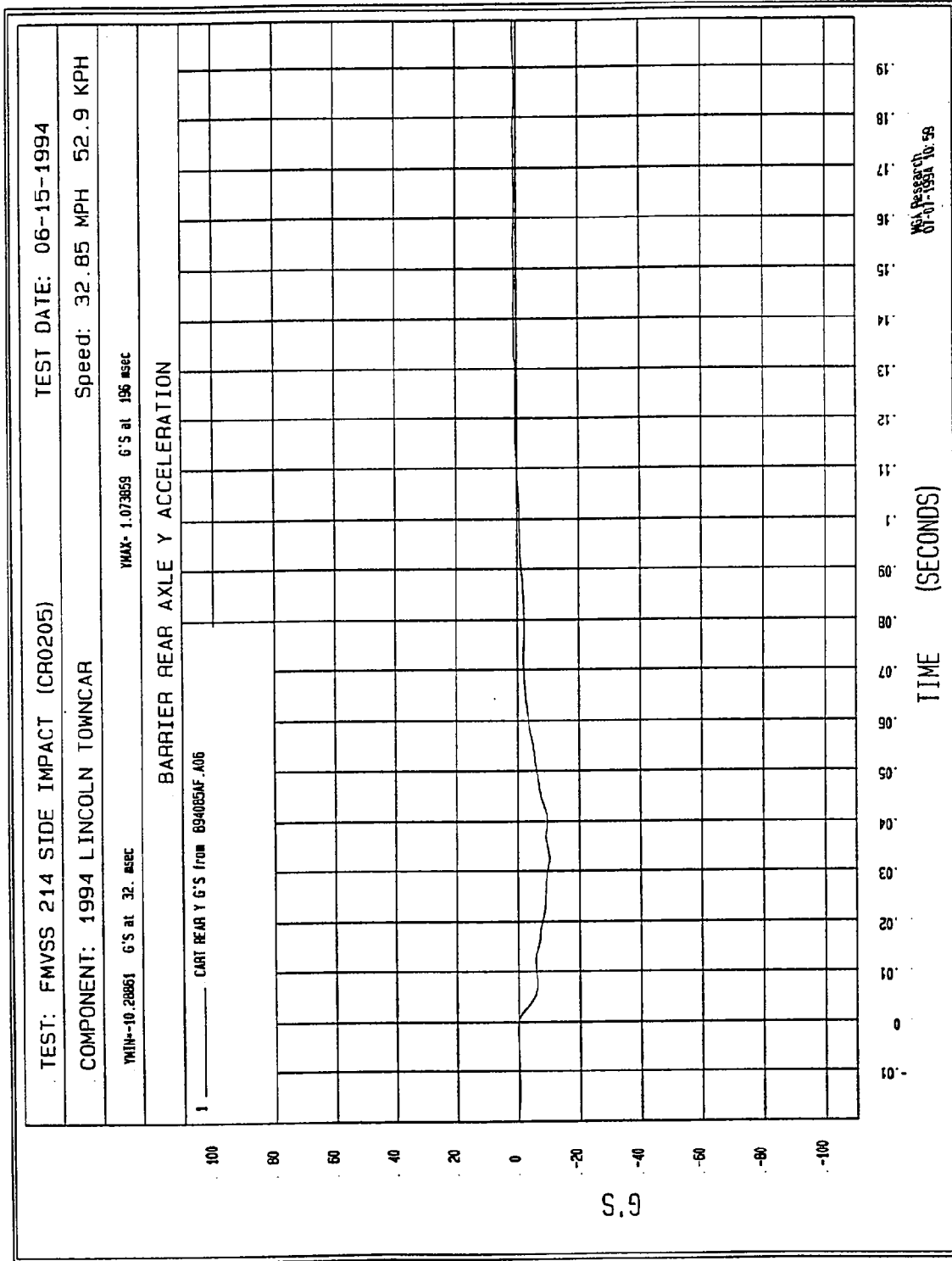


Figure B-61 - Moving Barrier Rear Axle Y Acceleration vs. Time

Filter: Class 180 (300 Hz)

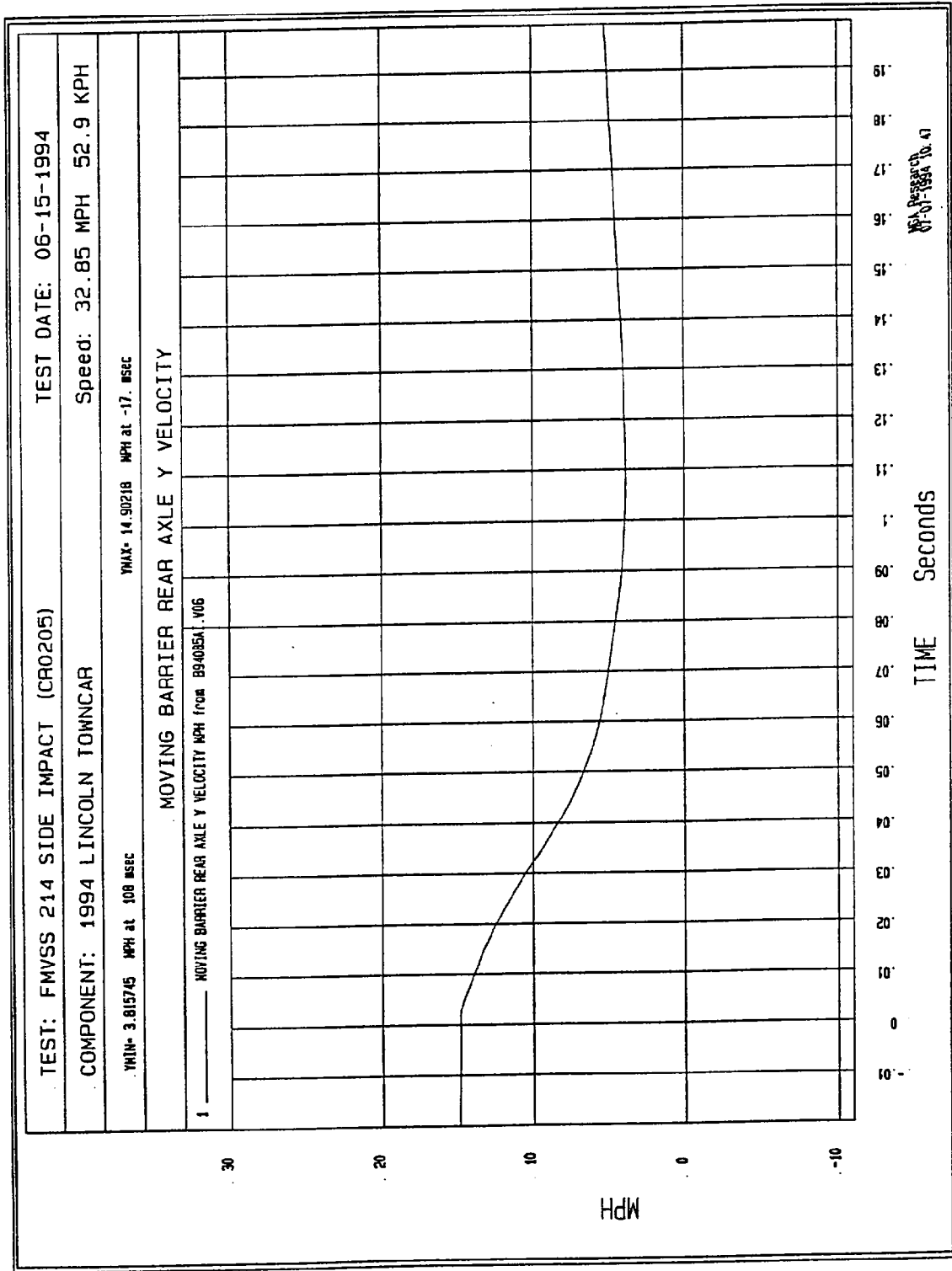


Figure B-62 - Moving Barrier Rear Axle Y Velocity vs. Time

Filter: Class 1000 (1650 Hz)

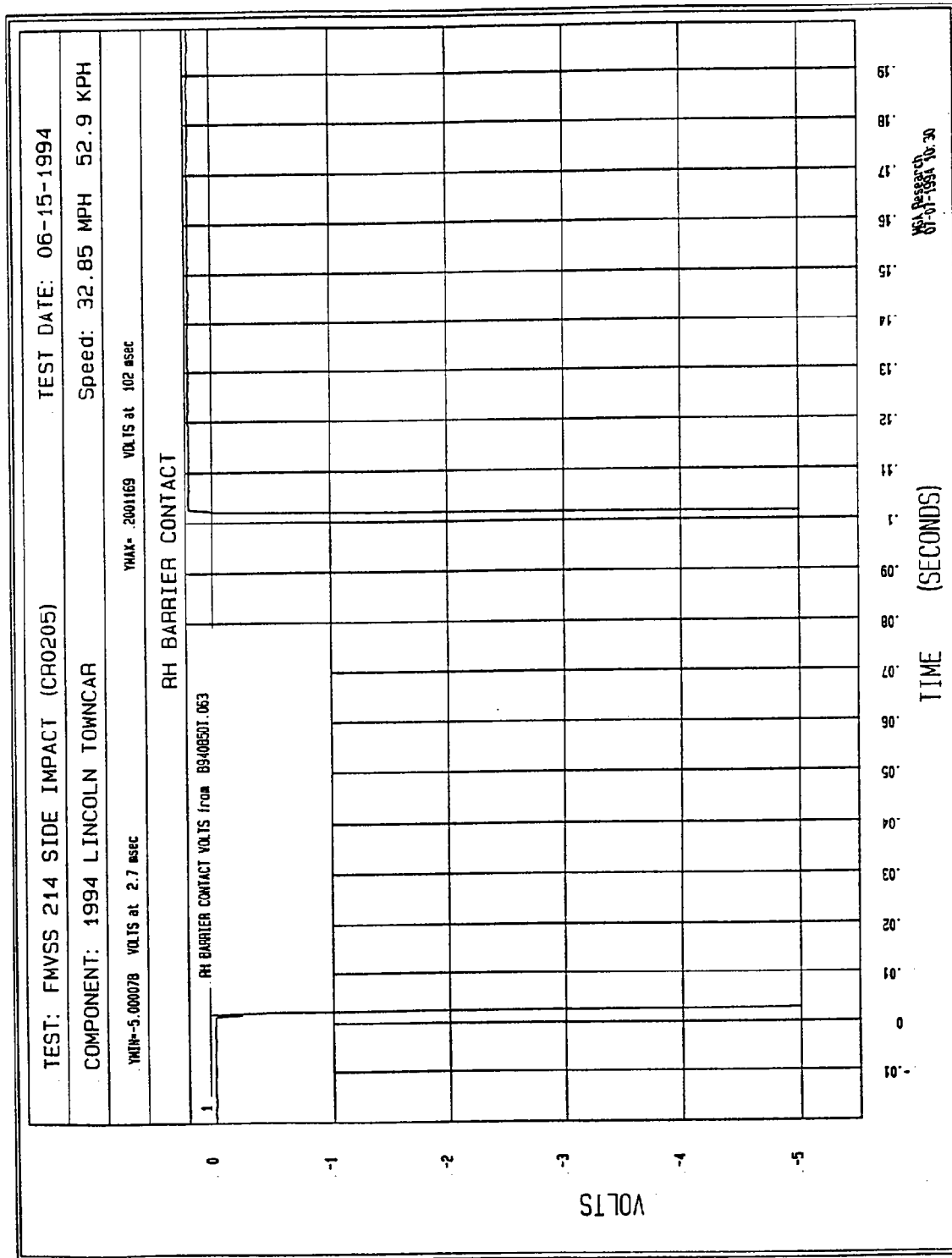


Figure B-63 - Right Hand Barrier Contact

Filter: Class 1000 (1650 Hz)

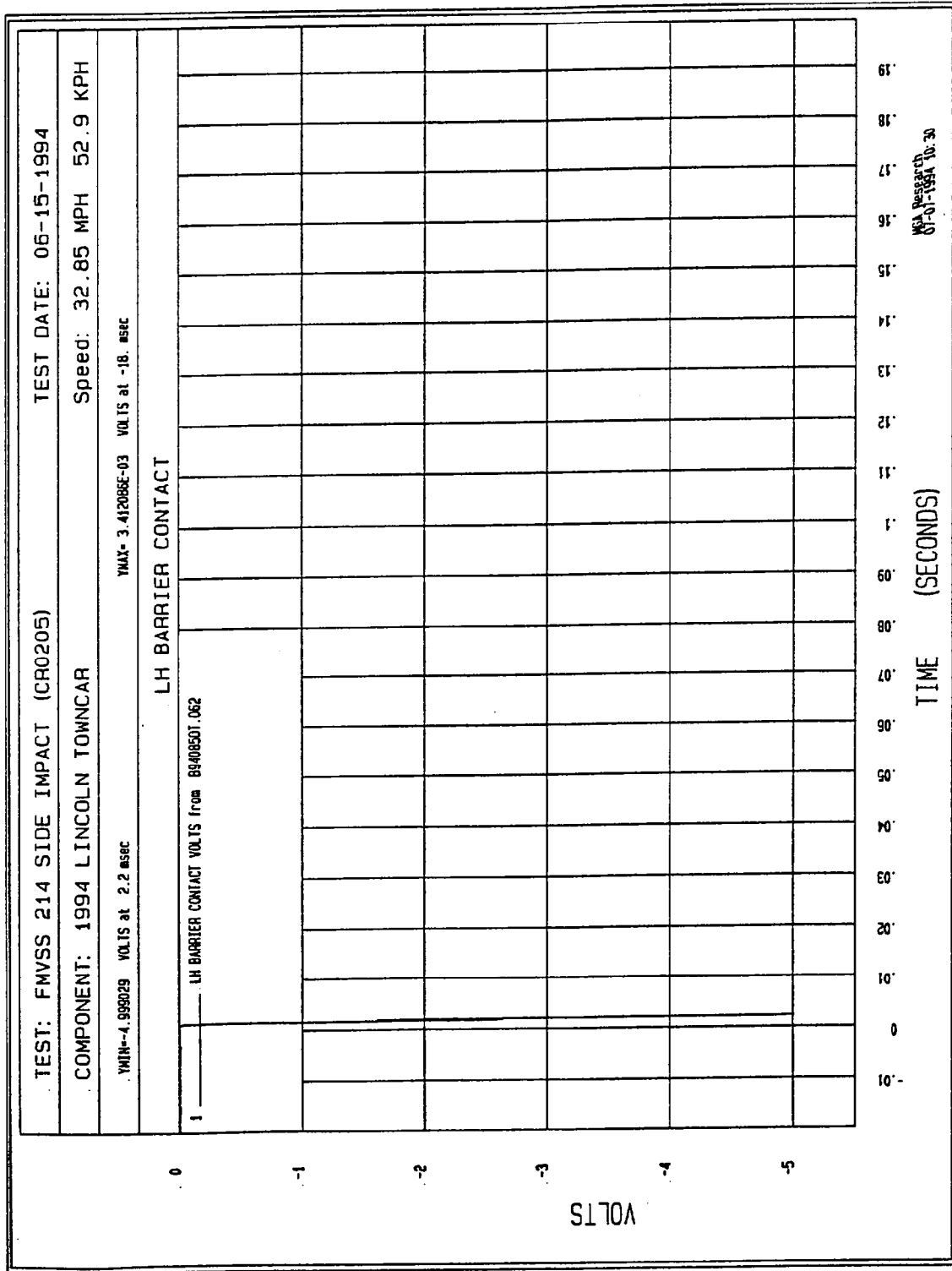


Figure B-64 - Left Hand Barrier Contact

Filter: Class 180 (300 Hz)

