

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING
PASSENGER CARS

1998 TOYOTA AVALON
4-DOOR SEDAN
NHTSA NO: MW5104

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: December 5, 1997

Report Date: January 8, 1998

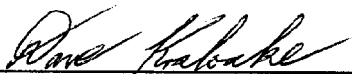
FINAL REPORT

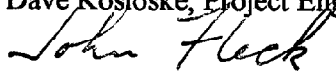
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TECHNICAL REPORT STANDARD TITLE PAGE

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15. Supplementary Notes																							
16. Abstract A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1998 Toyota Avalon 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 December 5, 1997. The impact velocity of the Moving Deformable Barrier (MDB) was 61.6 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 20 °C. The target vehicle post test maximum crush was 373 mm at level 2. The test vehicle's performance follows: <table border="0" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>DRIVER</u></th> <th style="text-align: center;"><u>PASS</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td style="text-align: center;">48</td> <td style="text-align: center;">55</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">51</td> <td style="text-align: center;">64</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">61</td> <td style="text-align: center;">67</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">56</td> <td style="text-align: center;">65</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">106</td> <td style="text-align: center;">108</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	48	55	Left Lower Rib (LLR) Accel., g	51	64	Lower Spine (T ₁₂) Accel., g	61	67	Thoracic Trauma Index (TTI)	56	65	Pelvis (PEV) Accel., g	106	108
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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																			
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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 Toyota Avalon 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 Toyota Avalon 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 38.3 mph (61.6 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 December 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)	56	65
Pelvis (g)	106	108

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/Toyota/Avalon/4-Door/Sedan
Vehicle NHTSA No.: MW5104 VIN: 4T1BF18B8WU229557
Vehicle Body Color: Blue Build Date: 11-97
Engine Data: 6 Cylinders; CID; 3.0 Liter; cc
Placement Longitudinal; X Lateral
Transmission: 4 Speed; Manual; X Automatic; X Overdrive
Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 57 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): 32 Psi FRONT
32 Psi REAR
Recommended Tire Size: P205/65R/15
Tires on Test Vehicle: P205/65R/15 Manufacturer: Bridgestone

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 Lever, X Power
Vehicle Maximum Capacity Loading = 474.0 kg (A)
No. of Occupants x 68.04 kg. = 408.2 kg (B)
Cargo Capacity (A-B) = 65.8 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>457.2</u> kg	Right Rear	=	<u>303.5</u> kg
Left Front	=	<u>482.6</u> kg	Left Rear	=	<u>285.3</u> kg
TOTAL FRONT	=	<u>939.8</u> kg	TOTAL REAR	=	<u>588.8</u> kg
% of Total Vehicle Weight	=	<u>61.5</u> %;	% of Total Weight	=	<u>38.5</u> %
TOTAL WEIGHT	=	<u>1528.6</u> kg			

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1528.6</u> kg
Cargo Carrying Capacity of Test Vehicle	=	<u>65.8</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>1755.8</u> kg

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

Right Front	=	<u>469.5</u> kg	Right Rear	=	<u>371.9</u> kg
Left Front	=	<u>525.7</u> kg	Left Rear	=	<u>387.8</u> kg
TOTAL FRONT	=	<u>995.2</u> kg	TOTAL REAR	=	<u>759.7</u> kg
% of Total Weight	=	<u>56.7</u> %	% of Total Weight	=	<u>43.3</u> %
TOTAL TEST WEIGHT	=	<u>1754.9</u> kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 696 mm Left Front 700 mm Right Rear 708 mm Left Rear 700 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 689 mm Left Front 683 mm Right Rear 666 mm Left Rear 649 mm

TEST ATTITUDE:

Right Front 690 mm Left Front 687 mm Right Rear 669 mm Left Rear 653 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2716 mm

C.G. = 1155 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4575 mm

Centerline = 4811 mm

Left Side = 4575 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 225 mm

Test Position: 133 mm from foremost position

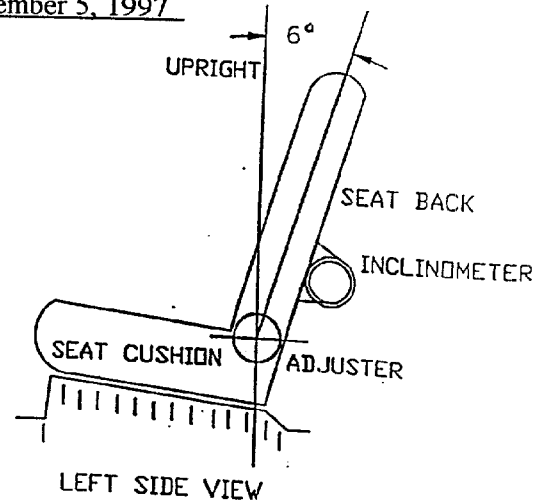
FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = +6° from first locking position

SECOND POSITION SEAT:

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

Seat Back Adjustment Position: Non-adjustable



ADJUSTABLE STEERING COLUMN POSITION: 3rd up from lowest being #1

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 = 18.5 gallons

Test Volume: 17.1 gallons 92 % of capacity

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

Wheelbase: = 2716 mm

Impact Point is 418 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan
Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997
Overall Length = 4811 mm; Overall Width = 1798 mm

TEST WEIGHT:

Right Front = 473.5 kg Right Rear = 367.0 kg
Left Front = 532.1 kg Left Rear = 376.9 kg
TOTAL FRONT = 1005.6 kg TOTAL REAR = 743.9 kg
% of Total Weight = 57.5 % % of Total Weight = 42.5 %
TOTAL VEHICLE WEIGHT = 1749.5 kg
Wheelbase = 2716 mm
Longitudinal C.G. from Center of Front Axle = 1155 mm
Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (284 mm above ground) = 180 mm
2. LEVEL 2 (475 mm above ground) = 373 mm
3. LEVEL 3 (594 mm above ground) = 358 mm
4. LEVEL 4 (902 mm above ground) = 349 mm
5. LEVEL 5 (1342 mm above ground) = 83 mm

Maximum Post-Test Intrusion = 373 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>frontal and</u> <u>side airbag</u>	<u>type II belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels:	=	<u>25</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/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 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: 38.30 mph (61.6 kph) Secondary: 38.39 mph (61.8 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>179</u> mm |
| 2. | Row B Mid Stack (686 mm) | = <u>112</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = <u>78</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = <u>126</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 5

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to window sill and side airbag</u>	<u>to C-pillar and header</u>
Arm	<u>to inflated side airbag</u>	<u>to rear door above</u>
		<u>armrest</u>
Pelvis	<u>to armrest</u>	<u>to door panel</u>
Left Knee	<u>to mid door</u>	<u>to door panel</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 18 mm rearward Vertical: 8 mm high

ARM REST LOCATIONS:

Front: 234 mm from bottom of window
Rear: 250 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 93 mm Front Seat Cushion: 98 mm
Left Rear Seat Back: 105 mm Rear Seat Cushion: 105 mm

GLAZING DAMAGE:

Impact side windows shattered and windshield cracked

PILLAR PERFORMANCE:

No separation noted

SILL SEPARATION:

No separation noted

OTHER NOTABLE IMPACT EFFECTS:

Driver's side airbag deployed

AIRBAG DEPLOYMENT STATUS:

	<u>DRIVER</u>	<u>PASSENGER</u>
Frontal	<u>No</u>	<u>No</u>
Side	<u>Yes</u>	<u>No</u>

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

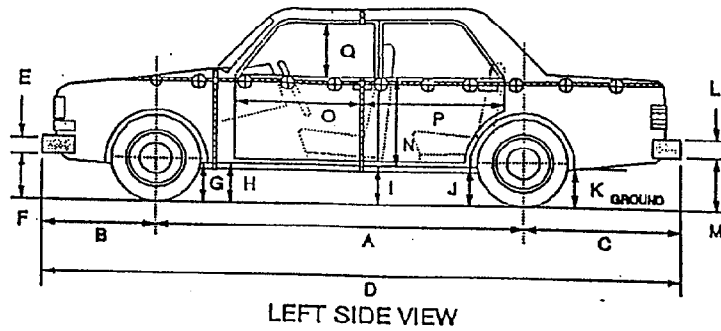
Year/Make/Model/Body Style: 1998 Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104
Test Date: December 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)	Max (g)	Time (msec)
RIB ACCELERATIONS							
47.6	37	-16.9	76	55.4	52	-7.8	129
51.4	38	-12.6	92	64.1	44	-18.5	69
SPINE ACCELERATIONS							
61.1	33	-16.0	67	66.5	45	-14.6	74
PELVIS ACCELERATIONS							
106.3	31	-16.5	87	108.2	38	-9.6	76

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	2716	2700	16
B	960	970	10
C	1135	1135	0
D	4811	4805	6
E	130	130	0
F	420	421	1
G	191	198	7
H	199	212	13
I	186	205	19
J1/J2	180/177	199/198	19/21
K	199	222	23
L	200	200	0
M	336	357	21
N	678	582	96
O	678	638	40
P	1295	1234	61
Q	420	400	20
R	4575	4500	75
S	4575	4588	13
T	1798	1553	245

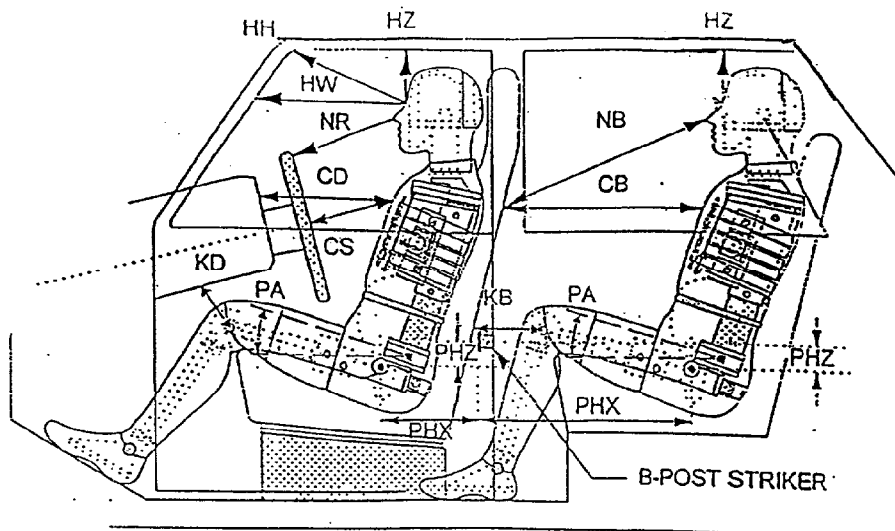
DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

NHTSA NO.: MW5104

Test Date: December 5, 1997



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

	DRIVER SID ID #272		LEFT REAR PASSENGER SID ID #271
HH	342	HZ	148
HW	552	NB	728
HZ	182	CB	640
NR	416	KBL (KBA)	336 (0.0°)
CD	524	KBR (KBA)	350 (0.0°)
CS	287	PA°	23.2°
KDL(KDA°)	178 (27.6°)	PHX	223
KDR(KDA°)	180 (28.7°)	PHZ	324
PA°	23.8°		
PHX	200		
PHZ	188		

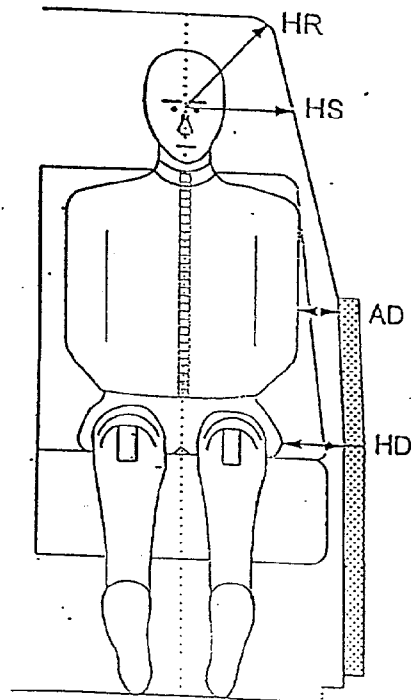
NOTE:

2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle 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/Toyota/Avalon/4-Door/Sedan

NHTSA NO.: MW5104 Test Date: December 5, 1997



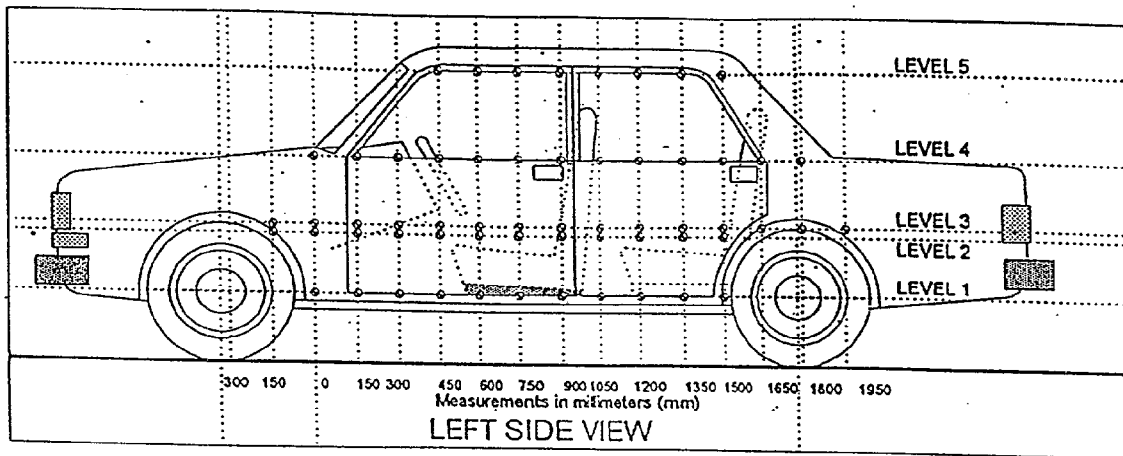
NOTE: All dimensions are in mm

	DRIVER SID ID #272	LEFT REAR PASSENGER SID ID #271
HR	242	188
HS	340	240
AD	80	106
HD	160	161

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

NHTSA NO.: MW5104 Test Date: December 5, 1997



MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED"
CONFIGURATION ALONG THE VERTICAL BARRIER CENTERLINE SHOWN ABOVE

Level 1 @ Axle Centerline Height	
(or Sill Top Height)	= <u>284</u> mm
Level 2 @ Occupant H-Point	= <u>475</u> mm
Level 3 @ Mid Door	= <u>594</u> mm
Level 4 @ Window Sill	= <u>902</u> mm
Level 5 @ Window Top	= <u>1342</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)	720	748	28
150	725	870	145
300	730	893	163
450	732	904	172
600	732	905	173
750	740	907	167
900	735	908	173
1050	735	910	175
1200	735	915	180
1350	732	888	156
1500	730	857	127
1650	727	812	85
1800	724	770	46

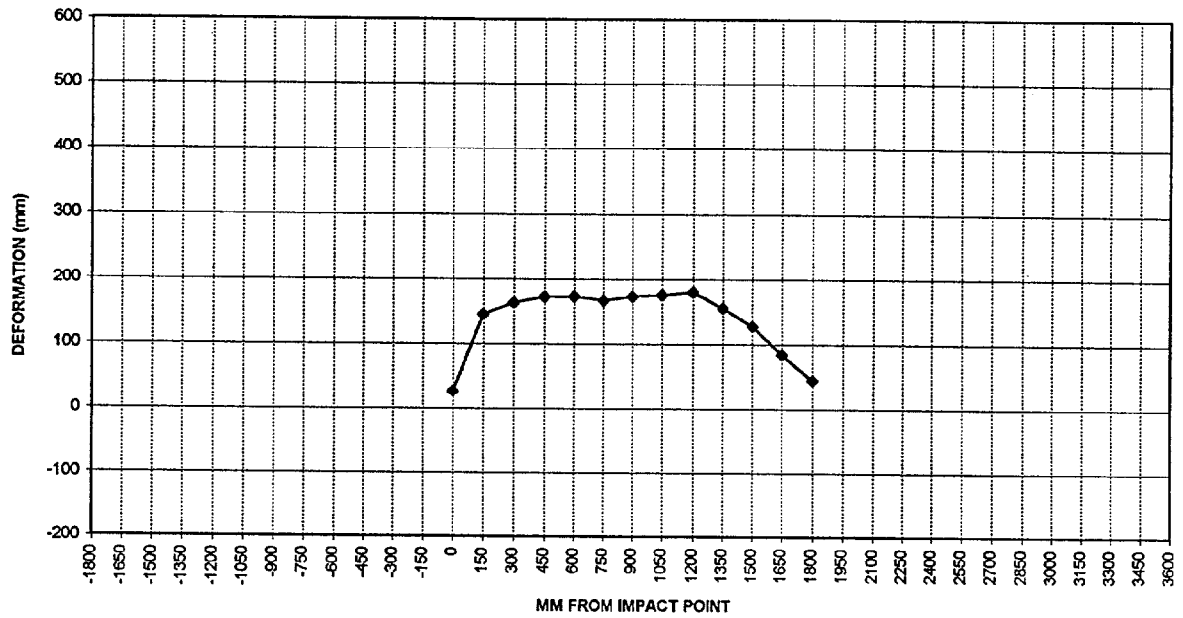
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

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			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	682	683	1
150	680	954	274
300	680	1001	321
450	680	1020	340
600	680	1037	357
750	681	1045	364
900	682	1055	373
1050	682	1054	372
1200	682	1024	342
1350	681	1022	341
1500	680	998	318
1650	678	970	292
1800	679	928	249

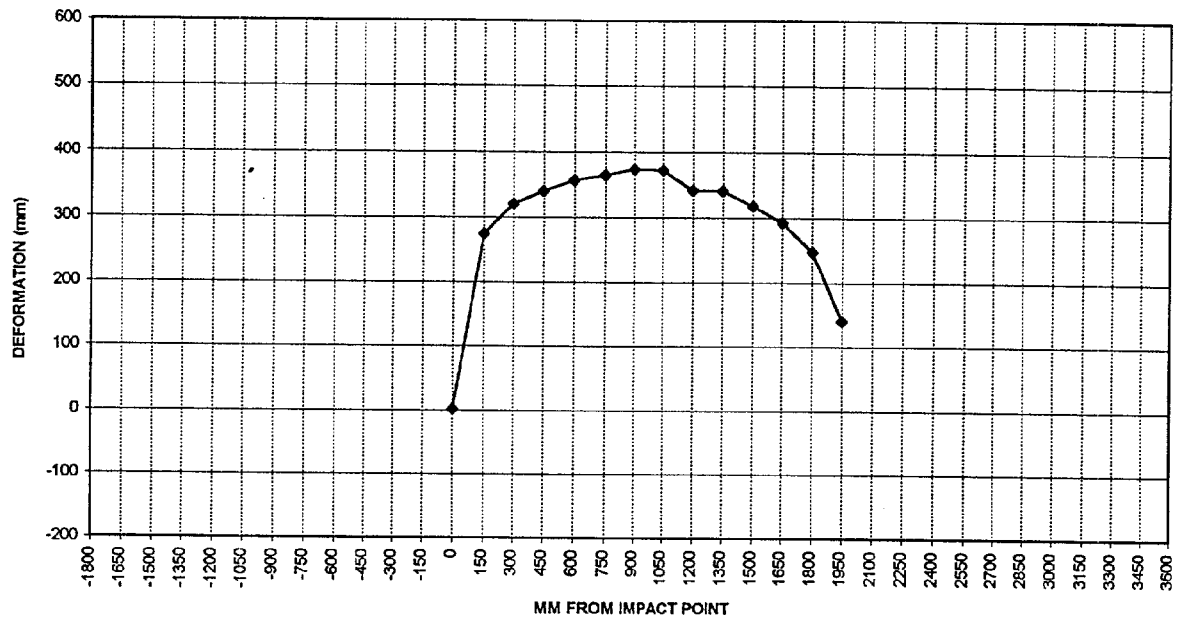
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

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	679	820	141
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 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			
-1050	722	765	43
-900	722	738	16
-750	722	714	-8
-600			
-450			
-300			
-150	678	688	10
0 (impact point)	680	690	10
150	682	914	232
300	682	959	277
450	682	985	303
600	682	1003	321
750	681	1012	331
900	681	1024	343
1050	682	1034	352
1200	682	1040	358
1350	681	1024	343
1500	680	1010	330
1650	679	984	305
1800	680	959	279

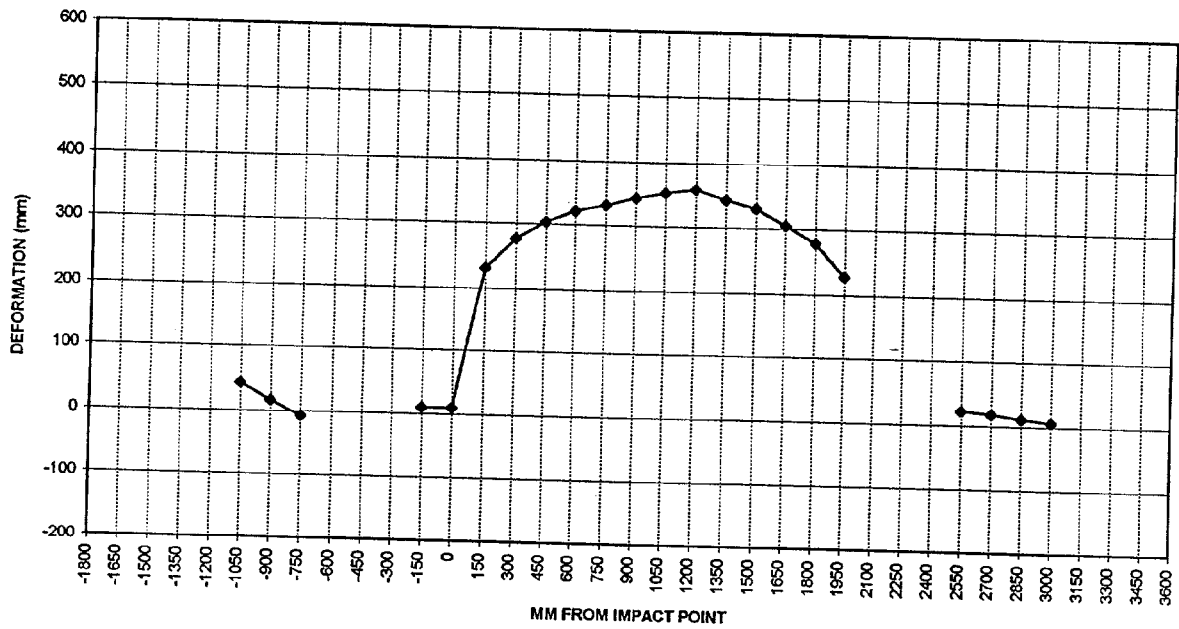
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

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	680	910	230
2100			
2250			
2400			
2550	690	712	22
2700	706	724	18
2850	723	734	11
3000	740	746	6
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 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			
-1050	830	847	17
-900	800	821	21
-750	784	806	22
-600	770	794	24
-450	756	784	28
-300	748	778	30
-150	739	774	35
0 (impact point)	731	771	40
150	728	822	94
300	728	893	165
450	725	940	215
600	725	992	267
750	725	1006	281
900	725	1015	290
1050	726	1035	309
1200	726	1075	349
1350	726	1055	329
1500	726	1039	313
1650	730	1032	302
1800	734	981	247

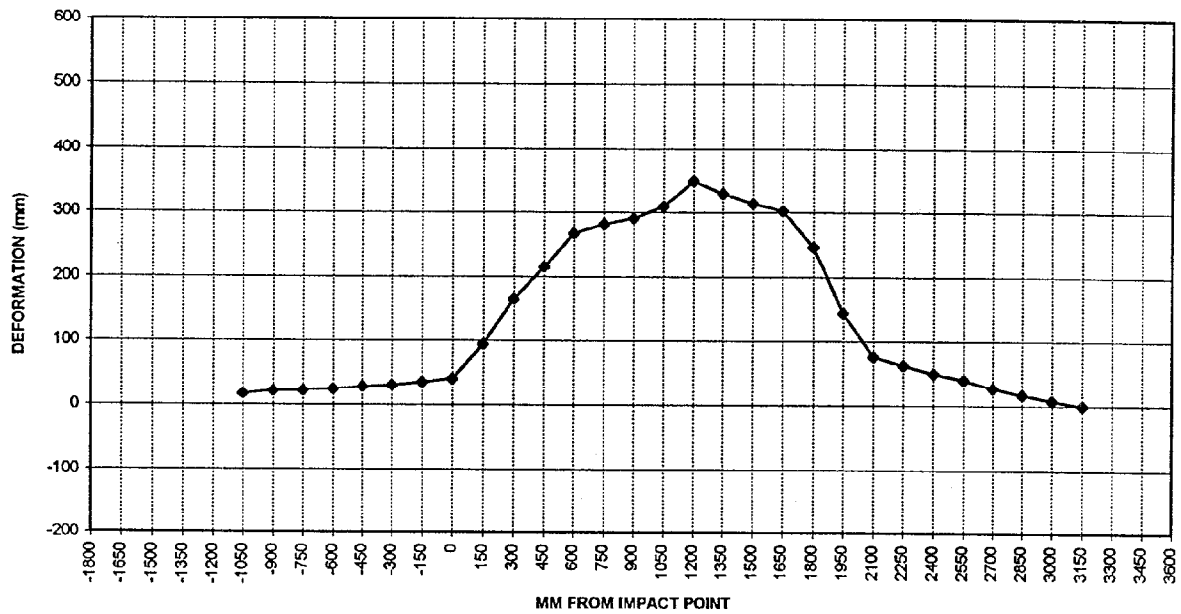
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

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	738	882	144
2100	744	820	76
2250	748	811	63
2400	758	808	50
2550	768	808	40
2700	782	809	27
2850	797	814	17
3000	815	823	8
3150	835	835	0
3300			
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	964	1009	45
900	955	955	0
1050	955	972	17
1200	954	994	40
1350	954	1037	83
1500	957	982	25
1650	959	943	-16
1800	964	907	-57

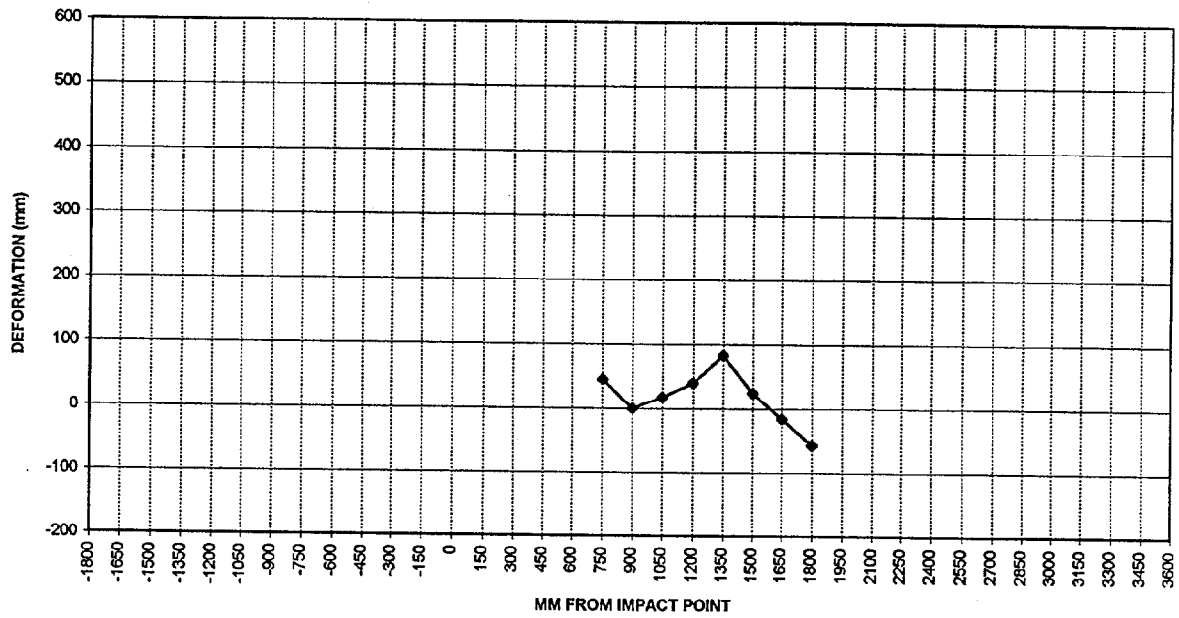
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

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			
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



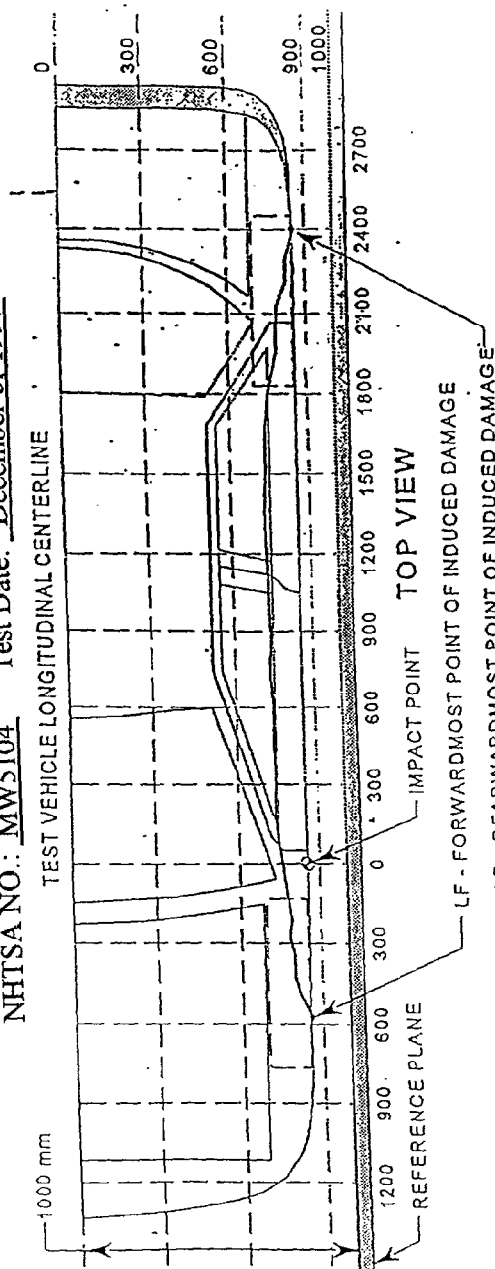
LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

NHTSA NO.: MW5104 Test Date: December 5, 1997



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

Maximum Crush: Level 2 Location: 1050 Depth: 373 mm

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = -750 mm)	714	714	0
2. 0 mm	771	731	40
3. 750 mm	1045	681	364
4. 1500 mm	1010	680	330
5. 2250 mm	820	748	72
6. (LR = 3000 mm)	835	835	0

DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

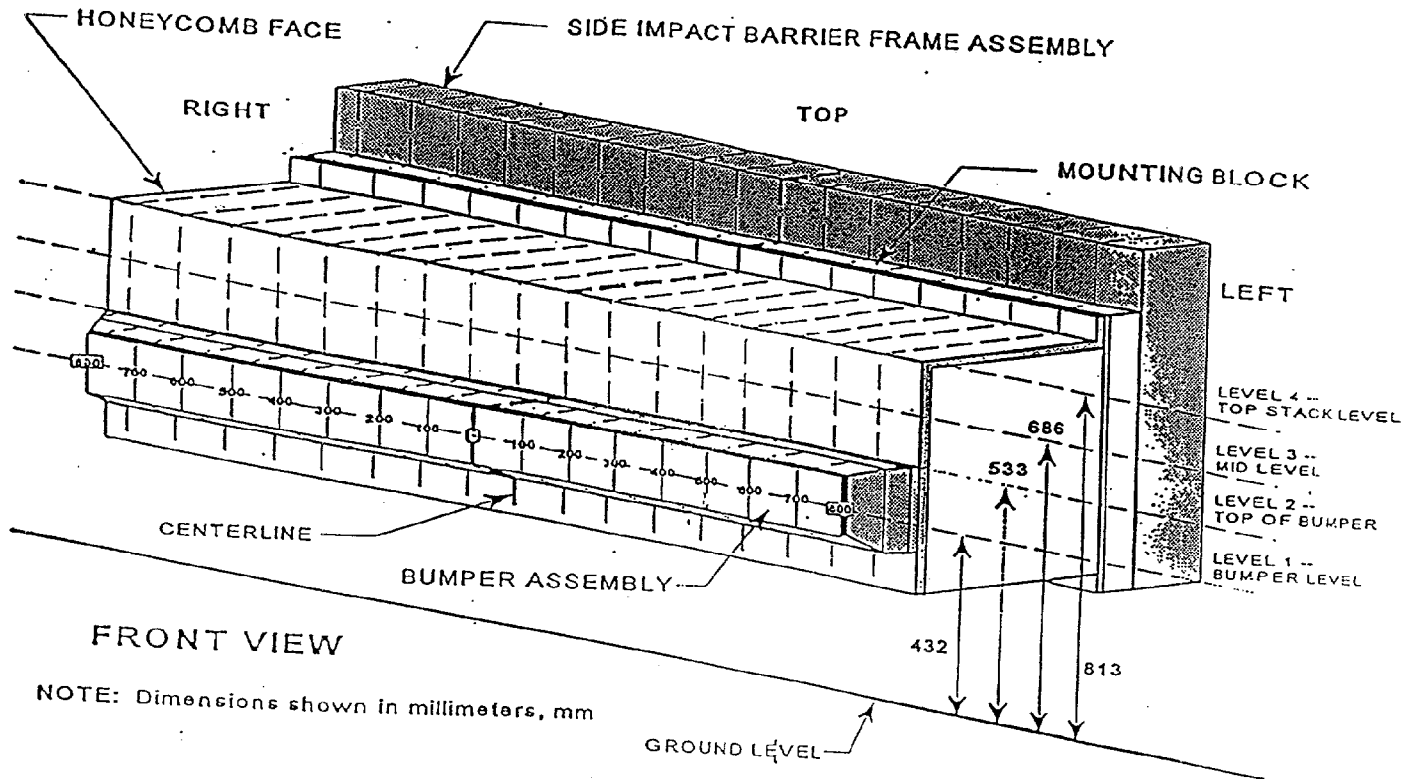
Year/Make/Model/Body Style: 1998/ Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

		Distance Right of Center (mm)									Distance Left of Center (mm)							
Location	Height at CL	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	51	1	-8	-8	-5	-3	0	2	5	8	12	15	20	83	78	107	179
Mid Level Level 3	686 mm	40	7	-2	-4	-4	-3	1	3	3	5	7	9	12	18	31	59	112
Top Bumper Level 2	533 mm	49	39	26	19	14	16	17	13	13	18	19	26	32	41	43	59	78
Mid Bumper Level 1	432 mm	124	118	107	98	97	97	85	75	70	71	73	75	79	83	90	109	126

See next page for Barrier Face Graphic

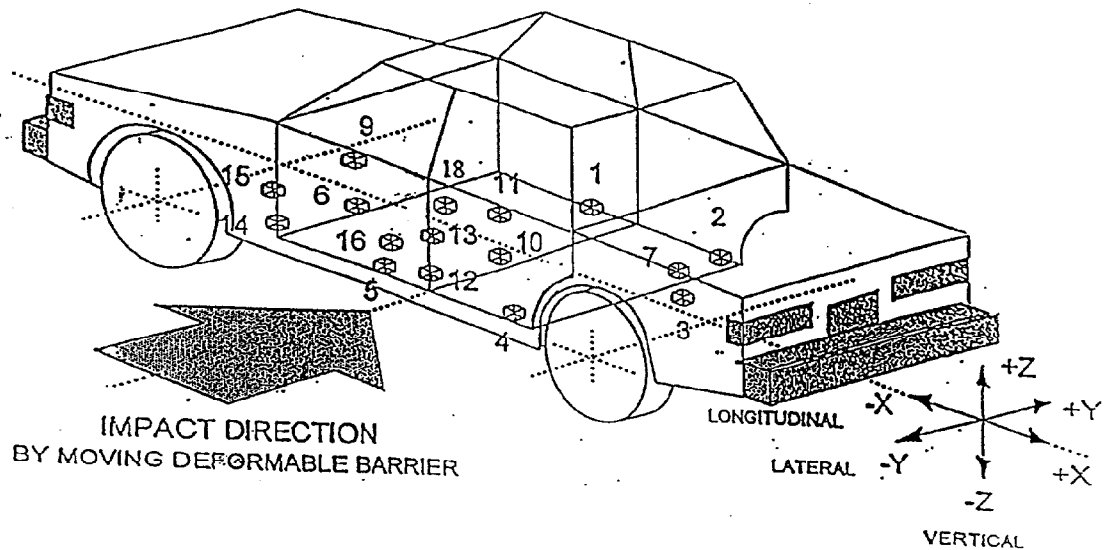
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 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
- 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
- 18-Vehicle C.G.

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 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	2682	706	208	5.4	-4.0	21.6	-3.1	(1)	(1)	---
2	Rt. Side Sill @ Rear Seat	1564	710	205	5.2	-3.1	24.5	-3.3	4.1	-6.3	24.9
3	Rr. Floorpan Above Axle	1170	0	440	1.1	-6.4	23.9	-2.8	14.7	-5.6	24.0
4	Left Side Sill @ Rr. Seat	1628	-706	225	---	---	36.8	-5.2	---	---	---
5	Left Side Sill @ Frt. Seat	2705	-710	218	---	---	27.9	-4.5	---	---	---
6	Left Front Door Centerline	2738	-762	643	---	---	284.9	-124.9	---	---	---
7	Right Rear Occupant Compartment	1985	378	240	---	---	21.7	-2.8	---	---	---
8	Left Front Door Mid Rear	2374	-764	664	---	---	126.8	-110.3	---	---	---
9	Left Front Door Upper Centerline	2729	-760	858	---	---	250.1	-63.6	---	---	---
10	Left Rear Door Mid Rear	1802	-801	684	---	---	174.1	-144.2	---	---	---
11	Left Rear Door Upper Centerline (3)	1825	-757	858	---	---	236.0	-93.5	---	---	---
12	Left Lower B-Post	2244	-698	349	---	---	67.7	-60.7	---	---	---
13	Left Mid B-Post	2230	-750	882	---	---	132.2	-34.6	---	---	---
14	Left Lower A-Post	3274	-700	320	---	---	98.8	-132.5	---	---	---
15	Left Mid A-Post (2)	3285	-773	904	---	---	22.4	-3.5	---	---	---
16	Driver Left Seat Track	2493	-584	348	---	---	72.5	-43.7	---	---	---
18	Vehicle CG	2867	0	290	2.9	-11.3	19.4	-2.5	13.8	-9.5	22.0

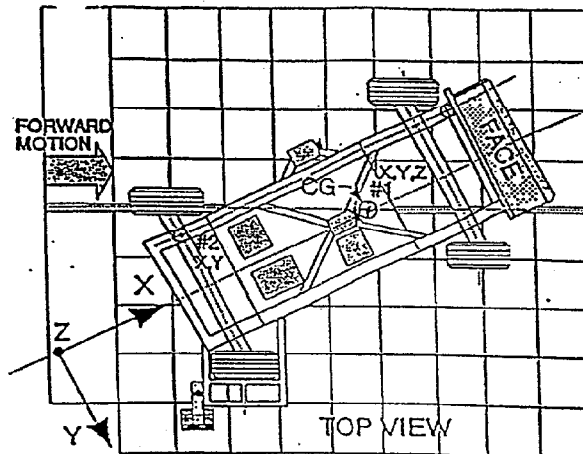
*Reference: X - Rear Bumper (+ Forward) (1) No valid data collected
Y - Vehicle Centerline (+ To right) (2) Data not valid after 33 msec.
Z - Ground Level (+ Up) (3) Data not valid after 20 msec.

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997



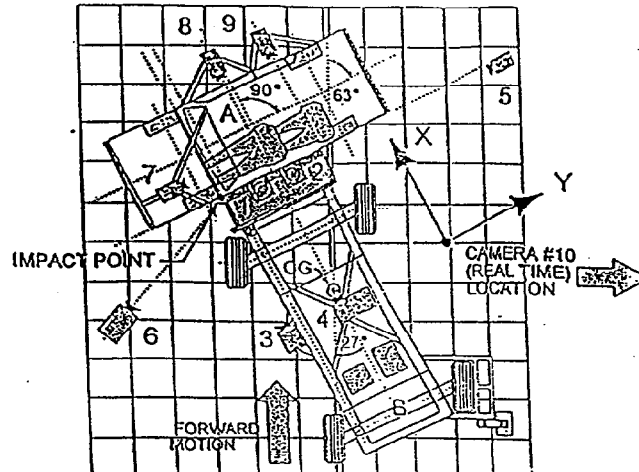
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	5.9	103	-18.3	38
	Lateral (Y)	---	---	---	2.5	104	-5.7	31
	Vertical (Z)	---	---	---	25.7	37	-26.1	43
	Resultant (R)	---	---	---	31.8	37	---	---
2	Rear Frame Member	-2591	-625	622				
	Longitudinal (X)	---	---	---	2.5	100	-25.9	33
	Lateral (Y)	---	---	---	3.9	28	-3.4	104

*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/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997



Camera No.	View	Coordinates (mm)*			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
	Real Time						
6	Left Impact	-440	-2610	1660		13	877
8	Onboard Driver					13	1000
9	Onboard Passenger					8	1205
7	Onboard Hood					8	810
5	Right Impact	-590	10420	1660		25	885
1	Top Overall	-60	1360	5000		8	1064
2	Top Impact	270	20	5000		13	982
4	Cart Overall					13	1015
3	Cart Pointer					35	1010

* 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/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 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 38.3 mph (61.6 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

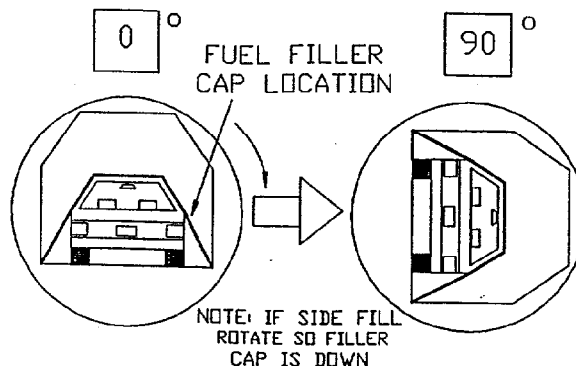
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 56 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 56 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

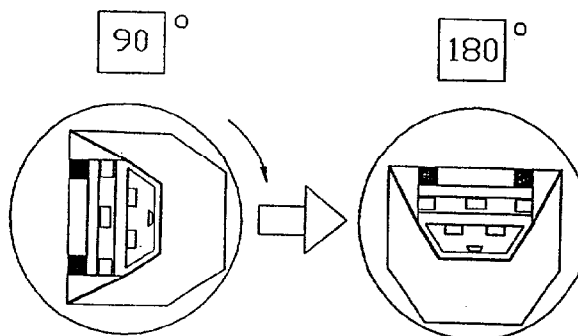
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 29 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 29 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

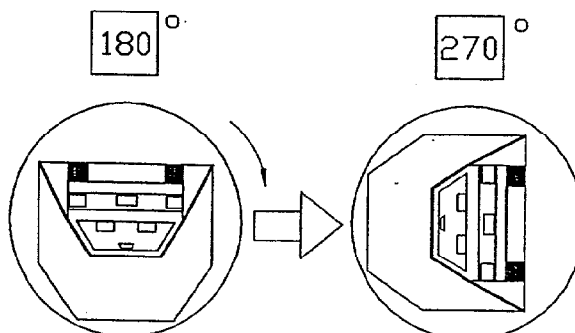
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 14 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 14 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

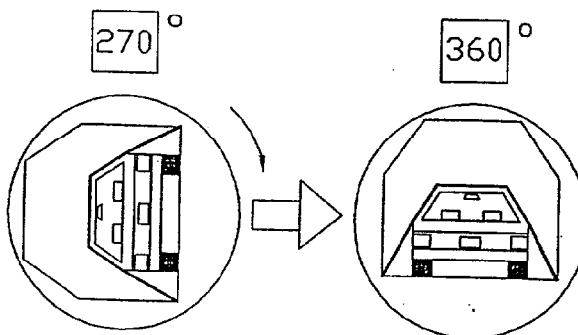
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Toyota/Avalon/4-Door/Sedan

Vehicle NHTSA No.: MW5104 Test Date: December 5, 1997

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 38 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 38 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

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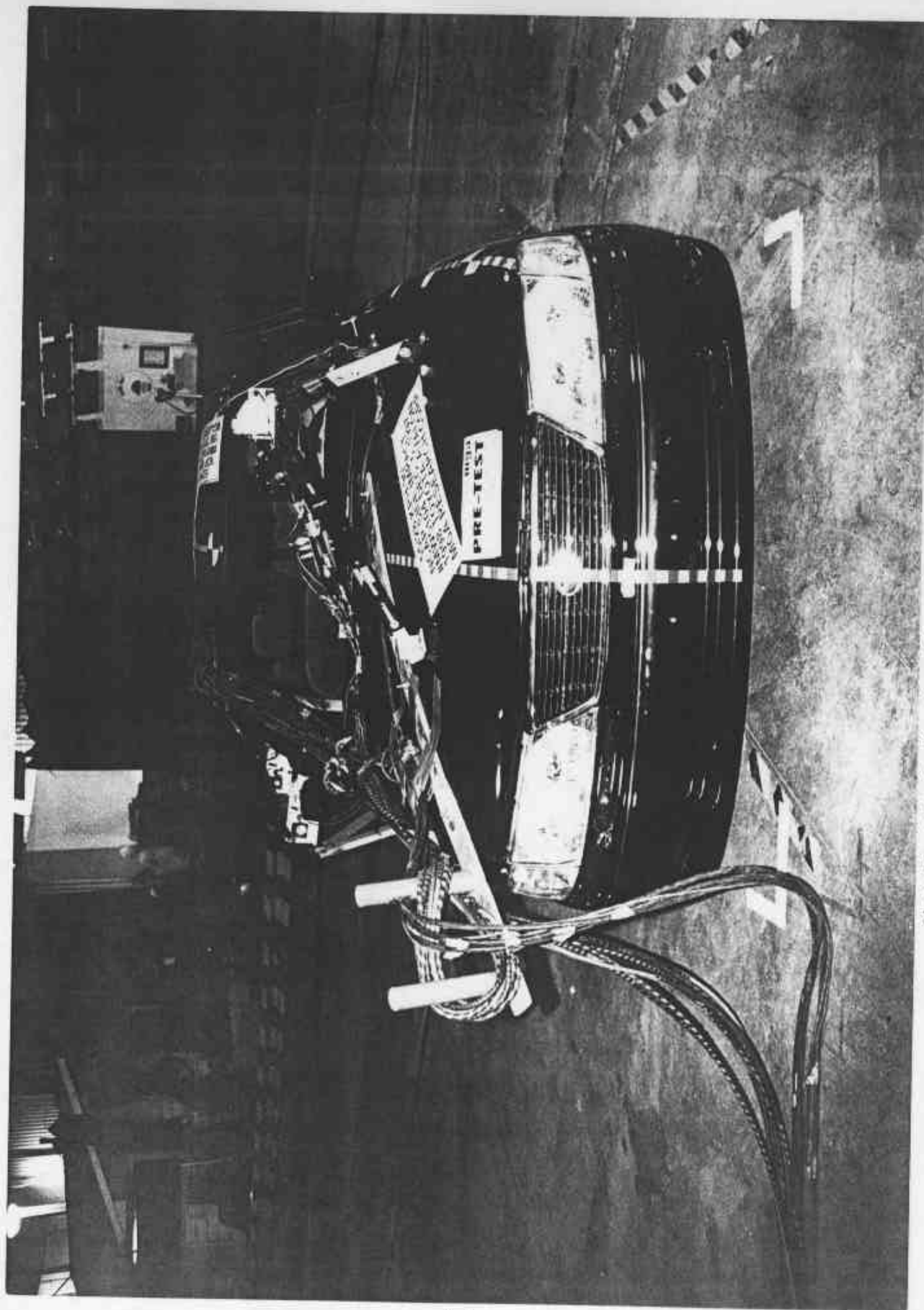


Photo No. A-1 - Pre-Test Front View of Test Vehicle

A-1

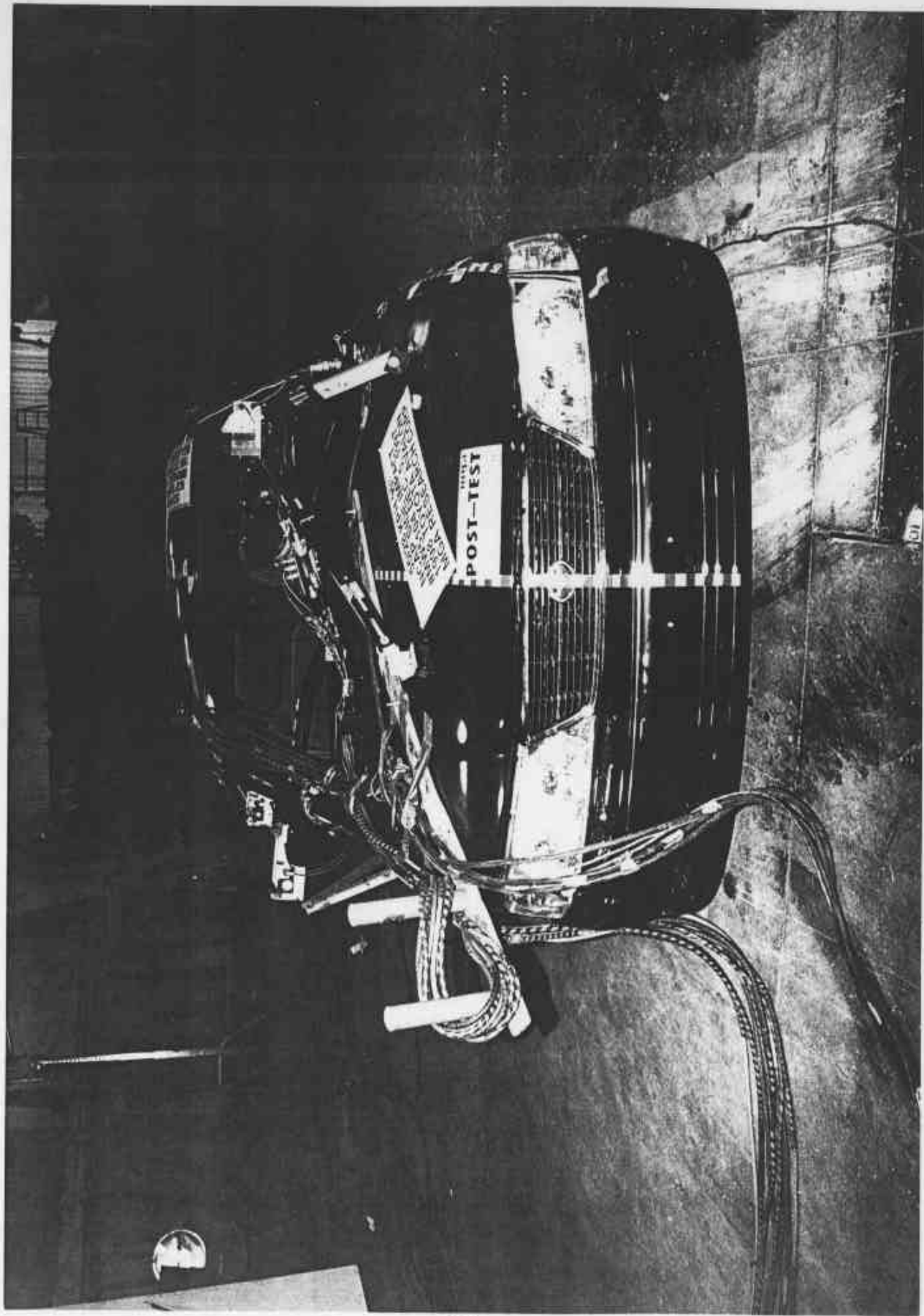


Photo No. A-2 - Post-Test Front View of Test Vehicle

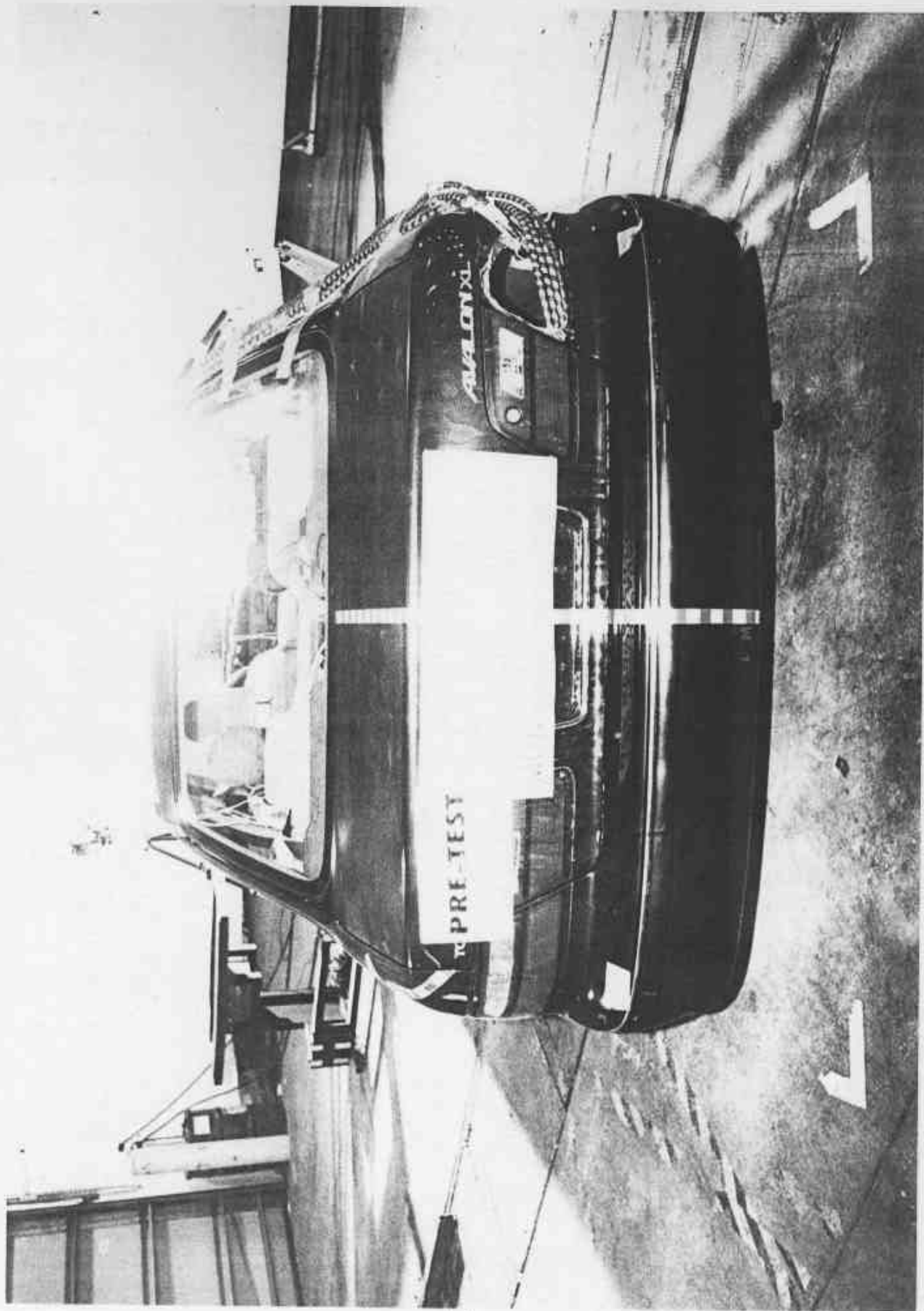


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

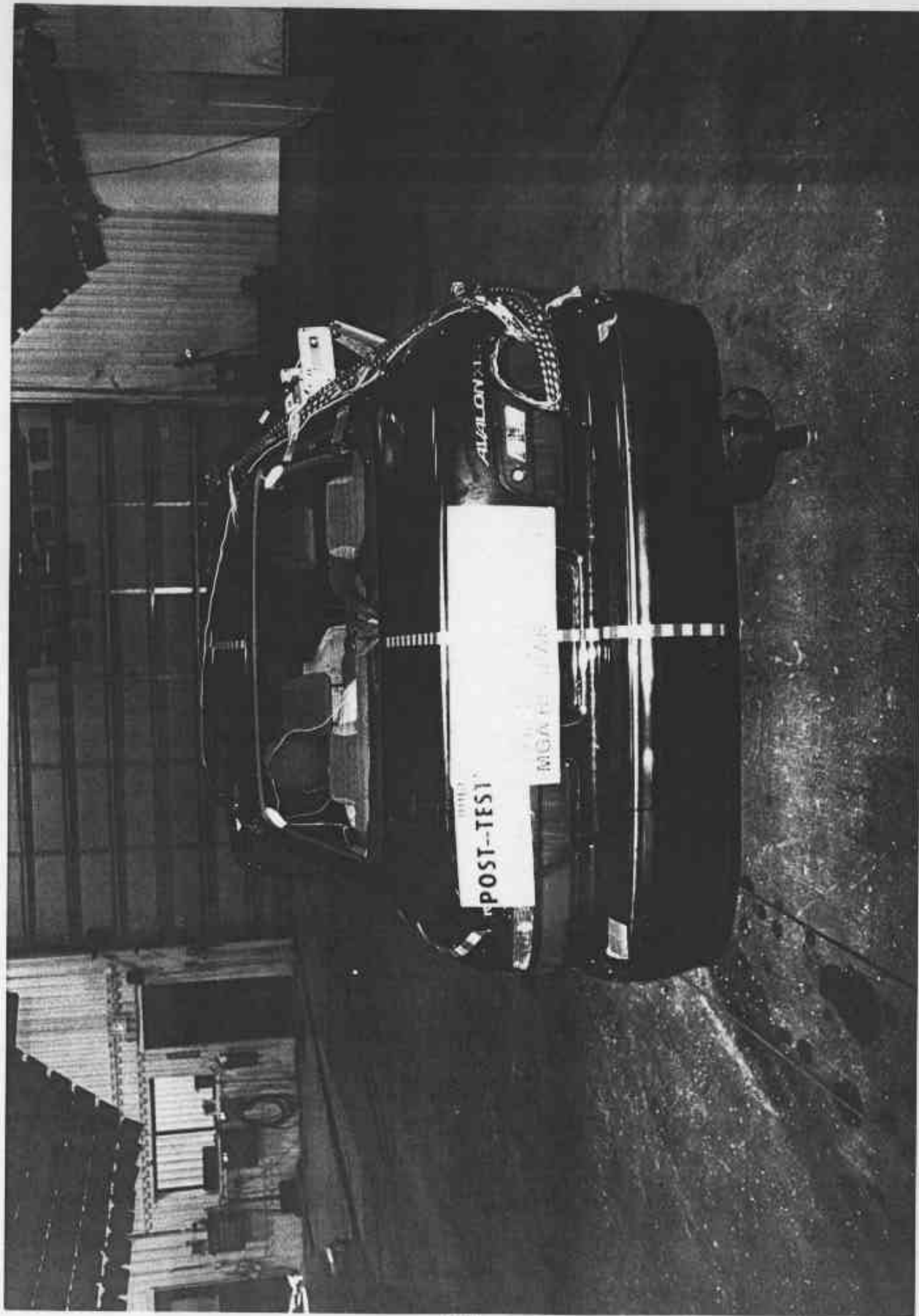
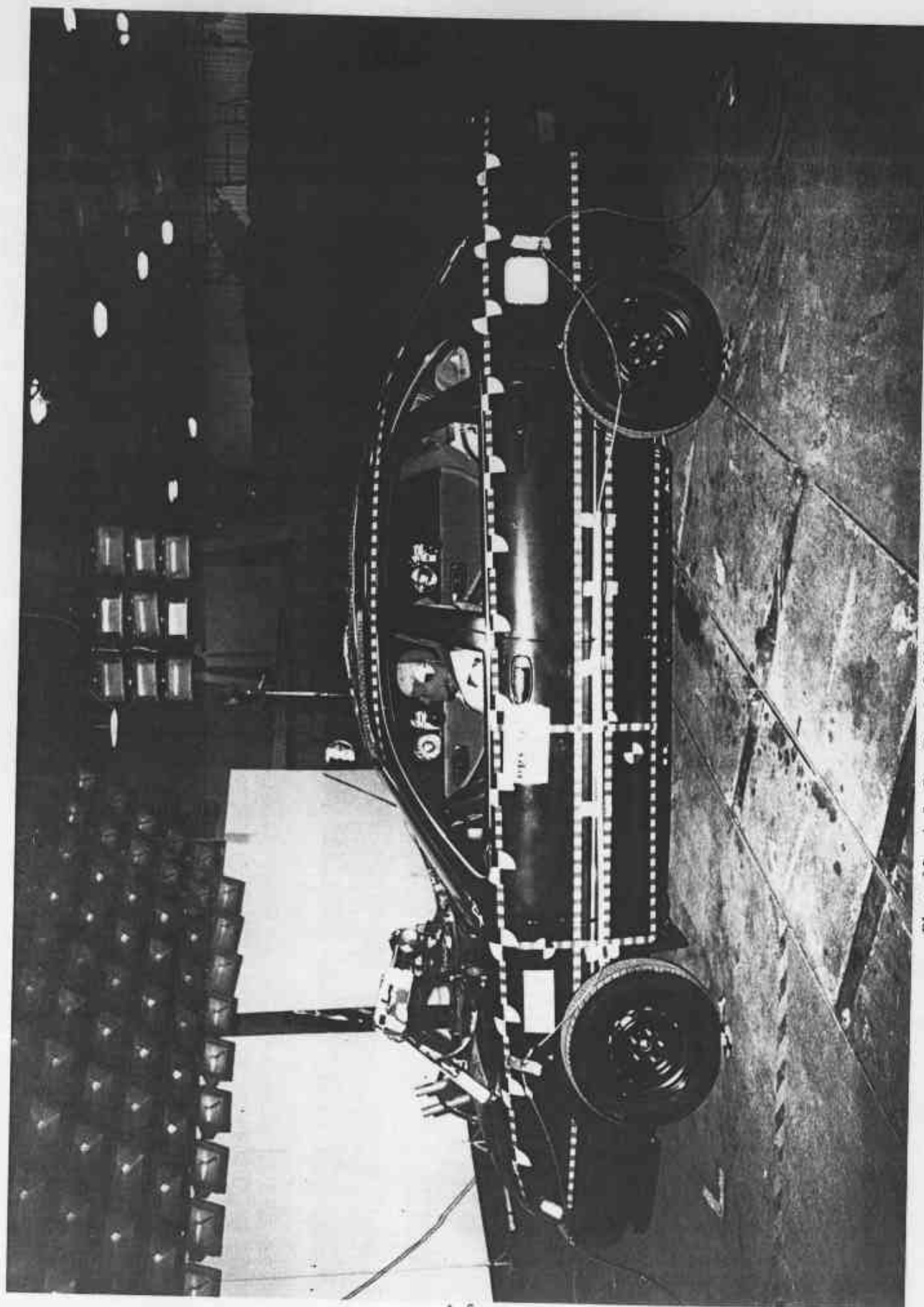


Photo No. A-4 - Post-Test Rear View of Test Vehicle



A-5

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

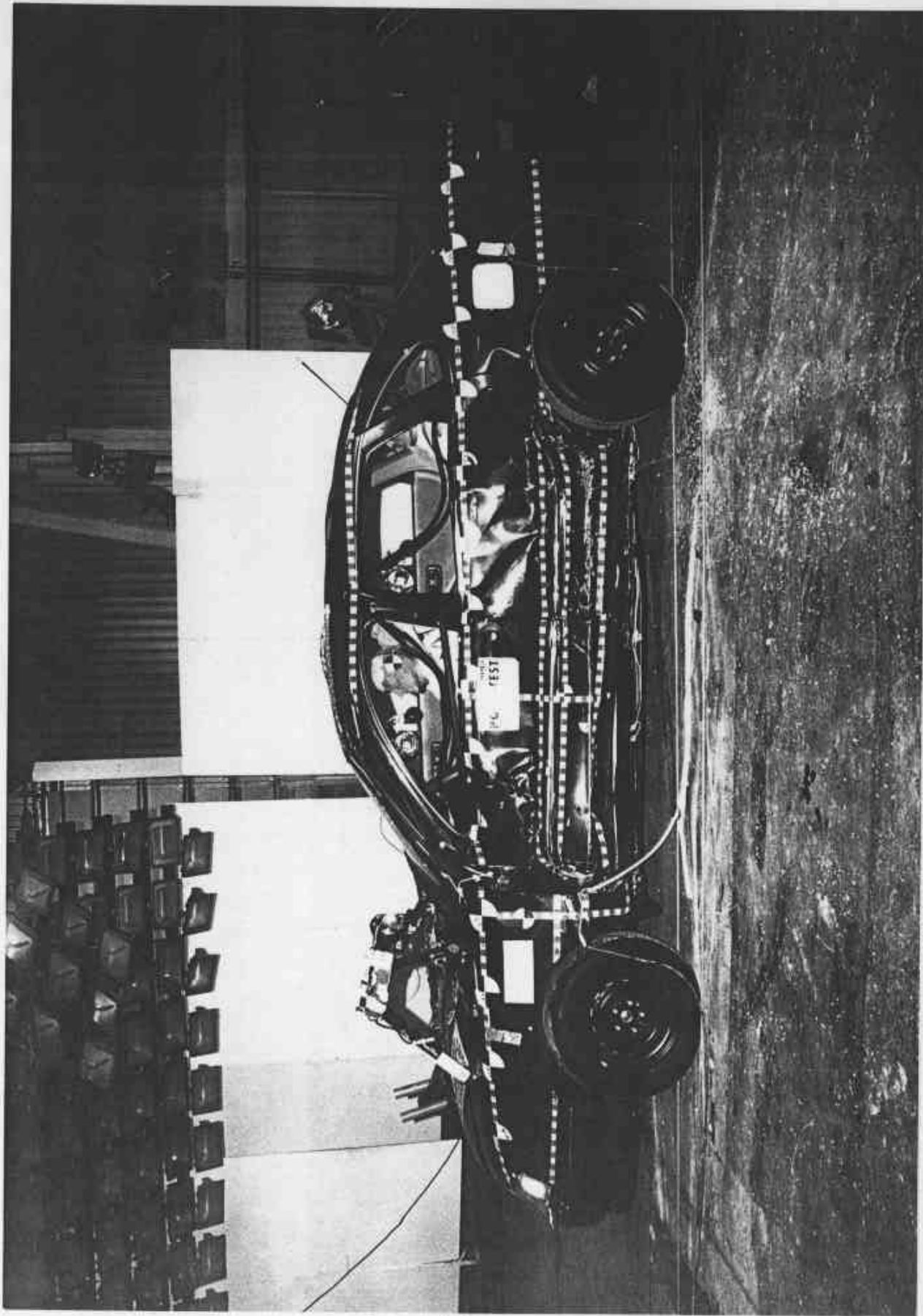
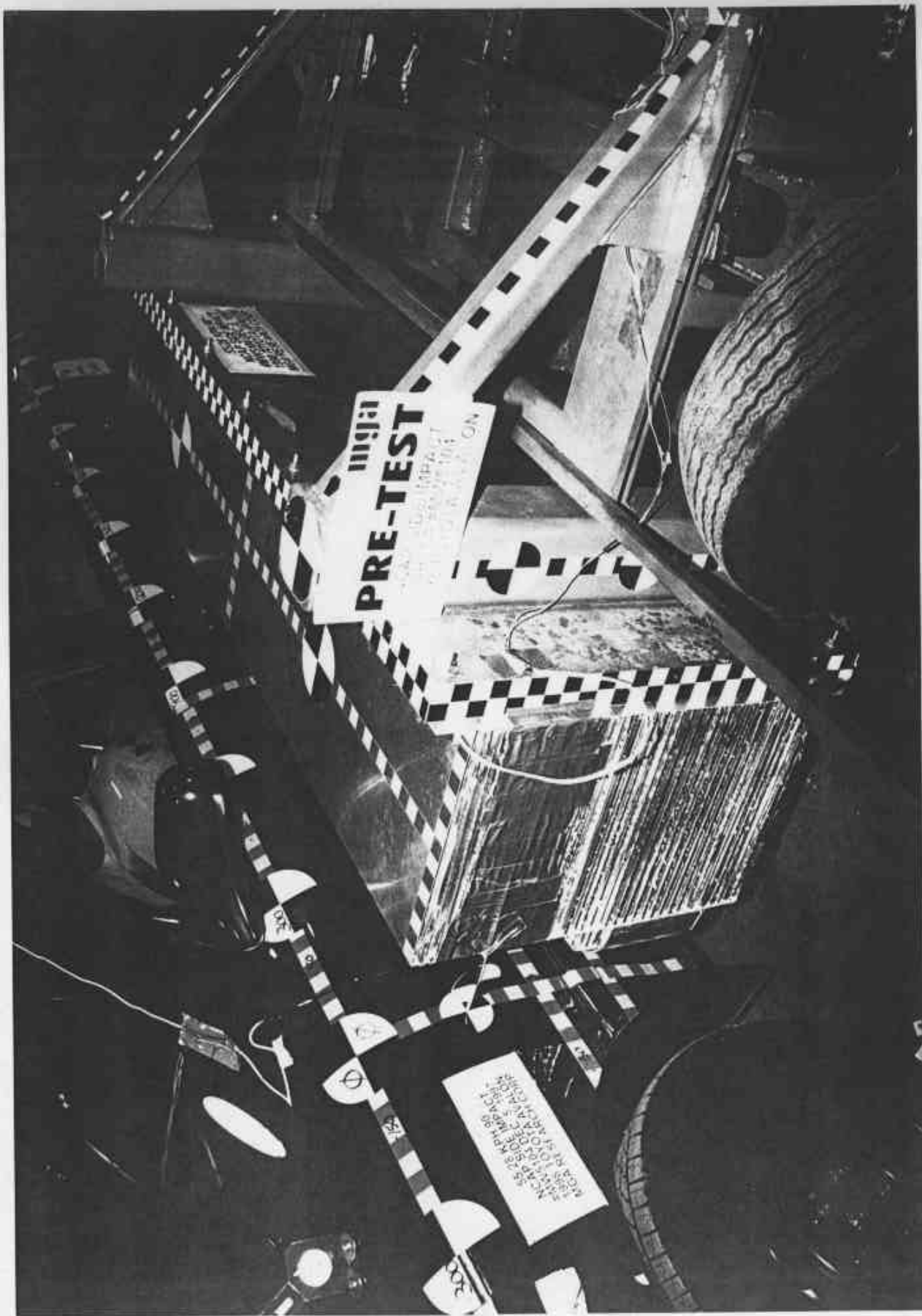


