

REPORT NO.: 214-MGA-96-001
SAFETY COMPLIANCE TESTING FOR
FMVSS 214 "SIDE IMPACT PROTECTION -
PASSENGER CARS"

GENERAL MOTORS CORPORATION
1996 GEO METRO 3 DOOR HATCHBACK
NHTSA NO: CT0104

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: October 16, 1995

Report Date: October 26, 1995

FINAL REPORT

Prepared For:

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				14. Sponsoring Agency Code NSA-30																			
15. Supplementary Notes																							
16. Abstract A 48/24 kph 90° Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject 1995 Geo Metro 3 Door Hatchback in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-04 for the determination of FMVSS No. 214 Side Impact Protection compliance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on October 16, 1995. The impact velocity of the Moving Deformable Barrier (MDB) was 53 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 23°C. The target vehicle post test maximum crush was 239 mm at level 2. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th> <th><u>DRIVER</u></th> <th><u>PASS</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>88</td> <td>52</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>83</td> <td>70</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>73</td> <td>68</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>80</td> <td>69</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>84</td> <td>100</td> </tr> </tbody> </table> The door on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door did not open during the side impact event.							<u>DRIVER</u>	<u>PASS</u>	Left Upper Rib (LUR) Accel., g	88	52	Left Lower Rib (LLR) Accel., g	83	70	Lower Spine (T ₁₂) Accel., g	73	68	Thoracic Trauma Index (TTI)	80	69	Pelvis (PEV) Accel., g	84	100
	<u>DRIVER</u>	<u>PASS</u>																					
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17. Key Words Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. 202-366-4946 Attn: Robert Hornickle																			
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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 96 FMVSS 214 Side Impact Protection 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 1996 Geo Metro 3 Door Hatchback.

This side impact test was conducted in accordance with the Vehicle Safety Compliance's FMVSS 214 test procedure (TP-214D-04, dated September 1, 1995).

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 1996 Geo Metro 3 Door Hatchback 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 tow road guidance system at a velocity of 32.95 mph (53 kph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on October 16, 1995. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

Two Side Impact Dummies (SIDs) were placed in the driver and left rear designated seating positions according to instructions specified in the OVSC Side Impact Laboratory Test Procedure which is dated September 1, 1995. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report.

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)

Appendix B contains the vehicle and dummy response data traces. A summary of the side impact dummy (SID) configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The following table summarizes the results of the test:

Injury Criteria	Front SID	Rear SID
TTI (g)	80	69
Pelvis (g)	84	100

TEST NOTES

The following accelerometers were not used for this test:

Left Front Door on Centerline

Midrear of Left Front Door

Left Front Door Upper Centerline

Midrear of Left Rear Door

Left Rear Door Upper Centerline

Rear Seat Track

SECTION 3
SIDE IMPACT DUMMY (SID) AND
VEHICLE TEST DATA

DATA SHEET NO. 1
GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback
Vehicle NHTSA No.: CT0104 VIN: 2C1MR2263T6705453
Vehicle Body Color: Green Build Date: 8/95
Engine Data: 3 Cylinders; CID; 1.0 Liter; cc
Placement Longitudinal; X Lateral
Transmission: 5 speed; X Manual; Automatic; Overdrive
Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 121 miles
Options: A/C; X Pwr. Steering; X Pwr. Brakes; Pwr. Windows;
 Cruise Control; Tilt Wheel; Power Door Locks;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 32 Psi FRONT
 32 Psi REAR
Recommended Tire Size: P155/80R13
Tires on Test Vehicle: P155/80R13 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 = 312 kg (A)
No. of Occupants x 68.04 kg. = 272 kg (B)
Cargo Capacity (A-B) = 40 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>237.2</u> kg	Right Rear	=	<u>164.2</u> kg
Left Front	=	<u>244.5</u> kg	Left Rear	=	<u>160.1</u> kg
TOTAL FRONT	=	<u>481.7</u> kg	TOTAL REAR	=	<u>324.3</u> kg
% of Total Vehicle Weight = <u>60</u> %; % of Total Weight = <u>40</u> %					
TOTAL WEIGHT = <u>806.0</u> kg					

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 806.0 kg

Cargo Carrying Capacity of Test Vehicle = 40.0 kg

Weight of 2 Side Impact Dummies (2 x 80.7 kg.) = 161.4 kg

TEST VEHICLE TARGET WEIGHT = 1007.4 kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 248.1 kg Right Rear = 220.4 kg

Left Front = 293.5 kg Left Rear = 239.5 kg

TOTAL FRONT = 541.6 kg TOTAL REAR = 459.9 kg

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

TOTAL TEST WEIGHT = 1001.5 kg

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 654 mm Left Front 650 mm Right Rear 665 mm Left Rear 666 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 644 mm Left Front 625 mm Right Rear 627 mm Left Rear 611 mm

TEST ATTITUDE:

Right Front 640 mm Left Front 631 mm Right Rear 628 mm Left Rear 616 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2365 mm

C.G. = 1086 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 3416 mm

Centerline = 3660 mm

Left Side = 3416 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

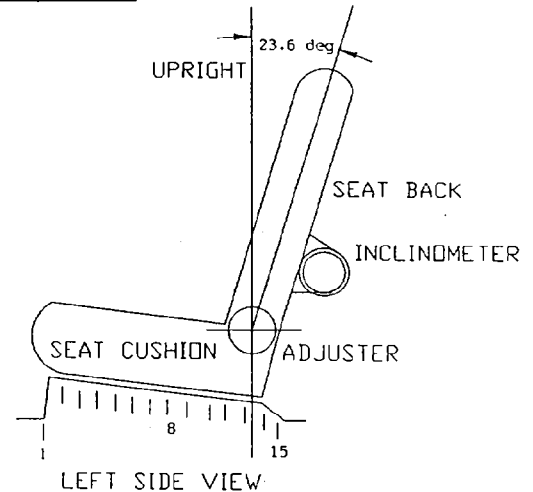
FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 210 mm

Test Position: 8th detent rearward out of 15 total

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 23.6° degrees



SECOND POSITION SEAT:

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

Seat Back Adjustment Position: Non-Adjustable

ADJUSTABLE STEERING COLUMN POSITION: Non-Adjustable

WINDOW POSITIONS: Left Front Closed Left Rear Closed

Right Front Open Right Rear Removed

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 40.1 liters

Test Volume: 37.2 liters 93 % of capacity

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

Wheelbase: = 2365 mm

Impact Point is 243 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback
Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995
Overall Length = 3660 mm; Overall Width = 1556 mm

TEST WEIGHT:

Right Front = 248.1 kg Right Rear = 220.4 kg
Left Front = 293.5 kg Left Rear = 239.5 kg
TOTAL FRONT = 541.6 kg TOTAL REAR = 459.9 kg
% of Total Weight = 54 % % of Total Weight = 46 %
TOTAL VEHICLE WEIGHT = 1001.5 kg
Wheelbase = 2365 mm
Longitudinal C.G. from Center of Front Axle = 1086 mm
Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (262 mm above ground) = 106 mm
2. LEVEL 2 (468 mm above ground) = 239 mm
3. LEVEL 3 (582 mm above ground) = 226 mm
4. LEVEL 4 (850 mm above ground) = 199 mm
5. LEVEL 5 (1274 mm above ground) = 49 mm
Maximum Post-Test Intrusion = 239 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 II belts</u> <u>with airbag</u>	<u>type II belt</u> <u>system</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>20</u>
Number of Cameras: Onboard Vehicle	=	<u>3</u>
Offboard Vehicle	=	<u>4</u>
Deformable Barrier	=	<u>2</u>
TOTAL	=	<u>9</u>

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	= <u>1252 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	= <u>4115 mm</u>
Wheelbase of Framework Carriage	= <u>2591 mm</u>
Tread of Framework Carriage (Front & Rear)	= <u>1880 mm</u>
C.G. Location Rearward of Front Axle	= <u>1102 mm</u>
C.G. Location From Center Line	= <u>-8 mm</u>
C.G. Location Above Ground Level	= <u>488 mm</u>

MDB WEIGHT:

Left Front	= <u>496.7 kg</u>	Left Rear	= <u>187.3 kg</u>
Right Front	= <u>283.0 kg</u>	Right Rear	= <u>389.2 kg</u>
TOTAL FRONT	= <u>779.7 kg</u>	TOTAL REAR	= <u>576.5 kg</u>
TOTAL MDB WEIGHT = <u>1356.2 kg</u>			

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

Impact Speed = Primary: 32.95 mph (53.0 kph) Secondary: 33.0 mph (53.1 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

- | | | |
|----|---------------------------------|----------------|
| 1. | Row A Top of Stack (813 mm) | = <u>90</u> mm |
| 2. | Row B Mid Stack (686 mm) | = <u>39</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = <u>51</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = <u>95</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to window sill</u>	<u>to C Post</u>
Arm	<u>to door trim</u>	<u>to trim</u>
Pelvis	<u>to door trim</u>	<u>to trim</u>
Left Knee	<u>to door trim</u>	<u>to trim</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>N/A</u>	<u>N/A</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 11 mm rearward Vertical: 8 mm high

ARM REST LOCATIONS:

Front: 438 mm Below window opening
Rear: 290 mm Below window opening

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 21 mm Front Seat Cushion: 62 mm

Left Rear Seat Back: 15 mm Rear Seat Cushion: 8 mm

GLAZING DAMAGE:

Left side windows shattered and windshield cracked

PILLAR PERFORMANCE:

No seperation noted

SILL SEPARATION:

No seperation noted

OTHER NOTABLE IMPACT EFFECTS:

None

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

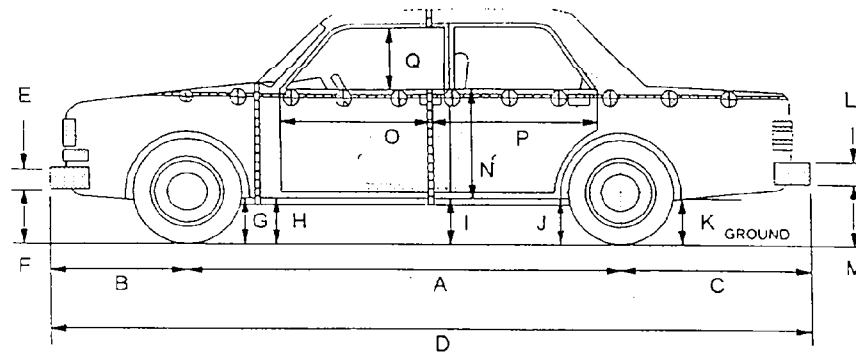
DATA SHEET NO. 5
 SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA
 Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback
 Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

	Front Dummy ID #271				Rear Dummy ID #272			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y	87.6	33	21.0	71	52.4	33	5.7	120
Left Lower Rib (LLR) Y	82.5	34	12.5	71	69.5	36	8.8	121
SPINE ACCELERATIONS								
Lower Lateral Y	72.5	36	17.0	61	68.0	44	11.4	65
PELVIS ACCELERATIONS								
Lateral Y	83.5	26	8.5	120	100.3	36	9.2	103

REFERENCE: Positive Direction- Longitudinal (X) = forward
 Lateral (Y) = to right
 Vertical (Z) = down

Negative Direction - Longitudinal (X) = rearward
 Lateral (Y) = to left
 Vertical (Z) = up

DATA SHEET NO. 6
VEHICLE PRE AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

D = Length at Centerline

R = Right Side Length

S = Left Side Length

T = Width at B Post

E & L = Bumper Thickness

J1 = To Pinch Weld

J2 = To Sill

ALL MEASUREMENTS IN (mm)

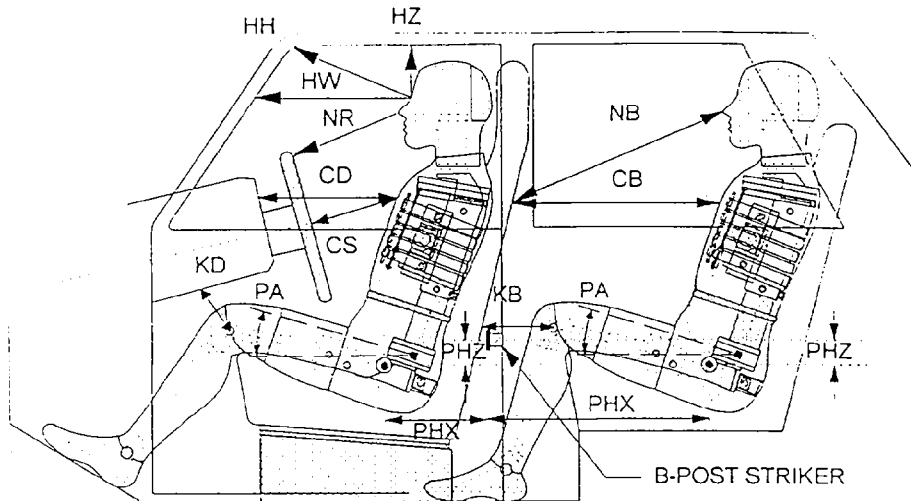
	PRE-TEST	POST-TEST	Δ CHANGE
A	2365	2336	29
B	759	705	54
C	536	583	47
D	3660	3624	36
E	N/A	N/A	N/A
F	197	210	13
G	242	255	13
H	194	217	23
I	194	175	19
J1/J2	198/194	189/179	9/15
K	390	374	16
L	137	130	7
M	377	362	15
N	603	545	58
O	657	652	5
P	573	566	7
Q	475	475	0
R	3416	3430	16
S	3416	3395	21
T	1556	1341	215

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995



NOTE: All dimensions are in mm with tolerance of ± 3 mm

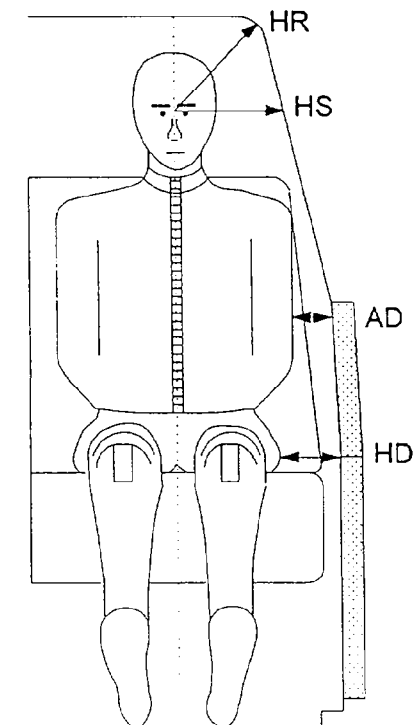
	FRONT SID ID #271		REAR PASSENGER SID ID #272
HH	379	HZ	108
HW	616	NB	565
HZ	175	CB	492
NR	457	KBL (KBA)	185 (0)
CD	526	KBR (KBA)	170 (0)
CS	350	PA°	24.0
KDL(KDA°)	154 (26.5)	PHX	476
KDR(KDA°)	170 (37.2)	PHZ	174
PA°	23.9		
PHX	391		
PHZ	154		

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

DATA SHEET NO. 8
SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995



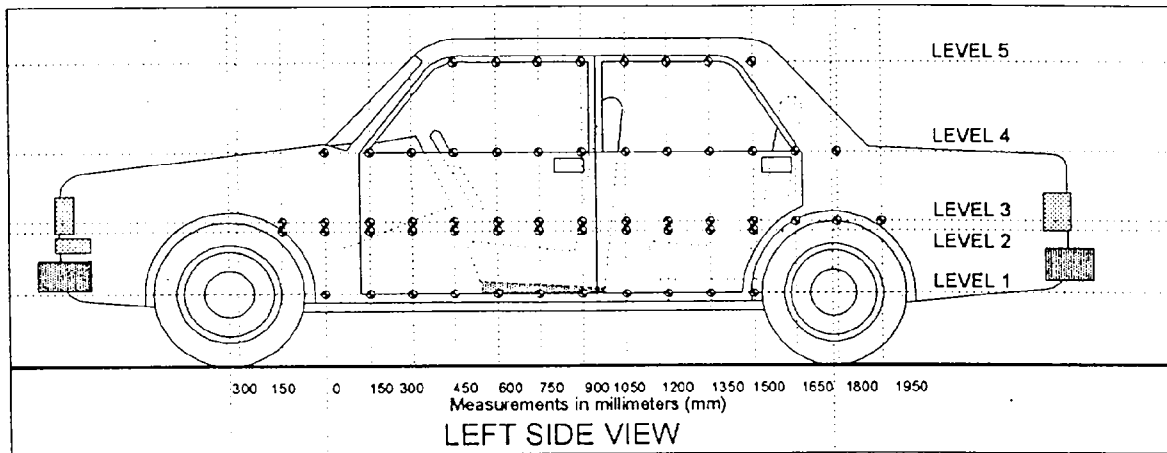
NOTE: All dimensions are in mm

	DRIVER ID #271	LEFT REAR PASSENGER ID #272
HR	163	140
HS	267	240
AD	81	15
HD	97	98

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995



MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED" CONFIGURATION

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 5 @ Window Top	= <u>1274</u> mm
Level 4 @ Window Sill	= <u>850</u> mm
Level 3 @ Mid Door	= <u>582</u> mm
Level 2 @ Occupant H-Point	= <u>468</u> mm
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>262</u> mm

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

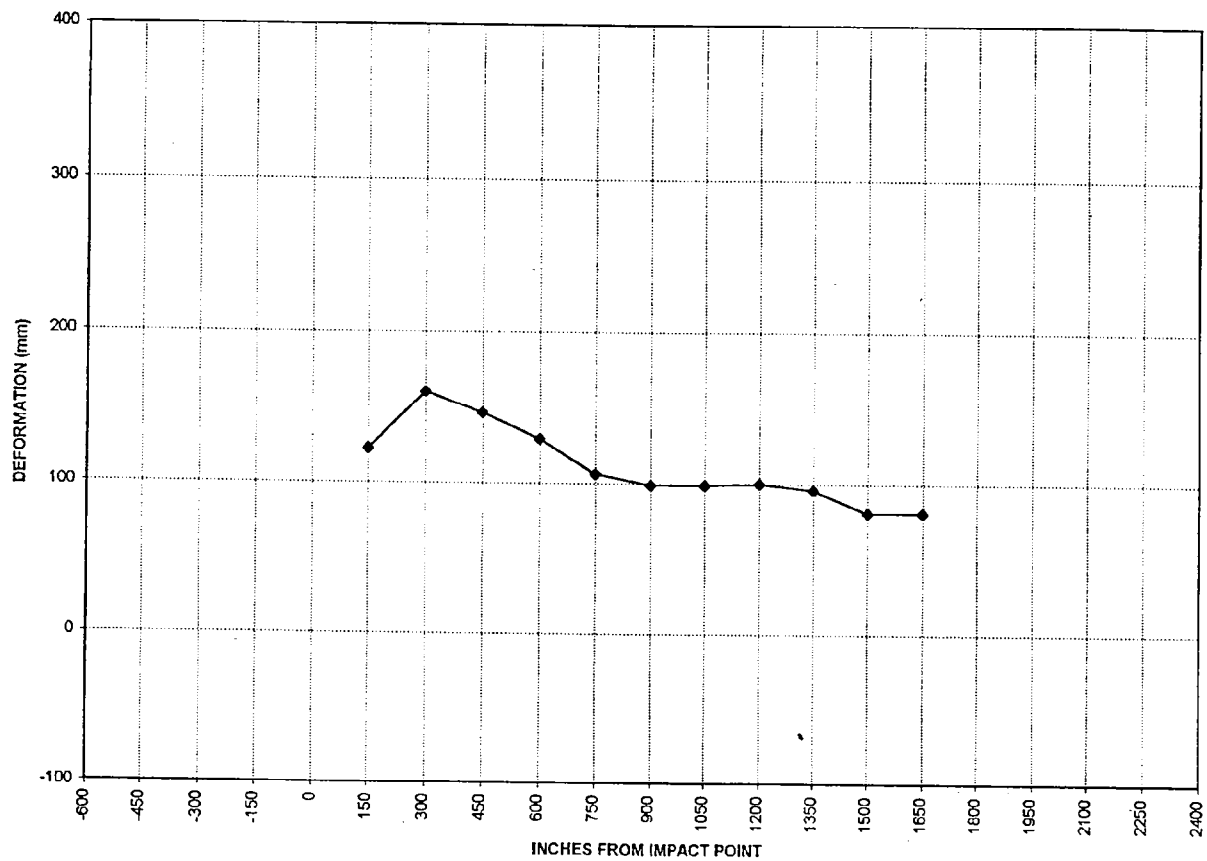
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995

Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-600			
-450			
-300			
-150			
0 (impact point)			
150	802	924	122
300	806	966	160
450	811	957	146
600	812	941	129
750	819	925	106
900	819	918	99
1050	819	918	99
1200	816	916	100
1350	810	906	96
1500	800	881	81
1650	791	872	81
1800			
1950			
2100			
2250			
2400			

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

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 1 - AXLE CENTERLINE

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

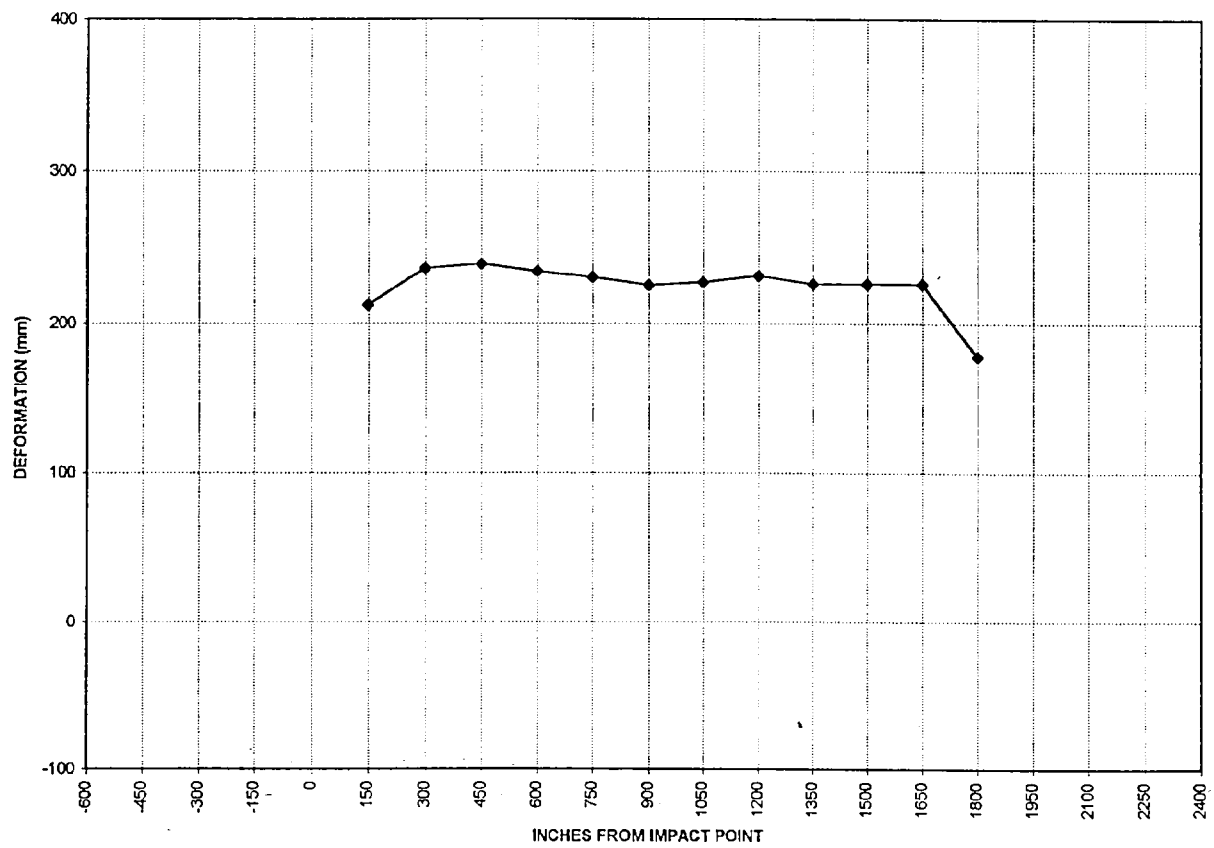
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995

	Level 2 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-600			
-450			
-300			
-150			
0 (impact point)			
150	766	978	212
300	767	1003	236
450	768	1007	239
600	767	1001	234
750	766	996	230
900	765	990	225
1050	765	992	227
1200	761	992	231
1350	761	987	226
1500	761	987	226
1650	760	986	226
1800	760	938	178
1950			
2100			
2250			
2400			

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

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

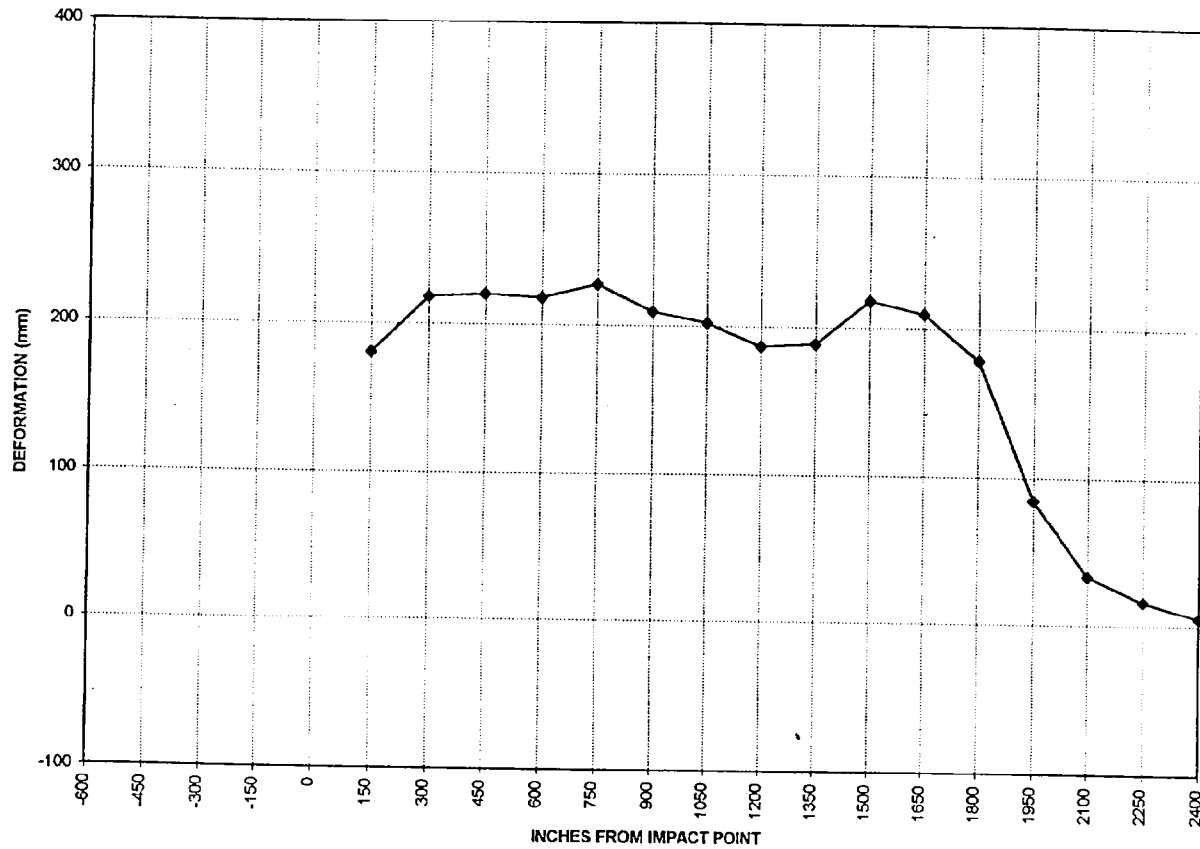
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995

	Level 3 - Mid Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-600			
-450			
-300			
-150			
0 (impact point)			
150	759	940	181
300	760	977	217
450	760	979	219
600	760	977	217
750	760	986	226
900	759	968	209
1050	758	960	202
1200	756	943	187
1350	756	945	189
1500	757	974	217
1650	758	967	209
1800	758	937	179
1950	756	841	85
2100	759	792	33
2250	769	785	16
2400	795	800	5

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

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 3 - MID DOOR

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

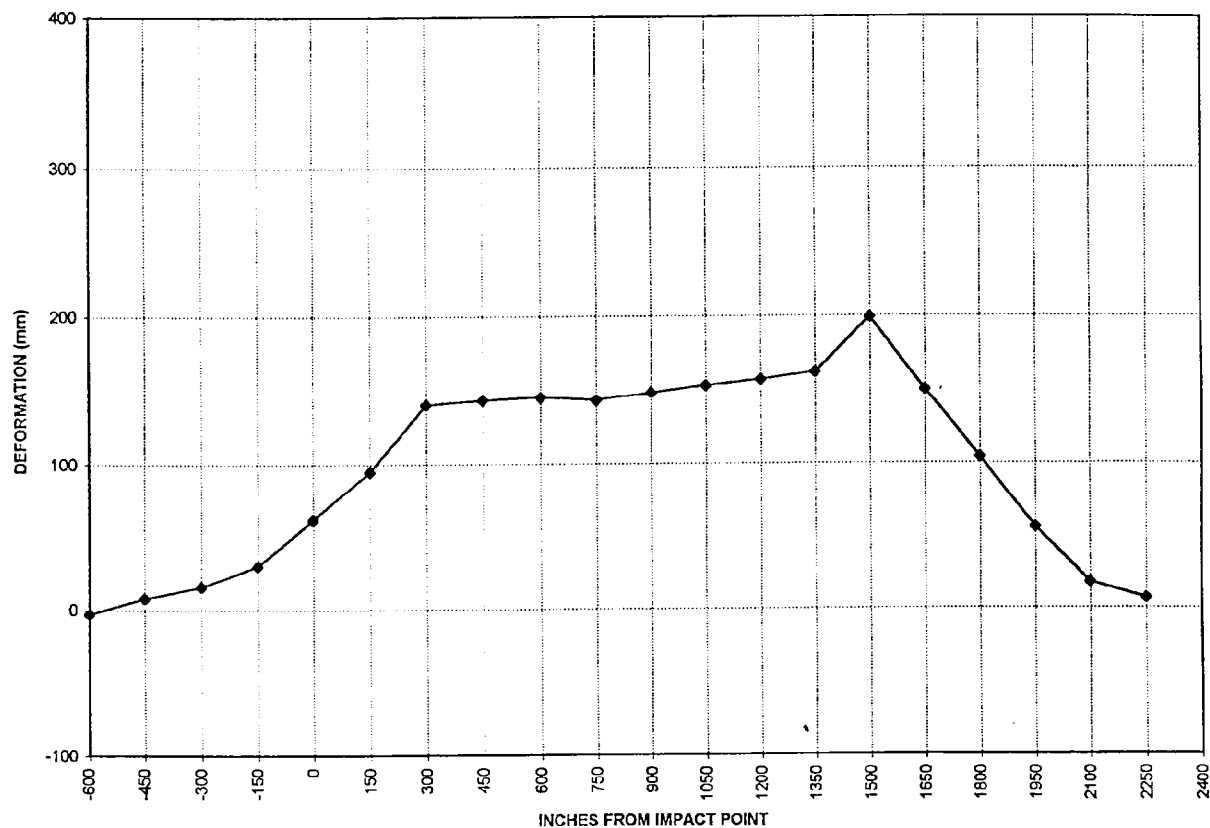
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-600	864	861	-3
-450	835	843	8
-300	822	838	16
-150	810	840	30
0 (impact point)	801	863	62
150	793	888	95
300	796	936	140
450	801	944	143
600	800	945	145
750	801	944	143
900	802	950	148
1050	804	957	153
1200	805	962	157
1350	806	968	162
1500	810	1009	199
1650	814	964	150
1800	815	919	104
1950	819	875	56
2100	825	843	18
2250	836	843	7
2400			

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

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 4 - WINDOW SILL

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

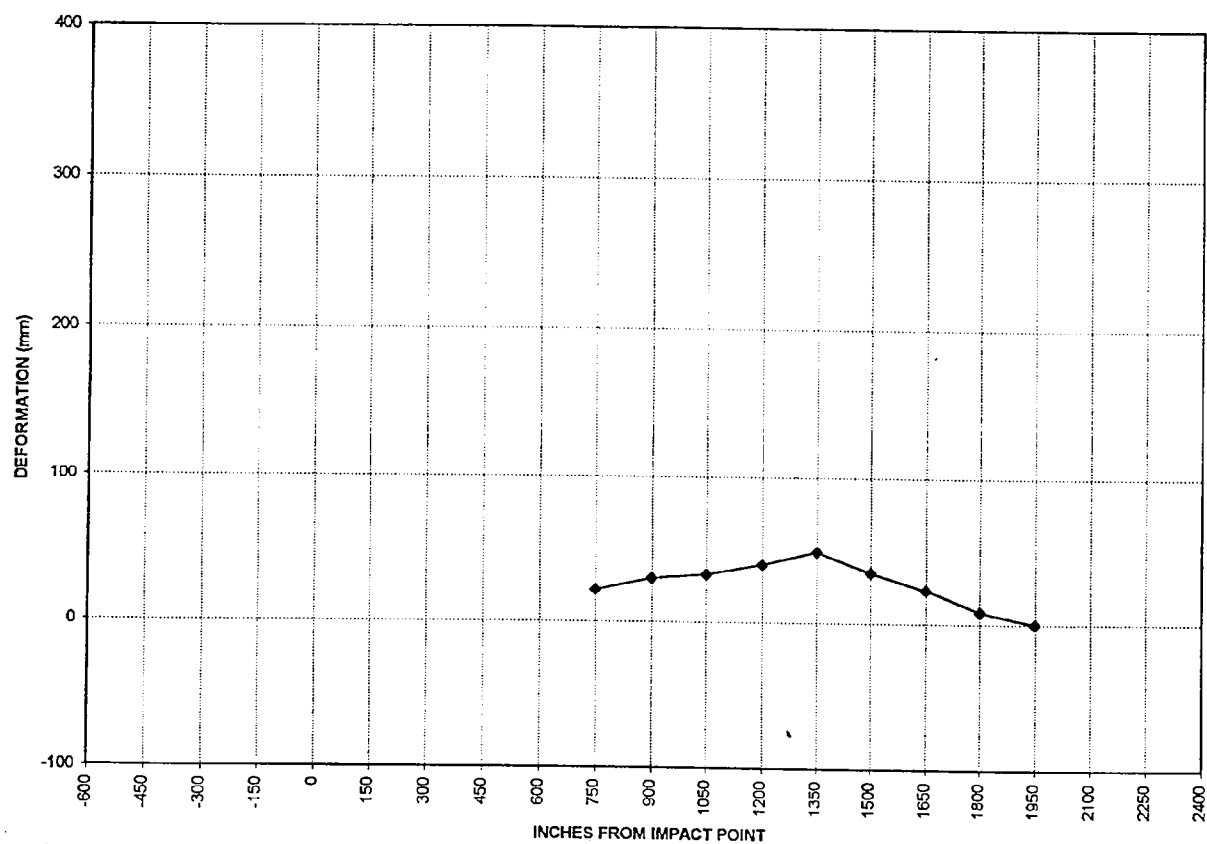
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600			
750	1024	1046	22
900	1020	1050	30
1050	1032	1065	33
1200	1039	1079	40
1350	1046	1095	49
1500	1055	1090	35
1650	1060	1083	23
1800	1066	1074	8
1950	1084	1084	0
2100			
2250			
2400			

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

VEHICLE EXTERIOR STATIC CRUSH



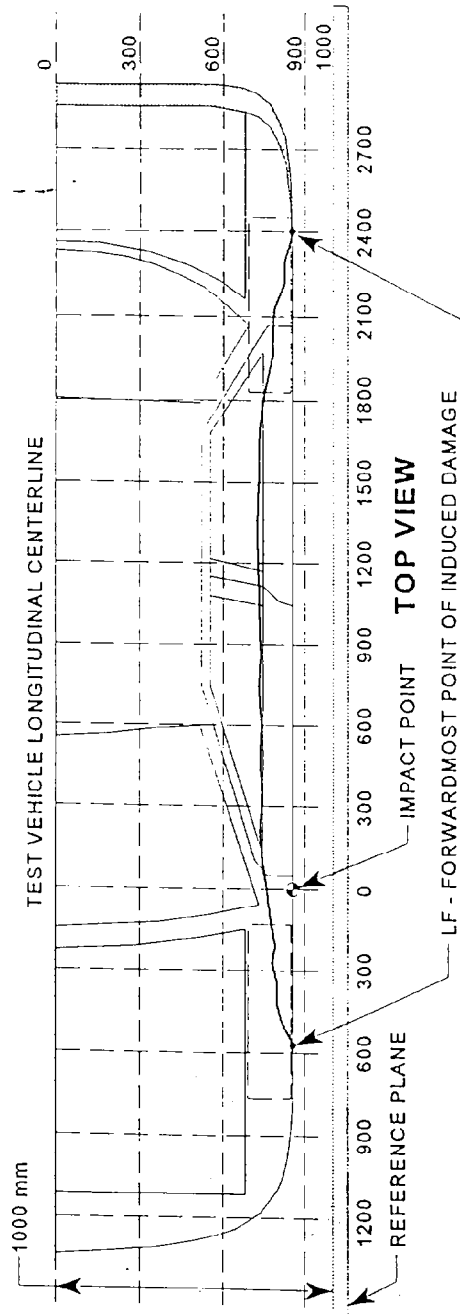
LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

NHTSA NO.: CT0104 Test Date: October 16, 1995



MEASUREMENT CONVENTIONS:

Forward of the impact point (towards front of vehicle) is considered negative (-)
Rearward of the impact point (toward rear end of vehicle) is considered positive (+).

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = 450 mm)	766	766	0.0
2. 65 mm	934	766	168
3. 580 mm	969	767	202
4. 1095 mm	966	764	202
5. 1610 mm	964	760	204
6. (LR = 2125 mm)	760	760	0.0

DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

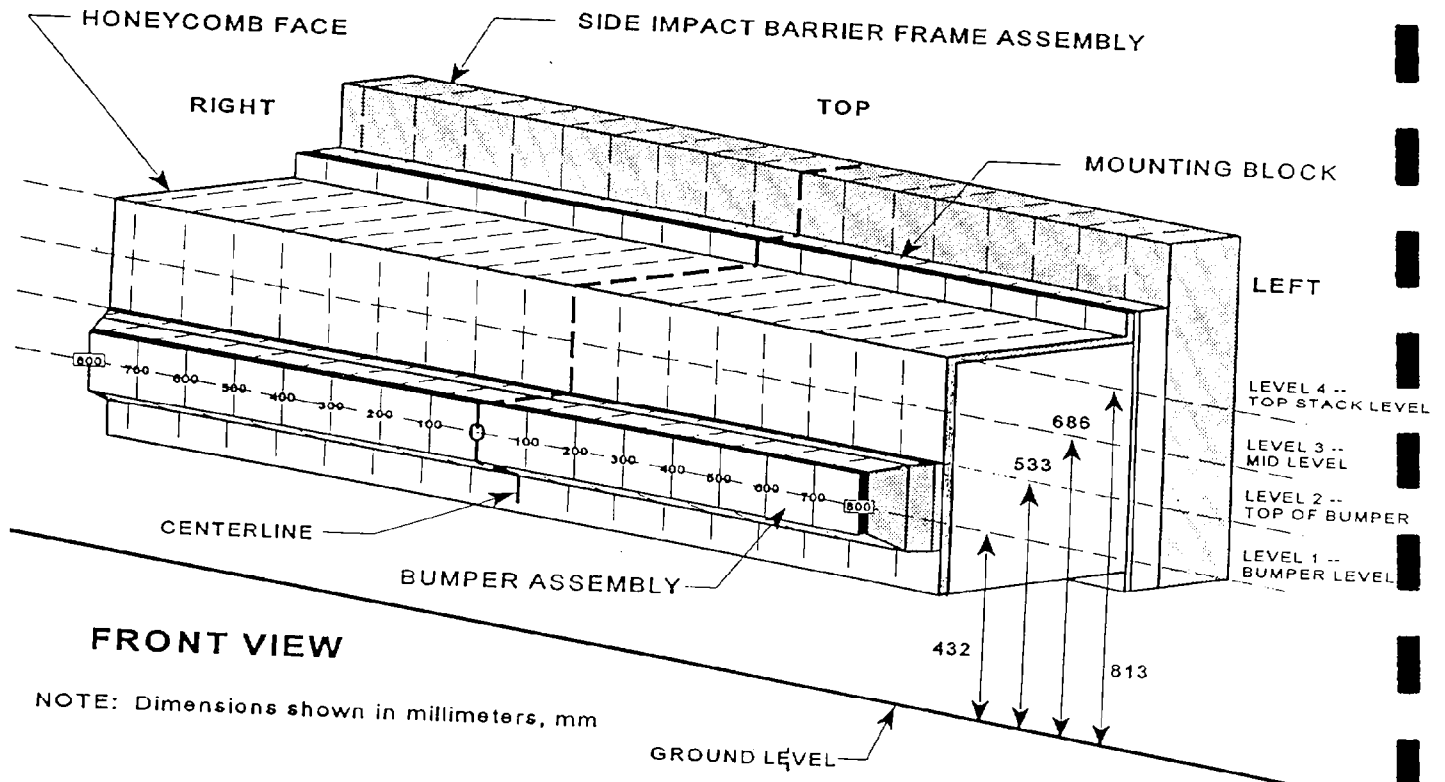
Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

Location	Height at CL*	Distance Right of Center (mm)									Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	38	12	3	2	3	3	3	4	5	6	7	8	10	14	19	44	90
Mid Level Level 3	686 mm	16	5	4	5	4	4	4	3	3	2	2	1	4	2	4	34	39
Top Bumper Level 2	533 mm	51	46	43	45	39	34	30	27	22	20	20	20	22	24	28	32	34
Mid Bumper Level 1	432 mm	95	80	78	71	60	52	45	40	36	34	30	27	25	26	32	42	40

See next page for Barrier Face Graphic

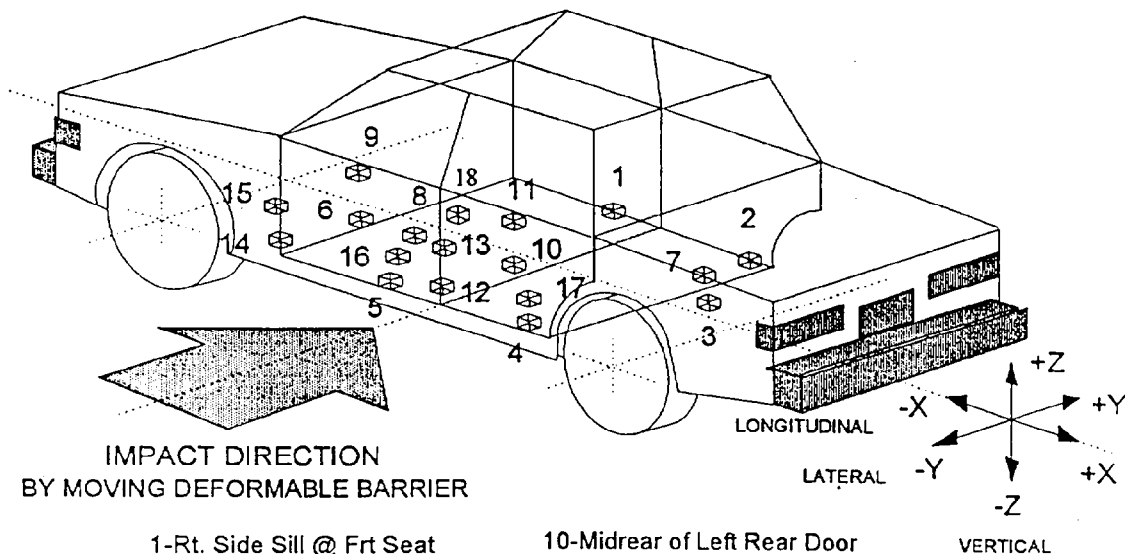
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995



- 1-Rt. Side Sill @ Frt Seat
- 2-Rt. Side Sill @ Rr. Seat
- 3-Rr. Floorpan Above Axle
- 4-Left Side Sill @ Rr. Seat
- 5-Left Side Sill @ Frt. Seat
- 6-Left Frt. Door On Centerline
- 7-Rt. Rr. Occ Compartment
- 8-Midrear of Left Frt. Door
- 9-Left Frt. Door Upper Ctrline

- 10-Midrear of Left Rear Door
- 11-Left Rear Door Upper Ctrline
- 12-Left Lower B-Post
- 13-Left Middle B-Post
- 14-Left Lower A-Post
- 15-Left Middle A-Post
- 16-Front Seat Track
- 17-Rear Seat Track
- 18-Vehicle C.G.

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 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	1899	555	230	4.8	8.7	33.6	2.6	6.0	1.2	33.7
2	Rt. Side Sill @ Rear Seat	1119	612	265	4.4	9.7	38.8	3.4	6.9	10.0	39.7
3	Rr. Floorpan Above Axle	425	76	335	2.3	9.9	34.6	4.7	10.7	10.5	34.7
4	Left Side Sill @ Rr. Seat	1119	613	240	---	---	56.1	3.5	---	---	---
5	Left Side Sill @ Frt. Seat	1916	555	228	---	---	50.6	2.8	---	---	---
7	Right Rear Occupant Compartment	1168	360	283	---	---	36.7	2.9	---	---	---
12	Left Lower B-Post	1334	612	285	---	---	100.9	39.2	---	---	---
13	Left Mid B-Post	1327	635	895	---	---	151.1	144.8	---	---	---
14	Left Lower A-Post	2498	580	207	---	---	130.1	72.4	---	---	---
15	Left Mid A-Post	2449	629	775	---	---	**	**	---	---	---
16	Driver Left Seat Track	NR	NR	NR	---	---	125.2	12.9	---	---	---
18	Vehicle CG	1830	141	370	2.2	8.9	37.9	10.8	27.7	17.9	39.2

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

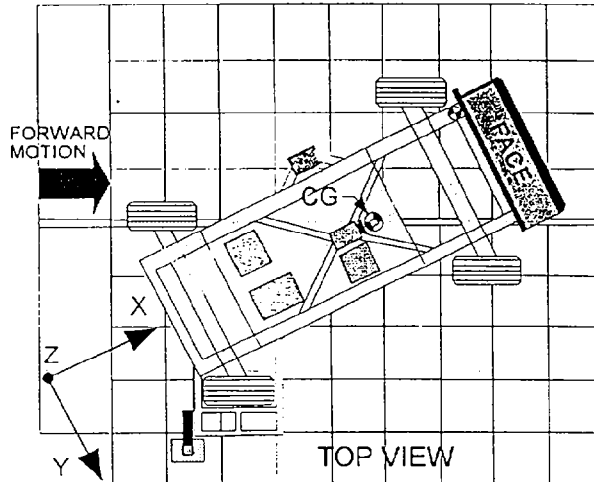
** No valid data collected

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995



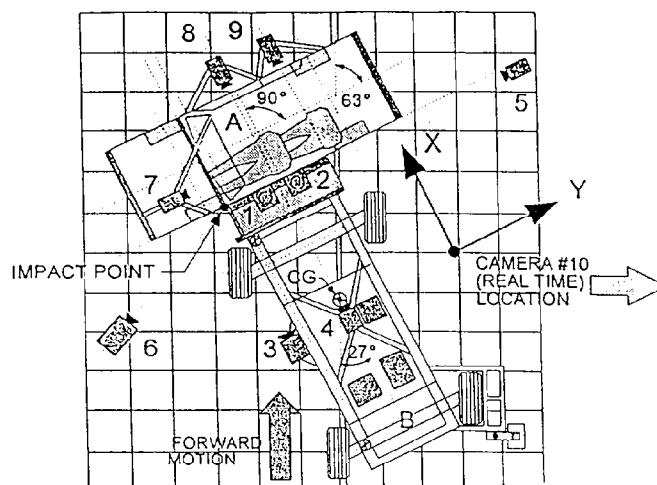
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Neg.
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.0	125	15.1	30
	Lateral (Y)	---	---	---	2.3	49	6.7	38
	Vertical (Z)	---	---	---	10.2	62	12.4	22
	Resultant (R)	---	---	---	19.1	22	---	---
2	Rear Frame Member	-2591	-625	622				
	Longitudinal (X)	---	---	---	1.2	148	19.4	31
	Lateral (Y)	---	---	---	5.3	34	.5	187

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

DATA SHEET NO. 15
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995



Camera No.	View	Coordinates (mm)*			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
	Real Time					13	24
1	Top Impact	-350	850	5400		13	926
2	Top Wide	-700	0	5130		8	1190
3	Cart Pointer					35	1026
4	Cart					13	1020
5	Right Impact	3800	7760	1360	90°	25	1010
6	Left Overall	-2980	2410	1690	90°	13	1015
7	Onboard Driver					8	1015
8	Onboard Hood					13	1020
9	Onboard Passenger					8	957

* Reference: (from point of impact)

+X = Forward

+Y = To Right

+Z = Upward

DATA SHEET 16
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

TEST REQUIREMENTS:

Drain the test vehicle's fuel system and operate the engine until the fuel system is dry. Add Stoddard solvent, which has been dyed purple, until 92-94% of the stated usable capacity is reached. Operate the engine to assure the Stoddard solvent is present throughout the entire fuel system.

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 33.0 mph (53 kph)

FUEL SPILLAGE MEASUREMENT:

POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0	1 oz
2. For 5 minute period after vehicle motion ceases	0	5 oz
3. For next 25 minutes	0	1 oz./1 min

FUEL SPILLAGE LOCATION(S): None

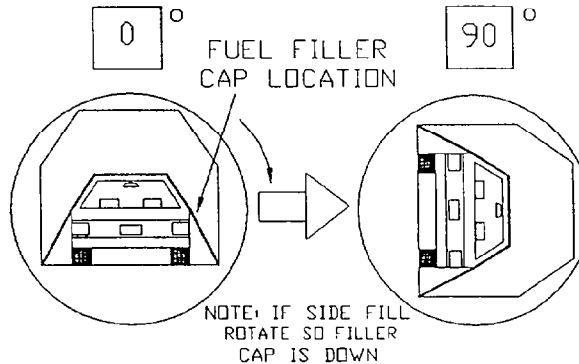
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

TEST PHASE: 0° - 90°



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 TIME = 7 minutes 40 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	N/R	1 oz

FUEL SPILLAGE LOCATIONS(S): None

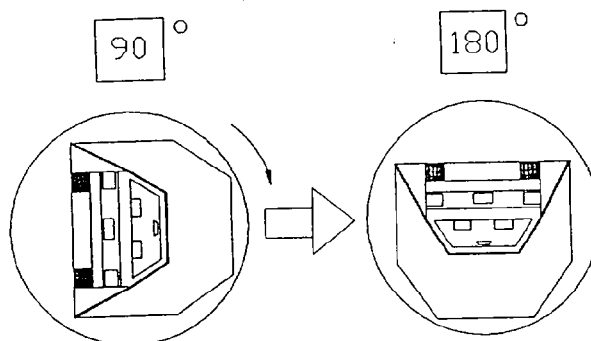
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

TEST PHASE: 90° - 180°



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 TIME = 7 minutes 40 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	N/R	1 oz

FUEL SPILLAGE LOCATIONS(S): None

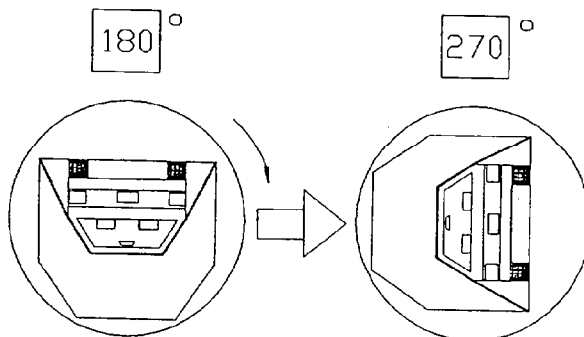
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1996/Geo/Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 20 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 20 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	N/R	1 oz

FUEL SPILLAGE LOCATIONS(S): None

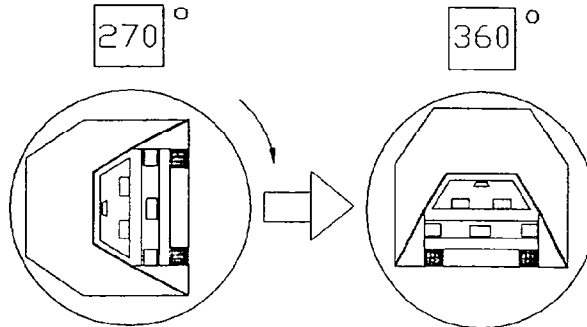
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1996/Geo Metro/3 Door Hatchback

Vehicle NHTSA No.: CT0104 Test Date: October 16, 1995

TEST PHASE: 270° - 360°



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 TIME = 7 minutes 40 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

270° TO 360° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz	5 oz
2. Sixth Minute From Onset of Rotation	0 oz	1 oz
3. Seventh Minute From Onset of Rotation	0 oz	1 oz
4. Eighth Minute if Required	N/R	1 oz

FUEL SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

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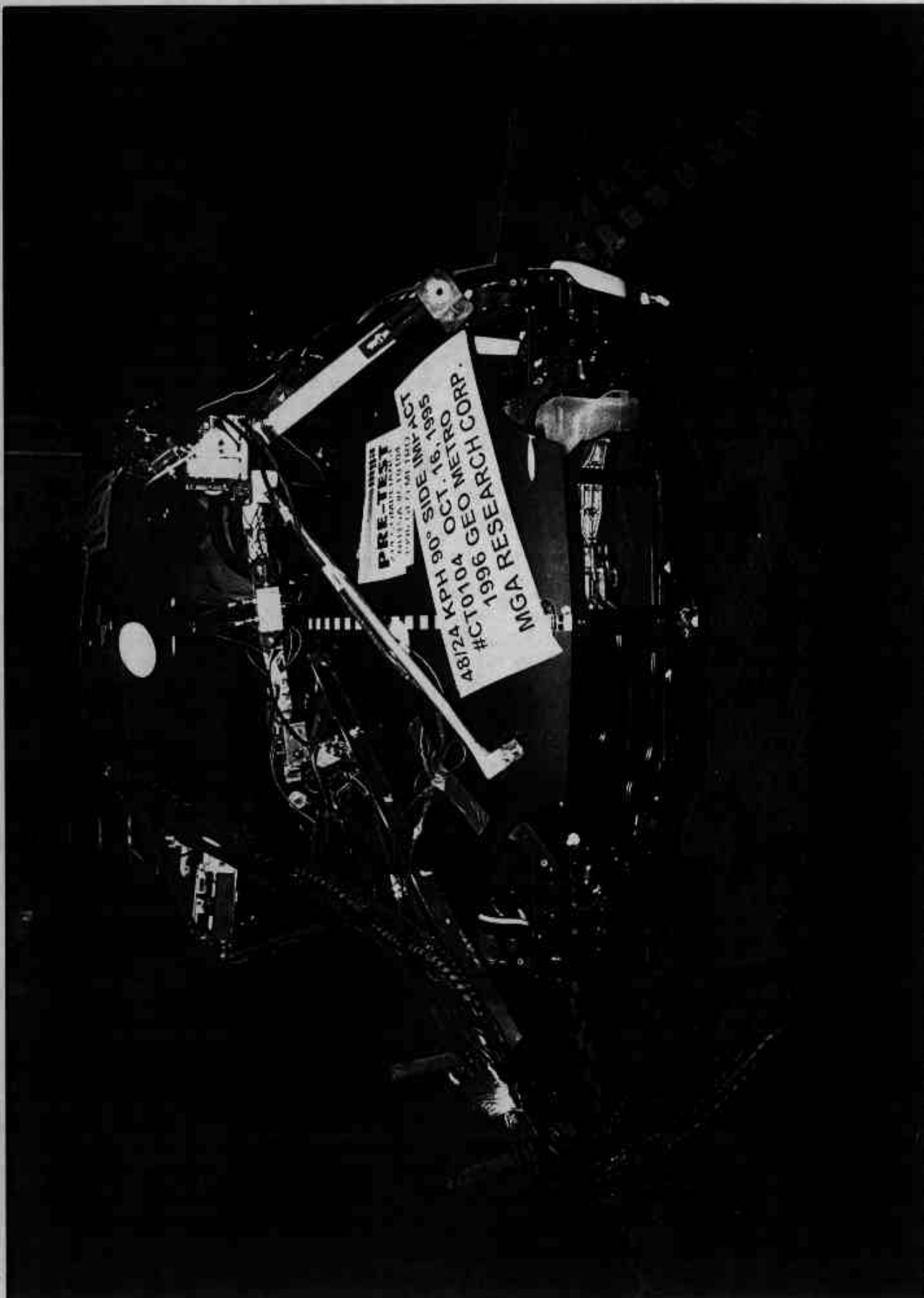


Photo No. A-1 - Pre-Test Front View of Test Vehicle



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

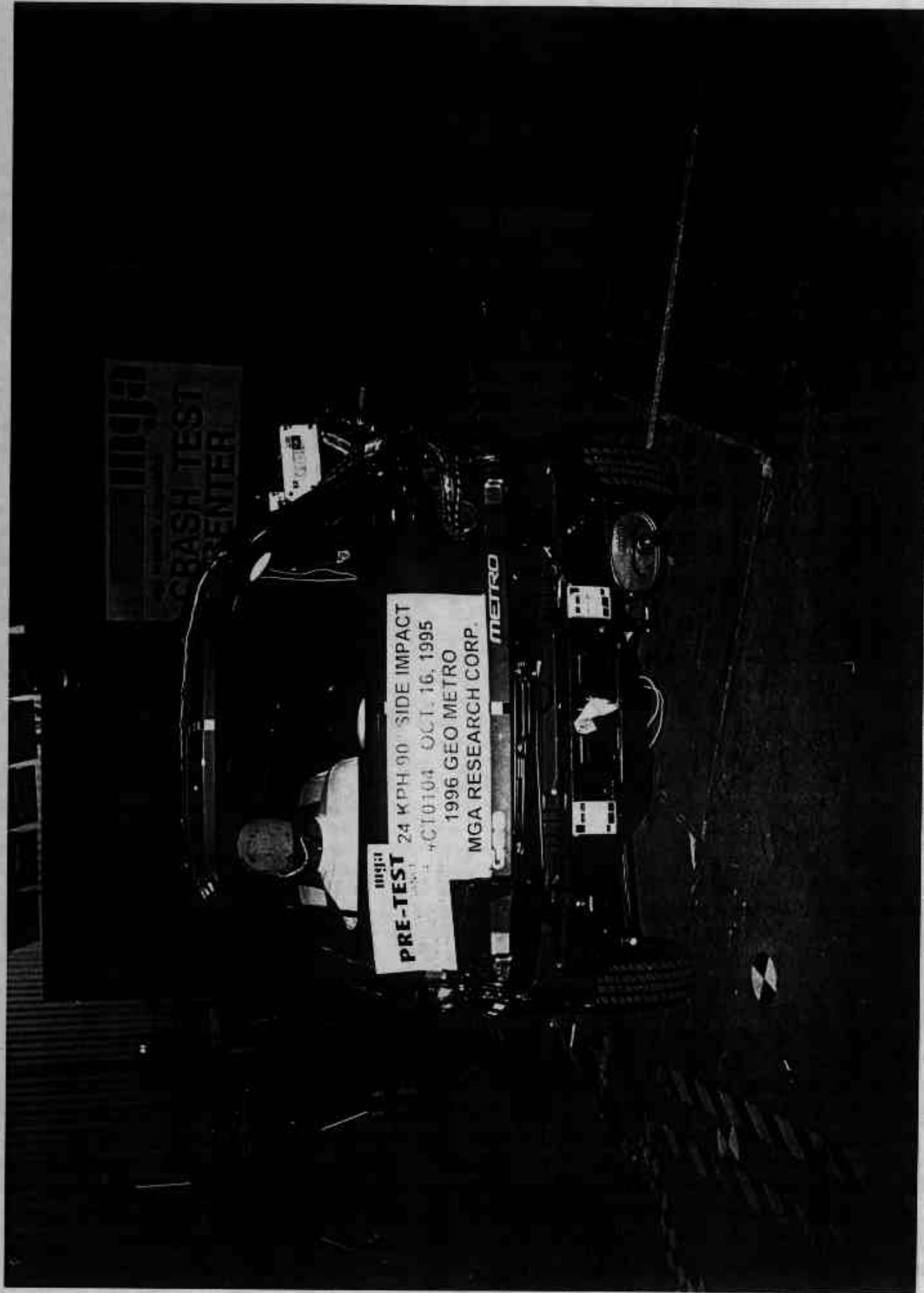
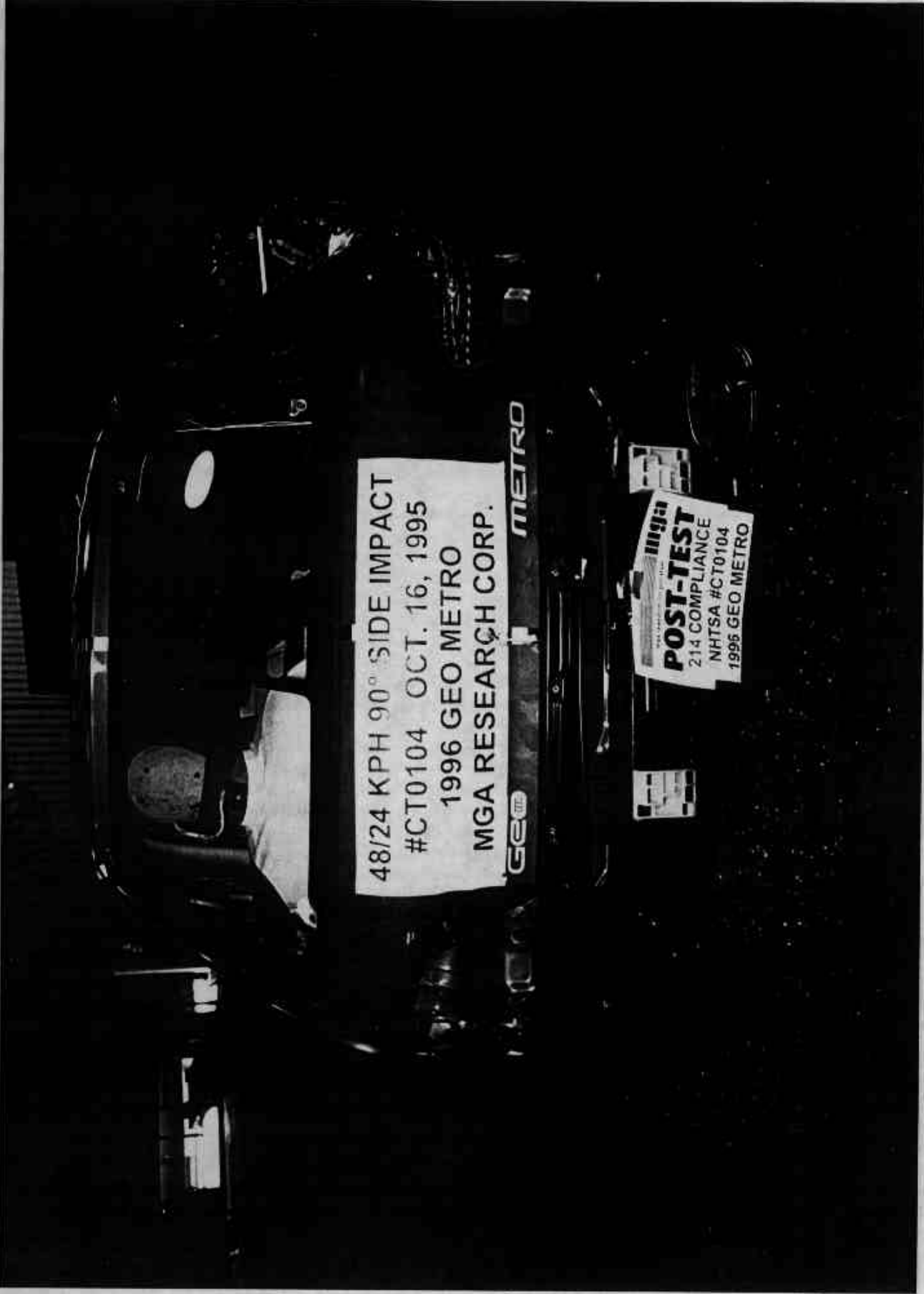


Photo No. A-3 - Pre-Test Rear View of Test Vehicle



48/24 KPH 90° SIDE IMPACT
#CT0104 OCT. 16, 1995
1996 GEO METRO
MGA RESEARCH CORP.

POST-TEST
214 COMPLIANCE
NHTSA #CT0104
1996 GEO METRO

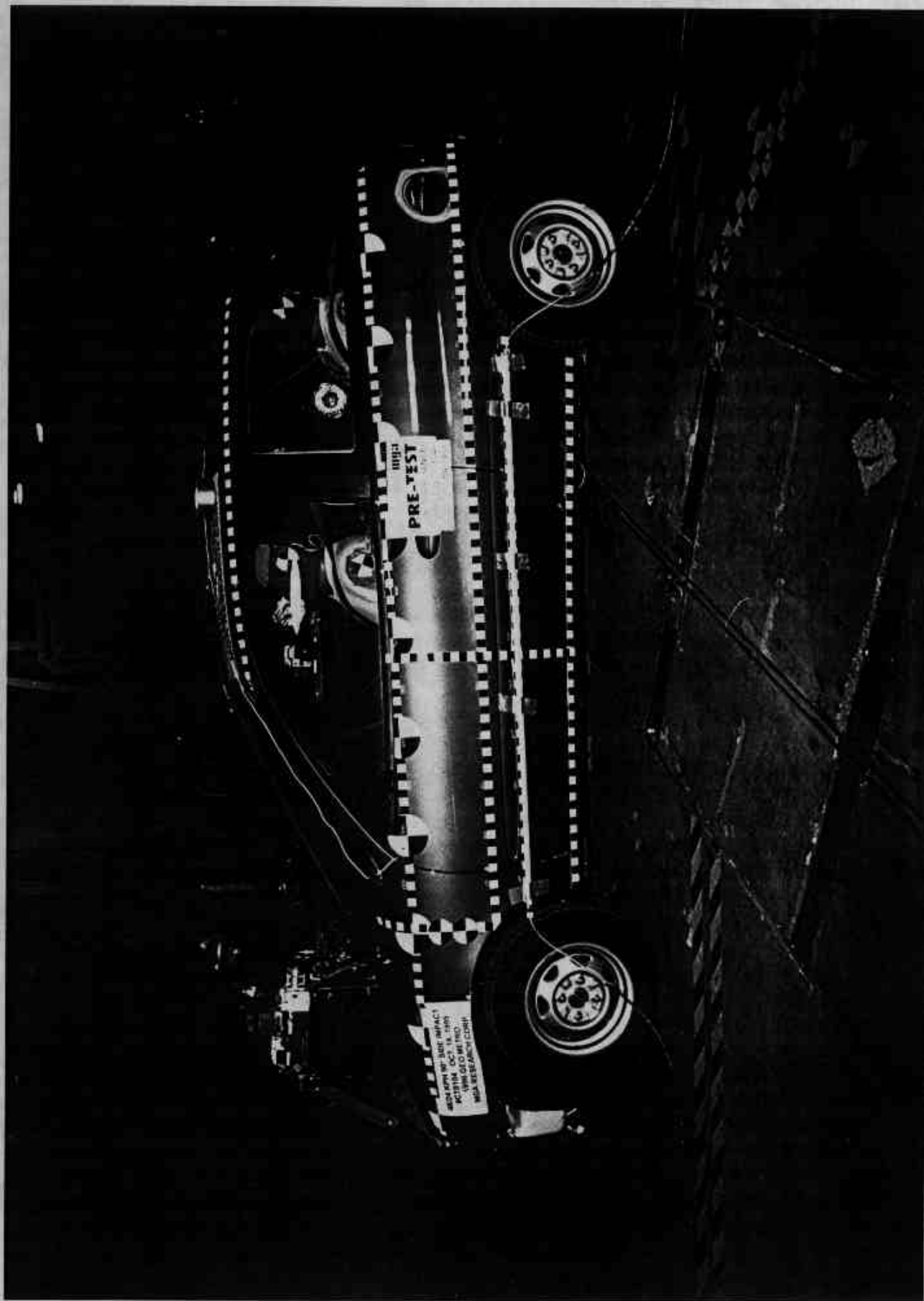


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

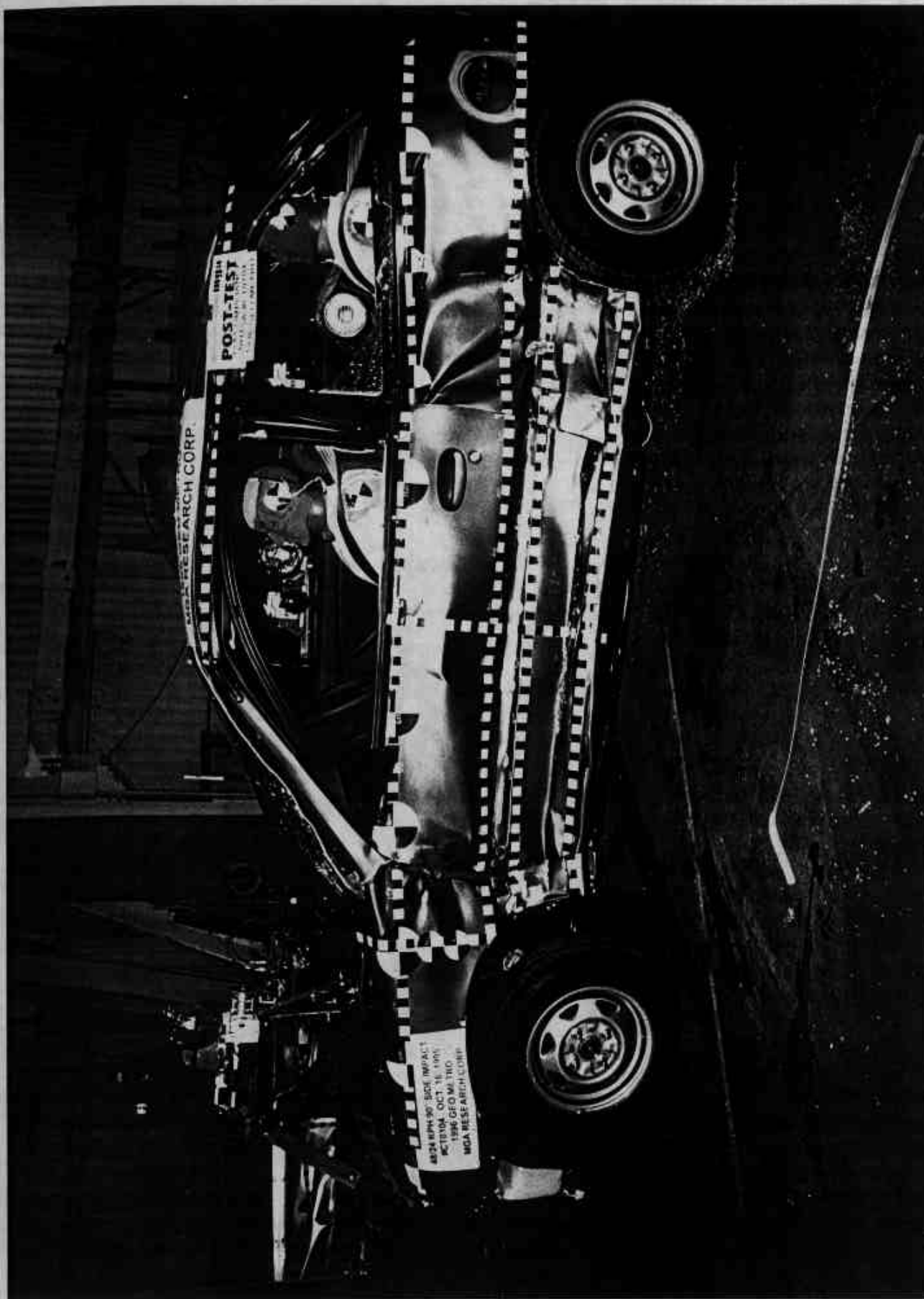


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

mga
PRE-TEST
241 COMPLIANCE
FSA #CT0104
1996 GEO METRO

48/24 KPH 90° SIDE IMPACT
#CT0104 OCT. 16, 1995
MGA RESEARCH CORP.

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

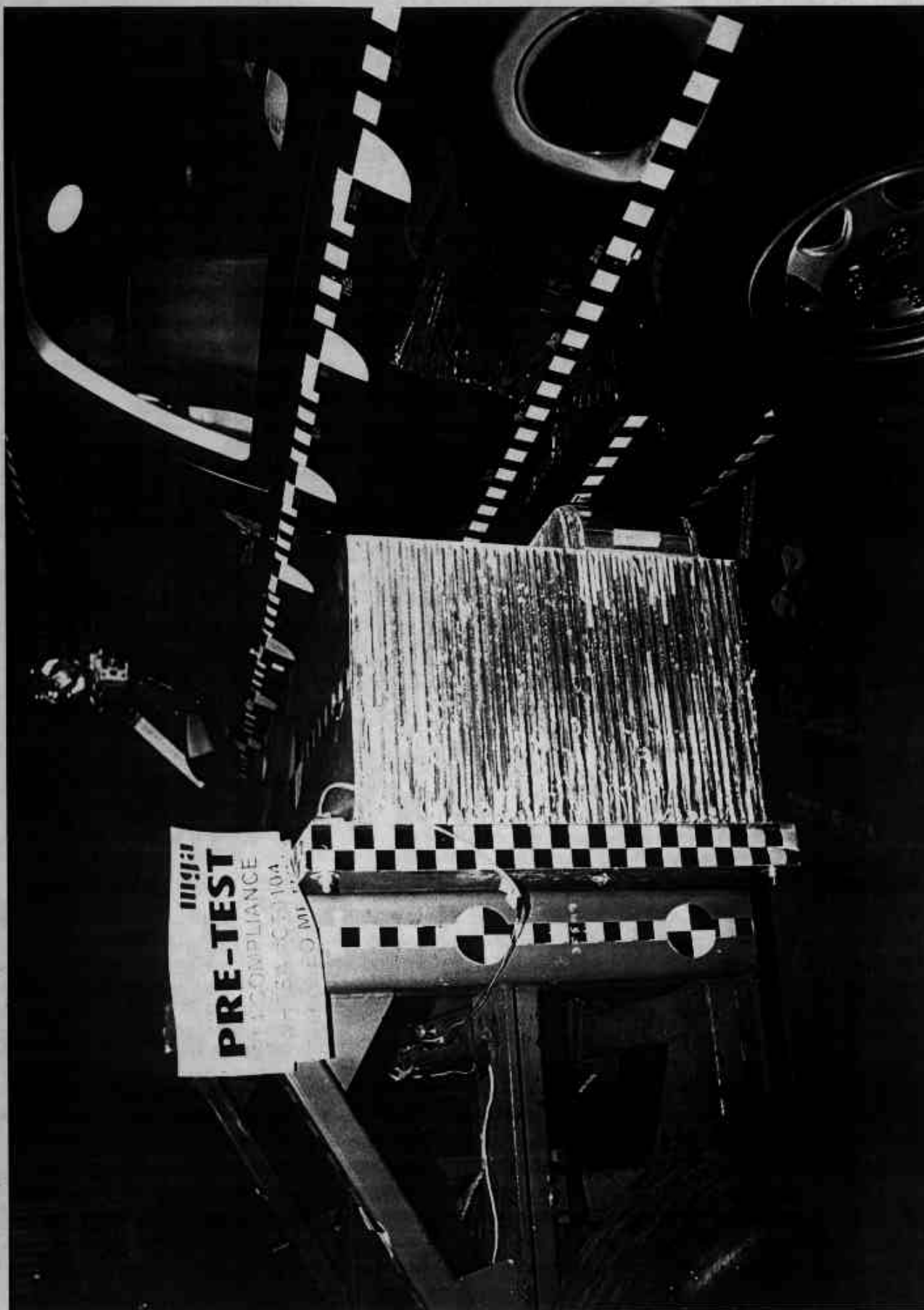


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)



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



A-10

Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

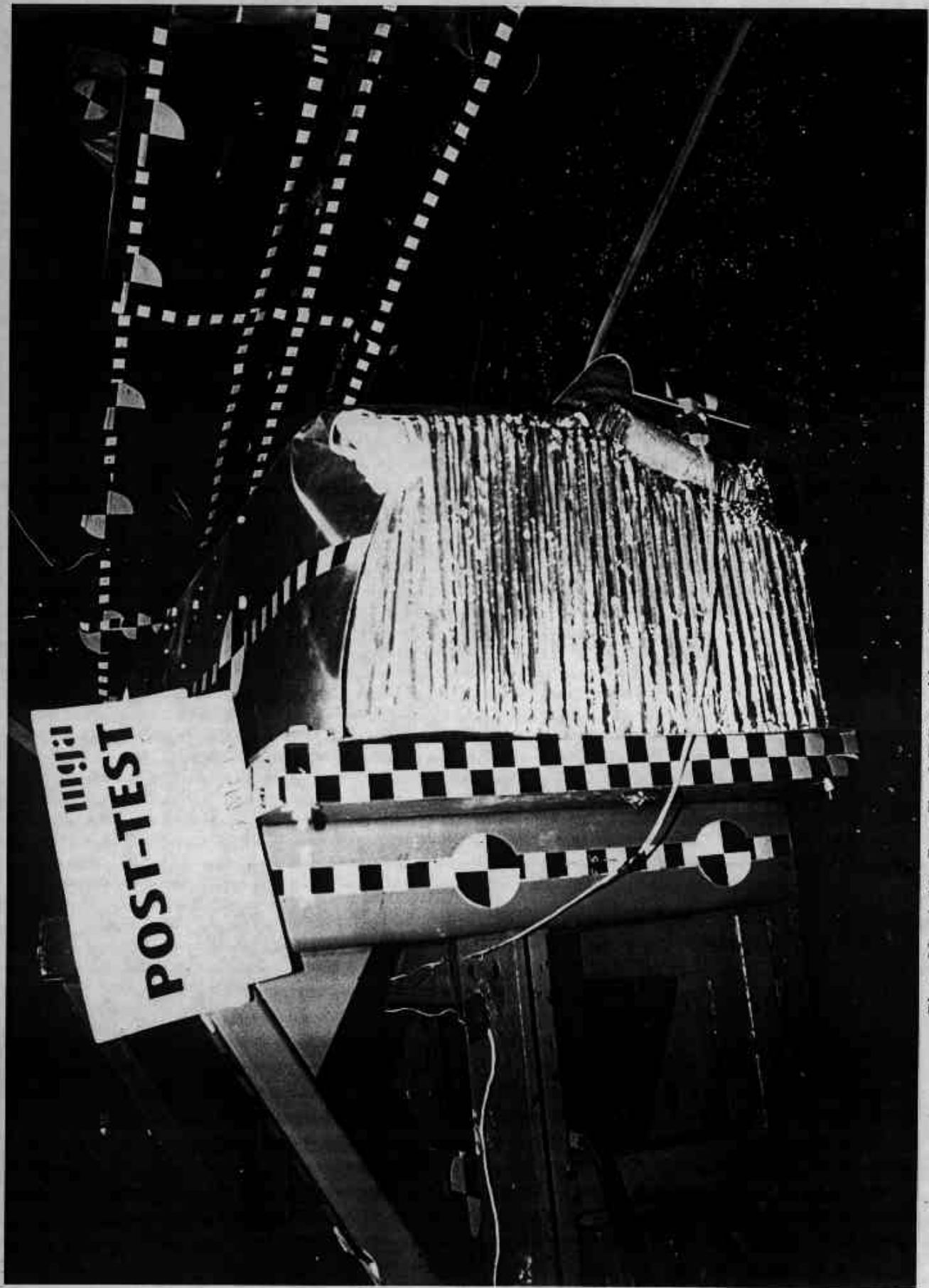


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

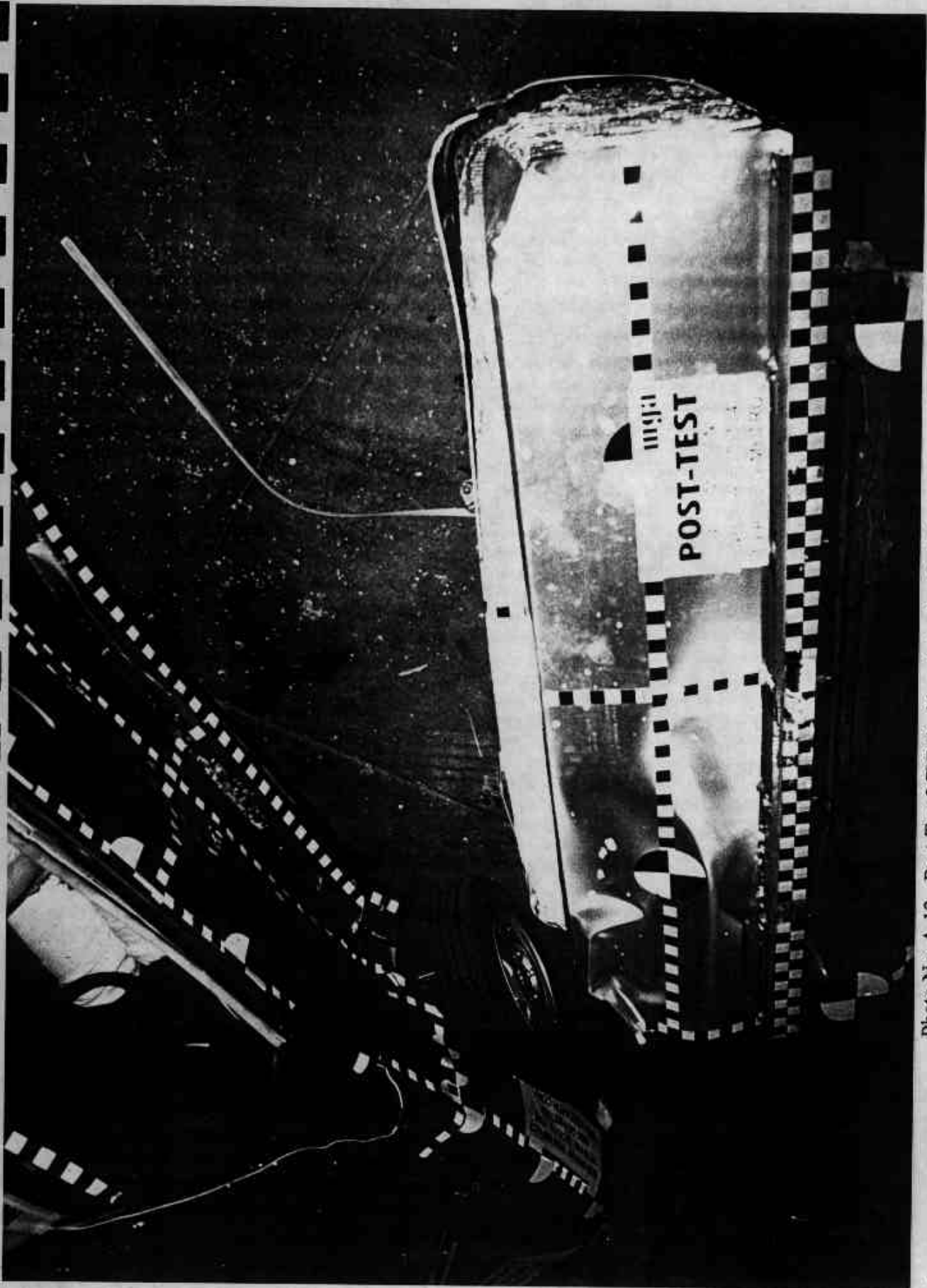
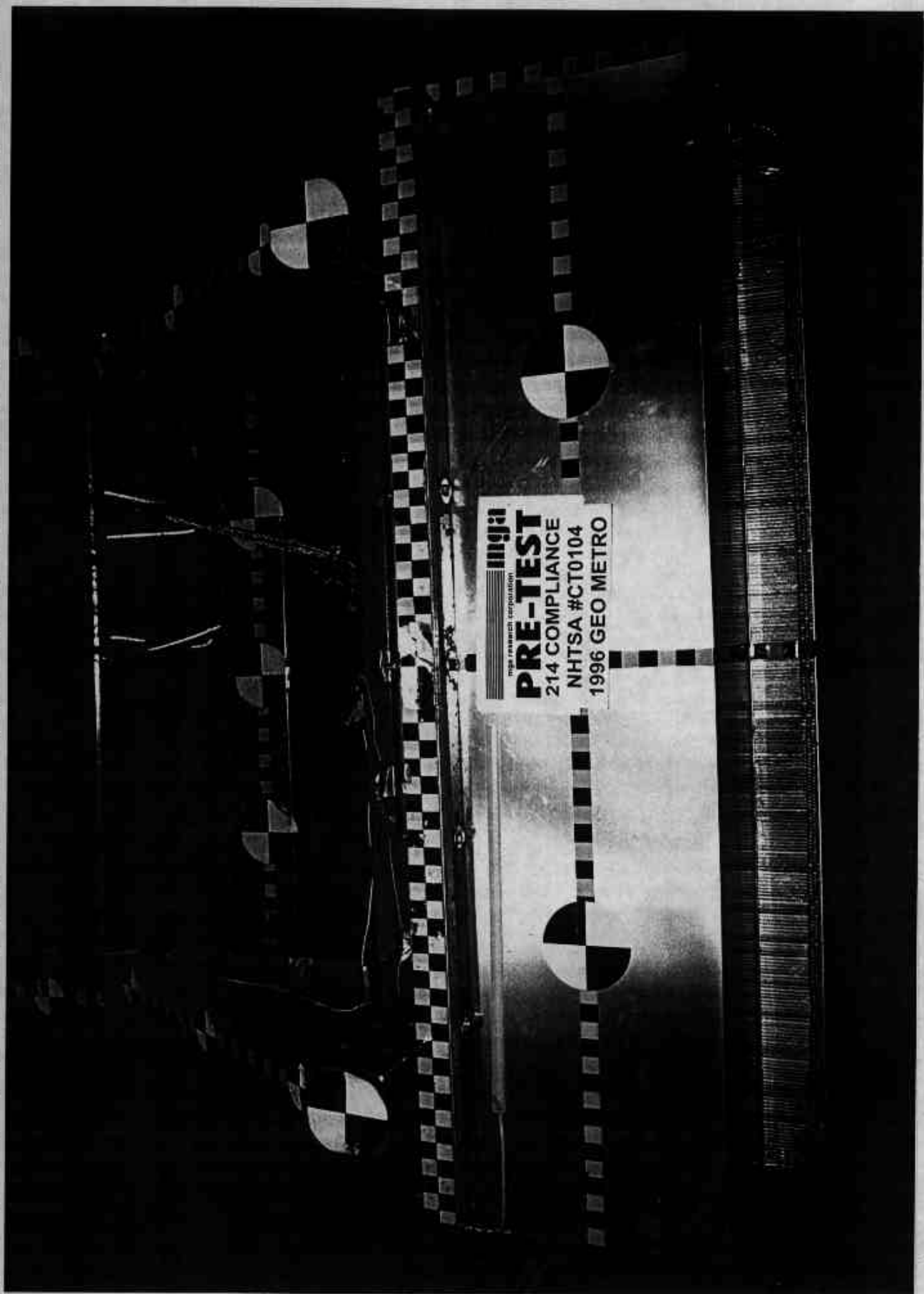