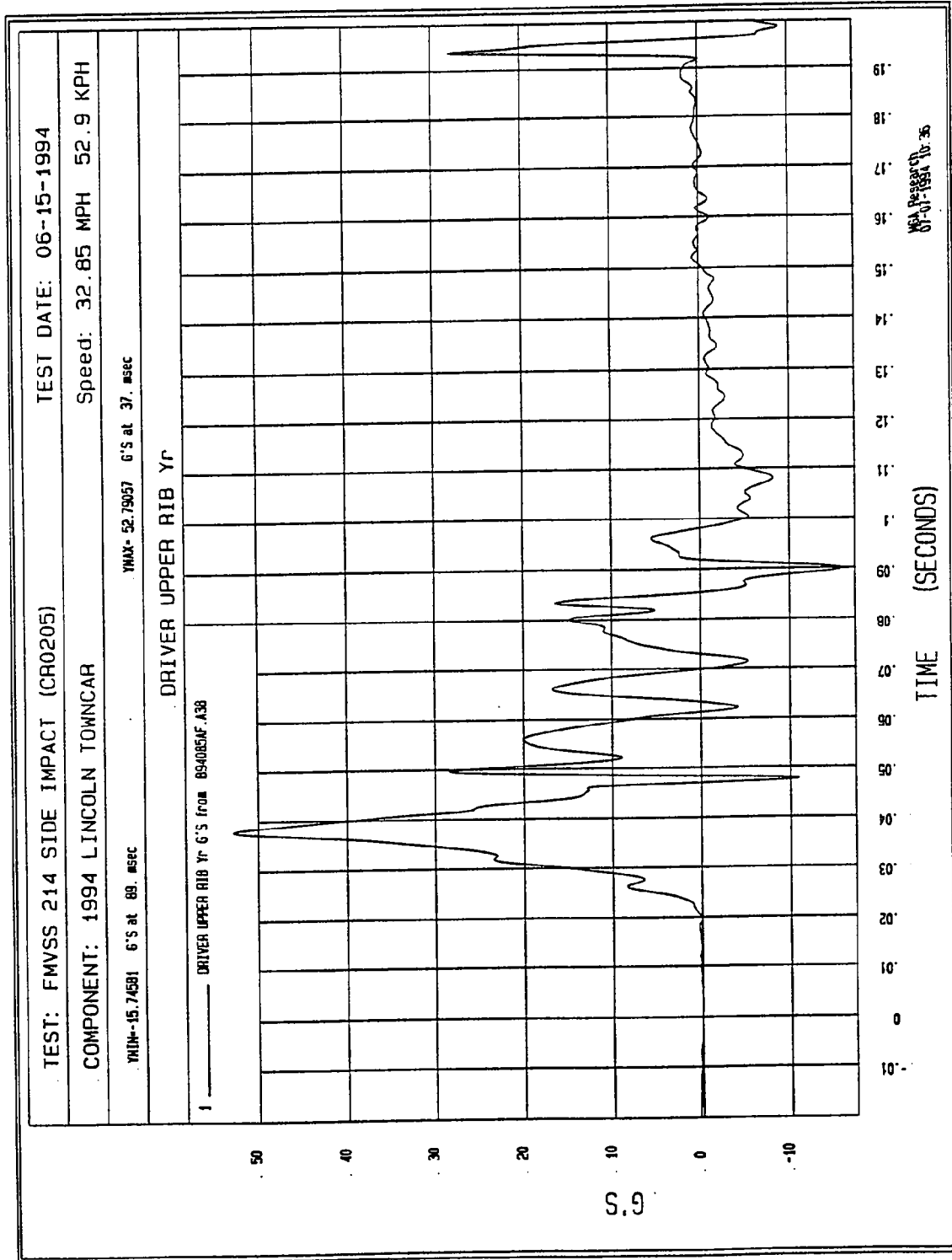


Figure B-65 - Driver Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

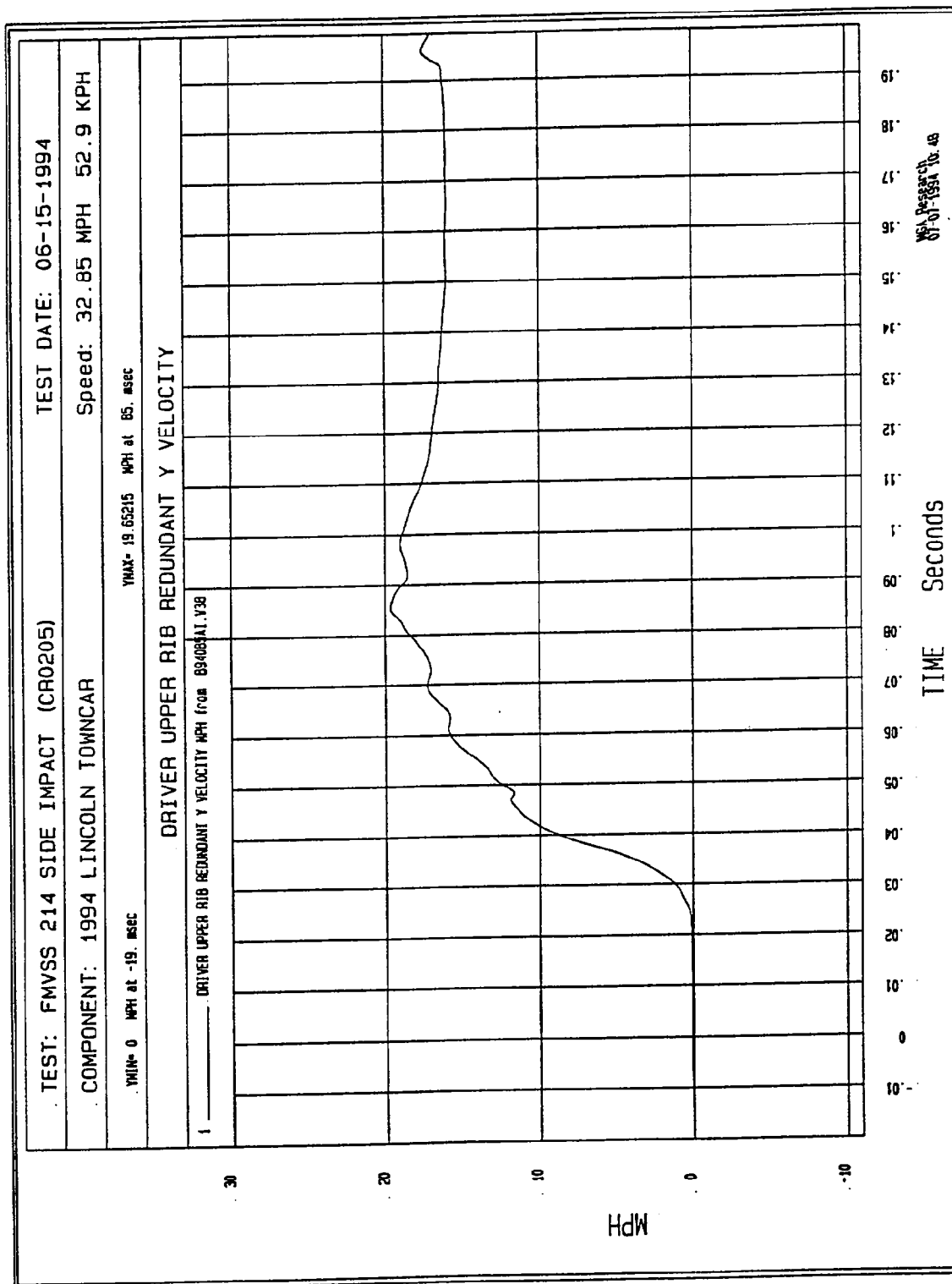


Figure B-66 - Driver Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

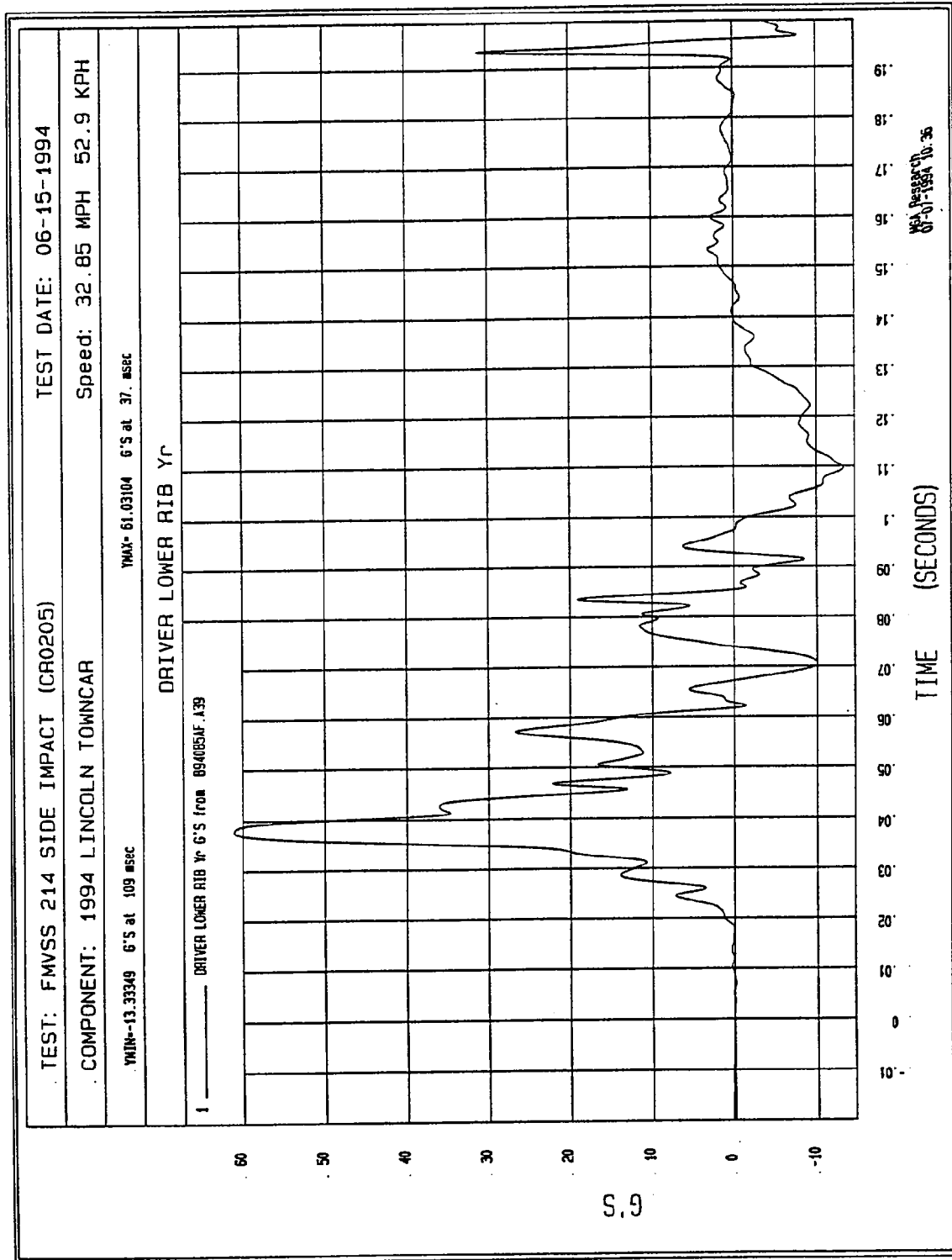


Figure B-67 - Driver Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

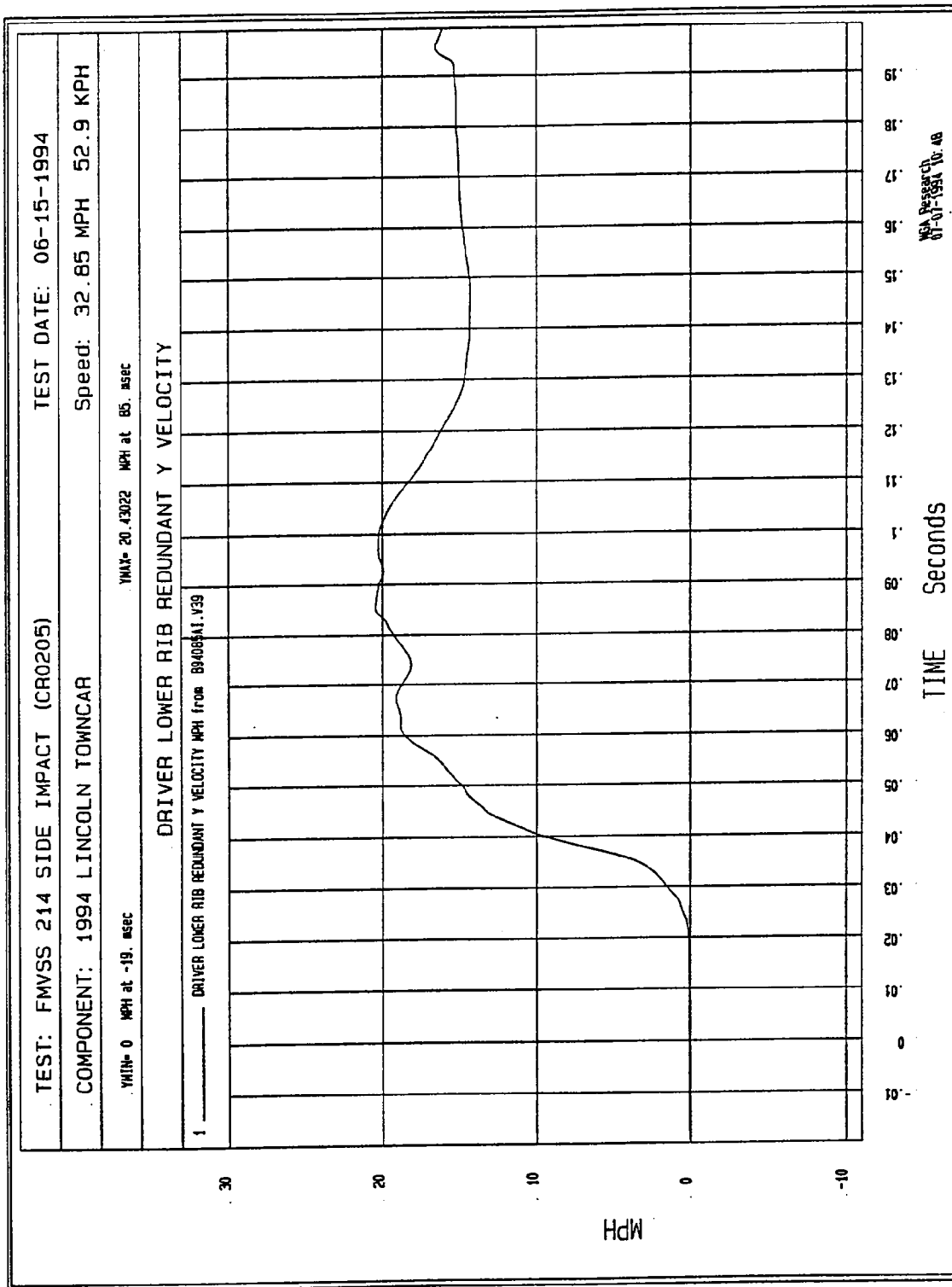


Figure B-68 - Driver Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

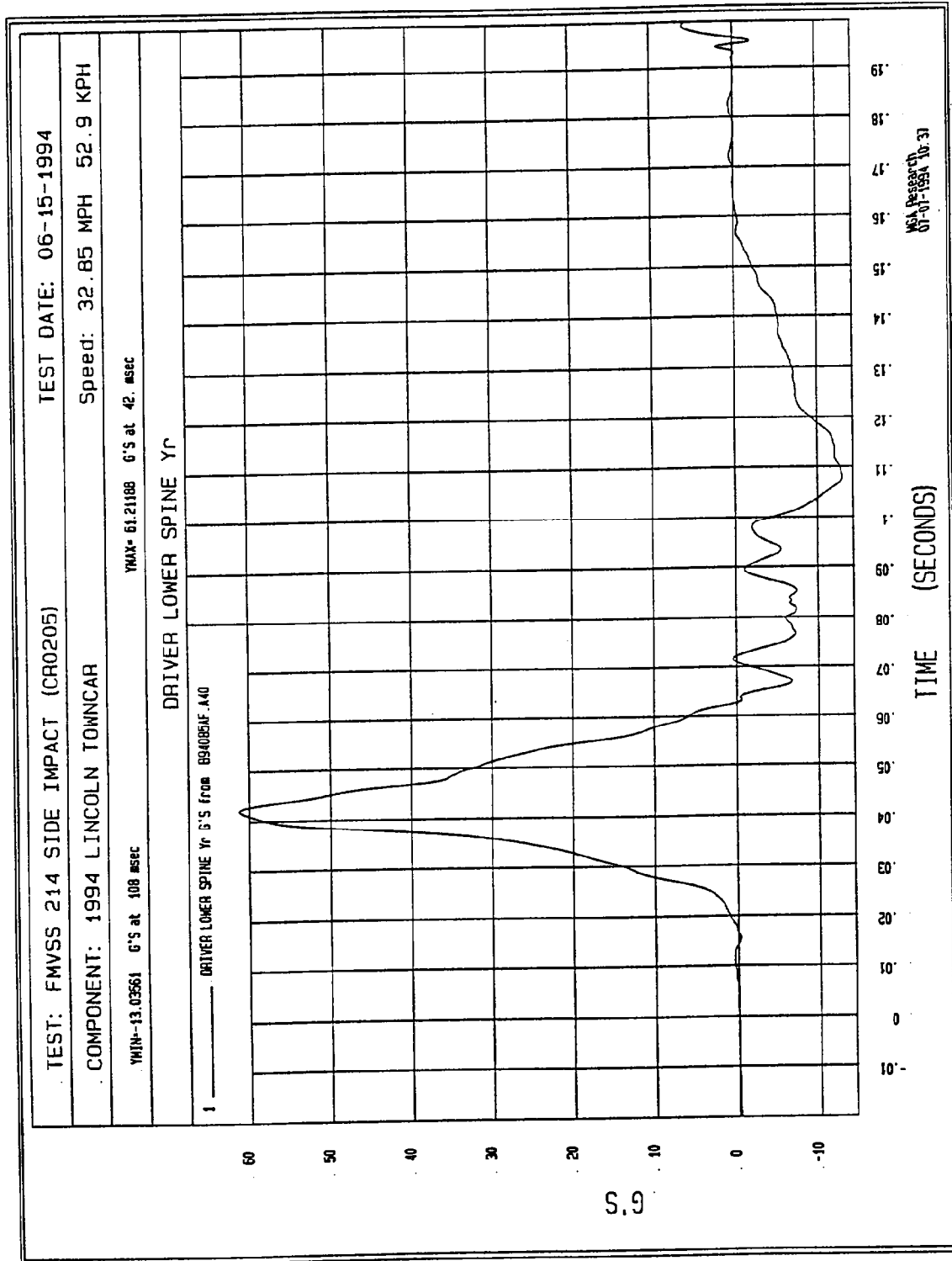


Figure B-69 - Driver Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

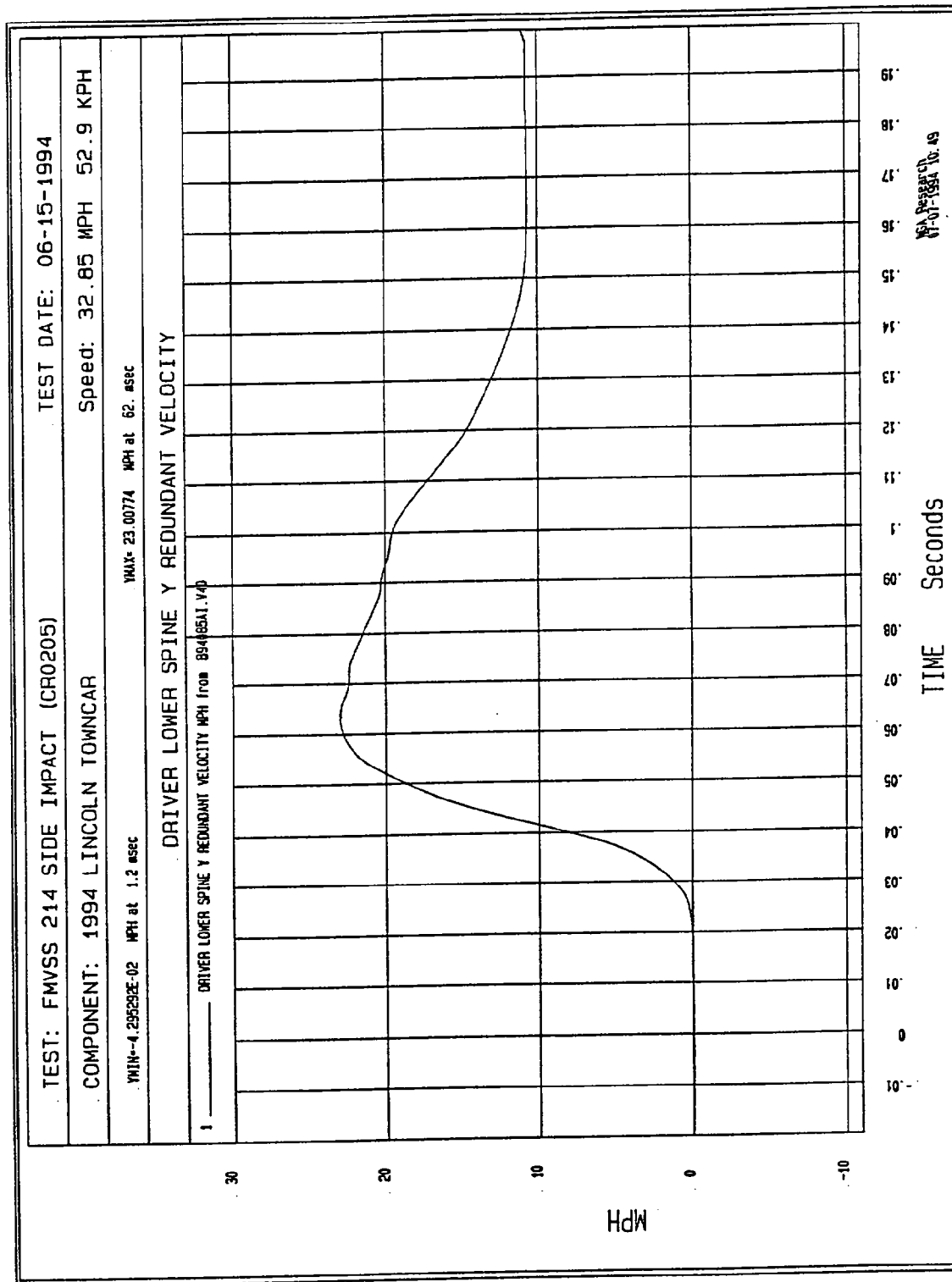


Figure B-70 - Driver Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

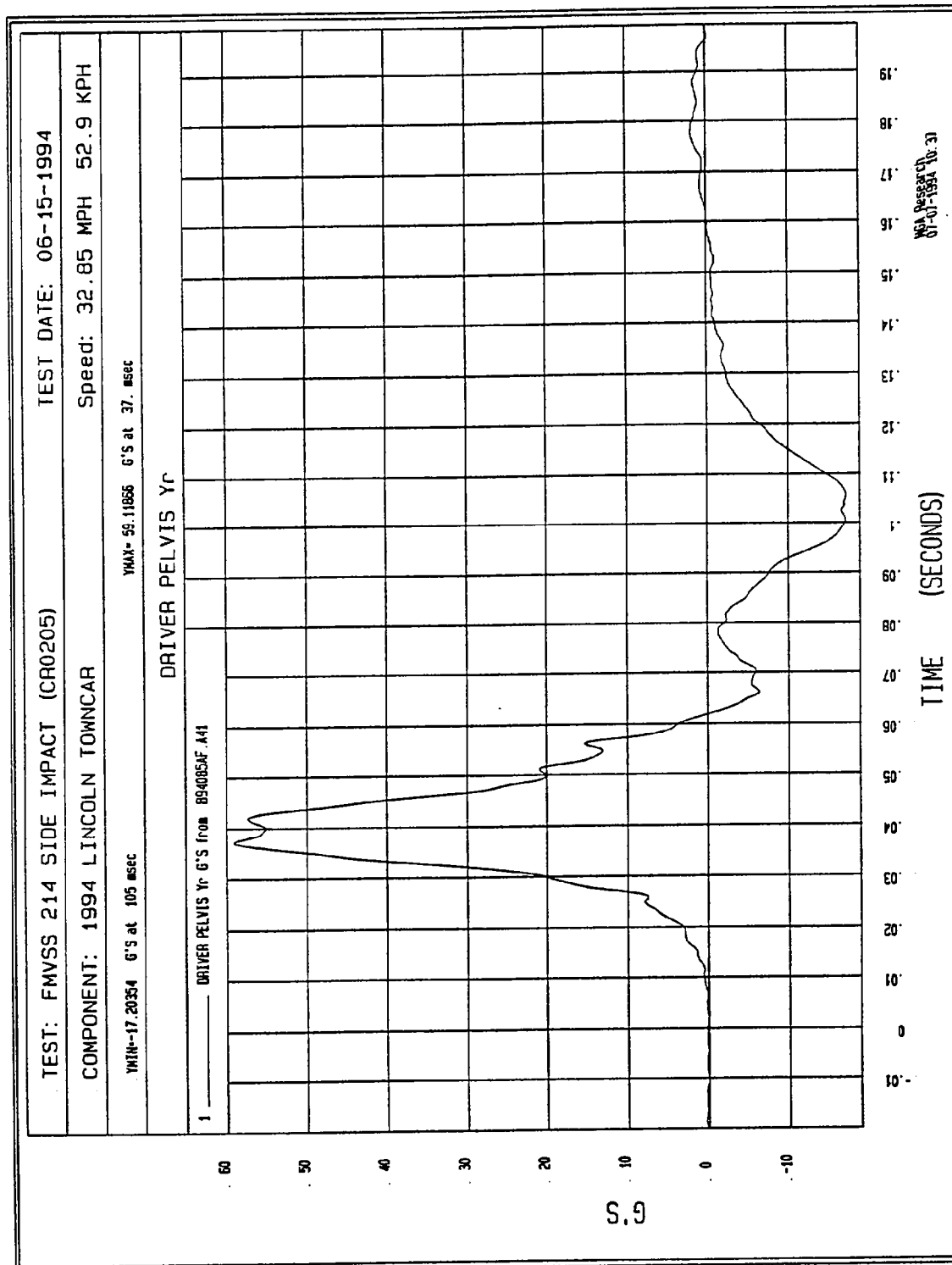


Figure B-71 - Driver Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

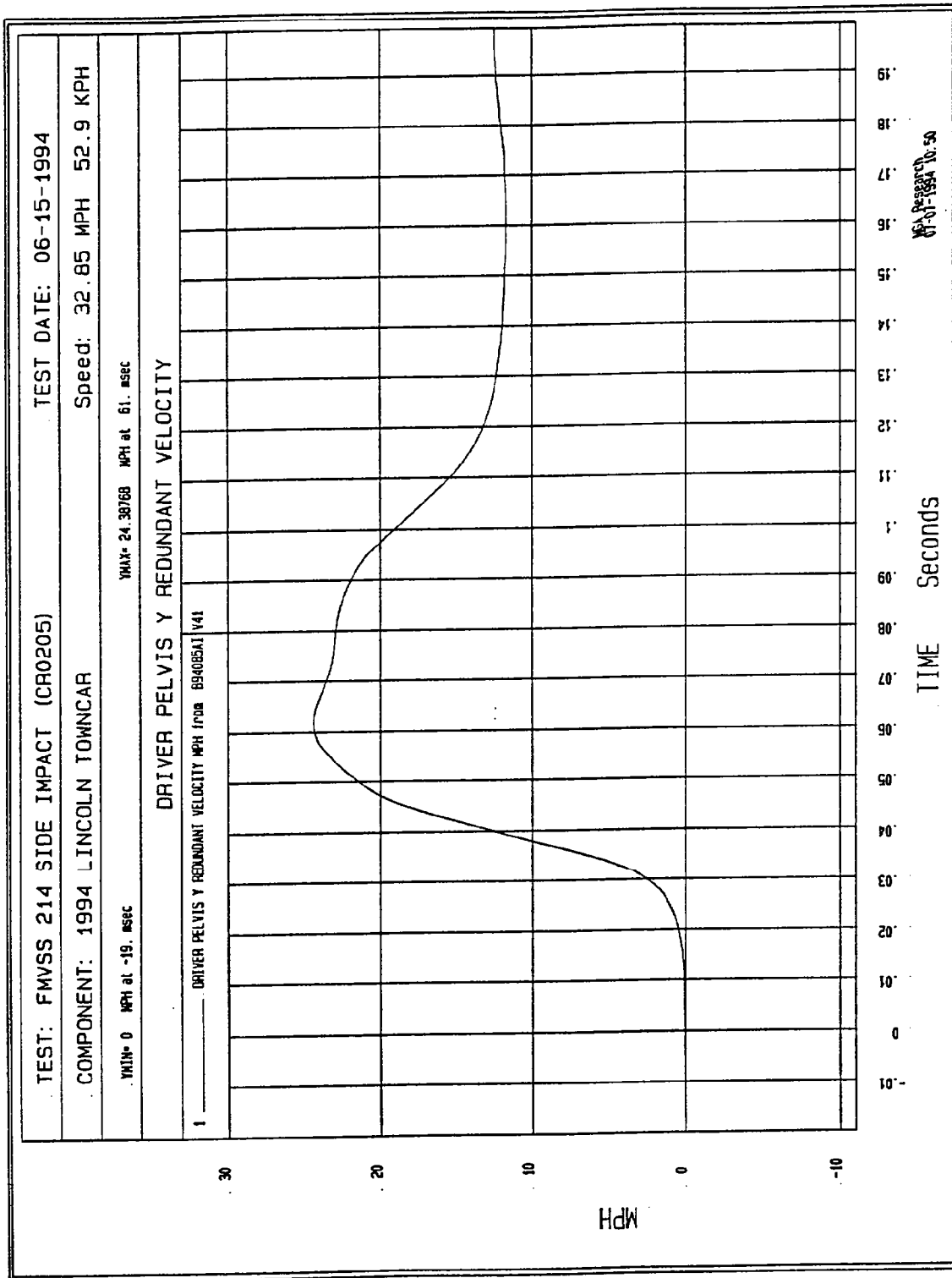


Figure B-72 - Driver Pelvis Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

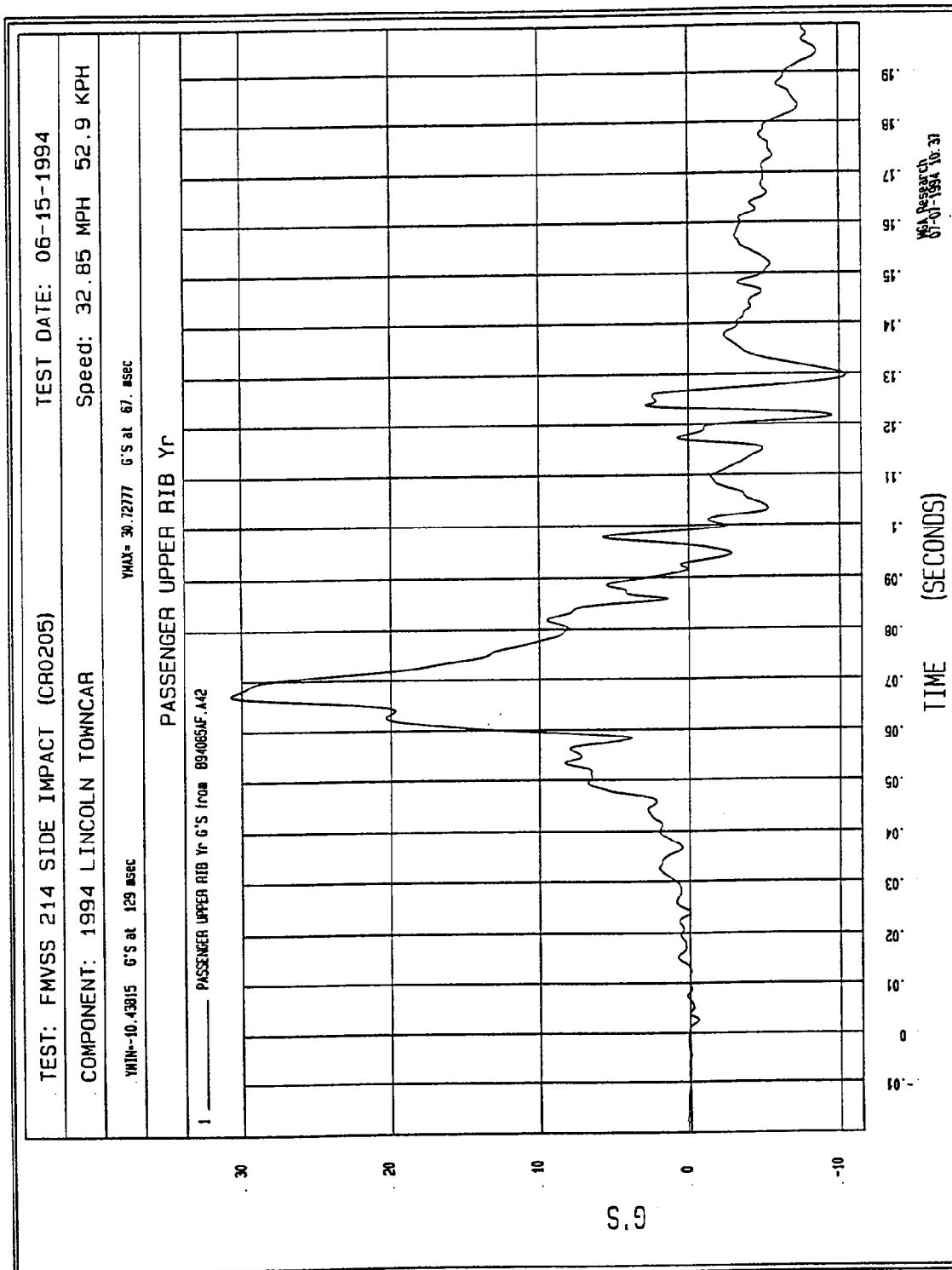


Figure B-73 - Passenger Upper Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

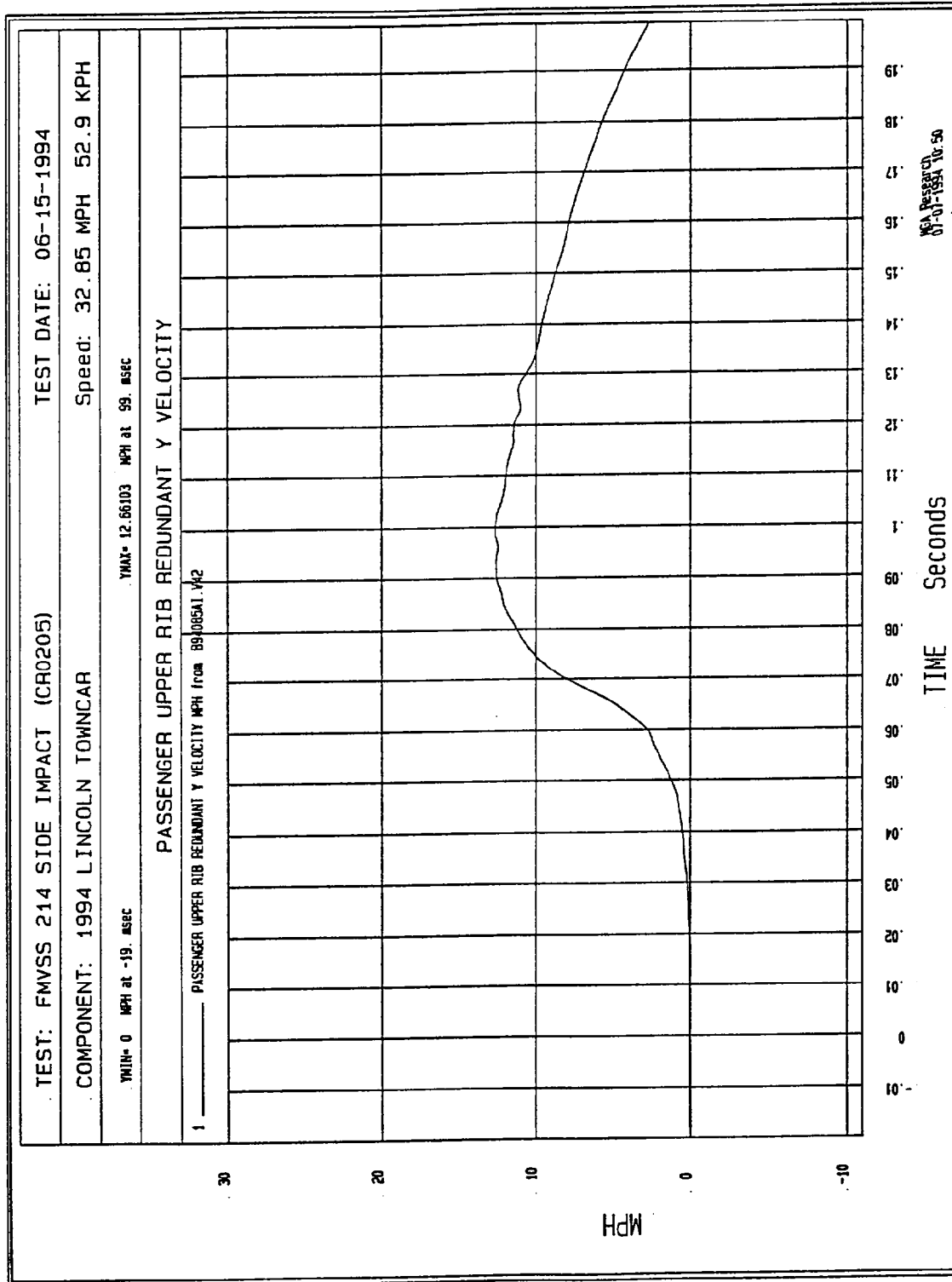


Figure B-74 - Passenger Upper Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

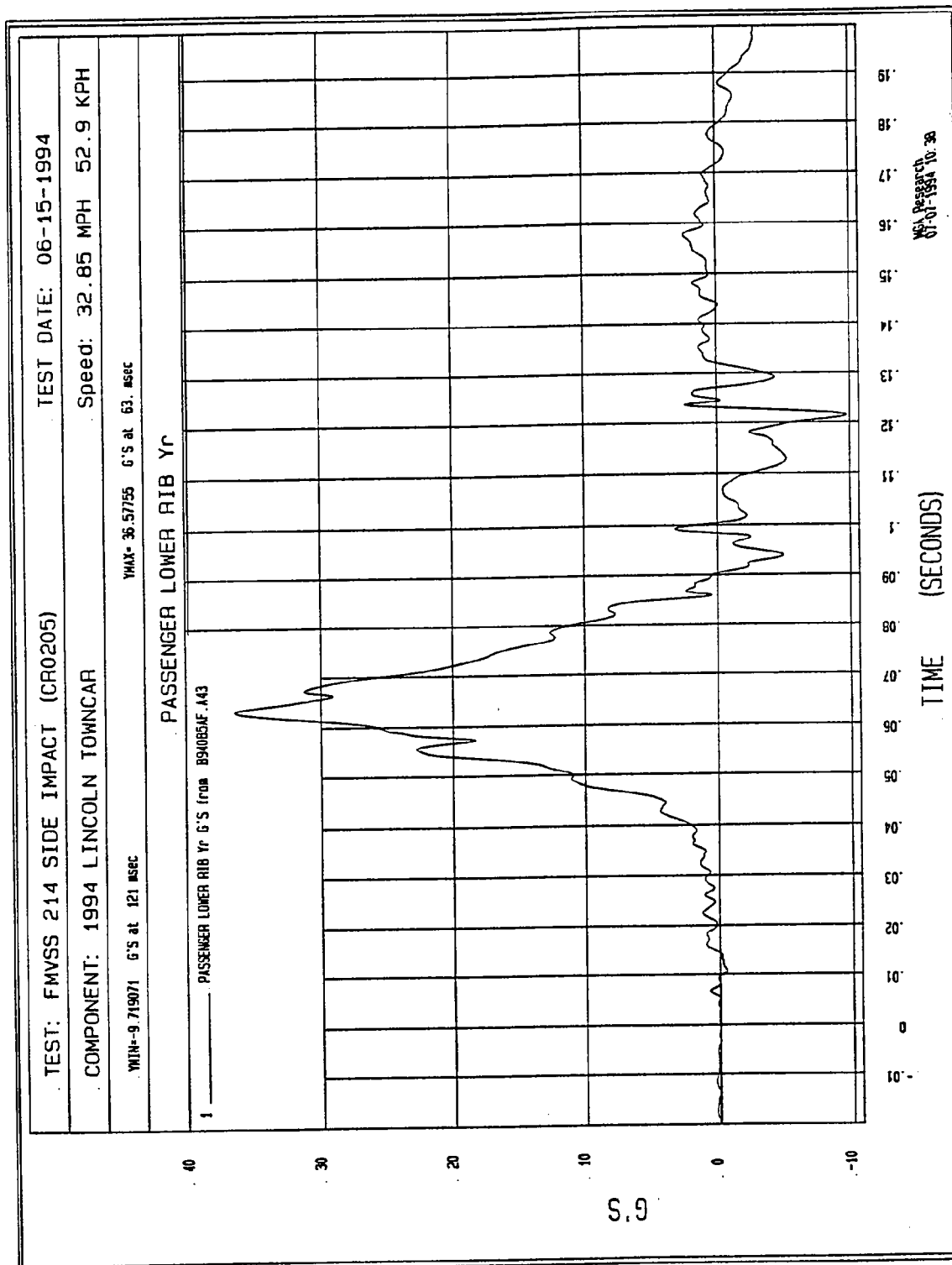


Figure 4-75 - Passenger Lower Rib Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

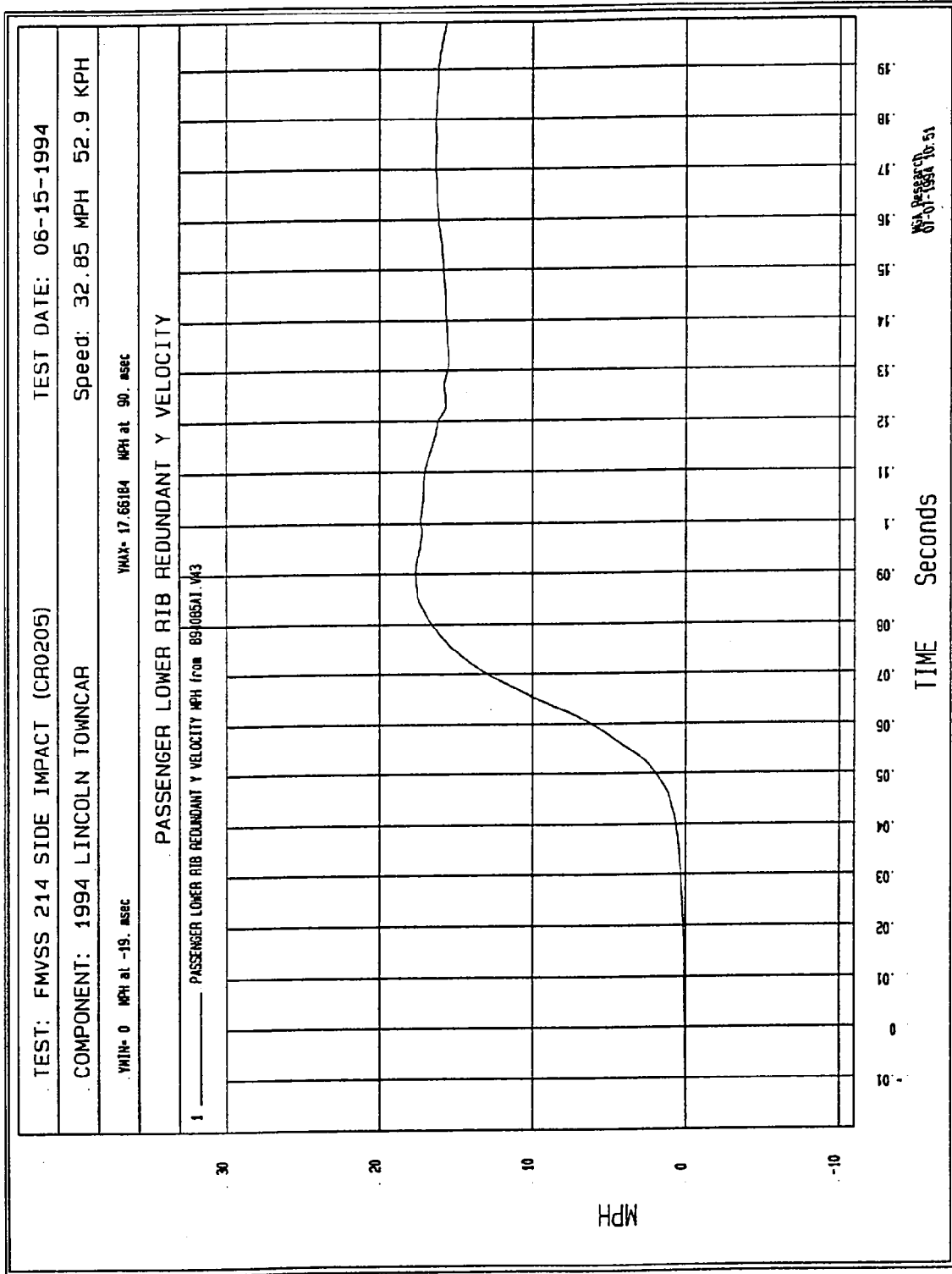


Figure B-76 - Passenger Lower Rib Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

