

V2228

REPORT NO.: MGA-95-21414

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

GENERAL MOTORS CORPORATION
1995 GEO METRO 4 DOOR SEDAN
NHTSA NO: CS0119

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



MGA Ref. No.: G93A-02

Test Date: January 19, 1995

Report Date: February 1, 1995

FINAL REPORT

Prepared For:

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<table border="0"> <thead> <tr> <th></th> <th><u>Driver's SID</u></th> <th><u>Left Rear SID</u></th> </tr> </thead> <tbody> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>72 g's</td> <td>75 g's</td> </tr> <tr> <td>Pelvis Acceleration</td> <td>74 g's</td> <td>86 g's</td> </tr> <tr> <td>Upper Rib Acceleration</td> <td>66.7 g's</td> <td>59.0 g's</td> </tr> <tr> <td>Lower Rib</td> <td>53.9 g's</td> <td>66.0 g's</td> </tr> <tr> <td>Lower Spine</td> <td>76.7 g's</td> <td>83.7 g's</td> </tr> </tbody> </table>							<u>Driver's SID</u>	<u>Left Rear SID</u>	Thoracic Trauma Index (TTI)	72 g's	75 g's	Pelvis Acceleration	74 g's	86 g's	Upper Rib Acceleration	66.7 g's	59.0 g's	Lower Rib	53.9 g's	66.0 g's	Lower Spine	76.7 g's	83.7 g's
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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 Geo Metro 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 Geo Metro 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 33.3 mph (53.6 kph) on January 19, 1995. 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. The SID in the driver (Pos. #1) and left rear (Pos. #4) were placed 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. Dummy and vehicle calibration data can be found in Appendix D of this report.

The driver's Thoracic Trauma Index (TTI) was 72 g's. Maximum pelvic Y acceleration was 74 g's.

The left rear passenger's TTI was 75 g's. Maximum pelvic Y acceleration was 86 g's.

SECTION 3
SUMMARY OF TEST DATA

TABLE 1
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
 Vehicle NHTSA No.: CS0119 VIN: 2C1MR529X56718422
 Vehicle Body Color: Purple Month & Year of Manufacture: 11-94
 Engine Data: 4 cylinders; CID; 1.3 Liter; cc
 Placement Longitudinal; or X Lateral
 Transmission: 5 speed; X Manual; Automatic; Overdrive
 Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive
 Odometer Reading 62 miles
 Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; Pwr. Windows
 Power Seats; Tilt Wheel; Power Door Locks; Self Leveling System;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 22 Psi FRONT (220 kpa)
22 Psi REAR (220 kpa)
 Recommended Tire Size: 15580R13
 Tires on Test Vehicle: 15580R13 Manufacturer: Goodyear

Vehicle Capacity Data:

Number of Occupants: 2 Front; 2 Rear; 3rd Seat 4 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 = 688 lbs (A) (312.1 kg)
 No. of Occupants x 150 lbs. = 600 lbs (B) (272.2 kg)
 Cargo Capacity (A-B) = 88 lbs (39.9 kg)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>569</u> lbs (258.1 kg)	Right Rear	=	<u>423</u> lbs (191.9 kg)
Left Front	=	<u>601</u> lbs (272.6 kg)	Left Rear	=	<u>397</u> lbs (180.1 kg)
TOTAL FRONT	=	<u>1170</u> lbs (530.7 kg)	TOTAL REAR	=	<u>820</u> lbs (372.0 kg)
% of Total Vehicle Weight	=	<u>58.8</u> %;	% of Total Weight	=	<u>41.2</u> %
TOTAL WEIGHT	=	<u>1990</u> lbs (902.7 kg)			

TABLE 2
TEST VEHICLE DATA

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 1990 lbs (902.7 kg)
Cargo Carrying Capacity of Test Vehicle = 88 lbs (39.9 kg)
Weight of 2 Side Impact Dummies (2 x 178 lbs.) = 356 lbs (161.5 kg)
TEST VEHICLE TARGET WEIGHT: = 2434 lbs (1104.1 kg)

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front	= <u>604</u> lbs (274.0 kg)	Right Rear	= <u>544</u> lbs (246.8 kg)
Left Front	= <u>705</u> lbs (319.8 kg)	Left Rear	= <u>570</u> lbs (258.6 kg)
TOTAL FRONT	= <u>1309</u> lbs (593.8 kg)	TOTAL REAR	= <u>1114</u> lbs (505.4 kg)
% of Total Weight	= <u>54.0%</u>	% of Total Weight	= <u>46.0%</u>
TOTAL TEST WEIGHT	= <u>2423</u> lbs (1099.2 kg)		

TEST VEHICLE ATTITUDE (all dimensions in inches):

CURB WEIGHT ATTITUDE: in (mm)

Right Front 25.0 (635) Left Front 25.3 (642) Right Rear 25.6 (651) Left Rear 25.0 (635)

FULLY LOADED WEIGHT ATTITUDE: in (mm)

Right Front 24.9 (633) Left Front 24.2 (615) Right Rear 24.5 (622) Left Rear 23.9 (606)

TEST ATTITUDE: in (mm)

Right Front 24.4 (620) Left Front 24.5 (622) Right Rear 24.5 (622) Left Rear 24.1 (611)

Test Vehicle Wheelbase: 93.4 inches (2372 mm)

C.G. = 43.0 inches (1091 mm) rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side	= <u>154.4</u> in (3922 mm)
Centerline	= <u>165.4</u> in (4202 mm)
Left Side	= <u>154.4</u> in (3922 mm)

FIGURE 1
PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 8.3 in (210 mm)

Total Number of Adjustment Positions or Detents: 15

Test Position: 8th

(8th detent from front, 1st position being #1)

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 23.9° degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: Non-adjustable

Seat Back Adjustment Position: N/A

WINDOW POSITIONS:

Left Front closed Left Rear closed

Right Front open Right Rear open

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 = 10.6 gallons (40.1 liters)

Test Volume: 9.75 gallons (36.9 liters) 92% of capacity

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

Wheelbase: = 93.4 in (2372 mm)

Impact Point is 9.7 in (246 mm) rearward of front axle centerline

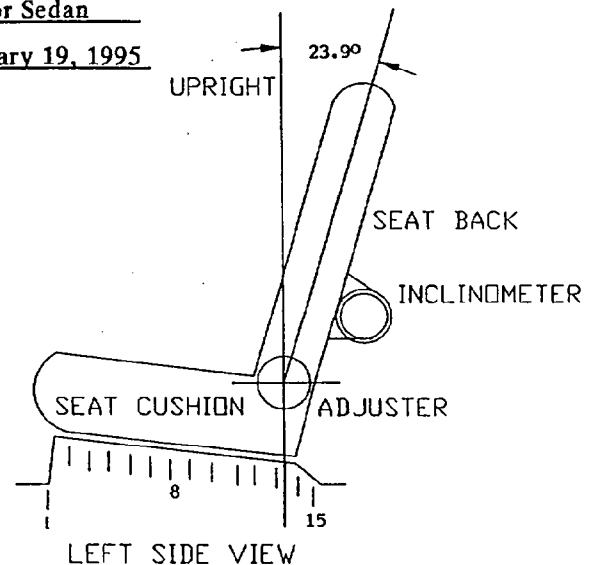


TABLE 3
CRASH TEST SUMMARY FOR TEST VEHICLE

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Overall Length = 165.4 in (4202 mm); Overall Width = 61.8 in (1570 mm)

TEST WEIGHT:

Right Front = 604 lbs (274.1 kg) Right Rear = 544 lbs (246.8 kg)

Left Front = 705 lbs (319.8 kg) Left Rear = 570 lbs (258.6 kg)

TOTAL FRONT = 1309 lbs (593.8 kg) TOTAL REAR = 1114 lbs (505.4 kg)

% of Total Weight = 54.0 % % of Total Weight = 46.0 %

TOTAL VEHICLE WEIGHT 2423 lbs (1099.2 kg)

Wheelbase = 93.4 in (2372 mm)

Longitudinal C.G. front Center of Front Axle = 43.0 in (1091 mm)

Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (264 mm above ground) = 185 mm

2. LEVEL 2 (456 mm above ground) = 292 mm

3. LEVEL 3 (540 mm above ground) = 277 mm

4. LEVEL 4 (831 mm above ground) = 193 mm

5. LEVEL 5 (1291 mm above ground) = 59 mm

Maximum Post-Test Intrusion = 277 mm

OCCUPANTS:

	<u>Left Front Passenger</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>type 2 lap &</u> <u>shoulder belt</u> <u>with airbag</u>	<u>type 2 lap &</u> <u>shoulder belt</u>

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>17</u>
Number of Cameras: Onboard Vehicle	=	<u>3</u>
Offboard Vehicle	=	<u>5</u>
Deformable Barrier	=	<u>2</u>
TOTAL	=	<u>10</u>

TABLE 4
CRASH TEST SUMMARY FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	= <u>49.3</u> in (1252.2 mm)
Overall Length of MDB (incl. honeycomb impact face)	= <u>162</u> in (4114.8 mm)
Wheelbase of Framework Carriage	= <u>102</u> in (2590.1 mm)
Tread of Framework Carriage (Front & Rear)	= <u>74</u> in (1879.6 mm)
C.G. Location Rearward of Front Axle	= <u>43.4</u> in (1102.4 mm)
C.G. Location From Center Line	= <u>-0.3</u> in (-7.62 mm)
C.G. Location Above Ground Level	= <u>19.2</u> in (487.7 mm)

MDB WEIGHT:

Left Front	= <u>1095</u> lbs (496.7 kg)	Left Rear	= <u>413</u> lbs (187.3 kg)
Right Front	= <u>624</u> lbs (283.0 kg)	Right Rear	= <u>858</u> lbs (389.2 kg)
TOTAL FRONT	= <u>1719</u> lbs (779.7 kg)	TOTAL REAR	= <u>1271</u> lbs (576.5 kg)
TOTAL MDB WEIGHT	= <u>2990</u> lbs (1356.2 kg)		

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

Impact Speed = Primary: 33.3 mph (53.6 kph) Secondary: 33.2 mph (53.4 kph)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1.	Row A Top of Stack (33 in)	= <u>119</u> mm
2.	Row B Mid Stack (27 in)	= <u>69</u> mm
3.	Row C Top of Bumper (21 in)	= <u>56</u> mm
4.	Row D Center of Bumper (17 in)	= <u>71</u> mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

TABLE 5
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Unknown</u>	<u>to C Post</u>
Arm	<u>to rear of door, top of armrest</u>	<u>to rear of rear</u>
Pelvis	<u>to armrest</u>	<u>to armrest</u>
Left Knee	<u>to window crank, mid door</u>	<u>to armrest, window crank</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 0 mm forward Vertical: 8 mm low

ARM REST LOCATIONS:

Front: 228 mm below window opening
Rear: 250 mm below window opening

SEAT CRUSH:

Driver Seat Back: 51 mm Driver Seat Cushion: 53 mm
Left Rear Seat Back: 4 mm Left Rear Seat Cushion: 78 mm

GLAZING DAMAGE:

Driver and left rear passenger window broke, windshield cracked

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

No separation noted

OTHER NOTABLE IMPACT EFFECTS:

None noted

SECTION 4
OCCUPANT AND VEHICLE INFORMATION



SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

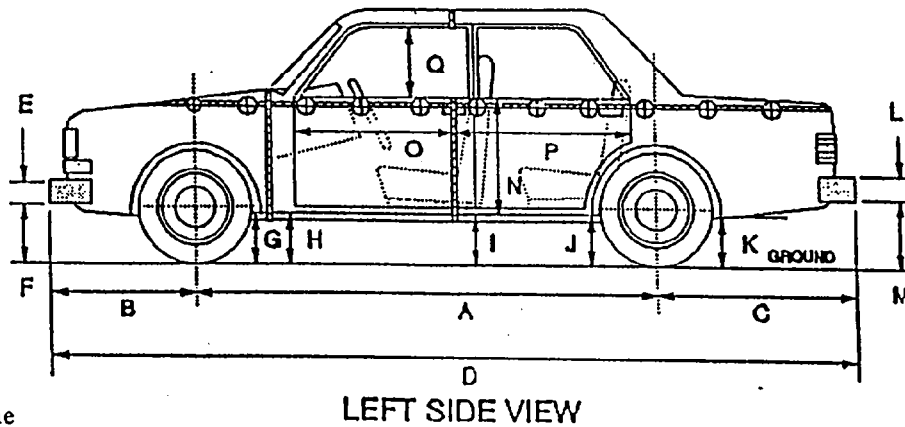
4-2

Positive Direction - Longitudinal (X) = forward

Vertical (Z) = up

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

FIGURE 2
PRE- AND POST-TEST MEASUREMENTS



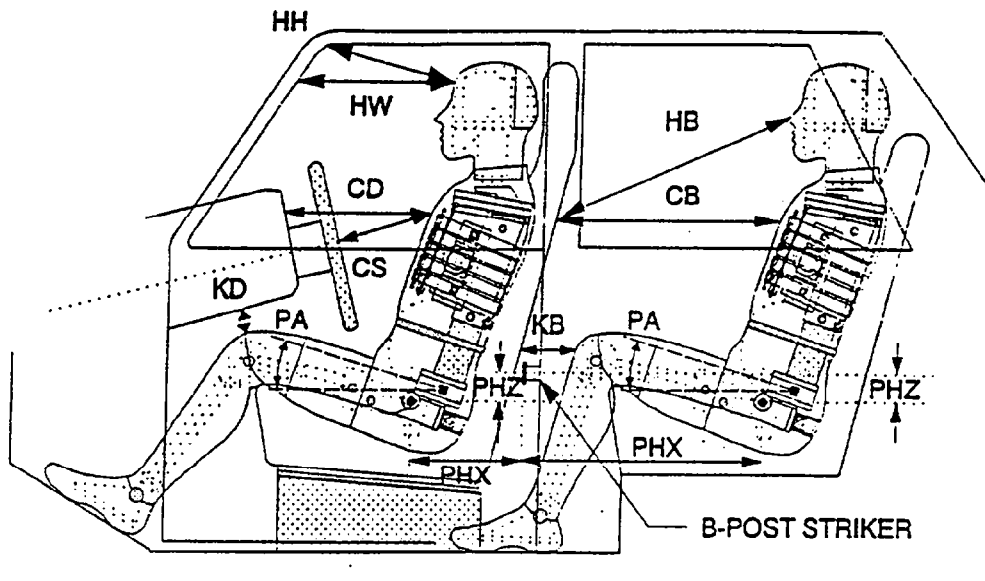
D = Length at Centerline
R = Right Side Length
S = Left Side Length
T = Width at B Post
E & L = Bumper Thickness

J1 = To Pinch Weld
J2 = To Sill

Units: mm

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	2372	2322	50
B	862	860	2
C	968	959	9
D	4202	4141	61
E	109	109	0
F	410	430	20
G	208	191	17
H	183	222	39
I	190	186	4
J1/J2	200/197	208/196	8/1
K	262	254	8
L	348	348	0
M	294	284	10
N	590	555	35
O	660	652	8
P	1333	1284	49
Q	405	405	0
R	3922	3922	0
S	3922	3905	17
T	1570	1422	148

FIGURE 3
SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

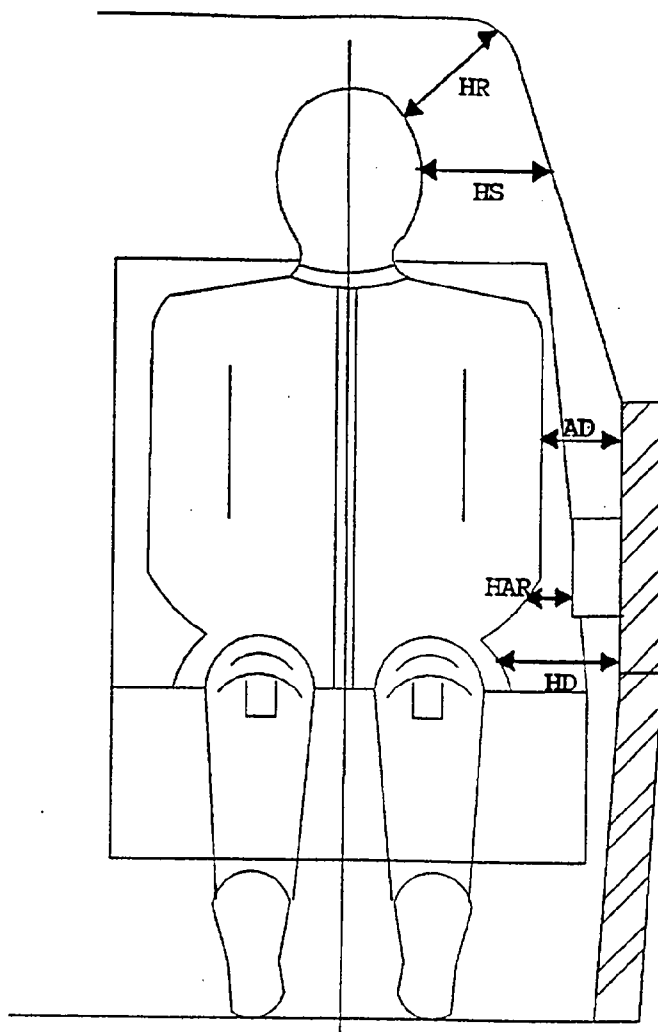
NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

NOTE: All dimensions are in mm

	DRIVER ID #270	LEFT REAR PASSENGER ID #271	
HH	422	N/A	
HW	649	N/A	
HS	N/A	559	
CD	536	CB	450
CS	360	N/A	
KDL	81	KBL	85
KDR	78	KBR	90
PA°	23.4°	24.0°	
PHX	187	300	
PHZ	127	274	

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



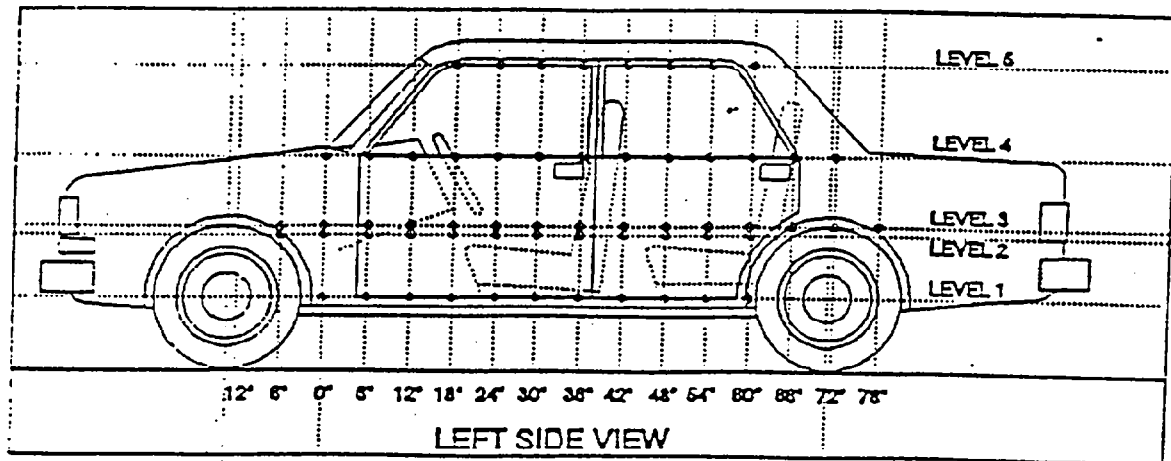
NOTE: All dimensions are in mm

	DRIVER ID #270	LEFT REAR PASSENGER ID #271
HR	100	74
HS	222	115
AD	63	35
HD	97	97

FIGURE 5
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995



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>1291</u> mm
Level 4 @ Window Sill	= <u>831</u> mm
Level 3 @ Mid Door	= <u>540</u> mm
Level 2 @ Occupant H-Point	= <u>456</u> mm
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>264</u> mm

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

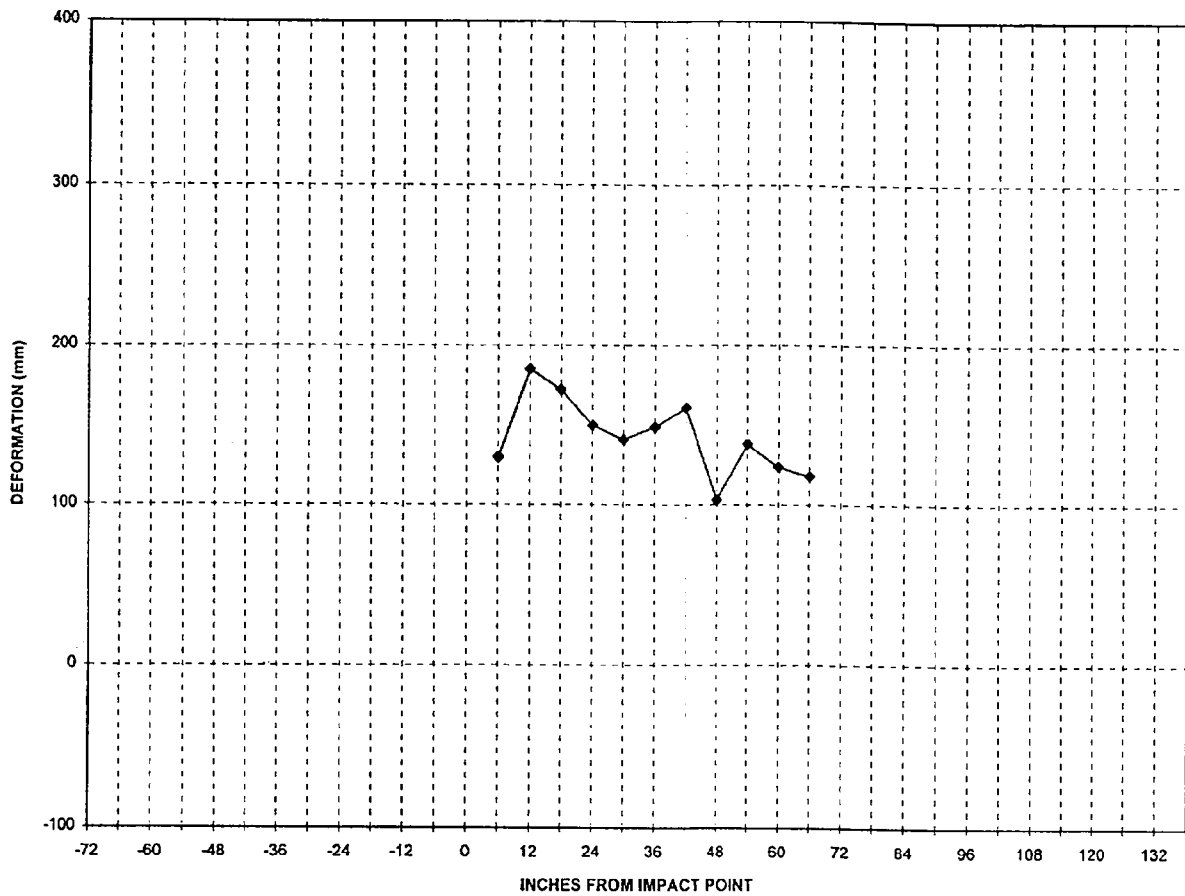
LEVEL 1 AT AXLE CENTER LINE

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door SedanVehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	---	---	---
6	991	1121	130 (impact point)
12	996	1181	185
18	1000	1172	172
24	1005	1155	150
30	1005	1146	141
36	1004	1153	149
42	1005	1166	161
48	1005	1108	103
54	1005	1143	138
60	998	1122	124
66	998	1116	118
72	---	---	---
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

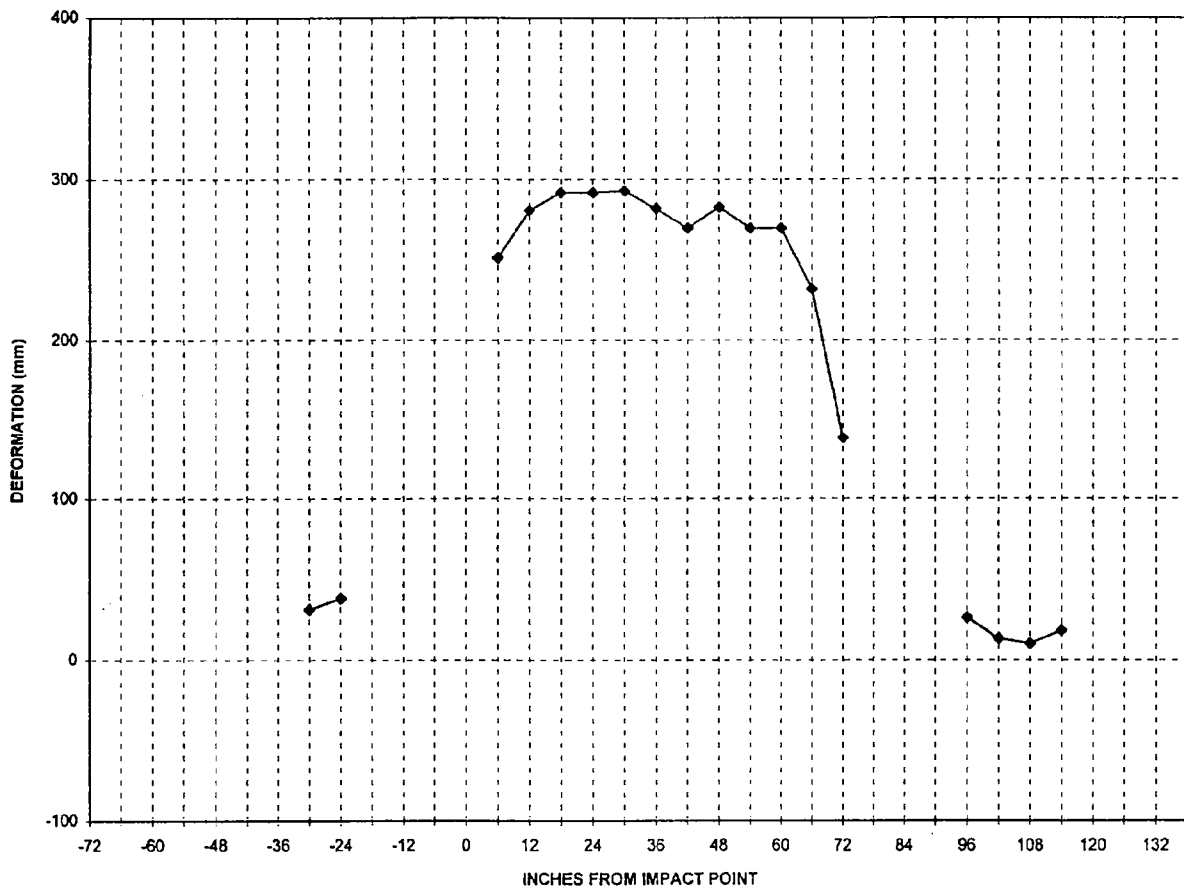
Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
 Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	1005	1036	31
-24	976	1014	38
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	---	---	---
6	960	1211	251
12	960	1240	280
18	960	1251	291
24	960	1251	291
30	959	1251	292
36	959	1240	281
42	959	1228	269
48	958	1240	282
54	956	1225	269
60	953	1222	269
66	953	1185	232
72	953	1091	138
78	---	---	---
84	---	---	---
90	---	---	---
96	954	980	26
102	973	986	13
108	992	1002	10
114	1035	1053	18
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---
144	---	---	---

(impact point)

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

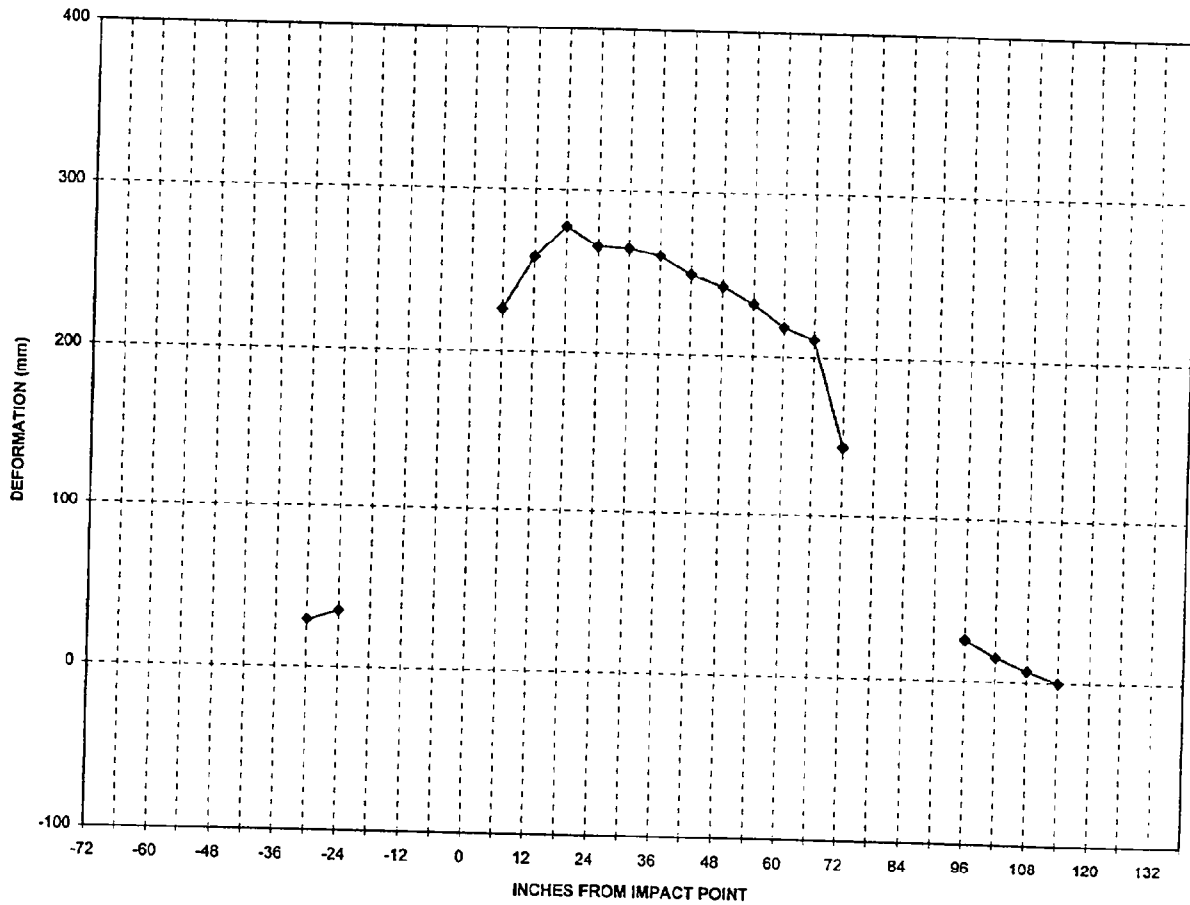
Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door SedanVehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	996	1025	29
-24	976	1011	35
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	---	---	---
6	956	1182	226
12	957	1215	258
18	957	1234	277
24	957	1222	265
30	956	1220	264
36	955	1215	260
42	953	1202	249
48	953	1195	242
54	954	1186	232
60	954	1172	218
66	951	1162	211
72	952	1096	144
78	---	---	---
84	---	---	---
90	---	---	---
96	951	976	25
102	963	978	15
108	984	991	7
114	1026	1026	0
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---

(impact point)

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

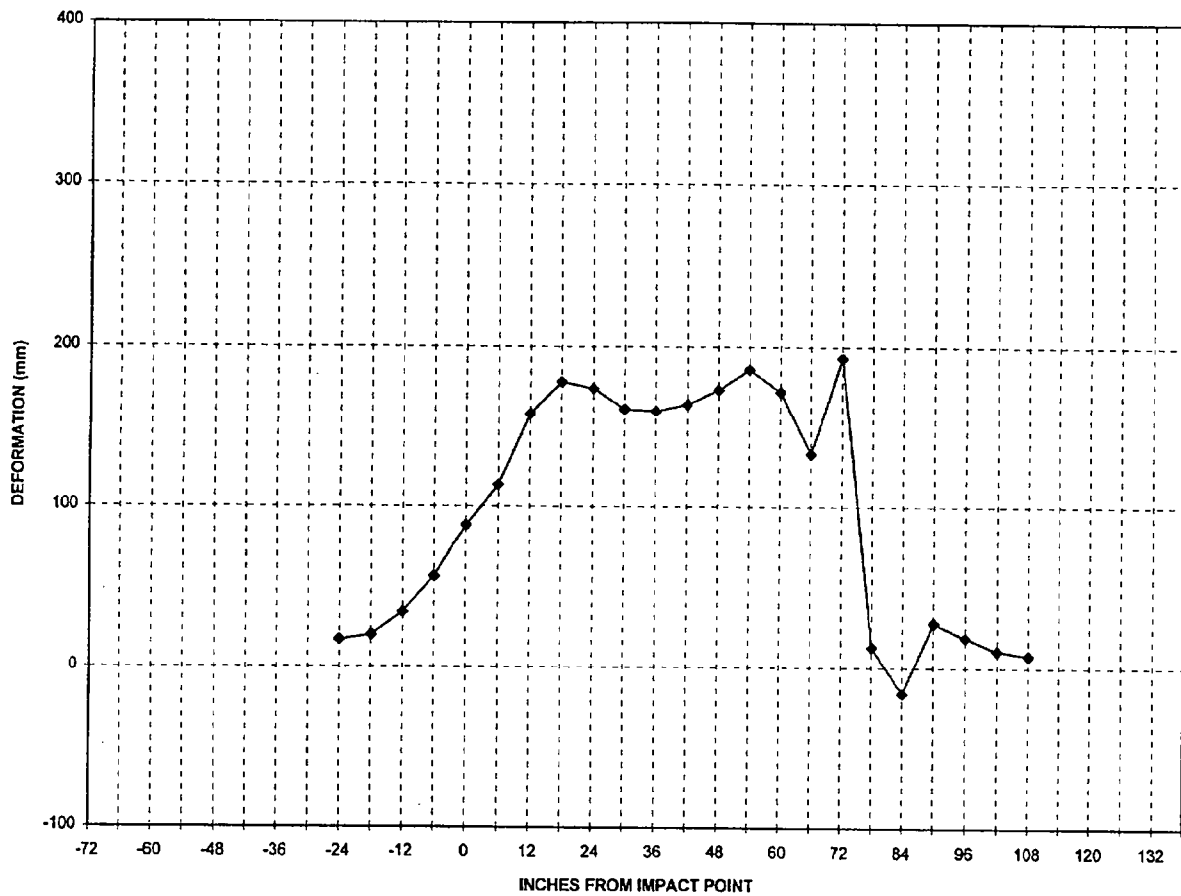
LEVEL 4 AT WINDOW SILL

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
 Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	---	---	---
-24	1073	1090	17
-18	1051	1071	20
-12	1026	1060	34
-6	1014	1070	56
0	1002	1090	88 (impact point)
6	1002	1115	113
12	1001	1159	158
18	998	1176	178
24	998	1172	174
30	1000	1161	161
36	1000	1160	160
42	1002	1166	164
48	999	1172	173
54	999	1185	186
60	1000	1172	172
66	1002	1135	133
72	1002	1195	193
78	1027	1040	13
84	1022	1006	-16
90	1022	1050	28
96	1031	1050	19
102	1045	1056	11
108	1063	1071	8
114	---	---	---
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---
144	---	---	---

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

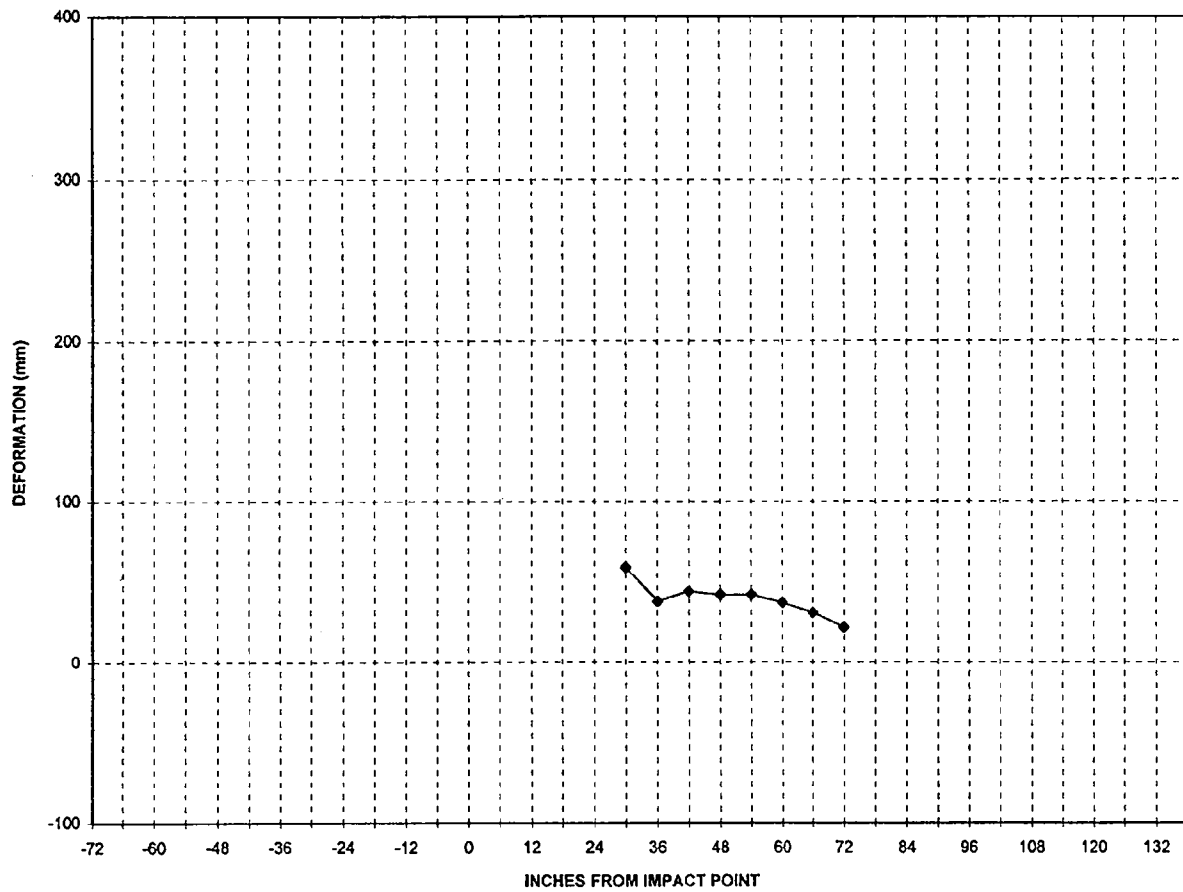
Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door SedanVehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)
-72	---	---	---
-66	---	---	---
-60	---	---	---
-54	---	---	---
-48	---	---	---
-42	---	---	---
-36	---	---	---
-30	---	---	---
-24	---	---	---
-18	---	---	---
-12	---	---	---
-6	---	---	---
0	---	---	---
6	---	---	---
12	---	---	---
18	---	---	---
24	---	---	---
30	1230	1289	59
36	1252	1290	38
42	1256	1300	44
48	1254	1296	42
54	1259	1301	42
60	1262	1299	37
66	1270	1301	31
72	1278	1300	22
78	---	---	---
84	---	---	---
90	---	---	---
96	---	---	---
102	---	---	---
108	---	---	---
114	---	---	---
120	---	---	---
126	---	---	---
132	---	---	---
138	---	---	---

(impact point)

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

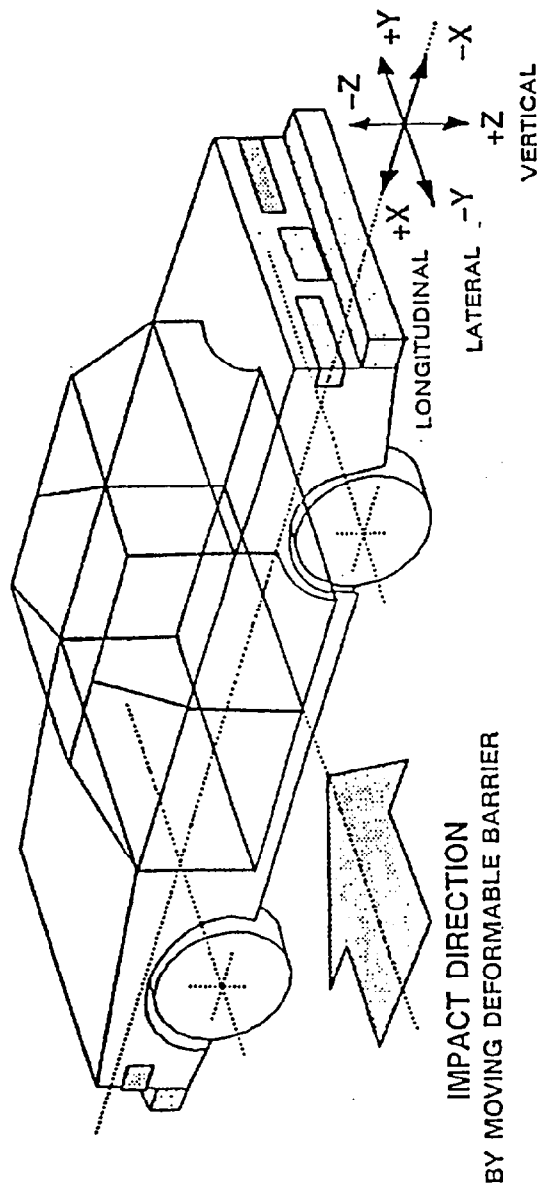
FIGURE 6
VEHICLE EXTERIOR STATIC CRUSH



LEVEL 5 AT WINDOW TOP

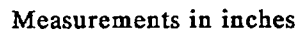
FIGURE 7
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
 Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995



1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

A = 15.1
B = 22.0
C = 66.2
D = 66.1
E = 66.2



Right	Left
A = <u>10.9</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 IMPACTOR
Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan
Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

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 (mm)	Crush inches (mm)	Crush inches (mm)	Crush inches (mm)
32"	1.5 (38)	1.5 (38)	2.2 (56)	2.8 (71)
28"	.4 (10)	1.6 (41)	1.6 (41)	2.3 (58)
24"	.2 (5)	.1 (3)	1.3 (33)	1.9 (54)
20"	.2 (5)	.1 (3)	1.3 (33)	1.7 (483)
16"	.2 (5)	.1 (3)	1.2 (30)	1.7 (43)
12"	.2 (5)	.1 (3)	1.2 (30)	1.7 (43)
8"	.2 (5)	0 (0)	1.1 (28)	1.6 (41)
4"	.2 (5)	0 (0)	1.2 (30)	1.6 (41)
0"	.3 (8)	0 (0)	1.2 (30)	1.5 (38)
4"	.4 (10)	.1 (3)	1.2 (30)	1.5 (38)
8"	.4 (10)	.1 (3)	1.2 (30)	1.4 (36)
12"	.5 (13)	.1 (3)	1.2 (30)	1.3 (33)
16"	.8 (20)	.1 (3)	1.2 (30)	1.3 (33)
20"	1.1 (28)	.2 (5)	1.2 (30)	1.3 (33)
24"	1.5 (38)	.6 (15)	1.3 (33)	1.5 (38)
28"	3.0 (76)	1.9 (48)	1.5 (38)	1.6 (41)
32"	4.7 (119)	2.7 (69)	1.6 (41)	1.4 (36)

Right

Left

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1995/Geo/Metro/4 Door SedanVehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Rt. Side Sill @ Front Seat	2439	615	307	2.7	5.6	30.2	3.3	7.2	4.8	31.0
2	Rt. Side Sill @ Rear Seat	1683	620	312	2.7	7.2	28.2	2.7	5.1	8.1	29.2
3	Rr. Floorpan Above Axle	992	30	325	3.1	9.7	30.7	3.8	6.8	7.5	32.2
4	Left Side Sill @ Rr. Seat	1730	-630	235	---	---	34.4	6.7	---	---	---
5	Left Side Sill @ Frt. Seat	2342	-630	227	---	---	38.3	20.2	---	---	---
6	Left Lower A-Post	2865	-640	400	---	---	138.6	34.3	---	---	---
7	Left Mid A-Post	2882	-695	685	---	---	60.9	2.2	---	---	---
8	Left B-Post Lower	1844	-640	410	---	---	279.0	19.1	---	---	---
9	Left B-Post Mid	1869	-625	825	---	---	193.2	61.9	---	---	---
10	Right Rear Occupant Compartment	1594	293	340	---	---	31.6	2.4	---	---	---
11	Driver Left Seat Track	1964	-534	280	---	---	88.7	24.7	---	---	---

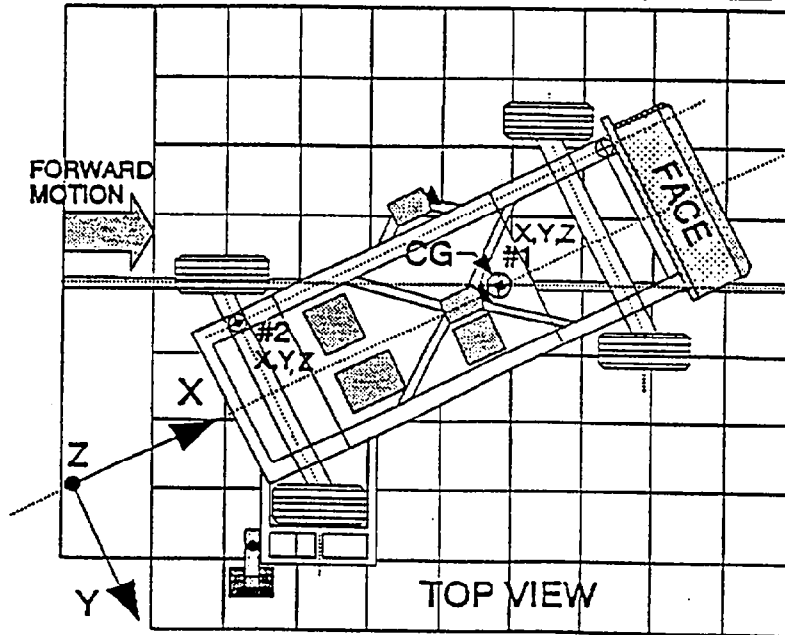
*Reference: X - Rear Bumper (+ Forward)
Y - Vehicle Centerline (+ To right)
Z - Ground Level (+ Up)

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995



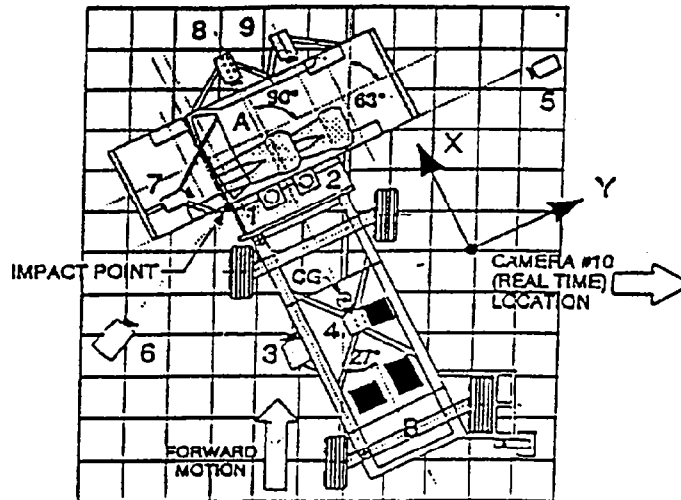
Accel. No.	Location	Coordinates (mm)			Pos. Direct.		Neg. Direct.	
					Max	Time	Max	Time
		X	Y	Z	(g)	(msec)	(g)	(msec)
1	MDB Center of Gravity							
	Longitudinal ... X				2.0	134	14.3	35
	Lateral Y	-1092	0	483	0.9	143	8.2	35
	Vertical Z				5.2	49	13.8	26
	Resultant R				21.0	35	0.2	-19
2	Rear Frame Member							
	Longitudinal ... X	-2591	-625	622	1.4	189	20.7	37
	Lateral Y				6.4	21	0.6	193

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/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995



Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
	Real Time					13	24
1	Top Impact	-350	850	5420		13	995
2	Top Wide	700	0	5130		8	1010
3	Cart Pointer					35	803
4	Cart					13	1000
5	Left Impact	2100	2580	1490	90°	13	1010
6	Rear Impact	3640	7420	1020	90°	25	1087
7	Onboard Driver					7.5	935
8	Onboard Hood					13	1000
9	Onboard Passenger					8	893

* 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: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

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

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 33.3 mph (53.6 kph)

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:

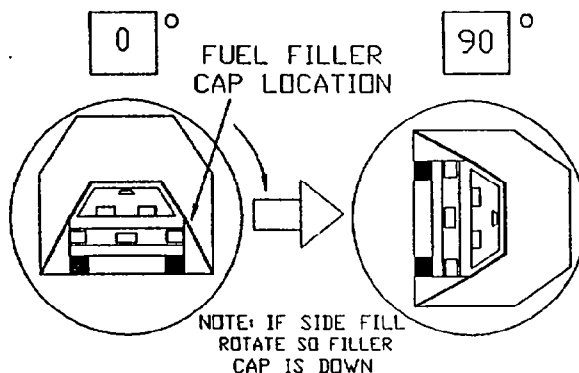
None

TABLE 11
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

TEST PHASE: 0° - 90°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 43 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 43 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.

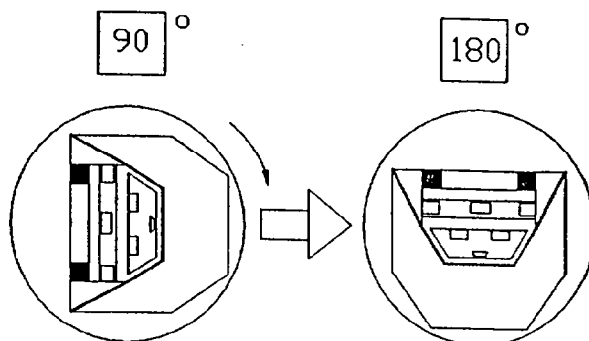
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

TEST PHASE: 90° - 180°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 29 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 29 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.

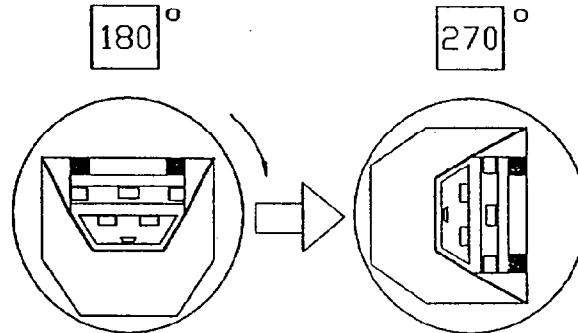
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

TEST PHASE: 180° - 270°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 18 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 18 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.

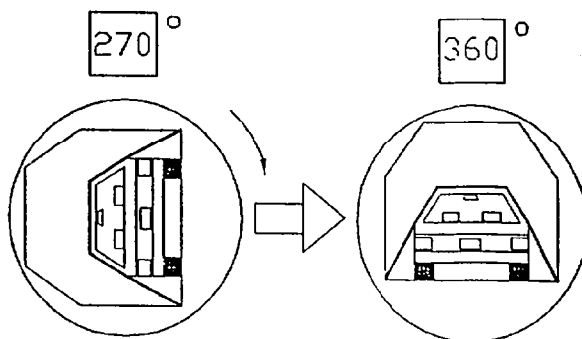
IV. SOLVENT SPILLAGE LOCATIONS(S): None

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

Year/Make/Model/Body Style: 1995/Geo/Metro/4 Door Sedan

Vehicle NHTSA No.: CS0119 TEST DATE: January 19, 1995

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

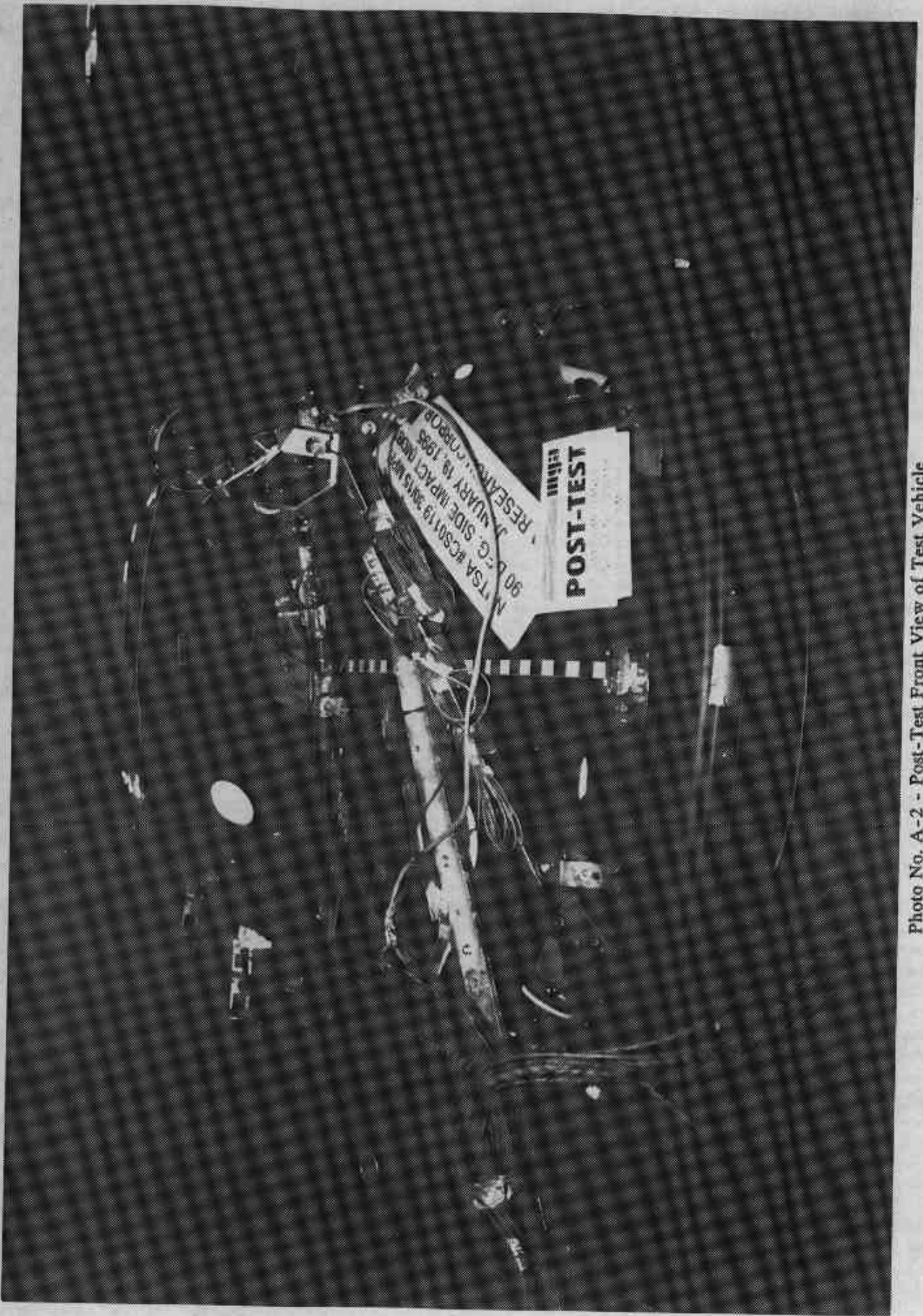


Photo No. A-2 - Post-Test Front View of Test Vehicle

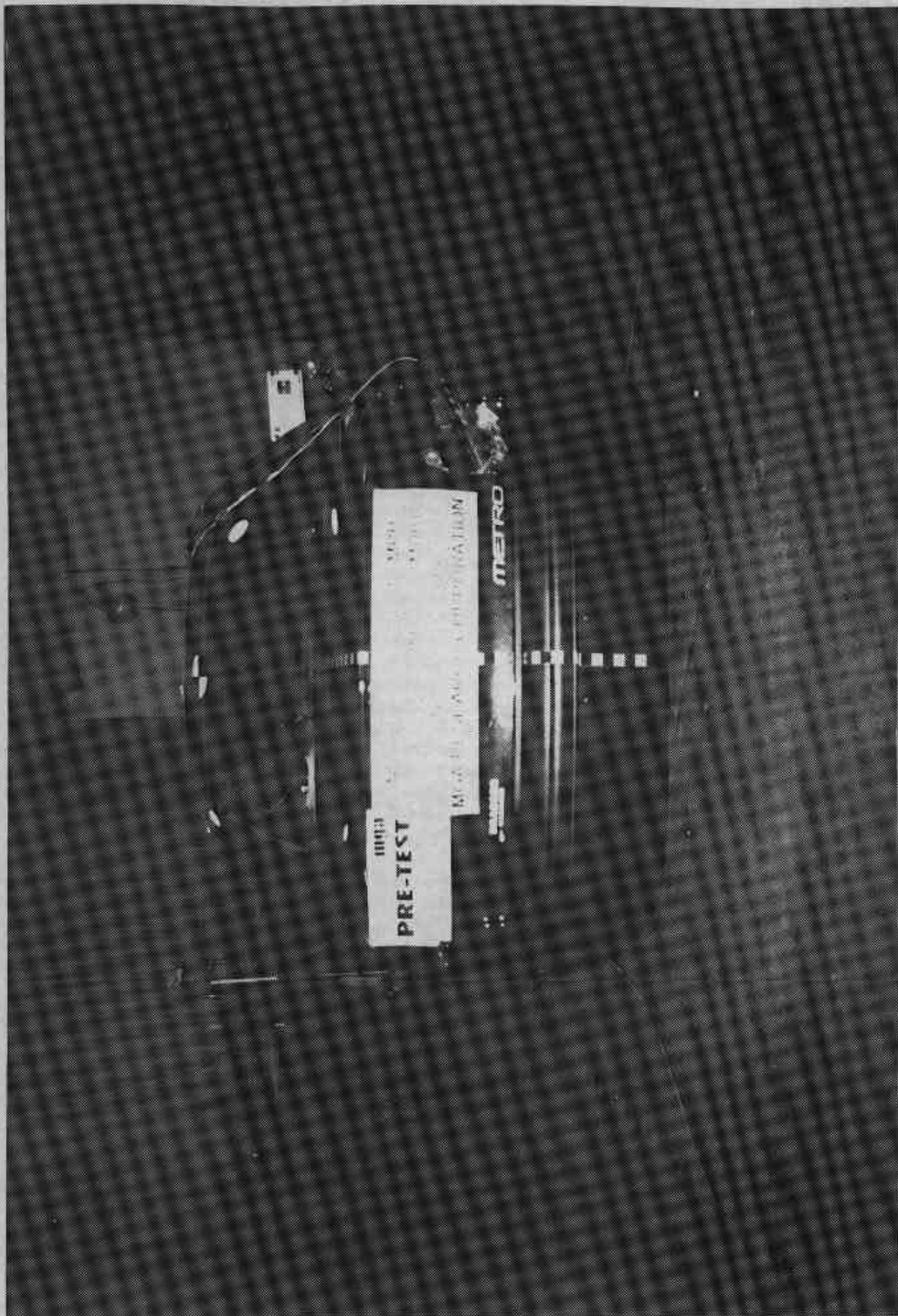


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

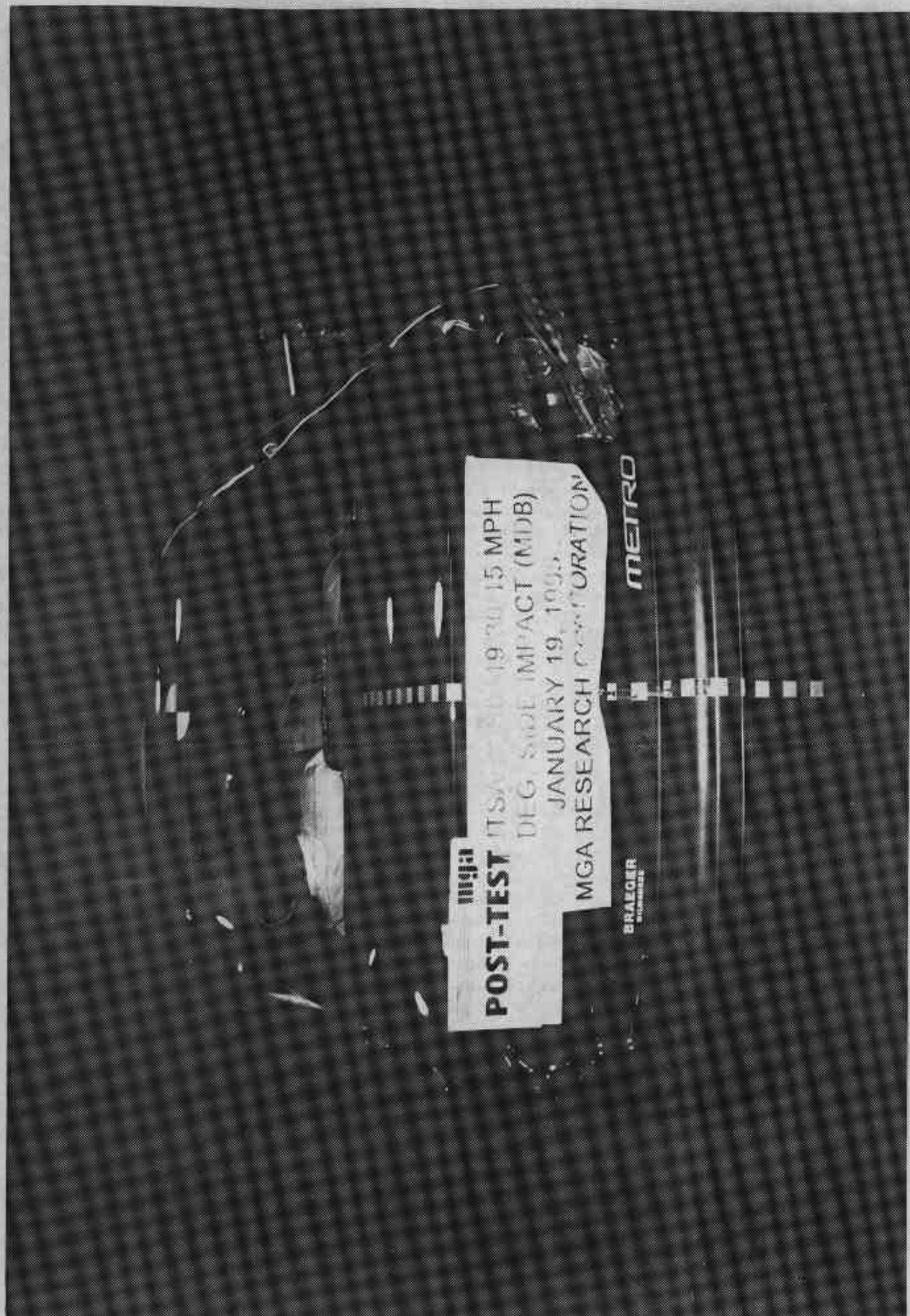


Photo No. A-4 - Post-Test Rear View of Test Vehicle

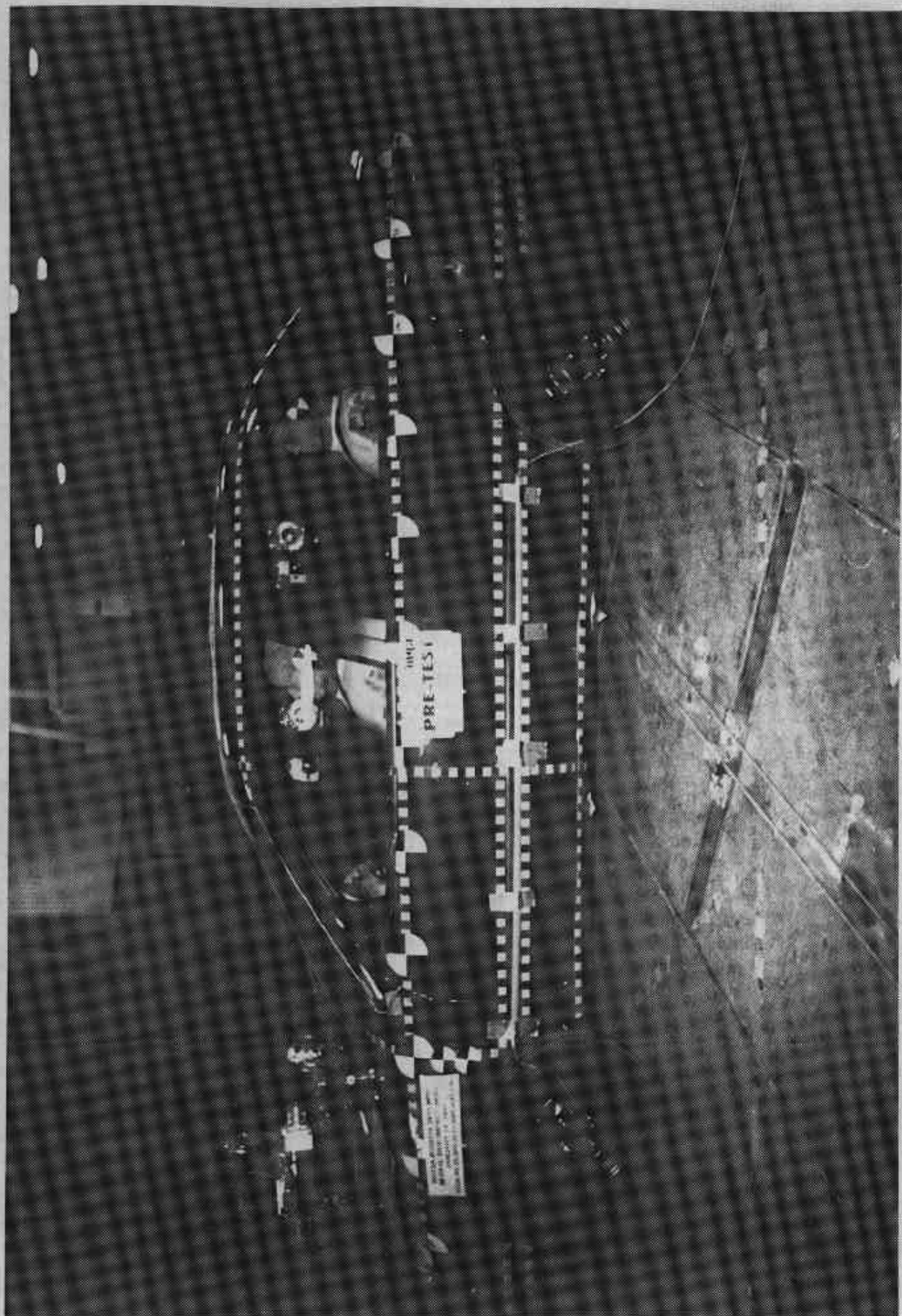


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

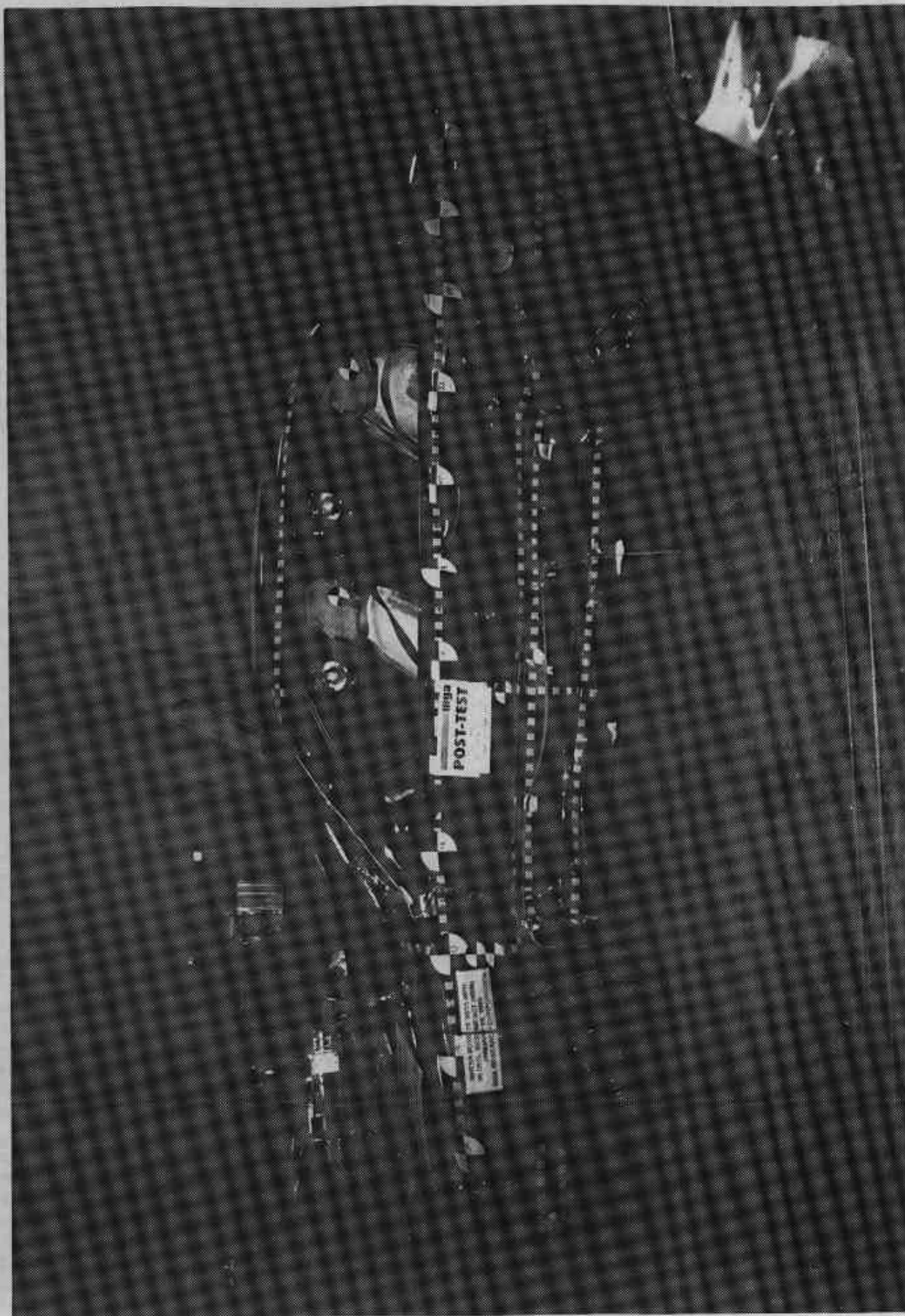


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

A-6



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



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

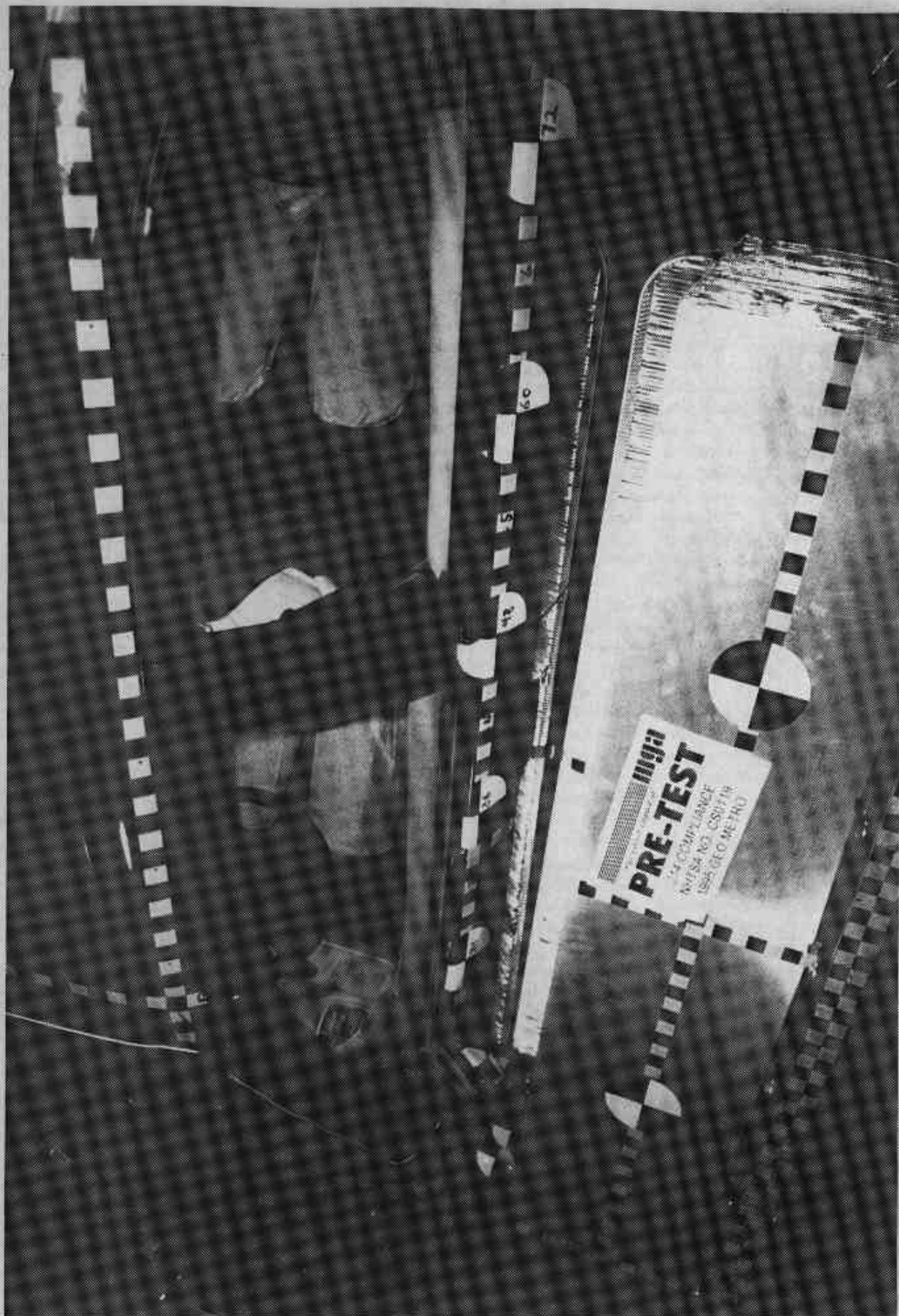


Photo No. A-9 - Pre-Test MDB Position Against Vehicle Overhead View

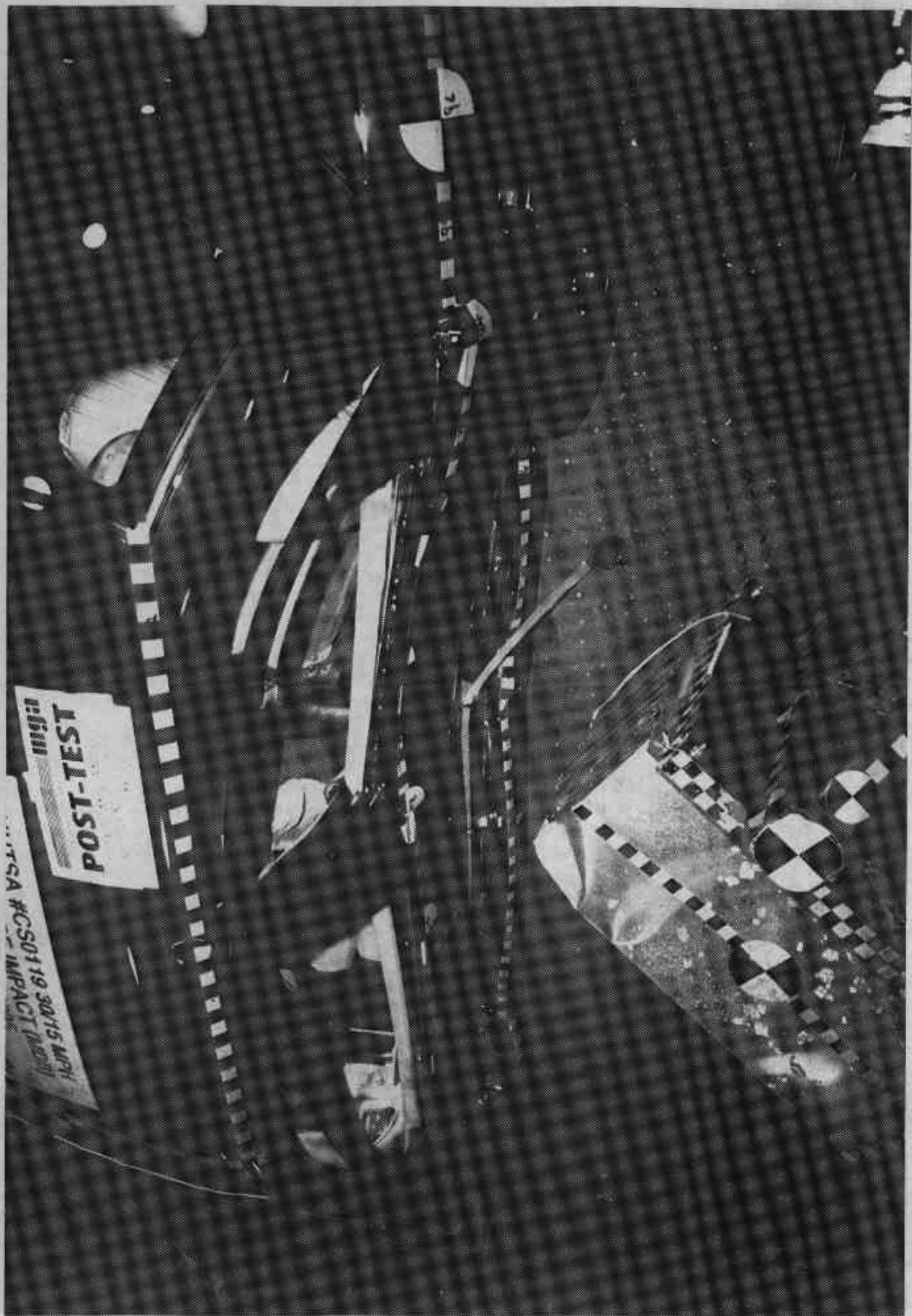
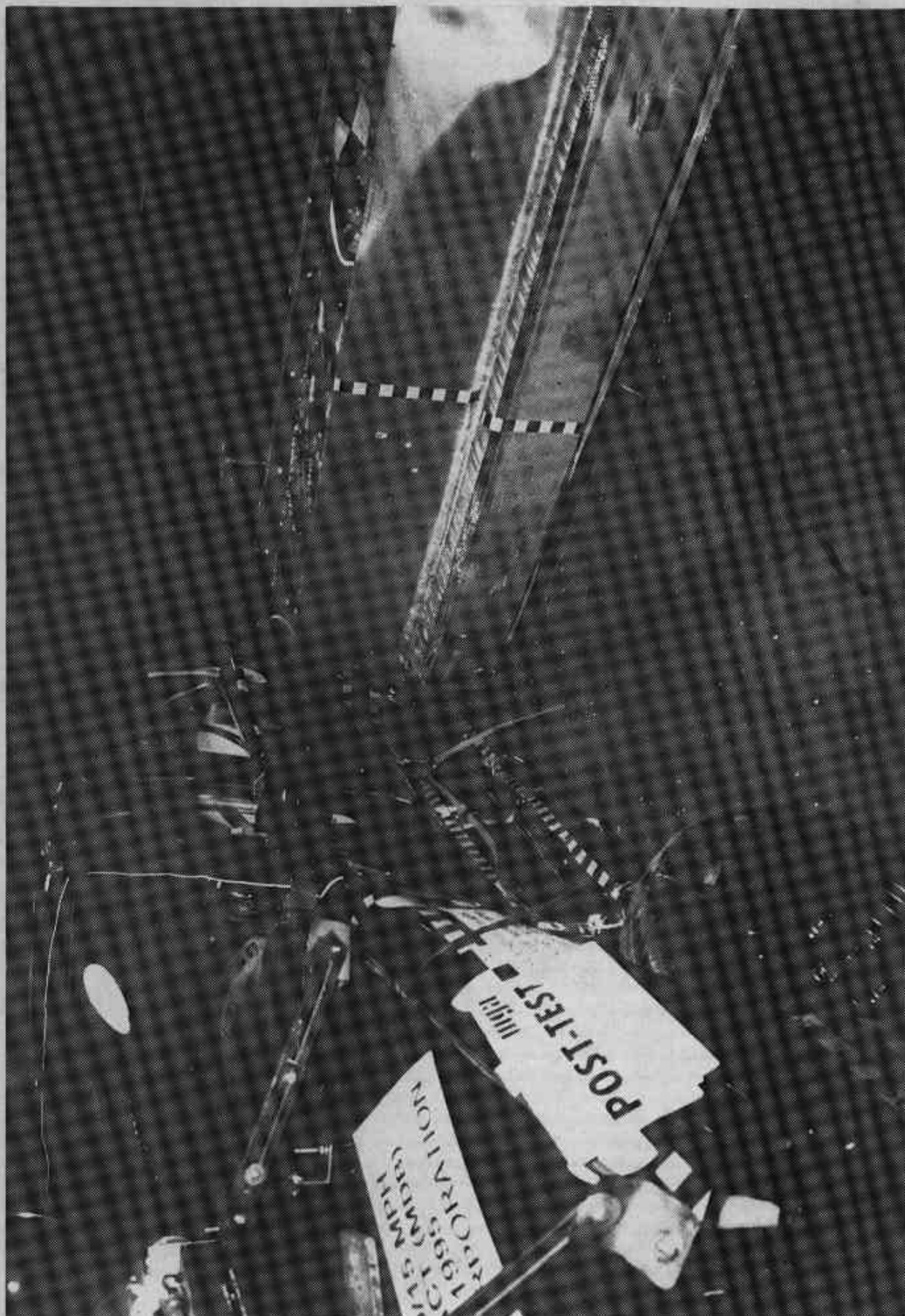