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View



A-13

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

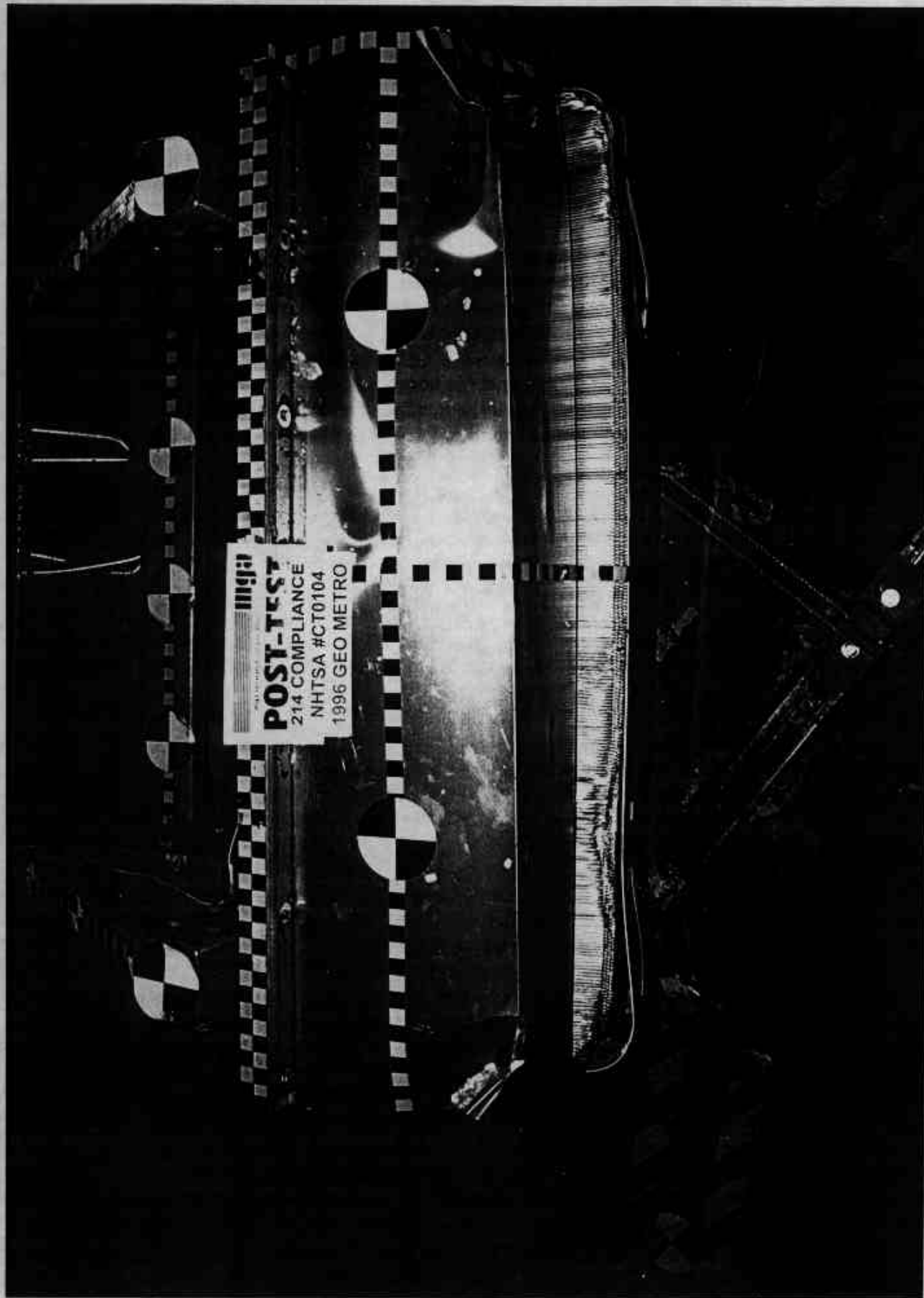


Photo No. A-14 - Post-Test MDB Top View

POST-TEST
SIA COMPLIANCE
NHTSA #CT0104
1996 GEO METRO

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

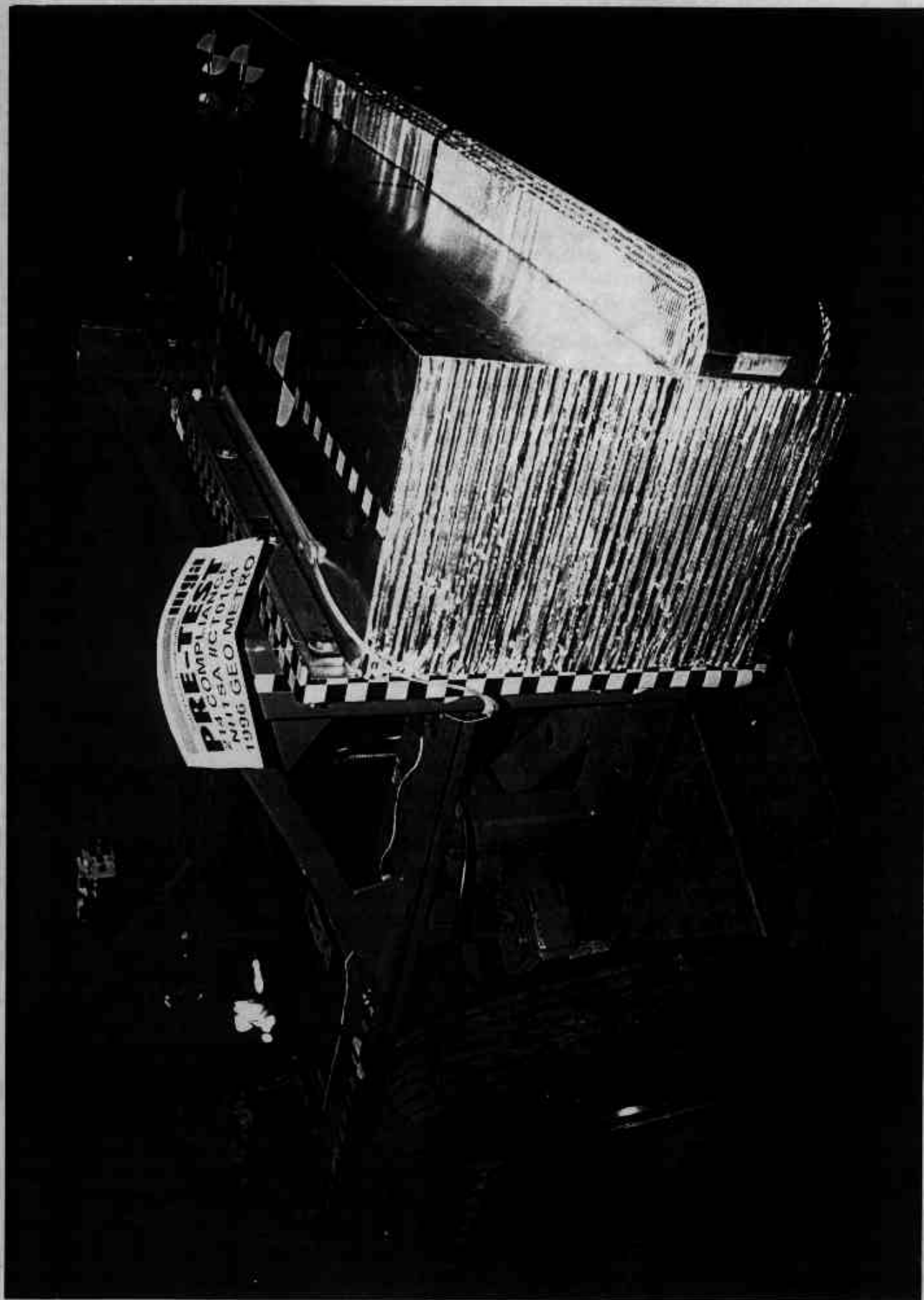


Photo No. A-17 - Pre-Test MDB Right Side View

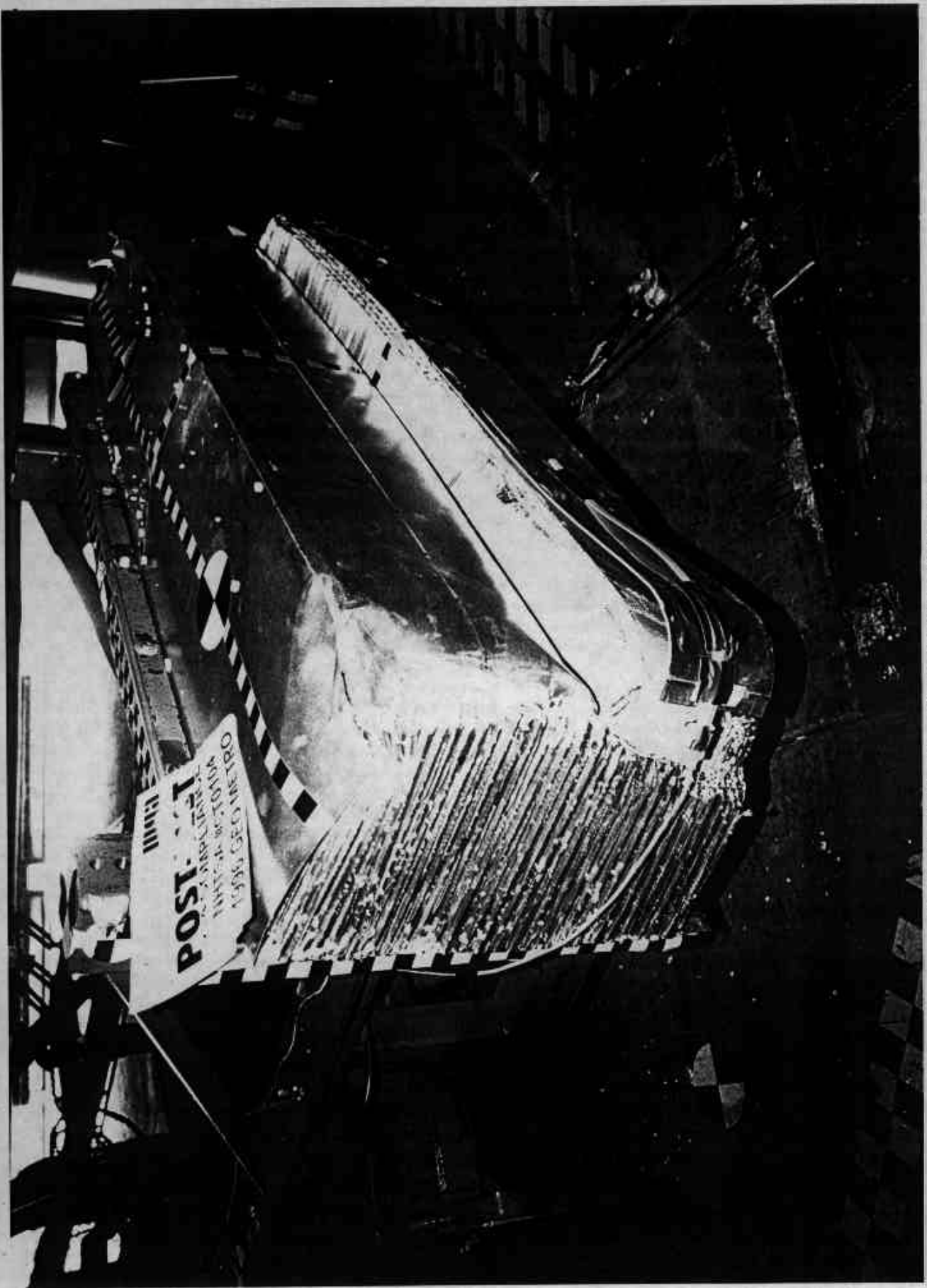


Photo No. A-18 - Post-Test MDB Right Side View

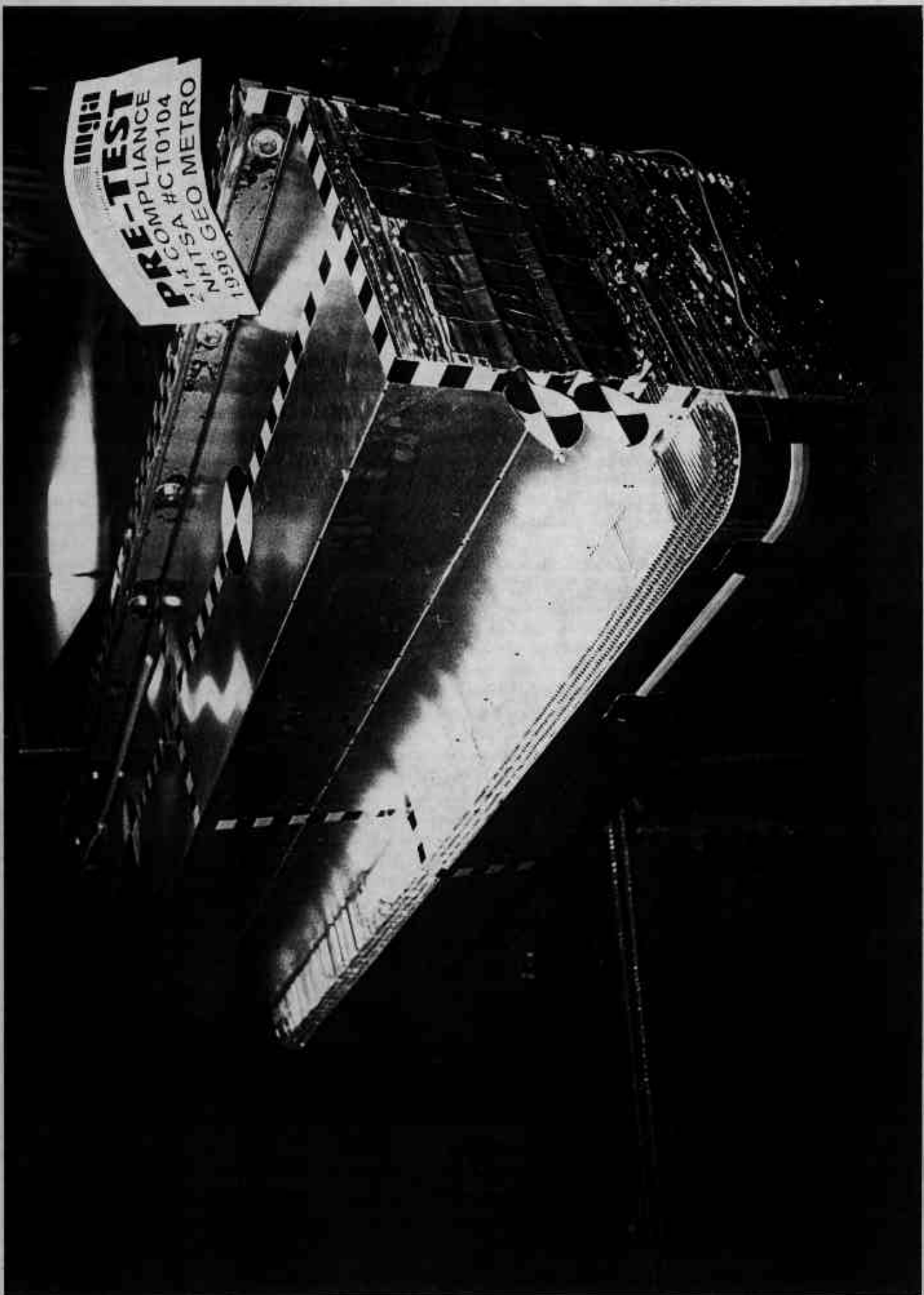


Photo No. A-19 - Pre-Test MDB Left Side View

POST-TEST
214 COMPLIANCE
NHTSA #CT0104
1996 GEO METRO

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



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

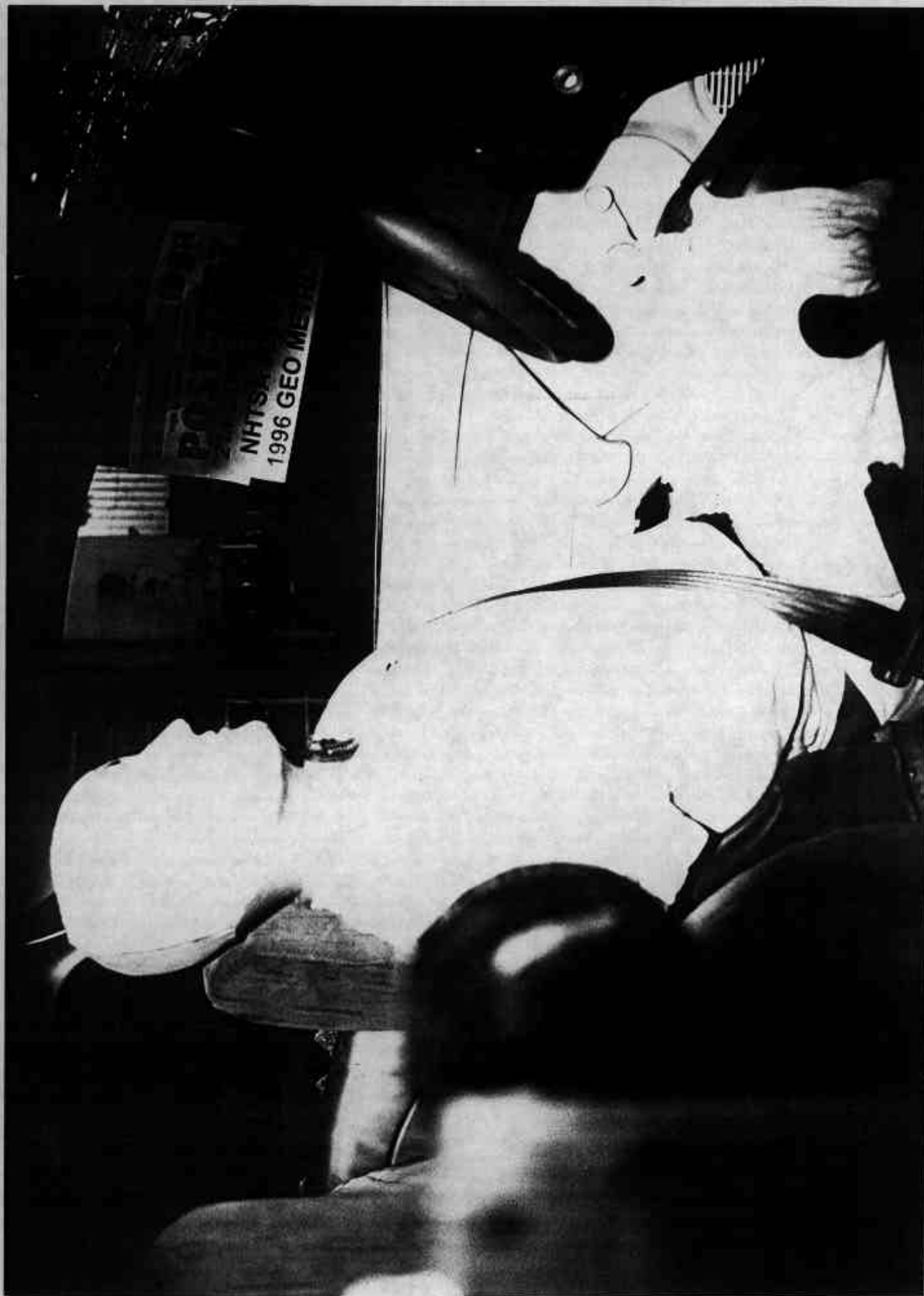


Photo No. A-22 - Post-Test Driver Dummy Right Side View

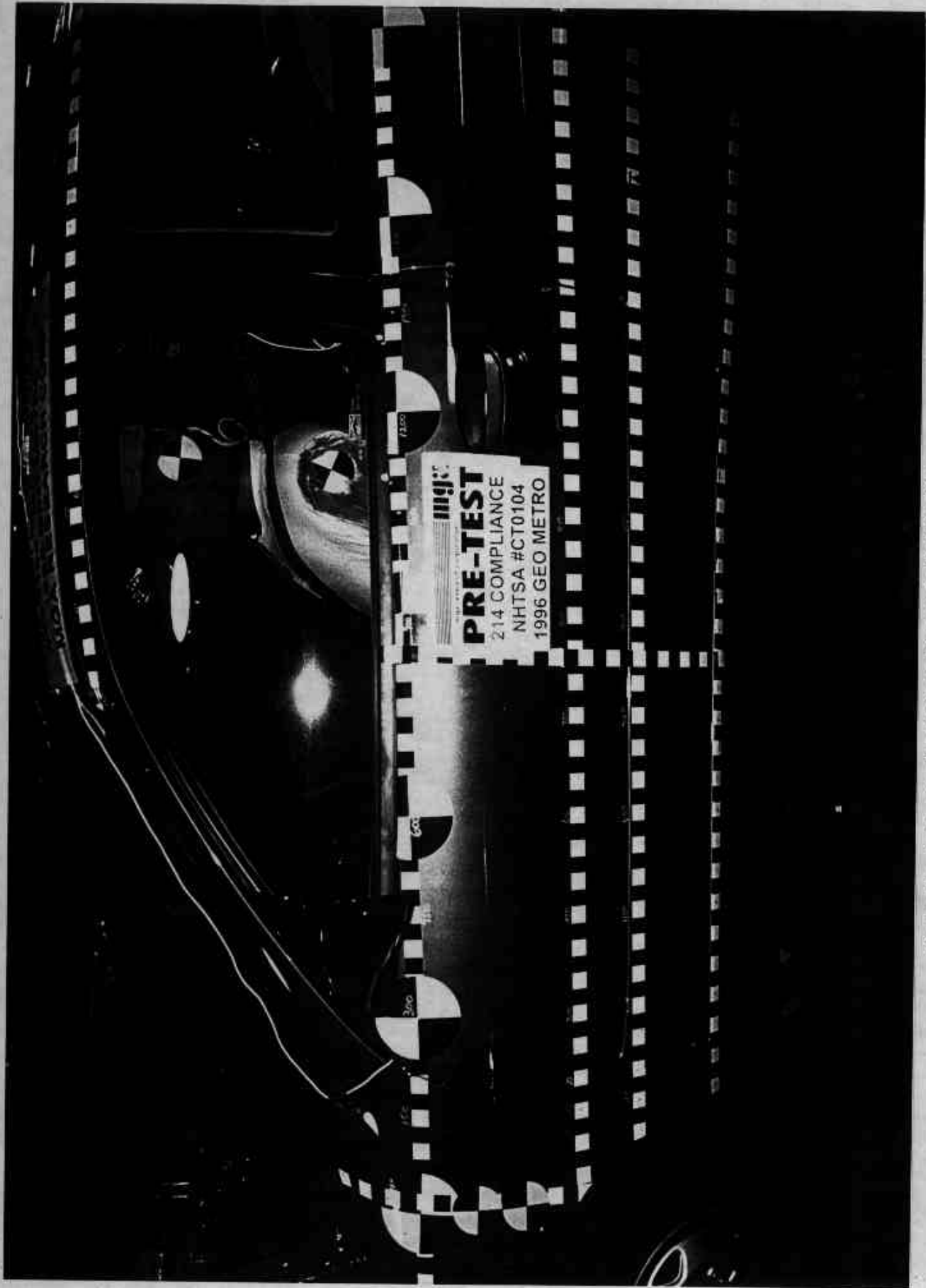


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

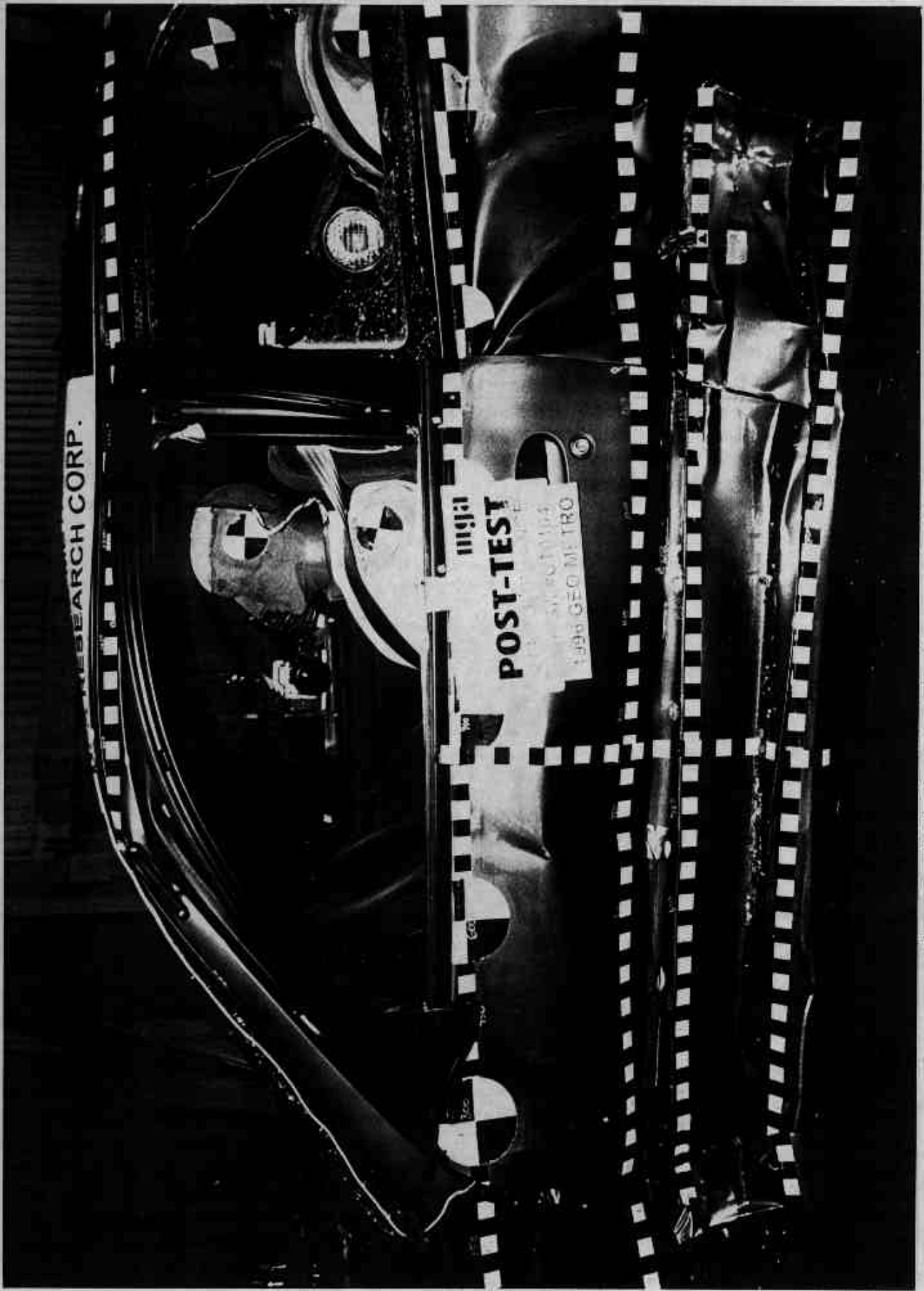


Photo No. A-24 - Post-Test Driver Dummy Left Side View

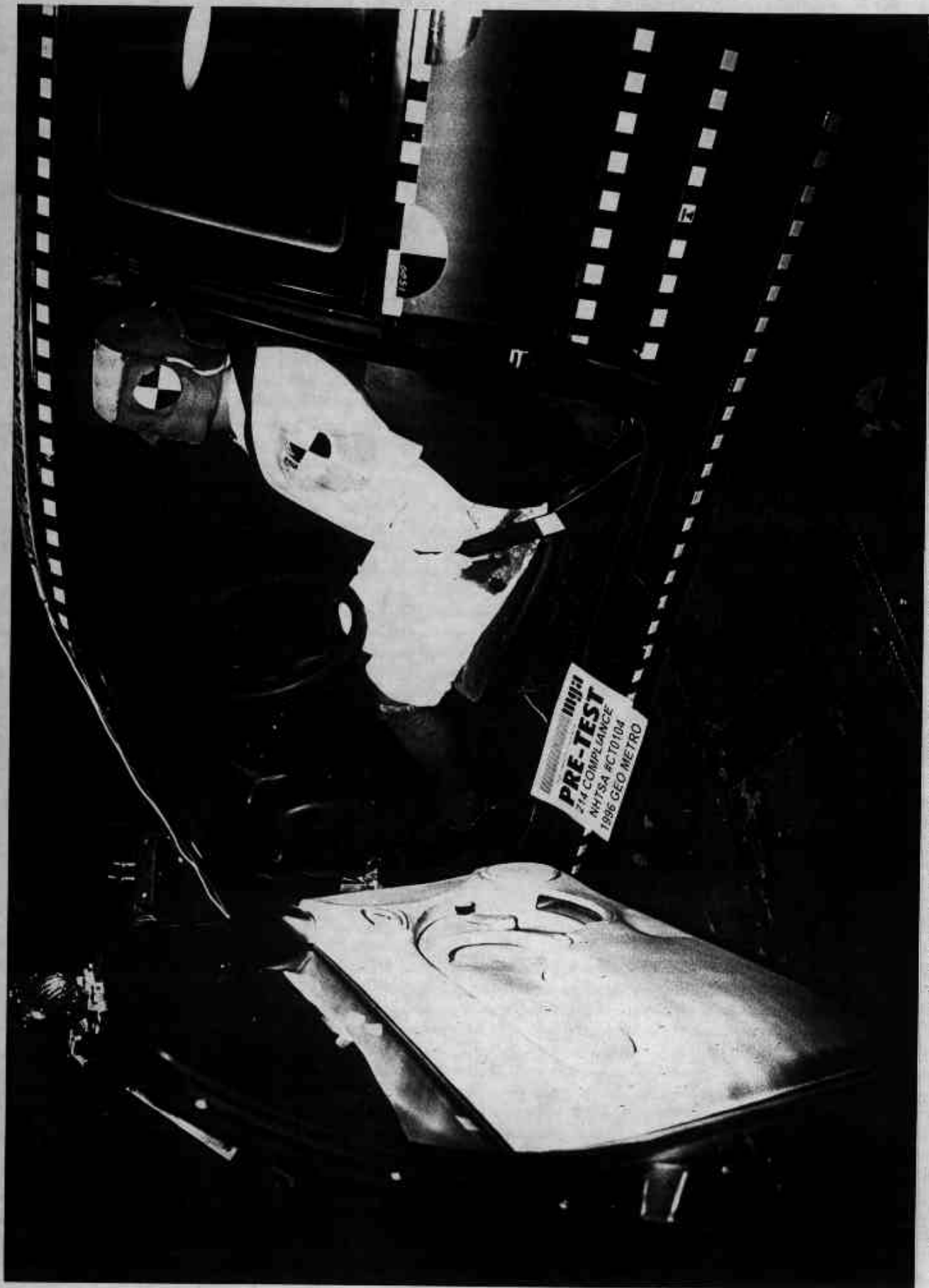


Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)



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

POST-TEST
COMPLIANCE

11/11/11

11/11/11



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

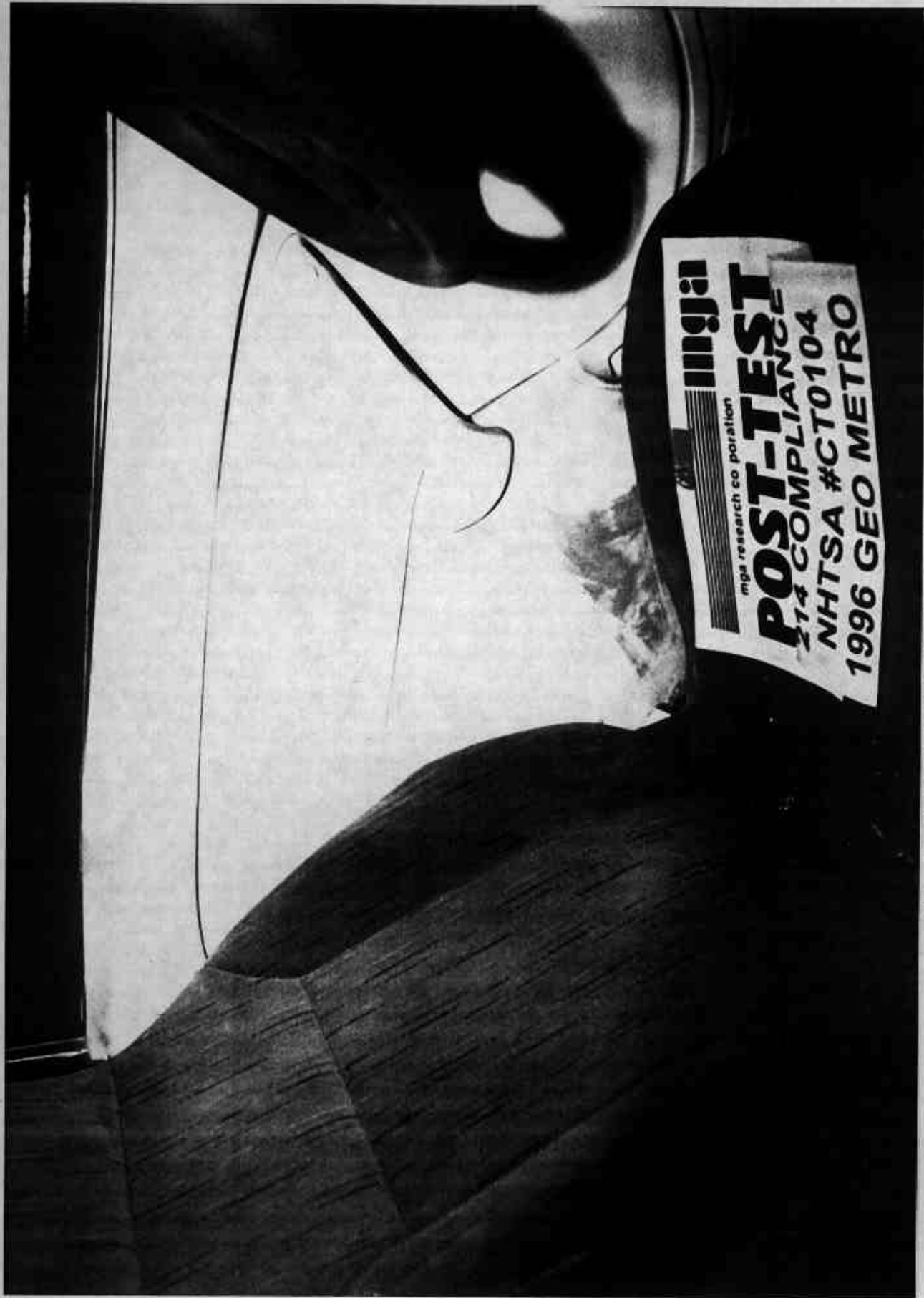


Photo No. A-28 - Post-Test Driver Dummy Contact



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



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

A-30

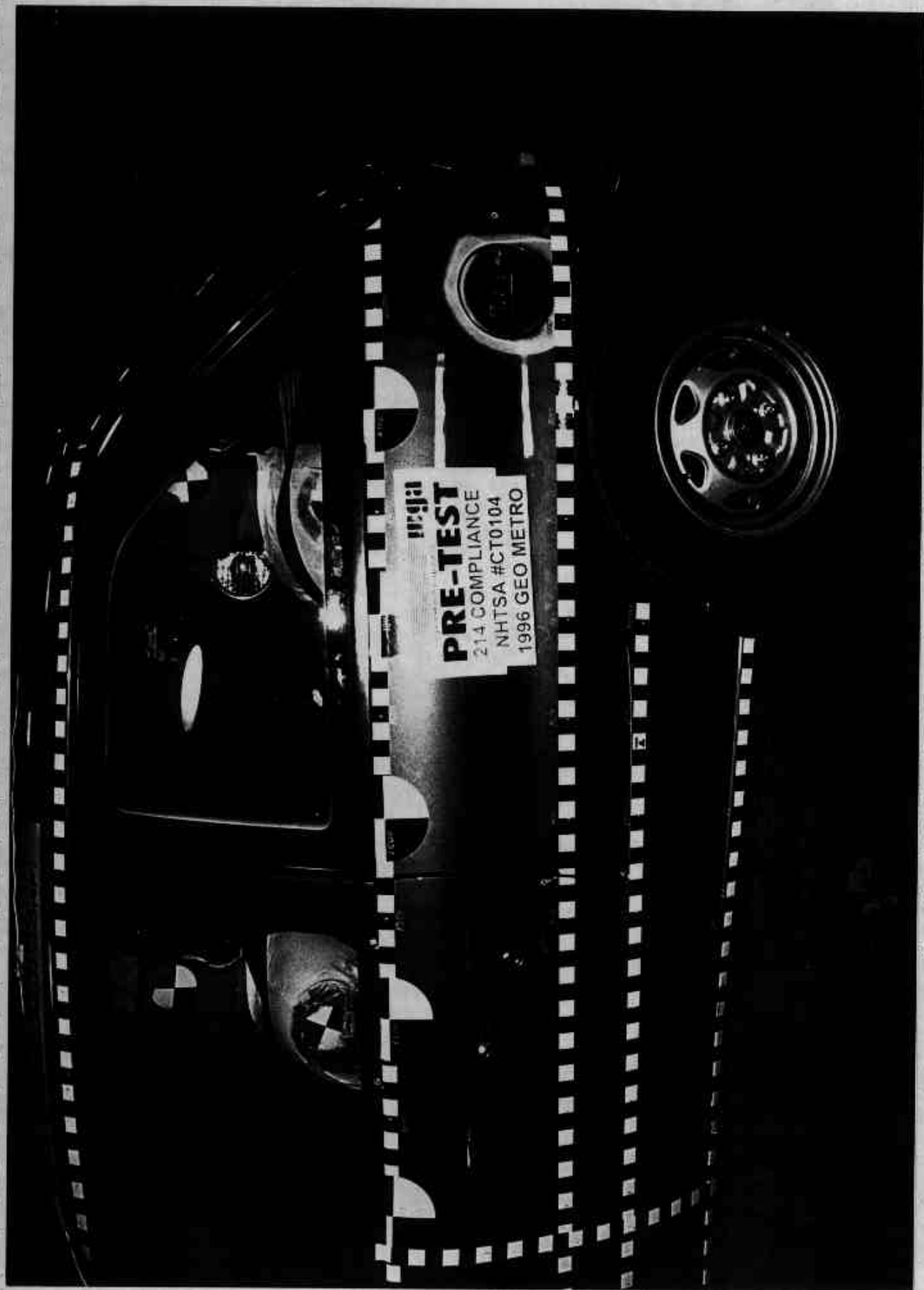


Photo No. A-31 - Pre-Test Passenger Dummy Left Side View

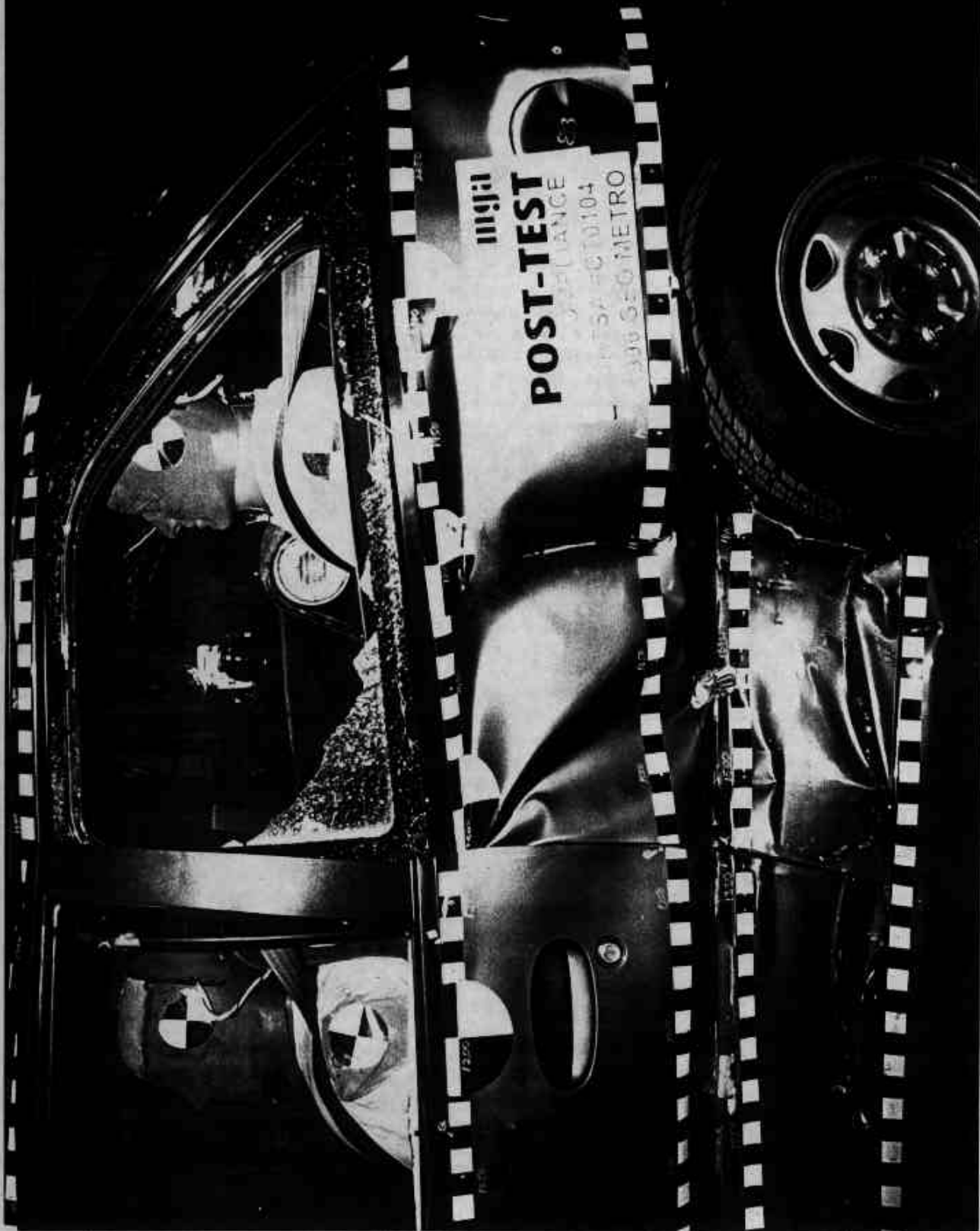


Photo No. A-32 - Post-Test Passenger Dummy Left Side View



Photo No. A-33 - Pre-Test Passenger Dummy Shoulder and Door Top View

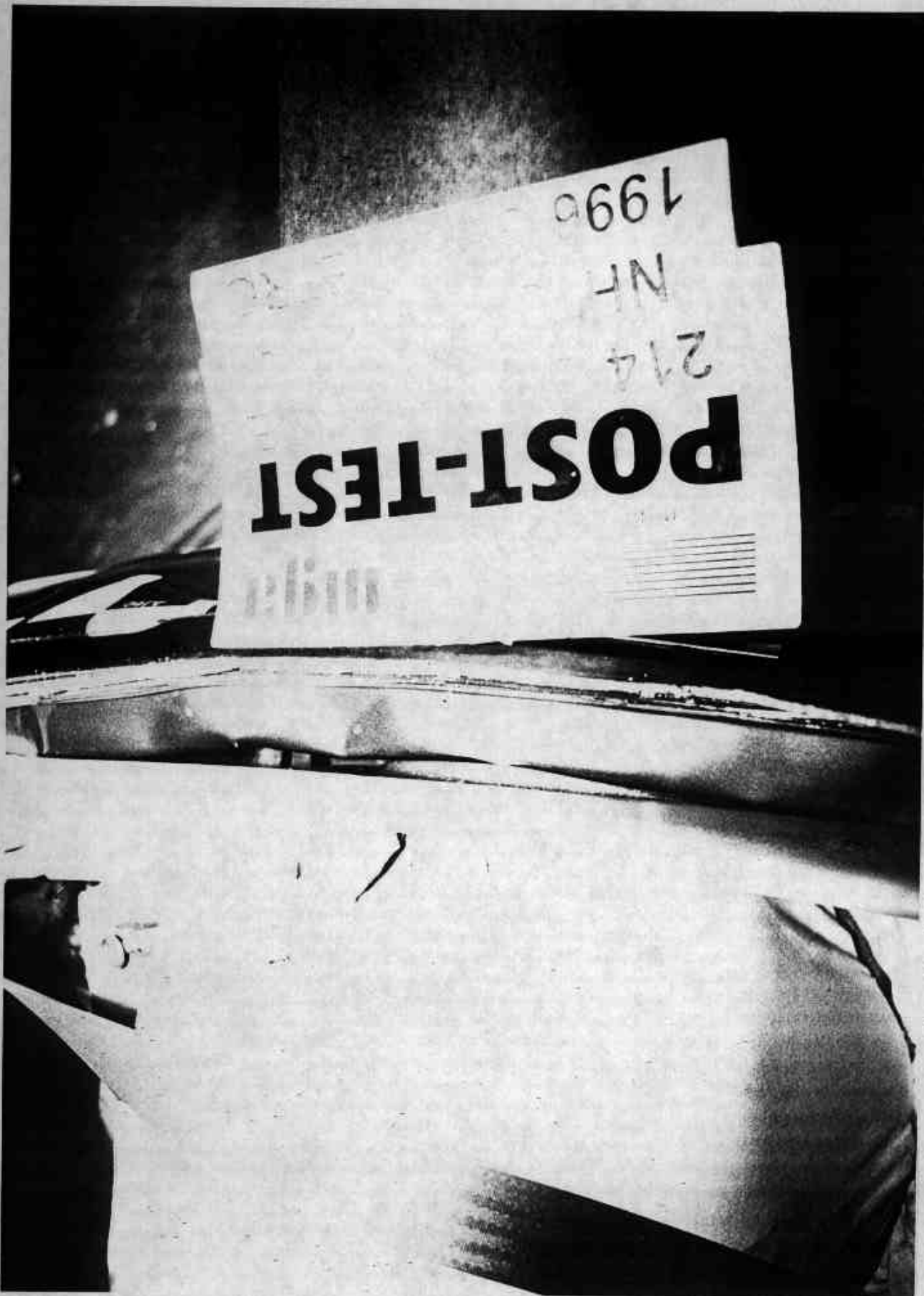


Photo No. A-34 - Post-Test Passenger Dummy Shoulder and Door Top View



Photo No. A-35 - Post-Test Passenger Dummy Contact

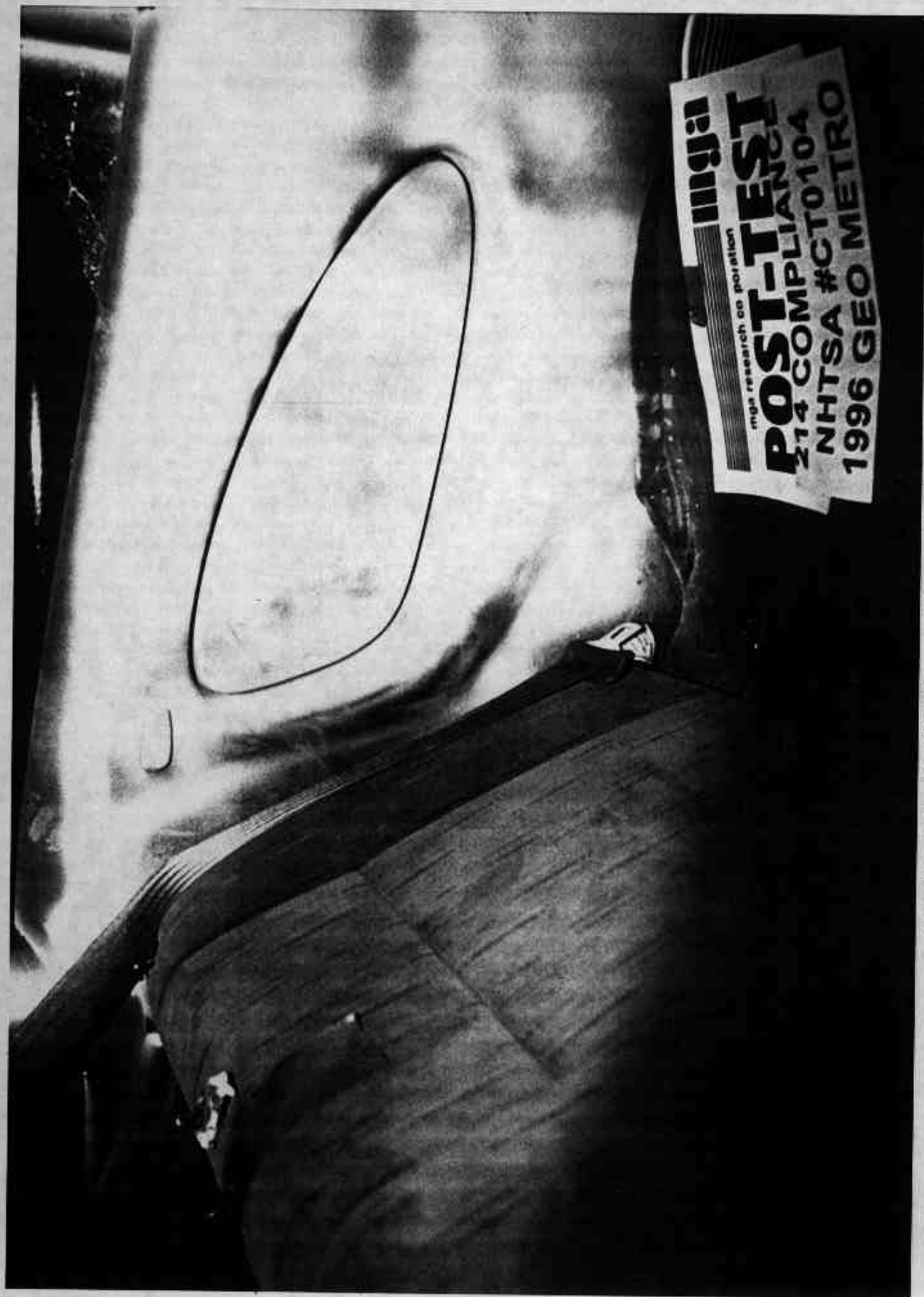


Photo No. A-36 - Post-Test Passenger Dummy Contact



POST-TEST
214 COMPLIANCE
VHTSA #CT0104
196 GEO METRO

A-37

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

RECOMMENDED		79761-50310	
FRONT	REAR	SPARE TIRE	
TIRE SIZE		P155/80R13 T115/70D14	
COLD TIRE PRESSURE		32 PSI 60 PSI	
AT MAX. LOAD		220 kPa 420 kPa	
VEHICLE CAPACITY			
MAX. LOAD (LBS.)		688 (OCCUPANTS PLUS CARGO)	
OCCUPANTS		FRONT 2 REAR 2	
SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION.			

MFD. BY CAMI-AUTOMOTIVE INC. CANADA
 DATE 08/95
 GVWR 2590LB
 1175KG
 GAWR FR 1399LB
 635KG
 GAWR RR 1234LB
 560KG

THIS VEHICLE CONFORMS TO ALL
 APPLICABLE U.S. FEDERAL MOTOR VEHICLE
 SAFETY, BUMPER, AND THEFT PREVENTION
 STANDARDS IN EFFECT ON THE DATE OF
 MANUFACTURE SHOWN ABOVE.

2C1MR2263T6705453
 PASSENGER CAR

YB4 USA

Photo No. A-38 - Vehicle Certification Label and Tire Placard

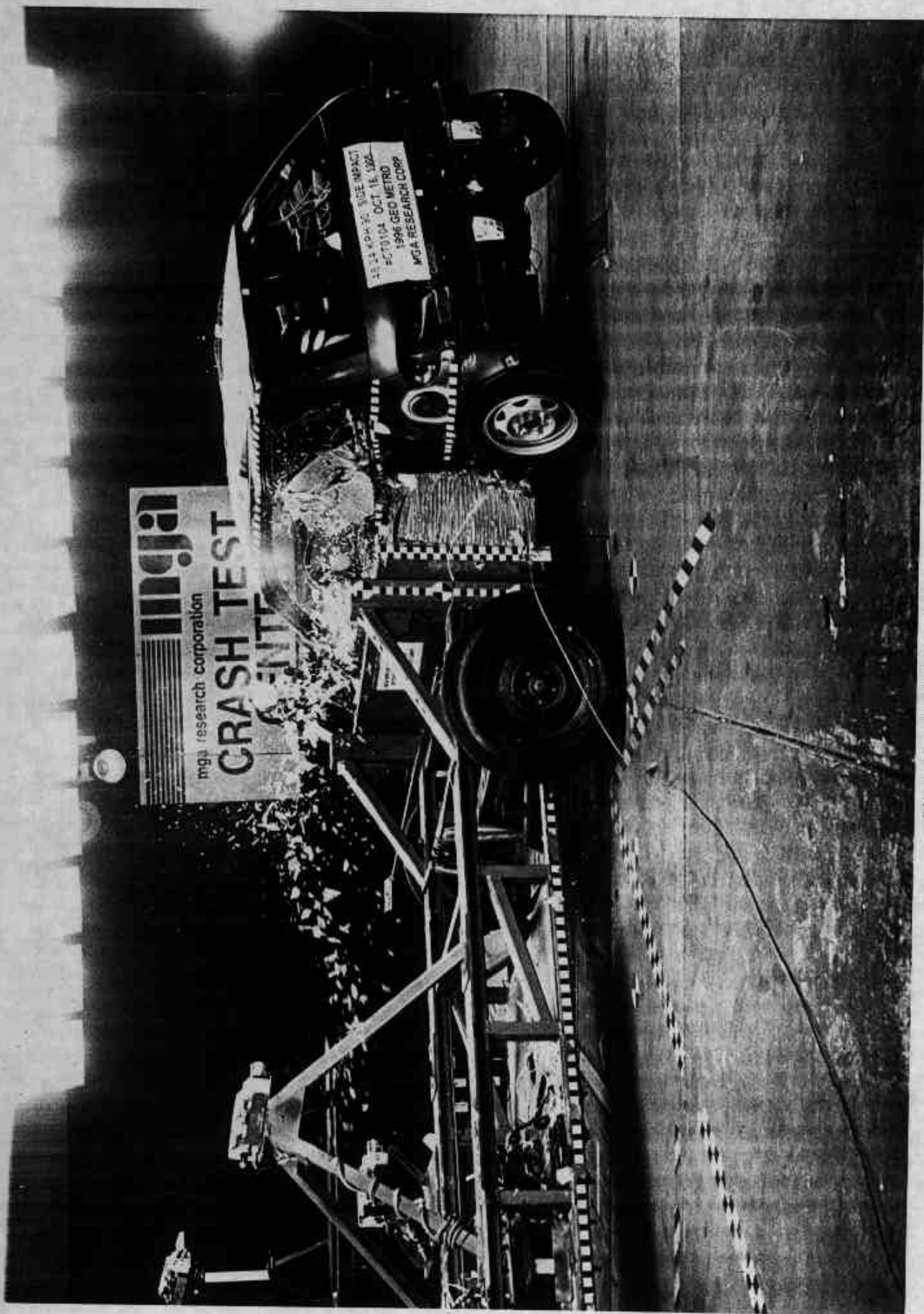
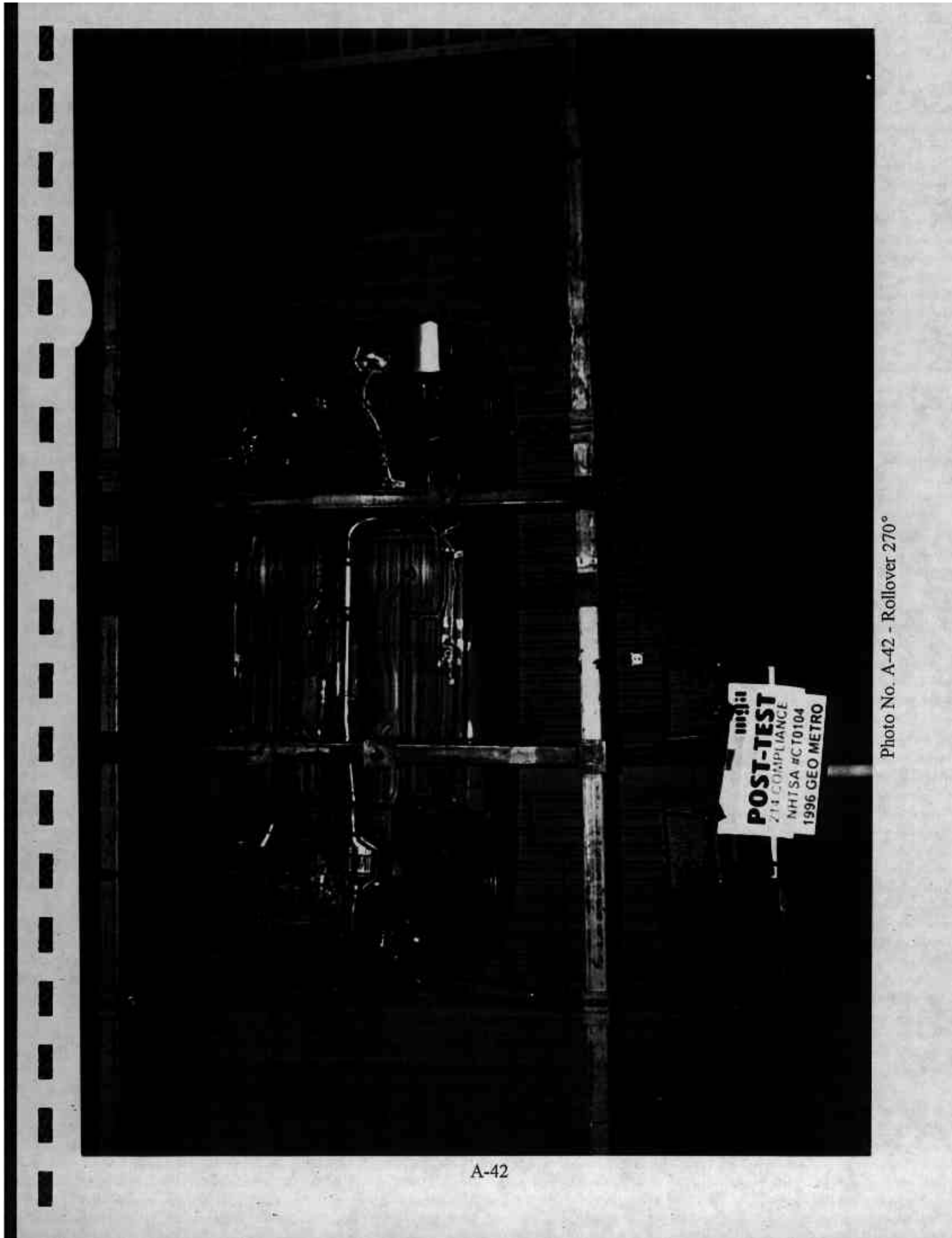


Photo No. A-39 - Impact



Photo No. A-41 - Rollover 180°

A-41



A-42

Photo No. A-42 - Rollover 270°



Photo No. A-43 - Rollover 360°

imga

PRE-TEST

COMPLIANCE

3A #CT0104

1996 GEO METRO

-360

-450

-600

48/24 KPH 90° SIDE IMPACT

#CT0104 OCT. 16, 1995

1996 GEO METRO

MGA RESEARCH CORP.



Photo No. A-44 - Left Front Attitude Point

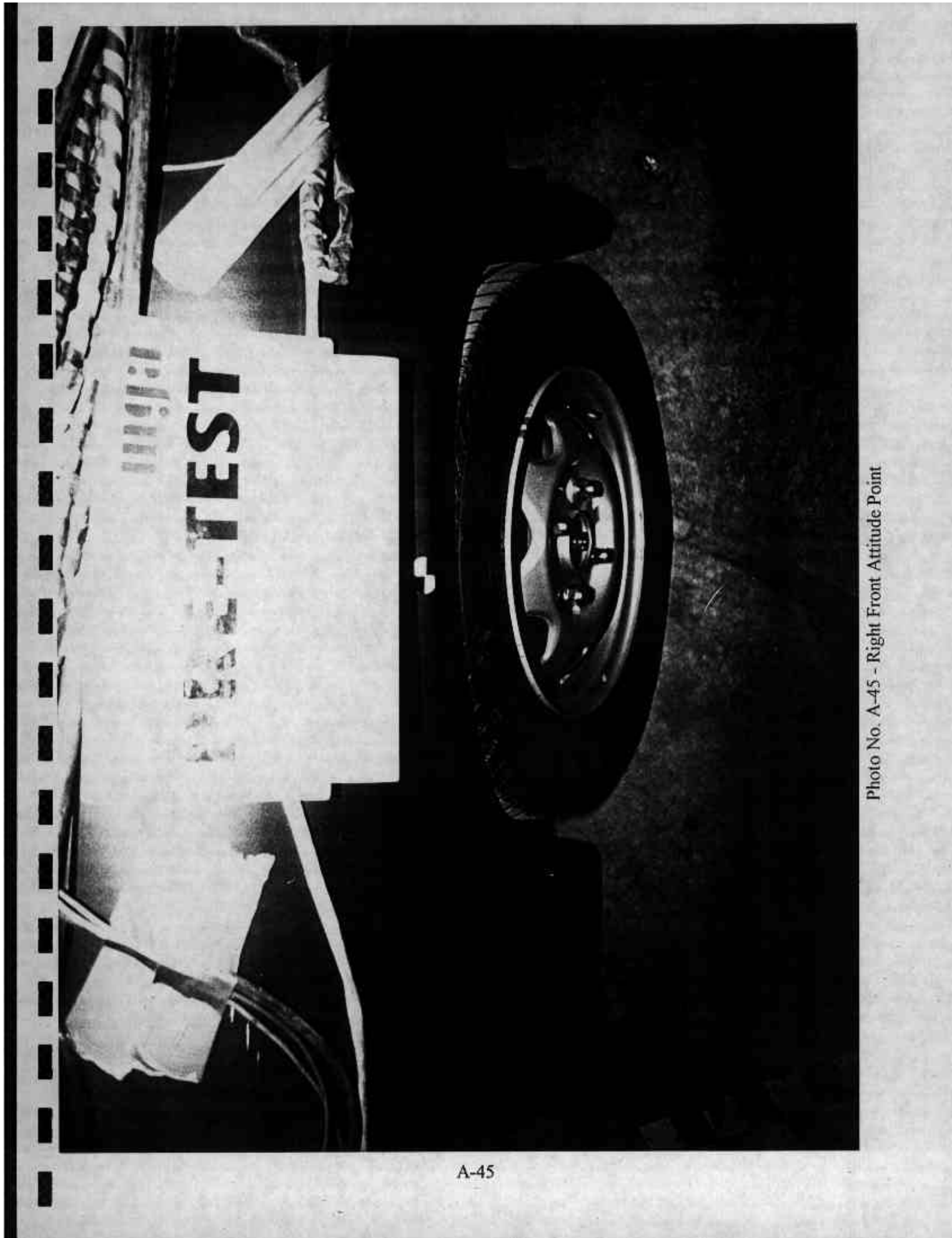


Photo No. A-45 - Right Front Attitude Point

A-45

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PRE-TEST

PLIANCE

CT0104

GEOMETRO

2400

1420

1820

A-46

Photo No. A-46 - Left Rear Attitude Point

11111111

PRE-TEST

STANCE

CT0104

U METRO

A-47

Photo No. A-47 - Right Rear Attitude Point

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* No valid data collected

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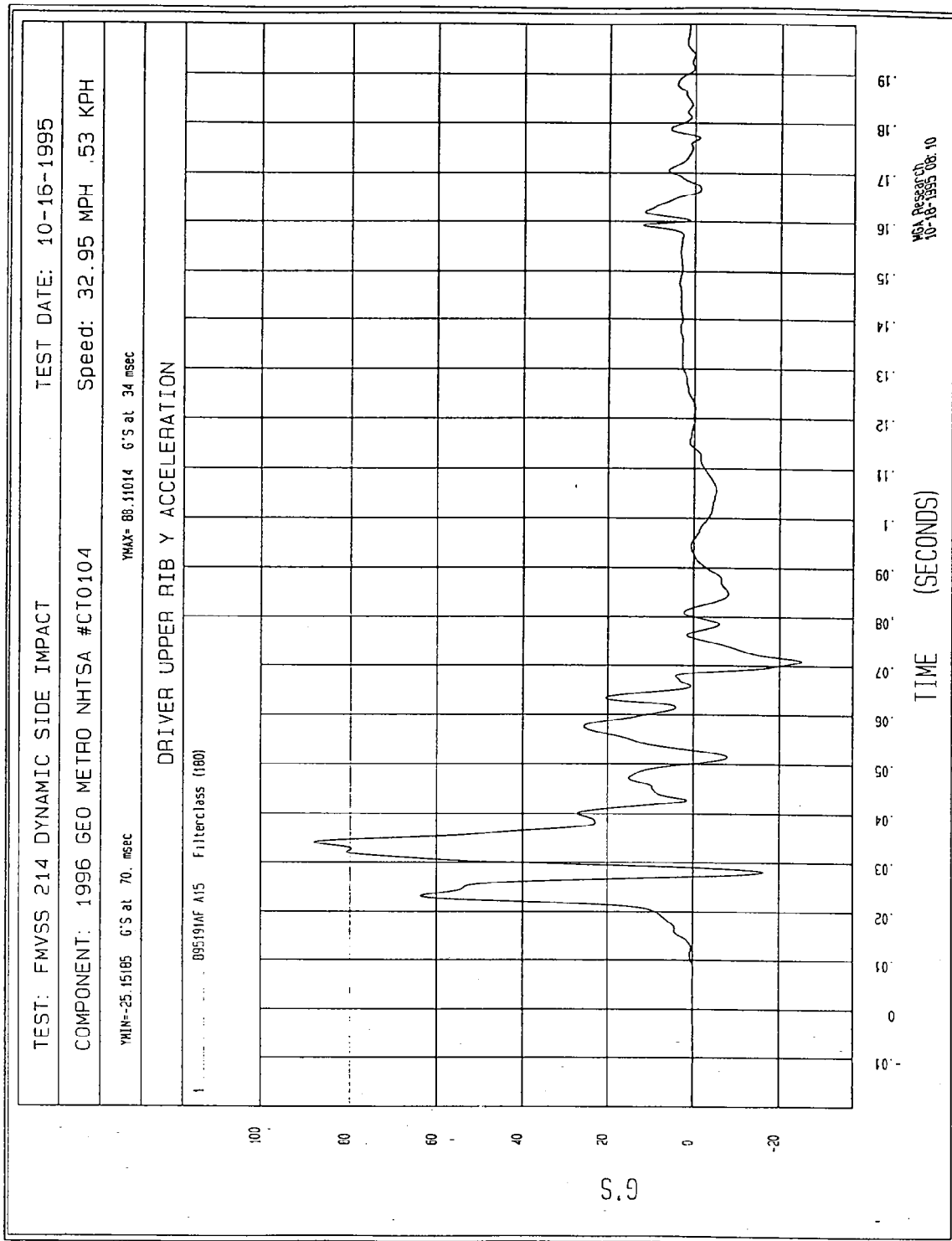


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time

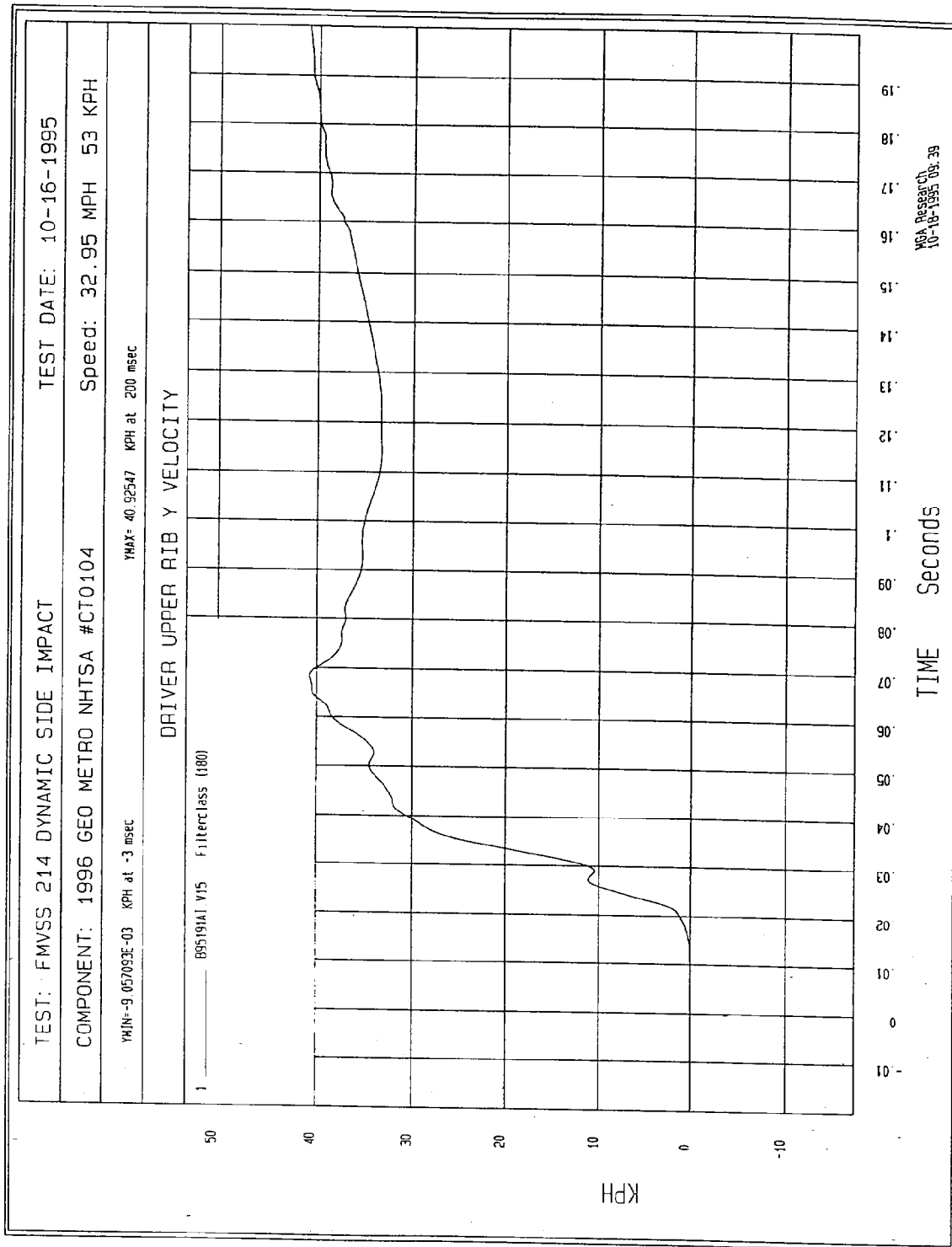


Figure B-2 - Driver Upper Rib Y Velocity vs. Time

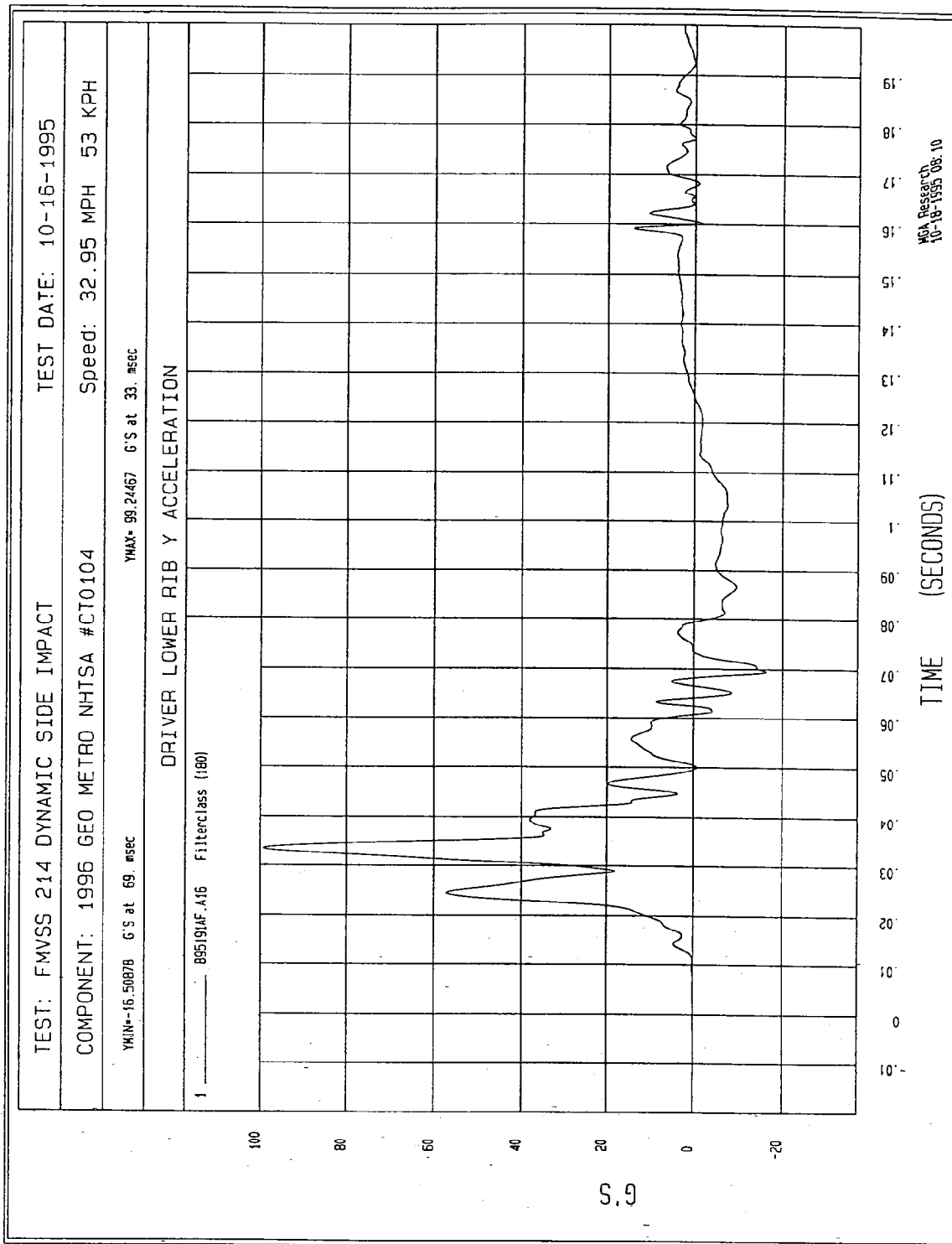


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

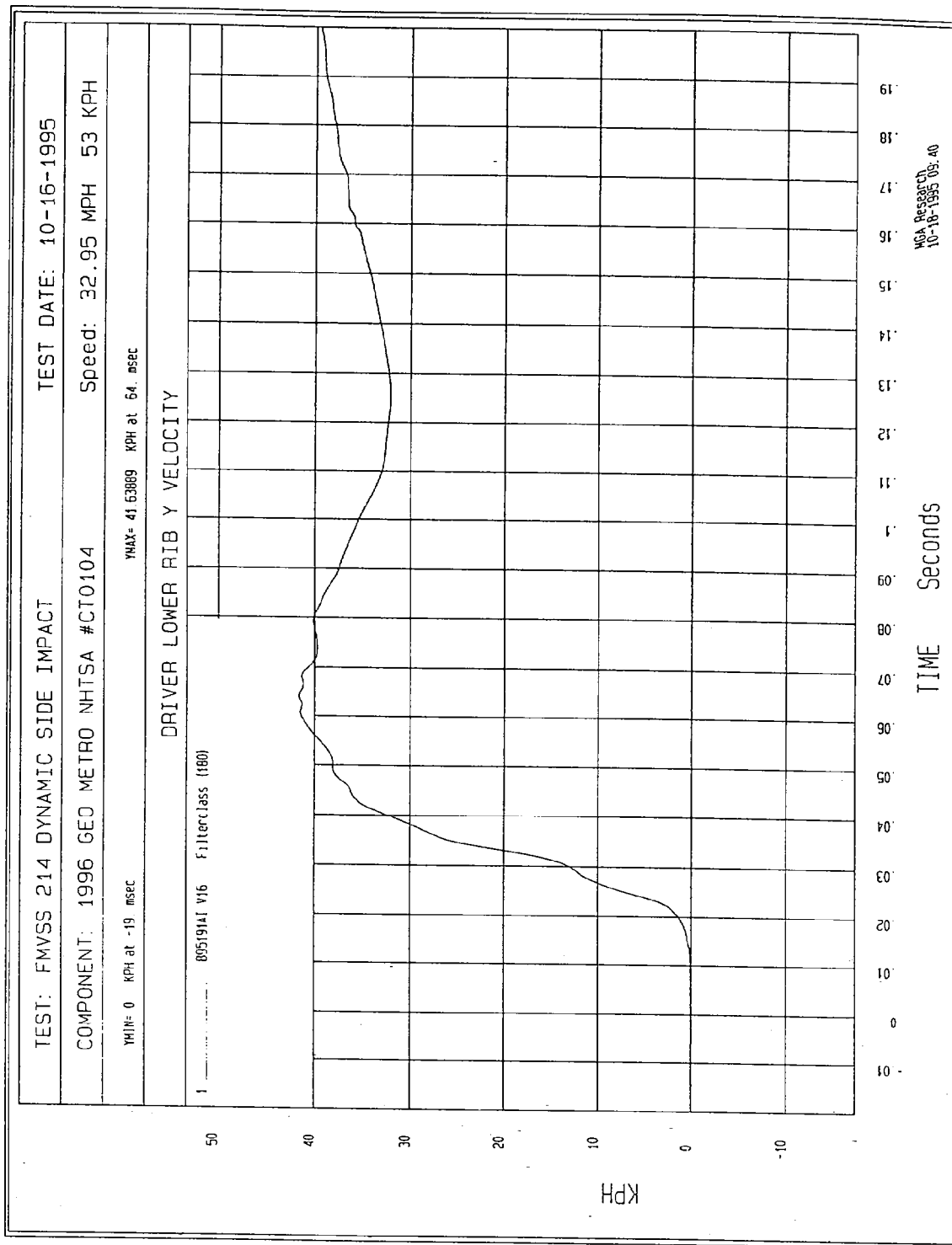


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

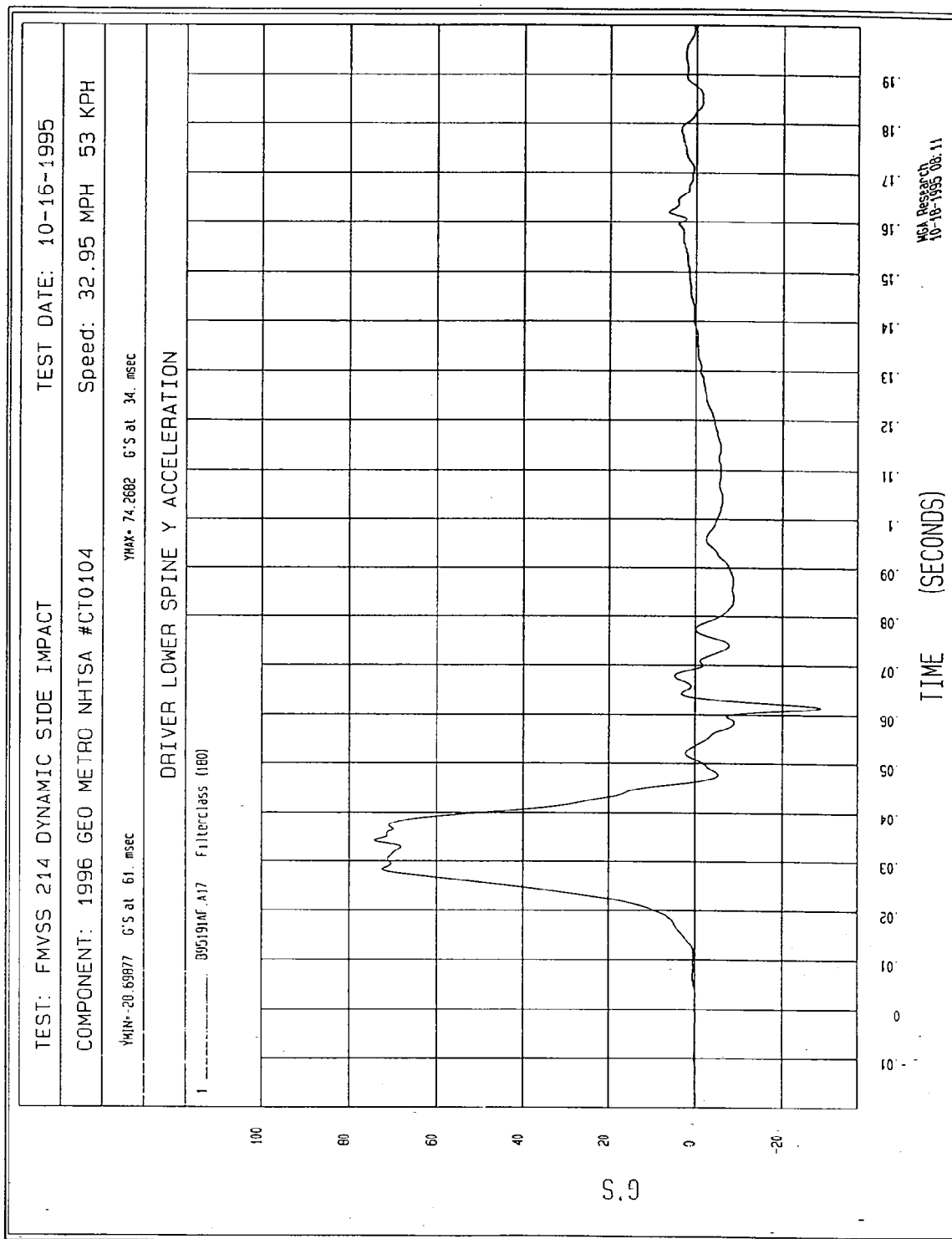
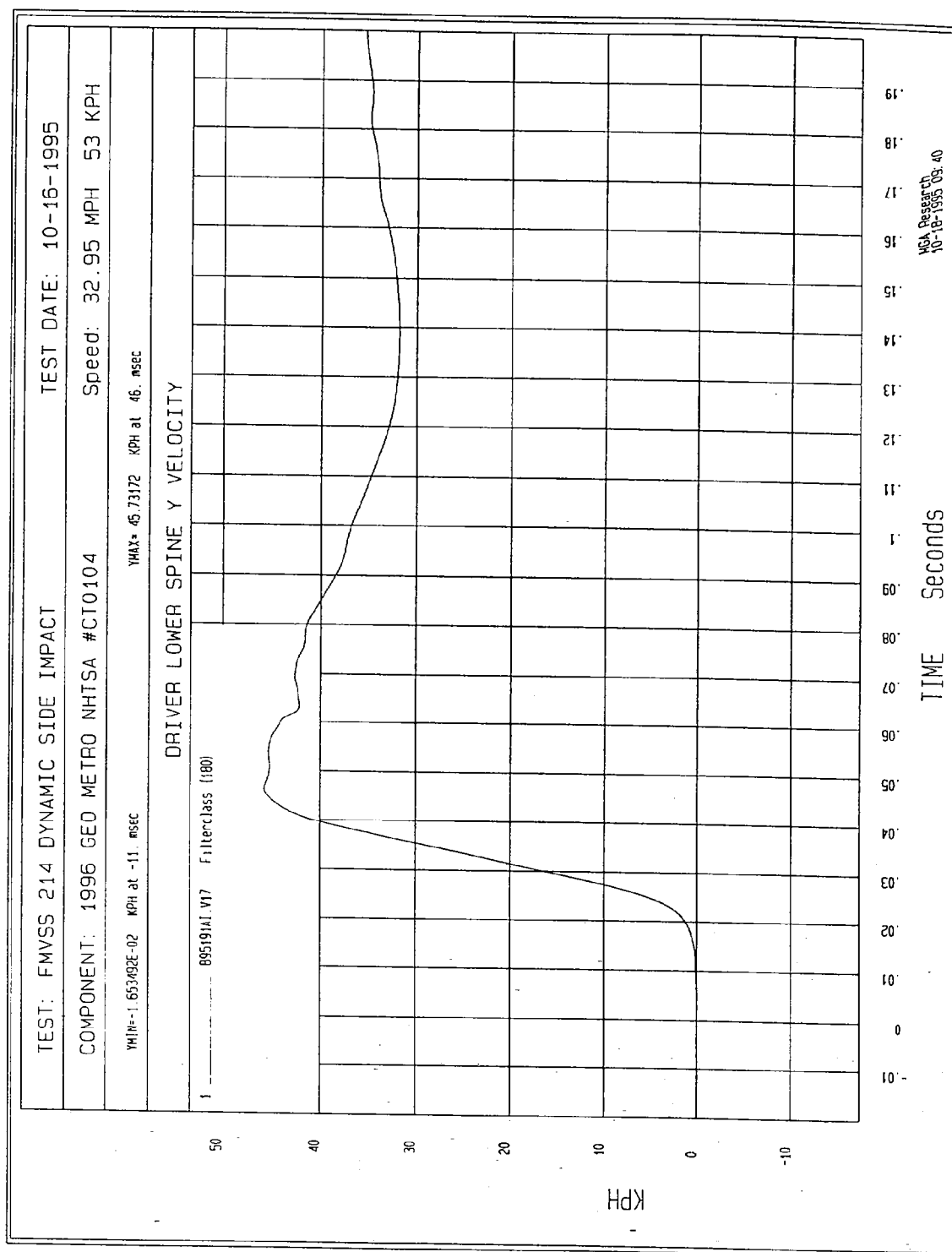