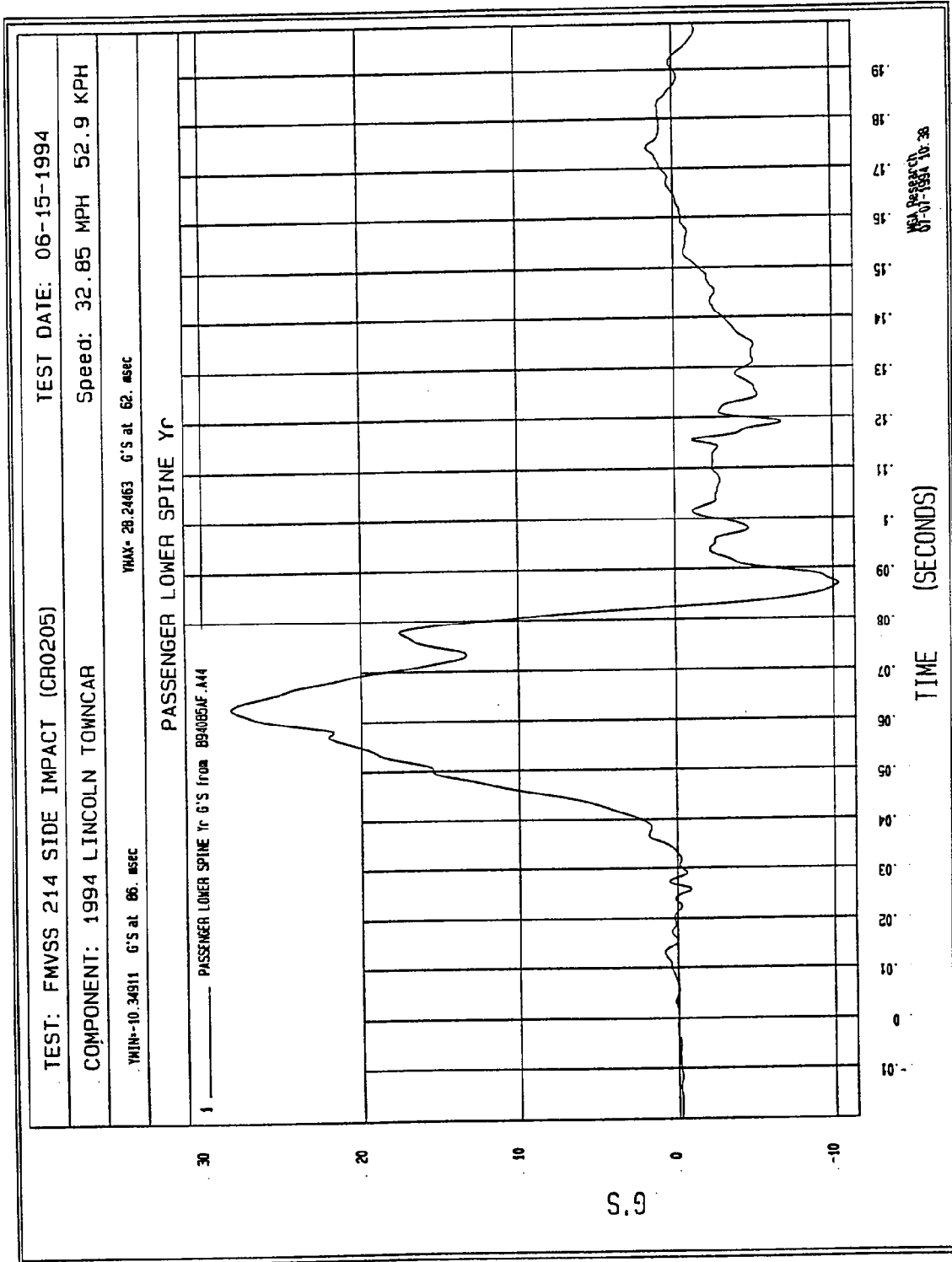


Figure B-77 - Passenger Lower Spine Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

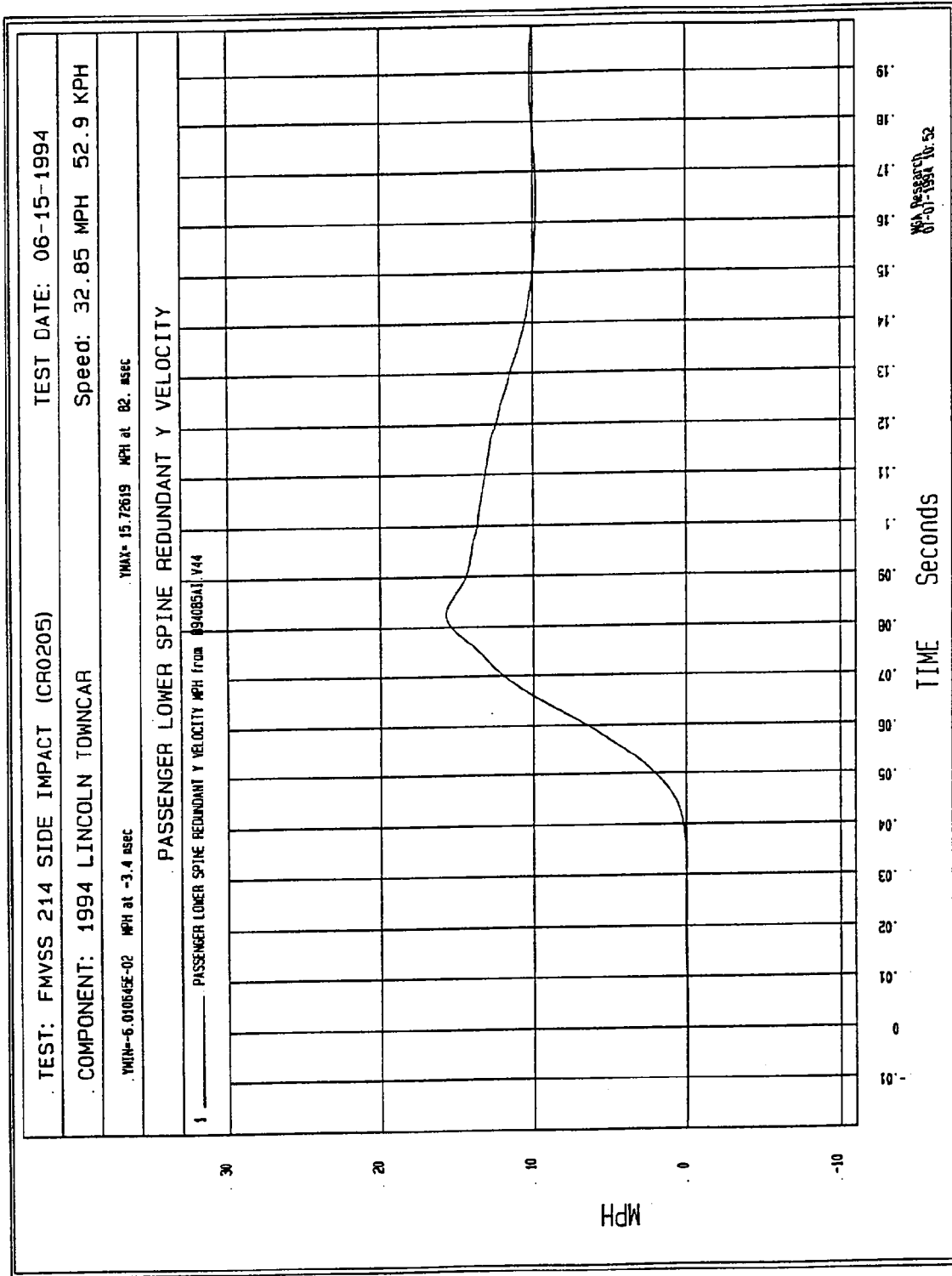


Figure B-78 - Passenger Lower Spine Y Redundant Velocity vs. Time

Filter: Class 180 (300 Hz)

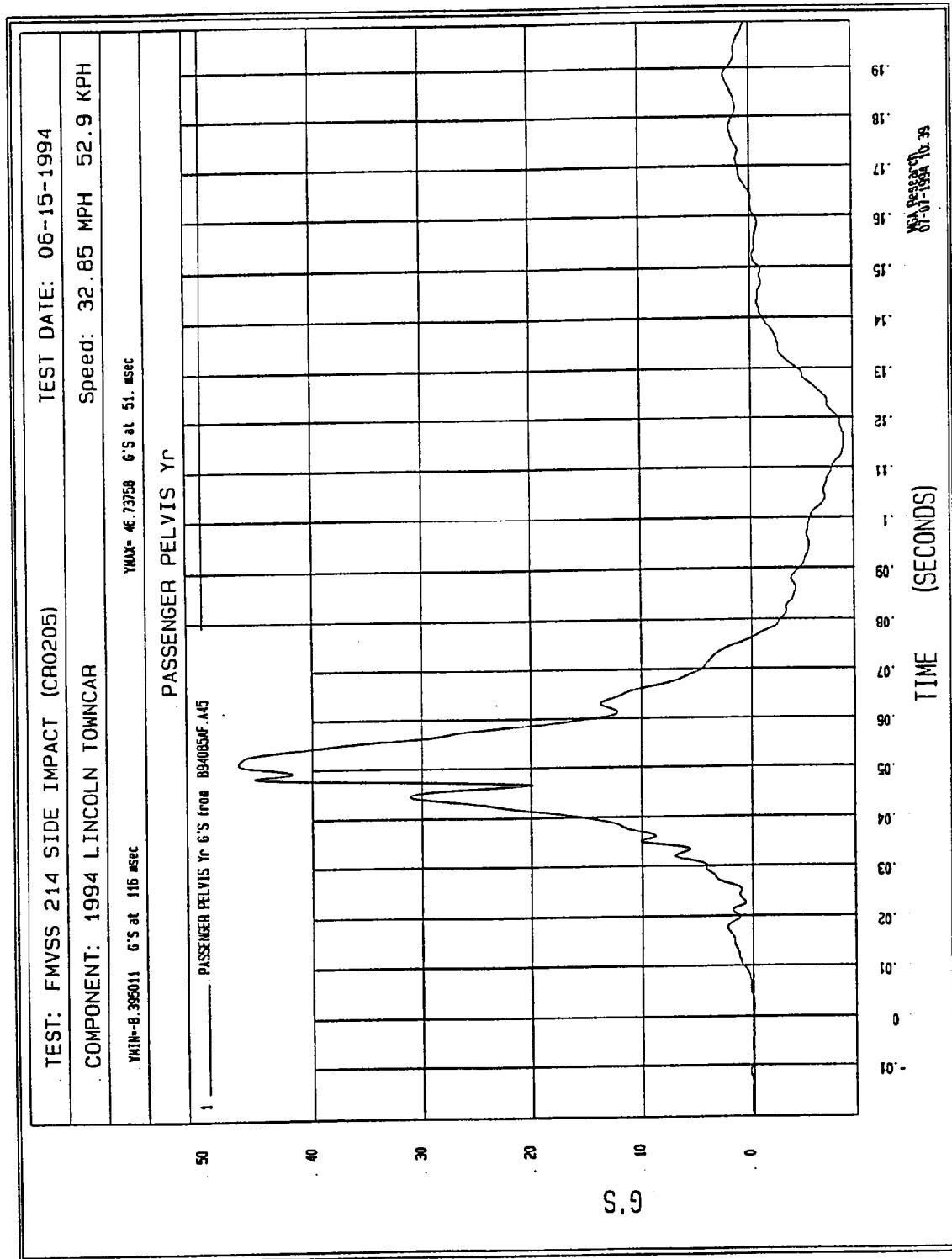


Figure B-79 - Passenger Pelvis Y Redundant Acceleration vs. Time

Filter: Class 180 (300 Hz)

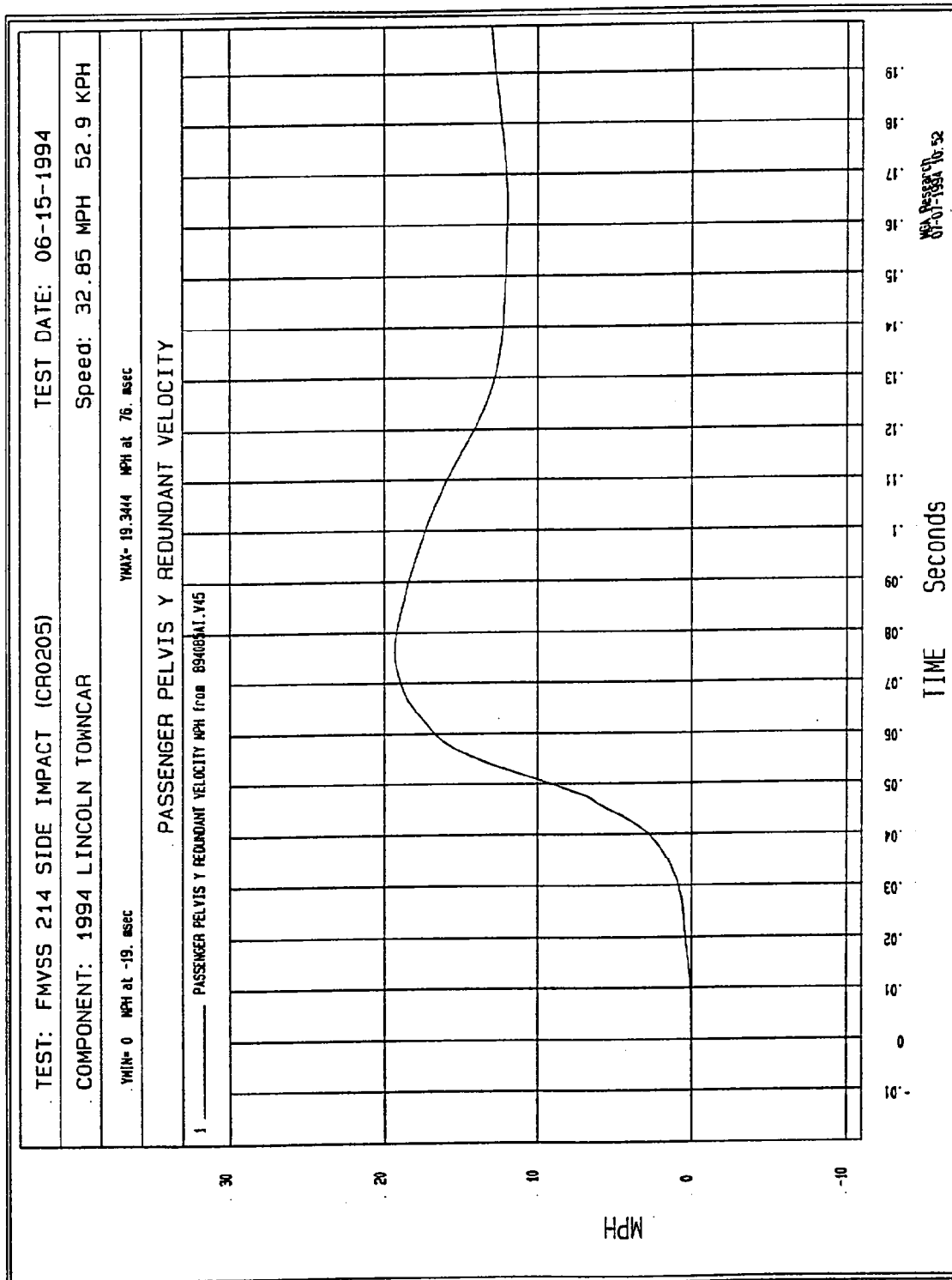


Figure B-80 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

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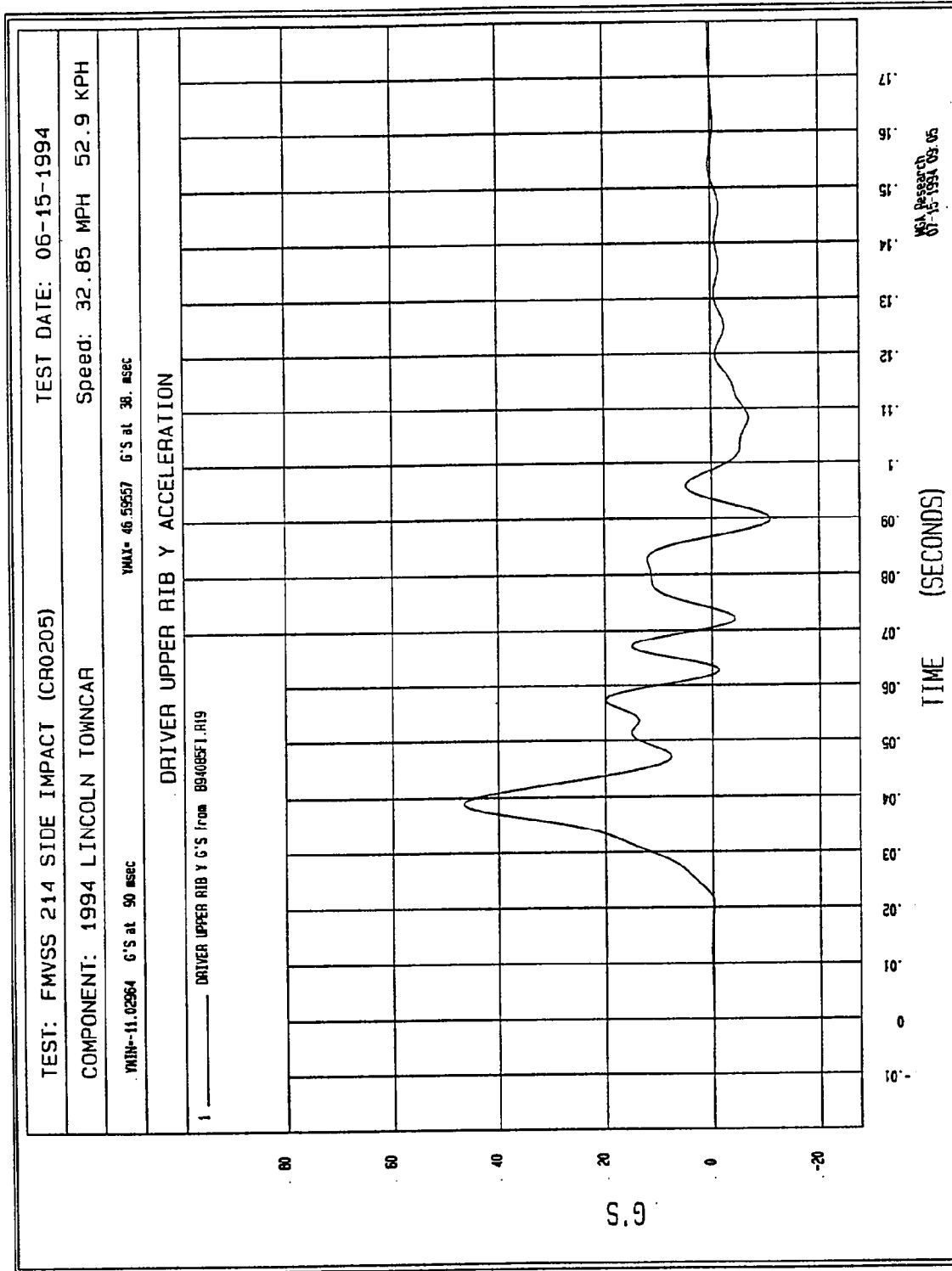


