

V2716

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING
PASSENGER CARS

1998 PONTIAC BONNEVILLE
4-DOOR SEDAN
NHTSA NO: MW0116

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: November 5, 1997

Report Date: December 19, 1997

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
OFFICE OF CRASHWORTHINESS STANDARDS
ROOM 5313, NPS-10
400 SEVENTH STREET, SW
WASHINGTON, D.C. 20590

This Final Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-93-C-02047.

This document is disseminated under the sponsorship of the U. S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof.

Prepared By: Norkham Khenthavong
Norkham Khenthavong, Project Engineer

Approved By: John Fleck
John Fleck, Facility Director

Approval Date: December 23, 1997

FINAL REPORT ACCEPTED BY (OCWS):

Accepted By: _____
Contract Technical Manager

Acceptance Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 214D-MGA-98-08		2. Government Accession No.		3. Recipient's Catalog No.																			
4. Title and Subtitle New Car Assessment Program Side Impact Test of a 1998 Pontiac Bonneville 4-Door Sedan NHTSA No. MW0116				5. Report Date December 19, 1997																			
				6. Performing Organization Code MGA																			
7. Author(s) Norkham Khenthavong, Project Engineer				8. Performing Organization Report No. MGA-DOT-214-0																			
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105				10. Work Unit No.																			
				11. Contract or Grant No. DTNH22-93-C-02047																			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 400 Seventh St., S.W. Washington, D.C. 20590				13. Type of Report and Period Covered Final Test Report November 5, 1997 to December 19, 1997																			
				14. Sponsoring Agency Code NPS-10																			
15. Supplementary Notes																							
16. Abstract A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1998 Pontiac Bonneville 4-Door Sedan to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on November 5, 1997. The impact velocity of the Moving Deformable Barrier (MDB) was 61.5 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 21.3 °C. The target vehicle post test maximum crush was 519 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>75</td> <td>80</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>73</td> <td>97</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>94</td> <td>91</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>84</td> <td>94</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>111</td> <td>111</td> </tr> </tbody> </table> The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.							<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	75	80	Left Lower Rib (LLR) Accel., g	73	97	Lower Spine (T ₁₂) Accel., g	94	91	Thoracic Trauma Index (TTI)	84	94	Pelvis (PEV) Accel., g	111	111
	<u>DRIVER</u>	<u>PASS.</u>																					
Left Upper Rib (LUR) Accel., g	75	80																					
Left Lower Rib (LLR) Accel., g	73	97																					
Lower Spine (T ₁₂) Accel., g	94	91																					
Thoracic Trauma Index (TTI)	84	94																					
Pelvis (PEV) Accel., g	111	111																					
17. Key Words New Car Assessment Program (NCAP) FMVSS No. 214D Side Impact Dummy (SID) Occupant Side Impact Protection				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																			
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 308																			
				22. Price																			

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF SIDE IMPACT TEST	2-1
3	SIDE IMPACT DUMMY (SID) AND VEHICLE TEST DATA	3-1
4	OCCUPANT AND VEHICLE INFORMATION	4-1
APPENDIX A	PHOTOGRAPHS	
APPENDIX B	VEHICLE AND SID RESPONSE DATA	
APPENDIX C	SID CONFIGURATION AND PERFORMANCE VERIFICATION	
APPENDIX D	TEST EQUIPMENT LIST AND CALIBRATION INFORMATION	

SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY98 NCAP Side Impact 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 of a 1998 Pontiac Bonneville 4-Door Sedan.

This side impact test was conducted in accordance with the New Car Assessment Program Side Impact Testing Procedure dated October 1996.

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 1998 Pontiac Bonneville 4-Door Sedan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 38.2 mph (61.5 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 November 5, 1997. 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 New Car Assessment Program Side Impact Laboratory Test Procedure which is dated October 1996. 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)
5. Head Center of Gravity triaxial accelerometers (X, Y, and Z-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)	84	94
Pelvis (g)	111	111

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: 1998/Pontiac/Bonneville/4-Door/Sedan
Vehicle NHTSA No.: MW0116 VIN: 1G2HX52K0W4202434
Vehicle Body Color: Burgundy Build Date: 8-97
Engine Data: 6 Cylinders; CID; 3.8 Liter; cc
Placement Longitudinal; X Lateral
Transmission: Speed; Manual; X Automatic; X Overdrive
Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 20 miles
Options: X A/C; X Pwr. Steering; X Pwr. Brakes; X Pwr. Windows;
 X Cruise Control; X Tilt Wheel; X Power Door Locks;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 Psi FRONT
30 Psi REAR
Recommended Tire Size: P225/60/R16
Tires on Test Vehicle: P225/60/R16 Manufacturer: Goodyear

Vehicle Capacity Data:

Number of Occupants: 3 Front; 3 Rear; 0 3rd Seat, 6 Total
Type of Front Seats: Bucket; Bench; X Split Bench
Type of Front Seat Back: Fixed; X Adjustable with X Lever
Vehicle Maximum Capacity Loading = 488.1 kg (A)
No. of Occupants x 68.04 kg. = 408.2 kg (B)
Cargo Capacity (A-B) = 79.9 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>497.6</u> kg	Right Rear	=	<u>300.3</u> kg
Left Front	=	<u>517.1</u> kg	Left Rear	=	<u>278.5</u> kg
TOTAL FRONT	=	<u>1014.7</u> kg	TOTAL REAR	=	<u>578.8</u> kg
% of Total Vehicle Weight	=	<u>63.7</u> %;	% of Total Weight	=	<u>36.3</u> %
TOTAL WEIGHT	=	<u>1593.5</u> kg			

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1593.5</u> kg
Cargo Carrying Capacity of Test Vehicle	=	<u>79.9</u> kg
Weight of 2 Side Impact Dummies (2 x <u>80.7</u> kg.)	=	<u>161.4</u> kg
TEST VEHICLE TARGET WEIGHT	=	<u>1834.8</u> kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO (Fully Loaded):

Right Front	=	<u>518.5</u> kg	Right Rear	=	<u>373.8</u> kg
Left Front	=	<u>566.1</u> kg	Left Rear	=	<u>371.9</u> kg
TOTAL FRONT	=	<u>1084.6</u> kg	TOTAL REAR	=	<u>745.7</u> kg
% of Total Weight	=	<u>59.3</u> %	% of Total Weight	=	<u>40.7</u> %
TOTAL TEST WEIGHT	=	<u>1830.3</u> kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 724 mm Left Front 734 mm Right Rear 743 mm Left Rear 738 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 719 mm Left Front 718 mm Right Rear 700 mm Left Rear 682 mm

TEST ATTITUDE:

Right Front 716 mm Left Front 723 mm Right Rear 704 mm Left Rear 691 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2818 mm

C.G. = 1147 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4790 mm

Centerline = 5118 mm

Left Side = 4790 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 210 mm

Test Position: Mid-position

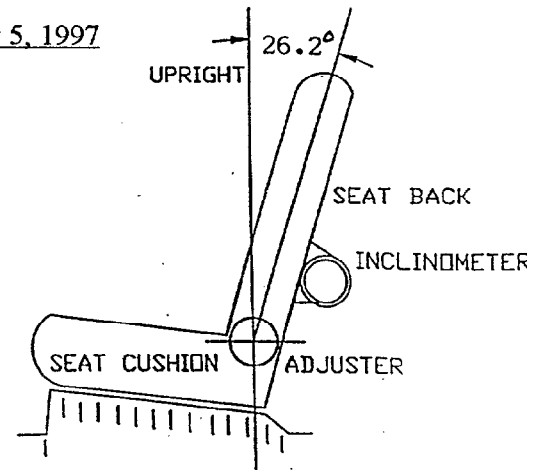
FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 26.2° (power seats)

SECOND POSITION SEAT:

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

Seat Back Adjustment Position: Non-adjustable



ADJUSTABLE STEERING COLUMN POSITION:

WINDOW POSITIONS: Left Front Closed Left Rear Closed
Right Front Open Right Rear Open

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 18.0 gallons

Test Volume: 16.7 gallons 93 % of capacity

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

Wheelbase: = 2818 mm

Impact Point is 469 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

Overall Length = 5118 mm; Overall Width = 1888 mm

TEST WEIGHT:

Right Front = 518.5 kg Right Rear = 373.8 kg

Left Front = 566.1 kg Left Rear = 371.9 kg

TOTAL FRONT = 1084.6 kg TOTAL REAR = 745.7 kg

% of Total Weight = 59.3 % % of Total Weight = 40.7 %

TOTAL VEHICLE WEIGHT = 1830.3 kg

Wheelbase = 2818 mm

Longitudinal C.G. from Center of Front Axle = 1147 mm

Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (298 mm above ground) = 358 mm

2. LEVEL 2 (483 mm above ground) = 502 mm

3. LEVEL 3 (611 mm above ground) = 487 mm

4. LEVEL 4 (891 mm above ground) = 363 mm

5. LEVEL 5 (1343 mm above ground) = 216 mm

Maximum Post-Test Intrusion = 519 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 belt</u> <u>and frontal airbag</u>	<u>type II belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>23</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: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

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>1105 mm</u>
C.G. Location From Center Line	= <u>-12 mm</u>
C.G. Location Above Ground Level	= <u>484 mm</u>

MDB WEIGHT:

Left Front	= <u>440.0 kg</u>	Left Rear	= <u>242.5 kg</u>
Right Front	= <u>338.2 kg</u>	Right Rear	= <u>331.9 kg</u>
TOTAL FRONT	= <u>778.2 kg</u>	TOTAL REAR	= <u>574.4 kg</u>
TOTAL MDB WEIGHT = <u>1352.9 kg</u>			

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

Impact Speed = Primary: 38.2 mph (61.5 kph) Secondary: 38.4 mph (61.7 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>165</u> mm
2.	Row B Mid Stack (686 mm)	= <u>75</u> mm
3.	Row C Top of Bumper (533 mm)	= <u>57</u> mm
4.	Row D Center of Bumper (432 mm)	= <u>83</u> mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to passenger seat headrest</u>	<u>to C-post</u>
Arm	<u>top of armrest</u>	<u>to rear of door</u>
Pelvis	<u>to armrest</u>	<u>to rear of armrest</u>
Left Knee	<u>to mid door, bottom of armrest</u>	<u>to mid door below armrest</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 13 mm forward Vertical: 9 mm high

ARM REST LOCATIONS:

Front: 264 mm from bottom of window
Rear: 270 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 250 mm Front Seat Cushion: 126 mm
Left Rear Seat Back: 128 mm Rear Seat Cushion: 277 mm

GLAZING DAMAGE:

Windshield cracked, driver and rear passenger door windows broke

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

Approximately 456 forward of rear axle. Approximately 120 mm wide and
149 mm long.

OTHER NOTABLE IMPACT EFFECTS:

Frontal airbags did not deploy.
No side airbags in this car.

AIRBAG DEPLOYMENT STATUS:

	<u>DRIVER</u>	<u>PASSENGER</u>
Frontal	<u>No</u>	<u>No</u>
Side	<u>N/A</u>	<u>N/A</u>

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5
SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA

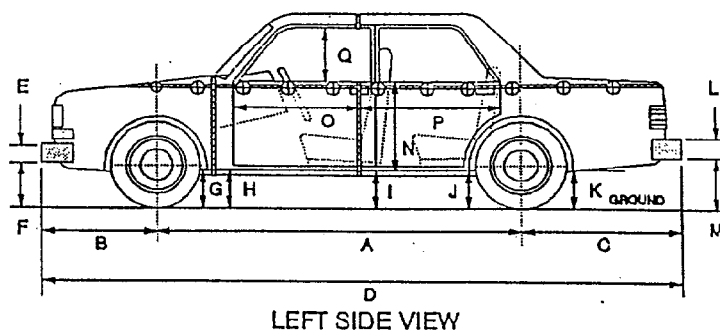
Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

	Front Dummy ID #272			Rear Dummy ID #271		
	Pos. Direct.		Neg. Direct	Pos. Direct.		Neg. Direct
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS						
Left Upper Rib (LUR) Y	74.8	31	-12.8	109	80.2	-19.2 70
Left Lower Rib (LLR) Y	72.7	31	-19.4	107	96.6	-18.7 68
SPINE ACCELERATIONS						
Lower Lateral Y	94.0	34	-21.5	101	91.1	-59.9 72
PELVIS ACCELERATIONS						
Lateral Y	111.4	32	-29.3	86	111.0	-24.8 71

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

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



D = Length at Centerline

R = Right Side Length

S = Left Side Length

T = Width at B Post

E & L = Bumper Thickness

J1 = To Pinch Weld

J2 = To Sill

ALL MEASUREMENTS IN (mm)

	PRE-TEST	POST-TEST	Δ CHANGE
A	2818	2728	-90
B	1110	1146	36
C	1190	1220	30
D	5118	5094	-24
E	160	160	0
F	402	435	33
G	190	205	15
H	197	200	3
I	186	212	26
J1/J2	142/173	188/151	46/-22
K	184	202	18
L	240	240	0
M	274	280	6
N	665	565	-100
O	807	732	-75
P	1342	1097	-245
Q	470	450	-20
R	4790	4770	-20
S	4790	4677	-113
T	1888	1512	-376

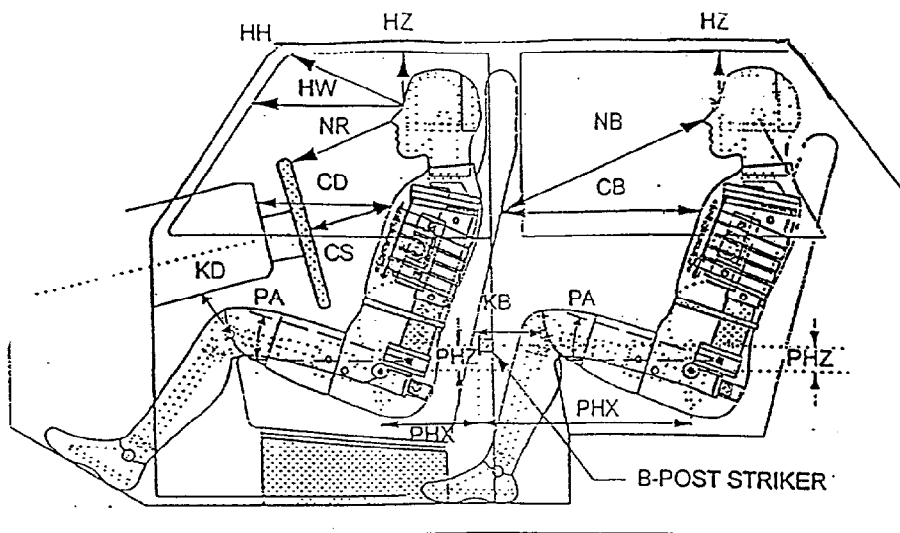
DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

NHTSA NO.: MW0116

Test Date: November 5, 1997



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

	DRIVER SID ID #272
HH	404
HW	700
HZ	192
NR	417
CD	496
CS	302
KDL(KDA°)	172 (20.0°)
KDR(KDA°)	165 (25.4°)
PA°	24.1°
PHX	200
PHZ	165

	LEFT REAR PASSENGER SID ID #271
HZ	155
NB	678
CB	612
KBL (KBA)	241 (3.8°)
KBR (KBA)	240 (3.8°)
PA°	248°
PHX	298
PHZ	23.4

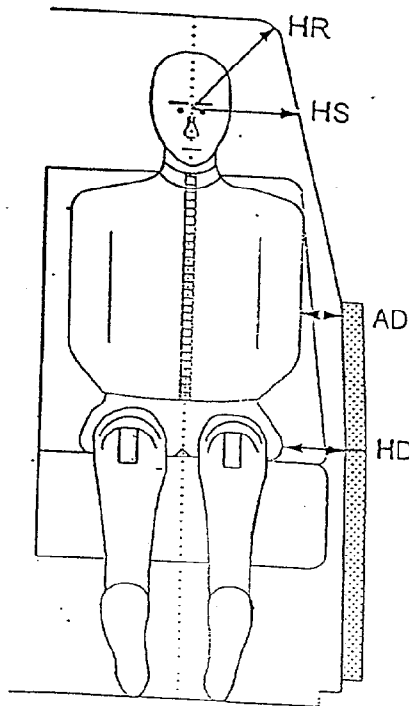
NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

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

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

NHTSA NO.: MW0116

Test Date: November 5, 1997



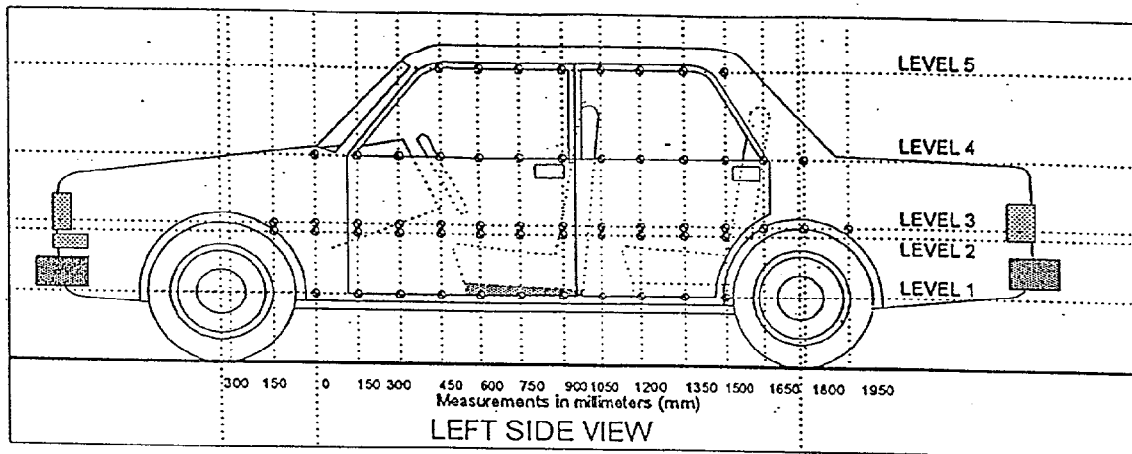
NOTE: All dimensions are in mm

	DRIVER SID ID #272	LEFT REAR PASSENGER SID ID #271
HR	257	204
HS	372	340
AD	164	147
HD	150	185

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

NHTSA NO.: MW0116 Test Date: November 5, 1997



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

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 1 @ Axle Centerline Height (or Sill Top Height)	=	<u>298</u> mm
Level 2 @ Occupant H-Point	=	<u>483</u> mm
Level 3 @ Mid Door	=	<u>611</u> mm
Level 4 @ Window Sill	=	<u>891</u> mm
Level 5 @ Window Top	=	<u>1343</u> mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 1 - Axle Centerline		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	617	682	65
150	617	808	191
300	617	866	249
450	616	895	279
600	614	902	288
750	612	908	296
900	611	924	313
1050	610	933	323
1200	606	934	328
1350	606	930	324
1500	608	943	335
1650	610	968	358
1800	610	900	290

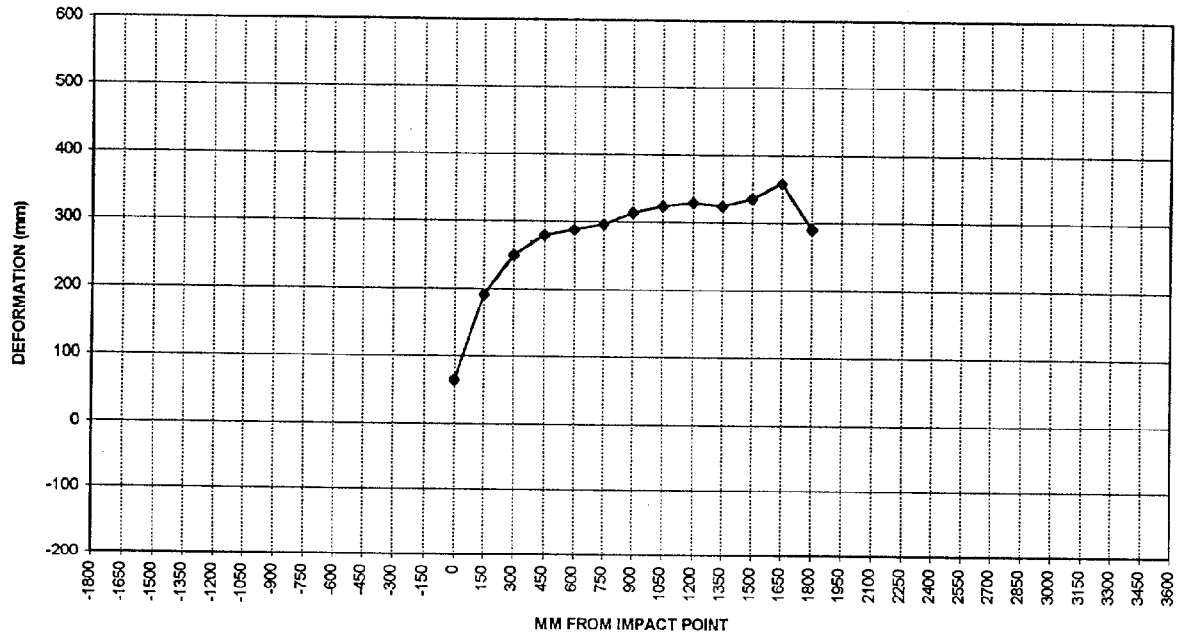
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 1 - Axle Centerline		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950			
2100			
2250			
2400			
2550			
2700			
2850			
3000			
3150			
3300			
3450			
3600			

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

	Level 2 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200	608	623	15
-1050	583	604	21
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	525	603	78
150	526	810	284
300	522	931	409
450	522	978	456
600	519	988	469
750	517	990	473
900	515	1000	485
1050	514	989	475
1200	513	991	478
1350	513	995	482
1500	514	983	469
1650	515	1017	502
1800	517	970	453

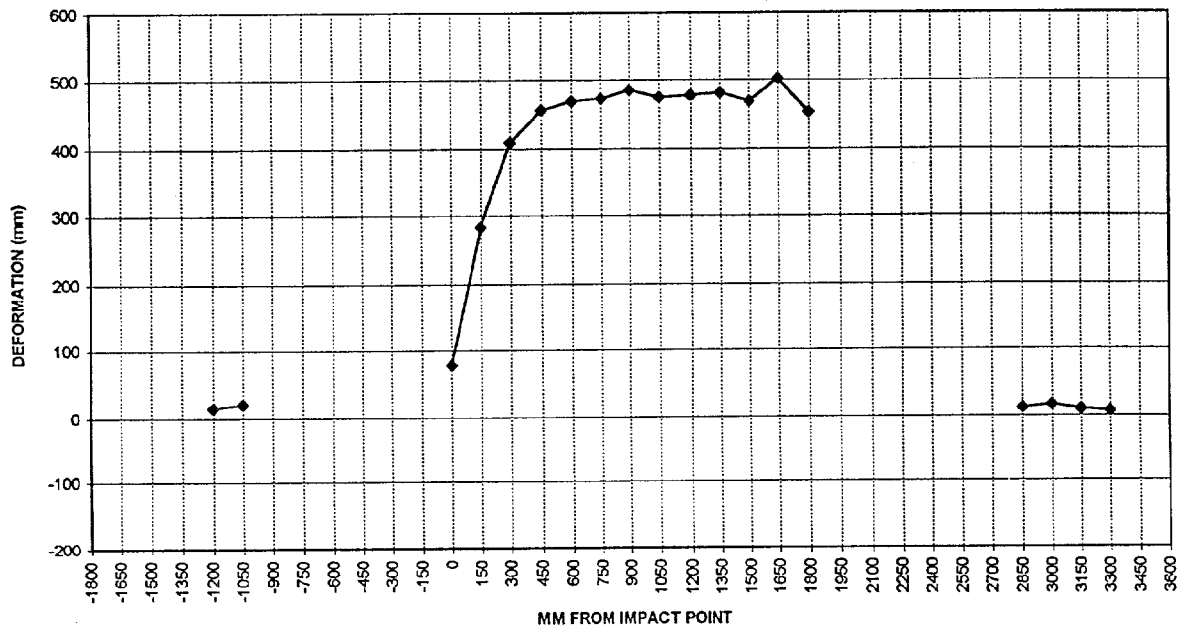
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 2 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950			
2100			
2250			
2400			
2550			
2700			
2850	588	600	12
3000	610	626	16
3150	634	644	10
3300	663	670	7
3450			
3600			

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

	Level 3 - Mid-Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200	637	655	18
-1050	598	622	24
-900	571	600	29
-750			
-600			
-450			
-300			
-150	526	592	66
0 (impact point)	524	606	82
150	523	785	262
300	520	924	404
450	518	920	402
600	516	918	402
750	515	930	415
900	513	938	425
1050	512	945	433
1200	512	962	450
1350	514	980	466
1500	513	972	459
1650	512	986	474
1800	513	1000	487

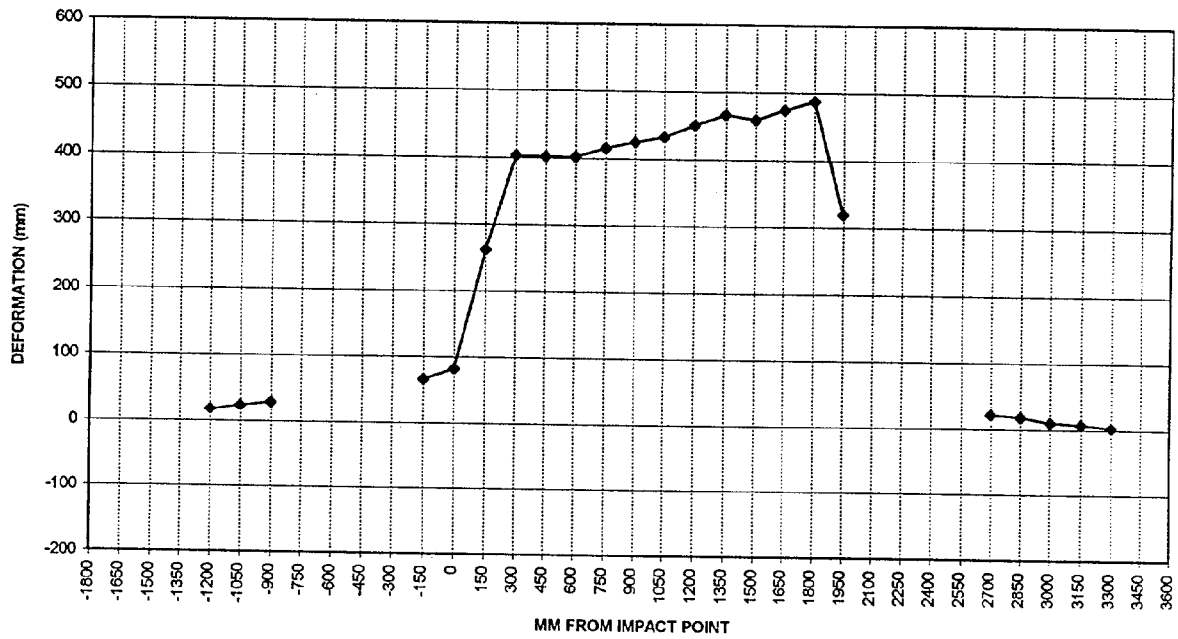
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 3 - Mid-Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	518	837	319
2100			
2250			
2400			
2550			
2700	567	589	22
2850	590	608	18
3000	617	627	10
3150	652	659	7
3300	706	709	3
3450			
3600			

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

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200	680	696	16
-1050	661	680	19
-900	646	674	28
-750	627	664	37
-600	617	659	42
-450	609	658	49
-300	603	658	55
-150	593	657	64
0 (impact point)	589	658	69
150	583	692	109
300	581	770	189
450			
600	570	844	274
750	570	883	313
900	571	905	334
1050	571	920	349
1200	573	936	363
1350	574	859	285
1500	574	850	276
1650	574	839	265
1800	574	912	338

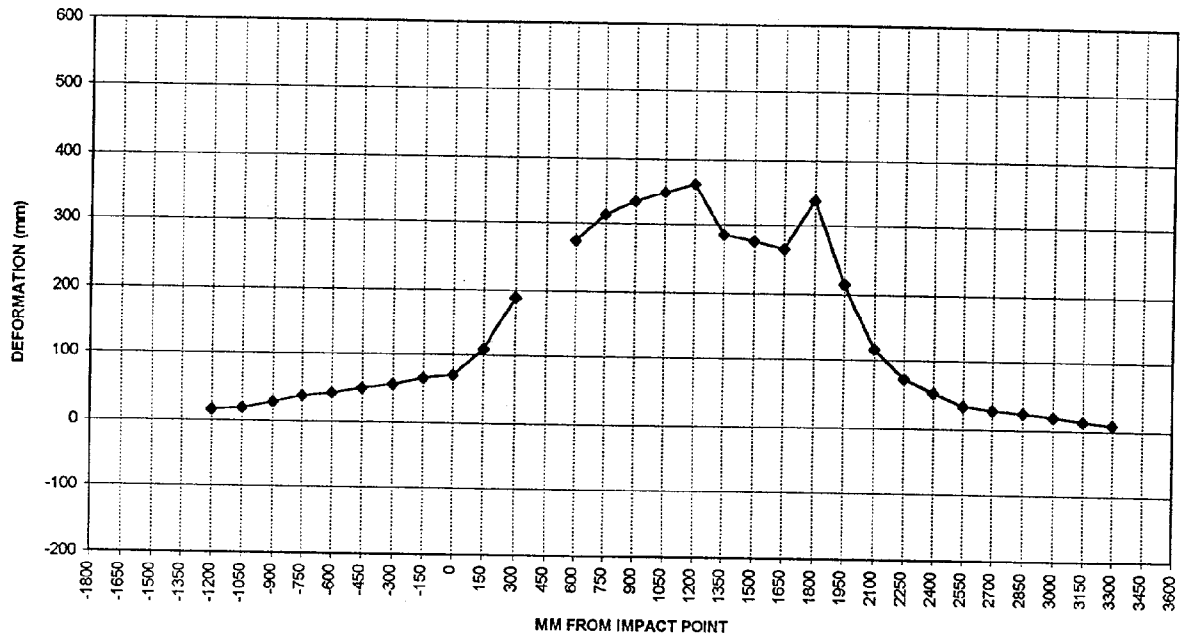
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	576	790	214
2100	582	698	116
2250	585	657	72
2400	595	647	52
2550	606	640	34
2700	622	650	28
2850	639	663	24
3000	663	682	19
3150	695	708	13
3300	744	753	9
3450			
3600			

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

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600			
750	840	943	103
900	836	962	126
1050	836	1005	169
1200	836	1052	216
1350	836	995	159
1500	838	957	119
1650	838	929	91
1800	840	908	68

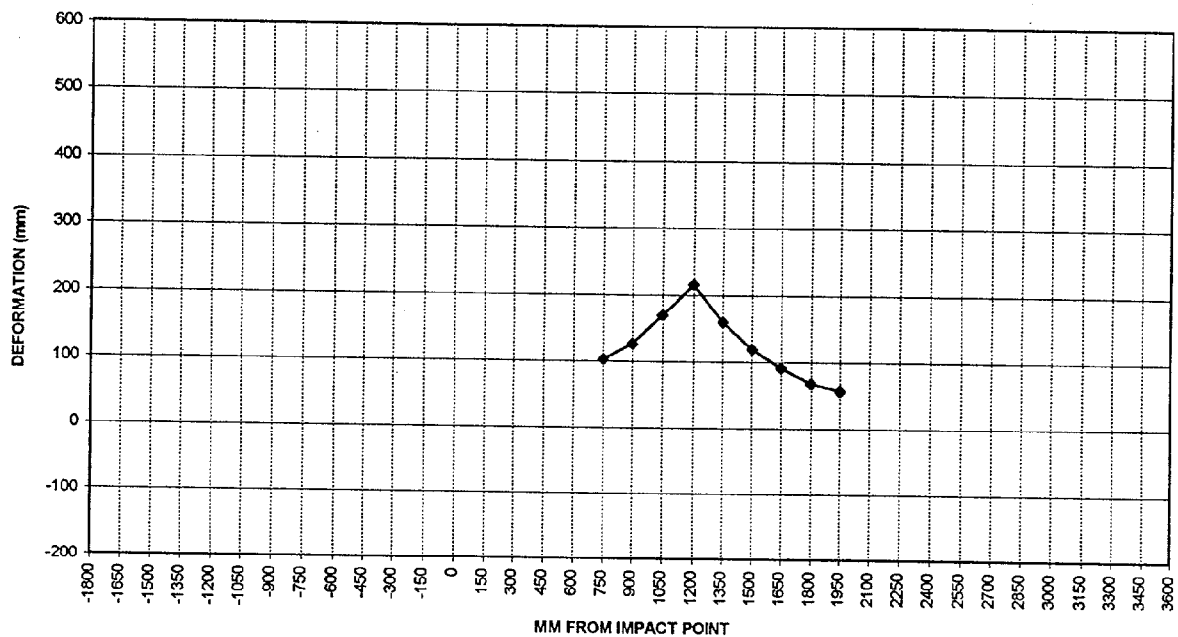
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	847	904	57
2100			
2250			
2400			
2550			
2700			
2850			
3000			
3150			
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH



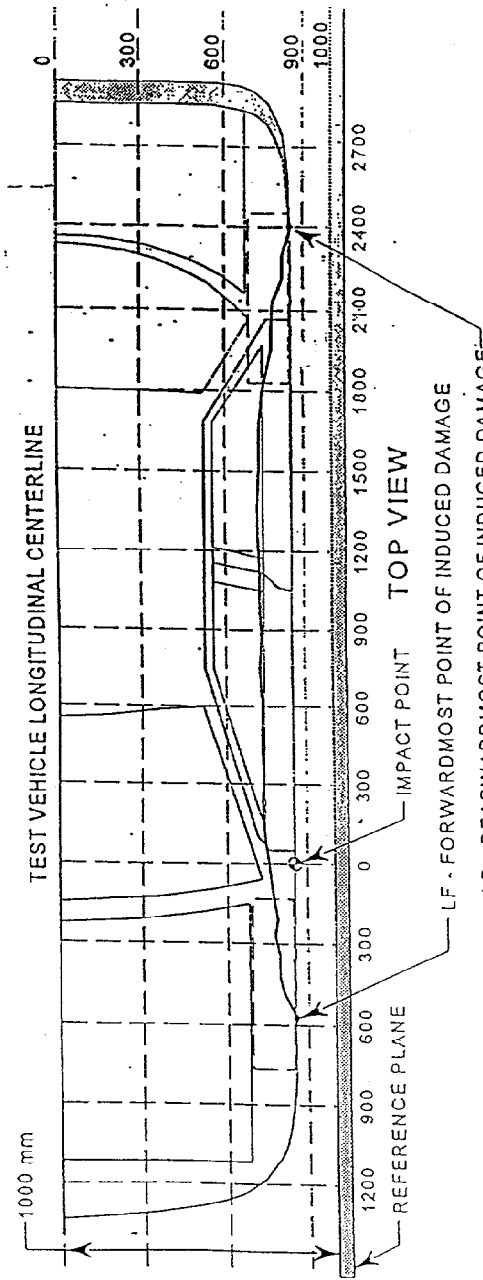
LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

NHTSA NO.: MW0116 Test Date: November 5, 1997



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 = -1200 mm)	623	608	15
2. -325 mm	661	604	57
3. 550 mm	1002	520	482
4. 1440 mm	1033	514	519
5. 2420 mm	648	596	52
6. (LR = 3300 mm)	670	663	7

DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

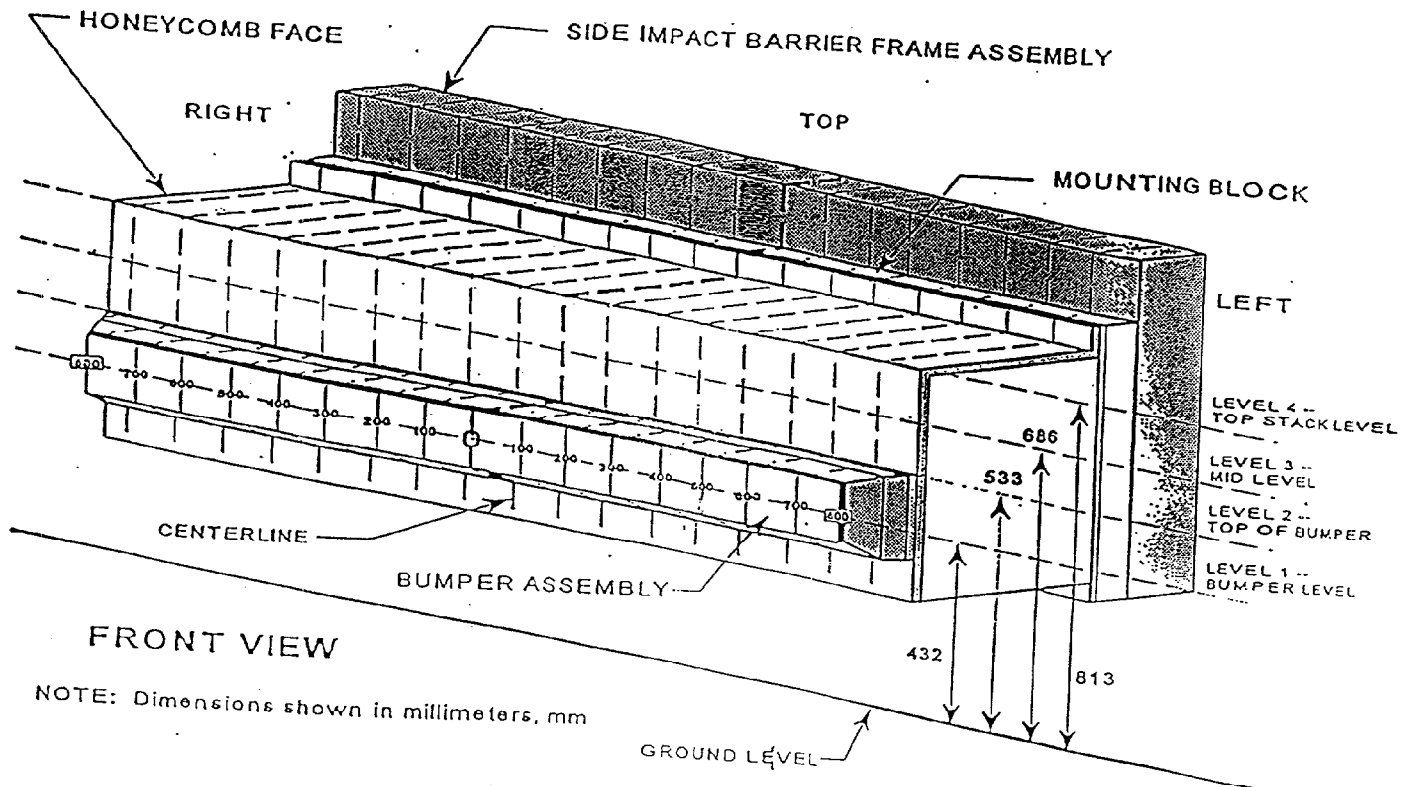
Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

Location	Height at CL	Distance Right of Center (mm)								0	Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	86	19	1	1	2	2	2	6	6	8	11	15	26	47	78	4	165
Mid Level Level 3	686 mm	10	-7	-7	-2	0	1	2	9	6	6	7	9	11	12	22	47	75
Top Bumper Level 2	533 mm	39	29	25	23	25	29	24	27	22	26	27	28	35	38	39	46	57
Mid Bumper Level 1	432 mm	65	49	37	35	37	48	50	42	37	35	35	37	40	43	47	62	83

See next page for Barrier Face Graphic

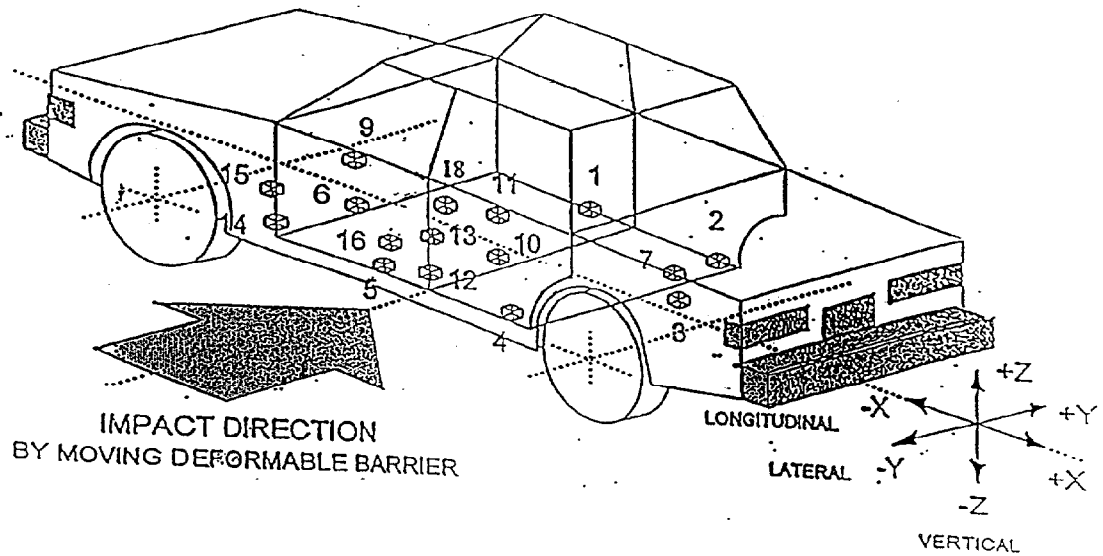
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997



- 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

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

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	2889	700	226	3.2	-6.1	22.8	-3.1	5.2	-6.1	22.9
2	Rt. Side Sill @ Rear Seat	1587	701	212	3.1	-4.1	18.1	-2.7	6.4	-9.4	18.2
3	Rr. Floorpan Above Axle	1074	0	339	4.8	-4.6	15.5	-2.7	13.8	-9.5	18.8
4	Left Side Sill @ Rr. Seat	1518	-701	215	---	---	50.6	-21.0	---	---	---
5	Left Side Sill @ Frt. Seat	2900	-700	226	---	---	41.4	-16.8	---	---	---
6	Left Front Door Centerline	2885	-835	664	---	---	203.4	-110.8	---	---	---
7	Right Rear Occupant Compartment	2038	418	296	---	---	32.8	-2.1	---	---	---
8	Midrear of Left Front Door	2557	-782	670	---	---	192.0	-115.4	---	---	---
9	Left Front Door Upper Centerline	2890	-806	796	---	---	208.3	-132.9	---	---	---
10	Midrear of Left Rear Door	1915	-790	642	---	---	259.9	-135.0	---	---	---
11	Left Rear Door Upper Centerline	1914	-833	827	---	---	147.0	-56.8	---	---	---
12	Left Lower B-Post	2339	-751	476	---	---	173.9	-47.6	---	---	---
13	Left Mid B-Post	2332	-757	930	---	---	103.1	-40.9	---	---	---
14	Left Lower A-Post	3413	-814	878	---	---	58.4	-27.0	---	---	---
15	Left Mid A-Post	3432	-728	432	---	---	27.6	-9.2	---	---	---
16	Driver Left Seat Track	2598	-520	340	---	---	108.1	-35.9	---	---	---
18	Vehicle CG	2832	40	310	9.9	-3.17	1.87	-22.9	10.8	-14.2	25.6

*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To right)

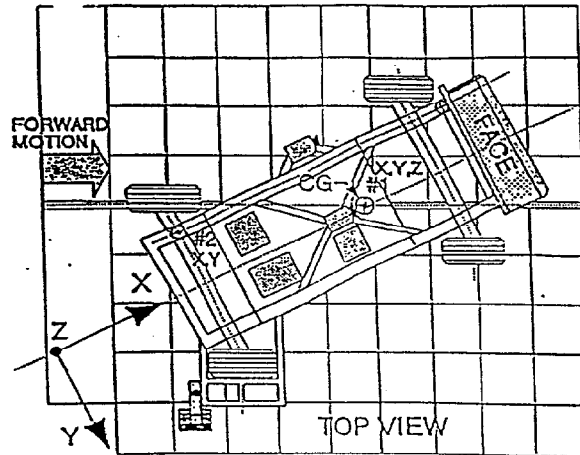
Z - Ground Level (+ Up)

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997



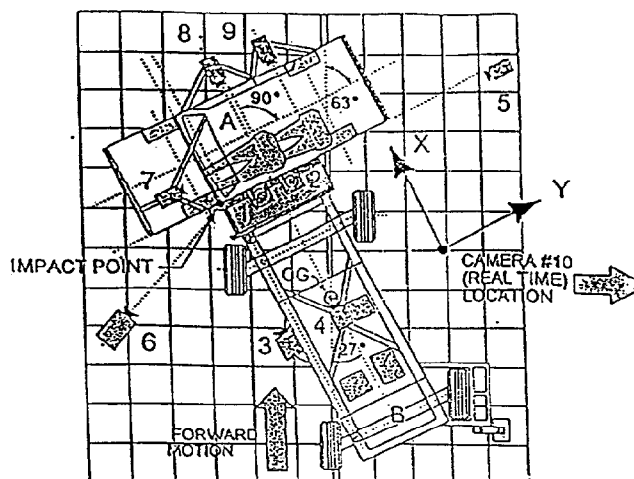
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.5	165	-17.2	44
	Lateral (Y)	---	---	---	1.9	21	-6.0	31
	Vertical (Z)	---	---	---	26.6	60	-27.2	52
	Resultant (R)	---	---	---	30.6	47	---	---
2	Rear Frame Member	-2591	-625	622				
	Longitudinal (X)	---	---	---	1.83	193	-22.1	37
	Lateral (Y)	---	---	---	3.9	30	-1.3	184

*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: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997



Camera No.	View	Coordinates (mm)*			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
	Real Time						
6	Left Impact	-540	-2280	1650		13	1000
8	Onboard Hood					13	1010
9	Onboard Front Occupant					8	957
7	Onboard Rear Occupant					8	1212
5	Right Impact	-920	4440	1720		25	1010
1	Top Overall	100	-1380	5000		8	1061
2	Top Impact	-230	40	5000		13	985
4	Cart Overall					13	930
3	Cart Impact					35	1005

* 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: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

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 38.2 mph (61.5 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

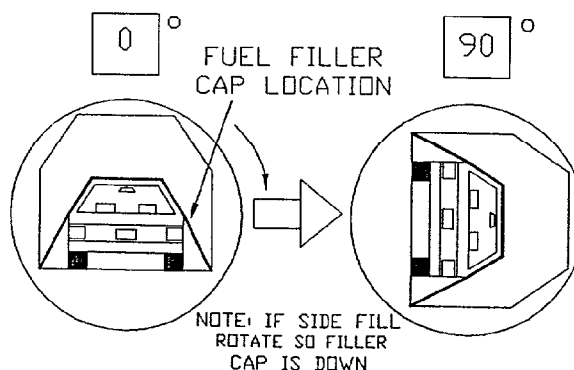
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 48 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 48 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	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

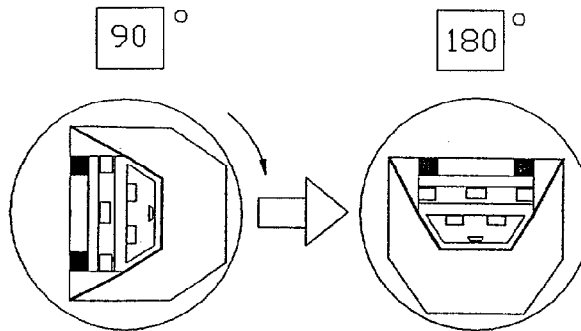
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 30 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 30 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	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16

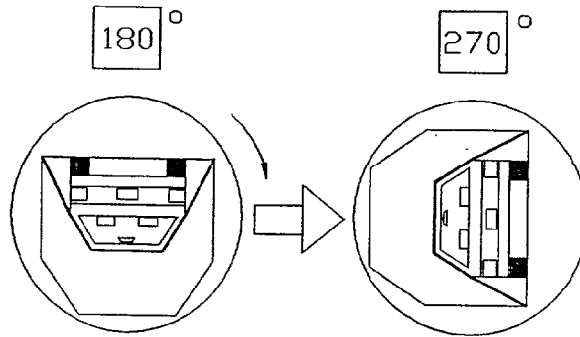
FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116

Test Date: November 5, 1997

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 8 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 8 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	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

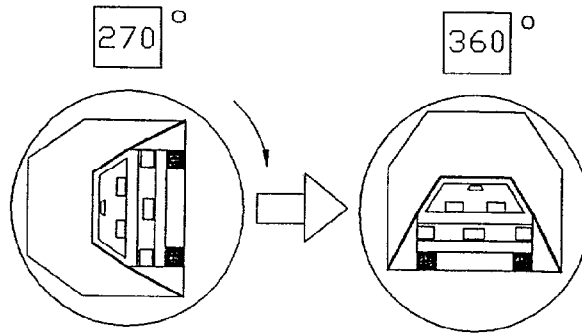
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Pontiac/Bonneville/4-Door/Sedan

Vehicle NHTSA No.: MW0116 Test Date: November 5, 1997

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 49 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 49 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	0 oz	1 oz

FUEL SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

	<u>Page No.</u>
Photo No. A-1 - Pre-Test Front View of Test Vehicle	A-1
Photo No. A-2 - Post-Test Front View of Test Vehicle	A-2
Photo No. A-3 - Pre-Test Rear View of Test Vehicle	A-3
Photo No. A-4 - Post-Test Rear View of Test Vehicle	A-4
Photo No. A-5 - Pre-Test Left Side View of Test Vehicle	A-5
Photo No. A-6 - Post-Test Left Side View of Test Vehicle	A-6
Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)	A-7
Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)	A-8
Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View	A-9
Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)	A-10
Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)	A-11
Photo No. A-12 - Pre-Test MDB Top View	A-12
Photo No. A-13 - Post-Test MDB Top View	A-13
Photo No. A-14 - Pre-Test MDB Front View	A-14
Photo No. A-15 - Post-Test MDB Front View	A-15
Photo No. A-16 - Pre-Test MDB Right Side View	A-16
Photo No. A-17 - Post-Test MDB Right Side View	A-17
Photo No. A-18 - Pre-Test MDB Left Side View	A-18
Photo No. A-19 - Post-Test MDB Left Side View	A-19
Photo No. A-20 - Pre-Test Driver Dummy Right Side View	A-20
Photo No. A-21 - Post-Test Driver Dummy Right Side View	A-21
Photo No. A-22 - Pre-Test Driver Dummy Left Side View	A-22
Photo No. A-23 - Post-Test Driver Dummy Left Side View	A-23
Photo No. A-24 - Pre-Test Driver Dummy Left Side View (Door Open)	A-24
Photo No. A-25 - Pre-Test Driver Dummy Shoulder and Door Top View	A-25
Photo No. A-26 - Post-Test Driver Dummy Shoulder and Door Top View	A-26
Photo No. A-27 - Post-Test Driver Dummy Contact	A-27
Photo No. A-28 - Post-Test Driver Dummy Head Contact	A-28
Photo No. A-29 - Post-Test Driver Dummy Head Contact	A-29

TABLE OF PHOTOGRAPHS

	<u>Page No.</u>
Photo No. A-30 - Pre-Test Passenger Dummy Right Side View	A-30
Photo No. A-31 - Post-Test Passenger Dummy Right Side View	A-31
Photo No. A-32 - Pre-Test Passenger Dummy Left Side View	A-32
Photo No. A-33 - Post-Test Passenger Dummy Left Side View	A-33
Photo No. A-34 - Pre-Test Passenger Dummy Left Side View (Door Open)	A-34
Photo No. A-35 - Pre-Test Passenger Dummy Shoulder and Door Top View	A-35
Photo No. A-36 - Post-Test Passenger Dummy Shoulder and Door Top View	A-36
Photo No. A-37 - Post-Test Passenger Dummy Contact	A-37
Photo No. A-38 - Post-Test Passenger Dummy Head Contact	A-38
Photo No. A-39 - Pre-Test Left Front Impact Point on Vehicle	A-39
Photo No. A-40 - Post-Test Left Front Impact Point on Vehicle	A-40
Photo No. A-41 - Impact	A-41
Photo No. A-42 - Vehicle Certification Label	A-42
Photo No. A-43 - Tire Placard	A-43
Photo No. A-44 - Rollover 90°	A-44
Photo No. A-45 - Rollover 180°	A-45
Photo No. A-46 - Rollover 270°	A-46
Photo No. A-47 - Rollover 360°	A-47
Photo No. A-48 - Left Front Attitude Point	A-48
Photo No. A-49 - Right Front Attitude Point	A-49
Photo No. A-50 - Left Rear Attitude Point	A-50
Photo No. A-51 - Right Rear Attitude Point	A-51

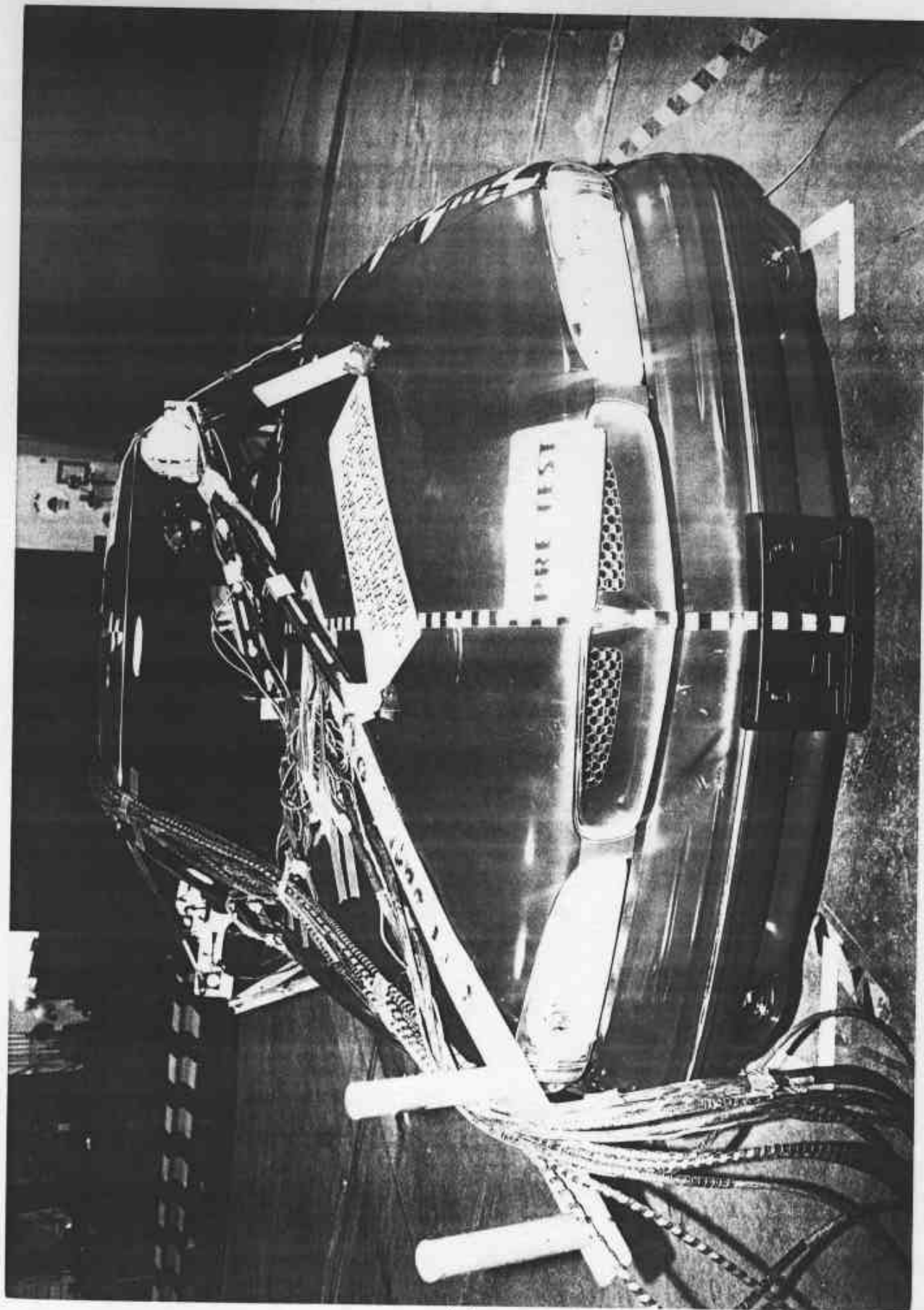


Photo No. A-1 - Pre-Test Front View of Test Vehicle

A-1

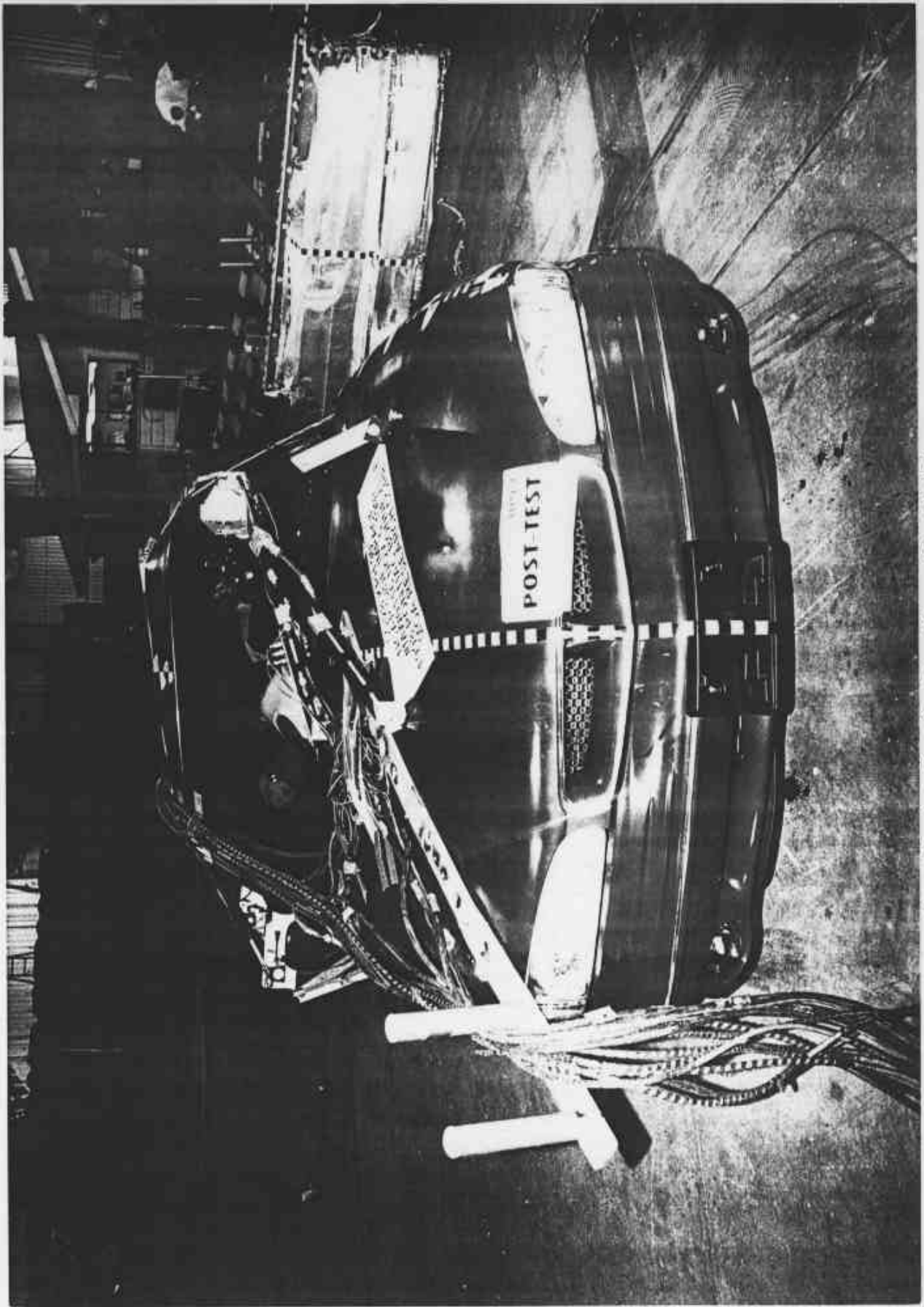


Photo No. A-2 - Post-Test Front View of Test Vehicle

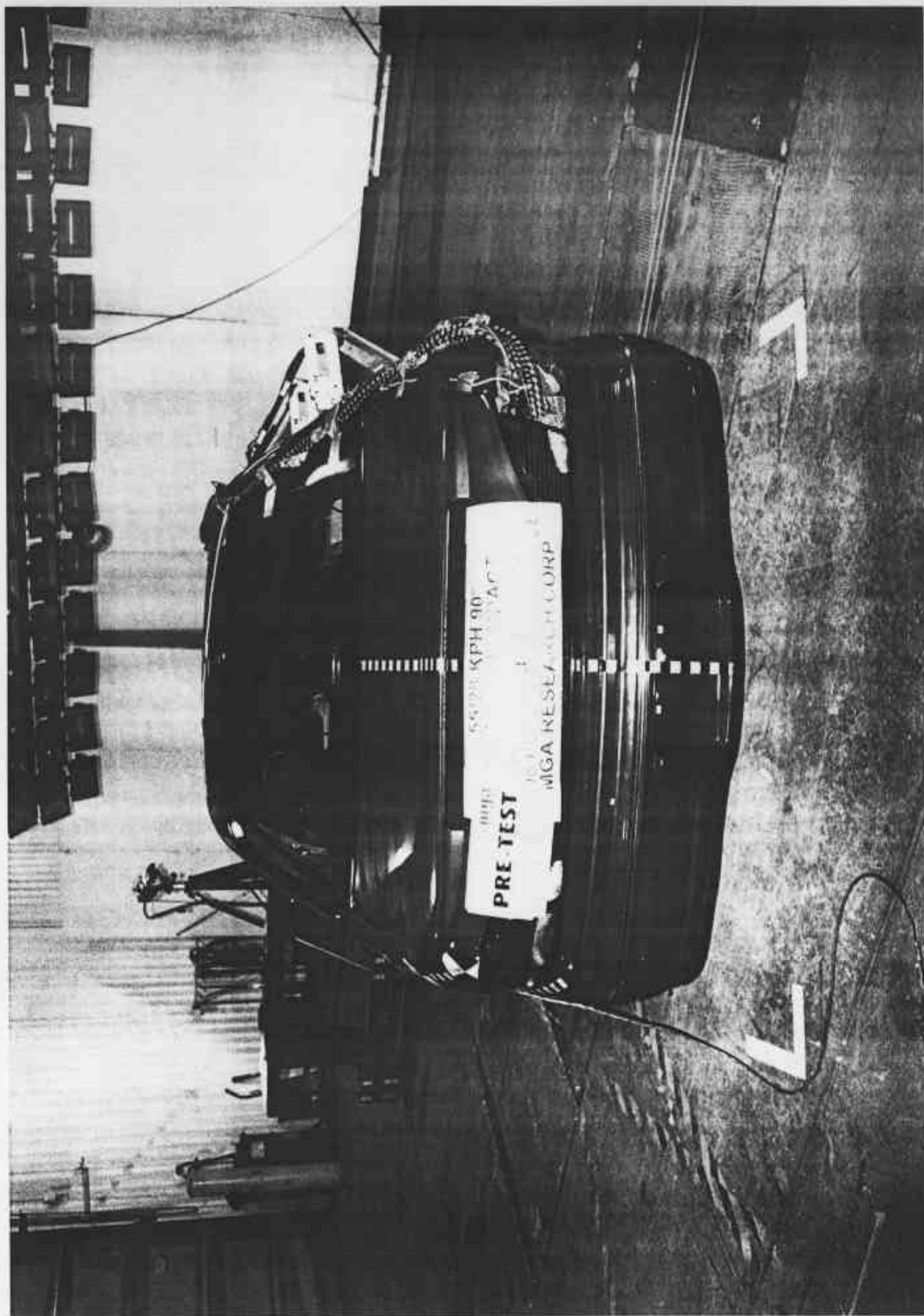


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

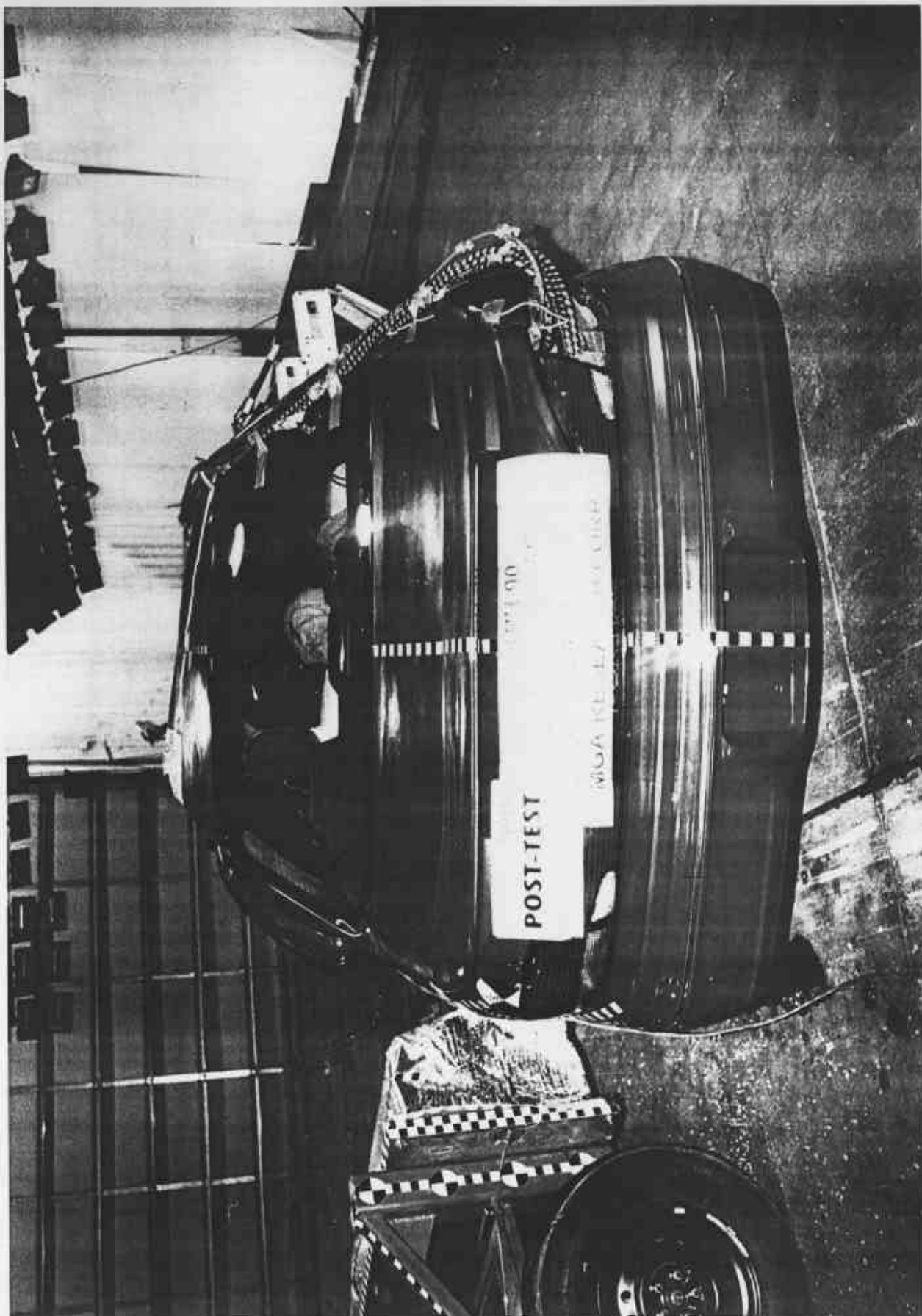


Photo No. A-4 - Post-Test Rear View of Test Vehicle

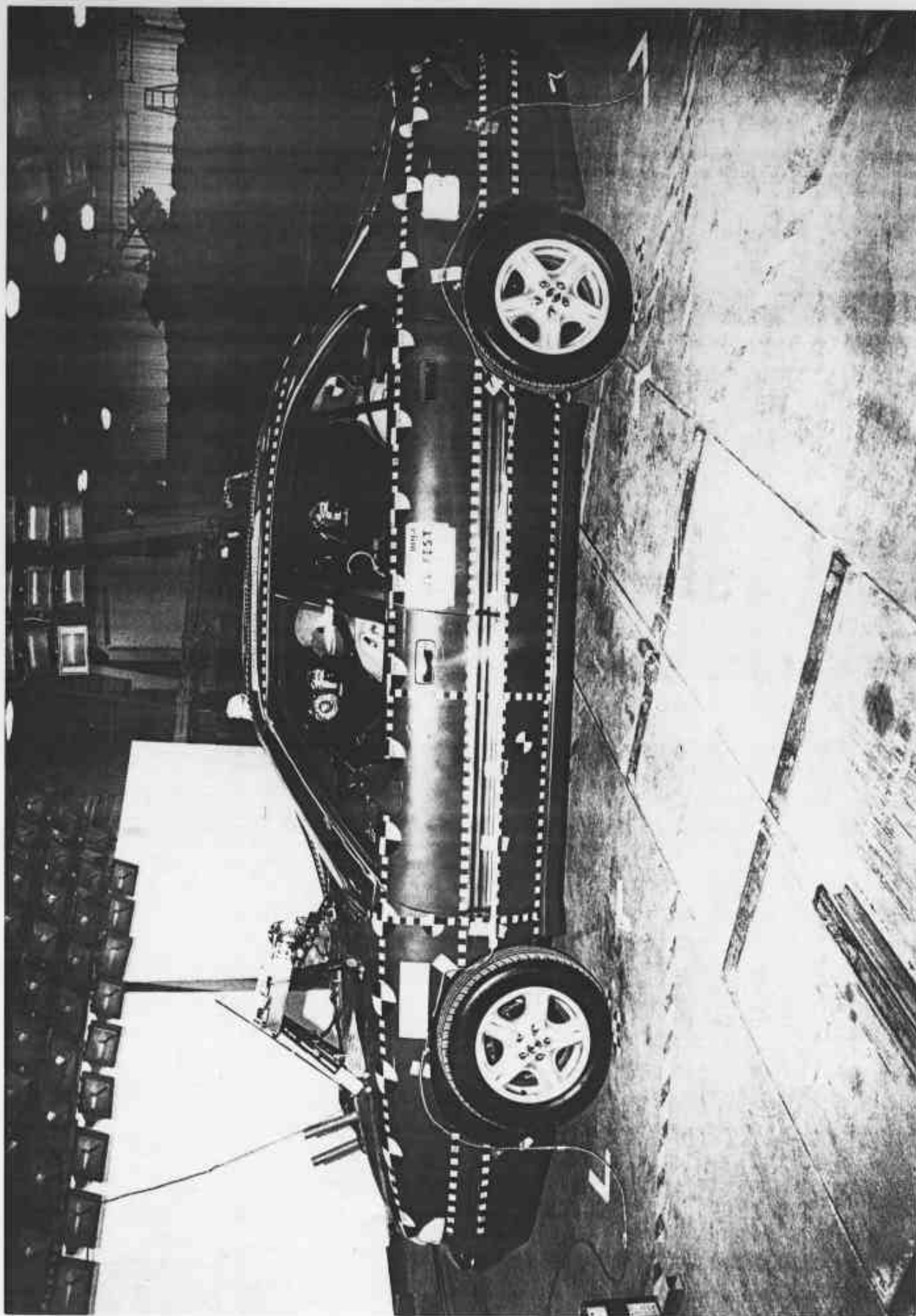


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

A-5

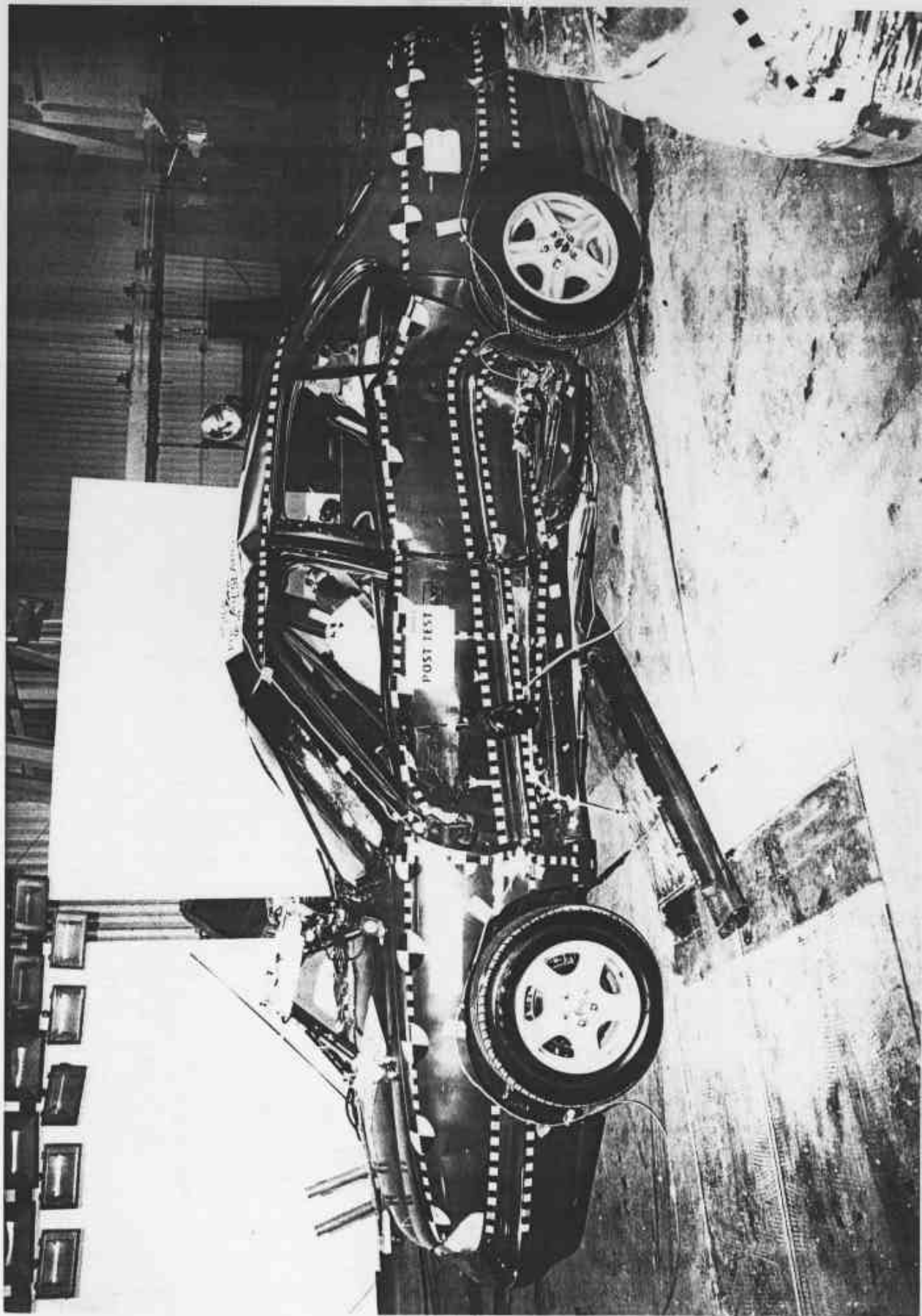


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

A-6

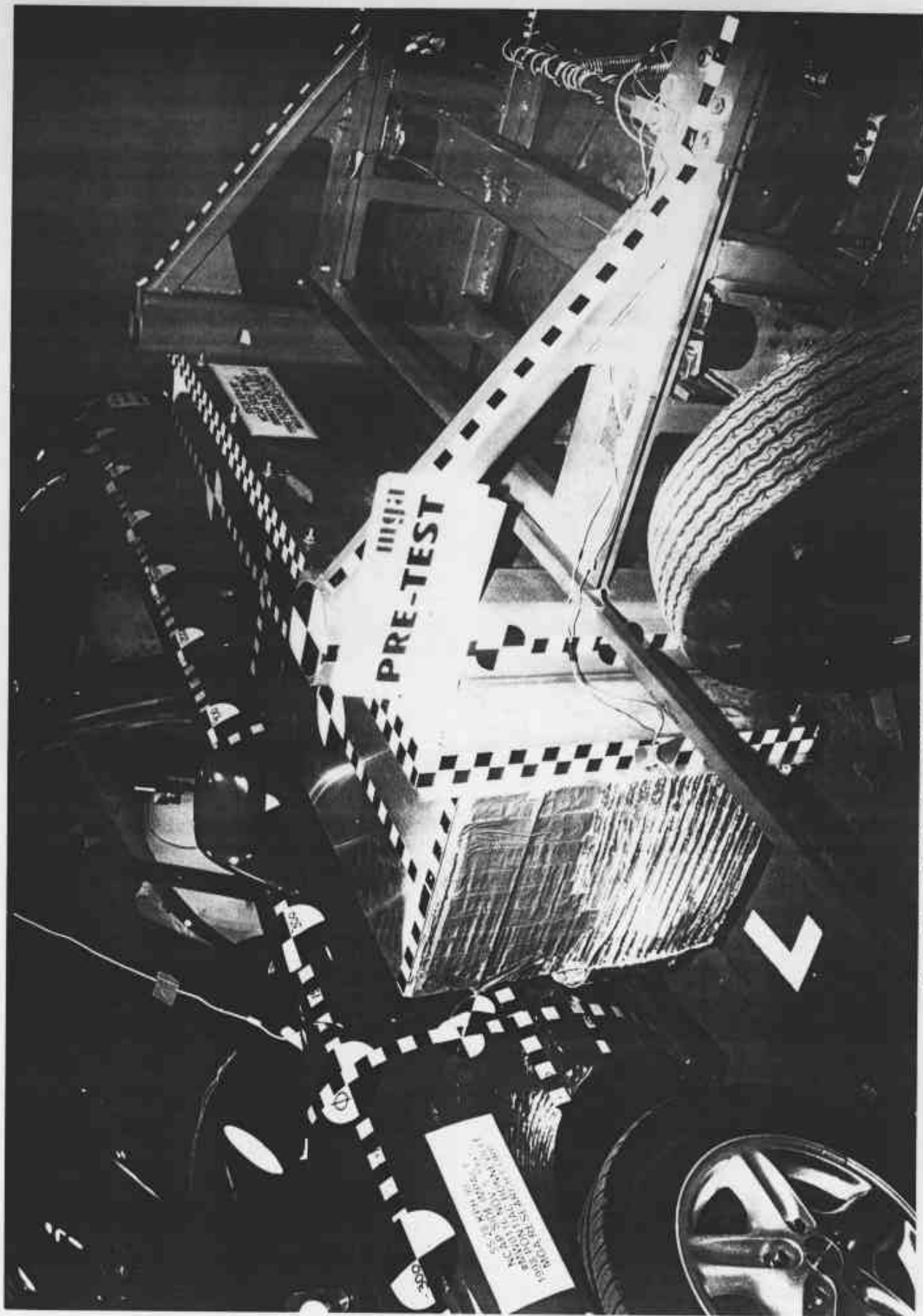


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

A-7

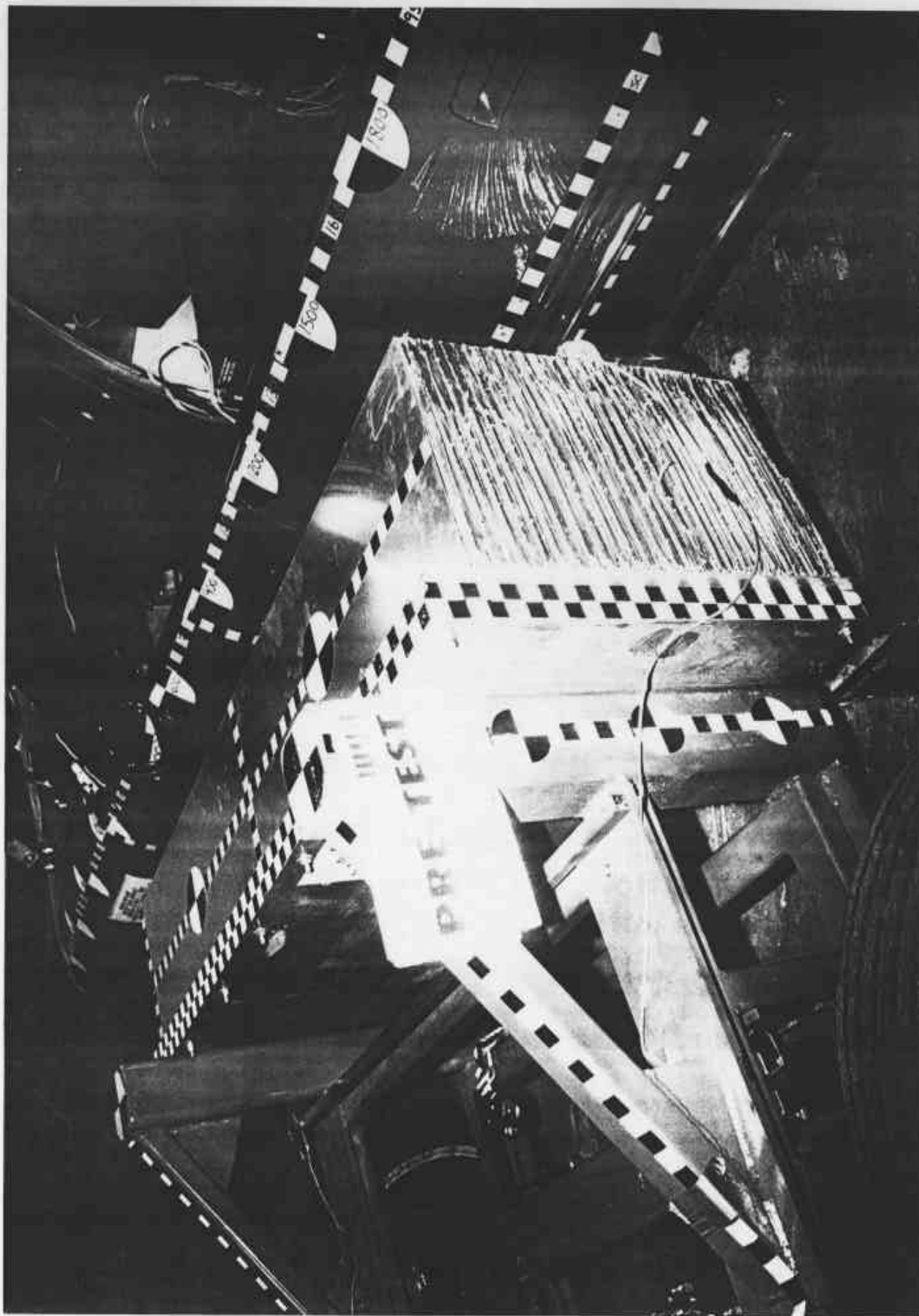


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

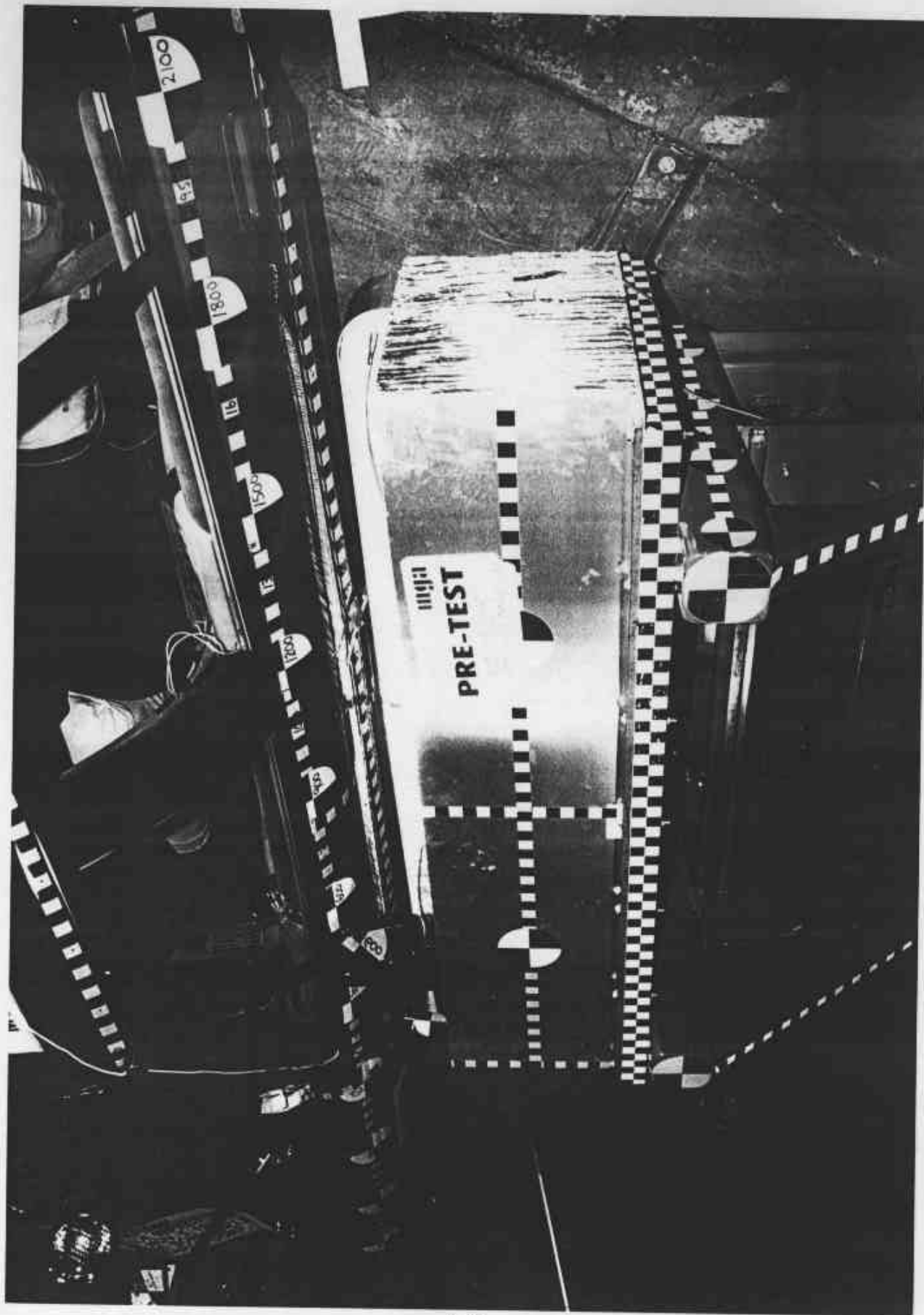


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

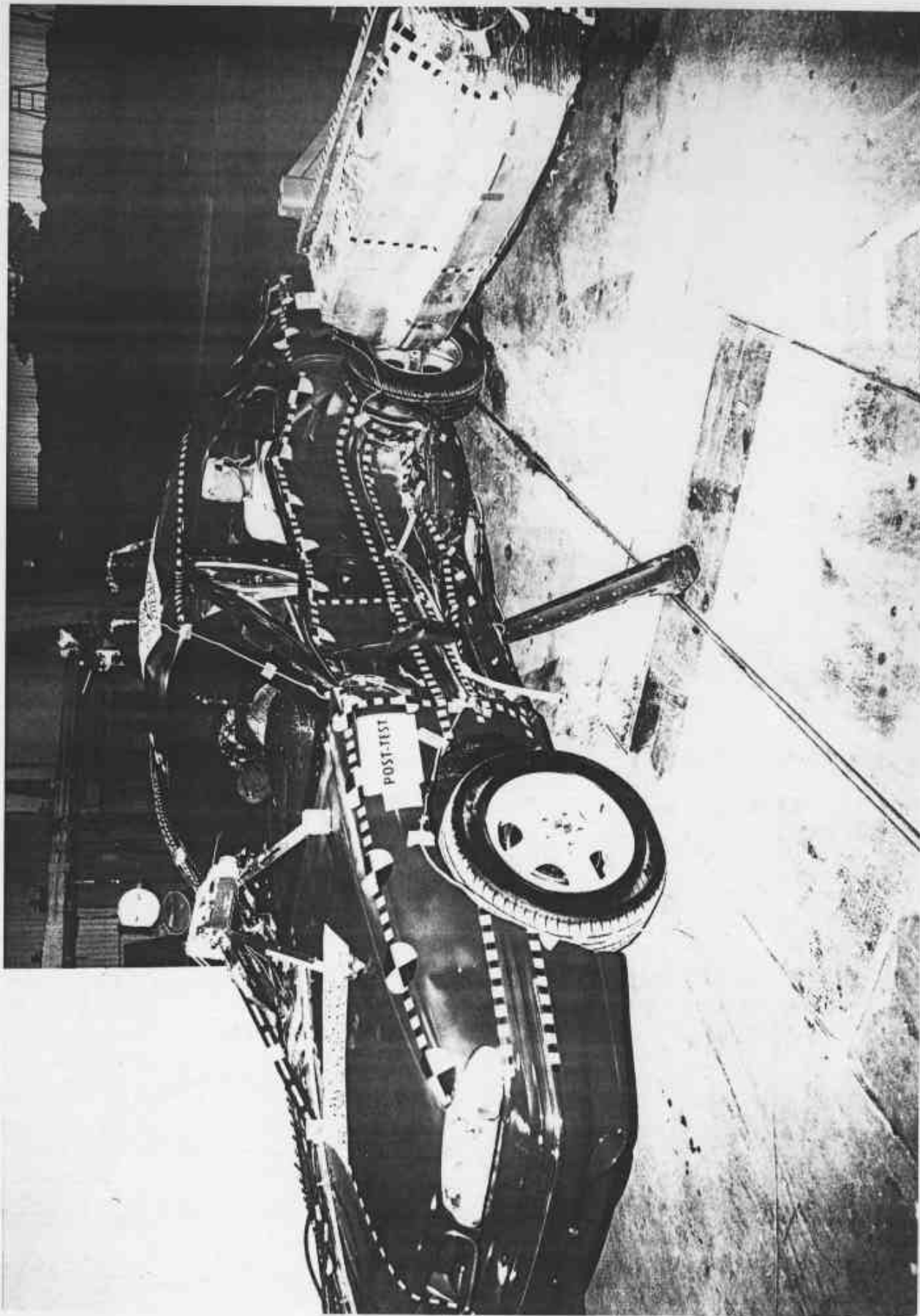


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

A-10

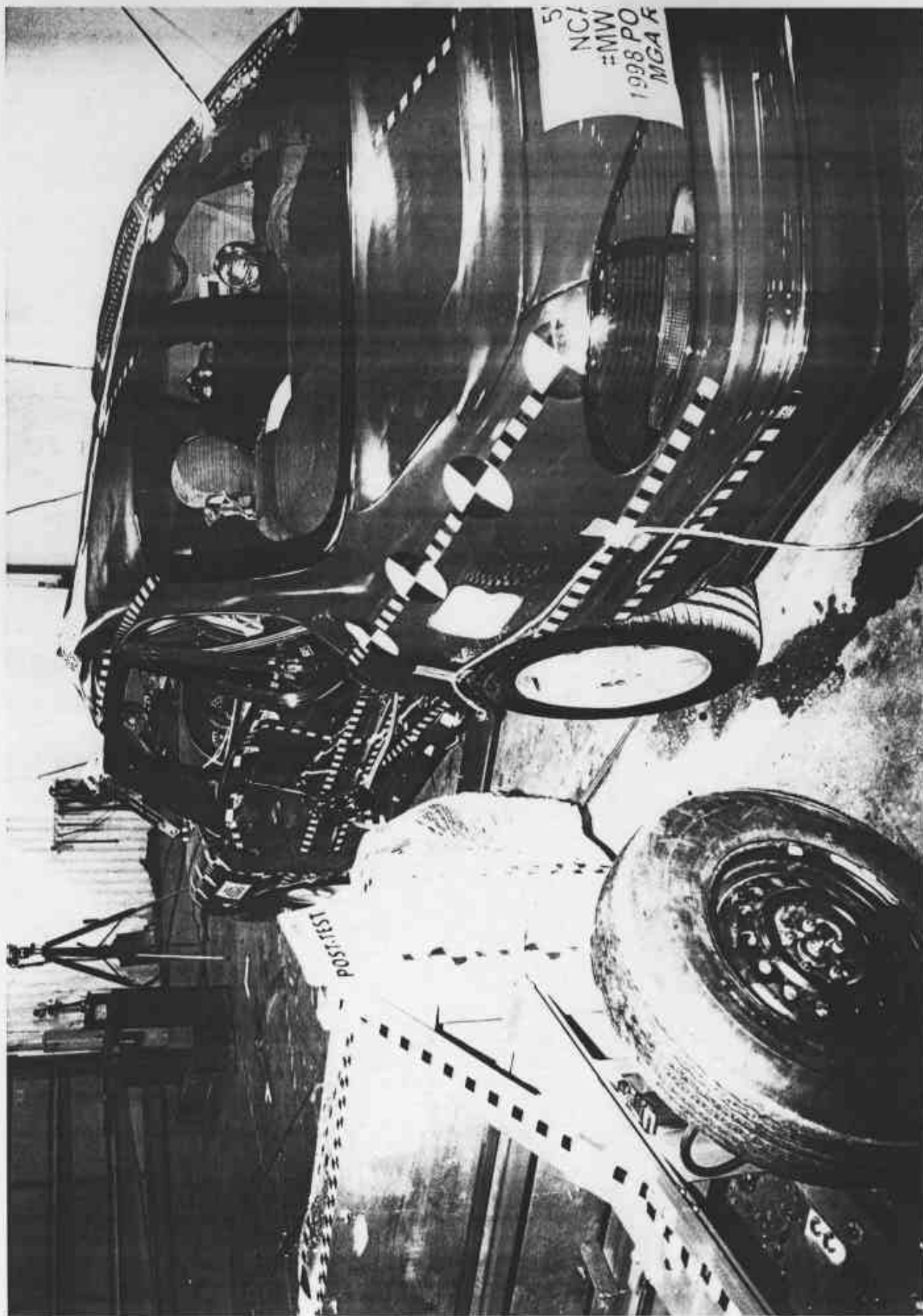


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

A-11

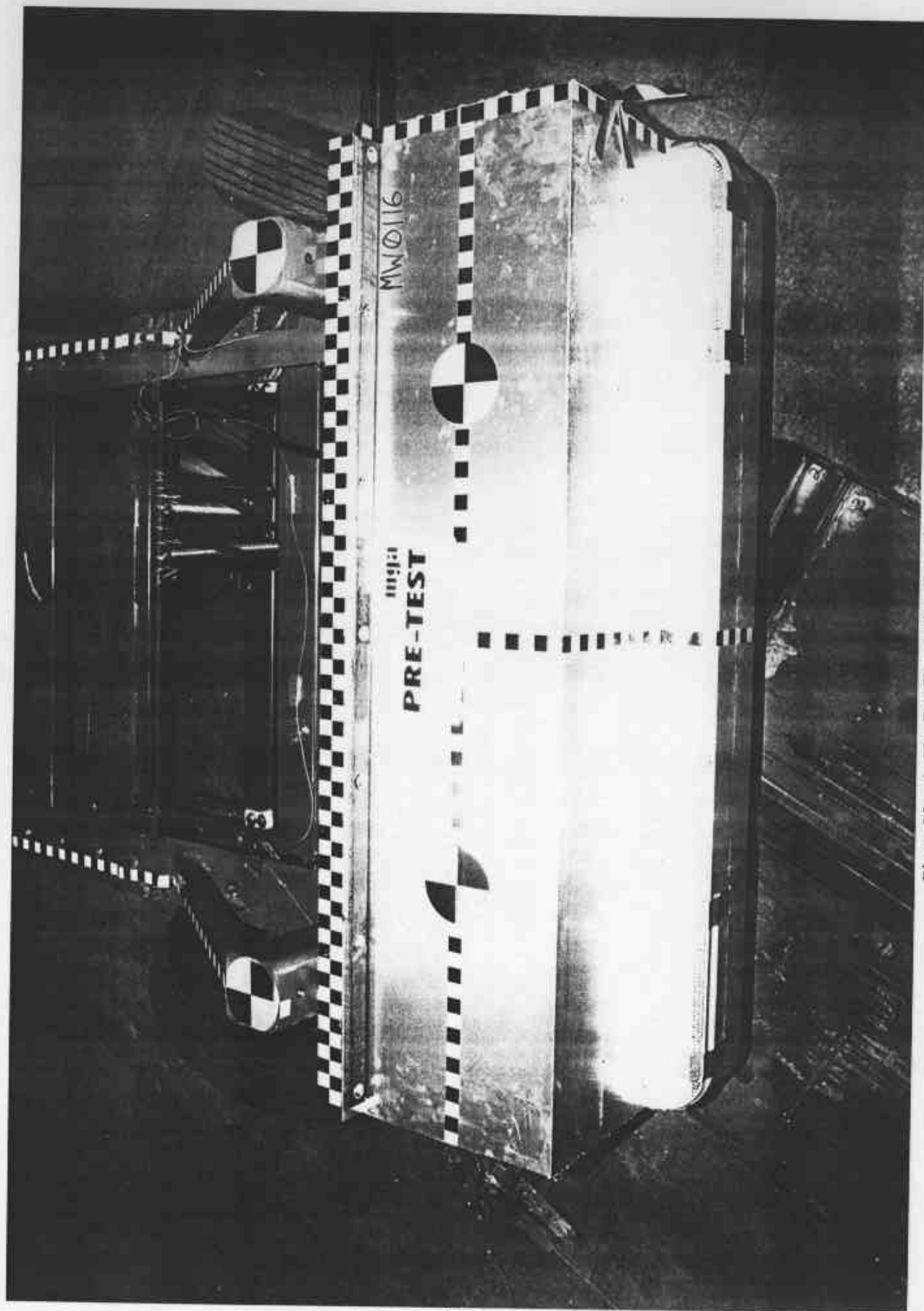
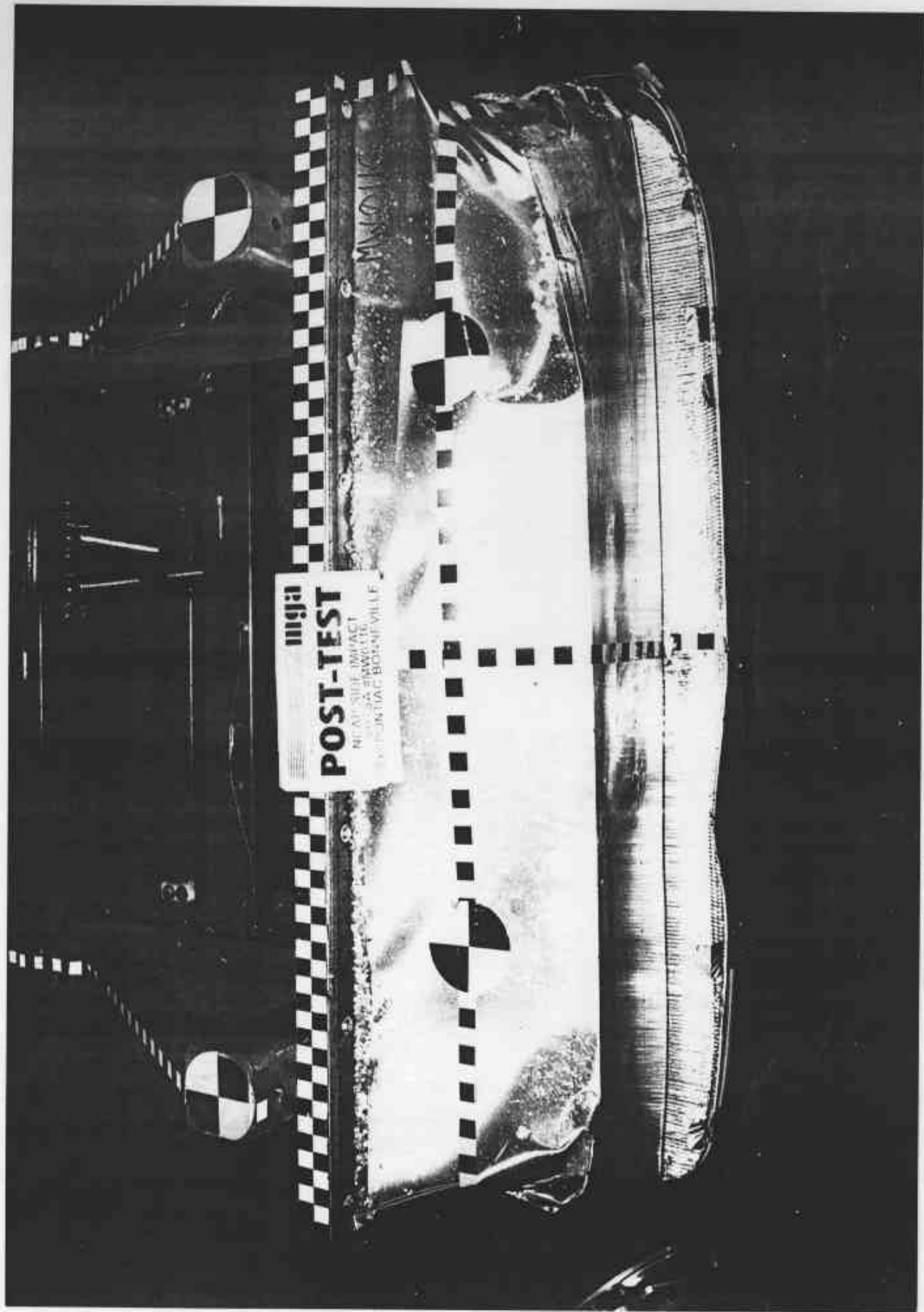