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time



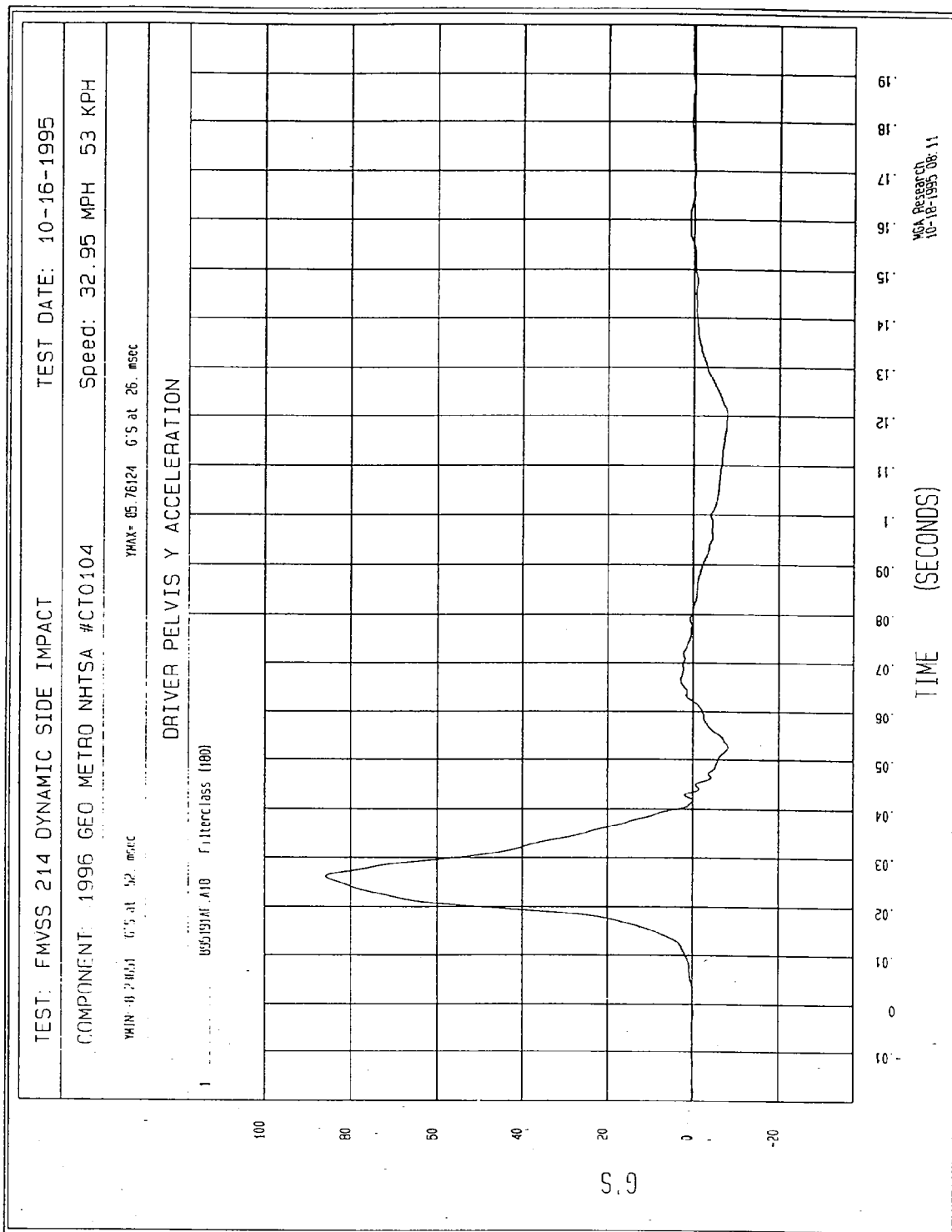


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

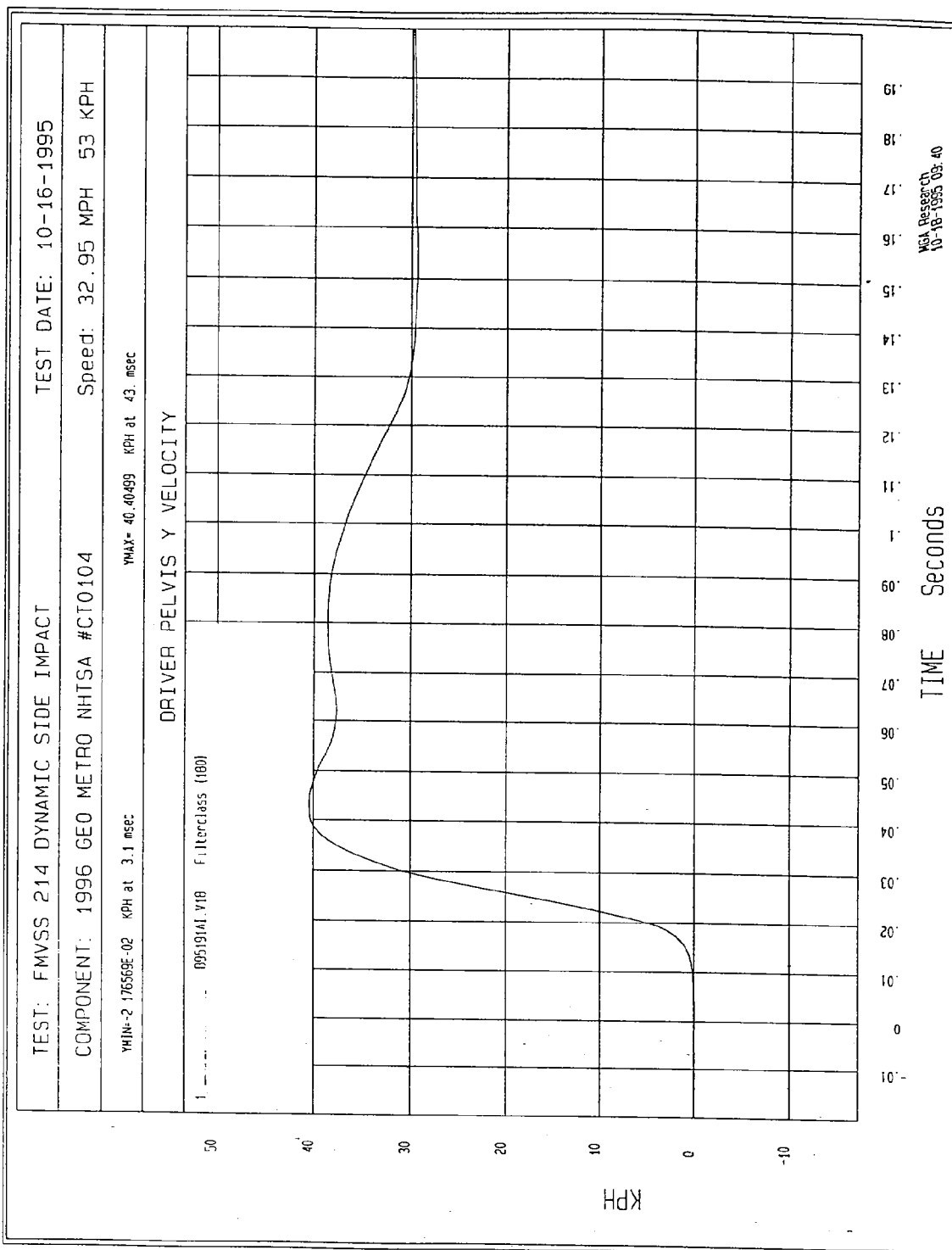


Figure B-8 - Driver Pelvis Y Velocity vs. Time

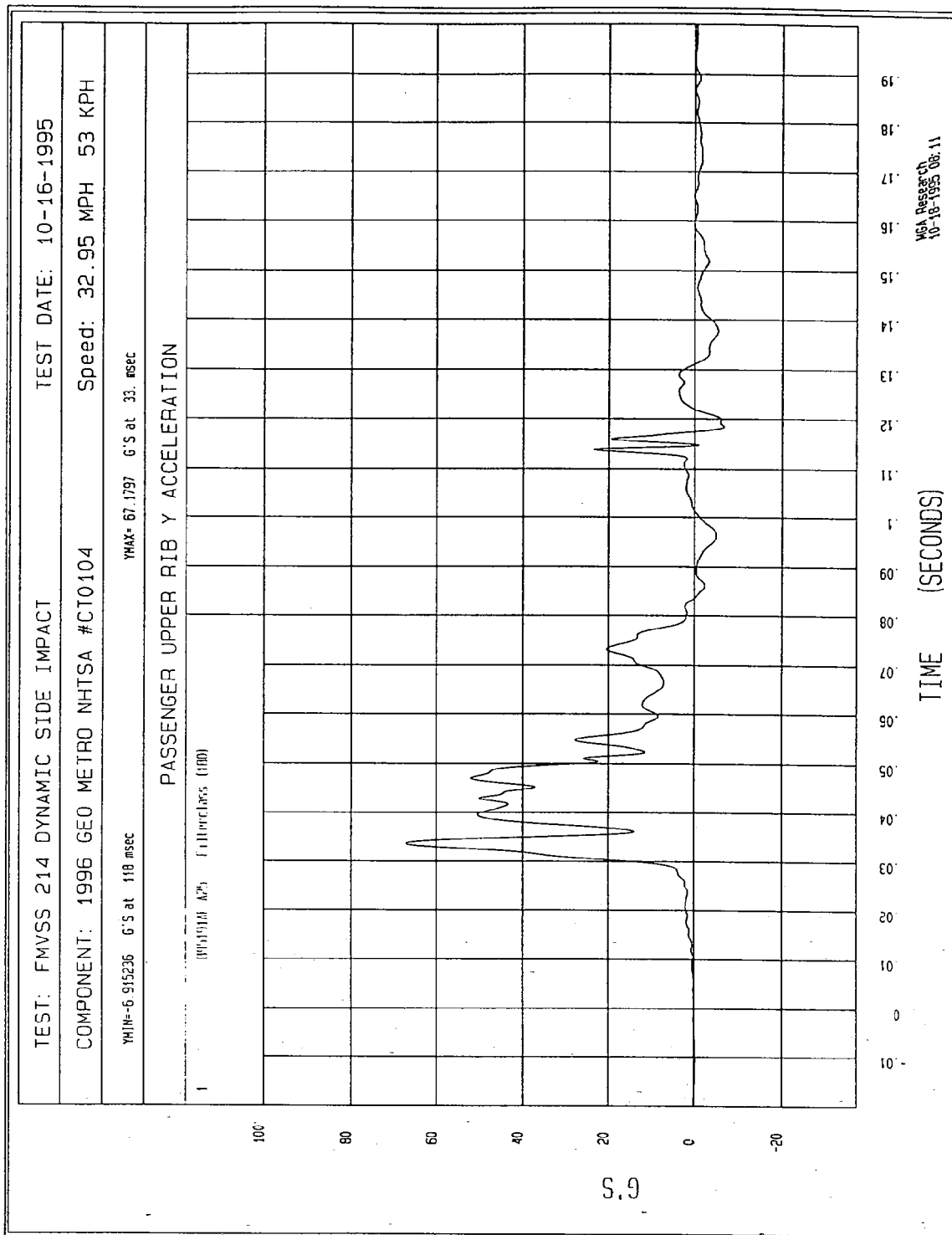


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

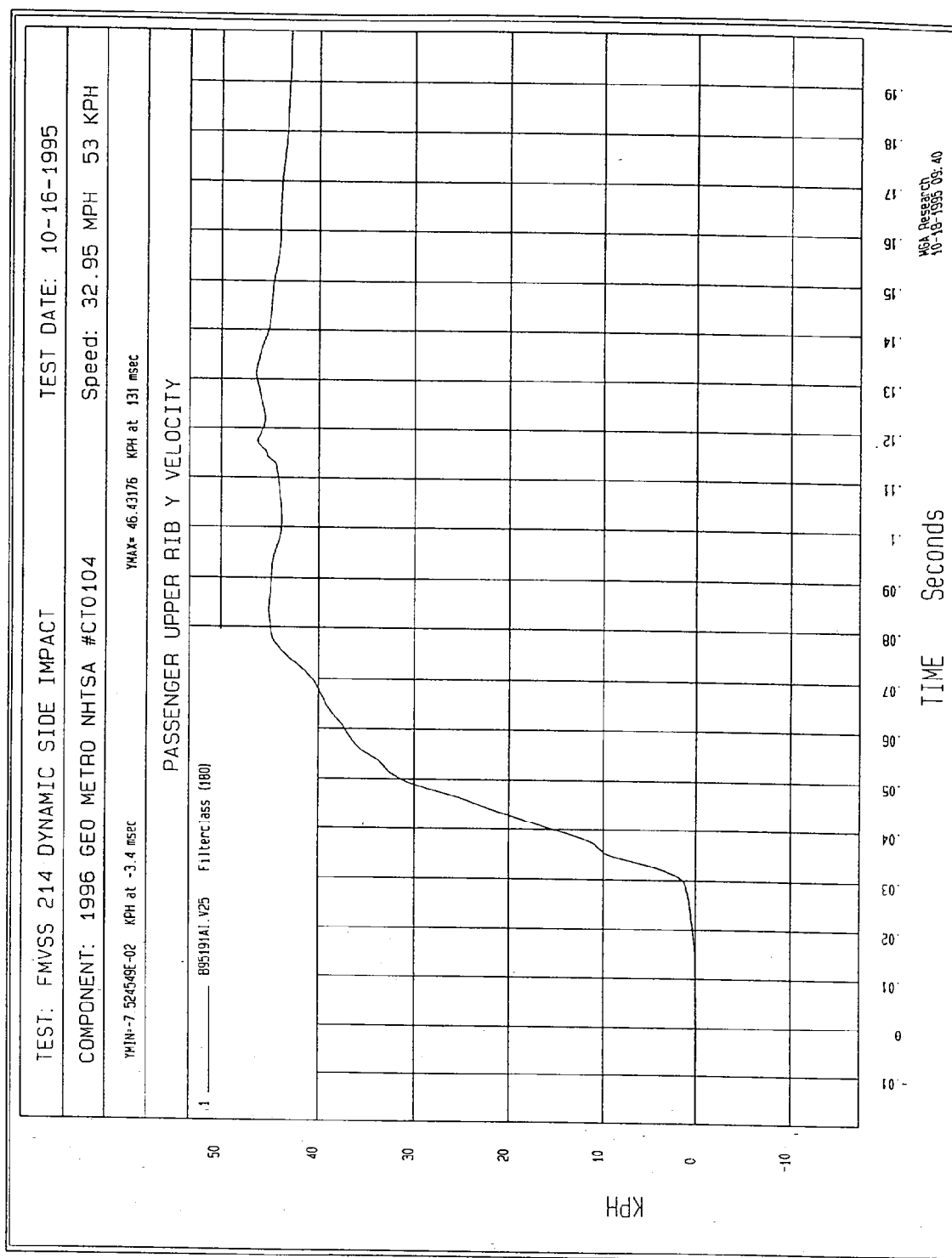


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

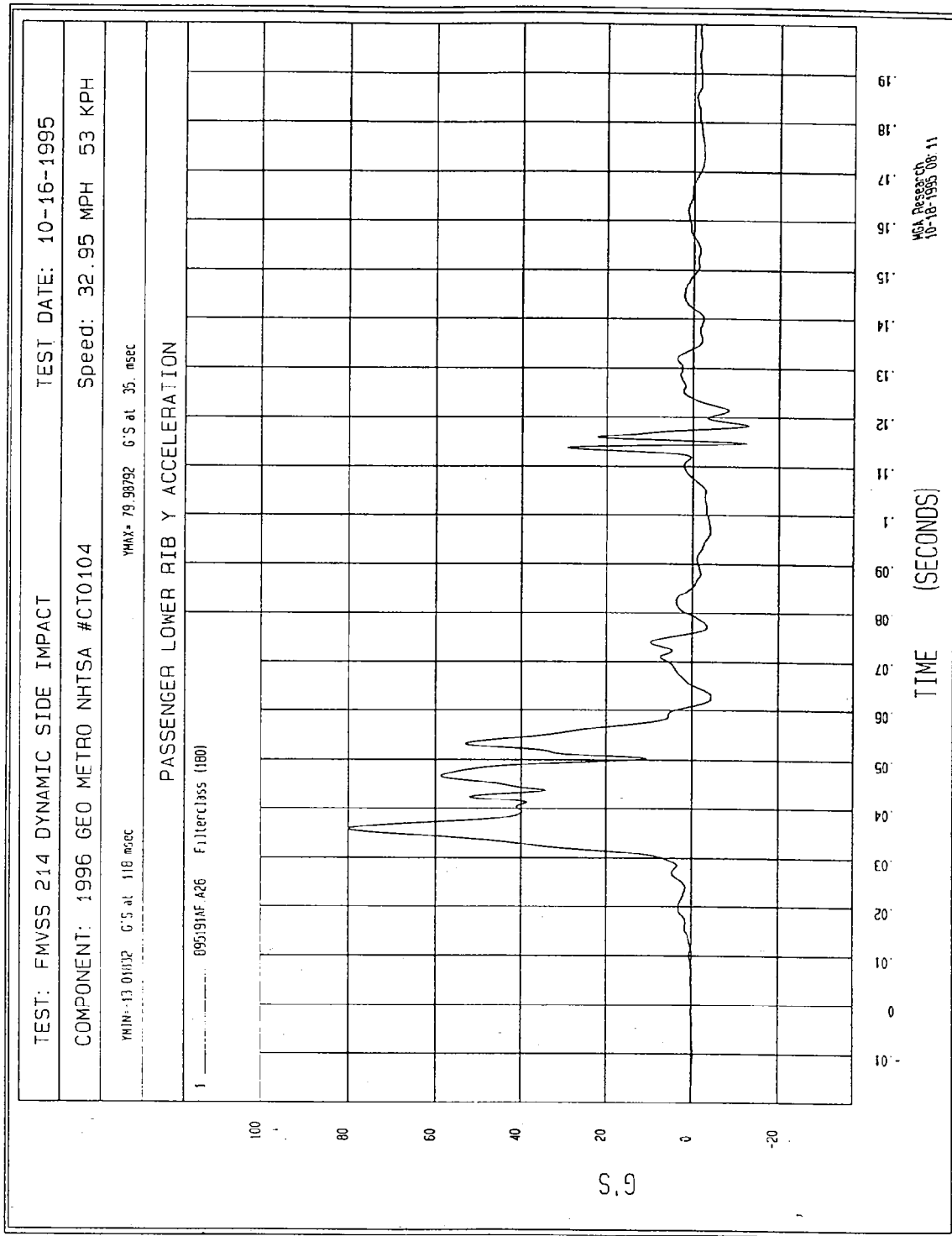


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

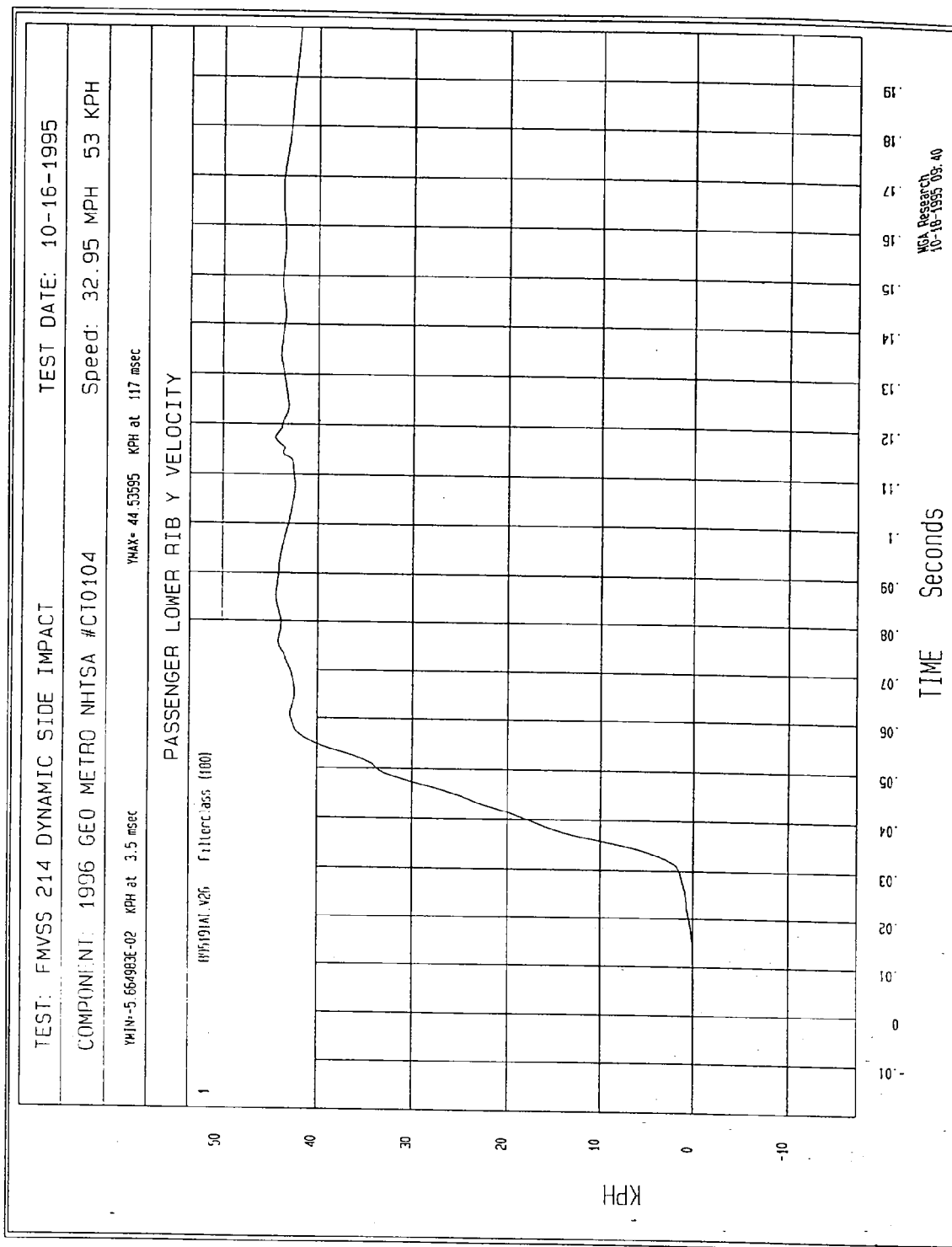


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

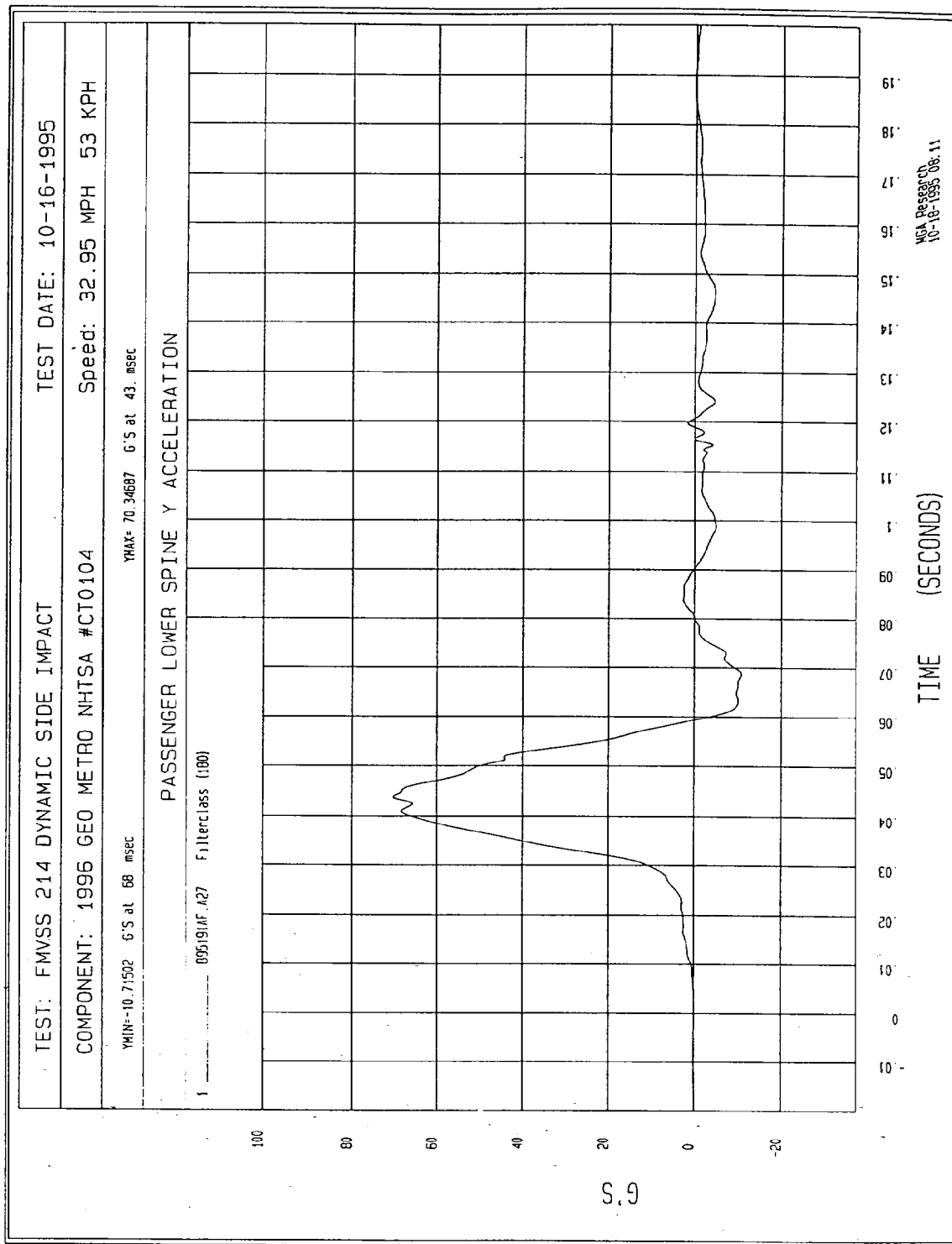


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

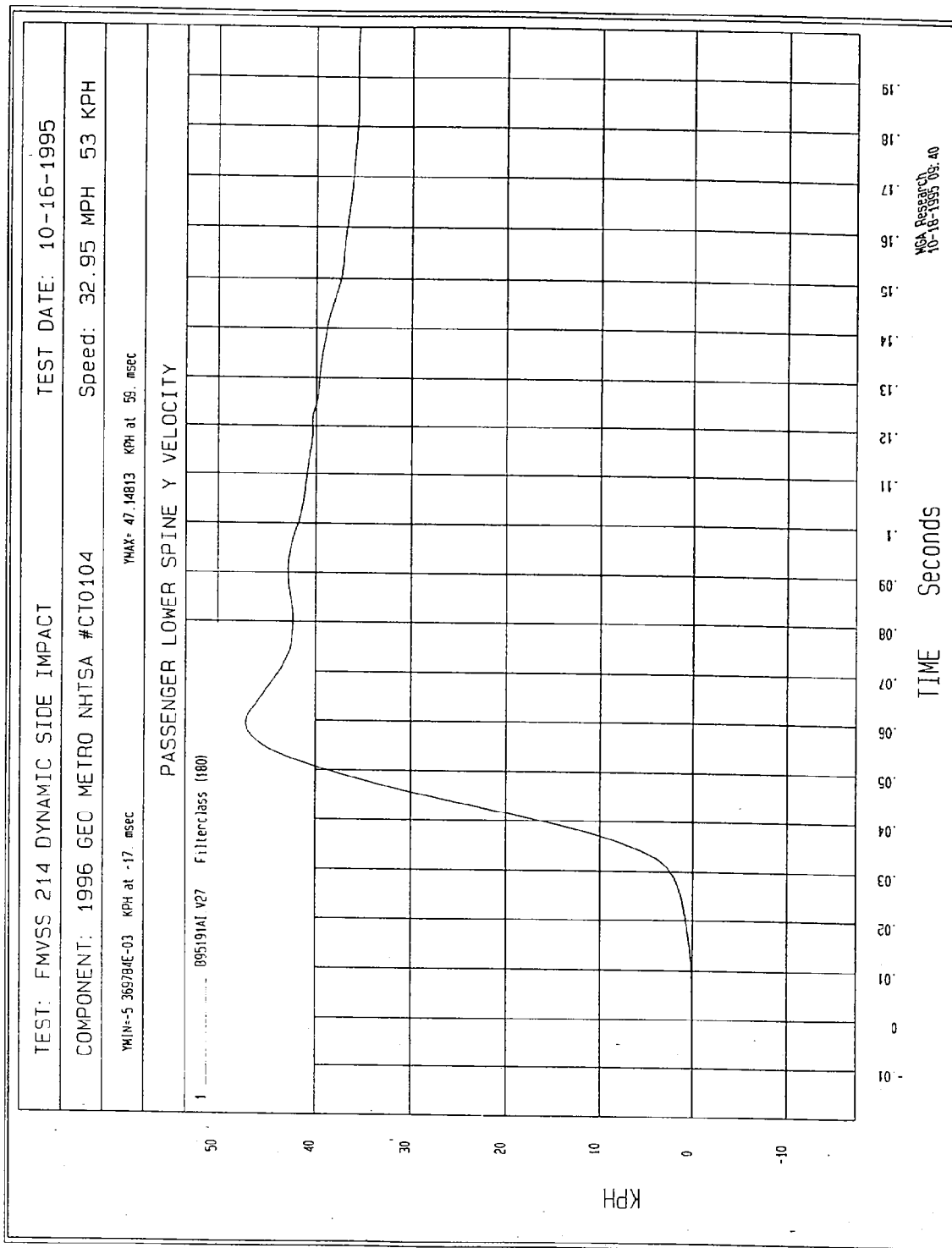


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

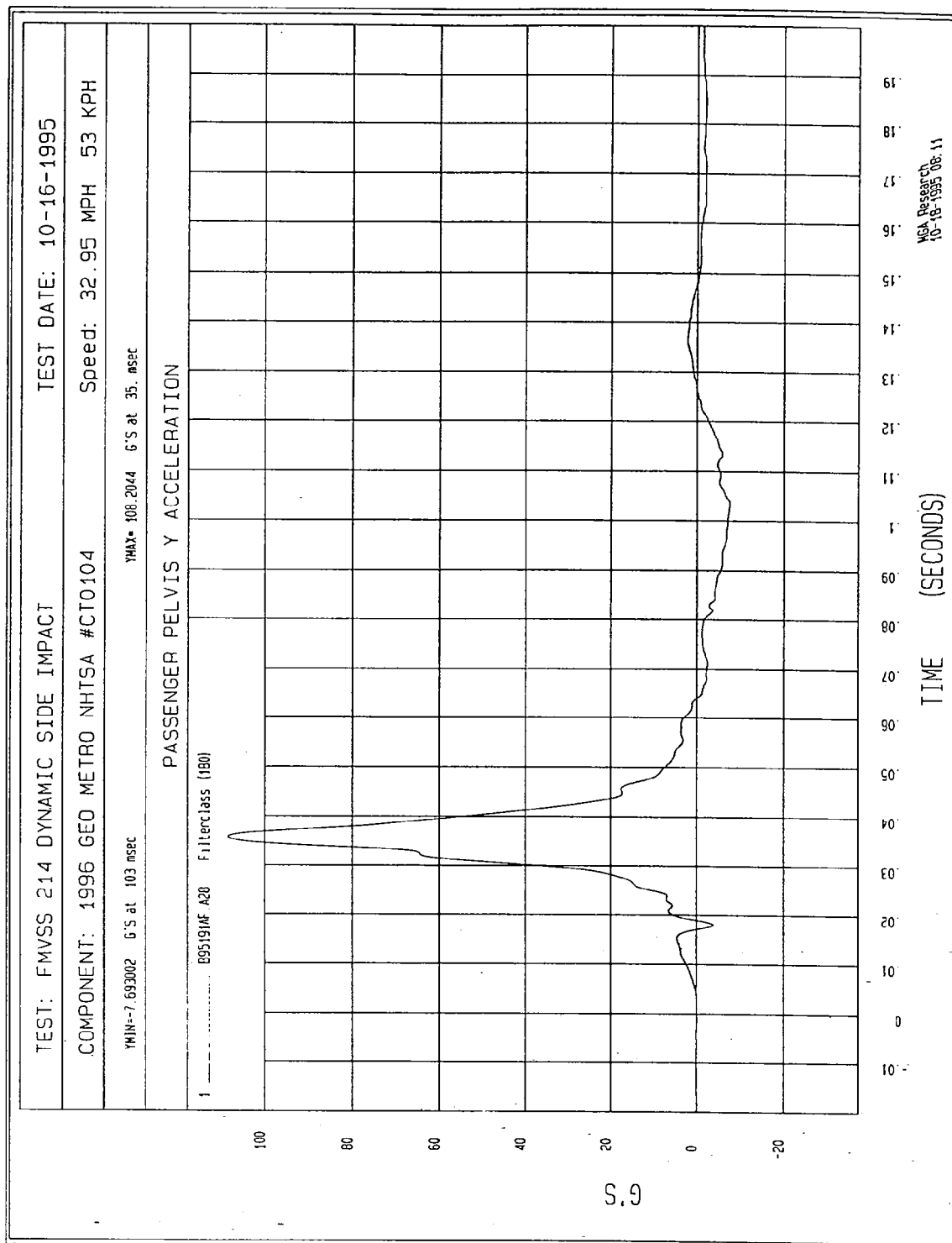


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

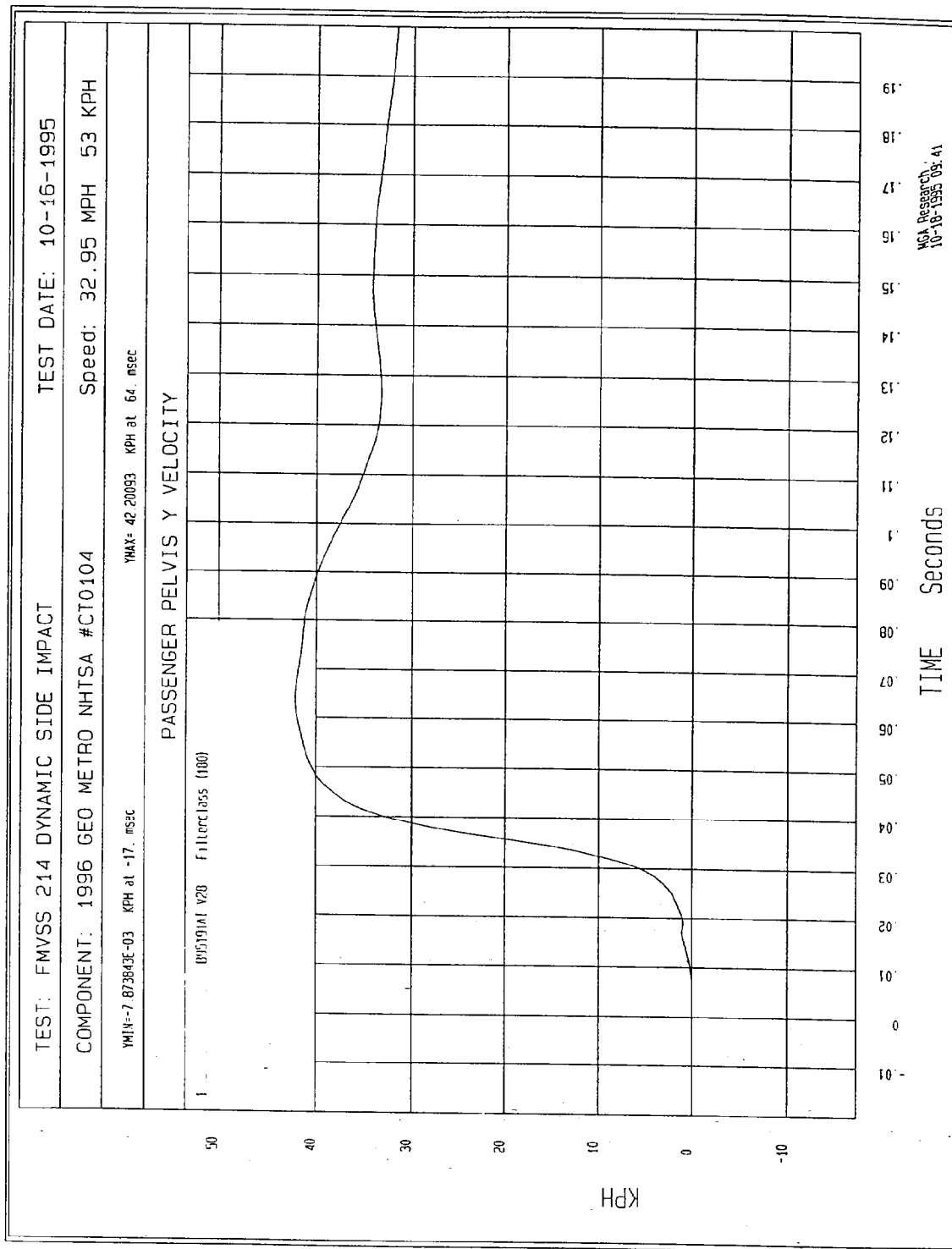


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

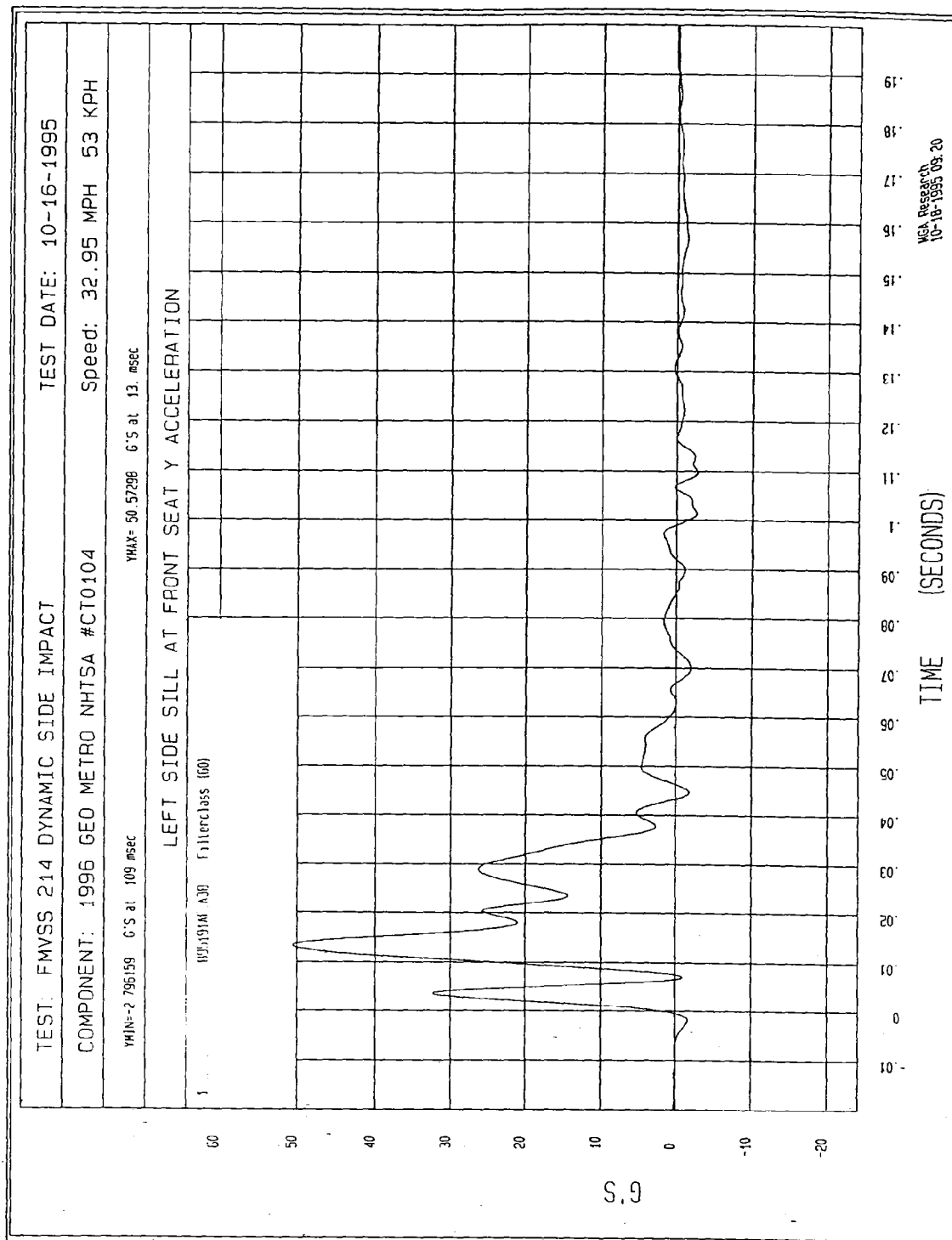


Figure B-17 - Left Side Sill at Front Seat Y Acceleration vs. Time

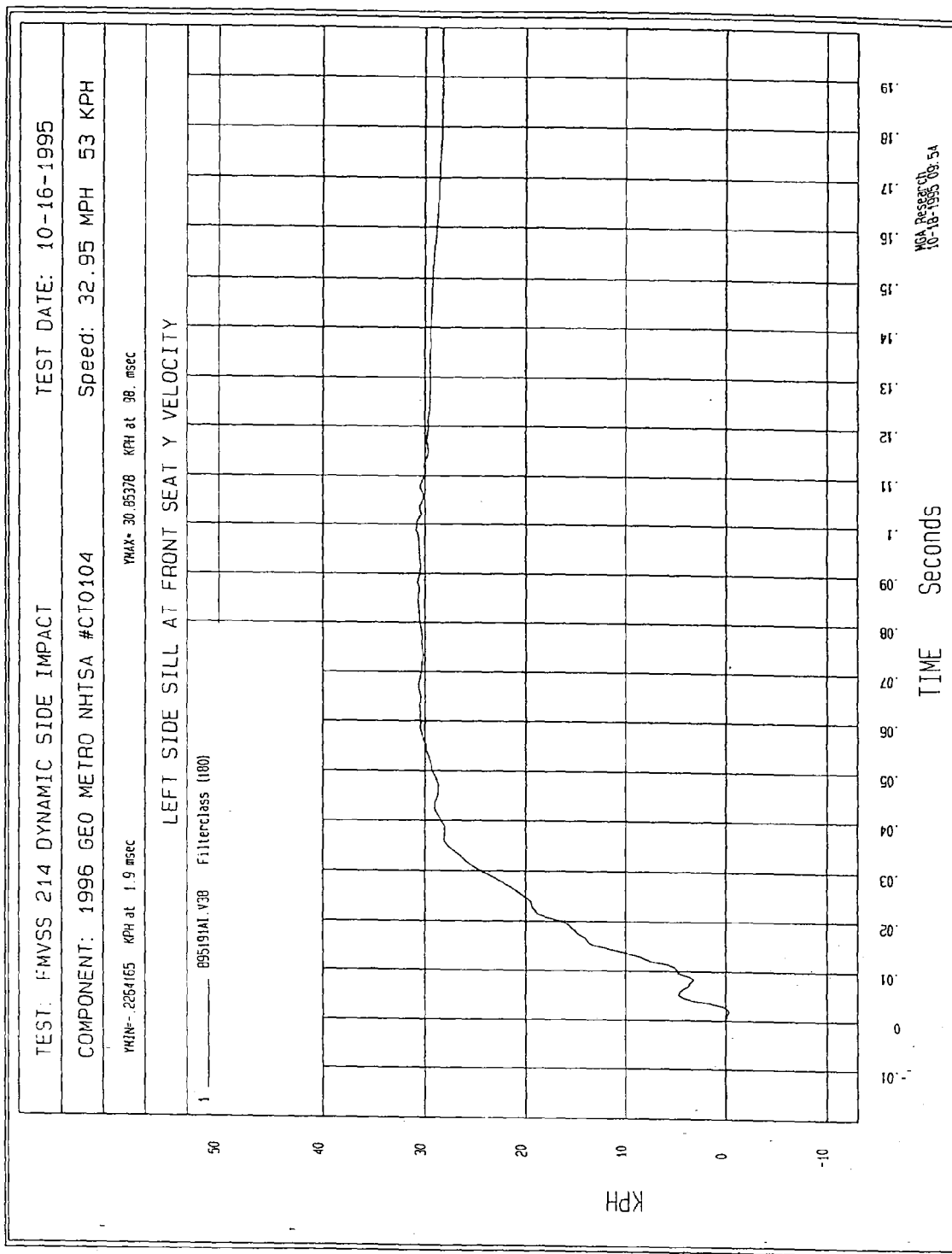


Figure B-18 - Left Side Sill at Front Seat Y Velocity vs. Time

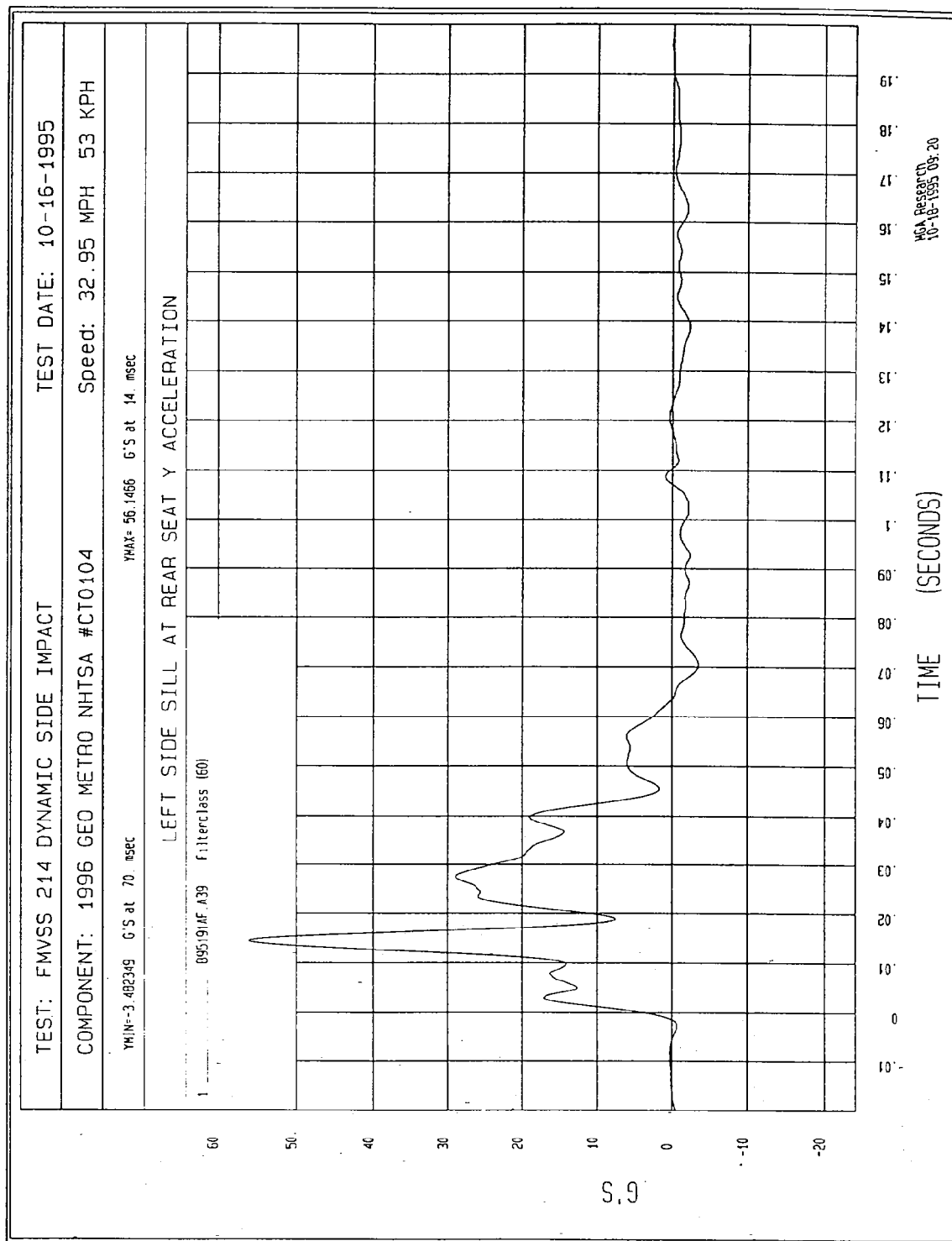


Figure B-19 - Left Side Sill at Rear Seat Y Acceleration vs. Time

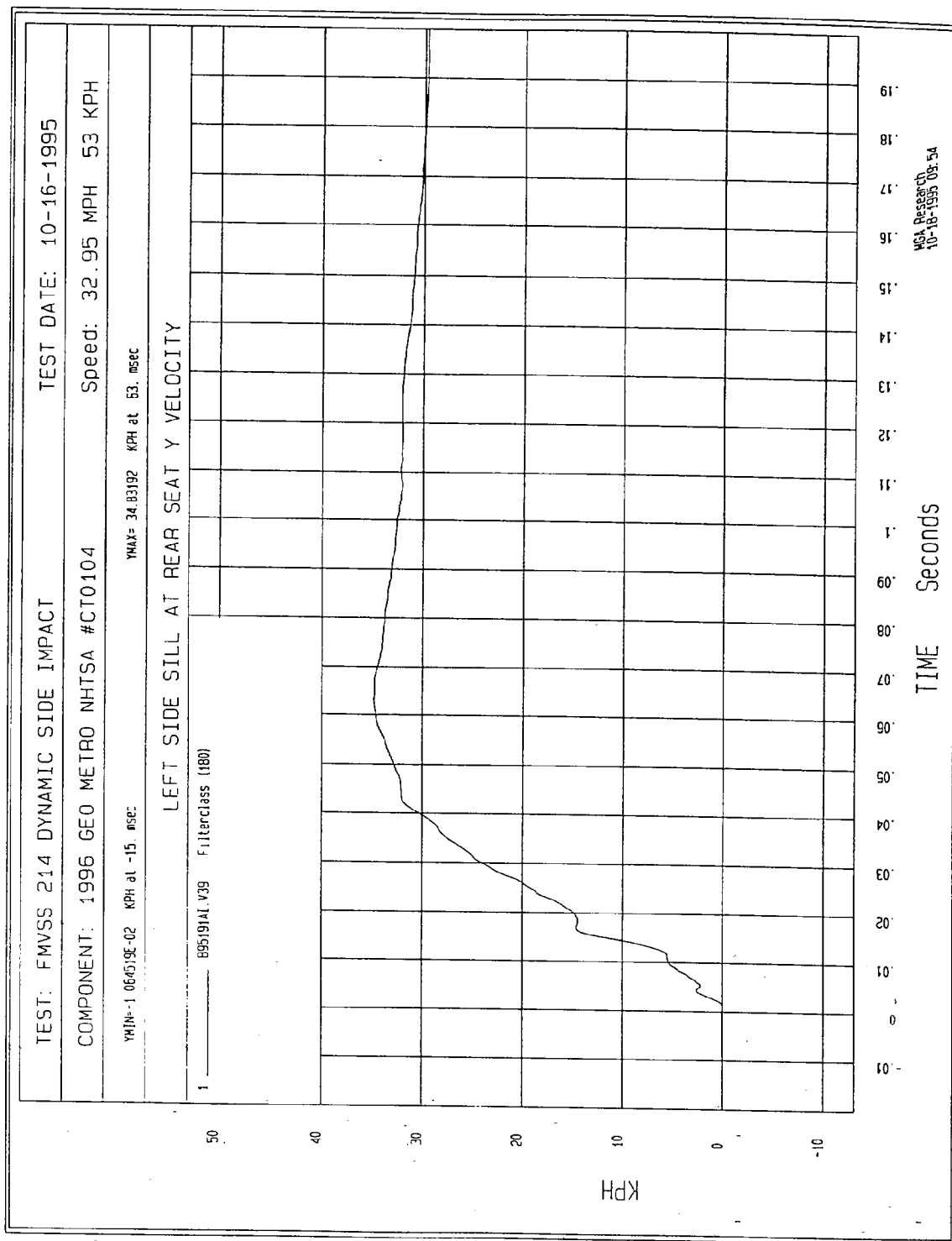


Figure B-20 - Left Side Sill at Rear Seat Y Velocity vs. Time

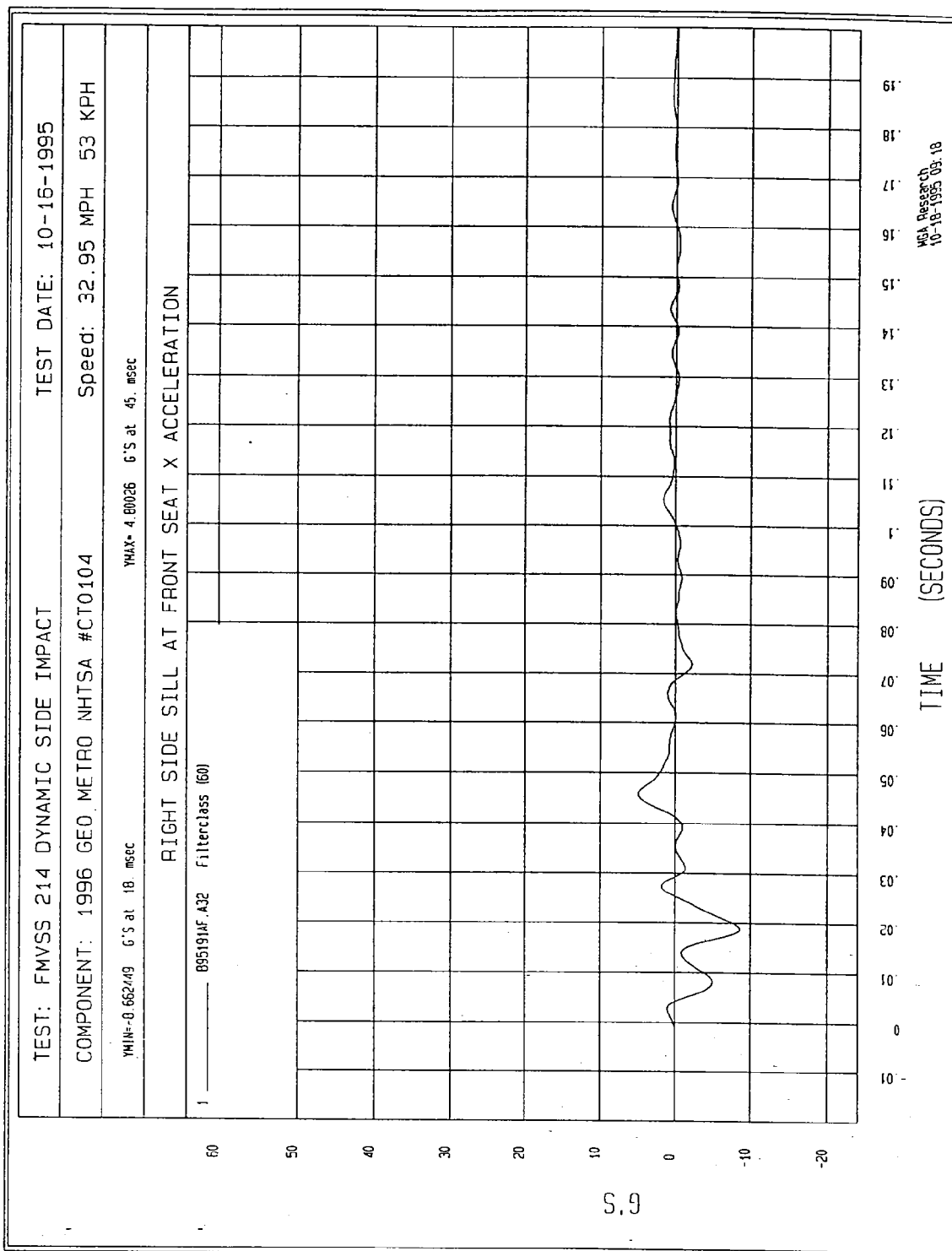


Figure B-21 - Right Side Sill at Front Seat X Acceleration vs. Time

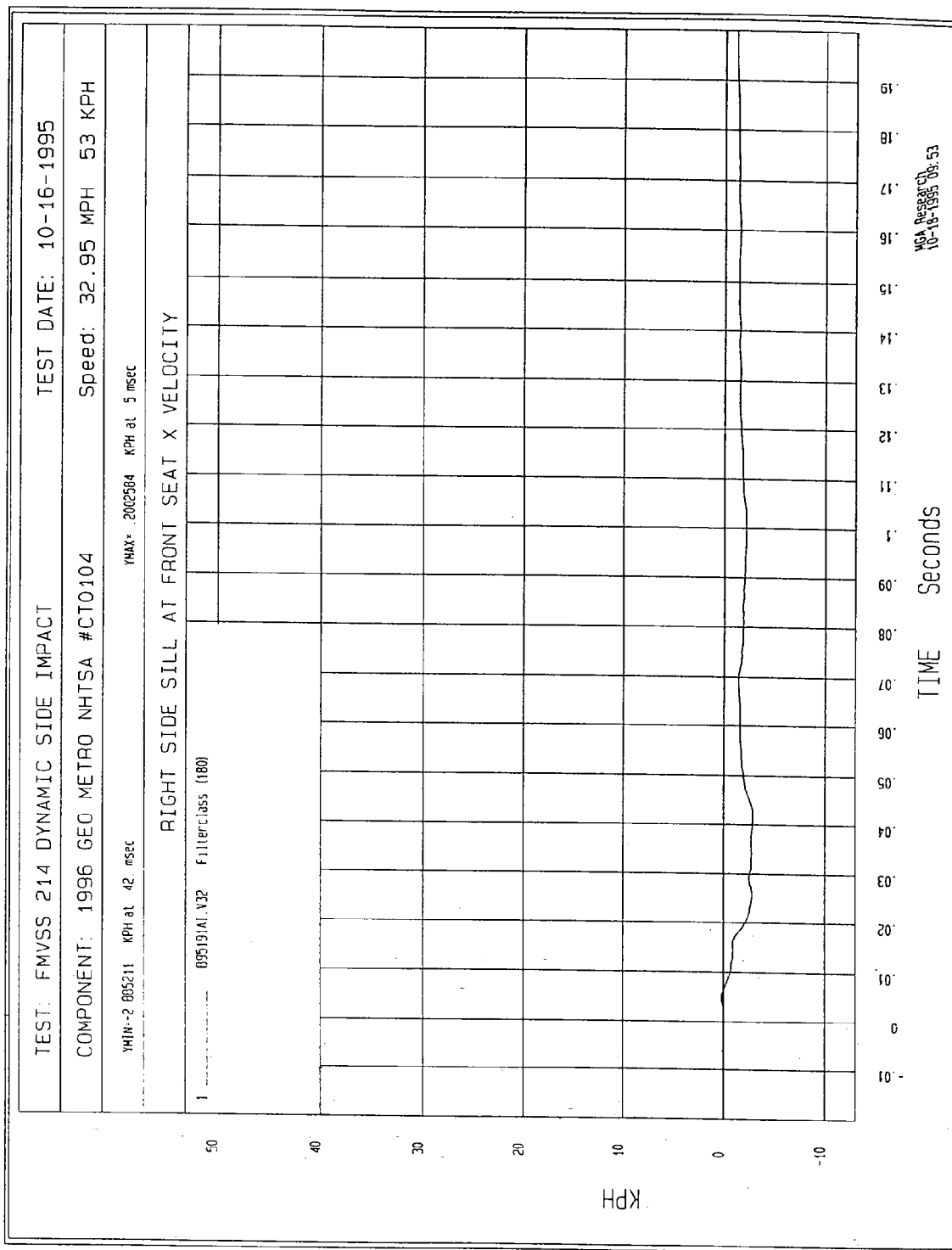


Figure B-22 - Right Side Sill at Front Seat X Velocity vs. Time

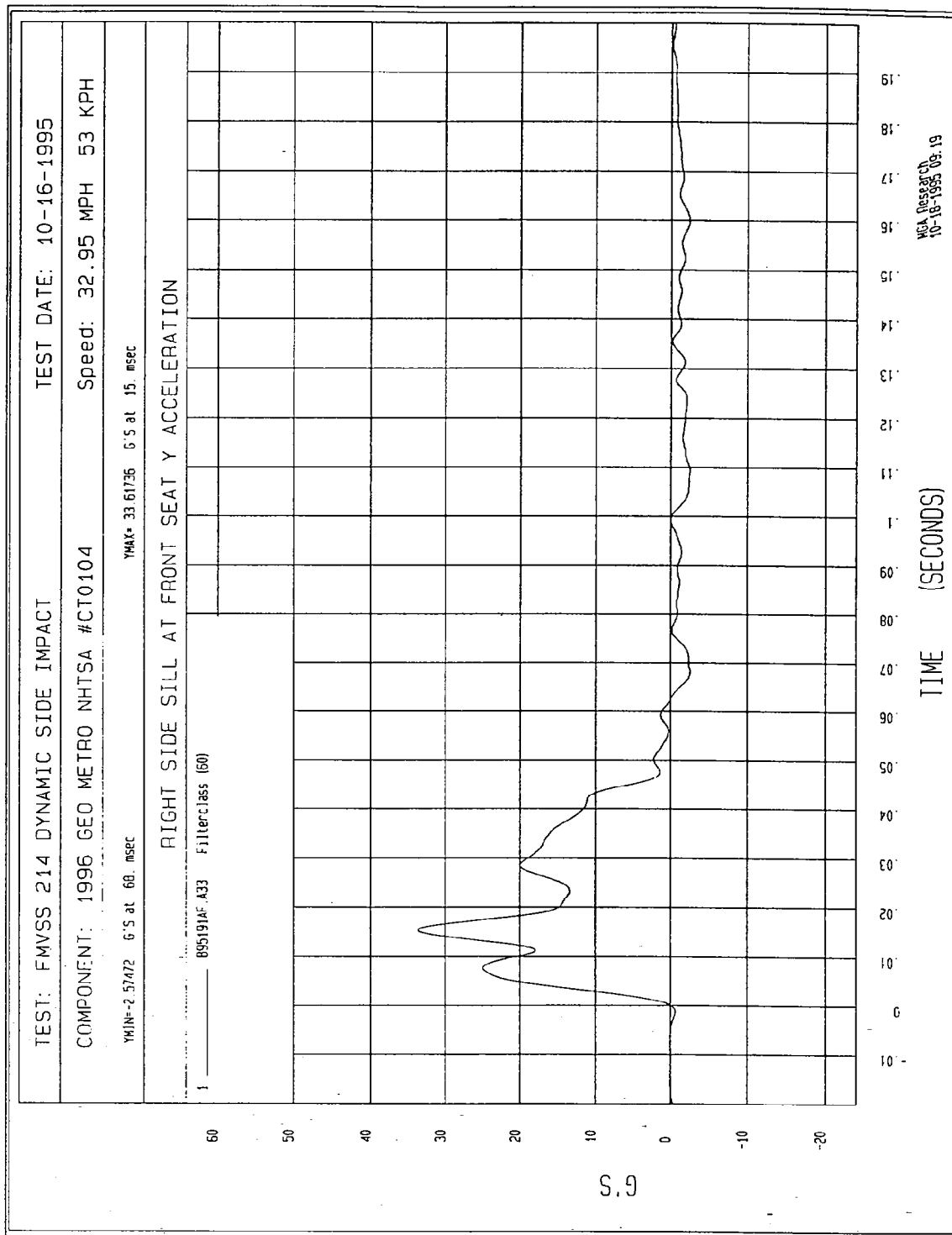


Figure B-23 - Right Side Sill at Front Seat Y Acceleration vs. Time

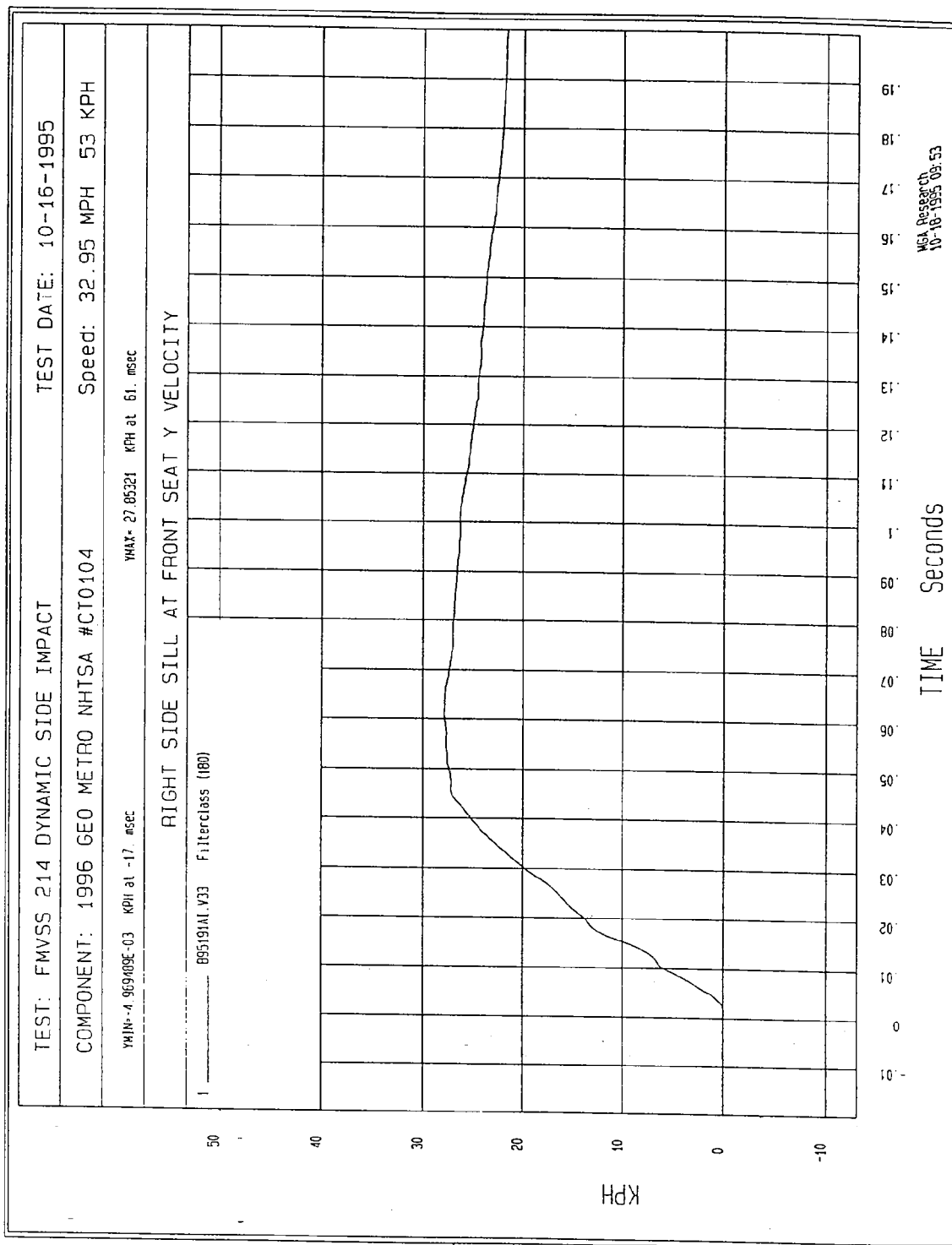


Figure B-24 - Right Side Sill at Front Seat Y Velocity vs. Time

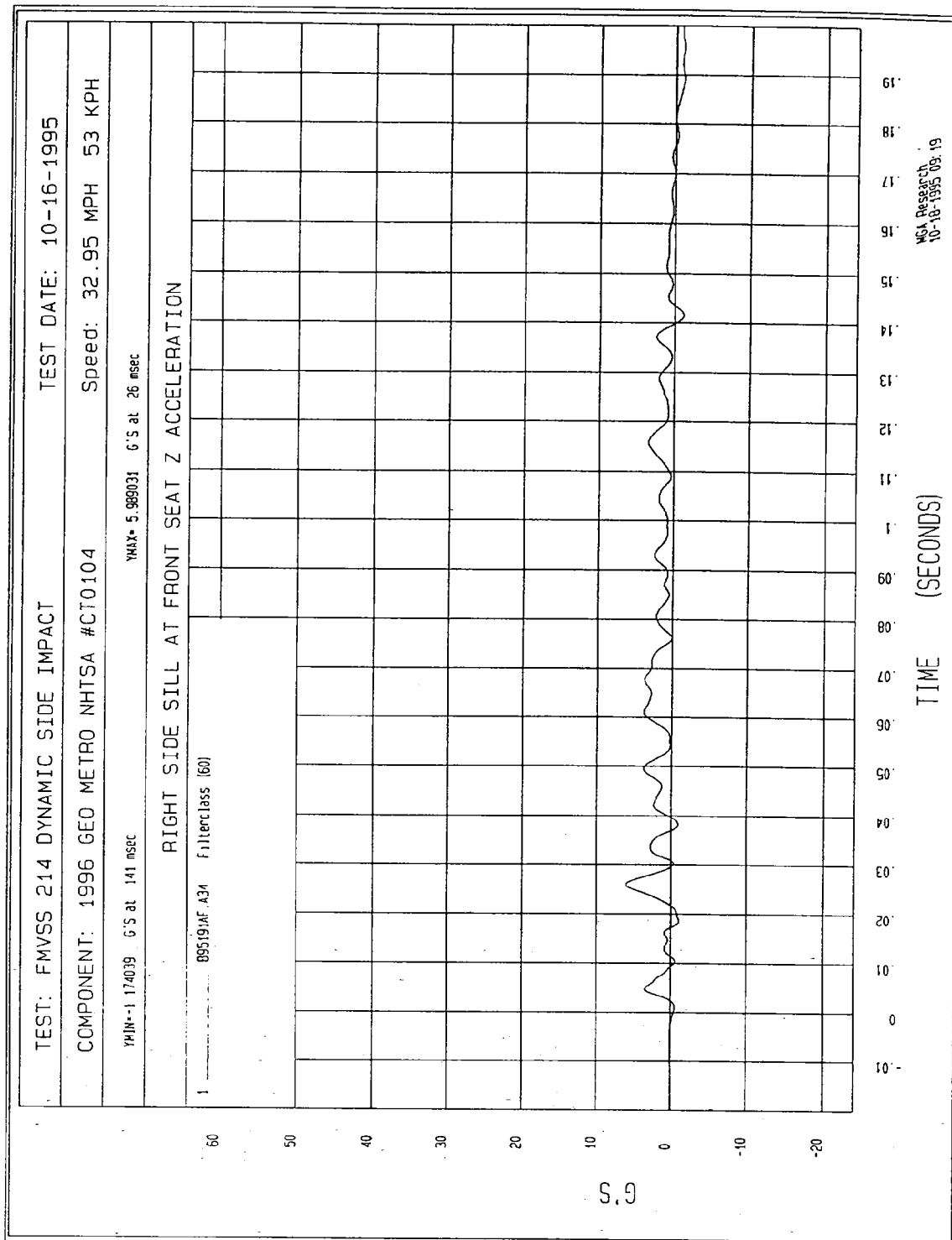


Figure B-25 - Right Side Sill at Front Seat Z Acceleration vs. Time

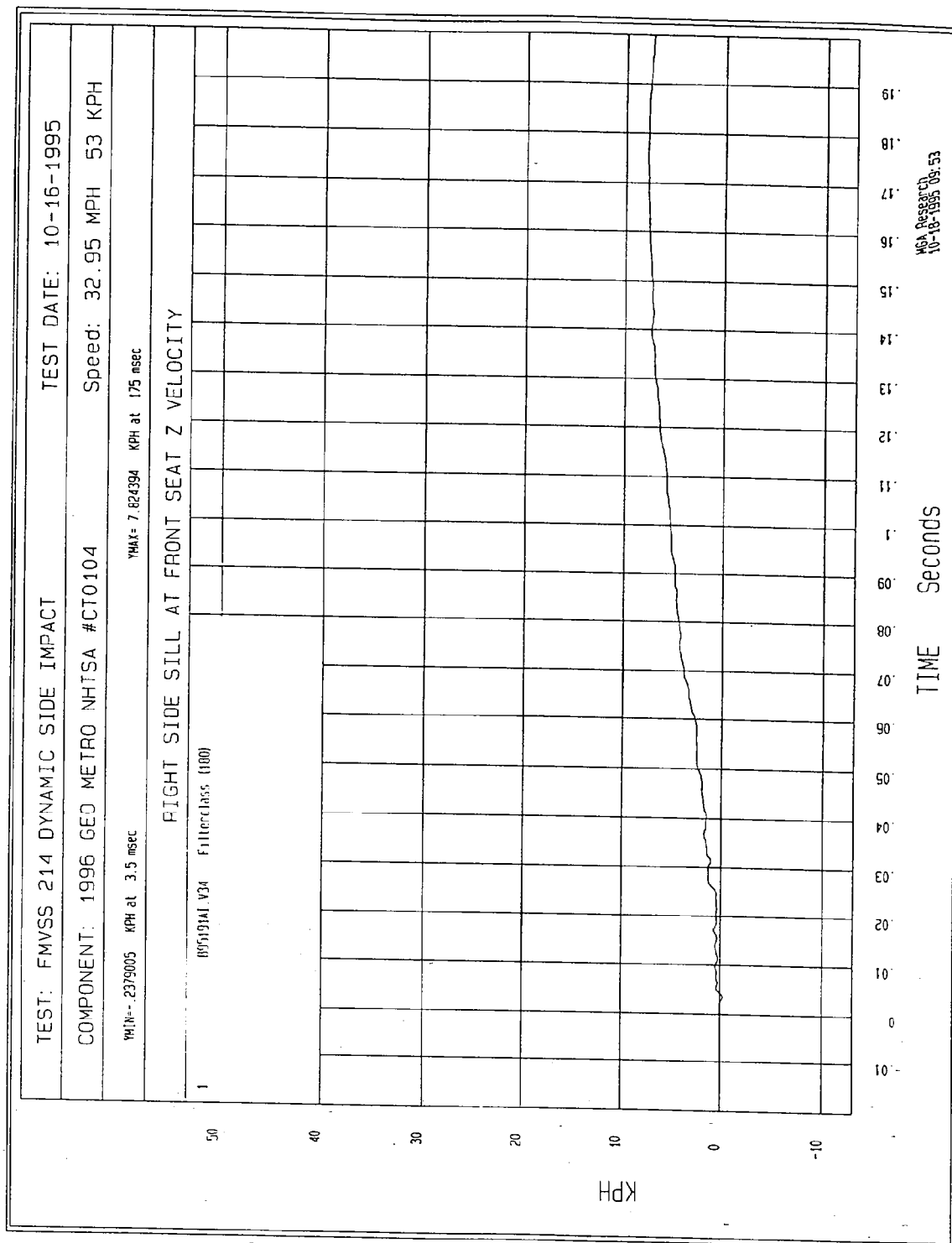


Figure B-26 - Right Side Sill at Front Seat Z Velocity vs. Time

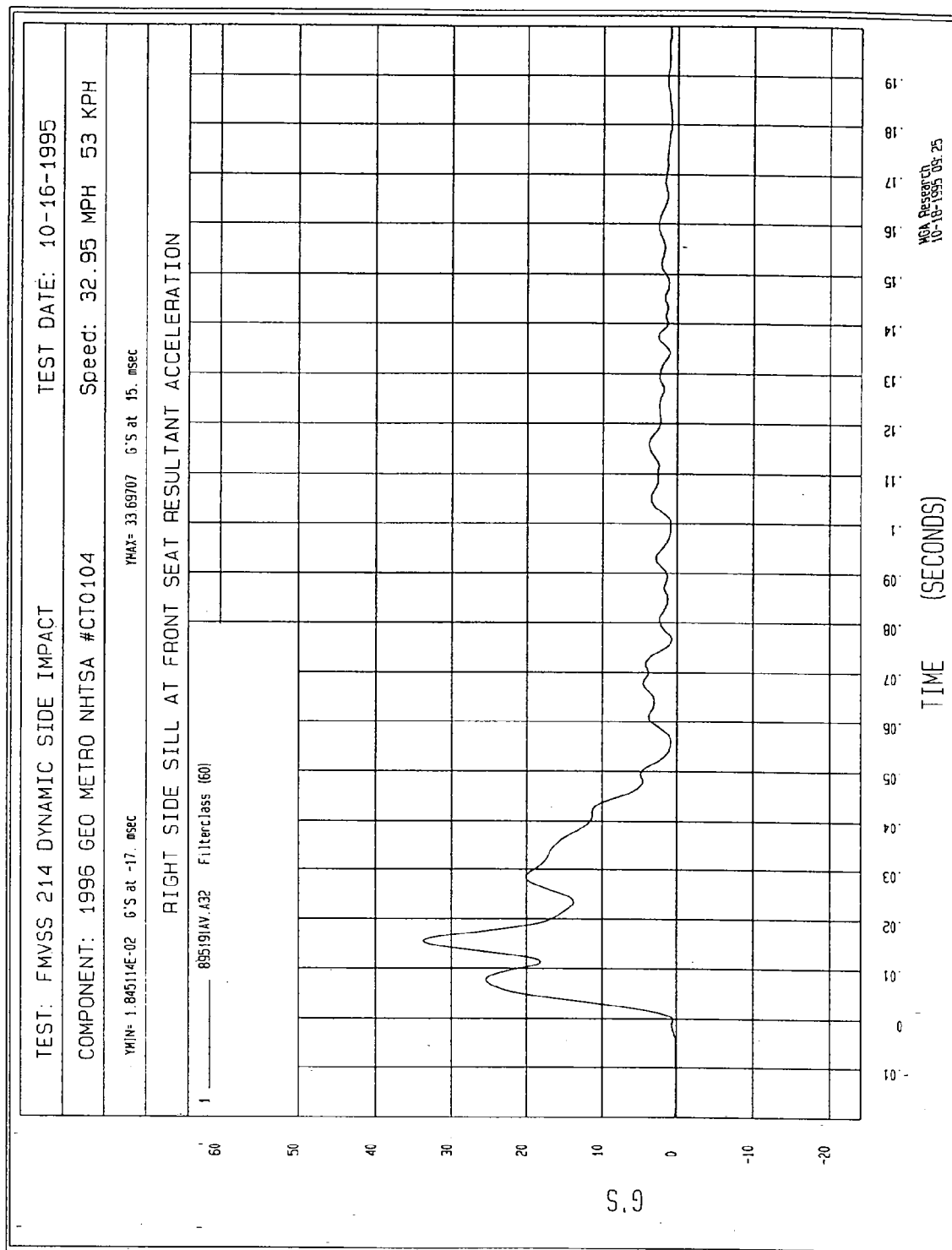


Figure B-27 - Right Side Sill at Front Seat Resultant Acceleration vs. Time

