

REPORT NO.: 214D-MGA-99-11

V298Z

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING
PASSENGER CARS

FORD MOTOR COMPANY

1999 FORD WINDSTAR
4-DOOR
NHTSA NO: MX0206

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: December 17, 1998

Report Date: December 22, 1998

FINAL REPORT

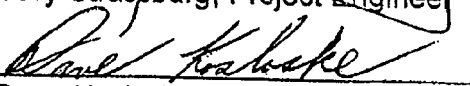
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				14. Sponsoring Agency Code NPS-10																			
15. Supplementary Notes																							
16. Abstract A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1999 Ford Windstar4-Door to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 17, 1998. The impact velocity of the Moving Deformable Barrier (MDB) was 61.9 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 22 °C. The target vehicle post test maximum crush was 401 mm at level 2. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th> <th>DRIVER</th> <th>PASS.</th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>45</td> <td>46</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>39</td> <td>50</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>62</td> <td>51</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>54</td> <td>50</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>79</td> <td>70</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.							DRIVER	PASS.	Left Upper Rib (LUR) Accel., g	45	46	Left Lower Rib (LLR) Accel., g	39	50	Lower Spine (T ₁₂) Accel., g	62	51	Thoracic Trauma Index (TTI)	54	50	Pelvis (PEV) Accel., g	79	70
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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 FY99 NCAP Side Impact Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-D-22001. The purpose of this test was to evaluate side impact protection of a 1999 Ford Windstar 4-Door.

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.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1999 Ford Windstar 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 38.46 mph (61.9 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 17, 1998. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

A SID III side impact dummy was placed in the driver designated seating position and a standard side impact dummy (SID) was placed in the left rear designated seating position 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)

The driver SID III was also instrumented with a six channel upper neck transducer. 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)	54	50
Pelvis (g)	79	70

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: 1999/Ford/Windstar/4-Door
 Vehicle NHTSA No.: MX0206 VIN: 2FMDA5246XBA04876
 Vehicle Body Color: Chestnut Brown Build Date: 11/98
 Engine Data: 6 Cylinders; CID; 3.8 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 26 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): 35 Psi FRONT
35 Psi REAR

Recommended Tire Size: P215/70R15

Tires on Test Vehicle: P215/70R15 Manufacturer: General

Vehicle Capacity Data:

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat, 7 Total

Type of Front Seats: X Bucket; Bench; Split Bench

Type of Front Seat Back: Fixed; X Adjustable with X Lever

Vehicle Maximum Capacity Loading = 544.3 kg (A)

No. of Occupants x 68.04 kg. = 476.3 kg (B)

Cargo Capacity (A-B) = 68.0 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front = 543.4 kg Right Rear = 406.0 kg

Left Front = 578.3 kg Left Rear = 391.5 kg

TOTAL FRONT = 1121.7 kg TOTAL REAR = 797.5 kg

% of Total Vehicle Weight = 58.4 %; % of Total Weight = 41.6 %

TOTAL WEIGHT = 1919.2 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 1999/Ford/Windstar/4-DoorVehicle NHTSA No.: MX0206 Test Date: December 17, 1998CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1919.2</u> kg
Cargo Carrying Capacity of Test Vehicle	=	<u>68.0</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>2148.6</u> kg

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

Right Front	=	<u>550.2</u> kg	Right Rear	=	<u>471.7</u> kg
Left Front	=	<u>637.8</u> kg	Left Rear	=	<u>485.8</u> kg
TOTAL FRONT	=	<u>1188.0</u> kg	TOTAL REAR	=	<u>957.5</u> kg
% of Total Weight	=	<u>55.4</u> %	% of Total Weight	=	<u>44.6</u> %
TOTAL WEIGHT	=	<u>2145.5</u> kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 738 mm Left Front 740 mm Right Rear 758 mm Left Rear 753 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 729 mm Left Front 720 mm Right Rear 733 mm Left Rear 711 mm

TEST ATTITUDE:

Right Front 725 mm Left Front 723 mm Right Rear 735 mm Left Rear 717 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 3080 mm

C.G. = 1348 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4820 mm

Centerline = 5048 mm

Left Side = 4815 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 180 mm

Test Position: Mid-position

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 21° measured at the lower inboard seatback

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: 101 mm

Test Position: Mid-position

Seat Back Adjustment Position: Mid-position

ADJUSTABLE STEERING COLUMN POSITION: Mid-position

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

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 26.0 gallons

Test Volume: 24.0 gallons 93 % of capacity

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

Wheelbase: = 3080 mm

Impact Point is 508 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door
 Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998
 Overall Length = 5048 mm; Overall Width = 1950 mm

TEST WEIGHT:

Right Front	= <u>571.5</u> kg	Right Rear	= <u>461.3</u> kg
Left Front	= <u>633.2</u> kg	Left Rear	= <u>476.3</u> kg
TOTAL FRONT	= <u>1204.7</u> kg	TOTAL REAR	= <u>937.6</u> kg
% of Total Weight	= <u>56.2</u> %	% of Total Weight	= <u>43.8</u> %
TOTAL VEHICLE WEIGHT = <u>2142.3</u> kg			
Wheelbase = <u>3080</u> mm			
Longitudinal C.G. from Center of Front Axle = <u>1348</u> mm			
Impact Angle with Respect to Impactor = <u>90 °</u> degrees			

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (258 mm above ground) = 274 mm
 2. LEVEL 2 (675 mm above ground) = 401 mm
 3. LEVEL 3 (742 mm above ground) = 397 mm
 4. LEVEL 4 (1000 mm above ground) = 311 mm
 5. LEVEL 5 (1590 mm above ground) = 88 mm
- Maximum Post-Test Intrusion = 401 mm

OCCUPANTS:

	<u>Driver</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID III</u>	<u>SID</u>
Restraints Used	<u>3 point belt with</u> <u>frontal and side airbags</u>	<u>3 point belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)INSTRUMENTATION:

Number of Vehicle Data Channels:		=	<u>26</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 RESULTSYear/Make/Model/Body Style: 1999/Ford/Windstar/4-DoorVehicle NHTSA No.: MX0206 Test Date: December 17, 1998POSITION OF IMPACT (MDB) ON MONORAIL:Crabbed 27 ° to leftMDB DETAILS:Overall Width of Framework Carriage = 1252 mmOverall Length of MDB (incl. honeycomb impact face) = 4115 mmWheelbase of Framework Carriage = 2591 mmTread of Framework Carriage (Front & Rear) = 1880 mmC.G. Location Rearward of Front Axle = 1098 mmC.G. Location From Center Line = -15 mmC.G. Location Above Ground Level = 485 mmMDB WEIGHT:Left Front = 457.7 kg Left Rear = 235.1 kgRight Front = 328.1 kg Right Rear = 342.6 kgTOTAL FRONT = 785.8 kg TOTAL REAR = 577.7 kgTOTAL MDB WEIGHT = 1363.5 kgImpact Angle (MDB C/L to Target Vehicle C/L) = 90 ° degreesImpact Speed = Primary: 38.46 mph (61.9 kph) Secondary: 38.55 mph (62.0 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Top of Stack (813 mm) = 126 mm
2. Row B Mid Stack (686 mm) = 45 mm
3. Row C Top of Bumper (533 mm) = 85 mm
4. Row D Center of Bumper (432 mm) = 101 mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Side airbag</u>	<u>Side window</u>
Arm	<u>Side airbag</u>	<u>Door panel</u>
Pelvis	<u>Door panel</u>	<u>Door panel</u>
Left Knee	<u>Door panel</u>	<u>Door panel</u>
Right Knee	<u>Left knee</u>	<u>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: 12 mm rear Vertical: 6 mm high

ARM REST LOCATIONS:

Front: 130 mm from bottom of window

Rear *

* Rear left door did not have an armrest

POST-TEST OBSERVATIONS (Cont'd)SEAT CRUSH:

Front Seat Back: 12 mm Front Seat Cushion: 4 mm
Left Rear Seat Back: 12 mm Rear Seat Cushion: 20 mm

GLAZING DAMAGE:

Driver and left far rear passenger windows broke/windshield cracked

PILLAR PERFORMANCE:

No separation

SILL SEPARATION:

Sill separation from 770 mm to 1030 mm forward of rear axle centerline

OTHER NOTABLE IMPACT EFFECTS:

Left rear sliding door front latch came unlatched

AIRBAG DEPLOYMENT STATUS:

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

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

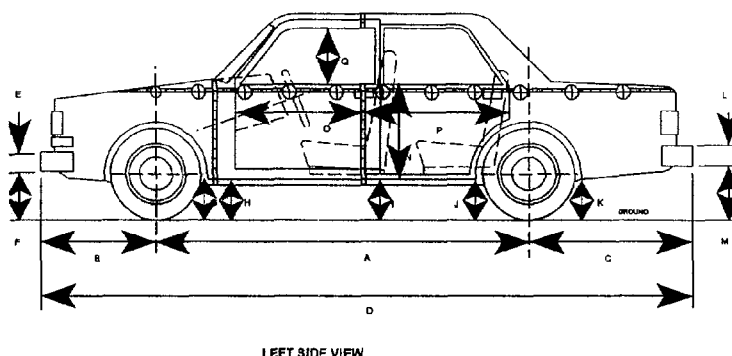
Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

	Driver SID ID # 269				Left Passenger SID ID # 270			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y	45.0	52	-7.2	96	45.6	66	-5.8	114
Left Lower Rib (LLR) Y	39.4	50	-6.4	108	49.6	65	-4.1	135
SPINE ACCELERATIONS								
Lower Lateral Y	62.4	43	-7.4	125	51.0	56	-11.4	76
PELVIS ACCELERATIONS								
Lateral Y	79.4	38	-13.6	59	70.2	49	-10.6	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)

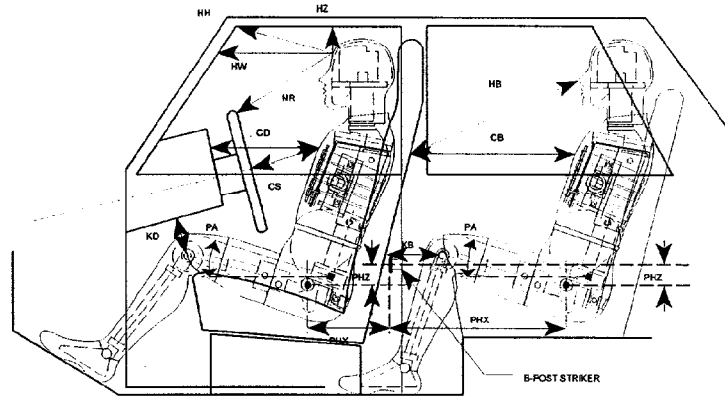
	PRE-TEST	POST-TEST	Δ CHANGE
A	3080	3115	-35
B	978	896	82
C	990	987	3
D	5048	4998	50
E	96	96	0
F	390	425	-35
G	172	193	-21
H	172	200	-28
I	180	207	-27
J1/J2	190/188	207/237	-17/-49
K	272	297	-25
L	96	96	0
M	358	372	-14
N	773	631	142
O	938	872	66
P	1227	1146	81
Q	600	579	21
R	4820	4809	11
S	4815	4735	80
T	1950	1585	365

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

NHTSA NO.: MX0206 Test Date: December 17, 1998



LEFT SIDE VIEW

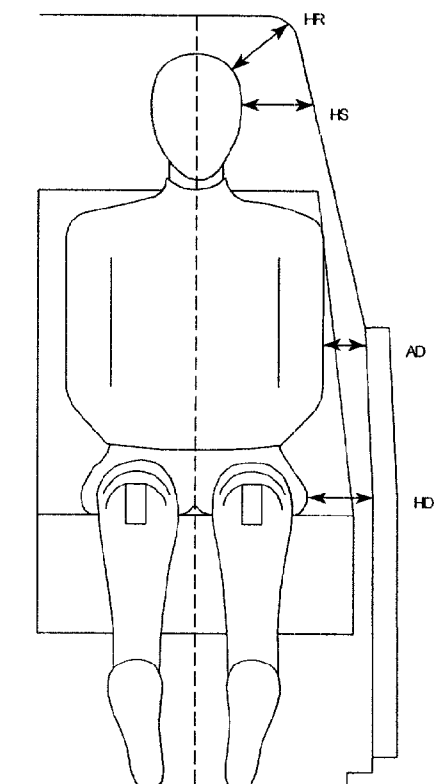
NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

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

	DRIVER SID ID # 269		LEFT REAR PASSENGER SID ID # 270
HH	472	HZ	244
HW	691	NB	577
HZ	207	CB	525
NR	484	KBL (KBA)	220 (0.0°)
CD	599	KBR (KBA)	226 (0.0°)
CS	375	PA°	24.3°
KDL(KDA°)	185 (0.0°)	PHX	269
KDR(KDA°)	178 (0.0°)	PHZ	82
PA°	24.1°		
PHX	202		
PHZ	61		

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

DATA SHEET NO. 8

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 1999/Ford/Windstar/4-DoorNHTSA NO.: MX0206 Test Date: December 17, 1998

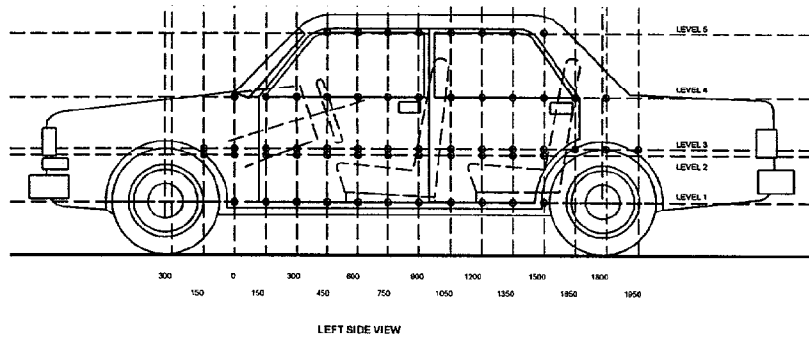
NOTE: All dimensions are in mm

	DRIVER SID ID # 269	LEFT REAR PASSENGER SID ID # 270
HR	257	354
HS	298	457
AD	119	248
HD	163	352

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

NHTSA NO.: MX0206 Test Date: December 17, 1998



NOTE: All measurements are in millimeters (mm)

LEVEL 5 - WINDOW TOP
LEVEL 4 - WINDOW SILL
LEVEL 3 - OCCUPANT H-POINT
LEVEL 2 - MID-DOOR
LEVEL 1 - AXLE CENTERLINE HEIGHT OR SILL TOP HEIGHT

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

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 1 @ Axle Centerline Height

(or Sill Top Height) = 258 mm

Level 2 @ Mid Door = 675 mm

Level 3 @ Occupant H-Point = 742 mm

Level 4 @ Window Sill = 1000 mm

Level 5 @ Window Top = 1590 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)	562	609	47
150	562	654	92
300	562	683	121
450	563	717	154
600	562	748	186
750	562	783	221
900	561	835	274
1050	561	817	256
1200	560	793	233
1350	560	752	192
1500	560	719	159
1650	560	619	59
1800	558	646	88

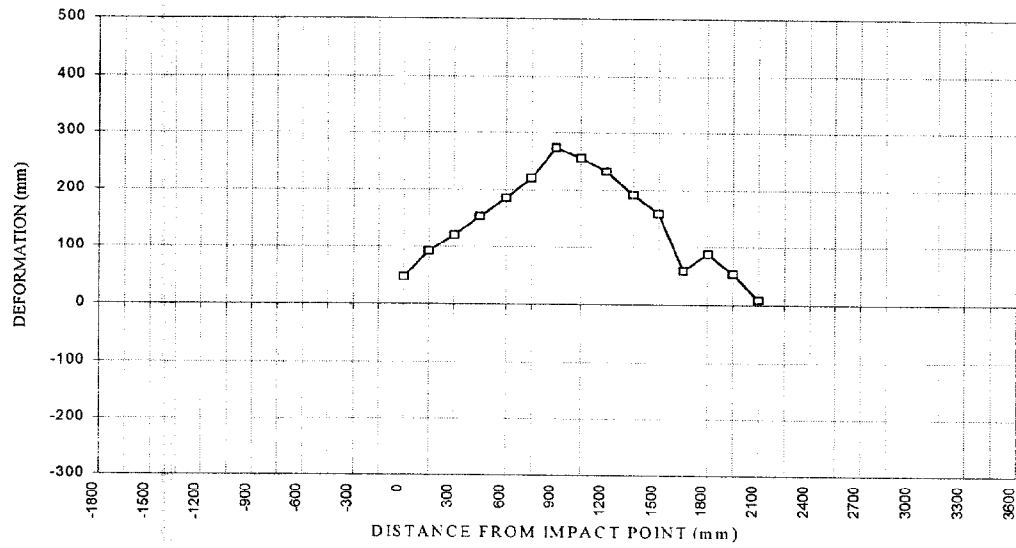
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

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	555	609	54
2100	557	566	9
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 - Mid Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900	535	551	16
-750			
-600			
-450			
-300			
-150	507	563	56
0 (impact point)	512	643	131
150	512	764	252
300	513	834	321
450	513	865	352
600	512	882	370
750	510	885	375
900	508	873	365
1050	507	865	358
1200	506	907	401
1350	507	882	375
1500	508	888	380
1650	508	865	357
1800	508	831	323

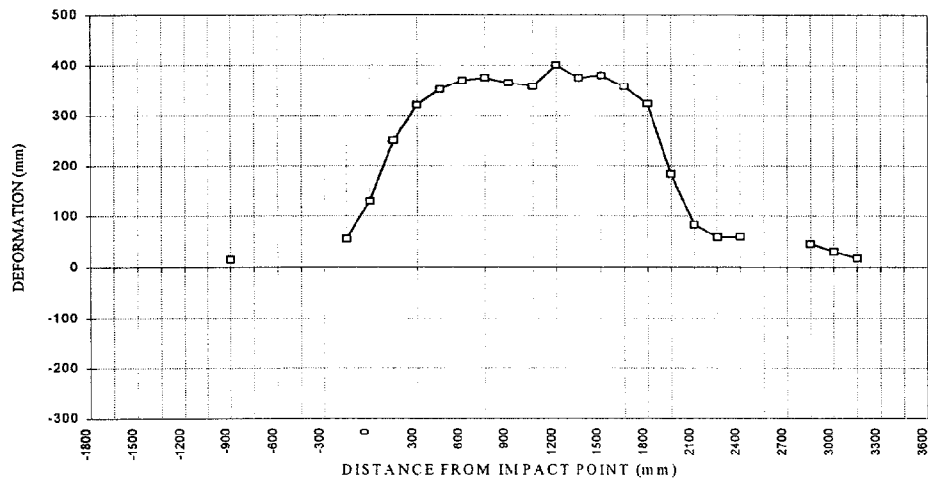
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 2 - Mid Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	508	692	184
2100	507	590	83
2250	500	559	59
2400	497	557	60
2550			
2700			
2850	508	554	46
3000	528	559	31
3150	553	571	18
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 - MID DOOR

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

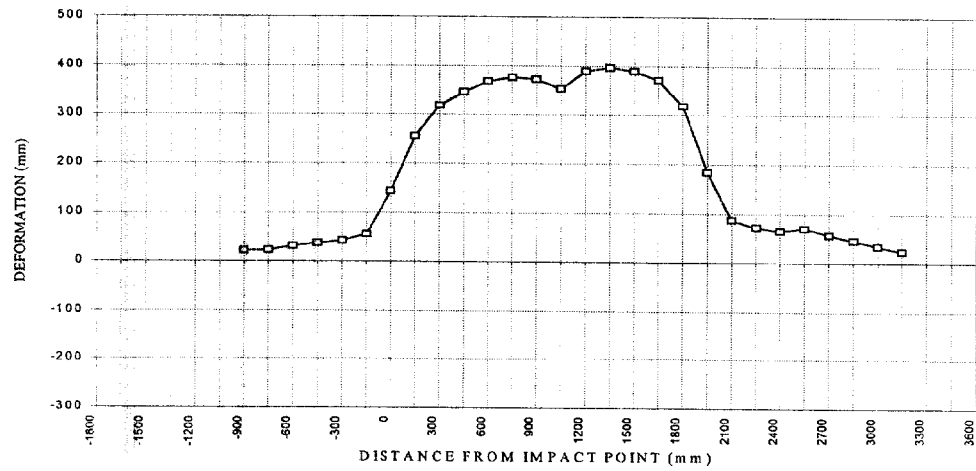
	Level 3 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900	536	558	22
-750	517	540	23
-600	507	538	31
-450	504	541	37
-300	502	544	42
-150	503	559	56
0 (impact point)	507	651	144
150	507	762	255
300	506	825	319
450	505	852	347
600	504	873	369
750	502	879	377
900	501	874	373
1050	501	855	354
1200	500	890	390
1350	501	898	397
1500	503	893	390
1650	505	877	372
1800	505	824	319

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 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	504	688	184
2100	504	592	88
2250	500	573	73
2400	494	559	65
2550	493	564	71
2700	496	553	57
2850	506	552	46
3000	524	558	34
3150	548	572	24
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 - OCCUPANT H-POINT

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	633	639	6
-900	605	621	16
-750	585	610	25
-600	572	600	28
-450	563	598	35
-300	554	597	43
-150	550	601	51
0 (impact point)	549	618	69
150	547	656	109
300	547	683	136
450	544	714	170
600	544	744	200
750	543	772	229
900	544	792	248
1050	545	803	258
1200	545	856	311
1350	545	838	293
1500	545	788	243
1650	547	746	199
1800	547	692	145

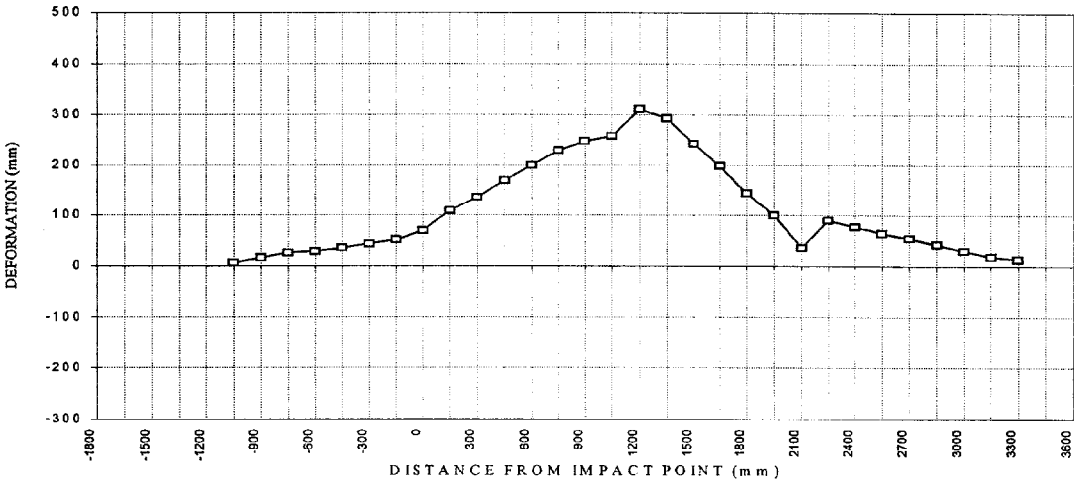
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

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	548	648	100
2100	552	588	36
2250	557	647	90
2400	563	640	77
2550	568	632	64
2700	574	628	54
2850	580	622	42
3000	585	614	29
3150	589	607	18
3300	611	624	13
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

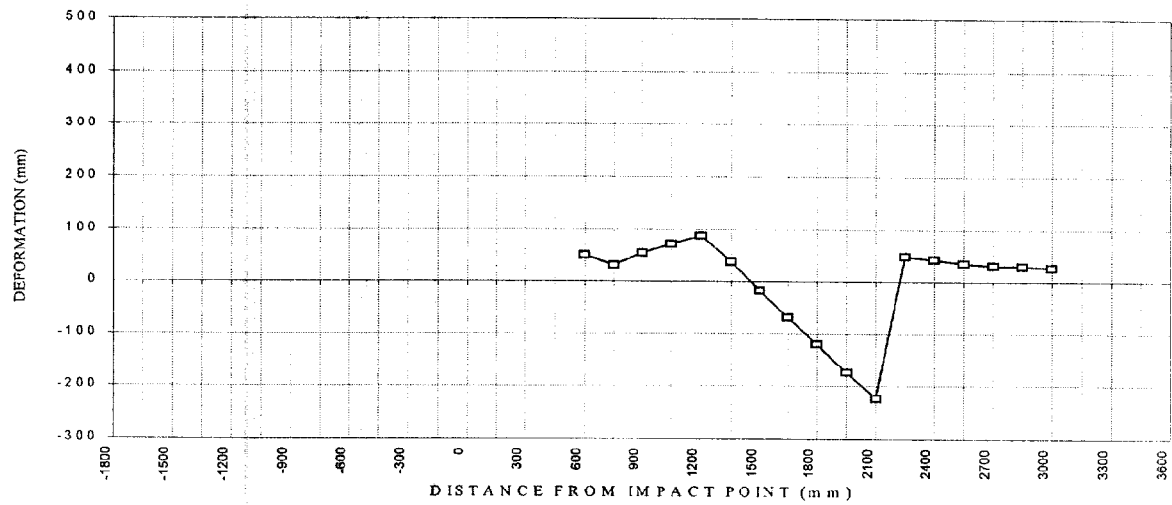
	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600	784	834	50
750	784	815	31
900	782	836	54
1050	782	854	72
1200	785	873	88
1350	788	826	38
1500	790	773	-17
1650	792	724	-68
1800	795	676	-119

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	798	624	-174
2100	797	574	-223
2250	798	846	48
2400	802	844	42
2550	808	843	35
2700	812	843	31
2850	814	844	30
3000	824	851	27
3150			
3300			
3450			
3600			

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

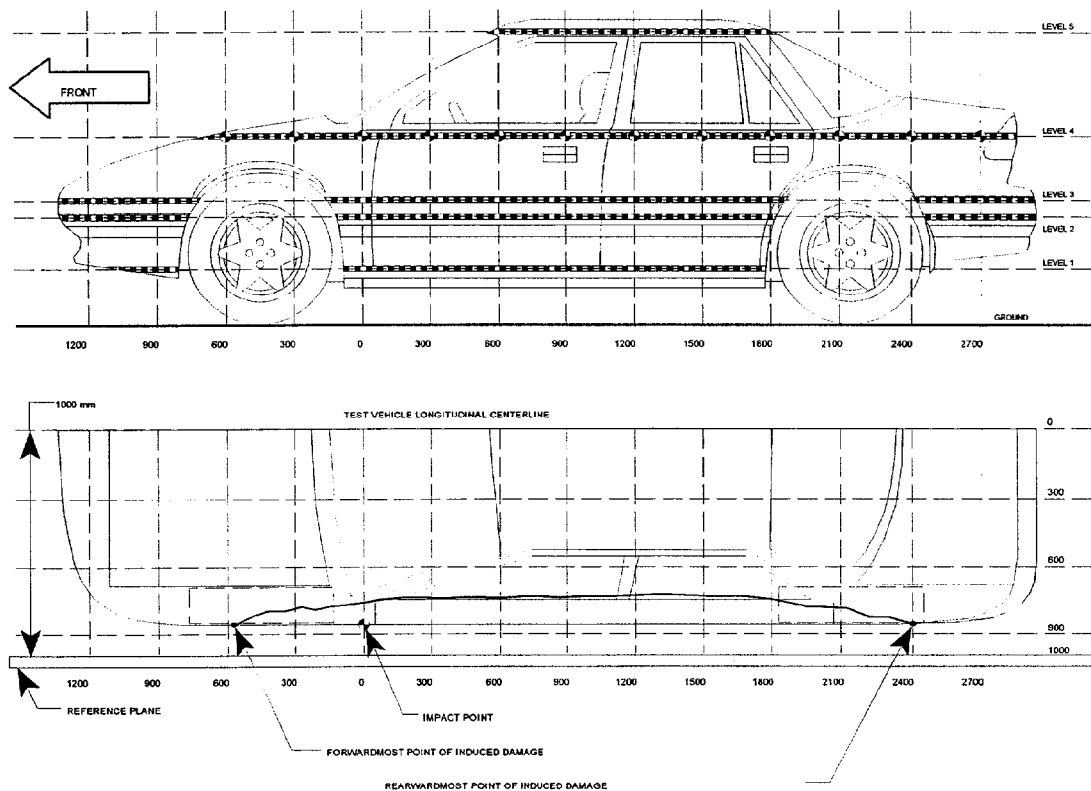
VEHICLE EXTERIOR STATIC CRUSH

LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

NHTSA NO.: MX0206 Test Date: December 17, 1998



NOTE: All measurements are in millimeters (mm)

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = <u>-450</u> mm)	504	504	0
2. 180 mm	840	542	298
3. 820 mm	882	535	347
4. 1500 mm	857	503	354
5. 2258 mm	607	557	50
6. (LR = <u>2850</u> mm)	580	580	0

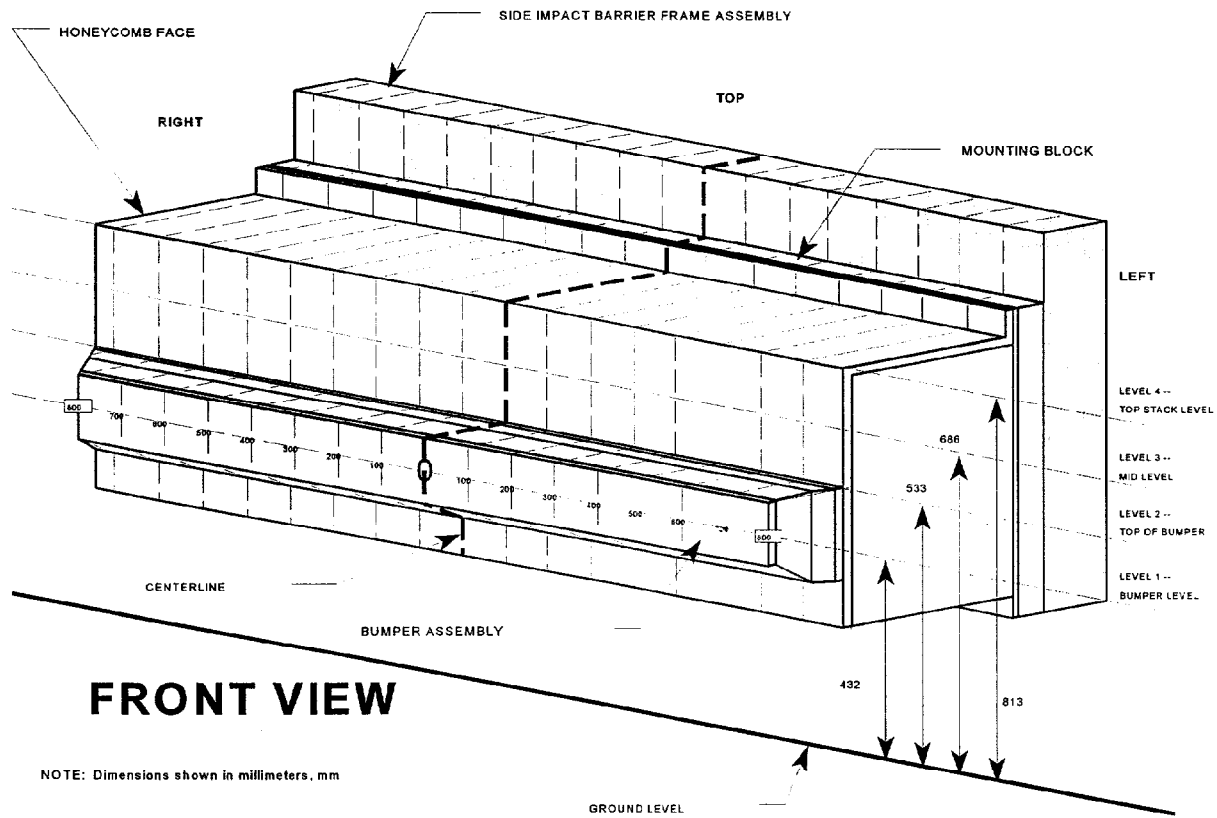
DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door
Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

Location	Height at CL	Distance Right of Center (mm)									Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	112	57	29	20	16	20	29	51	61	50	45	40	42	61	78	101	126
Mid Level Level 3	686 mm	44	22	14	10	9	12	12	14	24	13	11	11	12	14	17	36	45
Top Bumper Level 2	533 mm	85	77	69	64	60	51	51	60	51	49	50	51	55	56	54	58	60
Mid Bumper Level 1	432 mm	101	91	85	79	75	73	74	71	75	62	60	61	60	61	62	66	70

See next page for Barrier Face Graphic

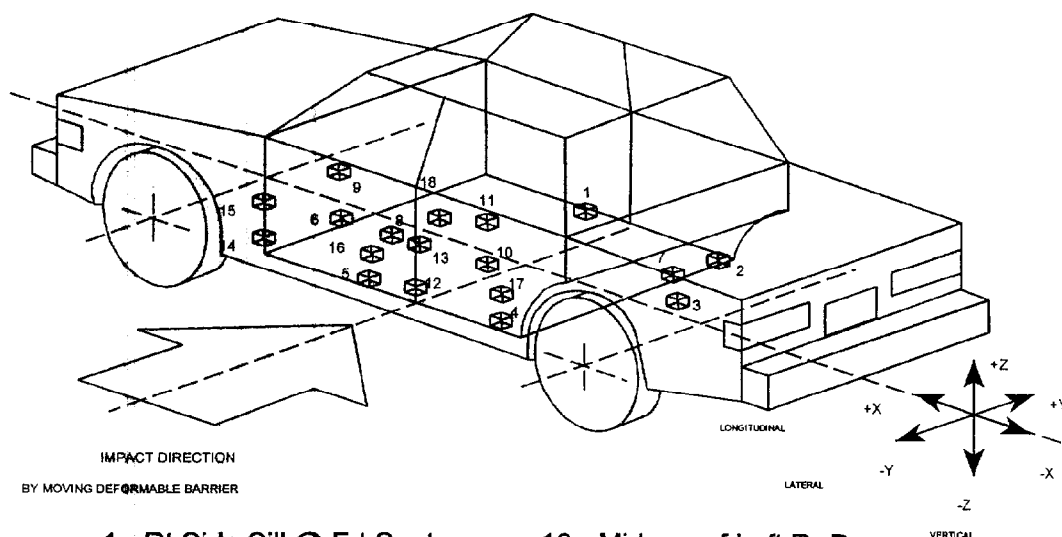
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998



- 1 - Rt Side Sill @ Frt Seat
- 2 - Rt Side Sill @ Rr Seat
- 3 - Rr Floorpan Above Axle
- 4 - Left Side Sill @ Rr Seat
- 5 - Left Side Sill @ Frt Seat
- 6 - Left Frt Door on Centerline
- 7 - Rt Rr Occ Compartment
- 8 - Midrear of Left Frt Door
- 9 - Left Frt Door Uptr C/Line

- 10 - Midrear of Left Rr Door
- 11 - Left Rr Door Uptr C/Line
- 12 - Left Lwr B-Post
- 13 - Left Middle B-Post
- 14 - Left Lwr A-Post
- 15 - Left Middle A-Post
- 16 - Frt Seat Track
- 17 - Rr Seat Track
- 18 - Vehicle C.G.

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

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	3016	730	243	6.2	-4.6	23.1	-5.0	4.3	-8.5	24.1
2	Rt. Side Sill @ Rear Seat	2005	730	262	6.2	-4.8	21.6	-4.2	4.6	-5.1	21.7
3	Rr. Floorpan Above Axle	1004	0	570	1.7	-8.9	19.7	-2.9	6.9	-6.9	21.3
4	Left Side Sill @ Rr. Seat	2001	-730	261	---	---	66.1	-31.3	---	---	---
5	Left Side Sill @ Frt. Seat	3022	-730	245	---	---	110.7	-19.0	---	---	---
6	Left Front Door Centerline	3056	-830	742	---	---	193.0	-178.4	---	---	---
7	Right Rear Occupant Compartment	2190	400	435	---	---	19.5	-2.4	---	---	---
8	Mid Rear of Left Front Door**	2713	-828	748	---	---	161.5	-27.2	---	---	---
9	Left Front Door Upper Centerline	3050	-825	973	---	---	77.3	-68.0	---	---	---
10	Left Rear Door Mid Rear	1745	-914	748	---	---	215.3	-182.9	---	---	---
11	Left Rear Door Upper Centerline	2012	-826	1007	---	---	112.5	-31.1	---	---	---
12	Left Lower B-Post***	2481	-790	432	---	---	113.8	---	---	---	---
13	Left Mid B-Post	2420	-785	1035	---	---	137.8	-39.3	---	---	---
14	Left Lower A-Post	3540	-755	450	---	---	51.9	-19.8	---	---	---
15	Left Mid A-Post	3547	-800	1120	---	---	14.1	-6	---	---	---
16	Driver Left Seat Track	2627	-585	530	---	---	103.5	-57.2	---	---	---
17	Left Rear Pass. Left Seat Track	1692	-470	495	---	---	92.3	-117.8	---	---	---
18	Vehicle CG	2738	0	410	12.2	-7.3	19.2	-4.6	13.9	-11.7	19.8

*Reference: X - Rear Bumper (+ Forward)

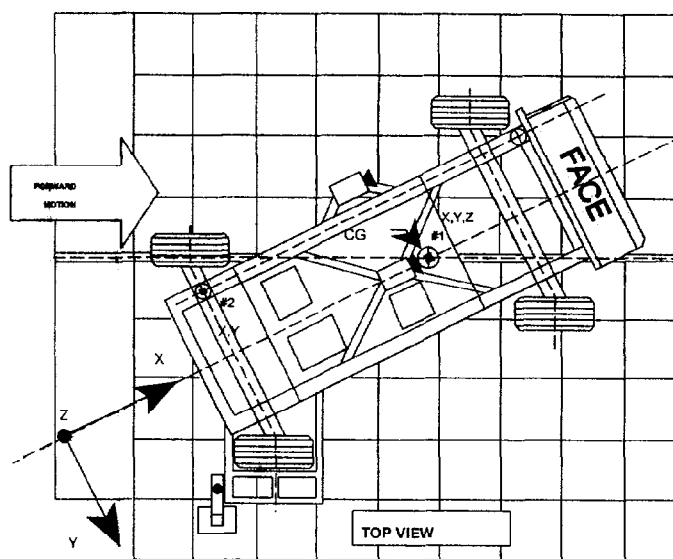
** Not valid after 20 msec.

Y - Vehicle Centerline (+ To right)

*** Not valid after 19 msec.

Z - Ground Level (+ Up)

DATA SHEET NO. 14

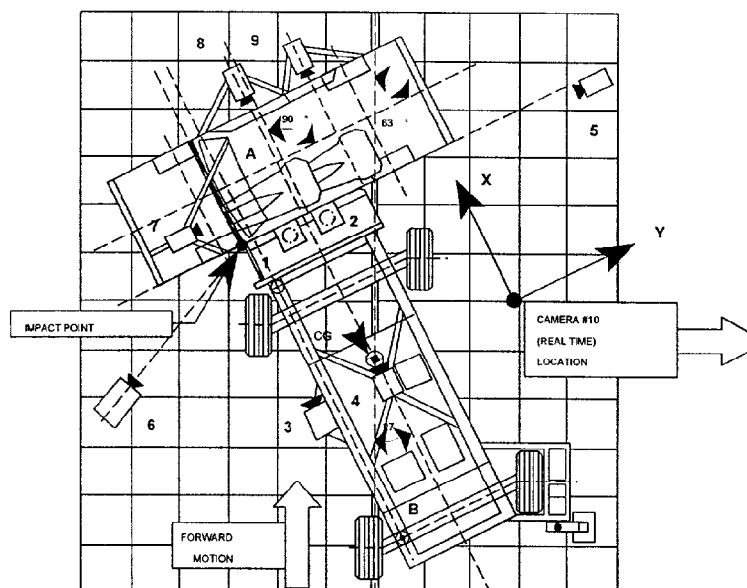
MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 1999/Ford/Windstar/4-DoorVehicle NHTSA No.: MX0206 Test Date: December 17, 1998

Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.9	156	-18.7	53
	Lateral (Y)	---	---	---	.7	68	-9.7	40
	Vertical (Z)	---	---	---	8.9	47	-8.3	20
	Resultant (R)	---	---	---	20.8	40	---	---
2	Rear Frame Member	-2501	-625	622				
	Longitudinal (X)	---	---	---	1.9	192	-20.1	41
	Lateral (Y)	---	---	---	6.9	28	-1.4	197

*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: 1999/Ford/Windstar/4-Door
 Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998



Camera No.	View	Coordinates (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
	Real Time					
1	Top Overall	-160	1280	5000	8	990
2	Top Impact	-215	40	5000	13	913
3	Cart Pointer				35	1010
4	Cart Overall				13	1020
5	Right Impact	-345	2705	1660	25	1015
6	Left Impact	-535	-104500	1740	13	1005
7	Onboard Hood				13	1000
8	Onboard Driver				8	1111
9	Onboard Rear Occupant				8	976

* 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: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

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 38.46 mph (61.9 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

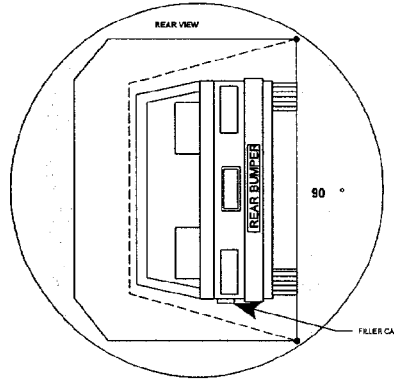
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 54 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 54 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

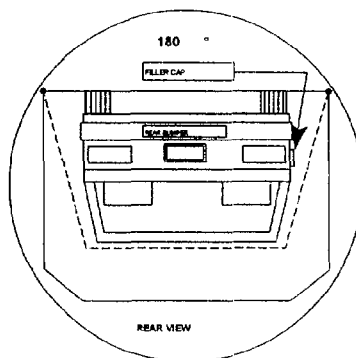
FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 27 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 27 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

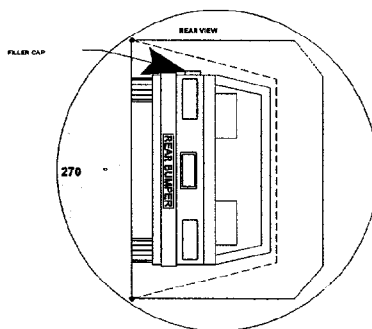
FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

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

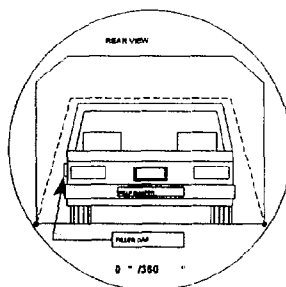
FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Ford/Windstar/4-Door

Vehicle NHTSA No.: MX0206 Test Date: December 17, 1998

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 44 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 44 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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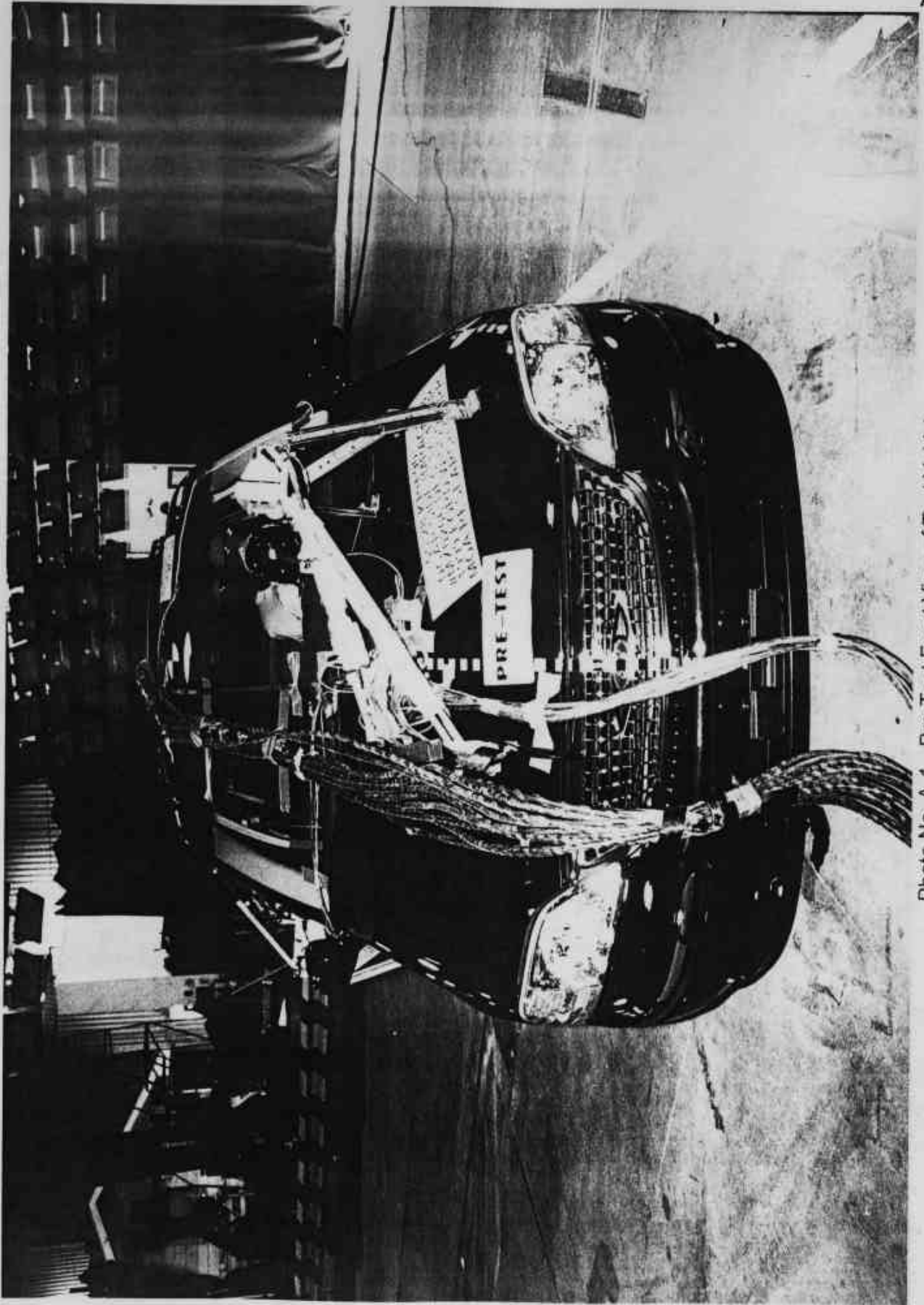