Photo No. A-10 - Post-Test MDB Position Against Vehicle Overhead View



A-11

Photo No. A-11 - Post-Test MDB Position Against Vehicle (left side)



Photo No. A-12 - Post-Test MDB Positioned Against Vehicle (right side)

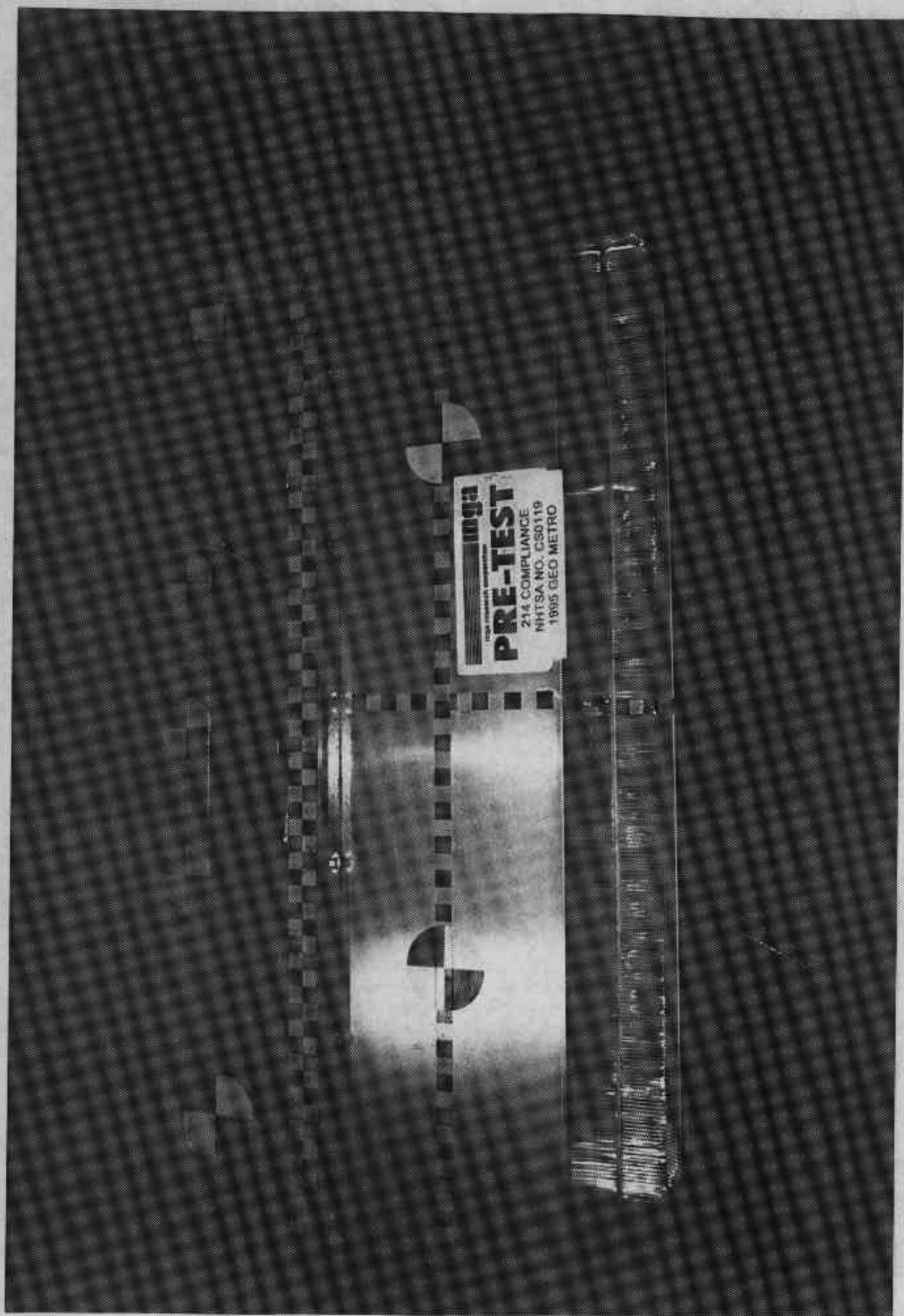


Photo No. A-13 - Pre-Test MDB Top View

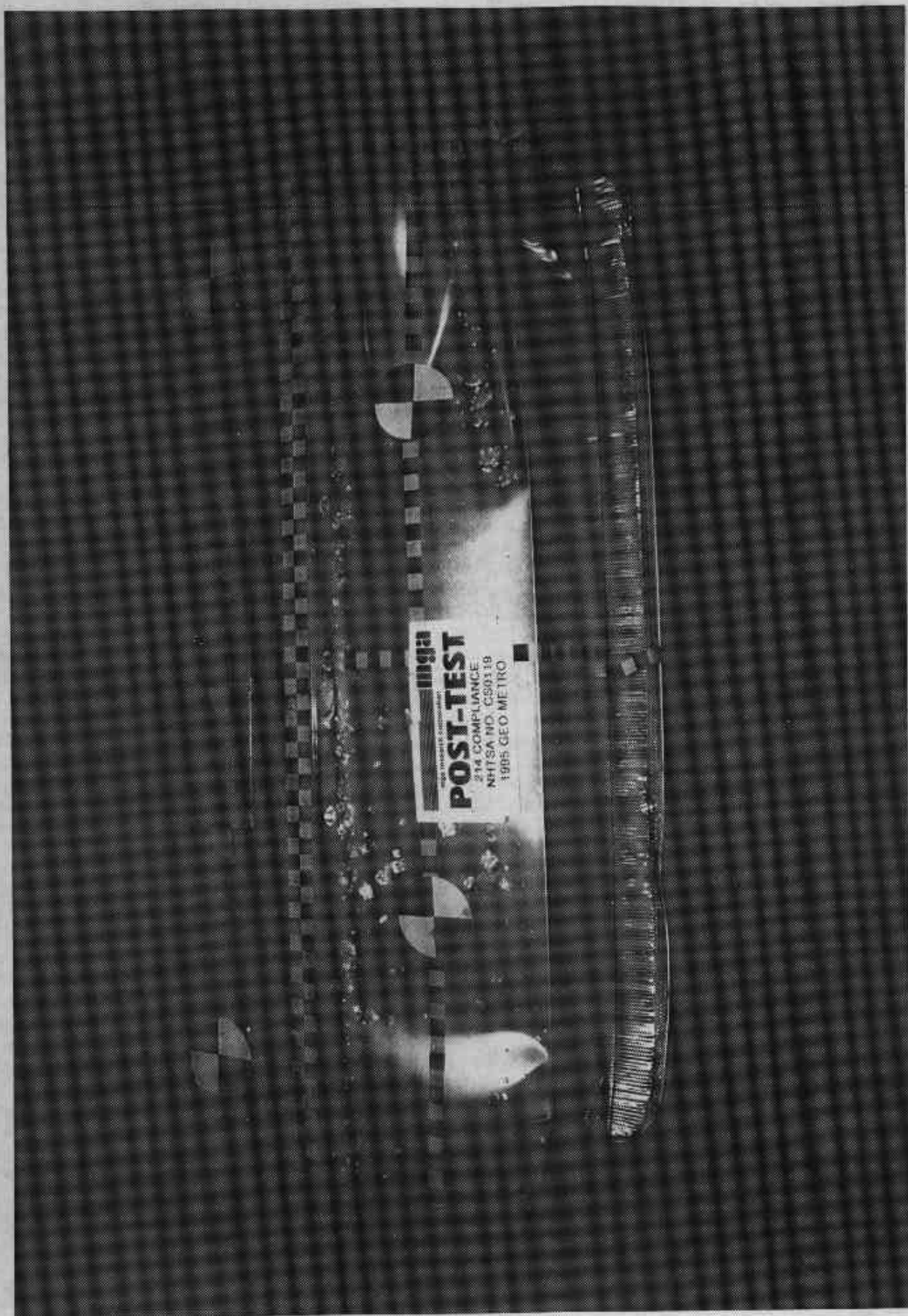


Photo No. A-14 - Post-Test MDB Top View

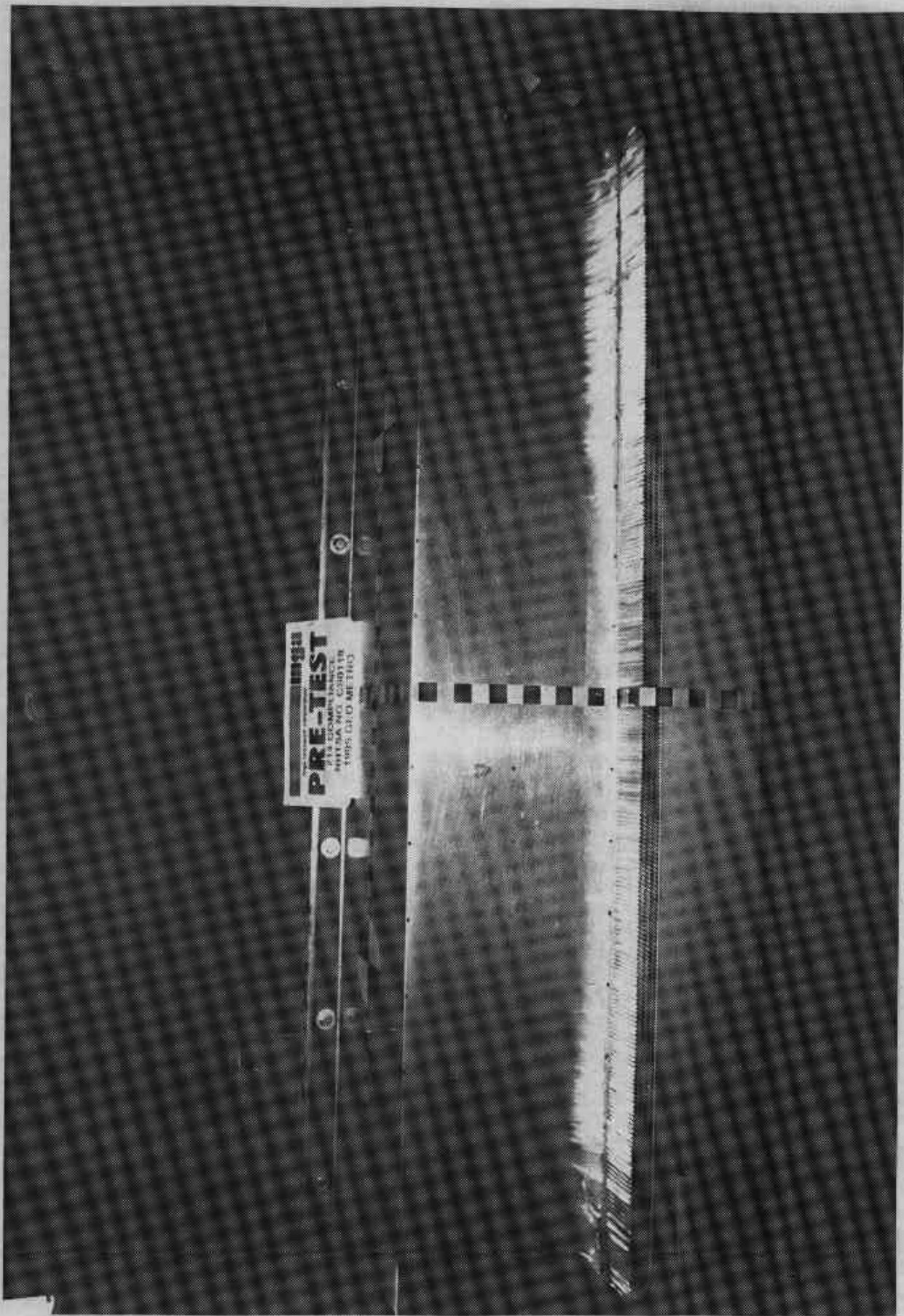


Photo No. A-15 - Pre-Test MDB Front View

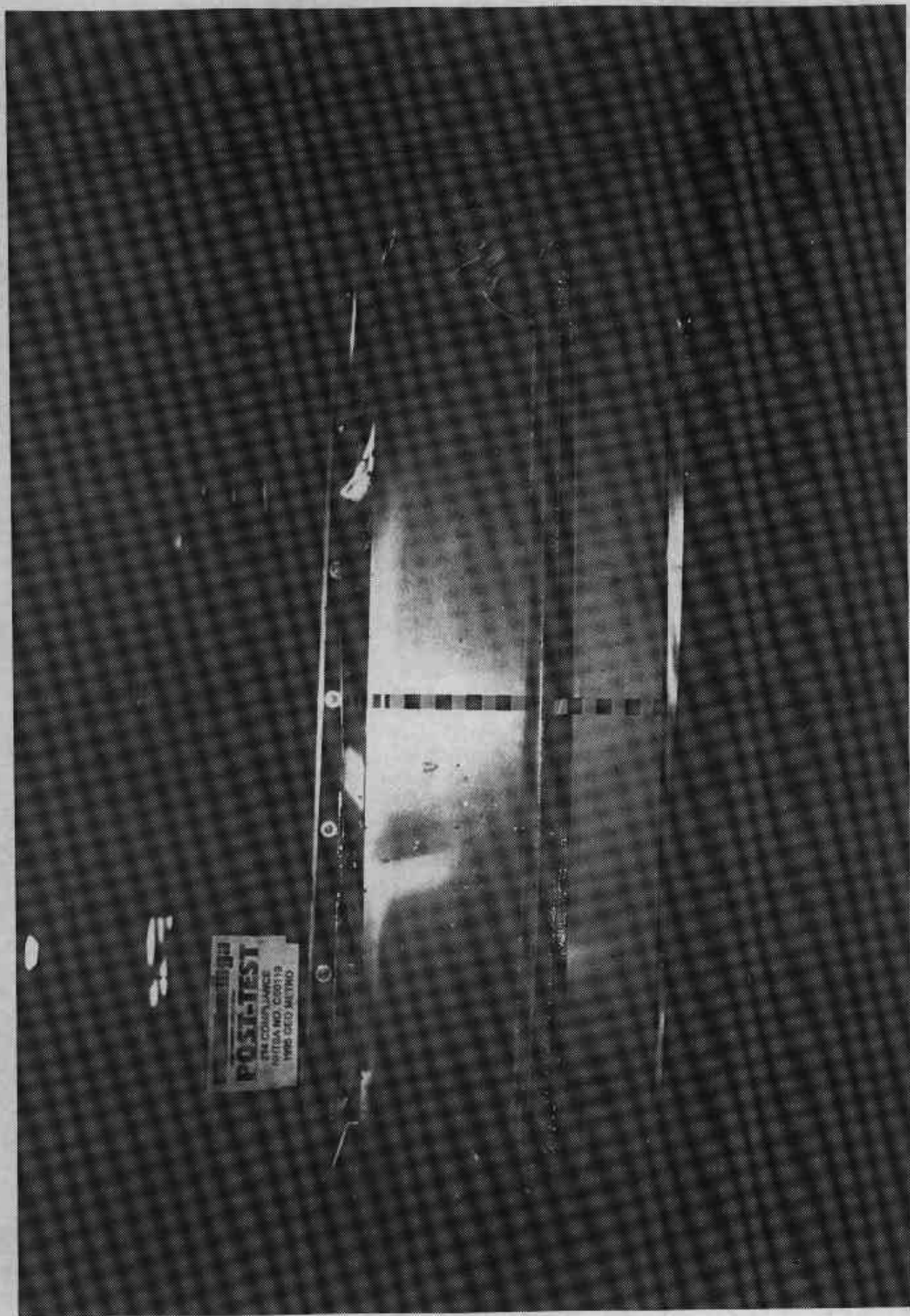


Photo No. A-16 - Post-Test MDB Front View



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

A-17

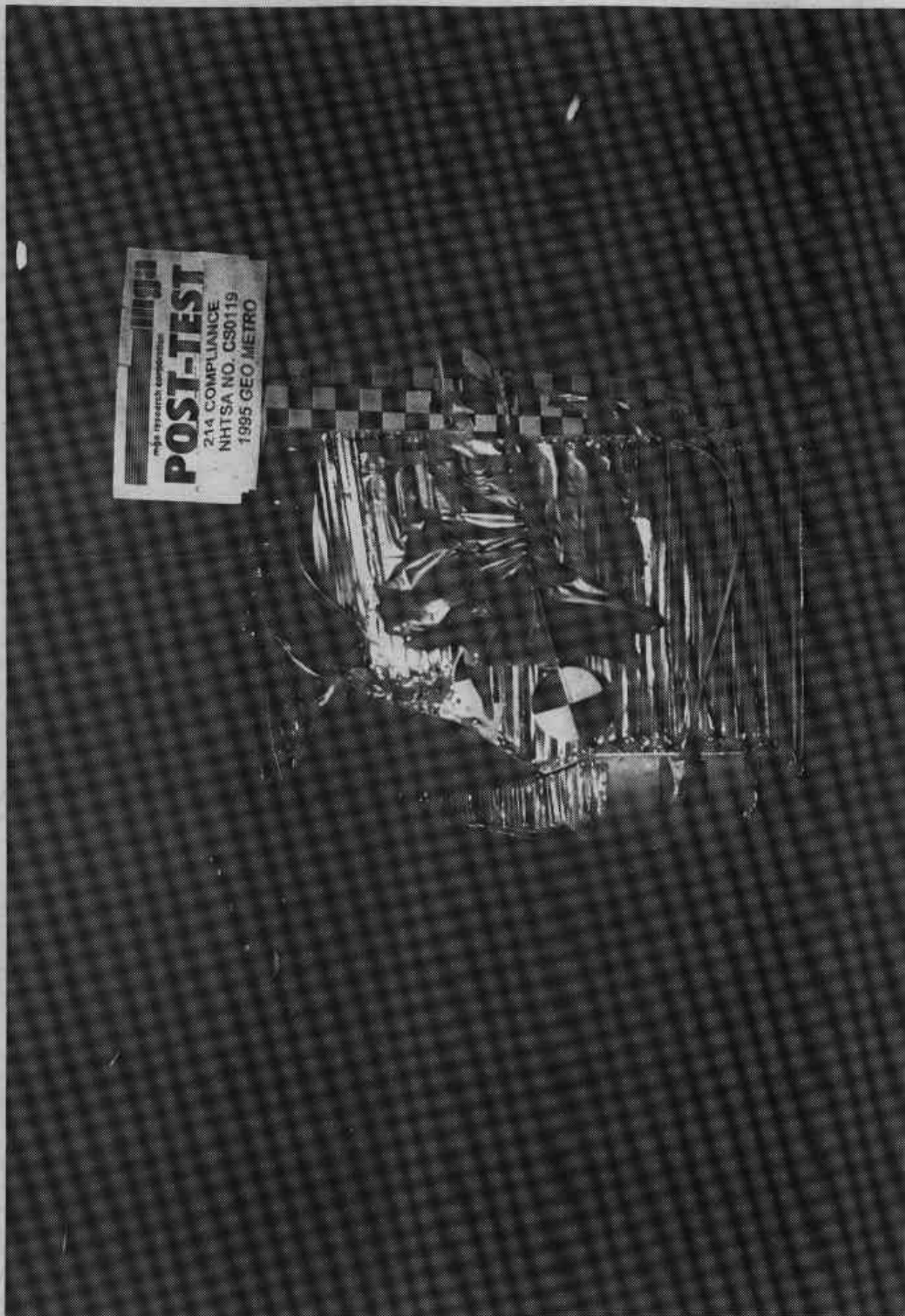


Photo No. A-18 - Post-Test MDB Left Side View

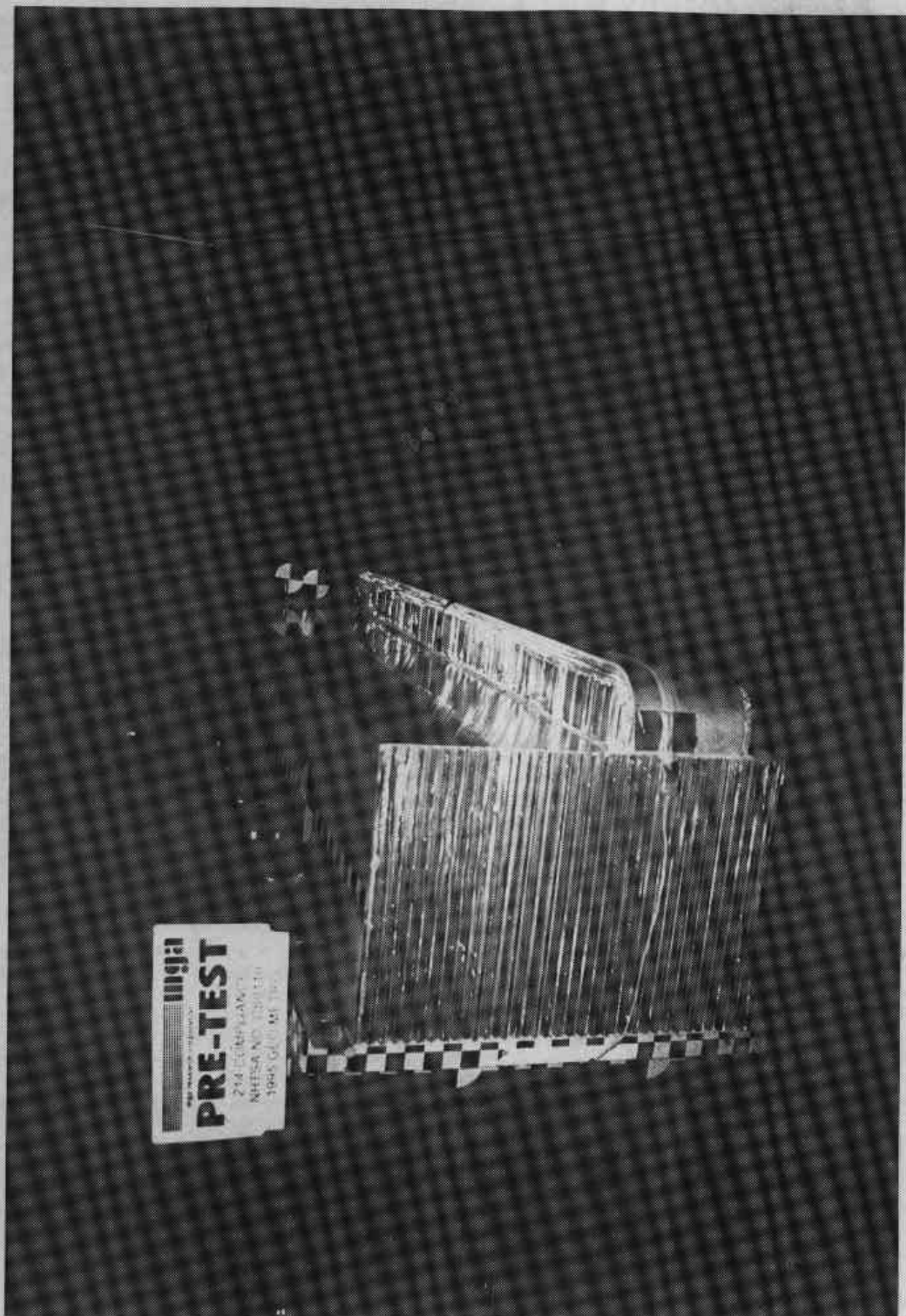


Photo No. A-19 - Pre-Test MDB Right Side View



Photo No. A-20 - Post-Test MDB Right Side View

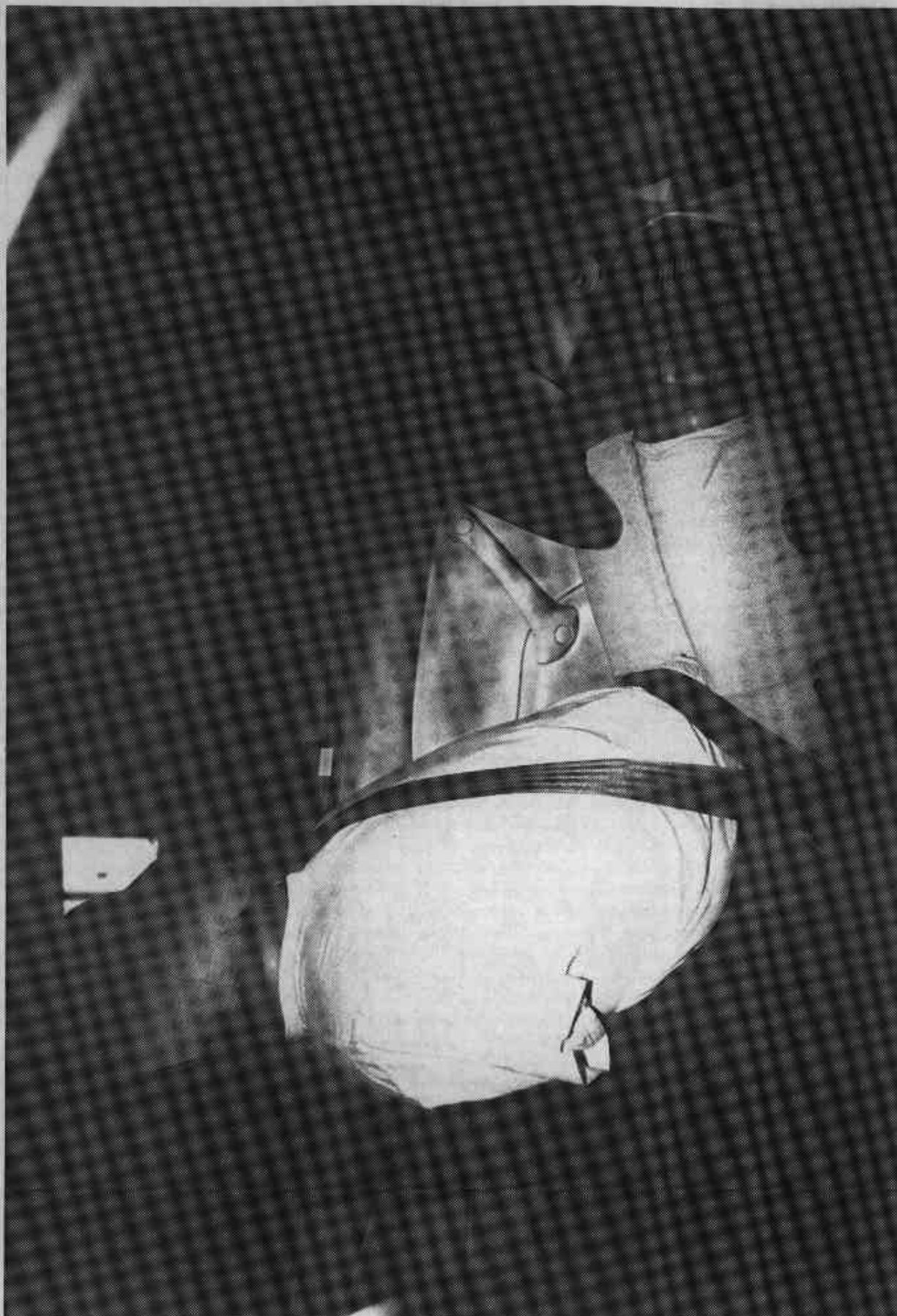
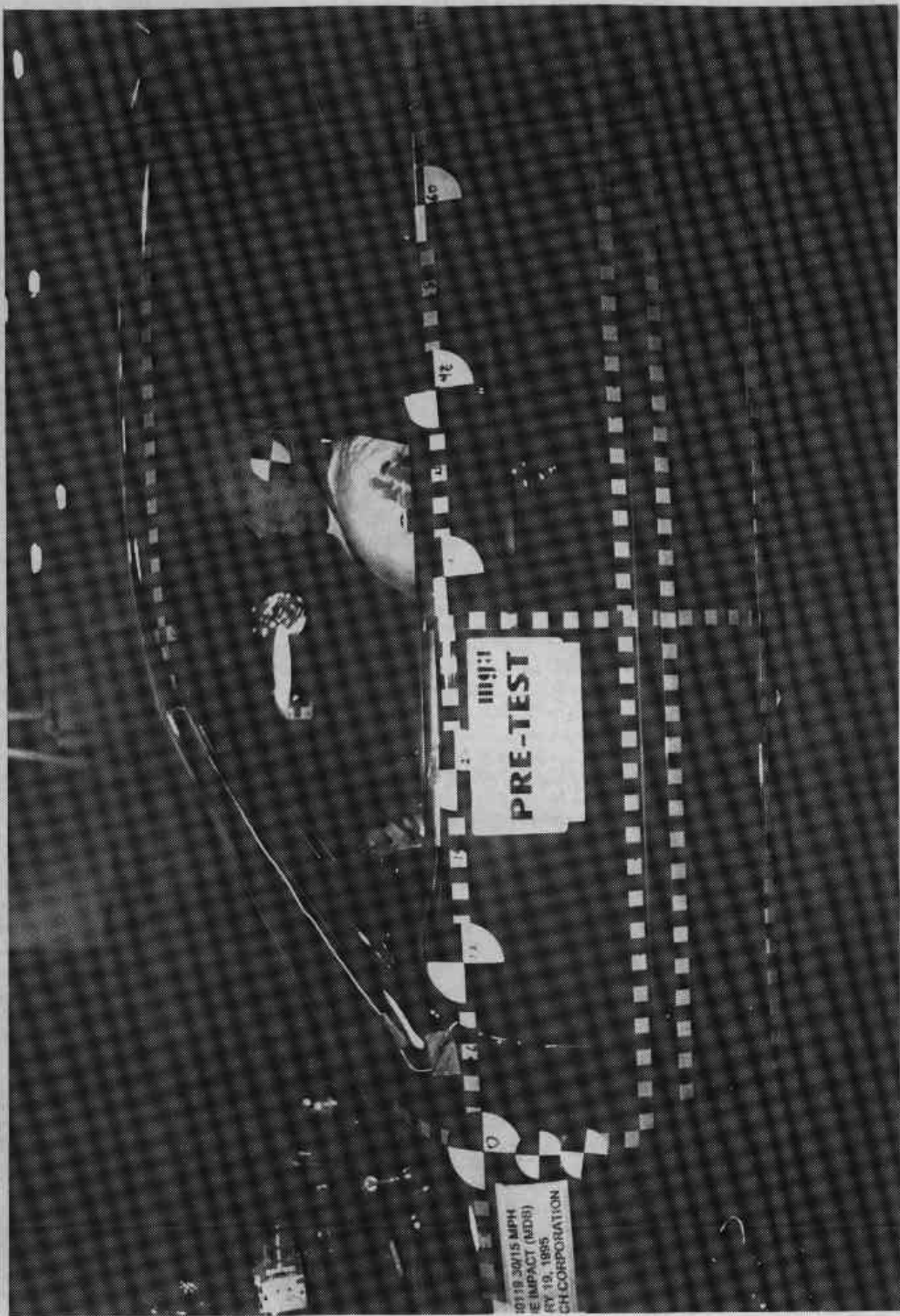


Photo No. A-21 - Pre-Test Driver Dummy Right Side View

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



A-23

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

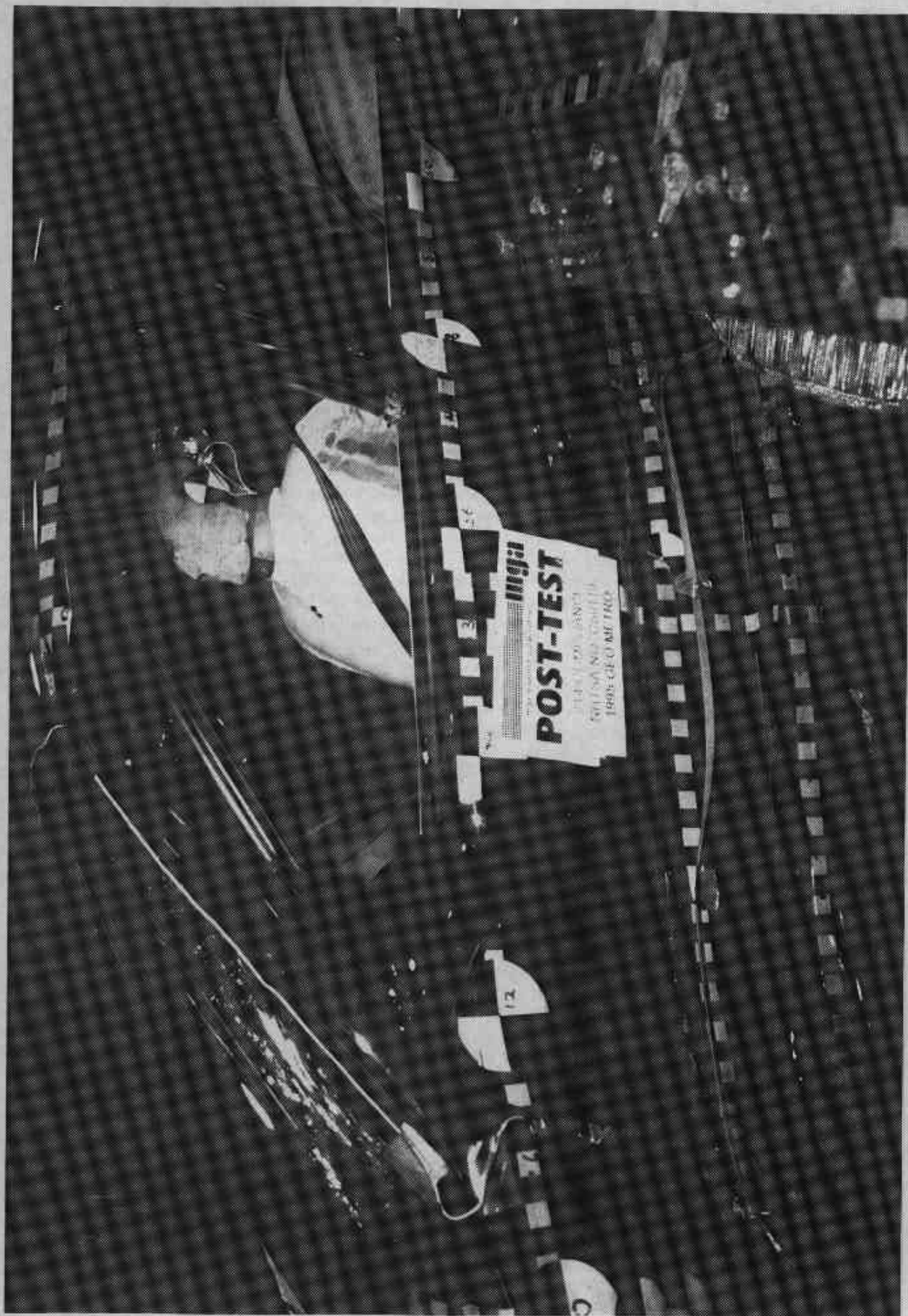


Photo No. A-24 - Post-Test Driver Dummy Left Side View



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

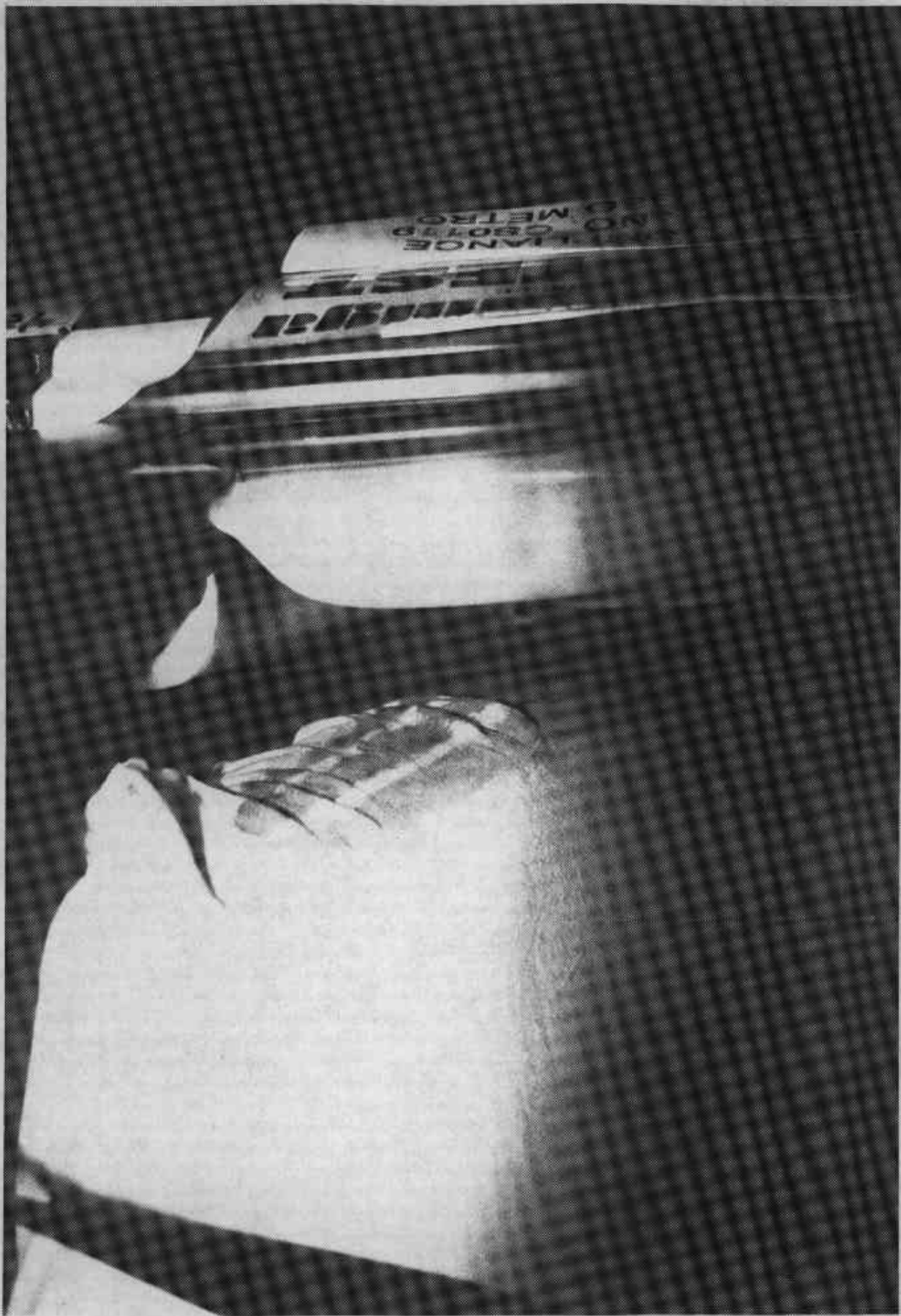


Photo No. A-26 - Pre-Test Driver Dummy Shoulder and Door Top View

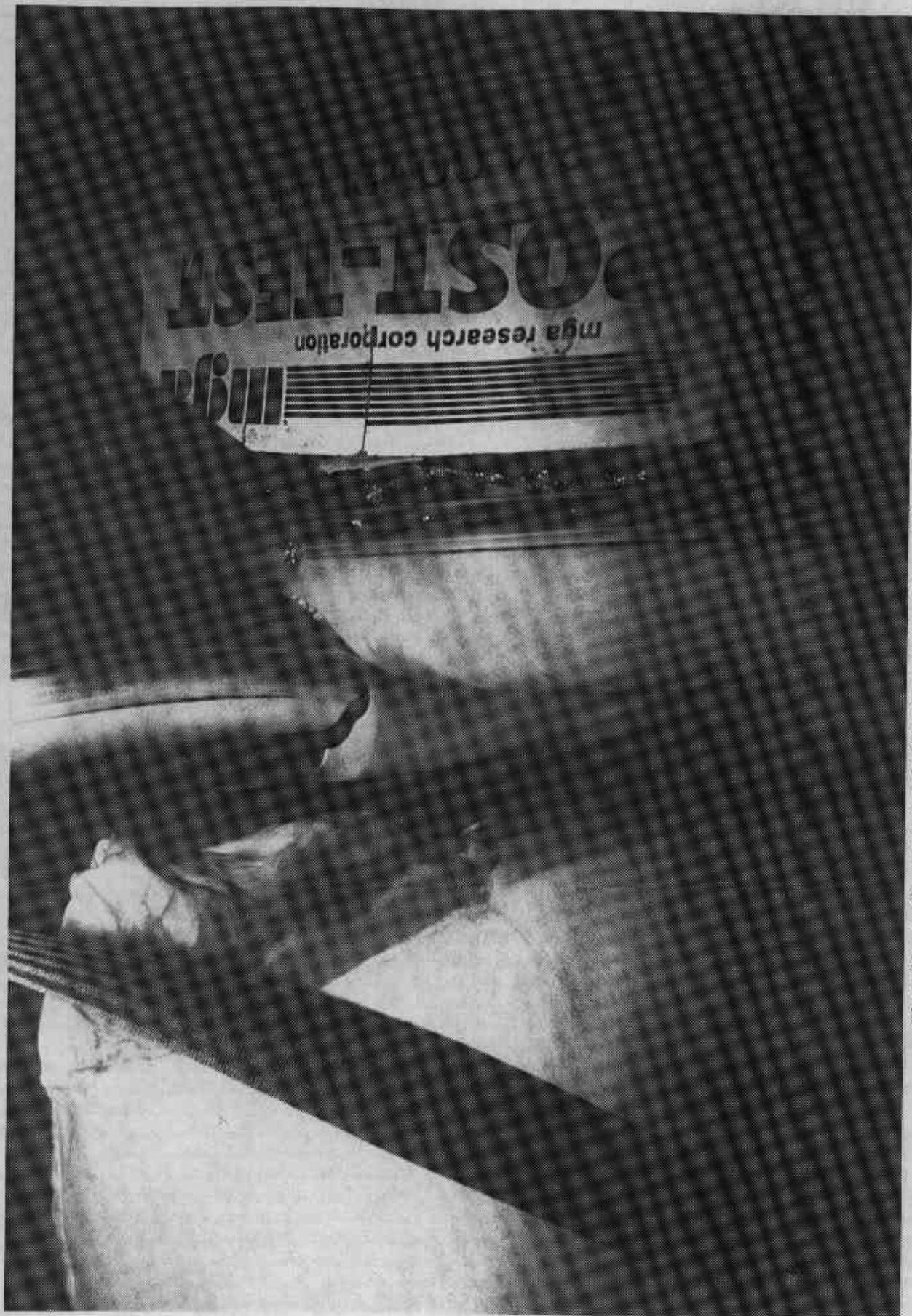


Photo No. A-27 - Post-Test Driver Dummy Shoulder and Door Top View



Photo No. A-28 - Post-Test Driver Dummy Contact

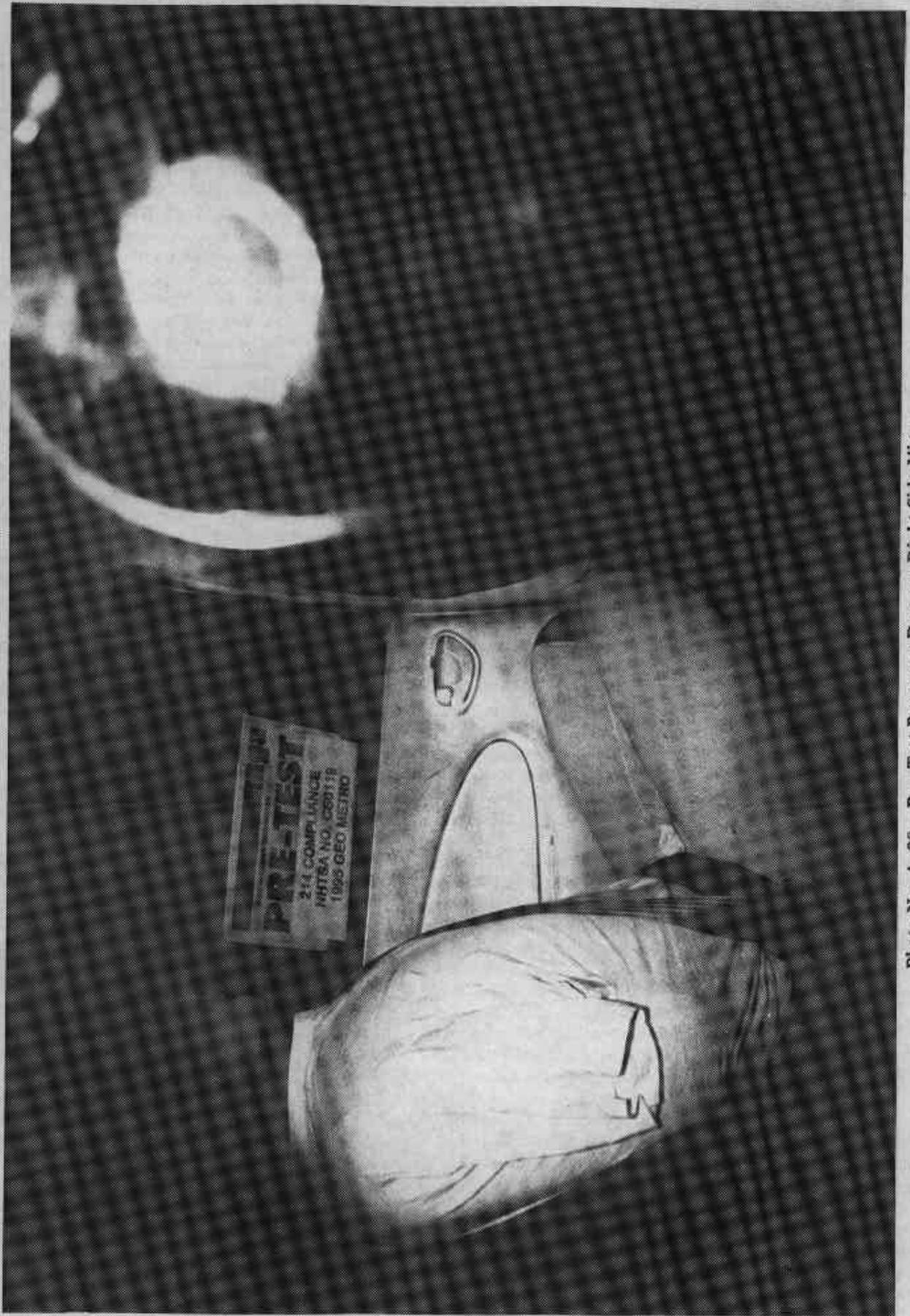


Photo No. A-29 - Pre-Test Passenger Dummy Right Side View

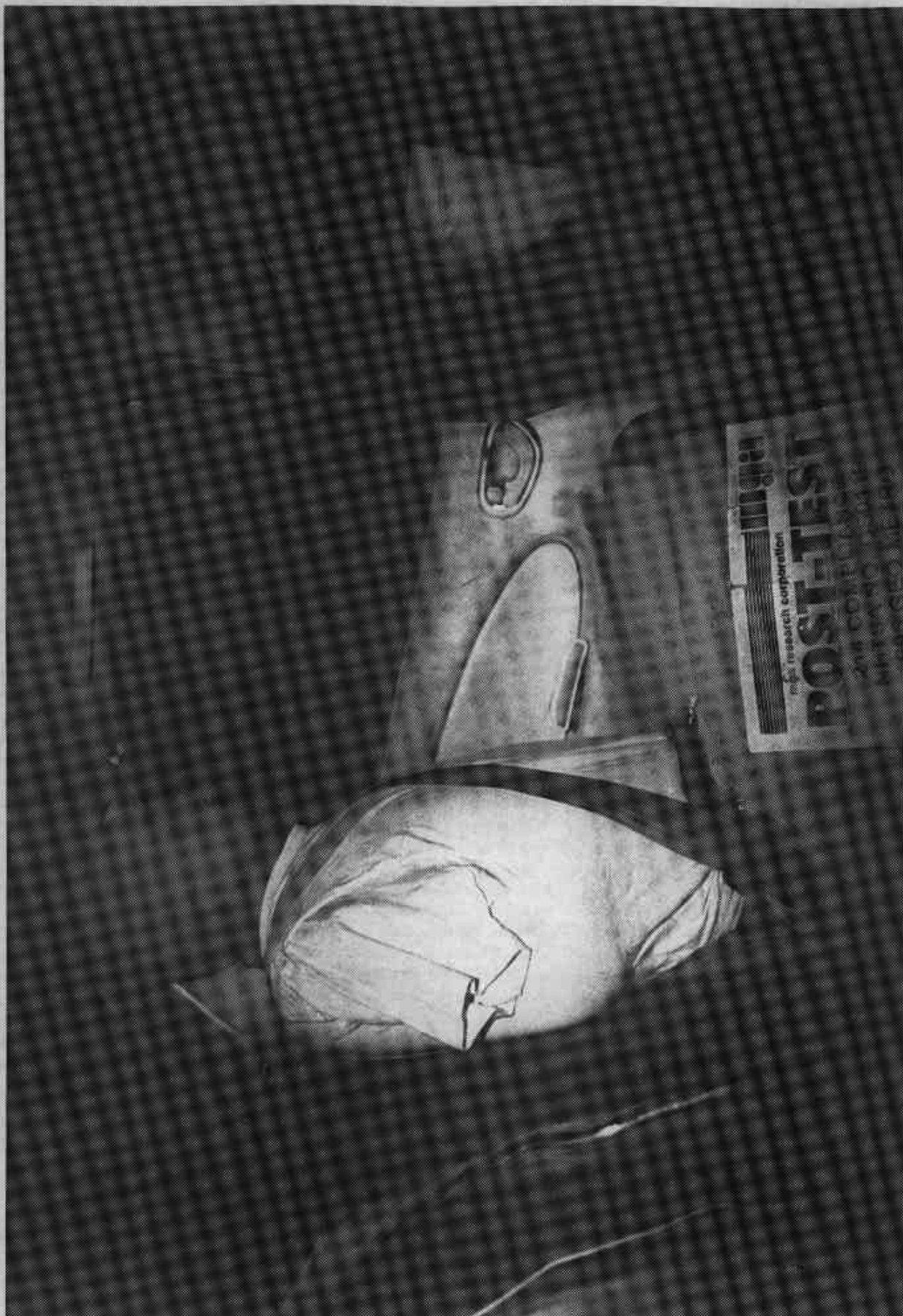
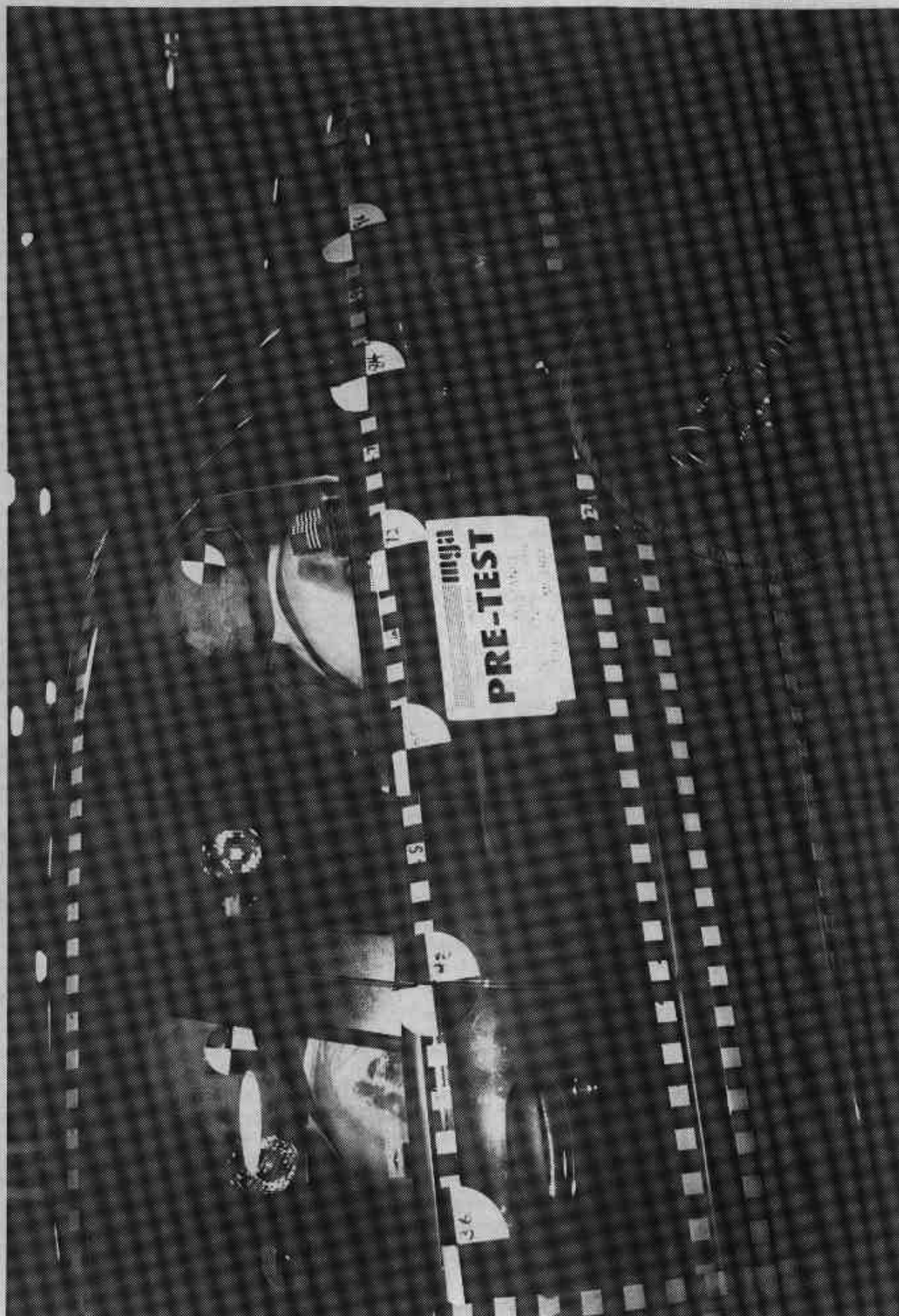


Photo No. A-30 - Post-Test Passenger Dummy Right Side View



A-31

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

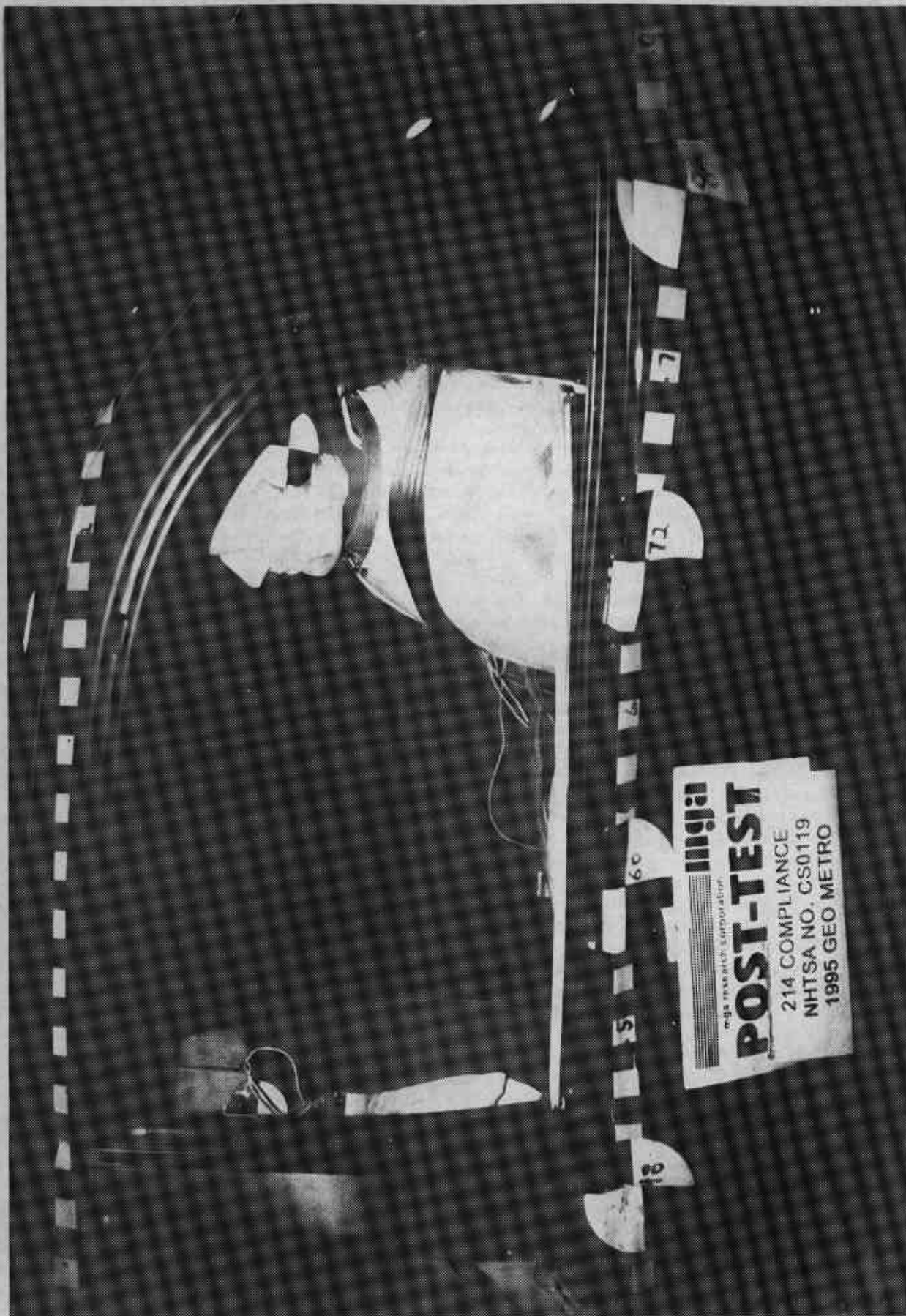


Photo No. A-32 - Post-Test Passenger Dummy Left Side View

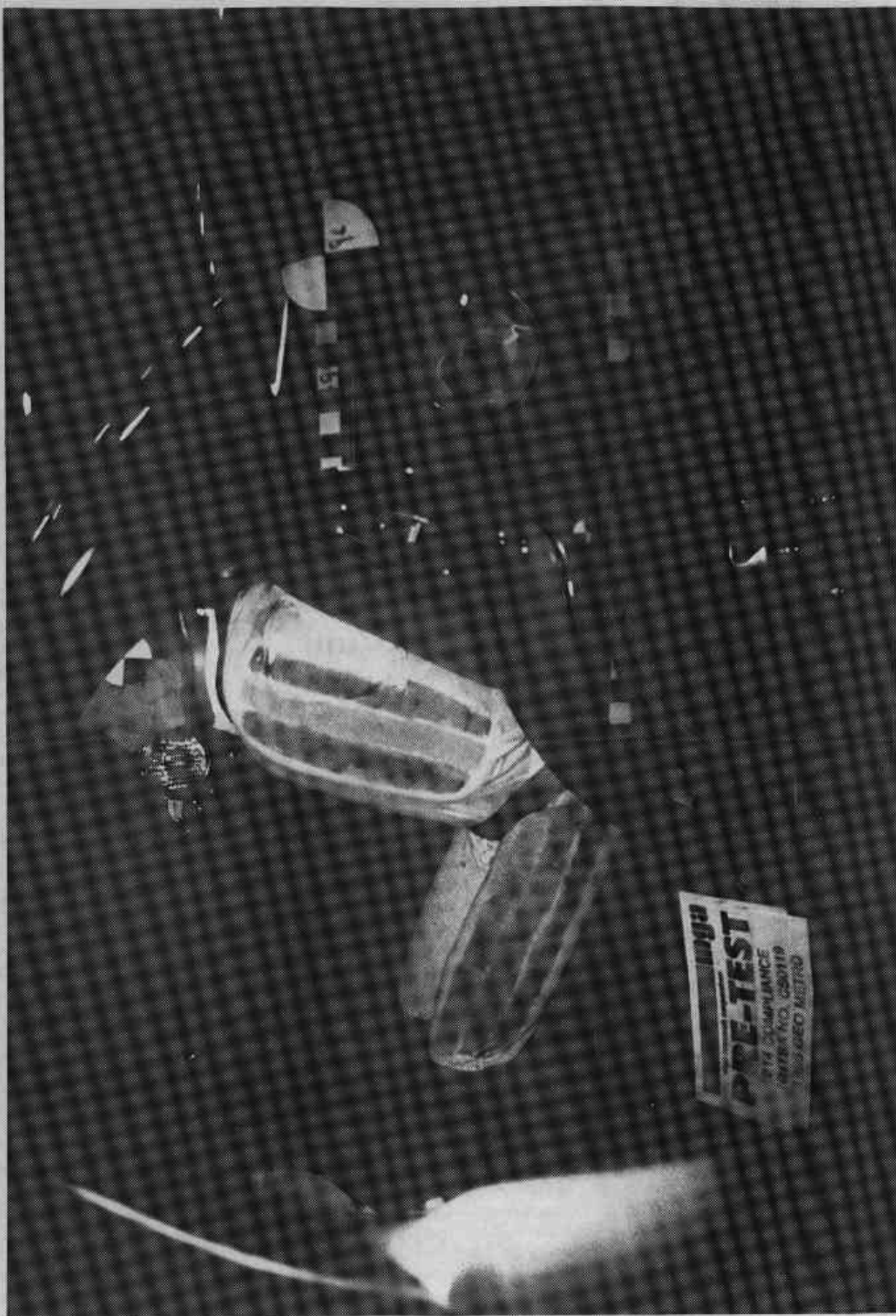


Photo No. A-33 - Pre-Test Passenger Dummy Left Side View (Door Open)

A-33

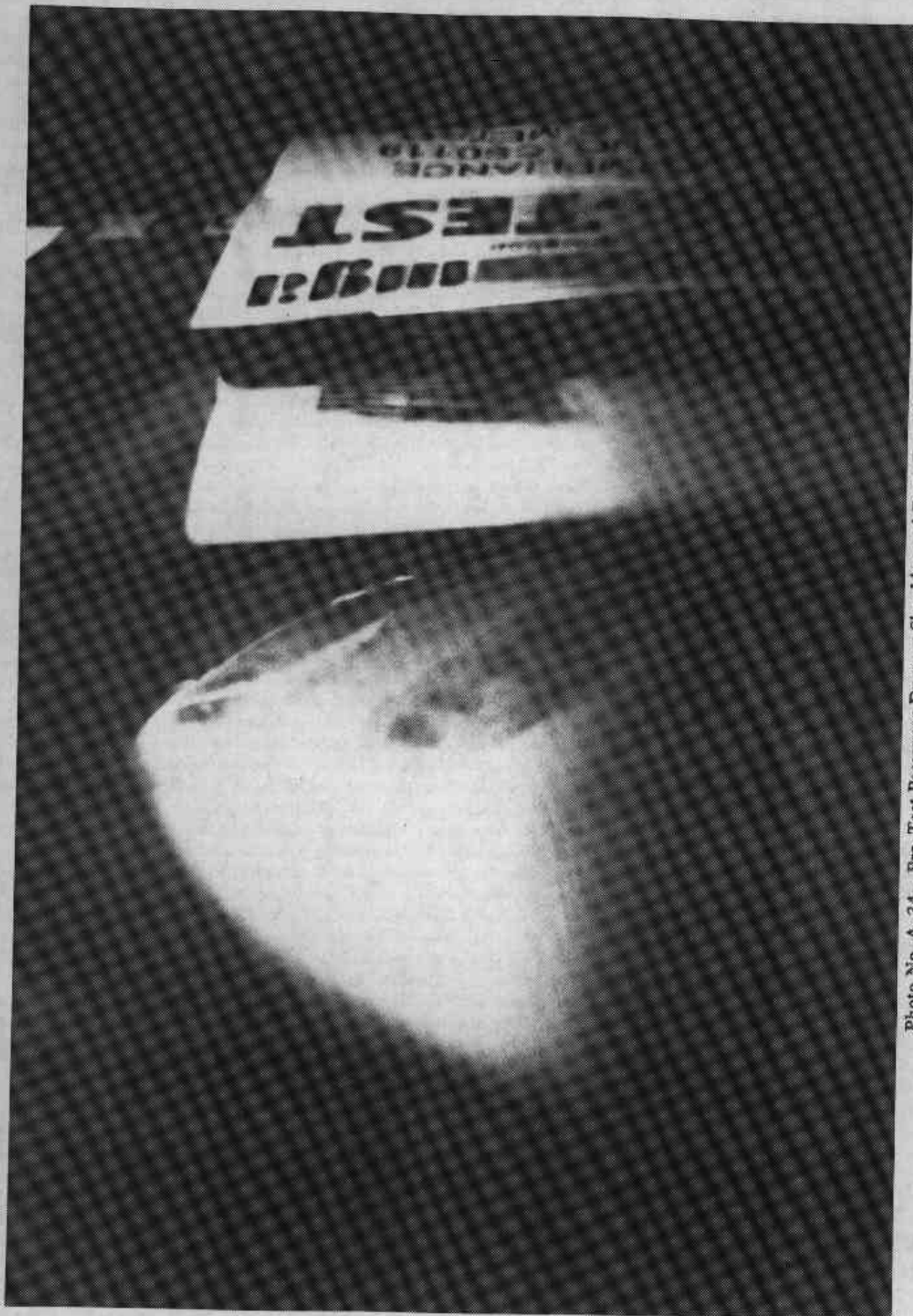


Photo No. A-34 - Pre-Test Passenger Dummy Shoulder and Door Top View

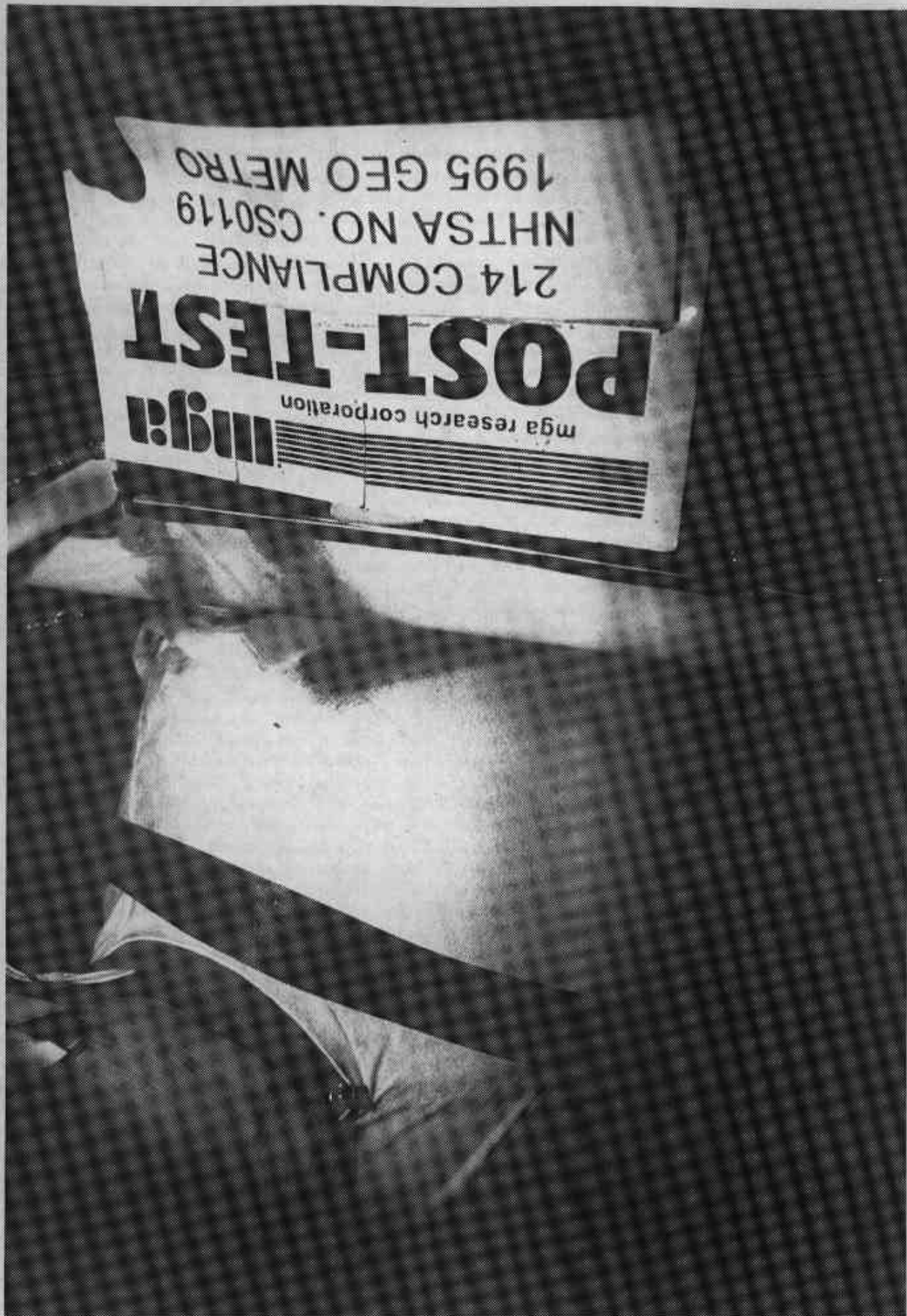


Photo No. A-35 - Post-Test Passenger Dummy Shoulder and Door Top View



Photo No. A-36 - Post-Test Passenger Dummy Contact

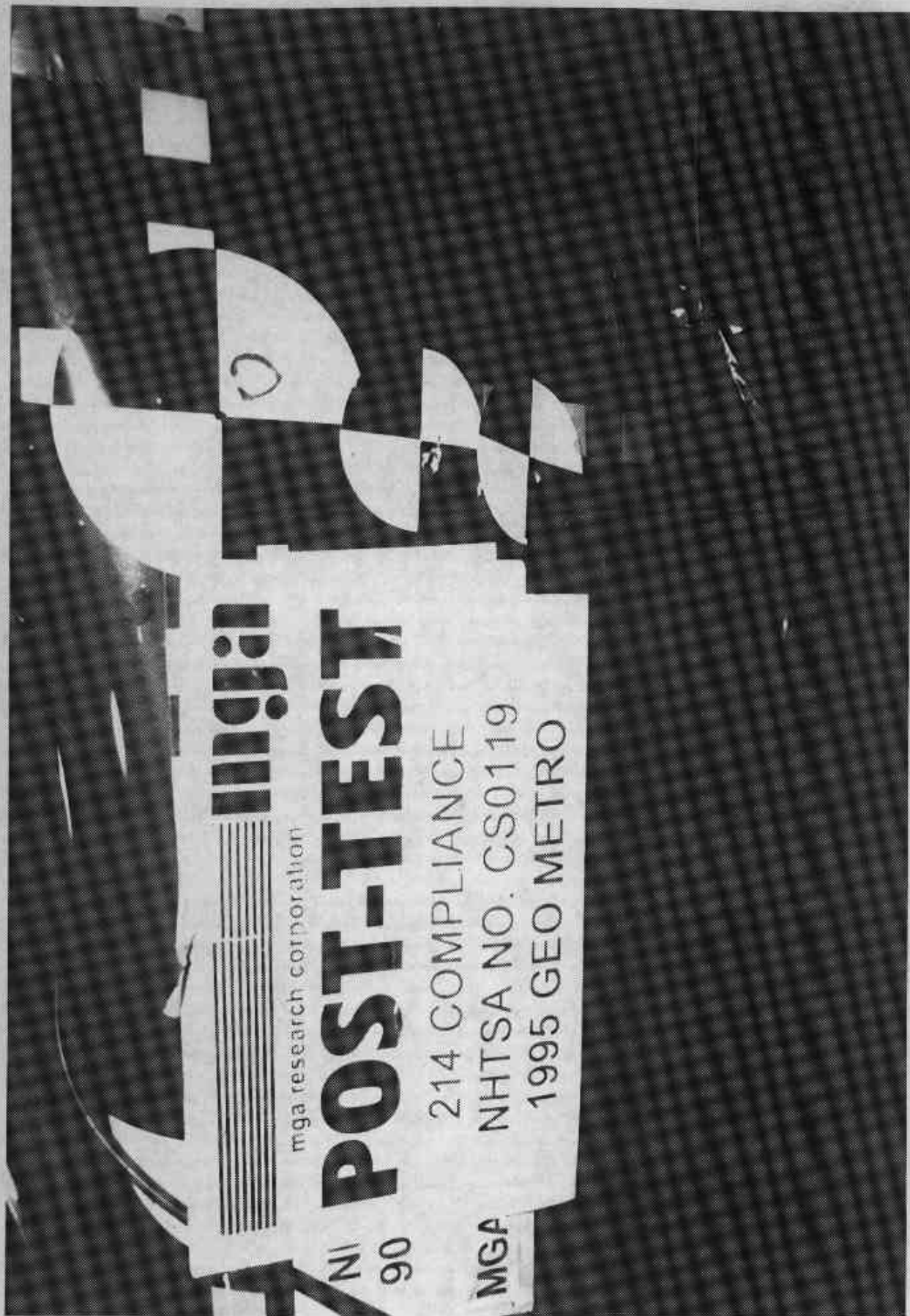


Photo No. A-37 - Left Front Impact Point on Vehicle

79161-50G10

FRONT REAR SPARE TIRE

PW55/80R13 T115/70D14

92 PSI 60 PSI

220 kPa 420 kPa

VEHICLE CAPACITY

688 (OCCUPANTS PLUS CARGO)

FRONT 2 REAR 2

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION.