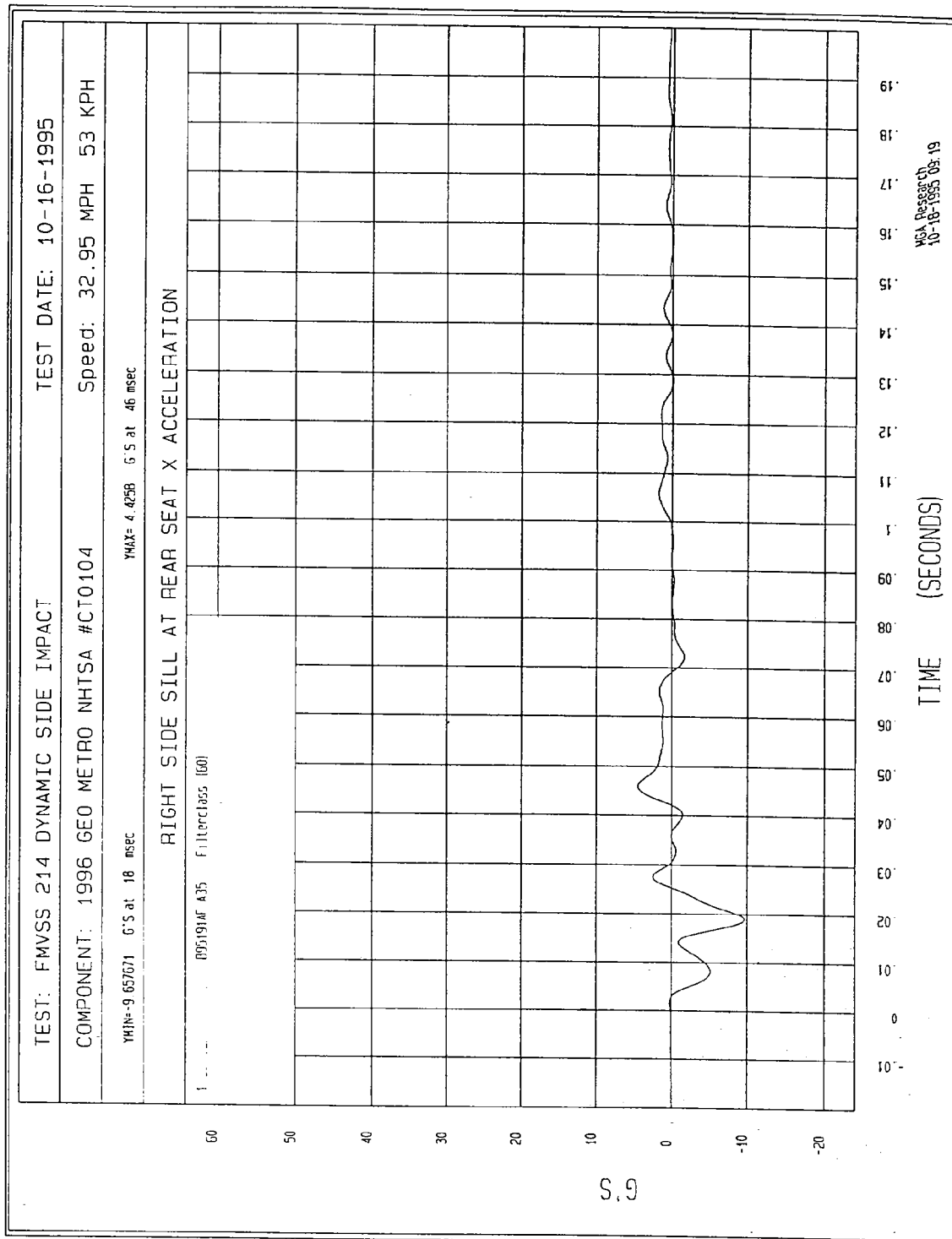


Figure B-28 - Right Side Sill at Rear Seat X Acceleration vs. Time

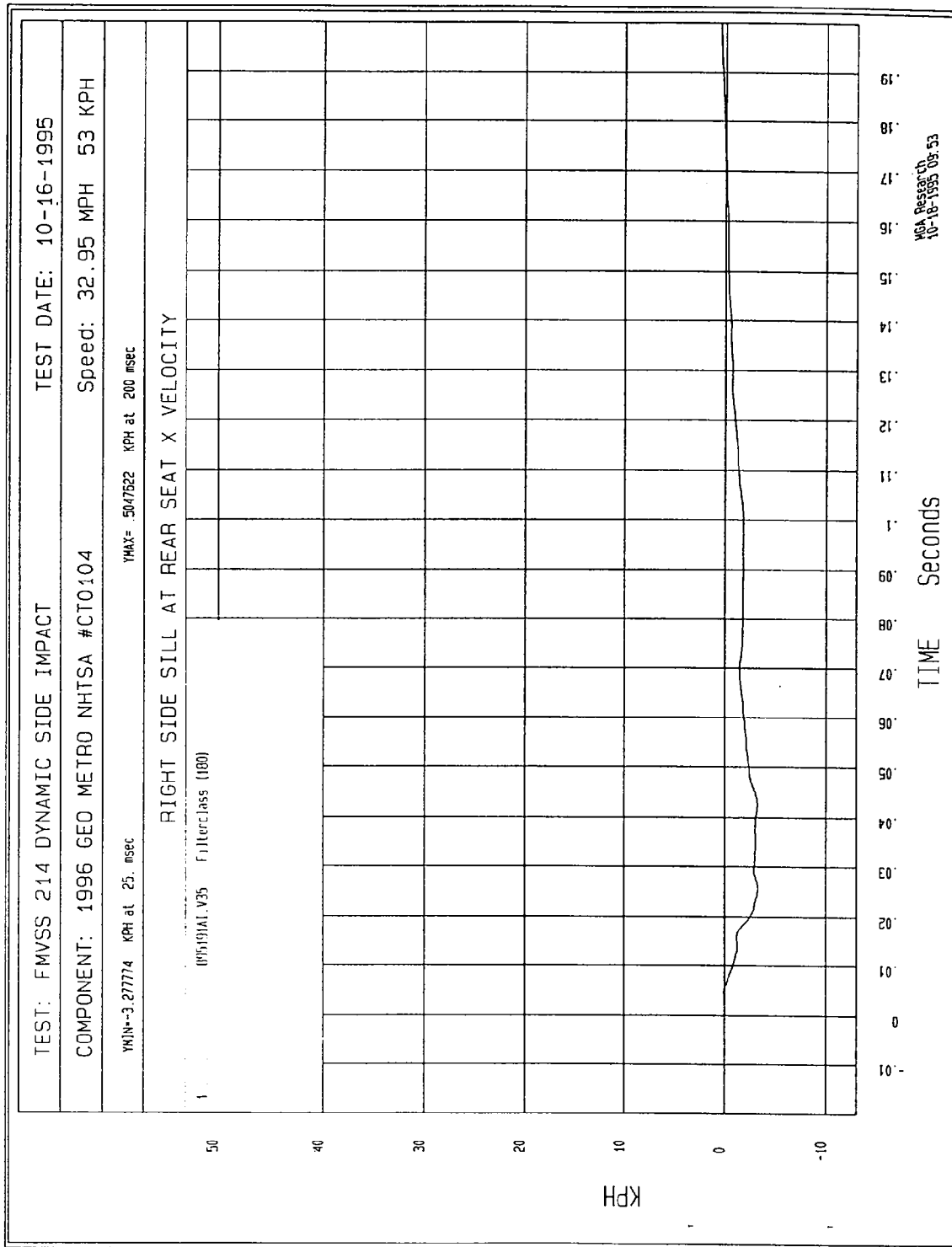


Figure B-29 - Right Side Sill at Rear Seat X Velocity vs. Time

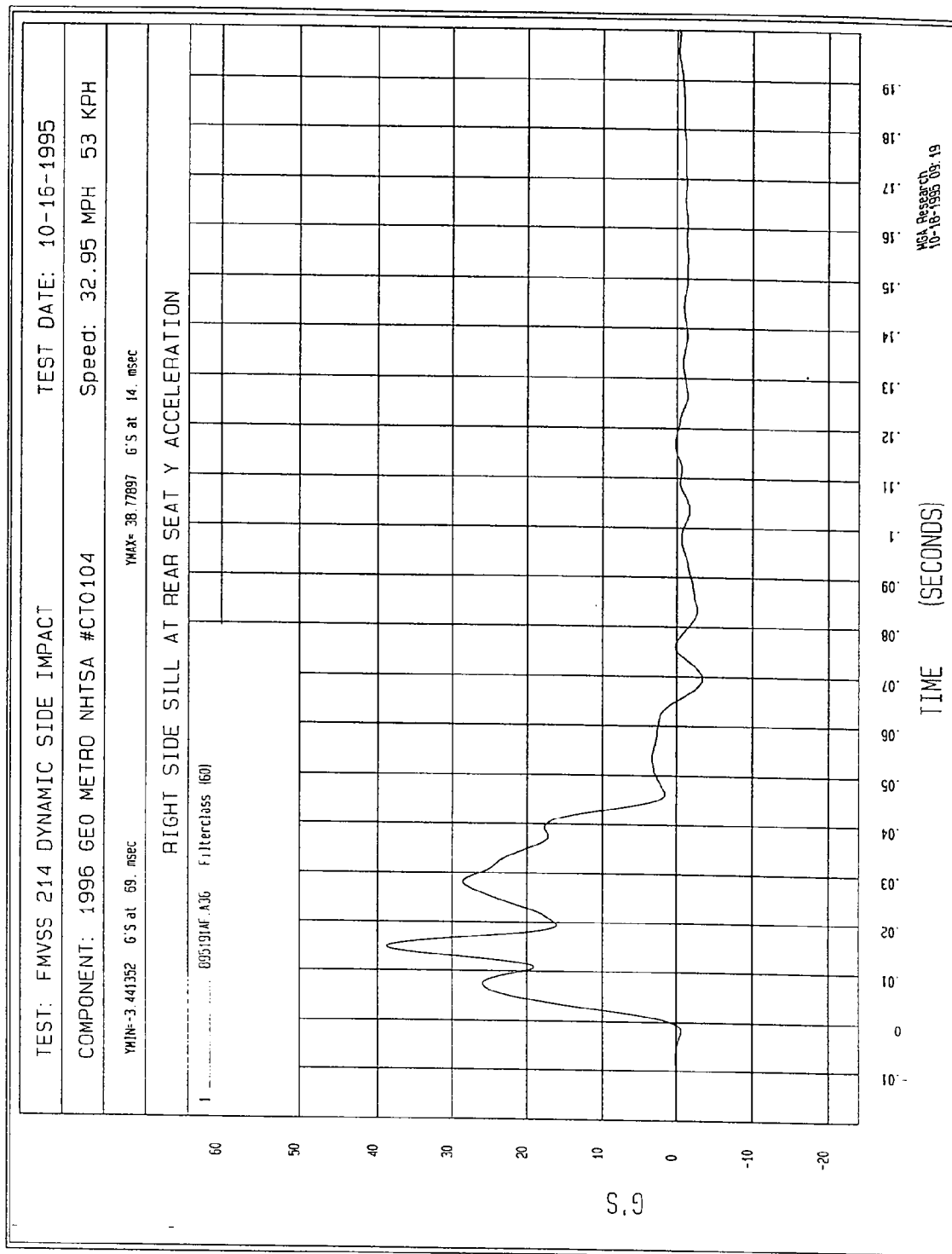


Figure B-30 - Right Side Sill at Rear Seat Y Acceleration vs. Time

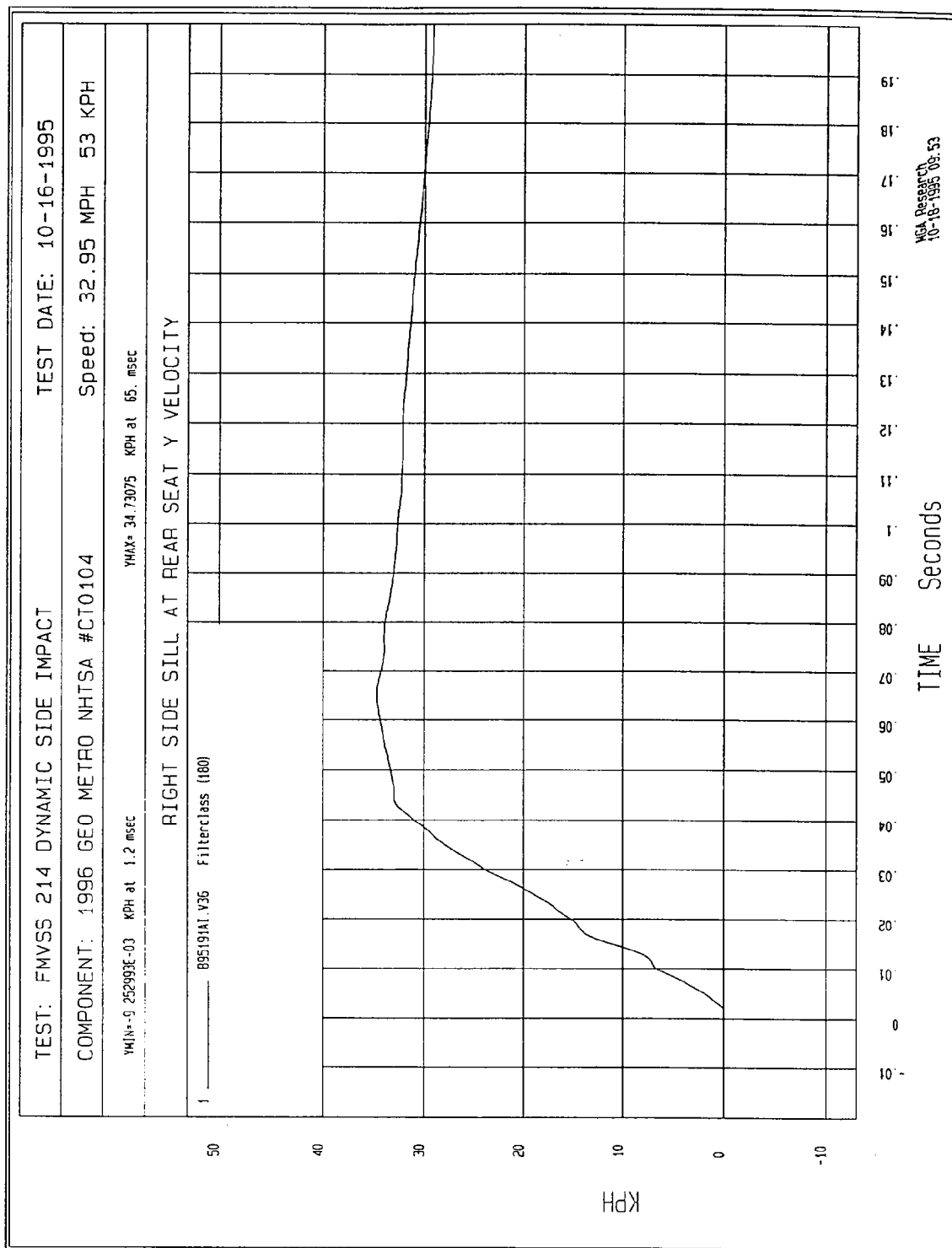


Figure B-31 - Right Side Sill at Rear Seat Y Velocity vs. Time

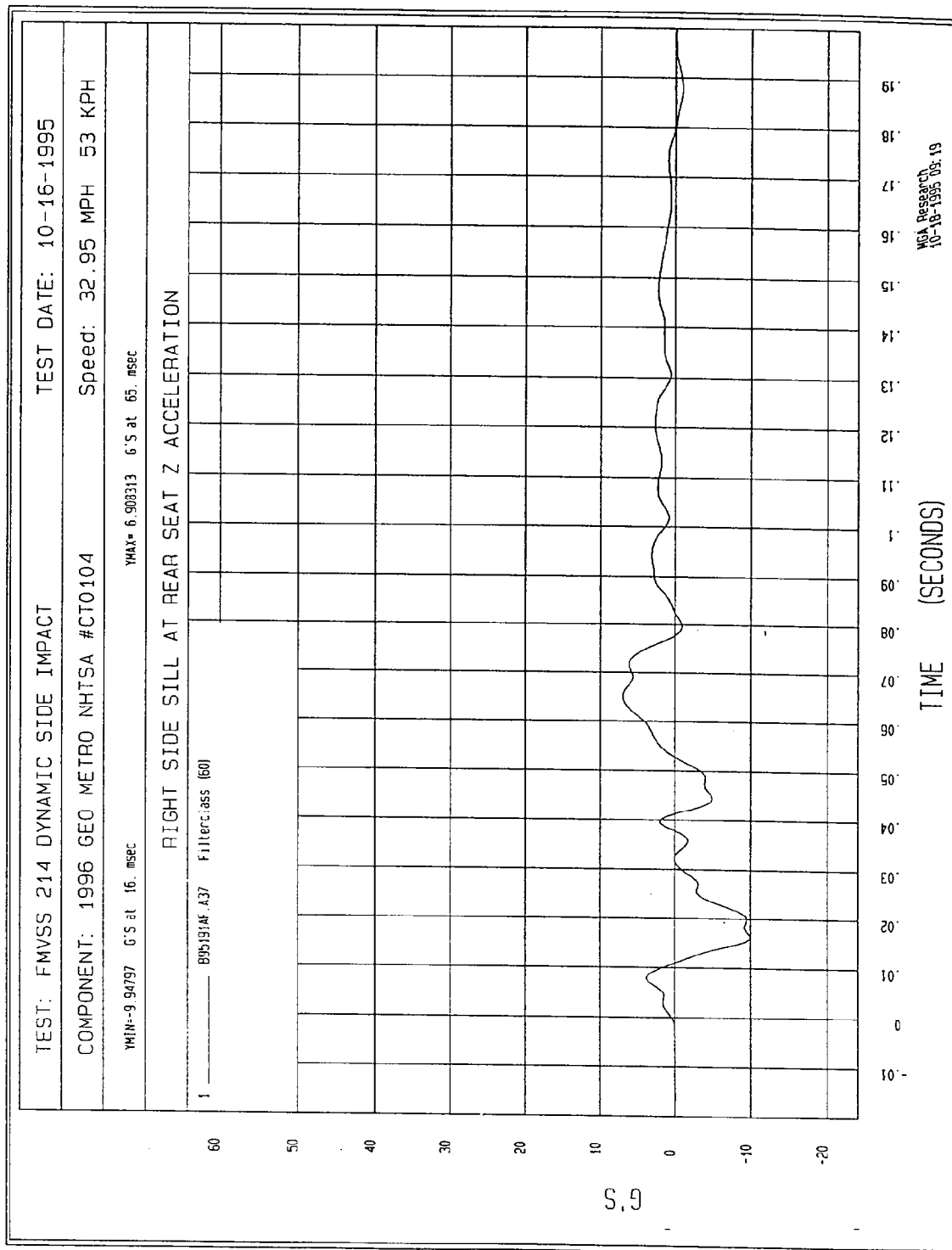


Figure B-32 - Right Side Sill at Rear Seat Z Acceleration vs. Time

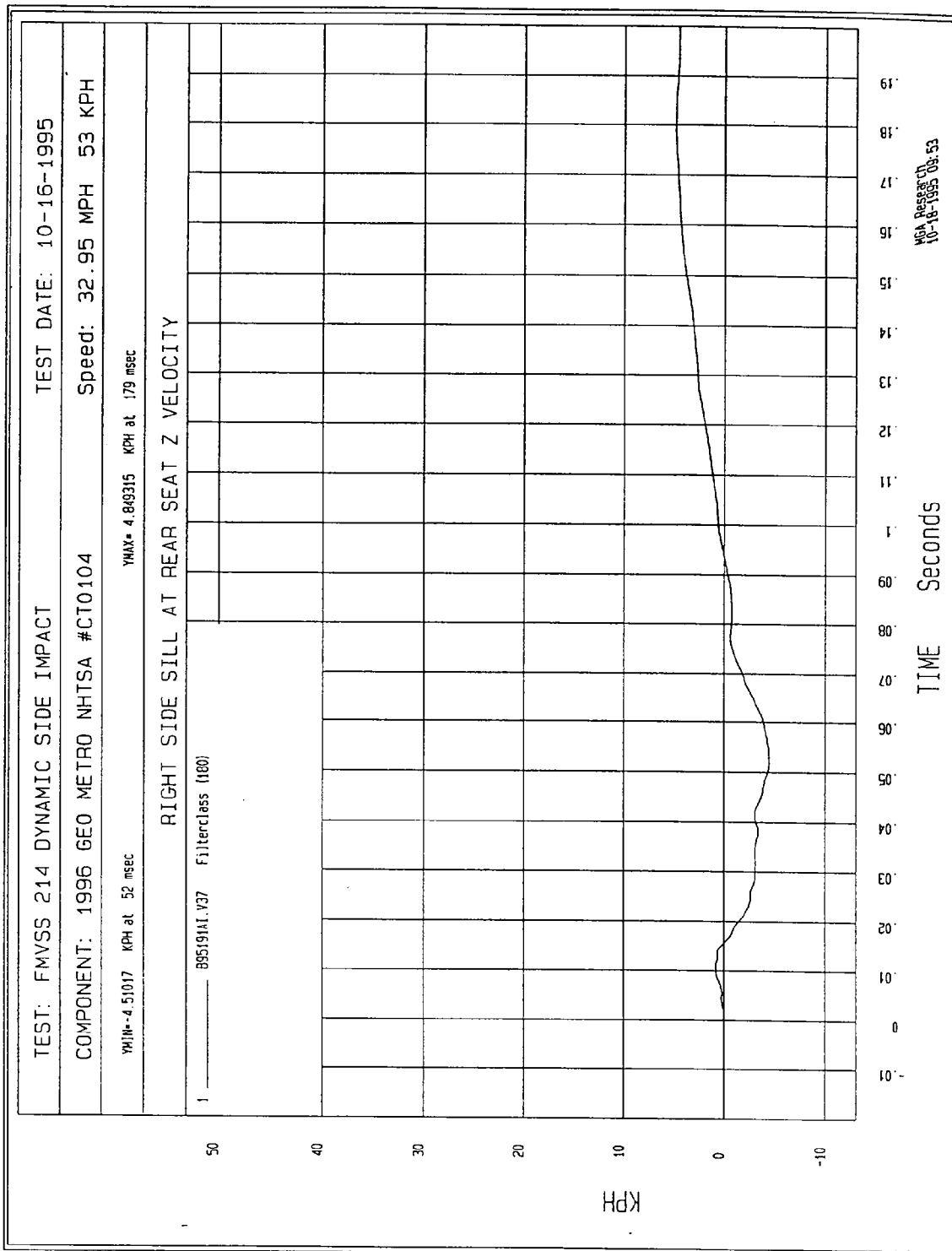


Figure B-33 - Right Side Sill at Rear Seat Z Velocity vs. Time

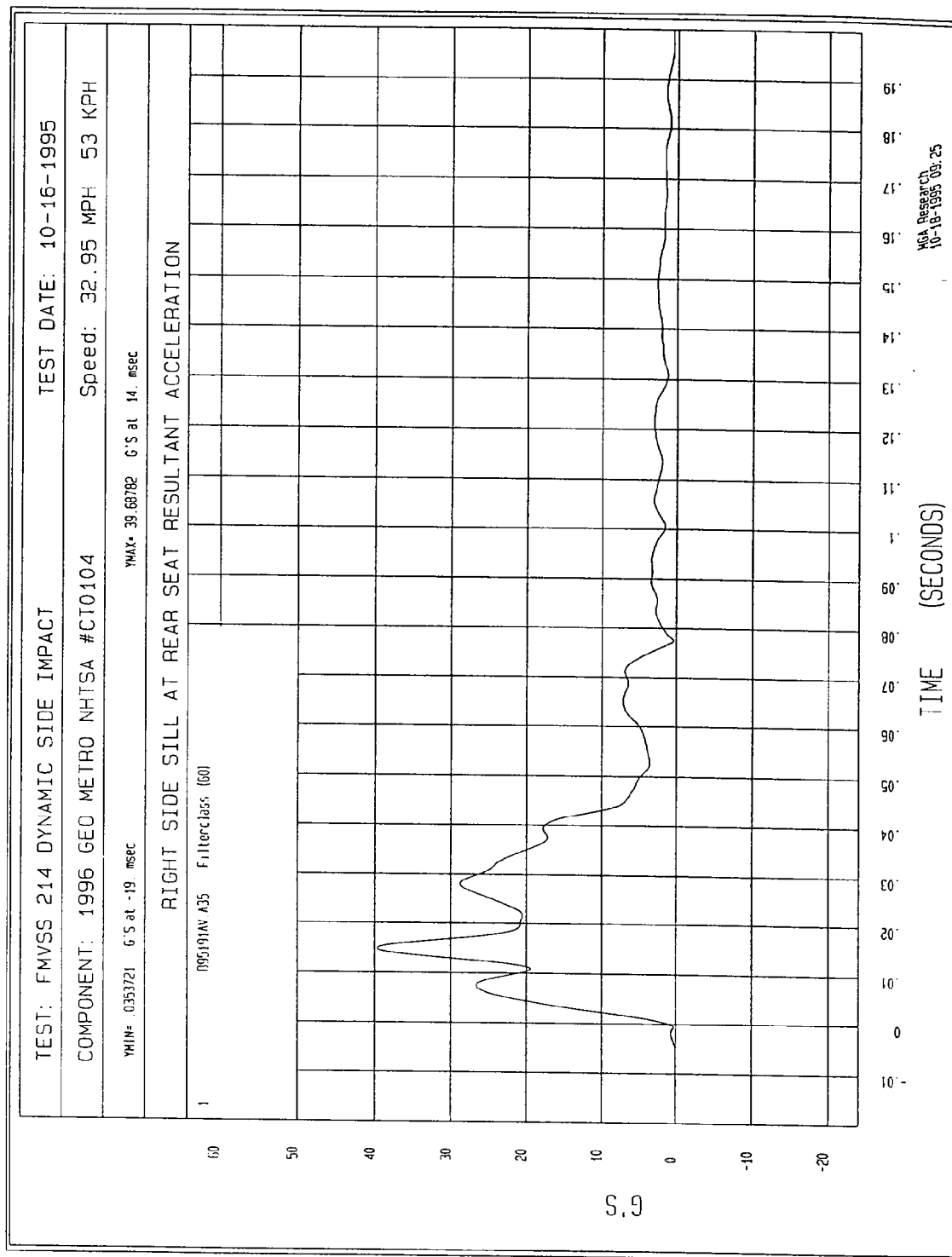


Figure B-34 - Right Side Sill at Rear Seat Resultant Acceleration vs. Time

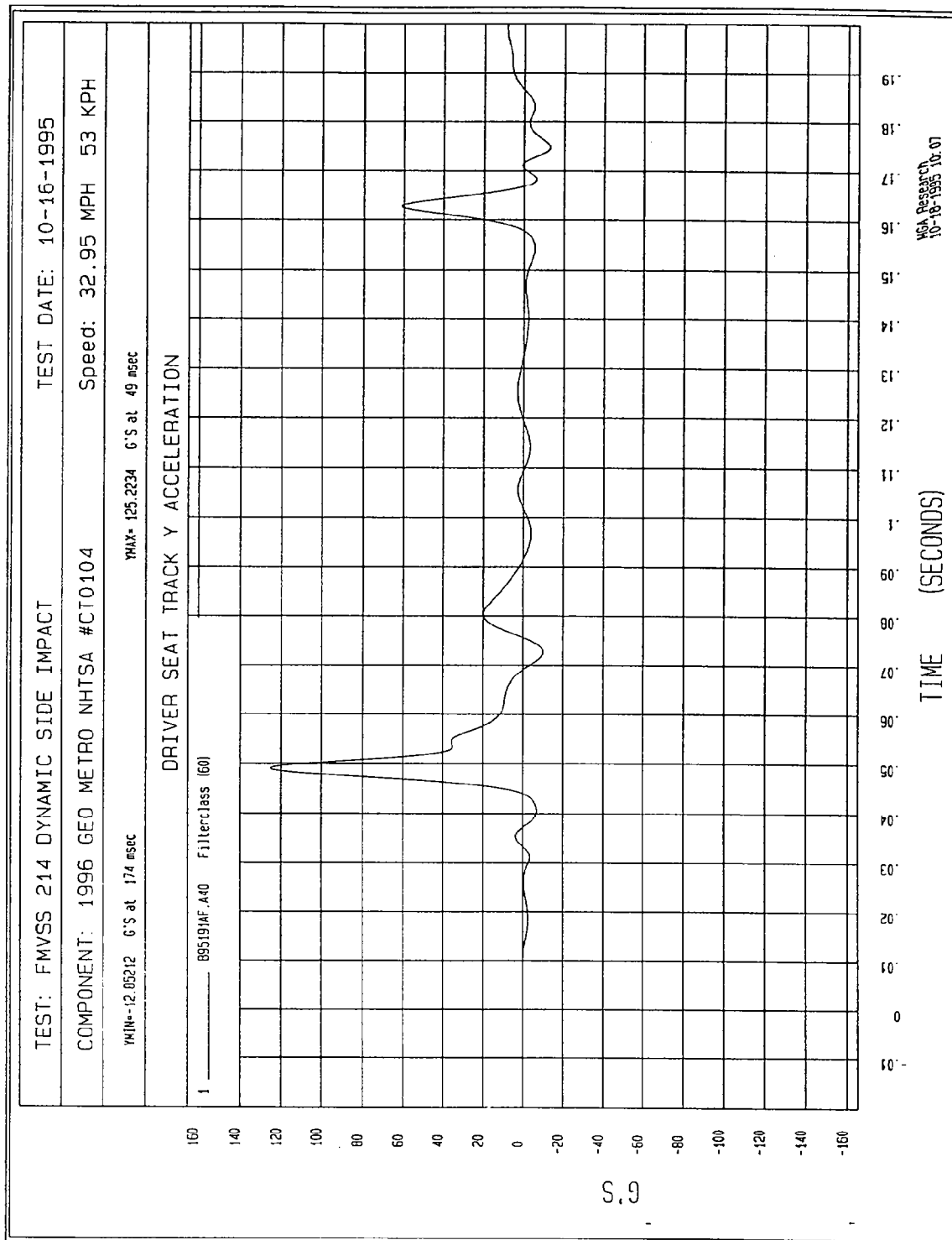


Figure B-35 - Driver Seat Track Y Acceleration vs. Time

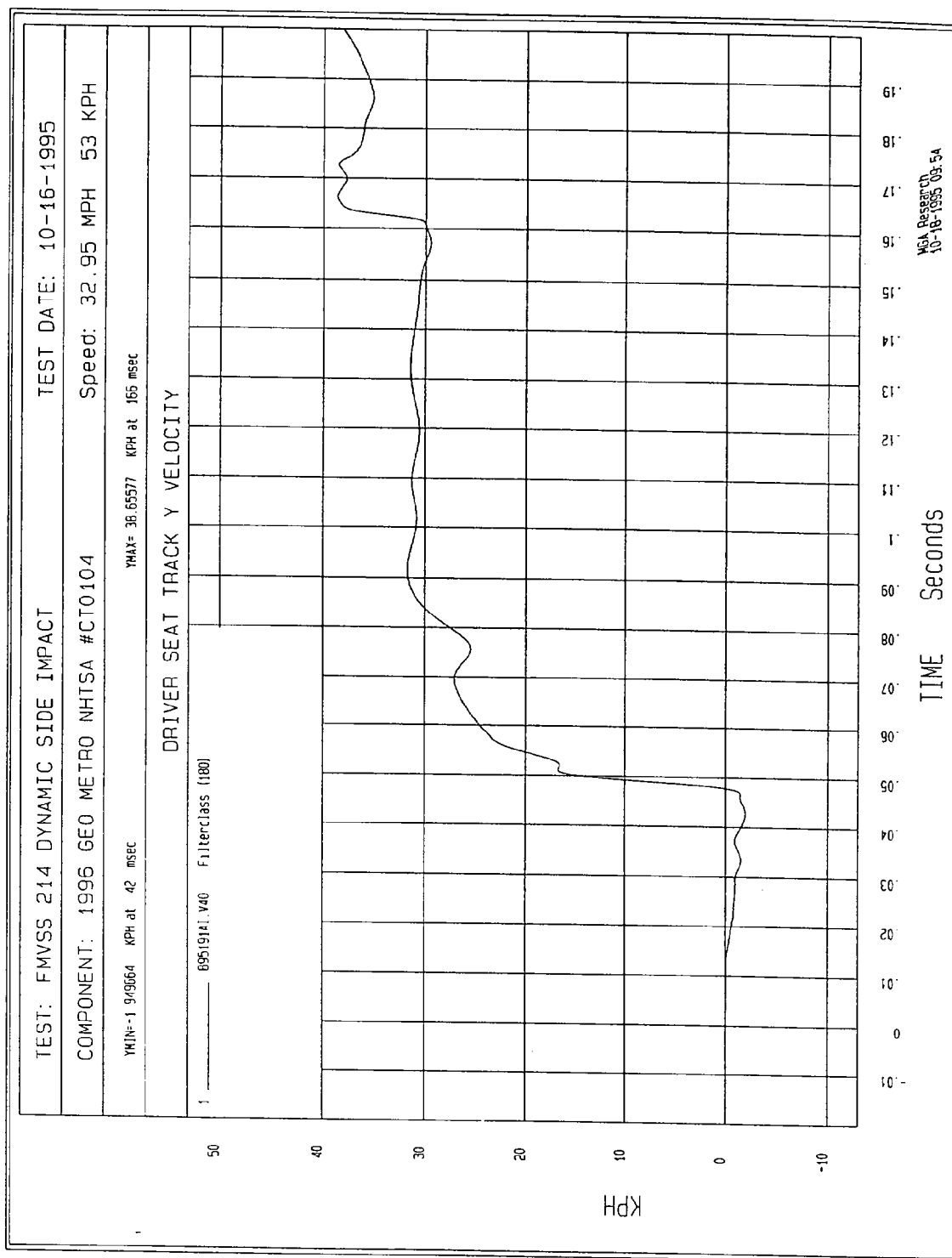


Figure B-36 - Driver Seat Track Y Velocity vs. Time

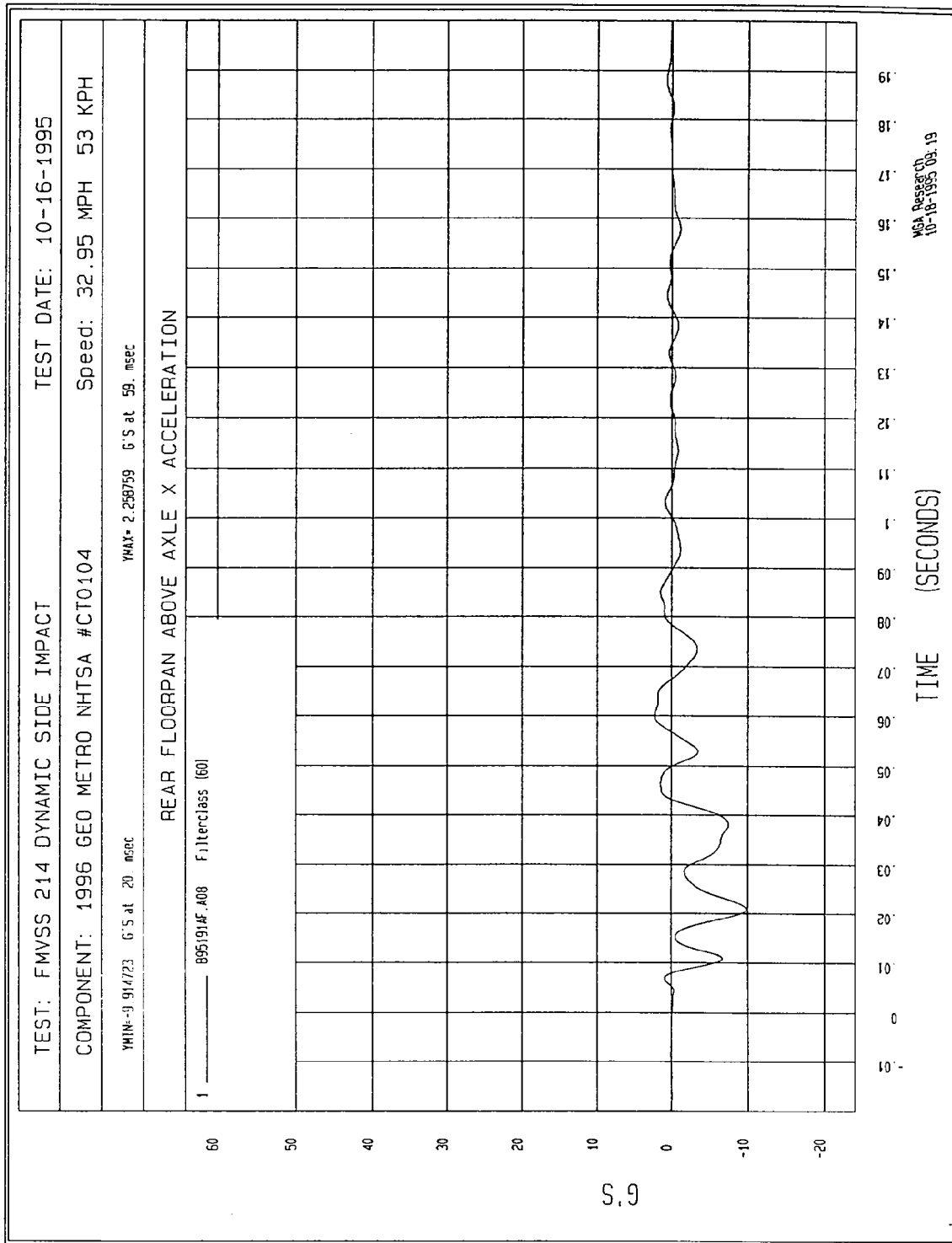


Figure B-37 - Rear Floorpan above Axle X Acceleration vs. Time

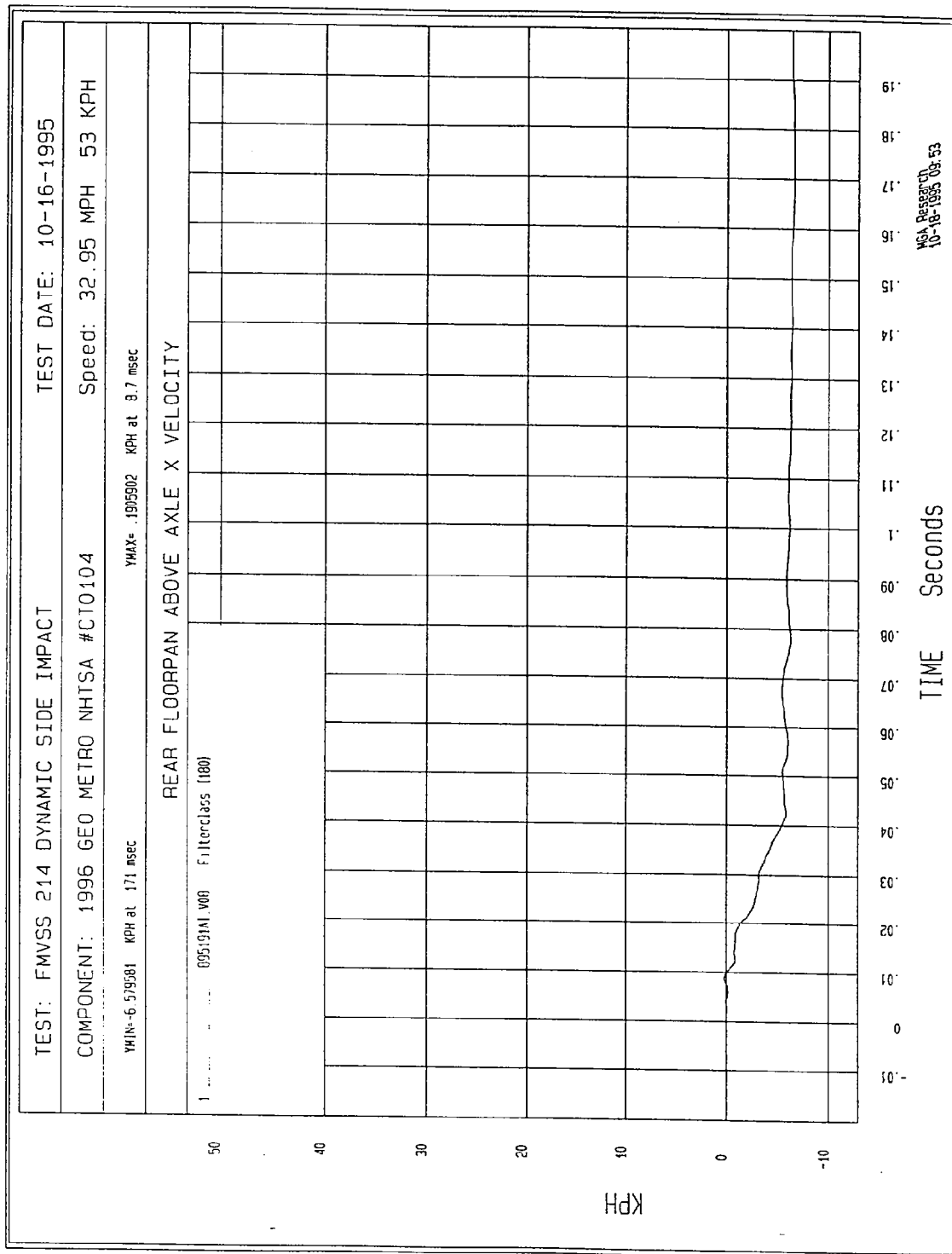


Figure B-38 - Rear Floorpan above Axle X Velocity vs. Time

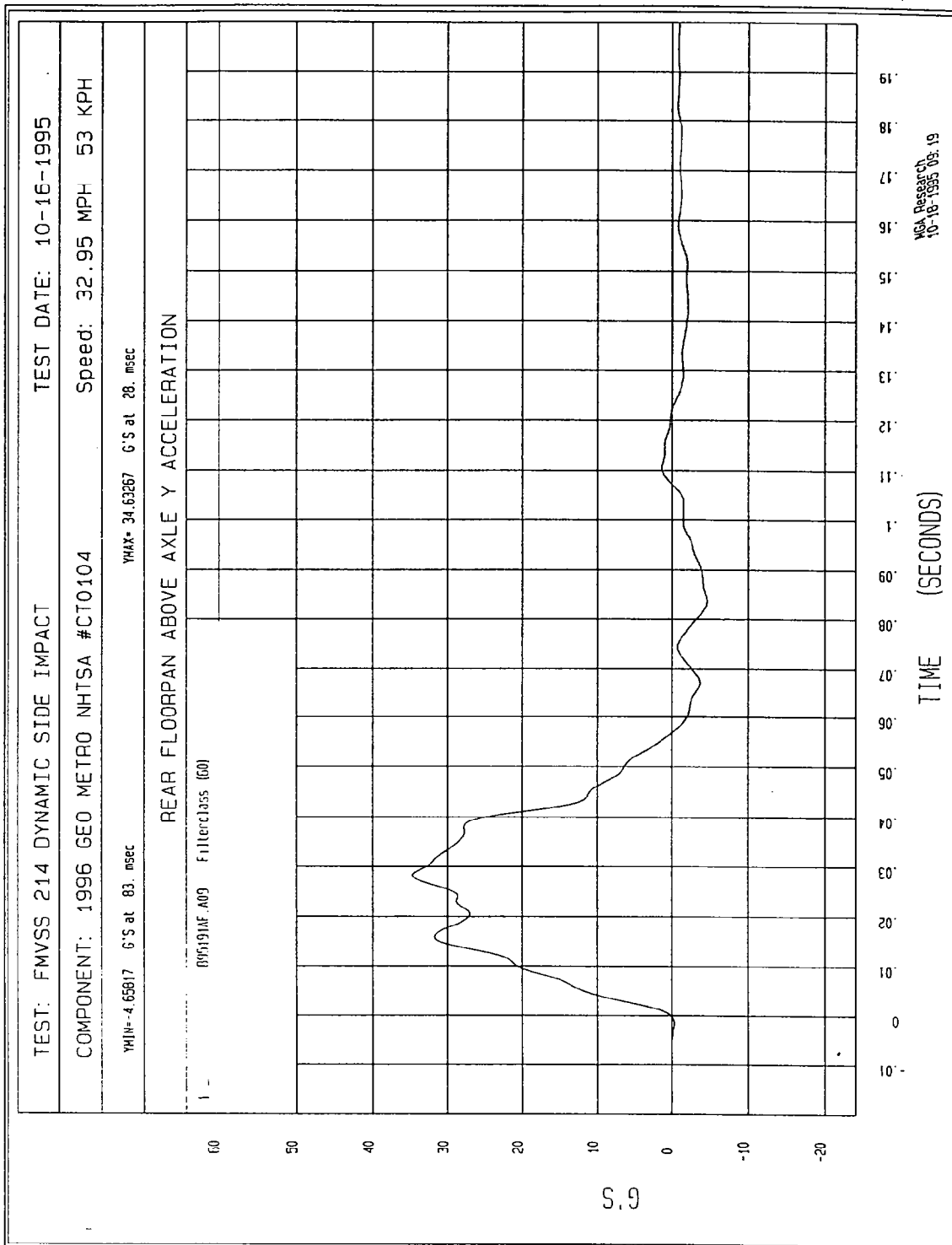


Figure B-39 - Rear Floorpan above Axle Y Acceleration vs. Time

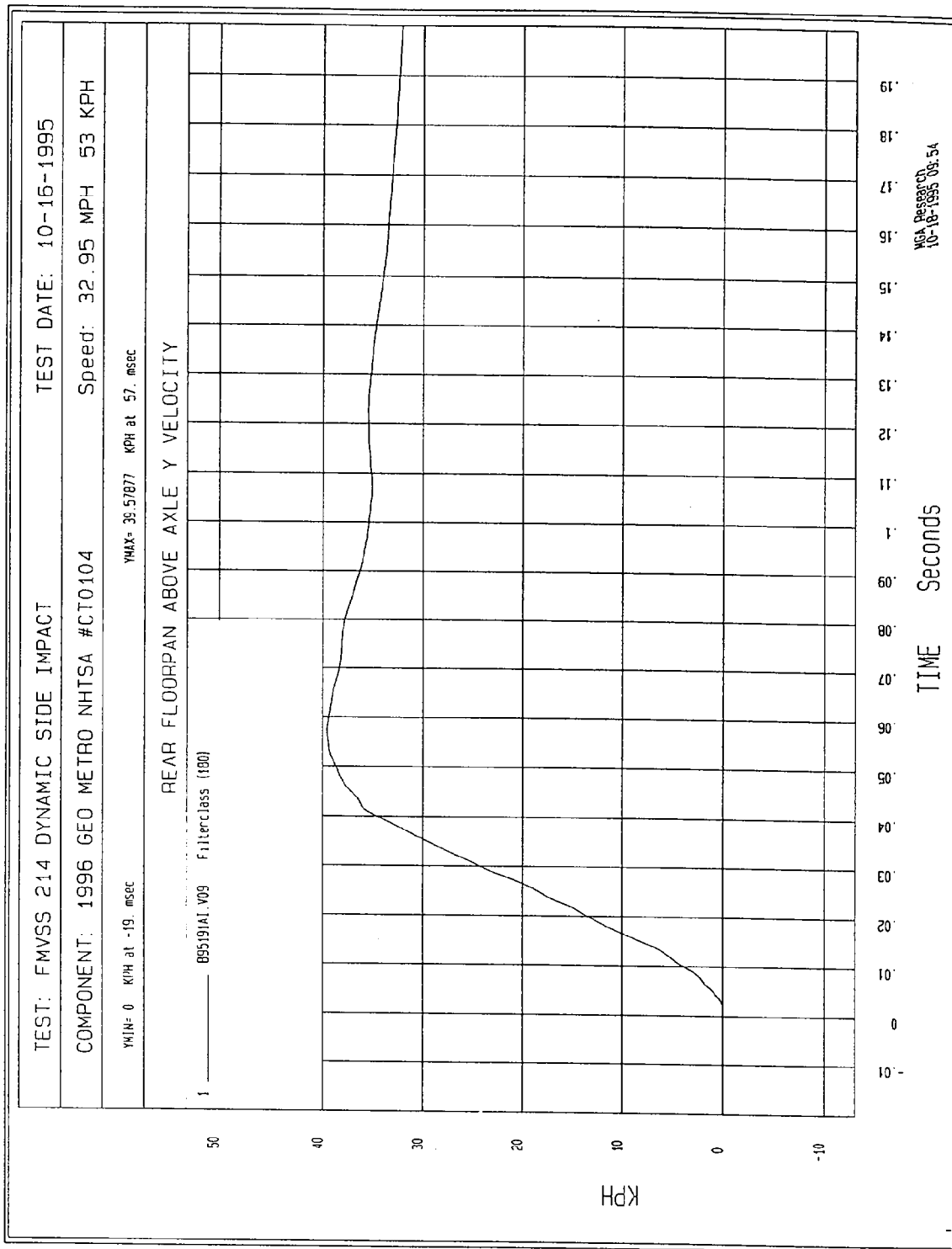


Figure B-40 - Rear Floorpan above Axle Y Velocity vs. Time

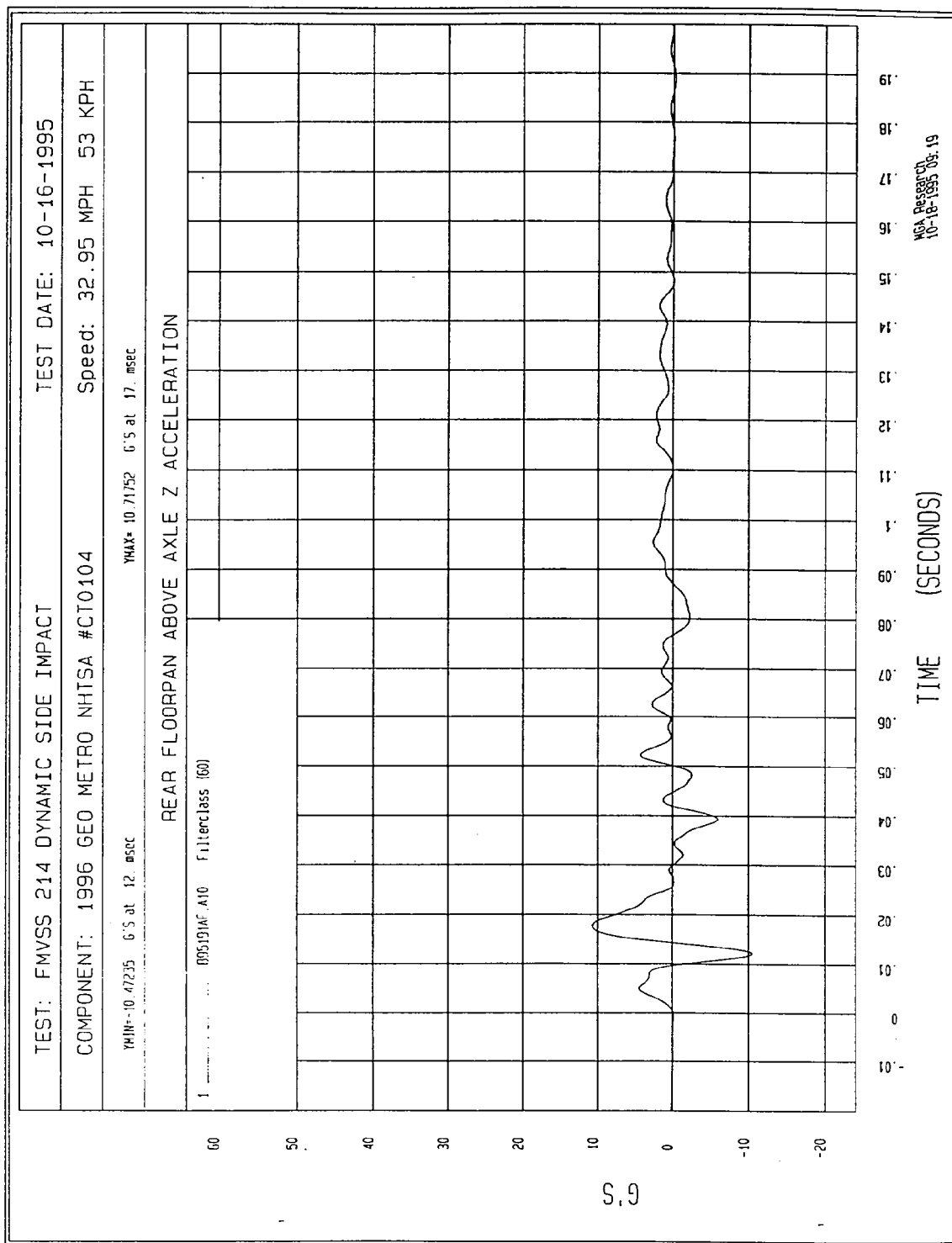


Figure B-41 - Rear Floorpan above Axle Z Acceleration vs. Time

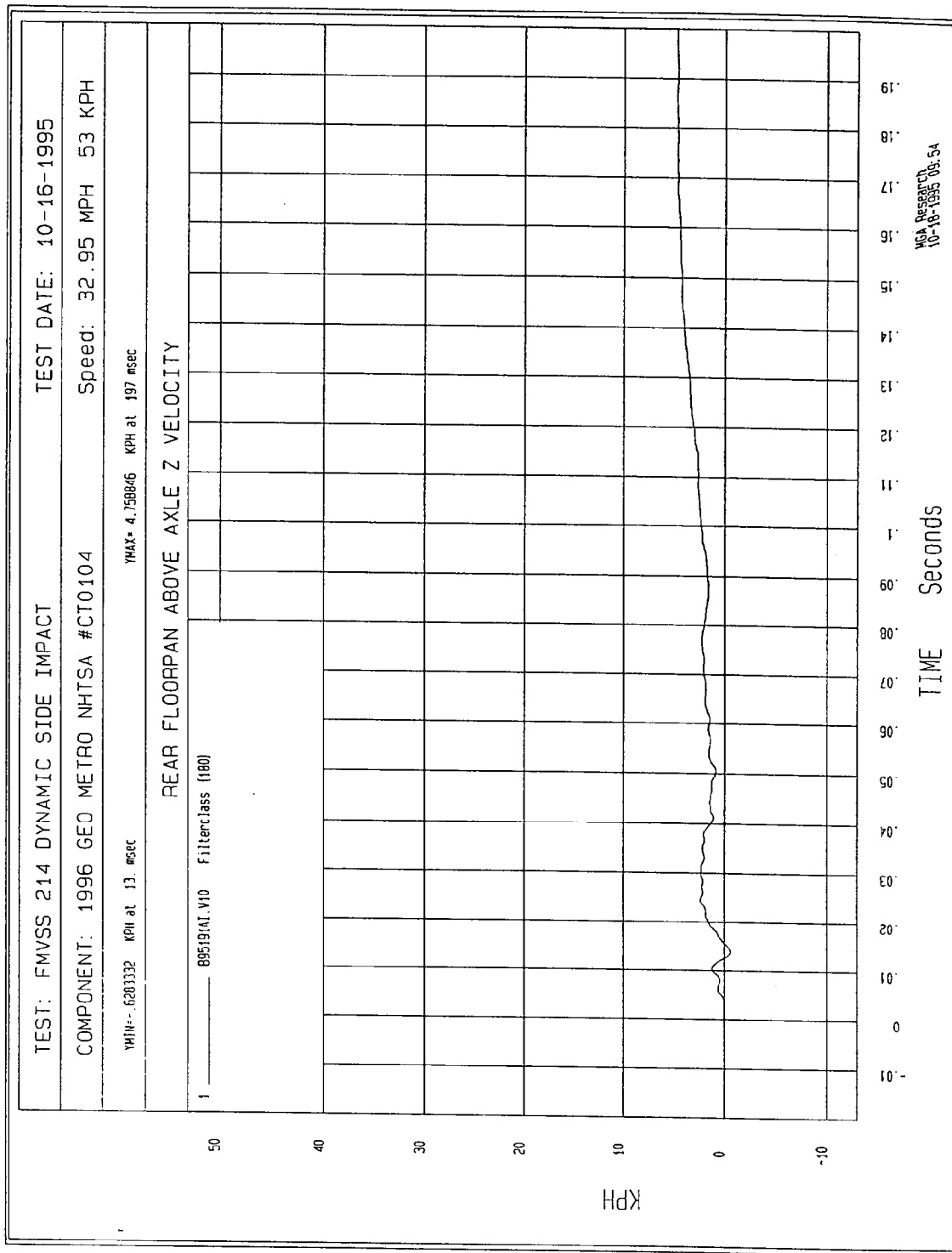


Figure B-42 - Rear Floorpan above Axle Z Velocity vs. Time

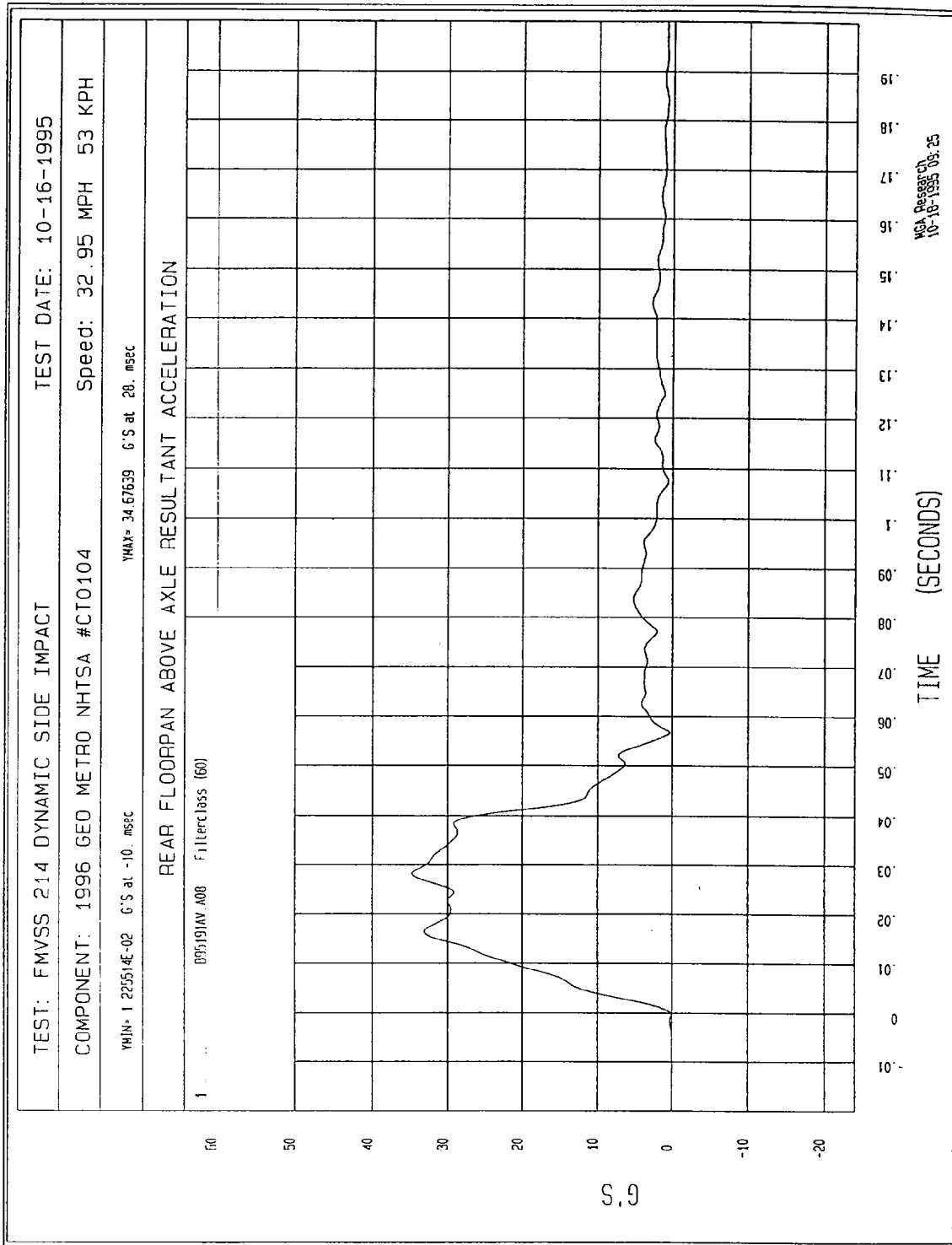


Figure B-43 - Rear Floorpan above Axle Resultant Acceleration vs. Time

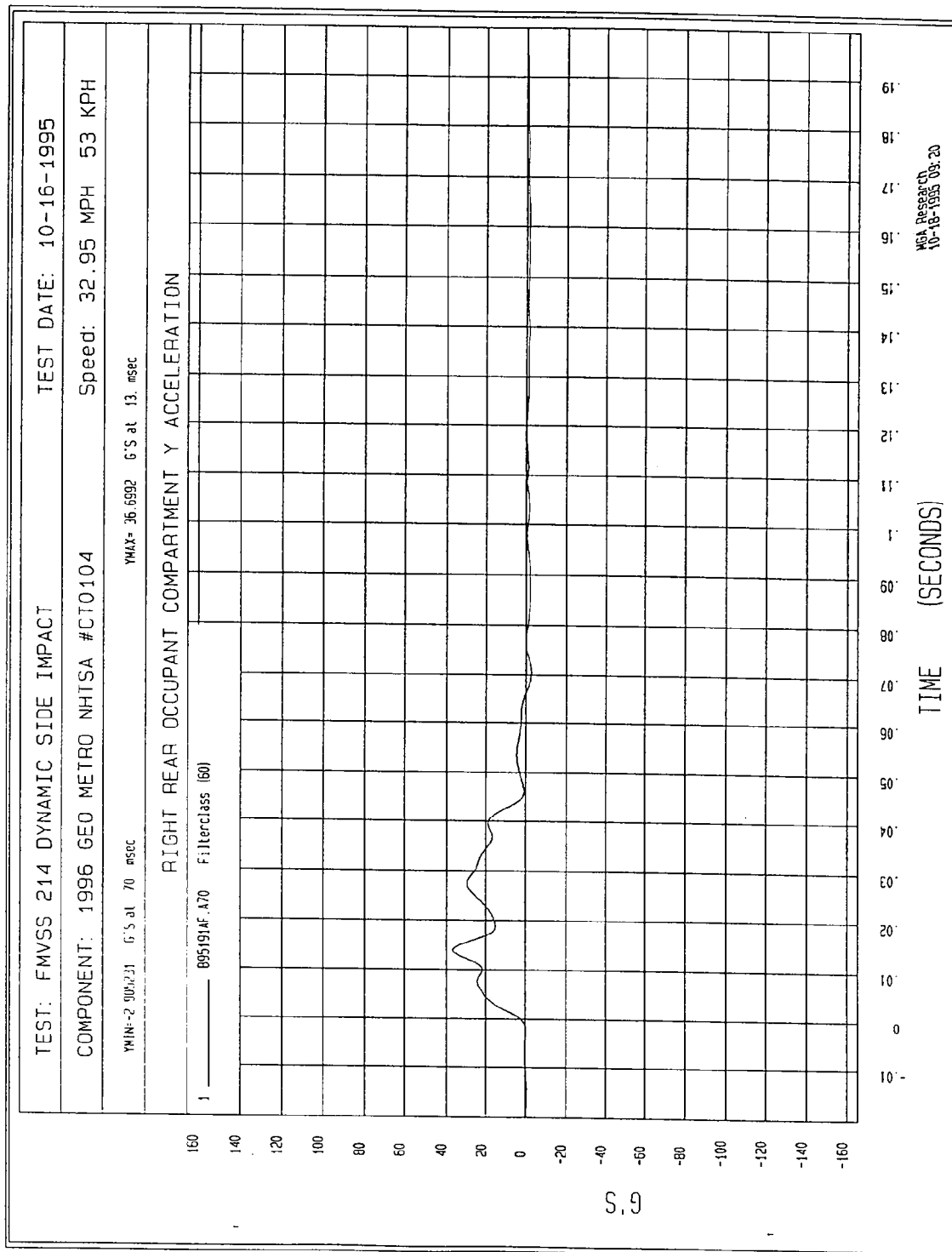


Figure B-44 - Right Rear Occupant Compartment Y Acceleration vs. Time

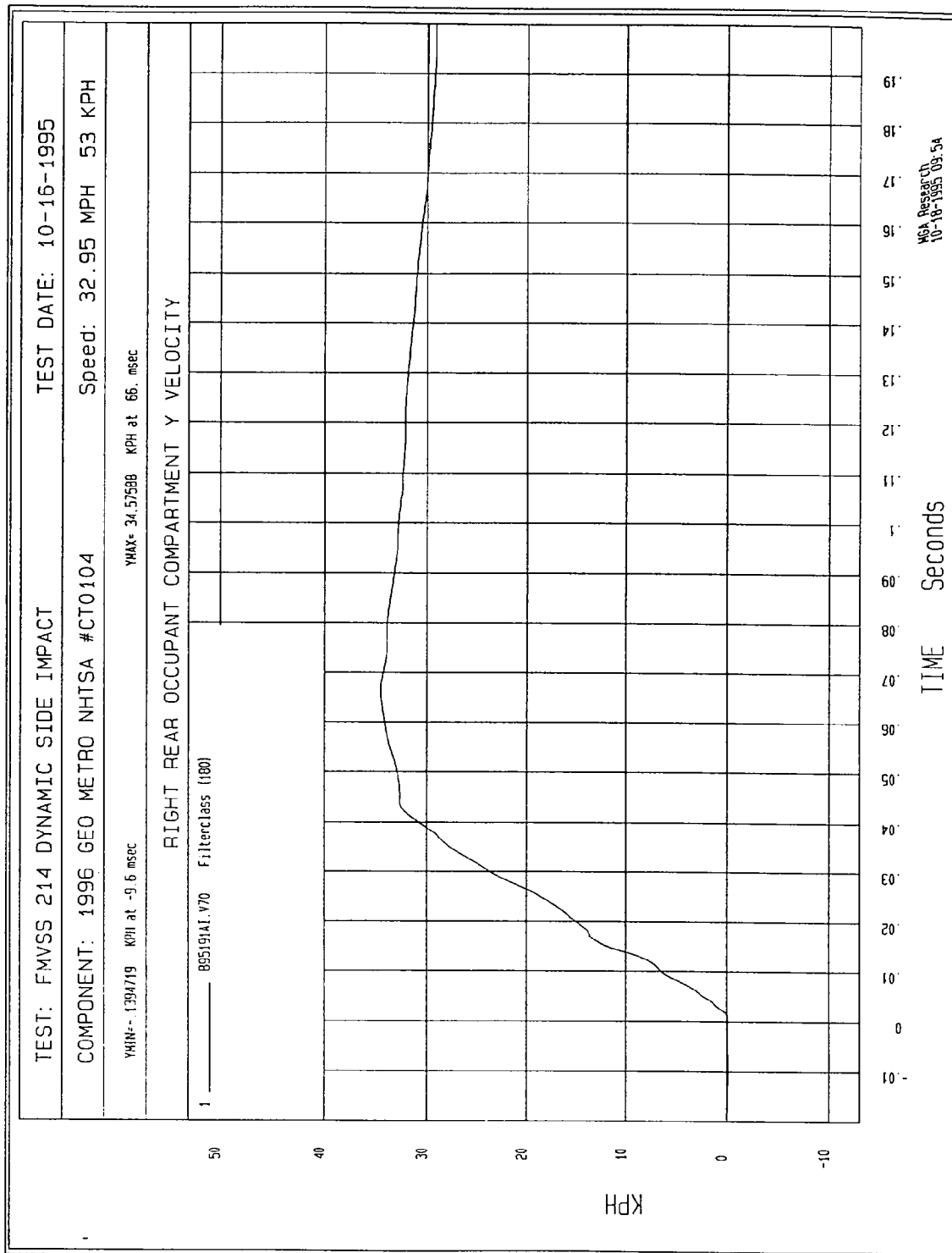


Figure B-45 - Right Rear Occupant Compartment Y Velocity vs. Time

NO VALID DATA COLLECTED

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

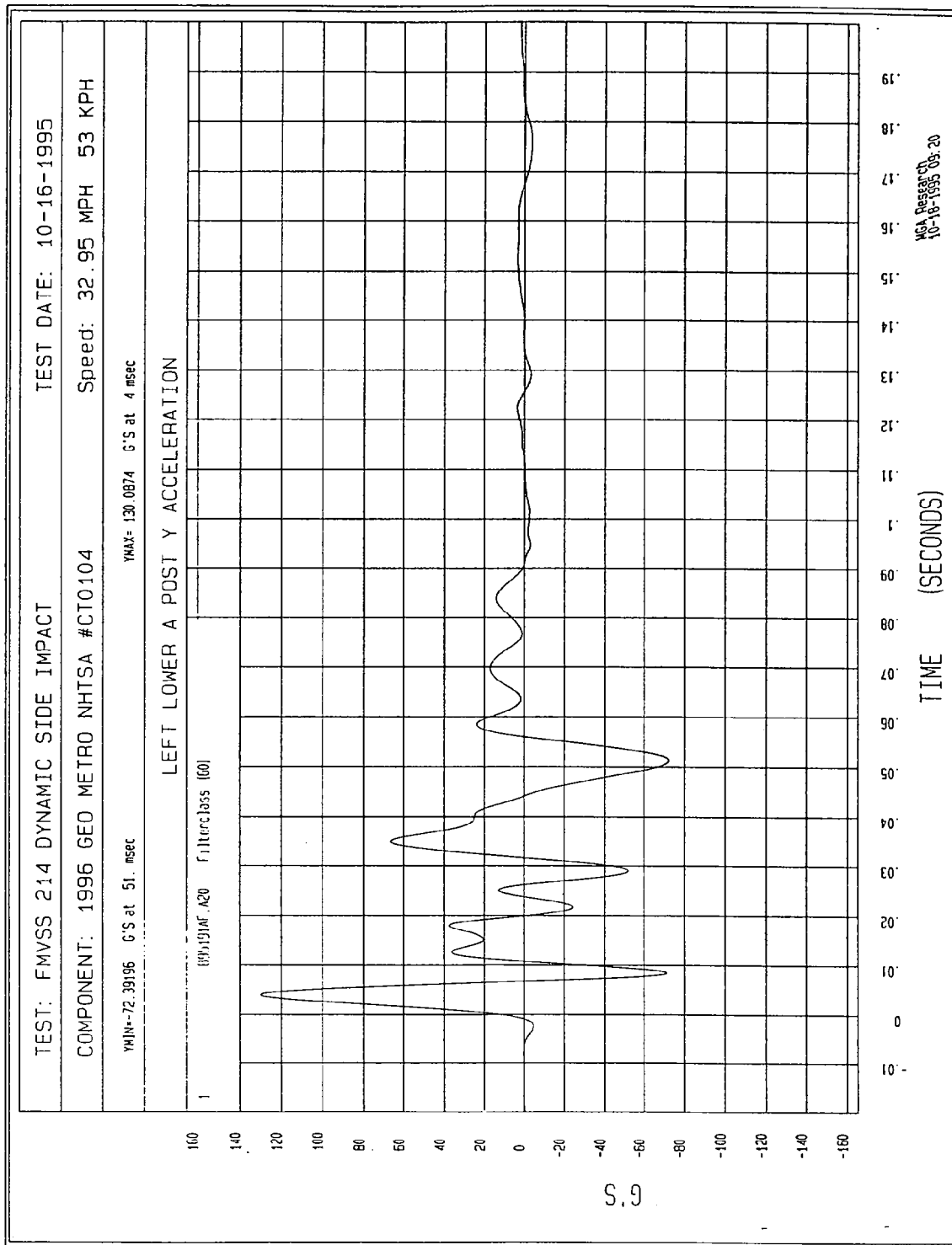


Figure B-47 - Left Lower A Post Y Acceleration vs. Time

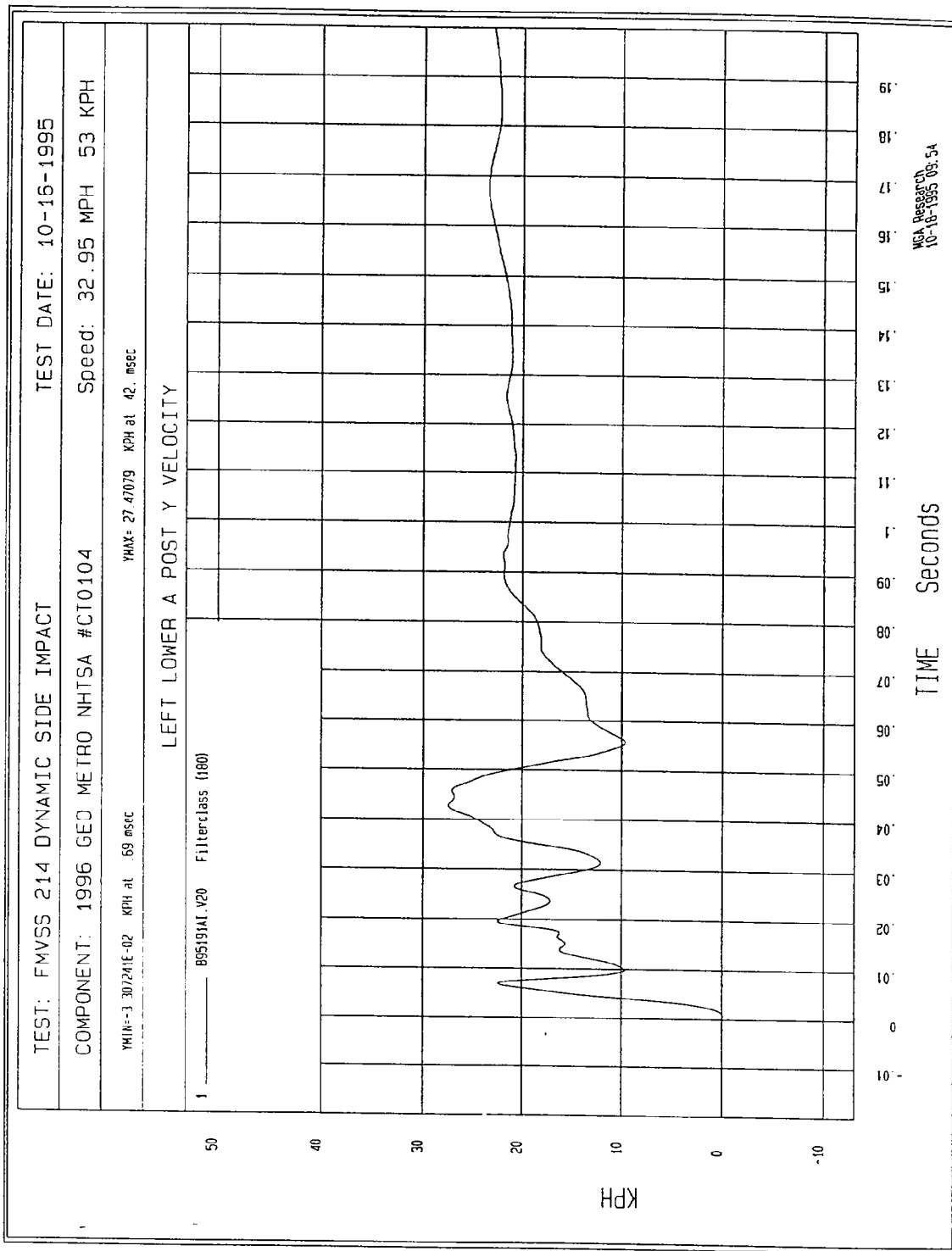
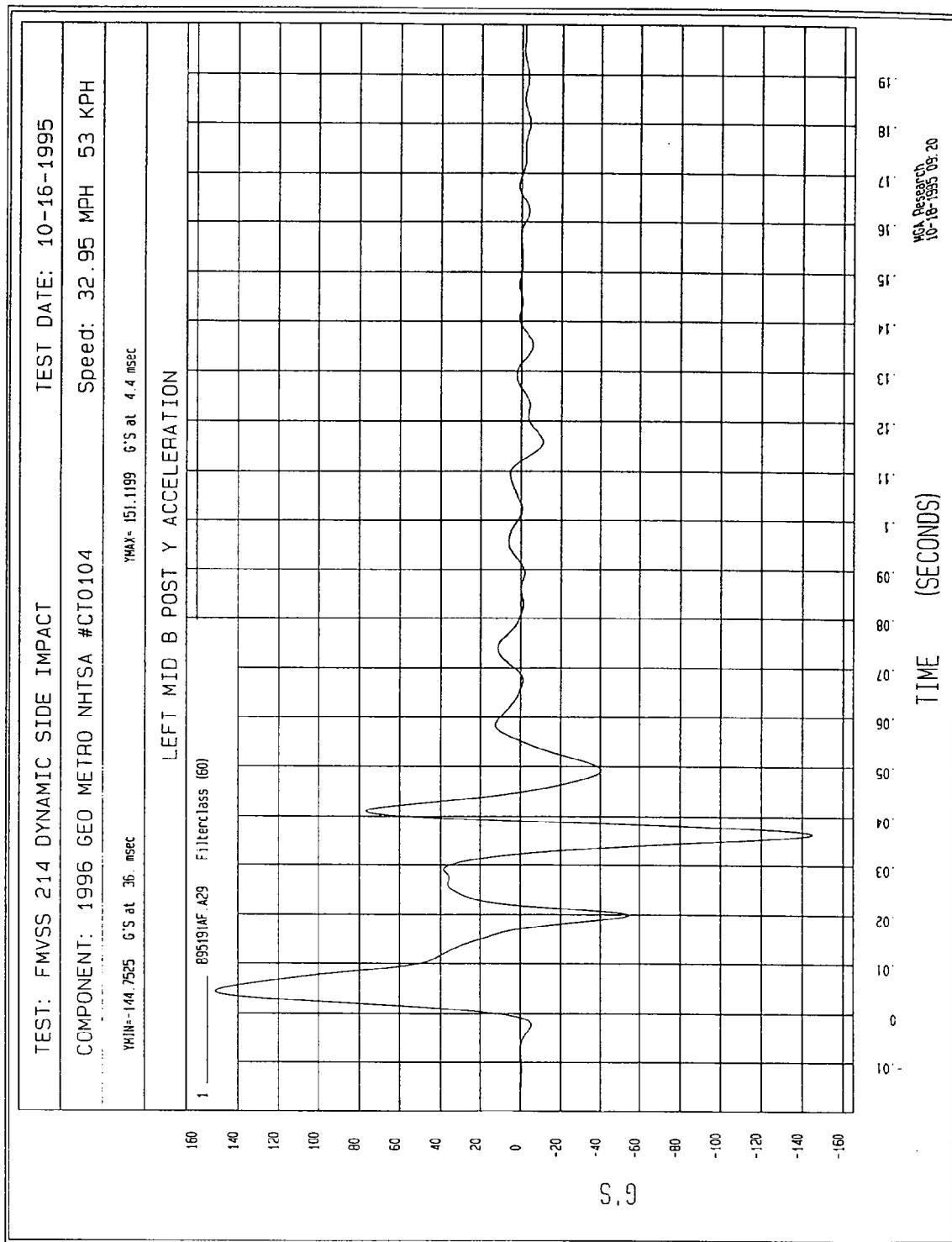