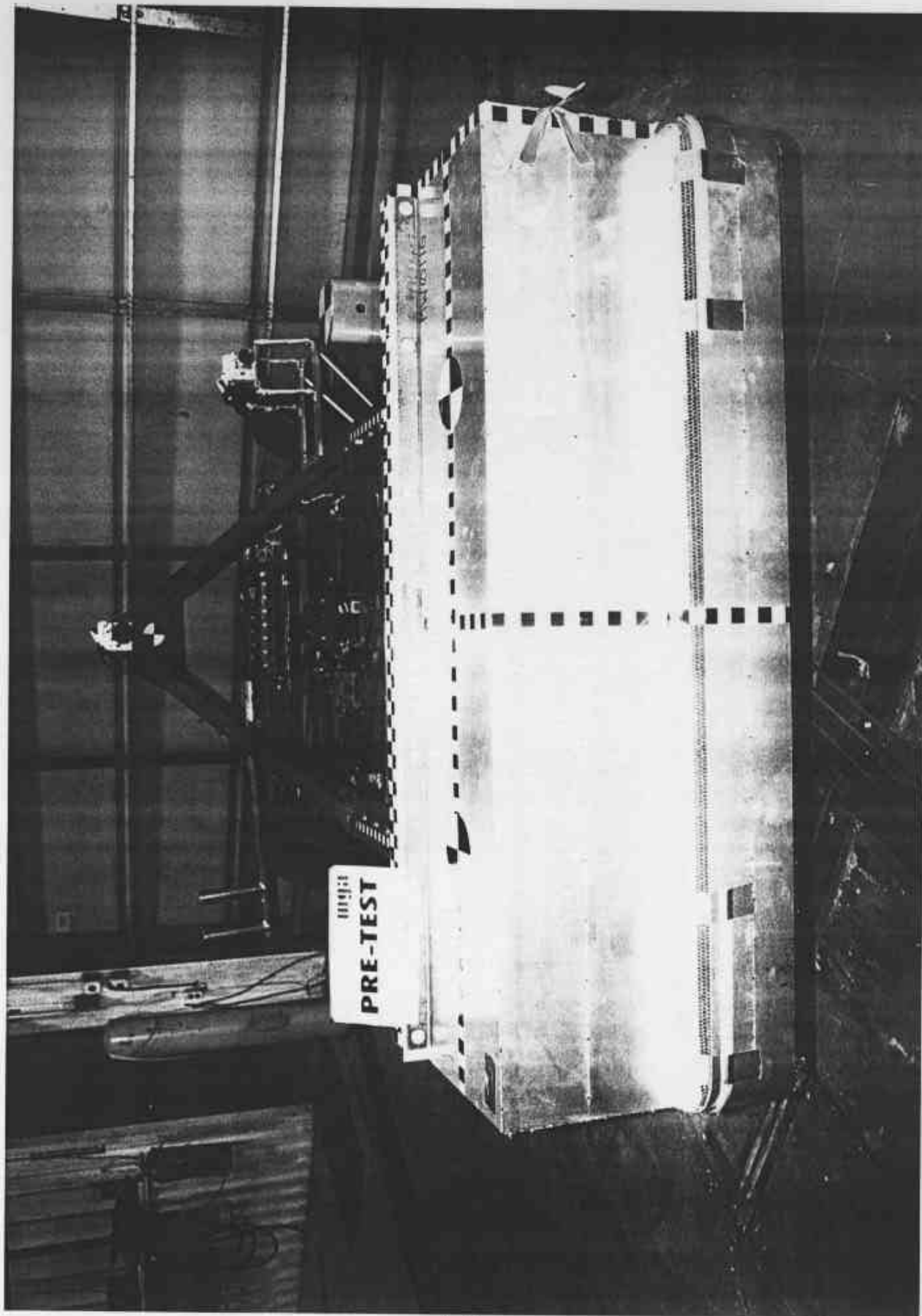
Photo No. A-12 - Pre-Test MDB Top View

A-12



A-13

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



A-14

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

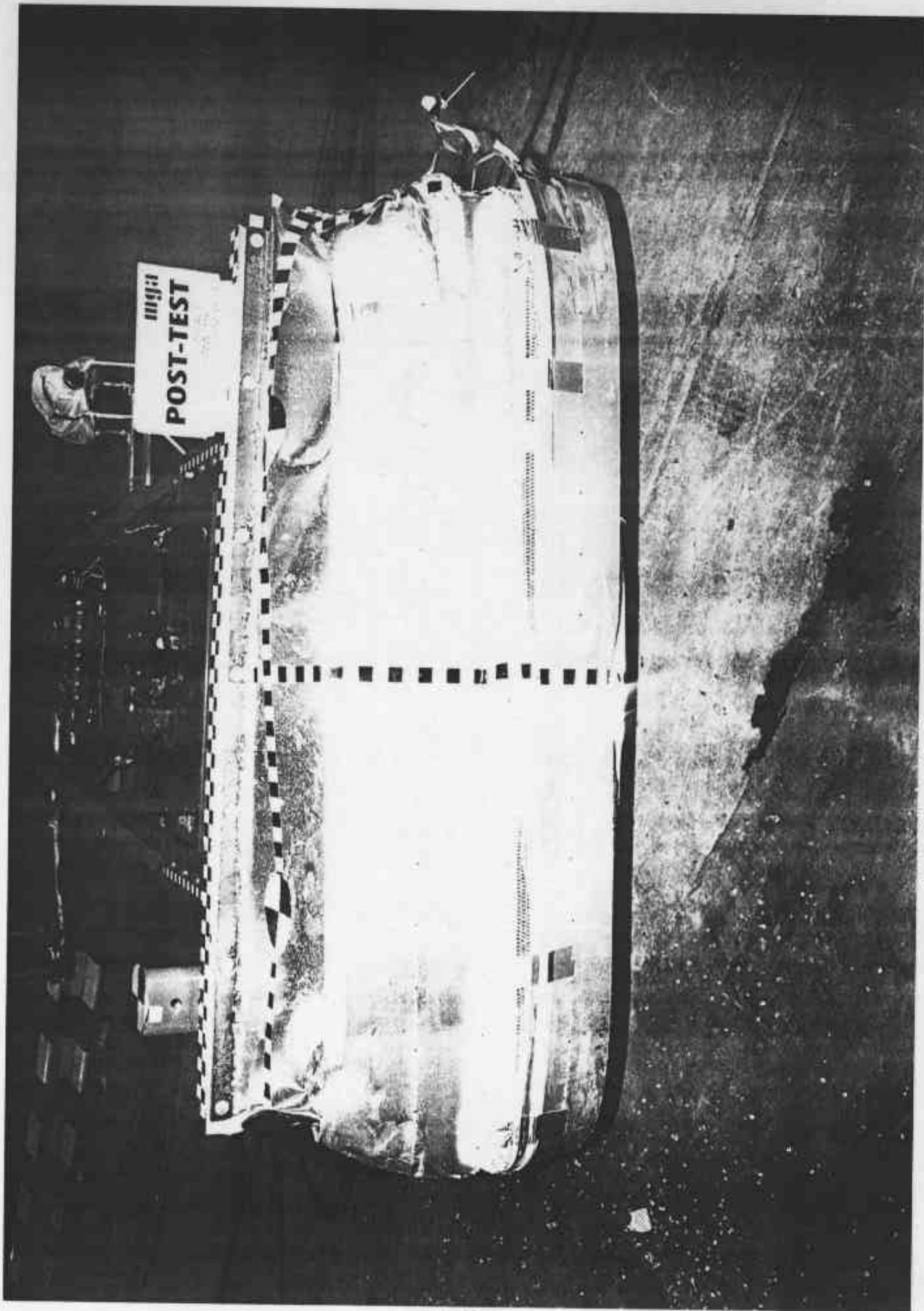
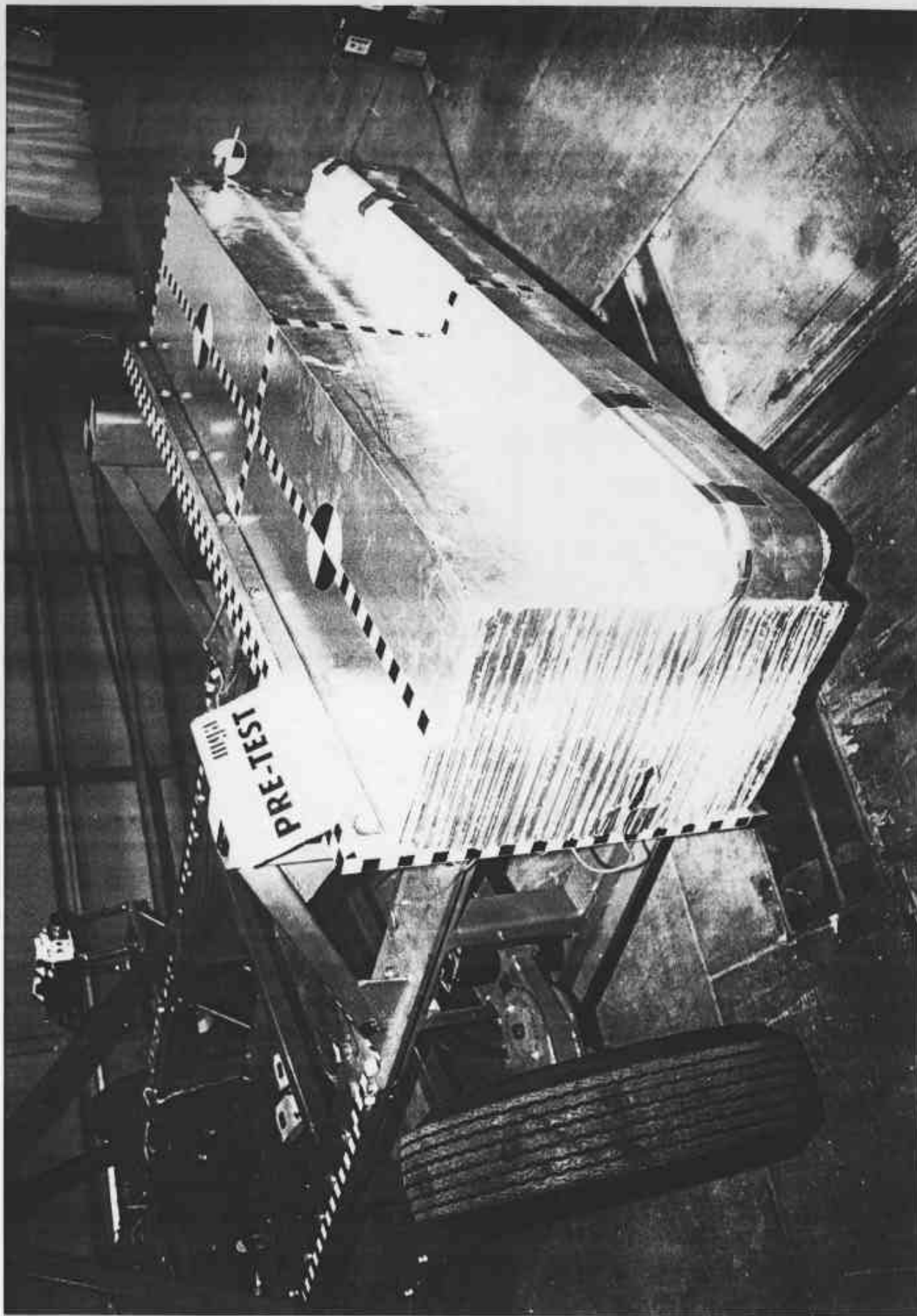


Photo No. A-15 - Post-Test MDB Front View

A-15



A-16

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

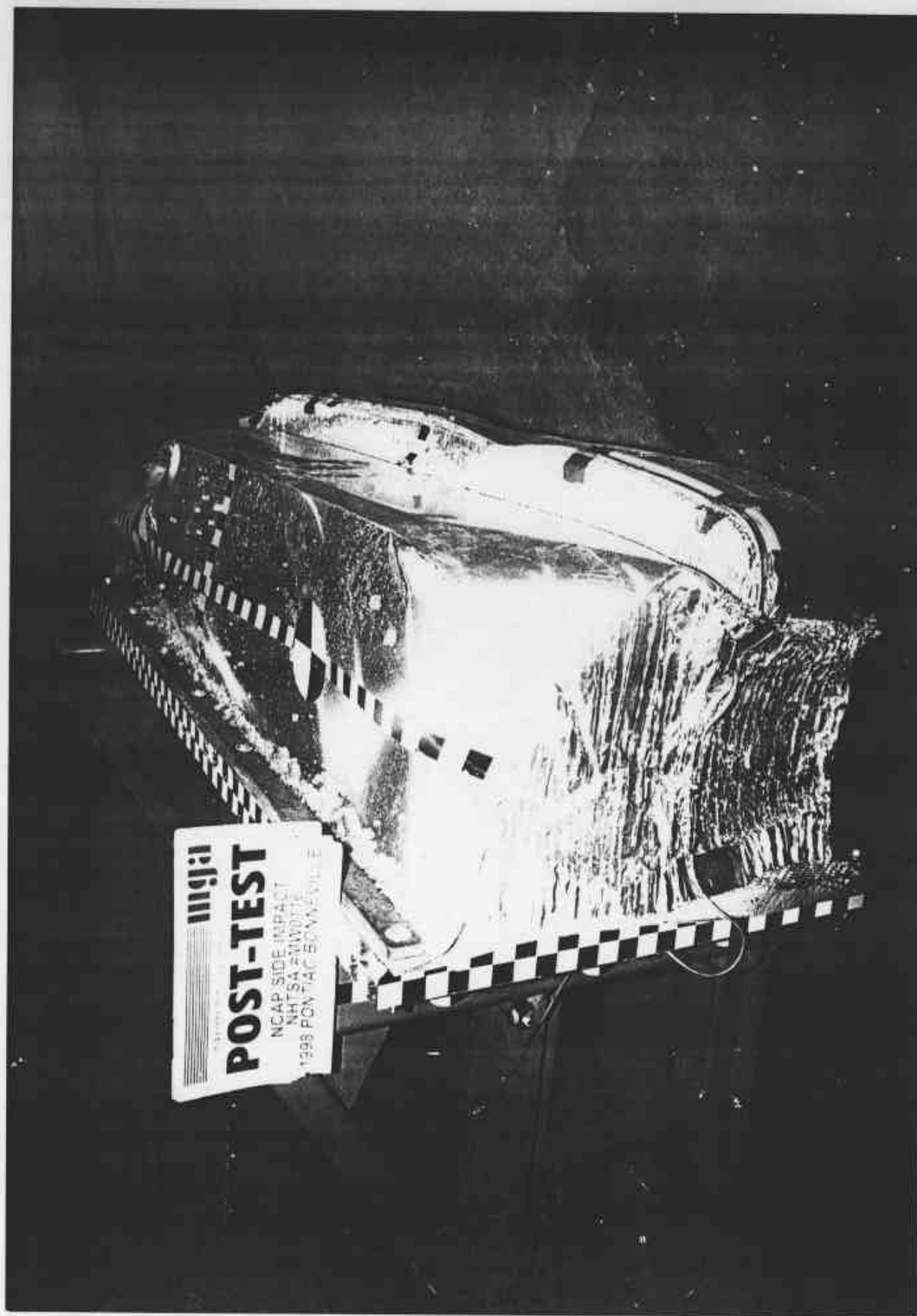


Photo No. A-17 - Post-Test MDB Right Side View

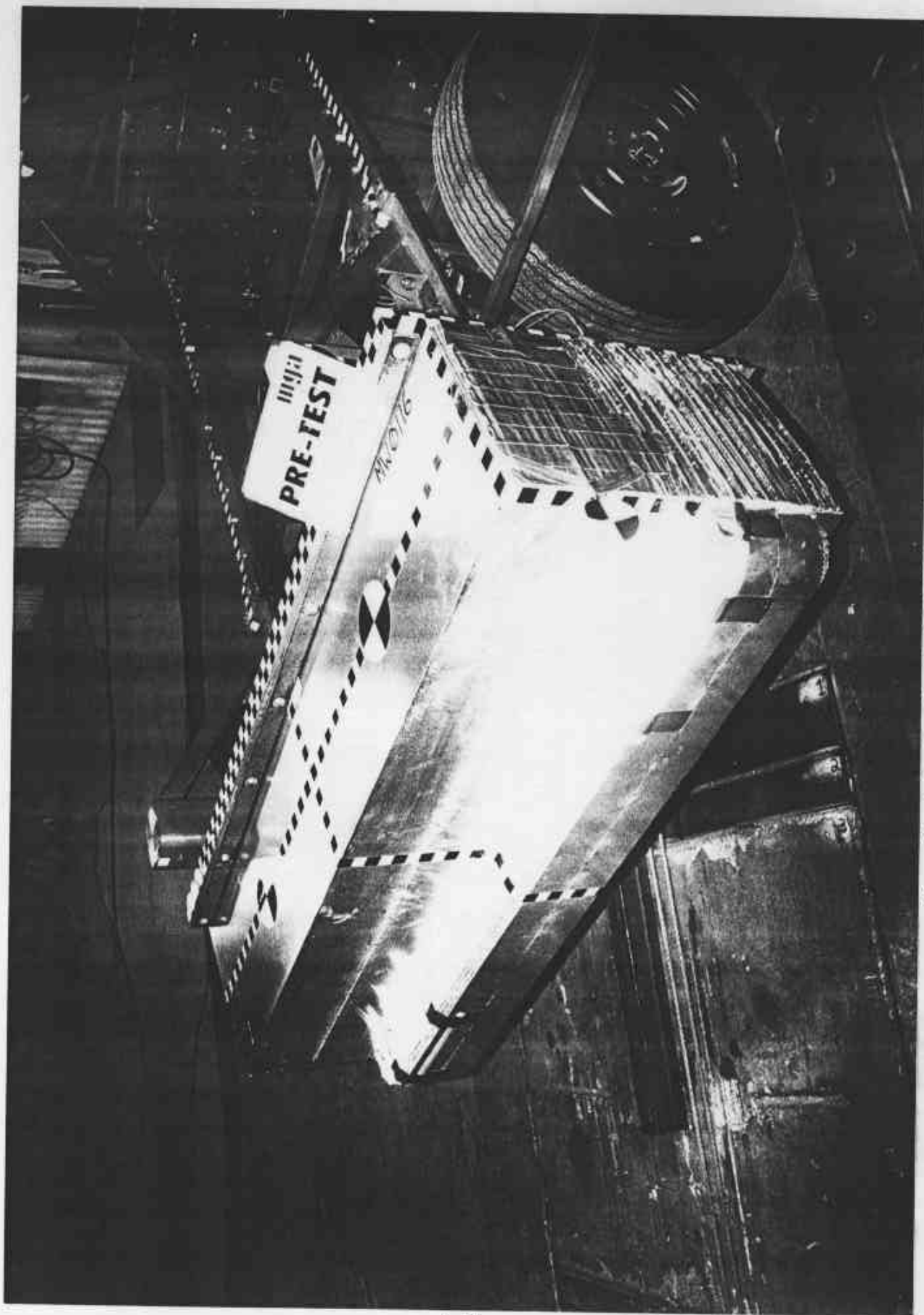


Photo No. A-18 - Pre-Test MDB Left Side View



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

A-19

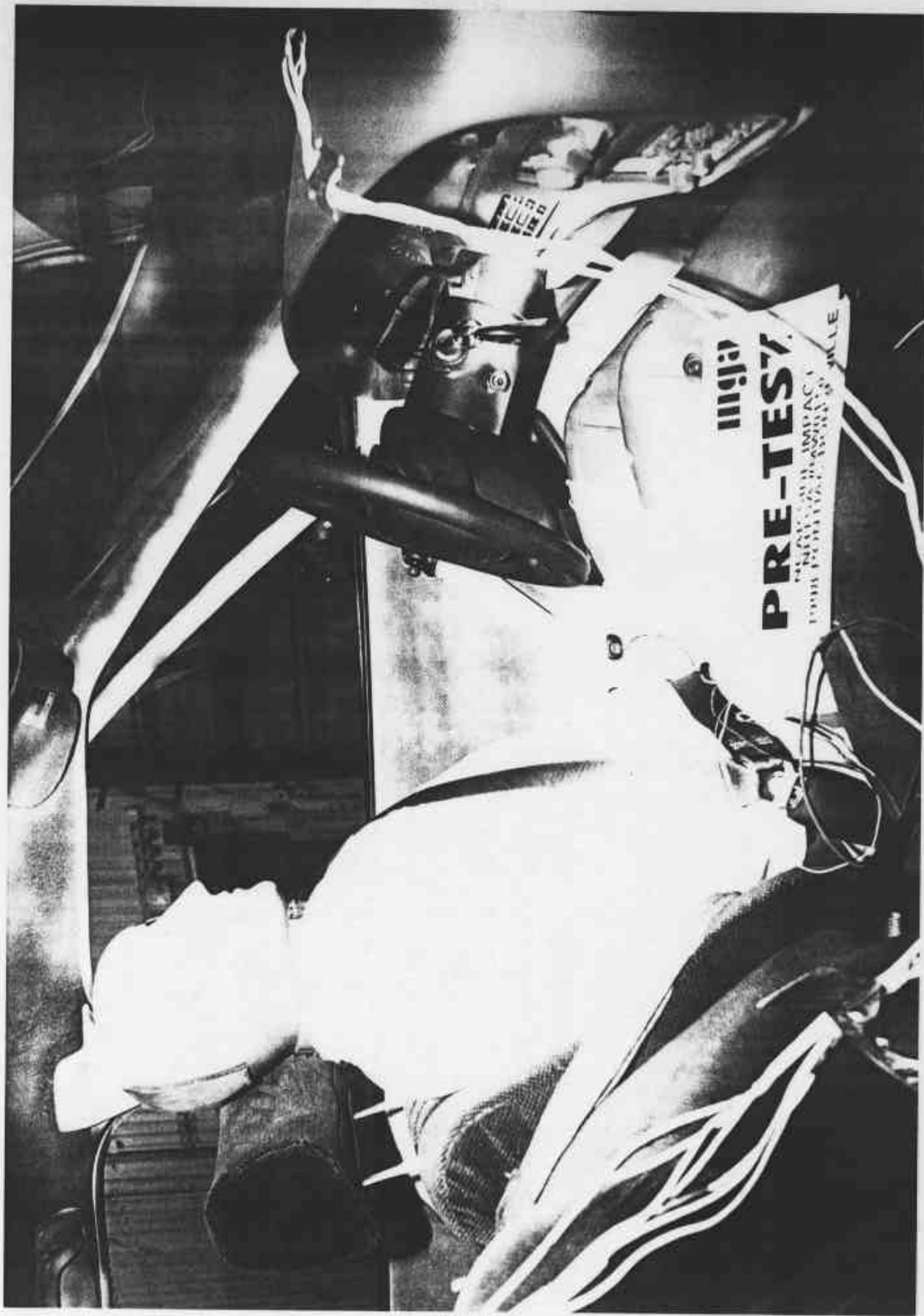


Photo No. A-20 - Pre-Test Driver Dummy Right Side View



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

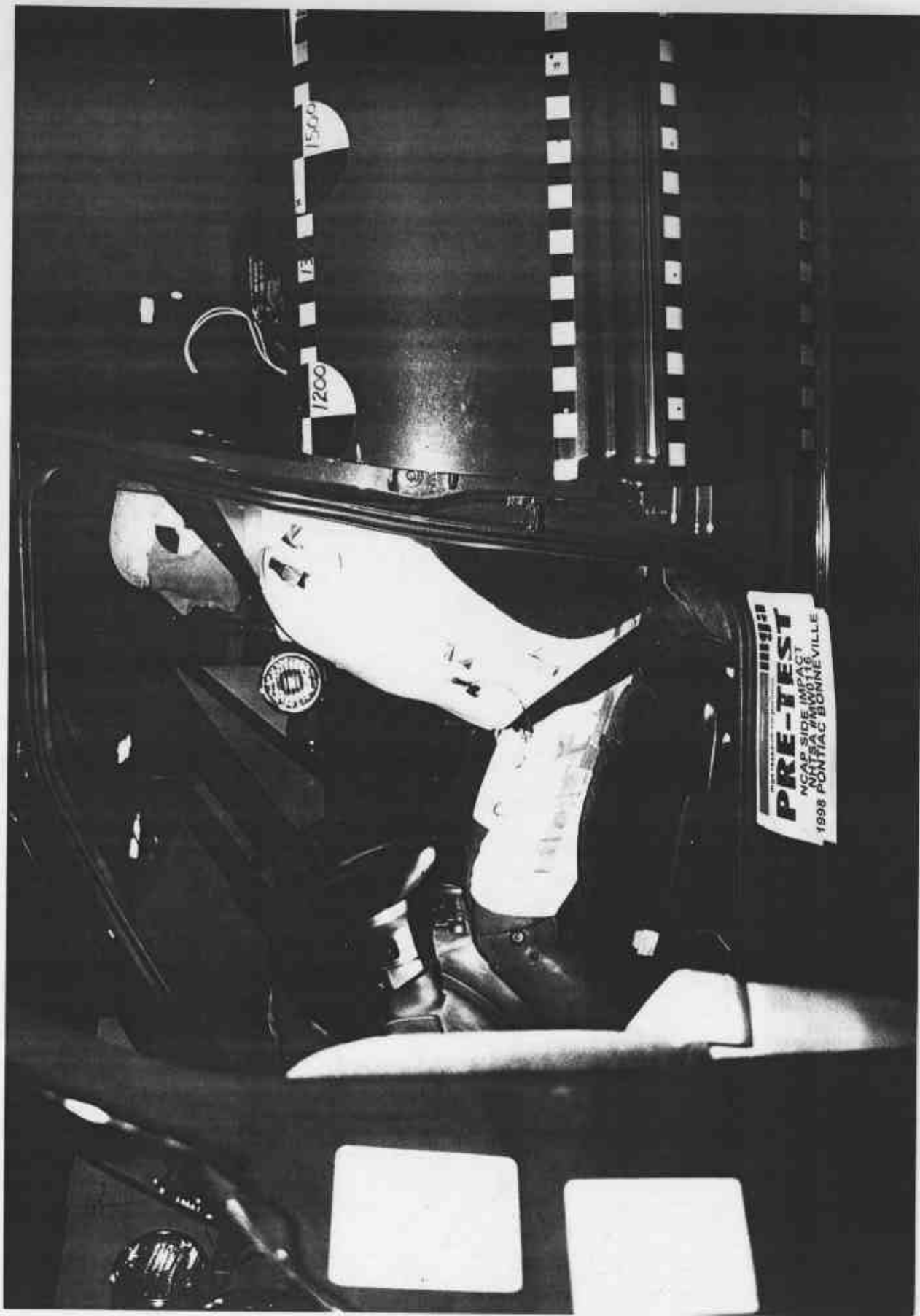


Photo No. A-22 - Pre-Test Driver Dummy Left Side View

A-22



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



A-24

Photo No. A-24 - Pre-Test Driver Dummy Left Side View (Door Open)



Photo No. A-25 - Pre-Test Driver Dummy Shoulder and Door Top View



A-26

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



Photo No. A-27 - Post-Test Driver Dummy Contact



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



ingja

POST-TEST

NCAP SIDE IMPACT

NHTSA #MW0116

1000 DONATIAC RONNEVILLE

Photo No. A-29 - Post-Test Driver Dummy Head Contact

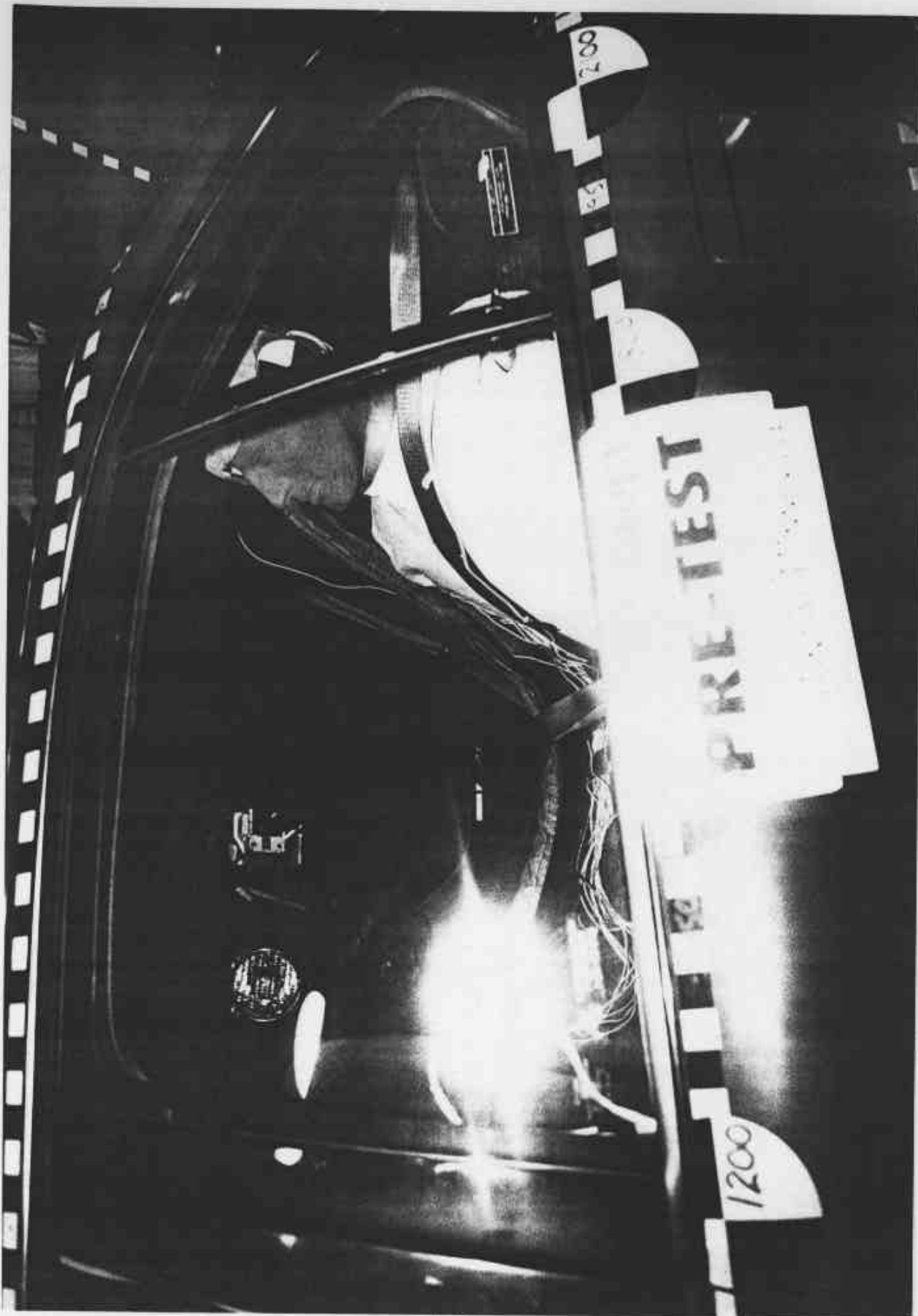


A-30

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



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



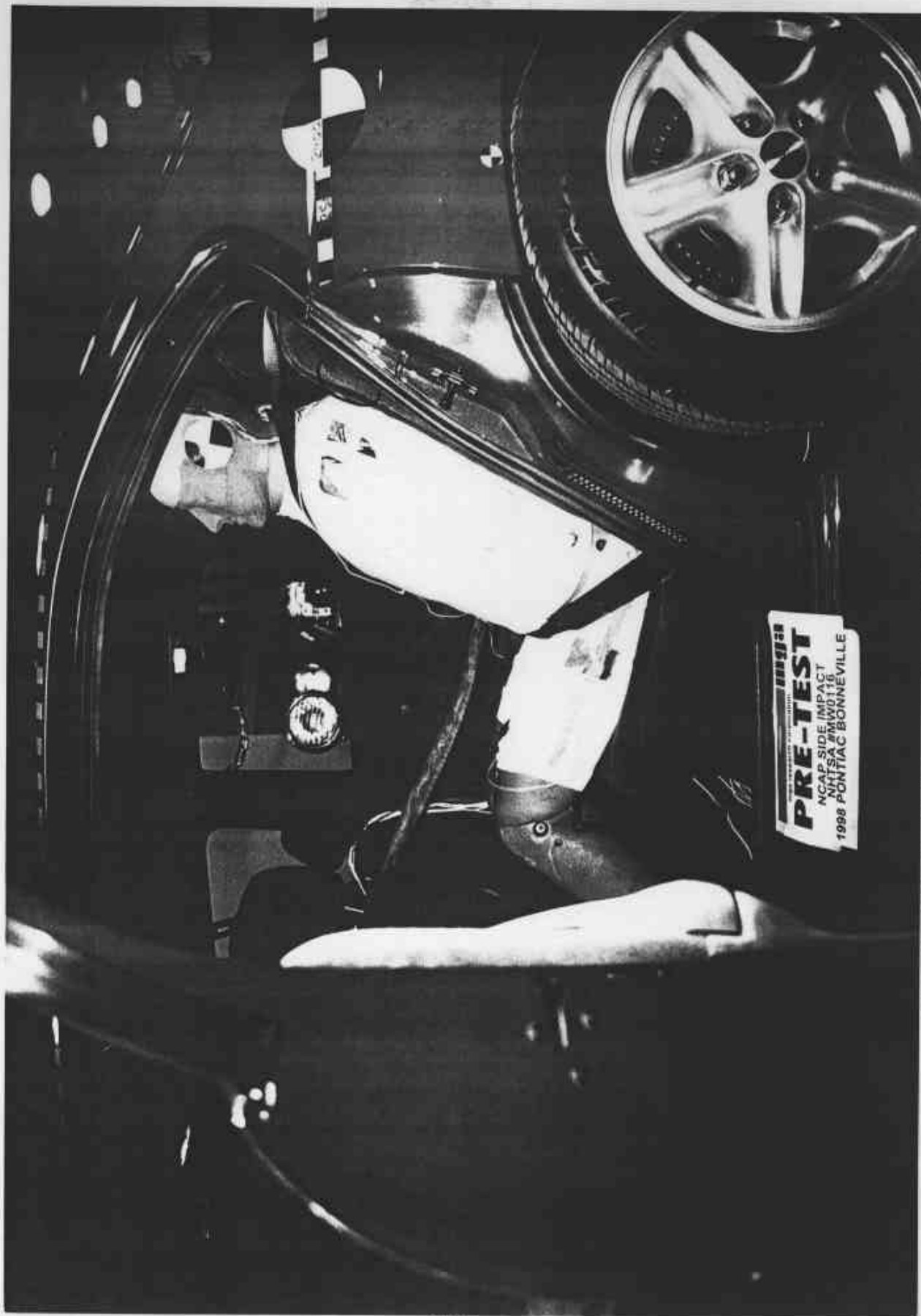
A-32

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



Photo No. A-33 - Post-Test Passenger Dummy Left Side View

A-33



A-34

Photo No. A-34 - Pre-Test Passenger Dummy Left Side View (Door Open)



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



Photo No. A-36 - Post-Test Passenger Dummy Shoulder and Door Top View



Photo No. A-37 - Post-Test Passenger Dummy Contact

A-37



Photo No. A-38 - Post-Test Passenger Dummy Head Contact

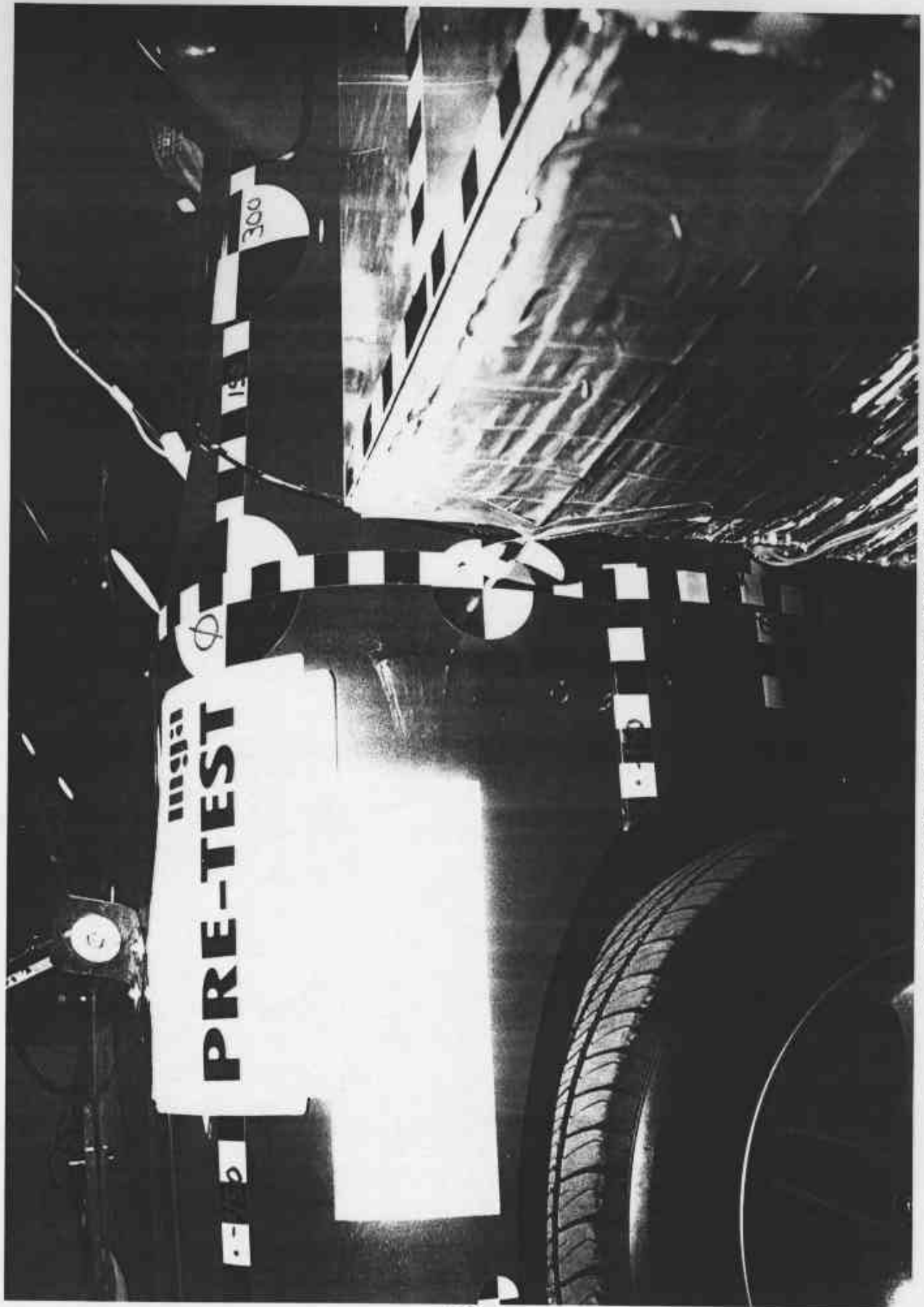


Photo No. A-39 - Pre-Test Left Front Impact Point on Vehicle



Photo No. A-40 - Post-Test Left Front Impact Point on Vehicle

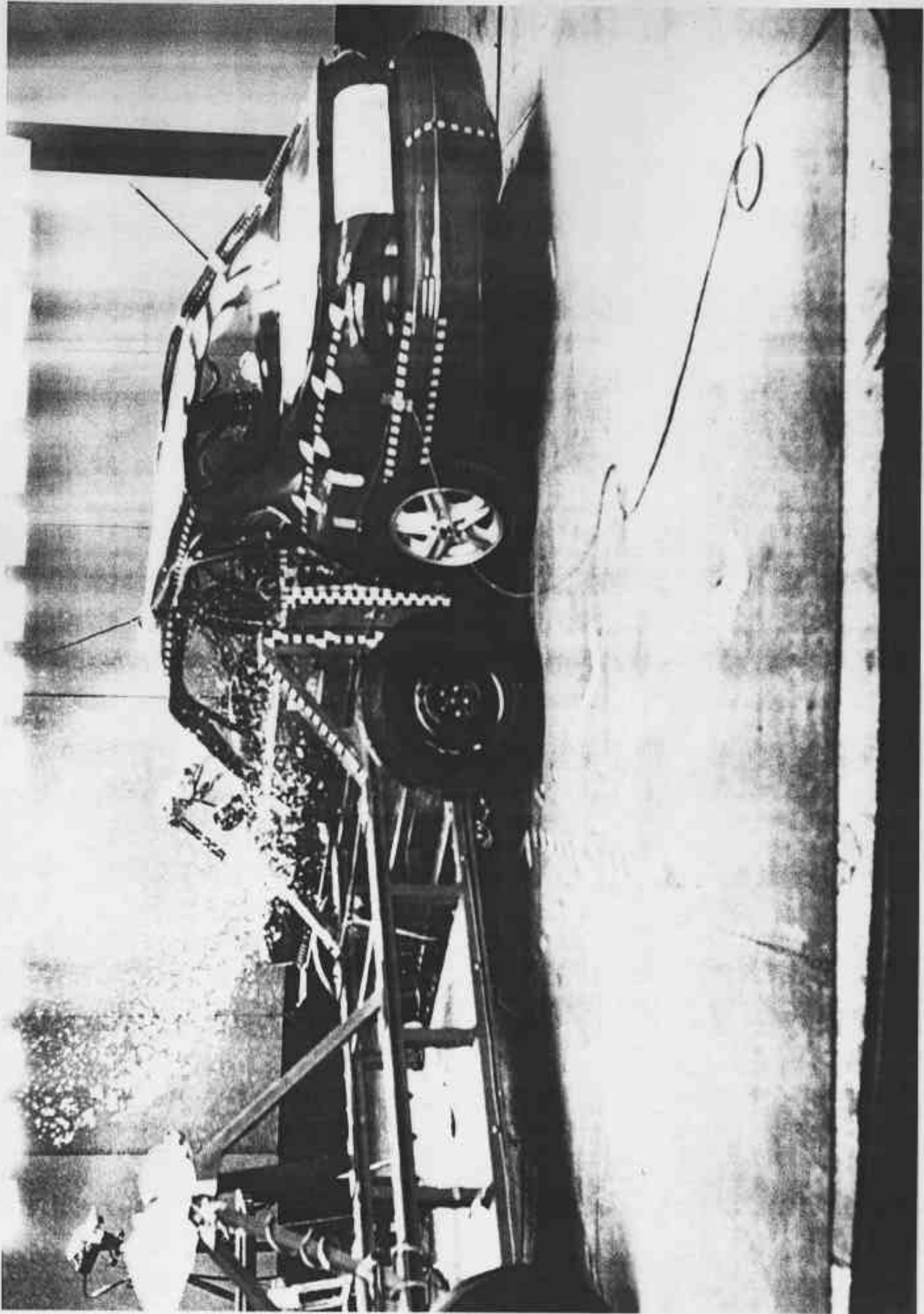


Photo No. A-41 - Impact

A-41



MFD BY GENERAL MOTORS CORP

DATE
08/97

GVWR
2088 KG
4602 LB

GAWR FRT
1144 KG
2522 LB

GAWR RR
944 KG
2080 LB

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.

1G2HX52K0W4202434

TYPE: PASS CAR



T
OCCU
FRT. CTR.
3 0

MAX. LOADING @ GVW
1G2HX52K0W4202
MODEL: HX69 HAR

TIRE SIZE
FRT P225/60R16
RR P225/60R16
SPA T135/70R15

IF TIRES ARE HOT, ADD
SEE OWNER'S MANUAL

Photo No. A-42 - Vehicle Certification Label

OTORS CORP

WR FRT
144 KG
122 LB

GAWR RR
944 KG
2080 LB

ABLE U.S. FEDERAL MOTOR
REVENTION STANDARDS IN
SHOWN ABOVE.

ASS CAR
A-43



TIRE - LOADING INFORMATION

OCCUPANTS			VEHICLE CAP. WT.	
FRT.	CTR.	RR.	TOTAL	KG LBS
3	0	3	6	488 1076

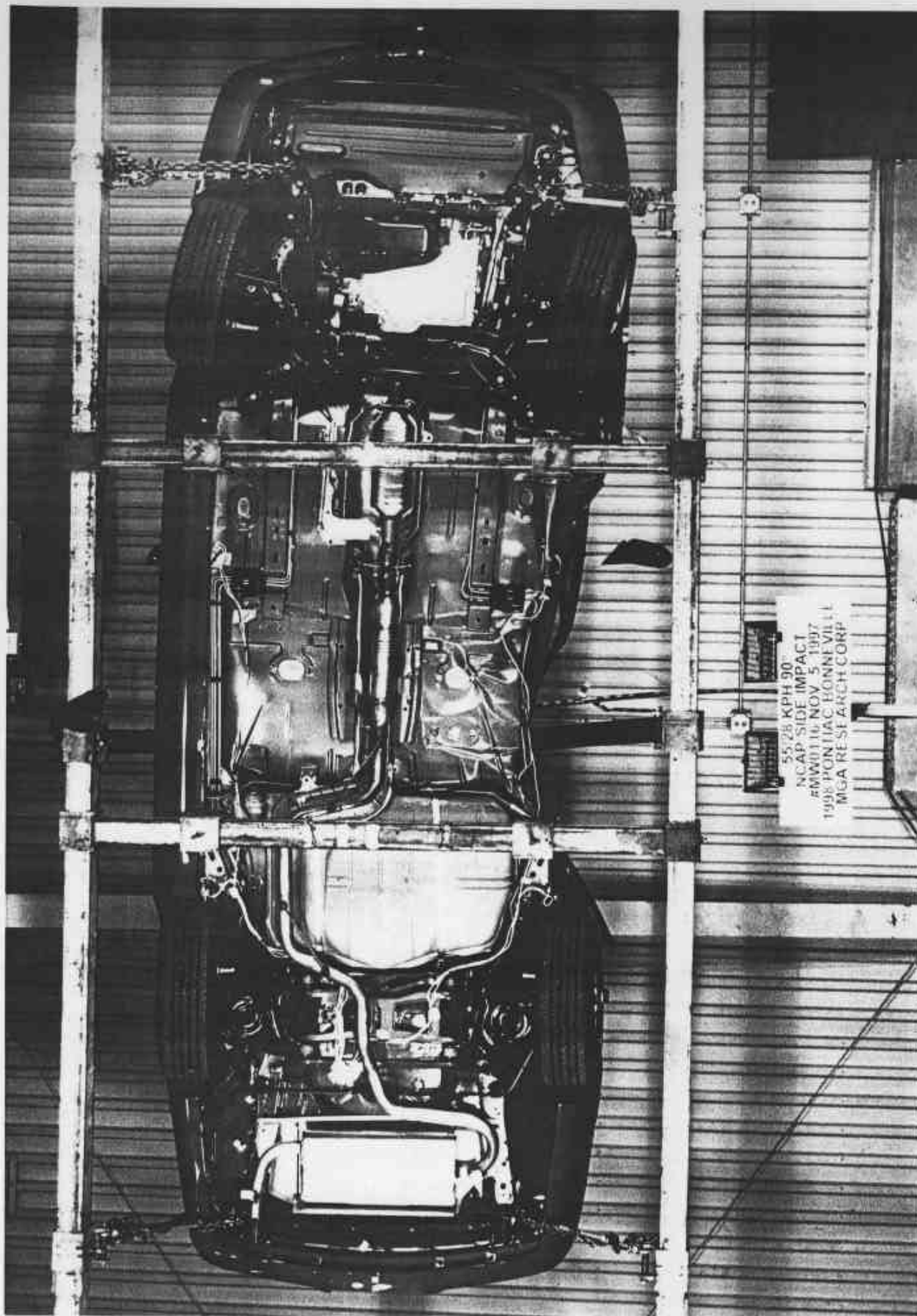
MAX. LOADING @ GVWR SAME AS VEHICLE CAPACITY WEIGHT.
1G2HX52K0W4202434

MODEL: HX69 HAR

TIRE SIZE		SPEED RTG	COLD TIRE PRESSURE
FRT	P225/60R16	S	210KPA(30PSI)
RR	P225/60R16	S	210KPA(30PSI)
SPA	T135/70R15	M	420KPA(60PSI)

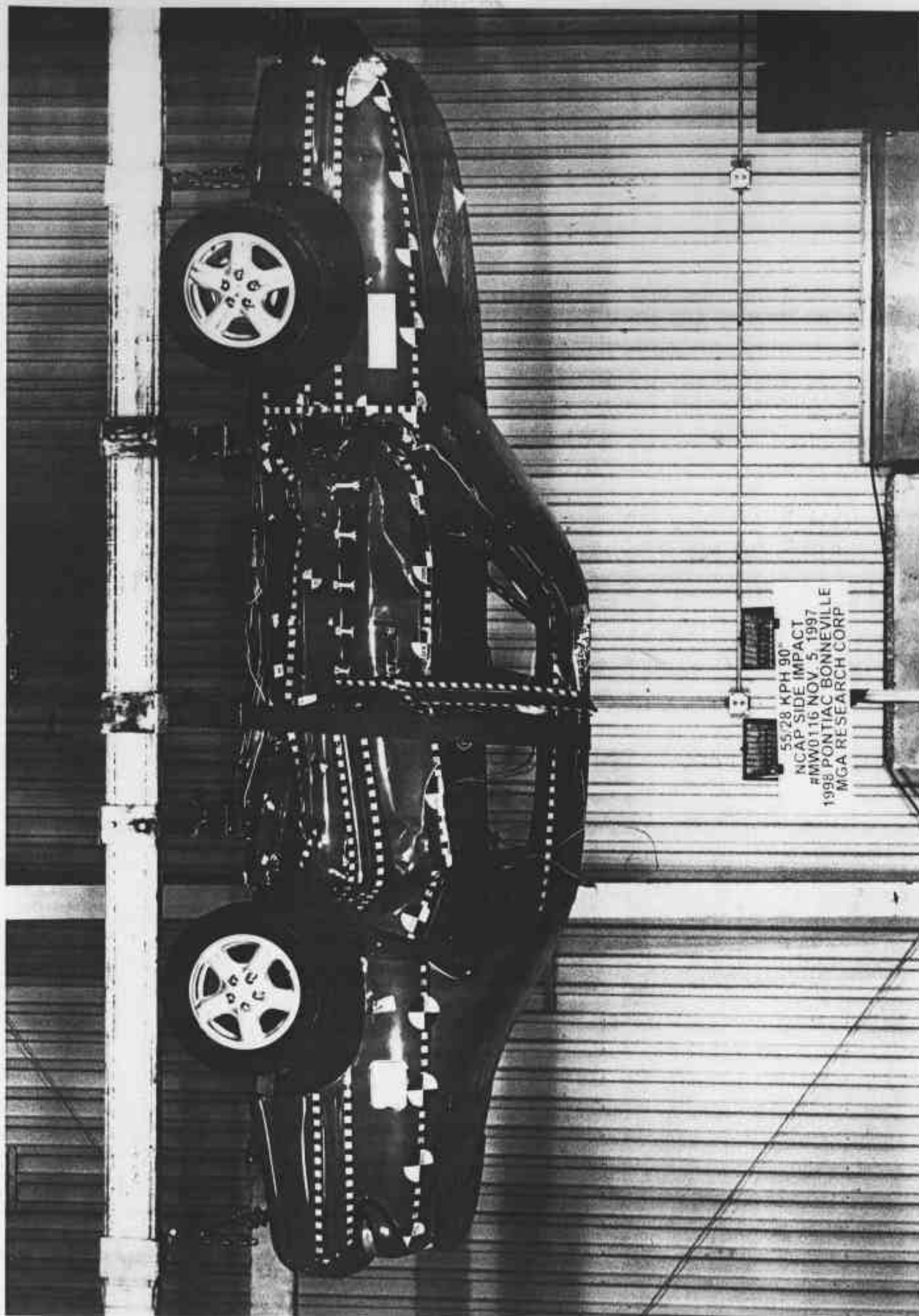
IF TIRES ARE HOT, ADD 28KPA(4LBS)

SEE OWNER'S MANUAL FOR MORE INFORMATION



A-44

Photo No. A-44 - Rollover 90°



55.28 KPH 90°
NCAP SIDE IMPACT
#MW0116 NOV. 5, 1997
1998 PONTIAC BONNEVILLE
MGA RESEARCH CORP

Photo No. A-45 - Rollover 180°

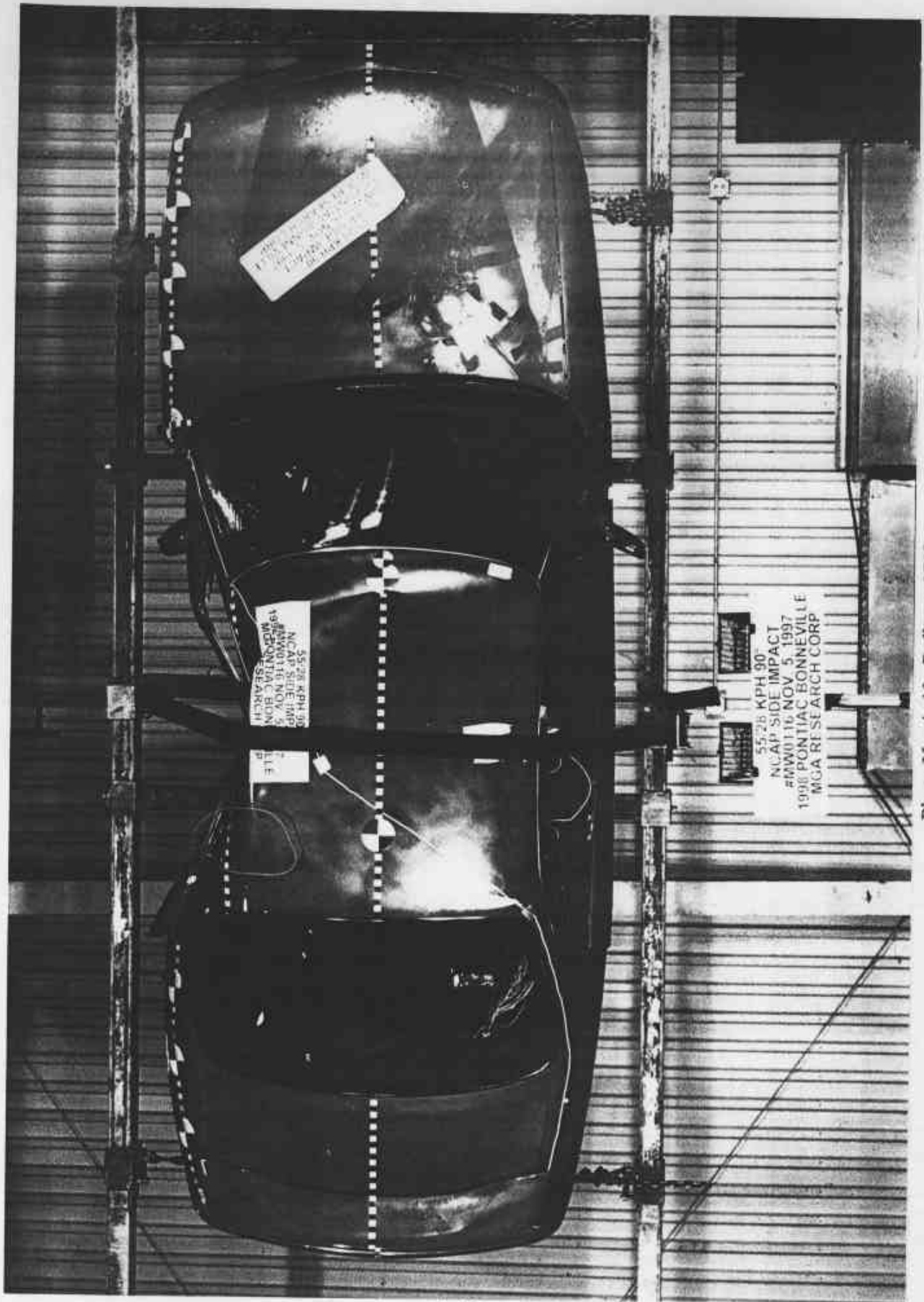
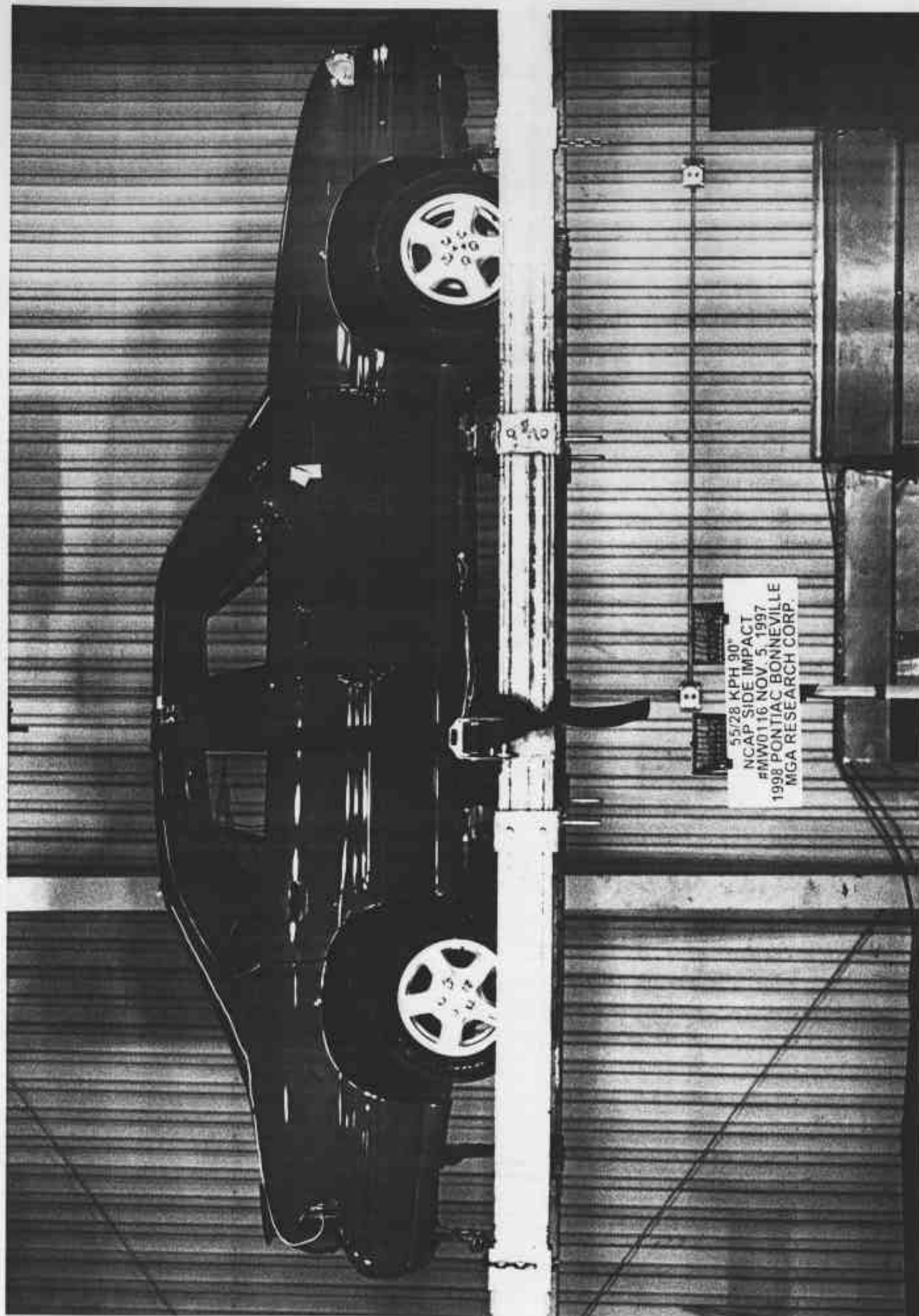


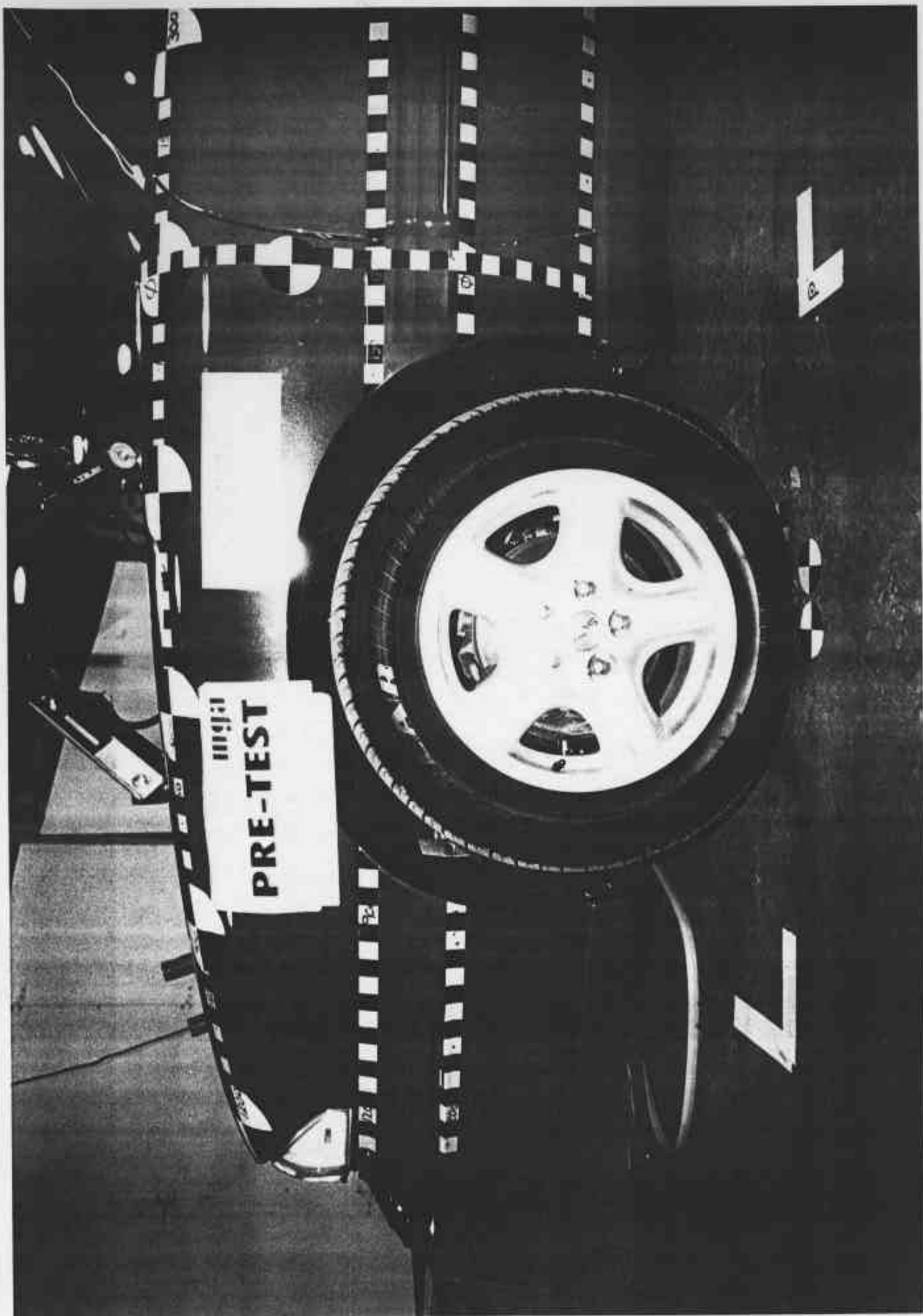
Photo No. A-46 - Rollover 270°

A-46



A-47

Photo No. A-47 - Rollover 360°



A-48

Photo No. A-48 - Left Front Attitude Point

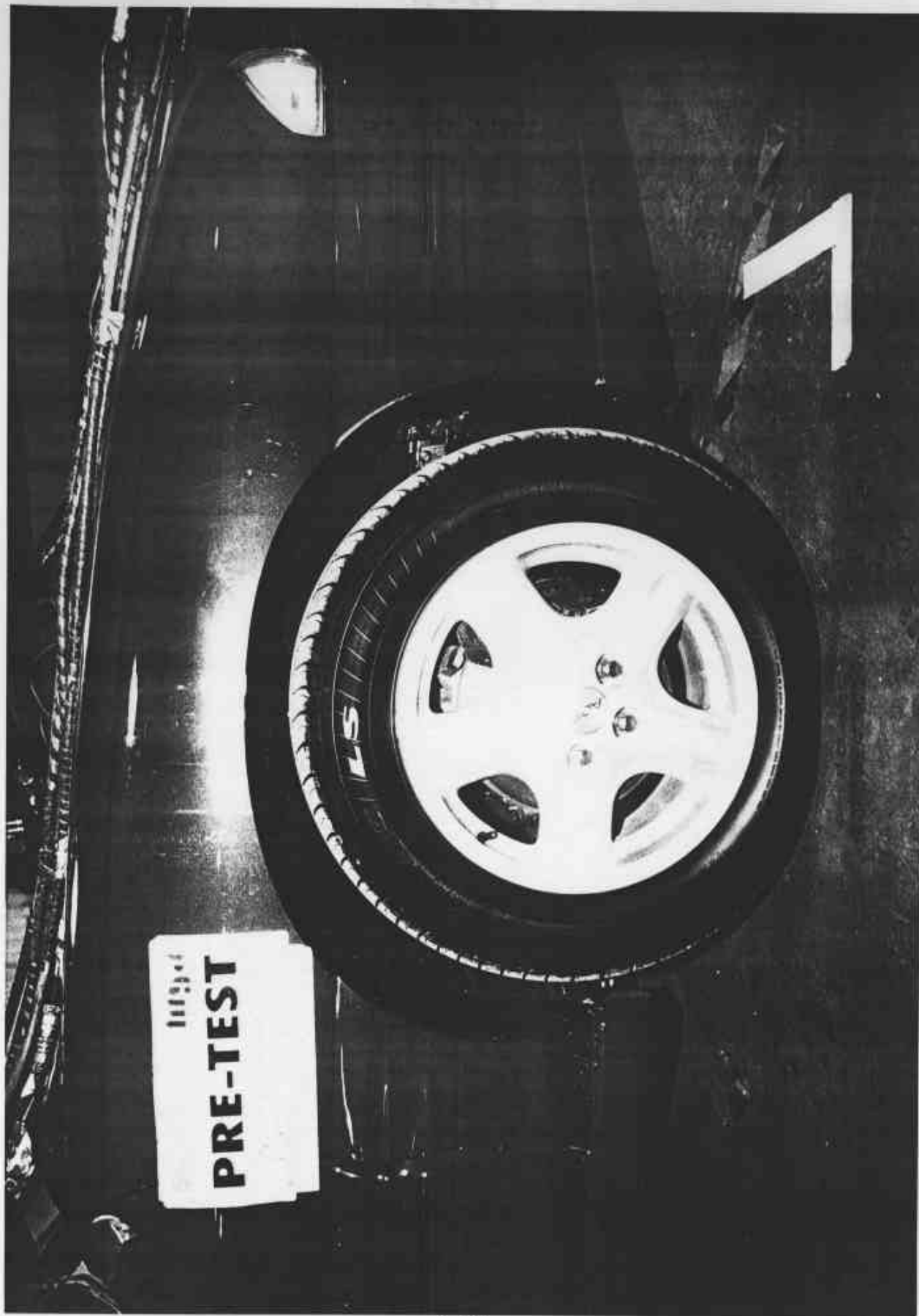
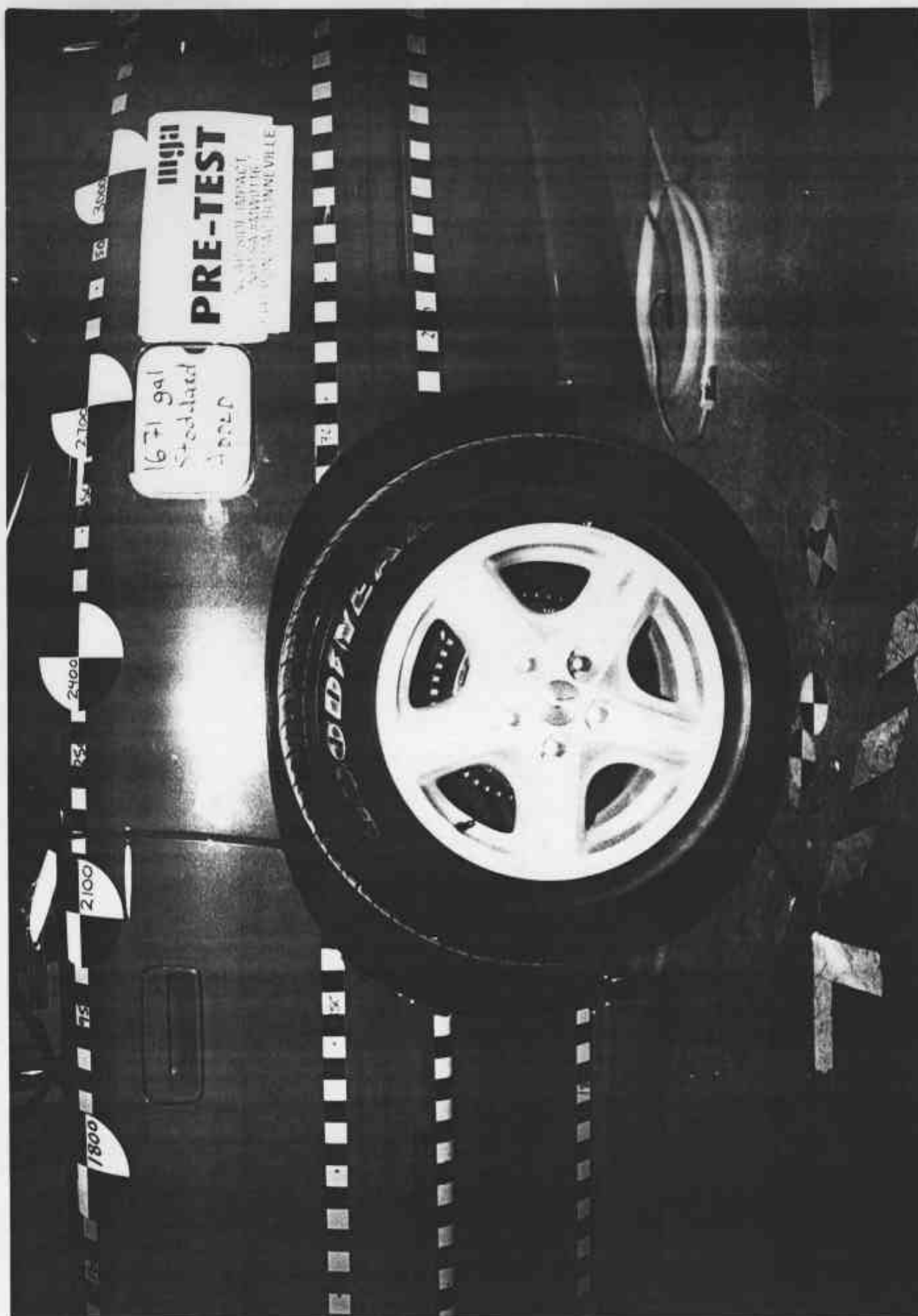
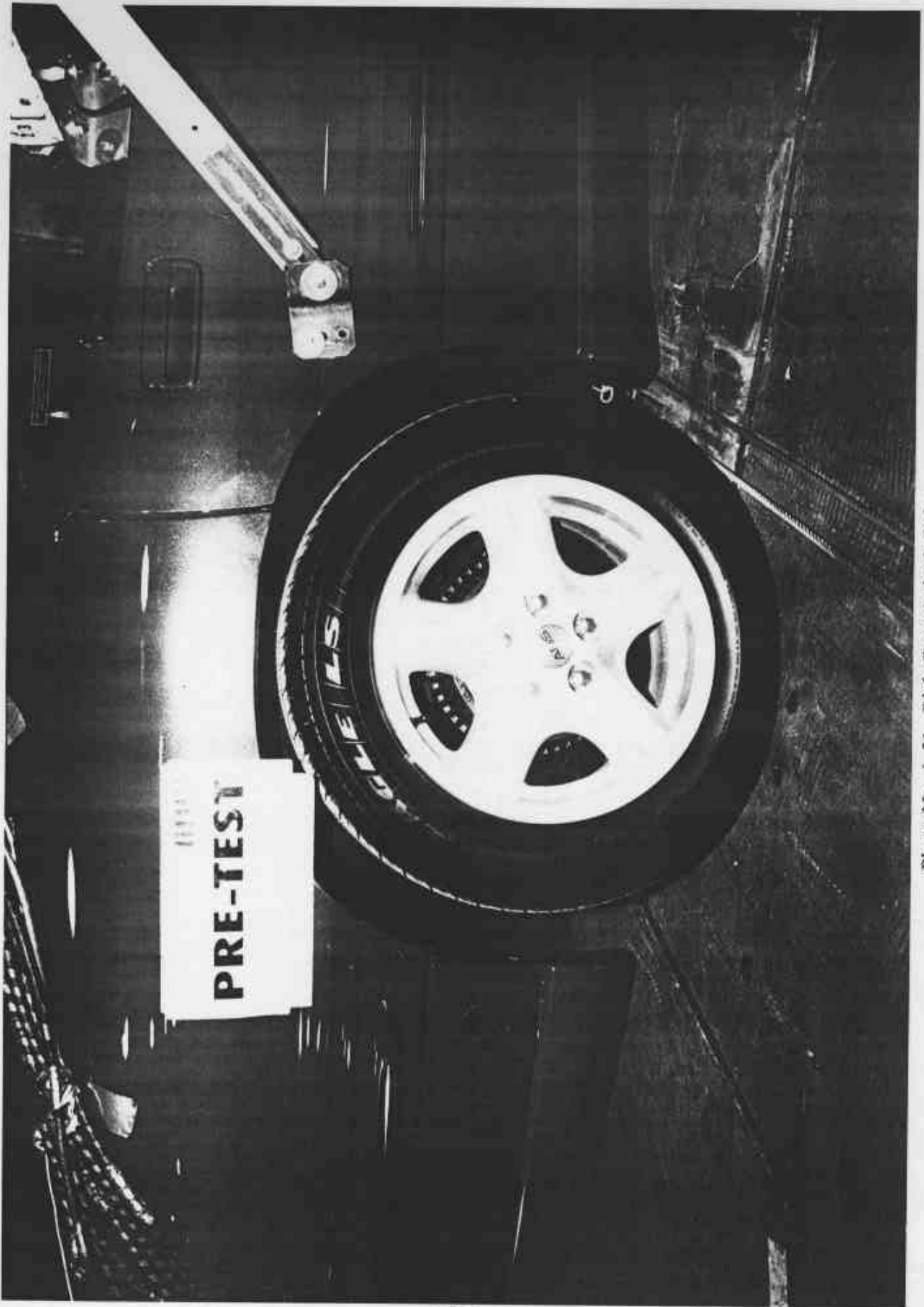


Photo No. A-49 - Right Front Attitude Point



A-50

Photo No. A-50 - Left Rear Attitude Point



A-51

Photo No. A-51 - Right Rear Attitude Point

APPENDIX B - VEHICLE AND SID RESPONSE DATA

Table of Data Plots

<u>Occupant:</u>	<u>Page No.</u>
Figure B-1 - Driver Head X Acceleration vs. Time	B-1
Figure B-2 - Driver Head X Velocity vs. Time	B-2
Figure B-3 - Driver Head Y Acceleration vs. Time	B-3
Figure B-4 - Driver Head Y Velocity vs. Time	B-4
Figure B-5 - Driver Head Z Acceleration vs. Time	B-5
Figure B-6 - Driver Head Z Velocity vs. Time	B-6
Figure B-7 - Driver Head Resultant vs. Time	B-7
Figure B-8 - Driver Upper Rib Y Acceleration vs. Time	B-8
Figure B-9 - Driver Upper Rib Y Velocity vs. Time	B-9
Figure B-10 - Driver Lower Rib Y Acceleration vs. Time	B-10
Figure B-11 - Driver Lower Rib Y Velocity vs. Time	B-11
Figure B-12 - Driver Lower Spine Y Acceleration vs. Time	B-12
Figure B-13 - Driver Lower Spine Y Velocity vs. Time	B-13
Figure B-14 - Driver Pelvis Y Acceleration vs. Time	B-14
Figure B-15 - Driver Pelvis Y Velocity vs. Time	B-15
Figure B-16 - Driver Leg Contact vs. Time	B-16
Figure B-17 - Driver Shoulder Contact vs. Time	B-17
Figure B-18 - Rear Passenger Head X Acceleration vs. Time	B-18
Figure B-19 - Rear Passenger Head X Velocity vs. Time	B-19
Figure B-20 - Rear Passenger Head Y Acceleration vs. Time	B-20
Figure B-21 - Rear Passenger Head Y Velocity vs. Time	B-21
Figure B-22 - Rear Passenger Head Z Acceleration vs. Time	B-22
Figure B-23 - Rear Passenger Head Z Velocity vs. Time	B-23
Figure B-24 - Rear Passenger Head Resultant vs. Time	B-24
Figure B-25 - Rear Passenger Upper Rib Y Acceleration vs. Time	B-25
Figure B-26 - Rear Passenger Upper Rib Y Velocity vs. Time	B-26
Figure B-27 - Rear Passenger Lower Rib Y Acceleration vs. Time	B-27
Figure B-28 - Rear Passenger Lower Rib Y Velocity vs. Time	B-28
Figure B-29 - Rear Passenger Lower Spine Y Acceleration vs. Time	B-29

Table of Data Plots

<u>Occupant (Cont'd):</u>	<u>Page No.</u>
Figure B-30 - Rear Passenger Lower Spine Y Velocity vs. Time	B-30
Figure B-31 - Rear Passenger Pelvis Y Acceleration vs. Time	B-31
Figure B-32 - Rear Passenger Pelvis Y Velocity vs. Time	B-32
Figure B-33 - Rear Passenger Leg Contact vs. Time	B-33
Figure B-34 - Rear Passenger Shoulder Contact vs. Time	B-34
 <u>Vehicle:</u>	
Figure B-35 - Left Side Sill at Front Seat Y Acceleration vs. Time	B-35
Figure B-36 - Left Side Sill at Front Seat Y Velocity vs. Time	B-36
Figure B-37 - Left Side Sill at Rear Seat Y Acceleration vs. Time	B-37
Figure B-38 - Left Side Sill at Rear Seat Y Velocity vs. Time	B-38
Figure B-39 - Right Side Sill at Front Seat X Acceleration vs. Time	B-39
Figure B-40 - Right Side Sill at Front Seat X Velocity vs. Time	B-40
Figure B-41 - Right Side Sill at Front Seat Y Acceleration vs. Time	B-41
Figure B-42 - Right Side Sill at Front Seat Y Velocity vs. Time	B-42
Figure B-43 - Right Side Sill at Front Seat Z Acceleration vs. Time	B-43
Figure B-44 - Right Side Sill at Front Seat Z Velocity vs. Time	B-44
Figure B-45 - Right Side Sill at Front Seat Resultant Acceleration vs. Time	B-45
Figure B-46 - Right Side Sill at Rear Seat X Acceleration vs. Time	B-46
Figure B-47 - Right Side Sill at Rear Seat X Velocity vs. Time	B-47
Figure B-48 - Right Side Sill at Rear Seat Y Acceleration vs. Time	B-48
Figure B-49 - Right Side Sill at Rear Seat Y Velocity vs. Time	B-49
Figure B-50 - Right Side Sill at Rear Seat Z Acceleration vs. Time	B-50
Figure B-51 - Right Side Sill at Rear Seat Z Velocity vs. Time	B-51
Figure B-52 - Right Side Sill at Rear Seat Resultant Acceleration vs. Time	B-52
Figure B-53 - Left Driver Seat Track Y Acceleration vs. Time	B-53
Figure B-54 - Left Driver Seat Track Y Velocity vs. Time	B-54
Figure B-55 - Rear Floorpan above Axle X Acceleration vs. Time	B-55

Table of Data Plots

<u>Vehicle (Cont'd):</u>	<u>Page No.</u>
Figure B-56 - Rear Floorpan above Axle X Velocity vs. Time	B-56
Figure B-57 - Rear Floorpan above Axle Y Acceleration vs. Time	B-57
Figure B-58 - Rear Floorpan above Axle Y Velocity vs. Time	B-58
Figure B-59 - Rear Floorpan above Axle Z Acceleration vs. Time	B-59
Figure B-60 - Rear Floorpan above Axle Z Velocity vs. Time	B-60
Figure B-61 - Rear Floorpan above Axle Resultant Acceleration vs. Time	B-61
Figure B-62 - Right Rear Occupant Compartment Y Acceleration vs. Time	B-62
Figure B-63 - Right Rear Occupant Compartment Y Velocity vs. Time	B-63
Figure B-64 - Left Lower A-Post Y Acceleration vs. Time	B-64
Figure B-65 - Left Lower A-Post Y Velocity vs. Time	B-65
Figure B-66 - Left Mid A-Post Y Acceleration vs. Time	B-66
Figure B-67 - Left Mid A-Post Y Velocity vs. Time	B-67
Figure B-68 - Left Lower B-Post Y Acceleration vs. Time	B-68
Figure B-69 - Left Lower B-Post Y Velocity vs. Time	B-69
Figure B-70 - Left Mid B-Post Y Acceleration vs. Time	B-70
Figure B-71 - Left Mid B-Post Y Velocity vs. Time	B-71
Figure B-72 - Vehicle Center of Gravity X Acceleration vs. Time	B-72
Figure B-73 - Vehicle Center of Gravity X Velocity vs. Time	B-73
Figure B-74 - Vehicle Center of Gravity Y Acceleration vs. Time	B-74
Figure B-75 - Vehicle Center of Gravity Y Velocity vs. Time	B-75
Figure B-76 - Vehicle Center of Gravity Z Acceleration vs. Time	B-76
Figure B-77 - Vehicle Center of Gravity Z Velocity vs. Time	B-77
Figure B-78 - Vehicle Center of Gravity Resultant Acceleration vs. Time	B-78
Figure B-79 - Left Front Door Midrear Y Acceleration vs. Time	B-79
Figure B-80 - Left Front Door Midrear Y Velocity vs. Time	B-80
Figure B-81 - Left Front Door Centerline Y Acceleration vs. Time	B-81
Figure B-82 - Left Front Door Centerline Y Velocity vs. Time	B-82
Figure B-83 - Left Front Door Upper Centerline Y Acceleration vs. Time	B-83
Figure B-84 - Left Front Door Upper Centerline Y Velocity vs. Time	B-84
Figure B-85 - Left Rear Door Midrear Y Acceleration vs. Time	B-85
Figure B-86 - Left Rear Door Midrear Y Velocity vs. Time	B-86

Table of Data Plots

Vehicle (Cont'd):

	<u>Page No.</u>
Figure B-87 - Left Rear Door Upper Centerline Y Acceleration vs. Time	B-87
Figure B-88 - Left Rear Door Upper Centerline Y Velocity vs. Time	B-88

Barrier:

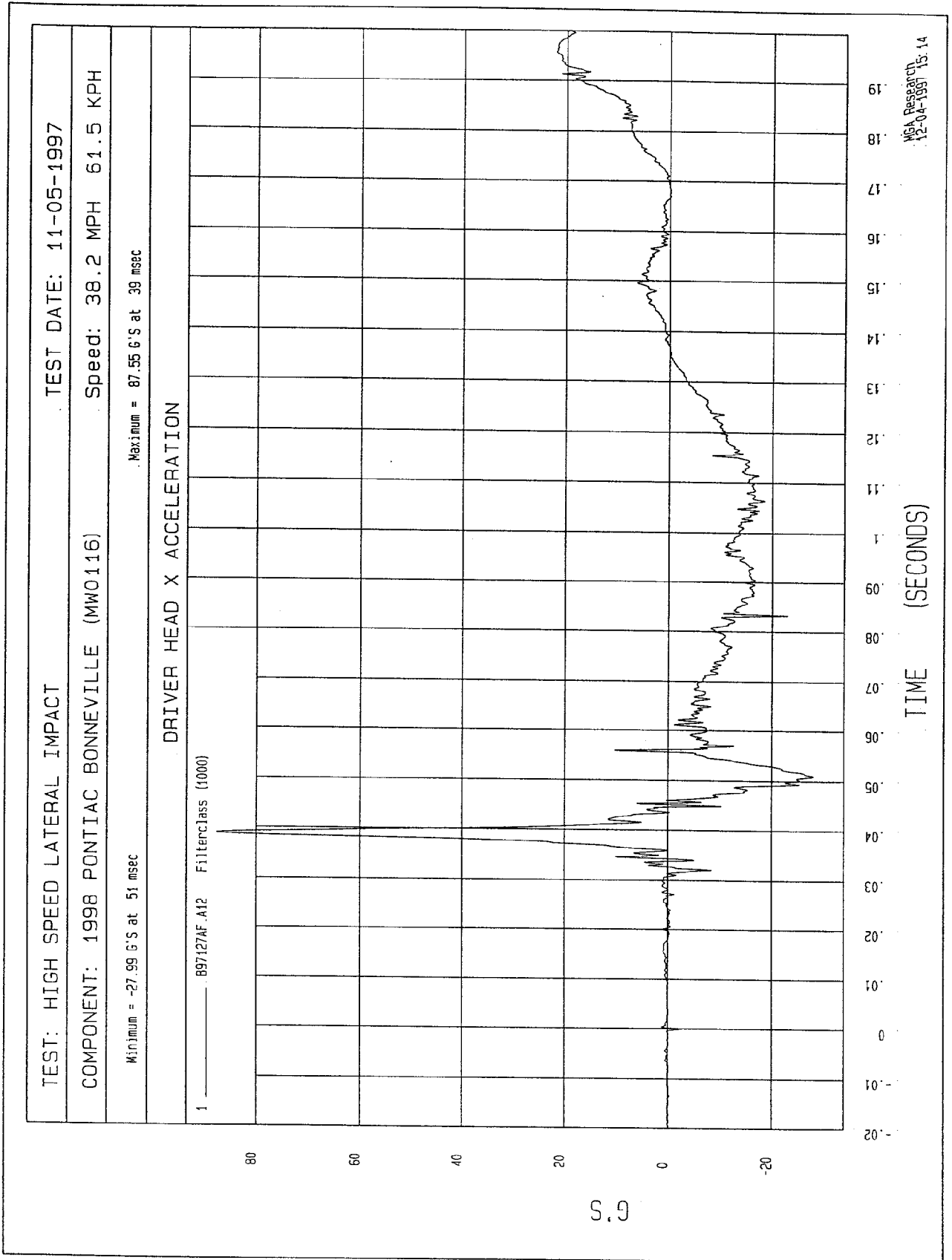
Figure B-89 - Moving Barrier Center of Gravity X Acceleration vs. Time	B-89
Figure B-90 - Moving Barrier Center of Gravity X Velocity vs. Time	B-90
Figure B-91 - Moving Barrier Center of Gravity Y Acceleration vs. Time	B-91
Figure B-92 - Moving Barrier Center of Gravity Y Velocity vs. Time	B-92
Figure B-93 - Moving Barrier Center of Gravity Z Acceleration vs. Time	B-93
Figure B-94 - Moving Barrier Center of Gravity Z Velocity vs. Time	B-94
Figure B-95 - Moving Barrier Center of Gravity Resultant Acceleration vs. Time	B-95
Figure B-96 - Moving Barrier Rear Axle X Acceleration vs. Time	B-96
Figure B-97 - Moving Barrier Rear Axle X Velocity vs. Time	B-97
Figure B-98 - Moving Barrier Rear Axle Y Acceleration vs. Time	B-98
Figure B-99 - Moving Barrier Rear Axle Y Velocity vs. Time	B-99
Figure B-100 - Left Barrier Contact	B-100
Figure B-101 - Right Barrier Contact	B-101

Redundant:

Figure B-102 - Driver Upper Rib Y Redundant Acceleration vs. Time	B-102
Figure B-103 - Driver Upper Rib Y Redundant Velocity vs. Time	B-103
Figure B-104 - Driver Lower Rib Y Redundant Acceleration vs. Time	B-104
Figure B-105 - Driver Lower Rib Y Redundant Velocity vs. Time	B-105
Figure B-106 - Driver Lower Spine Y Redundant Acceleration vs. Time	B-106
Figure B-107 - Driver Lower Spine Y Redundant Velocity vs. Time	B-107
Figure B-108 - Driver Pelvis Y Redundant Acceleration vs. Time	B-108
Figure B-109 - Driver Pelvis Y Redundant Velocity vs. Time	B-109

Table of Data Plots

<u>Redundant (Cont'd):</u>	<u>Page No.</u>
Figure B-110 - Rear Passenger Upper Rib Y Redundant Acceleration vs. Time	B-110
Figure B-111 - Rear Passenger Upper Rib Y Redundant Velocity vs. Time	B-111
Figure B-112 - Rear Passenger Lower Rib Y Redundant Acceleration vs. Time	B-112
Figure B-113 - Rear Passenger Lower Rib Y Redundant Velocity vs. Time	B-113
Figure B-114 - Rear Passenger Lower Spine Y Redundant Acceleration vs. Time	B-114
Figure B-115 - Rear Passenger Lower Spine Y Redundant Velocity vs. Time	B-115
Figure B-116 - Rear Passenger Pelvis Y Redundant Acceleration vs. Time	B-116
Figure B-117 - Rear Passenger Pelvis Y Redundant Velocity vs. Time	B-117
 <u>FIR Filtered</u>	
Figure B-118 - Driver Upper Rib Y Acceleration vs. Time	B-118
Figure B-119 - Driver Upper Rib Y Redundant Acceleration vs. Time	B-119
Figure B-120 - Driver Lower Rib Y Acceleration vs. Time	B-120
Figure B-121 - Driver Lower Rib Y Redundant Acceleration vs. Time	B-121
Figure B-122 - Driver Lower Spine Y Acceleration vs. Time	B-122
Figure B-123 - Driver Lower Spine Y Redundant Acceleration vs. Time	B-123
Figure B-124 - Driver Pelvis Y Acceleration vs. Time	B-124
Figure B-125 - Driver Pelvis Y Redundant Acceleration vs. Time	B-125
Figure B-126 - Rear Passenger Upper Rib Y Acceleration vs. Time	B-126
Figure B-127 - Rear Passenger Upper Rib Y Redundant Acceleration vs. Time	B-127
Figure B-128 - Rear Passenger Lower Rib Y Acceleration vs. Time	B-128
Figure B-129 - Rear Passenger Lower Rib Y Redundant Acceleration vs. Time	B-129
Figure B-130 - Rear Passenger Lower Spine Y Acceleration vs. Time	B-130
Figure B-131 - Rear Passenger Lower Spine Y Redundant Acceleration vs. Time	B-131
Figure B-132 - Rear Passenger Pelvis Y Acceleration vs. Time	B-132
Figure B-133 - Rear Passenger Pelvis Y Redundant Acceleration vs. Time	B-133

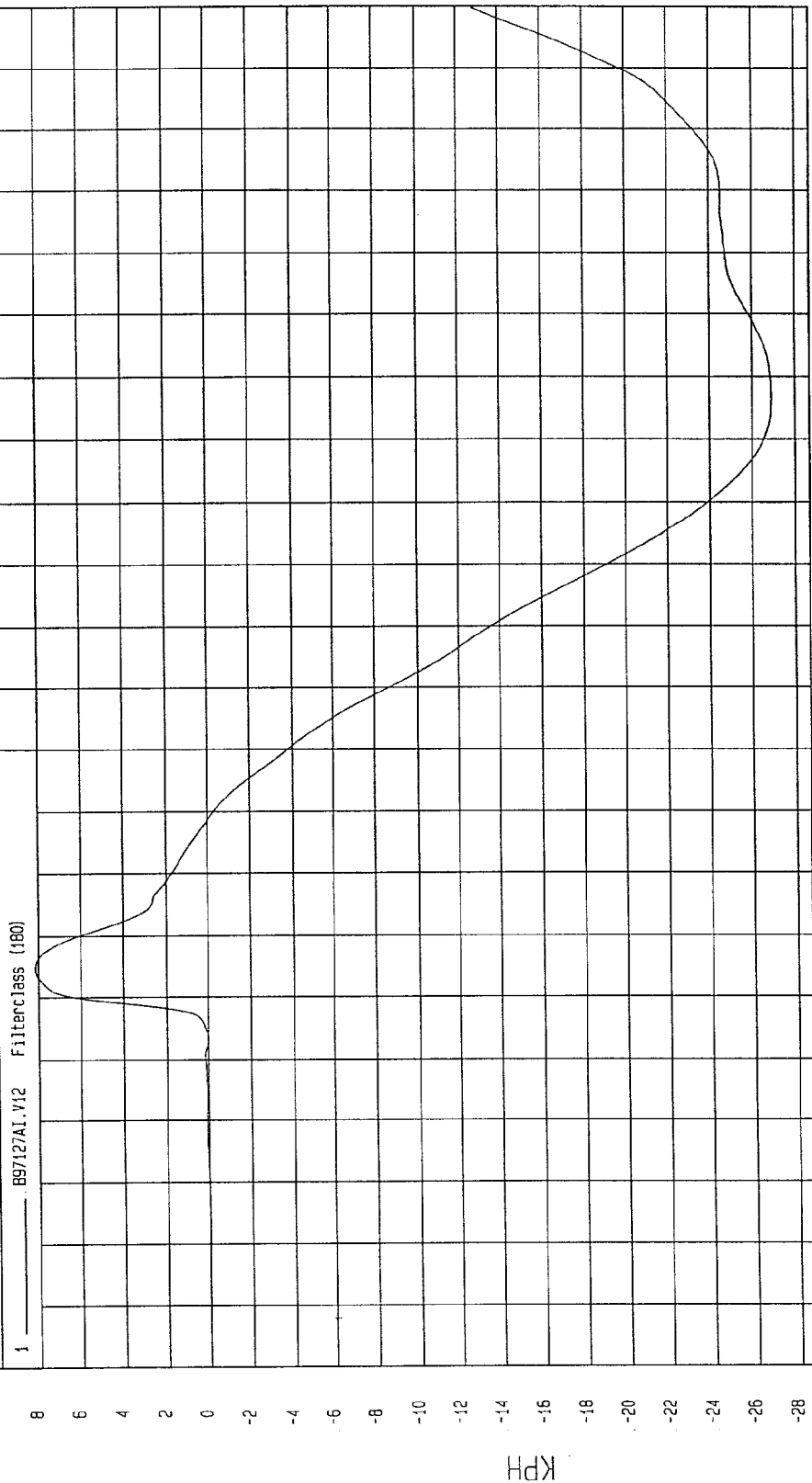


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -26.90 KPH at 137 msec Maximum = 8.14 KPH at 45 msec

DRIVER HEAD X VELOCITY



MSA Research
12-15-1997 15:20

TIME Seconds

TEST DATE: 11-05-1997

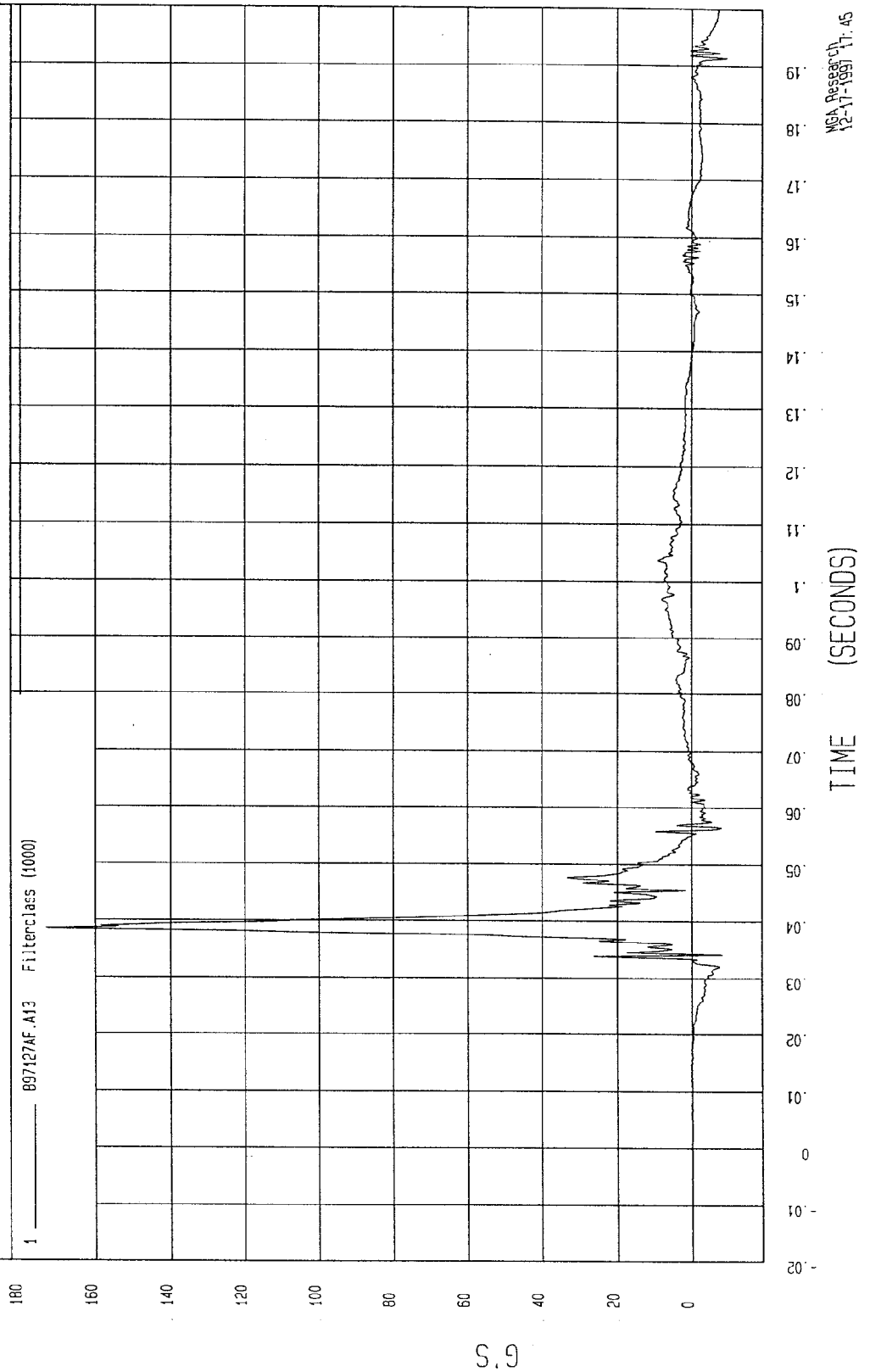
TEST: HIGH SPEED LATERAL IMPACT

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -9.08 G'S at 192 msec

Maximum = 173.35 G'S at 38 msec

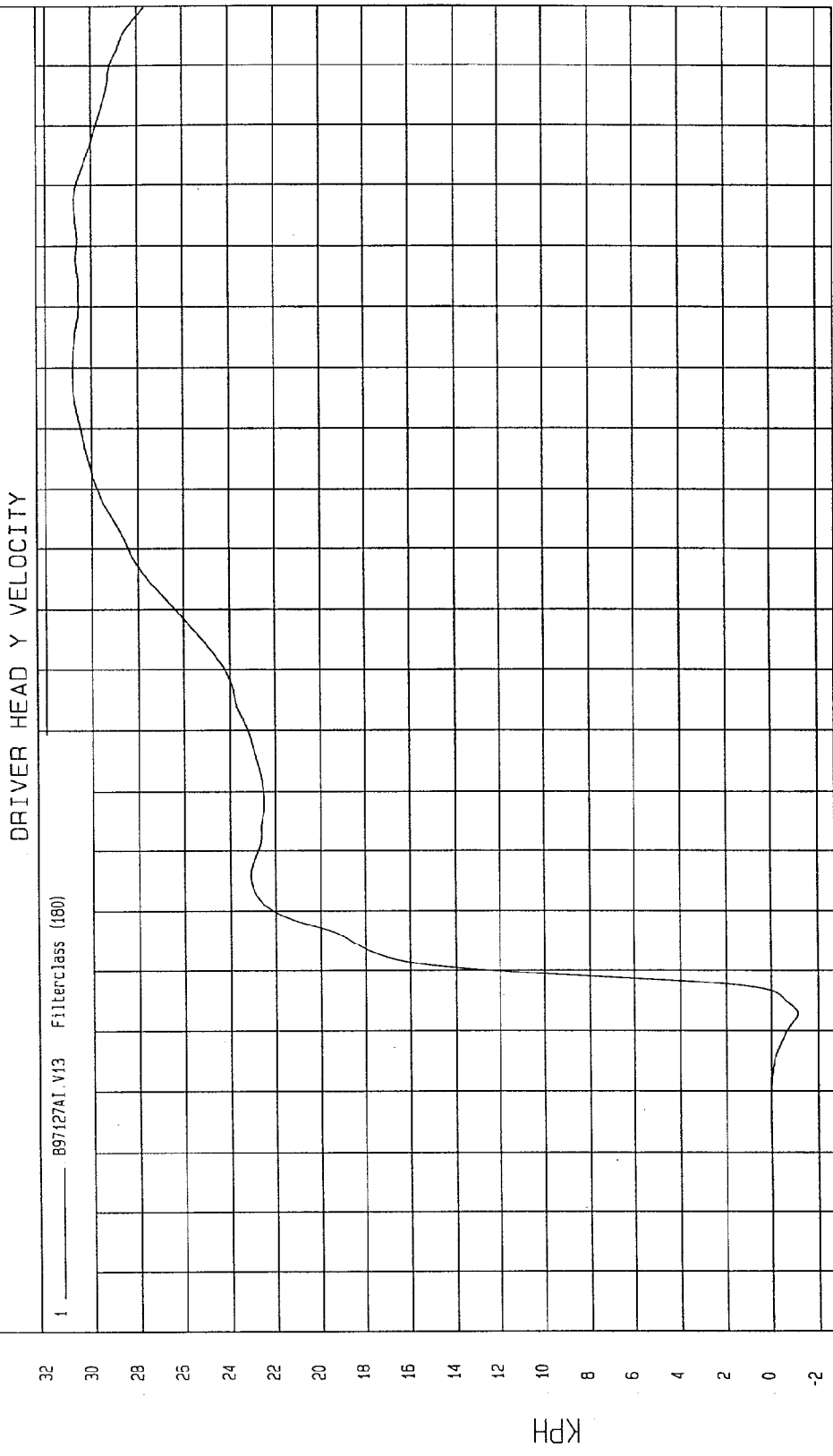
DRIVER HEAD Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