Photo No. A-39 - Tire Placard

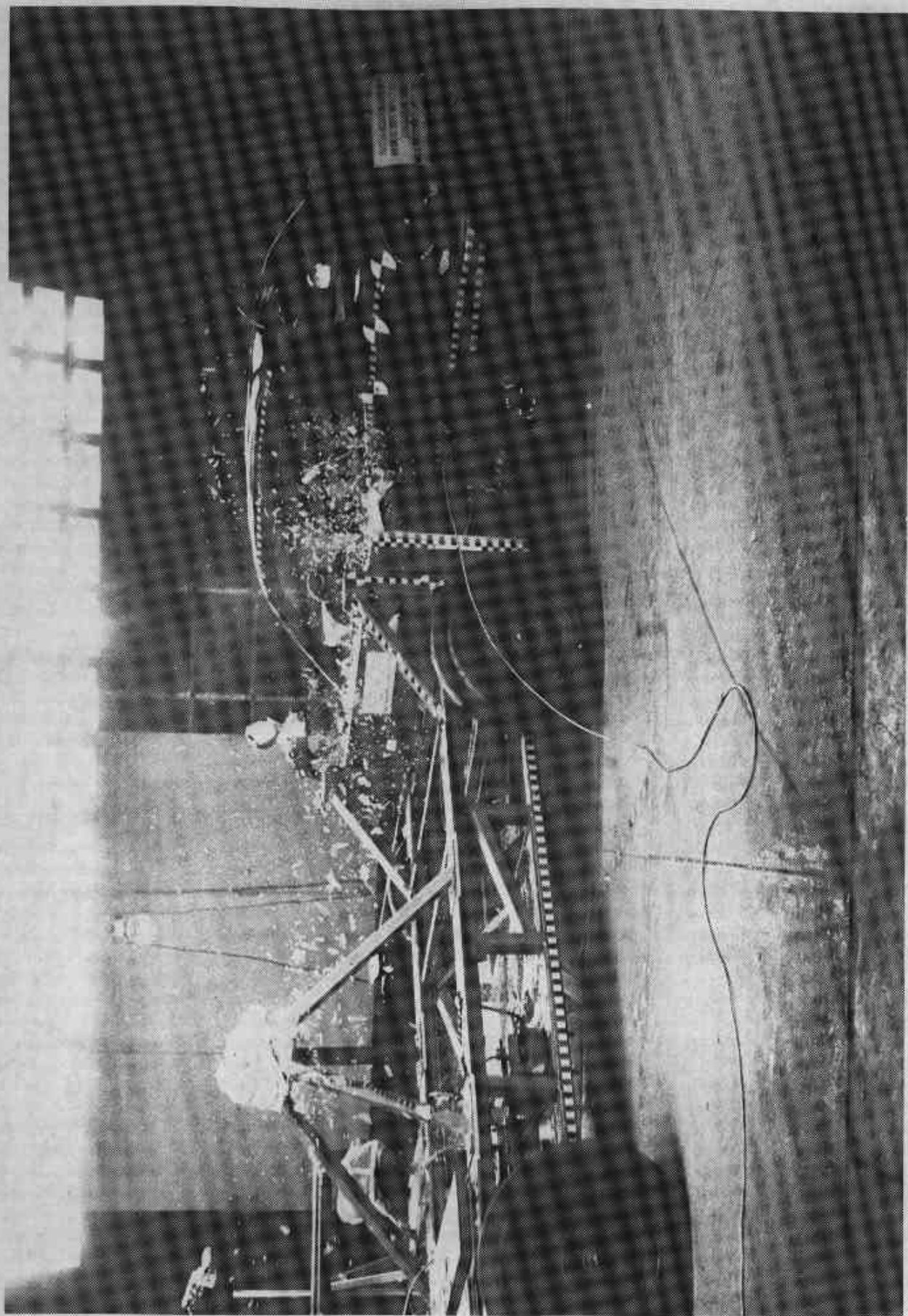


Photo No. A-49 - Impact

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Photo No. A-41 - Rollover 99°

A-41

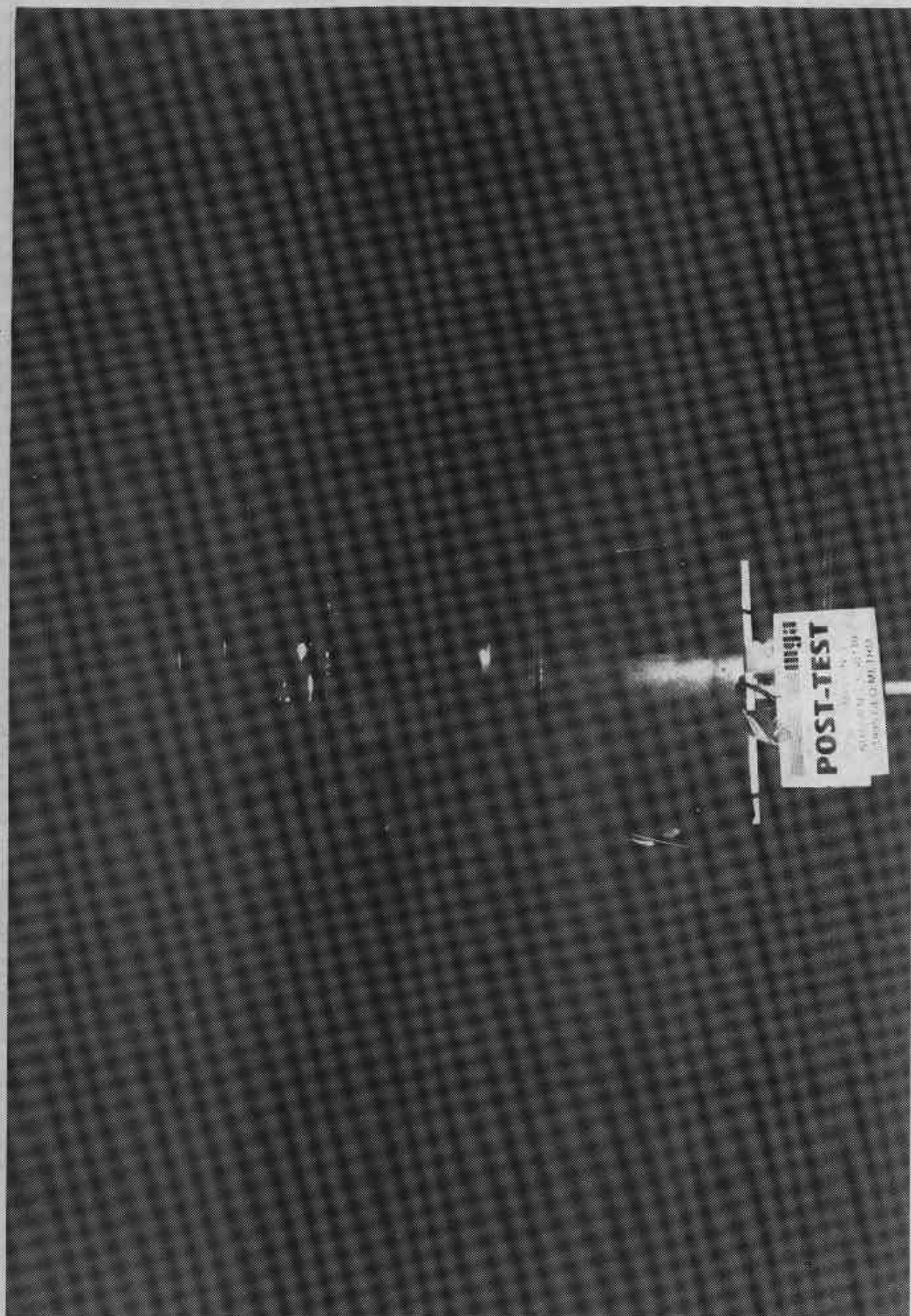


Photo No. A-42 - Rollover 180°

A-42

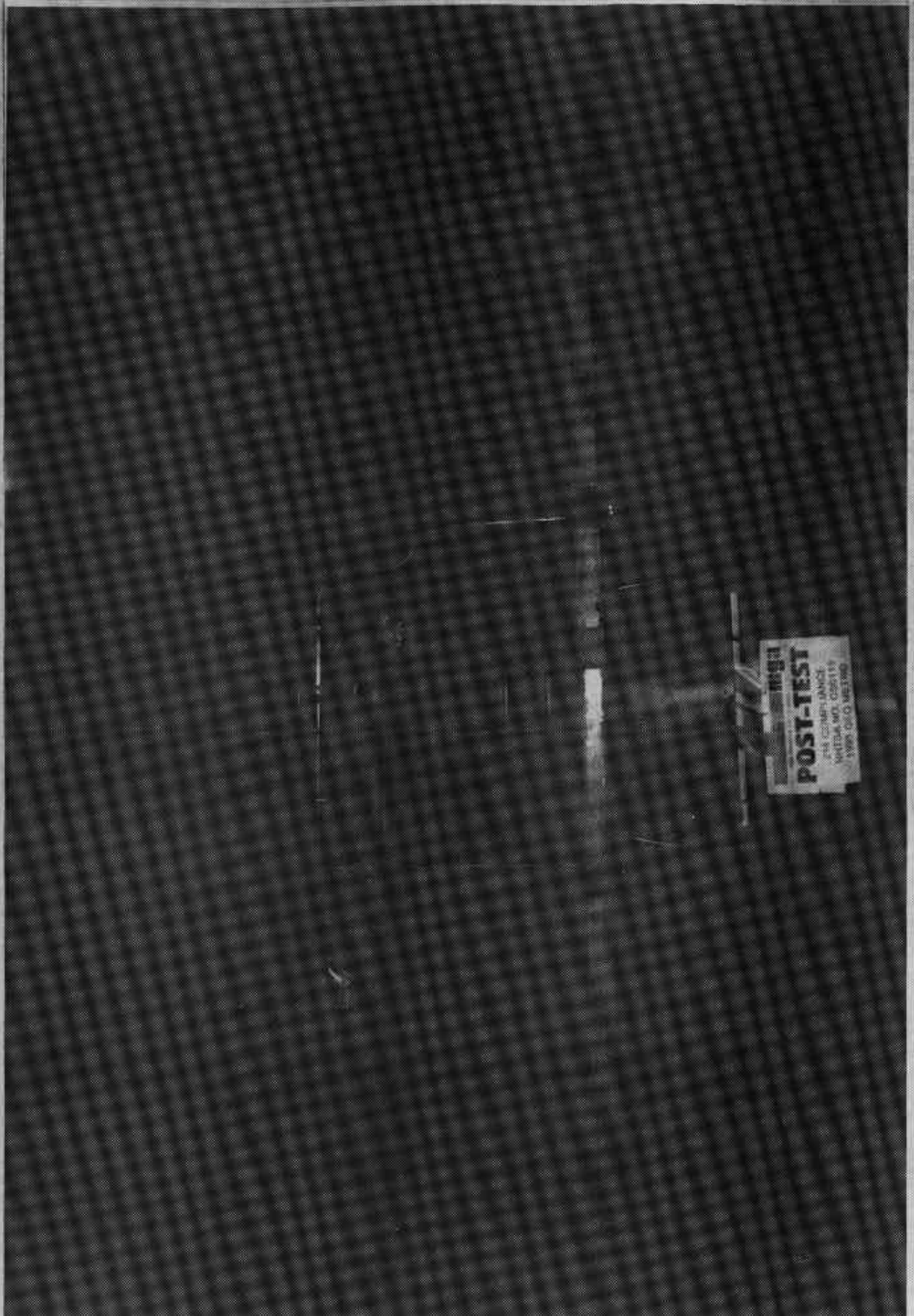


Photo No. A-43 - Rollover 278°



Photo No. A-44 - Rollover 389°

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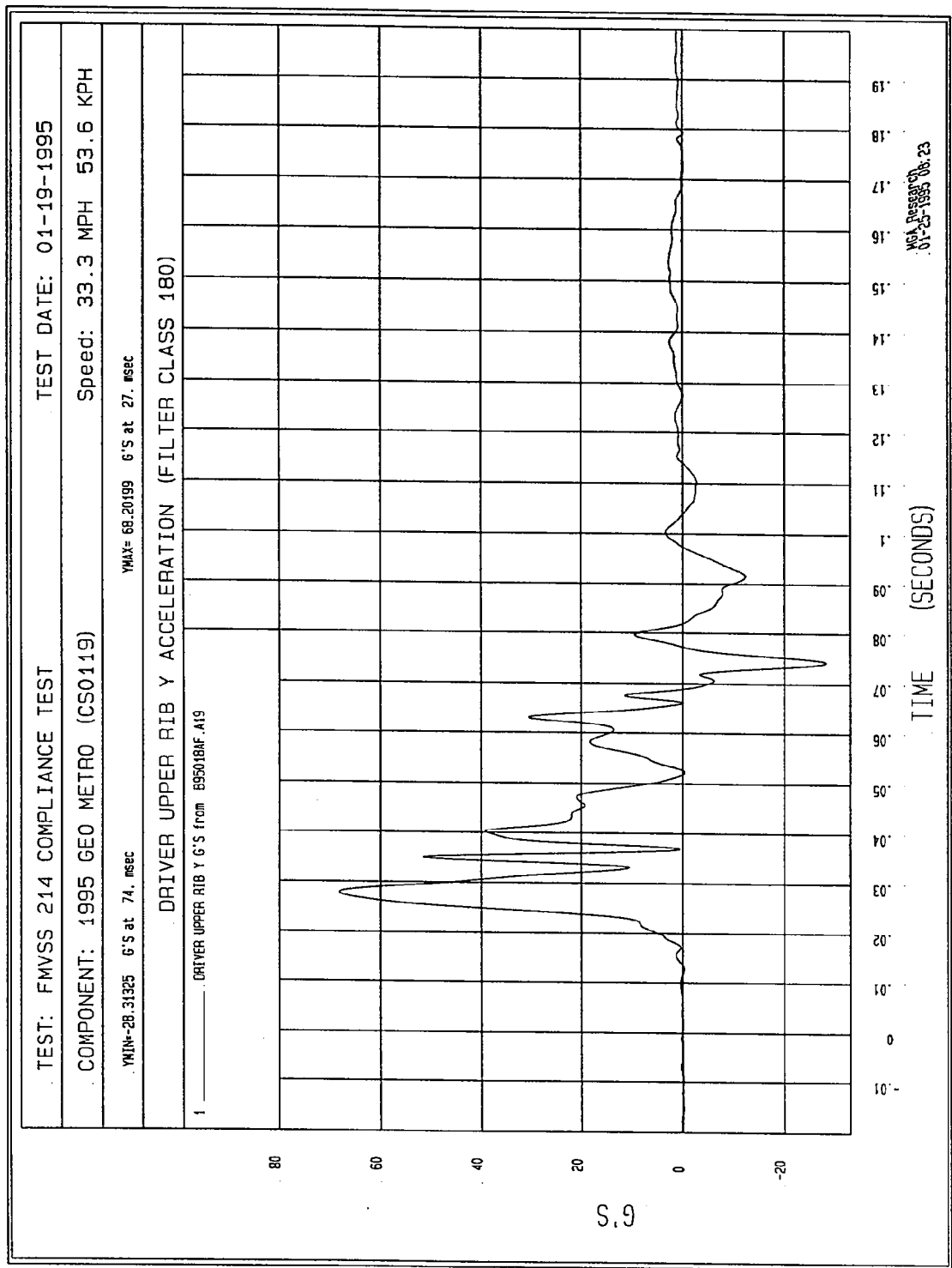