Figure B-48 - Left Lower A Post Y Velocity vs. Time



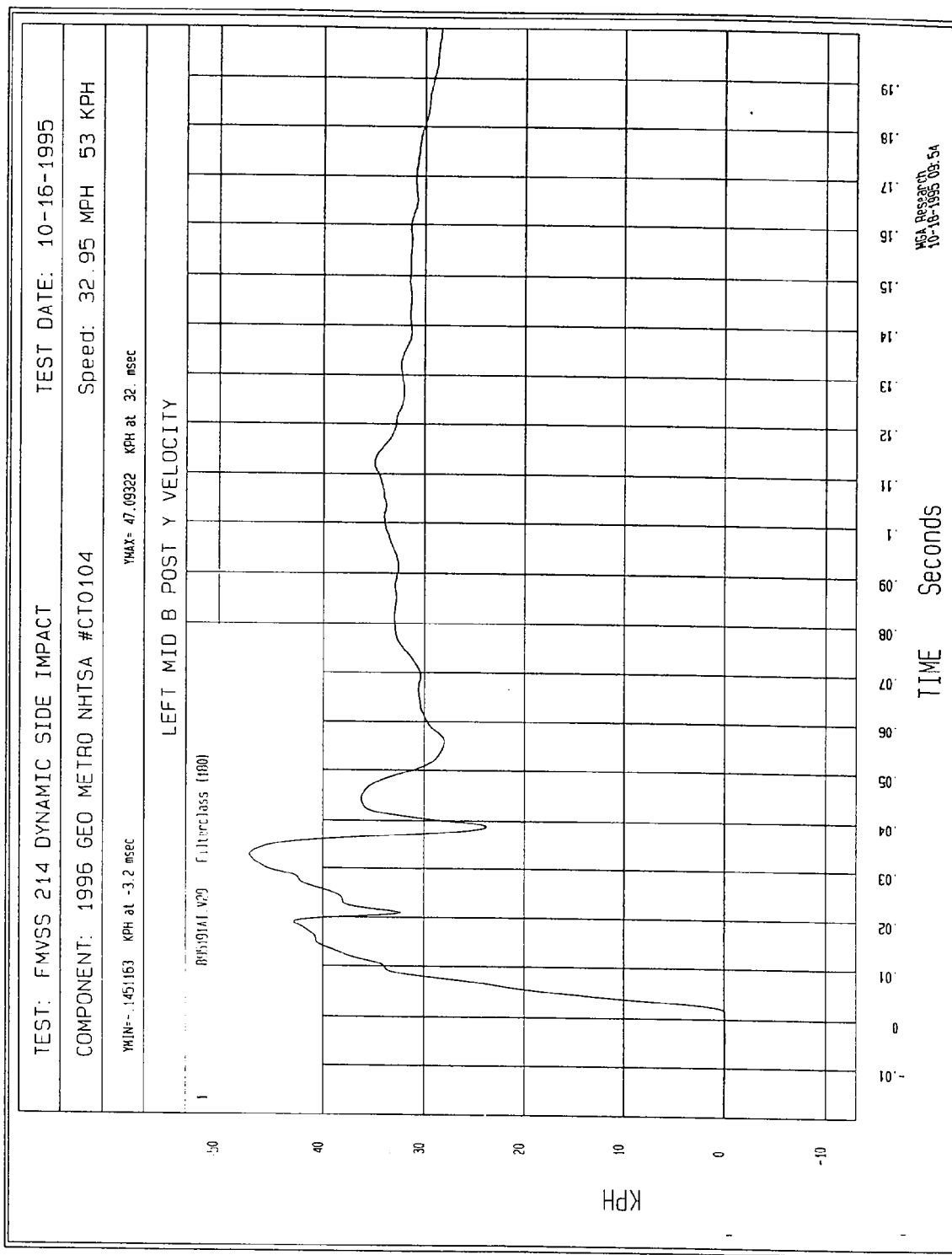


Figure B-50 - Left Mid B Post Y Velocity vs. Time

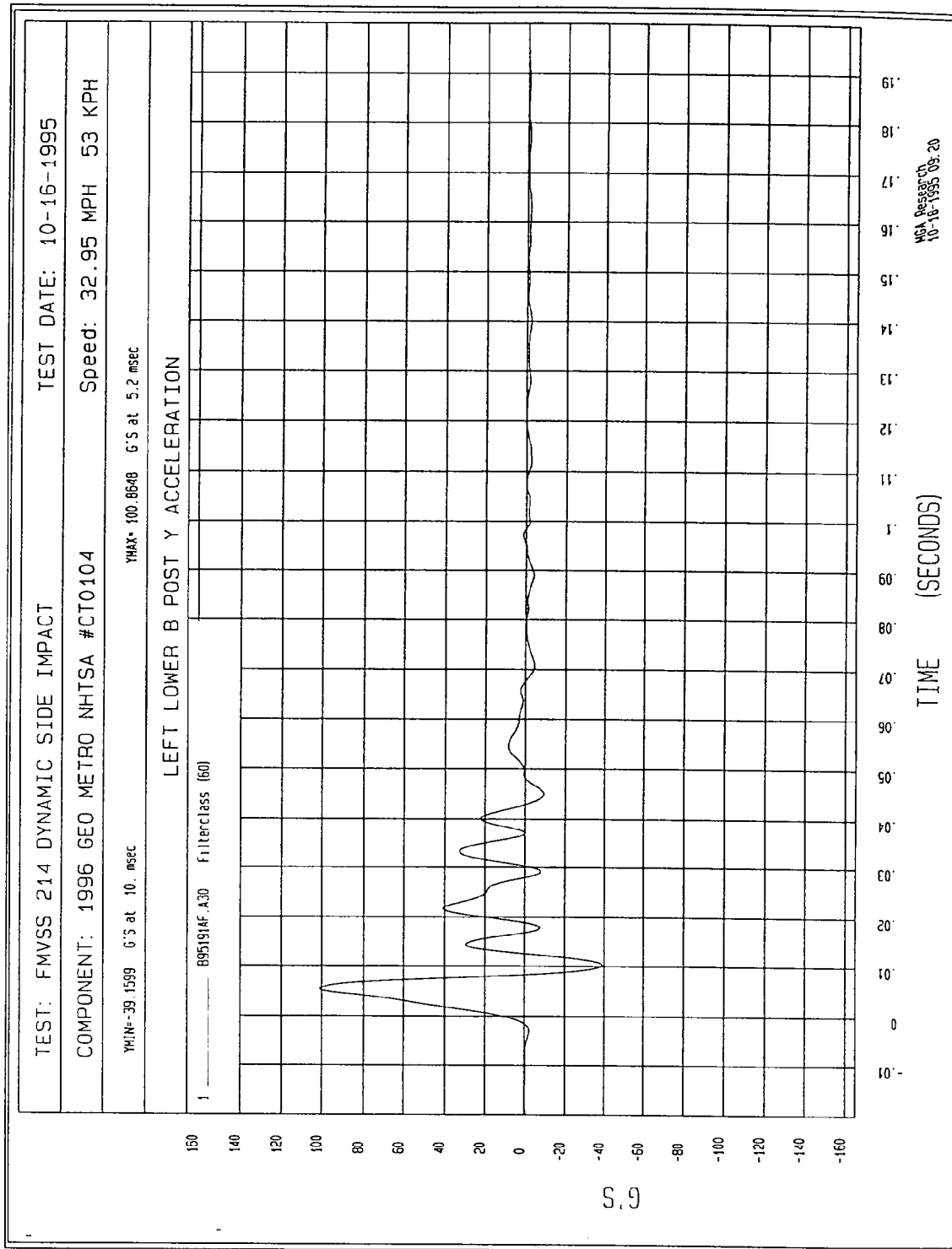


Figure B-51 - Left Lower B Post Y Acceleration vs. Time

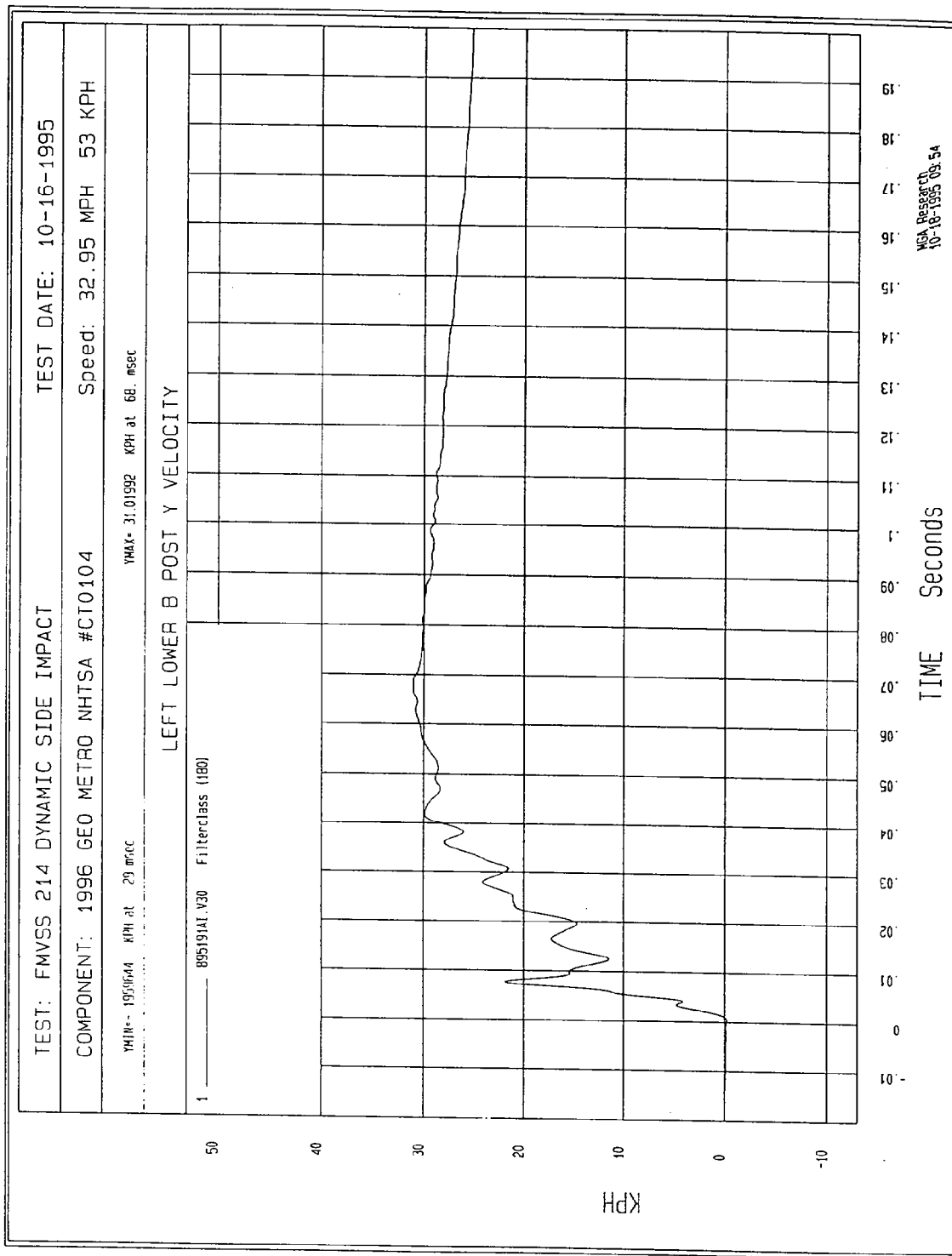


Figure B-52 - Left Lower B Post Y Velocity vs. Time

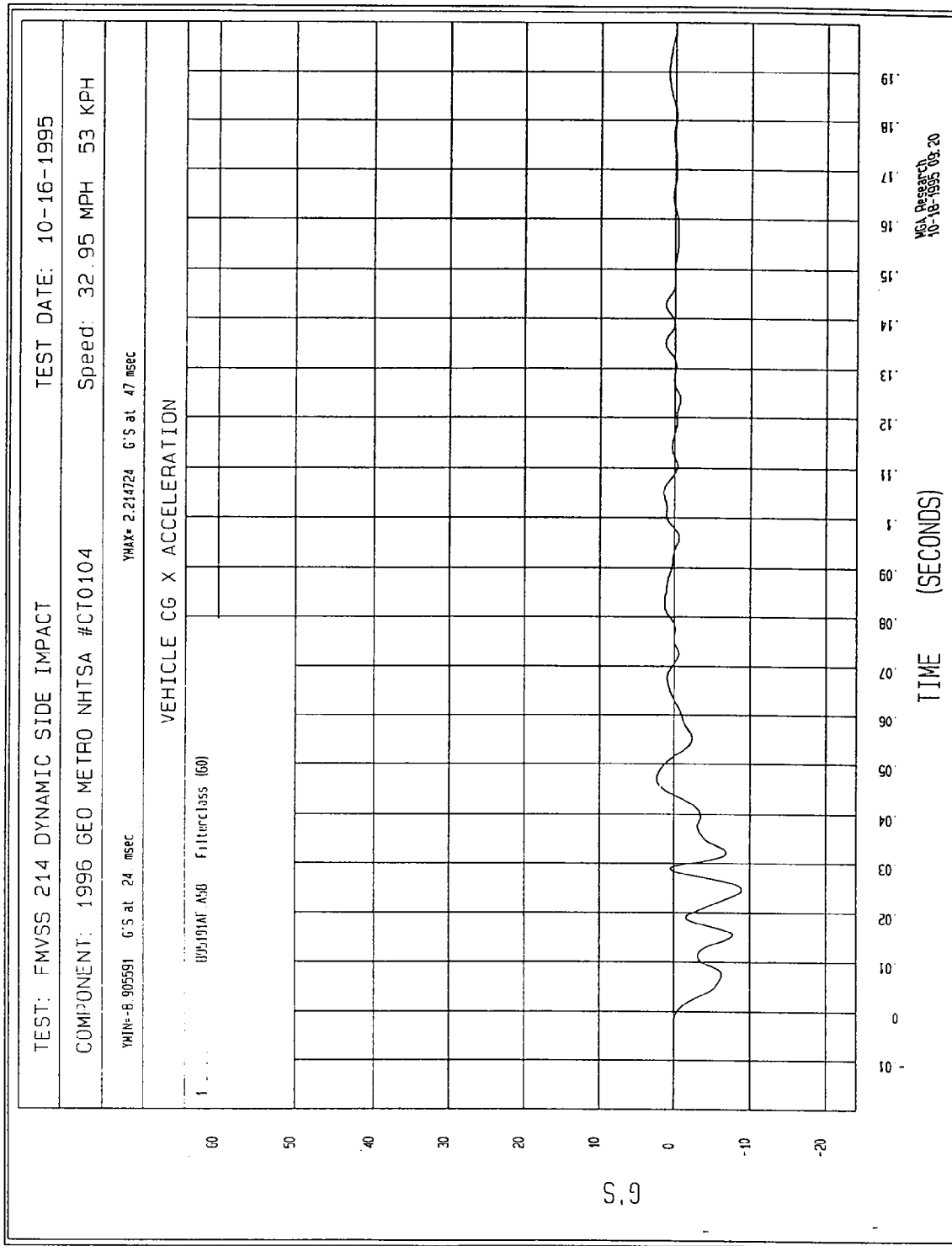


Figure B-53 - Vehicle Center of Gravity X Acceleration vs. Time

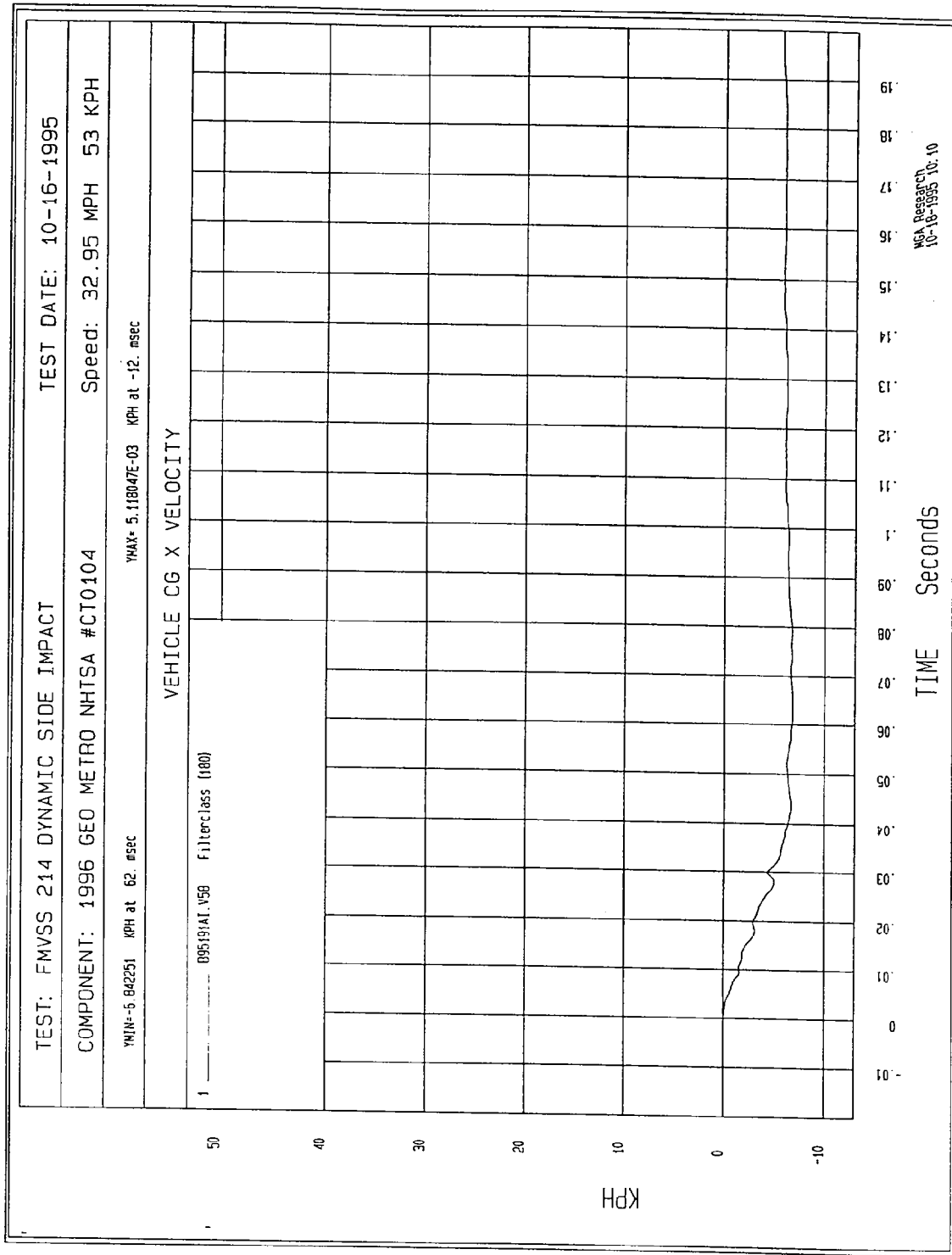


Figure B-54 - Vehicle Center of Gravity X Velocity vs. Time

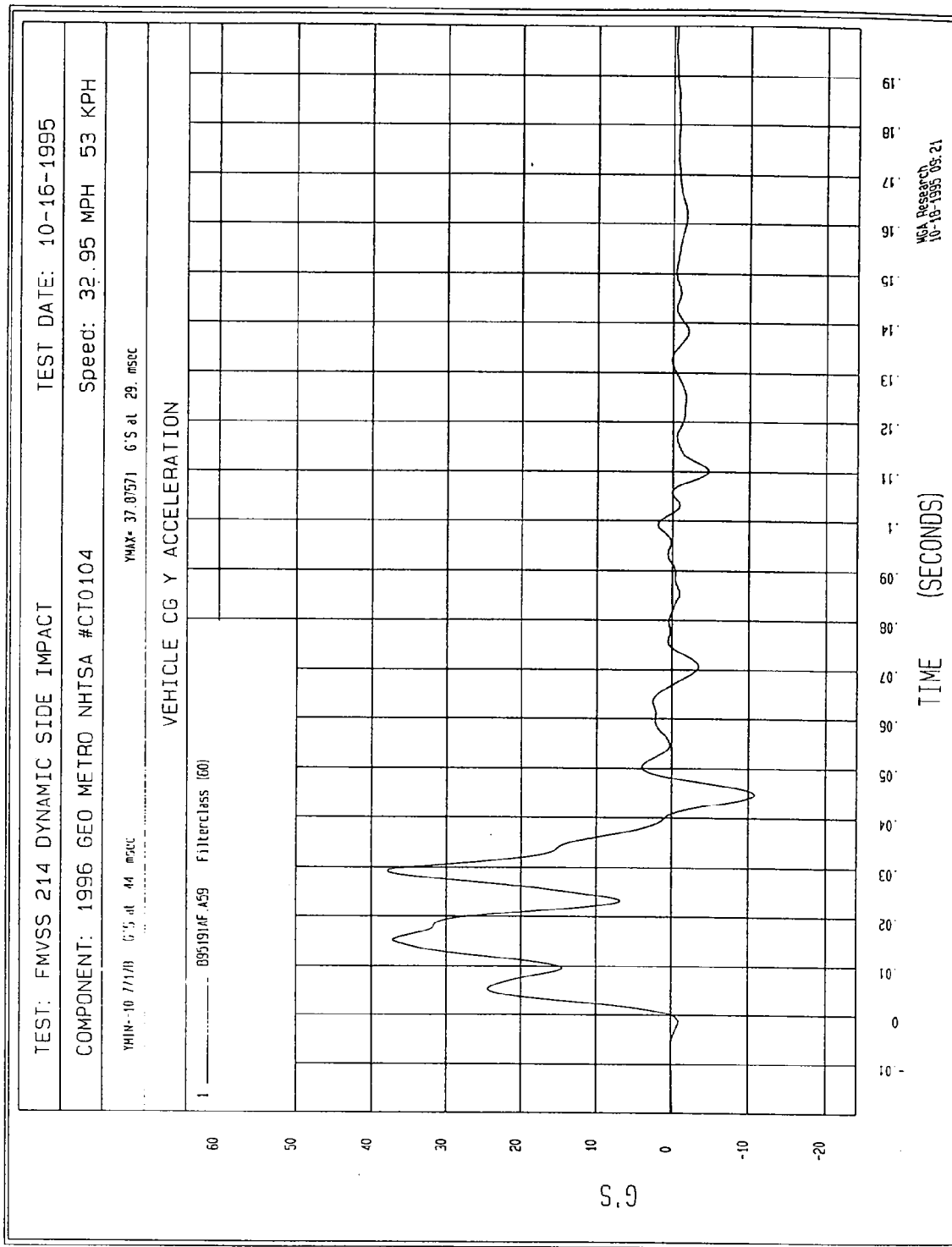


Figure B-55 - Vehicle Center of Gravity Y Acceleration vs. Time

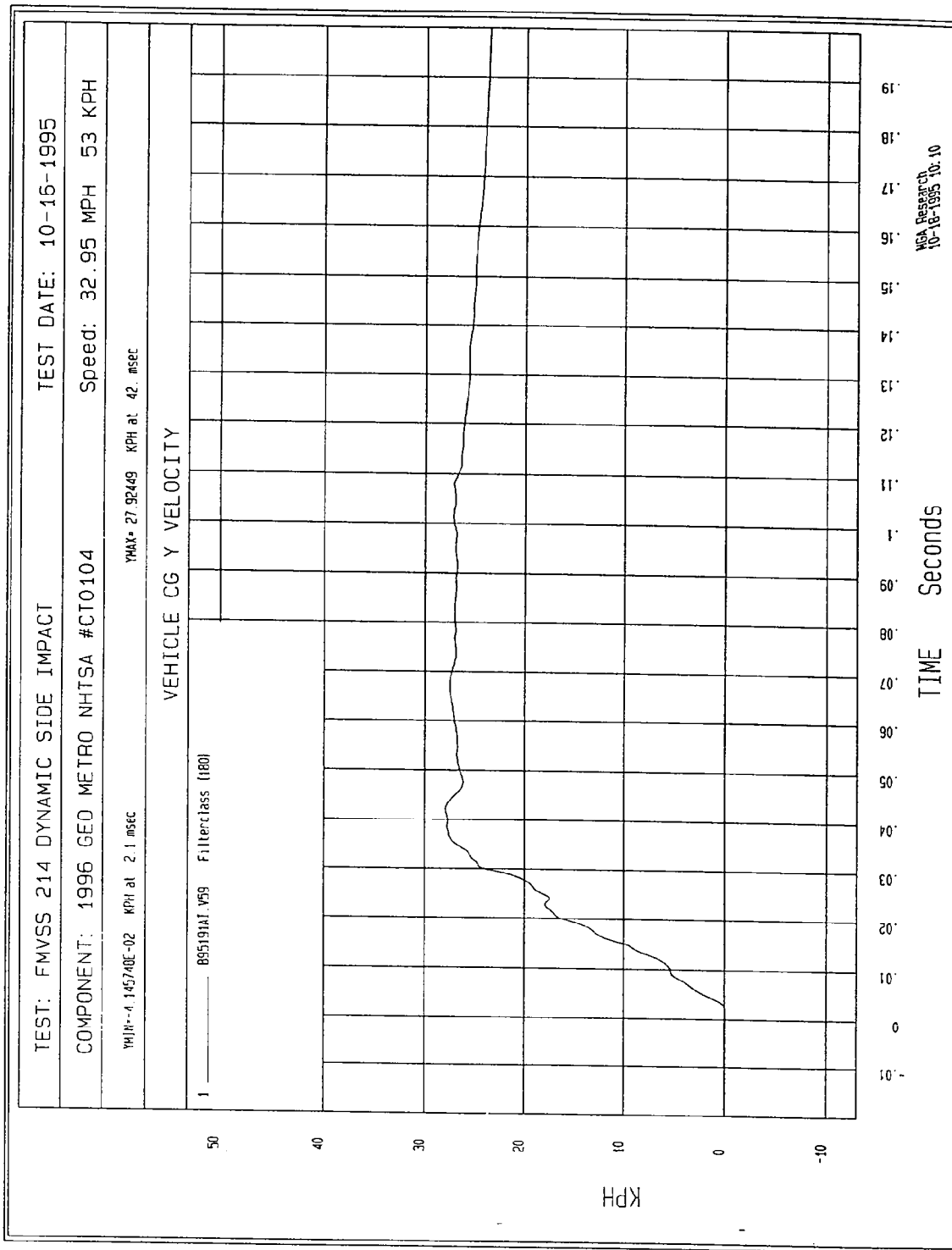
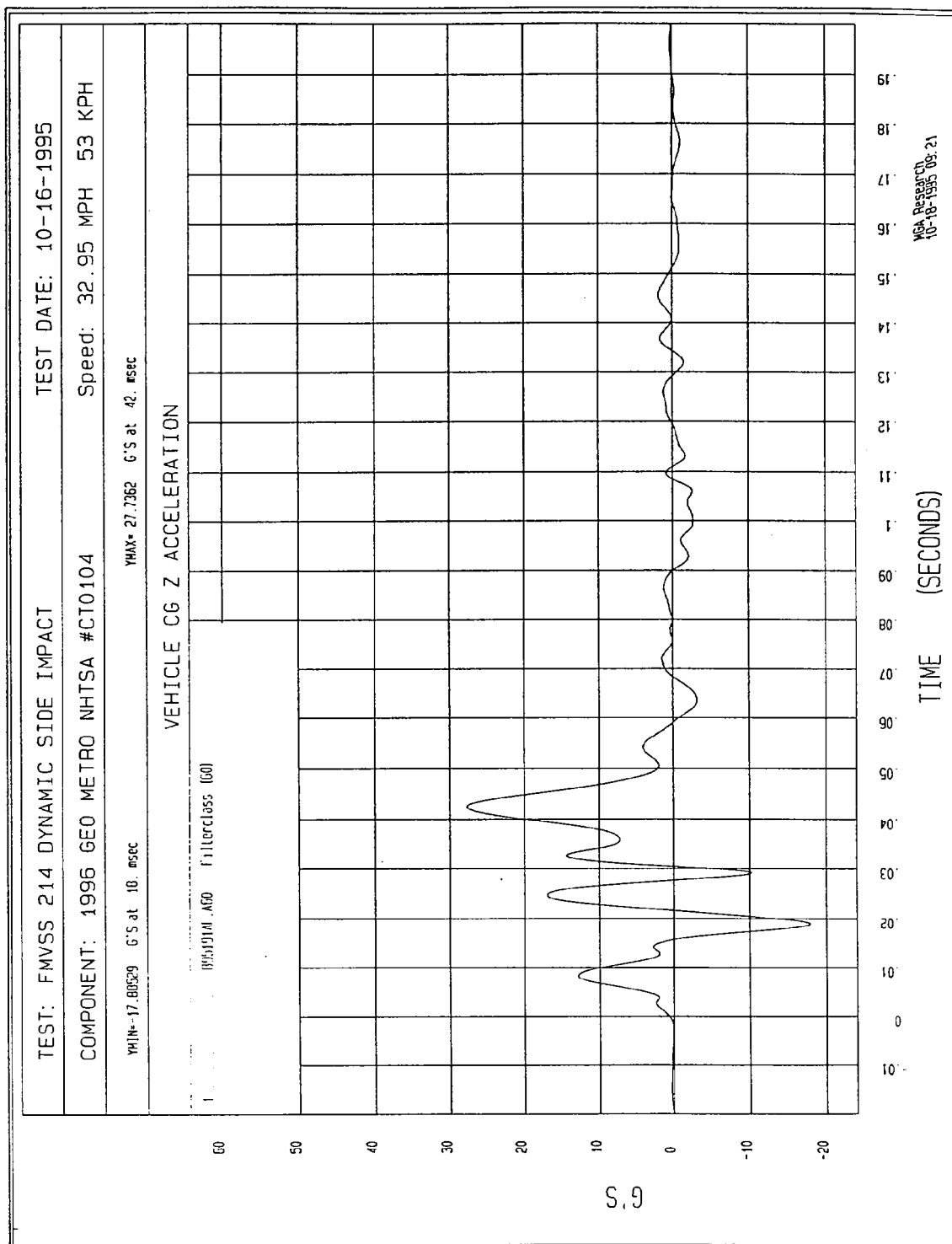


Figure B-56 - Vehicle Center of Gravity Y Velocity vs. Time



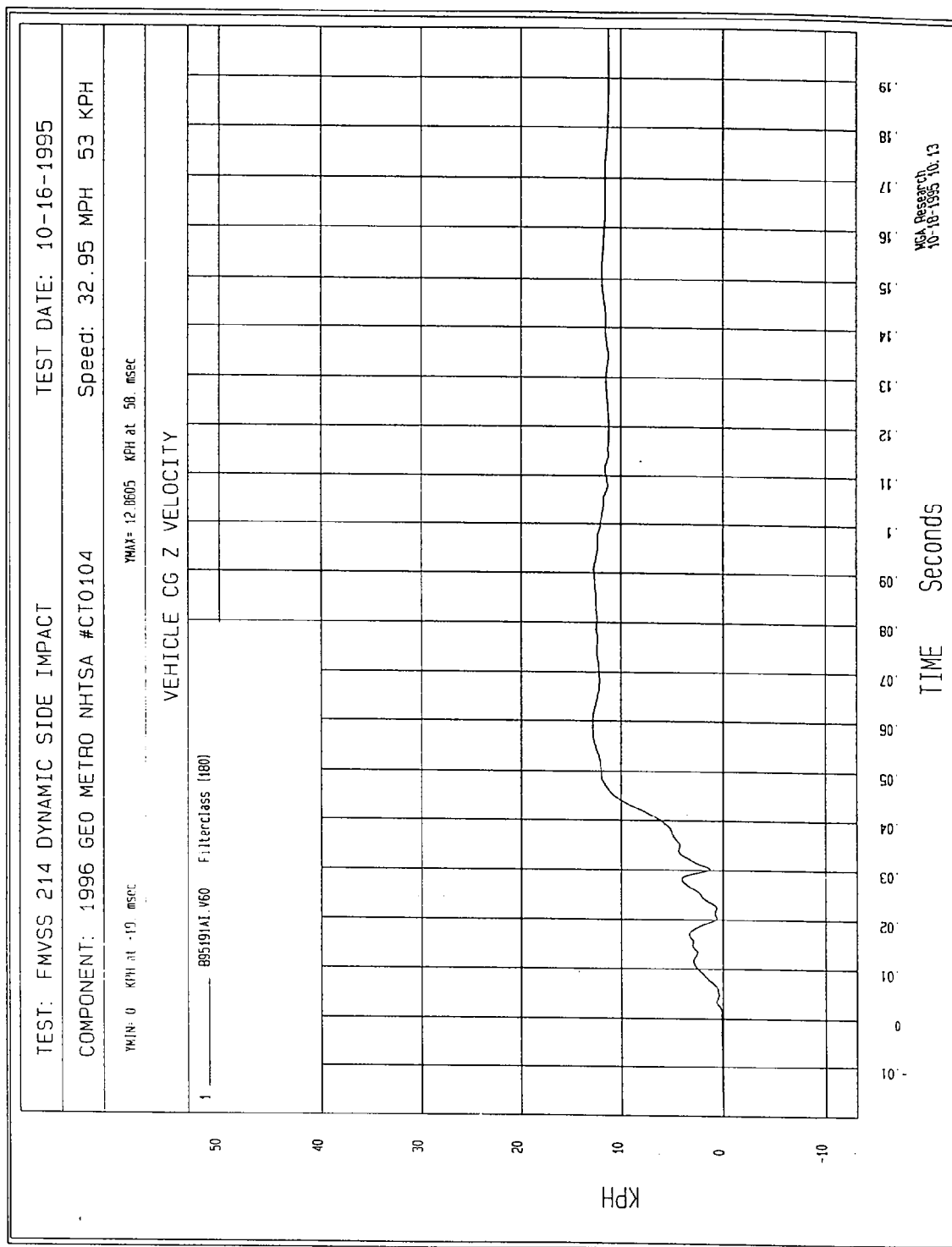


Figure B-58 - Vehicle Center of Gravity Z Velocity vs. Time

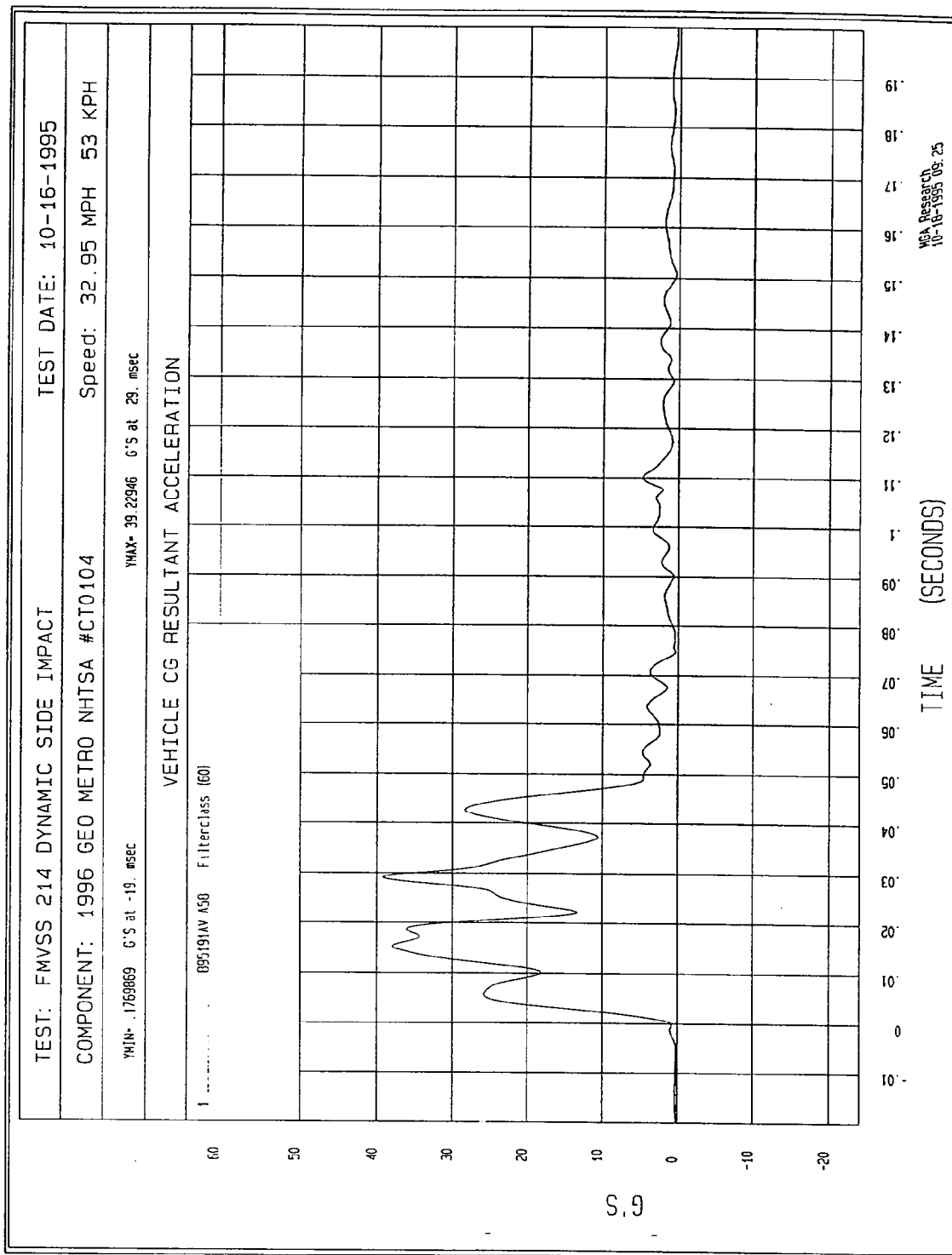


Figure B-59 - Vehicle Center of Gravity Resultant Acceleration vs. Time

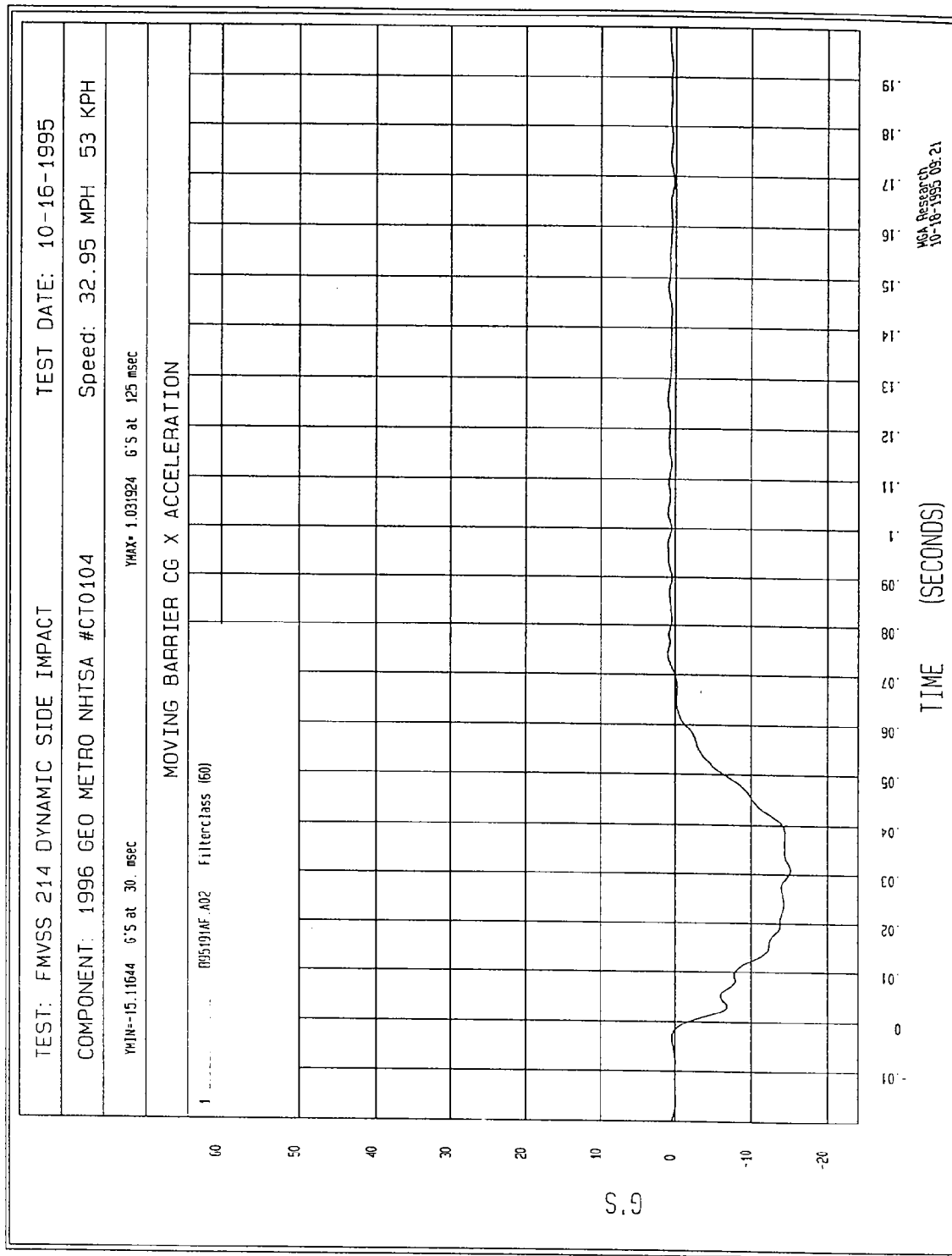


Figure B-60 - Moving Barrier Center of Gravity X Acceleration vs. Time

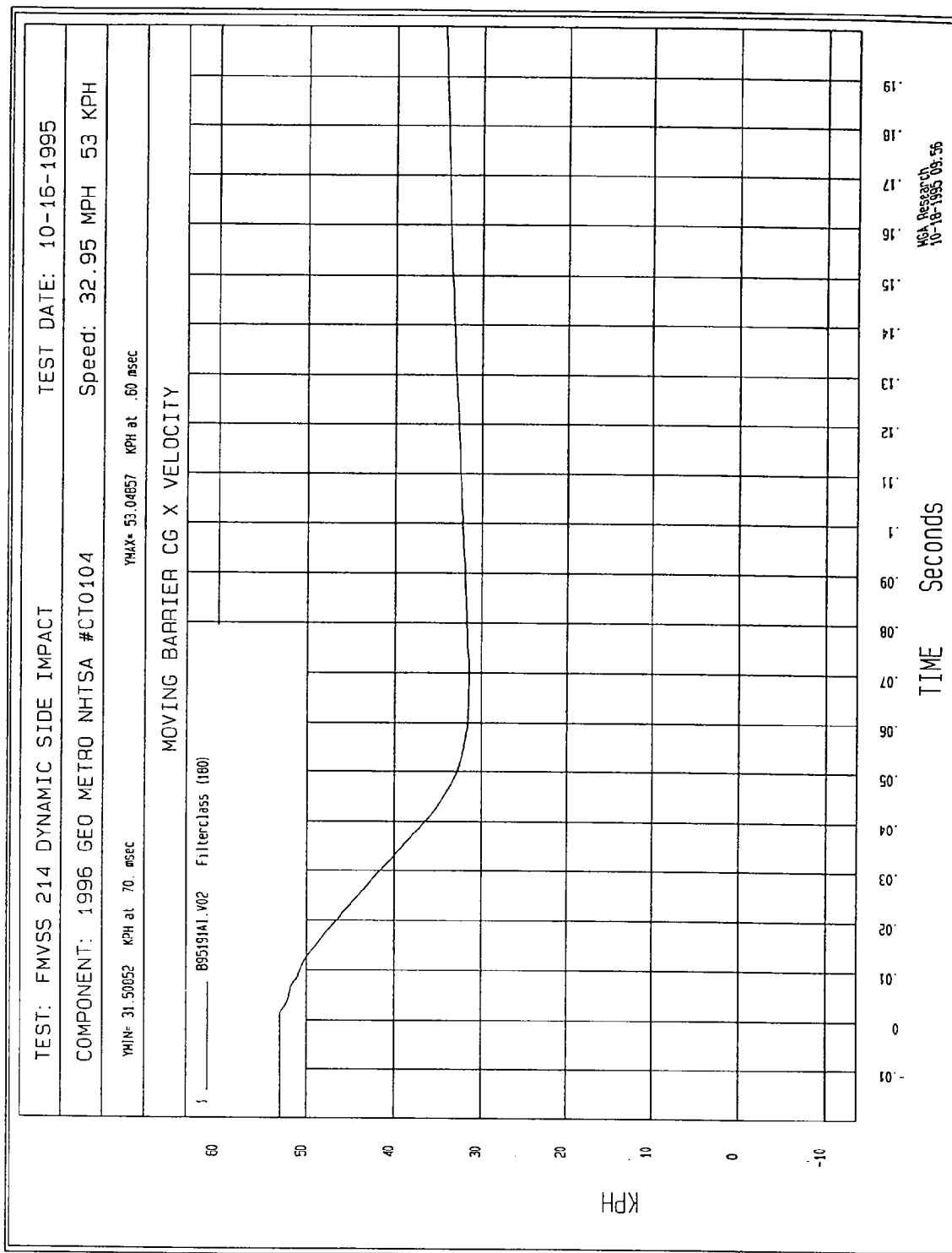


Figure B-61 - Moving Barrier Center of Gravity X Velocity vs. Time

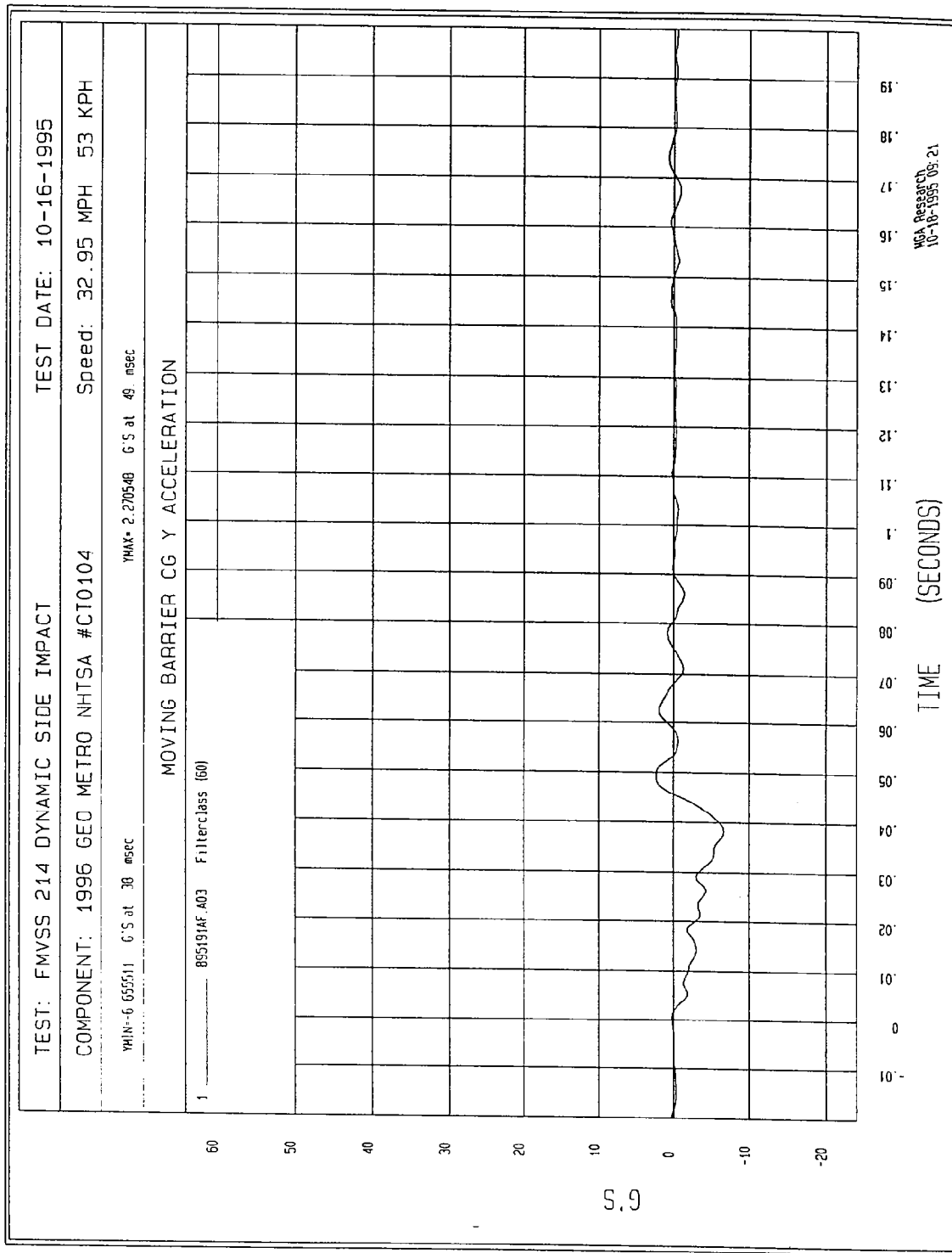


Figure B-62 - Moving Barrier Center of Gravity Y Acceleration vs. Time

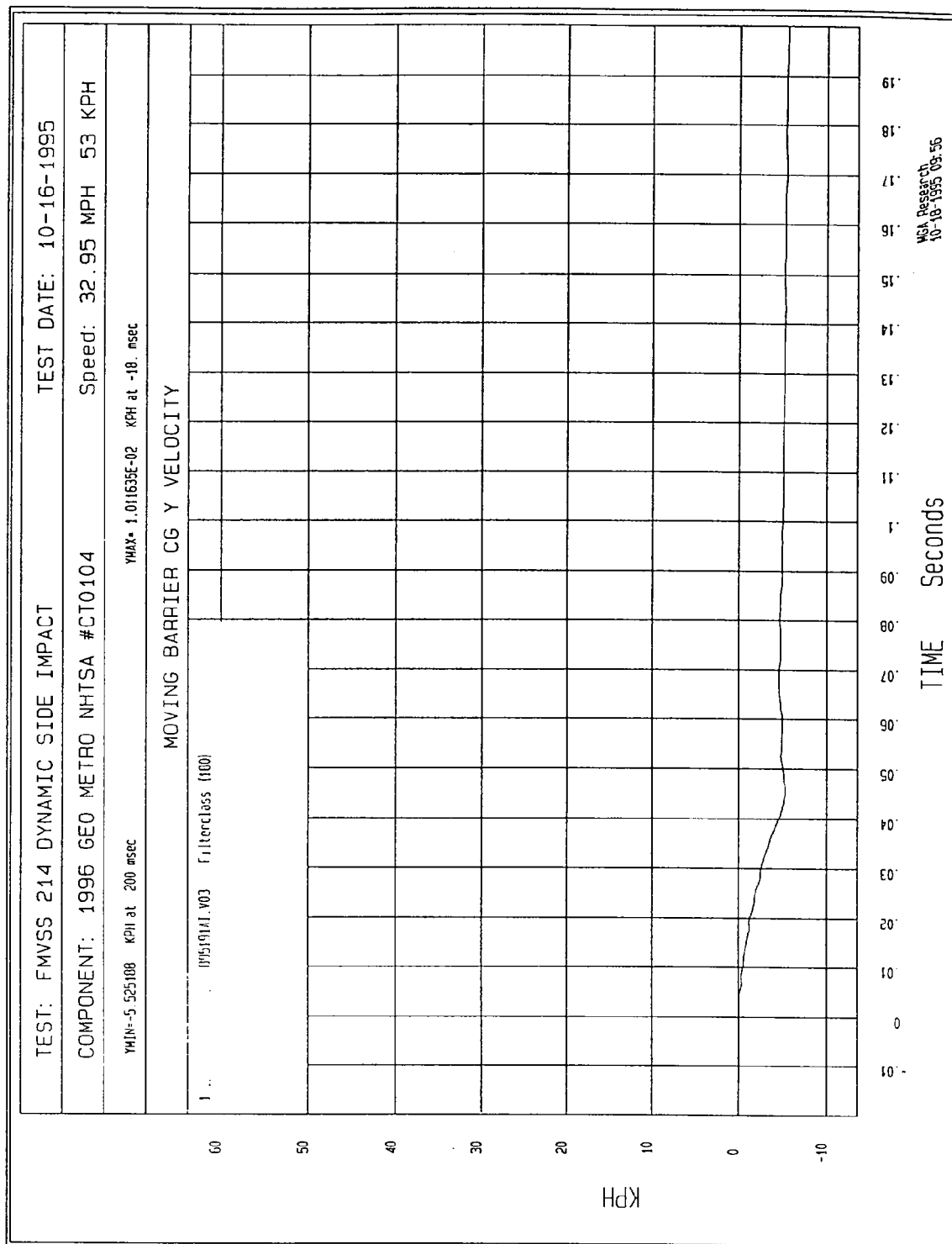


Figure B-63 - Moving Barrier Center of Gravity Y Velocity vs. Time

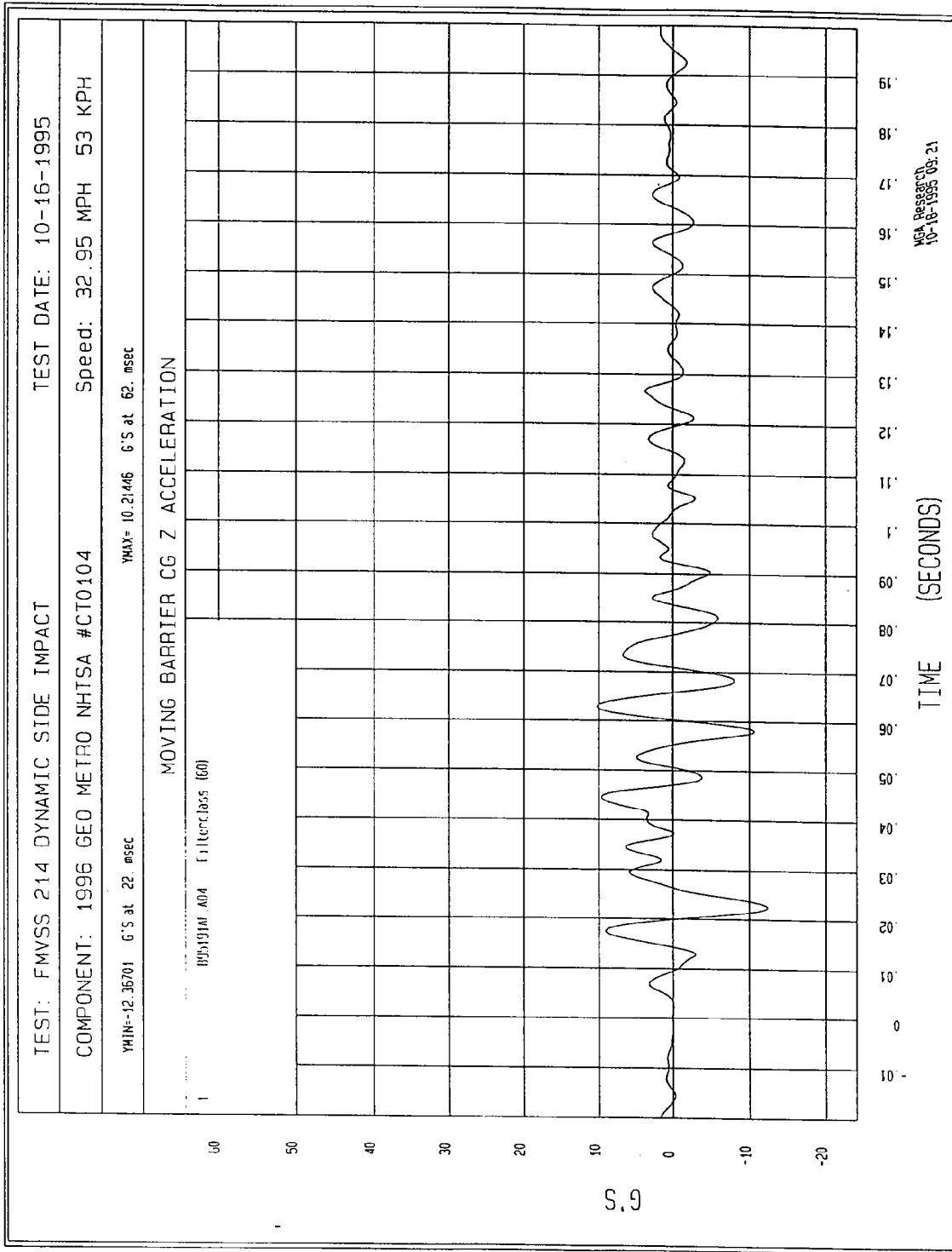


Figure B-64 - Moving Barrier Center of Gravity Z Acceleration vs. Time

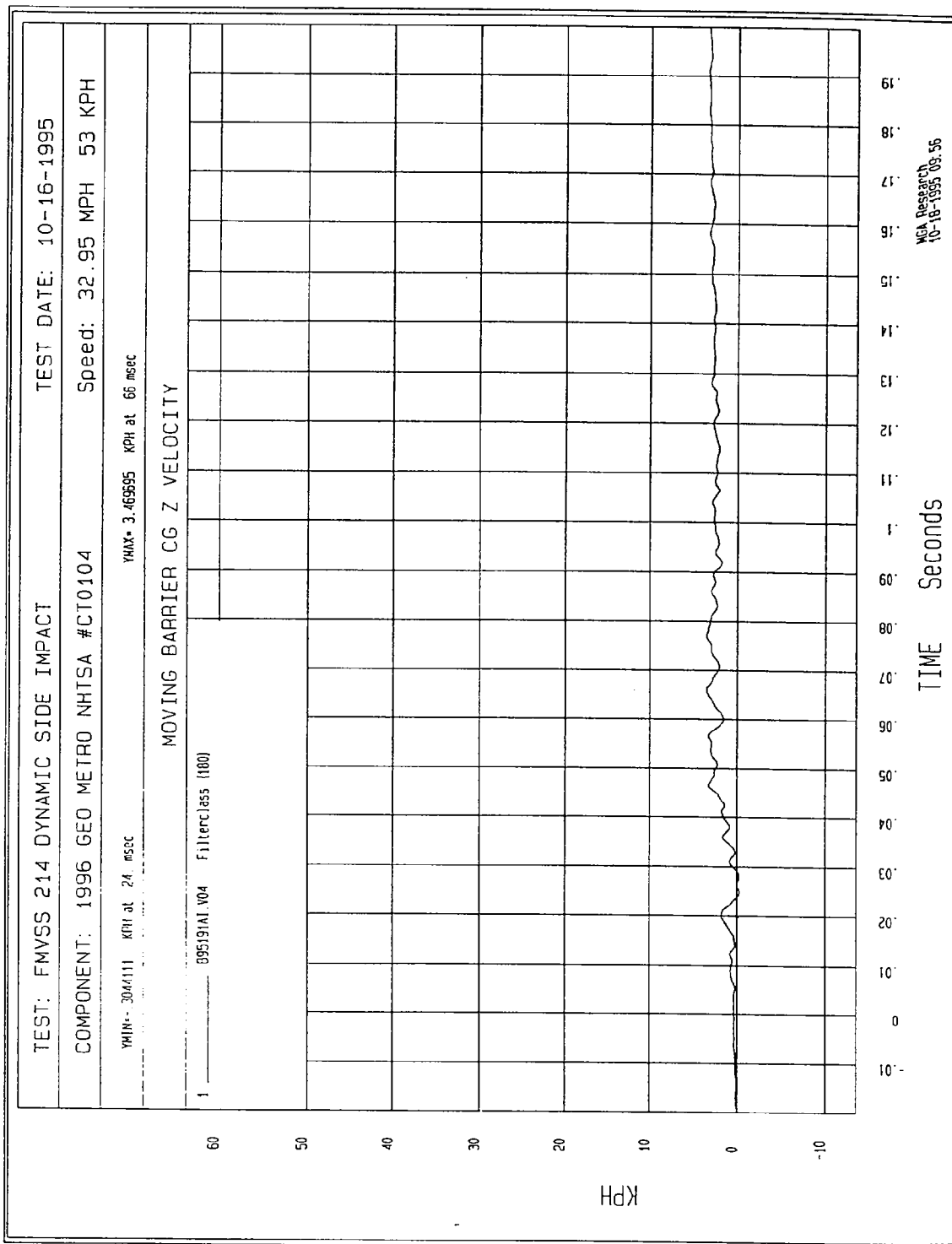


Figure B-65 - Moving Barrier Center of Gravity Z Velocity vs. Time

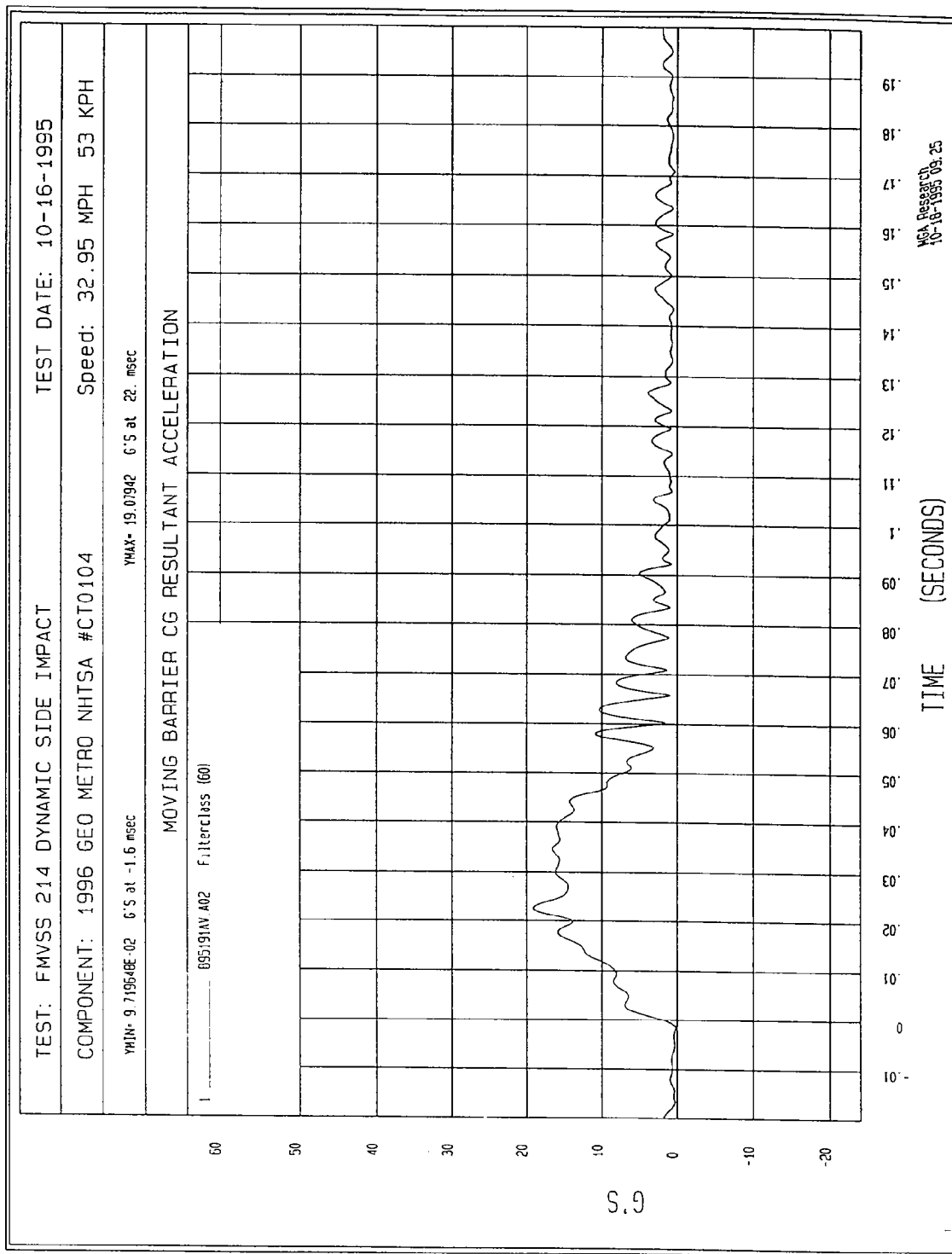


Figure B-66 - Moving Barrier Center of Gravity Resultant Acceleration vs. Time

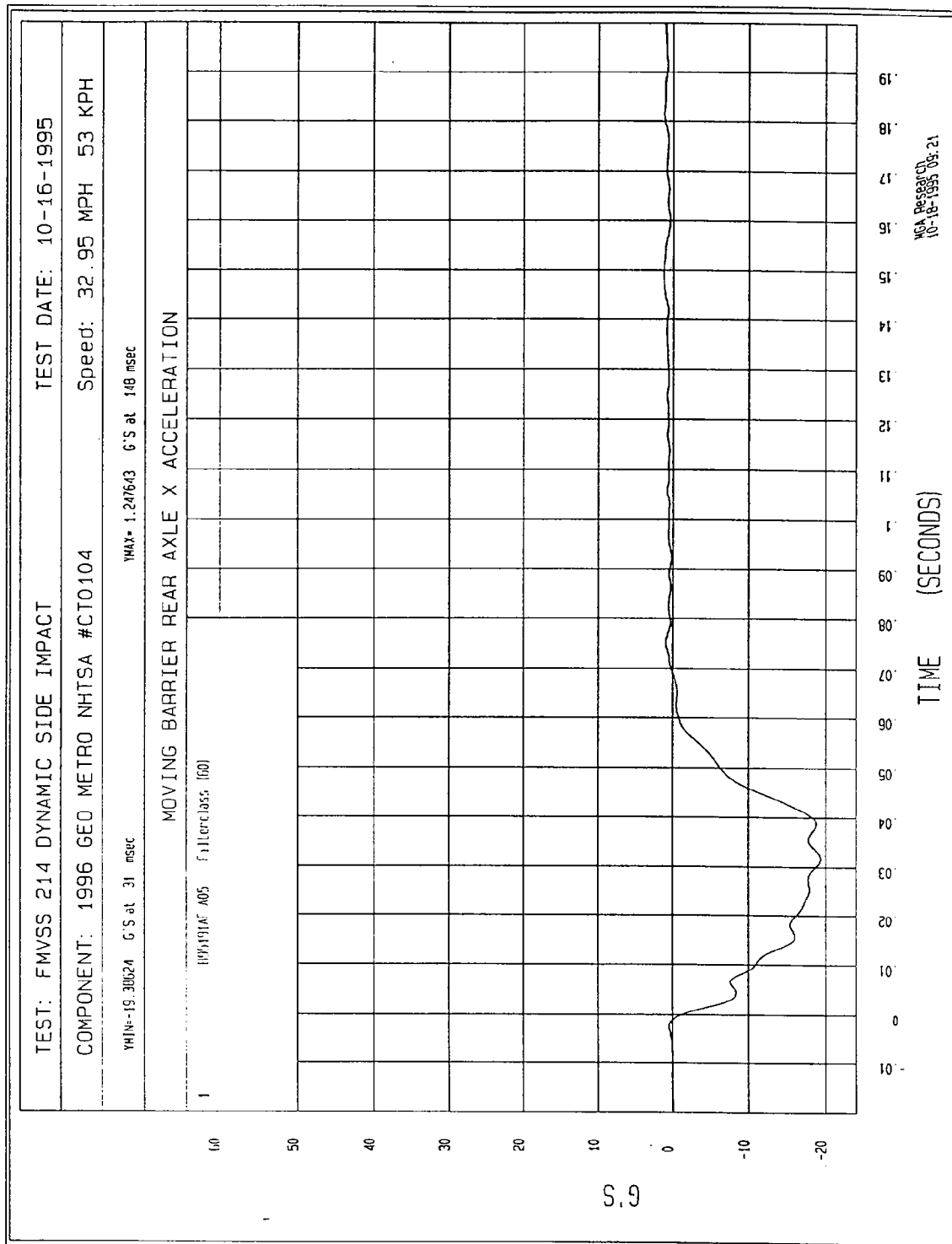


Figure B-67 - Moving Barrier Rear Axle X Acceleration vs. Time

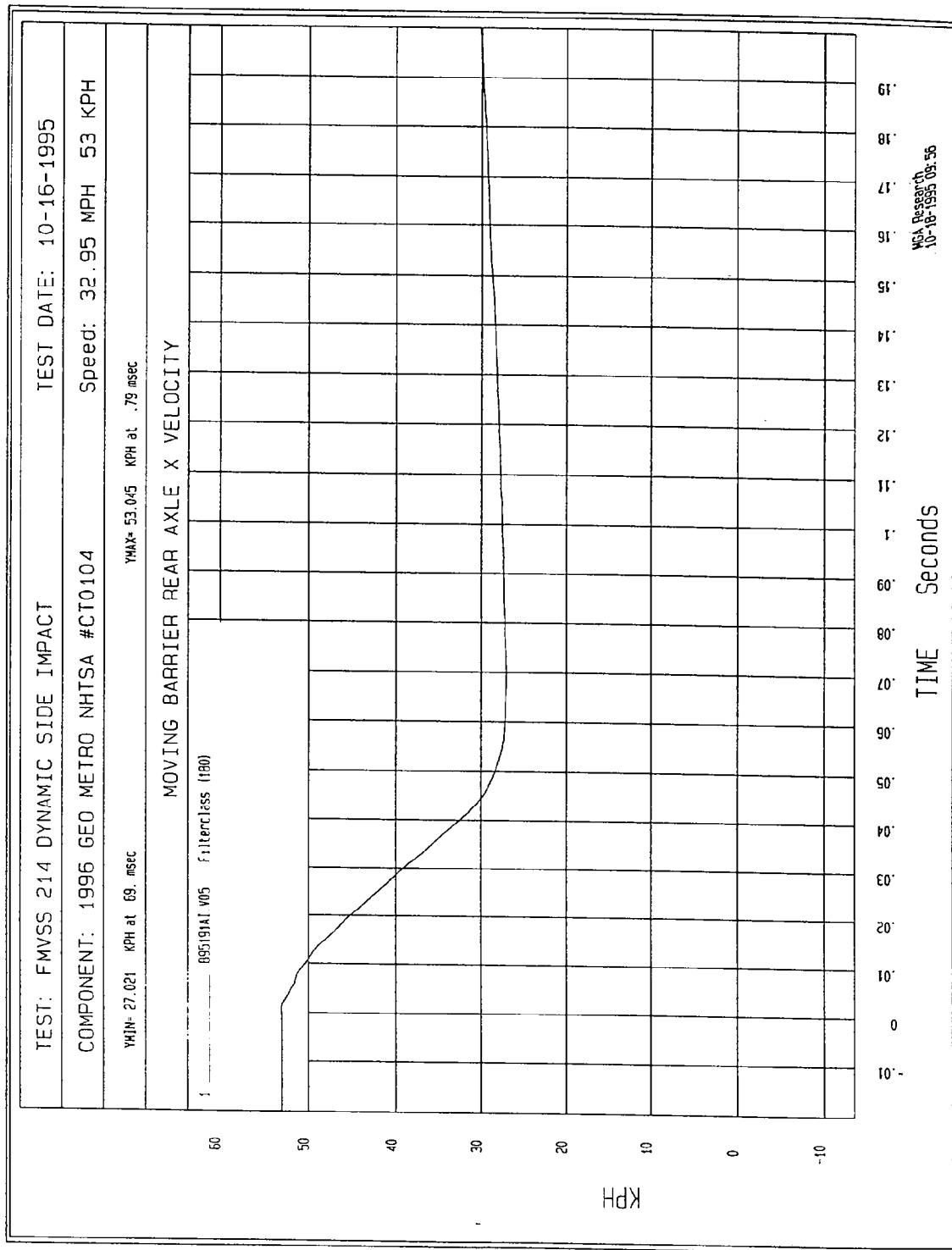
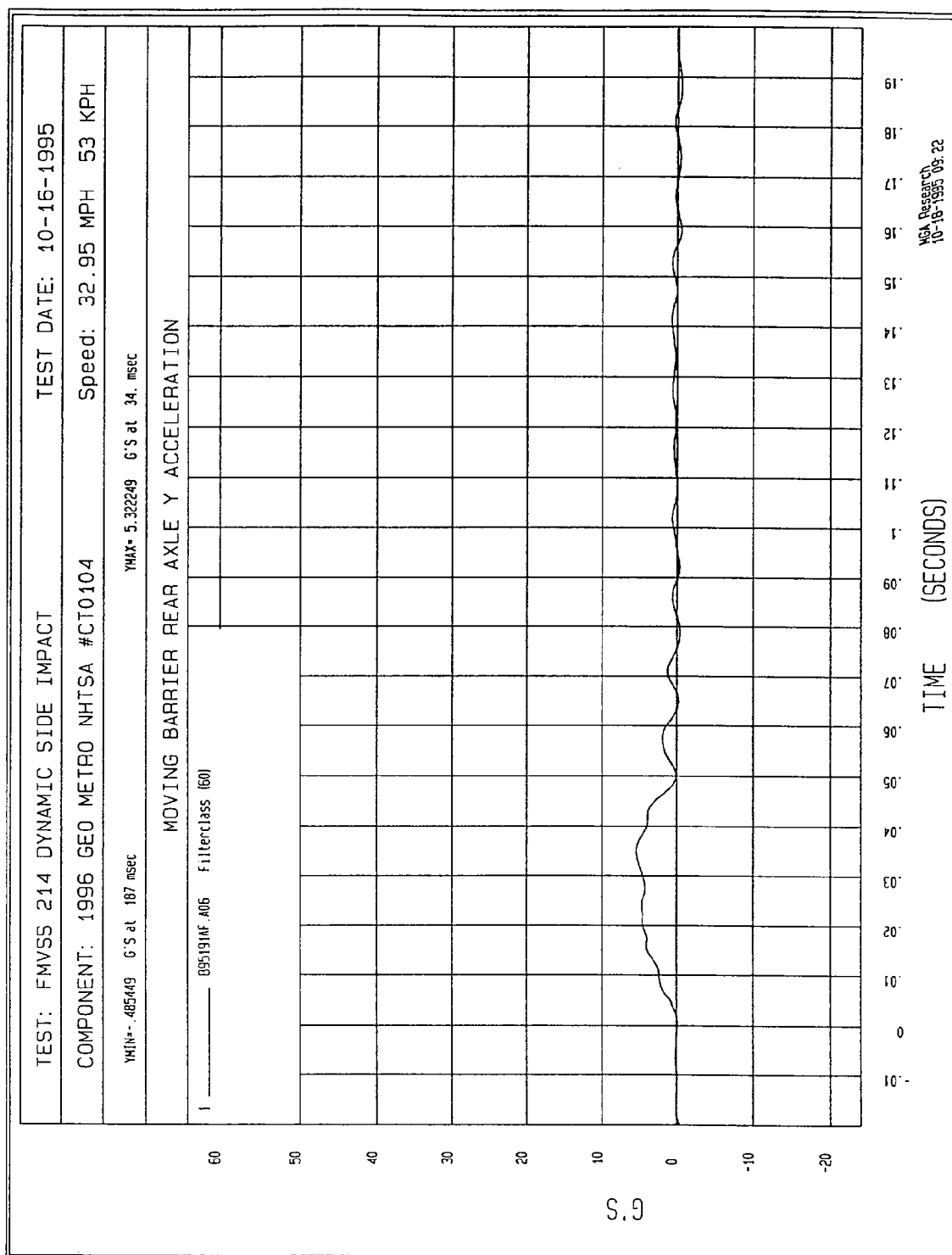