Figure B-81 - Driver Upper Rib Y Acceleration vs. Time

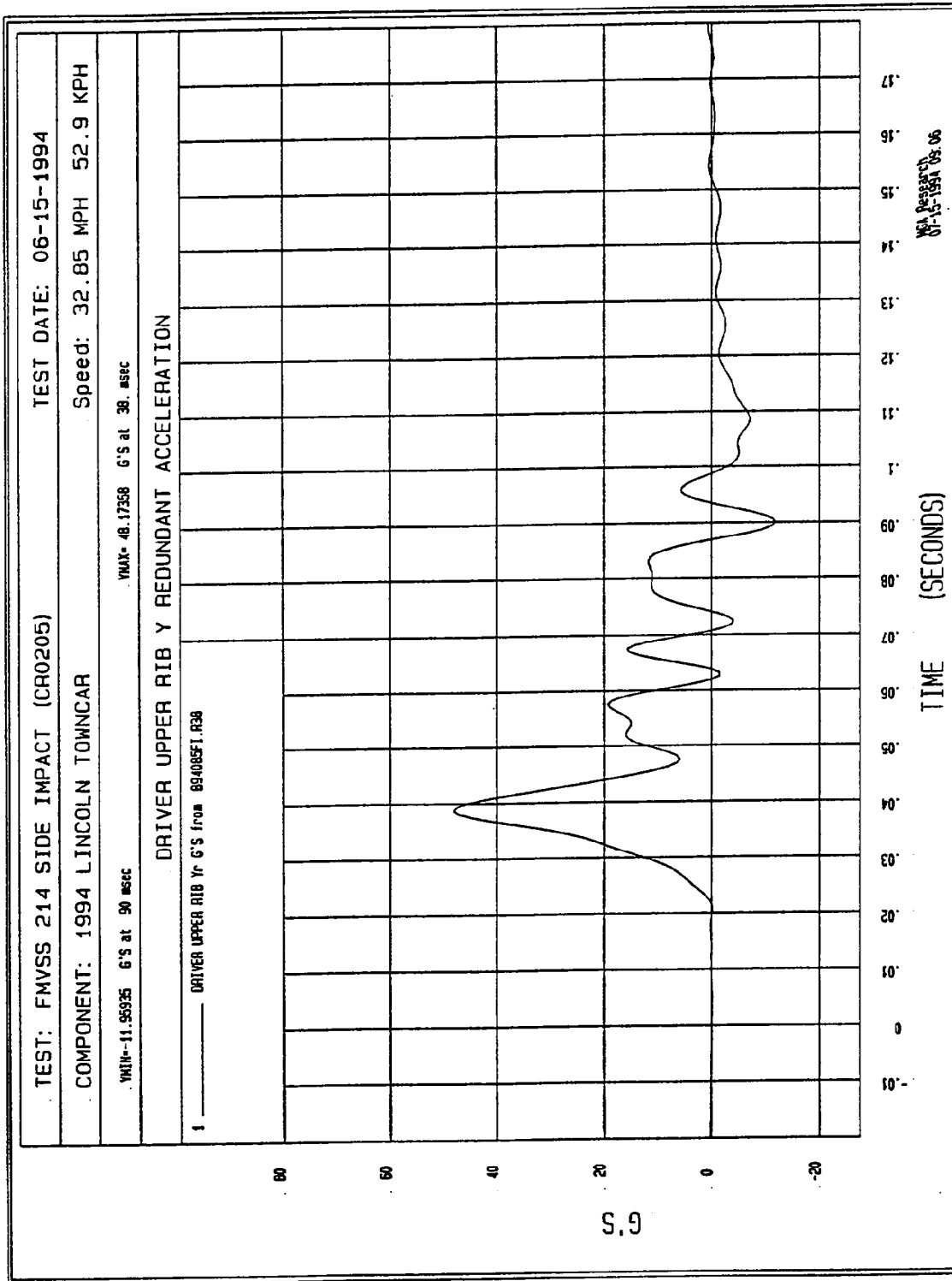


Figure B-82 - Driver Upper Rib Y Redundant Acceleration vs Time

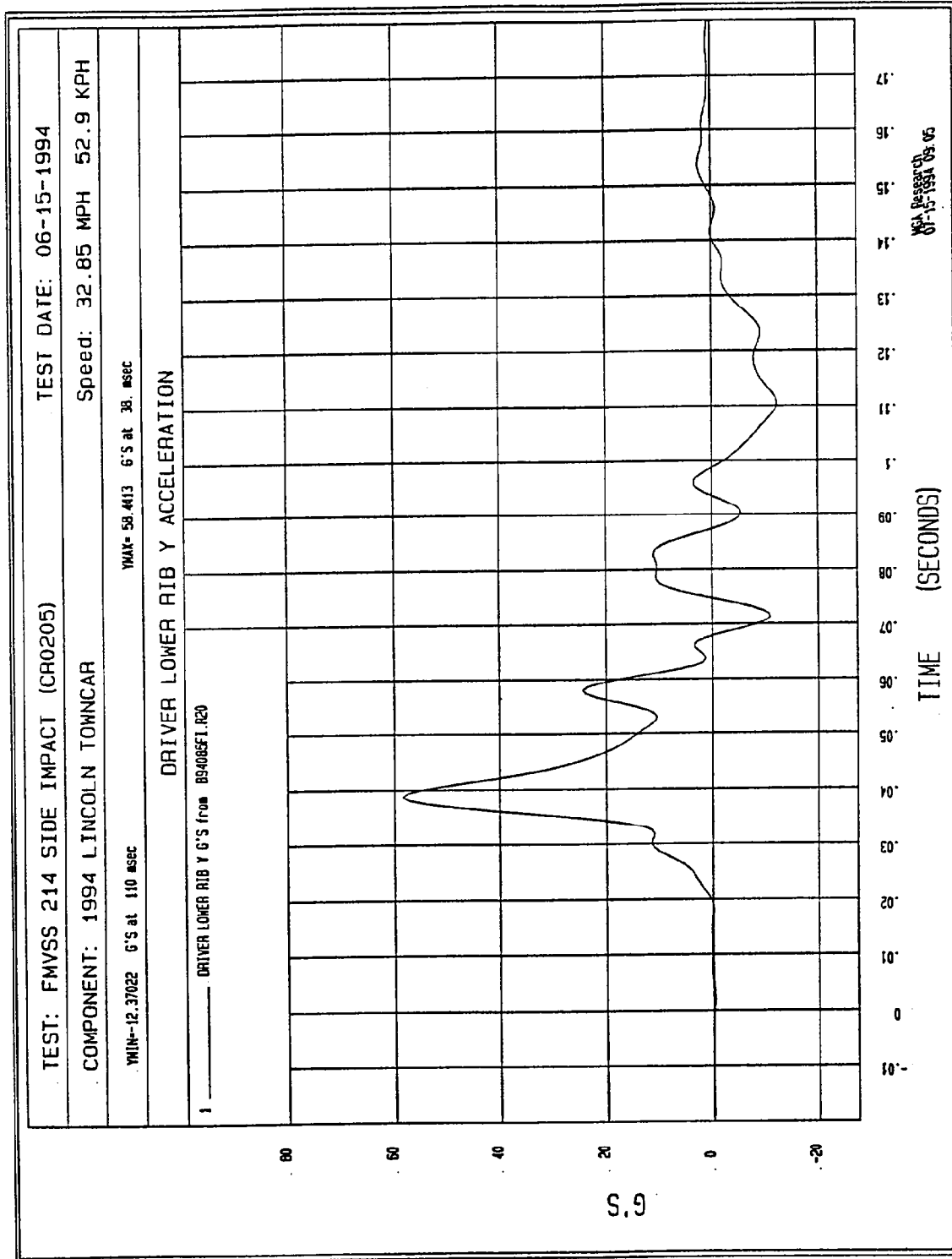


Figure B-83 - Driver Lower Rib Y Accelerat.on vs. Time

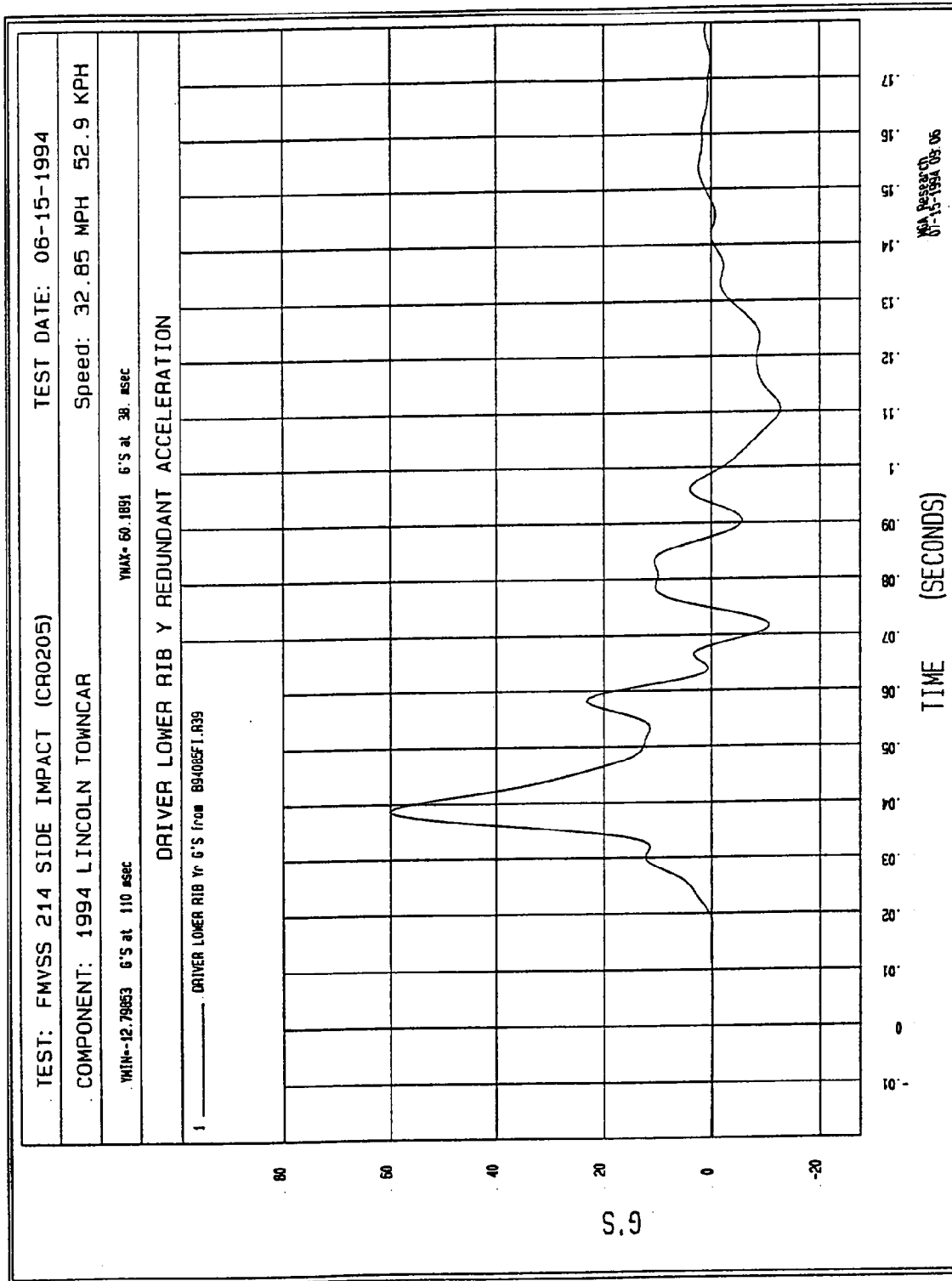


Figure B-84 - Driver Lower Rib Y Redundant Acceleration vs. Time

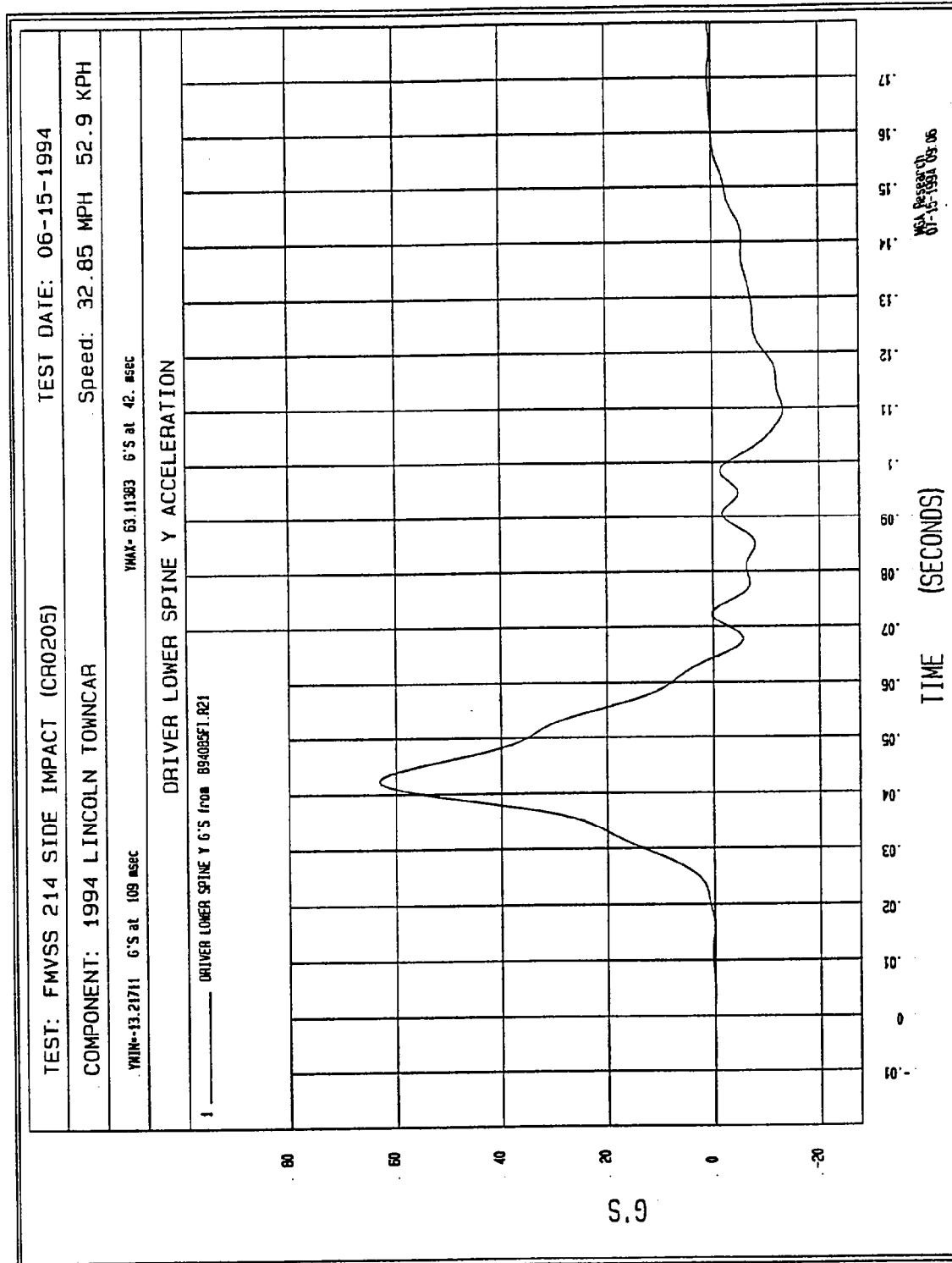


Figure B-85 .. Driver Lower Spine Y Acceleration vs. Time

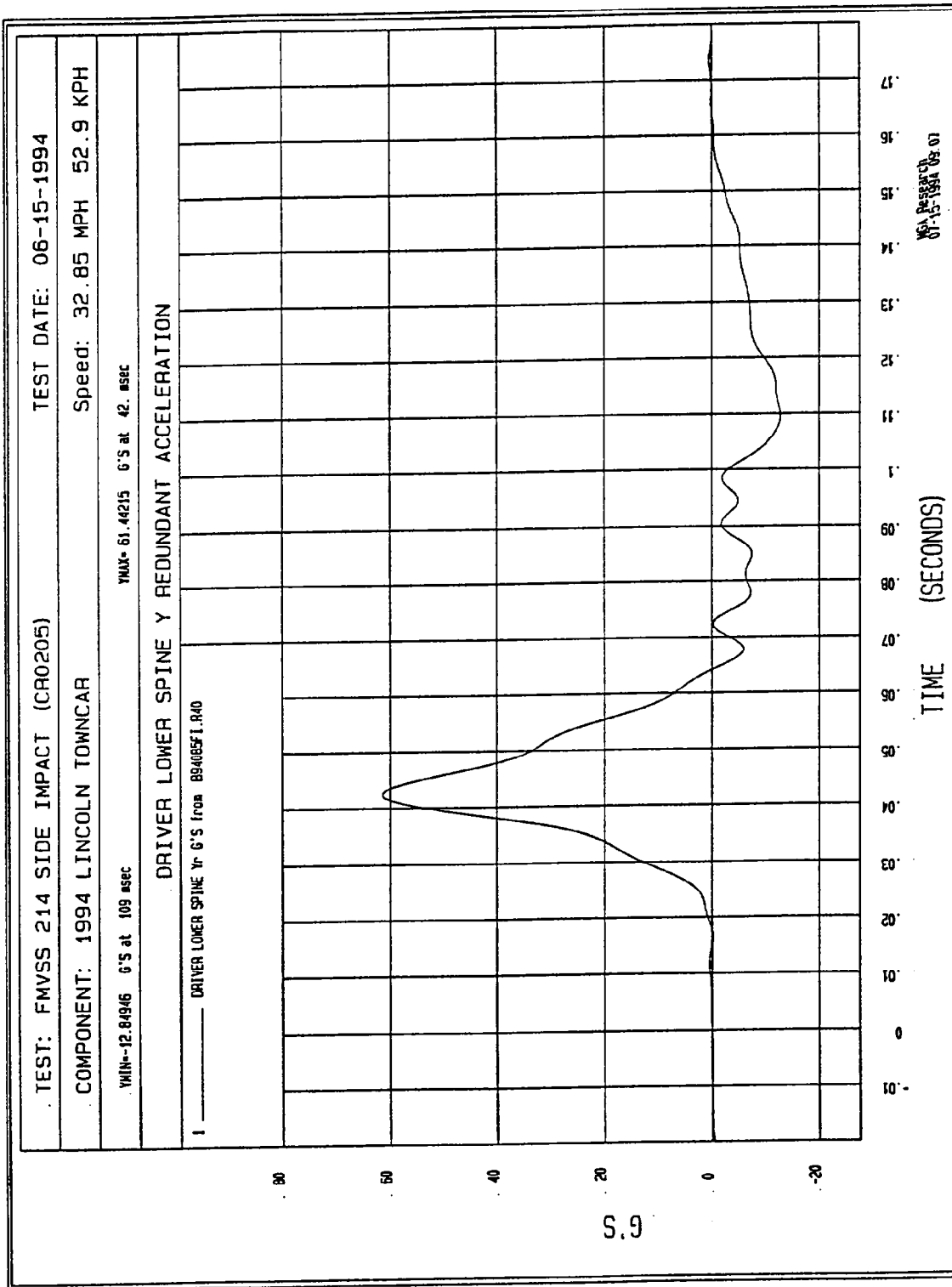


Figure B-86 - Driver Lower Spine Y Redundant Acceleration vs. Time

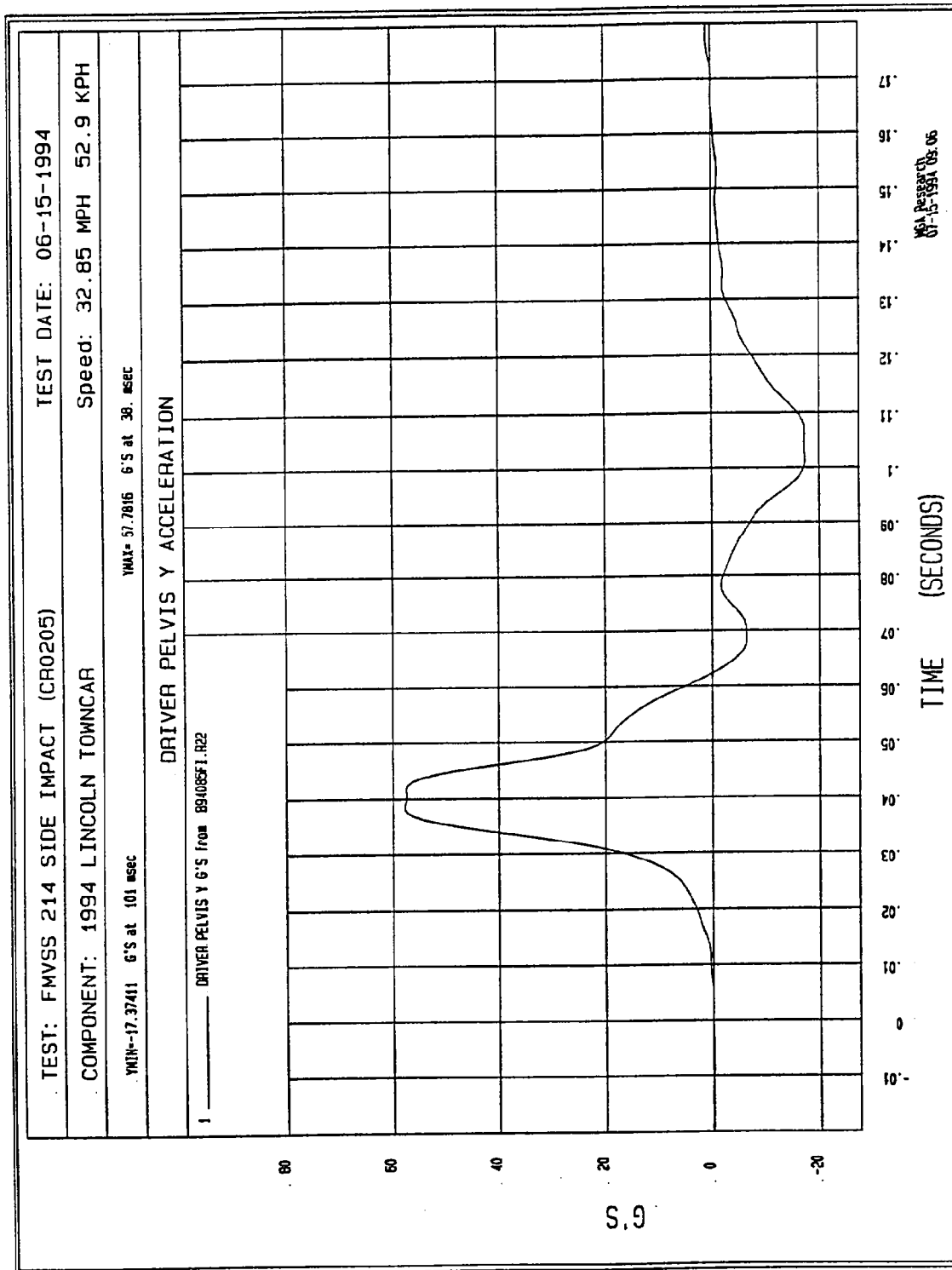


Figure B-87 - Driver Pelvis Y Acceleration vs. Time

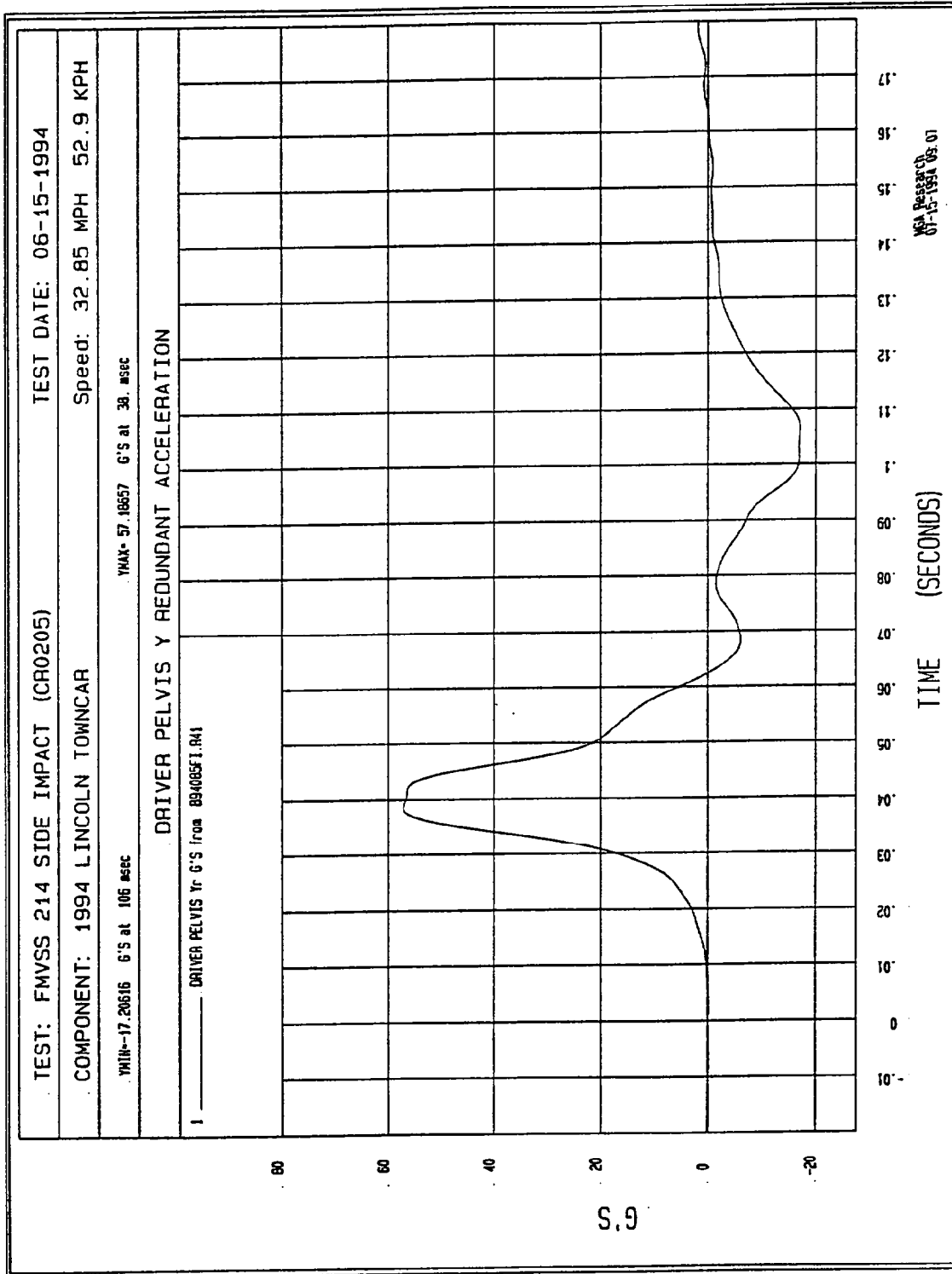


Figure B-88 - Driver Pelvis Y Redundant Acceleration vs. Time

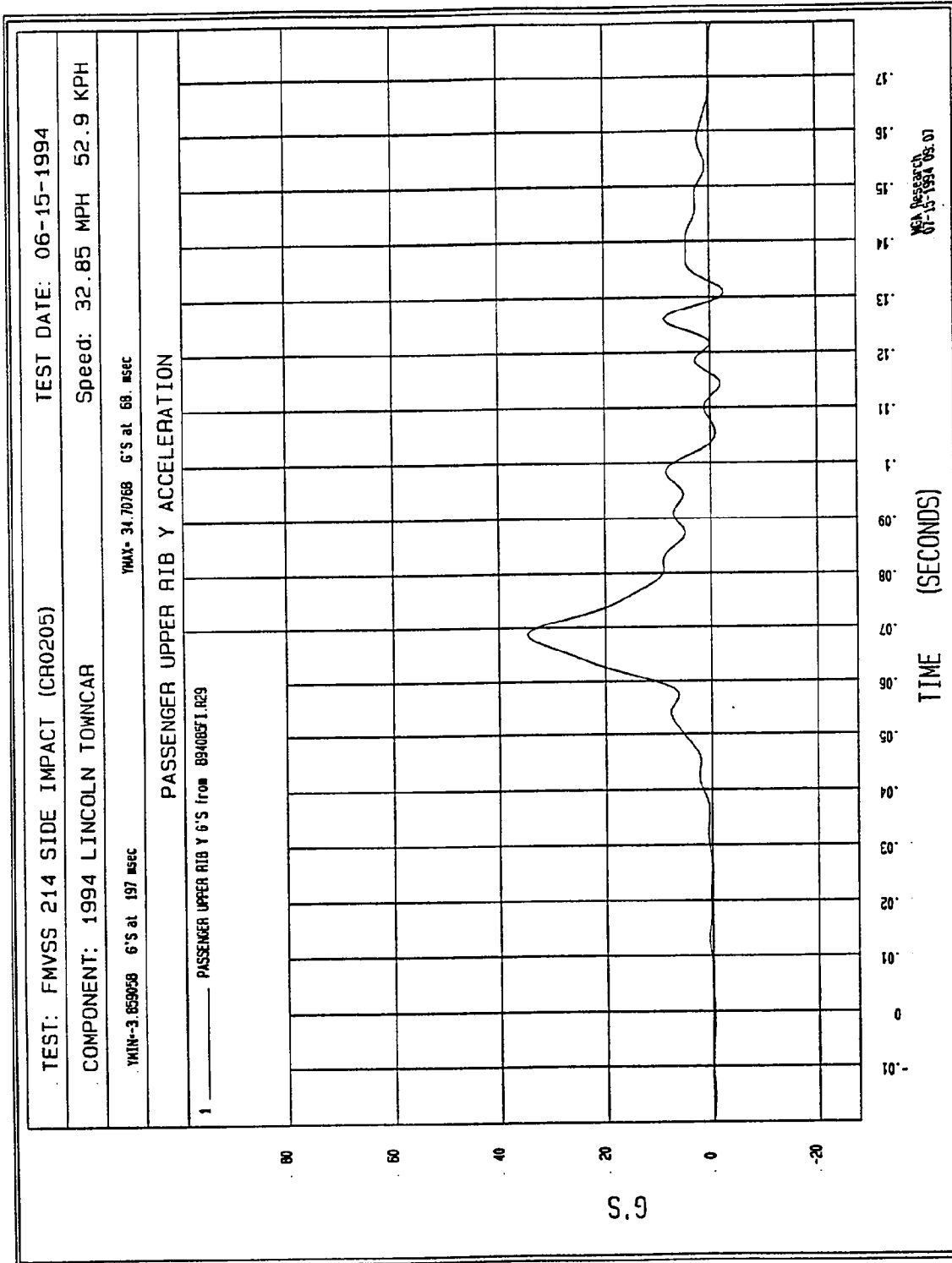


Figure B-89 - Passenger Upper Rib Y Acceleration vs. Time

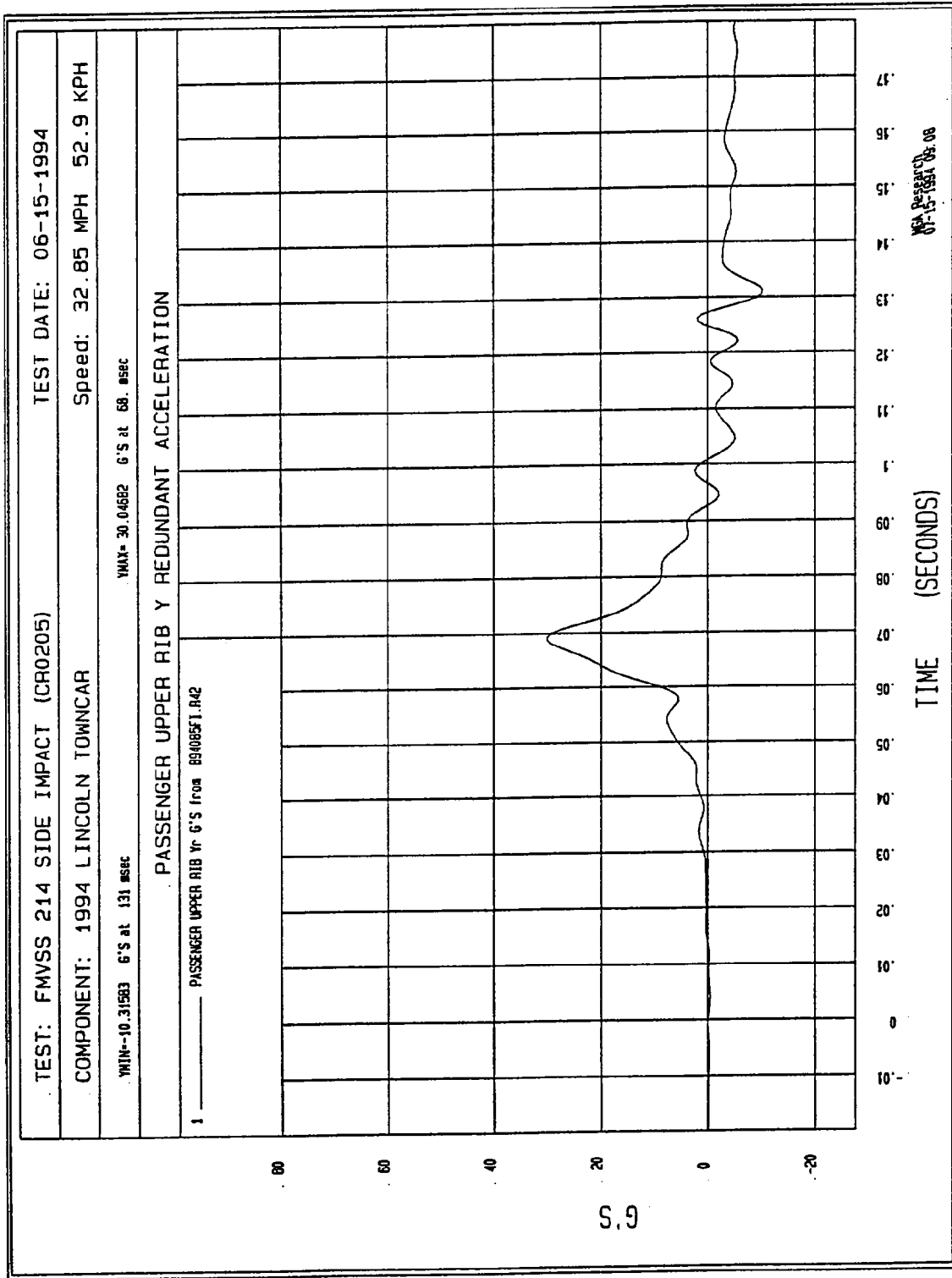


Figure B-90 - Passenger Upper Rib Y Redundant Acceleration vs. Time

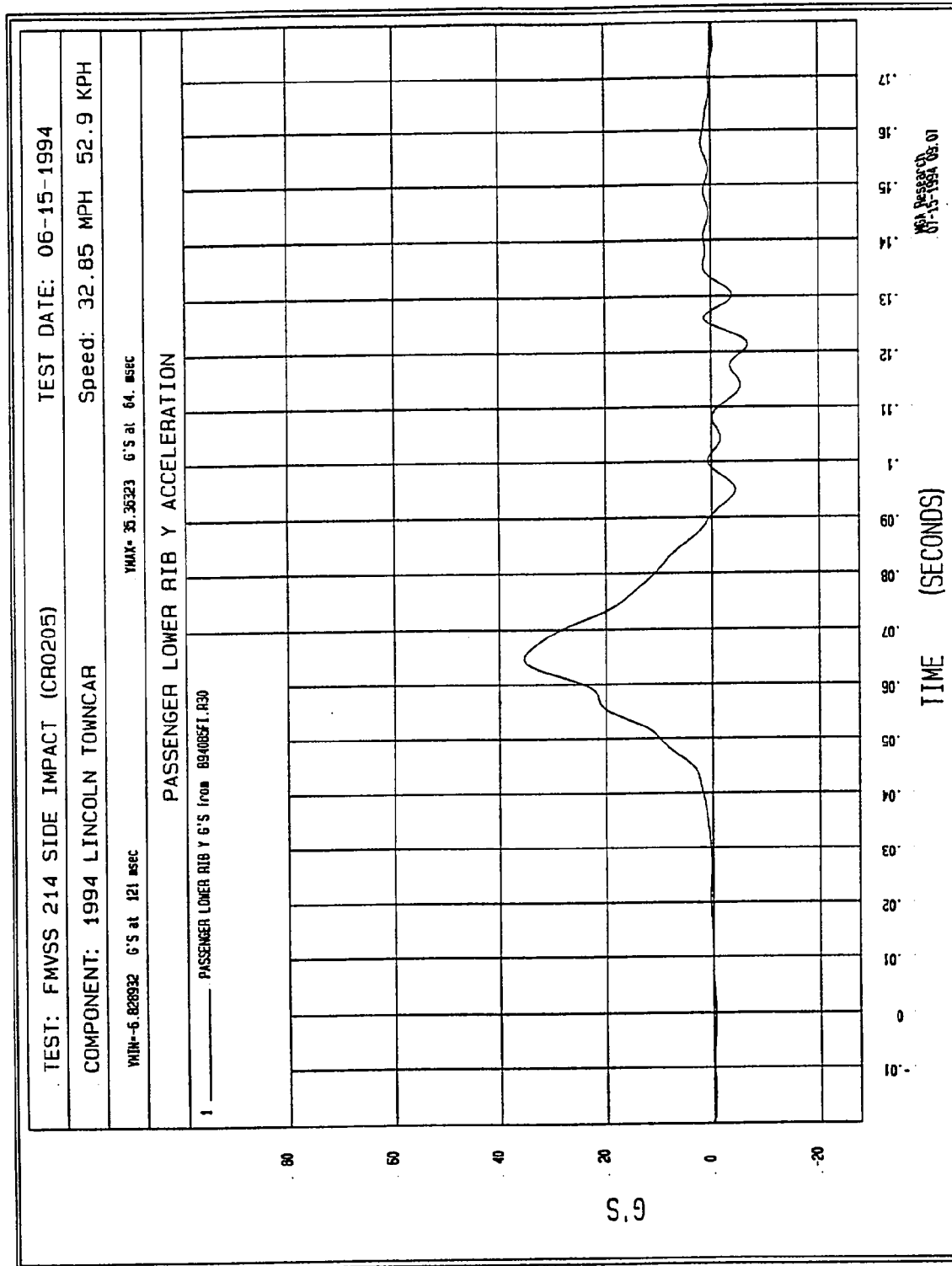


Figure B-91 - Passenger Lower Rib Y Acceleration vs. Time

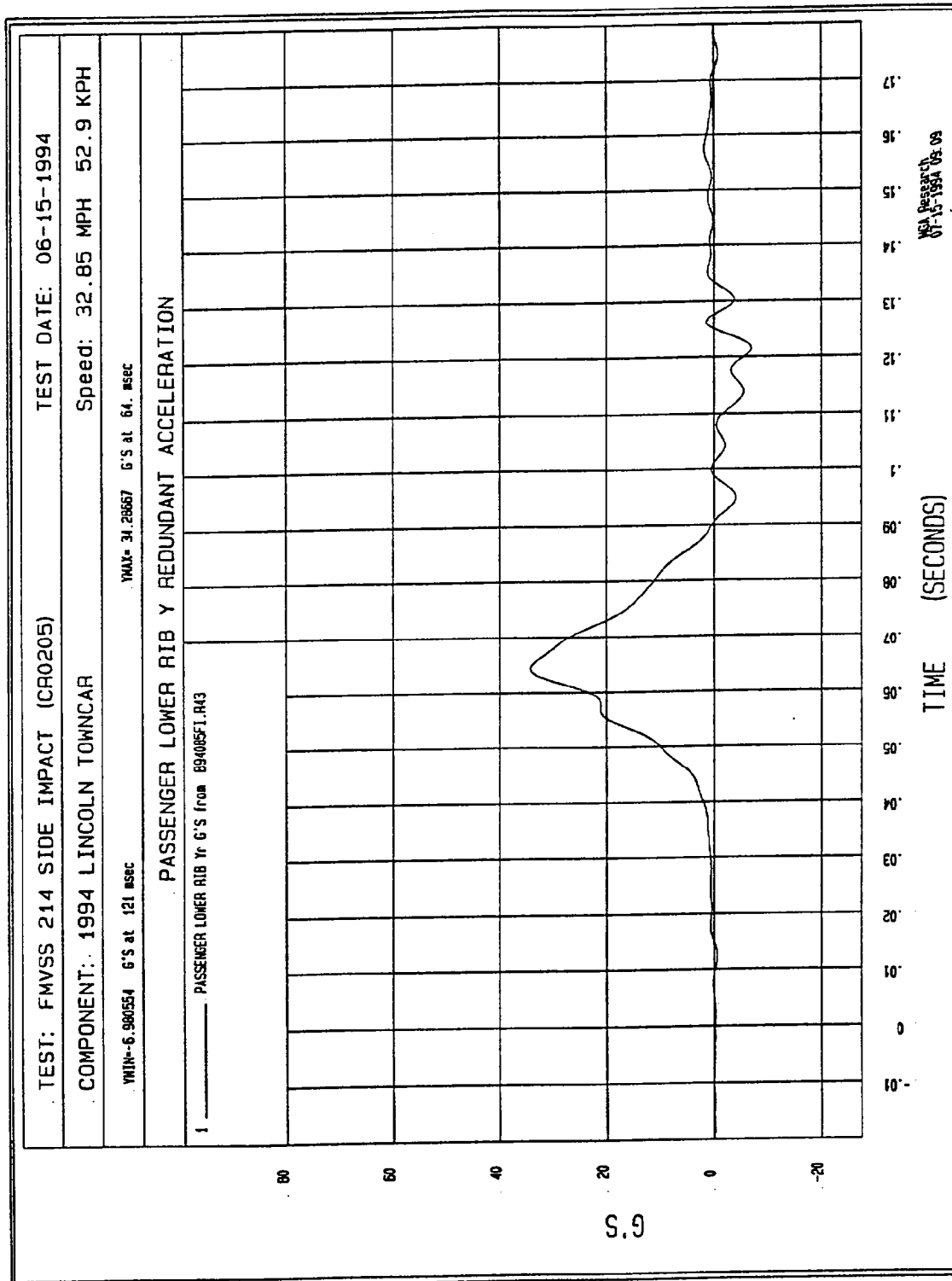


Figure B-92 - Passenger Lower Rib Y Redundant Acceleration vs. Time

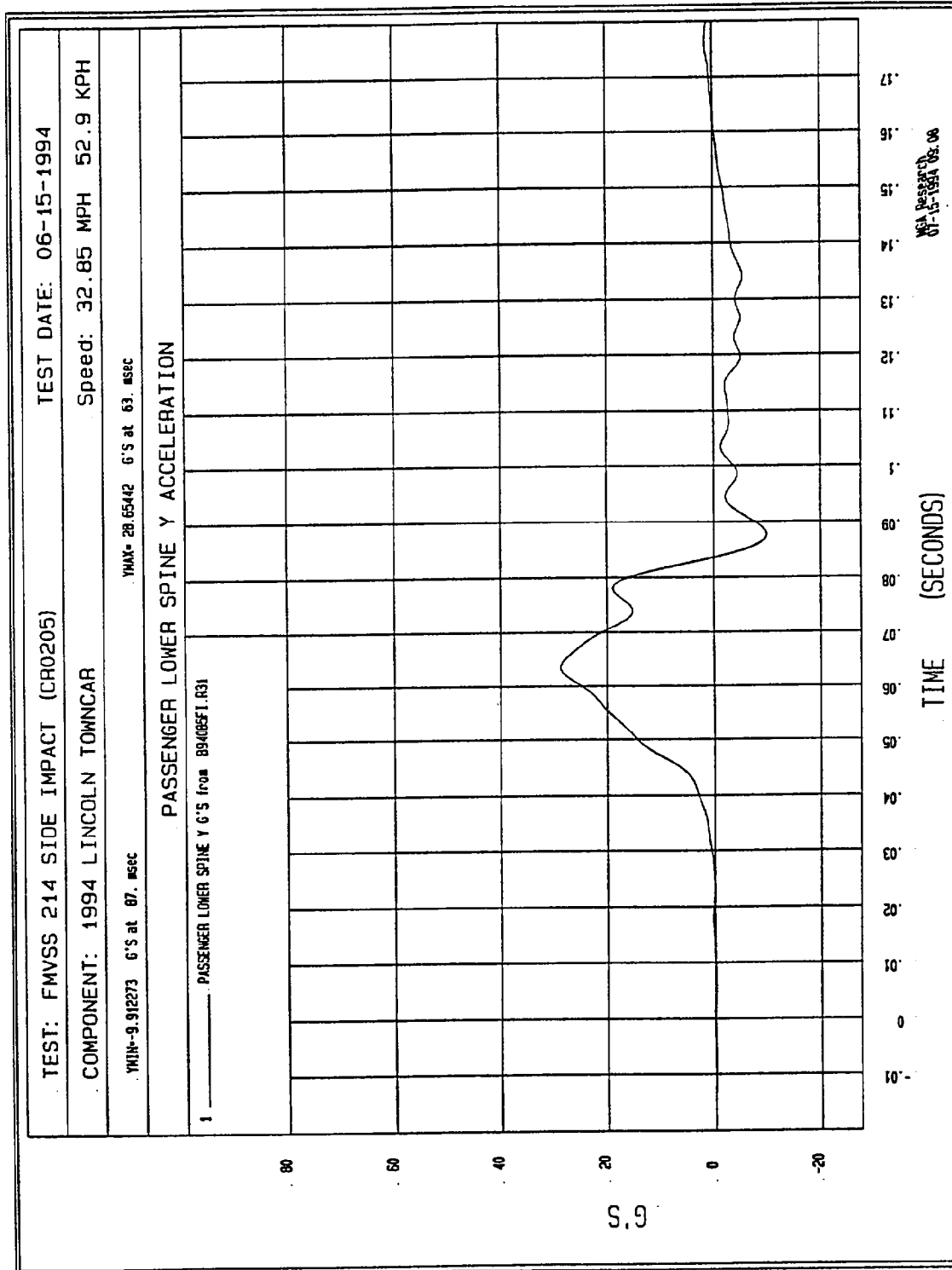


Figure B-93 - Passenger Lower Spine Y Accelerat. on vs. Time

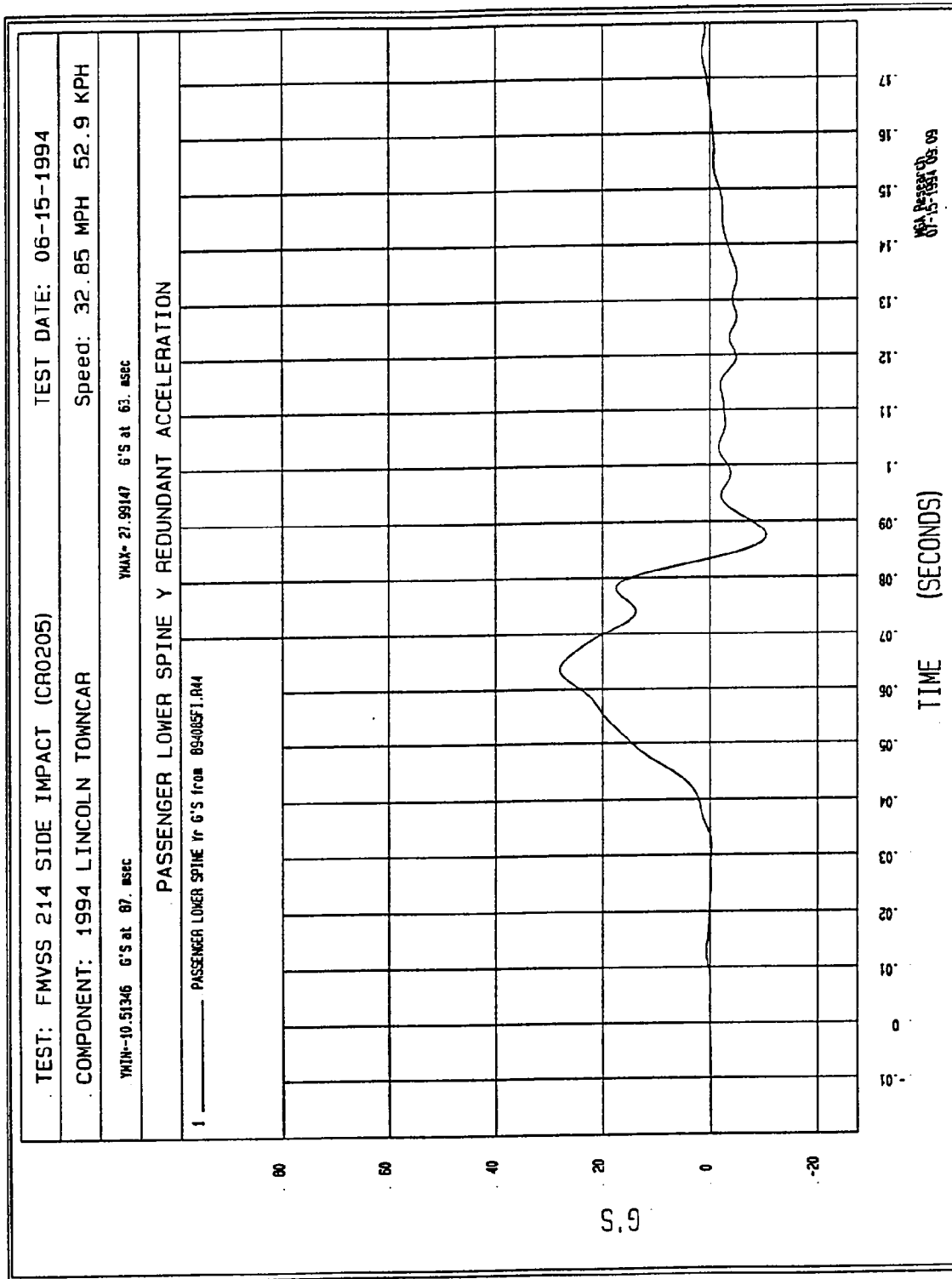


Figure B-94 - Passenger Lower Spine Y Redundant Acceleration vs. Time

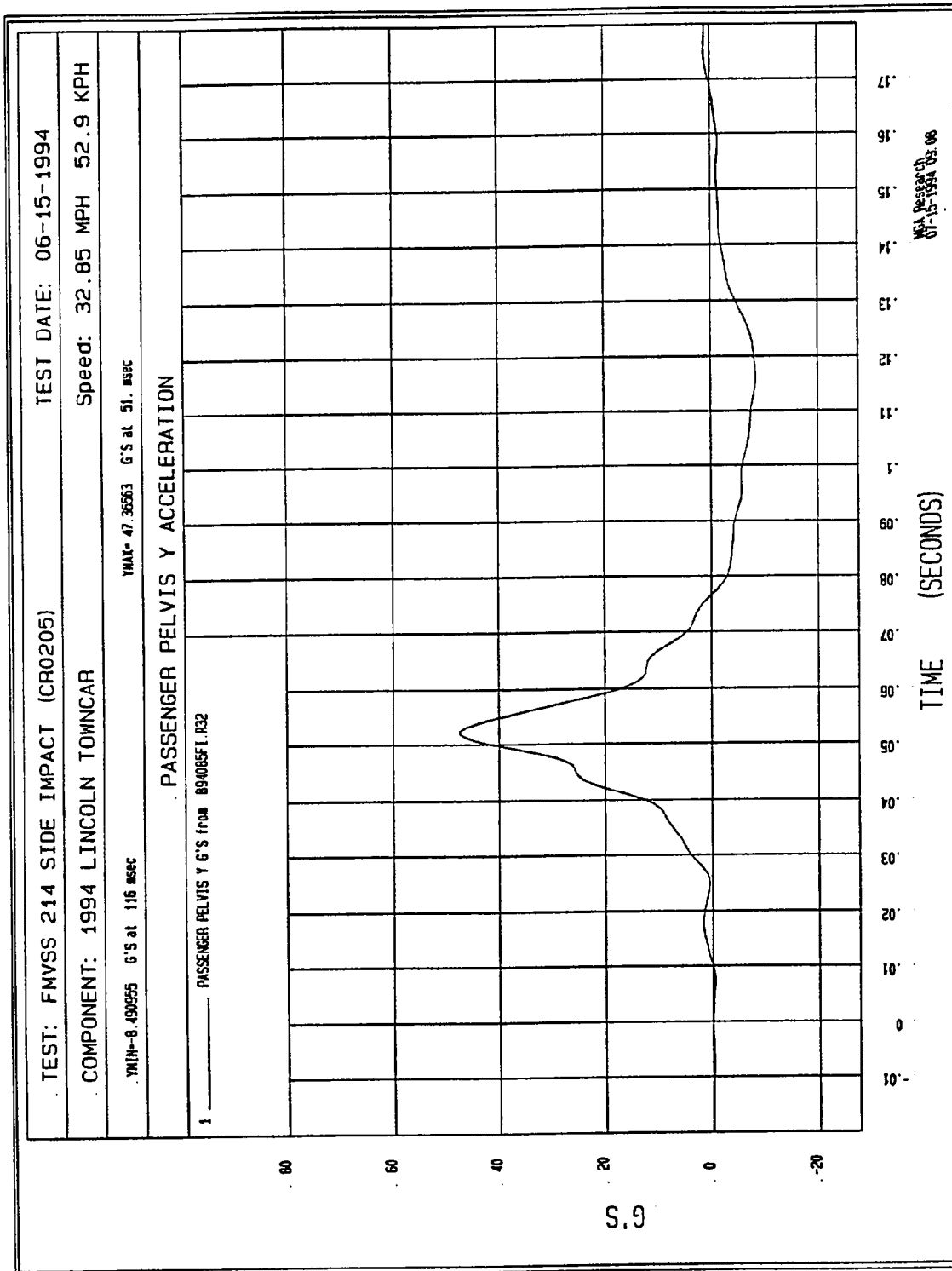


Figure B-95 - Passenger Pelvis Y Acceleration vs. Time