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

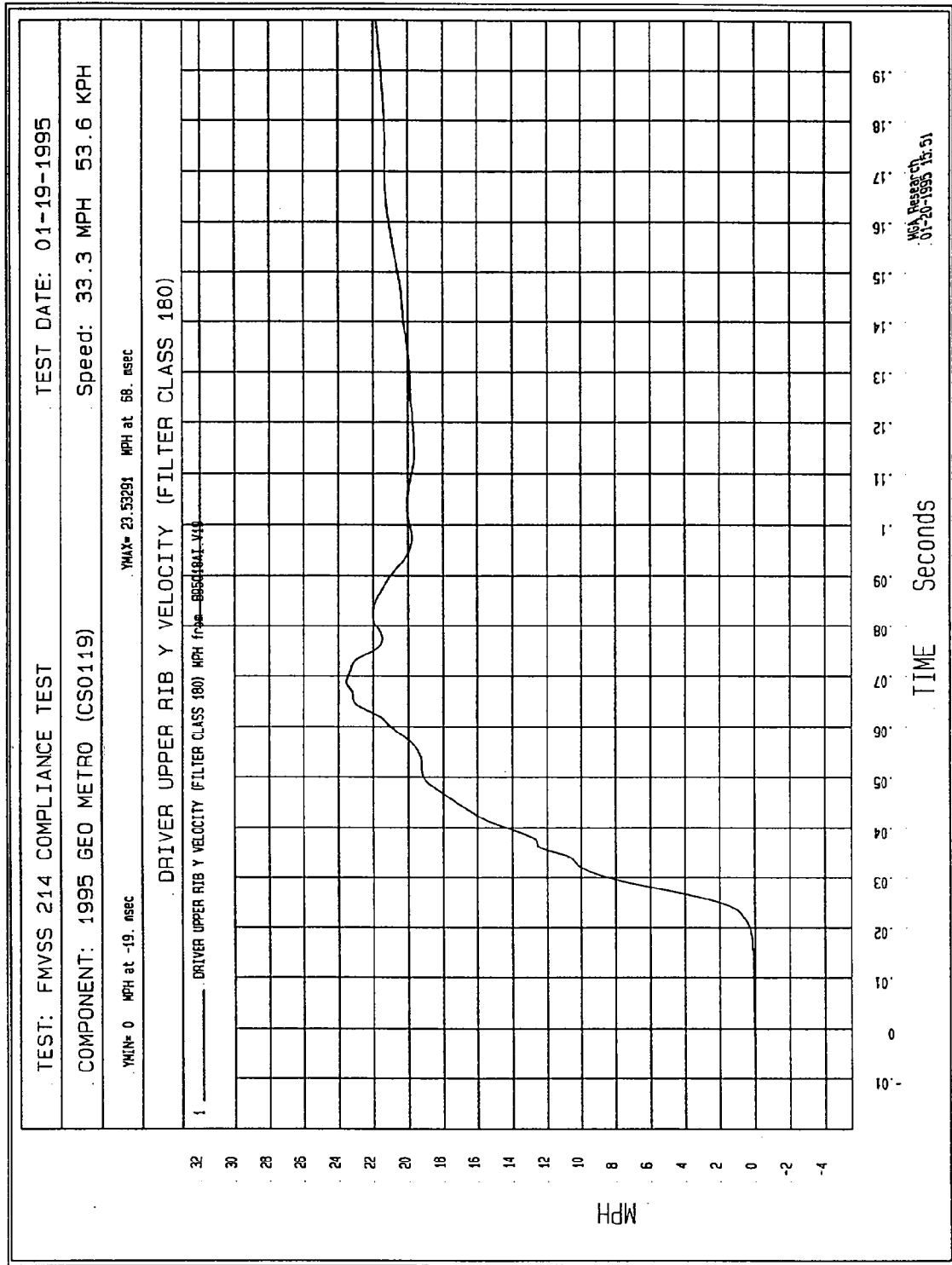


Figure B-2 - Driver Upper Rib Y Velocity vs. Time

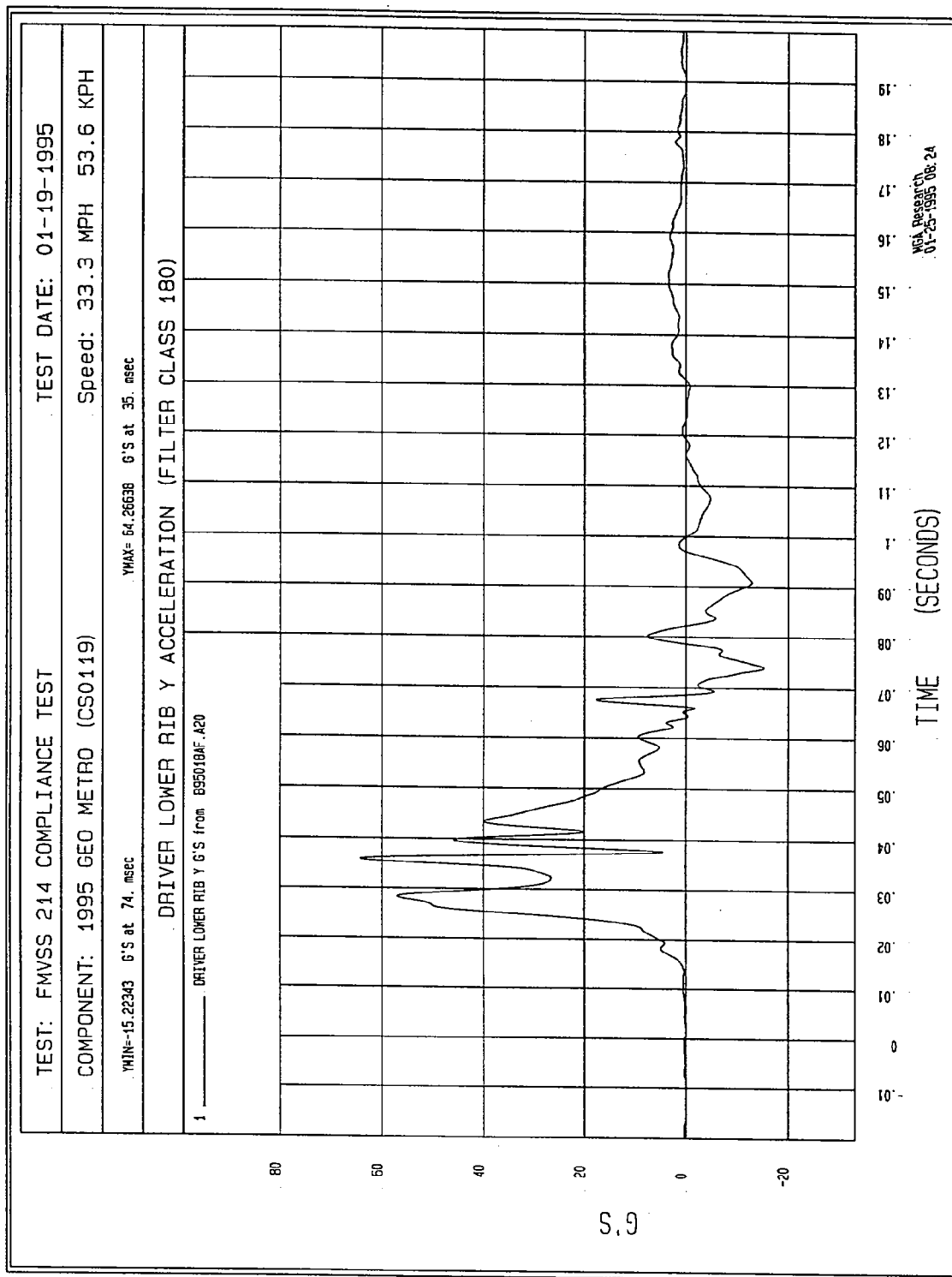


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

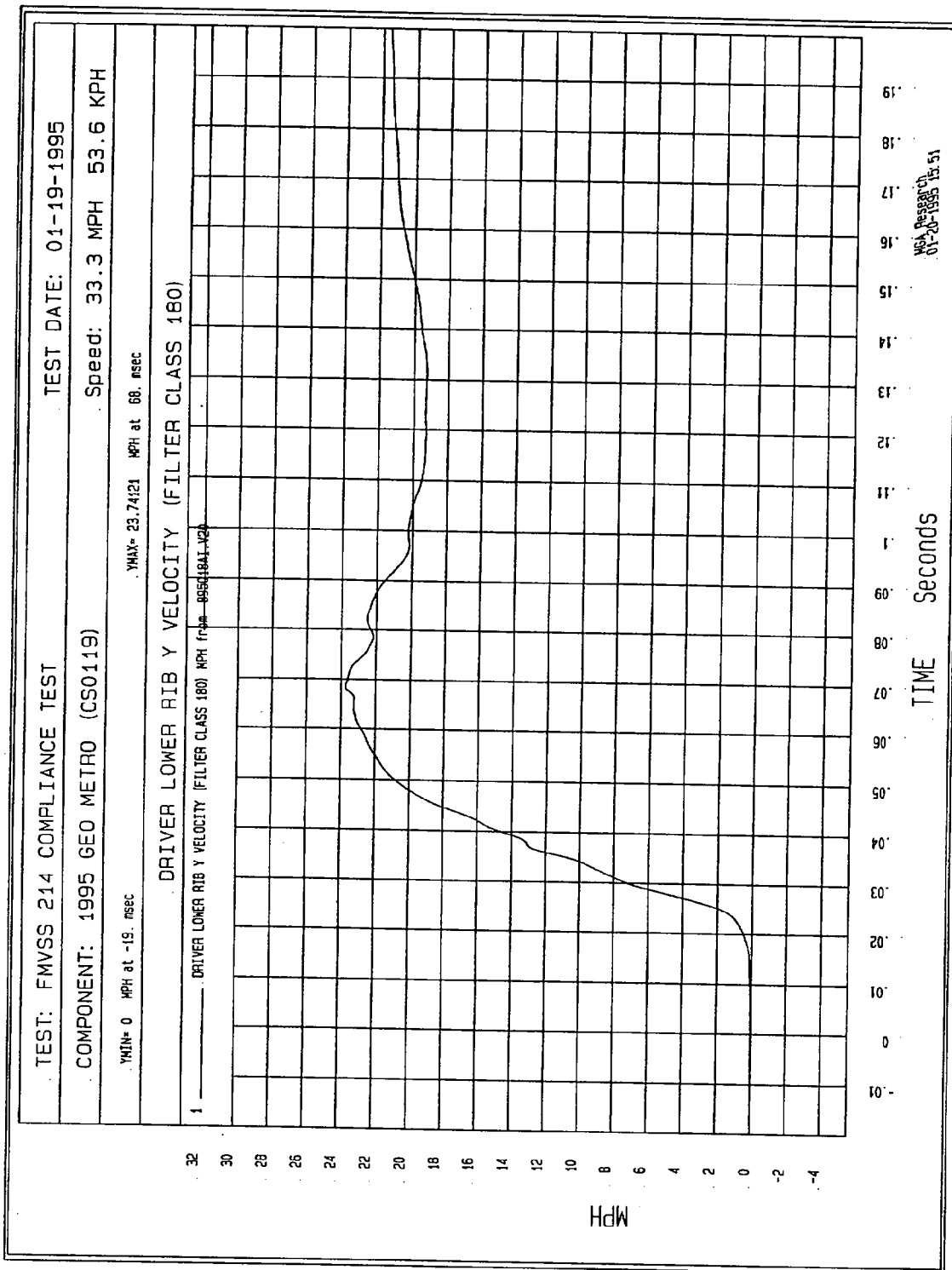


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

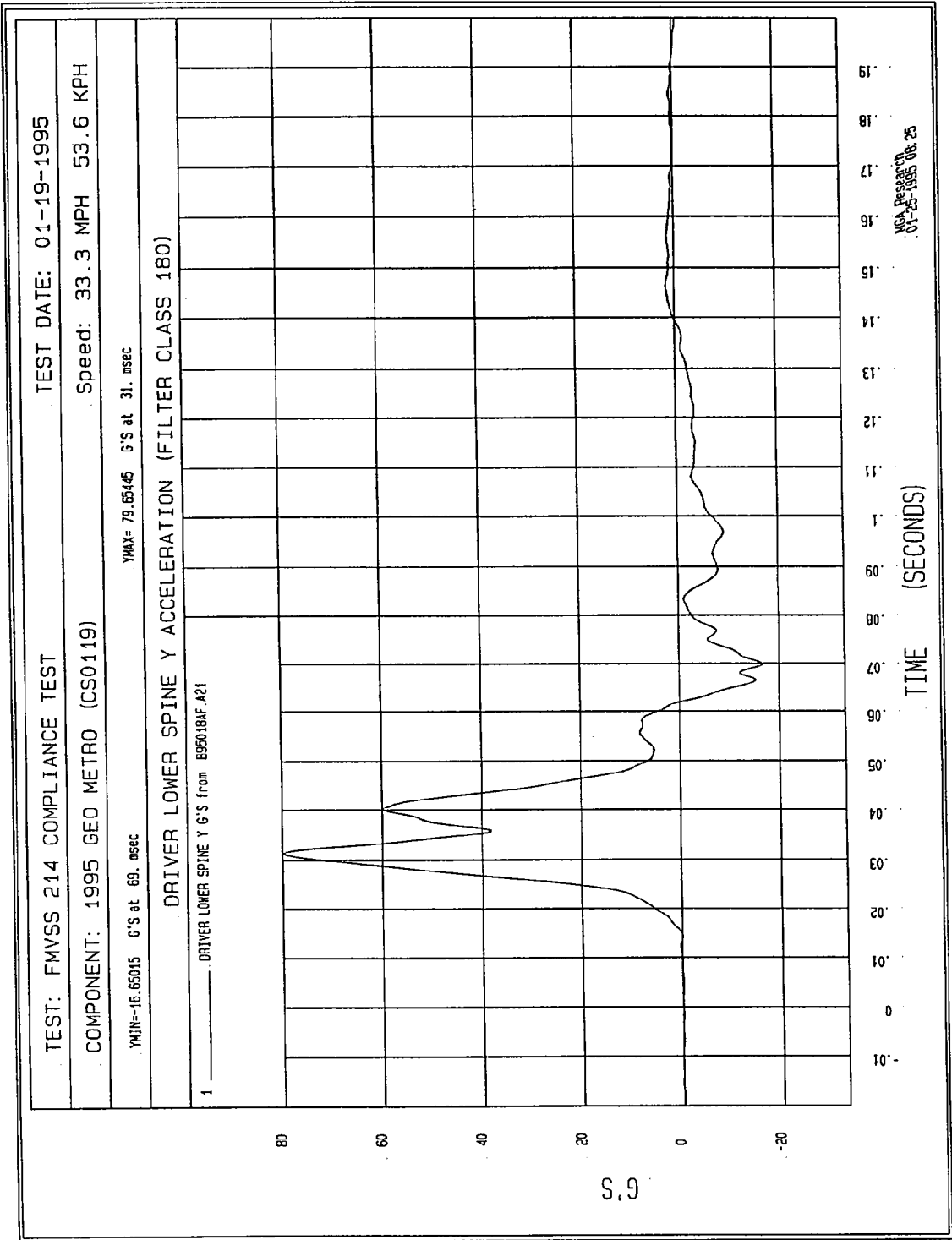


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

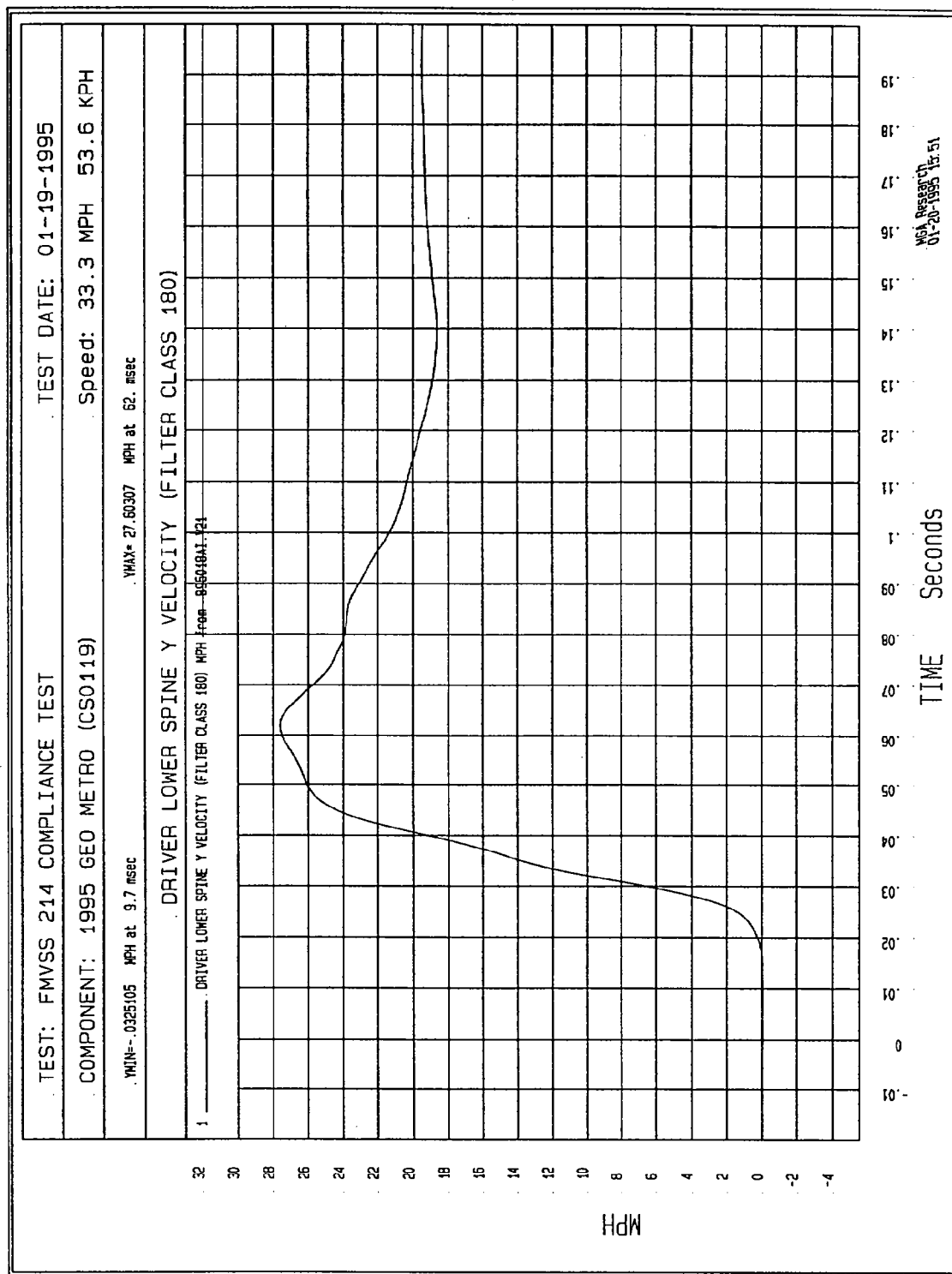


Figure B-6 - Driver Lower Spine Y Velocity vs. Time

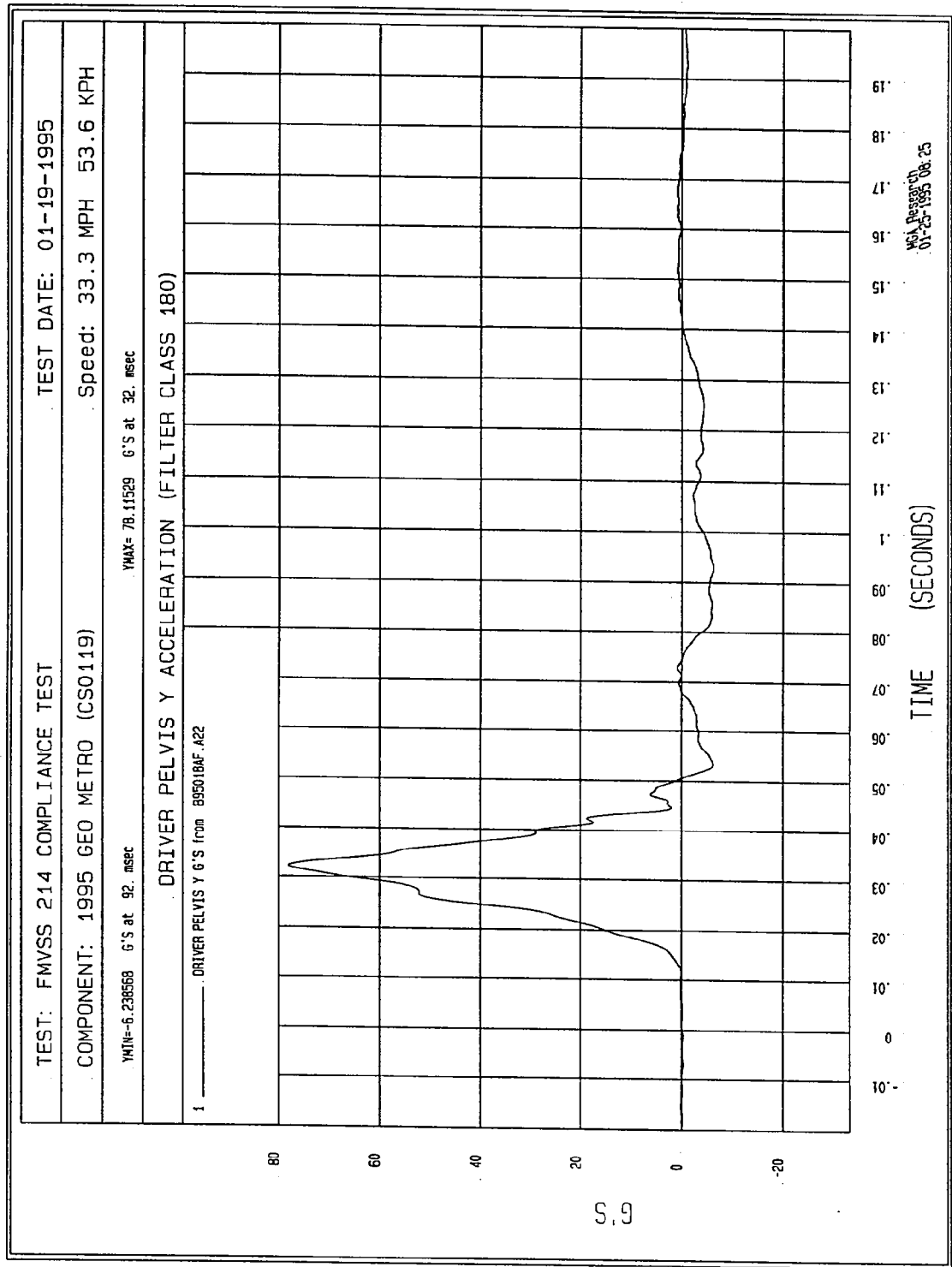


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

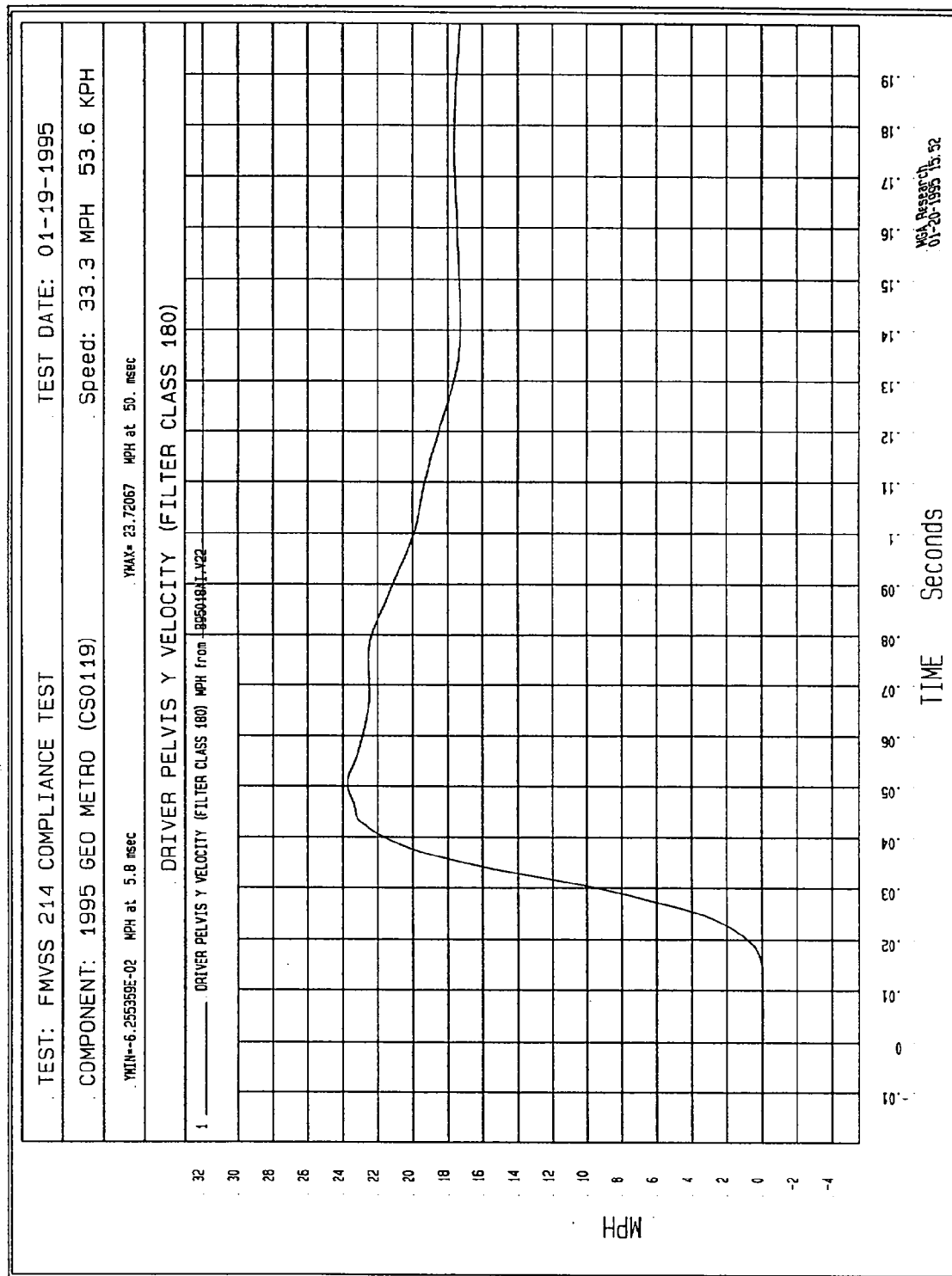


Figure B-8 - Driver Pelvis Y Velocity vs. Time

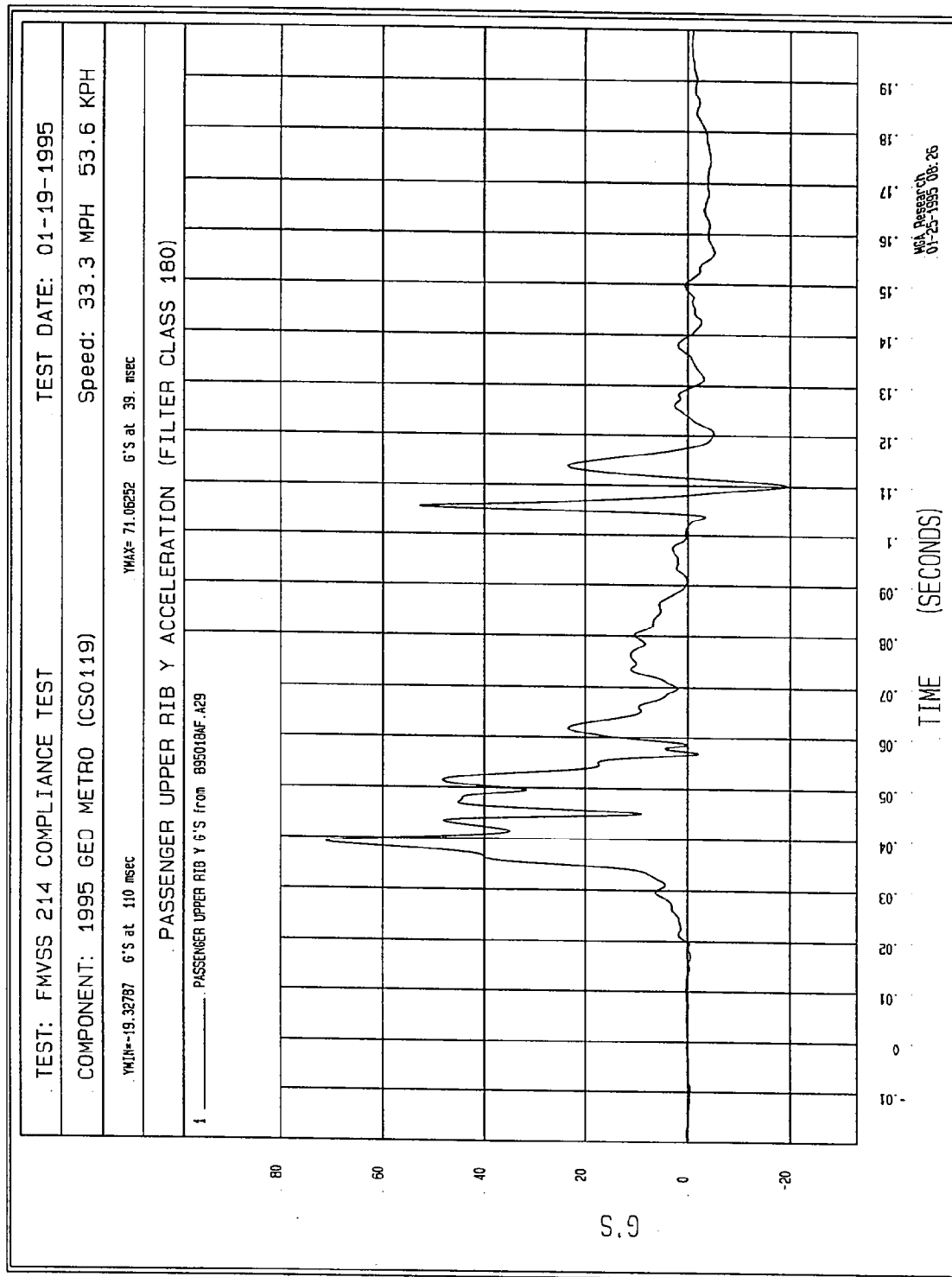


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

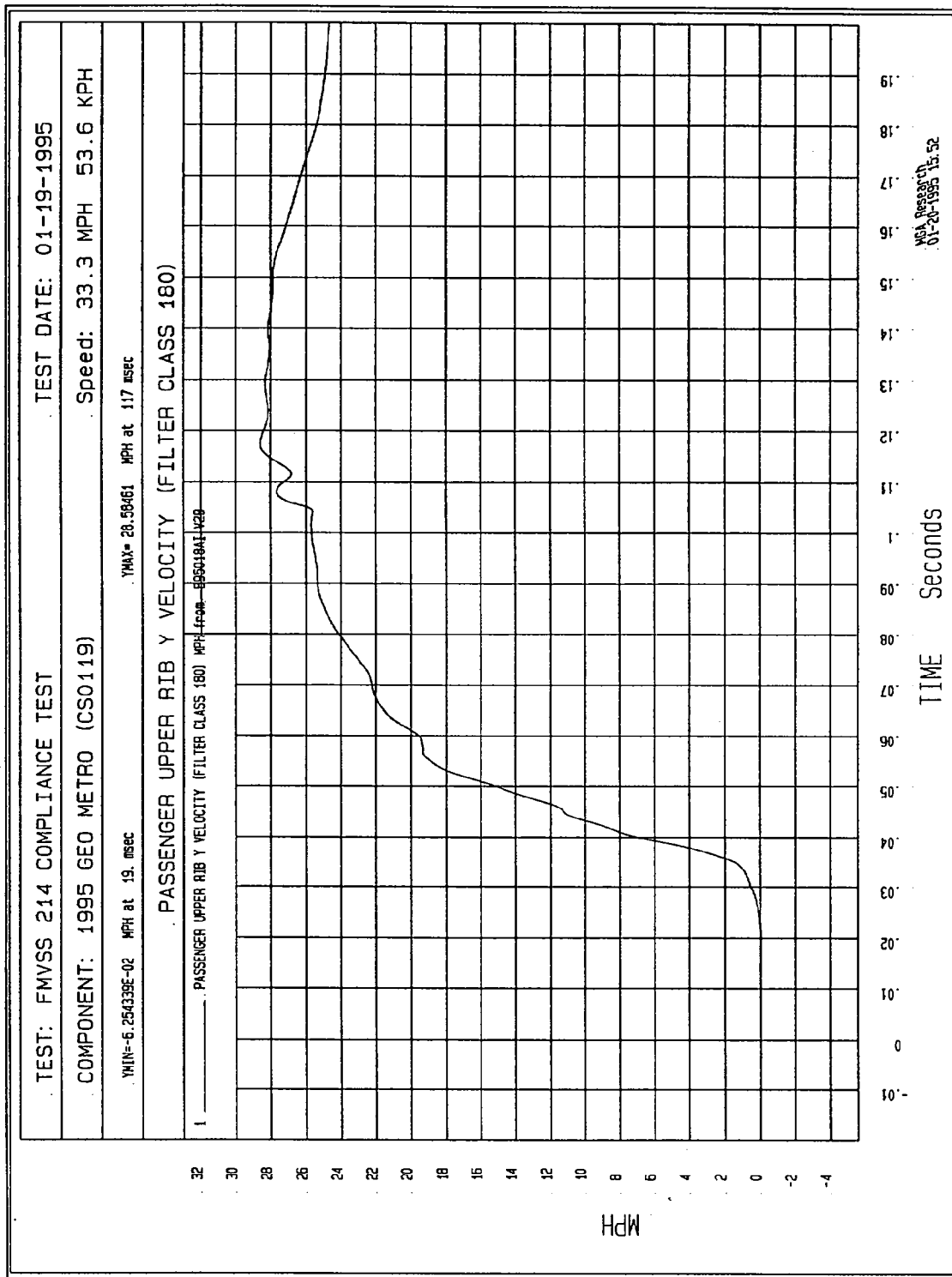


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

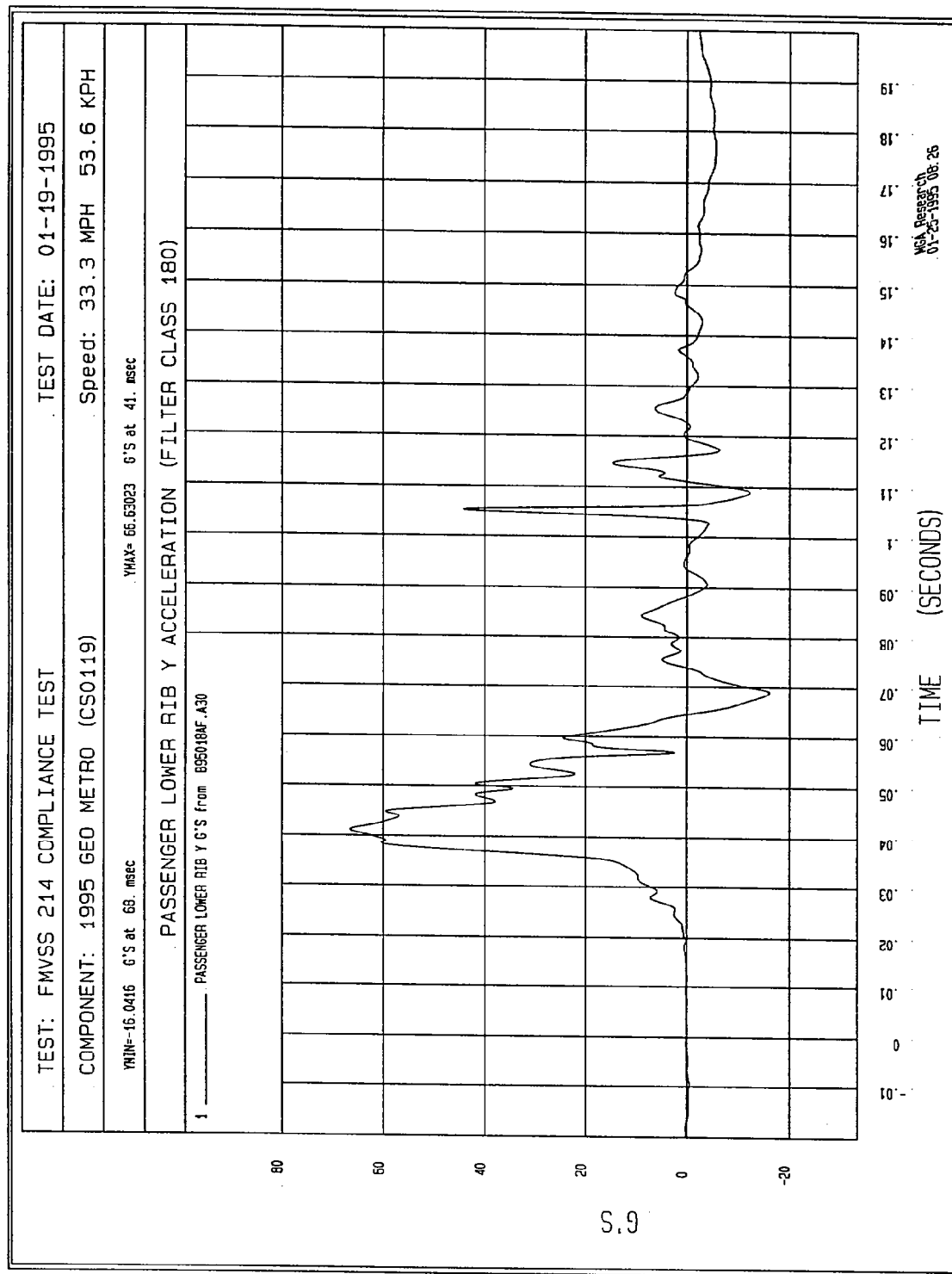


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

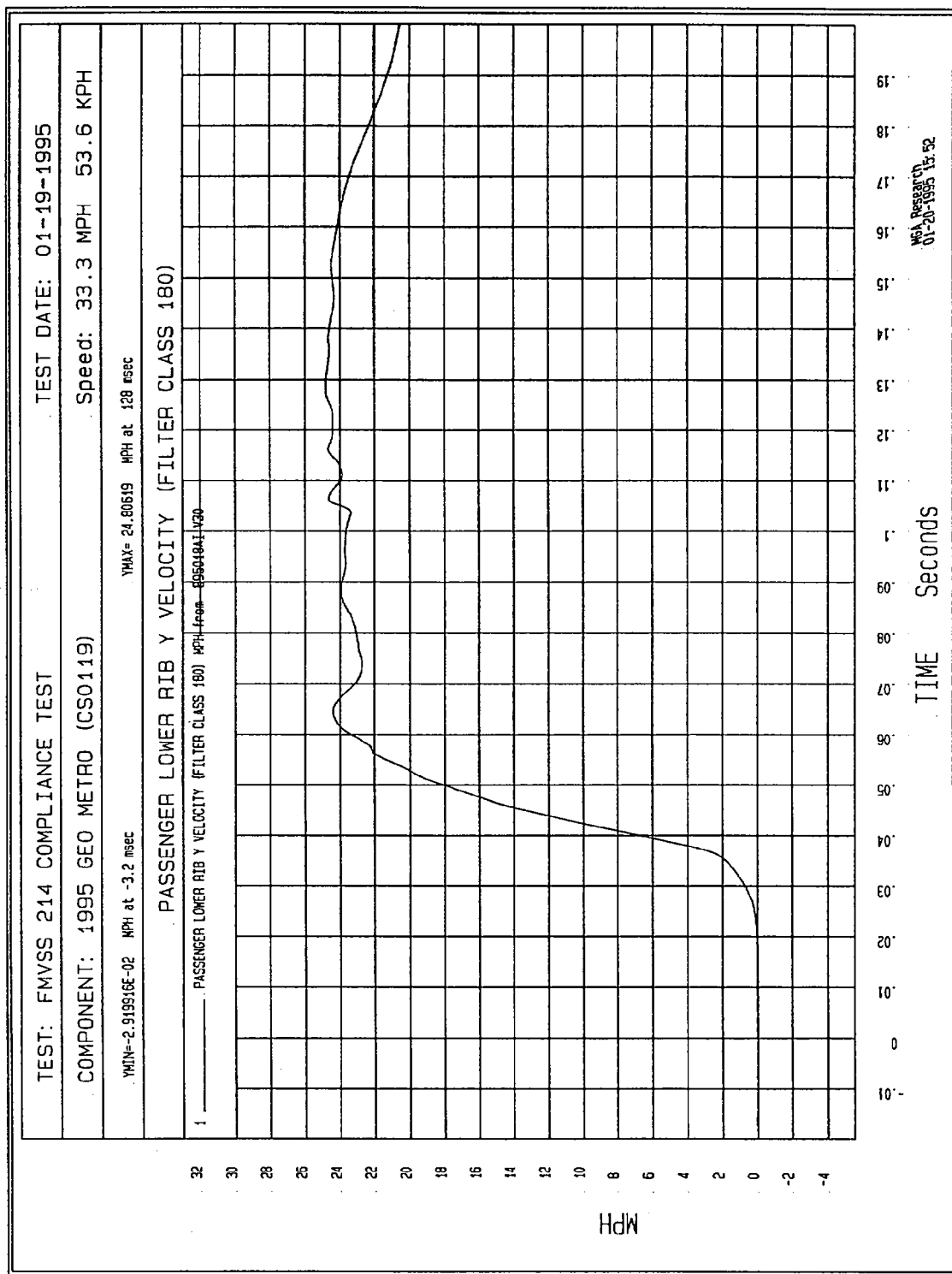


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

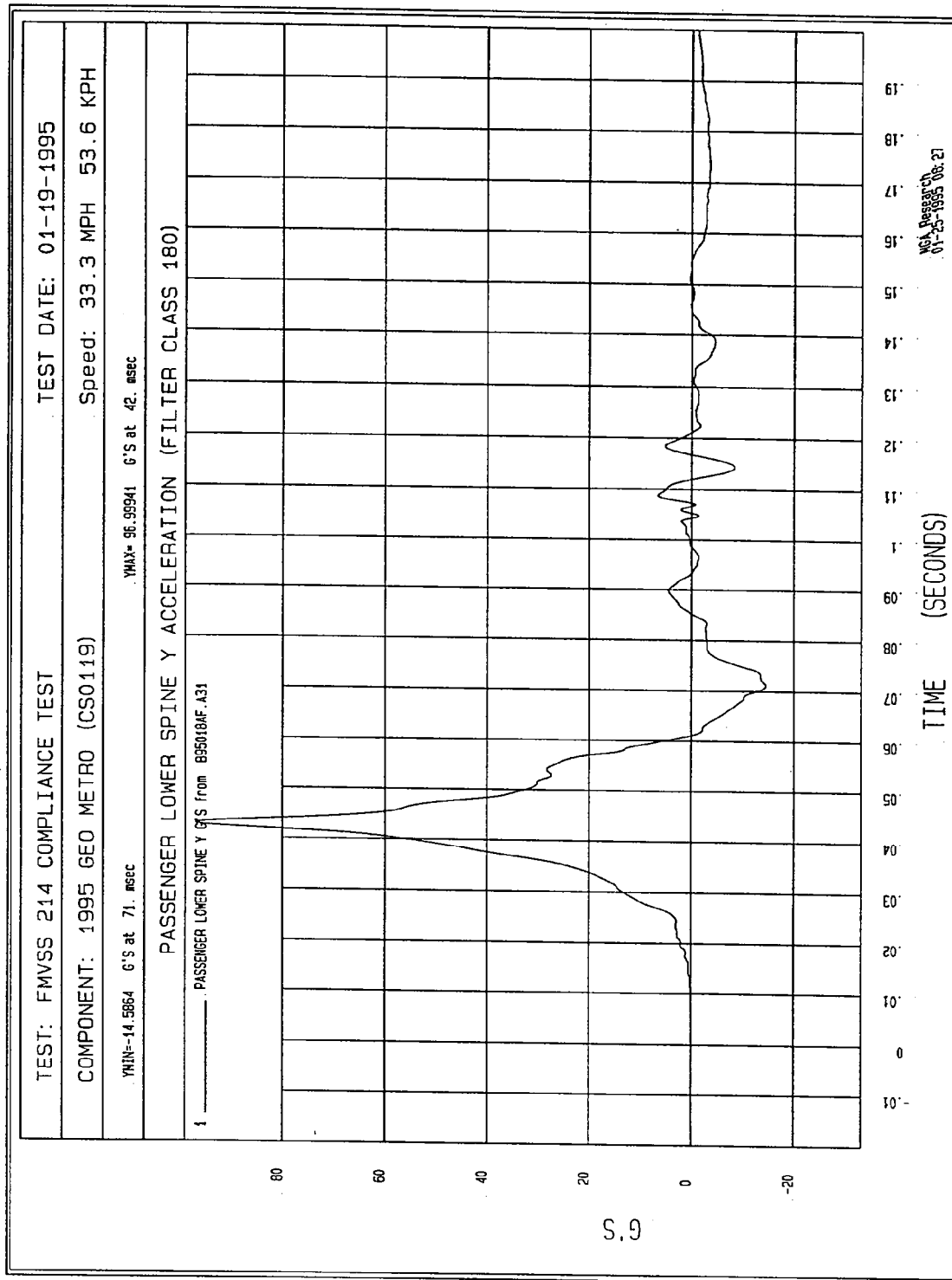


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

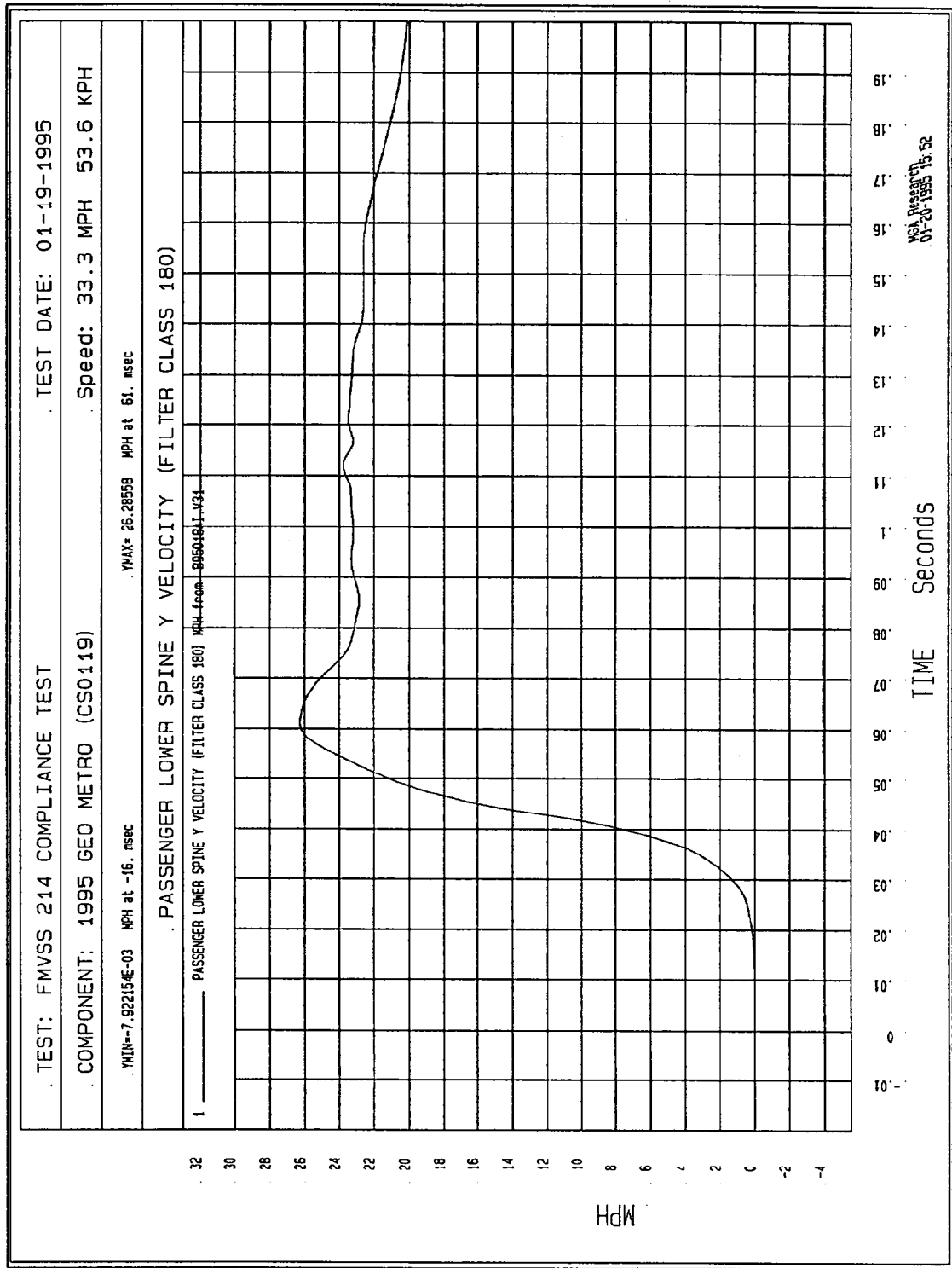


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

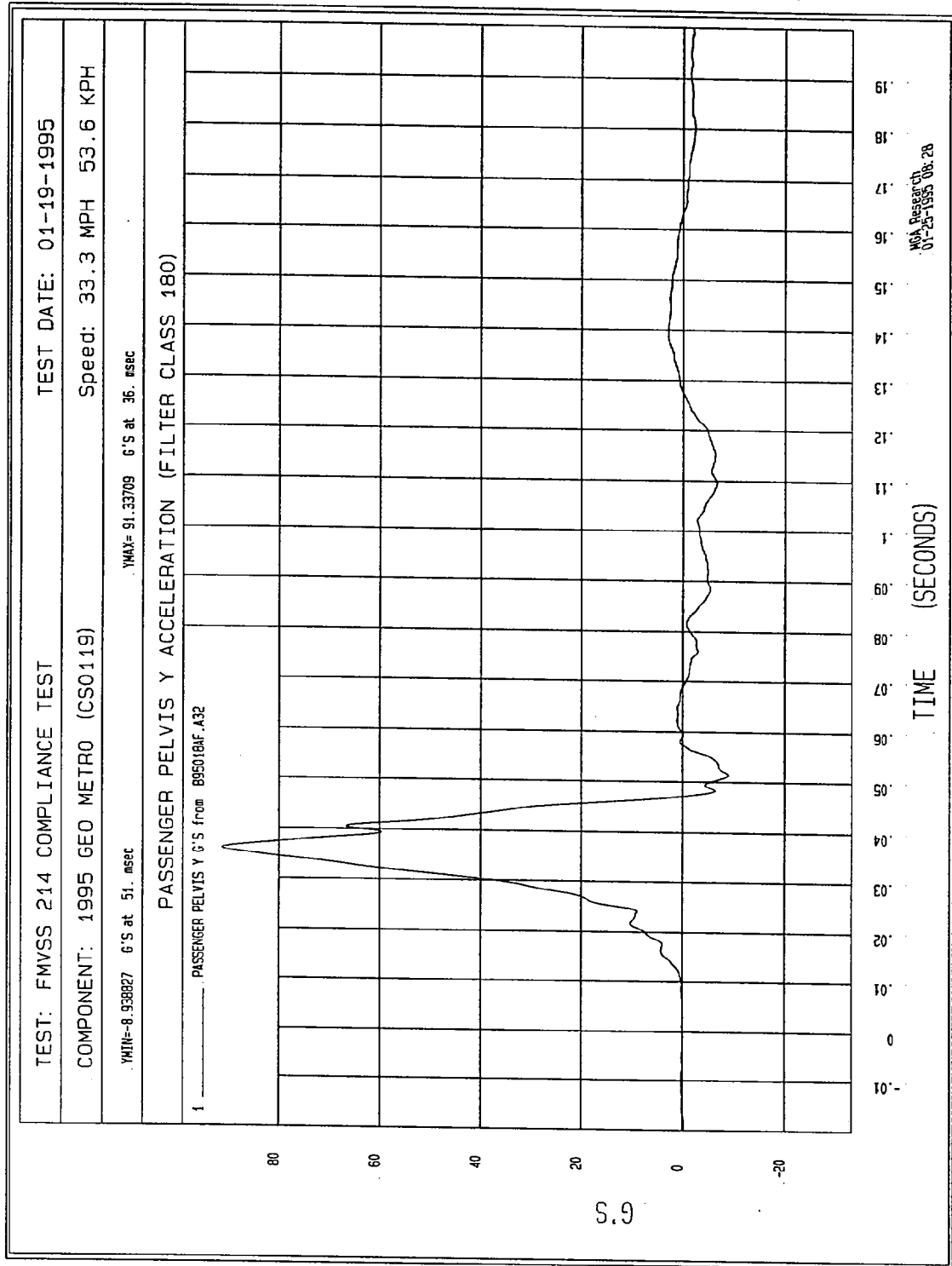


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

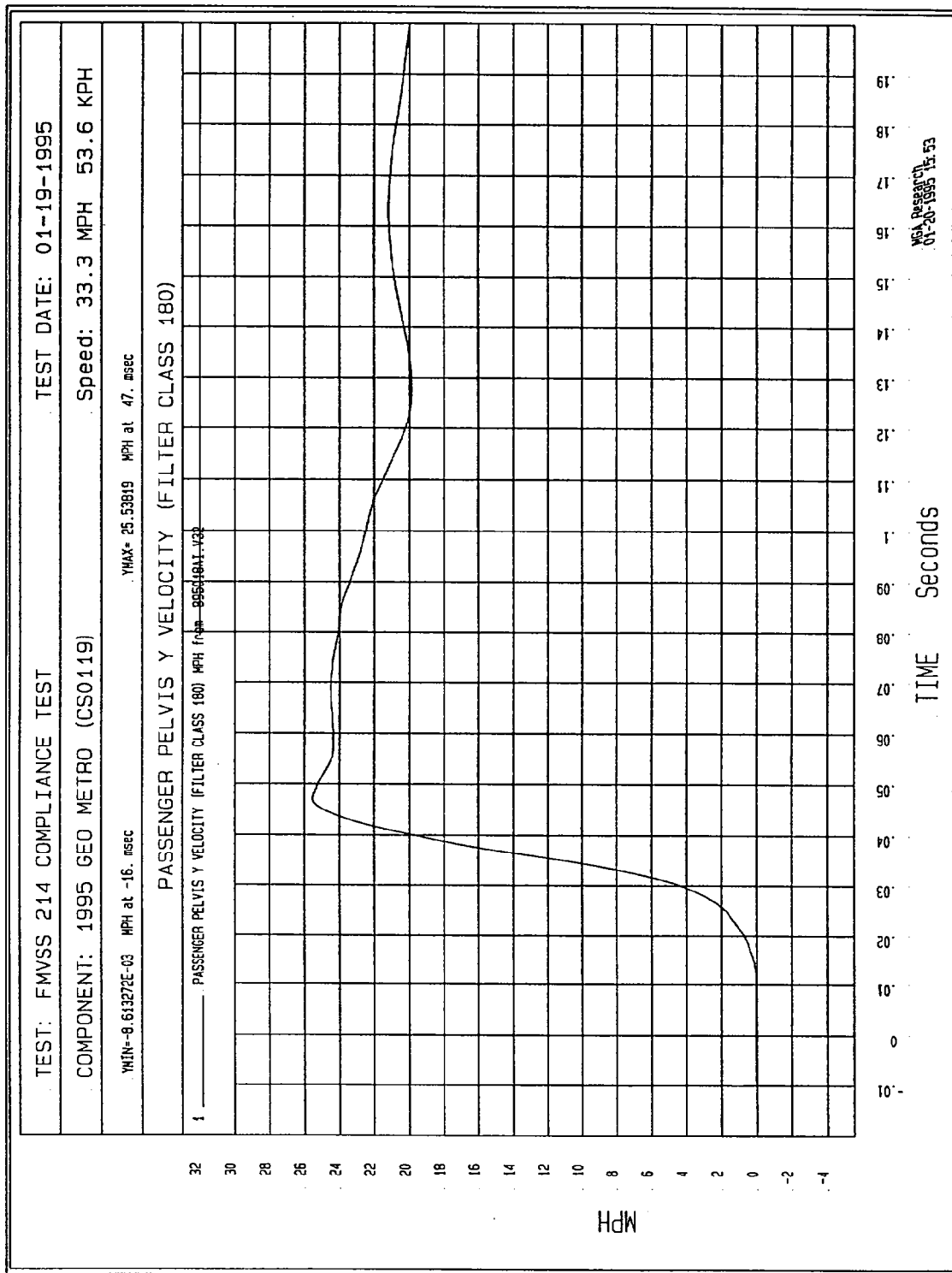


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

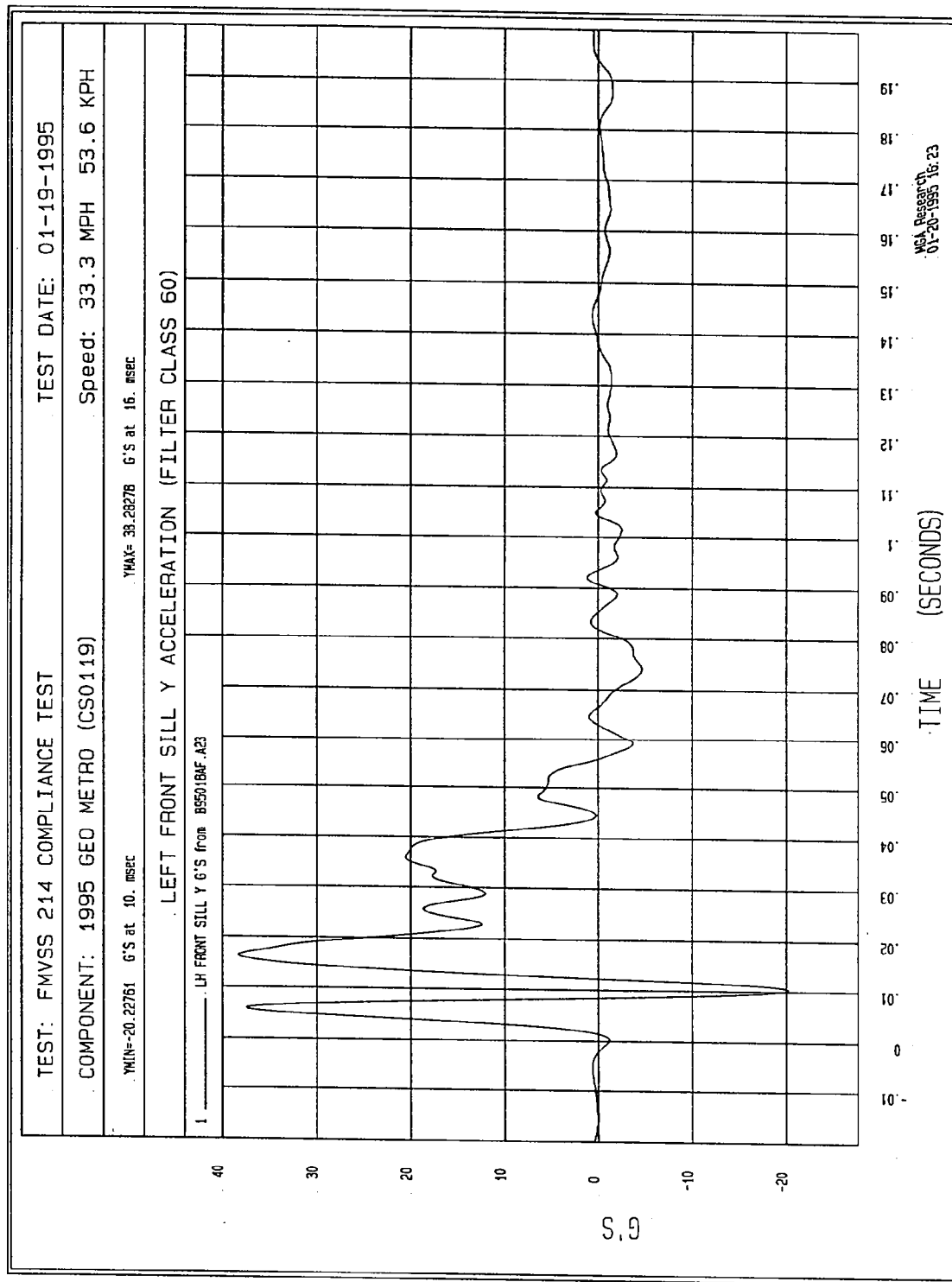


Figure B-17 - Left Front Sill Y Acceleration vs. Time

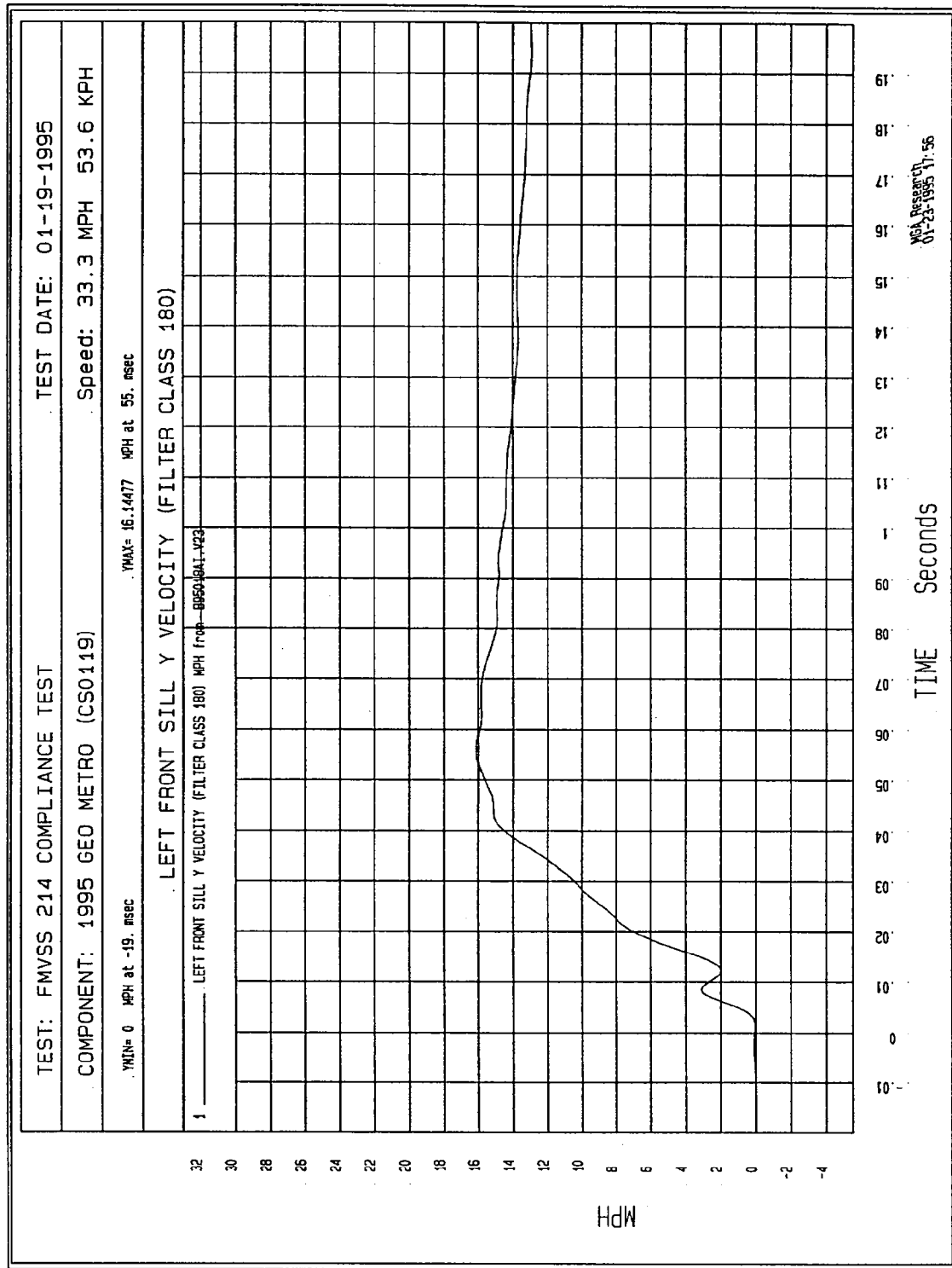


Figure B-18 - Left Front Sill Y Velocity vs. Time

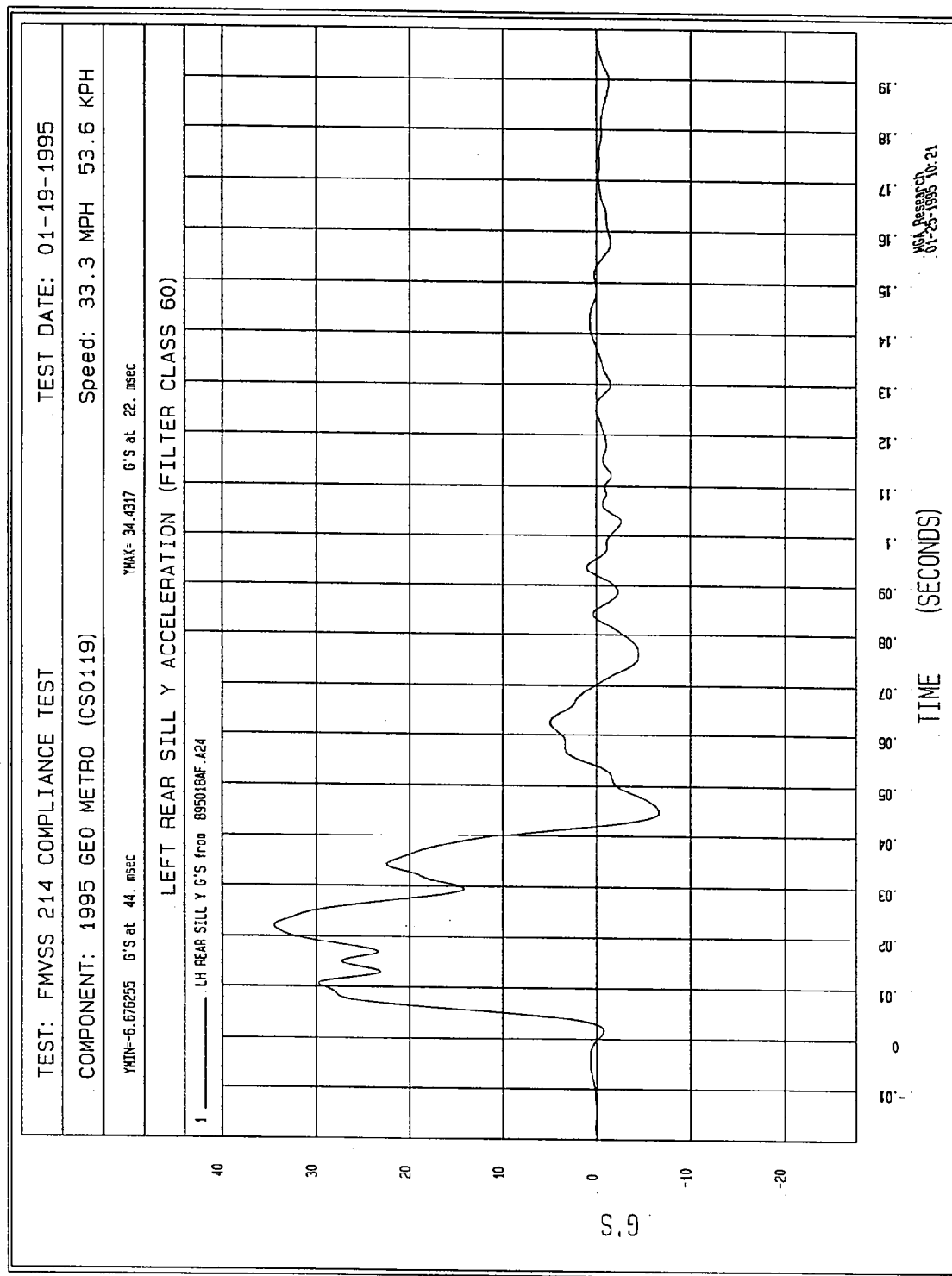


Figure B-19 - Left Rear Sill Y Acceleration vs. Time

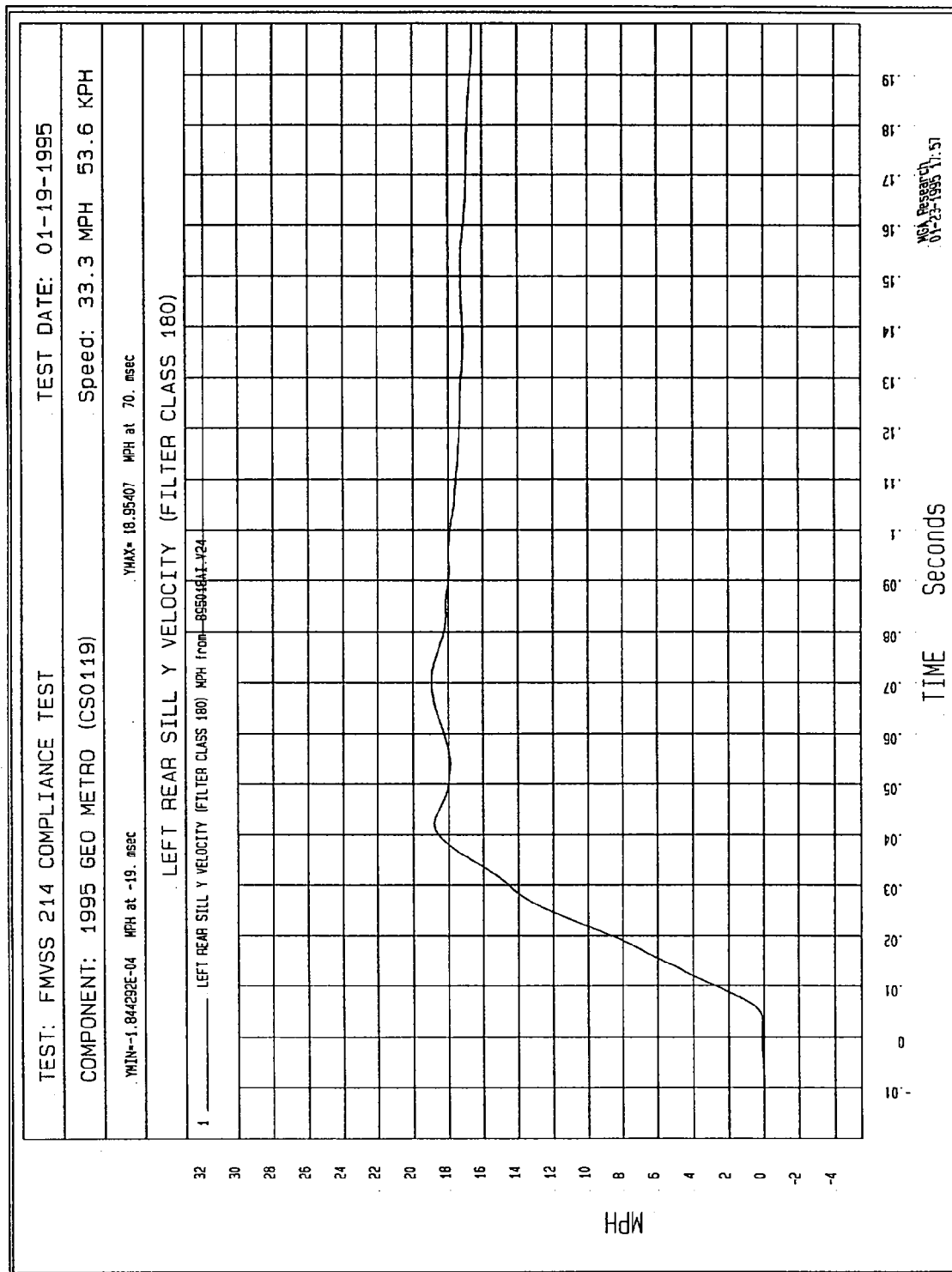


Figure B-20 - Left Rear Sill Y Velocity vs. Time

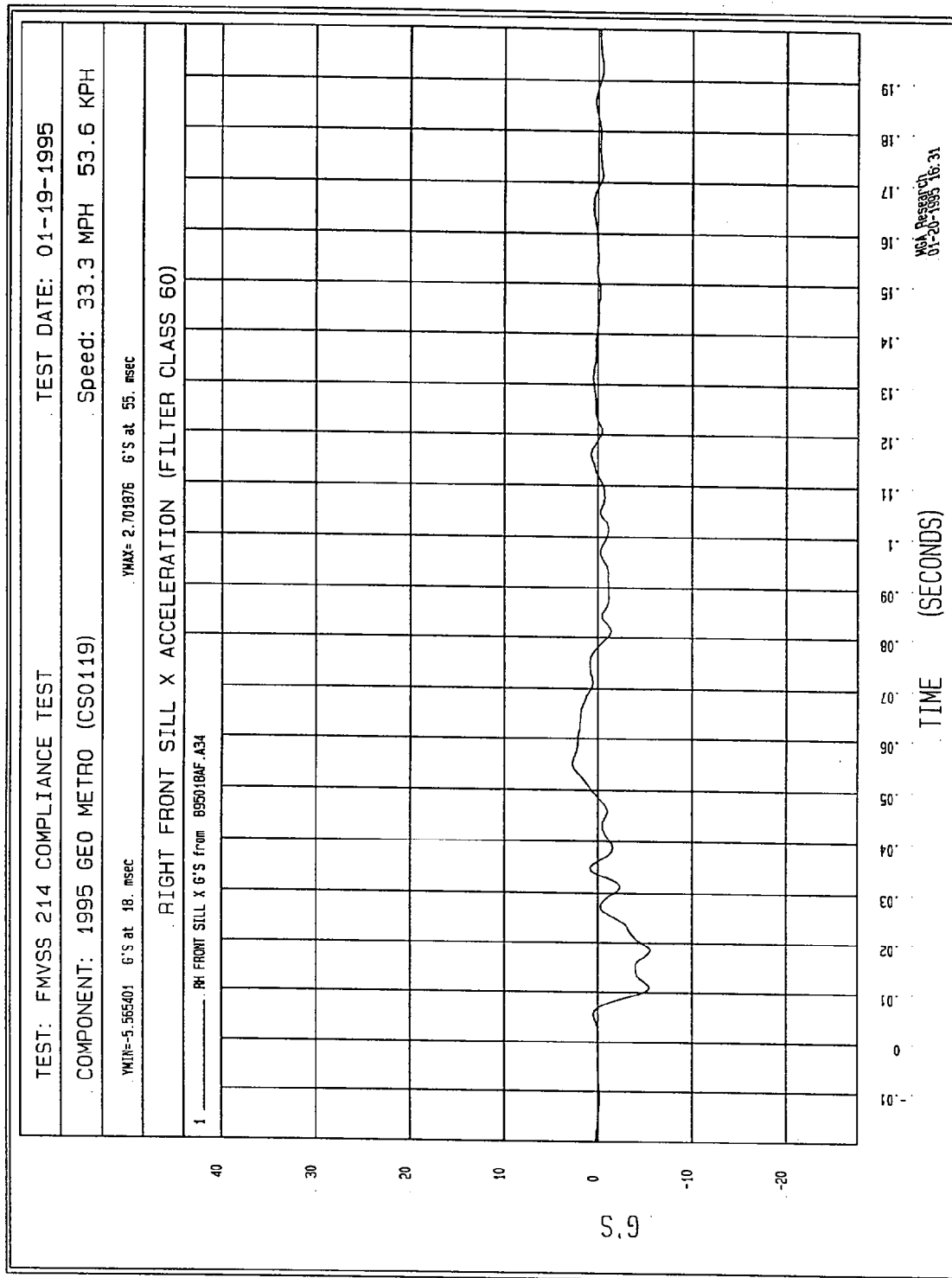


Figure B-21 - Right Front Sill X Acceleration vs. Time

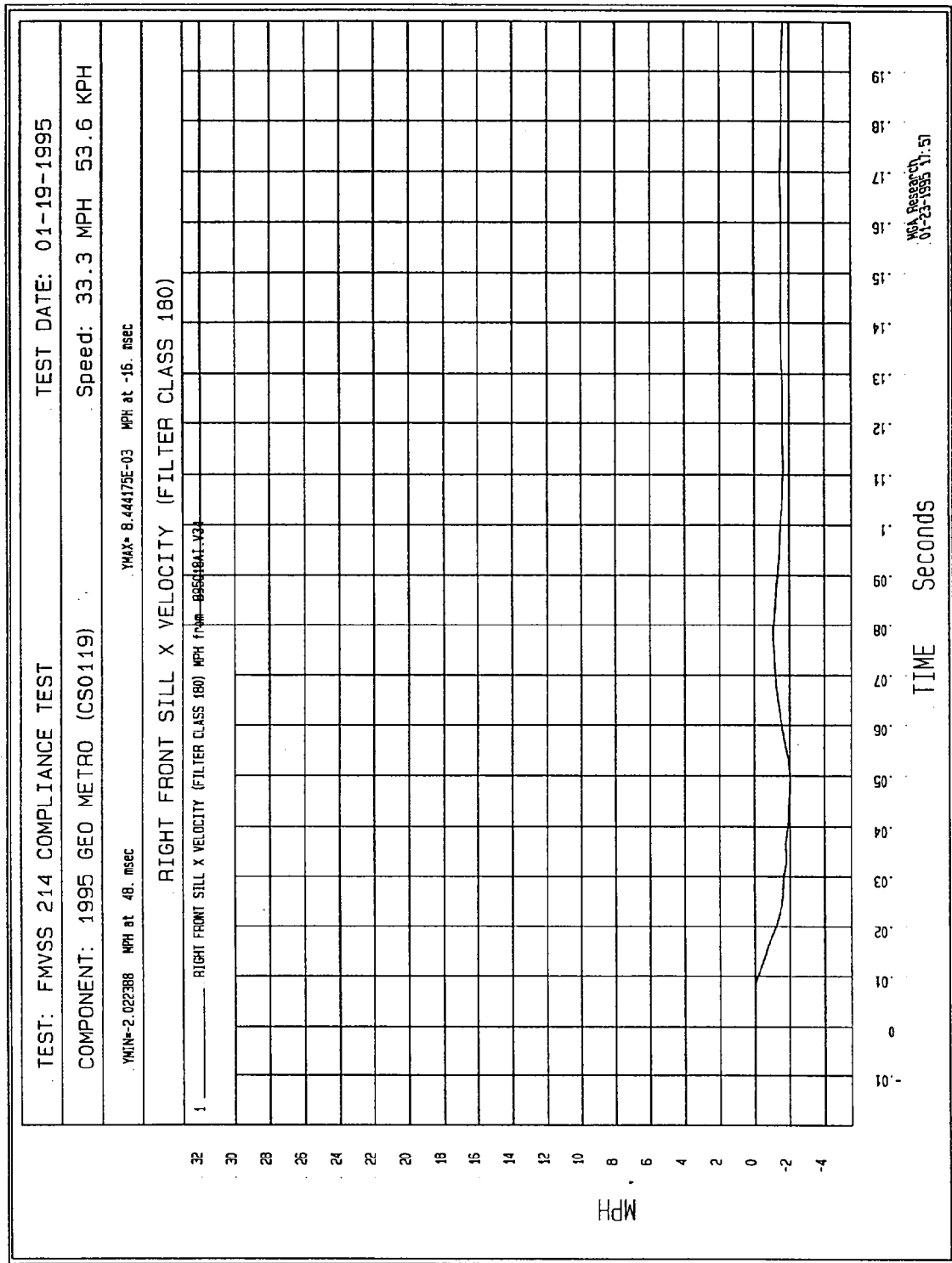


Figure B-22 - Right Front Sill X Velocity vs. Time

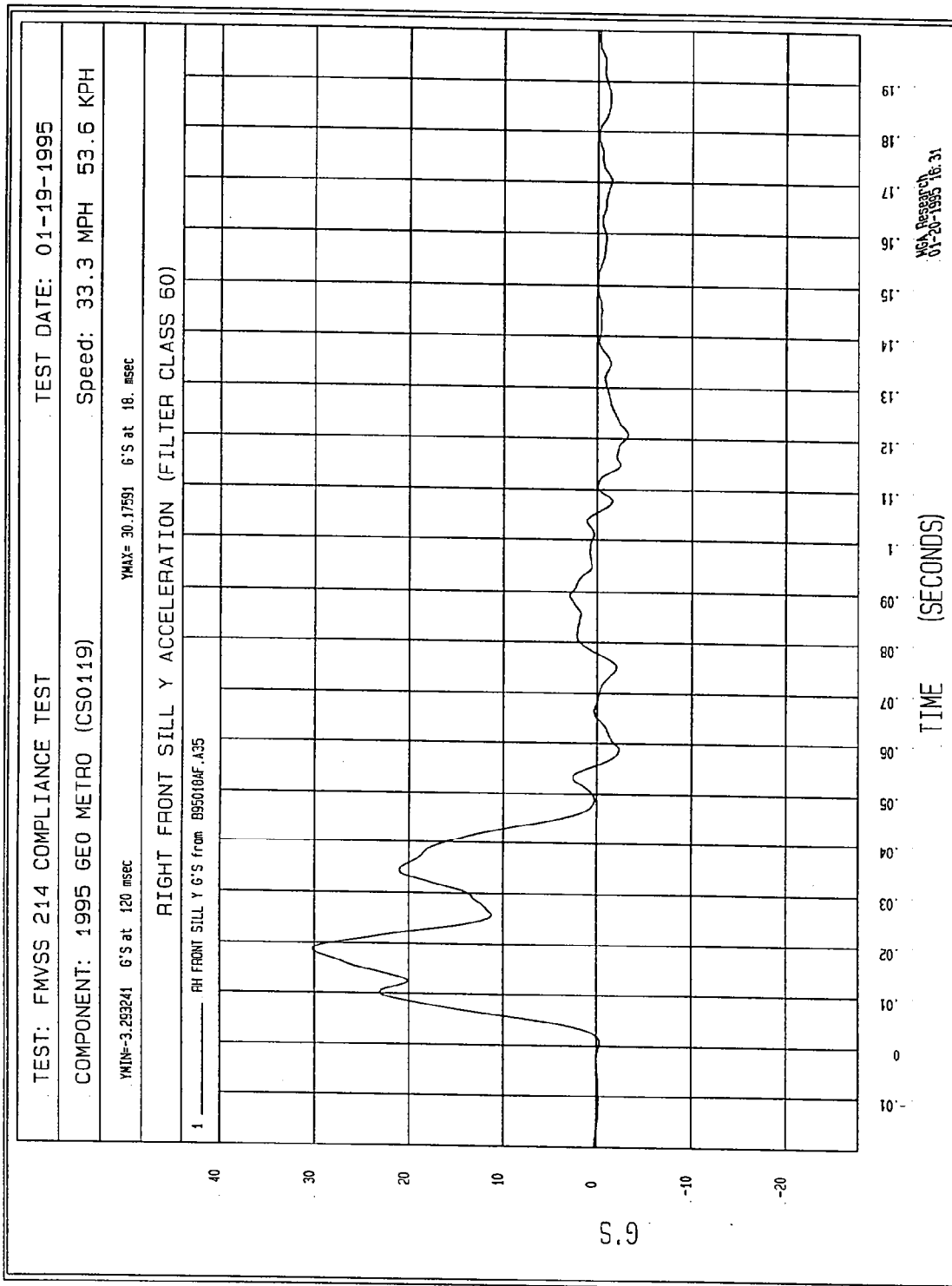


Figure B-23 - Right Front Sill Y Acceleration vs. Time

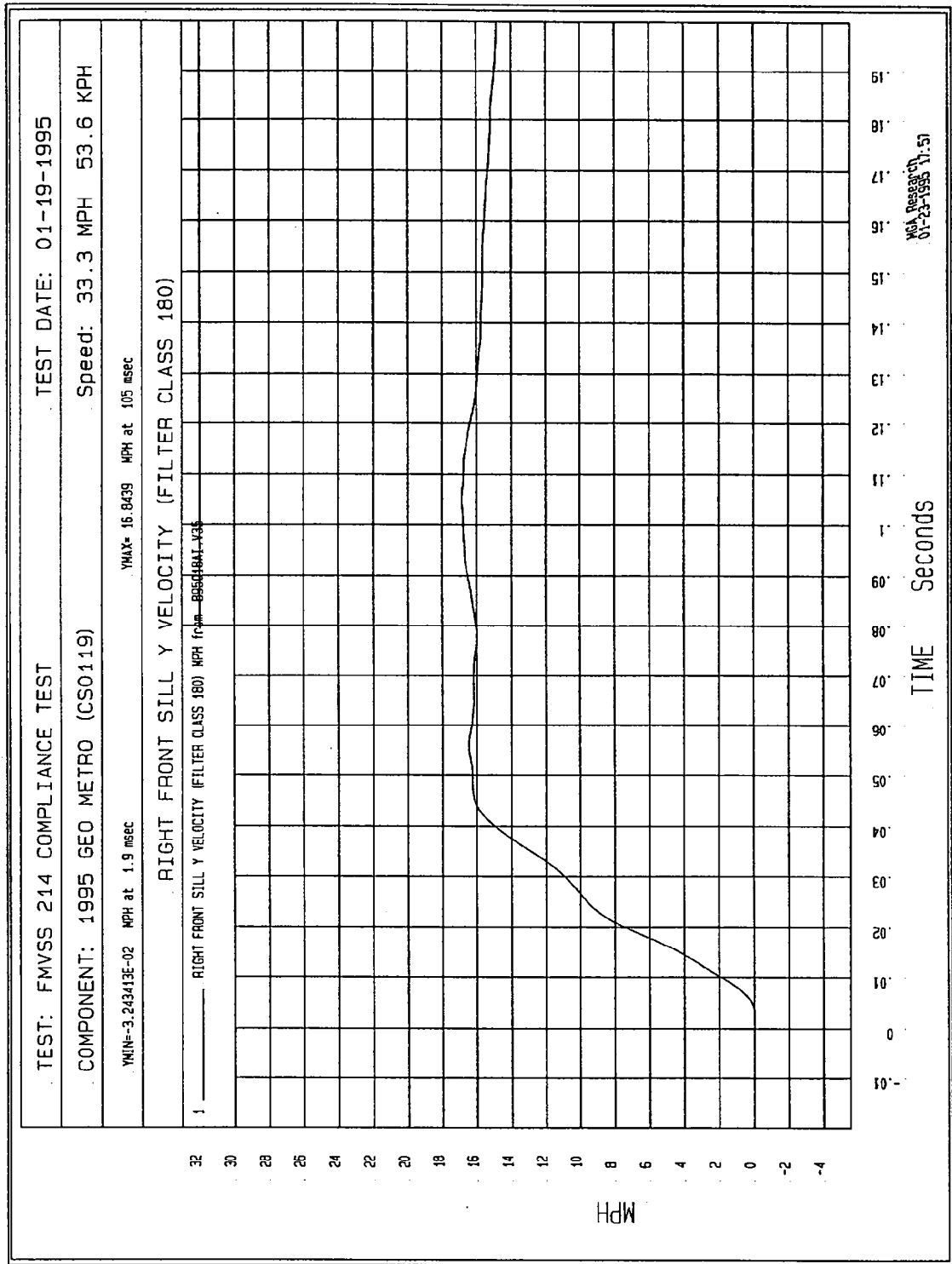


Figure B-24 - Right Front Sill Y Velocity vs. Time

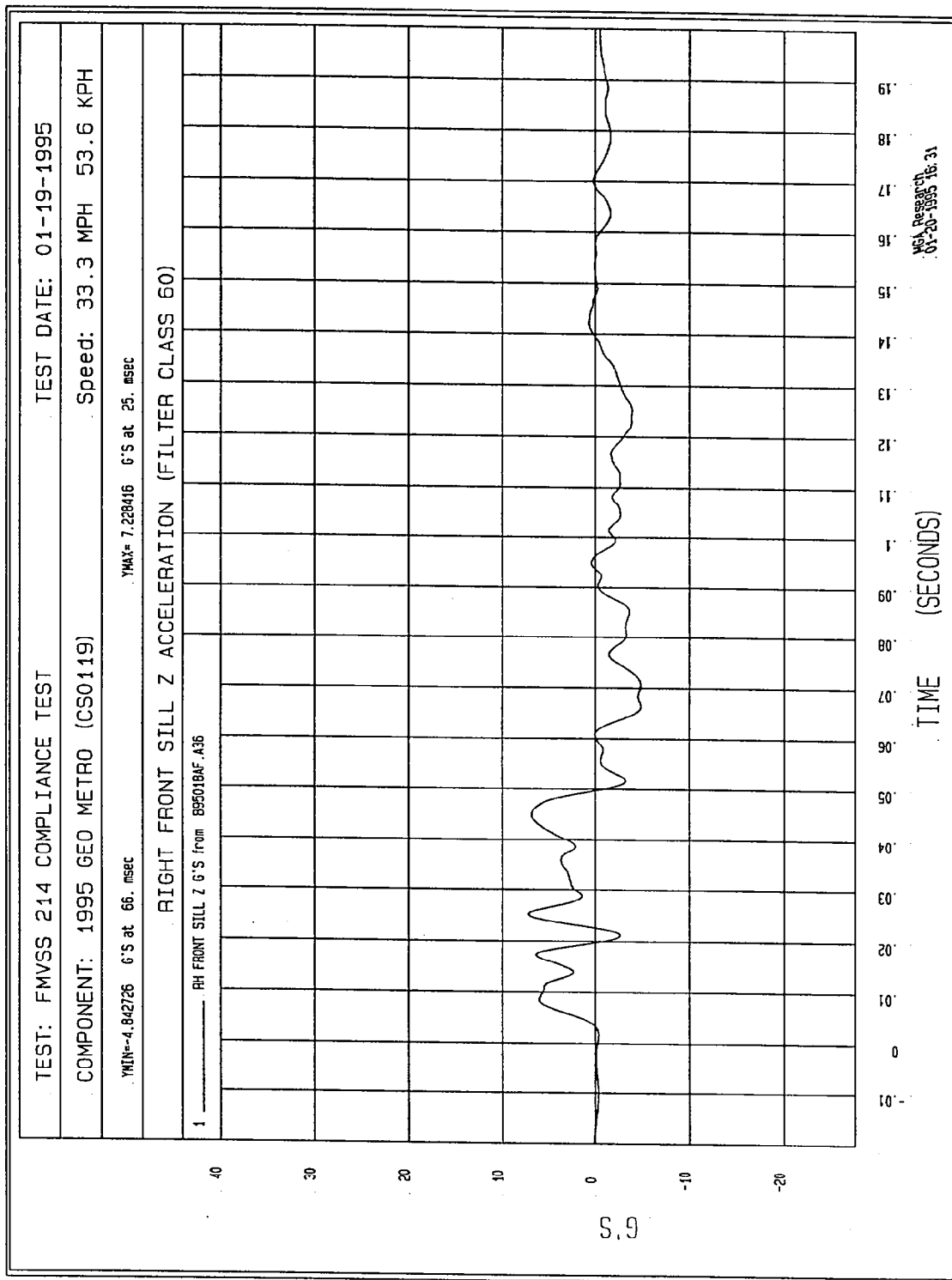


Figure B-25 - Right Front Sill Z Acceleration vs. Time

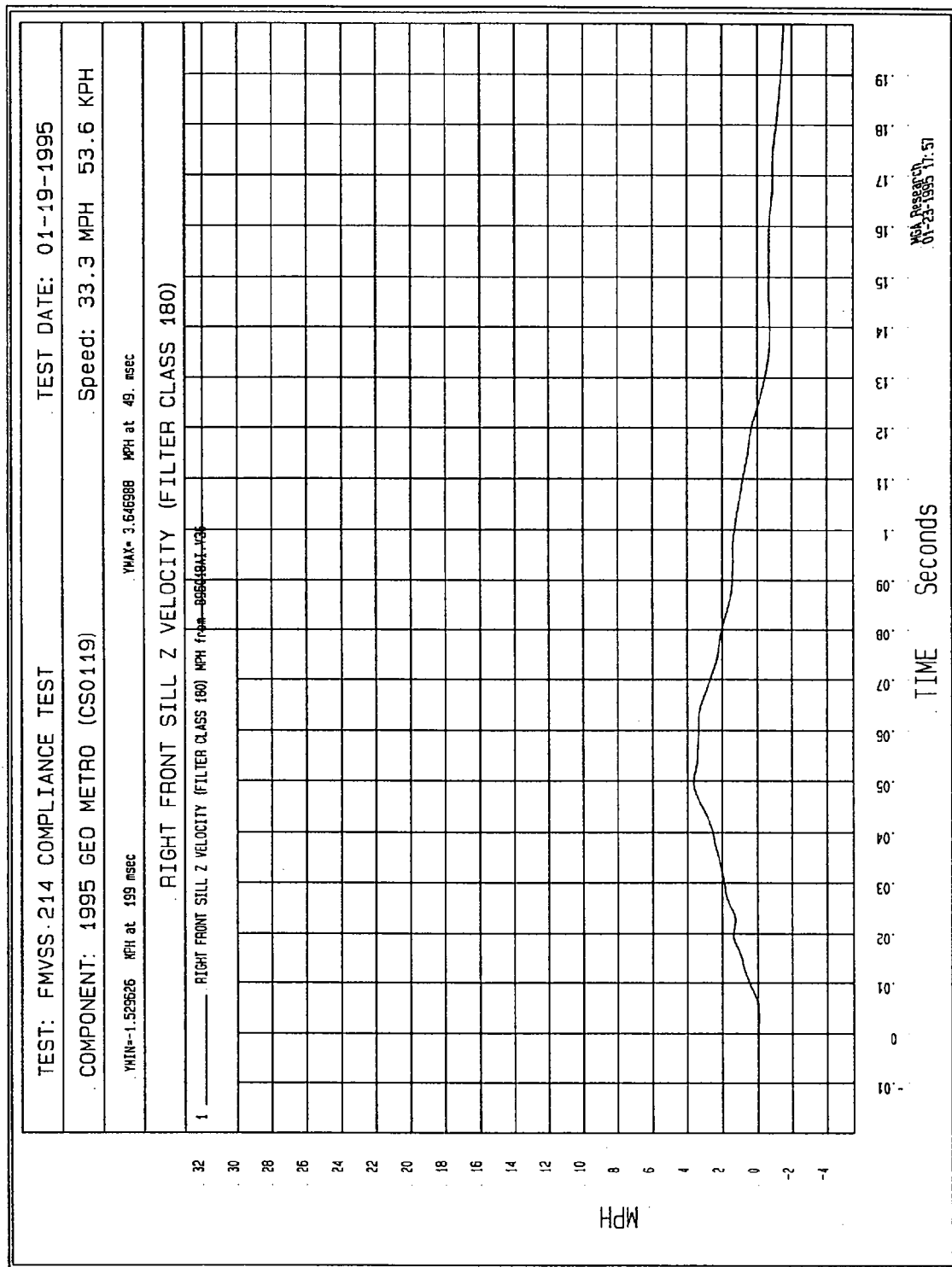


Figure B-26 - Right Front Sill Z Velocity vs. Time

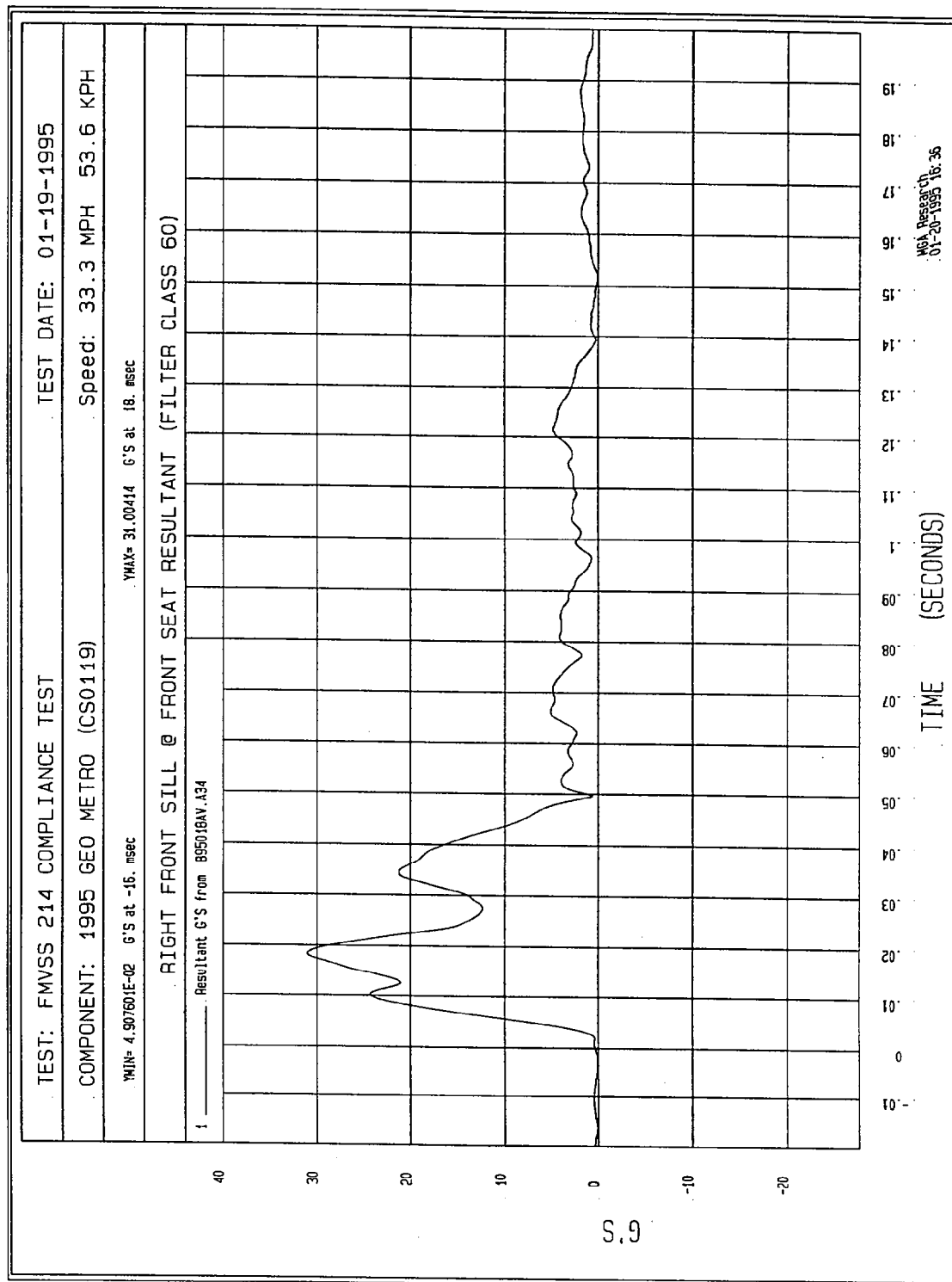


Figure B-27 - Right Front Sill at Front Seat Resultant vs. Time

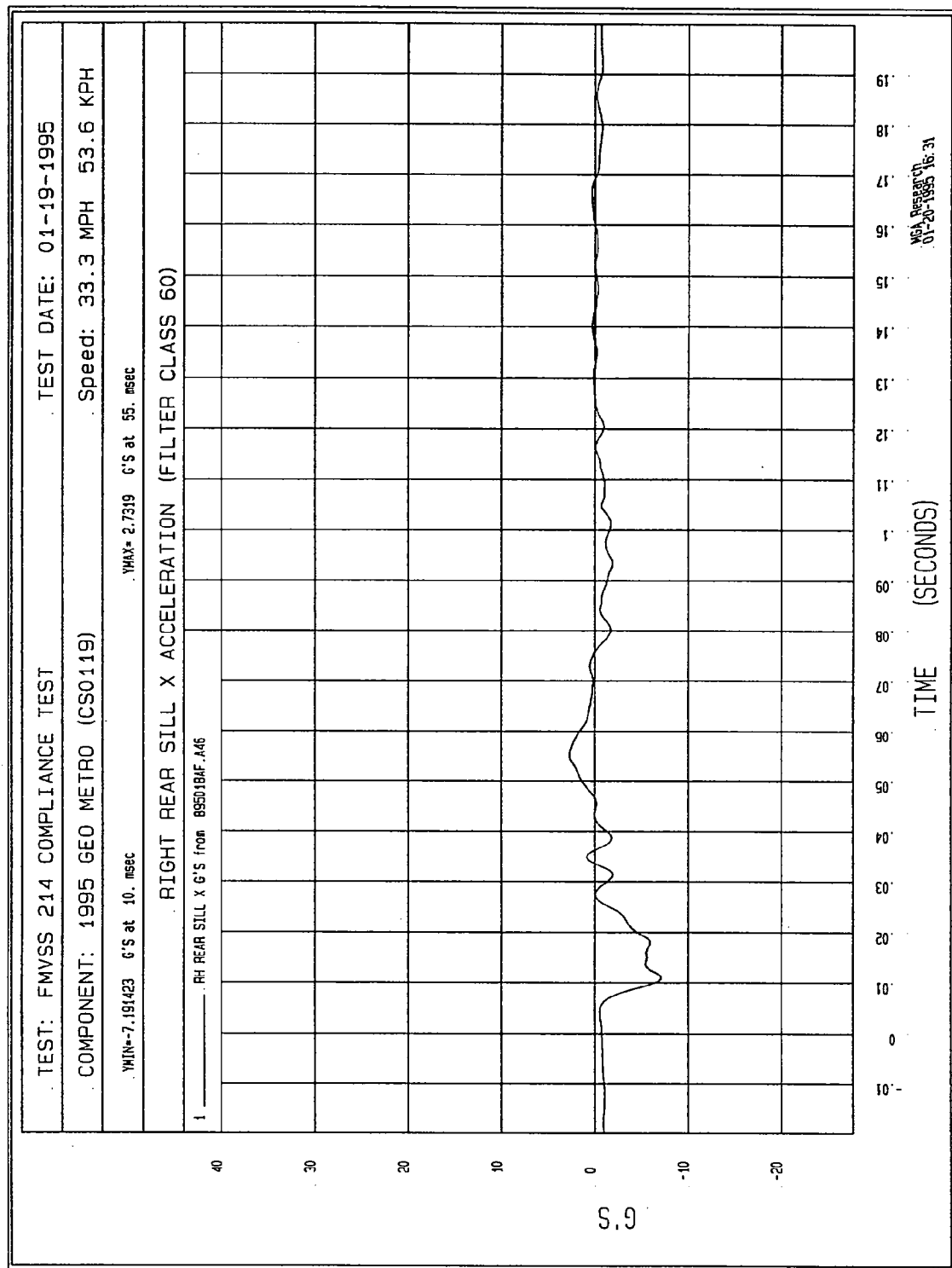


Figure B-28 - Right Rear Sill X Acceleration vs. Time

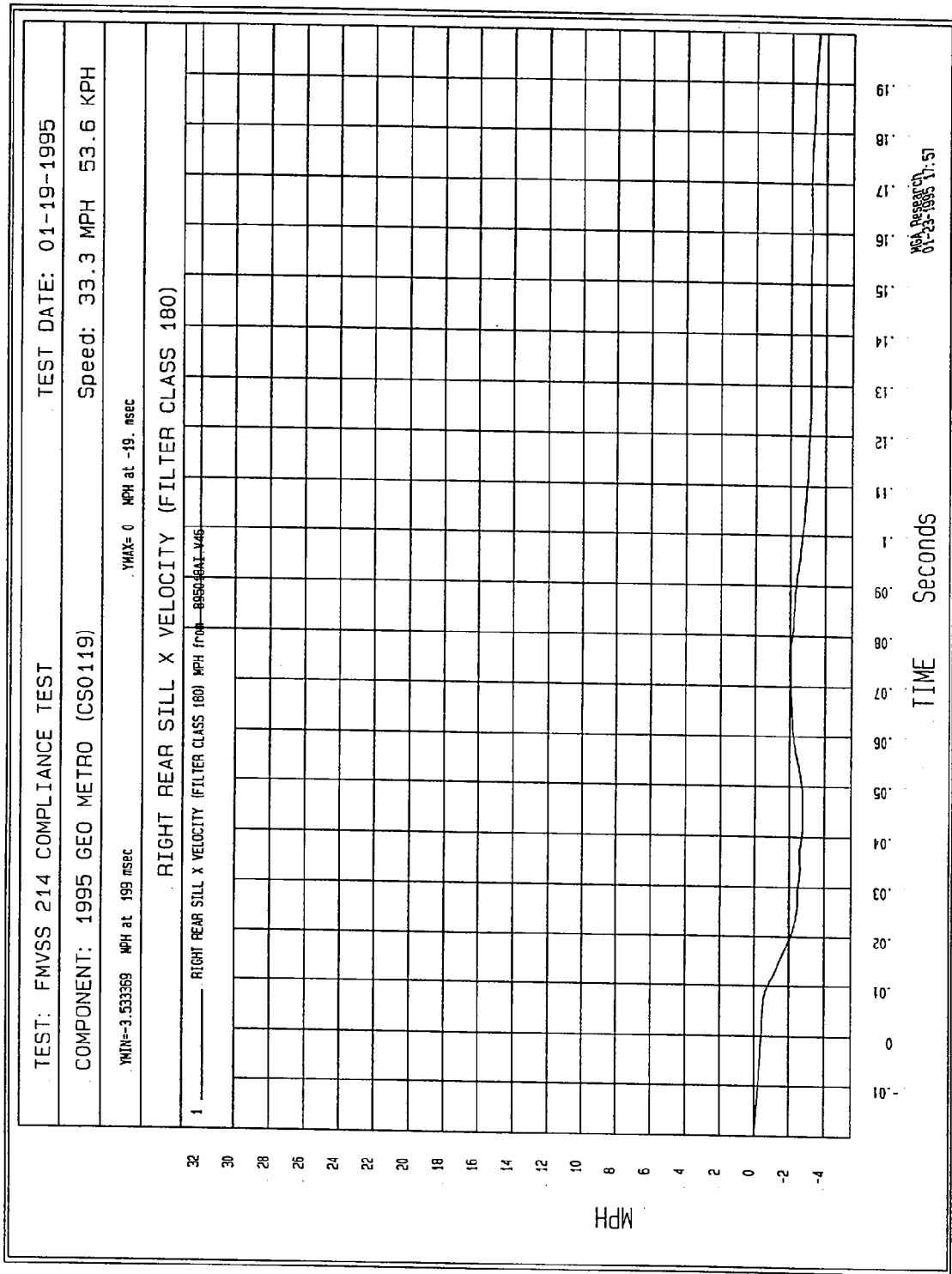