Photo No. A-1 - Pre-Test Front View of Test Vehicle

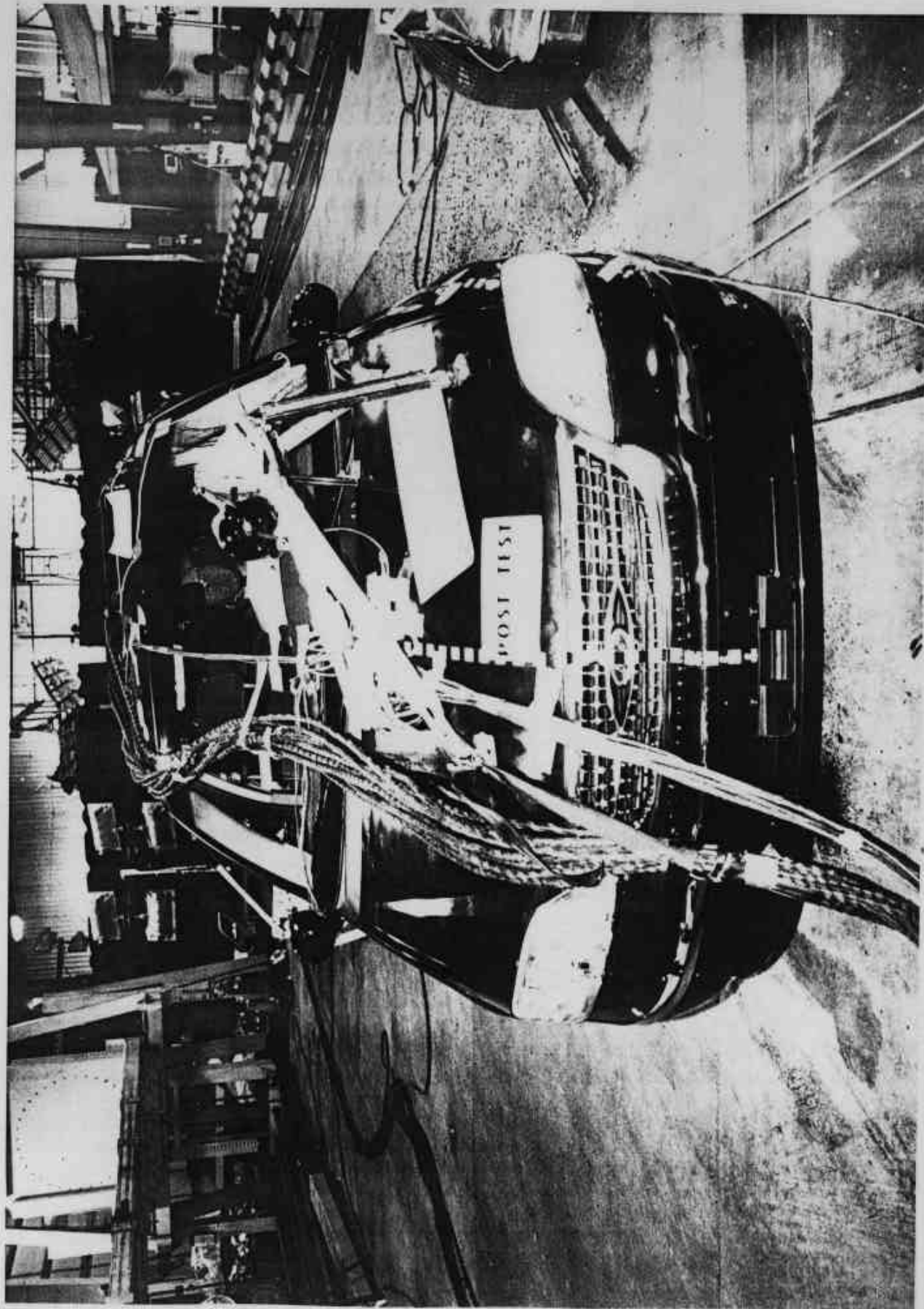


Photo No. A-2 - Post-Test Front View of Test Vehicle

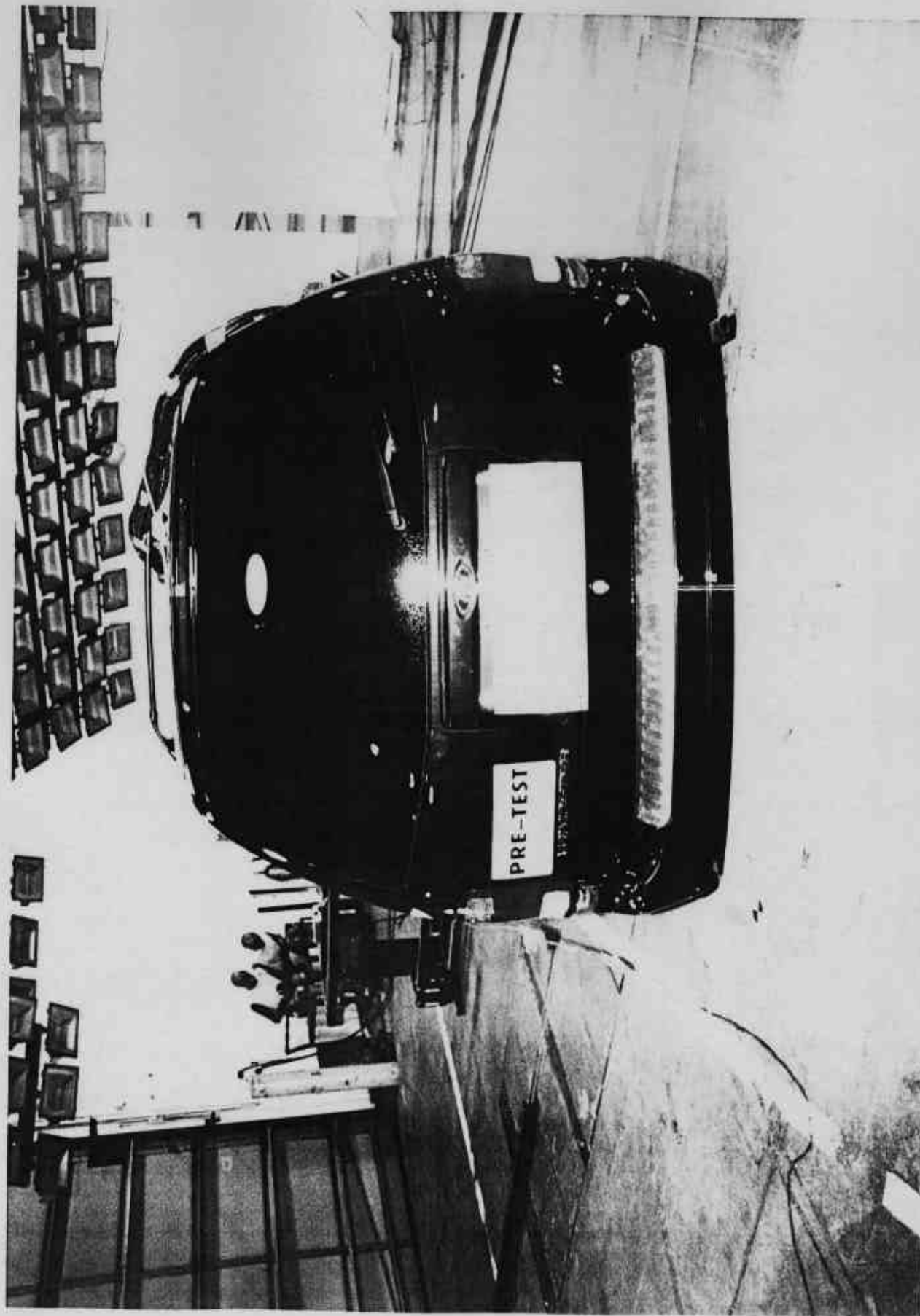


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

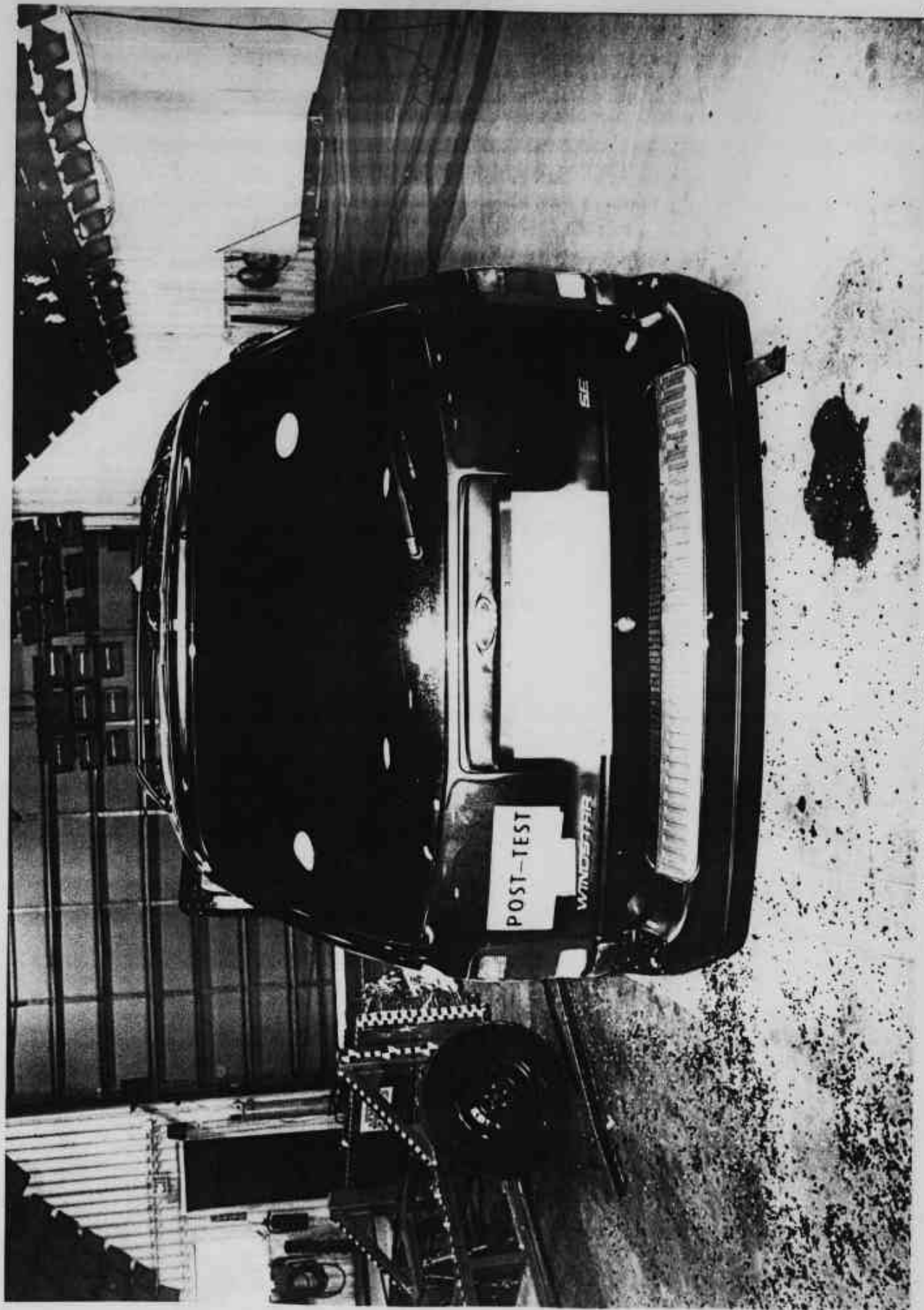


Photo No. A-4 - Post-Test Rear View of Test Vehicle

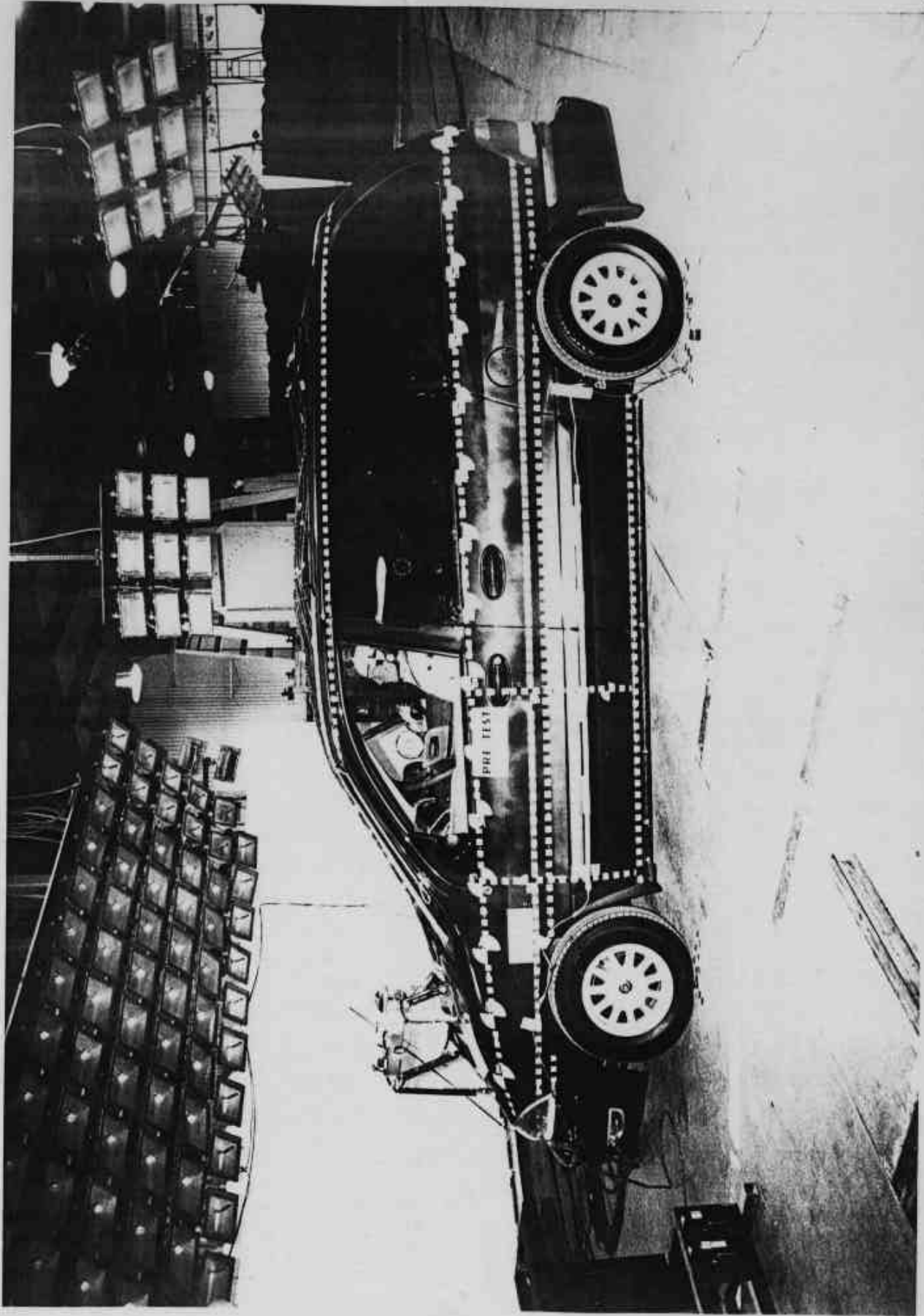


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

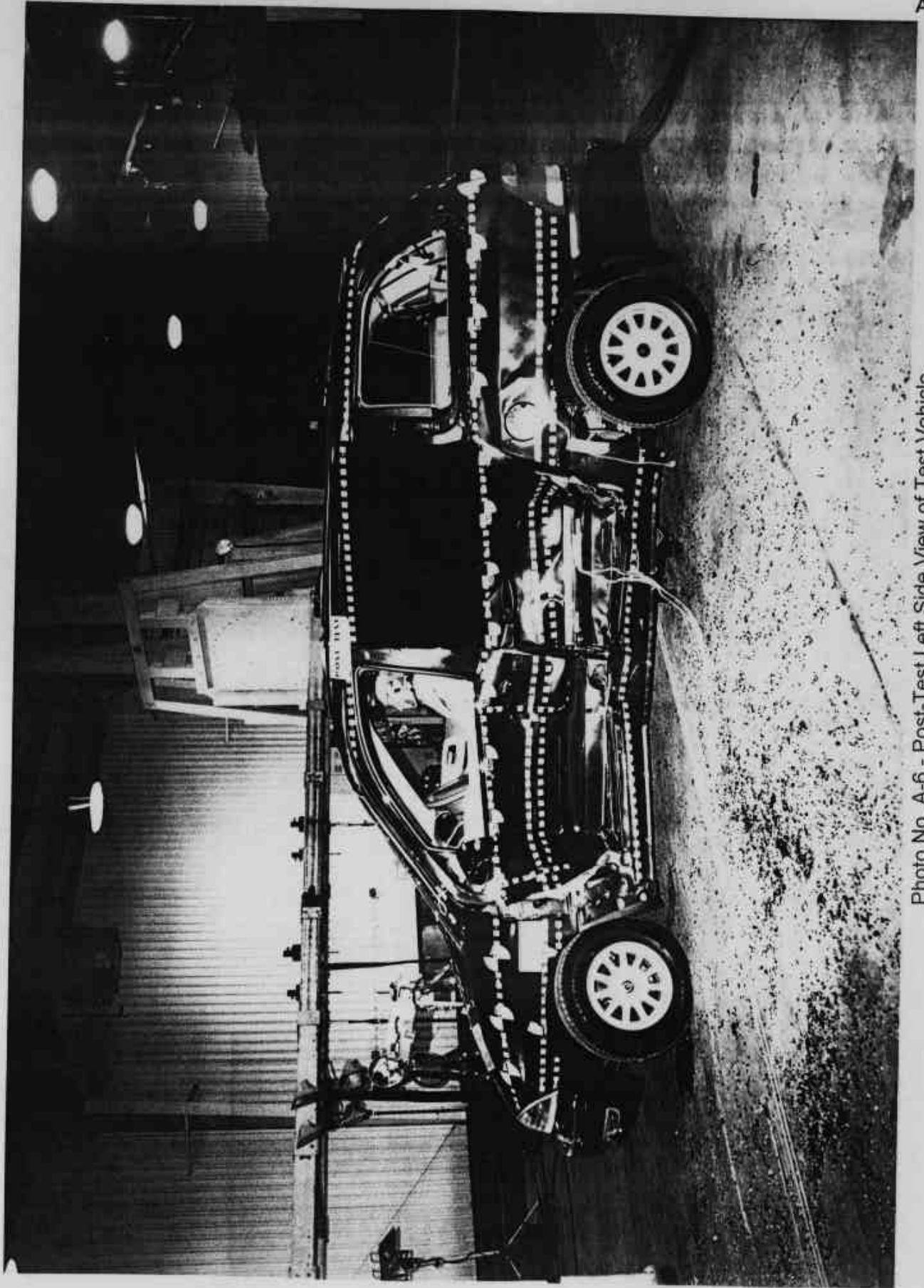


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

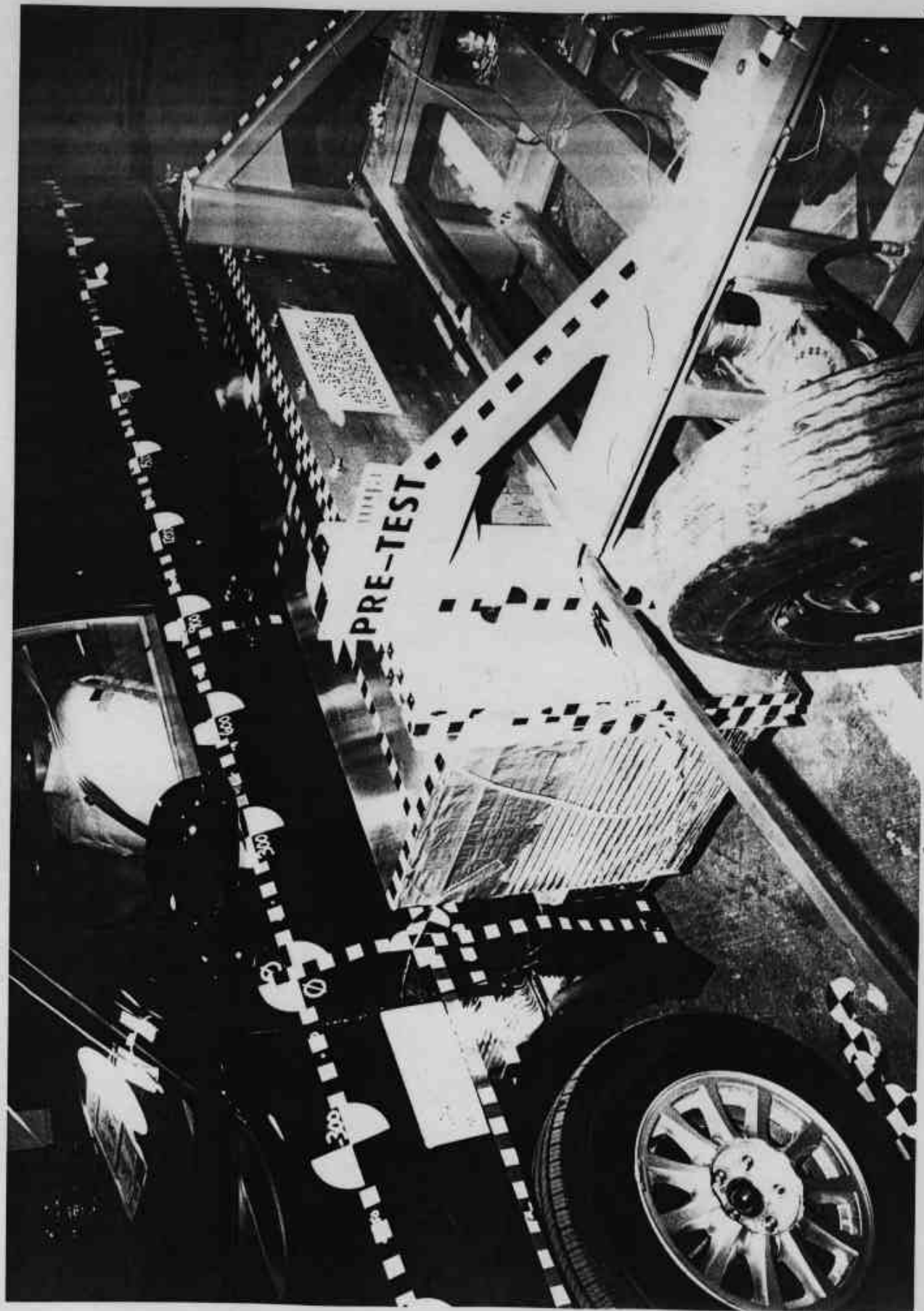


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

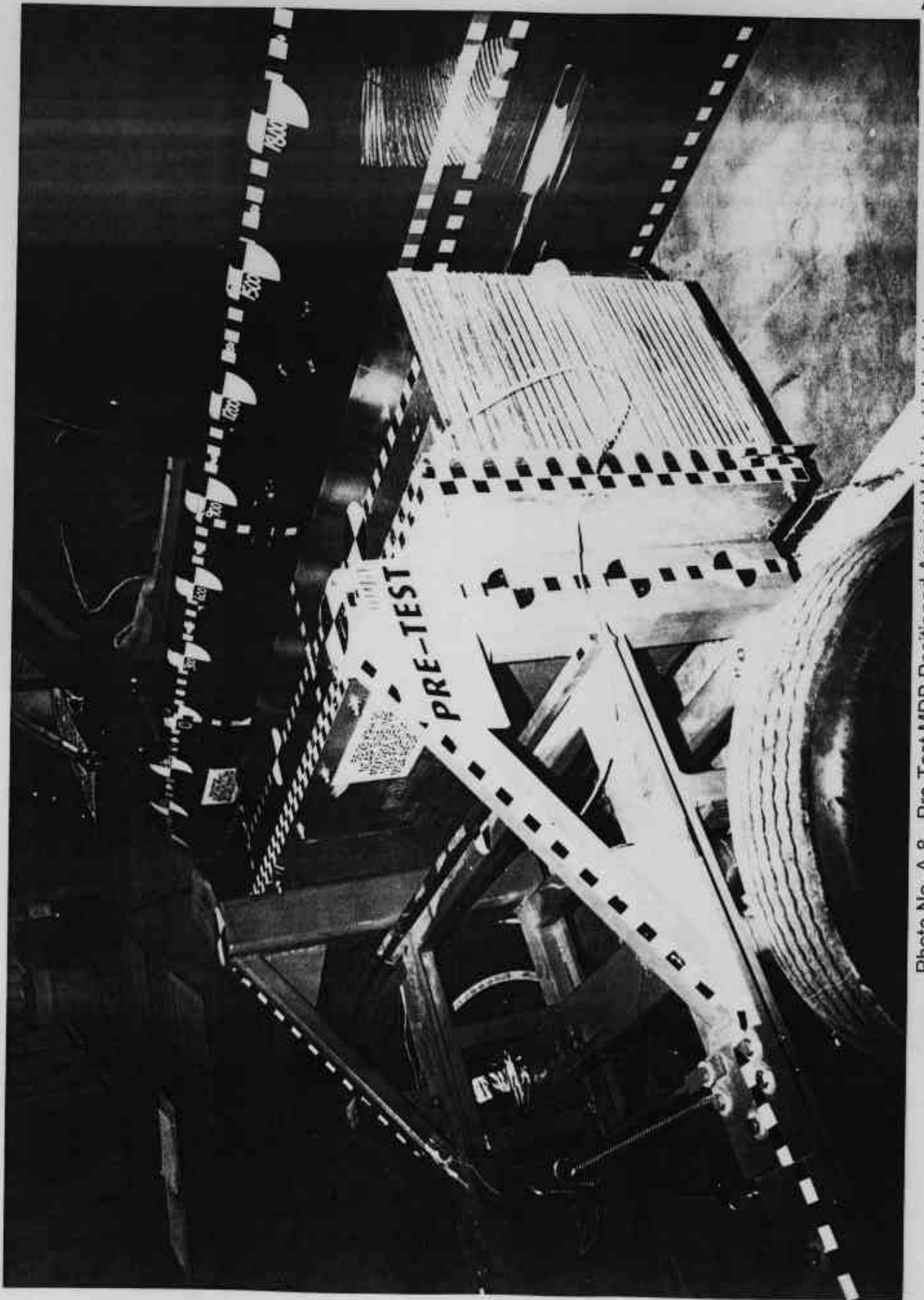


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

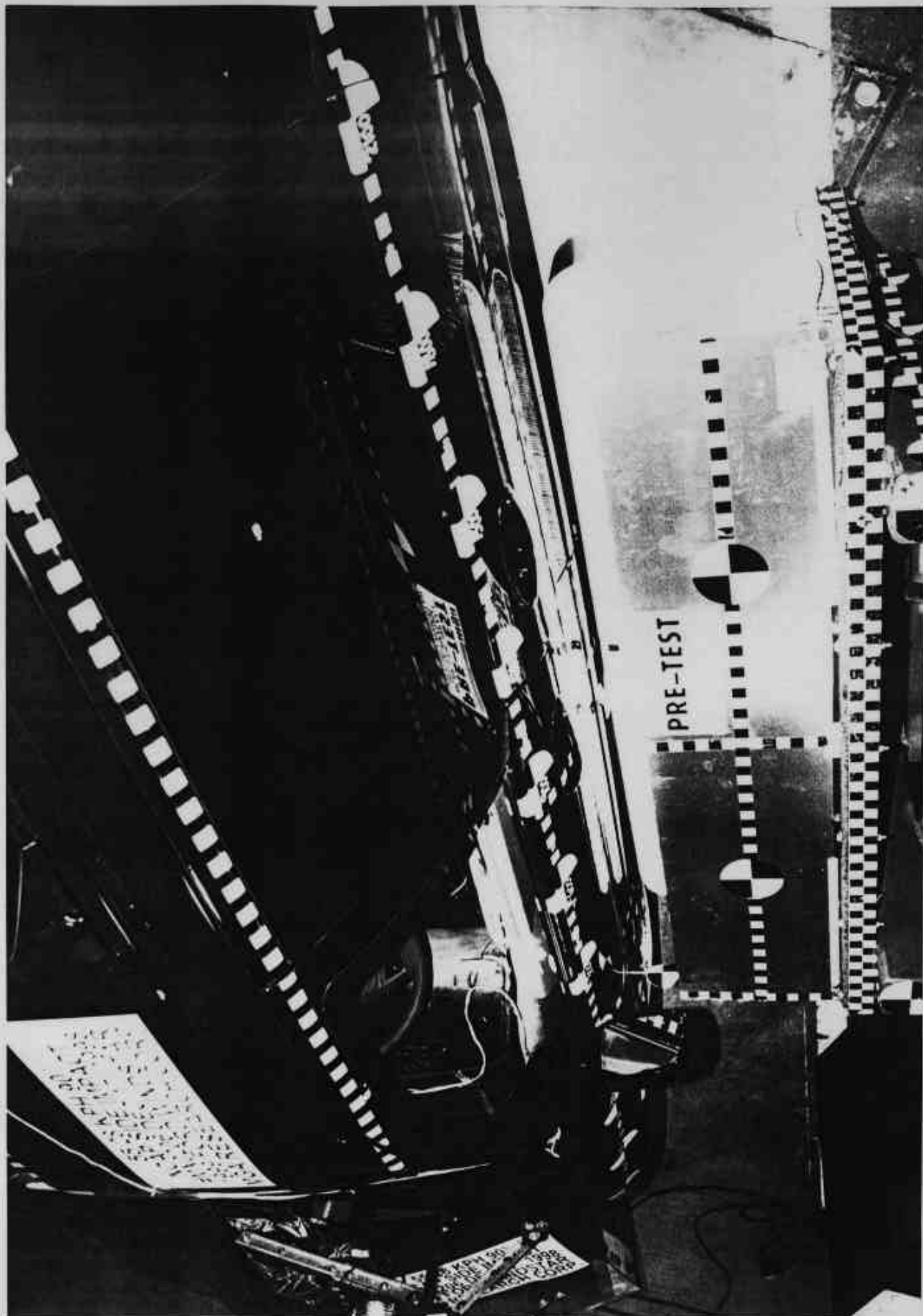


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

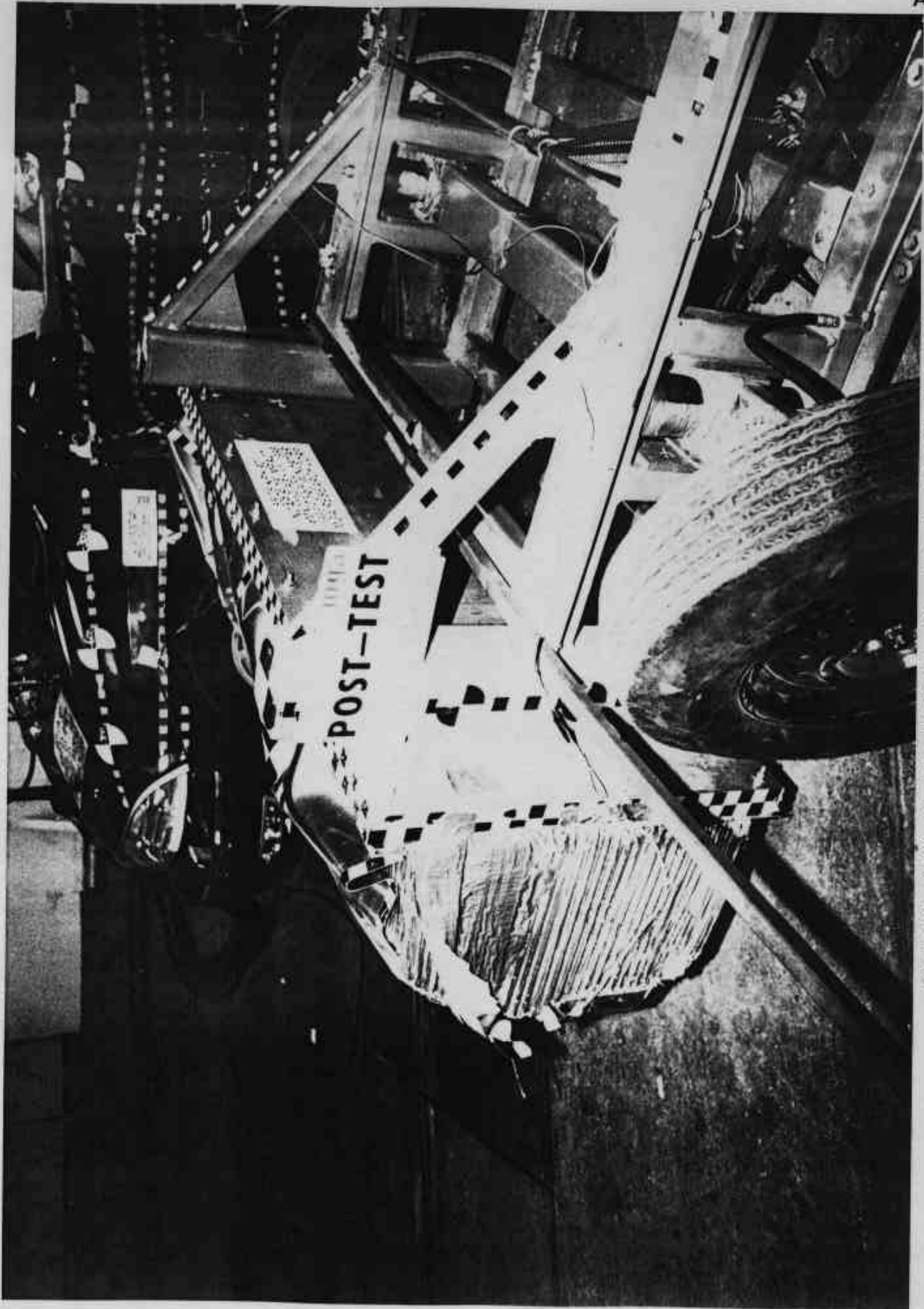


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

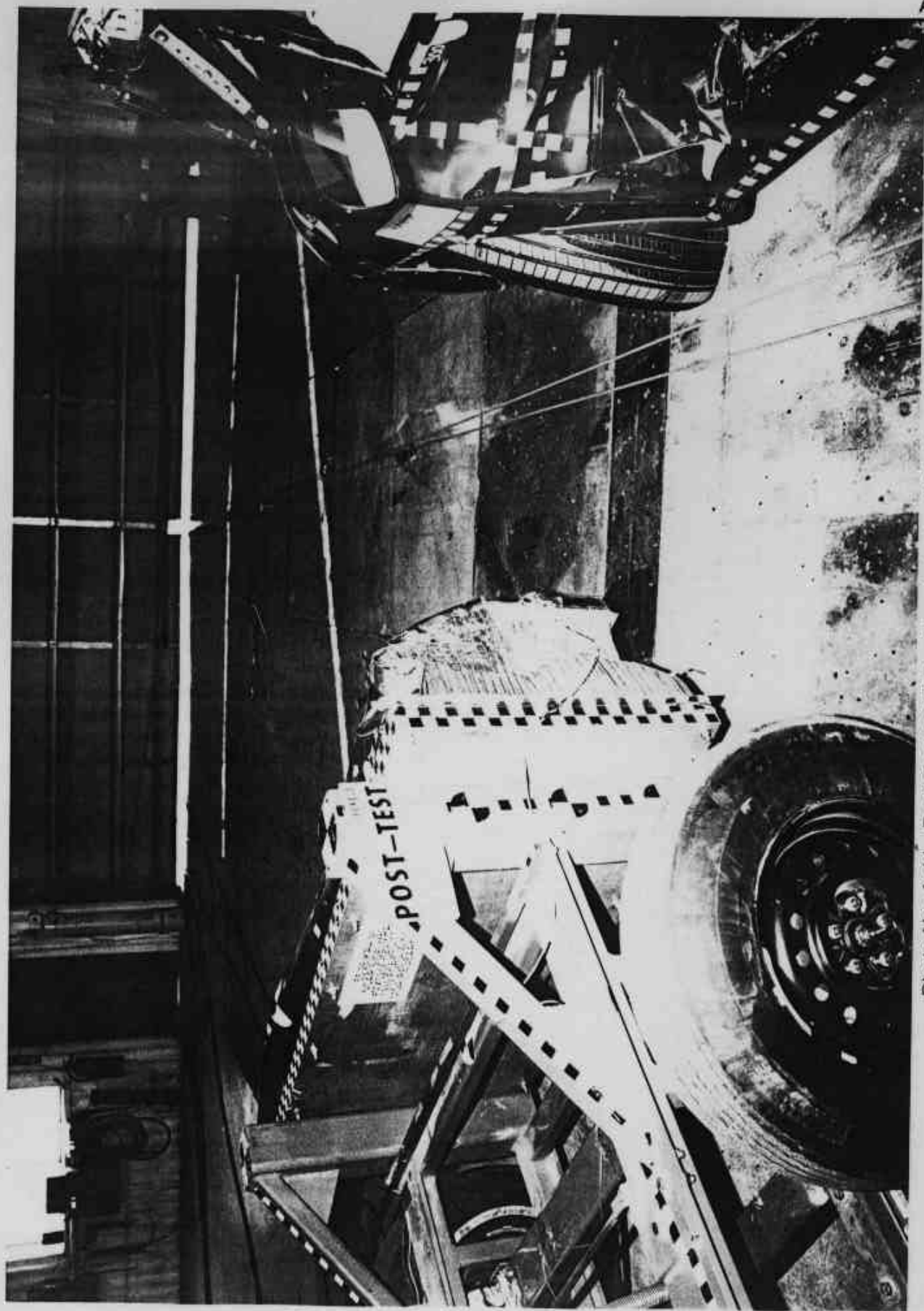


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

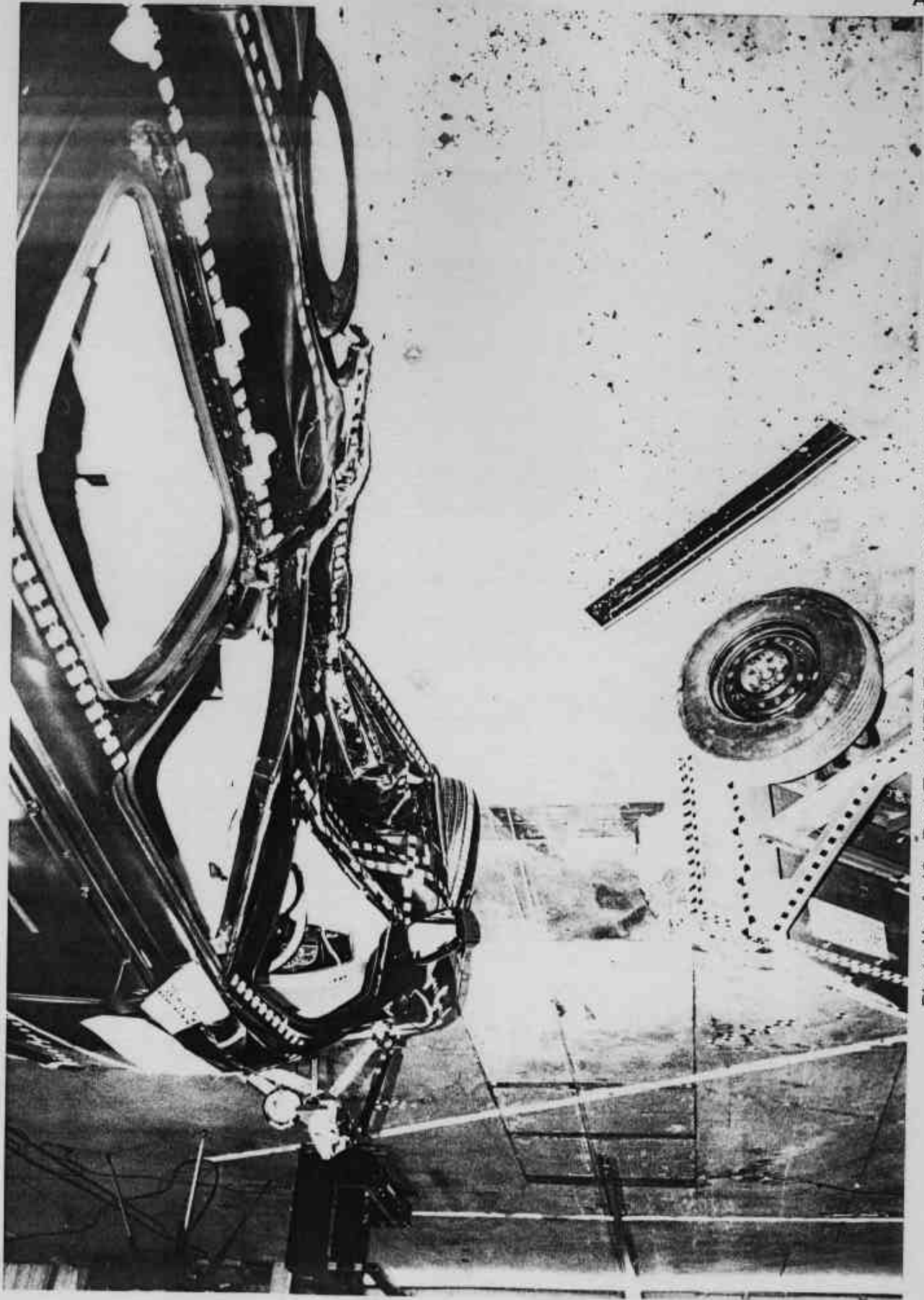


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View

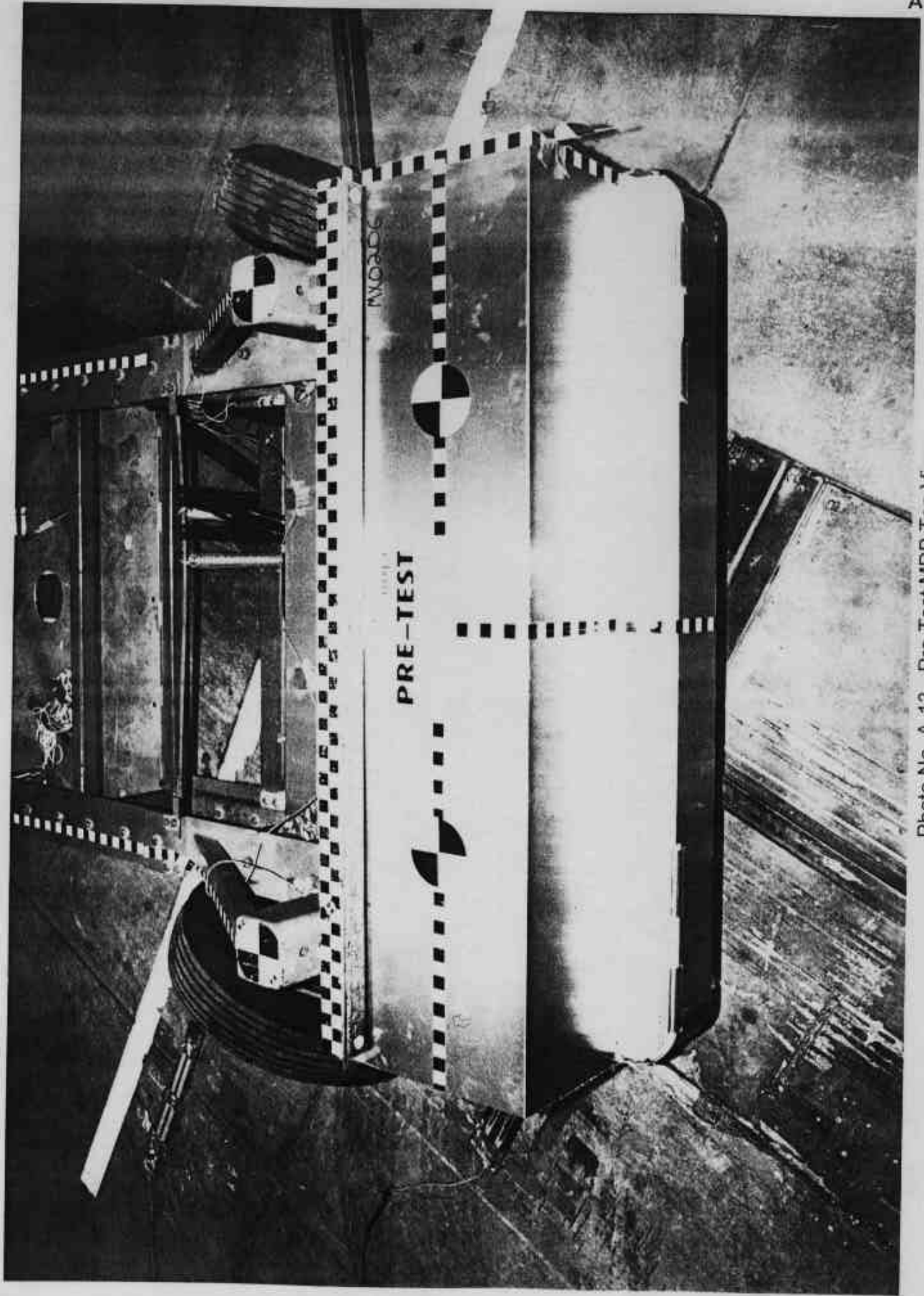


Photo No. A-13 - Pre-Test MDB Top View

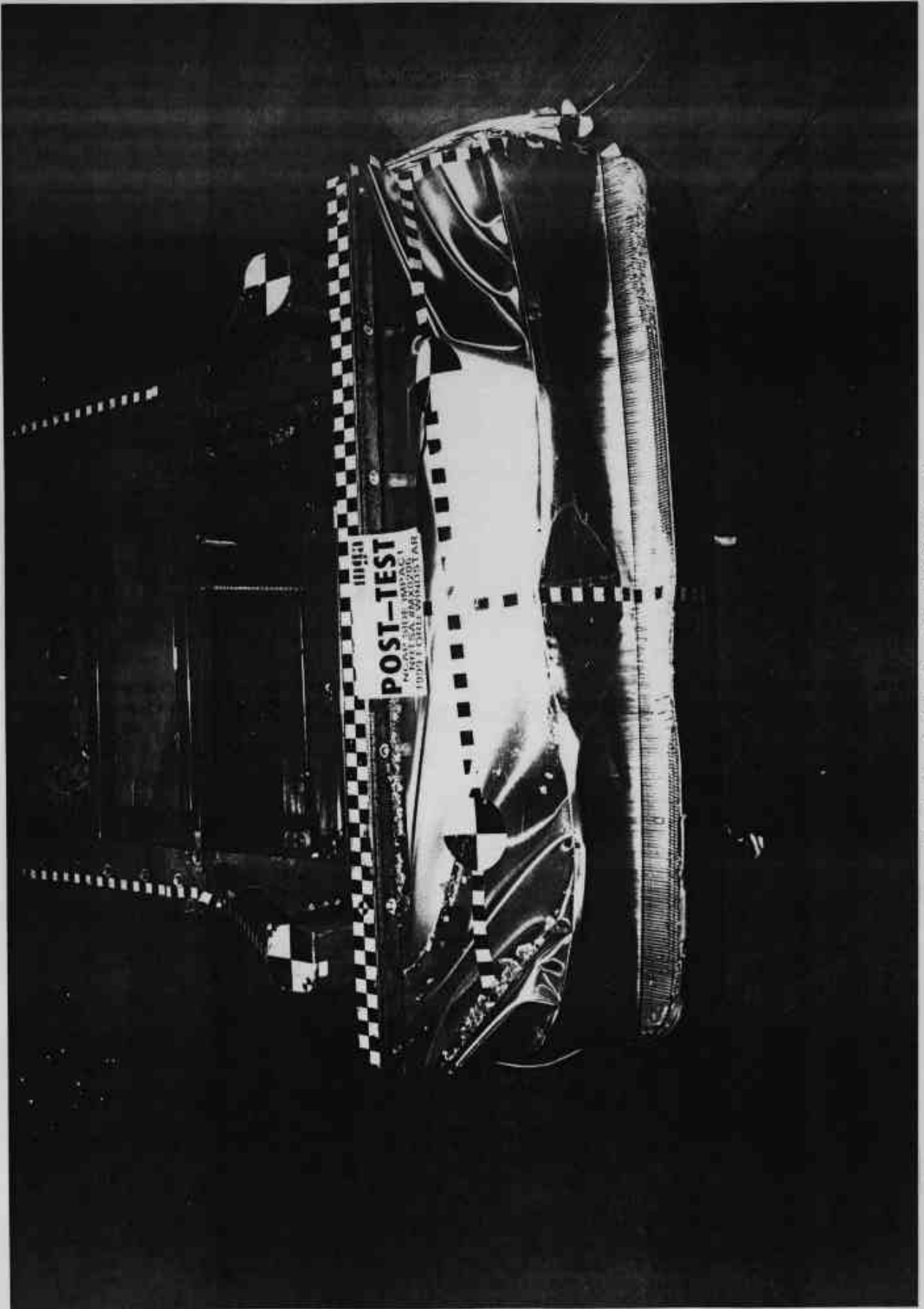


Photo No. A-14 - Post-Test MDB Top View

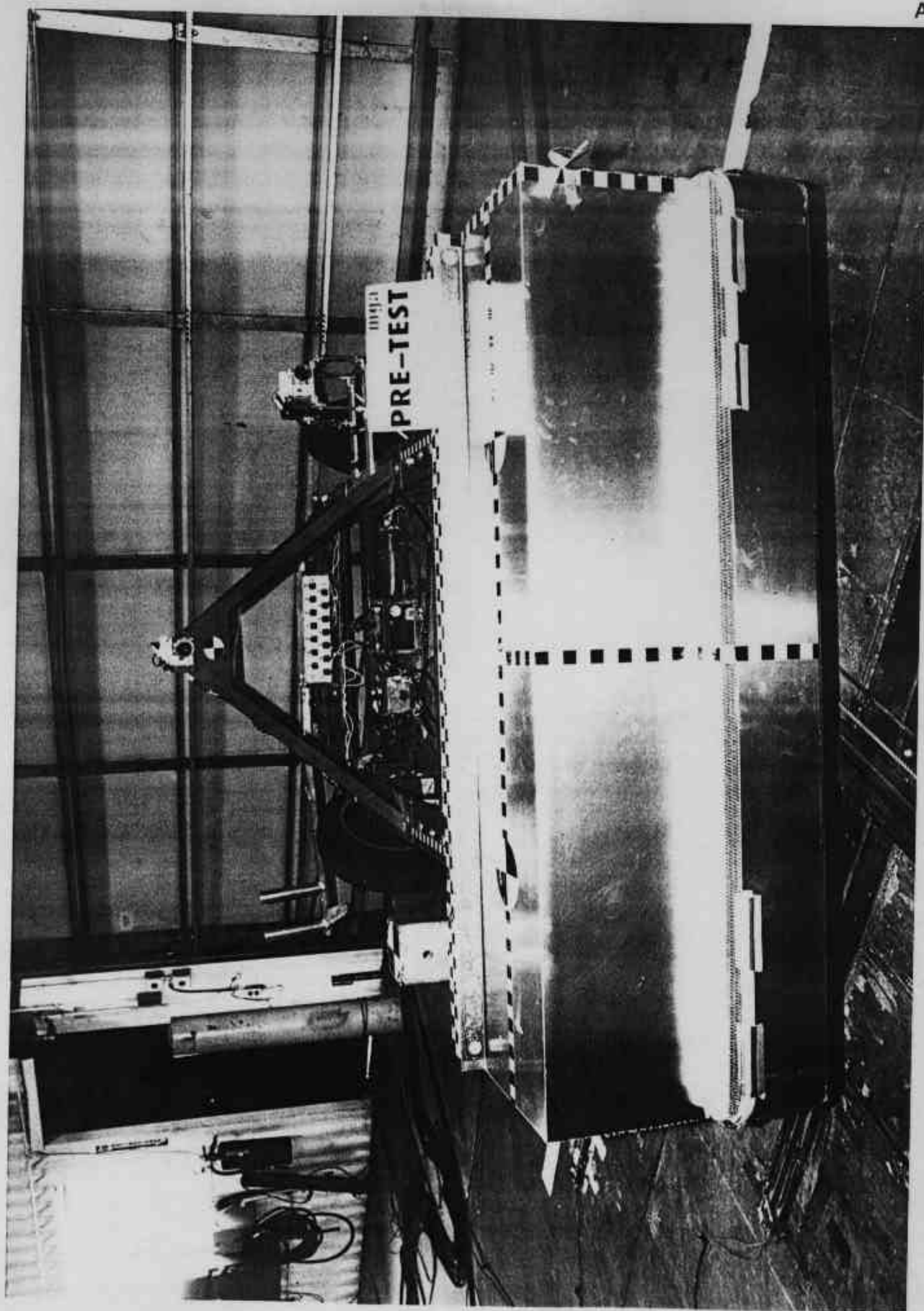


Photo No. A-15 - Pre-Test MDB Front View

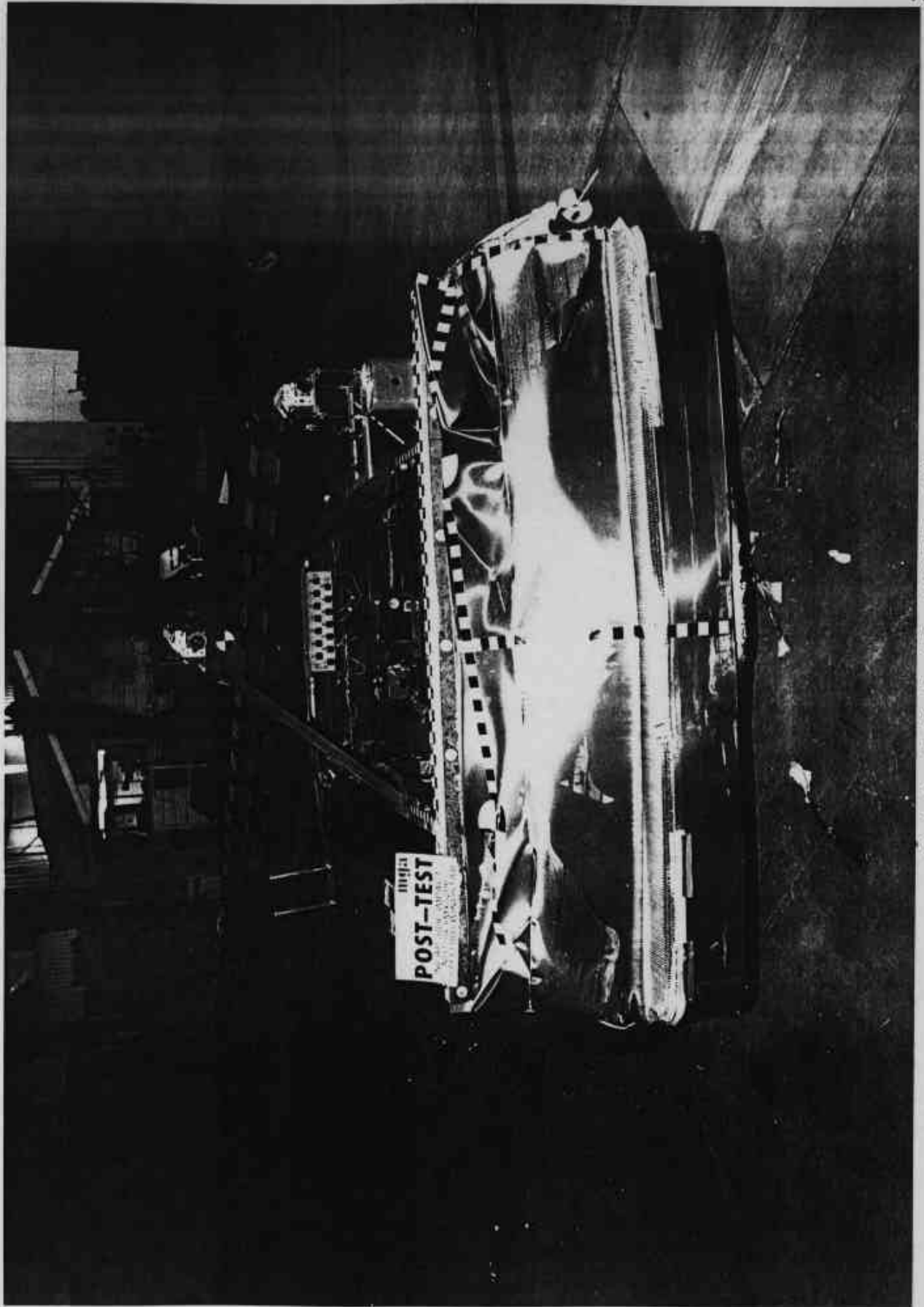


Photo No. A-16 - Post-Test MDB Front View

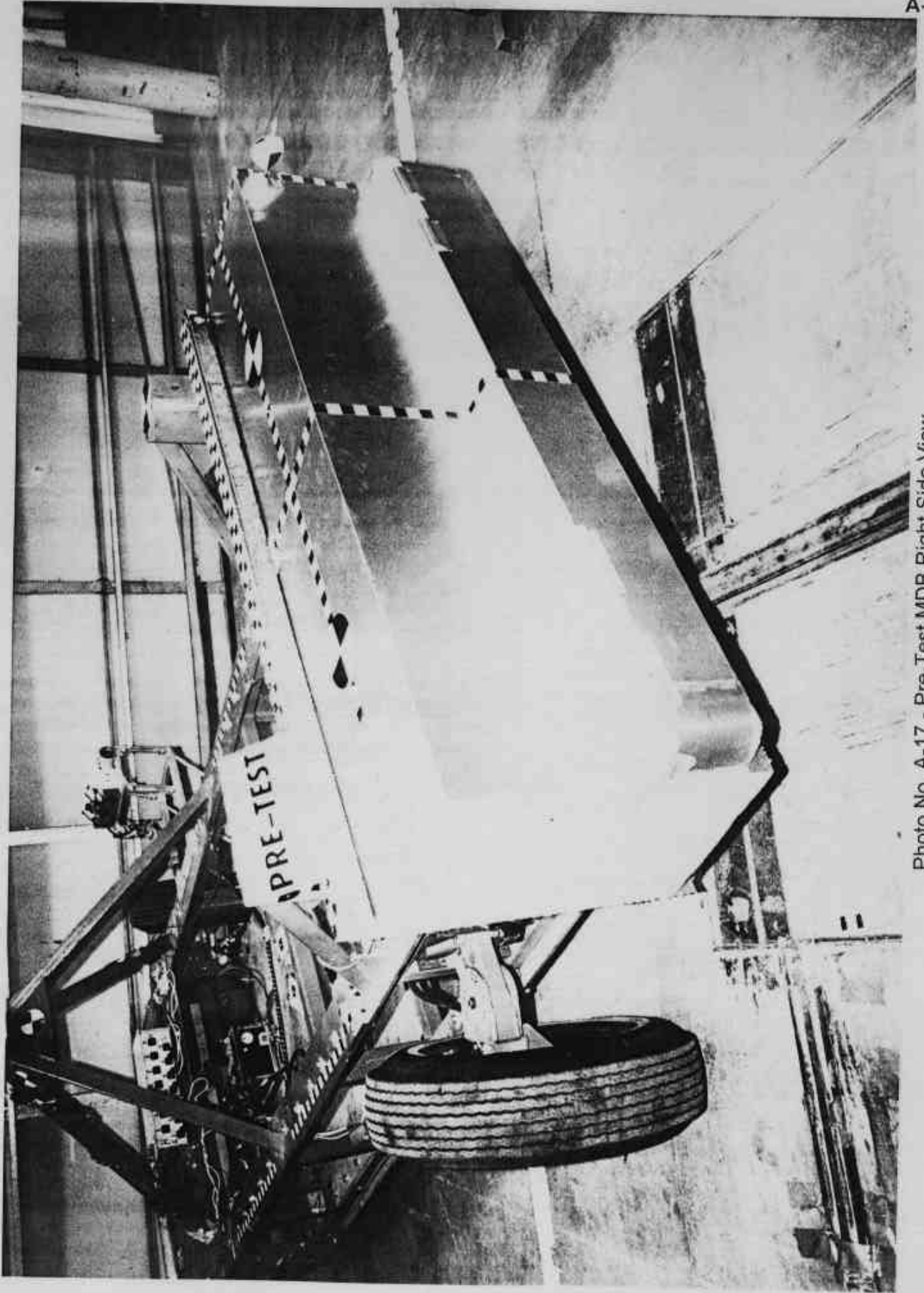


Photo No. A-17 - Pre-Test MDB Right Side View

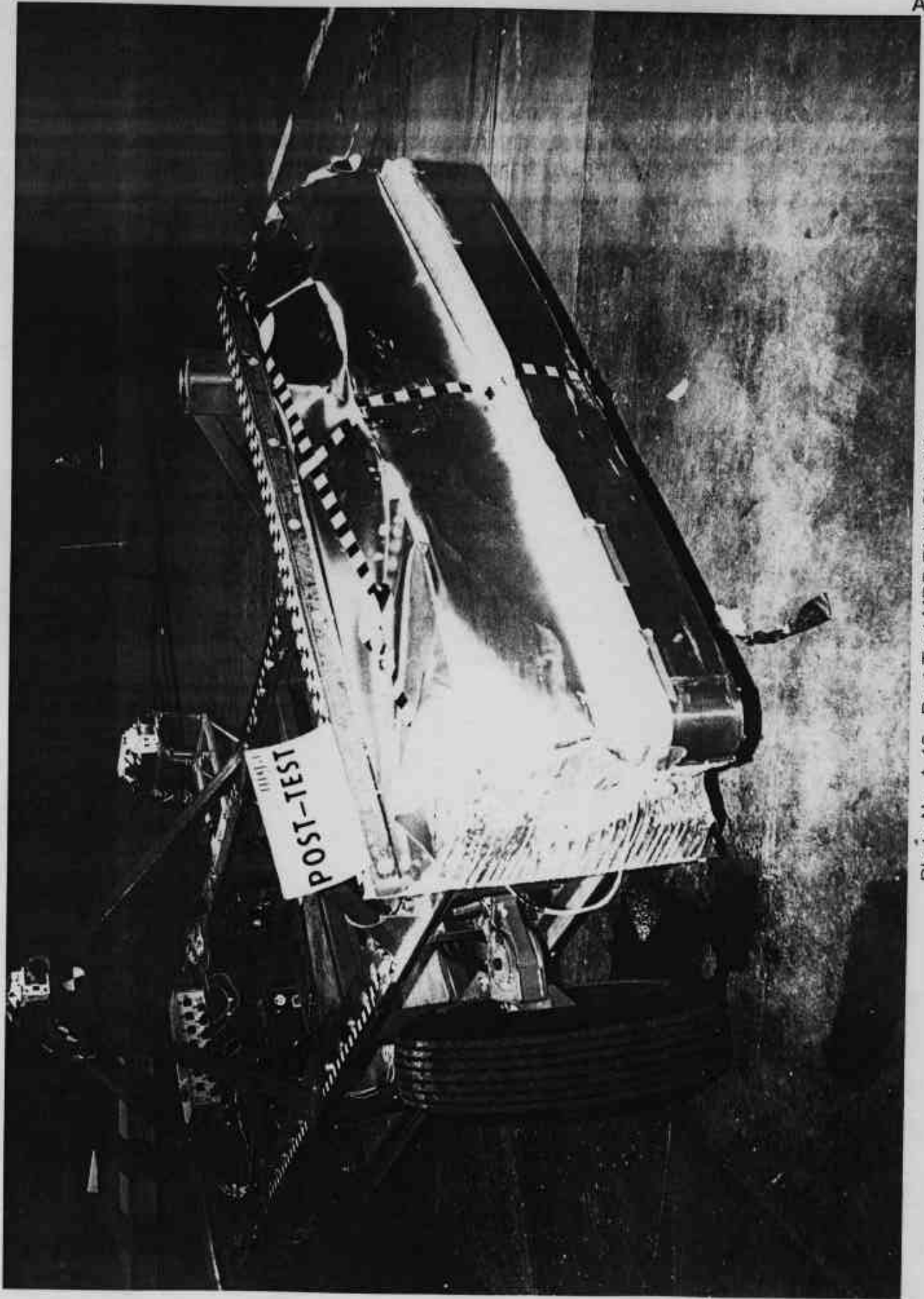


Photo No. A-18 - Post-Test MDB Right Side View

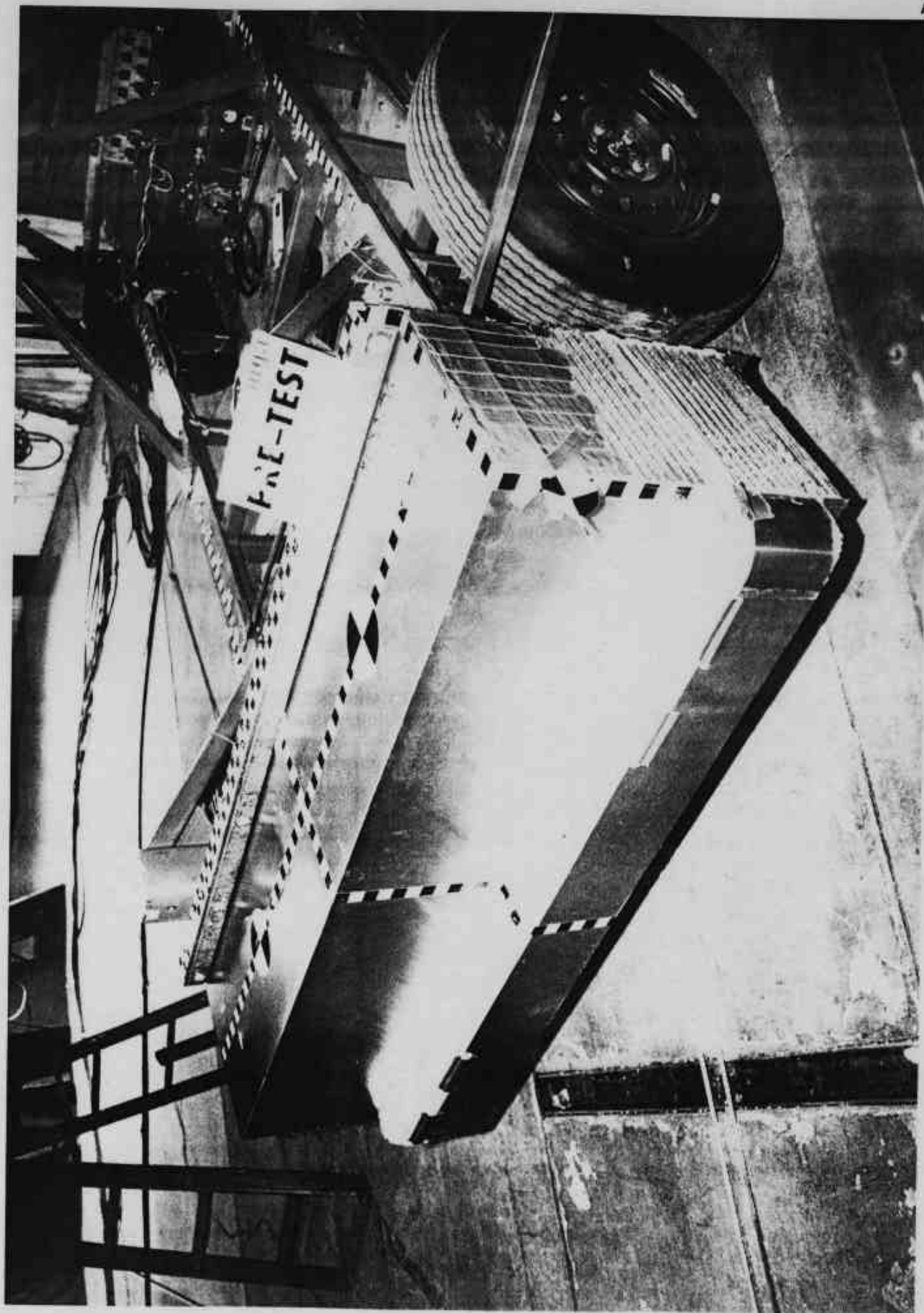


Photo No. A-19 - Pre-Test MDB Left Side View

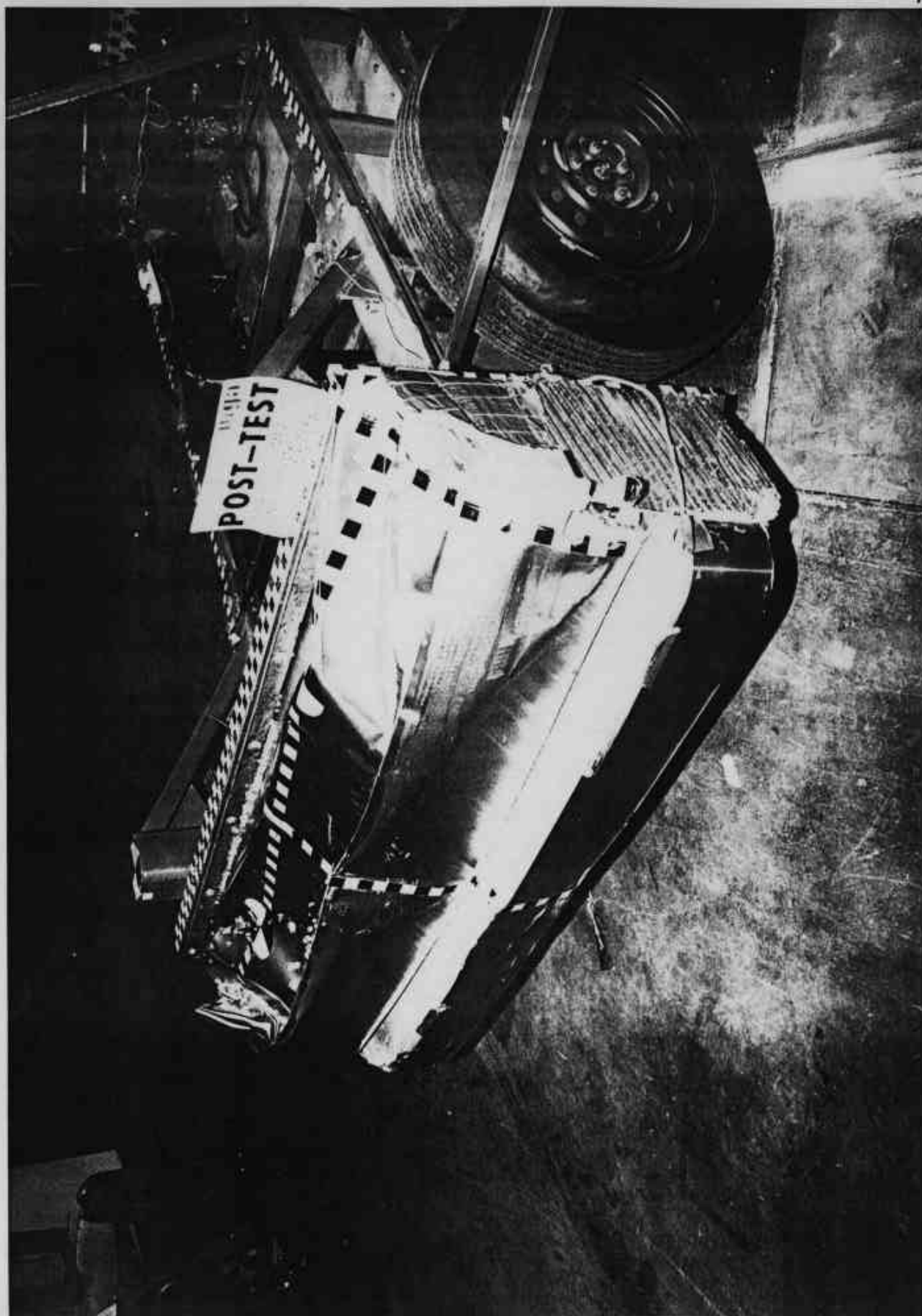


Photo No. A-20 - Post-Test MDB Left Side View



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



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

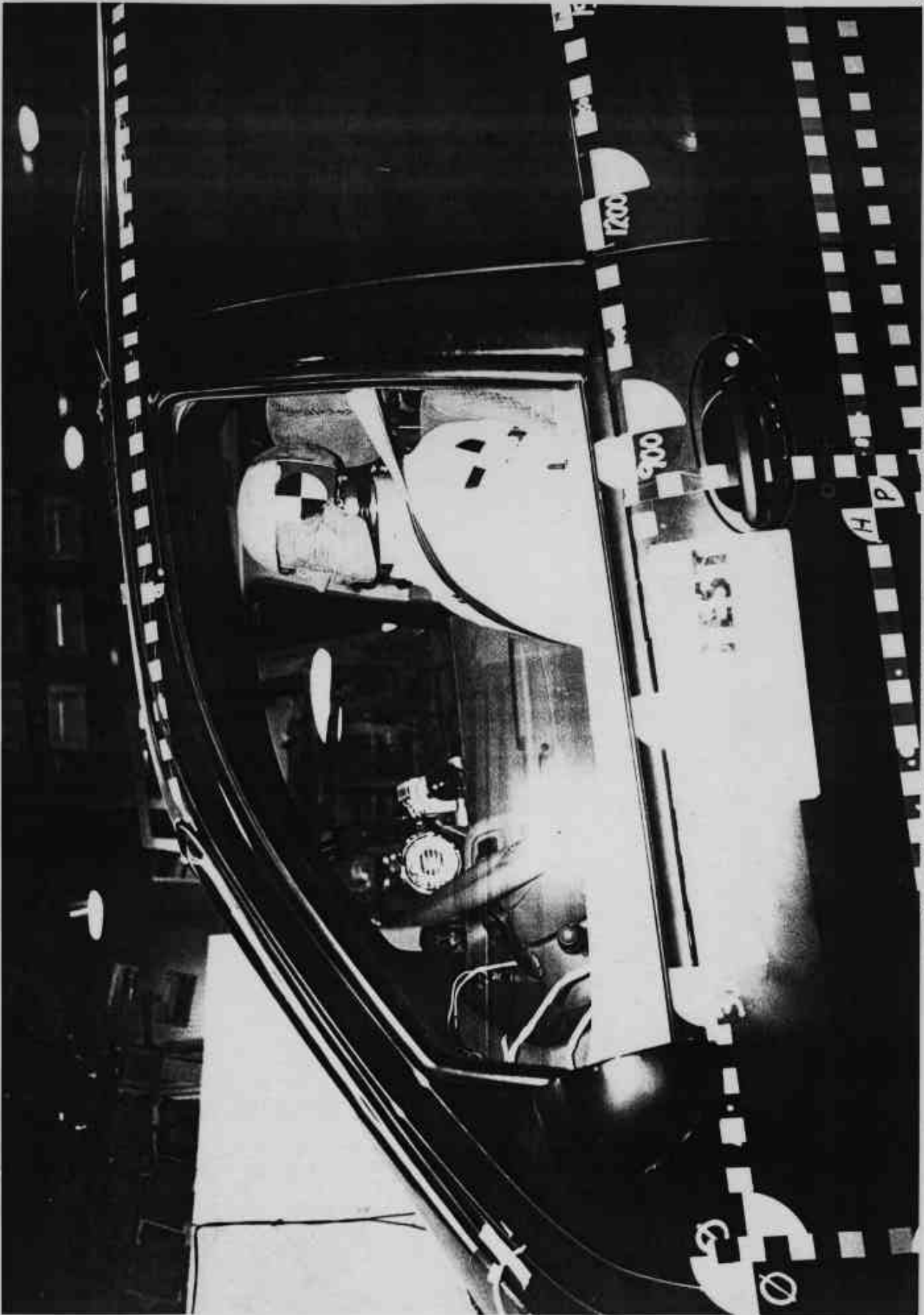


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

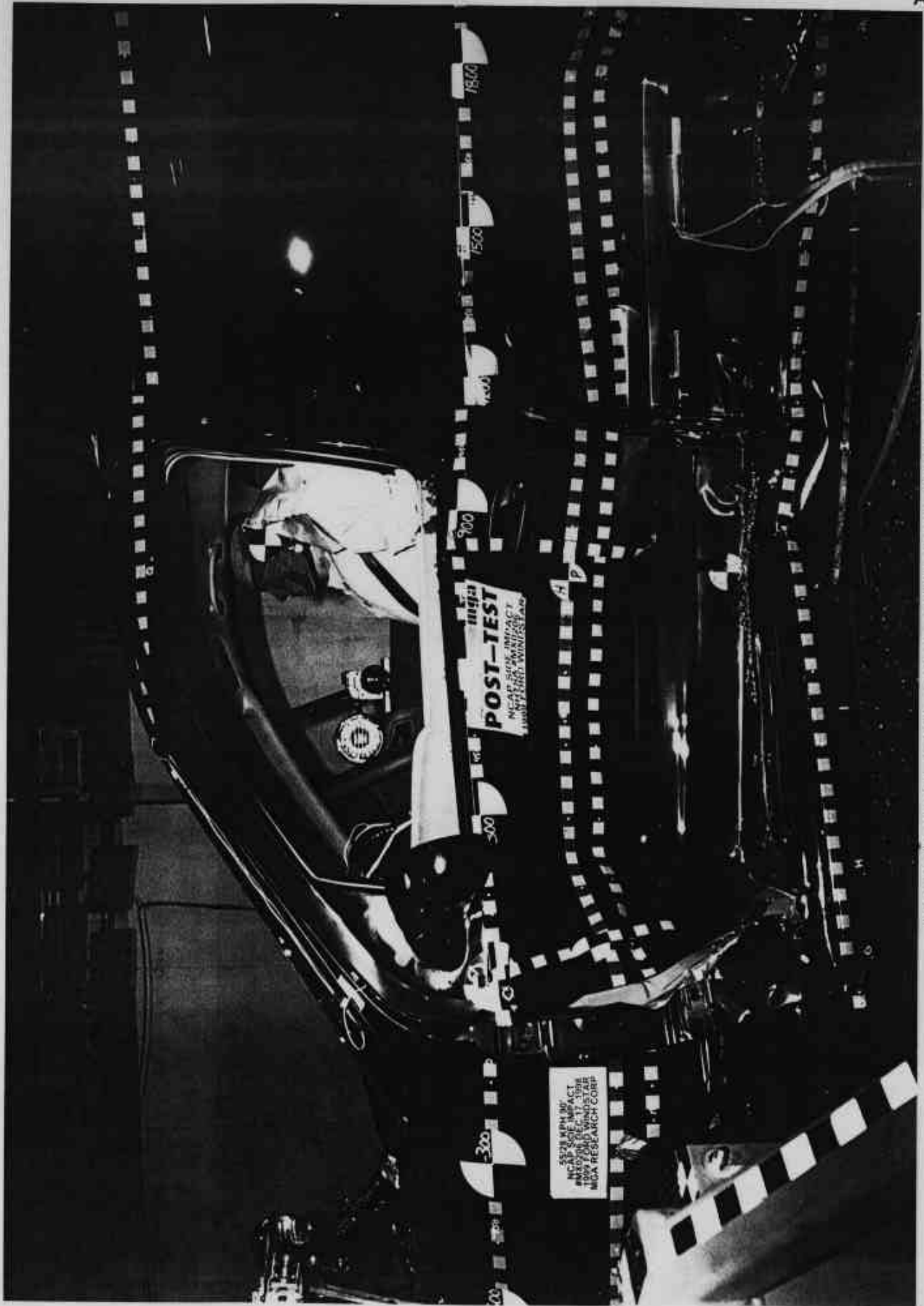


Photo No. A-24 - Post-Test Driver Dummy Left Side View

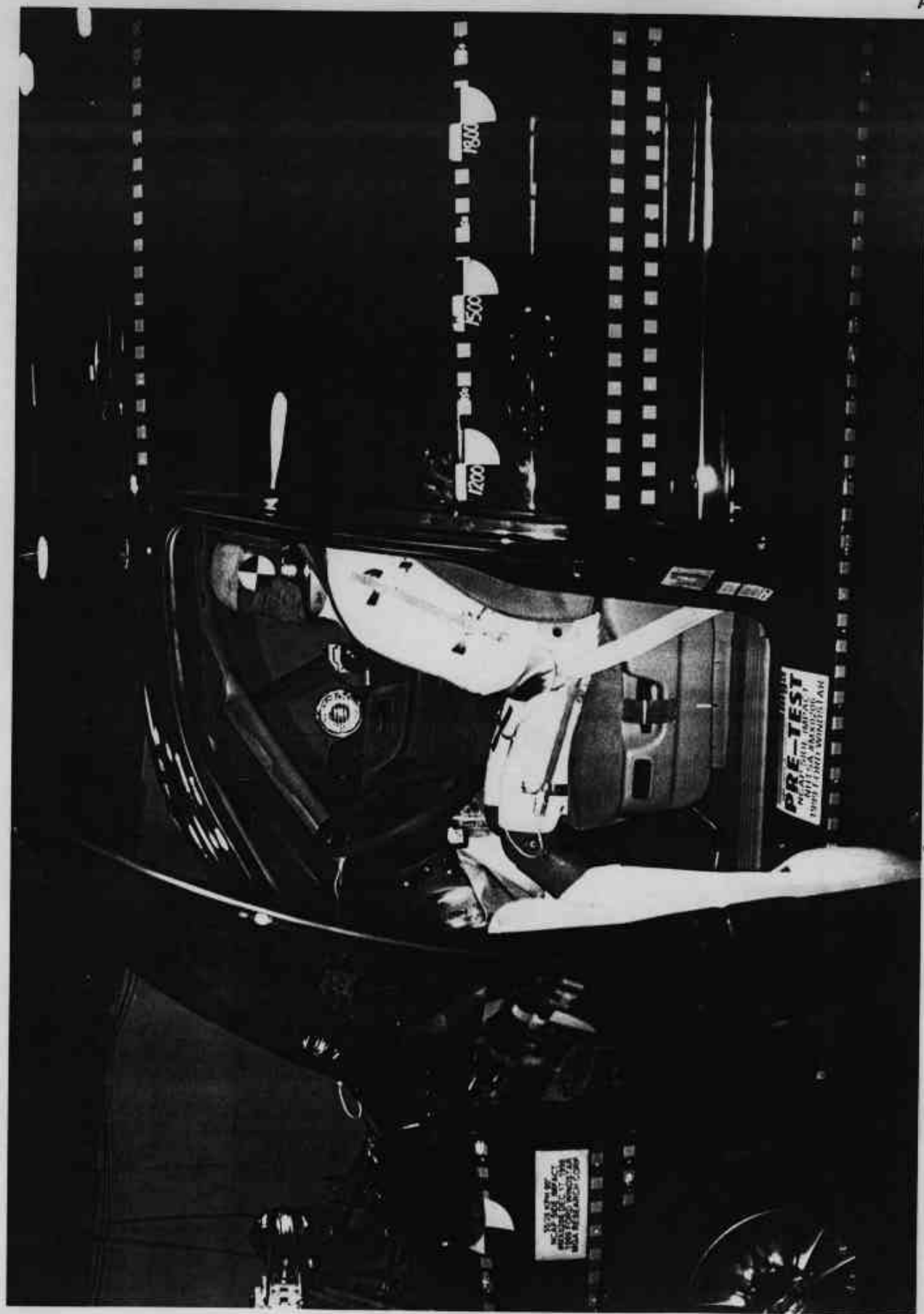


Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)

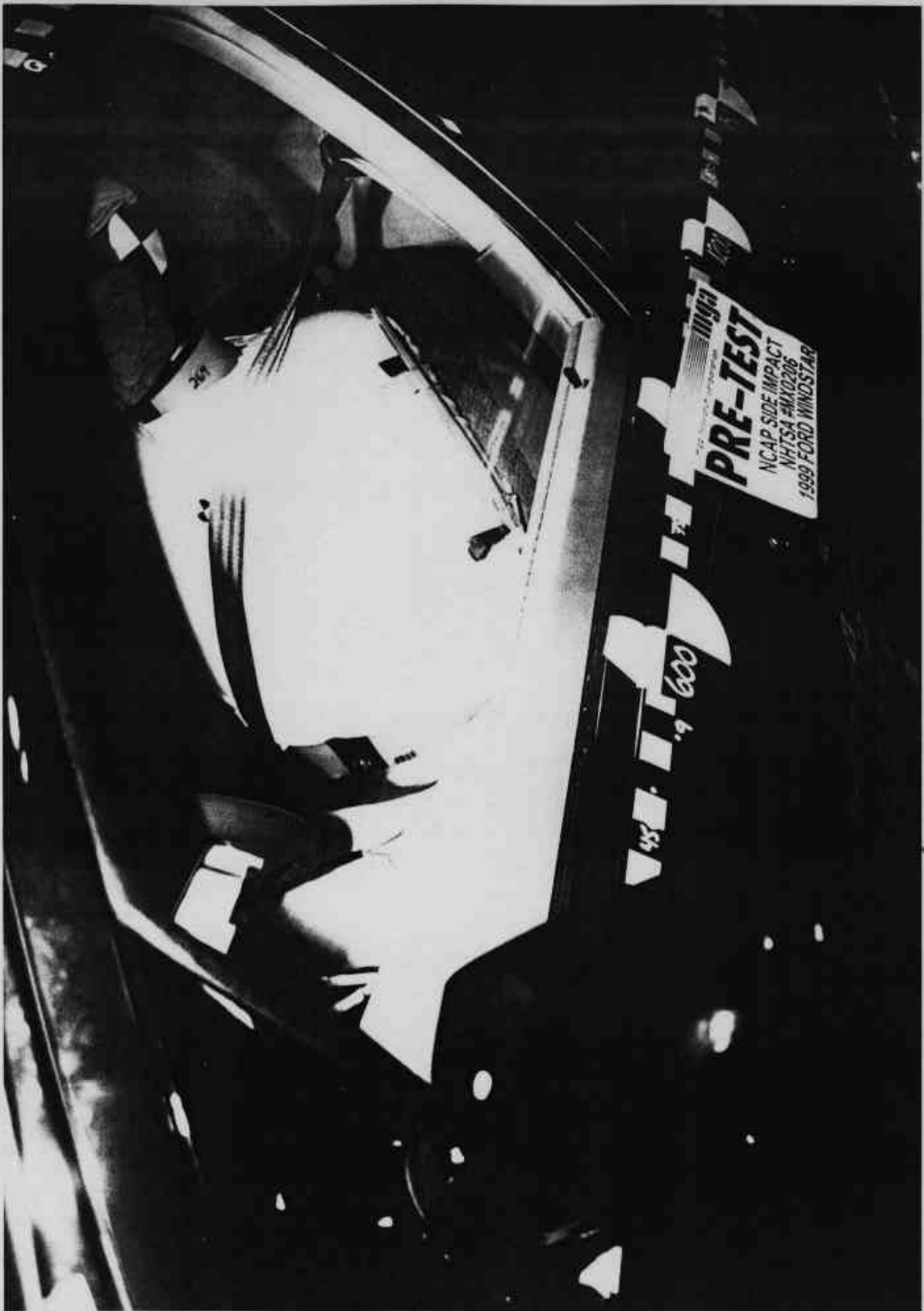


Photo No. A-26 - Pre-Test Driver Dummy Shoulder and Door Top View



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 - Pre-Test Passenger Dummy Right Side View