Photo No. A-6 - Post-Test Left Side View of Test Vehicle



A-7

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

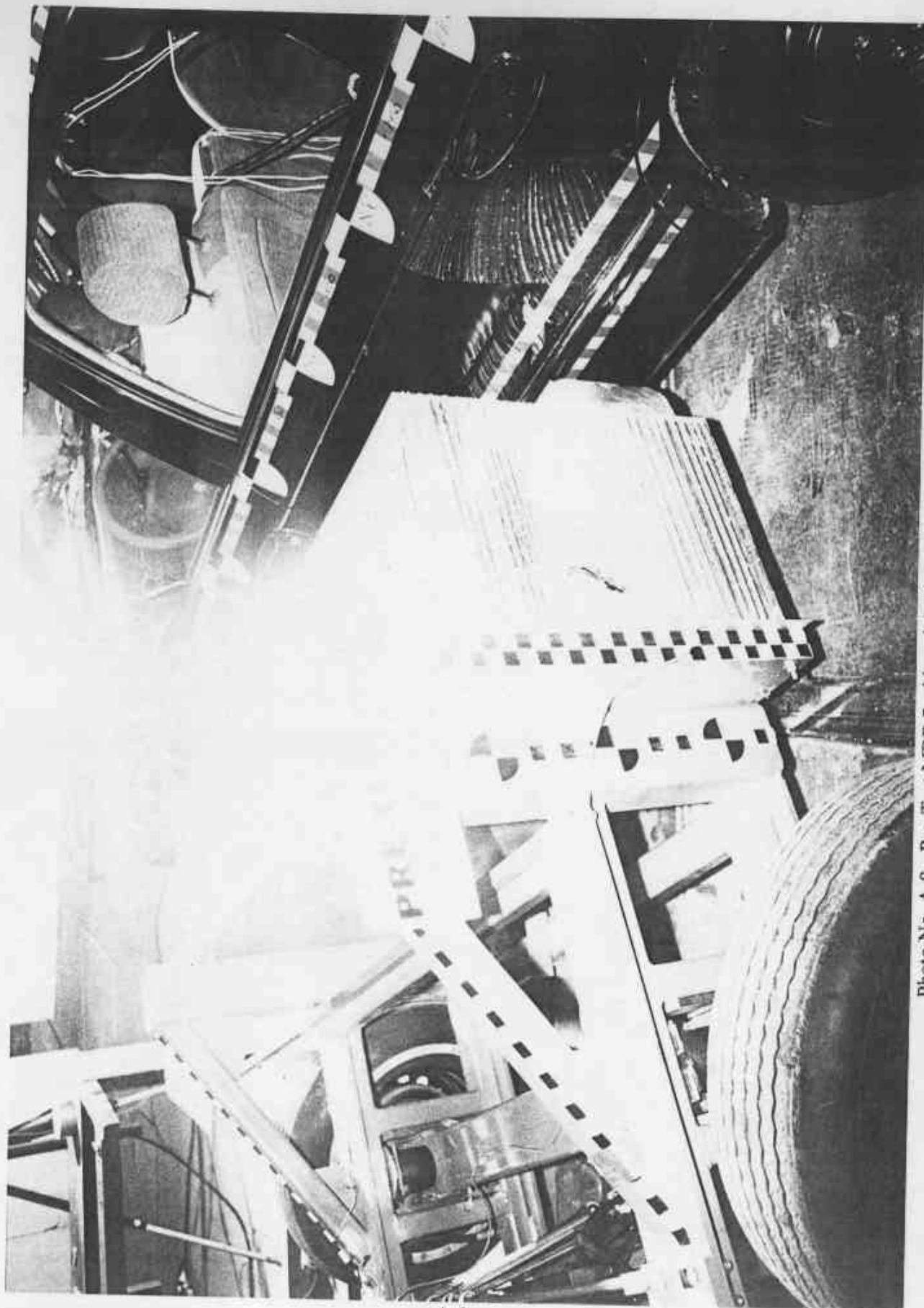


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

A-8

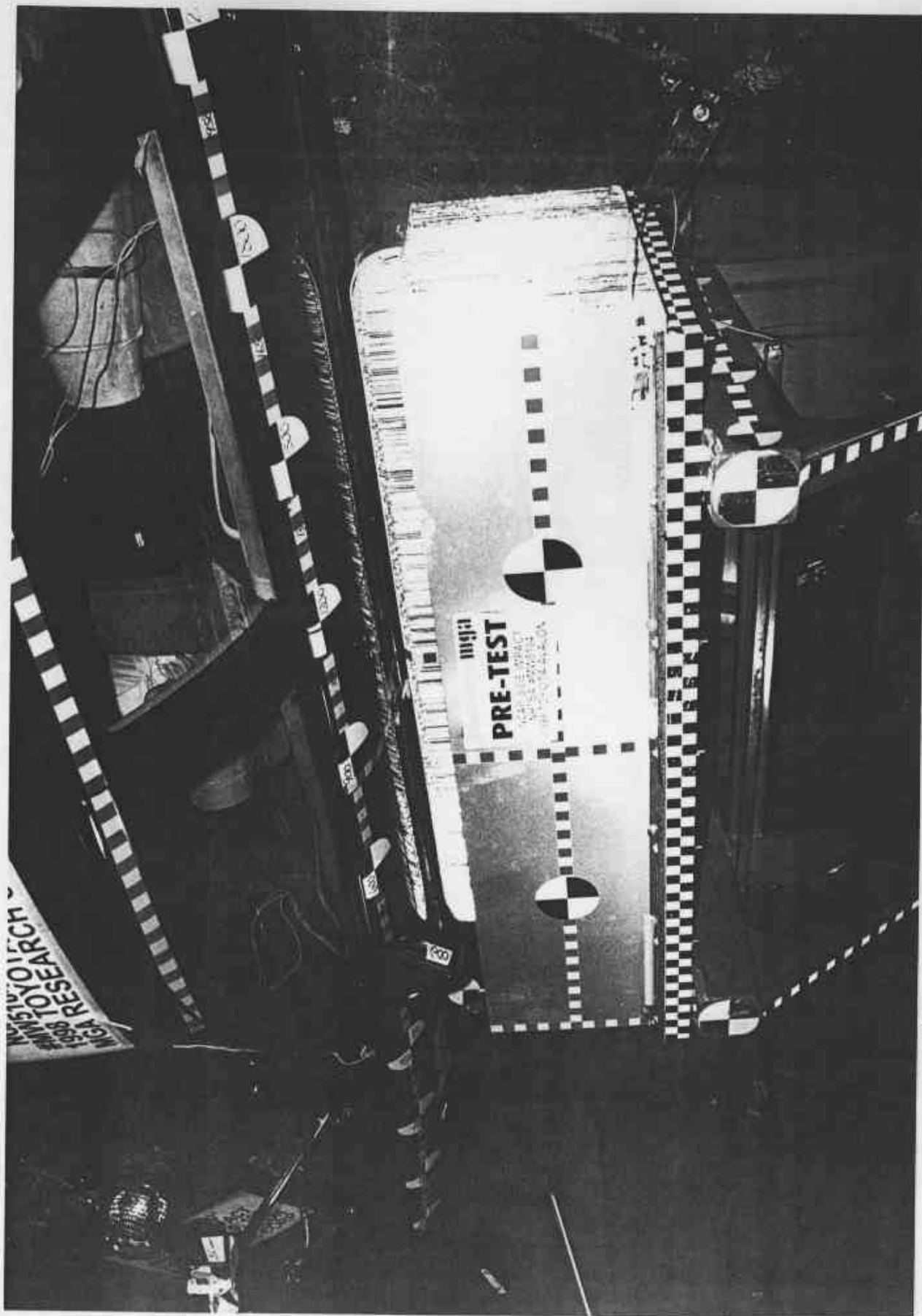


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

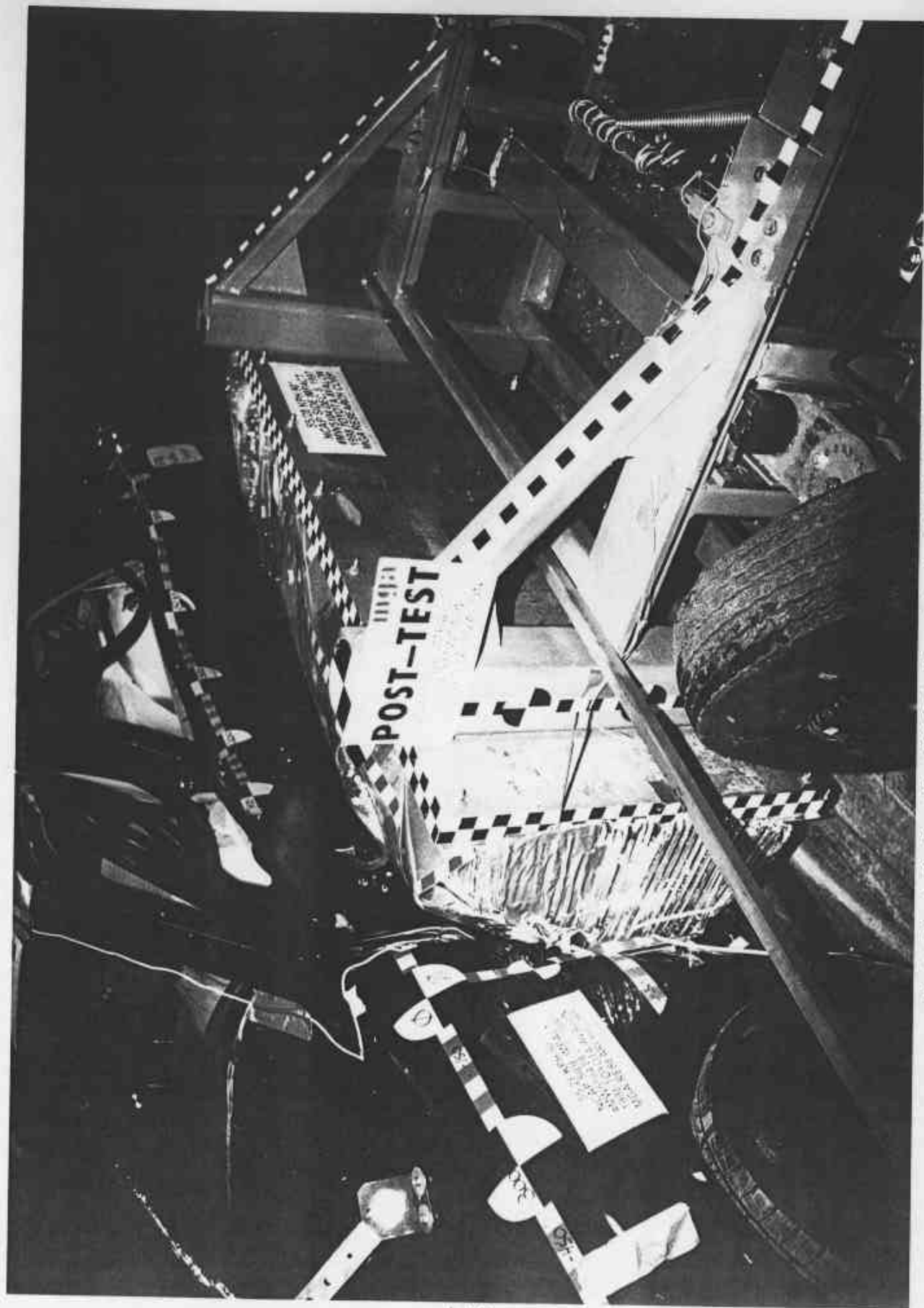


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

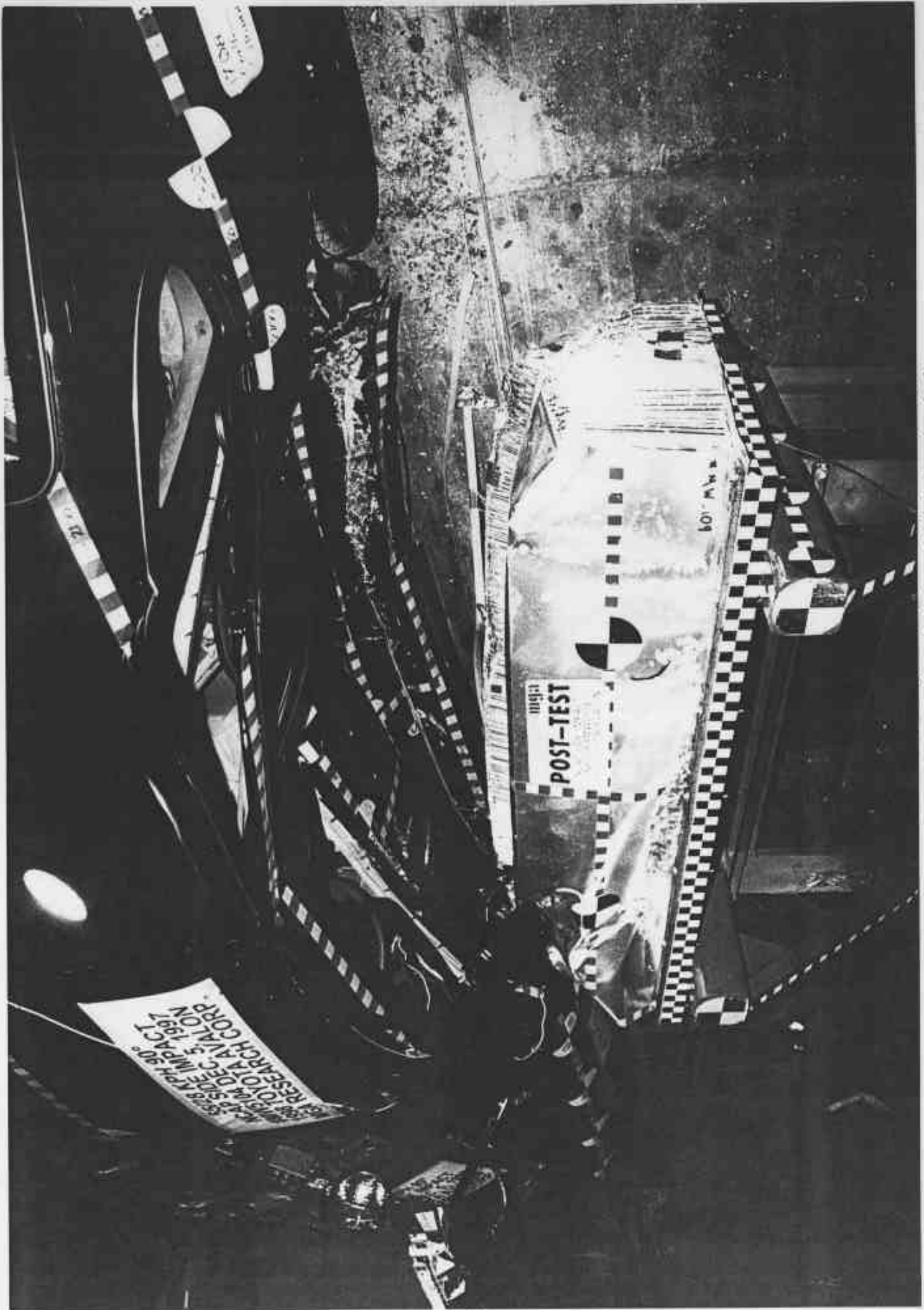


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View

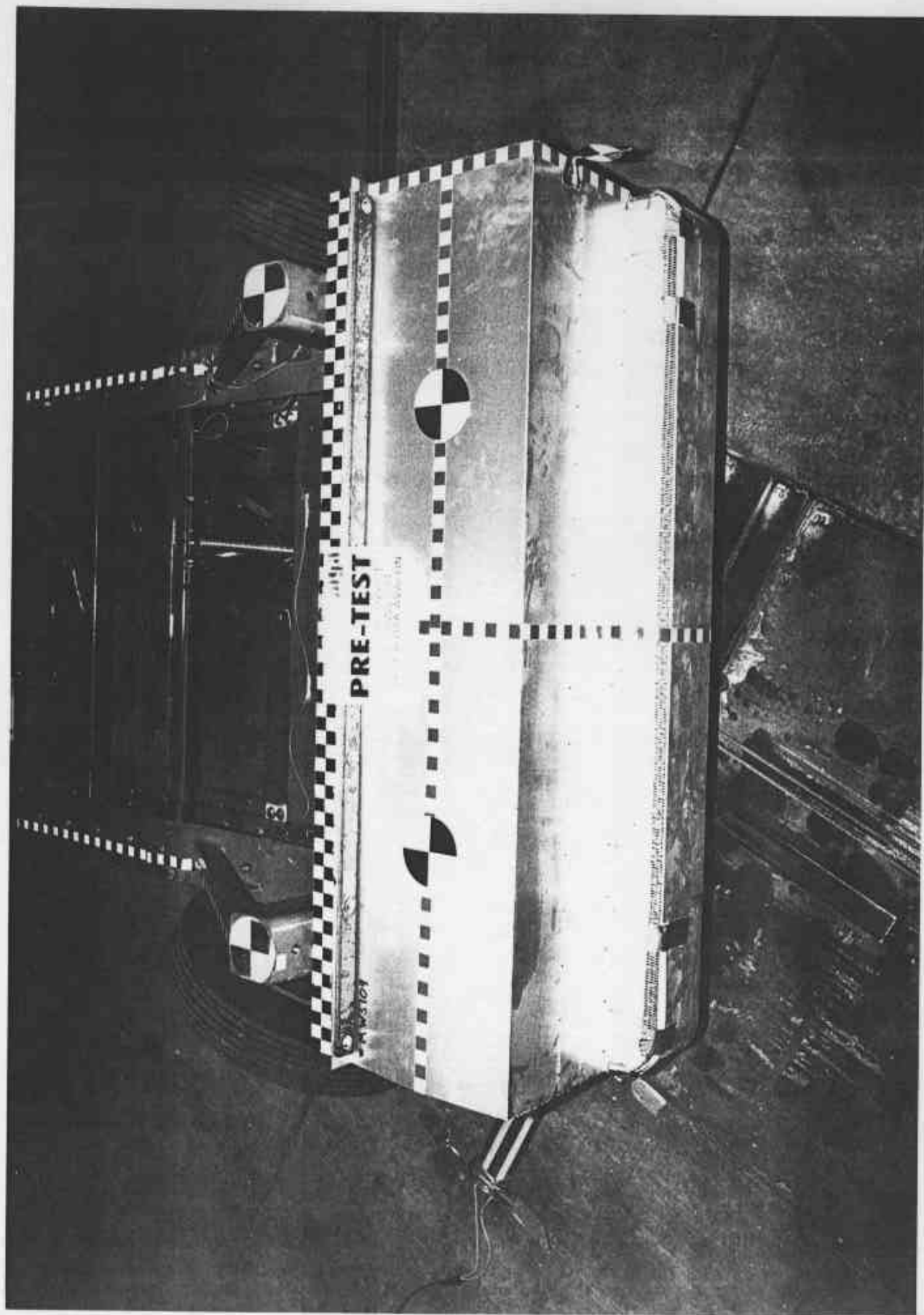


Photo No. A-13 - Pre-Test MDB Top View

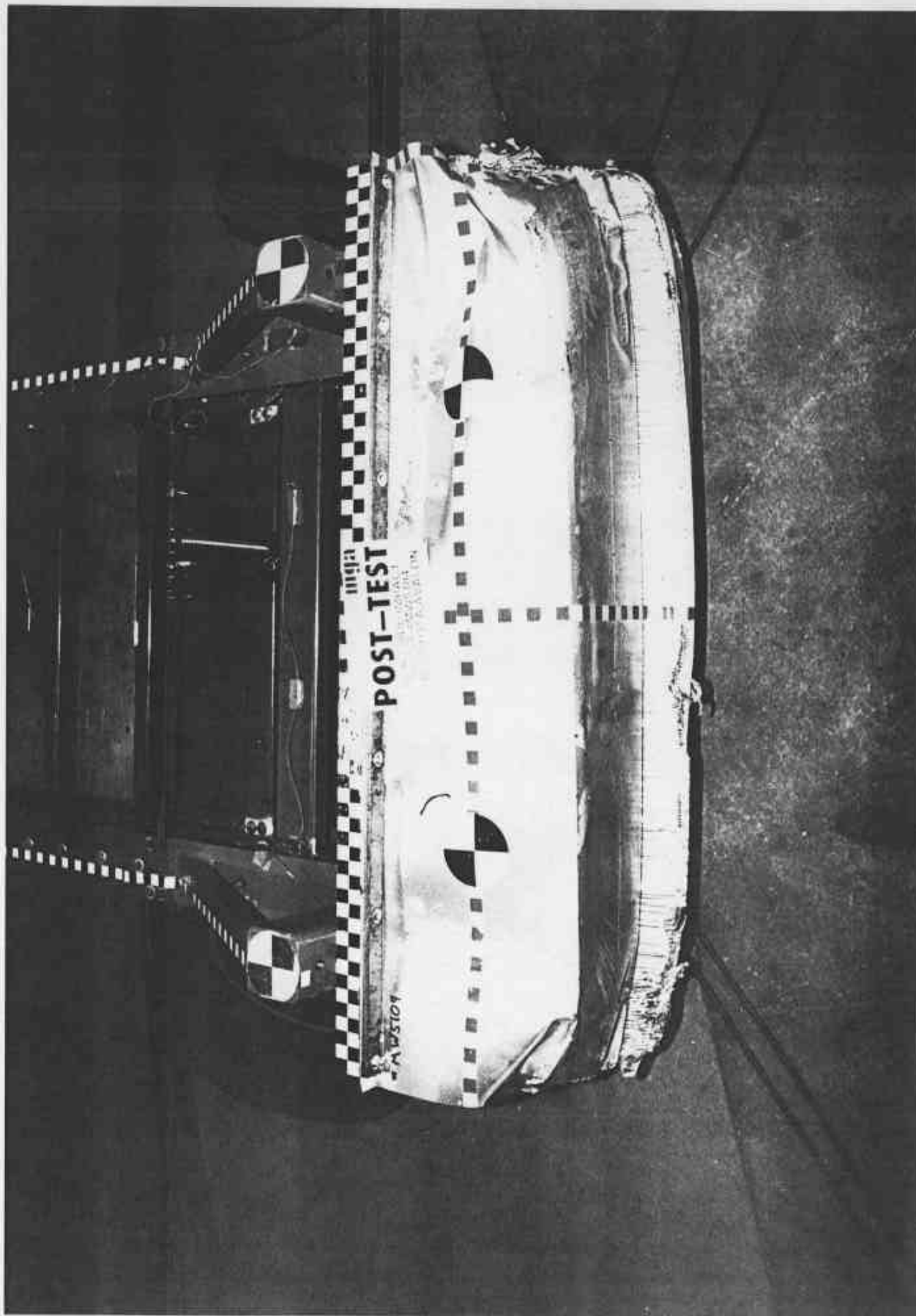


Photo No. A-14 - Post-Test MDB Top View

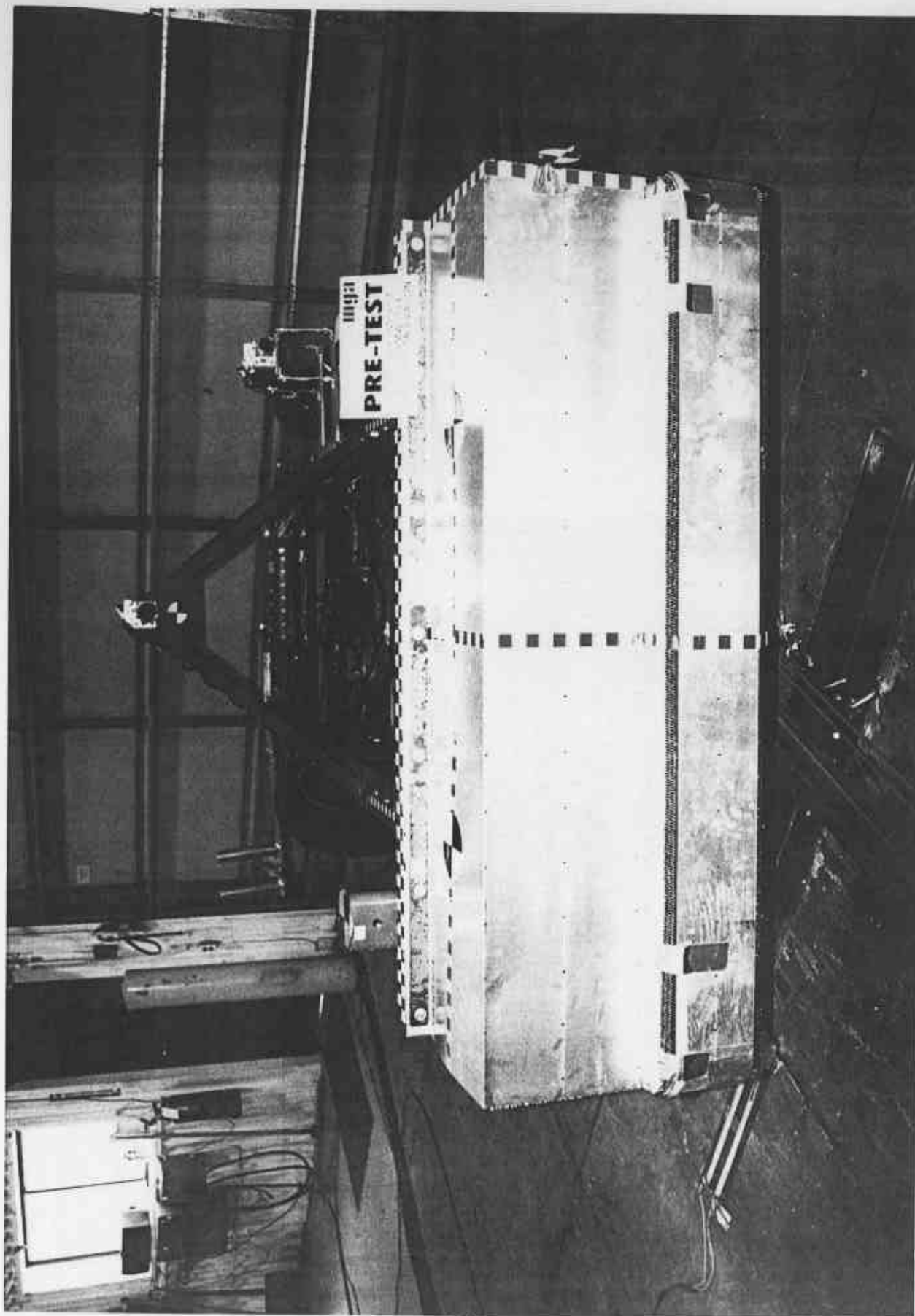


Photo No. A-15 - Pre-Test MDB Front View

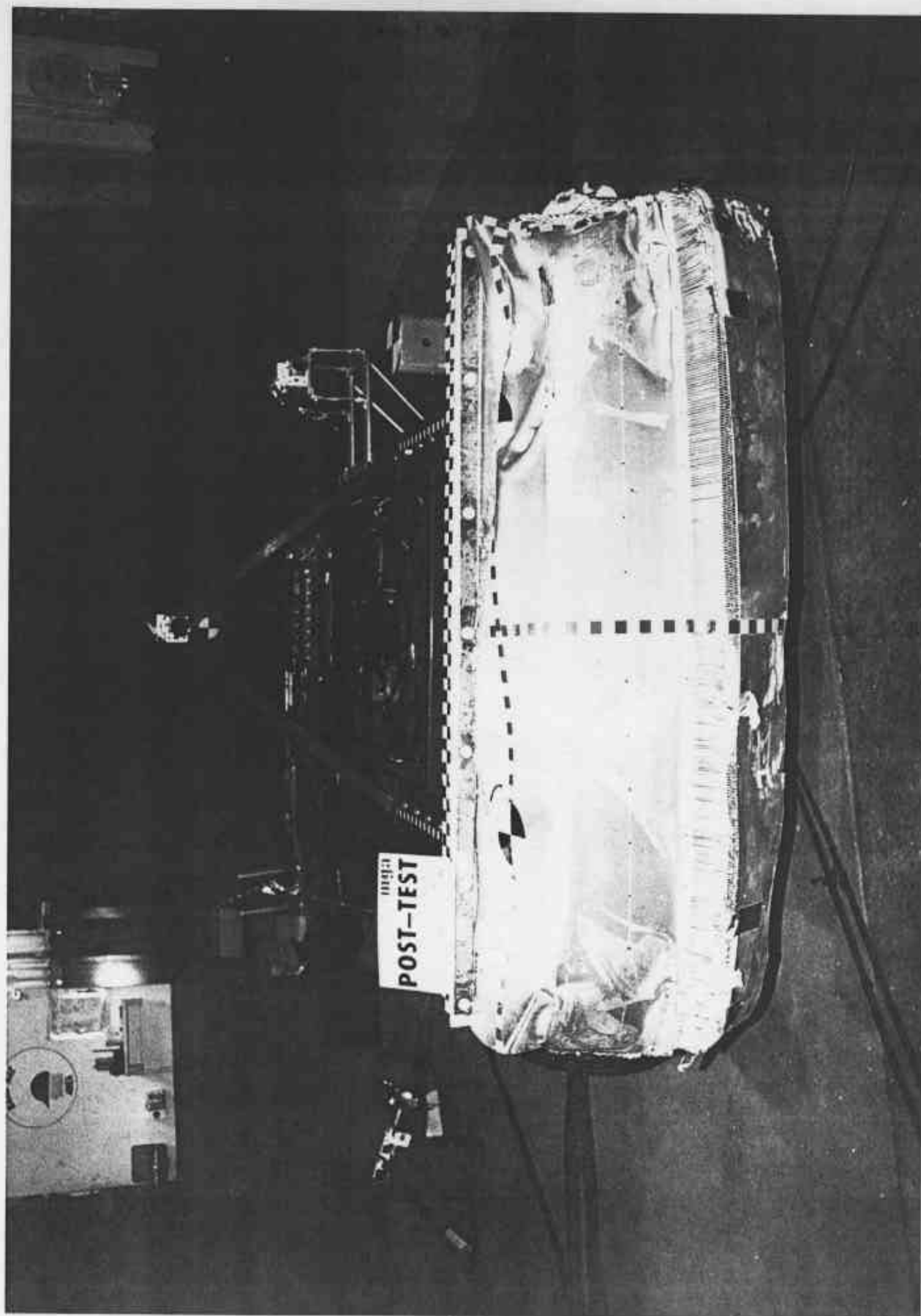


Photo No. A-16 - Post-Test MDB Front View

A-16

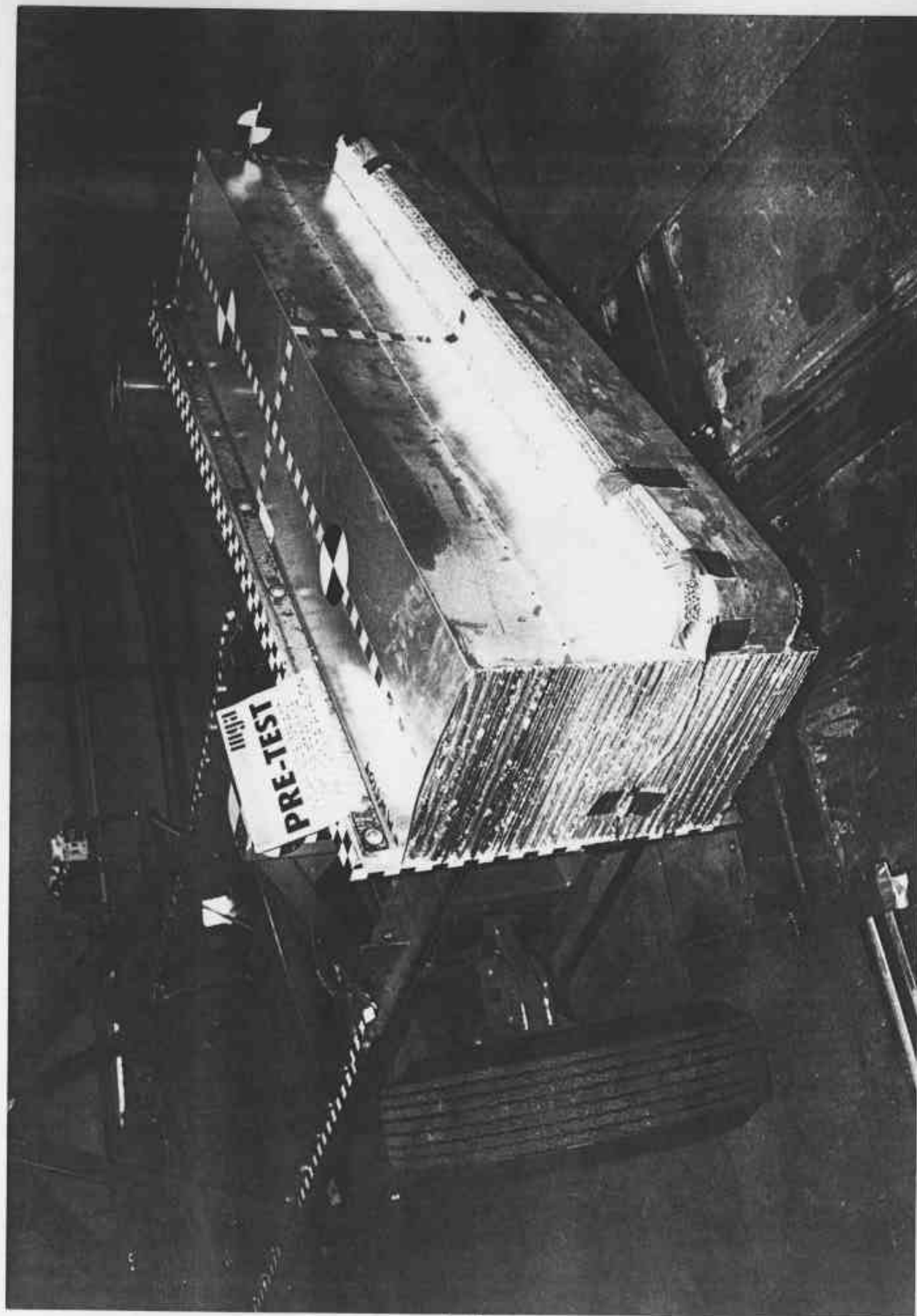


Photo No. A-17 - Pre-Test MDB Right Side View



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

A-18

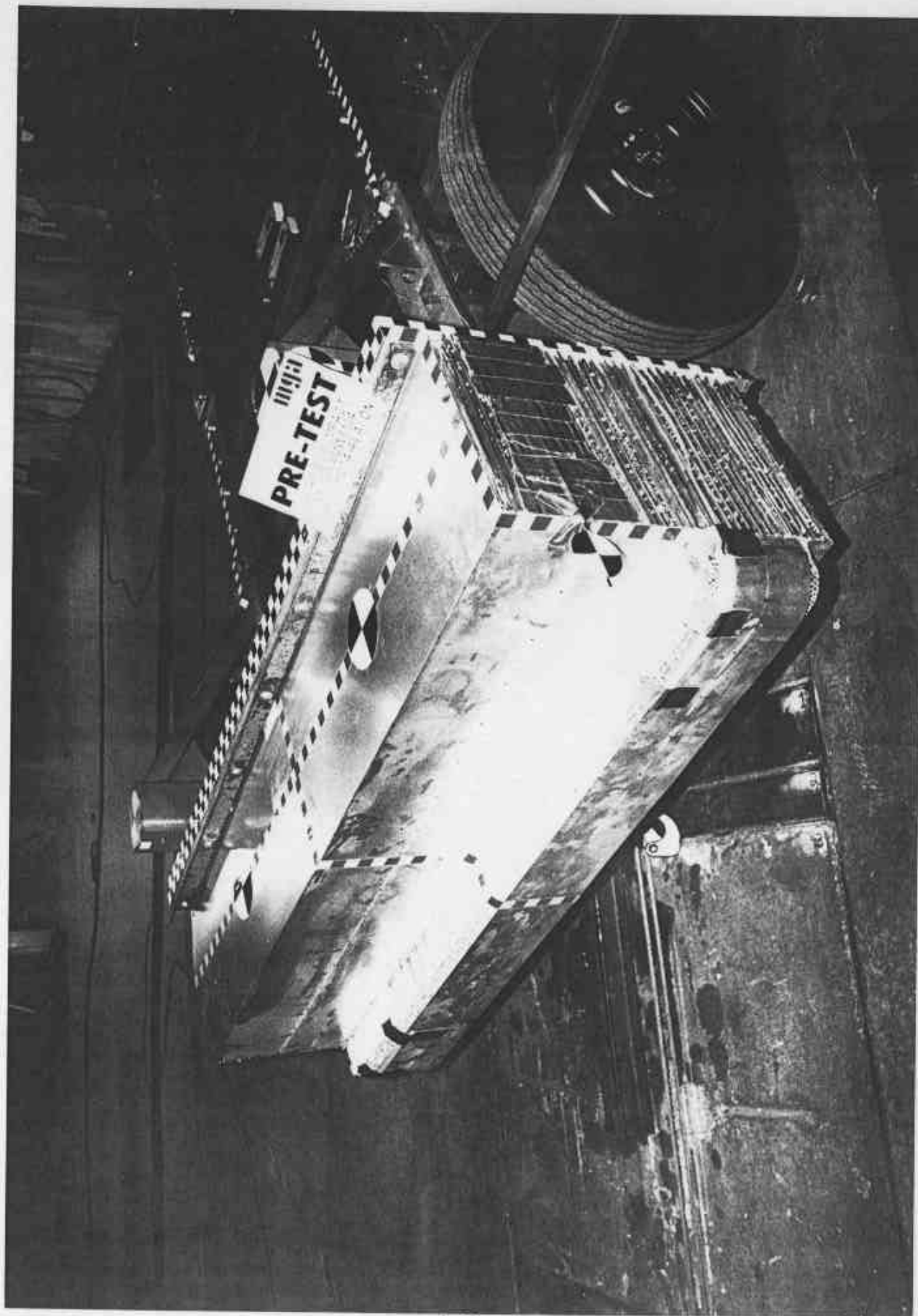


Photo No. A-19 - Pre-Test MDB Left Side View

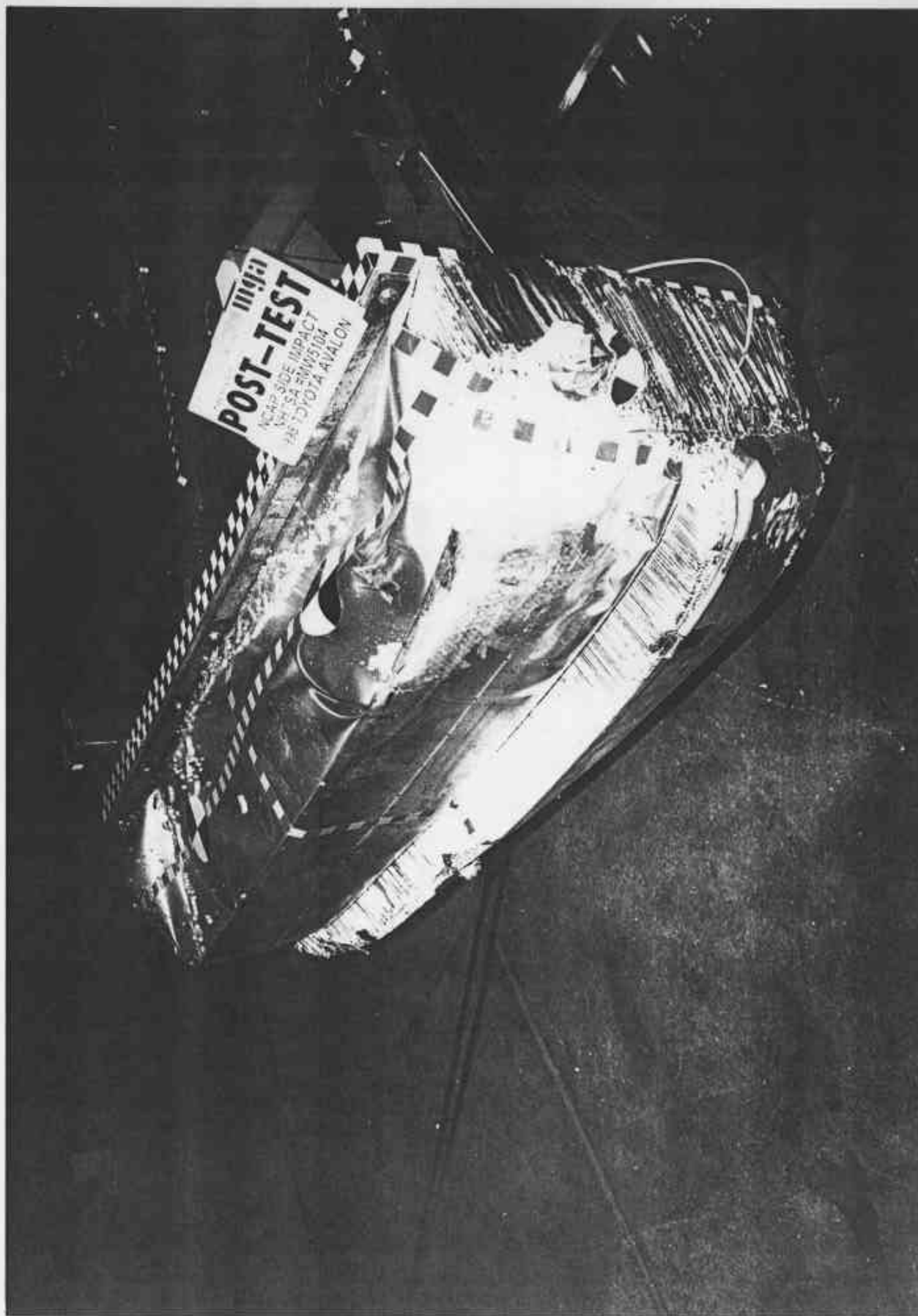


Photo No. A-20 - Post-Test MDB Left Side View



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



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

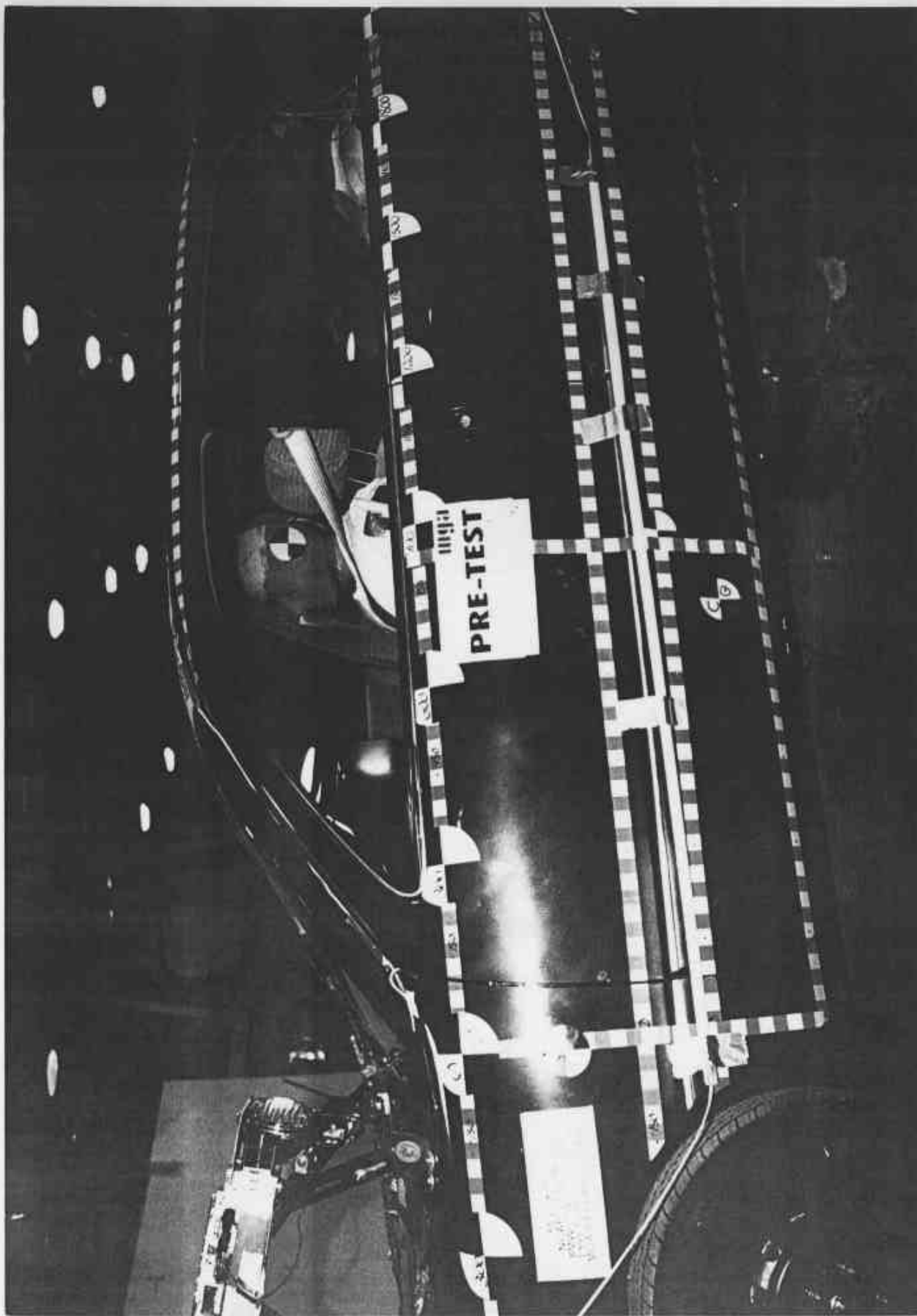
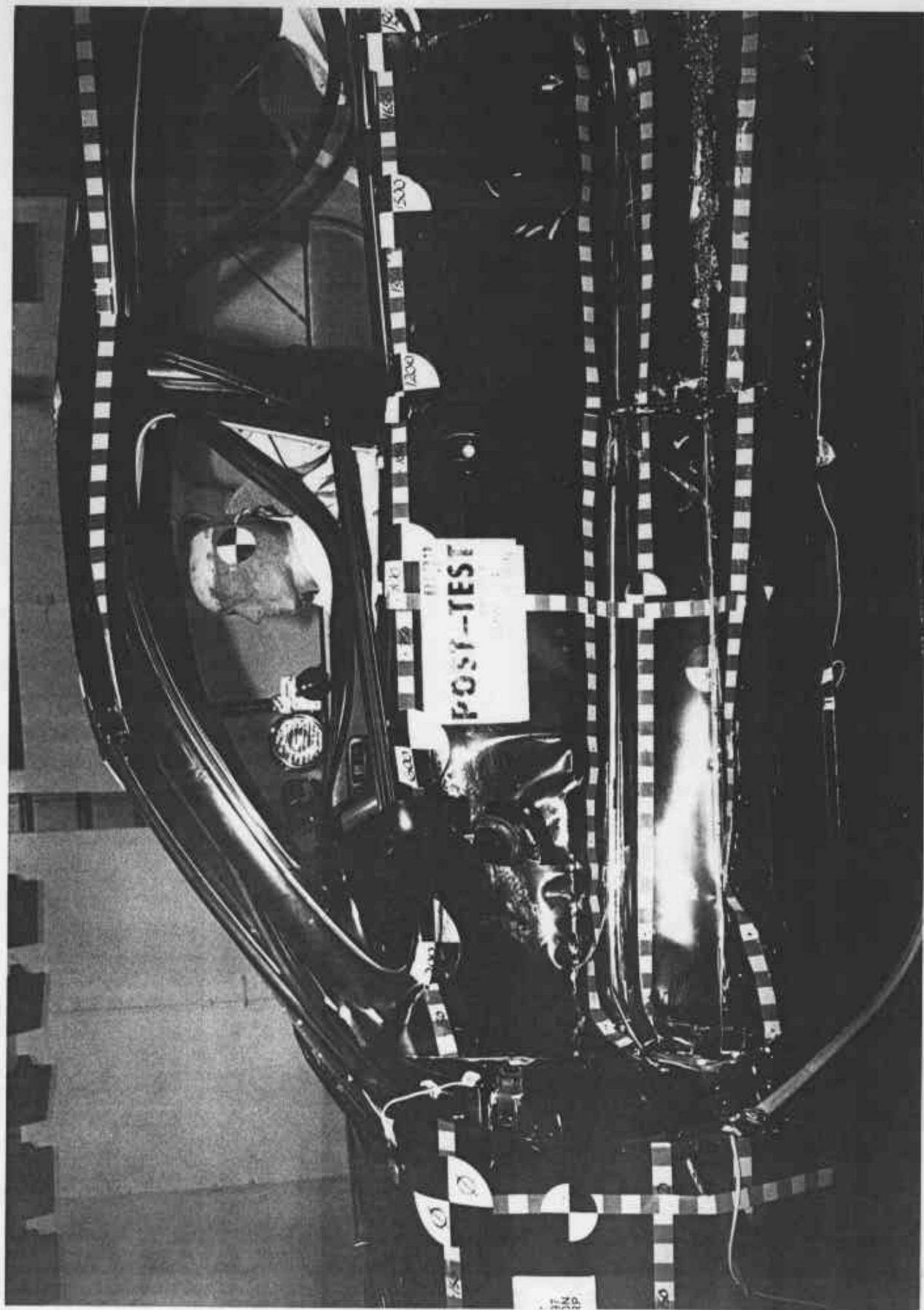


Photo No. A-23 - Pre-Test Driver Dummy Left Side View



A-24

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



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

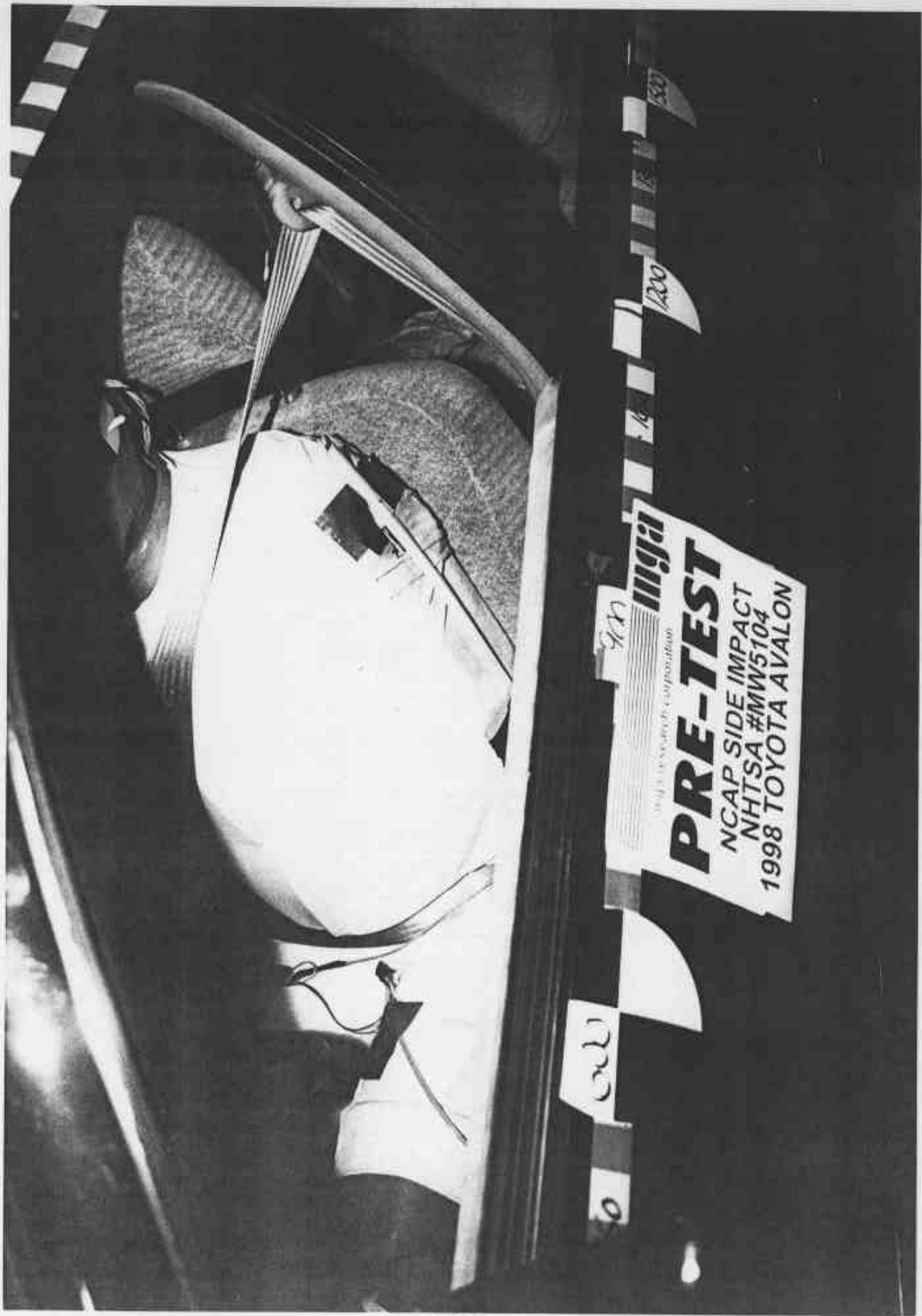


Photo No. A-26 - Pre-Test Driver Dummy Shoulder and Door Top View



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

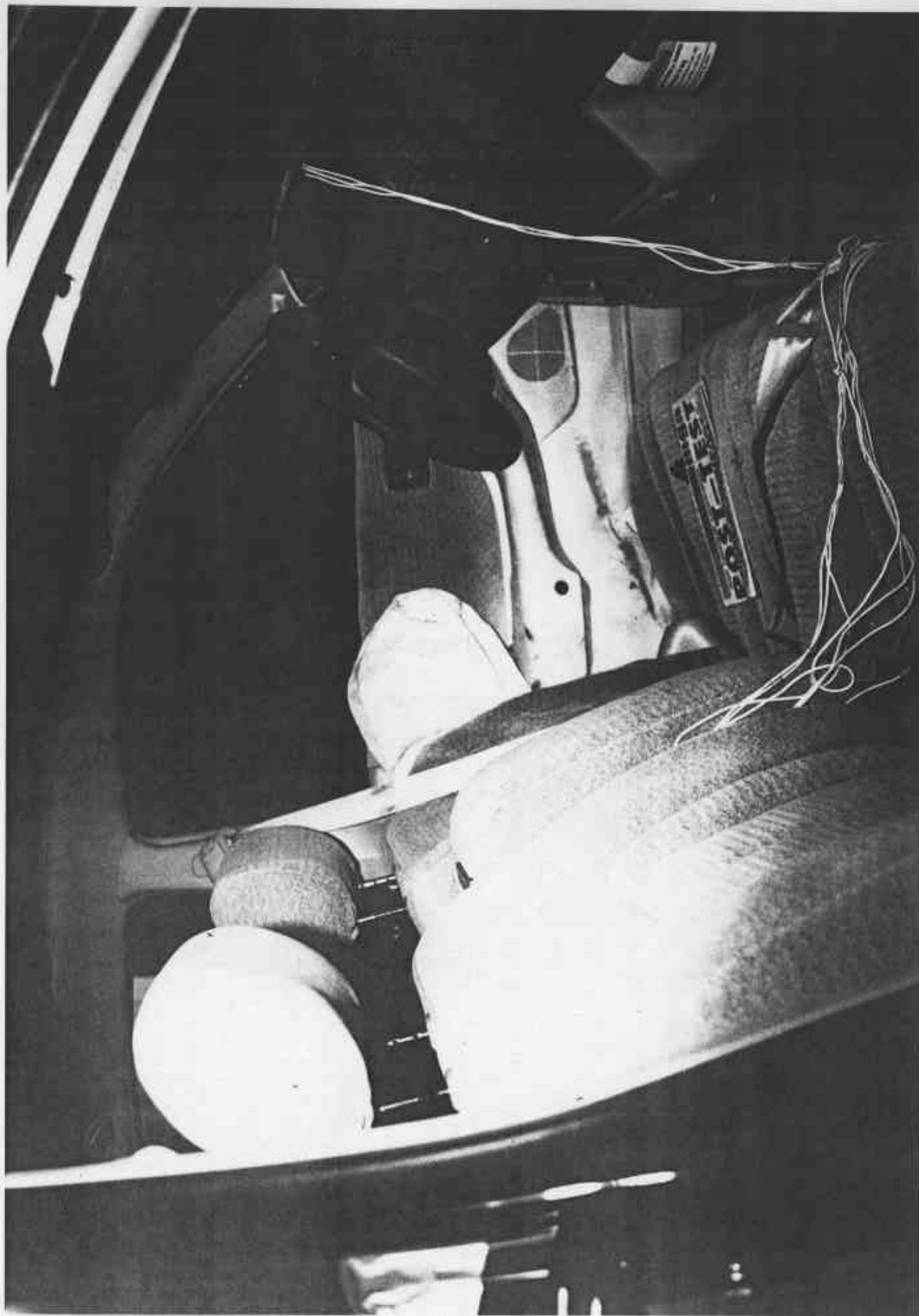


Photo No. A-28 - Post-Test Driver Dummy Contact

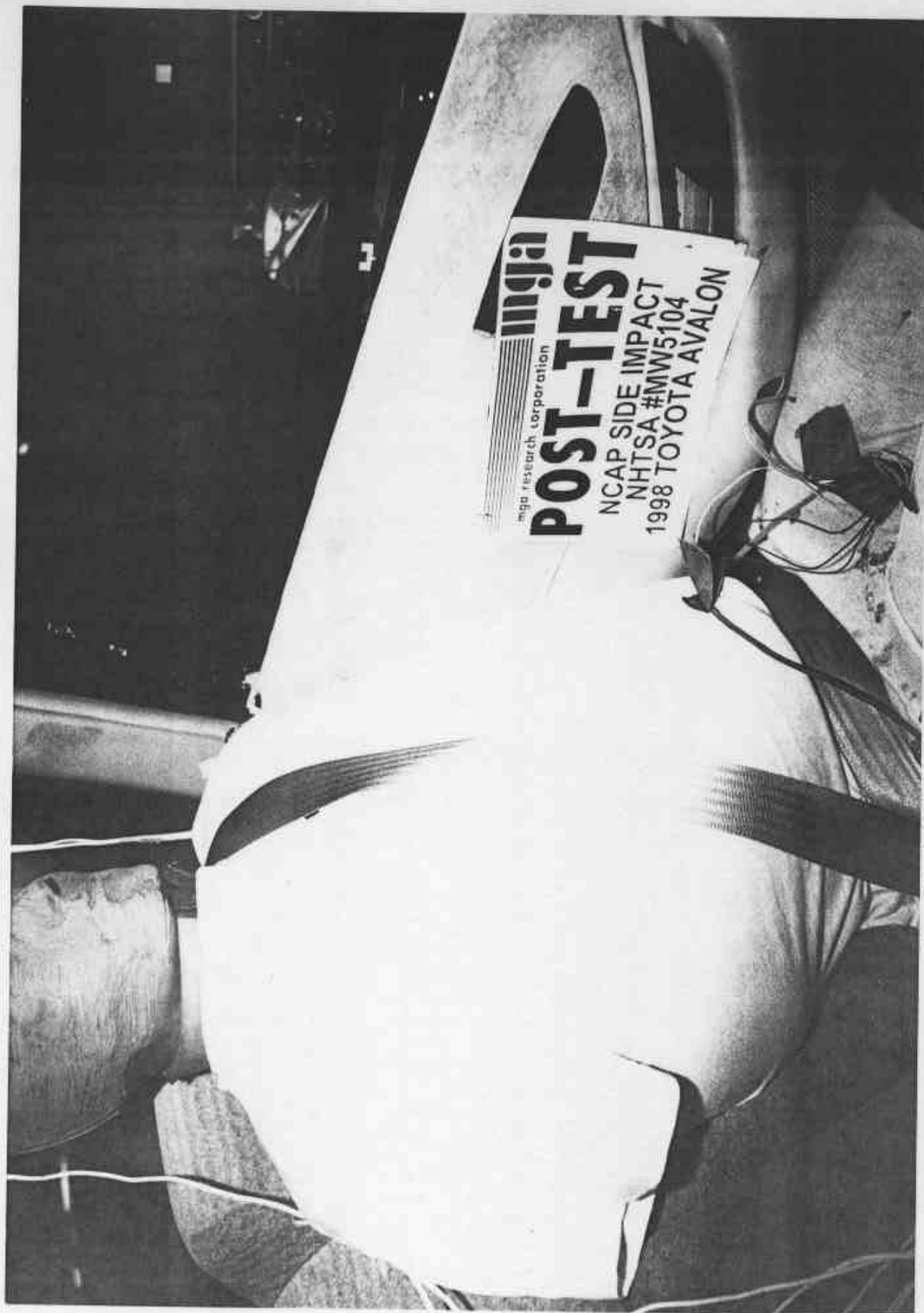


Photo No. A-29 - Post-Test Driver Dummy Head Contact



Photo No. A-30 - Post-Test Driver Dummy Head Contact

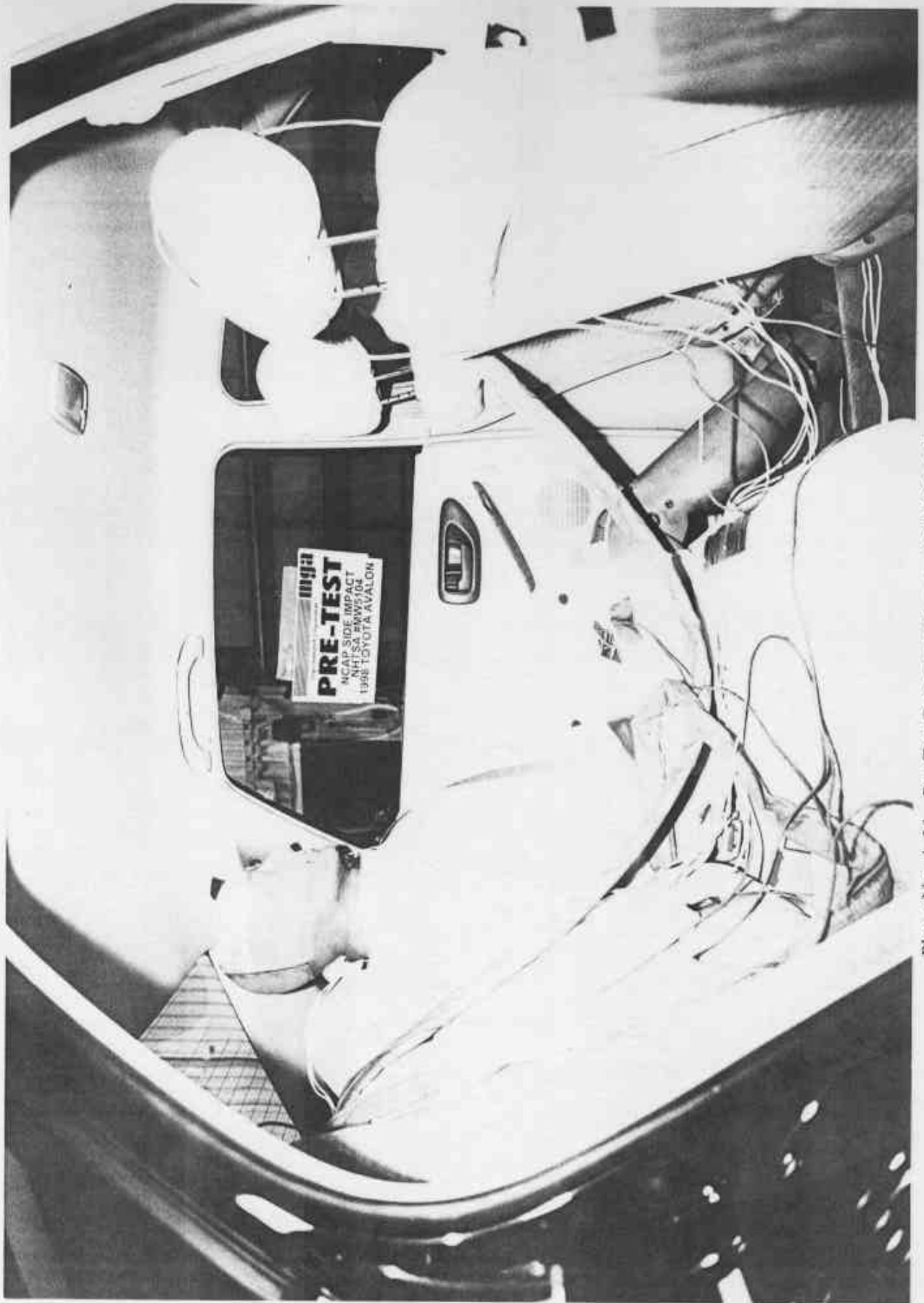


Photo No. A-31 - Pre-Test Passenger Dummy Right Side View

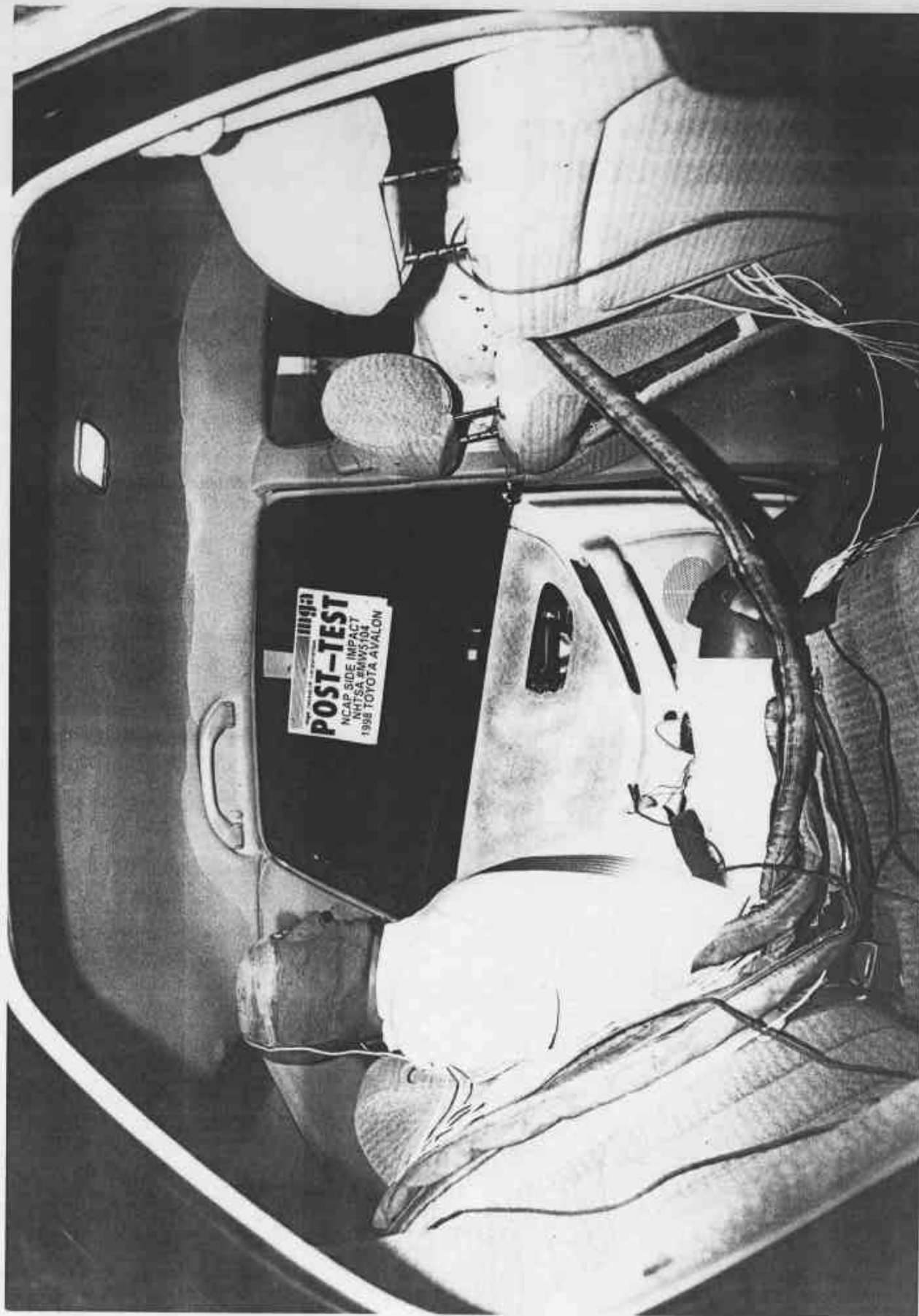
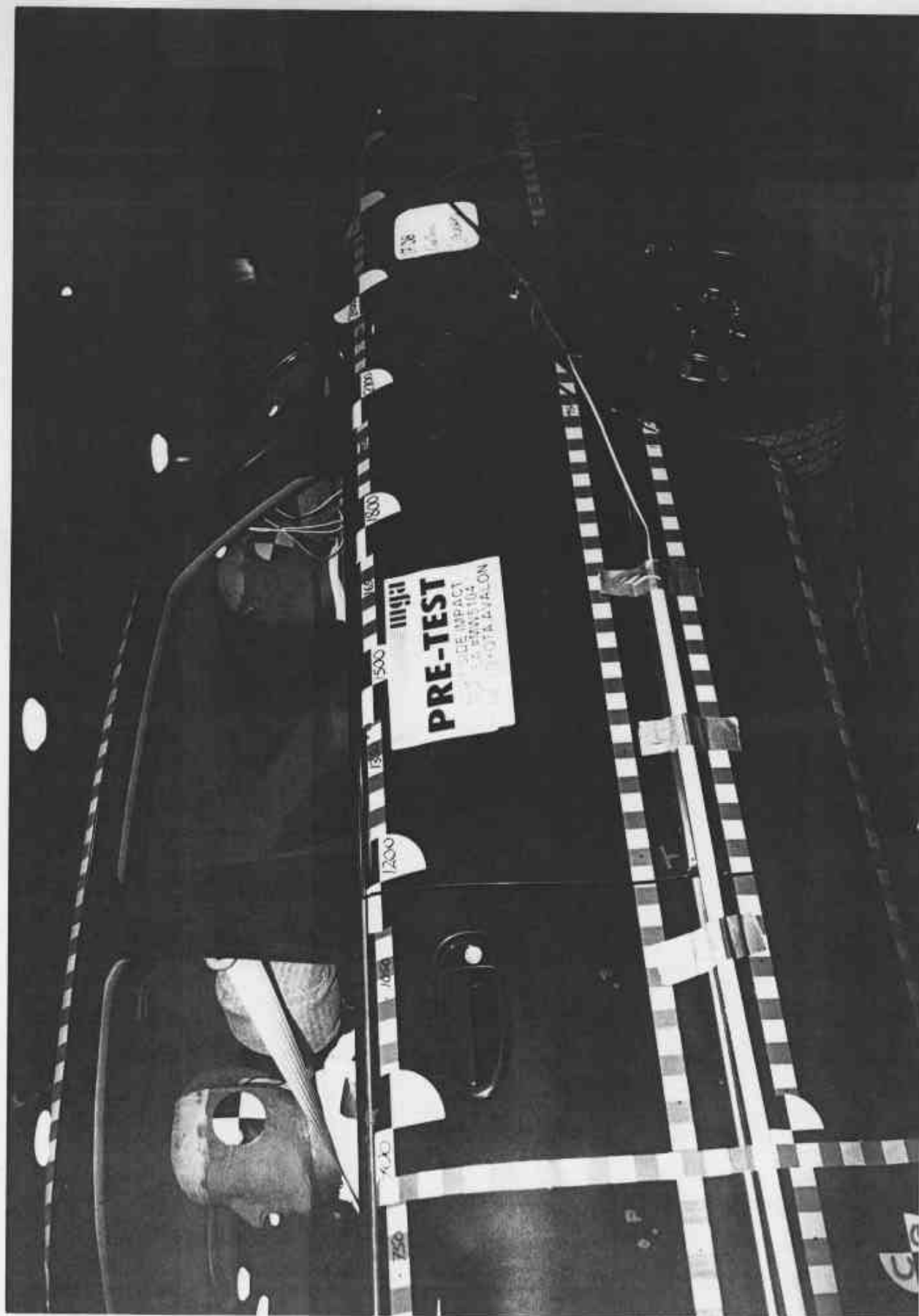


Photo No. A-32 - Post-Test Passenger Dummy Right Side View



A-33

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

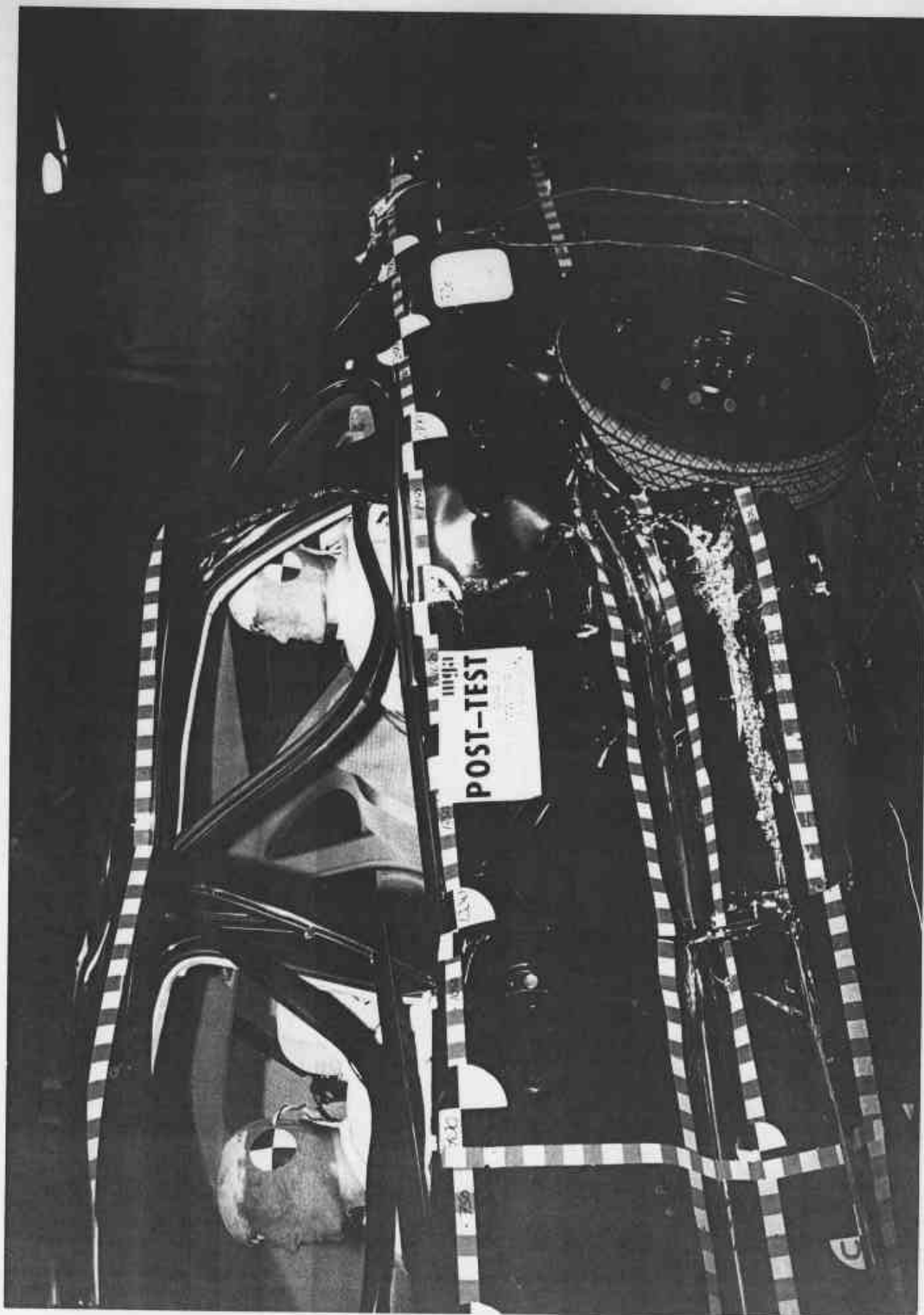


Photo No. A-34 - Post-Test Passenger Dummy Left Side View

A-34

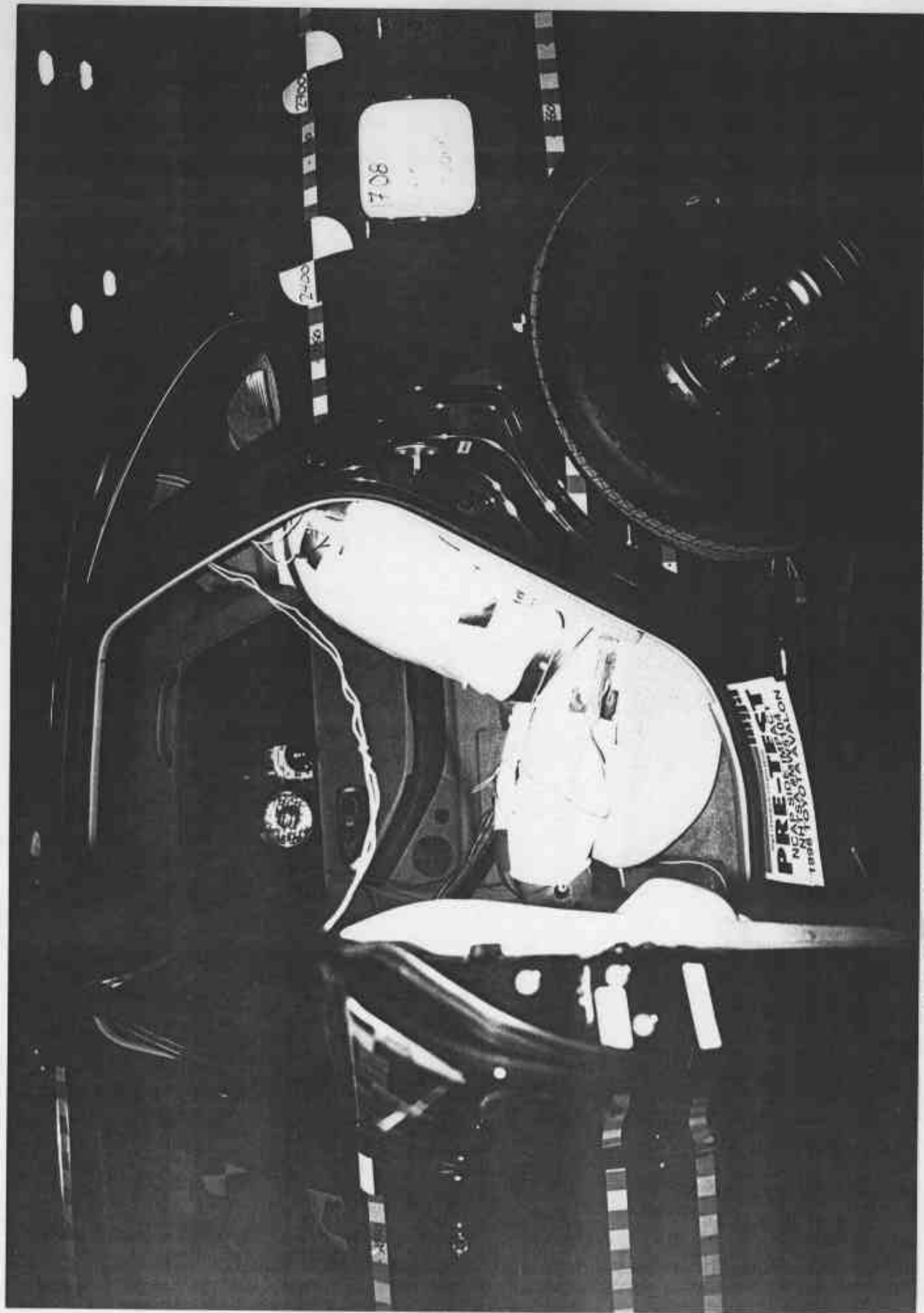


Photo No. A-35 - Pre-Test Passenger Dummy Left Side View (Door Open)

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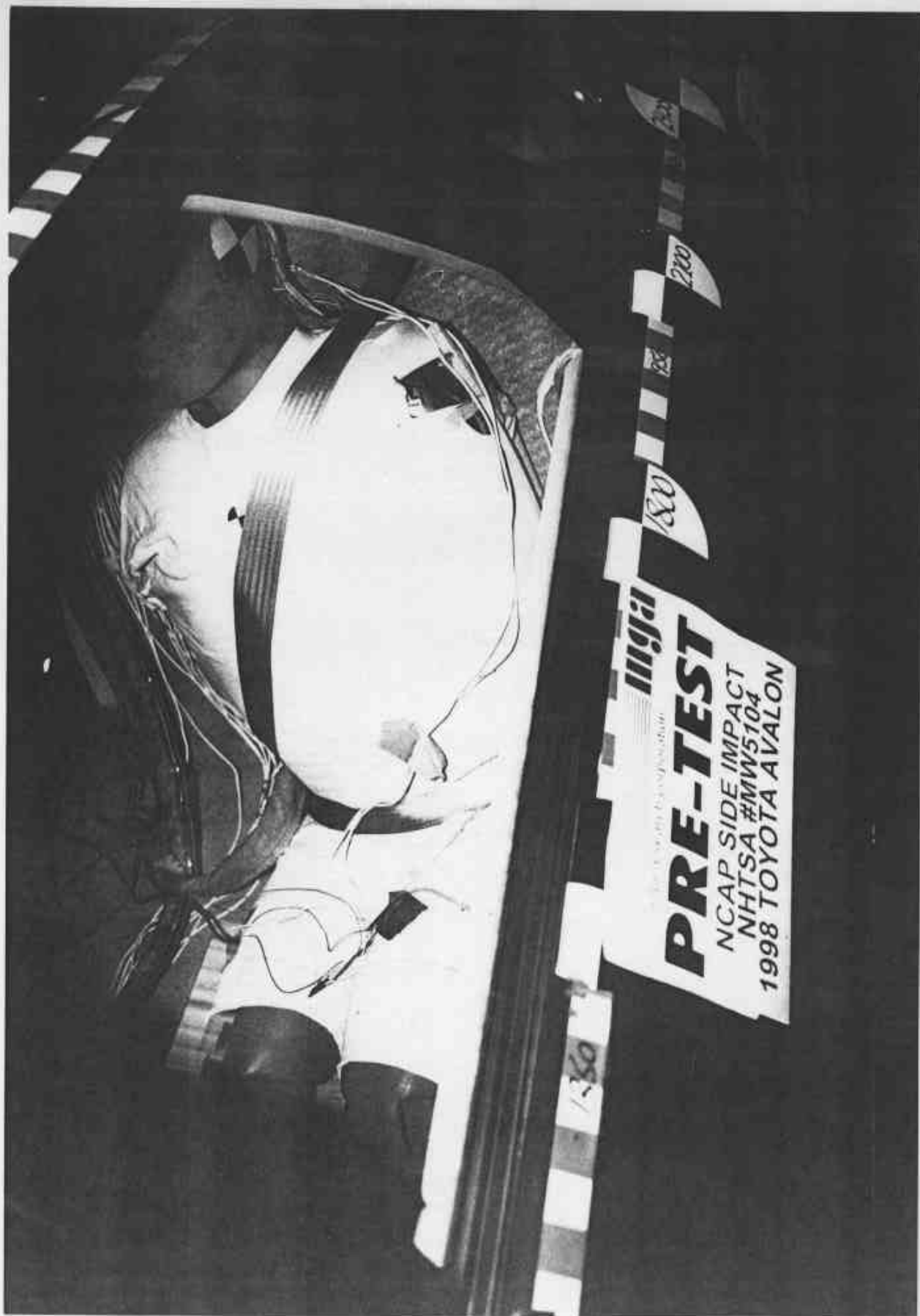


Photo No. A-36 - Pre-Test Passenger Dummy Shoulder and Door Top View



A-37

Photo No. A-37 - Post-Test Passenger Dummy Shoulder and Door Top View

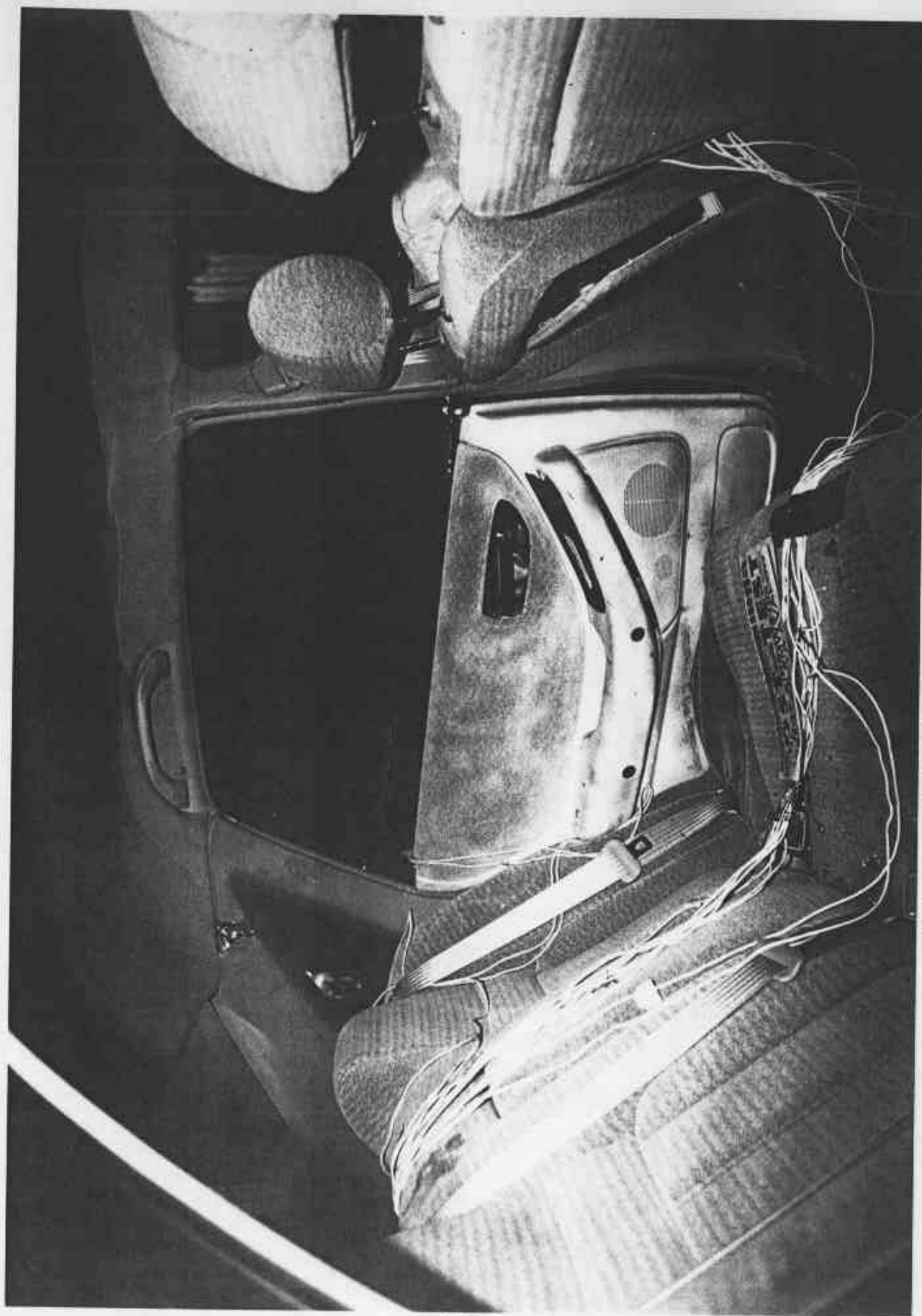


Photo No. A-38 - Post-Test Passenger Dummy Contact

A-38



Photo No. A-39 - Post-Test Passenger Dummy Head Contact

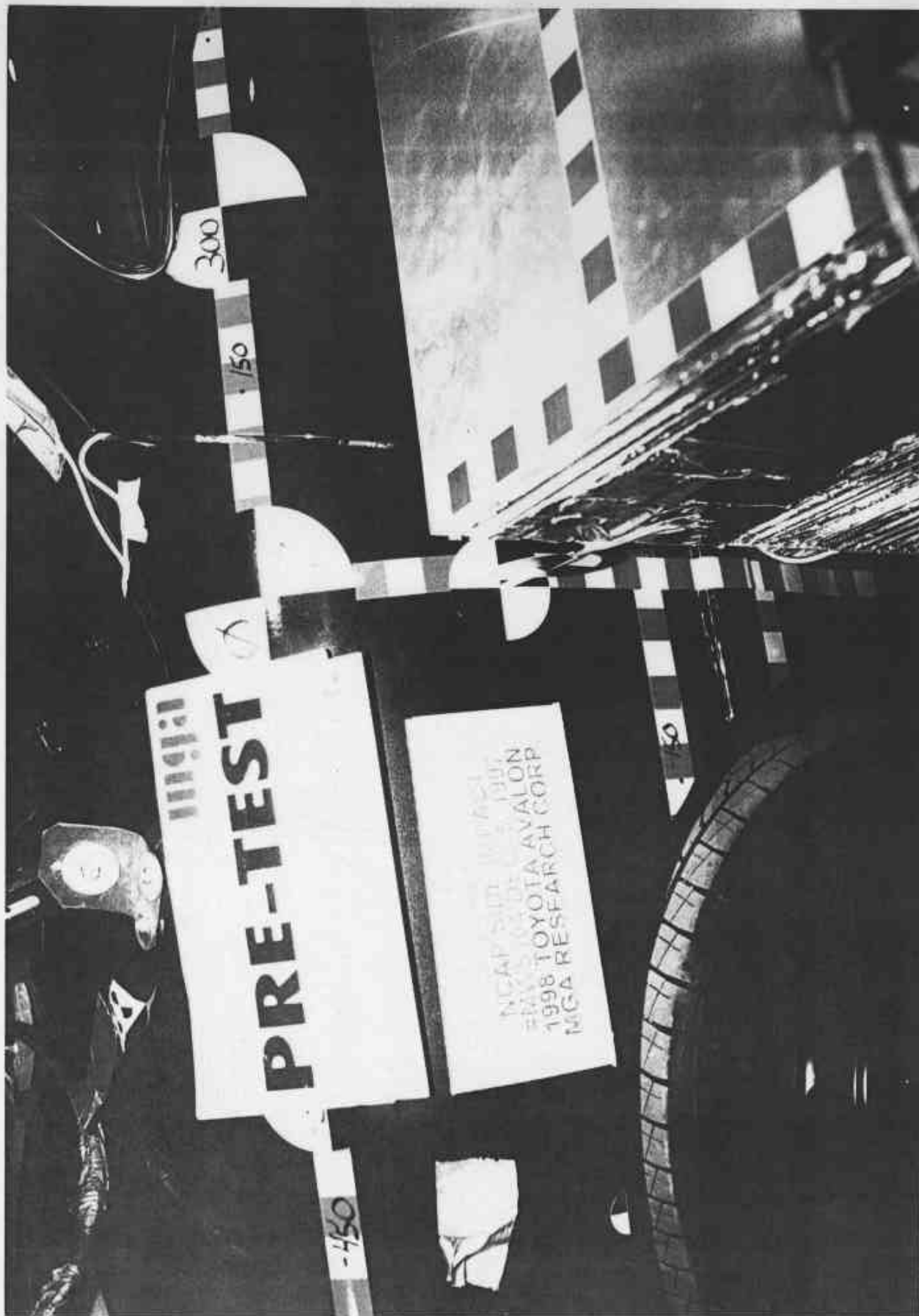


Photo No. A-40 - Pre-Test Left Front Impact Point on Vehicle

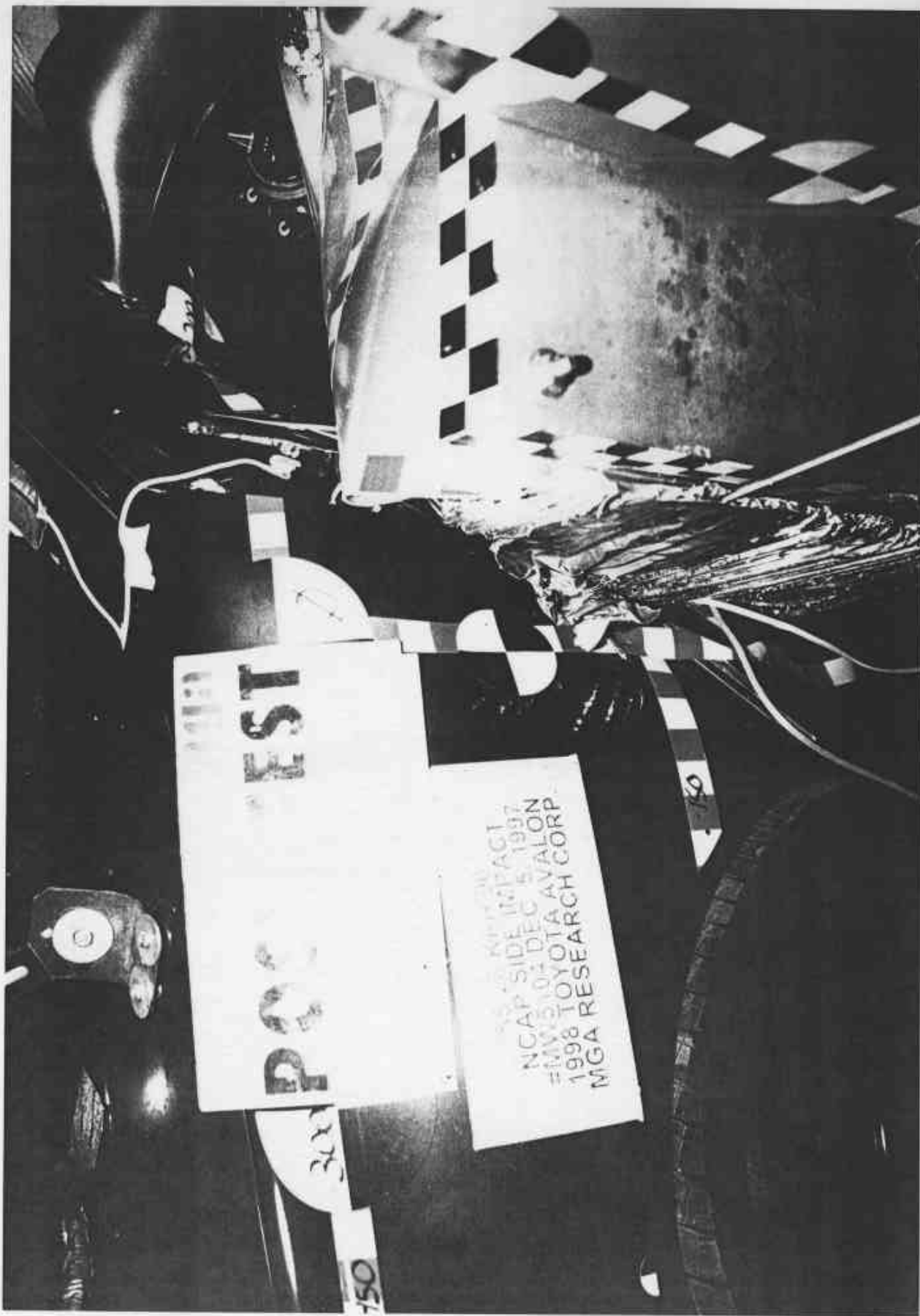
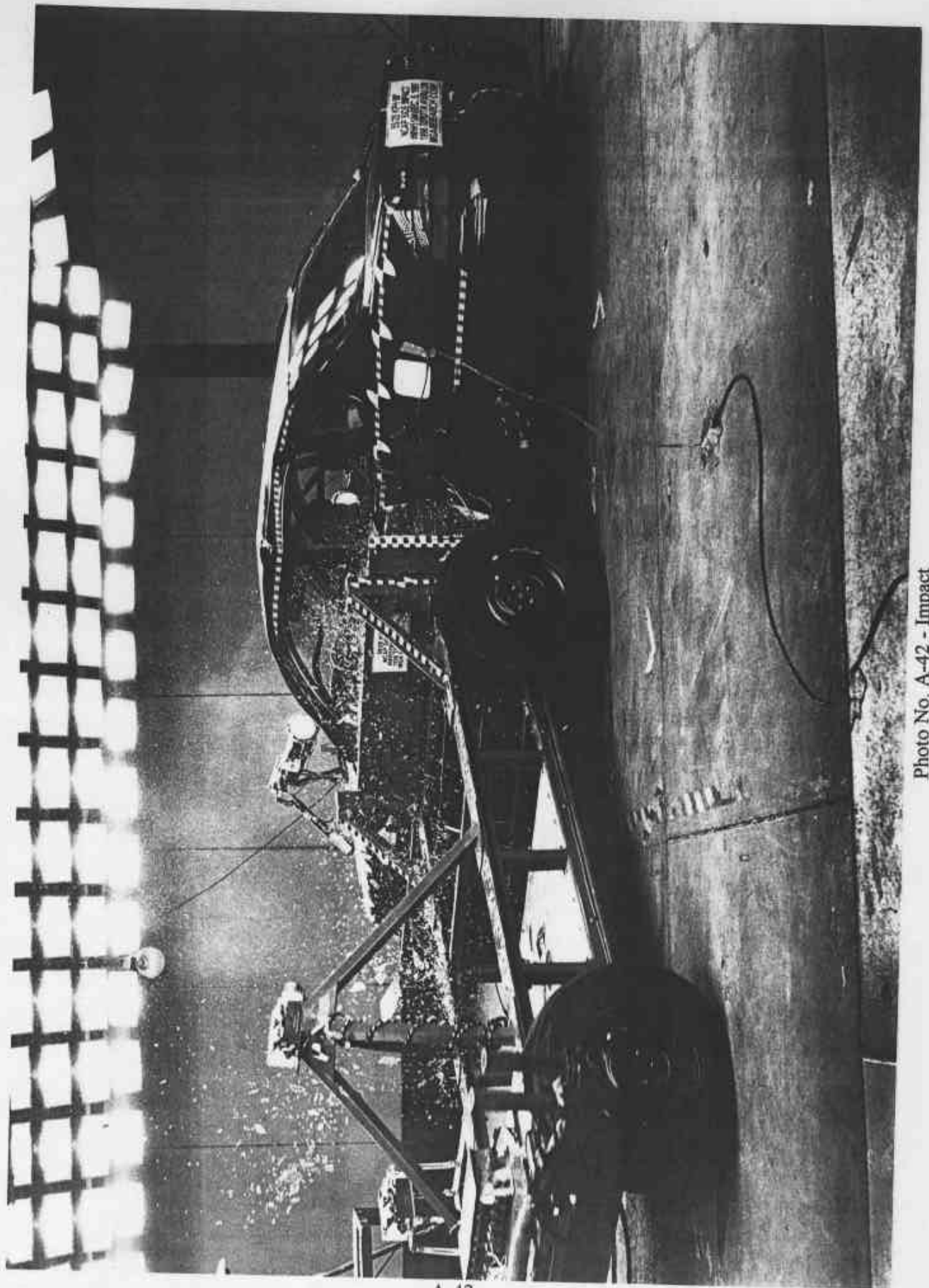


Photo No. A-41 - Post-Test Left Front Impact Point on Vehicle



A-42

Photo No. A-42 - Impact

MFD. BY: TOYOTA MOTOR MANUFACTURING,
 KENTUCKY INC.
 1175
 2665L RR 2665L
 4551 GOLF RD. RR 2665L
 THIS VEHICLE CONFORMS TO ALL APPLICABLE
 FEDERAL MOTOR VEHICLE SAFETY STANDARDS
 THE DATE OF MANUFACTURE SHOWN ABOVE IS
 4/18/88

418F1888AU229557 PASS. CAR

CTR: BL3/FC44
 A/TM:-01A/A541E

MODEL: MCX10L-AESNKA

71435

BA02737411

Photo No. A-43 - Vehicle Certification Label

DEATH OR INJURY

AT ANY COVER ON ANY FRONT SEAT.
AS DESCRIBED IN THE SUN VISOR AREA
FOR INFORMATION AND EXPLANATIONS.

QUE MORTEL OU BLESSURE GRAVE
D'ORIGINE SUR UN SIÈGE AVANT.
COUSSIN GONFLABLE SRS ET

CAUTIONS, VOIR LE MANUEL DU PROPRIÉTAIRE.



TOYOTA

VEHICLE CAPACITY WEIGHT: 475kg (1045lbs)
OCCUPANT: TOTAL 6 (FRONT 3, REAR 3)

RECOMMENDED COLD TIRE INFLATION PRESSURE: kPa (psi)

• UP TO 4 OCCUPANTS: Ft 220 (32), Rr 220 (32)

• VEHICLE CAPACITY WEIGHT: Ft 220 (32), Rr 220 (32)

TIRE SIZE: P205/65R15 92H

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

CHARGE MAXIMALE DU VEHICULE: 475kg (1045 LIVRES)

PERSONNES: TOTAL 6 (AVANT 3, ARRIERE 3)

PRESSION DE PNEUS: kPa (LB/PO²)

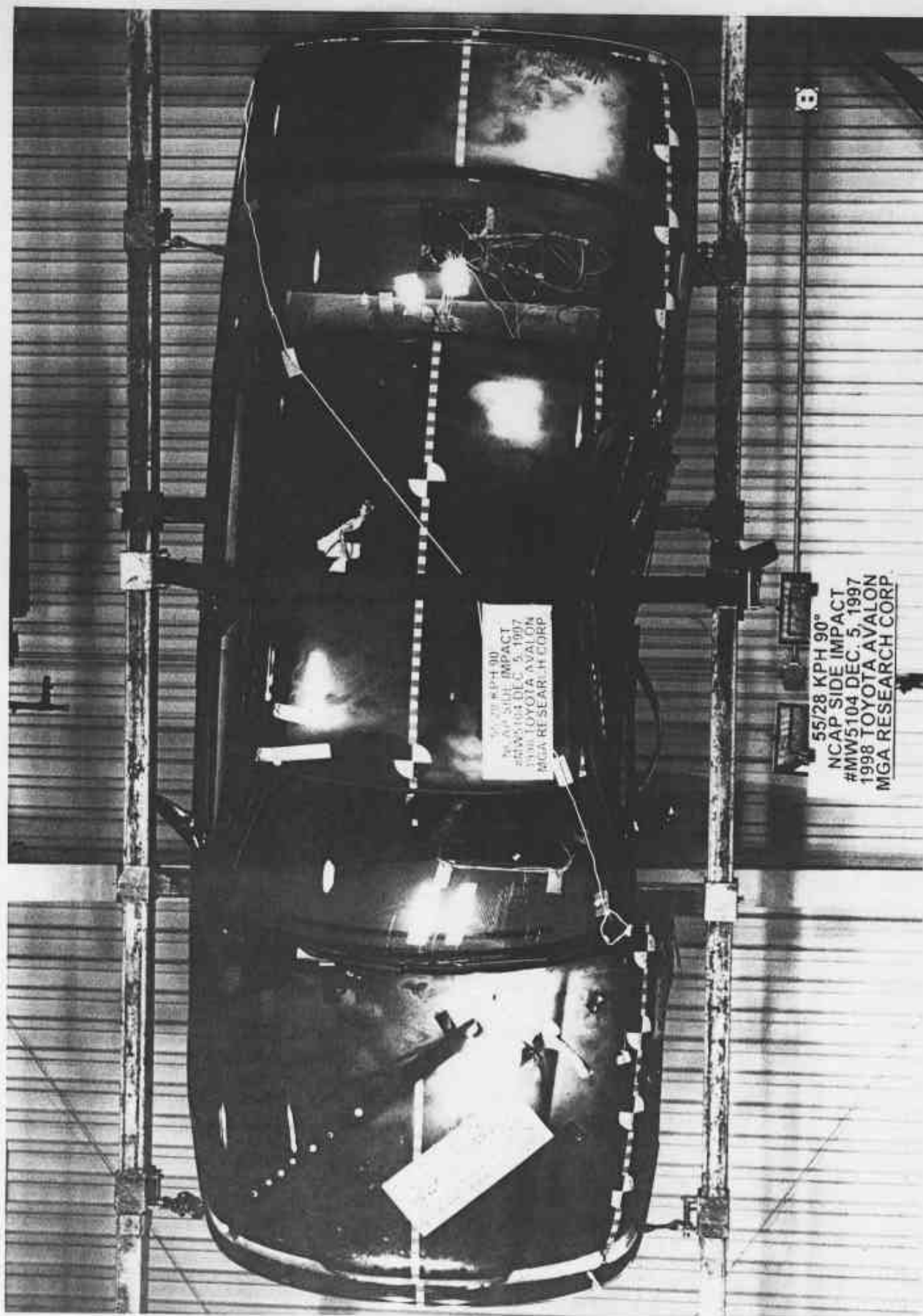
• AVEC 4 PERSONNES A BORD: AVANT 220 (32), ARRIERE 220 (32)

• A CHARGE MAXIMALE: AVANT 220 (32), ARRIERE 220 (32)

DIMENSION DES PNEUS: P205/65R15 92H

POUR DE PLUS AMPLES DETAILS, VOIR LE MANUEL DU PROPRIÉTAIRE

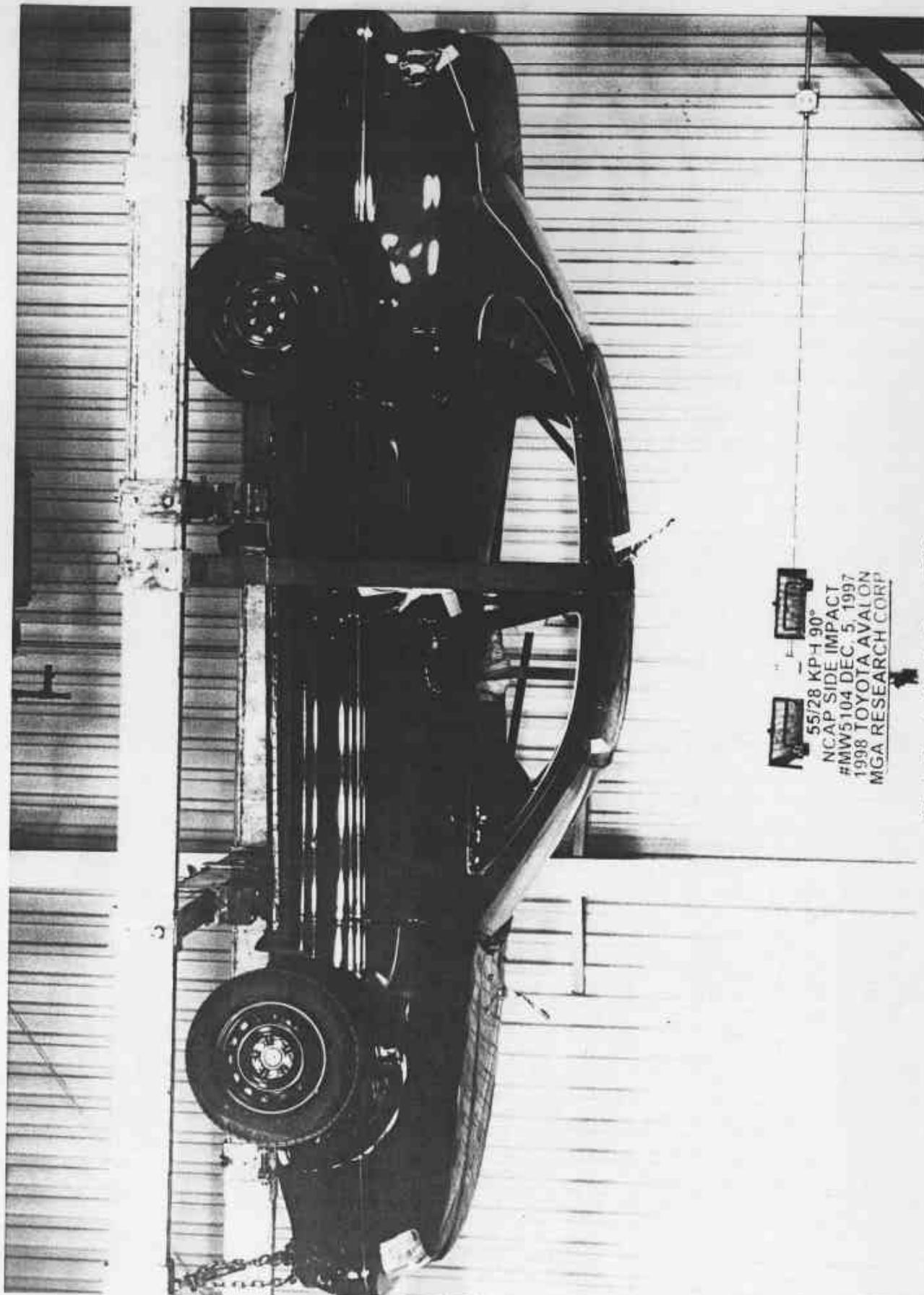
07050



55/28 KPH 90°
NCAP SIDE IMPACT
#MW5104 DEC. 5, 1997
1998 TOYOTA AVALON
MGA RESEARCH CORP.

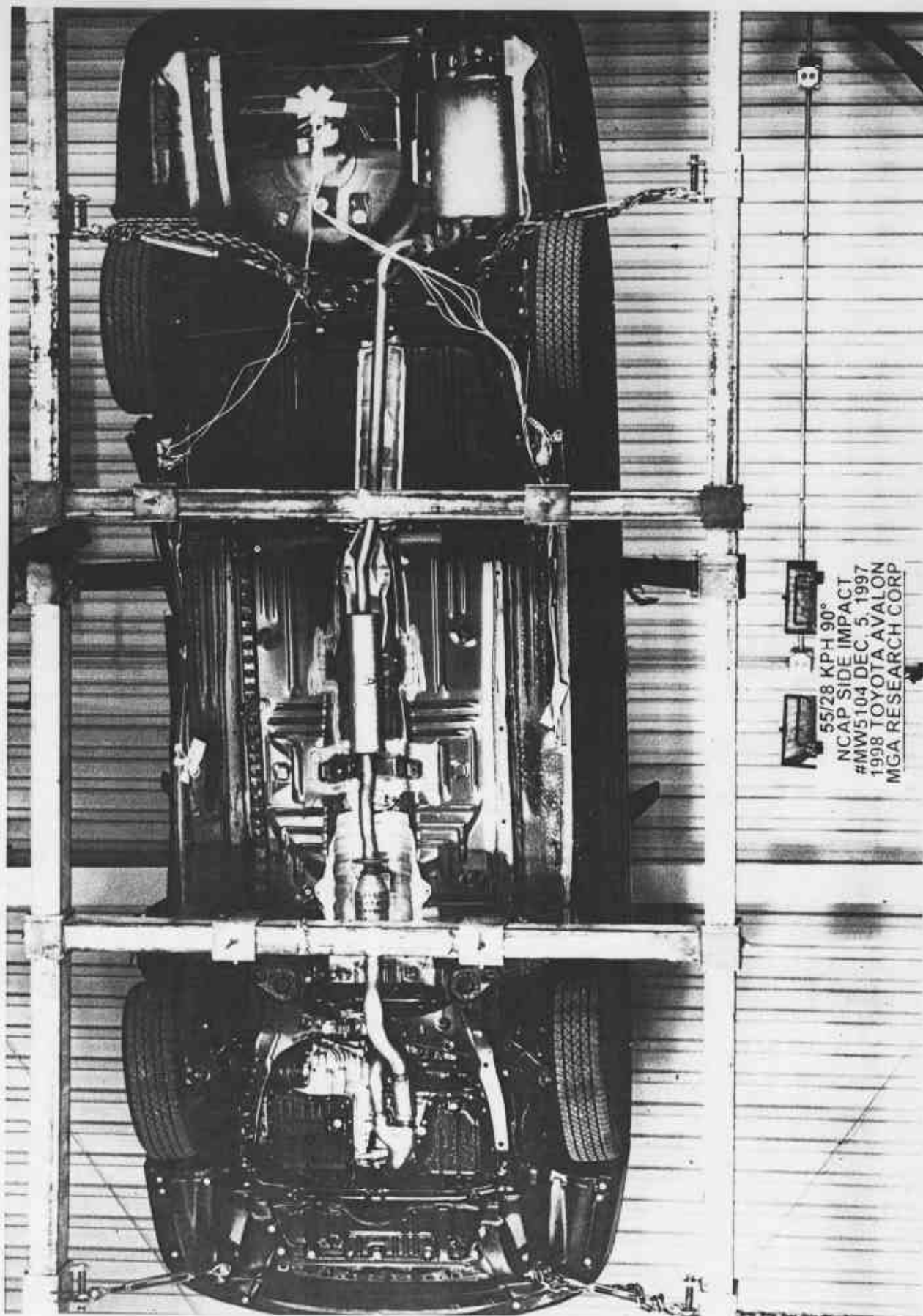
Photo No. A-45 - Rollover 90°

A-45



55/28 KP-H 90°
NCAP SIDE IMPACT
#MW5104 DEC. 5, 1997
1998 TOYOTA AVALON
MGA RESEARCH CORP.

Photo No. A-46 - Rollover 180°



A-47

55/28 KPH 90°
NCAP SIDE IMPACT
#MW5104 DEC. 5, 1997
1998 TOYOTA AVALON
MGA RESEARCH CORP

Photo No. A-47 - Rollover 270°

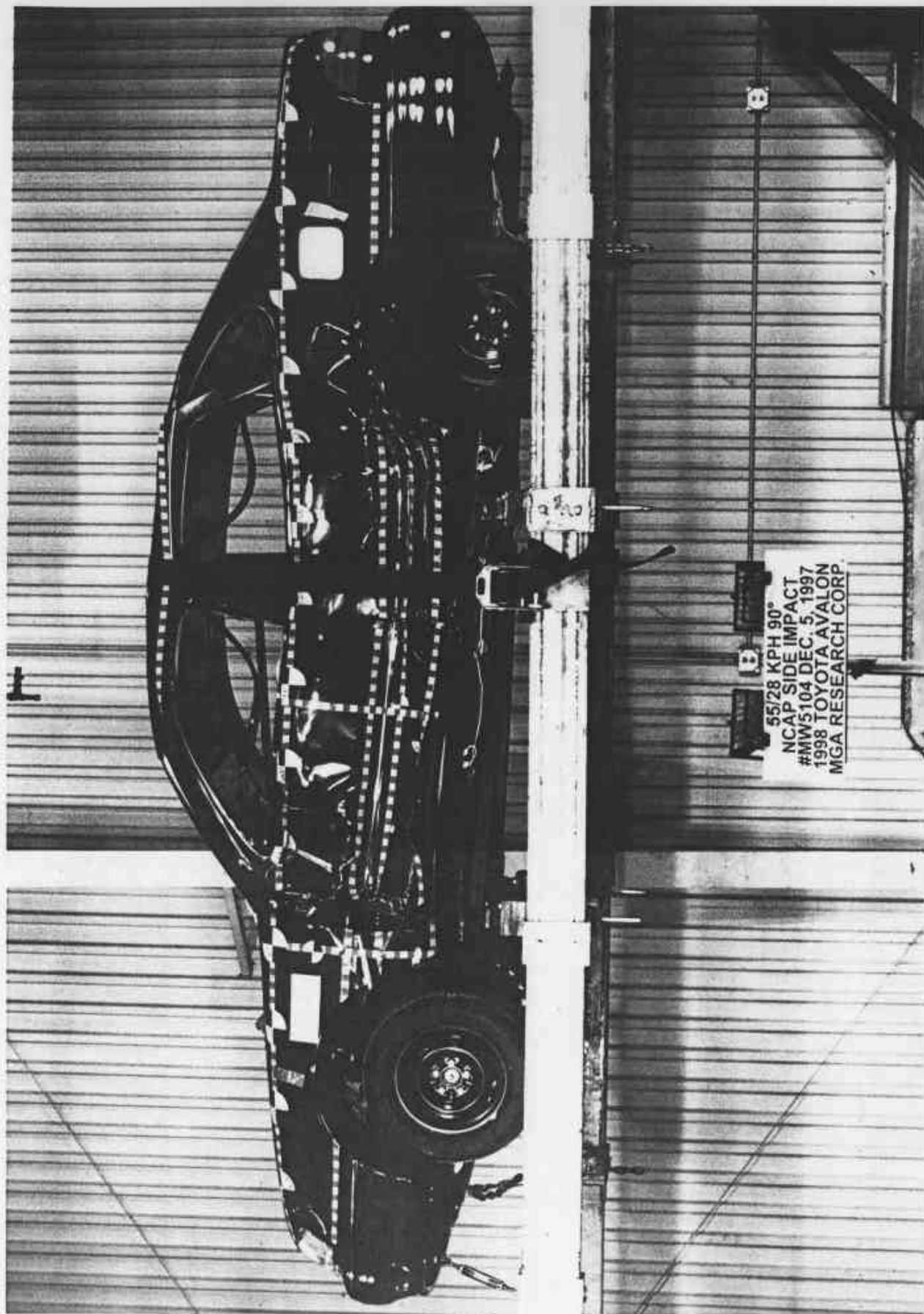


Photo No. A-48 - Rollover 360°

A-48

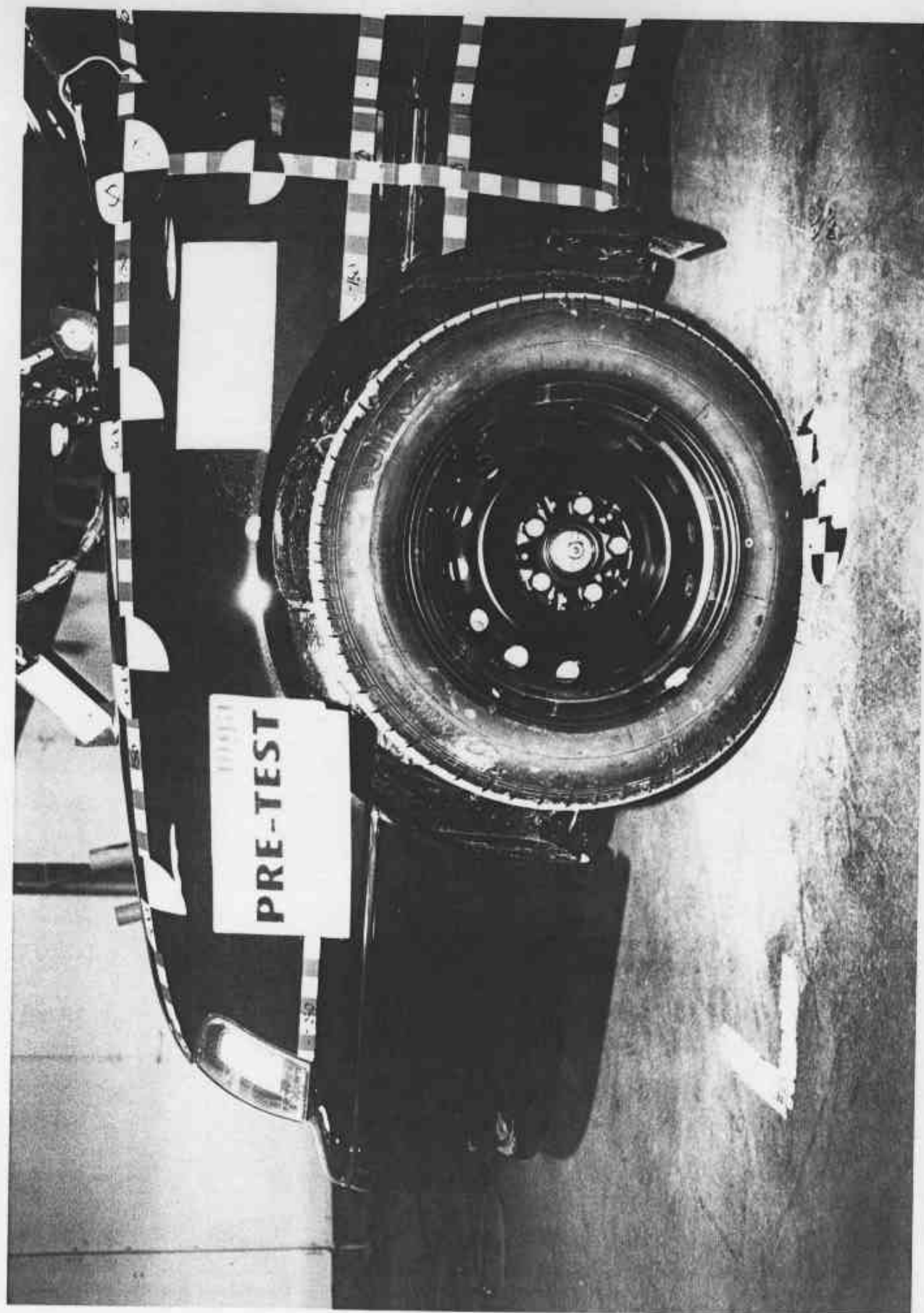


Photo No. A-49 - Left Front Attitude Point

A-49

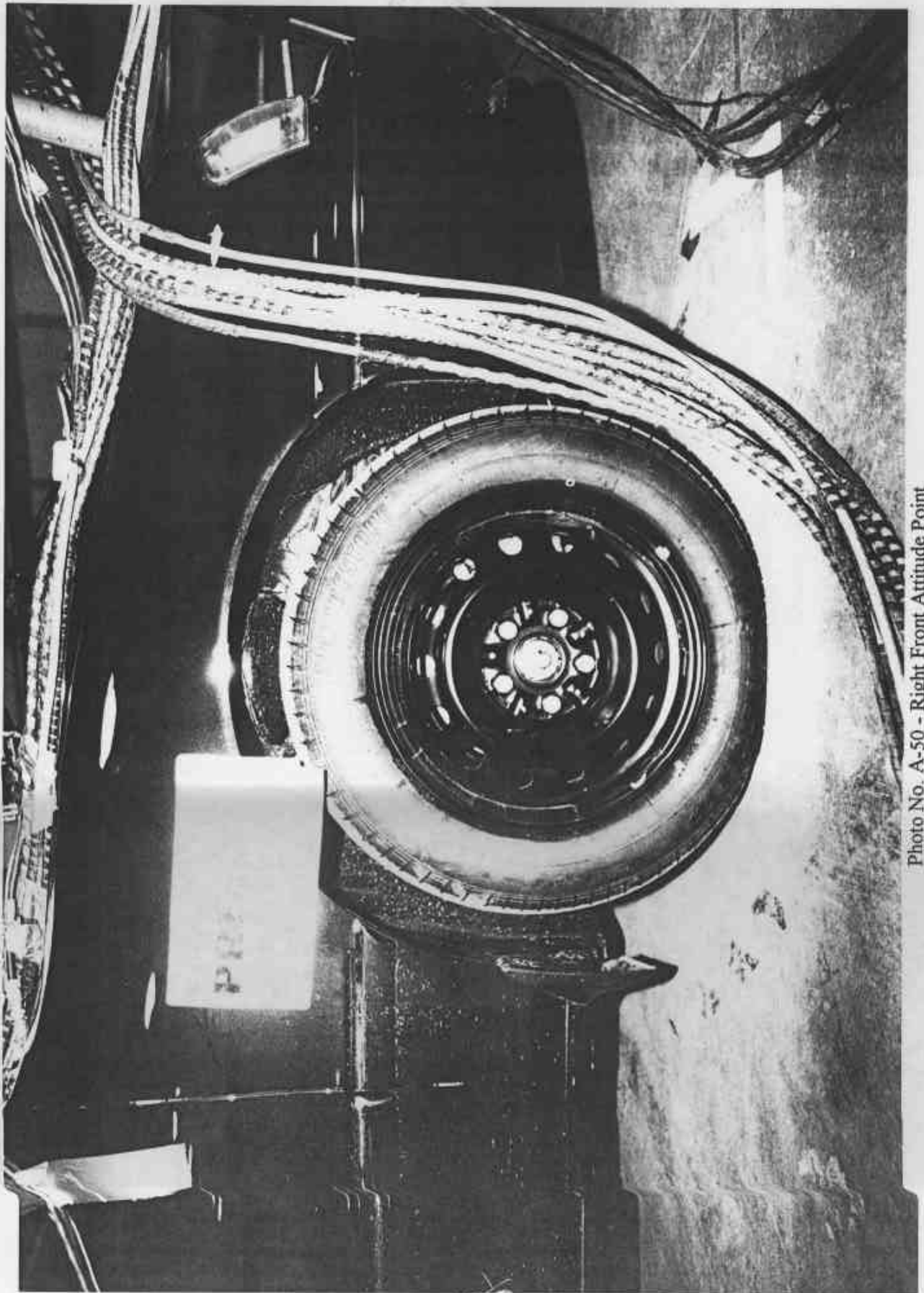


Photo No. A-50 - Right Front Attitude Point

A-50

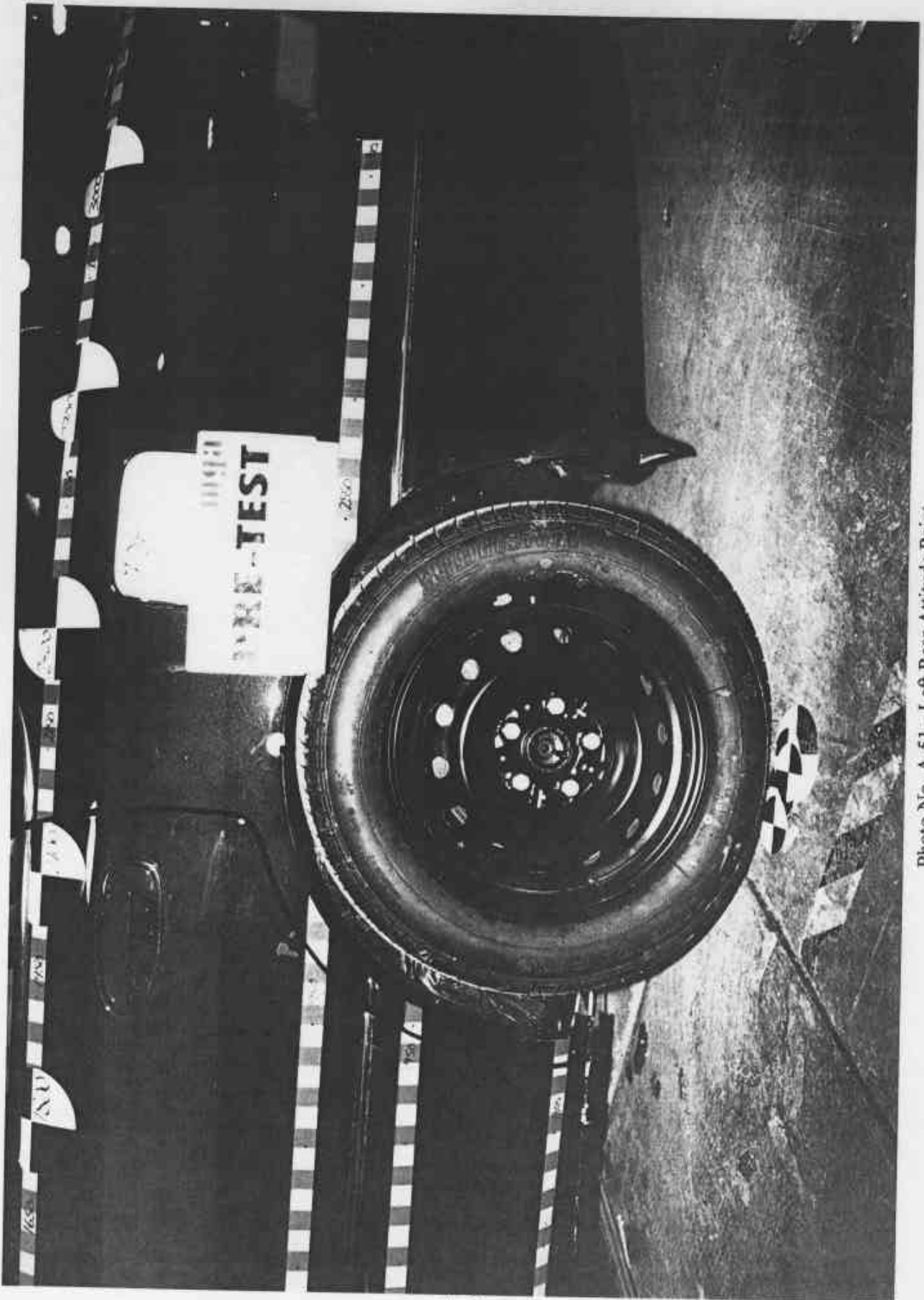


Photo No. A-51 - Left Rear Attitude Point

A-51

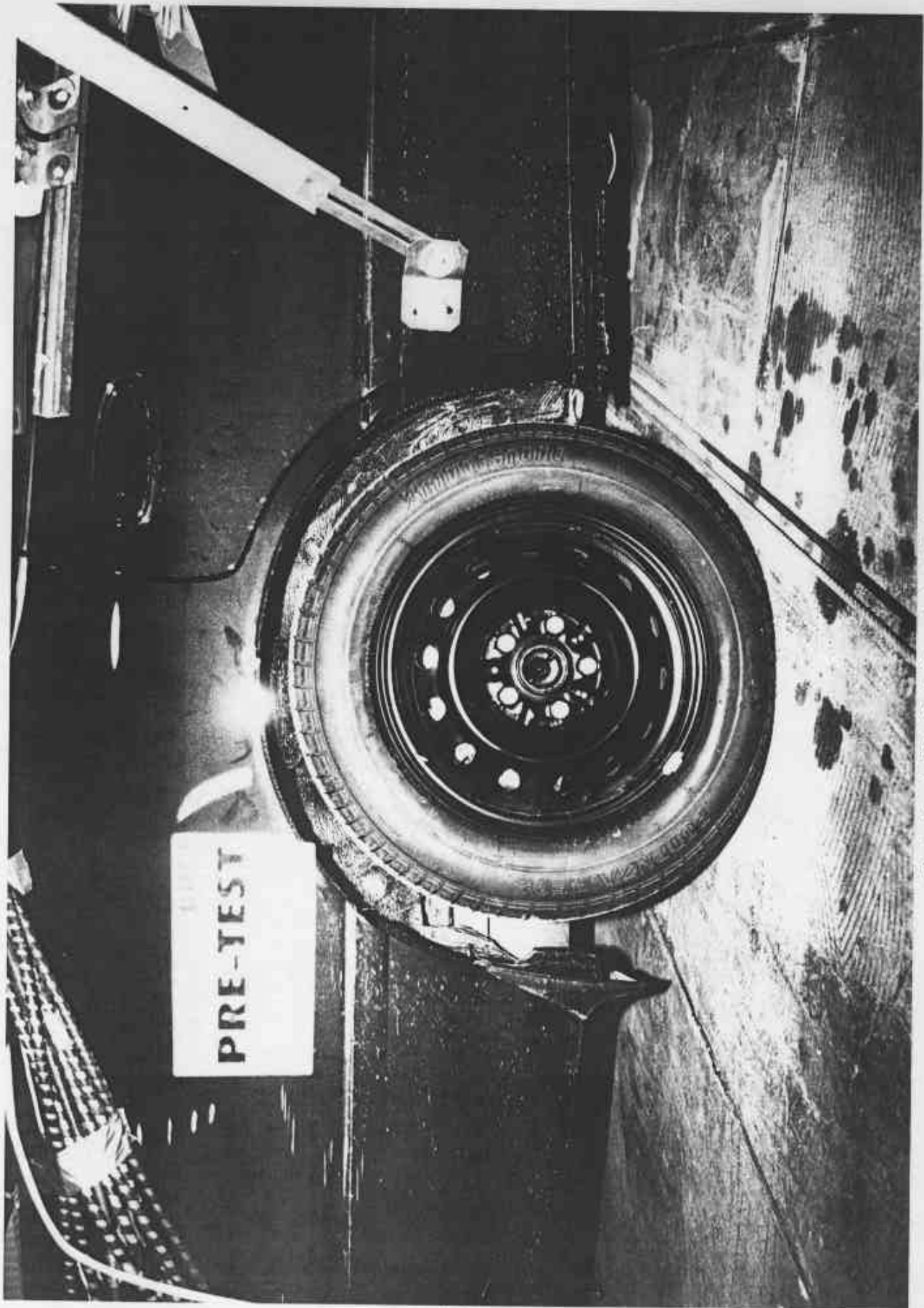


Photo No. A-52 - Right Rear Attitude Point

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* No valid data collected.