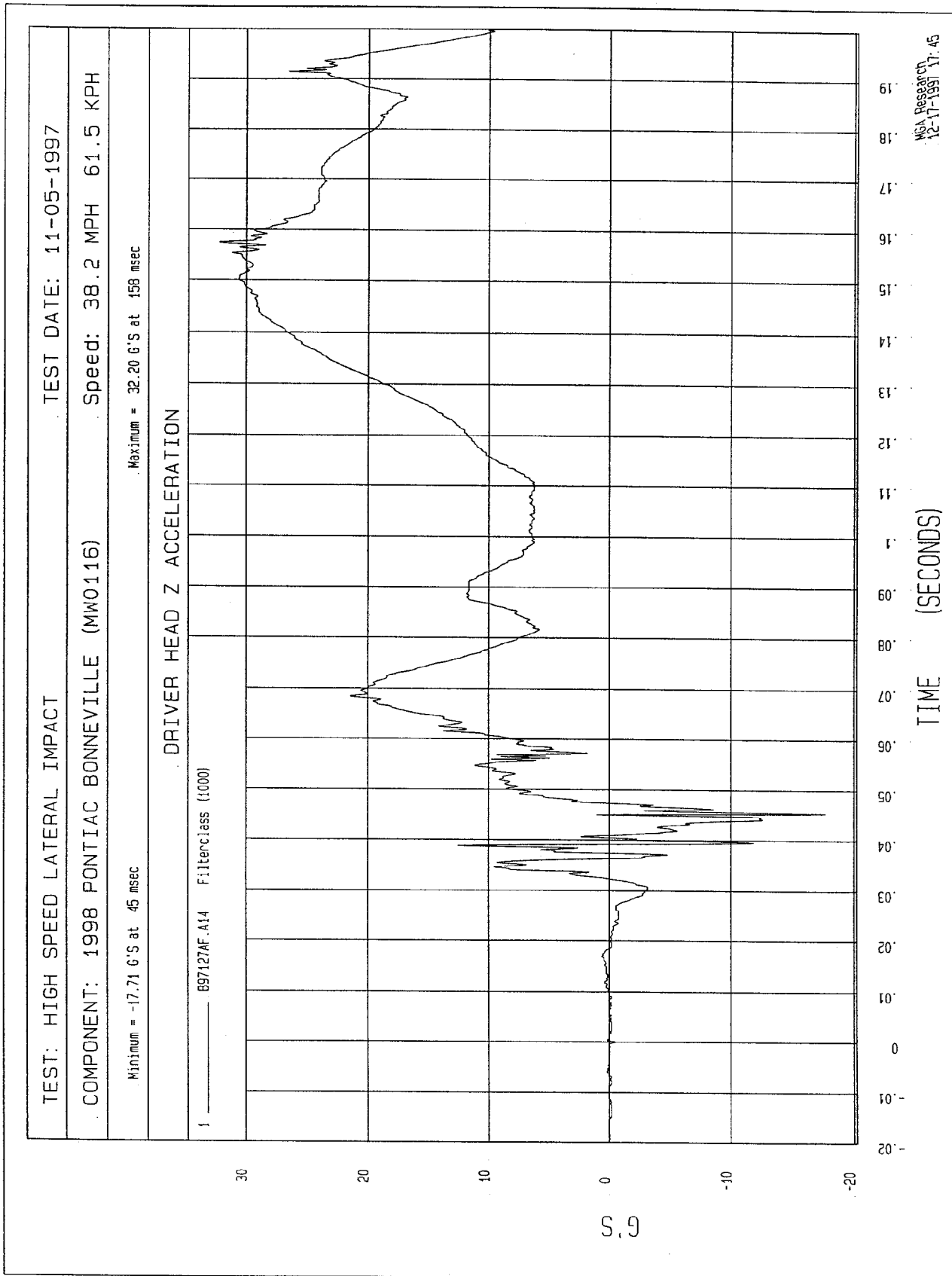
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -1.14 KPH at 33 msec Maximum = 30.81 KPH at 139 msec



TIME Seconds

WGA Research
12-18-1997 10:14

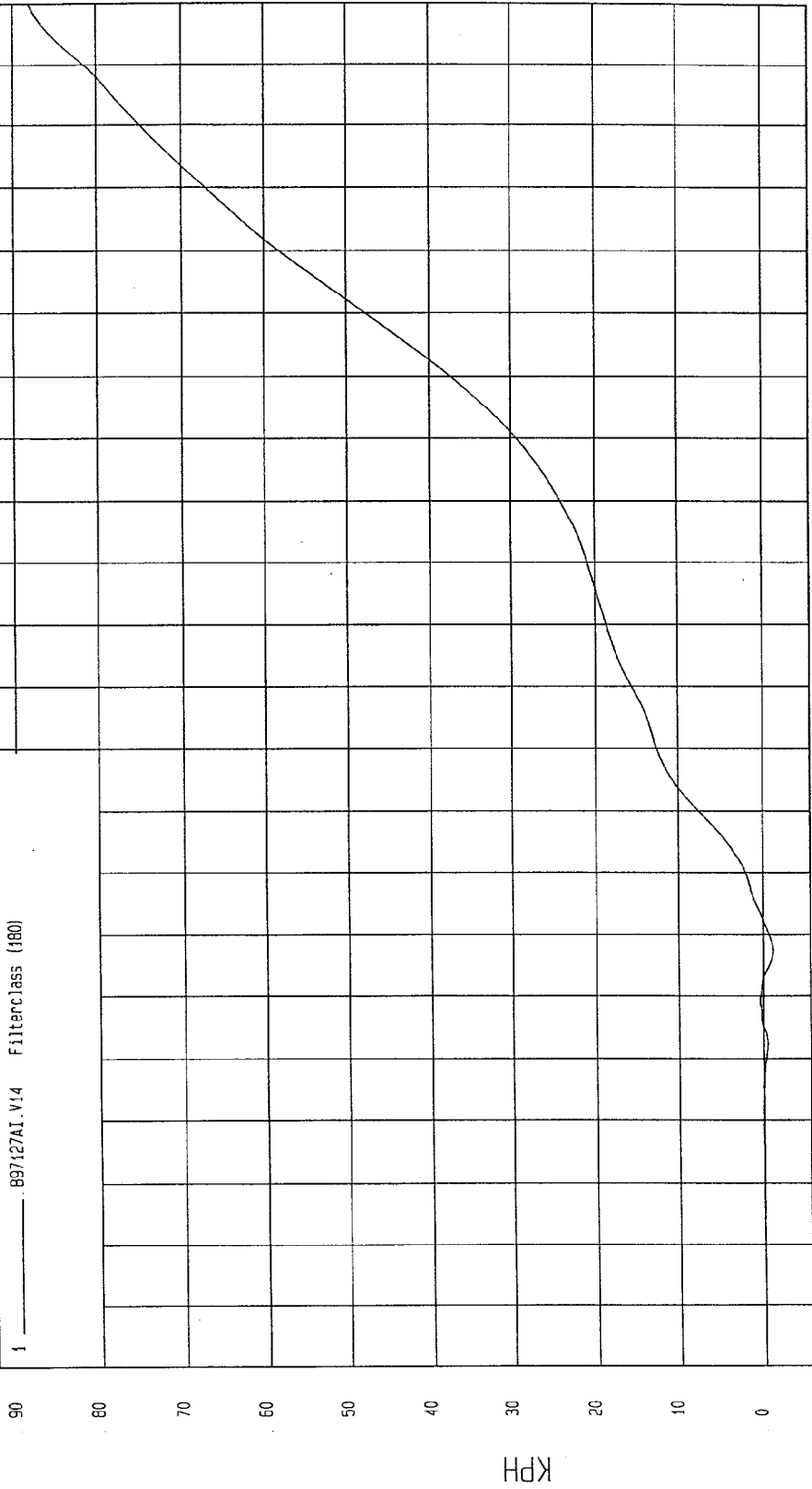


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -1.17 KPH at 47 msec Maximum = 88.13 KPH at 200 msec

DRIVER HEAD Z VELOCITY

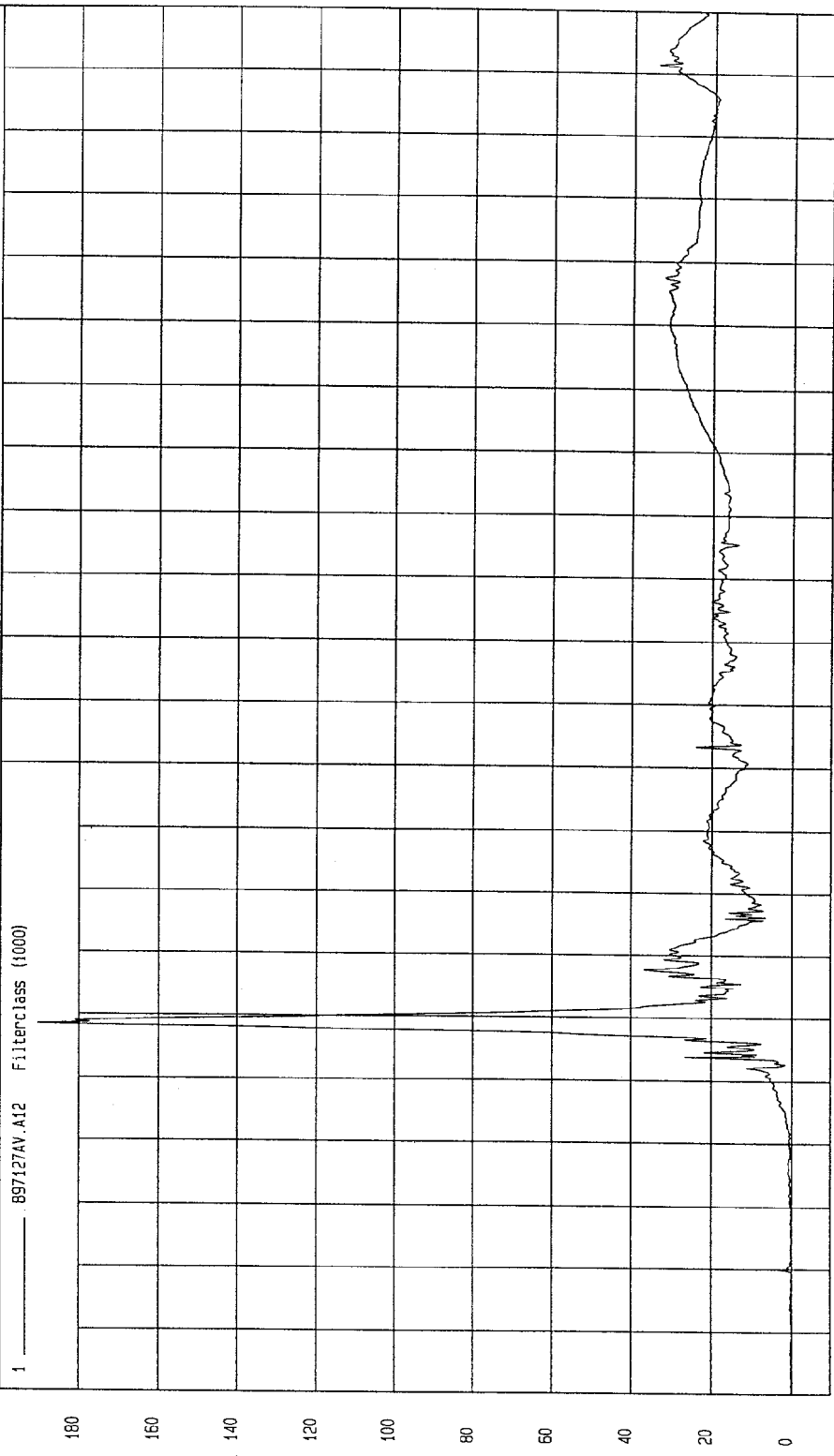


TIME Seconds

NSA Research
12-18-1997 10:14

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH
Minimum = .01 G'S at 0 msec Maximum = 190.26 G'S at 38 msec

DRIVER HEAD RESULTANT



TIME (SECONDS)

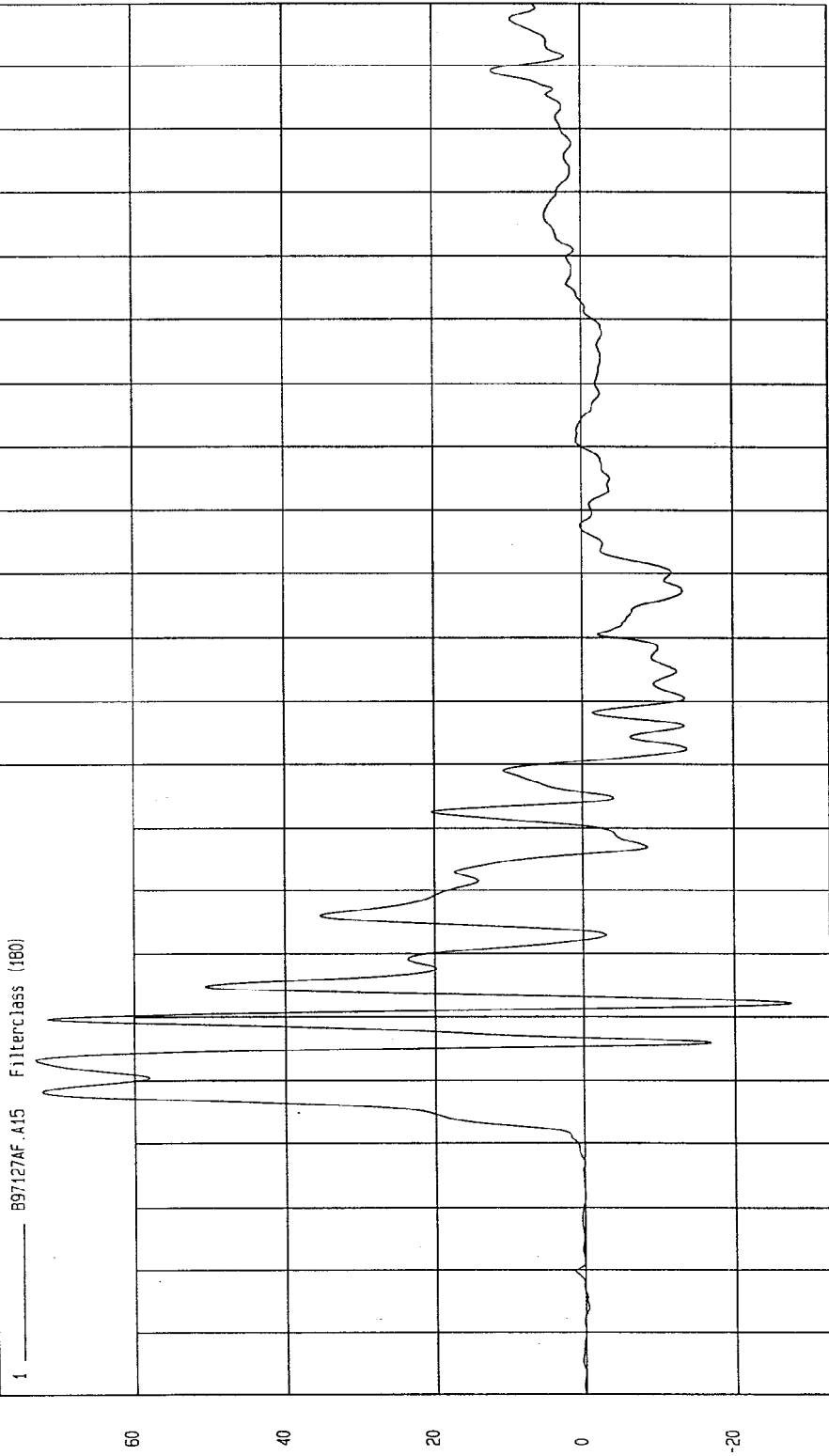
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0

0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19

WCA Research
12-17-1997 17:46

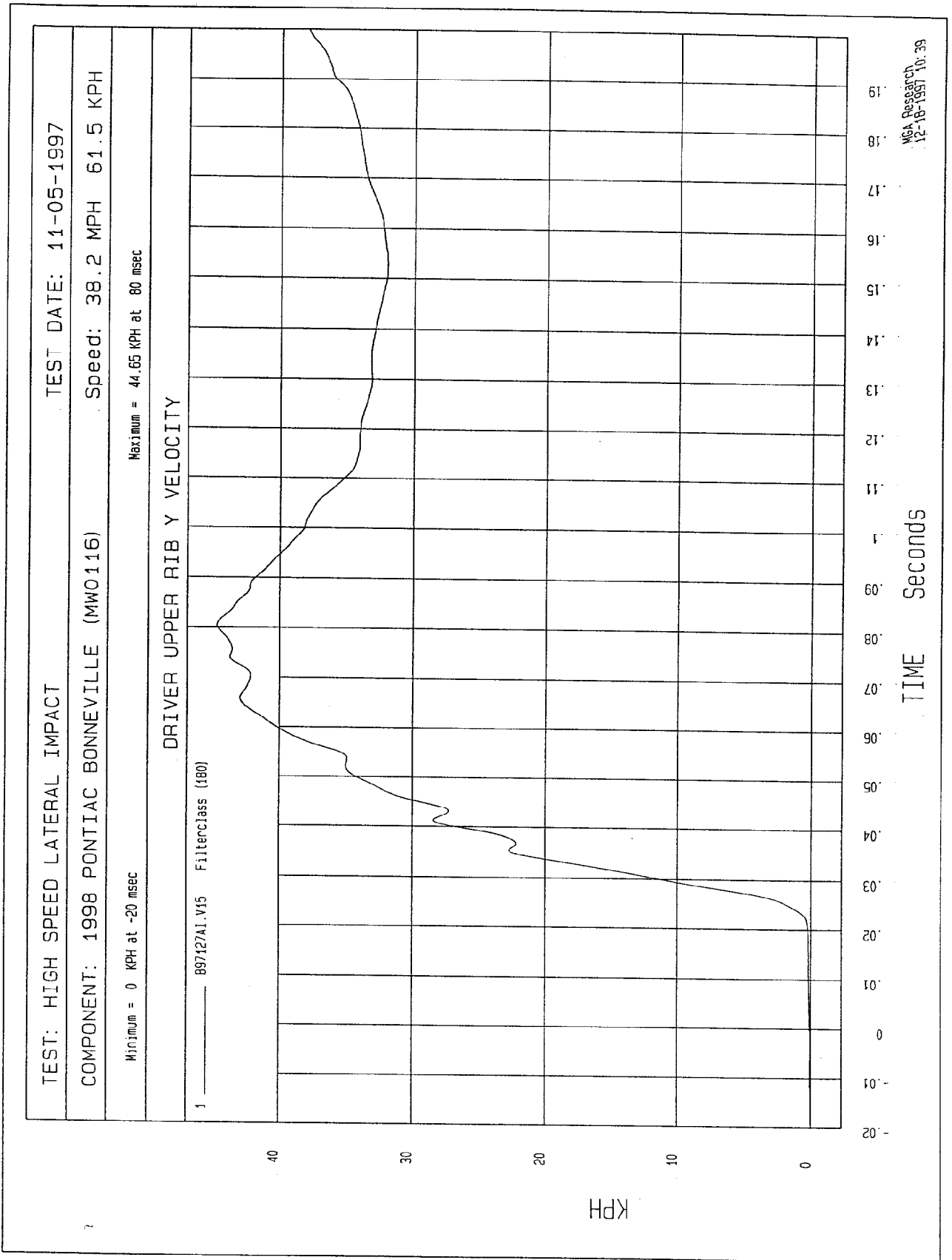
TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)	Speed: 38.2 MPH 61.5 KPH
Minimum = -27.36 G's at 42 msec	Maximum = 73.08 G's at 33 msec

DRIVER UPPER RIB Y ACCELERATION



TIME (SECONDS)

MCA Research
12-04-1997 16.13

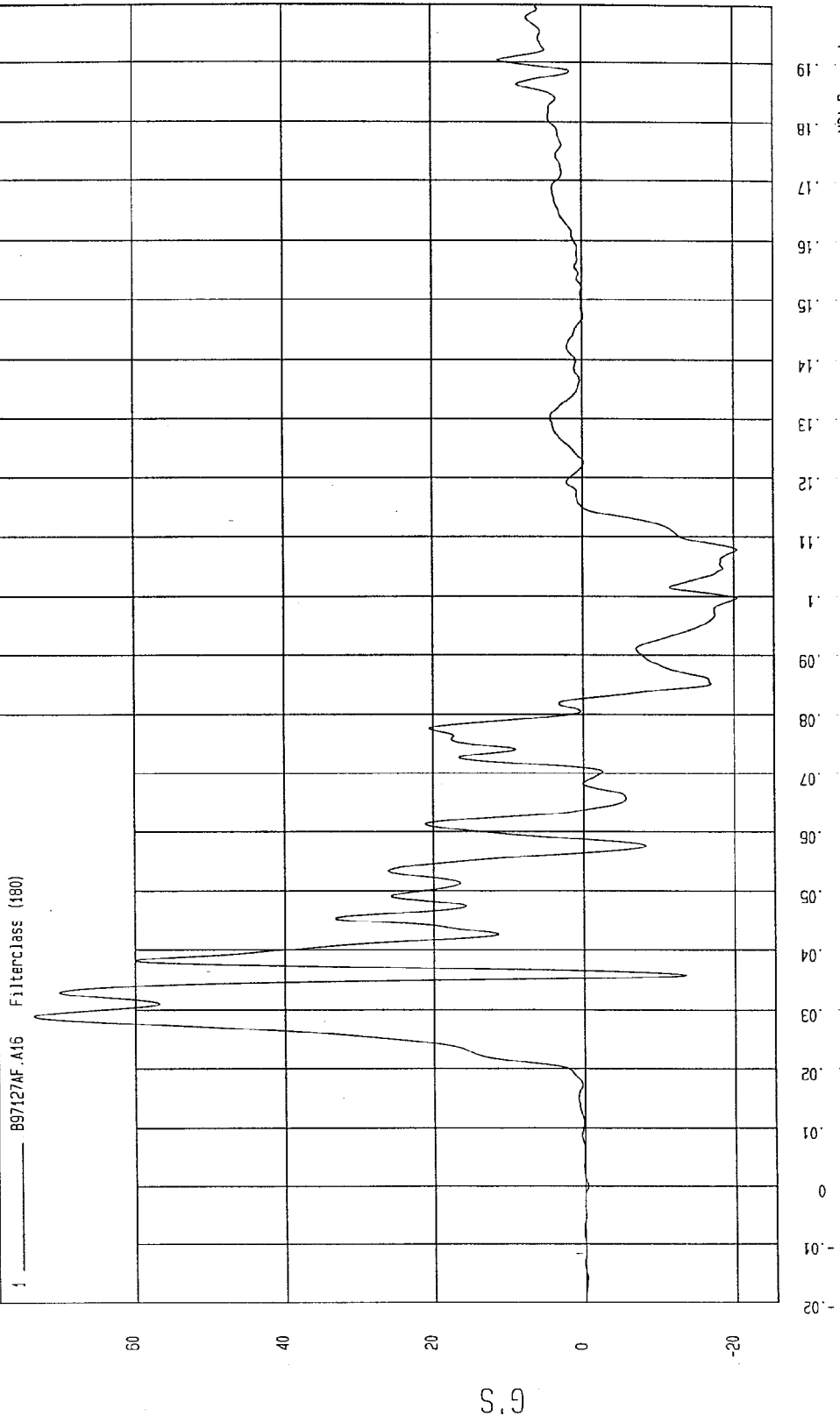


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

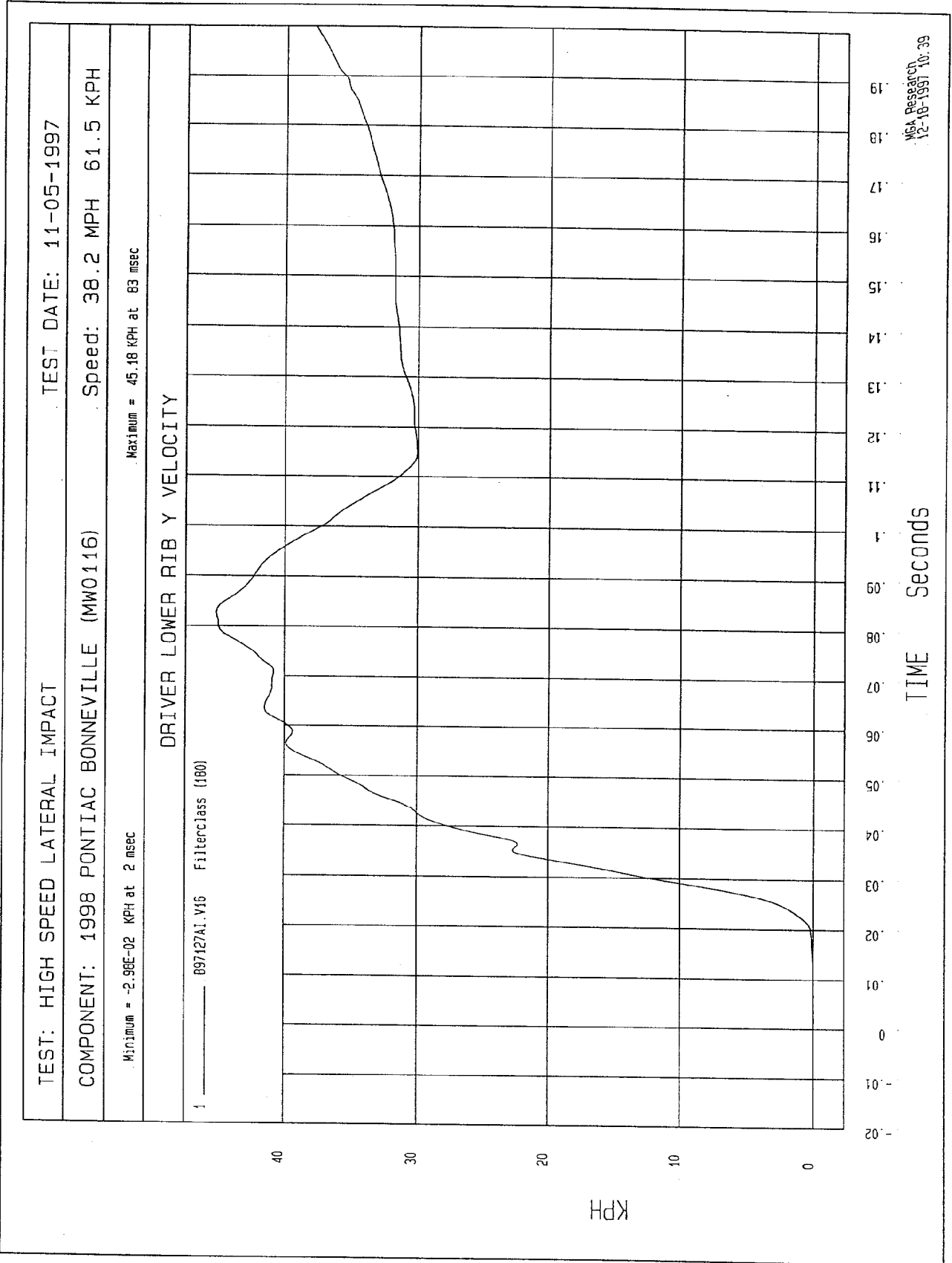
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -20.47 G'S at 100 msec Maximum = 73.50 G'S at 29 msec

DRIVER LOWER RIB Y ACCELERATION



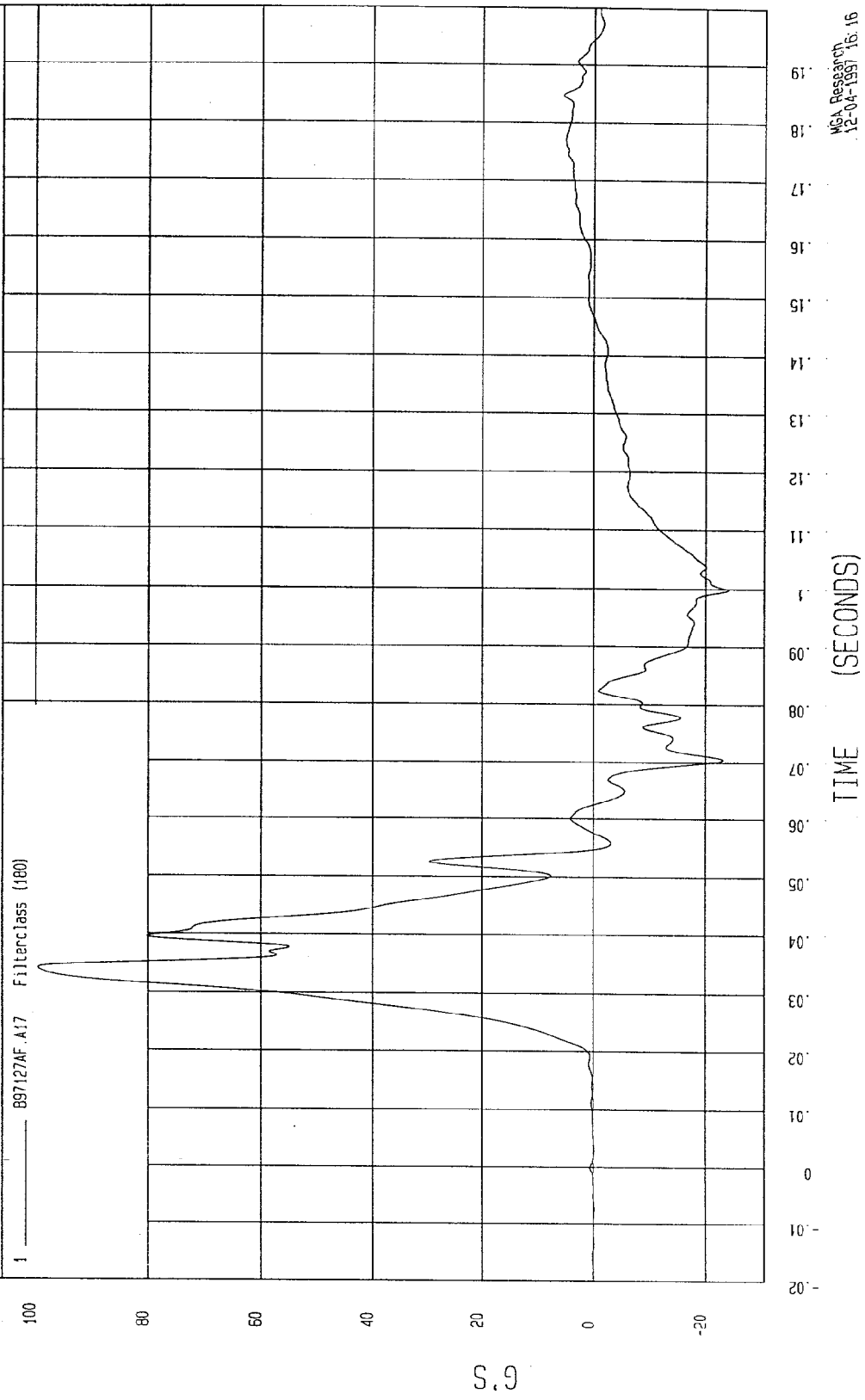
M&A Research
12-18-1997 10:51



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -24.13 G'S at 100 msec Maximum = 99.56 G'S at 34 msec

DRIVER LOWER SPINE Y ACCELERATION

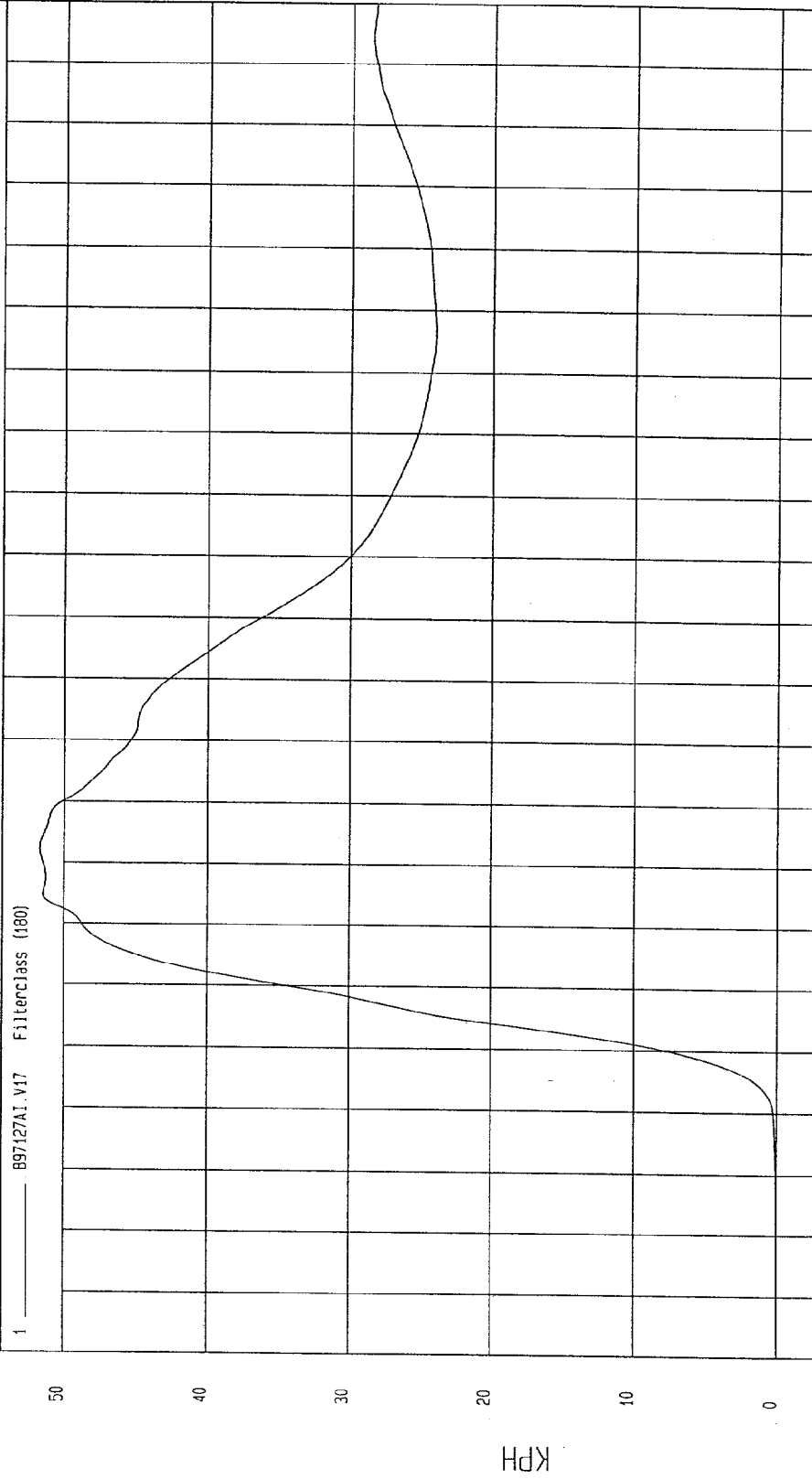


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

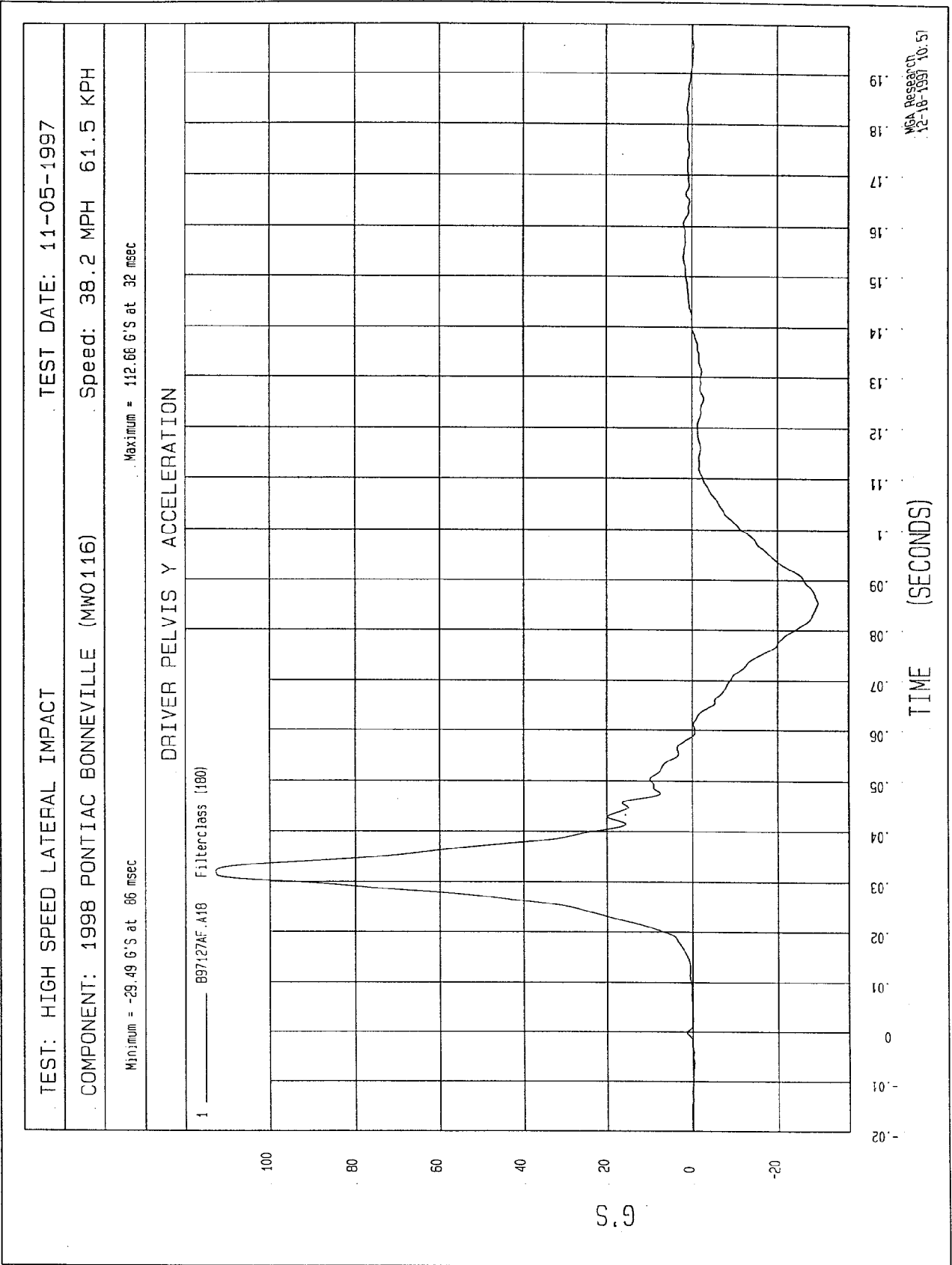
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

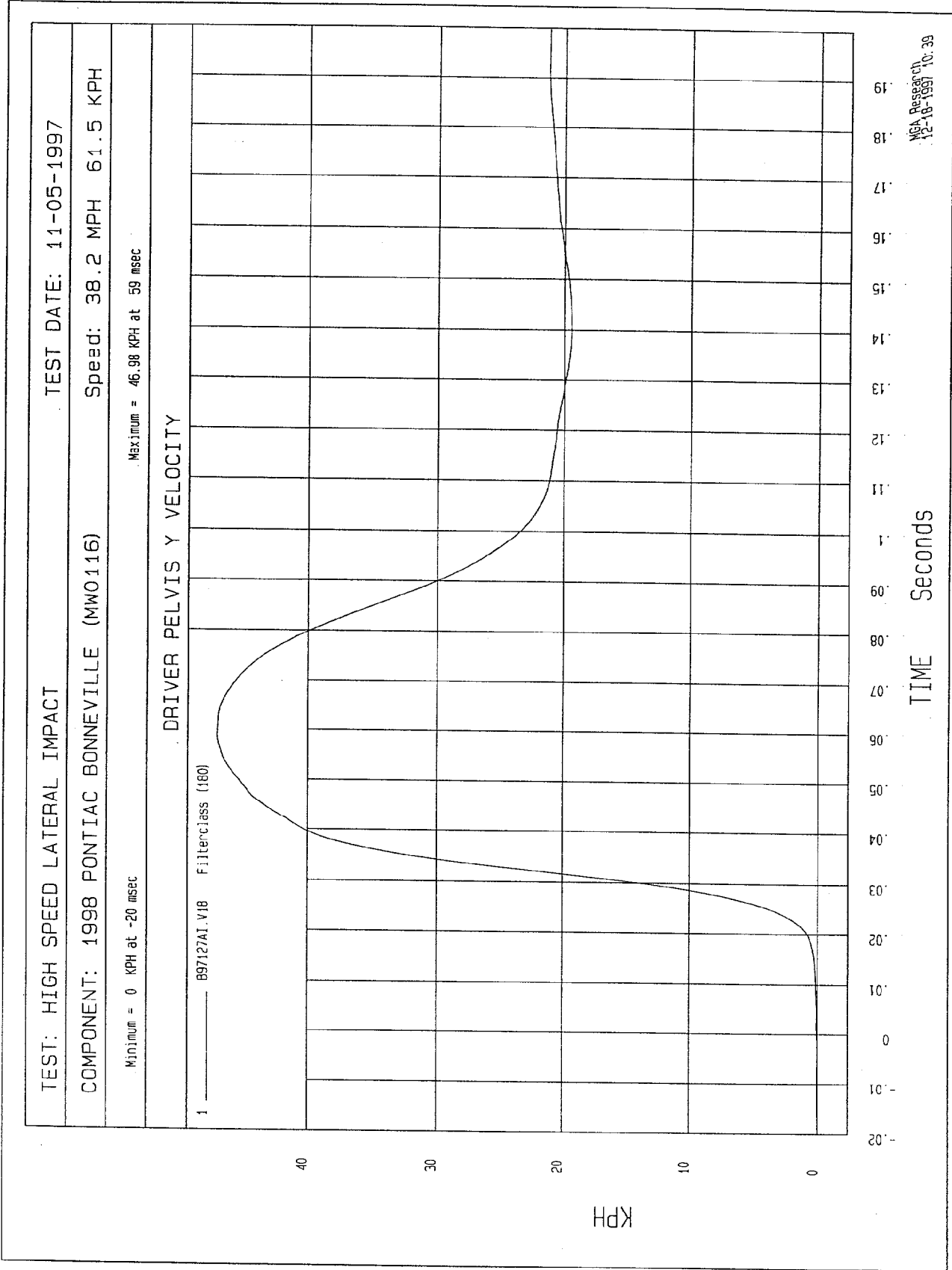
Minimum = 0 KPH at -20 msec Maximum = 51.67 KPH at 62 msec

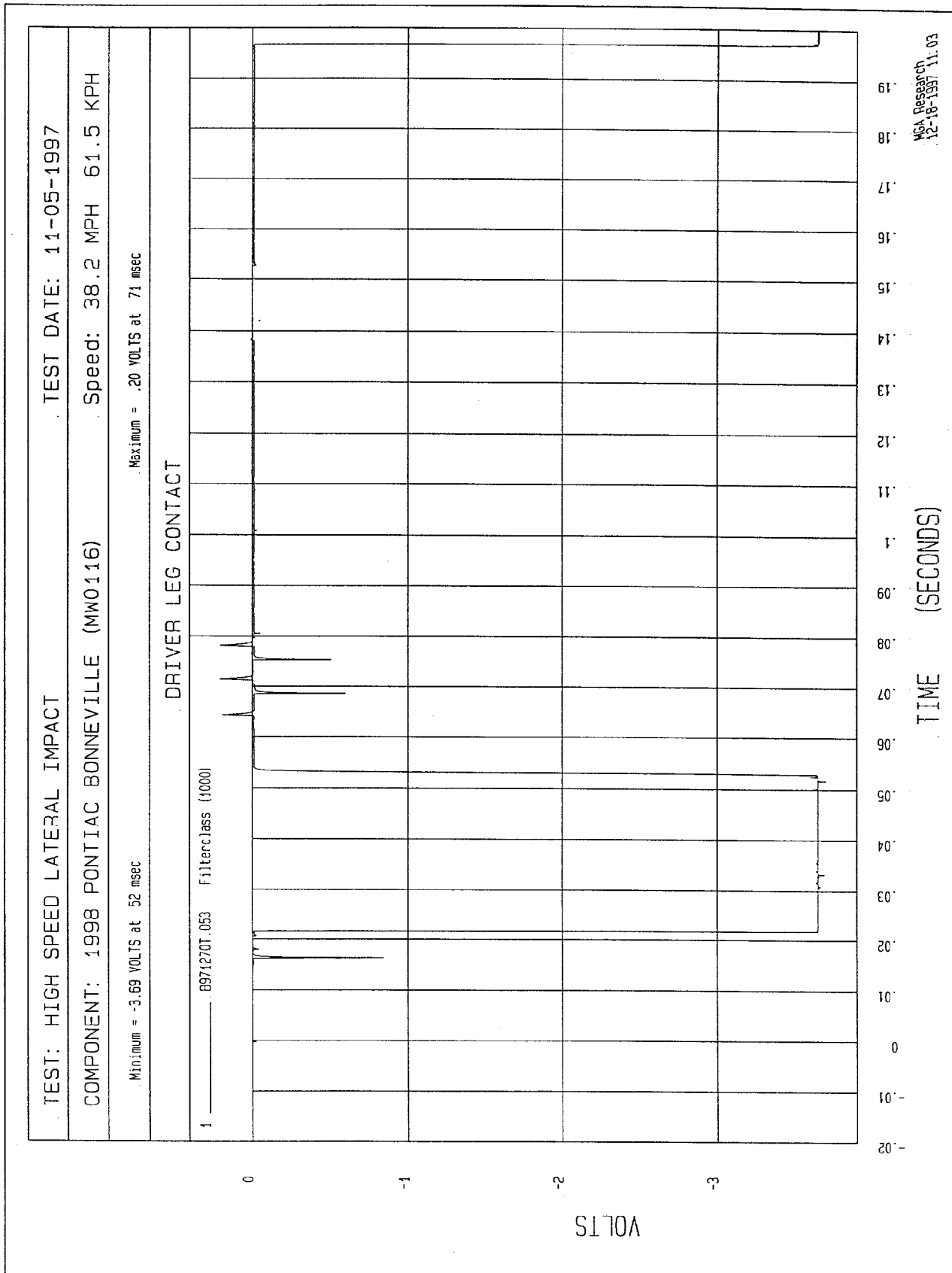
DRIVER LOWER SPINE Y VELOCITY

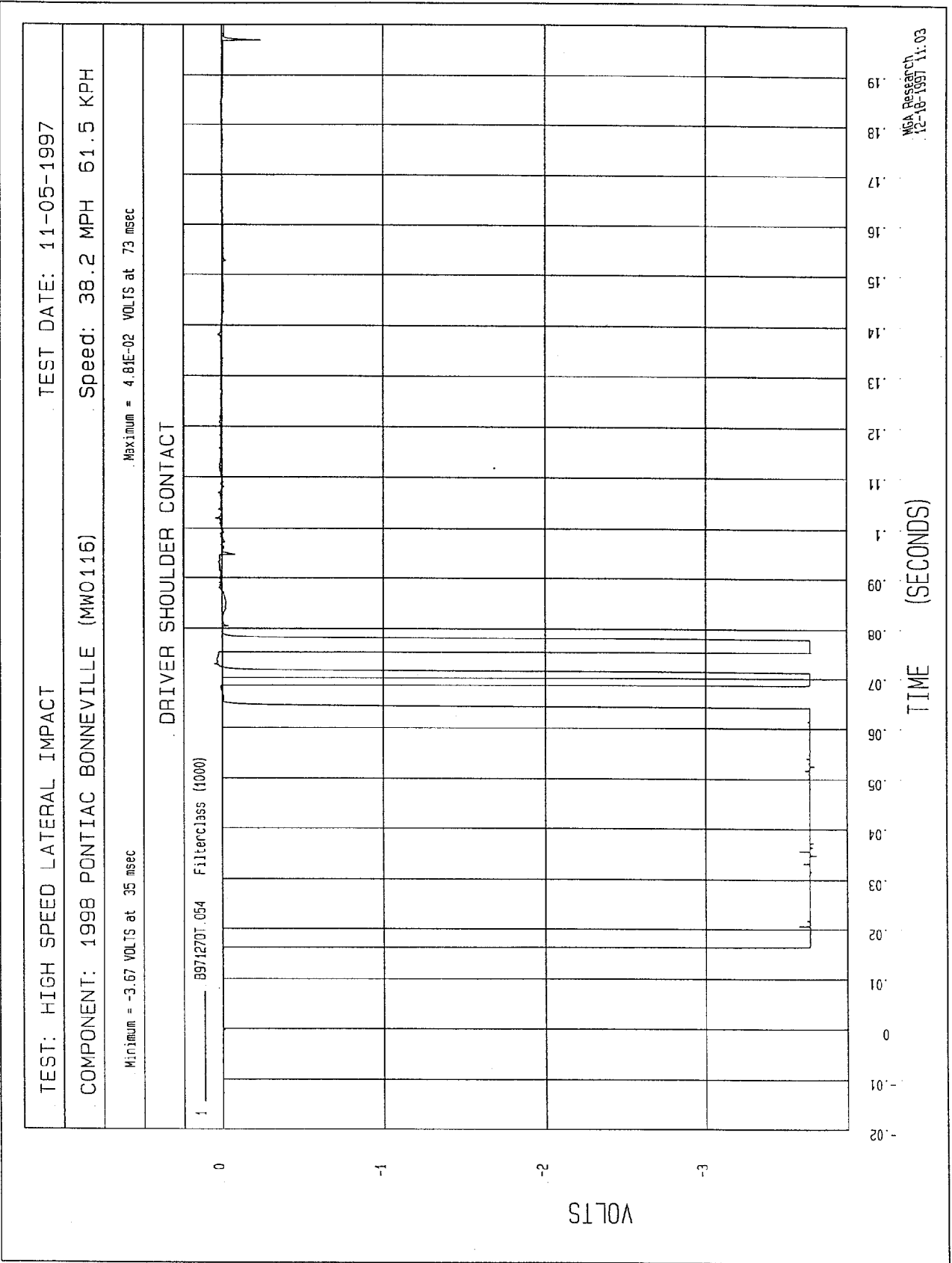


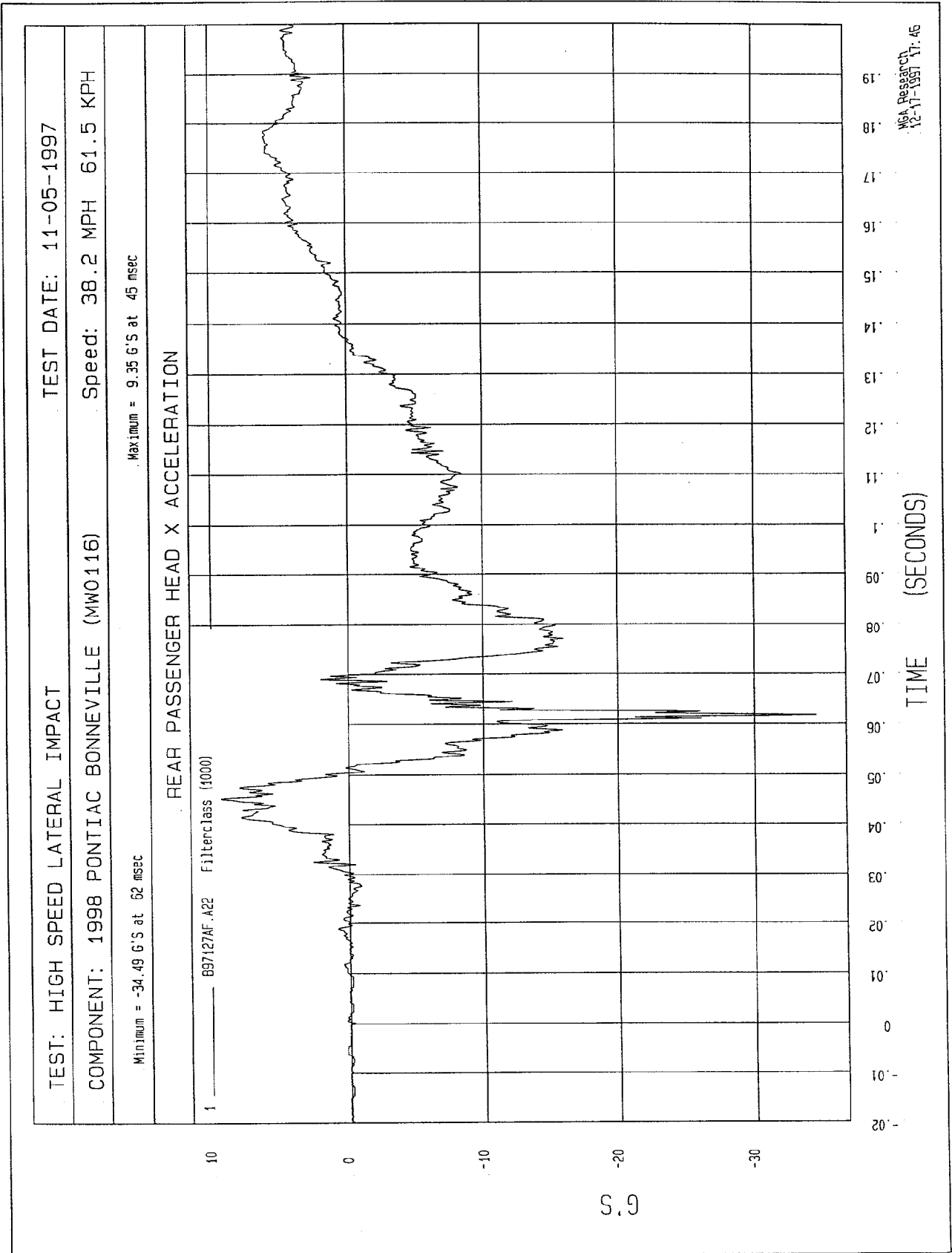
MSA Research
12-18-1997 10:39











TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

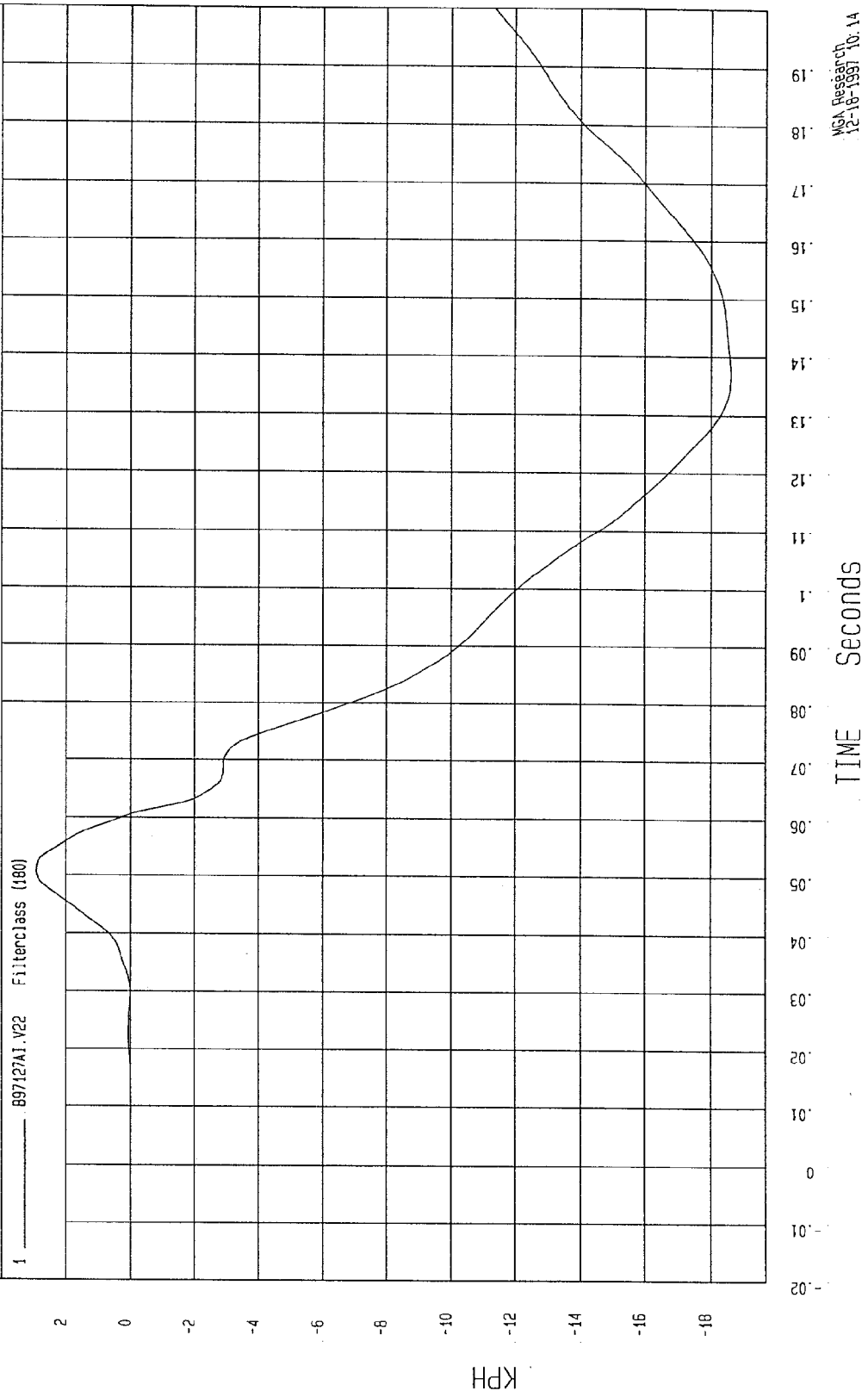
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

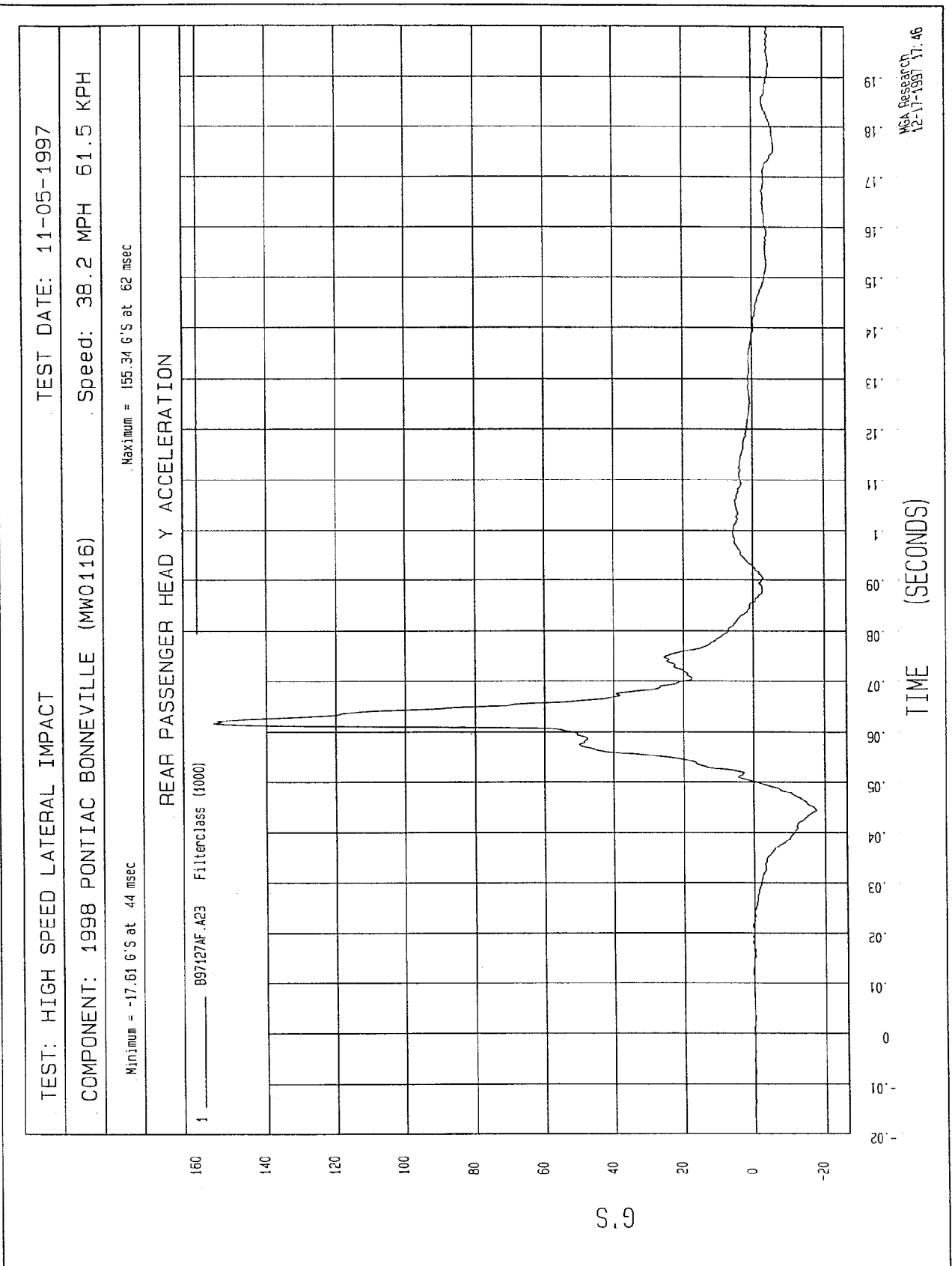
Speed: 38.2 MPH 61.5 KPH

Minimum = -18.62 KPH at 137 msec

Maximum = 2.91 KPH at 51 msec

REAR PASSENGER HEAD X VELOCITY





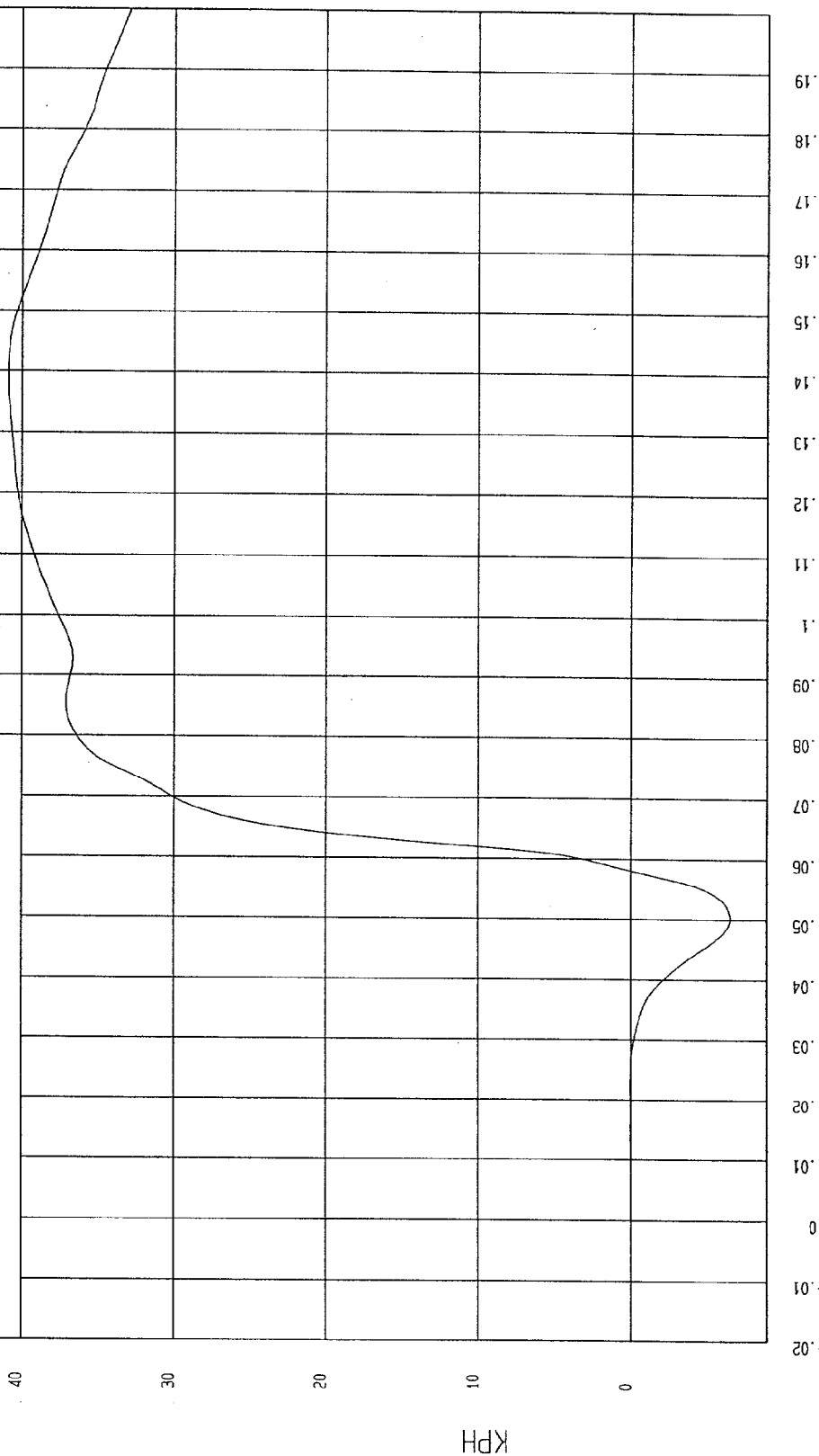
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

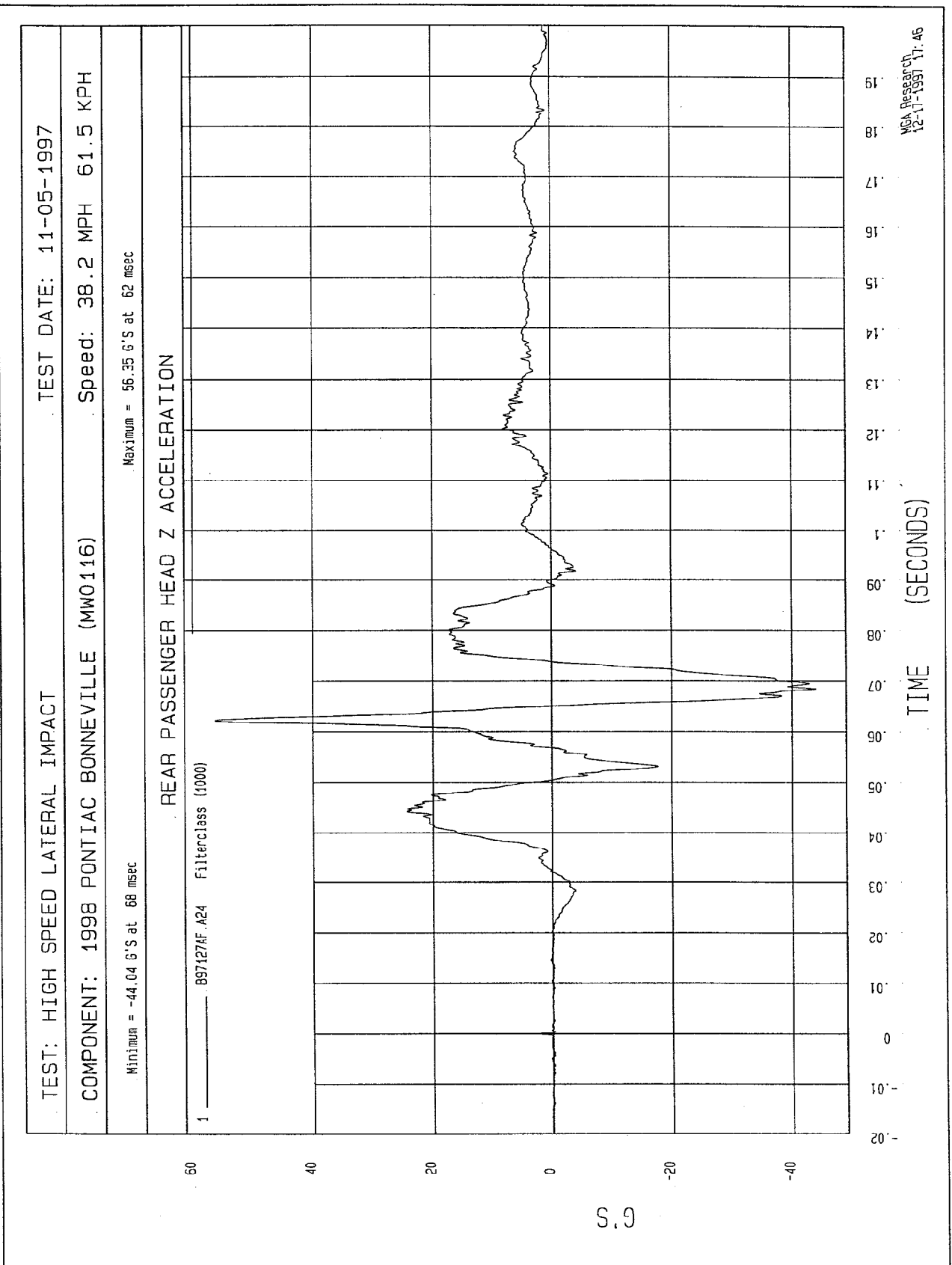
Minimum = -6.40 KPH at 50 msec
Maximum = 40.89 KPH at 139 msec

REAR PASSENGER HEAD Y VELOCITY

1 ——— B97127AI.V23 Filterclass (180)



MCA Research
12-18-1997 10:15



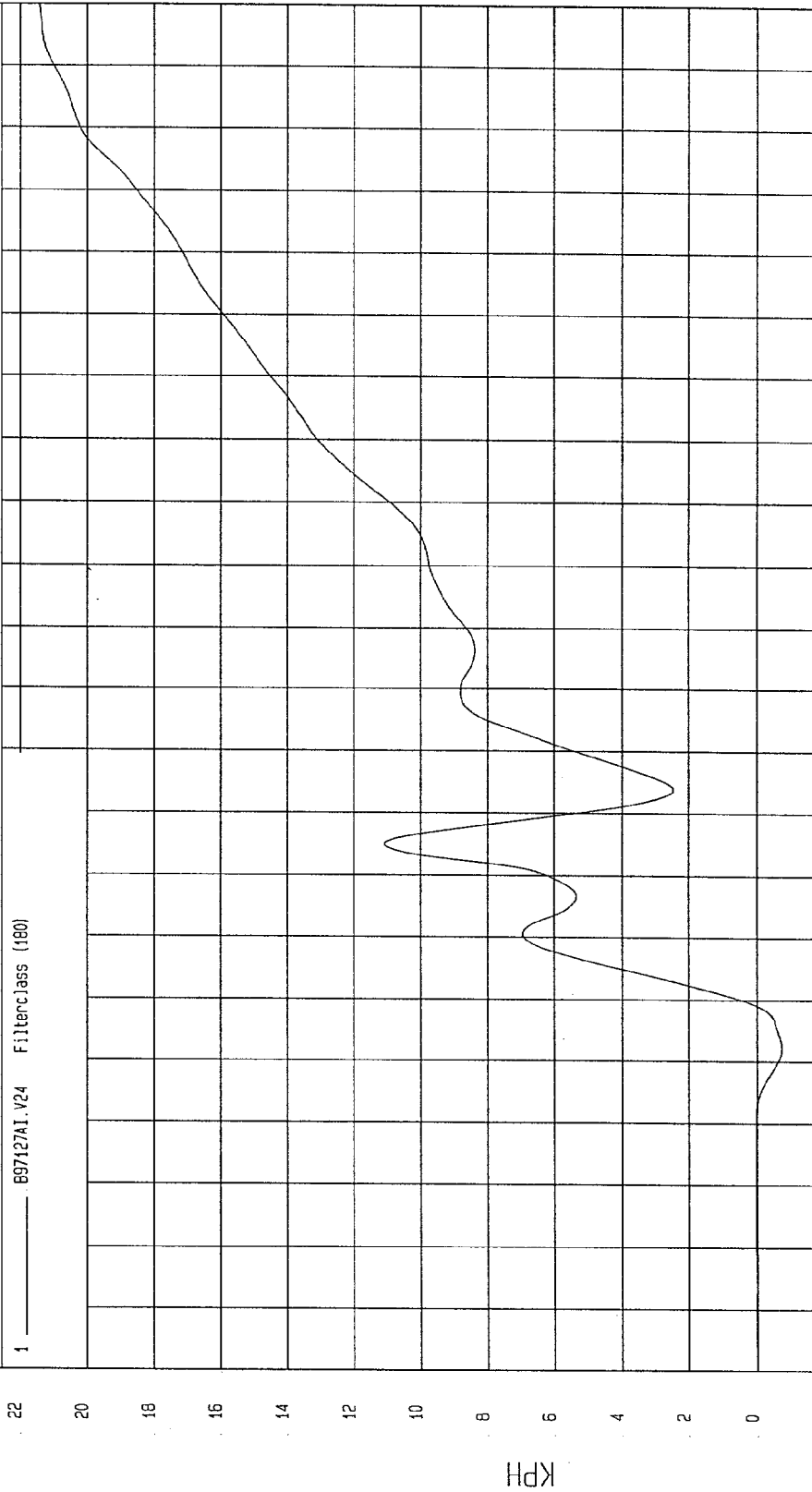
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -.72 KPH at 32 msec Maximum = 21.43 KPH at 200 msec

REAR PASSENGER HEAD Z VELOCITY

1 897127A1.V24 Filterclass (100)



NGA Research
12-18-1997 10:15

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

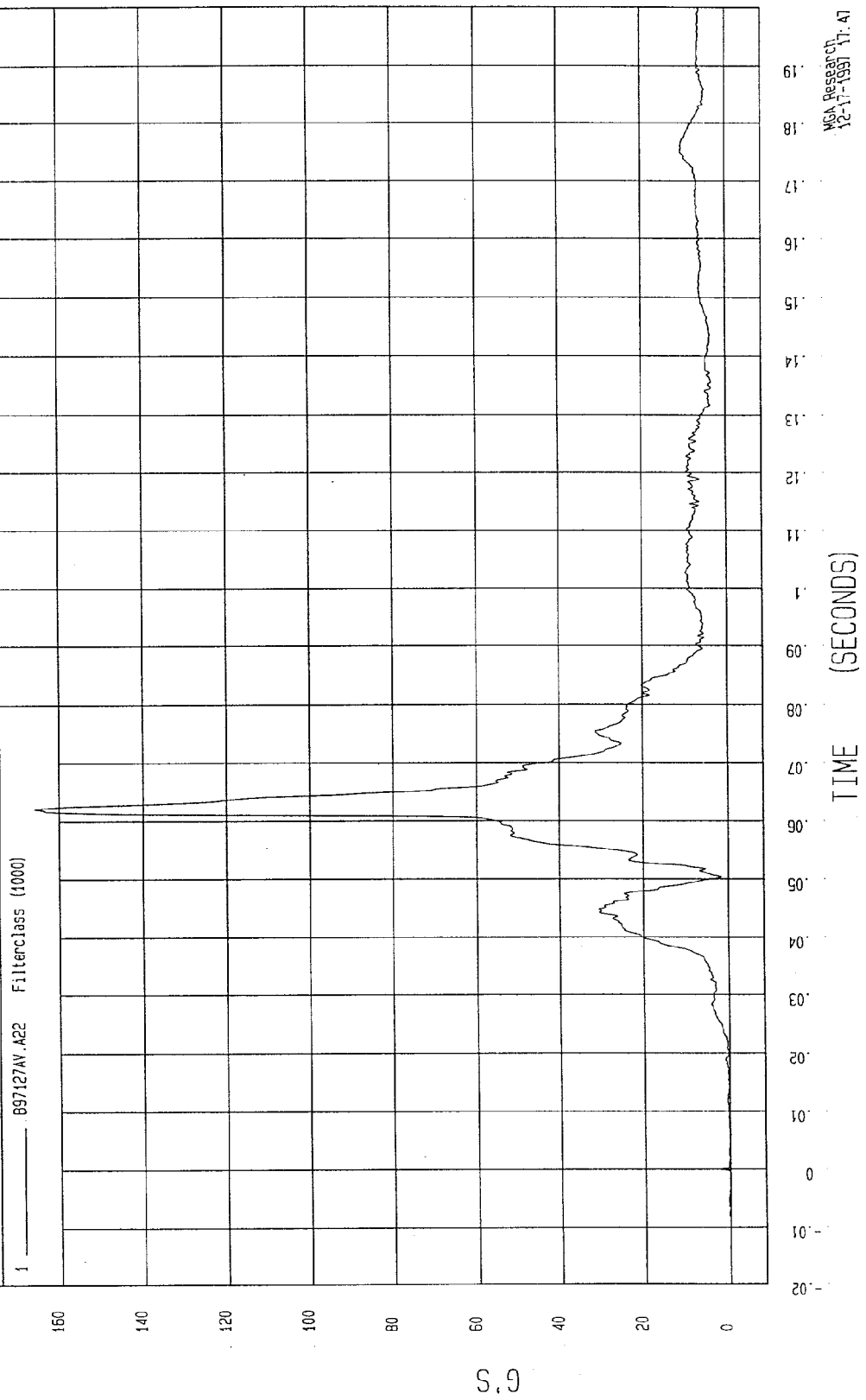
Speed: 38.2 MPH 61.5 KPH

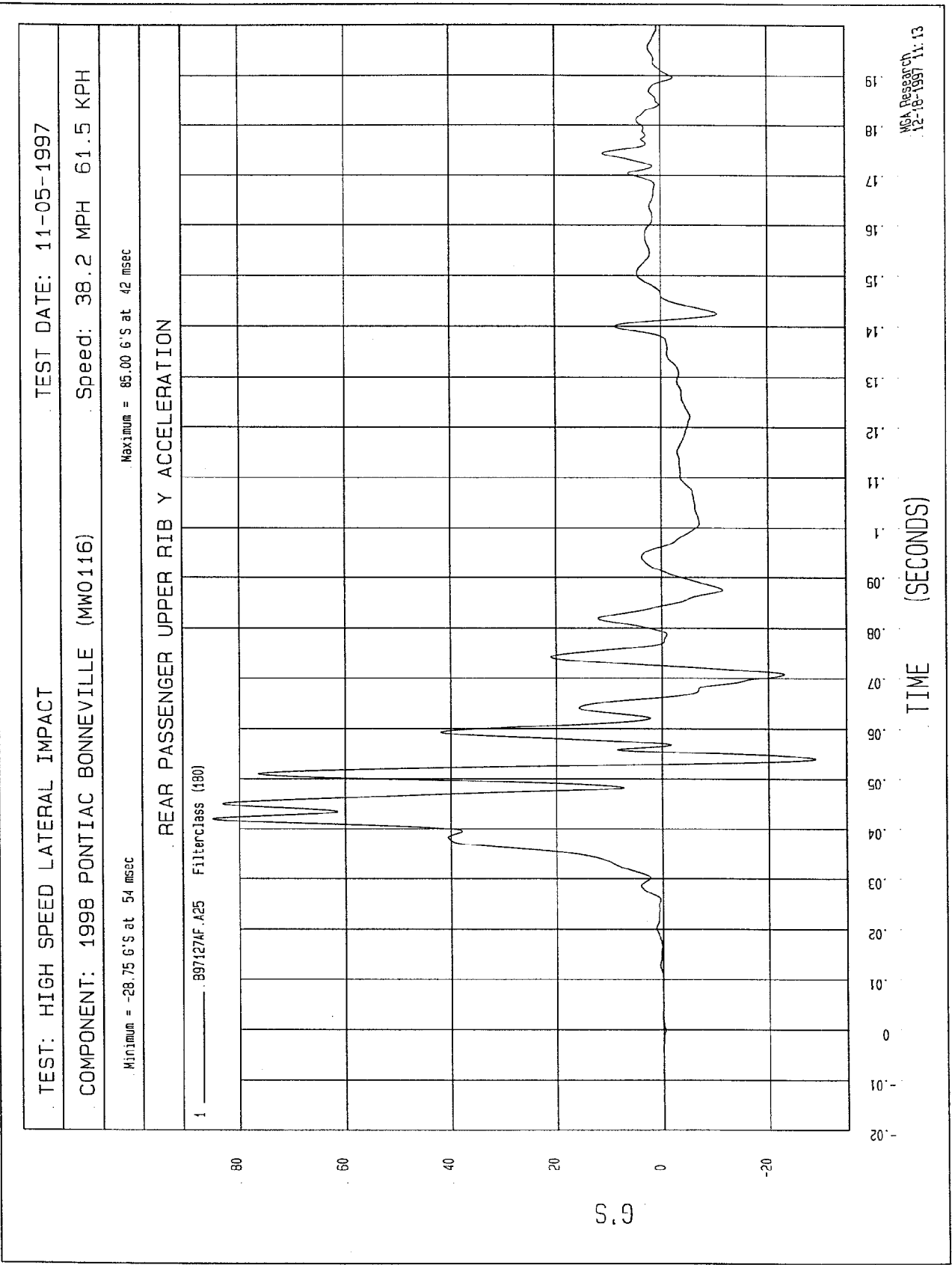
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 165.83 G'S at 62 msec

Minimum = 1.17E-02 G'S at 5 msec

REAR PASSENGER HEAD RESULTANT





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

SPEED: 38.2 MPH 61.5 KPH

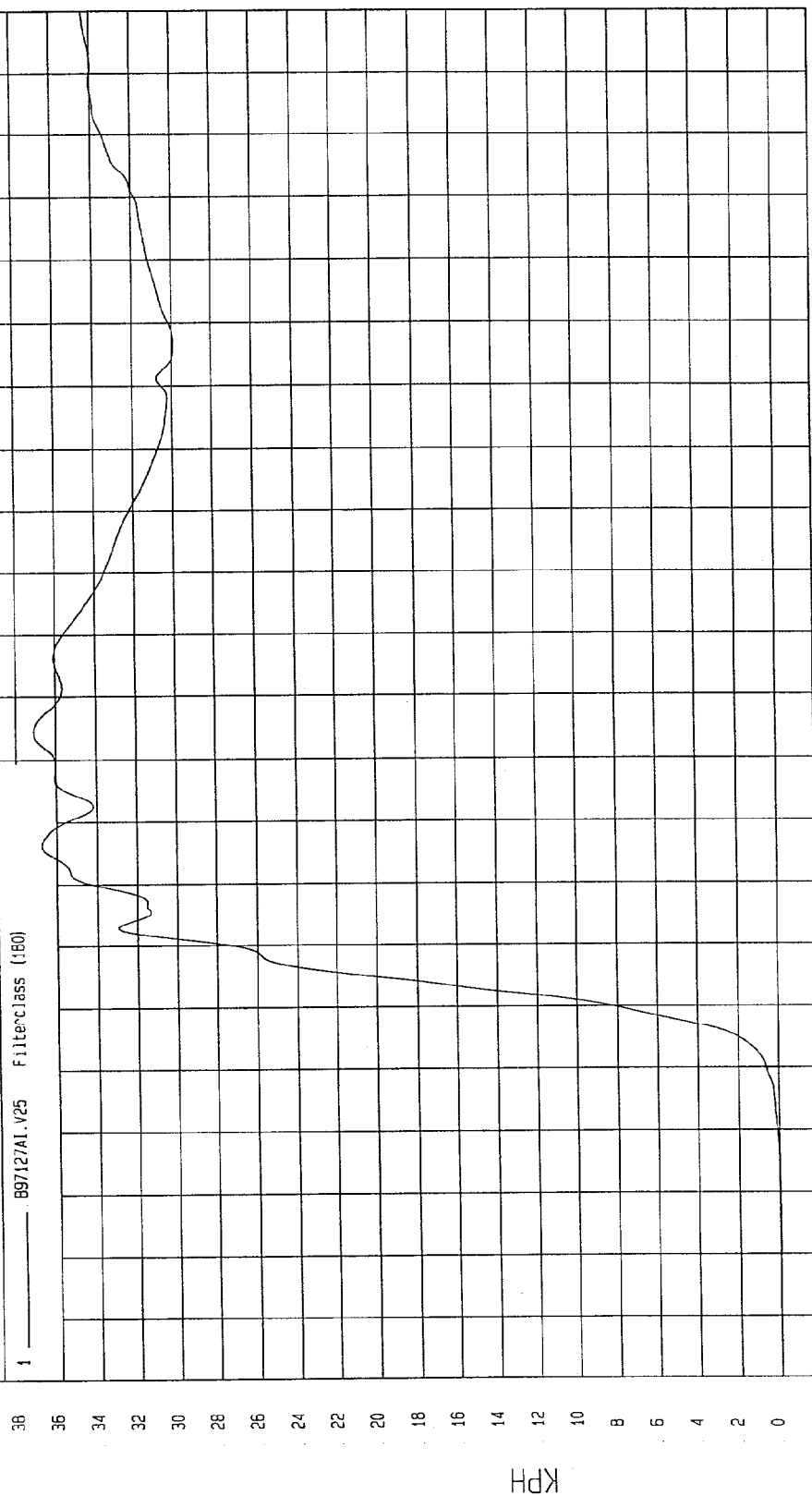
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 37.10 KPH at 64 msec

Minimum = -3.42E-02 KPH at 2 msec

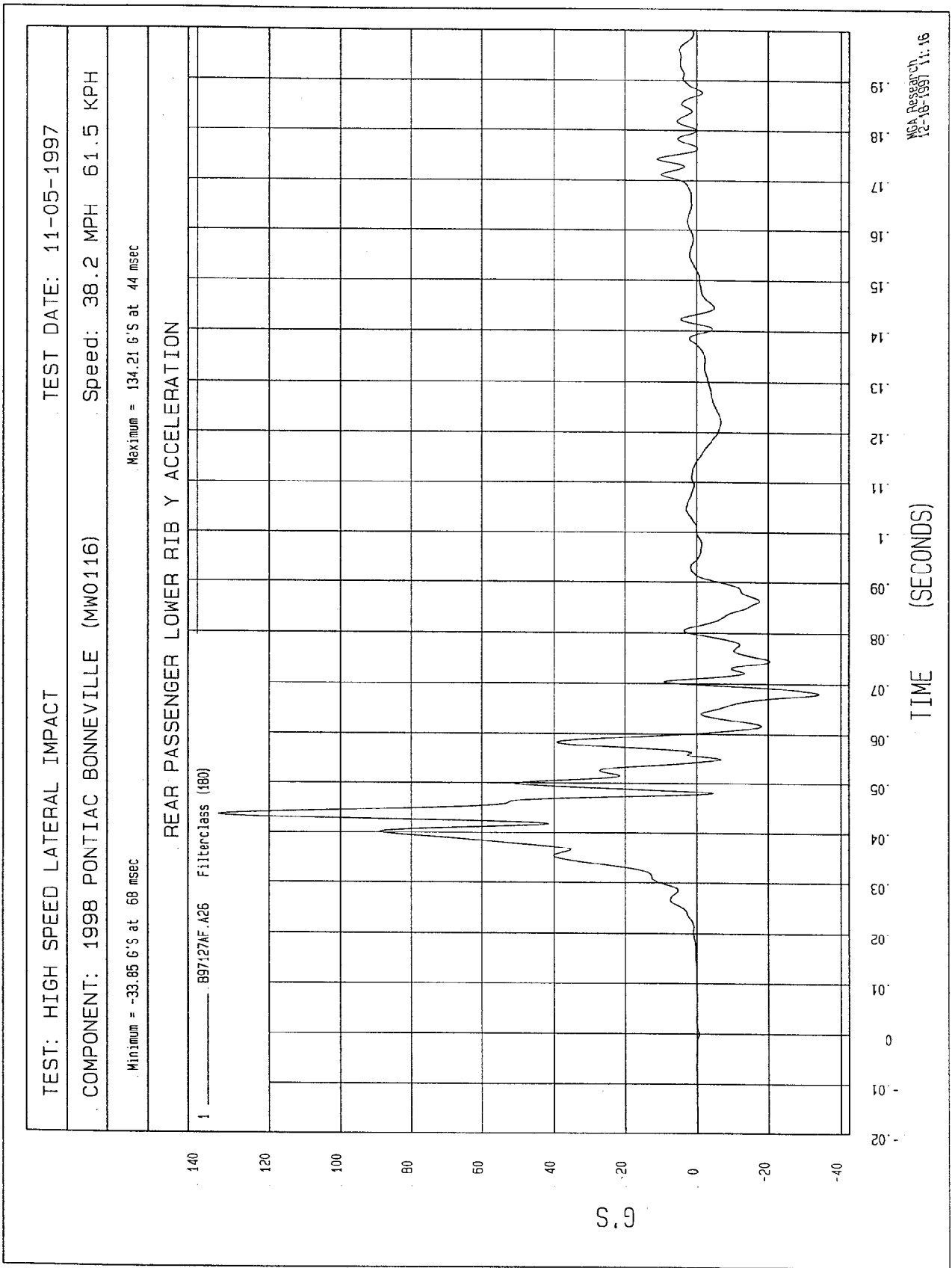
REAR PASSENGER UPPER RIB Y VELOCITY

1 B97127A1.V25 FilterClass (180)



TIME Seconds

MCA Research
12-18-1997 10:39



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

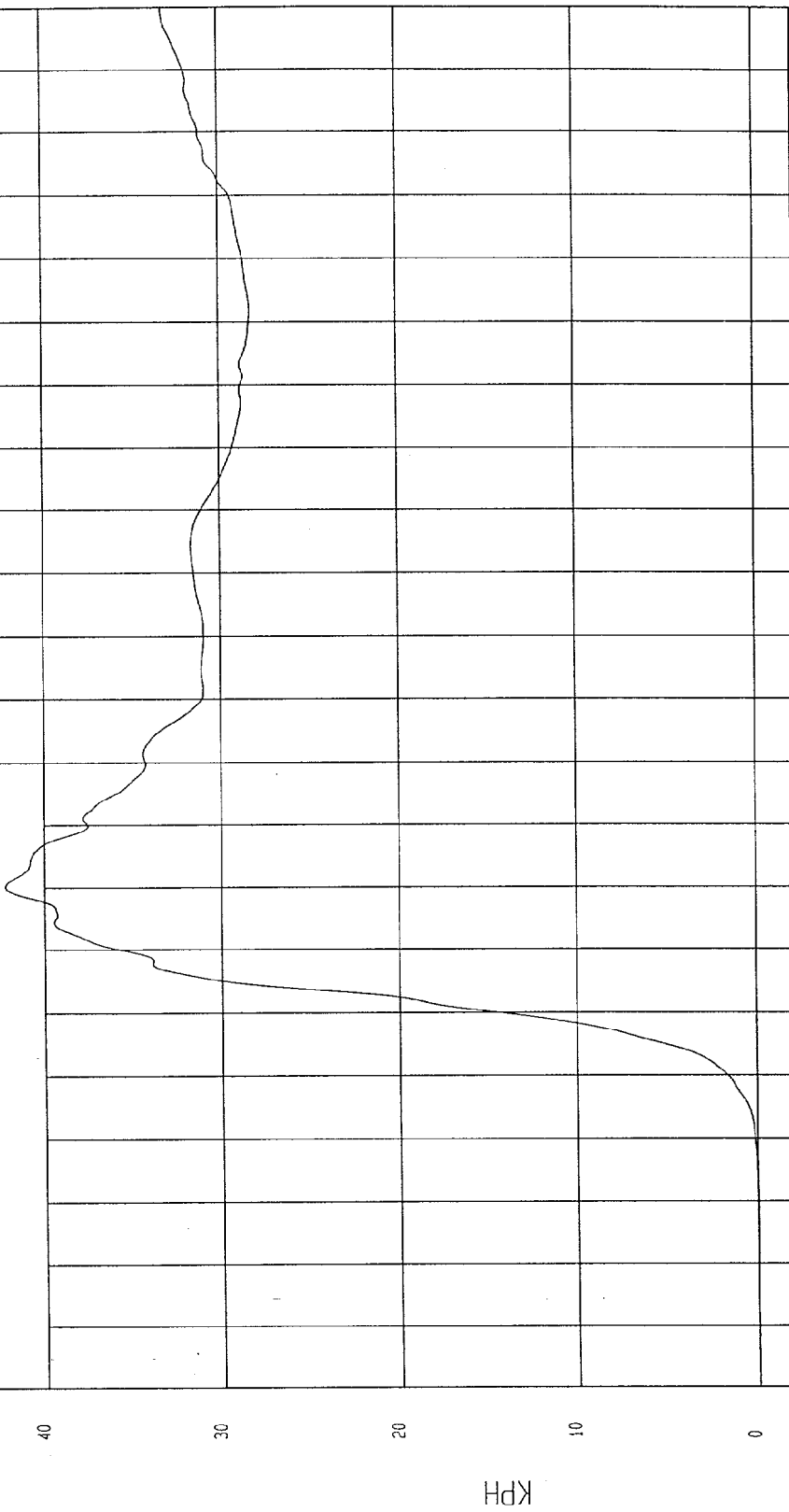
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 42.21 KPH at 60 msec

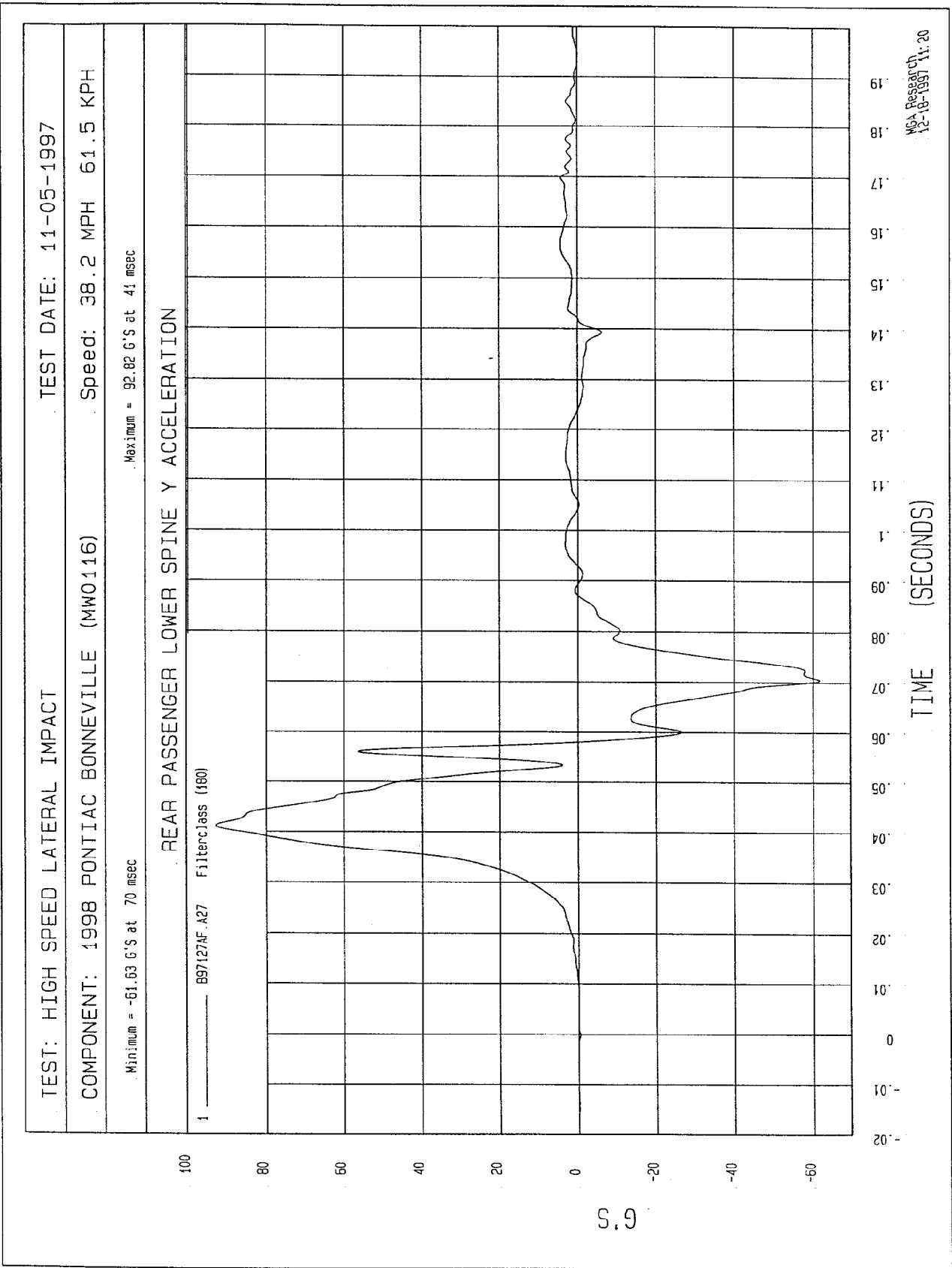
Minimum = -3.11E-02 KPH at 2 msec

REAR PASSENGER LOWER RIB Y VELOCITY

1 B97127A1.V26 FilterClass (180)



MGA Research
12-18-1997 10:40



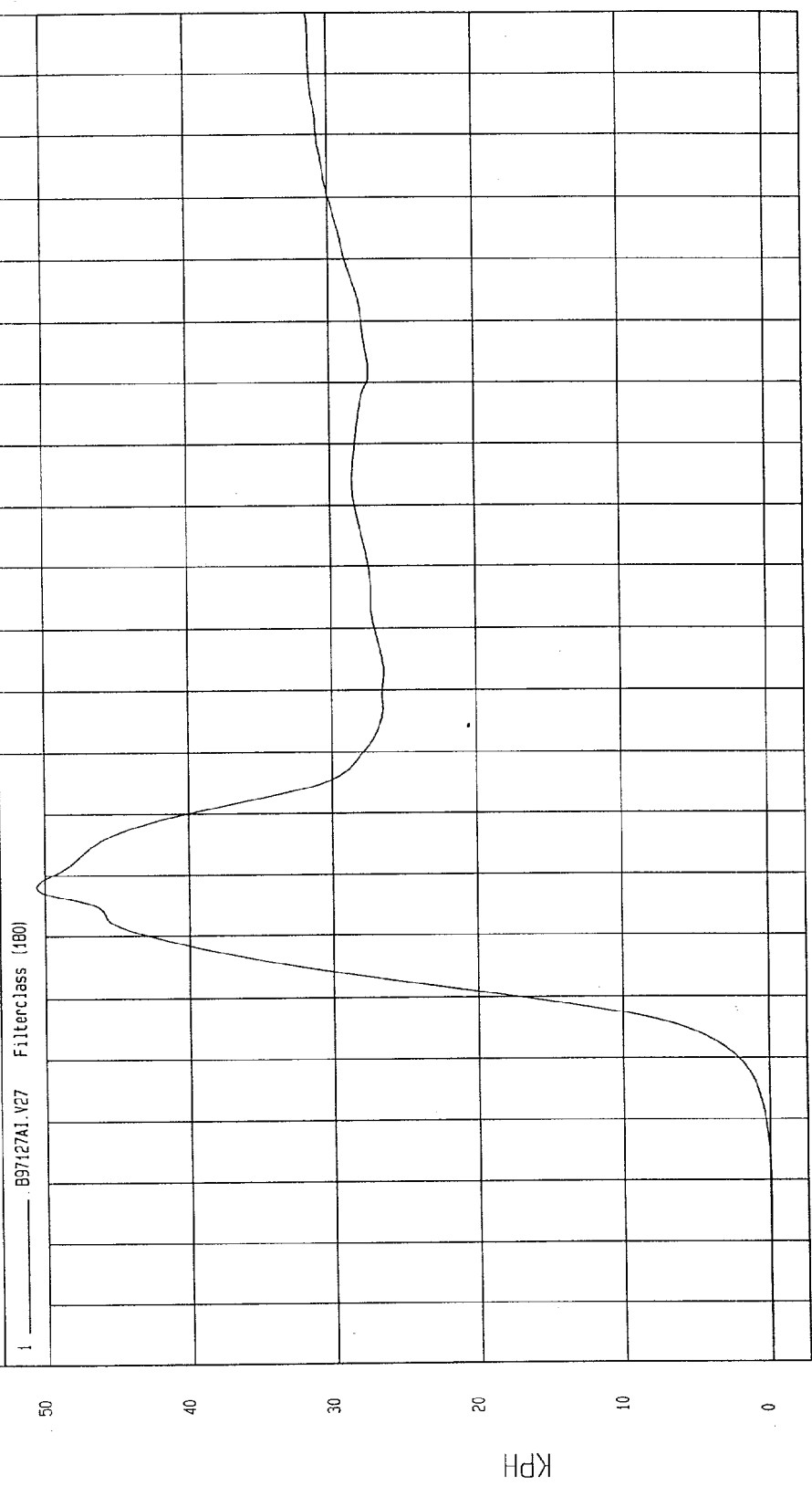
TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