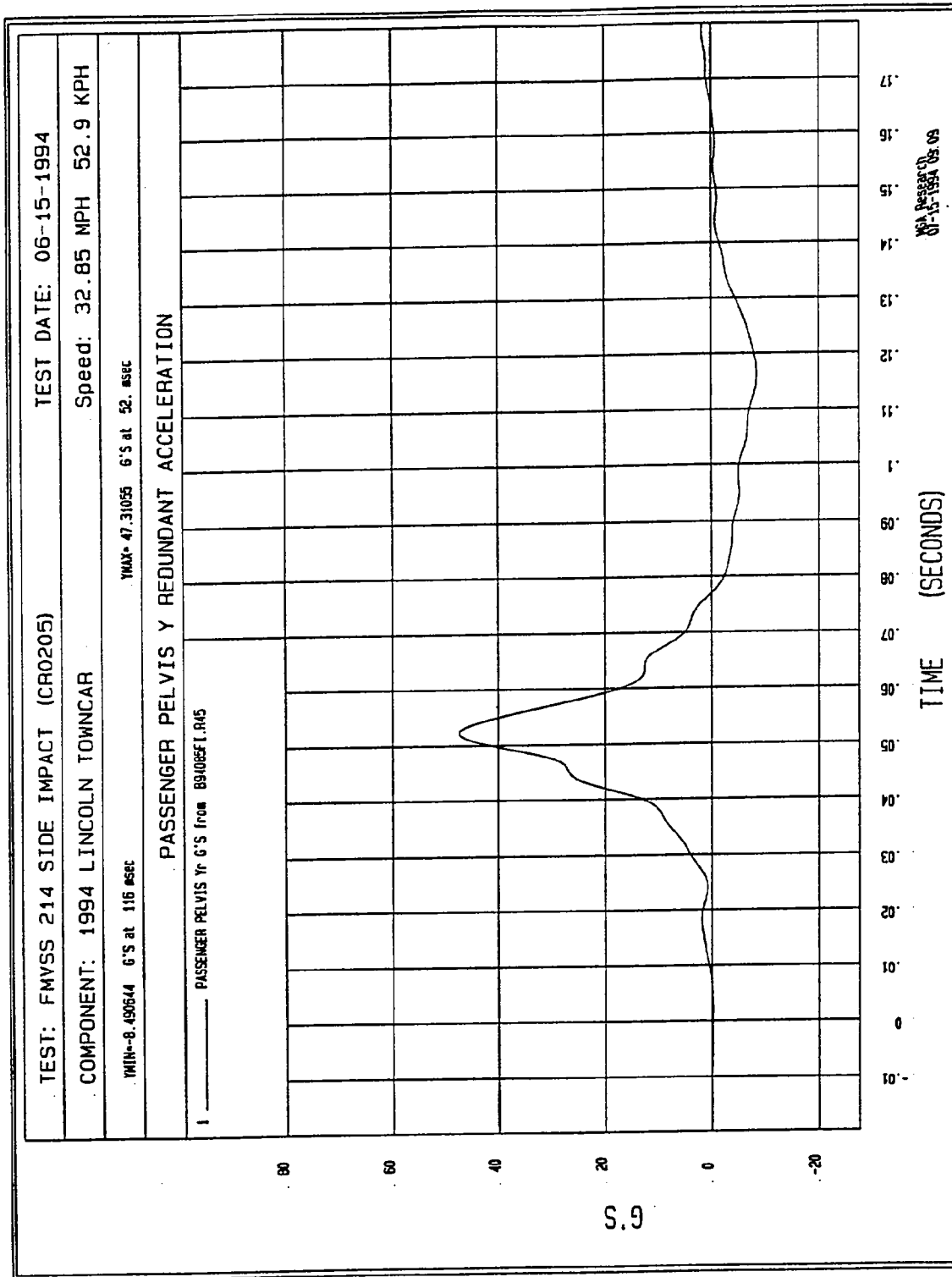


Figure B-96 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

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PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 269

Calibration Test Results Summary

Dummy Serial Number: 269

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.: 269

DATE OF VERIFICATION: June 6, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.6
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"	9.3
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"	14.5

MEASUREMENTS BY: *Rodney McElroy*

APPROVED BY: *J. A. Robbins*

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

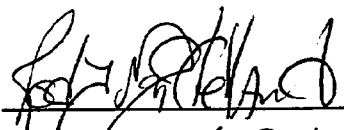
DATE: June 7, 1994

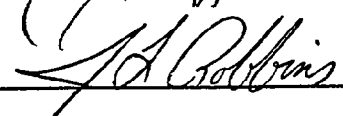
DUMMY NUMBER: 269

TEST NUMBER: D94932

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	42
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	21

TEST MEETS SPECIFICATIONS

TECHNICIAN 

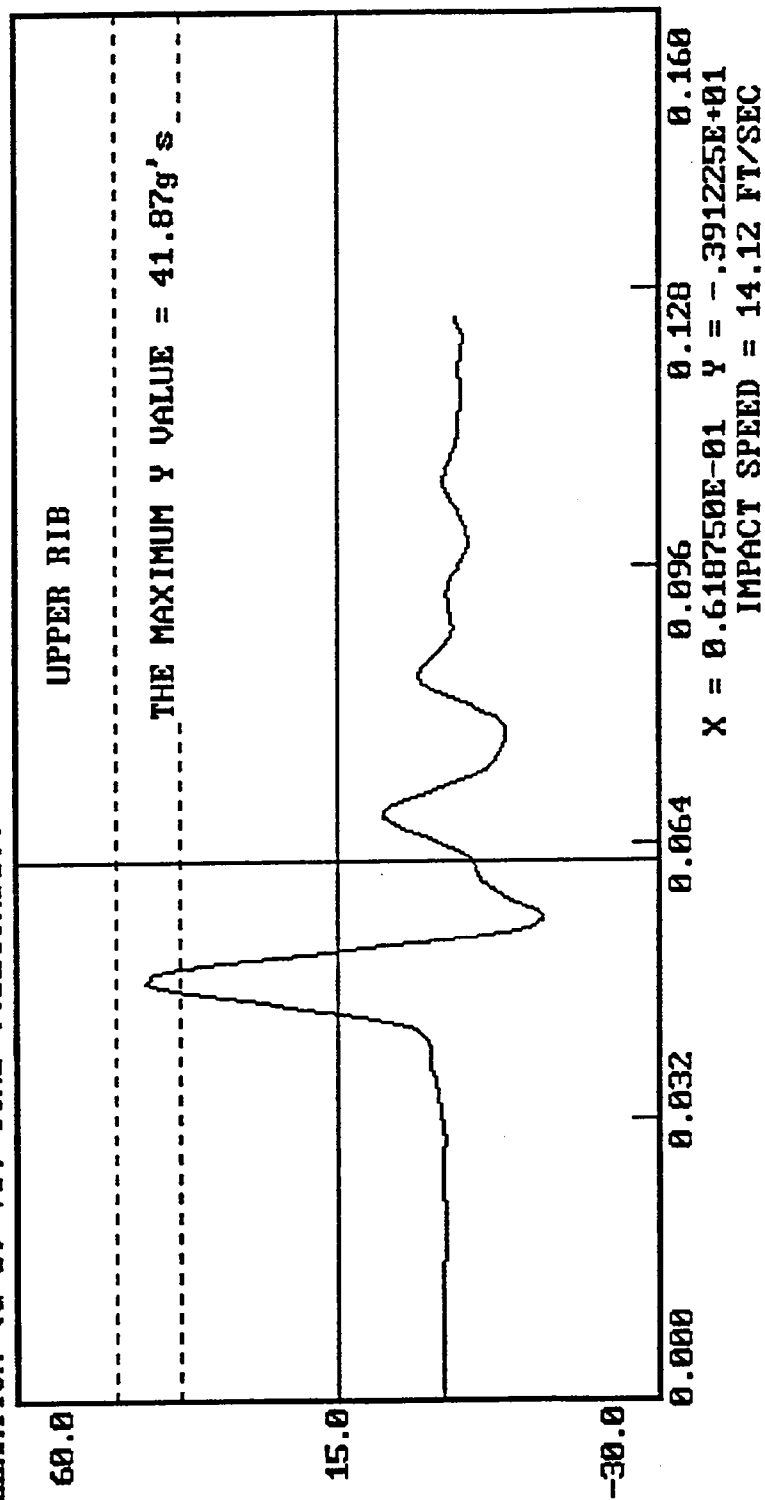
APPROVED BY 

06-06-1994 14:55

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 269

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

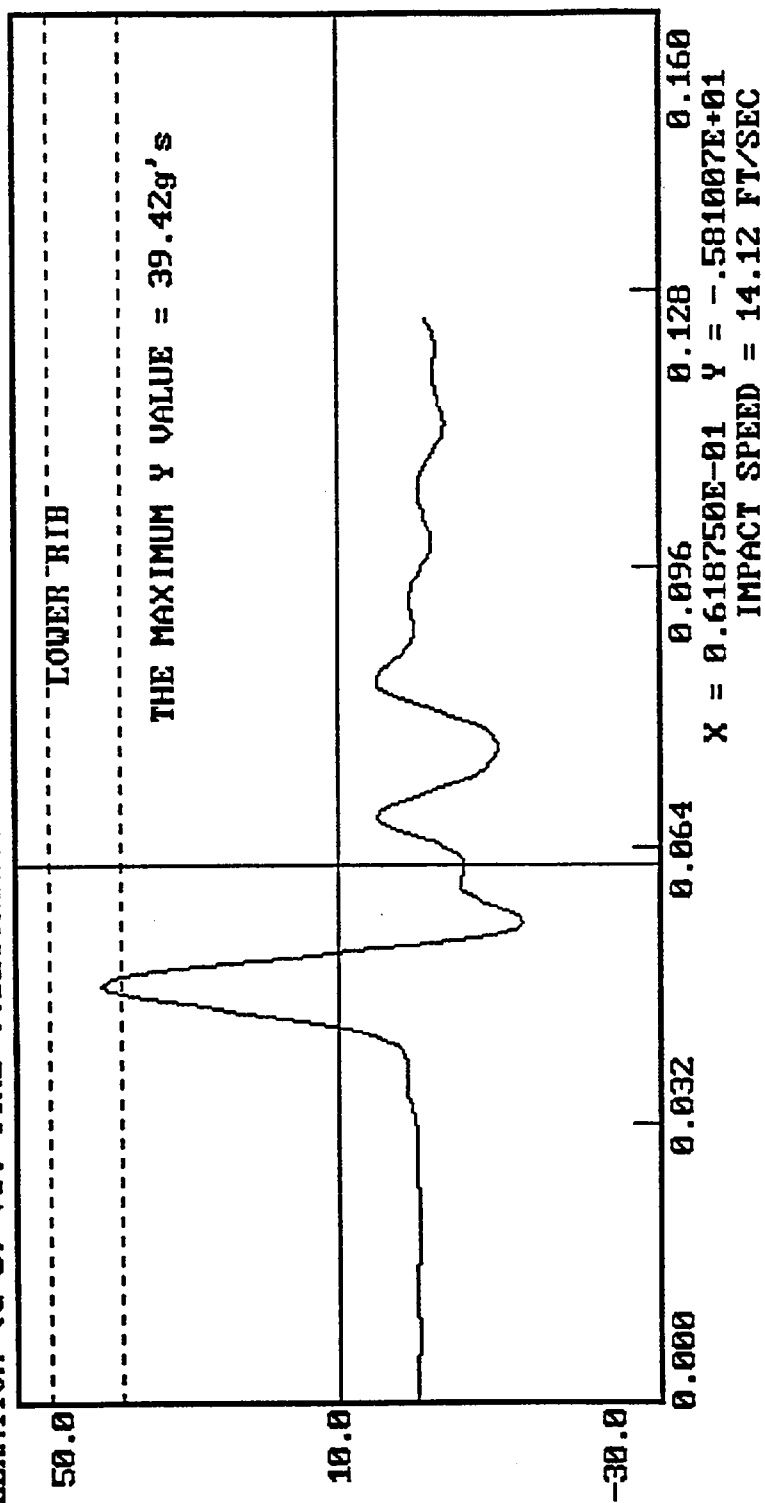


06-06-1994 14:55

DUMMY CALIBRATION - THORAX IMPACT

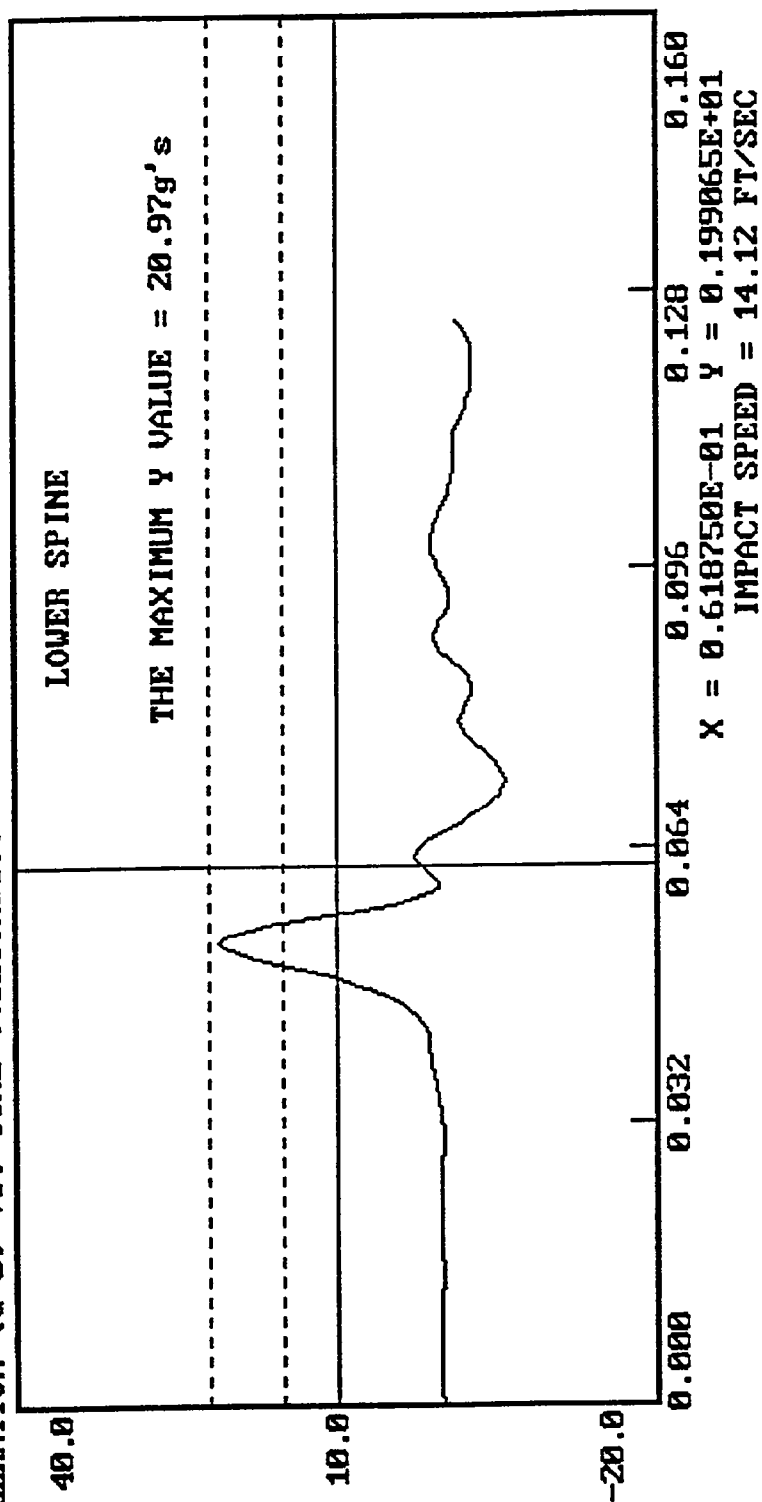
DUMMY # 269

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



06-06-1994 14:55

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 6, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94933