Figure B-68 - Moving Barrier Rear Axle X Velocity vs. Time



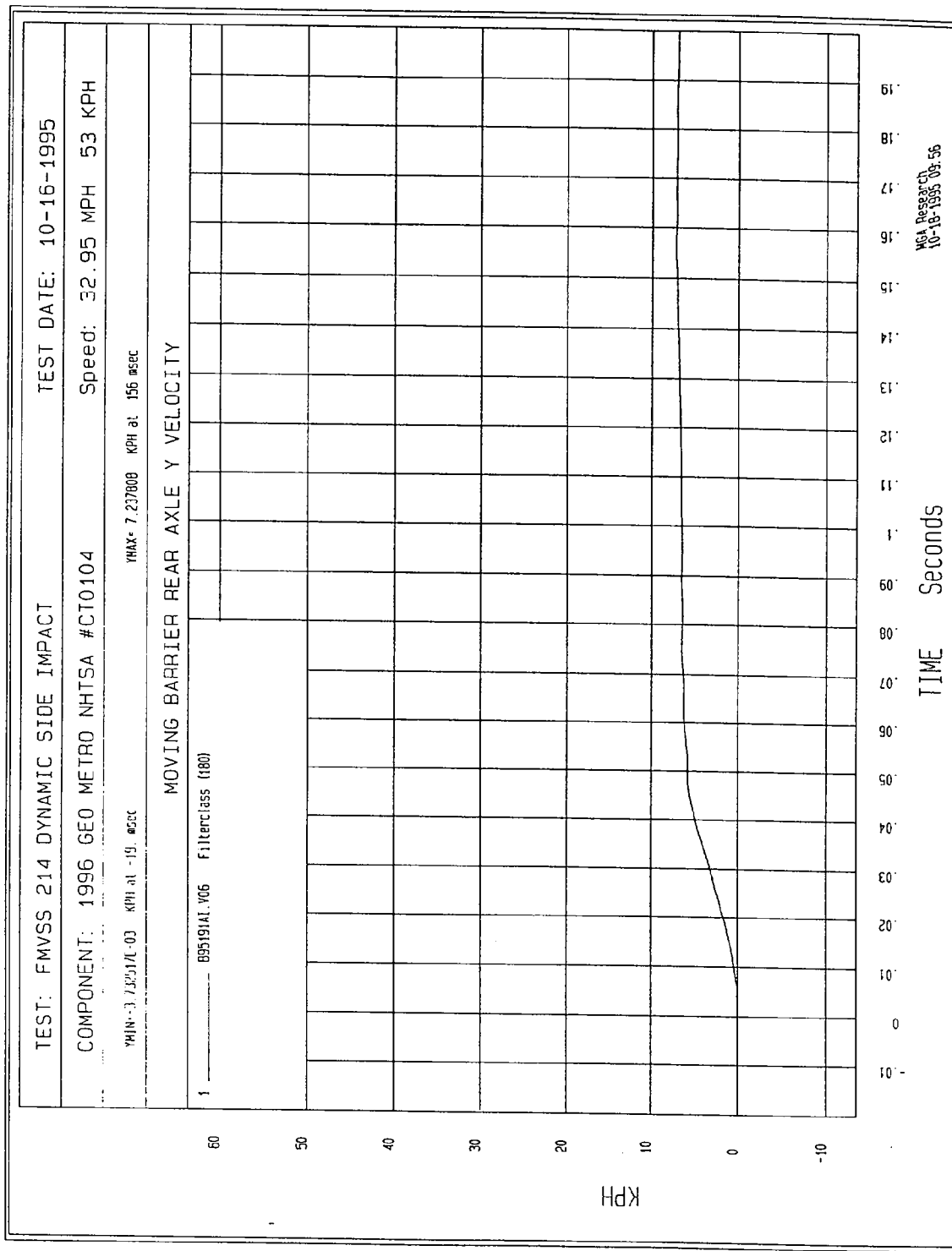


Figure B-70 - Moving Barrier Rear Axle Y Velocity vs. Time

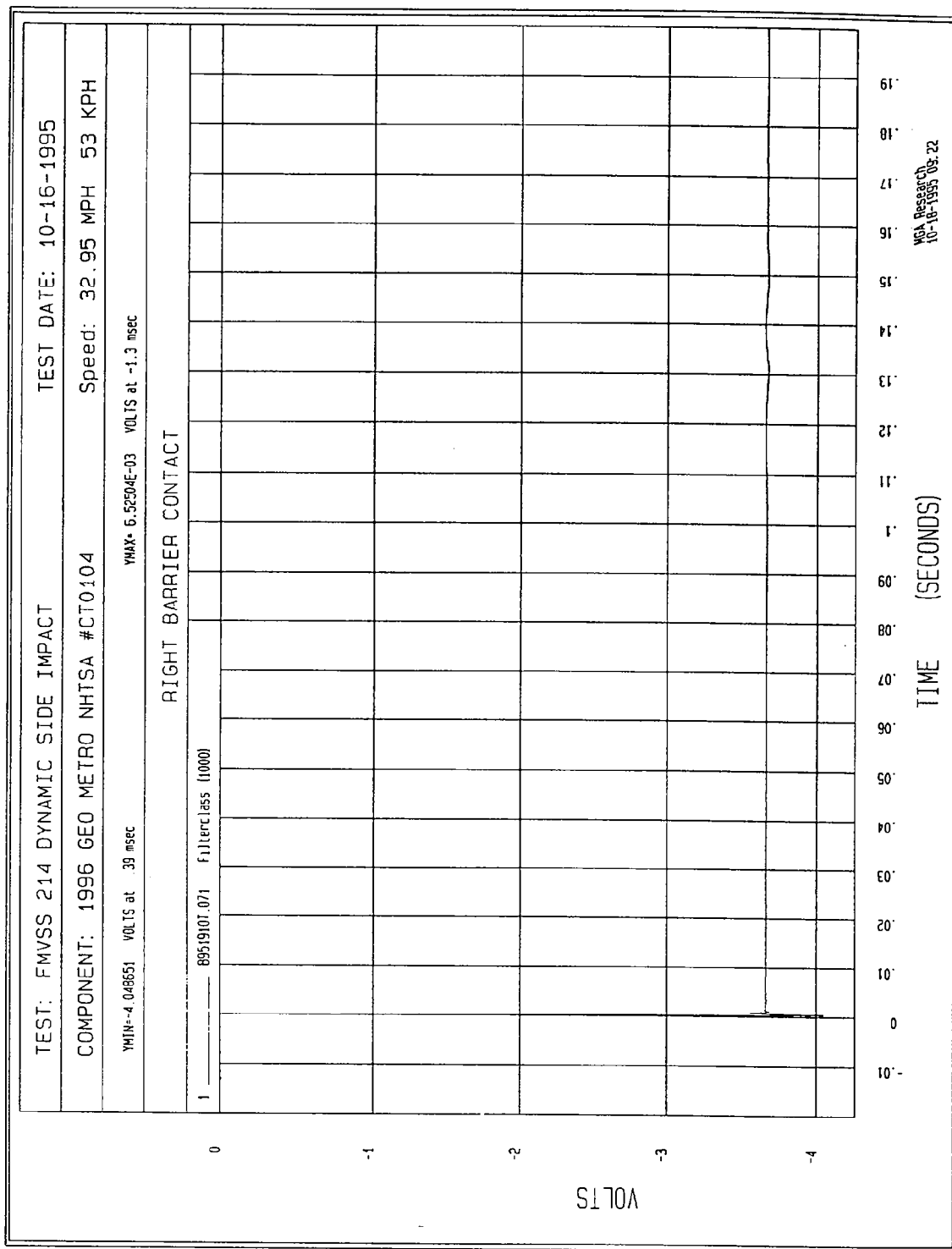


Figure B-71 - Right Barrier Contact

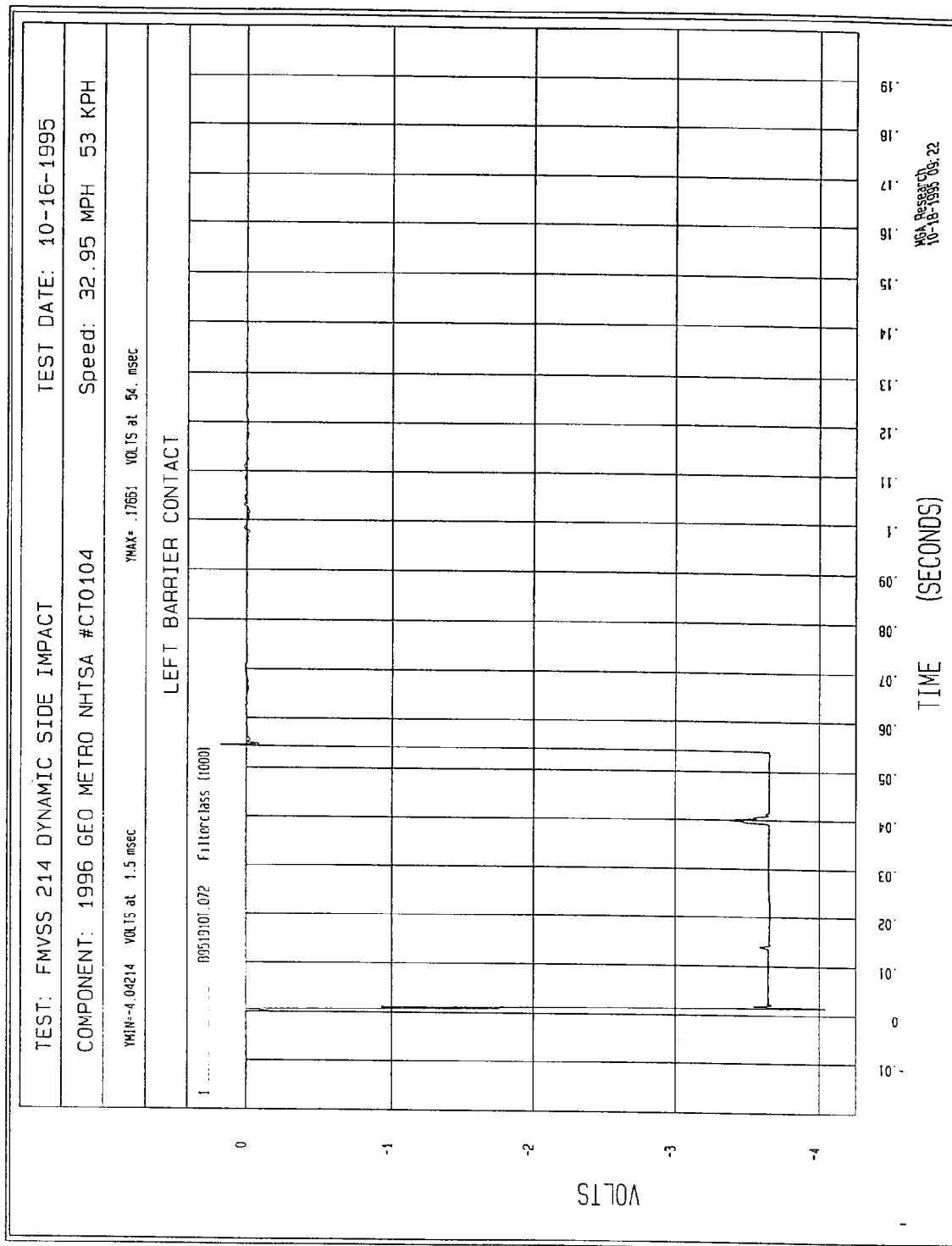


Figure B-72 - Left Barrier Contact

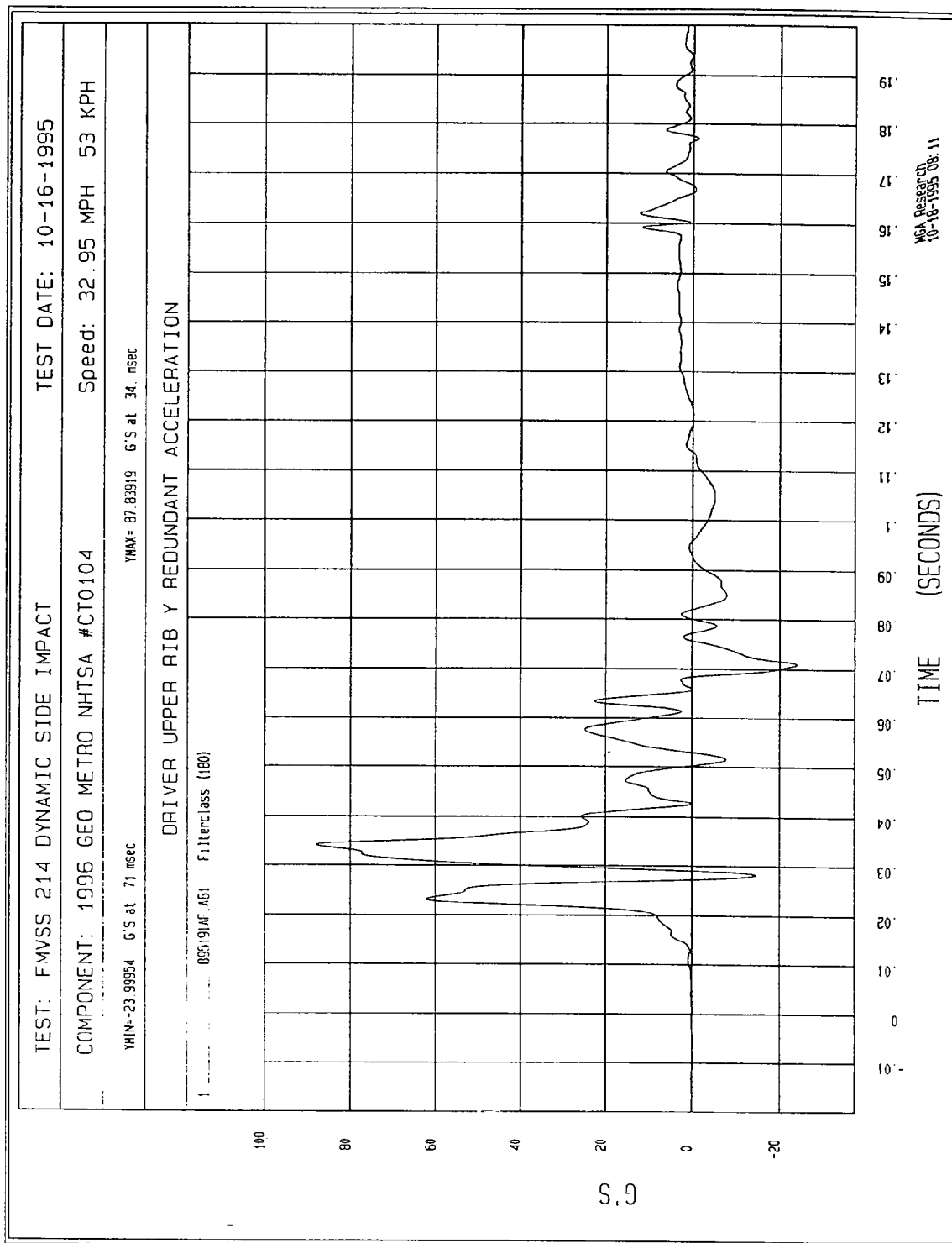


Figure B-73 - Driver Upper Rib Y Redundant Acceleration vs. Time

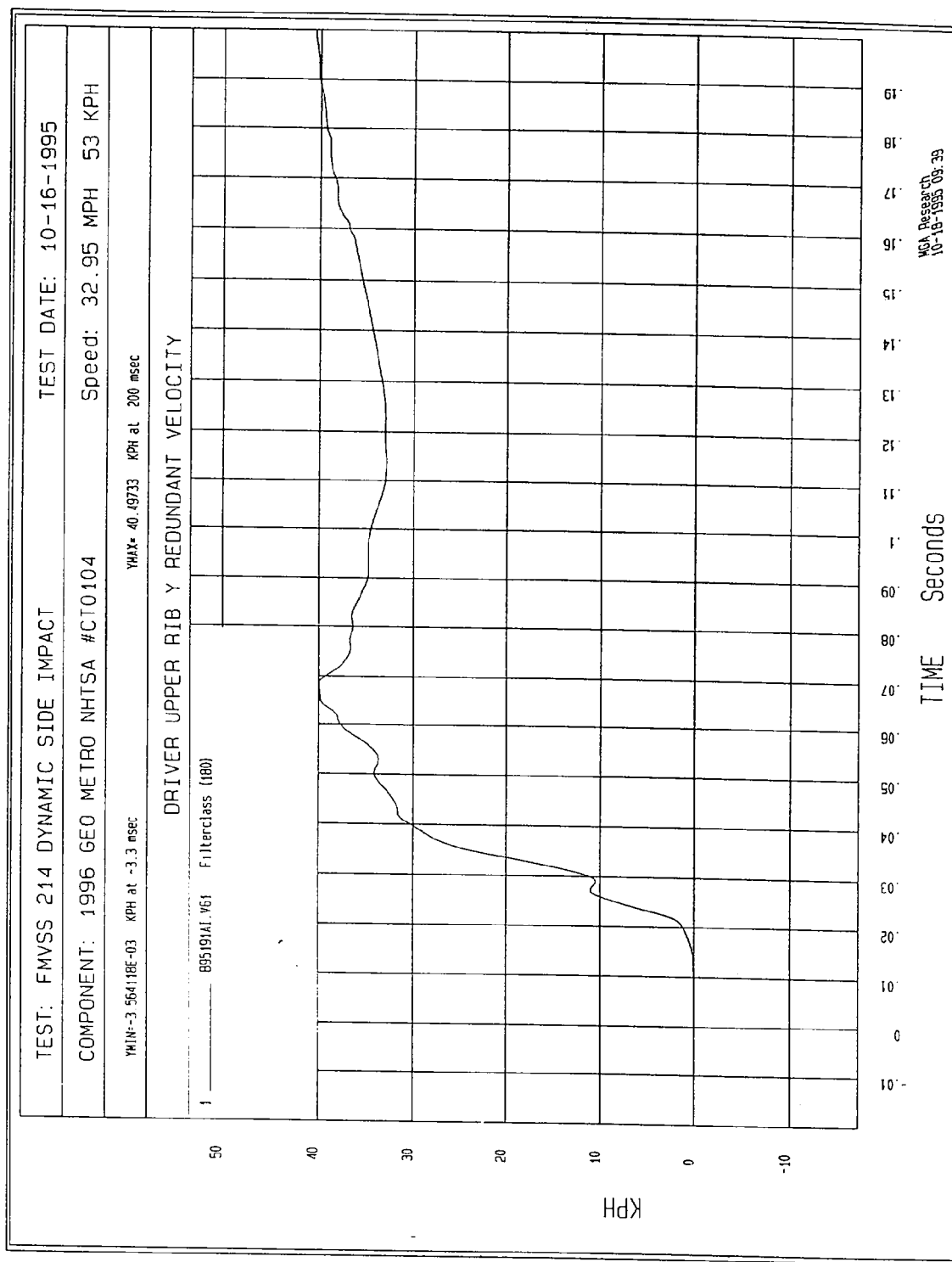


Figure B-74 - Driver Upper Rib Y Redundant Velocity vs. Time

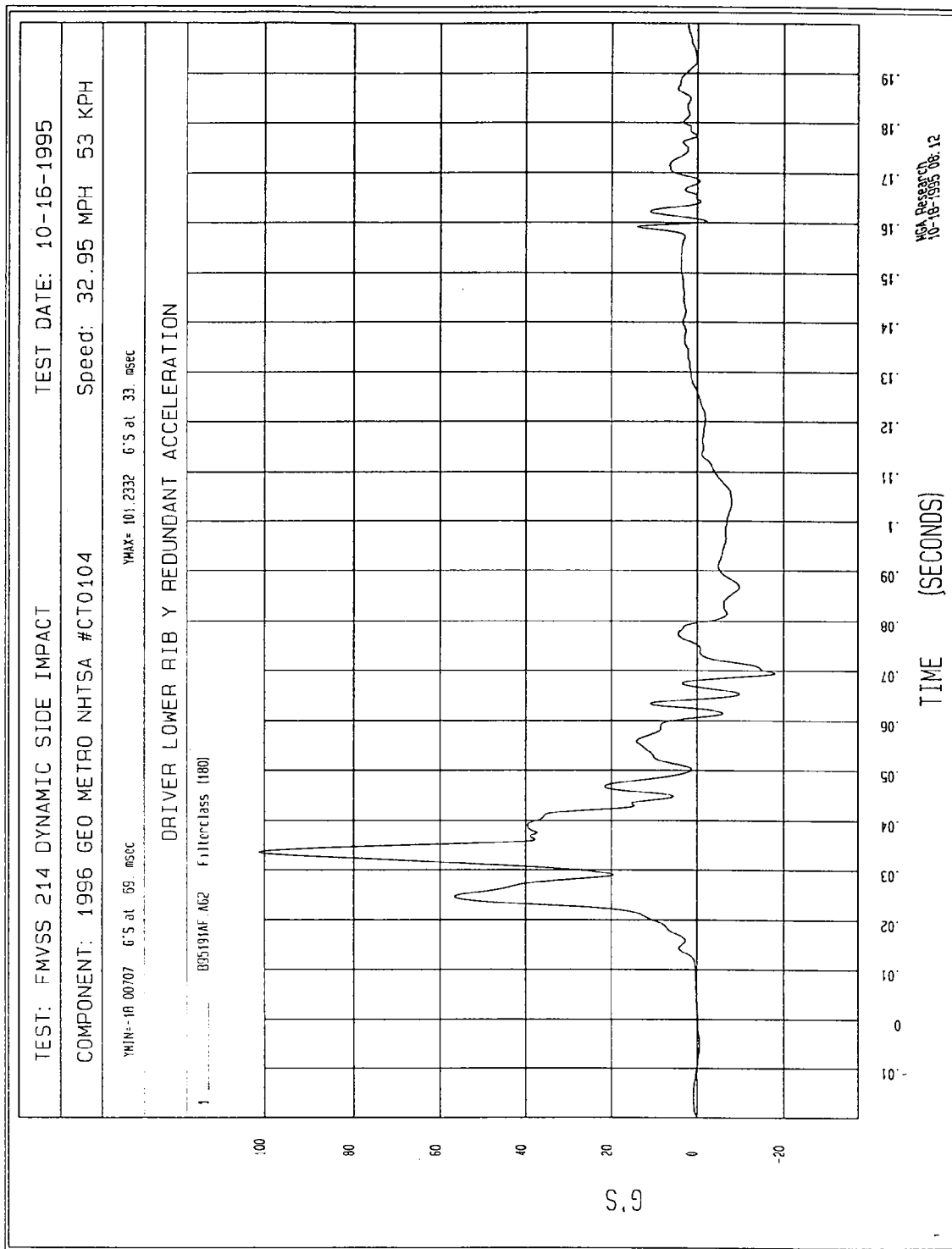


Figure B-75 - Driver Lower Rib Y Redundant Acceleration vs. Time

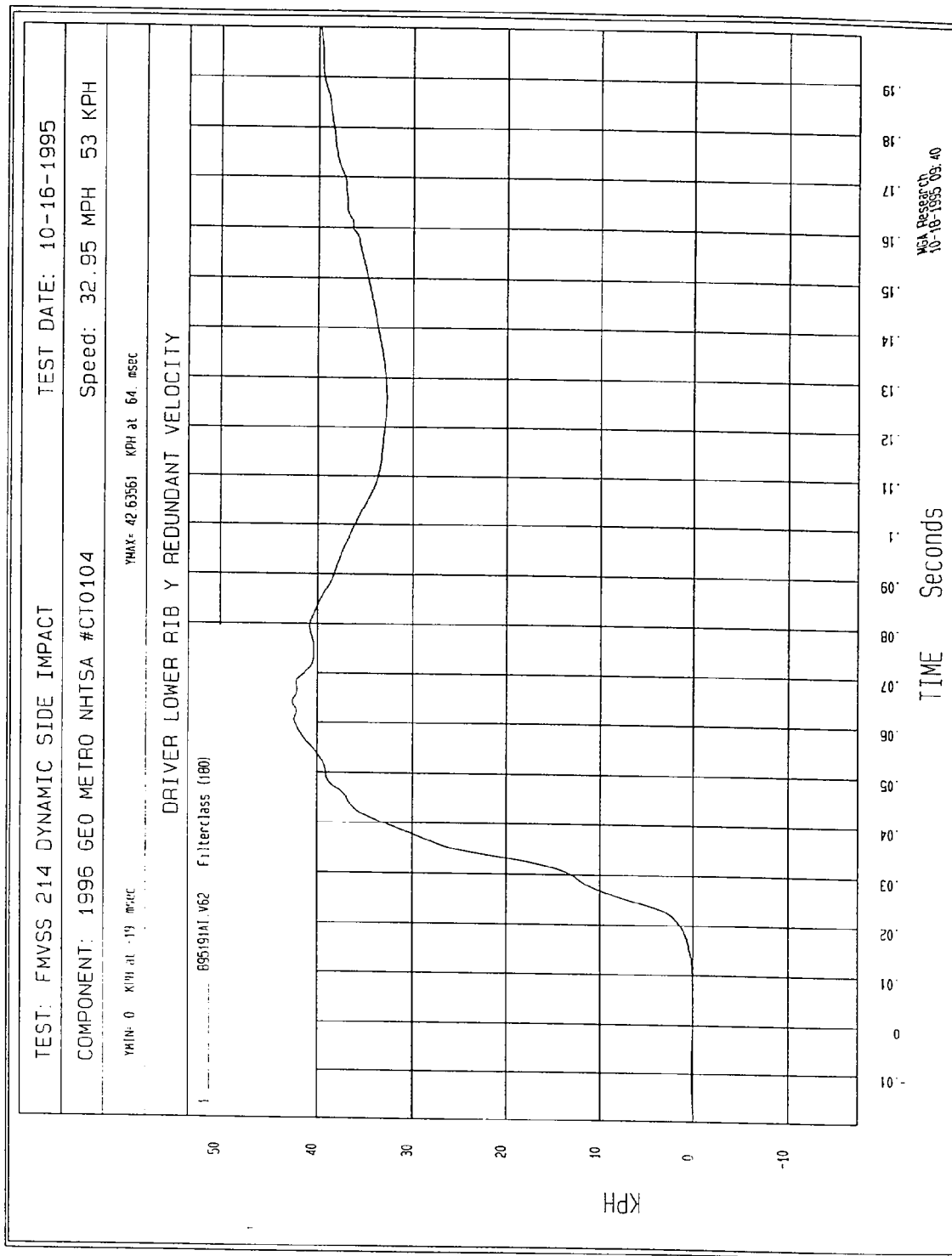


Figure B-76 - Driver Lower Rib Y Redundant Velocity vs. Time

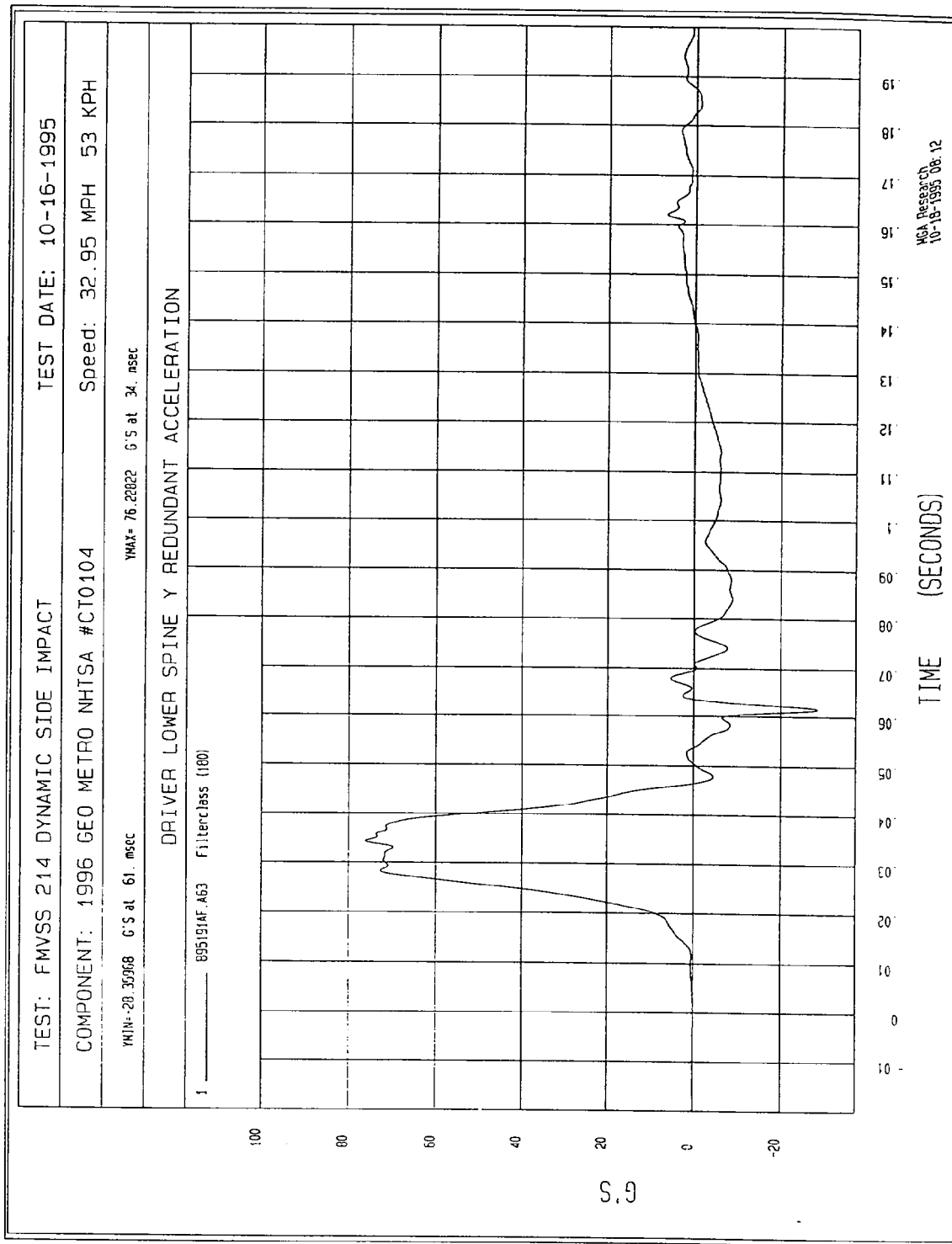


Figure B-77 - Driver Lower Spine Y Redundant Acceleration vs. Time

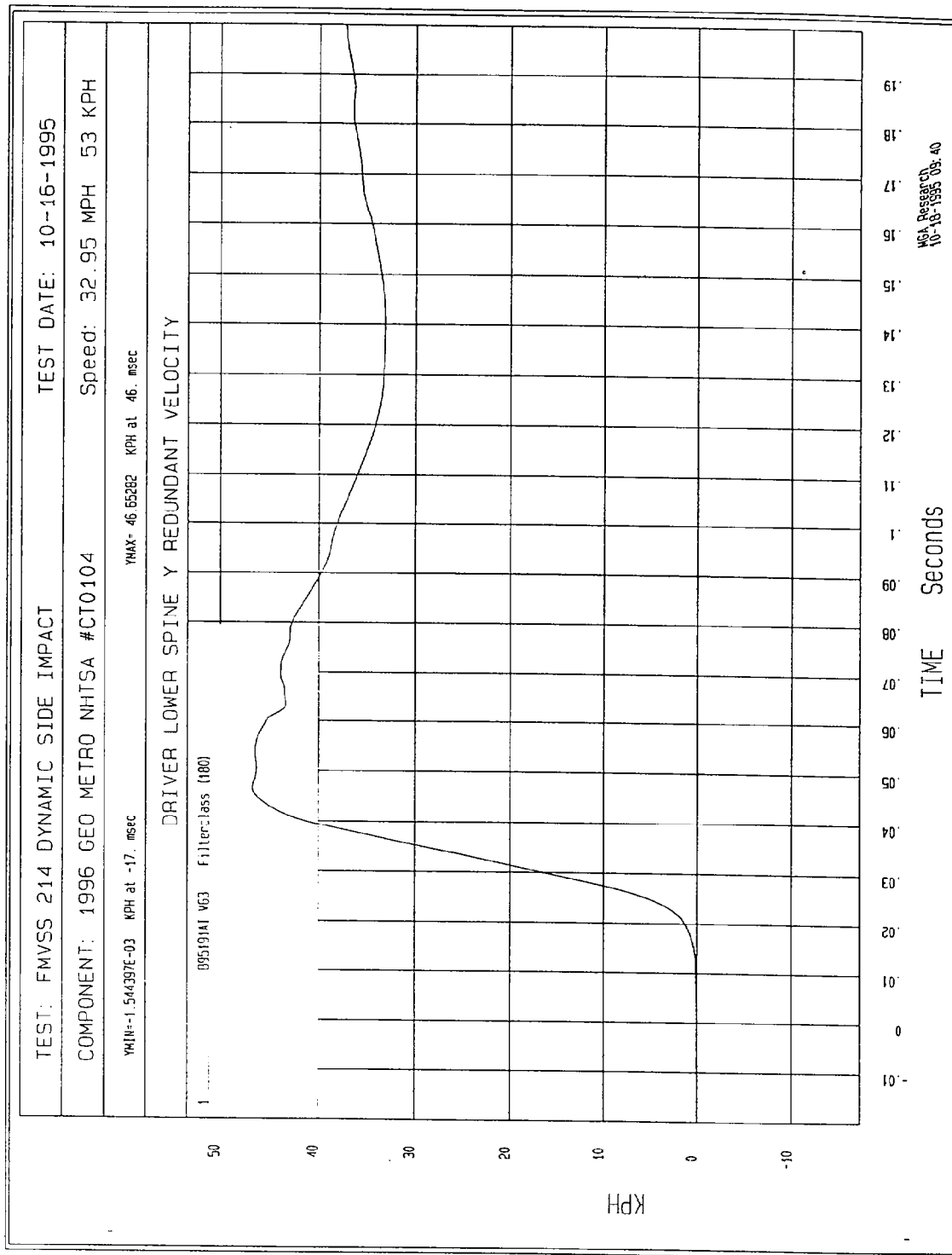


Figure B-78 - Driver Lower Spine Y Redundant Velocity vs. Time

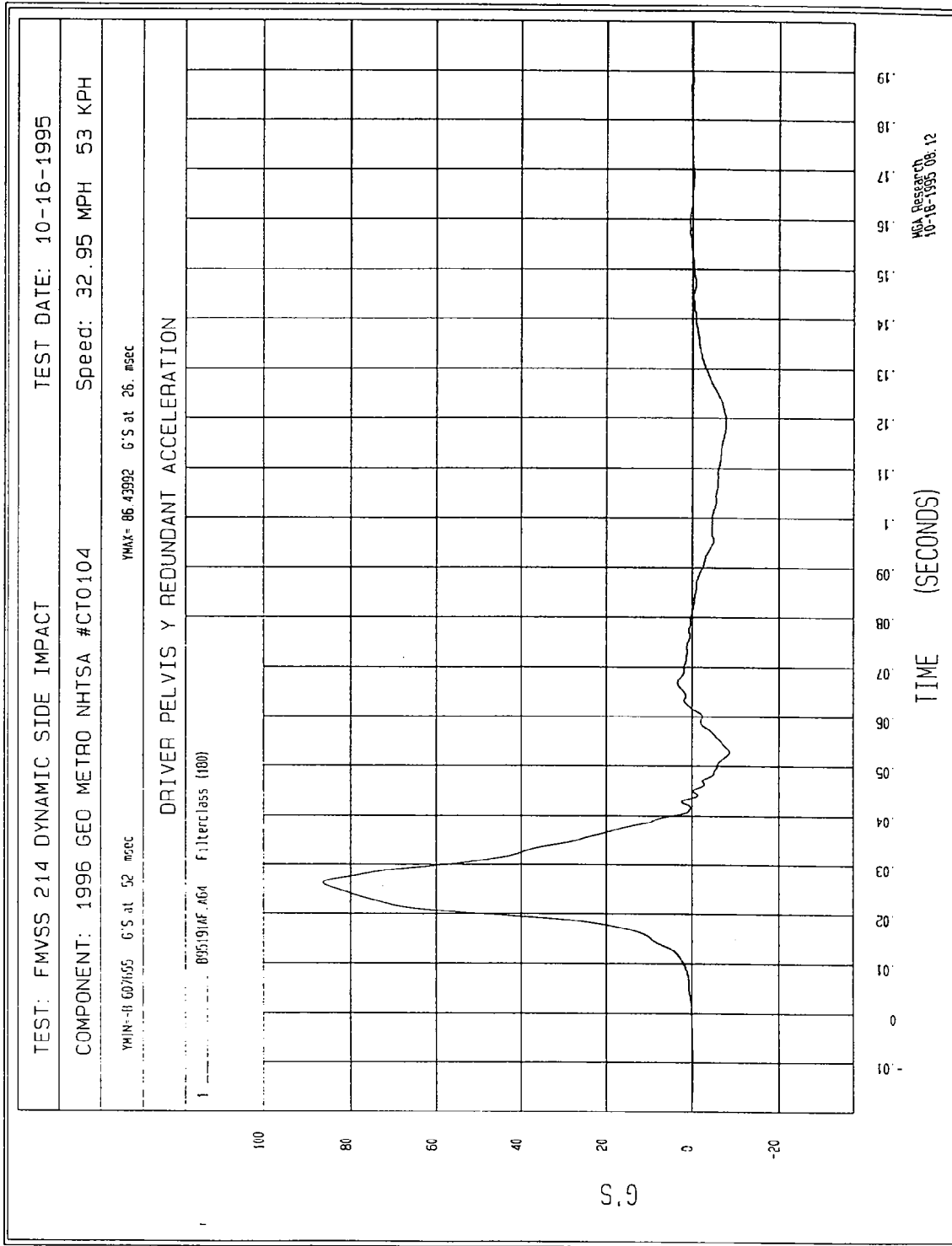


Figure B-79 - Driver Pelvis Y Redundant Acceleration vs. Time

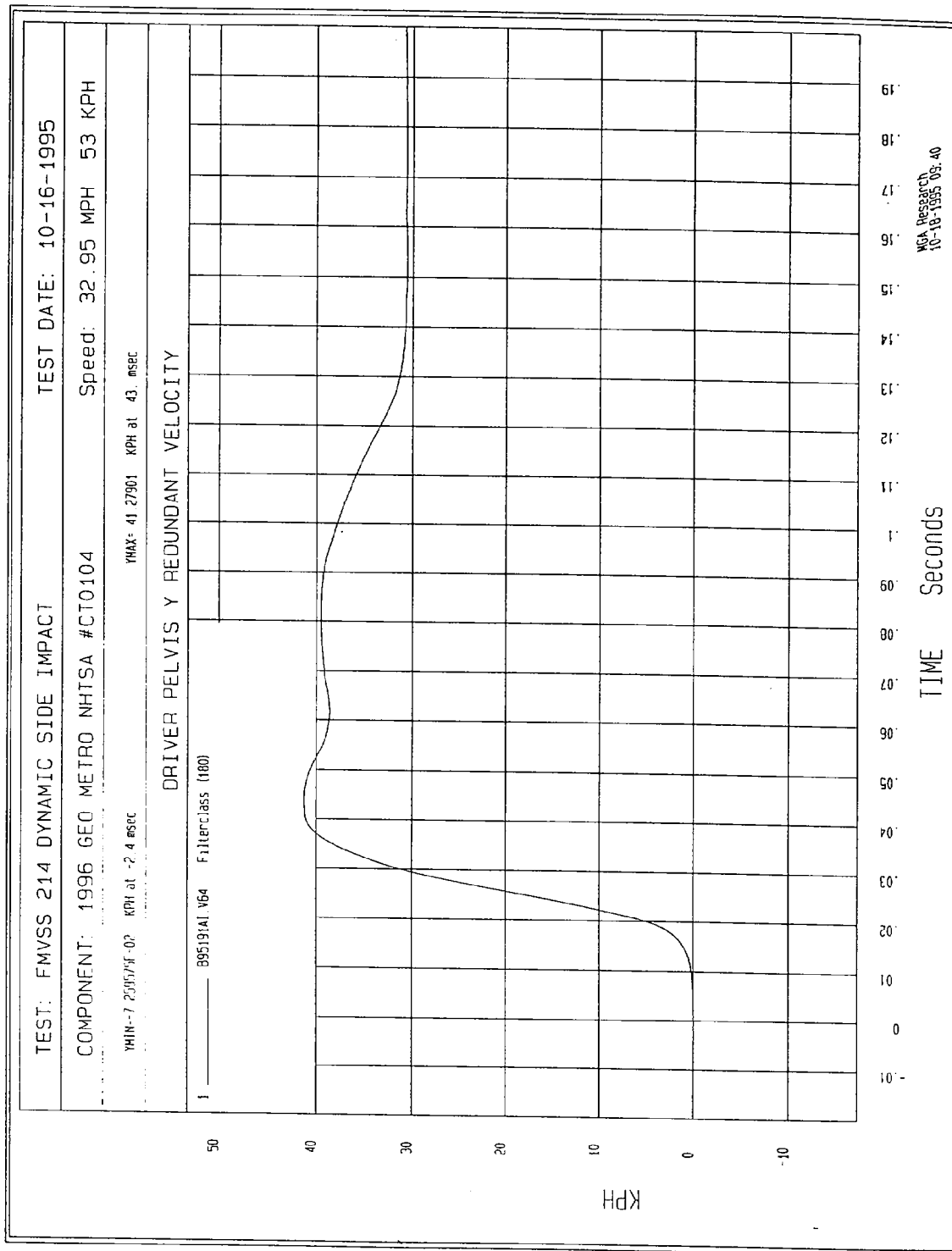


Figure B-80 - Driver Pelvis Y Redundant Velocity vs. Time

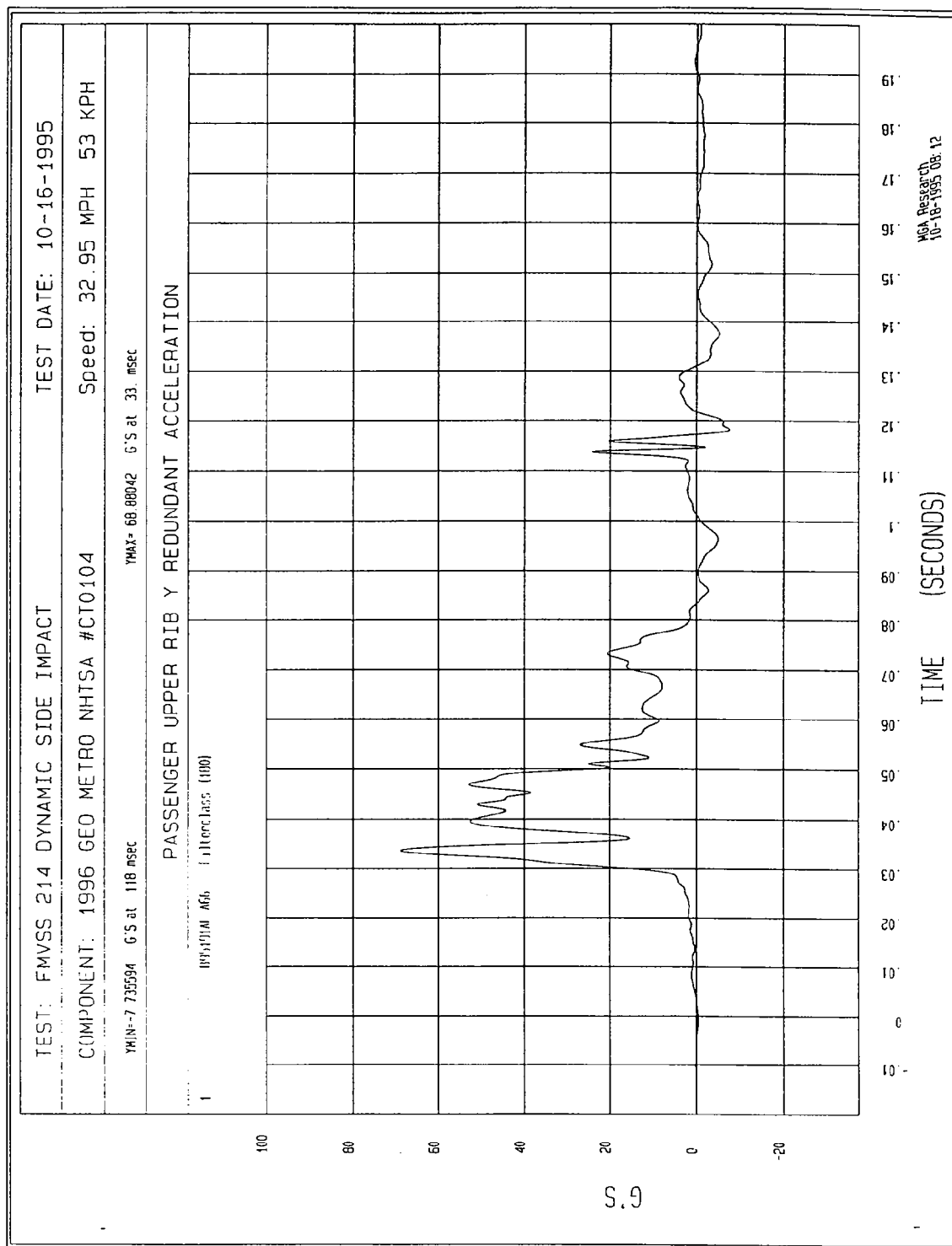


Figure B-81 - Passenger Upper Rib Y Redundant Acceleration vs. Time

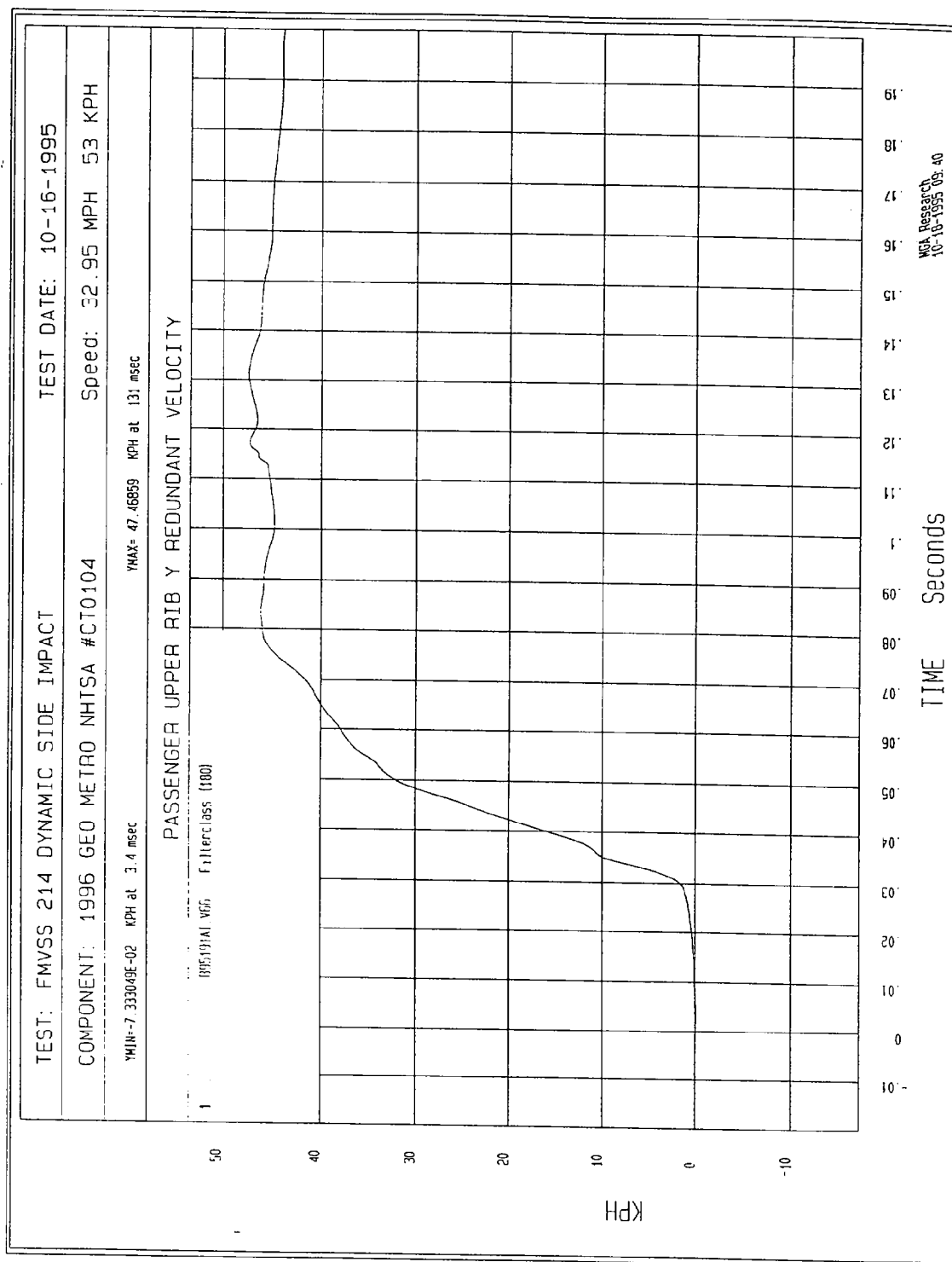
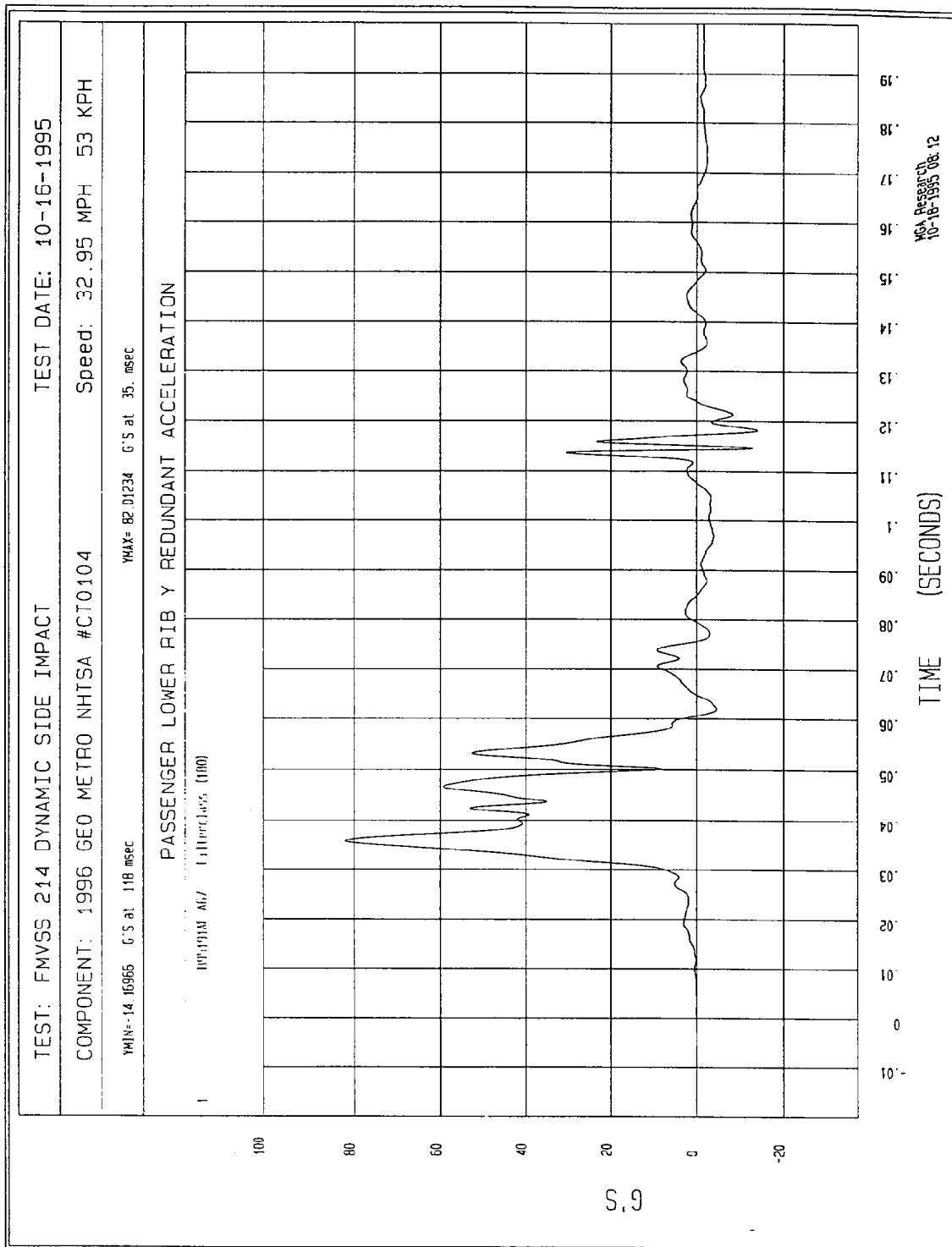


Figure B-82 - Passenger Upper Rib Y Redundant Velocity vs. Time



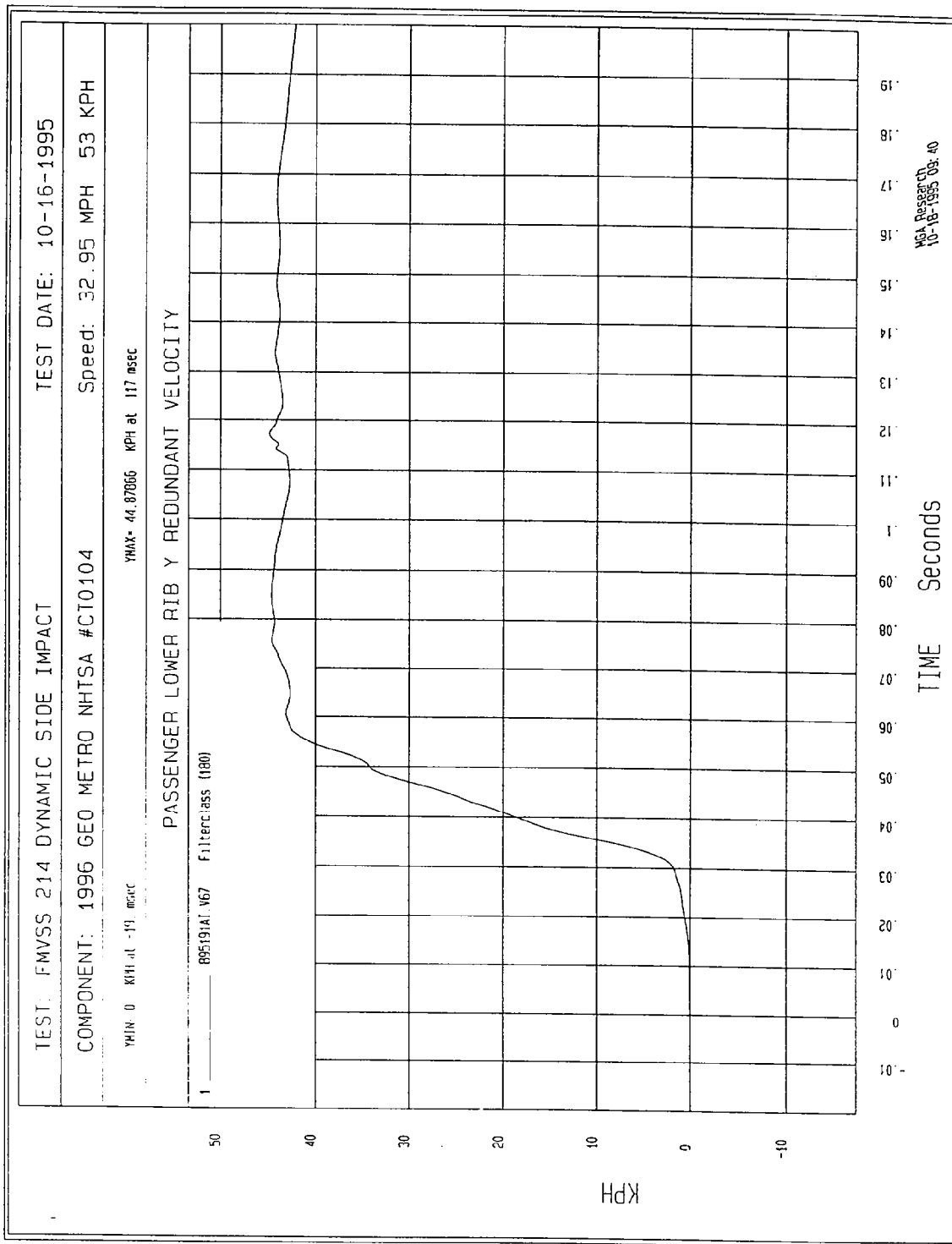


Figure B-84 - Passenger Lower Rib Y Redundant Velocity vs. Time

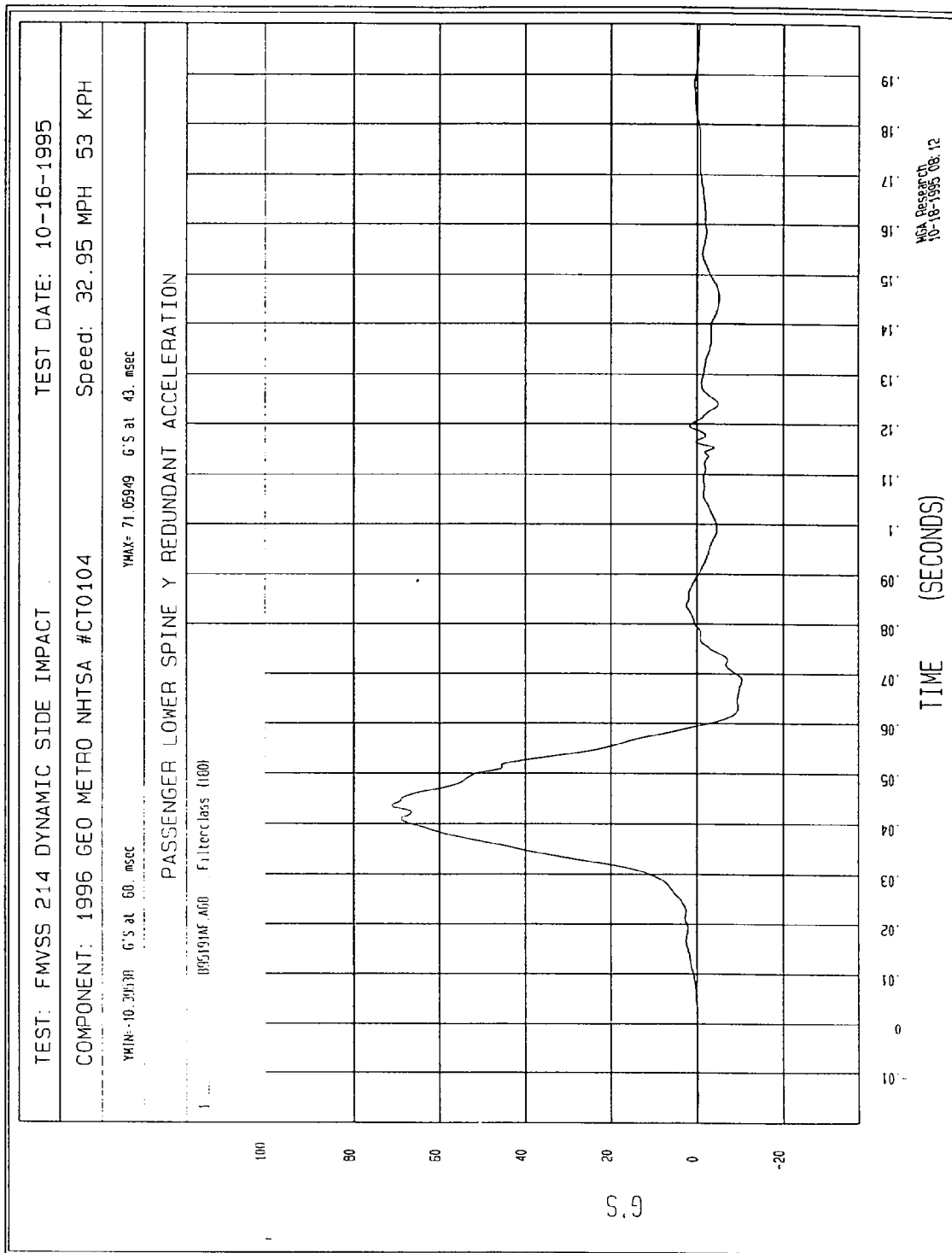


Figure B-85 - Passenger Lower Spine Y Redundant Acceleration vs. Time

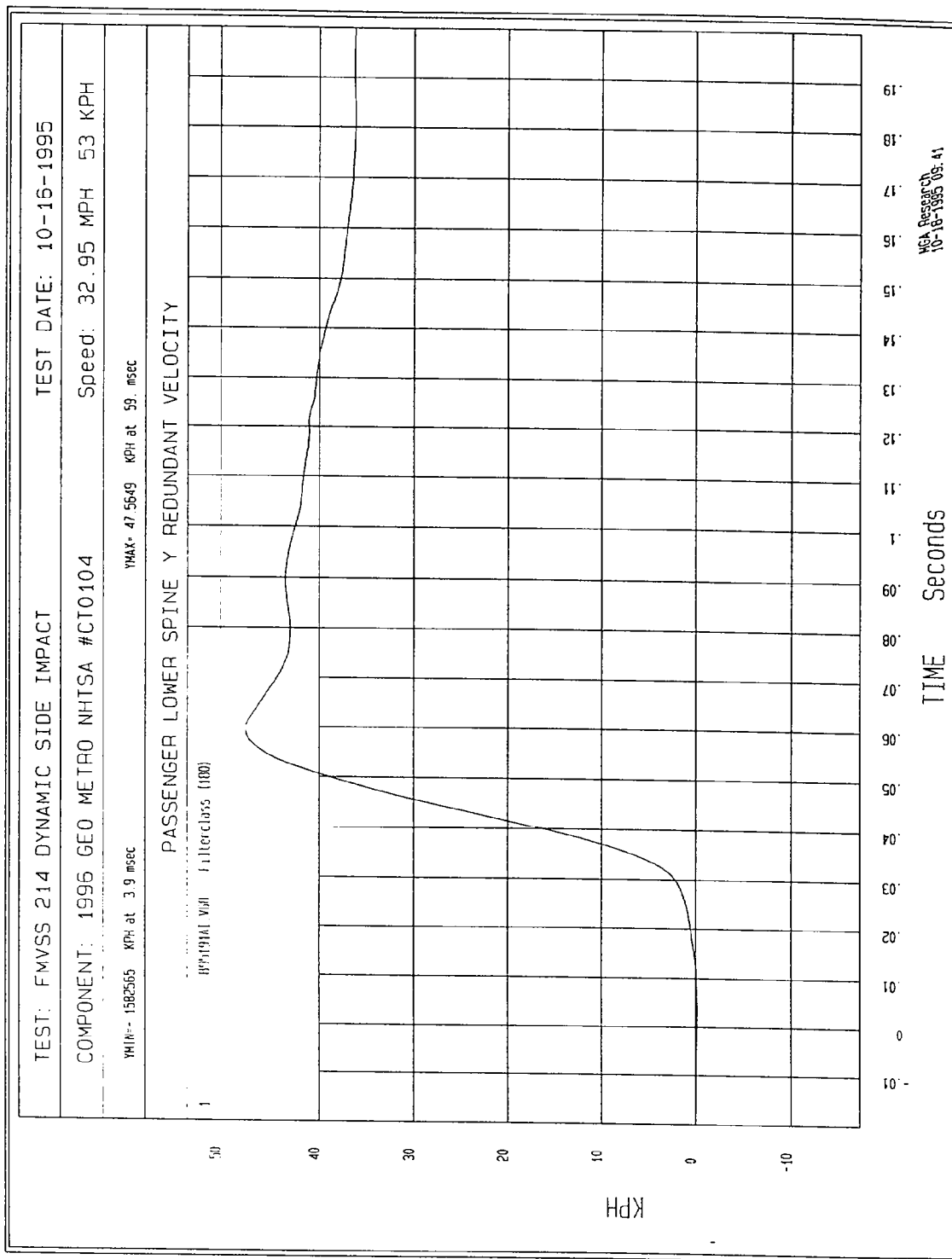


Figure B-86 - Passenger Lower Spine Y Redundant Velocity vs. Time

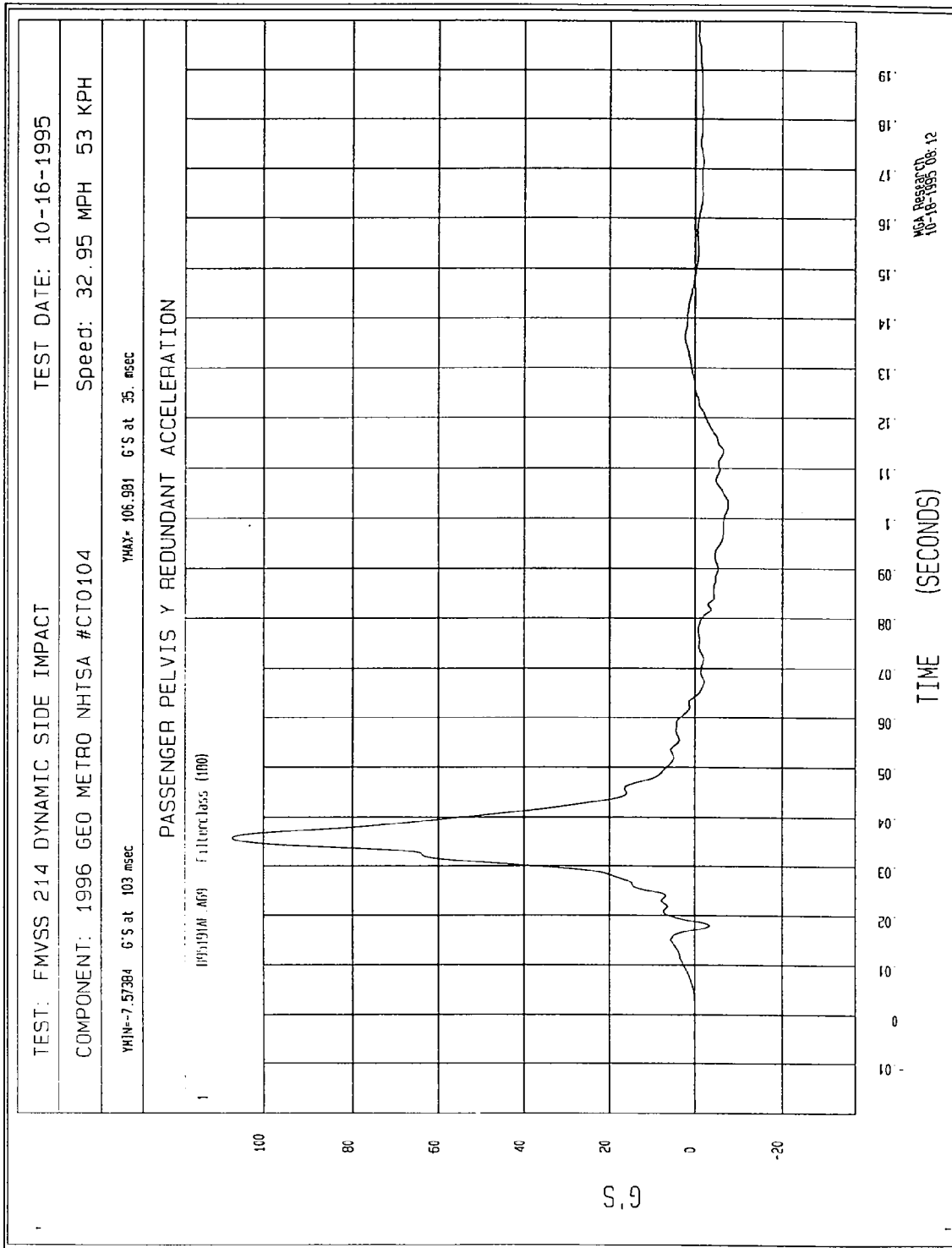


Figure B-87 - Passenger Pelvis Y Redundant Acceleration vs. Time

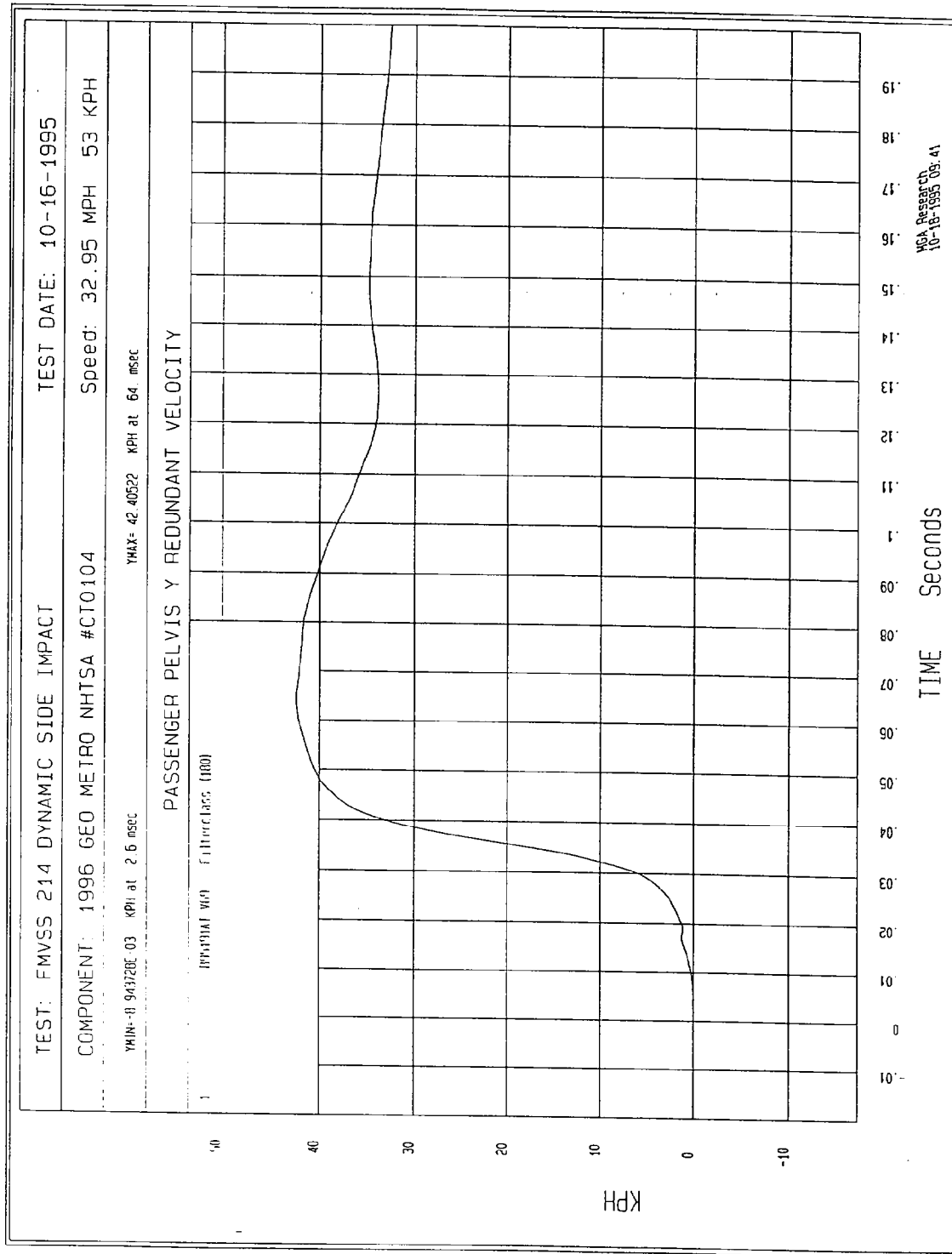


Figure B-88 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

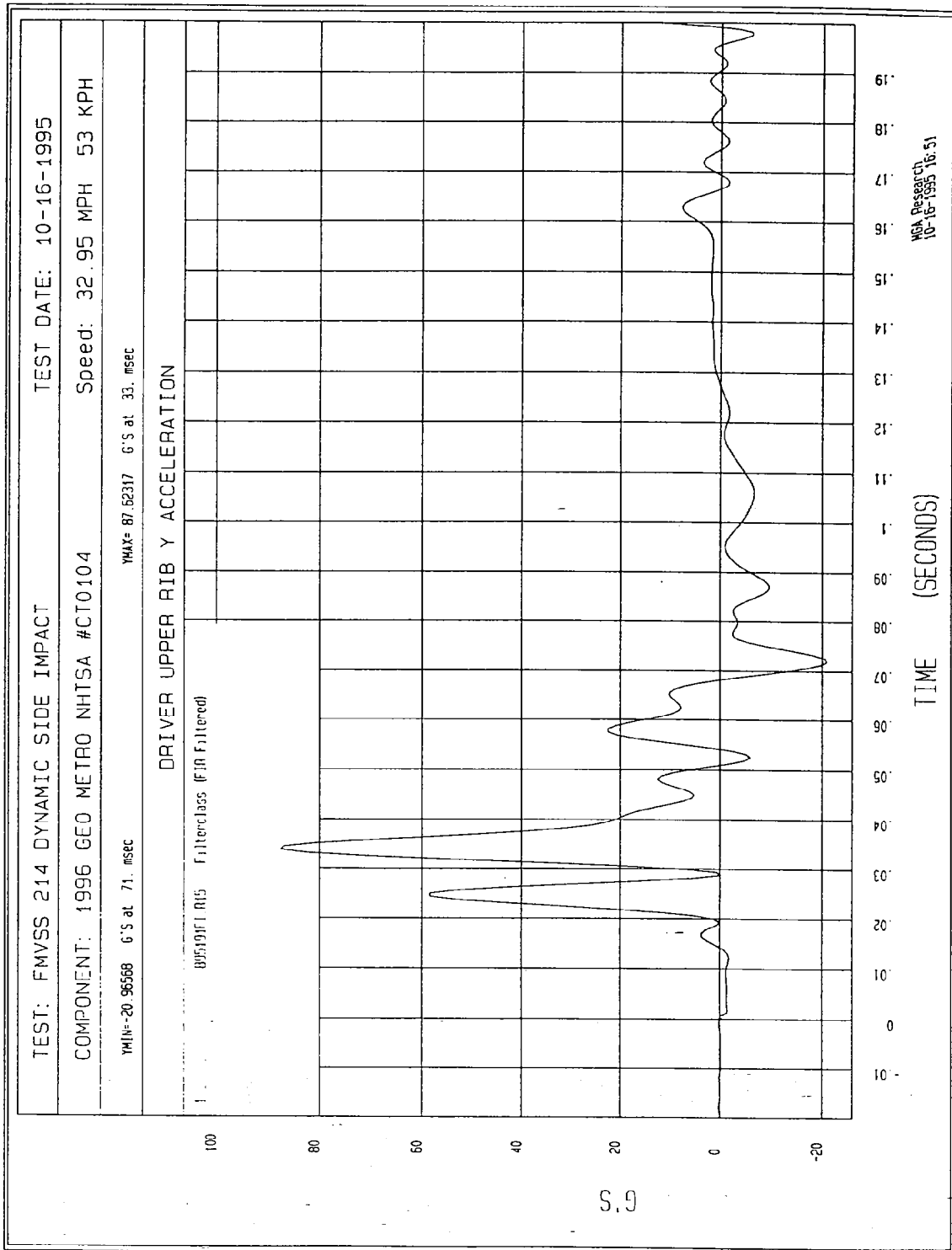


Figure B-89 - Driver Upper Rib Y Acceleration vs. Time

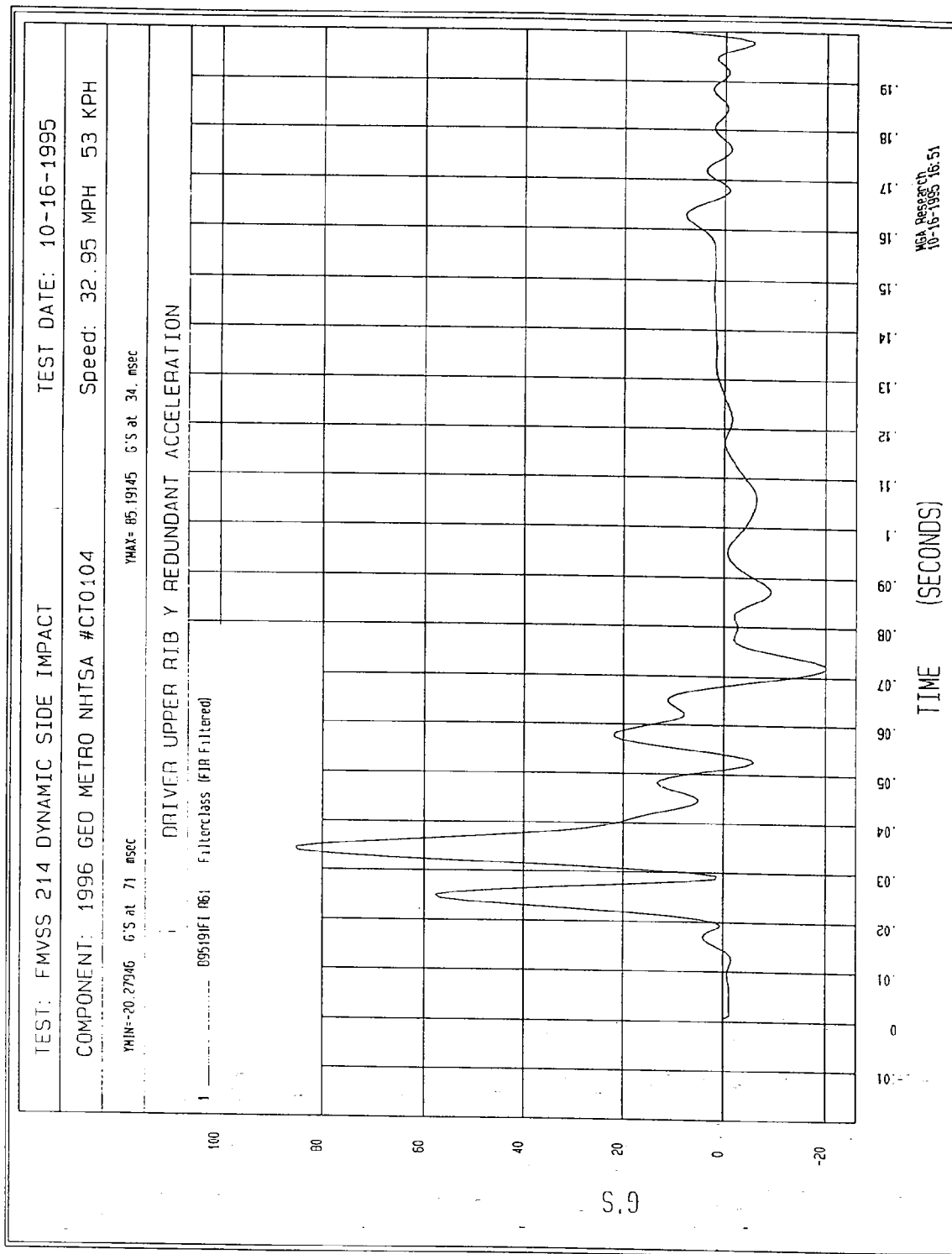


Figure B-90 - Driver Upper Rib Y Redundant Acceleration vs. Time

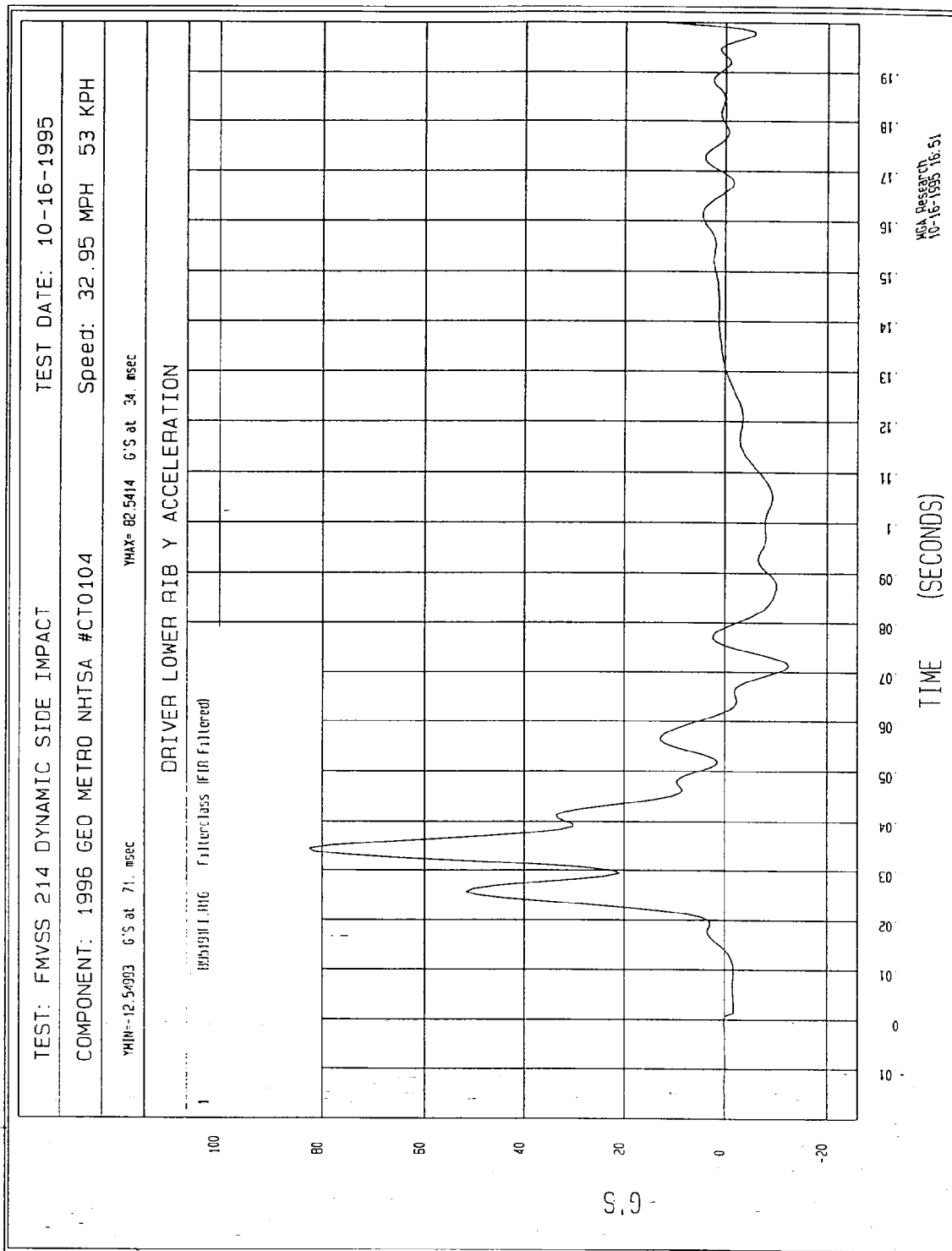


Figure B-91 - Driver Lower Rib Y Acceleration vs. Time

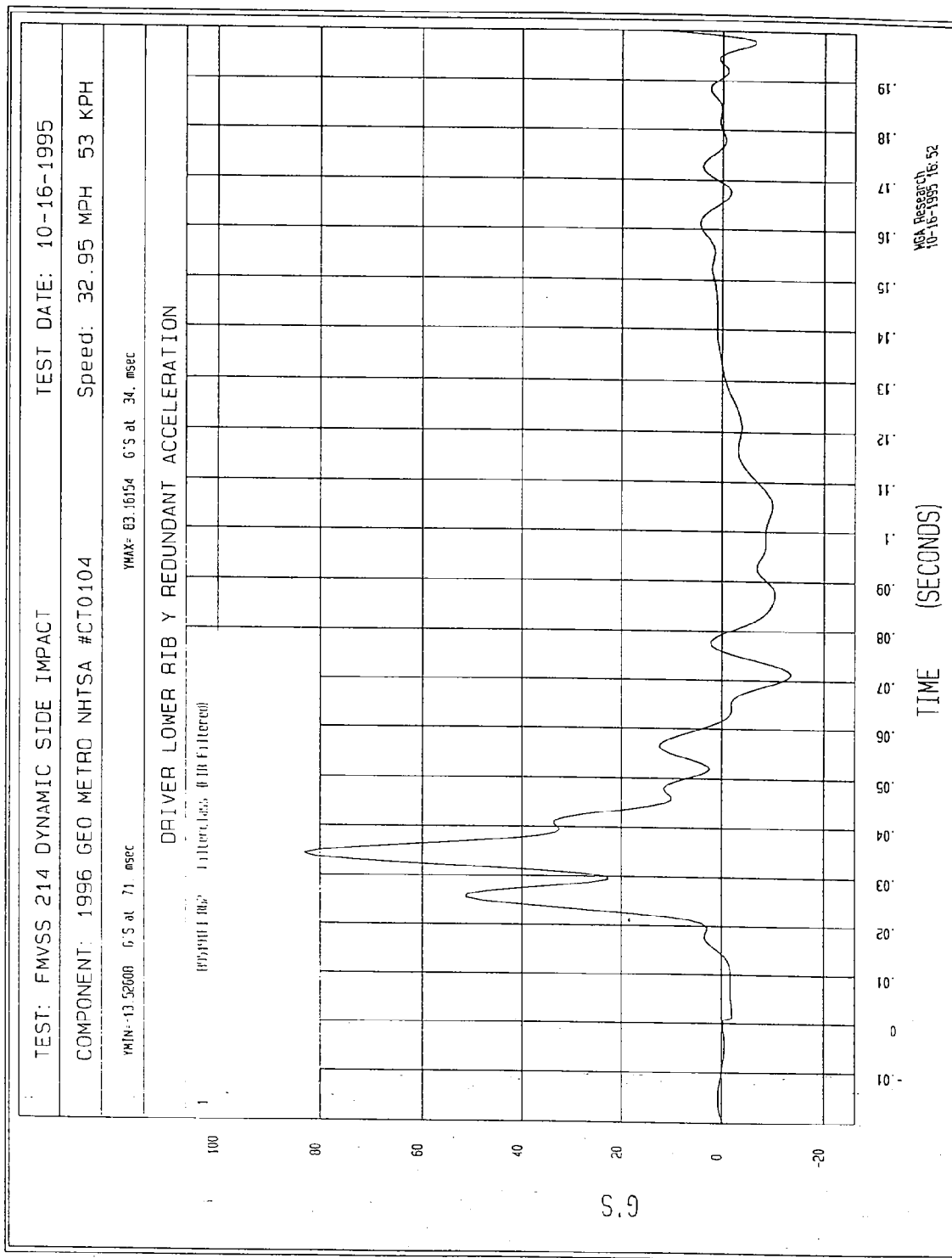
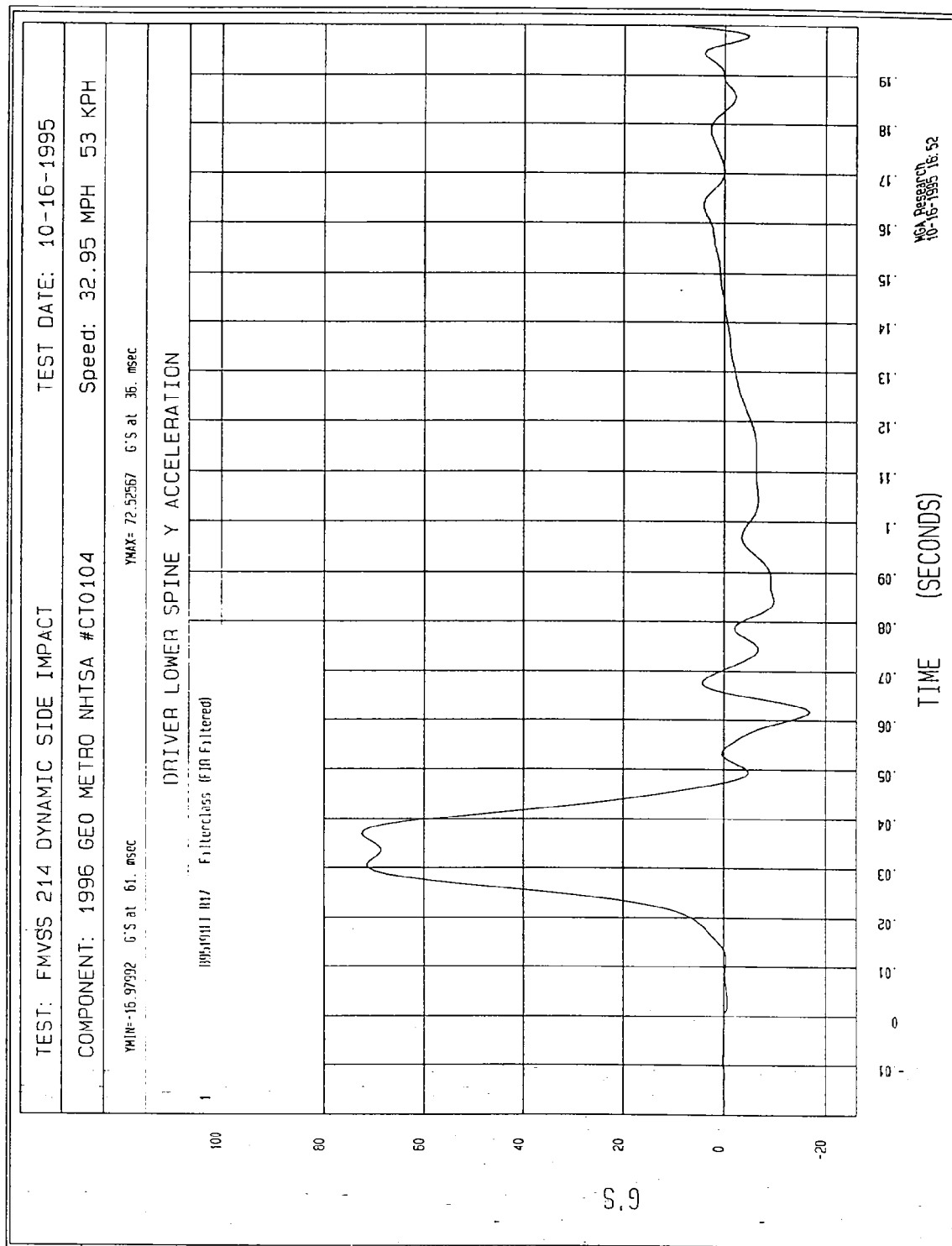