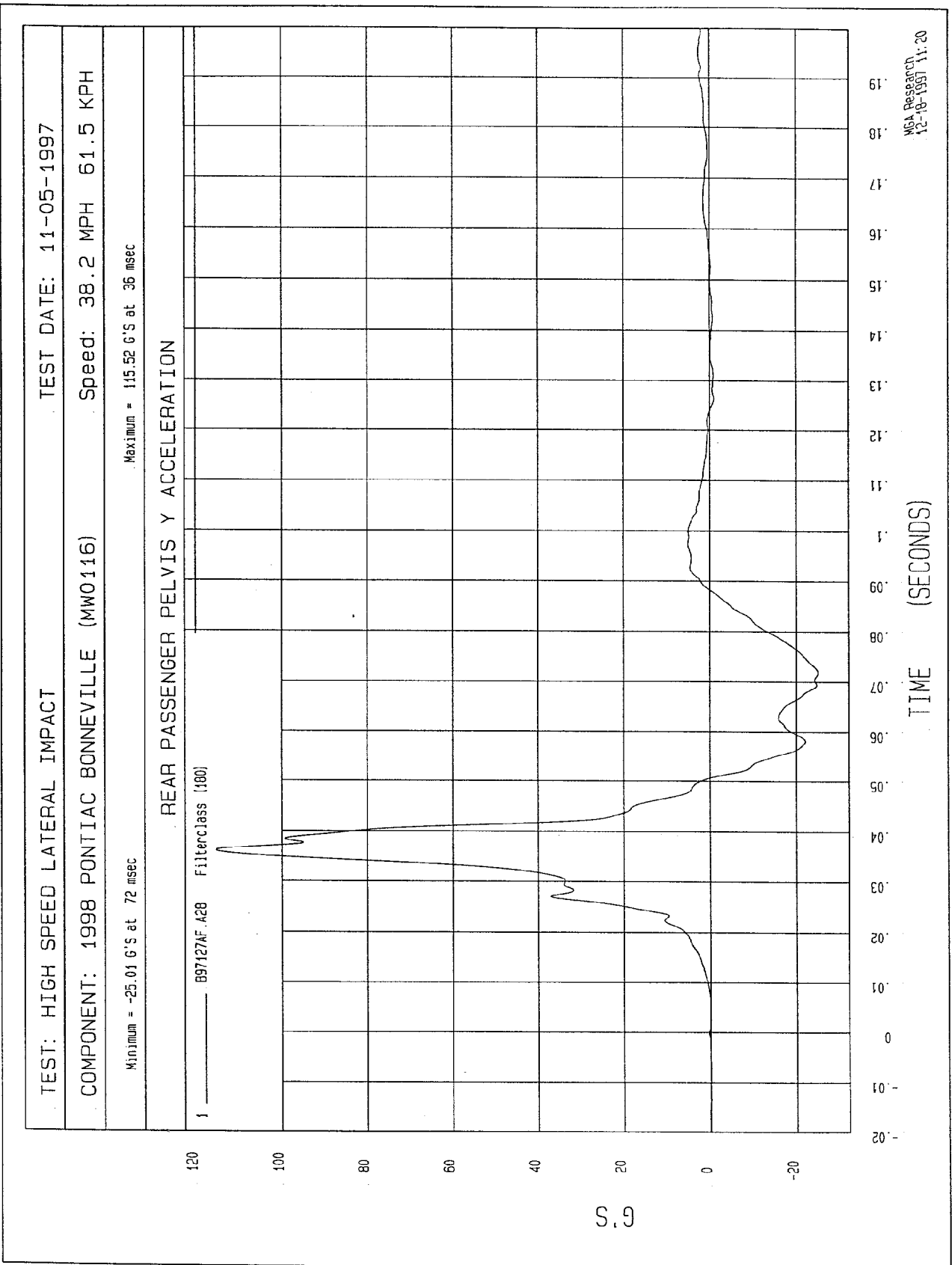
Minimum = -4.44E-02 KPH at 7 msec Maximum = 50.59 KPH at 59 msec

REAR PASSENGER LOWER SPINE Y VELOCITY



TIME Seconds

MCA Research
12-18-1997 10:40



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

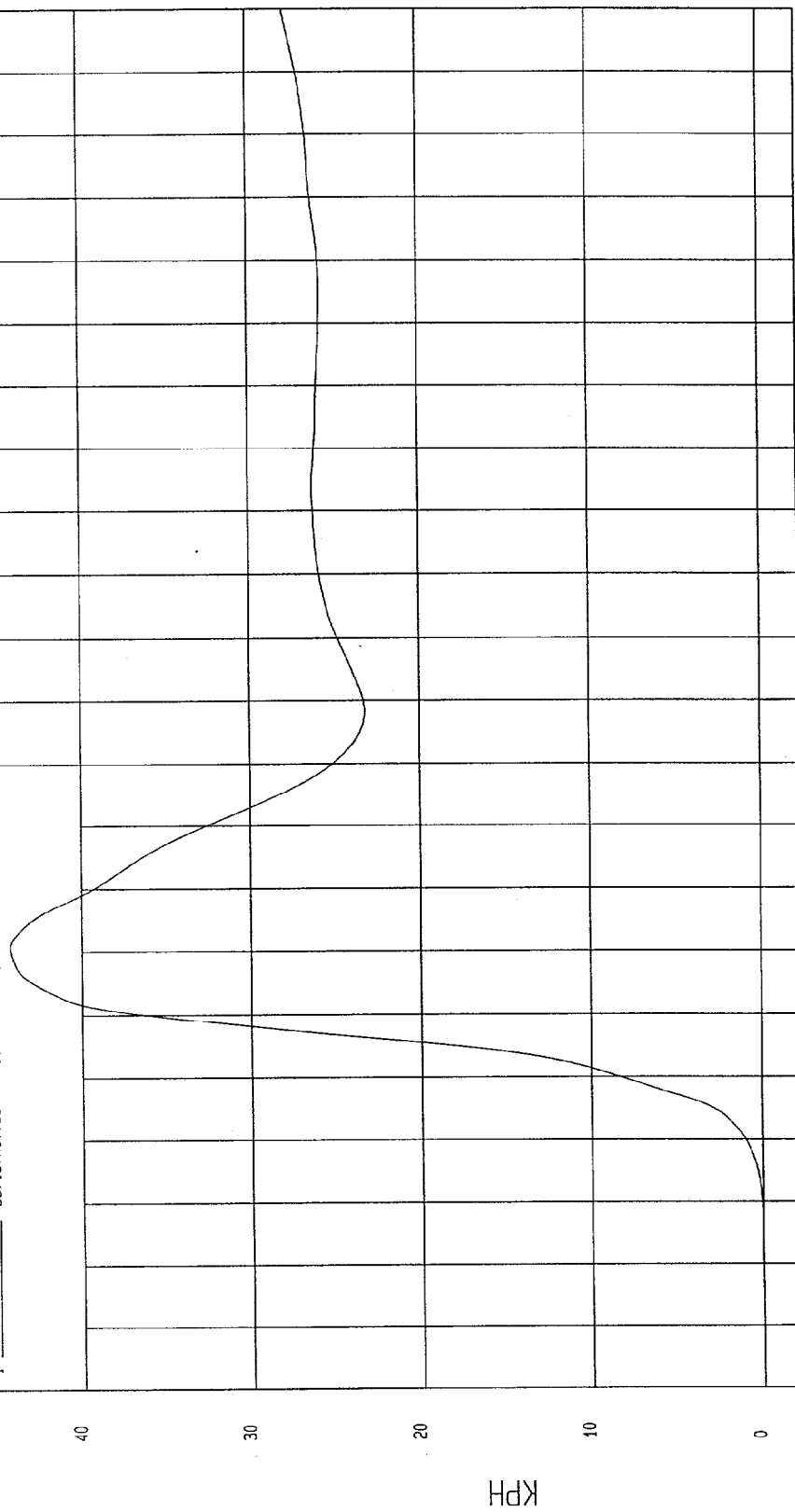
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 44.17 KPH at 51 msec

Minimum = -7.07E-03 KPH at -4 msec

REAR PASSENGER PELVIS Y VELOCITY

1 B97127A1.V28 Filterclass (180)



MSA Research
12-18-1997 10:40

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

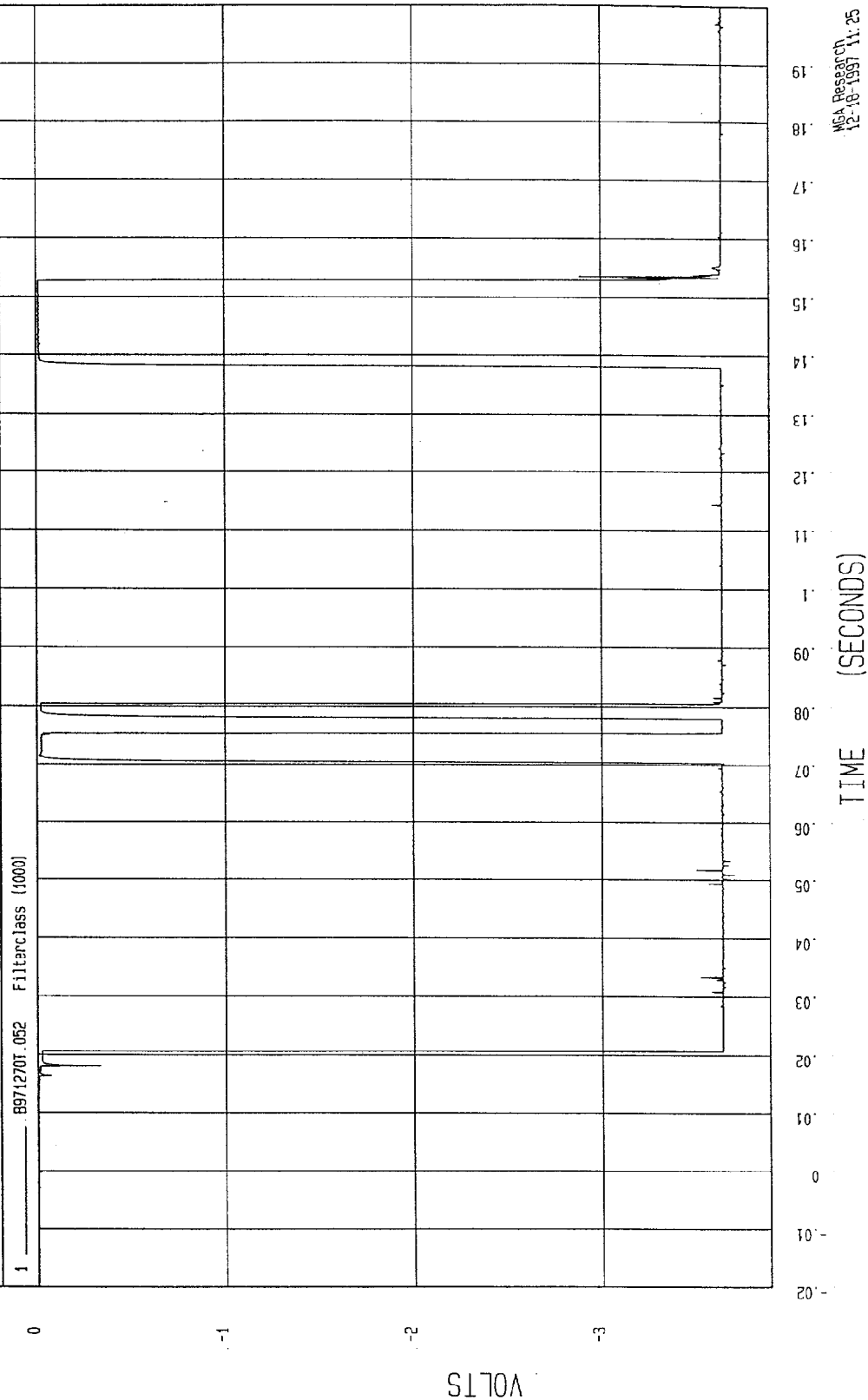
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 4.68E-03 VOLTS at -4 msec

Minimum = -3.59 VOLTS at 51 msec

REAR PASSENGER LEG CONTACT



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

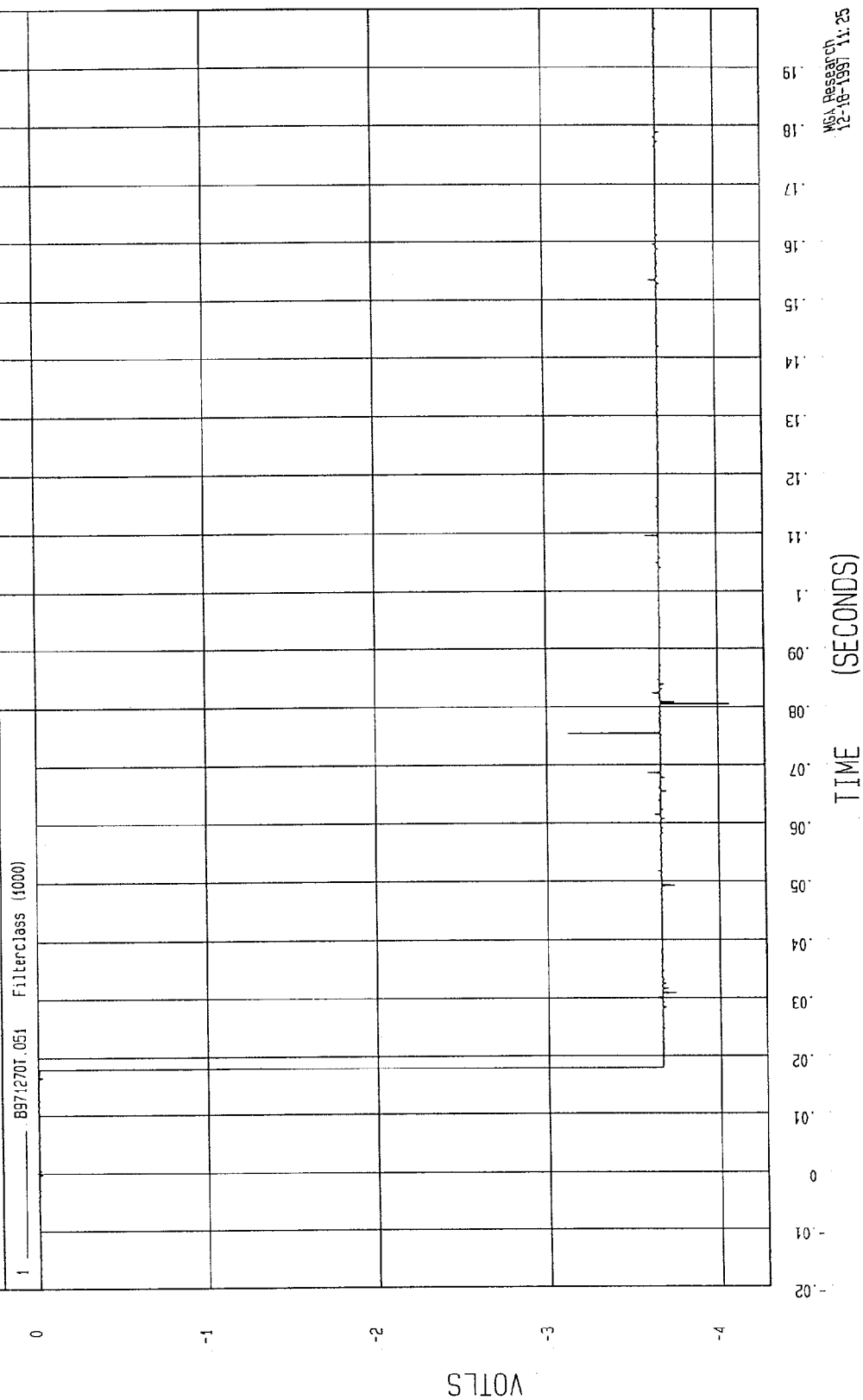
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 1.12E-02 VOTLS at 0 msec

Minimum = -4.06 VOTLS at 80 msec

REAR PASSENGER SHOULDER CONTACT



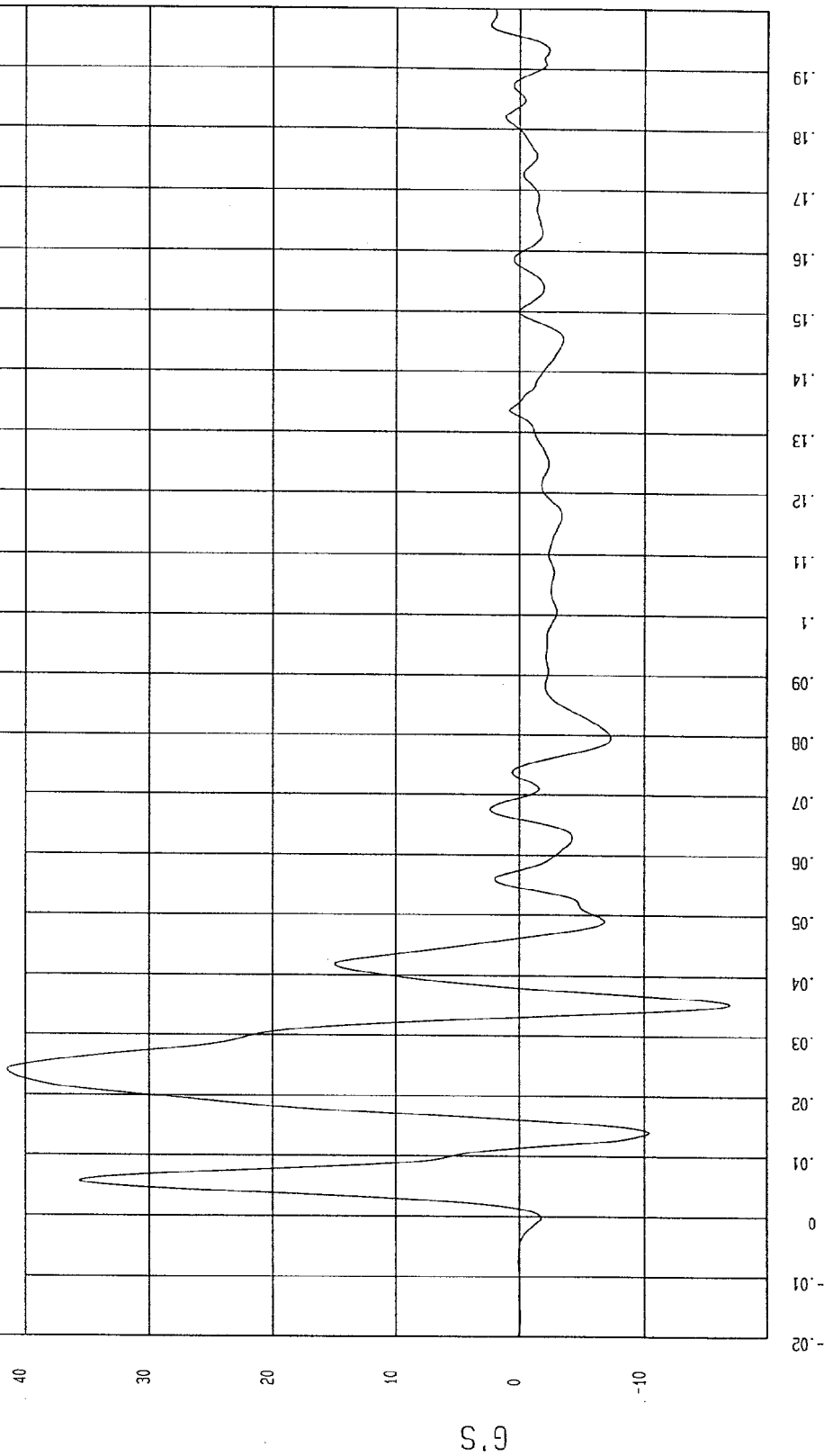
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -16.79 G'S at 35 msec Maximum = 41.44 G'S at 24 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 ——— 897127AF.A38 Filterclass (60)



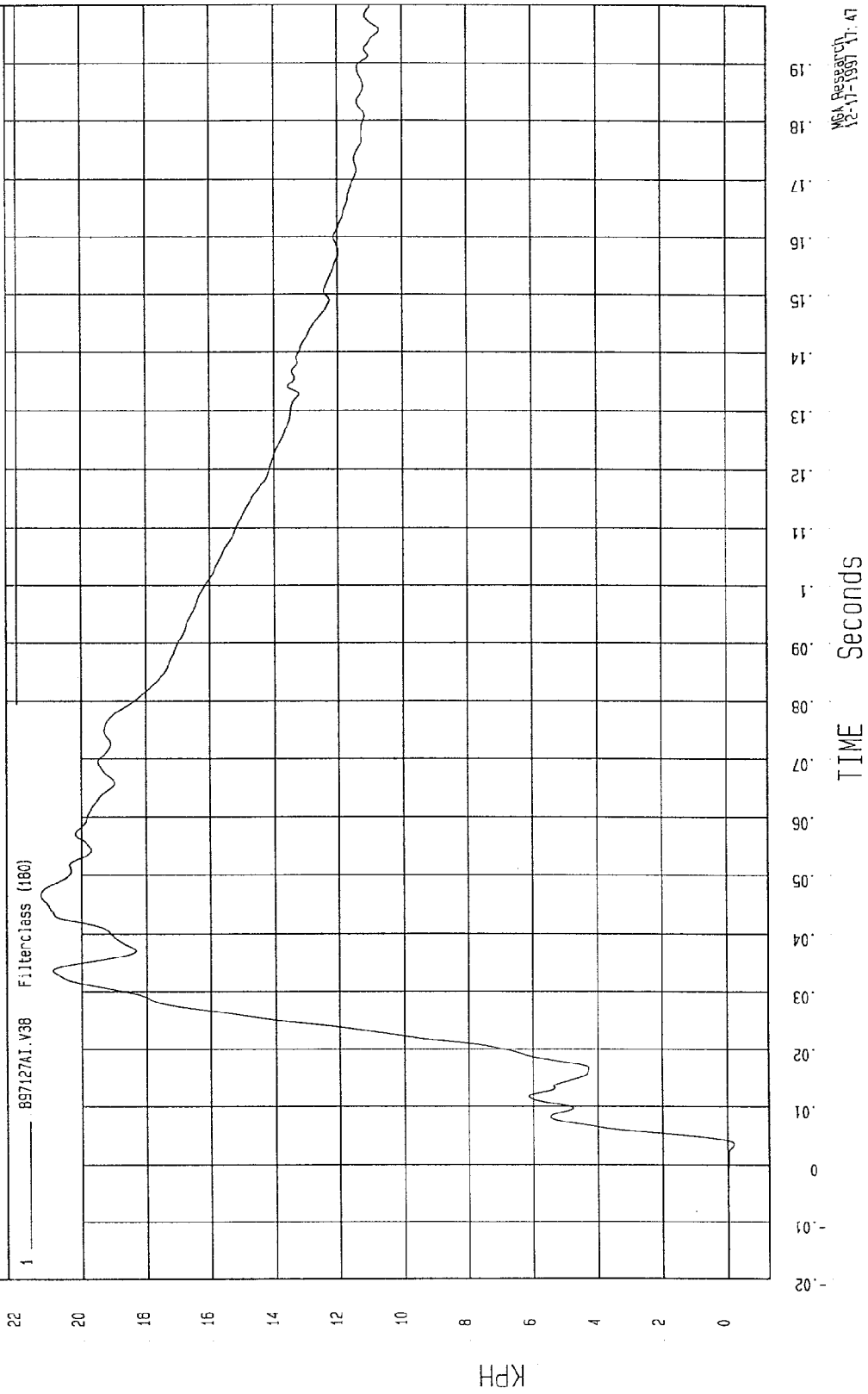
WGA Research
12-18-1997 14:40

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -.20 KPH at 4 msec Maximum = 21.25 KPH at 46 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

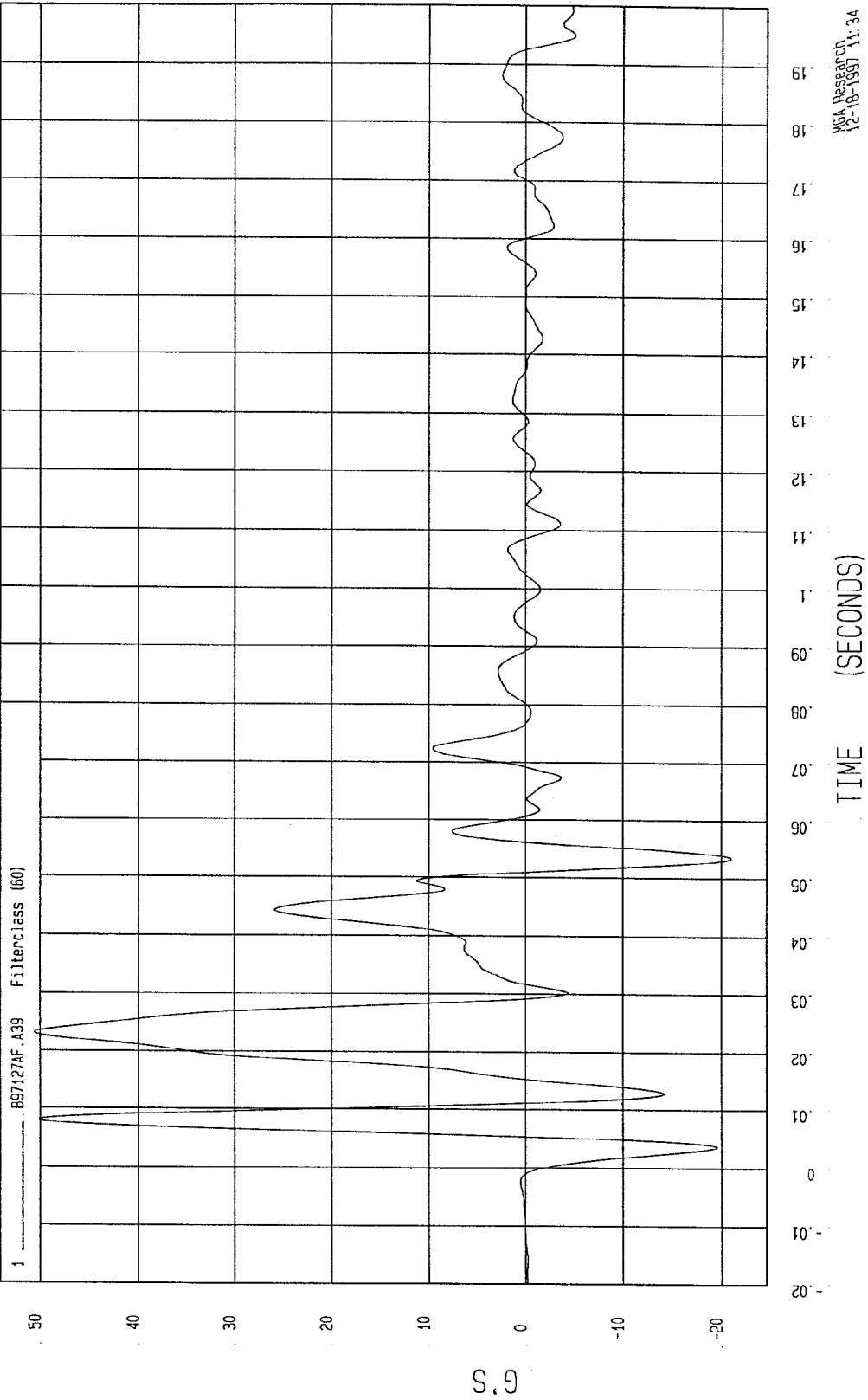
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 50.59 G'S at 23 msec

Minimum = -20.99 G'S at 54 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

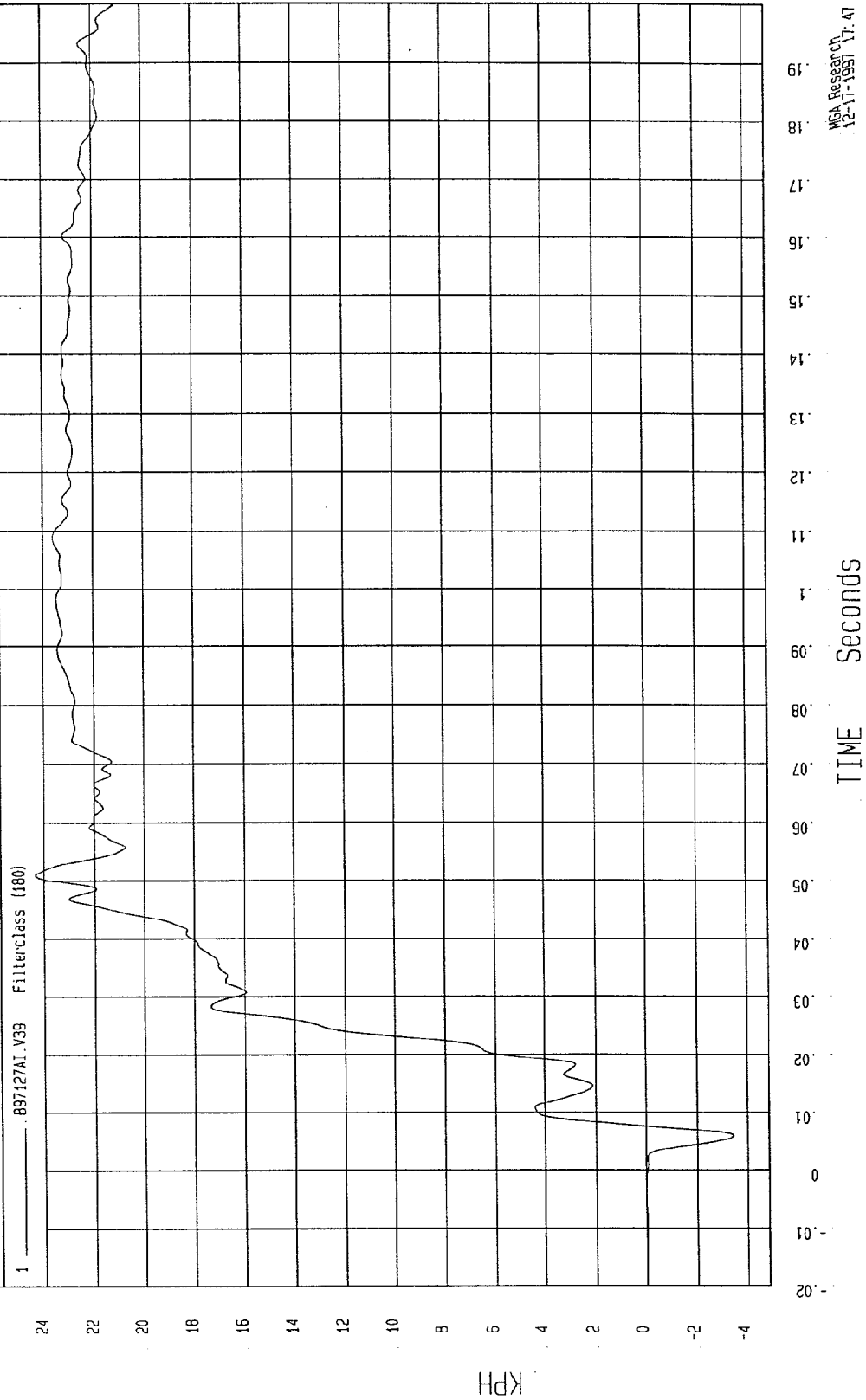
Speed: 38.2 MPH 61.5 KPH

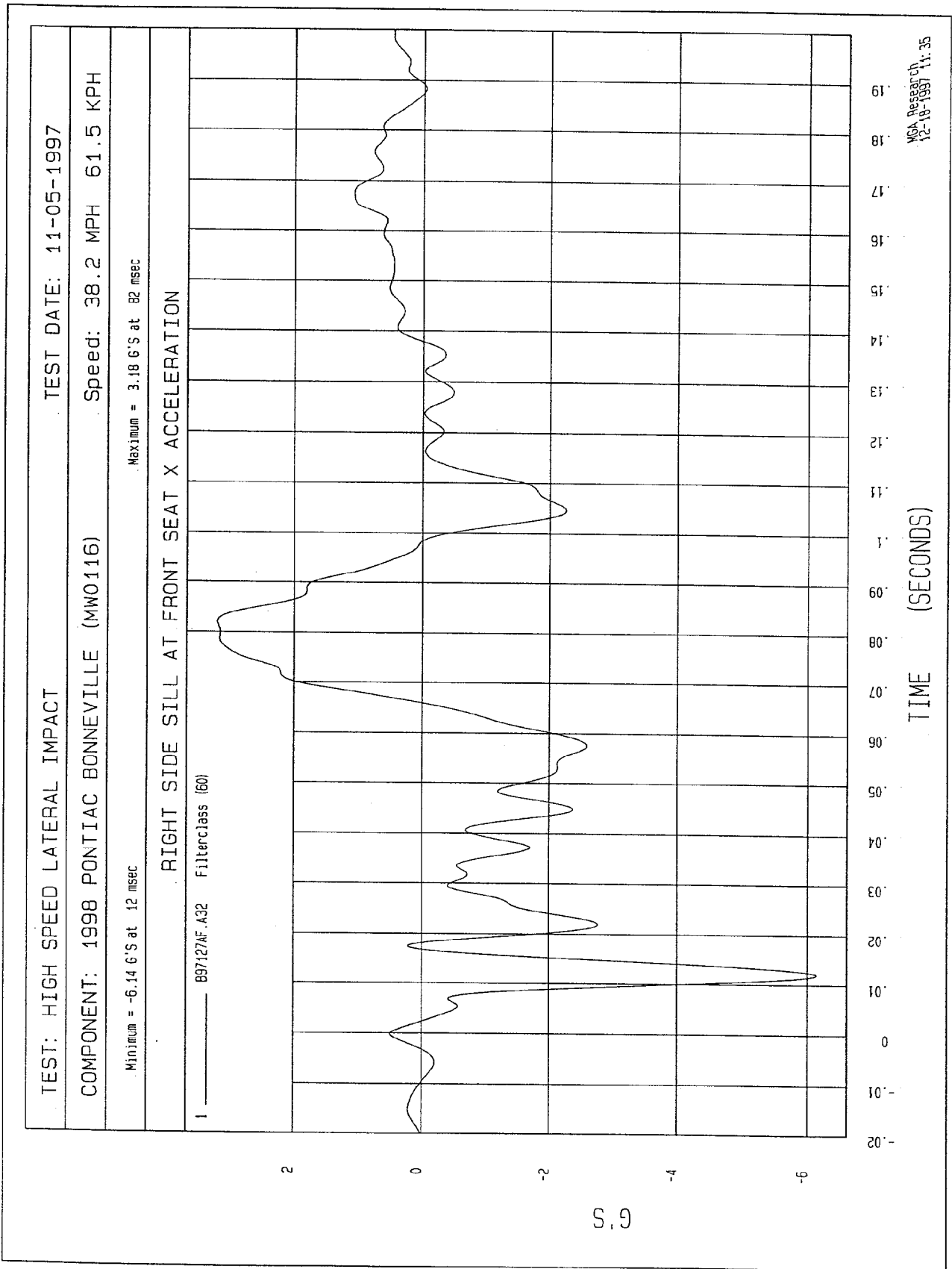
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

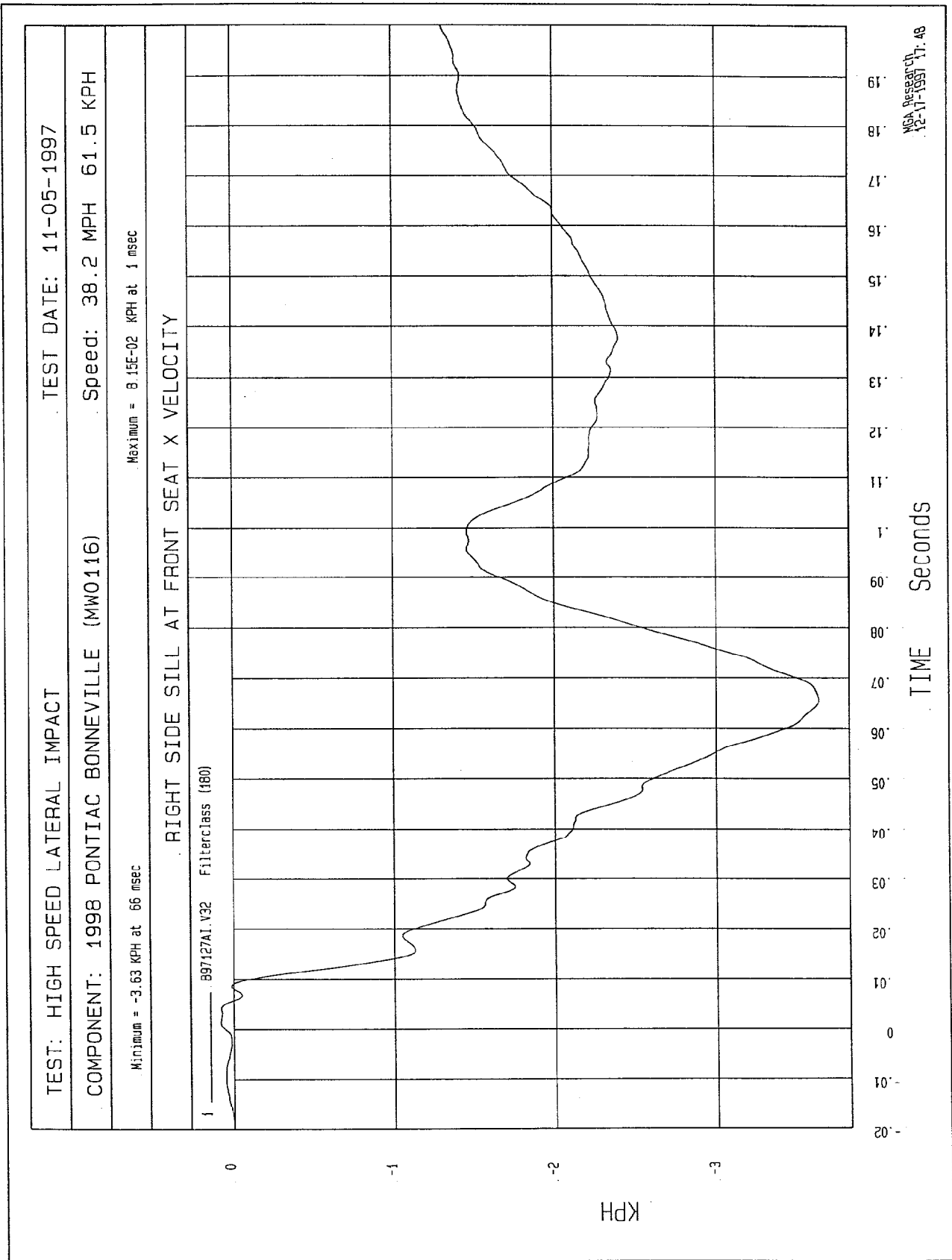
Maximum = 24.34 KPH at 51 msec

Minimum = -3.45 KPH at 6 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY





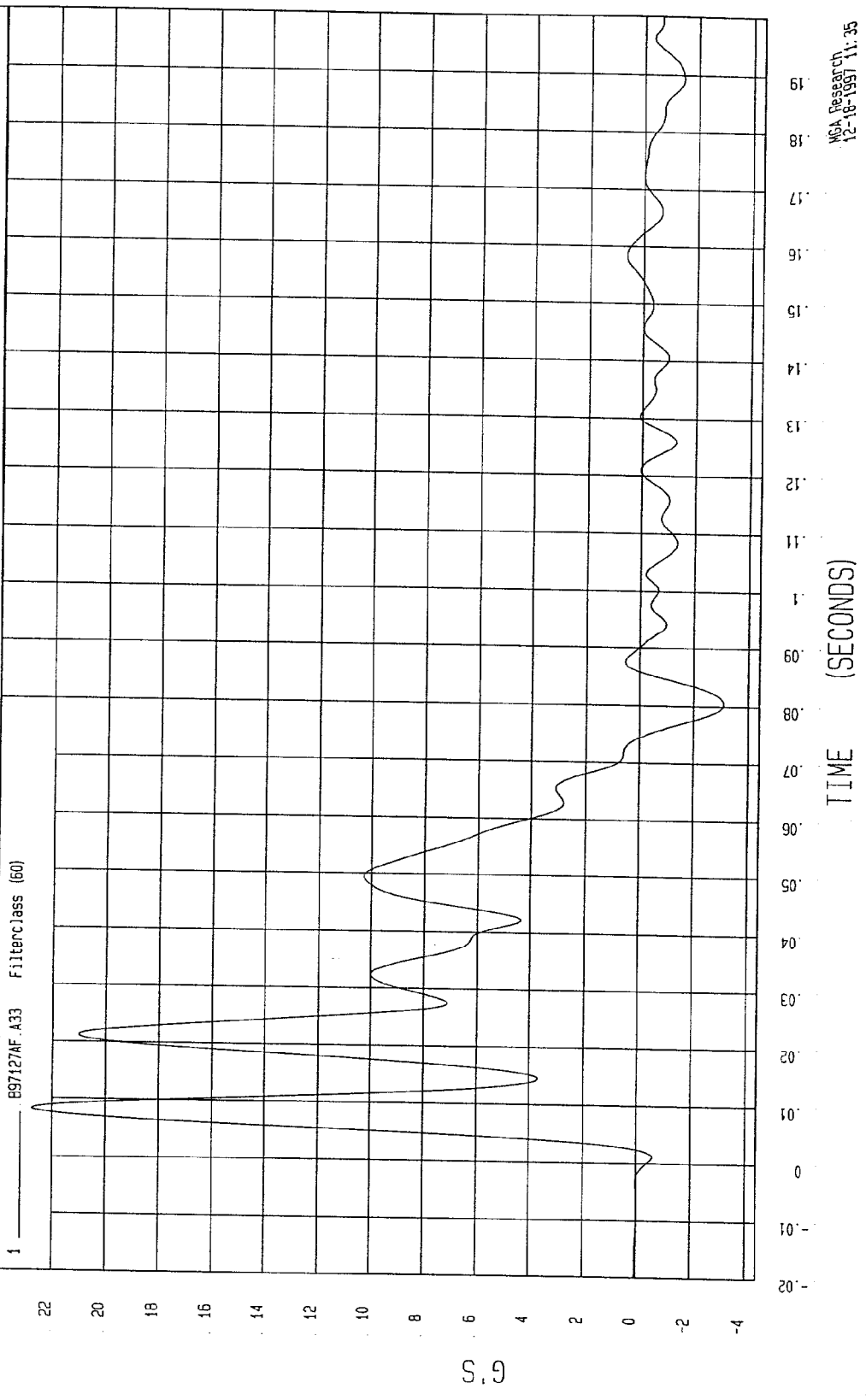


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

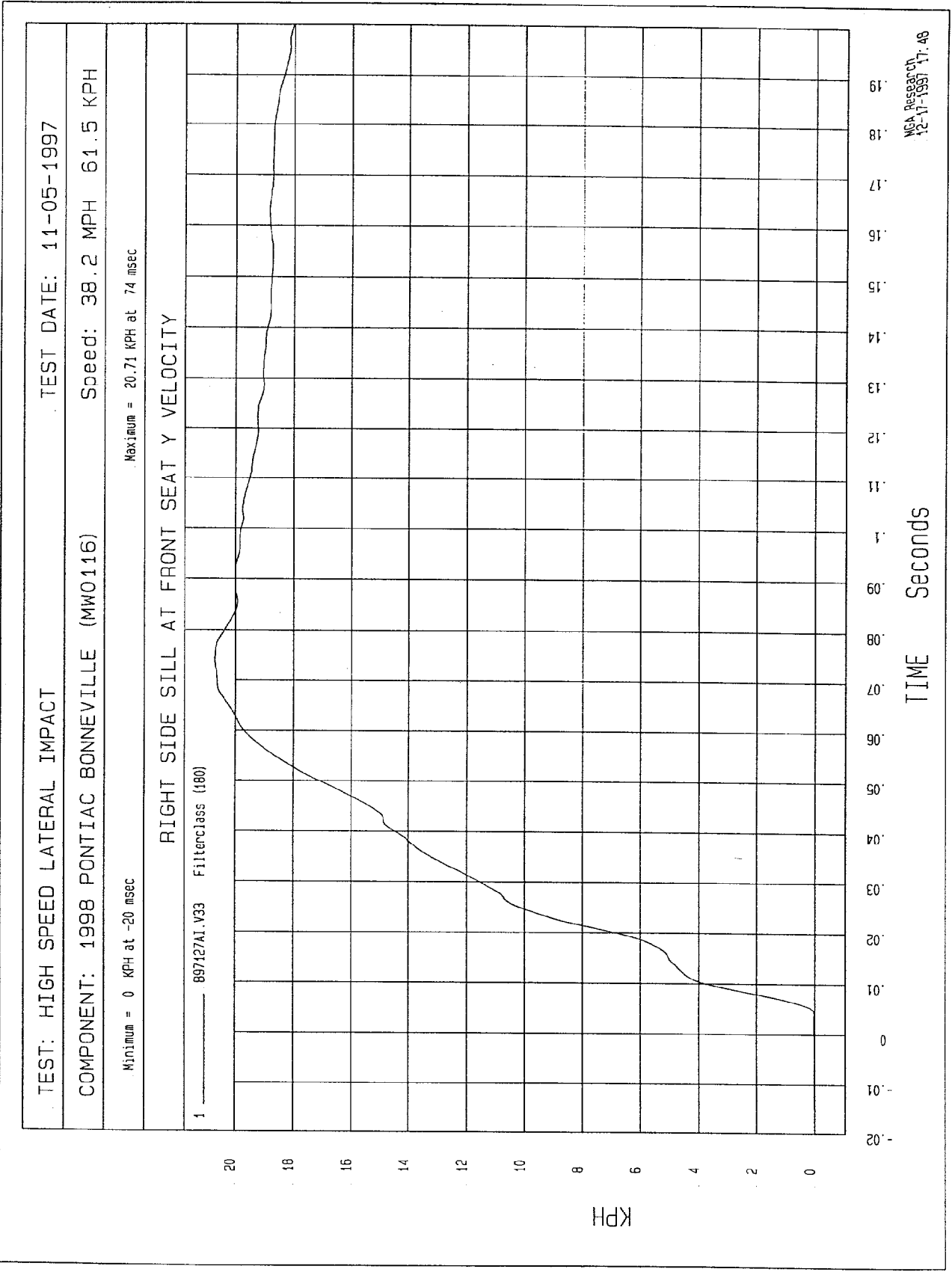
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

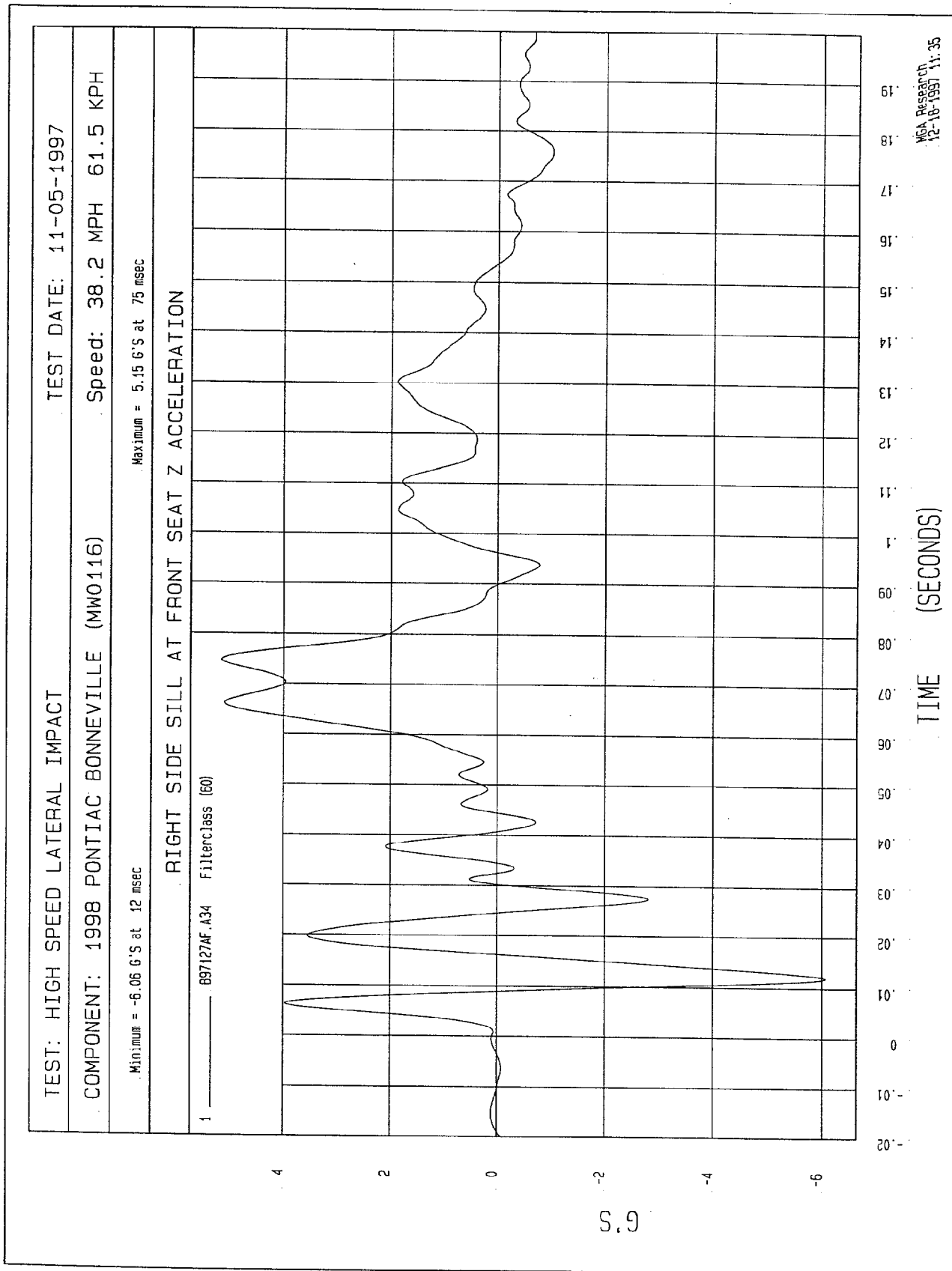
Minimum = -3.10 G'S at 80 msec Maximum = 22.75 G'S at 8 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION



MCA Research
12-18-1997 11:35





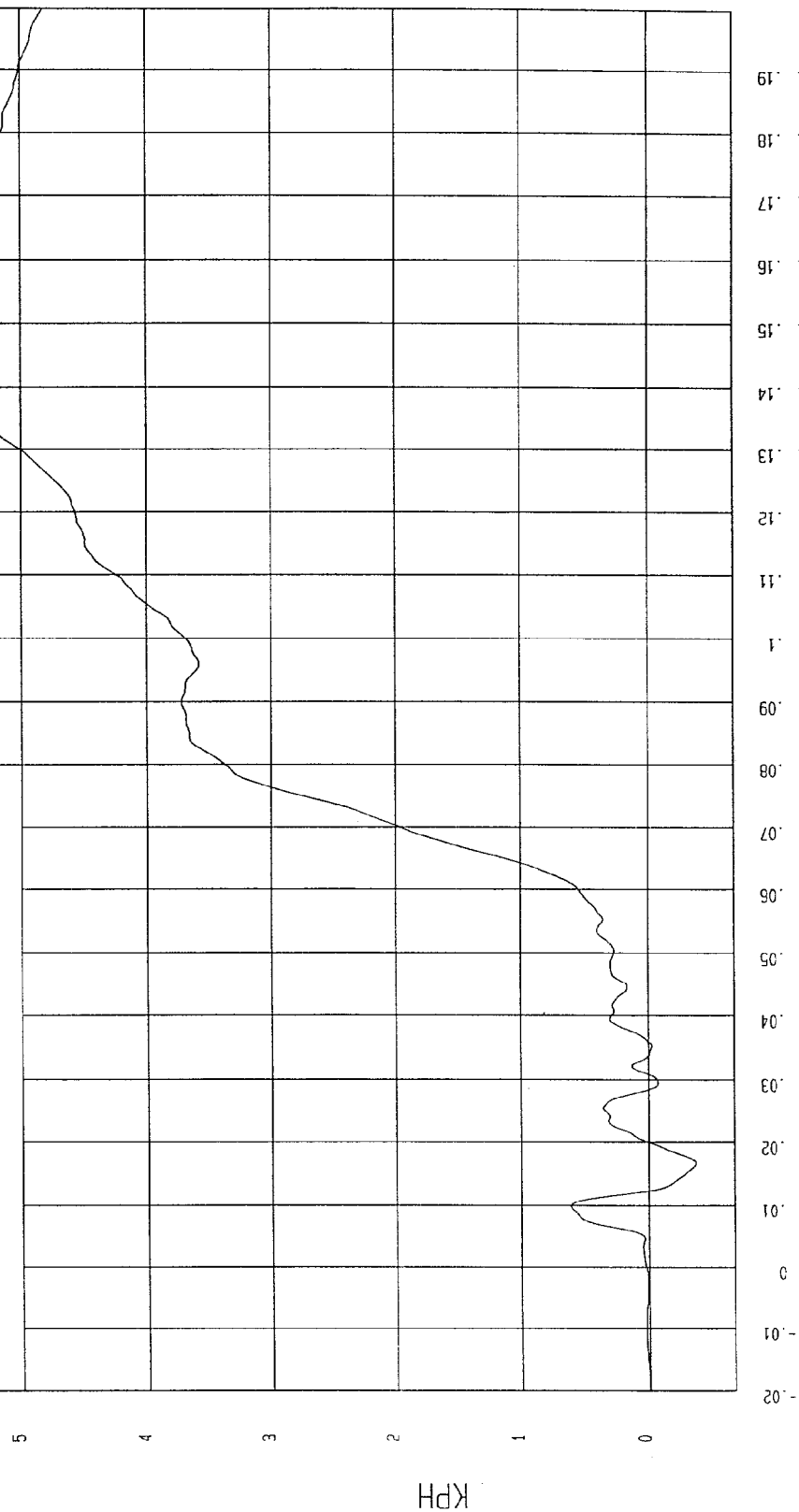
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

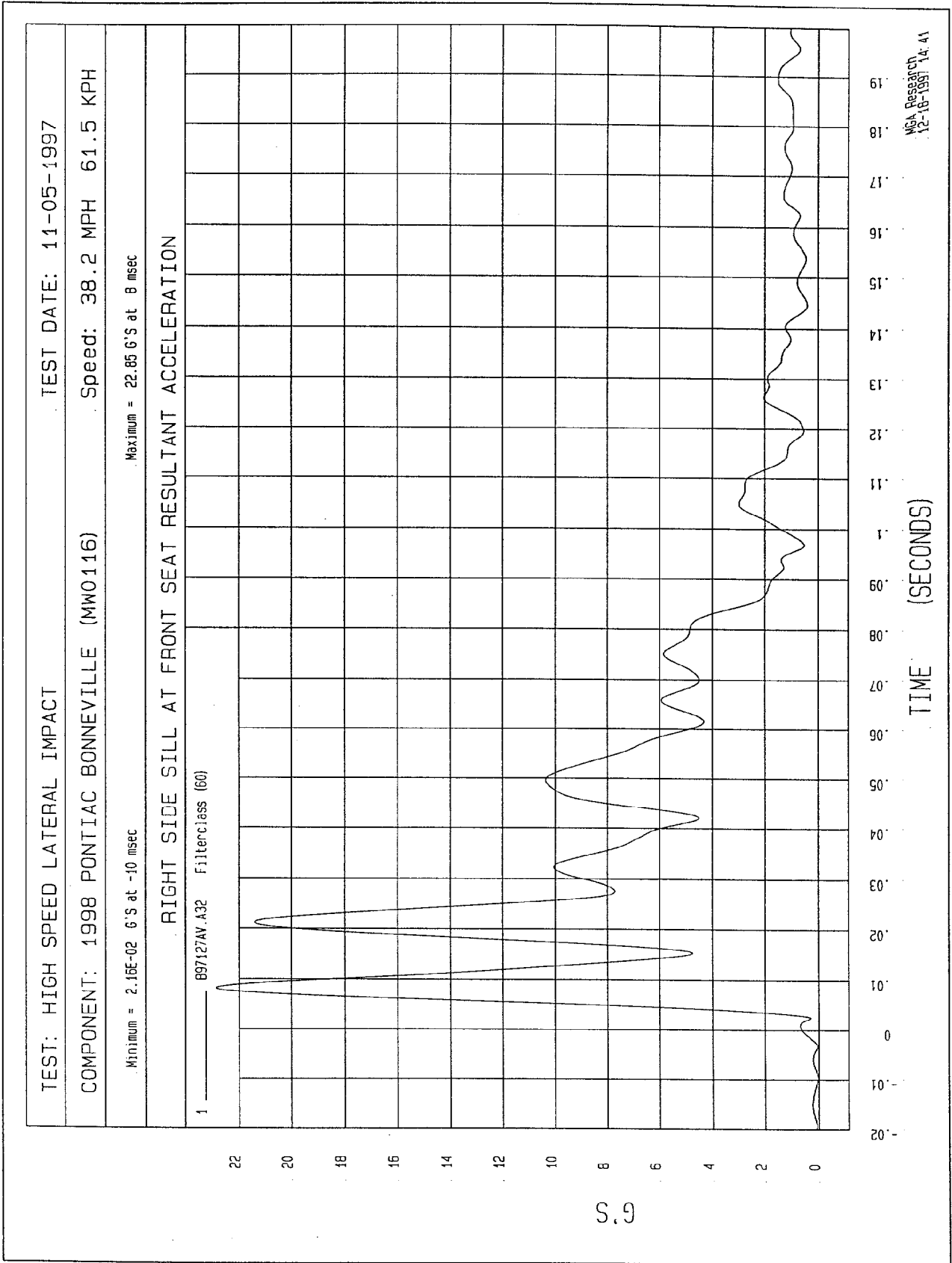
Minimum = -.36 KPH at 17 msec Maximum = 5.62 KPH at 154 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY

1 ——— 897127A1.V34 Filterclass (100)



NSA Research
12-17-1997 17:48

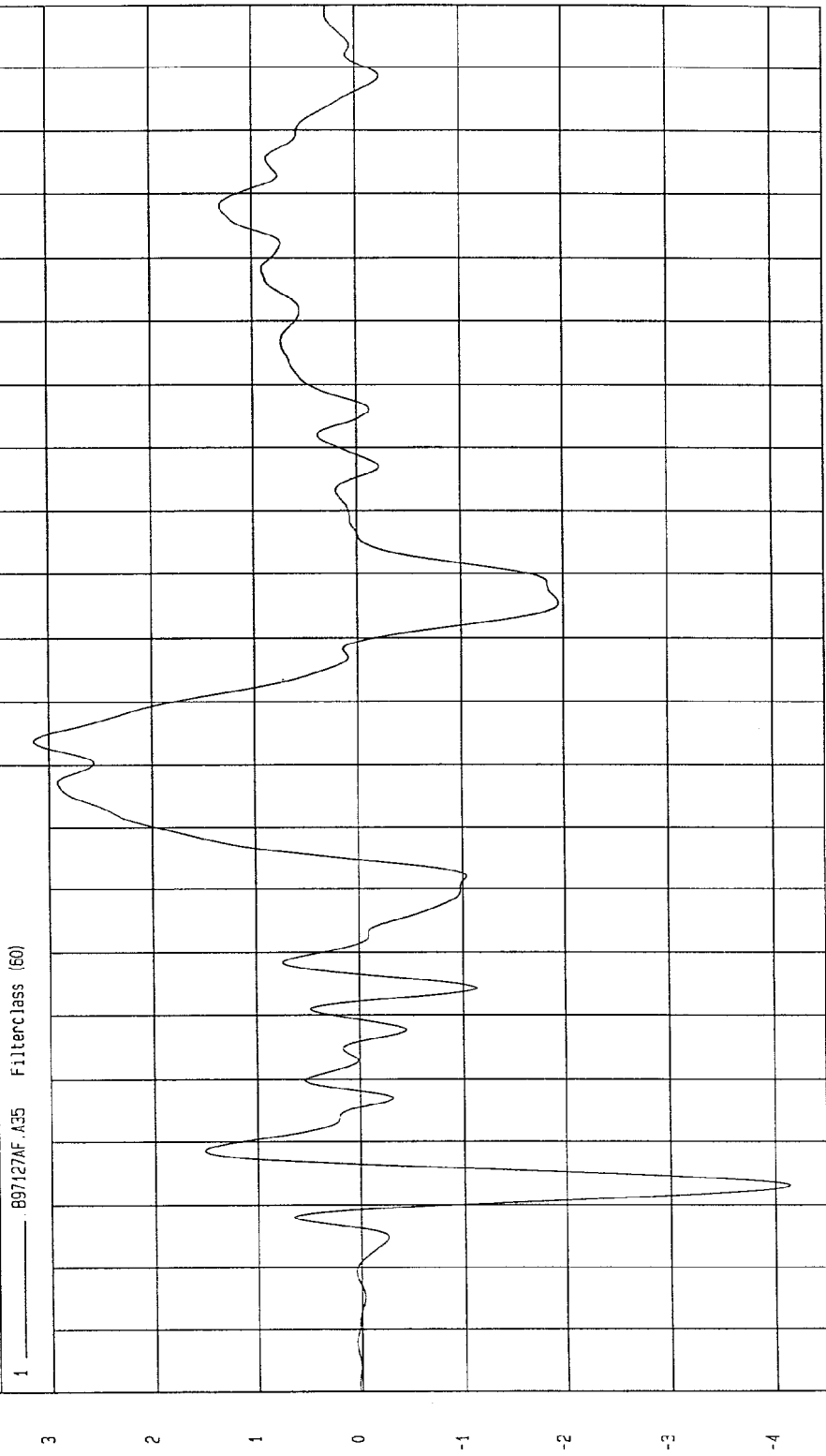


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

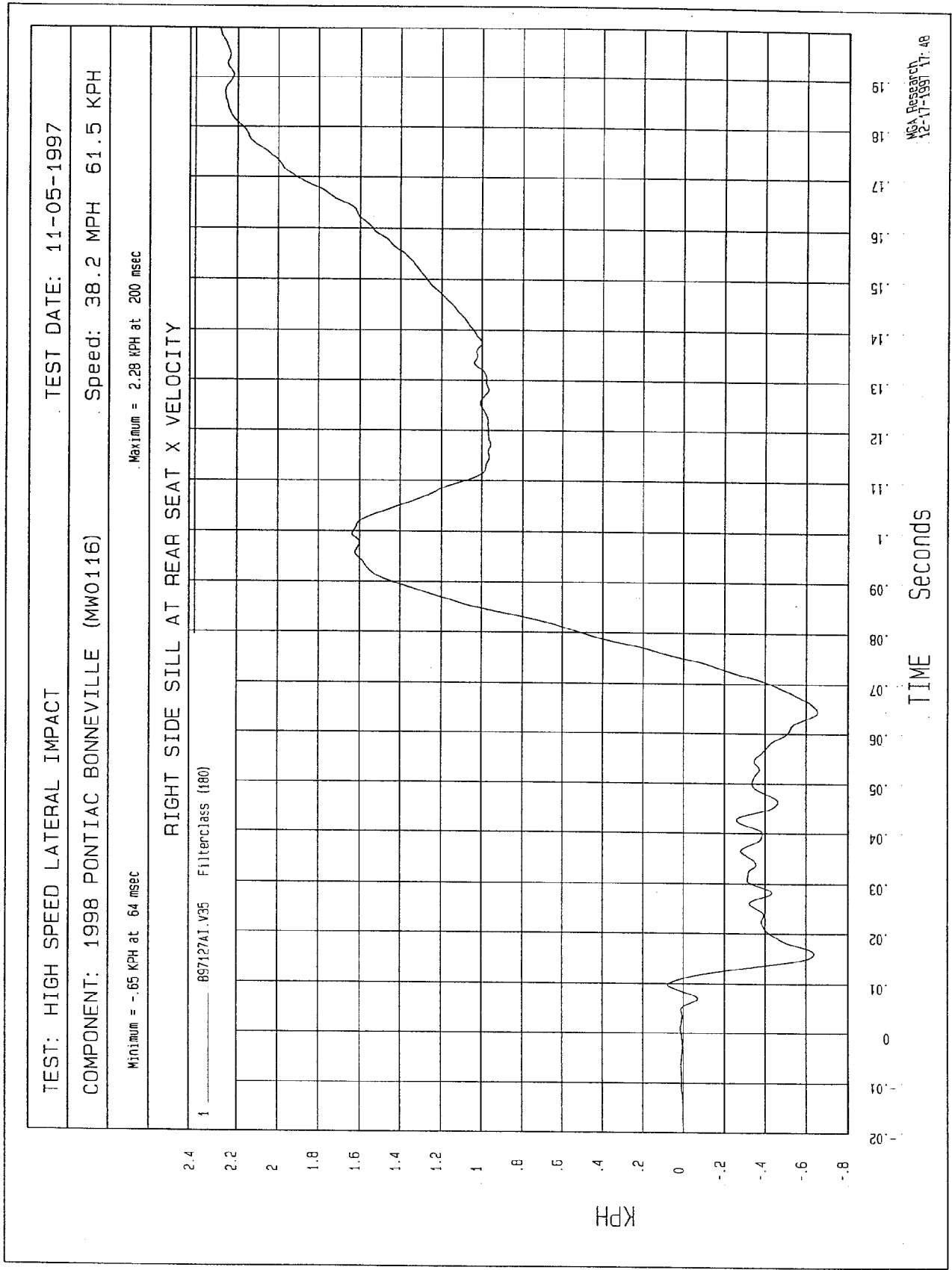
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -4.13 G'S at 13 msec Maximum = 3.14 G'S at 84 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION



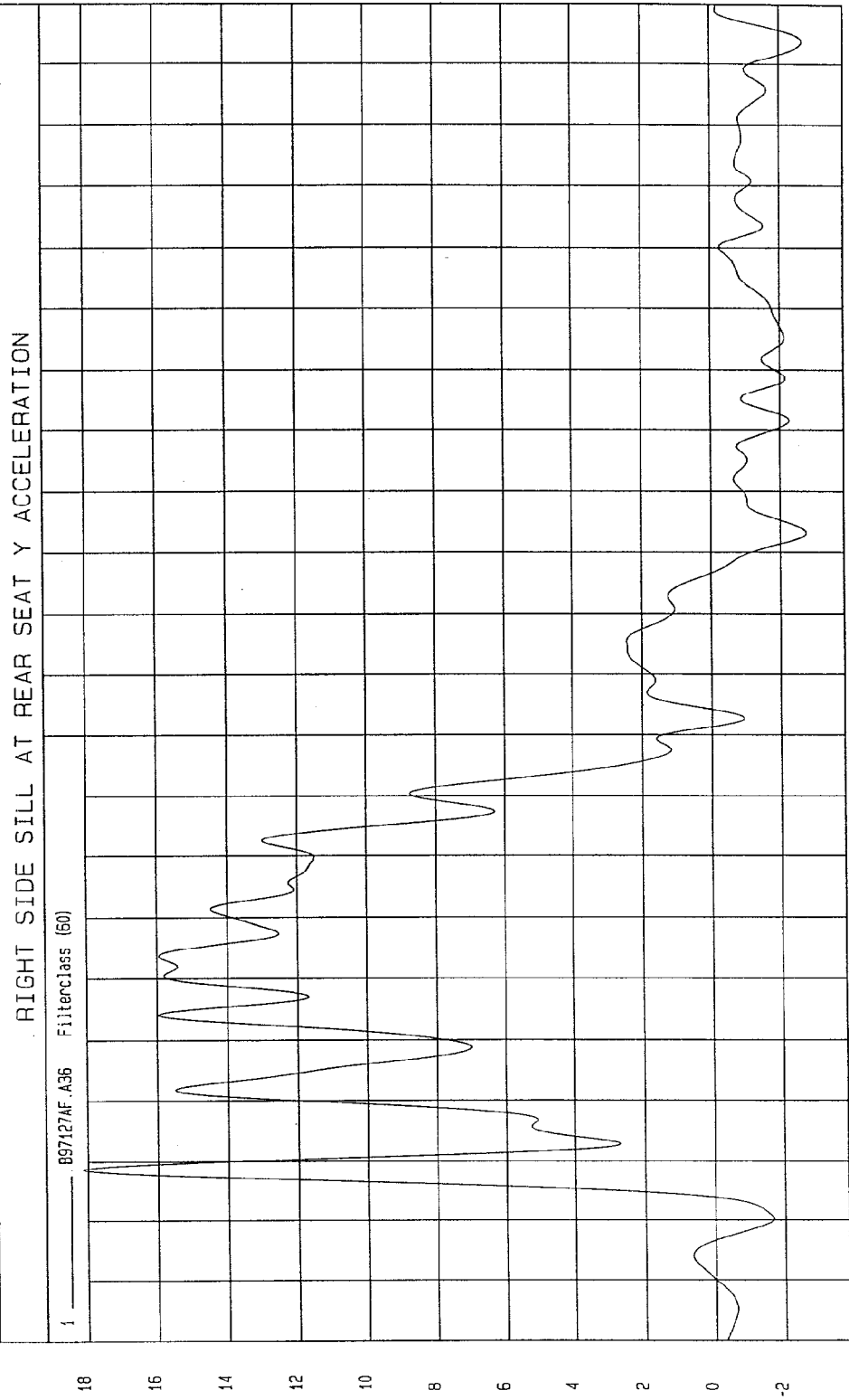
MCA Research
12-18-1997 11:36



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -2.72 G'S at 113 msec Maximum = 18.12 G'S at 8 msec



TIME (SECONDS)

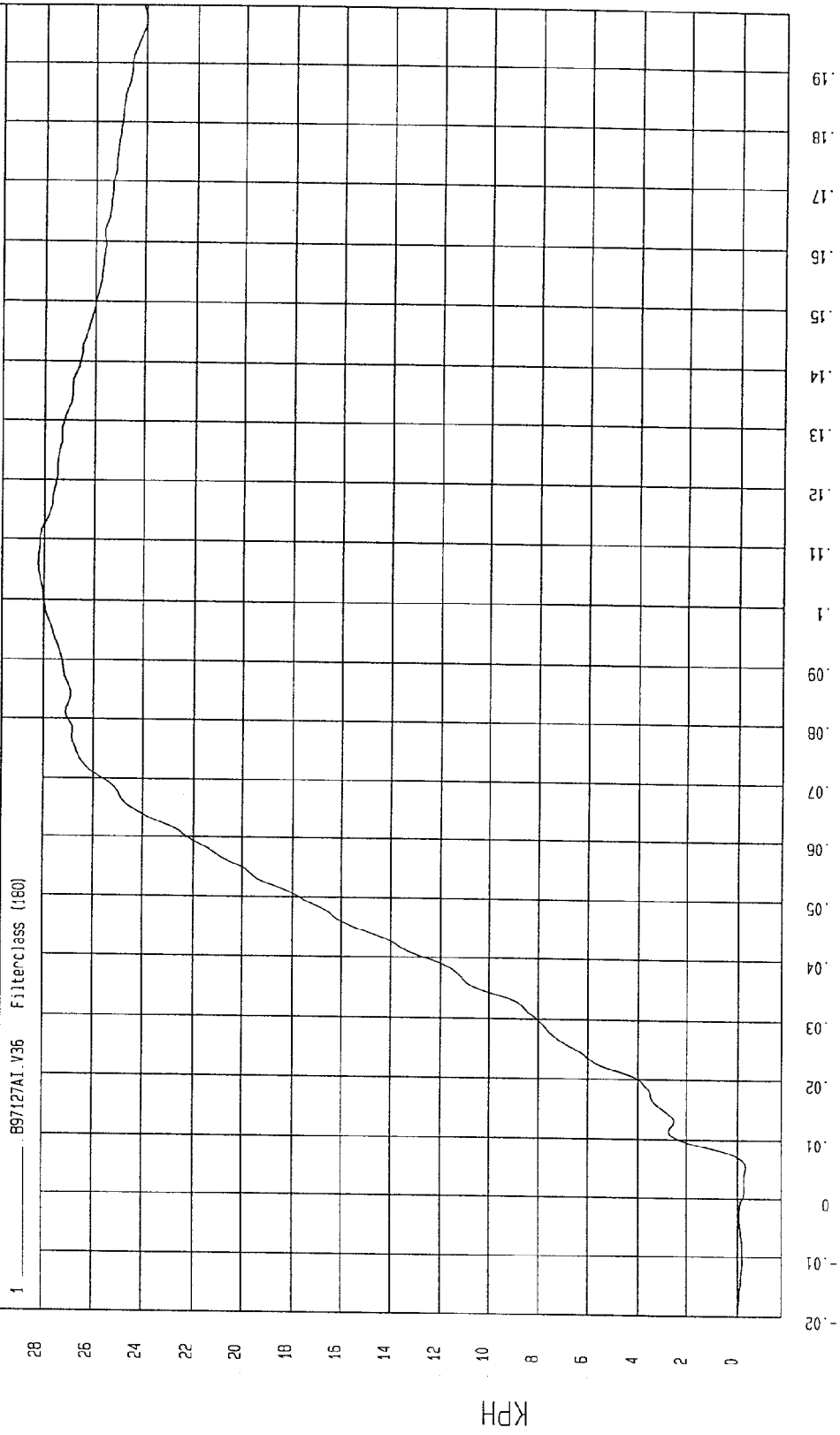
MSA Research
12-18-1997 11:36

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

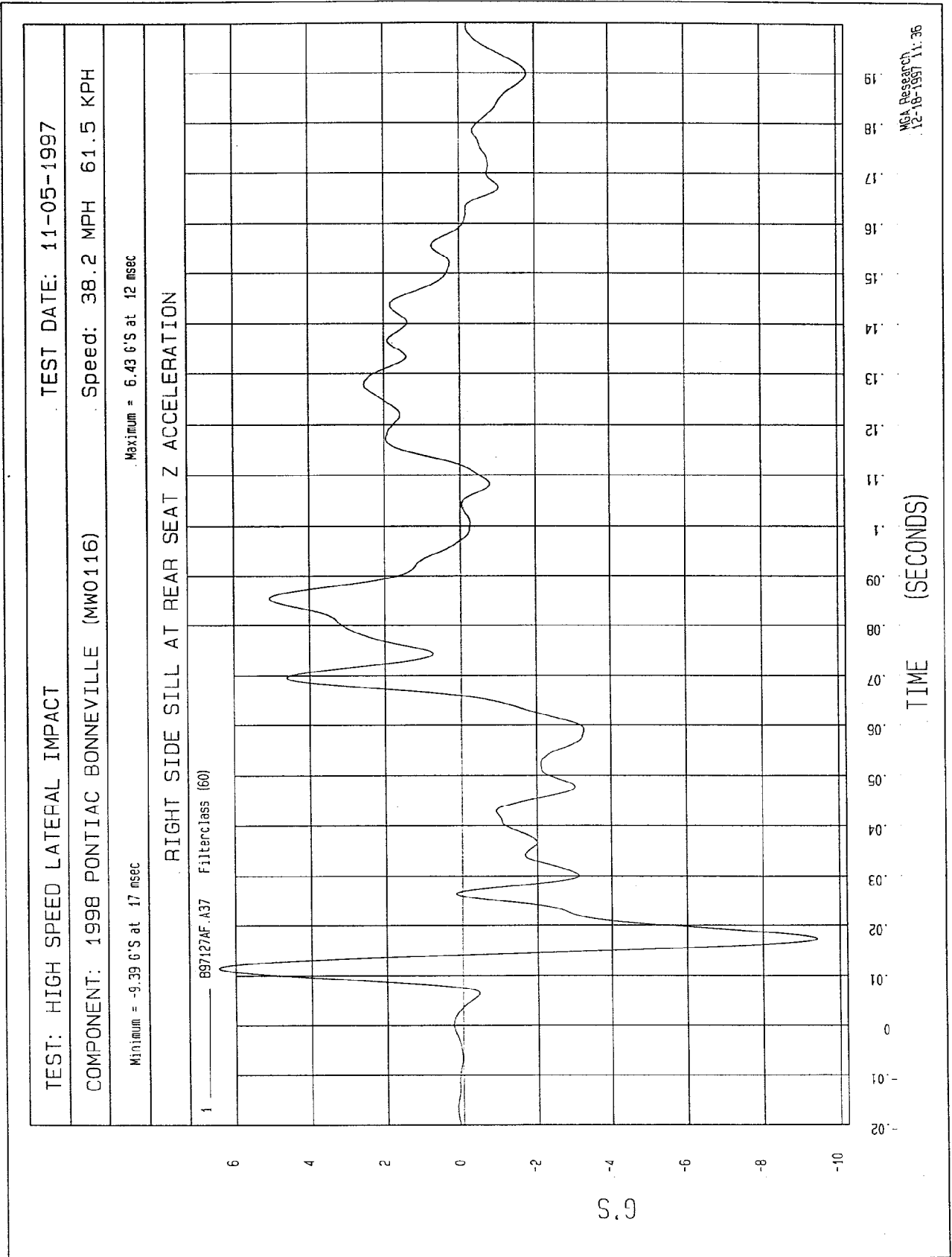
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

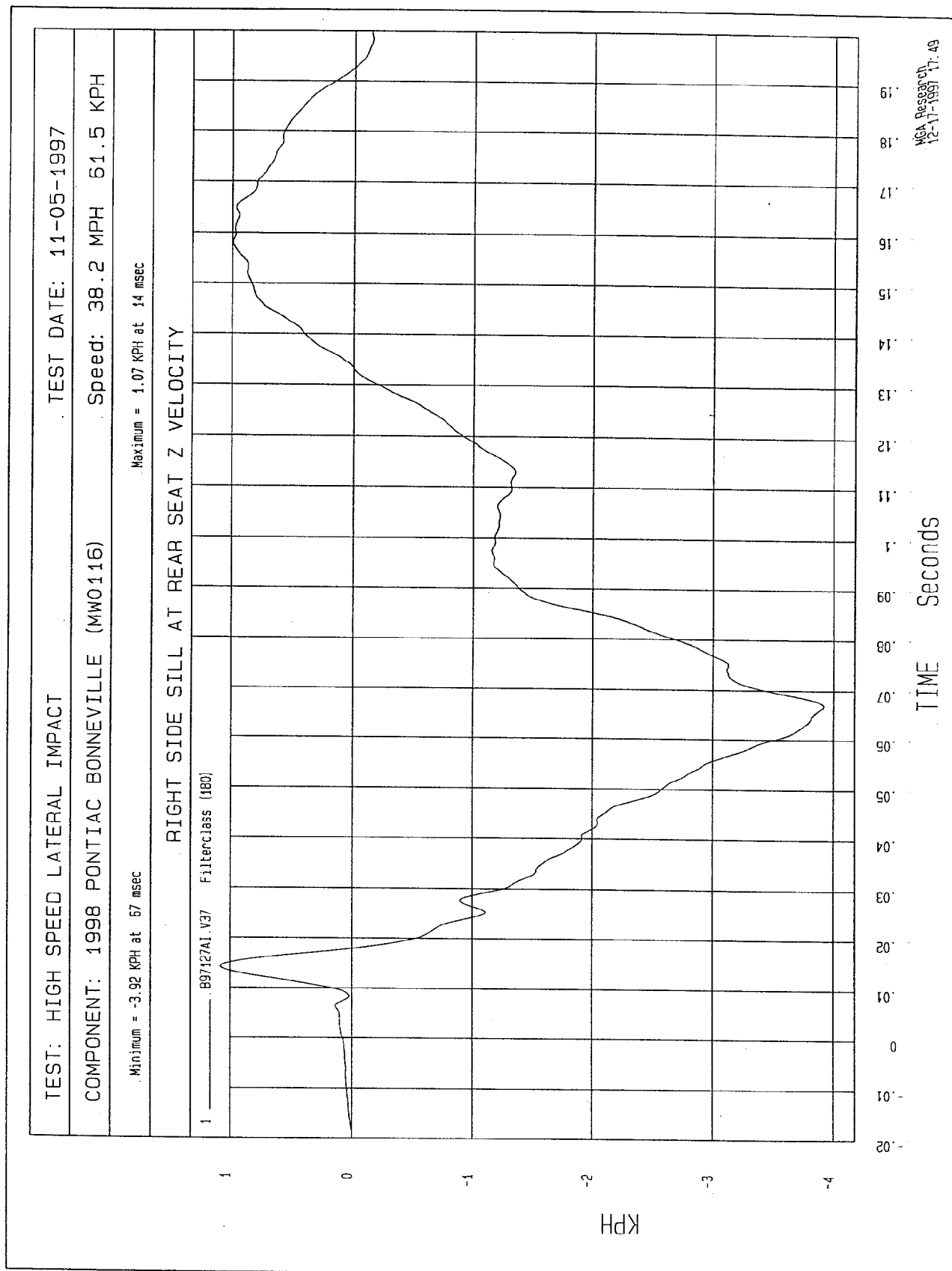
Minimum = - 31 KPH at 5 msec Maximum = 28.23 KPH at 106 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY



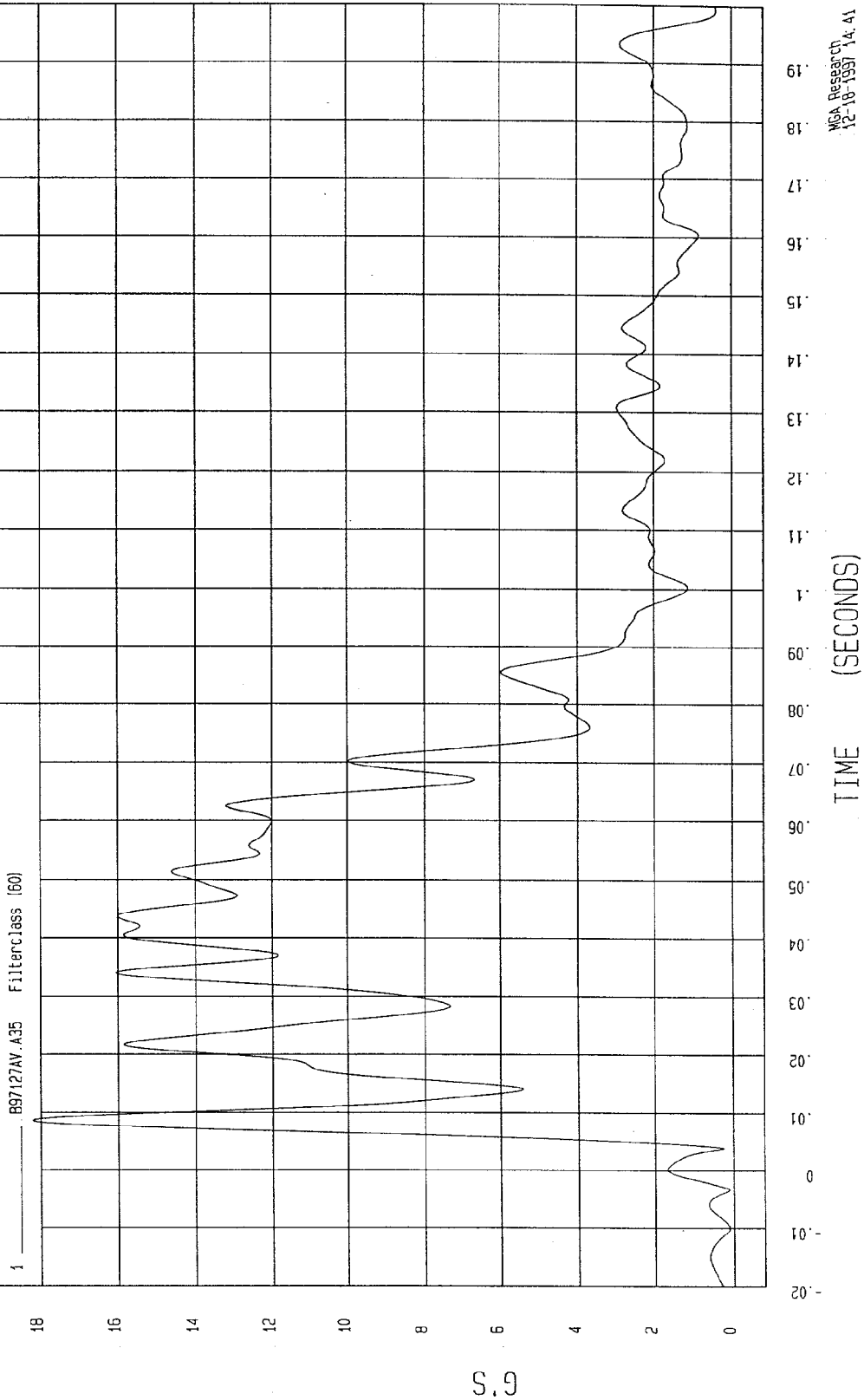
MCA Research
12-17-1997 17:48





TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)	Speed: 38.2 MPH 61.5 KPH
Minimum = .10 G'S at .10 msec	Maximum = 18.21 G'S at 9 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION



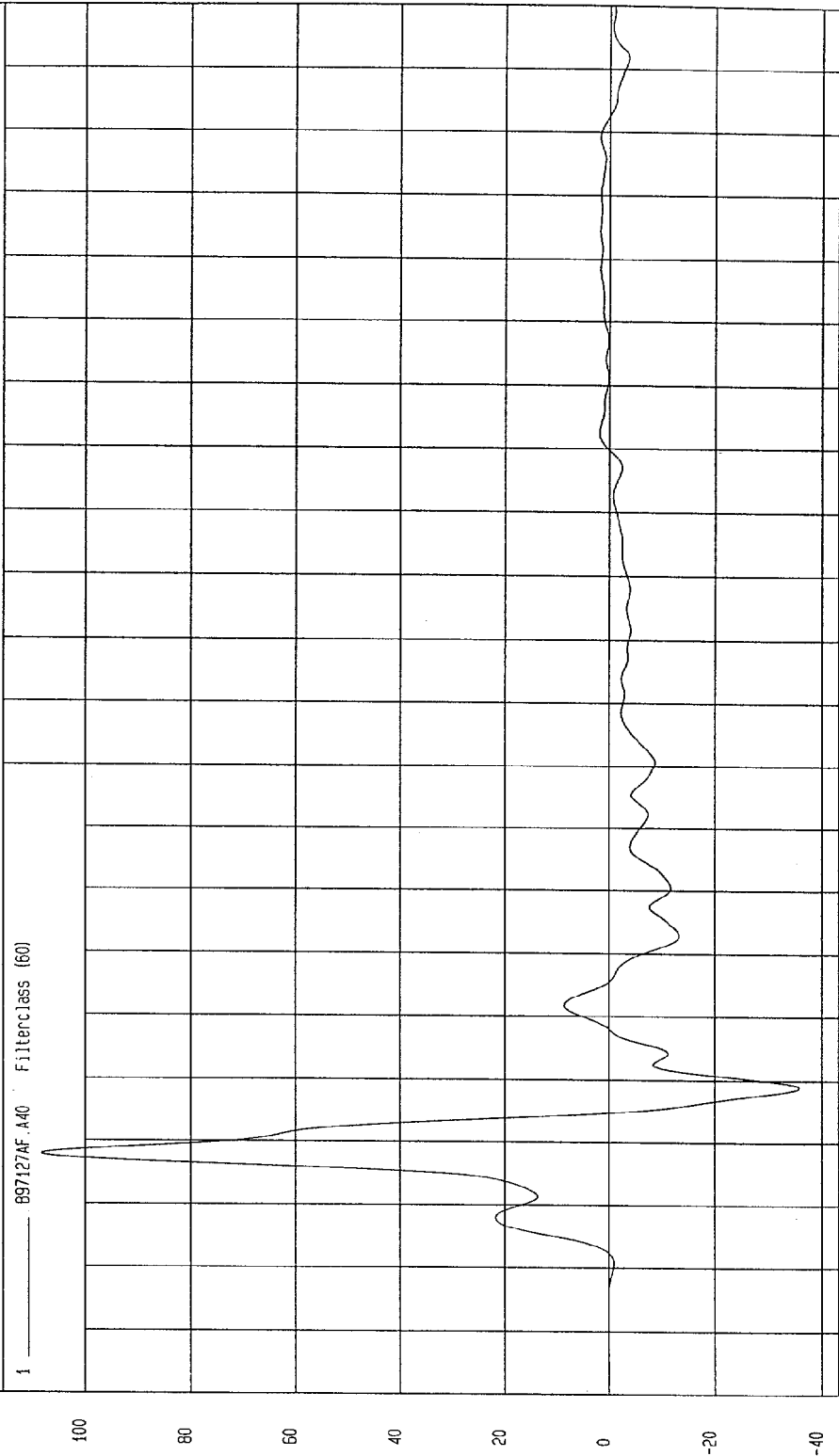
MSA Research
12-18-1997 14.41

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

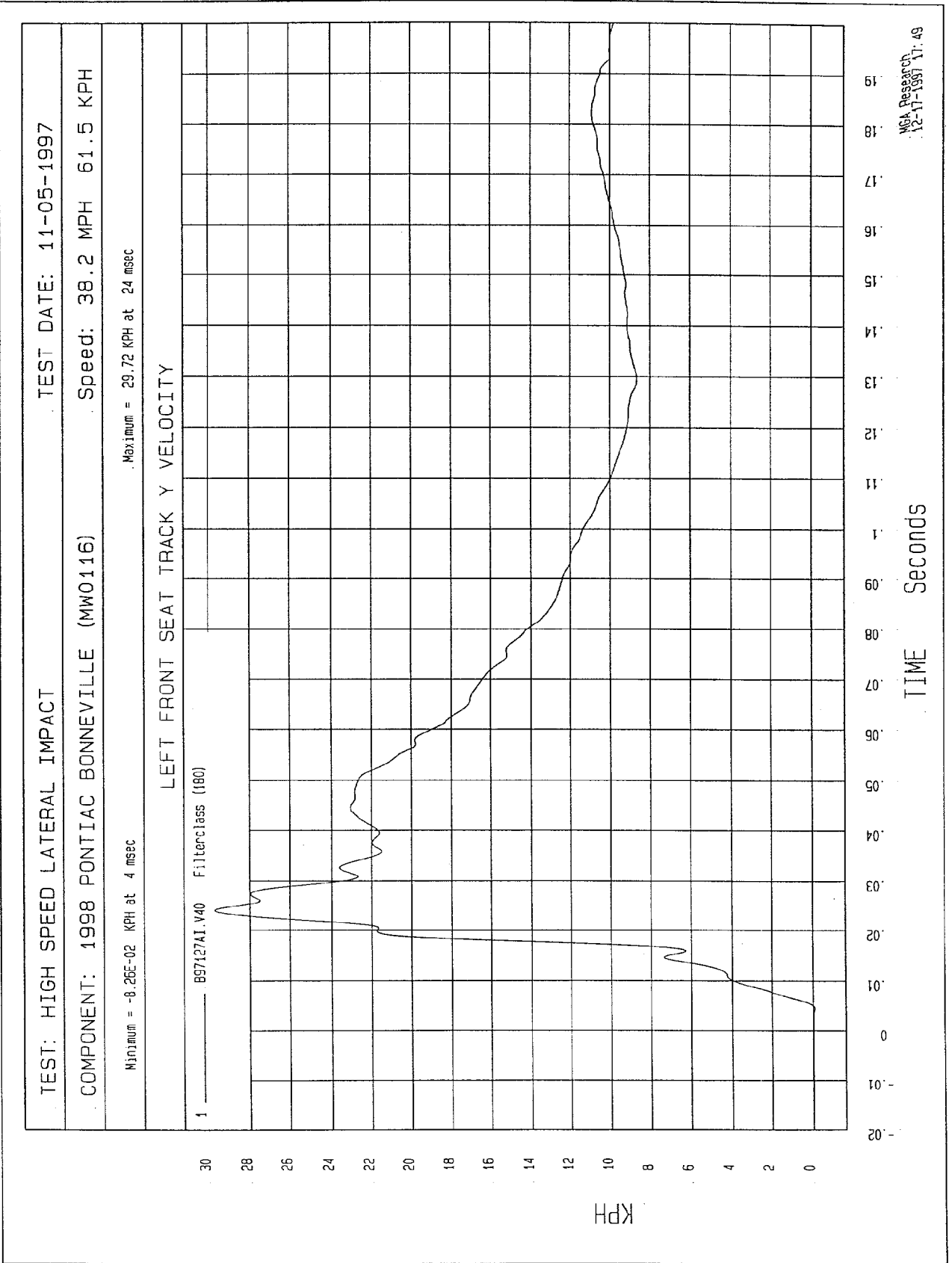
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -35.99 G'S at 29 msec Maximum = 108.05 G'S at 18 msec

LEFT FRONT SEAT TRACK Y ACCELERATION



MGA Research
12-18-1997 11:36

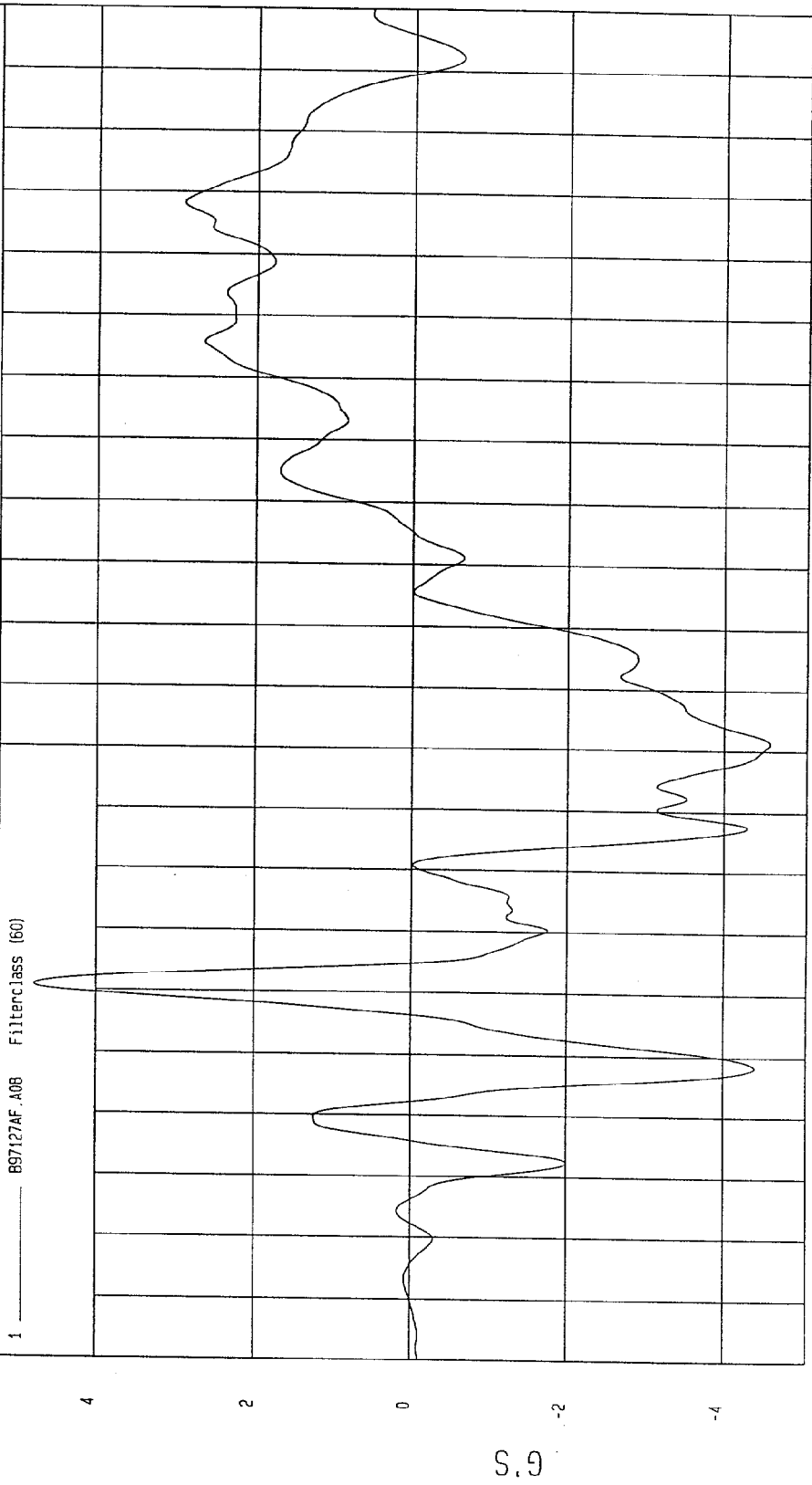


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -4.57 G'S at 81 msec Maximum = 4.76 G'S at 41 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION



TIME (SECONDS)