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



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

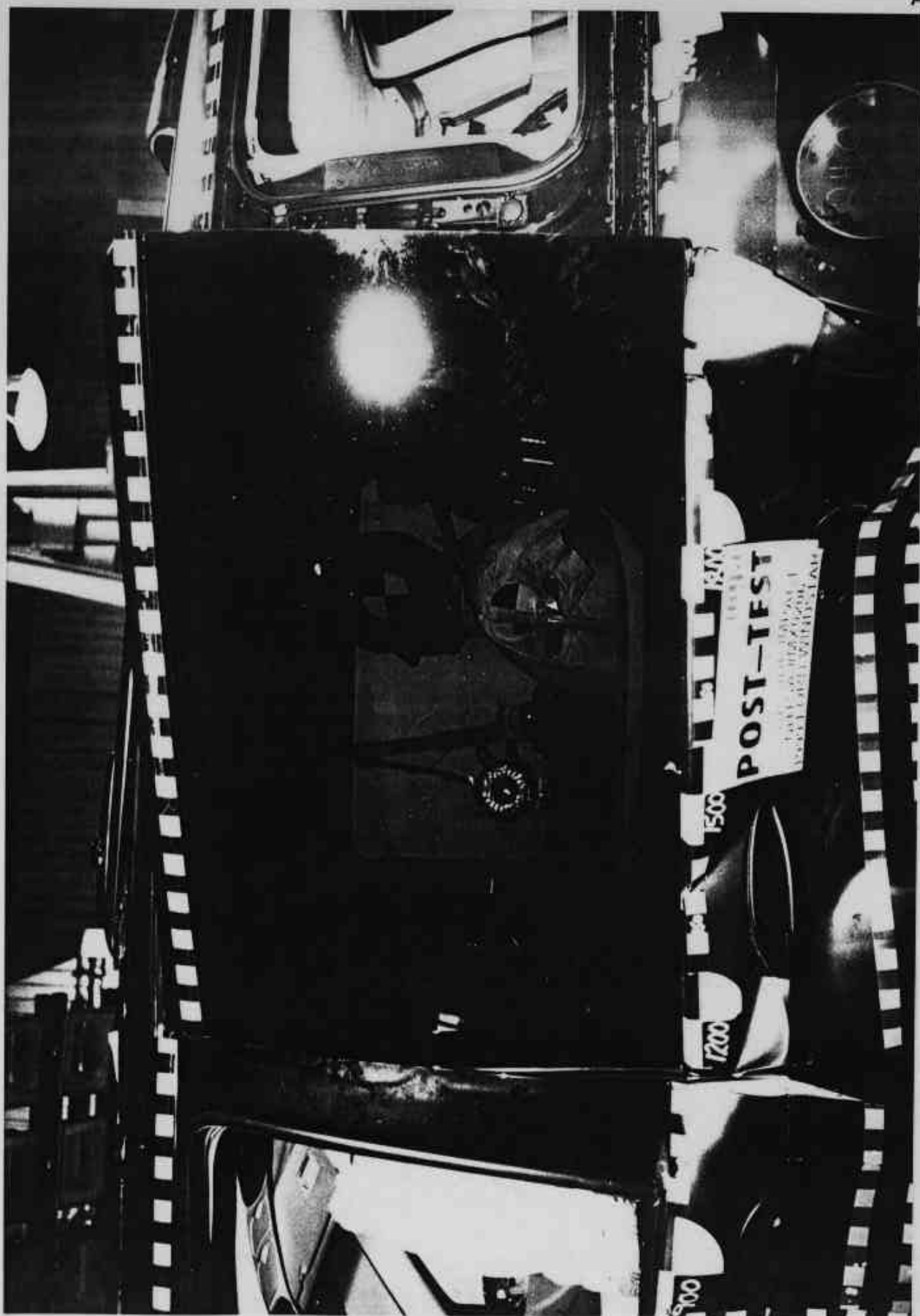
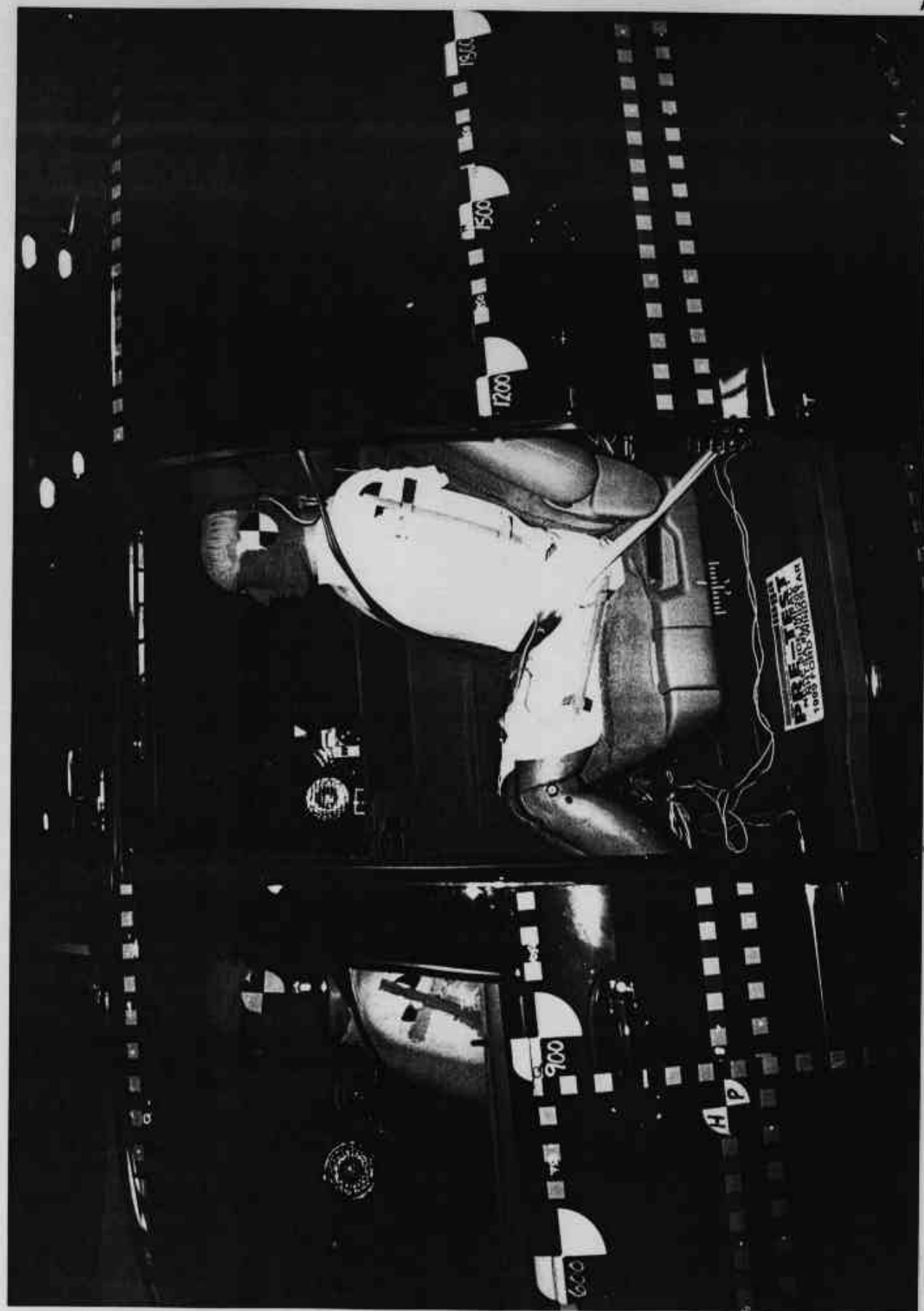


Photo No. A-33 - Post-Test Passenger Dummy Left Side View



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



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



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



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



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

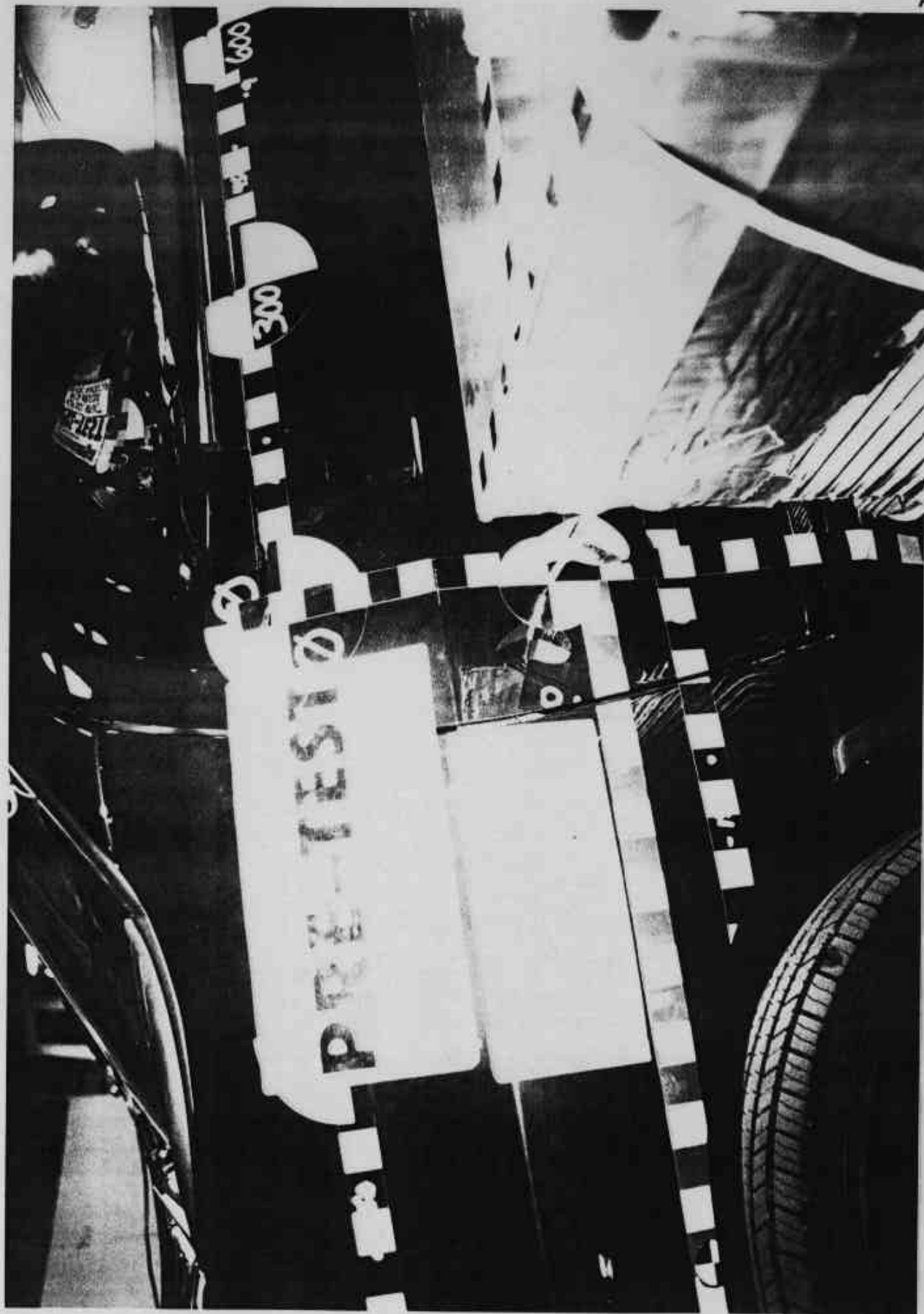
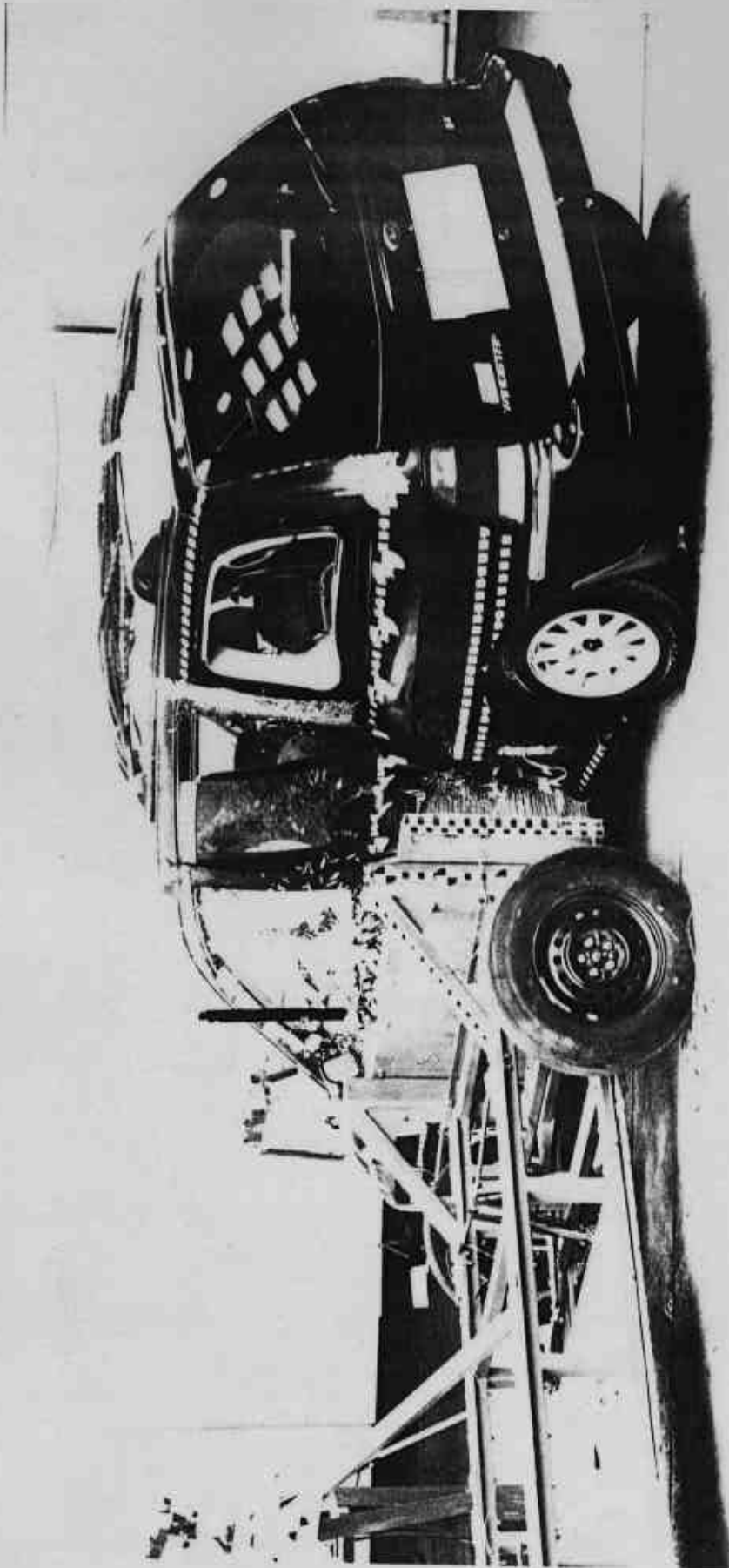


Photo No. A-39 - Pre-Test Left Front Impact Point on Vehicle



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

Photo No. A-41 - Impact



MFD. BY FORD MOTOR CO.

DATE: 11/98 GWR: 2521KG/5560LB
 FRONT GAWR: 1274KG/2809LB REAR GAWR: 1270KG/2800LB

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

VIN: 2FMDA5246XBA04876 TYPE: MPV
 MAXIMUM LOAD = OCCUPANTS + LUGGAGE = 544KG/1200LB

OCCUPANTS	LUGGAGE
2	408KG/900LB
4	272KG/600LB
7	68KG/150LB

OCCUPANTS = 7 TOTAL
 2 FRONT, 2 2ND, 3 REAR

TIRE: P215/70R15
 PRESSURE(FR): 241 kPa/35 PSI COLD
 PRESSURE(RR): 241 kPa/35 PSI COLD

2FMDA5246XBA04876

TRAILER TOWING - SEE OWNER GUIDE
 EXL PNT: BA
 BRK INT TR IP/PS IR AXLE TR SPR
 D HH K 15 L DE
 MADE IN CANADA CBC VF80B5420472 AG

▲ WARNING

- Do not use seat covers that block the air bag as it deploys from the side of the seatback.
- Do not lean head on the door; the side air bag could injure you.

See Owner's Guide

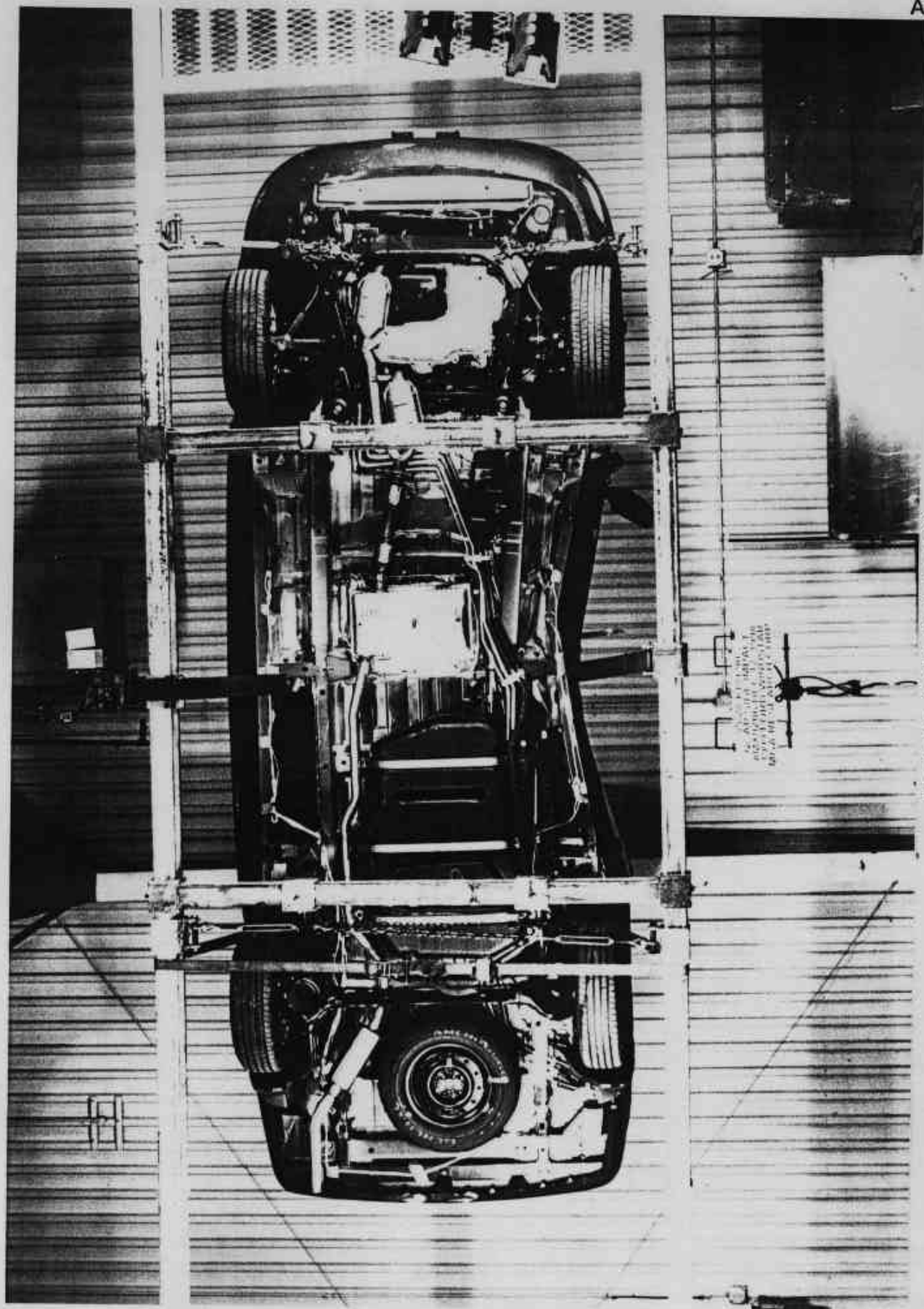


Photo No. A-43 - Rollover 90°

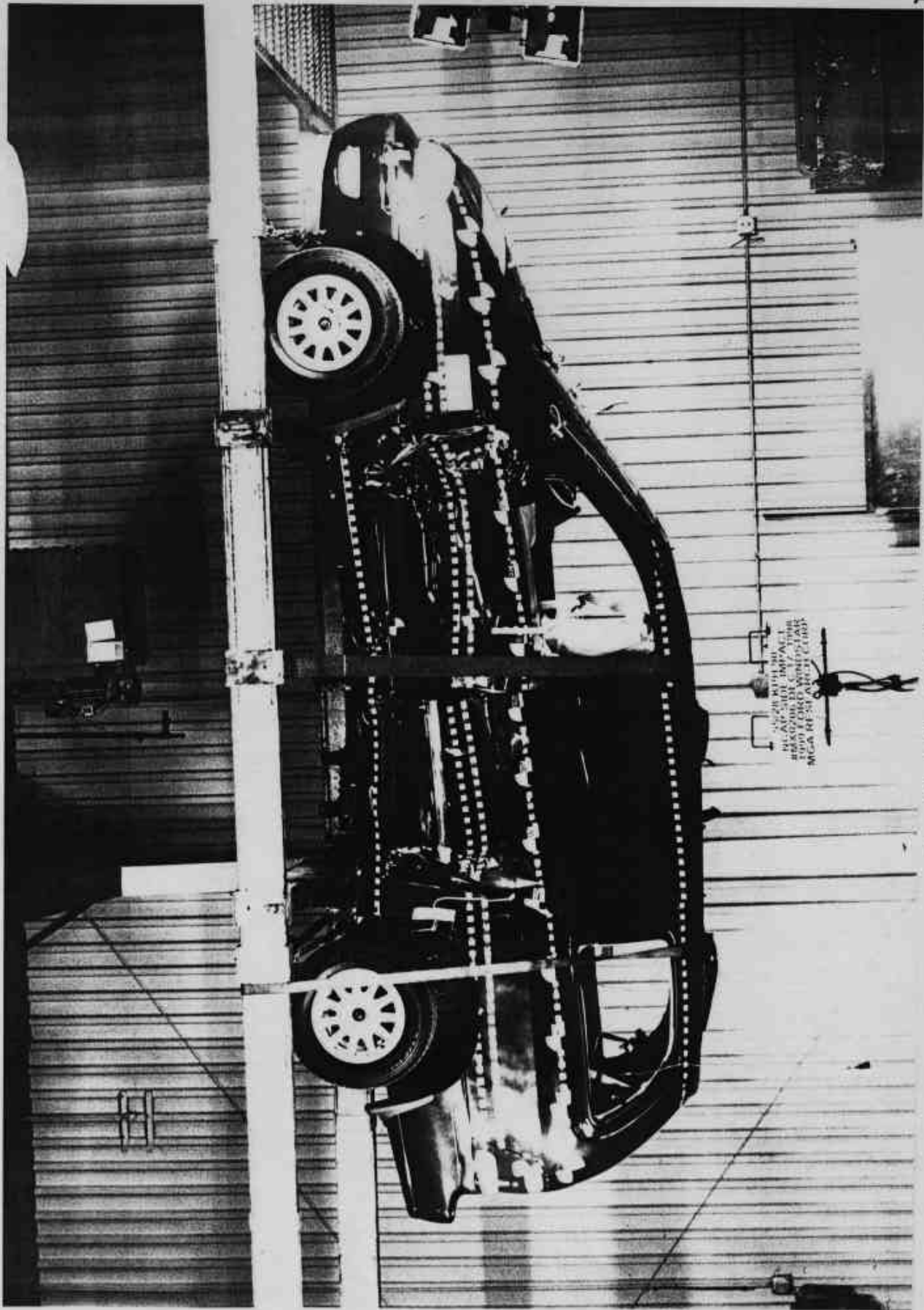


Photo No. A-44 - Rollover 180°

A-45

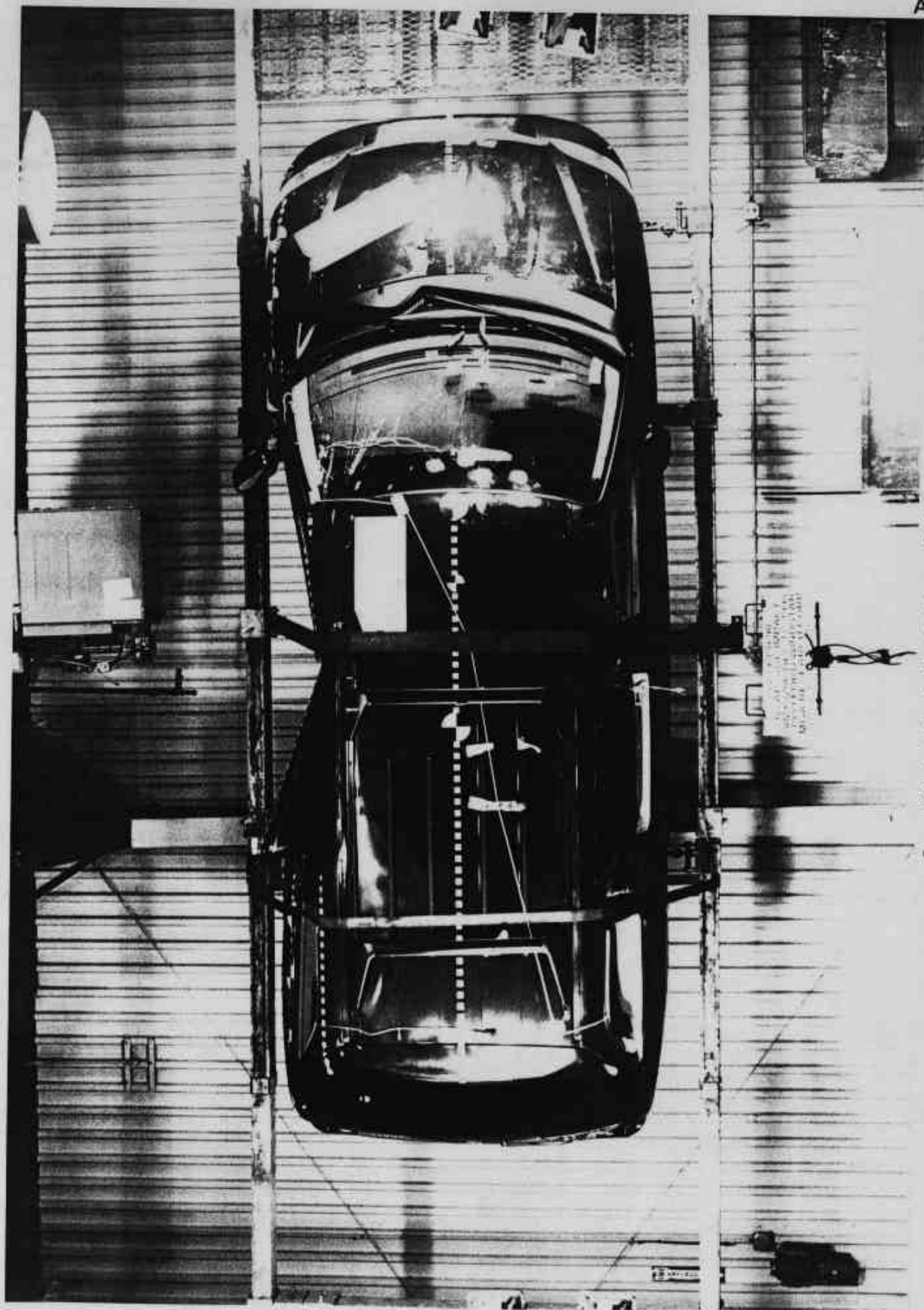


Photo No. A-45 - Rollover 270°

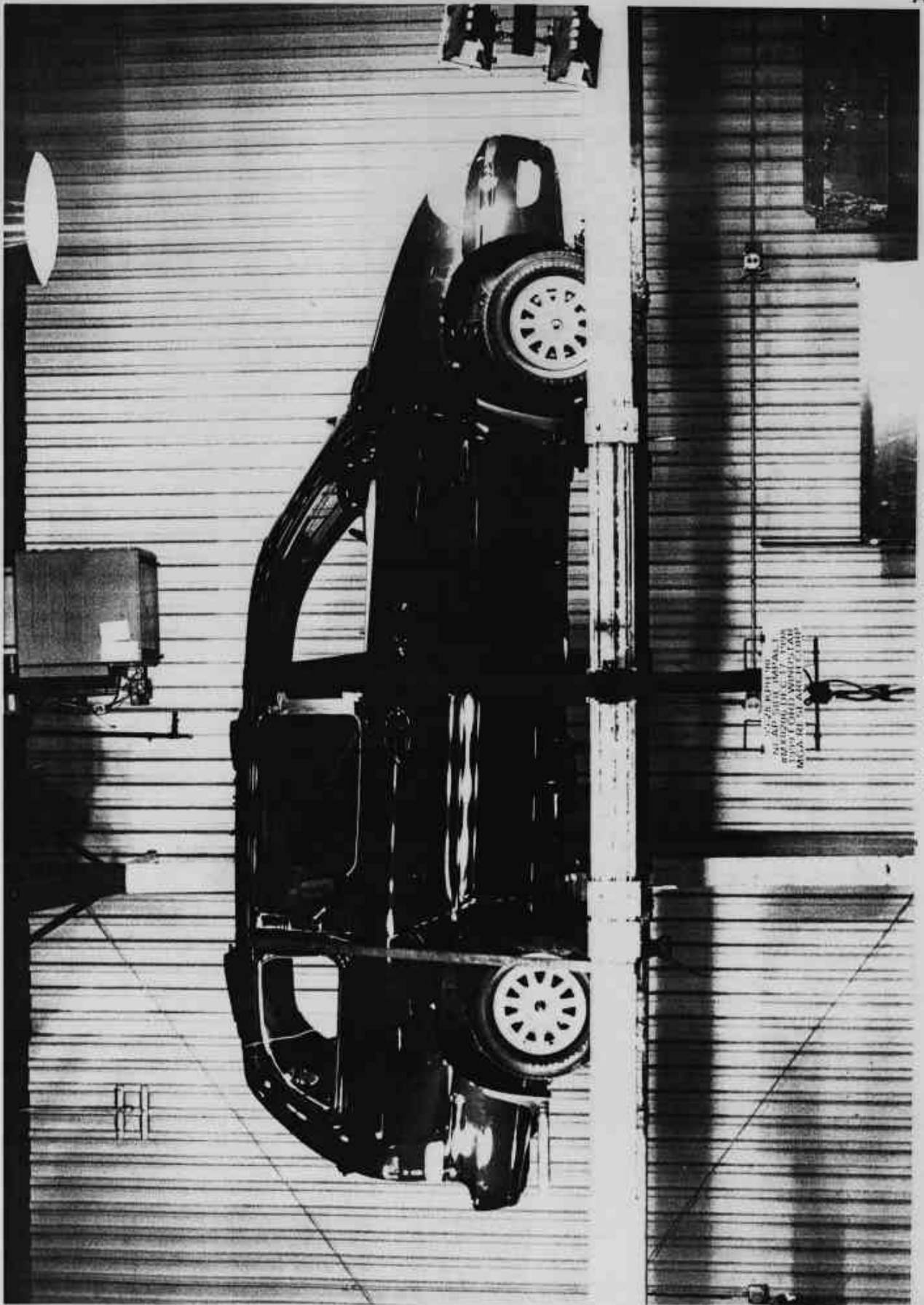


Photo No. A-46 - Rollover 360°

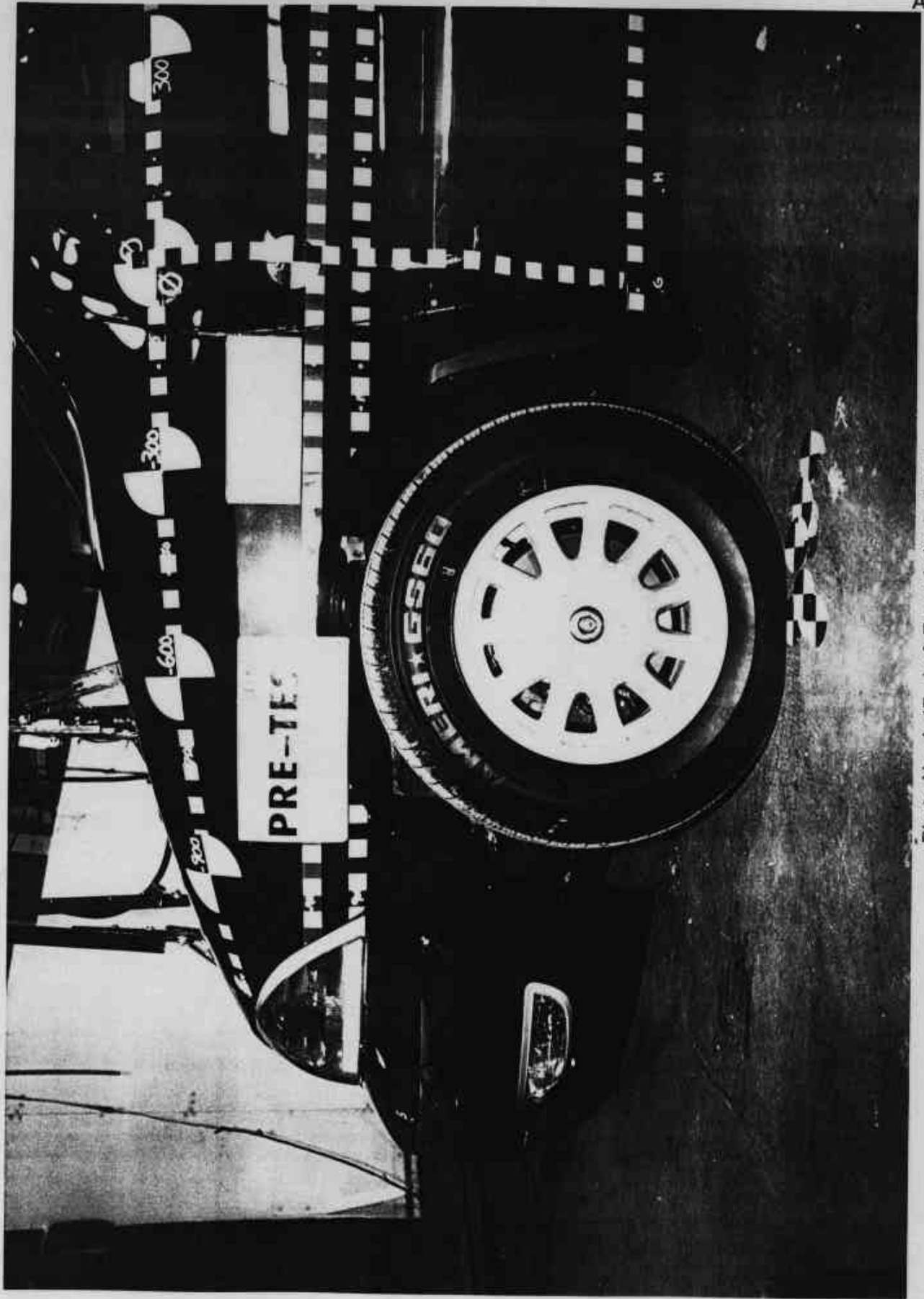


Photo No. A-47 - Left Front Attitude Point



Photo No. A-48 - Right Front Attitude Point

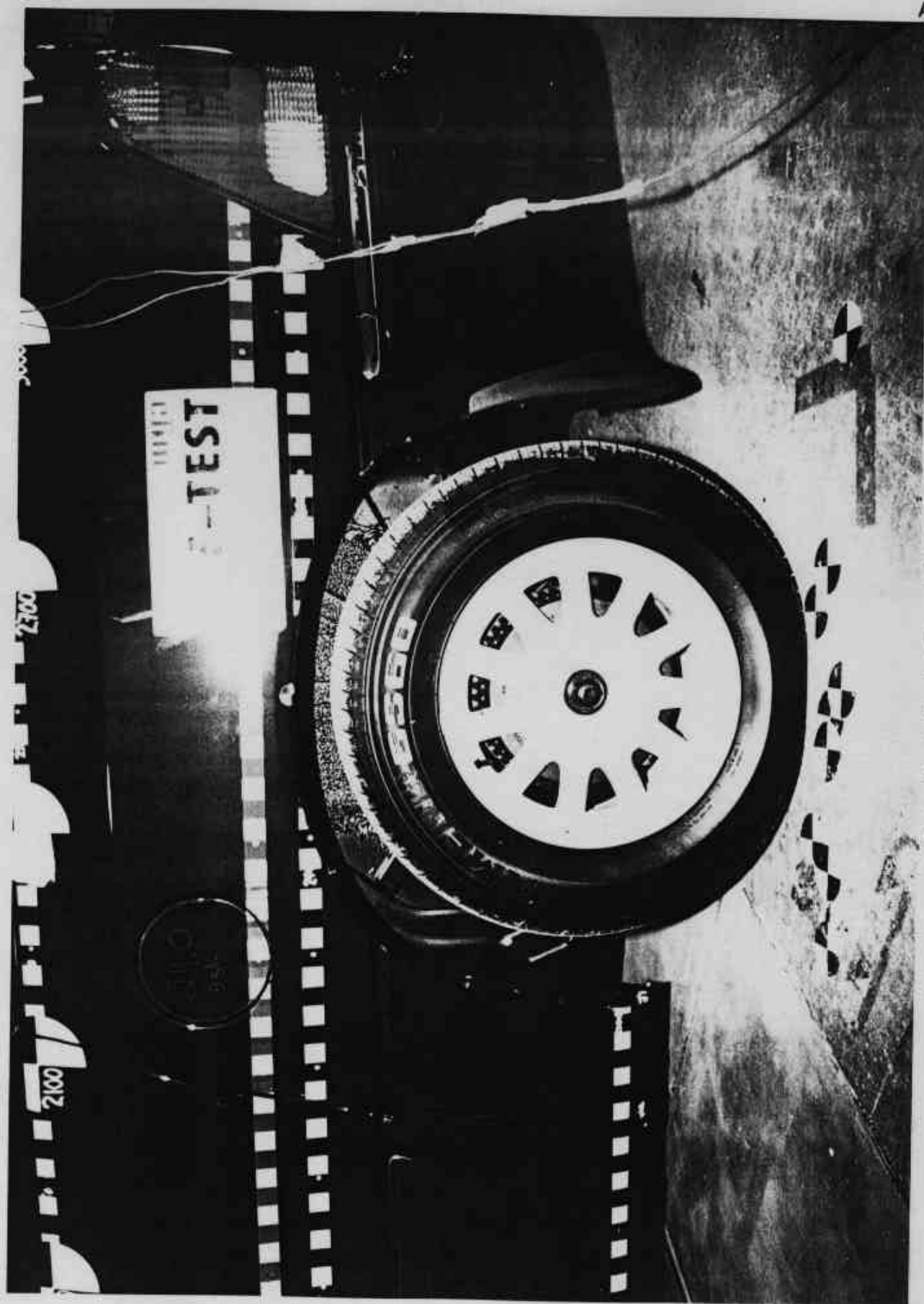


Photo No. A-49 - Left Rear Attitude Point

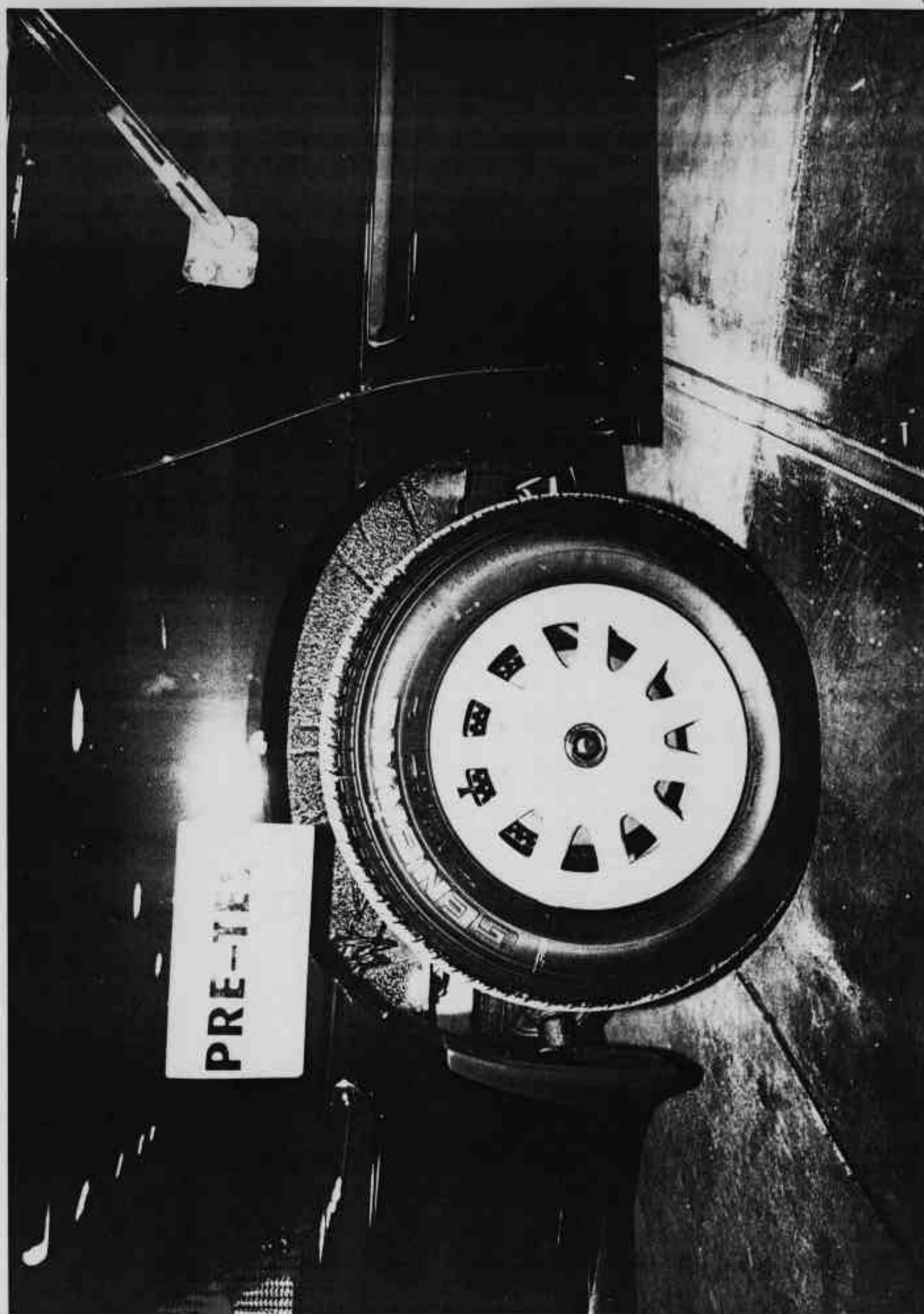


Photo No. A-50 - Right Rear Attitude Point



Photo No. 51 - Post-Test Left Rear Door Latch

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* Data not valid after approximately 19 msec.

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* Data not valid after approximately 20 msec.