Figure B-29 - Right Rear Sill X Velocity vs. Time

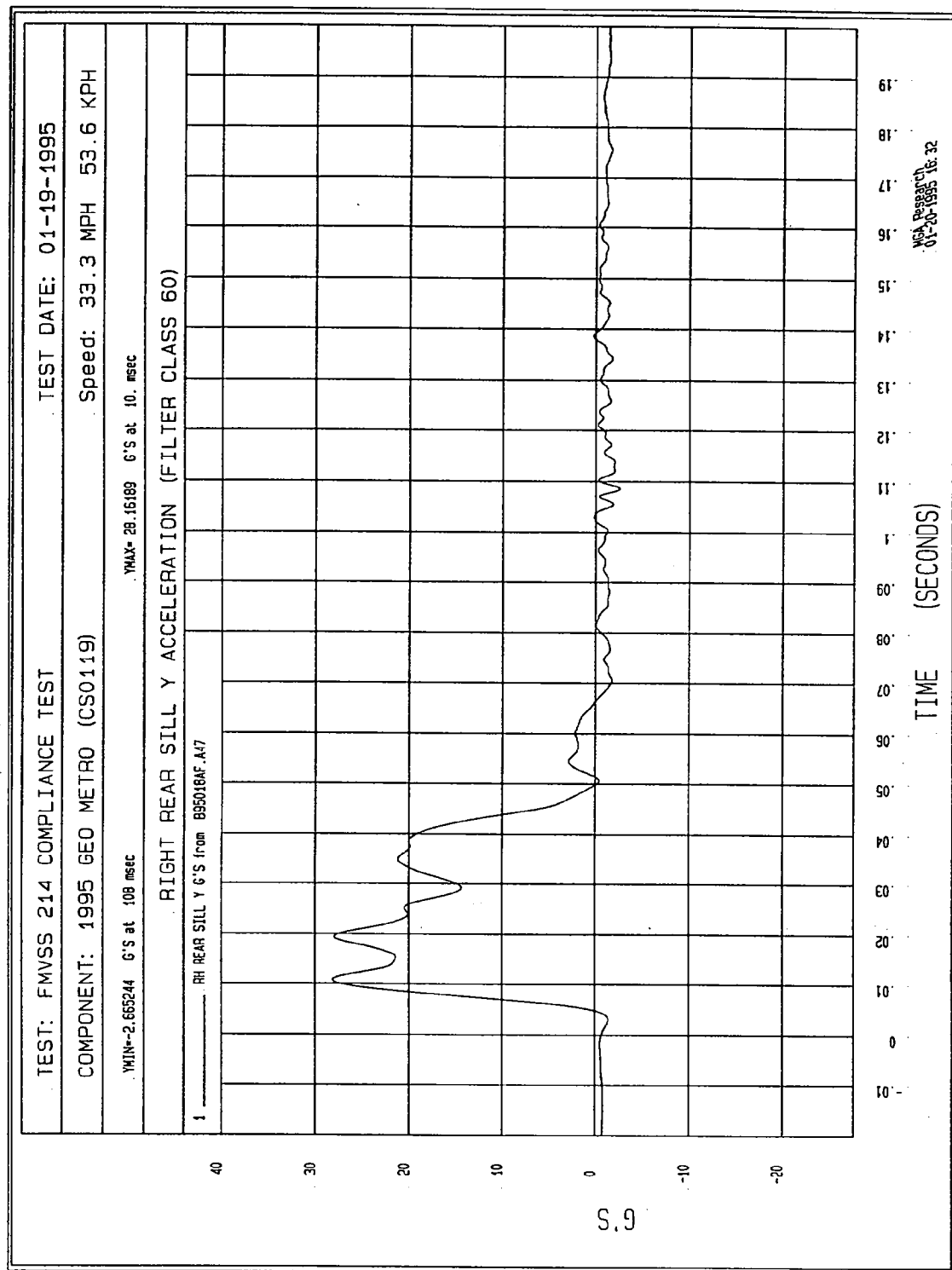


Figure B-30 - Right Rear Sill Y Acceleration vs. Time

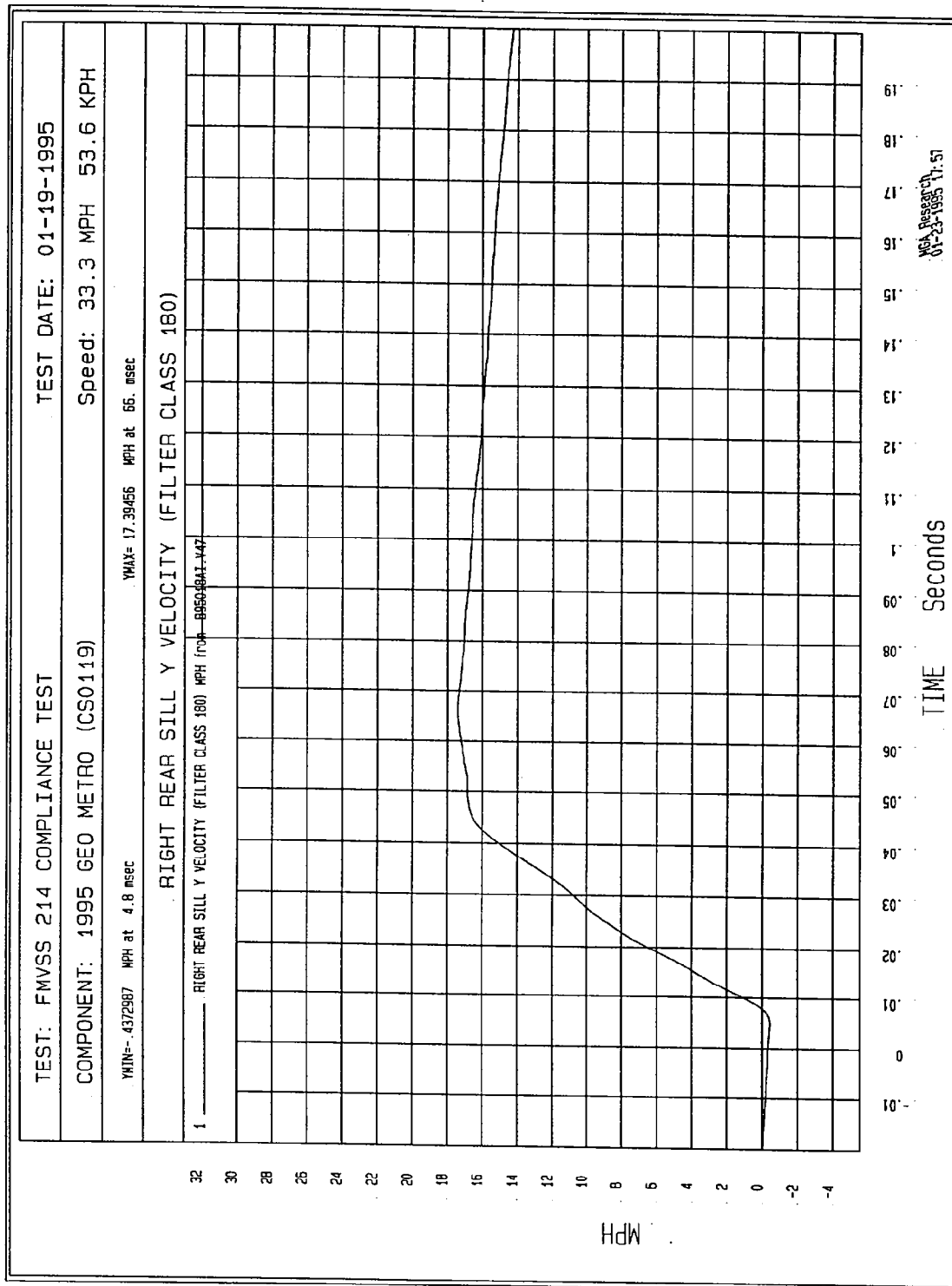


Figure B-31 - Right Rear Sill Y Velocity vs. Time

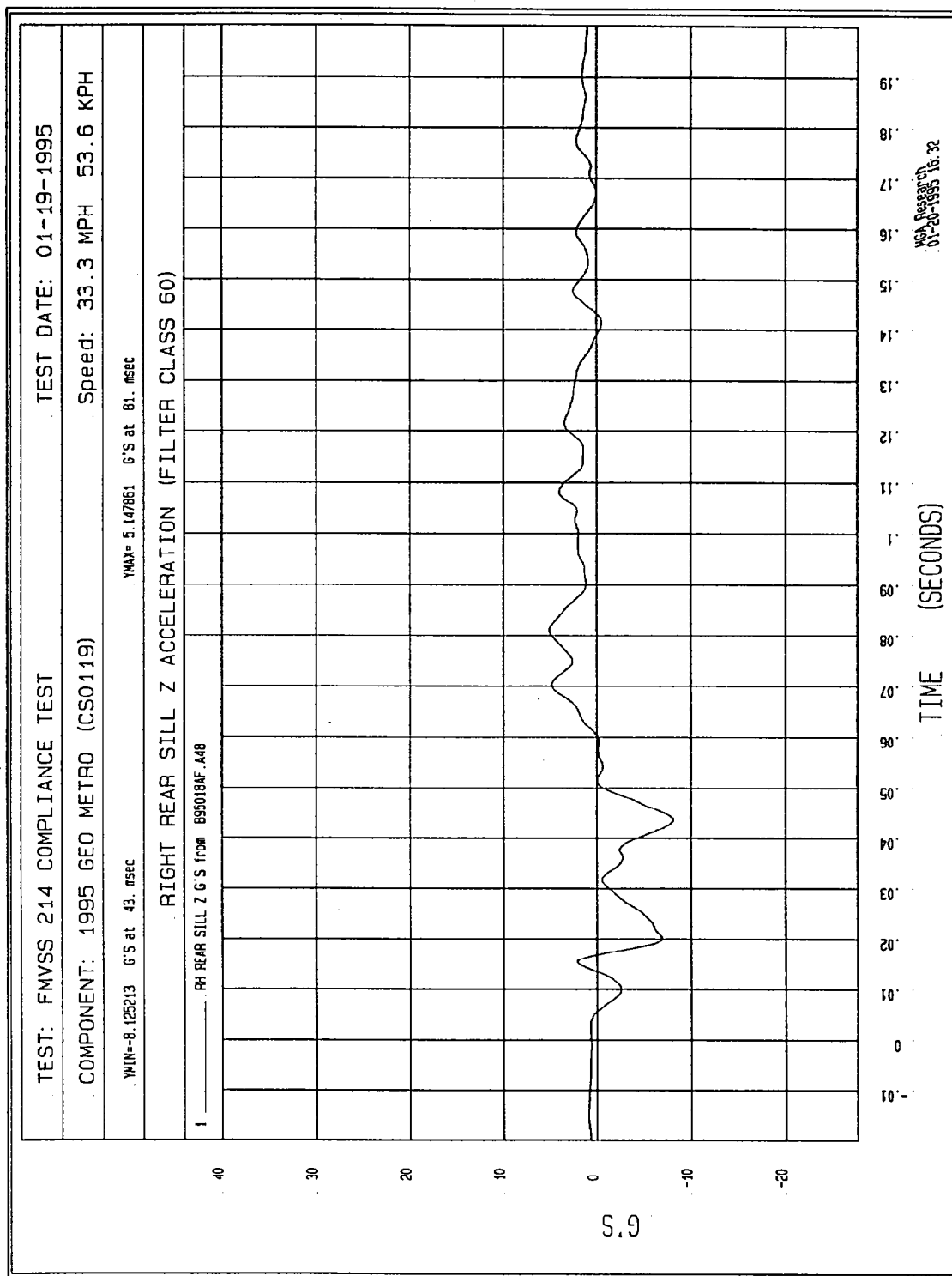


Figure B-32 - Right Rear Sill Z Acceleration vs. Time

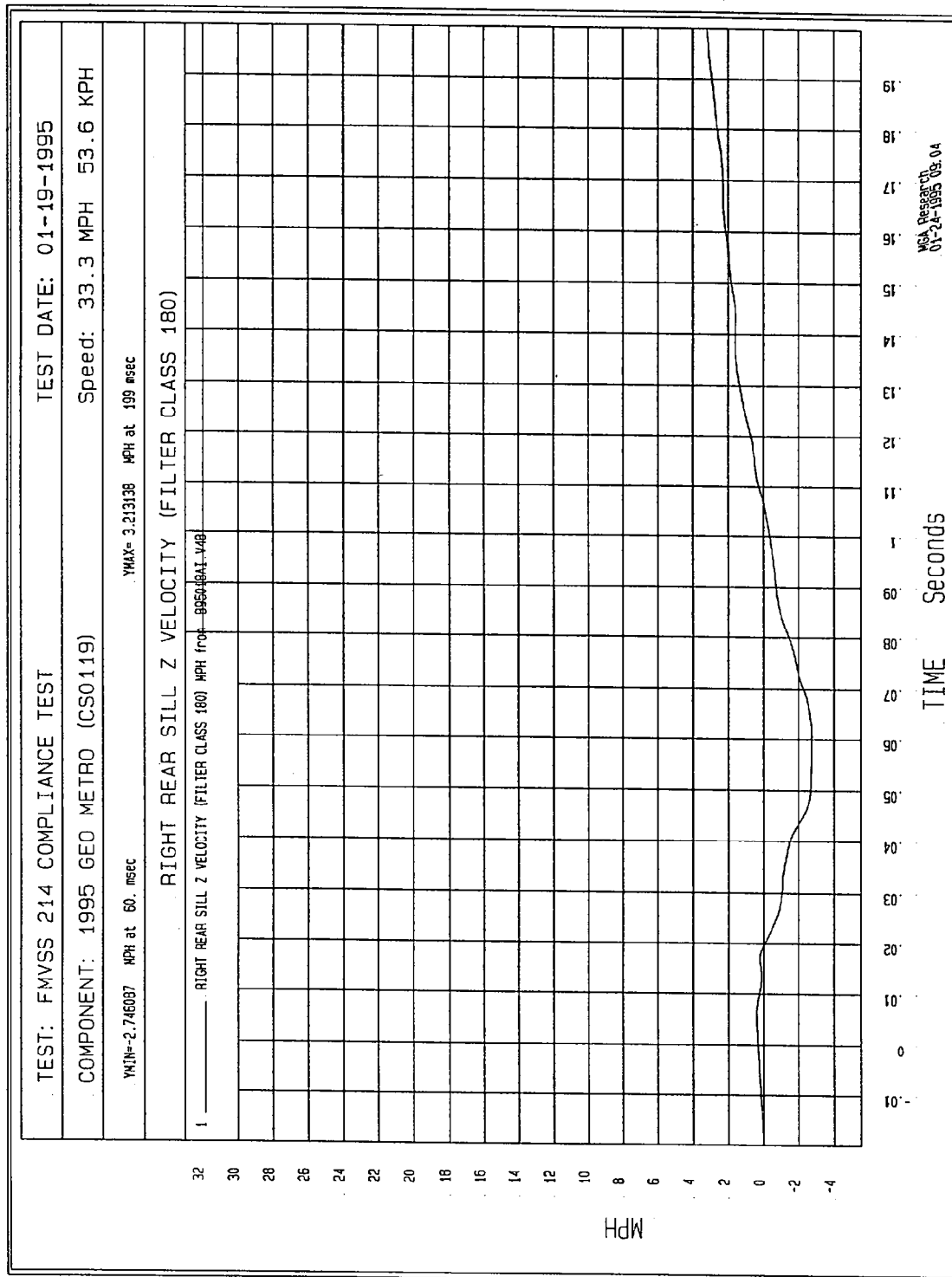


Figure B-33 - Right Rear Sill Z Velocity vs. Time

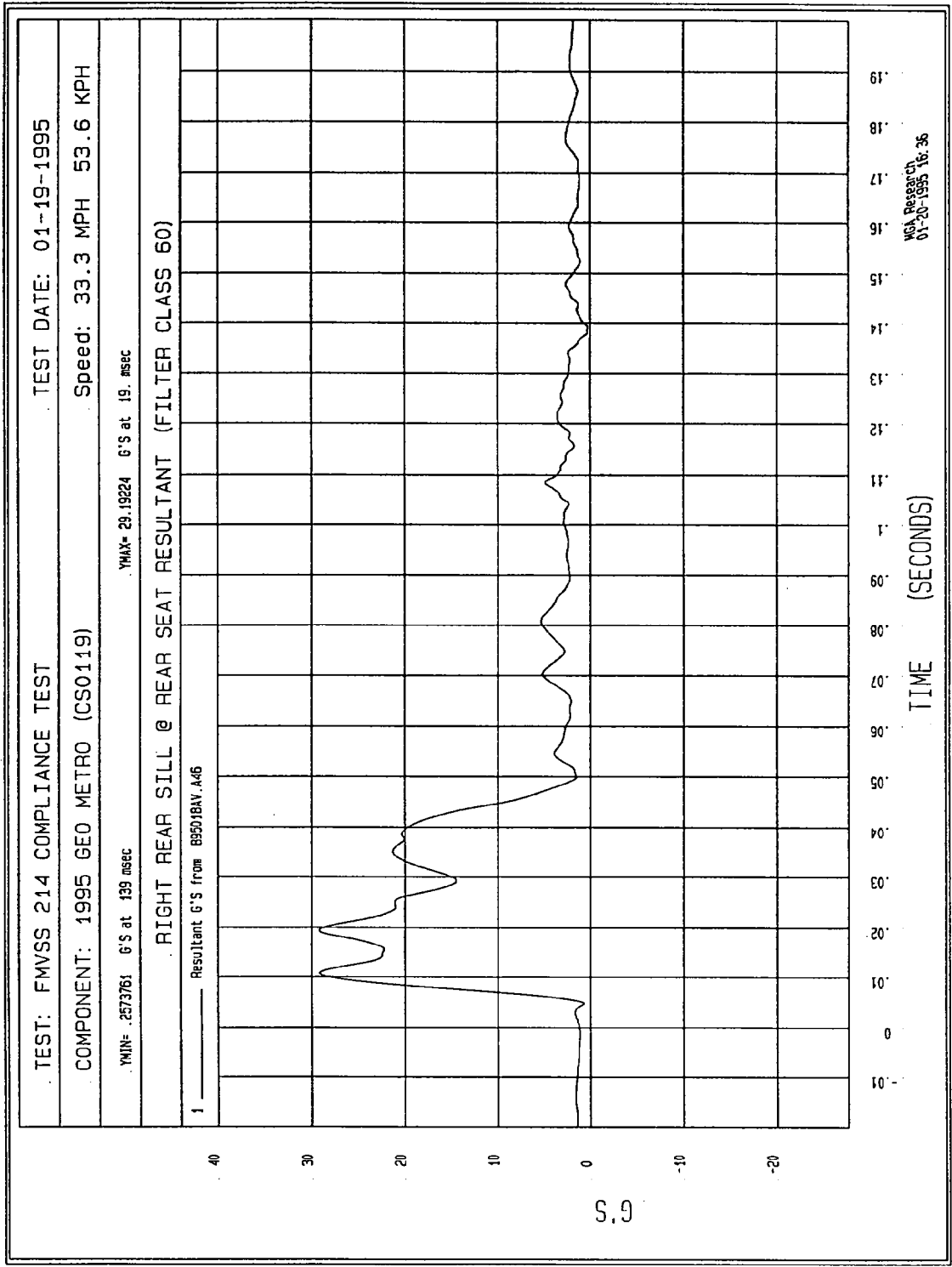


Figure B-34 - Right Rear Sill at Rear Seat Resultant vs. Time

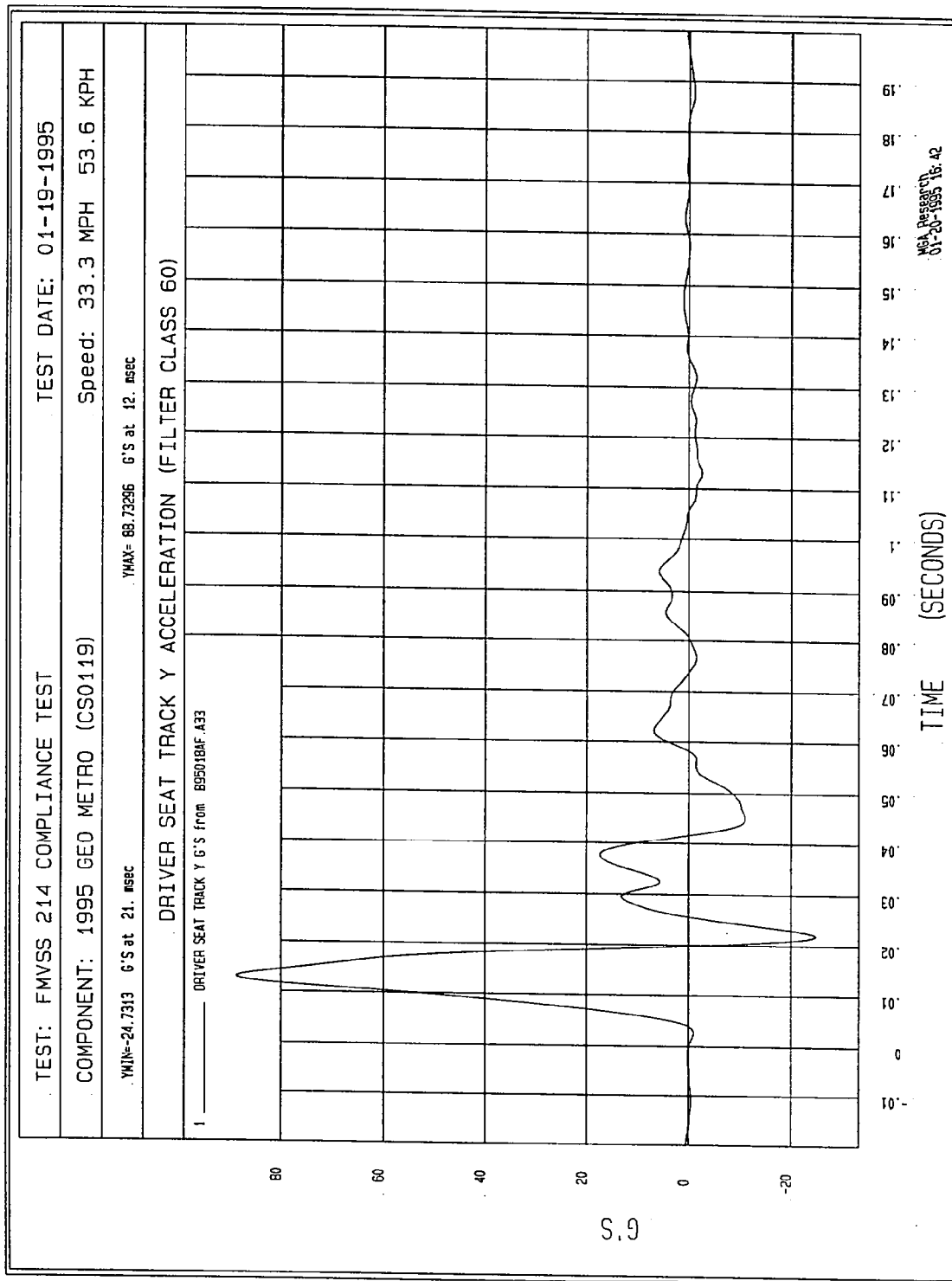


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

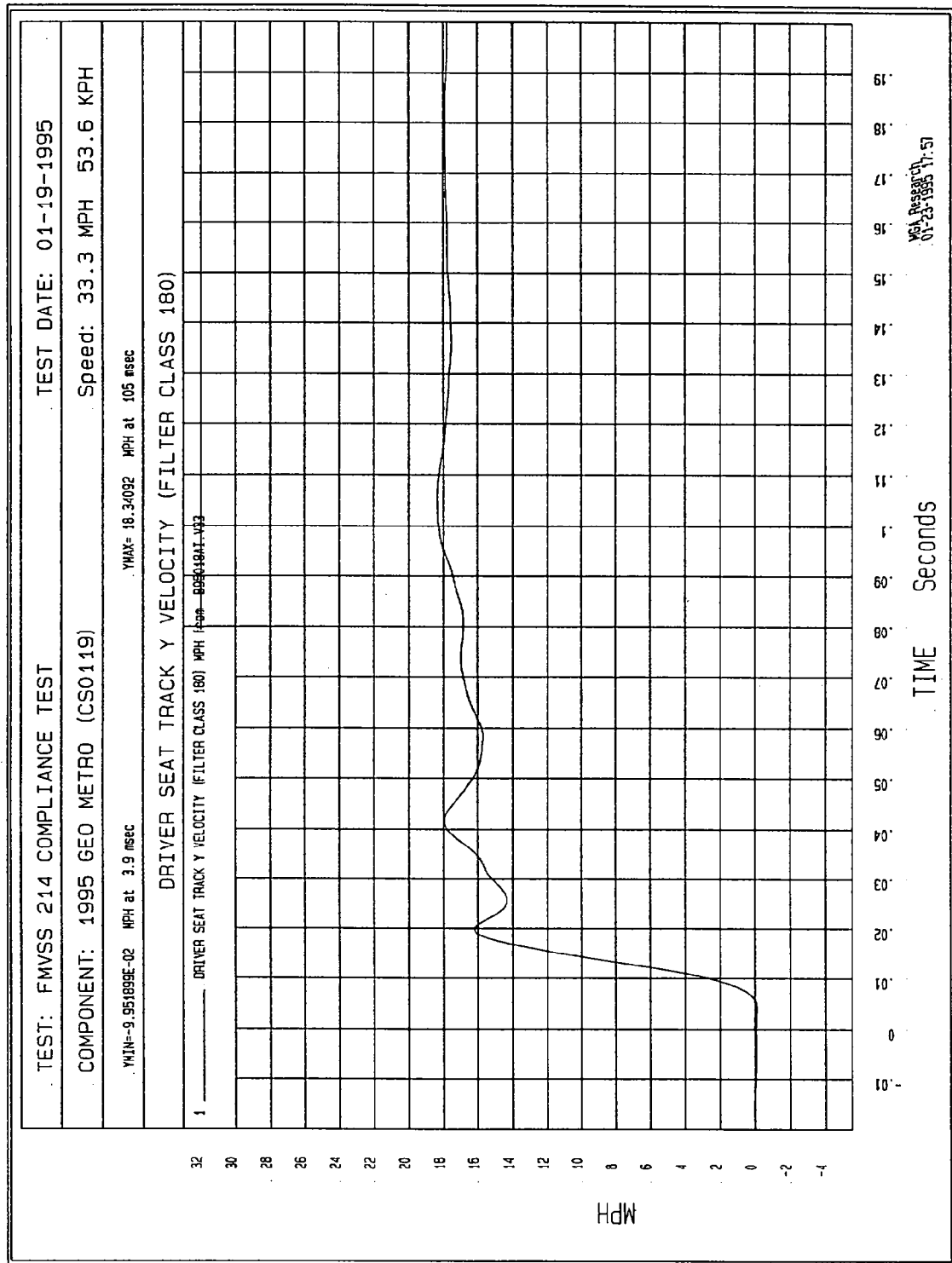


Figure B-36 - Driver Seat Track Y Velocity vs. Time

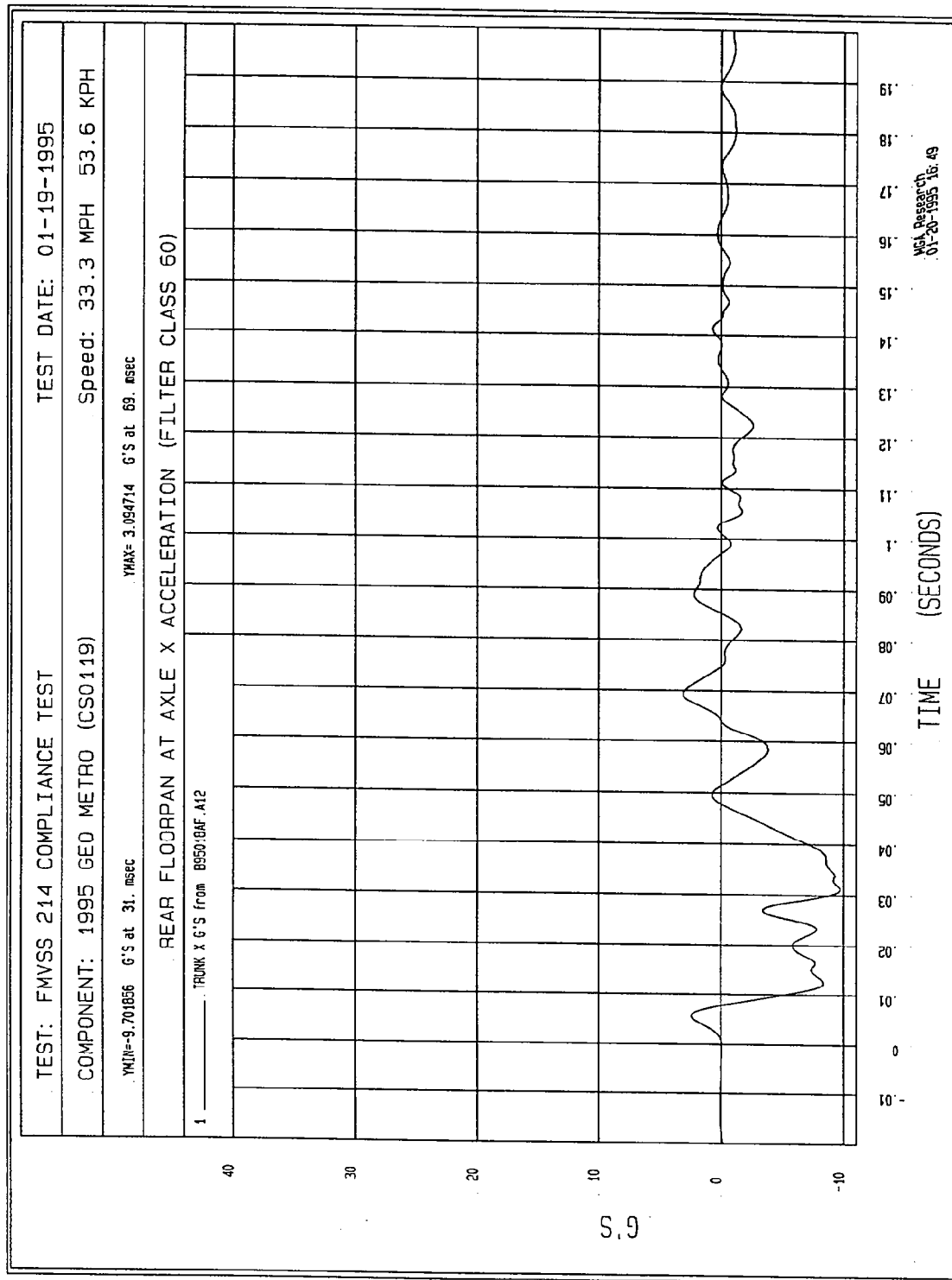


Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

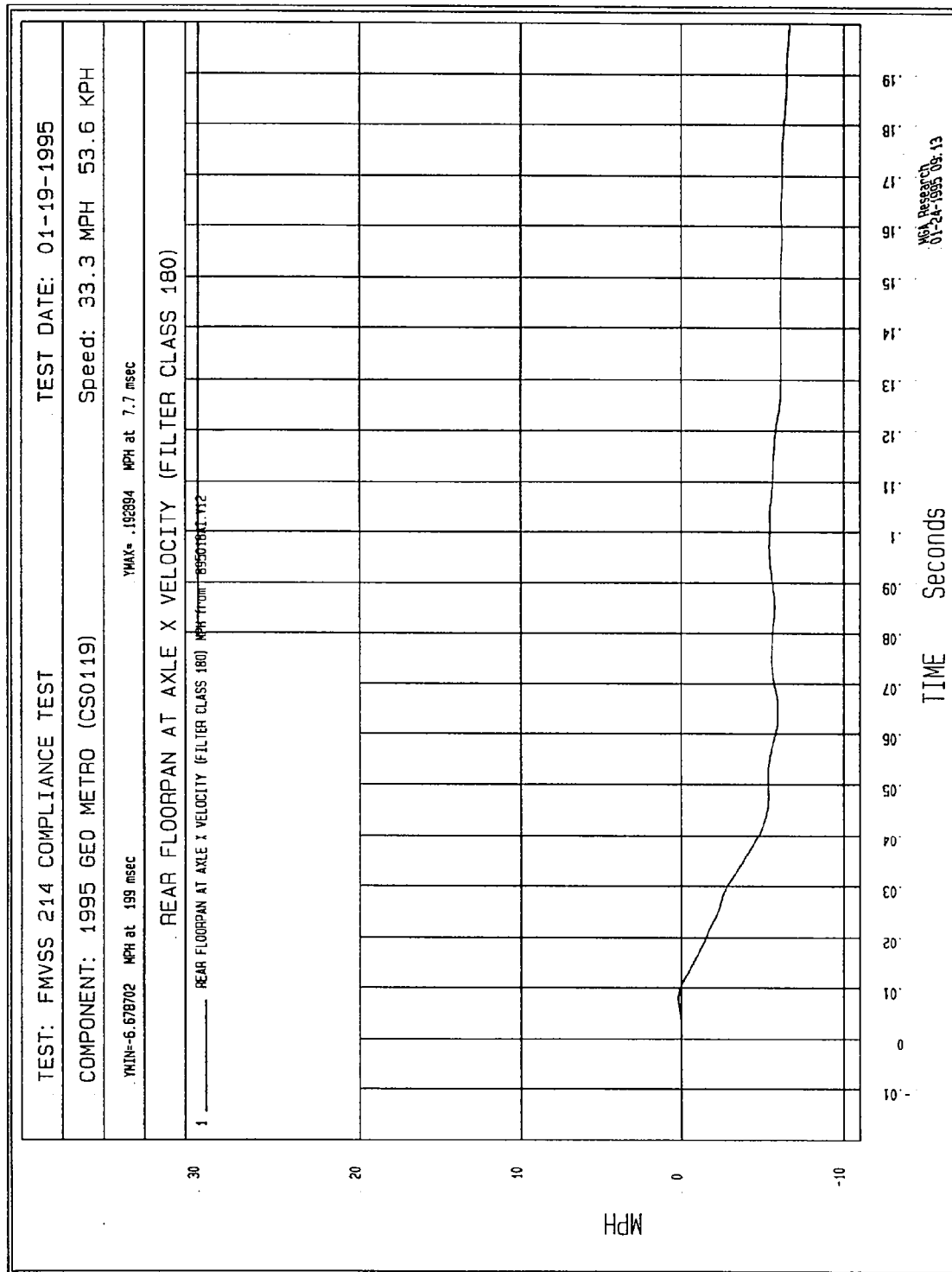


Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

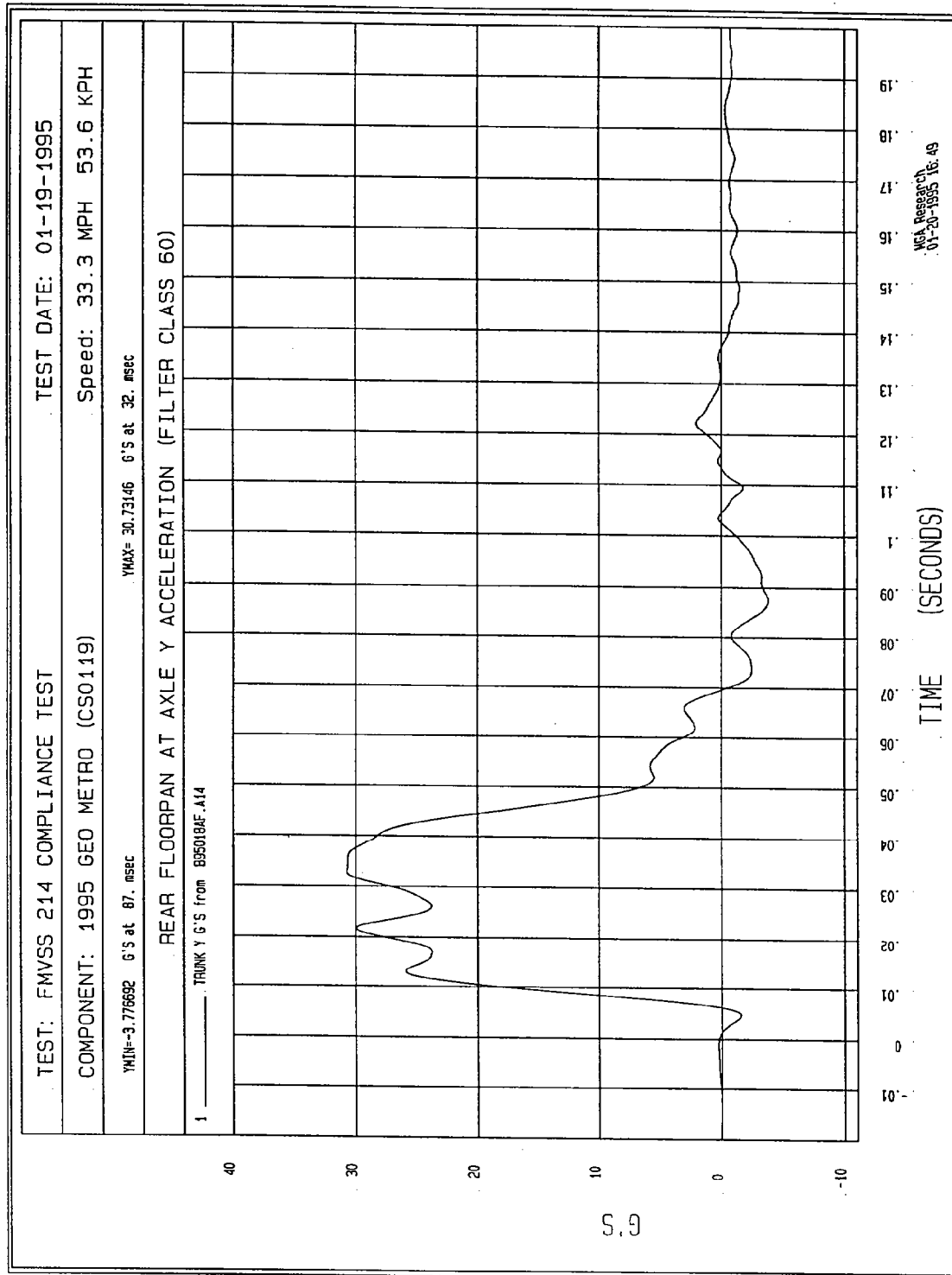


Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

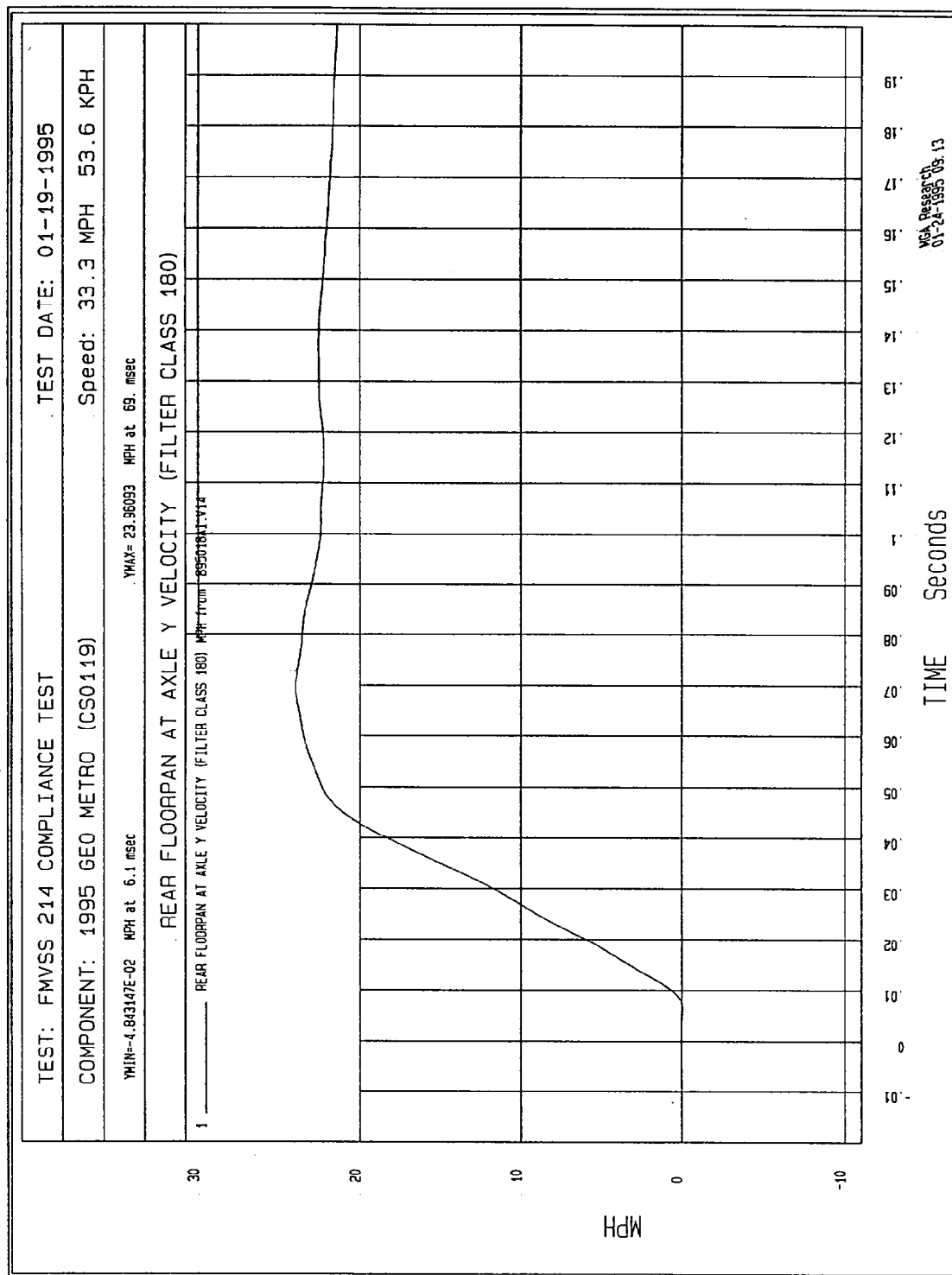


Figure B-40 - Rear Floorpan at Axle Y Velocity vs. Time

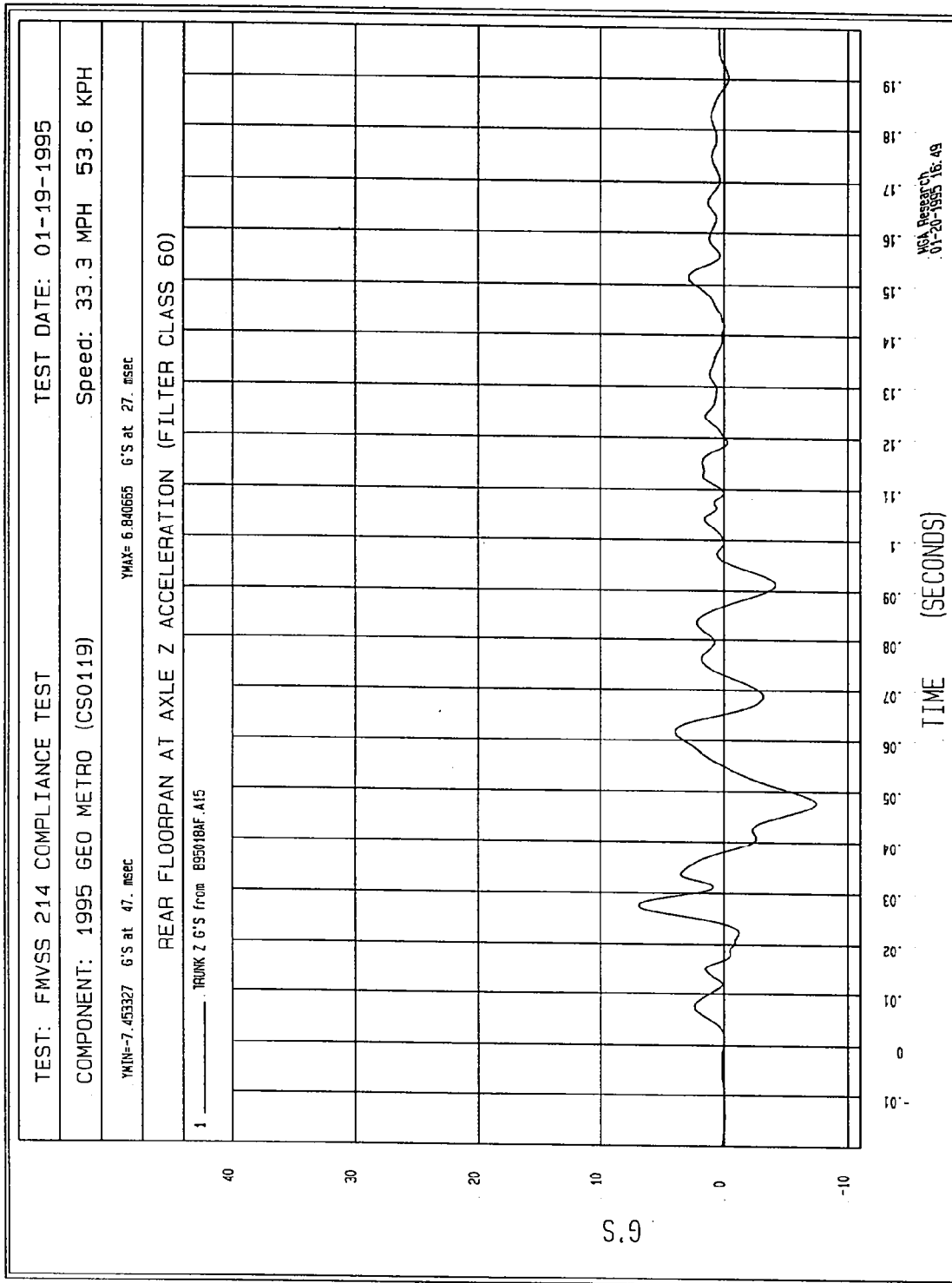


Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

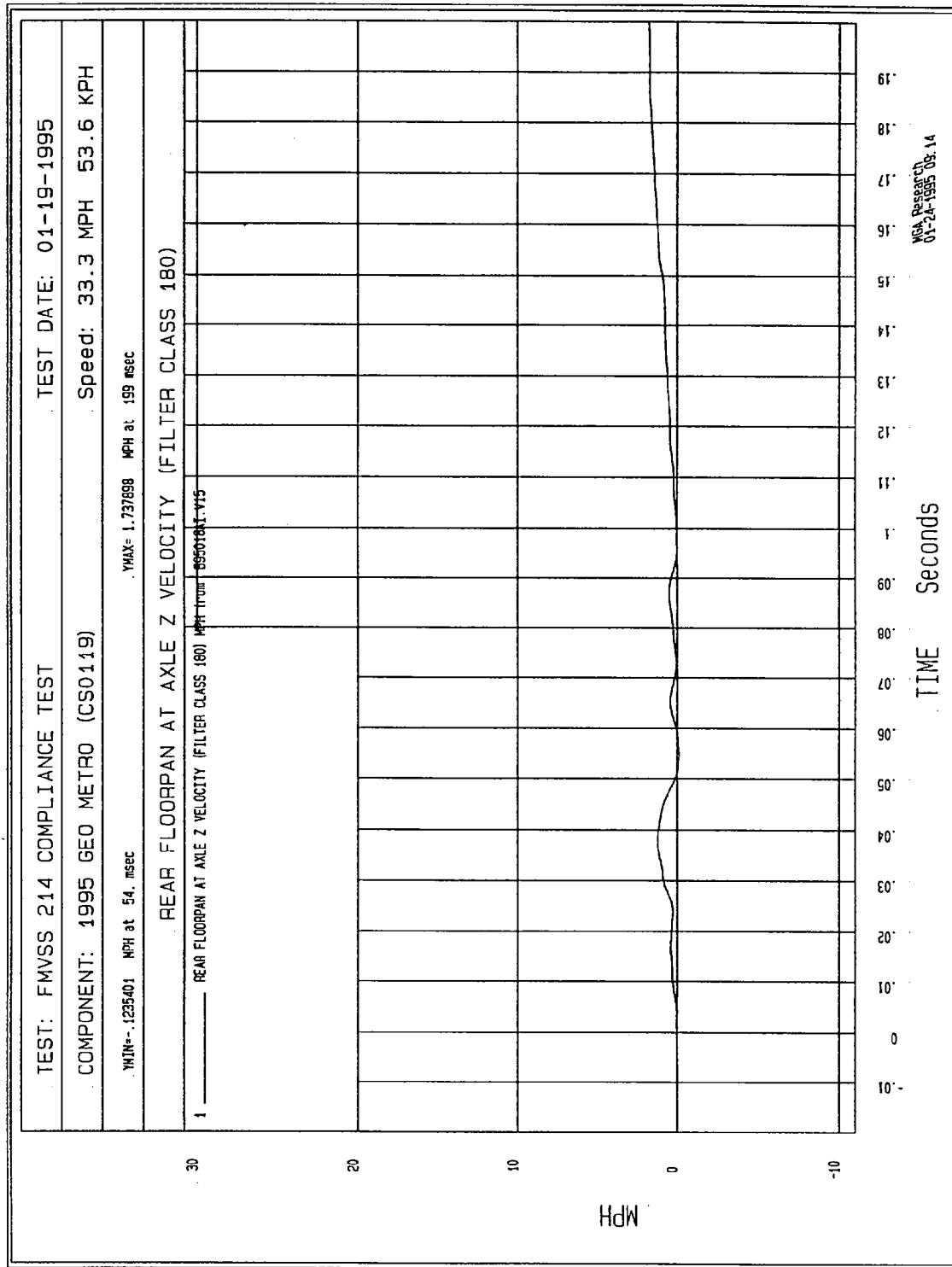


Figure B-42 - Rear Floorpan at Axle Z Velocity vs. Time



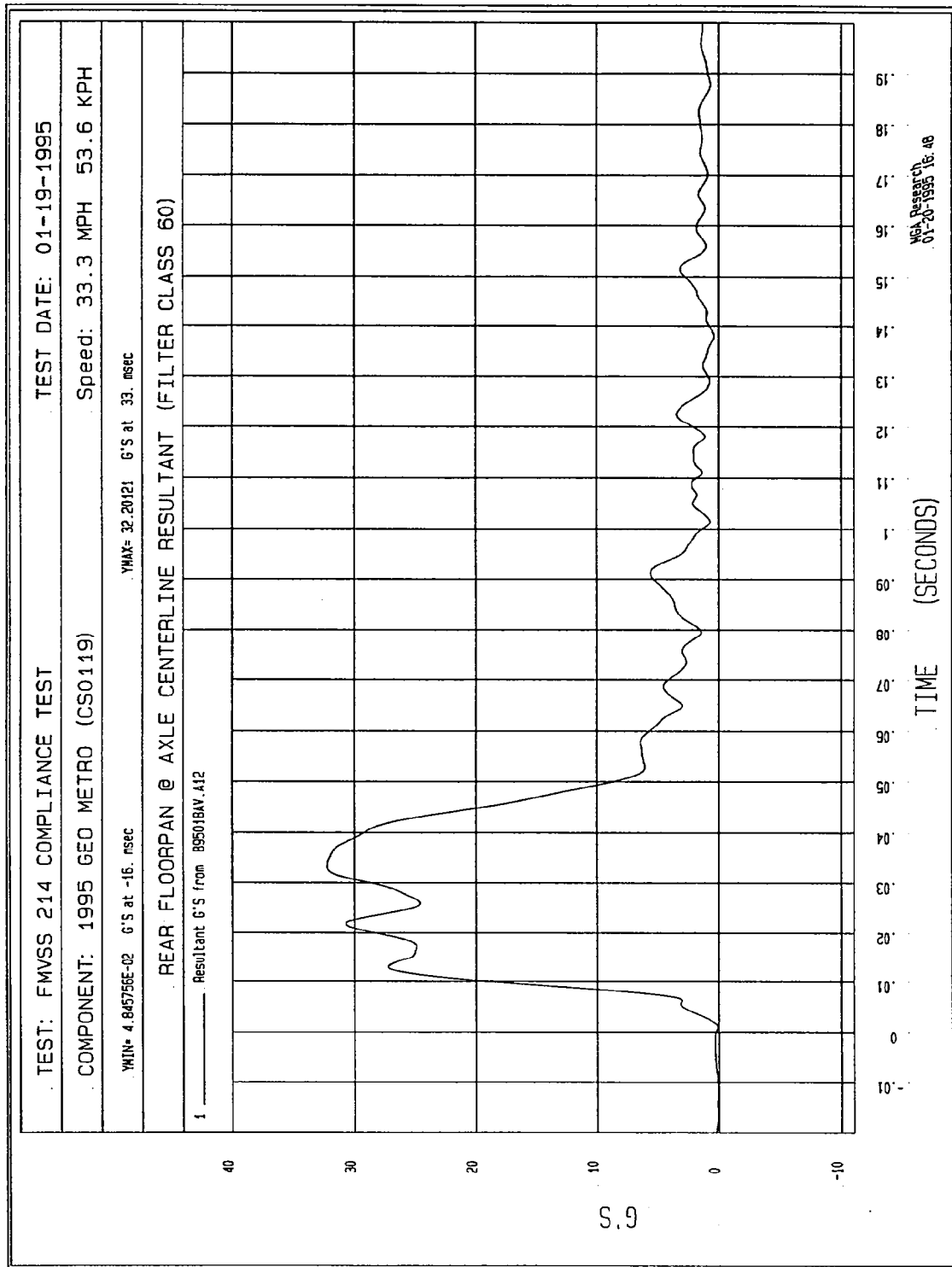


Figure B-43 - Rear Floorpan at Axle Centerline Resultant vs. Time

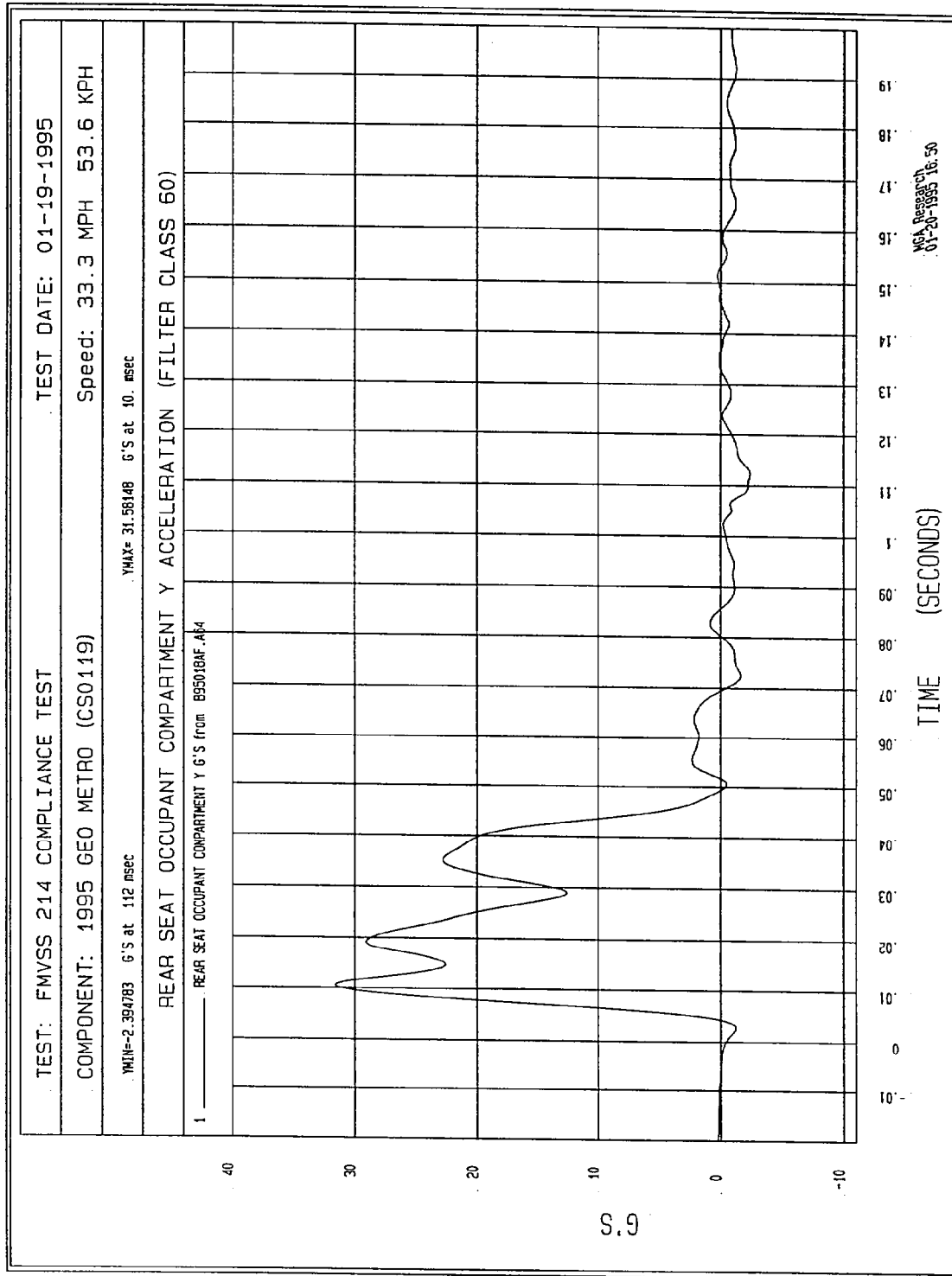


Figure B-44 - Rear Seat Occupant Compartment Y Acceleration vs. Time

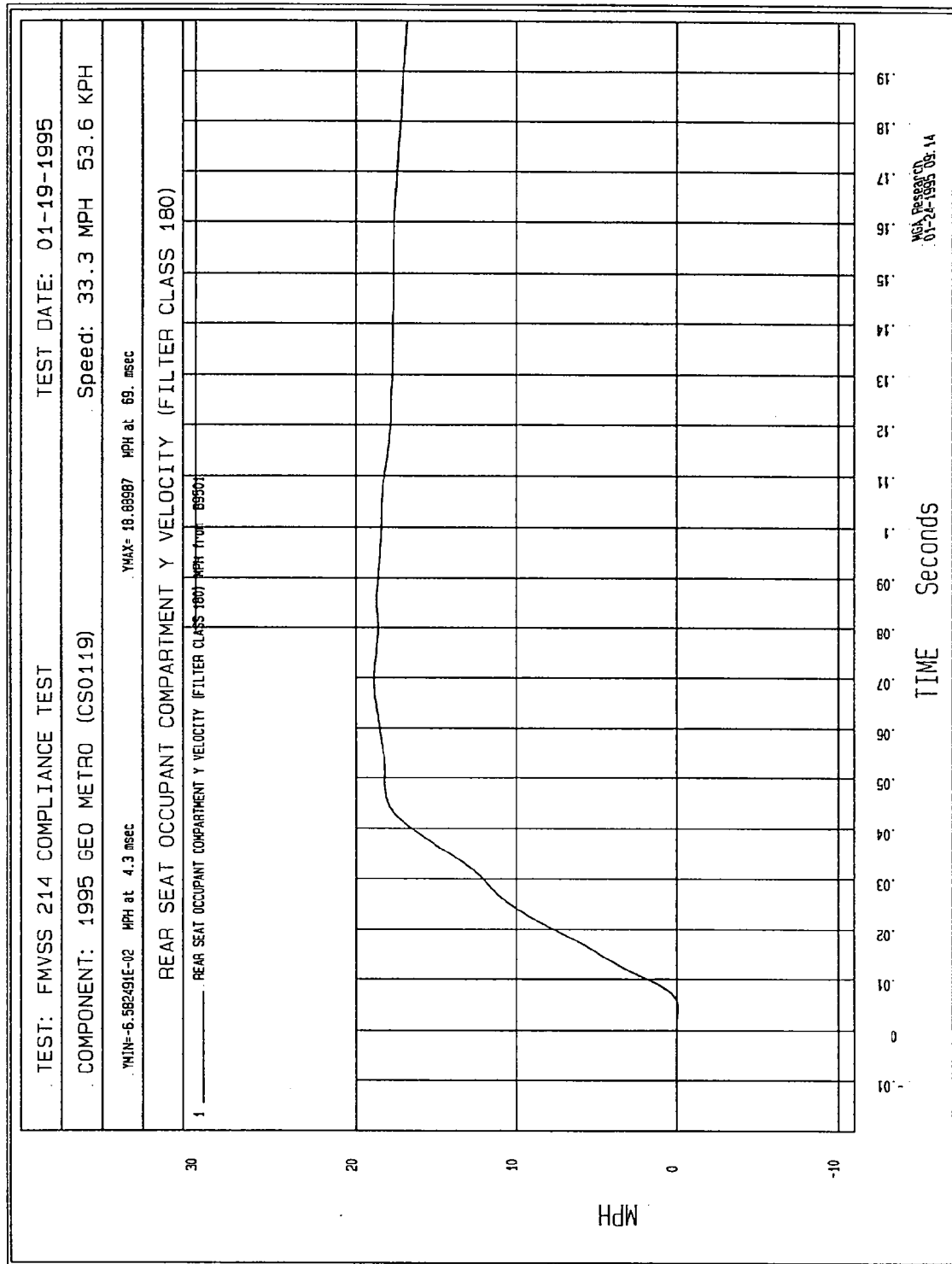


Figure B-45 - Rear Seat Occupant Compartment Y Velocity vs. Time

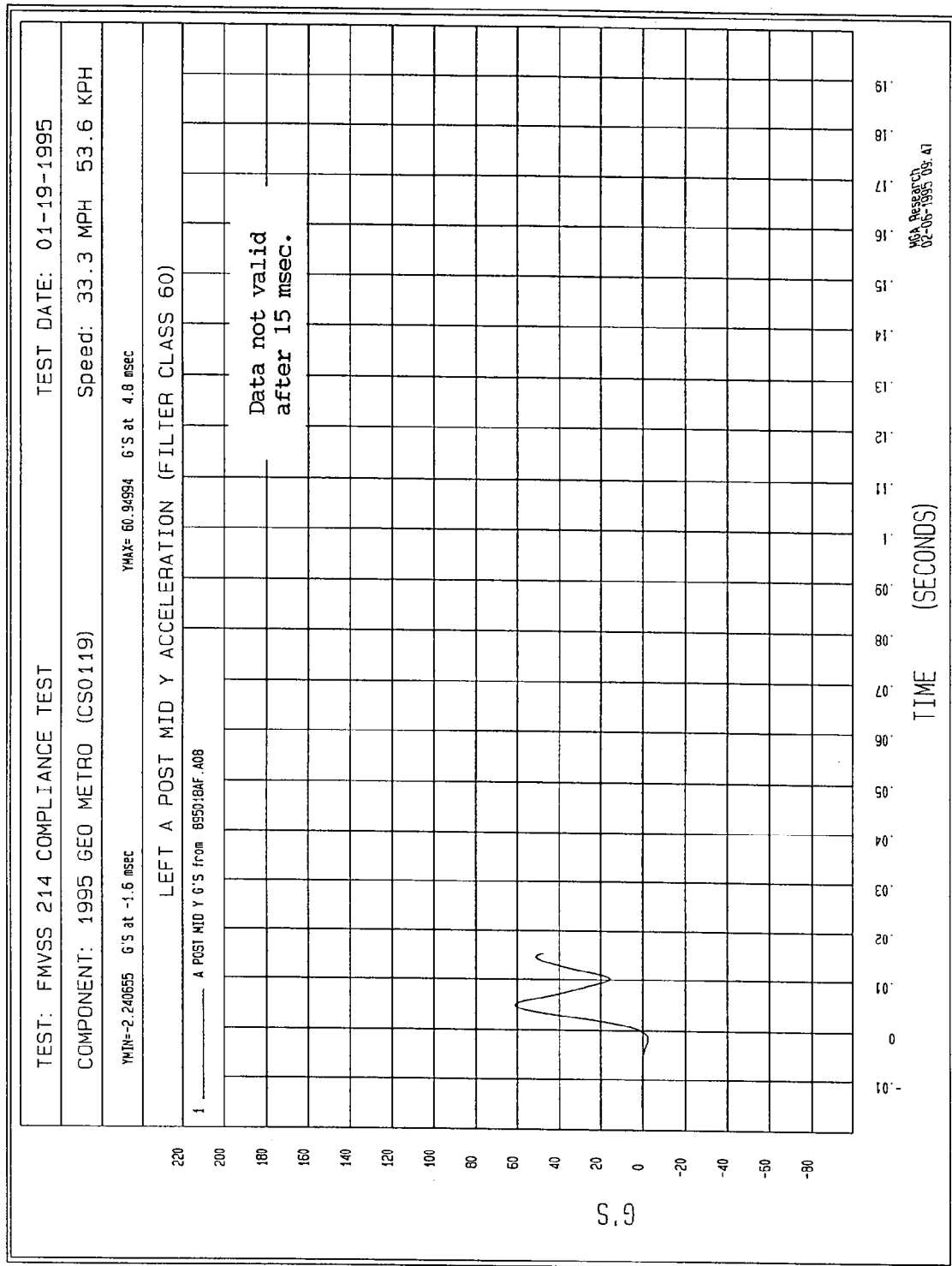


Figure B-46 - Left A Post Mid Y Acceleration vs. Time

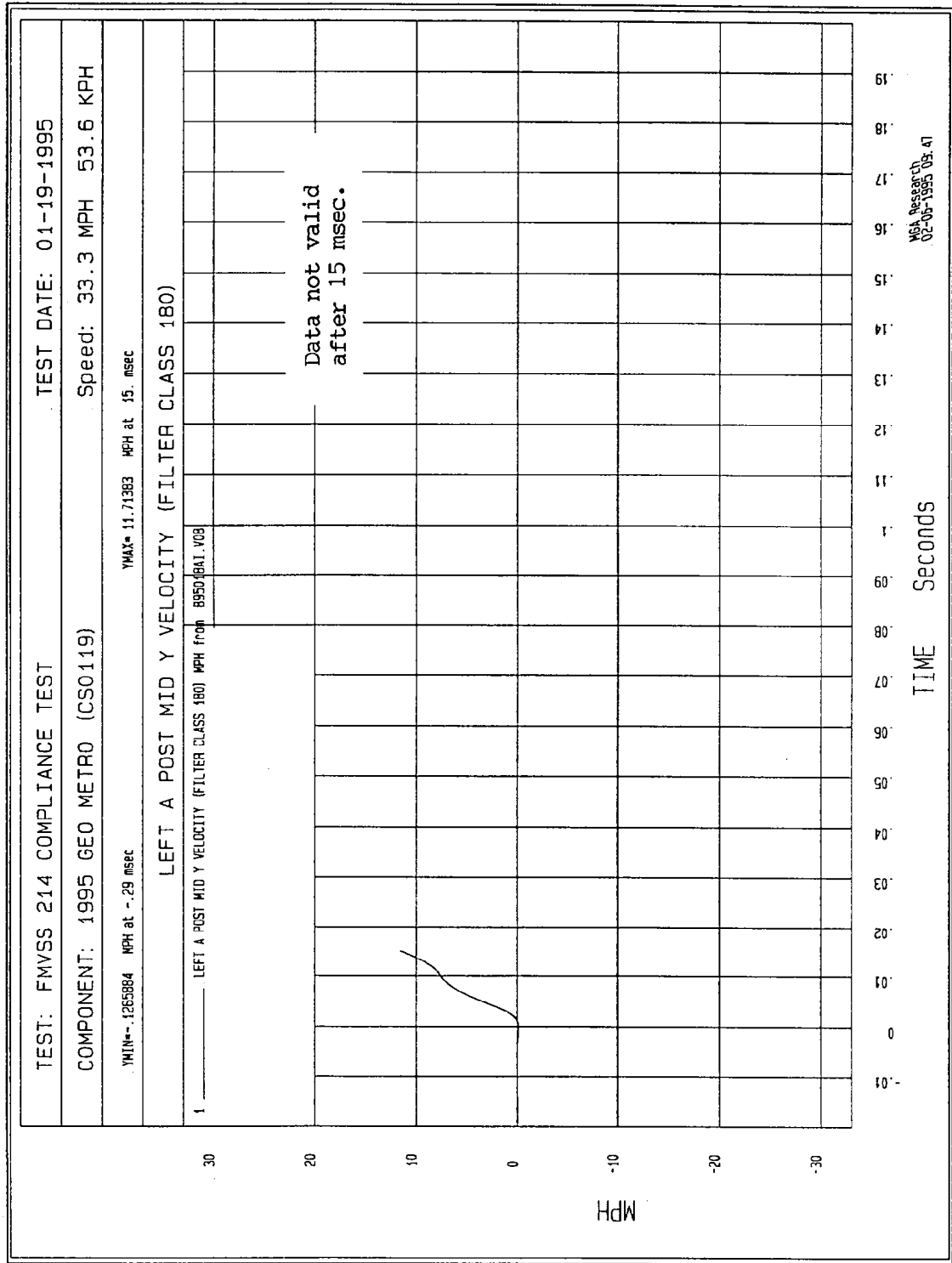


Figure B-47 - Left A Post Mid Y Velocity vs. Time

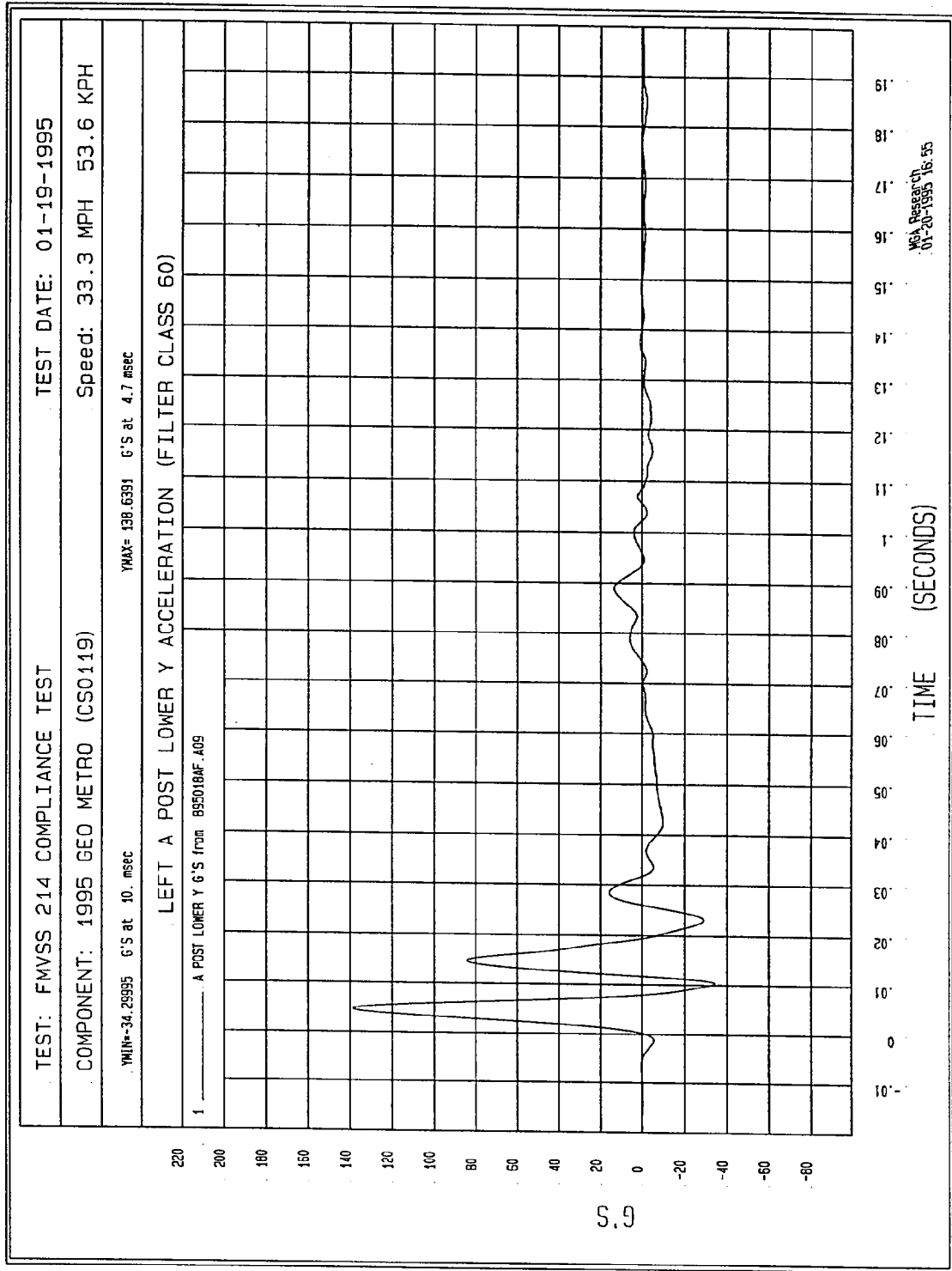


Figure B-48 - Left A Post Lower Y Acceleration vs. Time

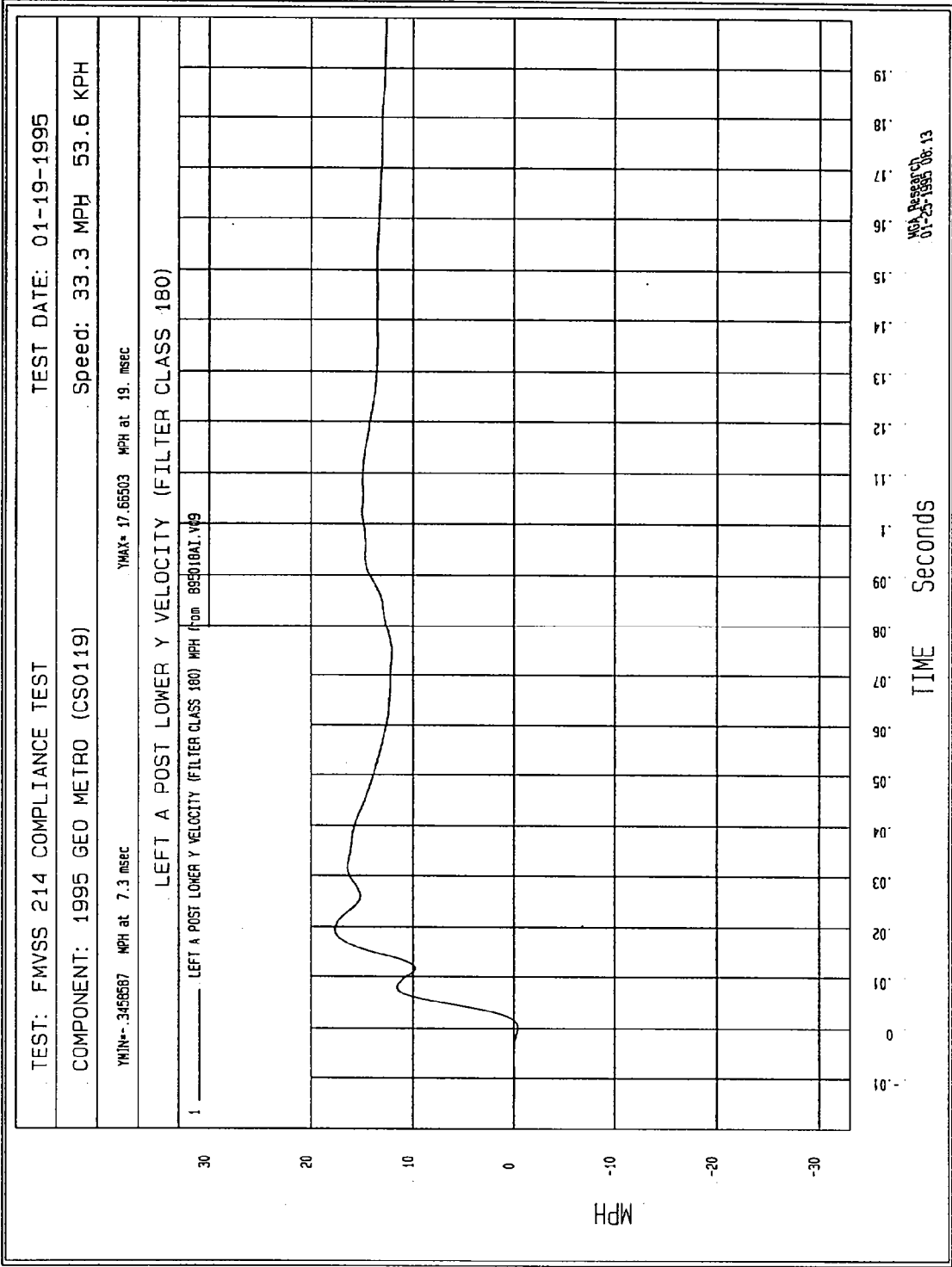


Figure B-49 - Left A Post Lower Y Velocity vs. Time

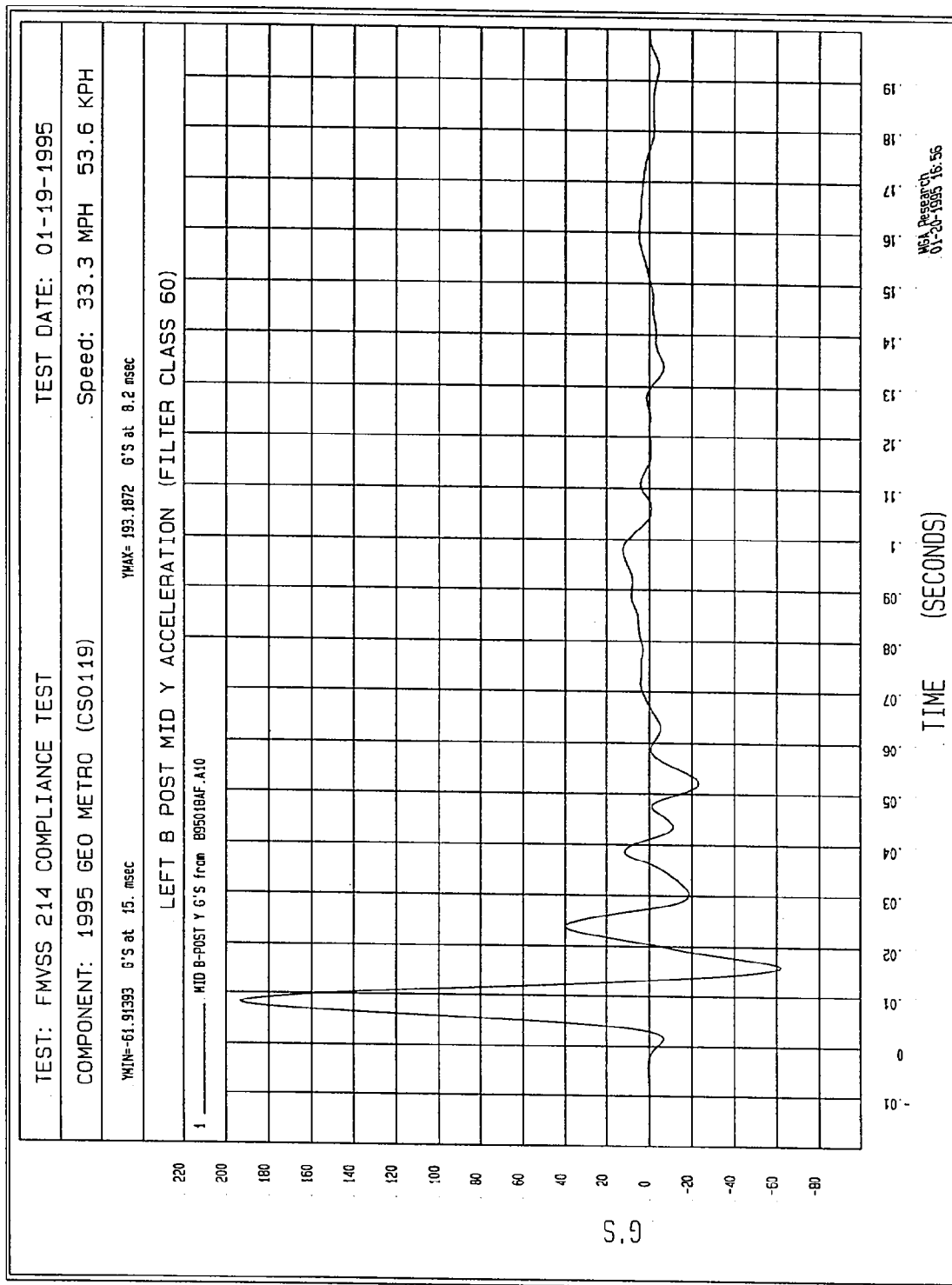


Figure B-50 - Left B Post Mid Y Acceleration vs. Time

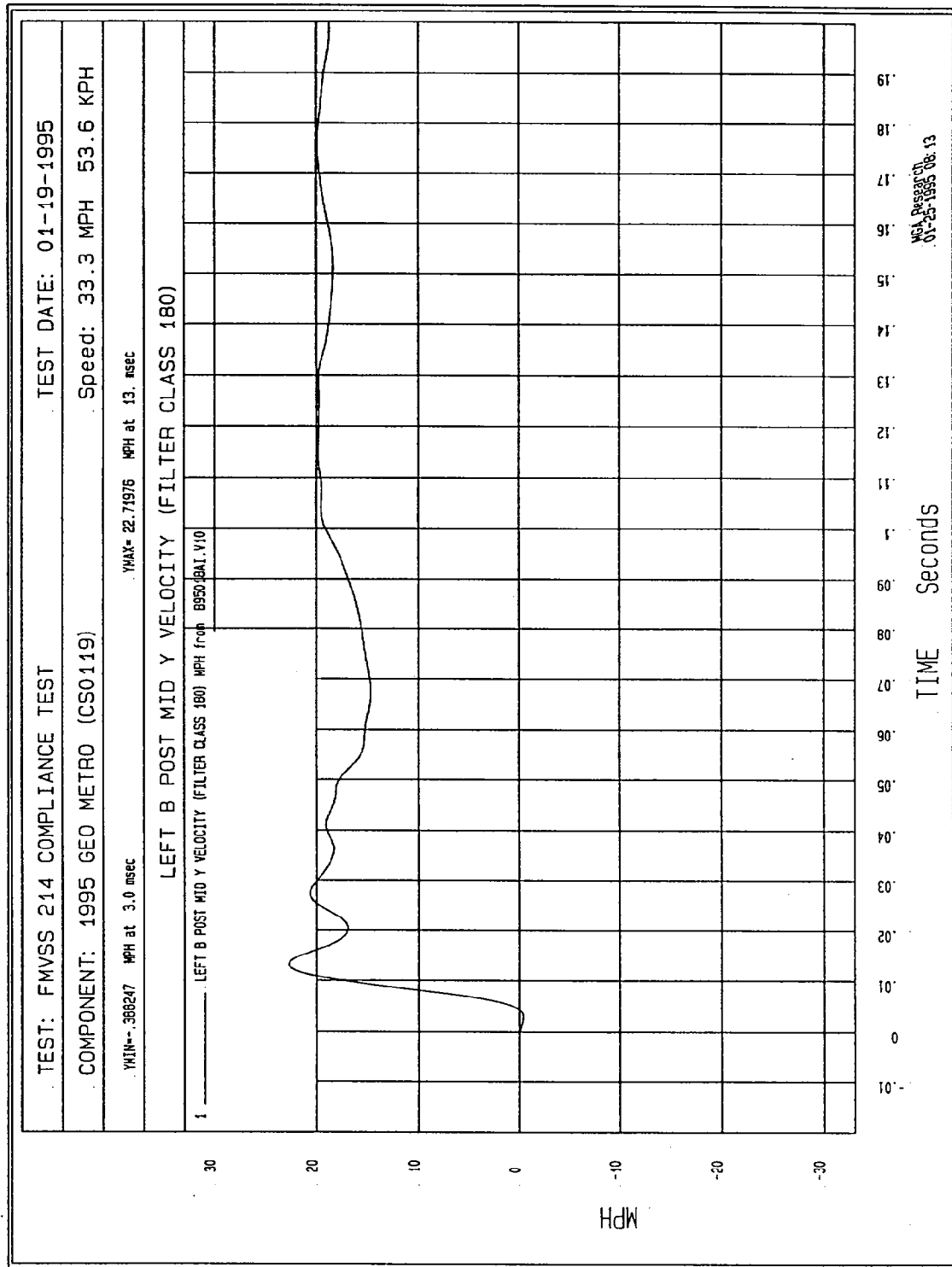


Figure B-51 - Left B Post Mid Y Velocity vs. Time

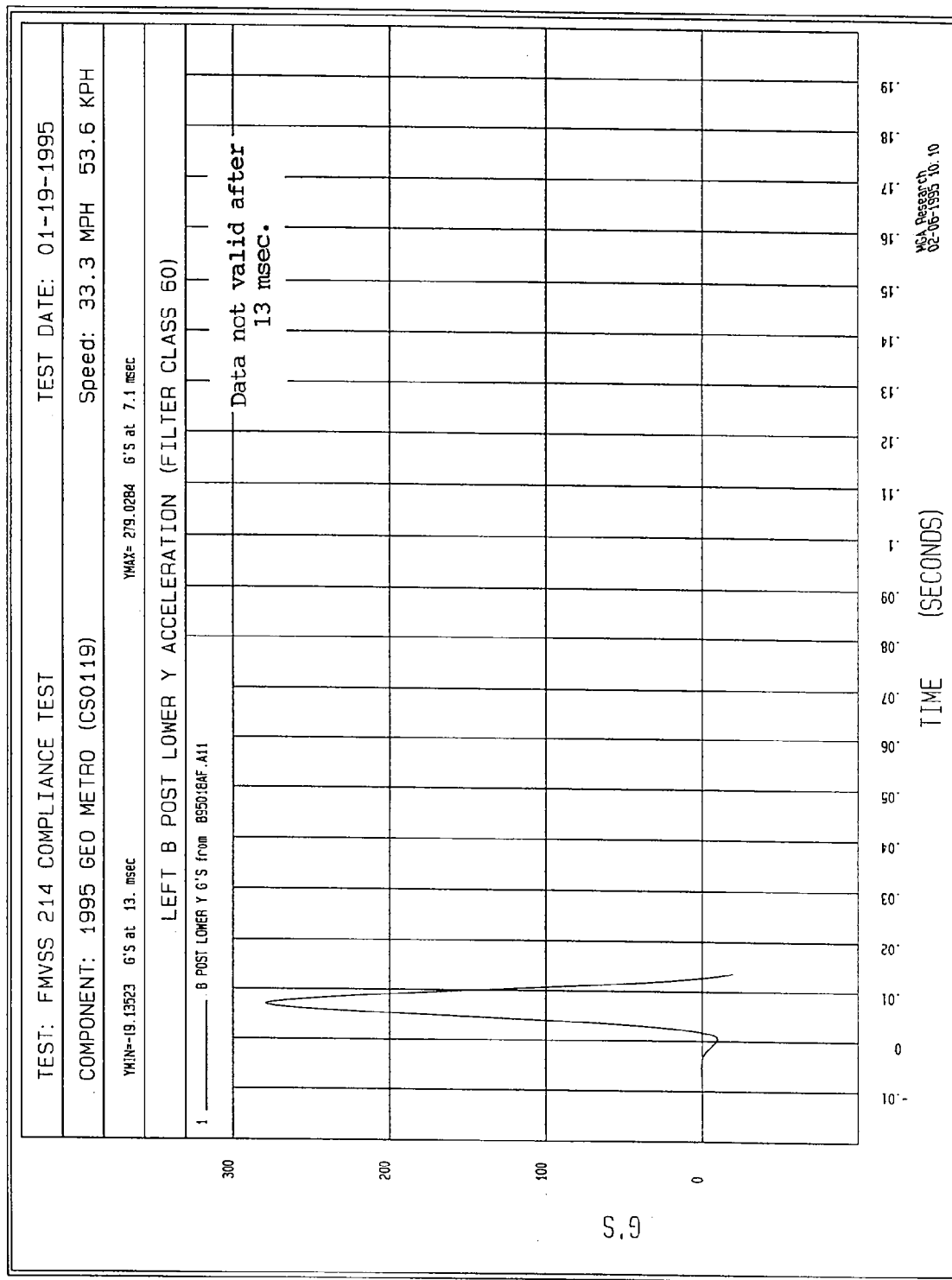


Figure B-52 - Left B Post Lower Y Acceleration vs. Time

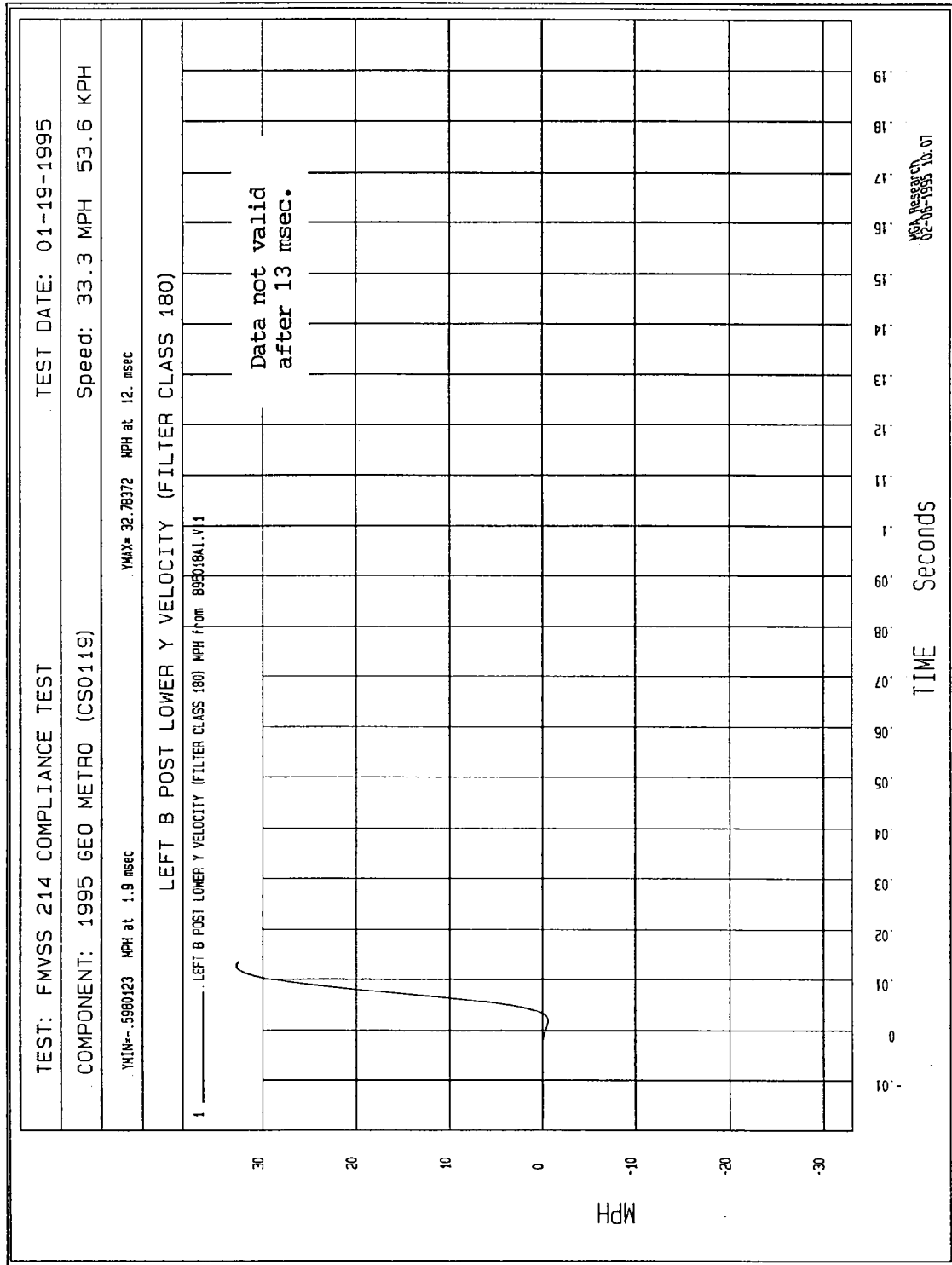


Figure B-53 - Left B Post Lower Y Velocity vs. Time

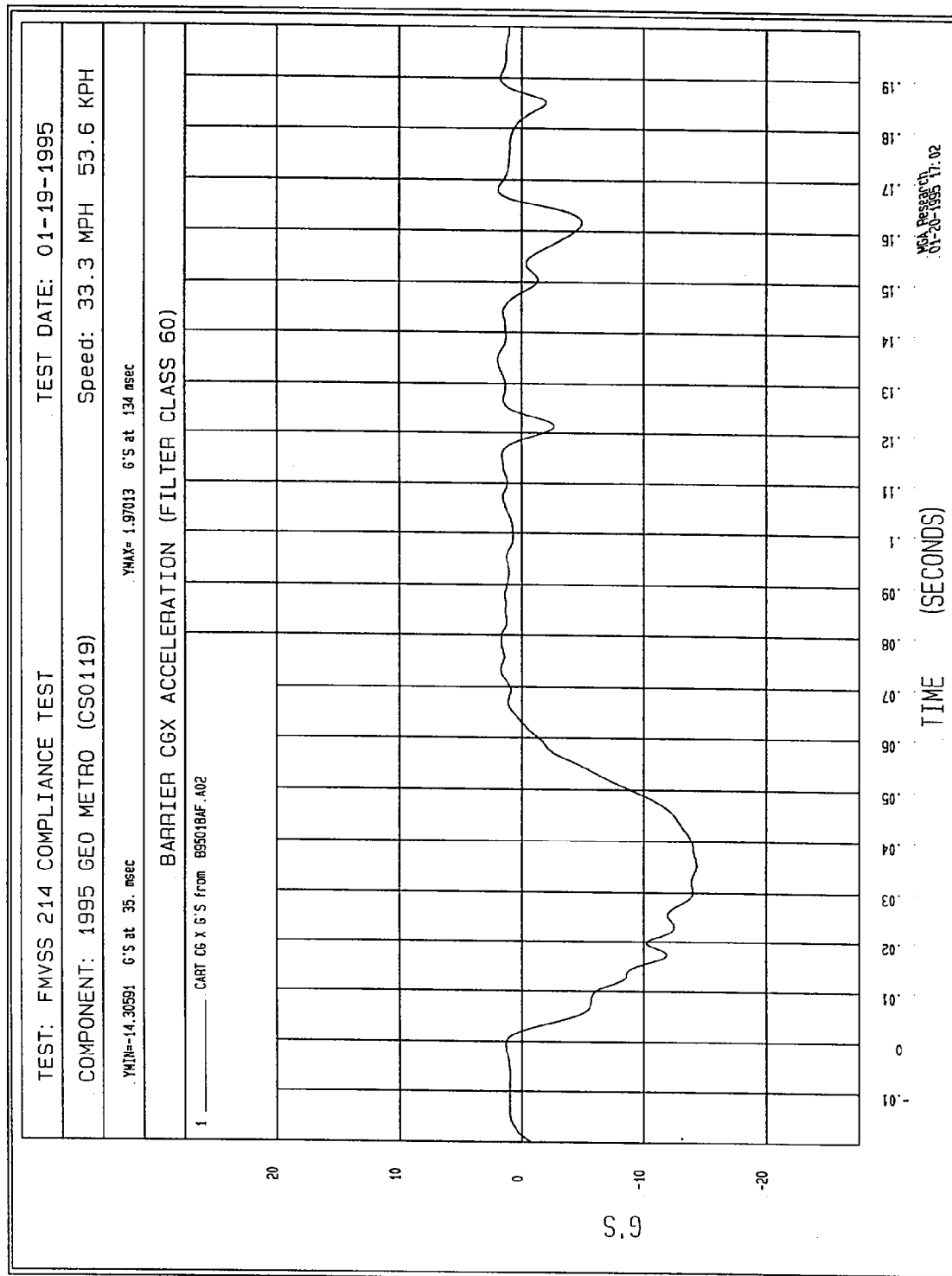


Figure B-54 - Moving Barrier Center of Gravity X Acceleration vs. Time

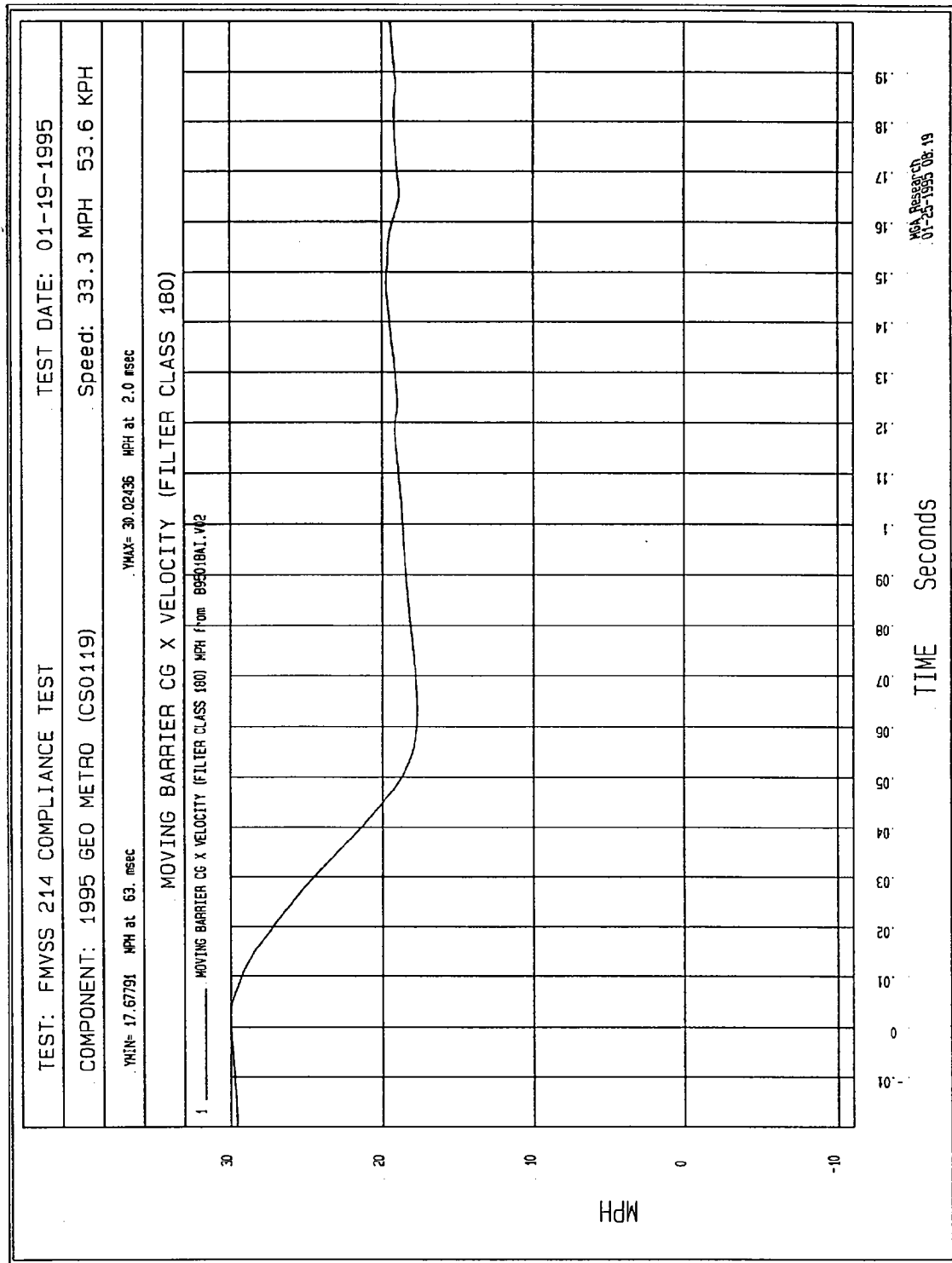


Figure B-55 - Moving Barrier Center of Gravity X Velocity vs. Time

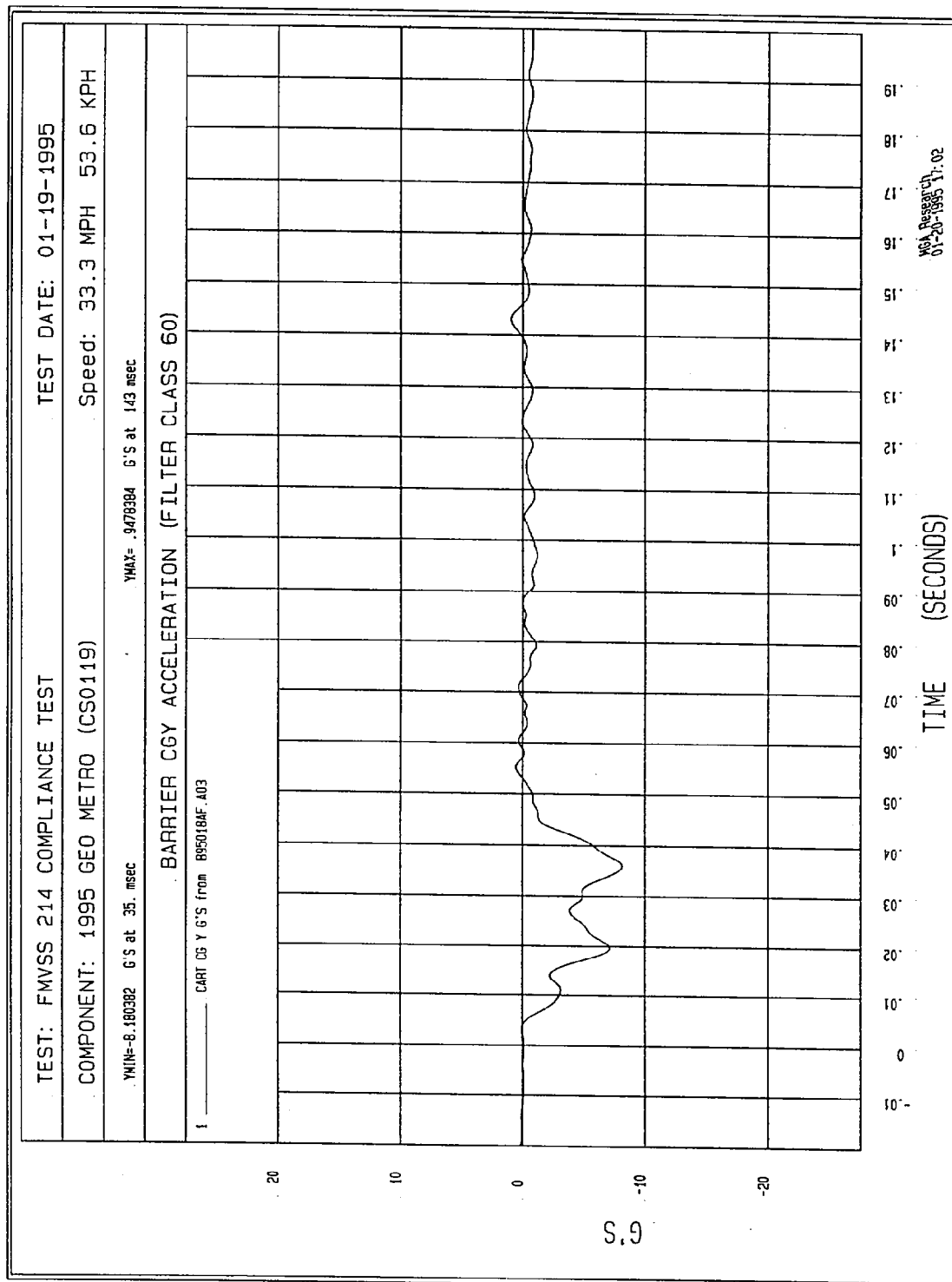


Figure B-56 - Moving Barrier Center of Gravity Y Acceleration vs. Time