Figure B-92 - Driver Lower Rib Y Redundant Acceleration vs. Time



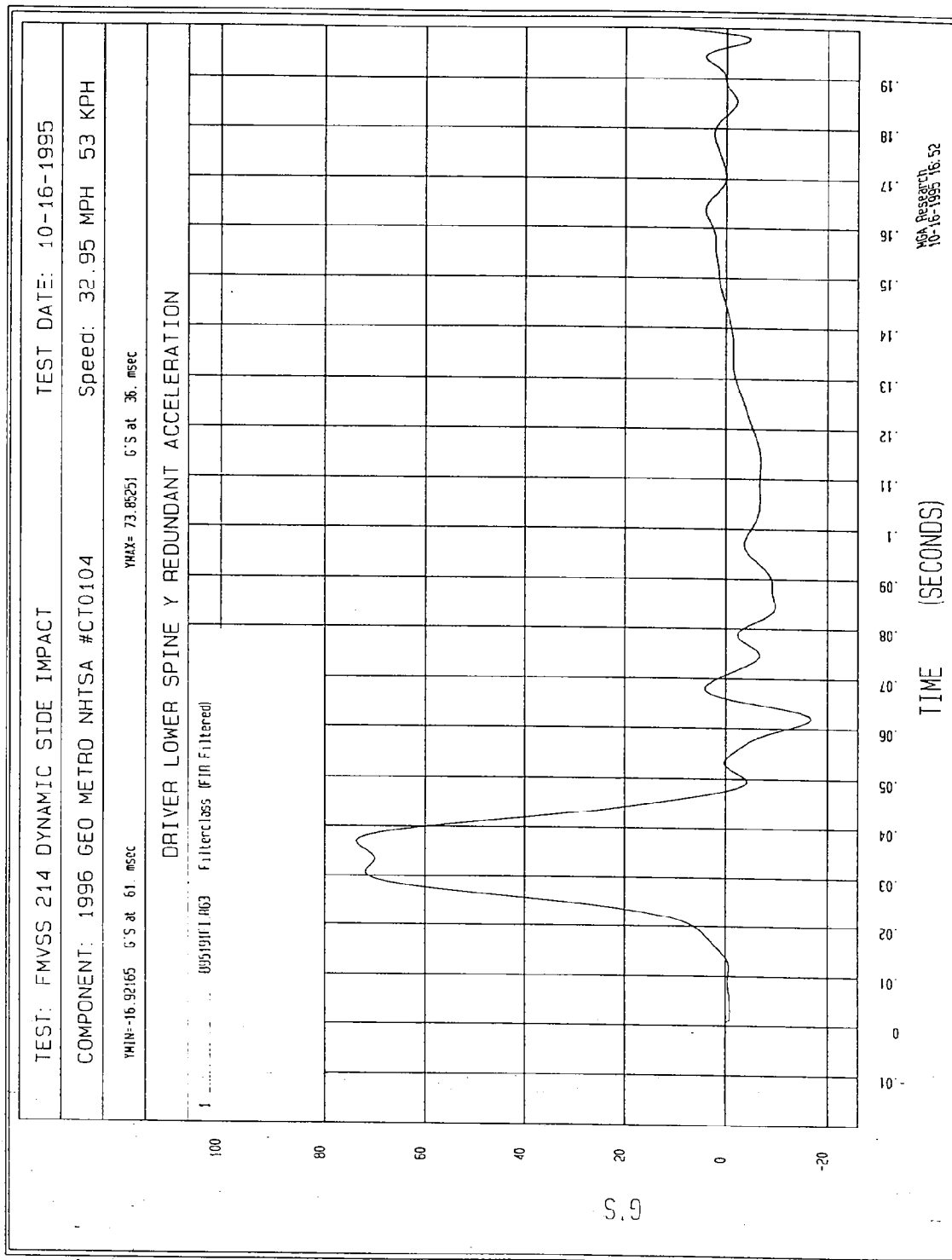


Figure B-94 - Driver Lower Spine Y Redundant Acceleration vs. Time

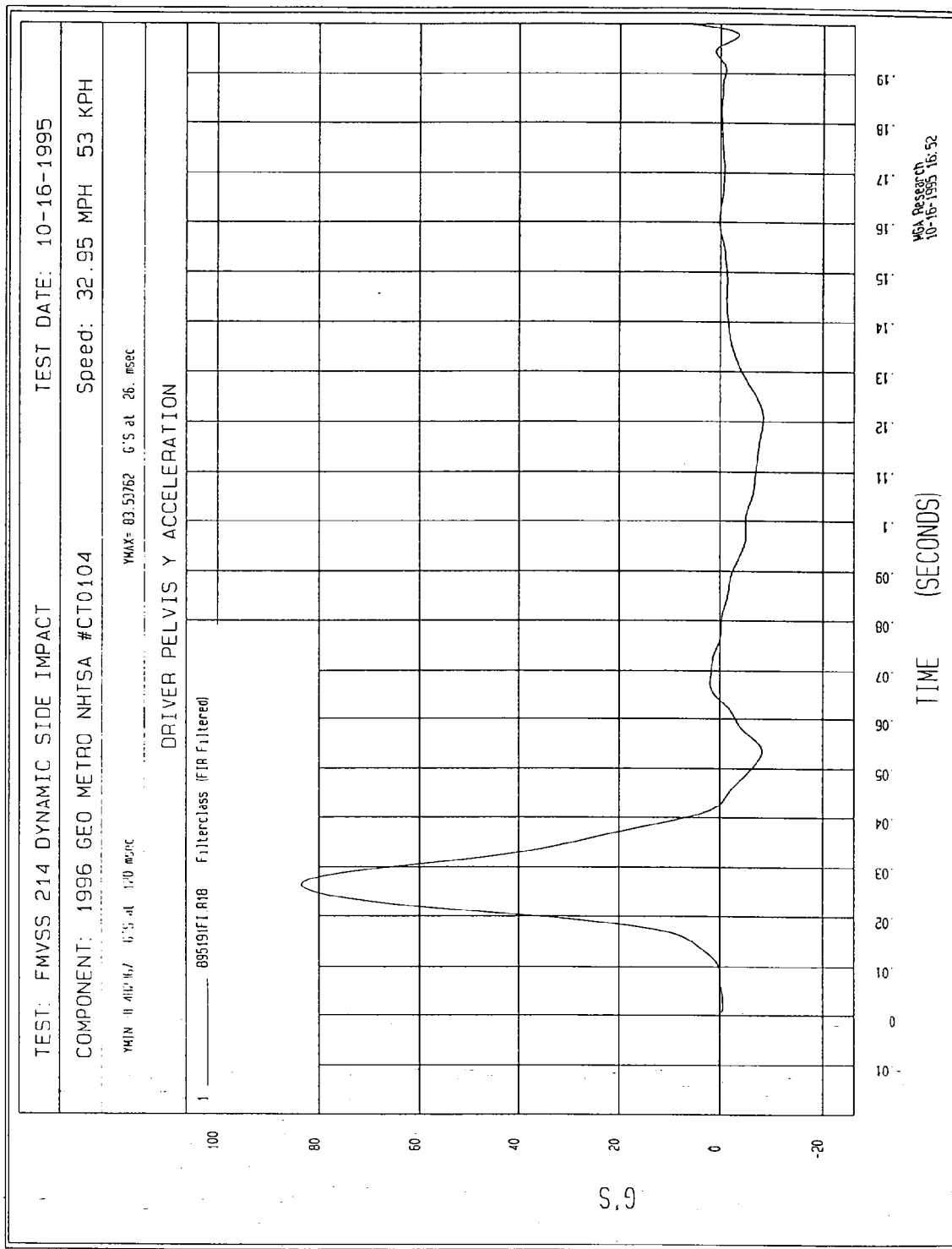


Figure B-95 - Driver Pelvis Y Acceleration vs. Time

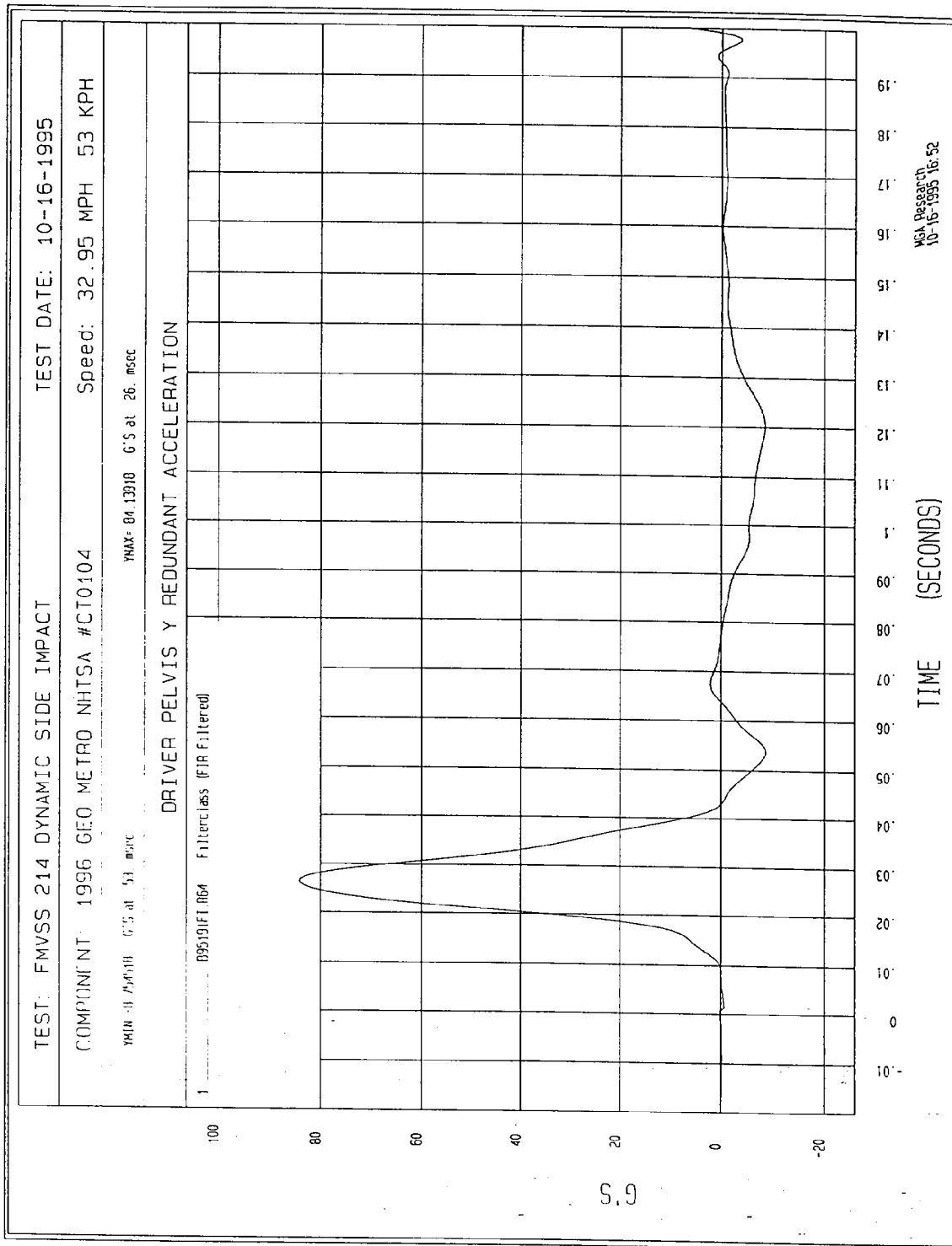


Figure B-96 - Driver Pelvis Y Redundant Acceleration vs. Time

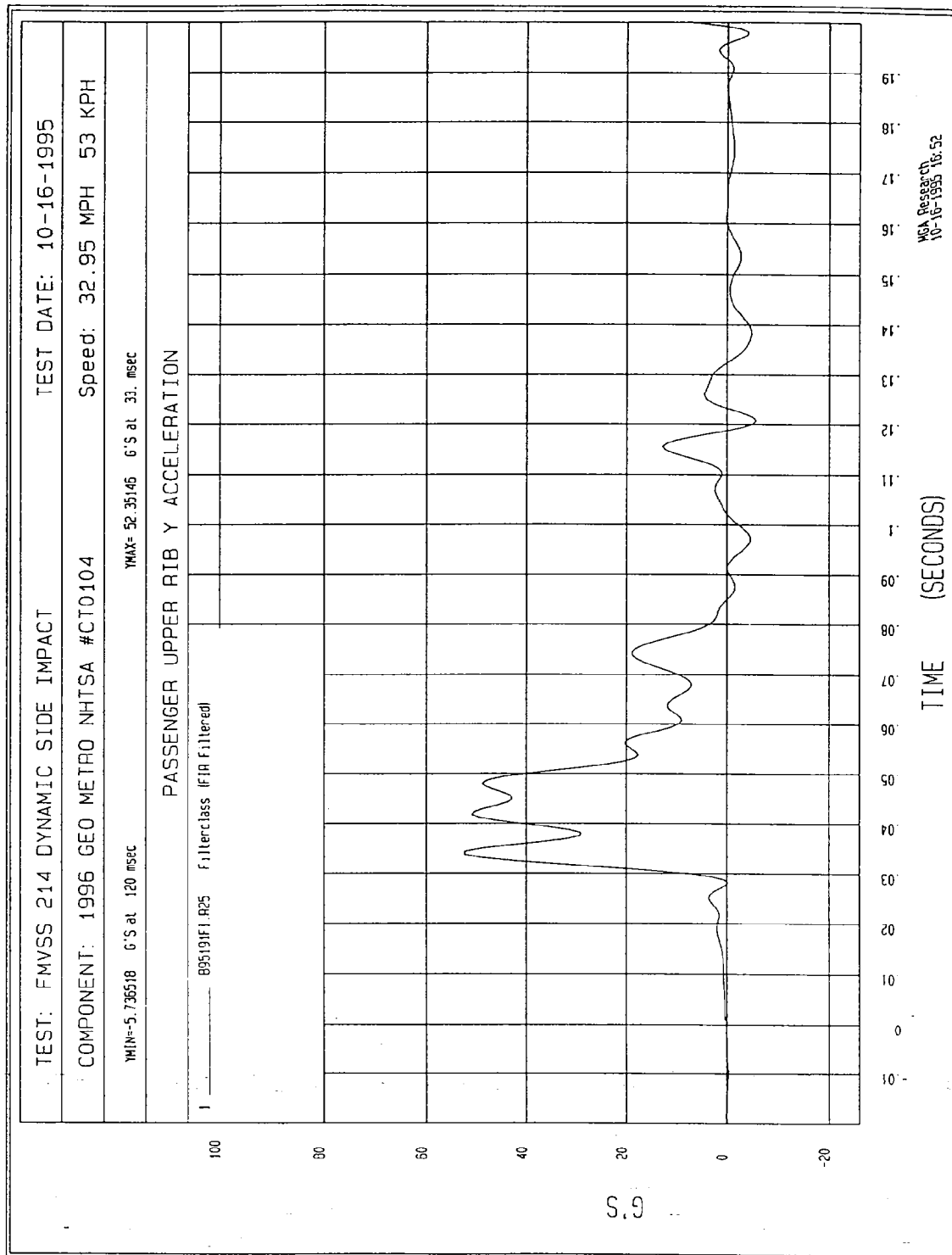


Figure B-97 - Passenger Upper Rib Y Acceleration vs. Time

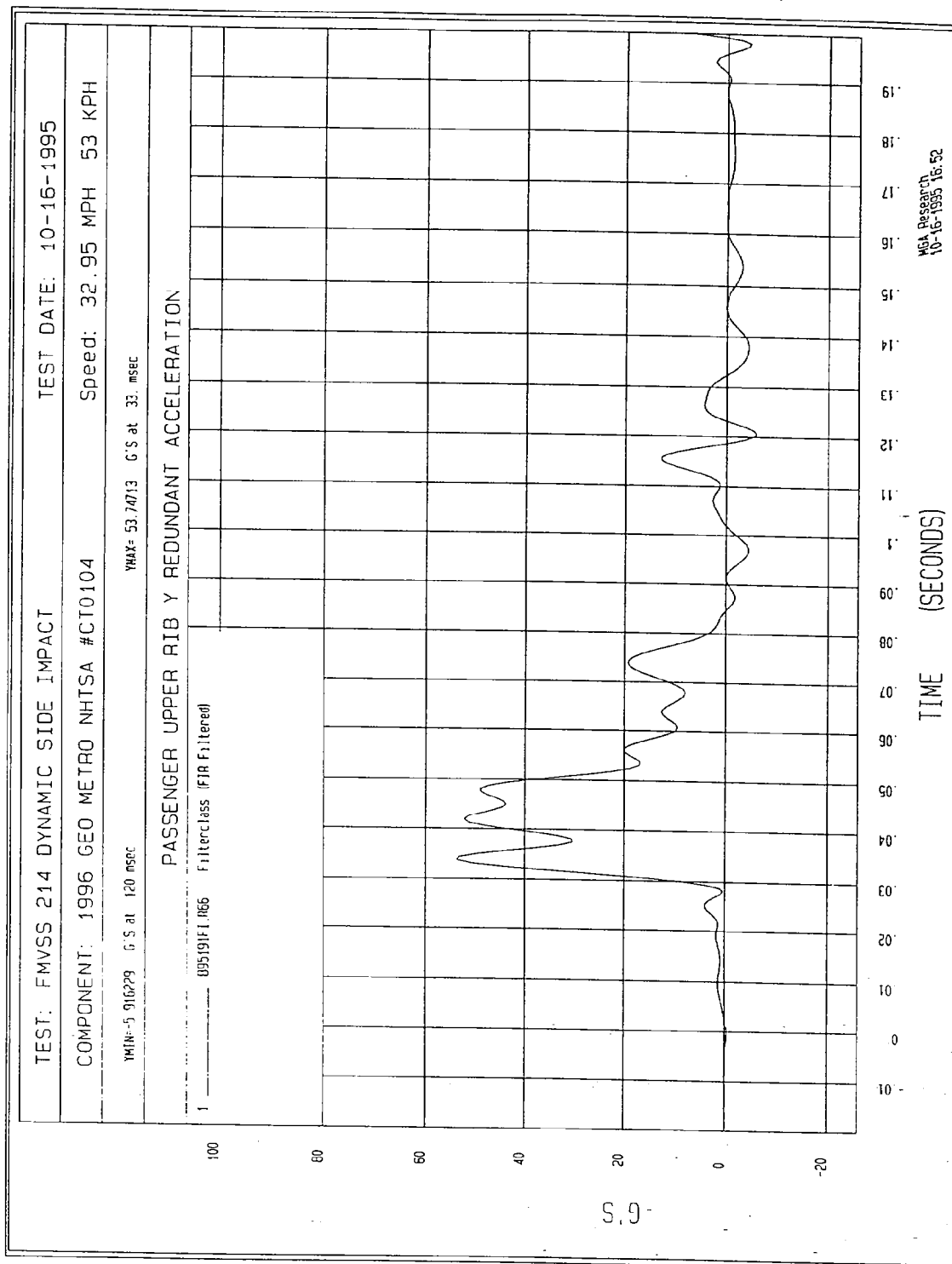


Figure B-98 - Passenger Upper Rib Y Redundant Acceleration vs. Time

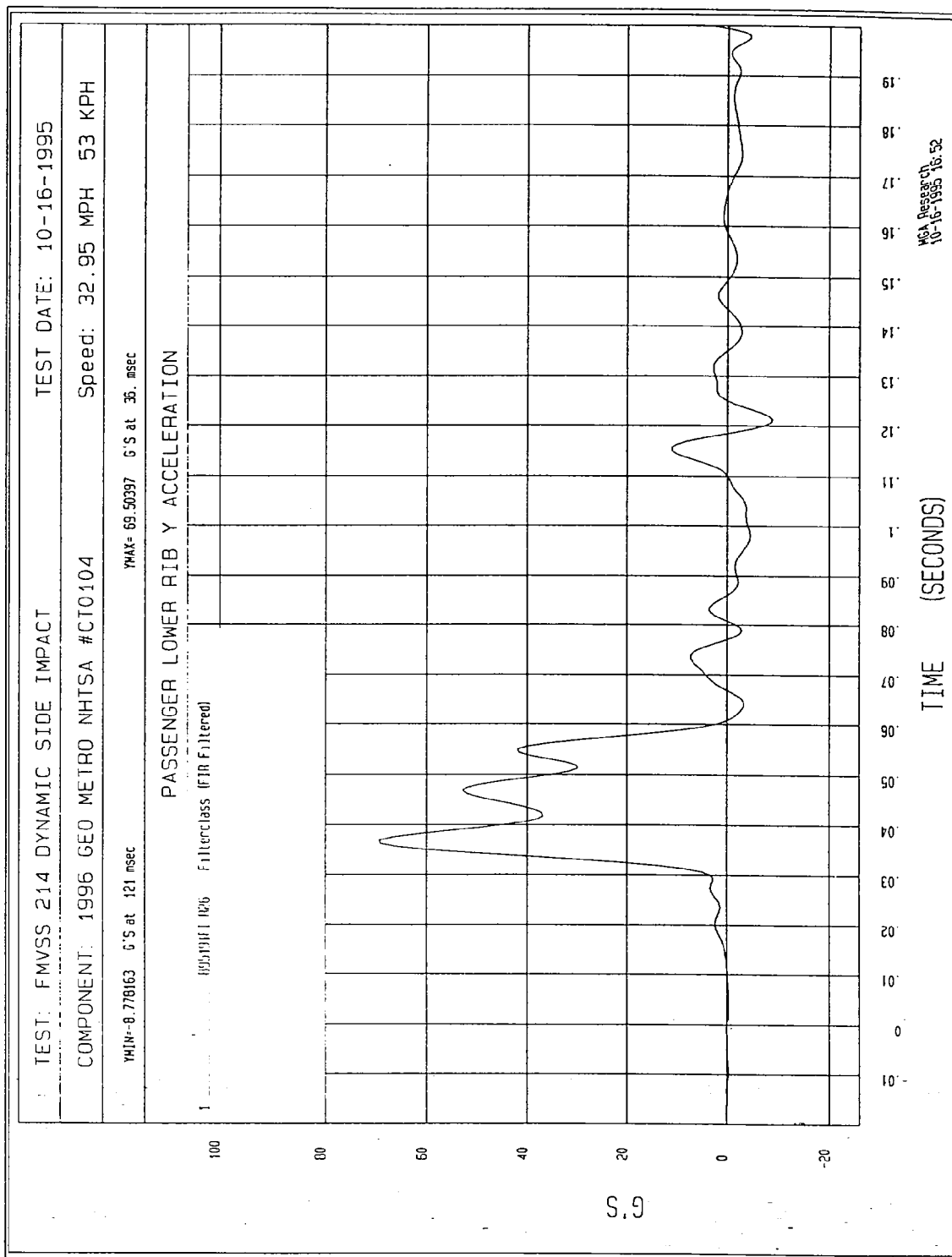


Figure B-99 - Passenger Lower Rib Y Acceleration vs. Time

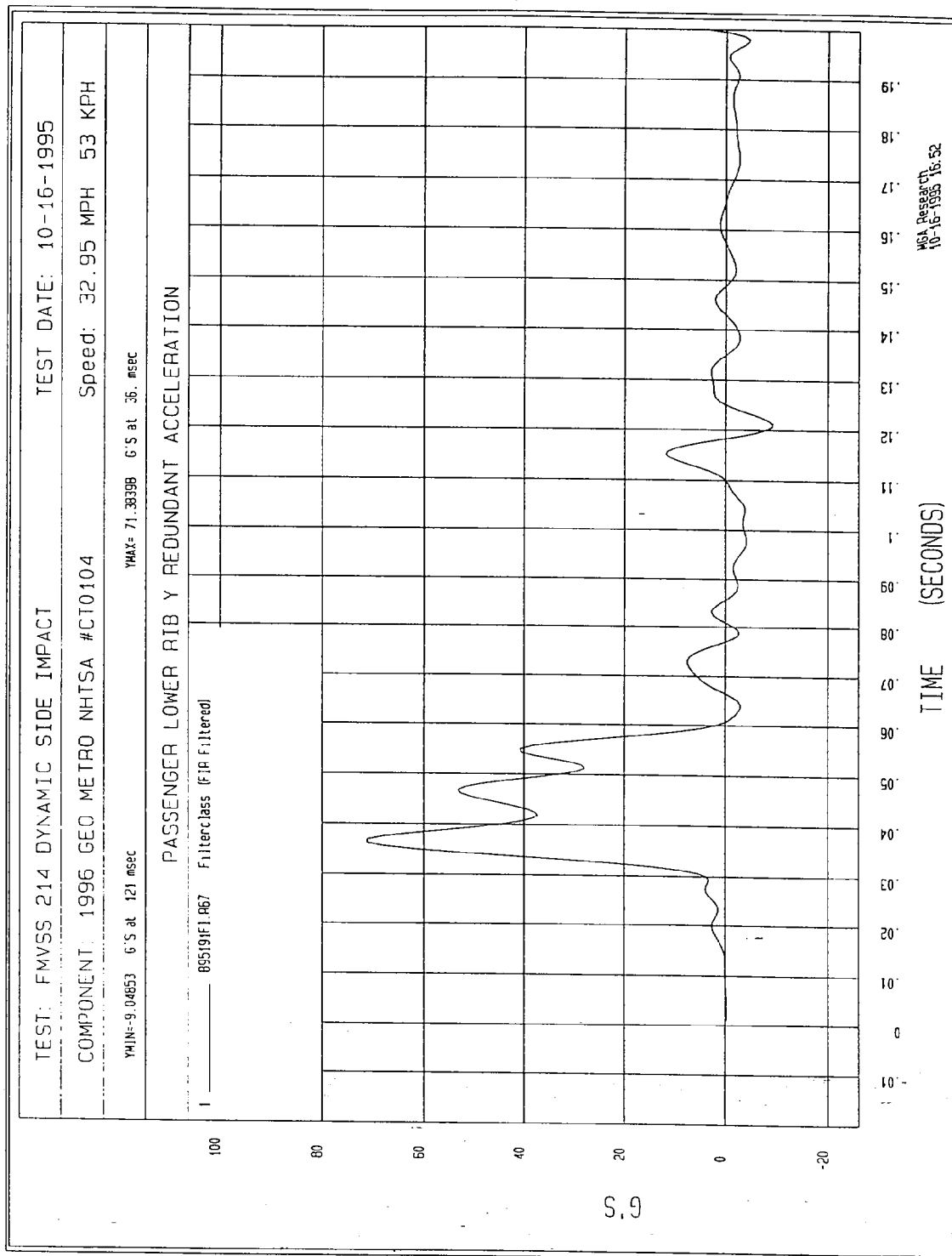


Figure B-100 - Passenger Lower Rib Y Redundant Acceleration vs. Time

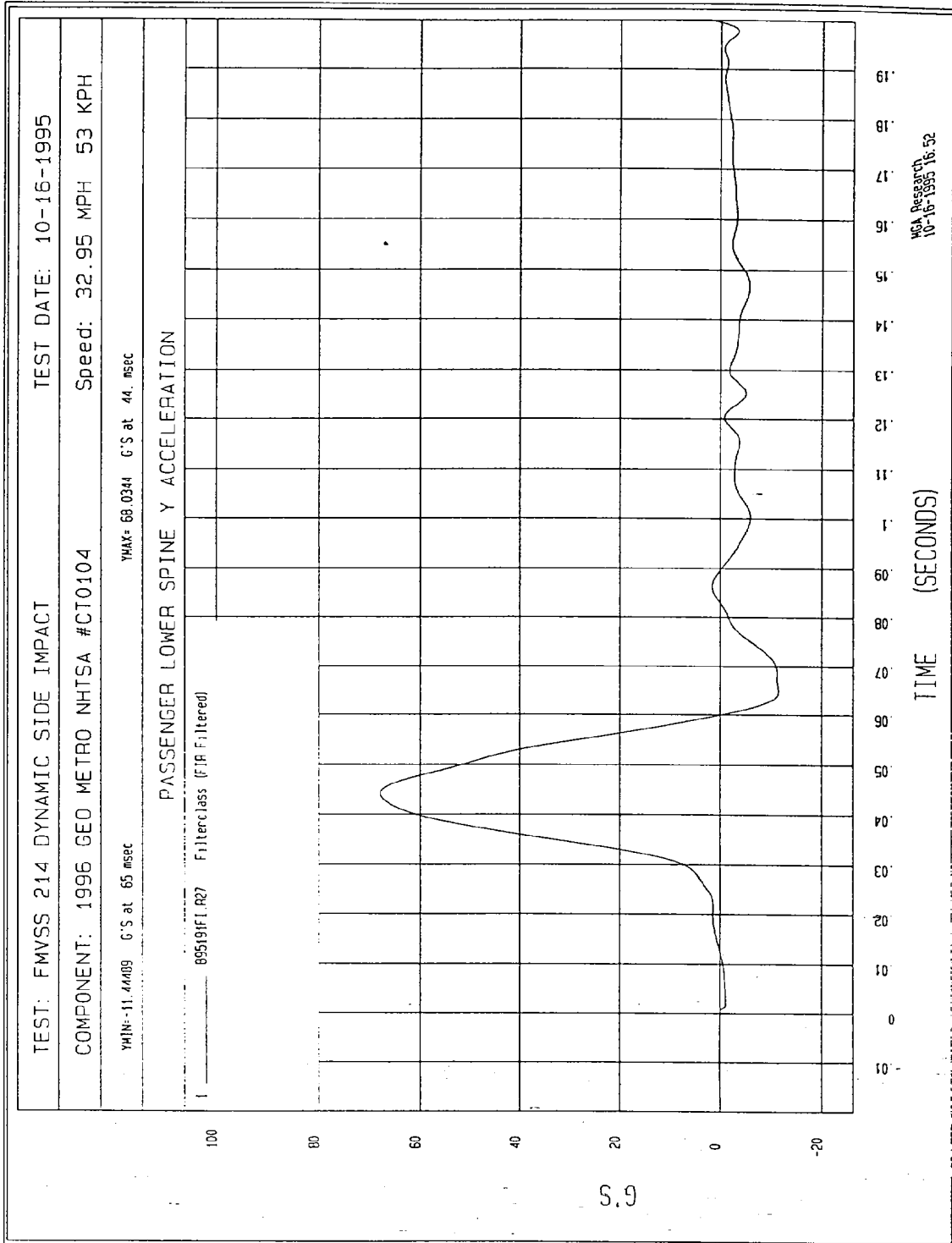


Figure B-101 - Passenger Lower Spine Y Acceleration vs. Time

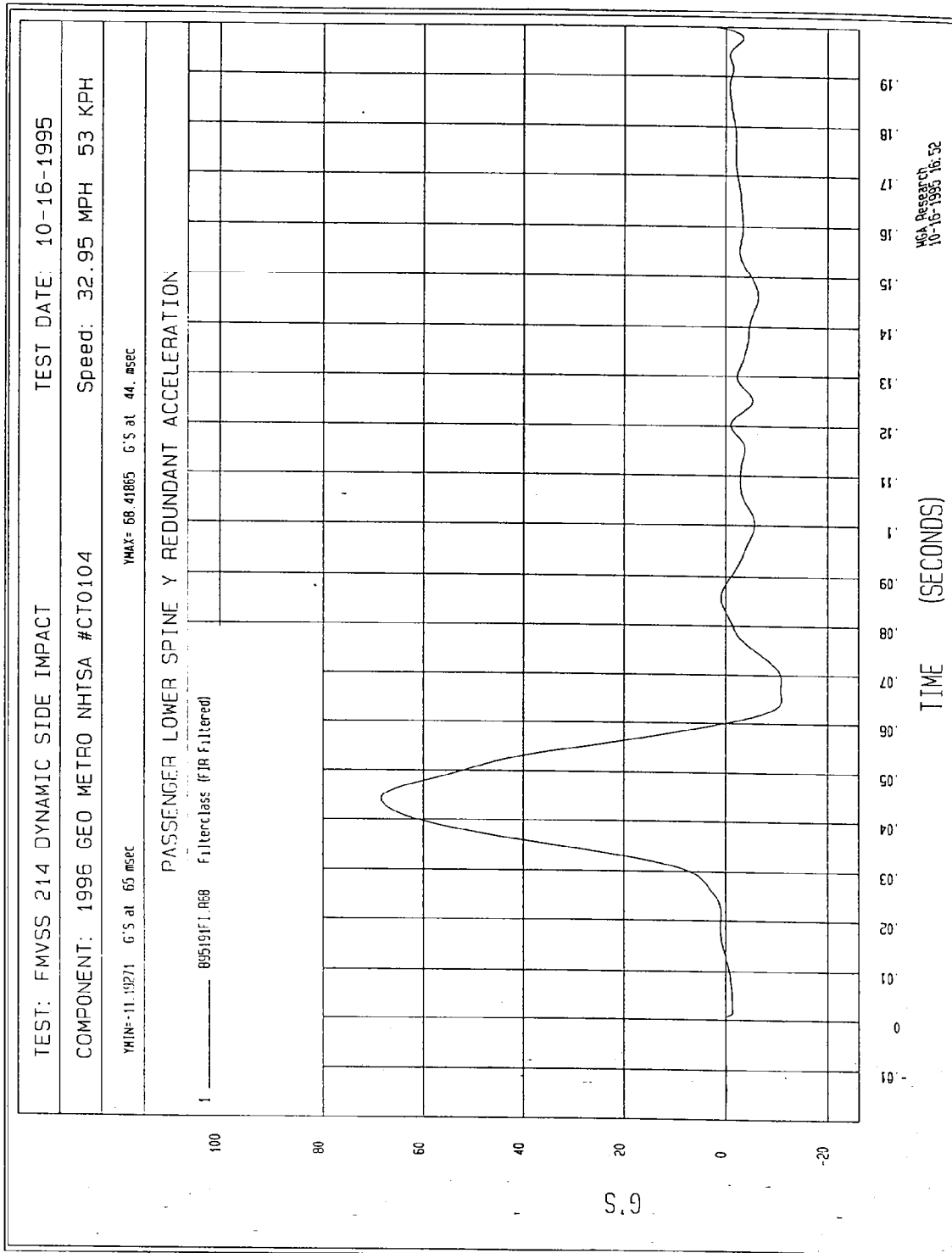


Figure B-102 - Passenger Lower Spine Y Redundant Acceleration vs. Time

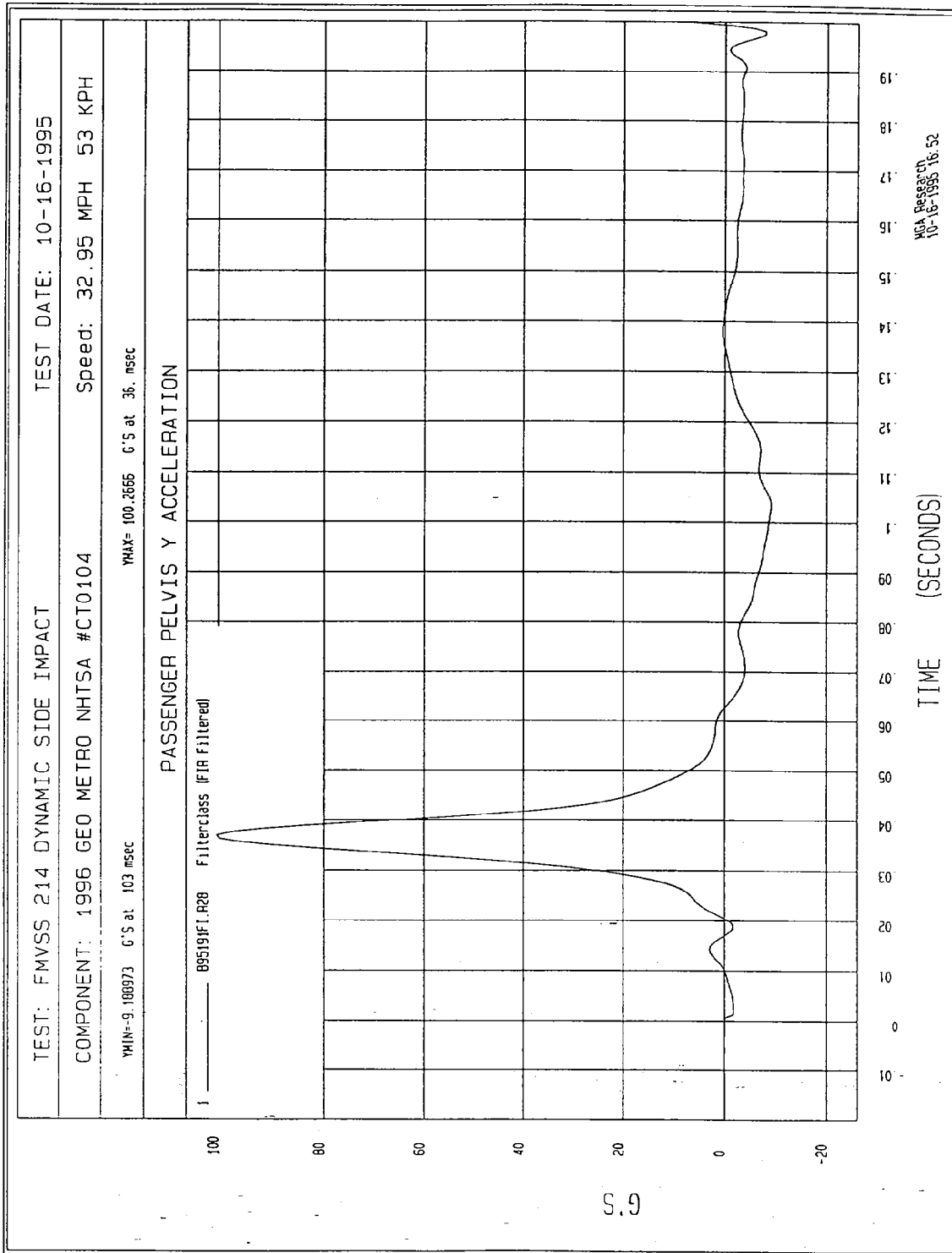


Figure B-103 - Passenger Pelvis Y Acceleration vs. Time

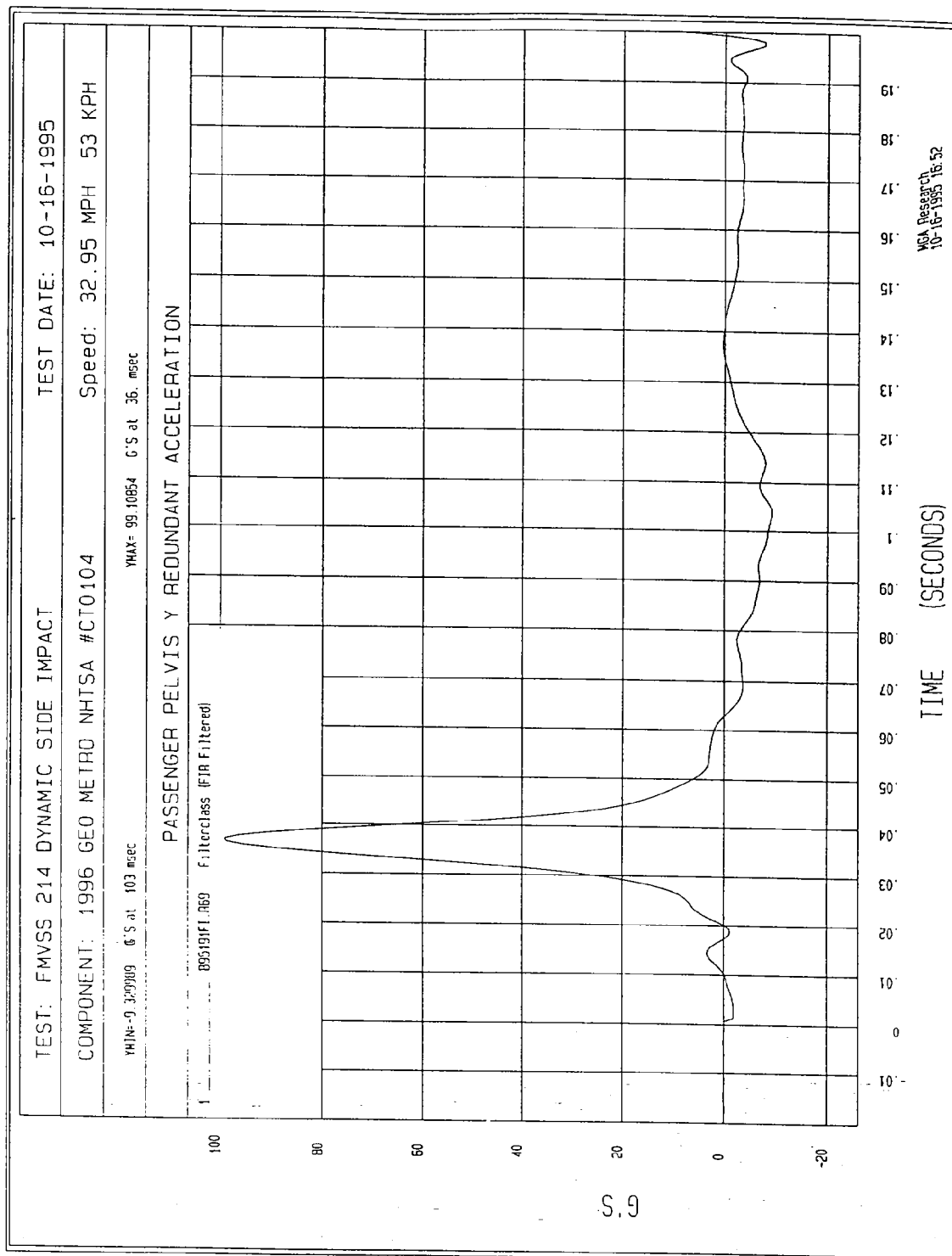


Figure B-104 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-96-DC01

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

GENERAL MOTORS CORPORATION
1996 GEO METRO 3 DOOR HATCHBACK
NHTSA NO. CT0104

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: October 16, 1995

Report Date: October 26, 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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DUMMY S/N: 272	POST-TEST CERTIFICATION DATA	4-1
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DUMMY S/N: 272	POST-TEST INSPECTION CHECKLIST	6-1
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PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 271

Calibration Test Results Summary

Dummy 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.

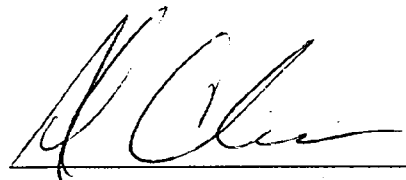
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: October 13, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75" - 20.50"	20.5
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.4
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.3
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.1

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION
THORACIC SHOCK ABSORBER TEST
SIDE IMPACT DUMMY (SID)

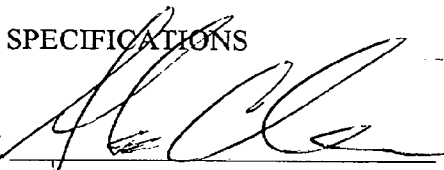
DATE: October 11, 1995

DUMMY NUMBER: 271

TEST NUMBER: D95139ABC

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66° - 78° F	70°
RELATIVE HUMIDITY		10 - 70%	45%
VELOCITY 10 ft/s	FORCE (lb.)	188 - 253	252
	DISPLACEMENT (in.)	1.18 - 1.38	1.30
VELOCITY 14 ft/s	FORCE (lb.)	389 - 472	393
	DISPLACEMENT (in.)	1.26 - 1.47	1.30
VELOCITY 20 ft/s	FORCE (lb.)	841 - 1000	992
	DISPLACEMENT (in.)	1.30 - 1.57	1.36

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY

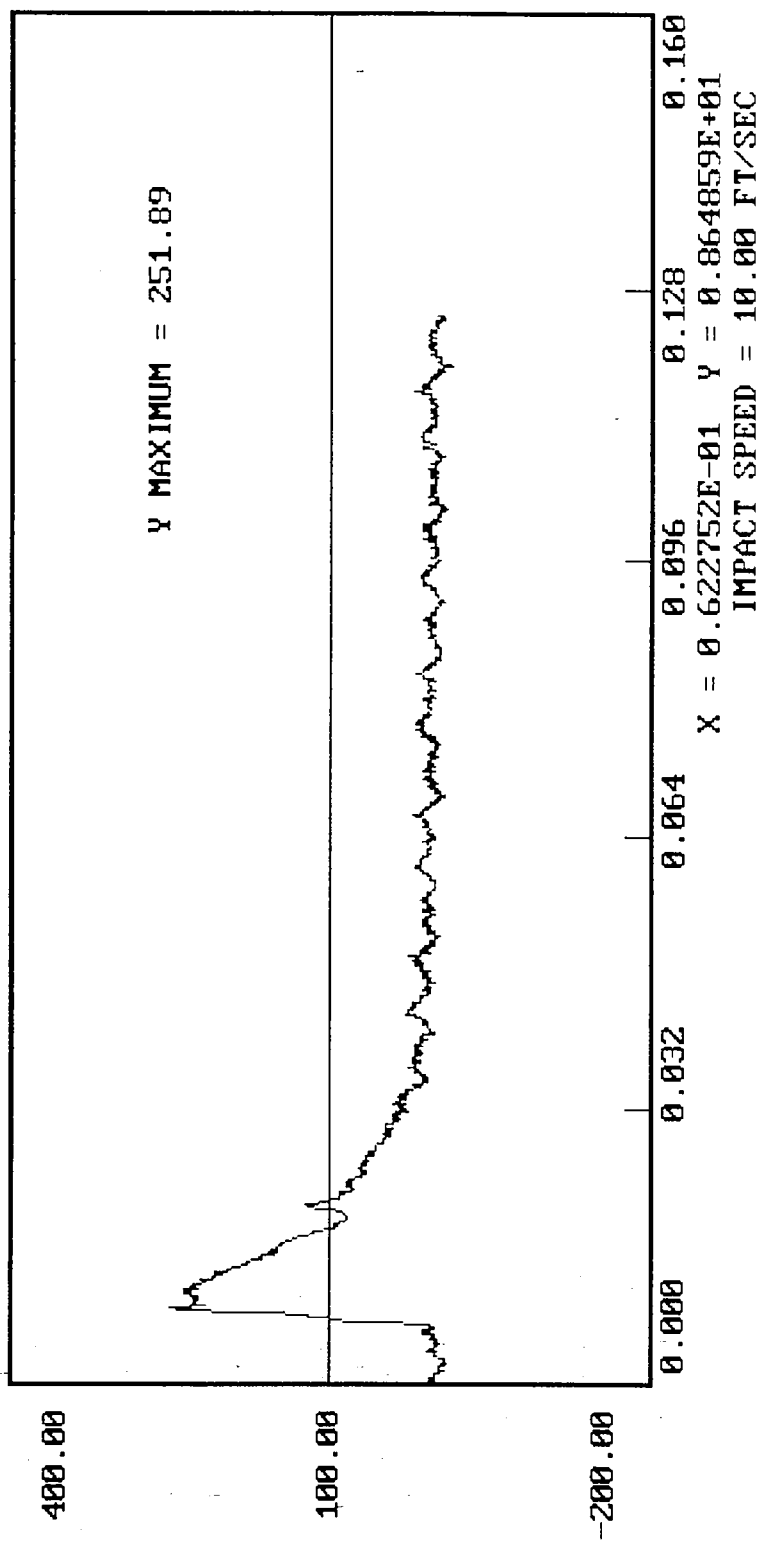
David Winkelbauer

10-11-1995 11:24

SID DAMPNER TEST

DUMMY # 271

FORCE (LBS) VS. TIME ((SECONDS))

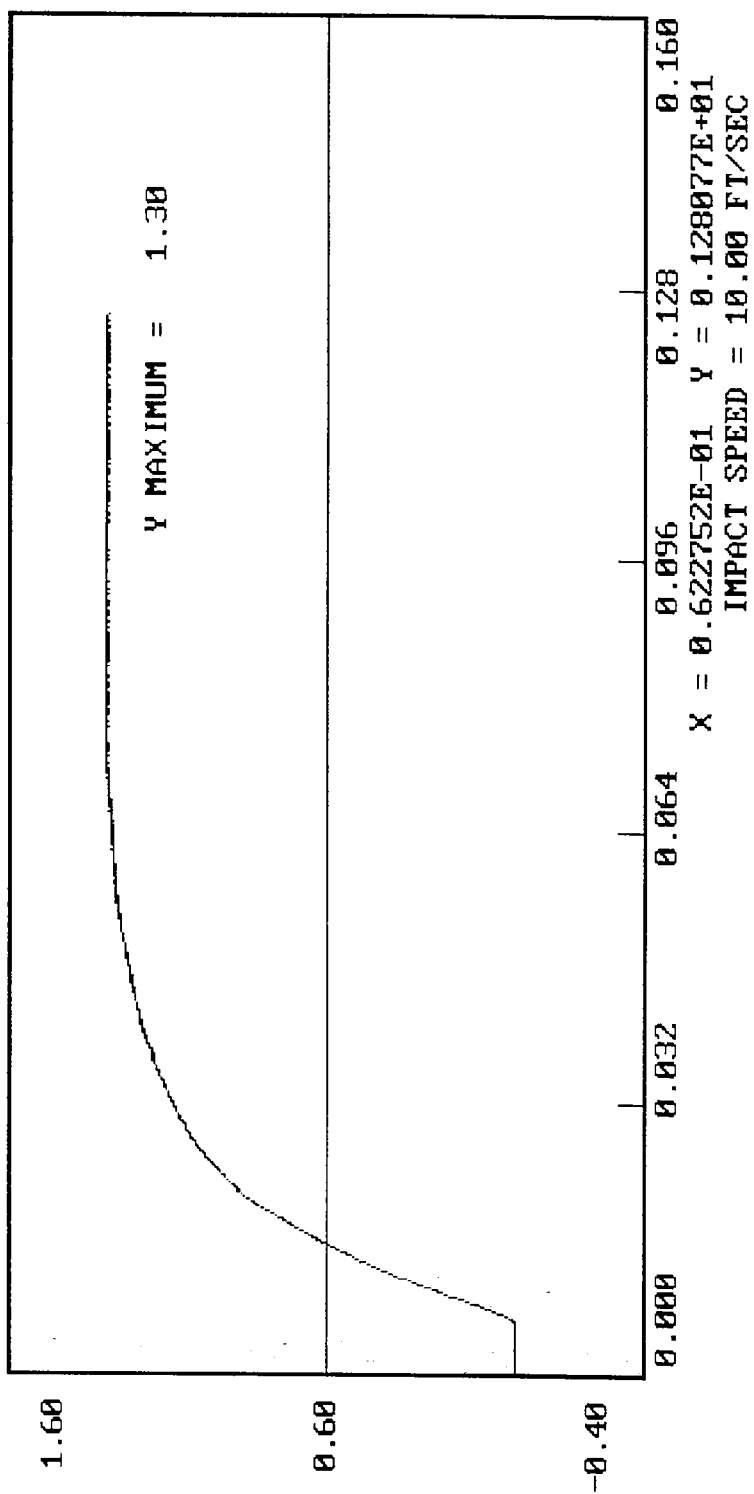


10-11-1995 11:24

SID DAMPNER TEST

DUMMY # 271

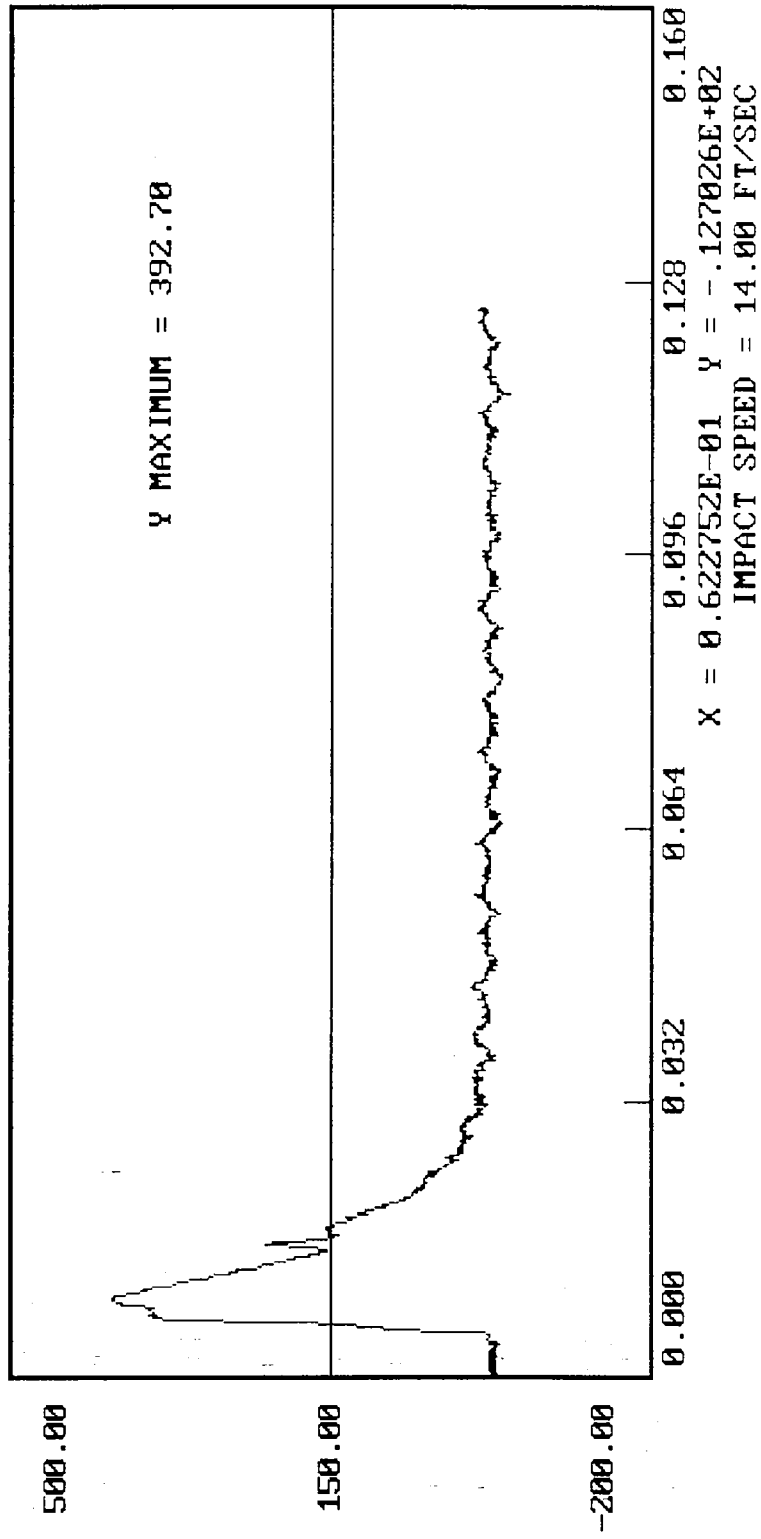
DISPLACEMENT (INCHES) VS. TIME ((SECONDS))



10-11-1995 11:14

SID DAMPNER
DUMMY # 271

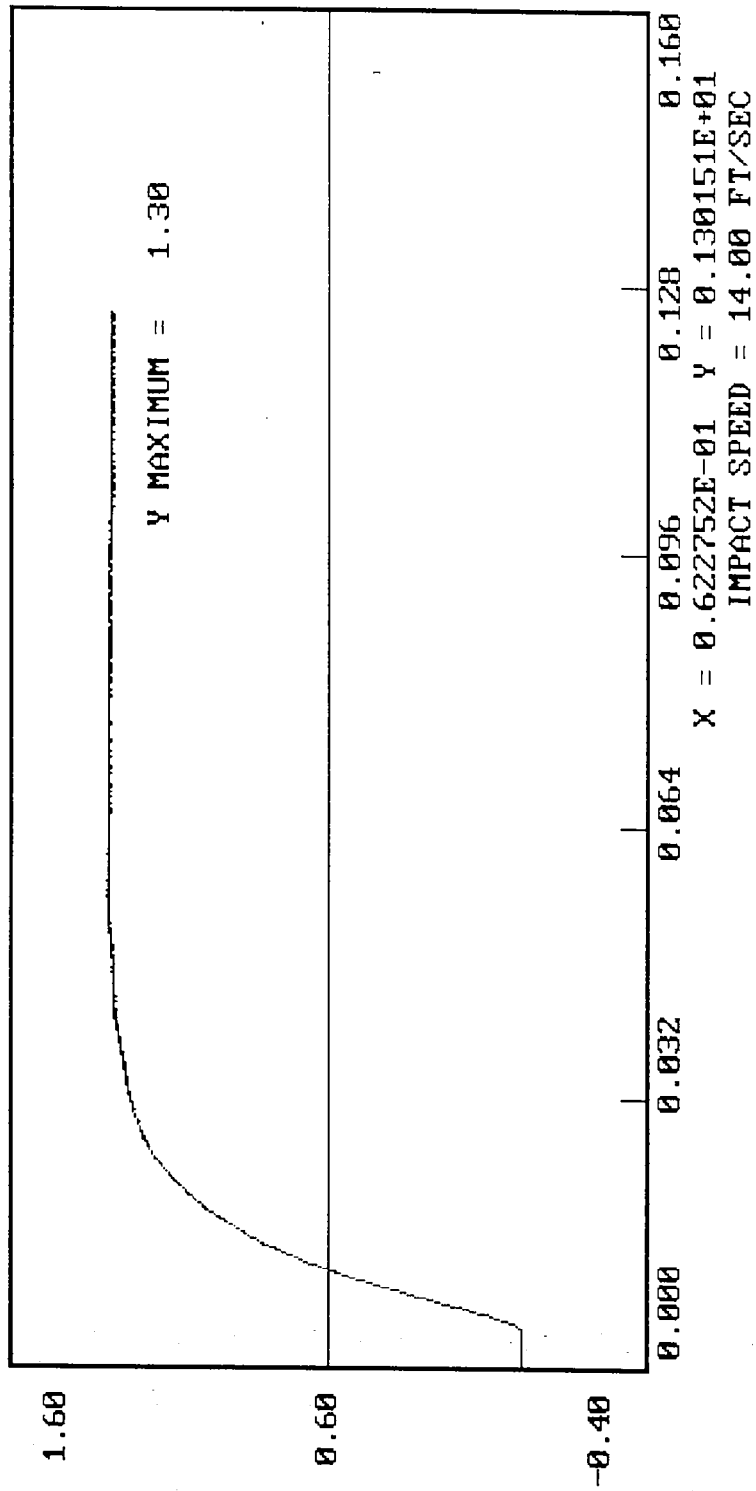
FORCE (LBS) VS. TIME ((SECONDS))



10-11-1995 11:14

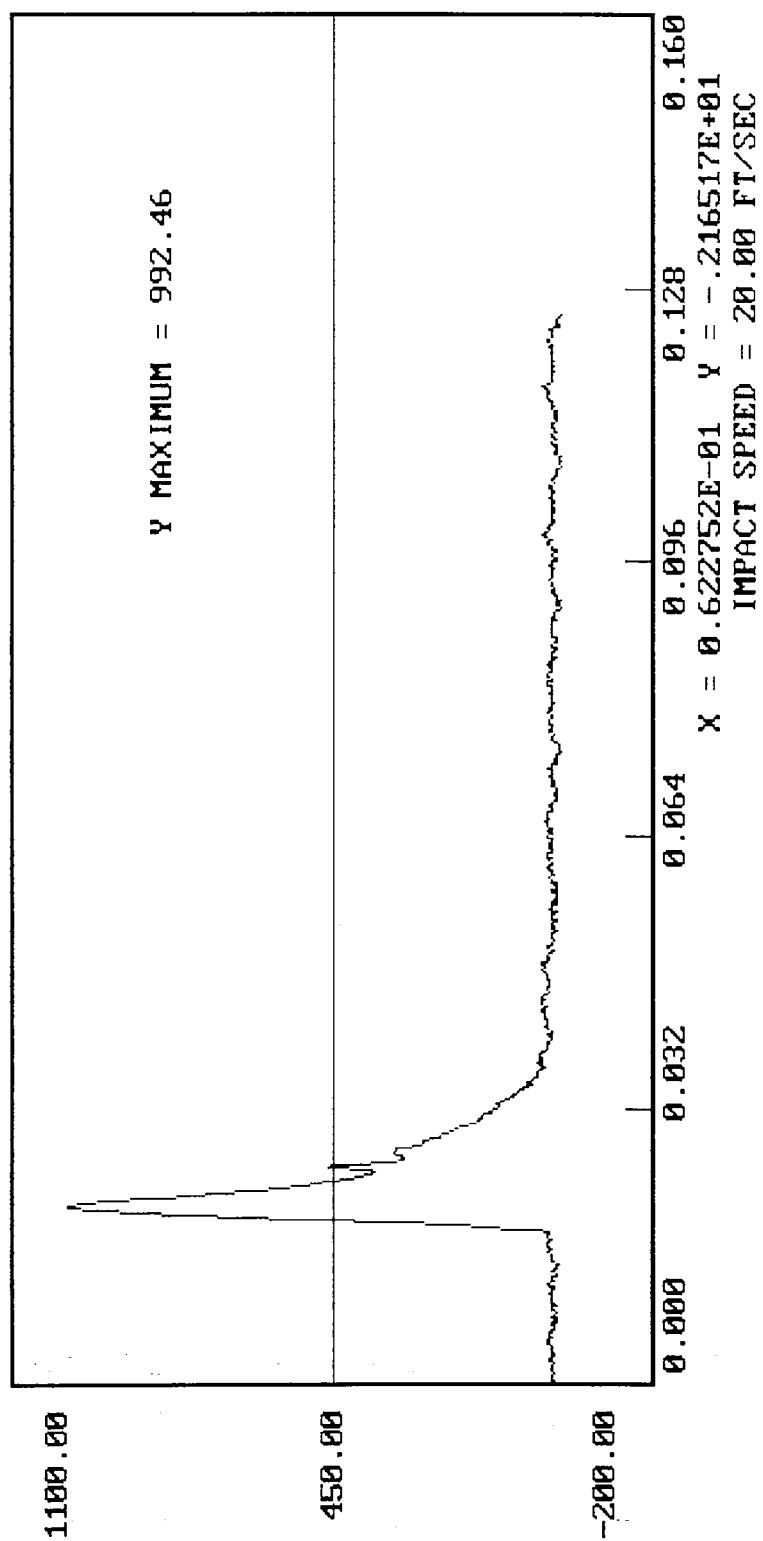
SID DAMPNER
DUMMY # 271

DISPLACEMENT (INCHES) VS. TIME ((SECONDS))

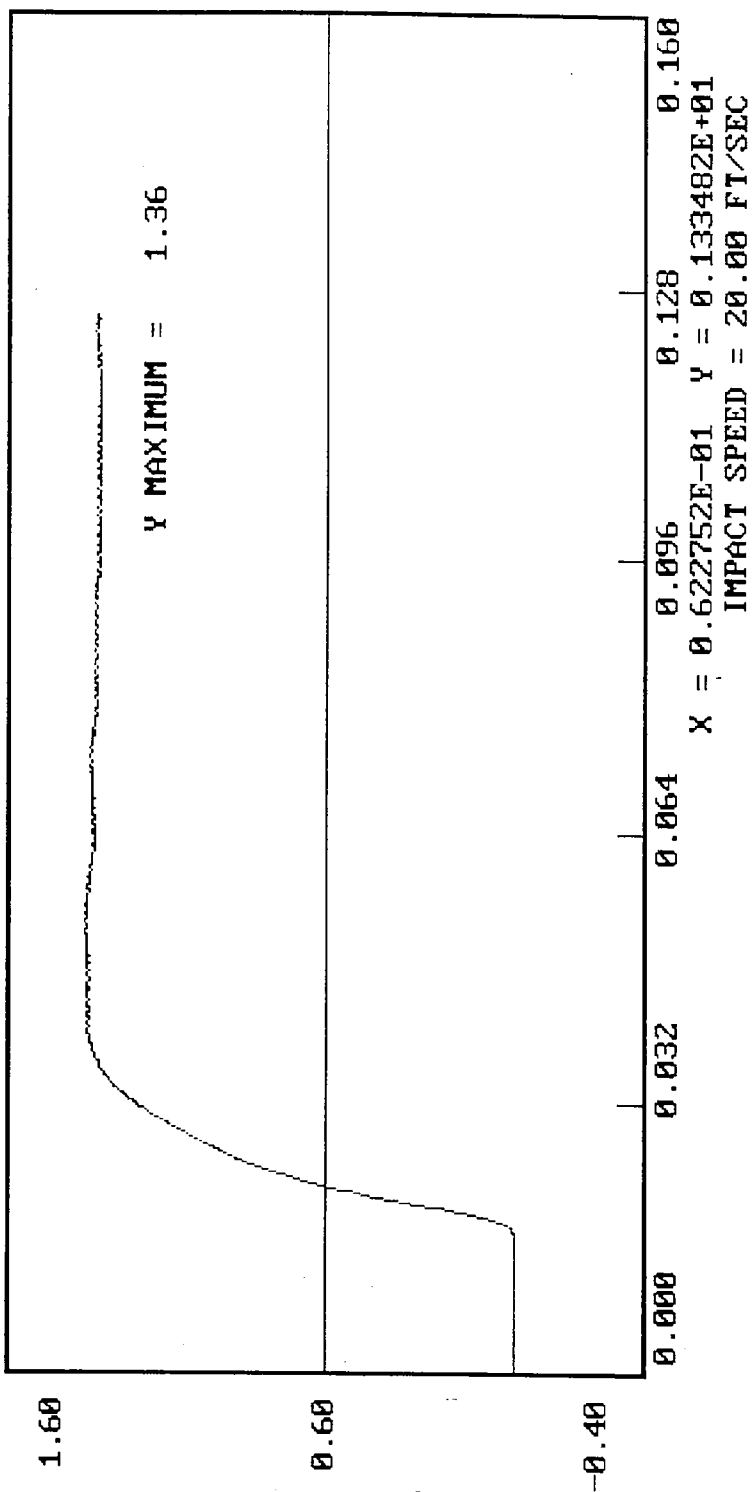


10-11-1995 12:18

SID DAMPNER TEST
DUMMY # 271
FORCE (LBS) VS. TIME ((SECONDS))



SID DAMPNER TEST 10-11-1995"
 12:18 # 271
 DISPLACEMENT (INCHES) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

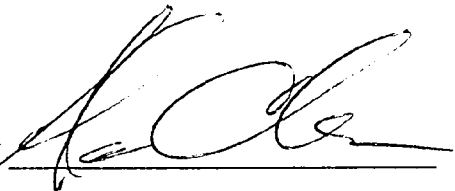
DATE: October 13, 1995

DUMMY NUMBER: 271

TEST NUMBER: D951392

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	14.2
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	20

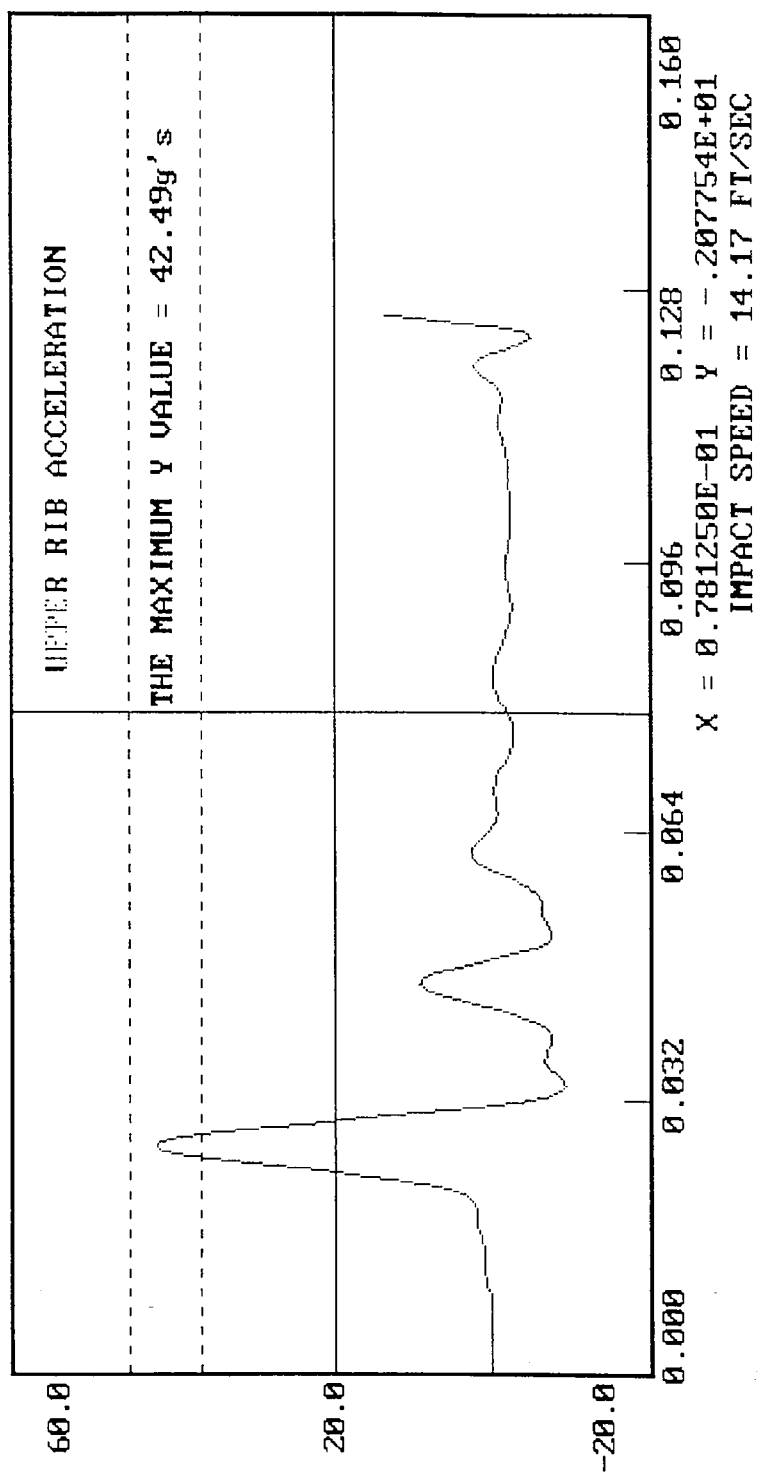
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY David Winkelbauer

10-13-1995 11:00

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

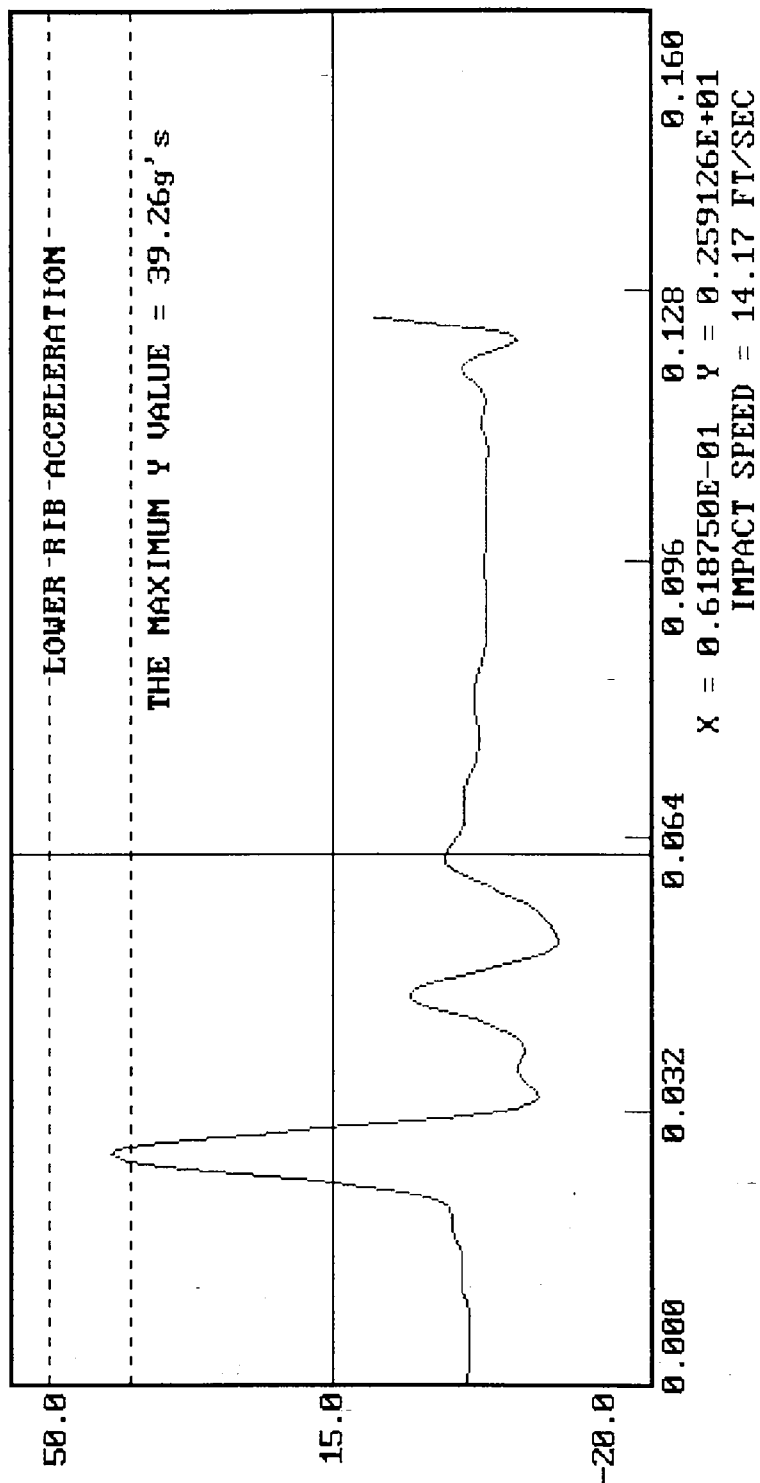


10-13-1995 11:00

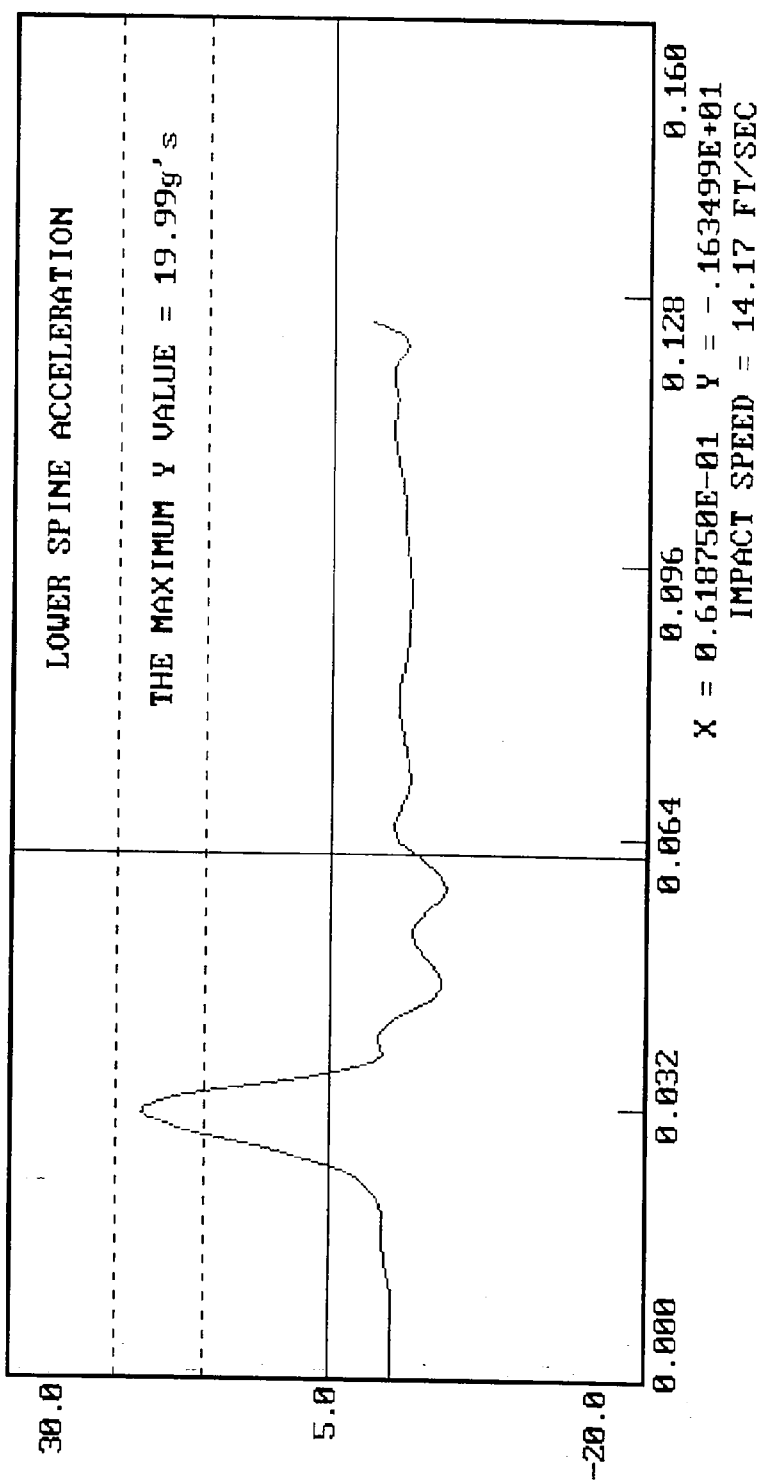
DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

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



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 271
 10-13-1995 11:00
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 13, 1995

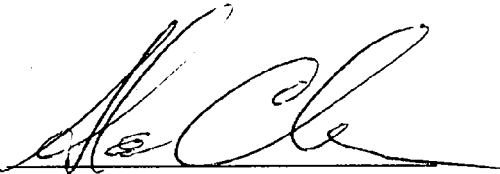
DUMMY NUMBER: 271

TEST NUMBER: 0951393

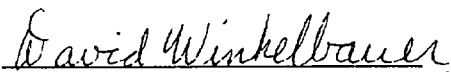
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	14.2
PELVIS ACCELERATION	40 - 60 g's	57

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

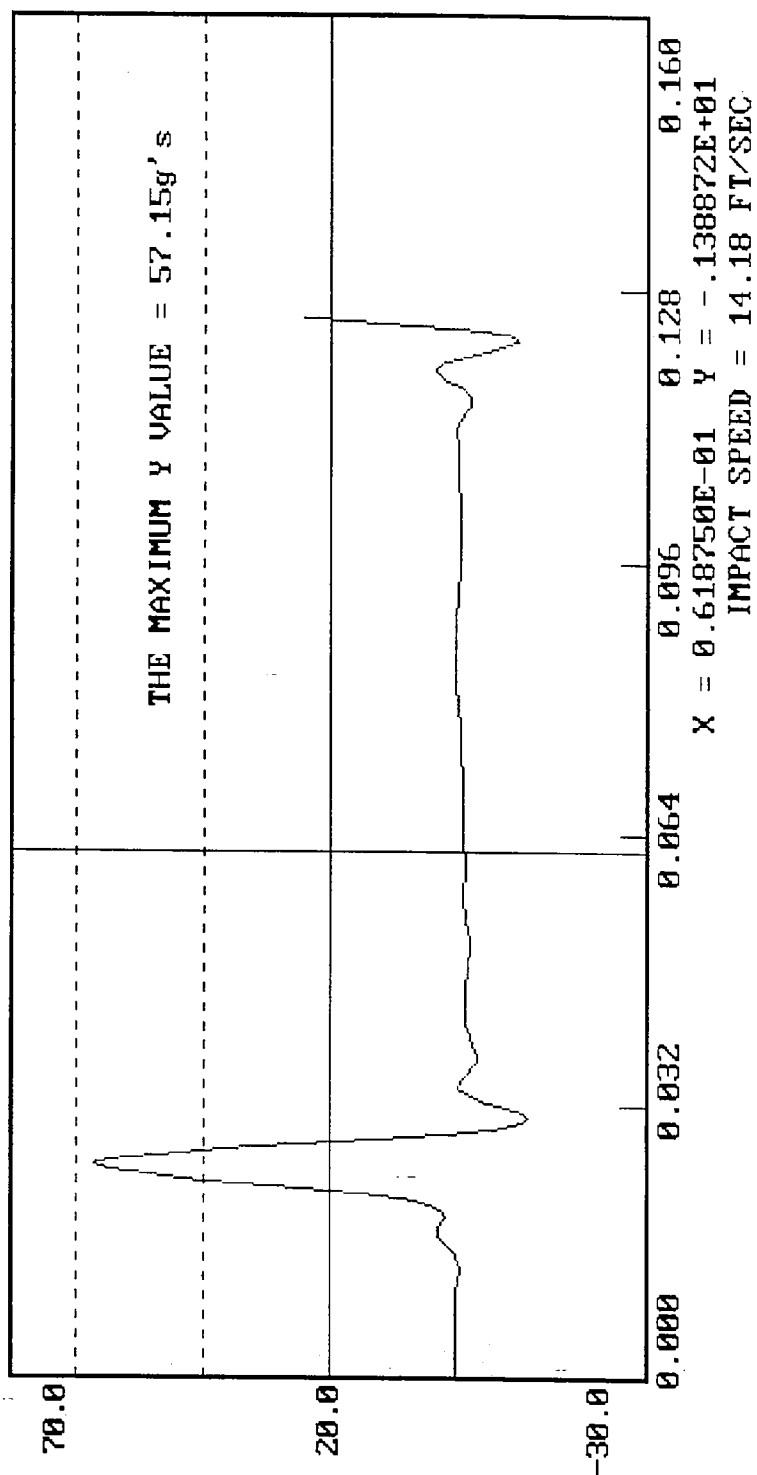


10-13-1995 11:08

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)

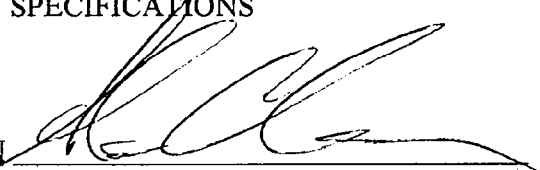
DATE: October 10, 1995

DUMMY NUMBER: 271

TEST NUMBER: D951394

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	45%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.8
FORCE @ 0.75 in	36.7 - 49.8 lbs	46.3
FORCE @ 1.0 in	50 - 63 lbs	61
FORCE @ 1.3 in	73 - 88 lbs	85

TEST MEETS SPECIFICATIONS

TECHNICIAN 

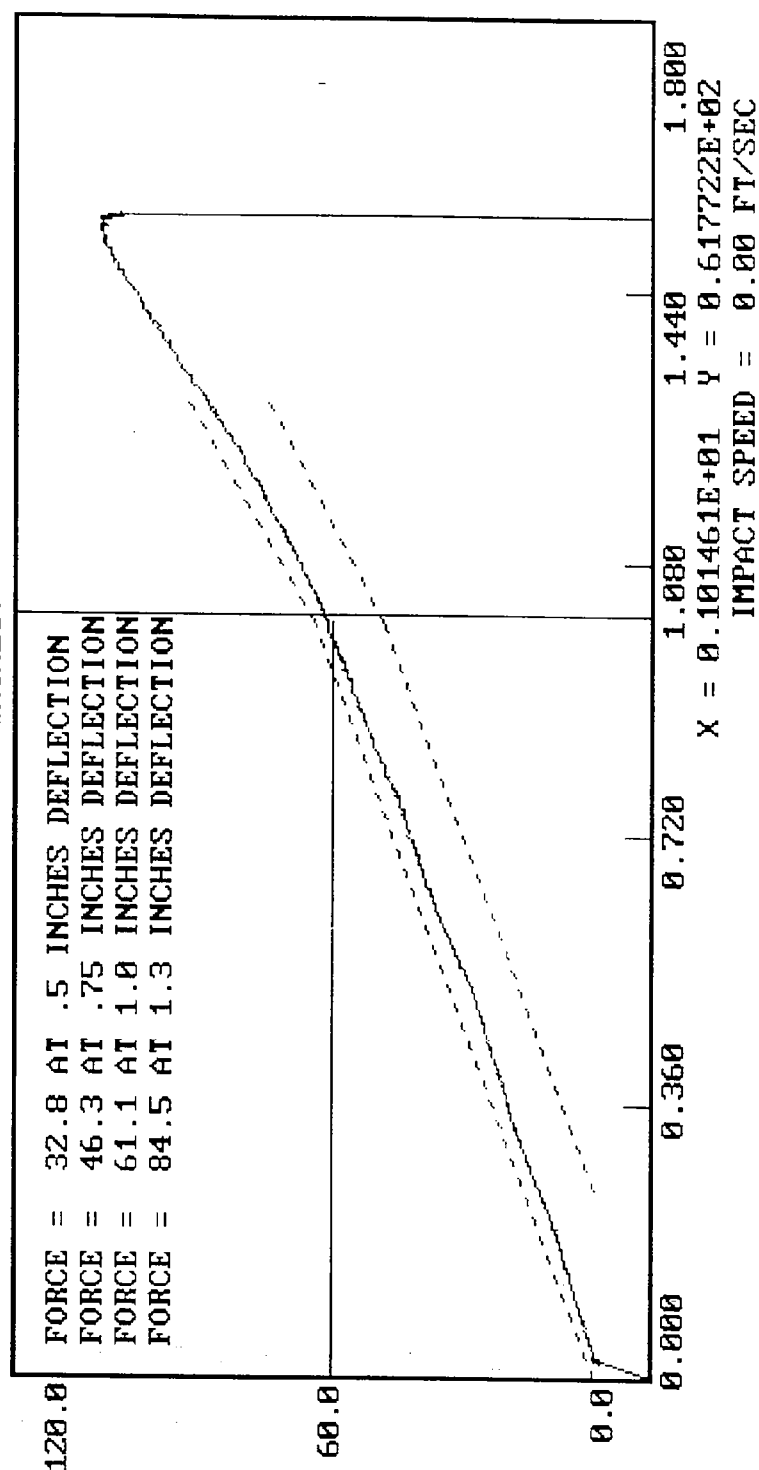
APPROVED BY David Winkelbauer

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 271

10-10-1995 10:23

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

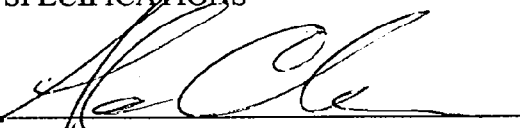
DATE: October 10, 1995

DUMMY NUMBER: 271

TEST NUMBER: D951395

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	45%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	27
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	53
RETURN ANGLE	12° maximum	4°

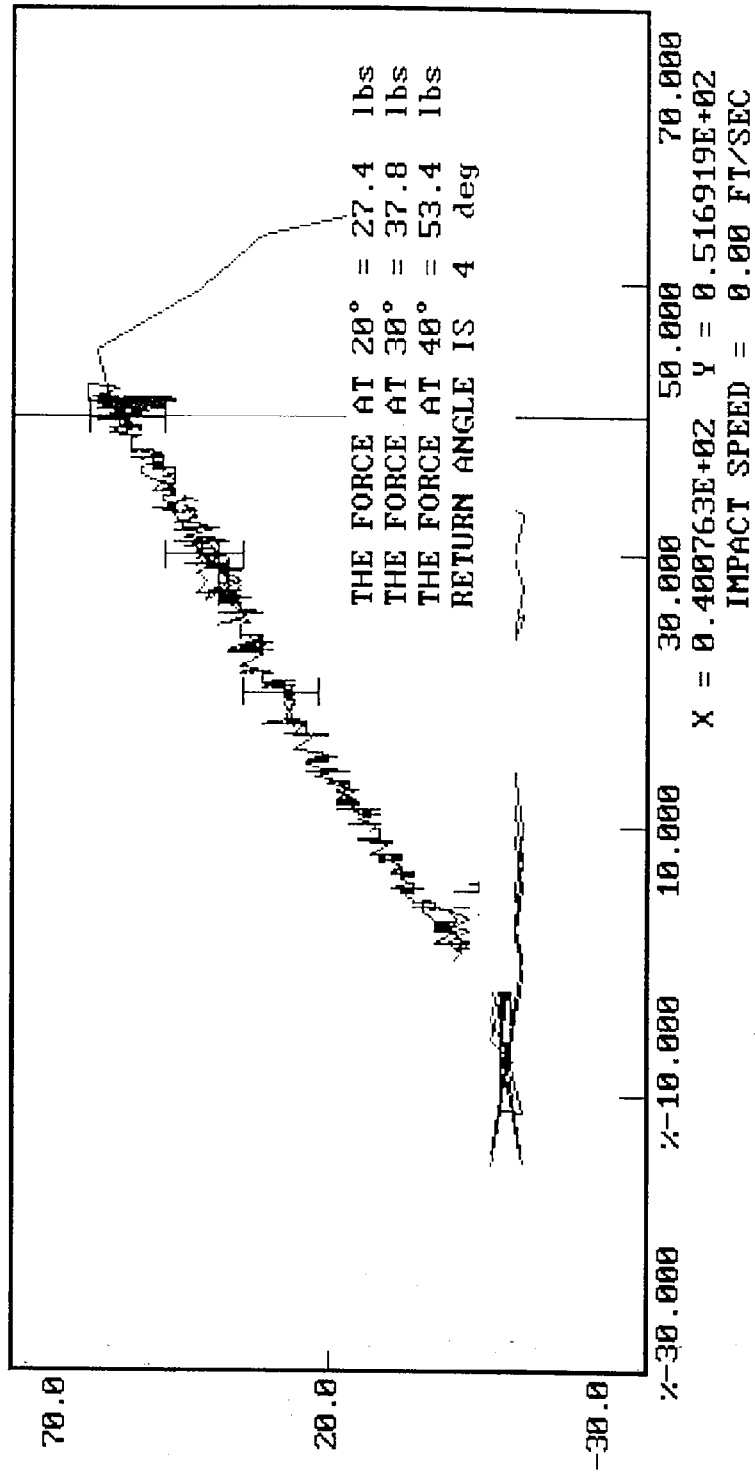
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY David Winkelbauer

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

18-10-1995 09:45



PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Passenger Serial Number: 272

Pre-Test Calibration

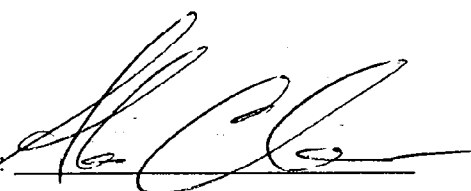
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: October 13, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
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"	9.4
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.7
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: 

APPROVED BY: David Winkelbauer

MGA RESEARCH CORPORATION
THORACIC SHOCK ABSORBER TEST
SIDE IMPACT DUMMY (SID)

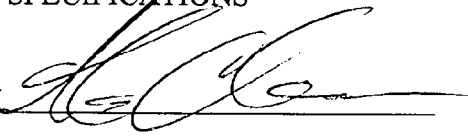
DATE: October 11, 1995

DUMMY NUMBER: 272

TEST NUMBER: D95140ABC

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66° - 78° F	70°
RELATIVE HUMIDITY		10 - 70%	45%
VELOCITY 10 ft/s	FORCE (lb.)	188 - 253	219
	DISPLACEMENT (in.)	1.18 - 1.38	1.28
VELOCITY 14 ft/s	FORCE (lb.)	389 - 472	397
	DISPLACEMENT (in.)	1.26 - 1.47	1.33
VELOCITY 20 ft/s	FORCE (lb.)	841 - 1000	898
	DISPLACEMENT (in.)	1.30 - 1.57	1.37

TEST MEETS SPECIFICATIONS

TECHNICIAN 

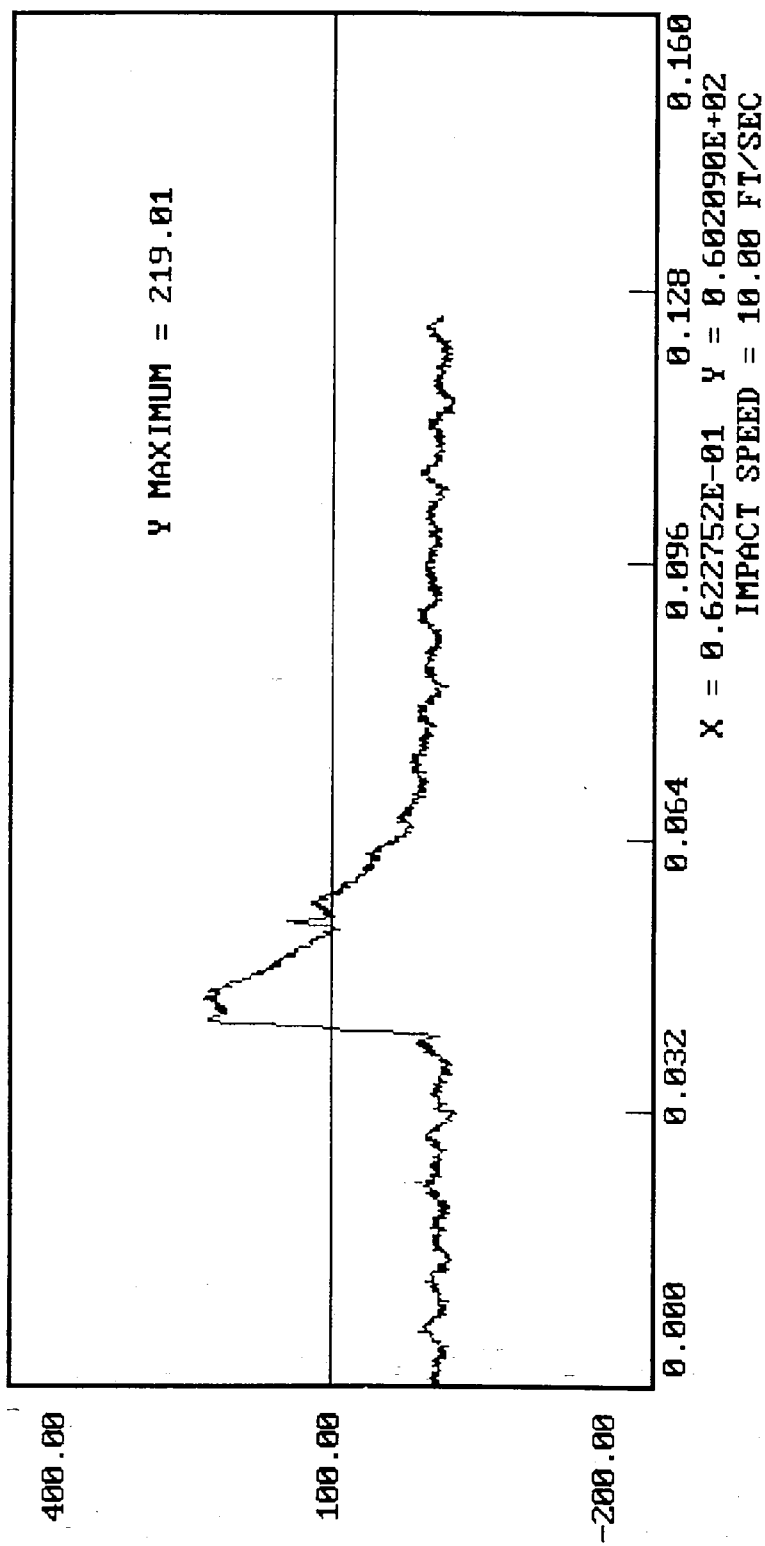
APPROVED BY David Winkelbauer

10-11-1995 14:52

SID DAMPER TEST

DUMMY # 272

FORCE (LBS) VS. TIME ((SECONDS))

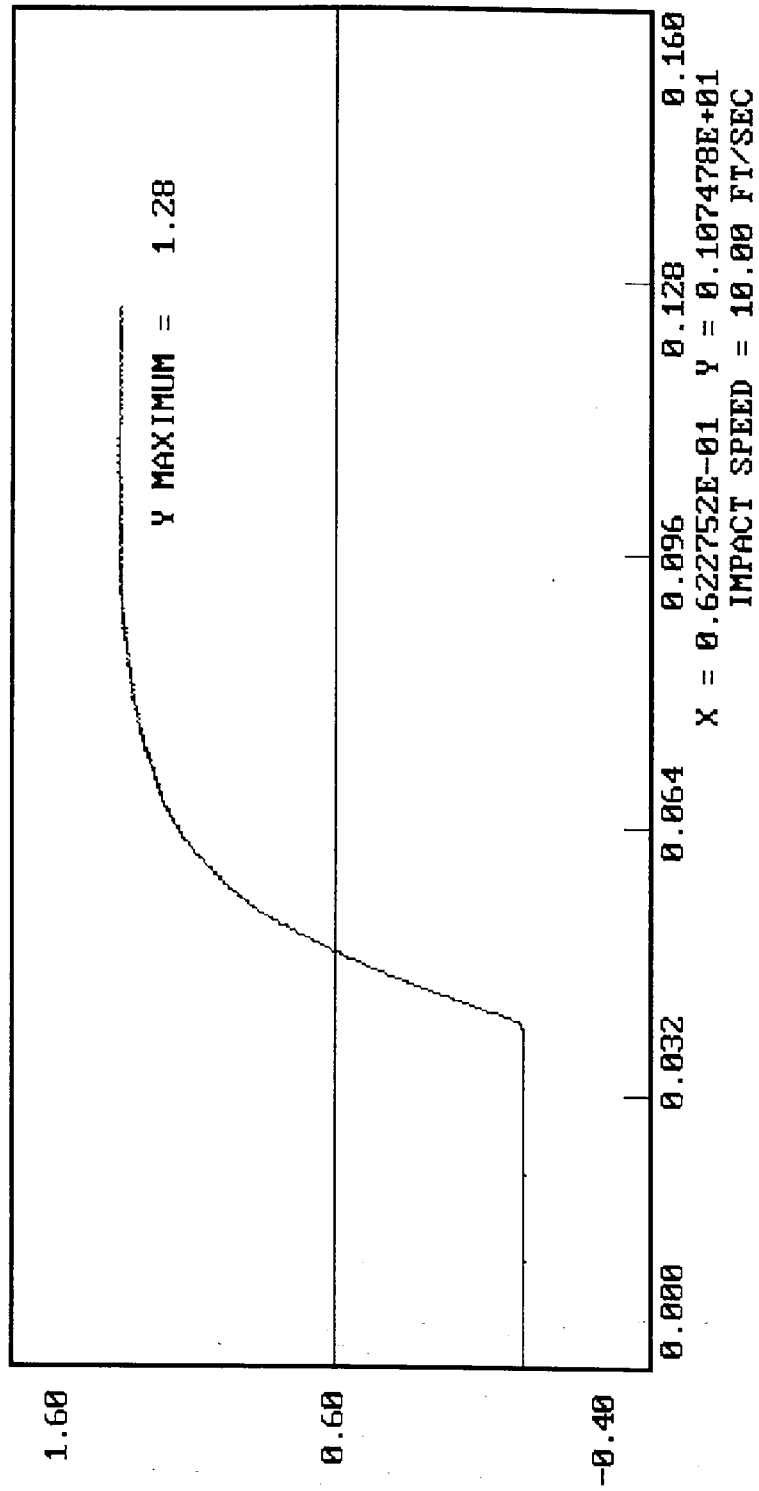


10-11-1995 14:52

SID DAMPER TEST

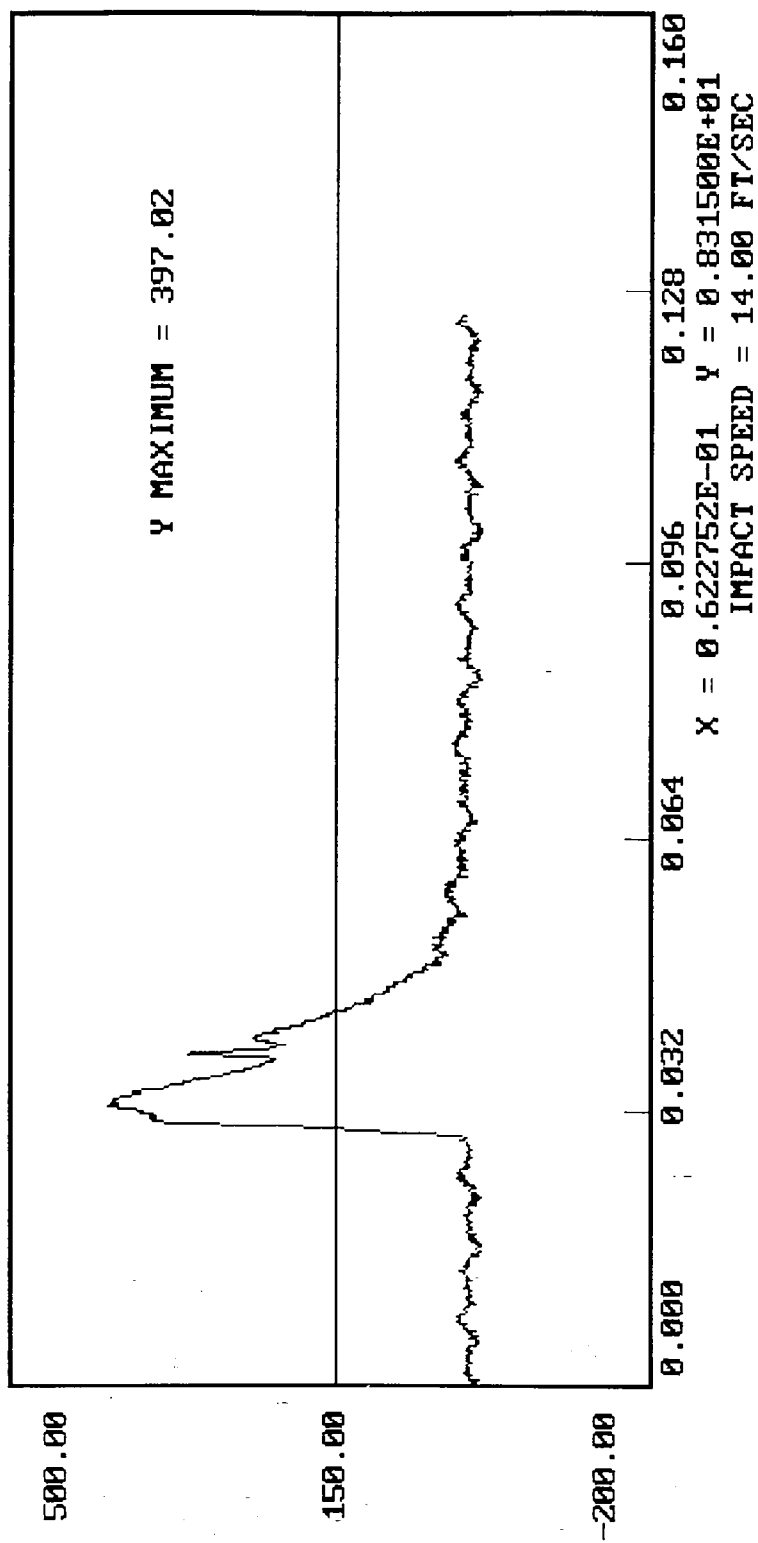
DUMMY # 272

DISPLACEMENT (INCHES) VS. TIME ((SECONDS))



10-11-1995 14:45

SID DAMPER TEST
DUMMY # 272
FORCE (LBS) VS. TIME ((SECONDS))

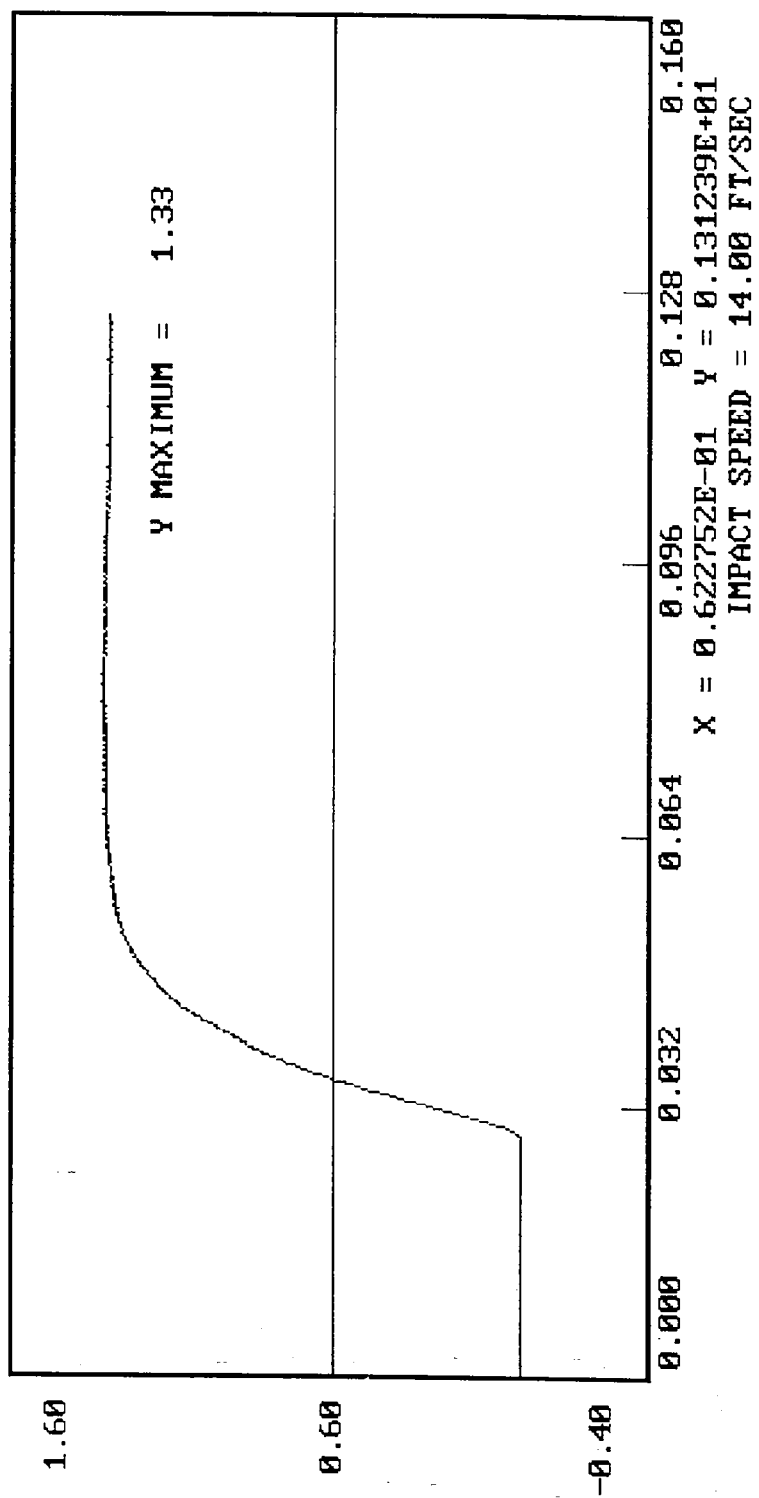


SID DAMPER TEST

DUMMY # 272

DISPLACEMENT (INCHES) VS. TIME ((SECONDS))