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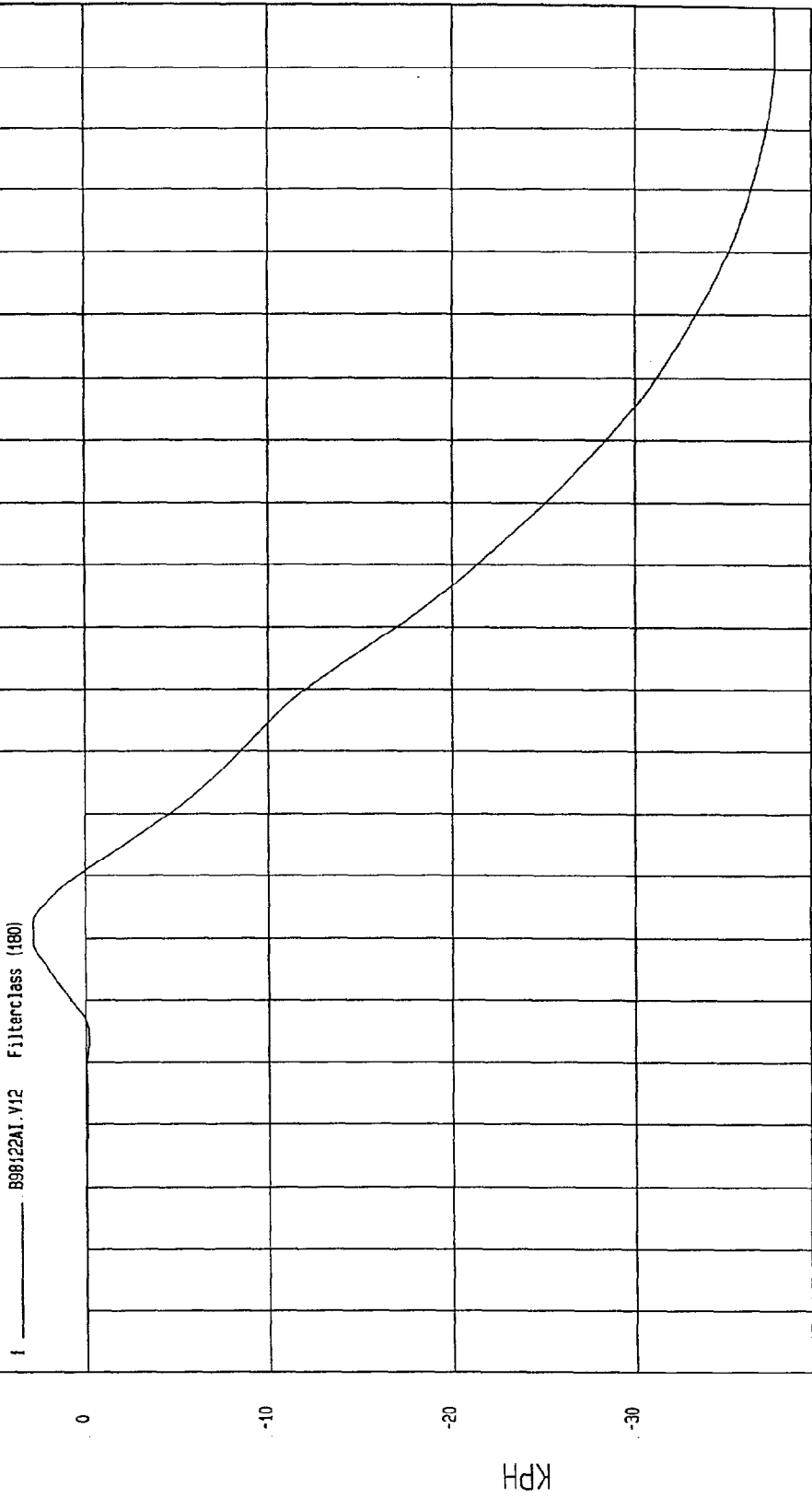
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TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -37.63 KPH at 194 msec Maximum = 2.87 KPH at 52 msec

DRIVER HEAD X VELOCITY

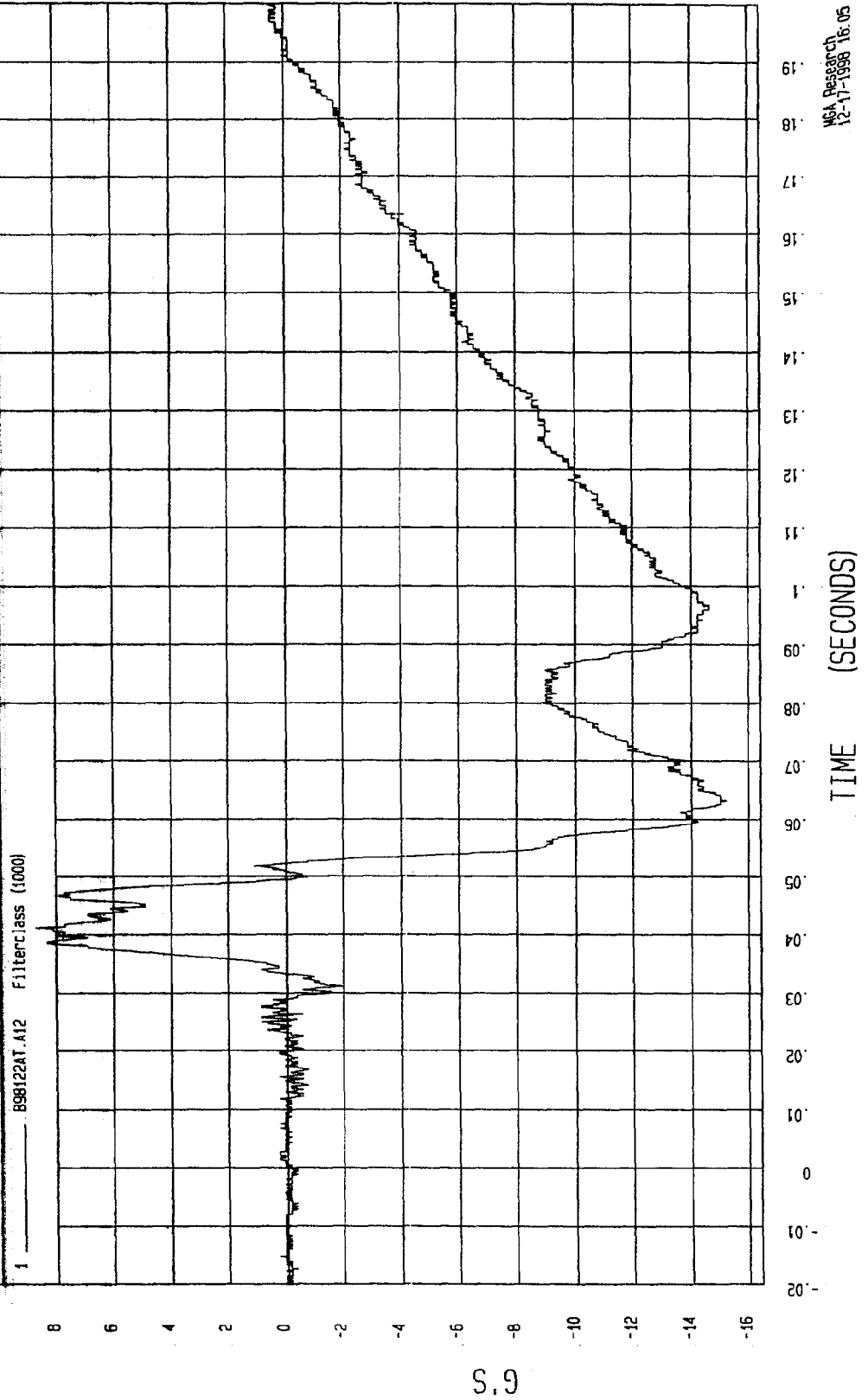


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

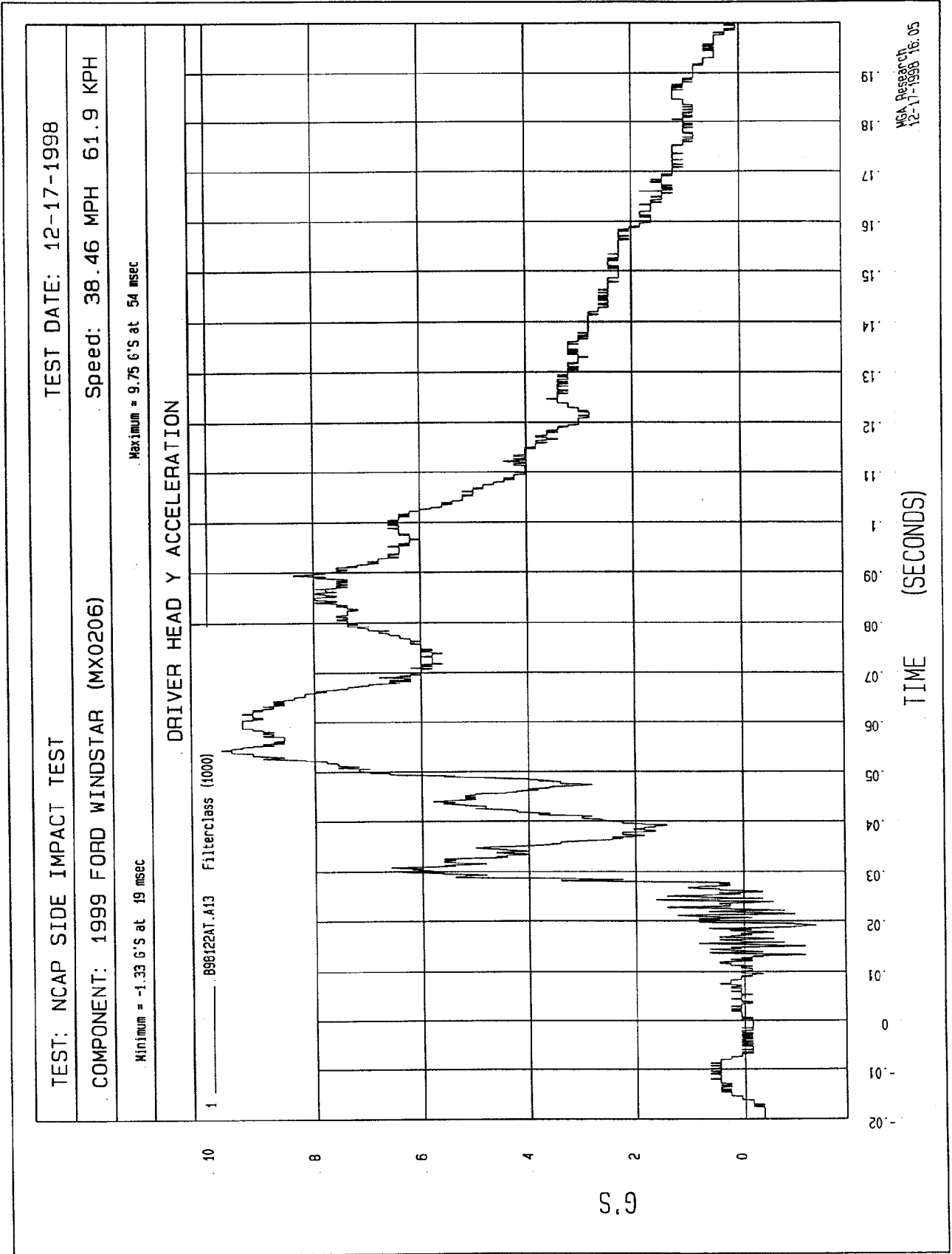
COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -15.22 G'S at 63 msec Maximum = 8.71 G'S at 41 msec

DRIVER HEAD X ACCELERATION



MCA Research
12-17-1998 16:05

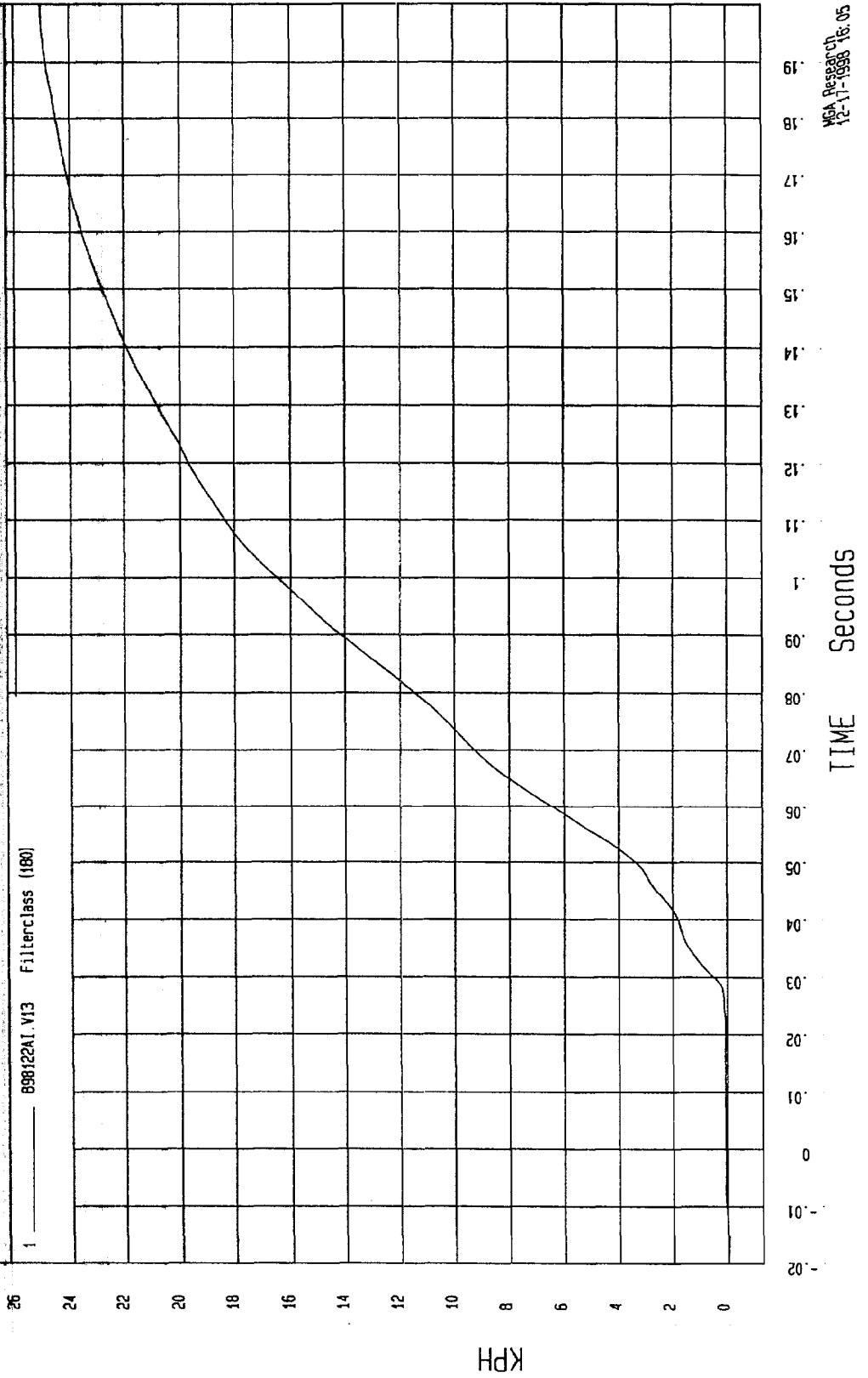


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -3.63E-02 KPH at -16 msec Maximum = 25.04 KPH at 200 msec

DRIVER HEAD Y VELOCITY



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

SPEED: 38.46 MPH 61.9 KPH

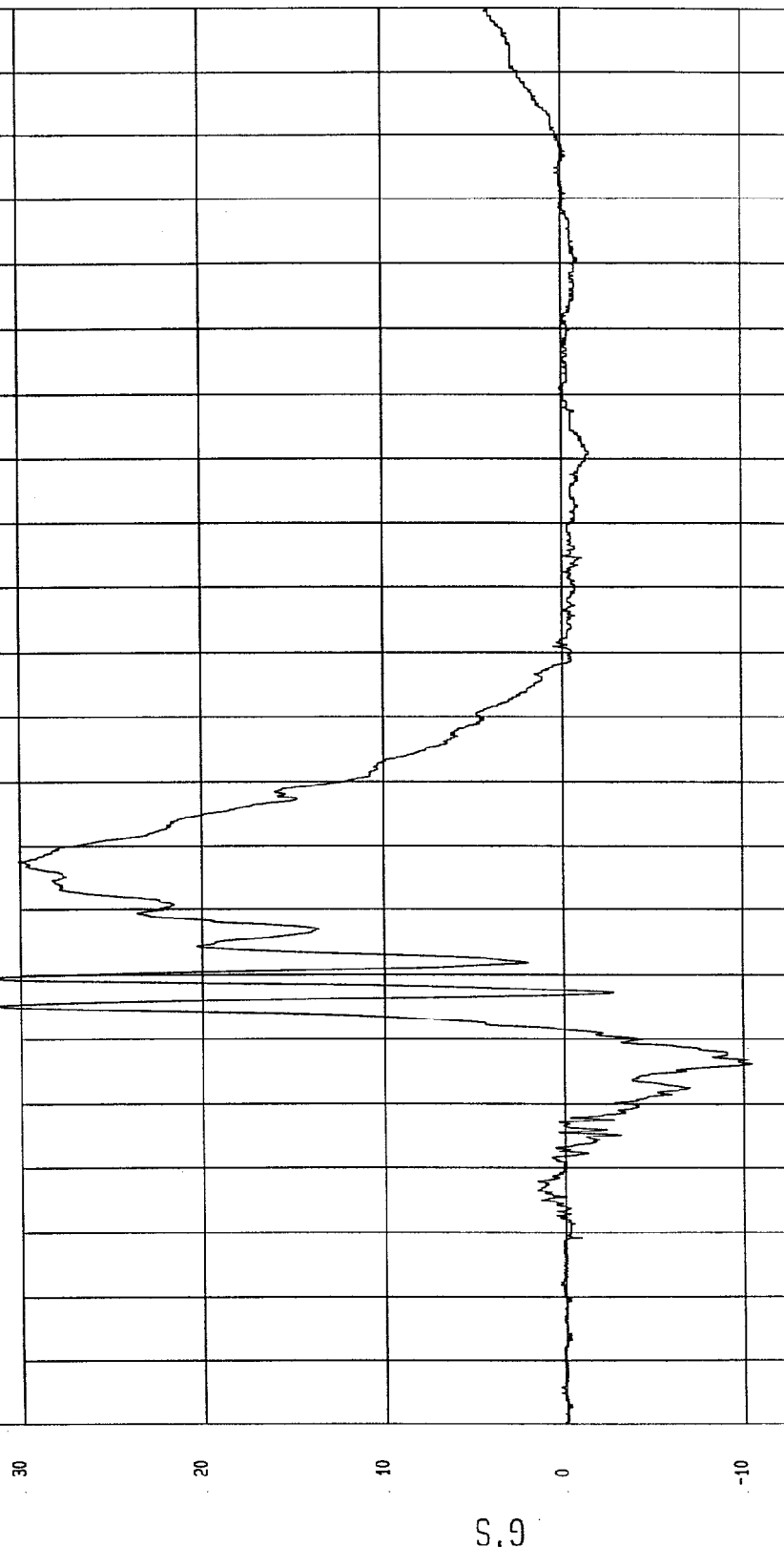
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 31.92 G'S at 50 msec

Minimum = -10.5 G'S at 36 msec

DRIVER HEAD Z ACCELERATION

1 898122AT.A14 Filterclass (1000)



TIME (SECONDS)

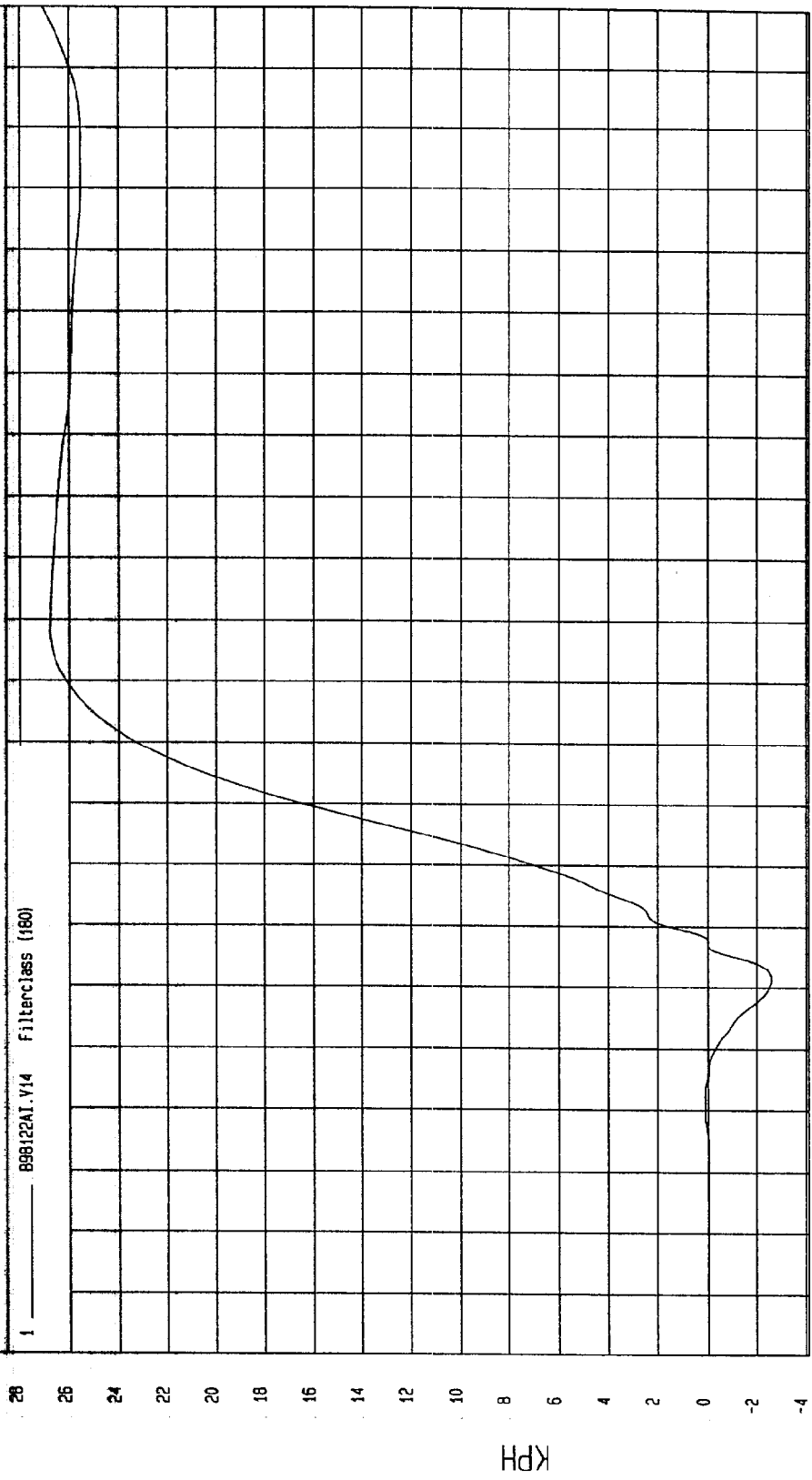
MOA Research
12-17-1998 16:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.62 KPH at 41 msec Maximum = 27.07 KPH at 200 msec

DRIVER HEAD Z VELOCITY



TIME Seconds

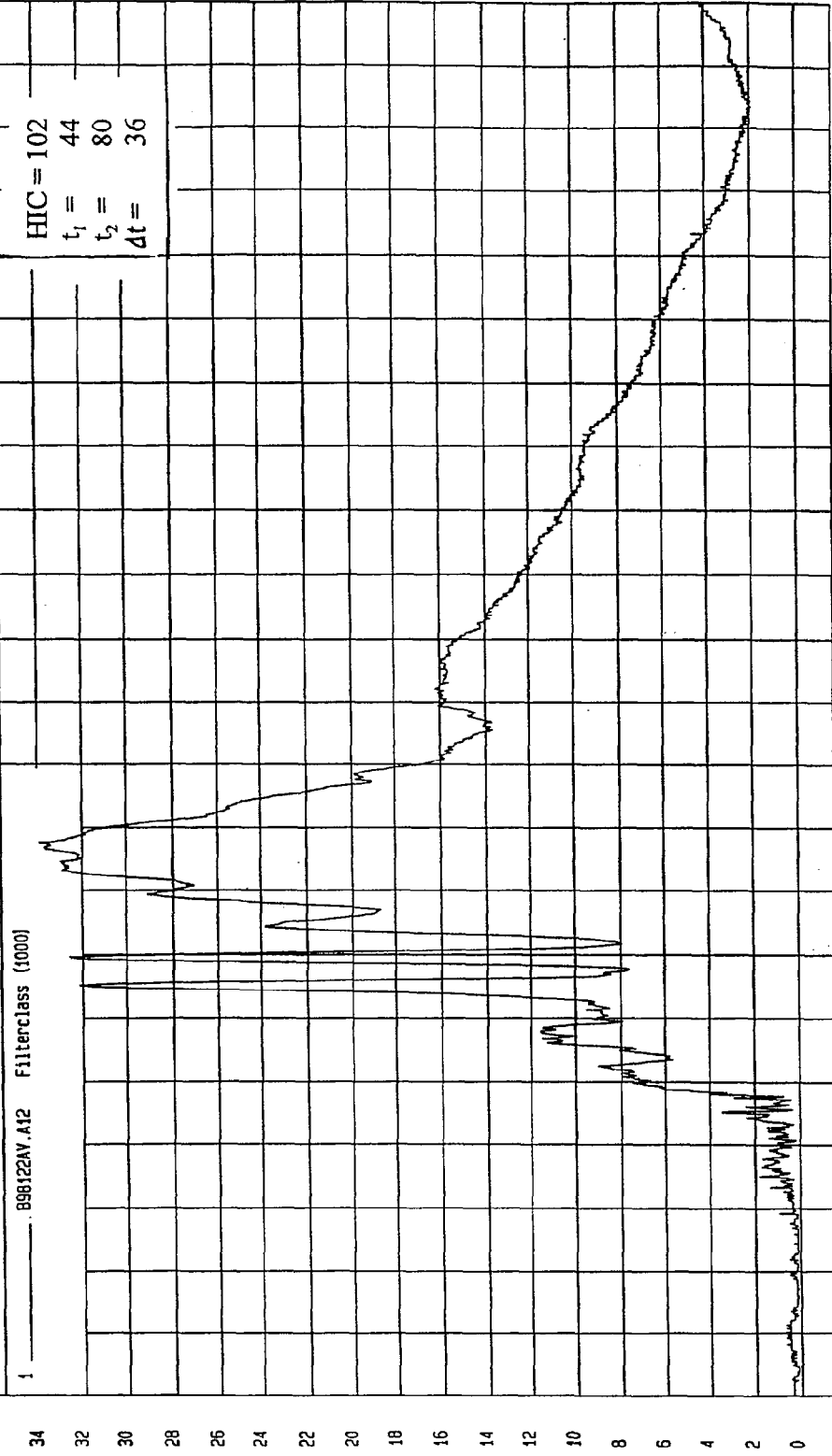
MSA Research
12-17-1998 16:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = .13 G'S at -16 msec Maximum = 33.92 G'S at 68 msec

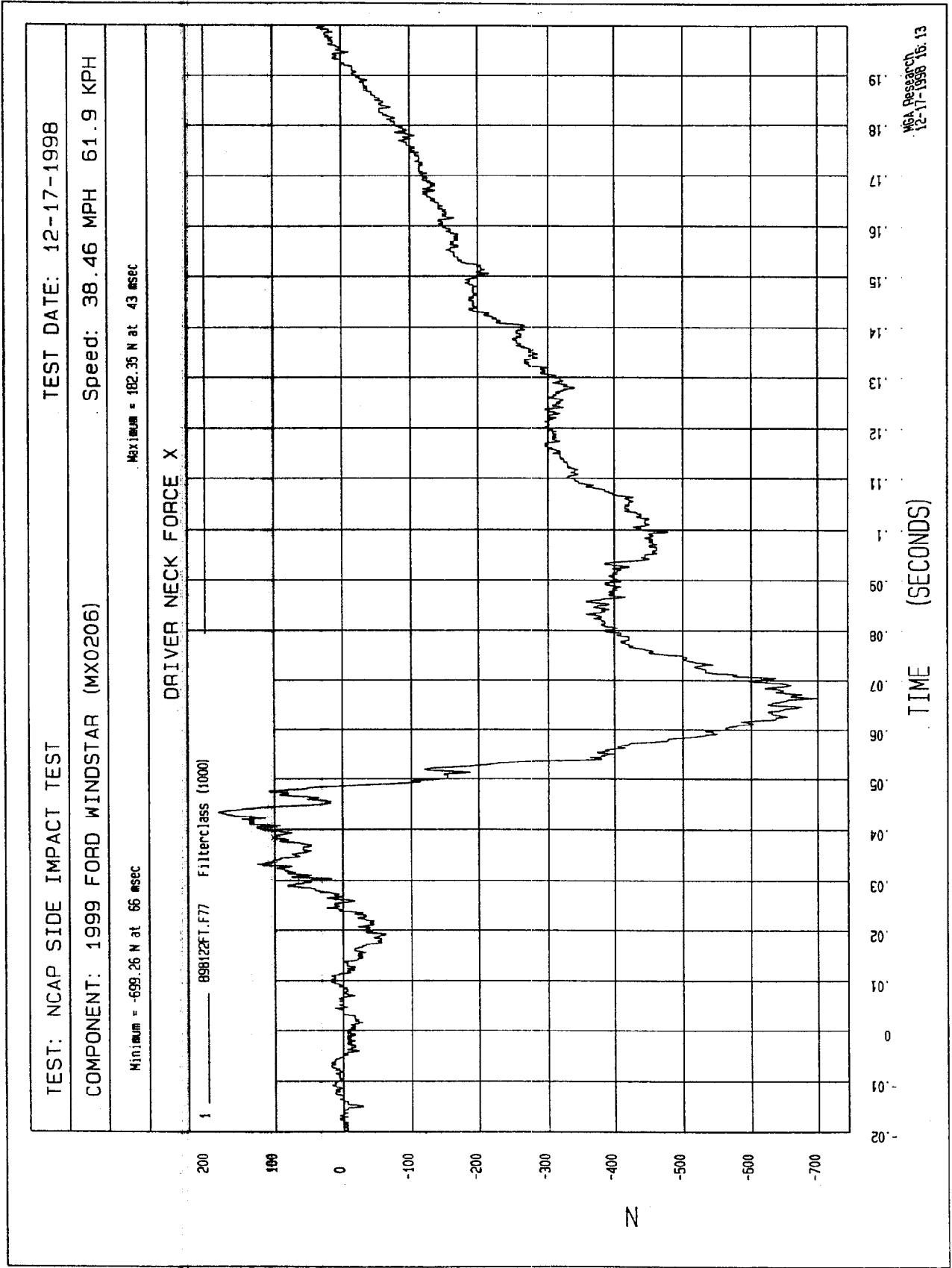
DRIVER HEAD RESULTANT ACCELERATION



MEK Research
 12-21-1998 10:28

TIME (SECONDS)

G.S



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

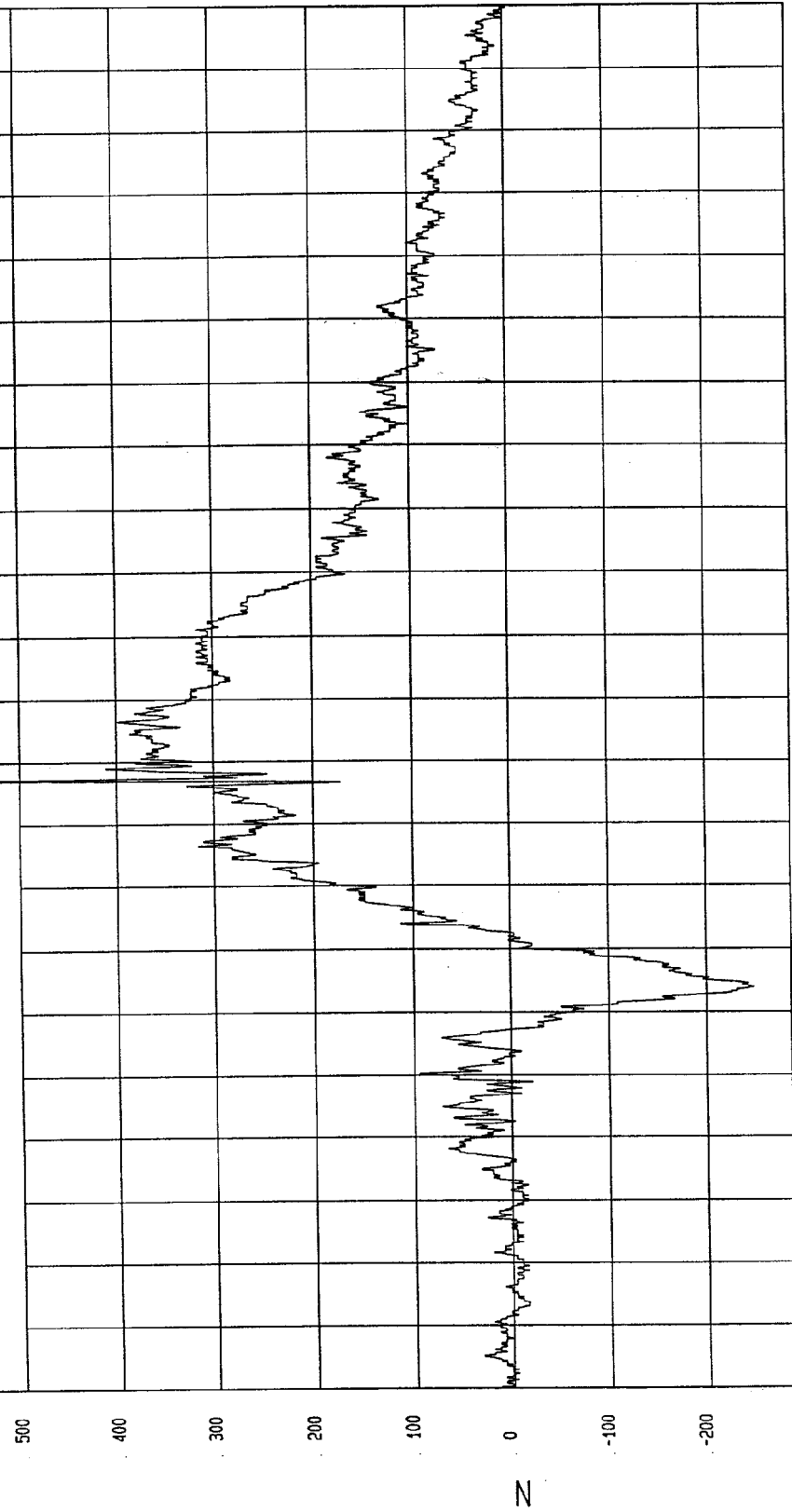
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 520.91 N at 77 msec

Minimum = -248.9 N at 44 msec

DRIVER NECK FORCE Y

1 89612FT.F78 Filterclass (1000)



TIME (SECONDS)

WSA Research
12-17-1998 16:13

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

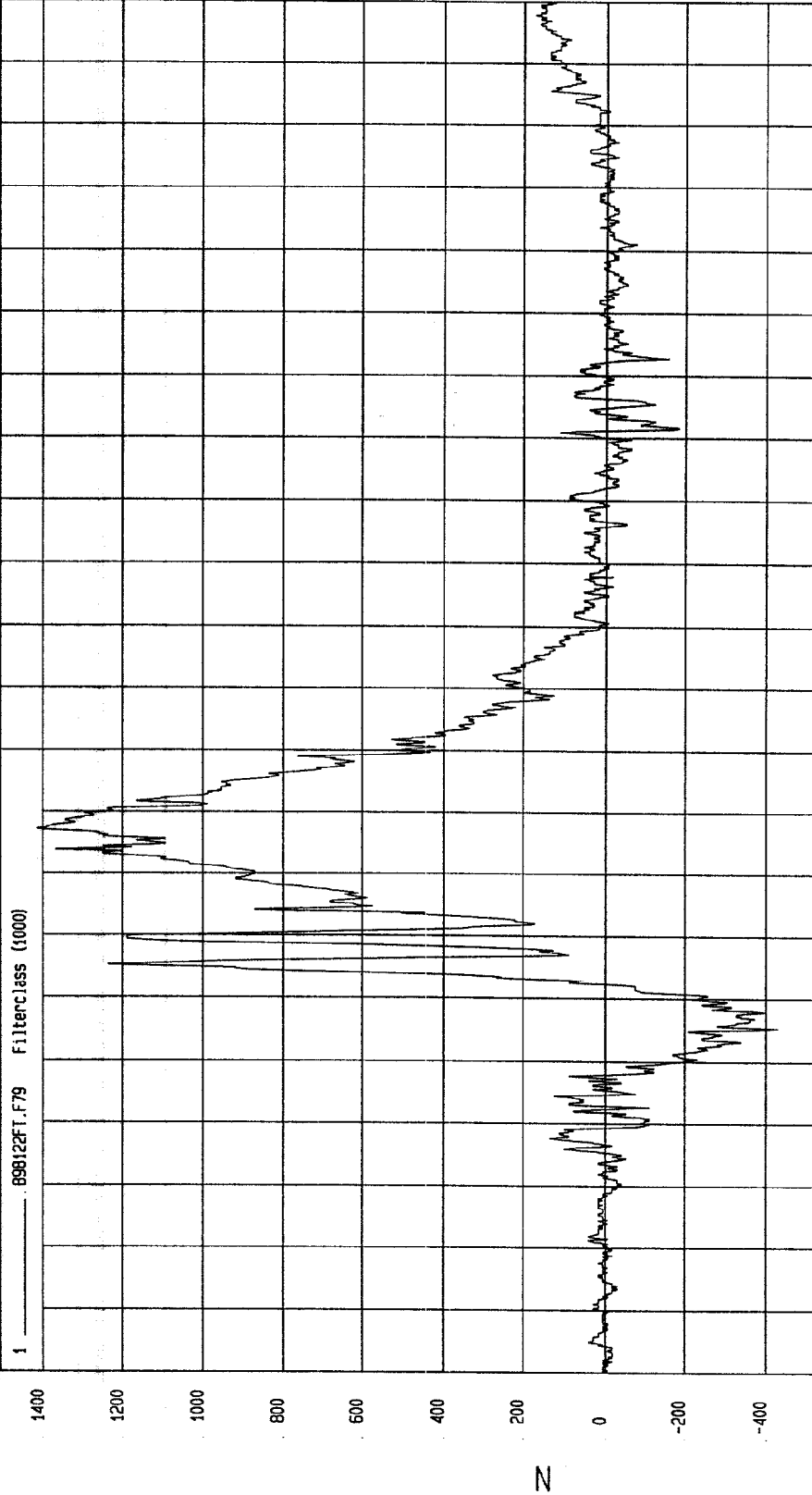
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 1414.41 N at 67 msec

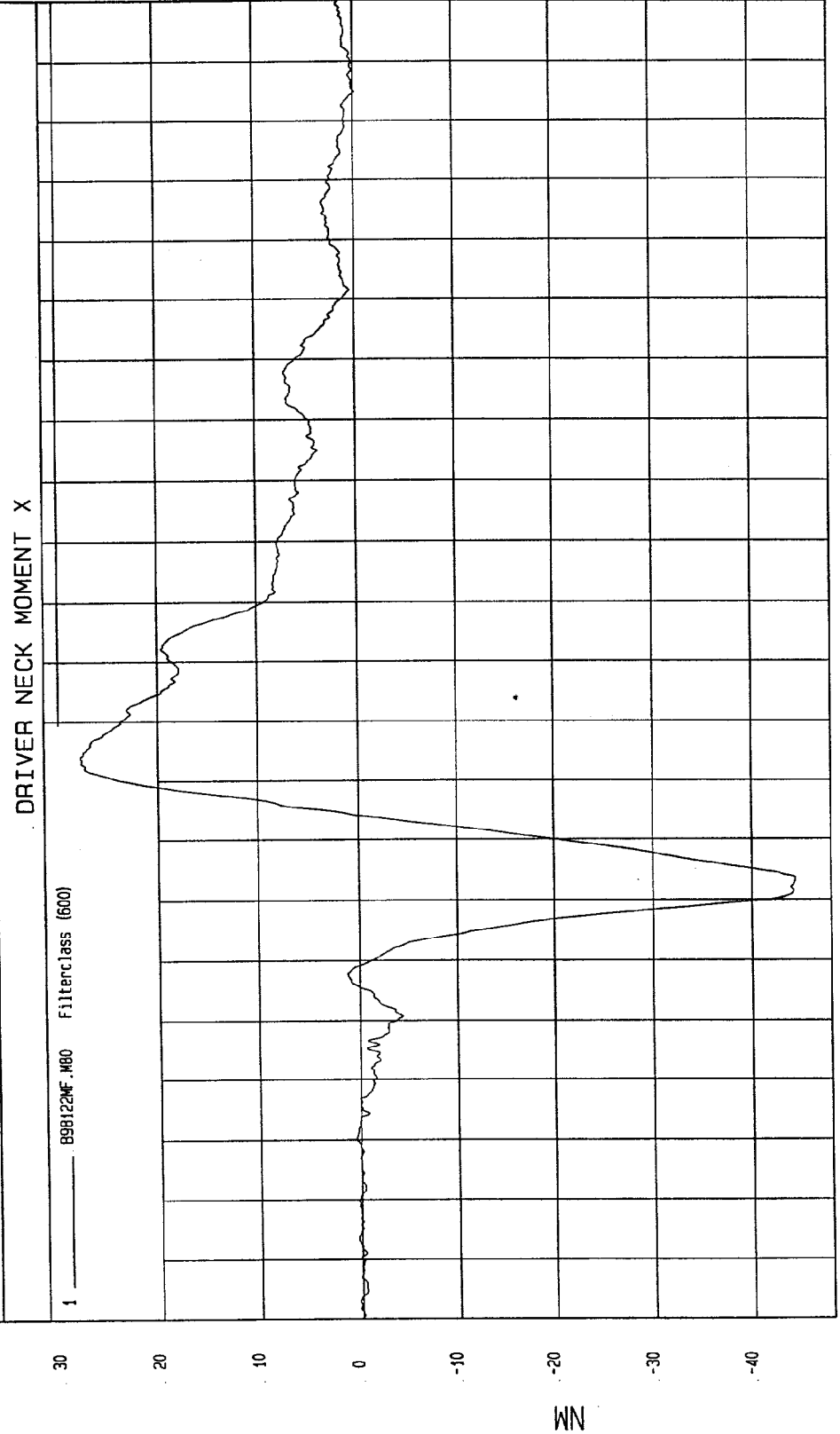
Minimum = -431.35 N at 35 msec

DRIVER NECK FORCE Z



MCA Research
12-17-1998 16:13

TEST: NCAP SIDE IMPACT TEST	TEST DATE: 12-17-1998
COMPONENT: 1999 FORD WINDSTAR (MX0206)	Speed: 38.46 MPH 61.9 KPH
Minimum = -44.5 NM at 54 msec	Maximum = 27.81 NM at 74 msec



TIME (SECONDS)

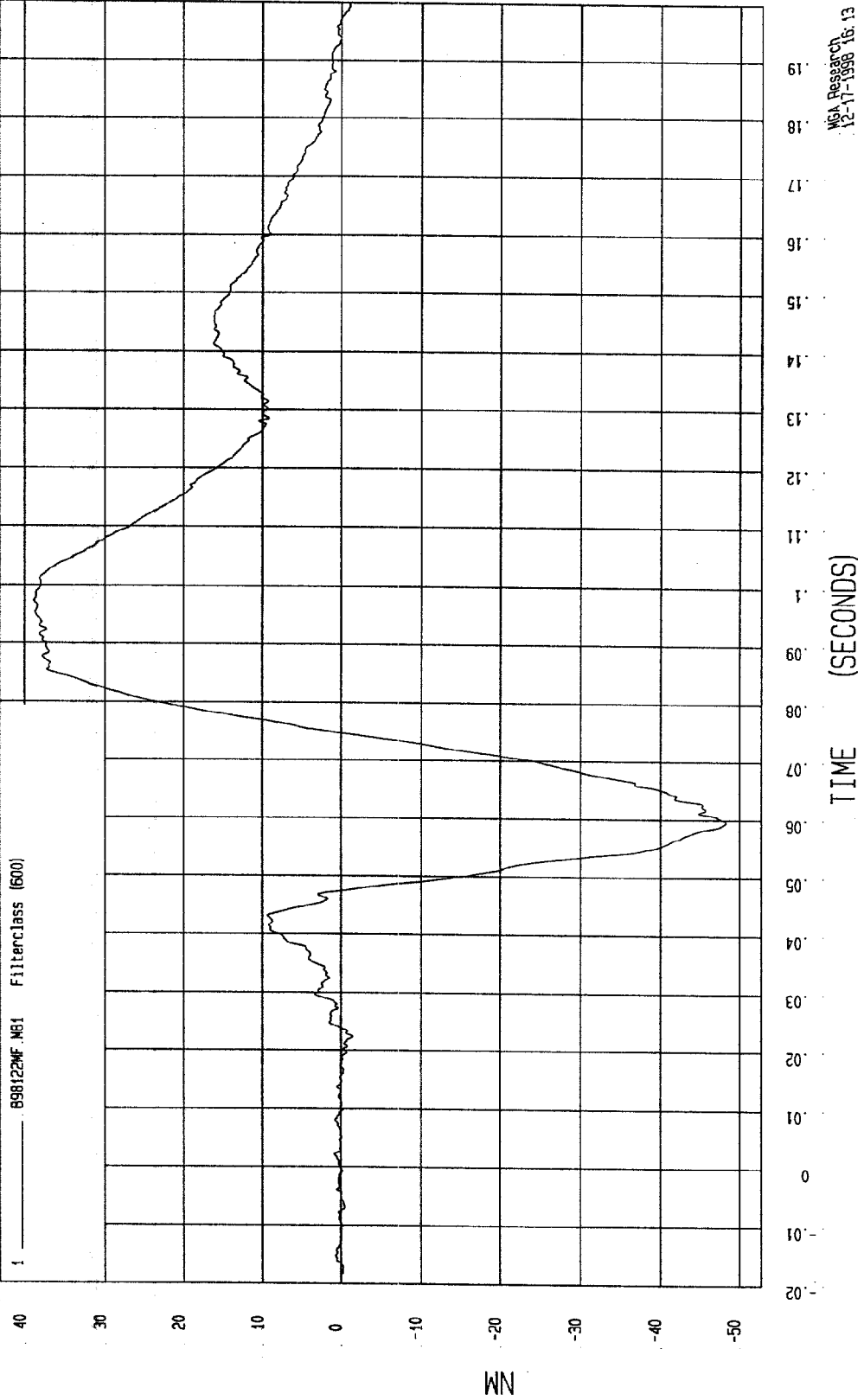
WSA Research
12-17-1998 16:13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -48.26 NM at 60 msec Maximum = 38.87 NM at 97 msec

DRIVER NECK MOMENT Y

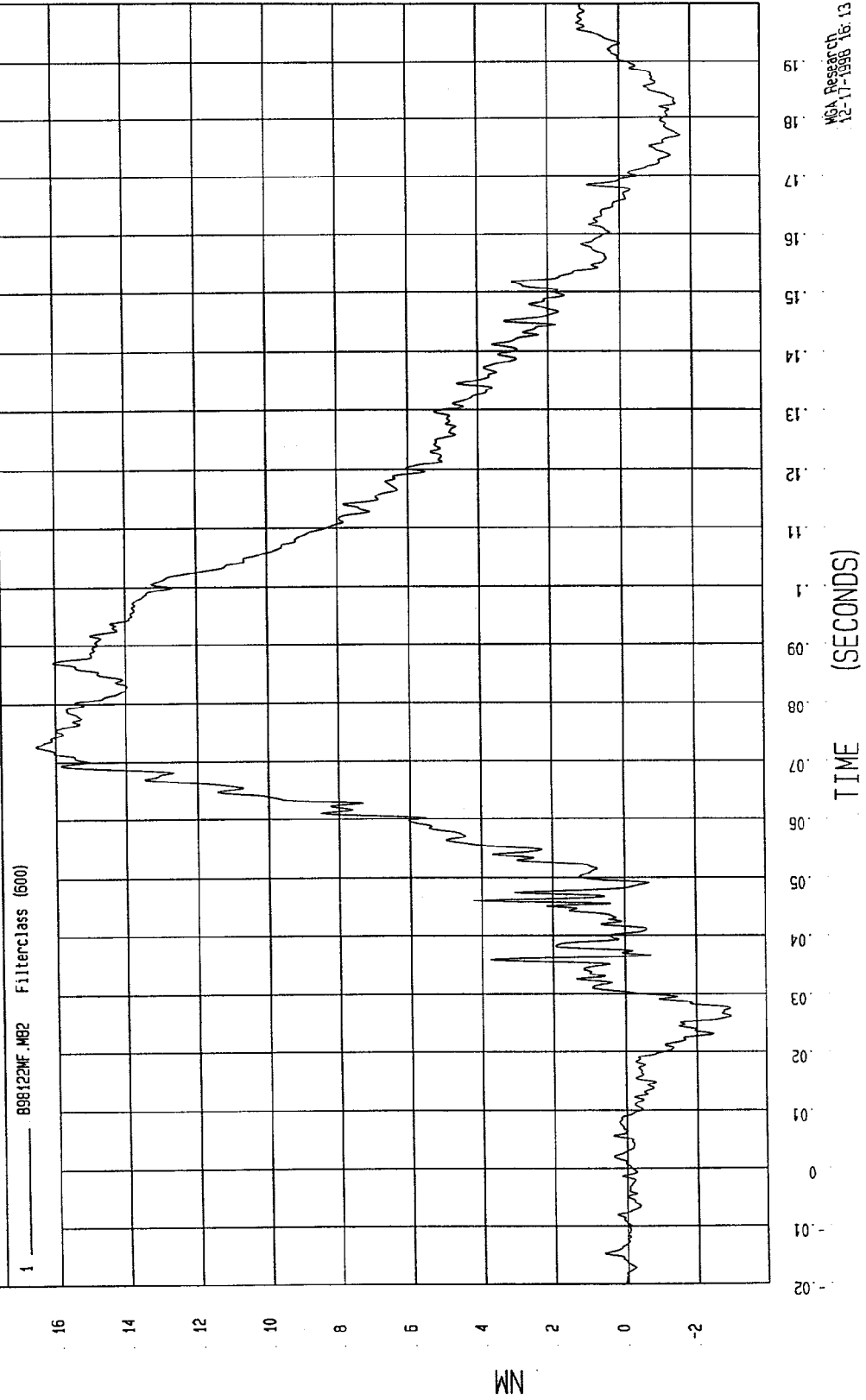


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.98 NM at 26 msec Maximum = 16.55 NM at 73 msec

DRIVER NECK MOMENT Z



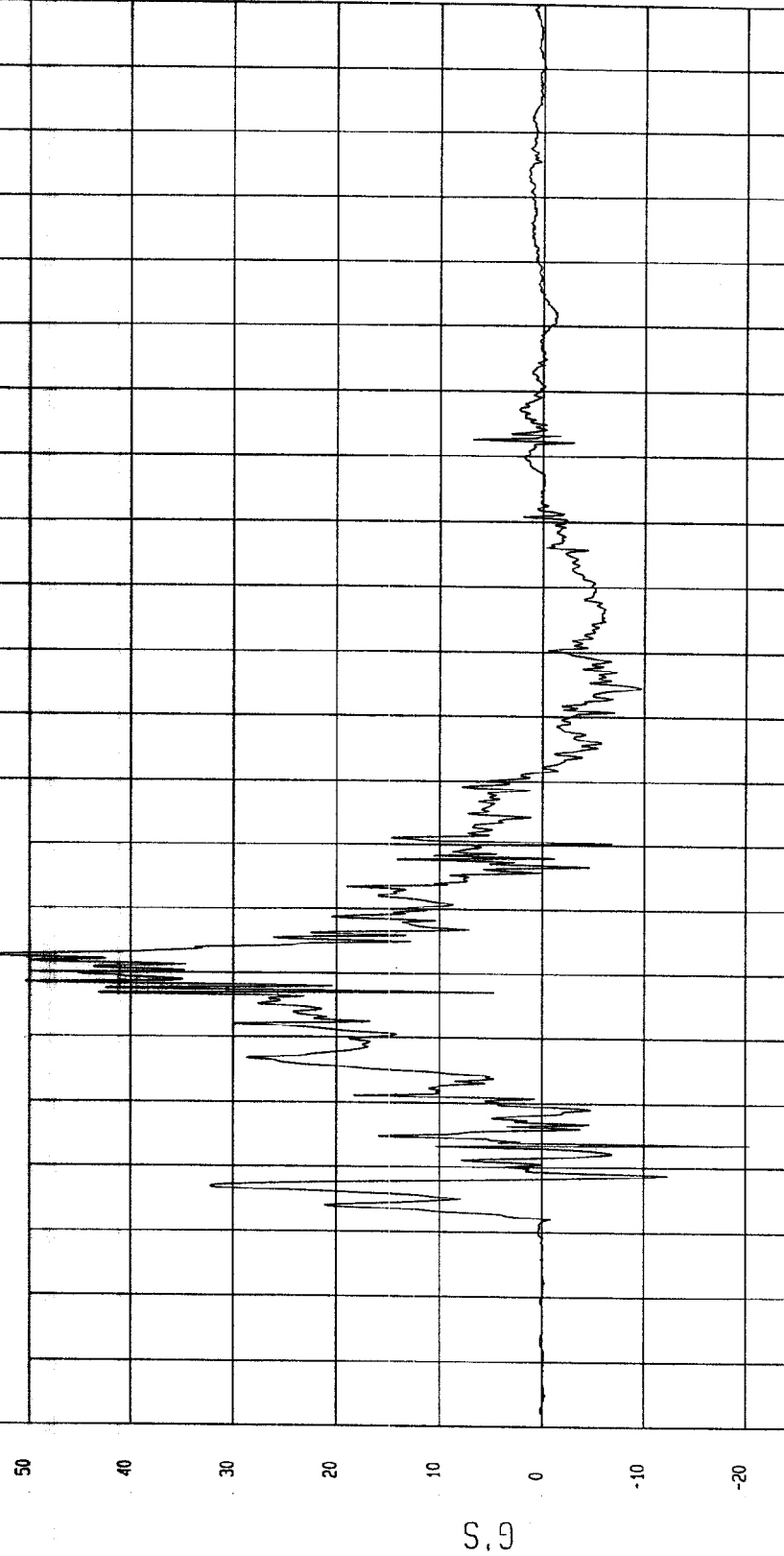
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -20.37 G'S at 24 msec Maximum = 55.1 G'S at 52 msec

DRIVER UPPER RIB Y ACCELERATION

1 898122AT.A15 Filterclass (1000)



TIME (SECONDS)

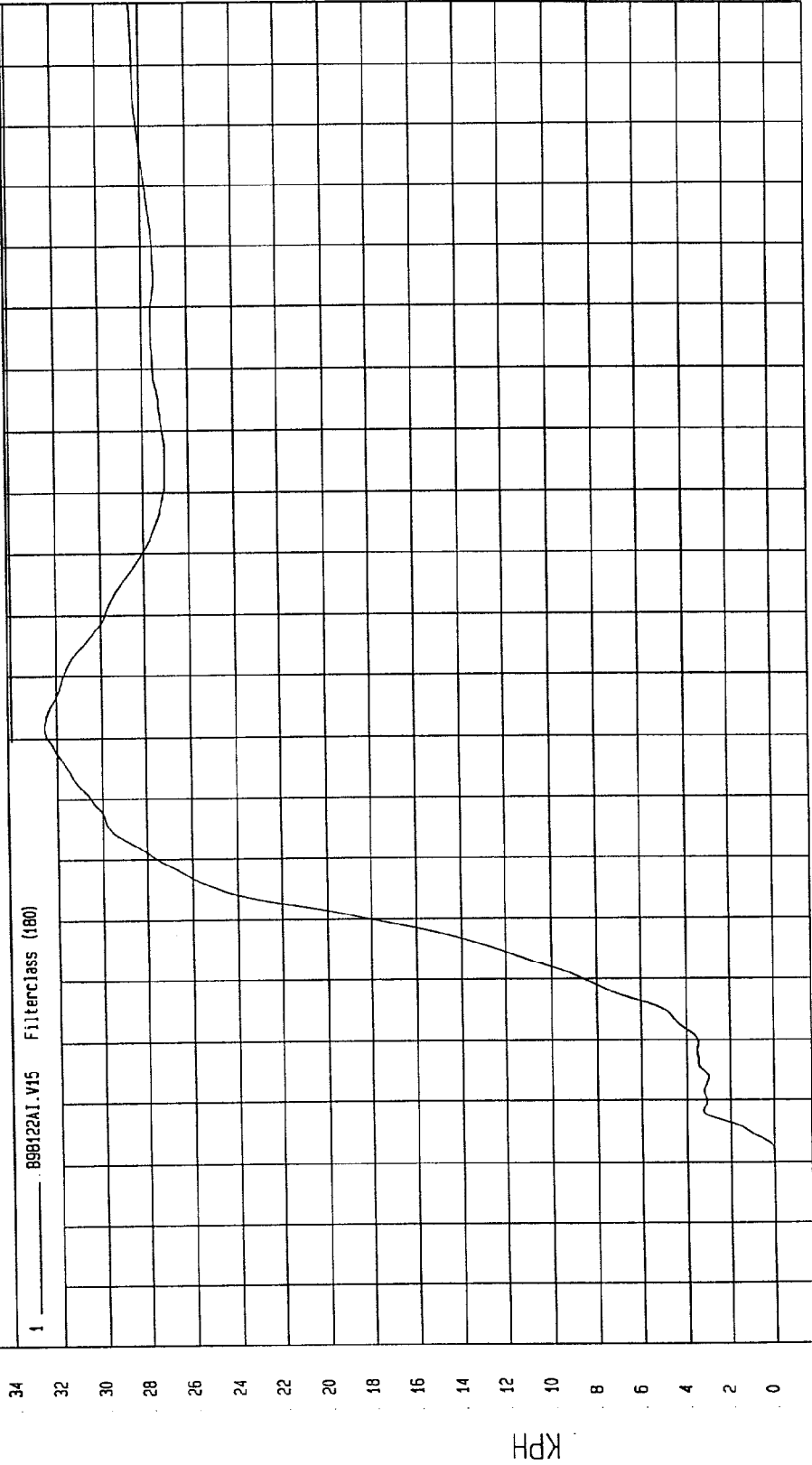
MSA Research
12-17-1998 16:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.14E-02 KPH at -8 msec Maximum = 32.53 KPH at 82 msec

DRIVER UPPER RIB Y VELOCITY



TIME Seconds

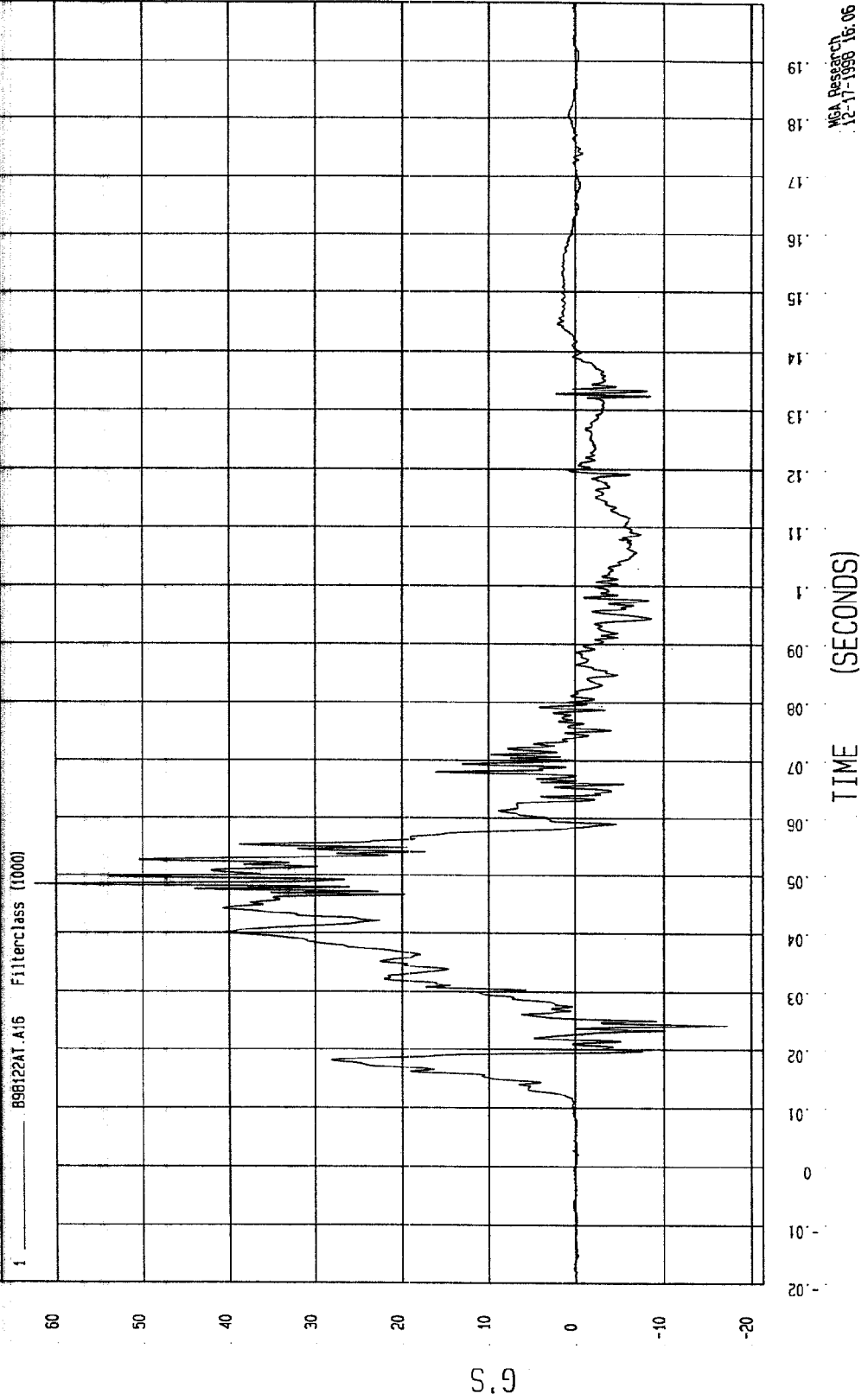
MGA Research
12-17-1998 16:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -17.31 G'S at 24 msec Maximum = 62.41 G'S at 48 msec