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	68°
RELATIVE HUMIDITY	10 - 70%	55%
PROBE SPEED	13.8 - 14.2 f/s	14.0
PELVIS ACCELERATION	40 - 60 g's	52

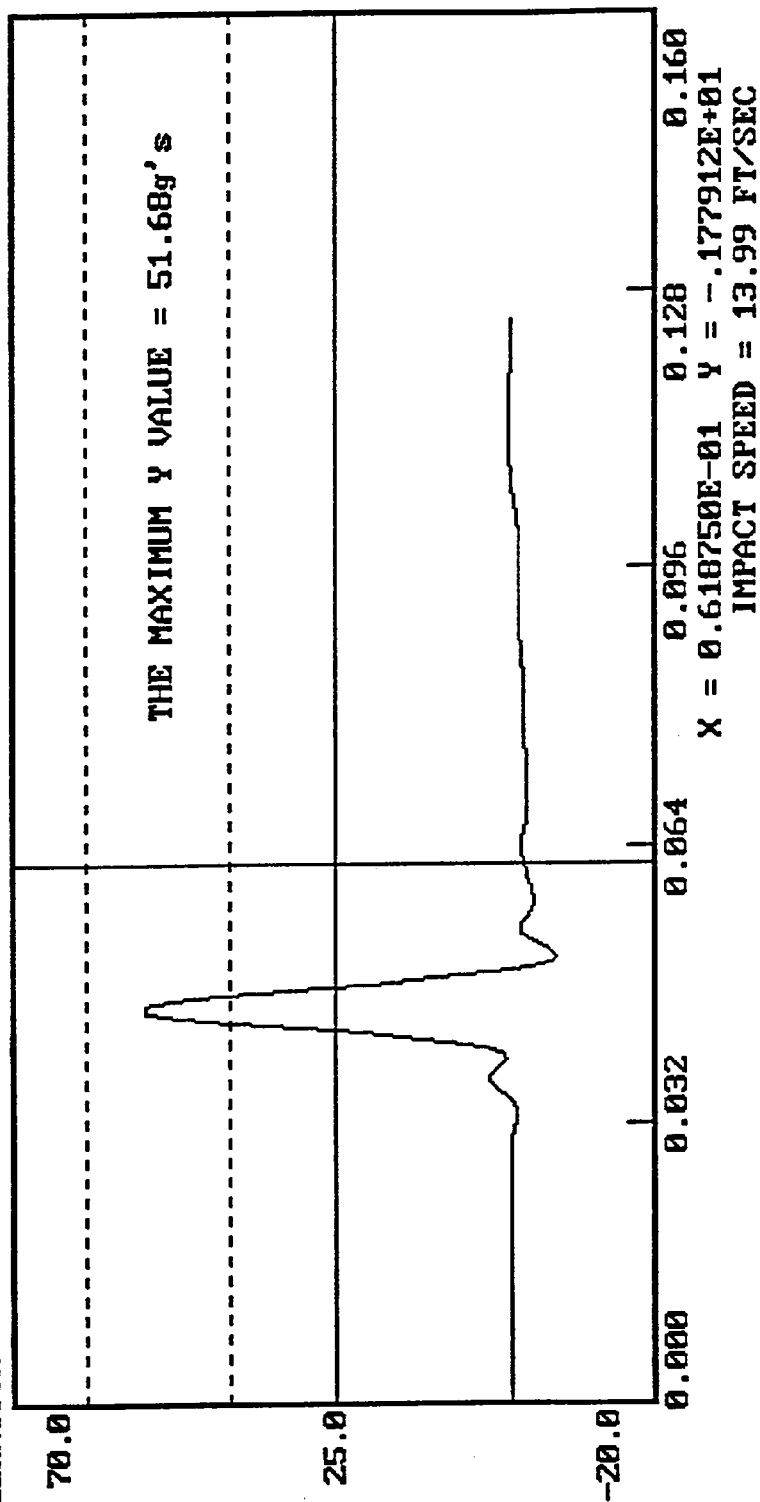
TEST MEETS SPECIFICATIONS

TECHNICIAN *Alan Allen*

APPROVED BY *J. Robbins*

06-06-1994 16:21

DUMMY CALIBRATION - PELVIS IMPACT
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: June 7, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94934

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	68°
RELATIVE HUMIDITY	10 - 70%	55%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.1
FORCE @ 0.75 in	36.7 - 49.8 lbs	43.7
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN Ala Cline

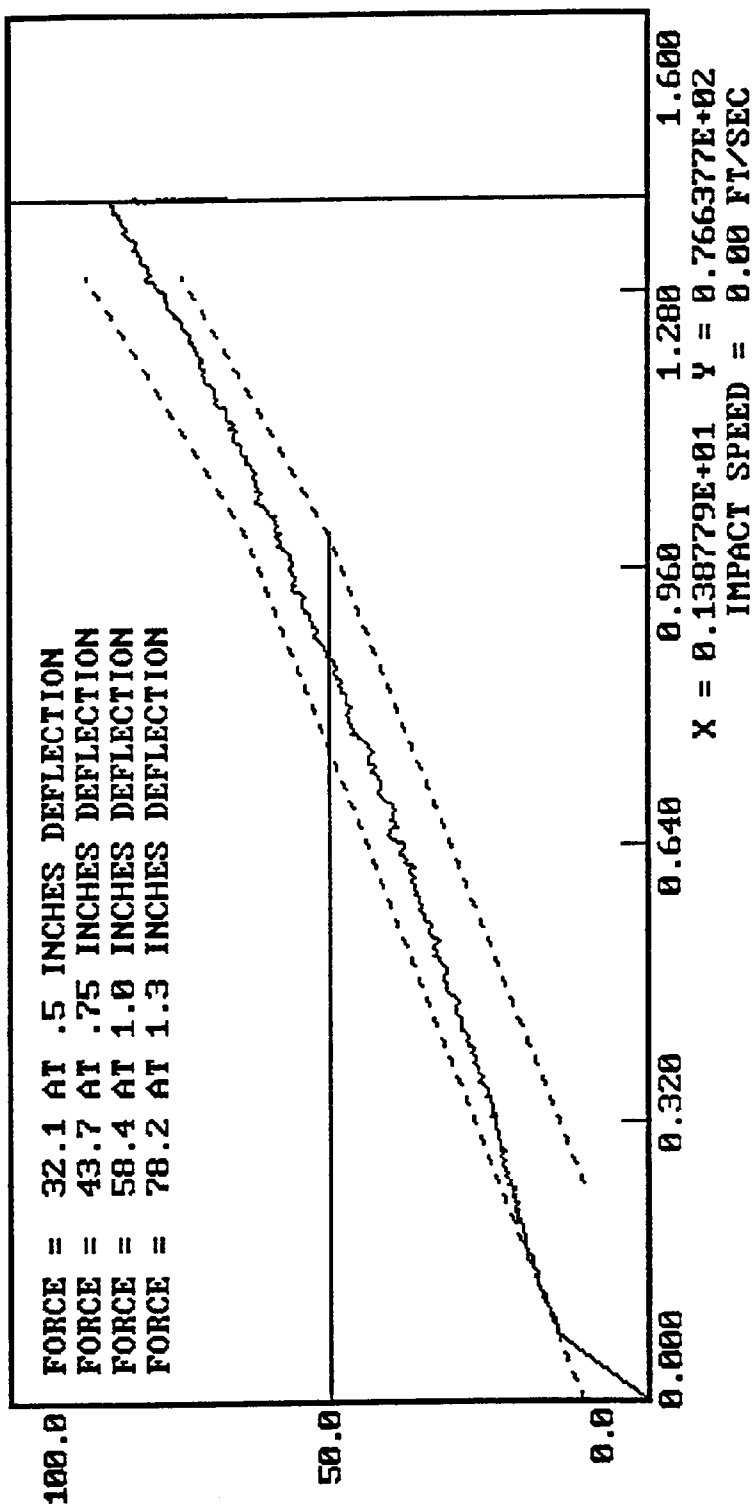
APPROVED BY J. D. Robbins

06-07-1994 09:48

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 269

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

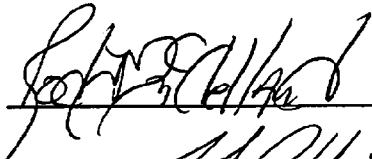
DATE: June 7, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94935

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	68°
RELATIVE HUMIDITY	10 - 70%	50%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	22
FORCE @ 30°	34 - 46 lbs	36
FORCE @ 40°	46 - 58 lbs	50
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

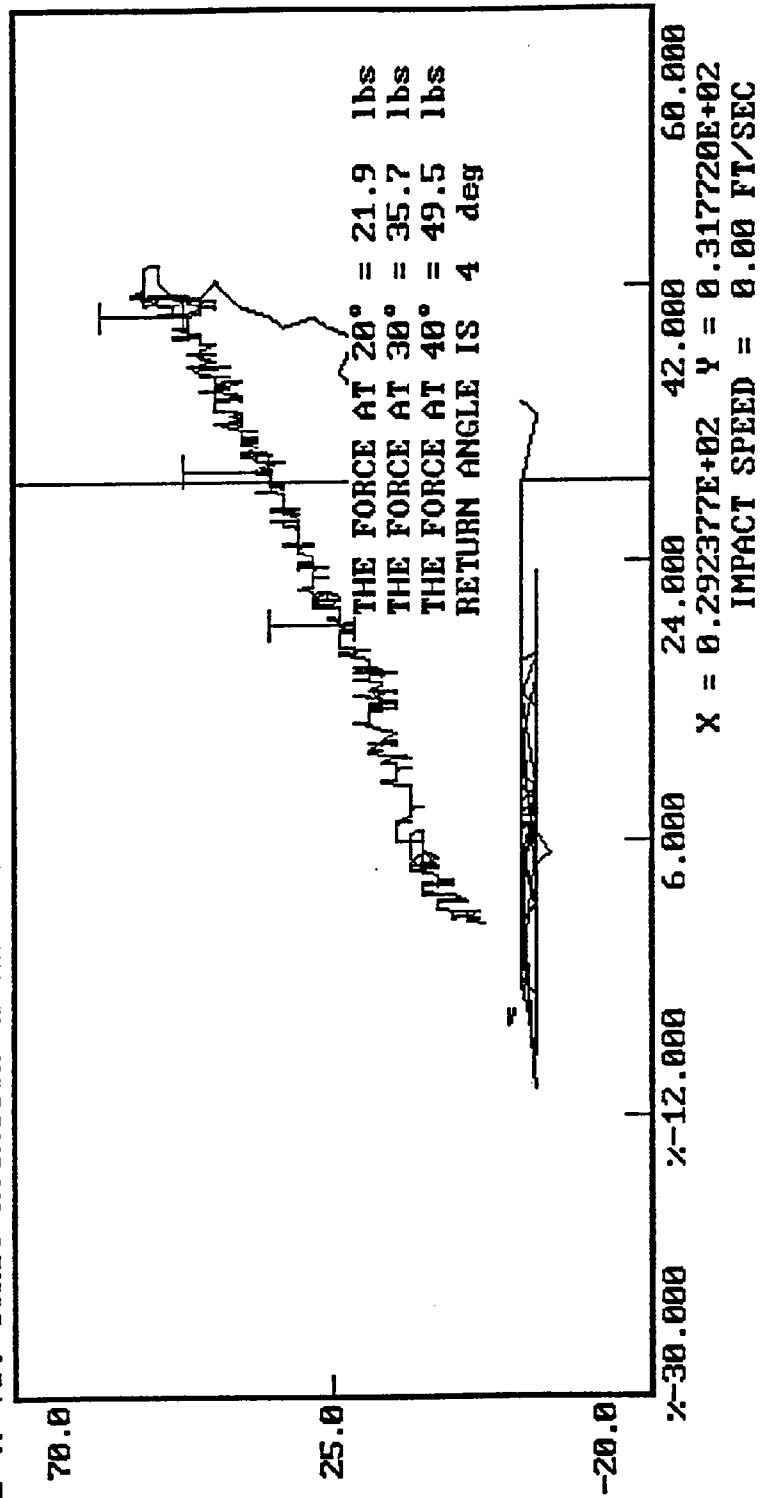
APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 269

FORCE () VS. TORSO ROTATION (DEGREES)

06-07-1994 12:12



PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 271

Calibration Test Results Summary

Passenger Serial Number: 271

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
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.: 271

DATE OF VERIFICATION: June 6, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.6
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"	19.5
HW - Hip Width	14.0" - 15.4"	14.4

MEASUREMENTS BY: *He Ober*

APPROVED BY: *J. L. Collins*

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 7, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94942

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	50%
PROBE SPEED	13.8 - 14.2 fps	14.0
UPPER RIB	37 - 46 g's	37
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN

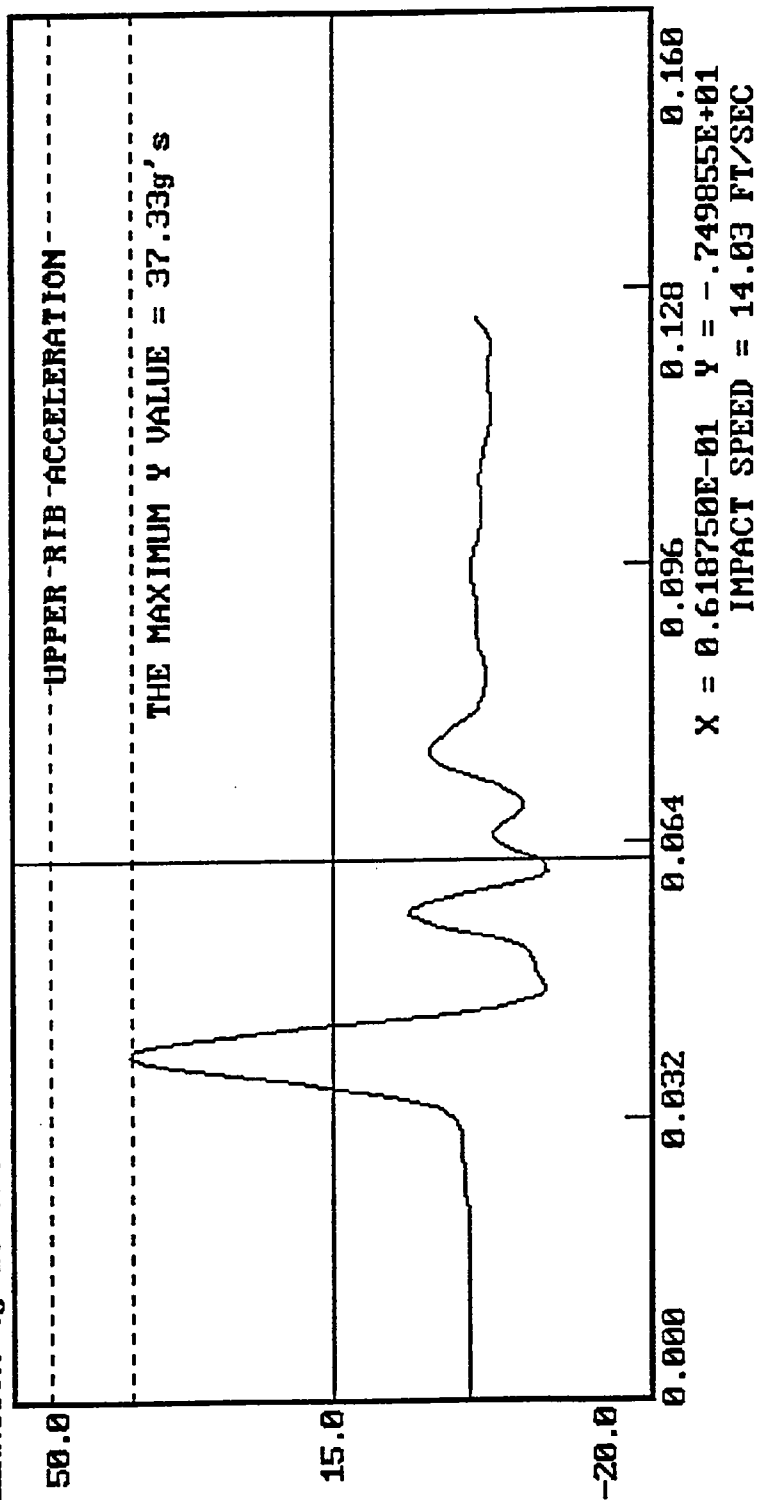
APPROVED BY

06-07-1994 16:04

DUMMY CALIBRATION - THORAX IMPACT

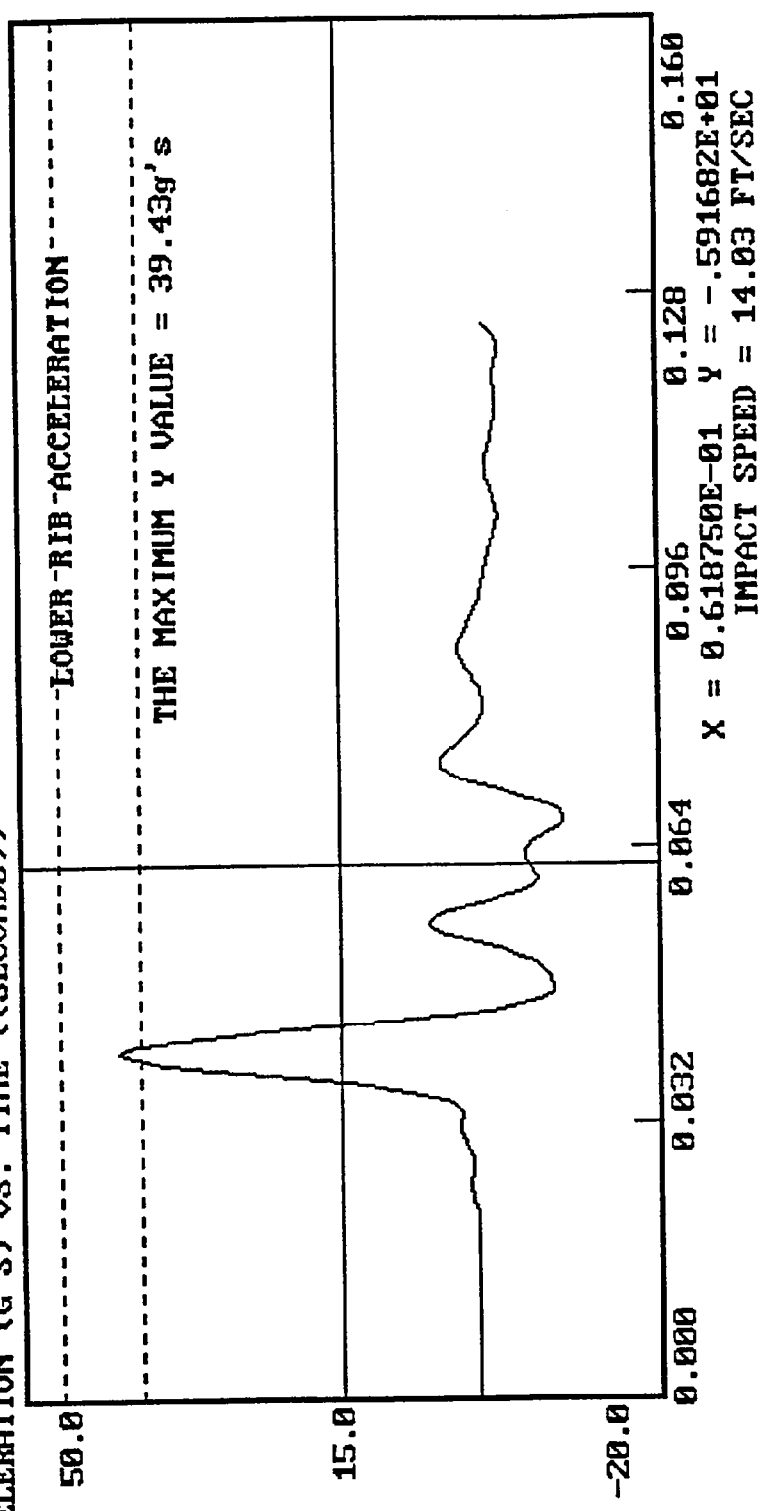
DUMMY # 271

ACCELERATION (g's) VS. TIME ((SECONDS))



06-07-1994 16:04

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

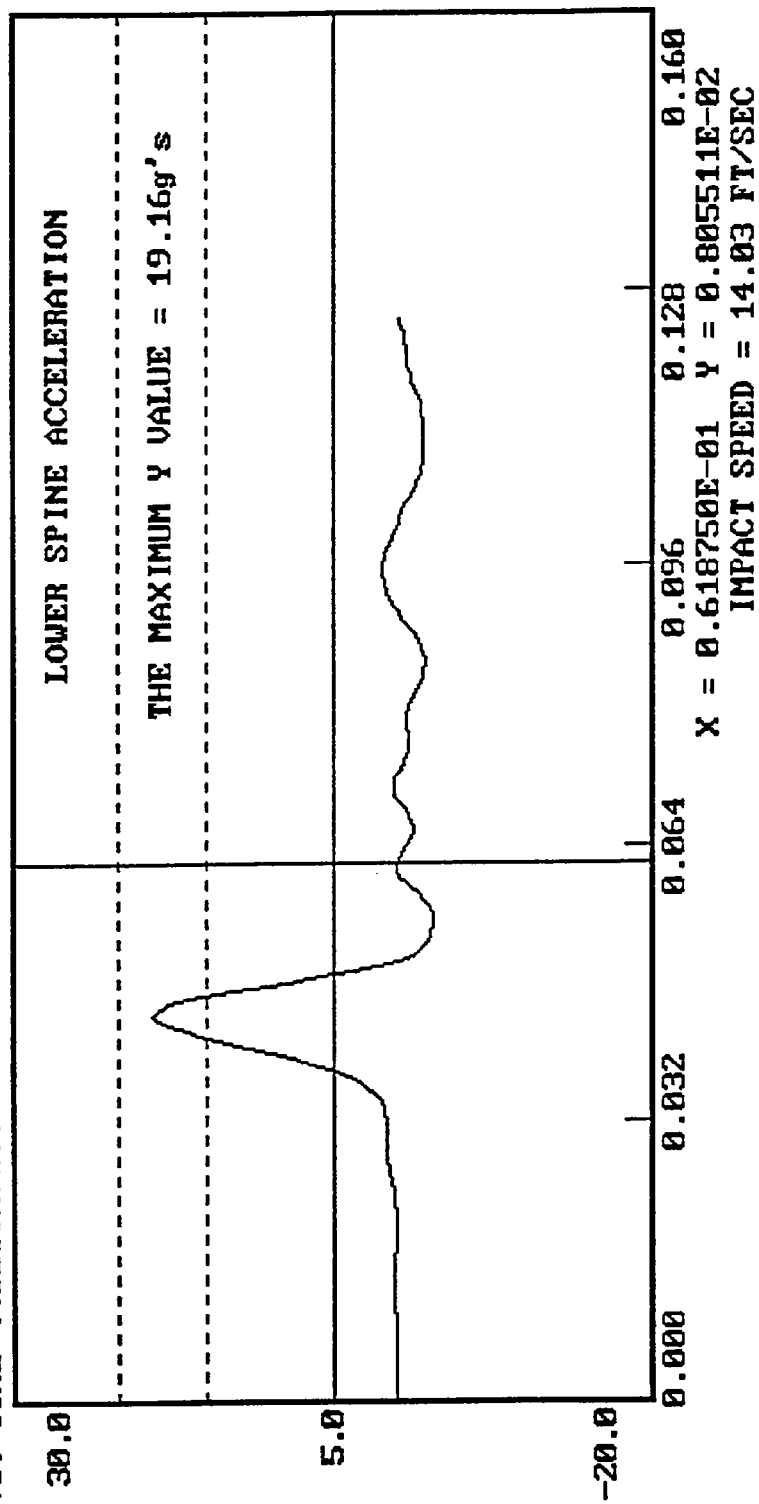


06-07-1994 16:04

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

() VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 6, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94943

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	50%
PROBE SPEED	13.8 - 14.2 f/s	14.0
PELVIS ACCELERATION	40 - 60 g's	51

TEST MEETS SPECIFICATIONS

TECHNICIAN

He Allen

APPROVED BY

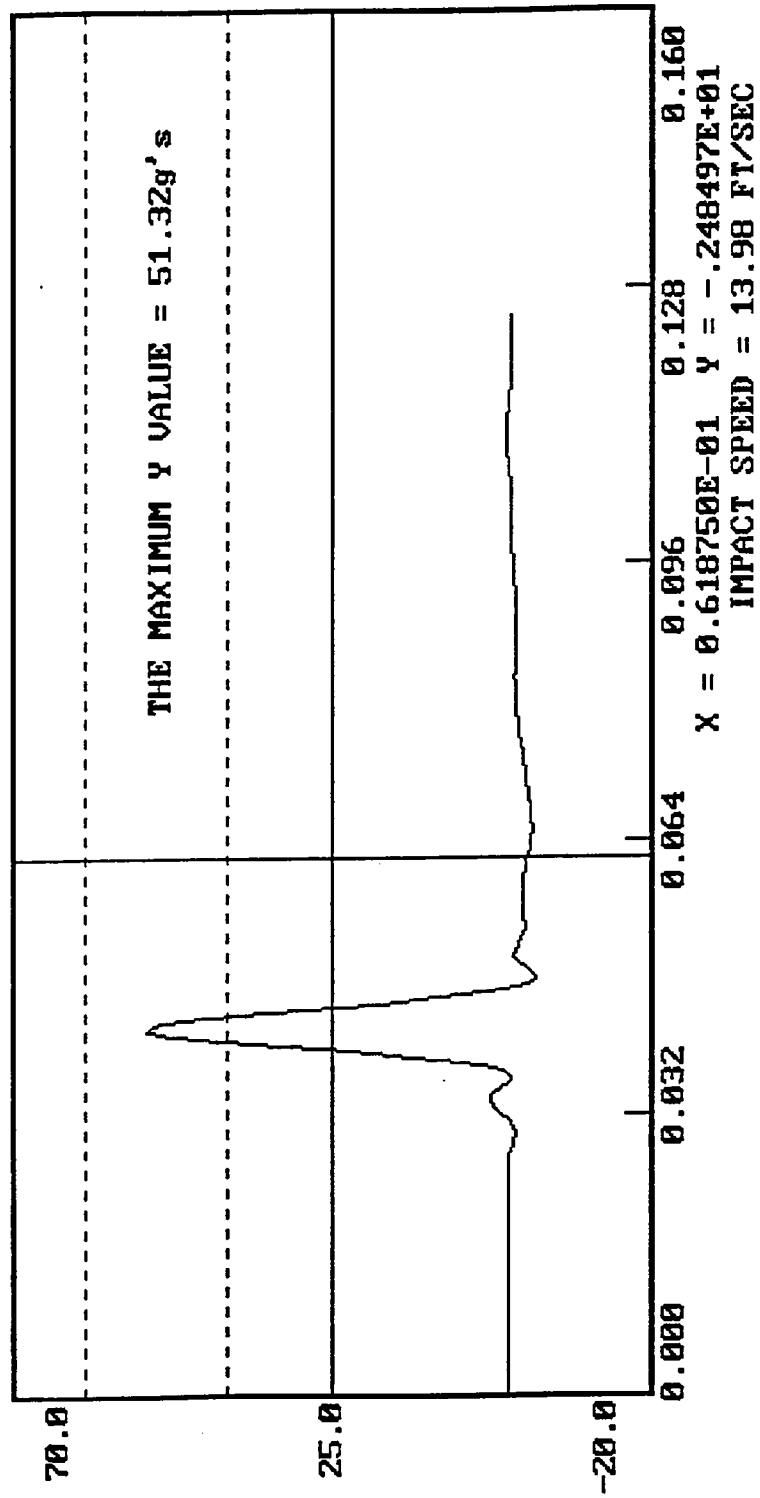
J Robbins

06-06-1994 16:14

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 271

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



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

DATE: June 7, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94944

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	55%
FORCE @ 0.5 in	23.3 - 36.5 lbs	27.4
FORCE @ 0.75 in	36.7 - 49.8 lbs	42.3
FORCE @ 1.0 in	50 - 63 lbs	55
FORCE @ 1.3 in	73 - 88 lbs	82