10-11-1995 14:45

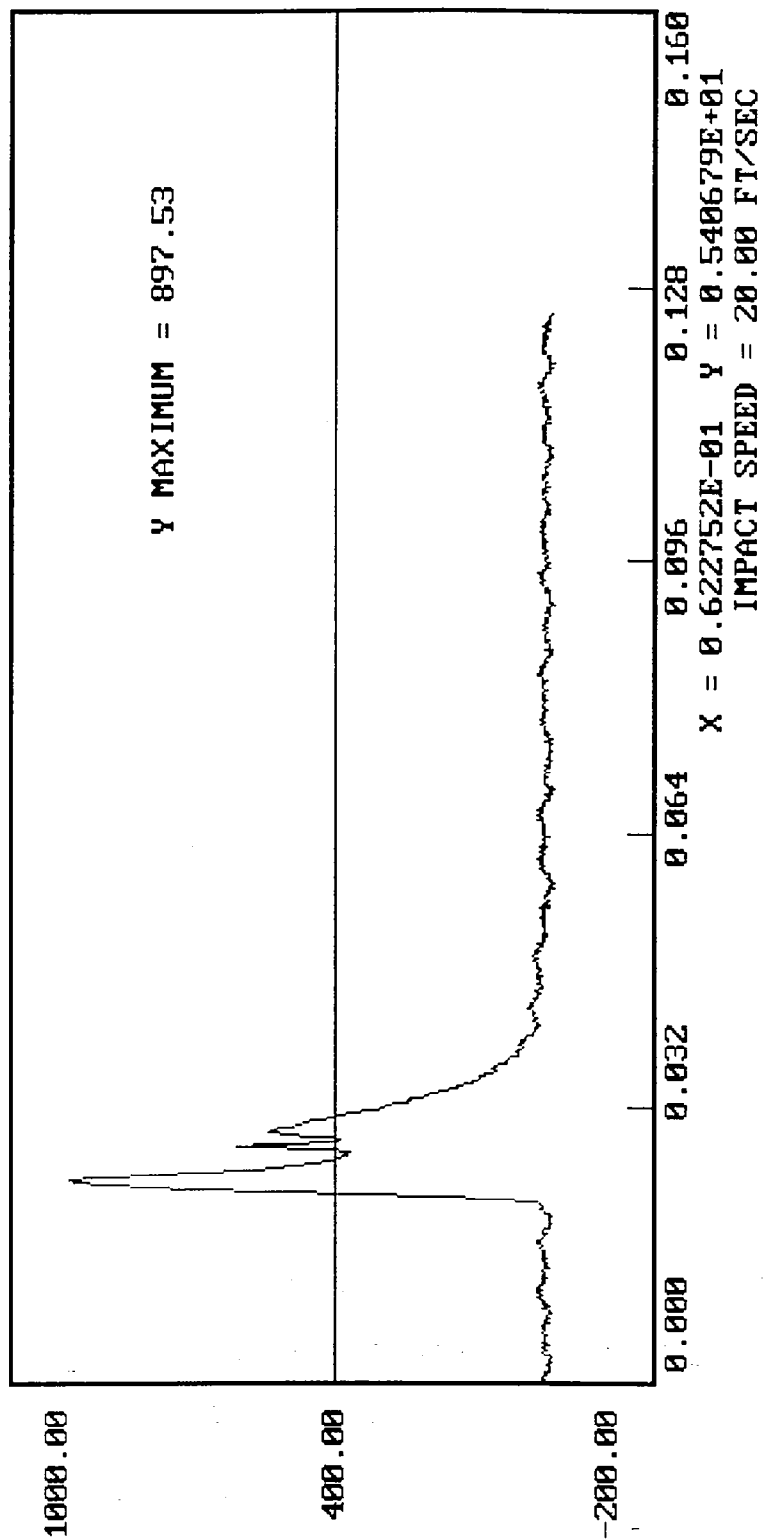


10-11-1995 14:31

SID DAMPER TEST

DUMMY # 272

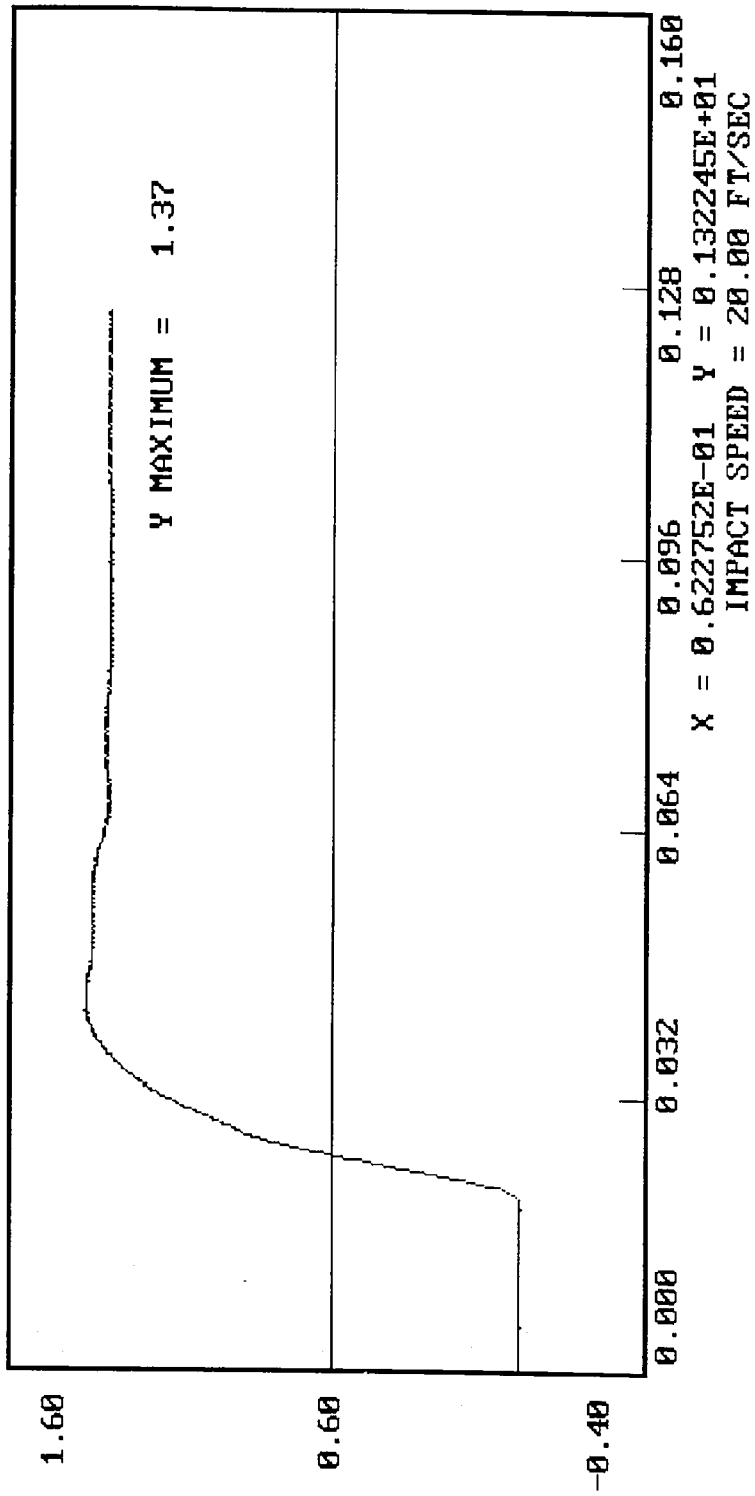
FORCE (LBS) VS. TIME ((SECONDS))



SID DAMPER TEST

DUMMY # 272

DISPLACEMENT (INCHES) VS. TIME (SECONDS)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 13, 1995

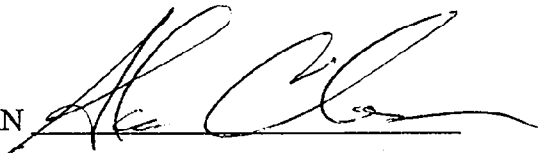
DUMMY NUMBER: 272

TEST NUMBER: D951402

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	14.2
UPPER RIB	37 - 46 g's	44
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	21

TEST MEETS SPECIFICATIONS

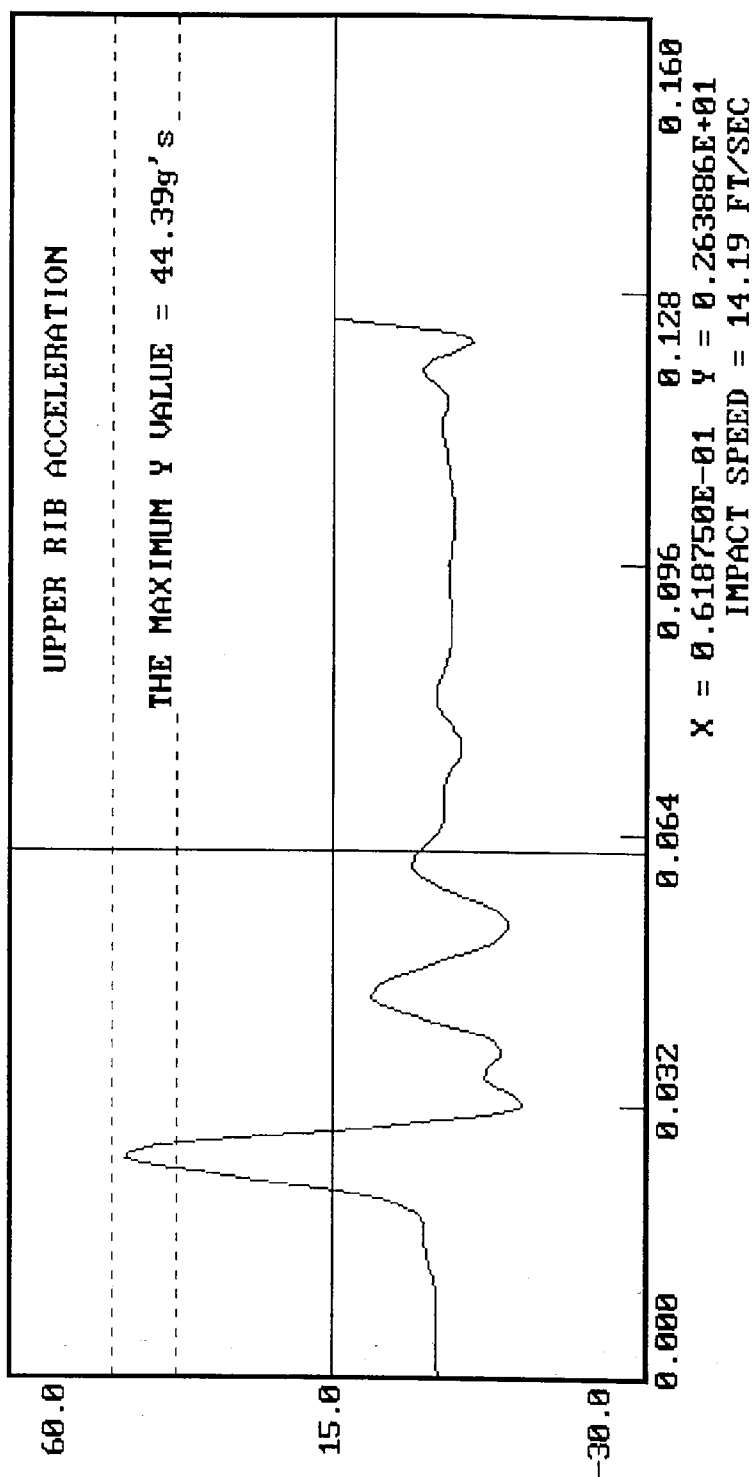
TECHNICIAN



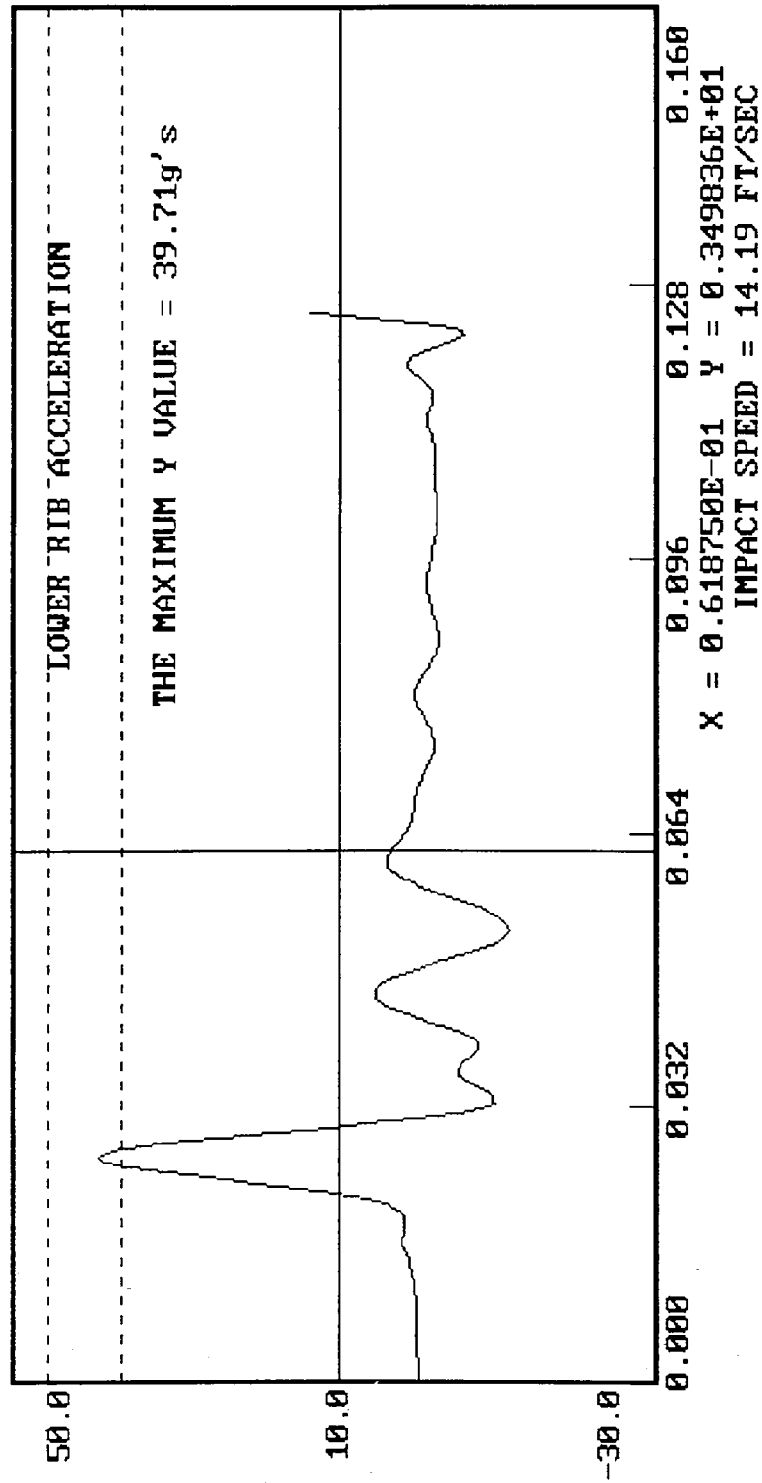
APPROVED BY

David Winkelbauer

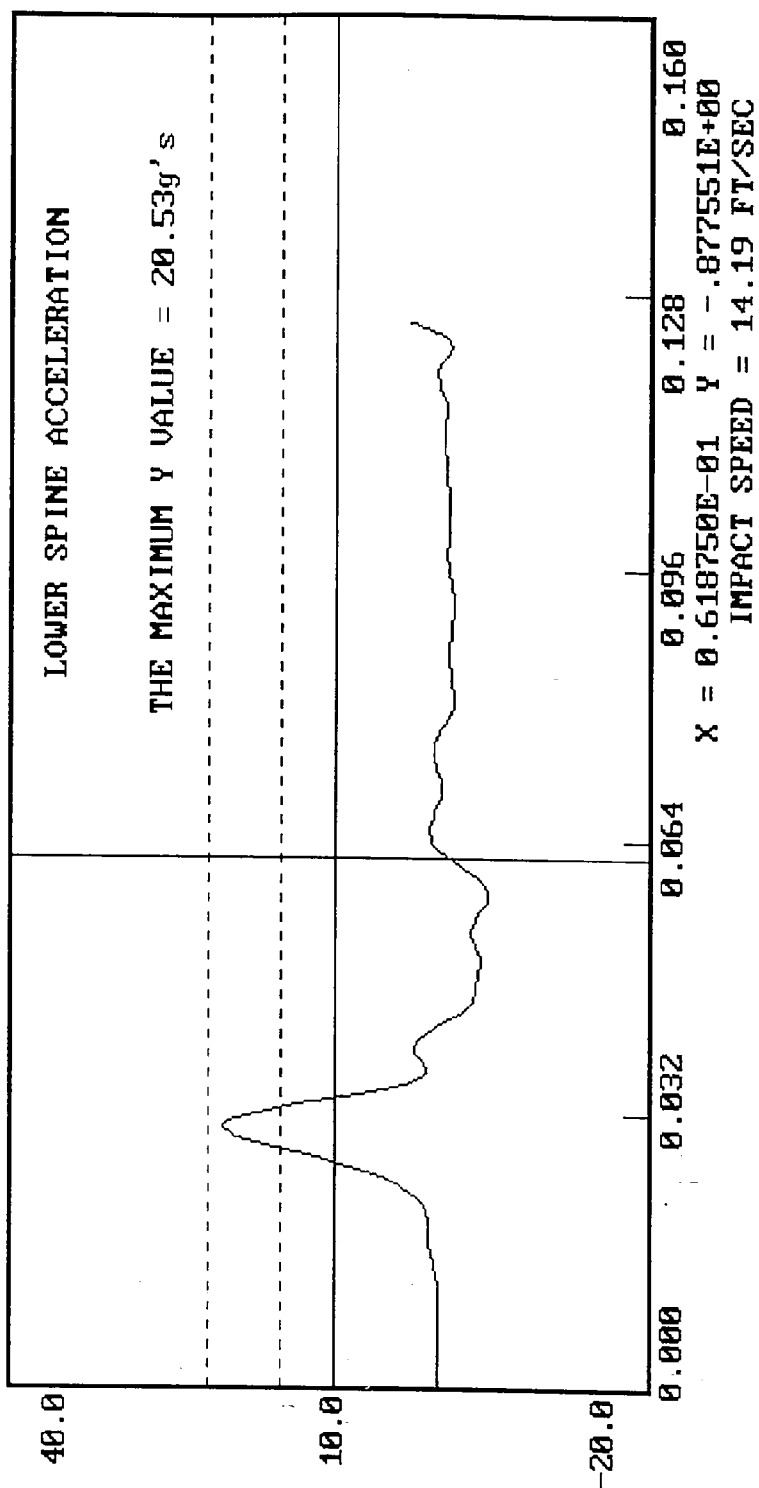
DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 10-13-1995 11:54
 ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
10-13-1995 11:54
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 10-13-1995 11:54
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 13, 1995

DUMMY NUMBER: 272

TEST NUMBER: D951403

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	14.1
PELVIS ACCELERATION	40 - 60 g's	55

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

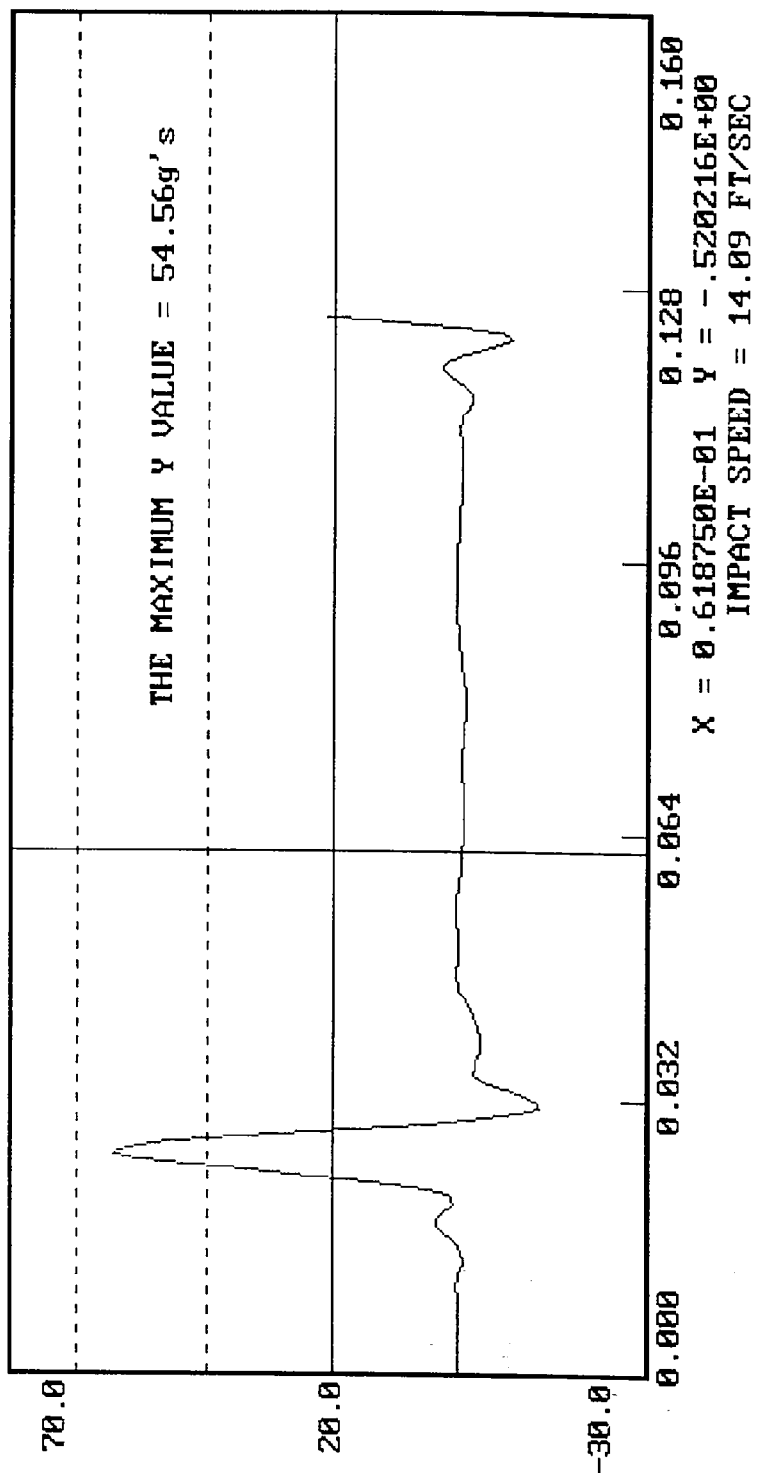
David Winkelbauer

10-13-1995 12:02

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 272

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



MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: October 10, 1995

DUMMY NUMBER: 272

TEST NUMBER: D951404

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	45%
FORCE @ 0.5 in	23.3 - 36.5 lbs	33.4
FORCE @ 0.75 in	36.7 - 49.8 lbs	46.4
FORCE @ 1.0 in	50 - 63 lbs	60
FORCE @ 1.3 in	73 - 88 lbs	83

TEST MEETS SPECIFICATIONS

TECHNICIAN

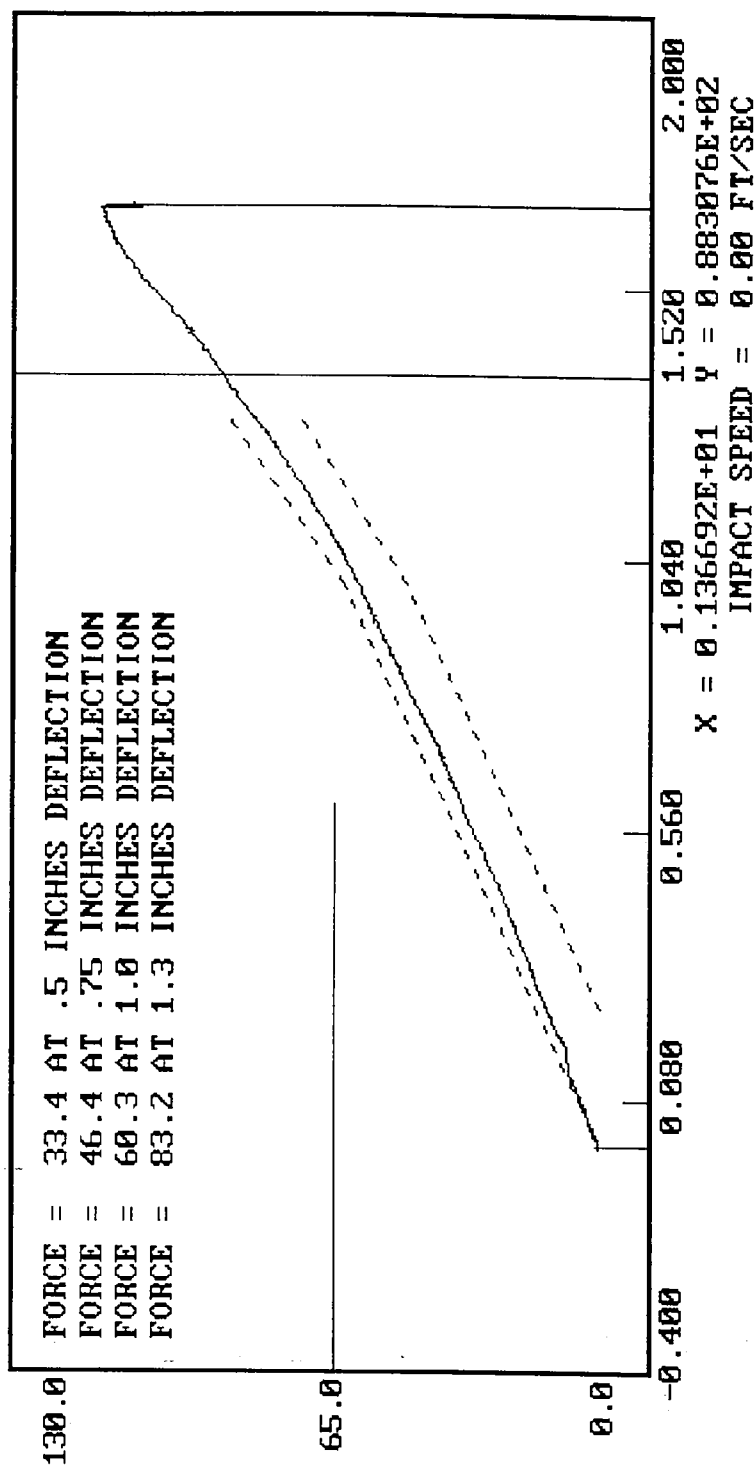


APPROVED BY

David Winkelbauer

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 272
 10-10-1995 10:34

ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: October 10, 1995

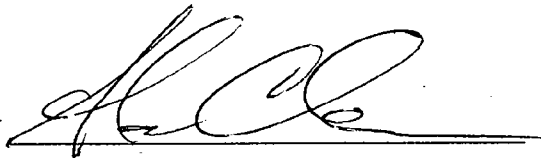
DUMMY NUMBER: 272

TEST NUMBER: D951405

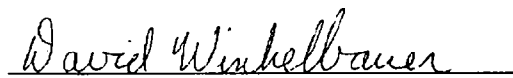
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	45%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	32
FORCE @ 30°	34 - 46 lbs	37
FORCE @ 40°	46 - 58 lbs	49
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

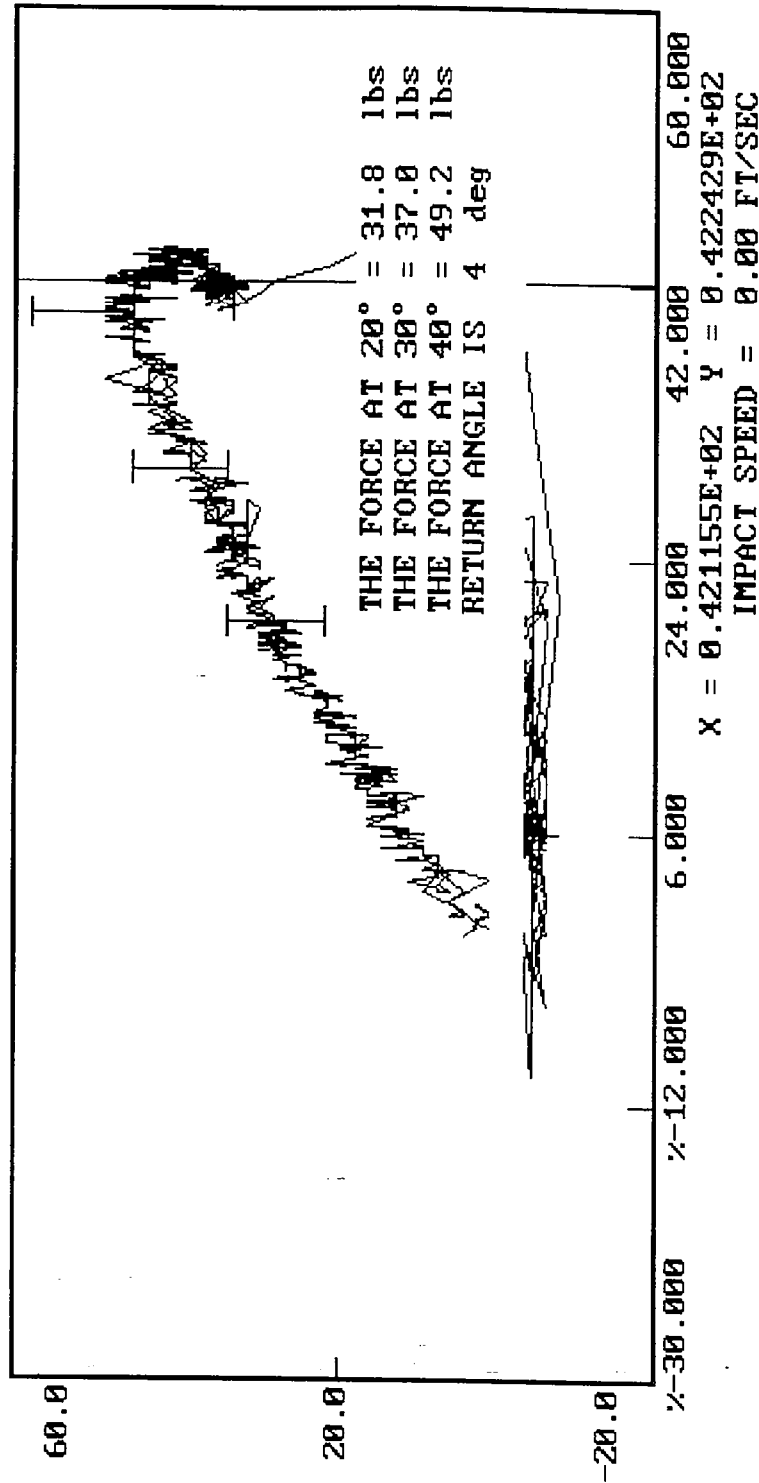


DUMMY CALIBRATION - LUMBAR FLEXION

DUMMY # 272

FORCE () VS. TORSO ROTATION (DEGREES)

10-10-1995 10:30



POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

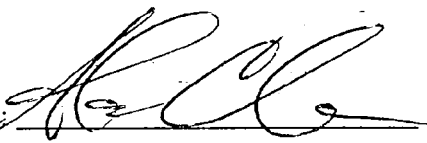
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: October 17, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75" - 20.50"	20.40
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"	15.0

MEASUREMENTS BY: 

APPROVED BY: David Winkelbauer

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 17, 1995

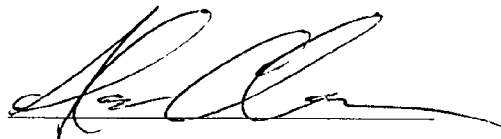
DUMMY NUMBER: 271

TEST NUMBER: D951442

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	42
LOWER SPINE	15 - 22 g's	21

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

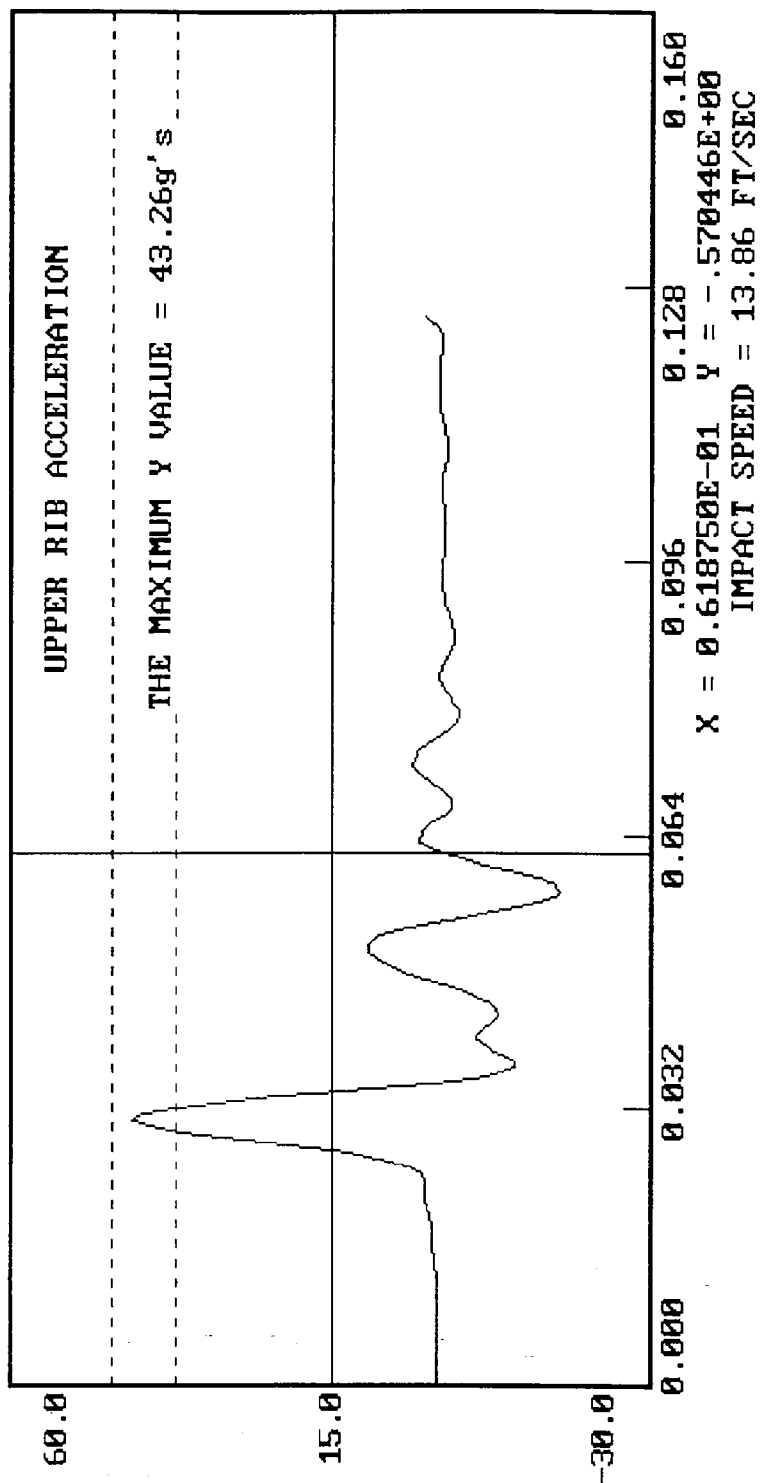
David Winkelbauer

10-17-1995 09:06

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

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

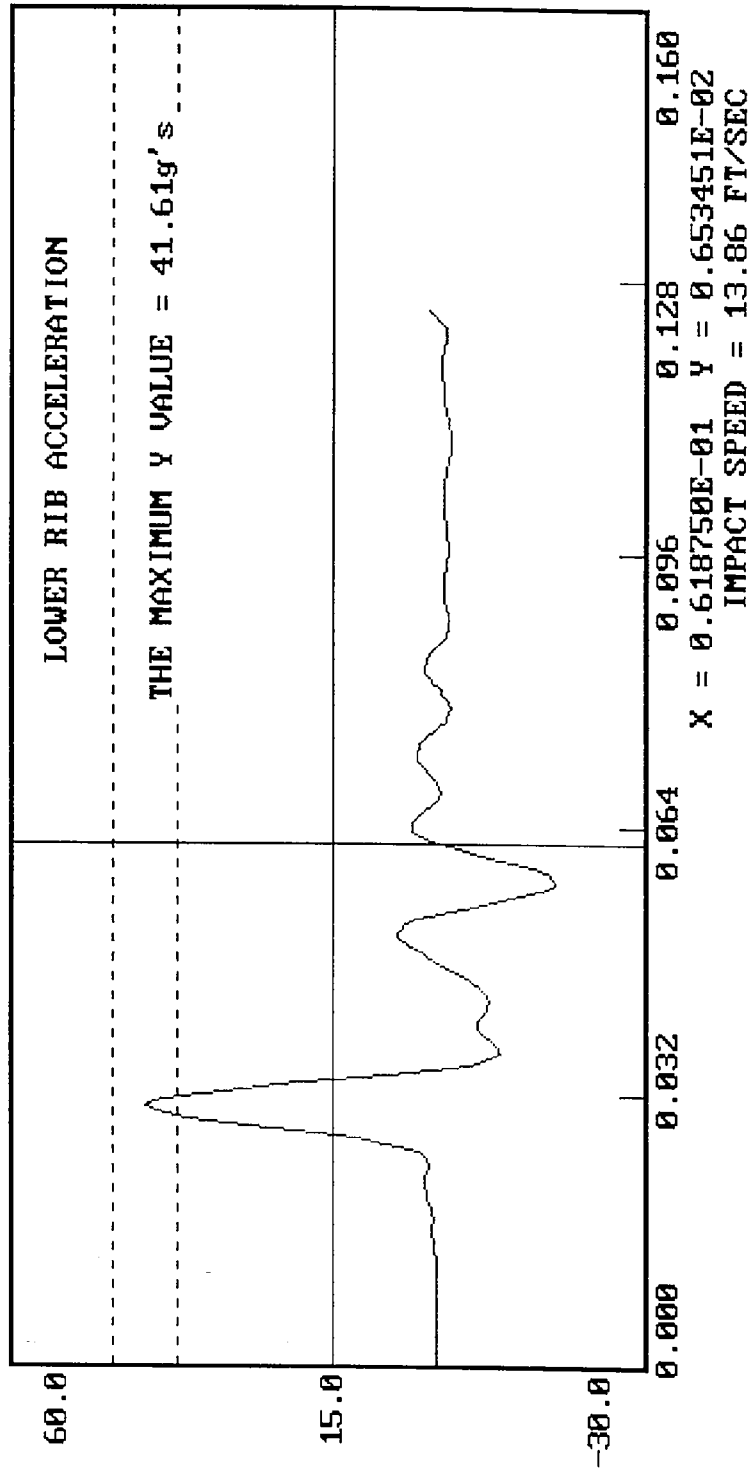


10-17-1995 09:06

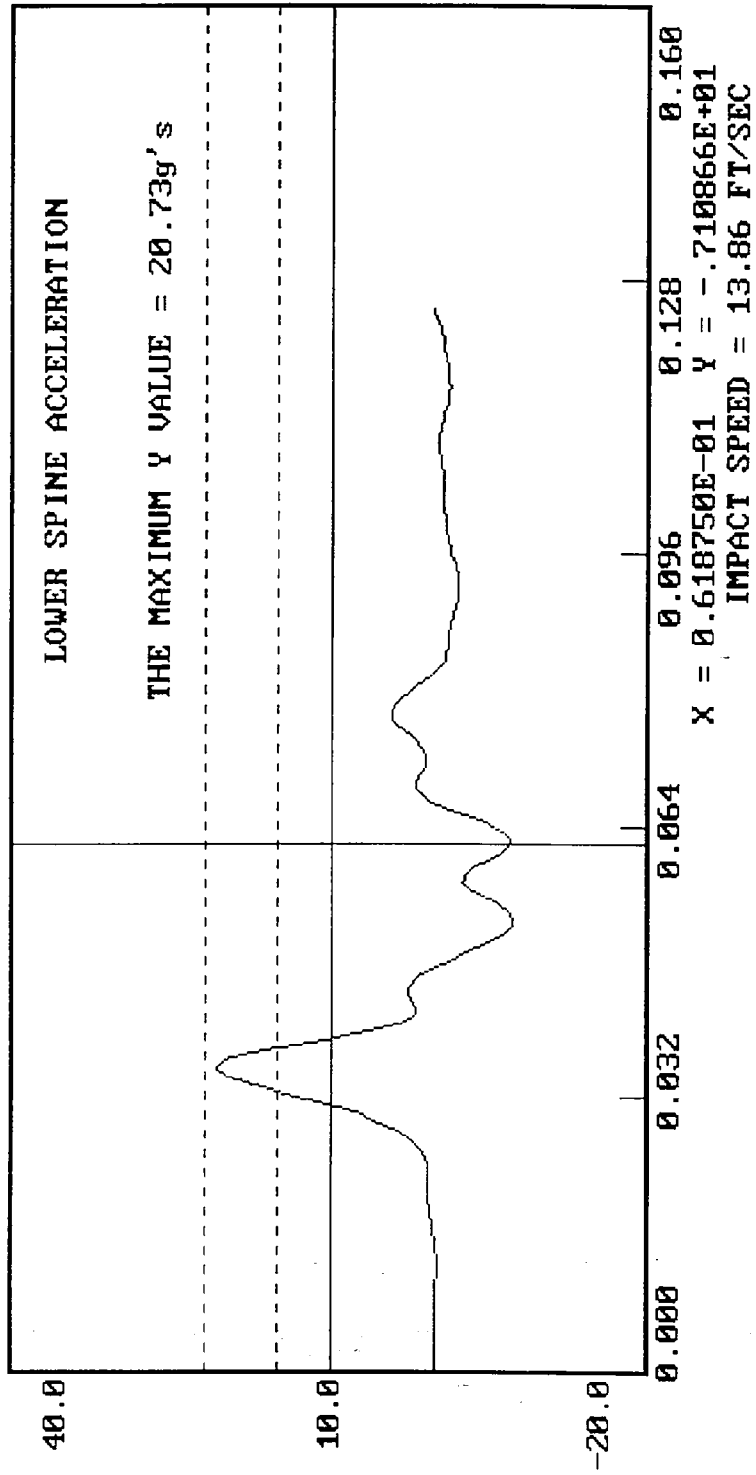
DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 271

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



DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 271
10-17-1995 09:06
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 17, 1995

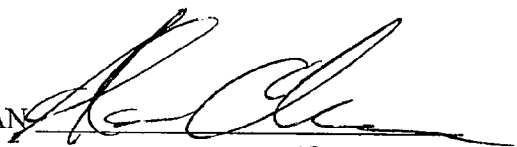
DUMMY NUMBER: 271

TEST NUMBER: D951443

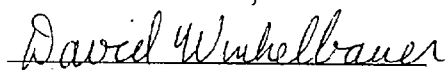
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	55

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

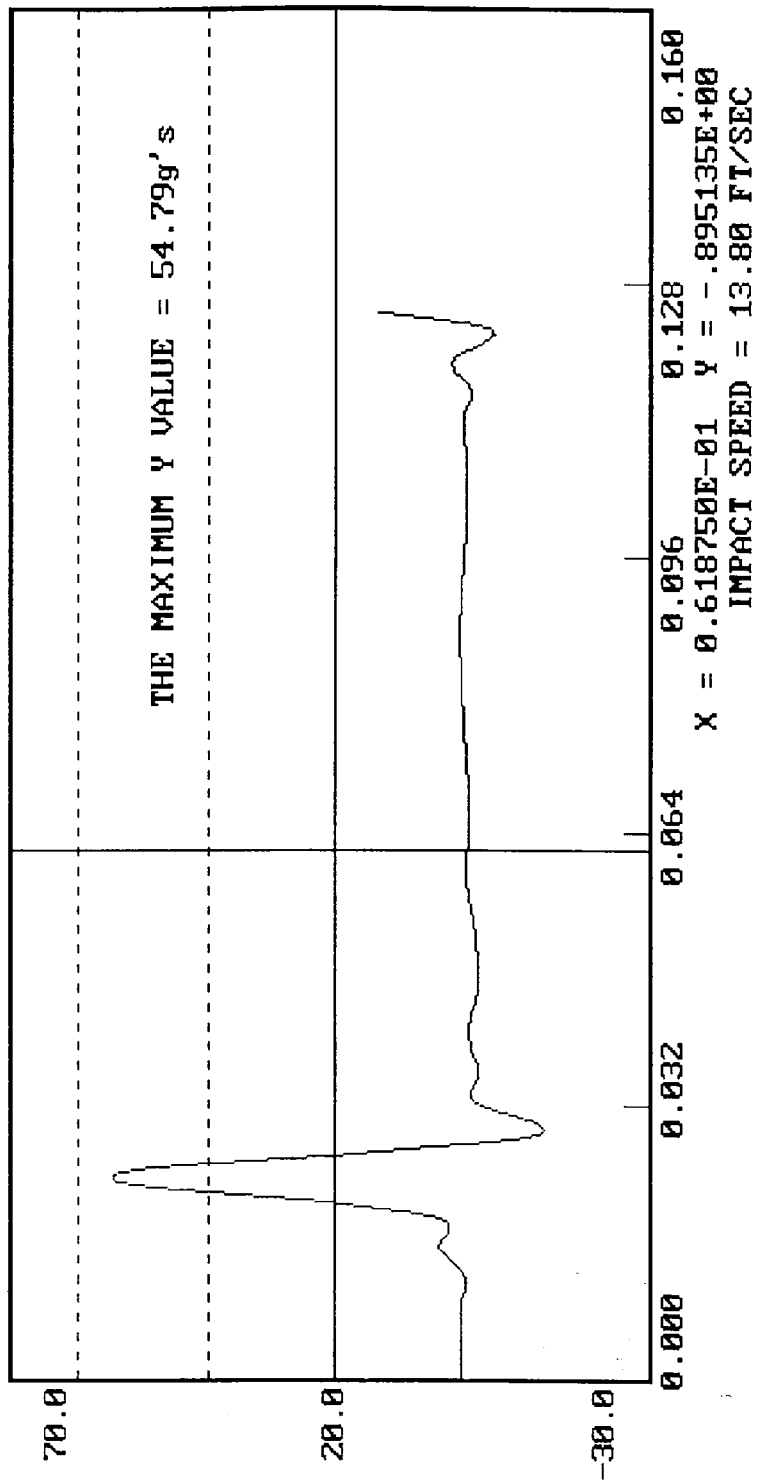


10-17-1995 09:30

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: October 17, 1995

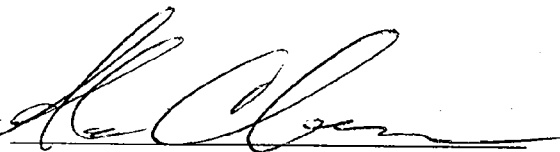
DUMMY NUMBER: 271

TEST NUMBER: D951444

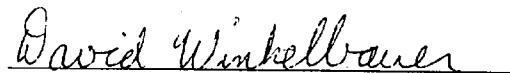
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.1
FORCE @ 0.75 in	36.7 - 49.8 lbs	48.3
FORCE @ 1.0 in	50 - 63 lbs	63
FORCE @ 1.3 in	73 - 88 lbs	84

TEST MEETS SPECIFICATIONS

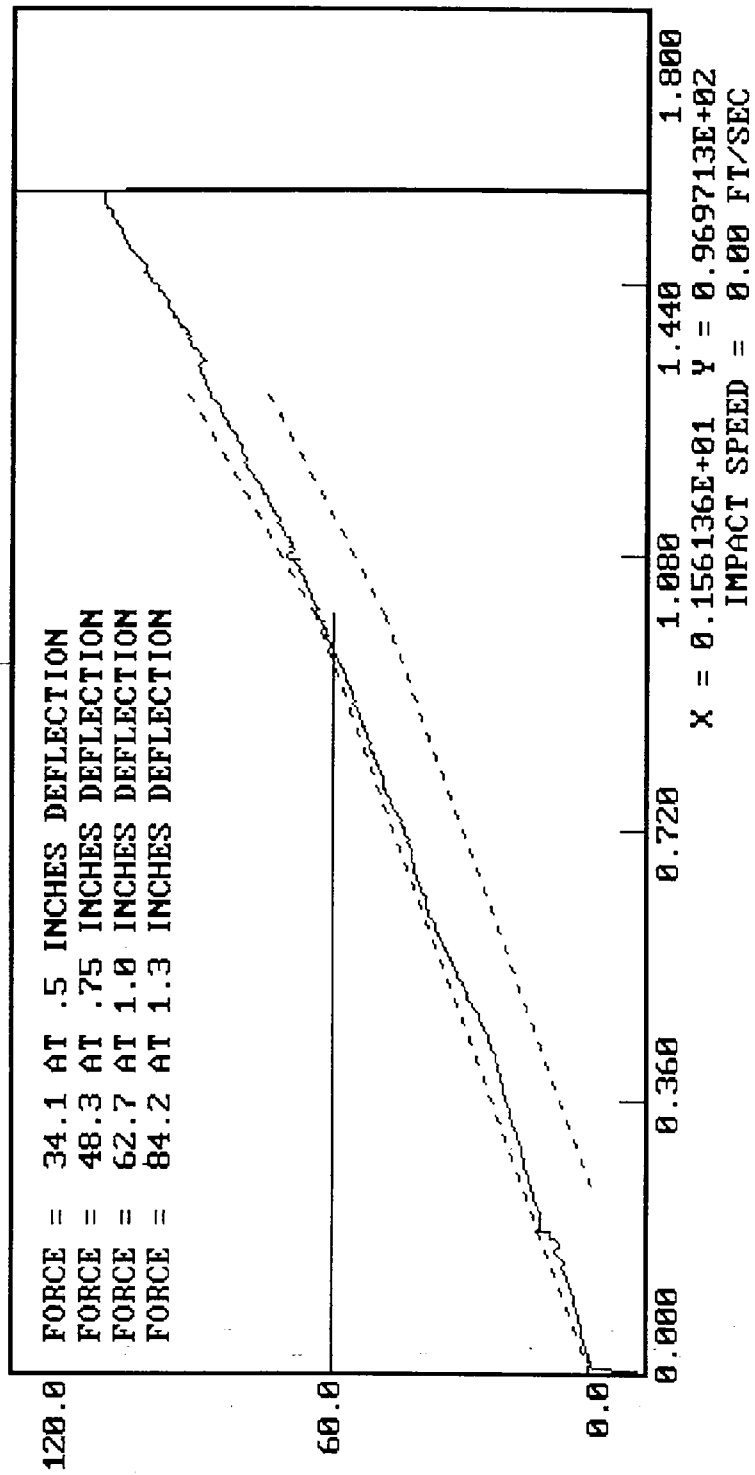
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 271
 10-17-1995 13:02
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

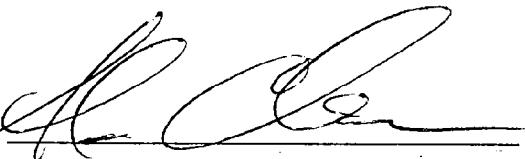
DATE: October 17, 1995

DUMMY NUMBER: 271

TEST NUMBER: D951445

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	42%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	24
FORCE @ 30°	34 - 46 lbs	39
FORCE @ 40°	46 - 58 lbs	53
RETURN ANGLE	12° maximum	4°

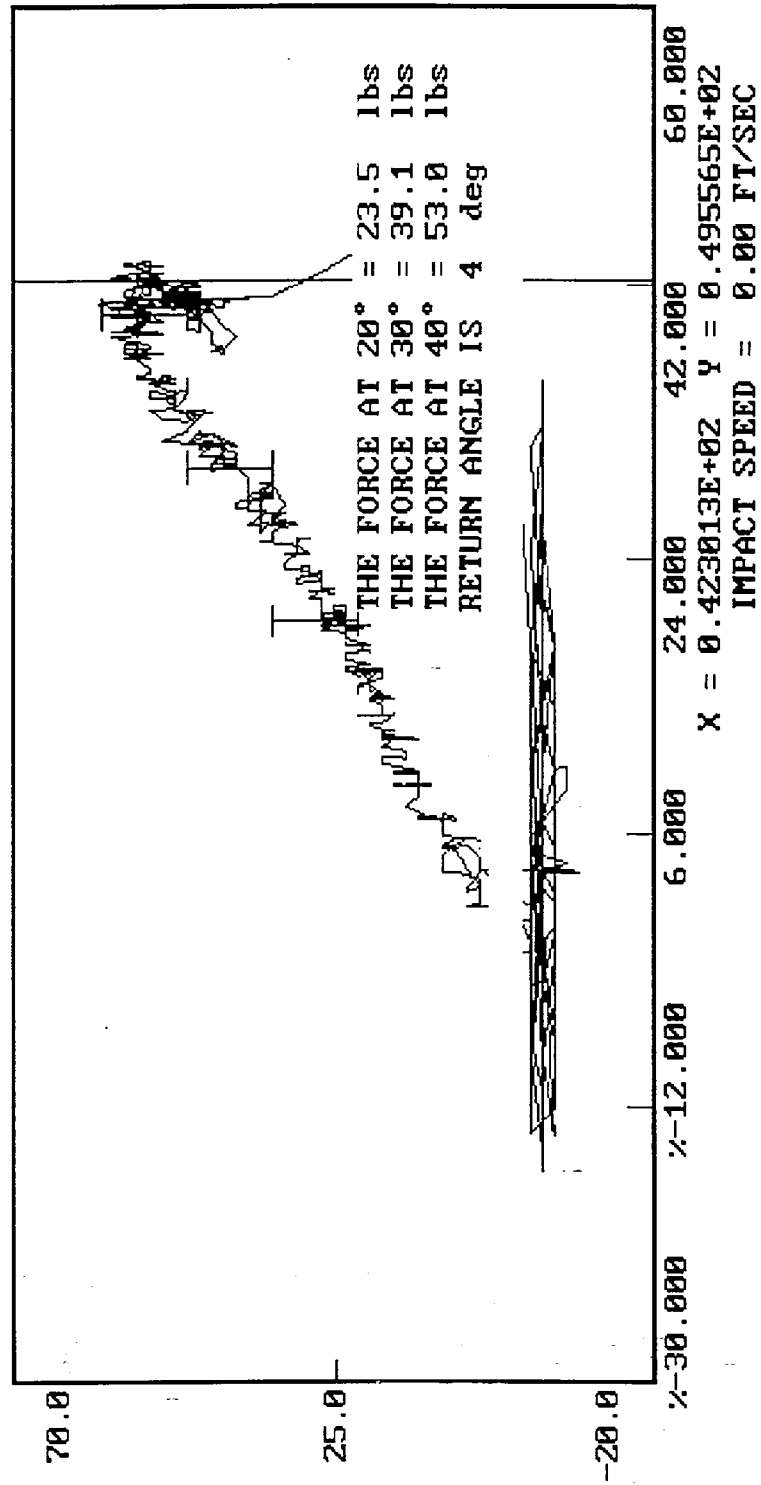
TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY David Winkelbauer

10-17-1995 10:08

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





POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

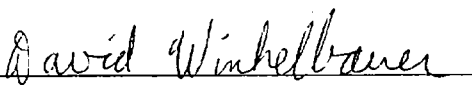
DATE OF VERIFICATION: October 19, 1995

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.20
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"	20.7
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 17, 1995

DUMMY NUMBER: 272

TEST NUMBER: D951452

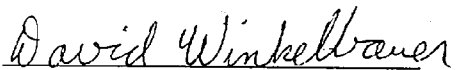
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	42
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

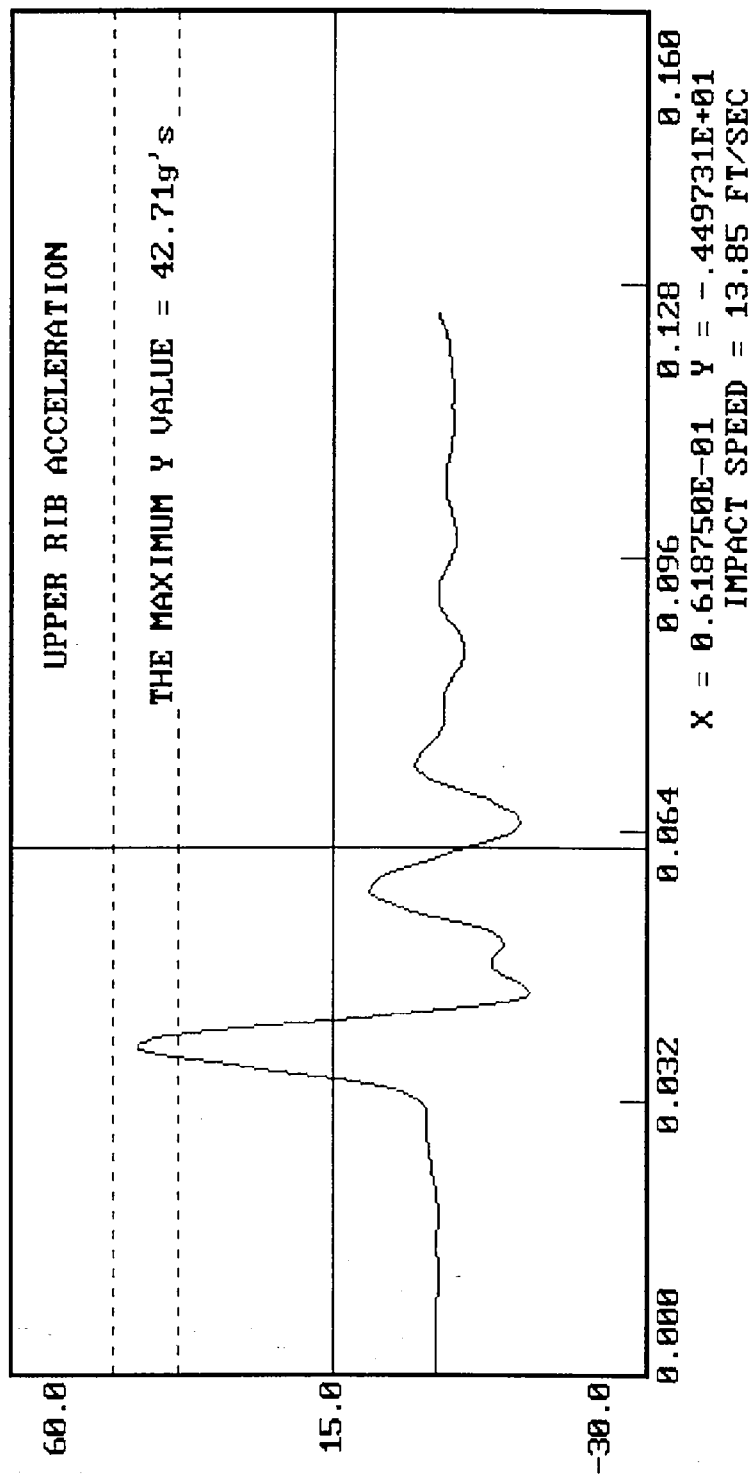
TECHNICIAN



APPROVED BY

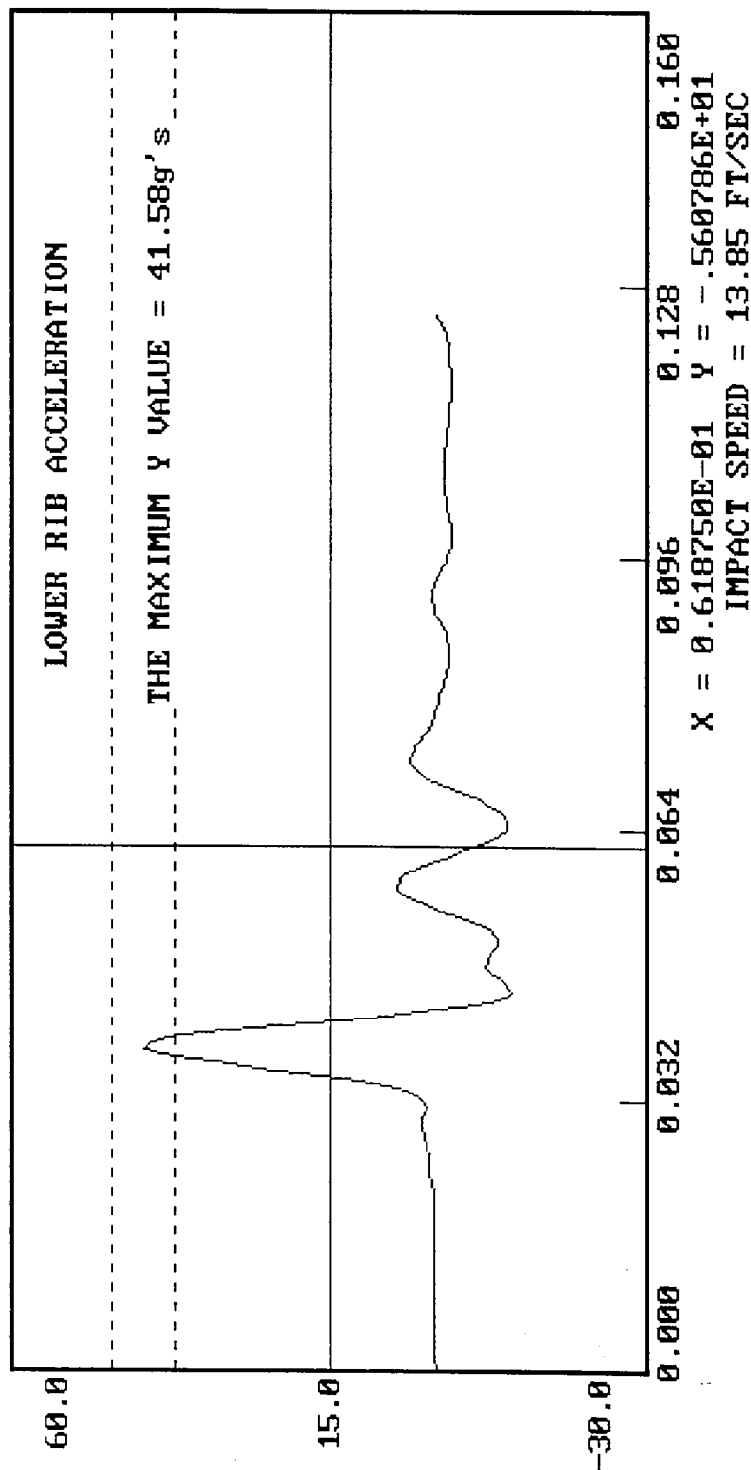


DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 10-17-1995 10:00
 ACCELERATION (G'S) VS. TIME ((SECONDS))

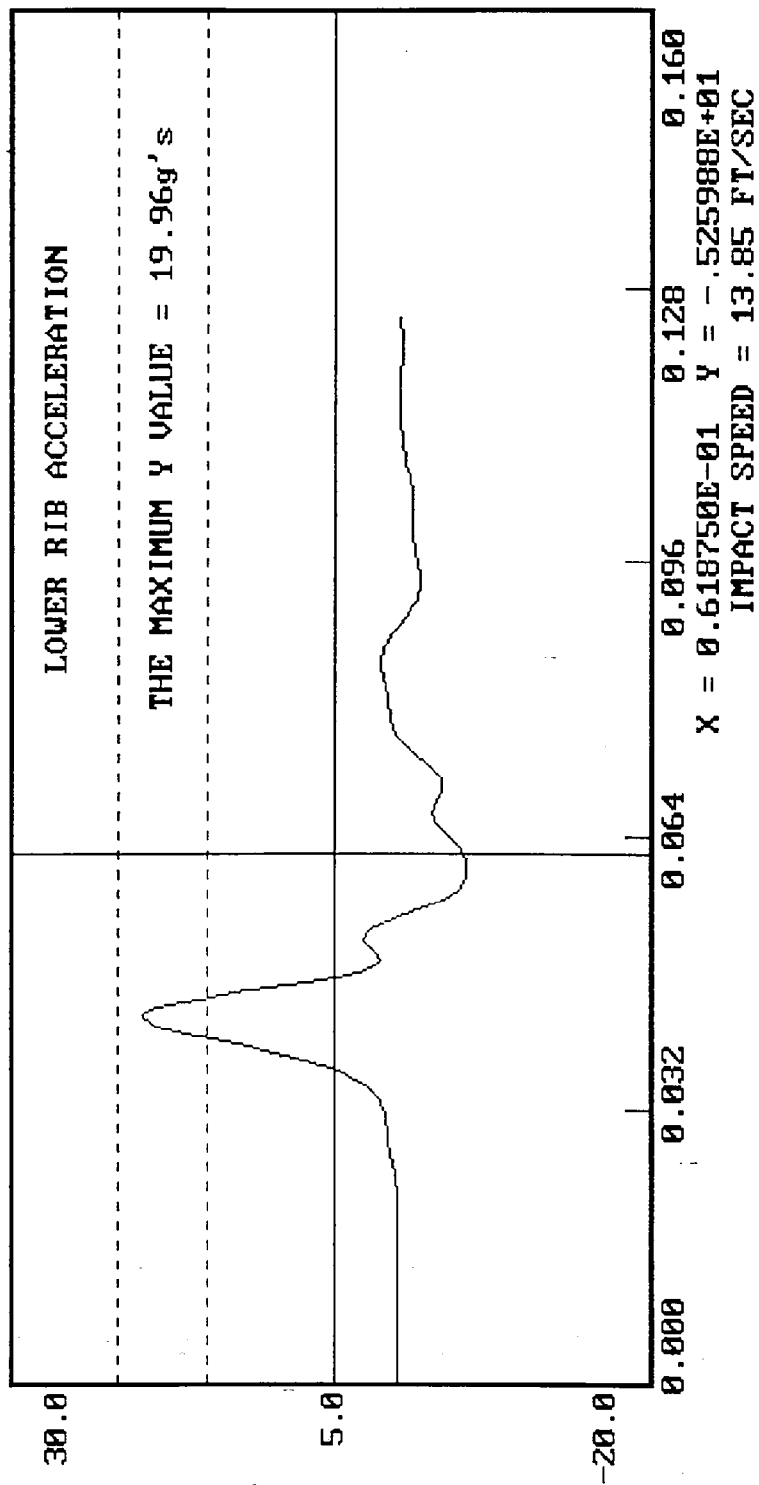


DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 ACCELERATION (G'S) VS. TIME ((SECONDS))

10-17-1995 10:00



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 272
 10-17-1995 10:00
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 19, 1995

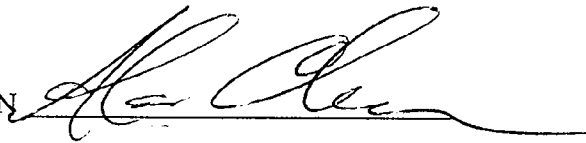
DUMMY NUMBER: 272

TEST NUMBER: D951453

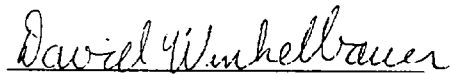
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	47

TEST MEETS SPECIFICATIONS

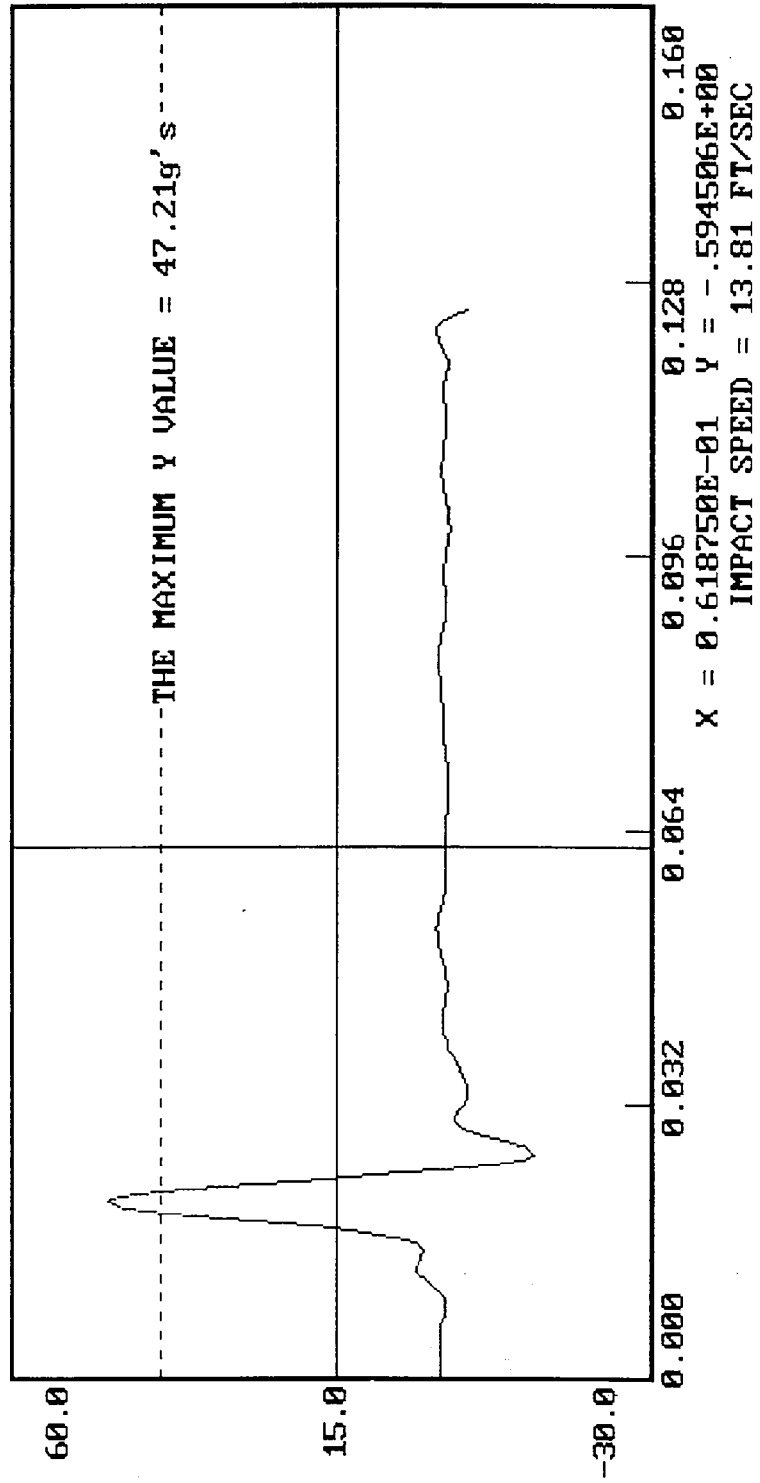
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - PELVIS IMPACT
DUMMY # 272
10-19-1995 14:30
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION
ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: October 17, 1995

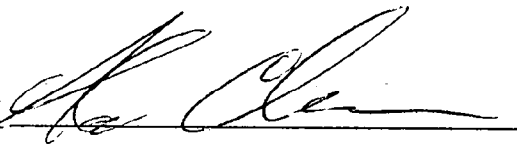
DUMMY NUMBER: 272

TEST NUMBER: D951454

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0.5 in	23.3 - 36.5 lbs	36.5
FORCE @ 0.75 in	36.7 - 49.8 lbs	49.2
FORCE @ 1.0 in	50 - 63 lbs	63
FORCE @ 1.3 in	73 - 88 lbs	85

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

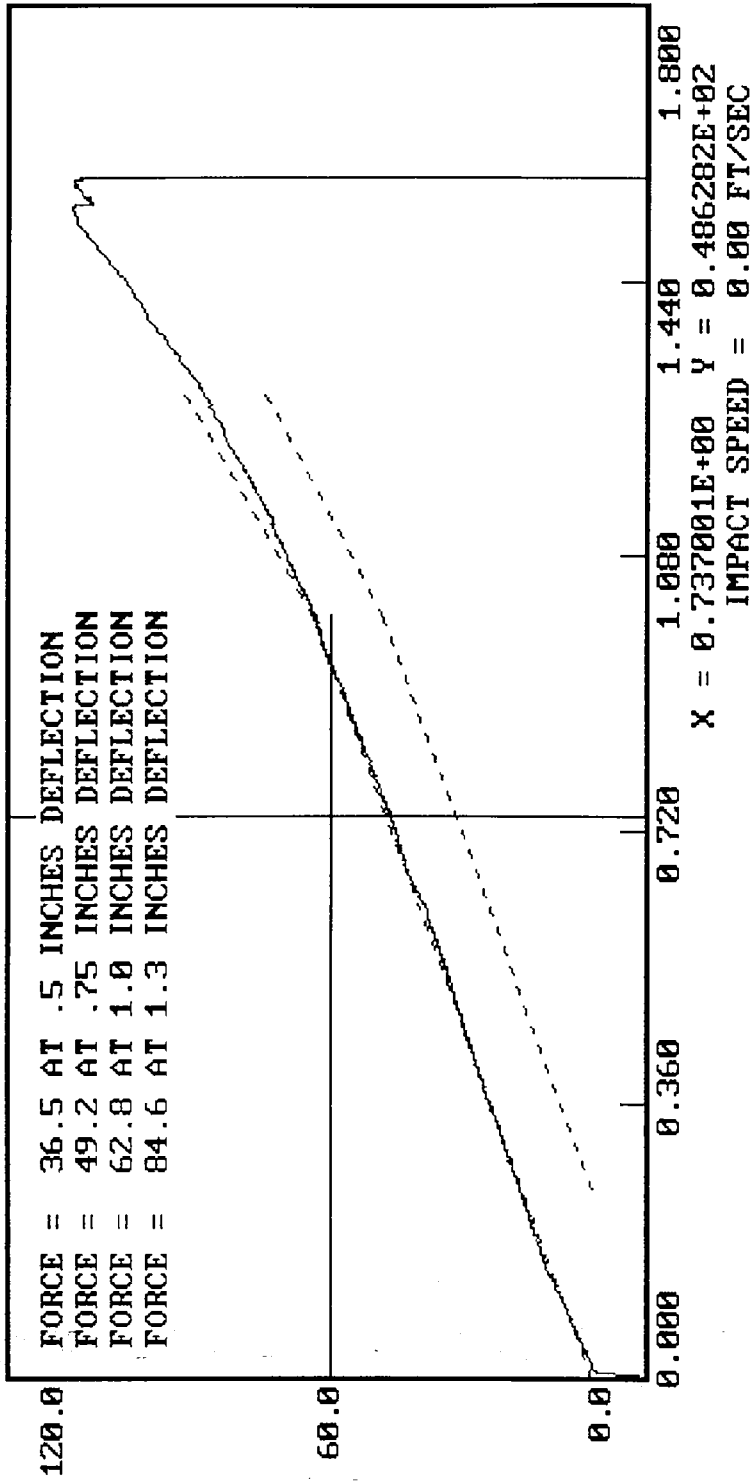


10-17-1995 13:12

DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 272

ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: October 19, 1995

DUMMY NUMBER: 272

TEST NUMBER: D951455

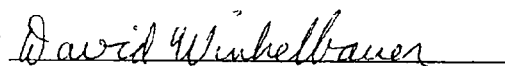
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	40%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	24
FORCE @ 30°	34 - 46 lbs	43
FORCE @ 40°	46 - 58 lbs	46
RETURN ANGLE	12° maximum	6°

TEST MEETS SPECIFICATIONS

TECHNICIAN

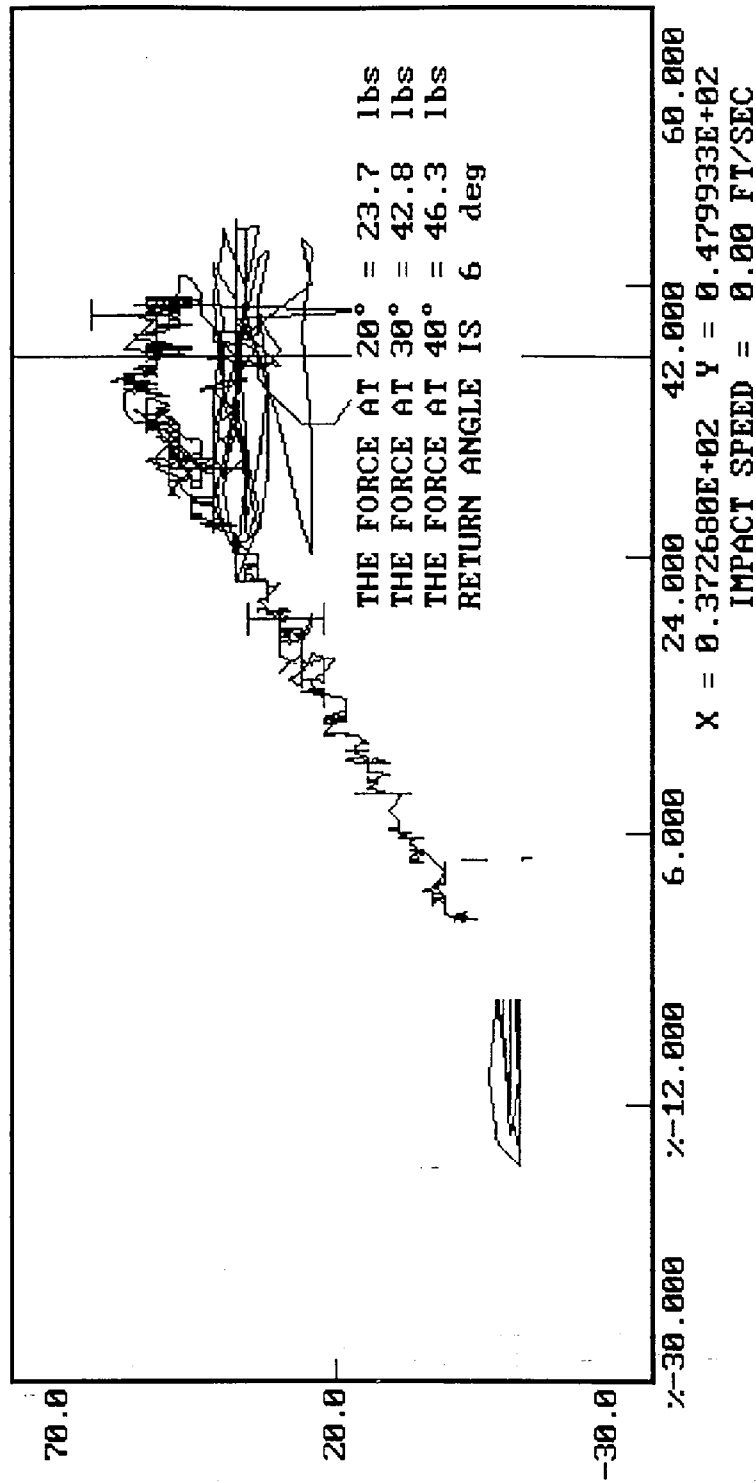


APPROVED BY



10-19-1995 14:51

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



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 271

Inspected By: Al Chalmers

Date: October 19, 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: 272

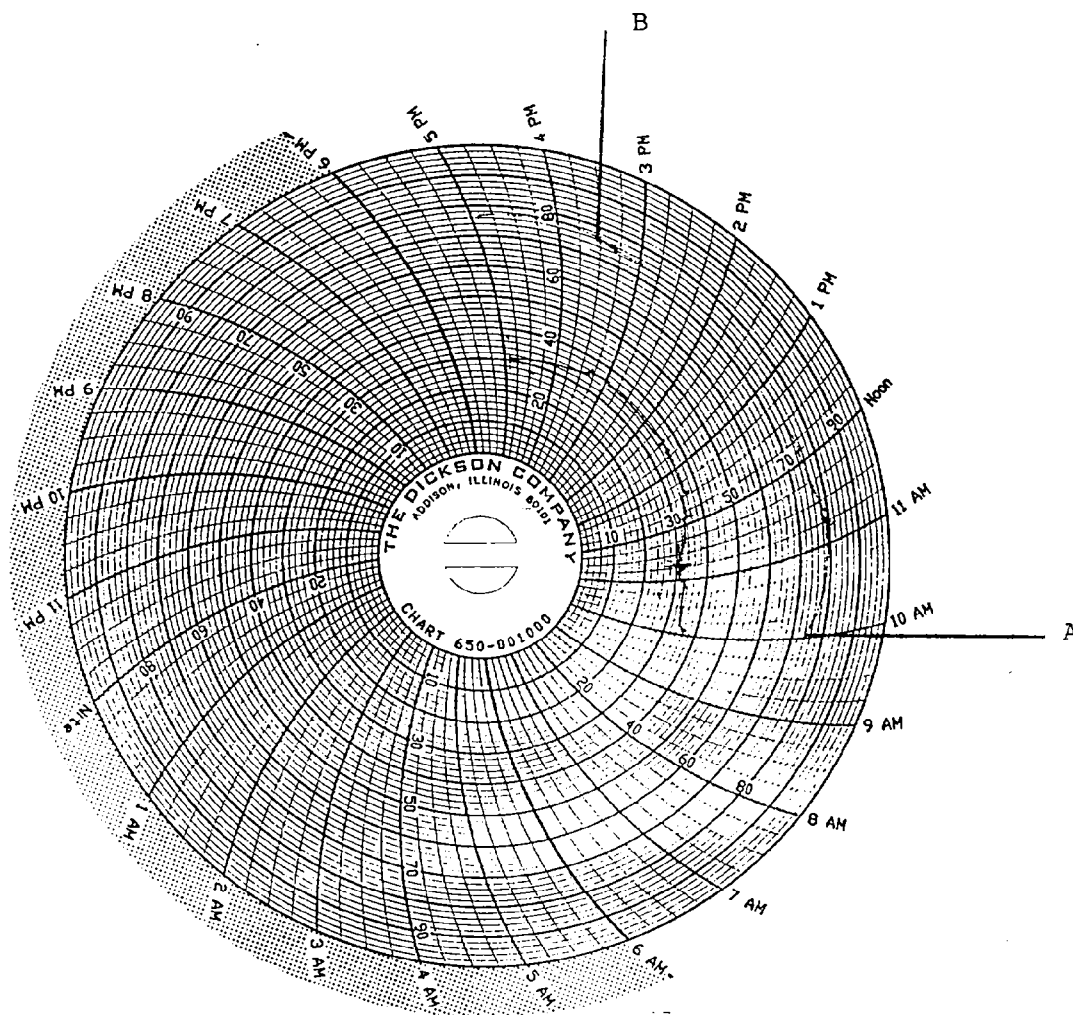
Inspected By: Al Chalmers

Date: October 19, 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):

VEHICLE AND DUMMY TEMPERATURE



A = Dummies placed in vehicle
B = Test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR DRIVER DUMMY NO. 271

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AP2A4	Endevco	September 14, 1995
Lower Rib Y	APIB3	Endevco	September 25, 1995
Lower Spine Y	ANAP1	Endevco	May 23, 1995
Pelvis Y	AJ417	Endevco	July 10, 1995
Upper Rib Redundant Y	AP2D8	Endevco	September 14, 1995
Lower Rib Redundant Y	AP1C6	Endevco	September 25, 1995
Lower Spine Redundant Y	ANAT6	Endevco	May 23, 1995
Pelvis Redundant Y	AGP20	Endevco	July 10, 1995

INSTRUMENTS FOR PASSENGER DUMMY NO. 272

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AN8L6	Endevco	June 31, 1995
Lower Rib Y	APYR7	Endevco	September 06, 1995
Lower Spine Y	AP0H4	Endevco	September 06, 1995
Pelvis Y	APY15	Endevco	September 06, 1995
Upper Rib Redundant Y	APY13	Endevco	September 06, 1995
Lower Rib Redundant Y	AJ8T5	Endevco	June 27, 1995
Lower Spine Redundant Y	AP0F6	Endevco	September 06, 1995
Pelvis Redundant Y	APY16	Endevco	September 06, 1995

VEHICLE INSTRUMENT CALIBRATION

VEHICLE ACCELEROMETERS			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	B12-G06	Entran	April 10, 1995
Moving Barrier CG Y	B12-G09	Entran	April 24, 1995
Moving Barrier CG Z	C06-G17	Entran	April 27, 1995
Moving Barrier Rear Axle X	E24-G02	Entran	September 28, 1995
Moving Barrier Rear Axle Y	L15-G10	Entran	July 20, 1995
Left Mid A-Post Y	H16-X15	Entran	September 21, 1995
Left Lower A-Post Y	E25-G05	Entran	September 29, 1995
Left Mid B-Post Y	H07-A14	Entran	September 15, 1995
Left Lower B-Post Y	F07-A04	Entran	August 01, 1995
Rear Floorpan Above Axle X	E13-D21	Entran	June 09, 1995
Rear Floorpan Above Axle Y	H07-A04	Entran	August 05, 1995
Rear Floorpan Above Axle Z	H07-A06	Entran	August 05, 1995
Driver Seat Track Y	B12-G02	Entran	October 05, 1995
Right Side Sill at Front Seat X	E25-G07	Entran	June 26, 1995
Right Side Sill at Front Seat Y	J07-X14	Entran	July 20, 1995
Right Side Sill at Front Seat Z	E25-G11	Entran	June 26, 1995
Right Side Sill at Rear Seat X	F07-A17	Entran	August 01, 1995
Right Side Sill at Rear Seat Y	F10-D04	Entran	August 02, 1995
Right Side Sill at Rear Seat Z	F07-A20	Entran	August 02, 1995
Left Side Sill at Front Seat Y	G19-G04	Entran	September 15, 1995

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO	MANUFACTURER	CALIBRATION DATE
Left Side Sill at Rear Seat Y	E13-D02	Entran	September 05, 1995
Right Rear Occupant Compartment Y	H07-A20	Entran	September 05, 1995
Vehicle CG X	B02-G02	Entran	September 29, 1995
Vehicle CG Y	H07-A17	Entran	September 29, 1995
Vehicle CG Z	C06-G22	Entran	September 29, 1995

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