0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02

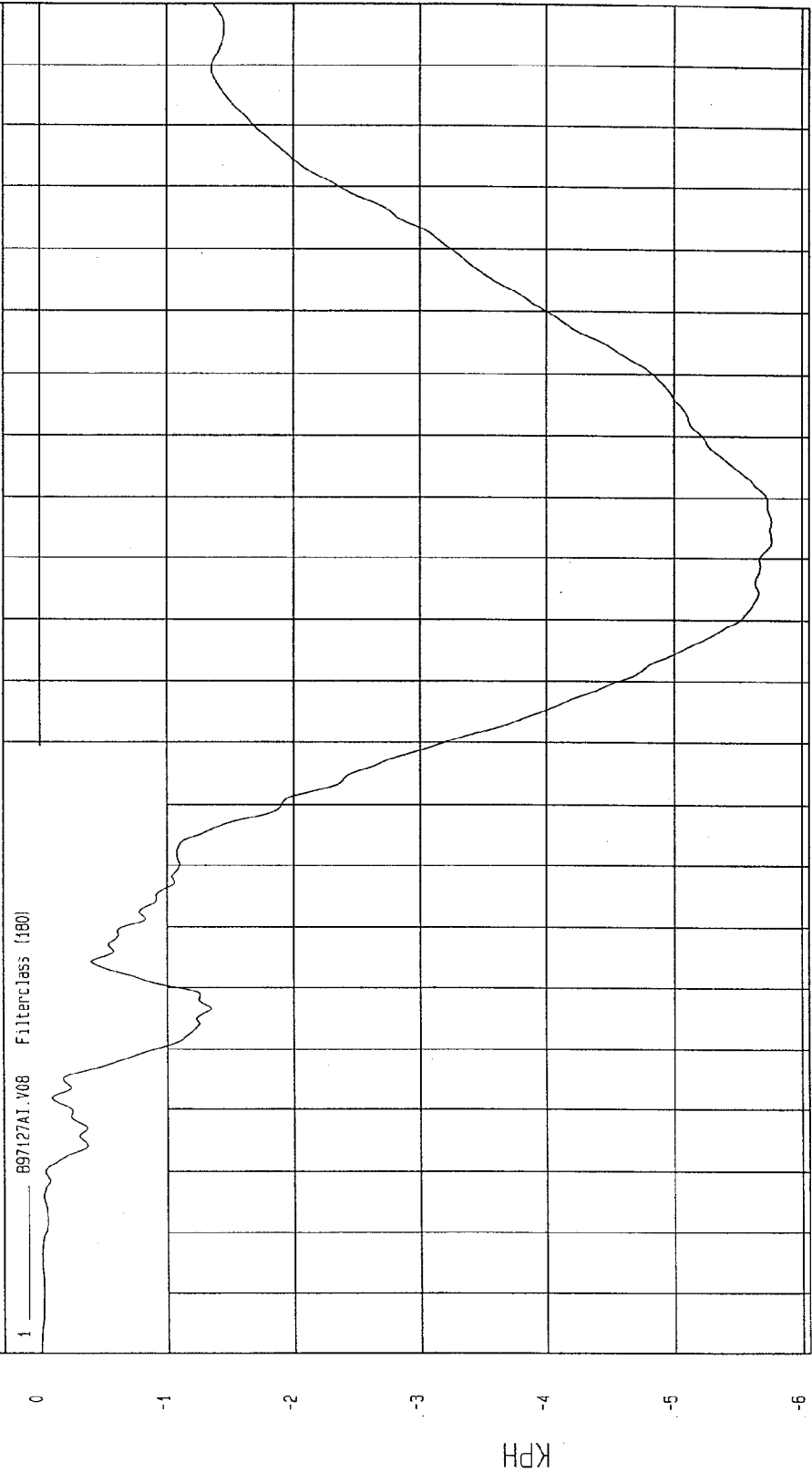
NCA Research
12-18-1997 11:37

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

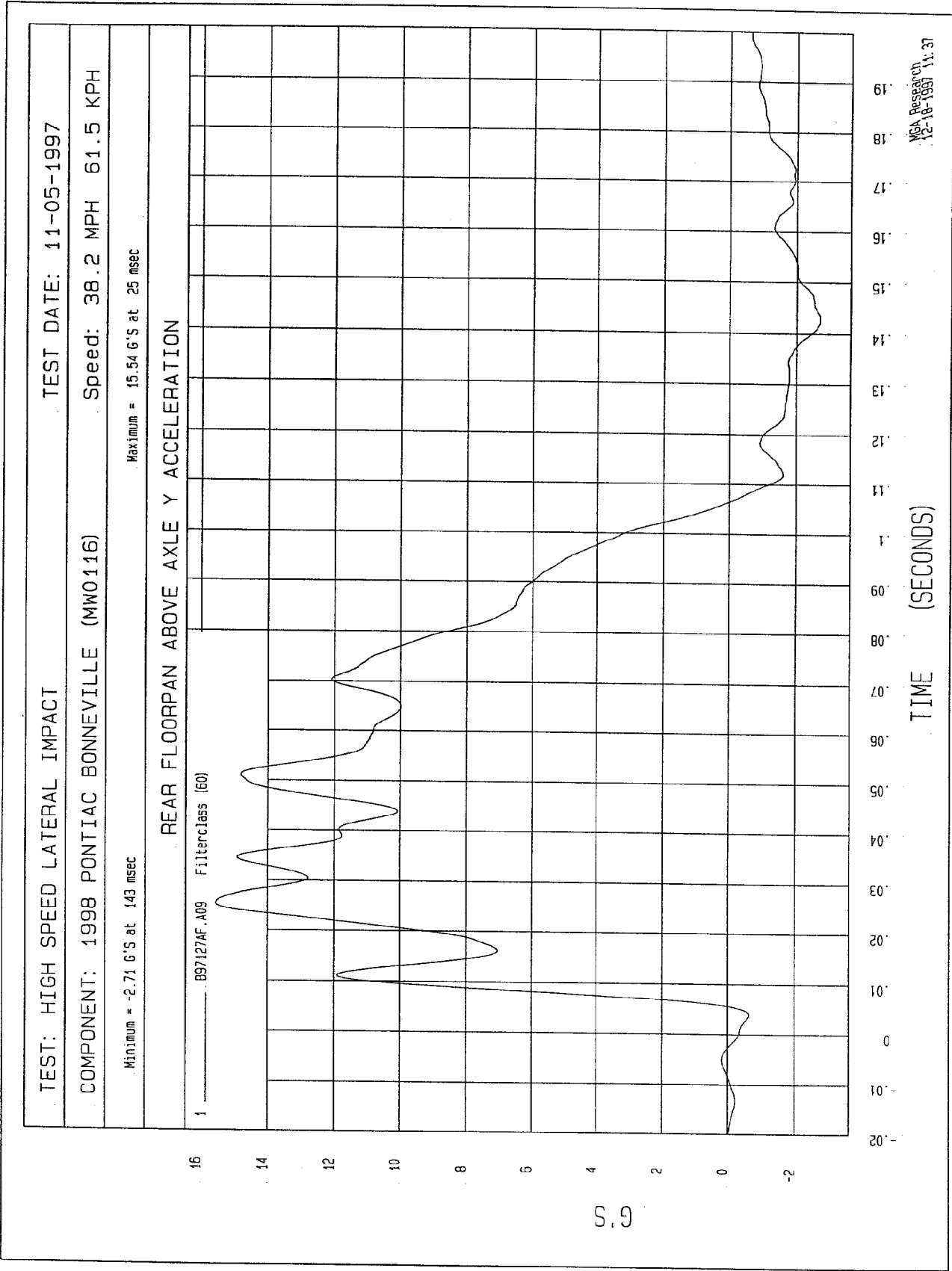
Minimum = -5.76 KPH at 113 msec Maximum = 0 KPH at -20 msec

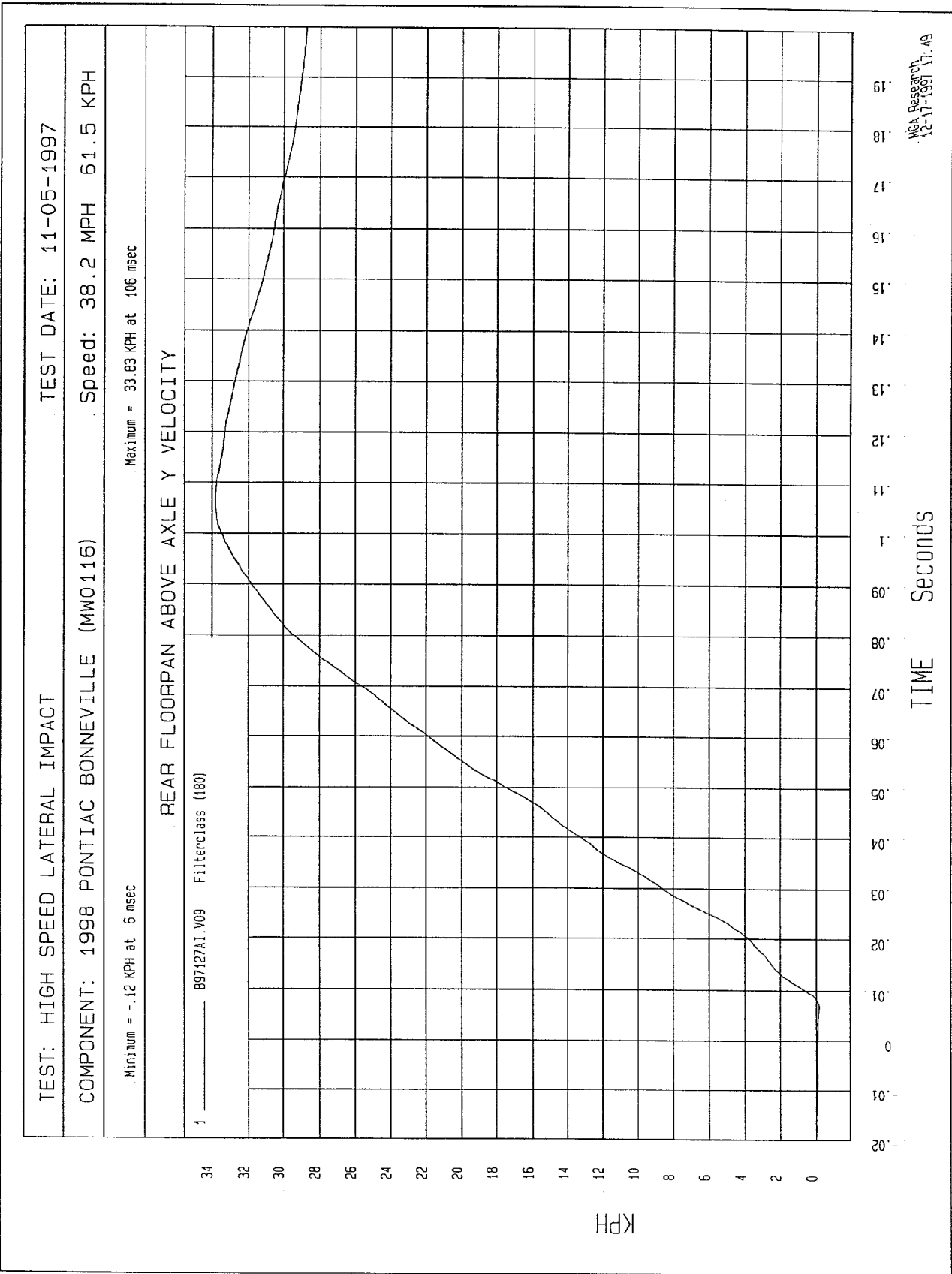
REAR FLOORPAN ABOVE AXLE X VELOCITY



TIME Seconds

NCA Research
12-11-1997 17:49



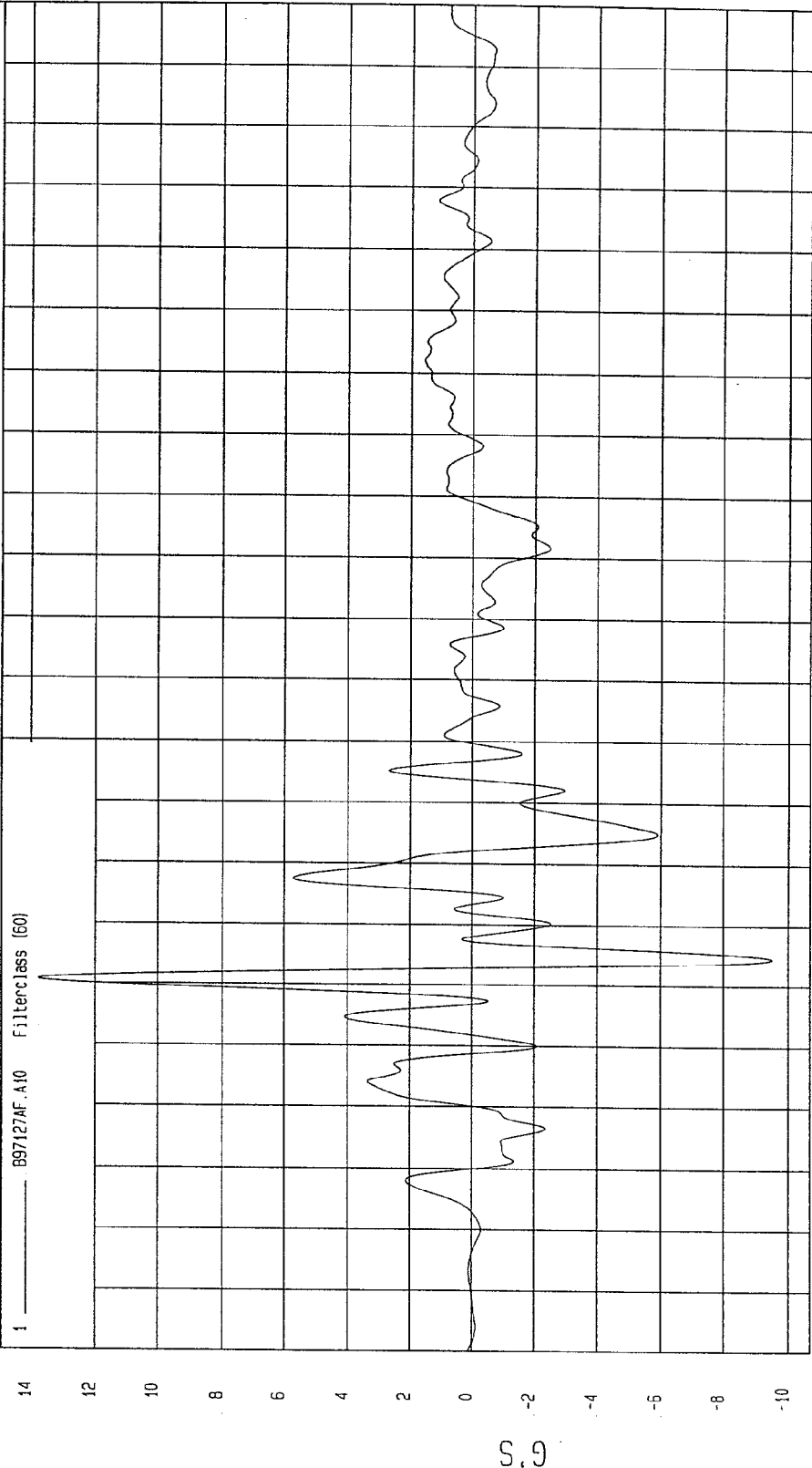


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -9.50 G'S at 45 msec Maximum = 13.77 G'S at 41 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION



TIME (SECONDS)

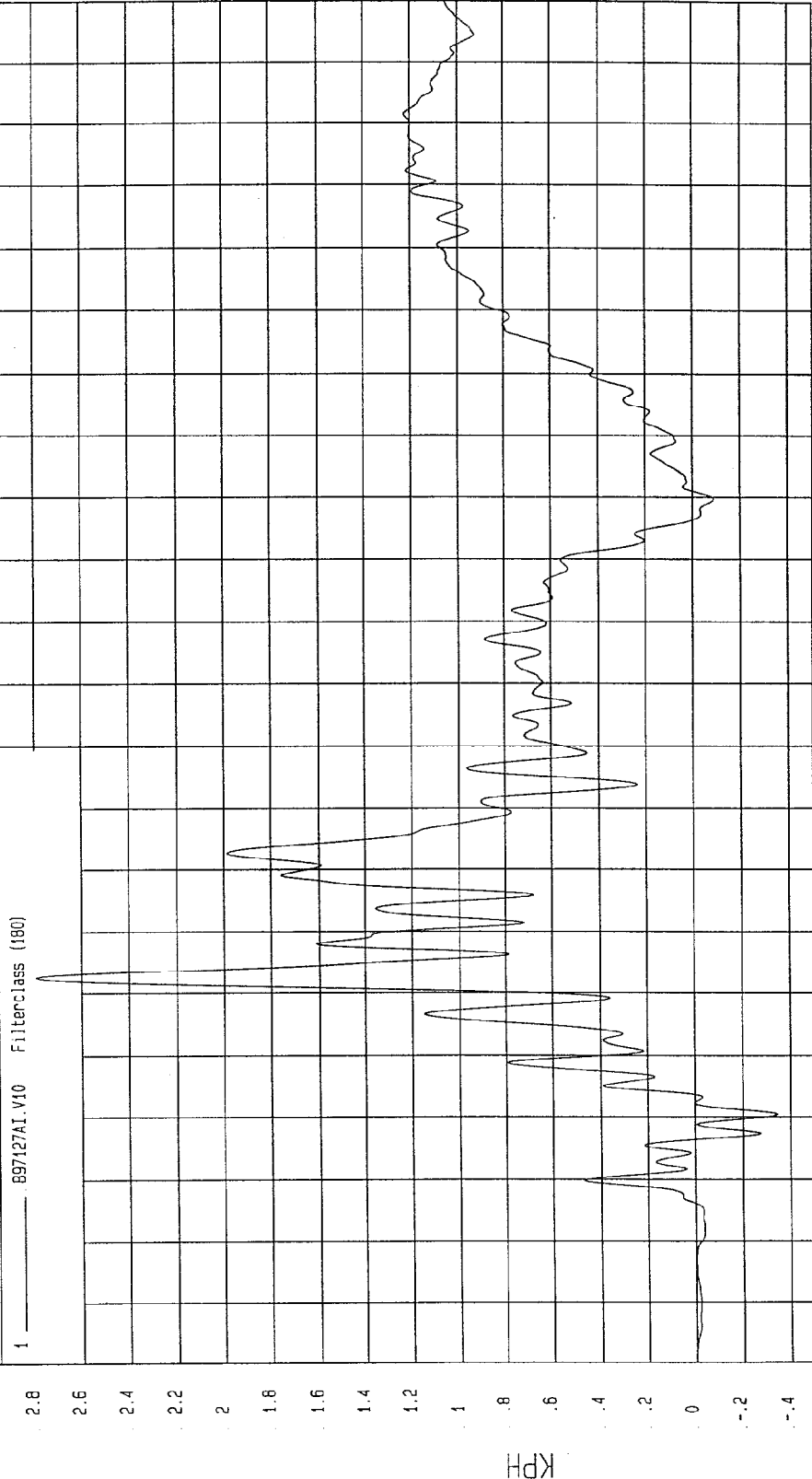
MCA Research
12-10-1997 11:37

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

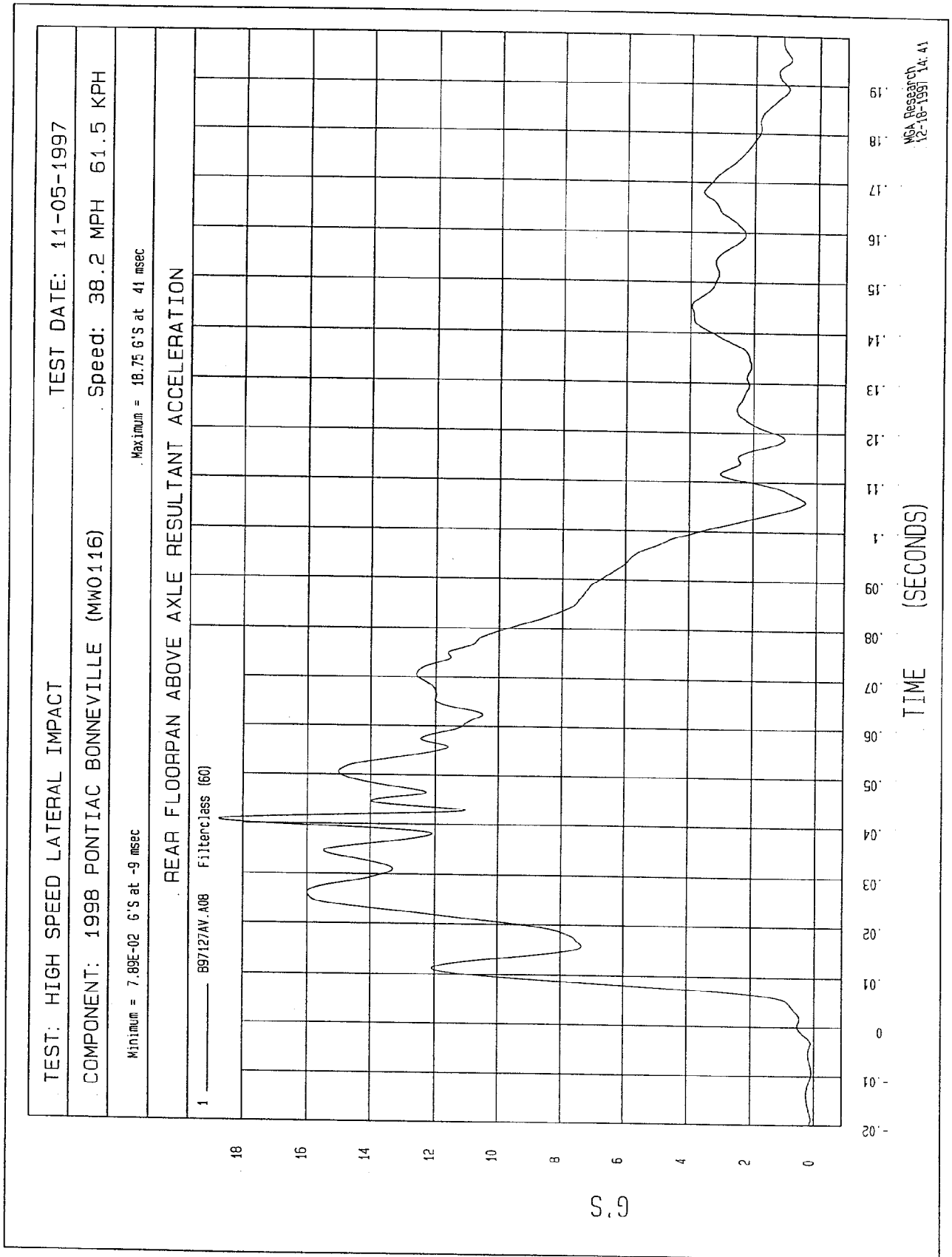
Minimum = -34 KPH at 20 msec Maximum = 2.79 KPH at 43 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY



TIME Seconds

WSA Research
12-11-1997 17:49

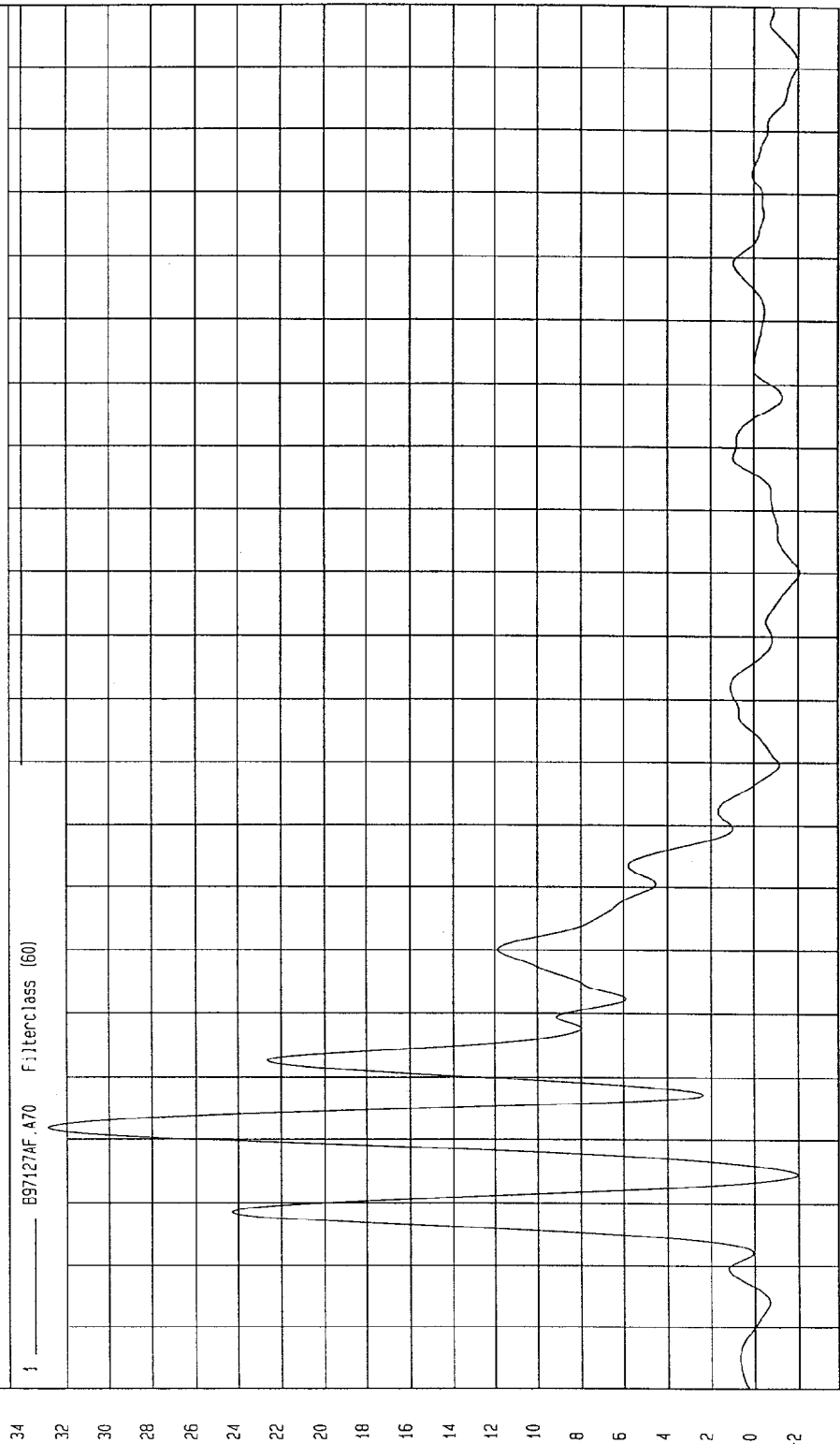


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -2.07 G'S at 110 msec Maximum = 32.83 G'S at 22 msec

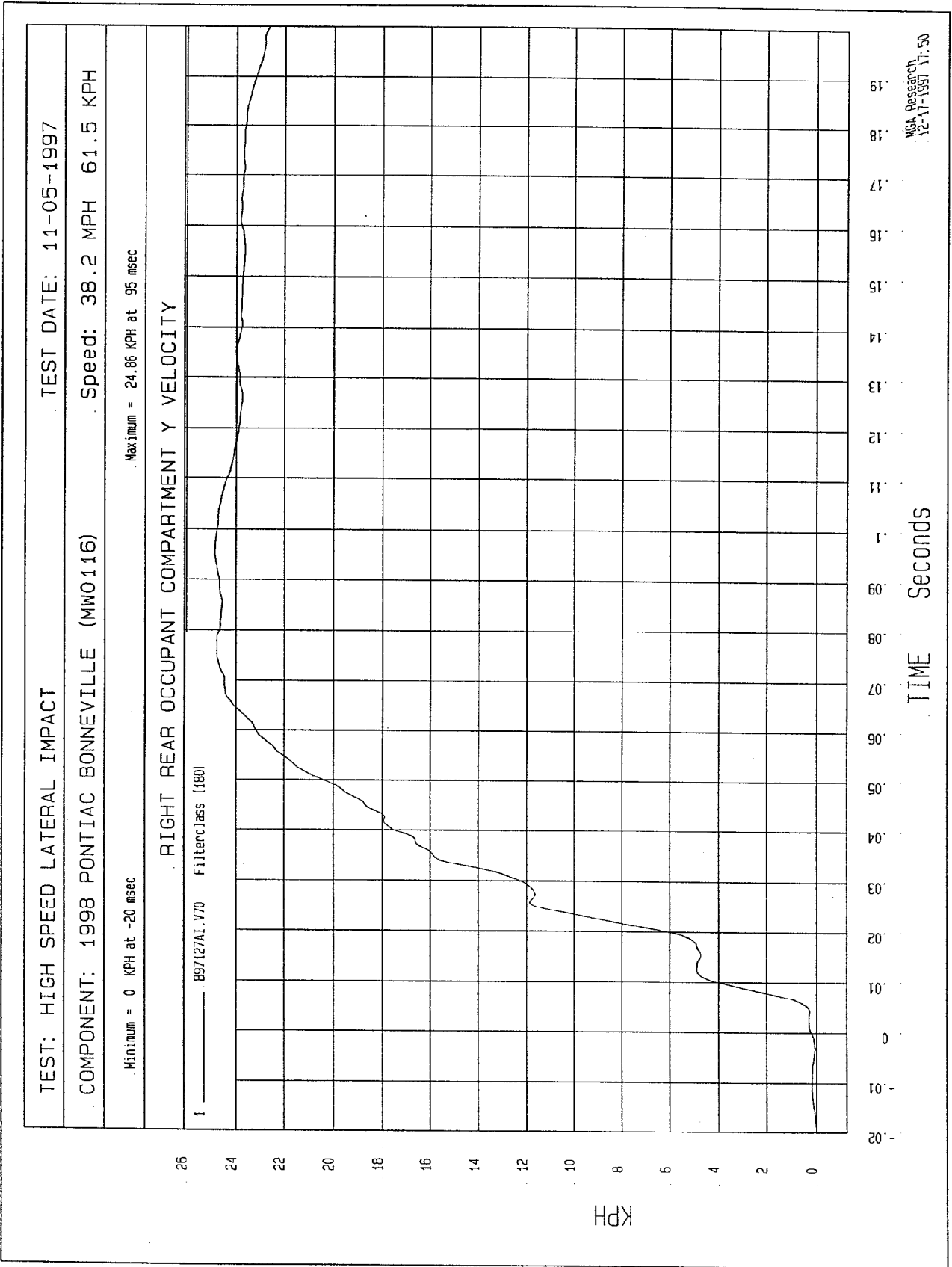
RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION



TIME (SECONDS)

19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
-2

NGA Research
12-16-1997 11:37

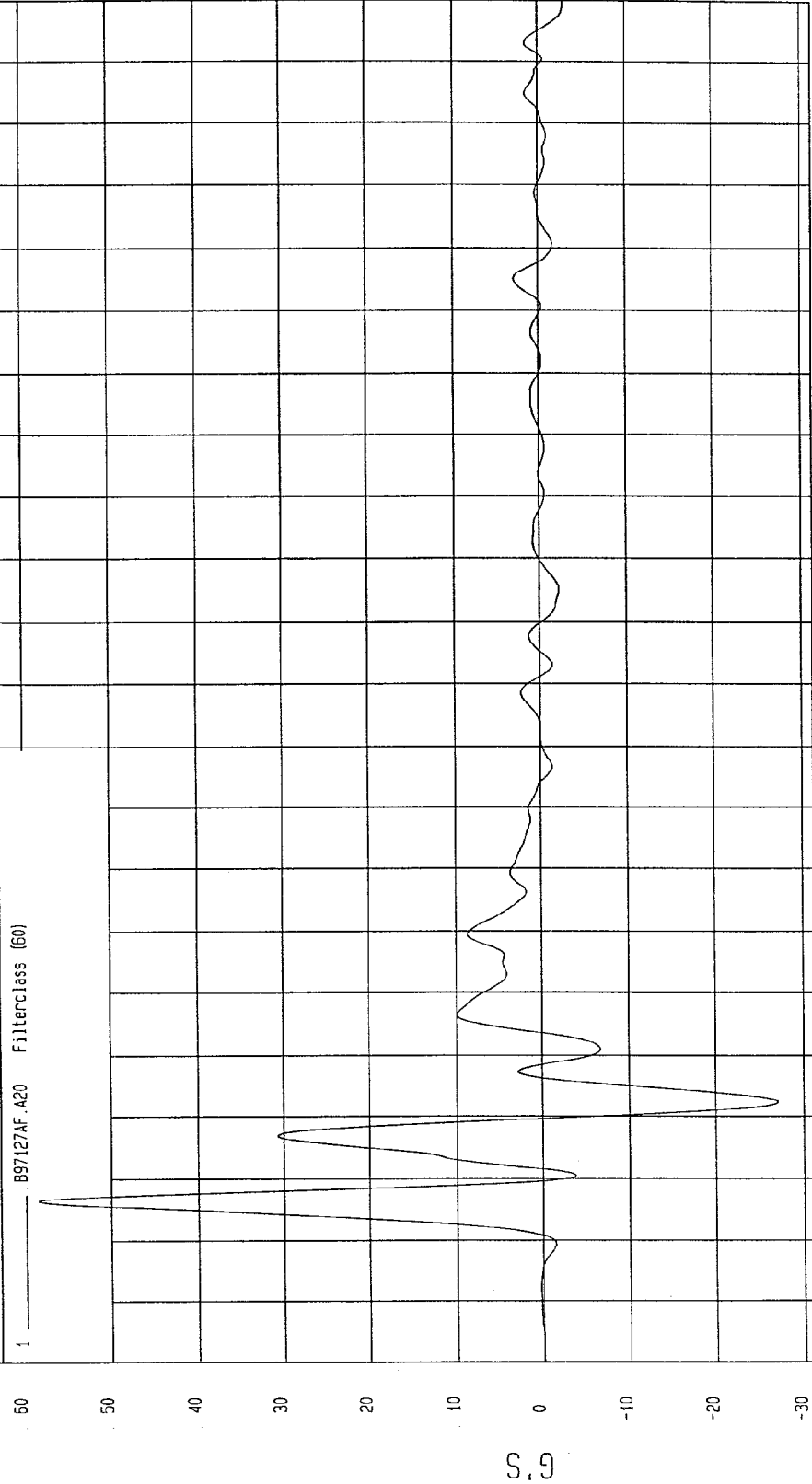


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -27.01 G'S at 22 msec Maximum = 58.37 G'S at 6 msec

LEFT LOWER A-POST Y ACCELERATION



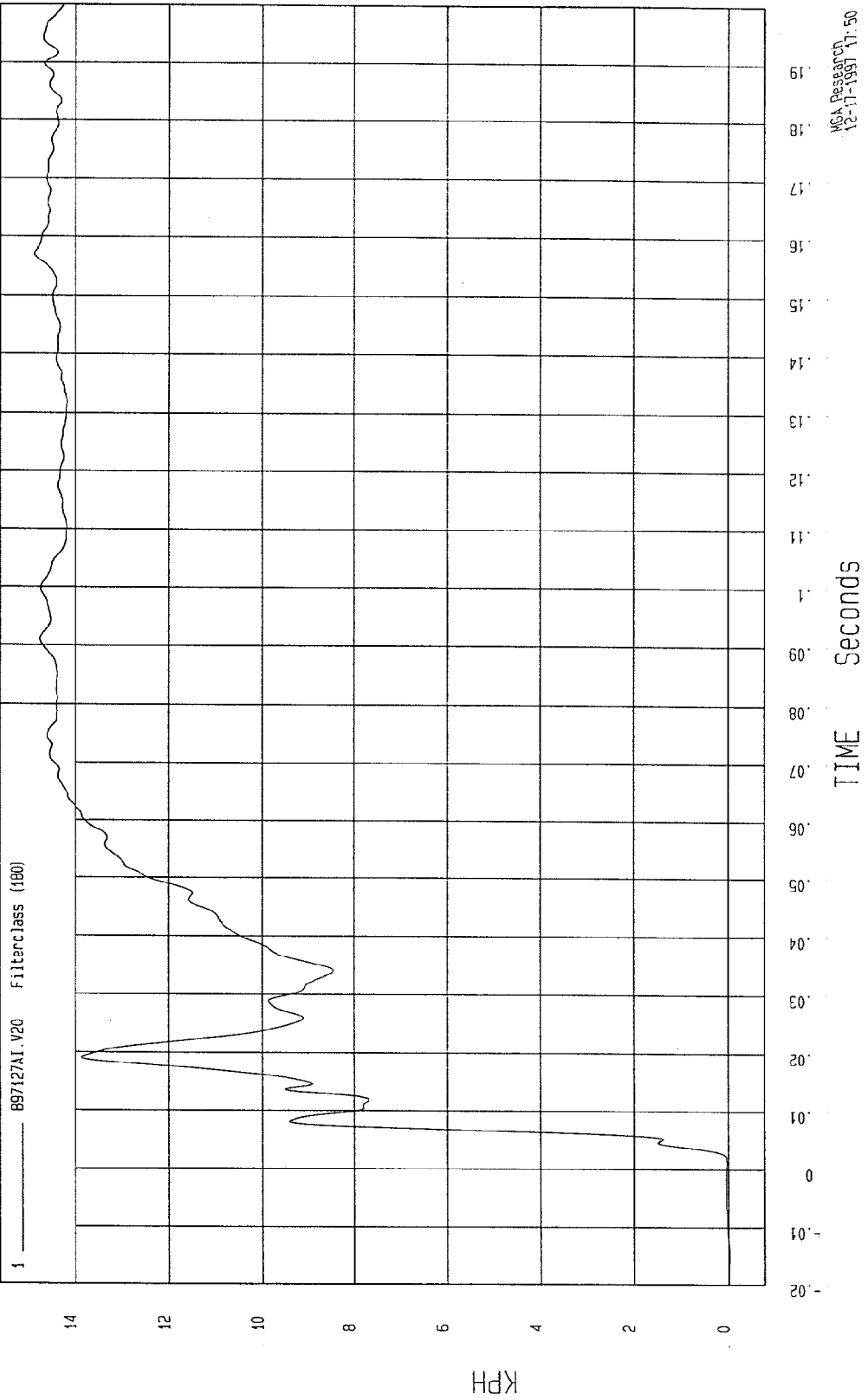
NCA Research
12-18-1997 11:38

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -1.95E-02 KPH at -15 msec
Maximum = 14.87 KPH at 157 msec

LEFT LOWER A-POST Y VELOCITY



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

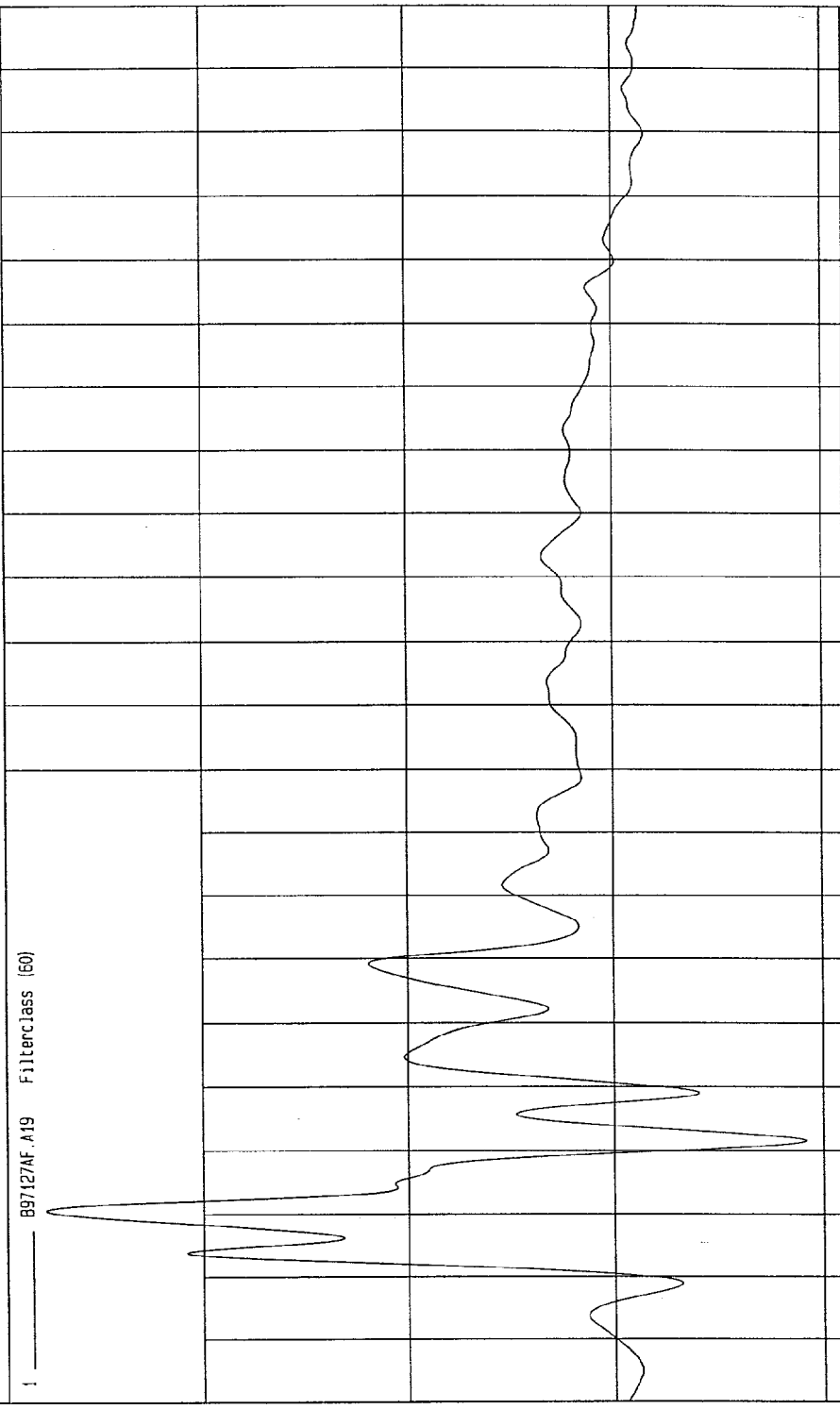
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -9.48 G'S at 22 msec Maximum = 27.63 G'S at 11 msec

LEFT MID A-POST Y ACCELERATION

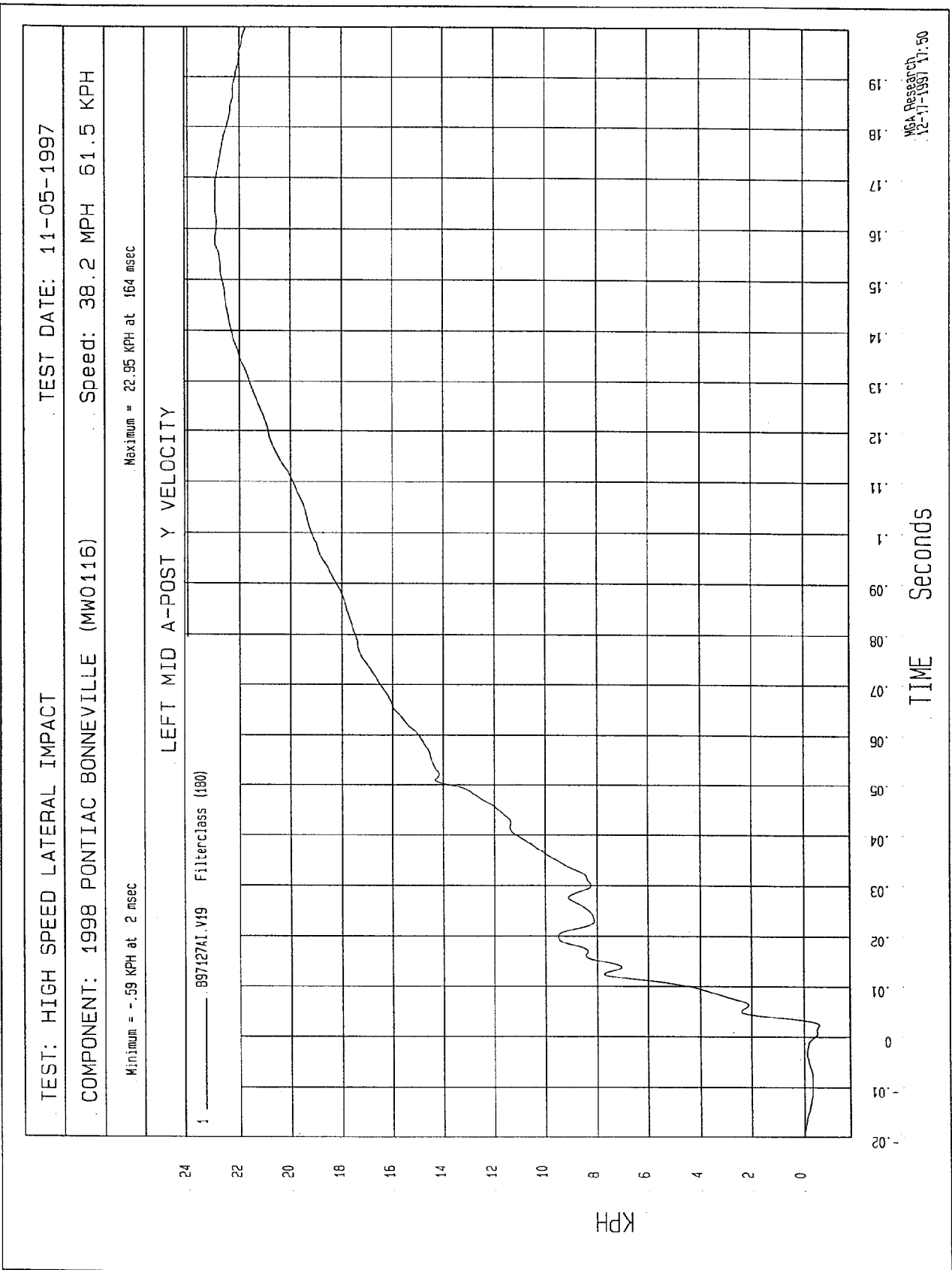
1 ——— B97127AF.A19 Filterclass (60)

G'S



MOA Research
12-18-1997 11:38

TIME (SECONDS)



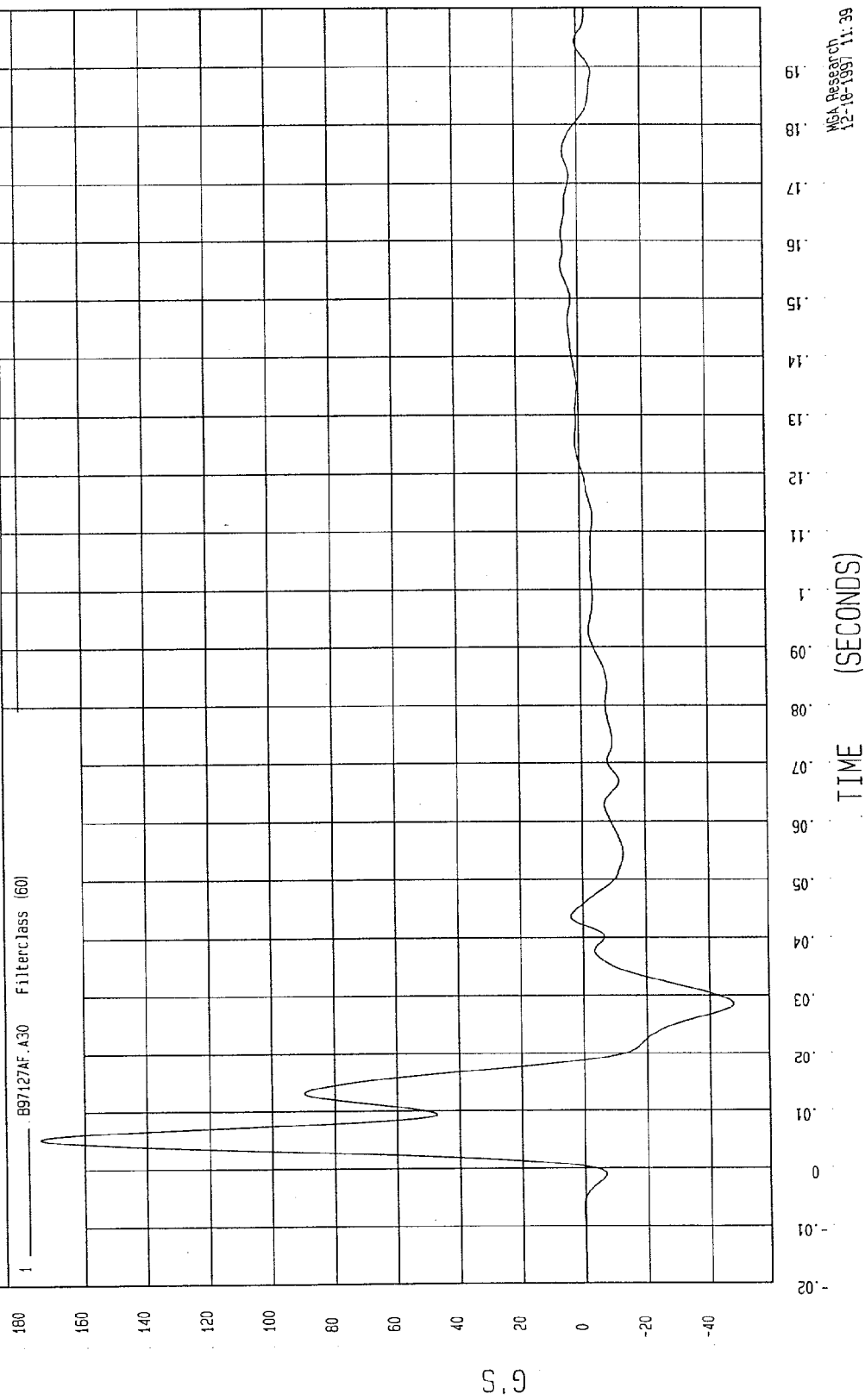
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -47.62 G'S at 28 msec Maximum = 173.93 G'S at 5 msec

LEFT LOWER B-POST Y ACCELERATION

1 B97127AF.A30 Filterclass (60)



MSA Research
12-18-1997 11:39

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

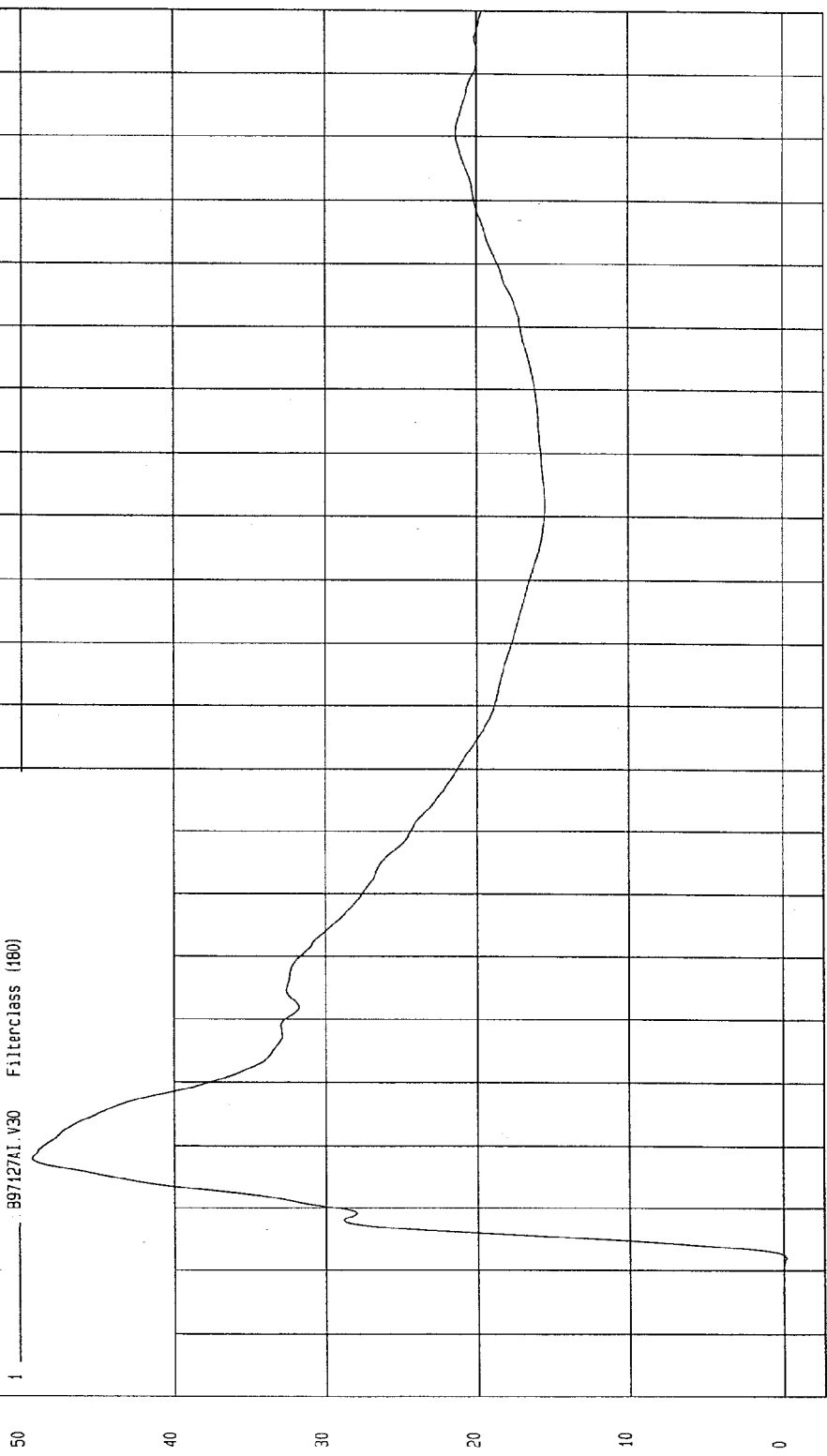
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 49.36 KPH at 18 msec

Minimum = -15 KPH at 2 msec

LEFT LOWER B-POST Y VELOCITY

1 B97127A1.V30 Filterclass (180)



NCA Research
12-11-1997 17:51

TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

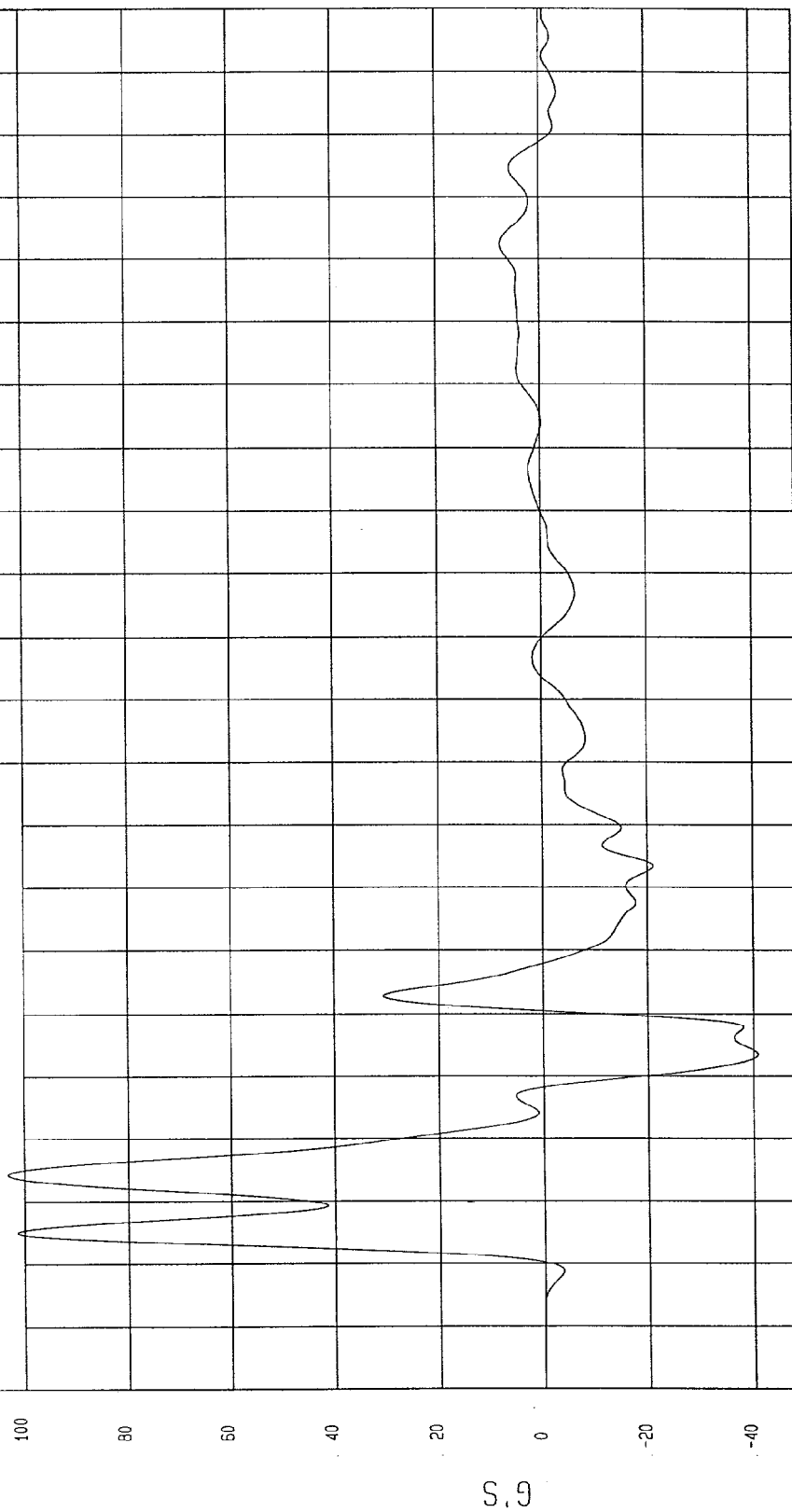
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 103.12 G'S at 14 msec

Minimum = -40.90 G'S at 33 msec

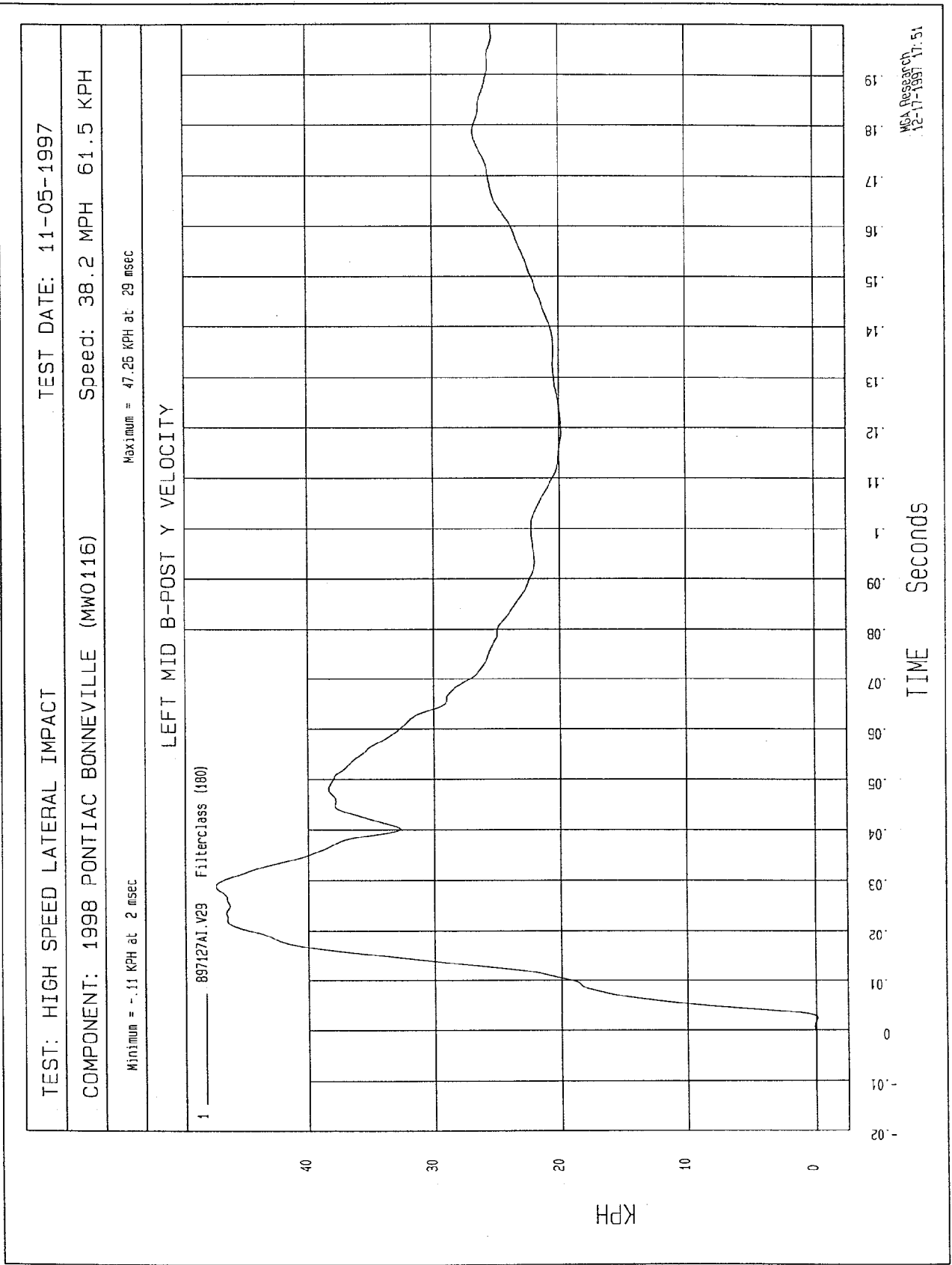
LEFT MID B-POST Y ACCELERATION

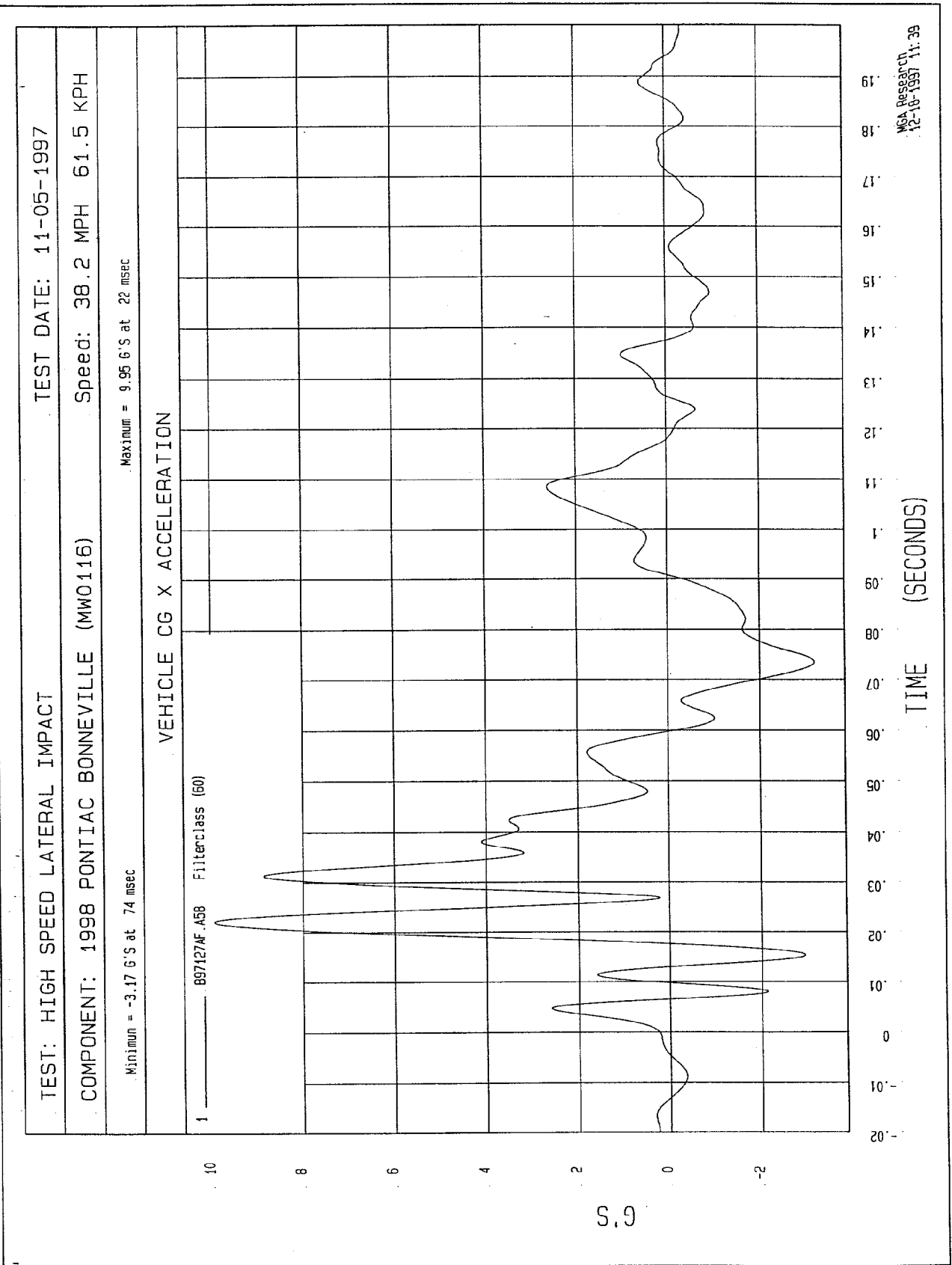
1 B97127AF A29 Filterclass (60)



NSA Research
12-18-1997 11:39

TIME (SECONDS)





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

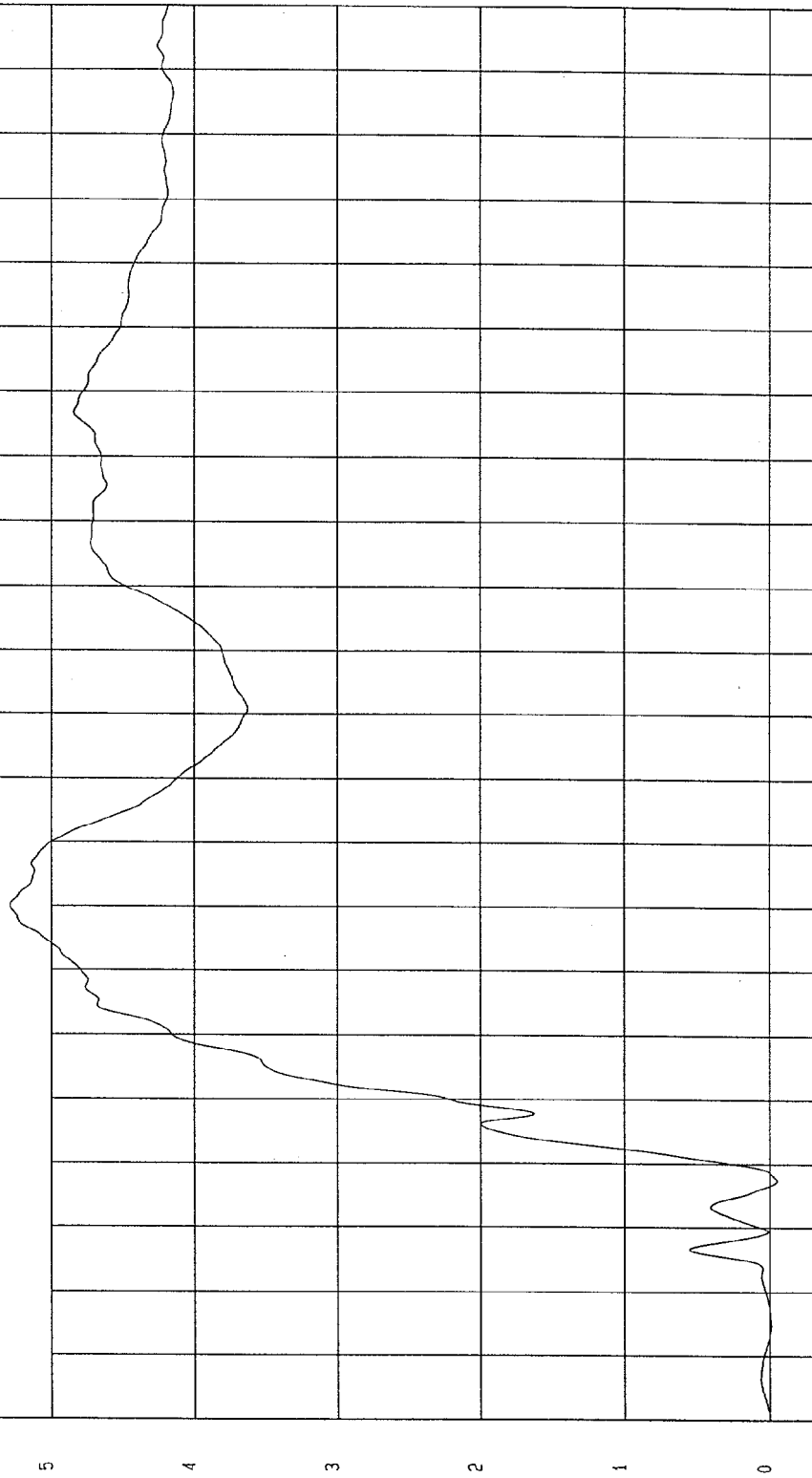
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 5.28 KPH at 50 msec

Minimum = -4.91E-02 KPH at 17 msec

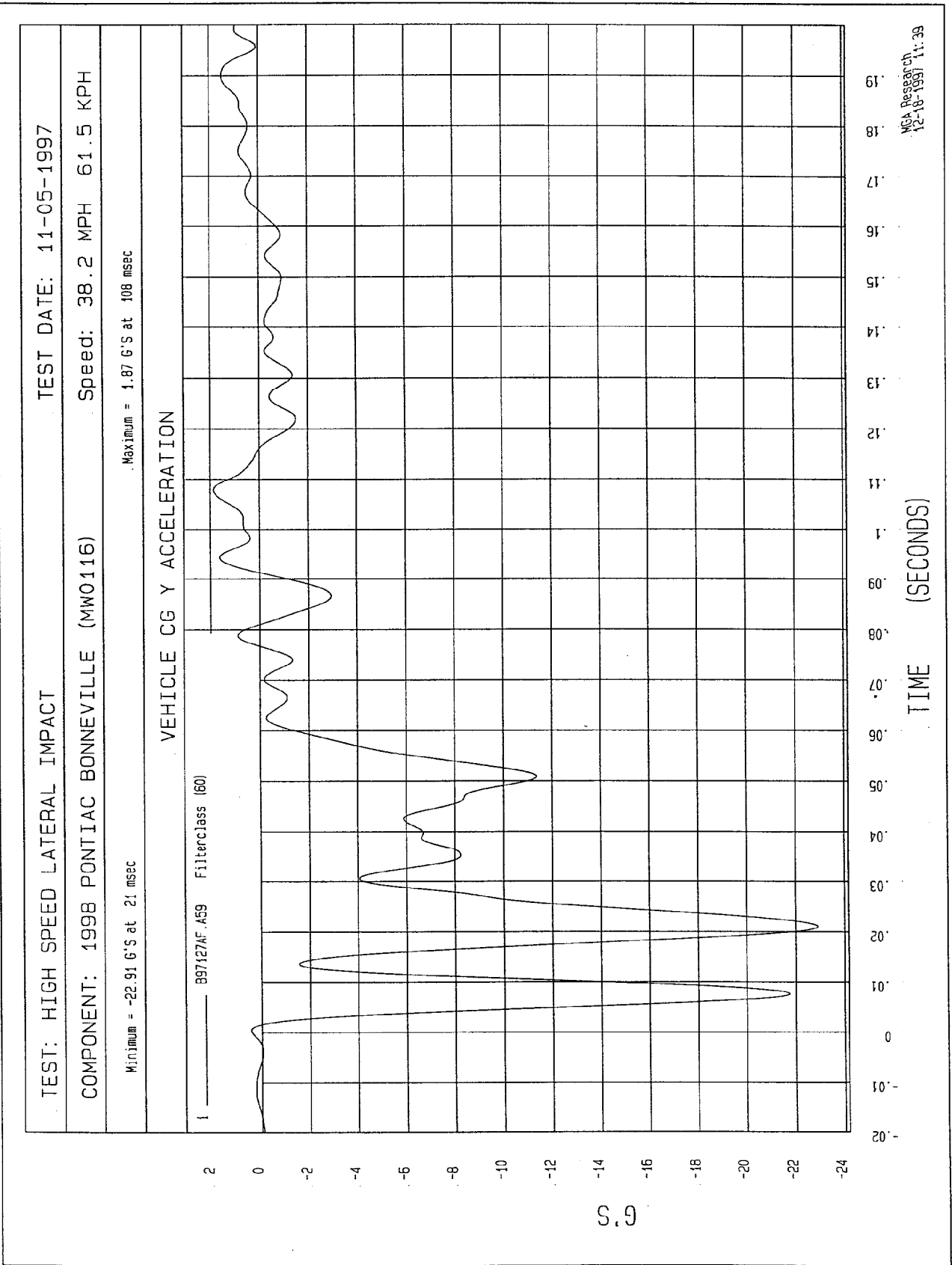
VEHICLE CG X VELOCITY

1 ——— 897127AI.V58 Filterclass (100)



TIME Seconds

NCA Research
12-17-1997 17:51



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

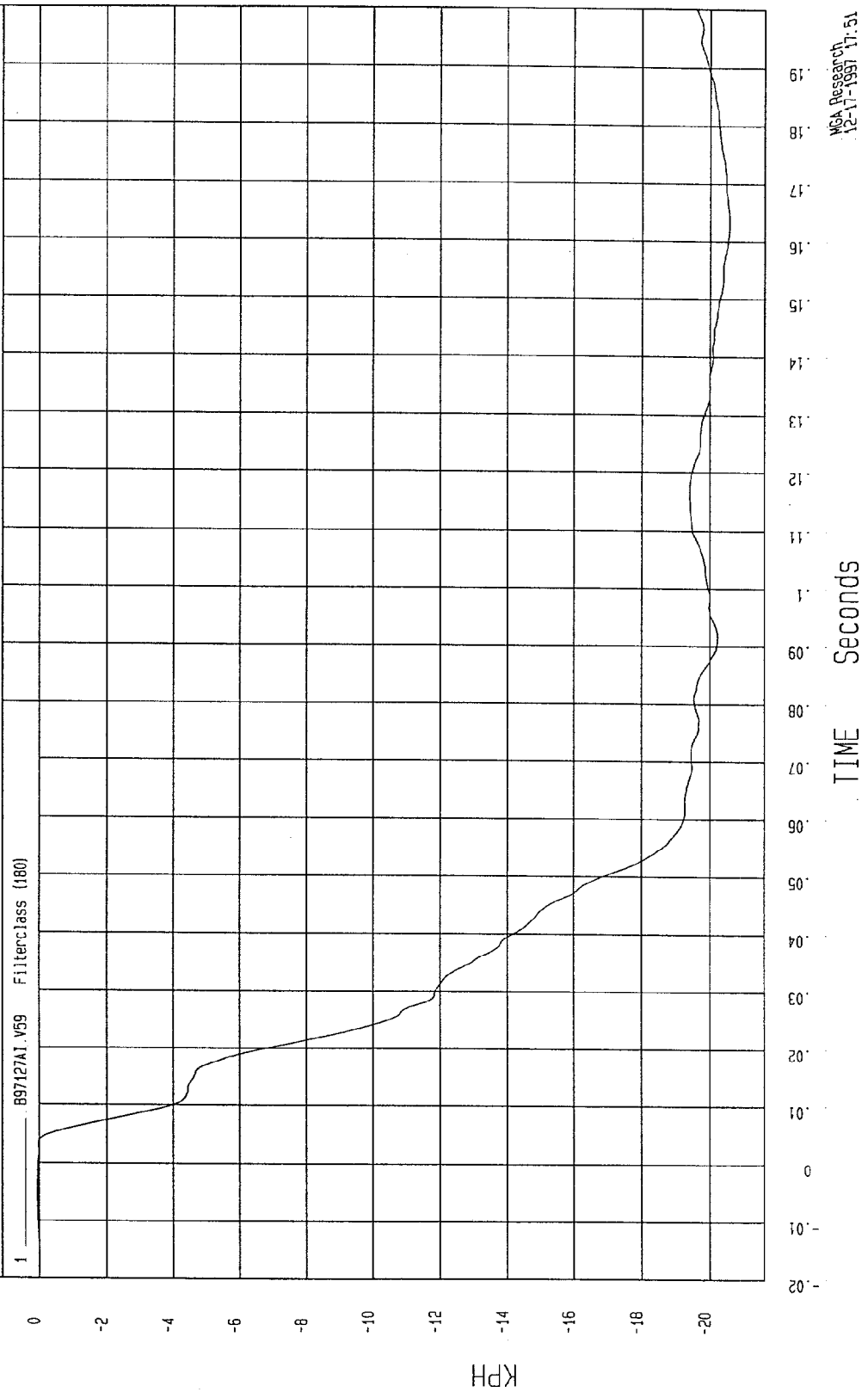
SPEED: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 5.50E-02 KPH at -6 msec

Minimum = -20.55 KPH at 164 msec

VEHICLE CG Y VELOCITY



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

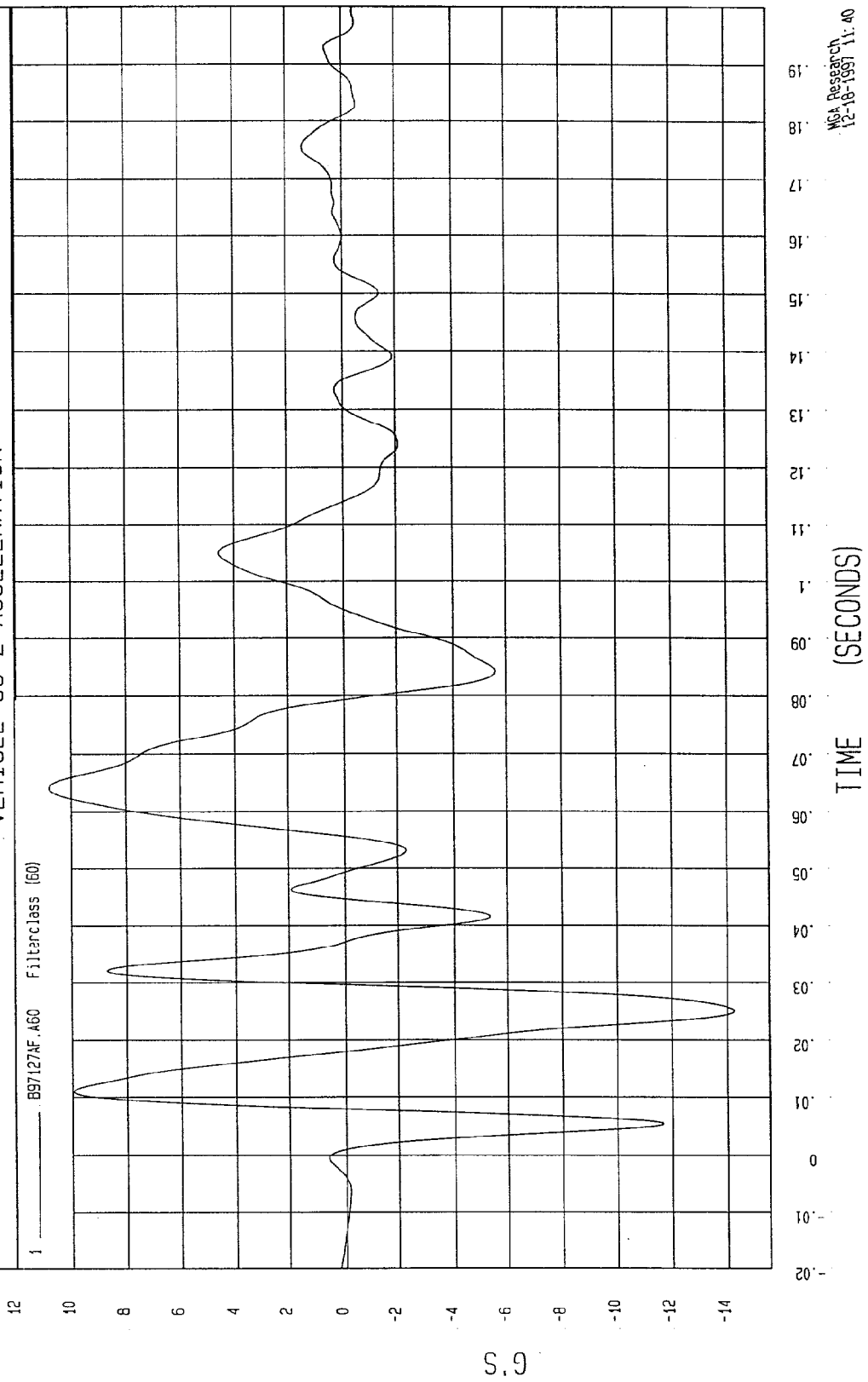
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 10.80 G'S at 64 msec

Minimum = -14.24 G'S at 25 msec

VEHICLE CG Z ACCELERATION



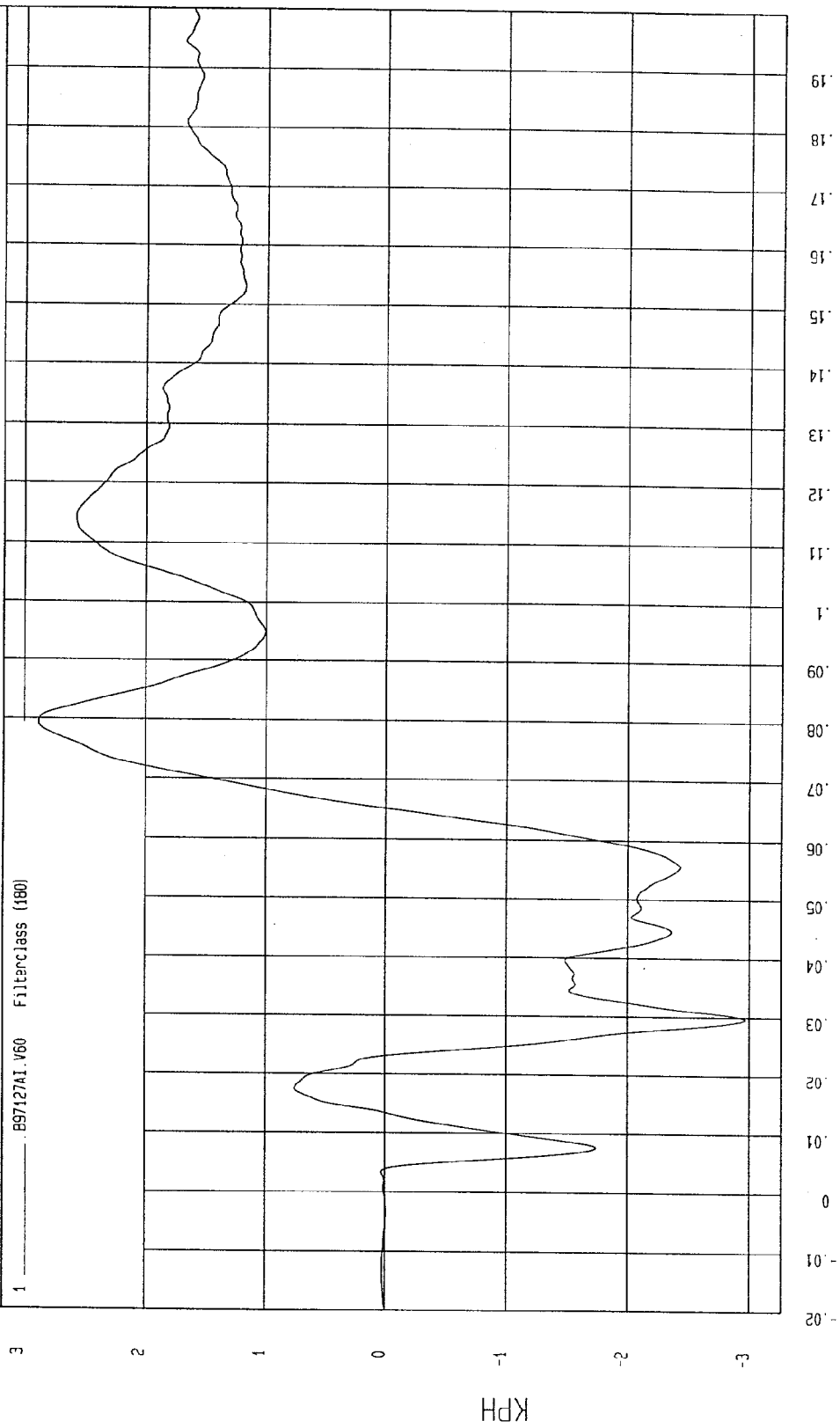
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -2.97 KPH at 30 msec
Maximum = 2.88 KPH at 79 msec

VEHICLE CG Z VELOCITY

1 _____ B57127A1.V60 FilterClass (100)



MSA Research
12-17-1997 17:51

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

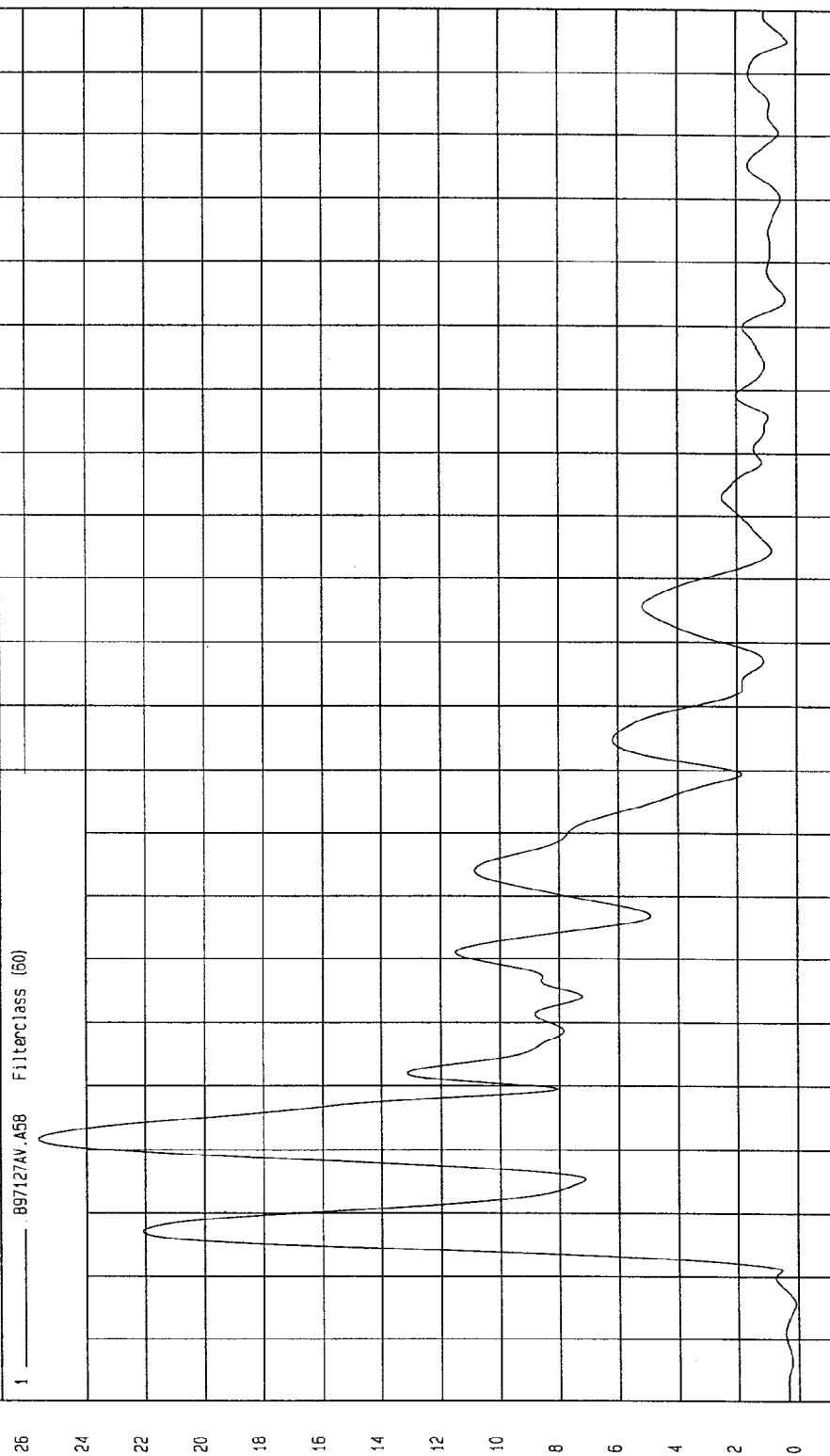
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 25.59 G'S at 22 msec

Minimum = .07 G'S at -4 msec

VEHICLE CG RESULTANT ACCELERATION

1 ——— B97127AV.A58 Filterclass (50)



MGA Research
12-18-1997 14:41

TEST DATE: 11-05-1997

TEST: HIGH SPEED LATERAL IMPACT

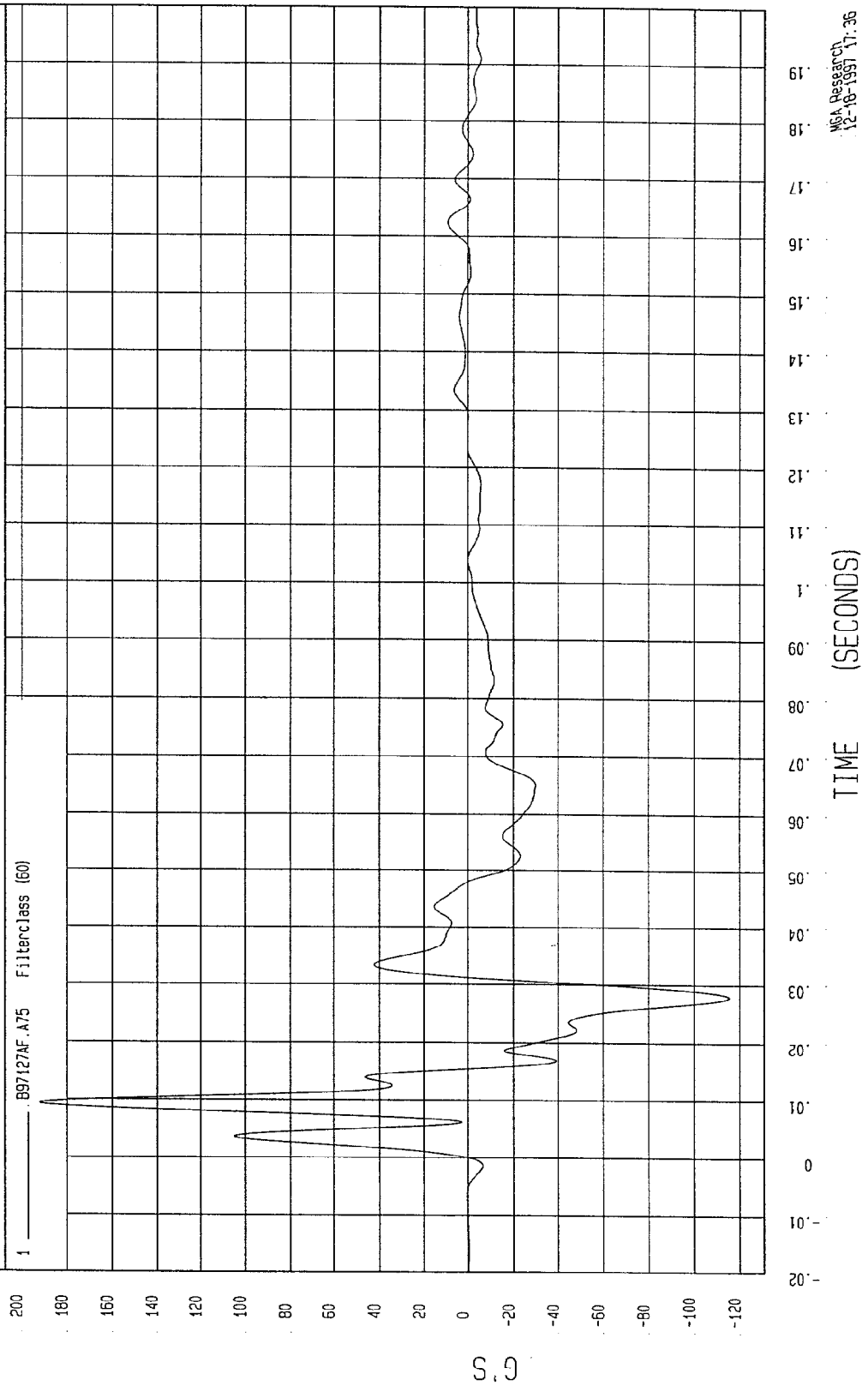
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 191.99 G'S at 9 msec

Minimum = -115.36 G's at 28 msec

LEFT FRONT DOOR MIDREAR Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

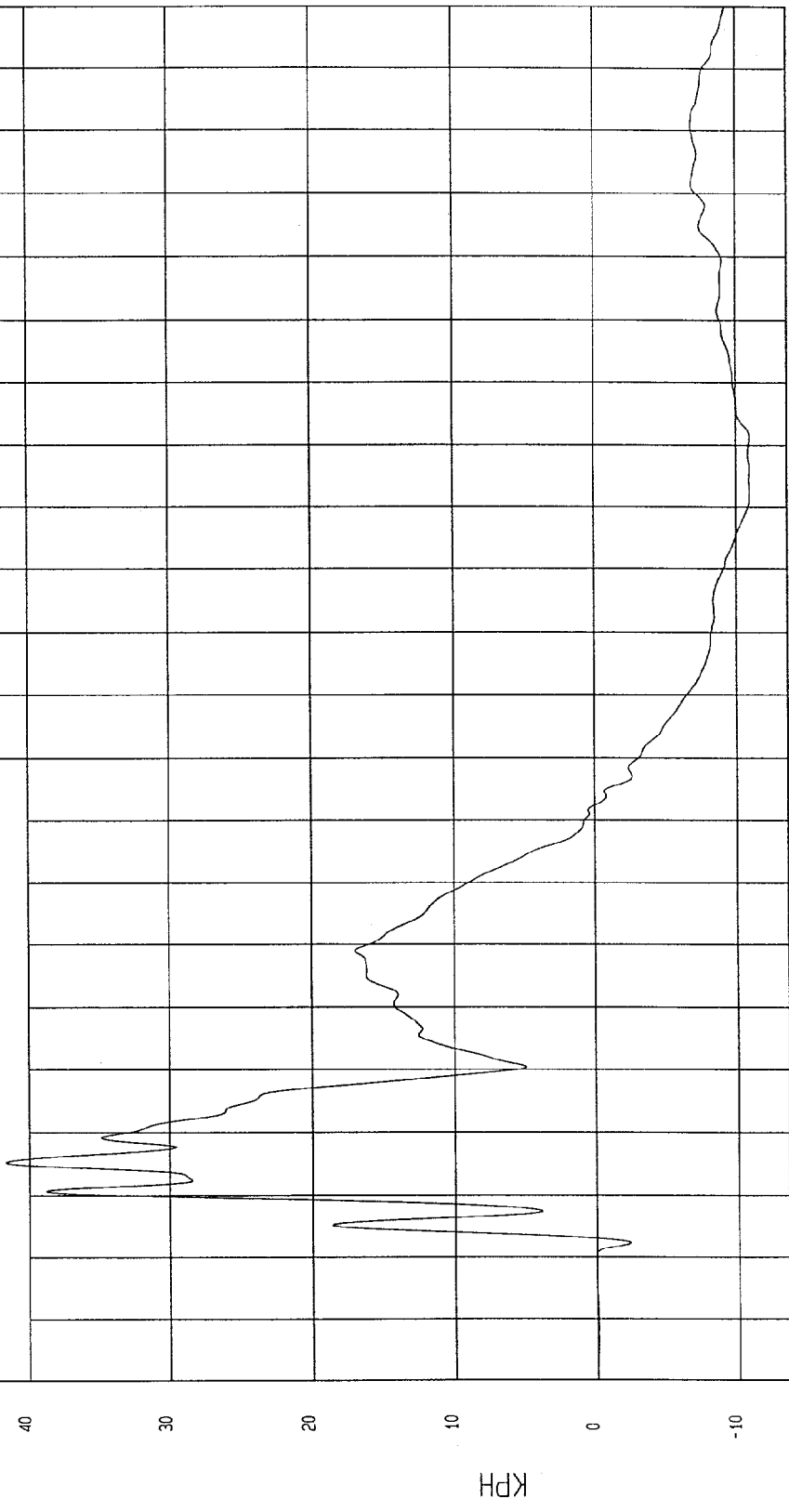
TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -10.97 KPH at 122 msec Maximum = 41.70 KPH at 15 msec

LEFT FRONT DOOR MIDREAR Y VELOCITY

1 B97127A1.V75 Filterclass (180)



TIME Seconds

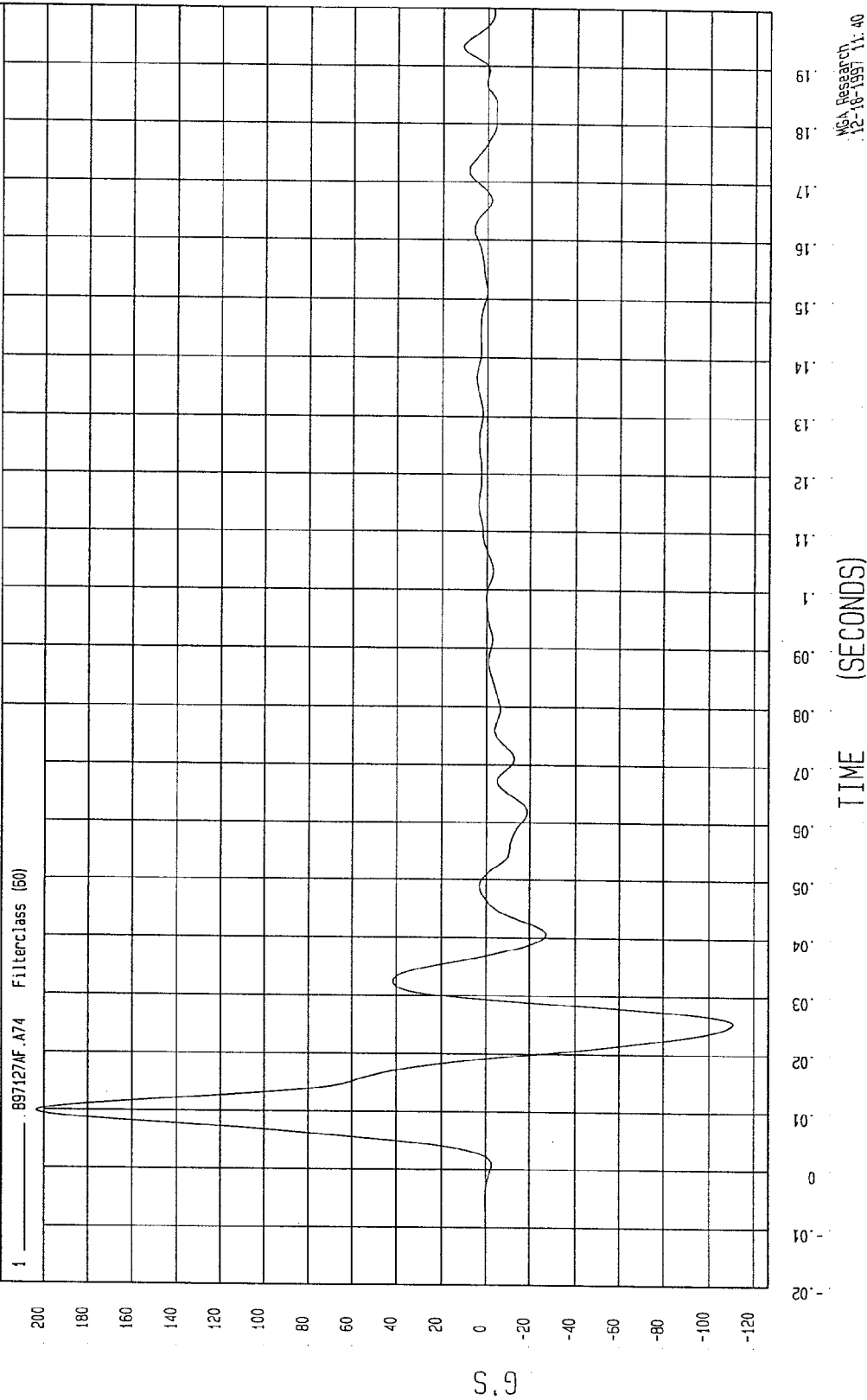
WCA Research
12-16-1997 18:20

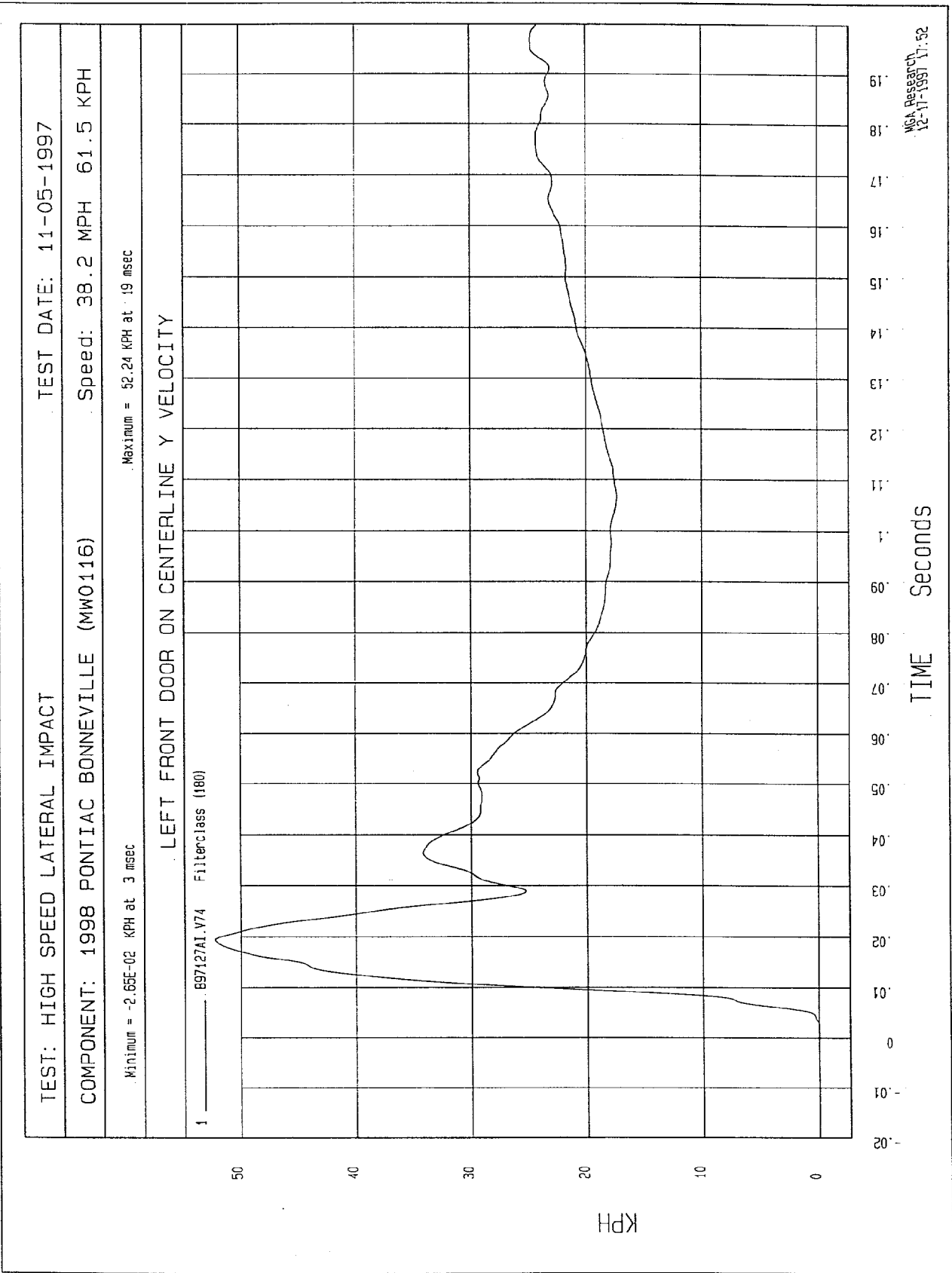
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -10.77 G'S at 25 msec
Maximum = 203.43 G'S at 10 msec