TEST MEETS SPECIFICATIONS

TECHNICIAN

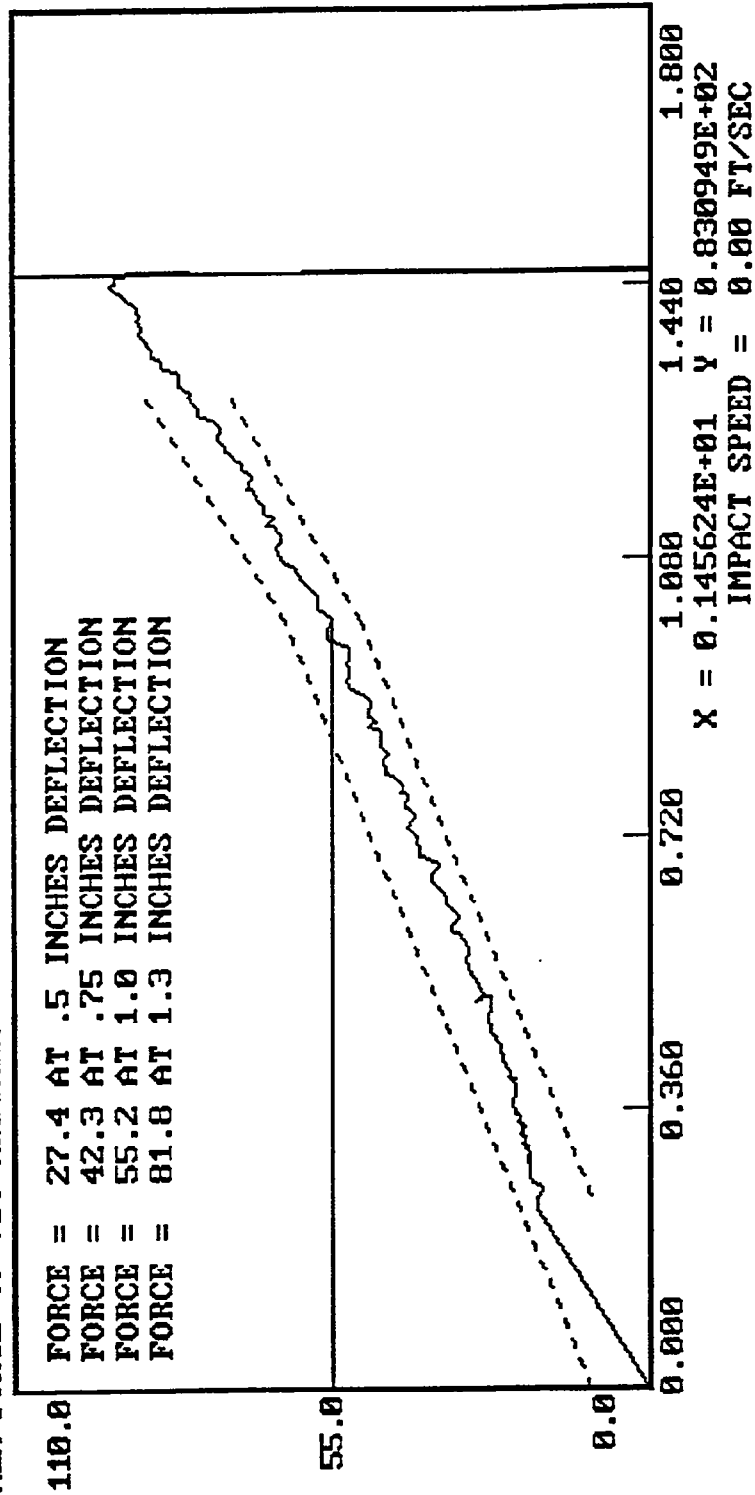
APPROVED BY

06-07-1994 10:30

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 7, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94945

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	55%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	24
FORCE @ 30°	34 - 46 lbs	34
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN

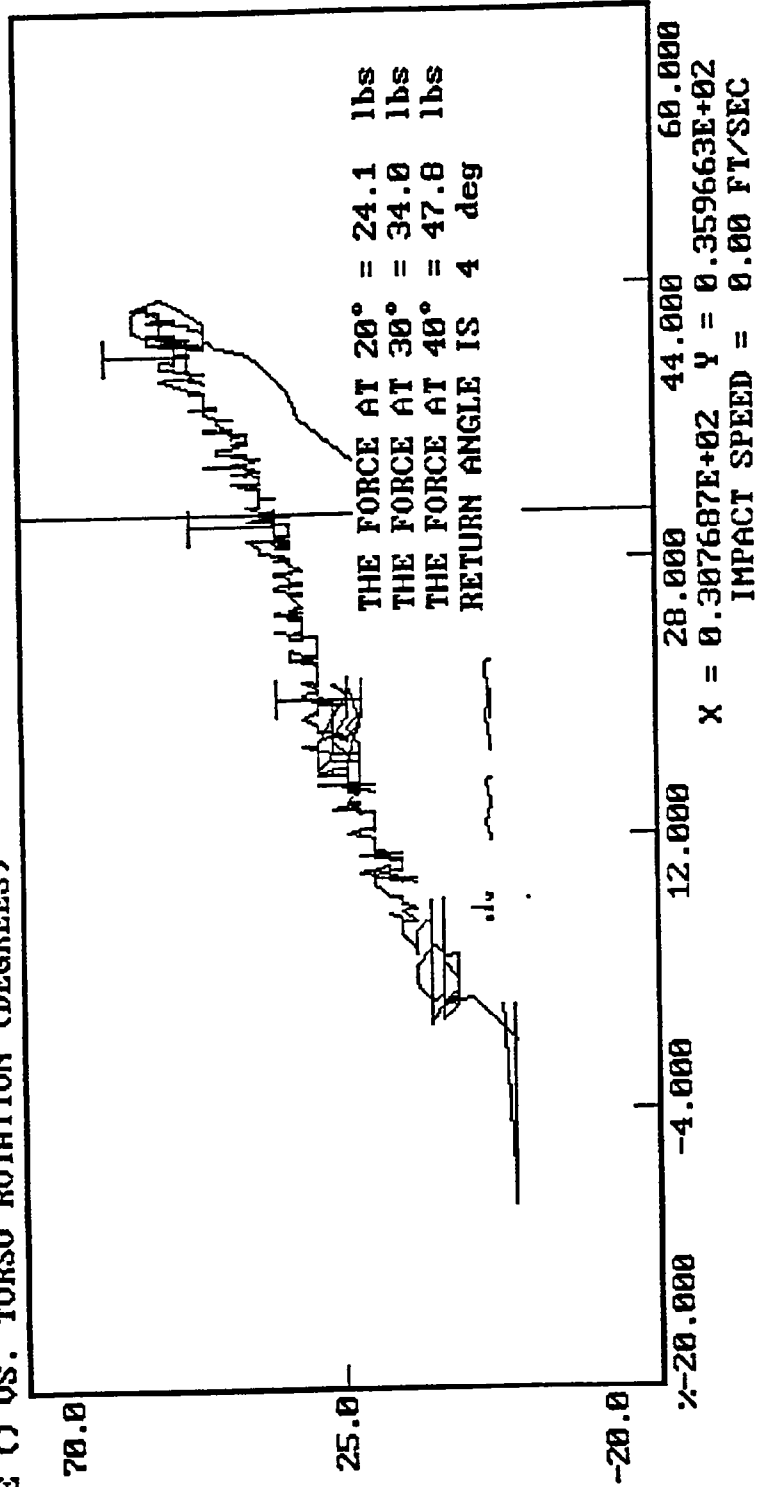
A. C. Clark

APPROVED BY

J. Robbins

06-07-1994 11:04

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



POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 269

Calibration Test Results Summary

Dummy Serial Number: 269

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.: 269

DATE OF VERIFICATION: June 16, 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"	9.3
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"	14.4

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 16, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94132

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	55%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	40
LOWER RIB	37 - 46 g's	38
LOWER SPINE	15 - 22 g's	20

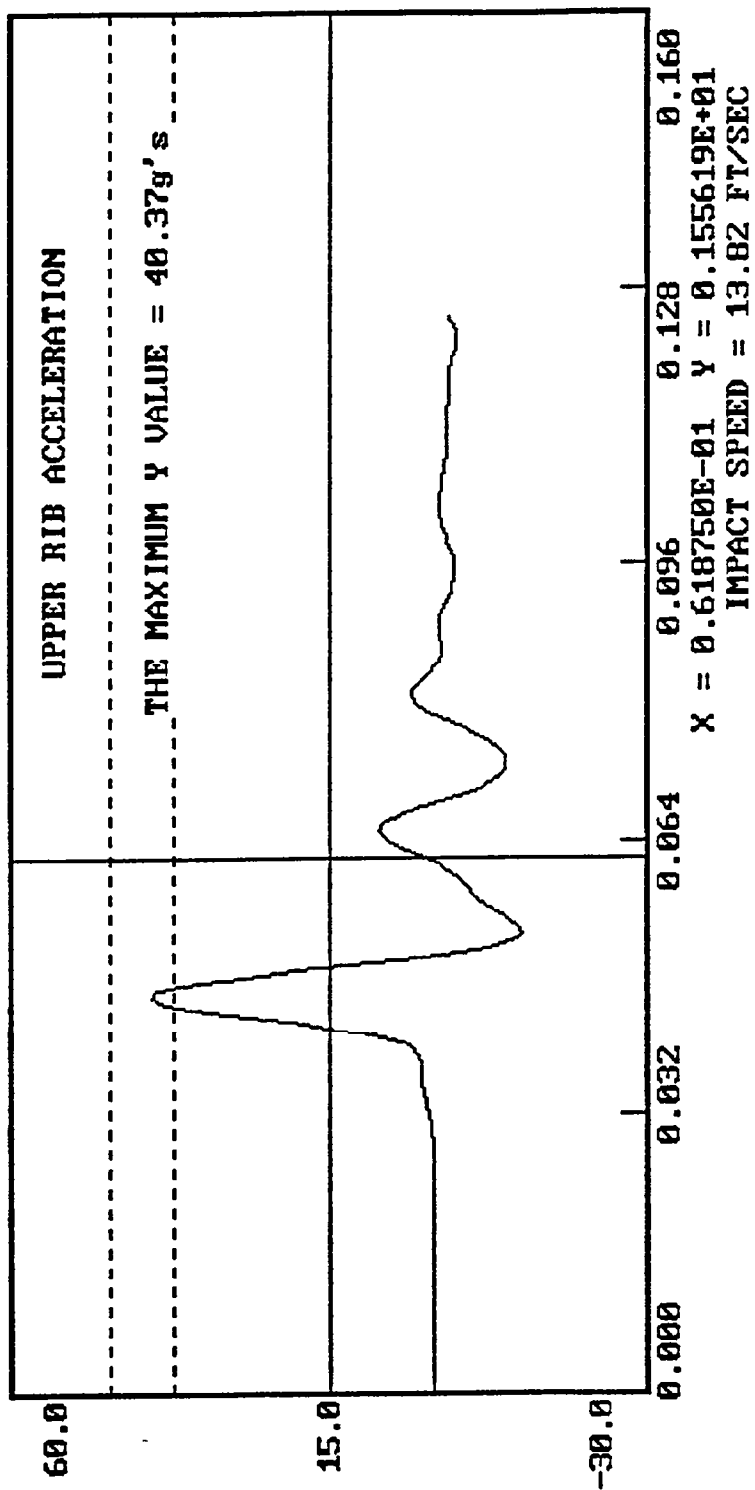
TEST MEETS SPECIFICATIONS

TECHNICIAN *Alan Chan*

APPROVED BY *J. Robbins*

06-16-1994 11:03

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))

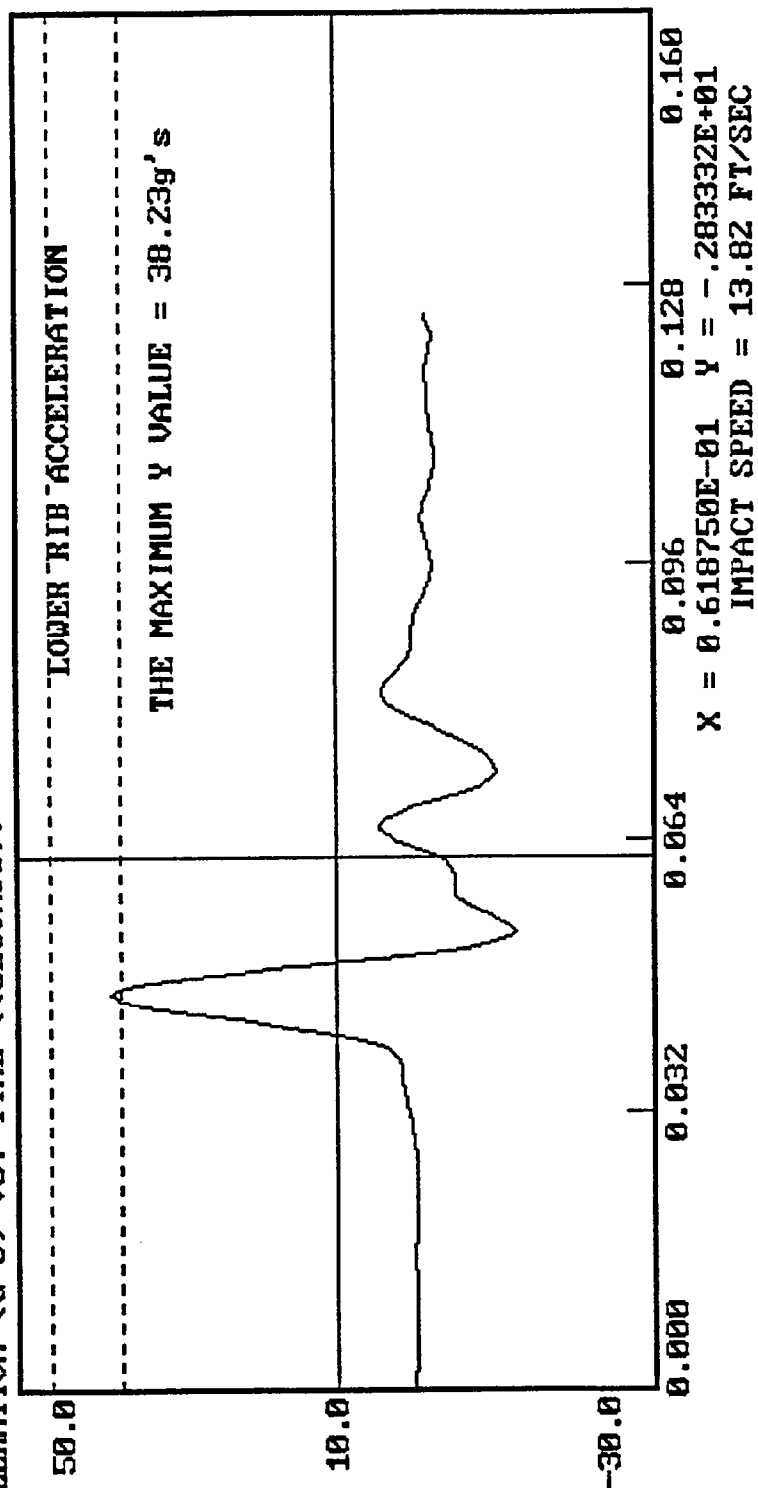


06-16-1994 11:03

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 269

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

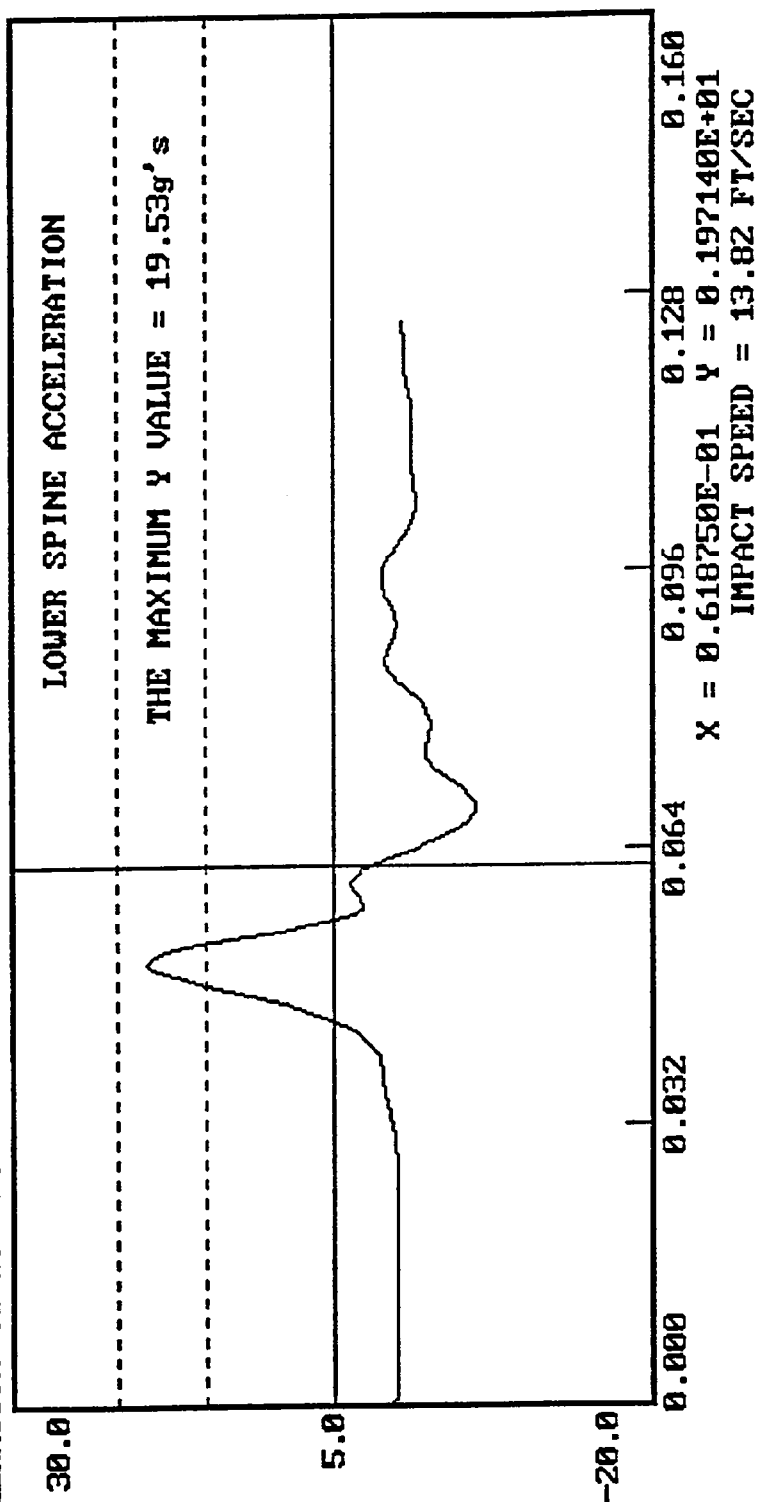


06-16-1994 11:03

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 269

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 16, 1994

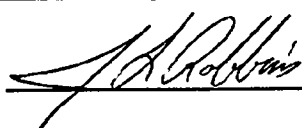
DUMMY NUMBER: 269

TEST NUMBER: D94133

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	55%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	59

TEST MEETS SPECIFICATIONS

TECHNICIAN 

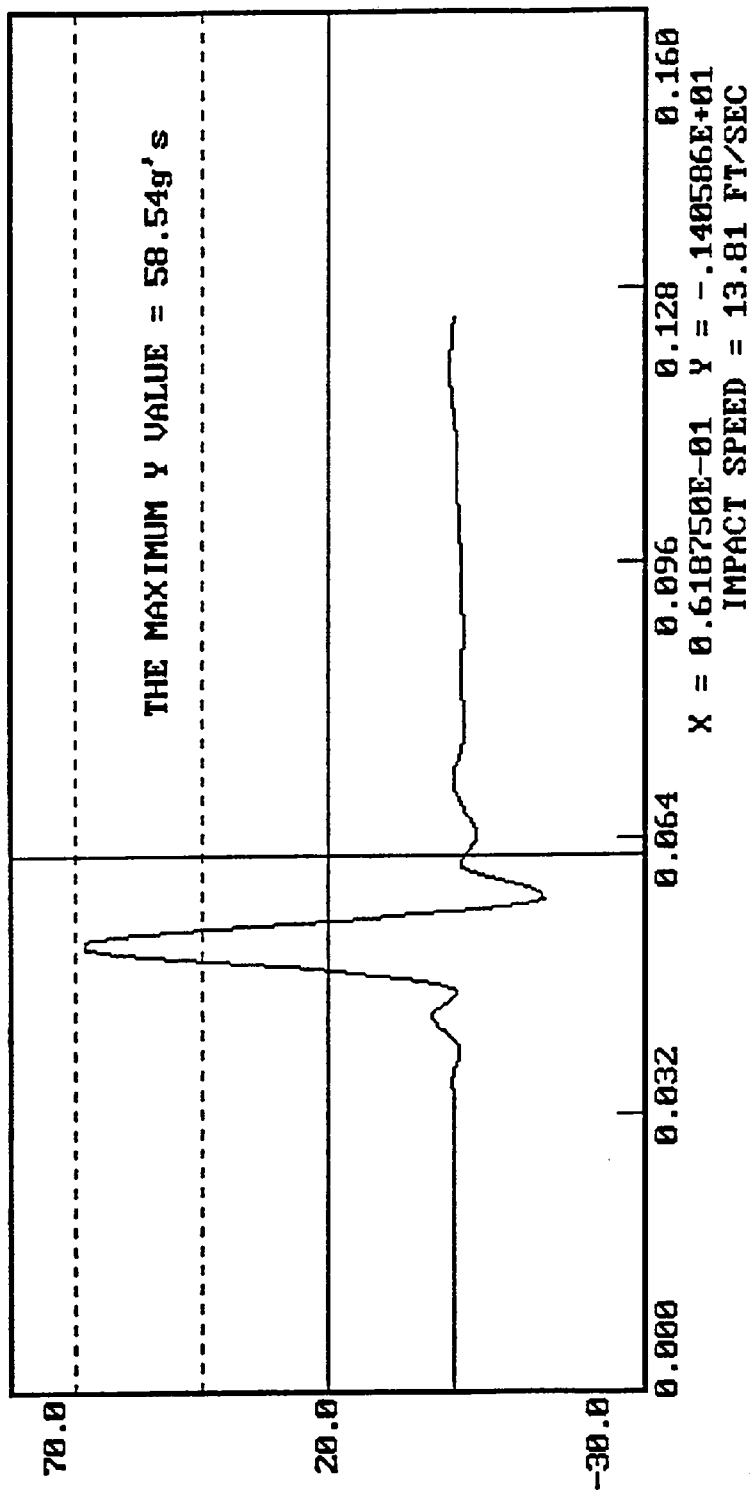
APPROVED BY 

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 269

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

06-16-1994 10:33



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

DATE: June 20, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94134

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	71°
RELATIVE HUMIDITY	10 - 70%	62%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.1
FORCE @ 0.75 in	36.7 - 49.8 lbs	48.1
FORCE @ 1.0 in	50 - 63 lbs	61
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN 

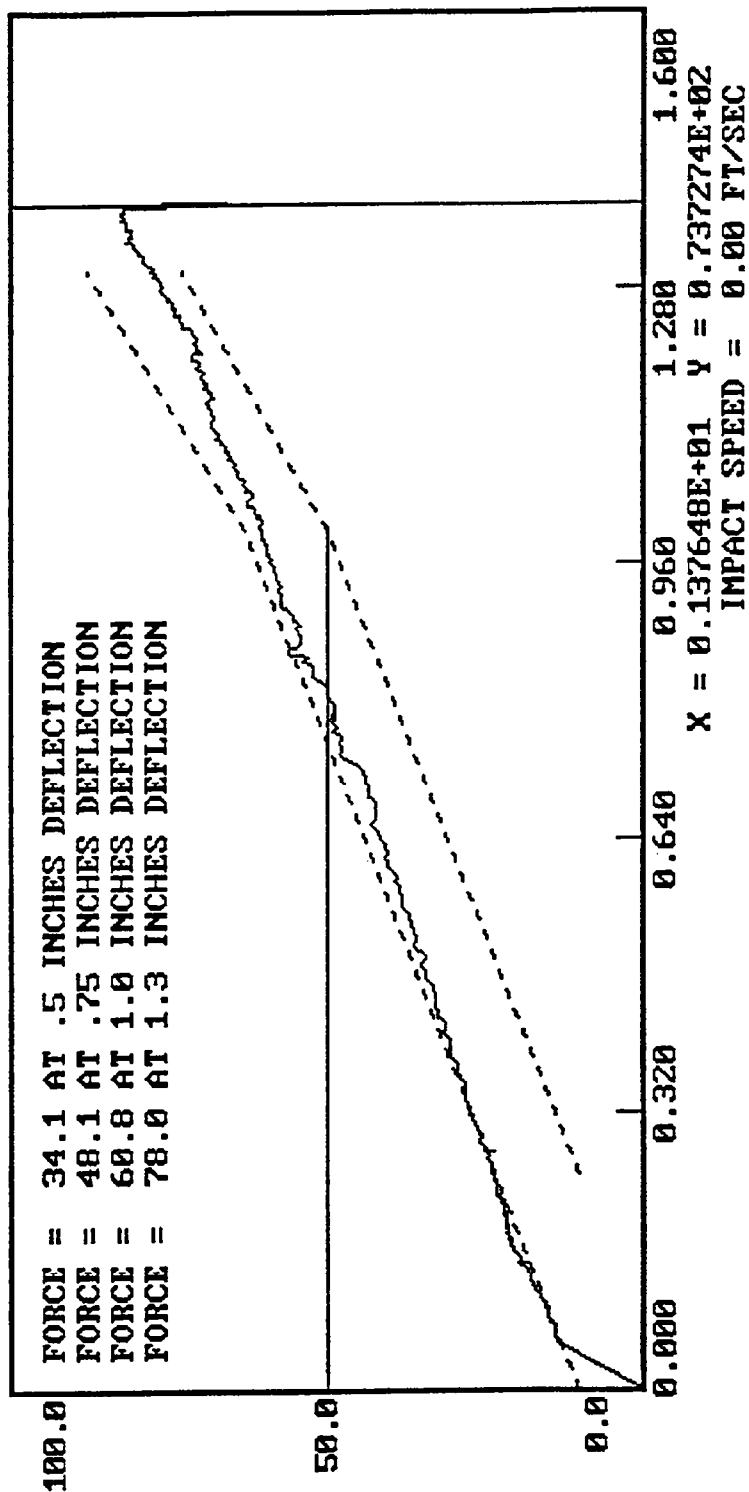
APPROVED BY 

06-20-1994 11:02

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 269

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: June 20, 1994

DUMMY NUMBER: 269

TEST NUMBER: D94135

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	62%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	32
FORCE @ 30°	34 - 46 lbs	40
FORCE @ 40°	46 - 58 lbs	52
RETURN ANGLE	12° maximum	4°

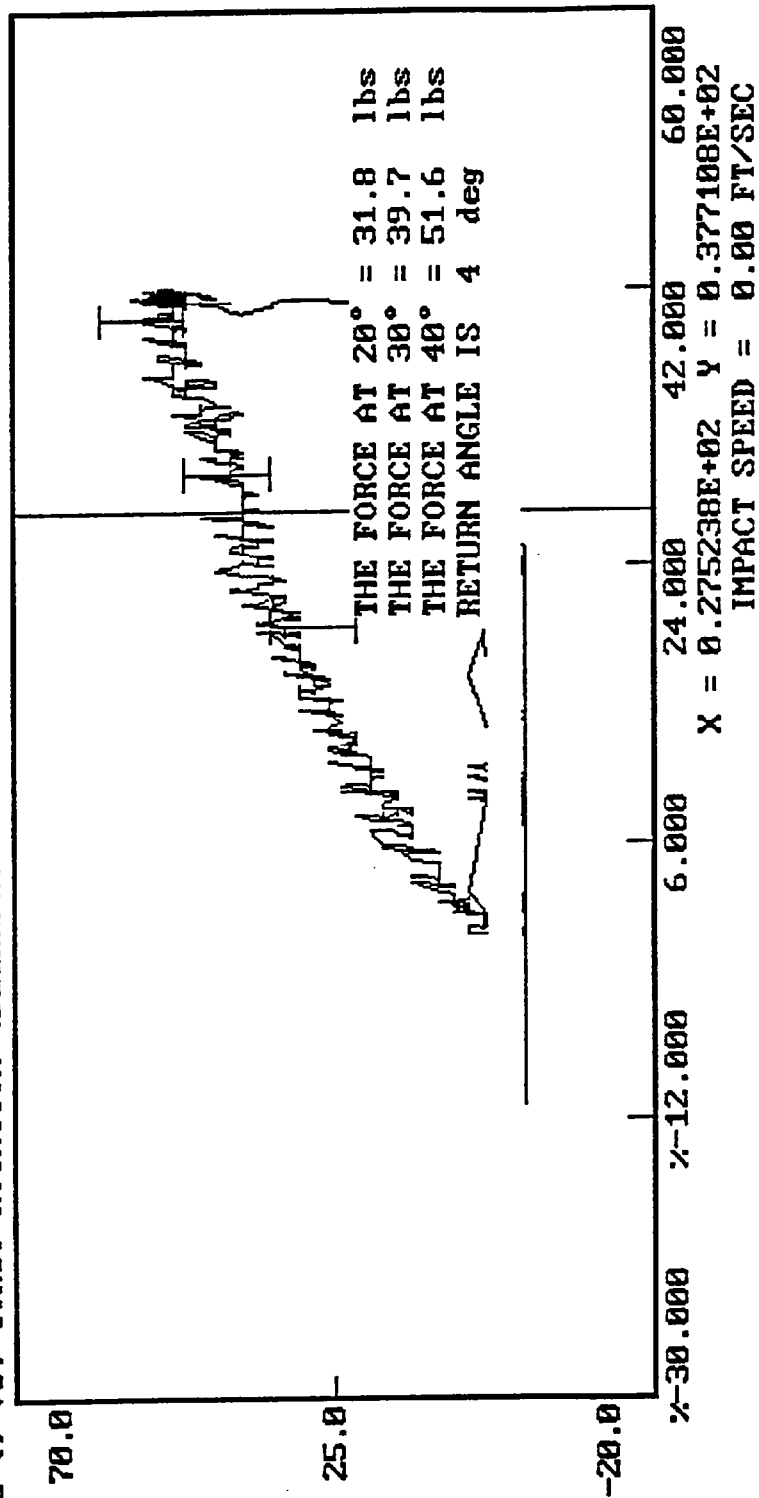
TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - LUMBAR FLEXION
 DUMMY # 269
 FORCE () VS. TORSO ROTATION (DEGREES)