DRIVER LOWER RIB Y ACCELERATION

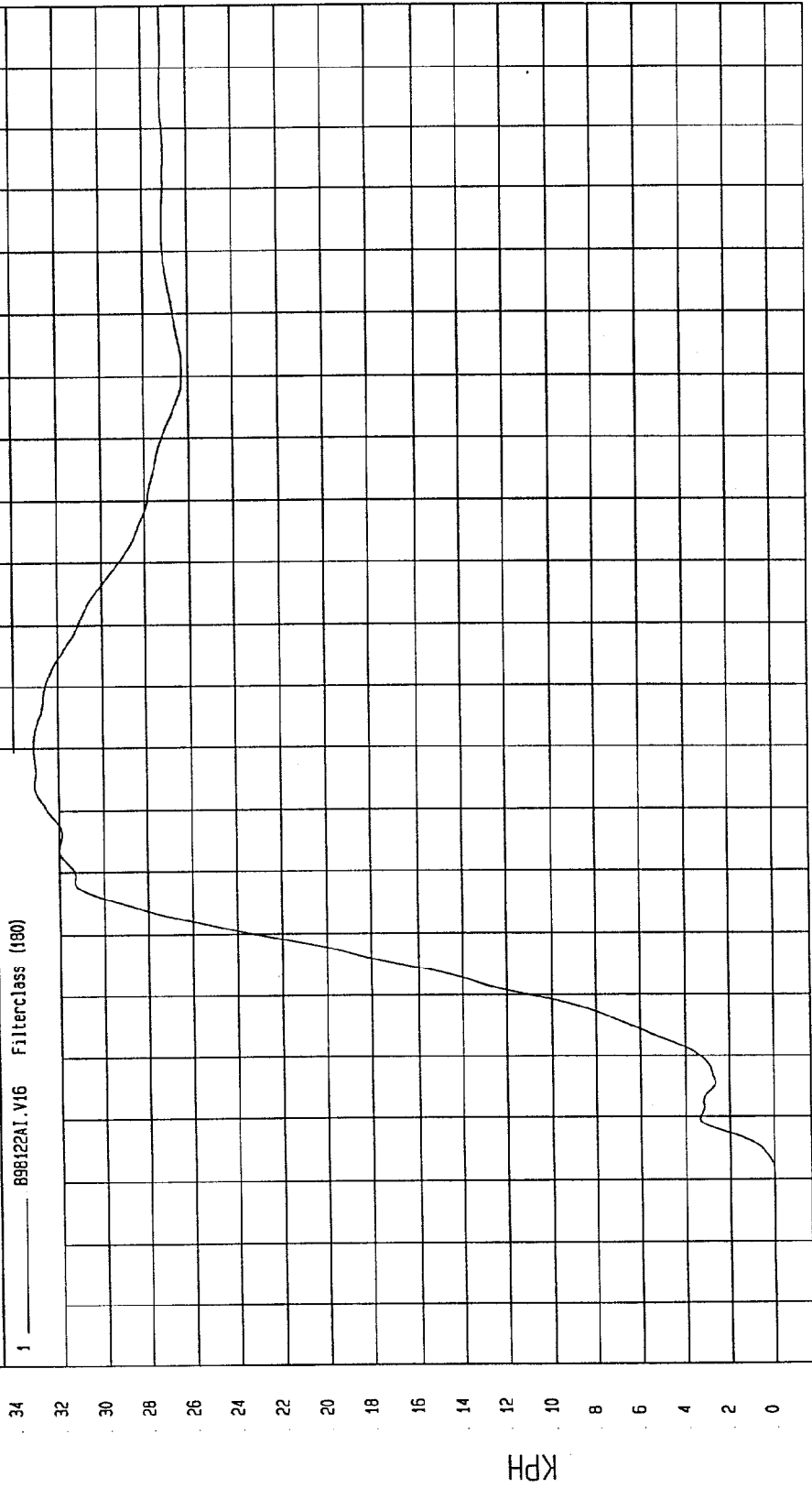


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.81E-02 KPH at -8 msec Maximum = 33.12 KPH at 80 msec

DRIVER LOWER RIB Y VELOCITY



TIME Seconds

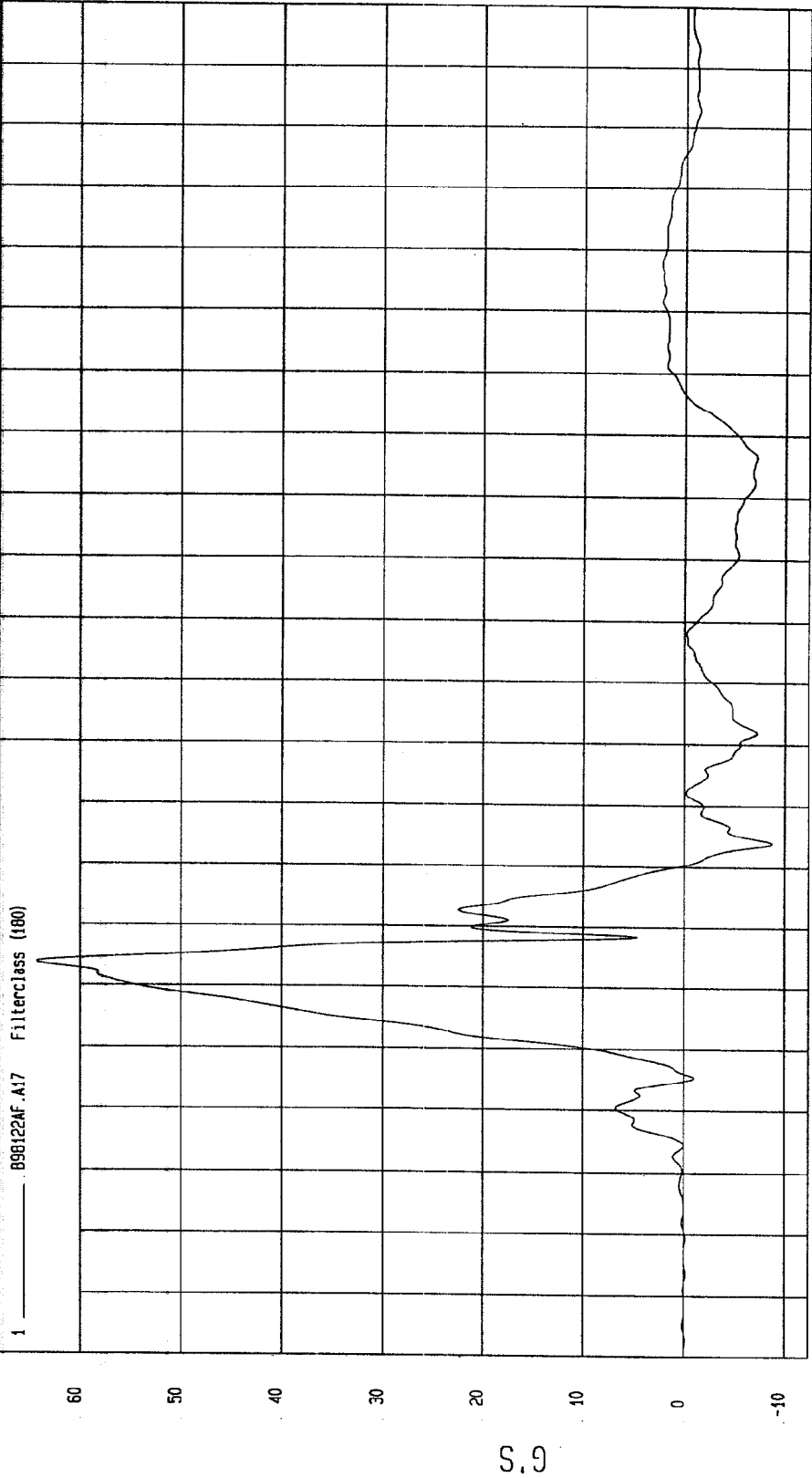
MSA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -8.75 G's at 64 msec Maximum = 64.34 G's at 44 msec

DRIVER LOWER SPINE Y ACCELERATION



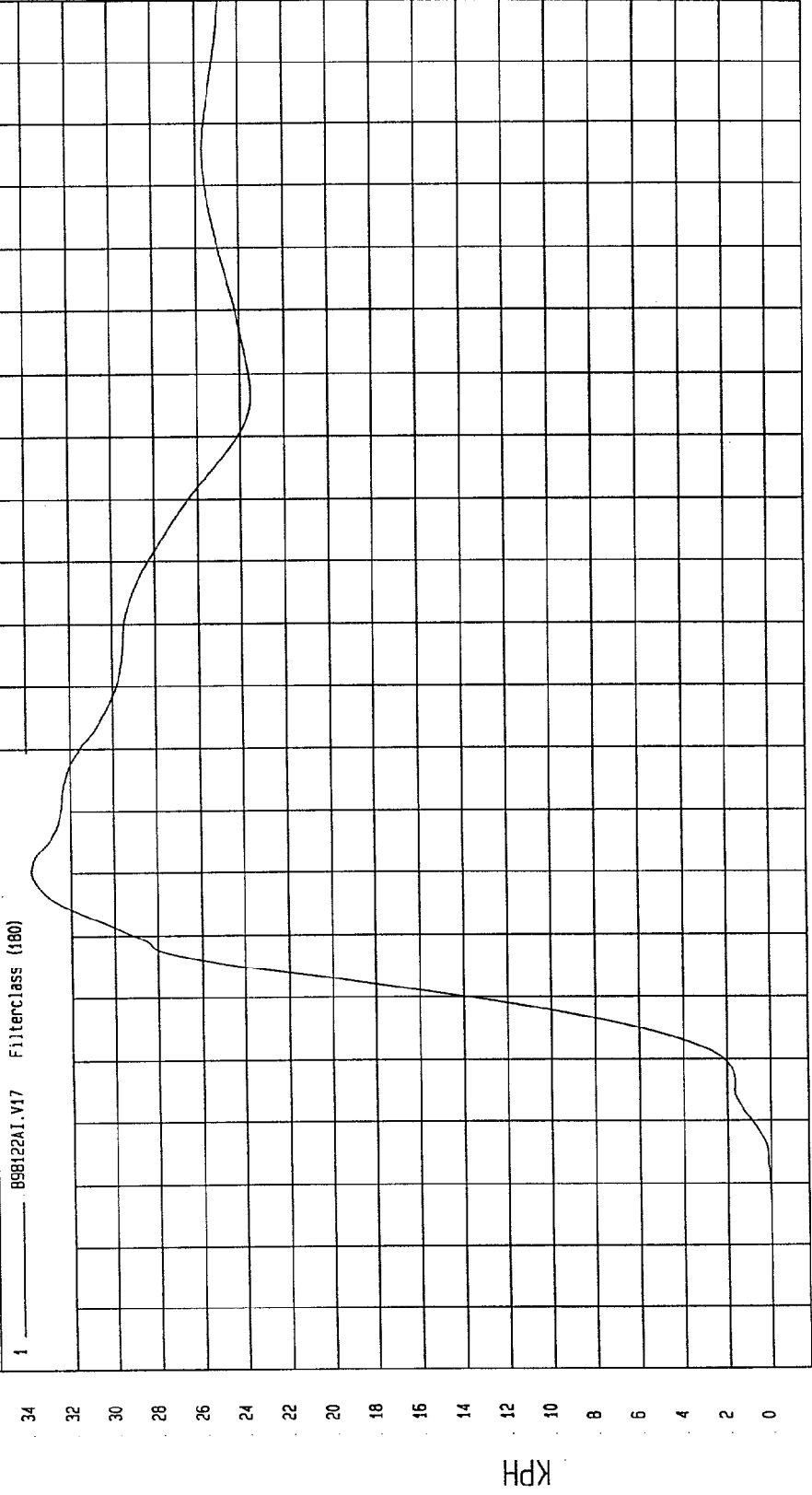
MCA Research
12-17-1998 18:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -9.16E-03 KPH at 0 msec Maximum = 33.79 KPH at 60 msec

DRIVER LOWER SPINE Y VELOCITY



TIME Seconds

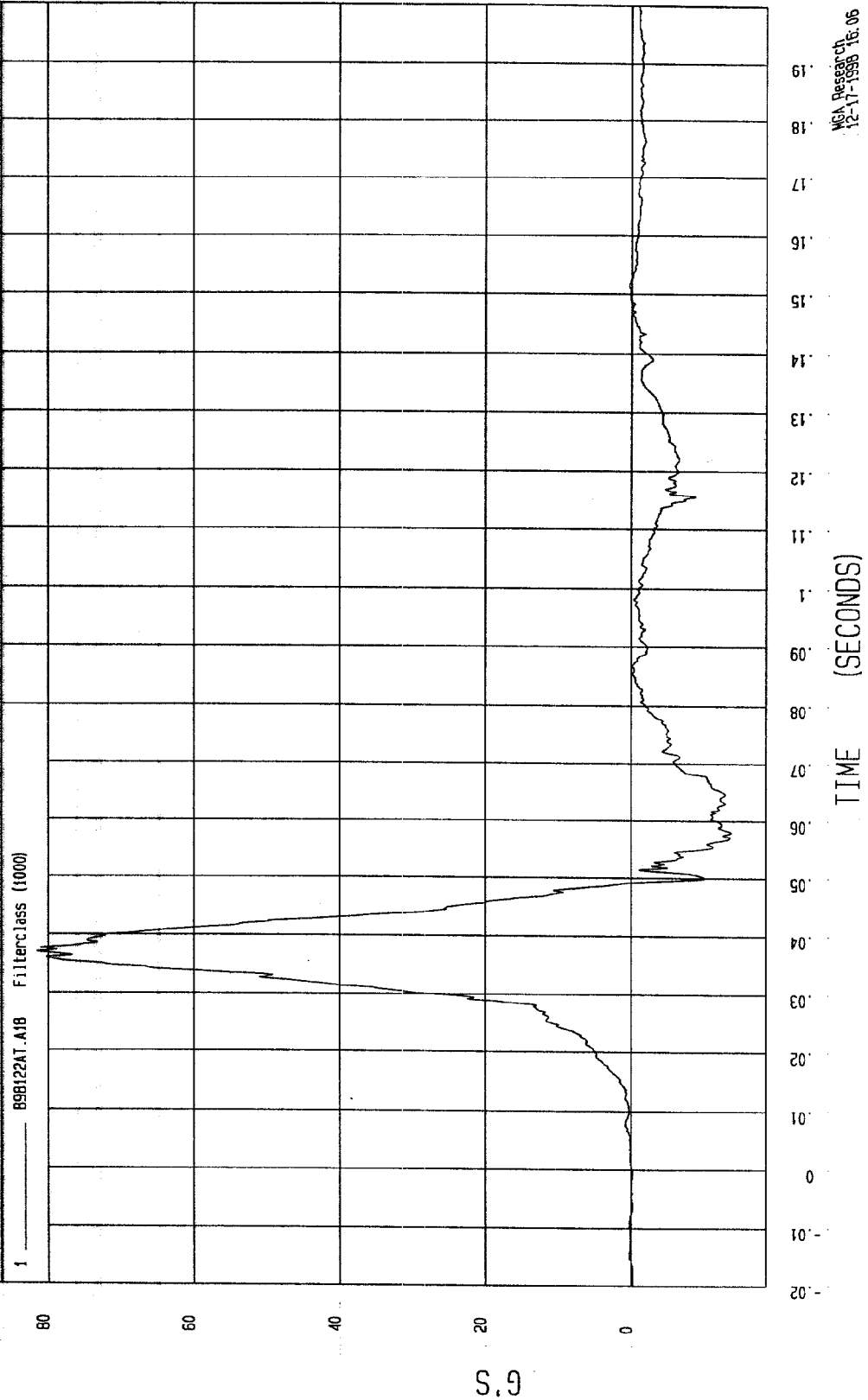
MSA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -13.89 G'S at 58 msec Maximum = 81.52 G'S at 37 msec

DRIVER PELVIS Y ACCELERATION

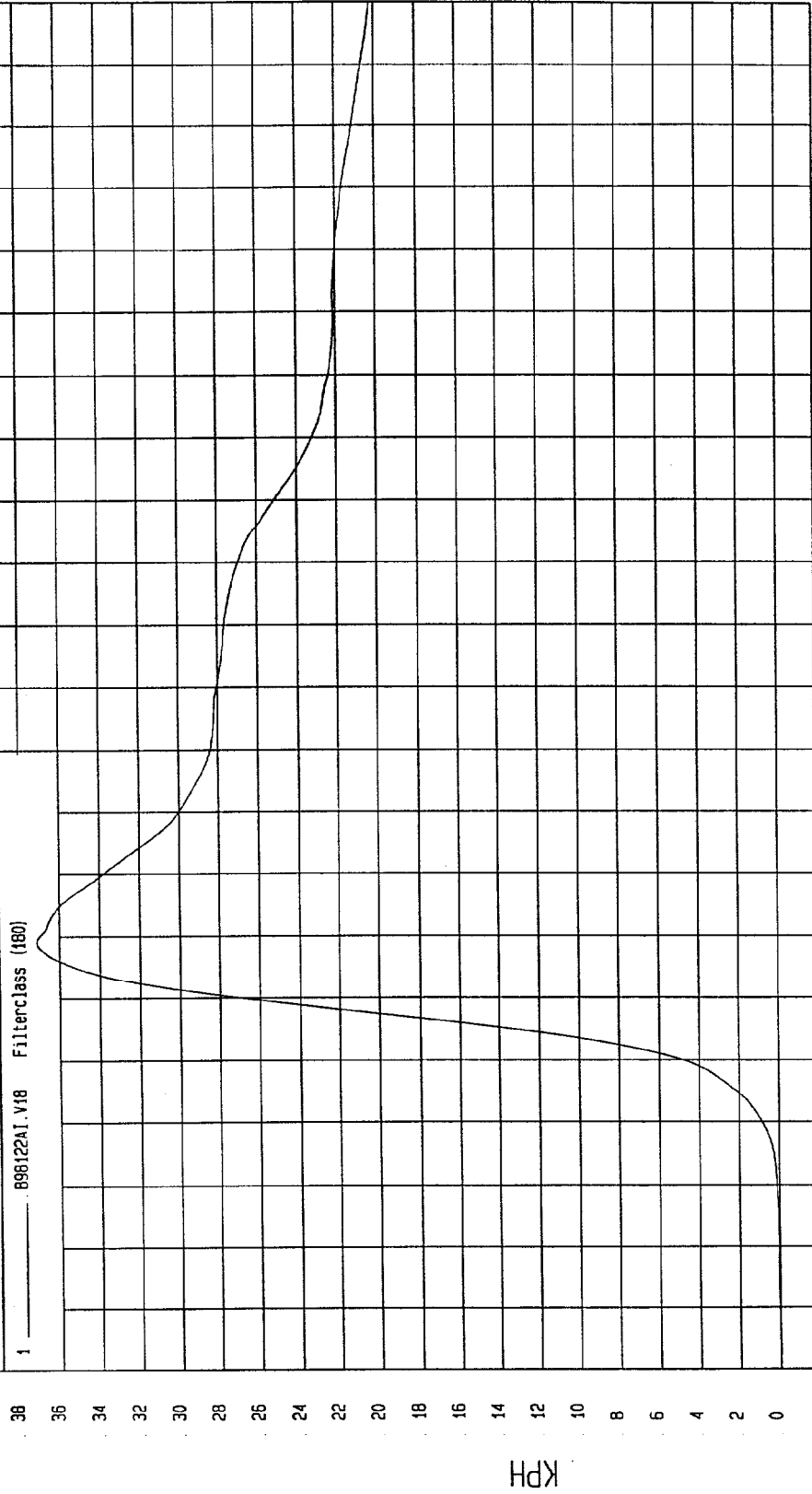


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.82E-02 KPH at -16 msec Maximum = 37.12 KPH at 49 msec

DRIVER PELVIS Y VELOCITY



WCA Research
12-17-1998 16.06

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

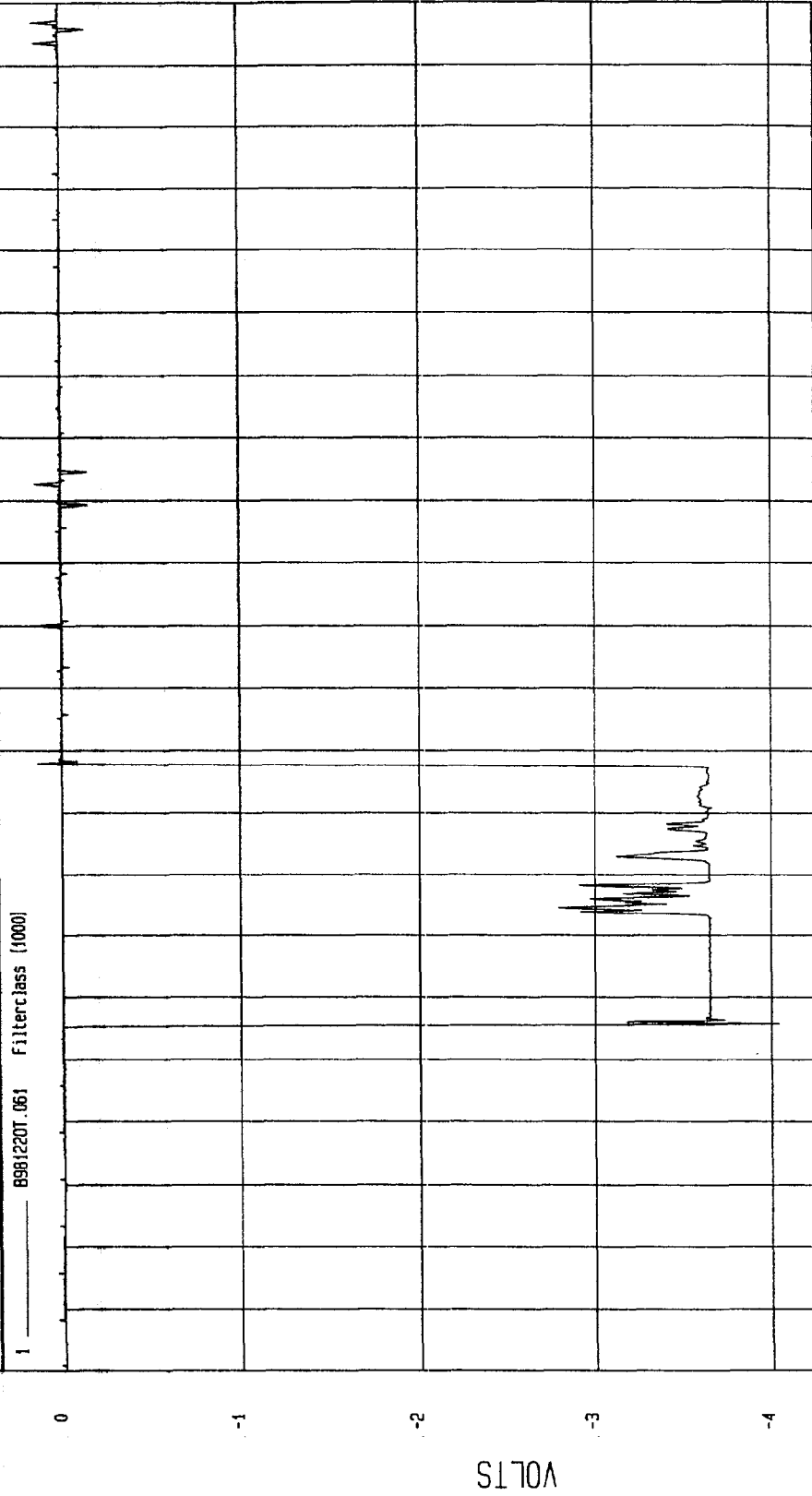
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = .14 VOLTS at 123 msec

Minimum = -4.04 VOLTS at 36 msec

DRIVER SHOULDER CONTACT



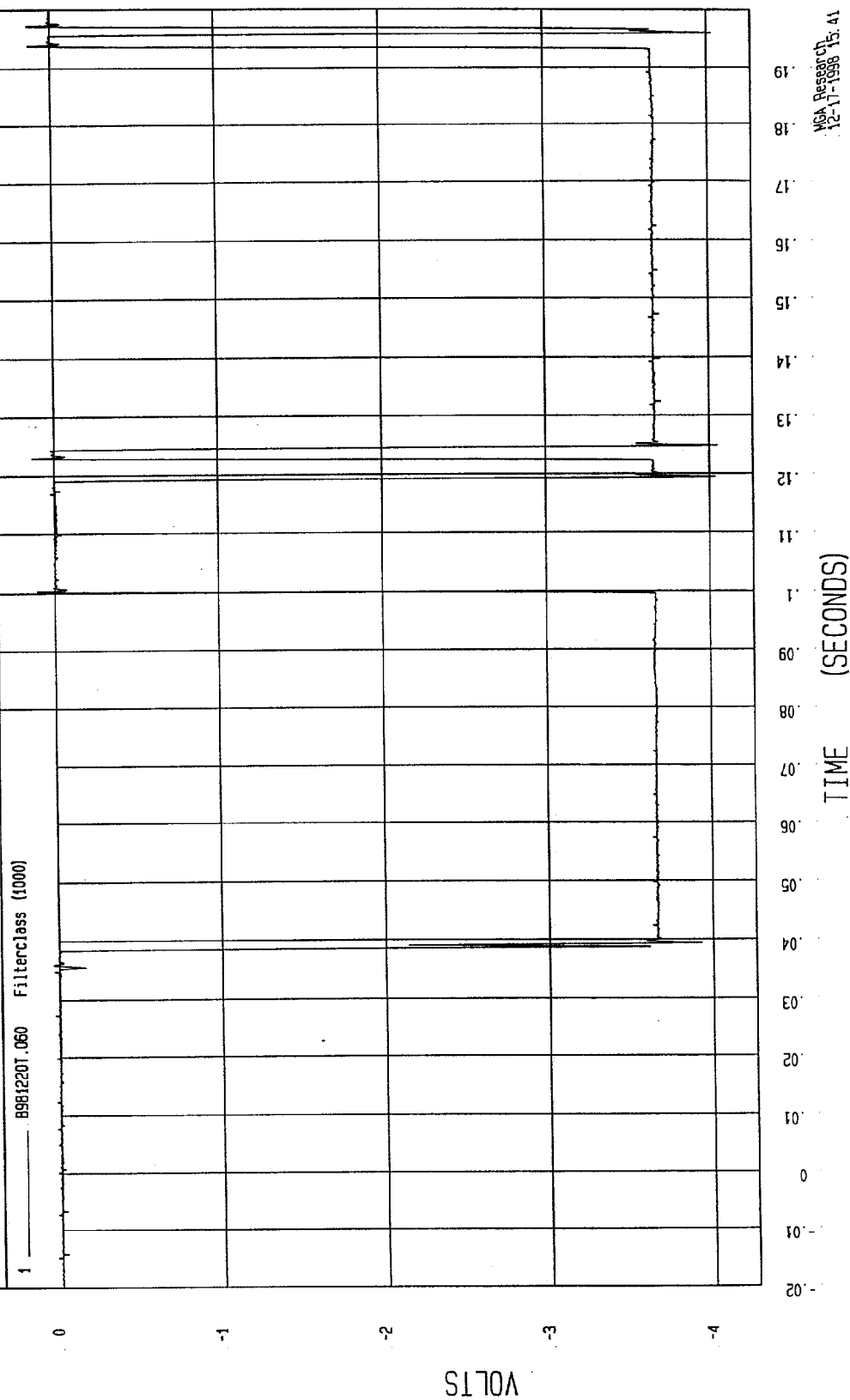
MGA Research
12-17-1998 15:42

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.05 VOLTS at 125 msec Maximum = .14 VOLTS at 197 msec

DRIVER PELVIS CONTACT



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

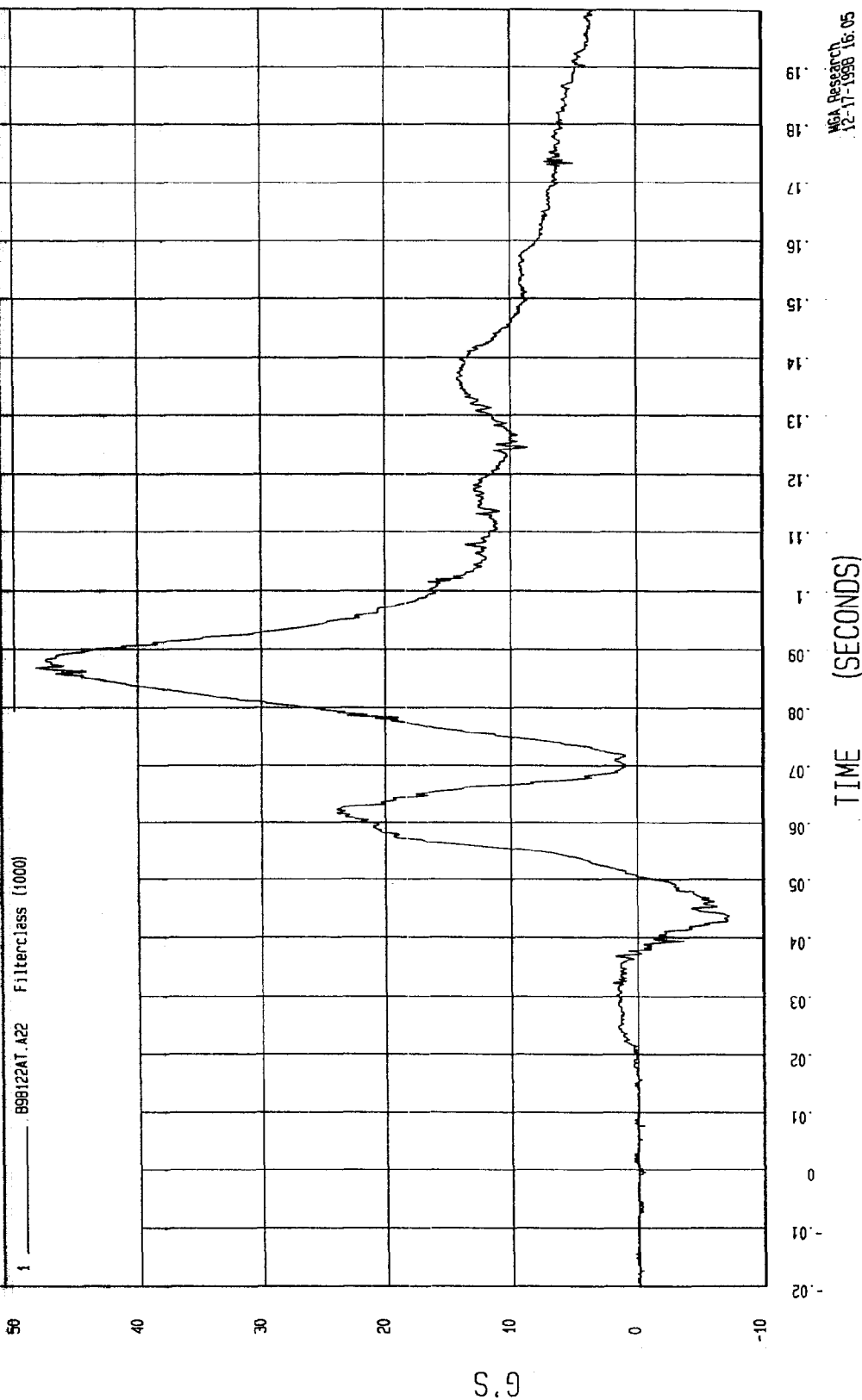
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 48.29 G'S at 87 msec

Minimum = -7.35 G'S at 44 msec

REAR PASSENGER HEAD X ACCELERATION

1 _____ 898122AT.A22 Filterclass (1000)

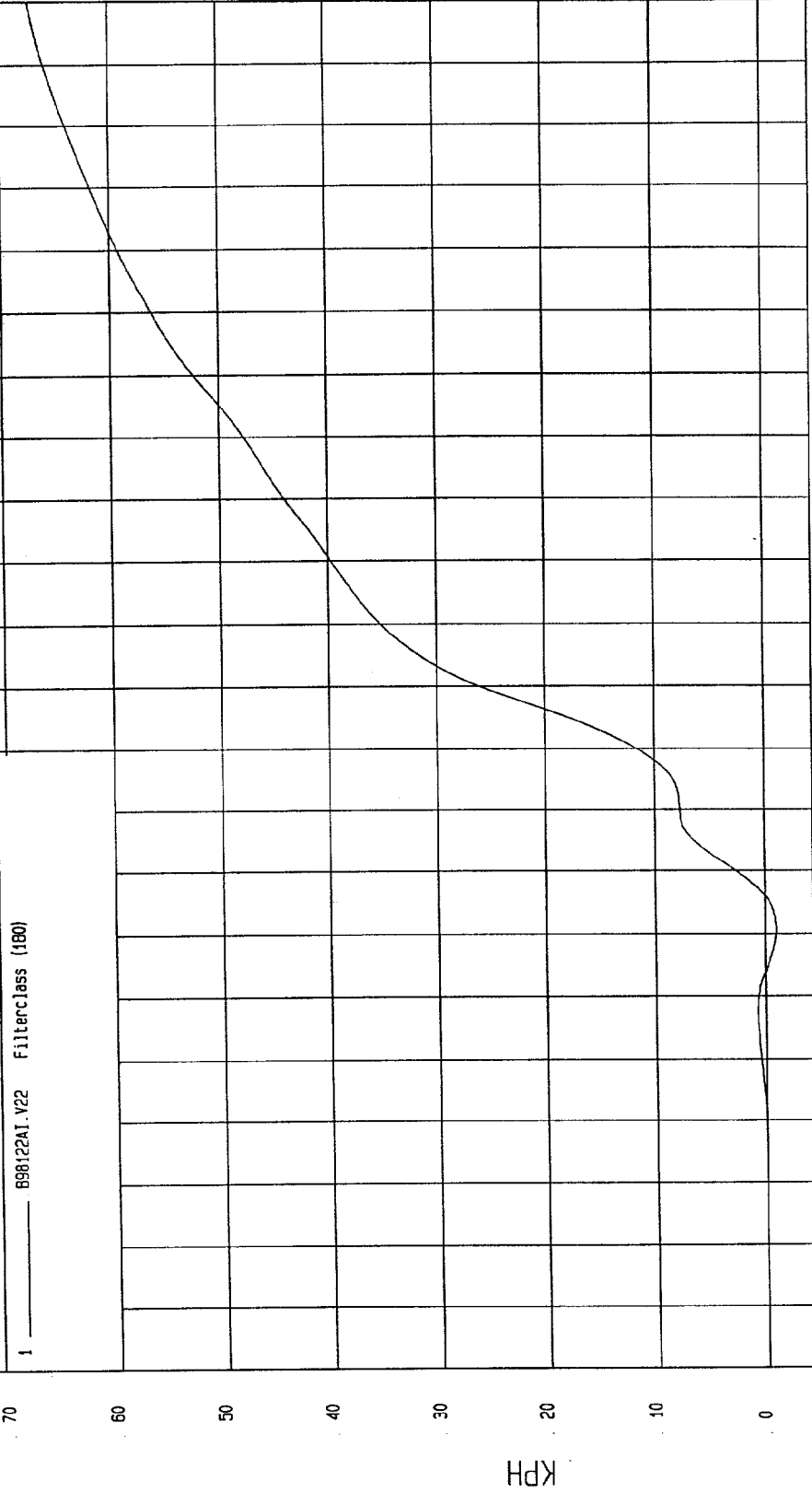
MGA Research
12-17-1998 16:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1 KPH at 51 msec Maximum = 67.36 KPH at 200 msec

REAR PASSENGER HEAD X VELOCITY



MCA Research
12-17-1998 16:05

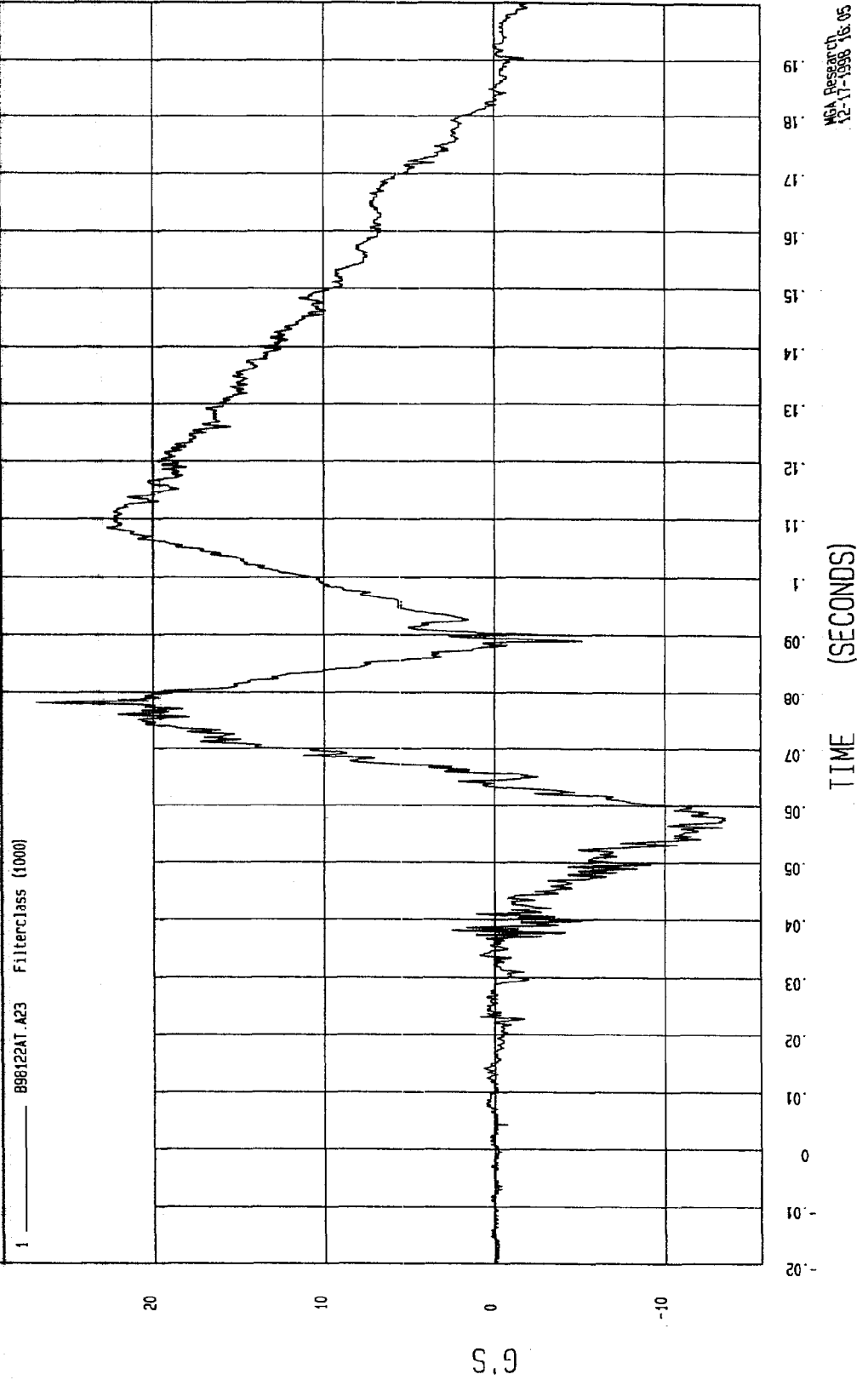
TIME Seconds

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -13.55 G'S at 58 msec Maximum = 26.9 G'S at 78 msec

REAR PASSENGER HEAD Y ACCELERATION



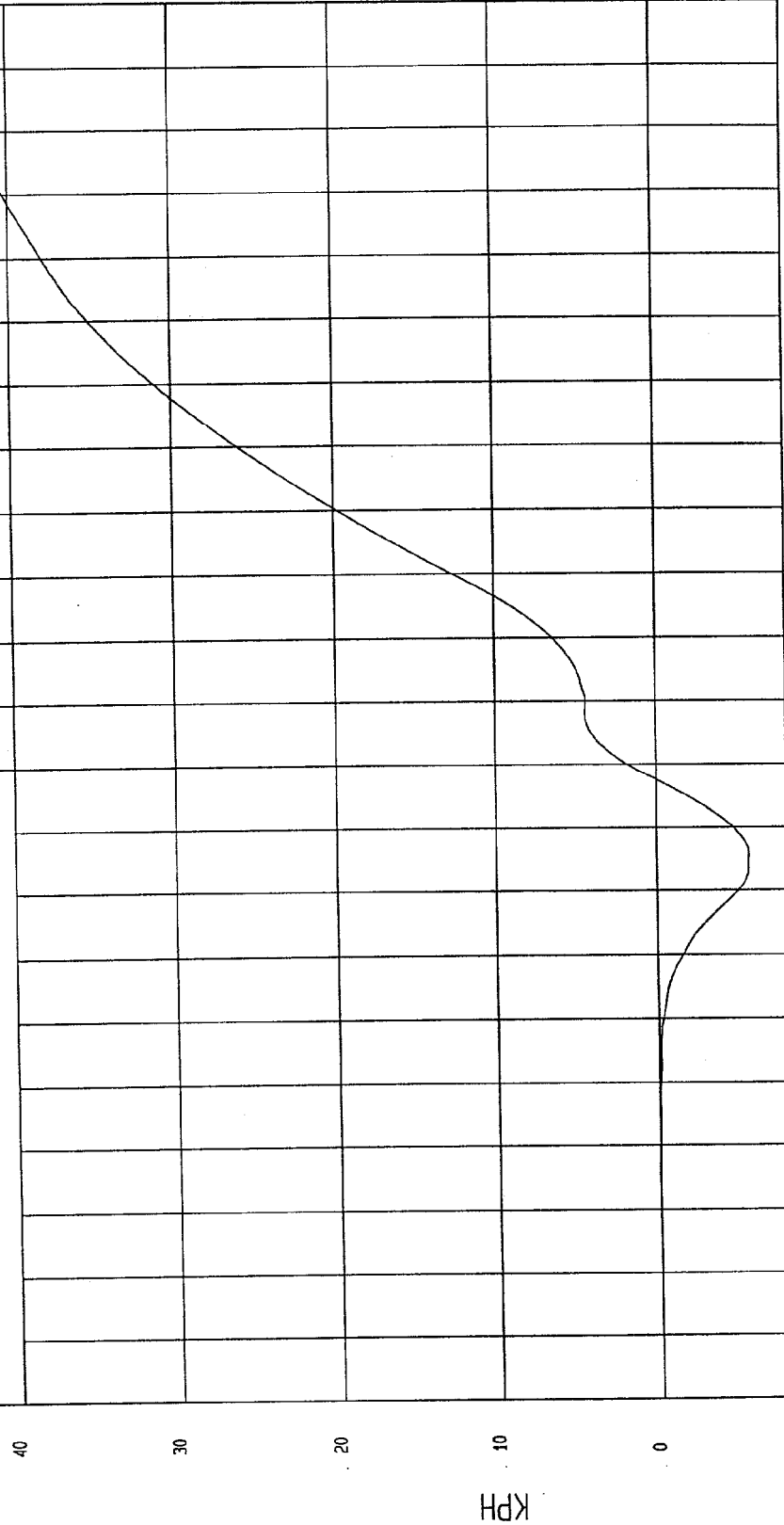
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -5.79 KPH at 66 msec Maximum = 41.48 KPH at 183 msec

REAR PASSENGER HEAD Y VELOCITY

1 _____ B90122AT.V23 Filterclass (180)



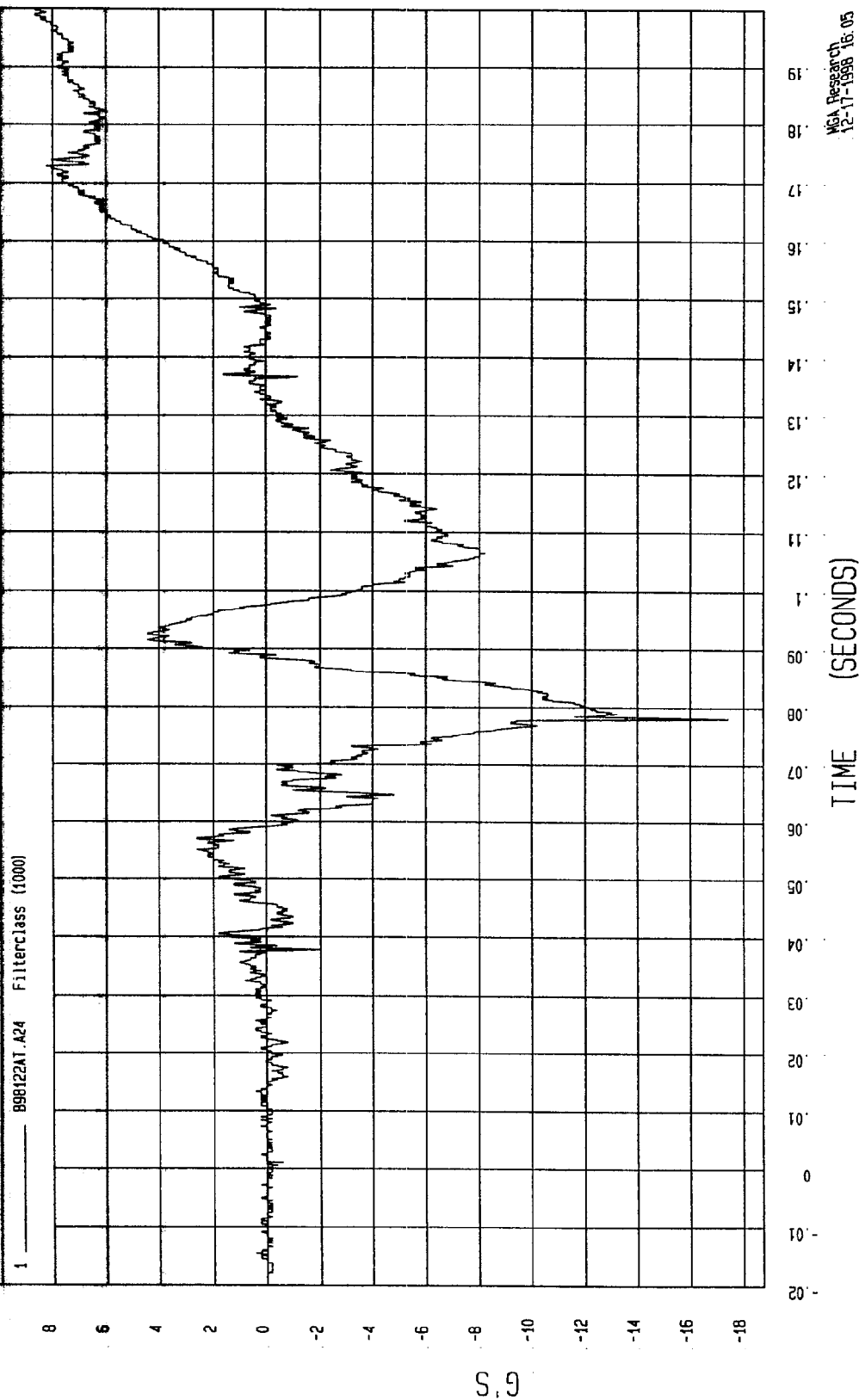
MCA Research
12-17-1998 16:05

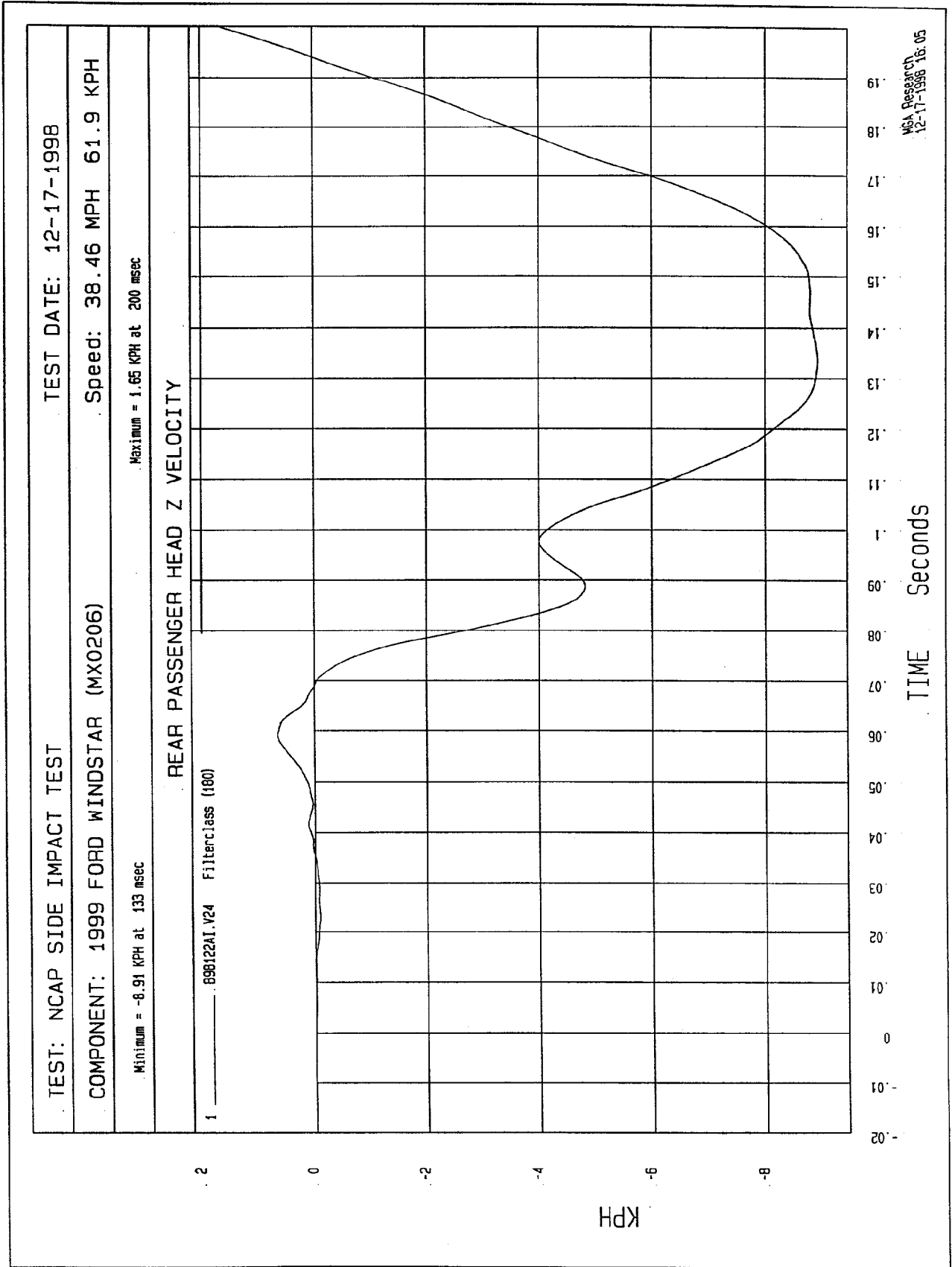
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -17.43 G'S at 78 msec Maximum = 8.63 G'S at 199 msec

REAR PASSENGER HEAD Z ACCELERATION



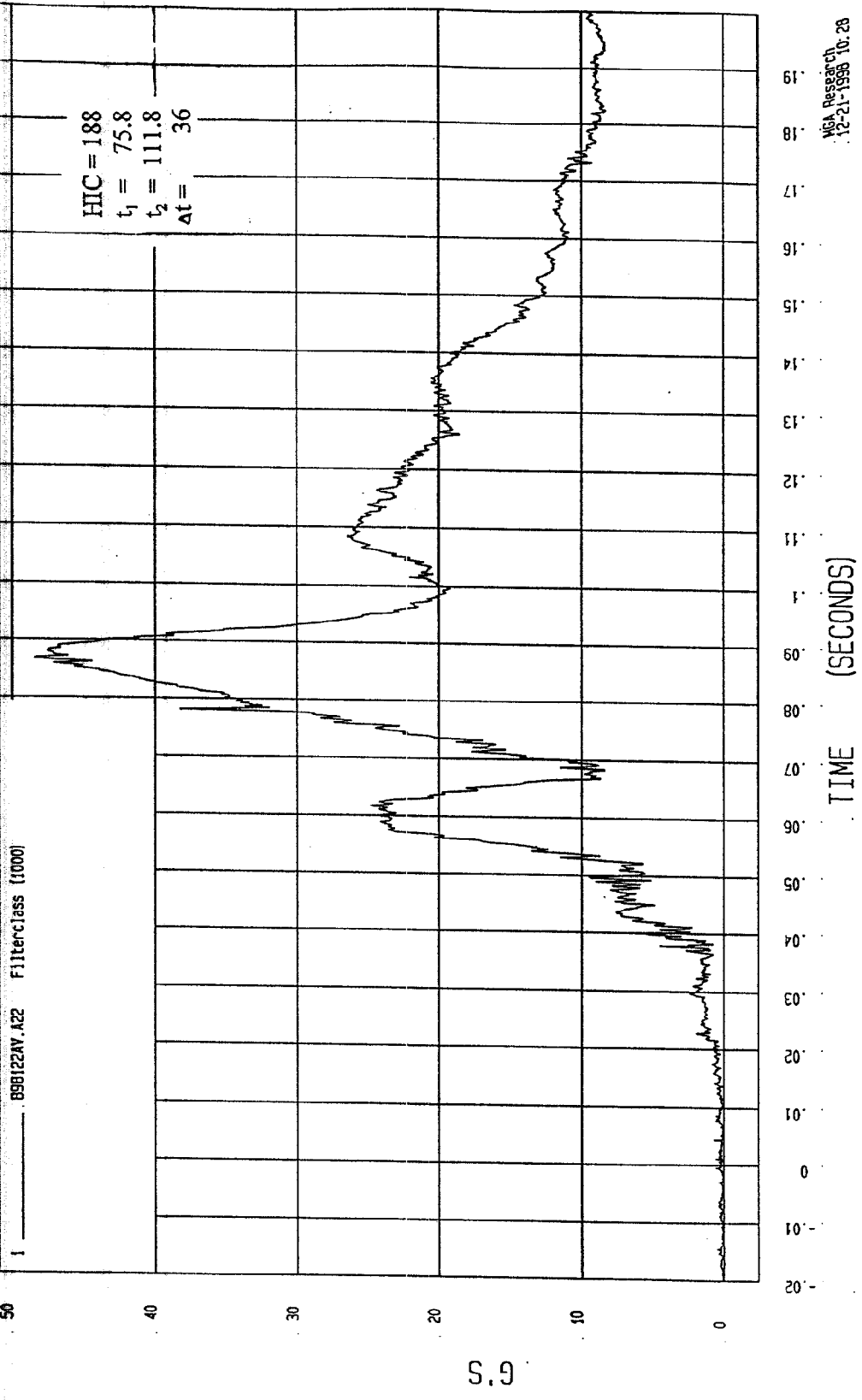


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.45 MPH 61.9 KPH

Minimum = 9.48E-02 G'S at -20 msec Maximum = 48.45 G'S at 87 msec

REAR PASSENGER HEAD RESULTANT ACCELERATION



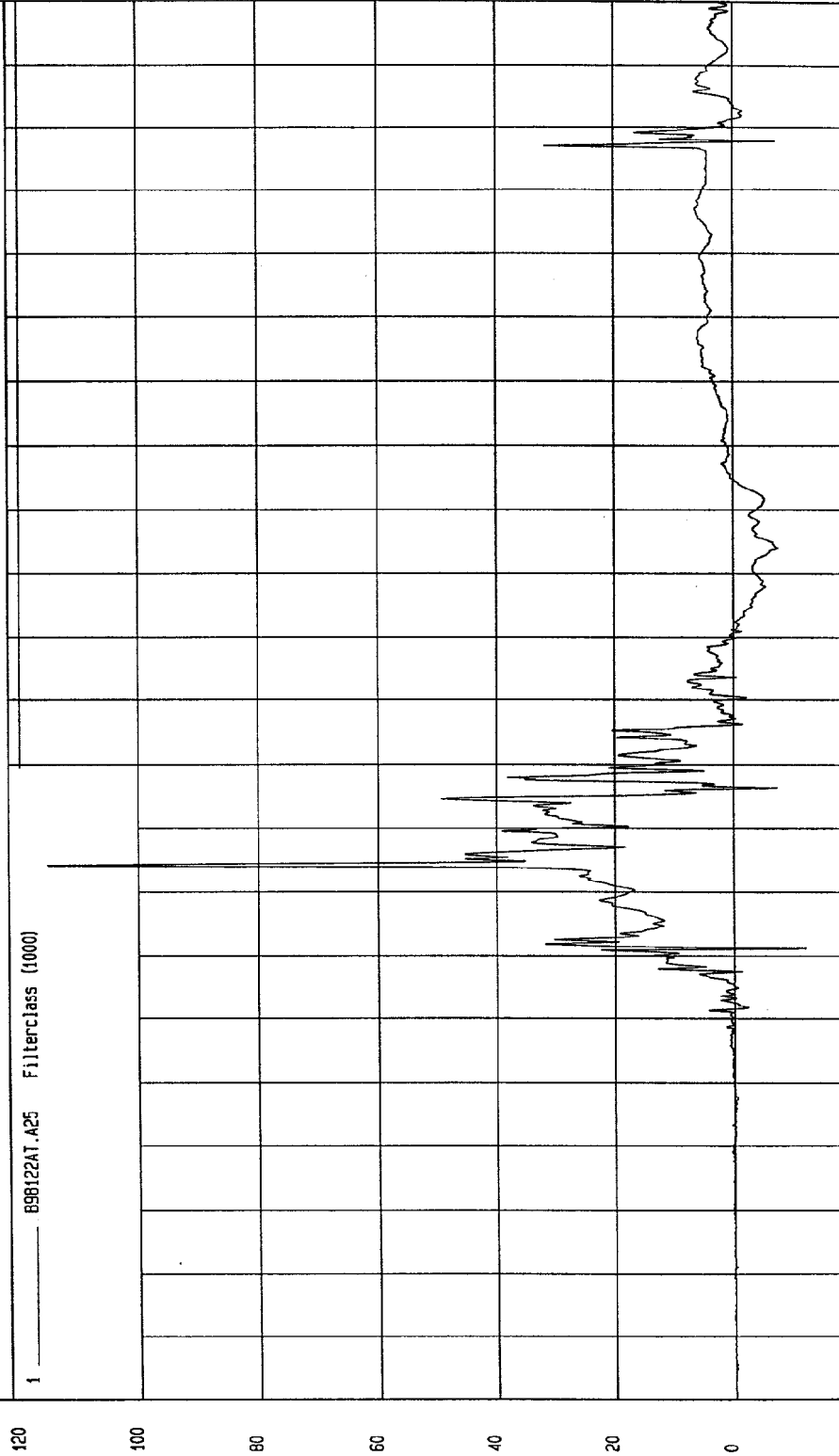
NCA Research
12-21-1998 10:28

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -12.17 G'S at 51 msec Maximum = 115.45 G'S at 64 msec