LEFT FRONT DOOR ON CENTERLINE Y ACCELERATION





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

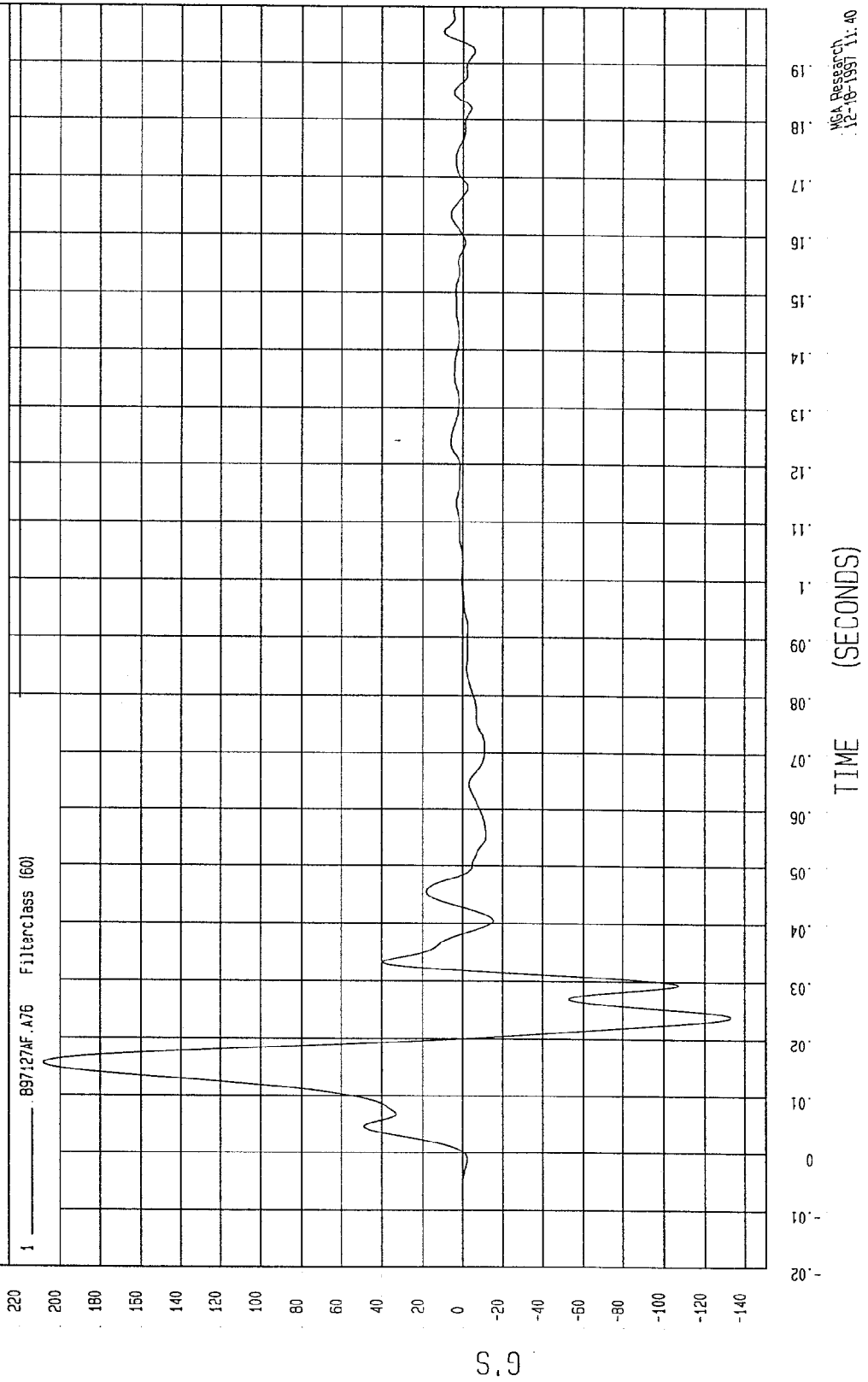
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 208.29 G'S at 16 msec

Minimum = -132.98 G'S at 24 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

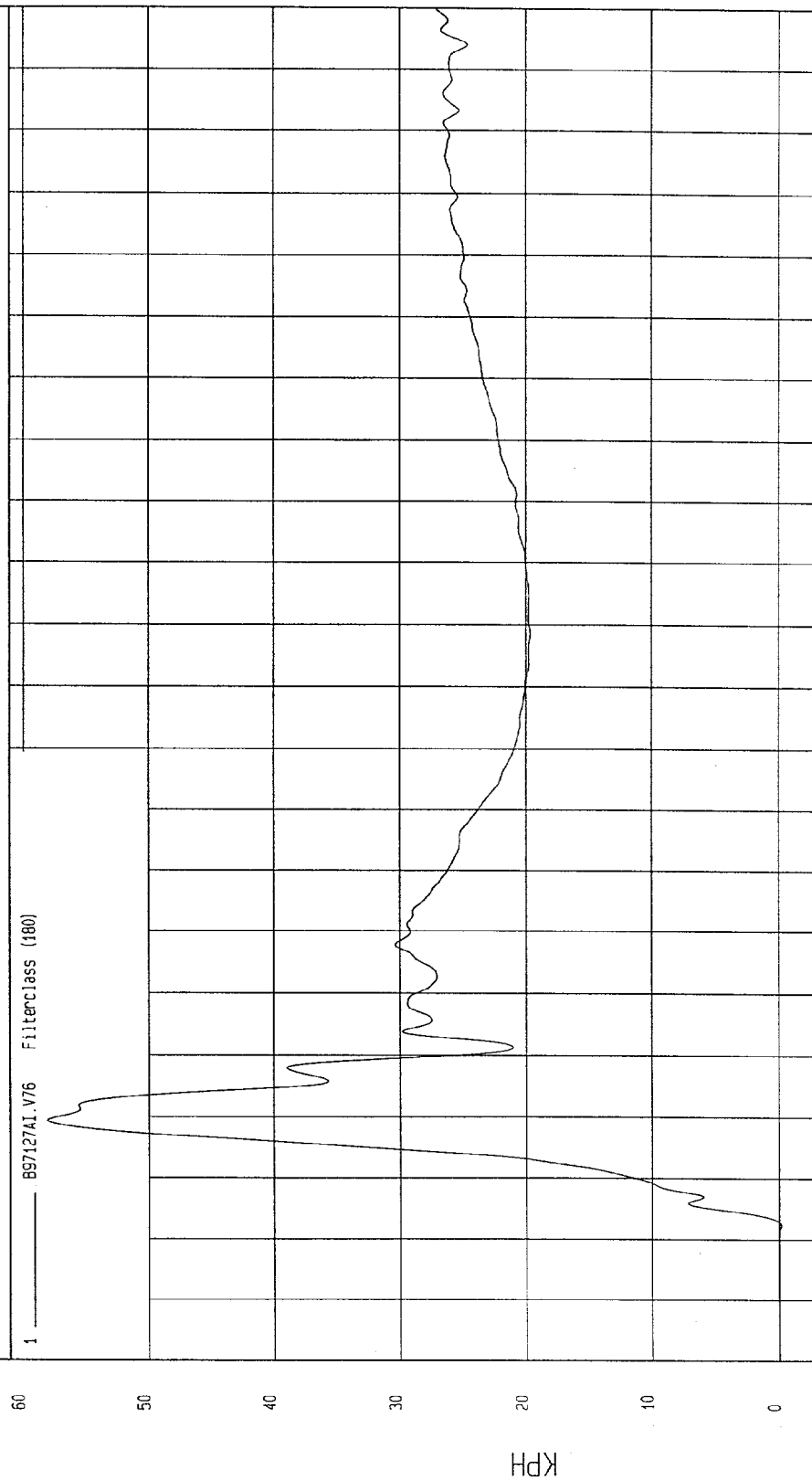
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 58.14 KPH at 19 msec

Minimum = -16 KPH at 2 msec

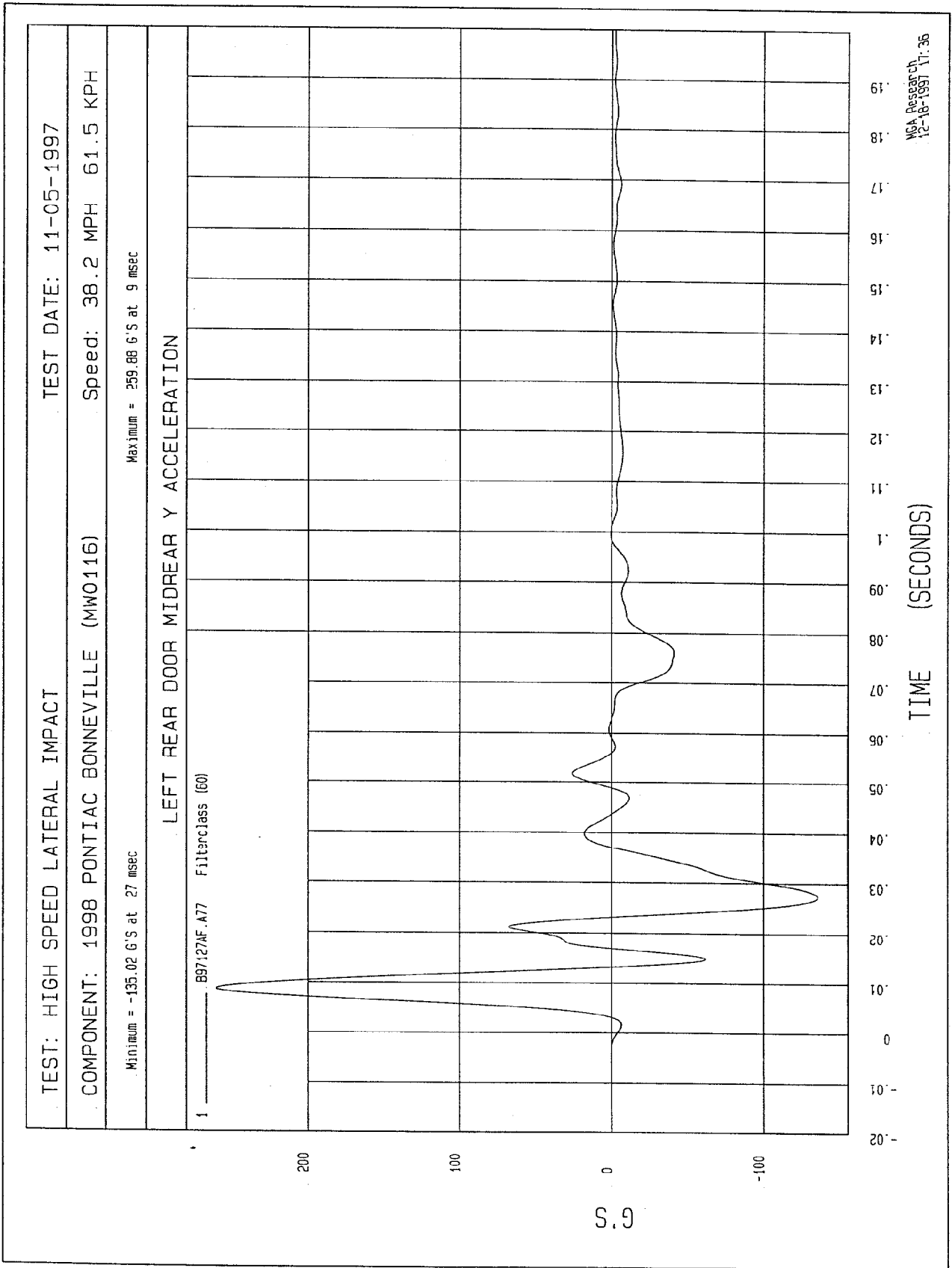
LEFT FRONT DOOR UPPER CENTERLINE Y VELOCITY

1 ——— B97127A1.V76 Filterclass (180)



TIME Seconds

MSA Research
12-17-1997 17:52



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

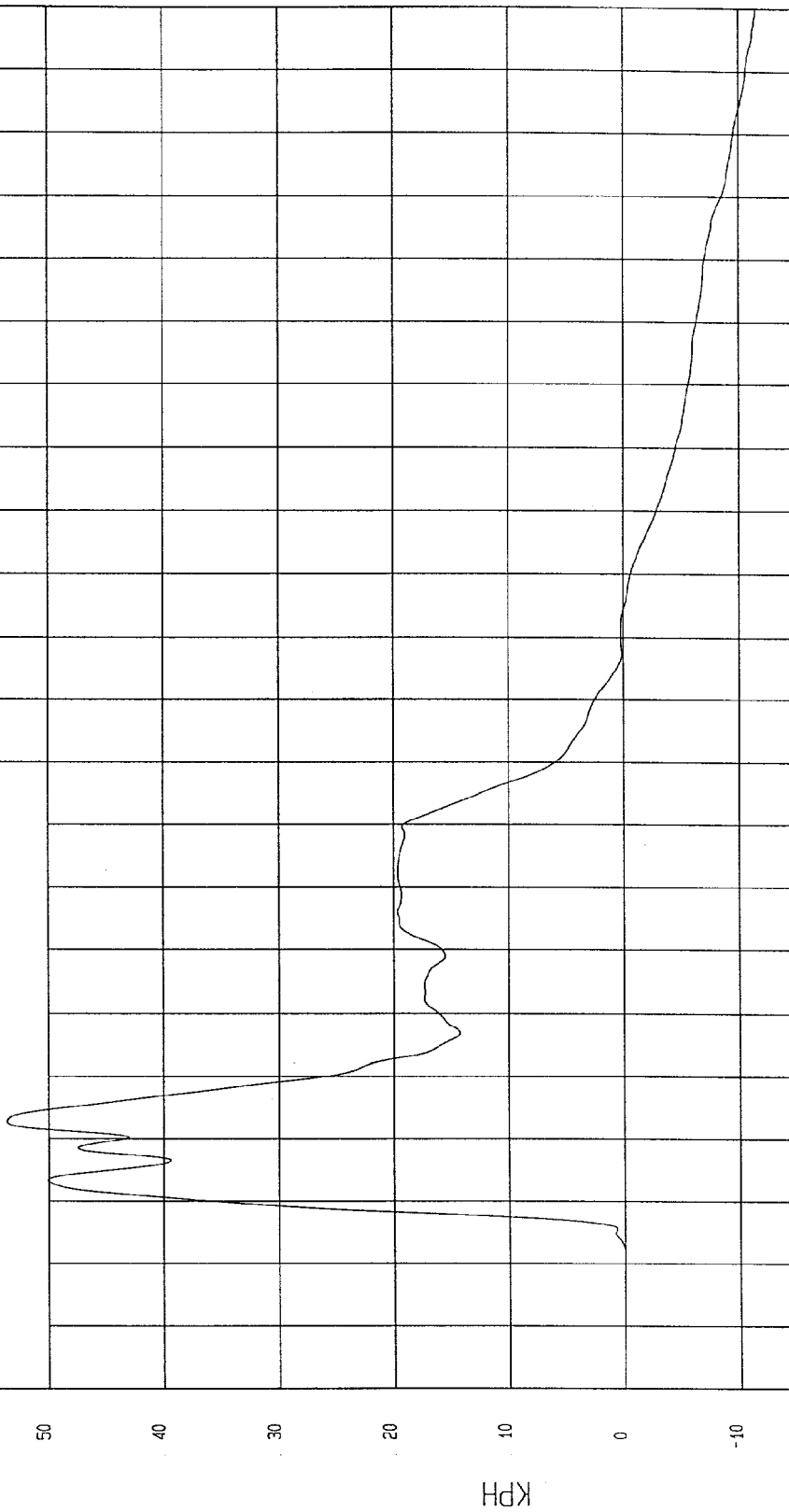
Speed: 38.2 MPH 61.5 KPH

Minimum = -11.48 KPH at 200 msec

Maximum = 53.52 KPH at 23 msec

LEFT REAR DOOR MIDREAR Y VELOCITY

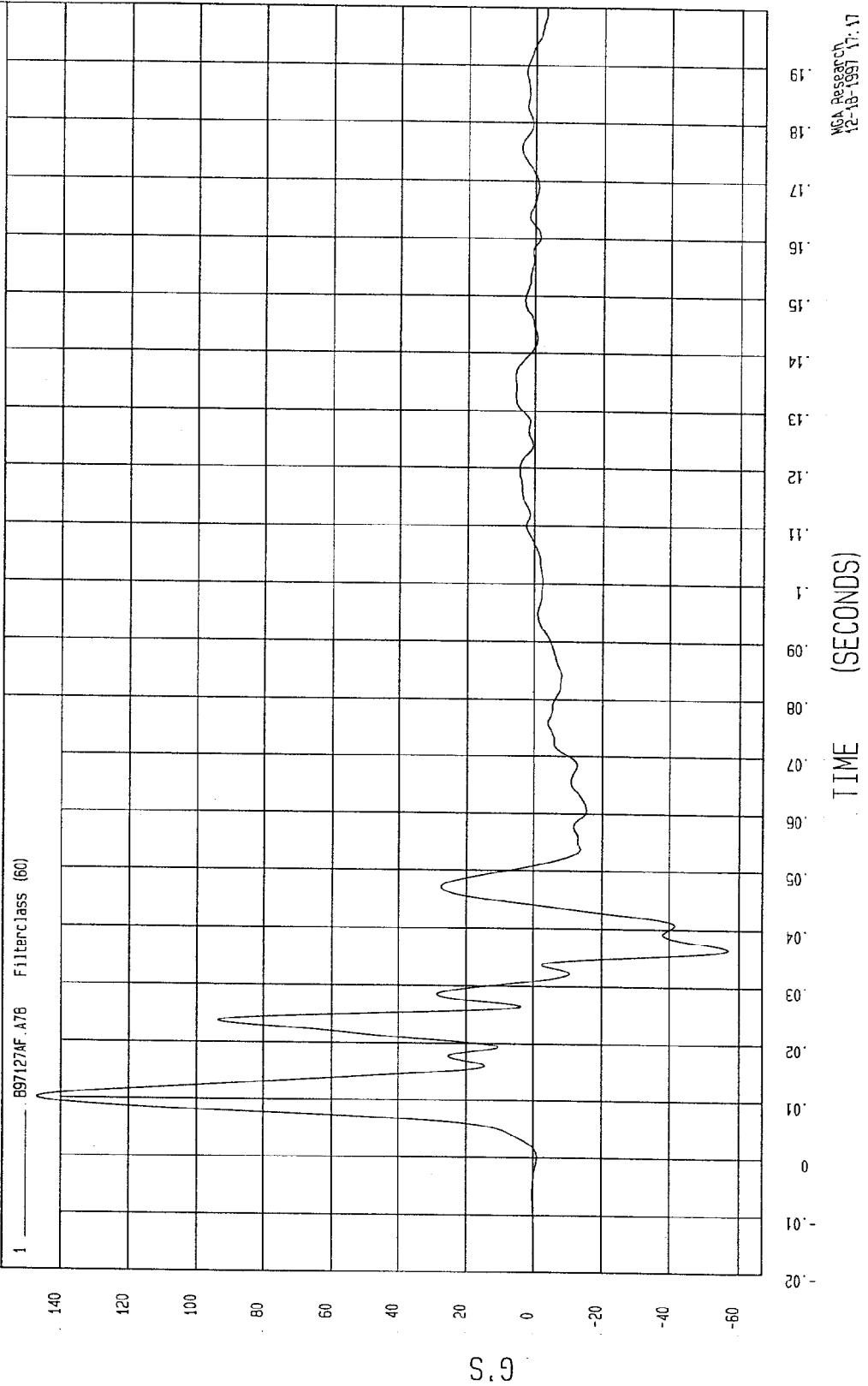
1 ——— 897127A1.V77 Filterclass (180)



WGA Research
12-13-1997 16:20

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH
Minimum = -56.84 G'S at 35 msec Maximum = 147.00 G'S at 10 msec

LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

Speed: 38.2 MPH 61.5 KPH

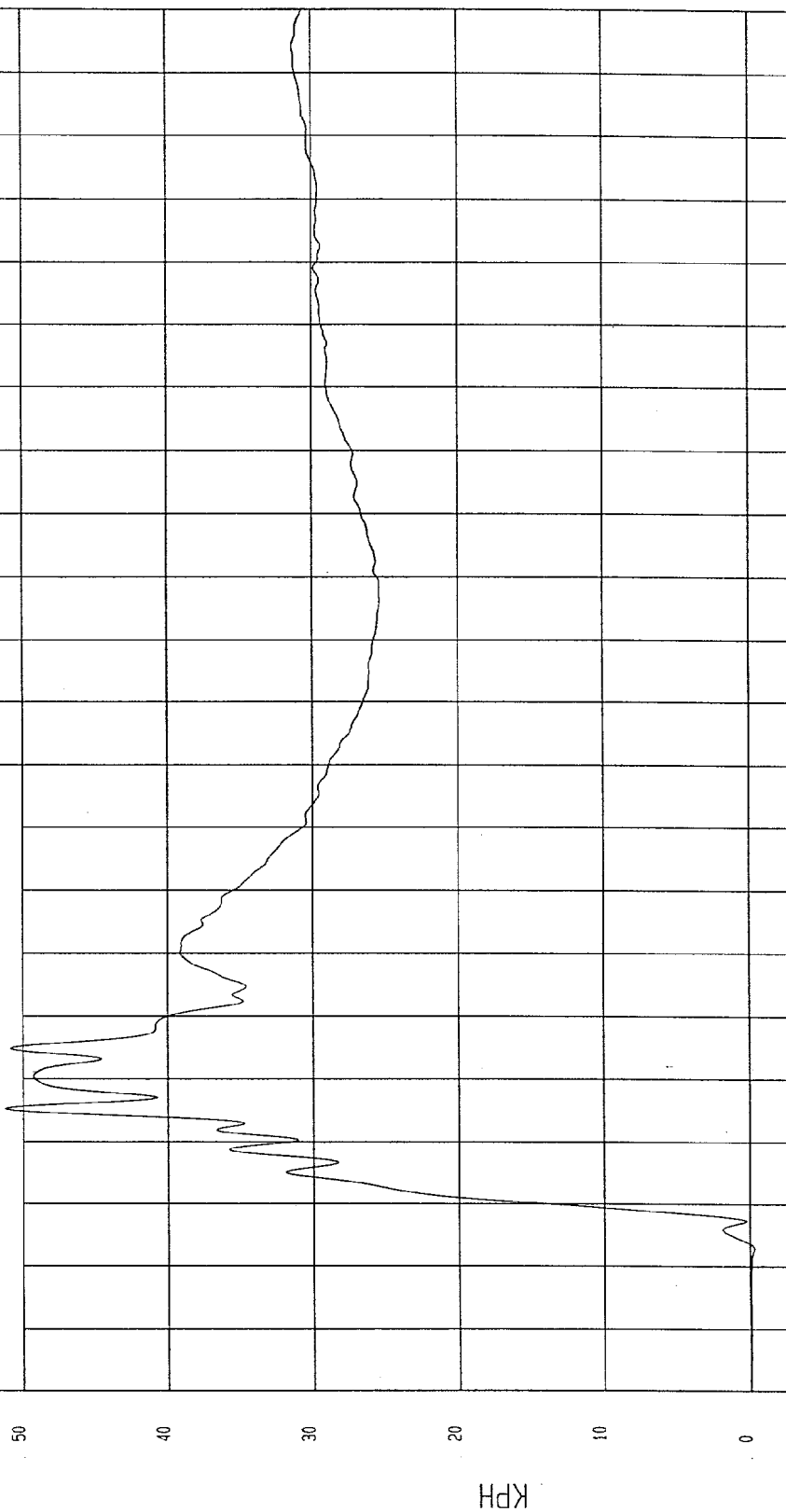
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 51.22 KPH at 25 msec

Minimum = -29 KPH at 3 msec

LEFT REAR DOOR UPPER CENTERLINE Y VELOCITY

1 B97127A1.V78 Filterclass (180)



MGA Research
12-18-1997 18:24

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -17.24 G'S at 44 msec Maximum = 1.45 G'S at 165 msec

MOVING BARRIER CG X ACCELERATION

1 ——— B97127AF.A02 Filterclass (50)

2

0
-2
-4
-6
-8
-10
-12
-14
-16
-18

G.S

TIME (SECONDS)
0
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
.12
.13
.14
.15
.16
.17
.18
.19

NCA Research
12-18-1997 11:51

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

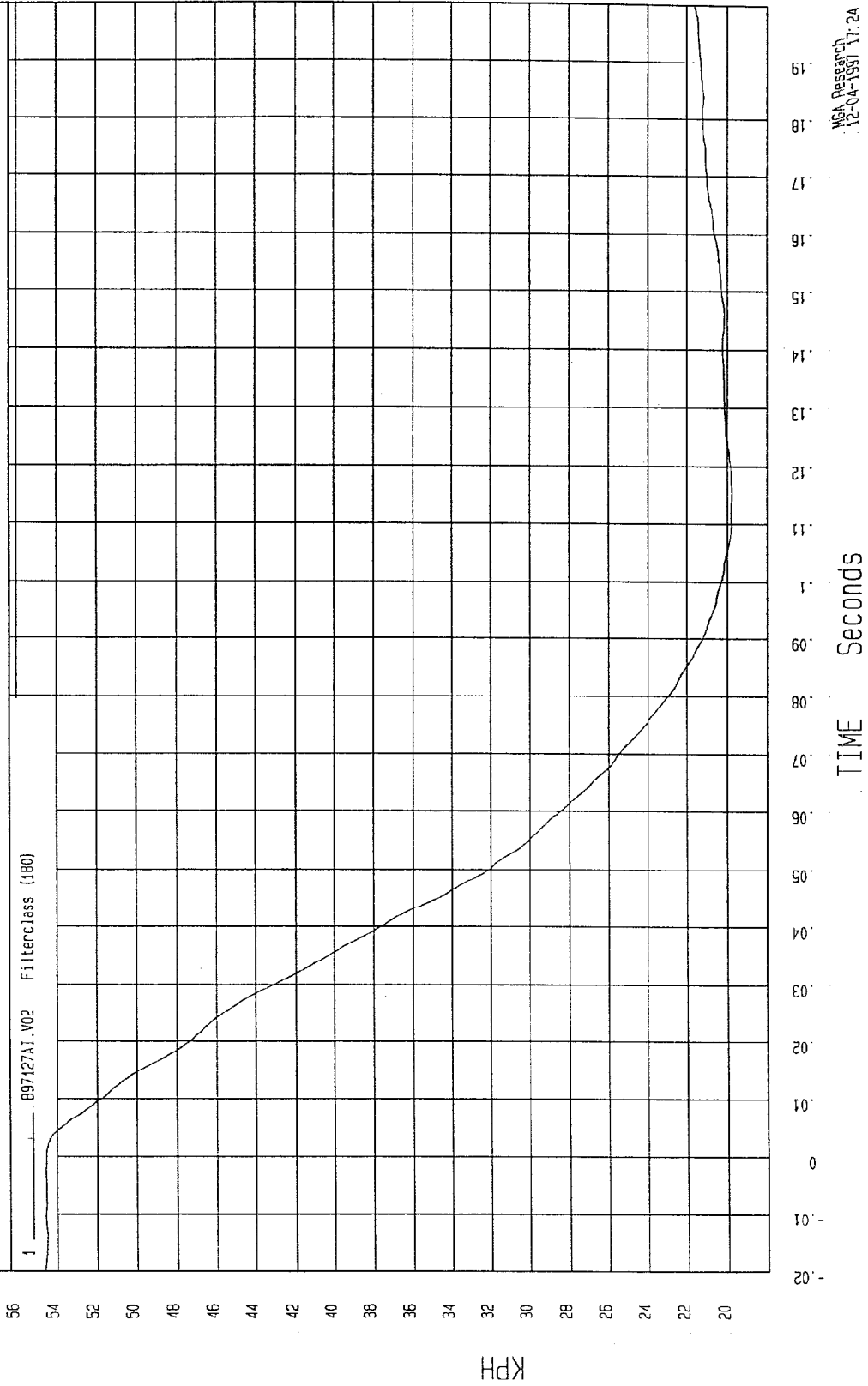
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

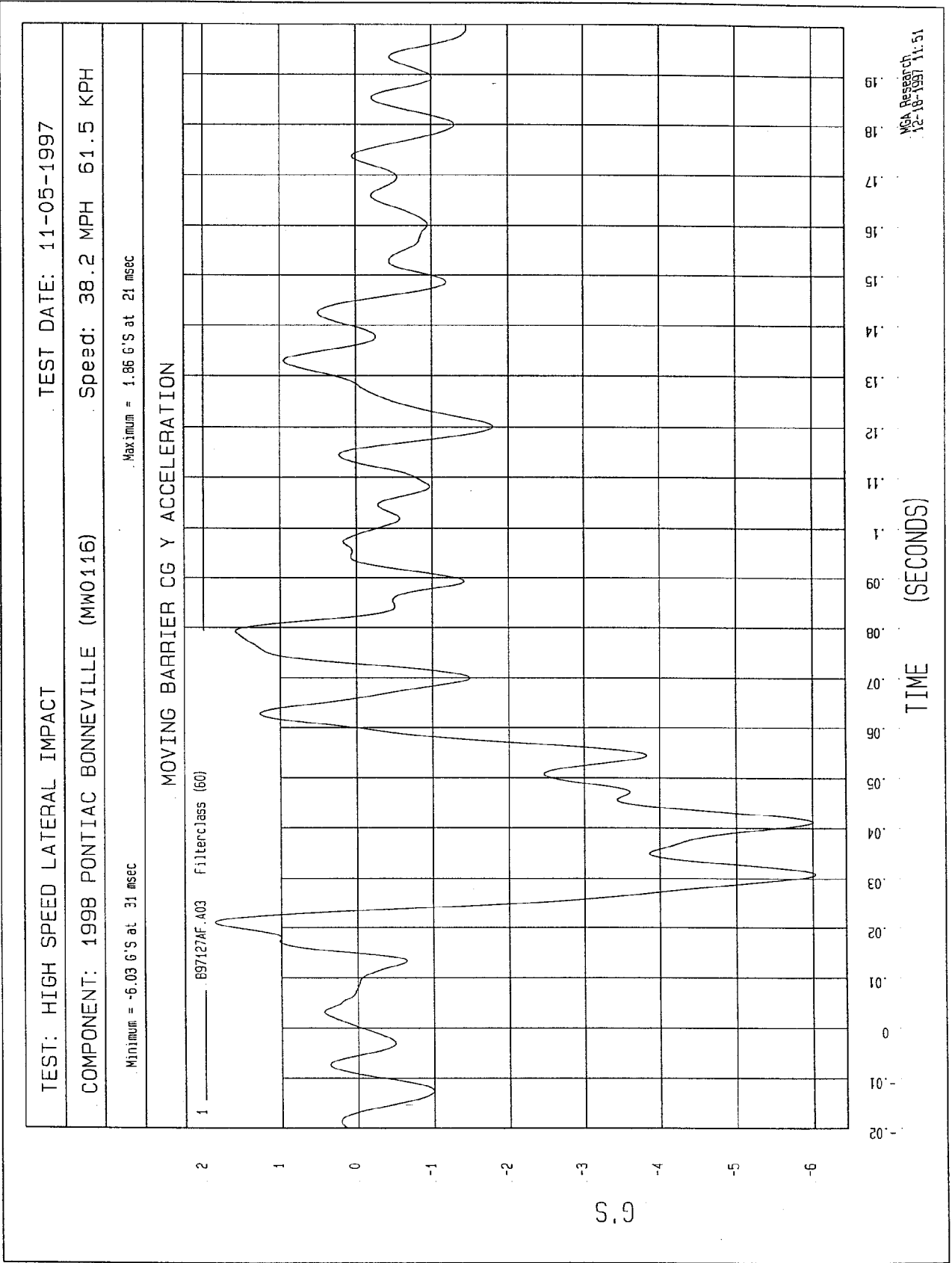
Speed: 38.2 MPH 61.5 KPH

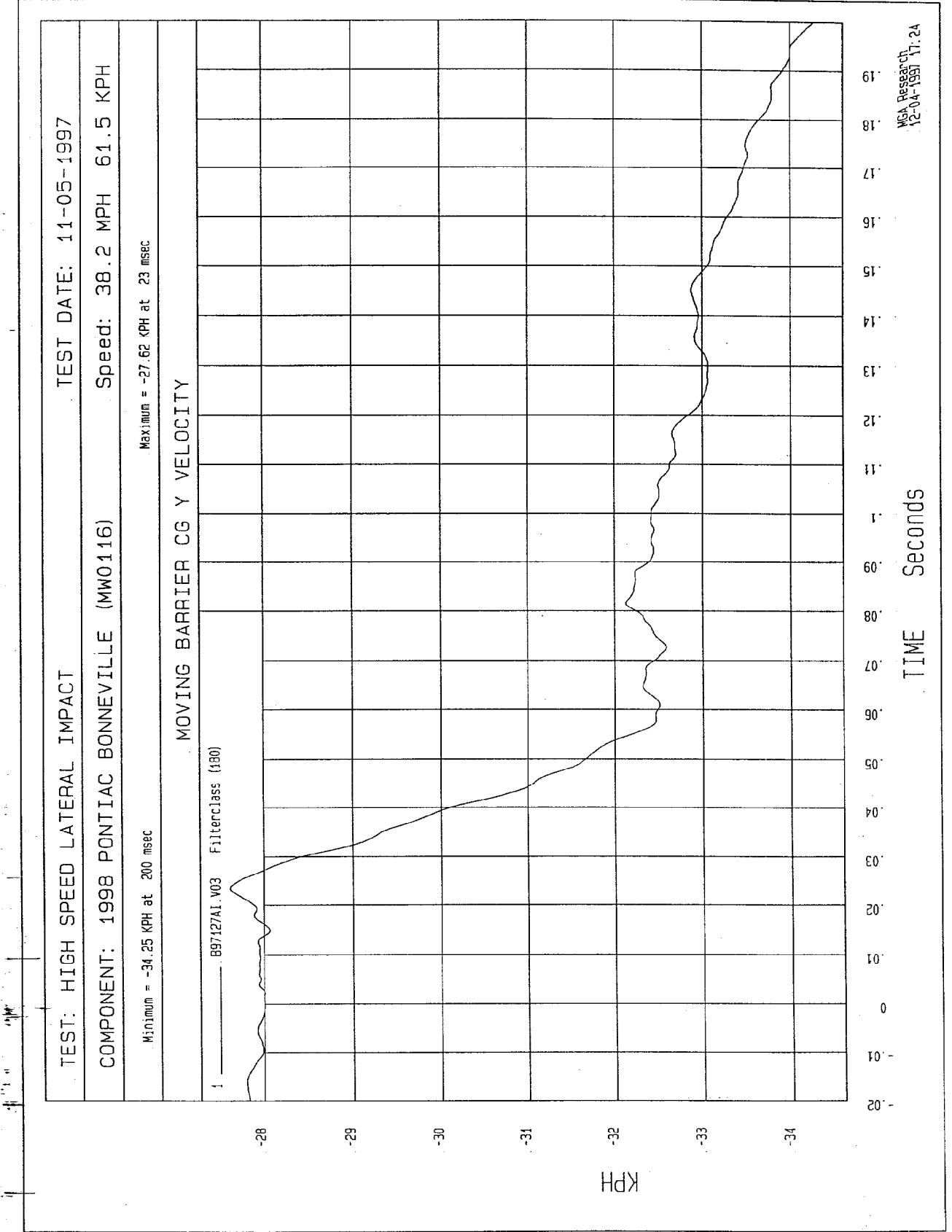
Minimum = 19.74 KPH at 115 msec

Maximum = 54.62 KPH at -20 msec

MOVING BARRIER CG X VELOCITY





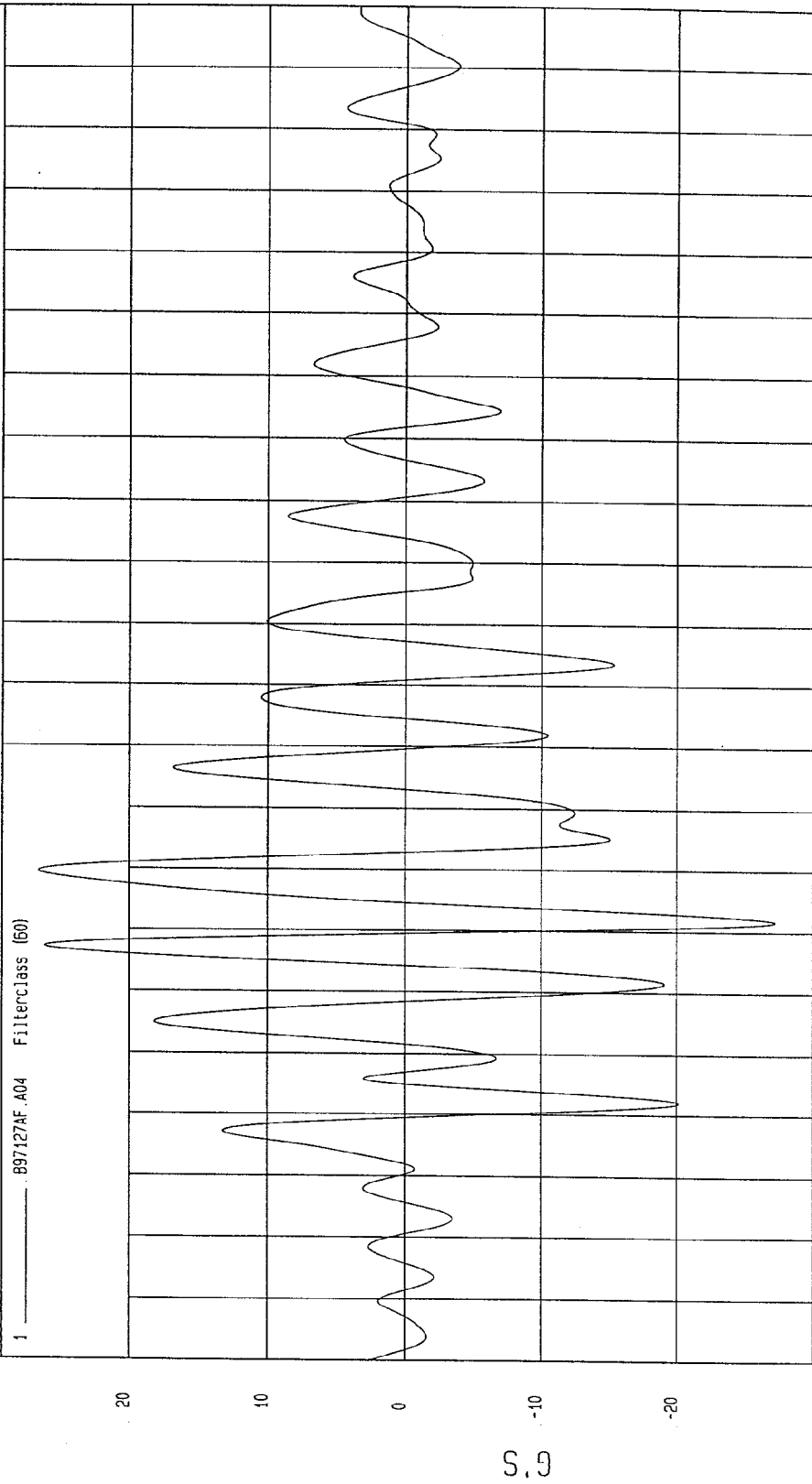


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

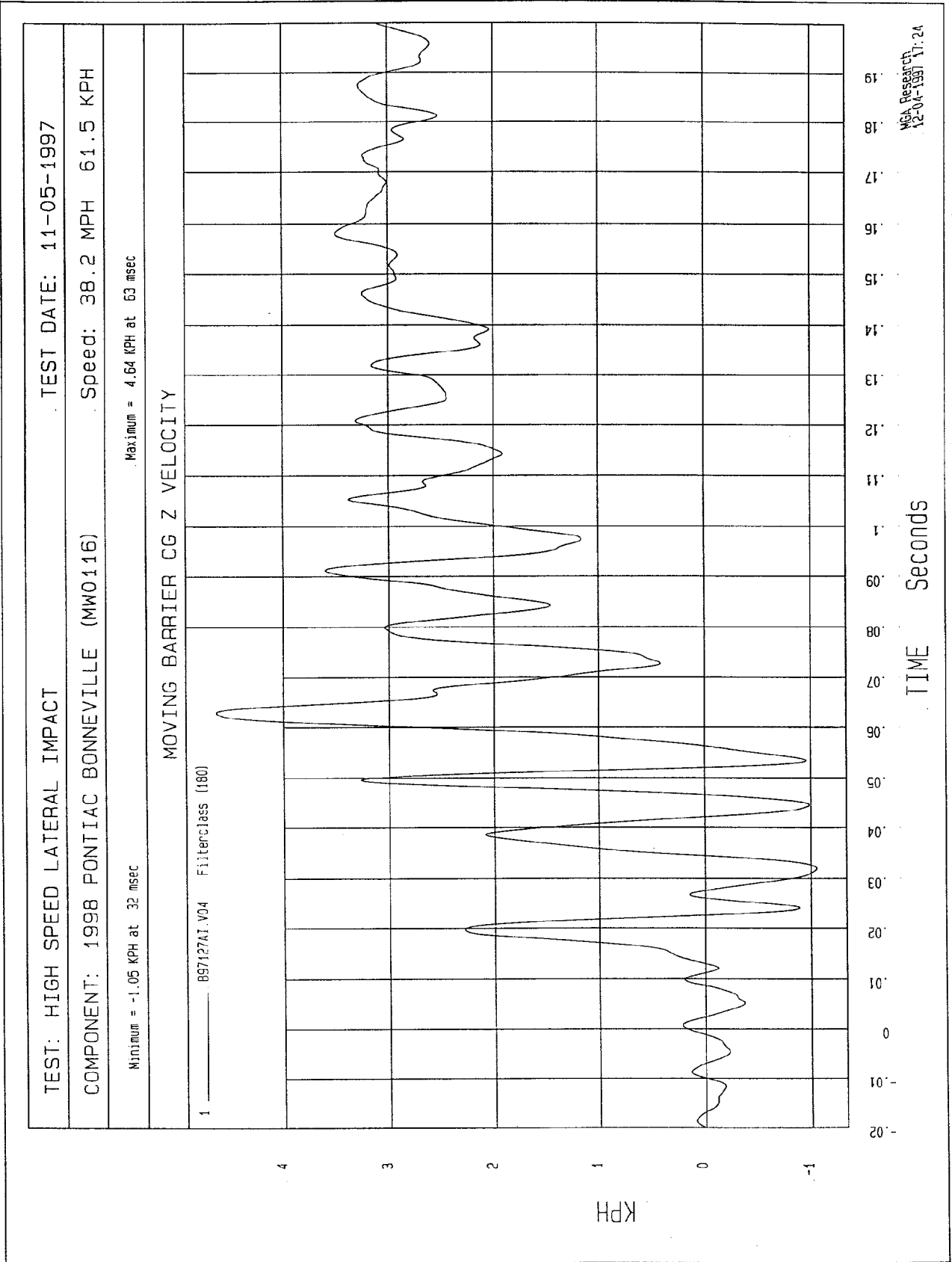
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

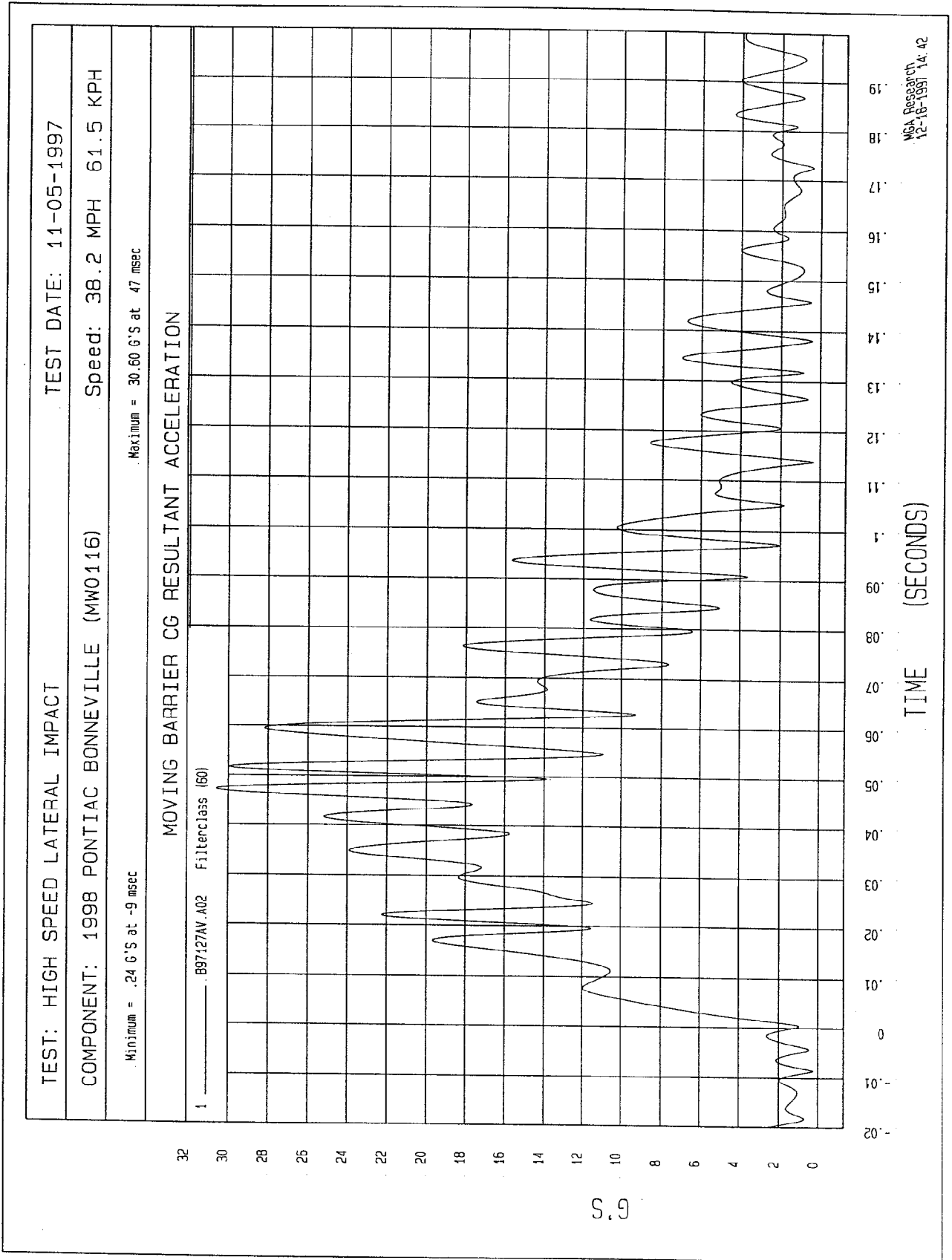
Minimum = -27.17 G'S at 52 msec Maximum = 26.55 G'S at 60 msec

MOVING BARRIER CG Z ACCELERATION



WCA Research
12-18-1997 11:51



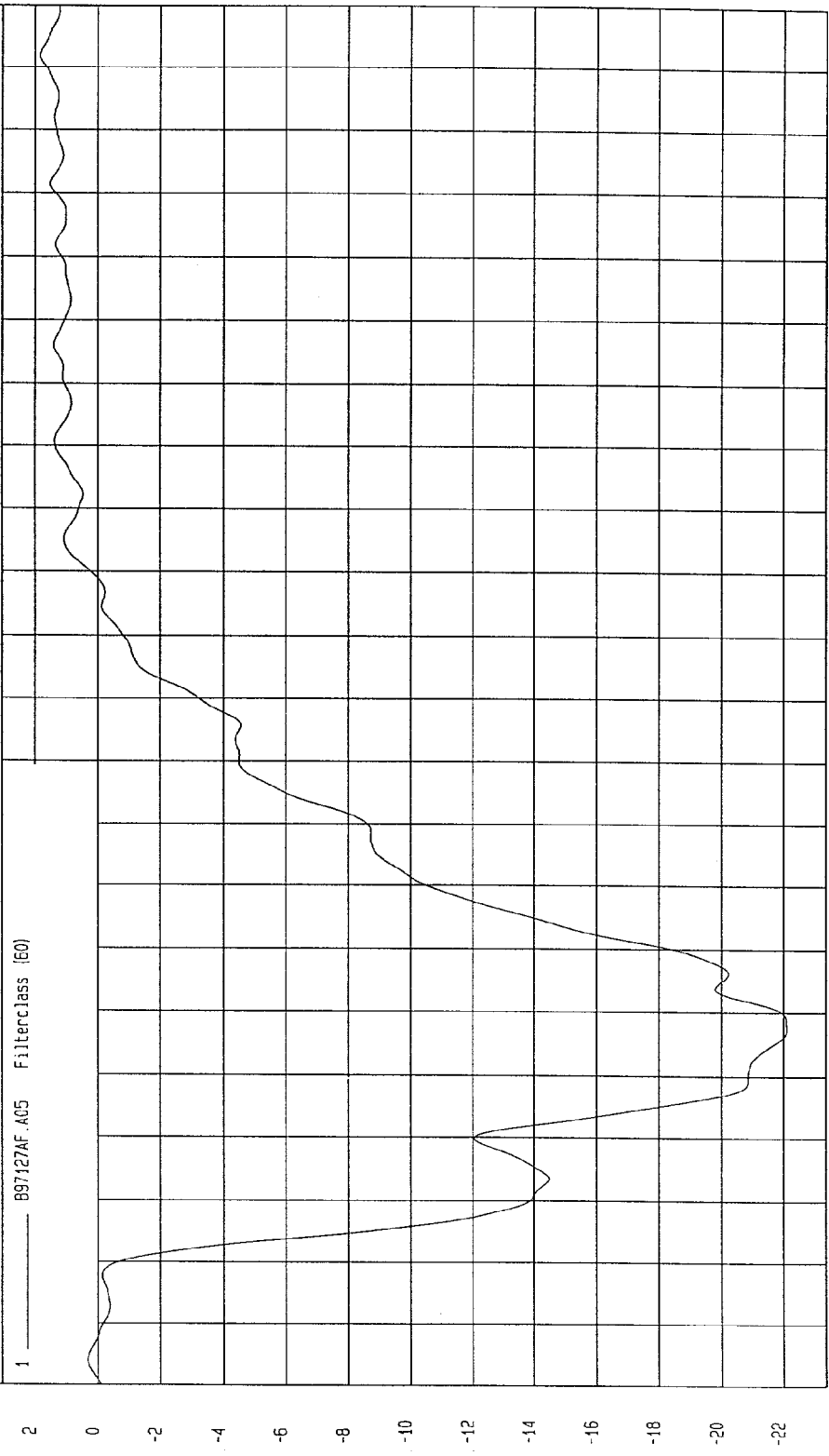


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -22.09 G'S at 37 msec Maximum = 1.83 G'S at 192 msec

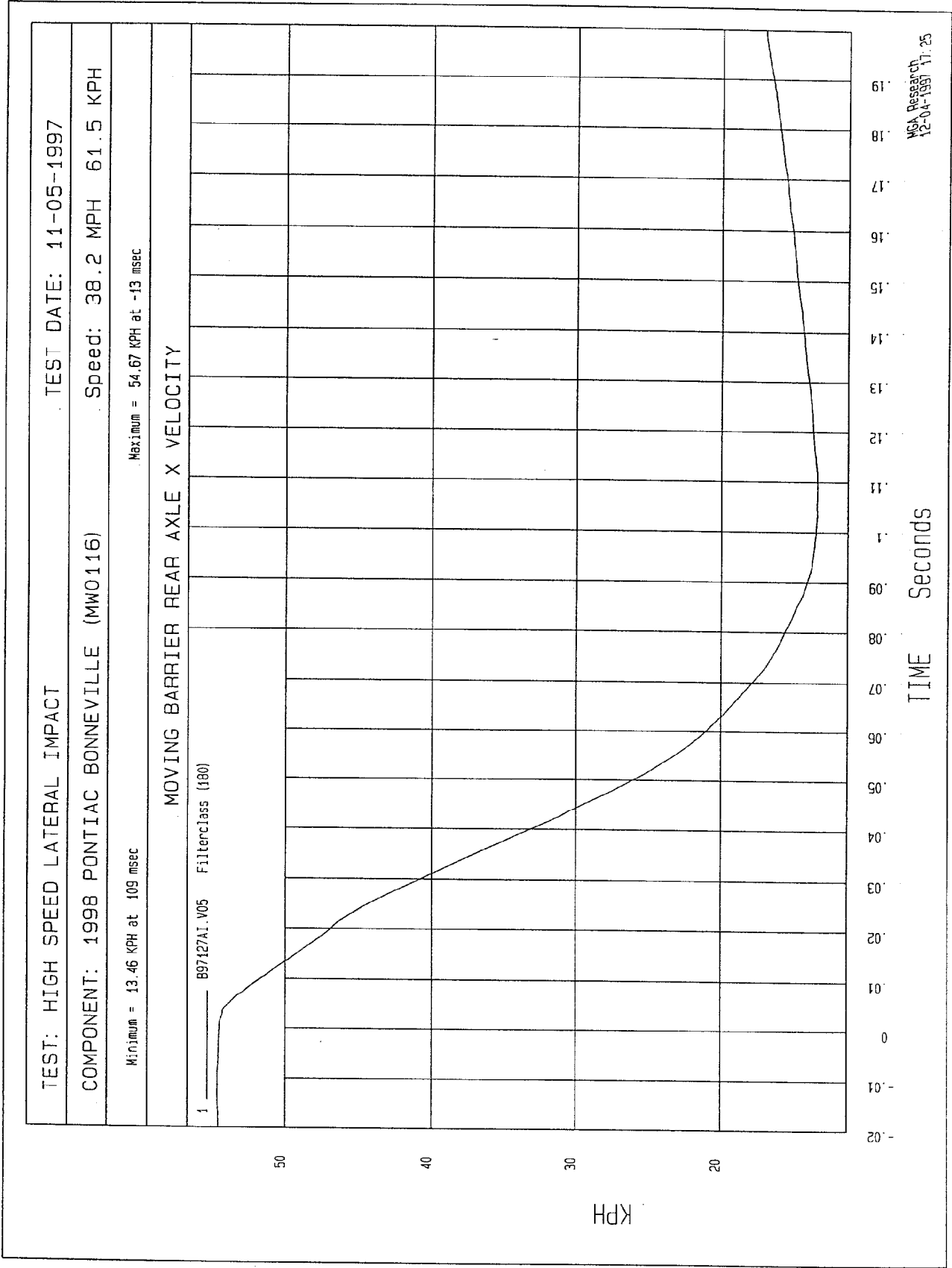
MOVING BARRIER REAR AXLE X ACCELERATION

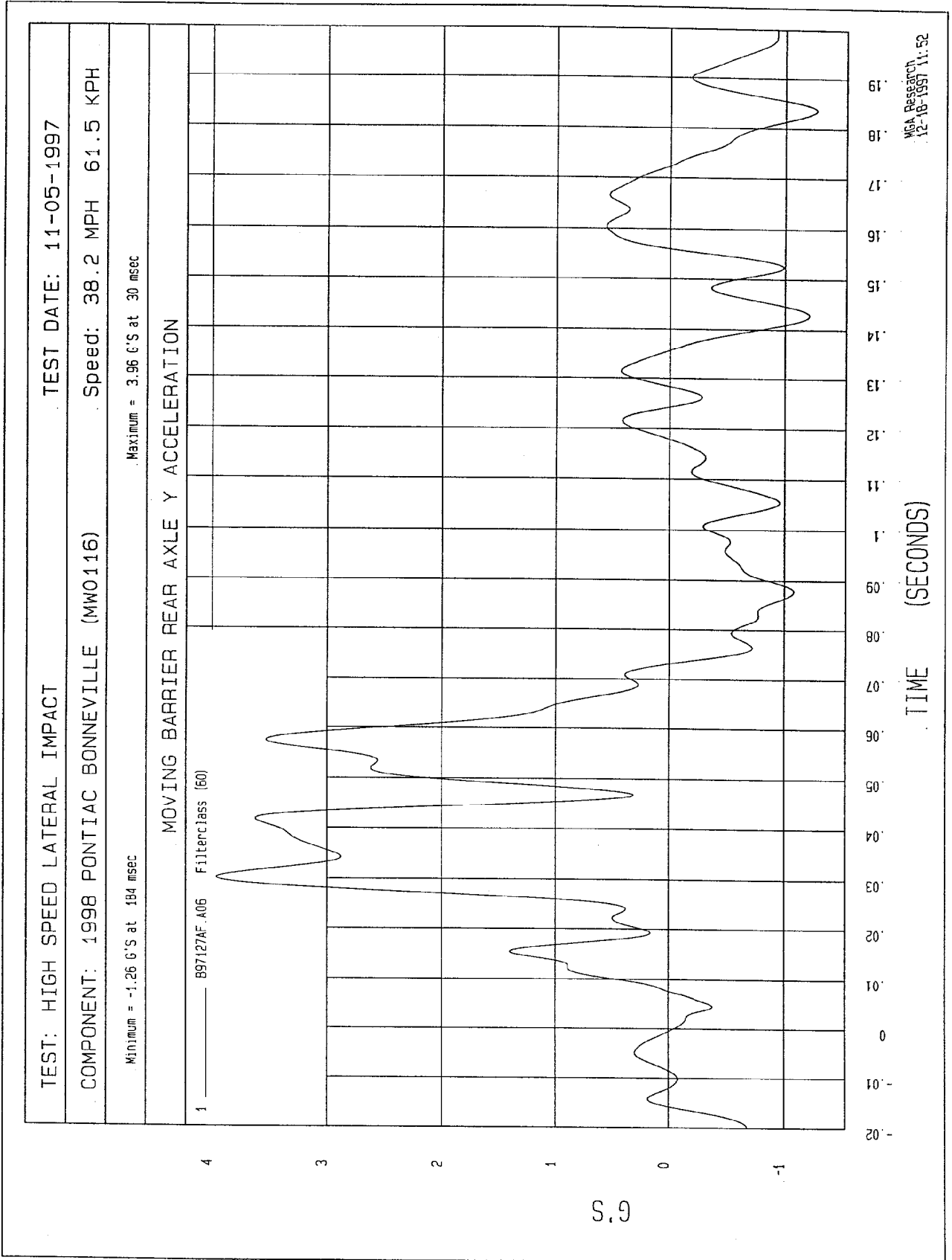


TIME (SECONDS)

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.1 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

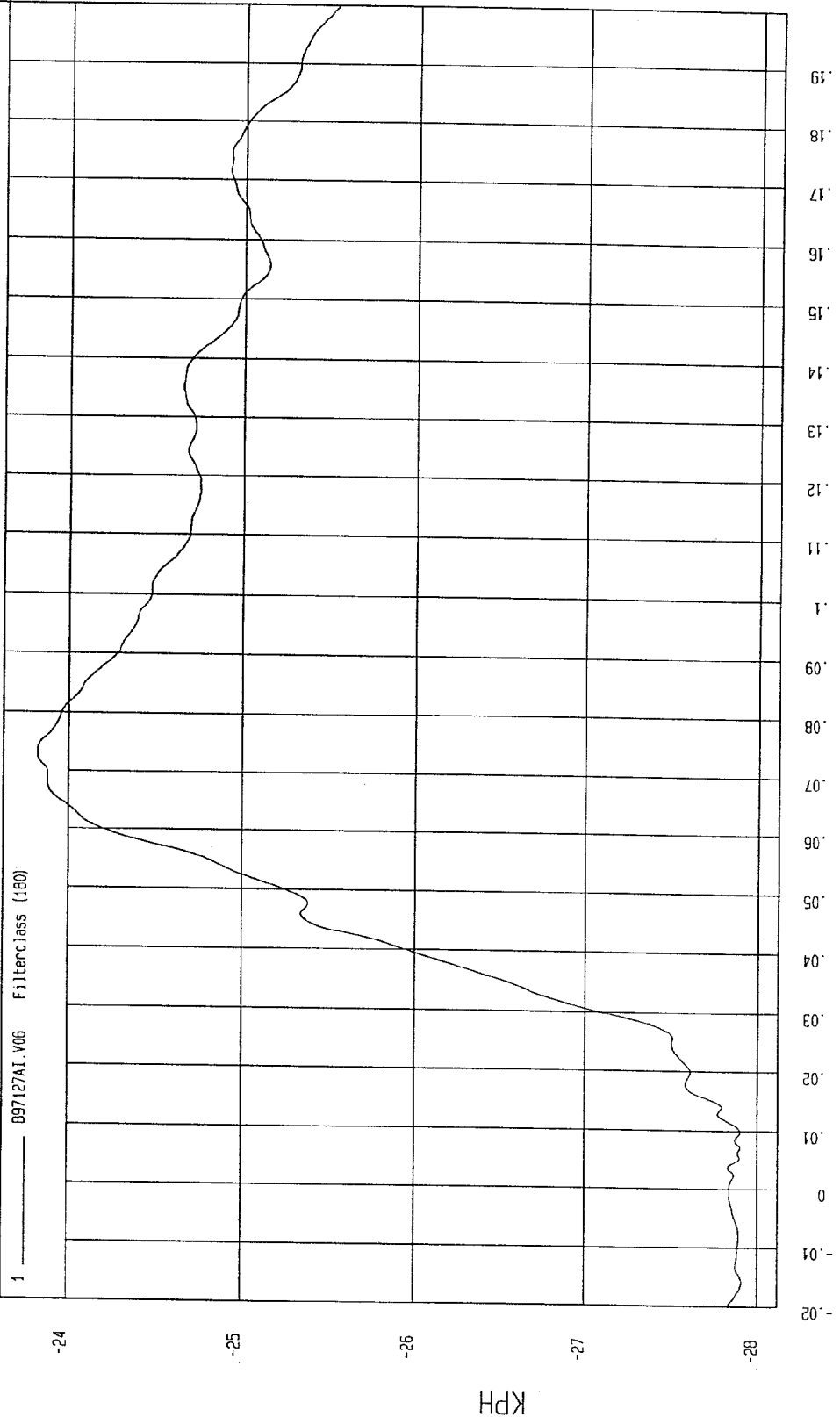
WCA Research
12-16-1997 11:51





TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)	Speed: 38.2 MPH 61.5 KPH
Minimum = -27.90 KPH at -16 msec	Maximum = -23.82 KPH at 73 msec

MOVING BARRIER REAR AXLE Y VELOCITY



MGA Research
12-04-1997 17:25

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

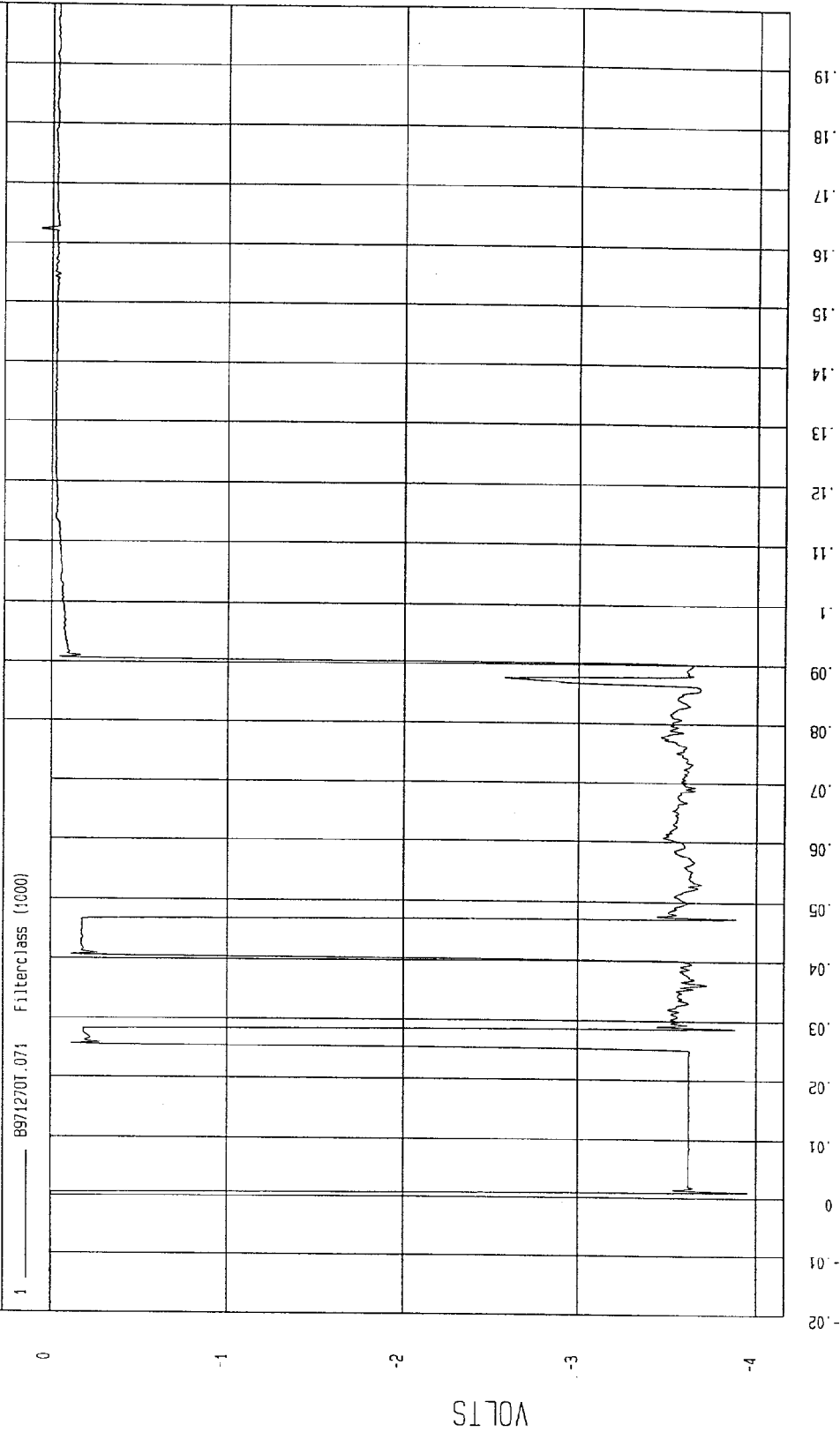
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Speed: 38.2 MPH 61.5 KPH

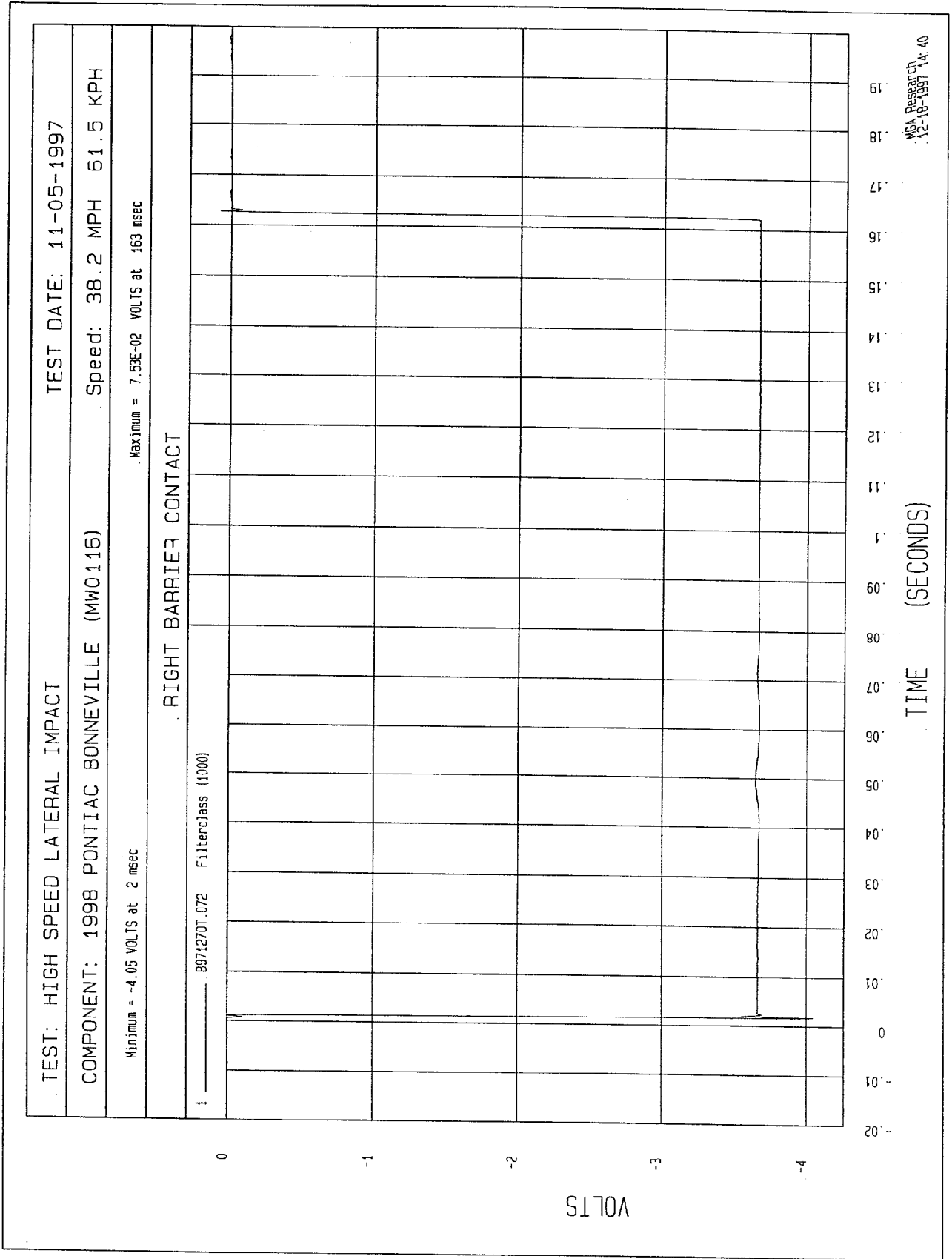
Minimum = -3.95 VOLTS at 1 nsec

Maximum = 6.33E-02 VOLTS at 162 nsec

LEFT BARRIER CONTACT



MSA Research
12-18-1997 14:40

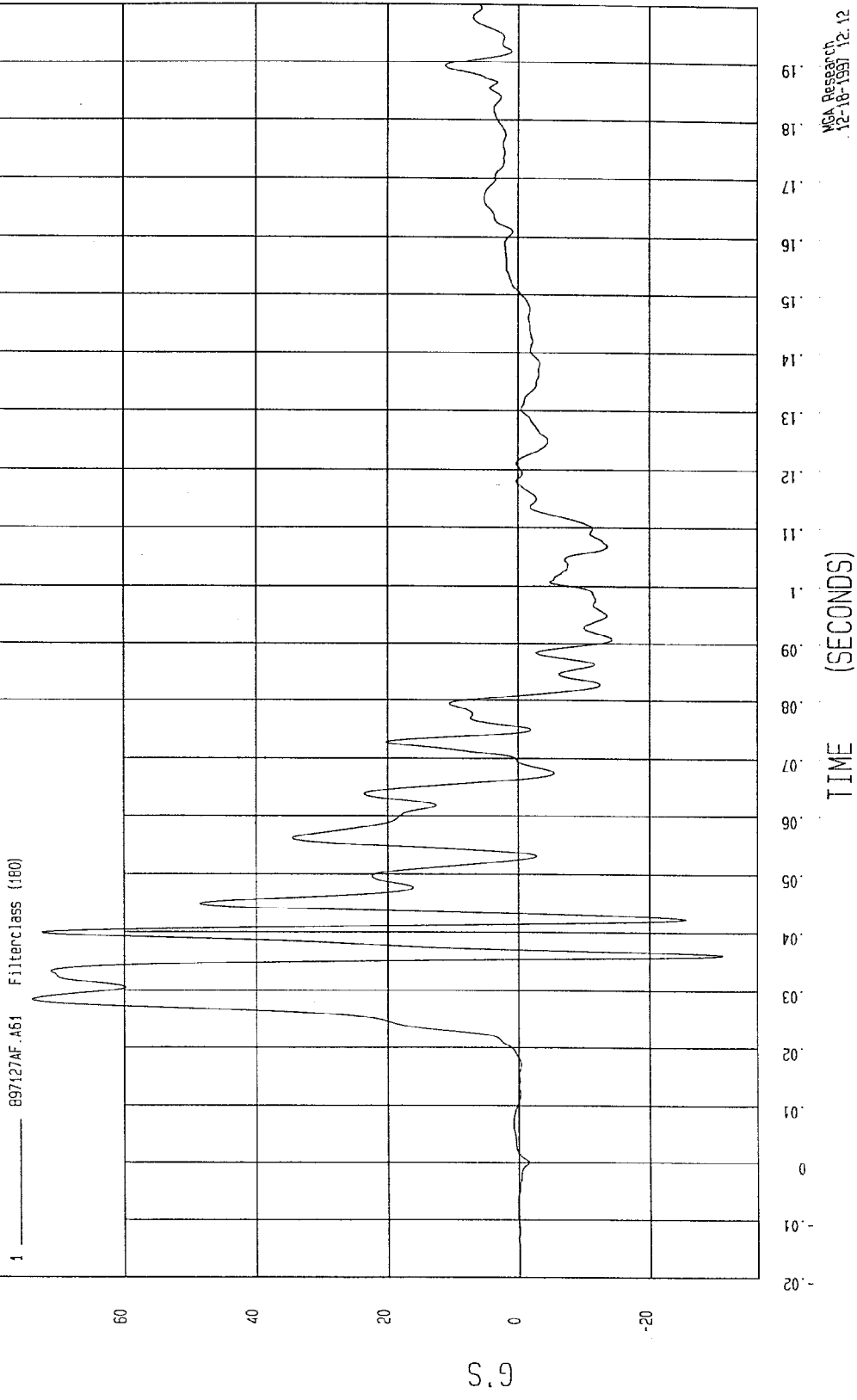


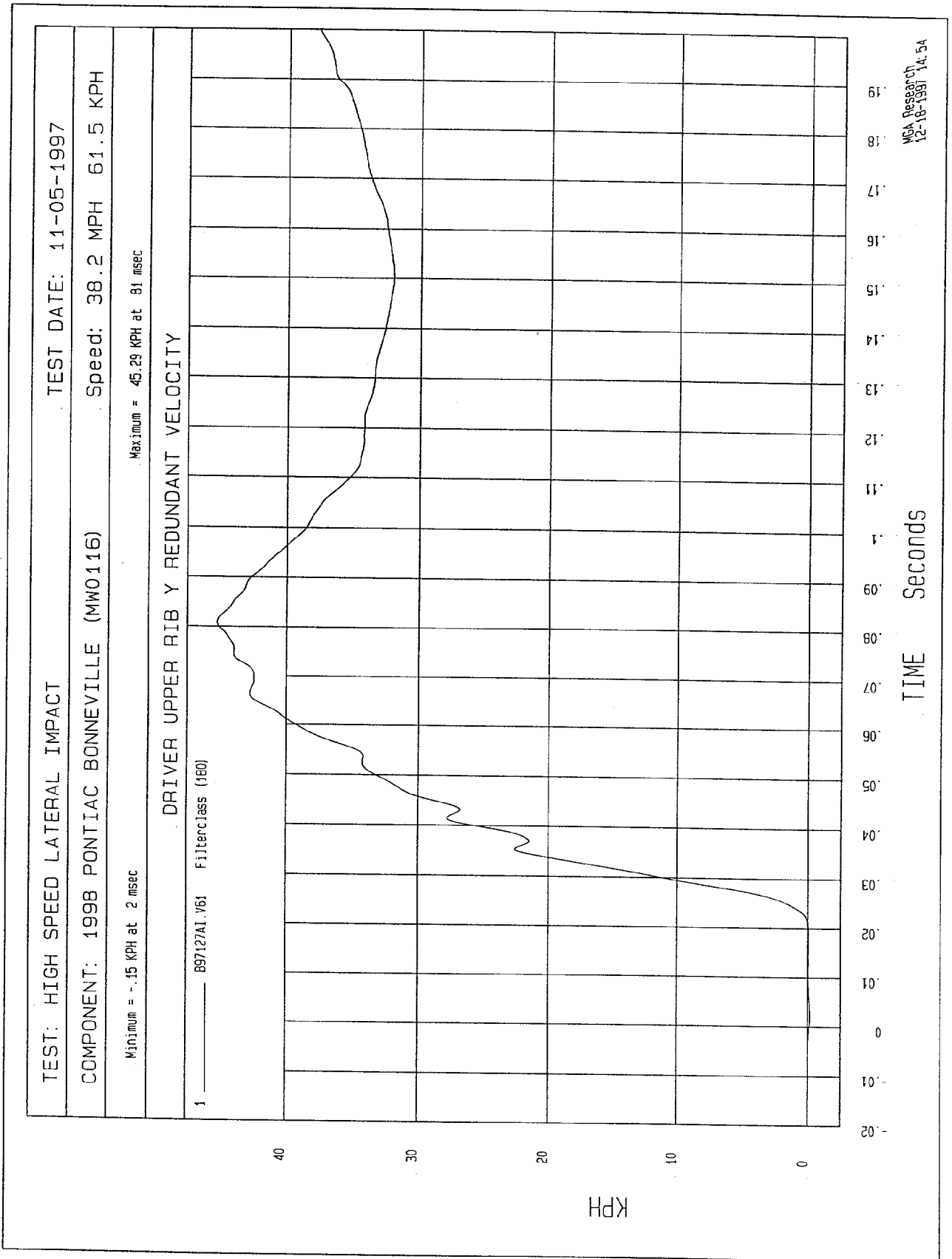
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

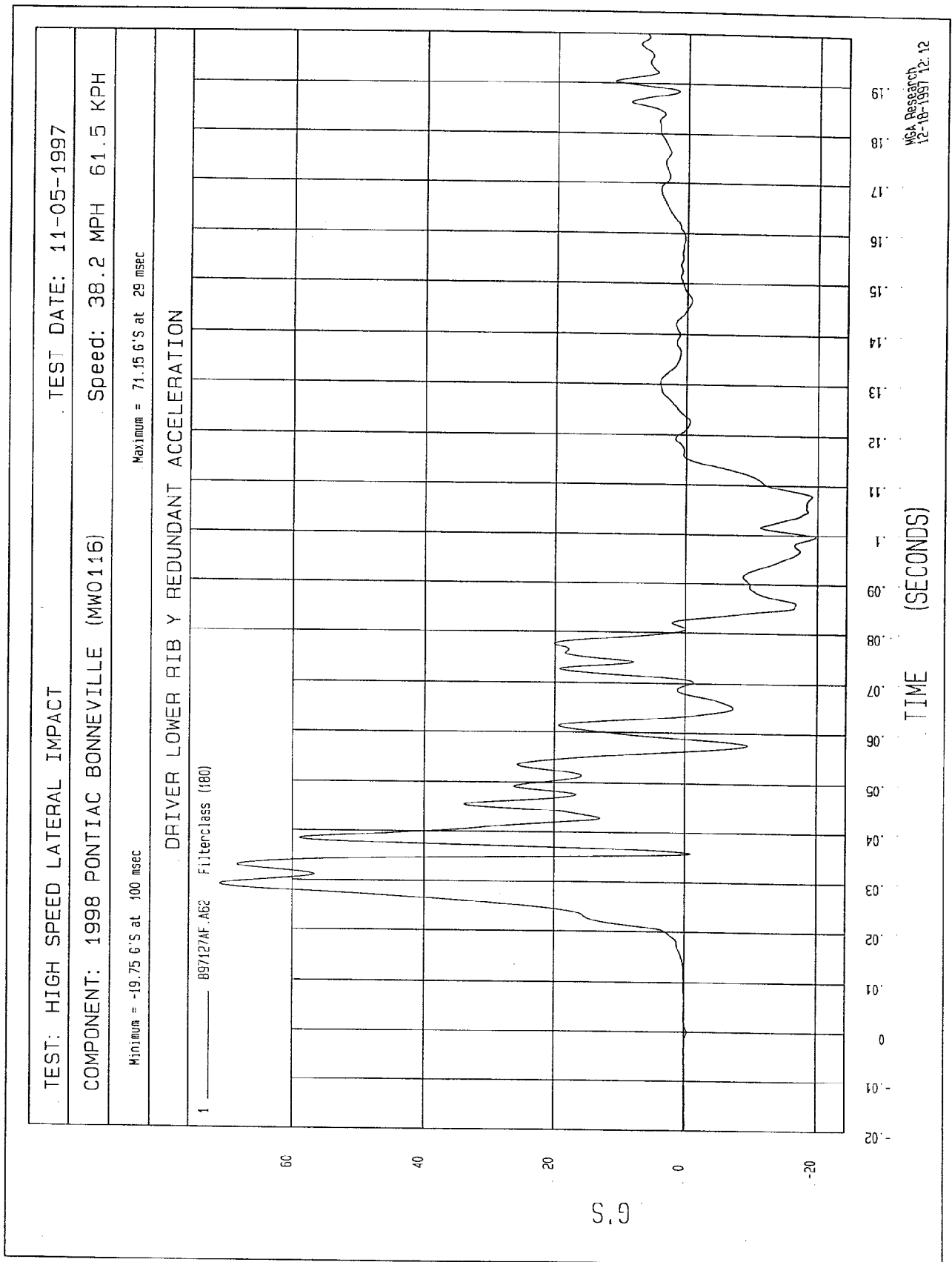
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

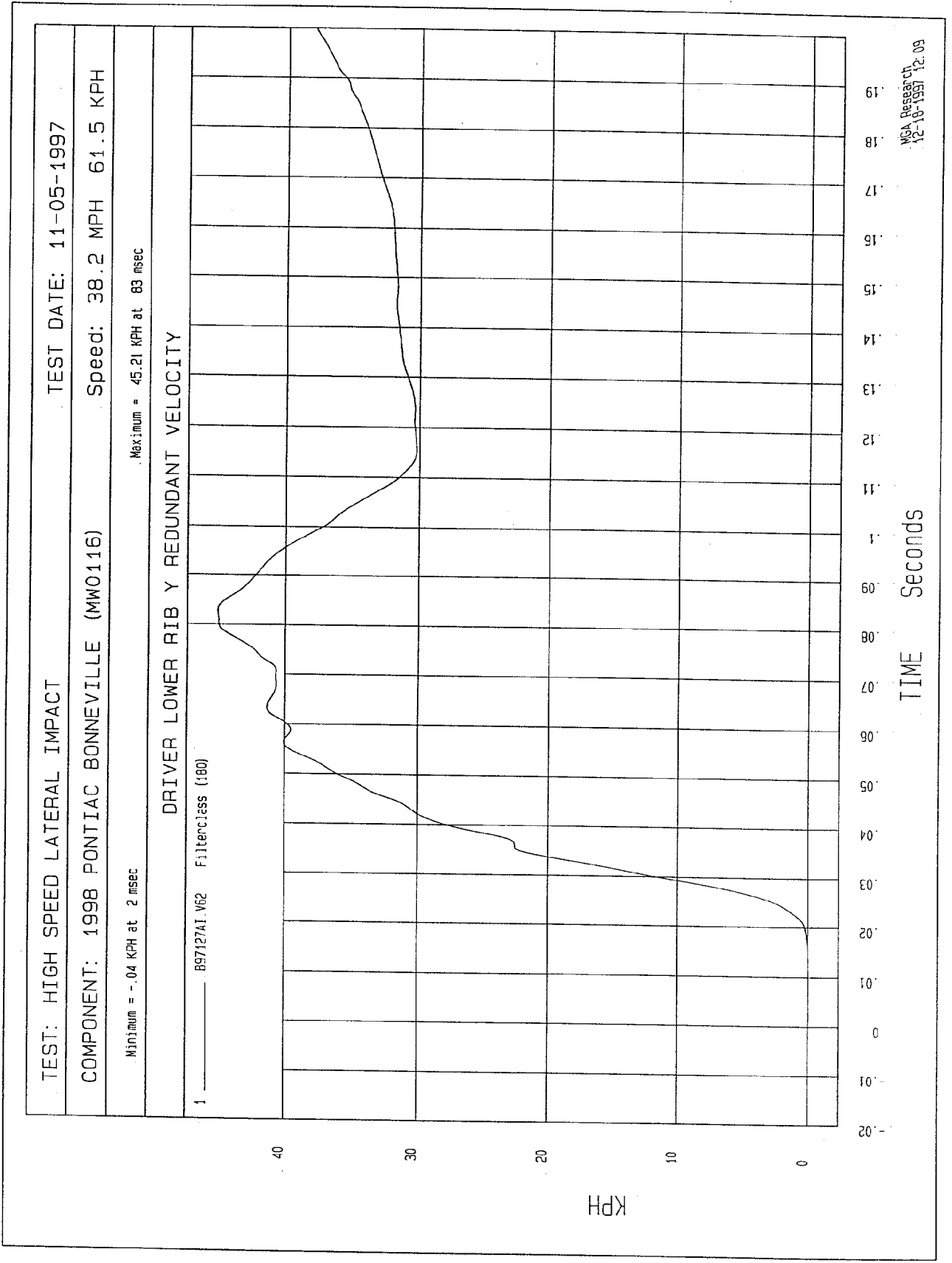
Minimum = -30.85 G'S at 36 msec Maximum = 73.89 G'S at 28 msec

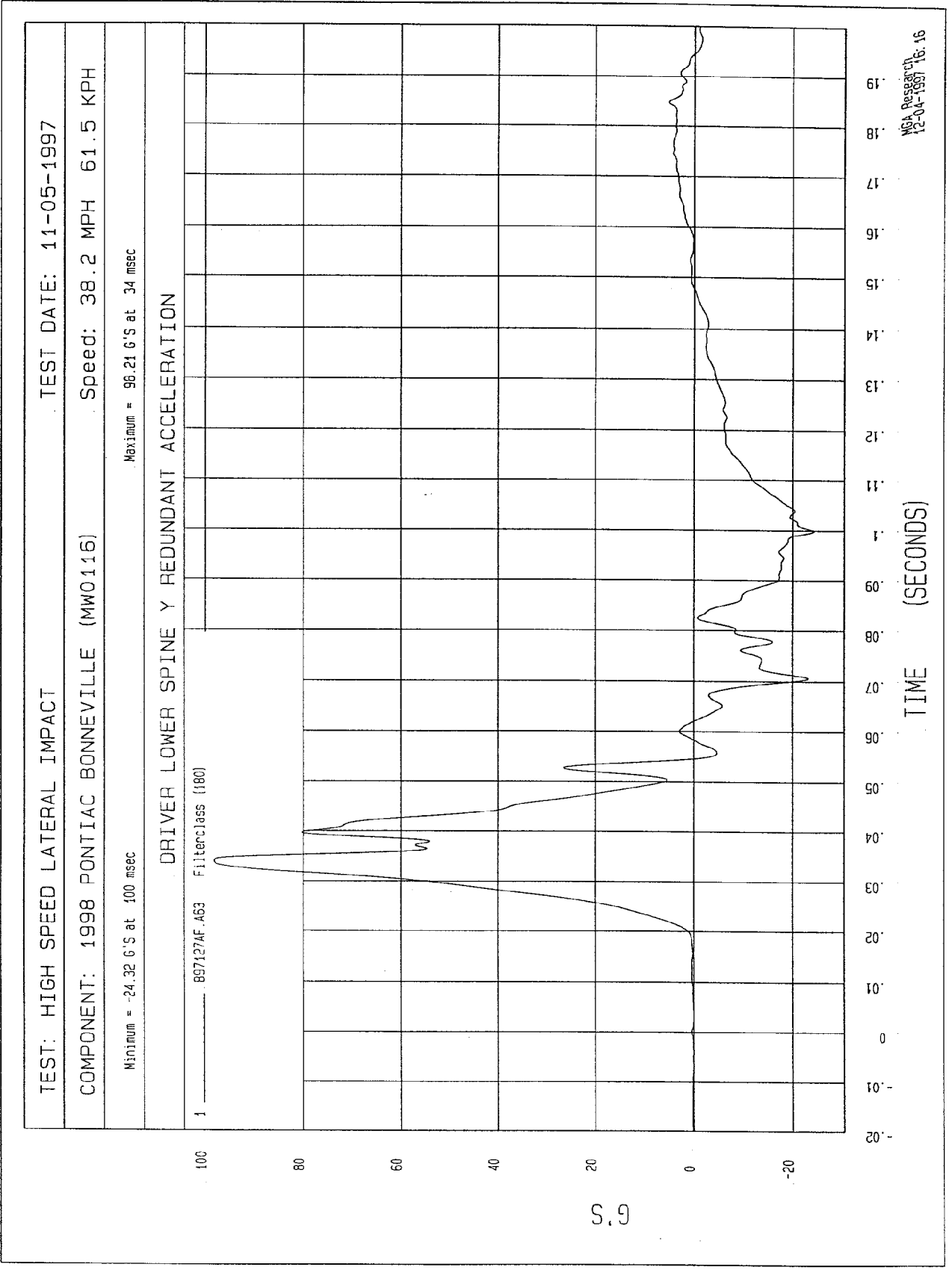
DRIVER UPPER RIB Y REDUNDANT ACCELERATION

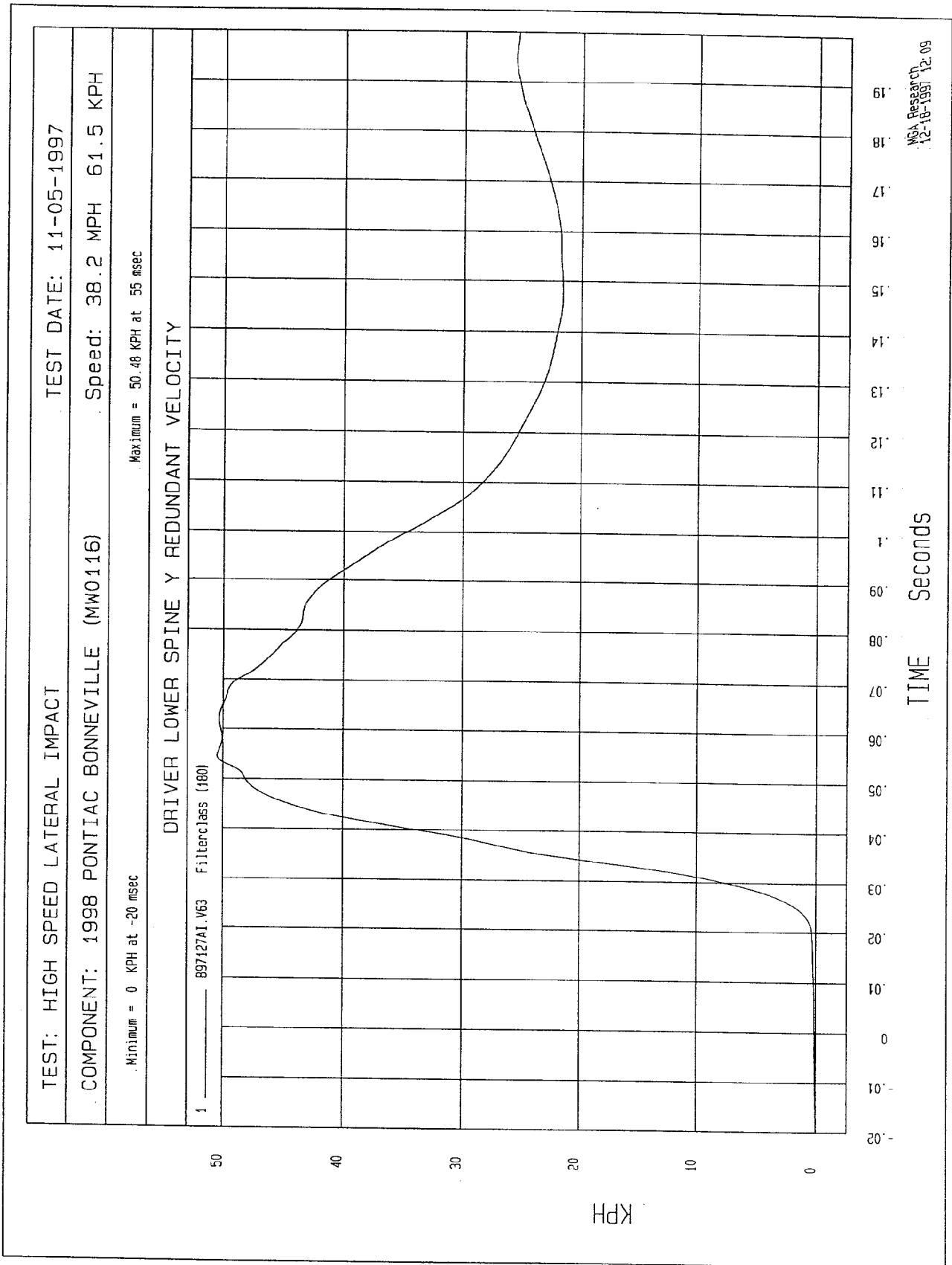


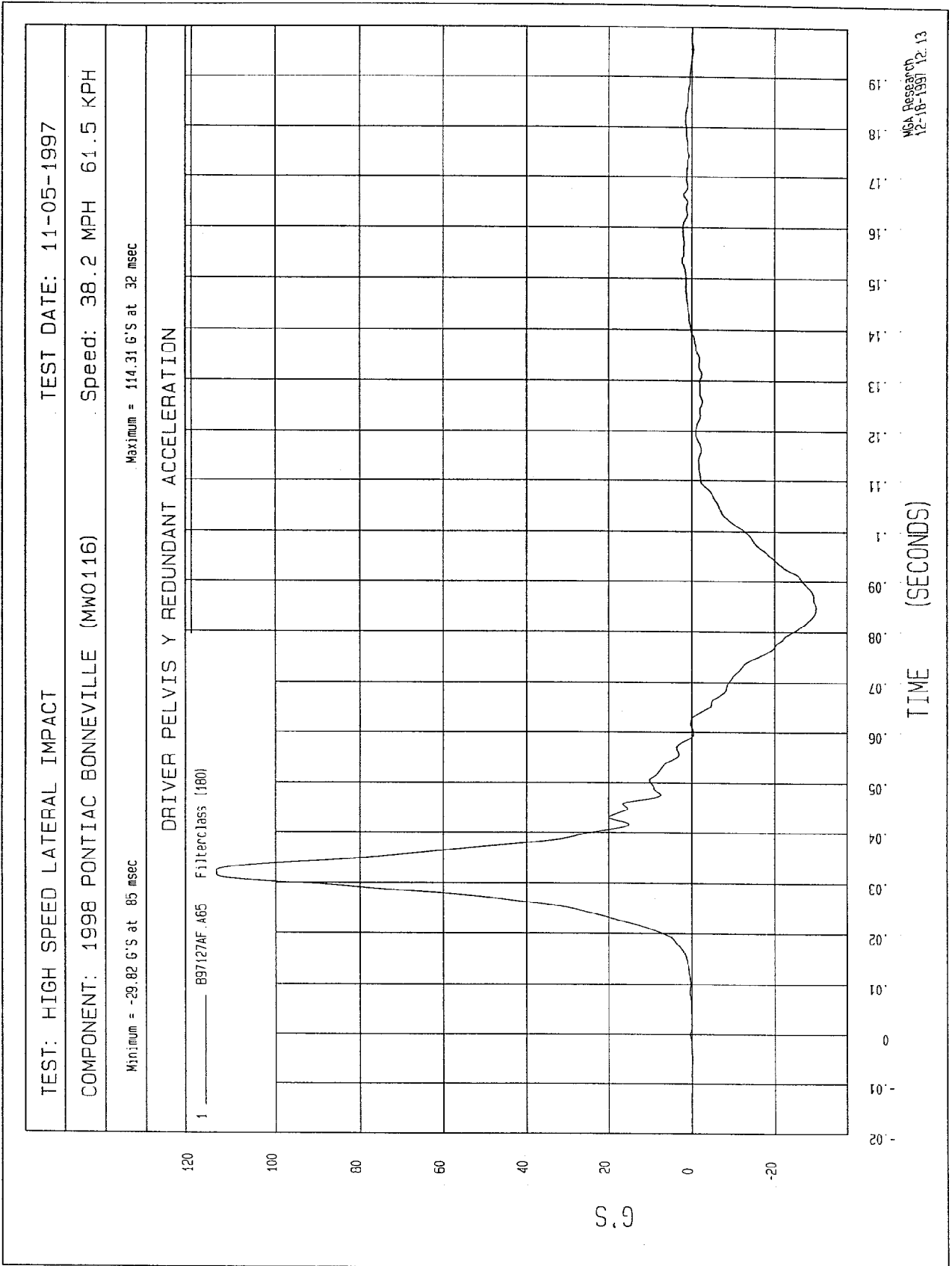










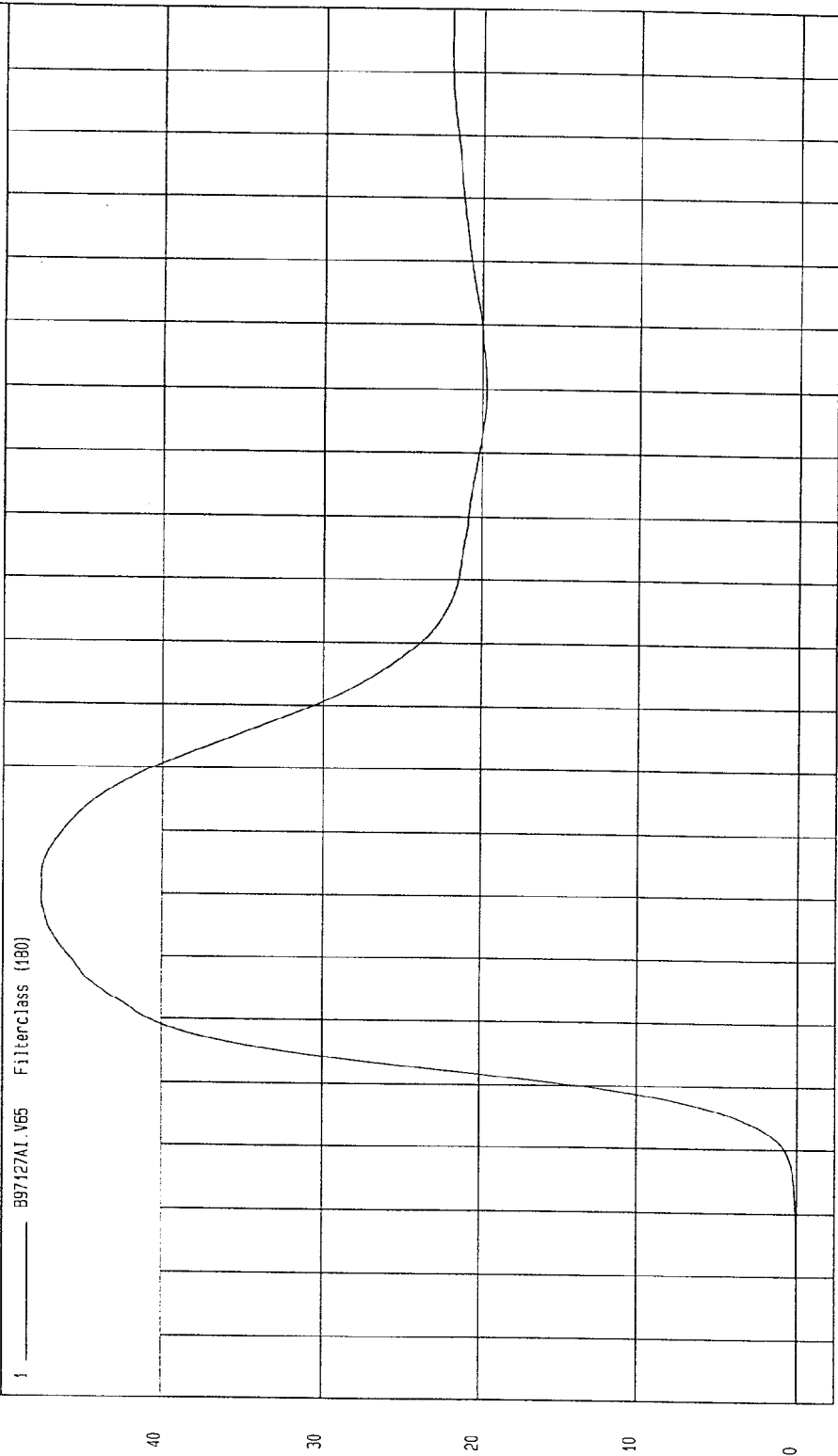


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

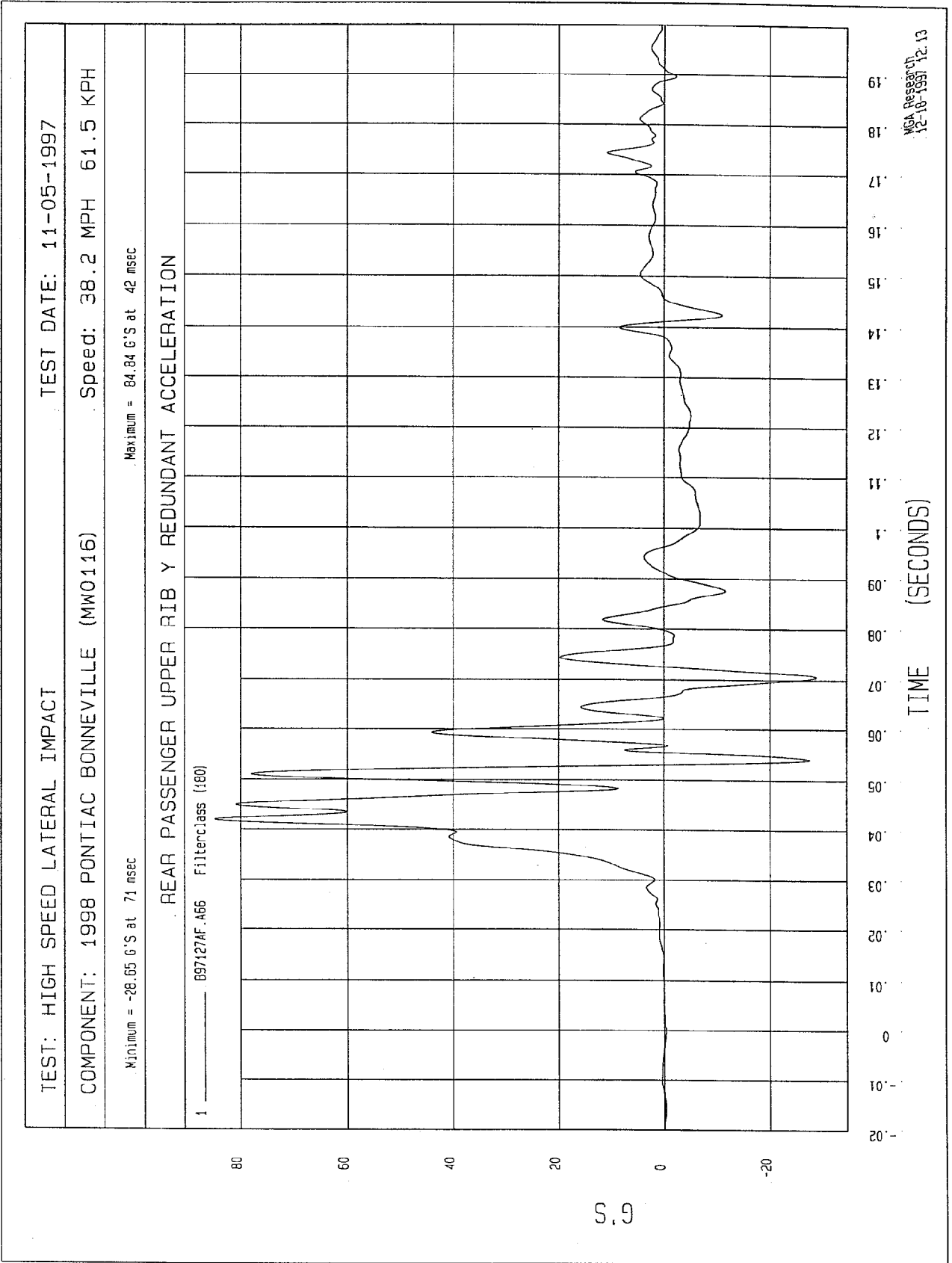
Minimum = 0 KPH at -20 msec Maximum = 47.60 KPH at 59 msec