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* Data not valid after approximately 33 msec.

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TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

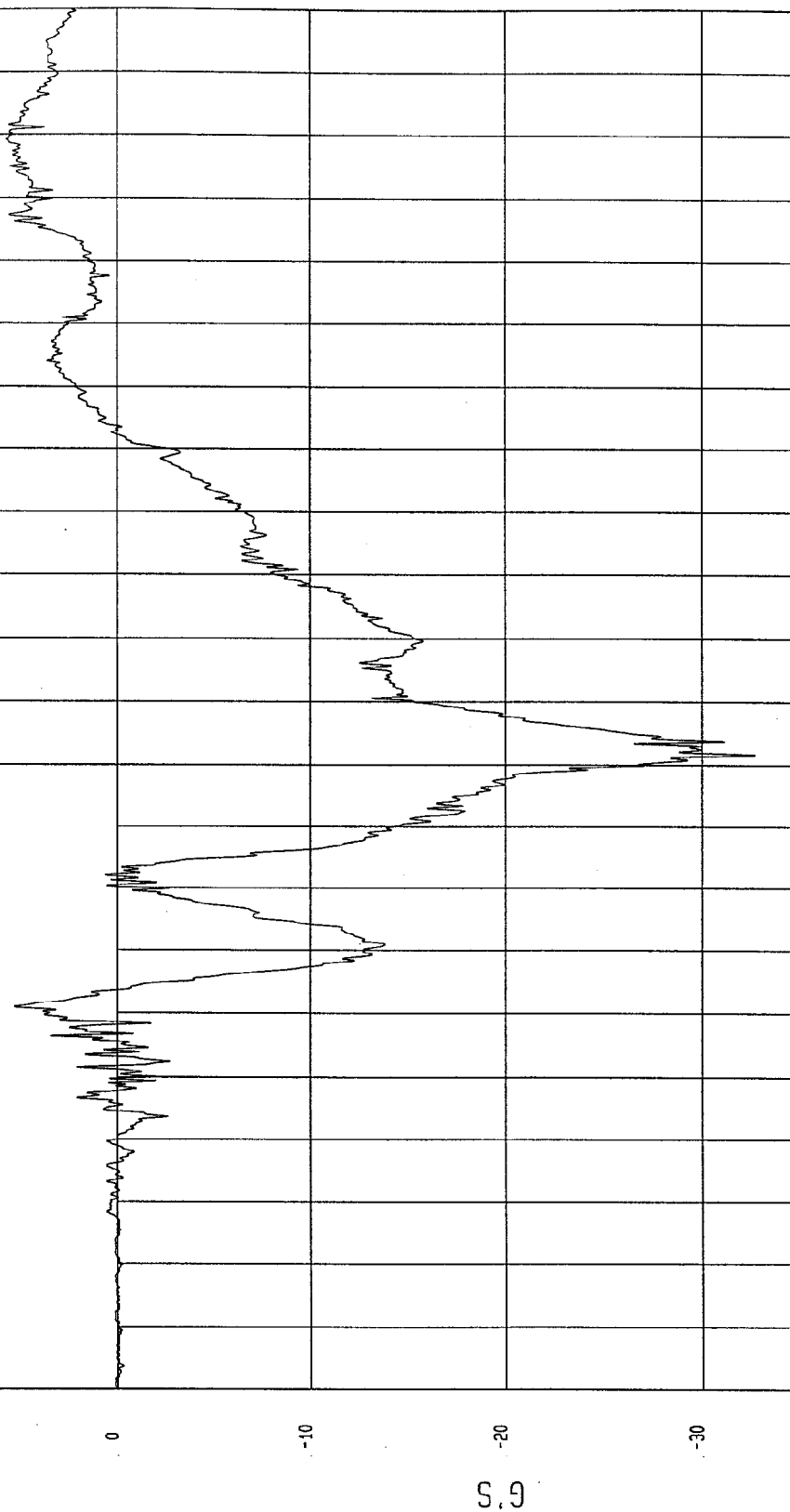
Speed: 38.3 MPH 61.6 KPH

Minimum = -32.62 G'S at 82 msec

Maximum = 5.65 G'S at 179 msec

DRIVER HEAD X ACCELERATION

1 ——— B97144AF.A12 Filterclass (1000)



TIME (SECONDS)

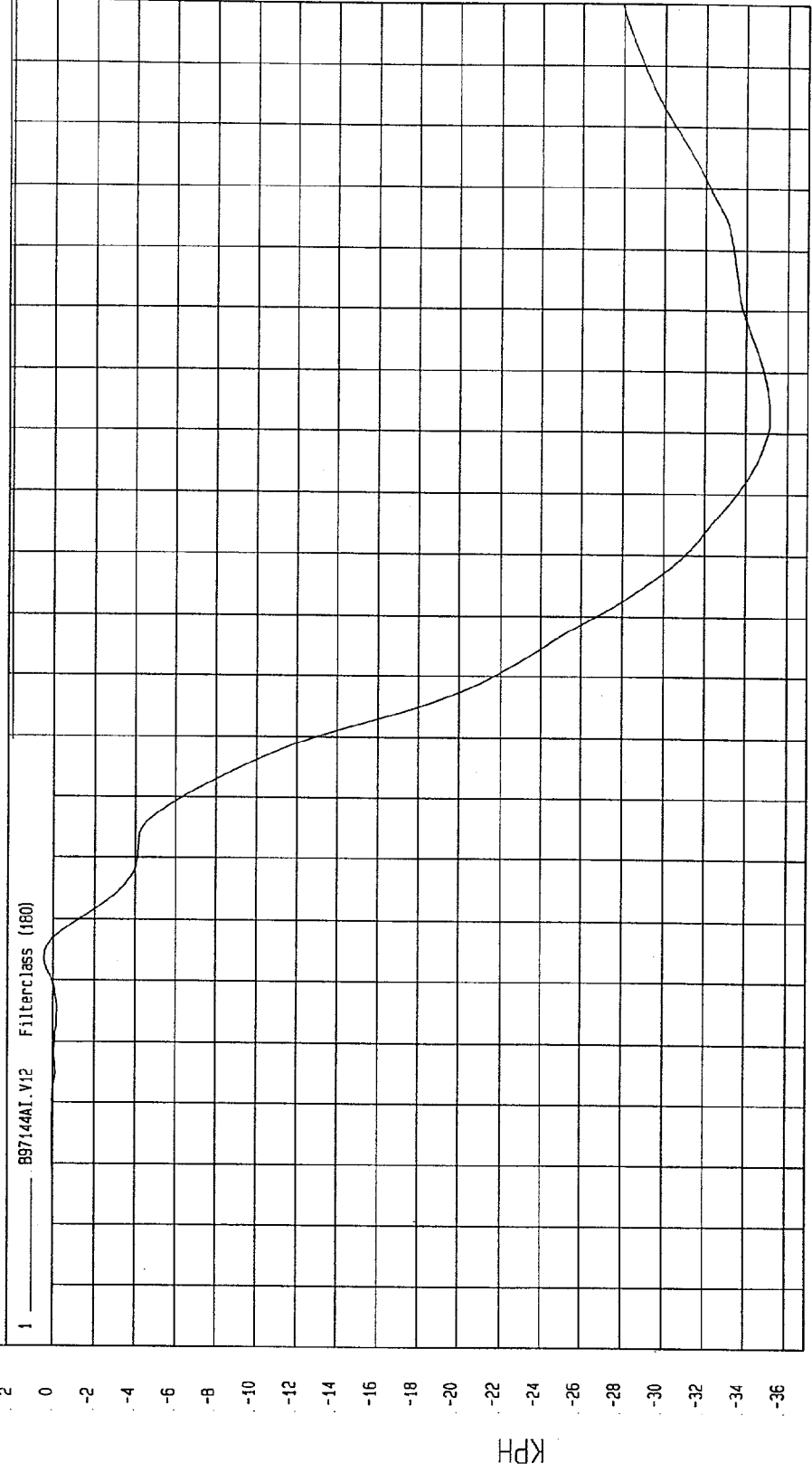
MGA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -35.16 KPH at 132 msec Maximum = .44 KPH at 44 msec

DRIVER HEAD X VELOCITY



TIME Seconds

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12-19-1997 11: 41

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

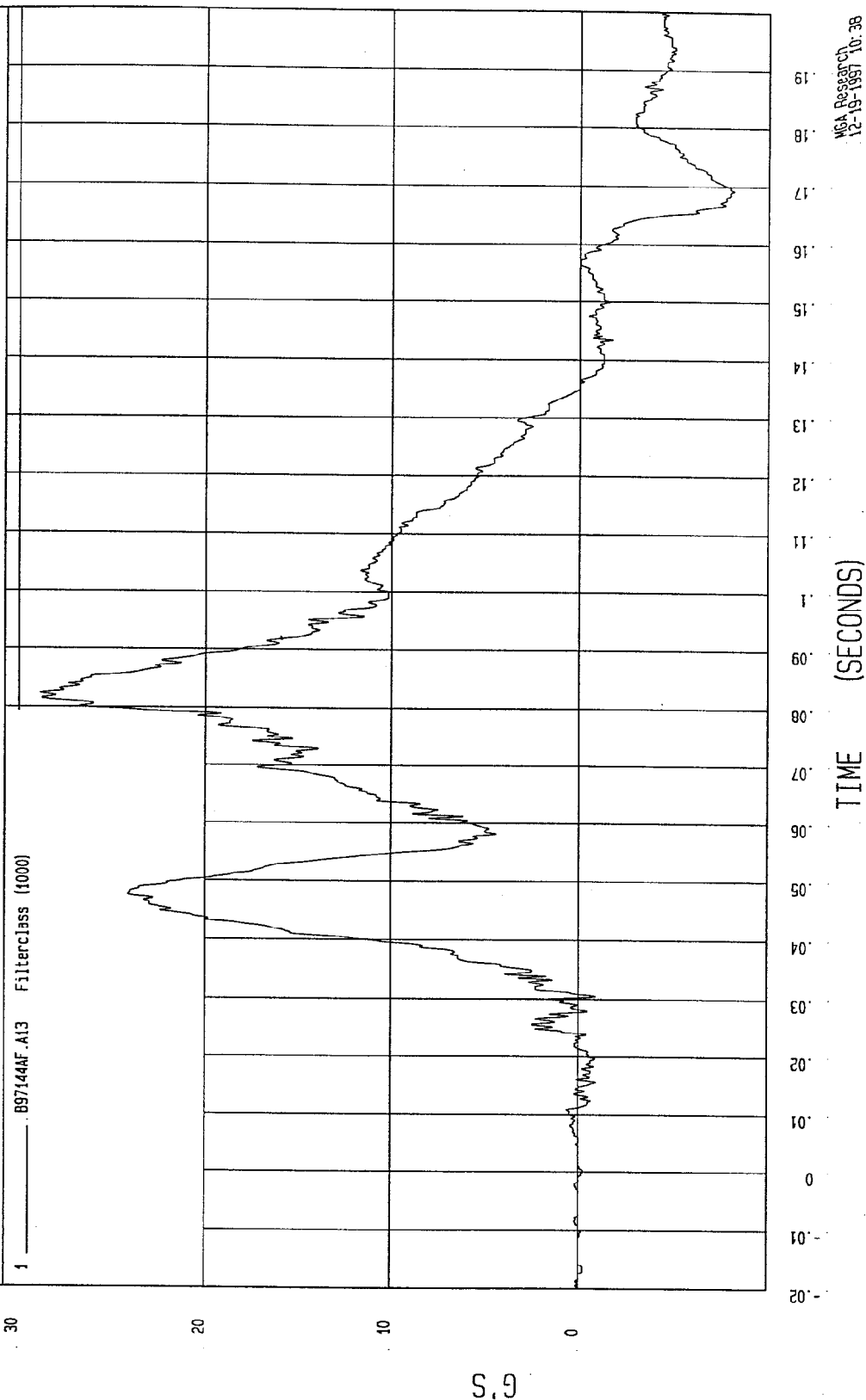
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 28.87 G'S at 82 msec

Minimum = -8.12 G'S at 169 msec

DRIVER HEAD Y ACCELERATION



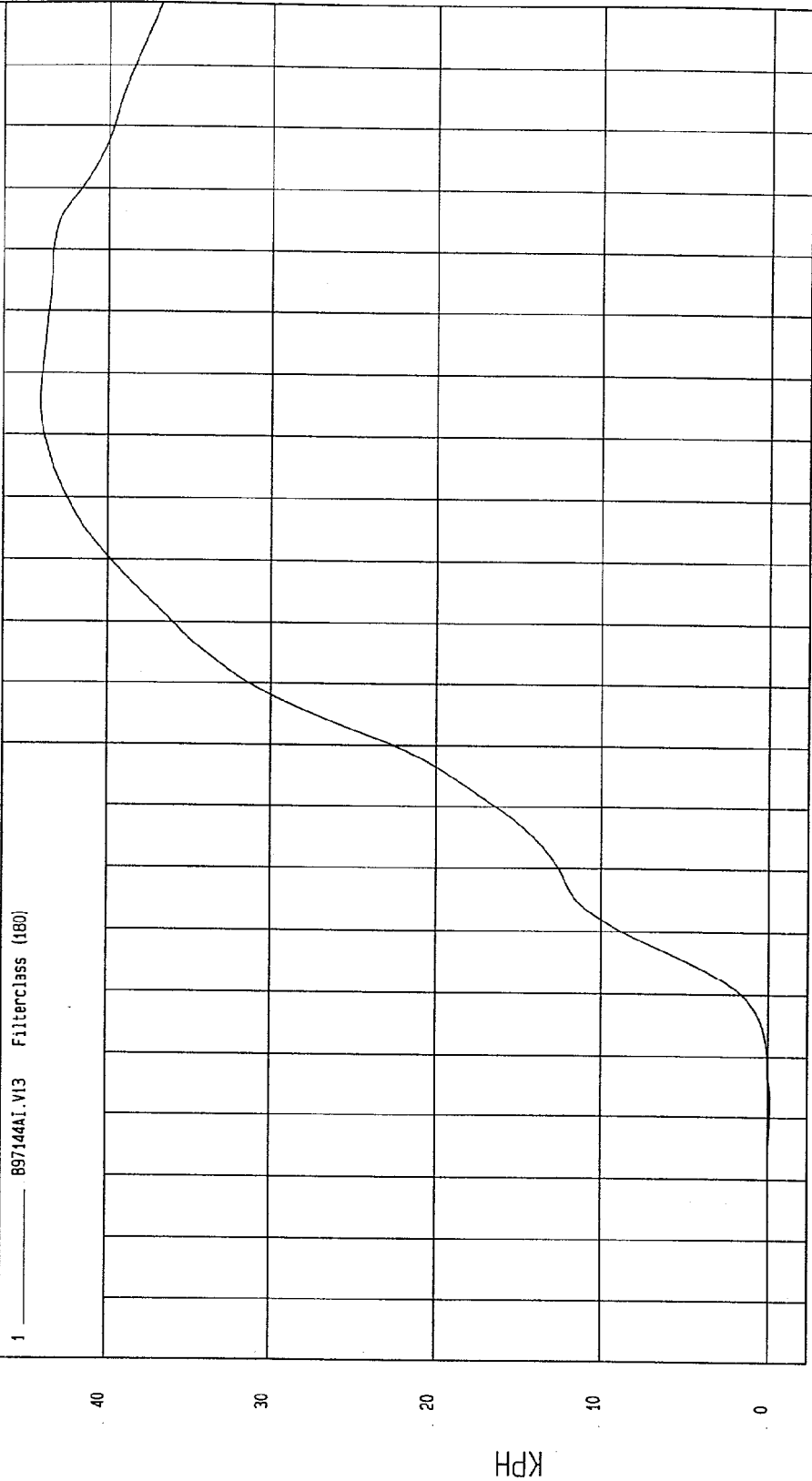
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -11 KPH at 22 msec Maximum = 44.06 KPH at 135 msec

DRIVER HEAD Y VELOCITY

1 ——— B97144A1.V13 Filterclass (180)



TIME Seconds

19
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MCA Research
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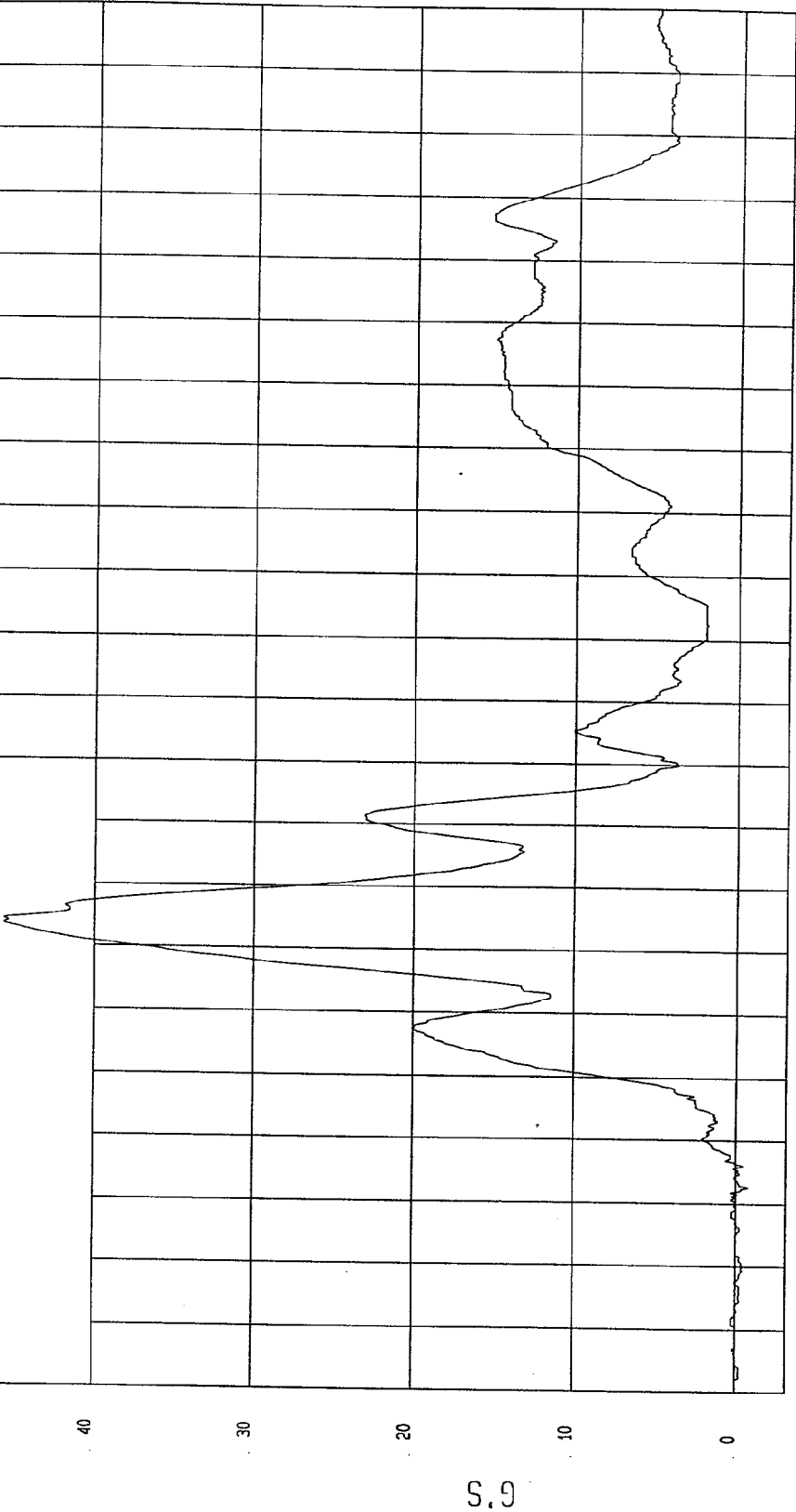
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

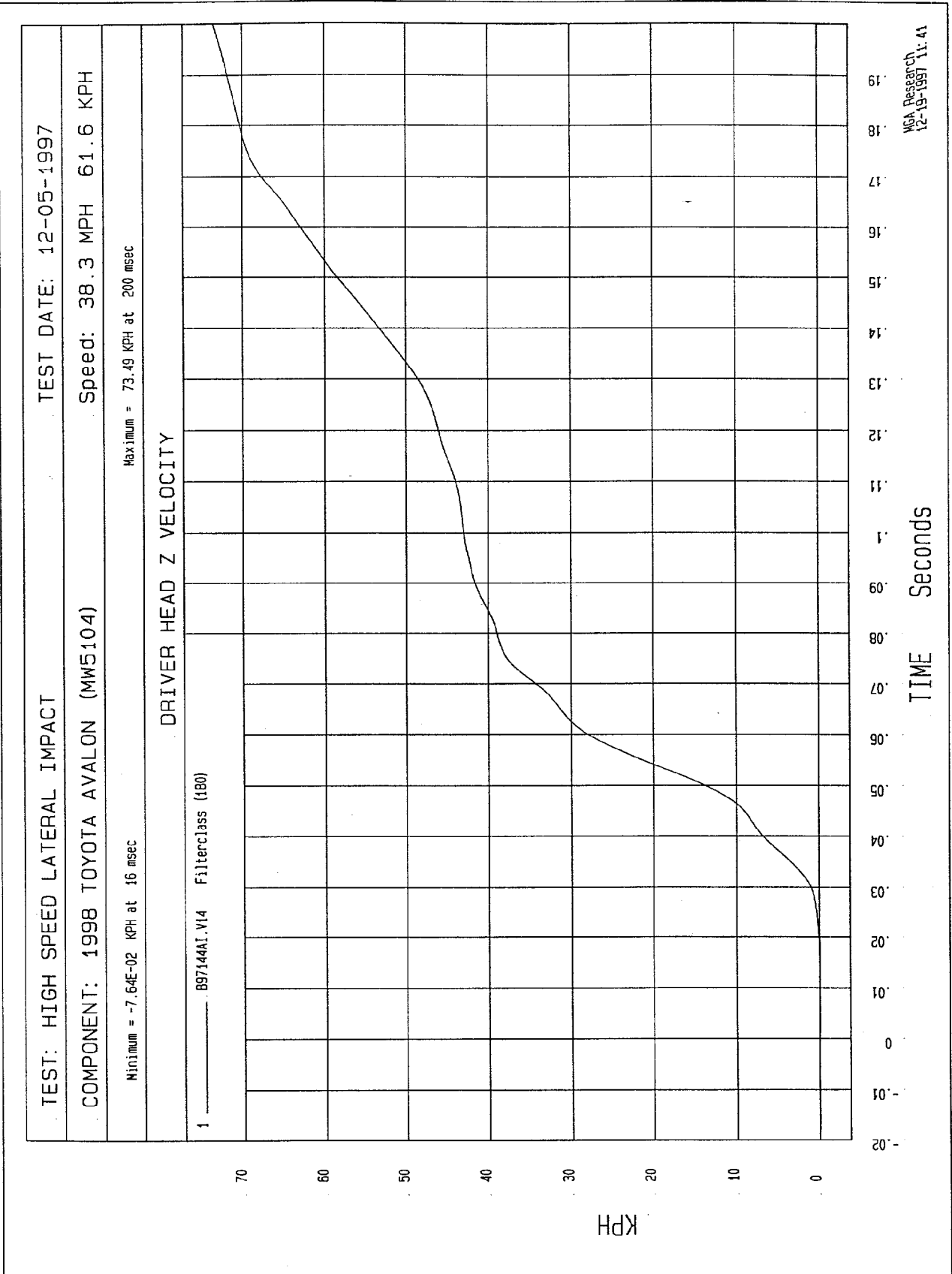
Minimum = -.75 G'S at 13 msec Maximum = 45.55 G'S at 54 msec

DRIVER HEAD Z ACCELERATION

1 _____ BS7144AF.A14 Filterclass (1000)



TIME (SECONDS) MGA Research 12-19-1997 10:38

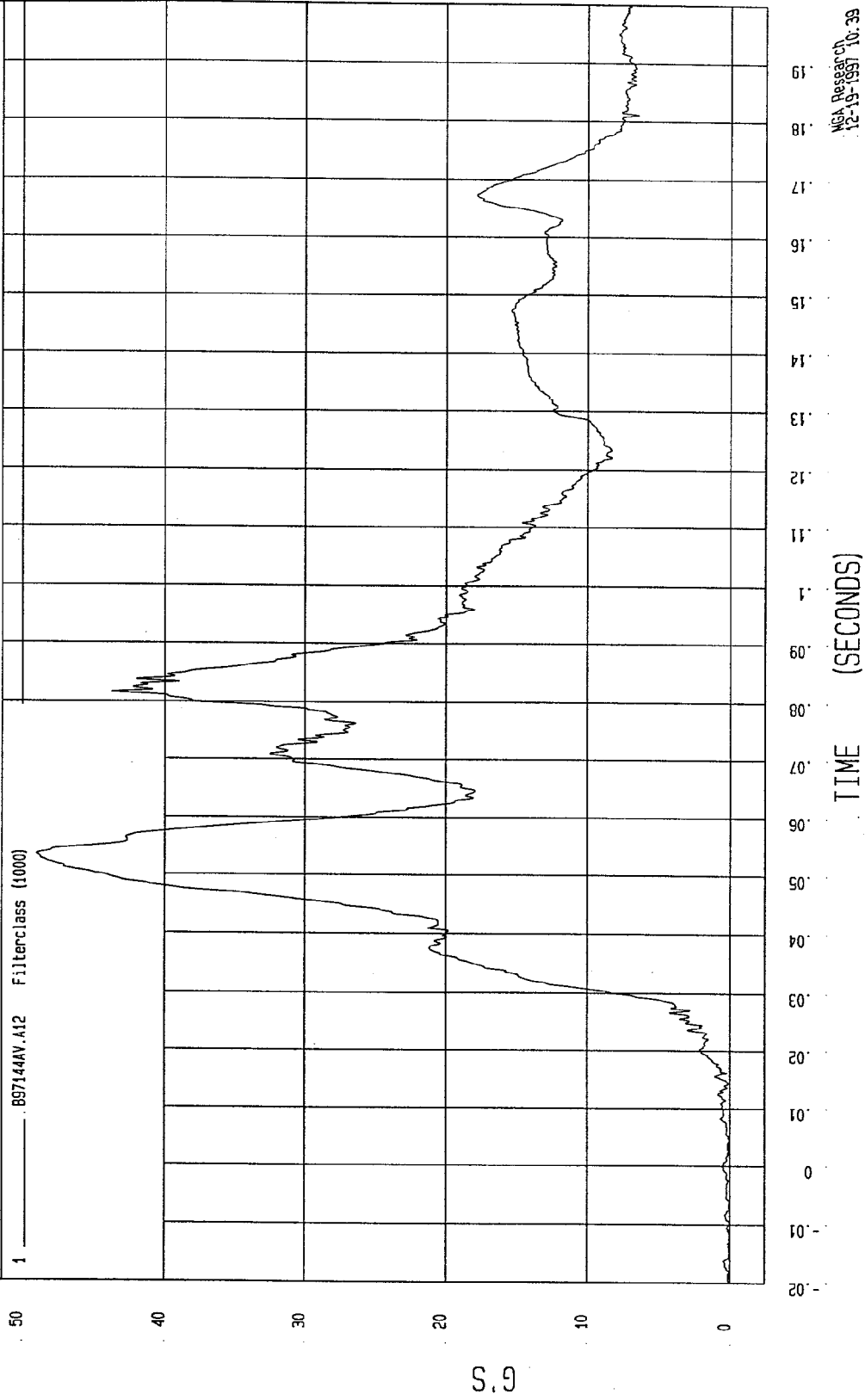


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = .02 G'S at -10 msec Maximum = 49.00 G'S at 54 msec

DRIVER HEAD RESULTANT



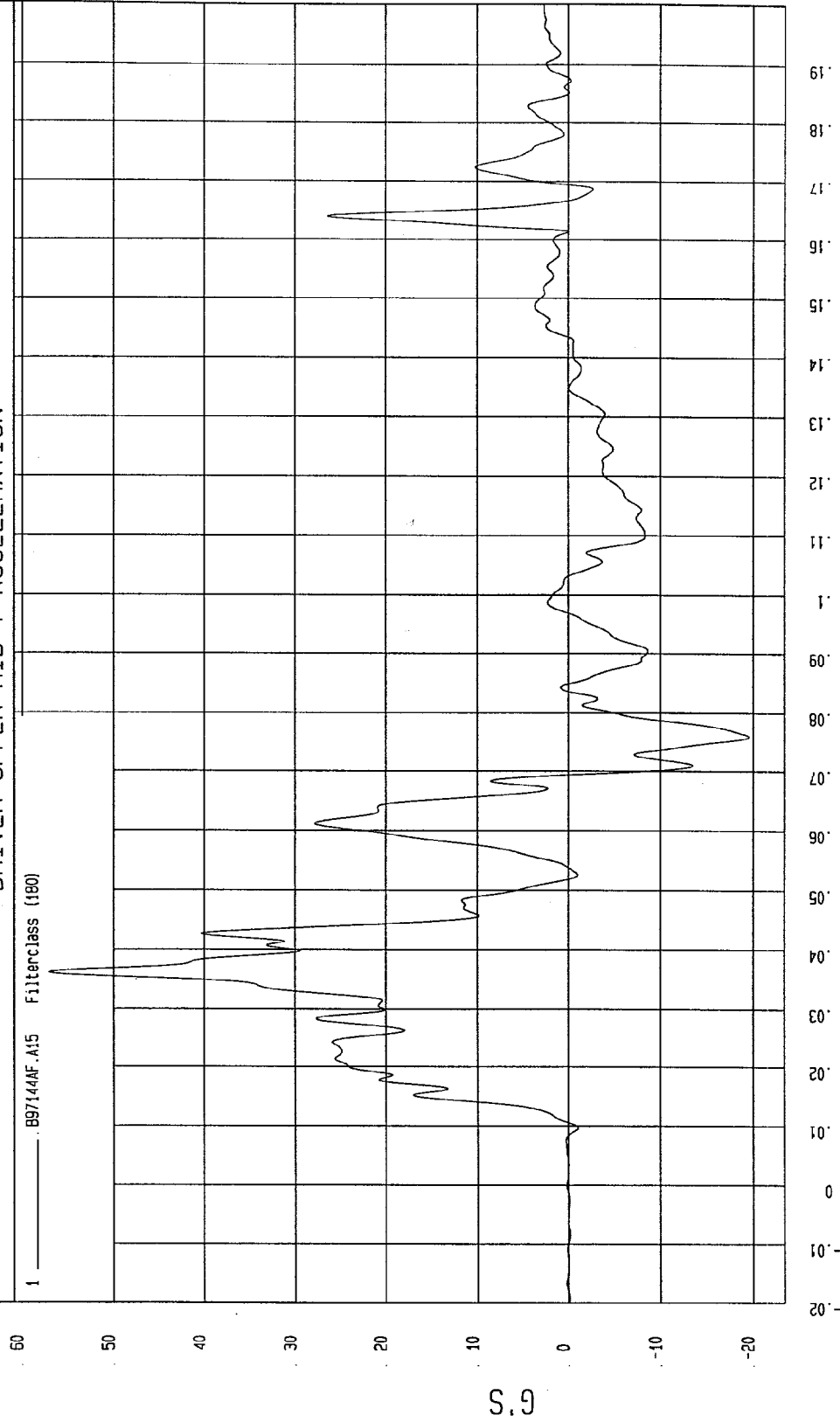
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -19.57 G'S at 76 msec
Maximum = 57.05 G'S at 36 msec

DRIVER UPPER RIB Y ACCELERATION

1 _____ B97144AF.A15 Filterclass (100)



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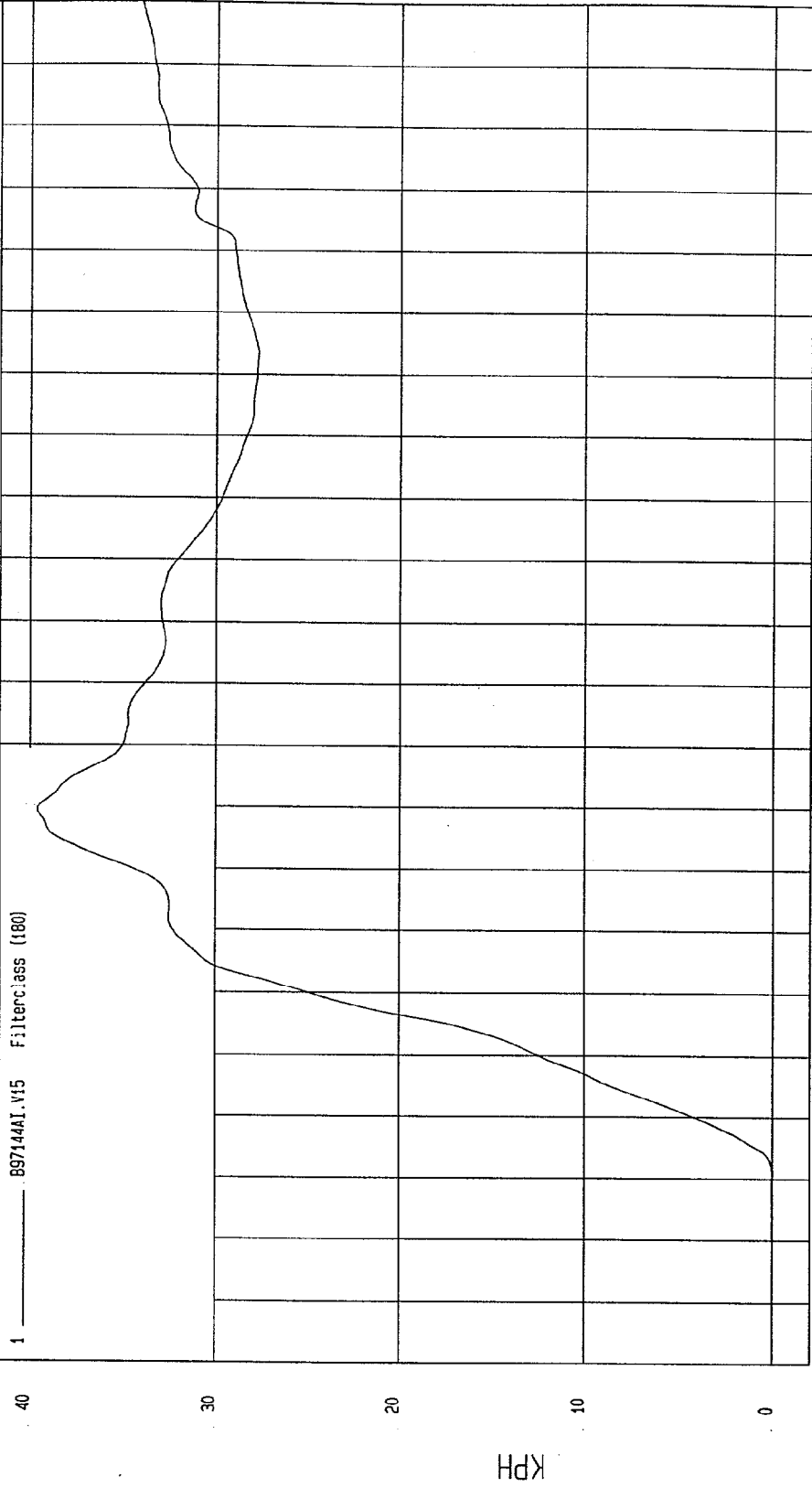
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -6.84E-03 KPH at 10 msec Maximum = 39.62 KPH at 69 msec

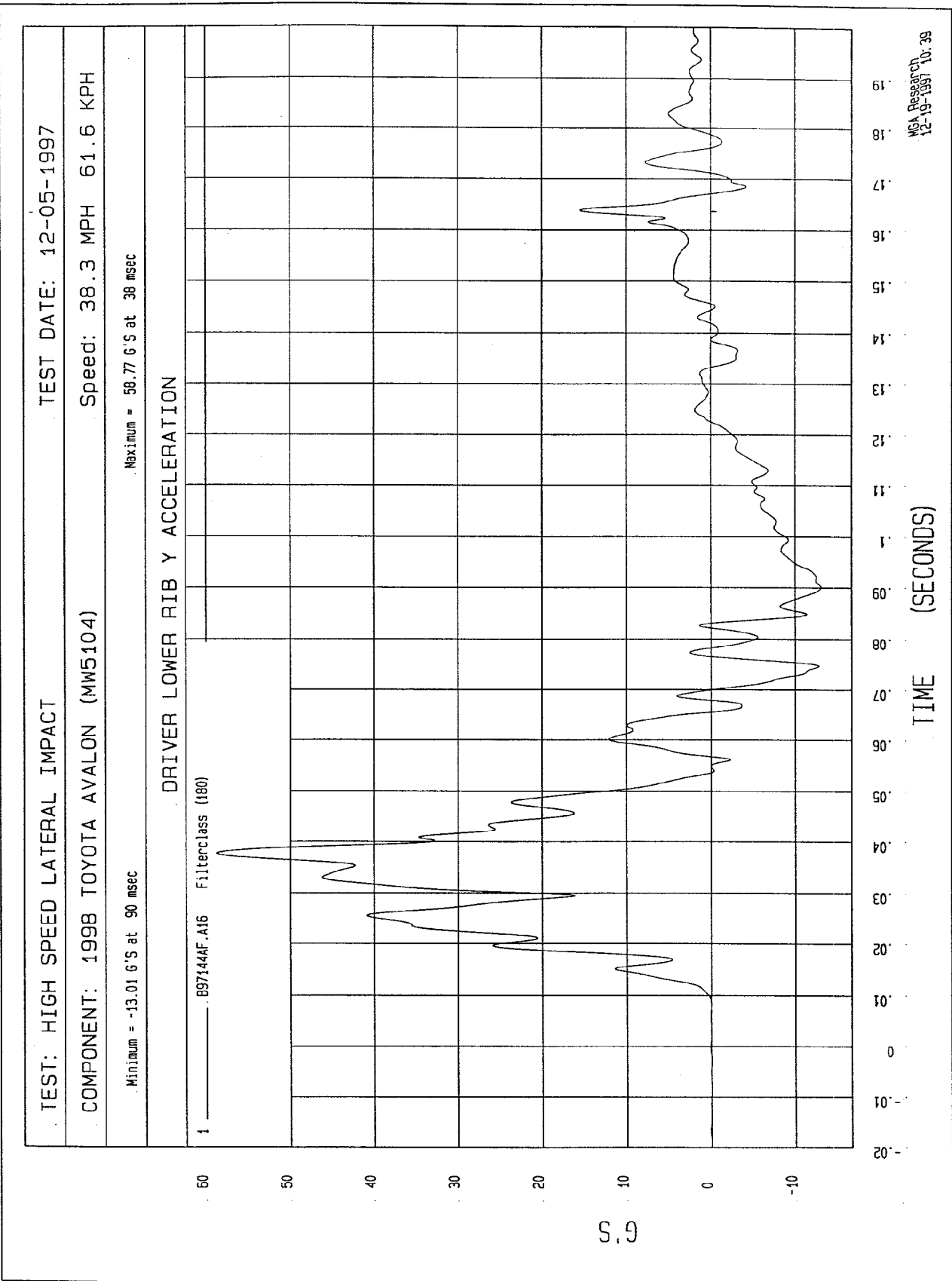
DRIVER UPPER RIB Y VELOCITY

1 897144A1.V15 Filter: class (180)



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
12-19-1997 11: 41



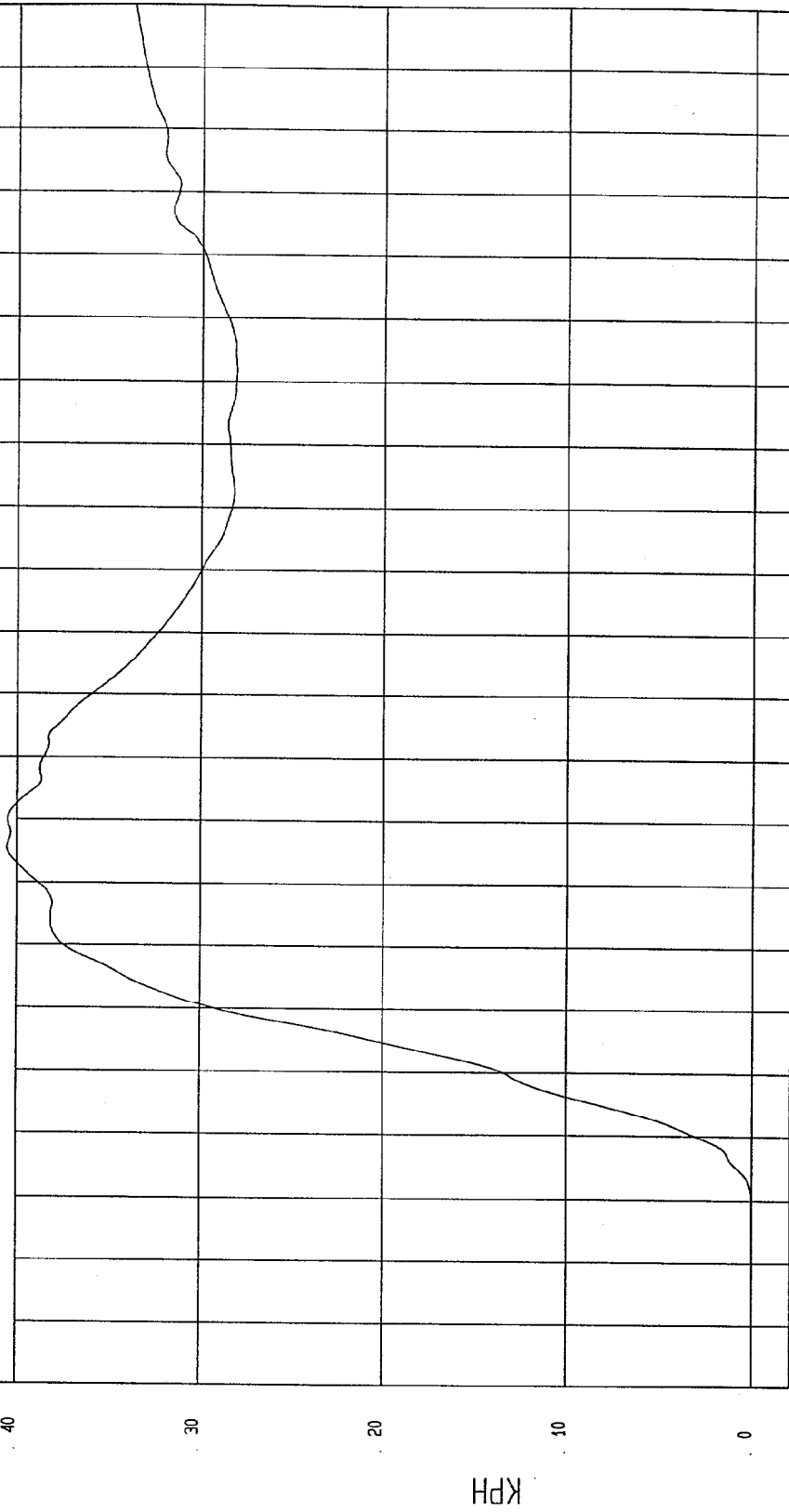
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

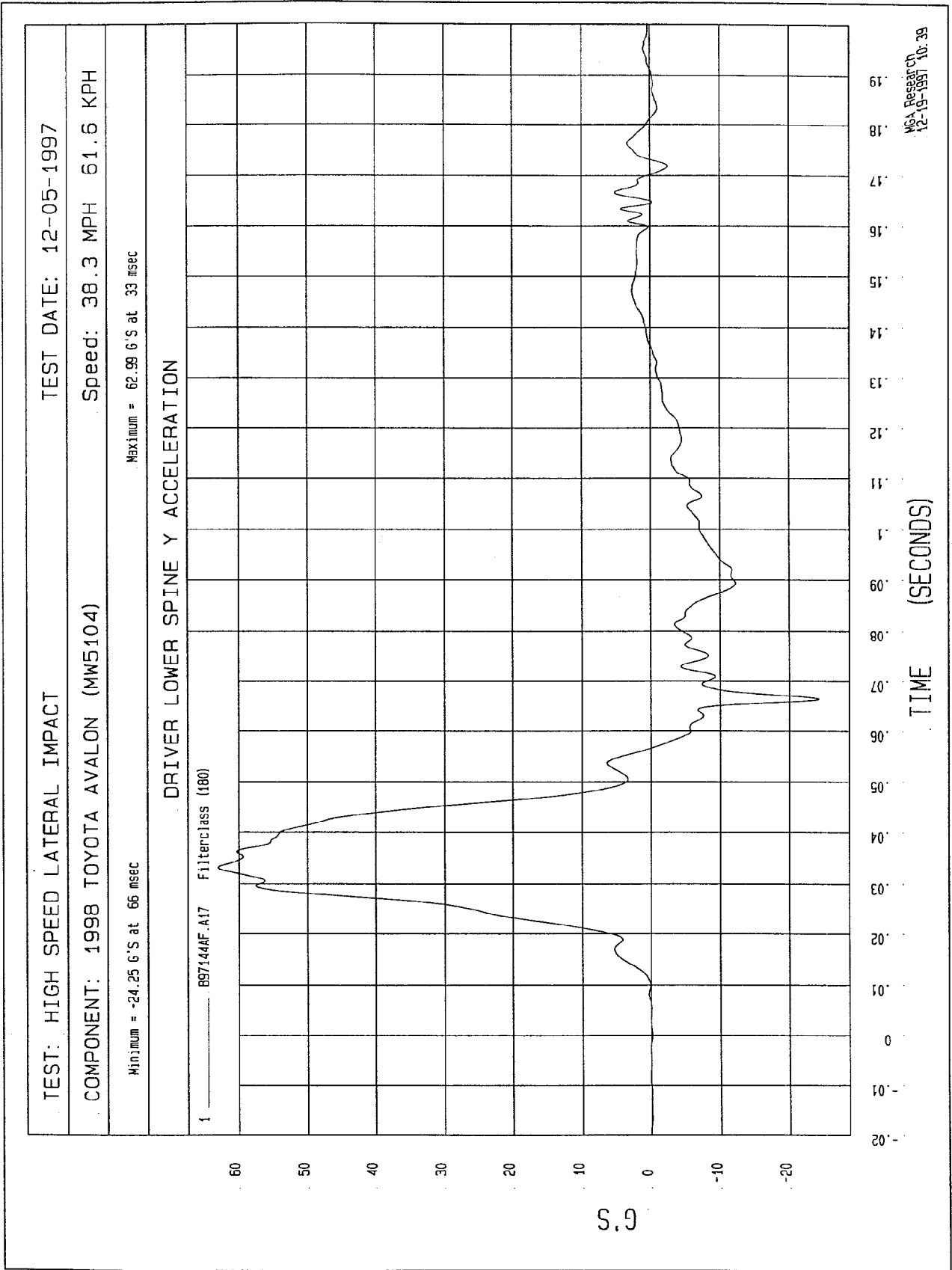
Minimum = -1.67E-03 KPH at -18 msec
Maximum = 40.53 KPH at 66 msec

DRIVER LOWER RIB Y VELOCITY

1 ——— B97144A1.V16 Filter: class (180)



TIME Seconds
NGA Research
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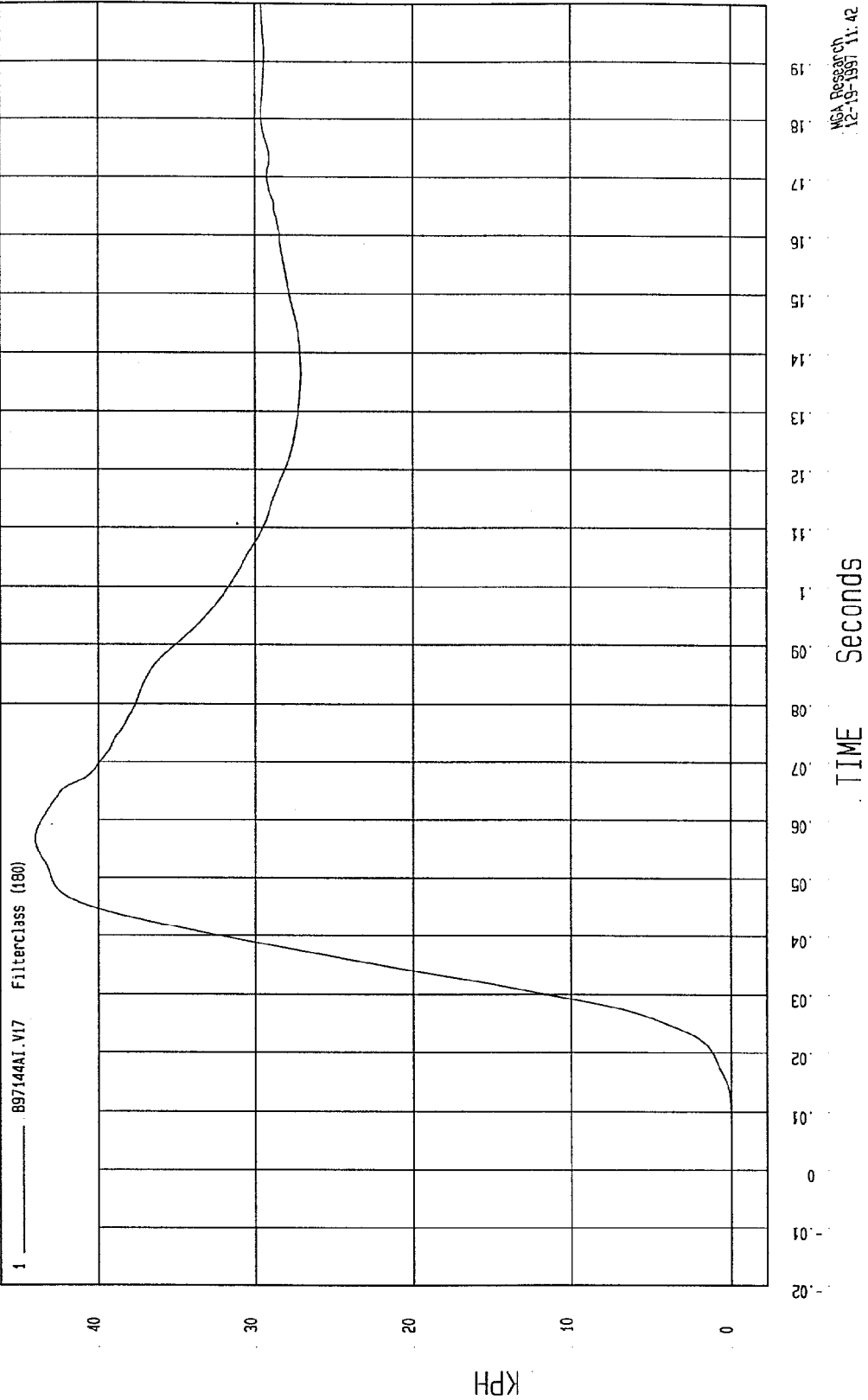


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.92E-02 KPH at 6 msec Maximum = 43.93 KPH at 57 msec

DRIVER LOWER SPINE Y VELOCITY

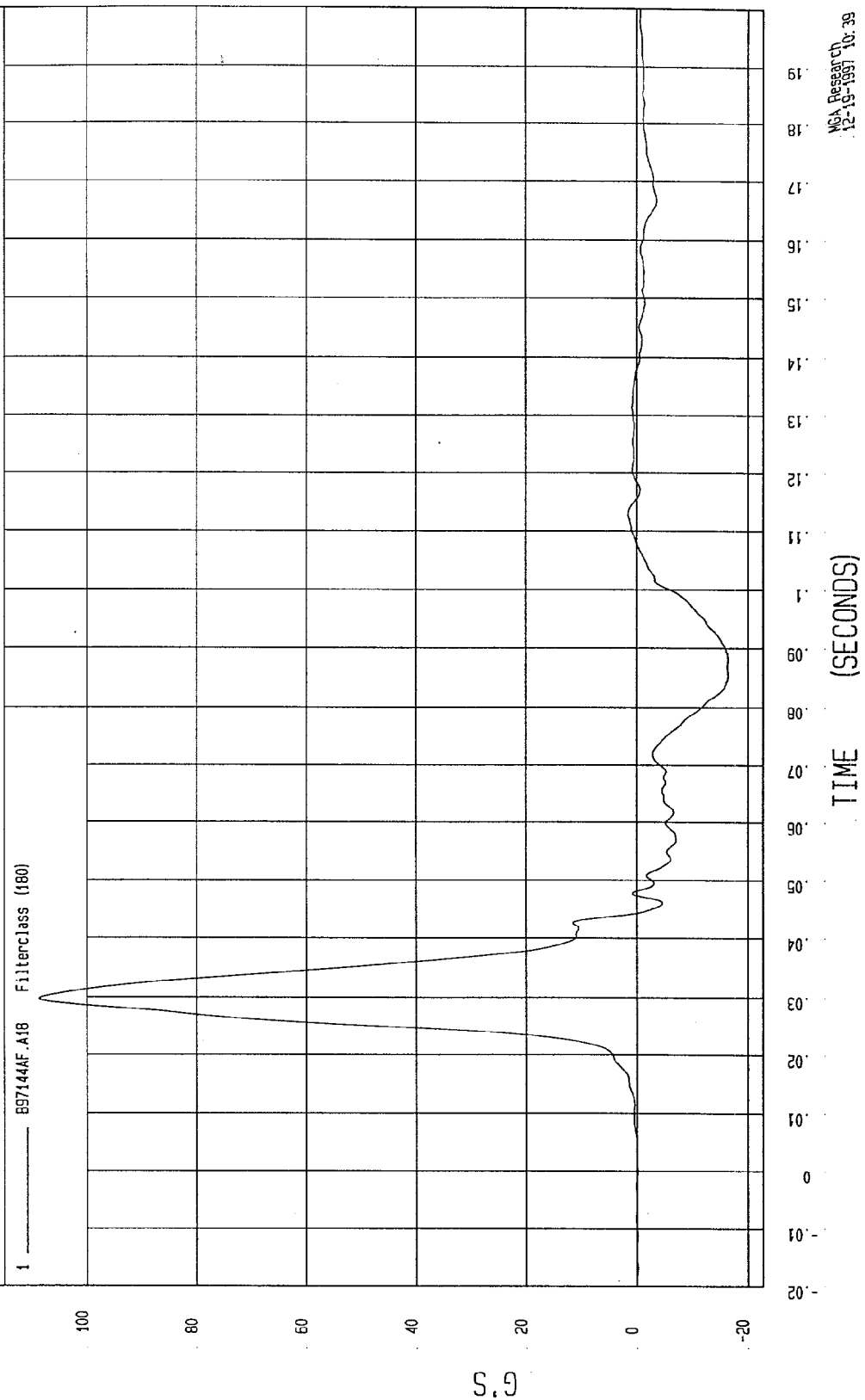


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -16.49 G'S at 85 msec Maximum = 106.75 G'S at 30 msec

DRIVER PELVIS Y ACCELERATION



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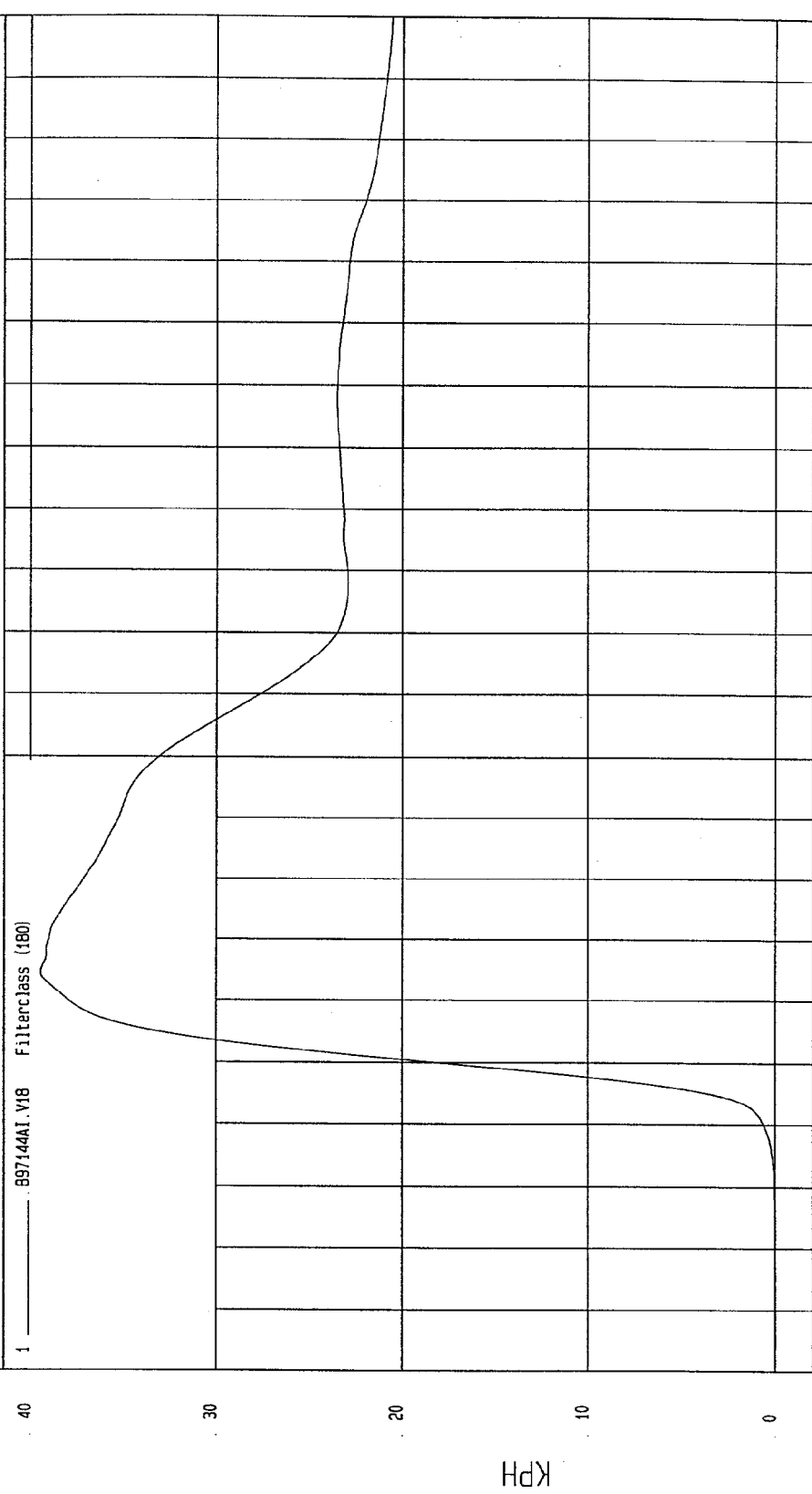
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.08E-02 KPH at -10 msec
Maximum = 39.46 KPH at 44 msec

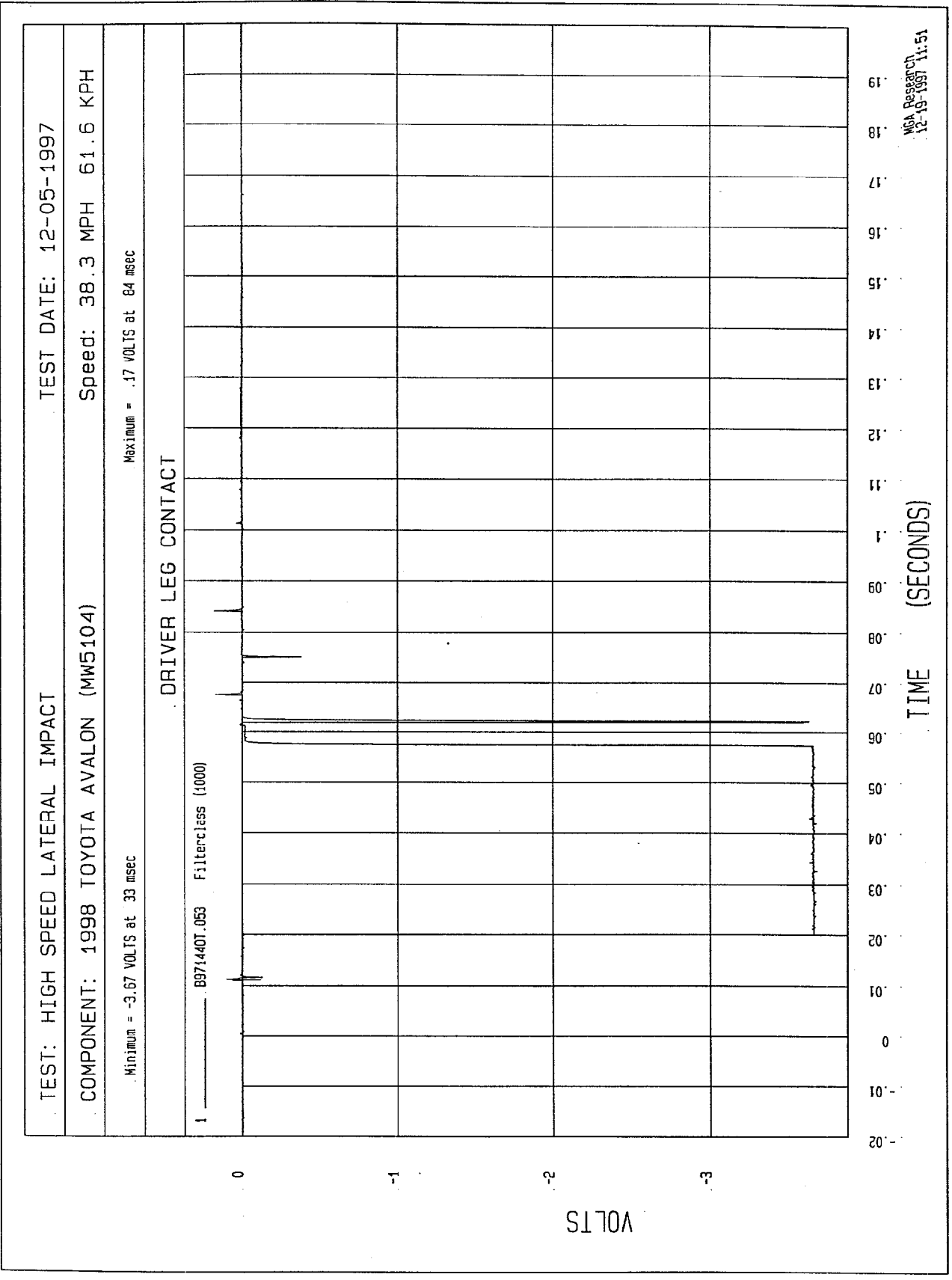
DRIVER PELVIS Y VELOCITY

1 897144A1.V18 Filterclass (180)



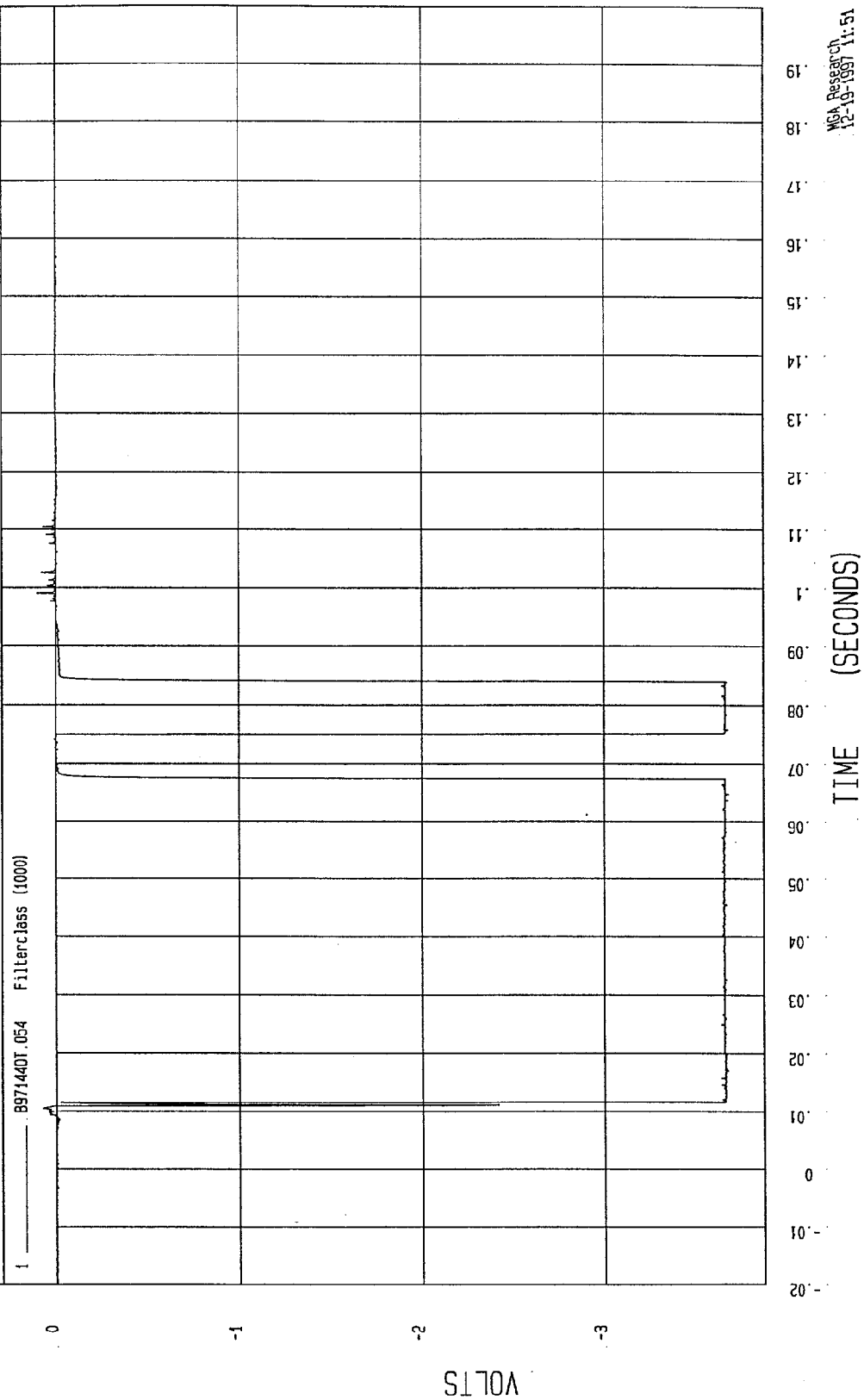
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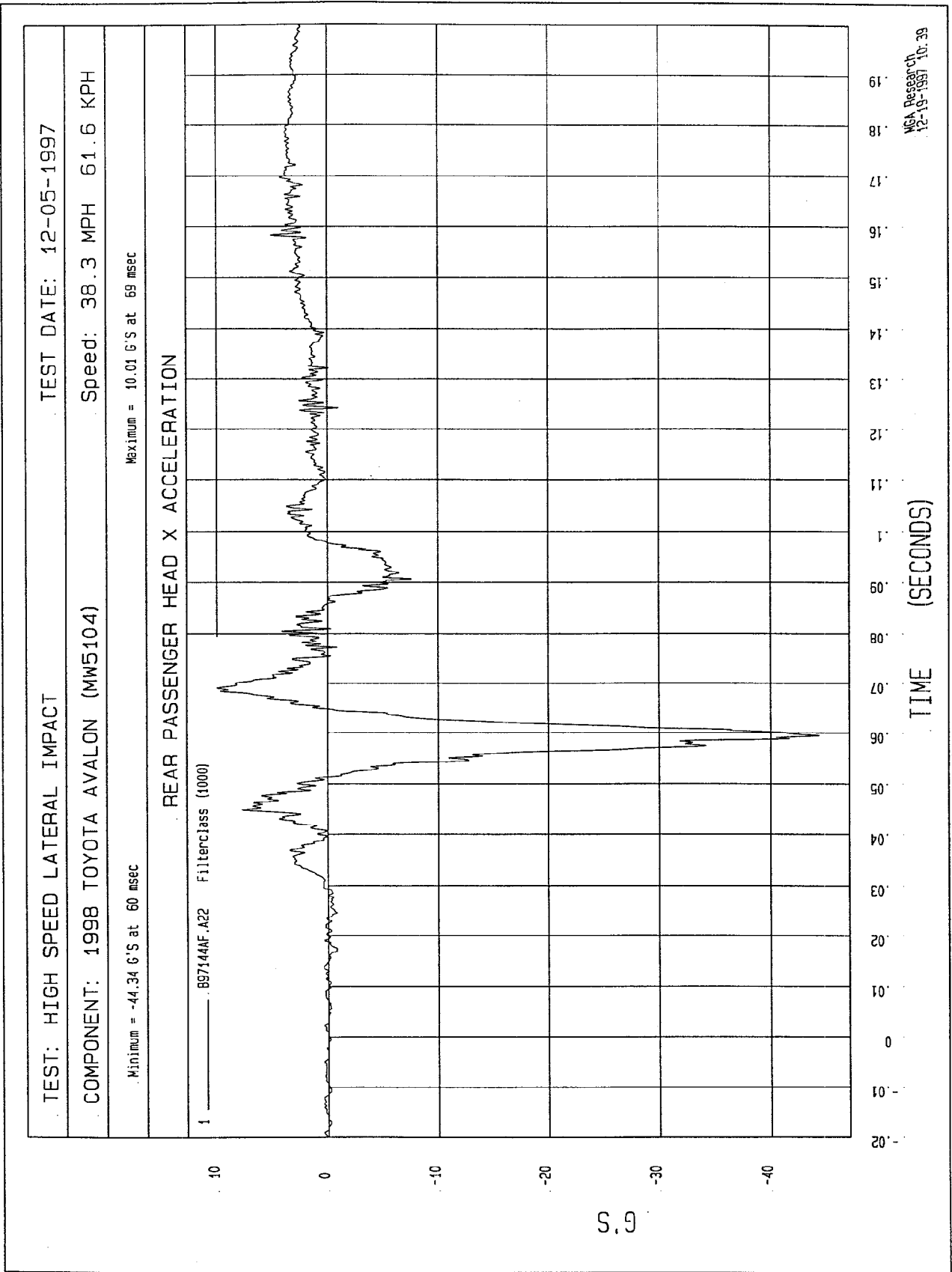
TIME Seconds



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH
Minimum = -3.67 VOLTS at 65 msec Maximum = .10 VOLTS at 99 msec

DRIVER SHOULDER CONTACT



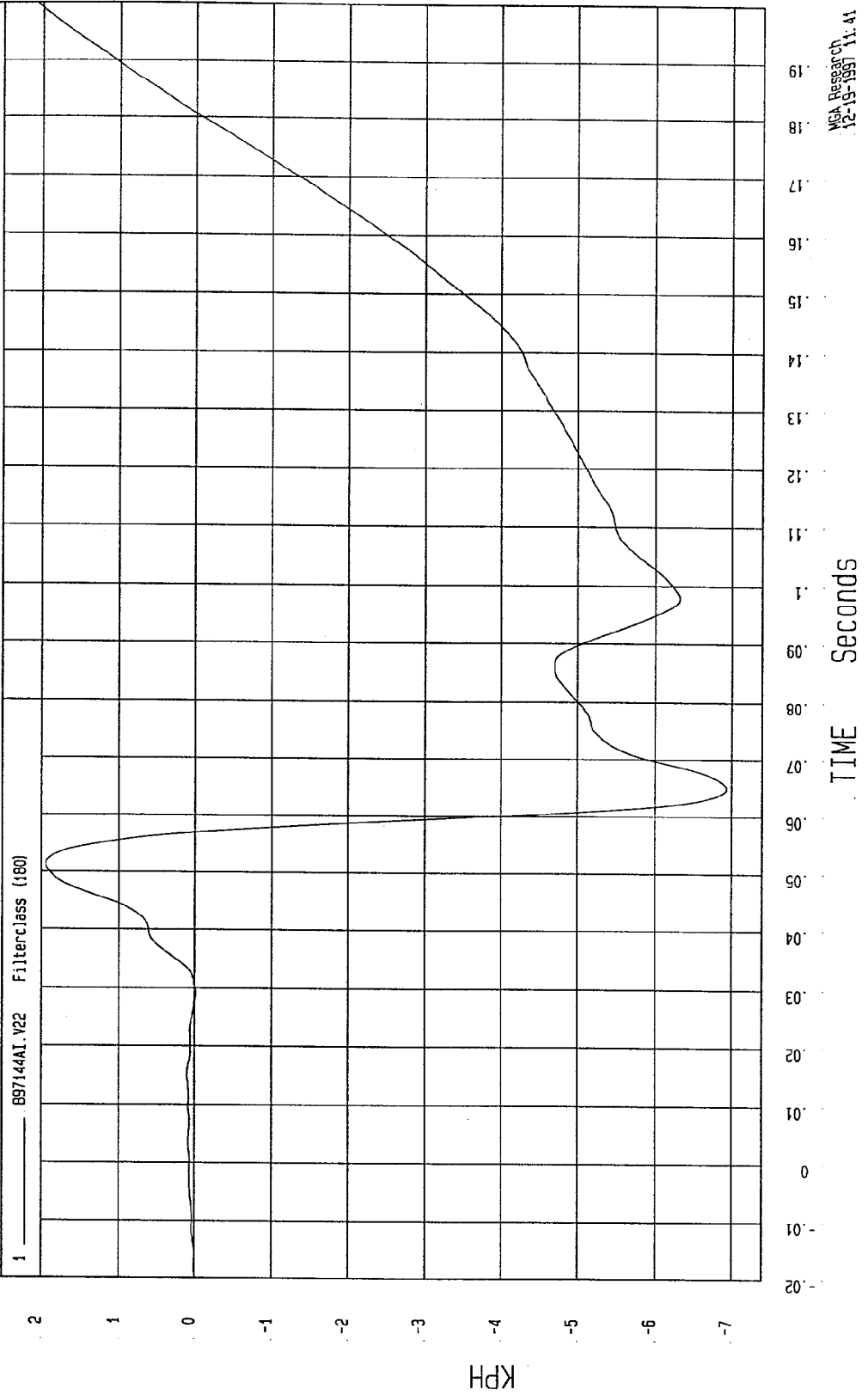


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -6.93 KPH at 65 msec Maximum = 2.05 KPH at 200 msec

REAR PASSENGER HEAD X VELOCITY

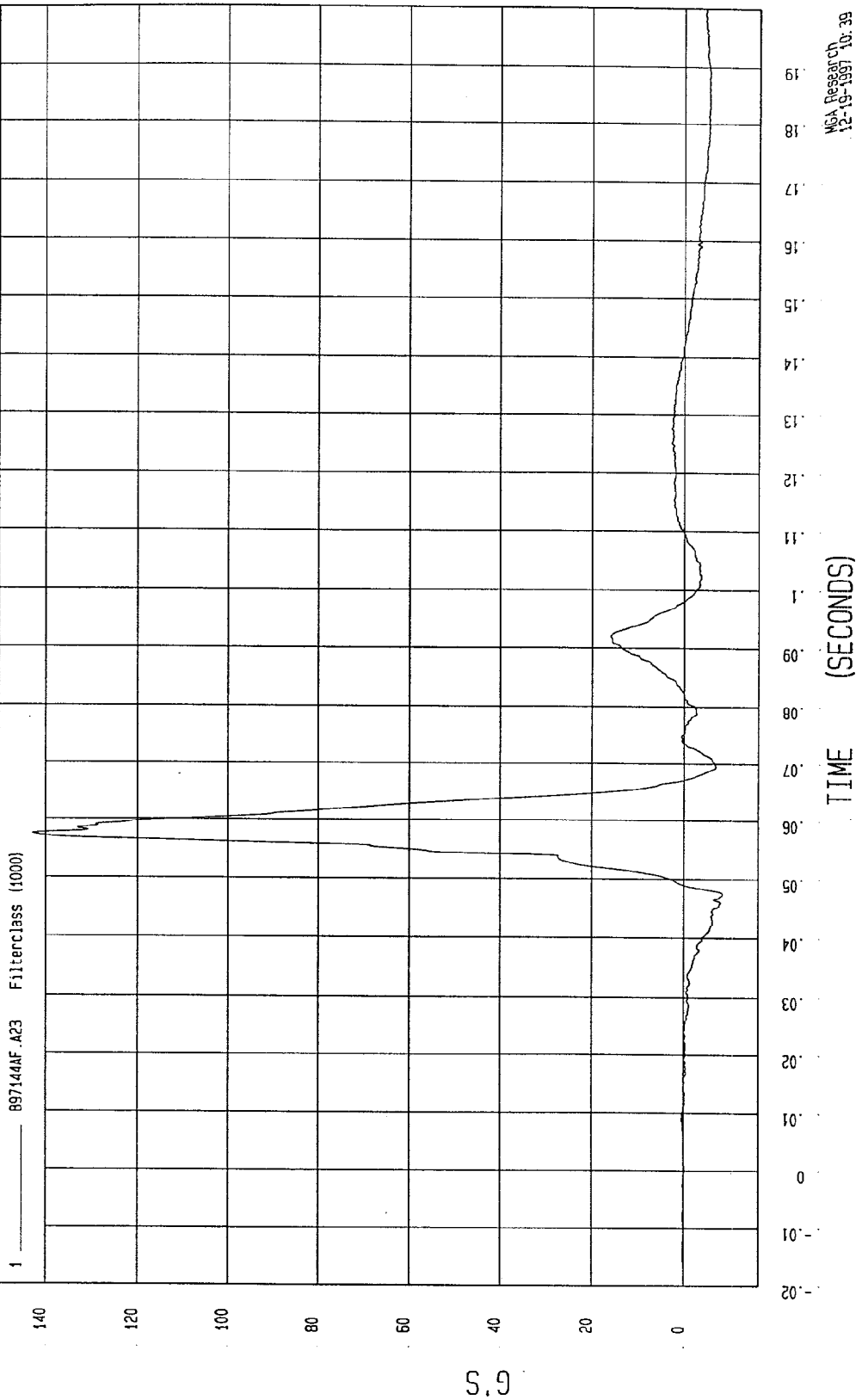


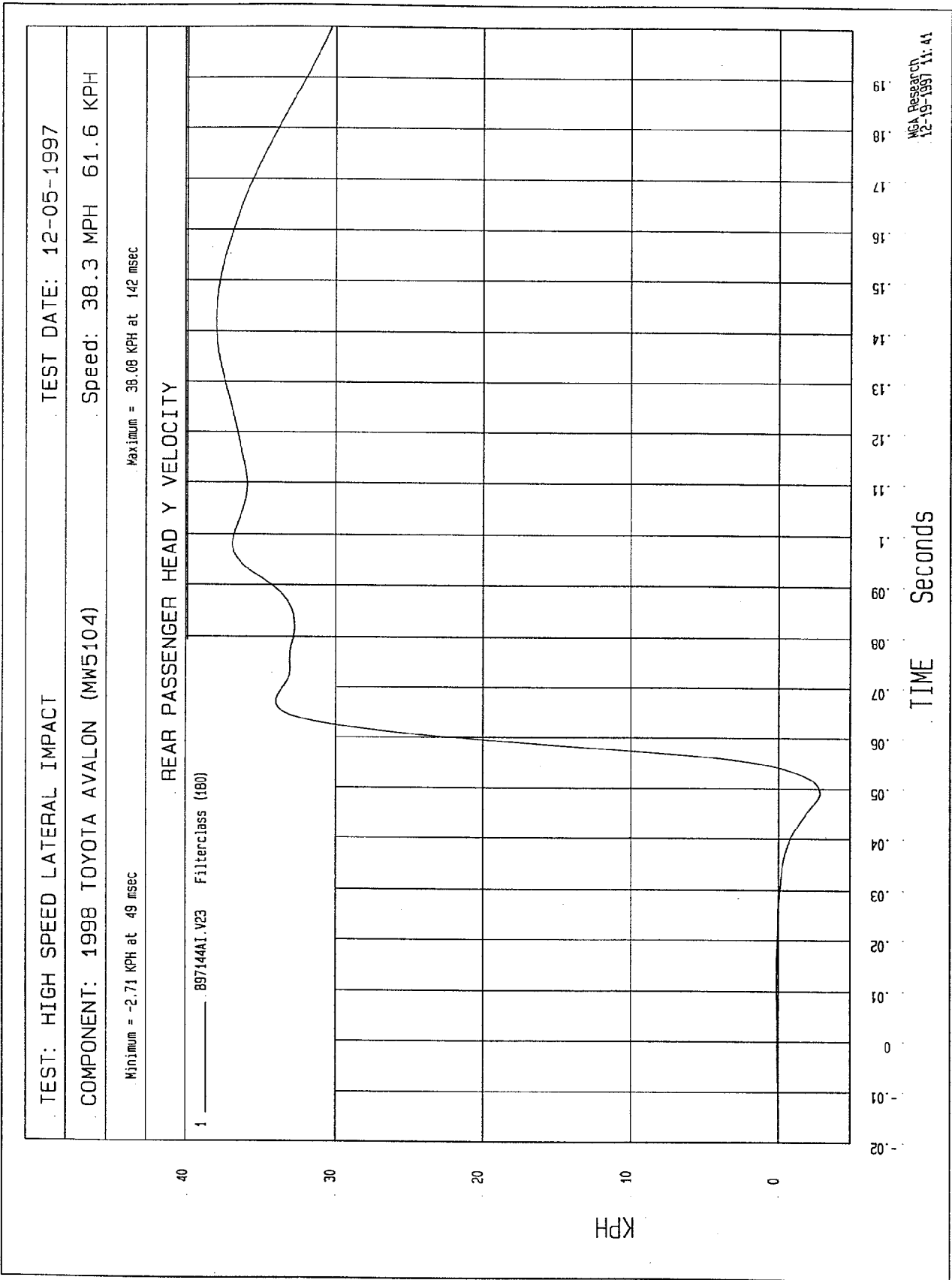
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.60 G'S at 48 msec Maximum = 142.77 G'S at 57 msec

REAR PASSENGER HEAD Y ACCELERATION





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

Speed: 38.3 MPH 61.6 KPH

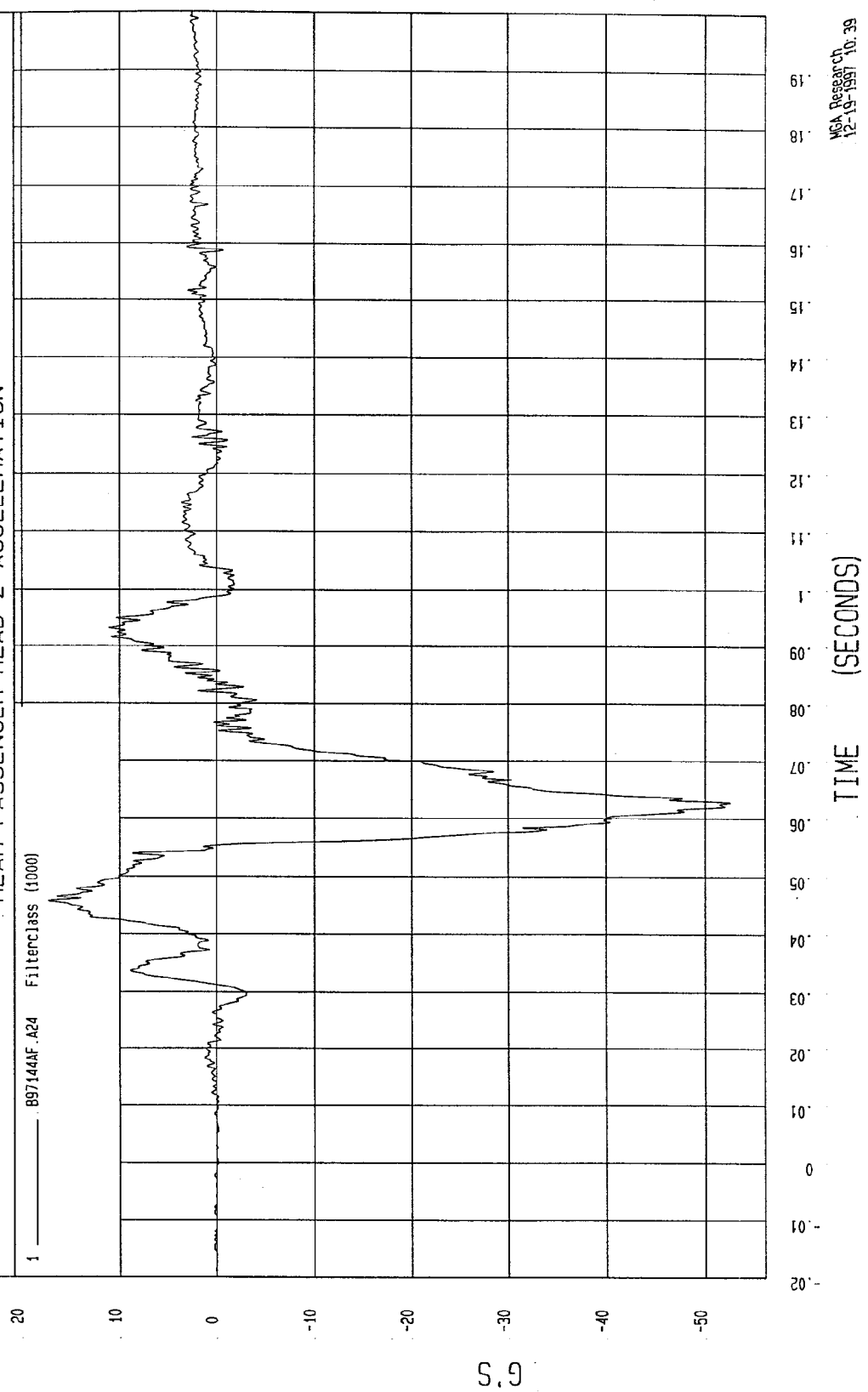
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 17.29 G'S at 46 msec

Minimum = -52.59 G'S at 63 msec

REAR PASSENGER HEAD Z ACCELERATION

1 _____ B97144AF.A24 FilterClass (1000)



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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

SPEED: 38.3 MPH 61.6 KPH

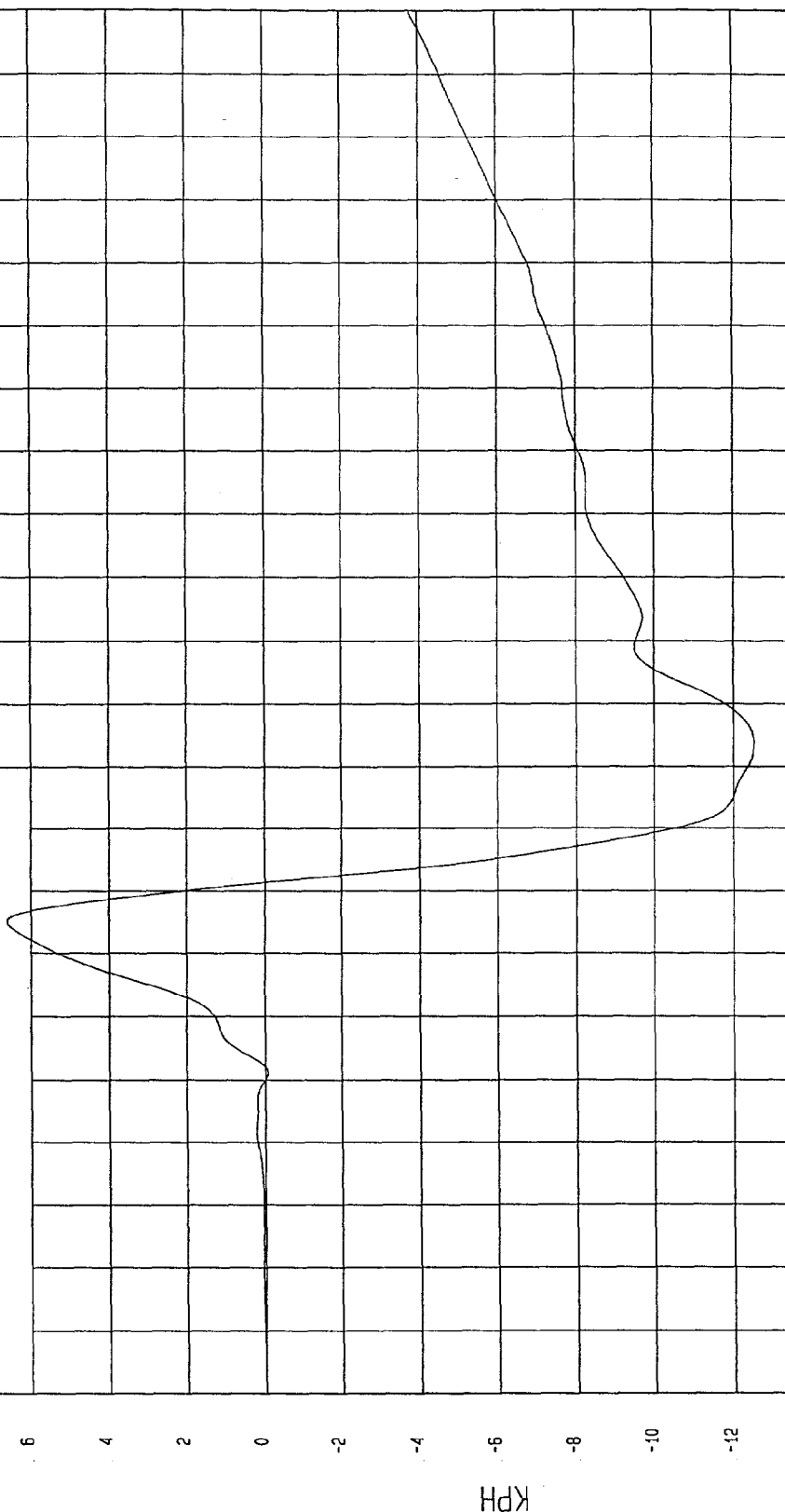
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Minimum = -12.54 KPH at 84 msec

Maximum = 6.61 KPH at 55 msec

REAR PASSENGER HEAD Z VELOCITY

1 897144AI.Y24 Filterclass (180)



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TIME Seconds

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.10 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

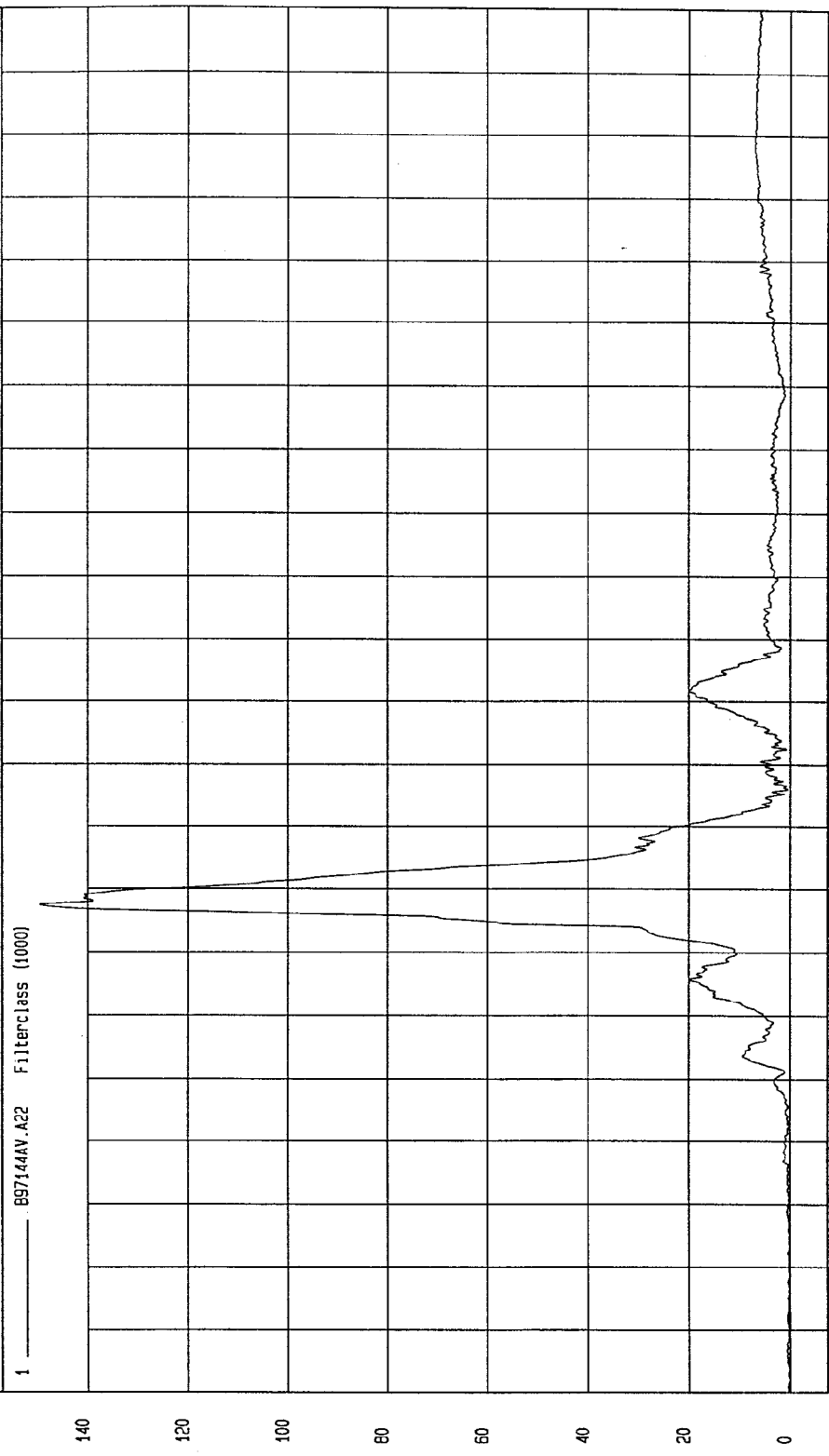
KPH

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 51.5 KPH

Minimum = 2.74E-02 G'S at 11 msec Maximum = 149.52 G'S at 58 msec

REAR PASSENGER HEAD RESULTANT



TIME (SECONDS)

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TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

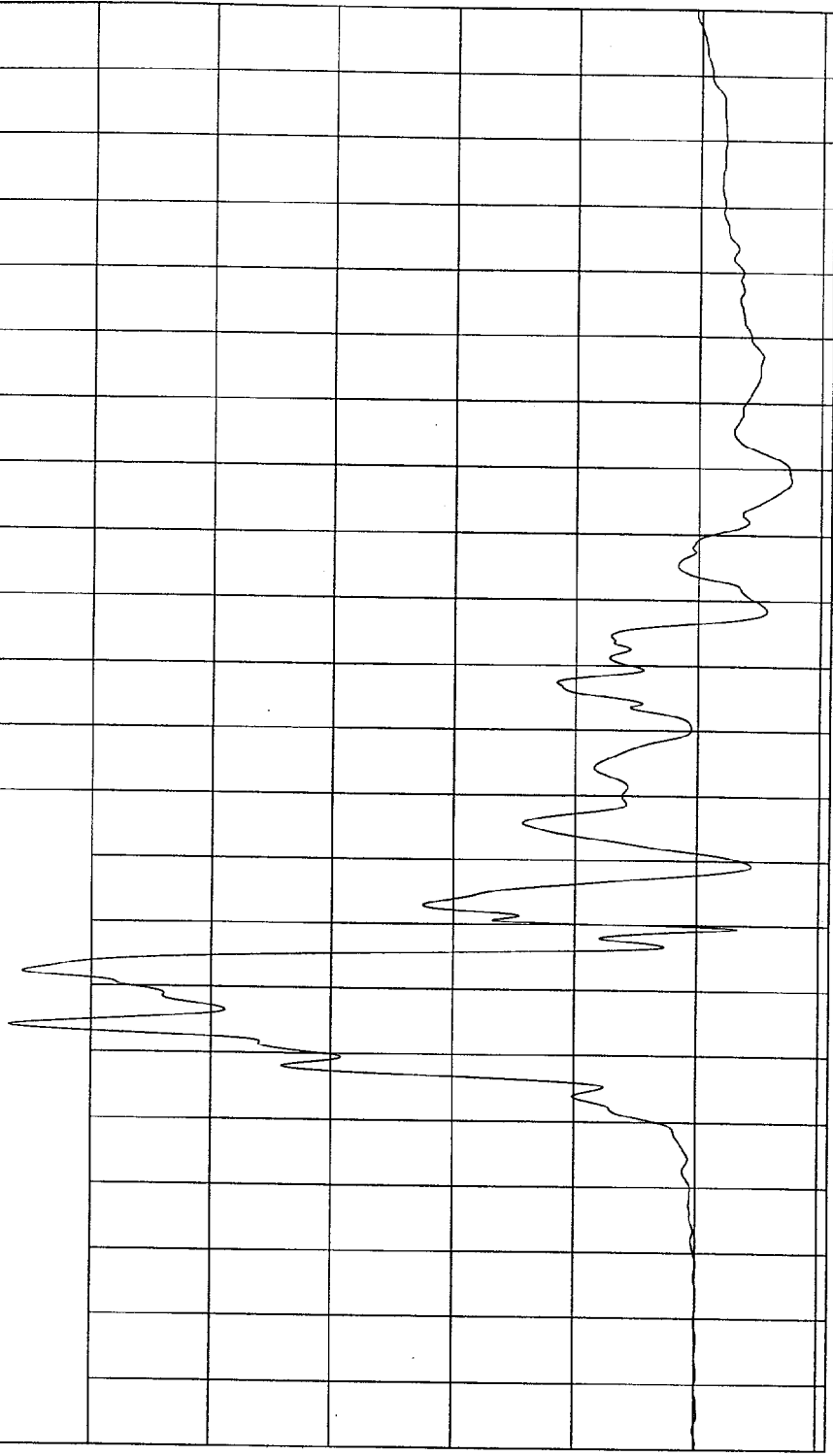
Speed: 38.3 MPH 61.6 KPH

Minimum = -7.61 G'S at 128 msec

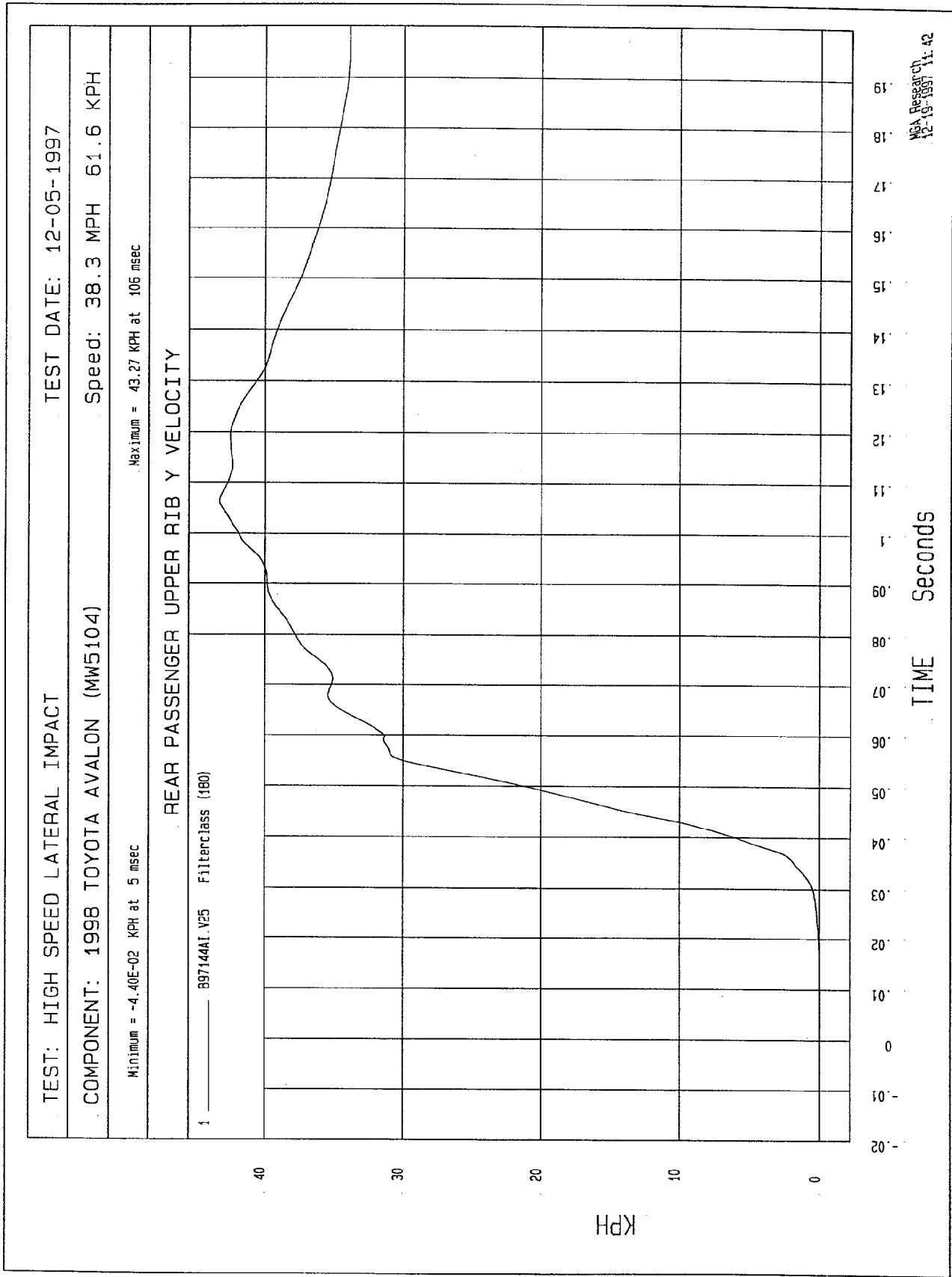
Maximum = 56.74 G'S at 44 msec

FEAR PASSENGER UPPER RIB Y ACCELERATION

1 B97144AF.A25 Filterc:ass (180)



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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -19.12 G'S at 69 msec Maximum = 55.86 G'S at 45 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 ——— B97144AF.A26 Filterclass (180)