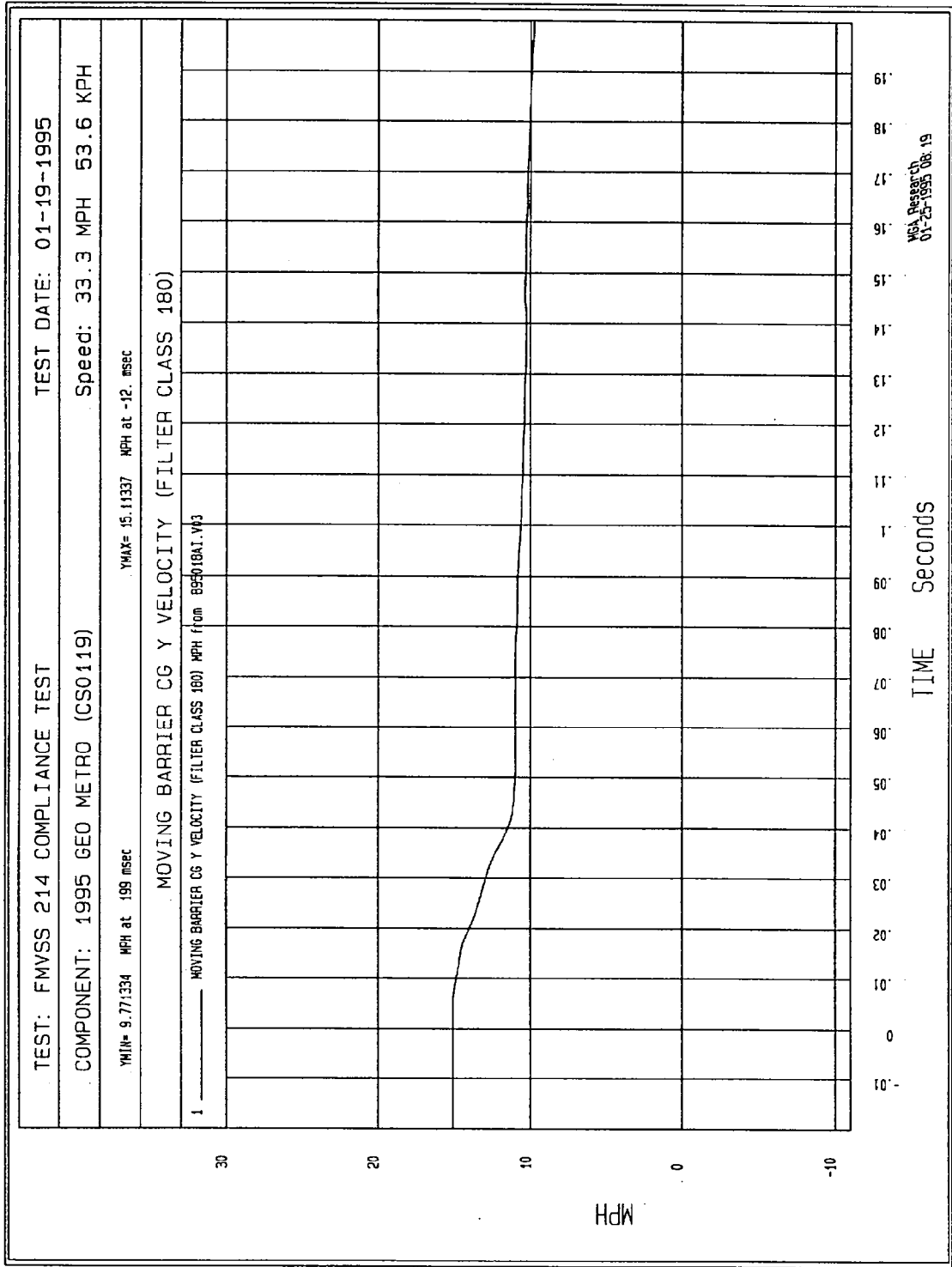


Figure B-57 - Moving Barrier Center of Gravity Y Velocity vs. Time

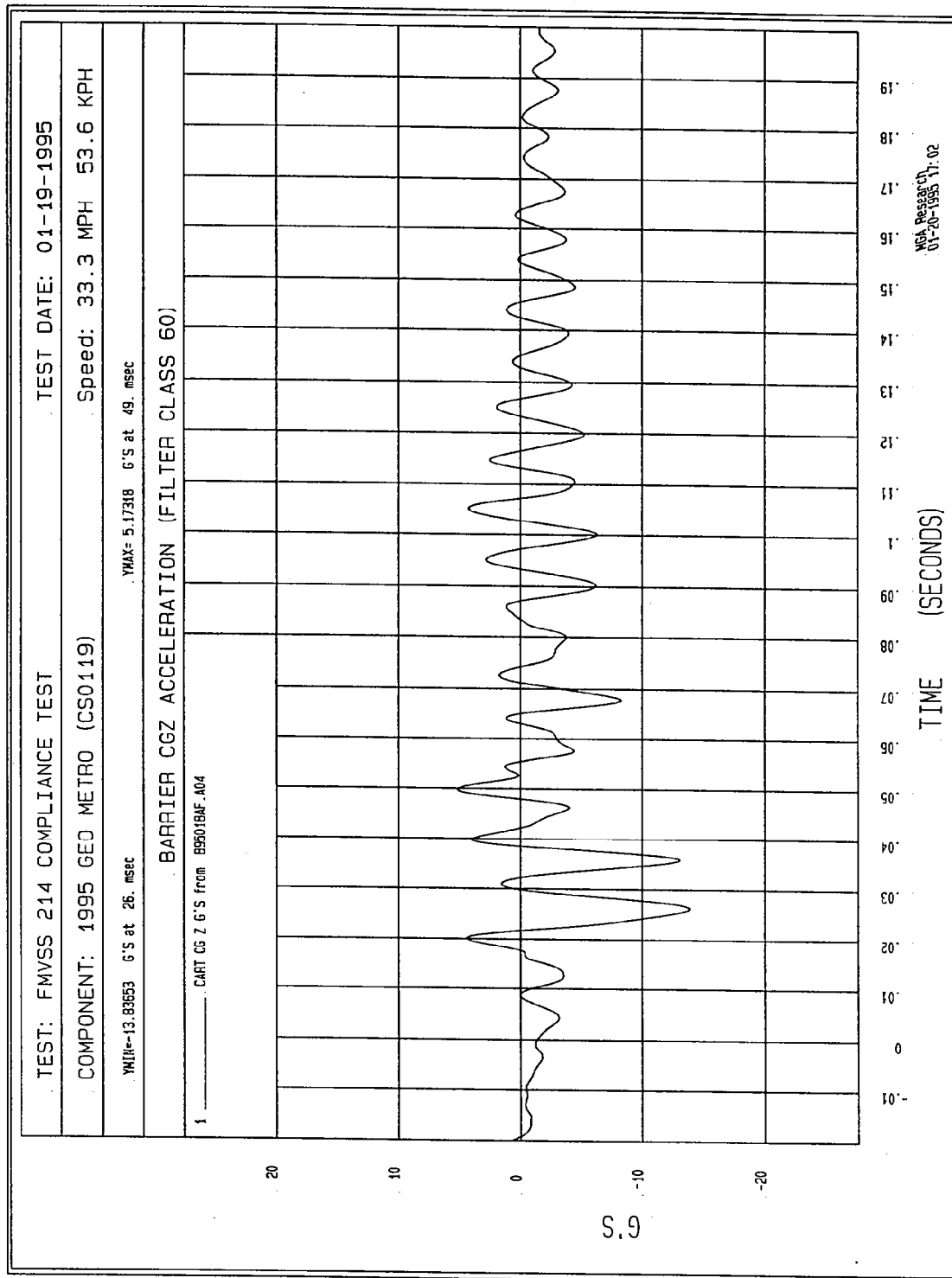


Figure B-58 - Moving Barrier Center of Gravity Z Acceleration vs. Time

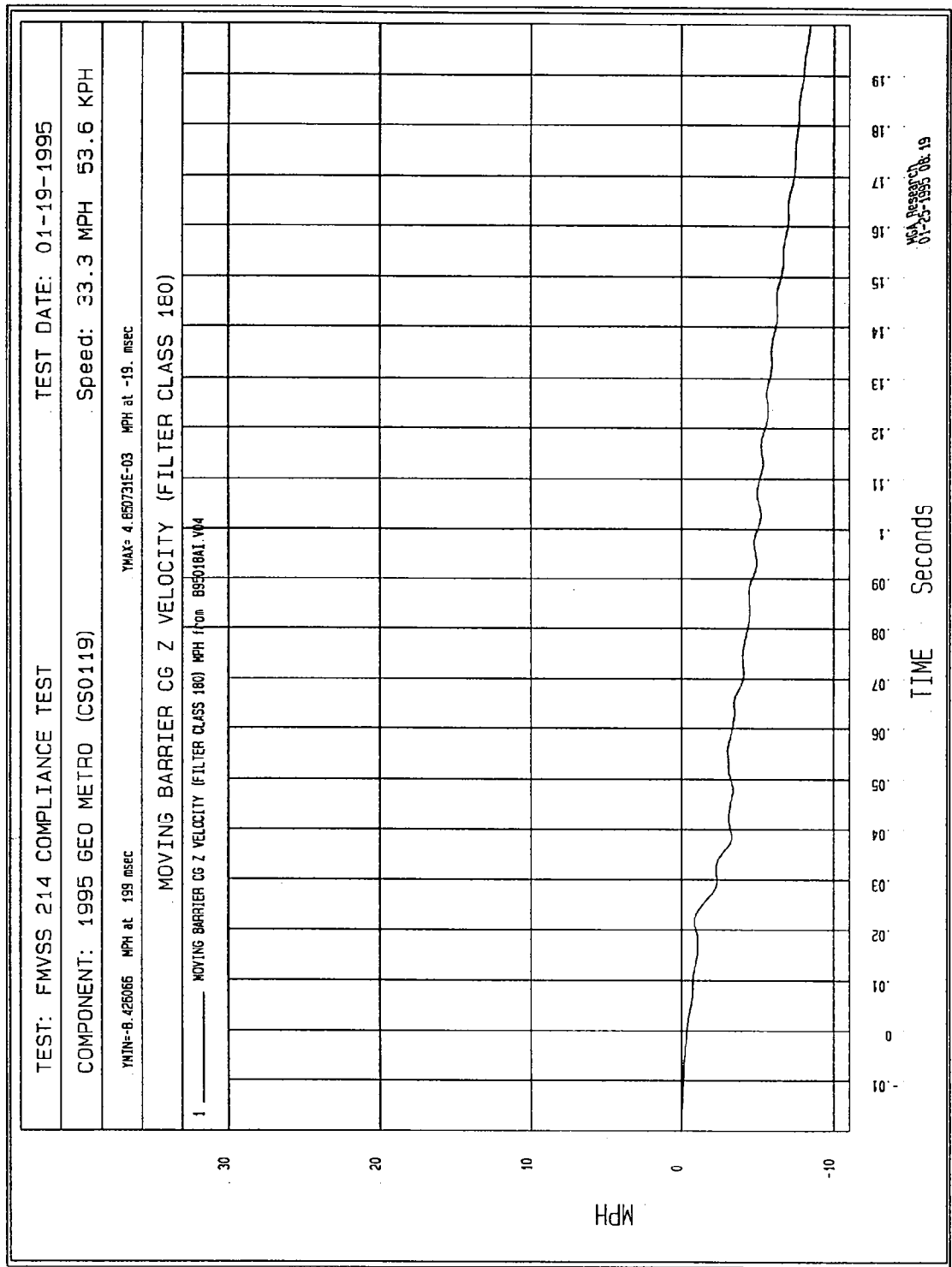


Figure B-59 - Moving Barrier Center of Gravity Z Velocity vs. Time

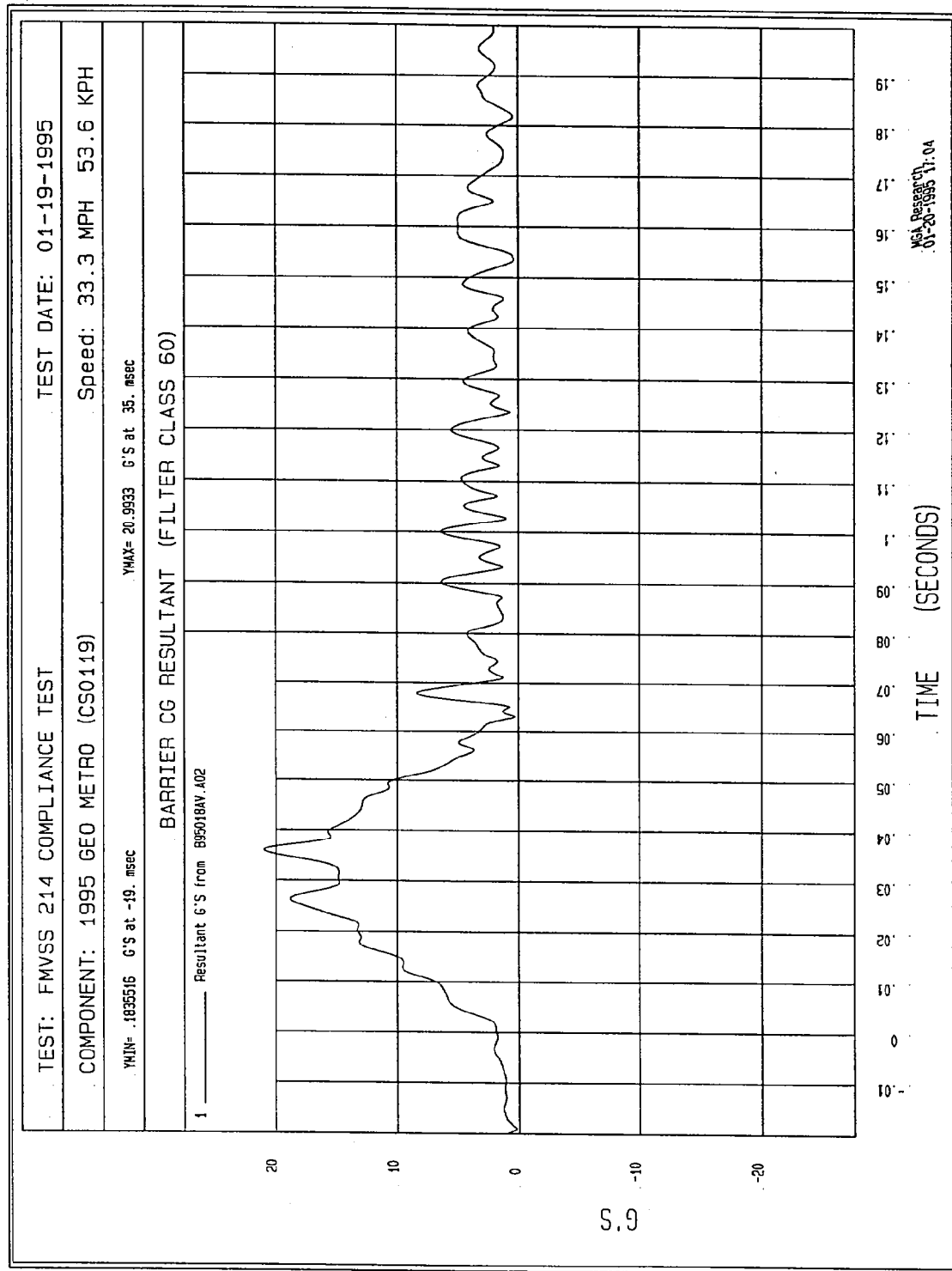


Figure B-60 - Moving Barrier Center of Gravity Resultant vs. Time

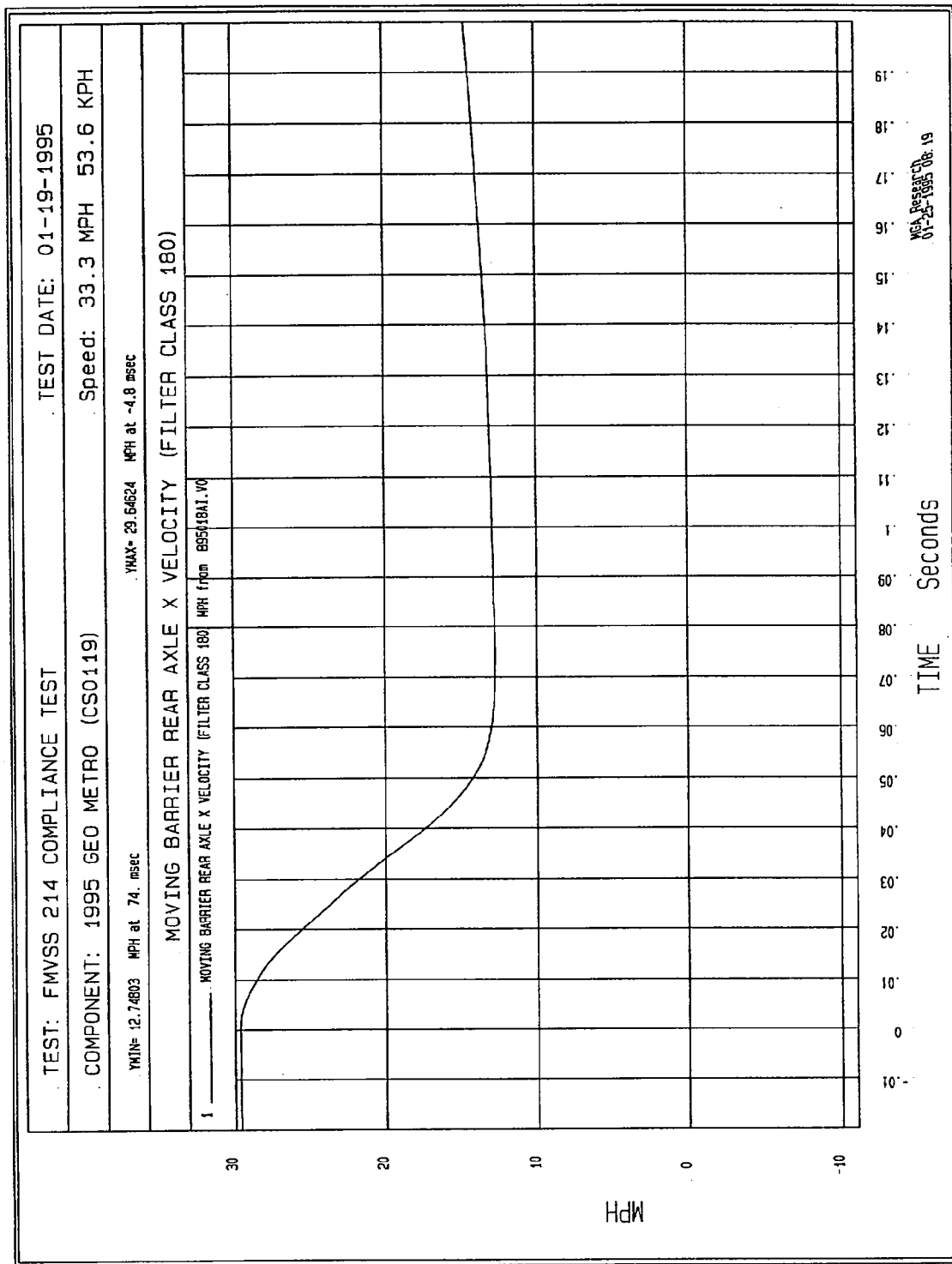


Figure B-62 - Moving Barrier Rear Axle X Velocity vs. Time

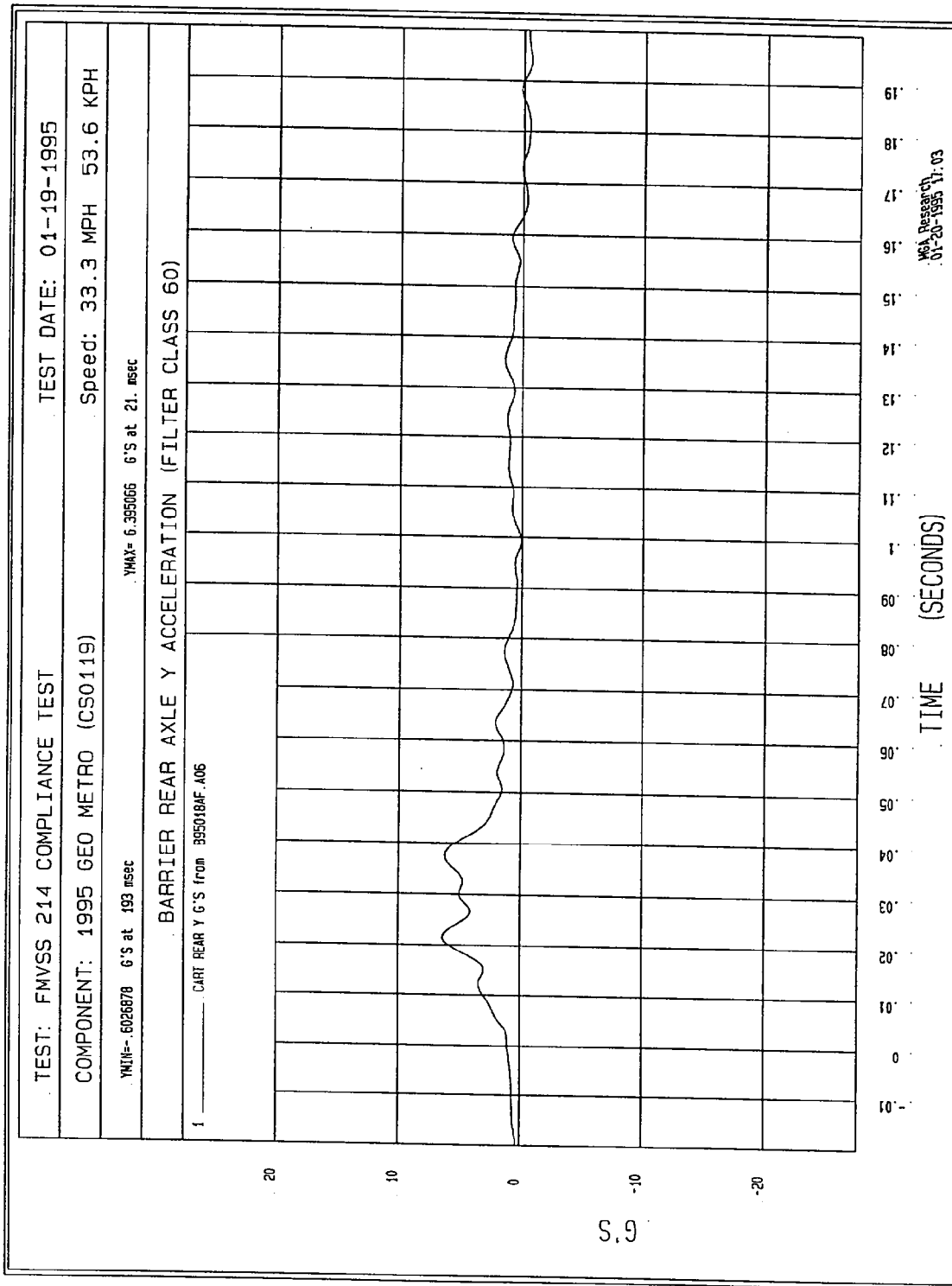


Figure B-63 - Moving Barrier Rear Axle Y Acceleration vs. Time

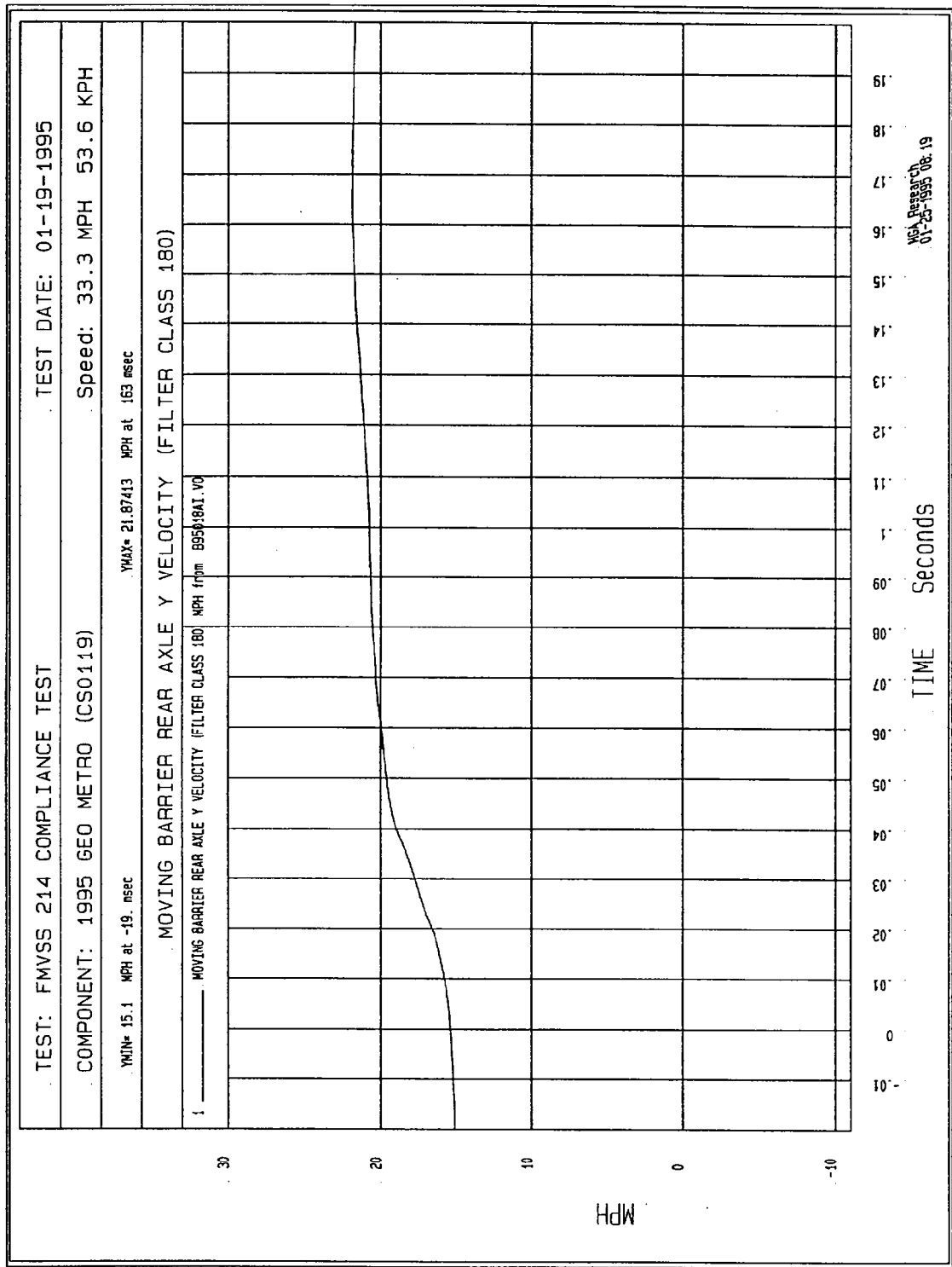


Figure B-64 - Moving Barrier Rear Axle Y Velocity vs. Time

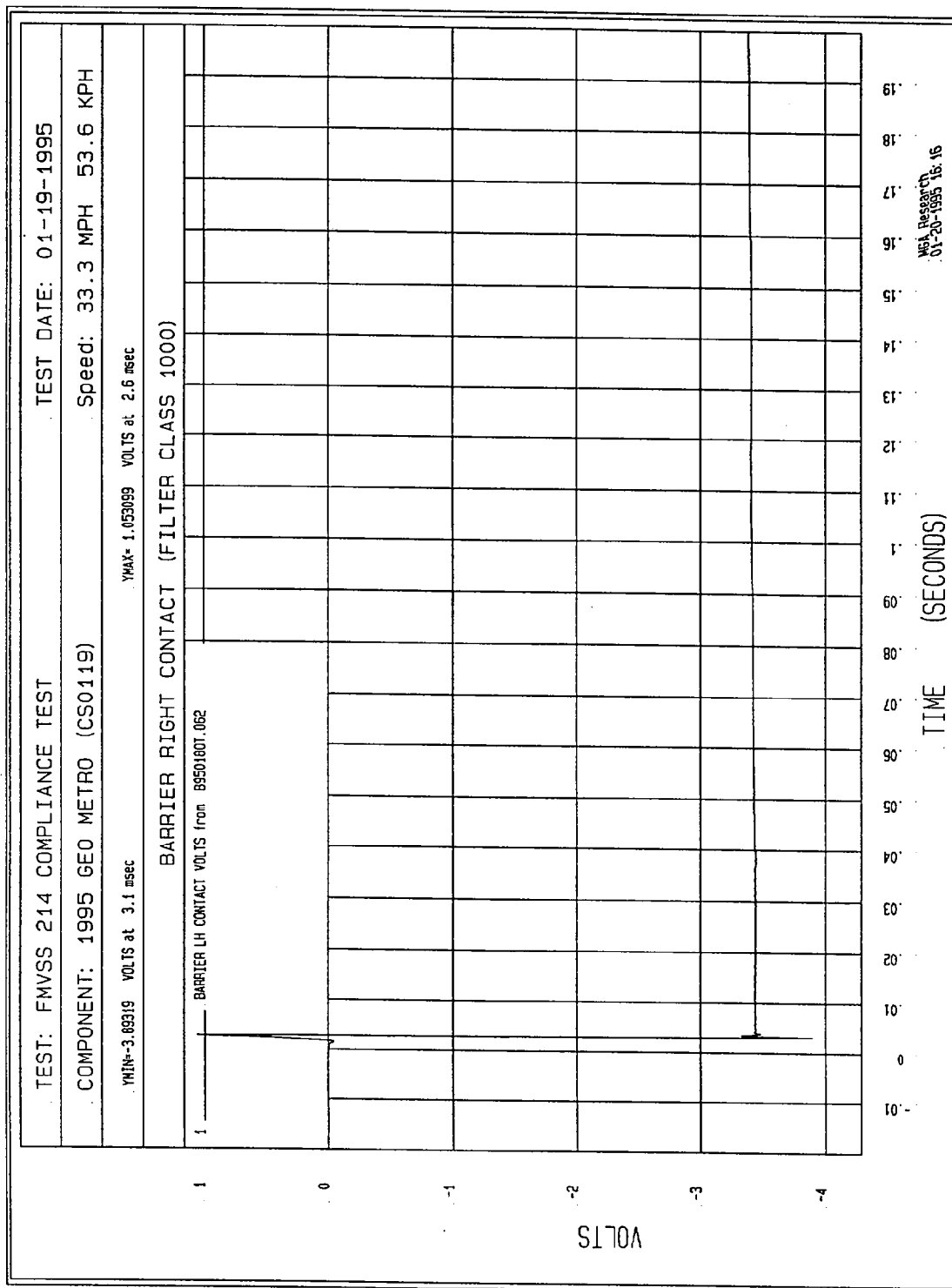
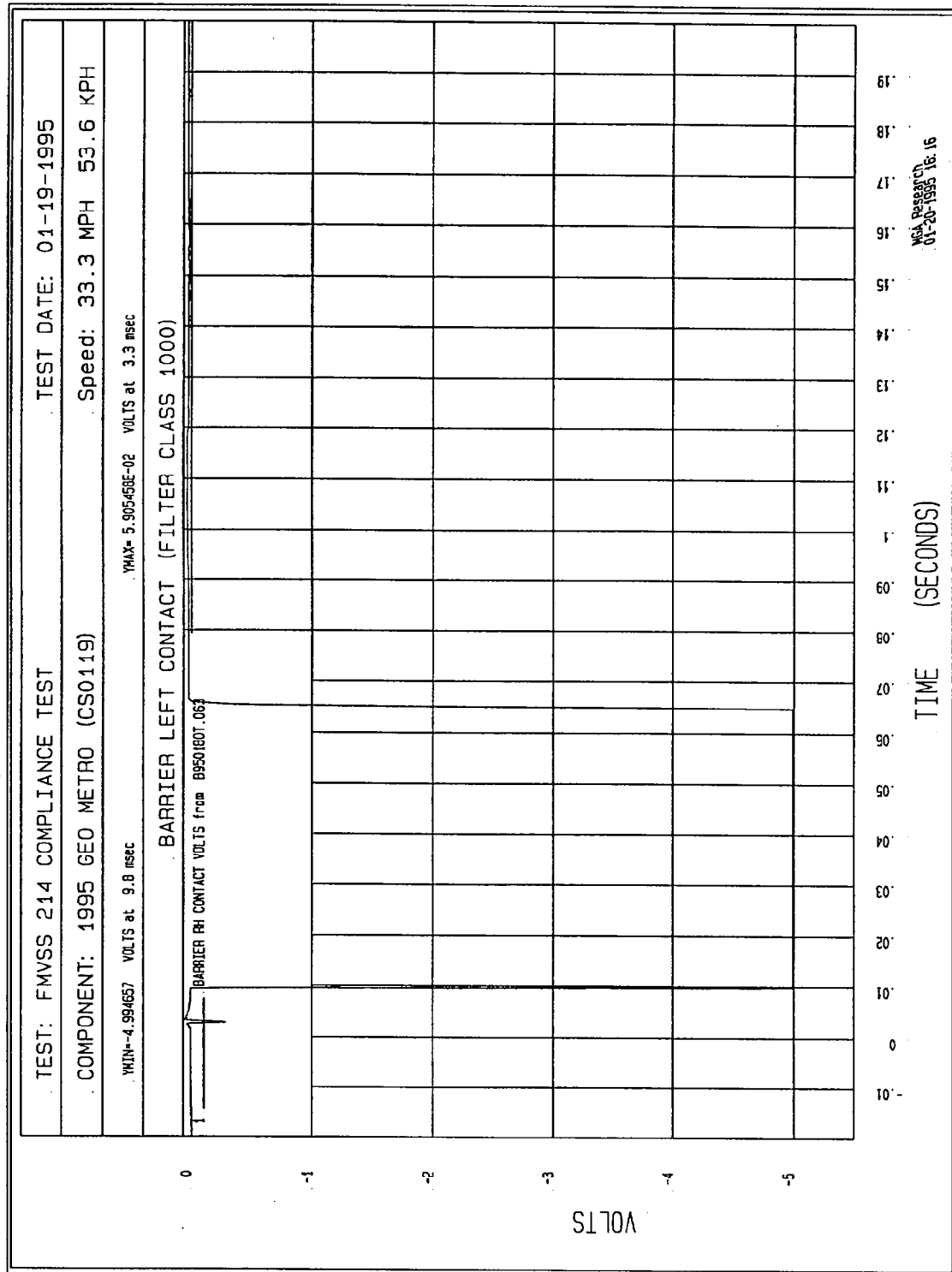


Figure B-65 - Right Hand Barrier Contact



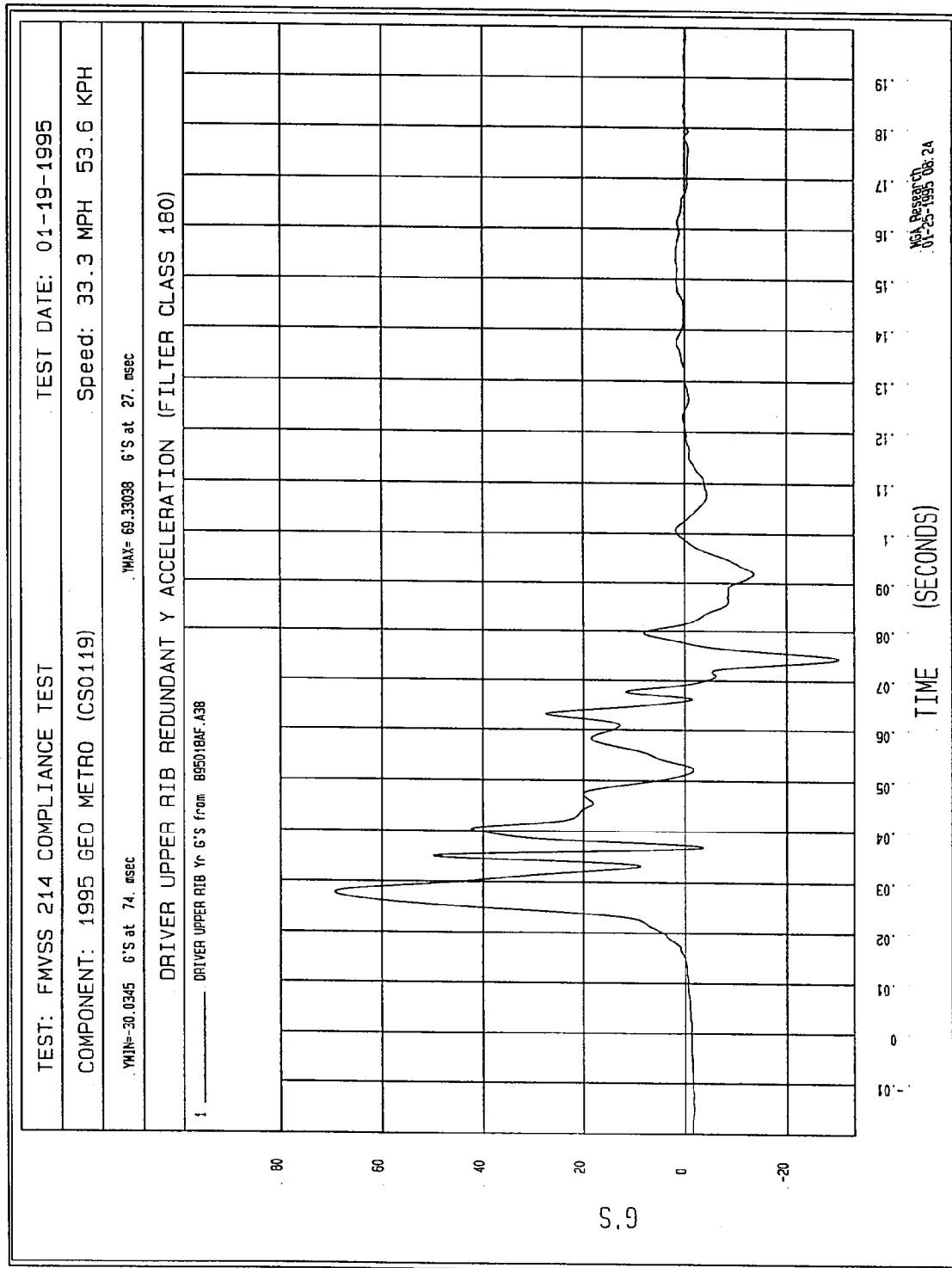


Figure B-67 - Driver Upper Rib Y Redundant Acceleration vs. Time

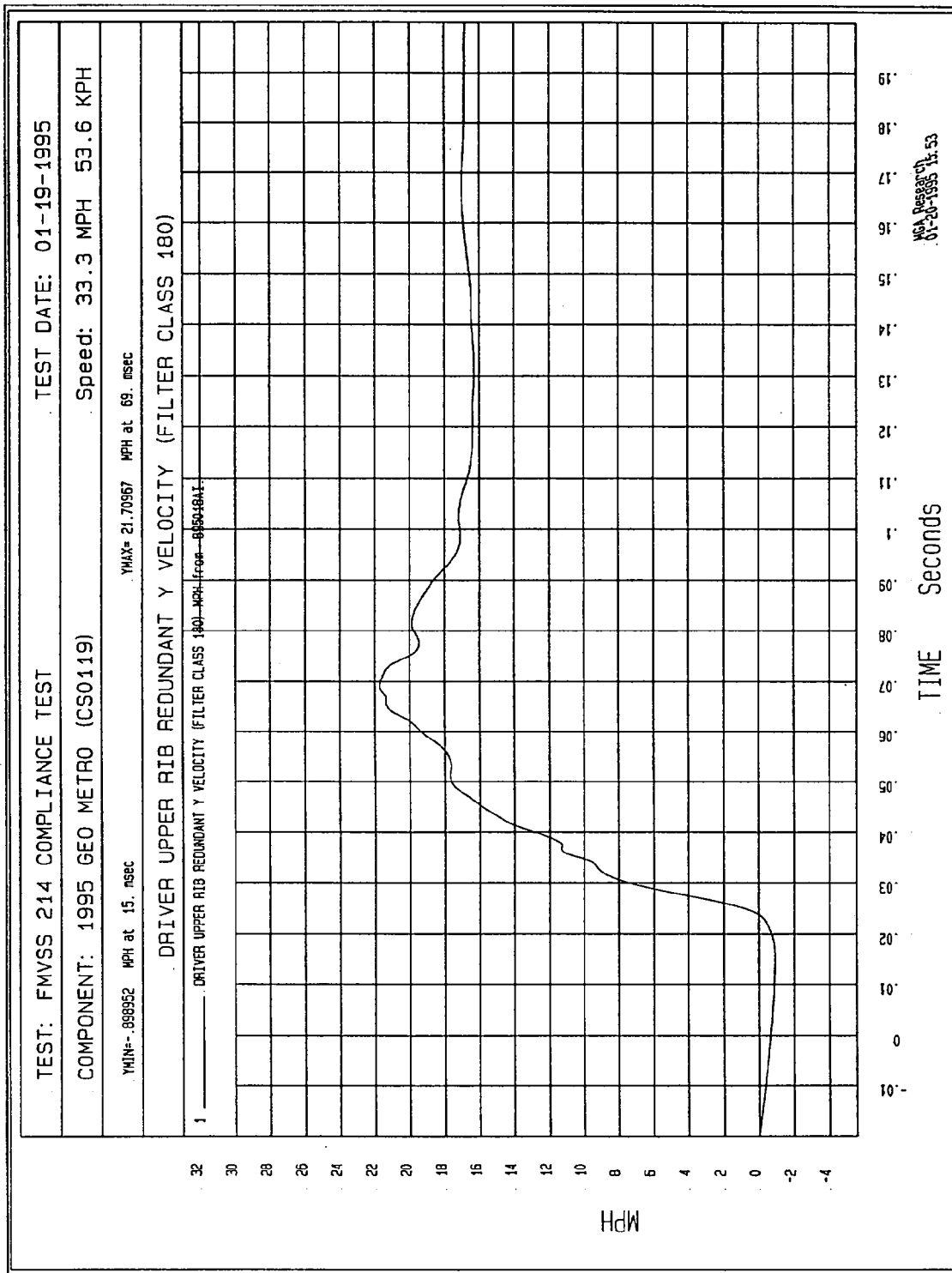


Figure B-68 - Driver Upper Rib Y Redundant Velocity vs. Time

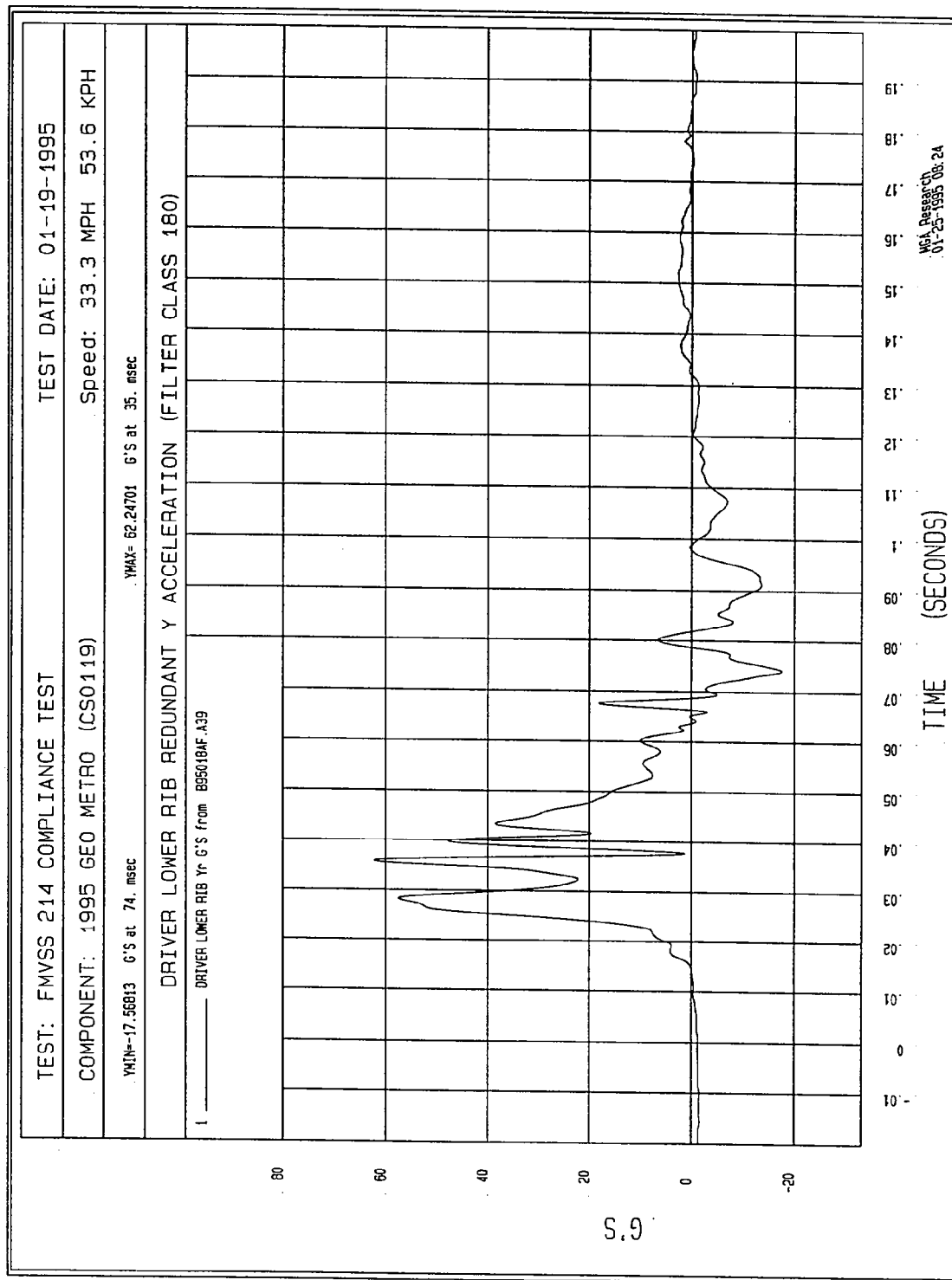


Figure B-69 - Driver Lower Rib Y Redundant Acceleration vs. Time

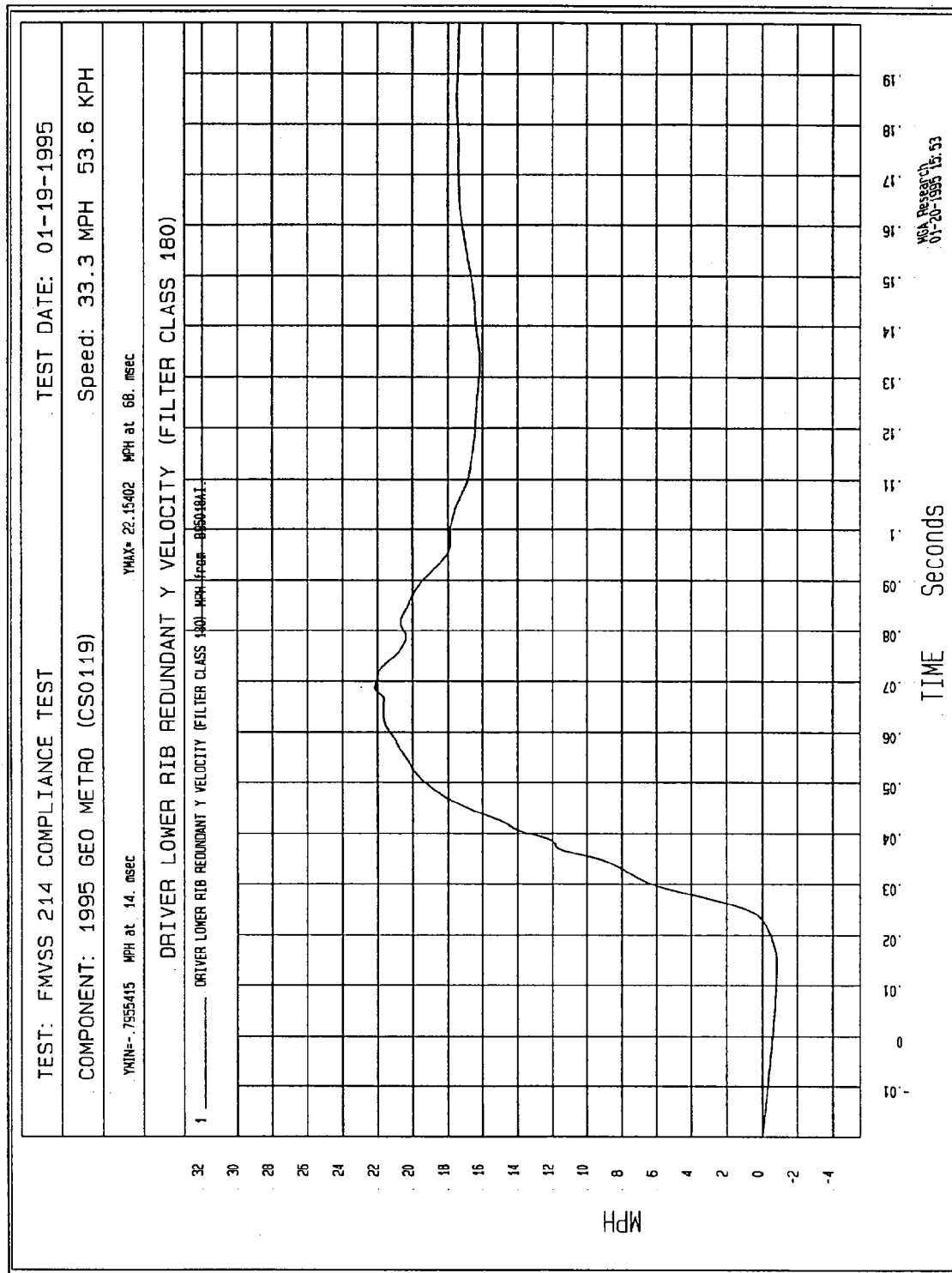


Figure B-70 - Driver Lower Rib Y Redundant Velocity vs. Time

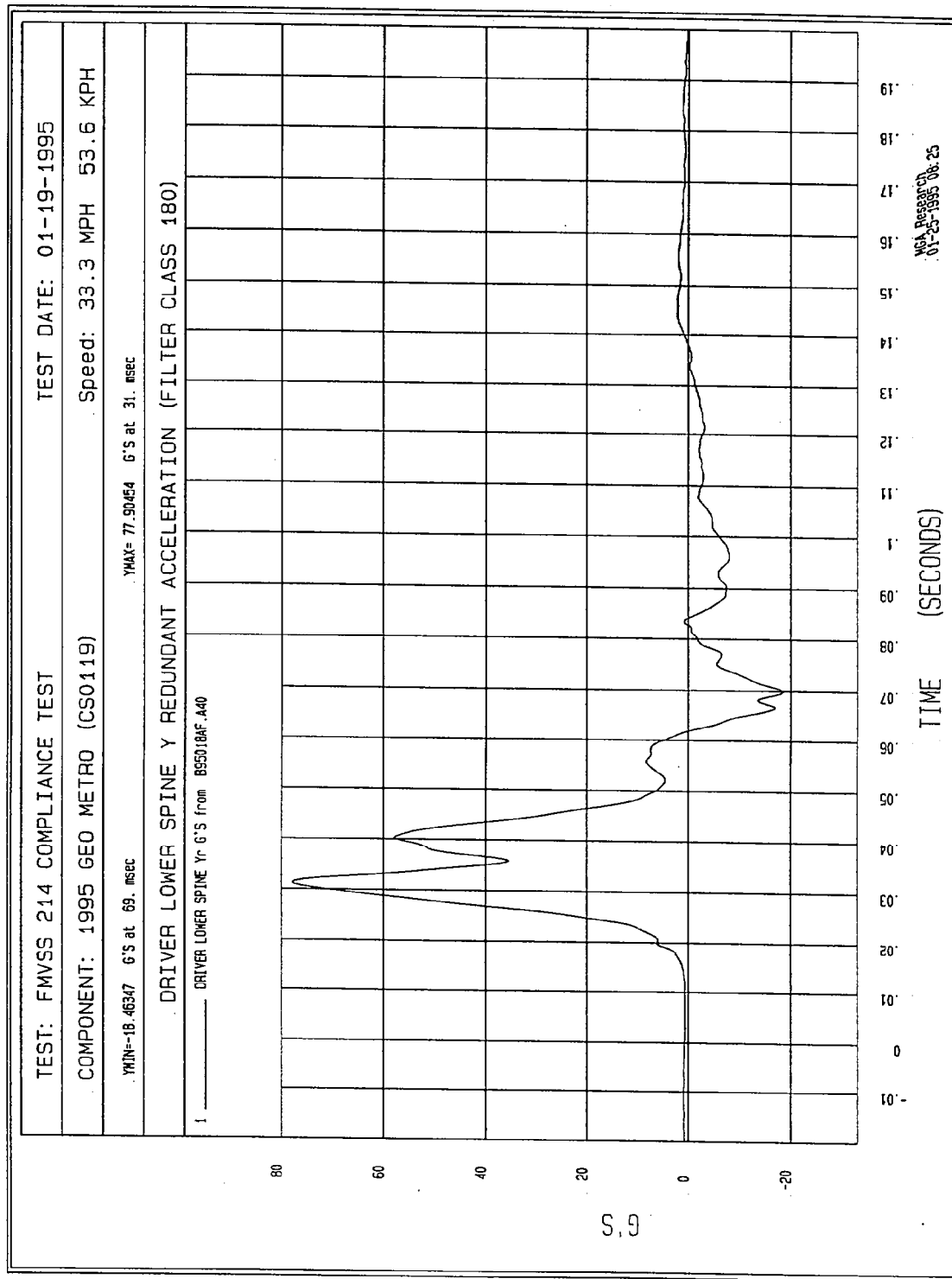


Figure B-71 - Driver Lower Spine Y Redundant Acceleration vs. Time

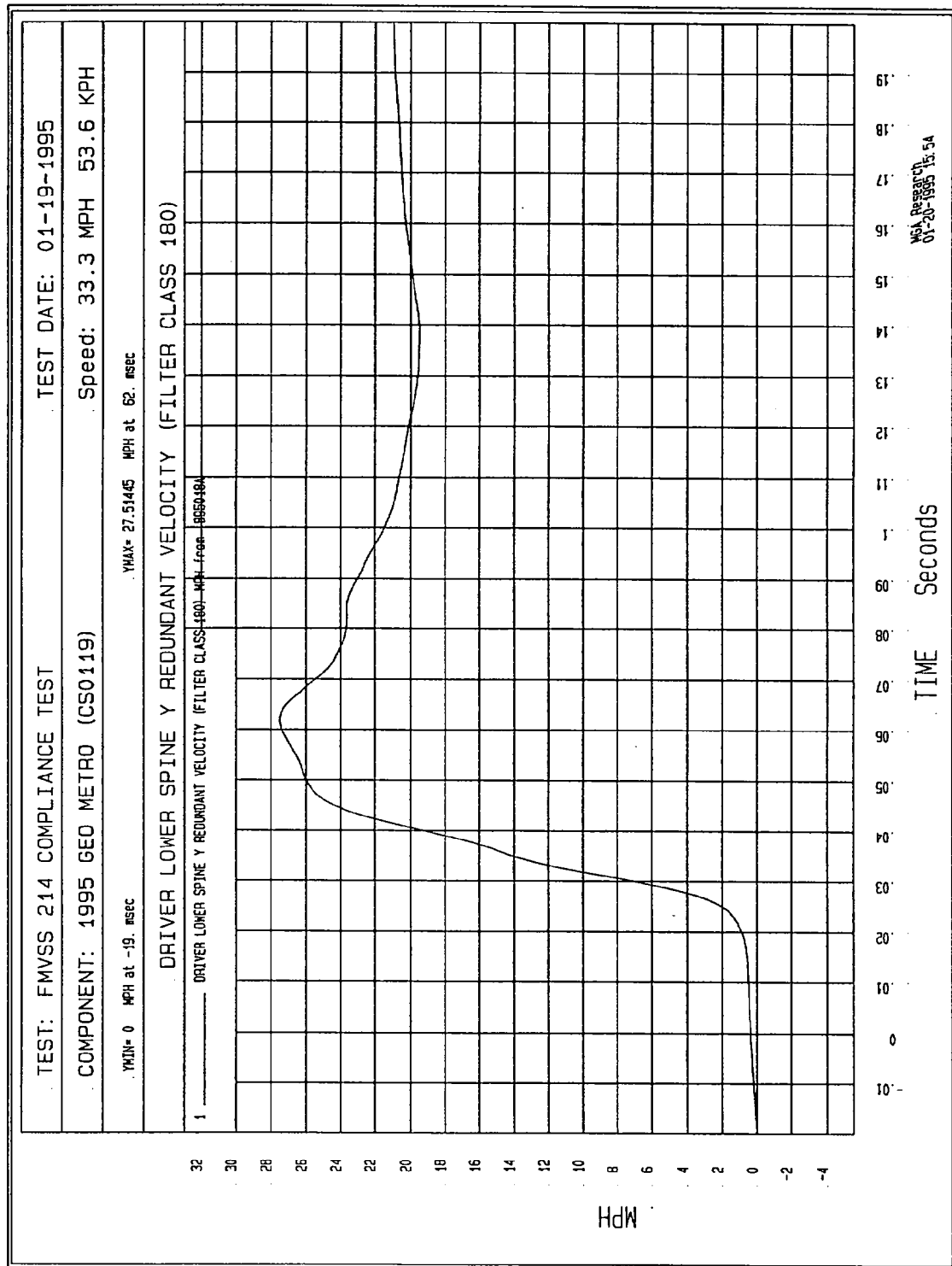


Figure B-72 - Driver Lower Spine Y Redundant Velocity vs. Time

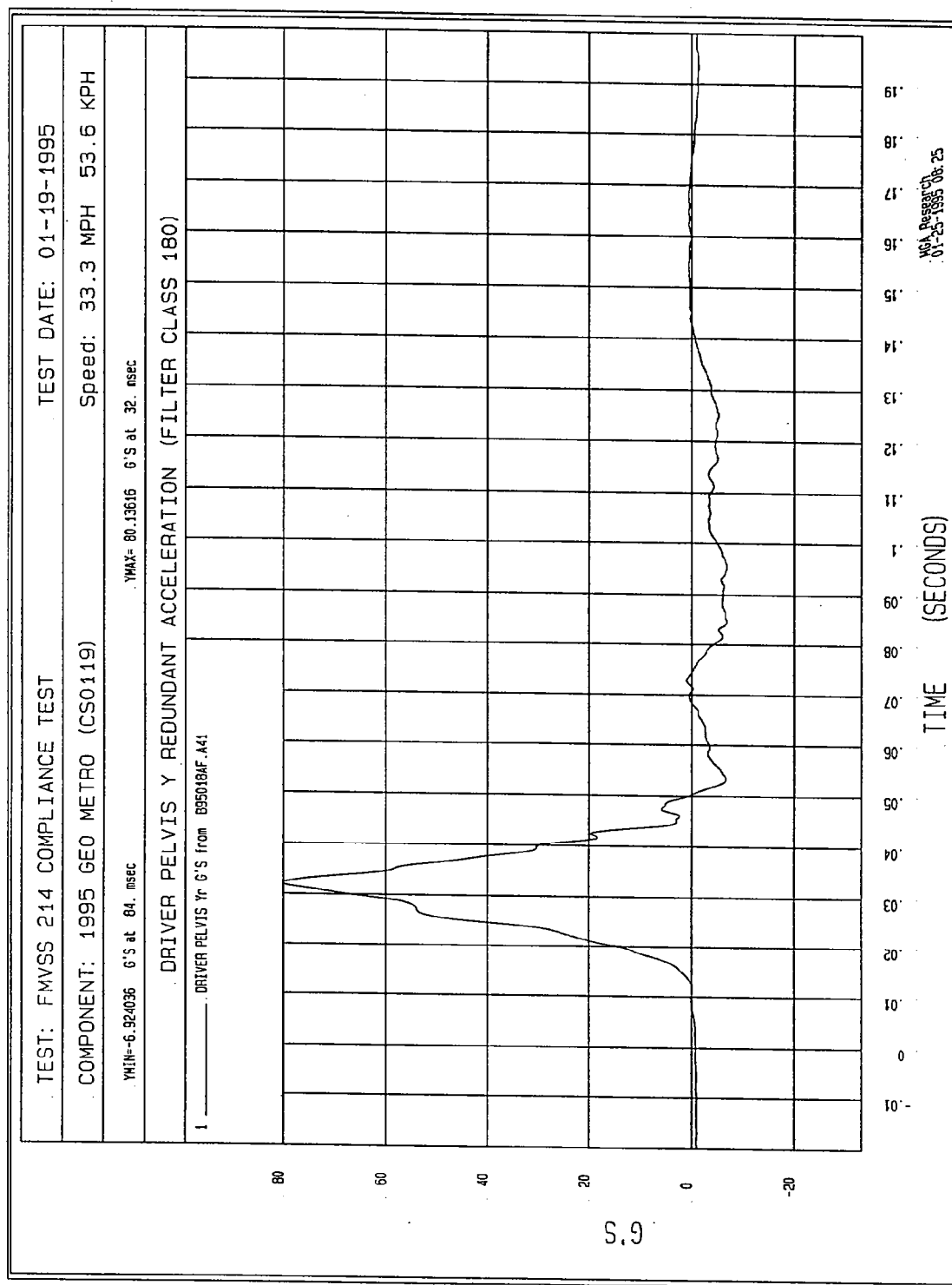


Figure B-73 - Driver Pelvis Y Redundant Acceleration vs. Time

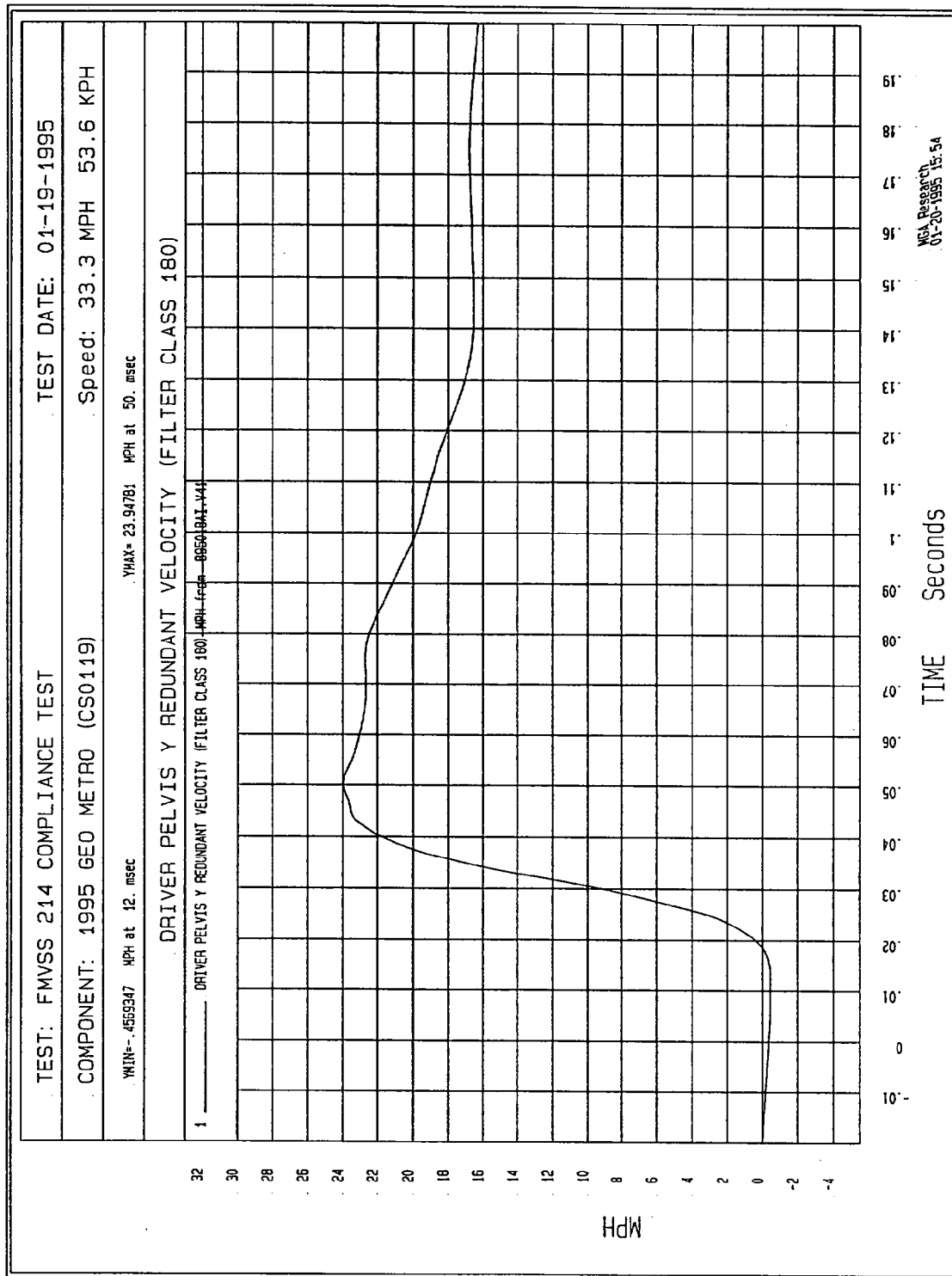


Figure B-74 - Driver Pelvis Y Redundant Velocity vs. Time

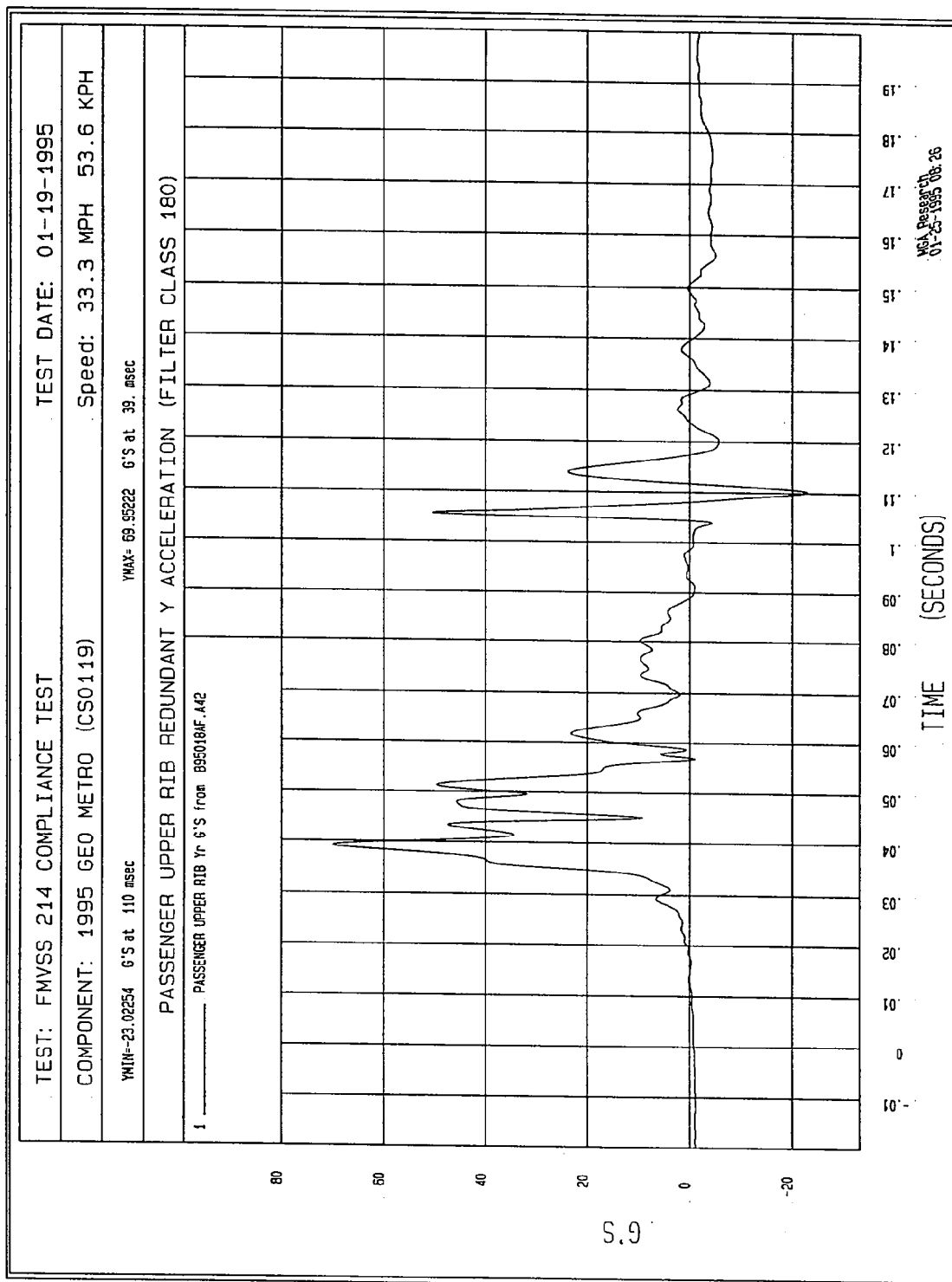
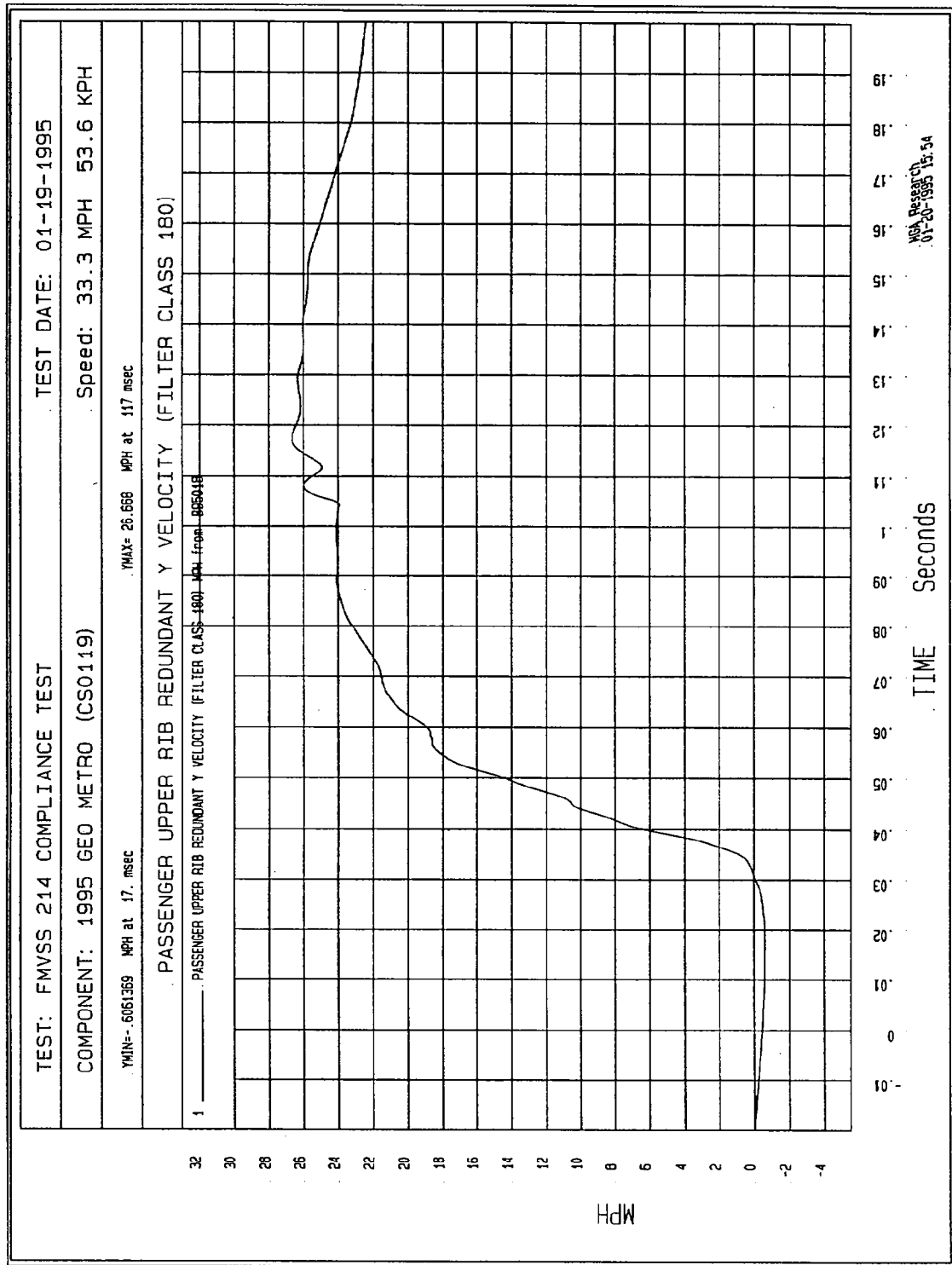


Figure B-75 - Passenger Upper Rib Y Redundant Acceleration vs. Time



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

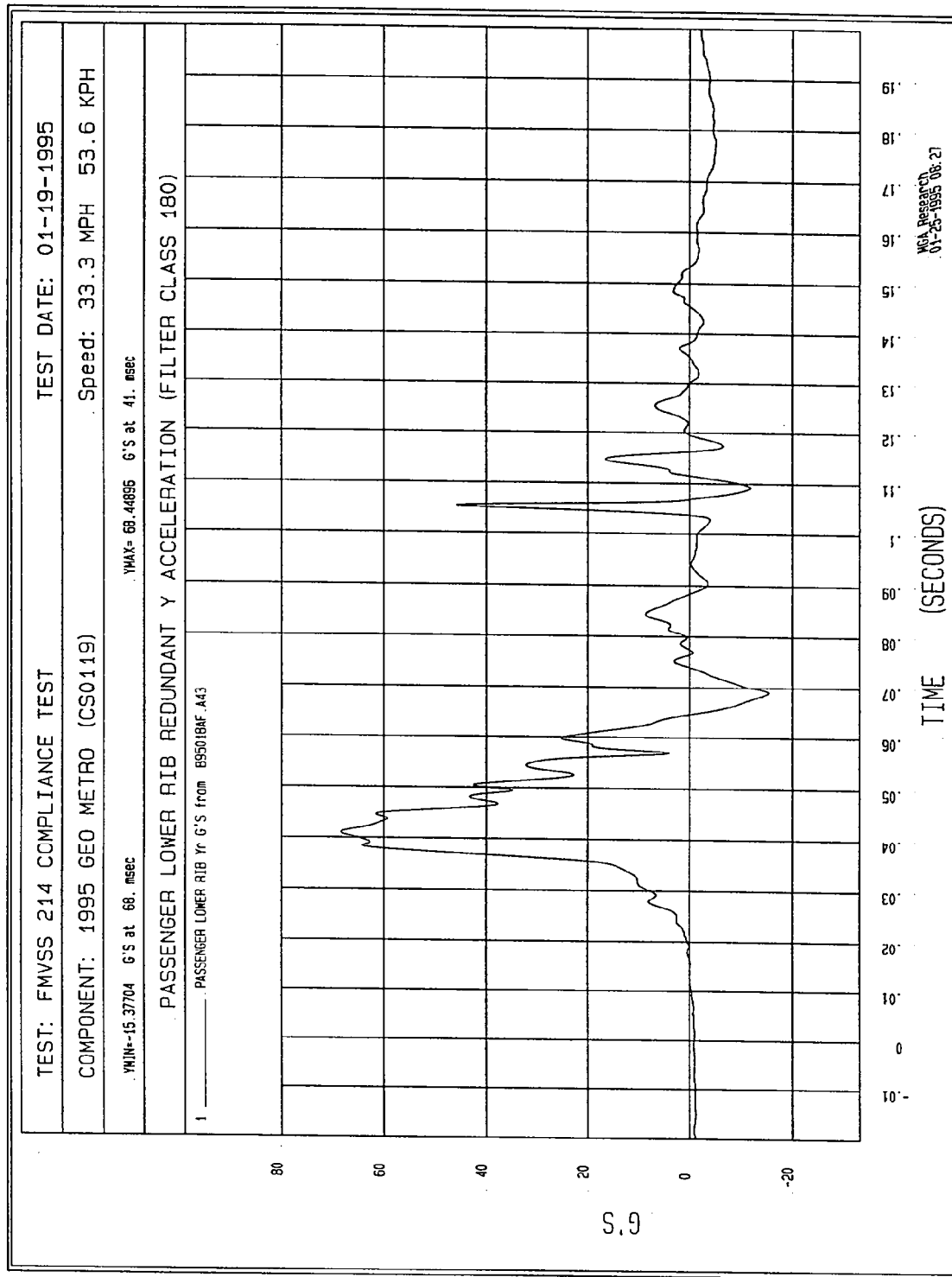


Figure B-77 - Passenger Lower Rib Y Redundant Acceleration vs. Time

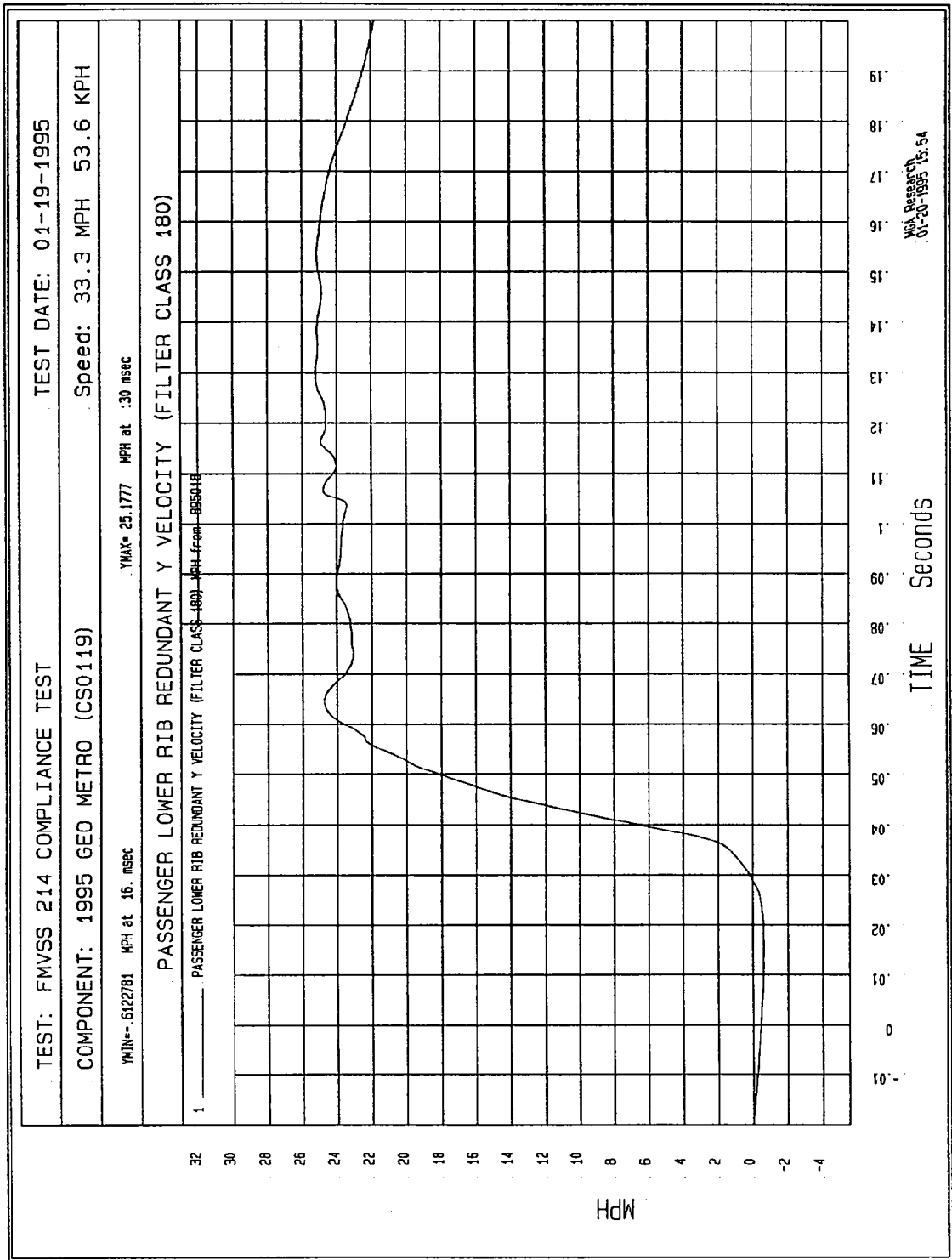


Figure B-78 - Passenger Lower Rib Y Redundant Velocity vs. Time

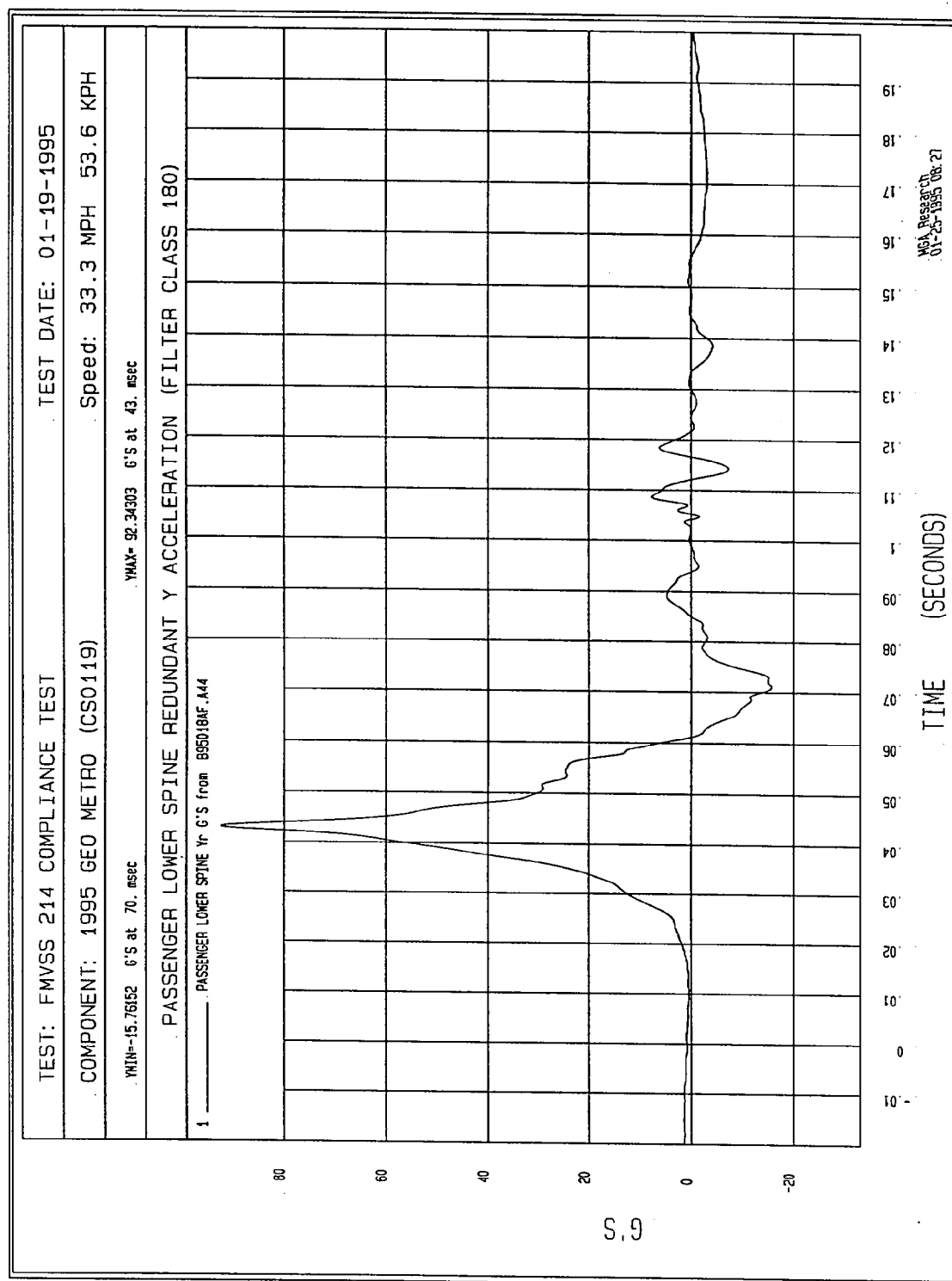


Figure B-79 - Passenger Lower Spine Y Redundant Acceleration vs. Time

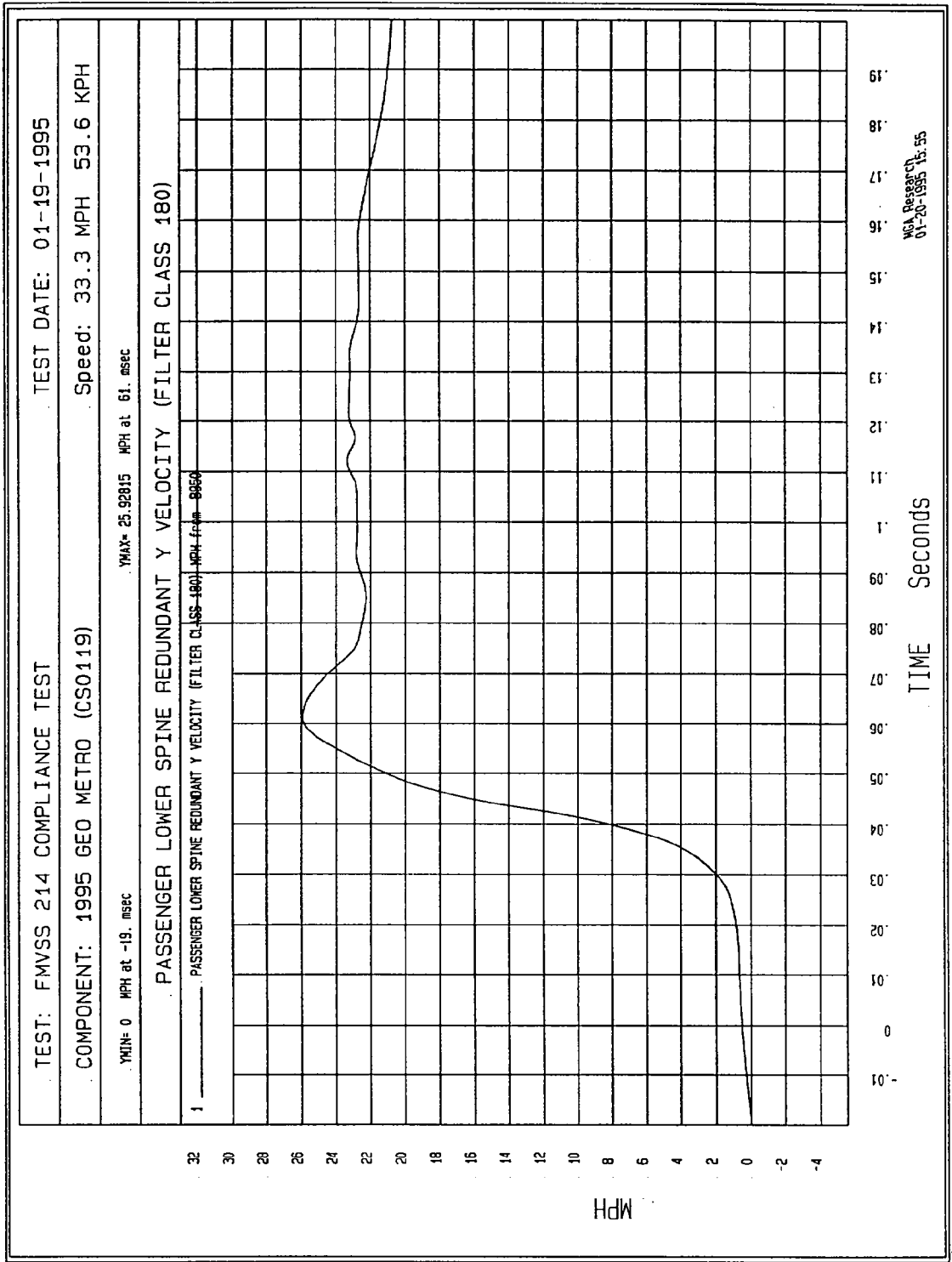


Figure B-80 - Passenger Lower Spine Y Redundant Velocity vs. Time

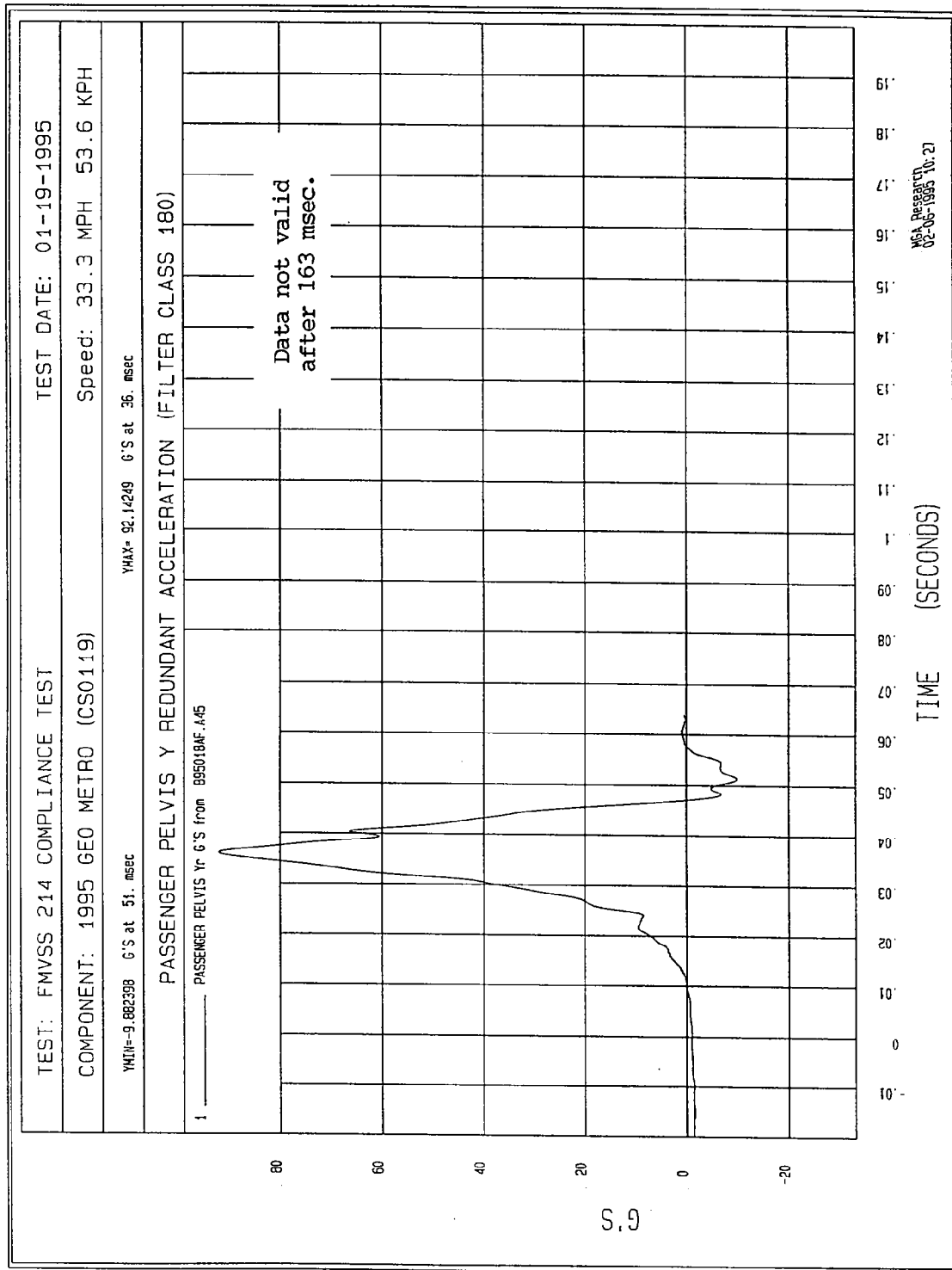


Figure B-81 - Passenger Pelvis Y Redundant Acceleration vs. Time

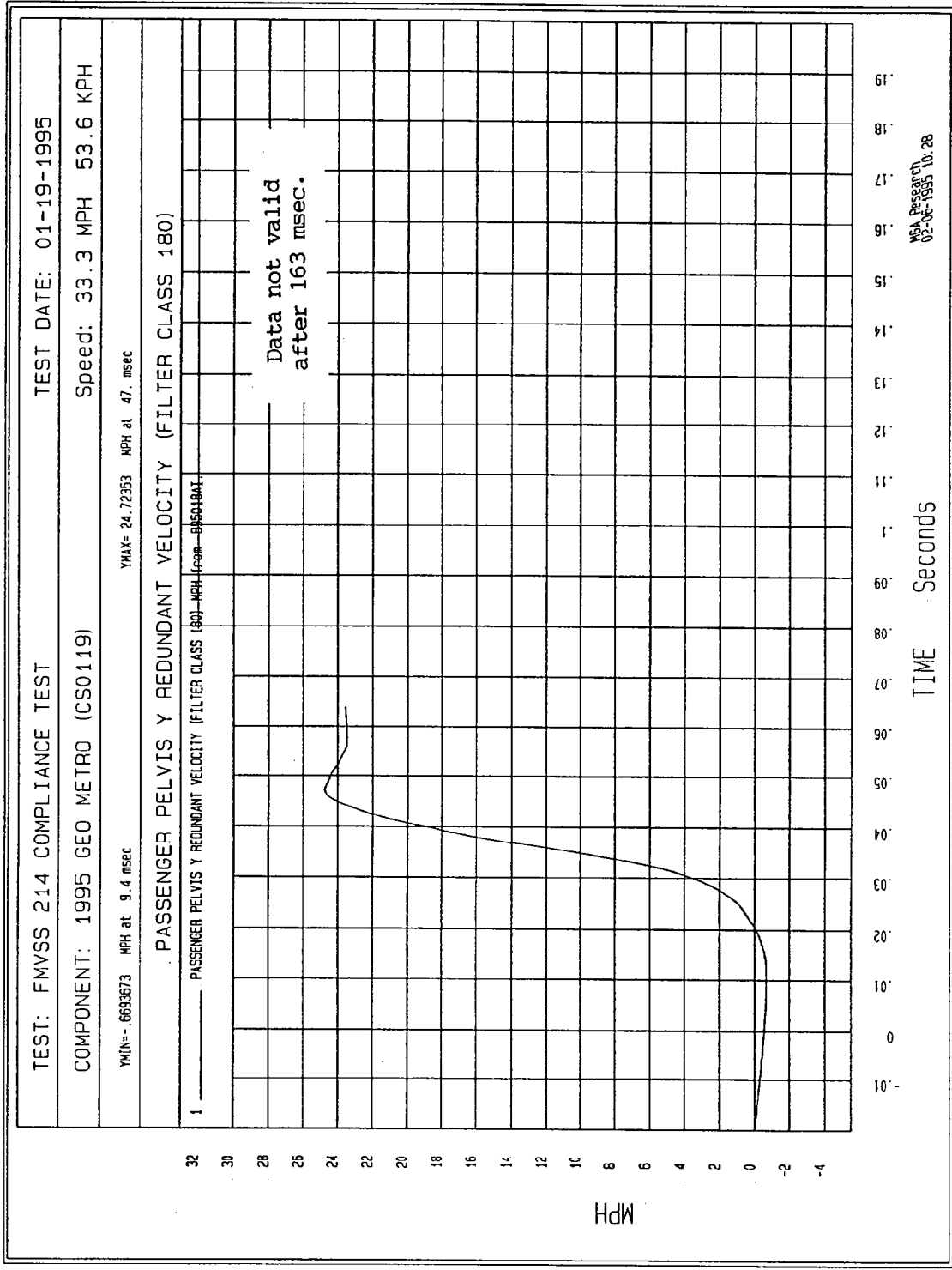


Figure B-82 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

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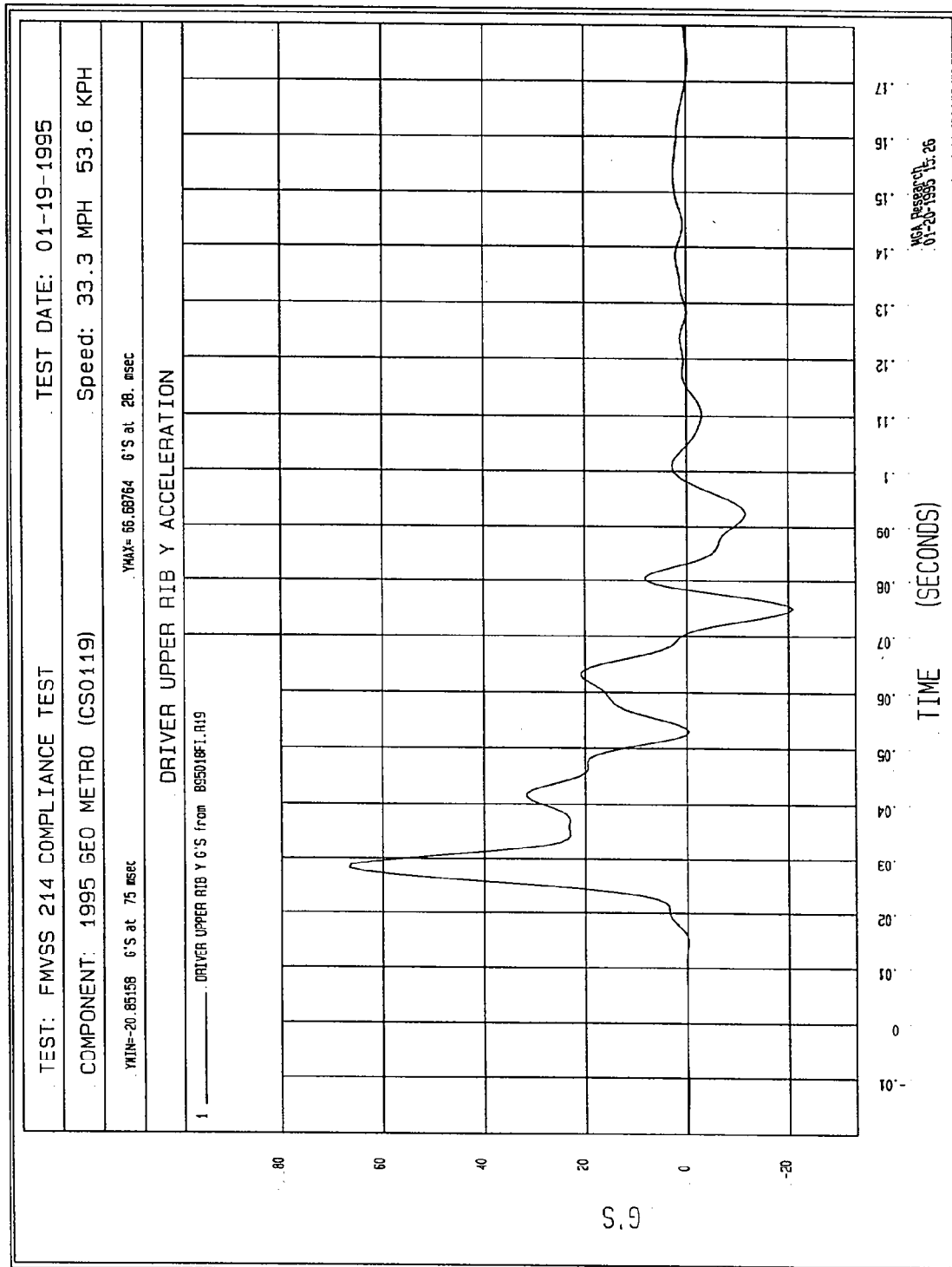