06-20-1994 10:16



POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
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.: 271

DATE OF VERIFICATION: June 16, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75 - 20.5"	19.9
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.5
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	14.5

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 16, 1994

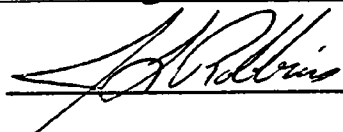
DUMMY NUMBER: 271

TEST NUMBER: D94142

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	55%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	40
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

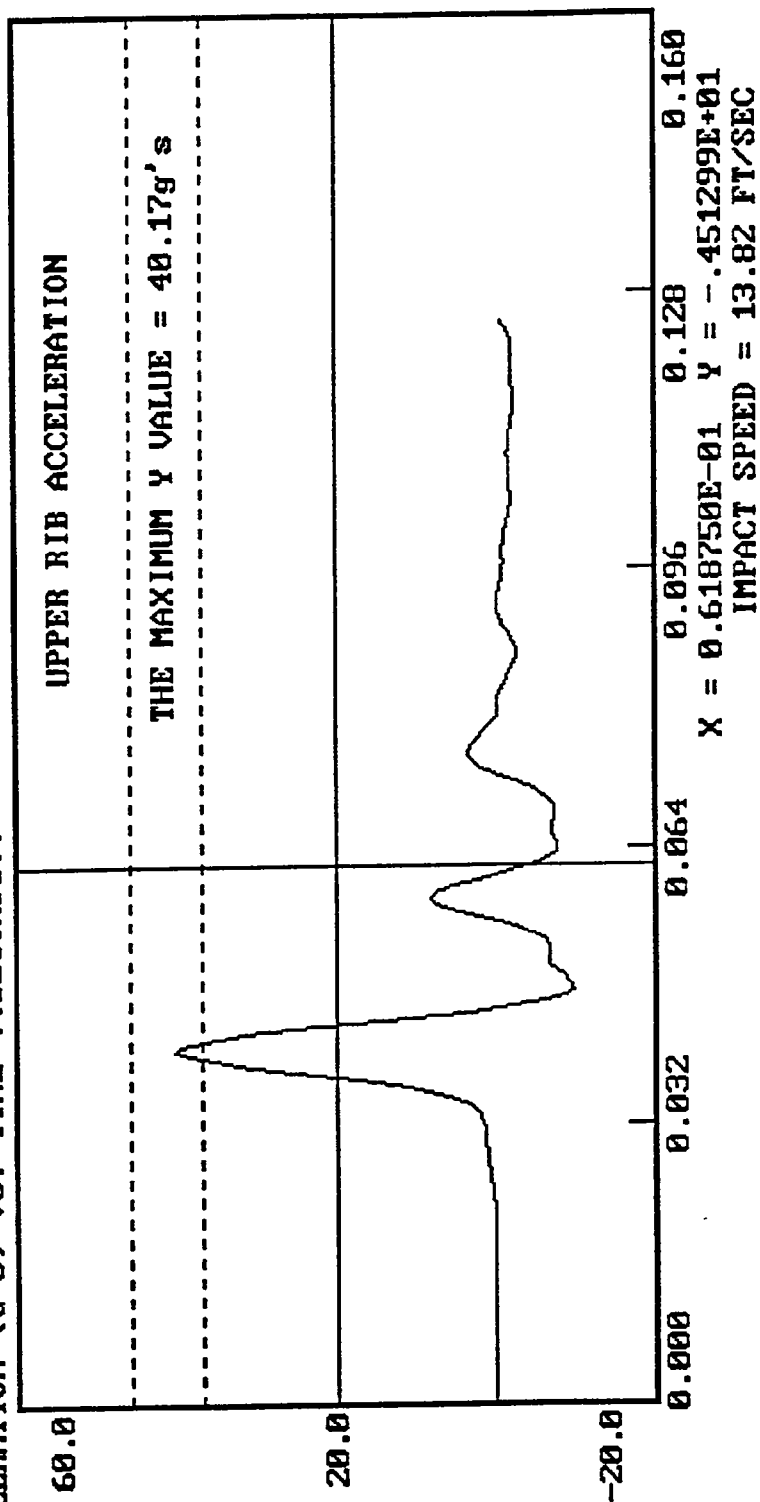
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

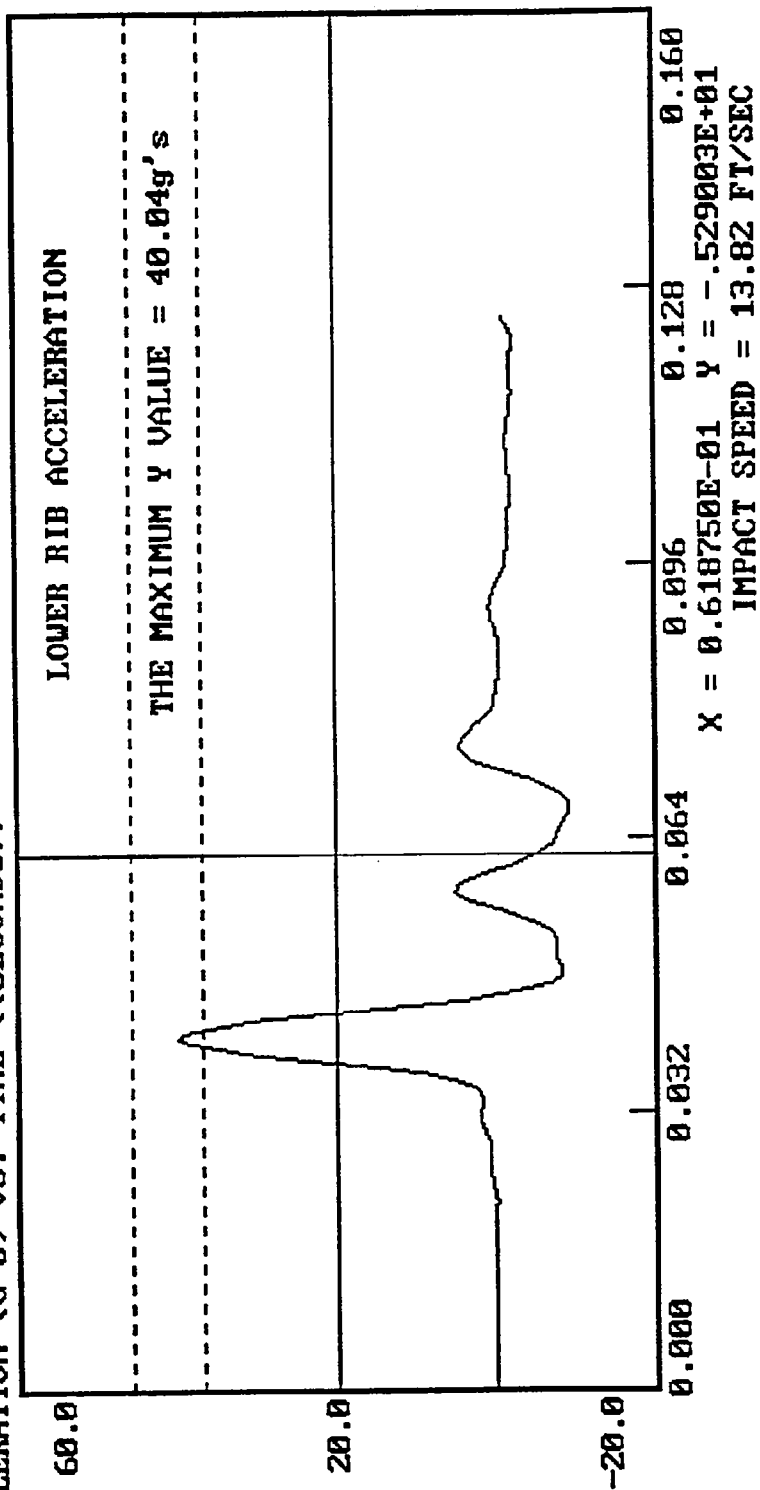
06-16-1994 11:27

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



06-16-1994 11:27

DUMMY CALIBRATION - THORAX IMPACT
DUMMY # Z71
ACCELERATION (G'S) VS. TIME ((SECONDS))

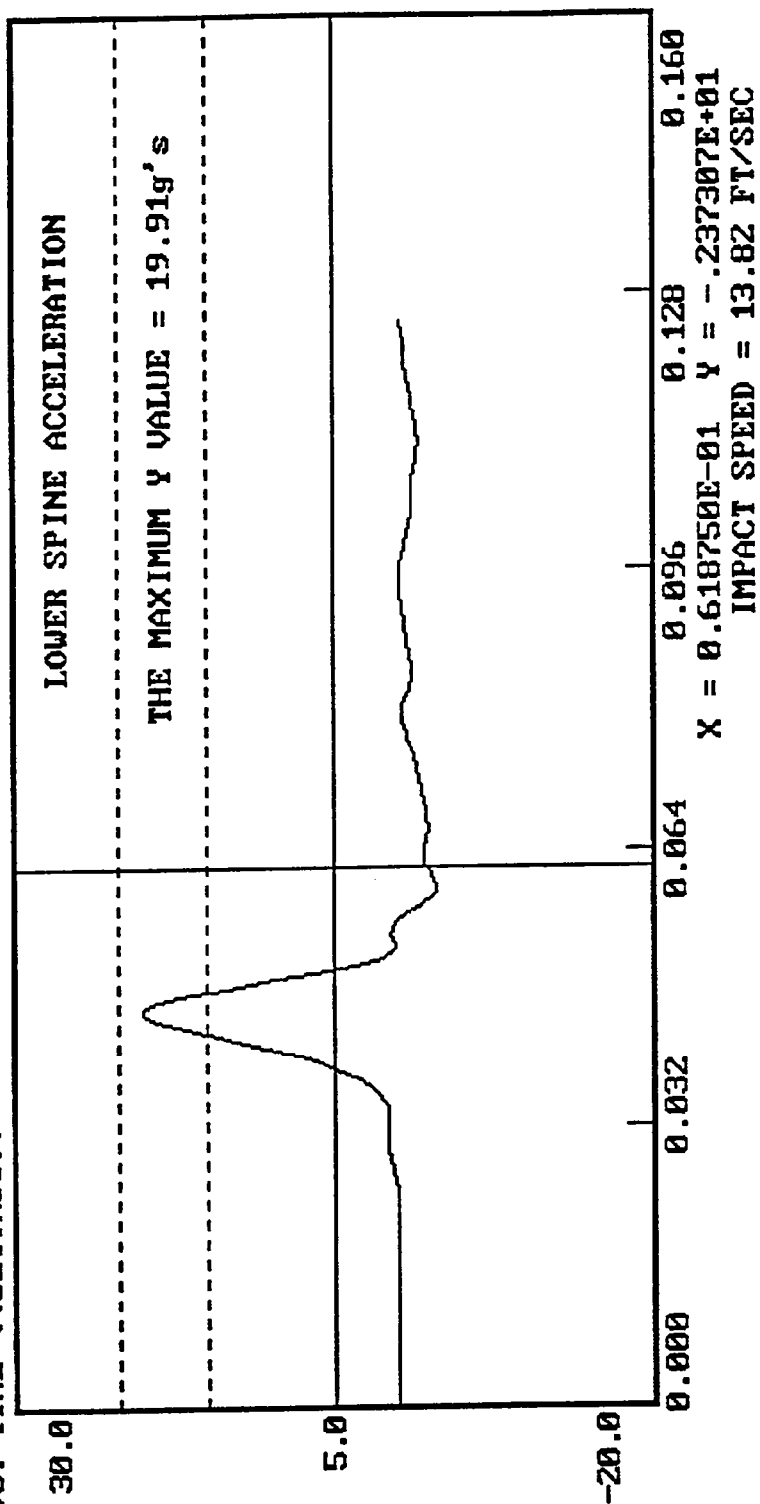


06-16-1994 11:27

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

() VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: June 16, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94143

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	69°
RELATIVE HUMIDITY	10 - 70%	55%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	59

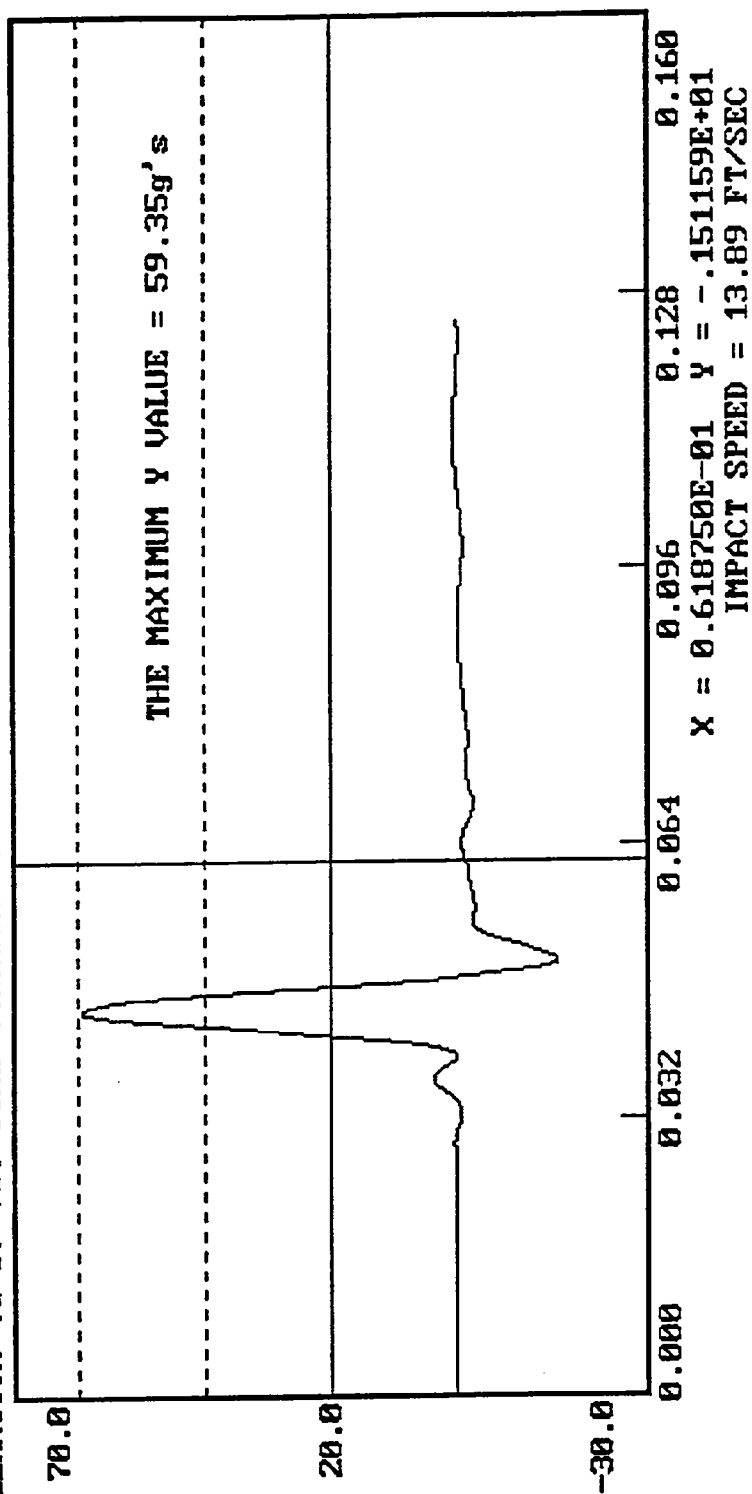
TEST MEETS SPECIFICATIONS

TECHNICIAN *Sha Chen*

APPROVED BY *J. Robbins*

06-16-1994 10:02

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



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

DATE: June 20, 1994

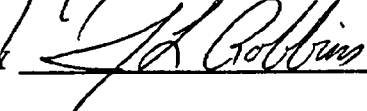
DUMMY NUMBER: 271

TEST NUMBER: D94144

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	62%
FORCE @ 0.5 in	23.3 - 36.5 lbs	28.0
FORCE @ 0.75 in	36.7 - 49.8 lbs	39.5
FORCE @ 1.0 in	50 - 63 lbs	54
FORCE @ 1.3 in	73 - 88 lbs	79

TEST MEETS SPECIFICATIONS

TECHNICIAN 

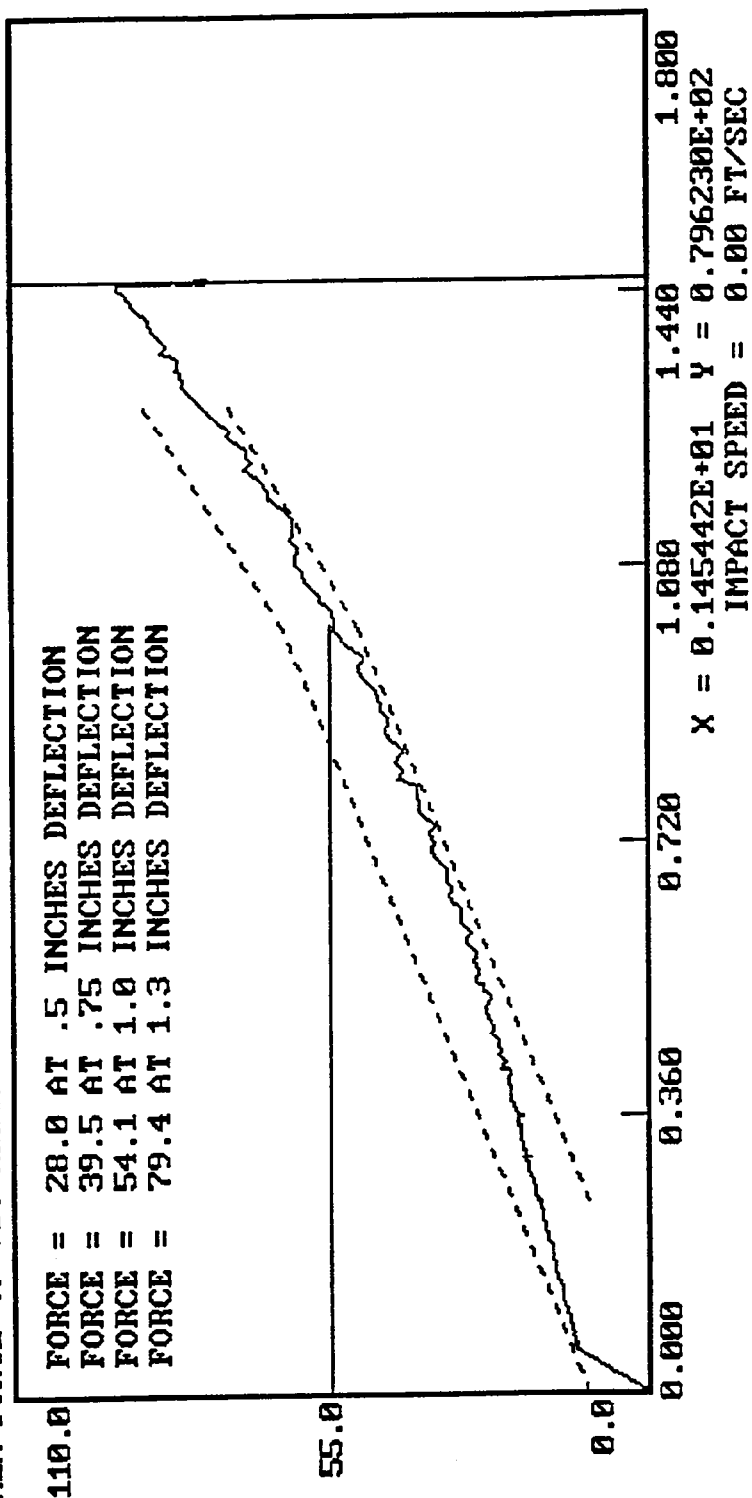
APPROVED BY 

06-20-1994 11:09

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

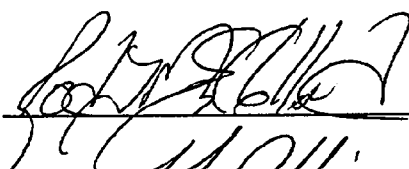
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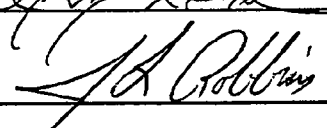
DUMMY NUMBER: 271

TEST NUMBER: D94145

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	62%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	32
FORCE @ 30°	34 - 46 lbs	44
FORCE @ 40°	46 - 58 lbs	56
RETURN ANGLE	12° maximum	5°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

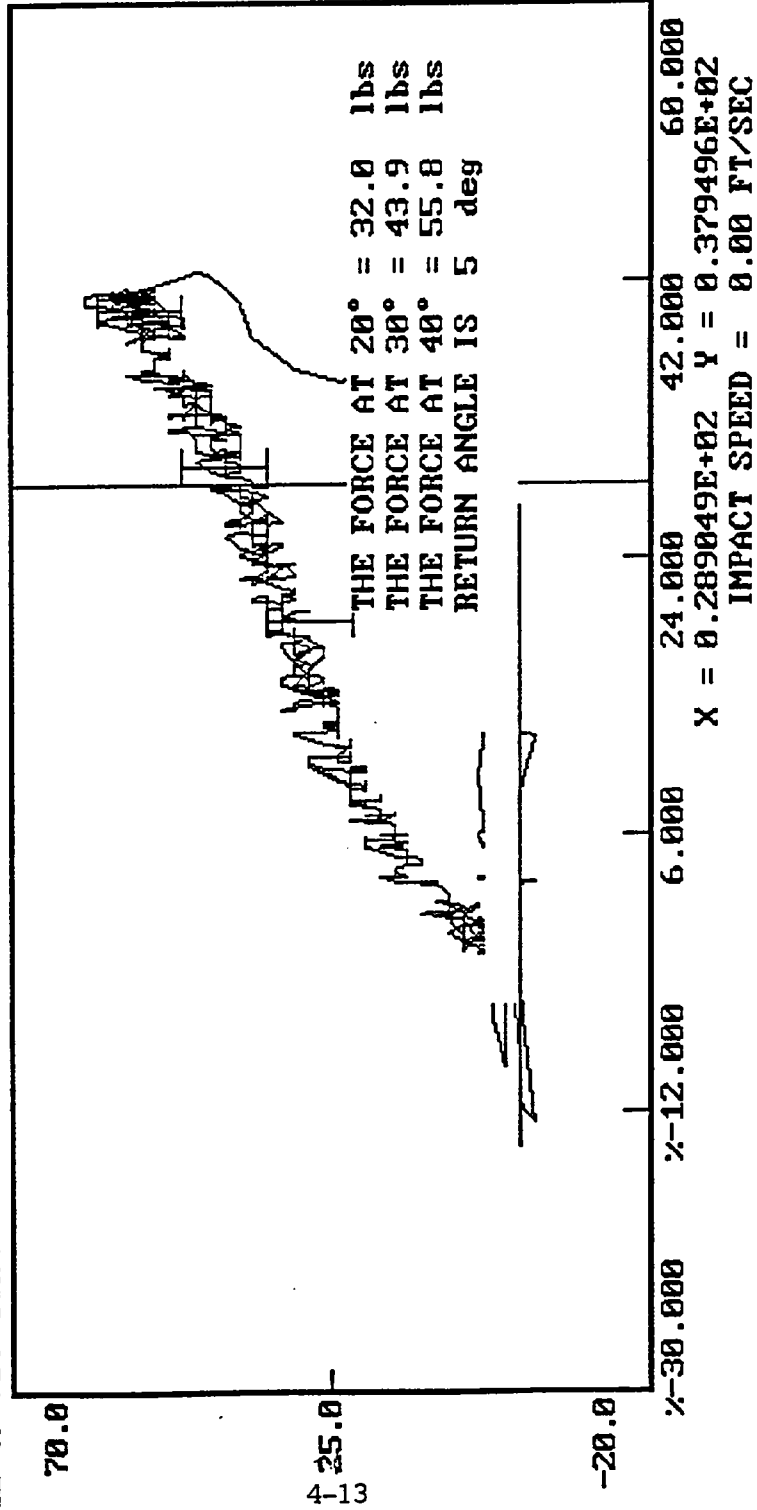
APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 271

FORCE () VS. TORSO ROTATION (DEGREES)

06-20-1994 10:47



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 269

Inspected By: Jeff Robbins

Date: June 16, 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: 271

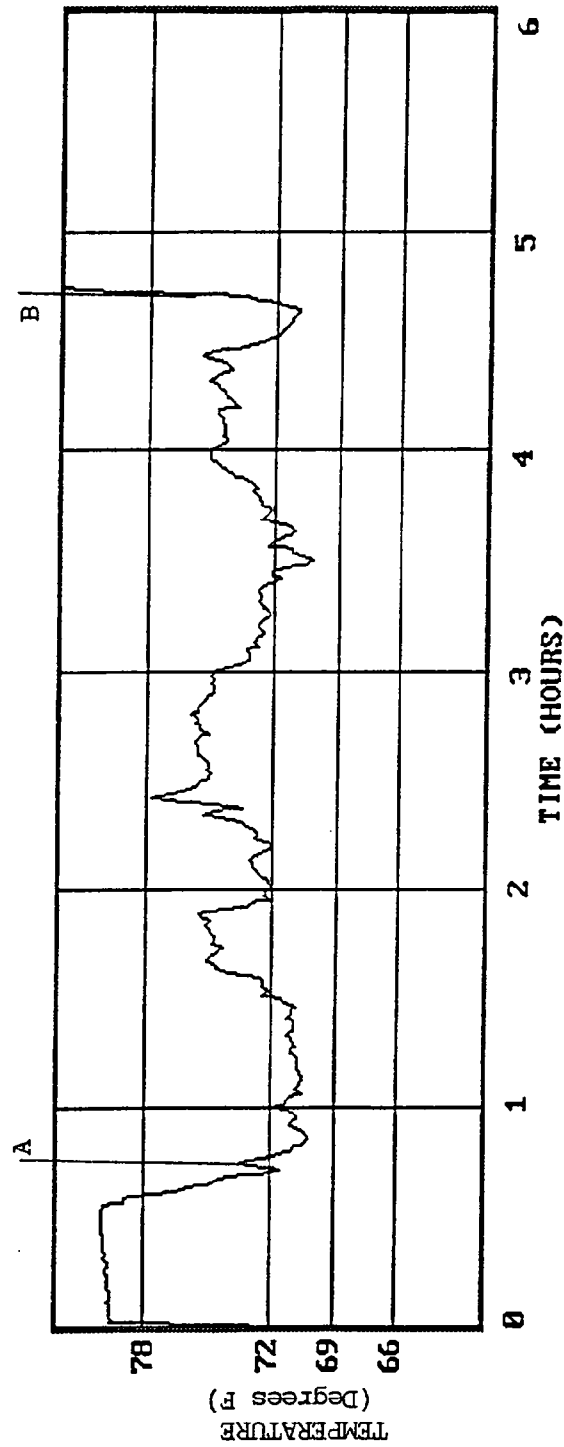
Inspected By: Jeff Robbins

Date: June 16, 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):

VEHICLE AND DUMMY TEMPERATURE



A = Dummies installed in vehicle
B = Test conducted

APPENDIX D
DUMMY AND VEHICLE CALIBRATION DATA

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	MGA146	Entran	June 2, 1994
Lower Left B-Post	AN47	Endevco	June 2, 1994
Upper Left B-Post	MGA114	Entran	June 2, 1994
Trunk Centerline X	MGA073	Entran	May 29, 1994
Trunk Centerline Y	MGA054	Entran	June 9, 1994
Trunk Centerline Z	MGA065	Entran	June 9, 1994
Driver Seat Track	MGA125	Entran	June 13, 1994
Right Front Sill X	MGA004	Entran	June 2, 1994
Right Front Sill Y	MGA078	Entran	June 9, 1994
Right Front Sill Z	MGA169	Entran	June 9, 1994
Right Rear Sill X	MGA117	Entran	June 2, 1994
Right Rear Sill Y	MGA058	Entran	June 2, 1994
Right Rear Sill Z	AO8M	Endevco	June 2, 1994
Right Rear Seat Occupant Compartment	A99L	Entran	June 2, 1994

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

**DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DRIVER DUMMY NO. 269**

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AHRY3	Endevco	June 10, 1994
Lower Rib	AHT11	Endevco	June 10, 1994
Lower Spine	AHT06	Endevco	June 10, 1994
Pelvis	AHTN7	Endevco	June 10, 1994
Upper Rib Redundant	AGTH6	Endevco	June 10, 1994
Lower Rib Redundant	AHTY4	Endevco	June 10, 1994
Lower Spine Redundant	AHT06	Endevco	June 10, 1994
Pelvis Redundant	AGTF7	Endevco	June 10, 1994

INSTRUMENTS FOR PASSENGER DUMMY NO. 271

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AHTT3	Endevco	June 10, 1994
Lower Rib	AHTY3	Endevco	June 10, 1994
Lower Spine	AHT12	Endevco	June 10, 1994
Pelvis	AGWA4	Endevco	June 10, 1994
Upper Rib Redundant	AGTP7	Endevco	June 10, 1994
Lower Rib Redundant	AHT20	Endevco	June 10, 1994
Lower Spine Redundant	AHTB2	Endevco	June 7, 1994
Pelvis Redundant	AHWK8	Endevco	June 10, 1994