70

60

50

40

30

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G'S

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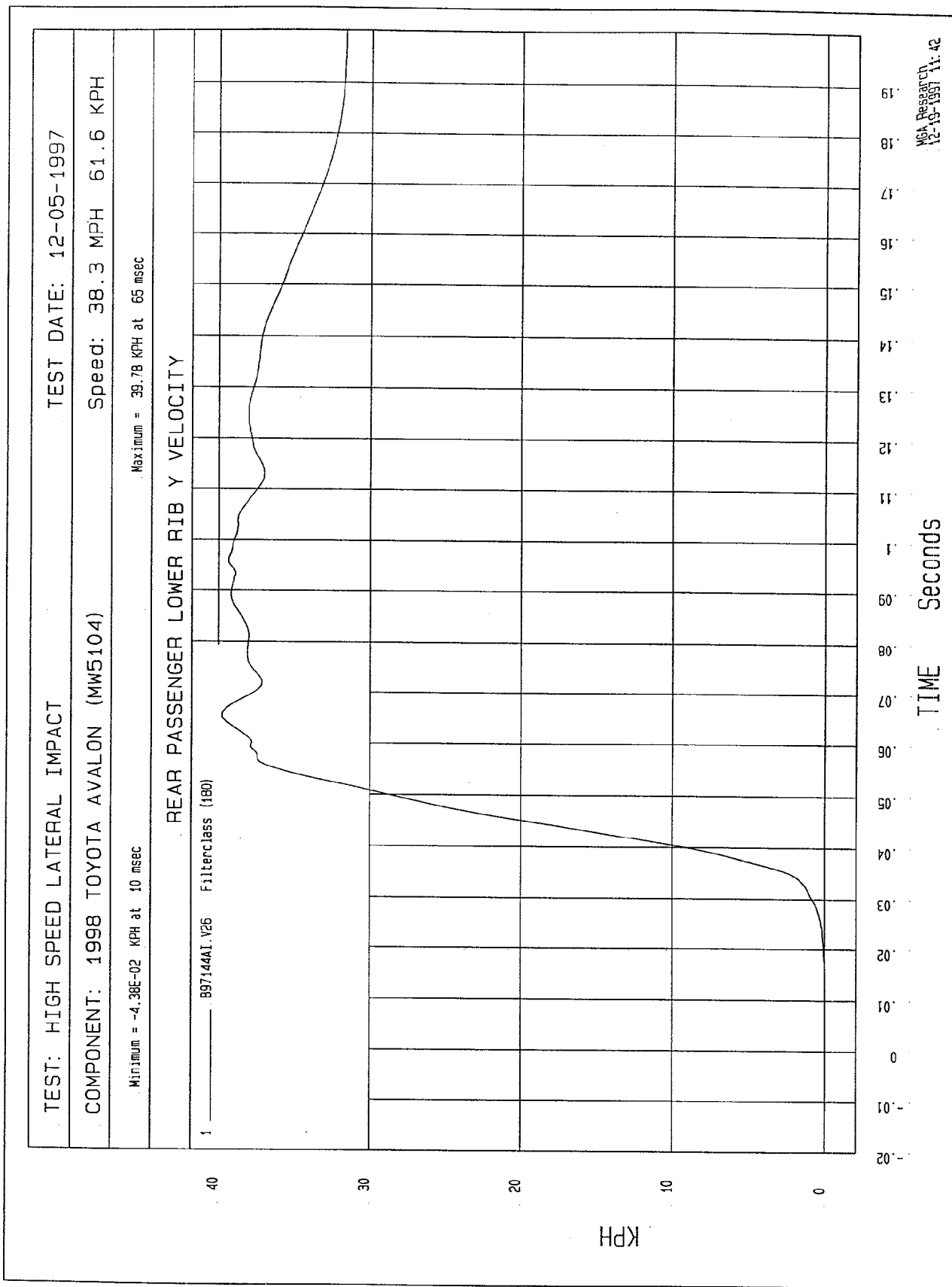
.37

.38

.39

TIME (SECONDS)

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12-19-1997 10:40



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

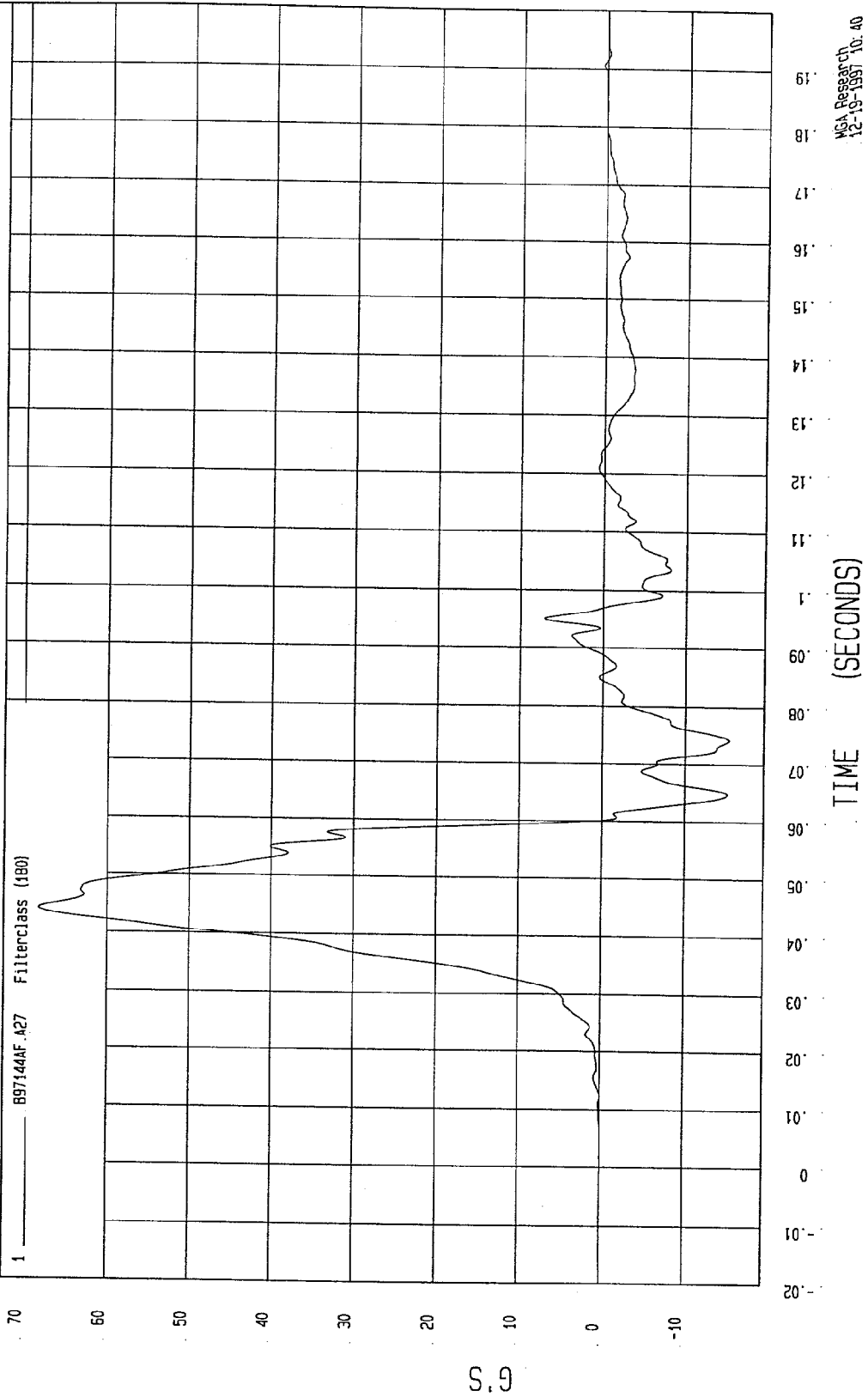
Speed: 38.3 MPH 61.6 KPH

Minimum = -15.29 G'S at 74 msec

Maximum = 68.24 G'S at 44 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 — B97144AF.A27 Filterclass (180)



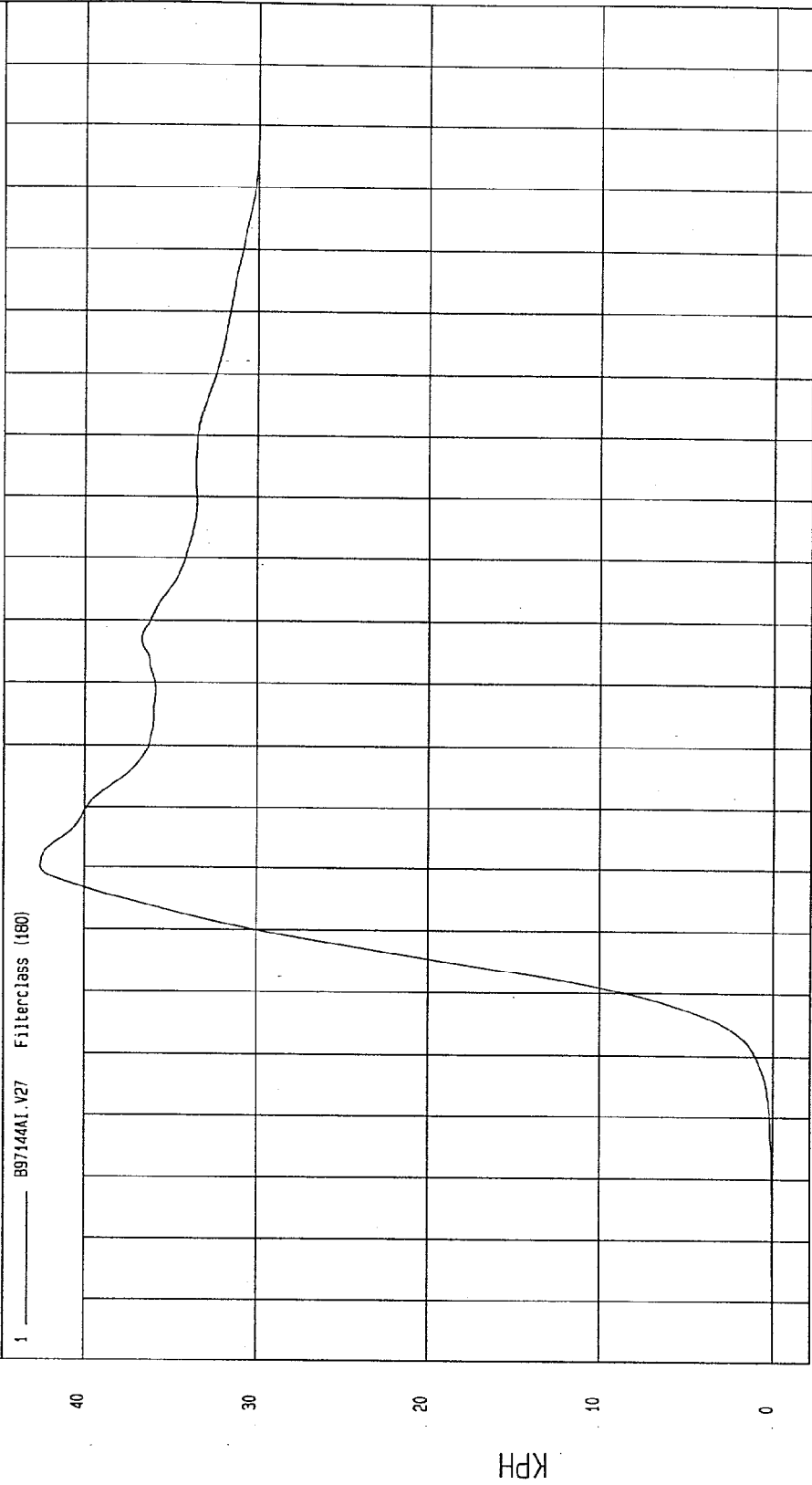
MOA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

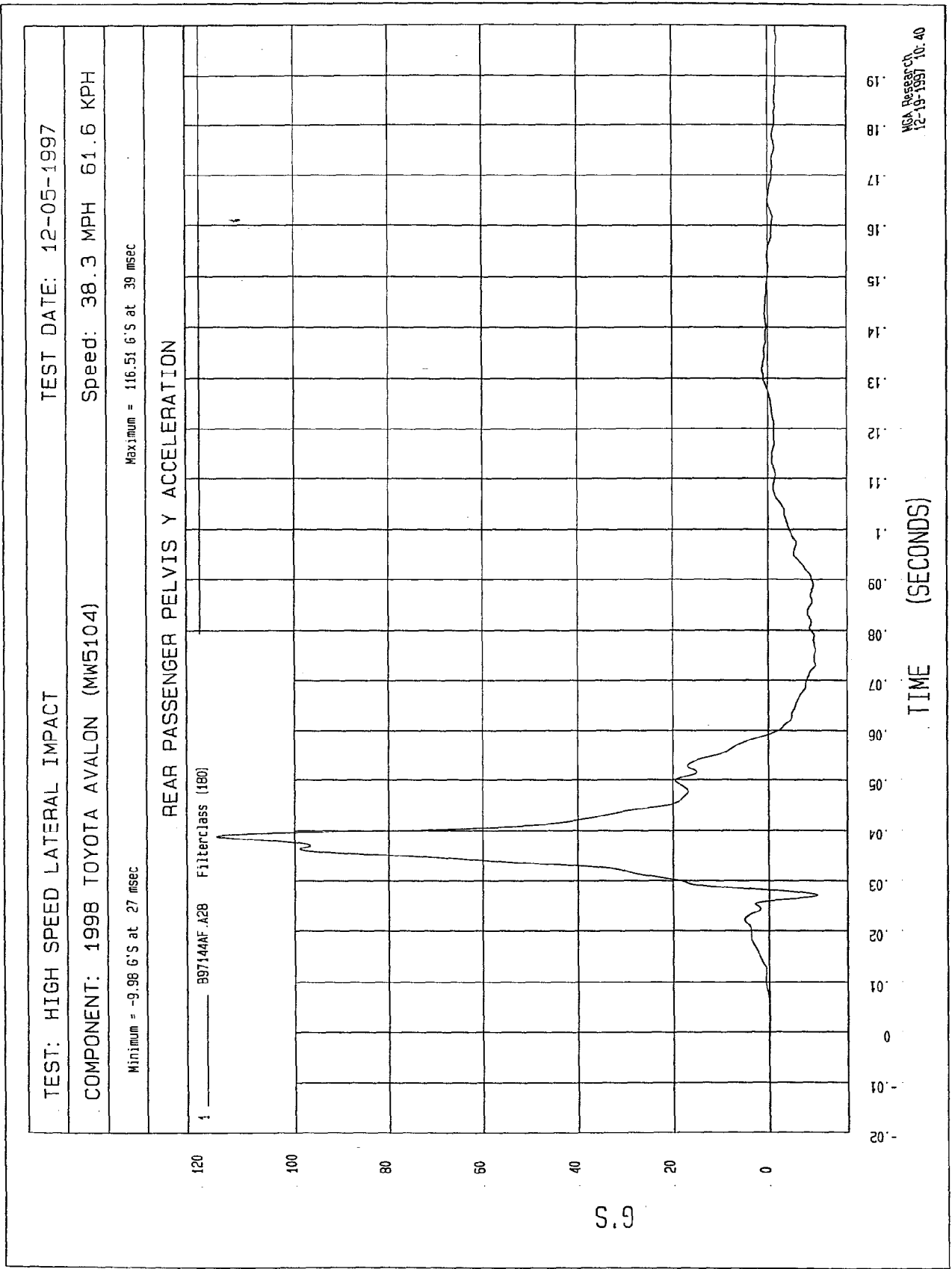
Minimum = -6.27E-04 KPH at -19 msec Maximum = 42.57 KPH at 60 msec

REAR PASSENGER LOWER SPINE Y VELOCITY



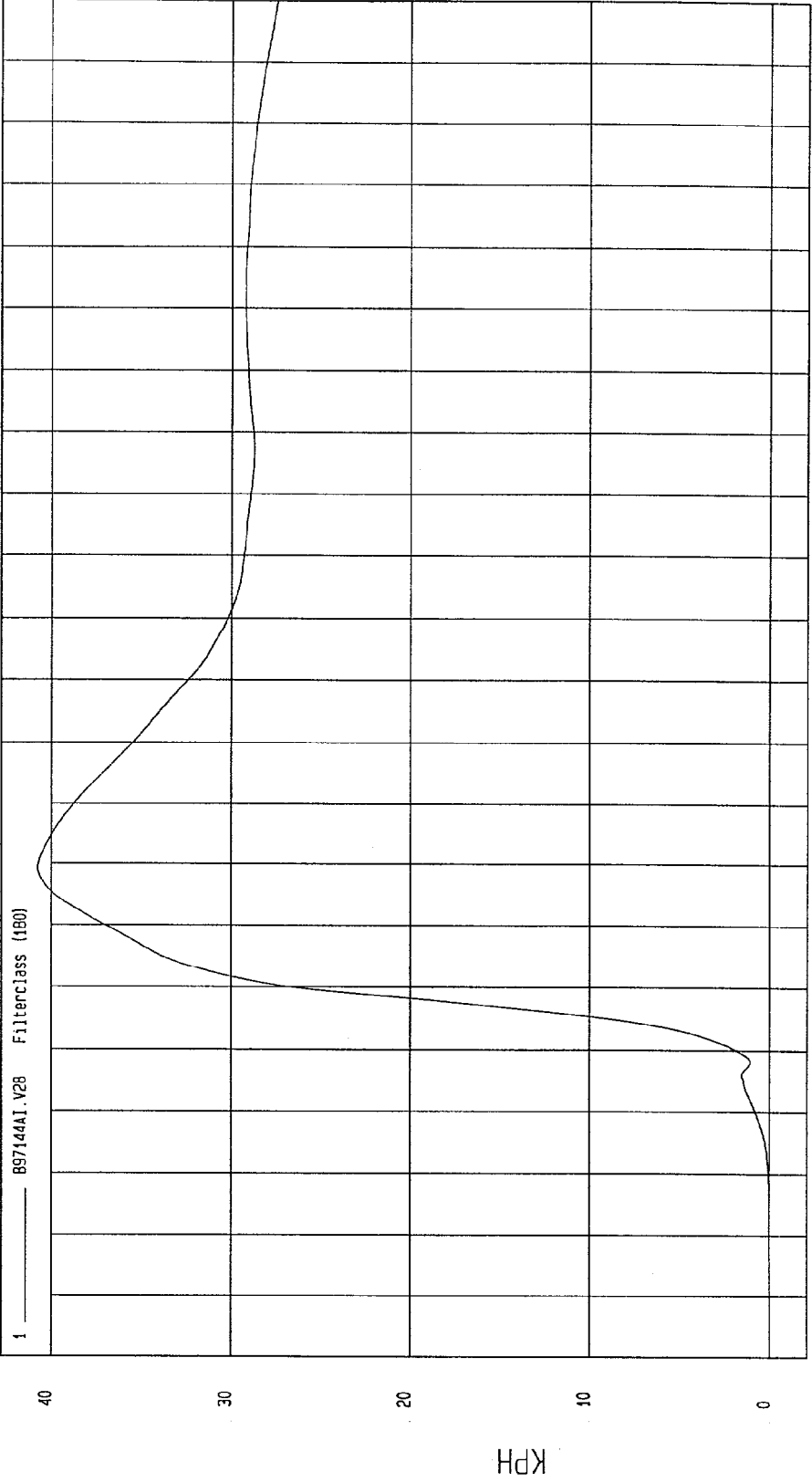
TIME Seconds

MGA Research
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TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -3.22E-04 KPH at -19 msec	Maximum = 40.74 KPH at 59 msec

REAR PASSENGER PELVIS Y VELOCITY

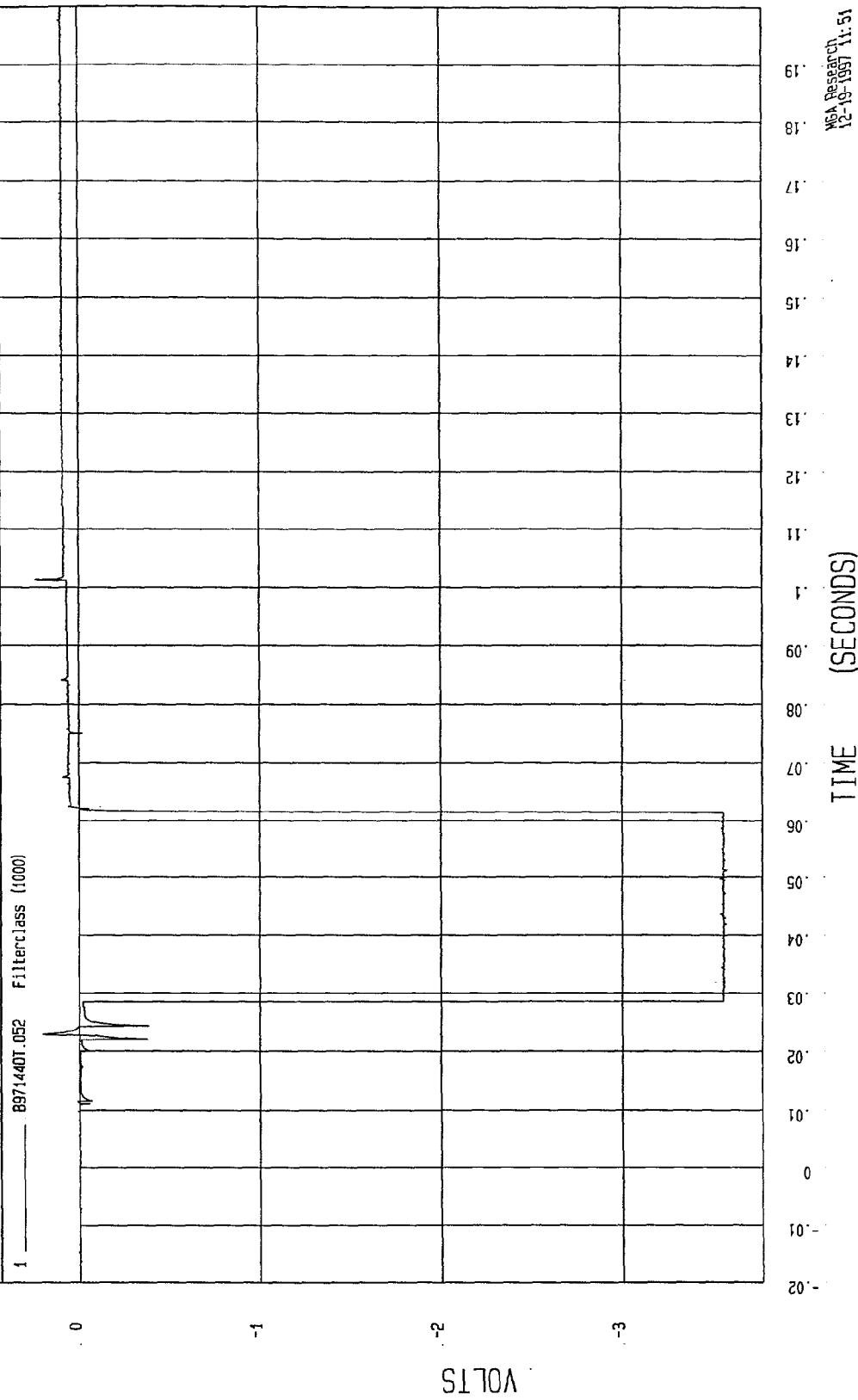


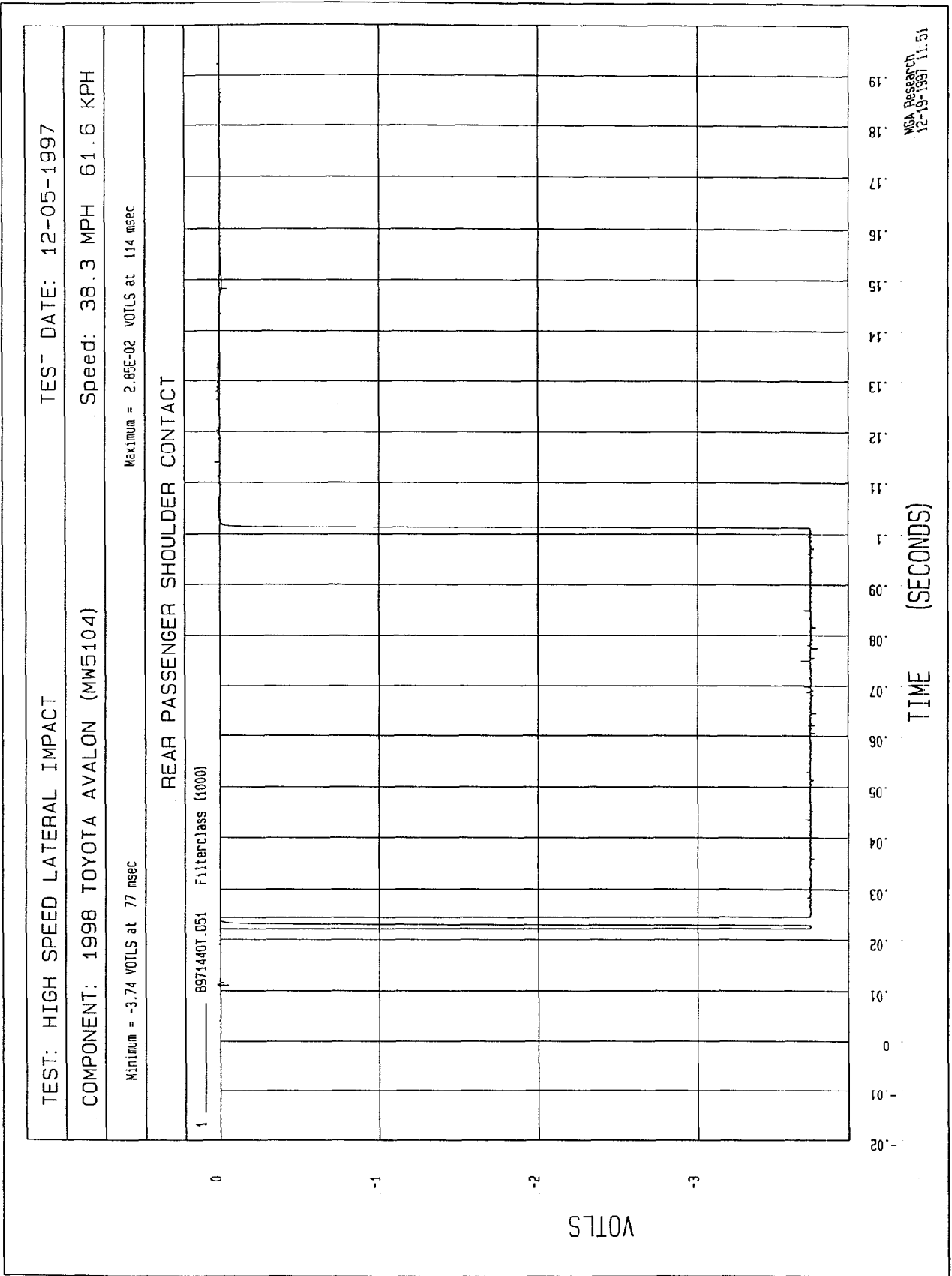
MSA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.57 VOLTS at 51 msec Maximum = .24 VOLTS at 101 msec

REAR PASSENGER LEG CONTACT





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

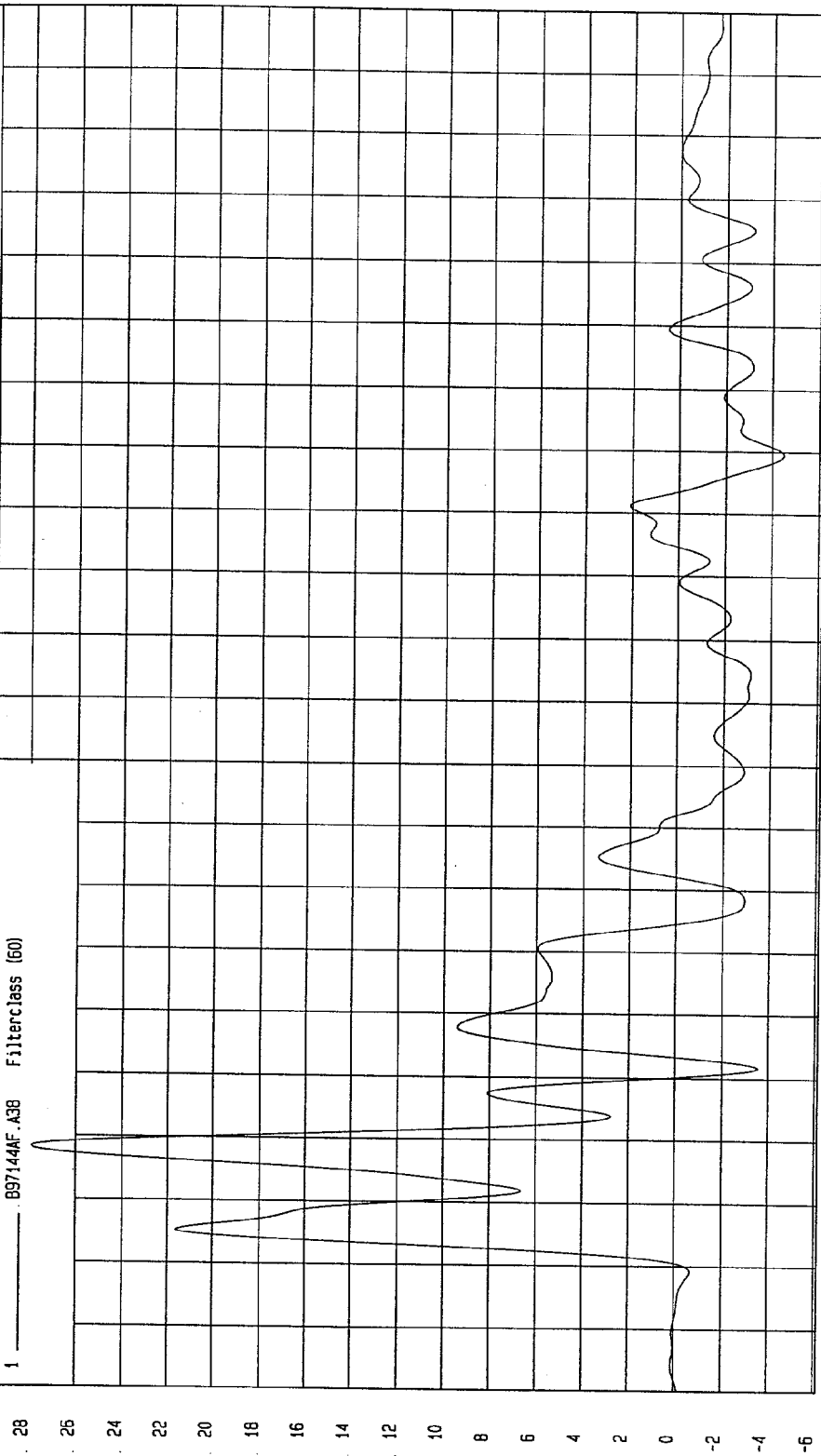
Speed: 38.3 MPH 61.6 KPH

Minimum = -4.50 G'S at 130 msec

Maximum = 27.88 G'S at 18 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 _____ B97144NF.A38 Filterclass (50)



MGA Research
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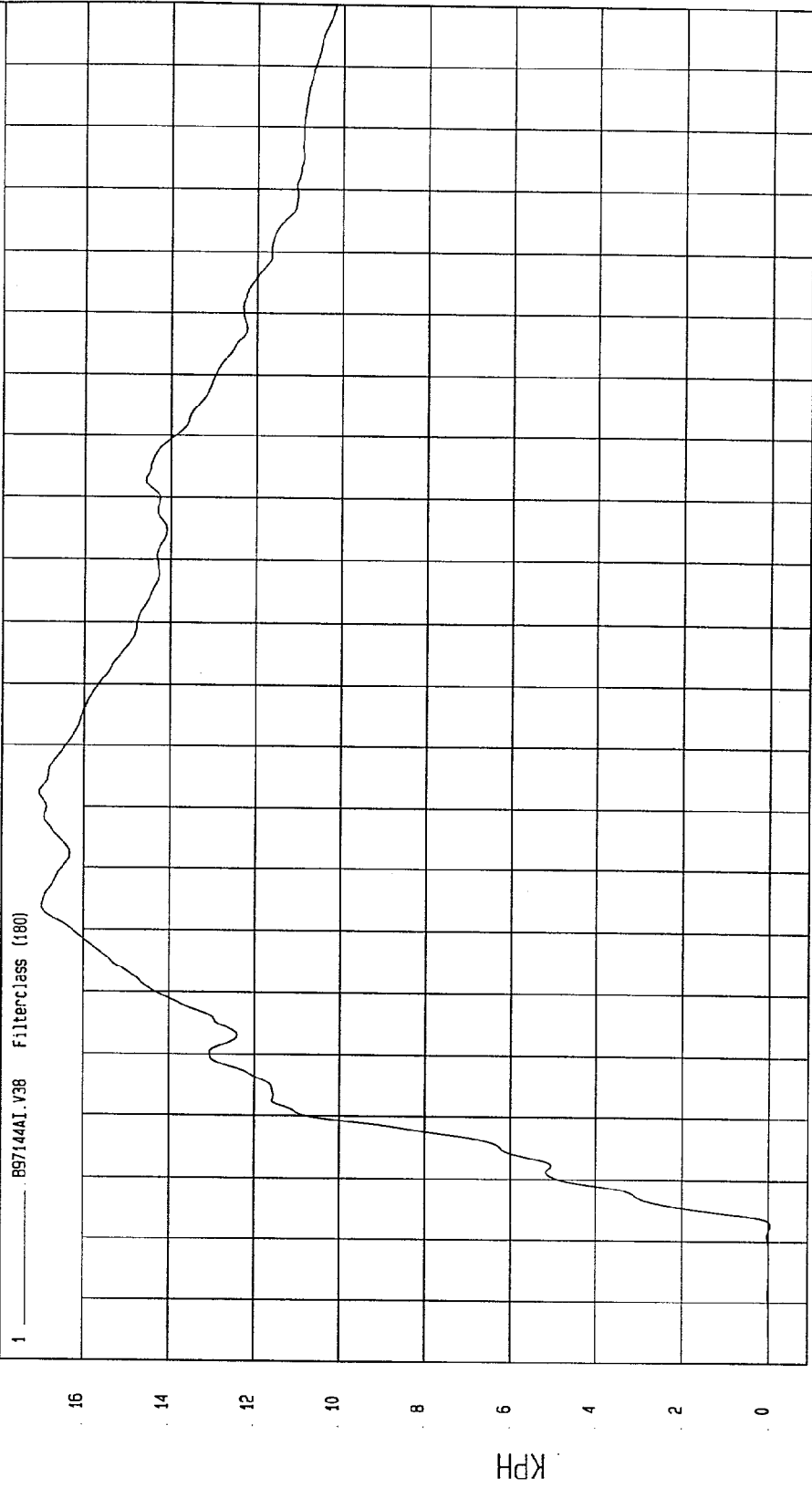
TIME (SECONDS)

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

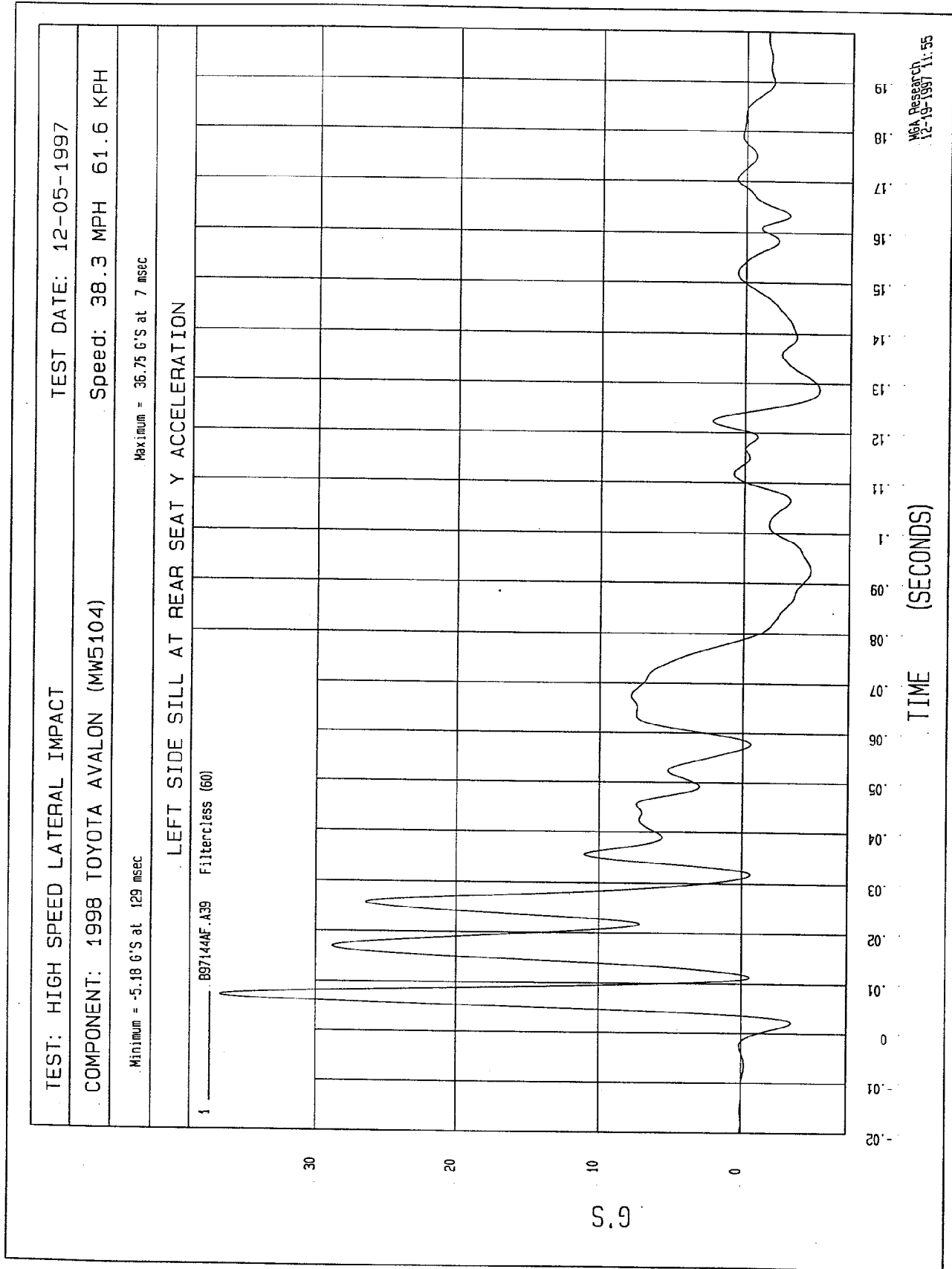
Minimum = -4.46E-02 KPH at 3 msec Maximum = 17.04 KPH at 72 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



TIME Seconds

MGA Research
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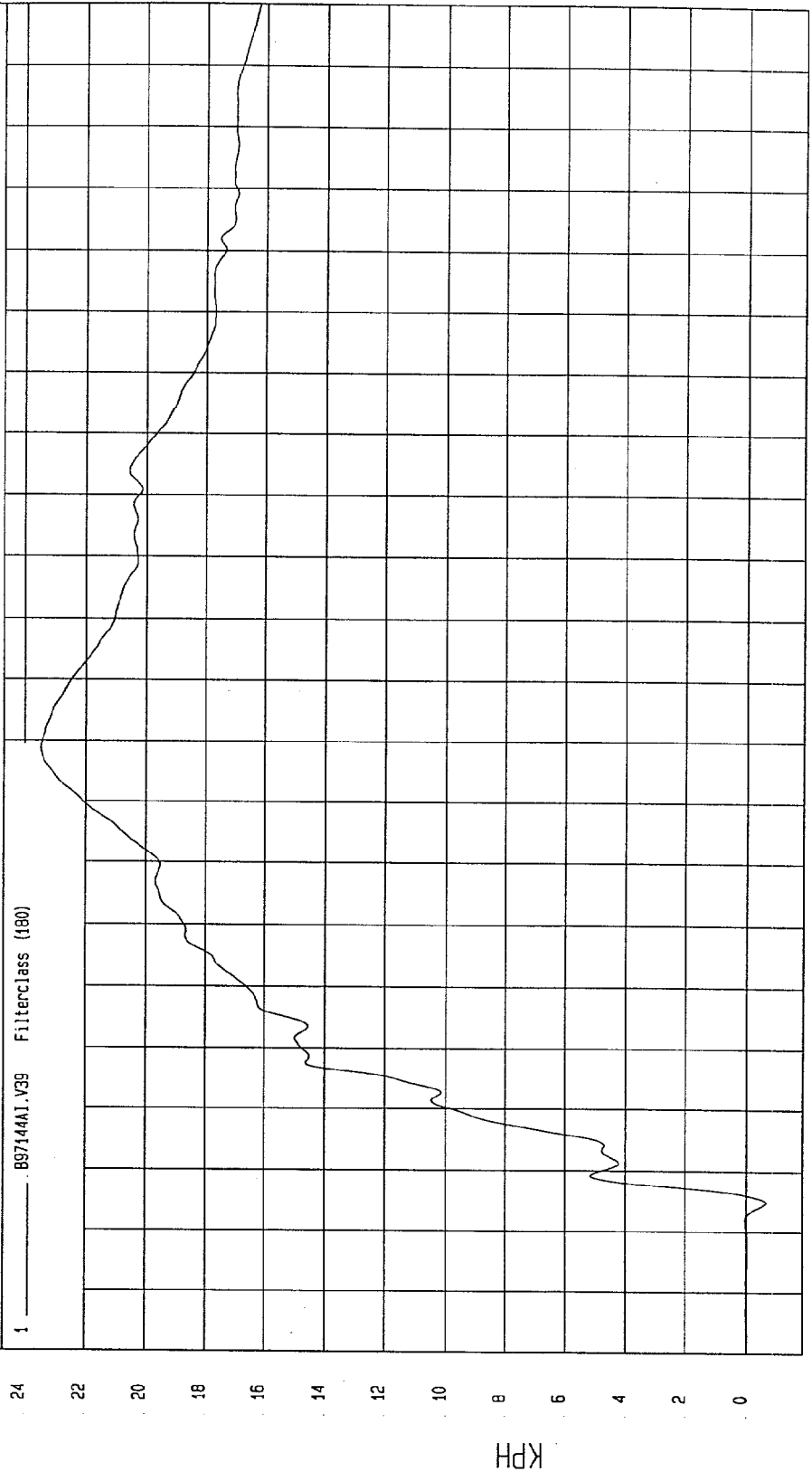


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -.65 KPH at 5 msec Maximum = 23.46 KPH at 79 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY



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TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

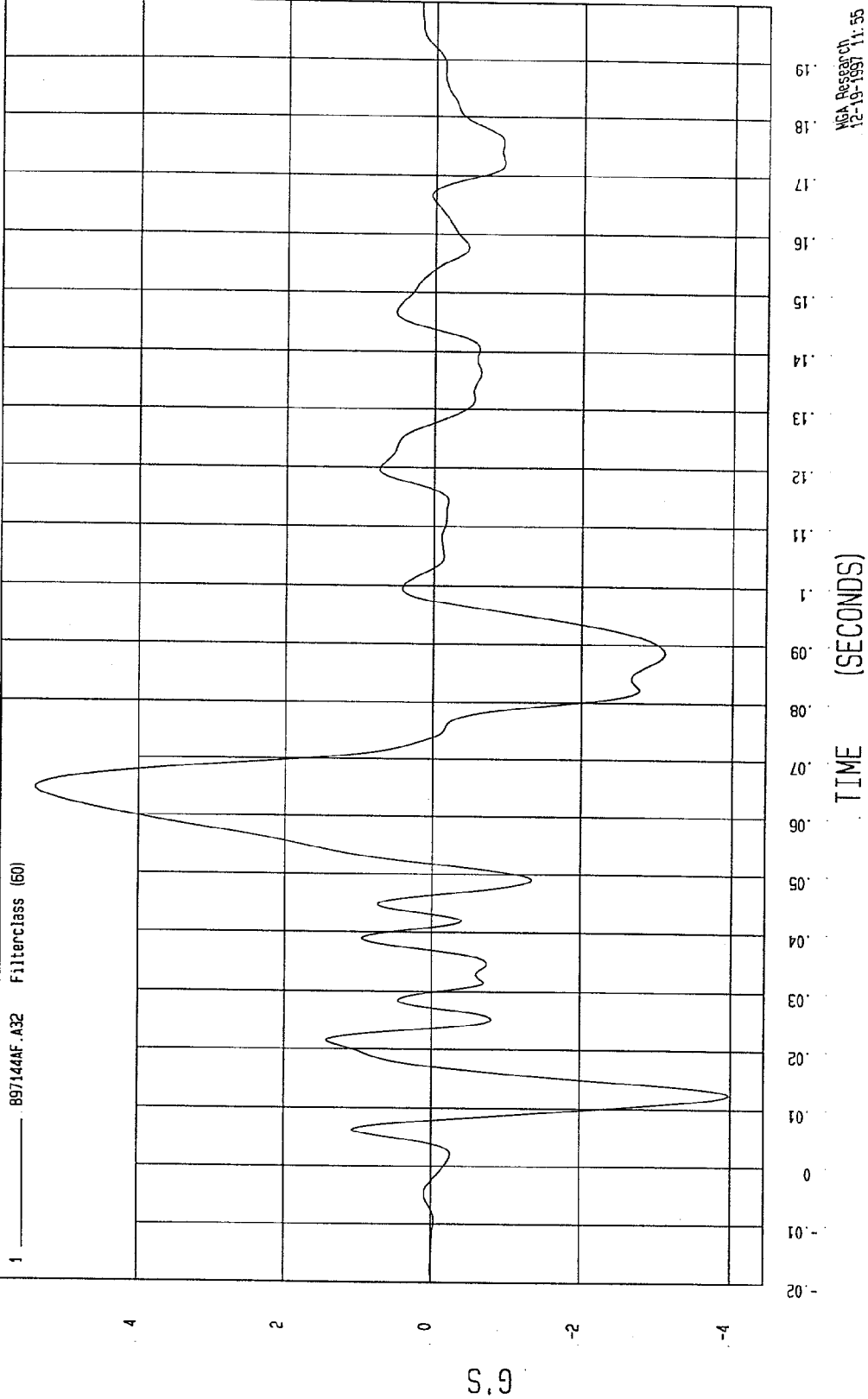
Speed: 38.3 MPH 61.6 KPH

Minimum = -3.97 G'S at 12 msec

Maximum = 5.37 G'S at 65 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 ——— B97144AF.A32 Filterclass (60)



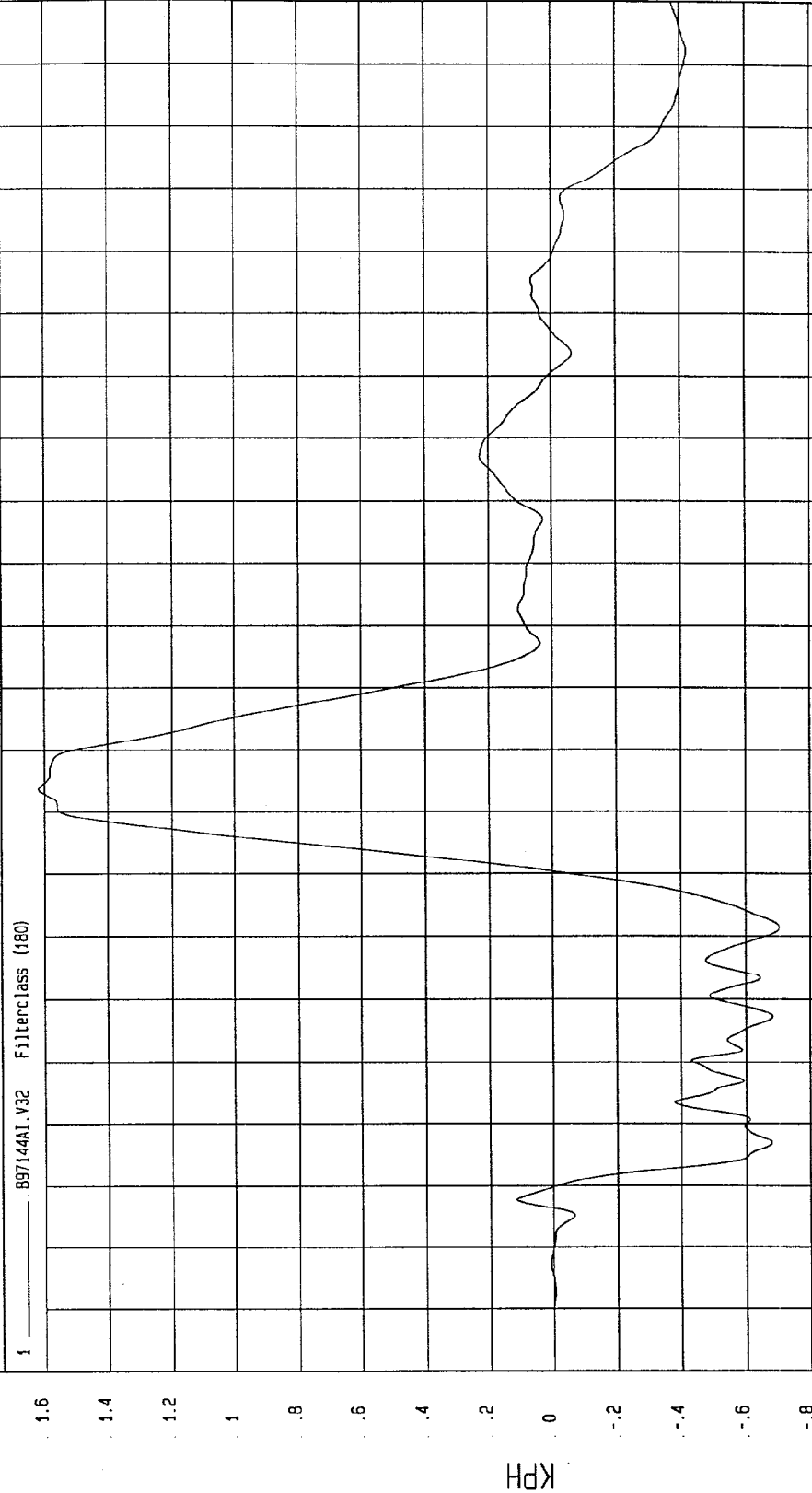
MSA Research
12-19-1997 11:55

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -.70 KPH at 51 msec Maximum = 1.61 KPH at 74 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY



TIME Seconds

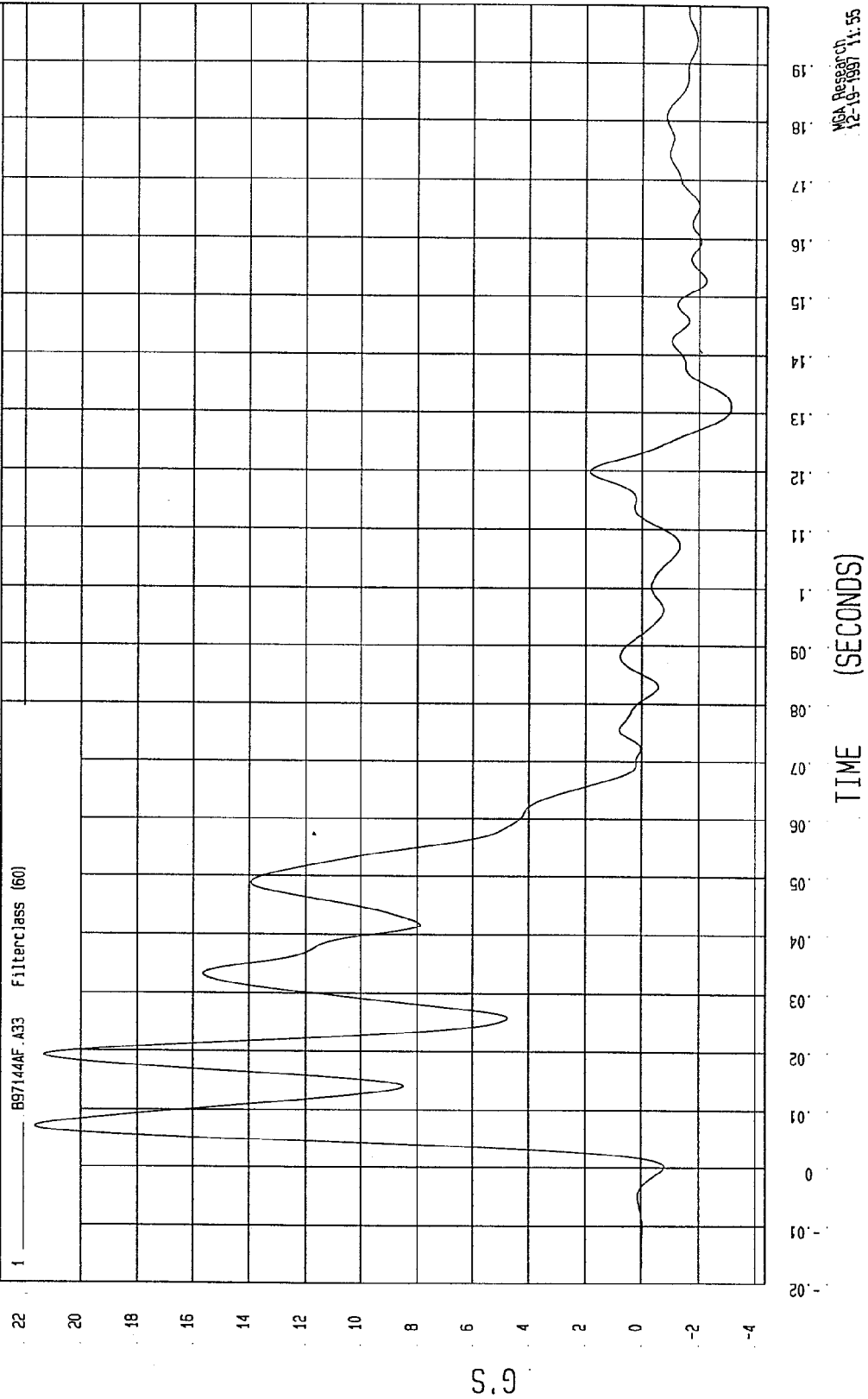
MCA Research
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TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

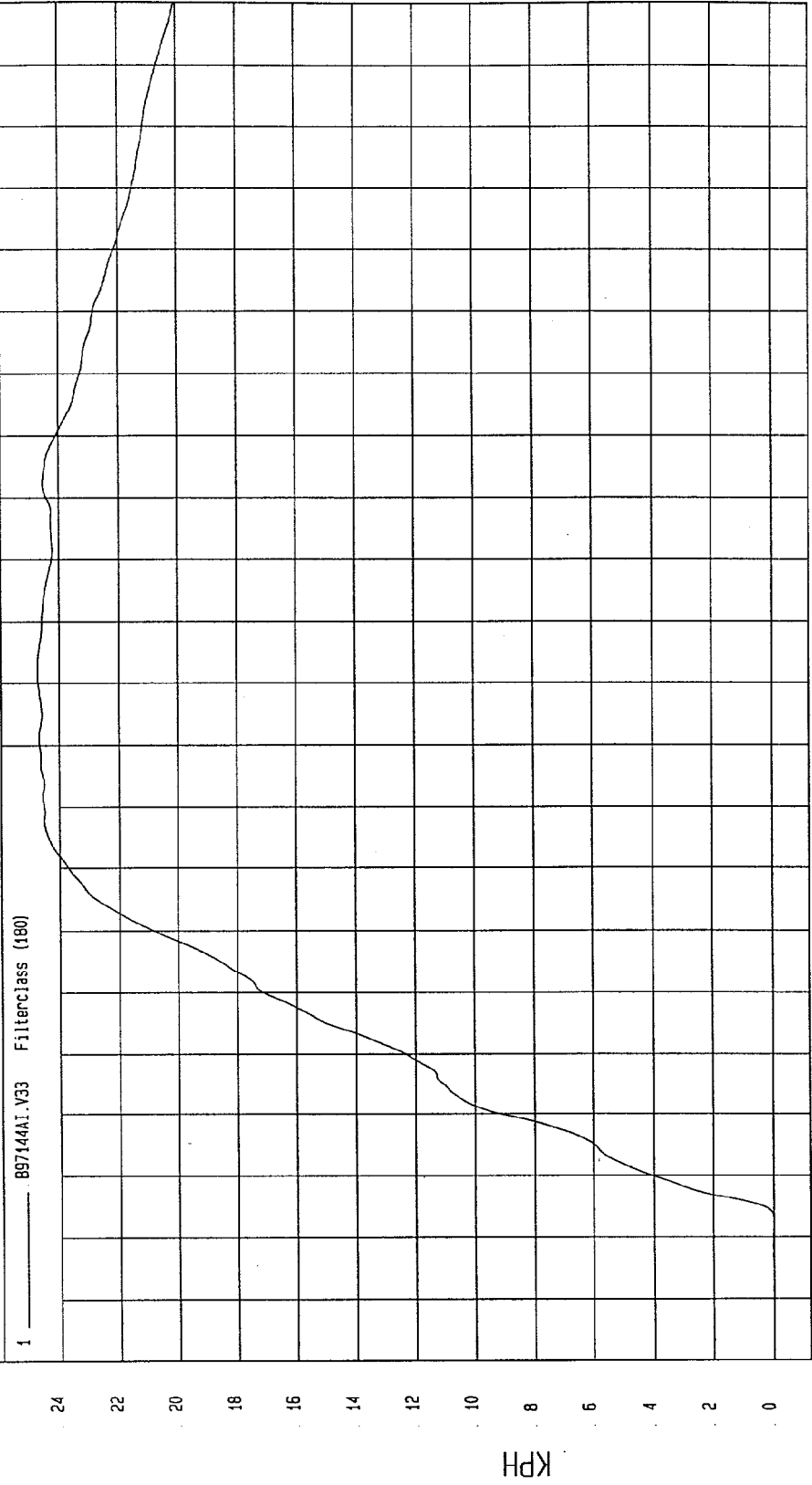
Minimum = -3.12 G'S at 131 msec
Maximum = 21.62 G'S at 7 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -3.50E-03 KPH at -8 msec	Maximum = 24.72 KPH at 92 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

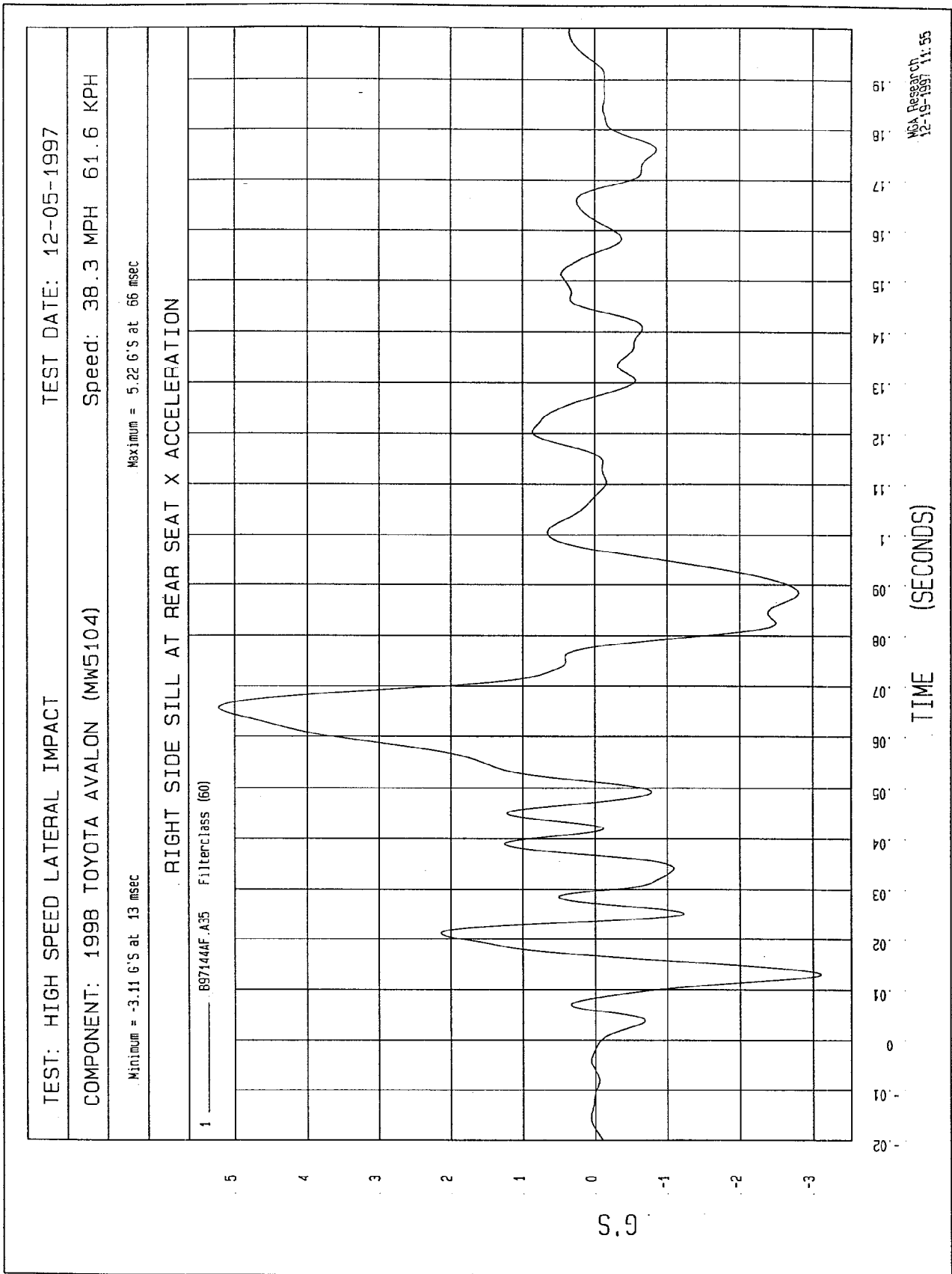


TIME Seconds

WCA Research
12-19-1997 11:52

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION VS. TIME

NO VALID DATA COLLECTED

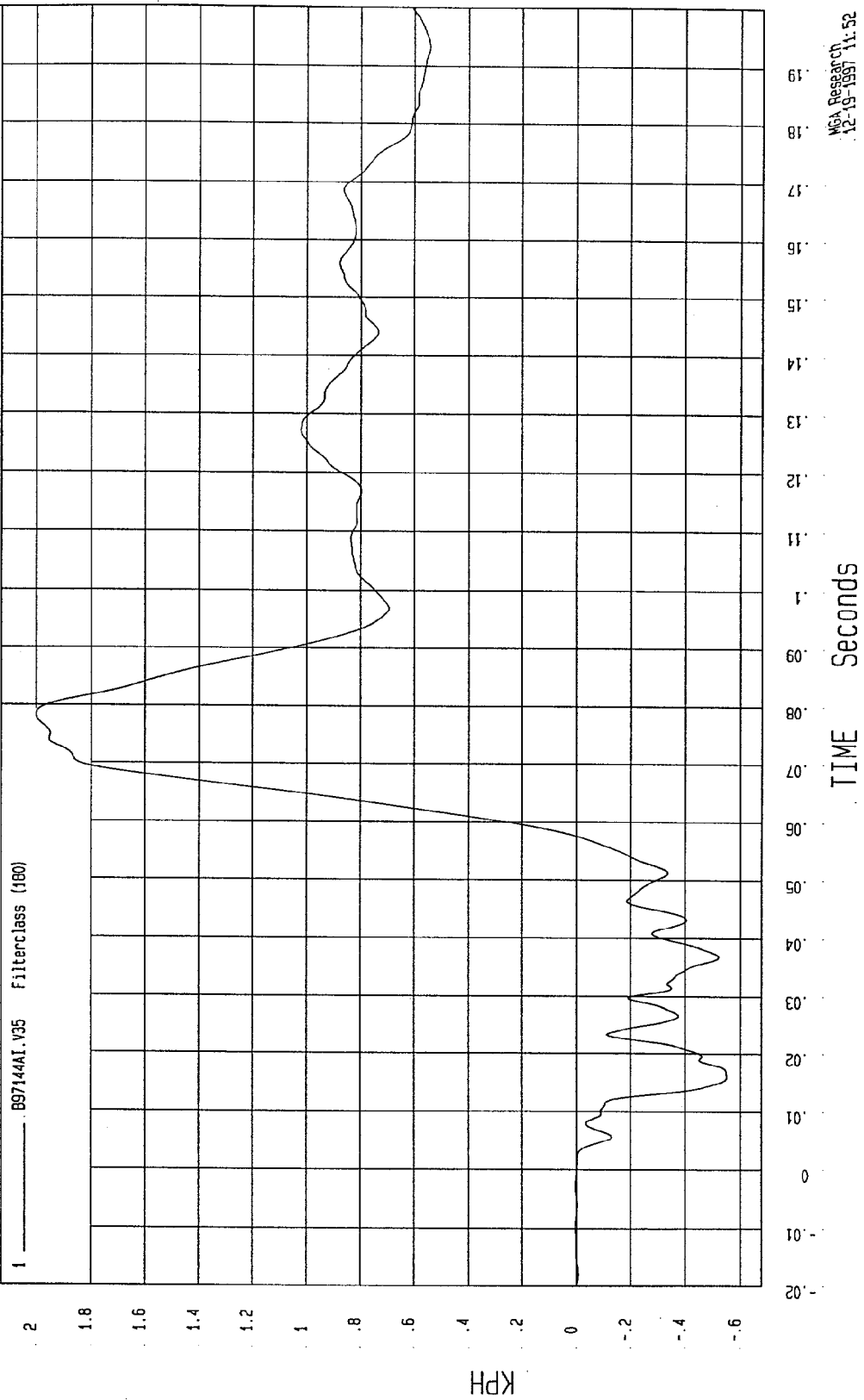


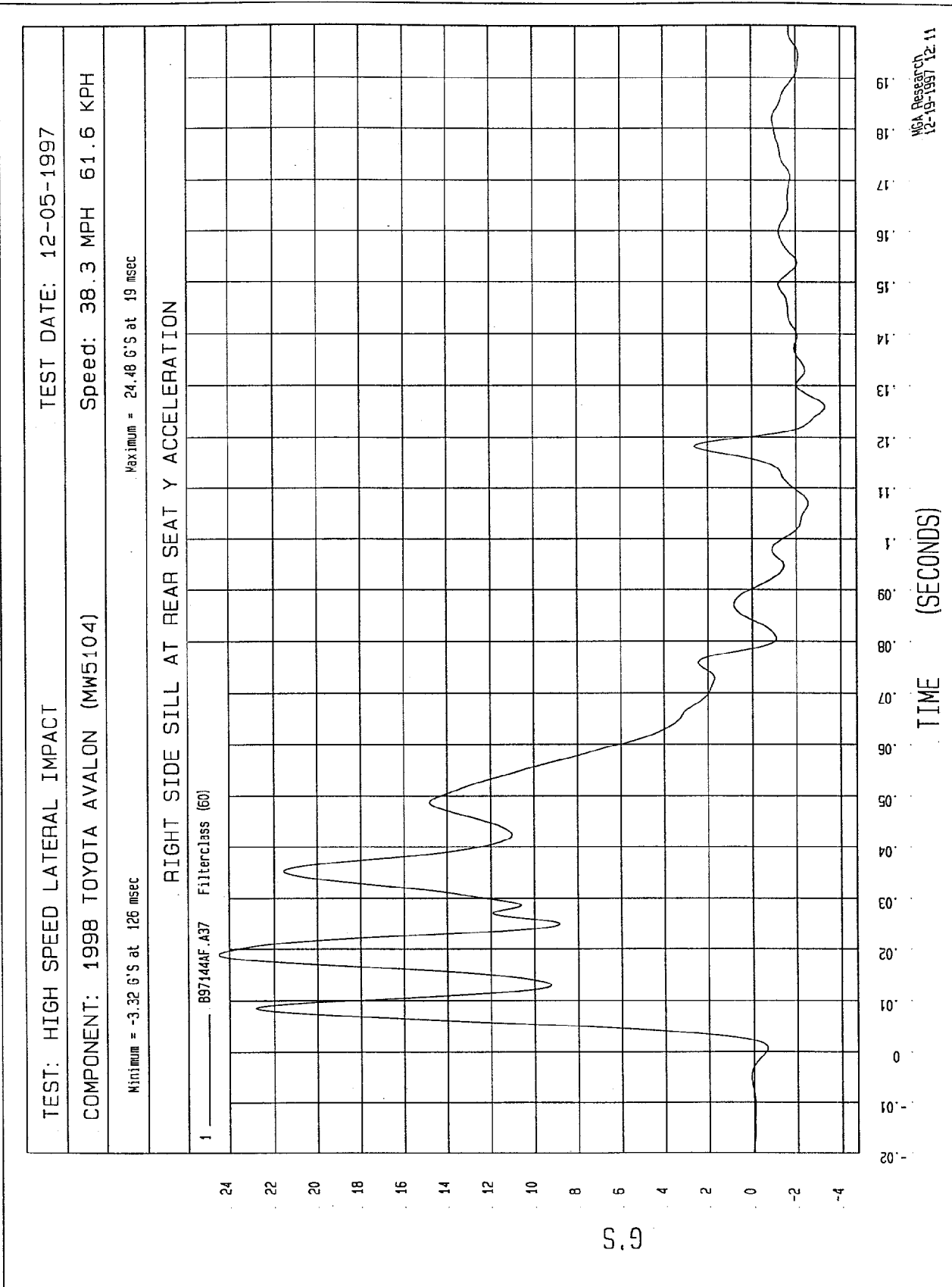
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -.55 KPH at 16 msec Maximum = 2.00 KPH at 78 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY



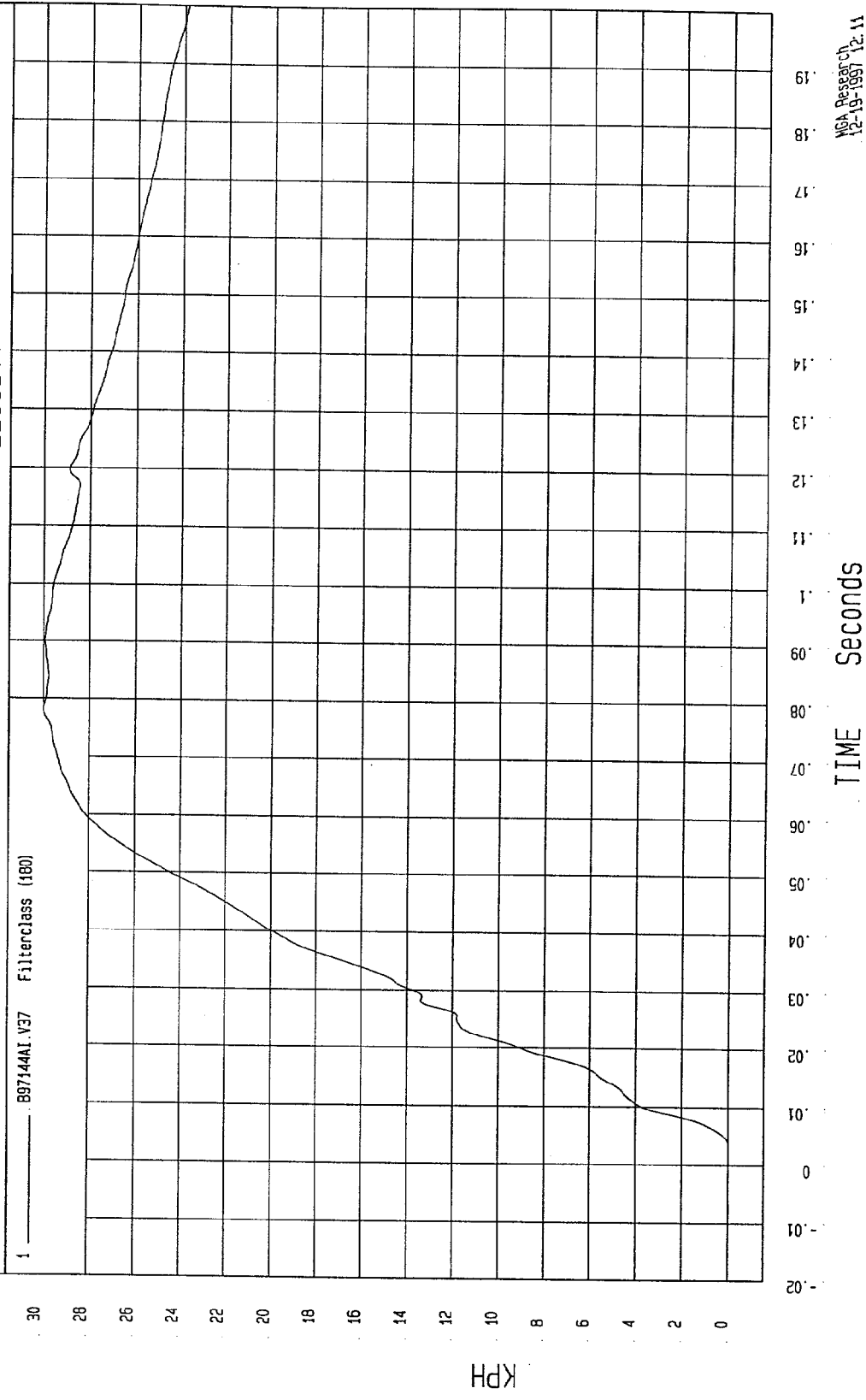


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

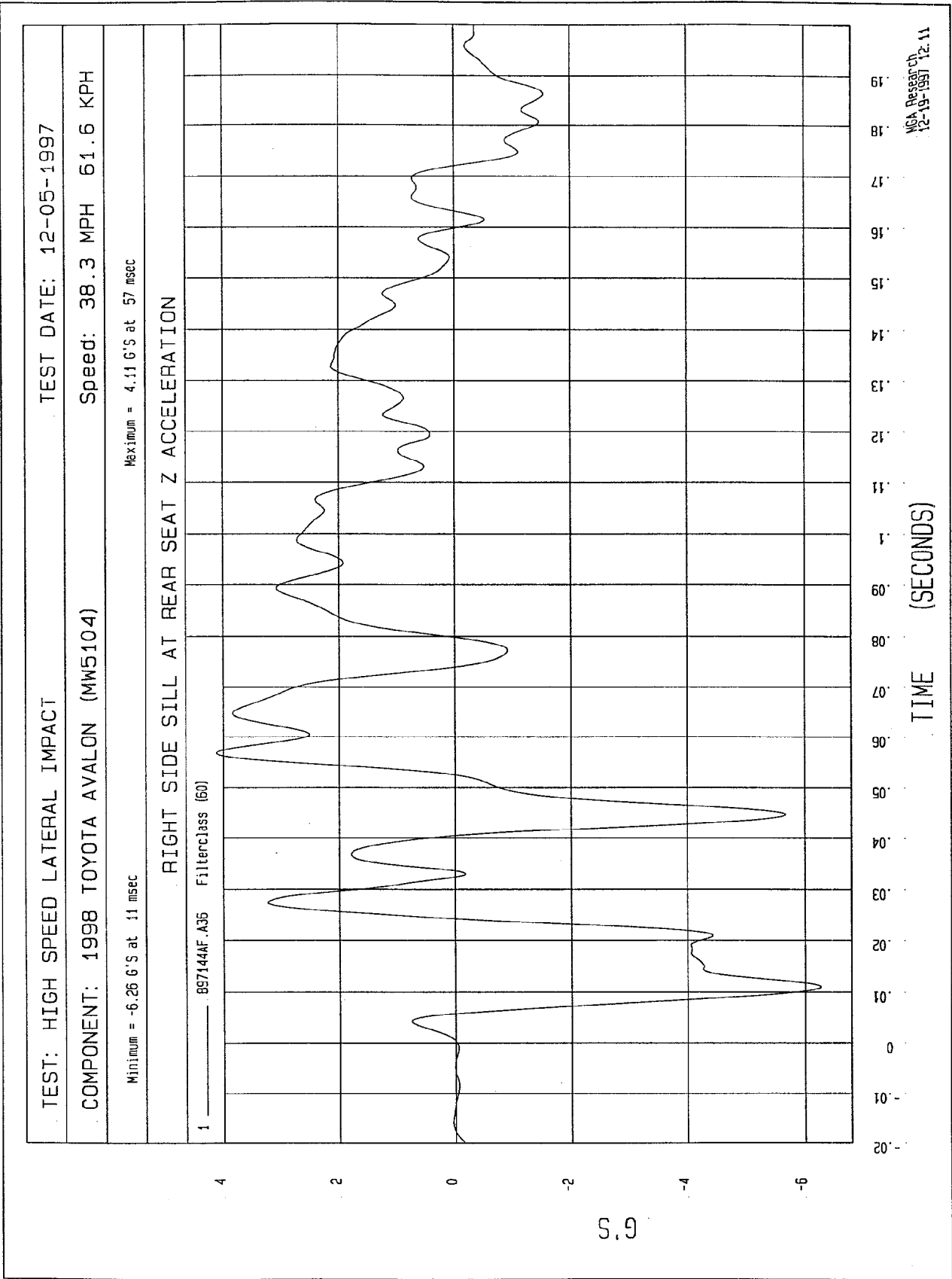
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.26E-02 KPH at 3 msec Maximum = 29.99 KPH at 78 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY



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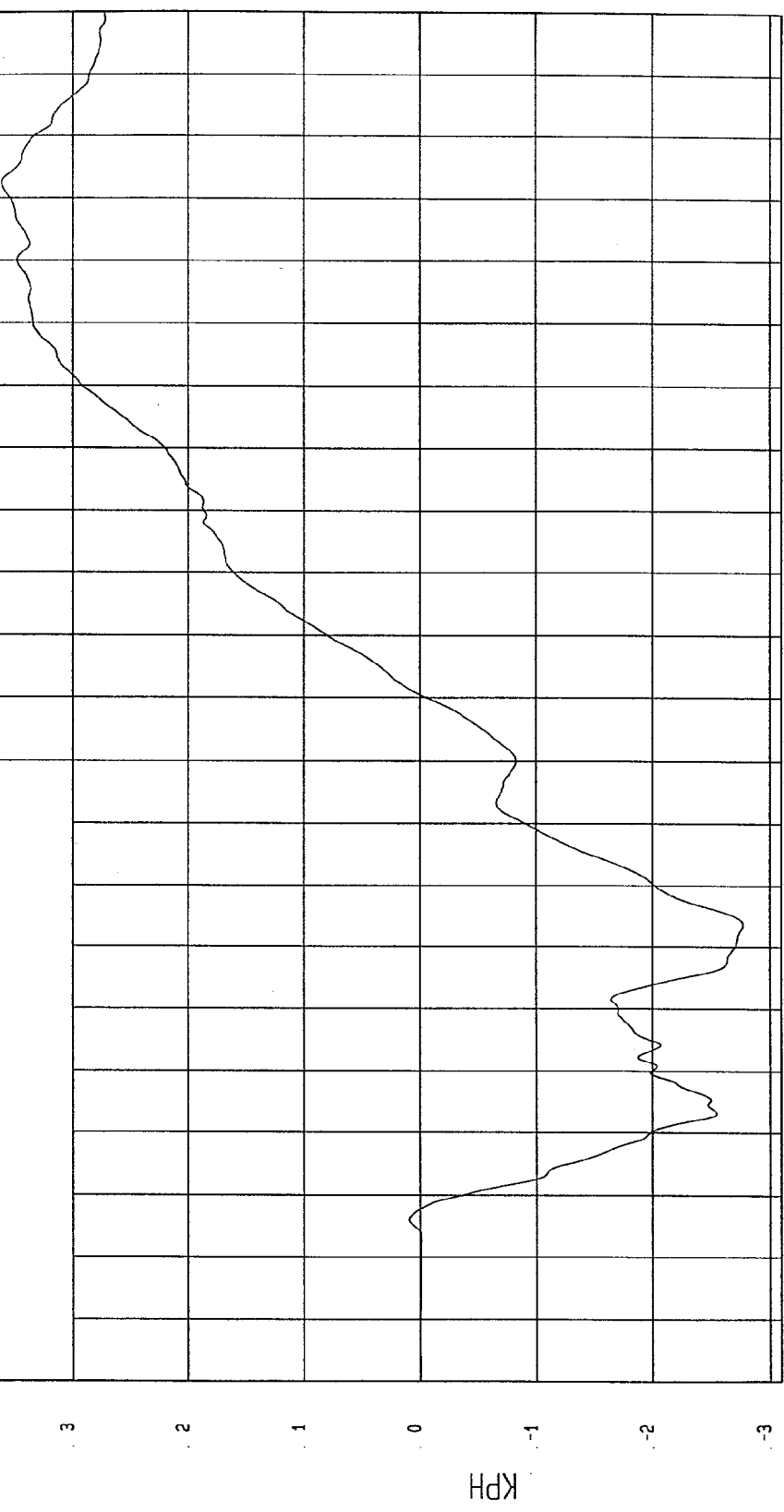
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.77 KPH at 54 msec Maximum = 3.60 KPH at 172 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

1 _____ 897144A1.V36 Filter: class (180)



TIME Seconds

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MEA Research
12-19-1997 12:11

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Speed: 38.3 MPH 61.6 KPH

Minimum = 5.24E-03 G'S at -18 msec

Maximum = 24.86 G'S at 19 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION

1 897144V.A35 Filterclass (50)

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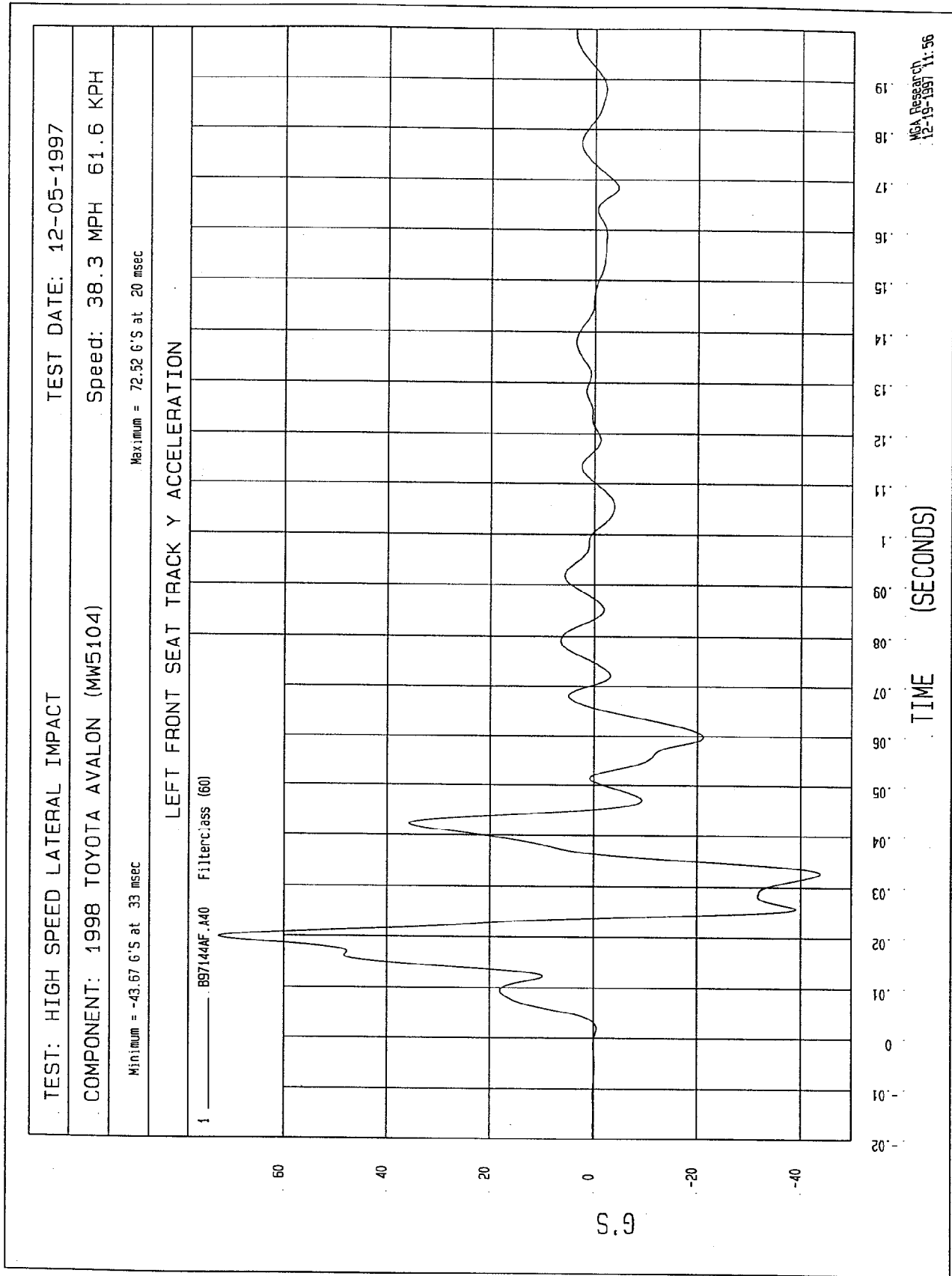
17

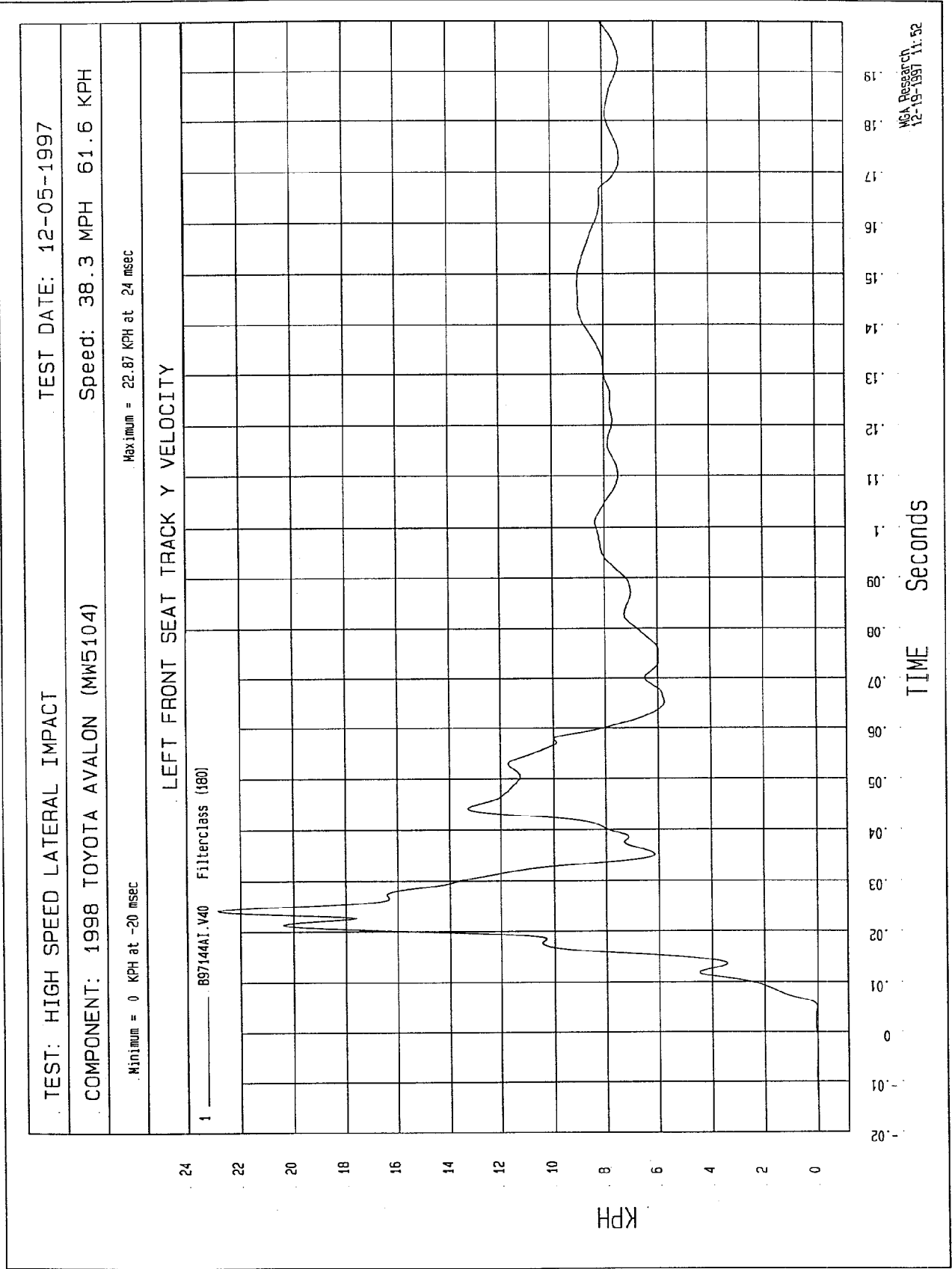
18

19

TIME (SECONDS)

NSA Research
12-19-1997 11:59





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

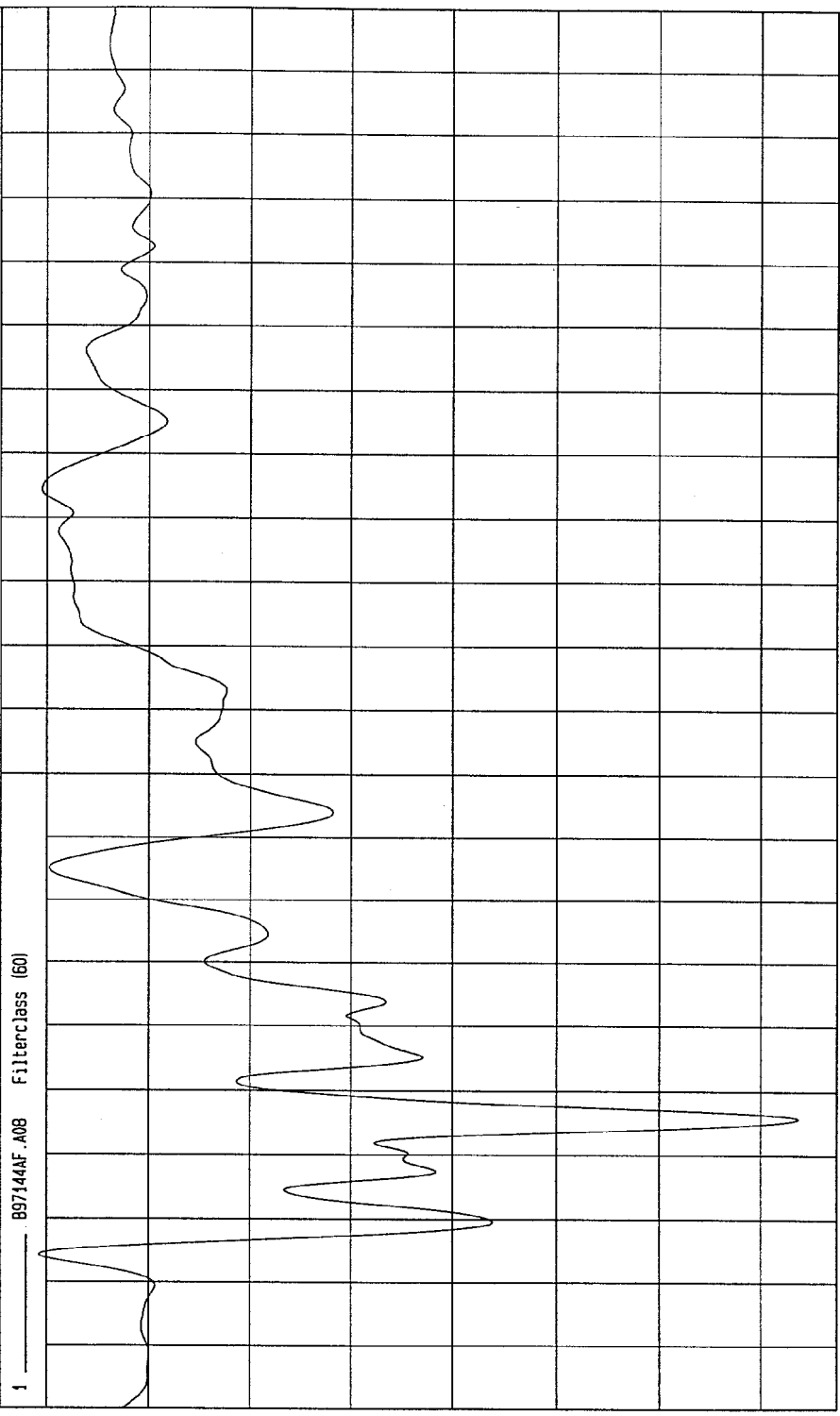
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Minimum = -6.35 G'S at 26 msec

Maximum = 1.07 G'S at 4 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION



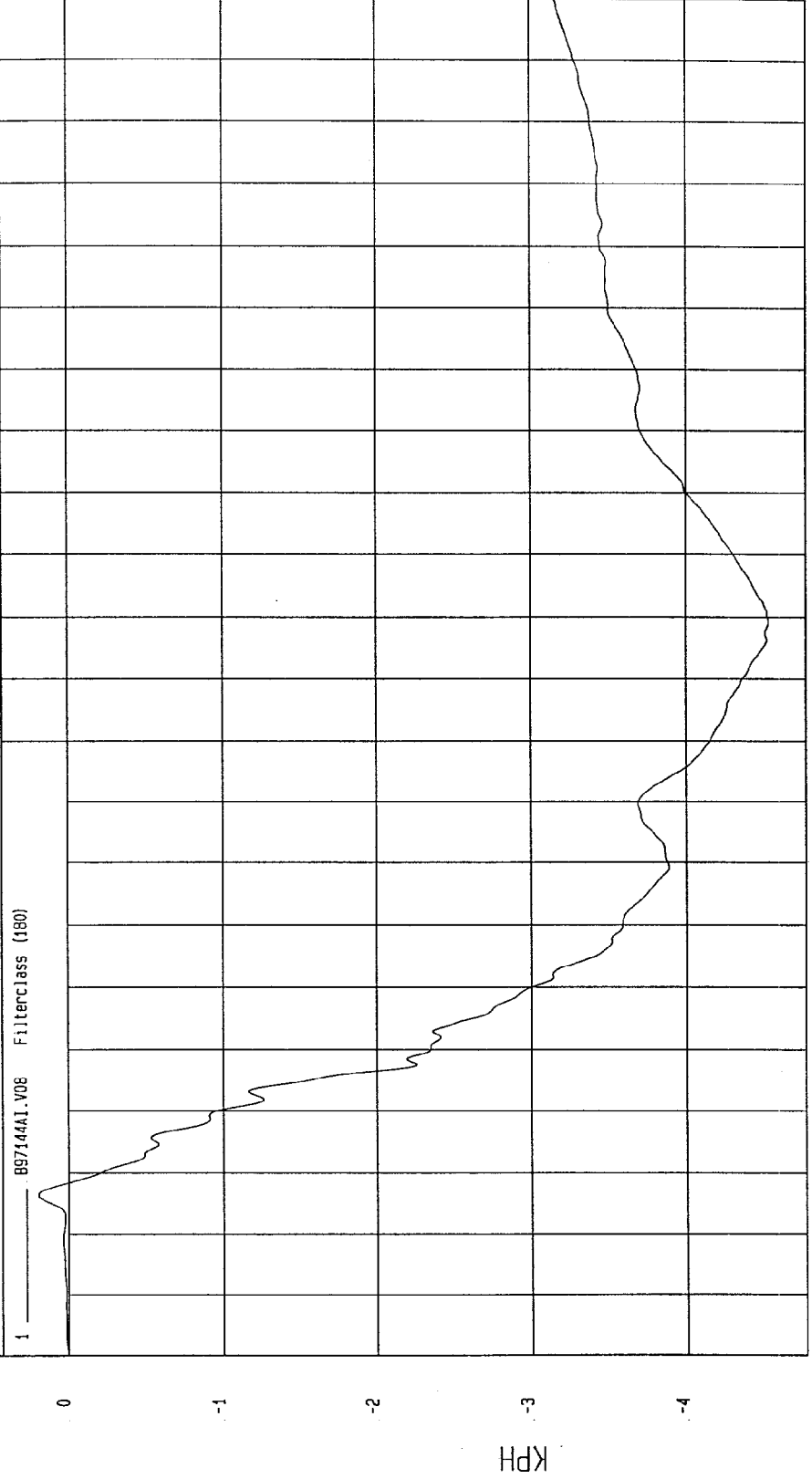
TIME (SECONDS)

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NGA Research
12-19-1997 11:56

TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -4.52 KPH at 99 msec	Maximum = .19 KPH at 6 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY



TIME Seconds

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.10 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