Figure B-83 - Driver Upper Rib Y Acceleration vs. Time

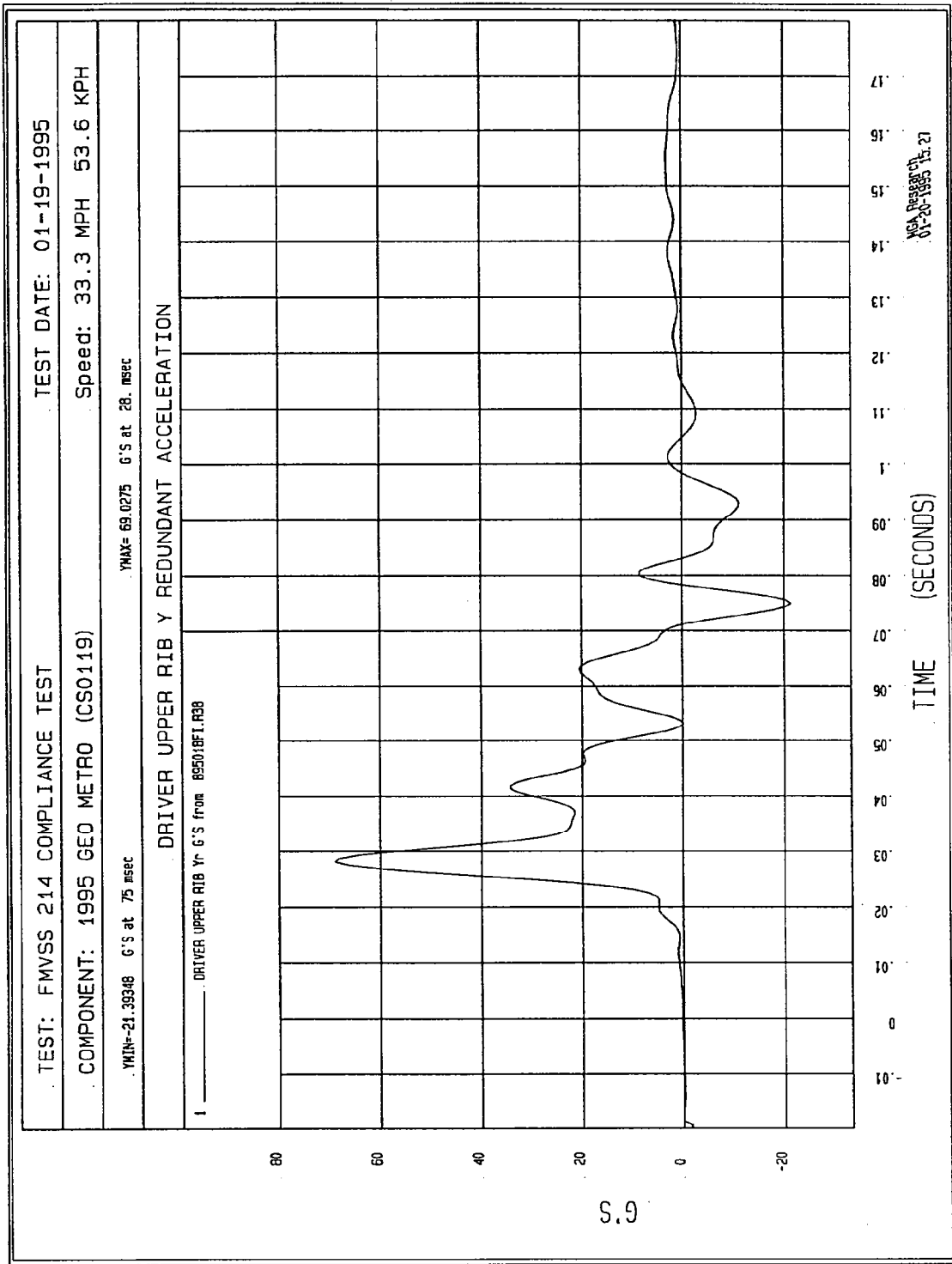


Figure B-84 - Driver Upper Rib Y Redundant Acceleration vs. Time

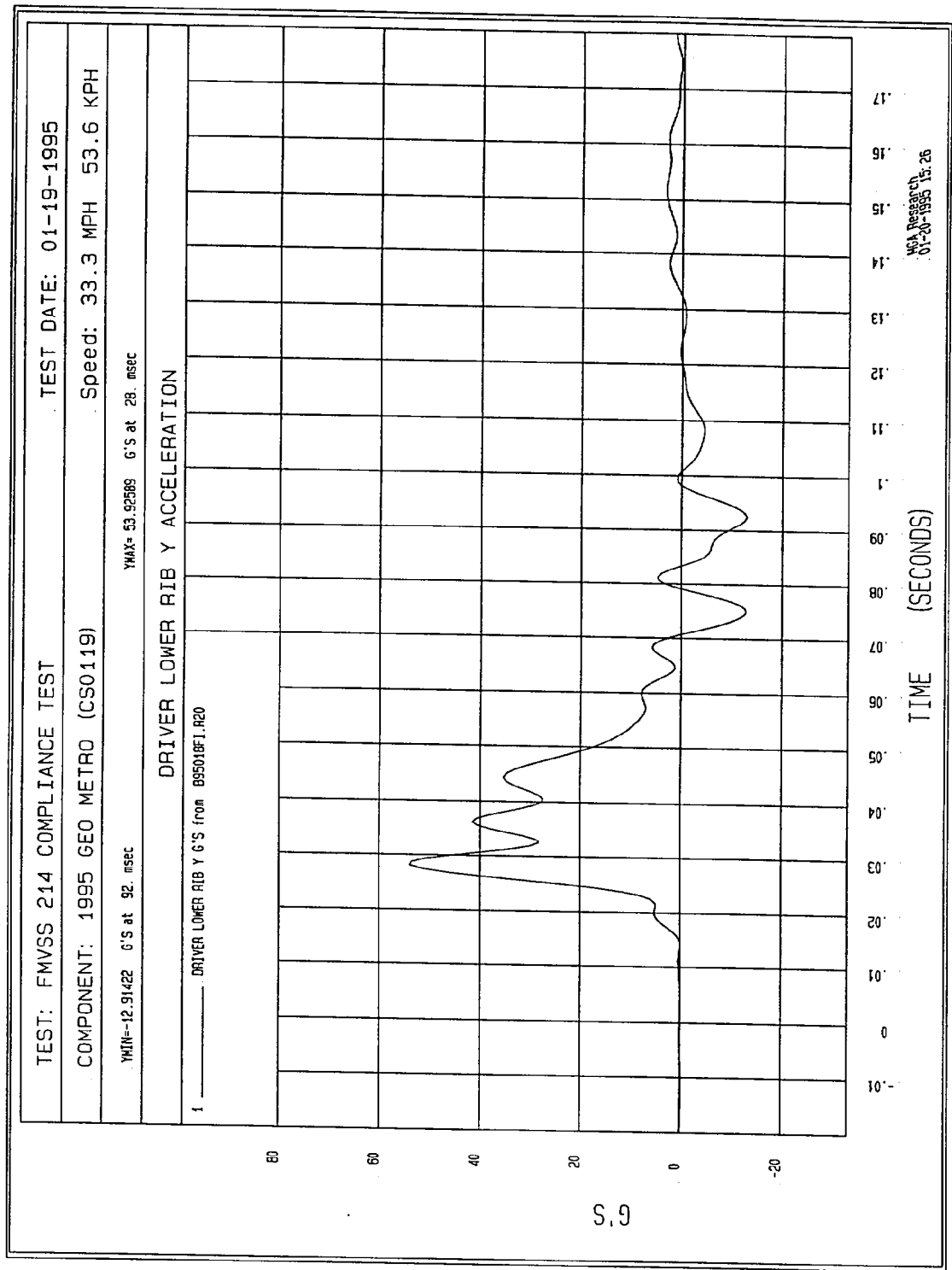


Figure B-85 - Driver Lower Rib Y Acceleration vs. Time

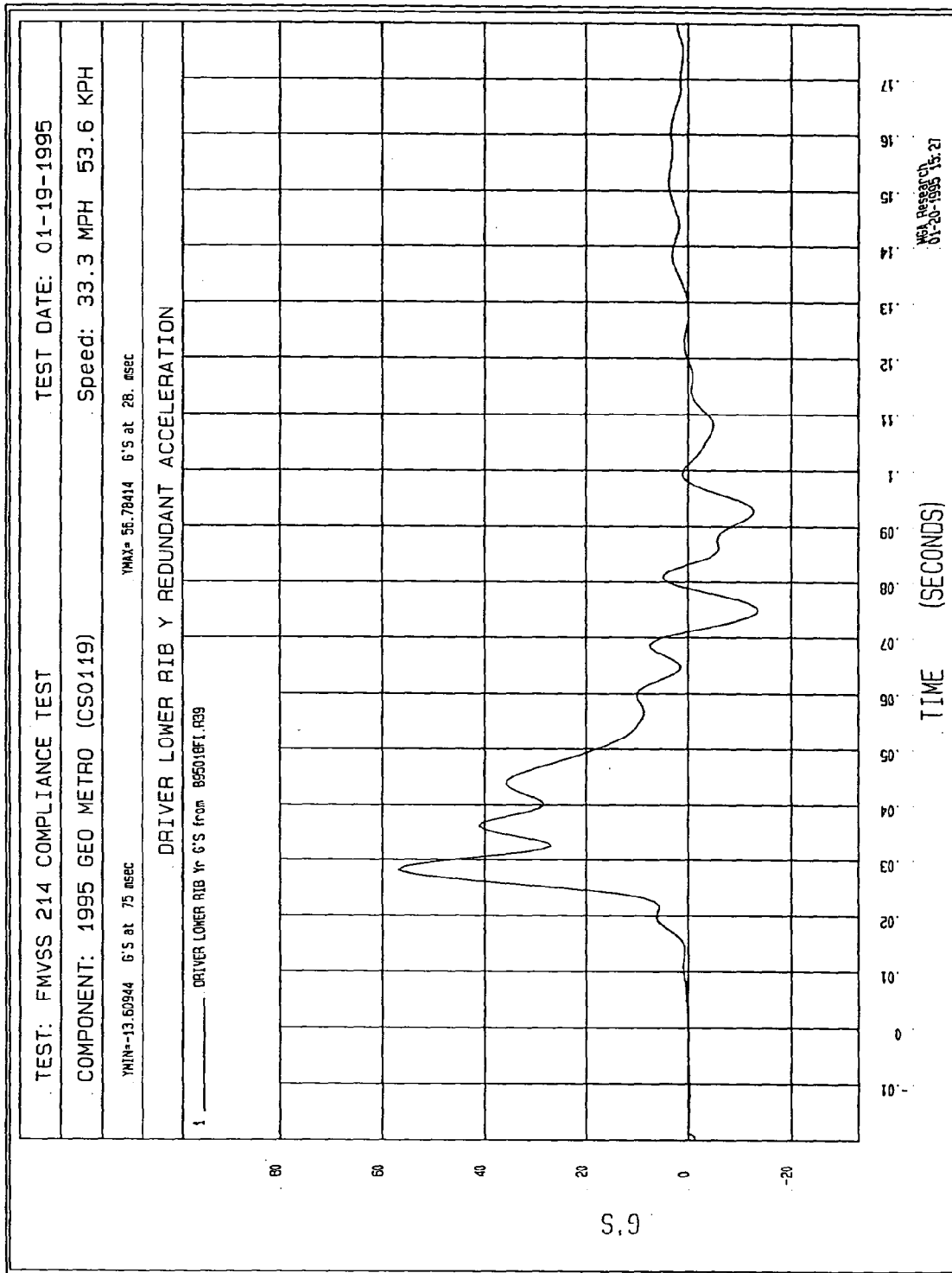
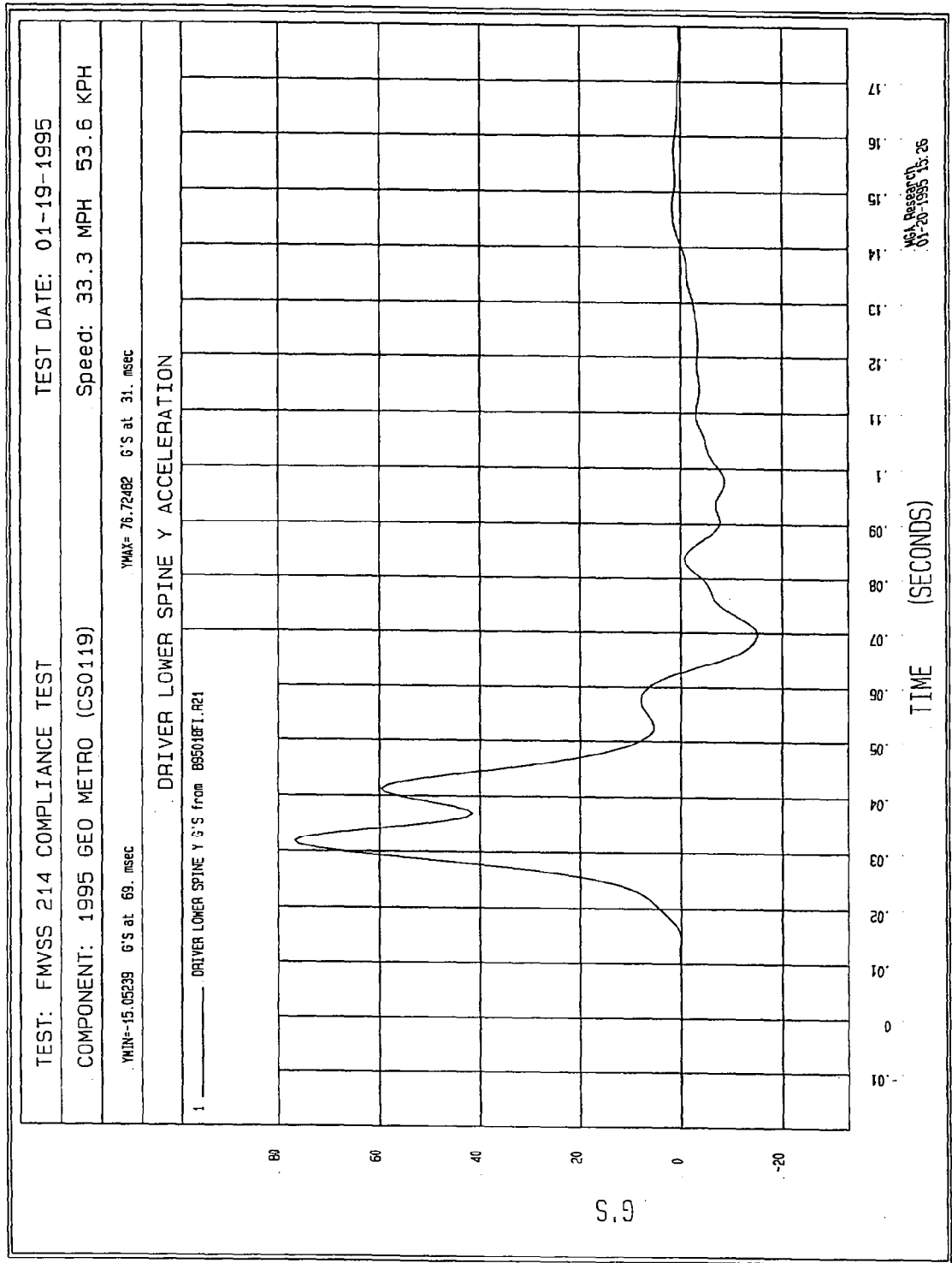
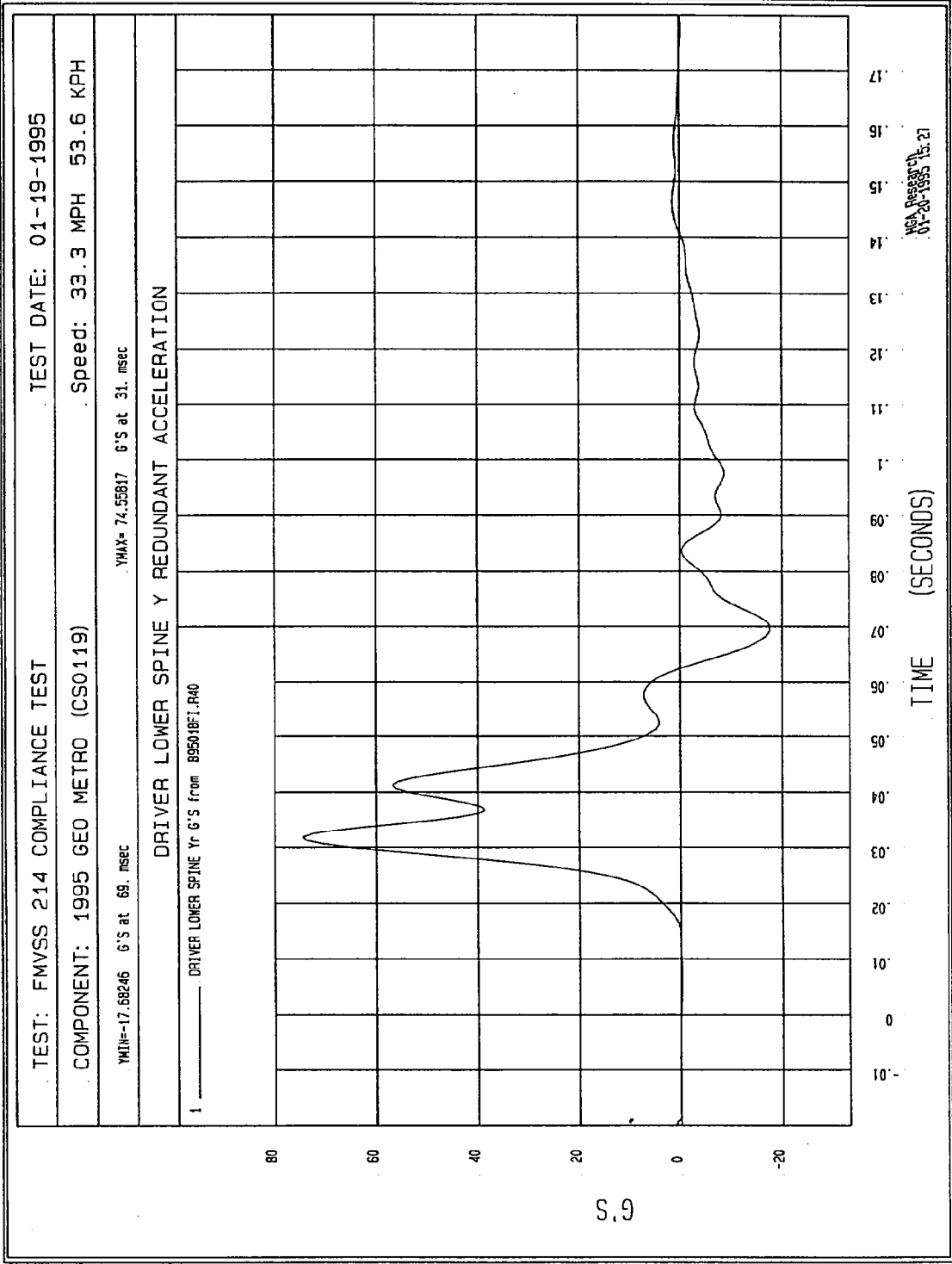


Figure B-86 - Driver Lower Rib Y Redundant Acceleration vs. Time



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Figure B-87 - Driver Lower Spine Y Acceleration vs. Time



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Figure B-88 - Driver Lower Spine Y Redundant Acceleration vs. Time

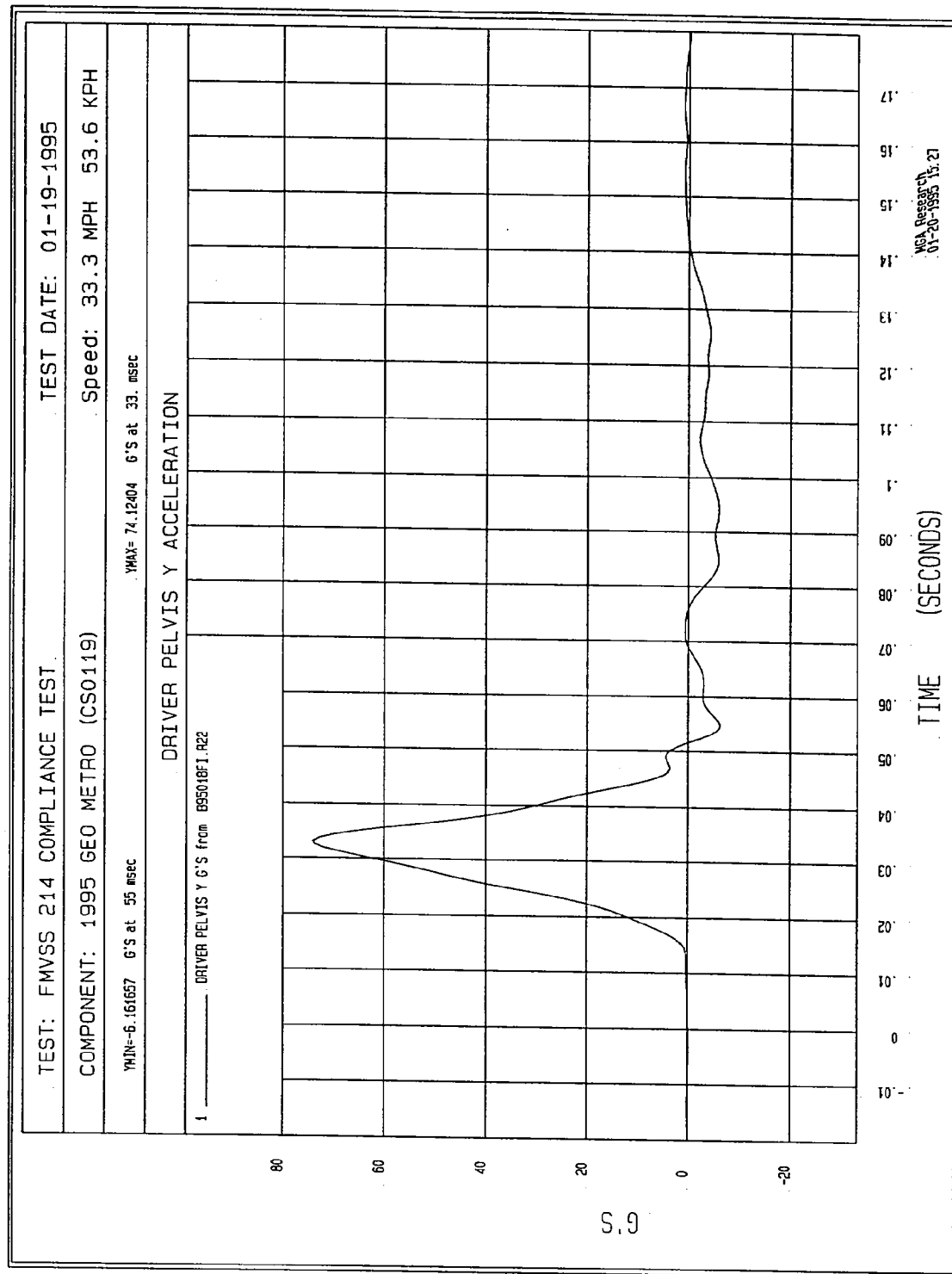


Figure B-89 - Driver Pelvis Y Acceleration vs. Time

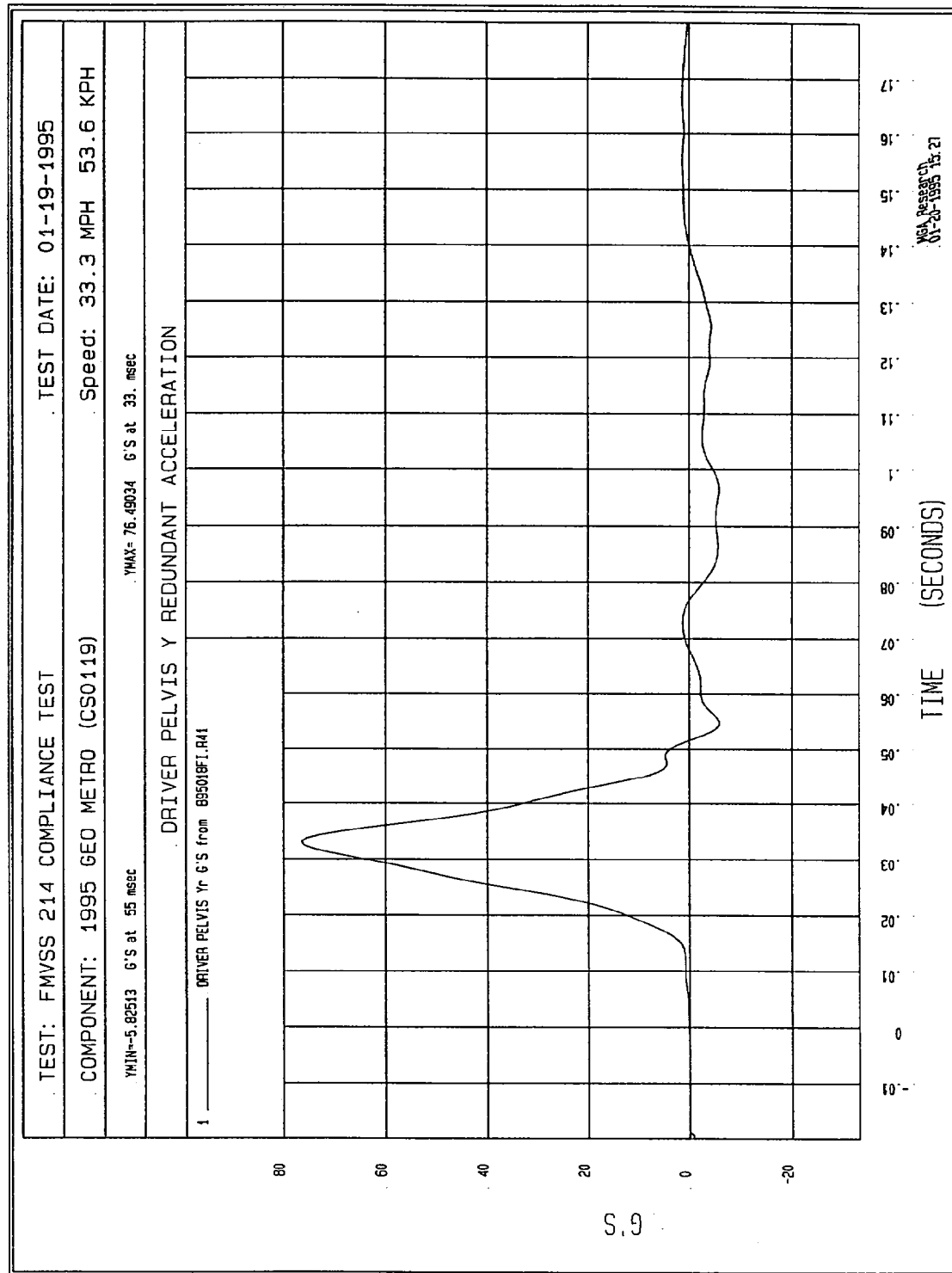


Figure B-90 - Driver Pelvis Y Redundant Acceleration vs. Time

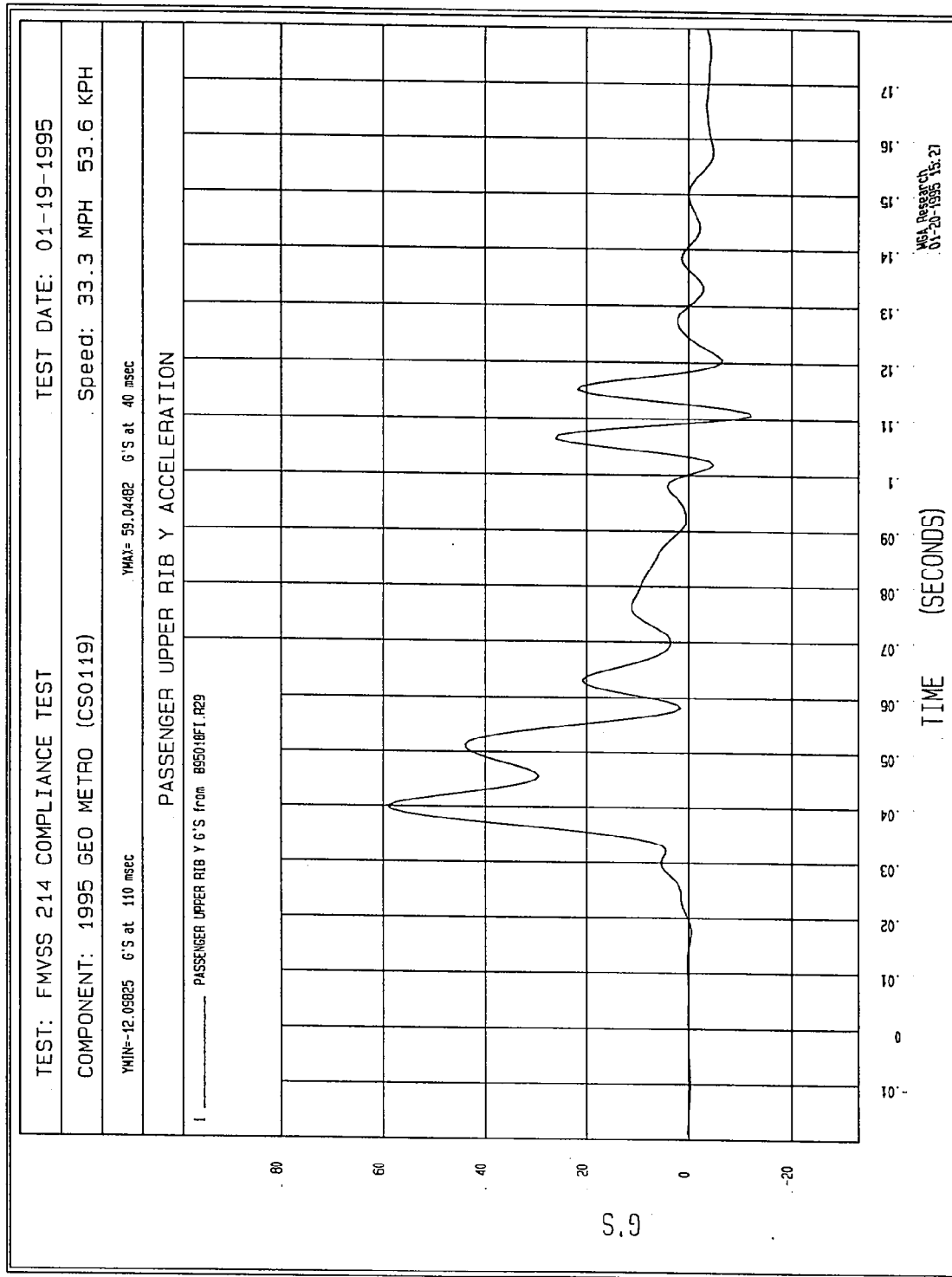


Figure B-91 - Passenger Upper Rib Y Acceleration vs. Time

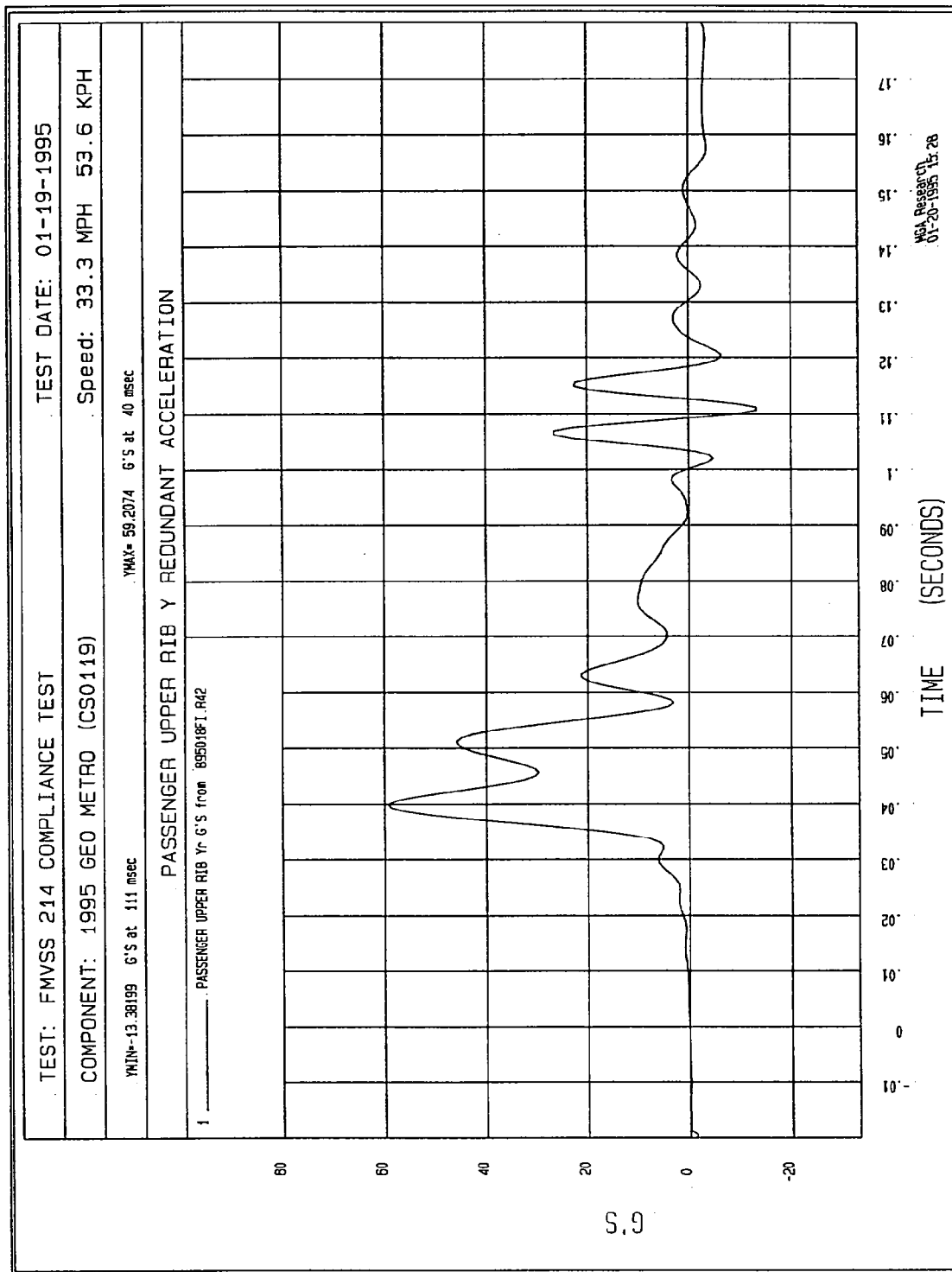


Figure B-92 - Passenger Upper Rib Y Redundant Acceleration vs. Time

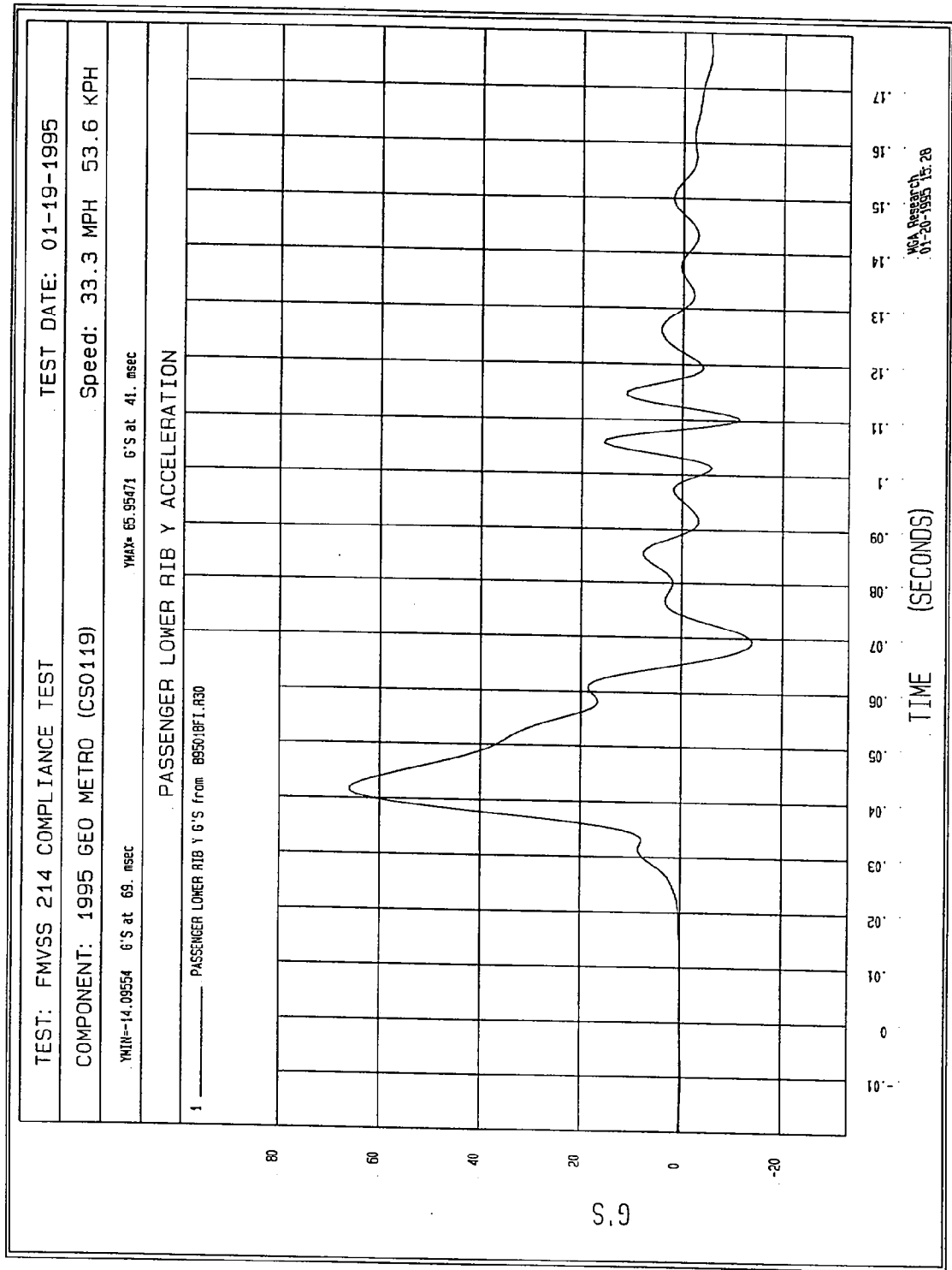


Figure B-93 - Passenger Lower Rib Y Acceleration vs. Time

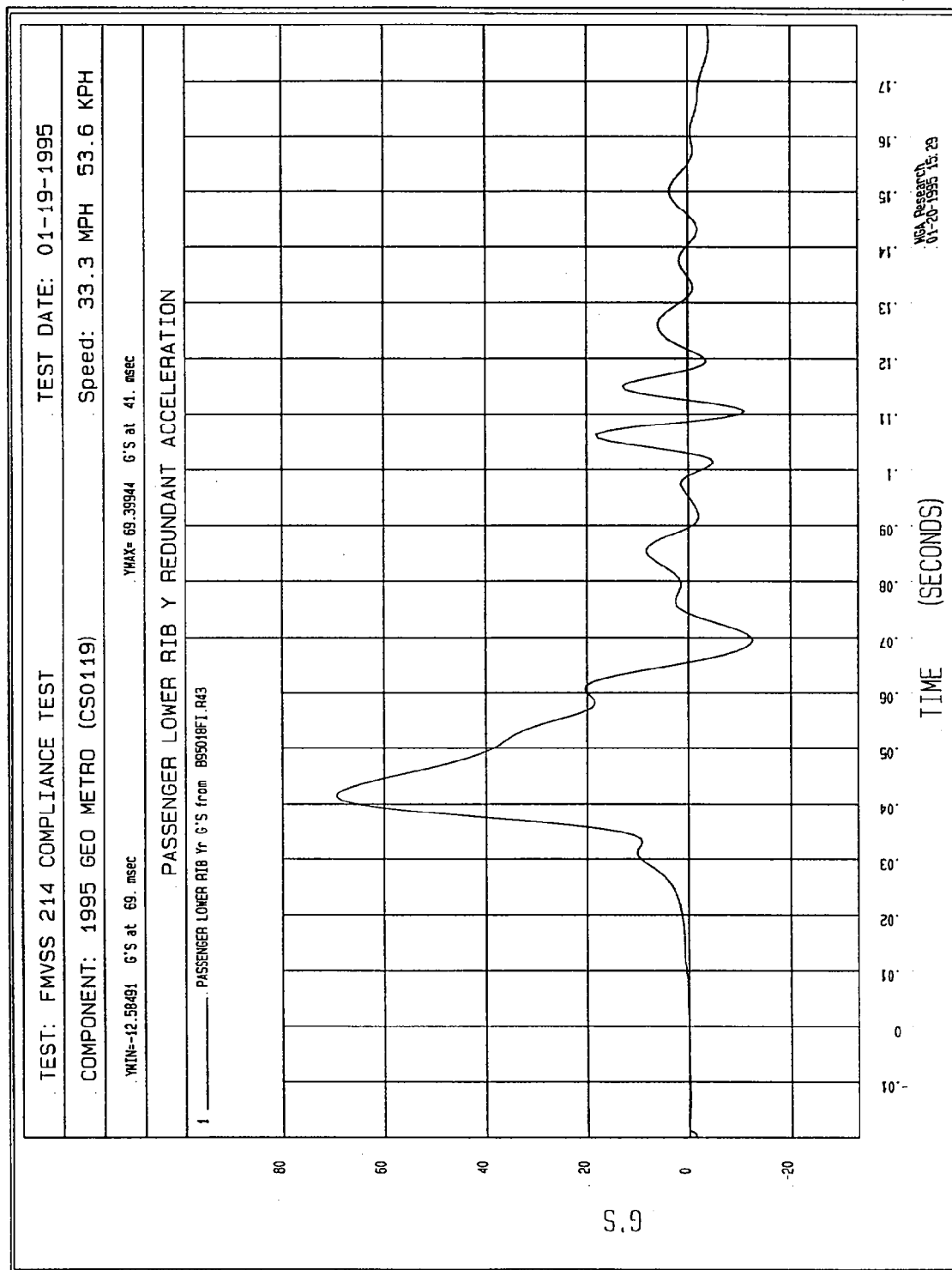


Figure B-94 - Passenger Lower Rib Y Redundant Acceleration vs. Time

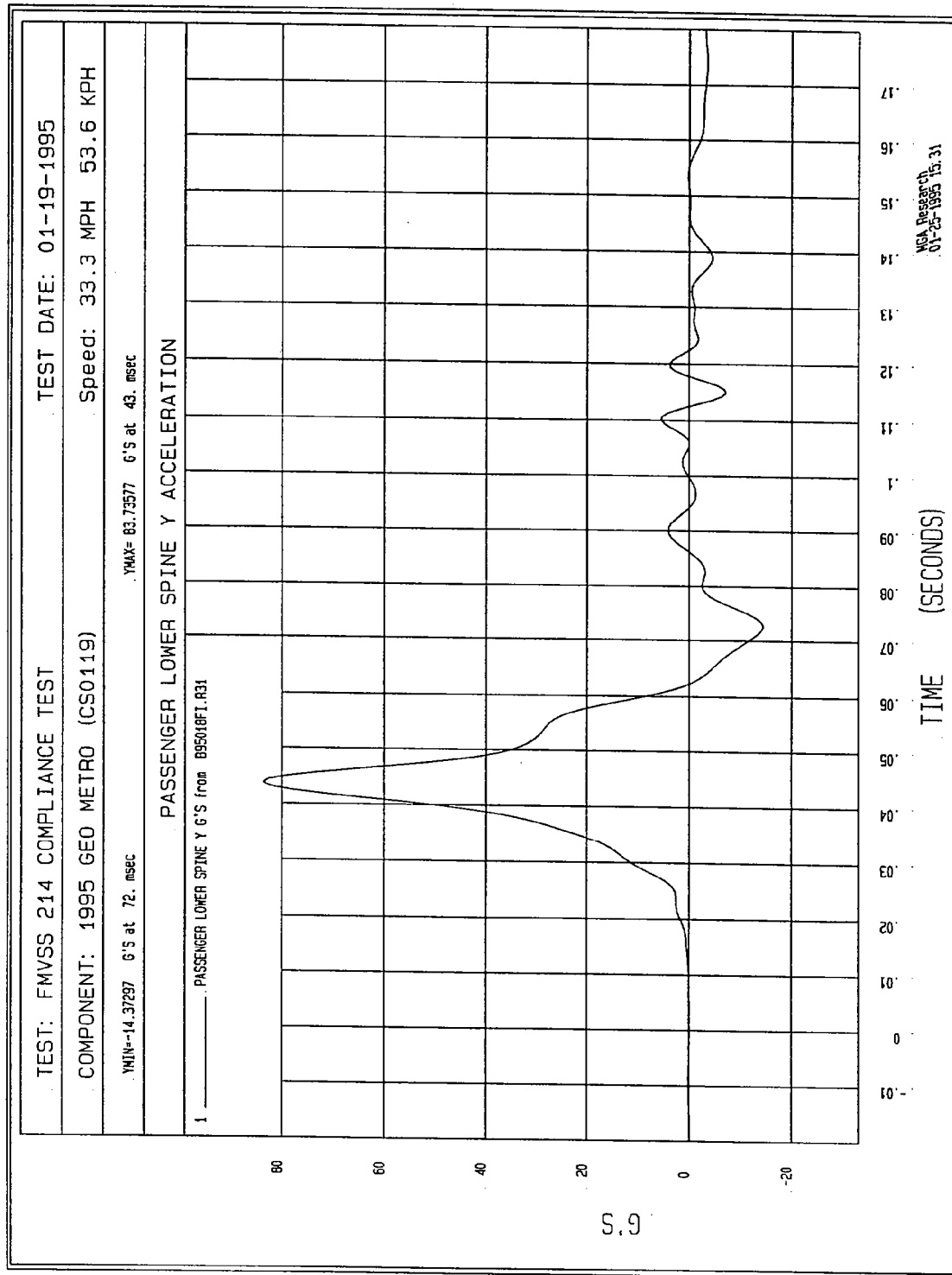


Figure B-95 - Passenger Lower Spine Y Acceleration vs. Time

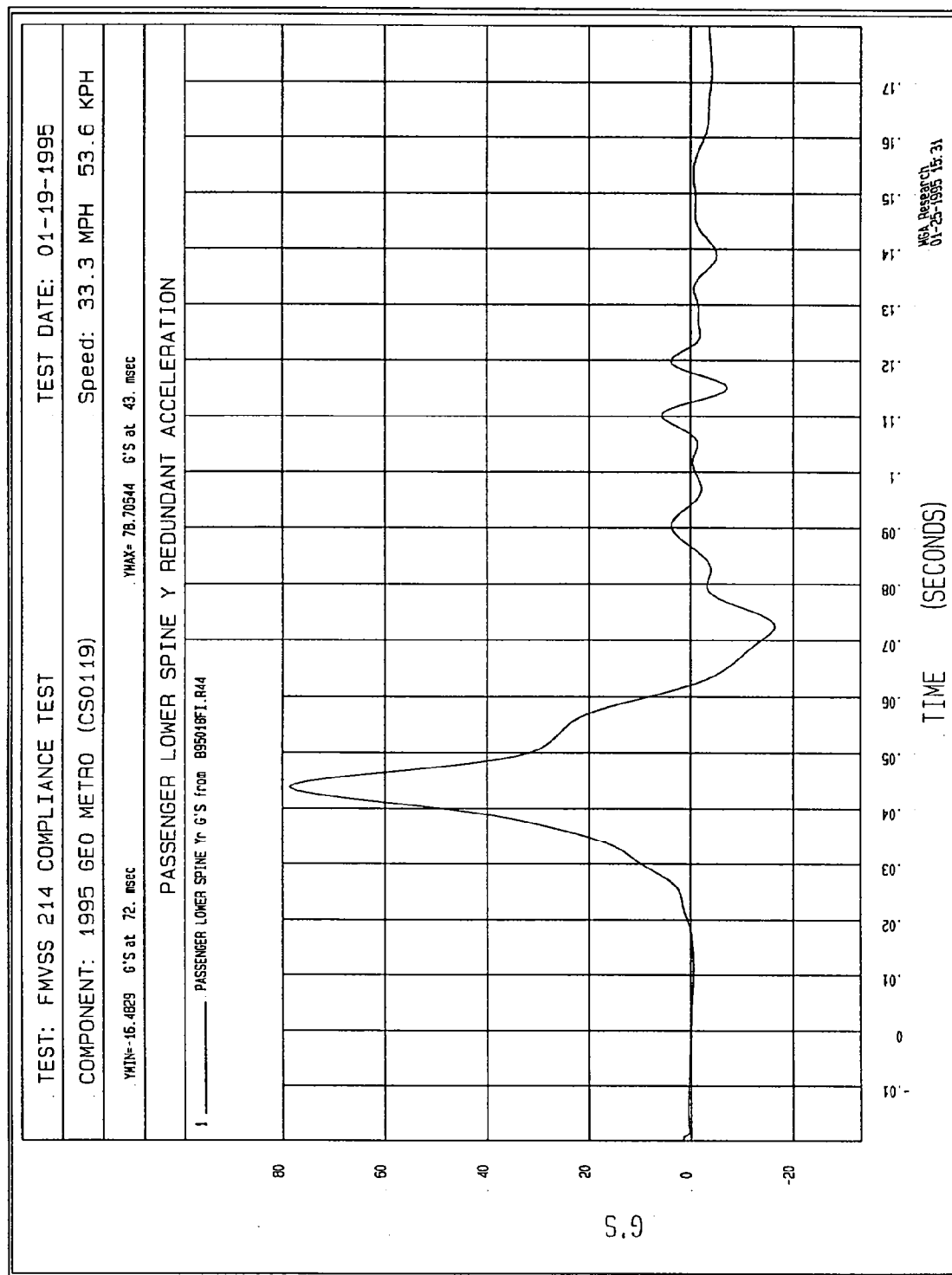


Figure B-96 • Passenger Lower Spine Y Redundant Acceleration vs. Time

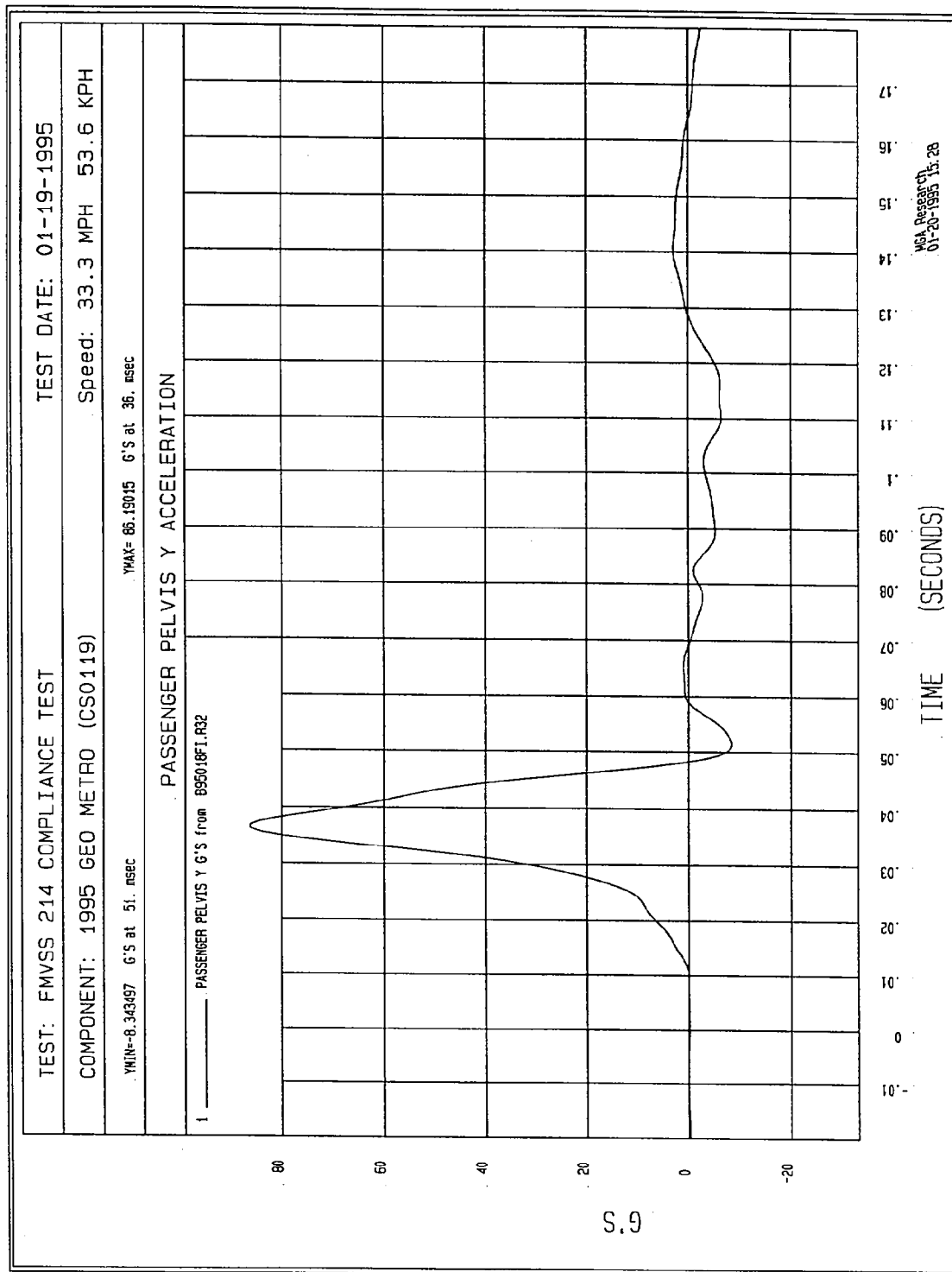


Figure B-97 - Passenger Pelvis Y Acceleration vs. Time

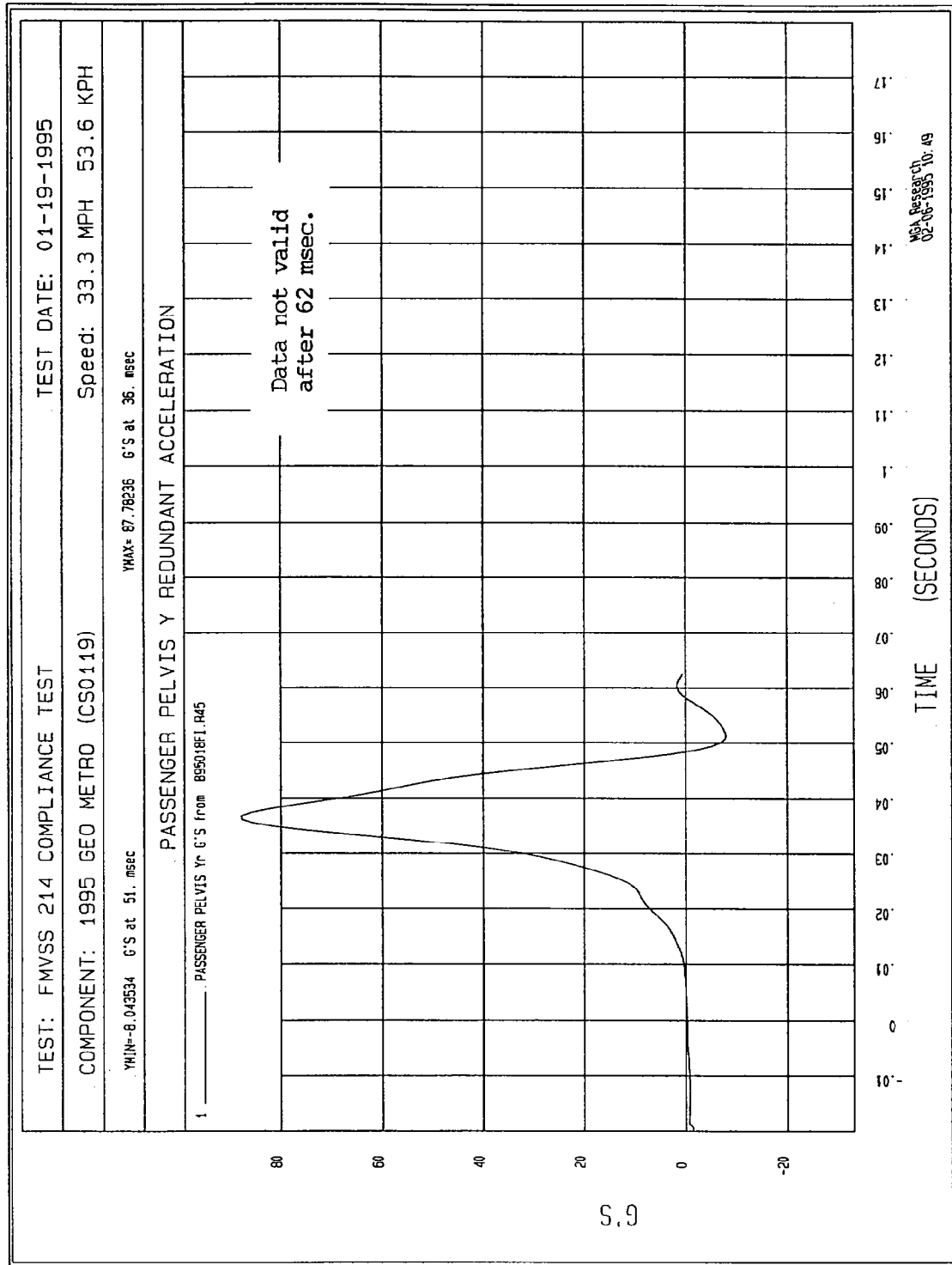


Figure B-98 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-95-DC014

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

GENERAL MOTORS CORPORATION
1995 GEO METRO 4 DOOR SEDAN
NHTSA NO. CS0119

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 19, 1995

Report Date: February 1, 1995

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 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

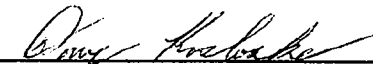
DATE OF VERIFICATION: December 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.0
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.4
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94522

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN

Tim Miller

APPROVED BY

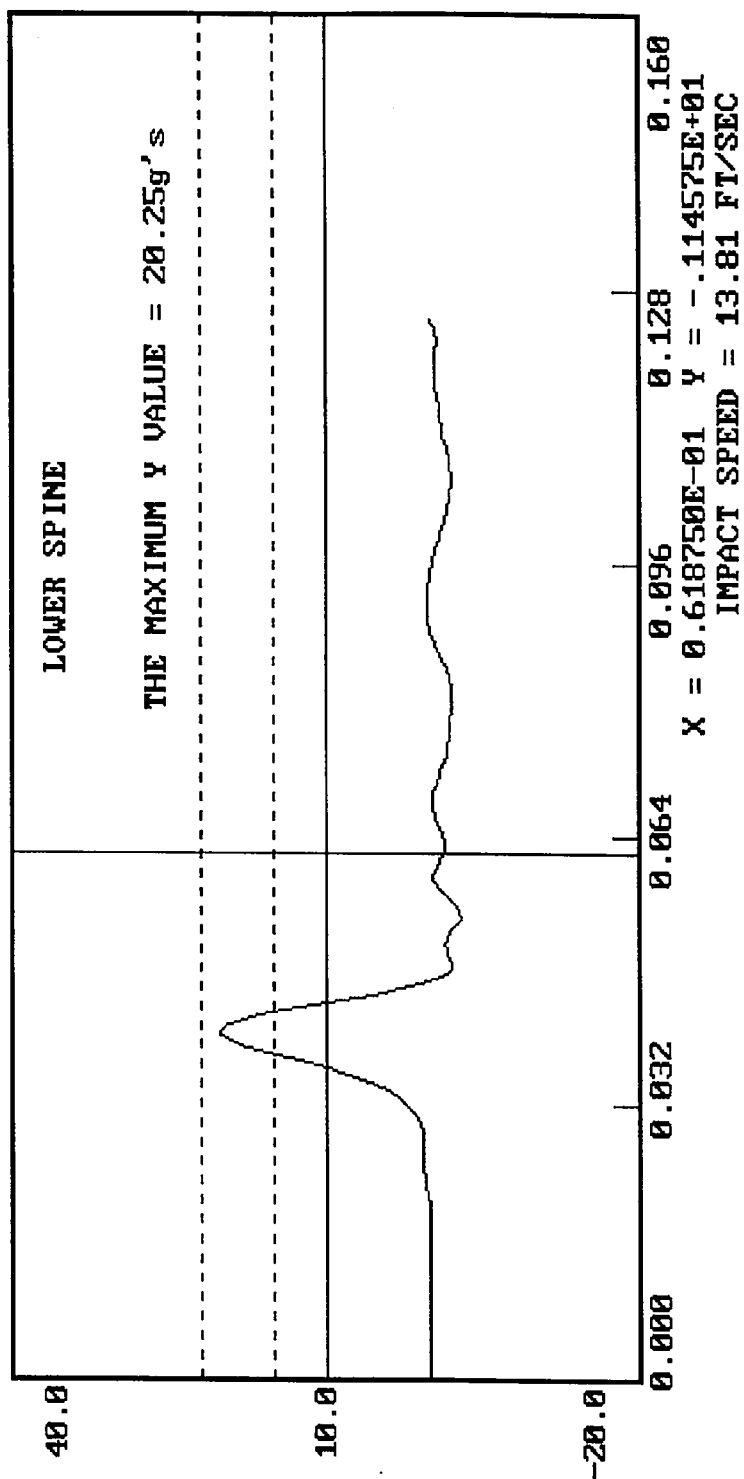
Steve Kischke

12-22-1994 08:18

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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

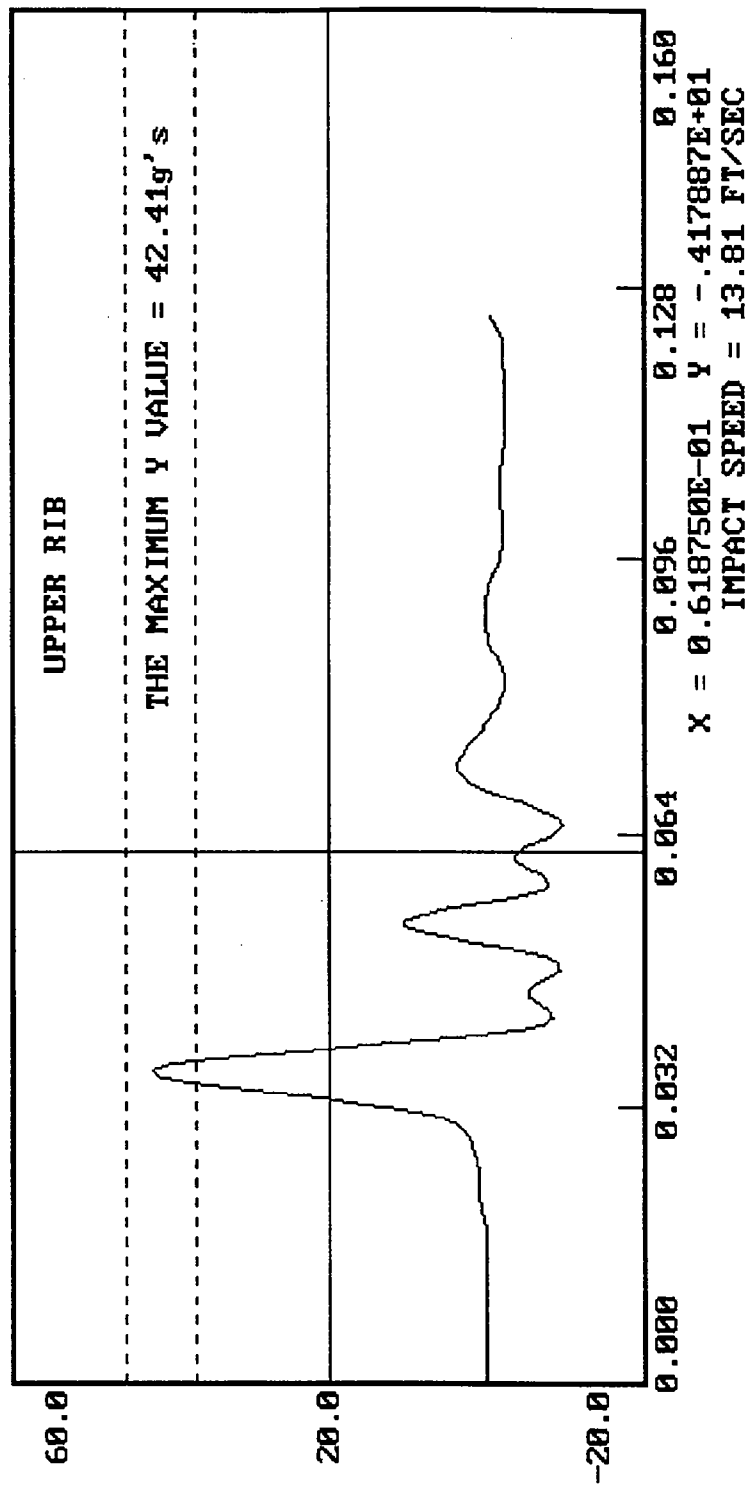


12-22-1994 08:18

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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

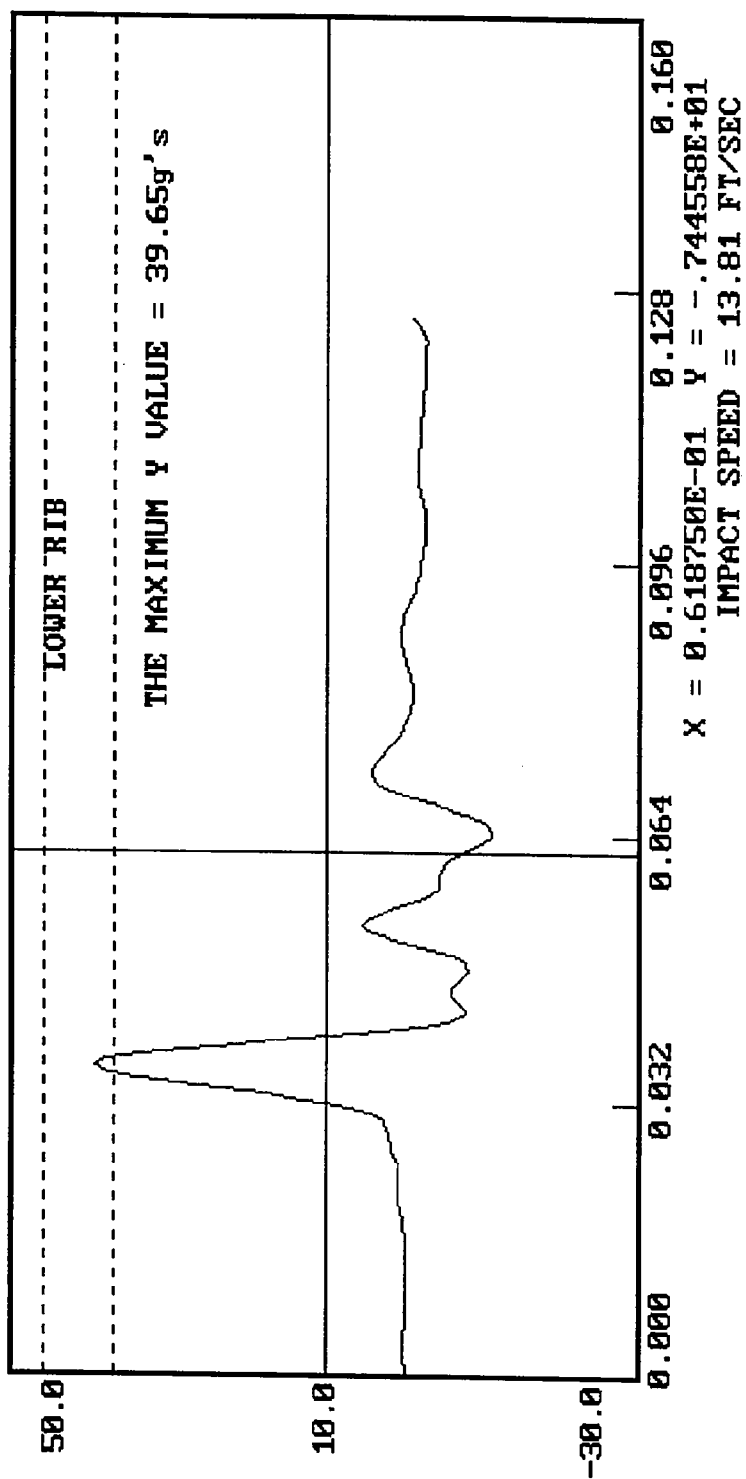


12-22-1994 08:18

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 270

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94523

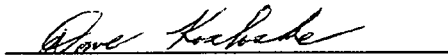
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	60

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

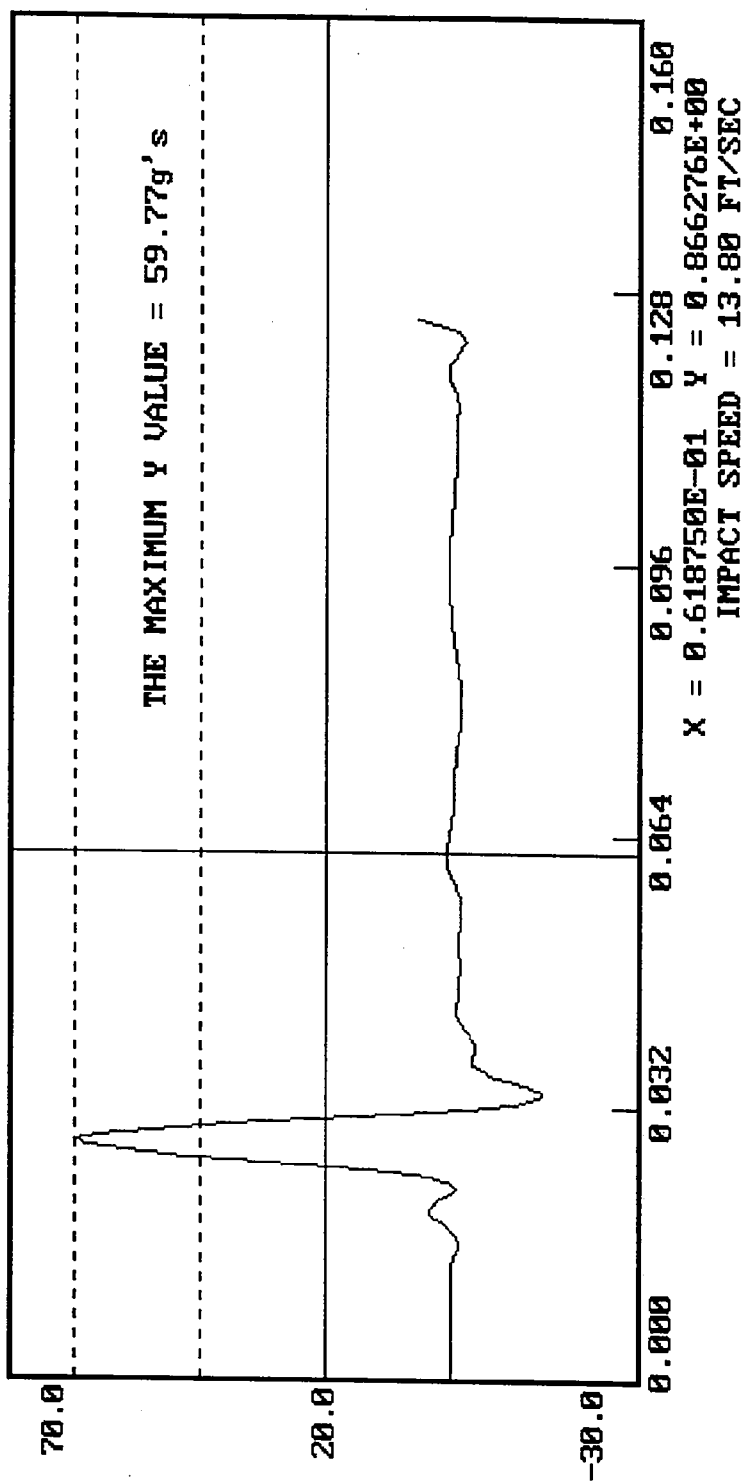


12-22-1994 13:43

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)

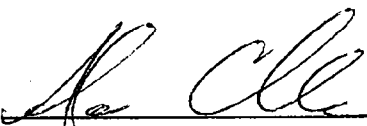
DATE: December 22, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94524

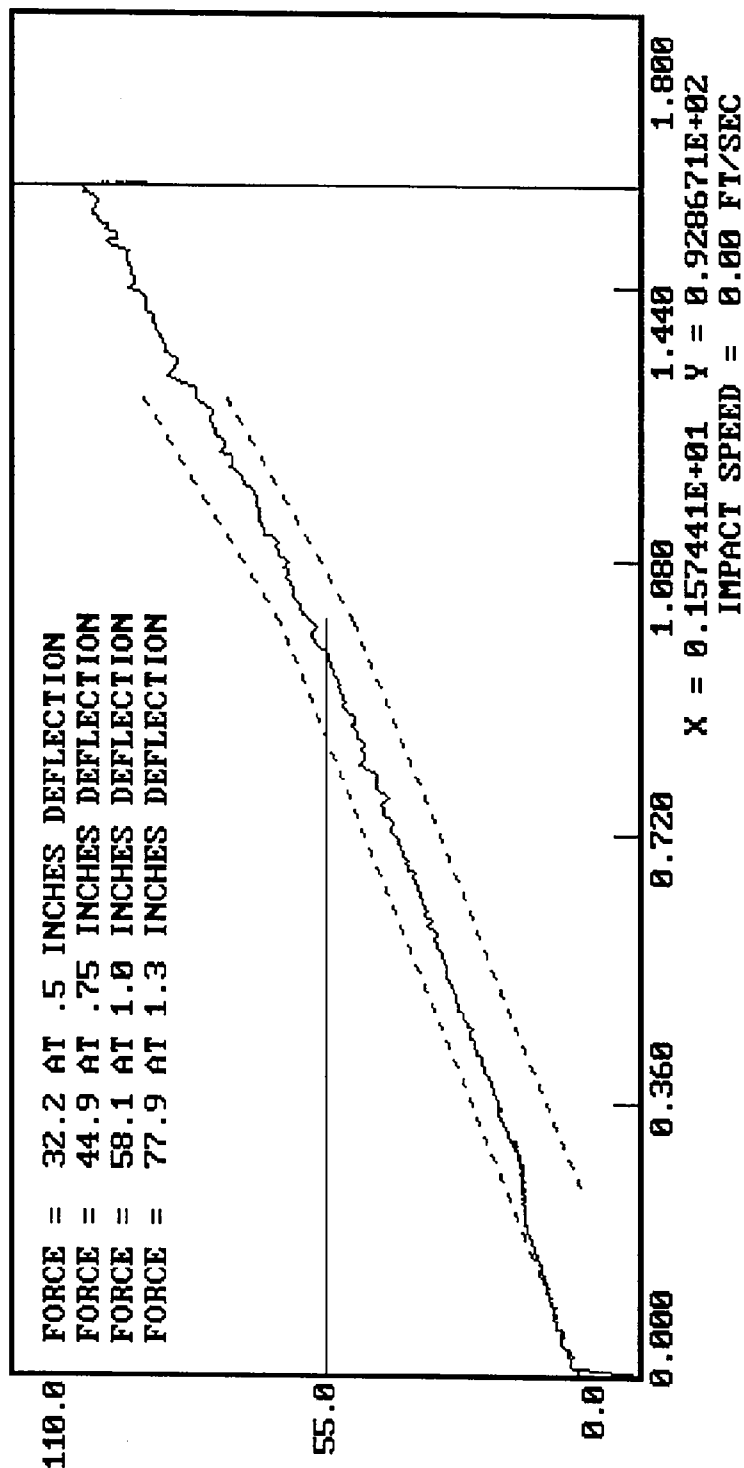
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.2
FORCE @ 0.75 in	36.7 - 49.8 lbs	44.9
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 270
 12-22-1994 16:22
 ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 270

TEST NUMBER: D94525

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	43
FORCE @ 40°	46 - 58 lbs	51
RETURN ANGLE	12° maximum	6°

TEST MEETS SPECIFICATIONS

TECHNICIAN

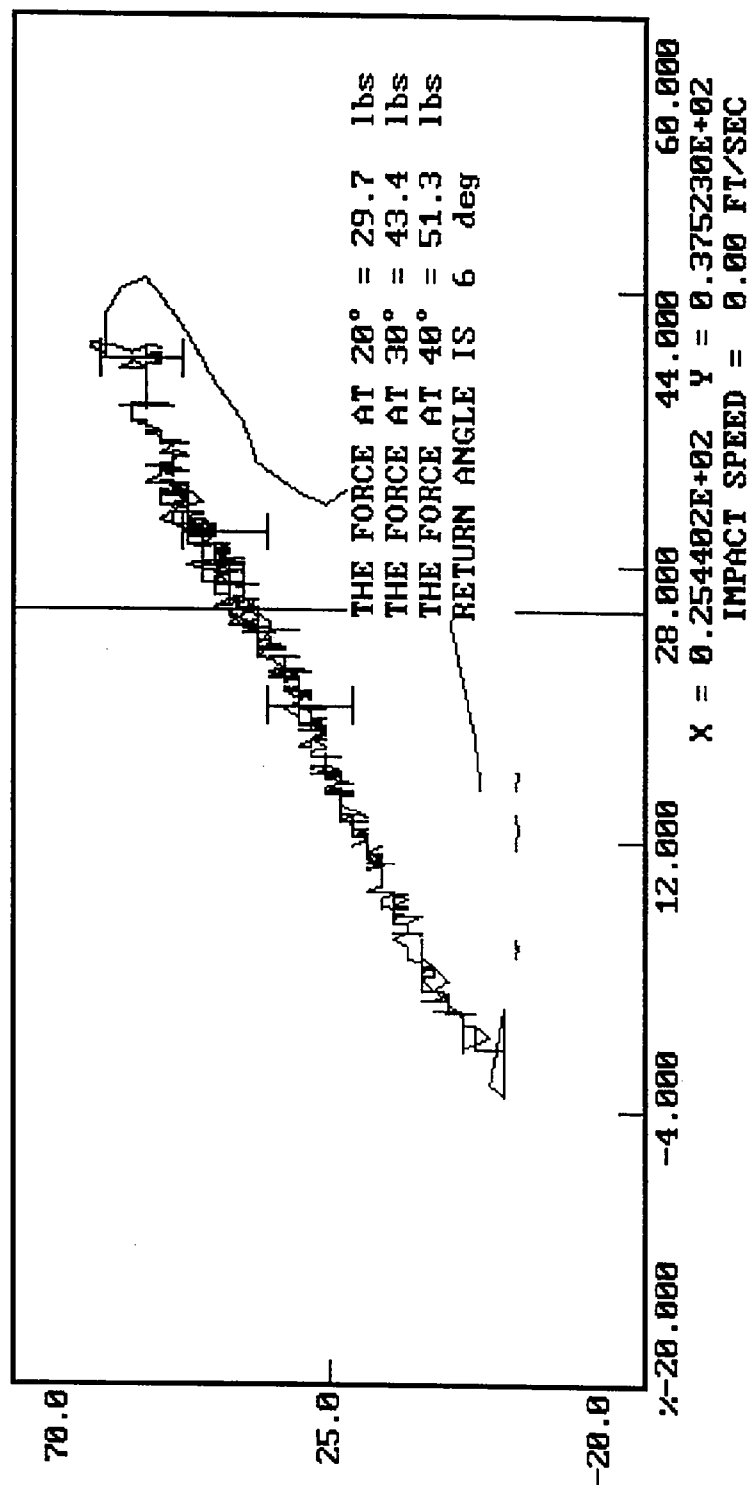
Jim Wilkins

APPROVED BY

Steve Kuebel

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

12-22-1994 17:01



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.