REAR PASSENGER UPPER RIB Y ACCELERATION



TIME (SECONDS)

NGA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

SPEED: 38.46 MPH 61.9 KPH

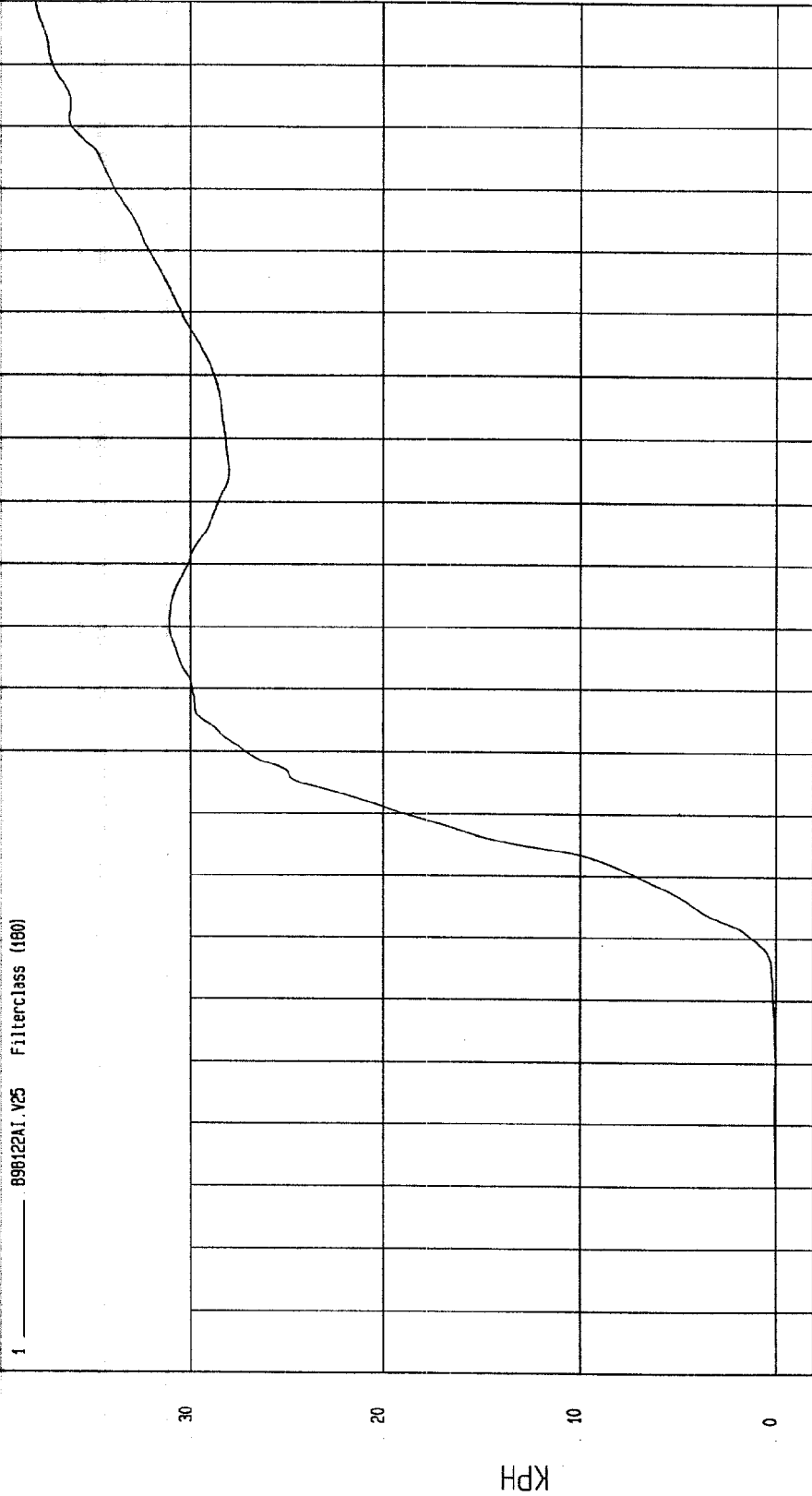
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 37.99 KPH at 200 msec

Minimum = -2.48E-03 KPH at -13 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 ——— 898122A1.V25 Filterclass (180)



TIME Seconds

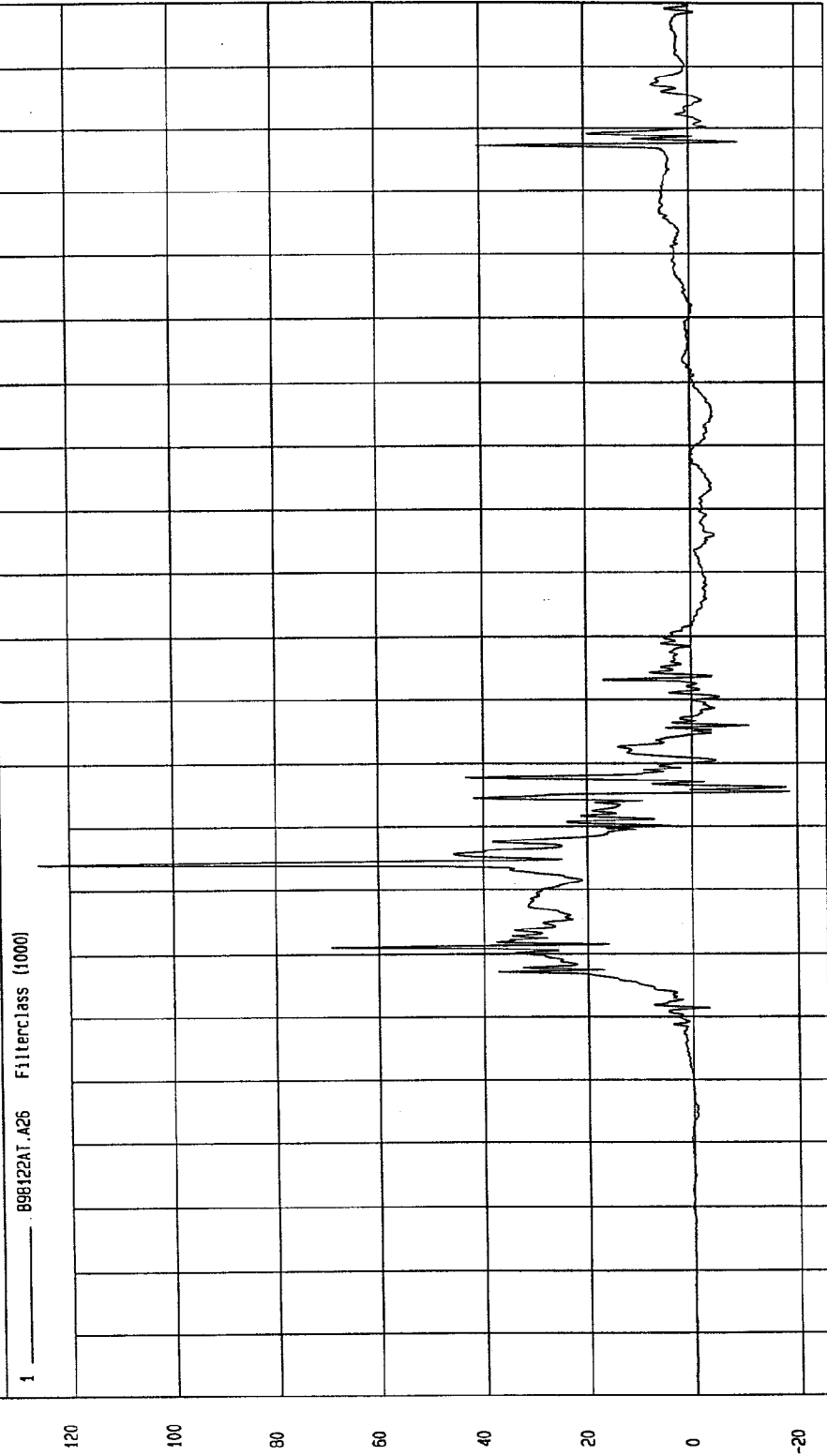
MGA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -18.49 G'S at 75 msec Maximum = 125.99 G'S at 64 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



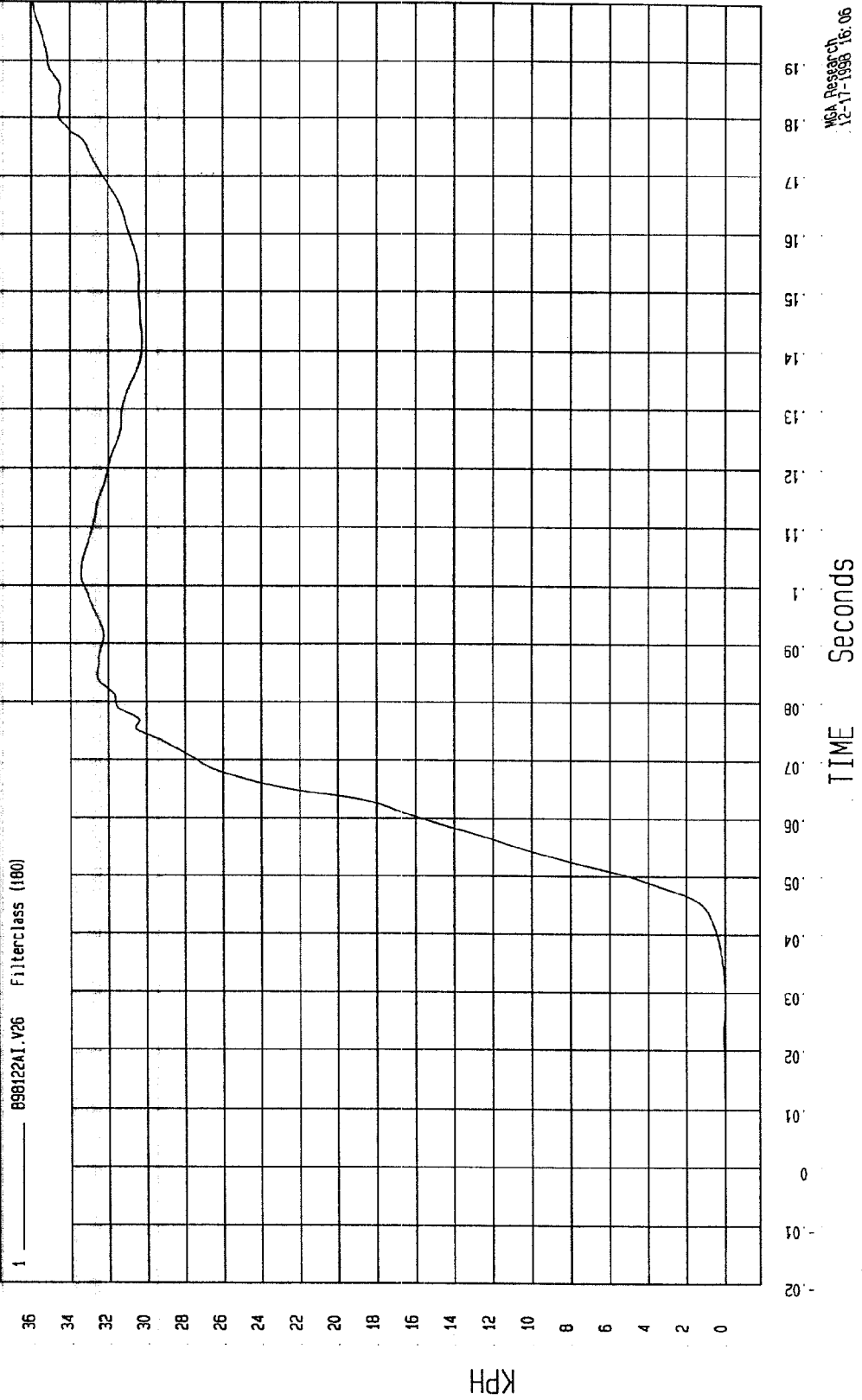
WCA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.02E-02 KPH at -8 msec Maximum = 35.91 KPH at 200 msec

REAR PASSENGER LOWER RIB Y VELOCITY

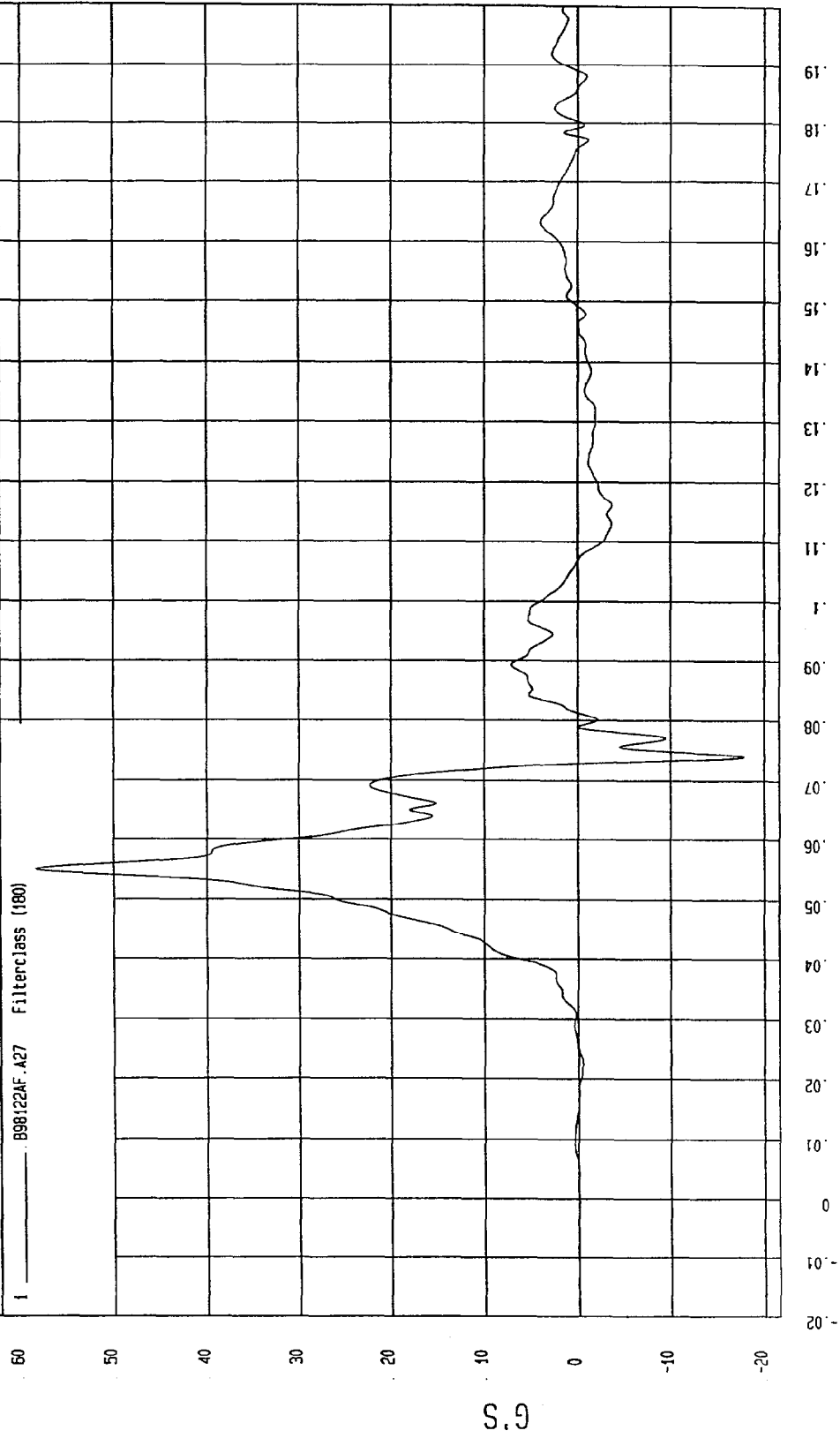


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -17.78 G's at 74 msec Maximum = 58.37 G's at 55 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



TIME (SECONDS)

WGA Research
12-17-1998 16.06

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

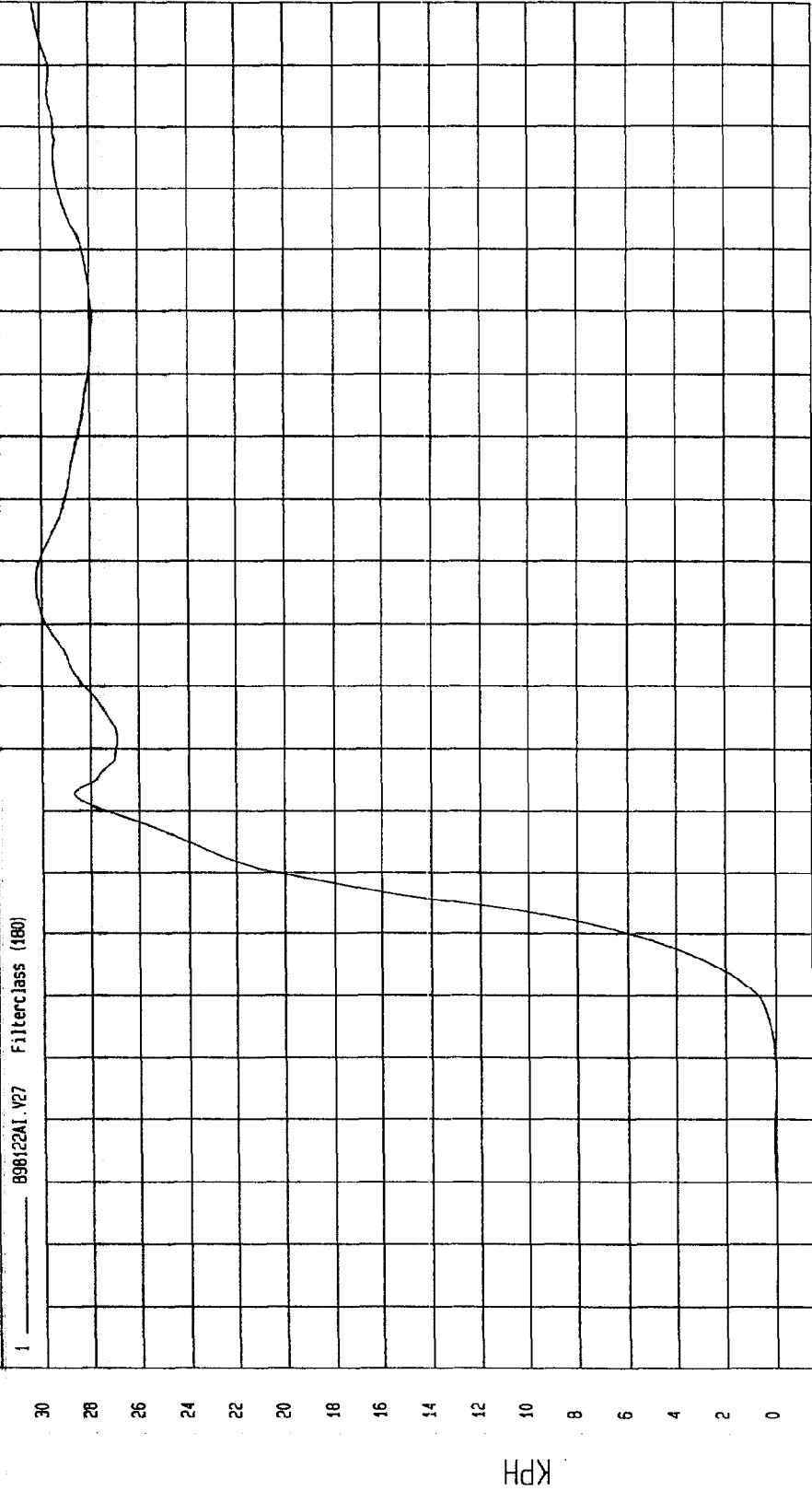
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 30.31 KPH at 200 msec

Minimum = -4.72E-03 KPH at 25 msec

REAR PASSENGER LOWER SPINE Y VELOCITY

1 898122A1.V27 Filterclass (180)



MCA Research
12-17-1998 16:06

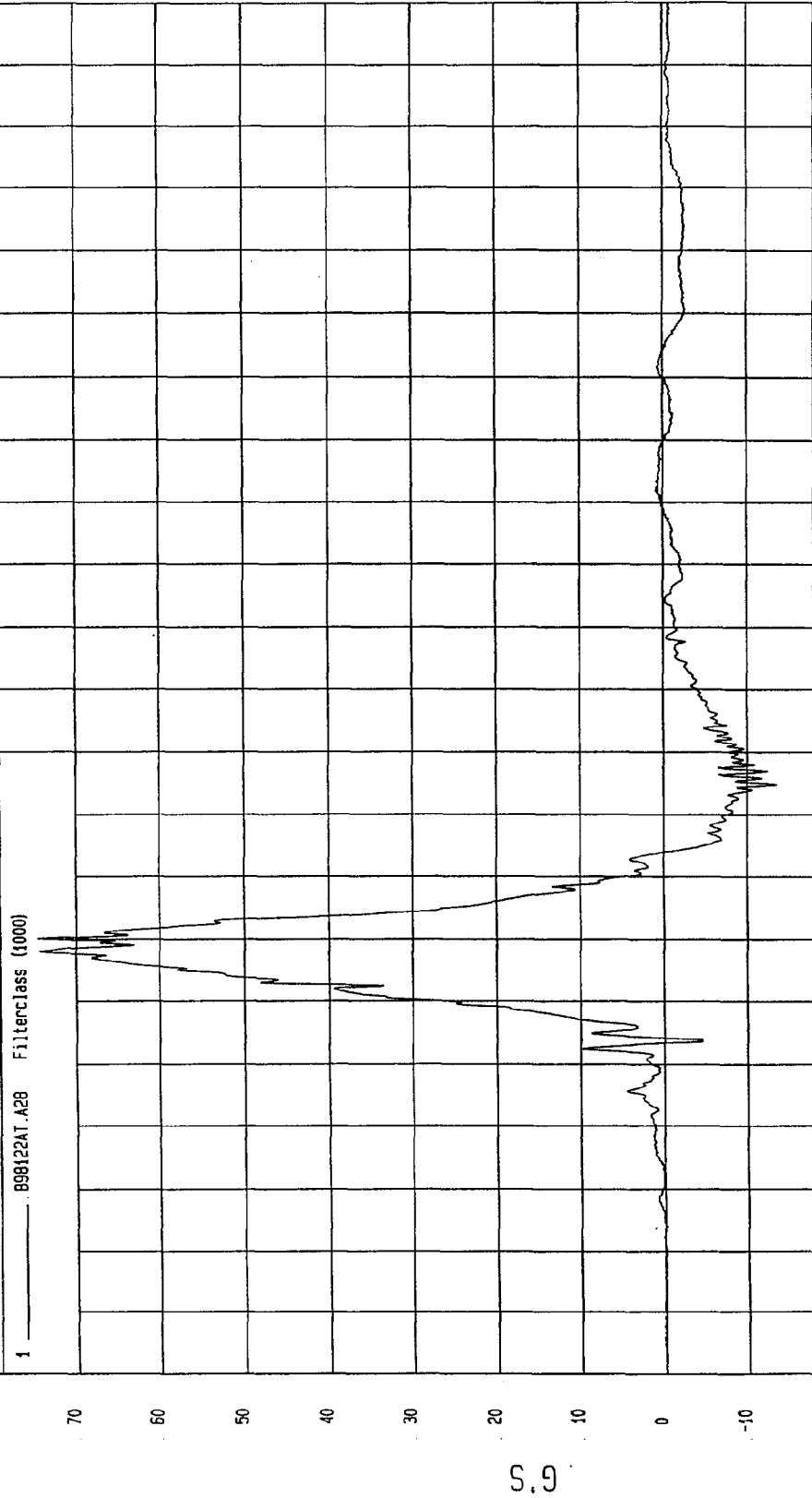
TIME Seconds

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.45 MPH 61.9 KPH

Minimum = -13.65 G'S at 75 msec Maximum = 74.56 G'S at 50 msec

REAR PASSENGER PELVIS Y ACCELERATION



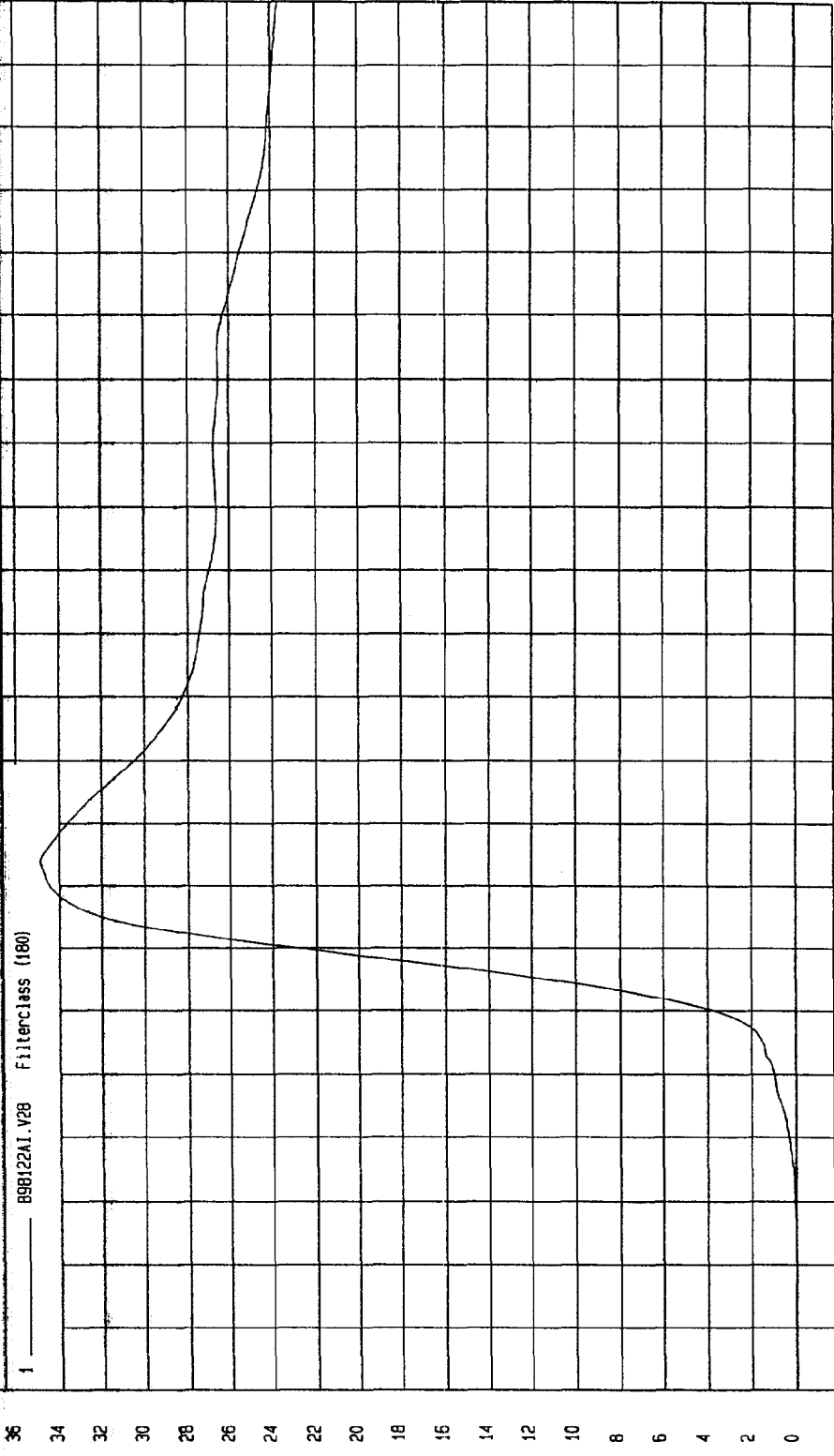
MEA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -7.90E-03 KPH at -16 msec Maximum = 34.86 KPH at 64 msec

REAR PASSENGER PELVIS Y VELOCITY



TIME Seconds

MGA Research
12-17-1998 16:06

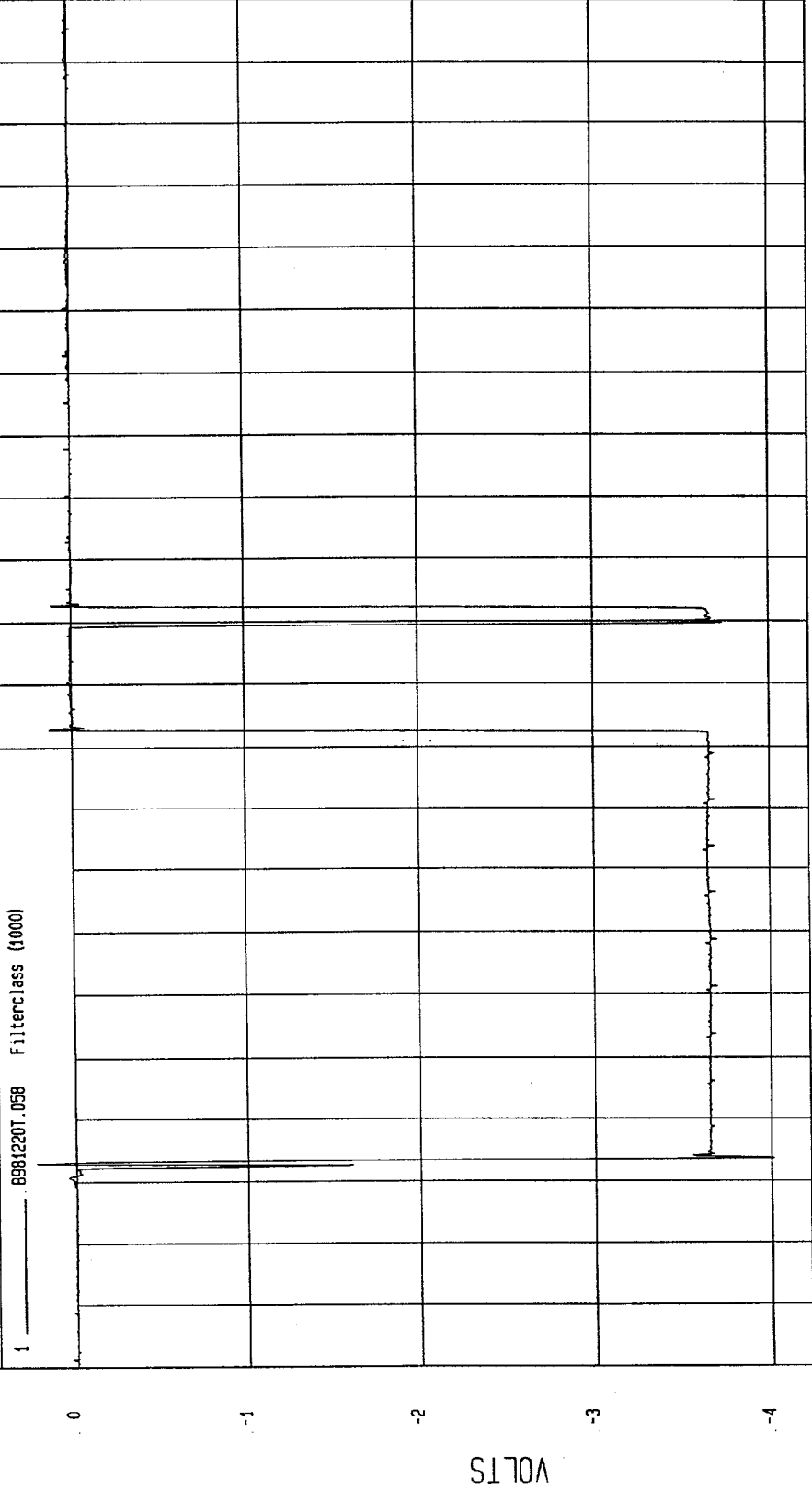
KPH

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.01 VOLTS at 14 msec Maximum = .23 VOLTS at 13 msec

REAR PASSENGER SHOULDER CONTACT



TIME (SECONDS)

MOA Research
12-17-1998 15:42

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206)

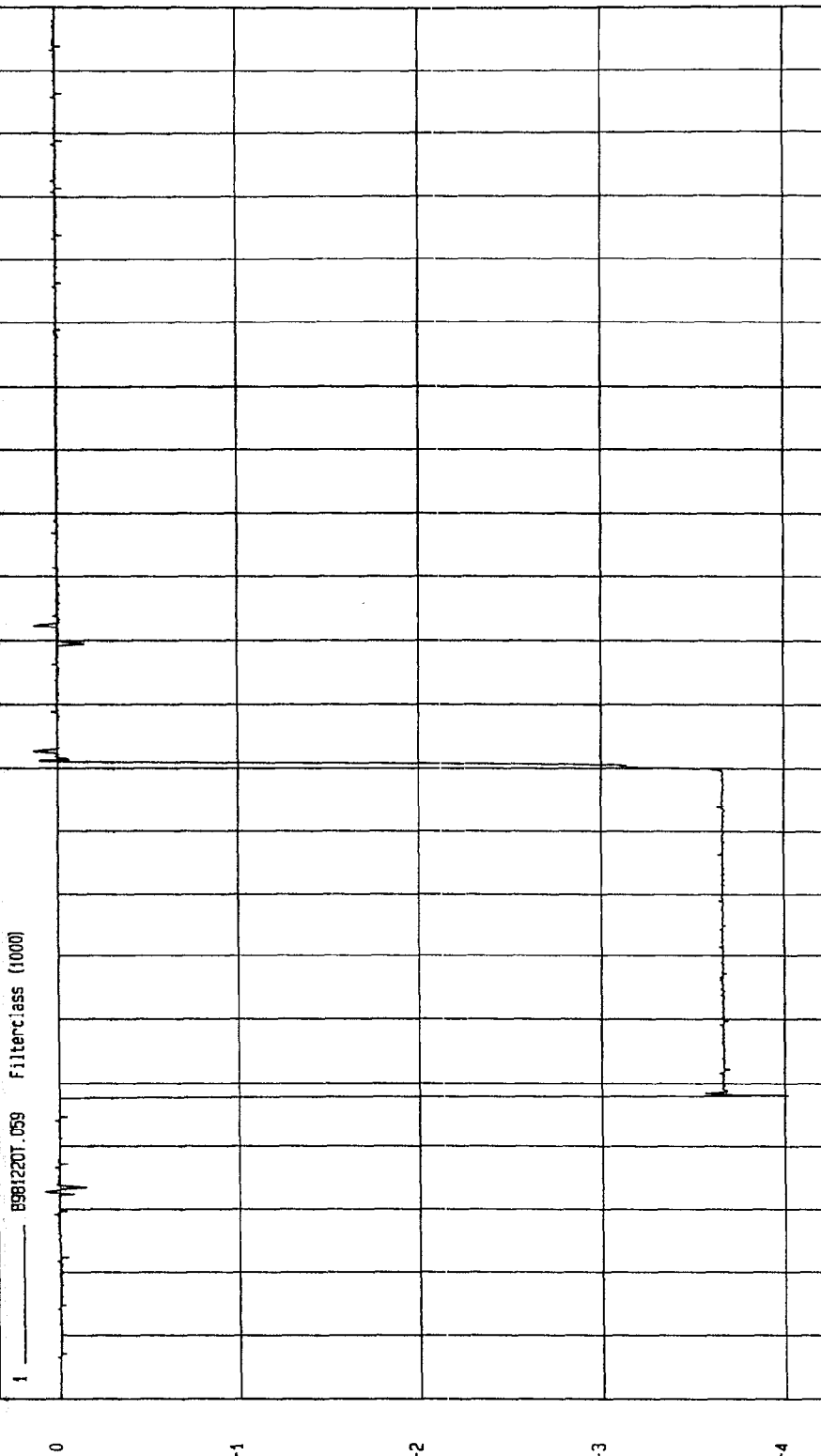
Speed: 38.46 MPH 61.9 KPH

Minimum = -4.02 VOLTS at 28 msec

Maximum = .13 VOLTS at 83 msec

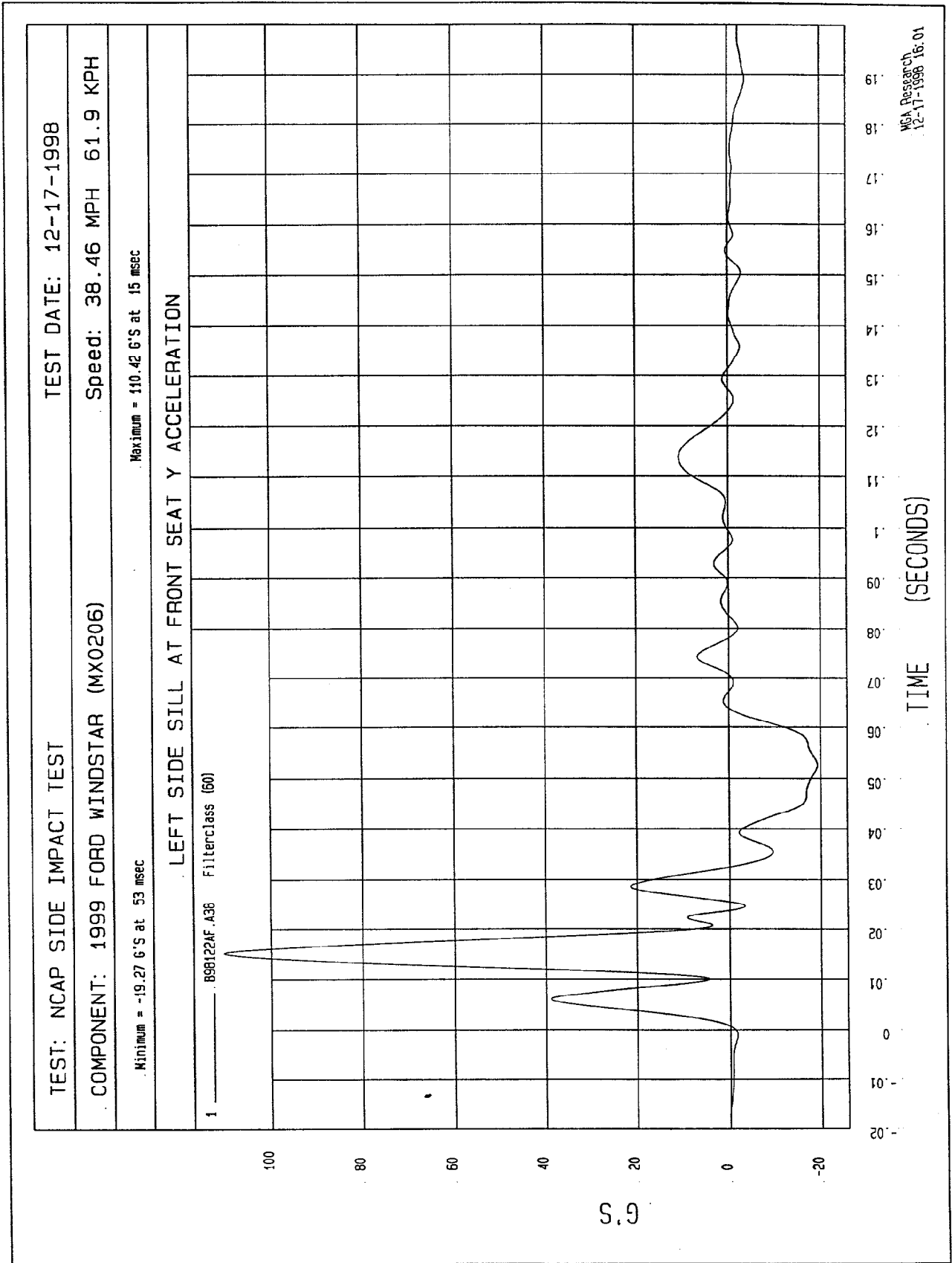
REAR PASSENGER PELVIS CONTACT

1 B981220T.059 Filterclass (1000)



TIME (SECONDS)

MSA Research
12-17-1998 15:42



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

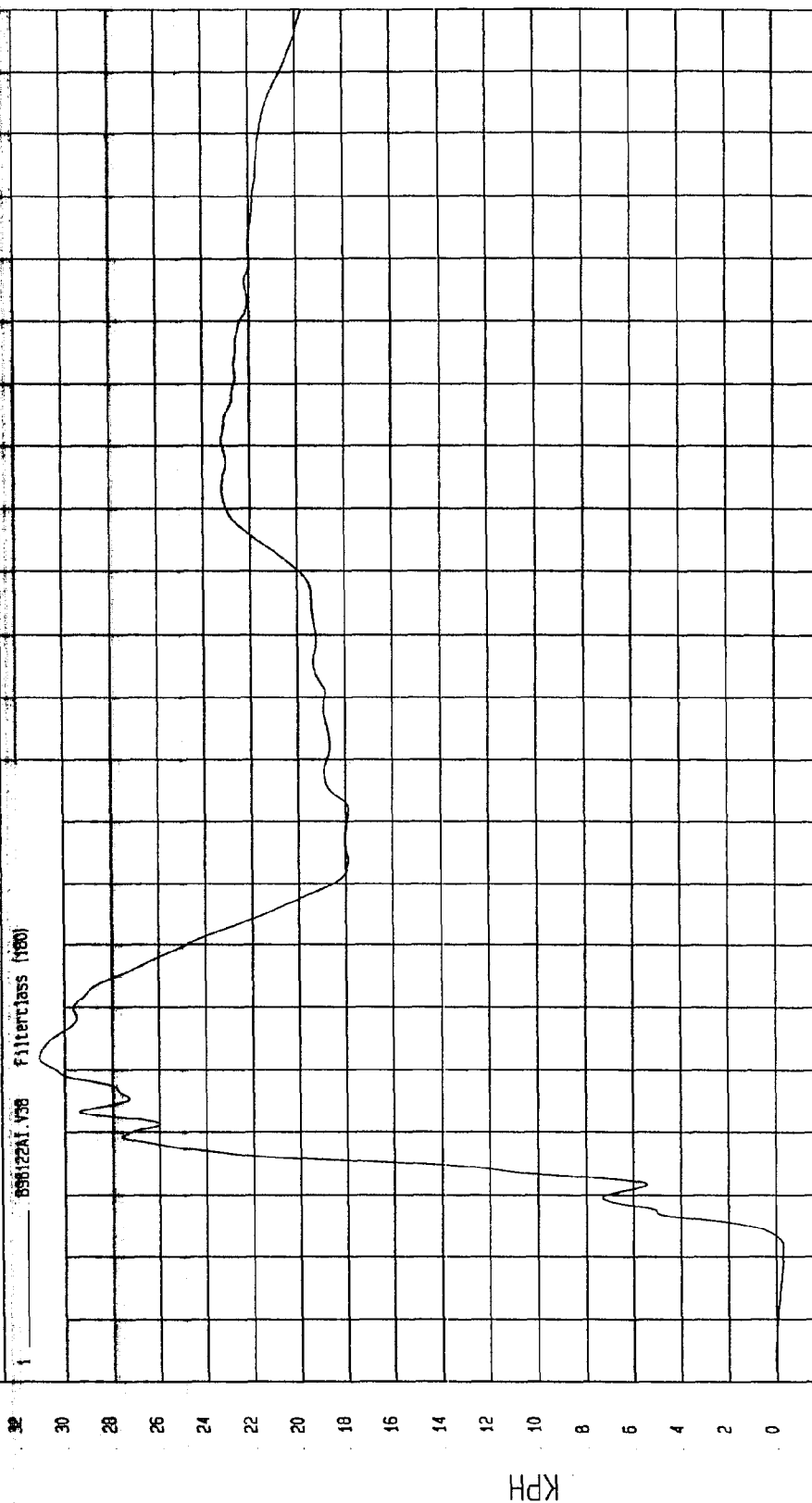
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 31.08 KPH at 32 msec

Minimum = -3 KPH at 2 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY

1 050122A1.V38 Filterclass (100)



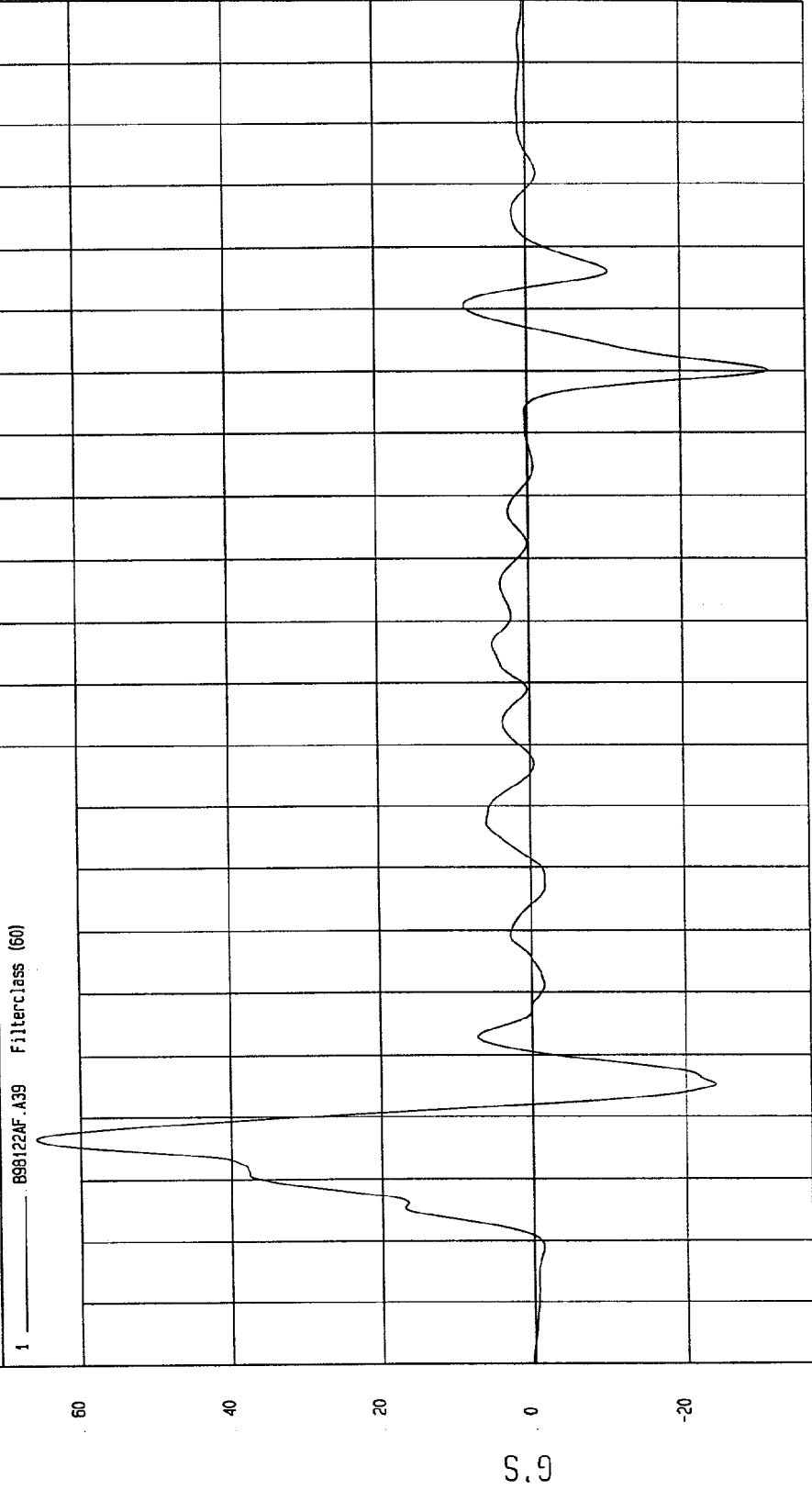
MSA Research
12-17-1998 16:01

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -31.55 G'S at 140 msec Maximum = 65.76 G'S at 17 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION



MCA Research
12-17-1998 16:01

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

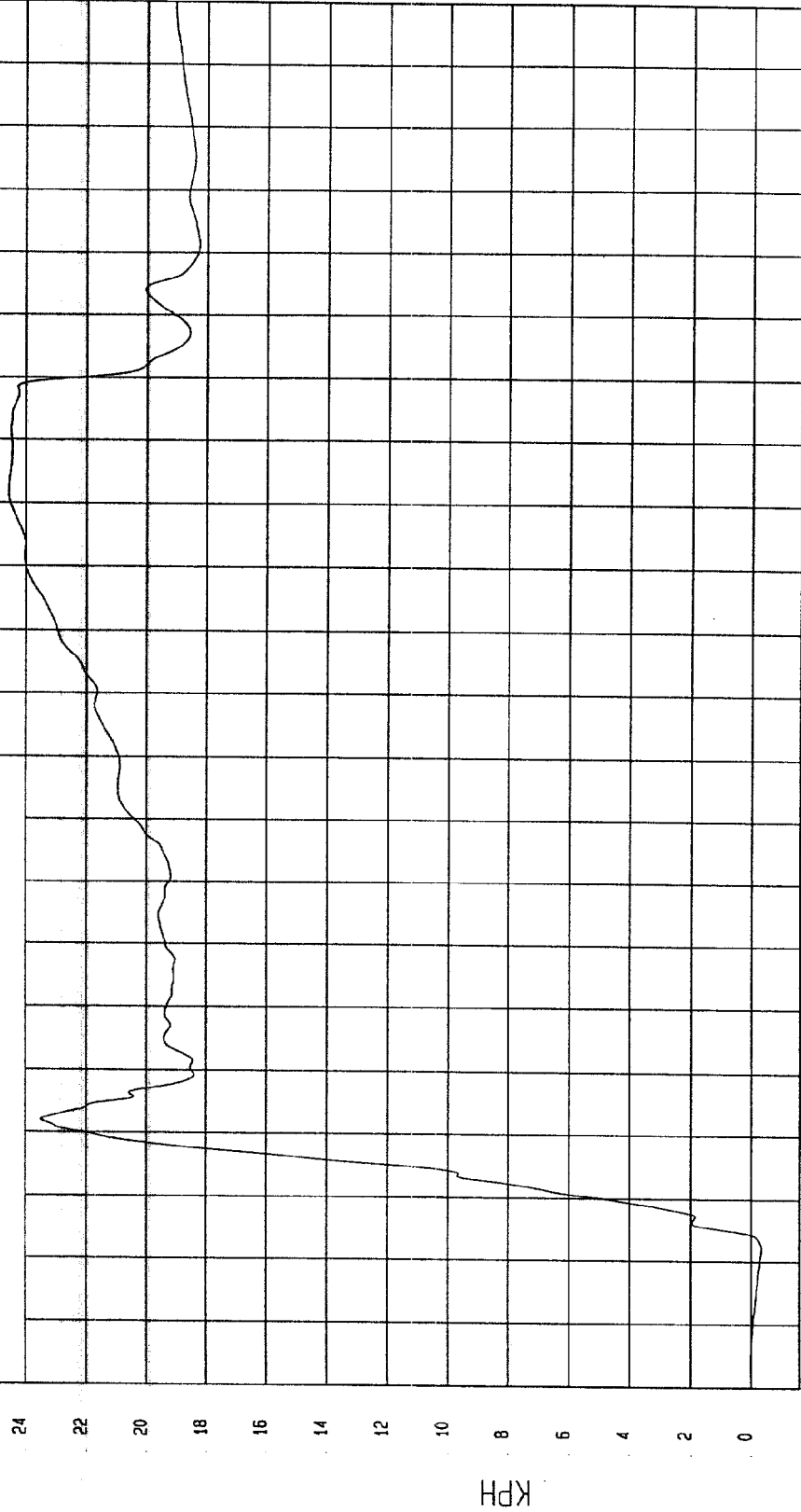
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Minimum = -32 KPH at 2 msec

Maximum = 24.56 KPH at 122 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY

1 B88122AI.V39 FilterClass (180)



TIME Seconds

MGA Research
12-17-1998 16:01

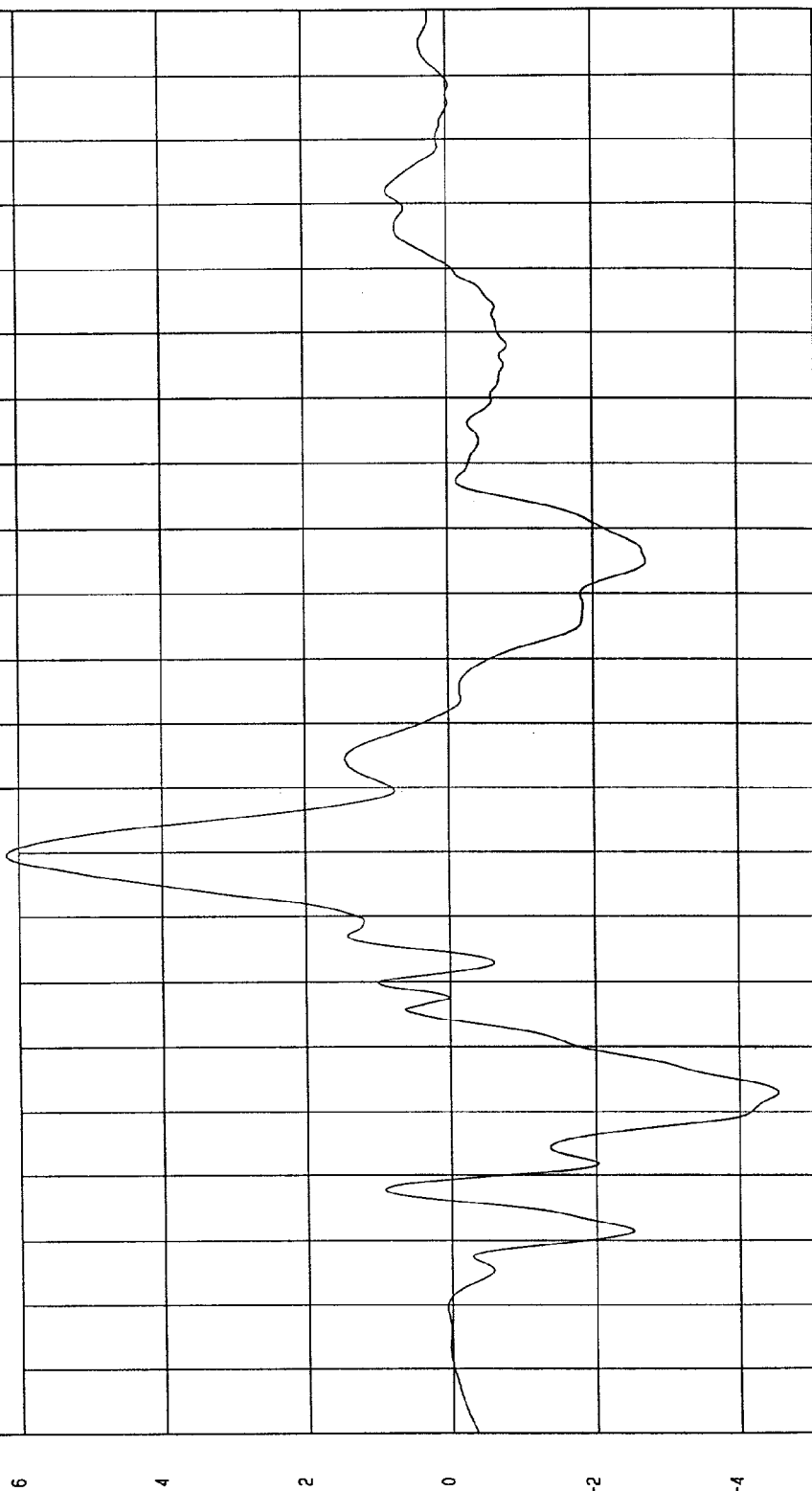
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.56 G'S at 33 msec Maximum = 6.18 G'S at 70 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 B98122AF.A32 Filterclass (60)



MCA Research
12-19-1998 12:13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

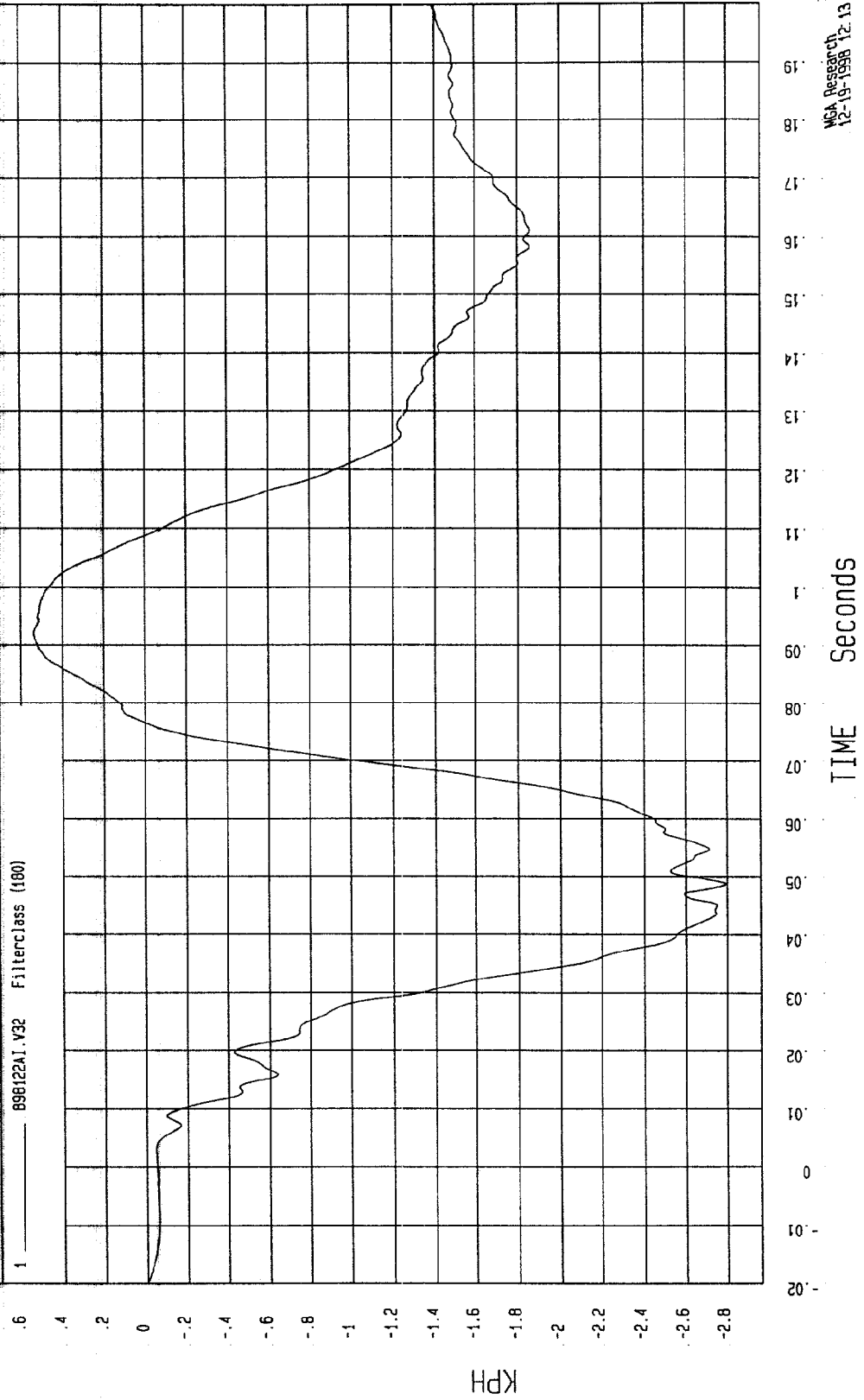
SPEED: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = .54 KPH at 92 msec