MEA Research
12-19-1997 11:52

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

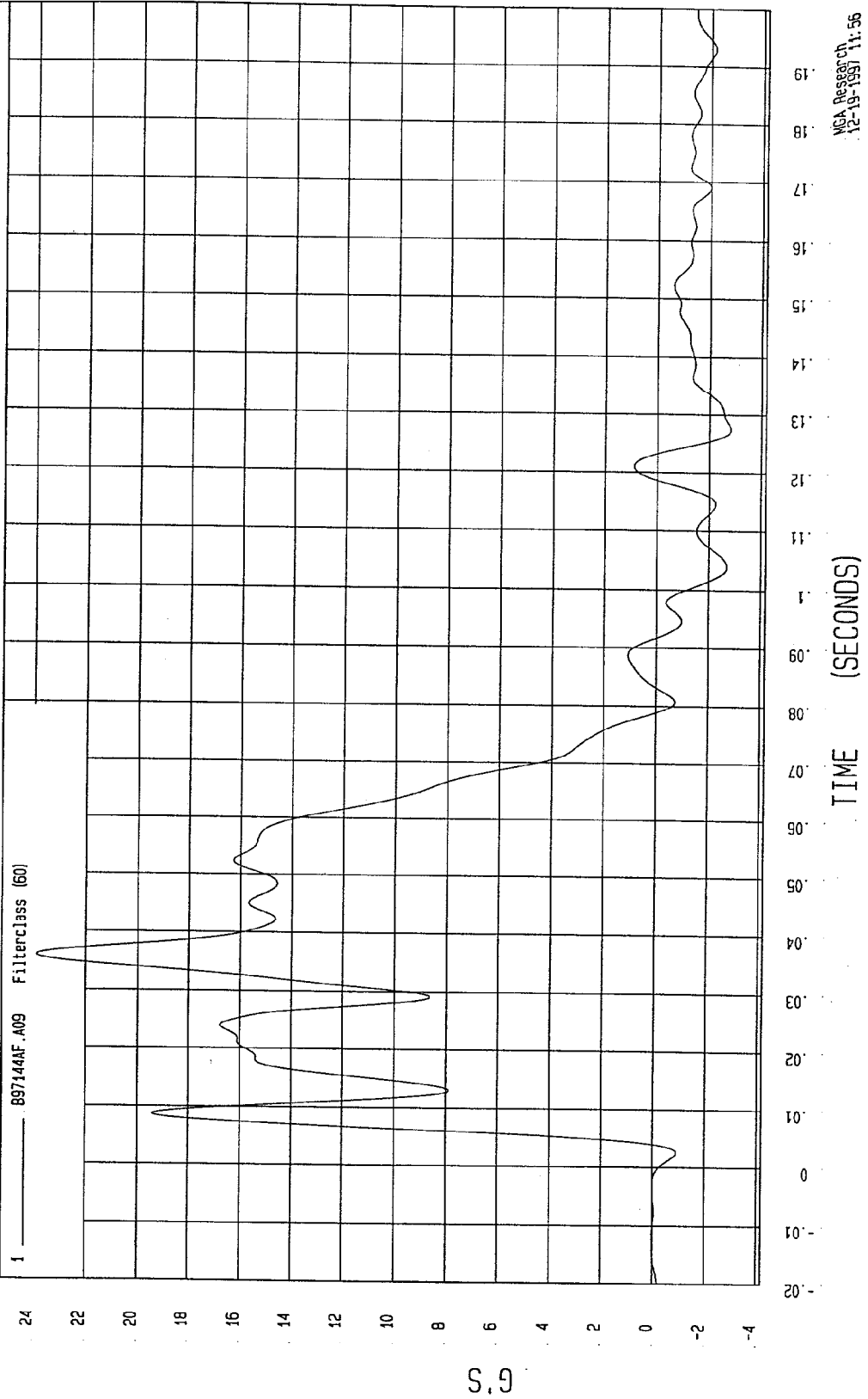
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 23.90 G'S at 36 msec

Minimum = -2.83 G'S at 127 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

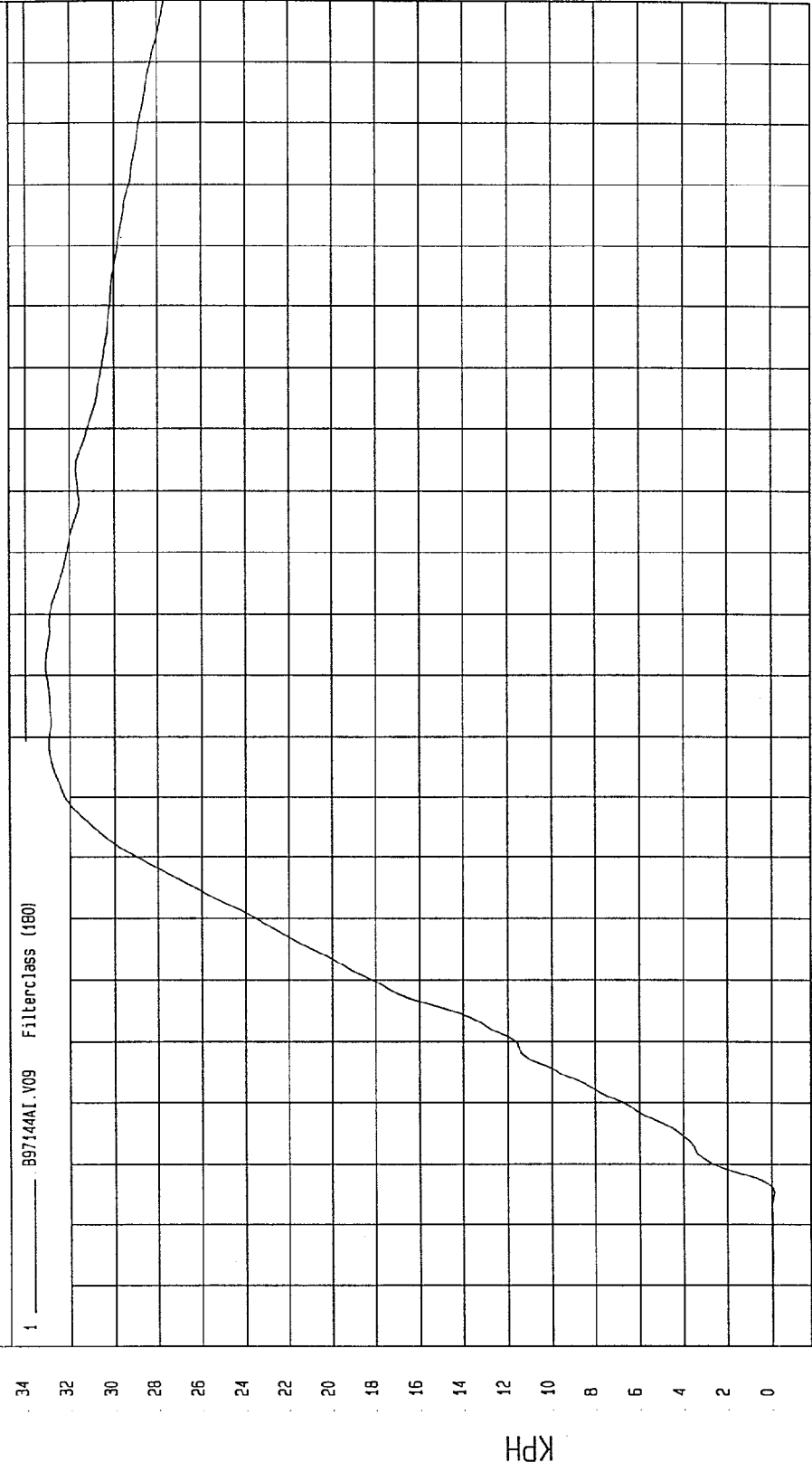


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -.09 KPH at 5 msec Maximum = 33.09 KPH at 91 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY



TIME Seconds

NGA Research
12-19-1997 11:52

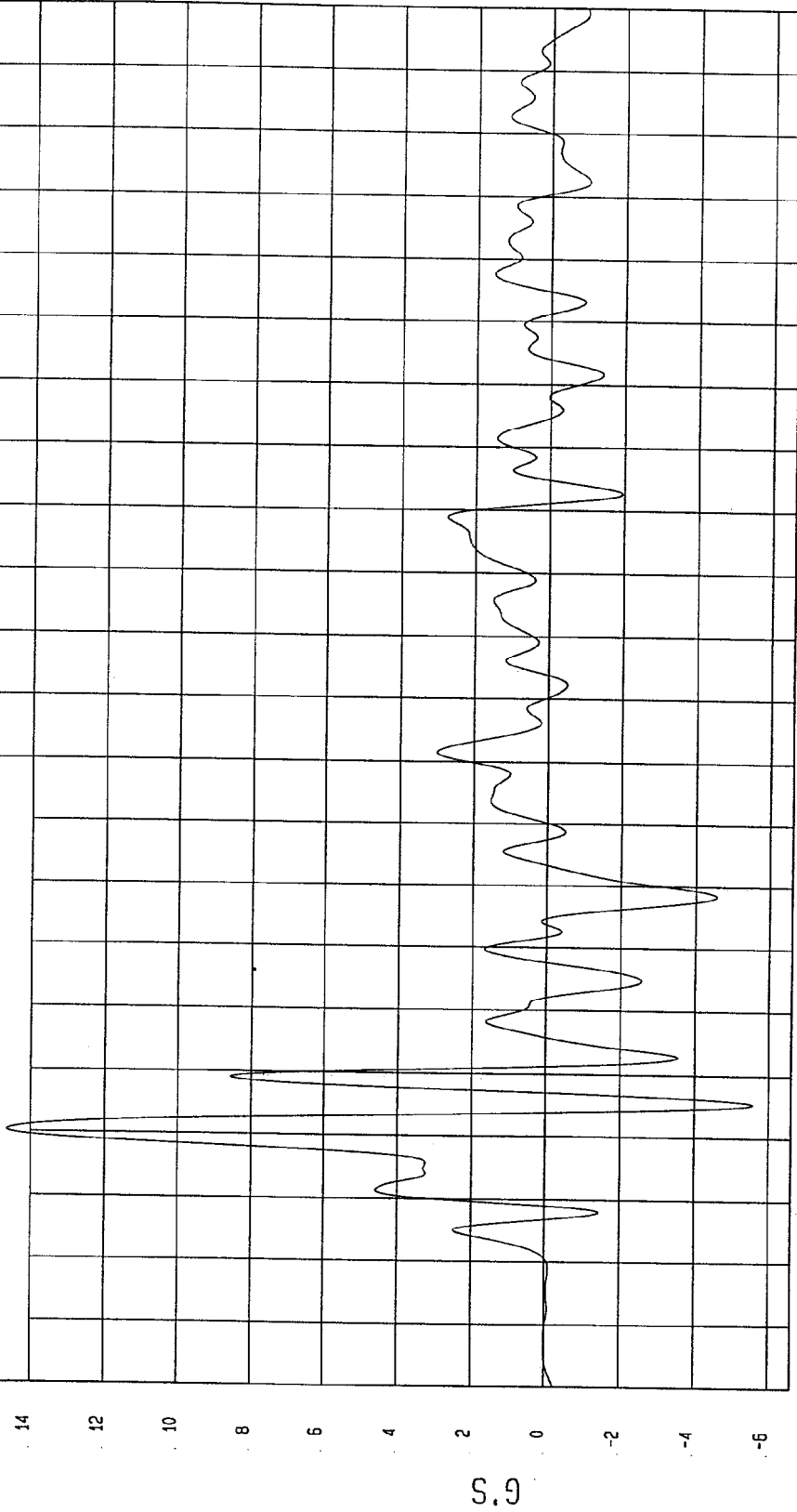
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.57 G'S at 25 msec Maximum = 14.65 G'S at 20 msec

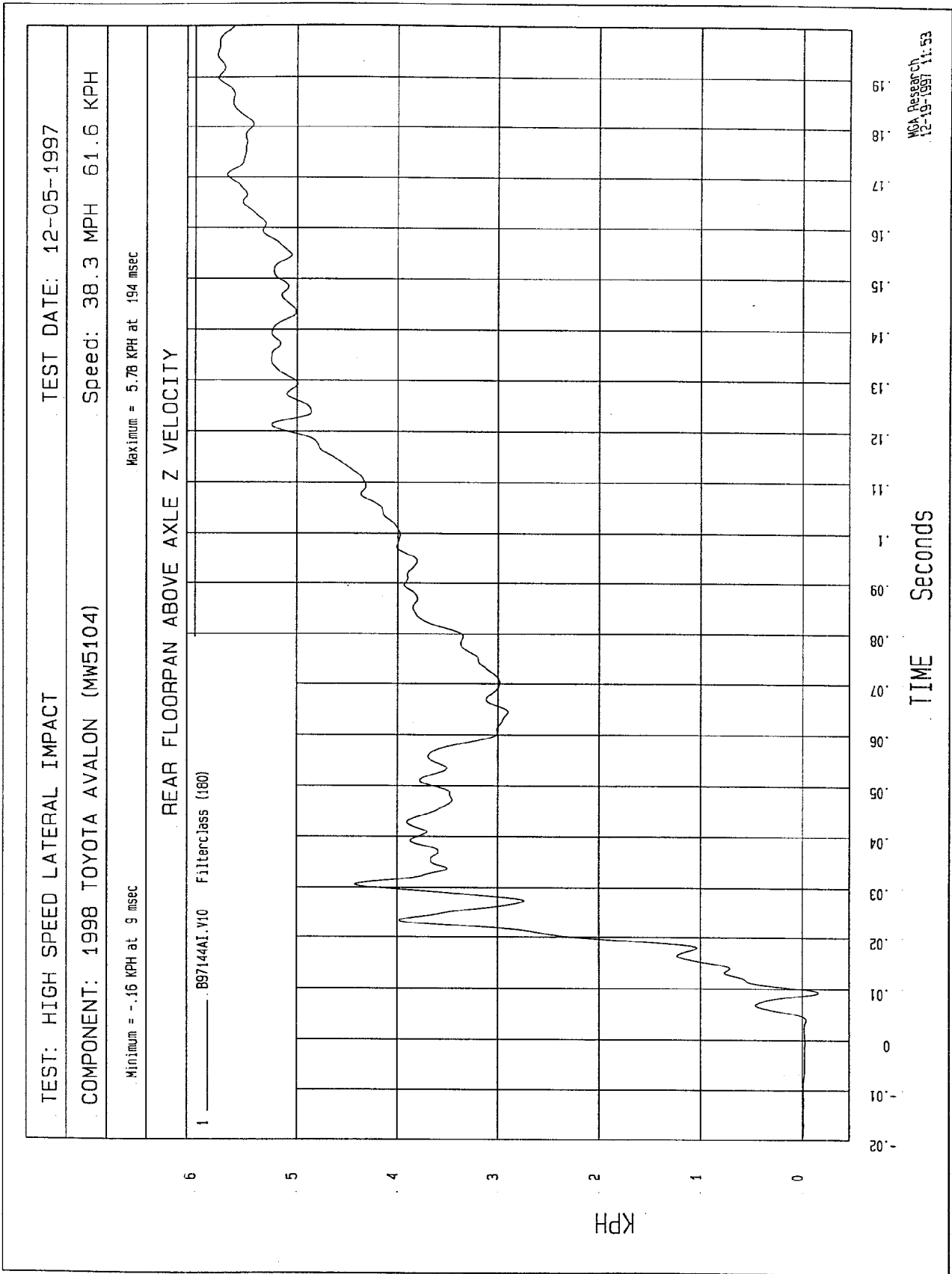
REAR FLOORPAN ABOVE AXLE Z ACCELERATION

1 B97144AF.A10 Filterclass (60)



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

MGA Research
12-19-1997 11:56



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

Speed: 38.3 MPH 61.6 KPH

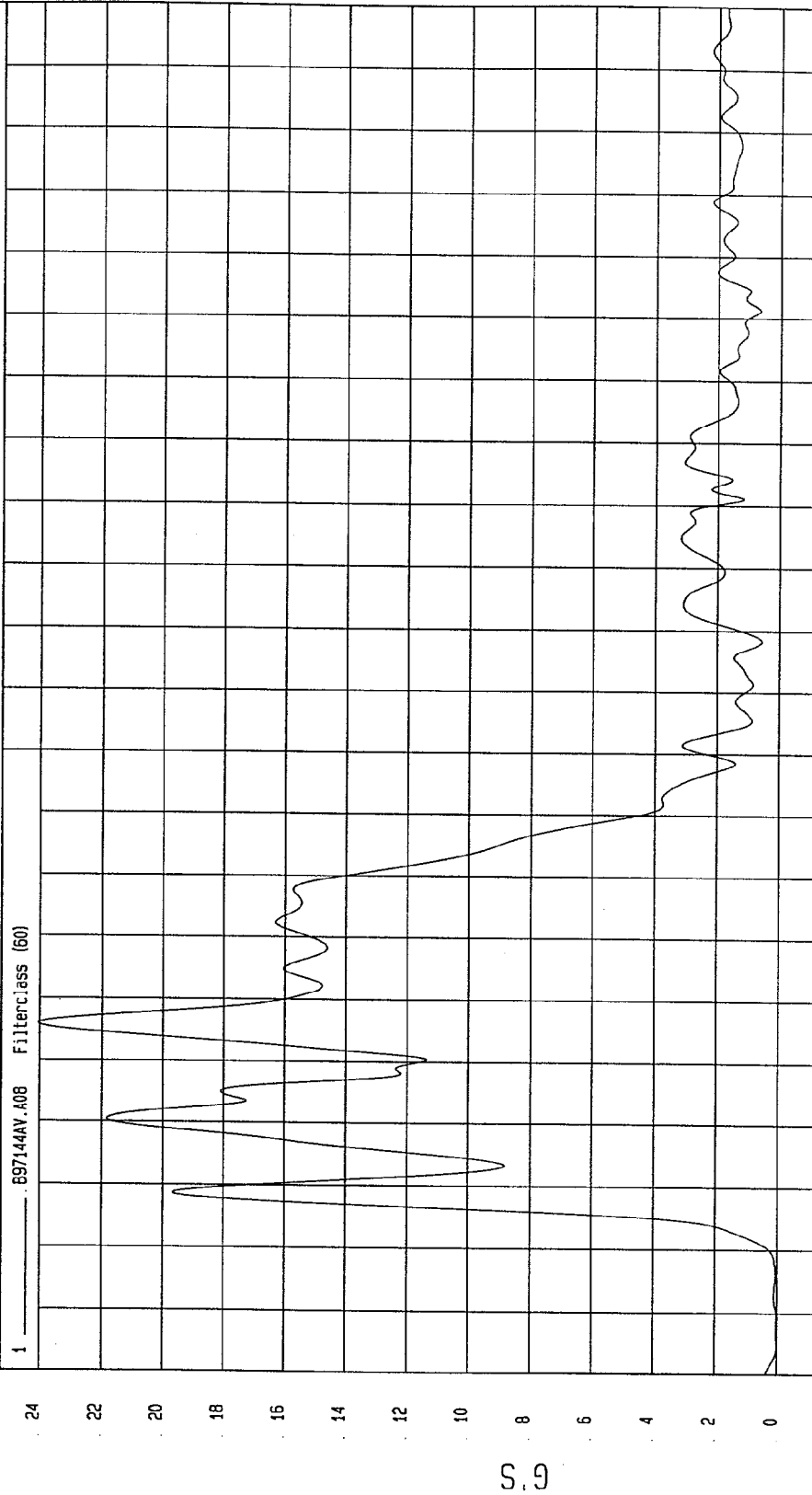
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 24.04 G's at 36 msec

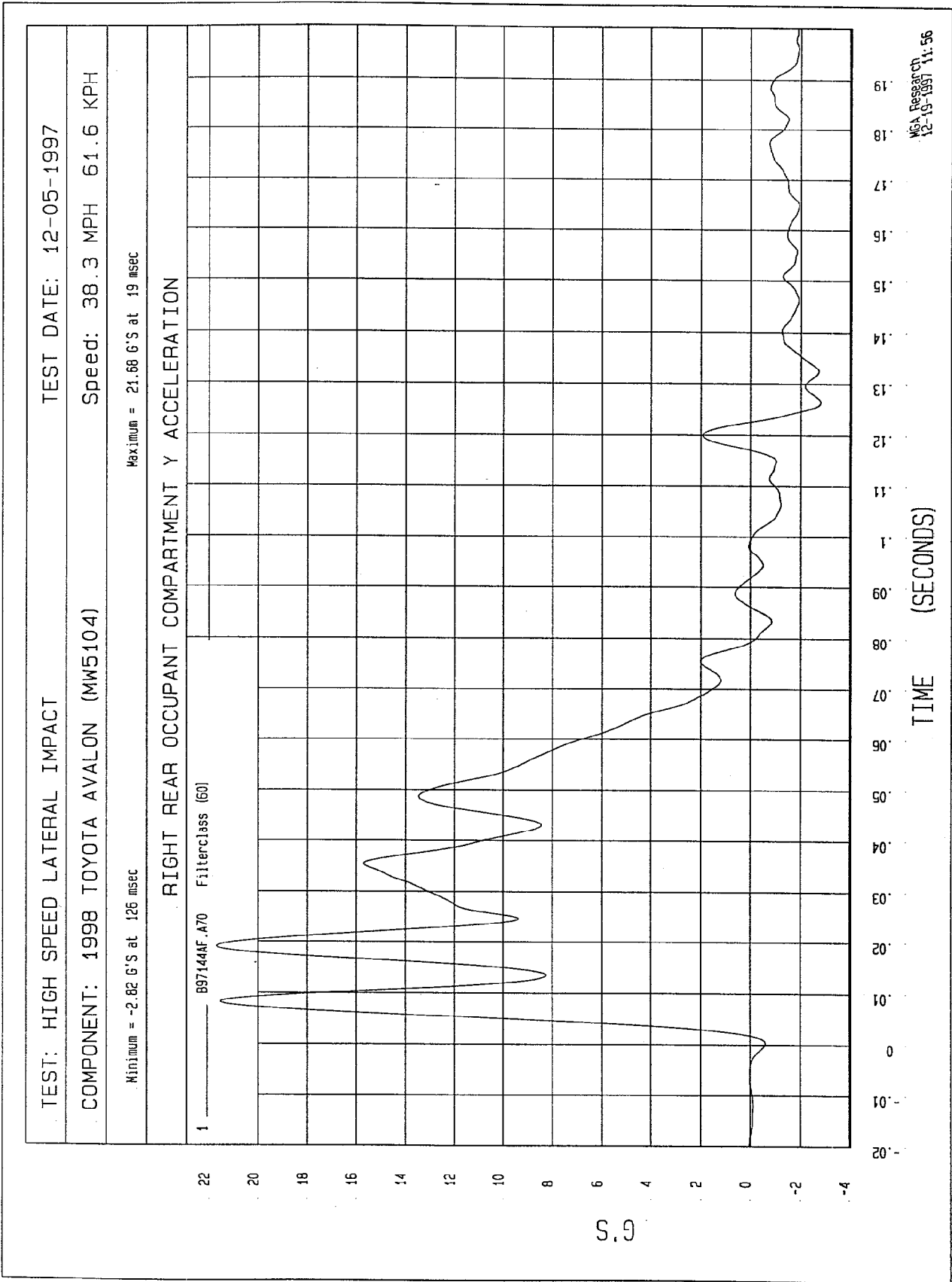
Minimum = 1.04E-02 G's at -10 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 697144V.A08 Filterclass (60)

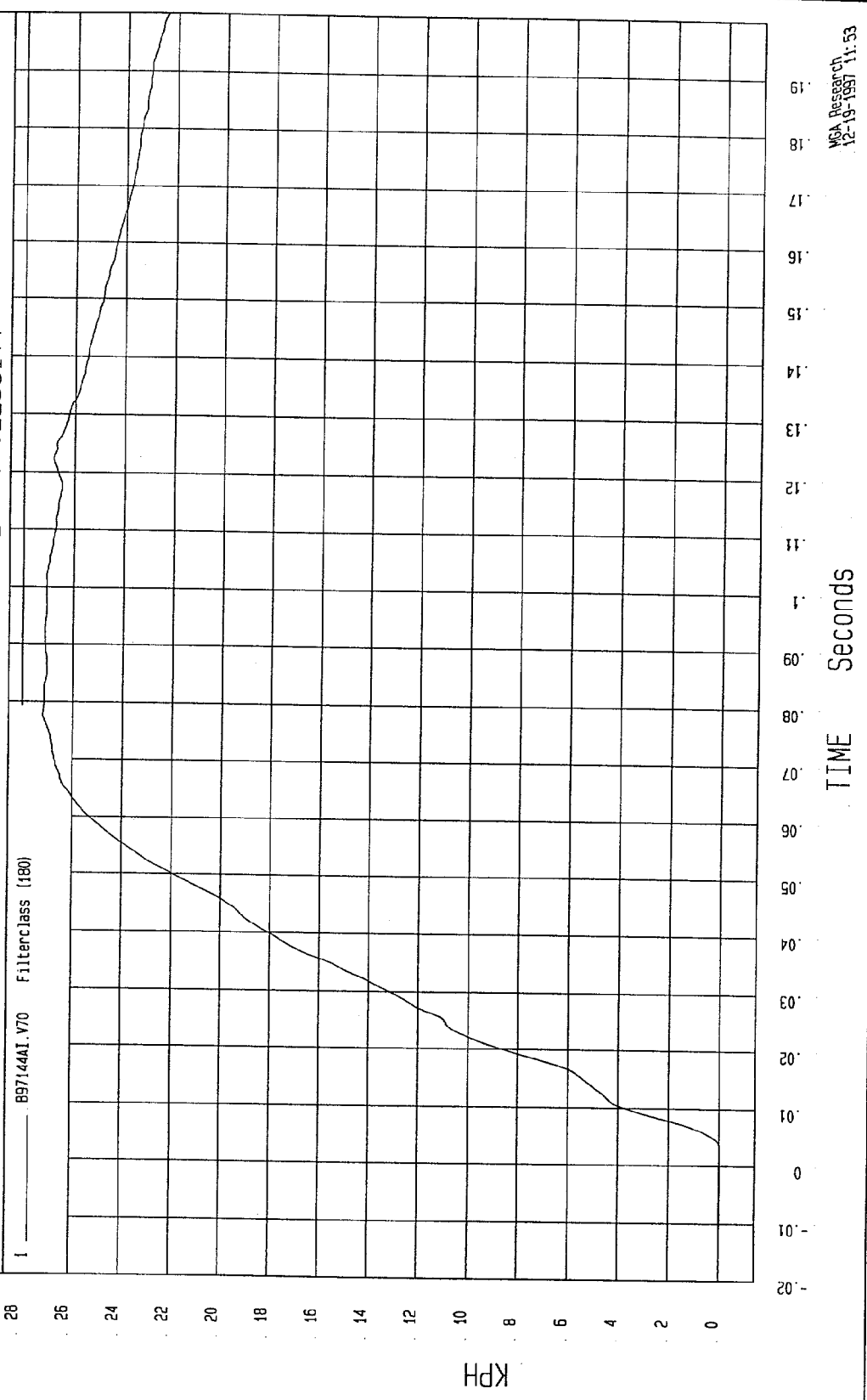


MCA Research
12-19-1997 11:59



TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH
Minimum = -4.39E-02 KPH at 3 msec Maximum = 27.18 KPH at 78 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

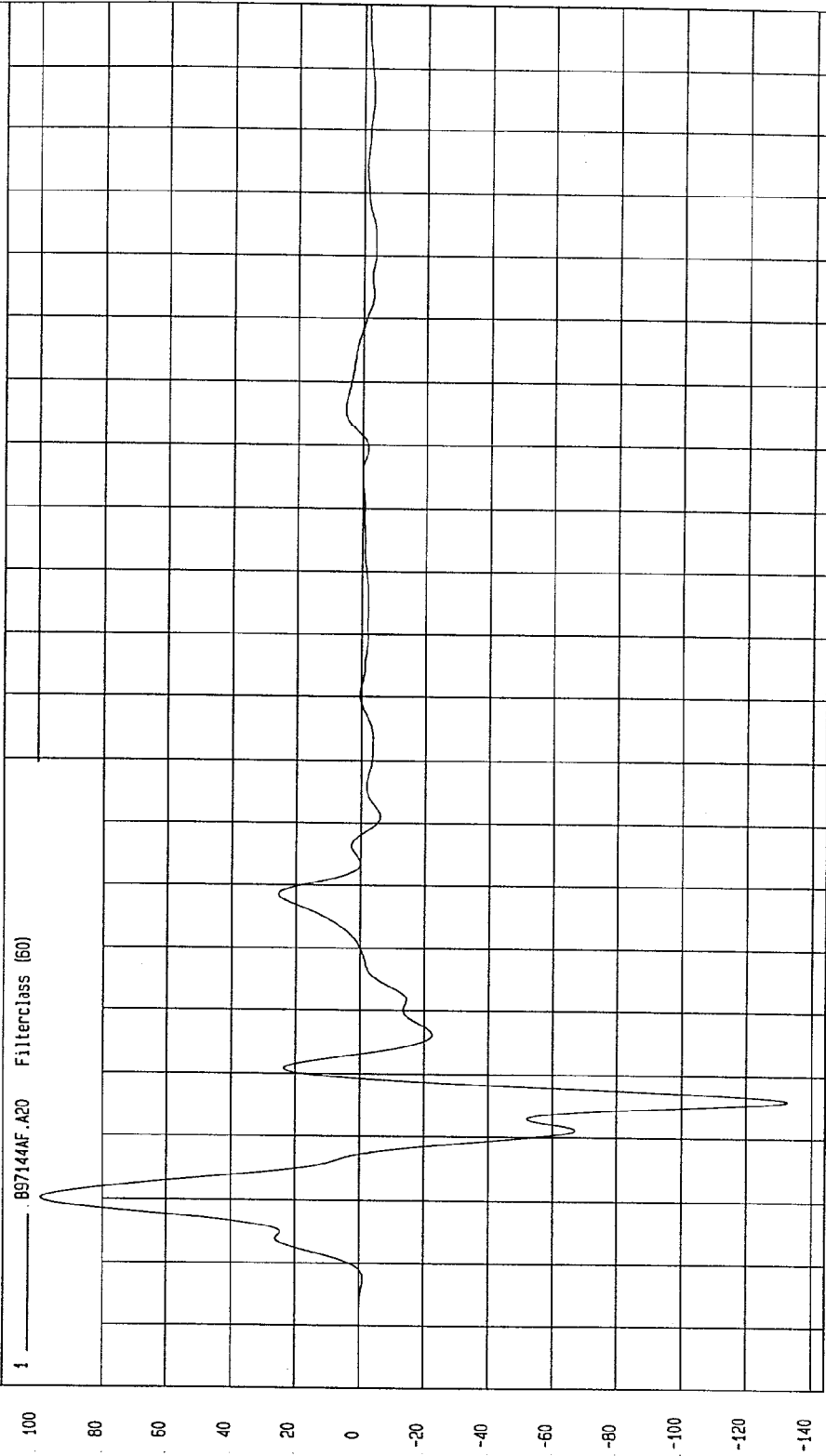
Speed: 38.3 MPH 61.6 KPH

Minimum = -132.54 G'S at 26 msec

Maximum = 98.81 G'S at 10 msec

LEFT LOWER A-POST Y ACCELERATION

1 ——— 897144AF.A20 Filterclass (60)



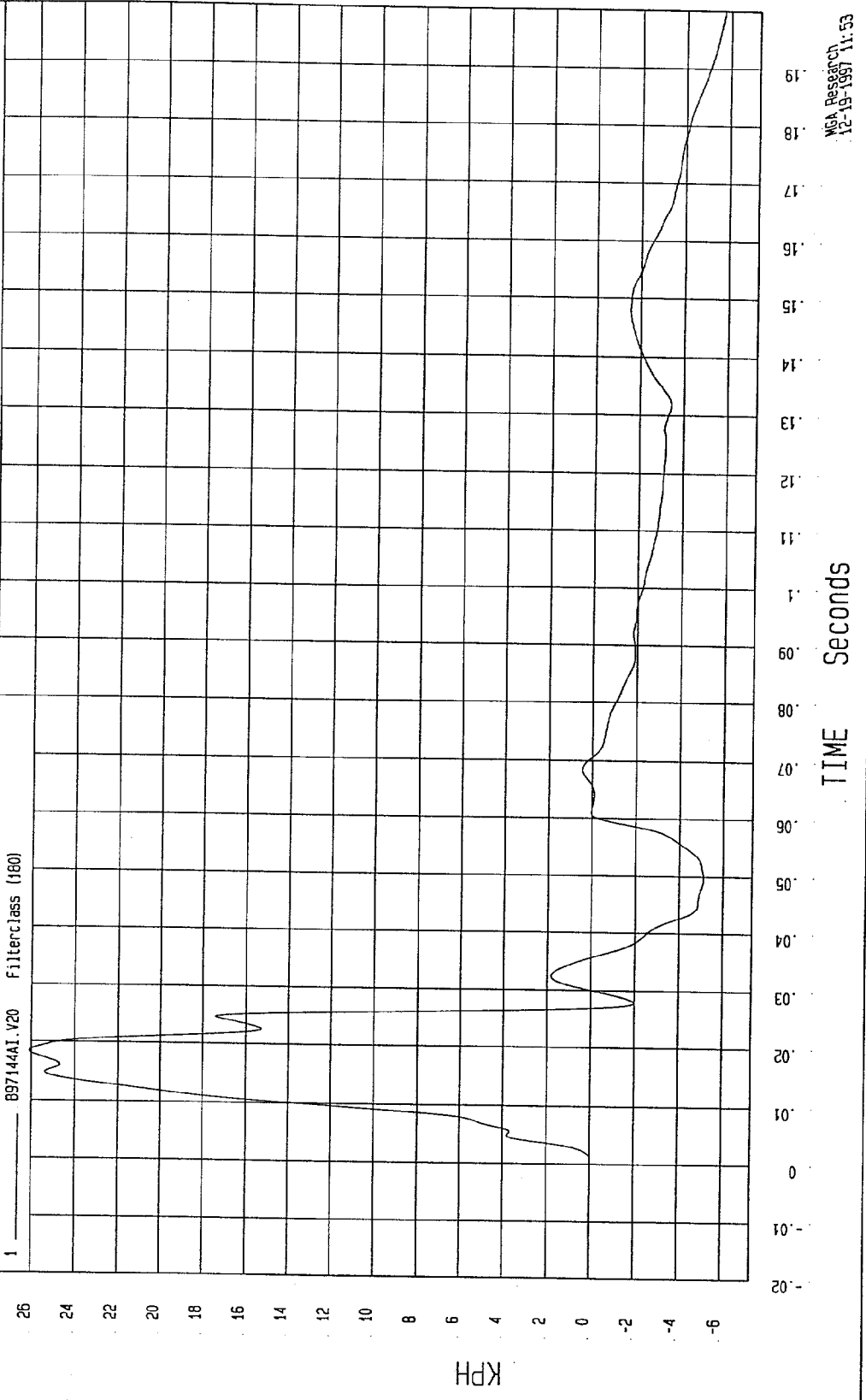
WCA Research
12-19-1997 11:56

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.73 KPH at 200 msec Maximum = 26.11 KPH at 10 msec

LEFT LOWER A-POST Y VELOCITY



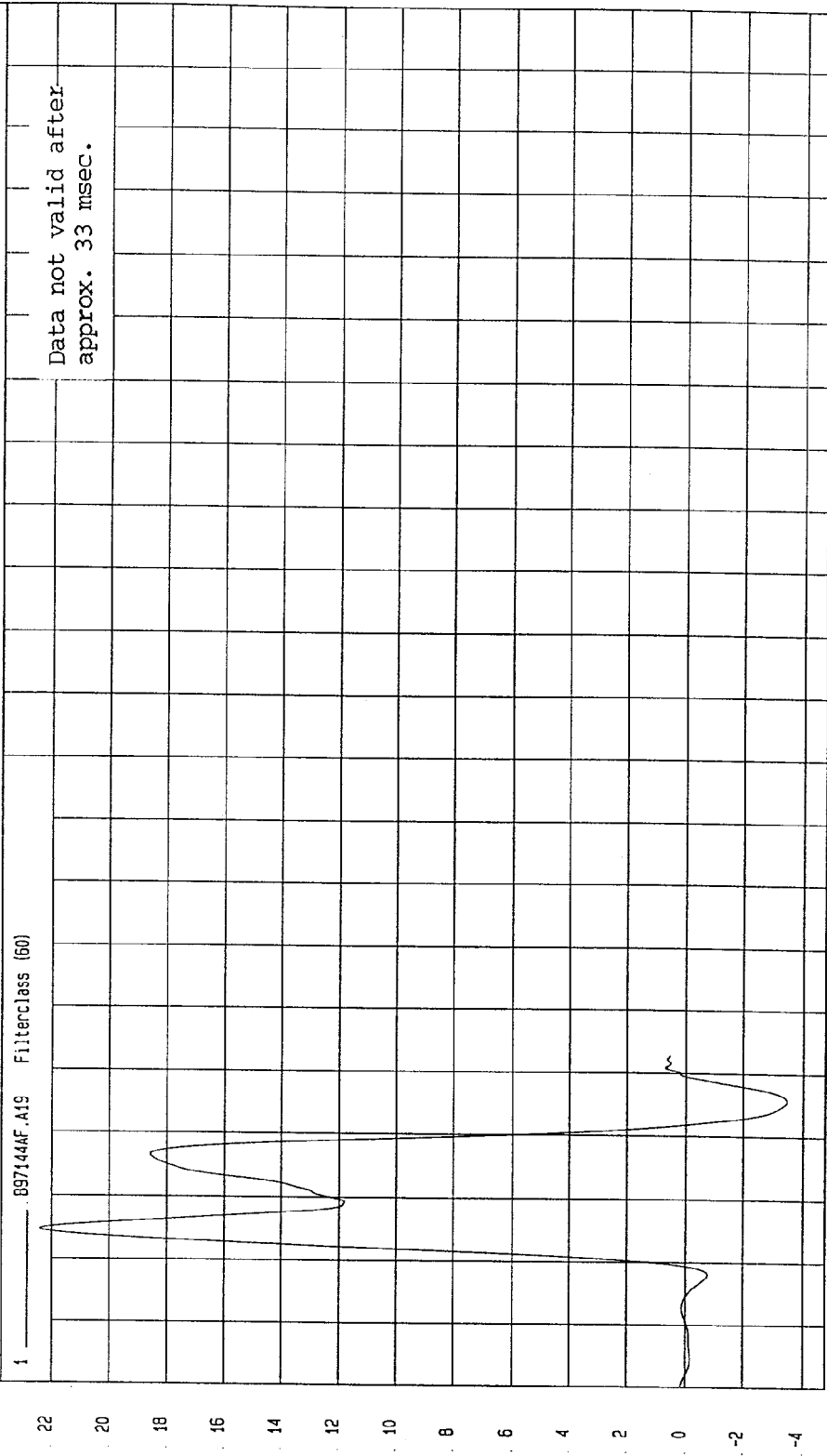
MGA Research
12-19-1997 11:53

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.46 G'S at 26 msec Maximum = 22.41 G'S at 5 msec

LEFT MID A-POST Y ACCELERATION



TIME (SECONDS)

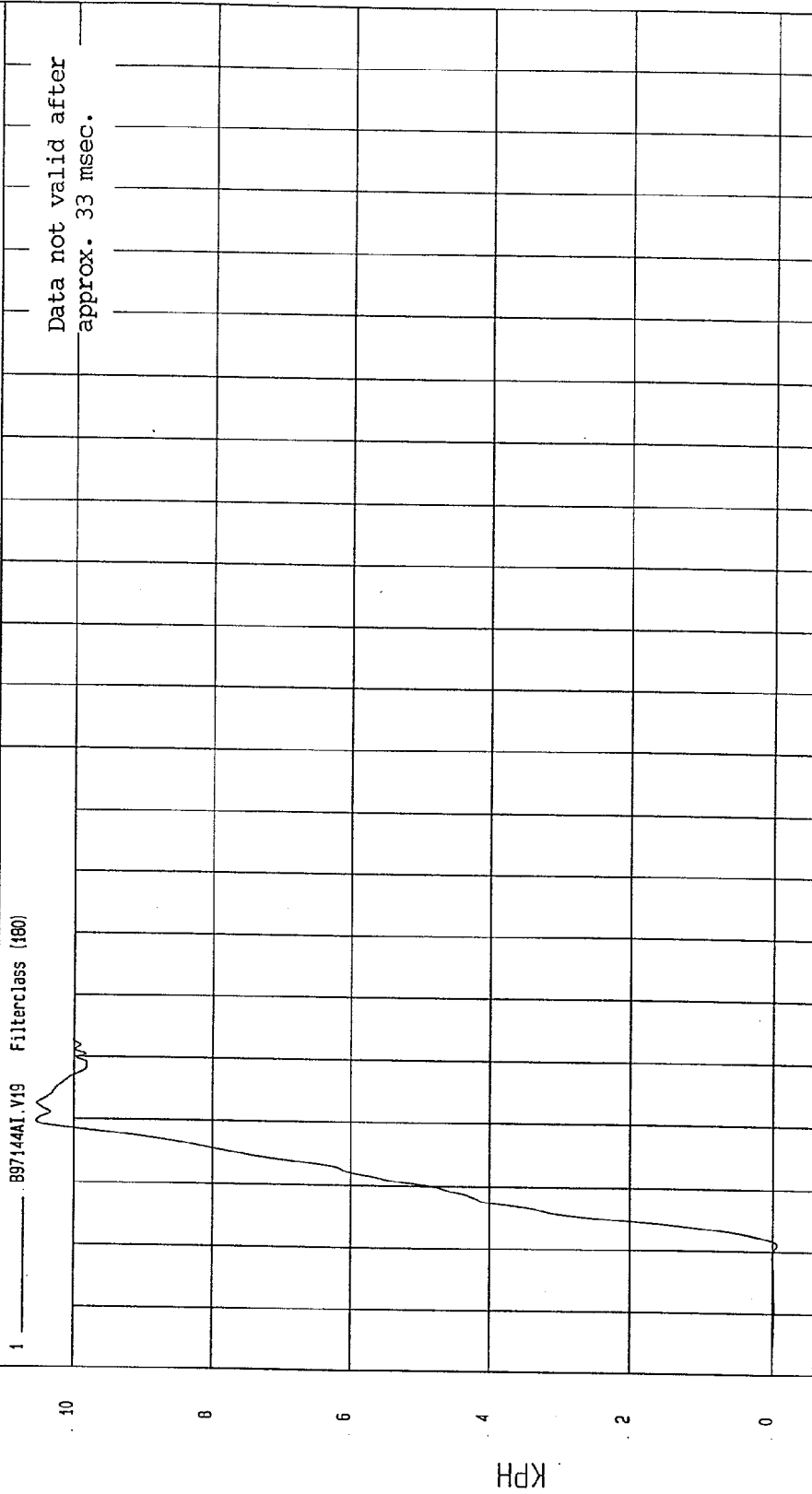
WCA Research
12-19-1997 12:17

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -6.13E-02 KPH at 1 msec Maximum = 10.54 KPH at 20 msec

LEFT MID A-POST Y VELOCITY



TIME Seconds

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

WCA Research
12-19-1997 12:17

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

SPEED: 38.3 MPH 61.6 KPH

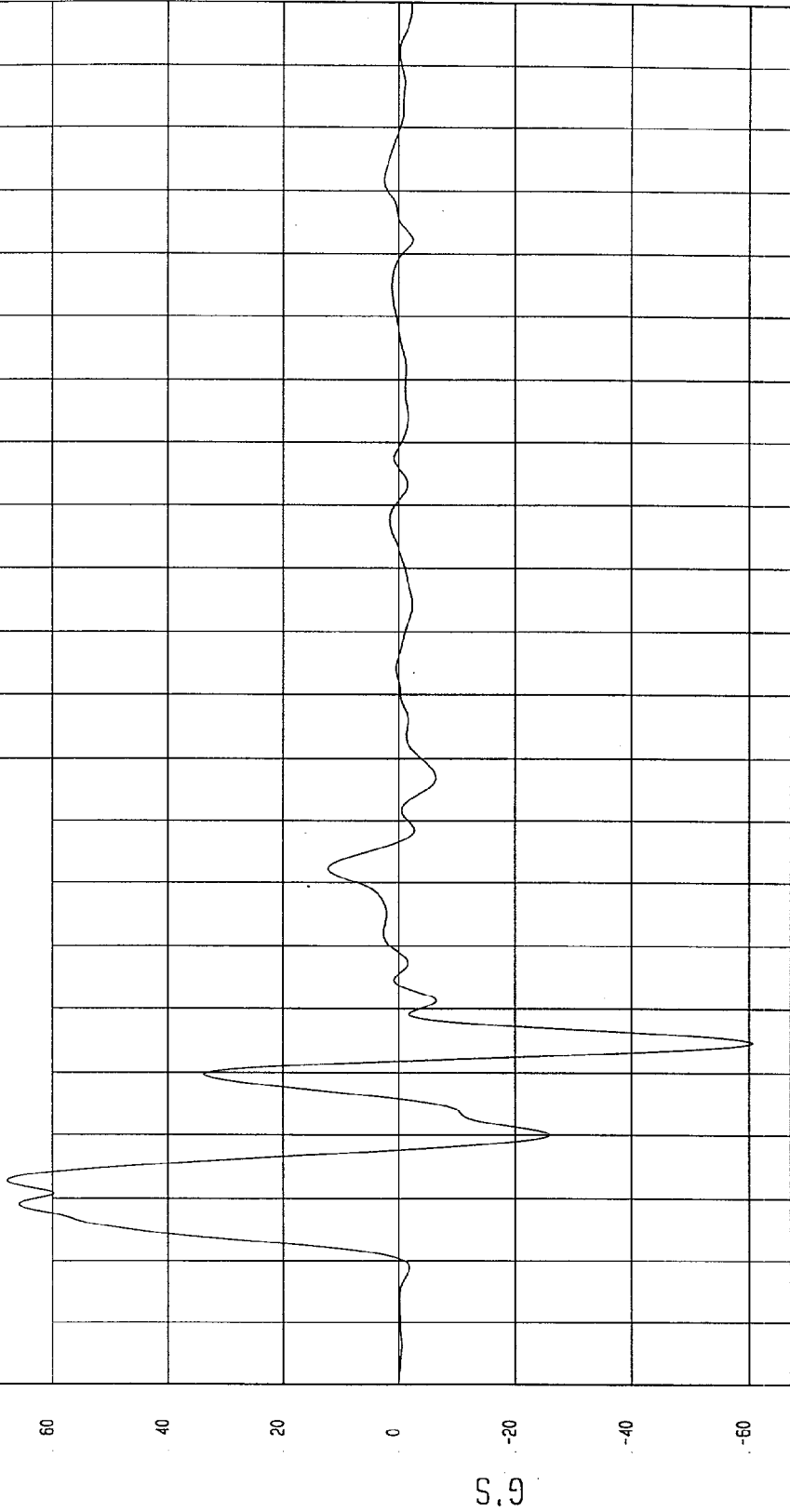
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 67.72 G'S at 13 msec

Minimum = -60.65 G'S at 35 msec

LEFT LOWER B-POST Y ACCELERATION

1 B97144AF.A30 Filterclass (60)



NCA Research
12-19-1997 11:56

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

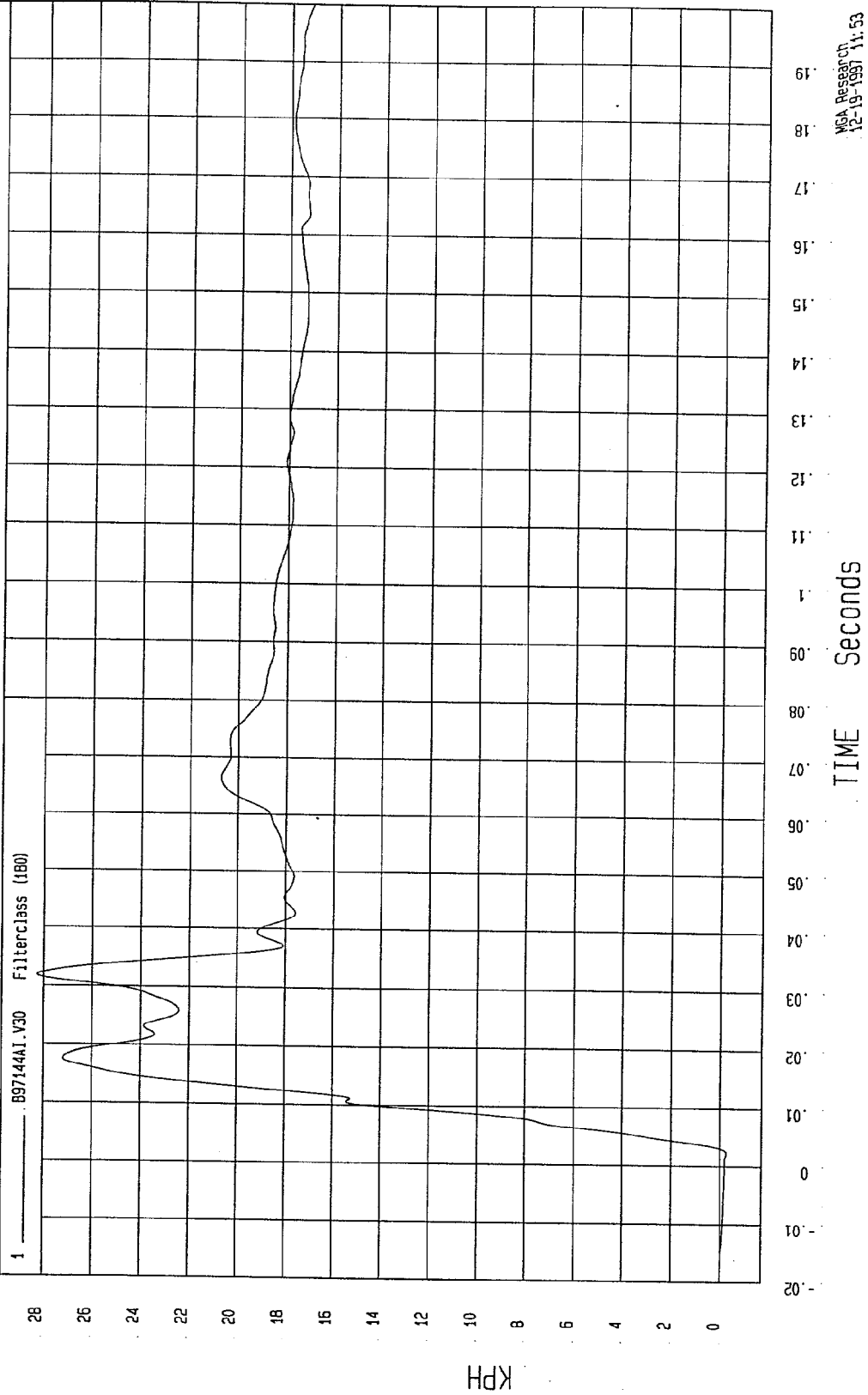
Speed: 38.3 MPH 61.6 KPH

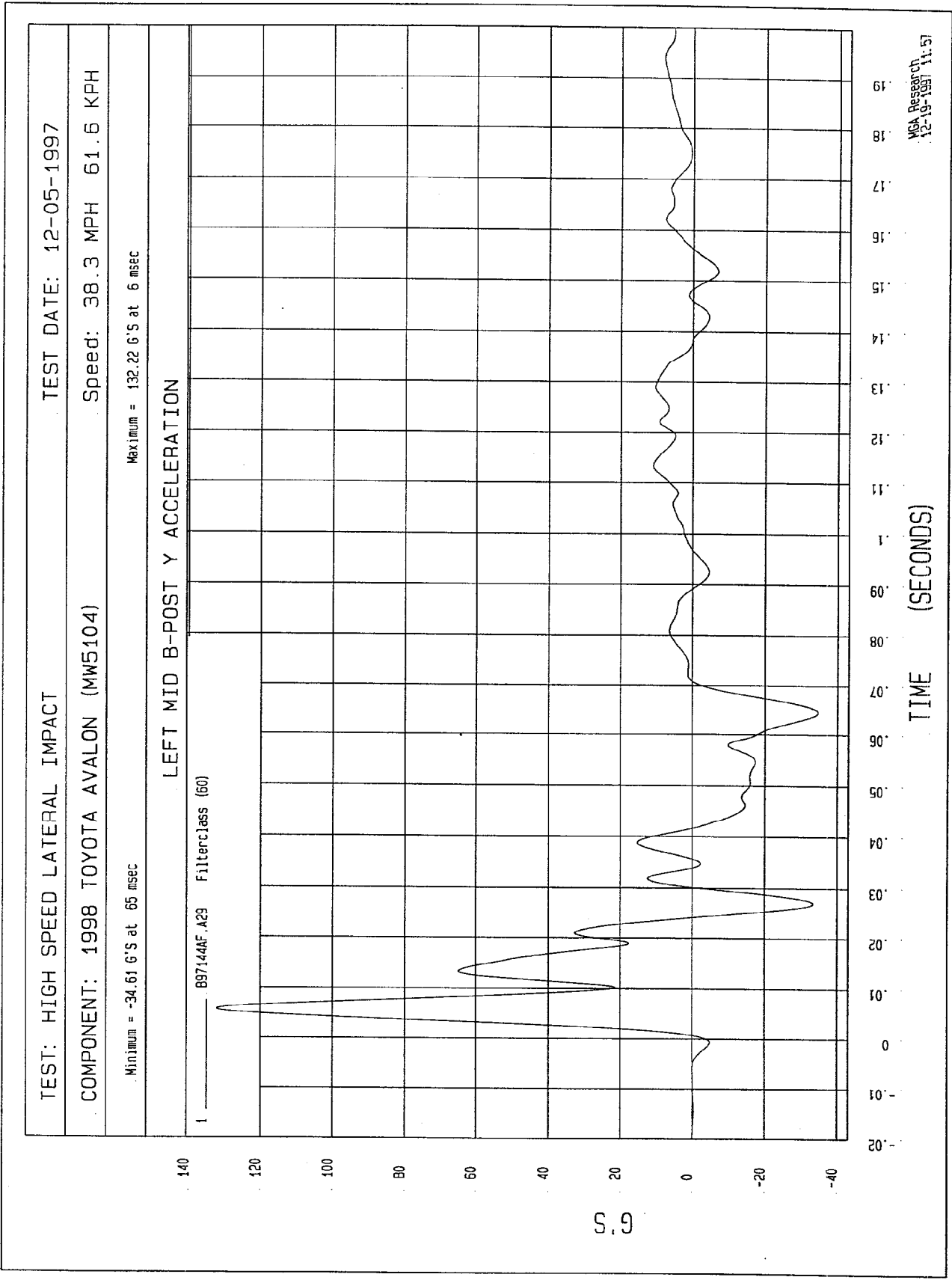
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Minimum = -24 KPH at 2 msec

Maximum = 28.26 KPH at 32 msec

LEFT LOWER B-POST Y VELOCITY





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

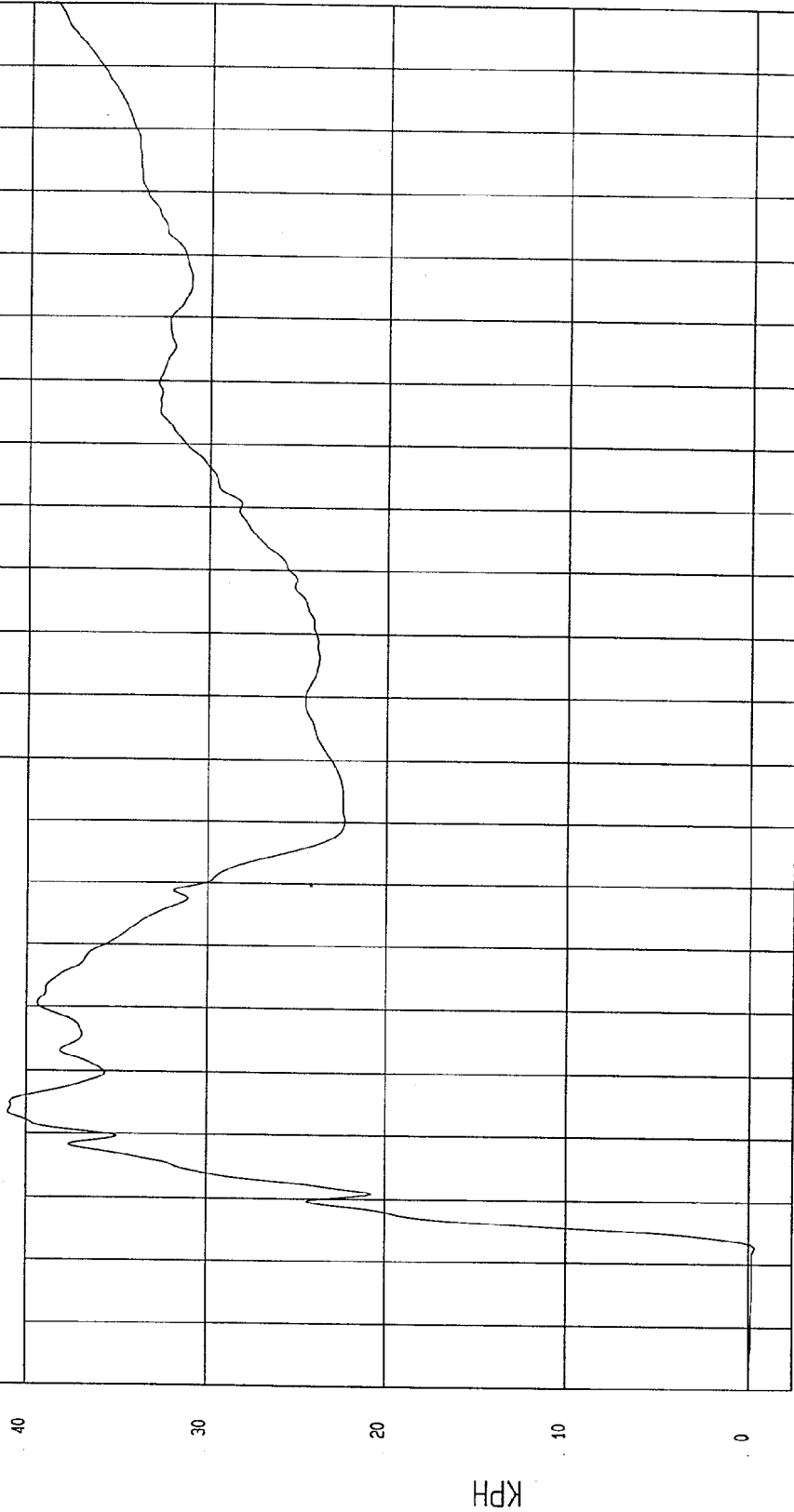
Speed: 38.3 MPH 61.6 KPH

Minimum = -31 KPH at 3 msec

Maximum = 41.03 KPH at 23 msec

LEFT MID B-POST Y VELOCITY

1 ——— B97144A1.V29 FilterClass (180)



TIME Seconds

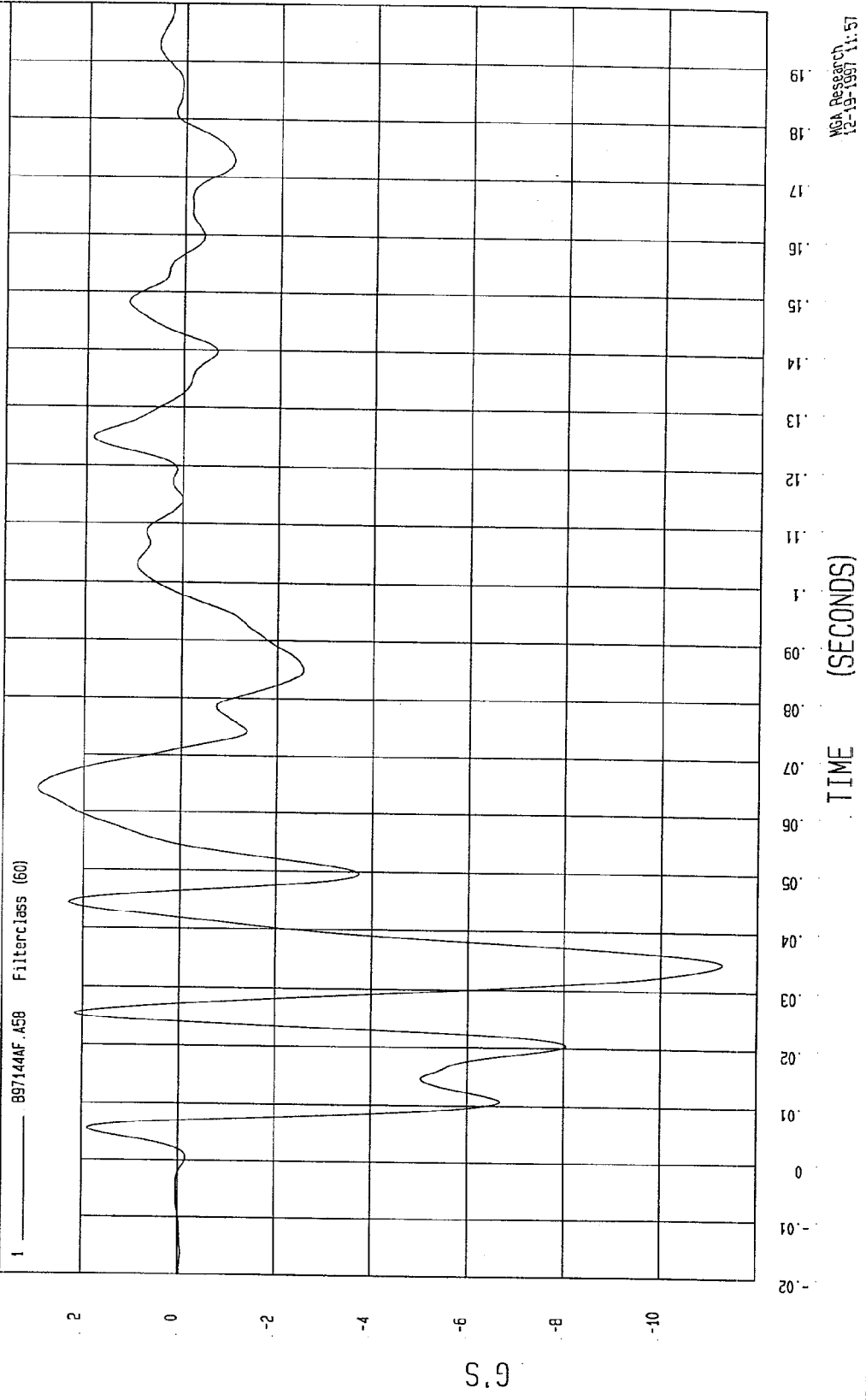
MCA Research
12-19-1997 11:53

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -11.25 G'S at 35 msec Maximum = 2.94 G'S at 64 msec

VEHICLE CG X ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

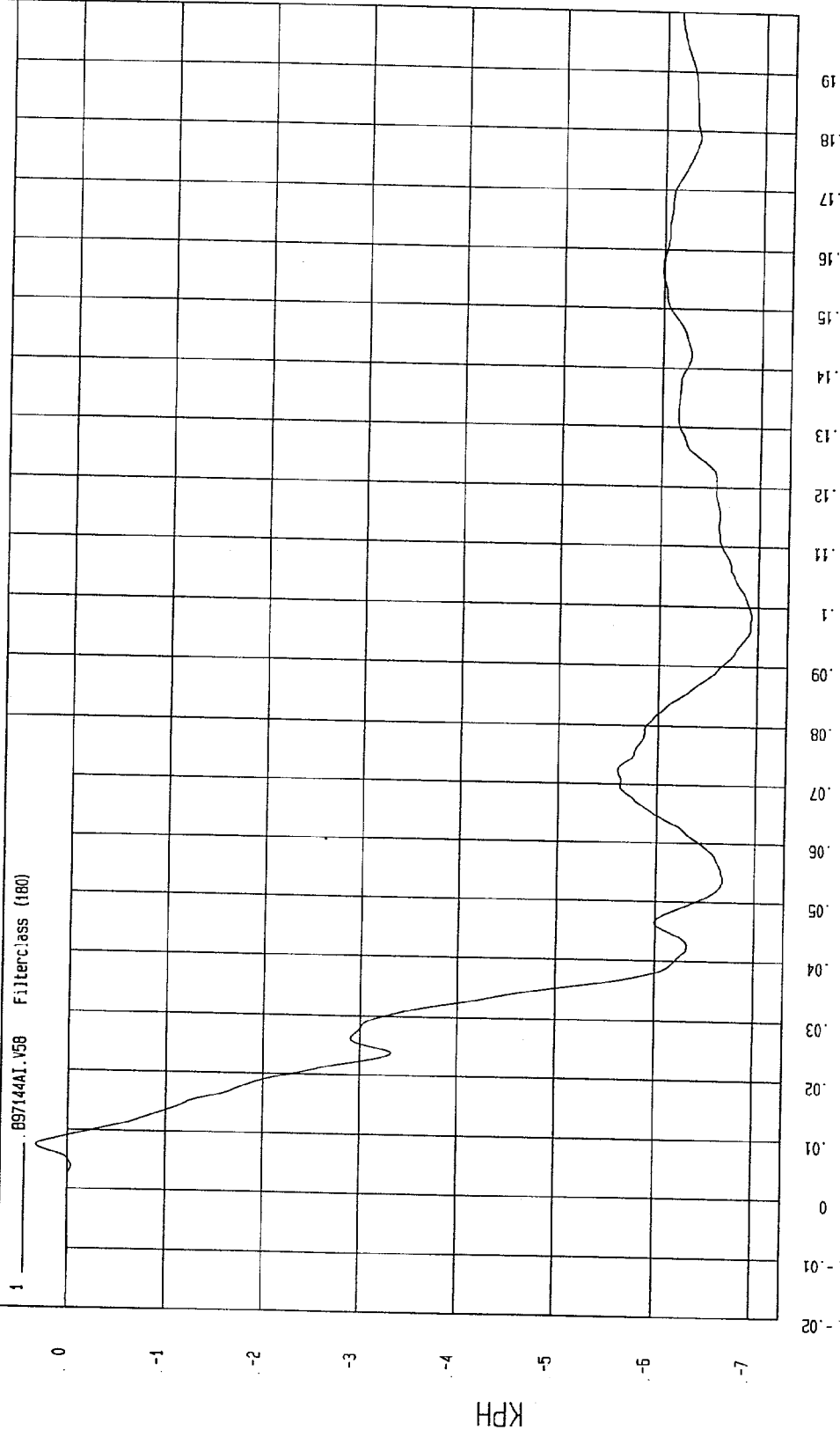
Speed: 38.3 MPH 61.6 KPH

Minimum = -6.93 KPH at 98 msec

Maximum = .31 KPH at 8 msec

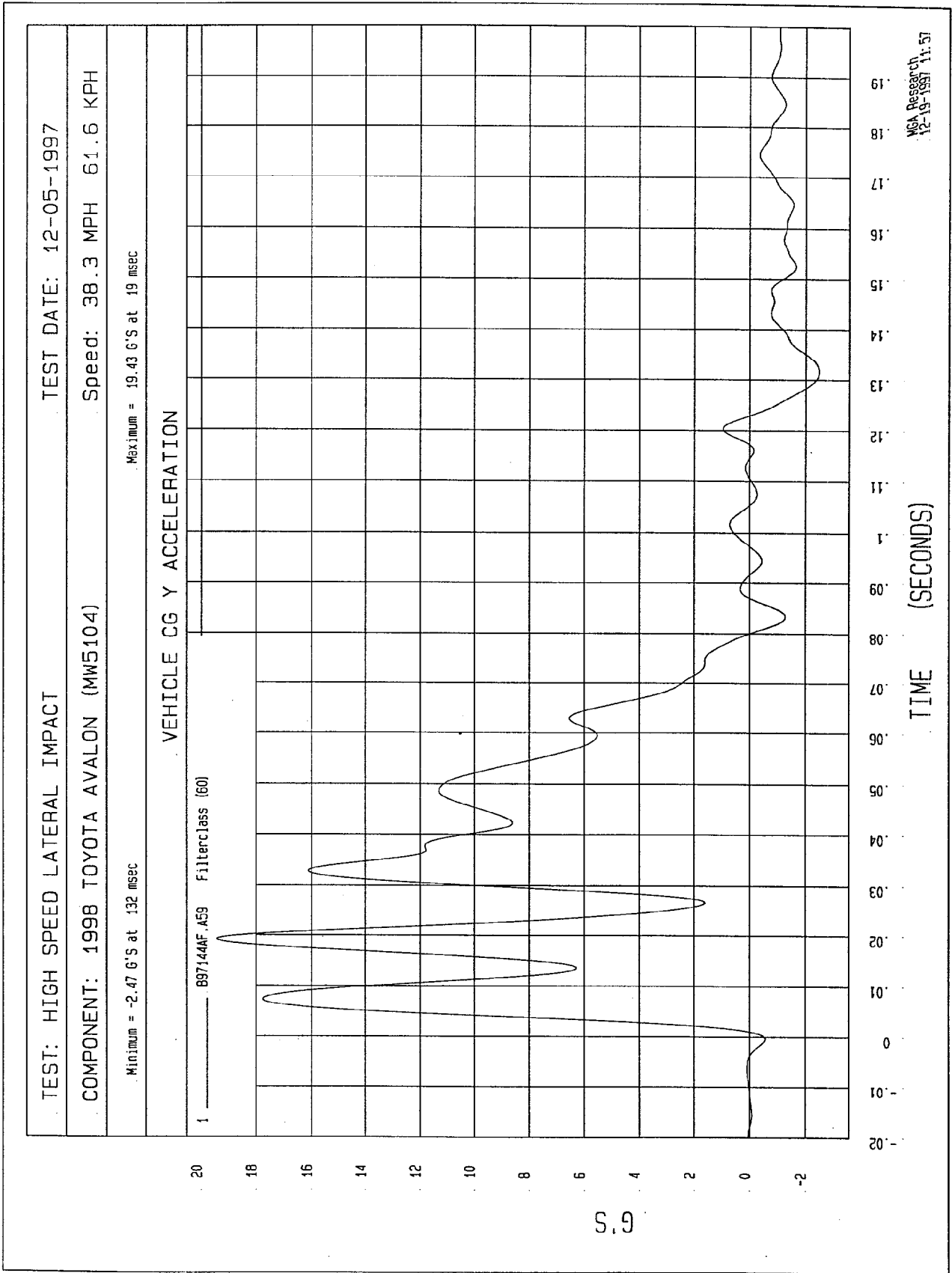
VEHICLE CG X VELOCITY

1 ——— .B97144A1.V58 Filterclass (180)



TIME Seconds

MGA Research
12-19-1997 11:53

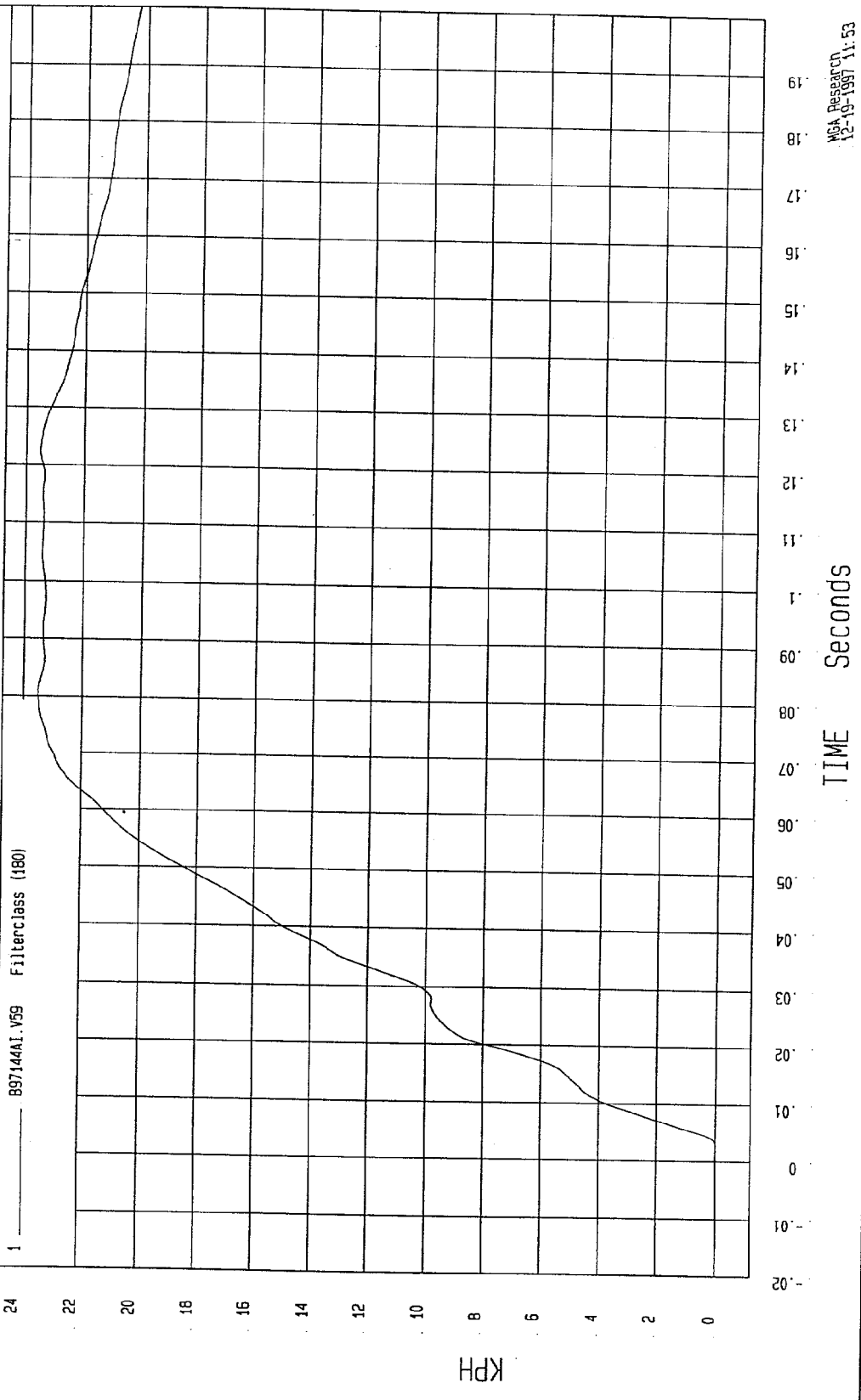


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -0.36E-03 KPH at -10 msec Maximum = 23.52 KPH at 122 msec

VEHICLE CG Y VELOCITY



MOA Research
12-19-1997 11:53

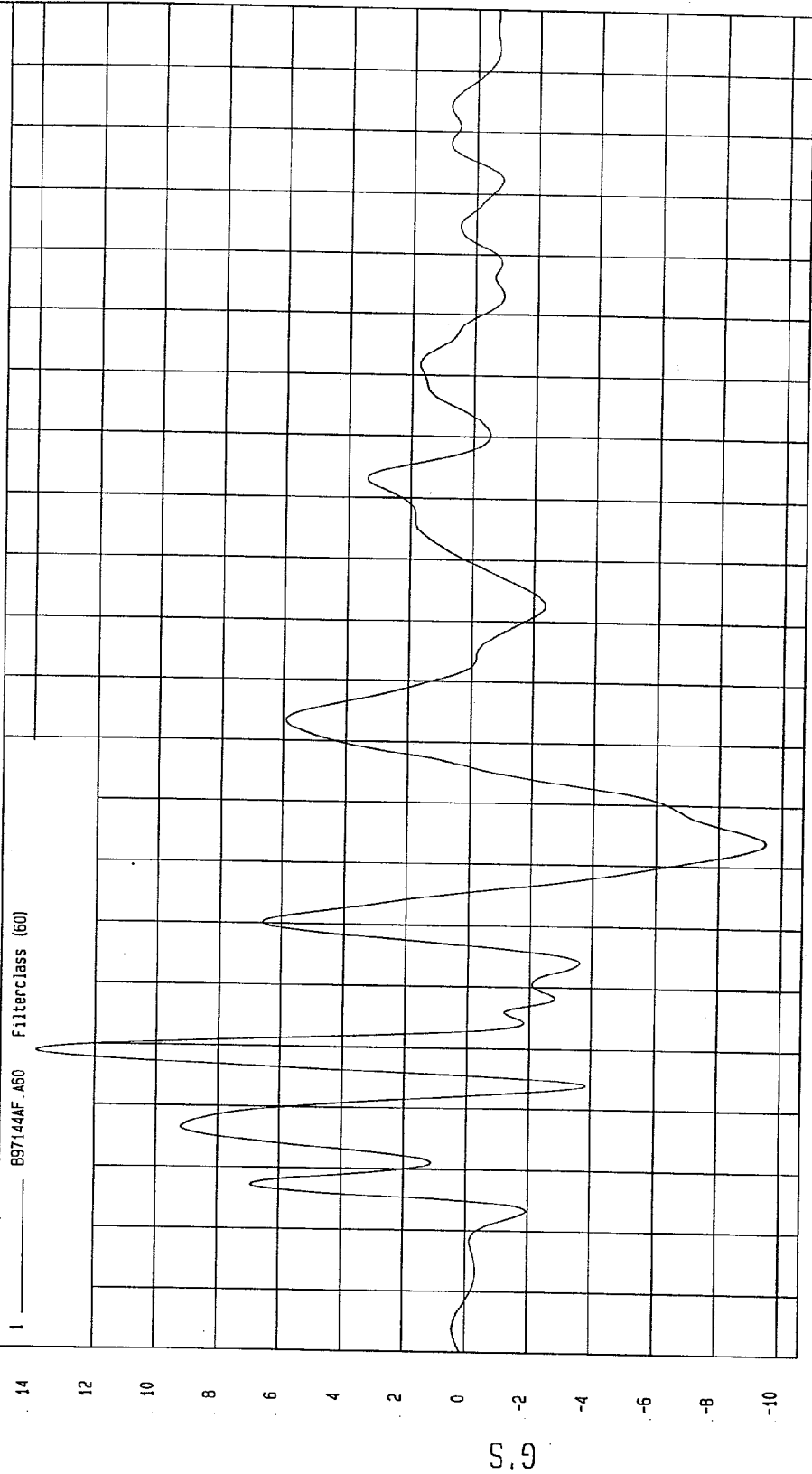
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.48 G'S at 64 msec Maximum = 13.84 G'S at 29 msec

VEHICLE CG Z ACCELERATION

1 ——— B97144AF.460 Filterclass (60)



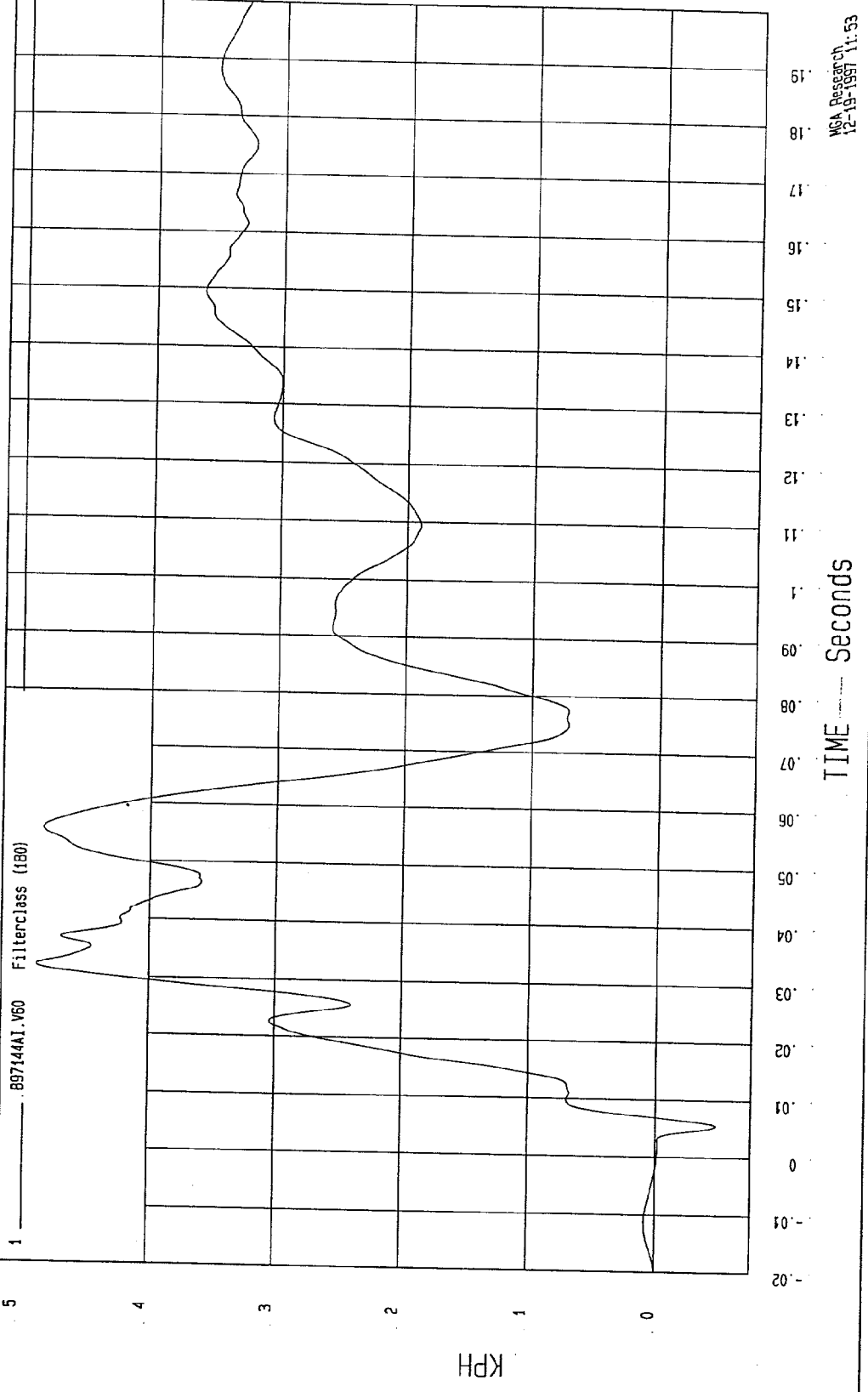
TIME (SECONDS)

NSA Research
12-19-1997 11: 57

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -.46 KPH at 5 msec Maximum = 4.87 KPH at 32 msec

VEHICLE CG Z VELOCITY

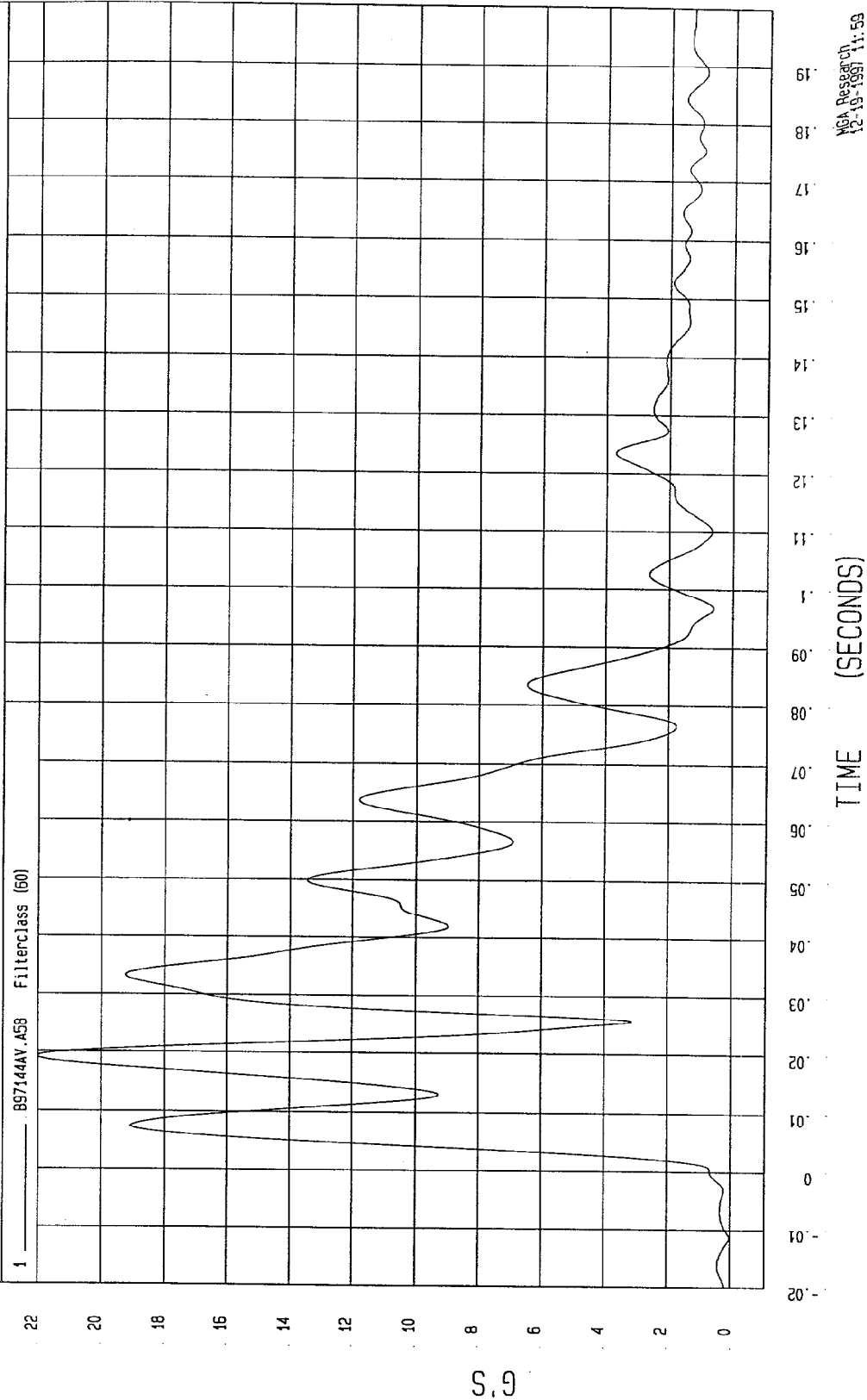


TEST DATE: 12-05-1997

Speed: 38.3 MPH 61.6 KPH

Maximum = 22.01 G'S at 19 msec

VEHICLE CG RESULTANT ACCELERATION

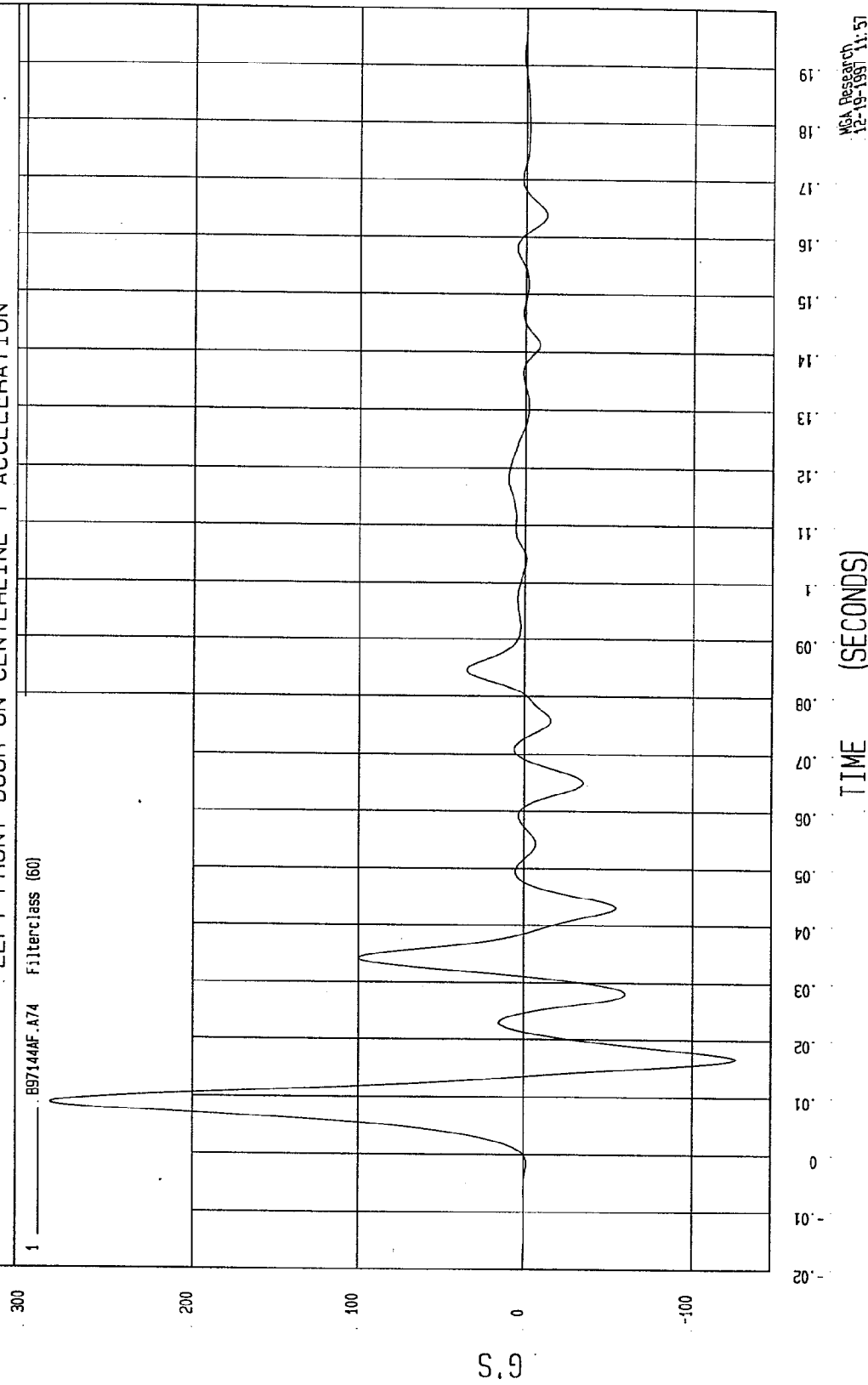


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -124.97 G'S at 17 msec Maximum = 284.93 G'S at 9 msec

LEFT FRONT DOOR ON CENTERLINE Y ACCELERATION

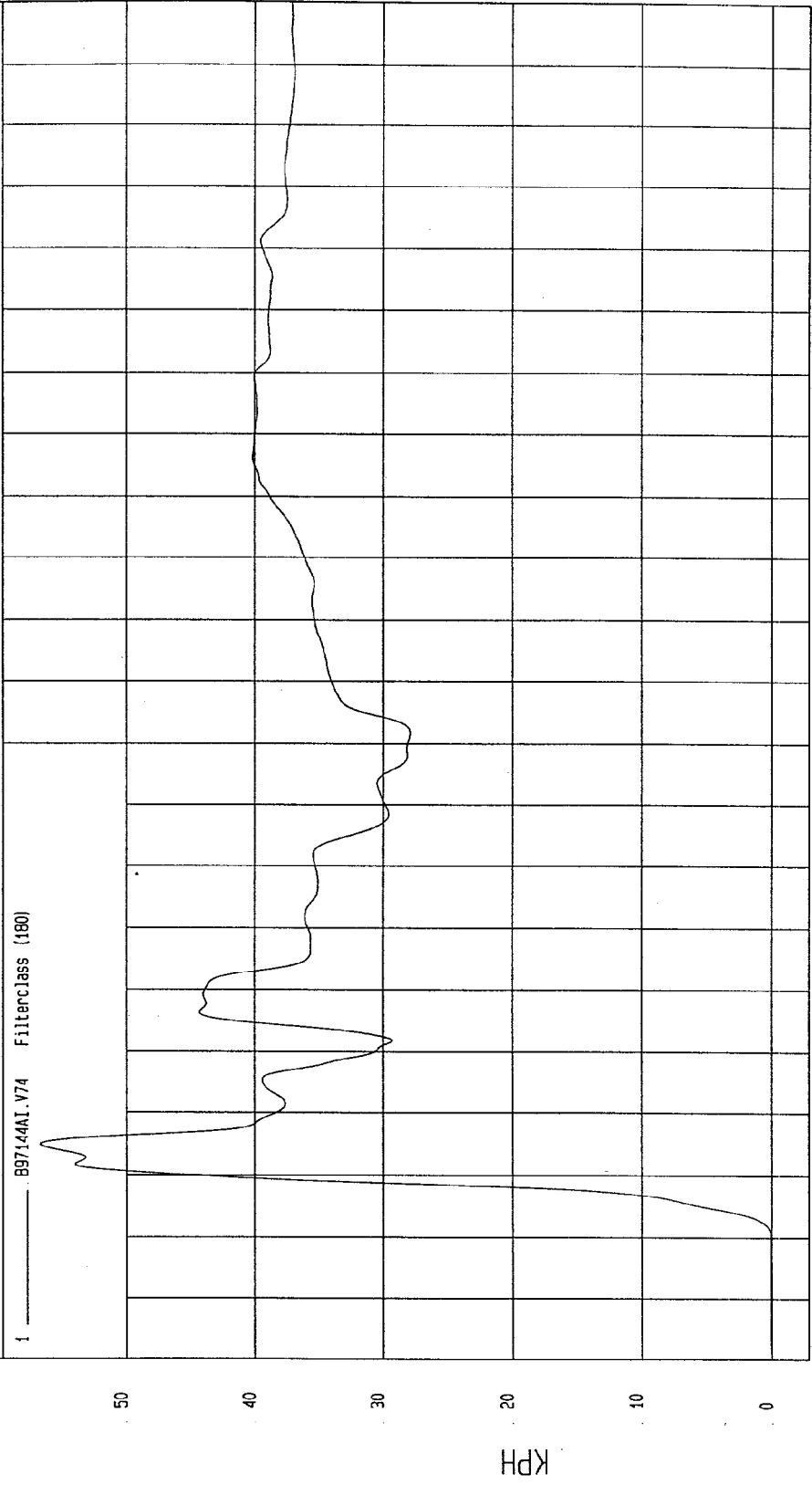


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec Maximum = 56.60 KPH at 15 msec

LEFT FRONT DOOR ON CENTERLINE Y VELOCITY



TIME Seconds

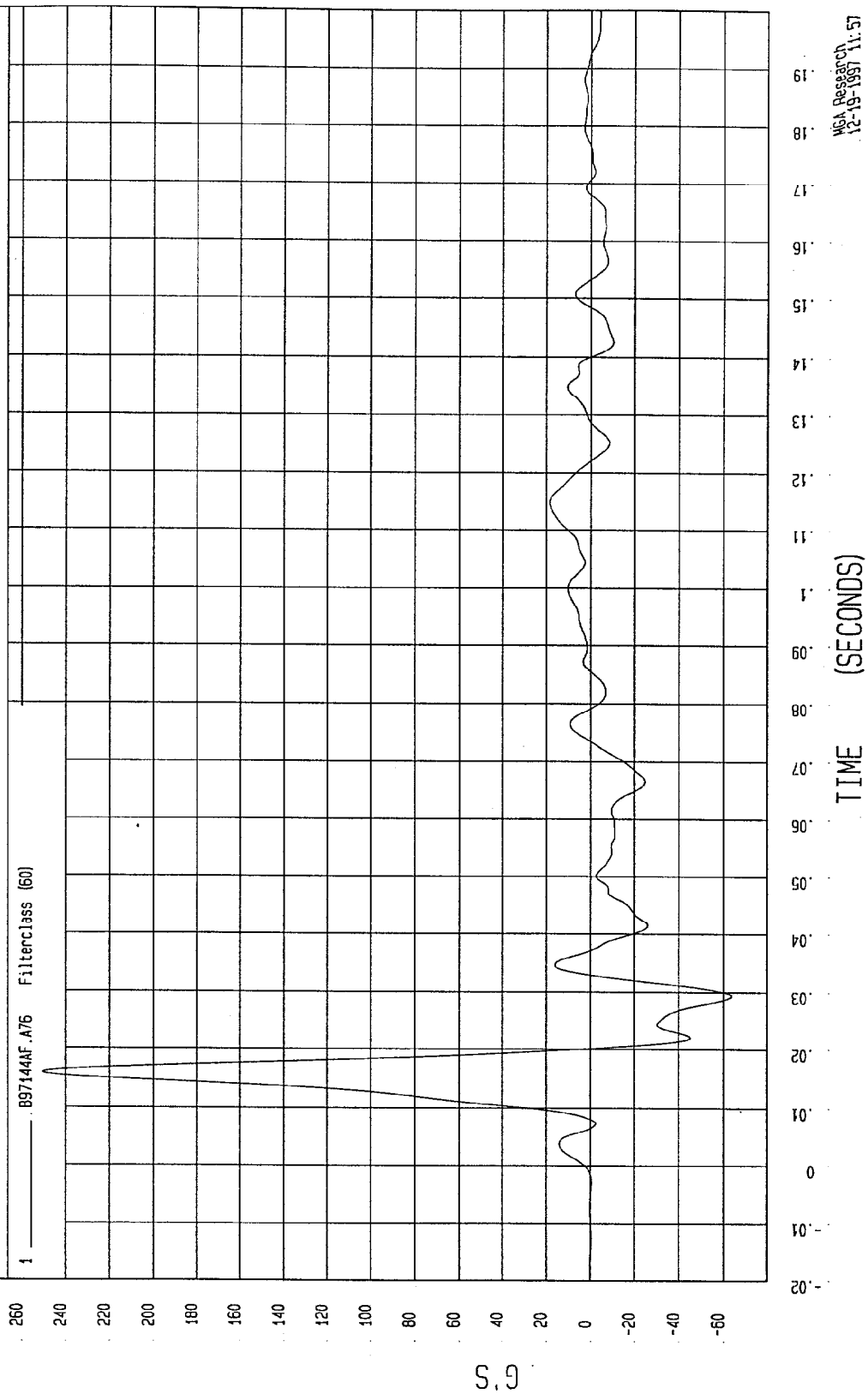
NSA Research
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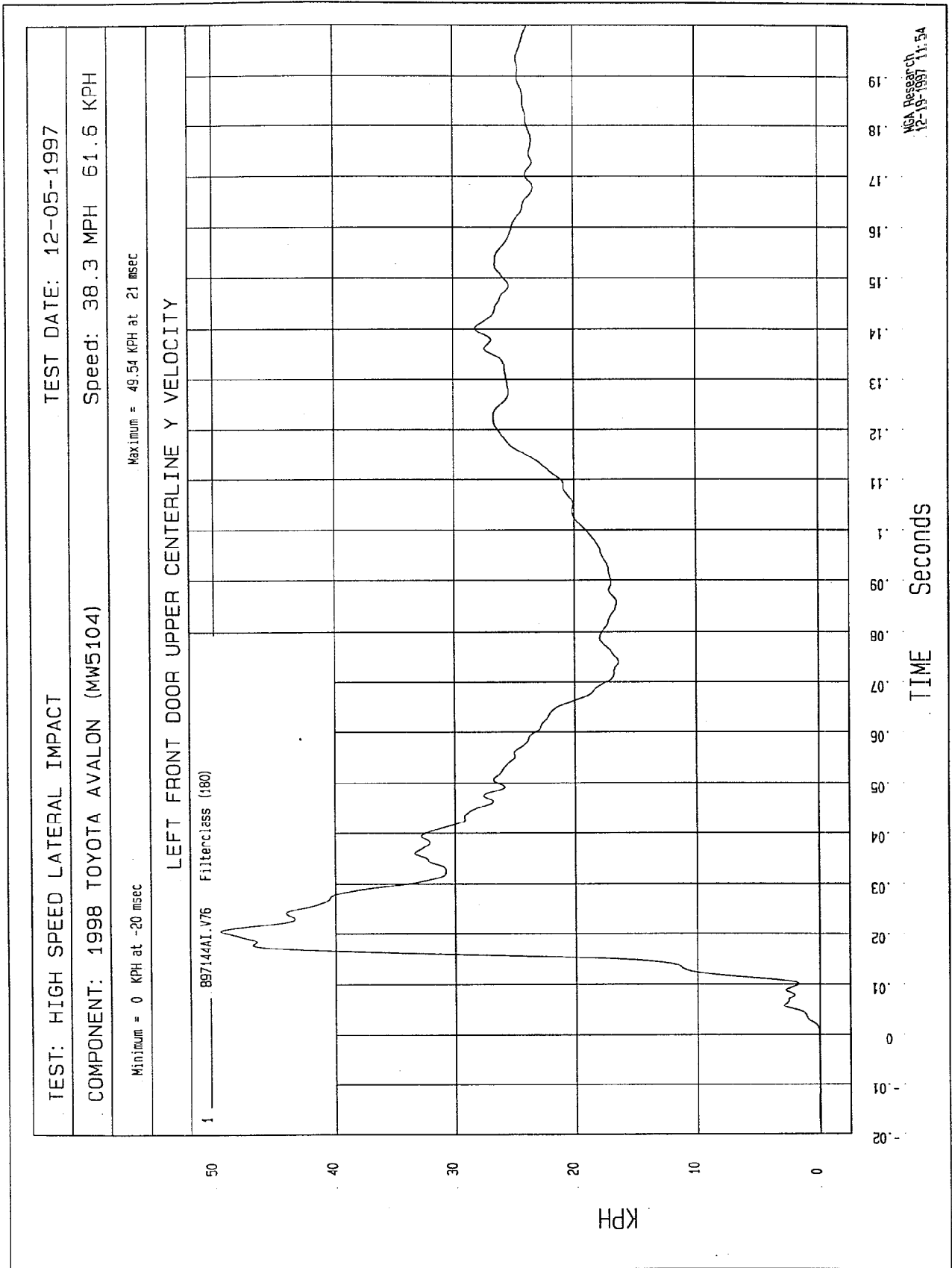
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -63.64 G'S at 29 msec Maximum = 250.64 G'S at 16 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