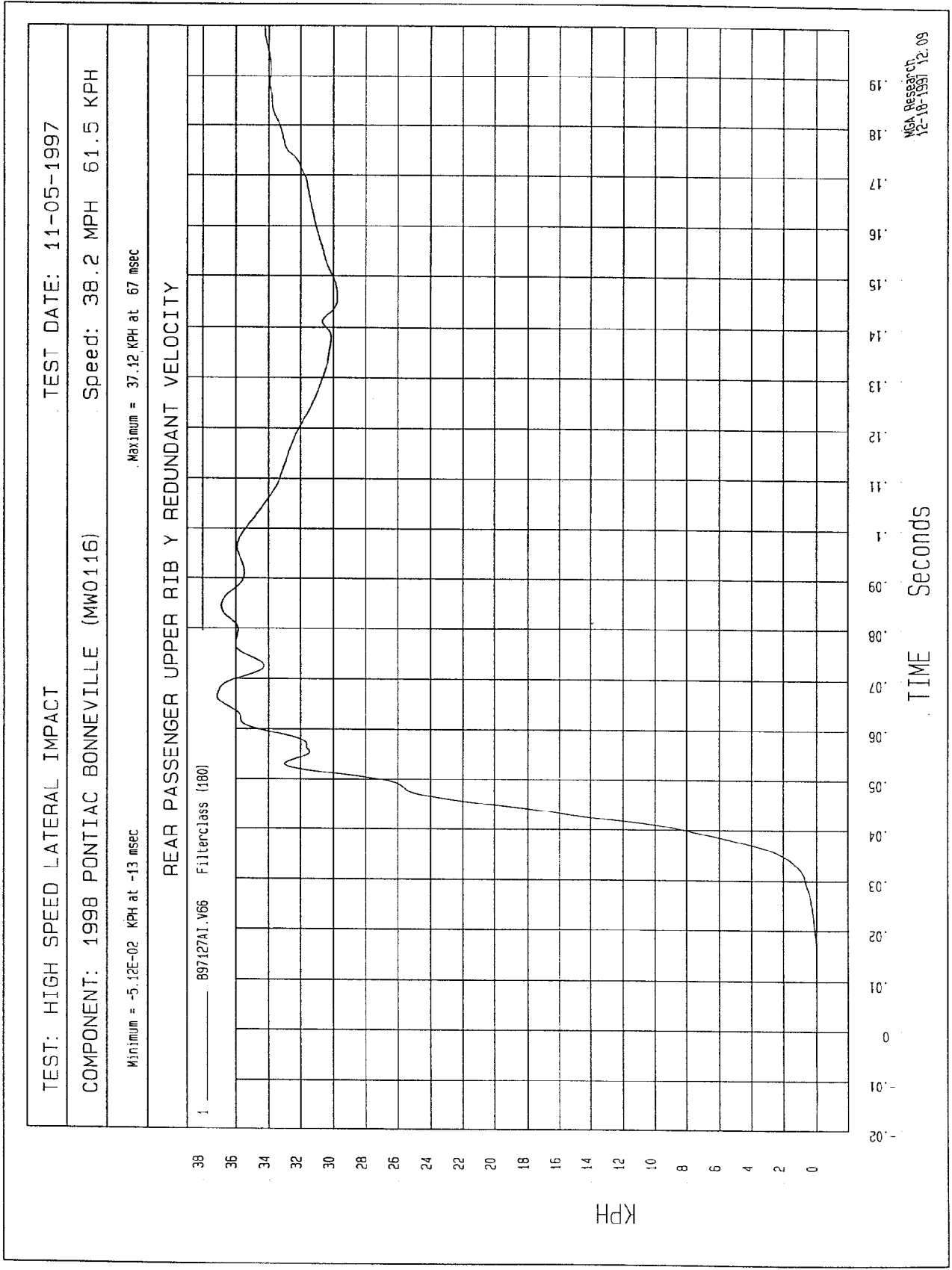
DRIVER PELVIS Y REDUNDANT VELOCITY

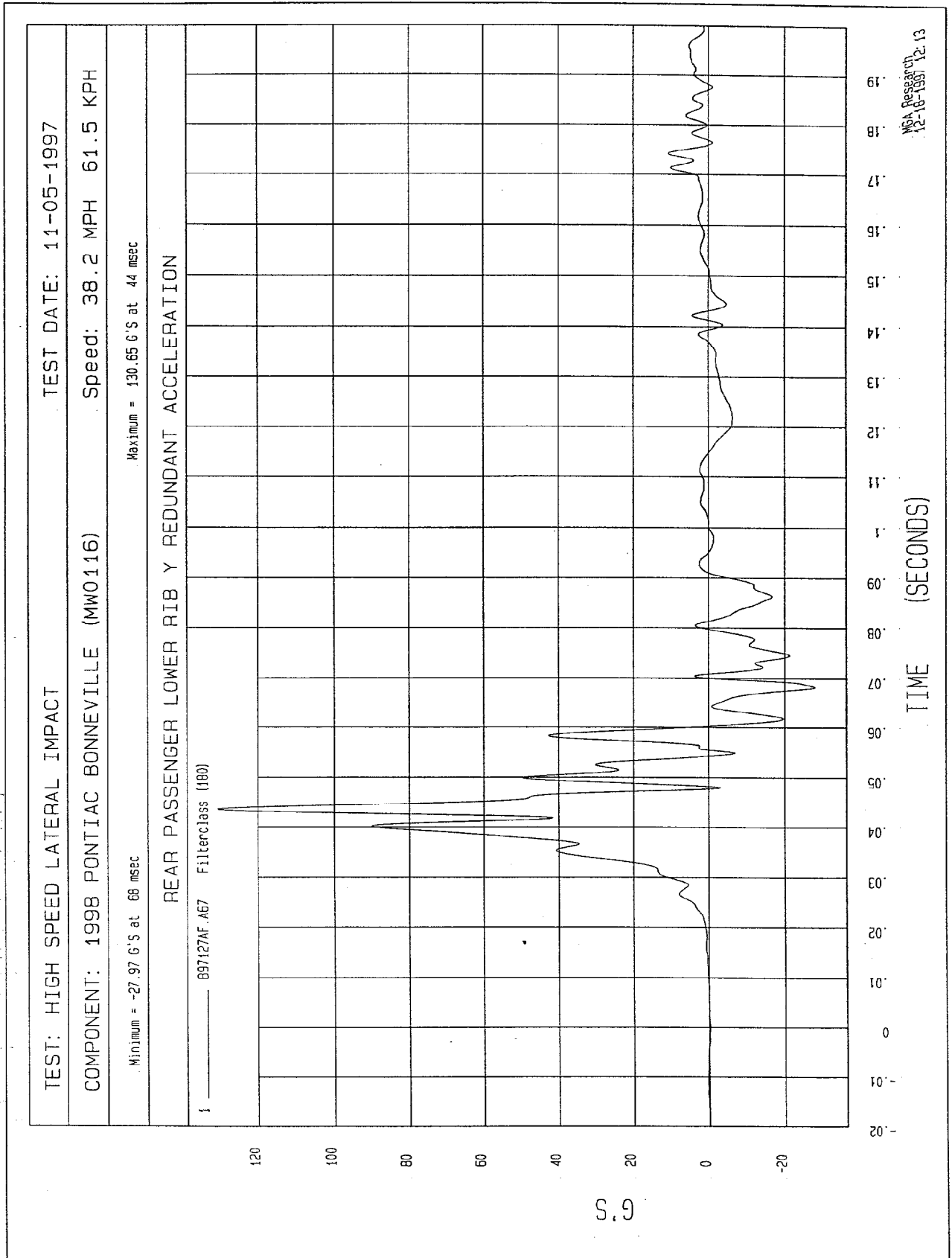


TIME Seconds

WCA Research
12-18-1997 12:09





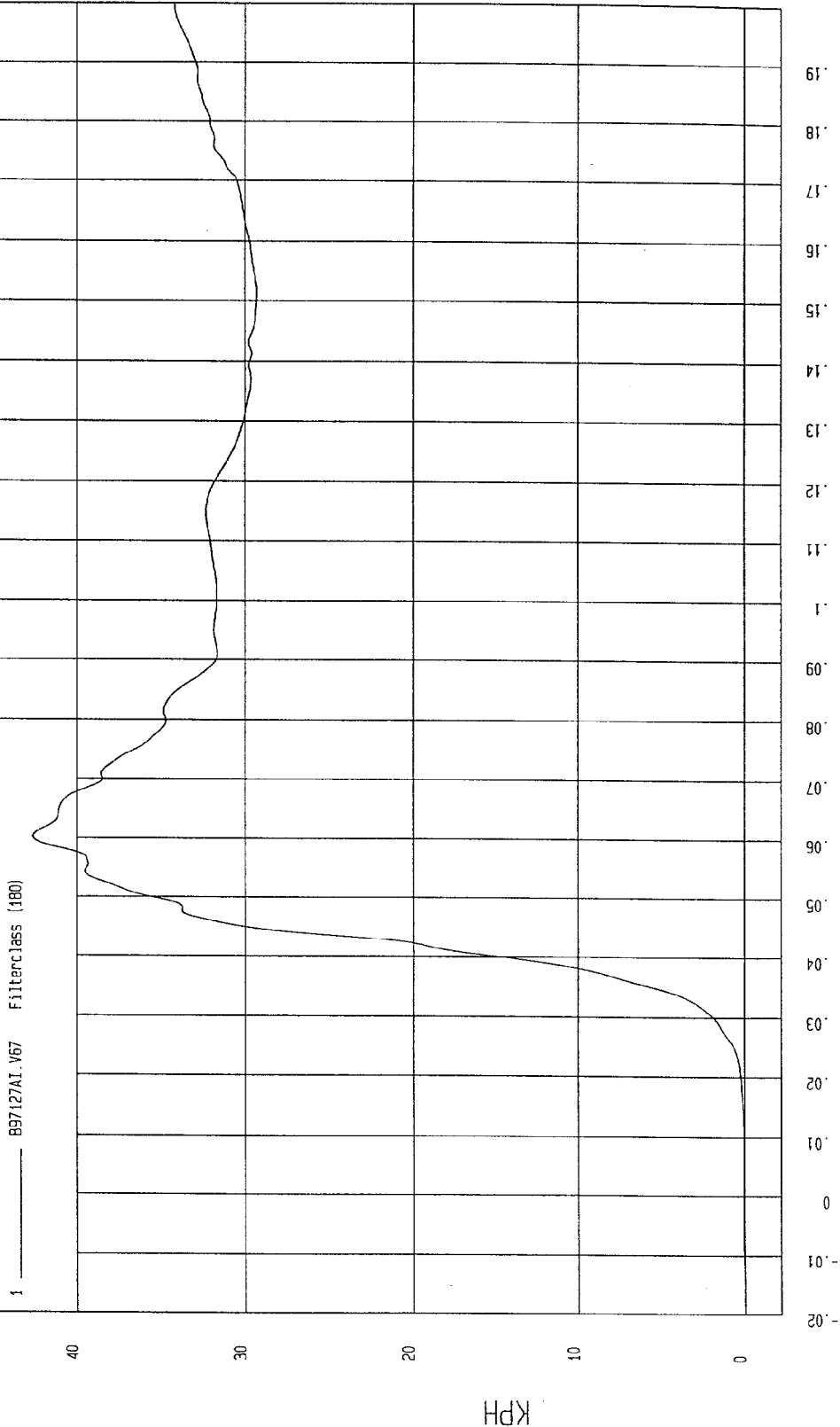


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

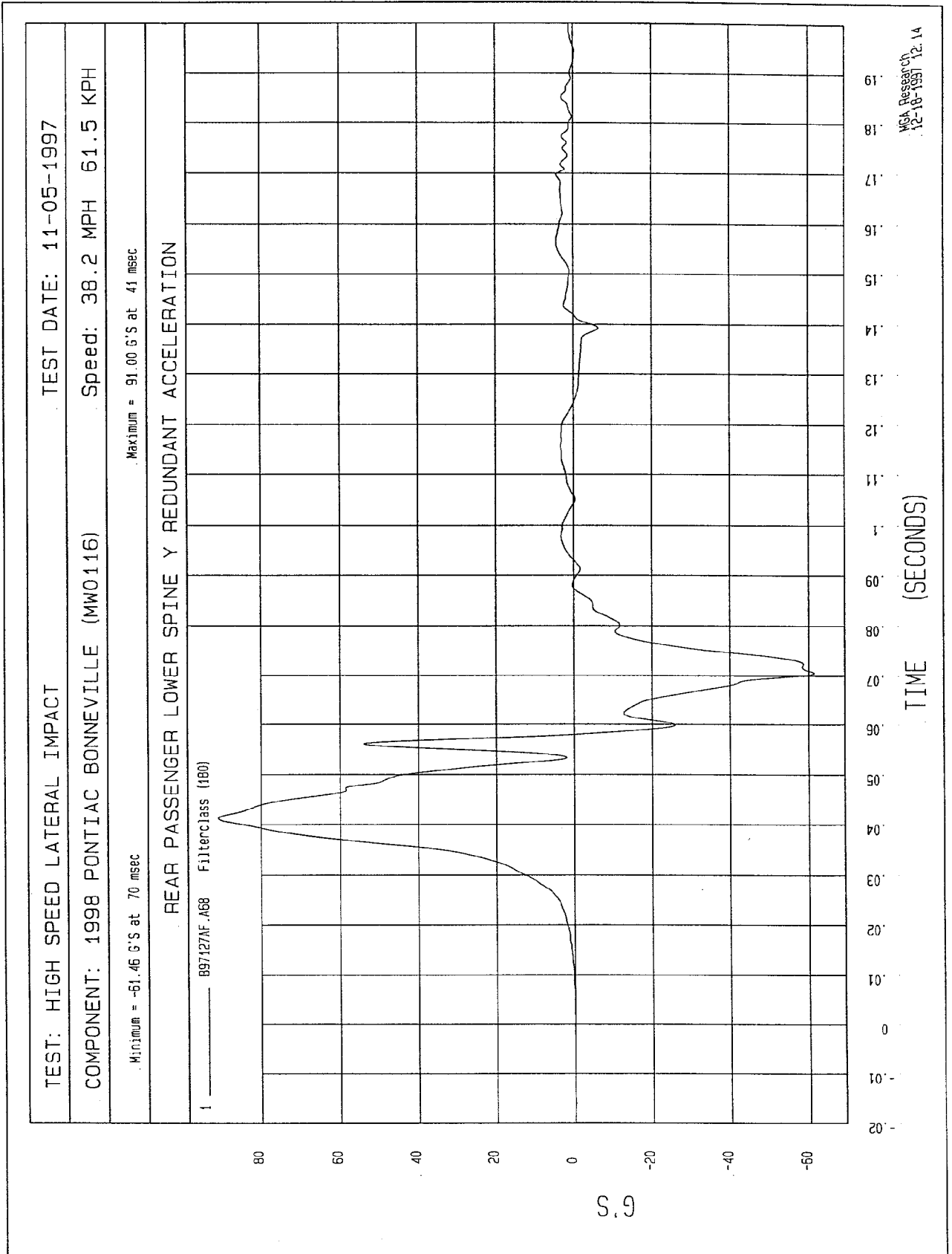
Minimum = -6.57E-03 KPH at -18 msec Maximum = 42.67 KPH at 60 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY



TIME Seconds

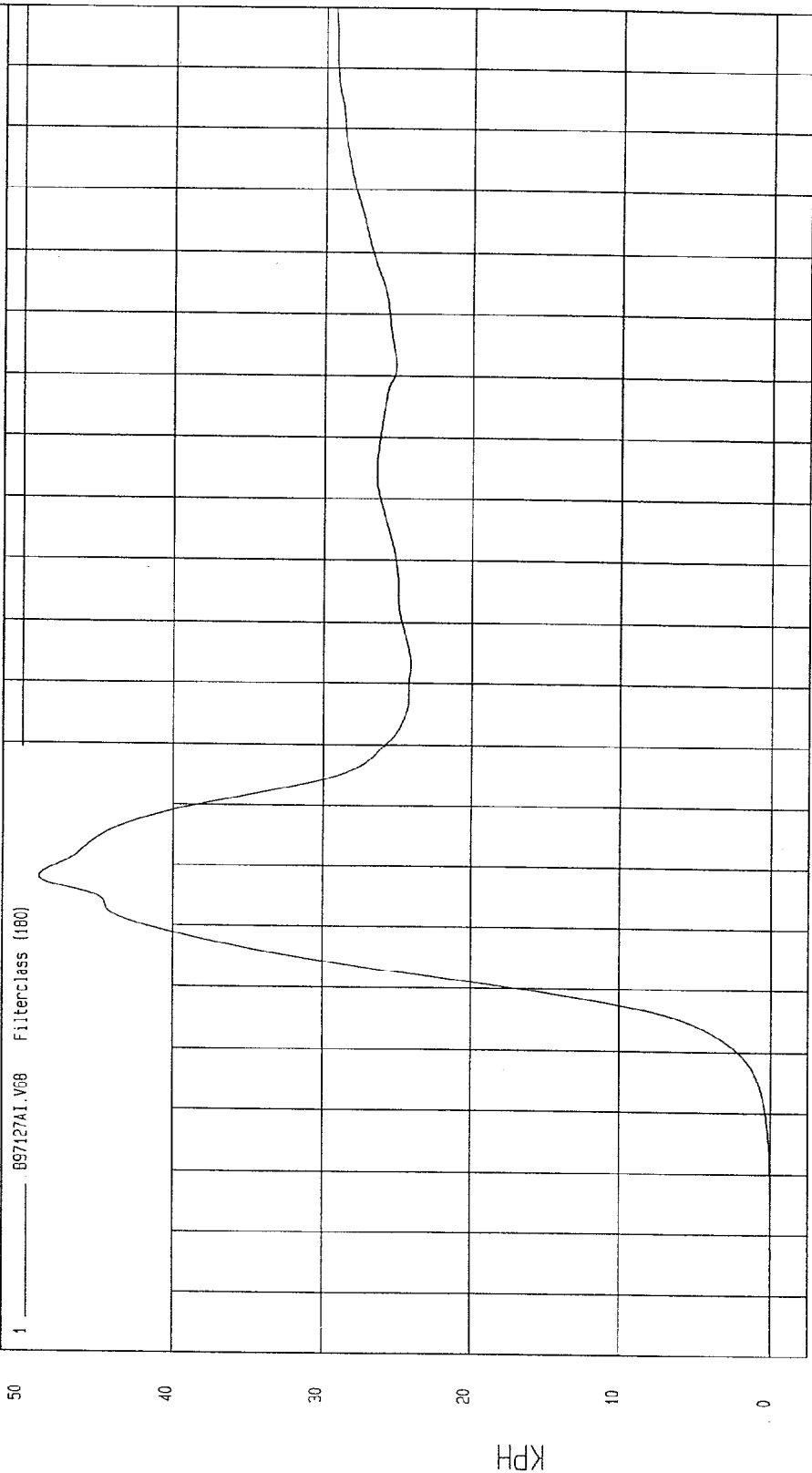
MOA Research
12-18-1997 12:10



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -1.09E-02 KPH at -3 msec Maximum = 48.87 KPH at 58 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY



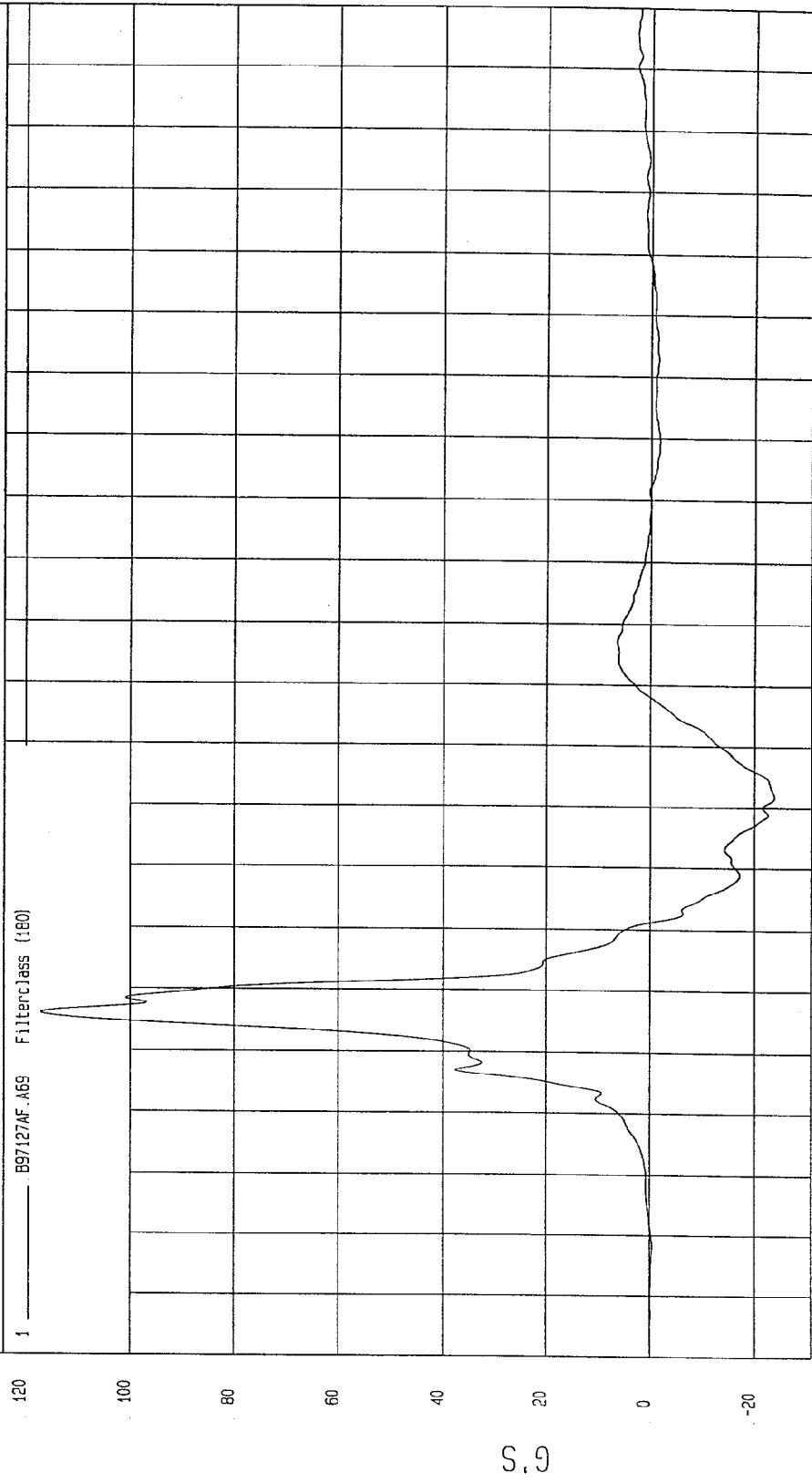
TIME Seconds MGA Research 12-18-1997 12:10

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

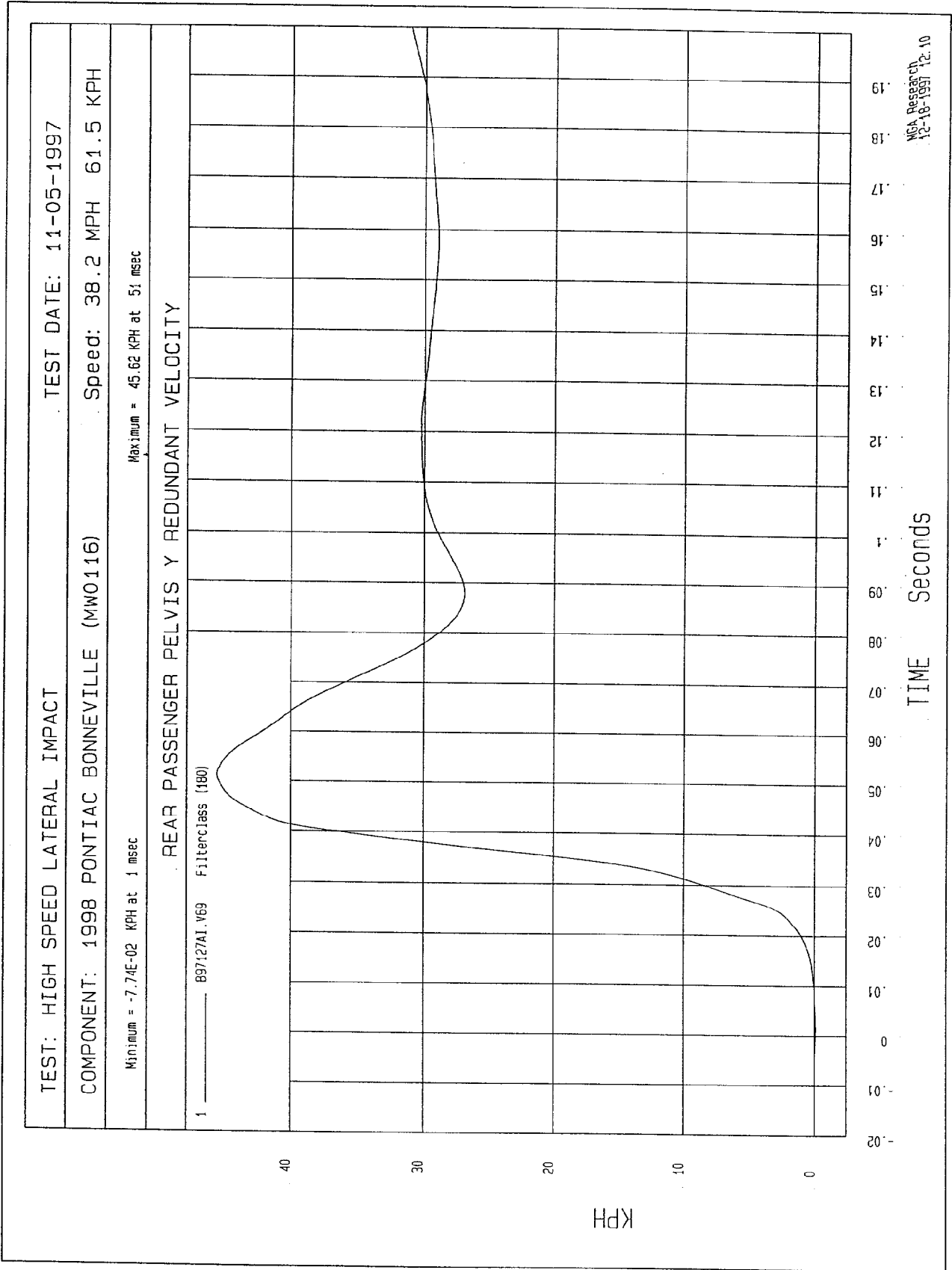
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -23.83 G'S at 72 msec Maximum = 117.13 G'S at 35 msec

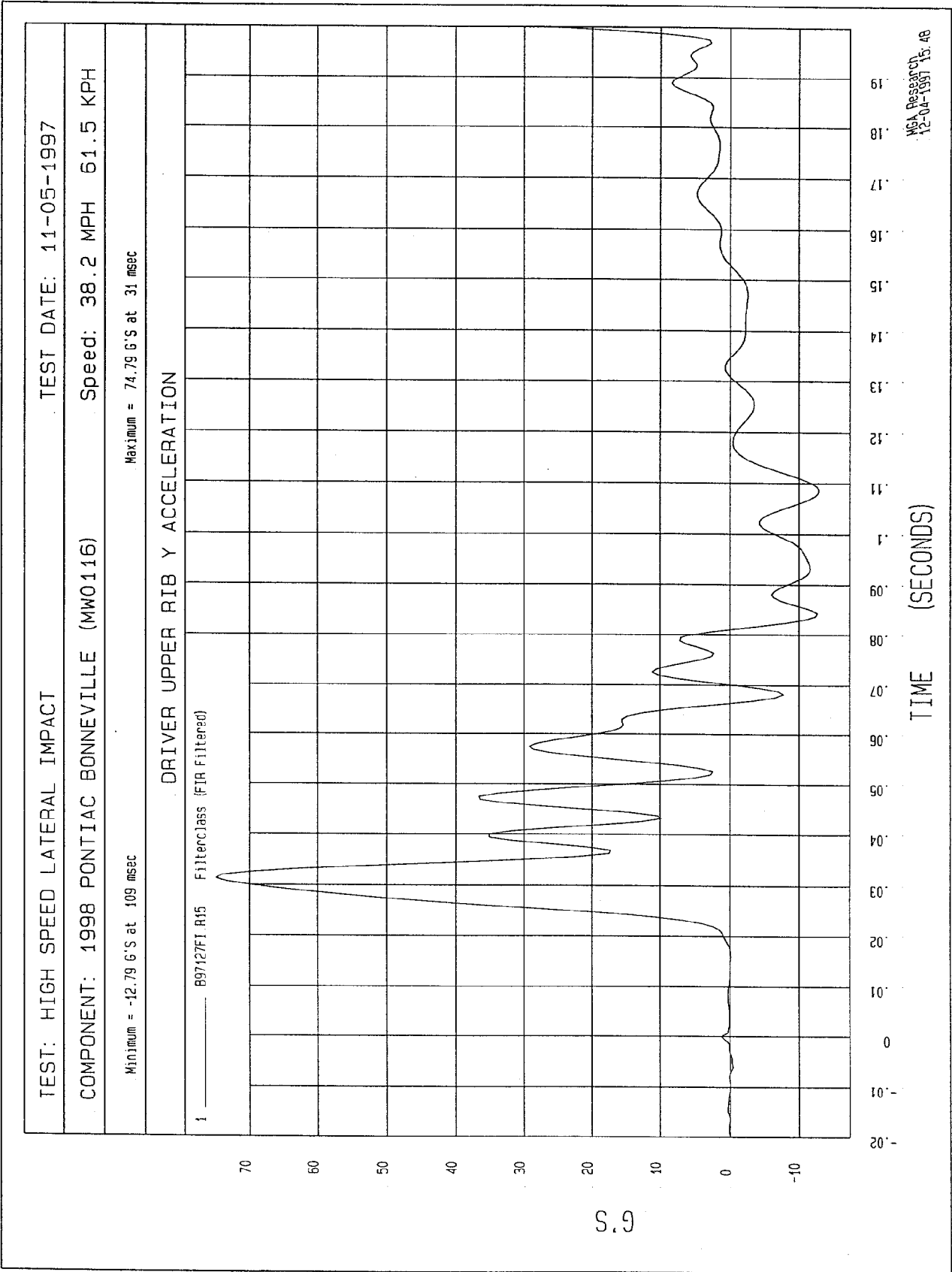
REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION



MCA Research
12-18-1997 12:14

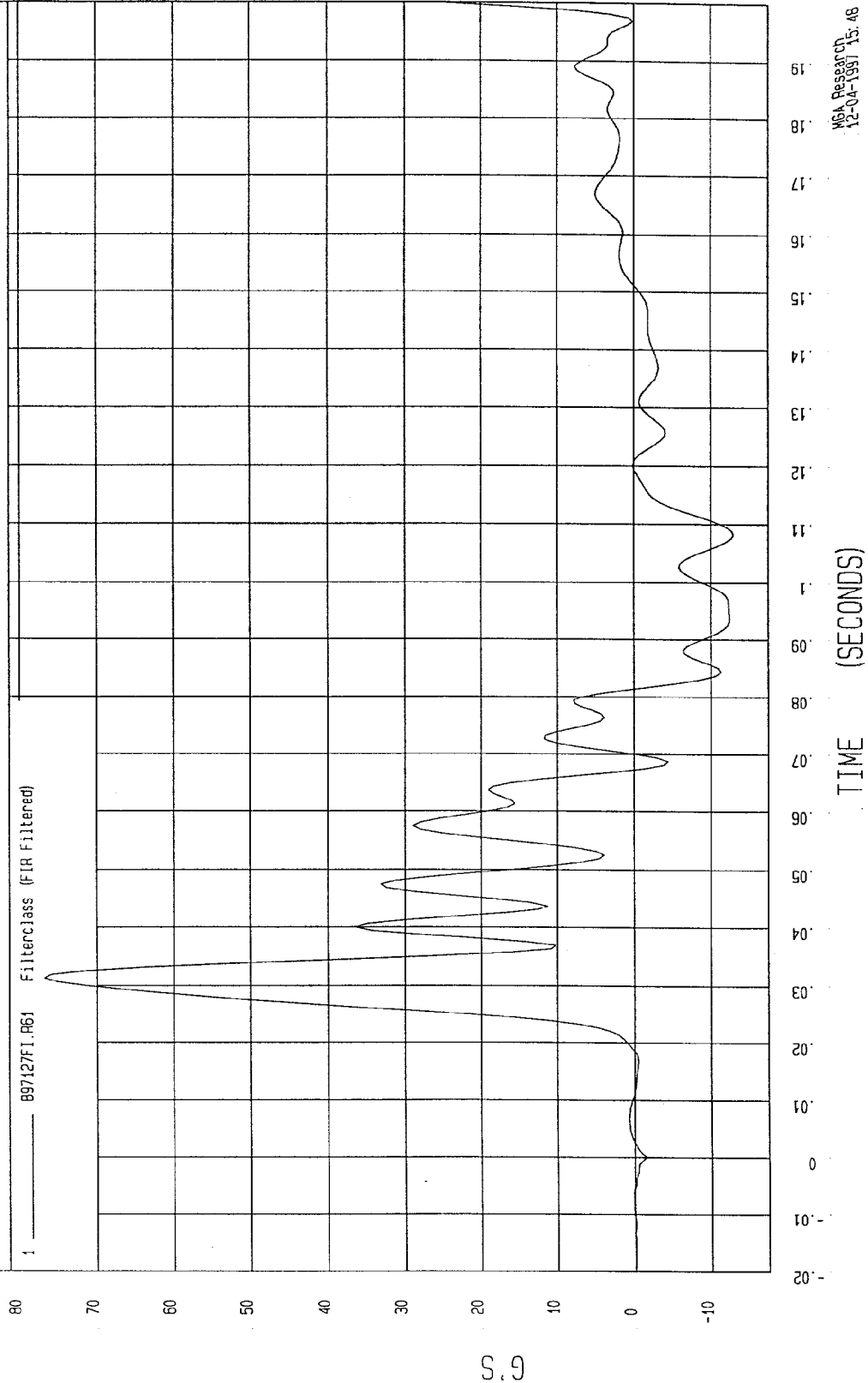


FINITE IMPULSE RESPONSE (FIR) FILTERED DATA



TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)	Speed: 38.2 MPH 61.5 KPH
Minimum = -12.87 G'S at 100 msec	Maximum = 76.85 G'S at 31 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



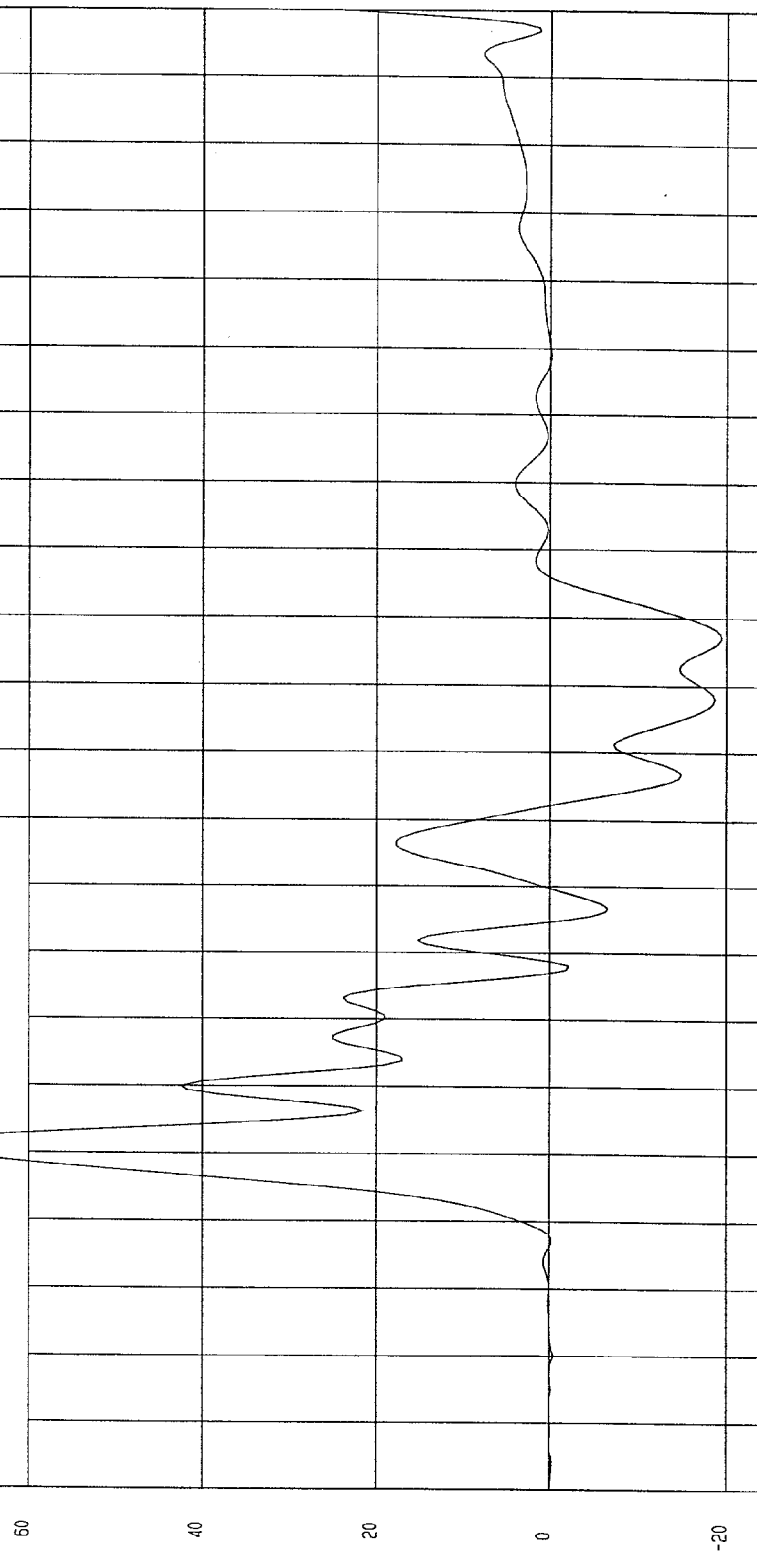
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -19.41 G'S at 107 msec
Maximum = 72.70 G'S at 31 msec

DRIVER LOWER RIB Y ACCELERATION

1 ——— 89712/F1.R16 Filterclass (FIR Filtered)



NGA Research
12-04-1997 15:51

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

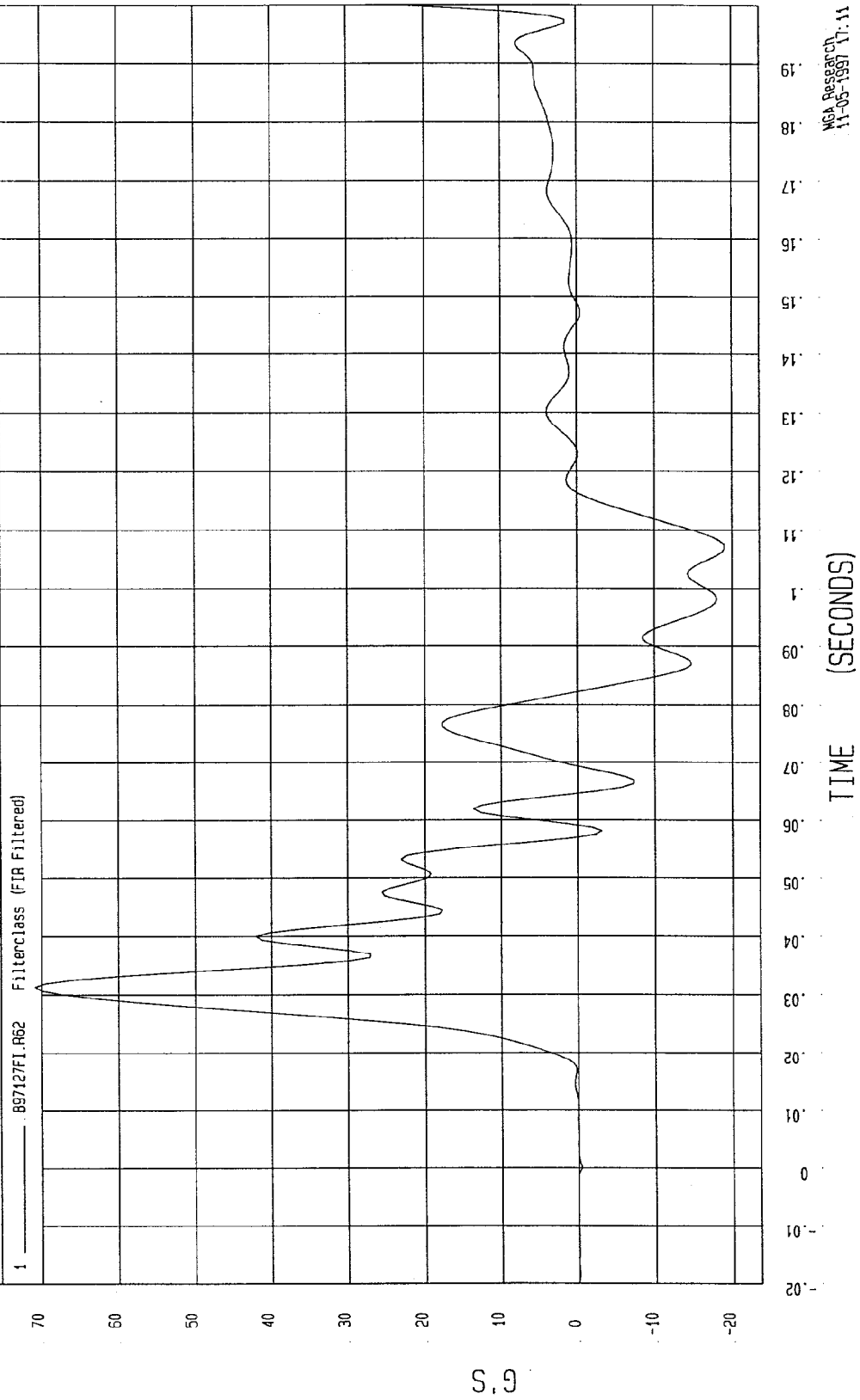
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

Maximum = 70.65 G'S at 31 msec

Minimum = -19.09 G'S at 107 msec

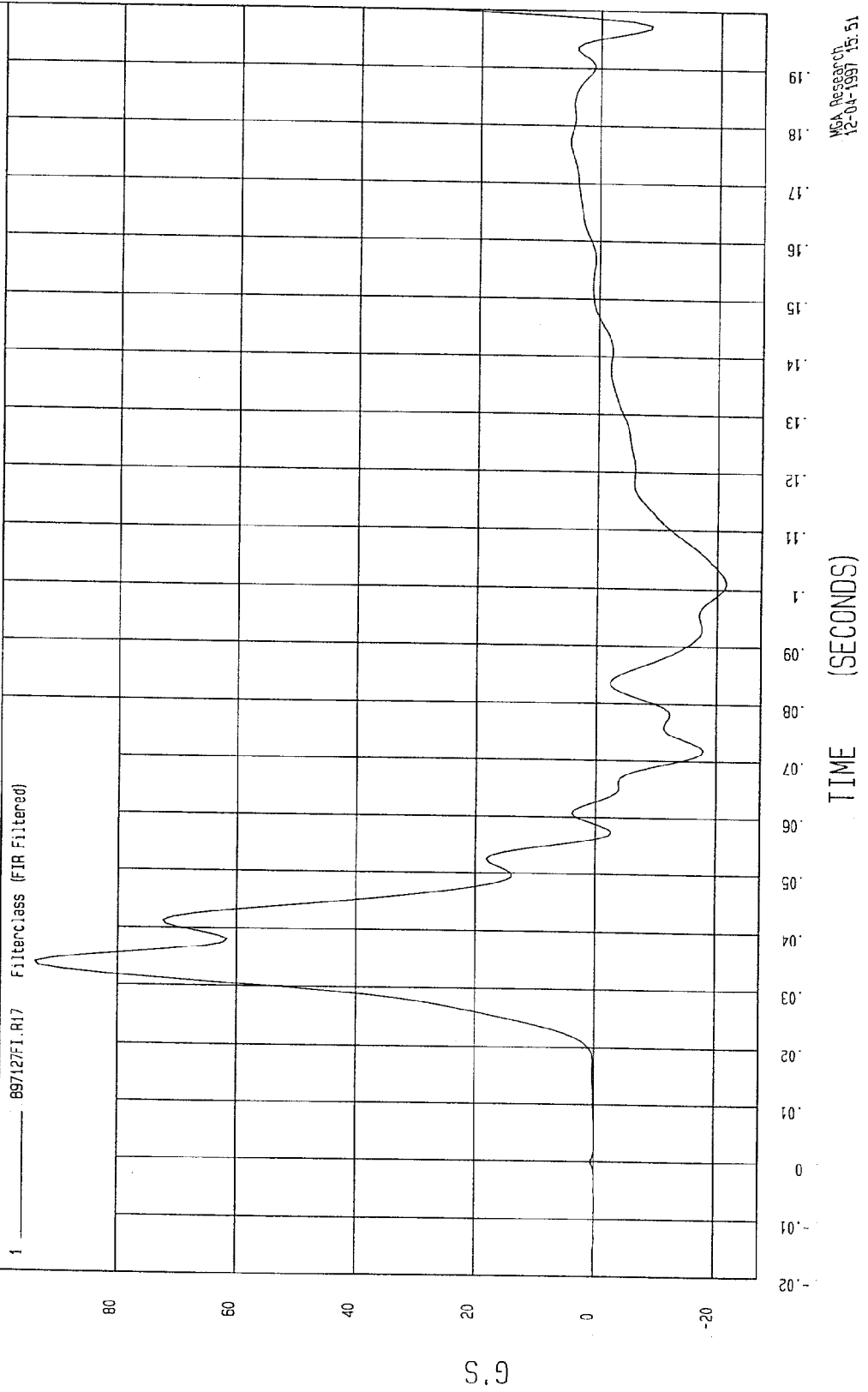
DRIVER LOWER RIB Y REDUNDANT ACCELERATION



NCA Research
11-05-1997 17:11

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH
Minimum = -21.46 G'S at 101 msec Maximum = 93.98 G'S at 34 msec

DRIVER LOWER SPINE Y ACCELERATION



TEST DATE: 11-05-1997

TEST: HIGH SPEED LATERAL IMPACT

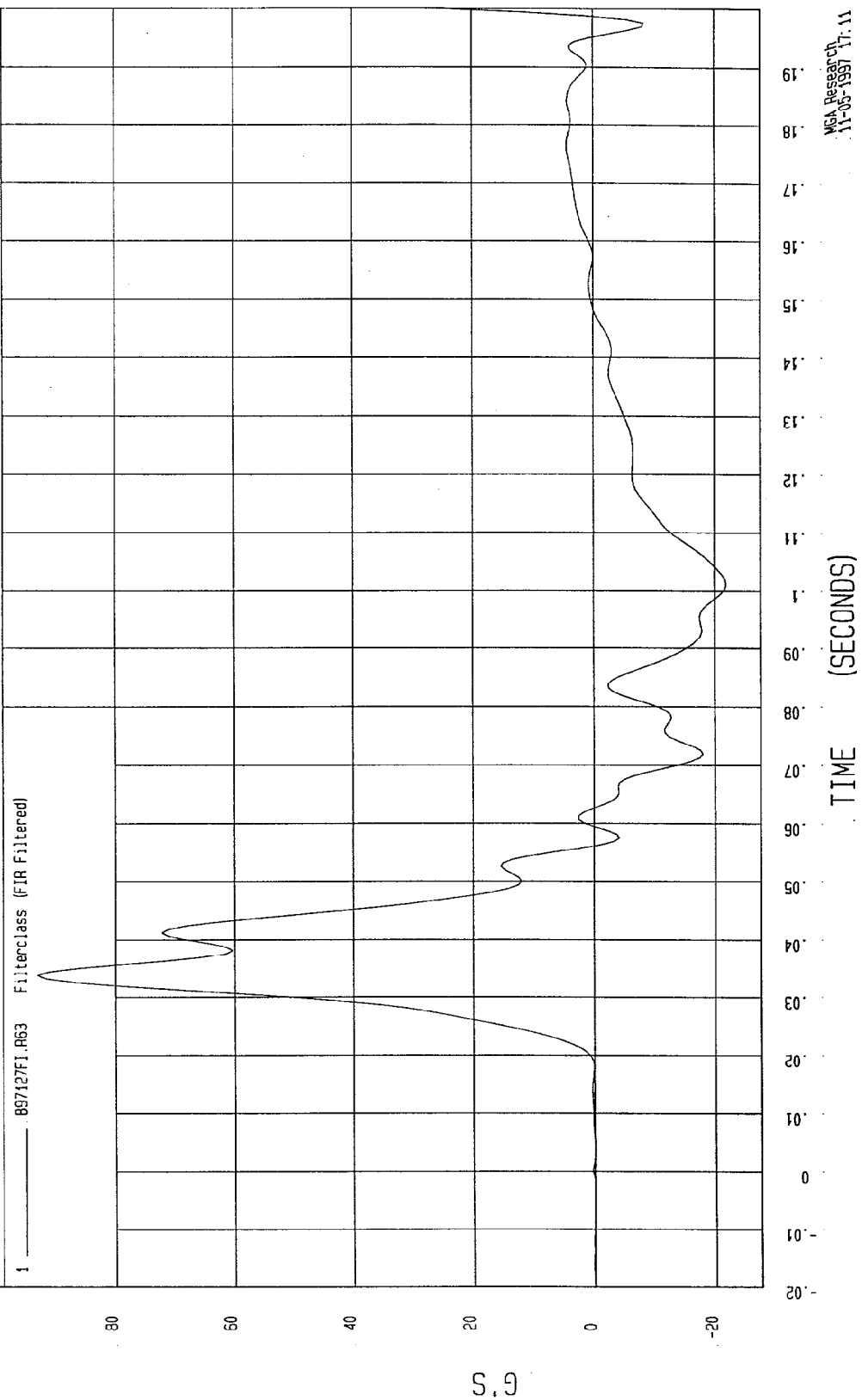
Speed: 38.2 MPH 61.5 KPH

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0115)

Maximum = 93.03 G'S at 34 msec

Minimum = -21.86 C'S at 101 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION



MGA Research
11-05-1997 17:11

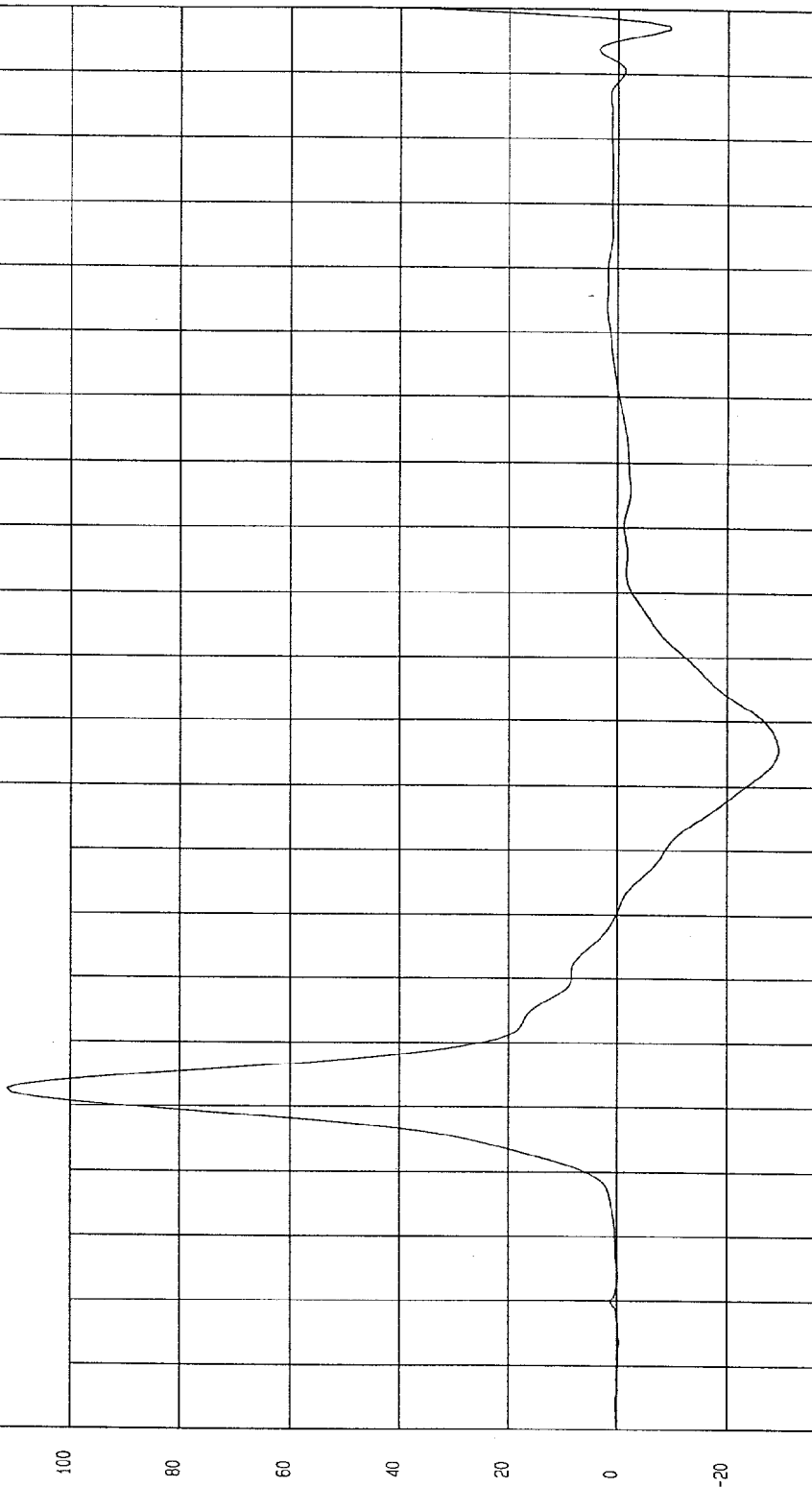
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -29.27 G'S at 86 msec
Maximum = 111.39 G'S at 32 msec

DRIVER PELVIS Y ACCELERATION

1 ——— B97127F1.R18 FilterClass (FIR Filtered)



MGA Research Corp.
12-04-1997 15:51

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 11-05-1997

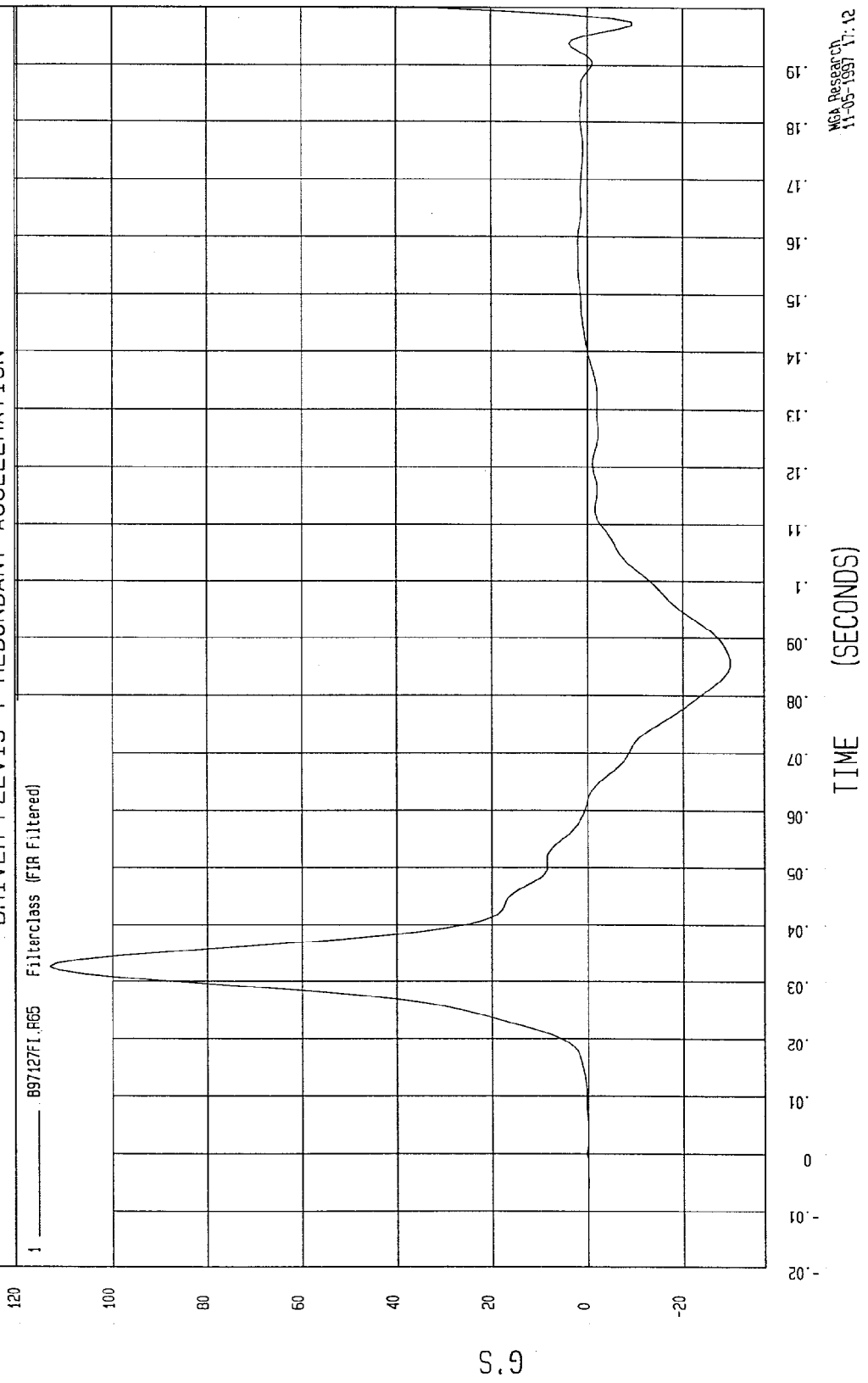
Speed: 38.2 MPH 61.5 KPH

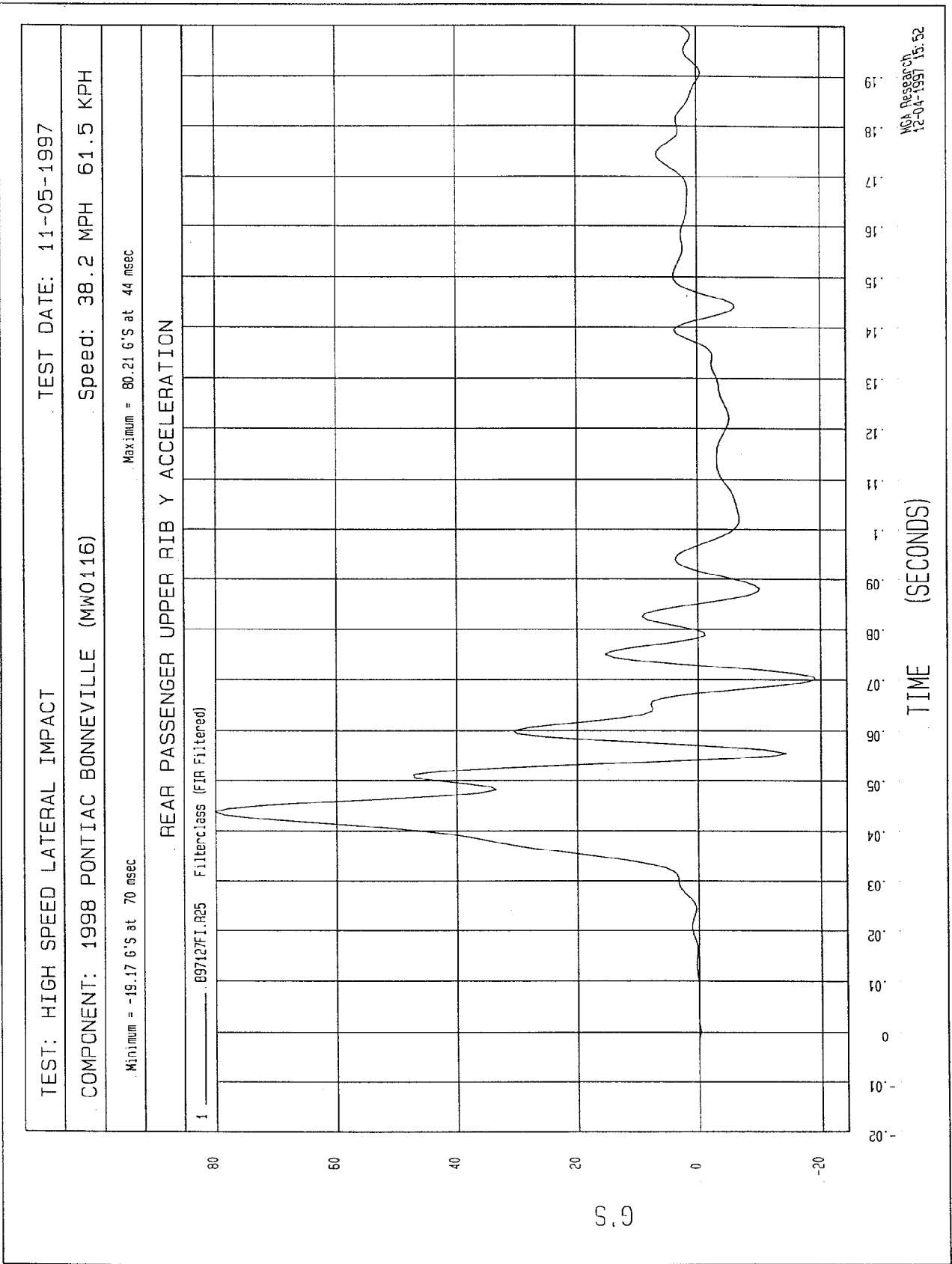
COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116)

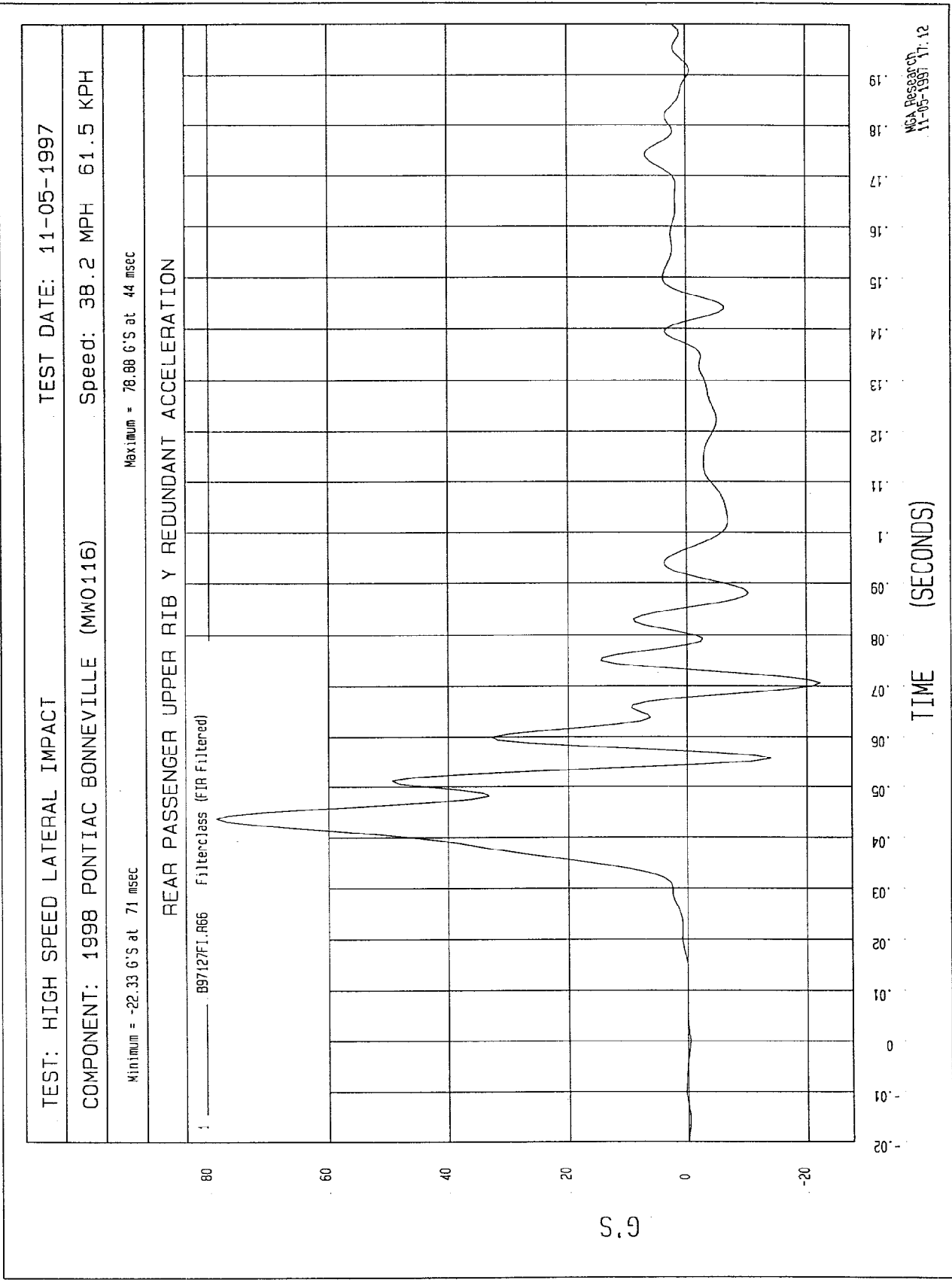
Maximum = 113.39 G'S at 32 msec

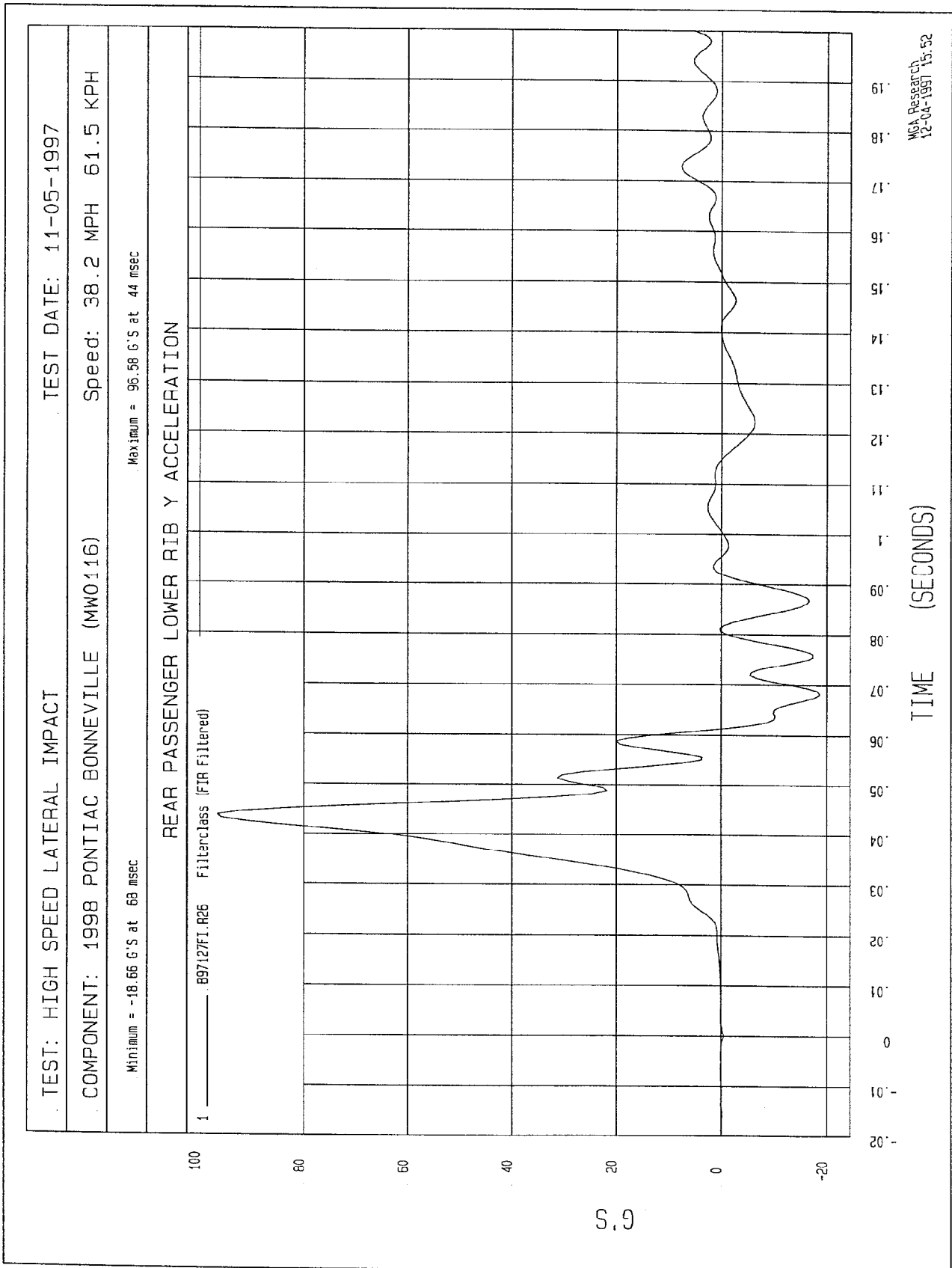
Minimum = -29.77 G'S at 86 msec

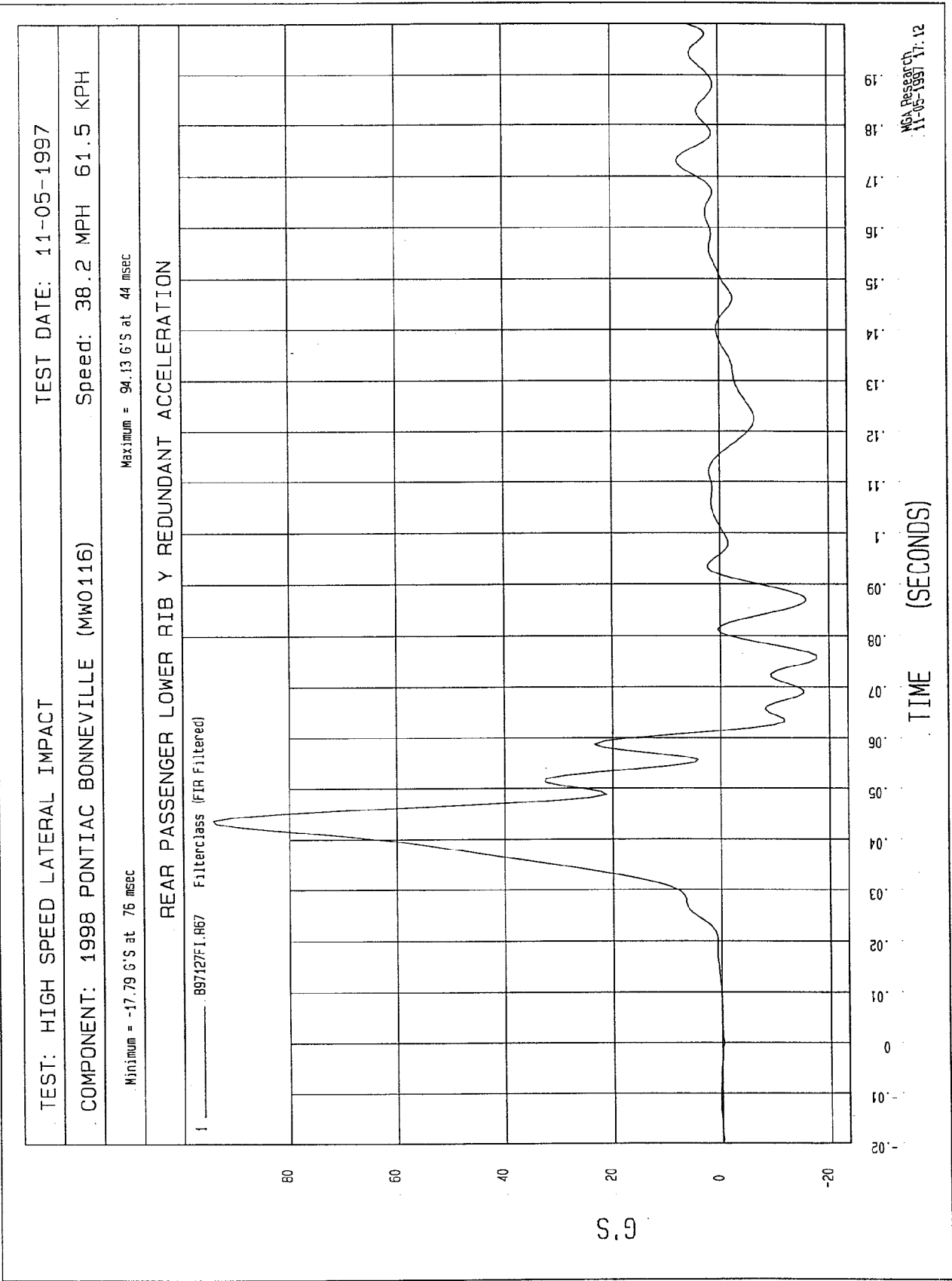
DRIVER PELVIS Y REDUNDANT ACCELERATION

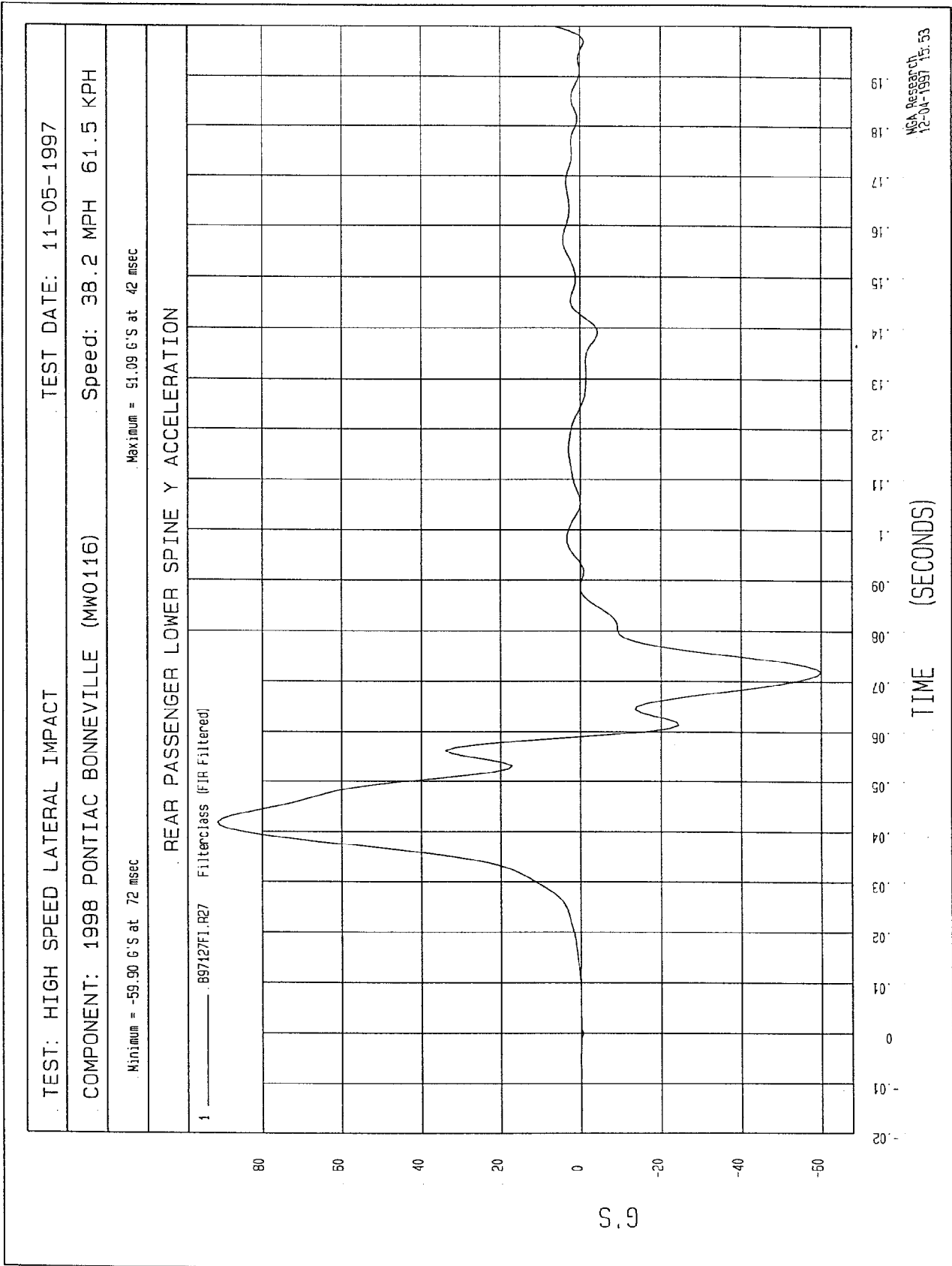


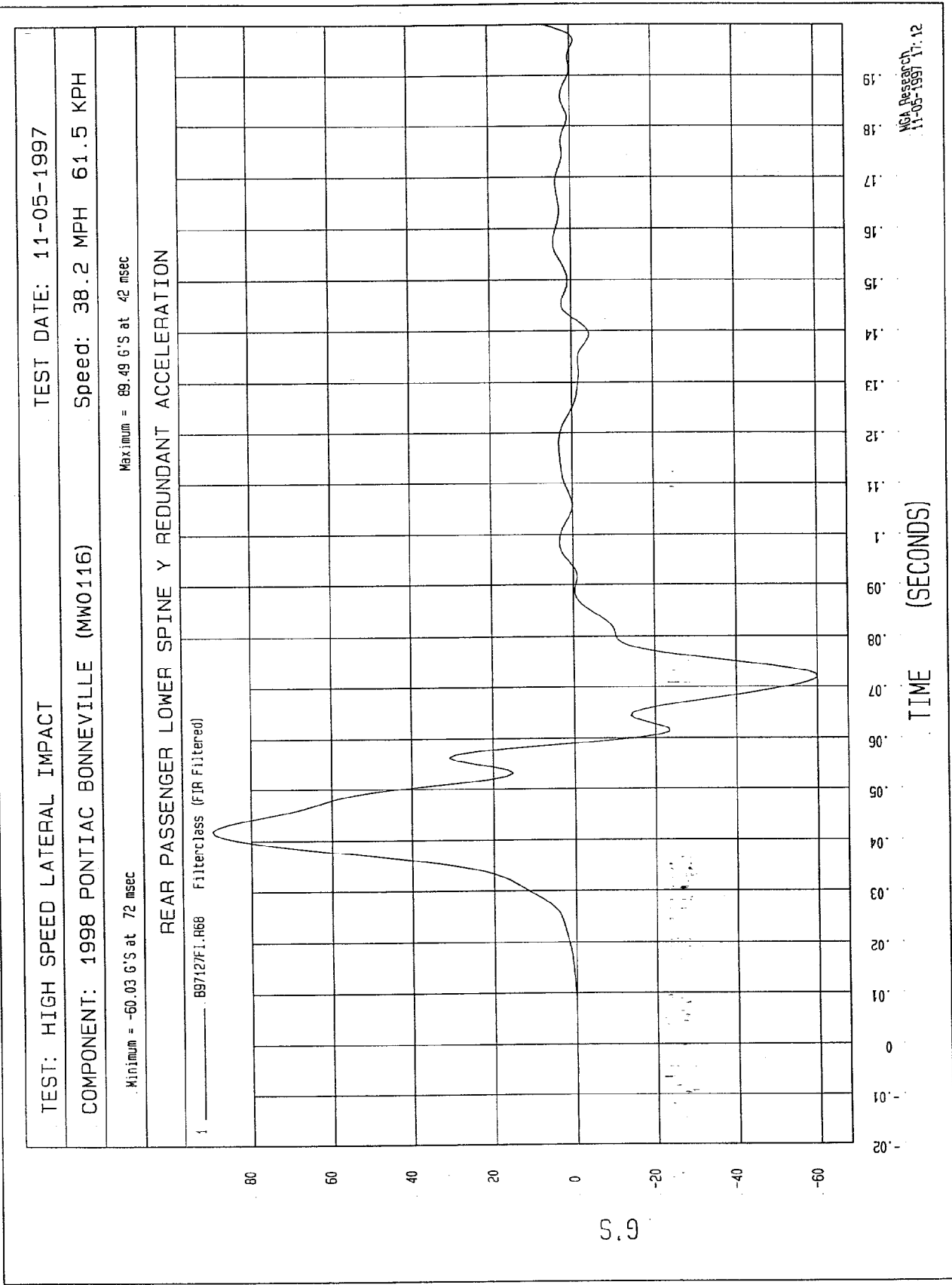










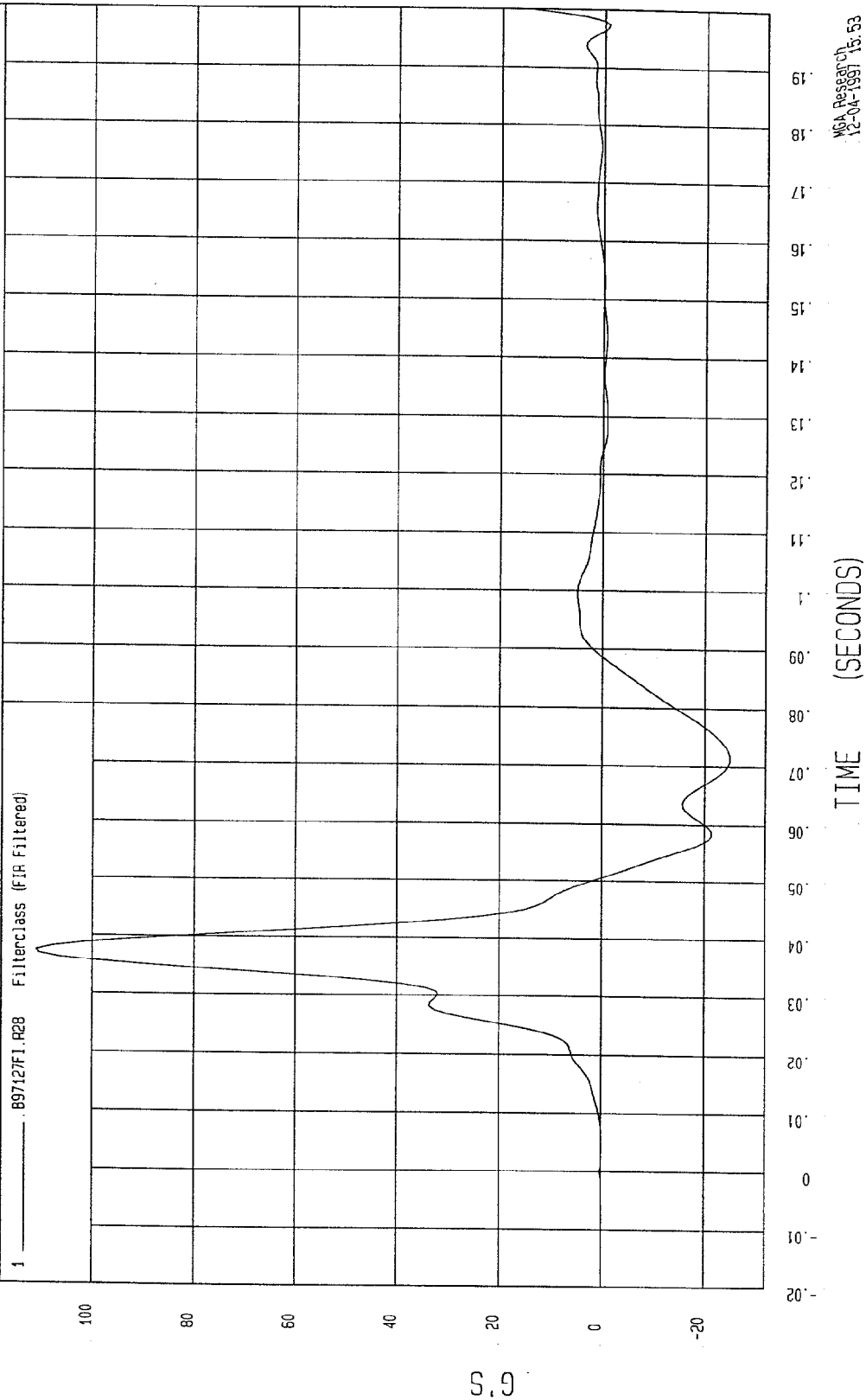


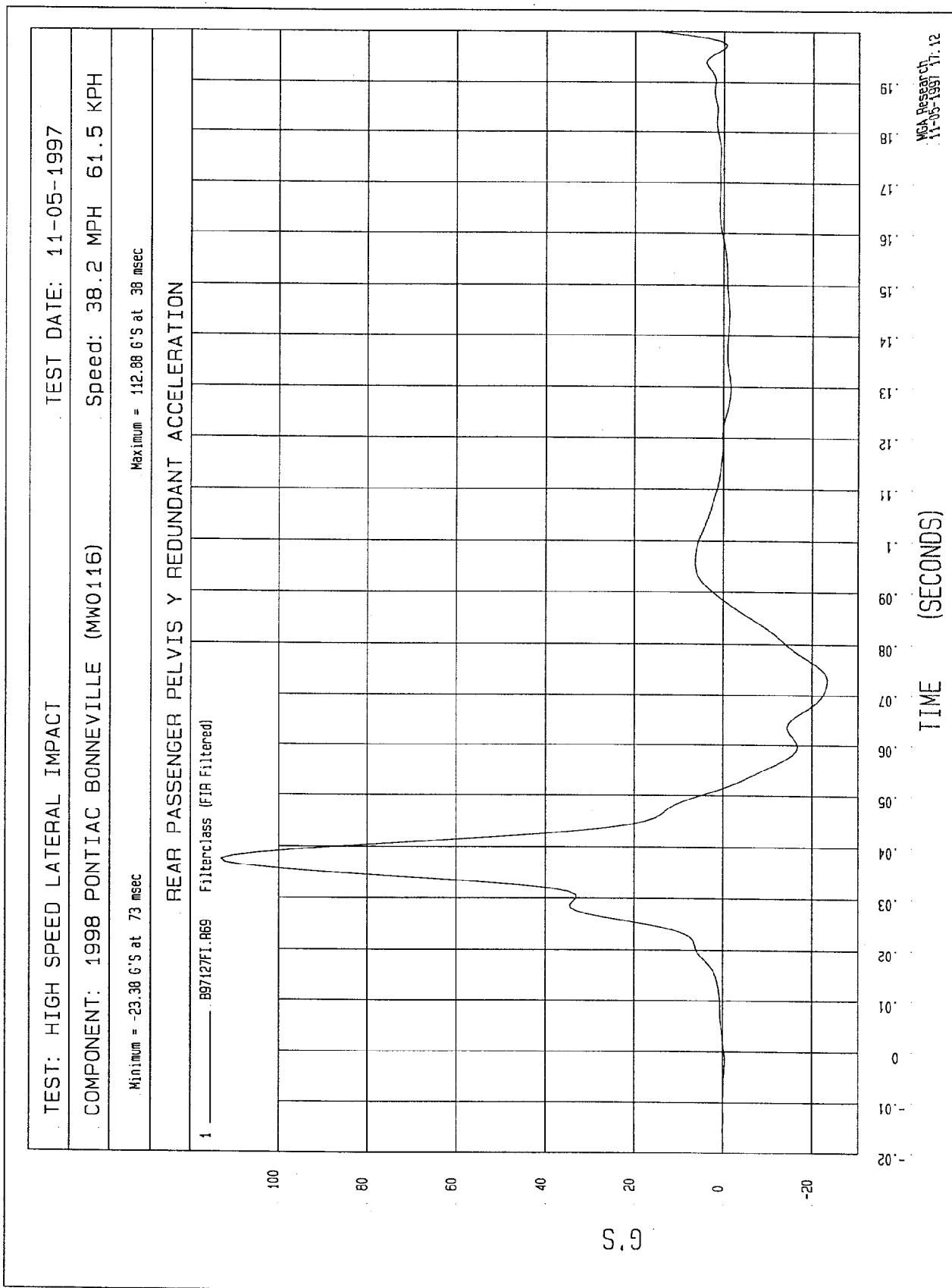
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 11-05-1997

COMPONENT: 1998 PONTIAC BONNEVILLE (MW0116) Speed: 38.2 MPH 61.5 KPH

Minimum = -24.82 G'S at 71 msec Maximum = 111.00 G'S at 38 msec

REAR PASSENGER PELVIS Y ACCELERATION





APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-97-DC08

DUMMY PERFORMANCE CALIBRATIONS

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST

1998 PONTIAC BONNEVILLE 4-DOOR
NHTSA NO. MW0116

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: November 5, 1997

Report Date: December 19, 1997

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
ROOM 5313, NPS-10
400 SEVENTH STREET, S.W.
Washington, D.C. 20590

TABLE OF CONTENTS

		<u>Page No.</u>
DUMMY S/N: 272	PRE-TEST CERTIFICATION DATA	1-1
DUMMY S/N: 271	PRE-TEST CERTIFICATION DATA	2-1
DUMMY S/N: 272	POST-TEST CERTIFICATION DATA	3-1
DUMMY S/N: 271	POST-TEST CERTIFICATION DATA	4-1
DUMMY S/N: 272	POST-TEST INSPECTION CHECKLIST	5-1
DUMMY S/N: 271	POST-TEST INSPECTION CHECKLIST	6-1
	VEHICLE AND DUMMY TEMPERATURE	7-1

PRE-TEST CERTIFICATION DATA

Front Dummy Serial Number: 272

Calibration Test Results Summary

Dummy 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

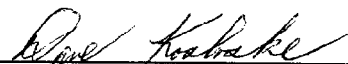
DATE OF VERIFICATION: November 4, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.2
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"	9.4
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.7
SW - Knee Pivot to Floor	19.3" - 19.9"	9.6
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 4, 1997

DUMMY NUMBER: 272

TEST NUMBER: D971982

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
PROBE SPEED	14.0 - 14.2 fps	14.0
UPPER RIB	37 - 46 g's	38
LOWER RIB	37 - 46 g's	37
LOWER SPINE	15 - 22 g's	18

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Wilk

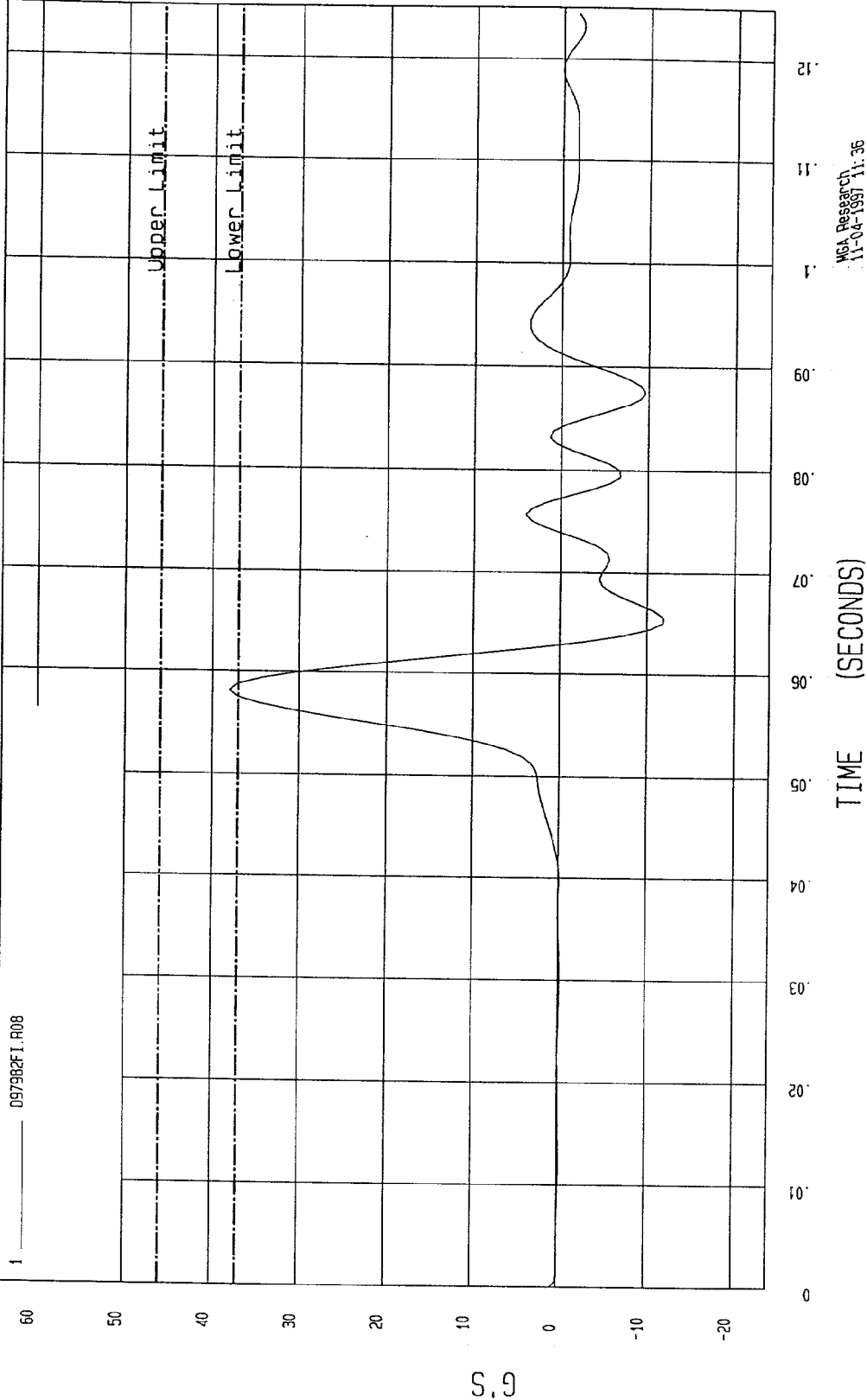
APPROVED BY Rene Kuchake

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 11:27

COMPONENT: DUMMY # 272 Velocity: 14.009 FT/SEC 4.27 M/SEC

Minimum = -11.87 G'S at 65.6 msec Maximum = 38.00 G'S at 58.1 msec

UPPER RIB ACCELERATION

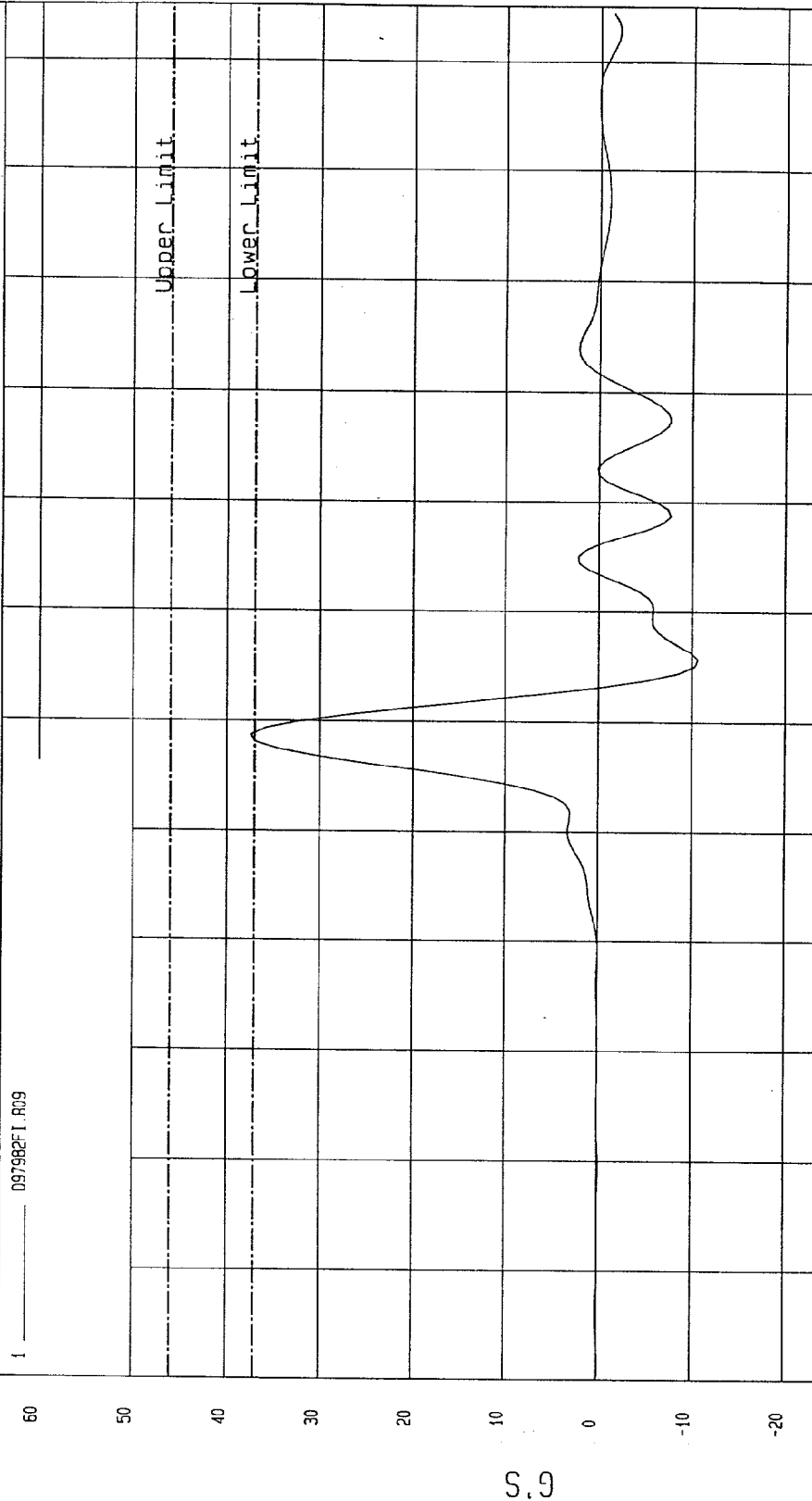


MSA Research
11-04-1997 11:36

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 11:27
COMPONENT: DUMMY # 272 Velocity: 14.009 FT/SEC 4.27 M/SEC