Minimum = -2.8 KPH at 49 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY

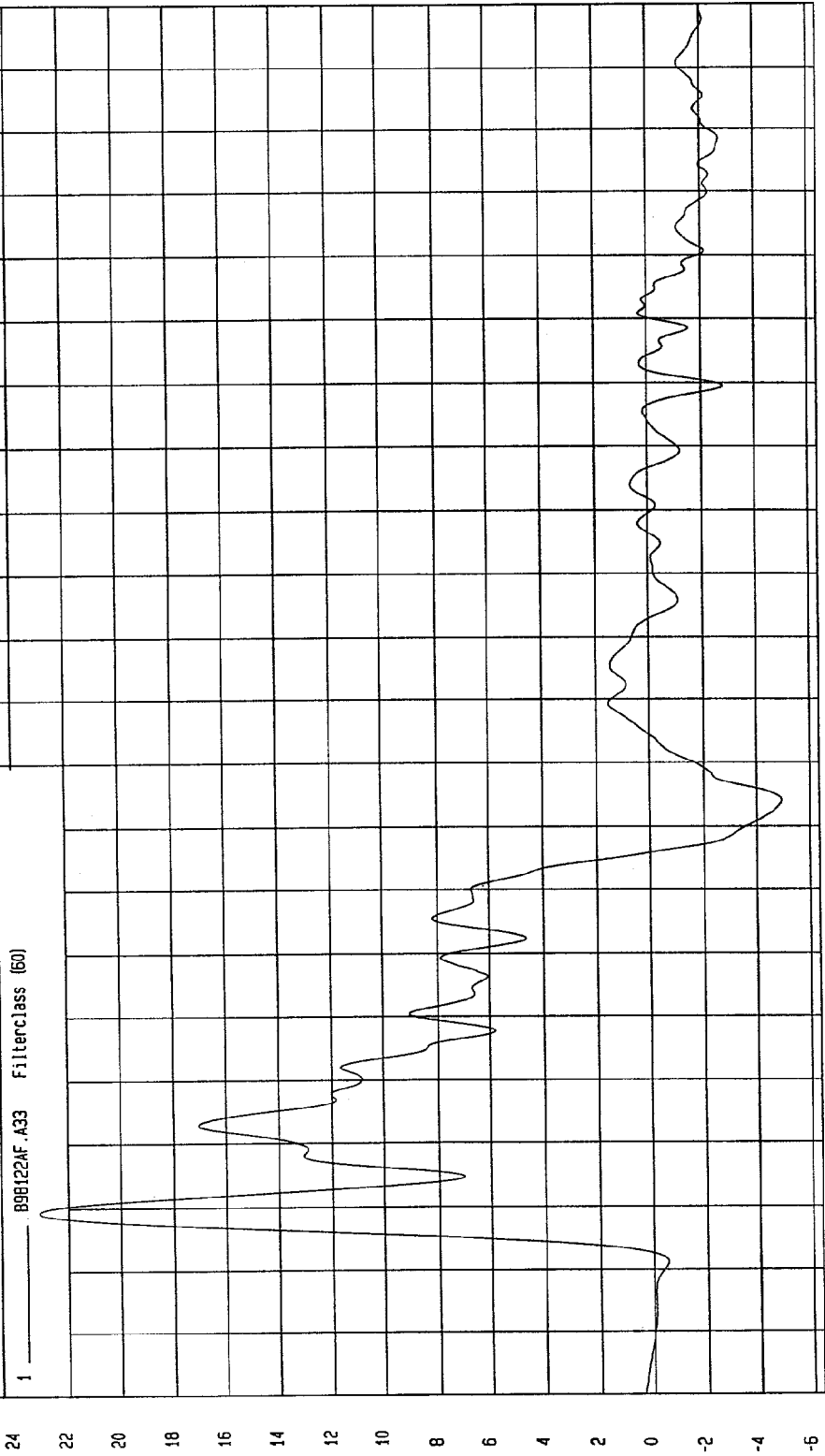


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.95 G'S at 74 msec Maximum = 23.09 G'S at 9 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION



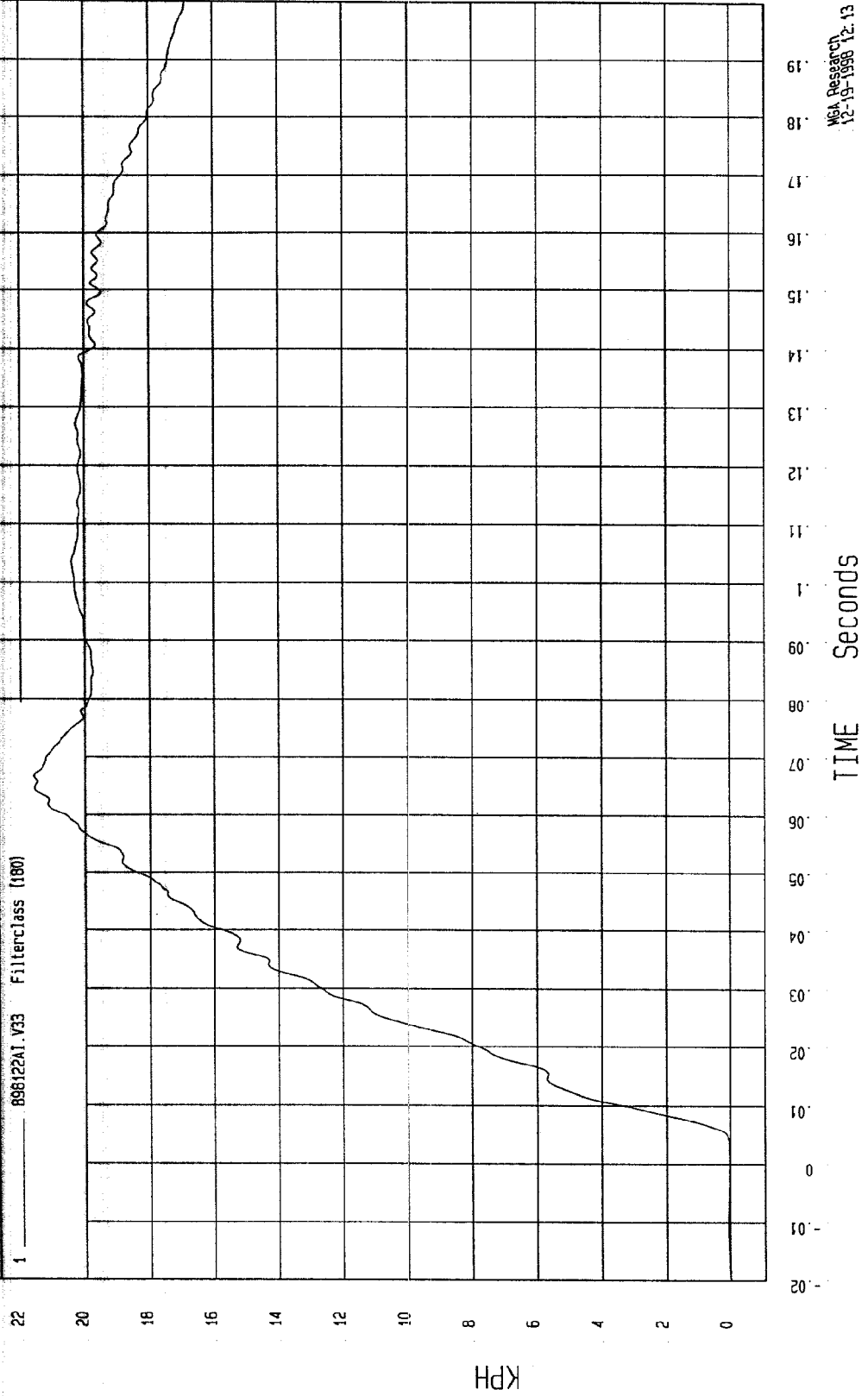
MCA Research
12-19-1998 12.13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 21.59 KPH at 67 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

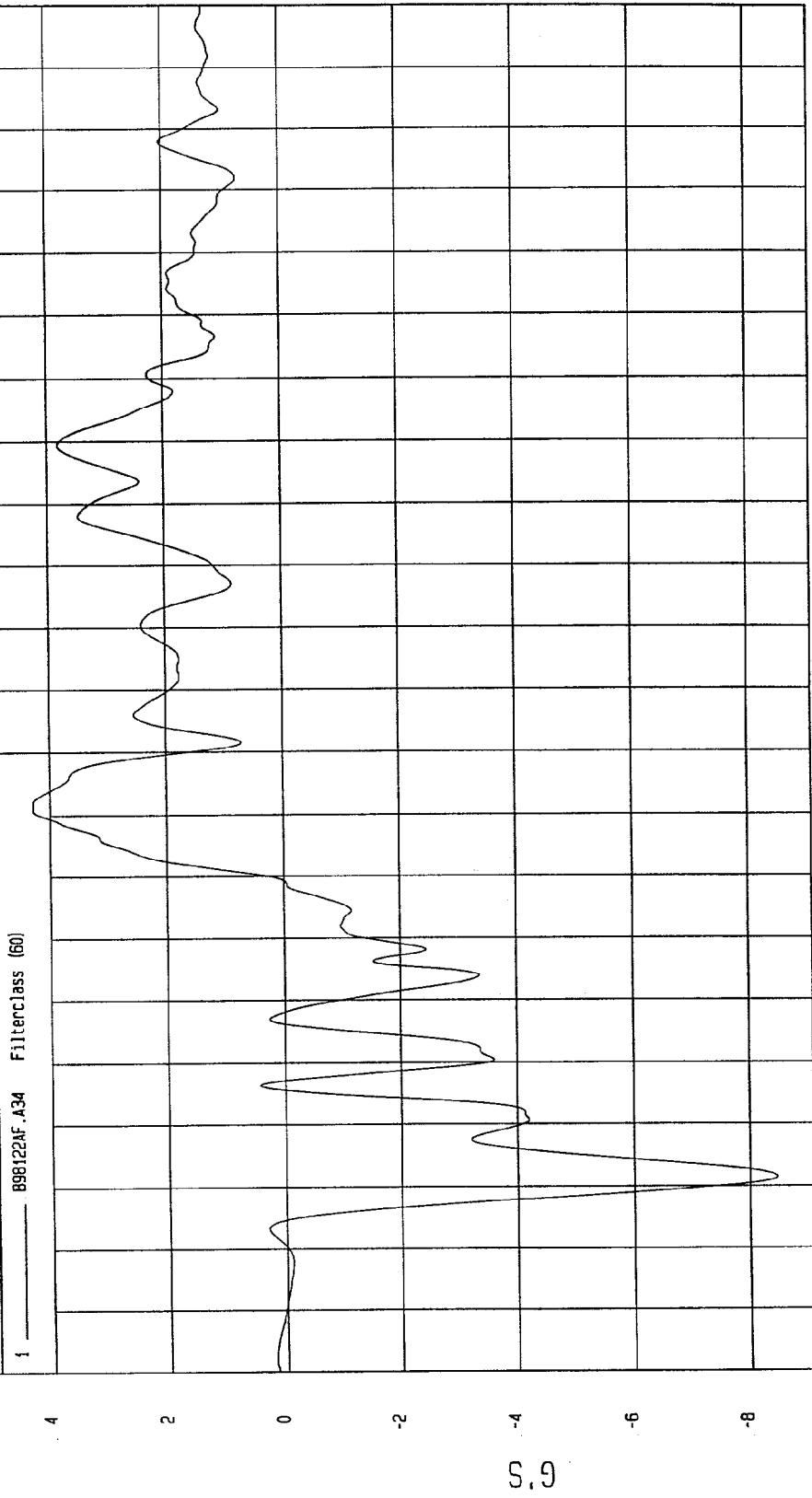


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -8.48 G'S at 11 msec Maximum = 4.28 G'S at 72 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION



TIME (SECONDS)

MCA Research
12-19-1998 12:13

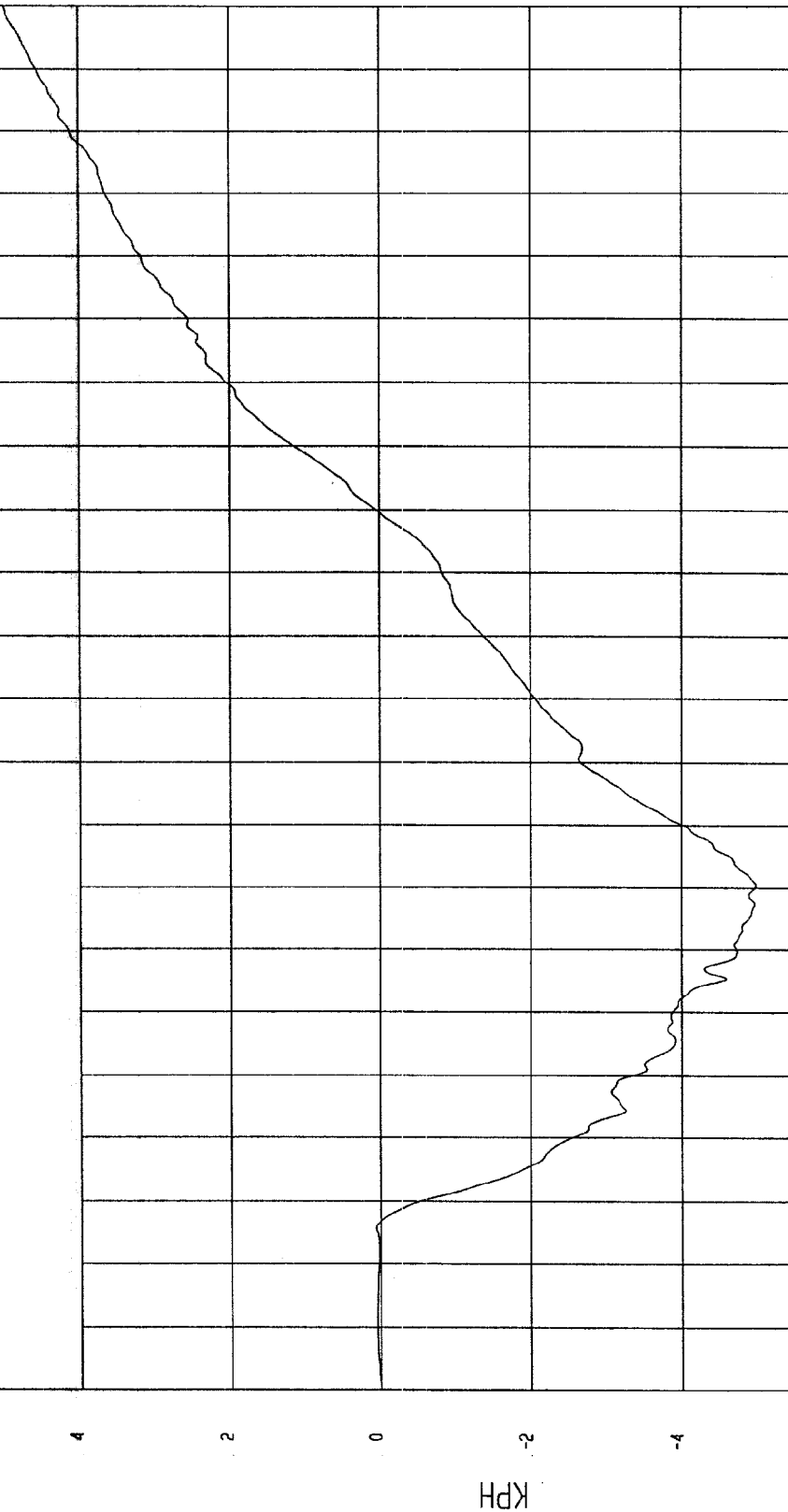
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.98 KPH at 60 msec Maximum = 4.99 KPH at 200 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY

1 B98122A1.V34 FilterClass (180)



TIME Seconds

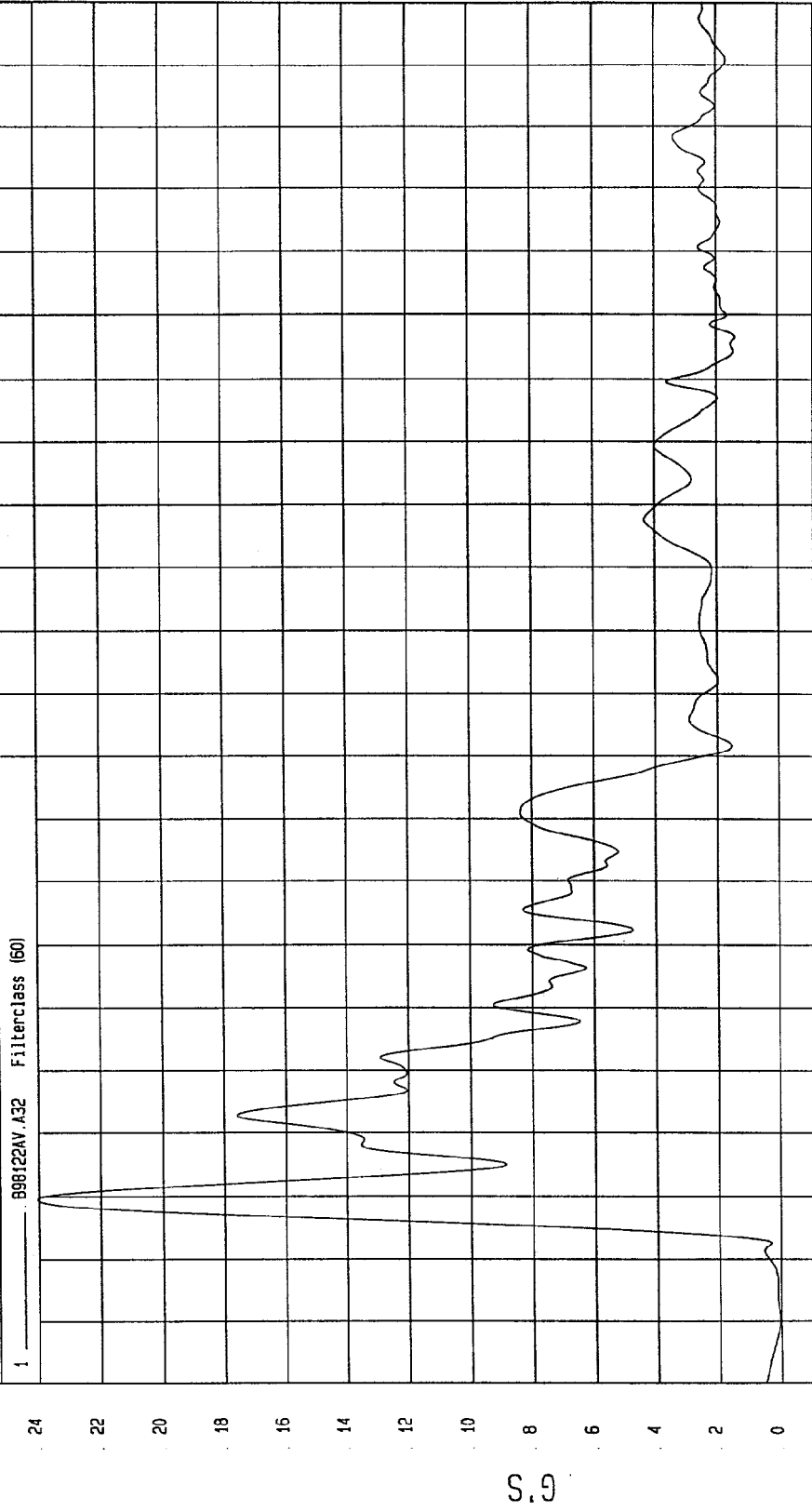
MSA Research
12-19-1998 12:13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 4.46E-02 G'S at -10 msec Maximum = 24.06 G'S at 10 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



MSA Research
12-19-1998 12:13

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

SPEED: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 6.15 G'S at 69 msec

Minimum = -4.79 G'S at 33 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION

1 898122AF A35 Filterclass (60)



TIME (SECONDS)

0.19
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0.07
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0.04
0.03
0.02
0.01
0
-0.01
-0.02

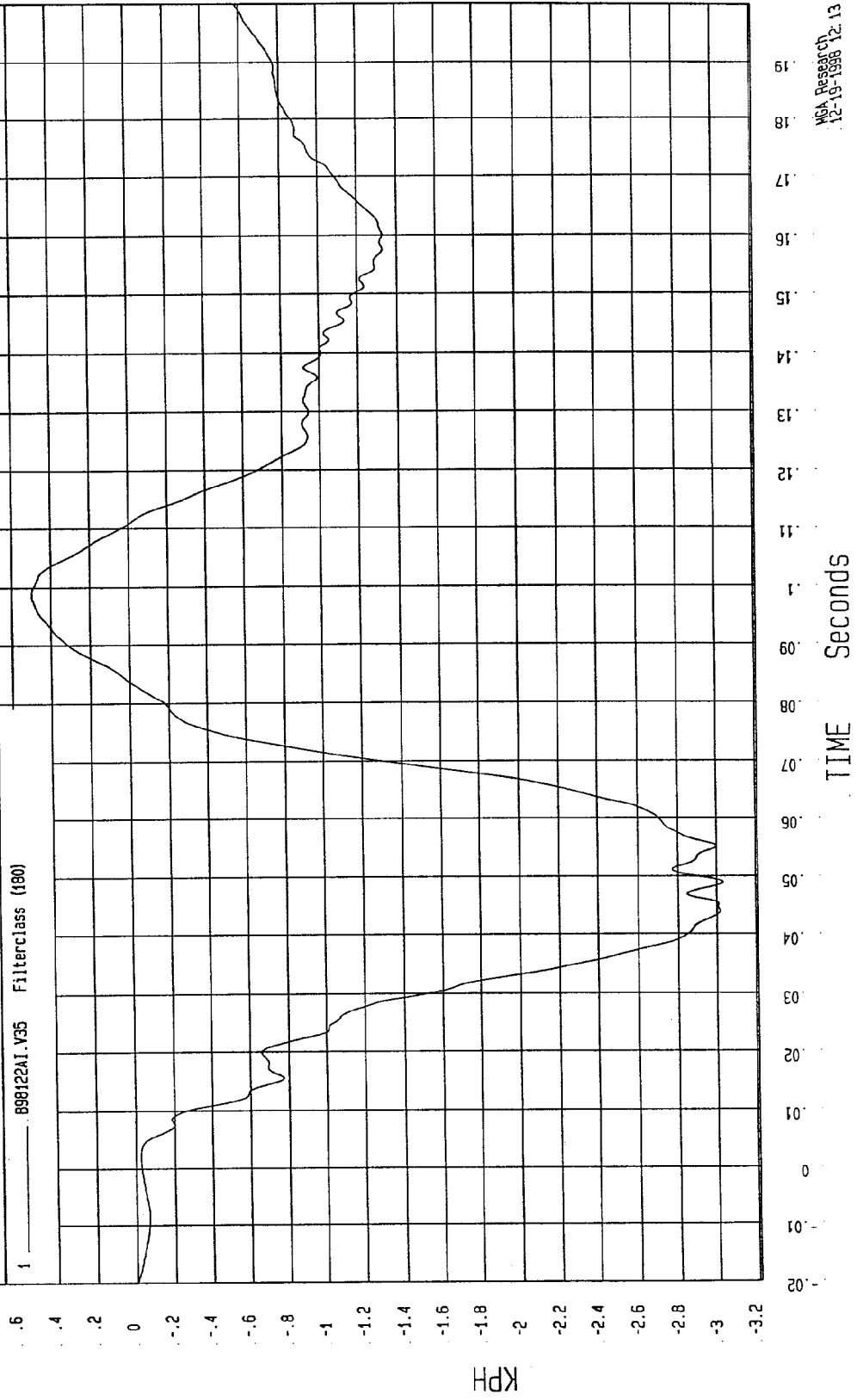
MOA Research
12-19-1998 12:13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -3.03 KPH at 49 msec Maximum = .5 KPH at 99 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

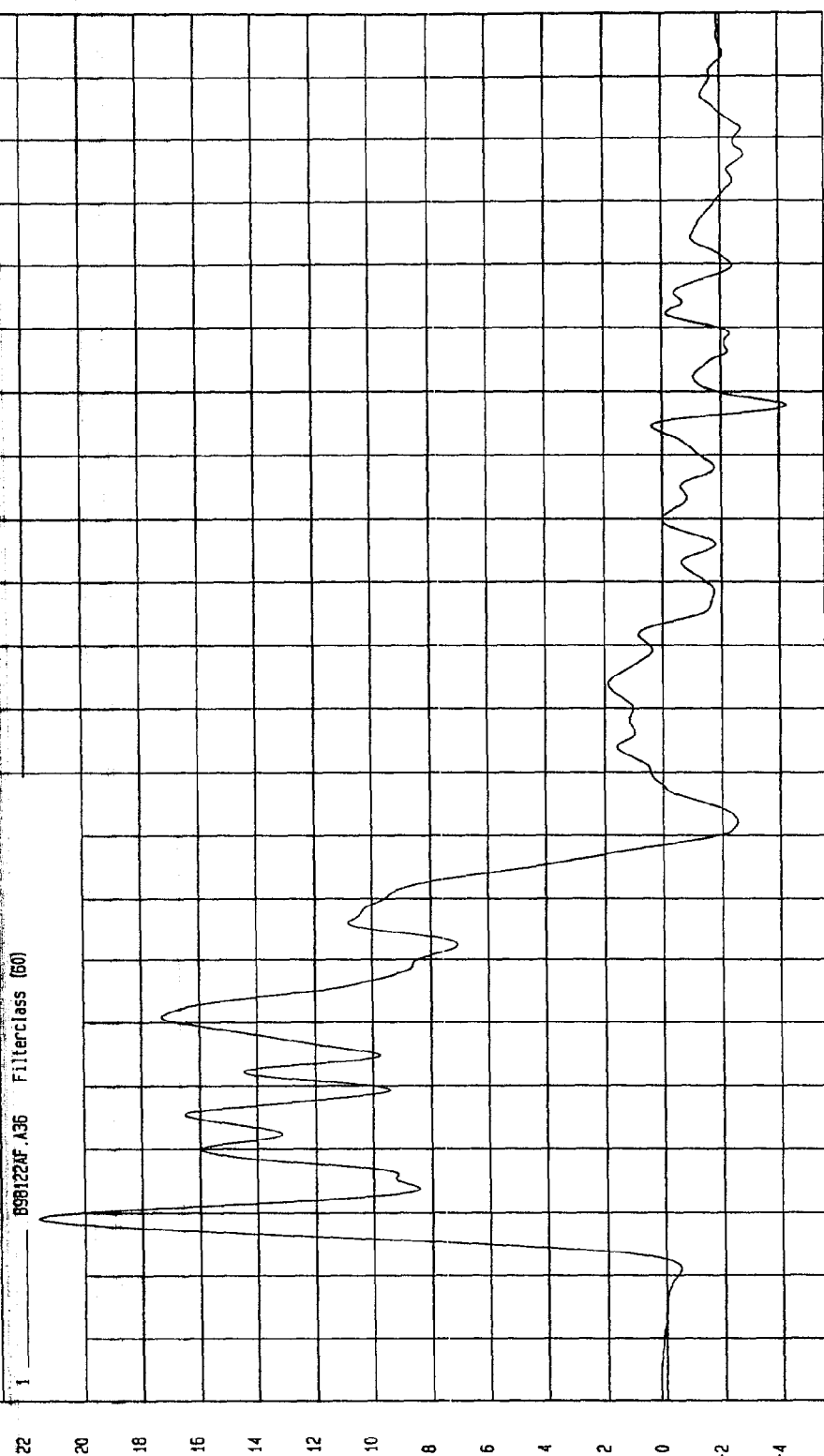
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 21.58 G'S at 9 msec

Minimum = -4.24 G'S at 138 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION

1 898122AF.A35 Filterclass (50)



MGA Research
12-19-1998 12:13

TIME (SECONDS)

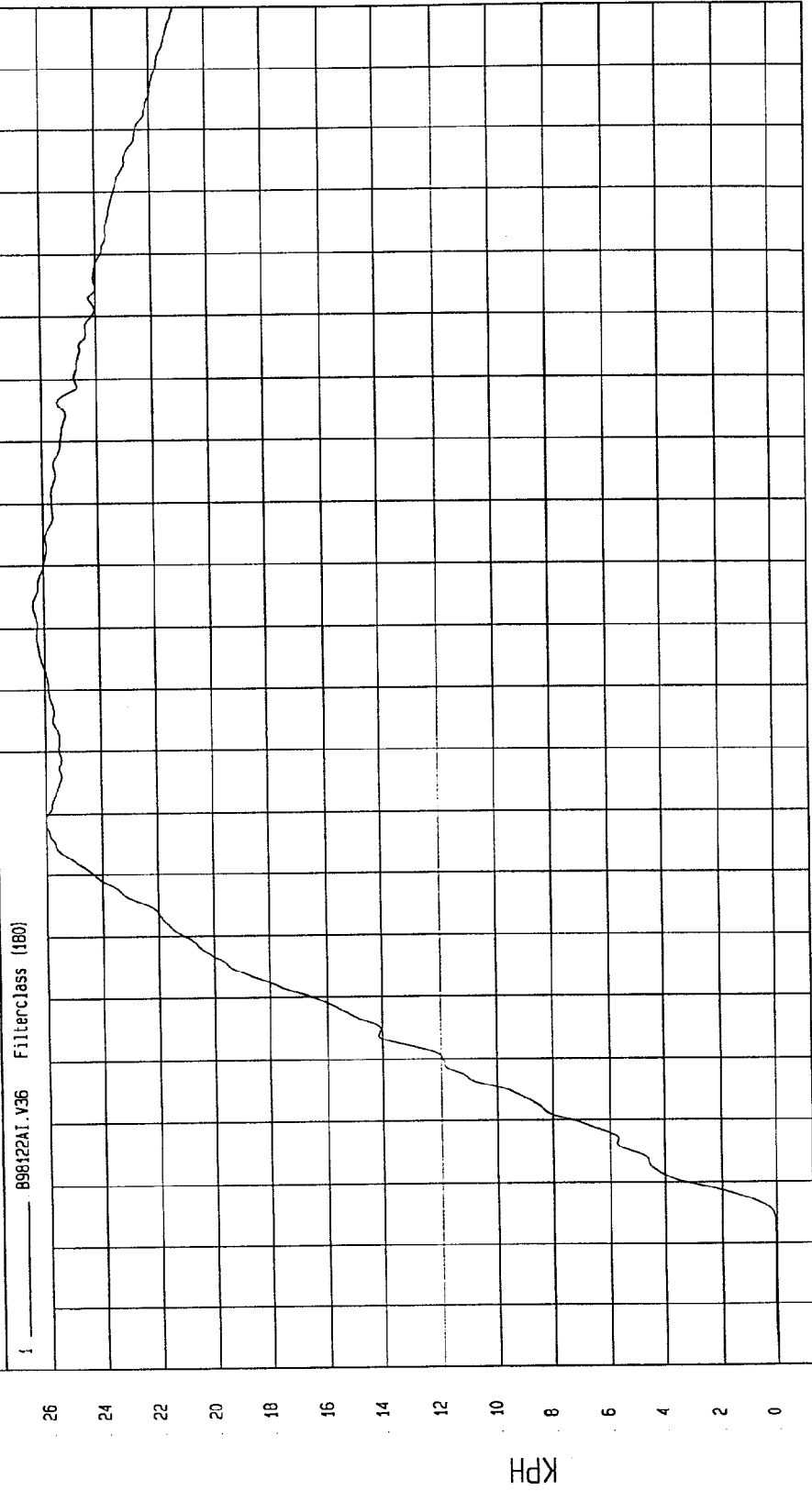
G's

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 26.4 KPH at 104 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY

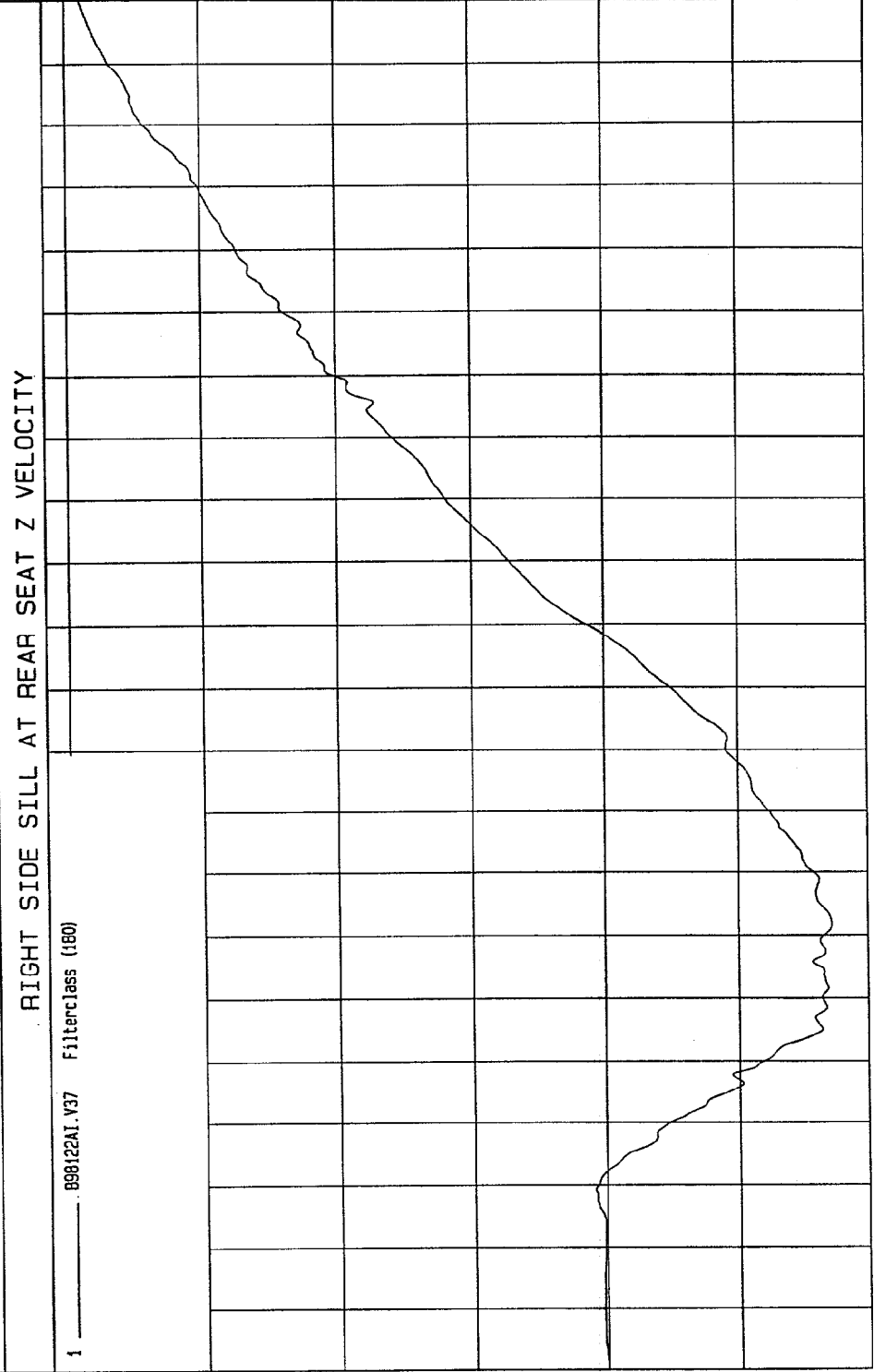


MGA Research
12-19-1998 12:13

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -3.38 KPH at 52 msec Maximum = 7.78 KPH at 200 msec



WCA Research
12-19-1998 12:13

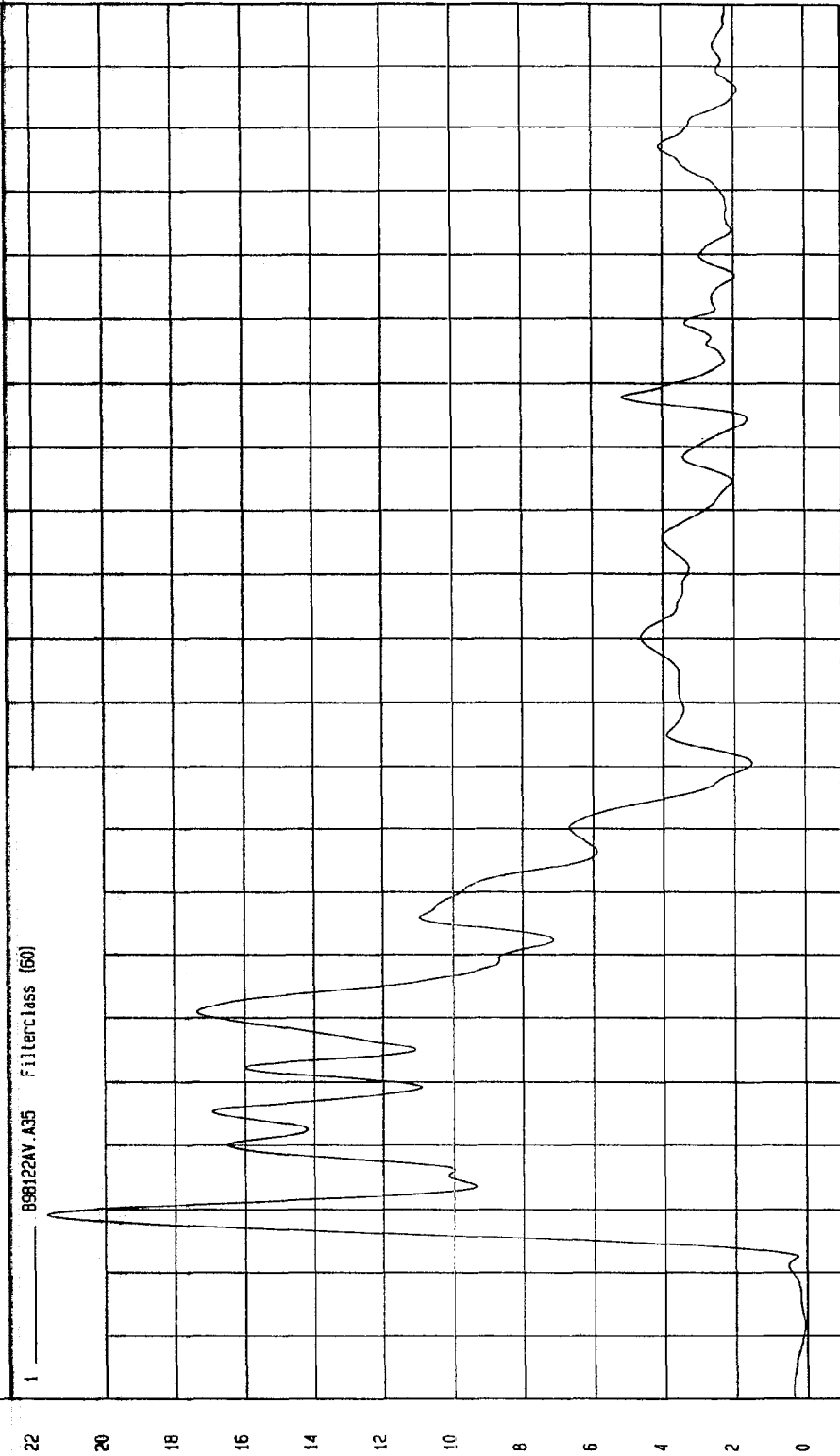
TIME Seconds

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 5.53E-02 G'S at -8 msec Maximum = 21.66 G'S at 9 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION



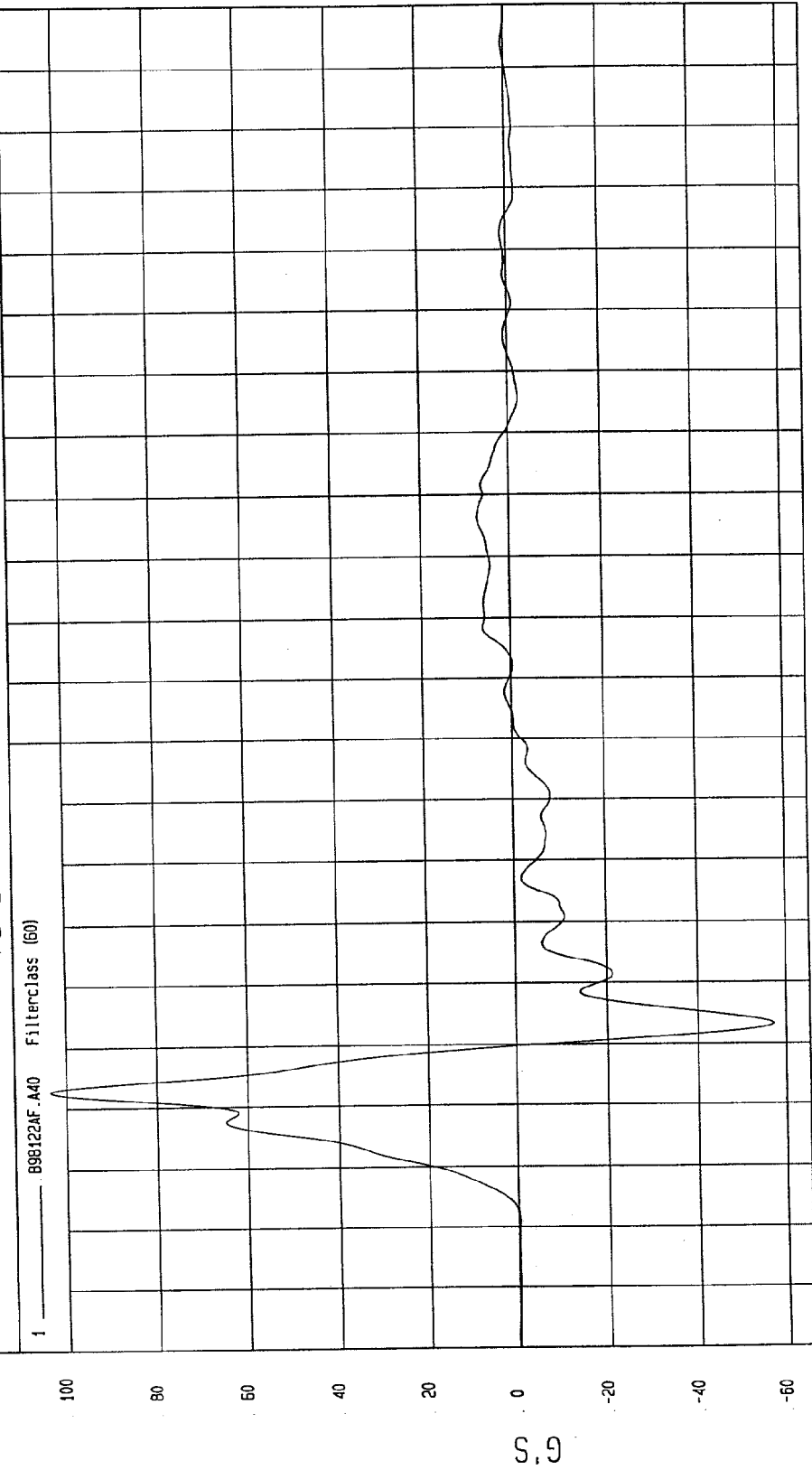
TIME (SECONDS)

MOA Research
12-19-1998 12:14

G.S.

TEST: NCAP SIDE IMPACT TEST
TEST DATE: 12-17-1998
COMPONENT: 1999 FORD WINDSTAR (MX0206)
Speed: 38.46 MPH 61.9 KPH
Minimum = -57.18 G'S at 33 msec
Maximum = 103.47 G'S at 23 msec

DRIVER SEAT TRACK Y ACCELERATION



MCA Research
12-19-1998 12:14

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

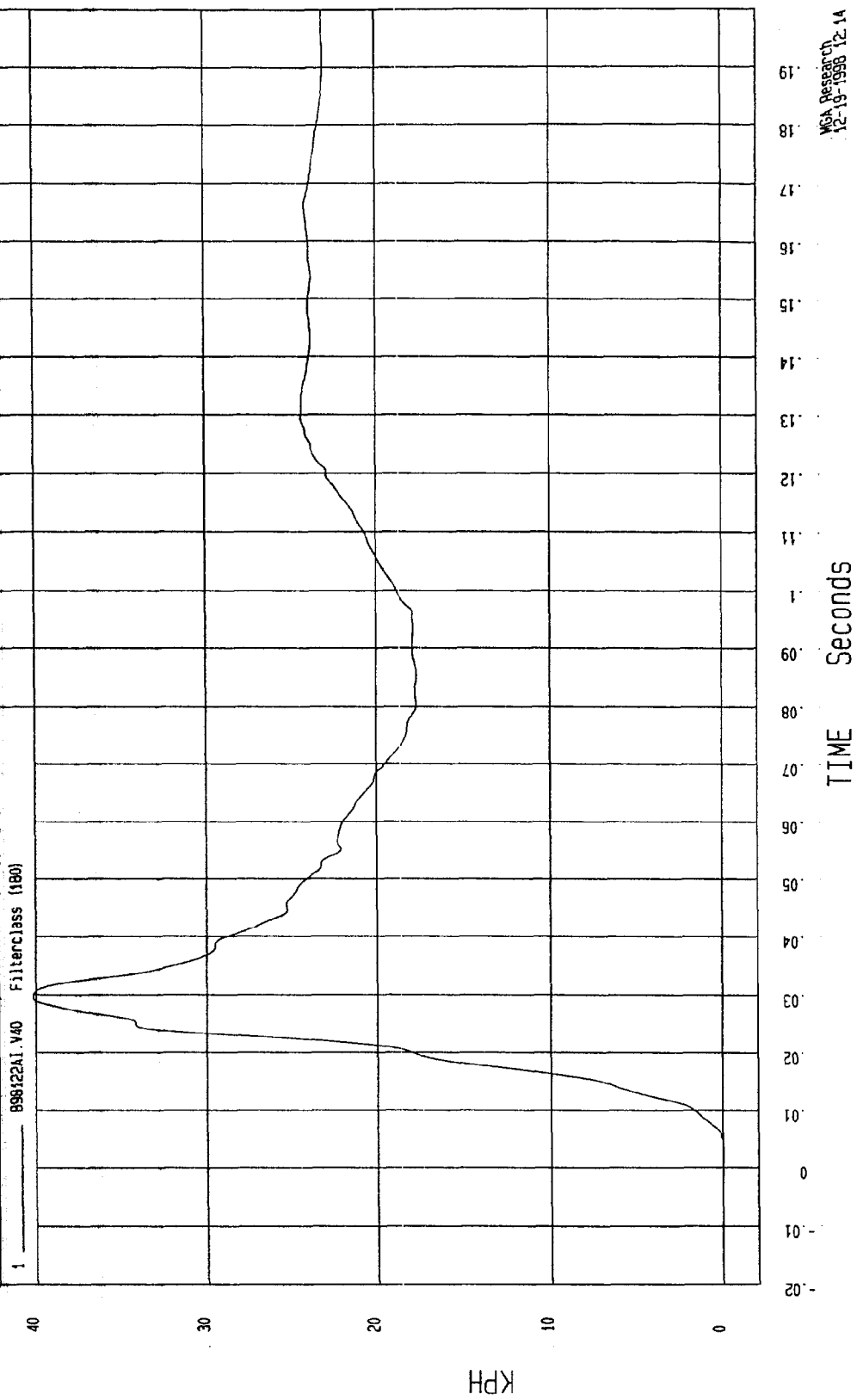
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 40.18 KPH at 30 msec

Minimum = -3.45E-02 KPH at 3 msec

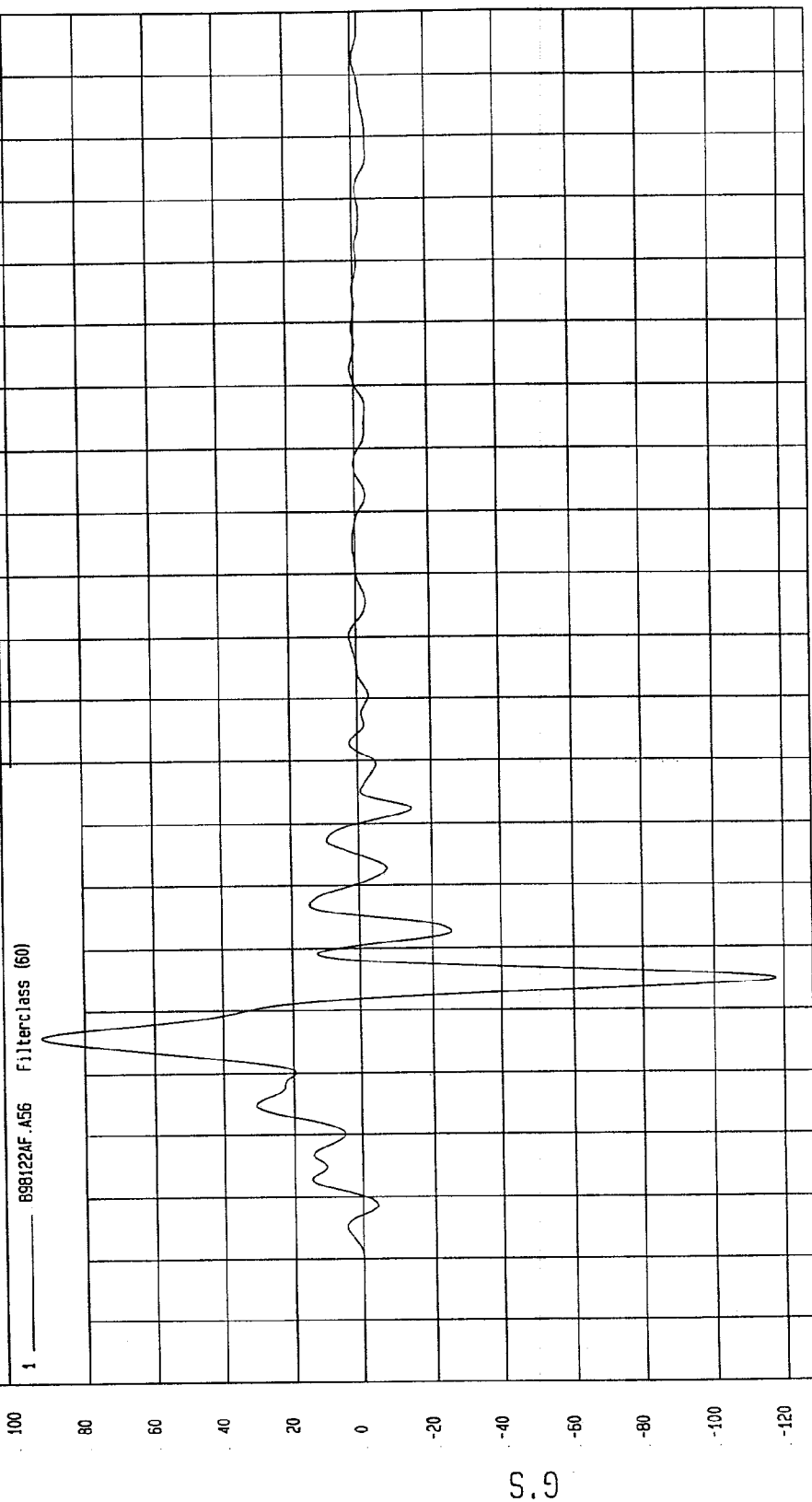
DRIVER SEAT TRACK Y VELOCITY



MOA Research
12-19-1998 12:14

TEST: NCAP SIDE IMPACT TEST
 TEST DATE: 12-17-1998
 COMPONENT: 1999 FORD WINDSTAR (MX0206)
 Speed: 38.46 MPH 61.9 KPH
 Minimum = -117.75 G'S at 45 msec
 Maximum = 92.26 G'S at 36 msec

REAR PASSENGER SEAT TRACK Y ACCELERATION



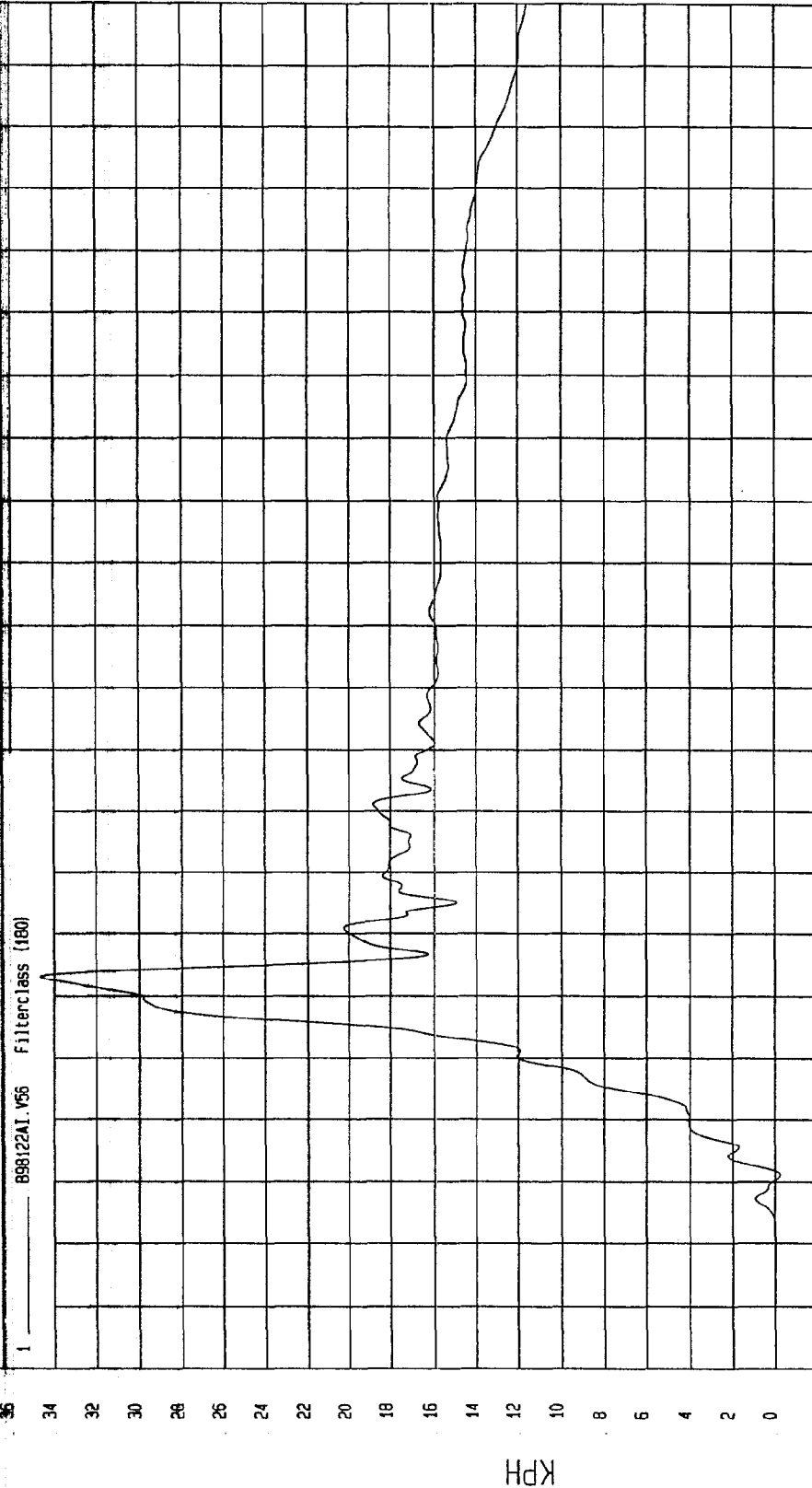
MGA Research
 12-17-1998 16:02

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

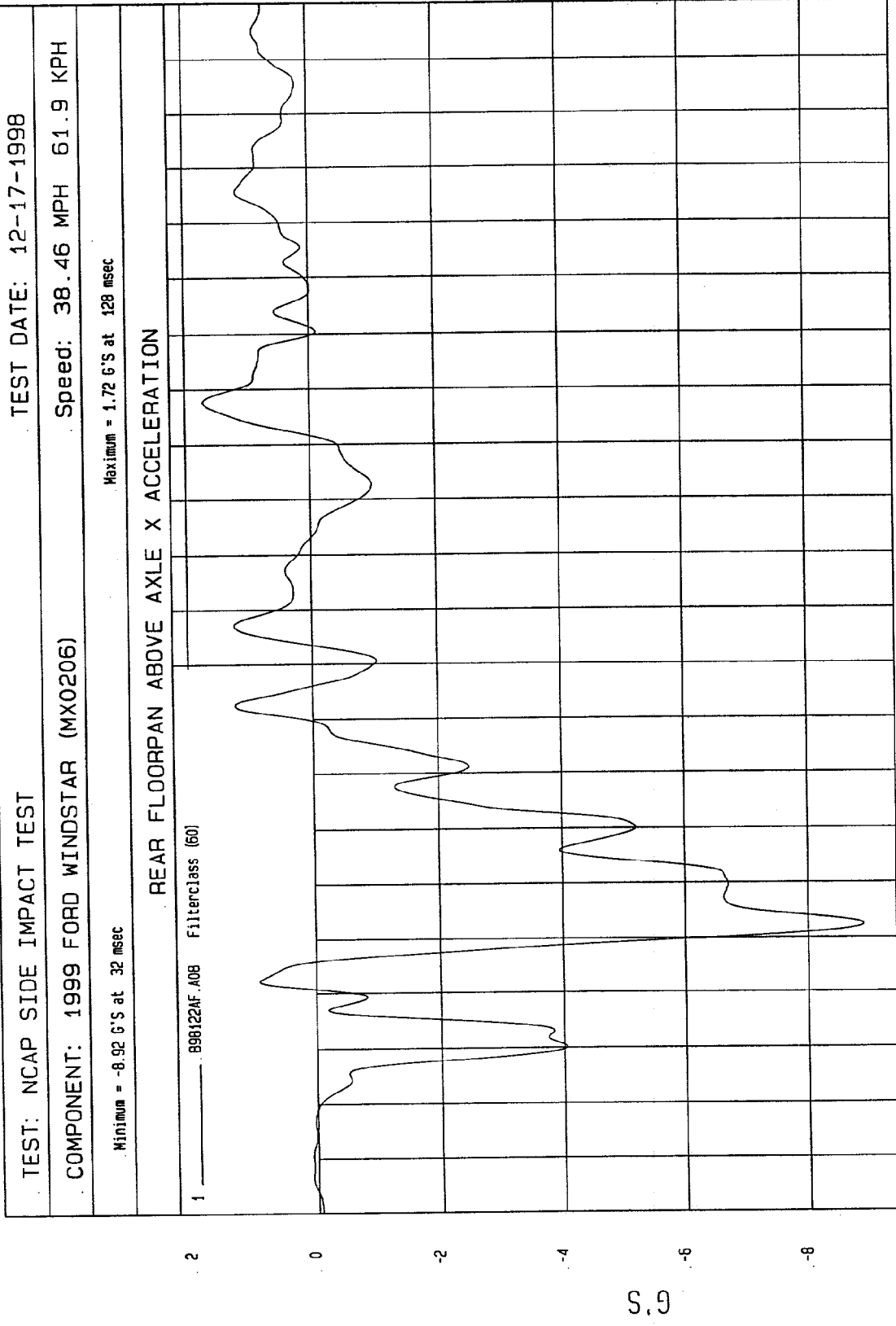
COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -.25 KPH at 11 msec Maximum = 34.66 KPH at 43 msec