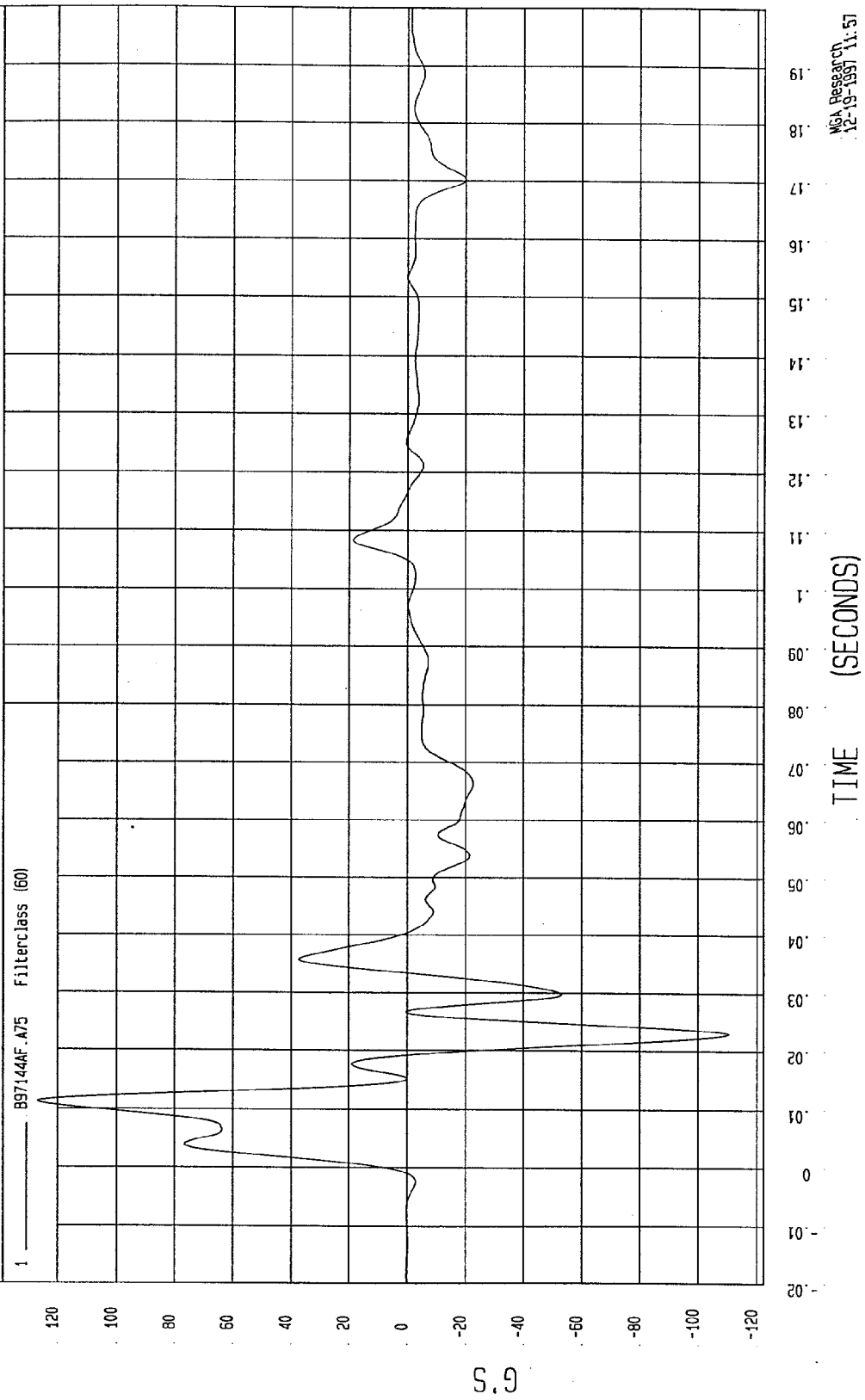
COMPONENT: 1998 TOYOTA AVALON (MW5104)

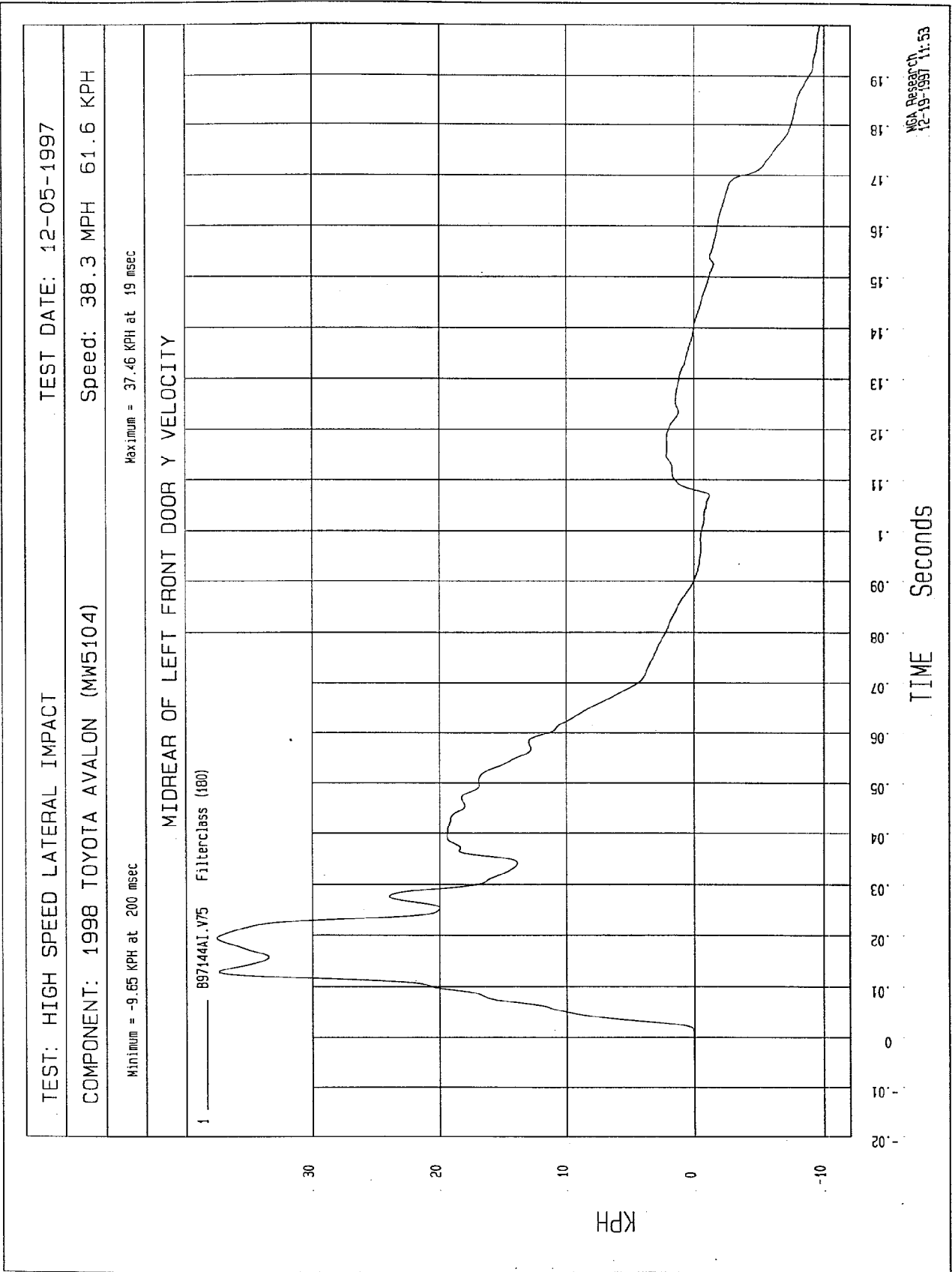
Speed: 38.3 MPH 61.6 KPH

Minimum = -110.34 G'S at 23 msec

Maximum = 126.84 G'S at 11 msec

MIDREAR OF LEFT FRONT DOOR Y ACCELERATION



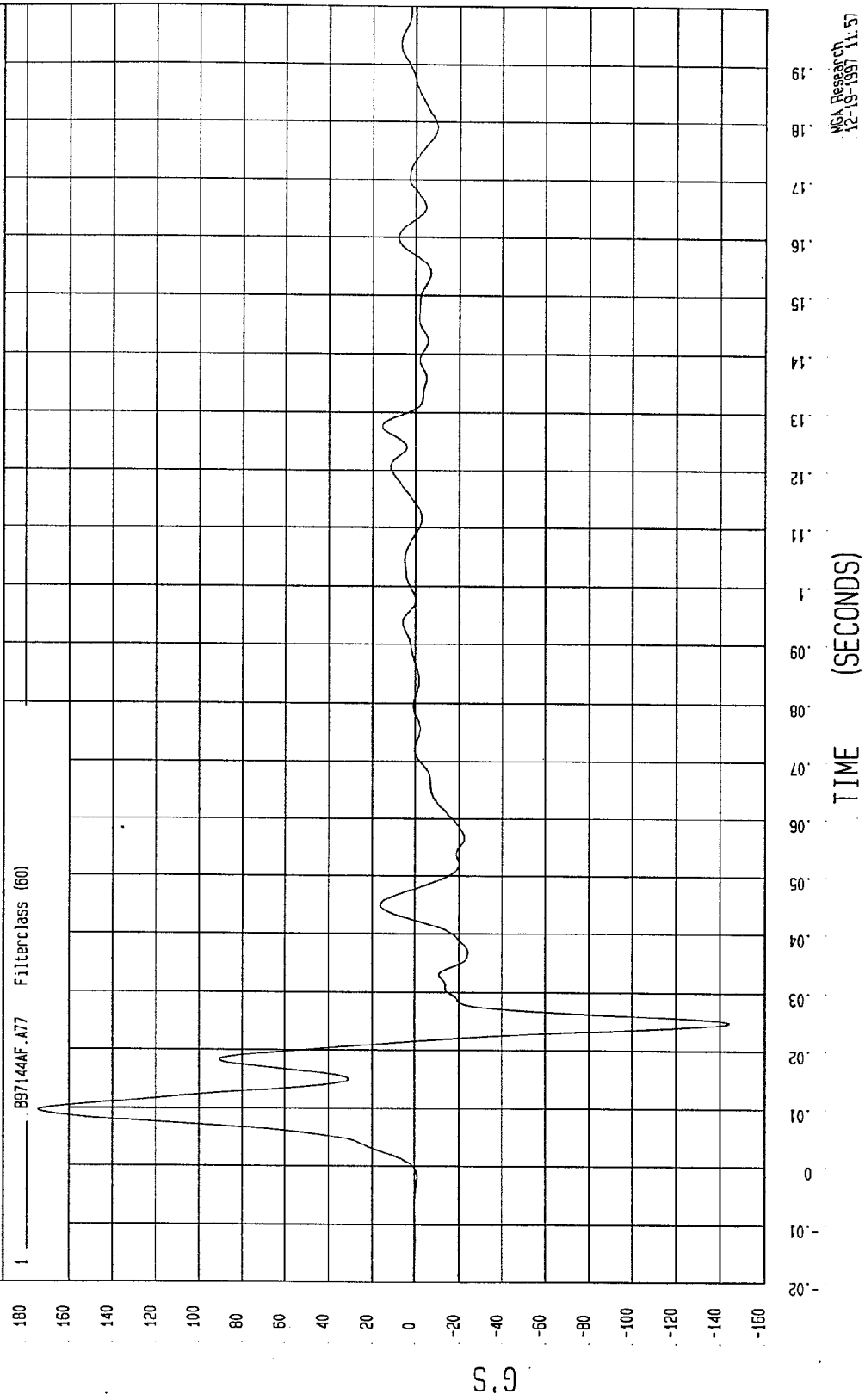


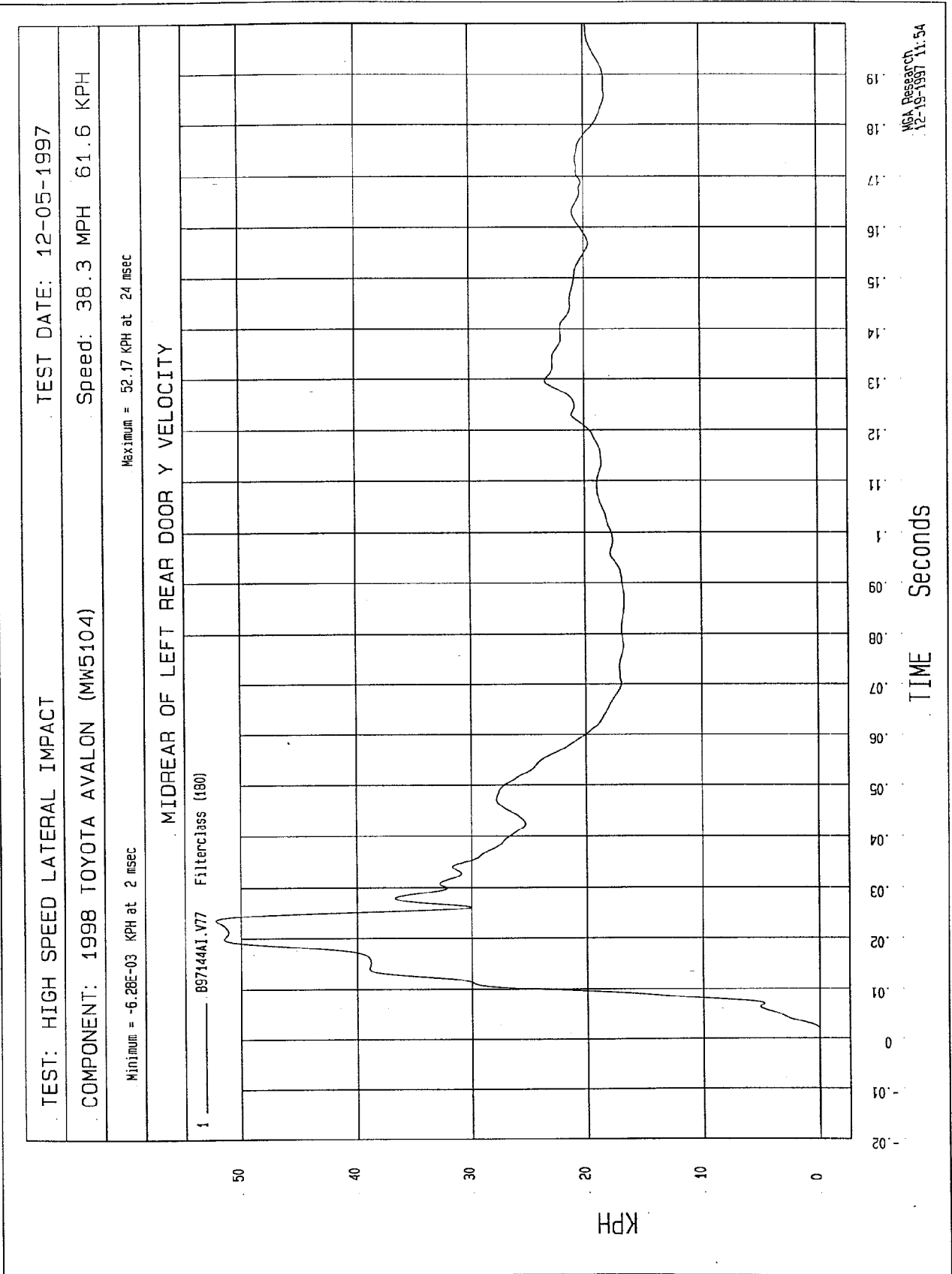
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -144.19 G'S at 25 msec Maximum = 174.14 G'S at 10 msec

MIDREAR OF LEFT REAR DOOR Y ACCELERATION





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

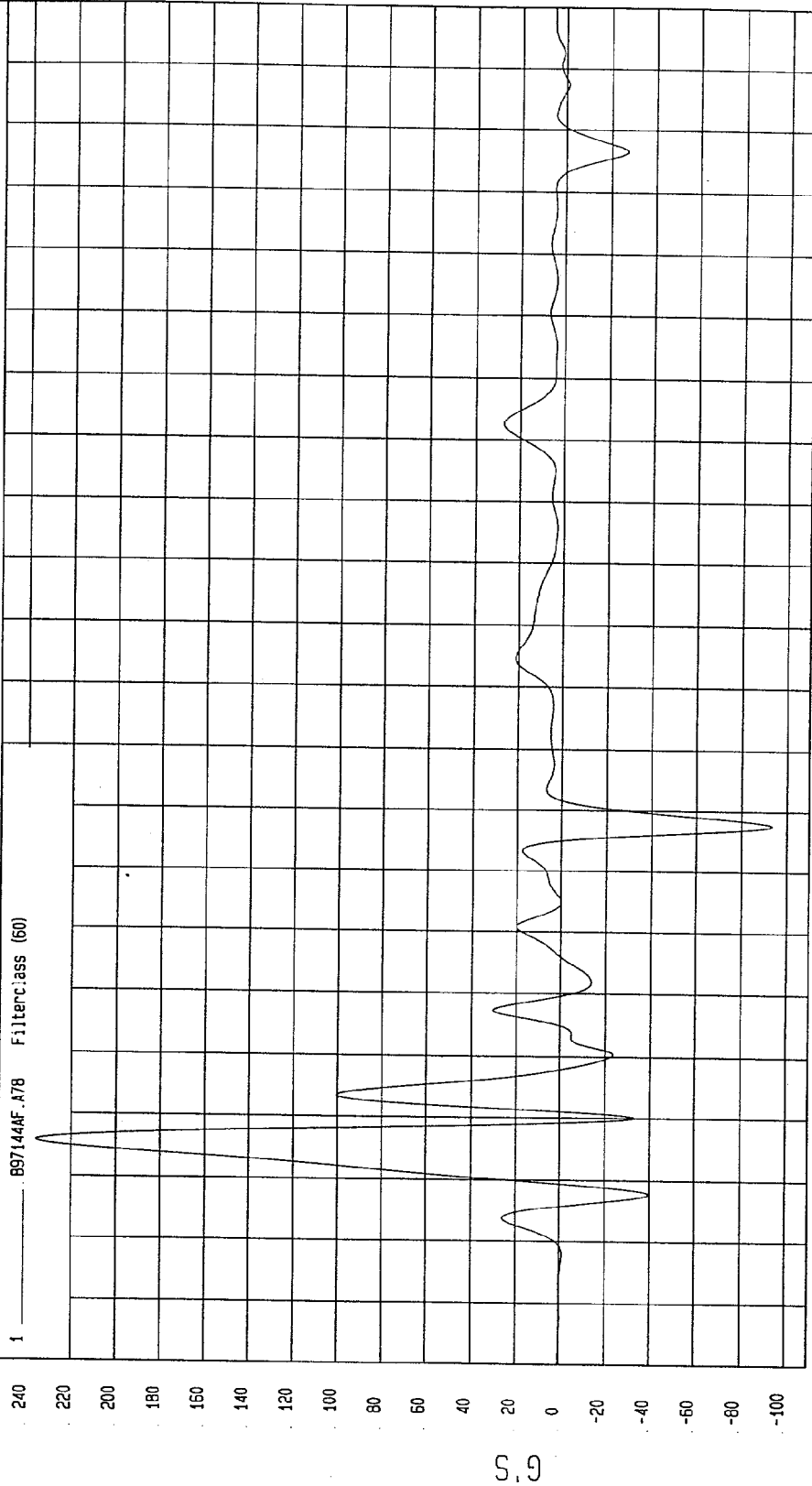
Speed: 38.3 MPH 61.6 KPH

Minimum = -93.47 G'S at 68 msec

Maximum = 236.00 G'S at 16 msec

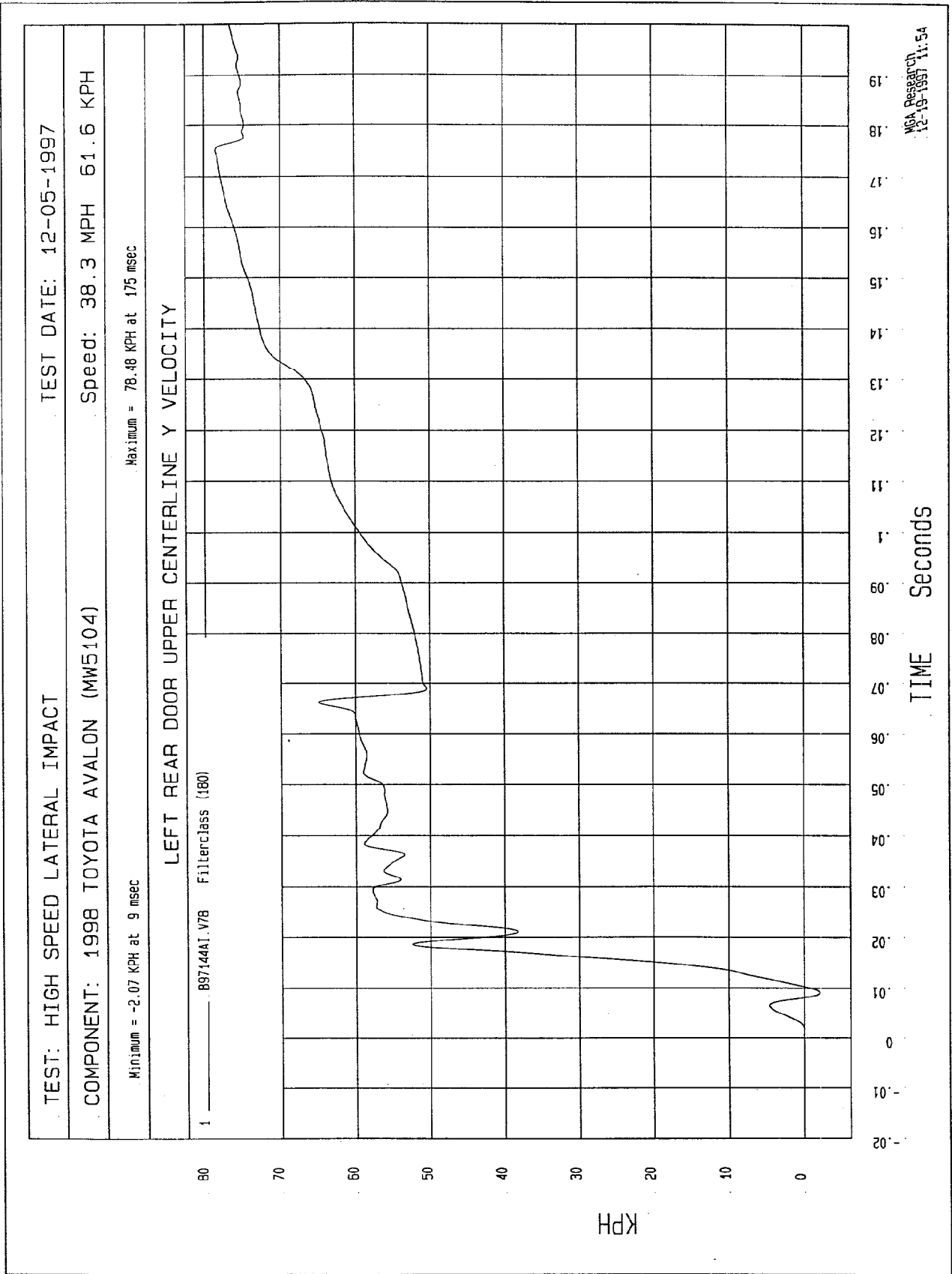
LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION

1 _____ B97144AF.A78 Filter: class (60)



TIME (SECONDS)

NSA Research
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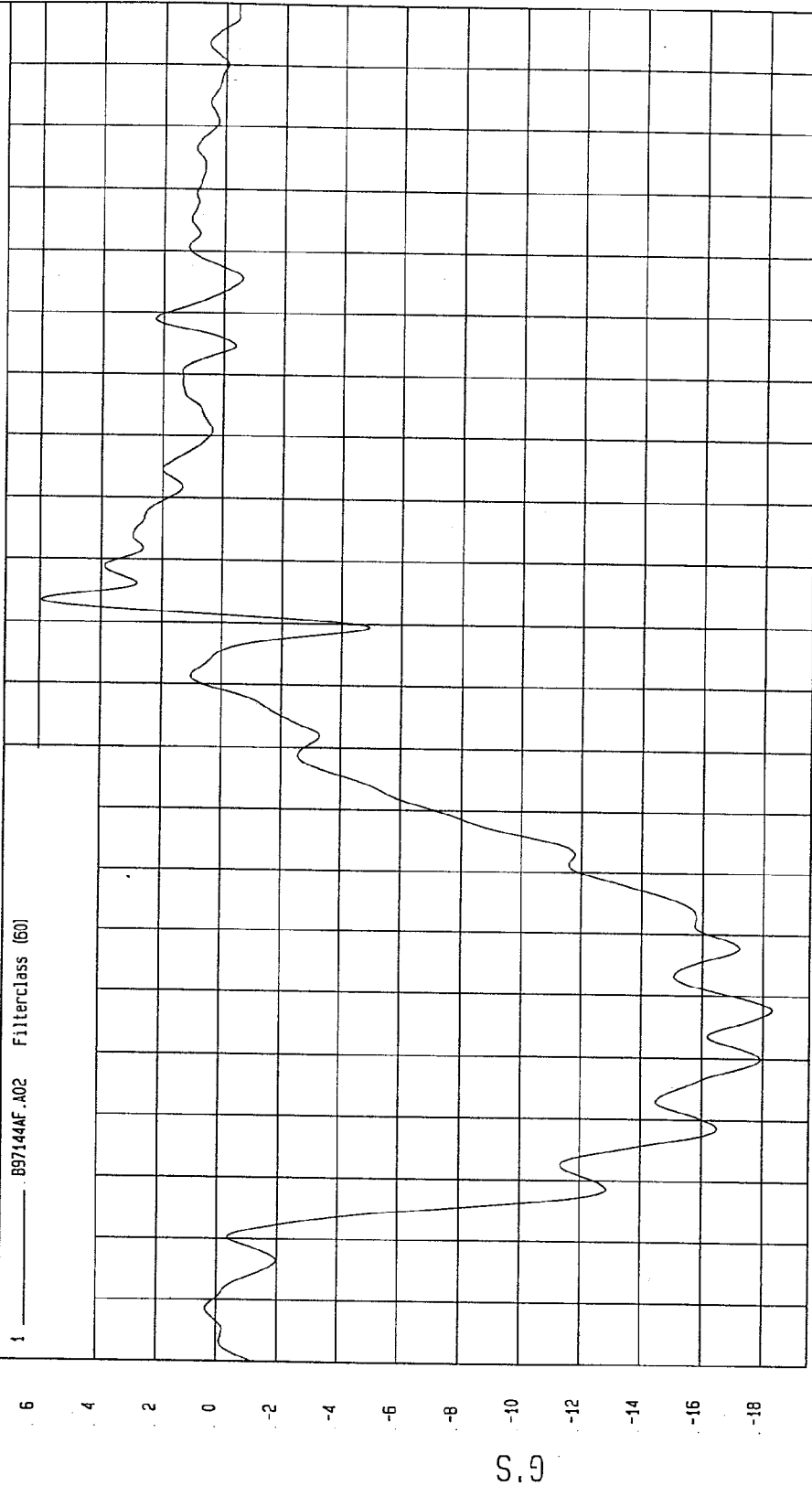
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -18.30 G'S at 38 msec Maximum = 5.93 G'S at 103 msec

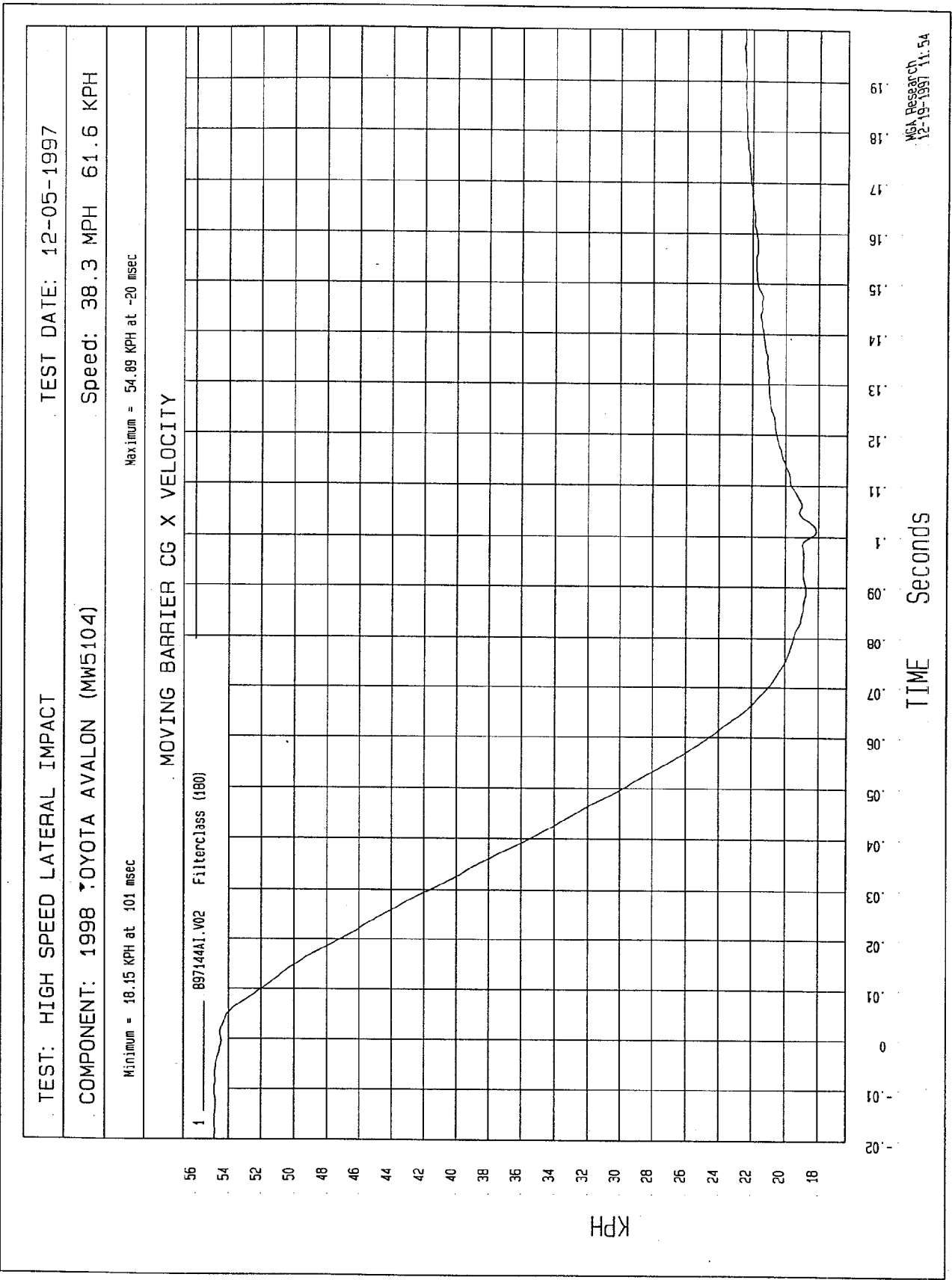
MOVING BARRIER CG X ACCELERATION

1 B97144AF.A02 Filterclass (60)



TIME (SECONDS)

MGA Research
12-19-1997 11:58



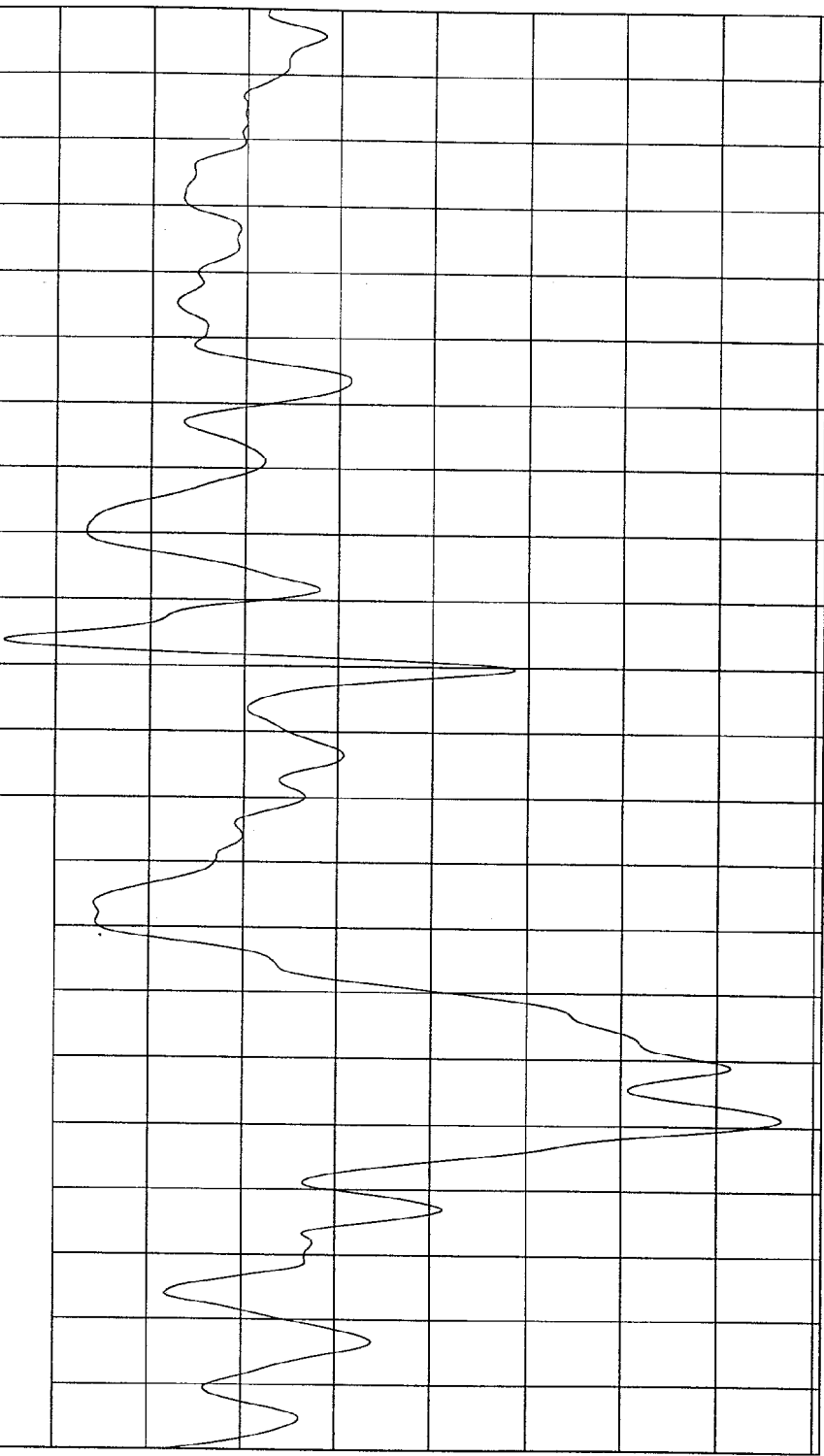
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.67 G'S at 31 msec Maximum = 2.53 G'S at 104 msec

MOVING BARRIER CG Y ACCELERATION

1 B97144AF.A03 Filterclass (60)



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TIME (SECONDS)

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-0.01
-0.02

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TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

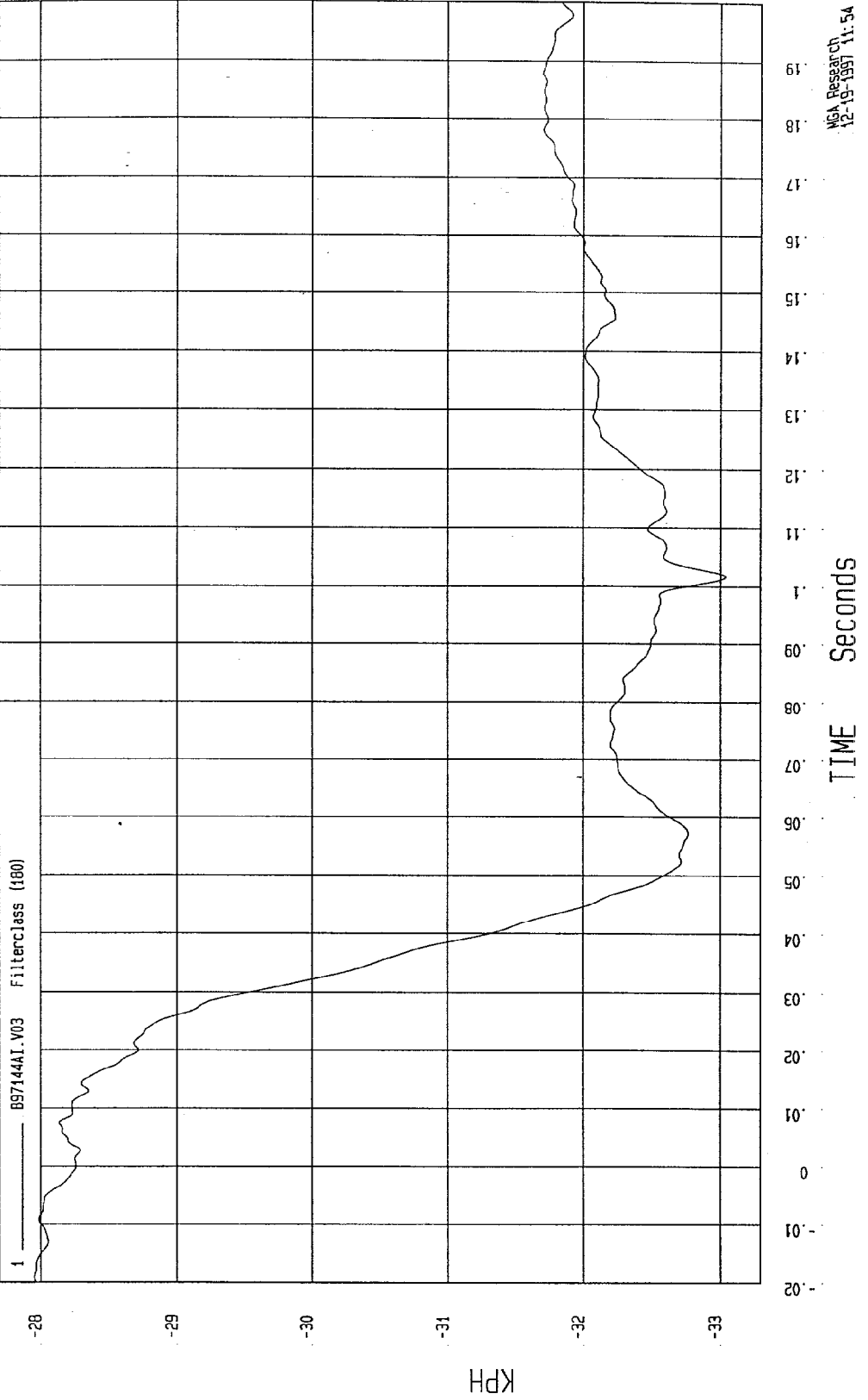
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = -27.95 KPH at -19 msec

Minimum = -33.03 KPH at 102 msec

MOVING BARRIER CG Y VELOCITY



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

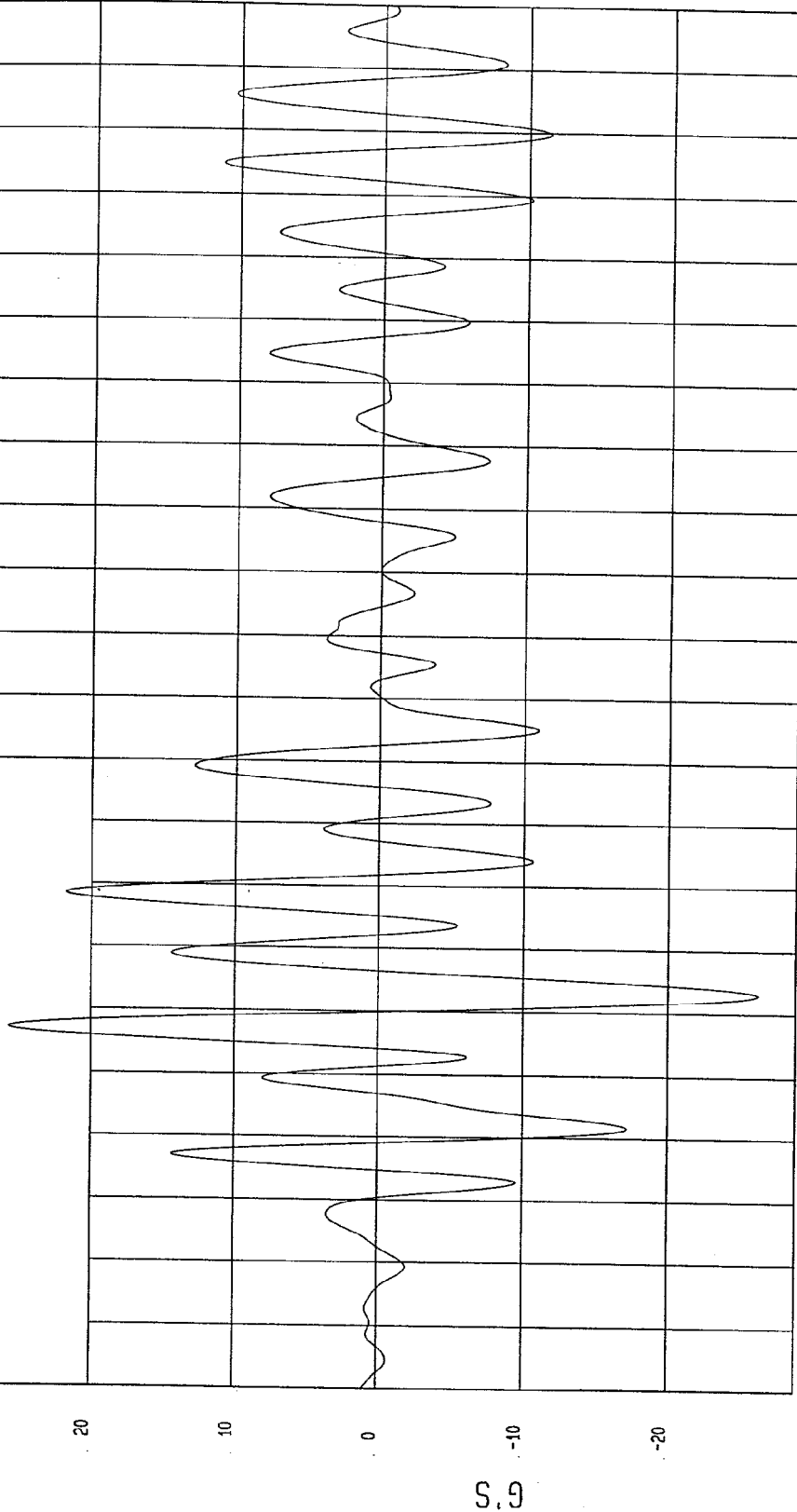
Speed: 38.3 MPH 61.6 KPH

Minimum = -26.13 G'S at 43 msec

Maximum = 25.68 G'S at 37 msec

MOVING BARRIER CG Z ACCELERATION

1 ——— .B97144AF.A04 Filterclass (60)



TIME (SECONDS)

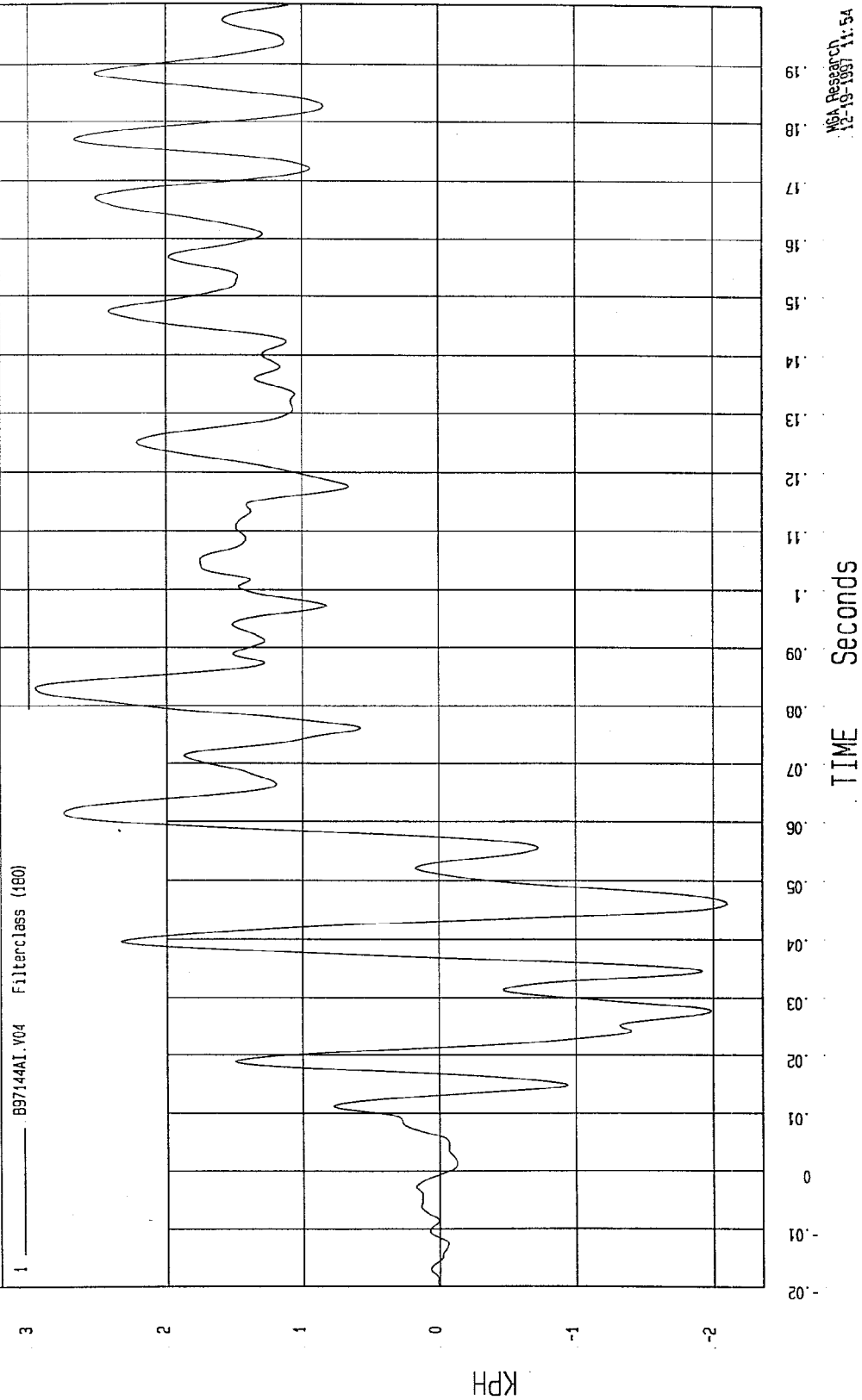
MGA Research
12-19-1997 11:58

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.09 KPH at 46 msec Maximum = 2.95 KPH at 83 msec

MOVING BARRIER CG Z VELOCITY

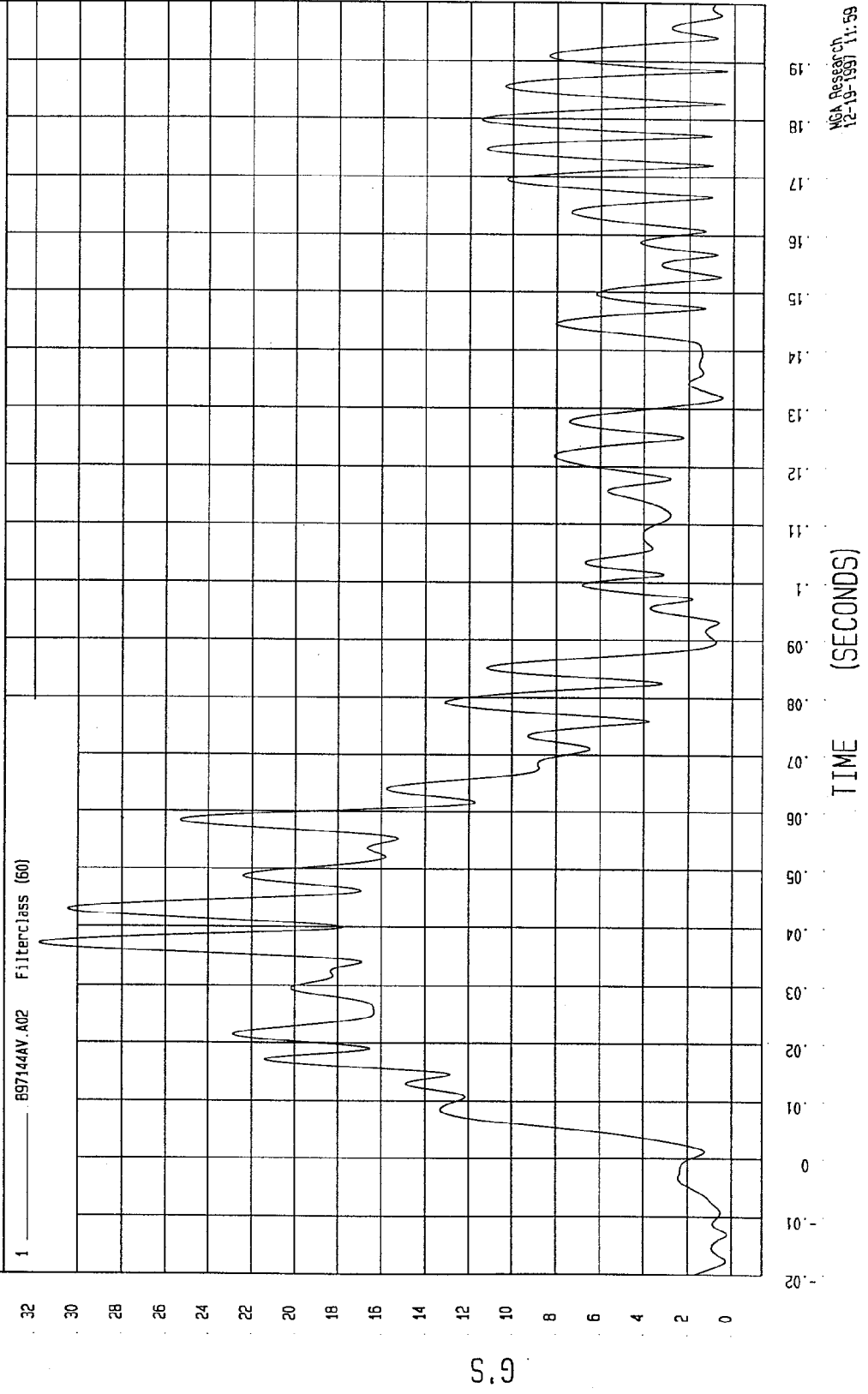


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = .19 G'S at -13 msec Maximum = 31.75 G'S at 37 msec

MOVING BARRIER CG RESULTANT ACCELERATION



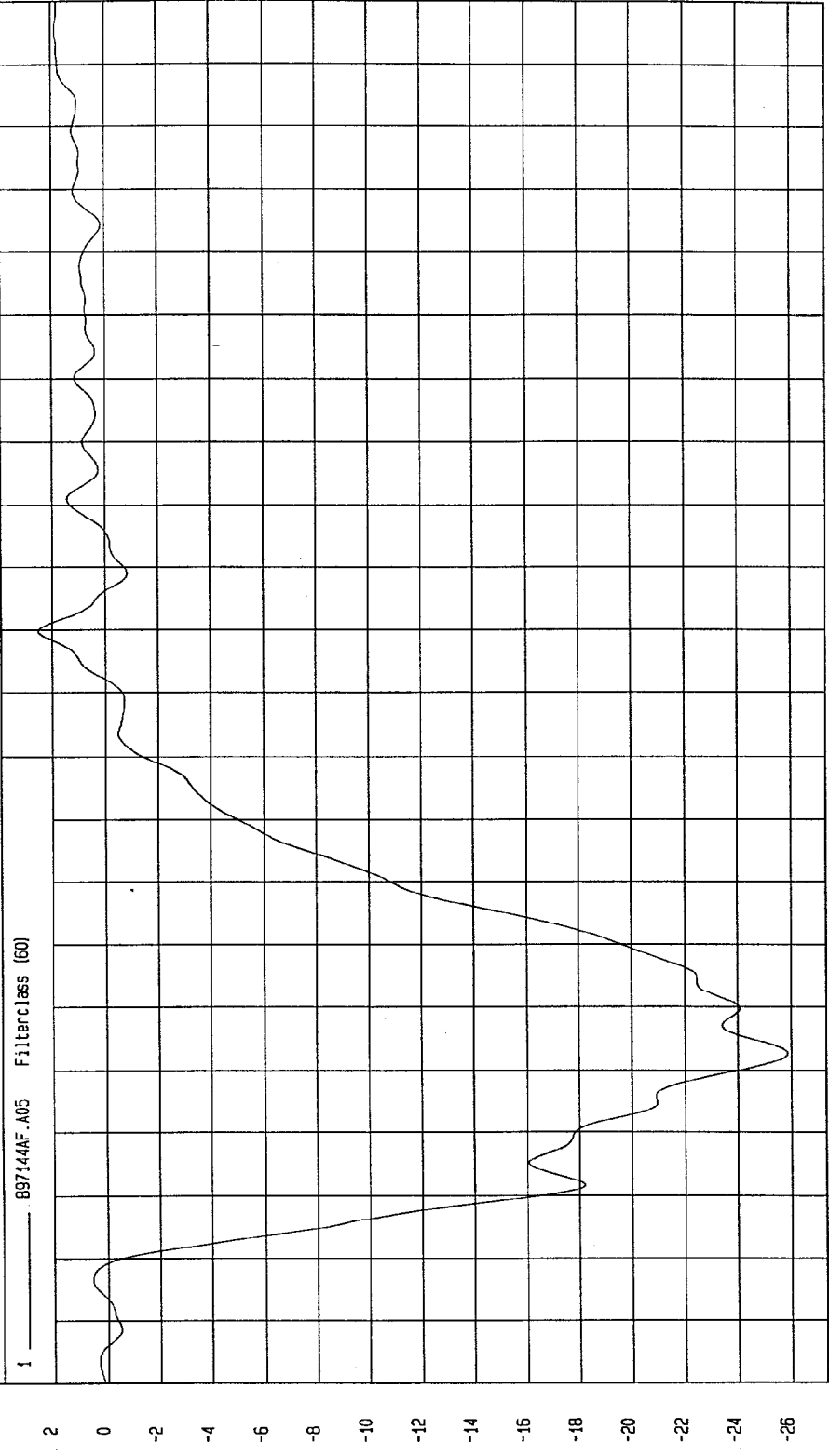
MCA Research
12-19-1997 11:59

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -25.97 G'S at 33 msec Maximum = 2.51 G'S at 100 msec

MOVING BARRIER REAR AXLE X ACCELERATION



TIME (SECONDS)

19 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 -10 -20

NGA Research
12-19-1997 11:58

S.9

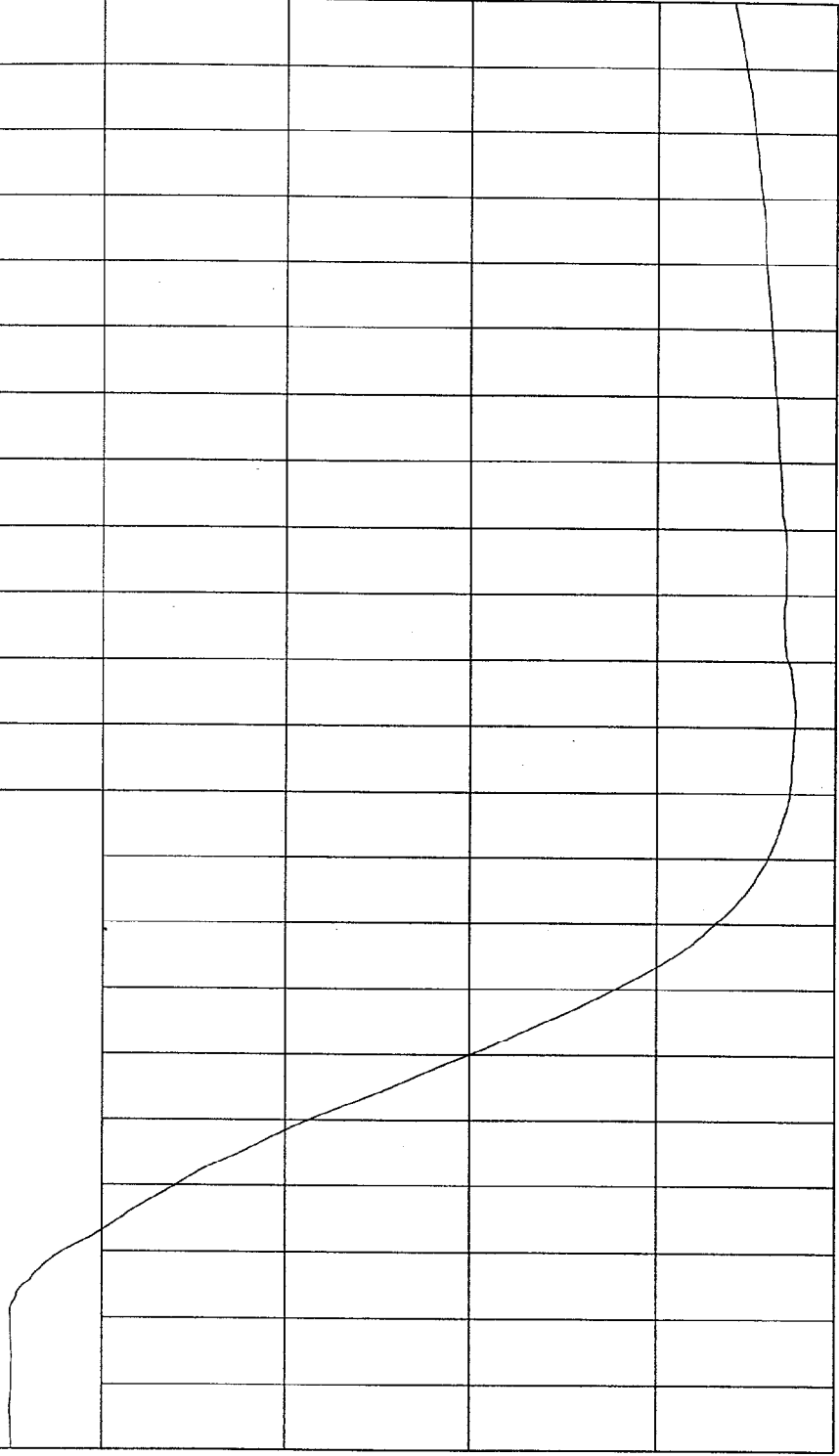
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = 12.65 KPH at 92 msec Maximum = 54.95 KPH at -14 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 ——— 897144A1.V05 Filterclass (180)

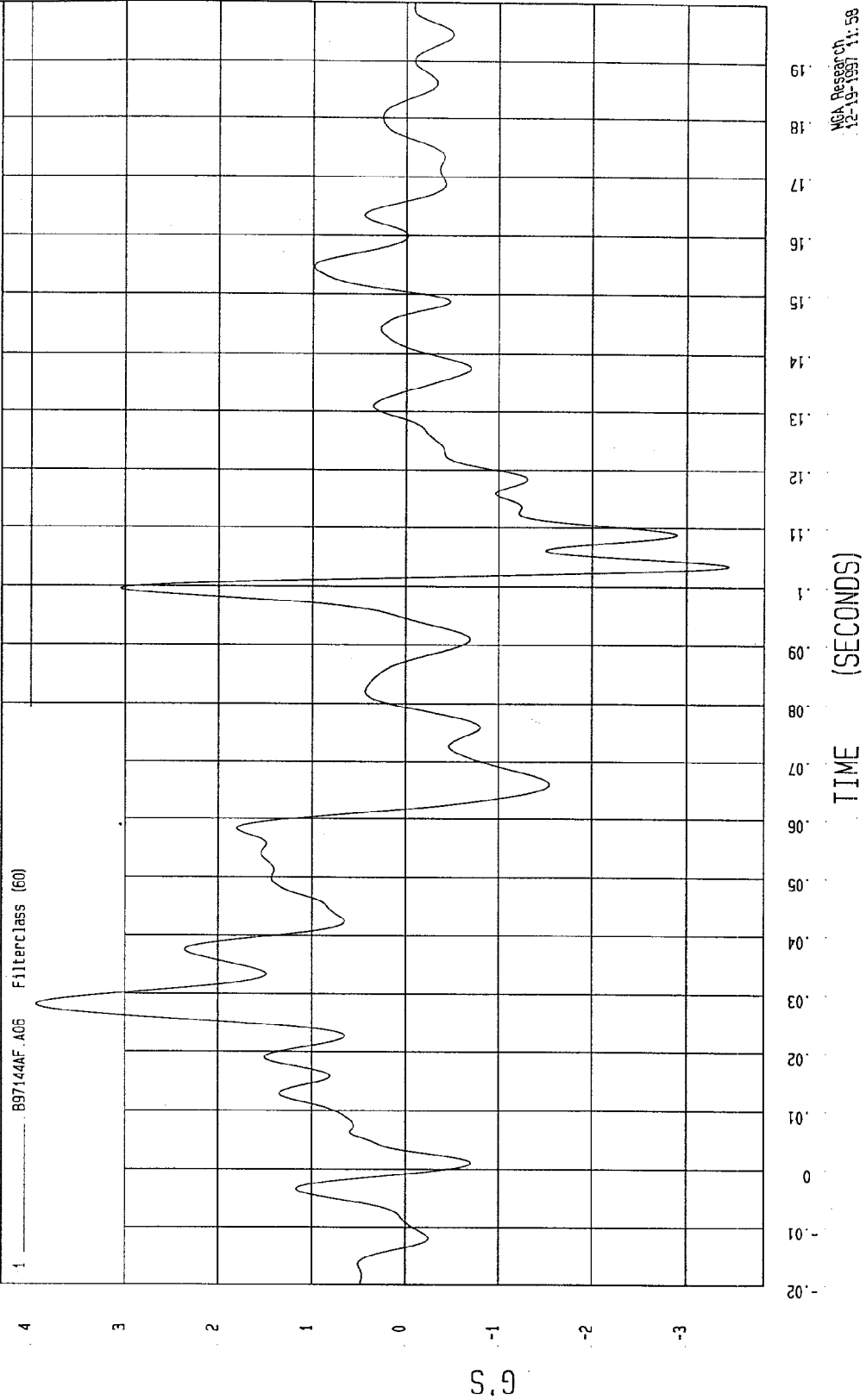


TIME Seconds

NGA Research
12-19-1997 11:54

TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -3.44 G'S at 104 msec	
Maximum = 3.94 G'S at 28 msec	

MOVING BARRIER REAR AXLE Y ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

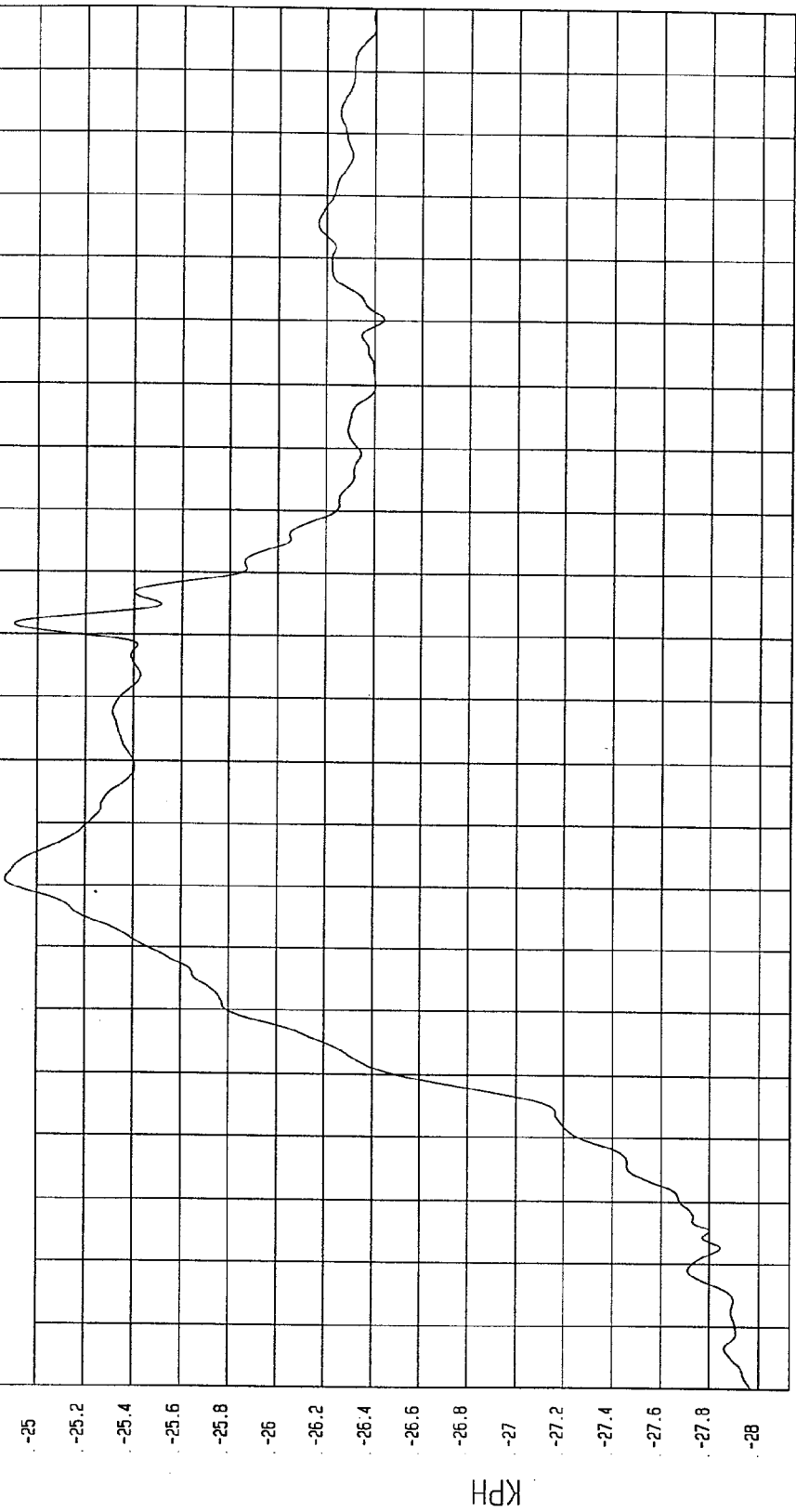
Speed: 38.3 MPH 61.6 KPH

Minimum = -27.97 KPH at -20 msec

Maximum = -24.87 KPH at 61 msec

MOVING BARRIER REAR AXLE Y VELOCITY

1 B97144AI.V06 Filterclass (180)

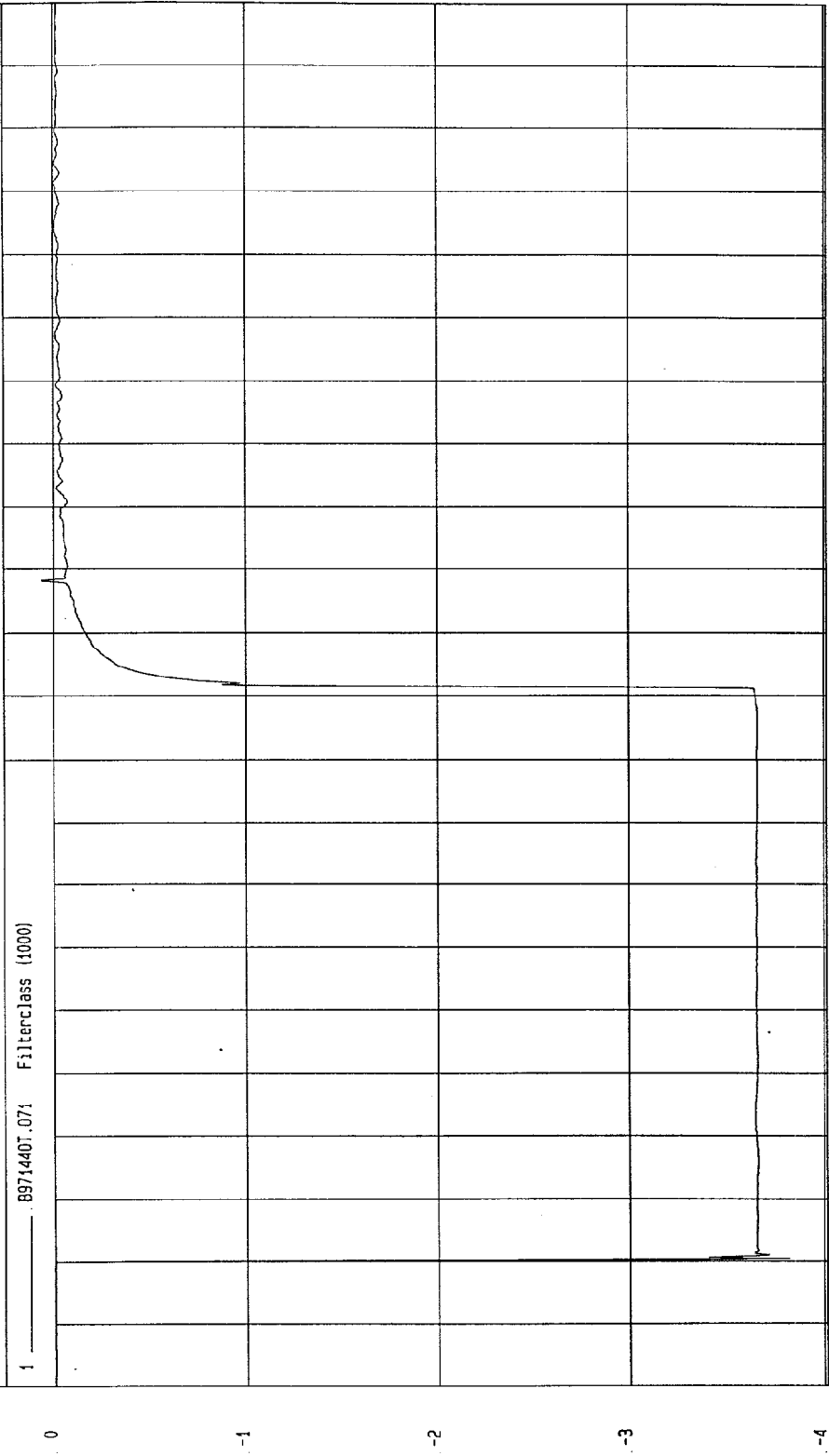


MCA Research
12-19-1997 11:54

TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -3.81 VOLTS at 0 msec	Maximum = 6.18E-02 VOLTS at 108 msec

LEFT BARRIER CONTACT



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

NGA Research
12-15-1997 11:58

VOLTS

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Speed: 38.3 MPH 61.6 KPH

Minimum = -4.07 VOLTS at 6 msec

Maximum = .15 VOLTS at 108 msec

RIGHT BARRIER CONTACT

1 ——— .8971440T.072 Filterclass (1000)

0

-1

-2

-3

-4

VOLTS

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

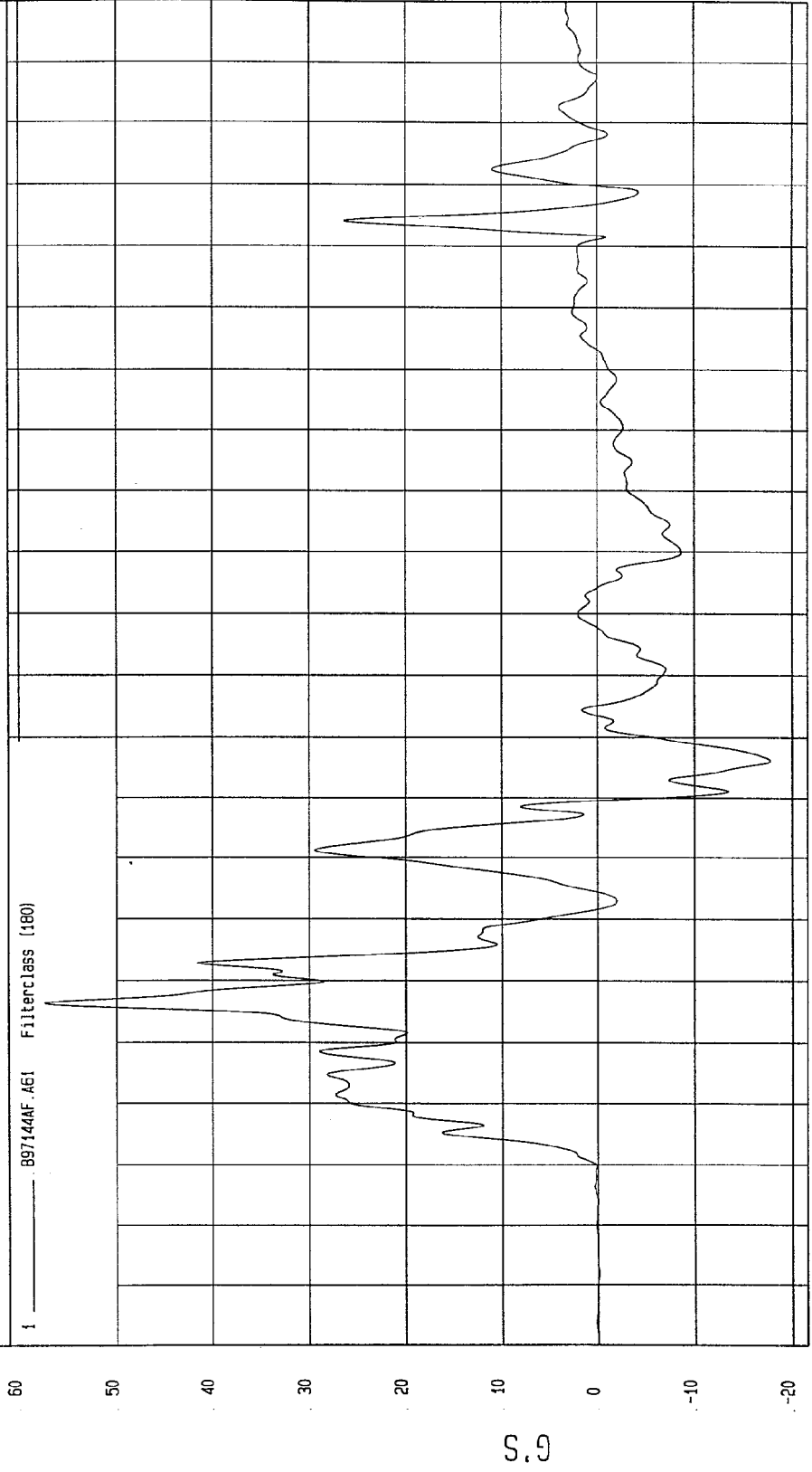
MGA Research
12-19-1997 11:58

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -17.76 G'S at 76 msec Maximum = 57.34 G'S at 35 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TIME (SECONDS)

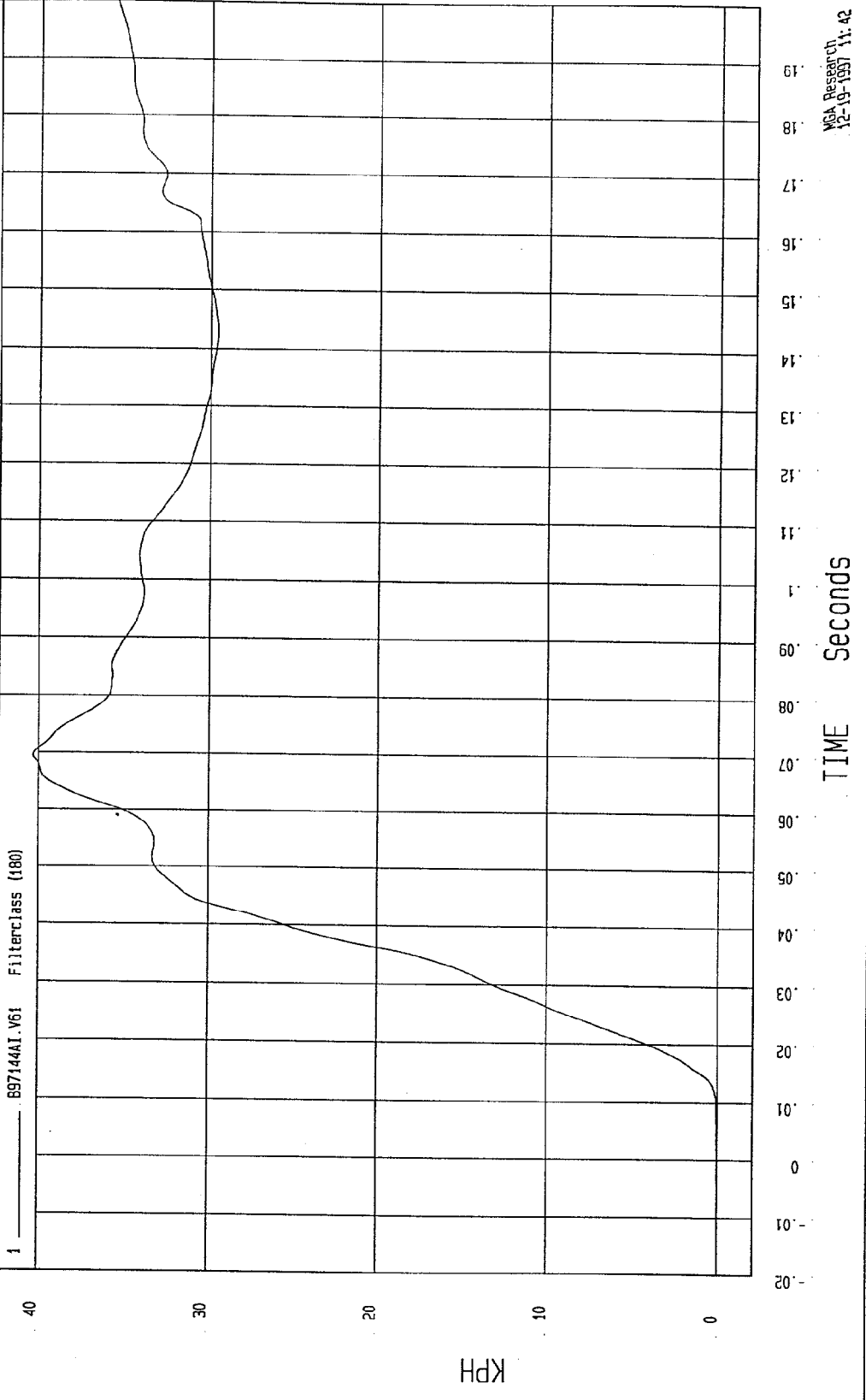
MCA Research
12-19-1997 10:40

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

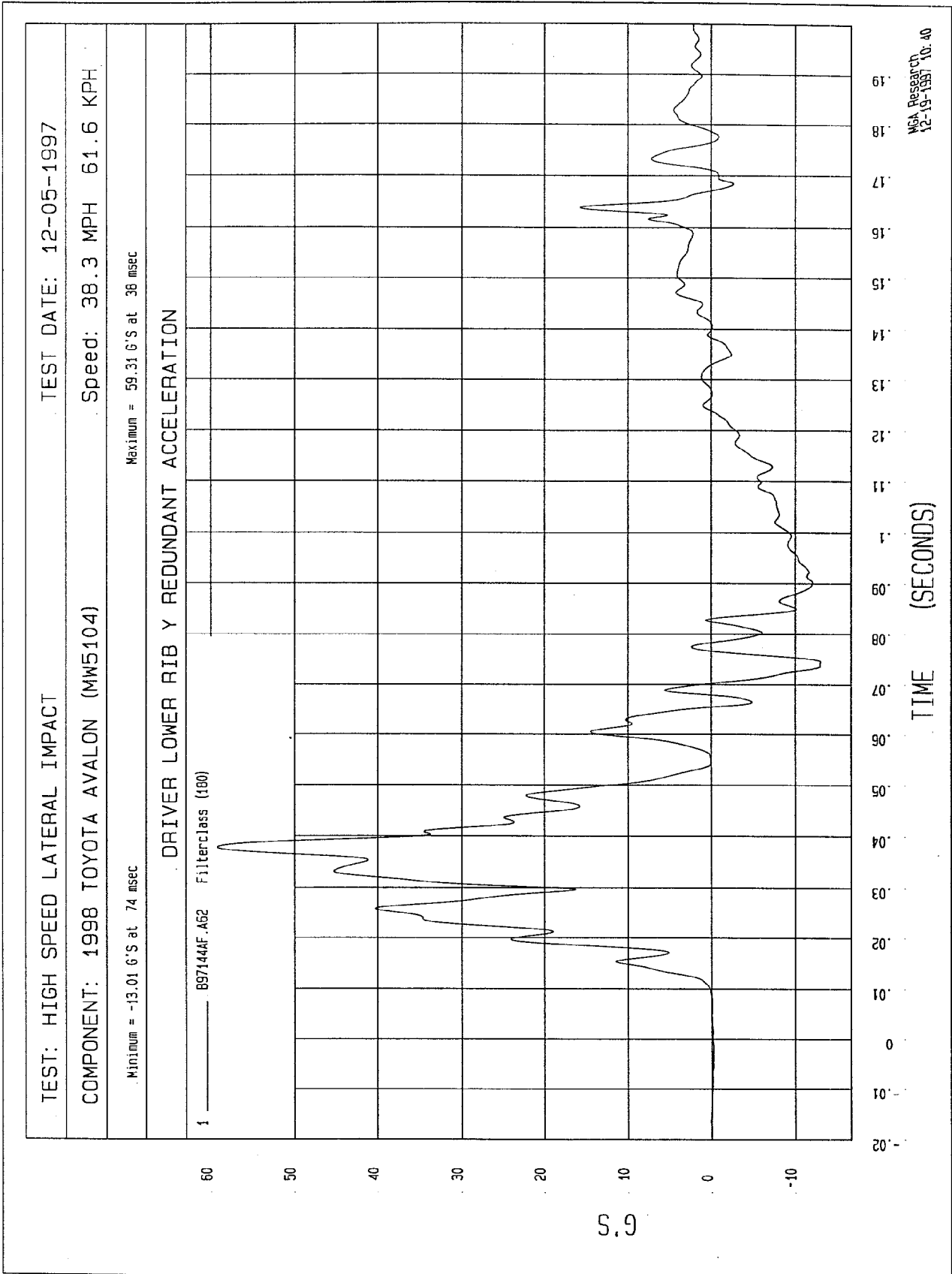
COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.94E-04 KPH at -19 msec Maximum = 40.30 KPH at 70 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY



WGA Research
12-19-1997 11:42

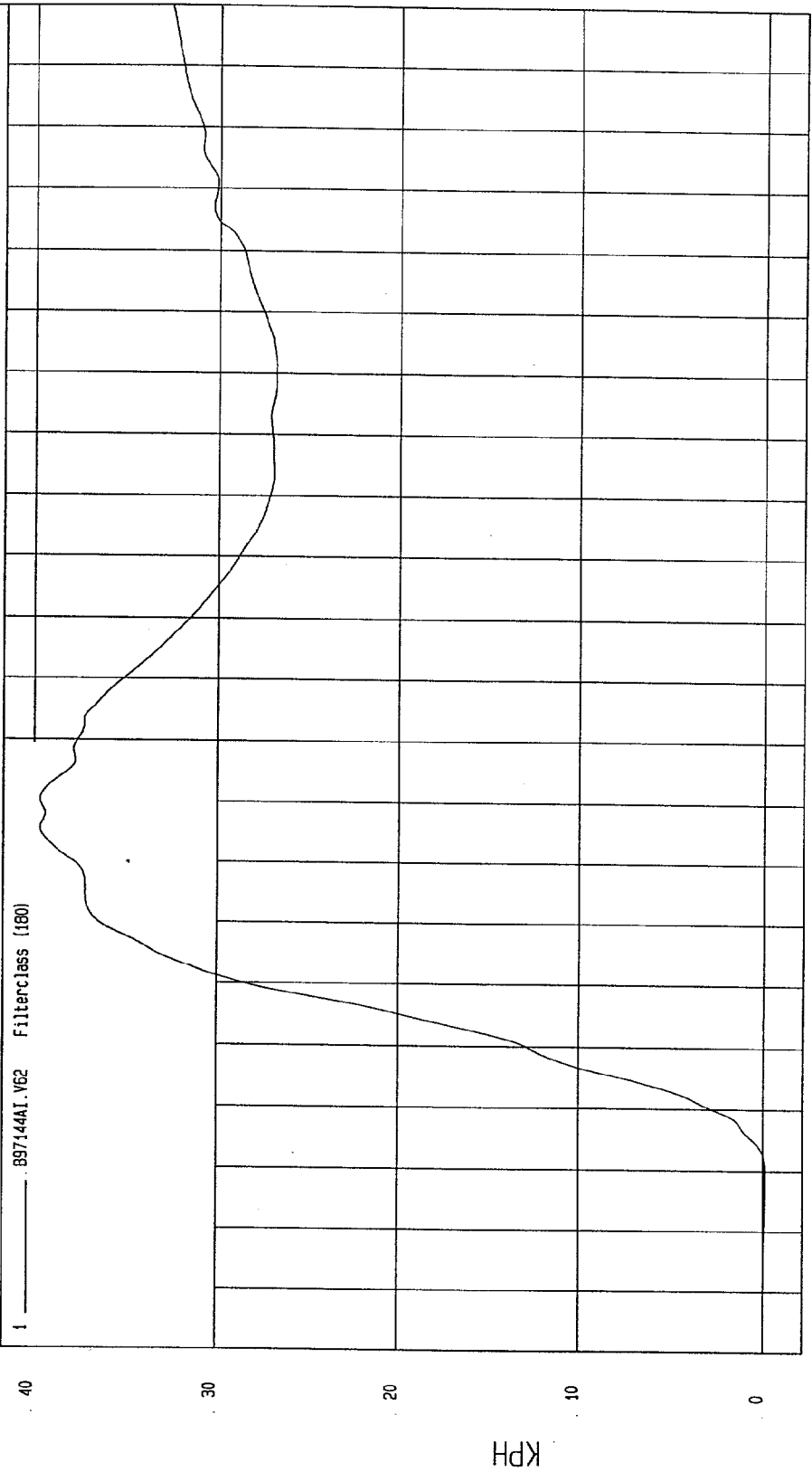


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.72E-02 KPH at 9 msec Maximum = 39.69 KPH at 56 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY



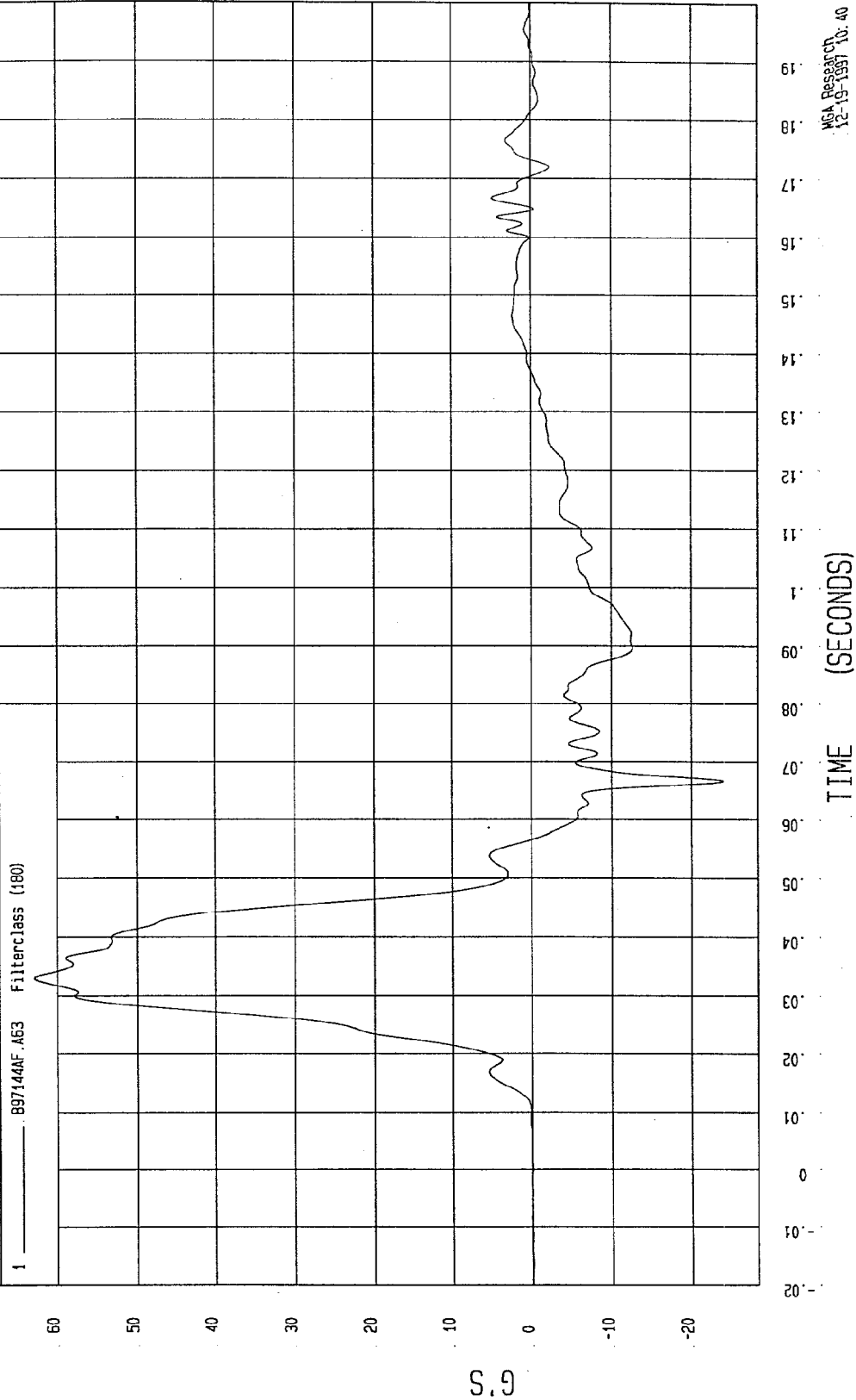
TIME Seconds

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

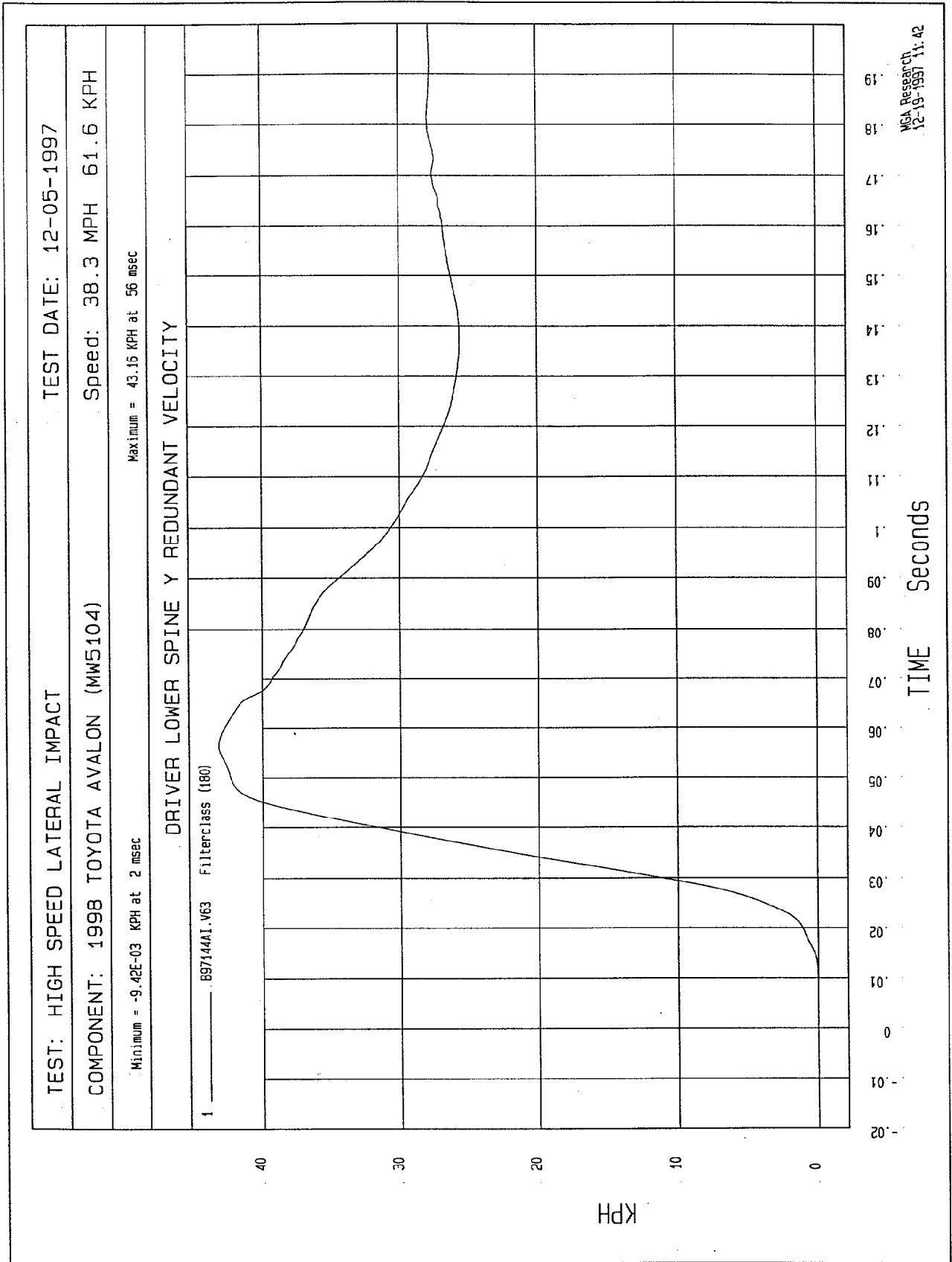
MGA Research
12-19-1997 11:42

TEST: HIGH SPEED LATERAL IMPACT	TEST DATE: 12-05-1997
COMPONENT: 1998 TOYOTA AVALON (MW5104)	Speed: 38.3 MPH 61.6 KPH
Minimum = -23.99 G's at 67 msec	Maximum = 62.89 G's at 33 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION



NSA Research
12-19-1997 10: 40



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

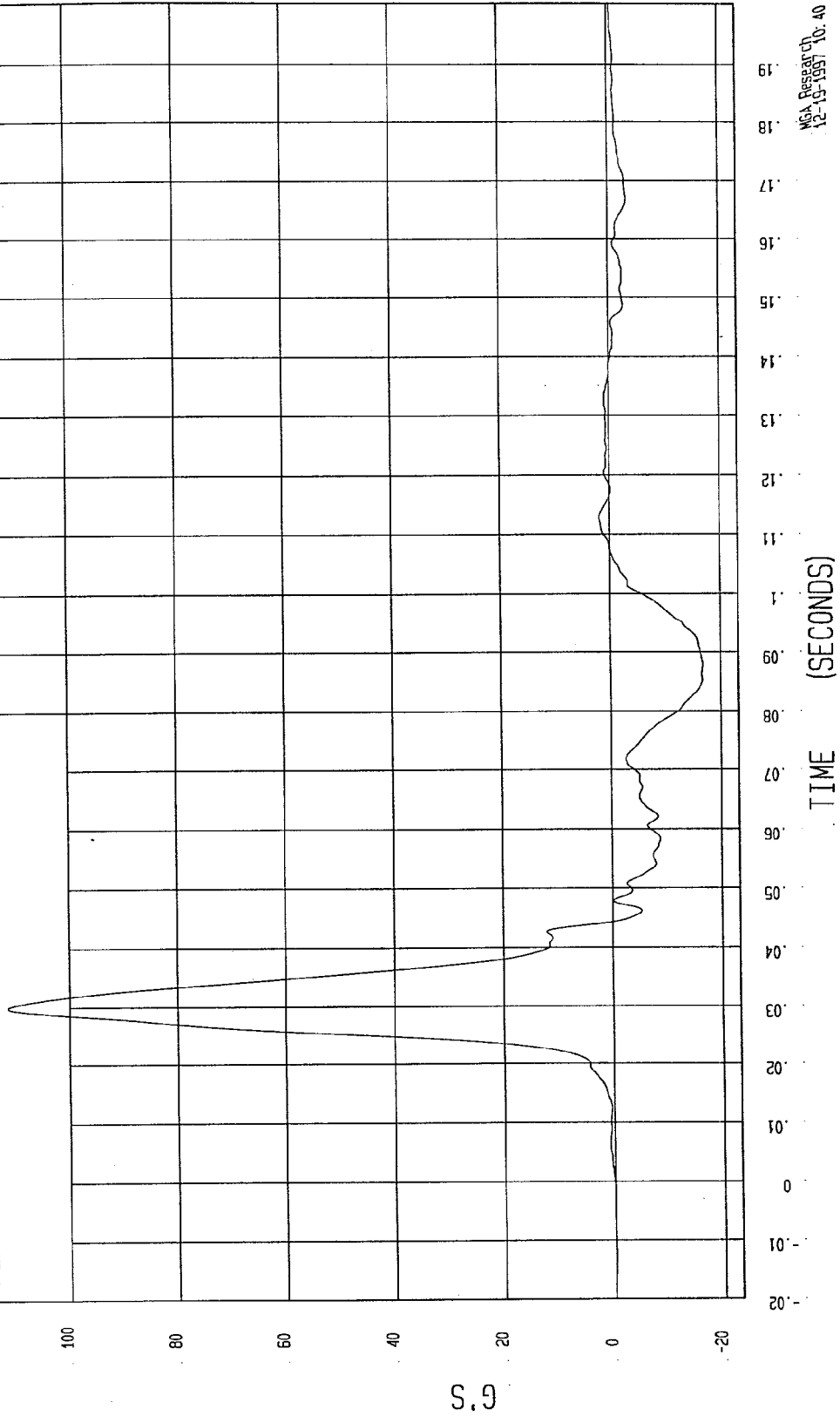
Speed: 38.3 MPH 61.6 KPH

Minimum = -16.76 G'S at 88 msec

Maximum = 111.26 G'S at 30 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

1 B97144AF.A65 Filterclass (180)



WCA Research
12-15-1997 10:40

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

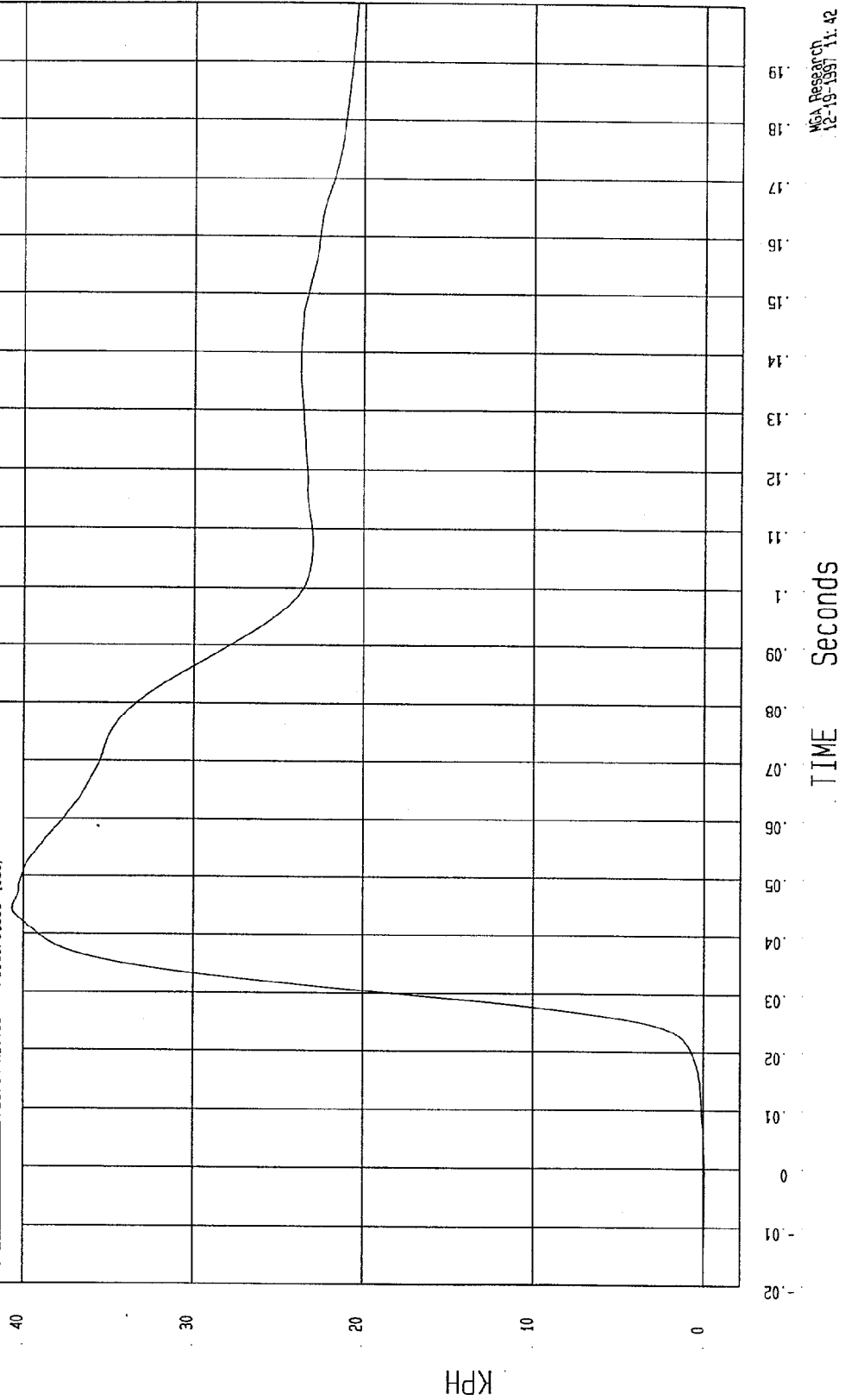
Speed: 38.3 MPH 61.6 KPH

Minimum = -.04 KPH at -1 msec

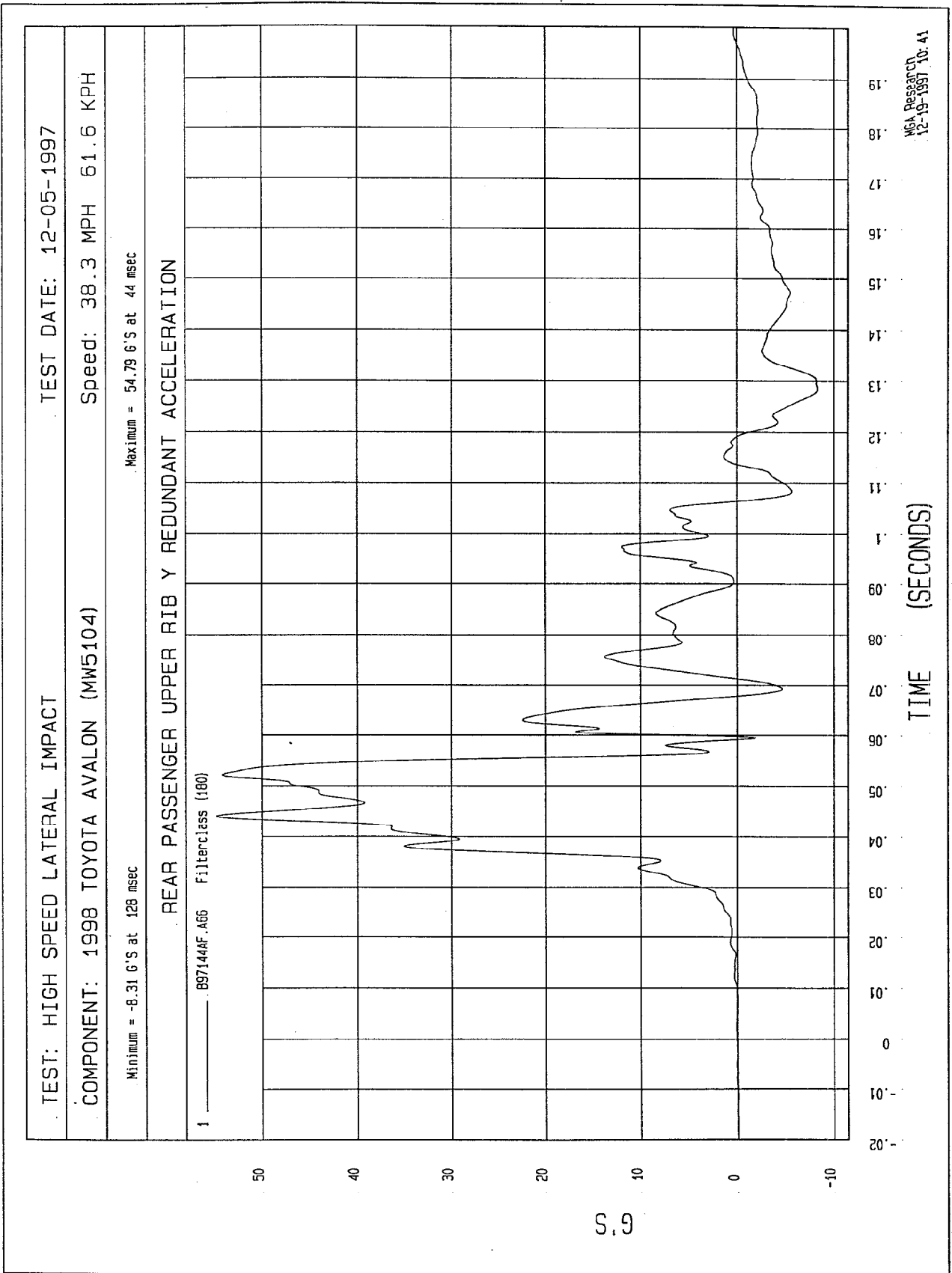
Maximum = 40.56 KPH at 44 msec

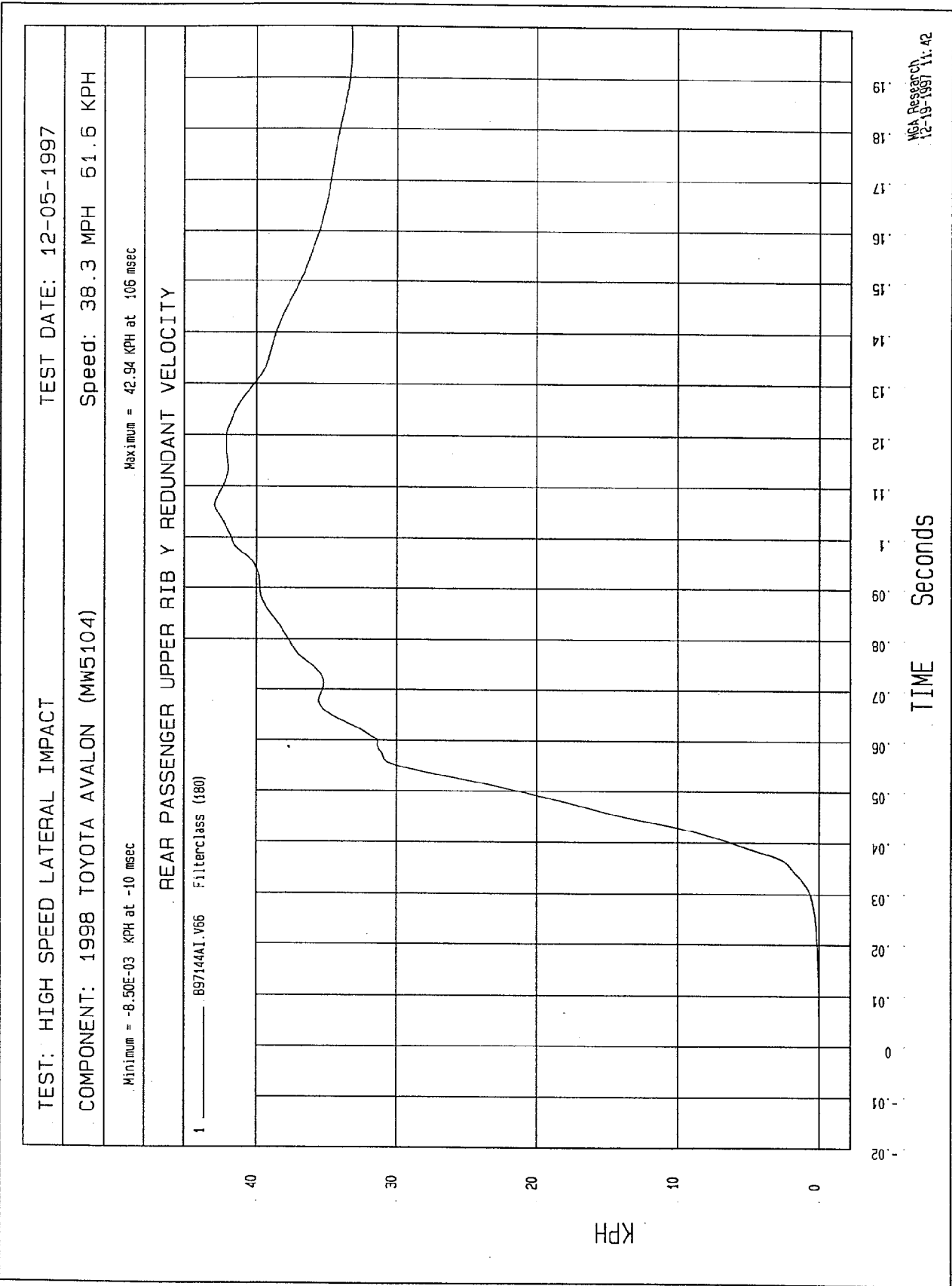
DRIVER PELVIS Y REDUNDANT VELOCITY

1 ——— .B97144A1.V65 Filterclass (180)



NCA Research
12-19-1997 11:42





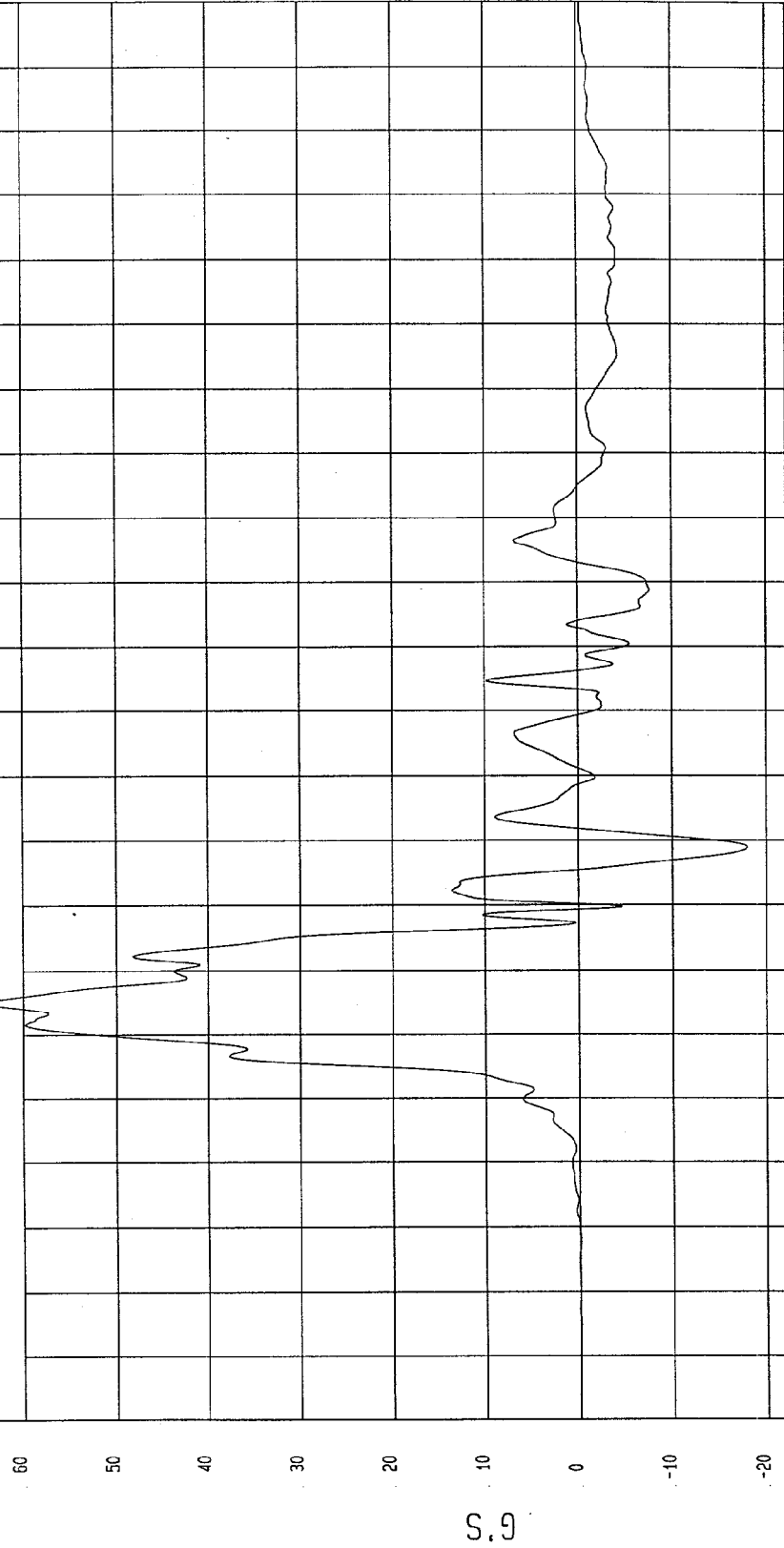
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -17.98 G'S at 69 msec Maximum = 64.37 G'S at 45 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 B97144AF.A57 Filterclass (180)



NCA Research
12-19-1997 10:41

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 39.50 KPH at 66 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY

1 _____ B97144I.V67 FilterClass (180)



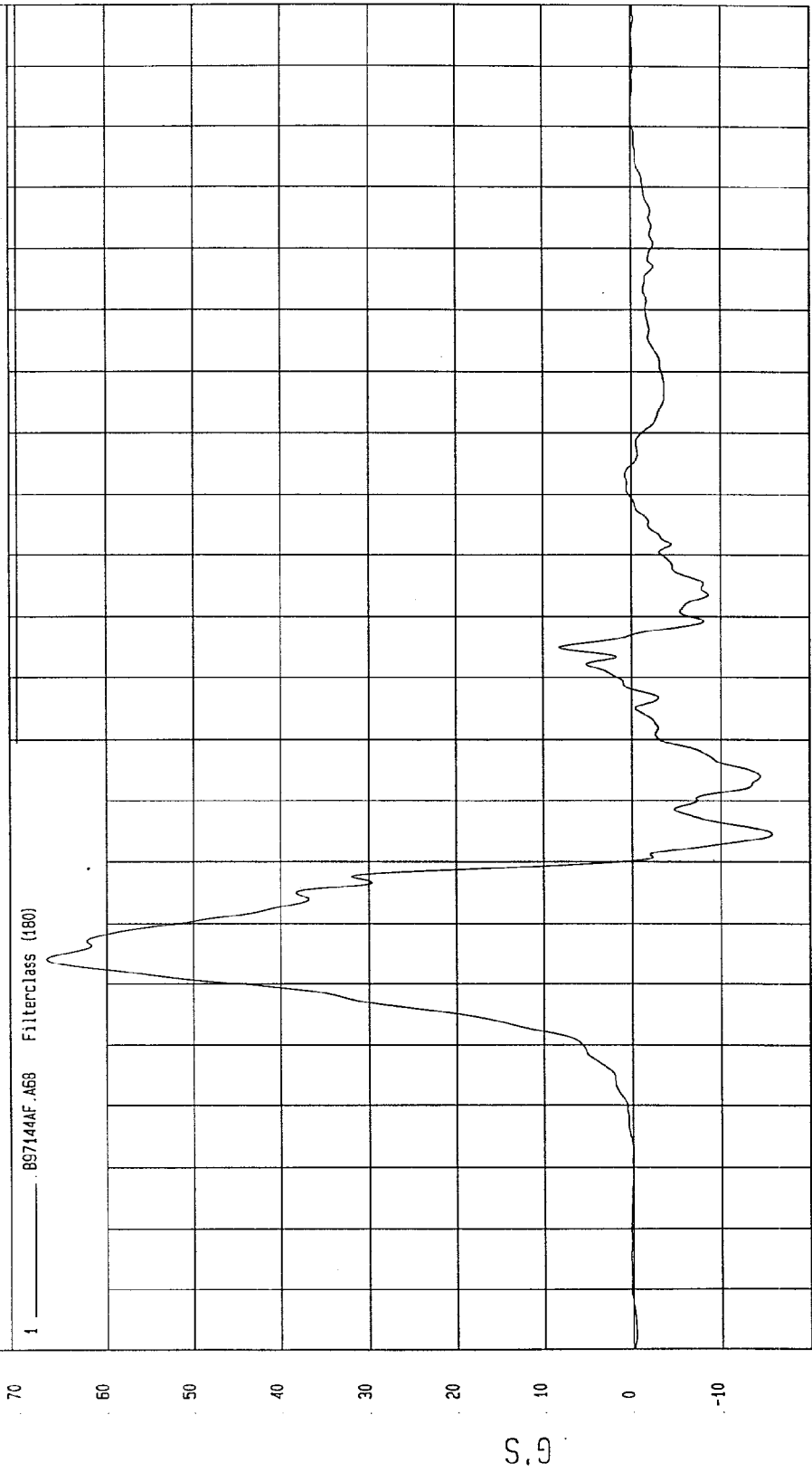
MSA Research
12-19-1997 11:43

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -15.70 G'S at 65 msec Maximum = 55.72 G'S at 44 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



TIME (SECONDS)

NCA Research
12-19-1997 10: 41

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

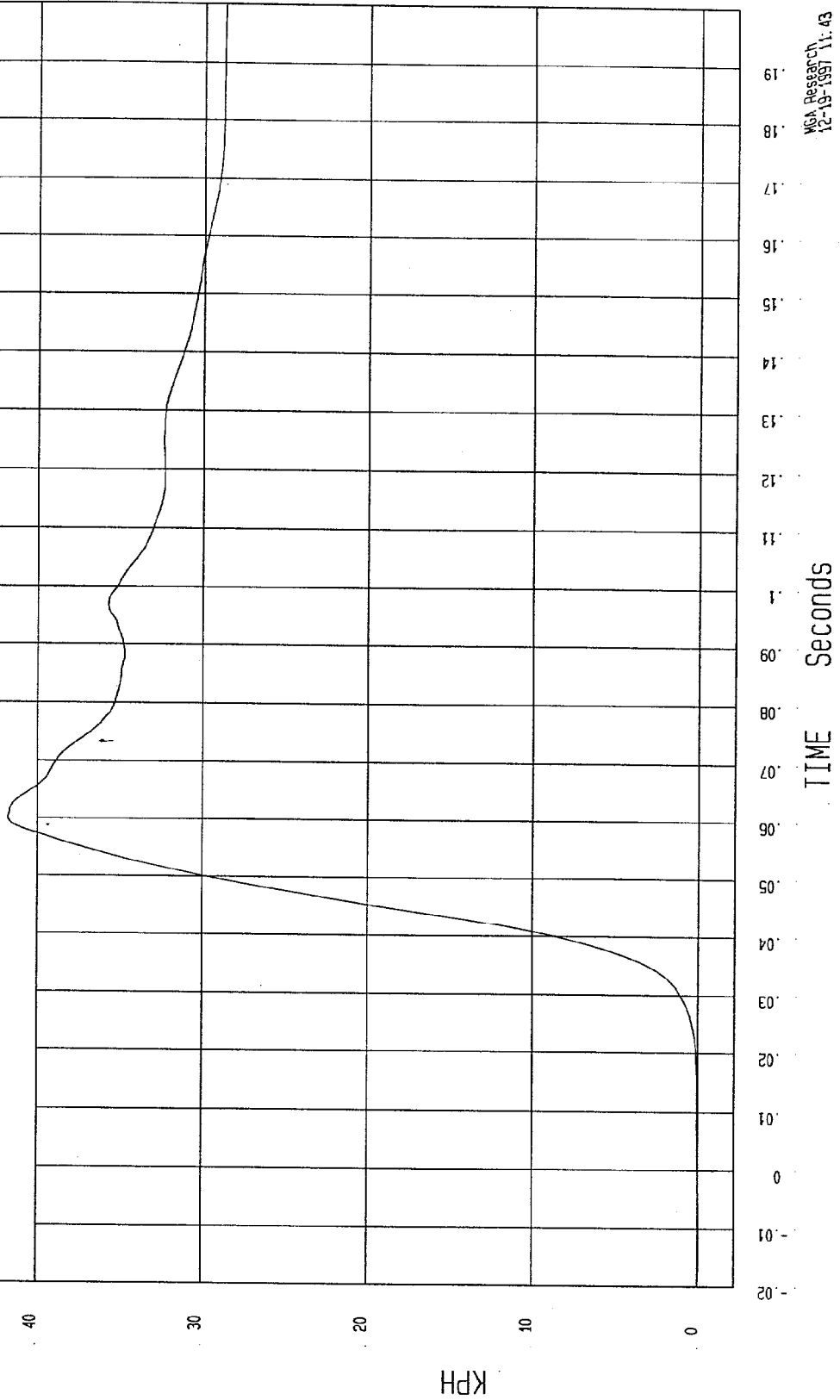
Speed: 38.3 MPH 61.6 KPH

Minimum = -6.45E-02 KPH at -12 msec

Maximum = 41.76 KPH at 50 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 997144A1.V58 Filterclass (480)



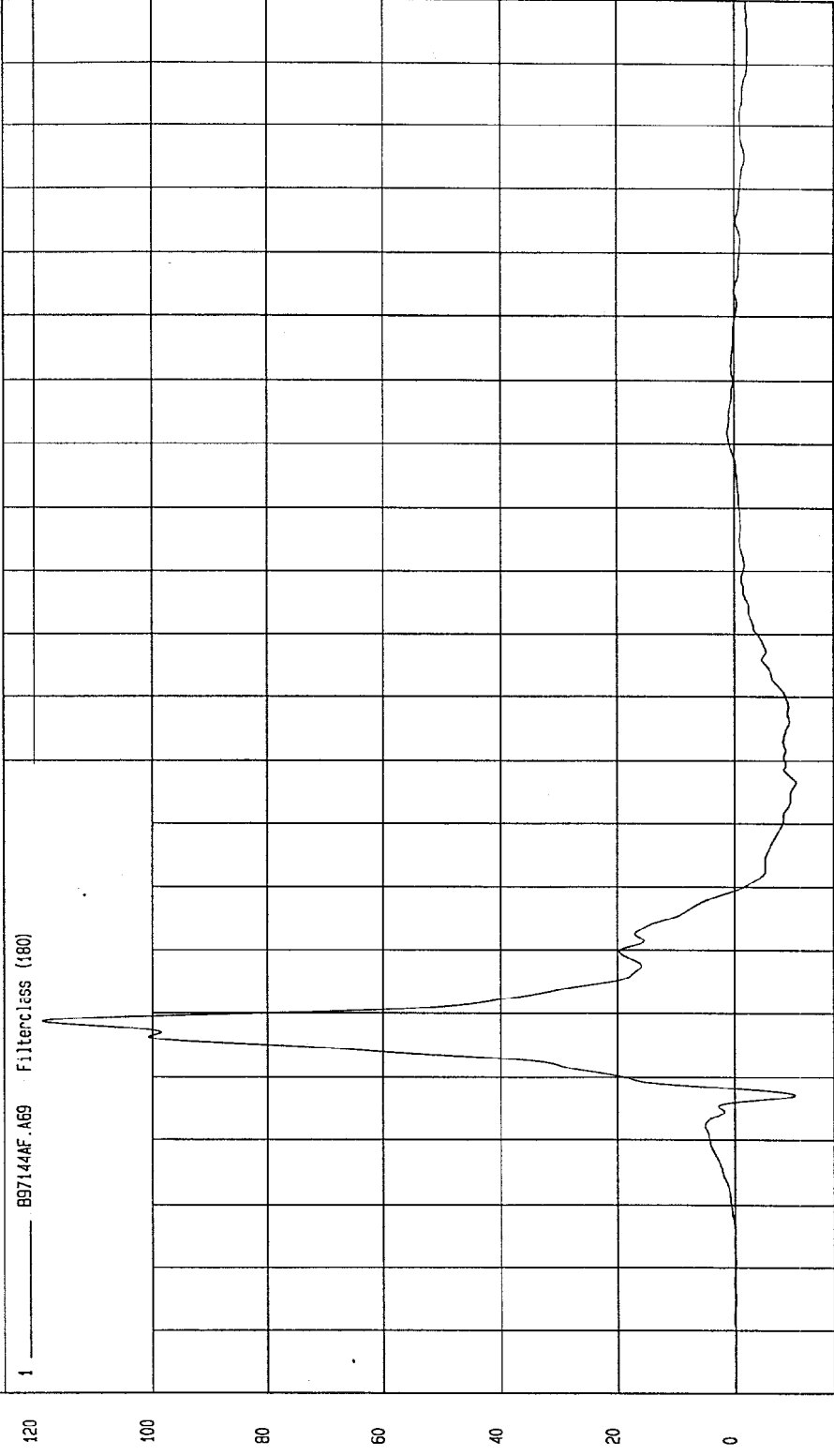
WCA Research
12-19-1997 11:43

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -10.22 G'S at 75 msec Maximum = 118.58 G'S at 39 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION



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

TIME (SECONDS)

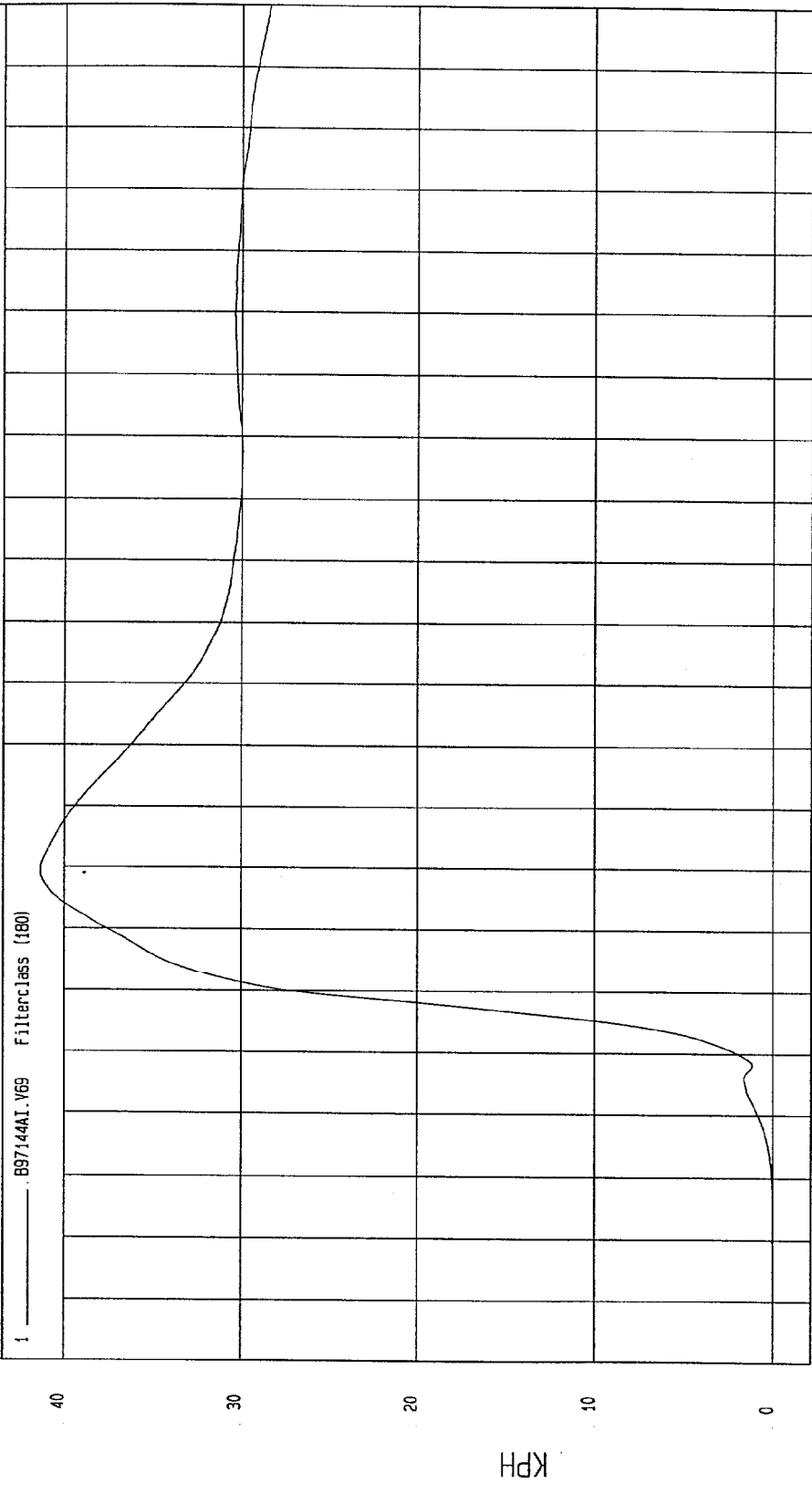
MOA Report CD
12-19-1997 10:41

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.52E-03 KPH at -10 msec Maximum = 41.34 KPH at 59 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY



MCA Research
12-19-1997 11:43

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

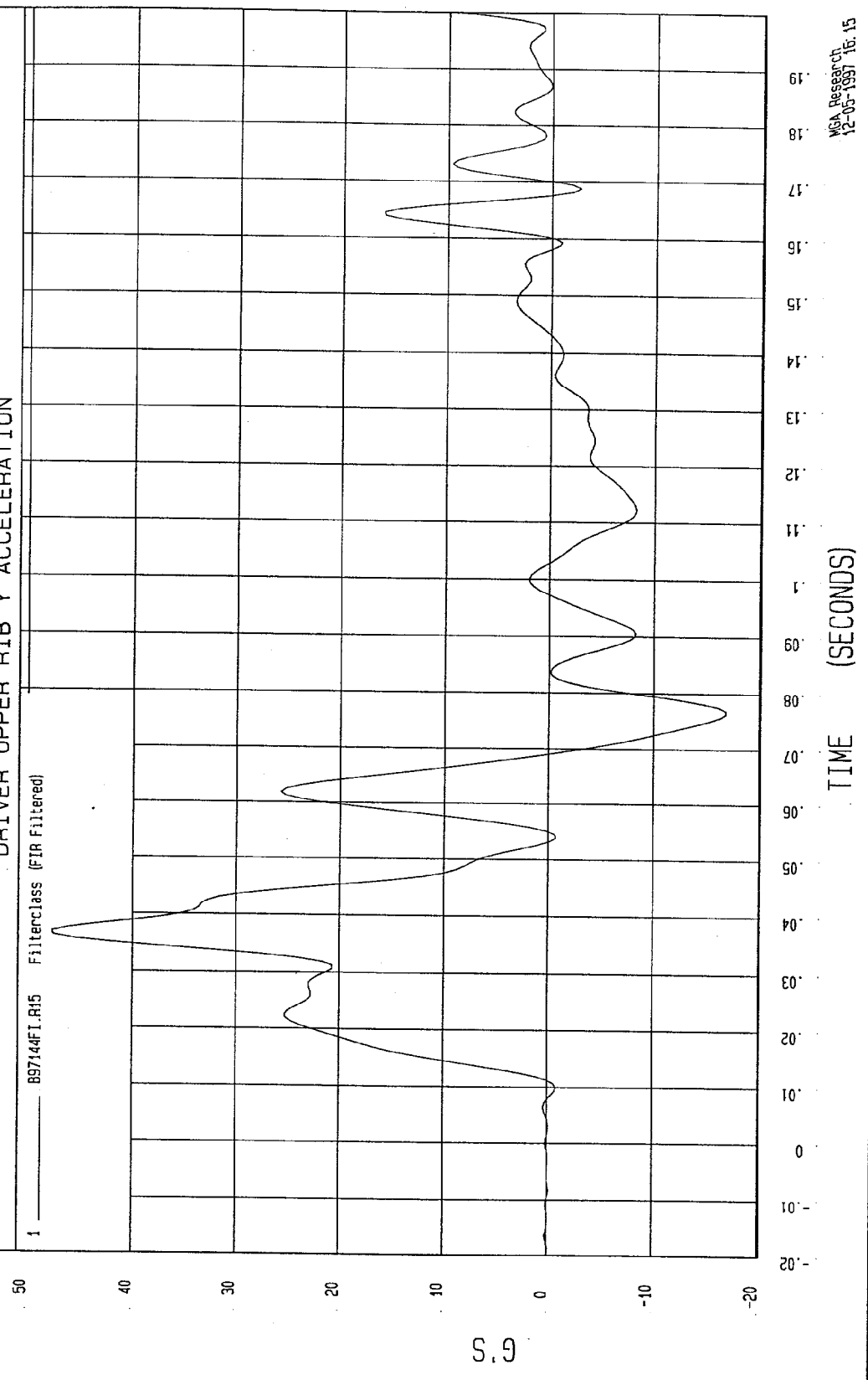
Speed: 38.3 MPH 61.6 KPH

Minimum = -16.89 G's at 76 msec

Maximum = 47.62 G's at 37 msec

DRIVER UPPER RIB Y ACCELERATION

1 897144F1.R15 Filterclass (FIR Filtered)



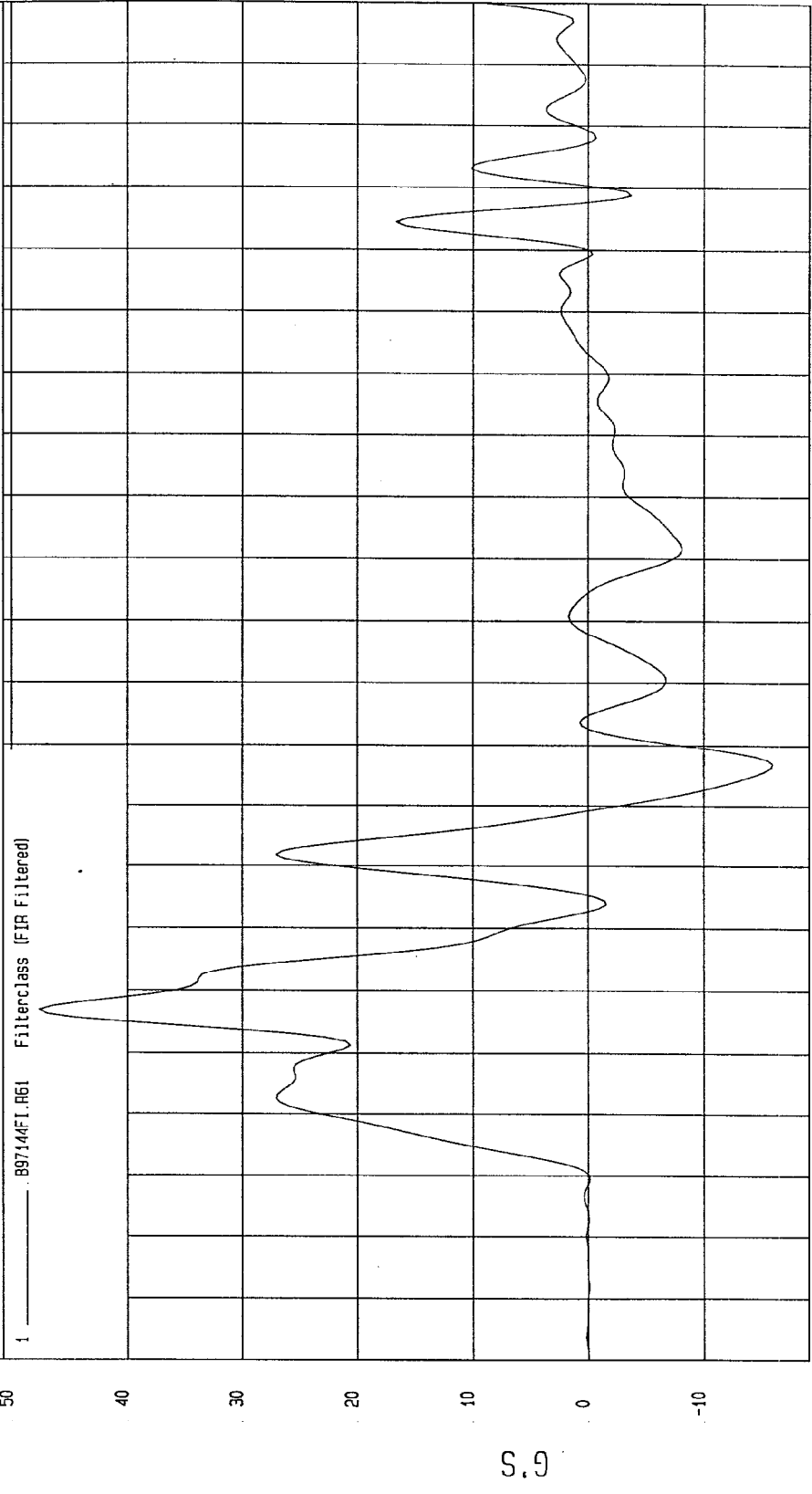
MSA Research
12-05-1997 15:15

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

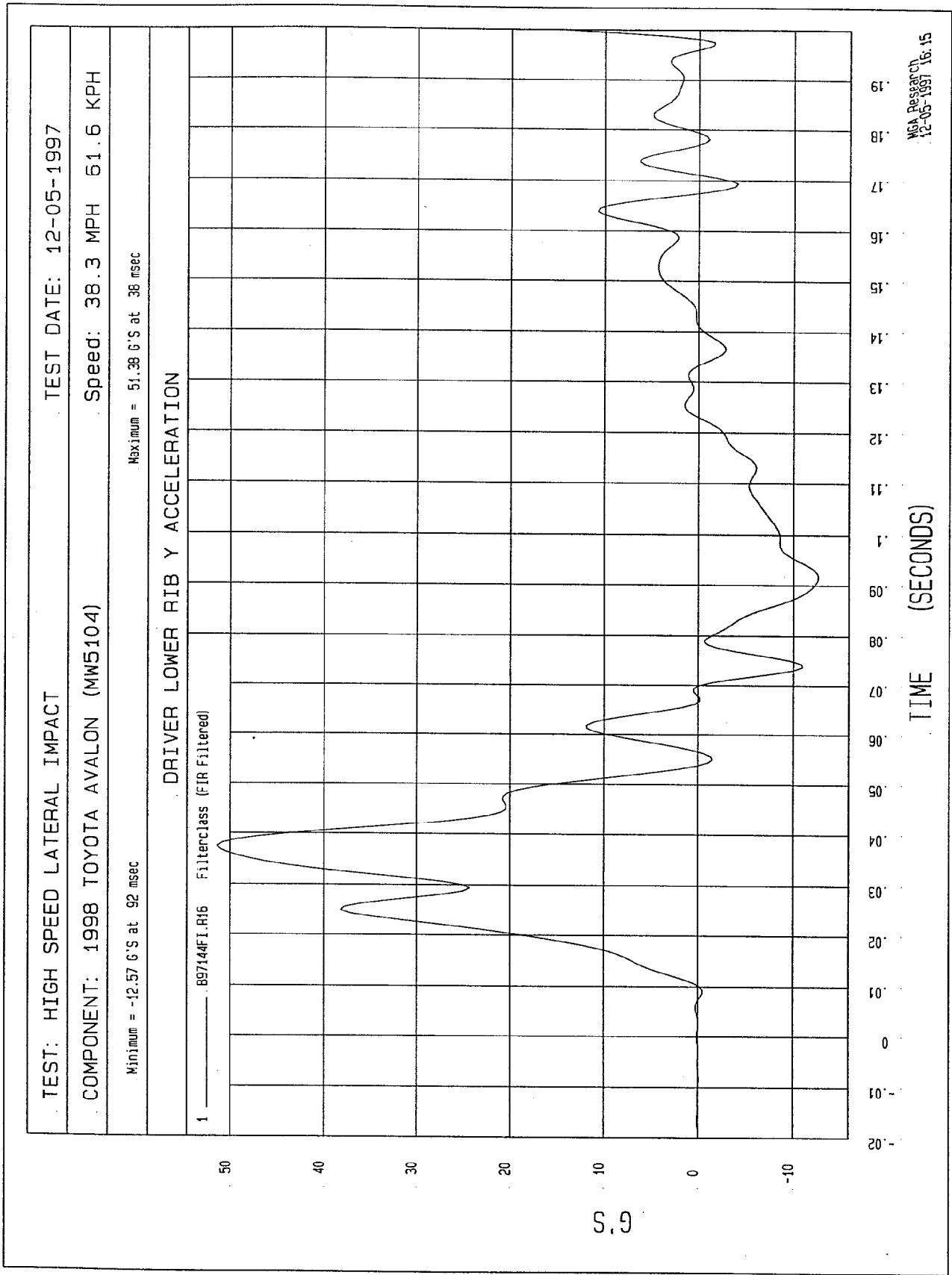
Minimum = -15.86 G'S at 77 msec Maximum = 47.56 G'S at 37 msec

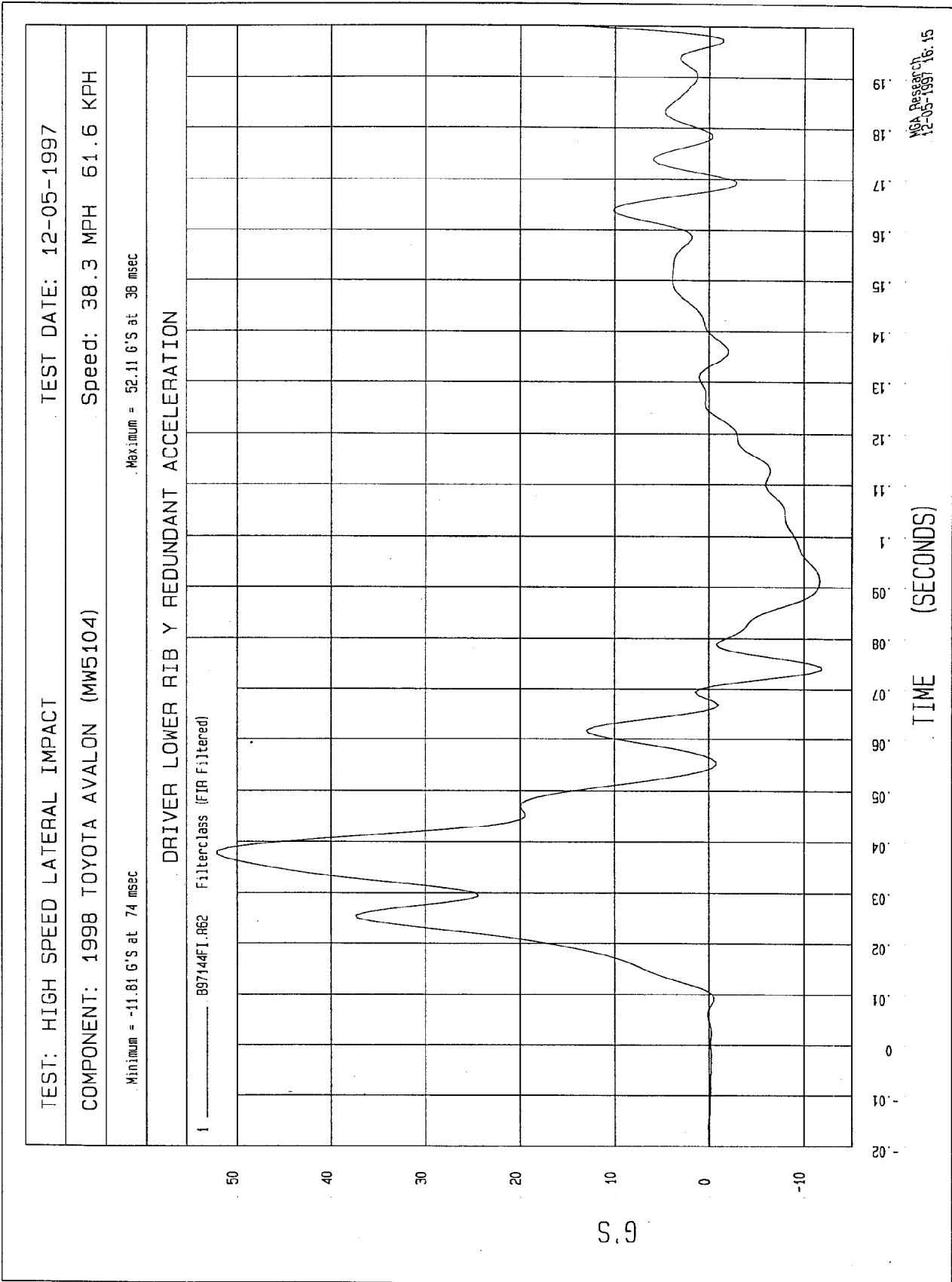
DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TIME (SECONDS)

MOA Research
12-05-1997 16:15





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

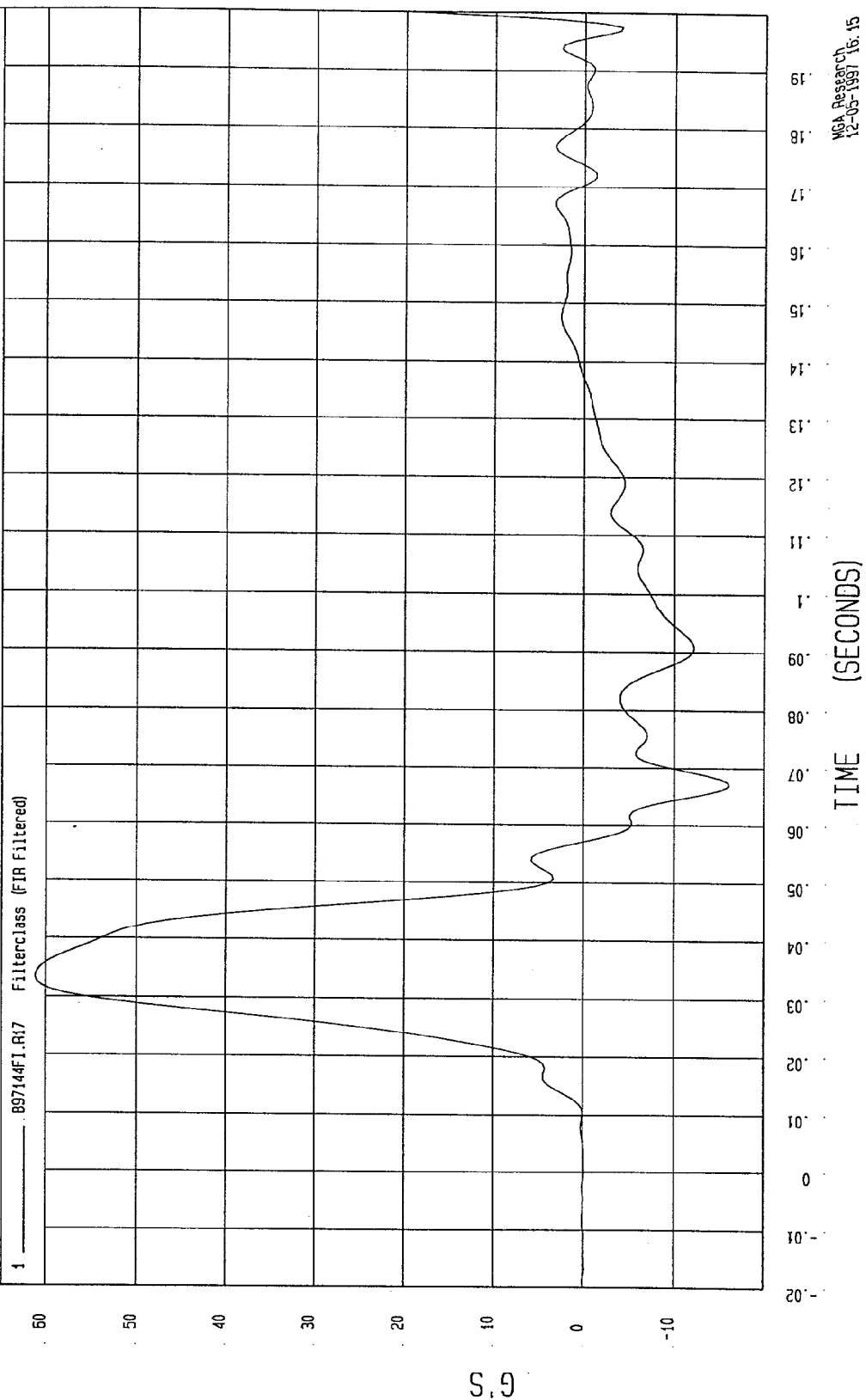
Speed: 38.3 MPH 61.6 KPH

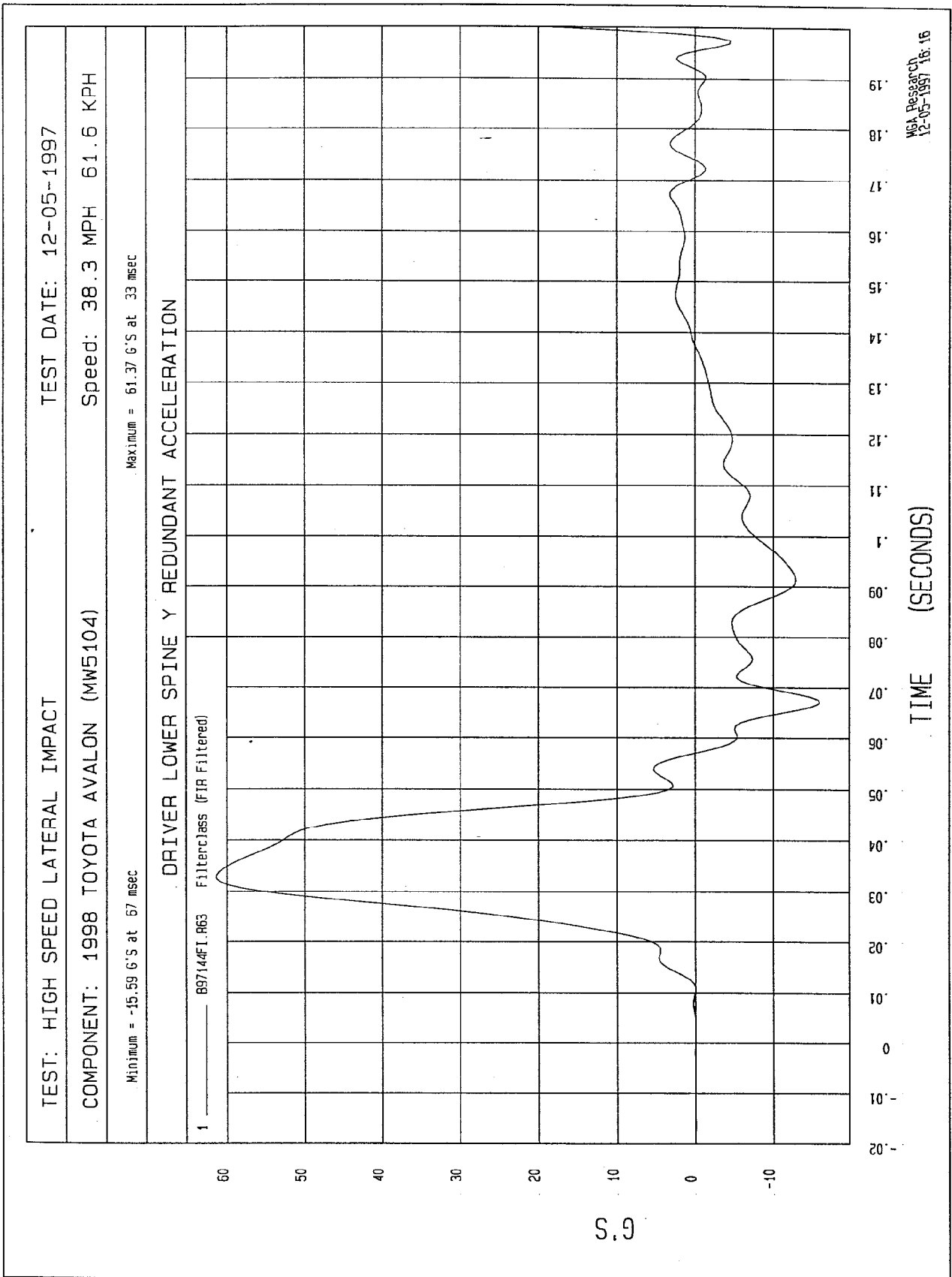
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Minimum = -16.02 G'S at 67 msec

Maximum = 61.11 G'S at 33 msec

DRIVER LOWER SPINE Y ACCELERATION



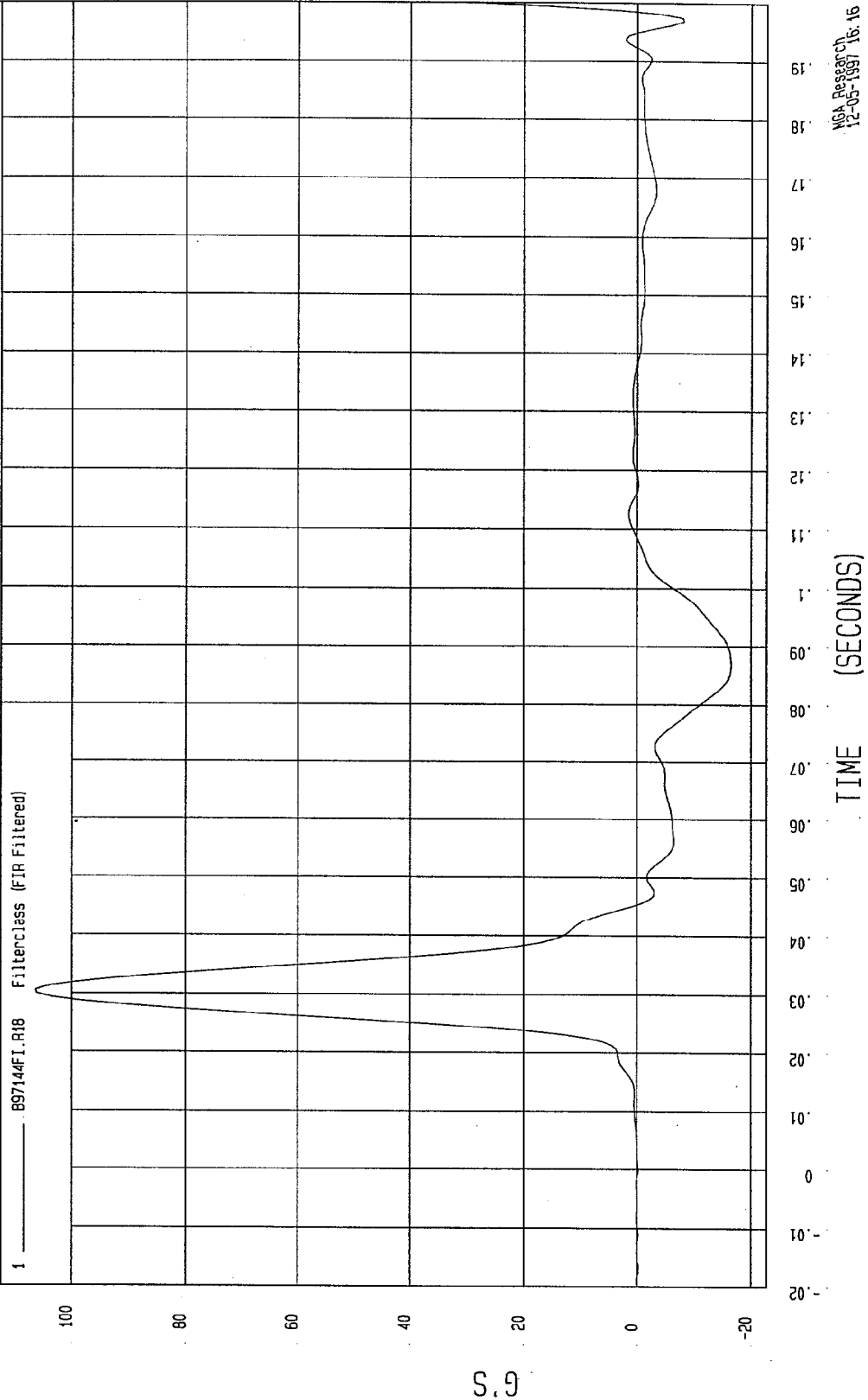


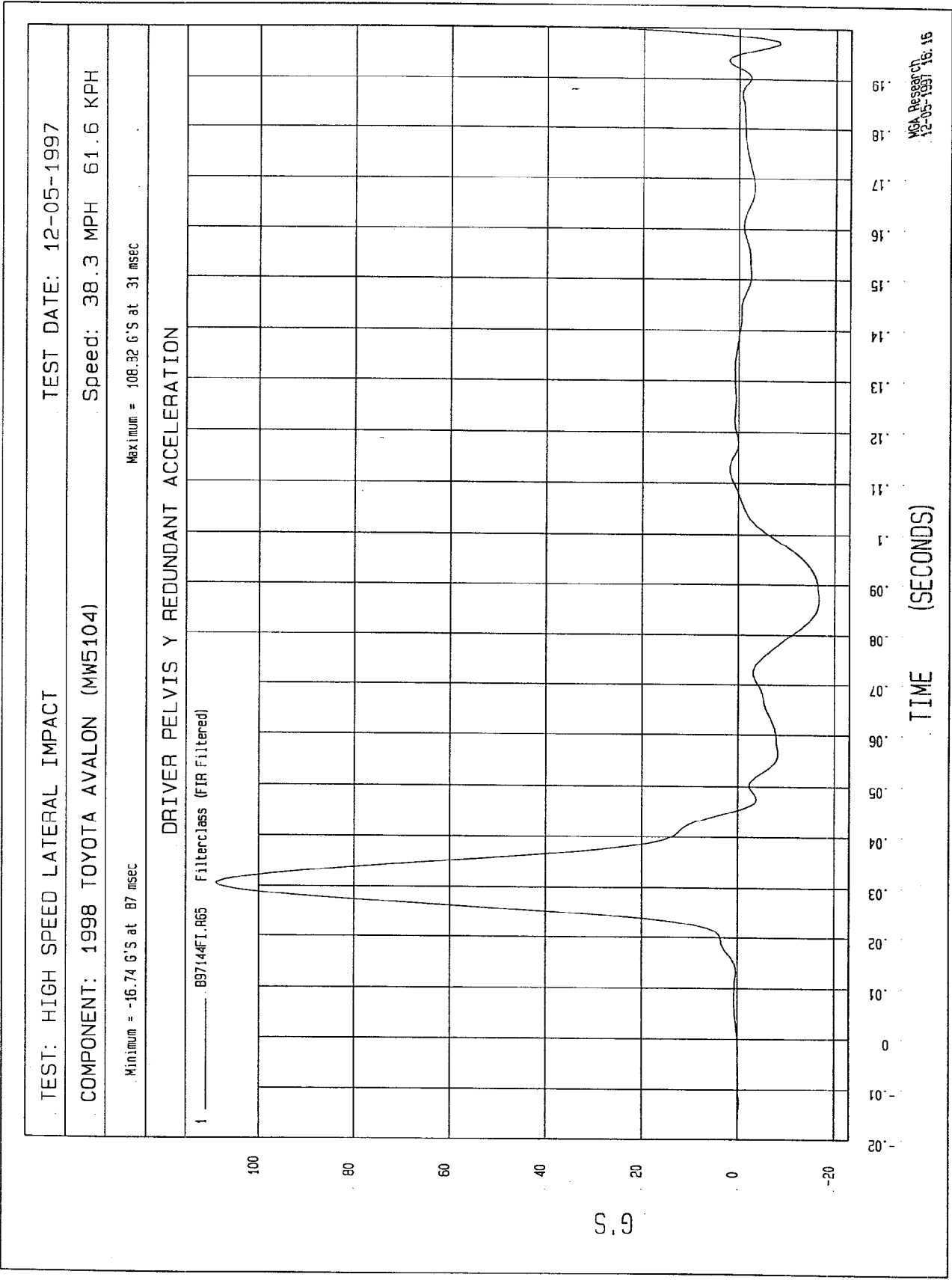
TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -16.53 G'S at 87 msec Maximum = 106.27 G'S at 31 msec

DRIVER PELVIS Y ACCELERATION





TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

Speed: 38.3 MPH 61.6 KPH

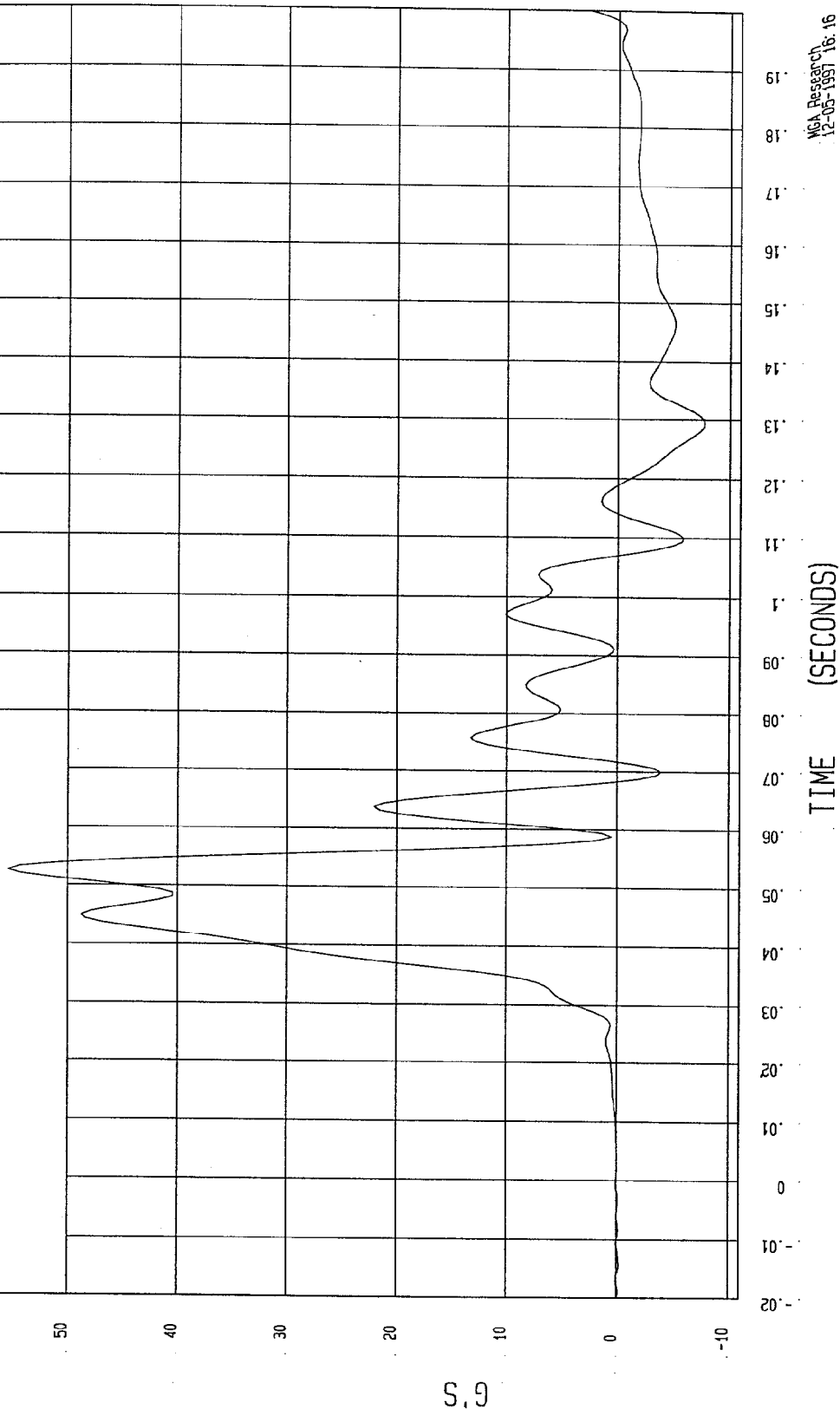
COMPONENT: 1998 TOYOTA AVALON (MW5104)

Maximum = 55.37 G'S at 52 msec

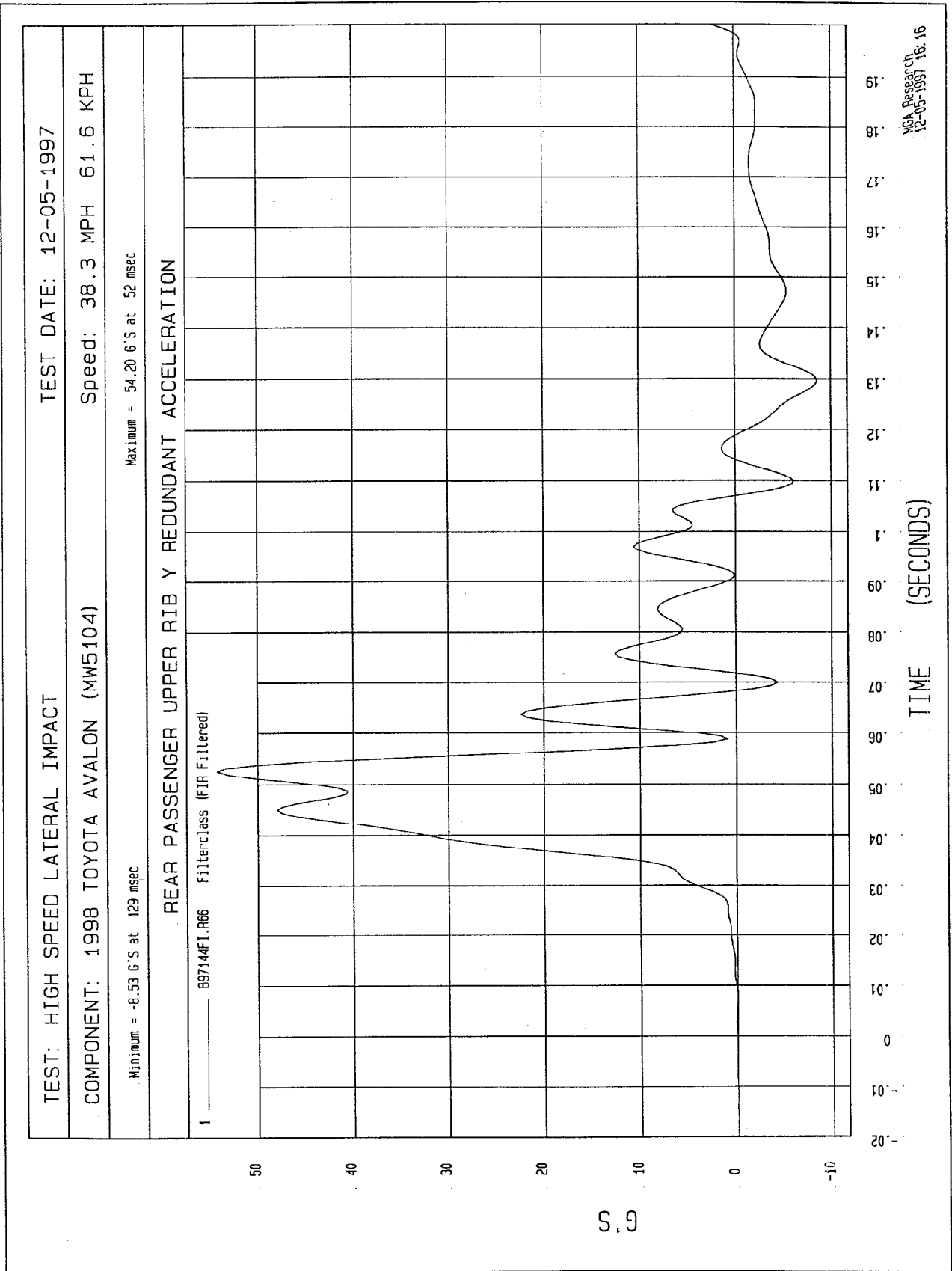
Minimum = -7.77 G'S at 129 msec

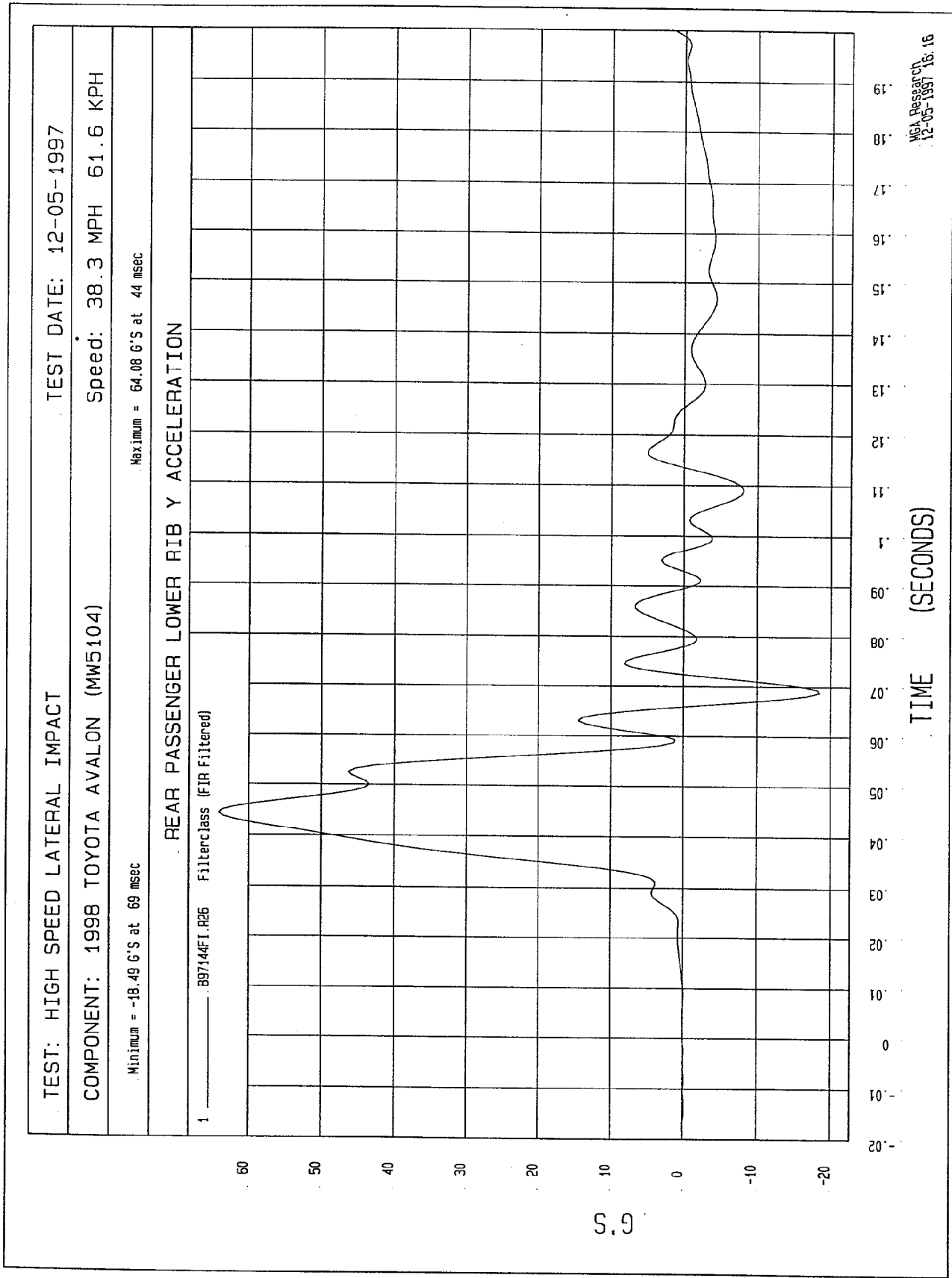
REAR PASSENGER UPPER RIB Y ACCELERATION

1 B97144FI.R25 Filterclass (FIR Filtered)



W&A Research
12-05-1997 16:16



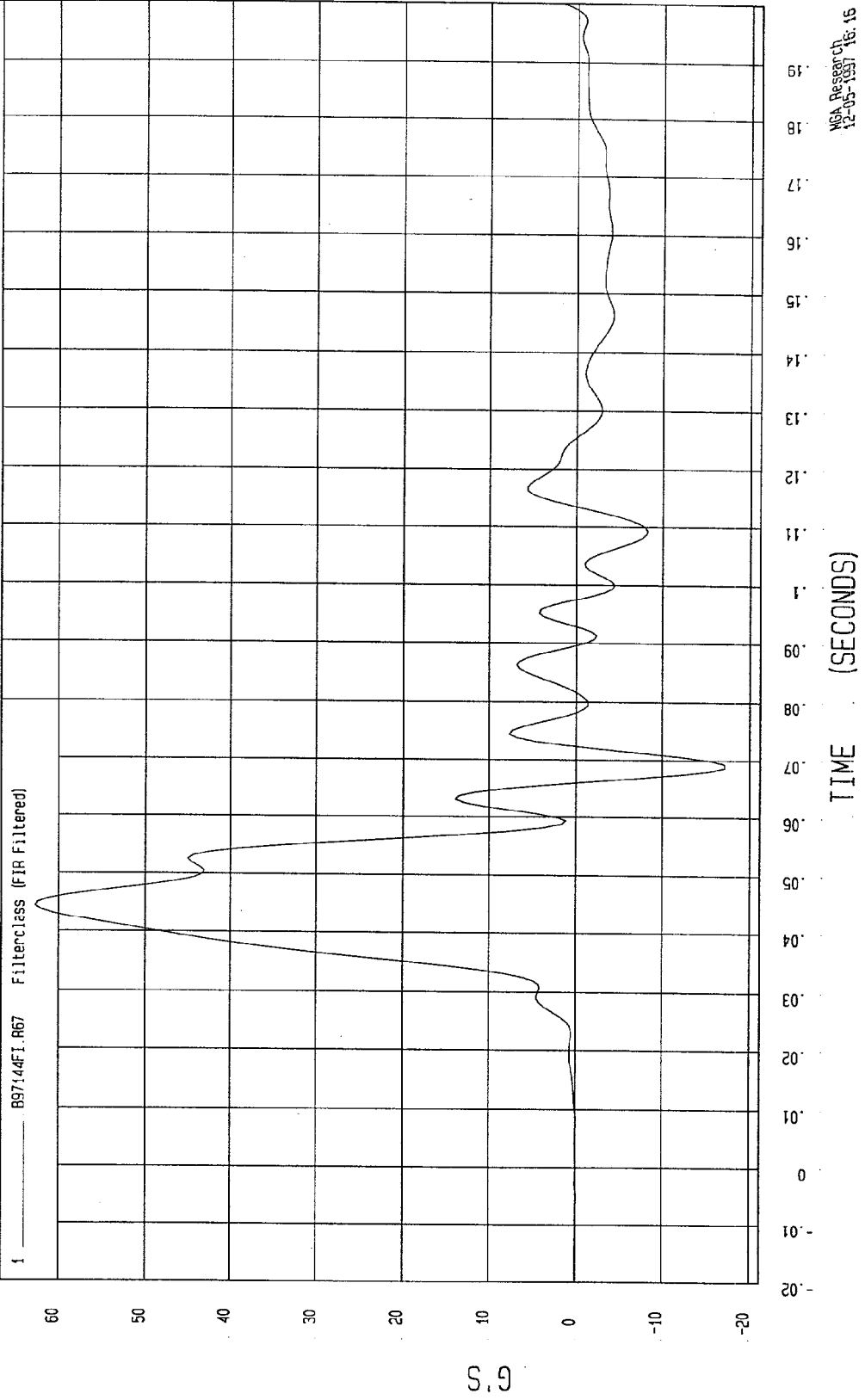


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -17.16 G'S at 69 msec Maximum = 62.67 G'S at 44 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

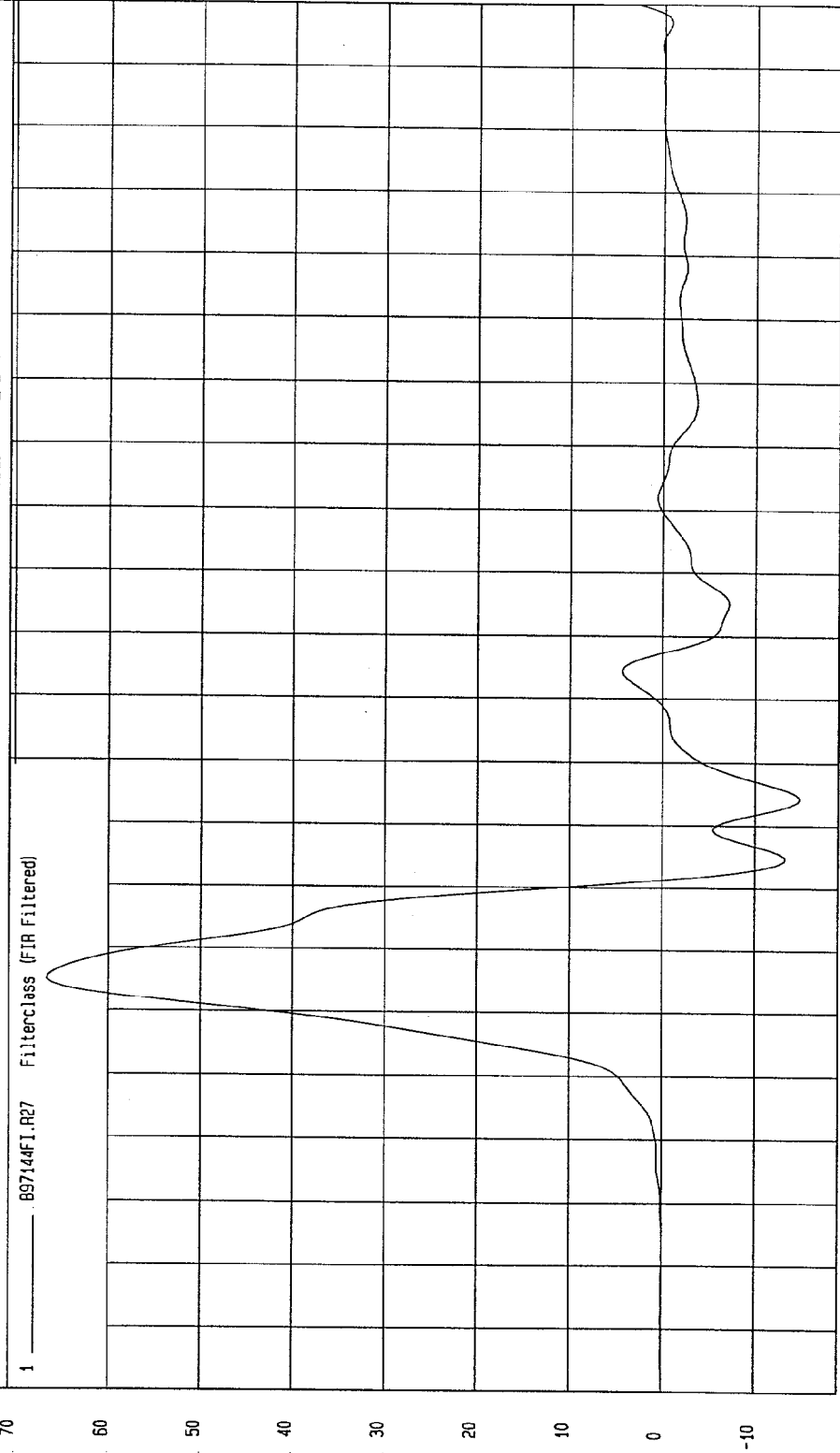


TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -14.64 G'S at 74 msec Maximum = 66.53 G'S at 45 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



TIME (SECONDS)

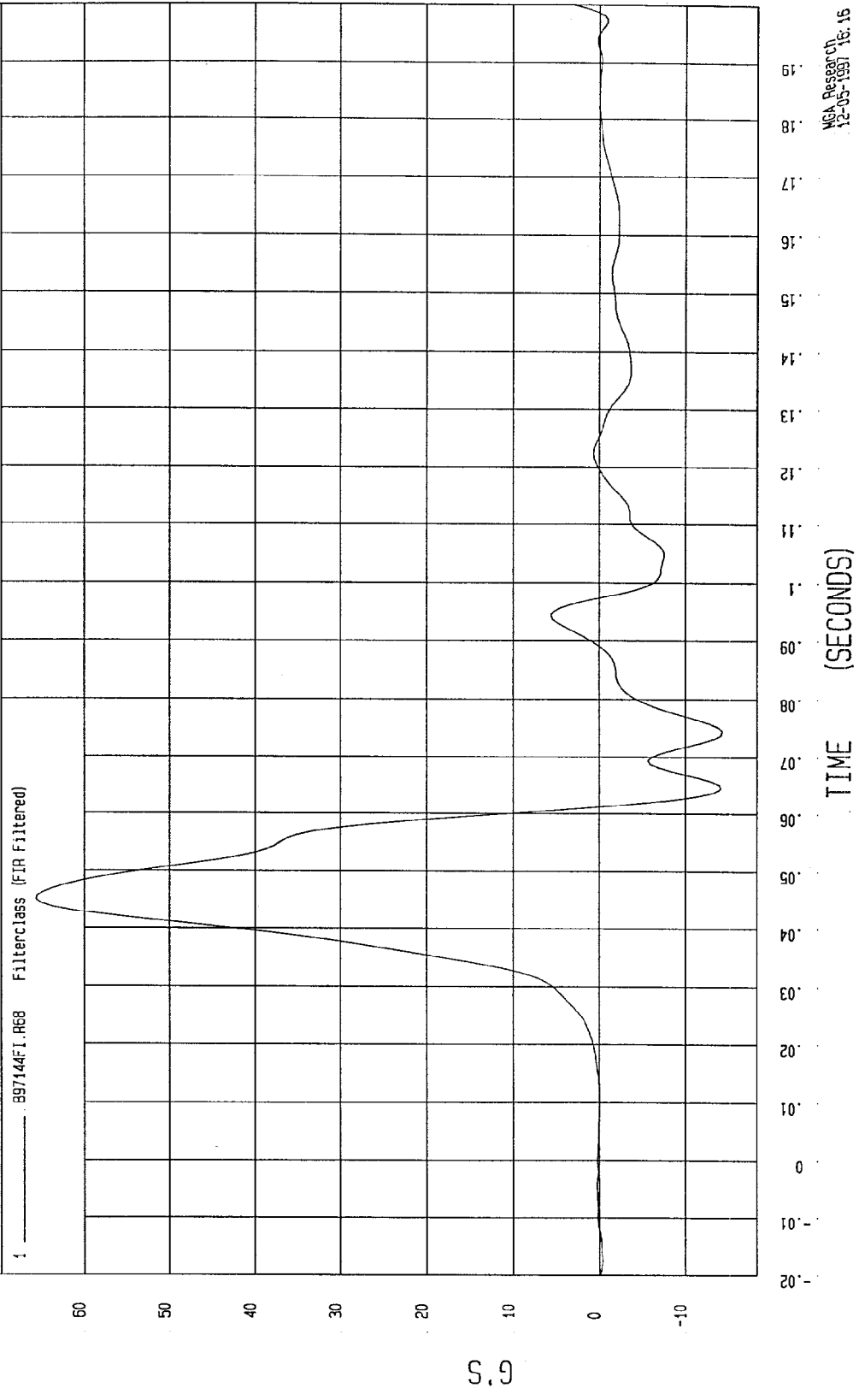
MSA Research
12-05-1997 16:16

TEST: HIGH SPEED LATERAL IMPACT TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104) Speed: 38.3 MPH 61.6 KPH

Minimum = -14.15 G'S at 74 msec Maximum = 65.51 G'S at 45 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT

TEST DATE: 12-05-1997

COMPONENT: 1998 TOYOTA AVALON (MW5104)

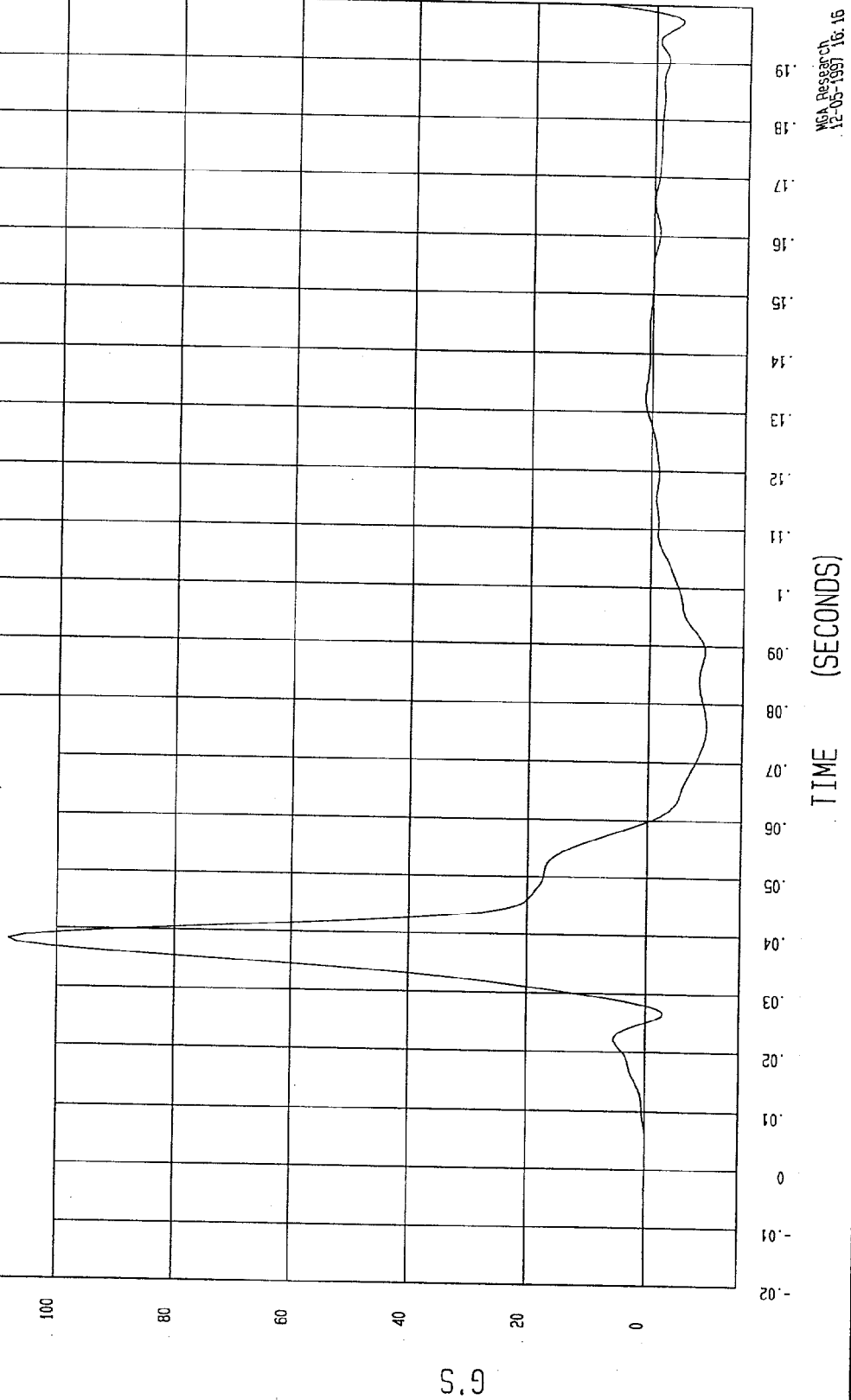
Speed: 38.3 MPH 61.6 KPH

Minimum = -9.63 G'S at 76 msec

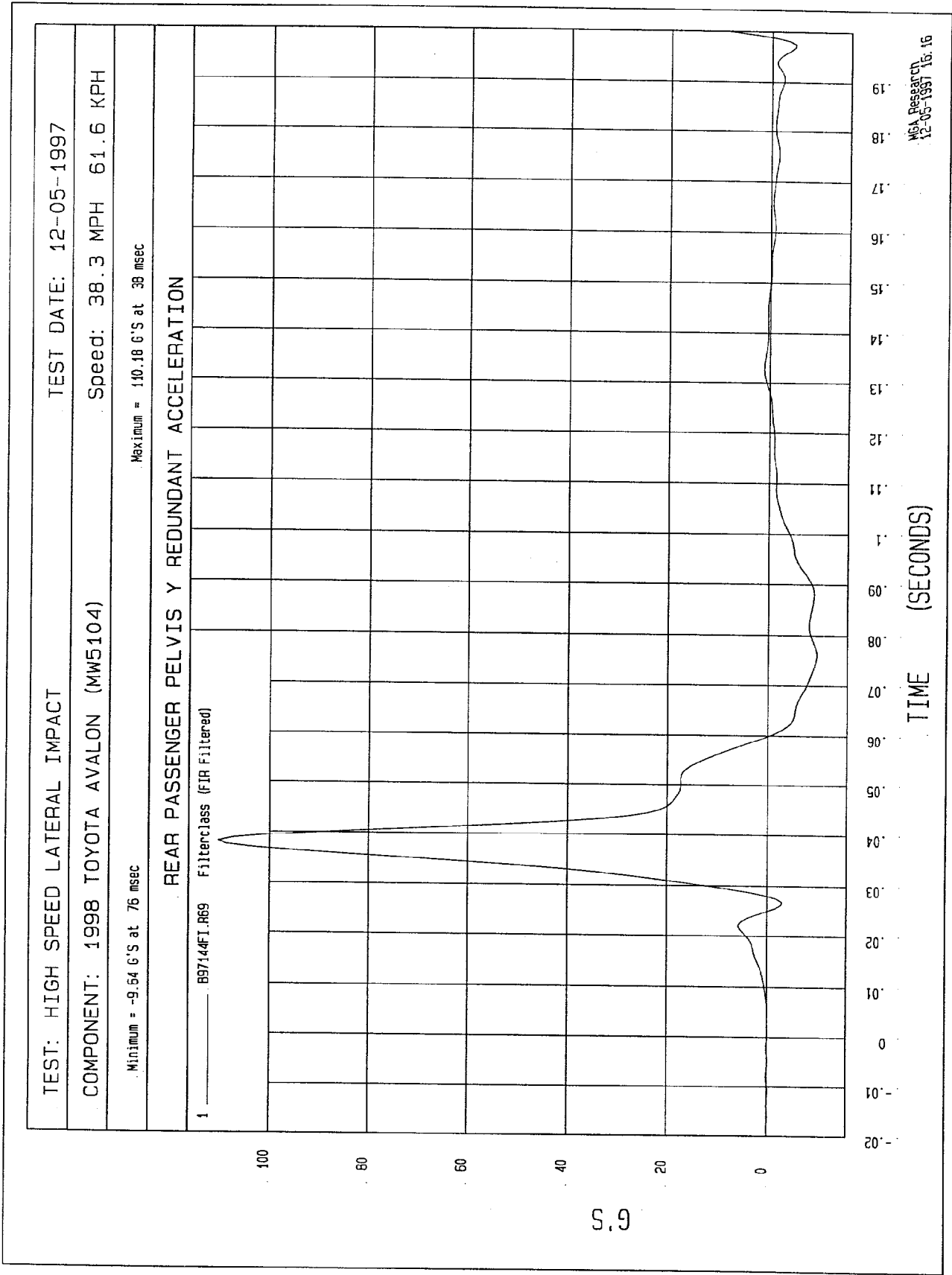
Maximum = 108.15 G'S at 38 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 897144F1.R28 Filterclass (FIR Filtered)



MCA Research
12-05-1997 16.16



APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-97-DC014

DUMMY PERFORMANCE CALIBRATIONS

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST

1998 TOYOTA AVALON 4-DOOR
NHTSA NO. MV5104

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: December 5, 1997

Report Date: January 8, 1998

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

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| DUMMY S/N: 272 | POST-TEST CERTIFICATION DATA | 3-1 |
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| 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. |

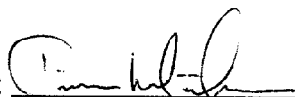
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

DATE OF VERIFICATION: December 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" | 19.6 |
| HW - Hip Width | 14.0" - 15.4" | 15.0 |

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 4, 1997

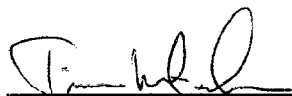
DUMMY NUMBER: 272

TEST NUMBER: D972302

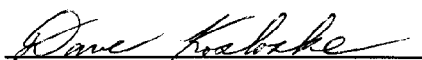
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 41 |
| LOWER RIB | 37 - 46 g's | 41 |
| LOWER SPINE | 15 - 22 g's | 21 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



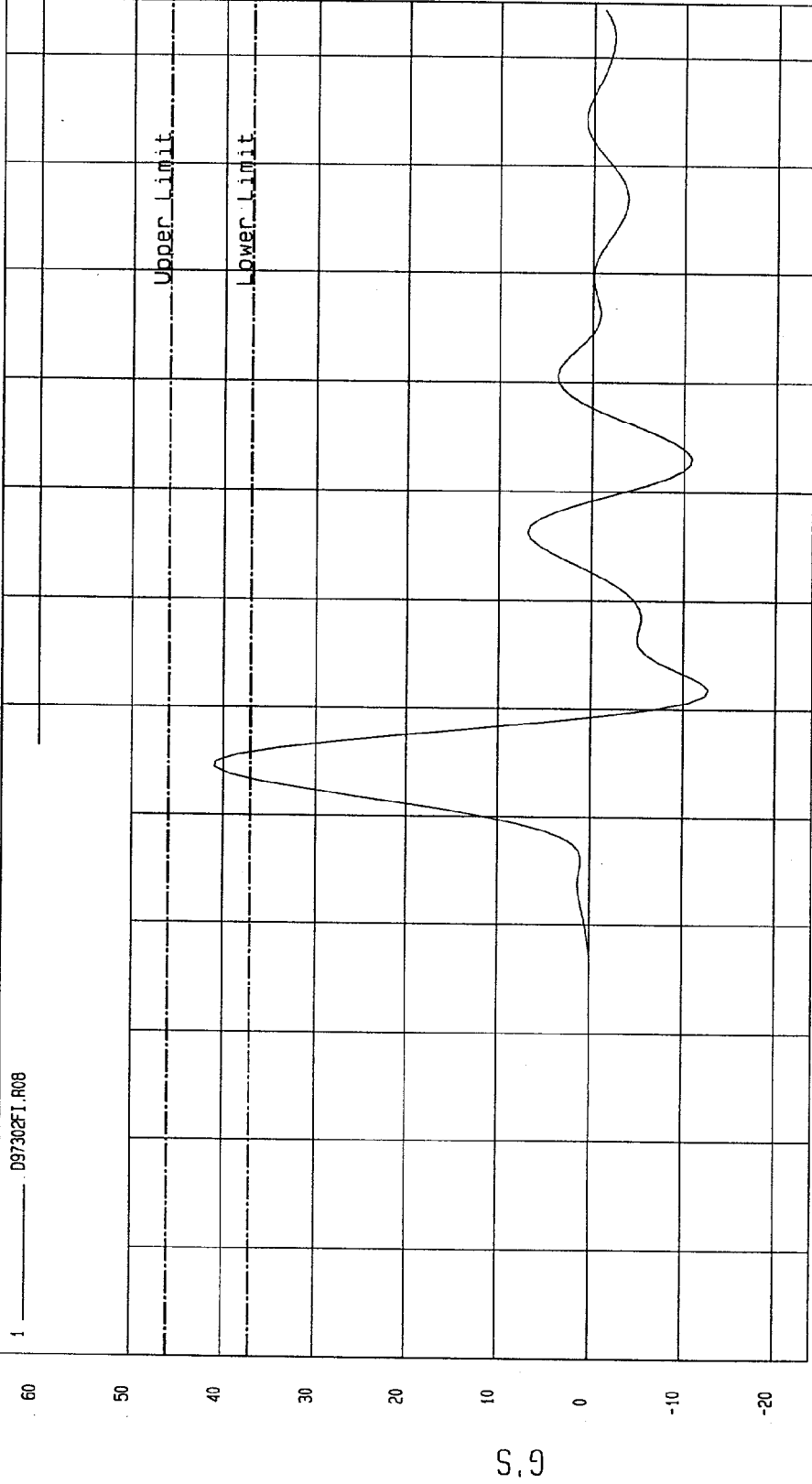
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-04-1997 - 14:55

COMPONENT: DUMMY # 272 Velocity: 14.074 FT/SEC 4.29 M/SEC

Minimum = -12.70 G'S at 51.8 msec
Maximum = 40.99 G'S at 54.3 msec

UPPER RIB ACCELERATION

1 _____ D97302F1.R08



NSA Research
12-04-1997 15:00

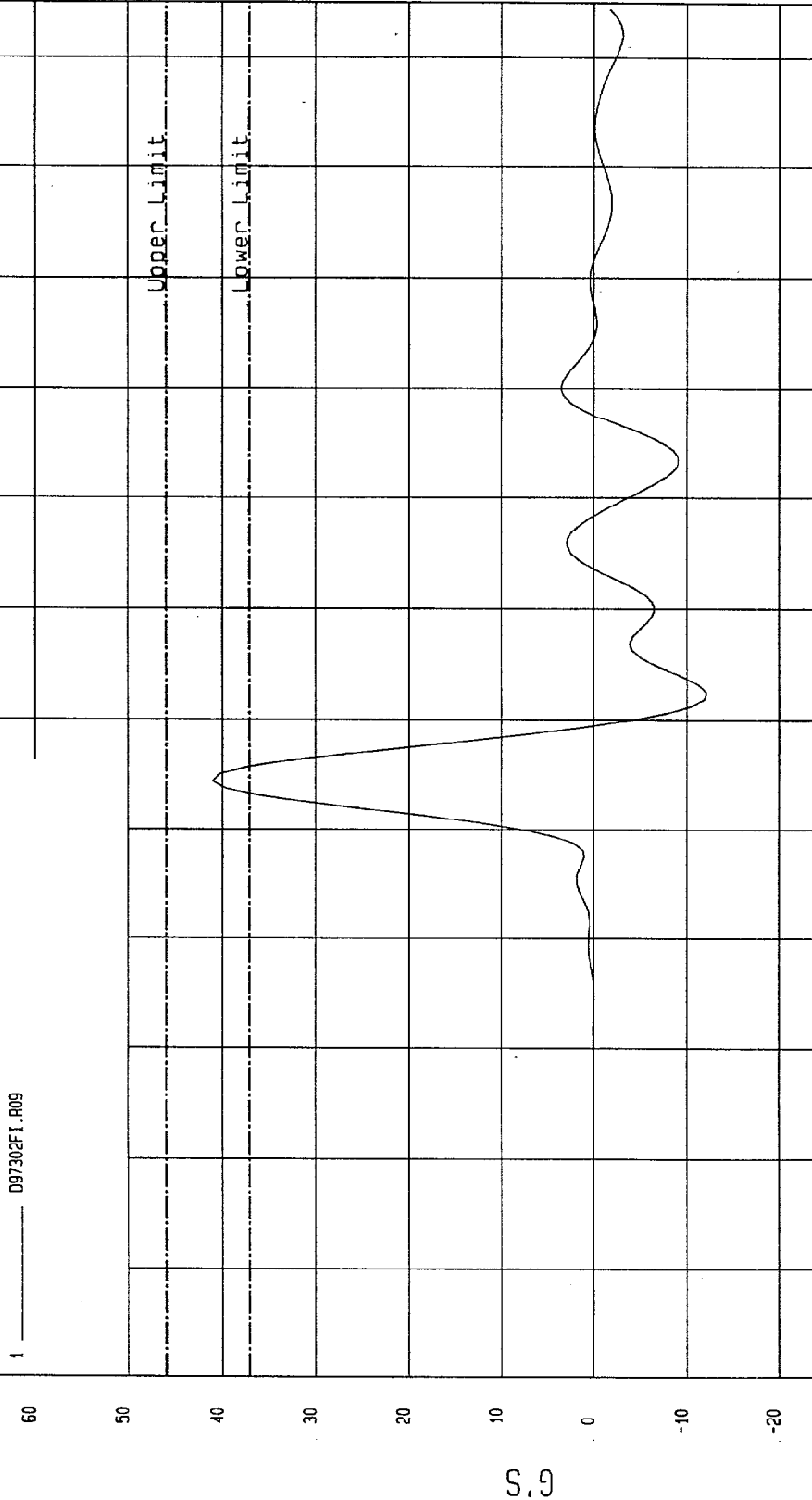
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-04-1997 - 14:55