Minimum = -10.62 G'S at 65.6 msec Maximum = 37.43 G'S at 58.7 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

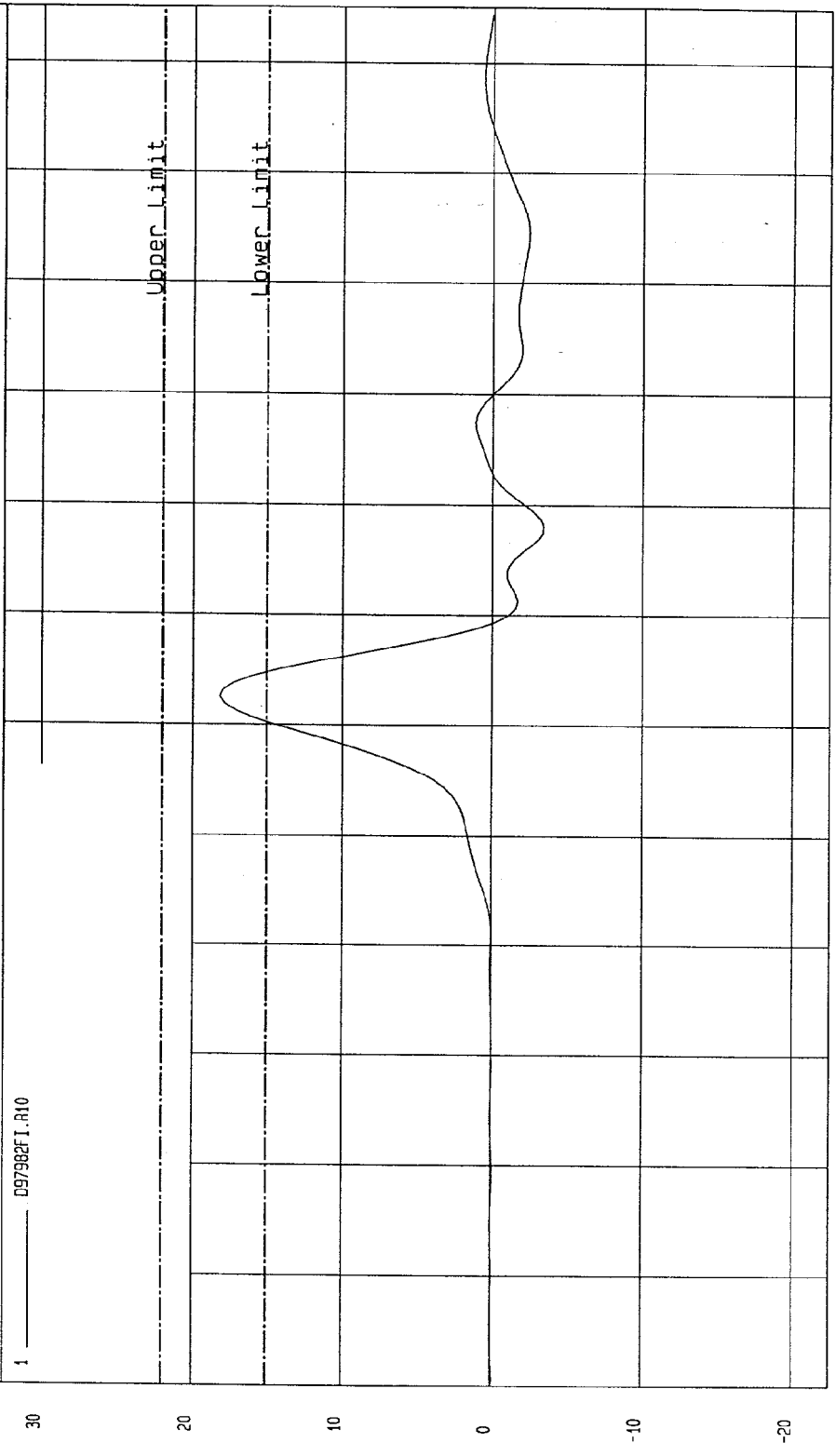
MCA Research
11-04-1997 11:36

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 11:27

COMPONENT: DUMMY # 272 Velocity: 14.009 FT/SEC 4.27 M/SEC

Minimum = -3.45 G'S at 78.1 msec Maximum = 18.19 G'S at 62.5 msec

LOWER SPINE ACCELERATION



TIME (SECONDS)

NSI Research
11-04-1997 11:37

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 4, 1997

DUMMY NUMBER: 272

TEST NUMBER: D971983

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
PROBE SPEED	14.0 - 14.2 f/s	14.1
PELVIS ACCELERATION	40 - 60 g's	42

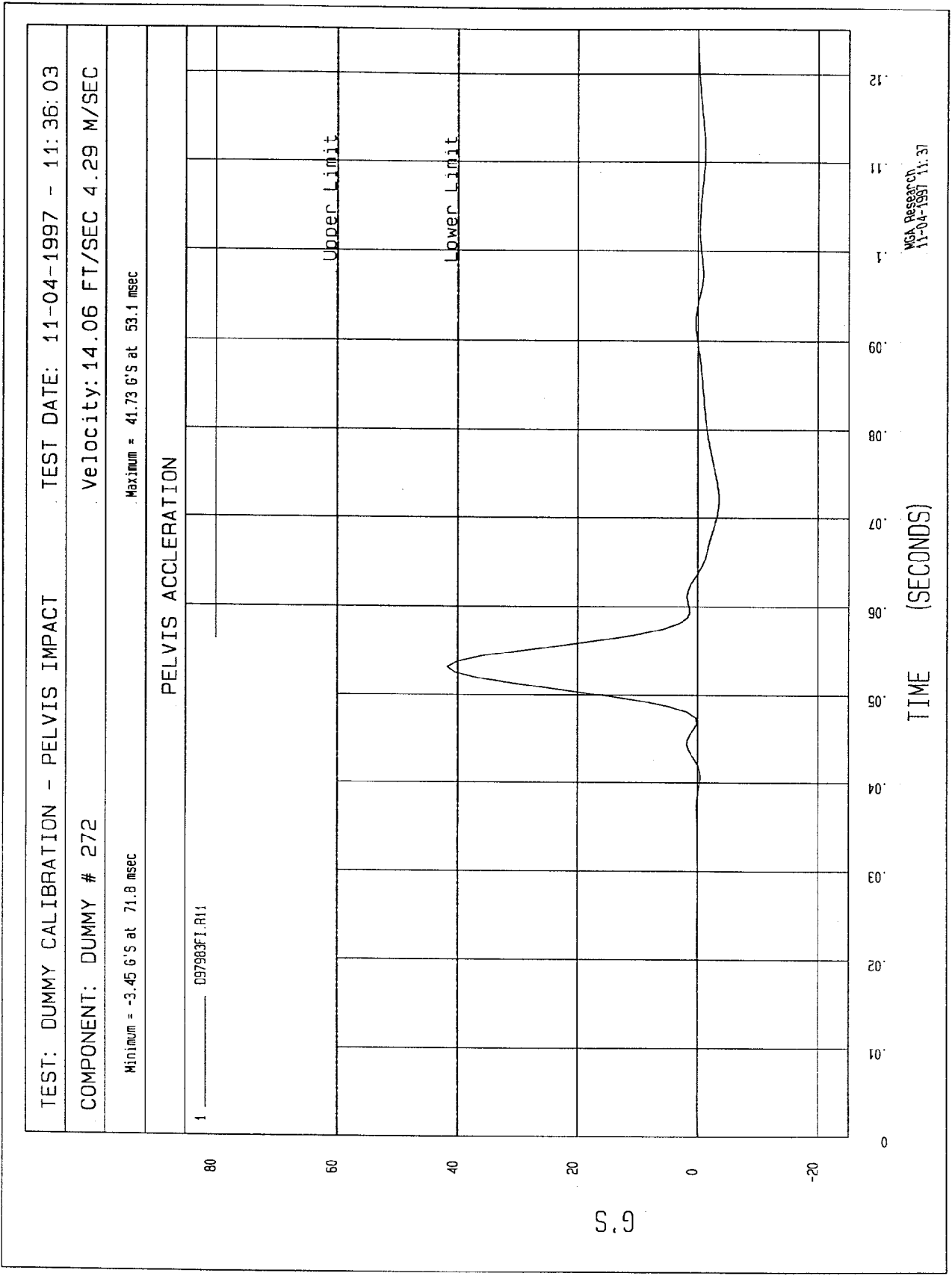
TEST MEETS SPECIFICATIONS

TECHNICIAN

Tim Hill

APPROVED BY

Rene Kibake



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

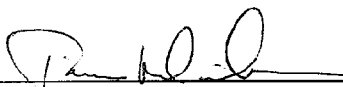
DATE: November 4, 1997

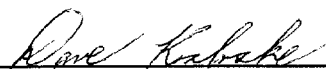
DUMMY NUMBER: 272

TEST NUMBER: D971984

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.6
FORCE @ 0.75 in	36.7 - 49.8 lbs	42.2
FORCE @ 1.0 in	50 - 63 lbs	56
FORCE @ 1.3 in	73 - 88 lbs	74

TEST MEETS SPECIFICATIONS

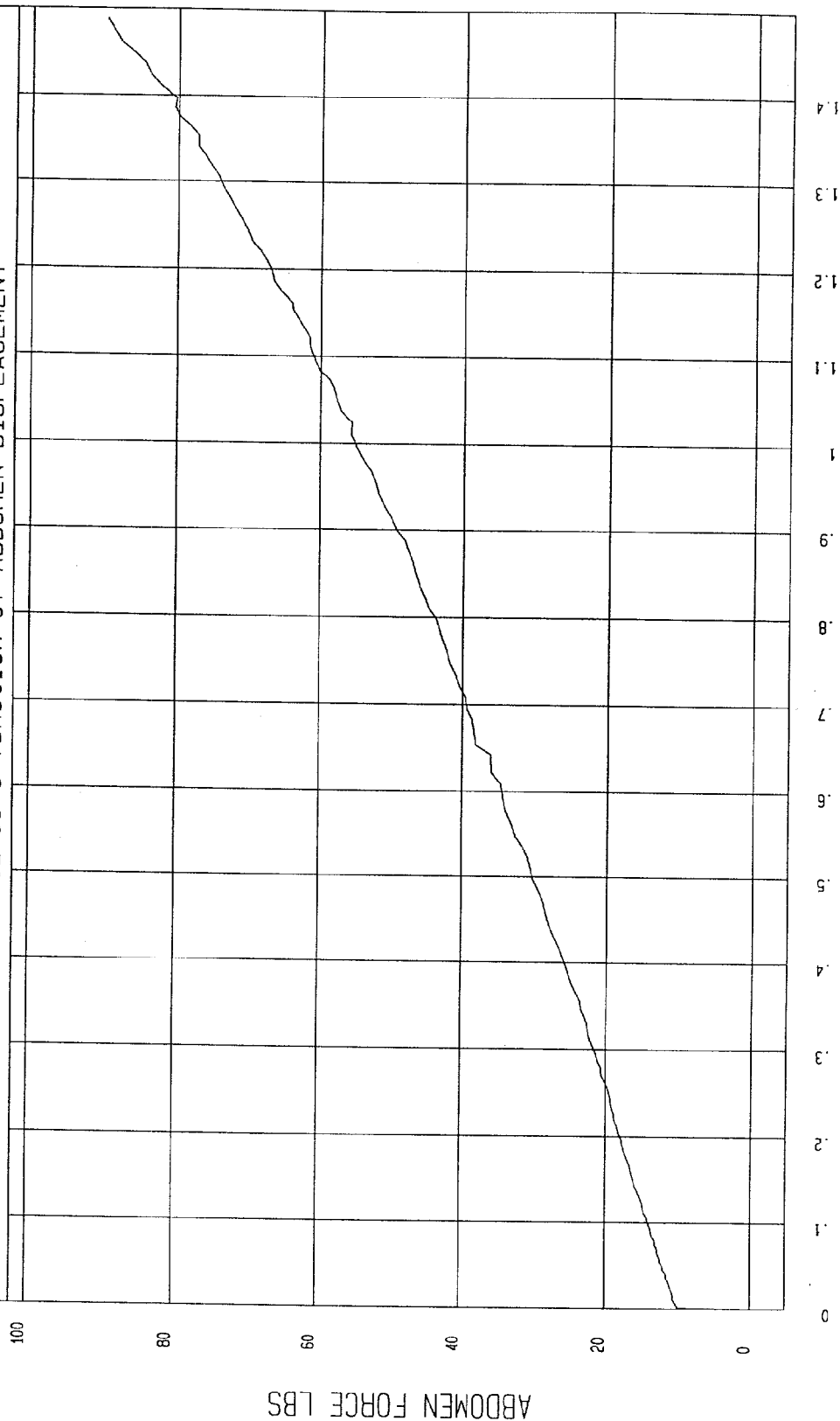
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-04-1997 - 14:17

COMPONENT: DUMMY # 272

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



WGA Research
11-04-1997 14:20

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: November 4, 1997

DUMMY NUMBER: 272

TEST NUMBER: D971985

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	29
FORCE @ 30°	34 - 46 lbs	39
FORCE @ 40°	46 - 58 lbs	55
RETURN ANGLE	12° maximum	2°

TEST MEETS SPECIFICATIONS

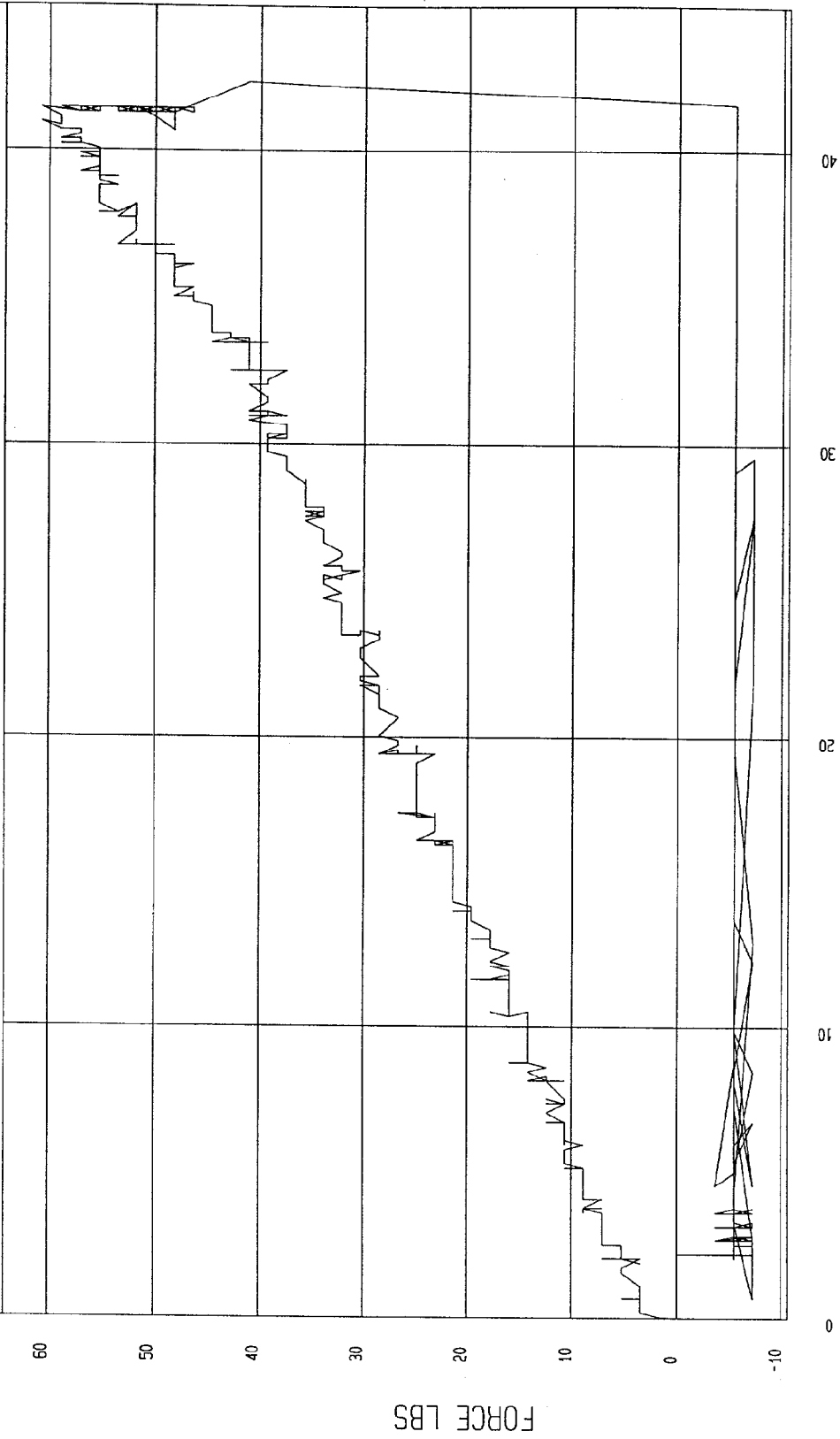
TECHNICIAN Tim H. L.

APPROVED BY Bob Koschke

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-04-1997 - 12:21

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



MGA Research
11-04-1997 12:23

TORSO ROTATION DEGREES

PRE-TEST CERTIFICATION DATA

Rear 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: November 4, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.6
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"	15.1

MEASUREMENTS BY: Tim White

APPROVED BY: Gene Kurbatke

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 4, 1997

DUMMY NUMBER: 271

TEST NUMBER: D971972

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
PROBE SPEED	14.0 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	42
LOWER SPINE	15 - 22 g's	22

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Hill

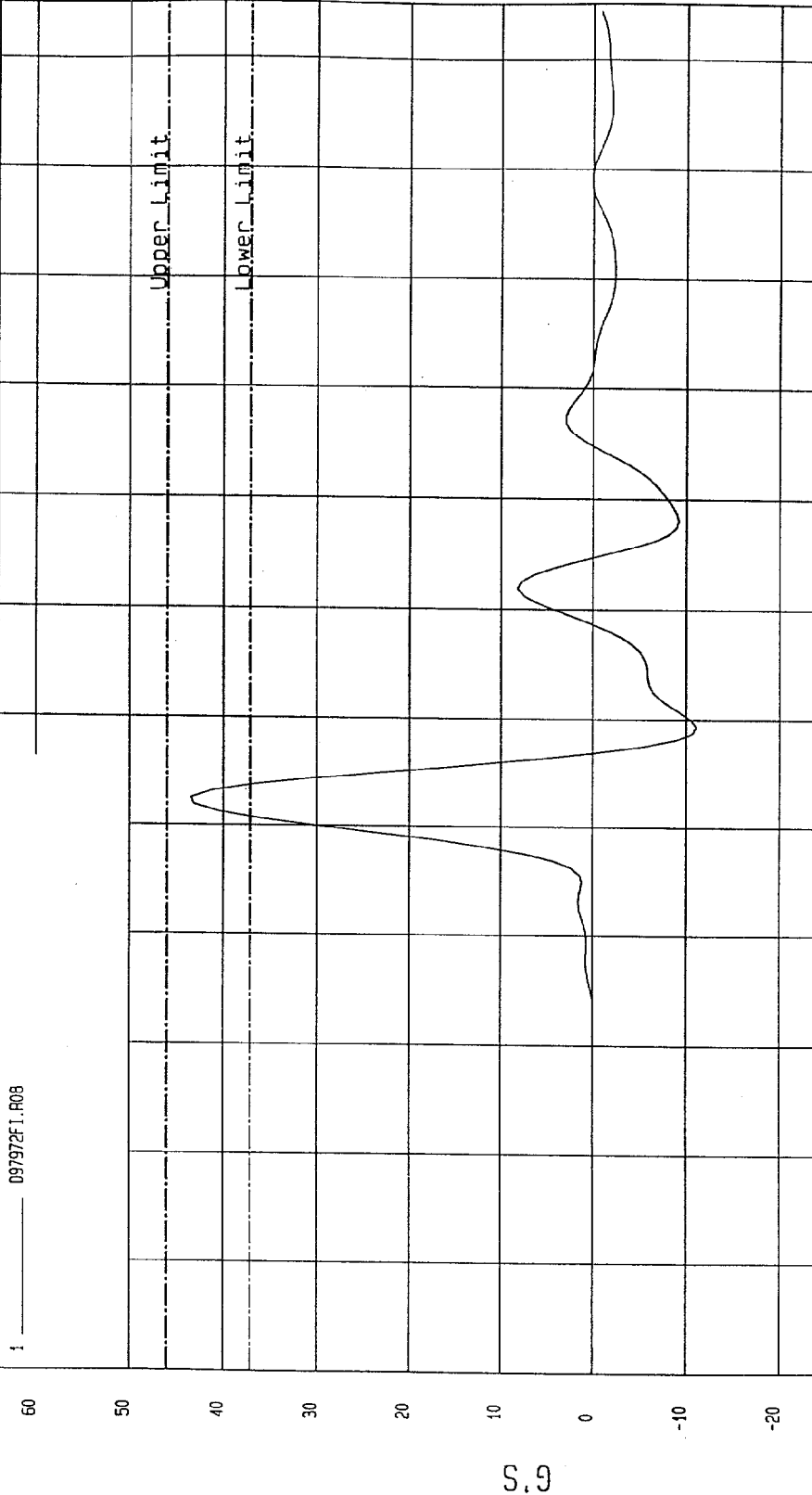
APPROVED BY Dave Kabahe

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 10:21

COMPONENT: DUMMY # 271 Velocity: 14.075 FT/SEC 4.29 M/SEC

Minimum = -11.11 G'S at 59.3 msec Maximum = 43.48 G'S at 52.5 msec

UPPER RIB ACCELERATION



MCA Research
11-04-1997 10:38

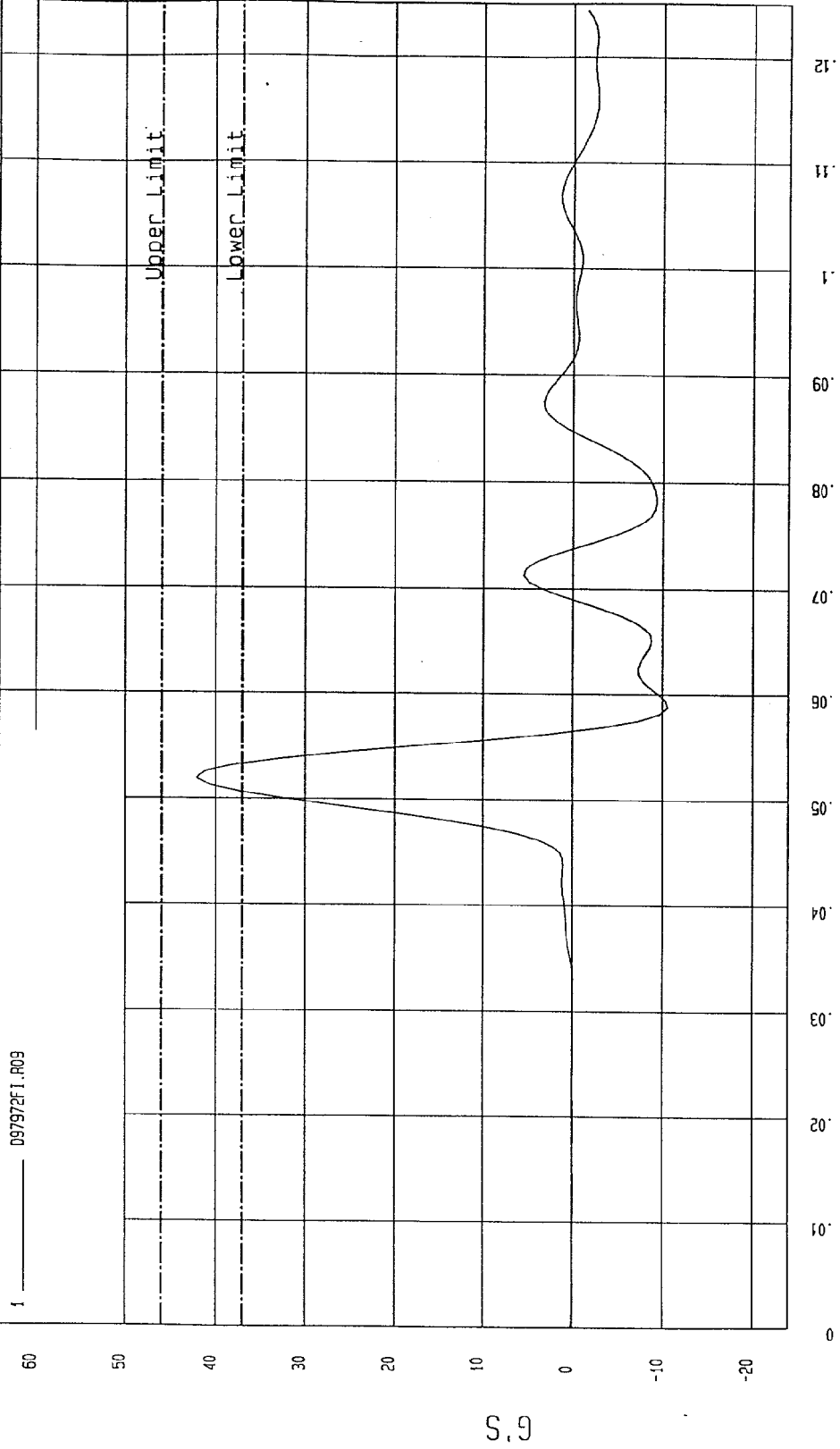
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 10:24:58

COMPONENT: DUMMY # 271 Velocity: 14.075 FT/SEC 4.29 M/SEC

Minimum = -10.50 G'S at 58.7 msec

Maximum = 42.17 G'S at 51.8 msec

LOWER RIB ACCELERATION



NCA Research
11-04-1997 10:38

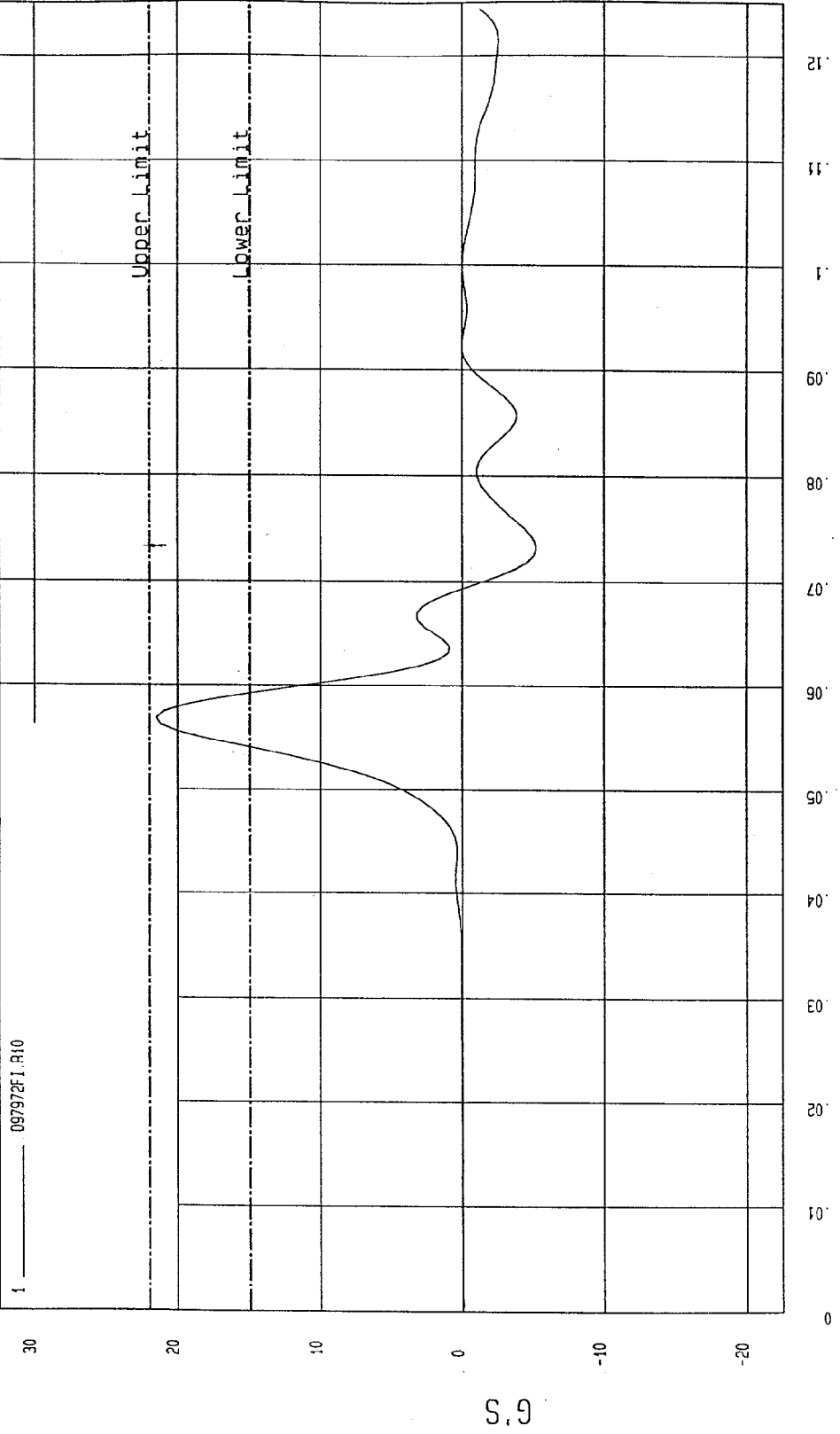
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-04-1997 - 10:25:35

COMPONENT: DUMMY # 271 Velocity: 14.075 FT/SEC 4.29 M/SEC

Minimum = -5.15 G'S at 73.1 msec

Maximum = 21.51 G'S at 56.8 msec

LOWER SPINE ACCELERATION



MCA Research
11-04-1997 10:38

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

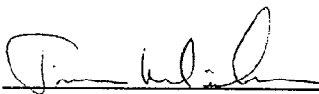
DATE: November 4, 1997

DUMMY NUMBER: 271

TEST NUMBER: D971973

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
PROBE SPEED	14.0 - 14.2 f/s	14.1
PELVIS ACCELERATION	40 - 60 g's	58

TEST MEETS SPECIFICATIONS

TECHNICIAN 

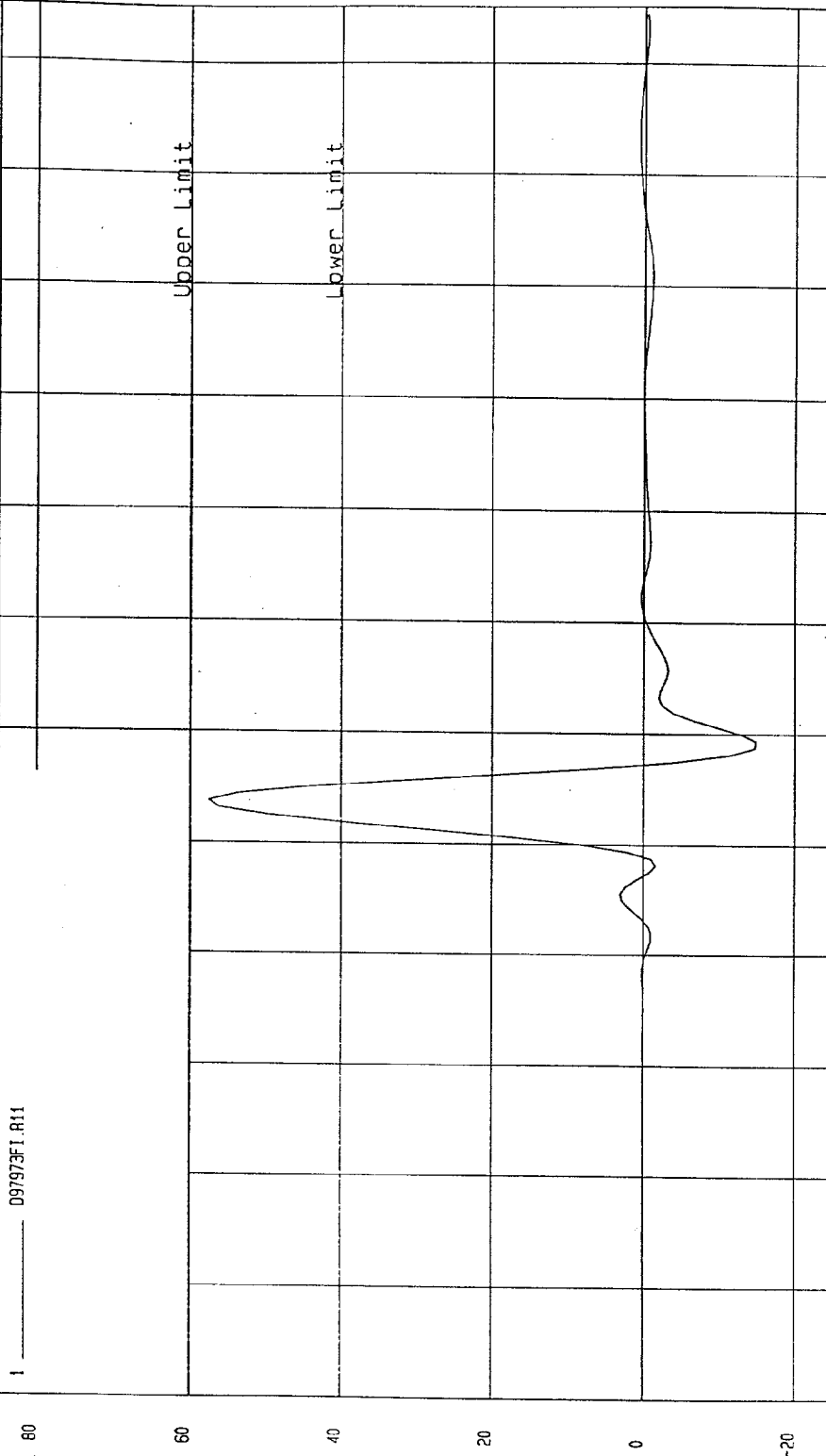
APPROVED BY 

TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 11-04-1997 - 10:37

COMPONENT: DUMMY # 271 Velocity: 14.066 FT/SEC 4.29 M/SEC

Minimum = -14.80 G'S at 59.3 msec Maximum = 57.50 G'S at 53.7 msec

PELVIS ACCELERATION



MCA Research
11-04-1997 10:38

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

DATE: November 4, 1997

DUMMY NUMBER: 271

TEST NUMBER: D971974

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
FORCE @ 0.5 in	23.3 - 36.5 lbs	34.2
FORCE @ 0.75 in	36.7 - 49.8 lbs	46.5
FORCE @ 1.0 in	50 - 63 lbs	59
FORCE @ 1.3 in	73 - 88 lbs	79

TEST MEETS SPECIFICATIONS

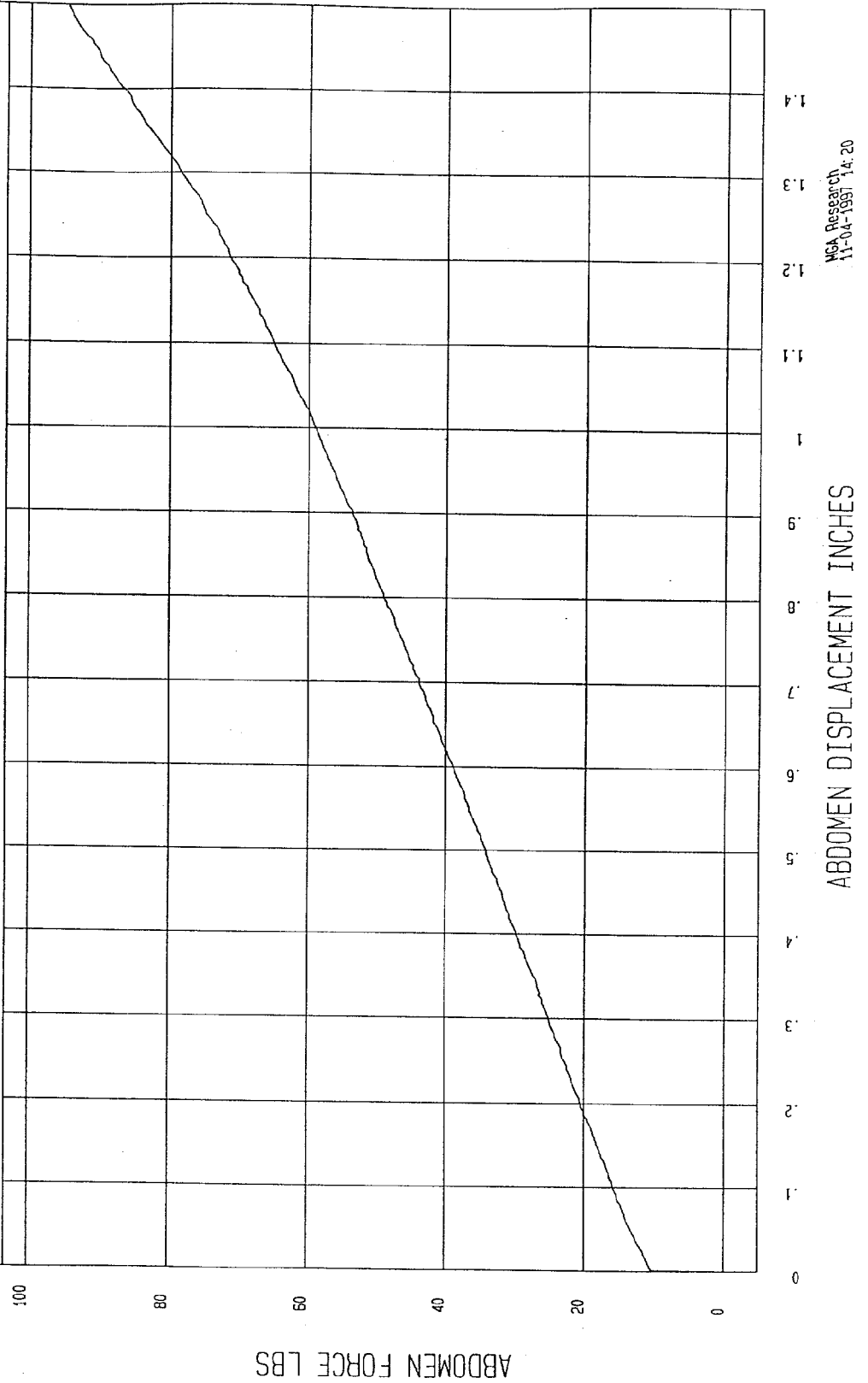
TECHNICIAN Tim Hilch

APPROVED BY Dave Korbach

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-04-1997 - 14:13

COMPONENT: DUMMY # 271

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



MCA Research
11-04-1997 14:20

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: November 4, 1997

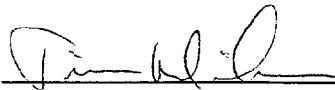
DUMMY NUMBER: 271

TEST NUMBER: D971975

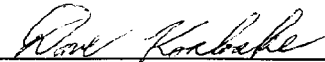
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	26%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	29
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	56
RETURN ANGLE	12° maximum	2°

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-04-1997 - 11:55

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION

50

40

30

20

10

0

-10

FORCE LBS

0

10

20

30

40

TORSO ROTATION DEGREES

NCA Research
11-04-1997 12:23

POST-TEST CERTIFICATION DATA

Front 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: November 17, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.2
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"	9.4
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: Jim White

APPROVED BY: Paul Kabeke

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 14, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972143

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	14.0 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	40
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	18

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Walsh

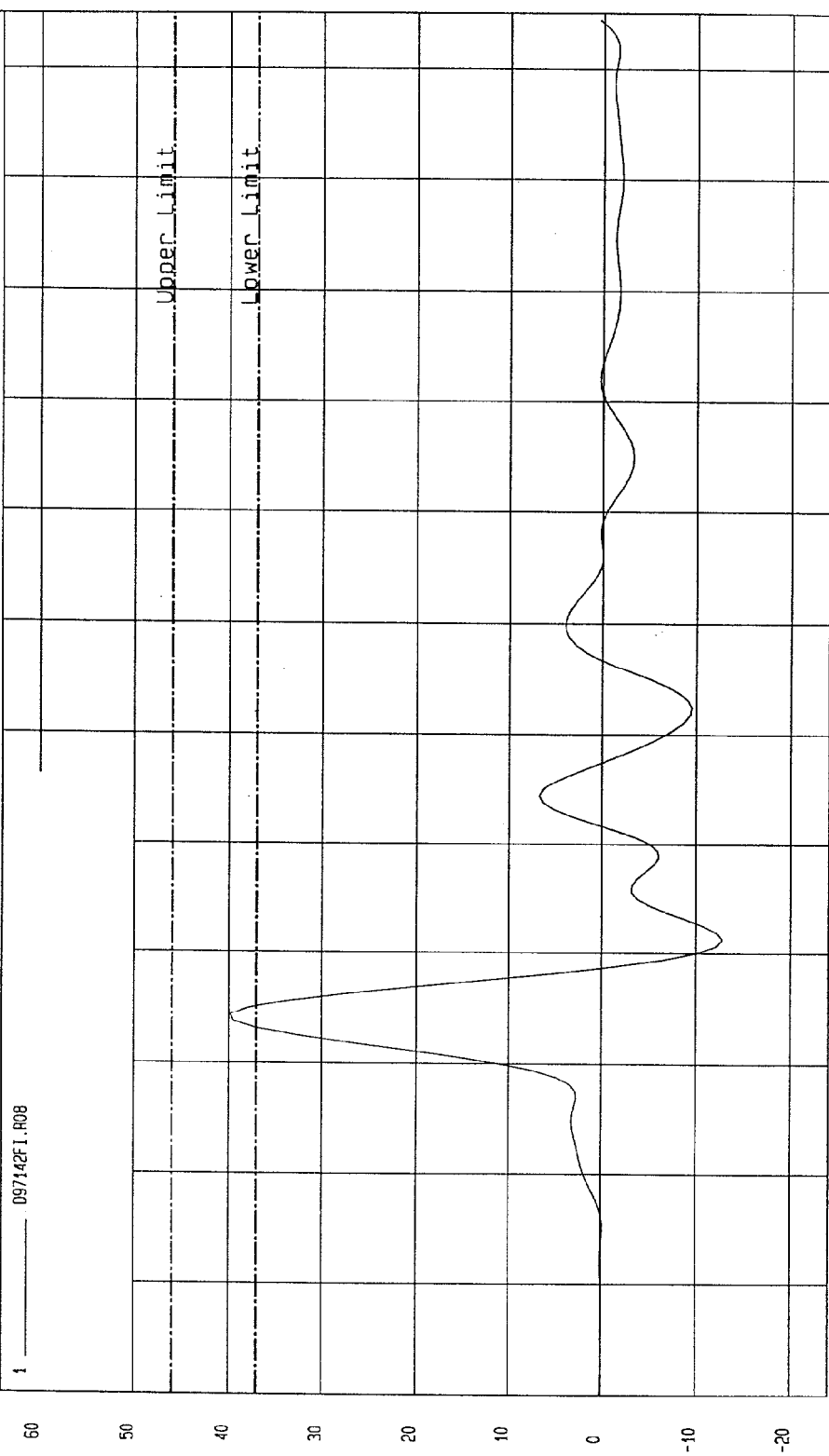
APPROVED BY Steve Kalsche

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-14-1997 - 15:37

COMPONENT: DUMMY # 272 Velocity: 14.09 FT/SEC 4.29 M/SEC

Minimum = -12.82 G'S at 41.2 msec Maximum = 39.80 G'S at 34.3 msec

UPPER RIB ACCELERATION



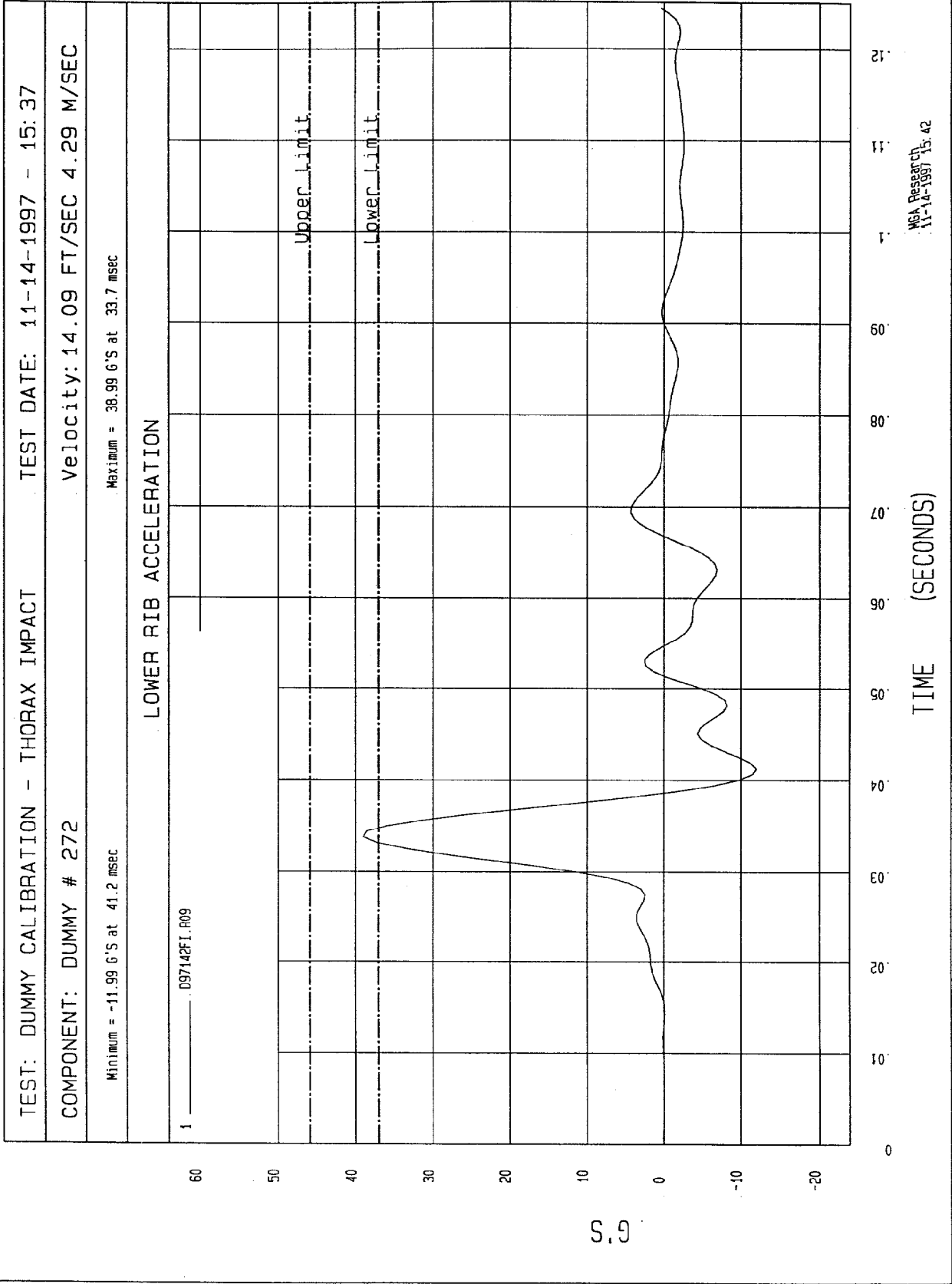
TIME (SECONDS)

0 10 20 30 40 50 60

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2

MCA Research
11-14-1997 15:41

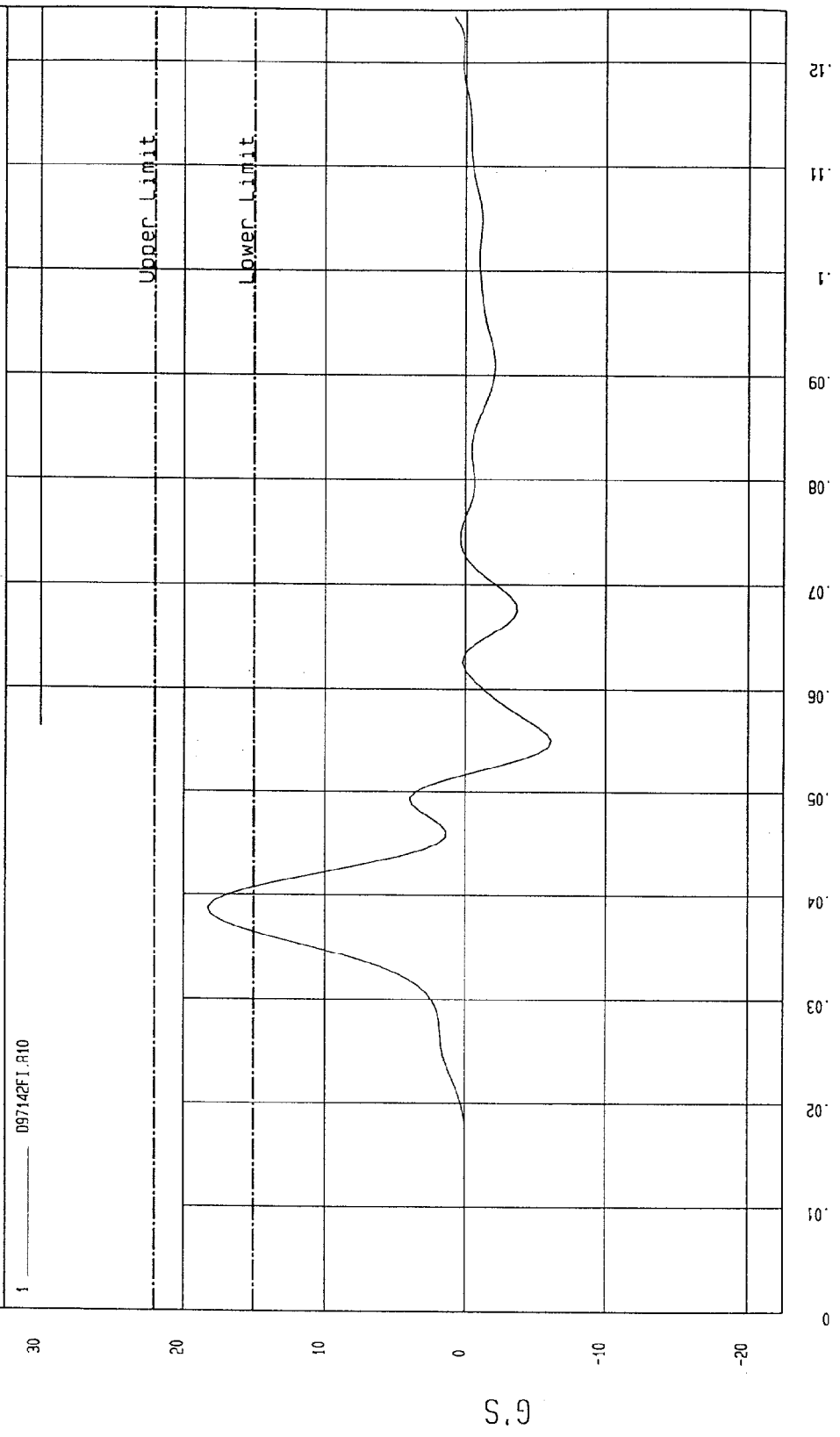
S.9



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-14-1997 - 15:37
 COMPONENT: DUMMY # 272 Velocity: 14.09 FT/SEC 4.29 M/SEC

Minimum = -6.11 G'S at 55 msec Maximum = 18.31 G'S at 38.7 msec

LOWER SPINE ACCELERATION



MOA Research
 11-14-1997 15:42

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 14, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972143

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	14.0 - 14.2 f/s	14.1
PELVIS ACCELERATION	40 - 60 g's	44

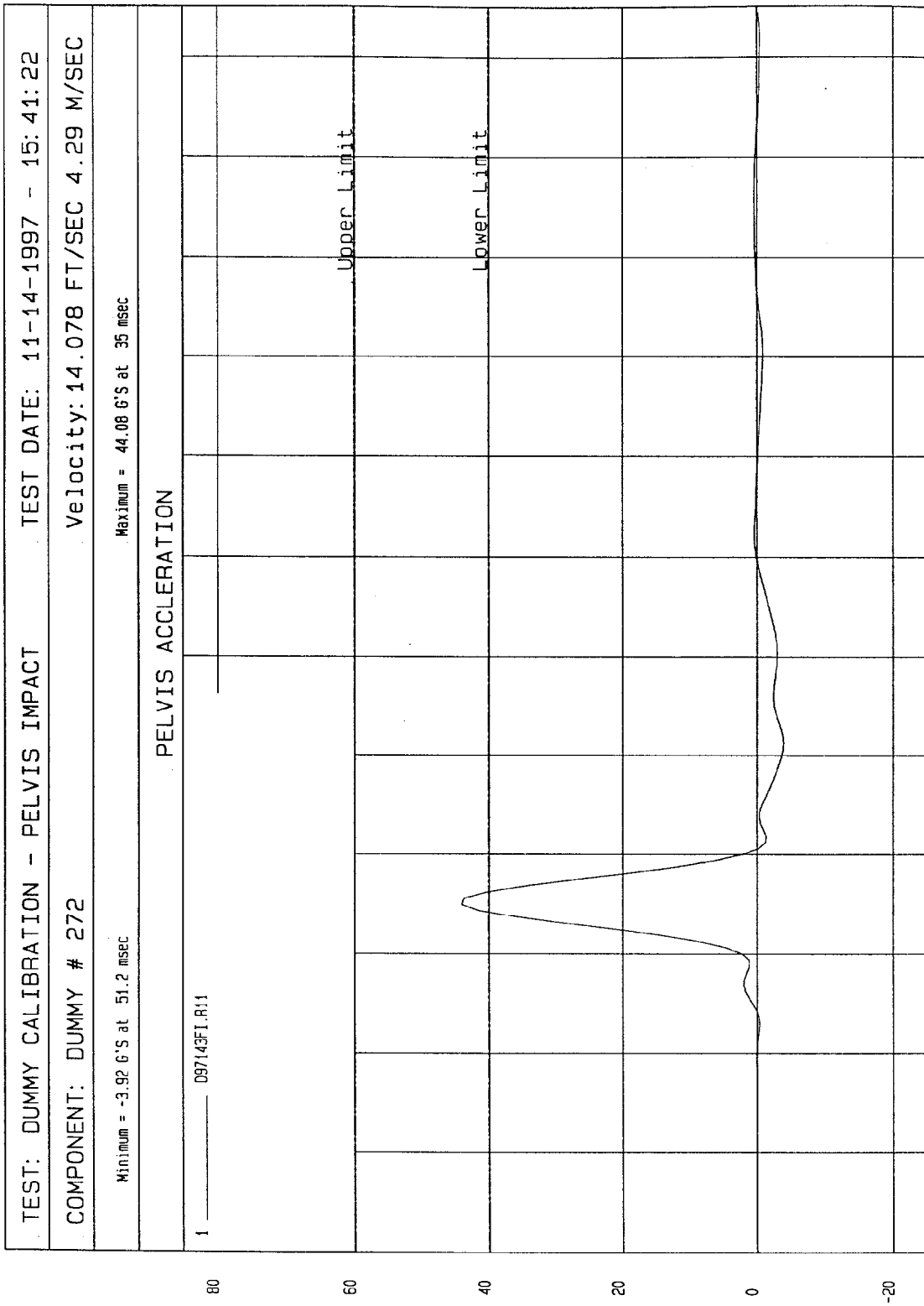
TEST MEETS SPECIFICATIONS

TECHNICIAN

Tim H. H.

APPROVED BY

Steve Kabake



WGA Research
11-14-1997 15:42

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

DATE: November 14, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972144

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	31.3
FORCE @ 0.75 in	36.7 - 49.8 lbs	42.9
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	81

TEST MEETS SPECIFICATIONS

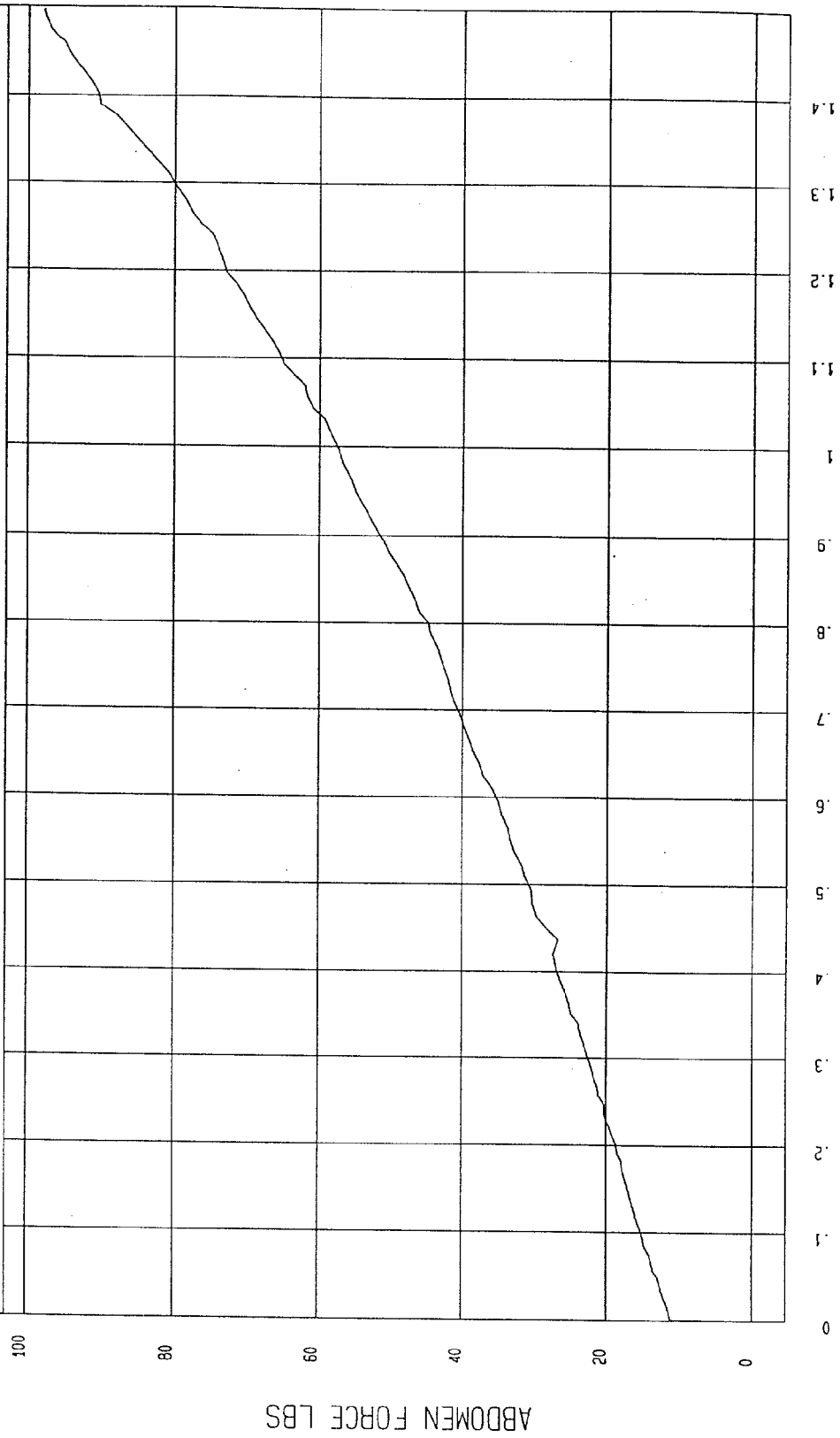
TECHNICIAN Tim White

APPROVED BY Dave Koelsche

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-14-1997 - 16:33

COMPONENT: DUMMY # 272

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



NCA Research
11-14-1997 16:35

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: November 17, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972145

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	25
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	52
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

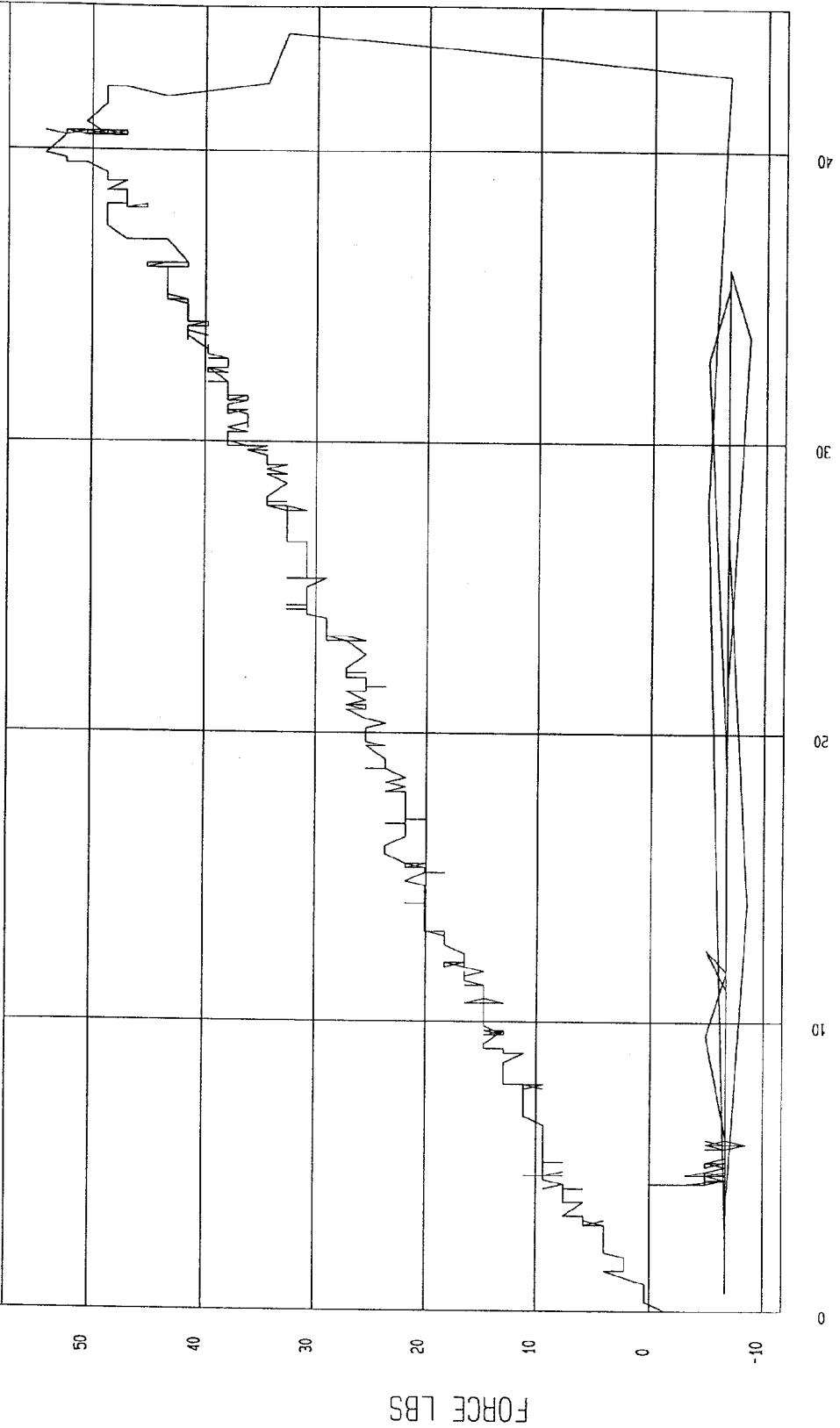
TECHNICIAN Tim Walsh

APPROVED BY Dave Krabacke

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-17-1997 - 09:30

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



MGA Research
11-17-1997 09:34

POST-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

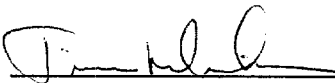
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion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

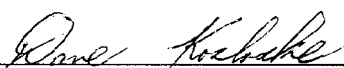
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: November 17, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.6
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"	15.1

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

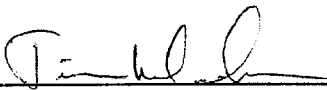
DATE: November 14, 1997

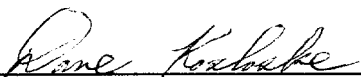
DUMMY NUMBER: 271

TEST NUMBER: D972132

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	14.0 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	43
LOWER RIB	37 - 46 g's	41
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN 

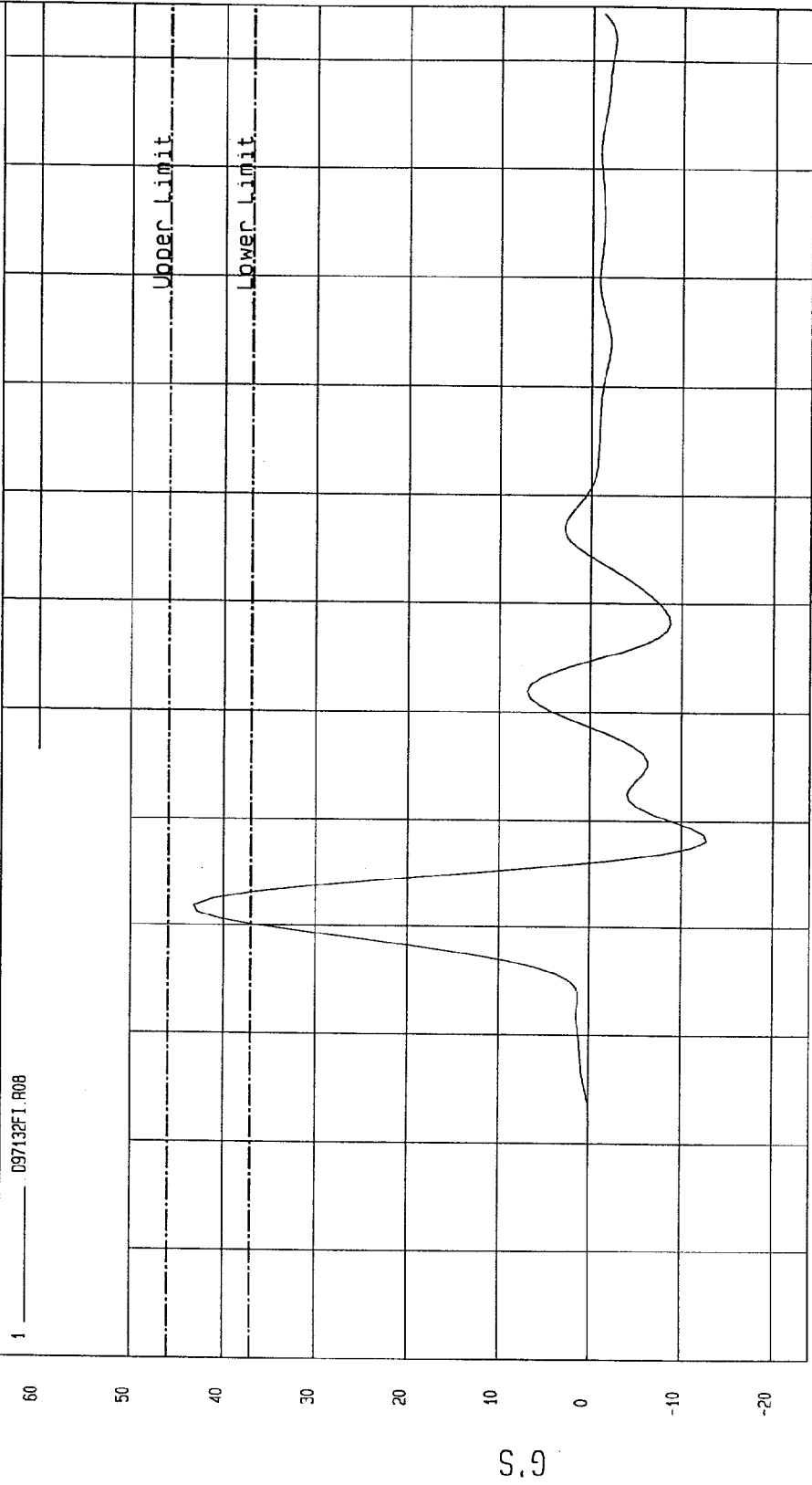
APPROVED BY 

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-14-1997 - 15:01

COMPONENT: DUMMY # 271 Velocity: 14.077 FT/SEC 4.29 M/SEC

Minimum = -12.72 G'S at 48.1 msec Maximum = 43.25 G'S at 41.8 msec

UPPER RIB ACCELERATION



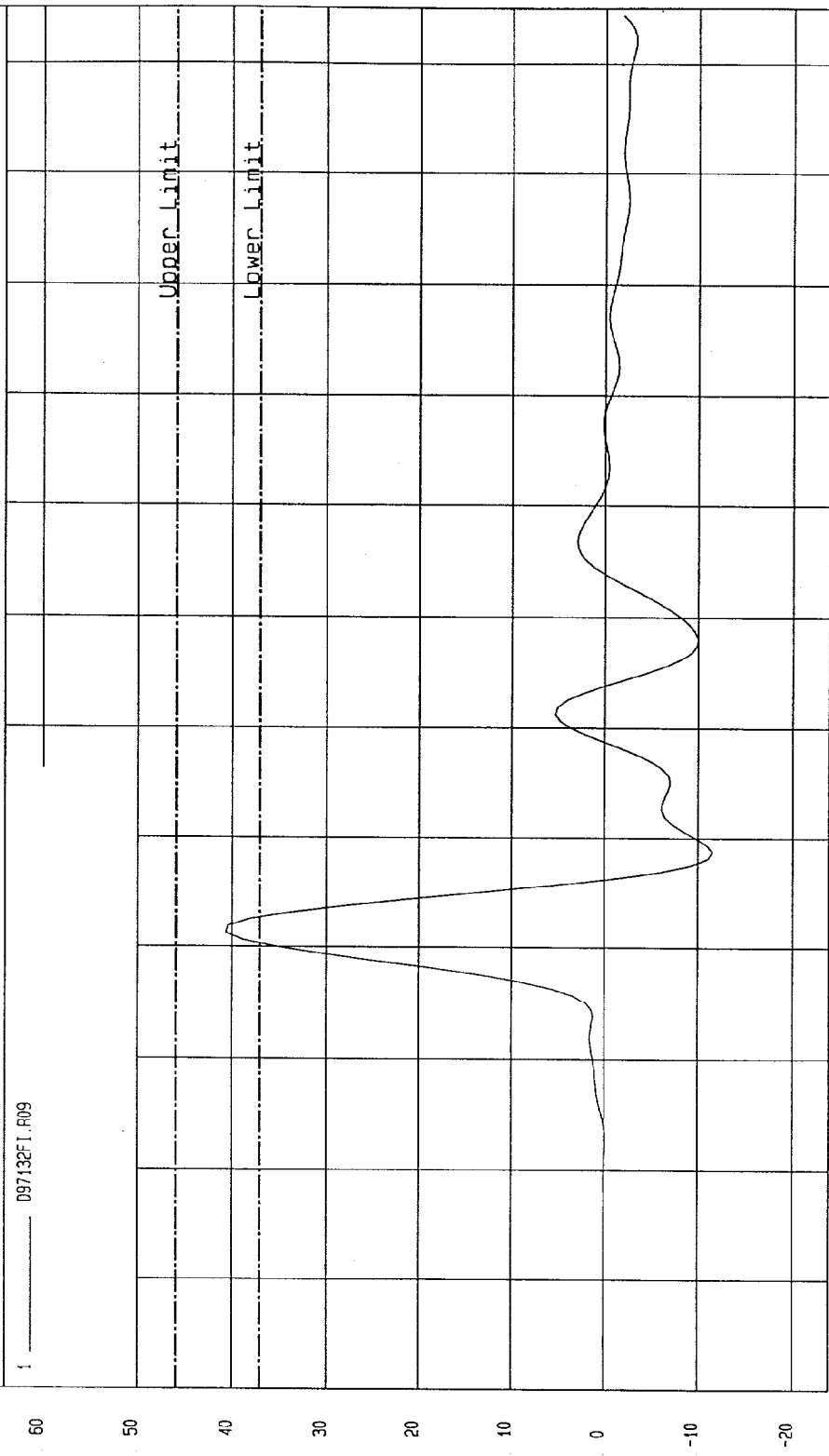
MCA Research
11-14-1997 15:07

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-14-1997 - 15:01

COMPONENT: DUMMY # 271 Velocity: 14.077 FT/SEC 4.29 M/SEC

Minimum = -11.55 G'S at 48.7 msec Maximum = 40.69 G'S at 41.2 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

WCA Research
11-14-1997 15:08

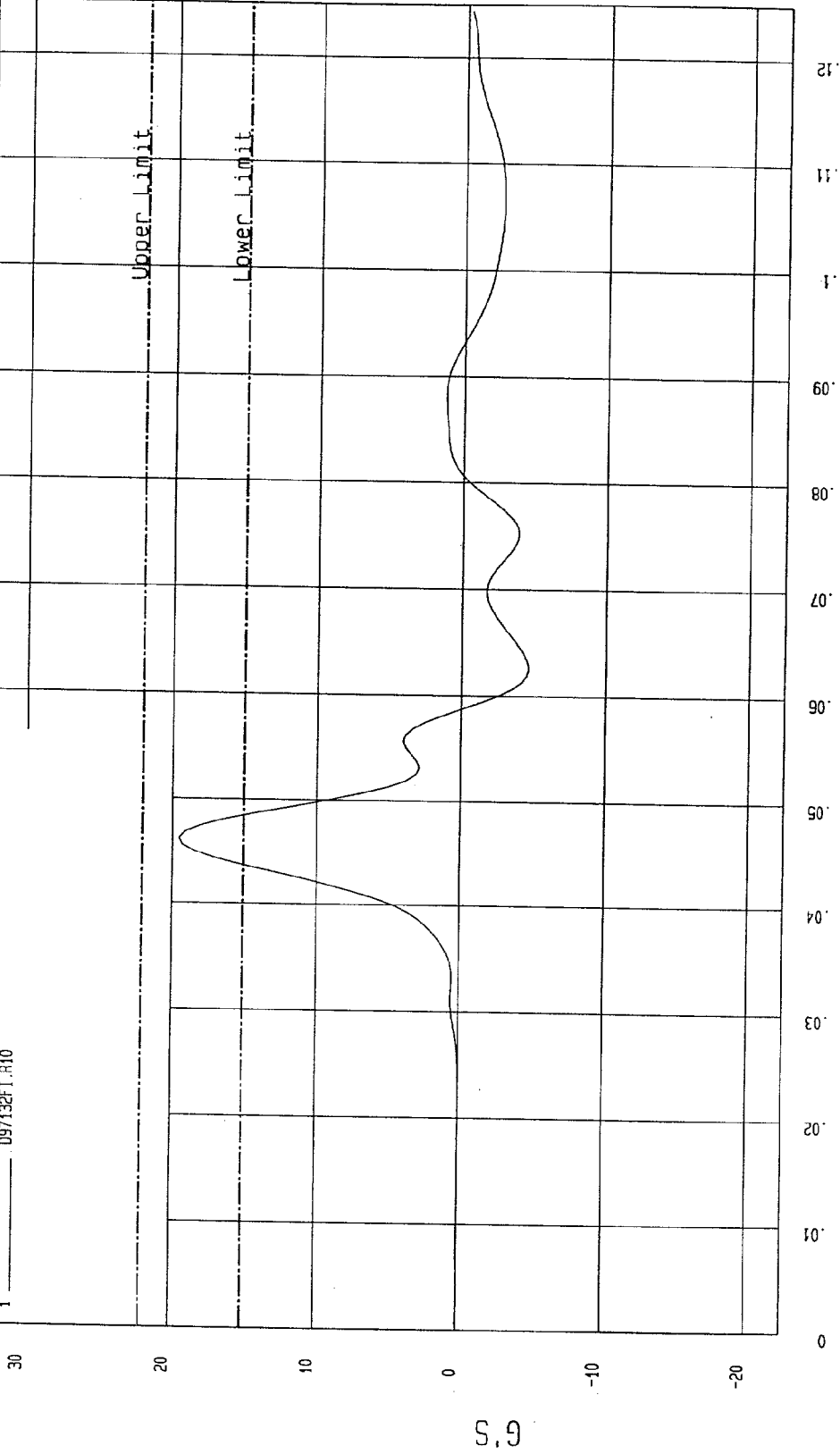
G

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 11-14-1997 - 15:02:23
COMPONENT: DUMMY # 271 Velocity: 14.077 FT/SEC 4.29 M/SEC

Minimum = -4.68 G'S at 52.5 msec Maximum = 19.54 G'S at 46.2 msec

LOWER SPINE ACCELERATION

1 ——— 097132FL.R10



NSA Research
11-14-1997 15:08

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

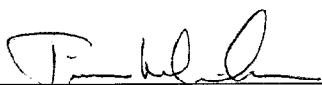
DATE: November 14, 1997

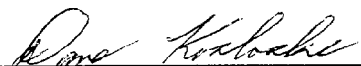
DUMMY NUMBER: 271

TEST NUMBER: D972133

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
PROBE SPEED	14.0 - 14.2 f/s	14.0
PELVIS ACCELERATION	40 - 60 g's	50

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

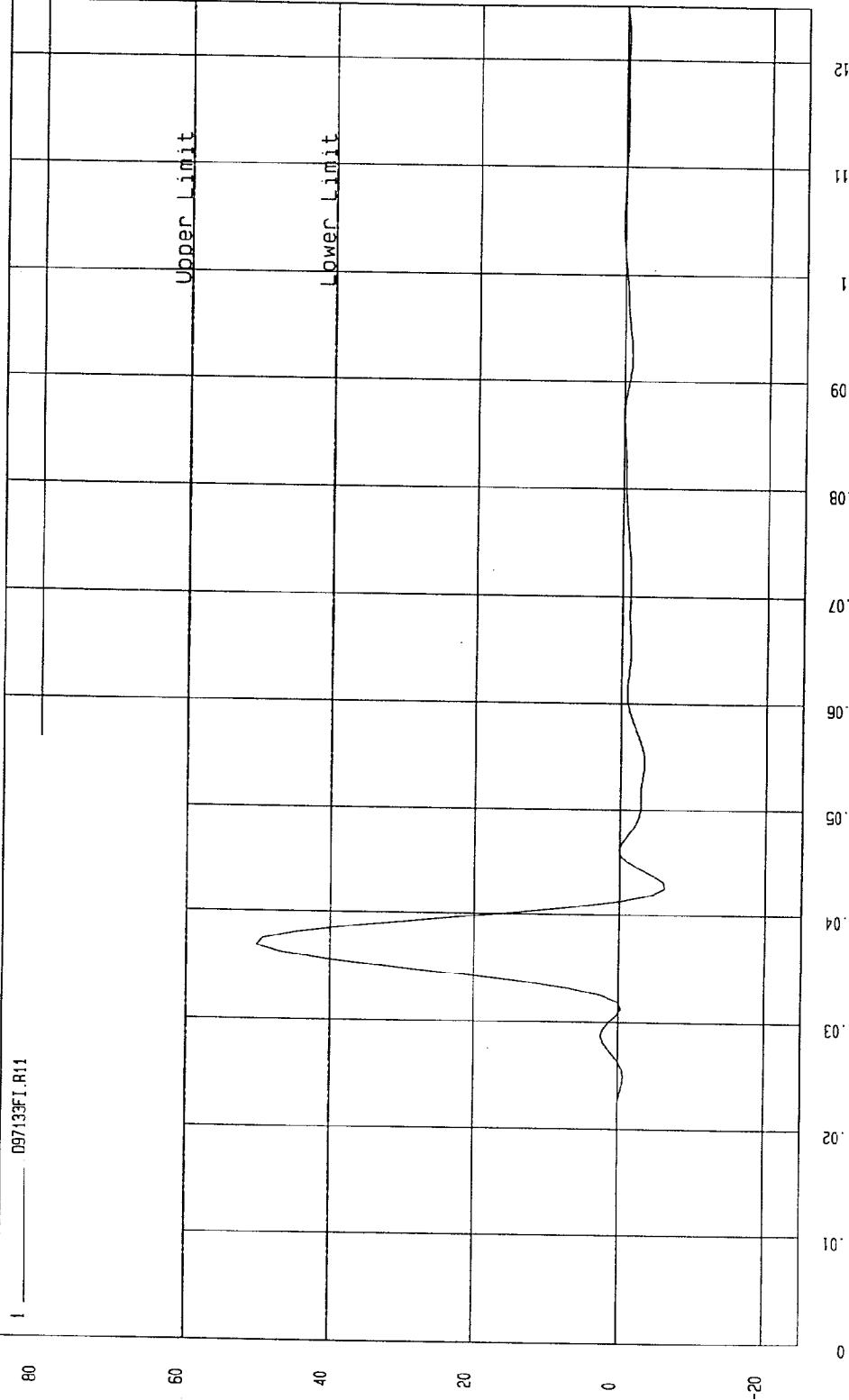
TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 11-14-1997 - 15:06

COMPONENT: DUMMY # 271 Velocity: 14.007 FT/SEC 4.27 M/SEC

Minimum = -6.18 G'S at 42.5 msec

Maximum = 50.10 G'S at 36.8 msec

PELVIS ACCELERATION



MCA Research
11-14-1997 15:09

S.9

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

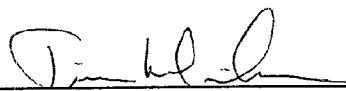
DATE: November 14, 1997

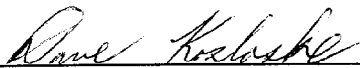
DUMMY NUMBER: 271

TEST NUMBER: D972134

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	30%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.6
FORCE @ 0.75 in	36.7 - 49.8 lbs	41.7
FORCE @ 1.0 in	50 - 63 lbs	55
FORCE @ 1.3 in	73 - 88 lbs	75

TEST MEETS SPECIFICATIONS

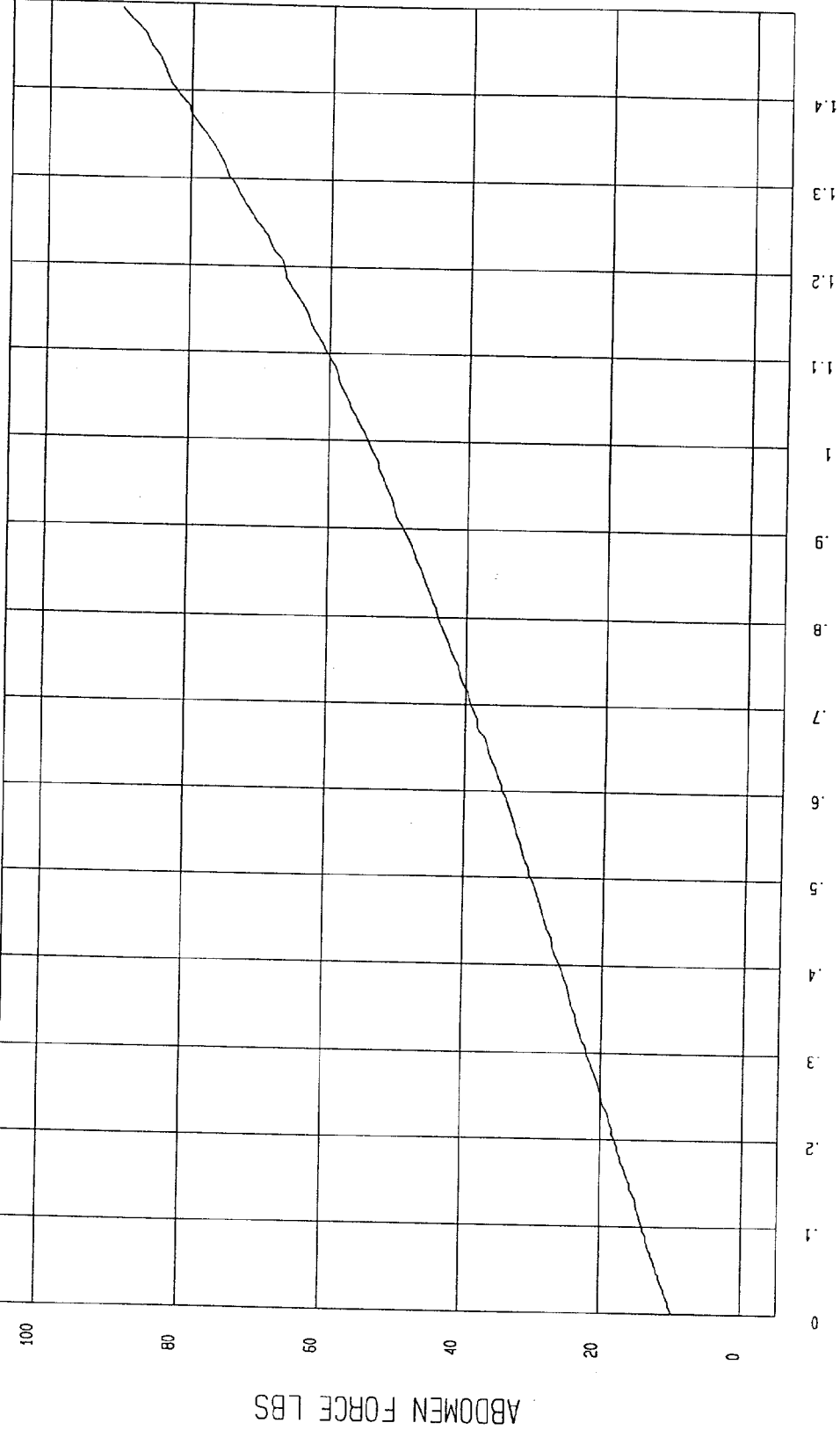
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-14-1997 - 16:27

COMPONENT: DUMMY # 271

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



MSA Research
11-14-1997 16:35

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

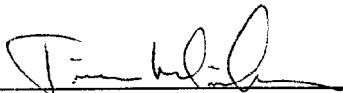
DATE: November 17, 1997

DUMMY NUMBER: 271

TEST NUMBER: D972135

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	39
FORCE @ 40°	46 - 58 lbs	56
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

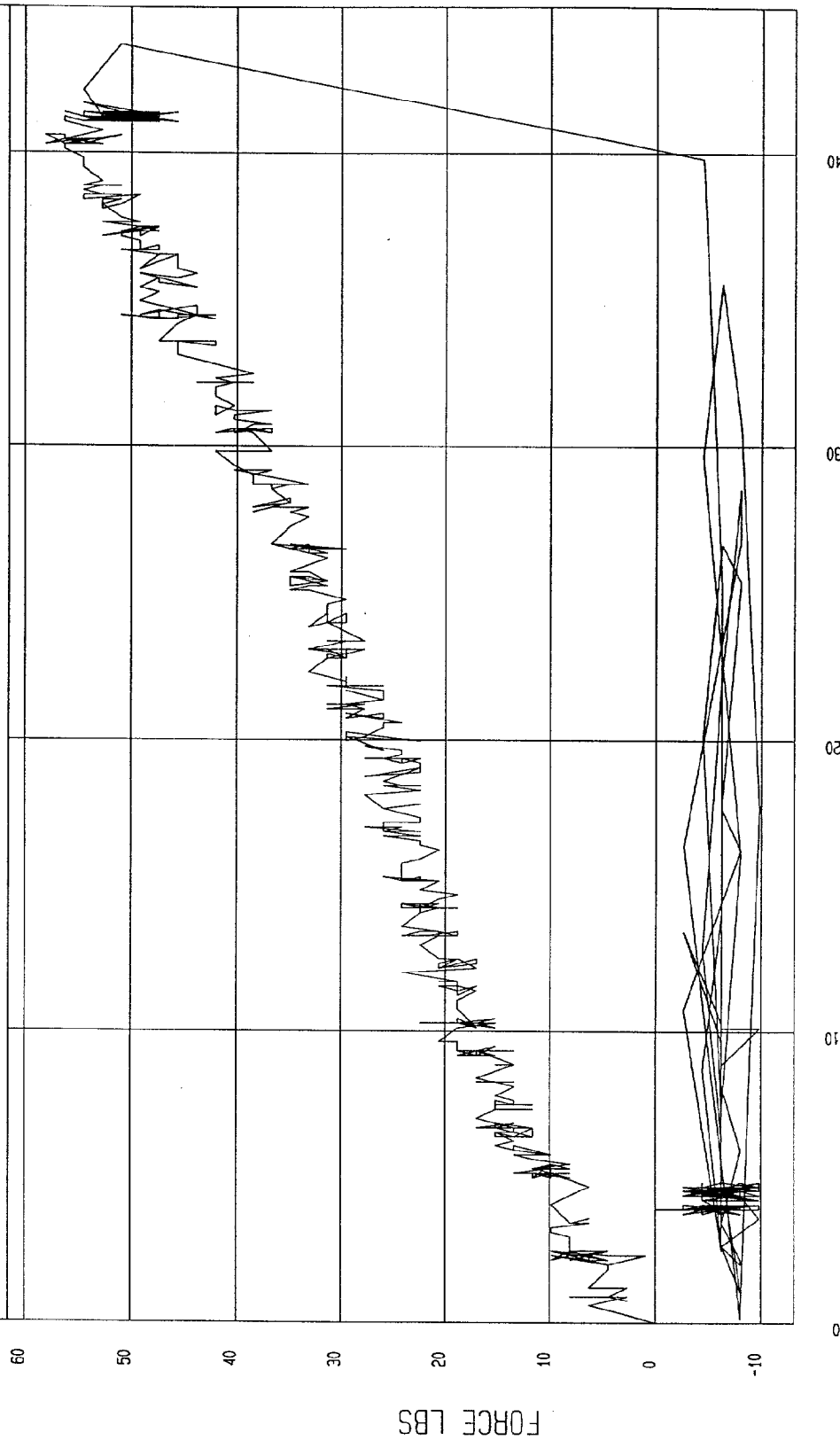
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-17-1997 - 09:13

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



NCA Research
11-17-1997 09:34

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 272

Inspected By: Tim Michnay

Date: November 17, 1997

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	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	Rib wrap damaged on impact side--Replaced	

NOTES: (include component/problem/action/reason):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 271

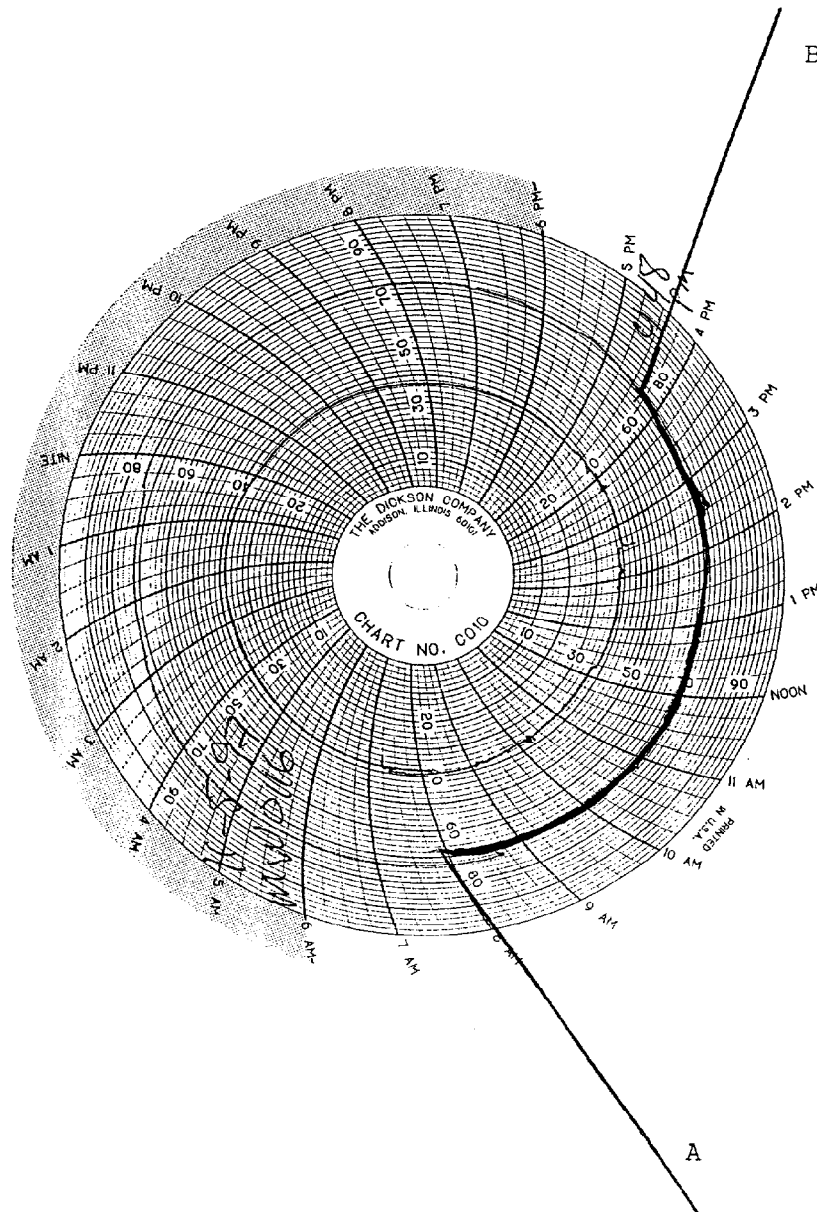
Inspected By: Tim Michnay

Date: November 17, 1997

<u>Part</u>	<u>Items Checked</u>	<u>Comments</u>
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

VEHICLE AND DUMMY TEMPERATURE



A = dummies installed in vehicle
B = test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR DRIVER DUMMY NO. 272

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	ALFJ7	Endevco	September 11, 1997
Lower Rib Y	APYN0	Endevco	September 11, 1997
Lower Spine Y	AP0G2	Endevco	September 11, 1997
Pelvis Y	APY15	Endevco	September 11, 1997
Upper Rib Redundant Y	ALDD6	Endevco	September 11, 1997
Lower Rib Redundant Y	APYN3	Endevco	September 11, 1997
Lower Spine Redundant Y	AP138	Endevco	September 11, 1997
Pelvis Redundant Y	APY16	Endevco	September 11, 1997

INSTRUMENTS FOR PASSENGER DUMMY NO. 271

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AP2A4	Endevco	September 11, 1997
Lower Rib Y	AP1B3	Endevco	September 11, 1997
Lower Spine Y	ANAP1	Endevco	September 11, 1997
Pelvis Y	AHTC2	Endevco	September 11, 1997
Upper Rib Redundant Y	AP2D8	Endevco	September 11, 1997
Lower Rib Redundant Y	AP1C6	Endevco	September 11, 1997
Lower Spine Redundant Y	ANAT6	Endevco	September 11, 1997
Pelvis Redundant Y	AGP53	Endevco	September 11, 1997

VEHICLE INSTRUMENT CALIBRATION

VEHICLE ACCELEROMETERS			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	J04-F10	Entran	August 7, 1997
Moving Barrier CG Y	F11-G04	Entran	August 7, 1997
Moving Barrier CG Z	J04-F12	Entran	August 7, 1997
Moving Barrier Rear Axle X	G13-B07	Entran	August 6, 1997
Moving Barrier Rear Axle Y	L14-D04	Entran	August 4, 1997
Left Mid A-Post Y	F20-G12	Entran	August 7, 1997
Left Lower A-Post Y	I25-J13	Entran	August 6, 1997
Left Mid B-Post Y	I26-D04	Entran	August 7, 1997
Left Lower B-Post Y	I25-J19	Entran	August 7, 1997
Rear Floorpan Above Axle X	E23-R06	Entran	August 5, 1997
Rear Floorpan Above Axle Y	D05-R19	Entran	July 7, 1997
Rear Floorpan Above Axle Z	L18-E09	Entran	July 7, 1997
Driver Seat Track Y	F18-G08	Entran	August 7, 1997
Right Side Sill at Front Seat X	C14-Z08	Entran	August 1, 1997
Right Side Sill at Front Seat Y	E13-D01	Entran	August 1, 1997
Right Side Sill at Front Seat Z	A09-G05	Entran	August 1, 1997
Right Side Sill at Rear Seat X	E10-F04	Entran	August 7, 1997
Right Side Sill at Rear Seat Y	H02-J16	Entran	August 5, 1997
Right Side Sill at Rear Seat Z		Entran	
Left Side Sill at Front Seat Y	F11-G08	Entran	August 7, 1997

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO	MANUFACTURER	CALIBRATION DATE
Left Side Sill at Rear Seat Y	I26-D02	Entran	August 7, 1997
Right Rear Occupant Compartment Y	C25-A11	Entran	August 5, 1997
Vehicle CG X	J04-F10	Entran	August 7, 1997
Vehicle CG Y	F11-G04	Entran	August 7, 1997
Vehicle CG Z	J04-F12	Entran	August 7, 1997
Left Front Door on Centerline	A09-G09	Entran	August 5, 1997
Midrear of Left Front Door	F20-G01	Entran	August 7, 1997
Left Front Door Upper Centerline	MGA095	Entran	June 12, 1997
Midrear of Left Rear Door	F18-G03	Entran	August 7, 1997
Left Rear Door Upper Centerline	I26-D09	Entran	August 5, 1997

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