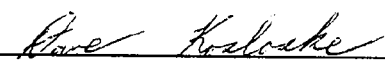
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: December 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94532

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	44
LOWER RIB	37 - 46 g's	38
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN

Tim McQuinn

APPROVED BY

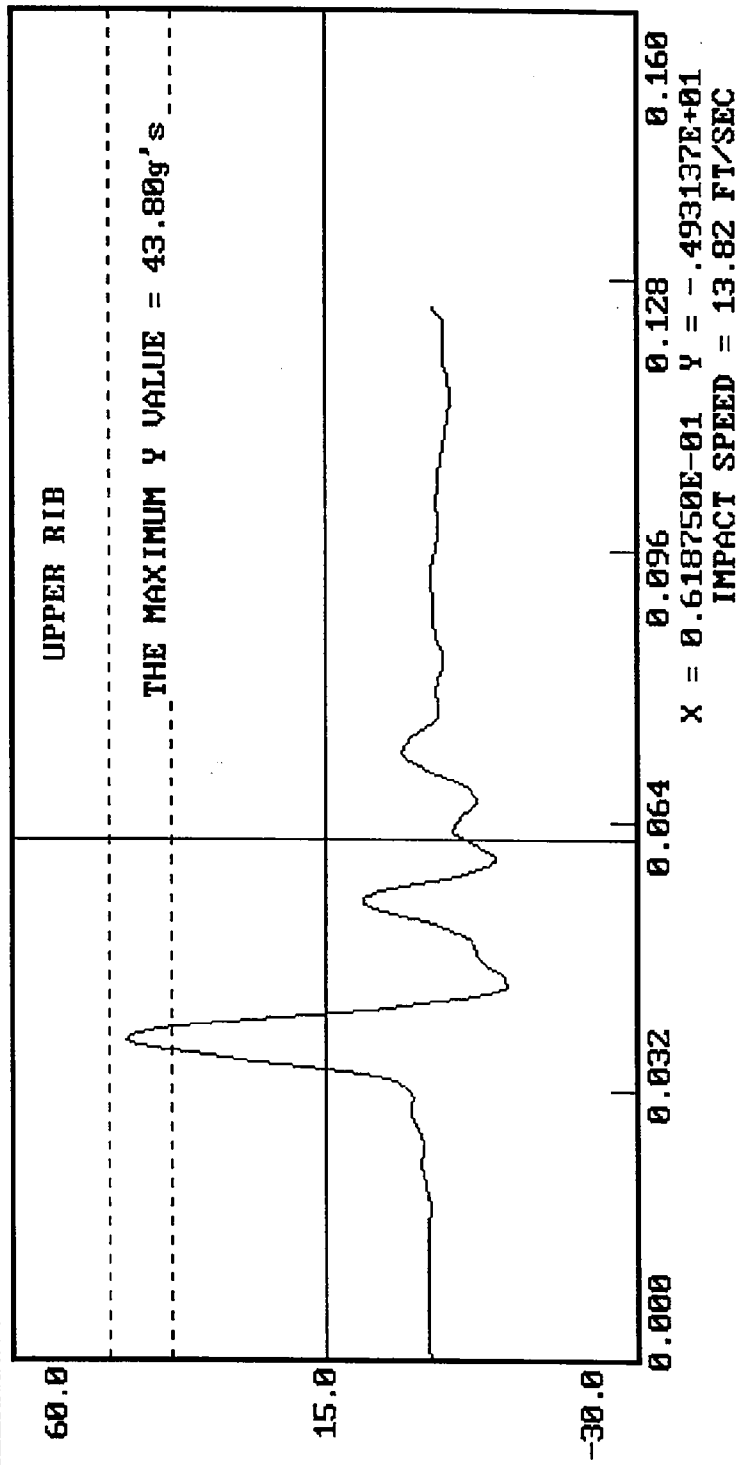
Steve Koshko

12-22-1994 10:37

DUMMY CALIBRATION - THORAX IMPACT

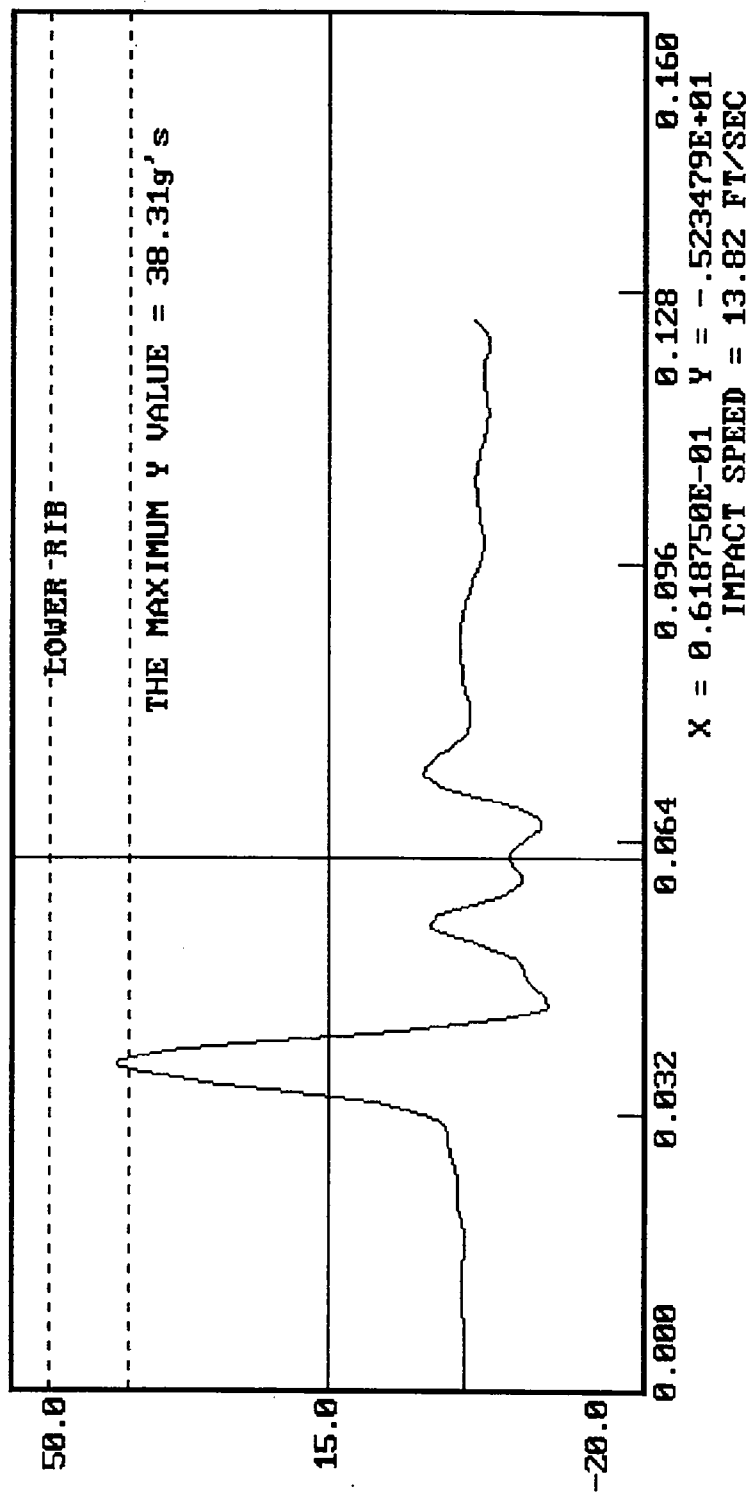
DUMMY # 271

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

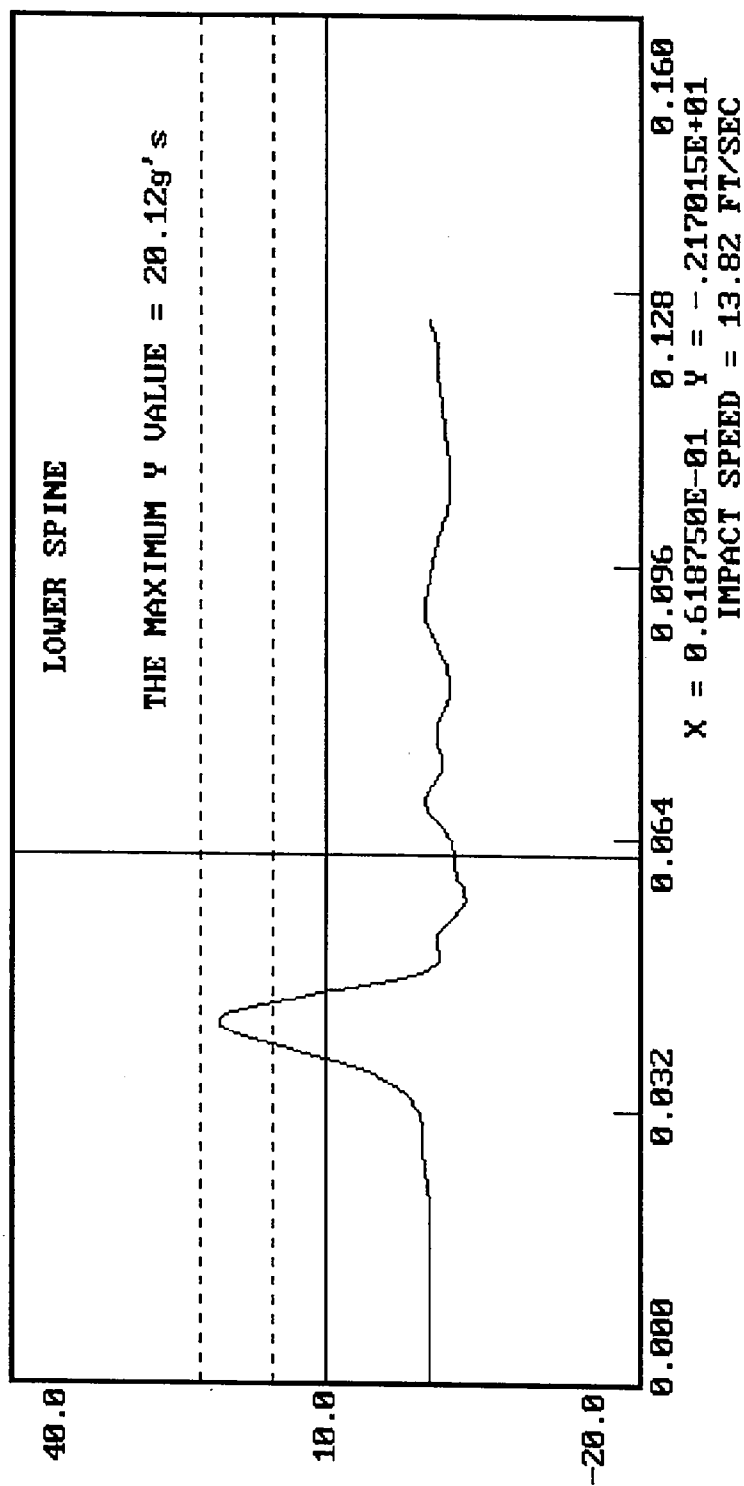


DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 271
12-22-1994 18:37

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



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 271
 12-22-1994 10:37
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 271

TEST NUMBER: D94533

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	59

TEST MEETS SPECIFICATIONS

TECHNICIAN

Ma Cle

APPROVED BY

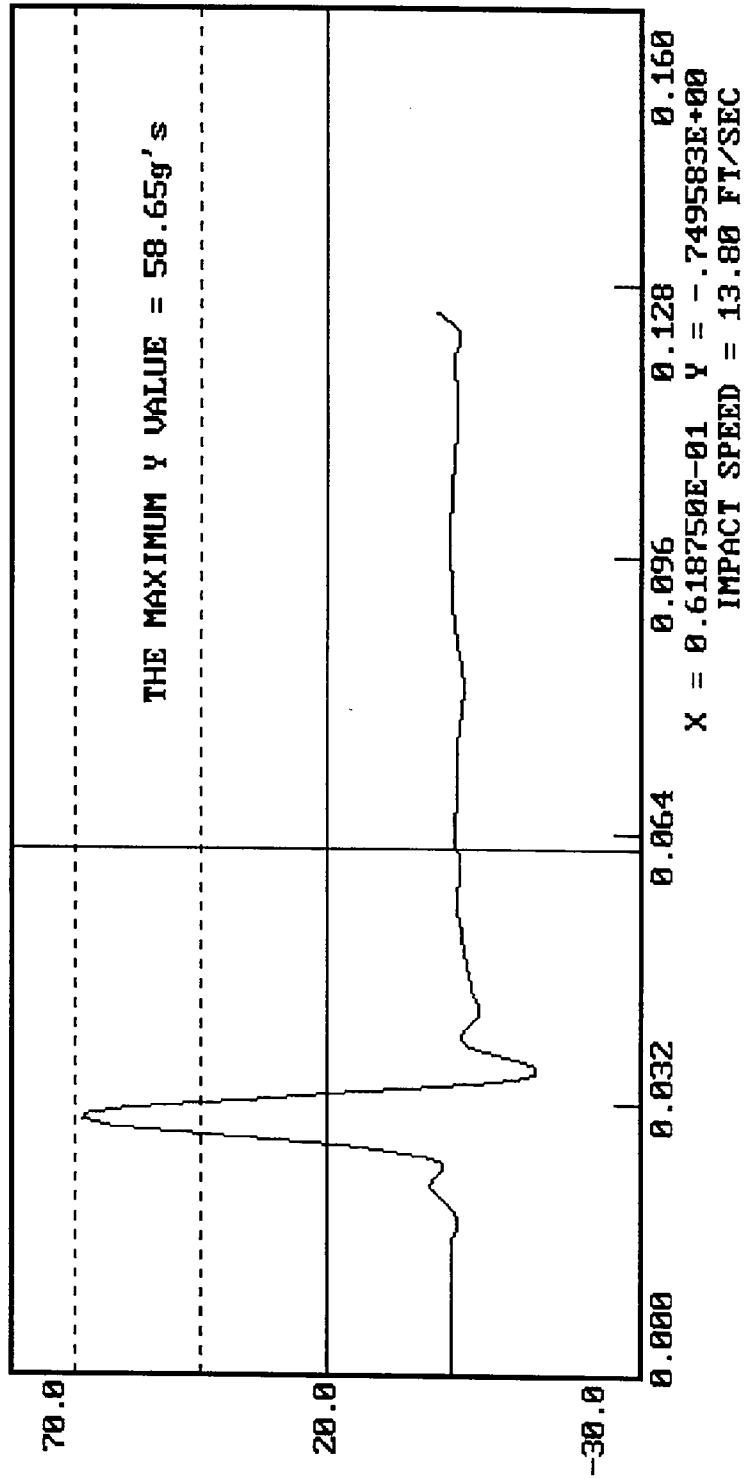
Dave Kurbake

12-22-1994 14:03

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: December 22, 1994

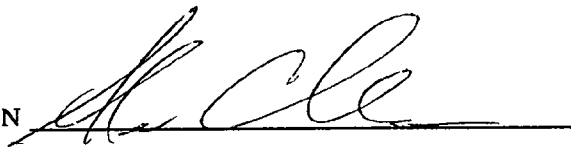
DUMMY NUMBER: 271

TEST NUMBER: D94534

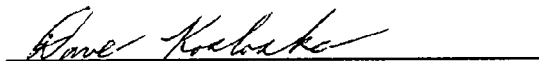
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0.5 in	23.3 - 36.5 lbs	28.7
FORCE @ 0.75 in	36.7 - 49.8 lbs	42.8
FORCE @ 1.0 in	50 - 63 lbs	56
FORCE @ 1.3 in	73 - 88 lbs	77

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

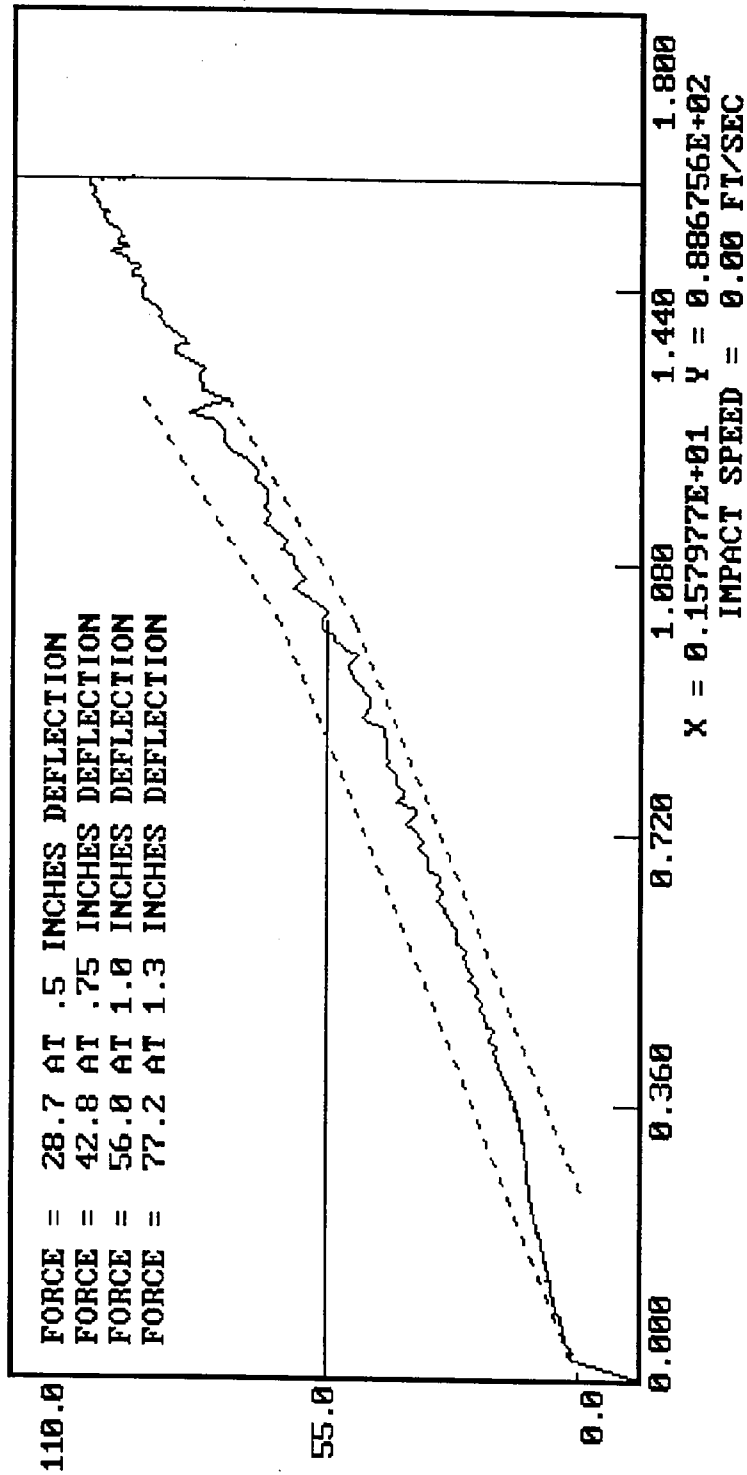


DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

12-22-1994 16:28

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

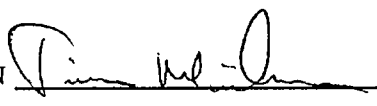
DATE: December 22, 1994

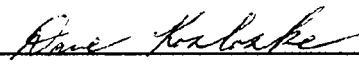
DUMMY NUMBER: 271

TEST NUMBER: D94535

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	40
FORCE @ 40°	46 - 58 lbs	58
RETURN ANGLE	12° maximum	3°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

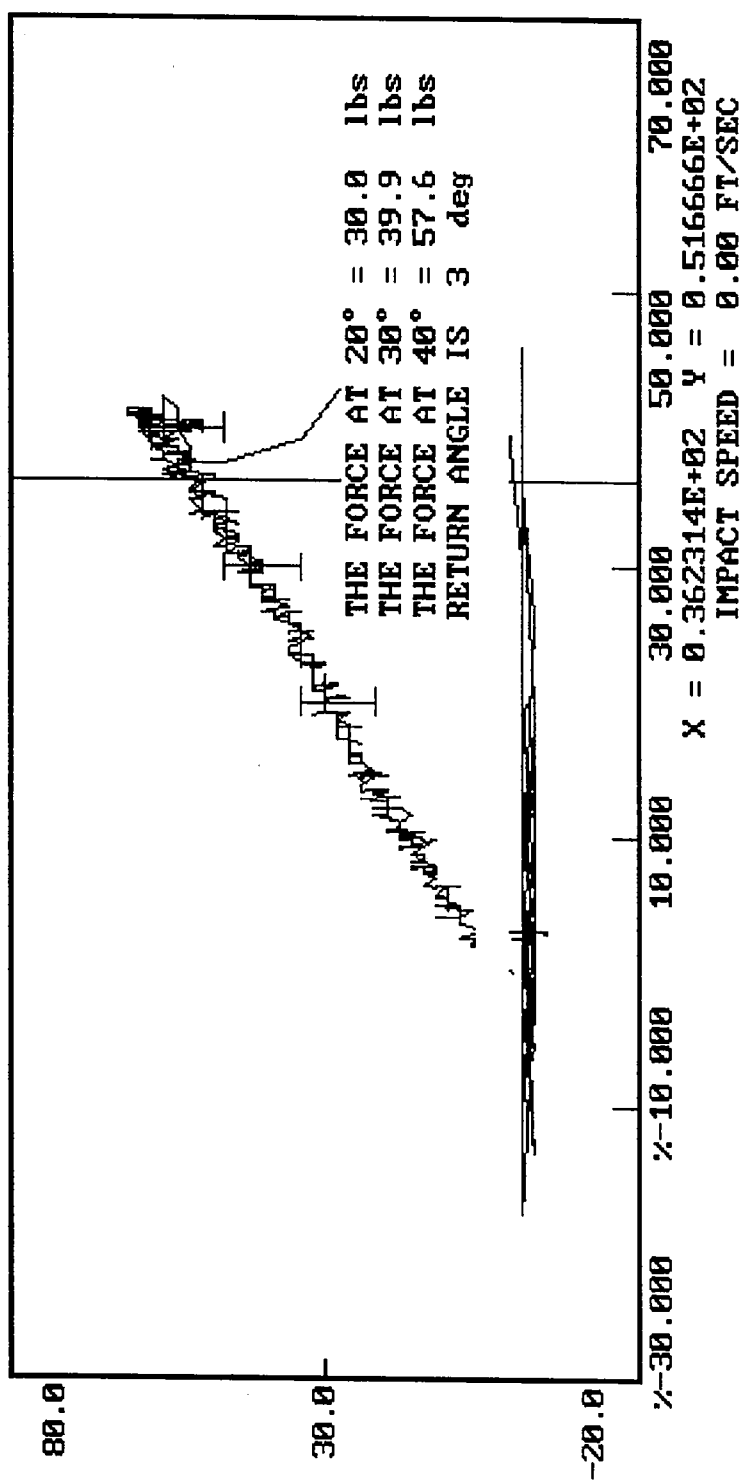
APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 271

FORCE () VS. TORSO ROTATION (DEGREES)

12-22-1994 16:52



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

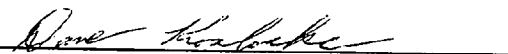
DATE OF VERIFICATION: January 23, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.0
RH - Rib Height	19.75" - 20.50"	20.30
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 23, 1995

DUMMY NUMBER: 270

TEST NUMBER: D95112

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	45
LOWER RIB	37 - 46 g's	43
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

TECHNICIAN

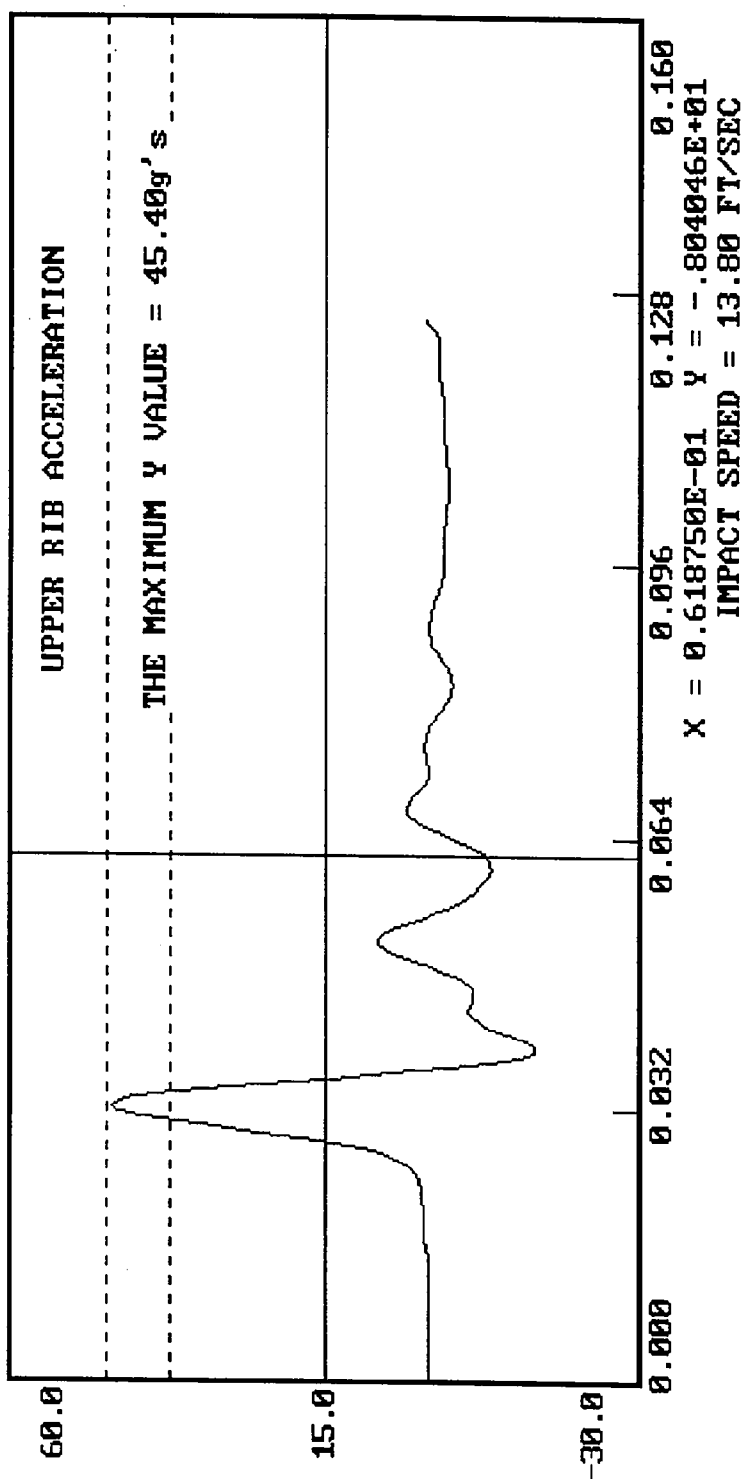


APPROVED BY

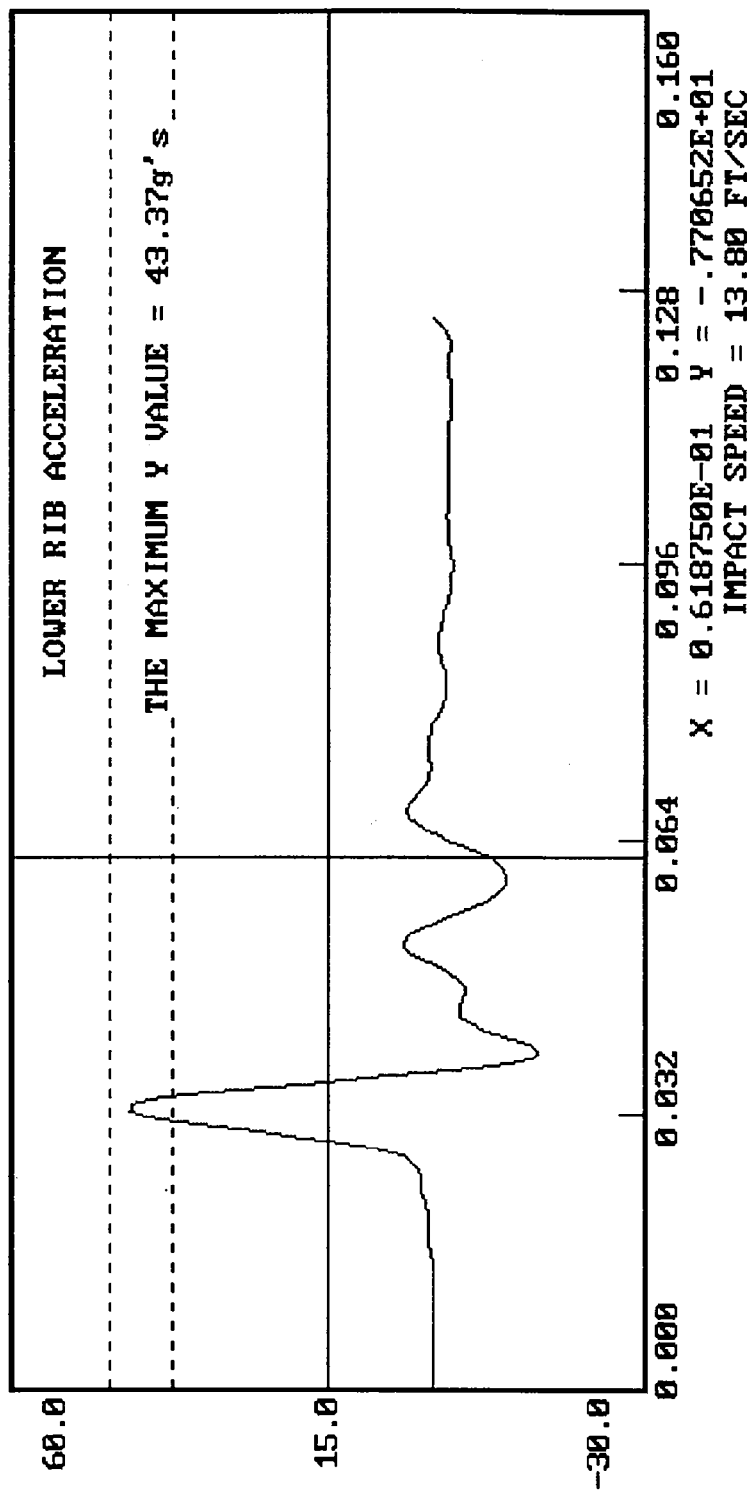


DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 270
 01-23-1995 09:55

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

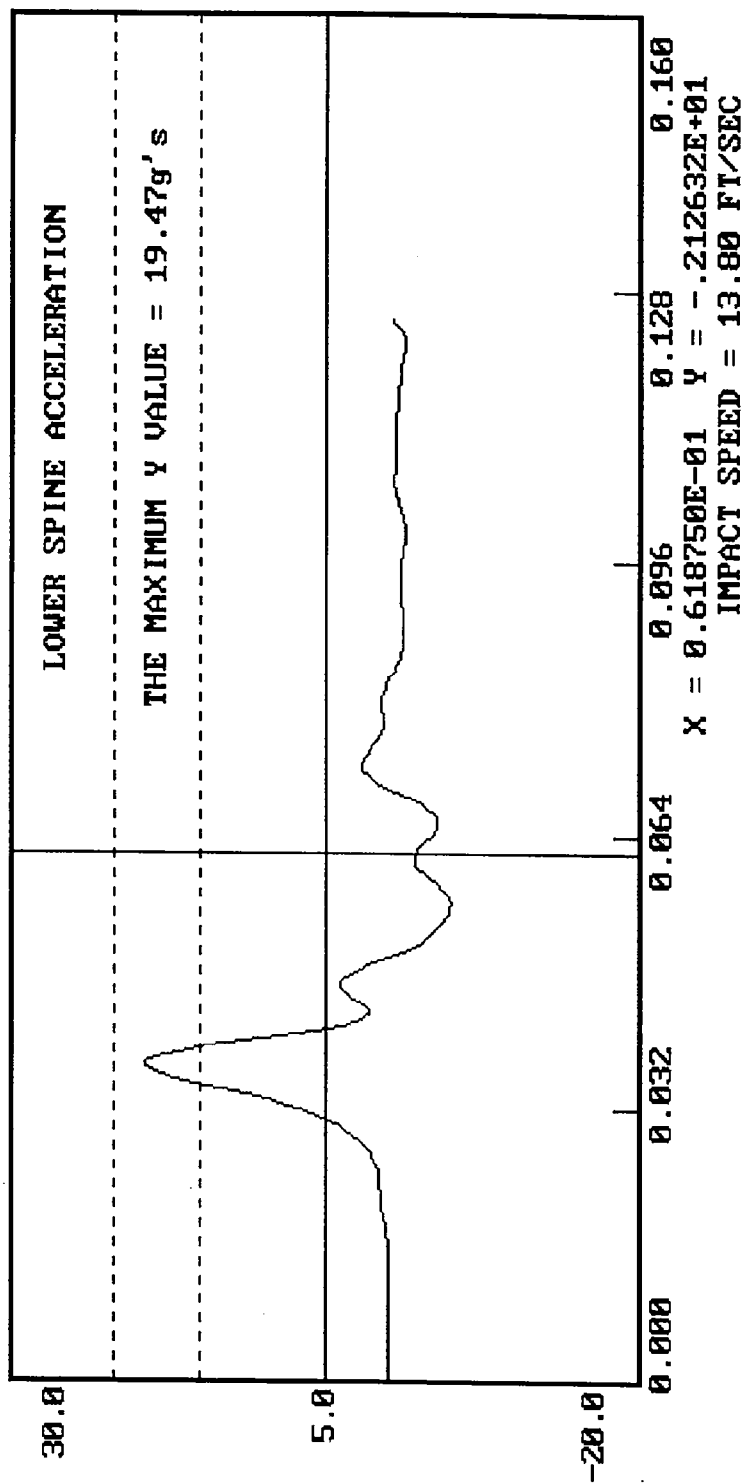


DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 270
 01-23-1995 09:55
 ACCELERATION (G'S) VS. TIME ((SECONDS))



01-23-1995 09:55

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 23, 1995

DUMMY NUMBER: 270

TEST NUMBER: D95113

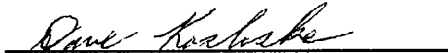
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	48

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

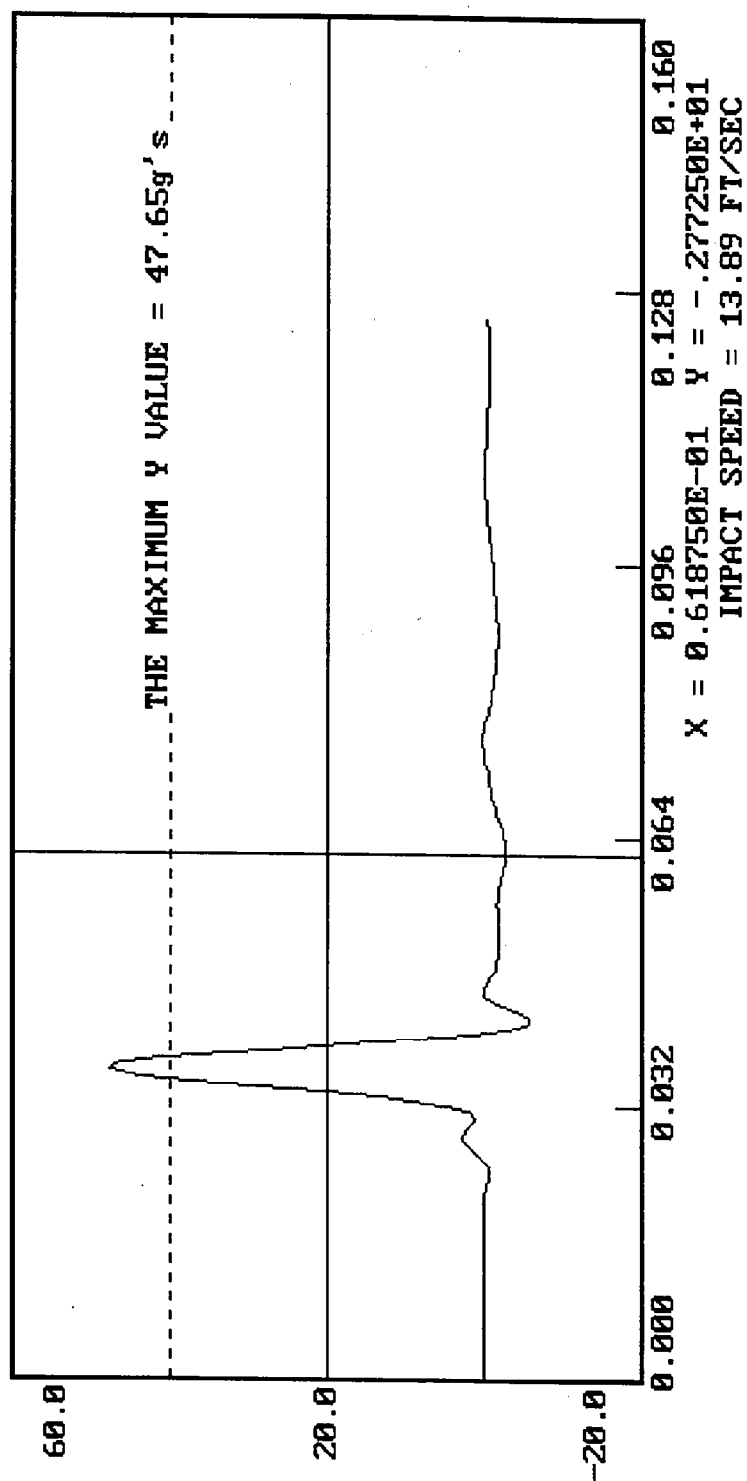


01-23-1995 08:58

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: January 20, 1995

DUMMY NUMBER: 270

TEST NUMBER: D95114

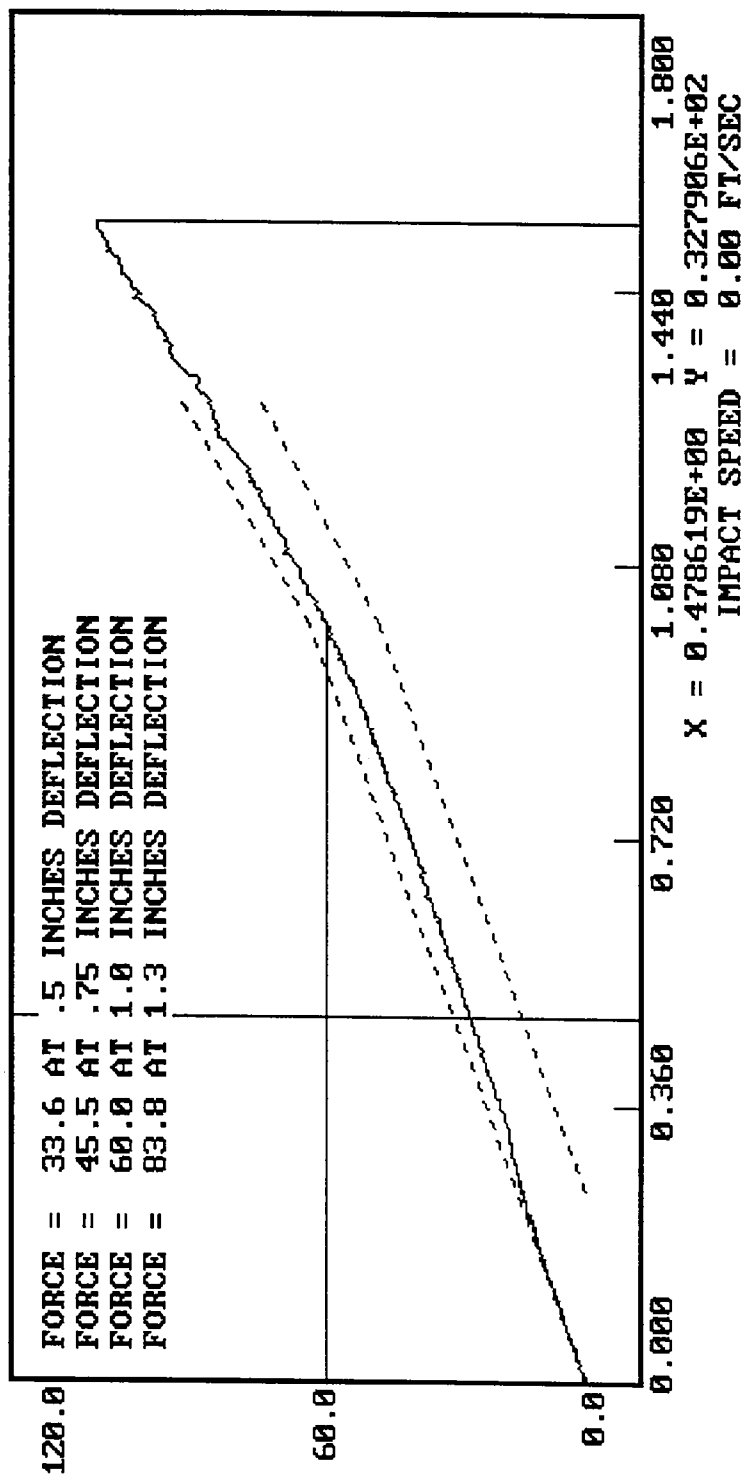
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
FORCE @ 0.5 in	23.3 - 36.5 lbs	33.6
FORCE @ 0.75 in	36.7 - 49.8 lbs	45.5
FORCE @ 1.0 in	50 - 63 lbs	60
FORCE @ 1.3 in	73 - 88 lbs	84

TEST MEETS SPECIFICATIONS

TECHNICIAN *Re Cle*

APPROVED BY *Don Kibuka*

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 270
 01-20-1995 16:33
 ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

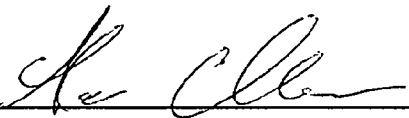
DATE: January 20, 1995

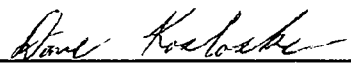
DUMMY NUMBER: 270

TEST NUMBER: D95115

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	26
FORCE @ 30°	34 - 46 lbs	40
FORCE @ 40°	46 - 58 lbs	52
RETURN ANGLE	12° maximum	10°

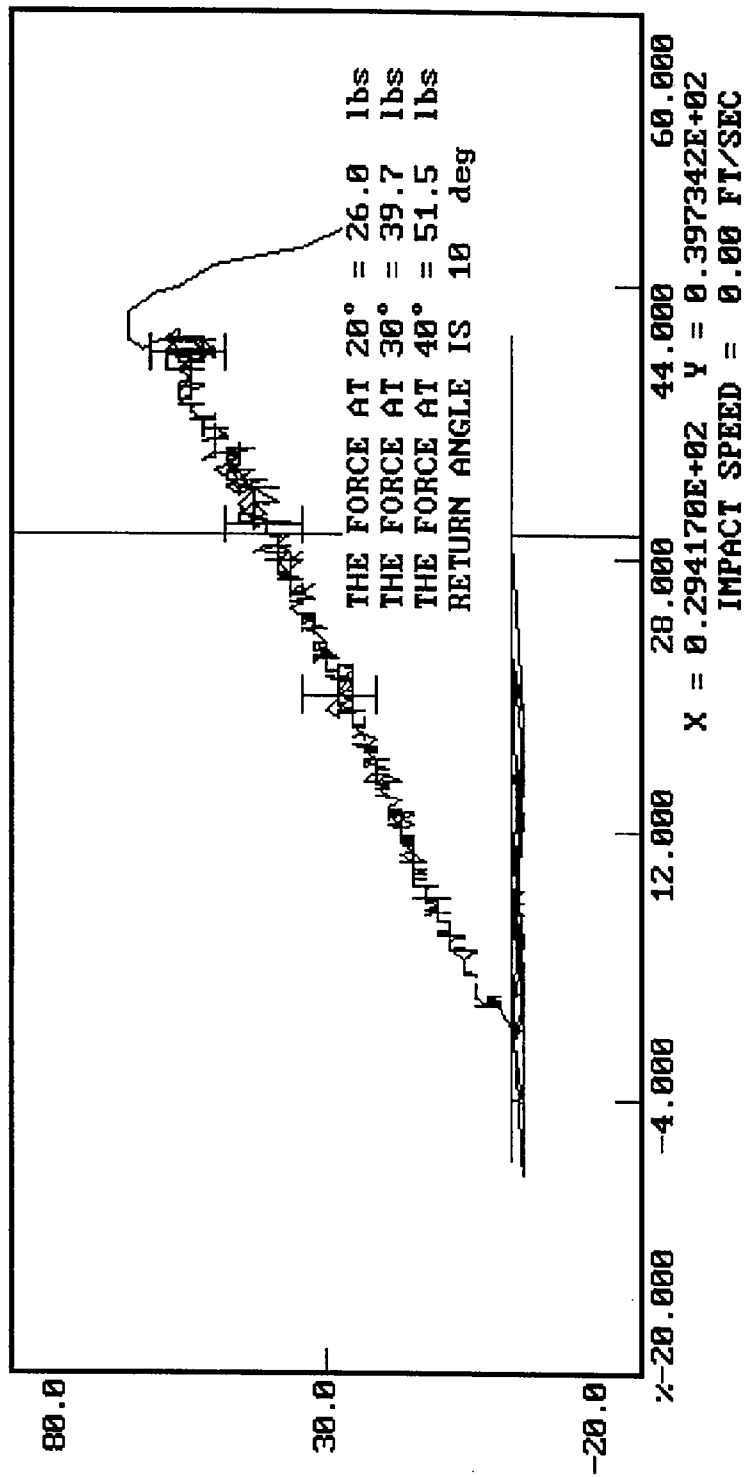
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

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

01-20-1995 14:39



POST-TEST CERTIFICATION DATA

Passenger 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.

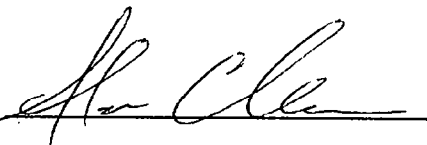
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

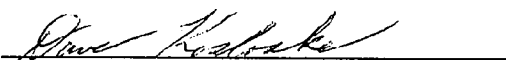
DATE OF VERIFICATION: January 23, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.1
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 23, 1995

DUMMY NUMBER: 271

TEST NUMBER: D95122

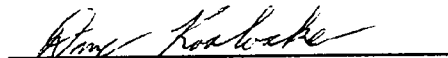
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

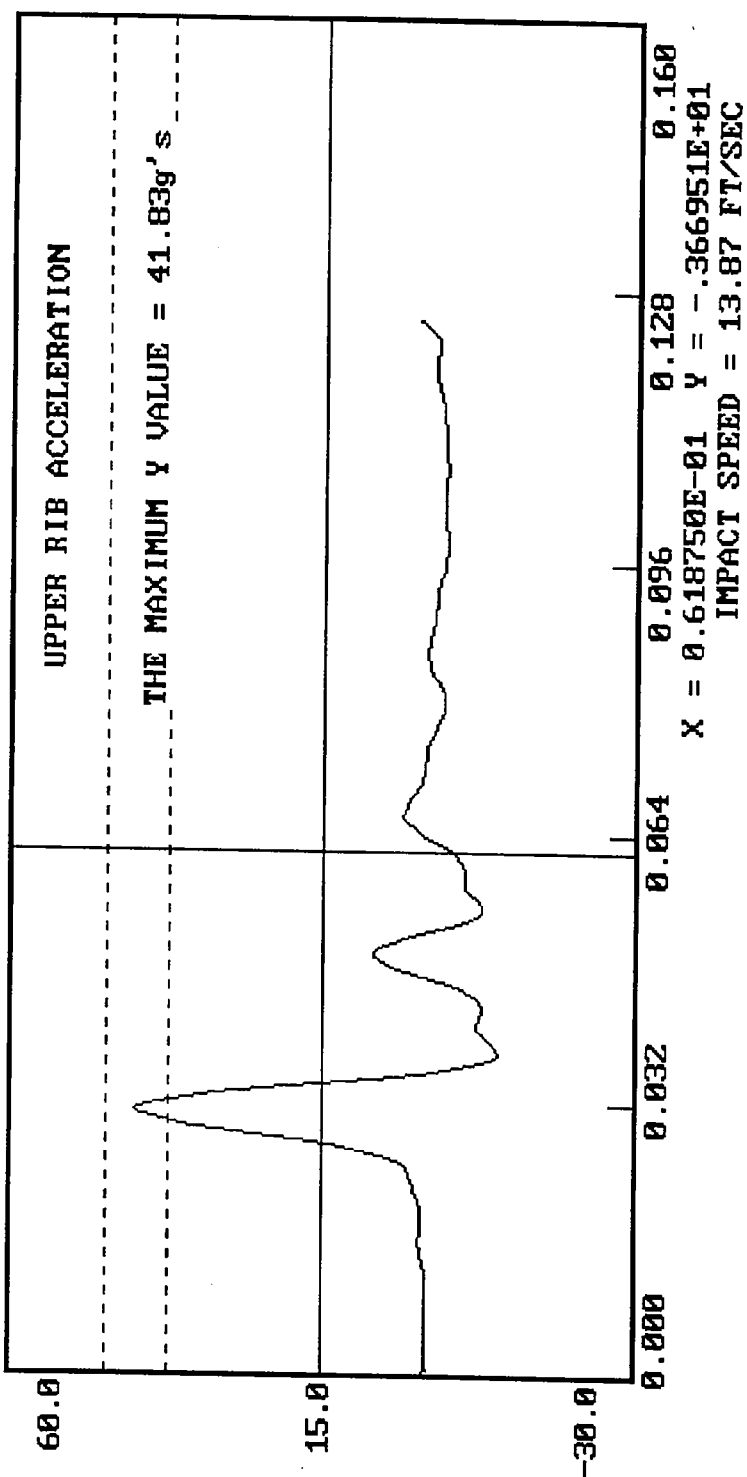
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 271
 01-23-1995 09:30
 ACCELERATION (G'S) VS. TIME ((SECONDS))

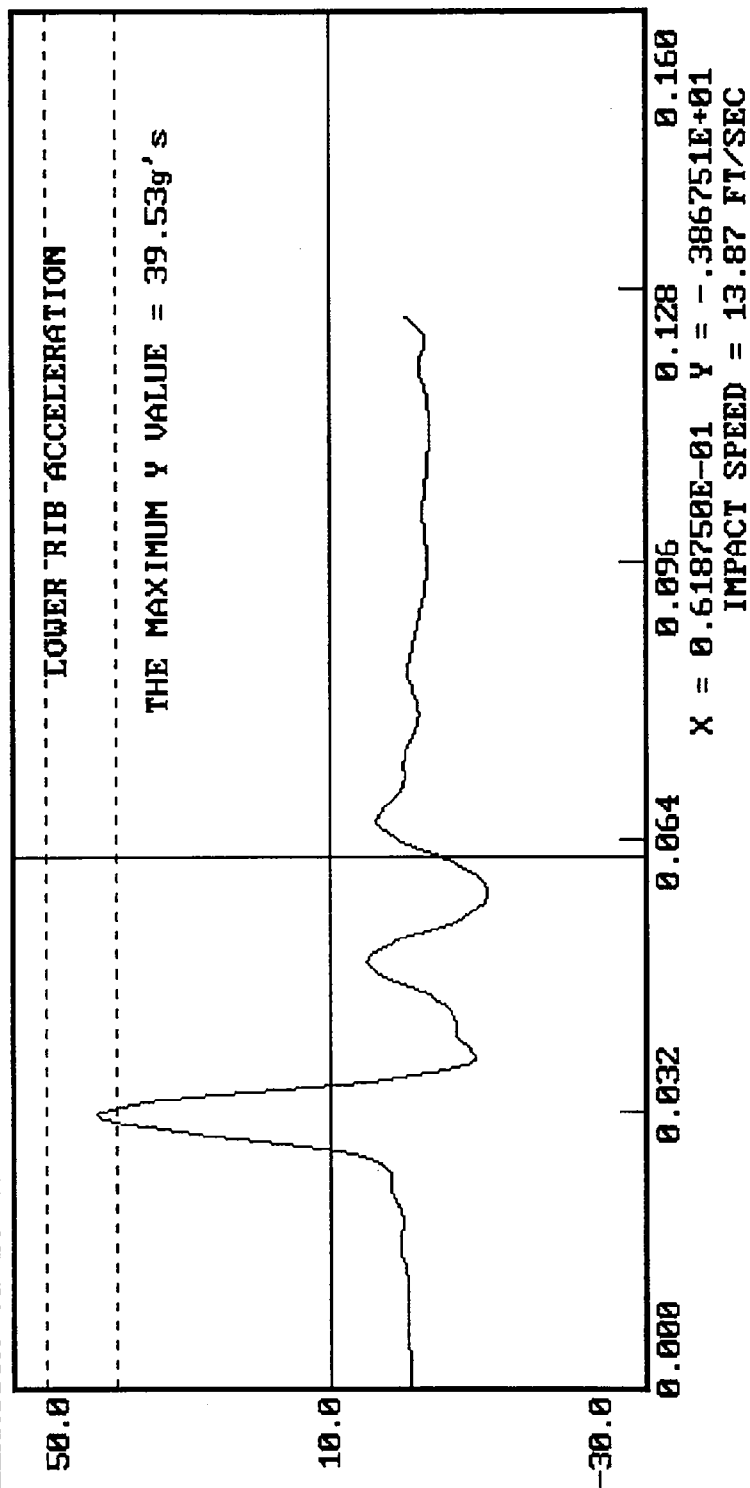


01-23-1995 09:30

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

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

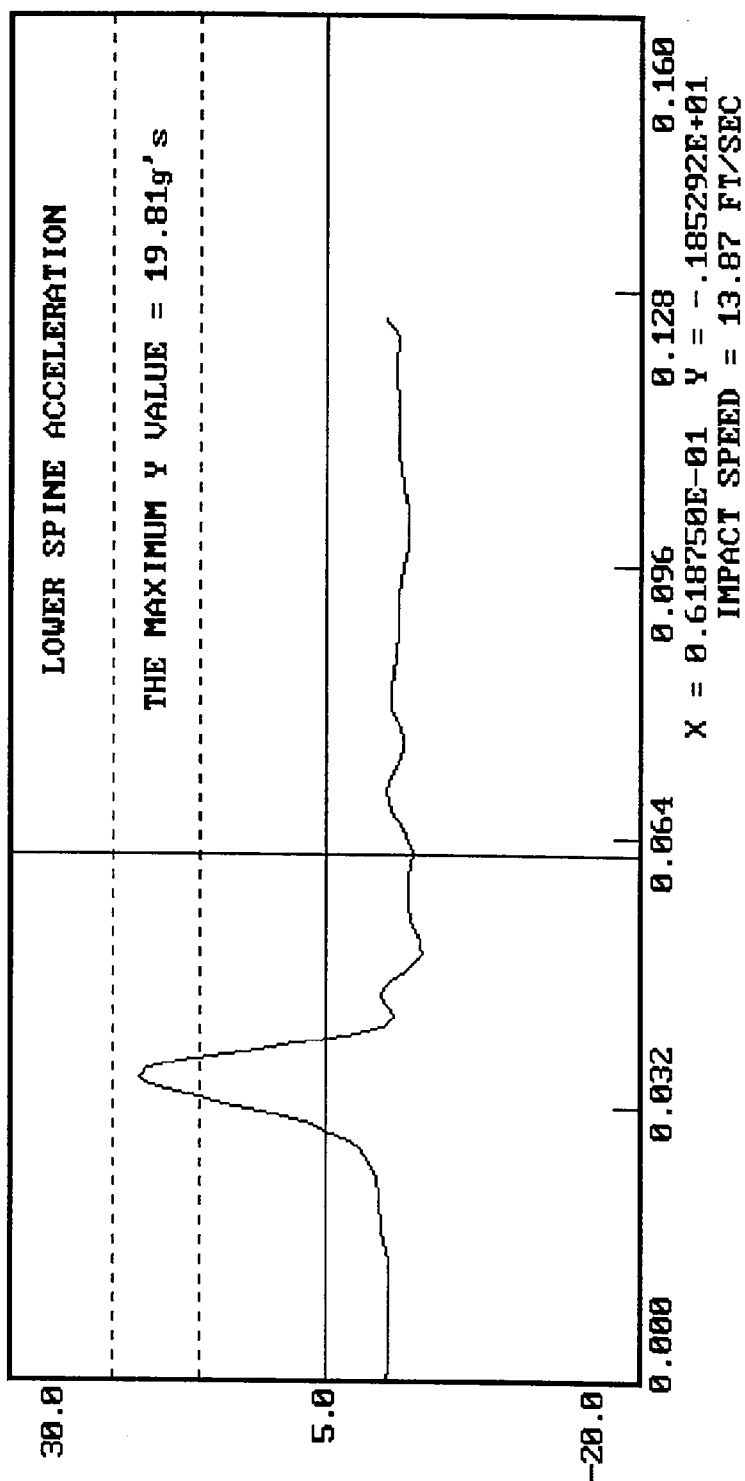


01-23-1995 09:30

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 23, 1995

DUMMY NUMBER: 271

TEST NUMBER: D95123

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	49

TEST MEETS SPECIFICATIONS

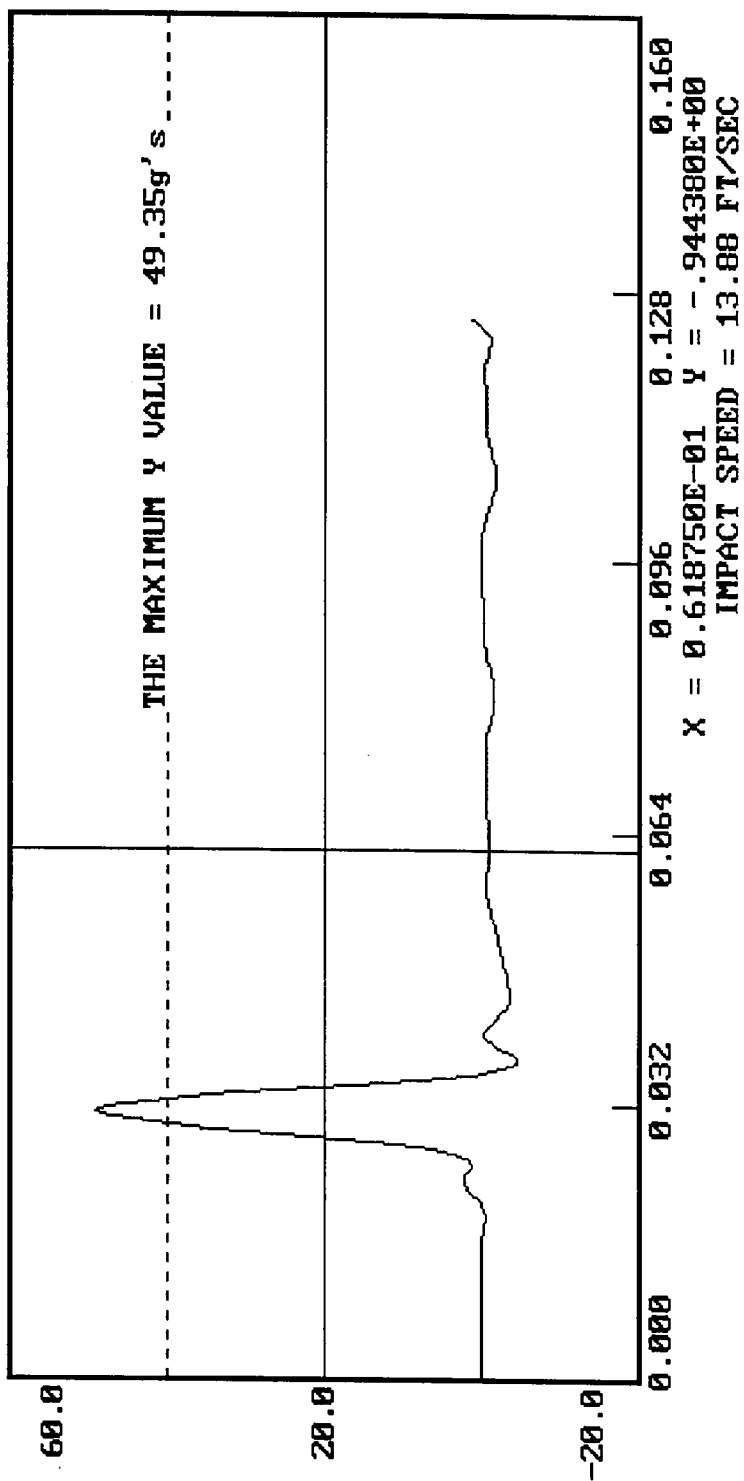
TECHNICIAN

Ken Cline

APPROVED BY

Dave Roalson

DUMMY CALIBRATION - PELVIS IMPACT
 DUMMY # 271
 01-23-1995 09:11
 ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 20, 1995

DUMMY NUMBER: 271

TEST NUMBER: D95124

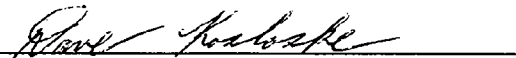
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
FORCE @ 0.5 in	23.3 - 36.5 lbs	28.3
FORCE @ 0.75 in	36.7 - 49.8 lbs	41.2
FORCE @ 1.0 in	50 - 63 lbs	55
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

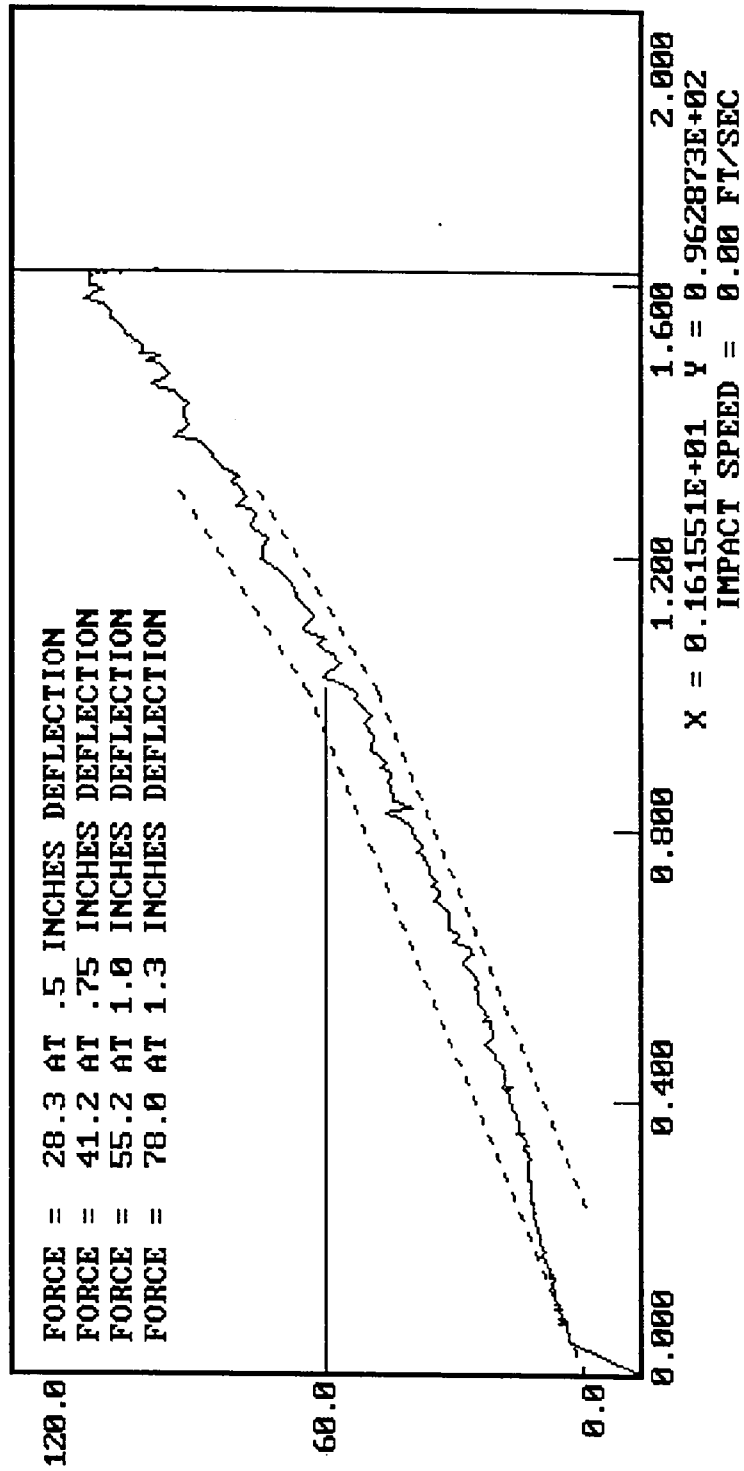


01-20-1995 16:10

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 20, 1995

DUMMY NUMBER: 271

TEST NUMBER: D95125

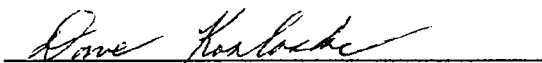
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	26
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	9°

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

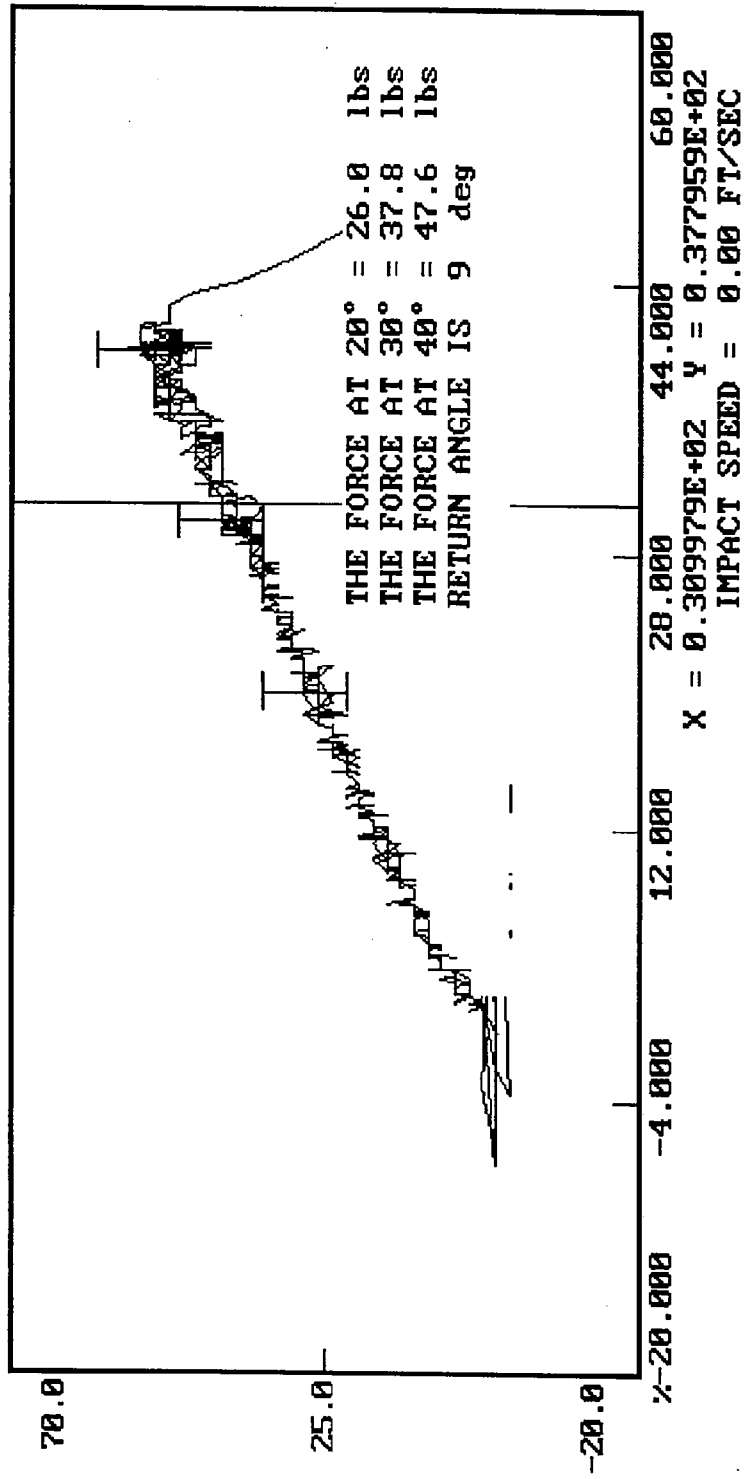


DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 271

FORCE () VS. TORSO ROTATION (DEGREES)

01-20-1995 15:45



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 270

Inspected By: Tim Michnay

Date: January 20, 1995

<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: Al Chalmer

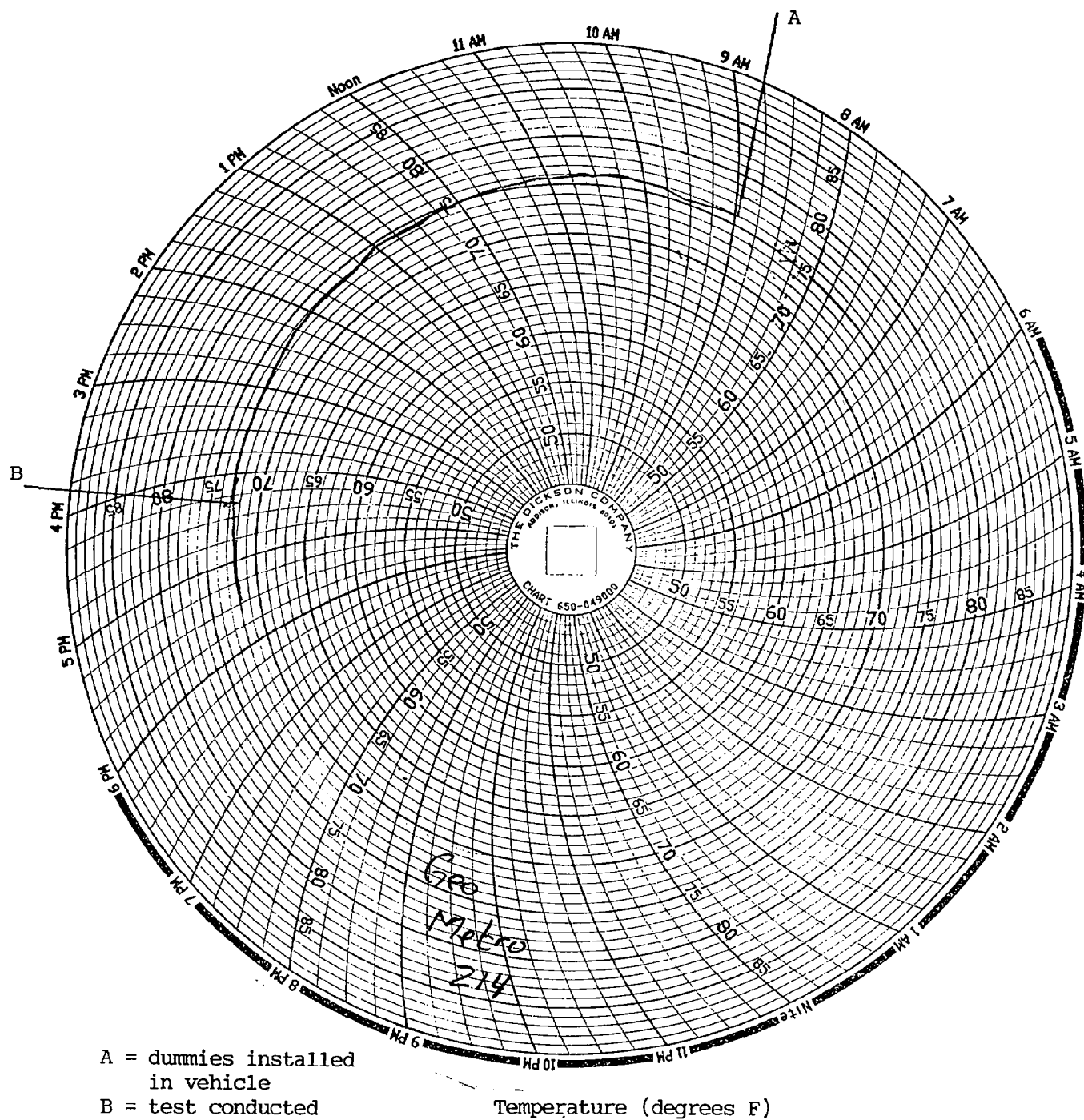
Date: January 20, 1995

<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):

APPENDIX D
DUMMY AND VEHICLE CALIBRATION DATA

VEHICLE AND DUMMY TEMPERATURE



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

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AHTF1	Endevco	September 01, 1994
Lower Rib	AHY78	Endevco	November 07, 1994
Lower Spine	AJ9B0	Endevco	October 19, 1994
Pelvis	AJ808	Endevco	October 12, 1994
Upper Rib Redundant	AGTB5	Endevco	September 16, 1994
Lower Rib Redundant	AJ7E9	Endevco	August 26, 1994
Lower Spine Redundant	AC9B7	Endevco	August 01, 1994
Pelvis Redundant	AJ9N4	Endevco	October 12, 1994

INSTRUMENTS FOR PASSENGER DUMMY NO. 271

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AJTM8	Endevco	January 16, 1995
Lower Rib	AHY21	Endevco	September 02, 1994
Lower Spine	AJ417	Endevco	October 10, 1994
Pelvis	AGTM2	Endevco	September 16, 1994
Upper Rib Redundant	AJ411	Endevco	January 16, 1995
Lower Rib Redundant	AGTG8	Endevco	September 16, 1994
Lower Spine Redundant	AGP20	Endevco	November 10, 1994
Pelvis Redundant	AHY98	Endevco	January 10, 1995

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
MDB CG X	AHDR9	Endevco	August 12, 1994
MDB CG Y	X14	Entran	October 30, 1994
MDB CG Z	MGA140	Entran	January 04, 1995
MDB Rear Axle X	AJ9E1	Endevco	October 14, 1994
MDB Rear Axle Y	AN47	Endevco	December 14, 1994
Mid Left A-Post	X08	Entran	November 10, 1994
Lower Left A-Post	A13	Entran	October 30, 1994
Mid Left B-Post	MGA122	Entran	January 11, 1995
Lower Left B-Post	A03	Entran	November 07, 1994
Trunk Centerline X	X18	Entran	December 14, 1994
Trunk Centerline Y	MGA035	Entran	November 10, 1994
Trunk Centerline Z	MGA060	Entran	August 04, 1994
Driver Seat Track	MGA130	Entran	December 13, 1994
Right Front Sill X	AJ5L6	Endevco	October 17, 1994
Right Front Sill Y	AJ9D5	Entran	October 17, 1994
Right Front Sill Z	AJ4R1	Entran	October 14, 1994
Right Rear Sill X	AHYV5	Entran	October 14, 1994
Right Rear Sill Y	AHTA5	Entran	January 11, 1994
Right Rear Sill Z	AH0P9	Entran	October 12, 1994
Left Front Sill Y	A06	Entran	November 07, 1994
Left Rear Sill Y	MGA084	Entran	January 16, 1995
Right Rear Seat Occupant Compartment Y	X03	Entran	November 07, 1994

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