COMPONENT: DUMMY # 272 Velocity: 14.074 FT/SEC 4.29 M/SEC

Minimum = -12.14 G'S at 62.5 msec

Maximum = 41.09 G'S at 54.3 msec

LOWER RIB ACCELERATION



MCA Research
12-04-1997 15:00

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-04-1997 - 14:55

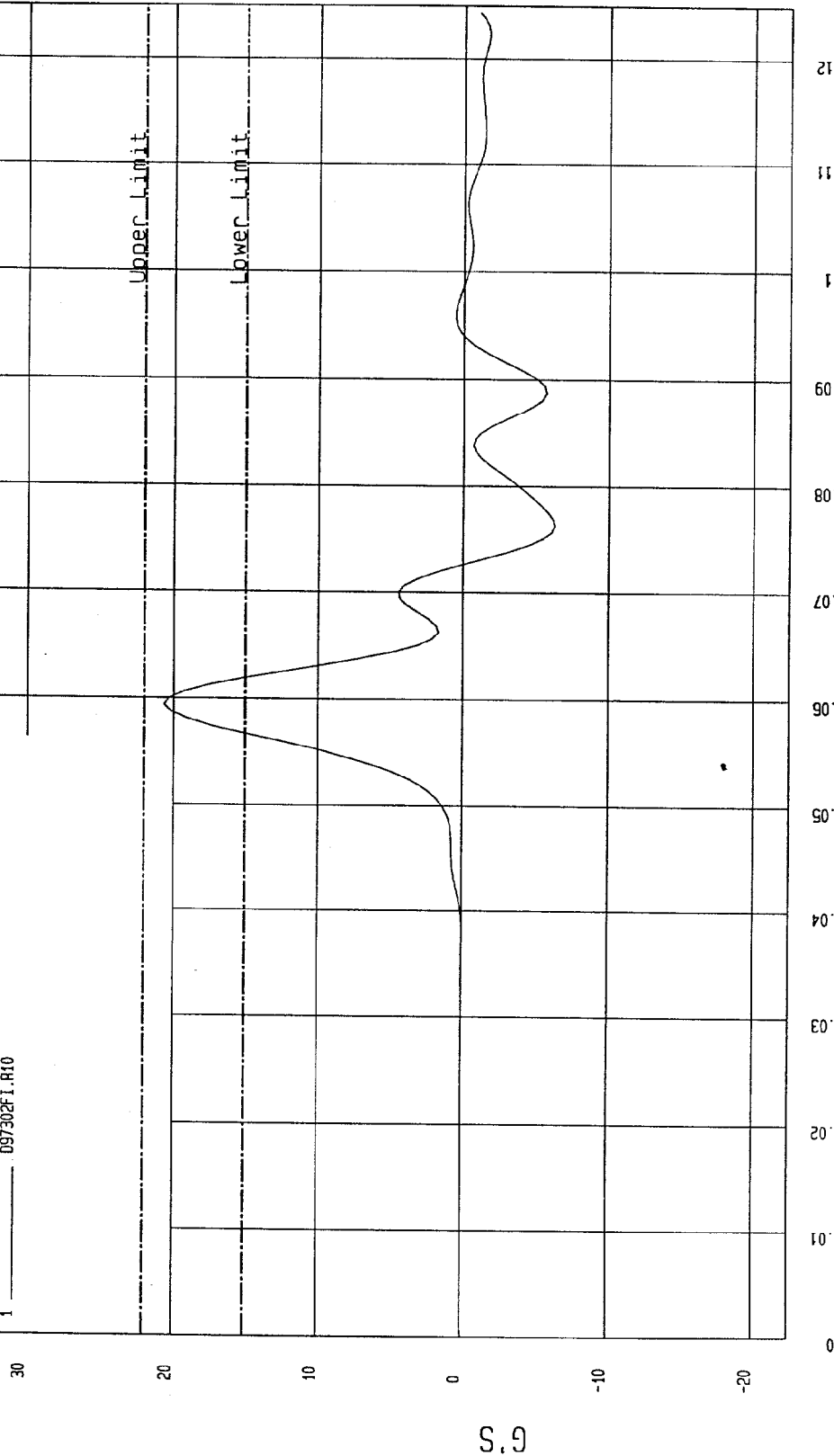
COMPONENT: DUMMY # 272 Velocity: 14.074 FT/SEC 4.29 M/SEC

Minimum = -6.30 G'S at 76.2 msec

Maximum = 20.64 G'S at 59.3 msec

LOWER SPINE ACCELERATION

1 _____ 097302FI.R10



NCA Research
12-04-1997 15:01

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 4, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972303

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 45 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



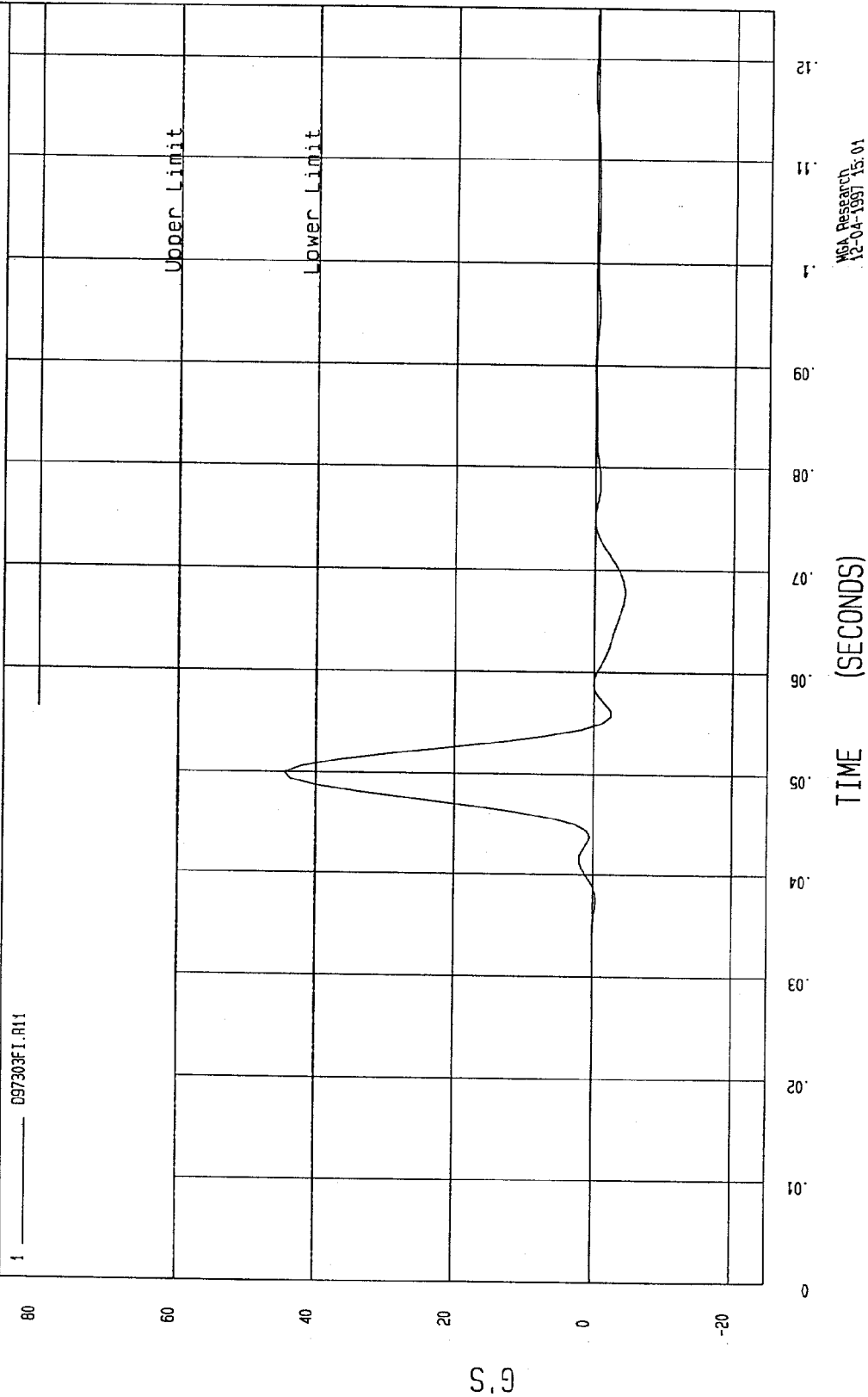
APPROVED BY



TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 12-04-1997 - 15:00:09
COMPONENT: DUMMY # 272 Velocity: 14.115 FT/SEC 4.3 M/SEC

Minimum = -4.37 G'S at 67.5 msec Maximum = 44.54 G'S at 50 msec

PELVIS ACCELERATION



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

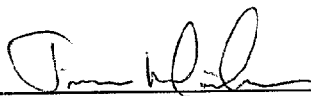
DATE: December 4, 1997

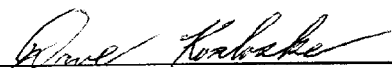
DUMMY NUMBER: 272

TEST NUMBER: D972304

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 29.2 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 40.6 |
| FORCE @ 1.0 in | 50 - 63 lbs | 54 |
| FORCE @ 1.3 in | 73 - 88 lbs | 73 |

TEST MEETS SPECIFICATIONS

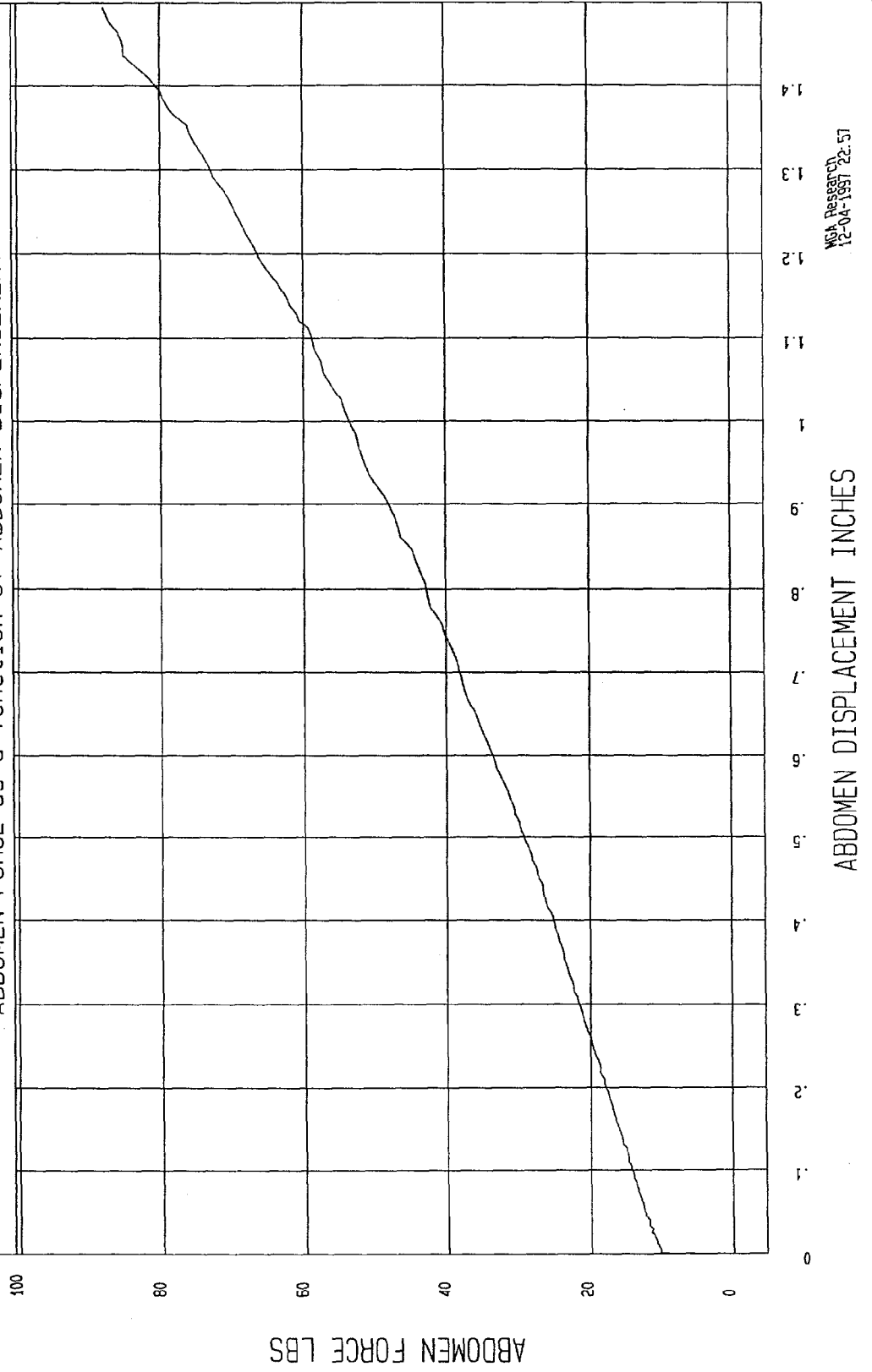
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-04-1997 - 22:40

COMPONENT: DUMMY # 272

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



MCA Research
12-04-1997 22:57

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

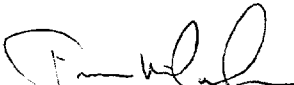
DATE: December 4, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972305

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 25 |
| FORCE @ 30° | 34 - 46 lbs | 37 |
| FORCE @ 40° | 46 - 58 lbs | 51 |
| RETURN ANGLE | 12° maximum | 6° |

TEST MEETS SPECIFICATIONS

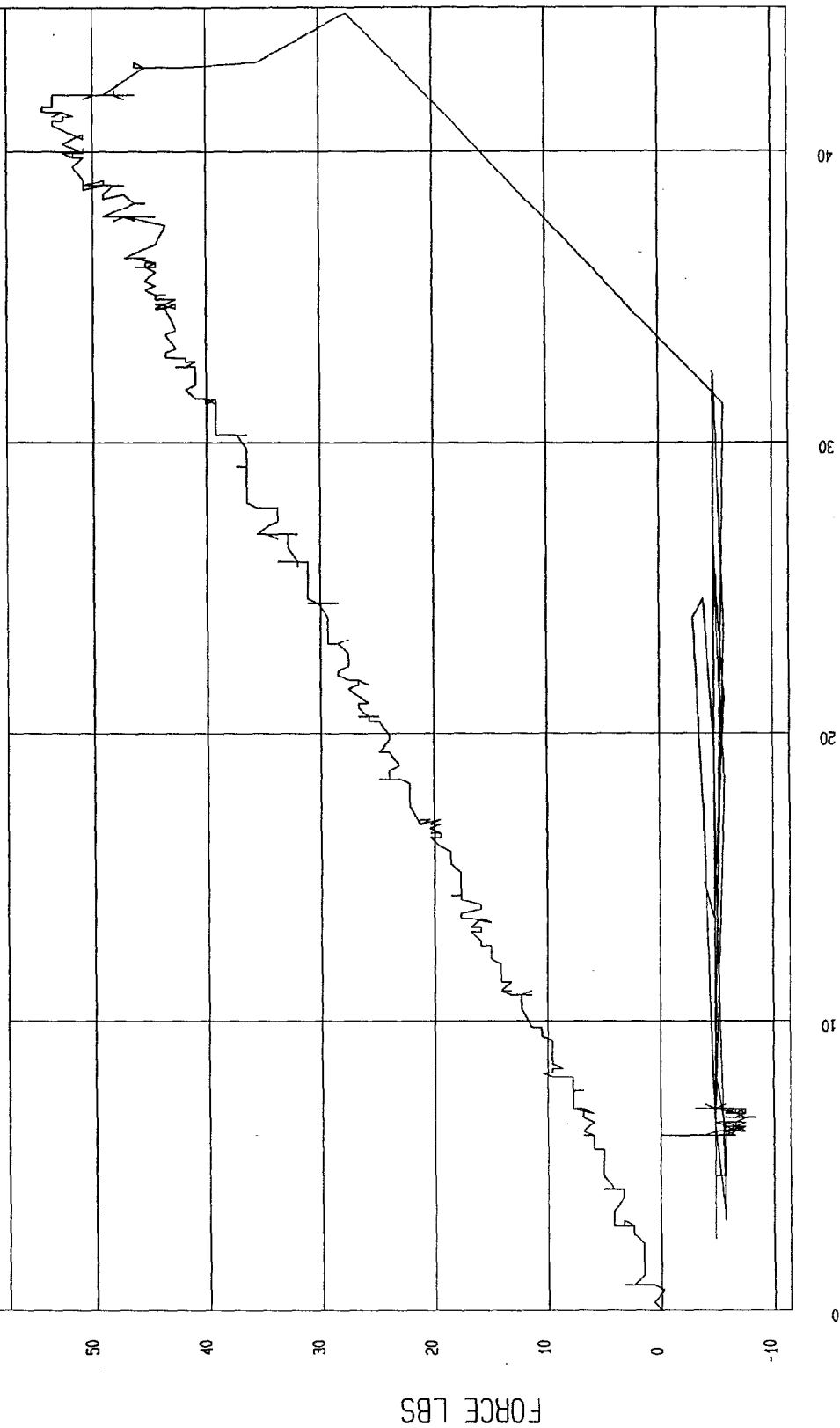
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-04-1997 - 22:14

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



NSA Research
12-04-1997 22:17

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. |

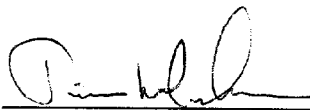
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: December 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:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

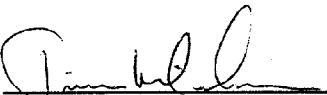
DATE: December 4, 1997

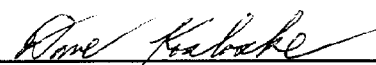
DUMMY NUMBER: 271

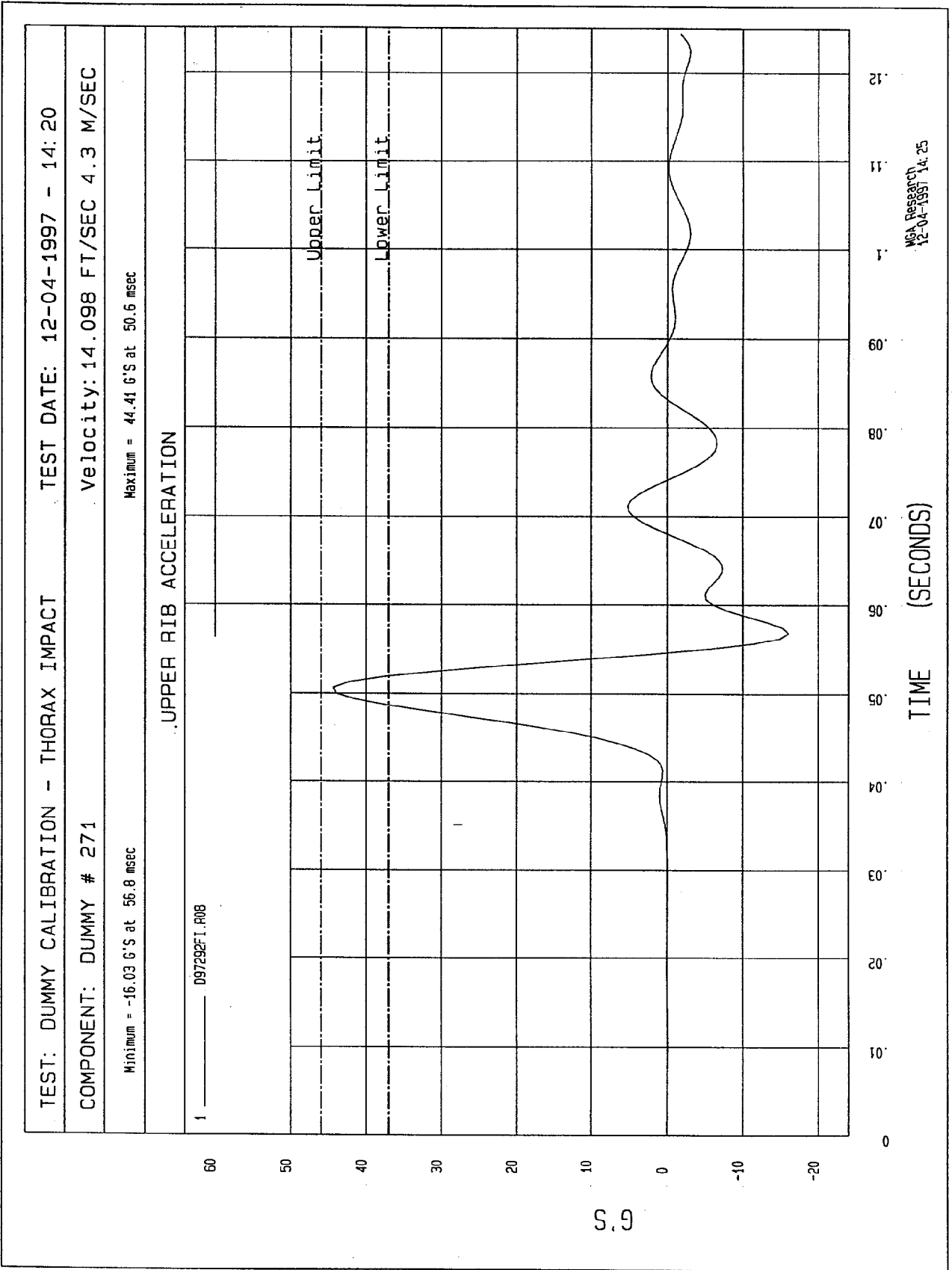
TEST NUMBER: D972292

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 44 |
| LOWER RIB | 37 - 46 g's | 42 |
| LOWER SPINE | 15 - 22 g's | 20 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

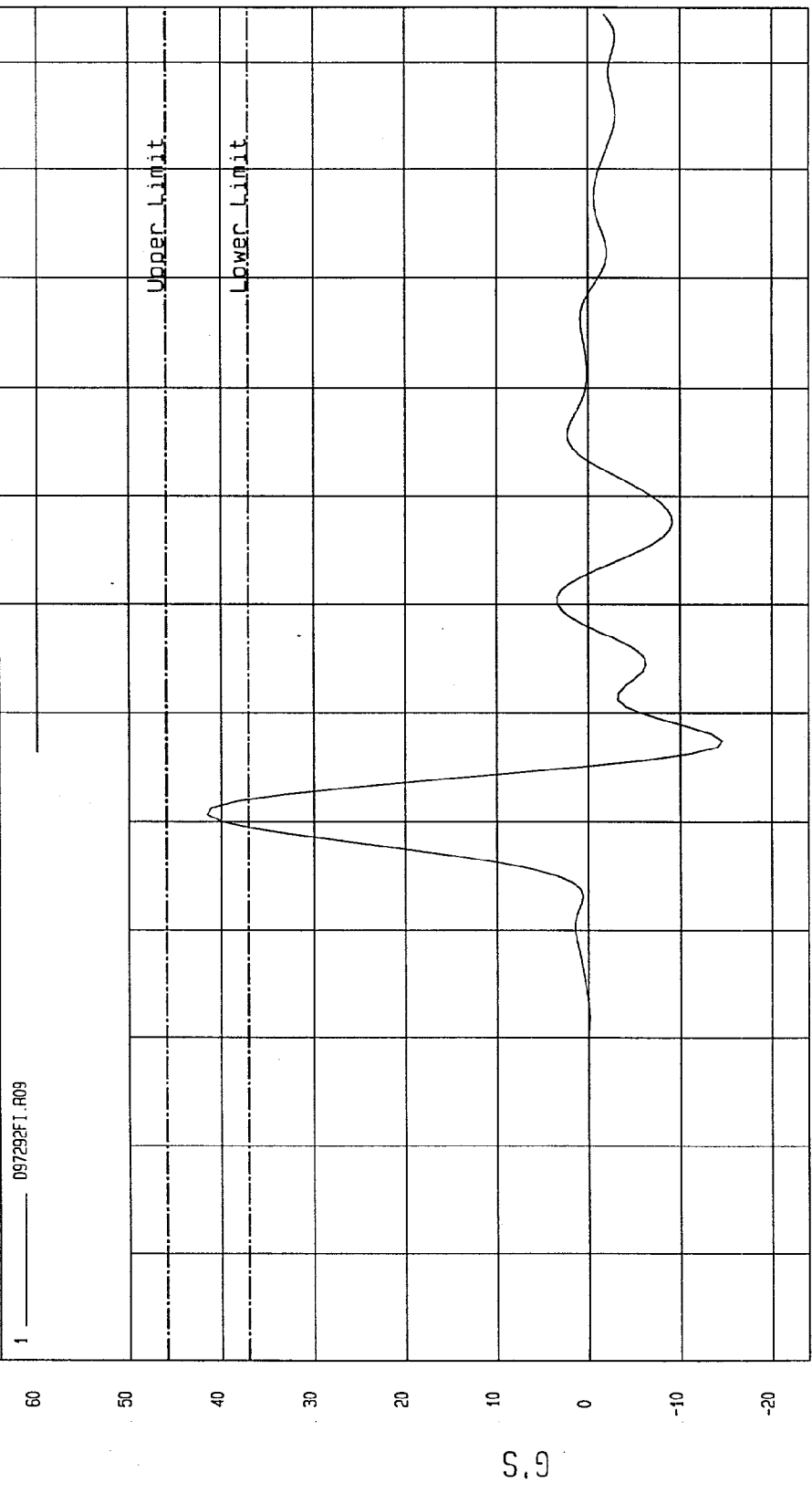


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-04-1997 - 14:20

COMPONENT: DUMMY # 271 Velocity: 14.098 FT/SEC 4.3 M/SEC

Minimum = -14.55 G'S at 57.5 msec Maximum = 41.57 G'S at 50.6 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

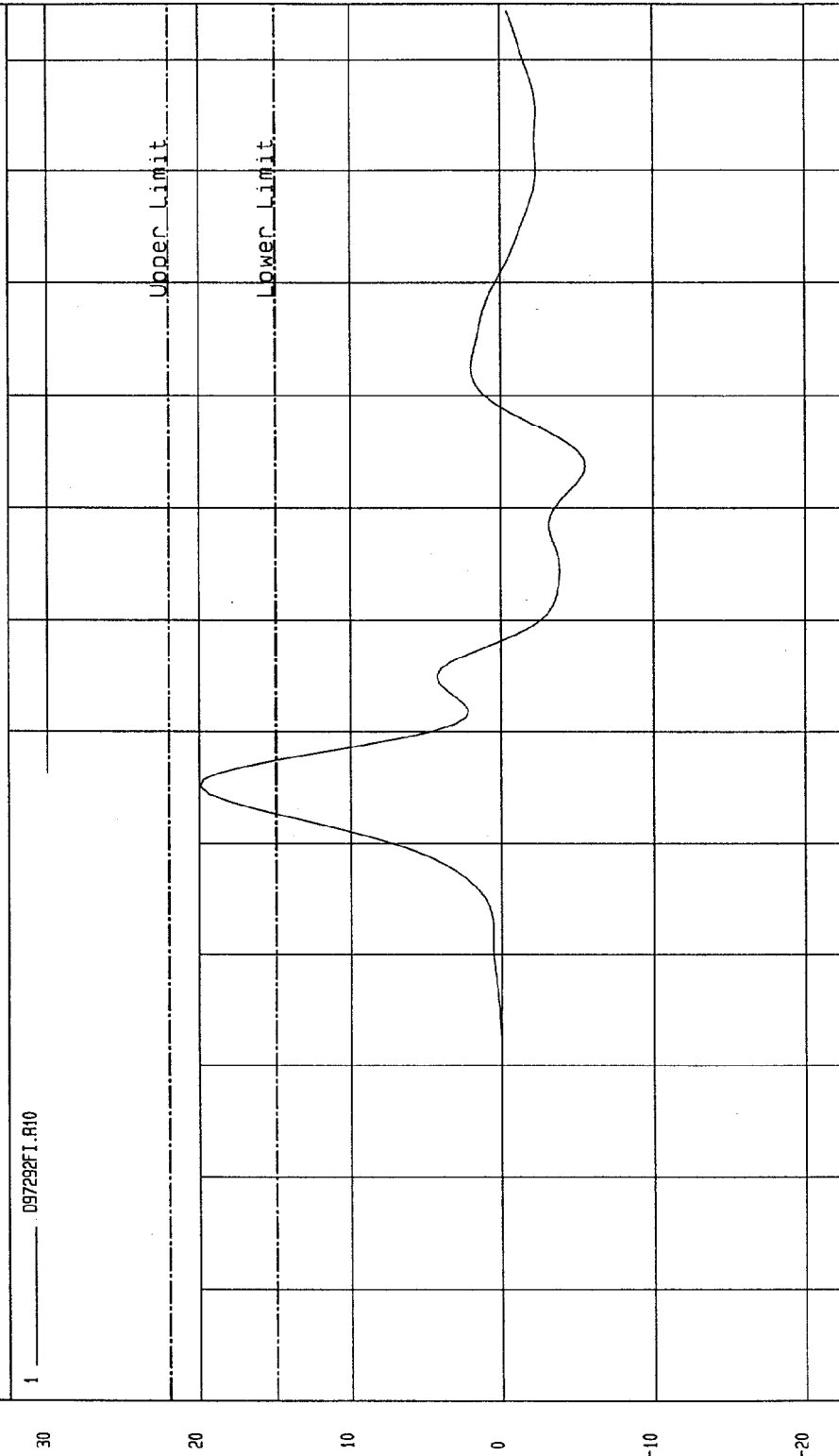
MCA Research
12-04-1997 14:25

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-04-1997 - 14:21:00

COMPONENT: DUMMY # 271 Velocity: 14.098 FT/SEC 4.3 M/SEC

Minimum = -5.51 G's at 83.7 msec Maximum = 19.94 G's at 55 msec

LOWER SPINE ACCELERATION



TIME (SECONDS)

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

WCA Research
12-04-1997 14:26

G's

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

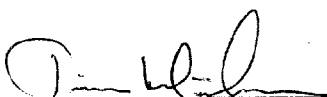
DATE: December 4, 1997

DUMMY NUMBER: 271

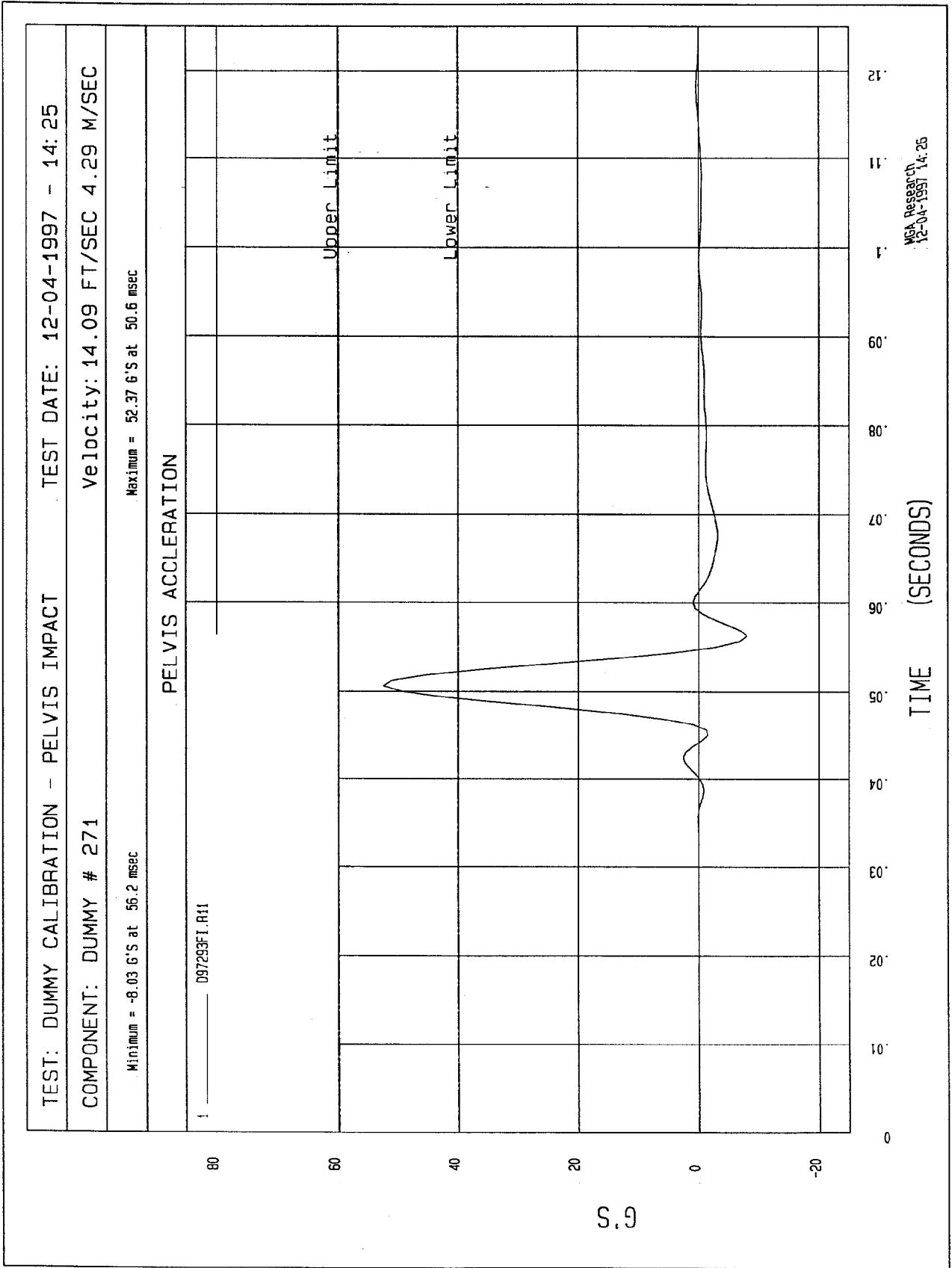
TEST NUMBER: D972293

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 52 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 



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

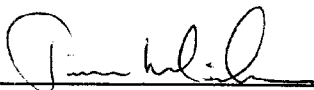
DATE: December 4, 1997

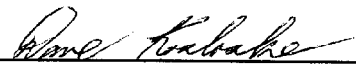
DUMMY NUMBER: 271

TEST NUMBER: D972294

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 31.5 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 44.1 |
| FORCE @ 1.0 in | 50 - 63 lbs | 58 |
| FORCE @ 1.3 in | 73 - 88 lbs | 79 |

TEST MEETS SPECIFICATIONS

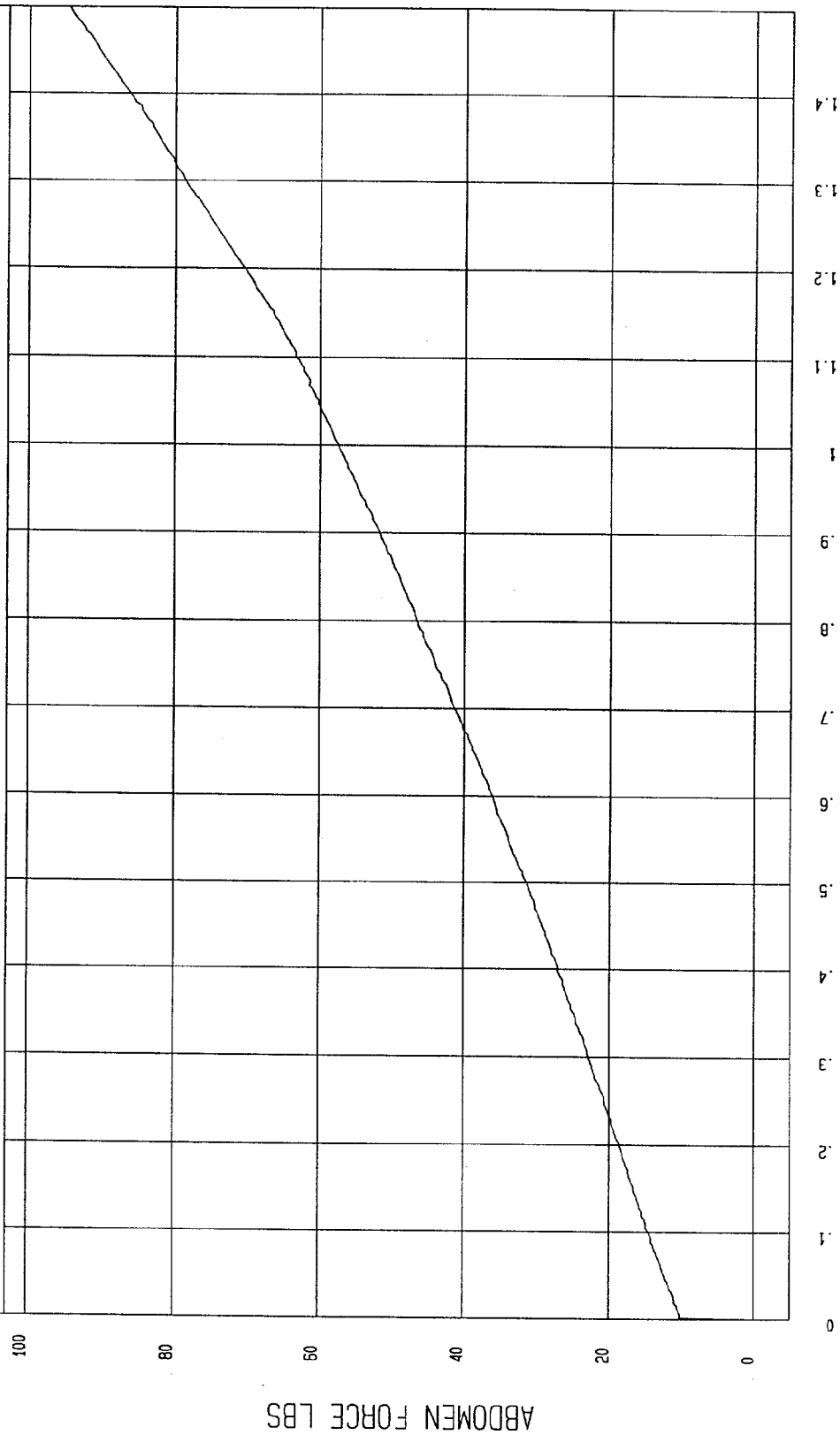
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-04-1997 - 22:36

COMPONENT: DUMMY # 271

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



NCA Research
12-04-1997 22:56

ABDOMEN DISPLACEMENT INCHES

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 4, 1997

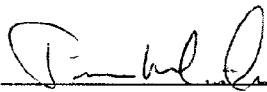
DUMMY NUMBER: 271

TEST NUMBER: D972295

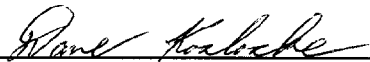
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 32% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 28 |
| FORCE @ 30° | 34 - 46 lbs | 37 |
| FORCE @ 40° | 46 - 58 lbs | 51 |
| RETURN ANGLE | 12° maximum | 4° |

TEST MEETS SPECIFICATIONS

TECHNICIAN



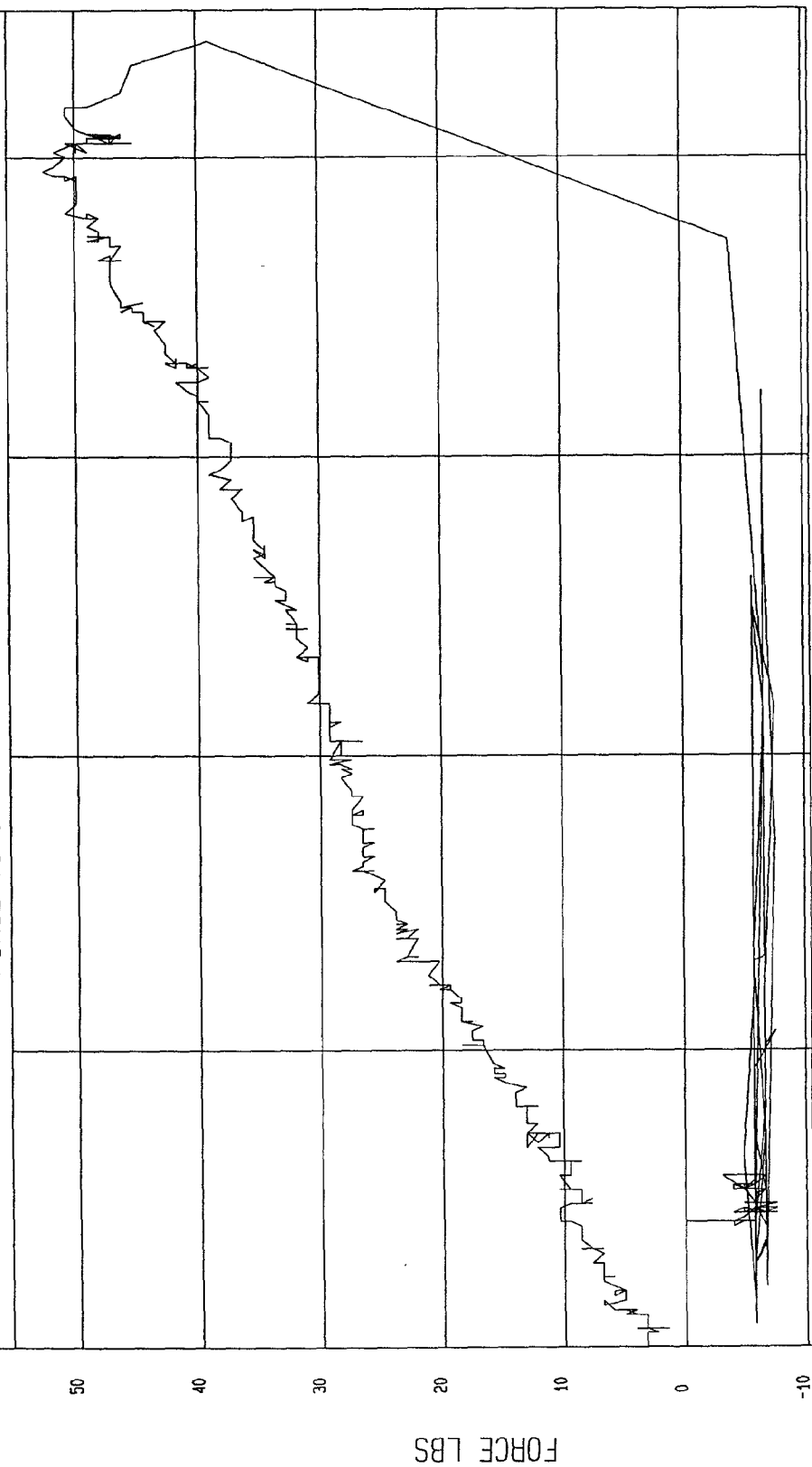
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-04-1997 - 21:54

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



40

30

20

10

0

NCA Research
12-04-1997 22.17

TORSO ROTATION DEGREES

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. |

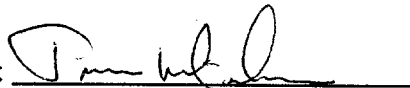
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272

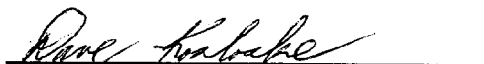
DATE OF VERIFICATION: December 15, 1997

| 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:



APPROVED BY:



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

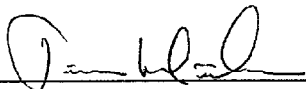
DATE: December 15, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972362

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 40 |
| LOWER RIB | 37 - 46 g's | 38 |
| LOWER SPINE | 15 - 22 g's | 20 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

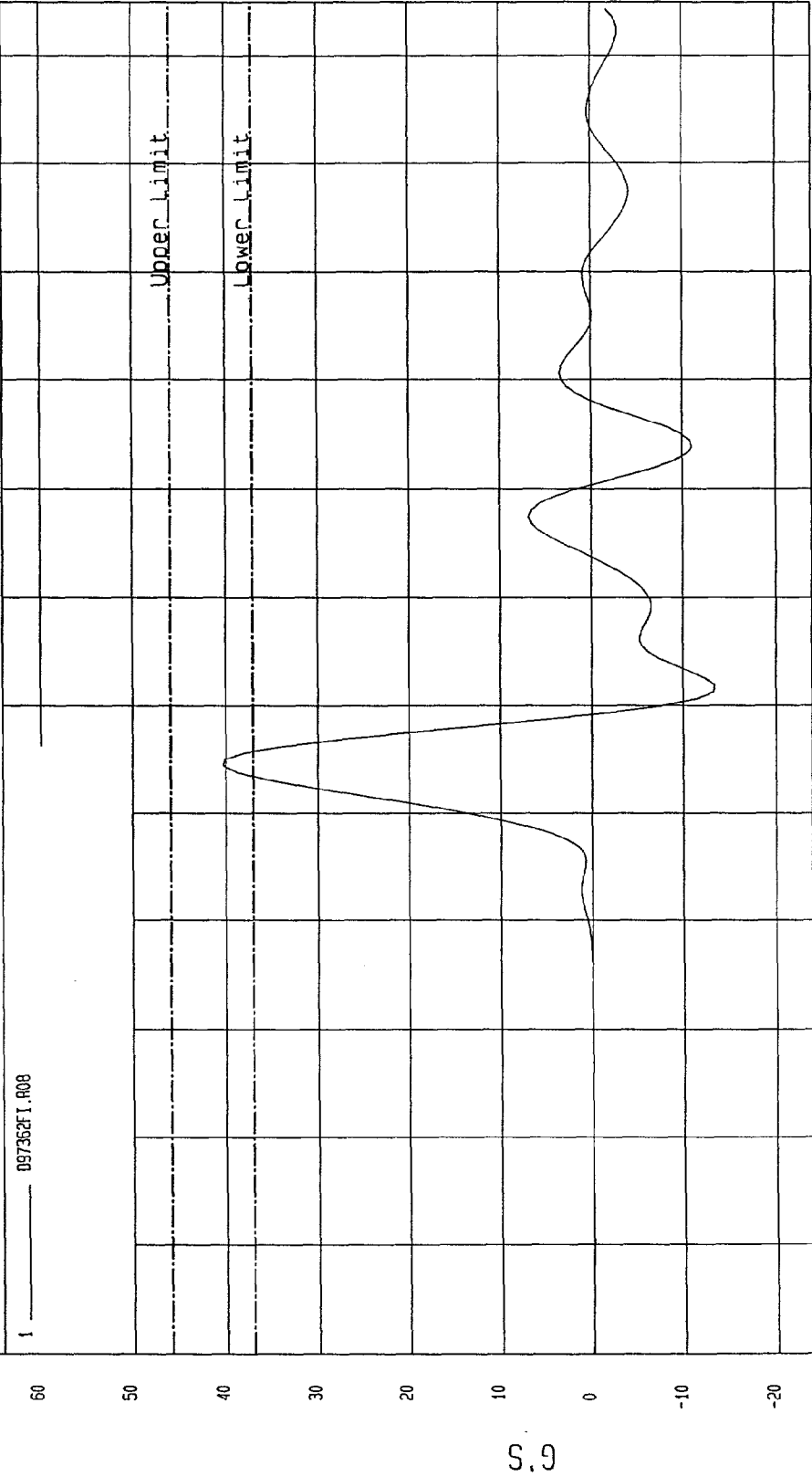
APPROVED BY 

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:41

COMPONENT: DUMMY # 272 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -13.48 G'S at 61.8 msec Maximum = 40.29 G'S at 54.3 msec

UPPER RIB ACCELERATION



TIME (SECONDS)

WSA Research
12-15-1997 11:48

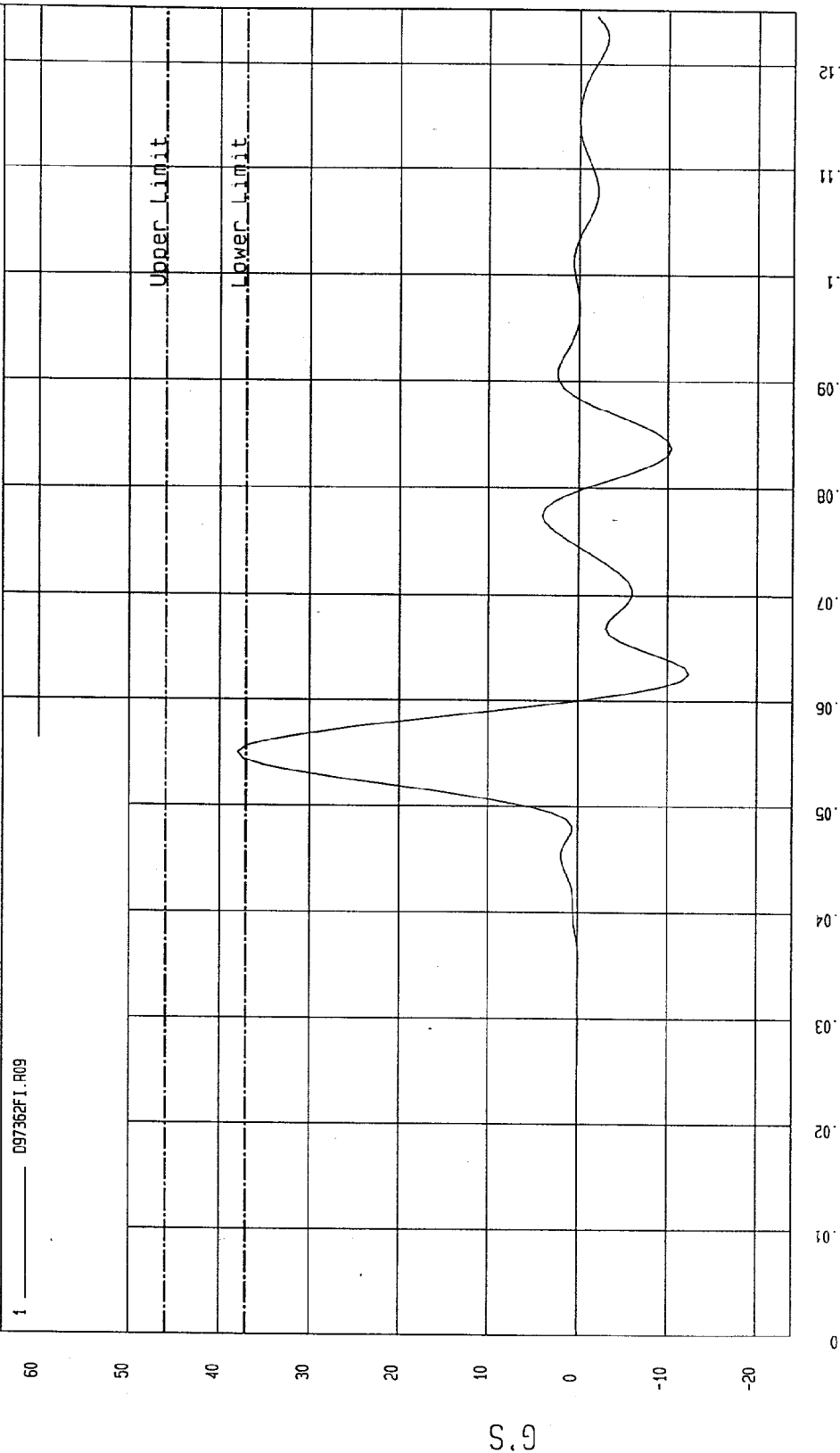
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:41

COMPONENT: DUMMY # 272 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -12.40 G'S at 62.5 msec

Maximum = 37.97 G'S at 55 msec

LOWER RIB ACCELERATION



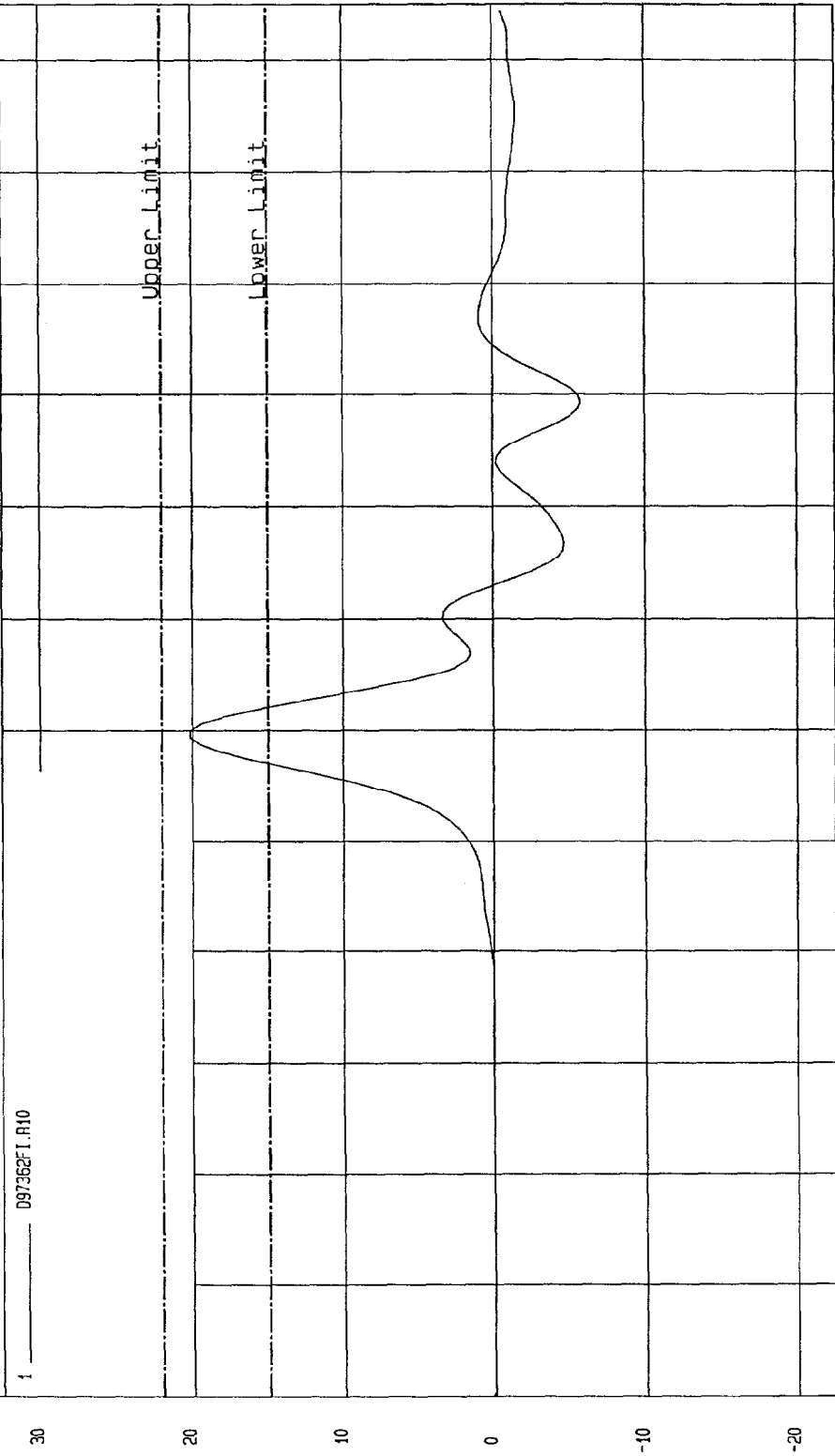
NSA Research
12-15-1997 11:48

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:41

COMPONENT: DUMMY # 272 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -5.73 G'S at 89.3 msec Maximum = 20.19 G'S at 59.3 msec

LOWER SPINE ACCELERATION



TIME (SECONDS)

0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12

MOA Research
12-15-1997 11:49

G

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

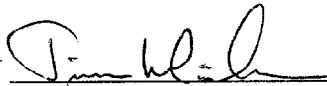
DUMMY NUMBER: 272

TEST NUMBER: D972363

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.0 |
| PELVIS ACCELERATION | 40 - 60 g's | 44 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

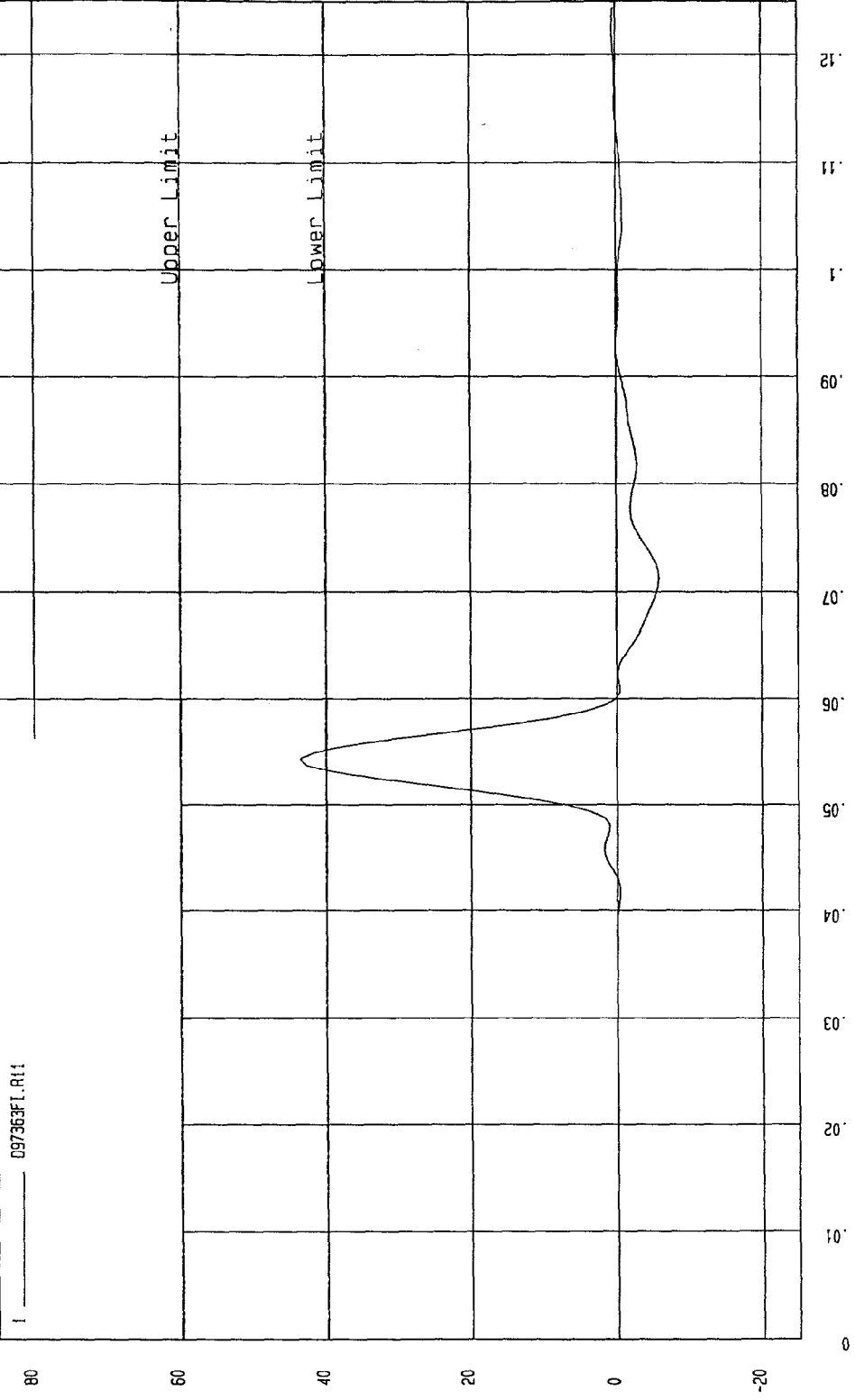


TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 12-15-1997 - 11:48:15

COMPONENT: DUMMY # 272 Velocity: 14.046 FT/SEC 4.28 M/SEC

Minimum = -5.85 G'S at 71.2 msec Maximum = 43.57 G'S at 54.3 msec

PELVIS ACCELERATION



MSA Research
12-15-1997 11:51

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

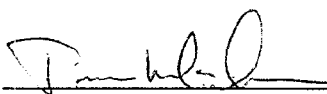
DUMMY NUMBER: 272

TEST NUMBER: D972364

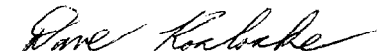
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 31.4 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 43.4 |
| FORCE @ 1.0 in | 50 - 63 lbs | 58 |
| FORCE @ 1.3 in | 73 - 88 lbs | 80 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



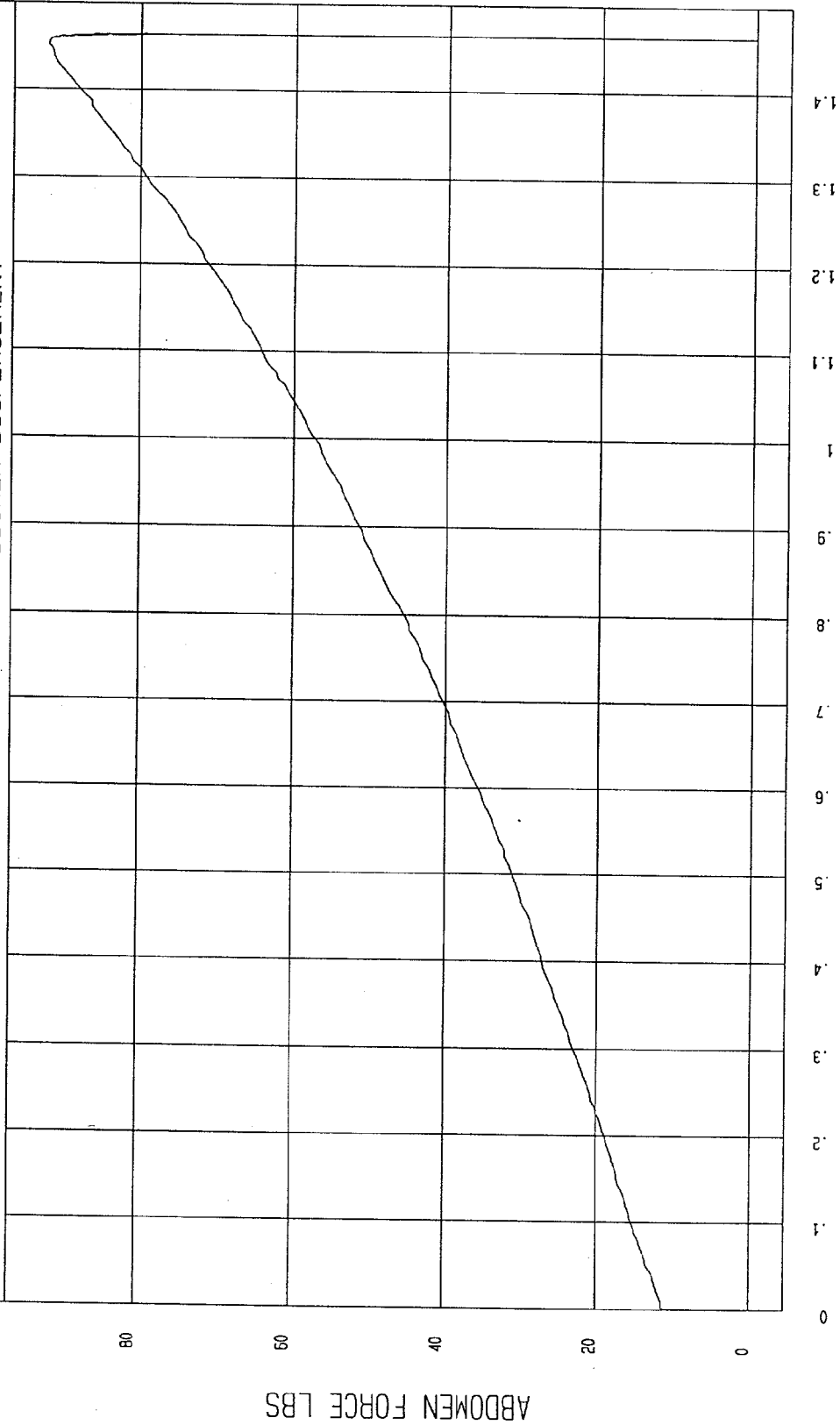
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-15-1997 - 13:49

COMPONENT: DUMMY # 272

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



NCA Research
12-15-1997 14:20

ABDOMEN DISPLACEMENT INCHES

ABDOMEN FORCE LBS

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

DUMMY NUMBER: 272

TEST NUMBER: D972365

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 25 |
| FORCE @ 30° | 34 - 46 lbs | 36 |
| FORCE @ 40° | 46 - 58 lbs | 55 |
| RETURN ANGLE | 12° maximum | 2° |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Timothy L. L.

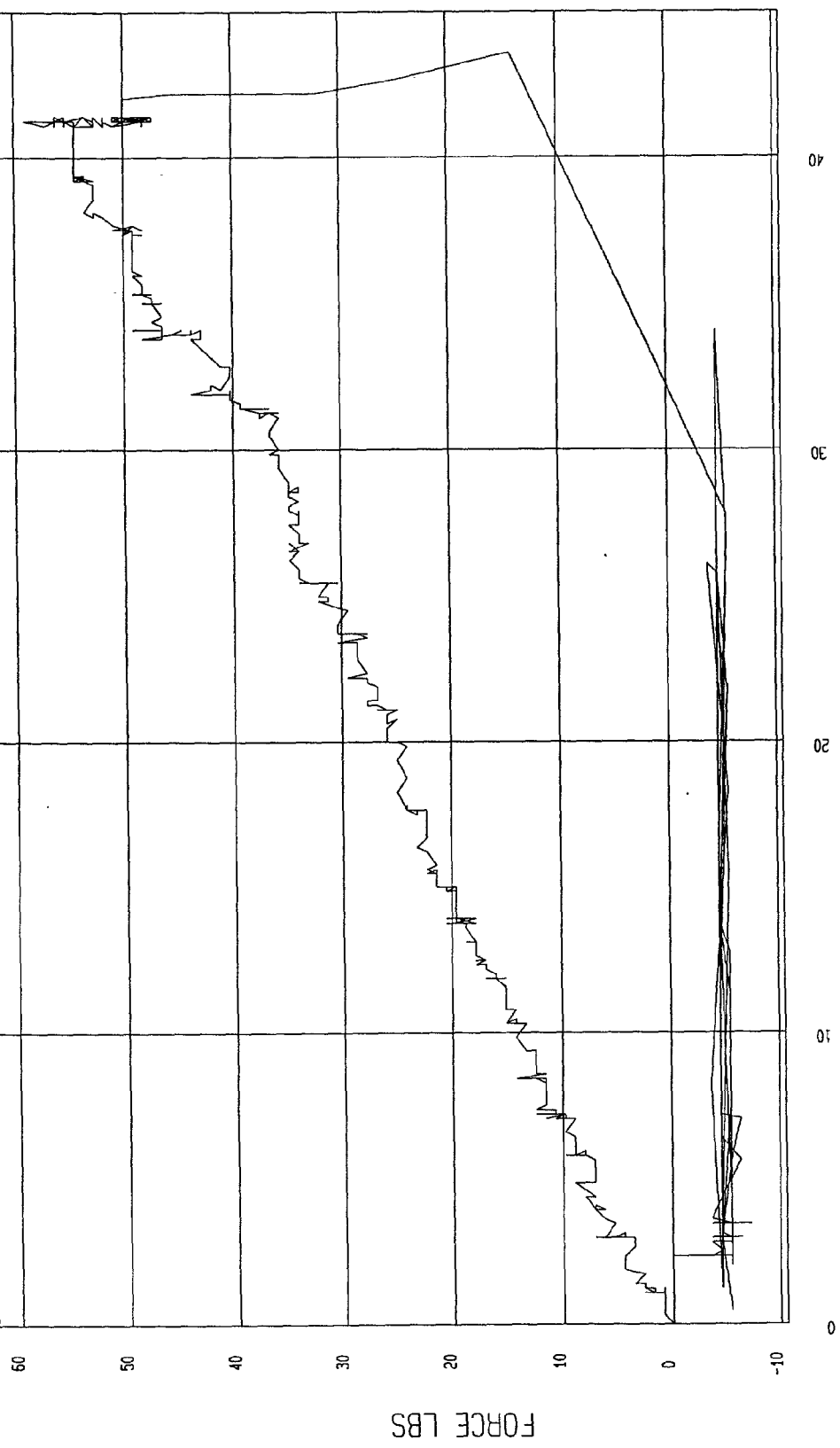
APPROVED BY

Rene K. K.

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-15-1997 - 14:13

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



WCA Research
12-15-1997 14:14

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. |

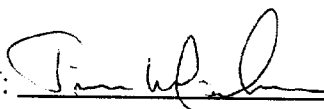
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 271

DATE OF VERIFICATION: December 15, 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)

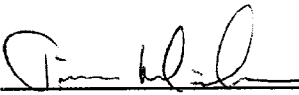
DATE: December 15, 1997

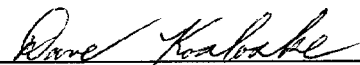
DUMMY NUMBER: 271

TEST NUMBER: D972352

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 42 |
| LOWER RIB | 37 - 46 g's | 40 |
| LOWER SPINE | 15 - 22 g's | 19 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

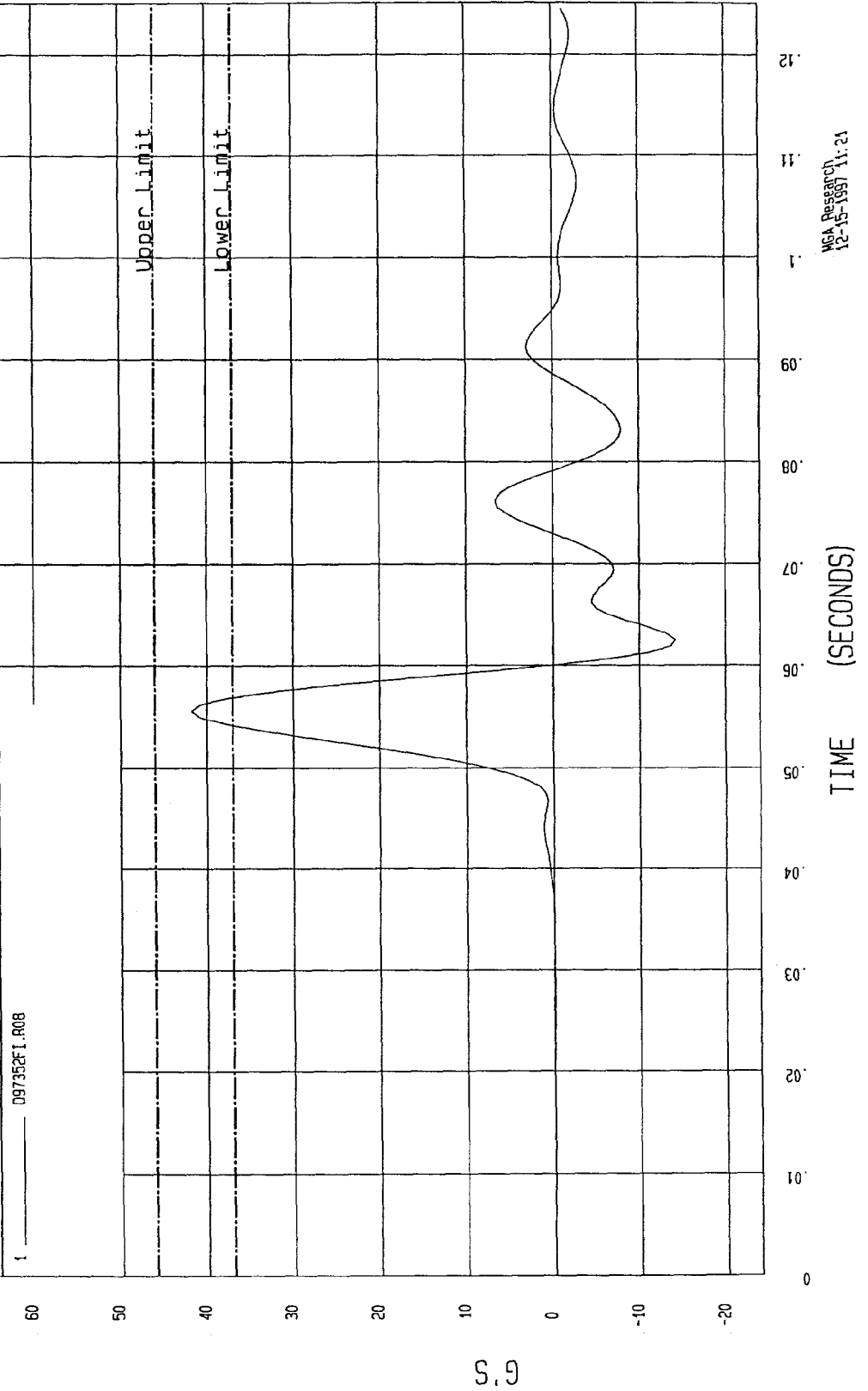
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:05

COMPONENT: DUMMY # 271 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -14.16 G's at 62.5 msec

Maximum = 41.76 G's at 55.6 msec

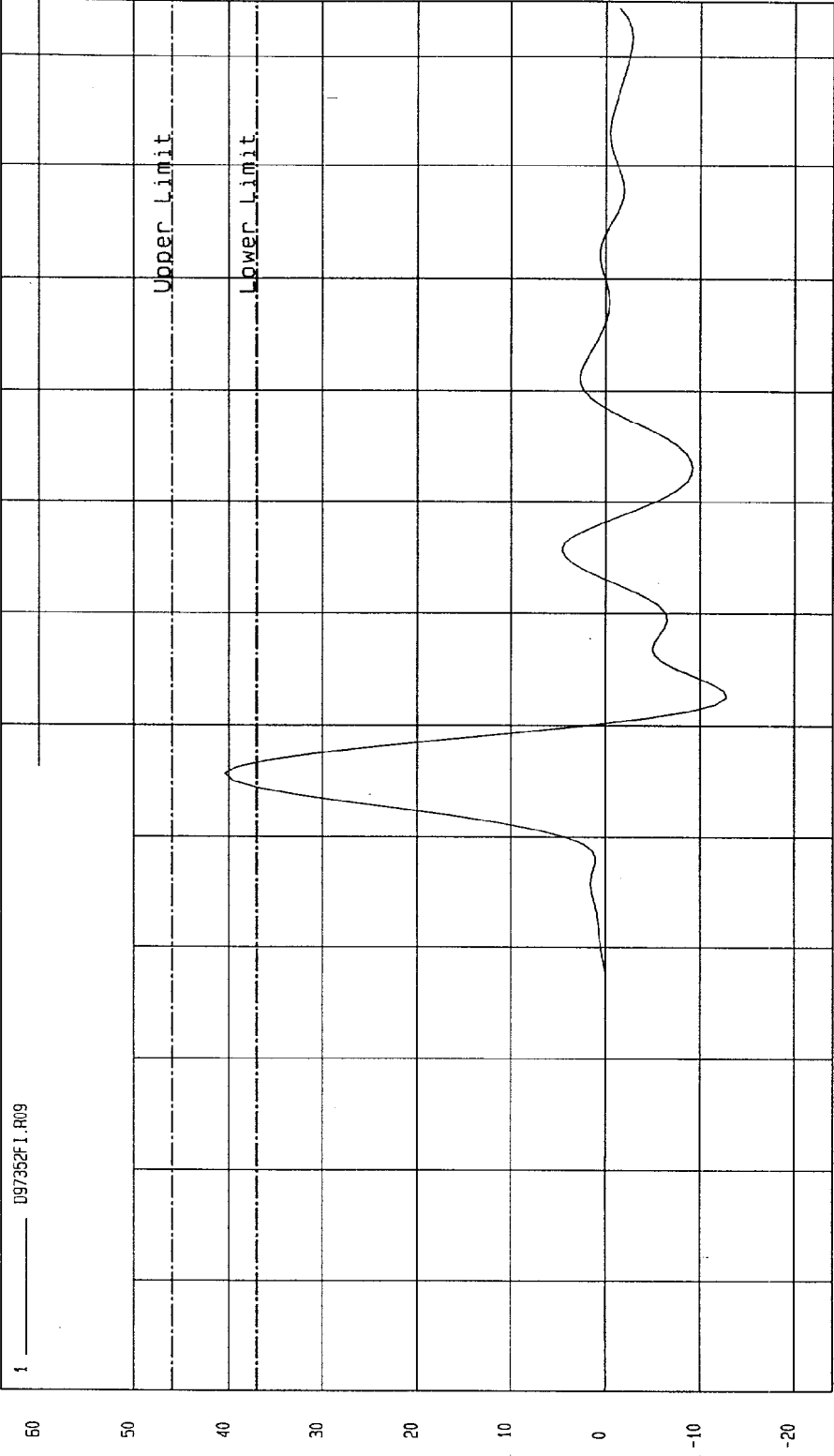
UPPER RIB ACCELERATION



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:05
COMPONENT: DUMMY # 271 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -12.79 G'S at 62.5 msec Maximum = 40.40 G'S at 55.6 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

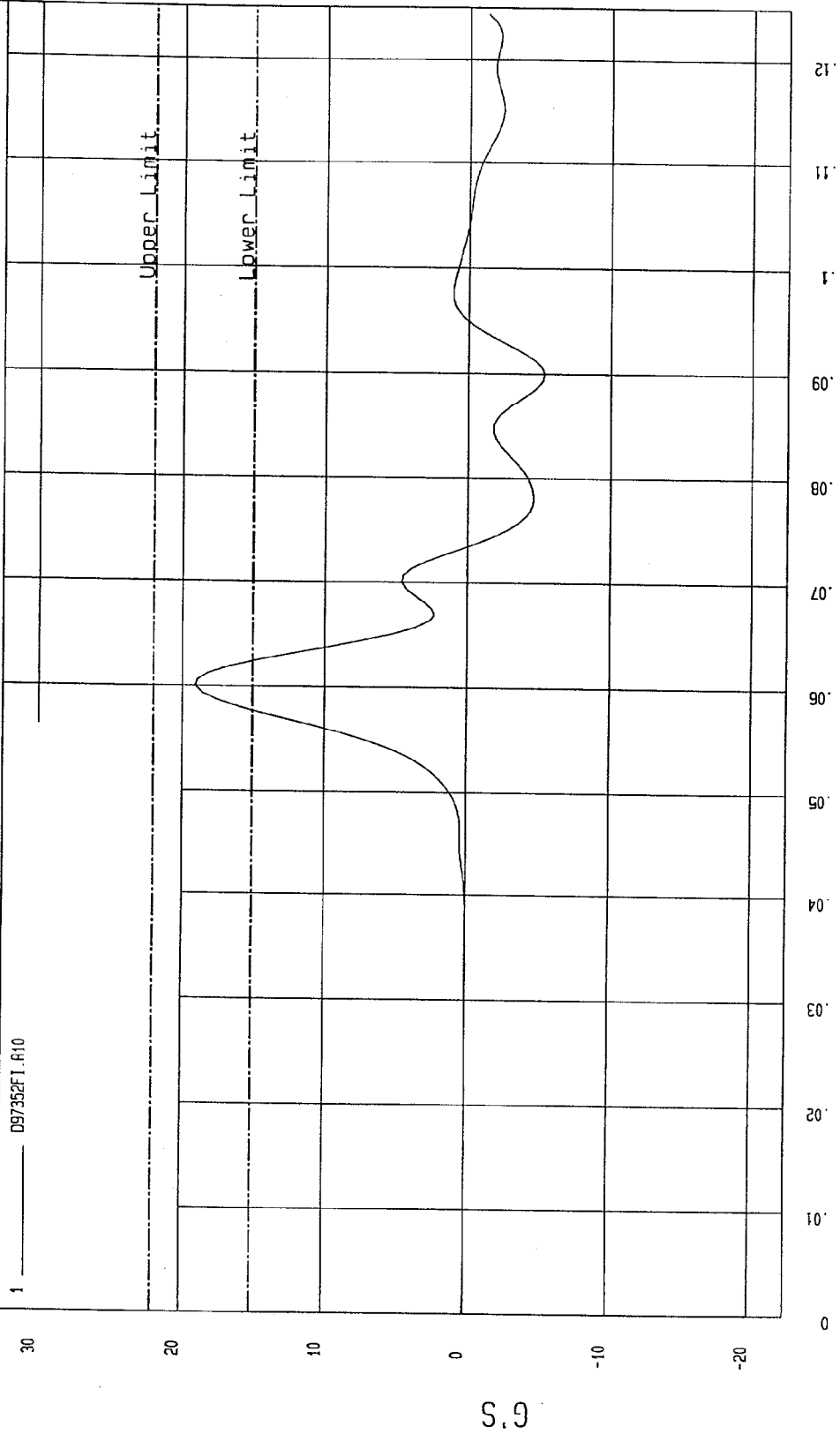
MSA Research
12-15-1997 11:22

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1997 - 11:06:04
COMPONENT: DUMMY # 271 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -5.33 G's at 90 msec

Maximum = 19.09 G's at 60 msec

LOWER SPINE ACCELERATION



MCA Research
12-15-1997 11:22

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

DUMMY NUMBER: 271

TEST NUMBER: D972353

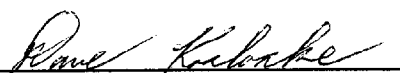
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 55 |

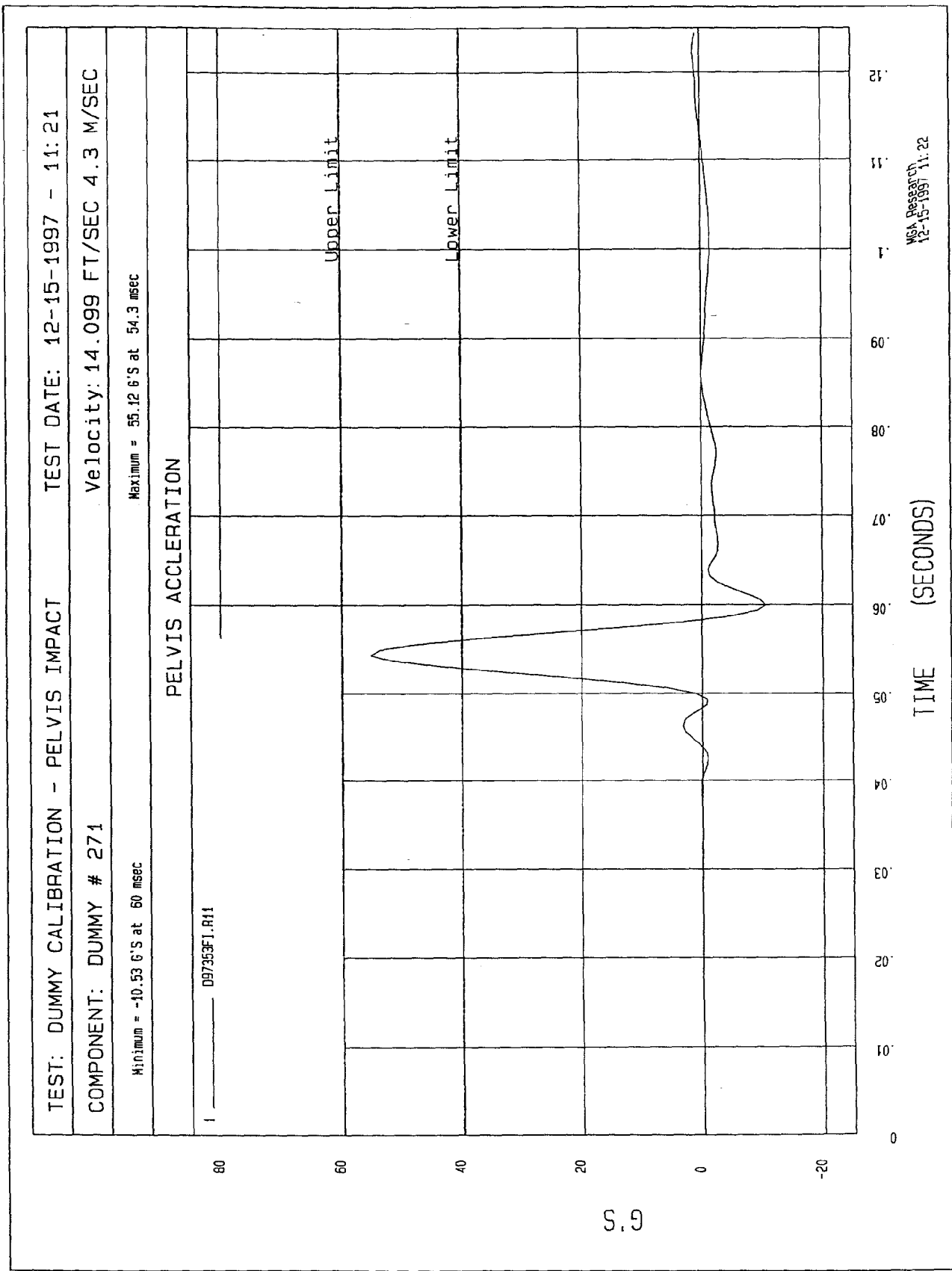
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

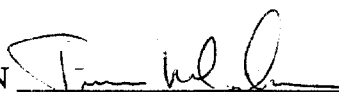
DUMMY NUMBER: 271

TEST NUMBER: D972354

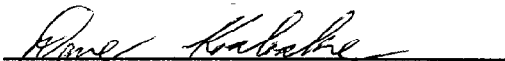
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 30.5 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 41.6 |
| FORCE @ 1.0 in | 50 - 63 lbs | 54 |
| FORCE @ 1.3 in | 73 - 88 lbs | 74 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



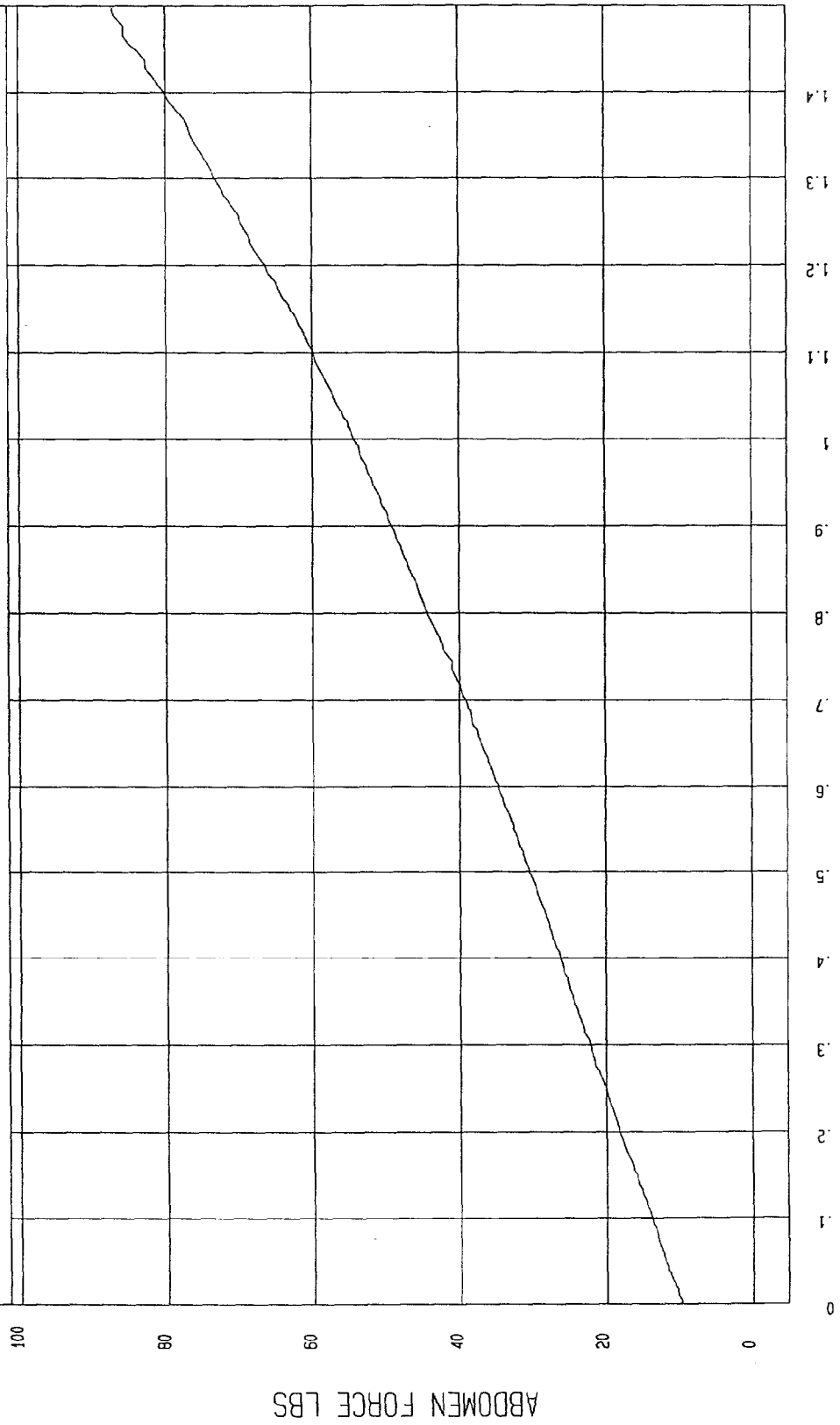
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-15-1997 - 13:42

COMPONENT: DUMMY # 271

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



NGA Research
12-15-1997 14:20

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1997

DUMMY NUMBER: 271

TEST NUMBER: D972355

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 17% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 23 |
| FORCE @ 30° | 34 - 46 lbs | 35 |
| FORCE @ 40° | 46 - 58 lbs | 47 |
| RETURN ANGLE | 12° maximum | 6° |

TEST MEETS SPECIFICATIONS

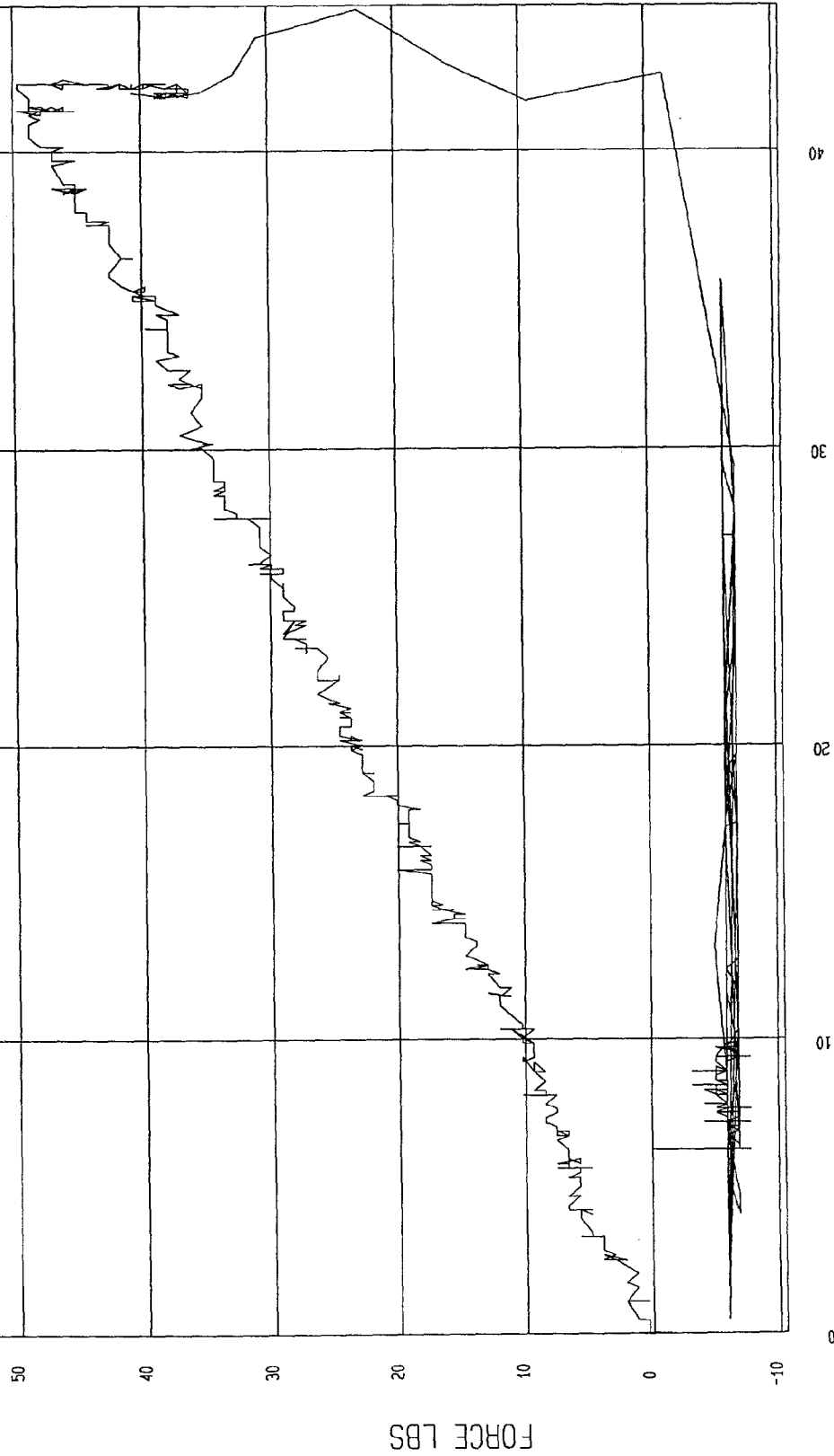
TECHNICIAN Tim White

APPROVED BY Dave Kabecke

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-15-1997 - 13:59

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



MGA Research
12-15-1997 14:14

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 272

Inspected By: Tim Michnay

Date: December 15, 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):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 271

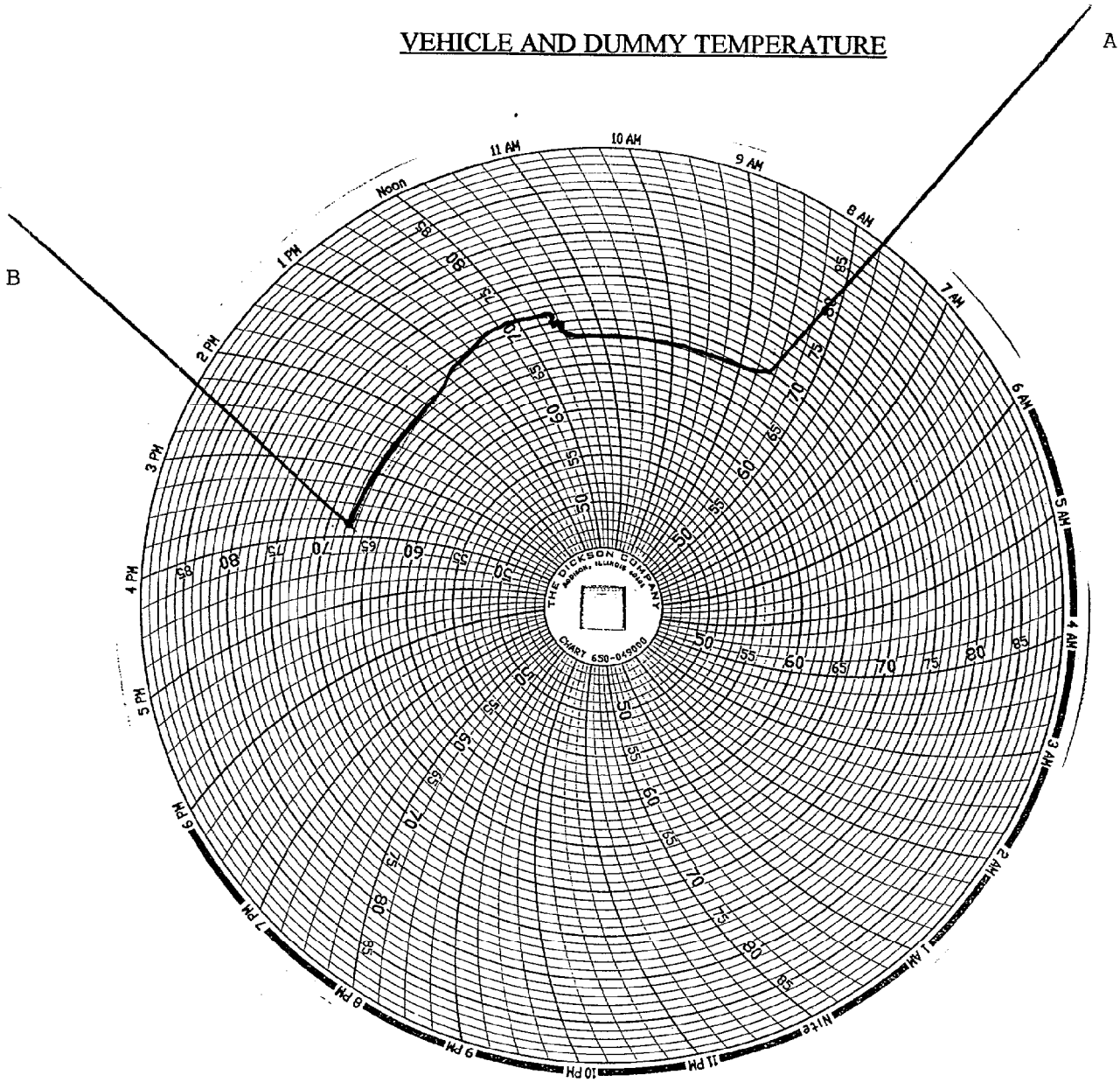
Inspected By: Tim Michnay

Date: December 15, 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 |
| Head Center of Gravity X | ALFL9 | Endevco | September 11, 1997 |
| Head Center of Gravity Y | AJ9N4 | Endevco | September 11, 1997 |
| Head Center of Gravity Z | AJ8D8 | 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 | AHTC3 | 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 |
| Head Center of Gravity X | AMP95 | Endevco | September 11, 1997 |
| Head Center of Gravity Y | AALH1 | Endevco | September 11, 1997 |
| Head Center of Gravity Z | AM748 | 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 | H02-J05 | Entran | August 6, 1997 |
| Left Lower A-Post Y | H02-J01 | Entran | August 6, 1997 |
| Left Mid B-Post Y | E10-F11 | Entran | August 5, 1997 |
| Left Lower B-Post Y | E10-F06 | Entran | August 6, 1997 |
| Rear Floorpan Above Axle X | J10-E06 | Entran | August 1, 1997 |
| Rear Floorpan Above Axle Y | I26-D02 | Entran | August 7, 1997 |
| Rear Floorpan Above Axle Z | F11-G08 | Entran | August 7, 1997 |
| Driver Seat Track Y | G01-J14 | Entran | August 7, 1997 |
| Right Side Sill at Front Seat X | B13-Z05 | Entran | August 1, 1997 |
| Right Side Sill at Front Seat Y | F12-G04 | Entran | July 14, 1997 |
| Right Side Sill at Front Seat Z | L22-G05 | Entran | August 5, 1997 |
| Right Side Sill at Rear Seat X | I26-D04 | Entran | August 7, 1997 |
| Right Side Sill at Rear Seat Y | G01-J18 | Entran | August 7, 1997 |
| Right Side Sill at Rear Seat Z | C25-A04 | Entran | July 7, 1997 |
| Left Side Sill at Front Seat Y | J06-D22 | Entran | June 12, 1997 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE ACCELEROMETERS | | |
|-----------------------------------|------------------------|--------------|------------------|
| | SERIAL NO | MANUFACTURER | CALIBRATION DATE |
| Left Side Sill at Rear Seat Y | C06-G12 | Entran | April 23, 1997 |
| Right Rear Occupant Compartment Y | F20-G12 | Entran | August 7, 1997 |
| Vehicle CG X | B14-R15 | Entran | July 14, 1997 |
| Vehicle CG Y | H02-J04 | Entran | August 7, 1997 |
| Vehicle CG Z | G13-B15 | Entran | August 5, 1997 |
| Left Front Door on Centerline | I25-J10 | Entran | August 7, 1997 |
| Midrear of Left Front Door | F20-G03 | Entran | August 7, 1997 |
| Left Front Door Upper Centerline | J23-E07 | Entran | November 5, 1997 |
| Midrear of Left Rear Door | E10-F14 | Entran | August 7, 1997 |
| Left Rear Door Upper Centerline | G13-B14 | Entran | July 16, 1997 |

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