REAR PASSENGER SEAT TRACK Y VELOCITY



WCA Research
12-17-1998 16:02



MCA Research
12-17-1998 16:02

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

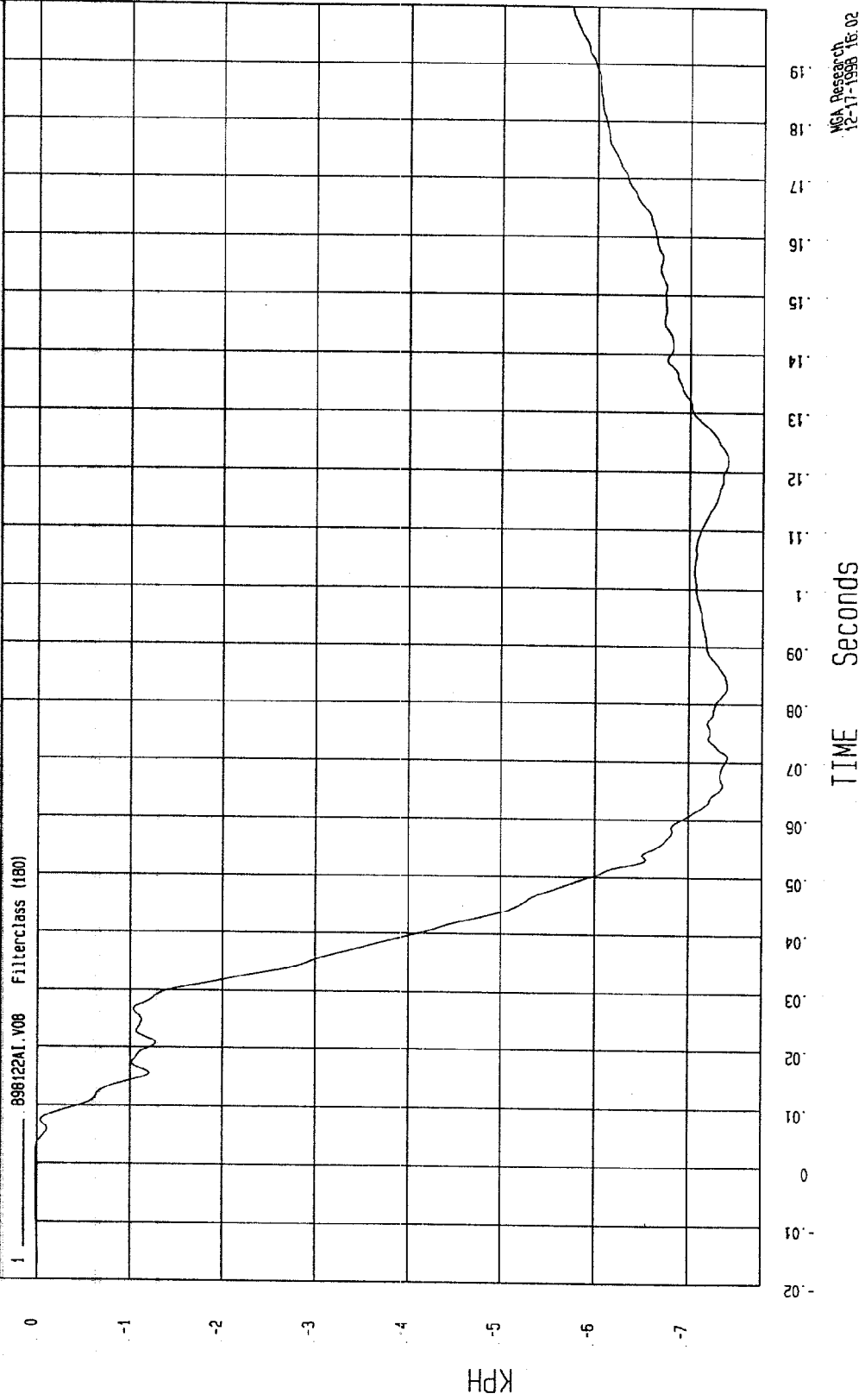
Speed: 38.46 MPH 61.9 KPH

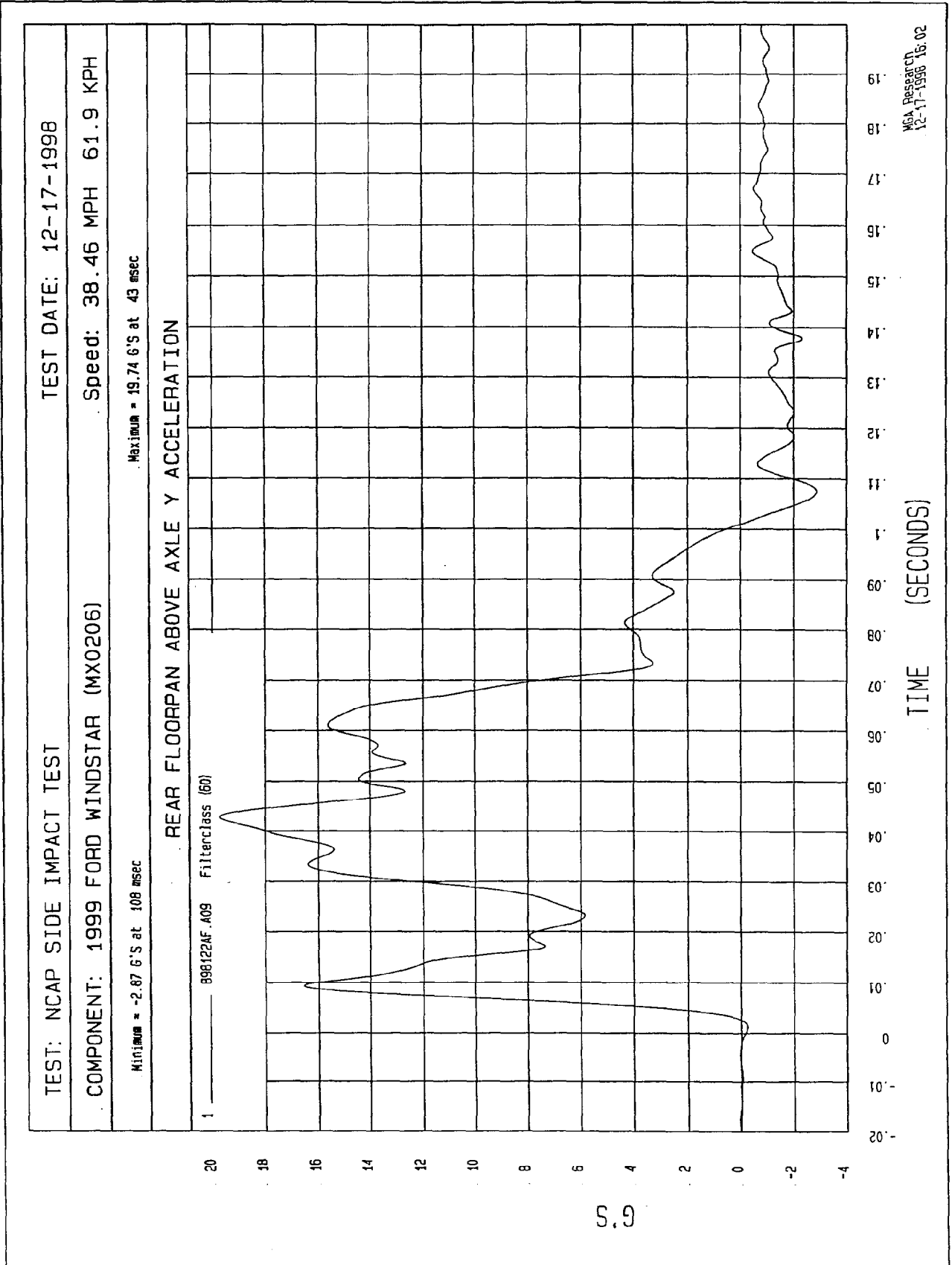
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 2.26E-02 KPH at -2 msec

Minimum = -7.42 KPH at 122 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY



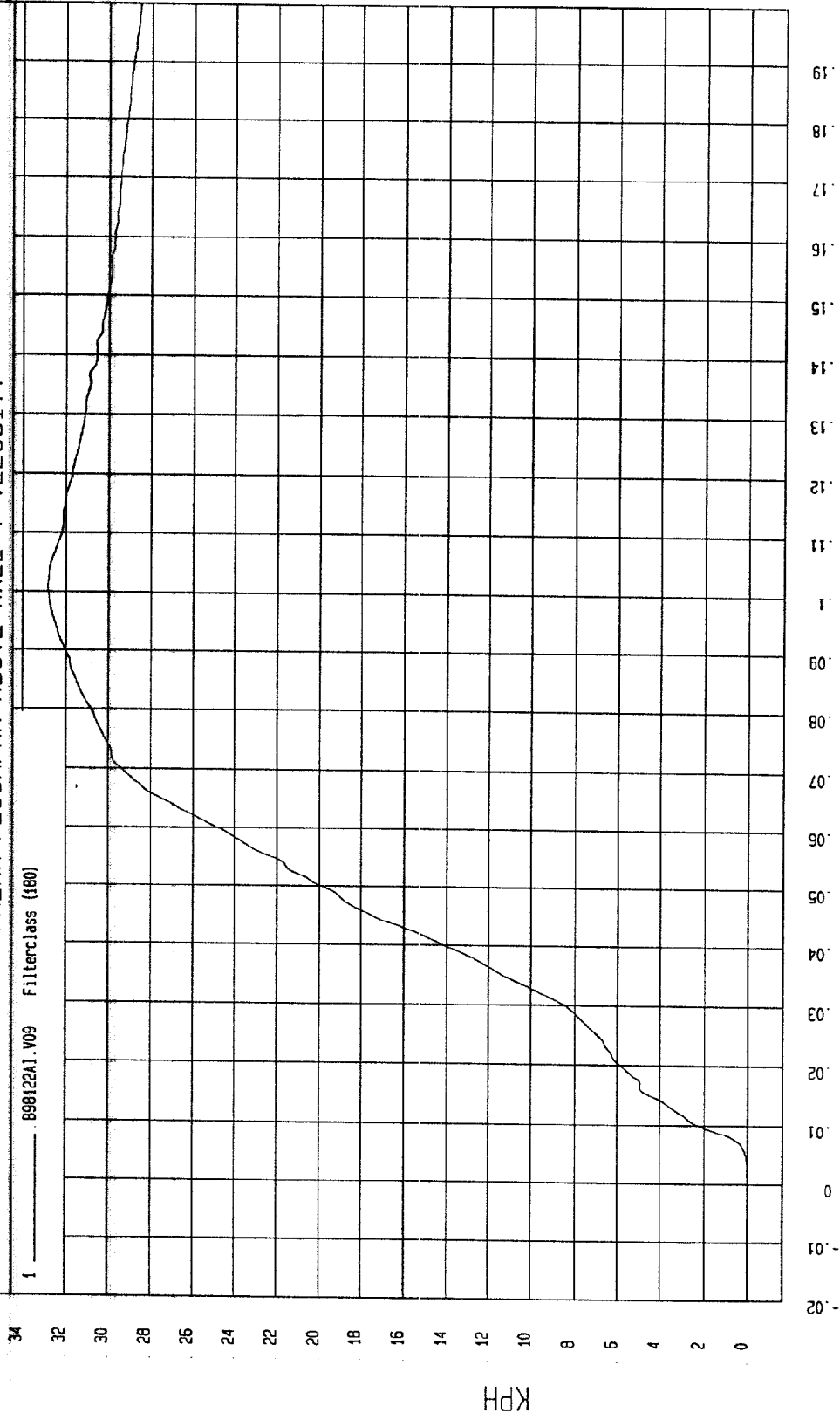


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

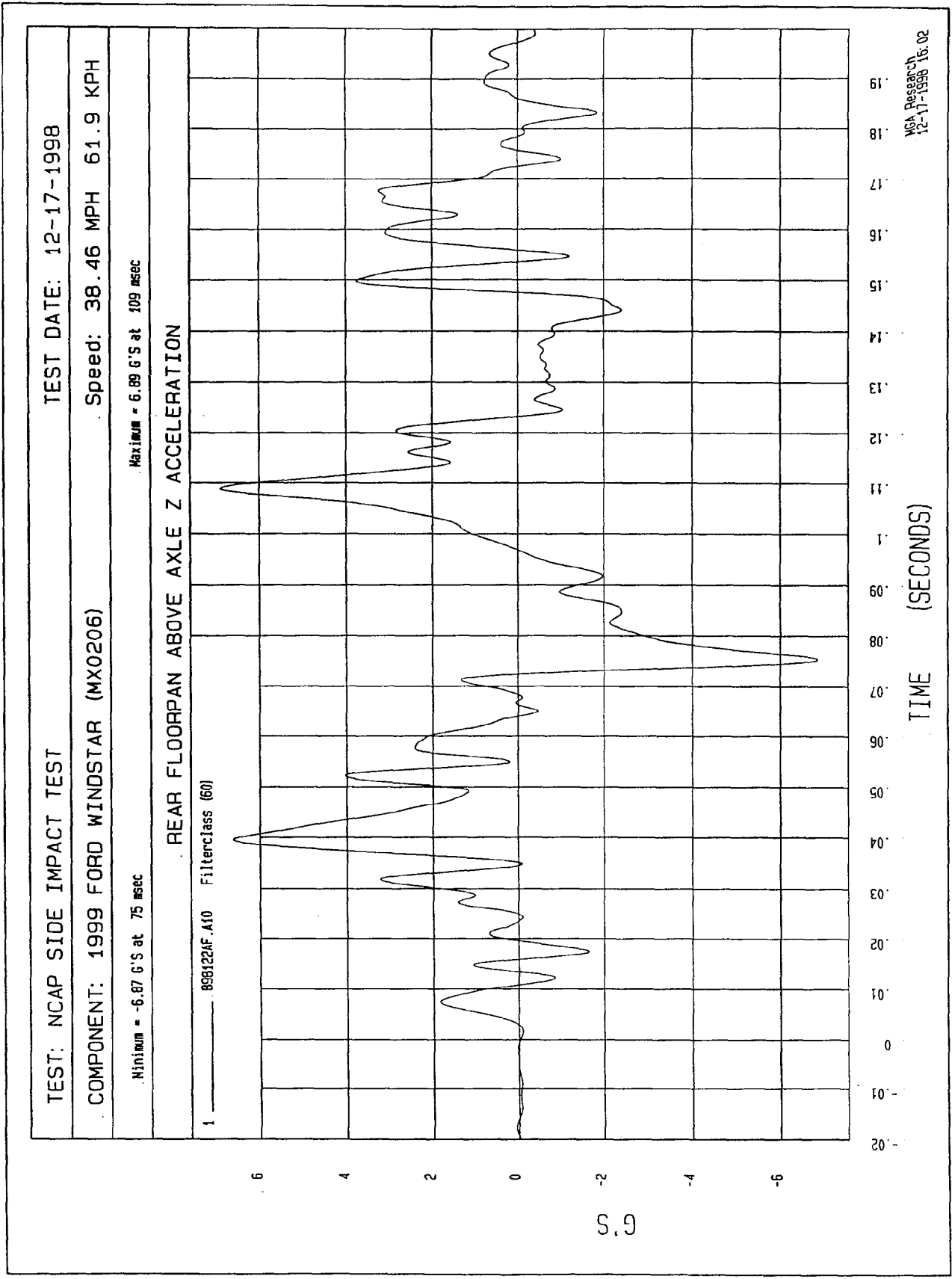
COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

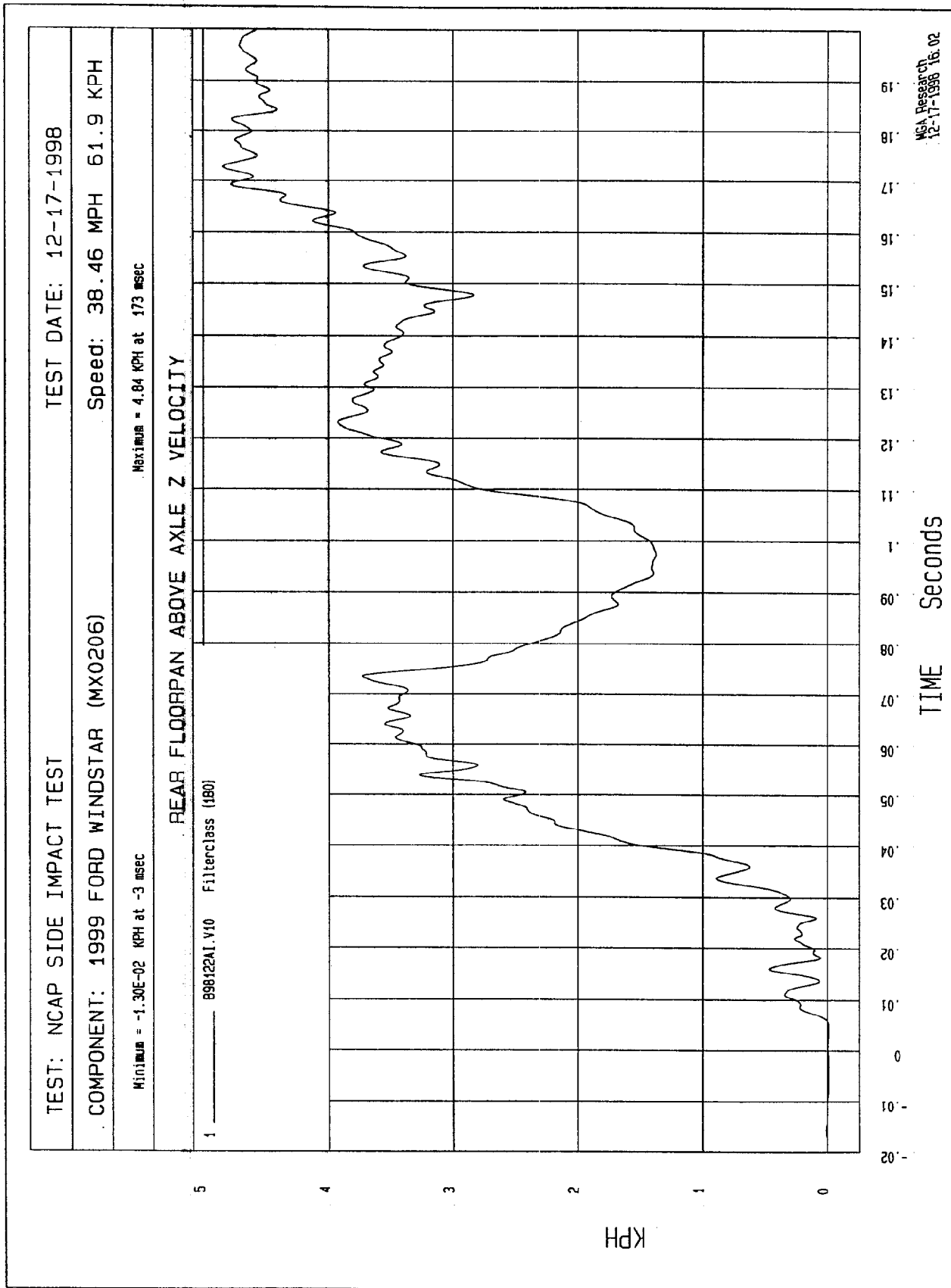
Minimum = -2.90E-03 KPH at -7 msec Maximum = 32.83 KPH at 101 msec

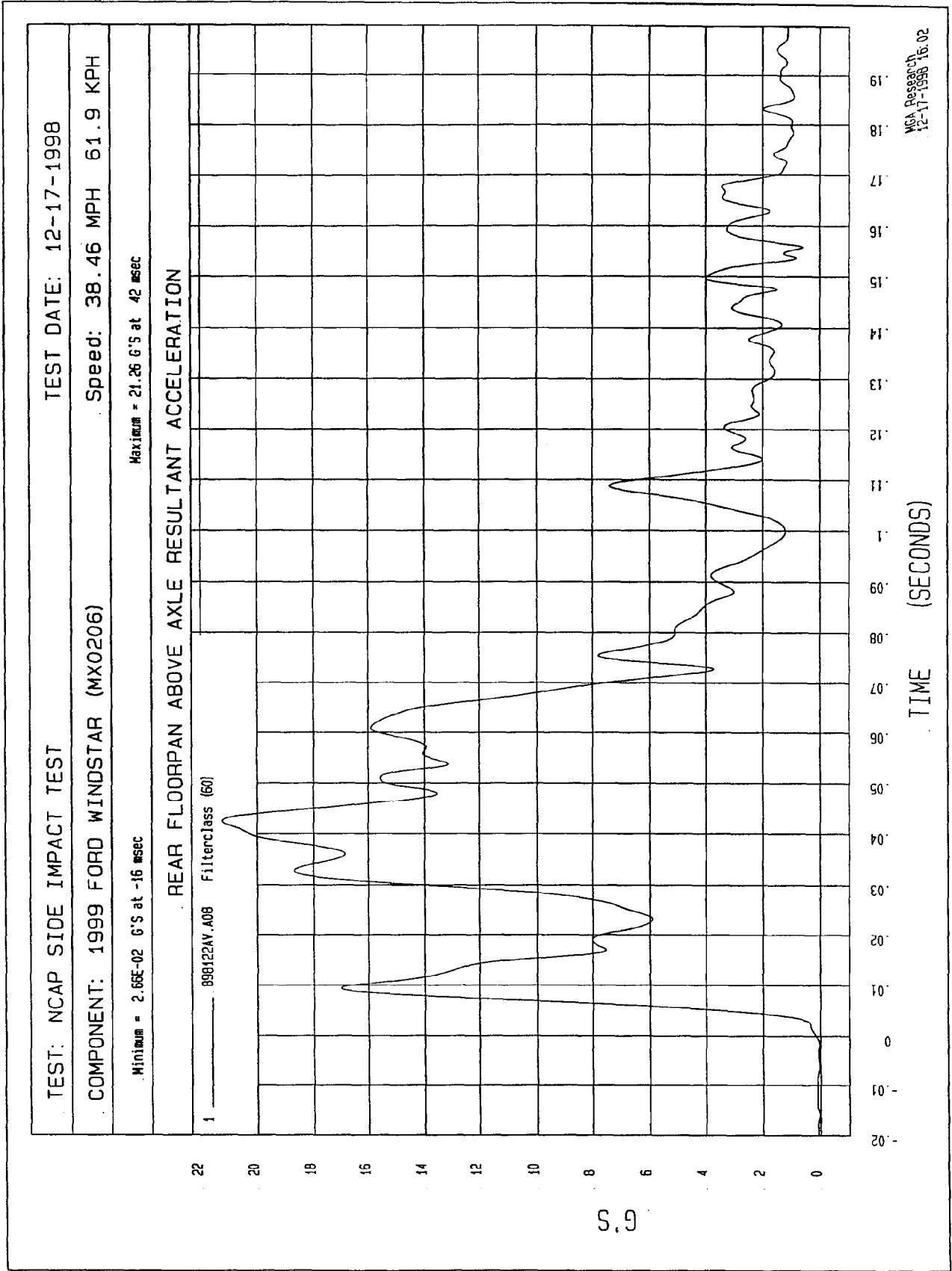
REAR FLOORPAN ABOVE AXLE Y VELOCITY



MCA Research
12-17-1998 16:02





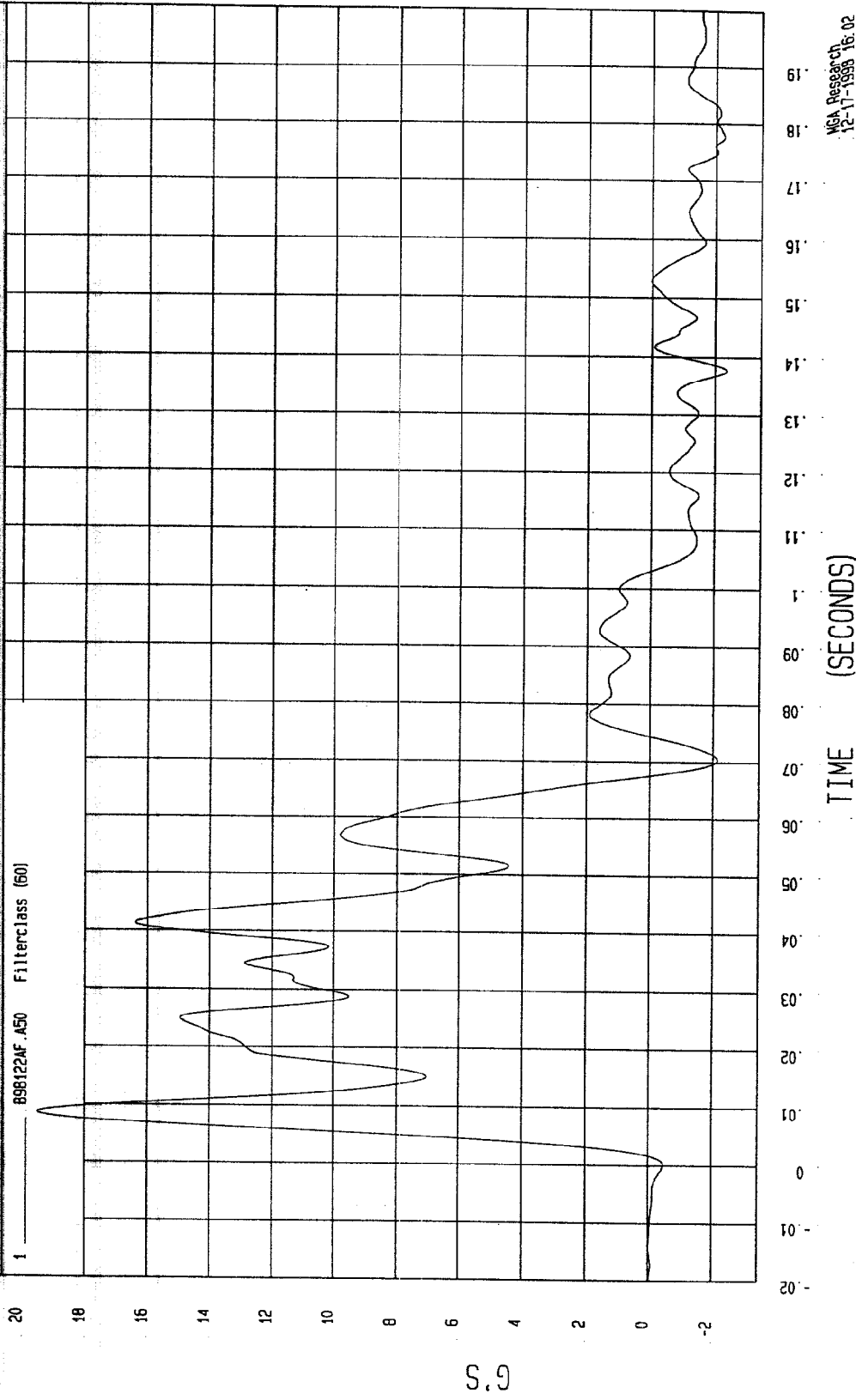


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.38 G'S at 138 msec Maximum = 19.51 G'S at 9 msec

RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION

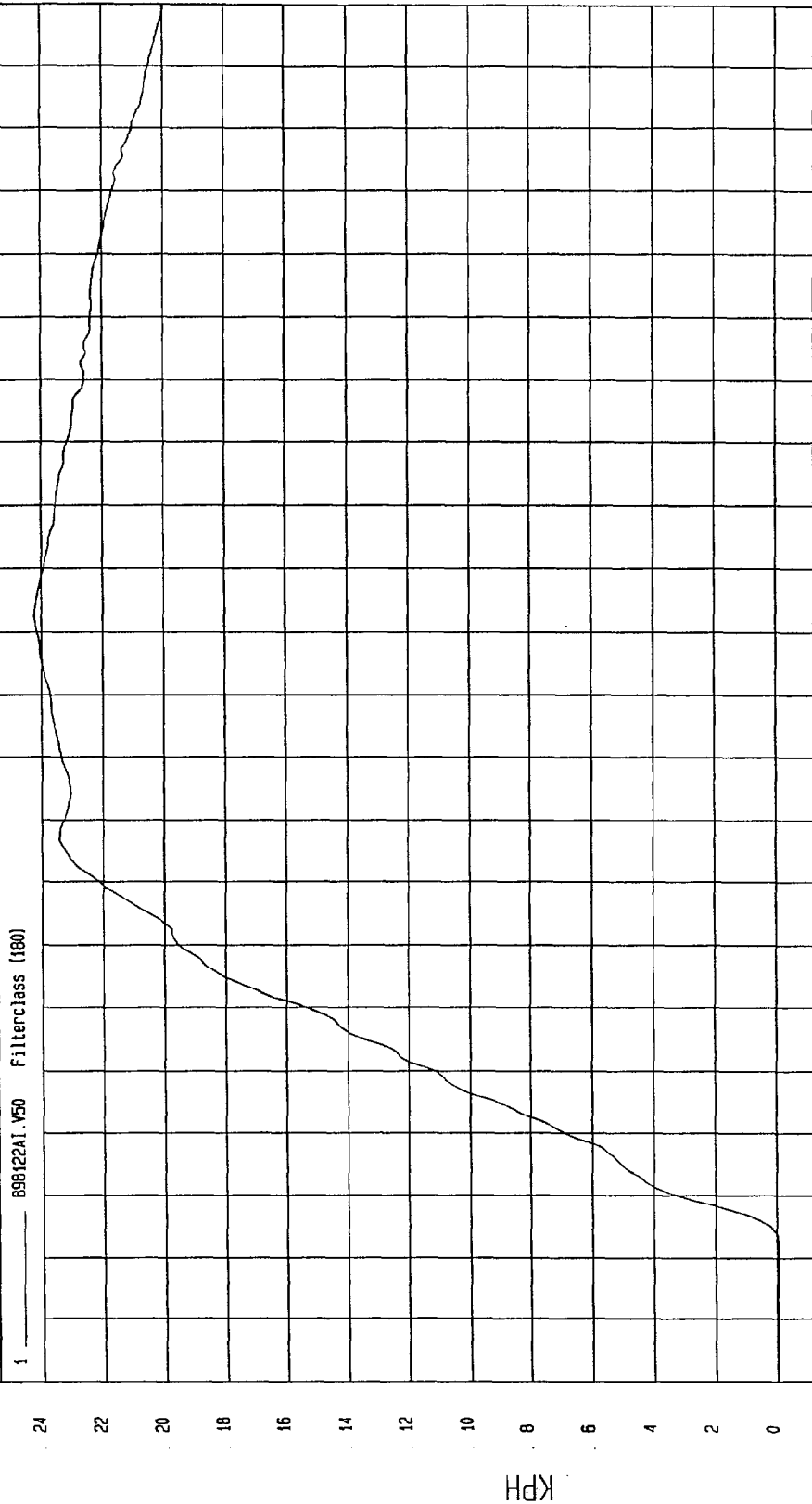


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -5.65E-02 KPH at 1 msec Maximum = 24.23 KPH at 103 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY



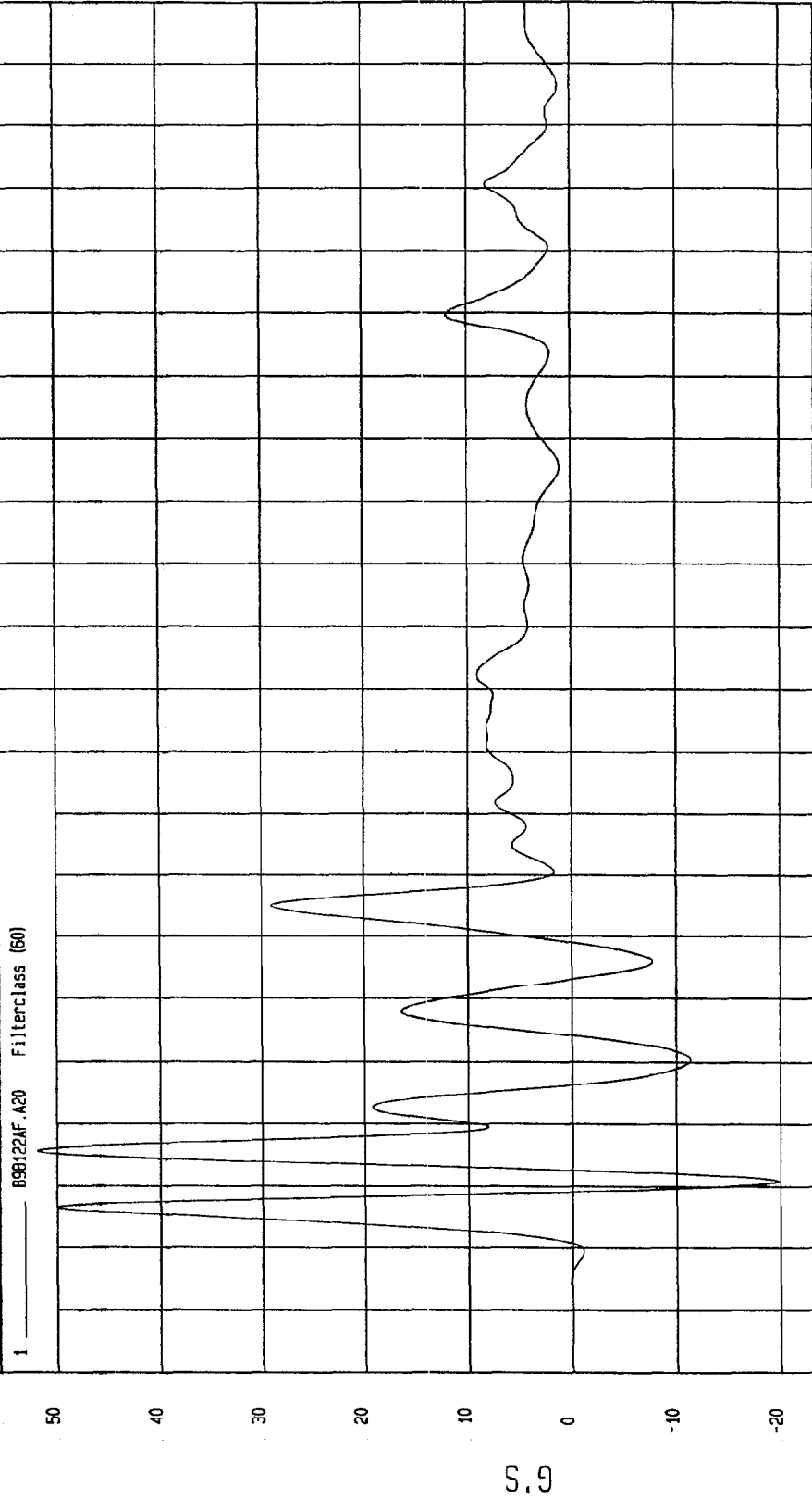
MCA Research
12-17-1998 16:02

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

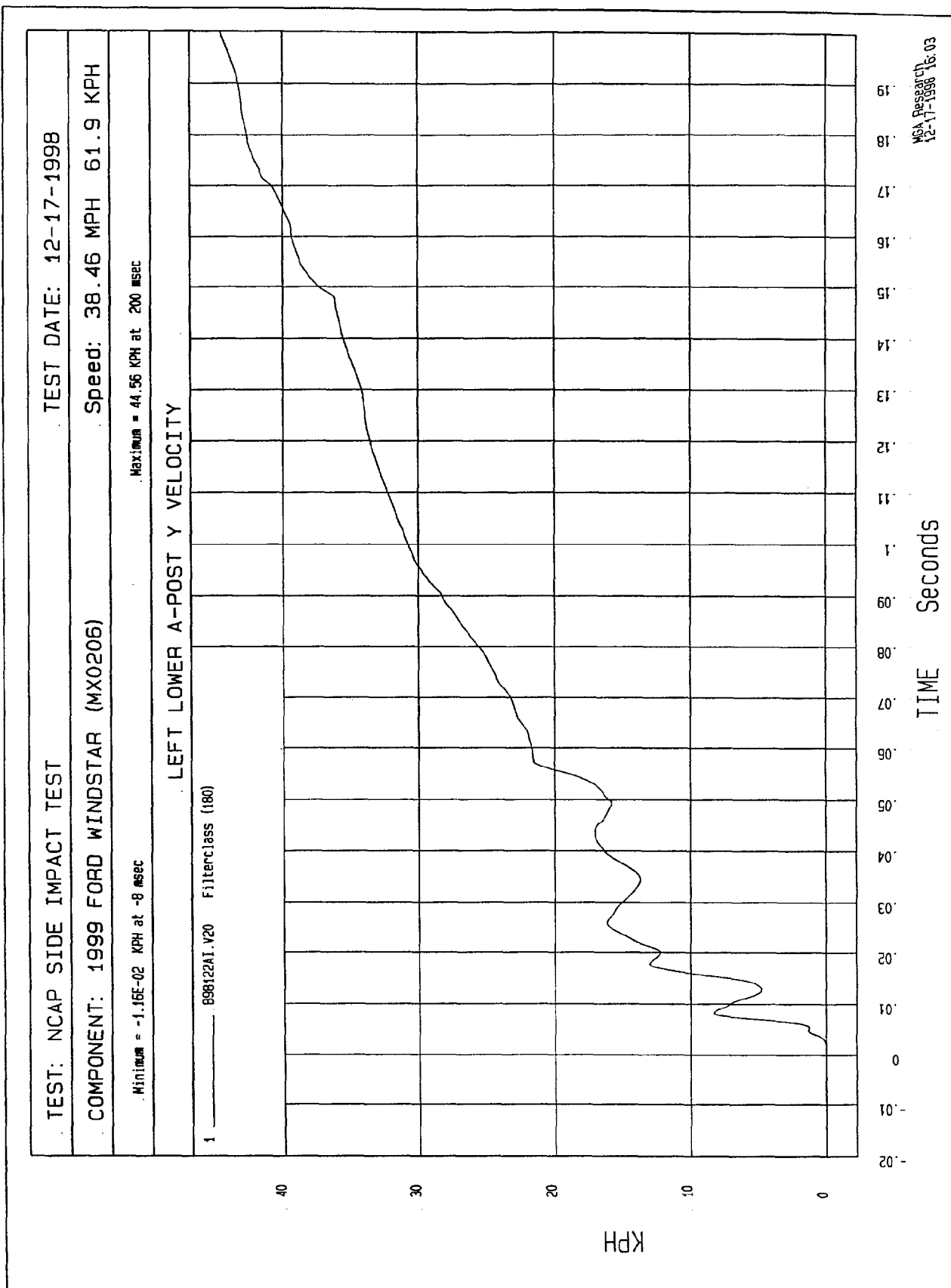
Minimum = -19.81 G'S at 11 msec Maximum = 51.91 G'S at 16 msec

LEFT LOWER A-POST Y ACCELERATION



TIME (SECONDS)

WCA Research
12-17-1998 16:02

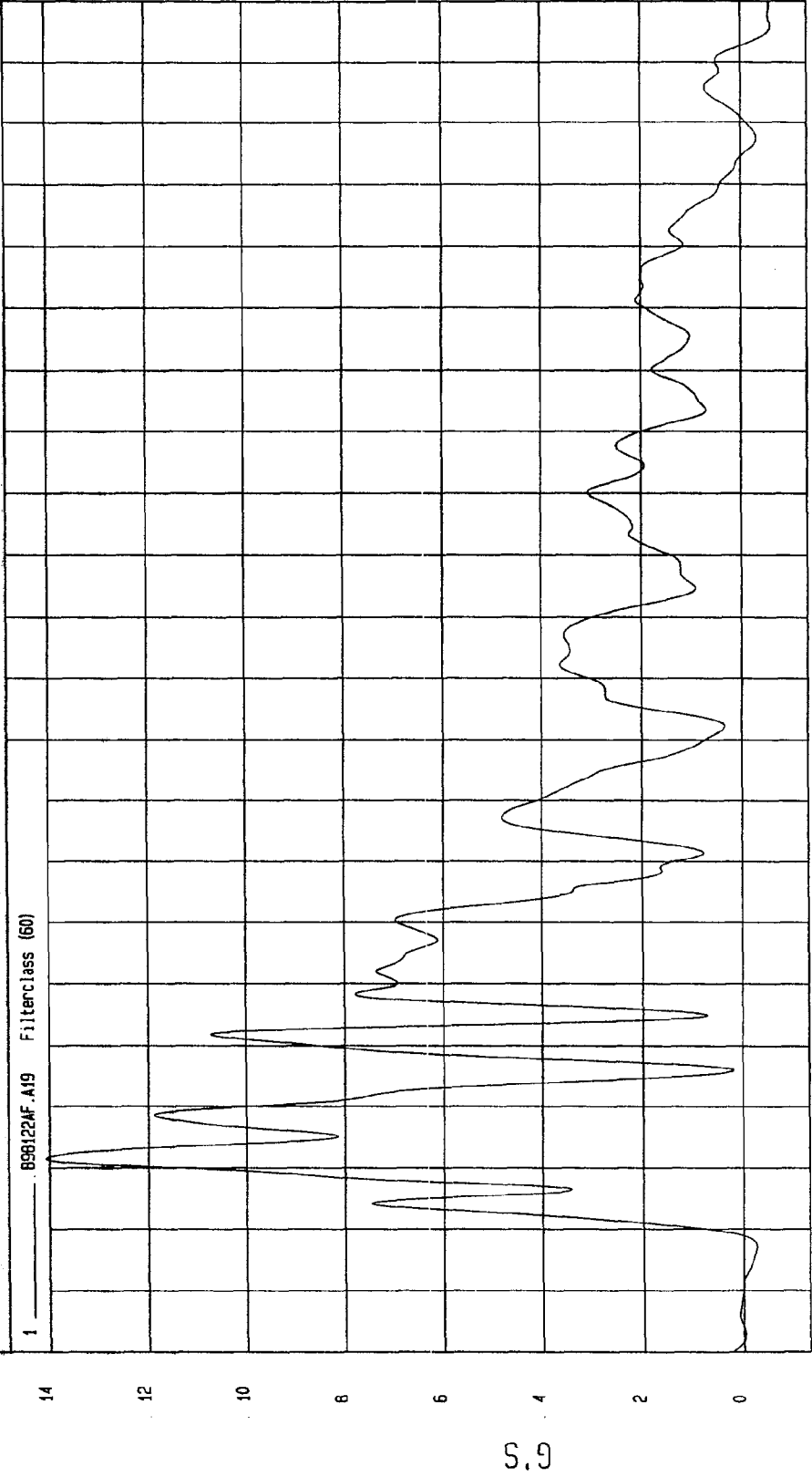


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

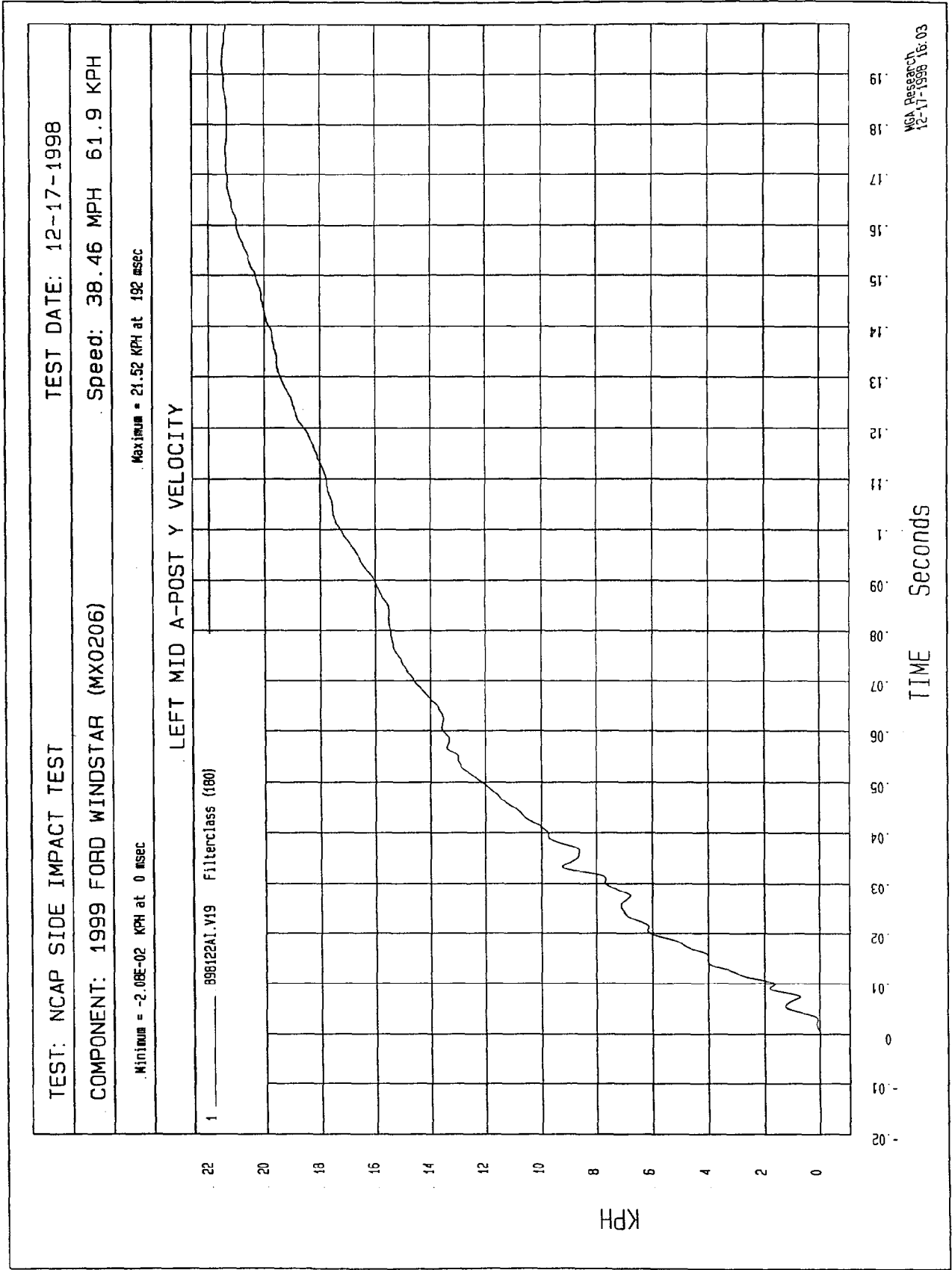
Minimum = -6.6 G'S at 195 msec Maximum = 14.08 G'S at 11 msec

LEFT MID A-POST Y ACCELERATION



TIME (SECONDS)

MSA Research
12-17-1998 16:03



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

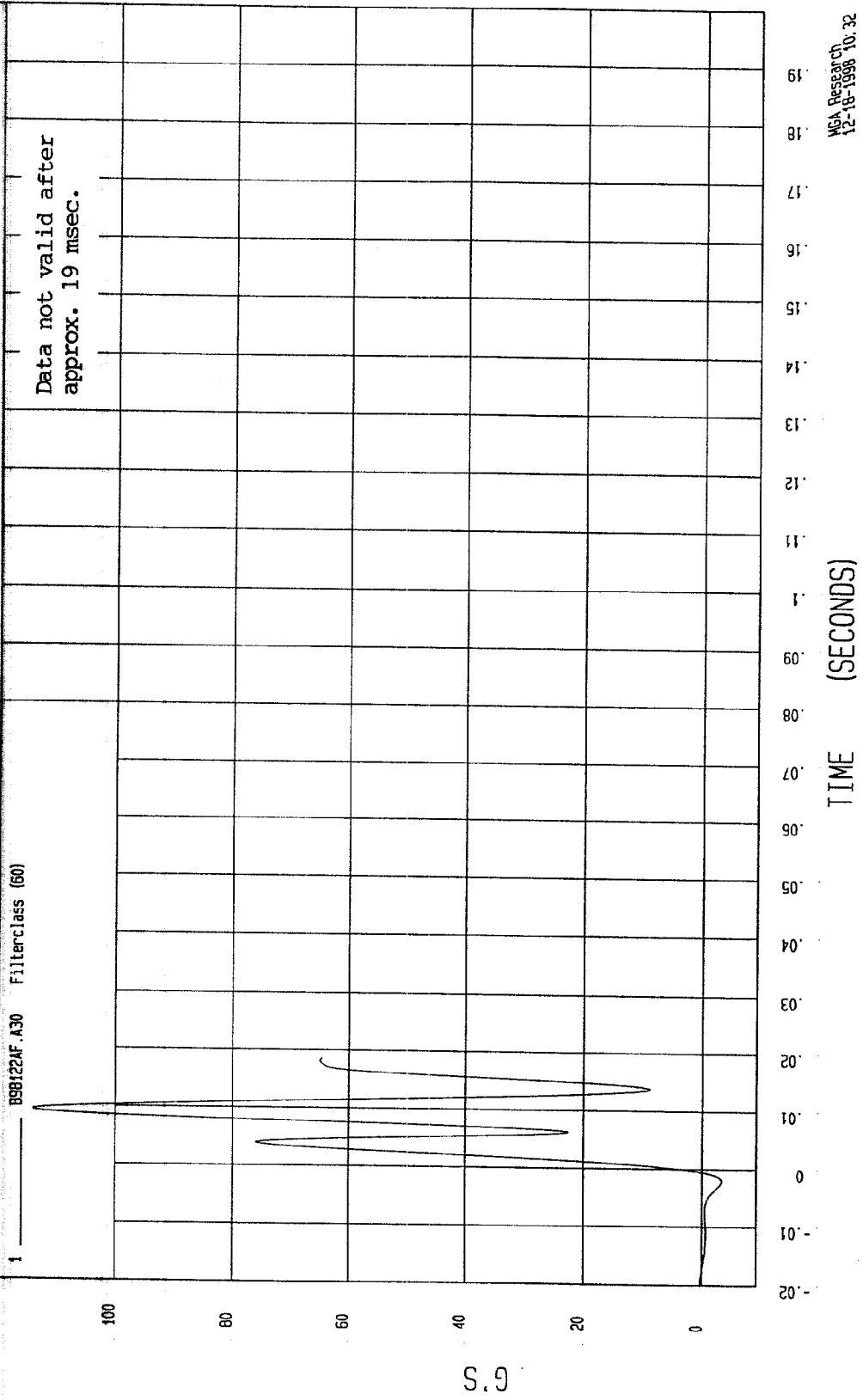
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Speed: 38.46 MPH 61.9 KPH

Minimum = -3.25 G'S at -2 msec

Maximum = 113.8 G'S at 9 msec

LEFT LOWER B-POST Y ACCELERATION



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 34.28 KPH at 19 msec

Minimum = -.32 KPH at 2 msec

LEFT LOWER B-POST Y VELOCITY

KPH

1 898122AF.V30 Filterclass (180)

Data not valid after approx. 19 msec.

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TIME Seconds

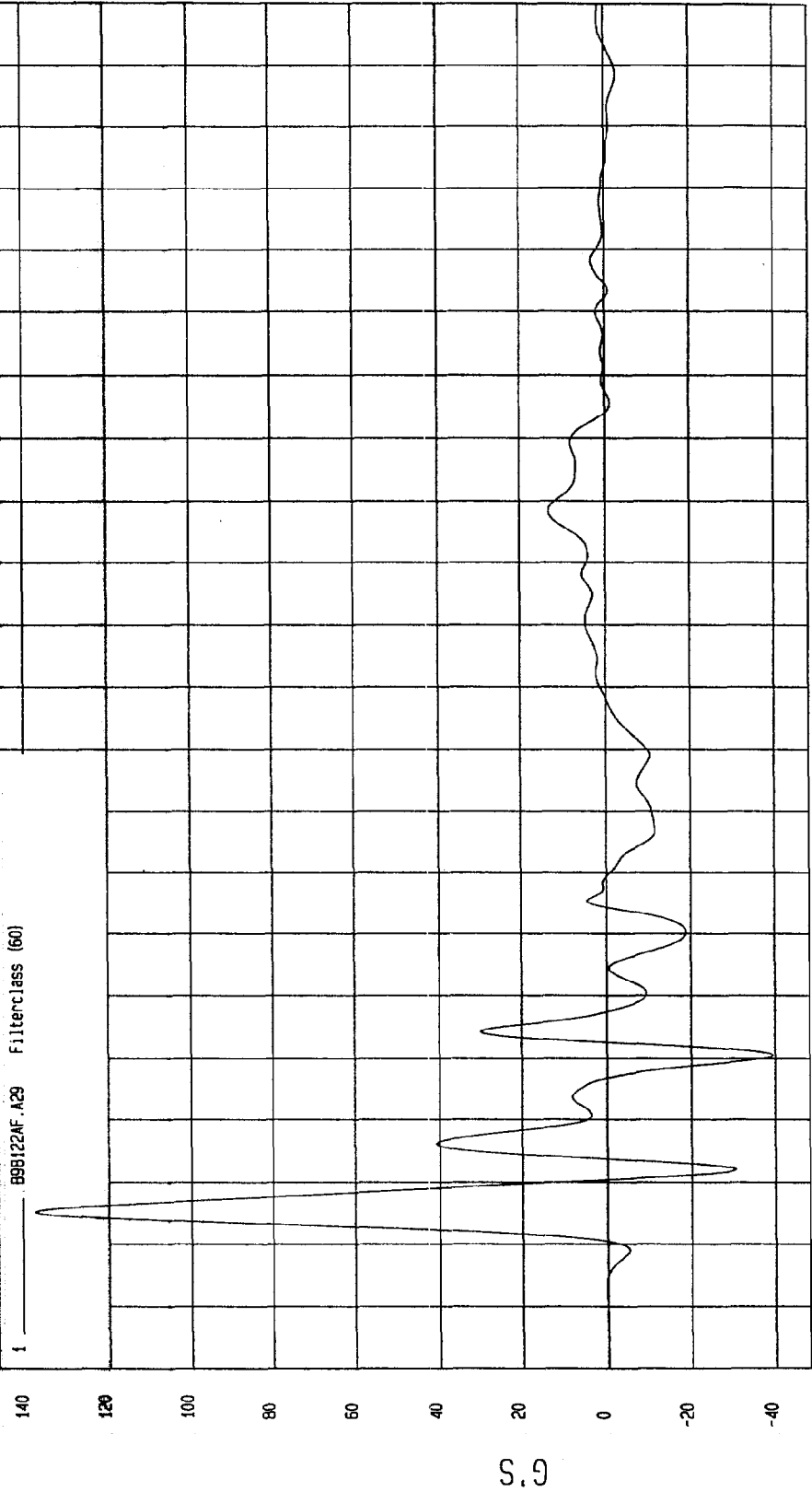
NGA Research
12-18-1998 10:32

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -39.32 G'S at 30 msec Maximum = 137.62 G'S at 5 msec

LEFT MID B-POST Y ACCELERATION



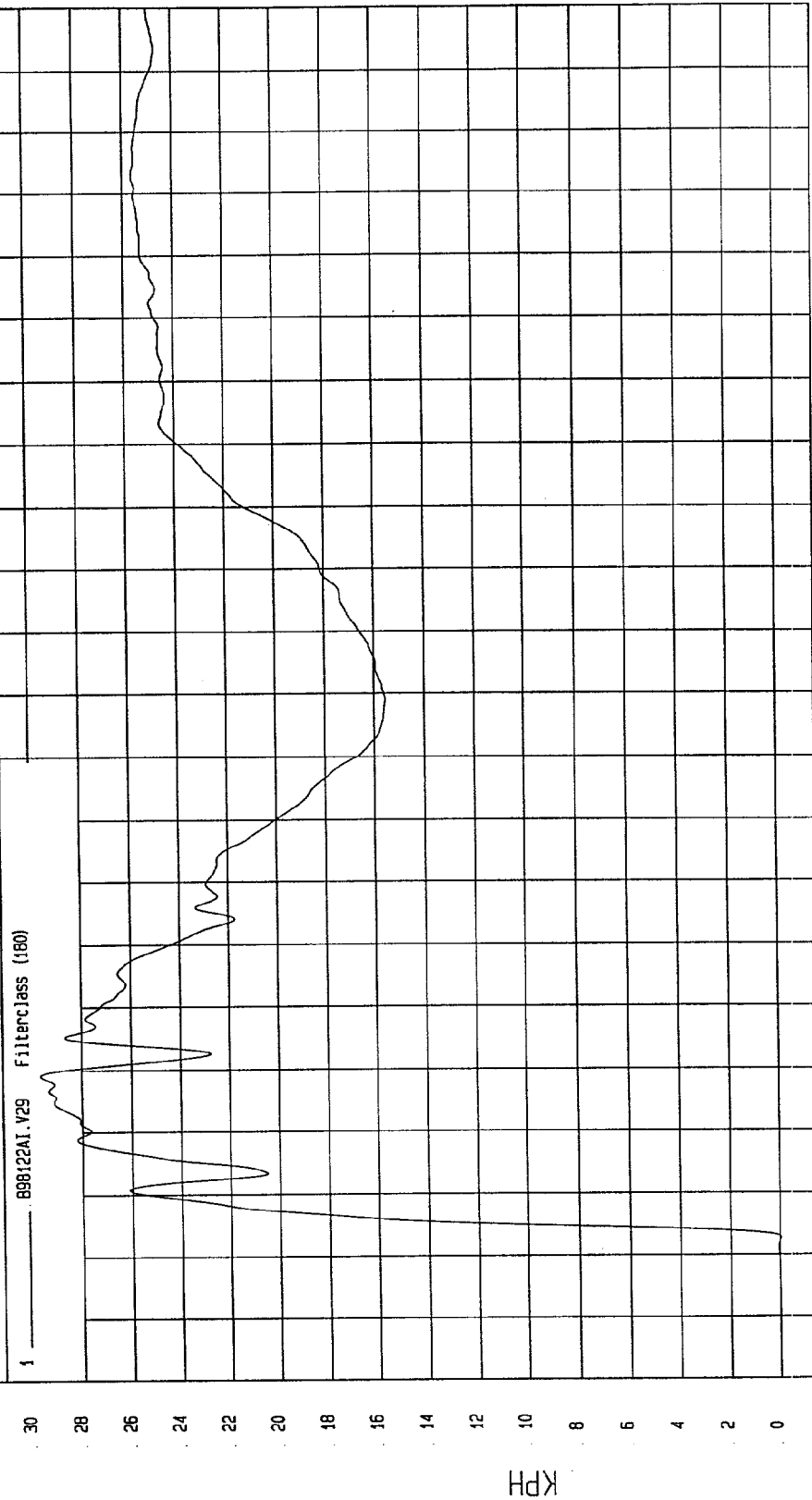
MSA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -5.07E-02 KPH at 3 msec Maximum = 29.65 KPH at 29 msec

LEFT MID B-POST Y VELOCITY



TIME Seconds

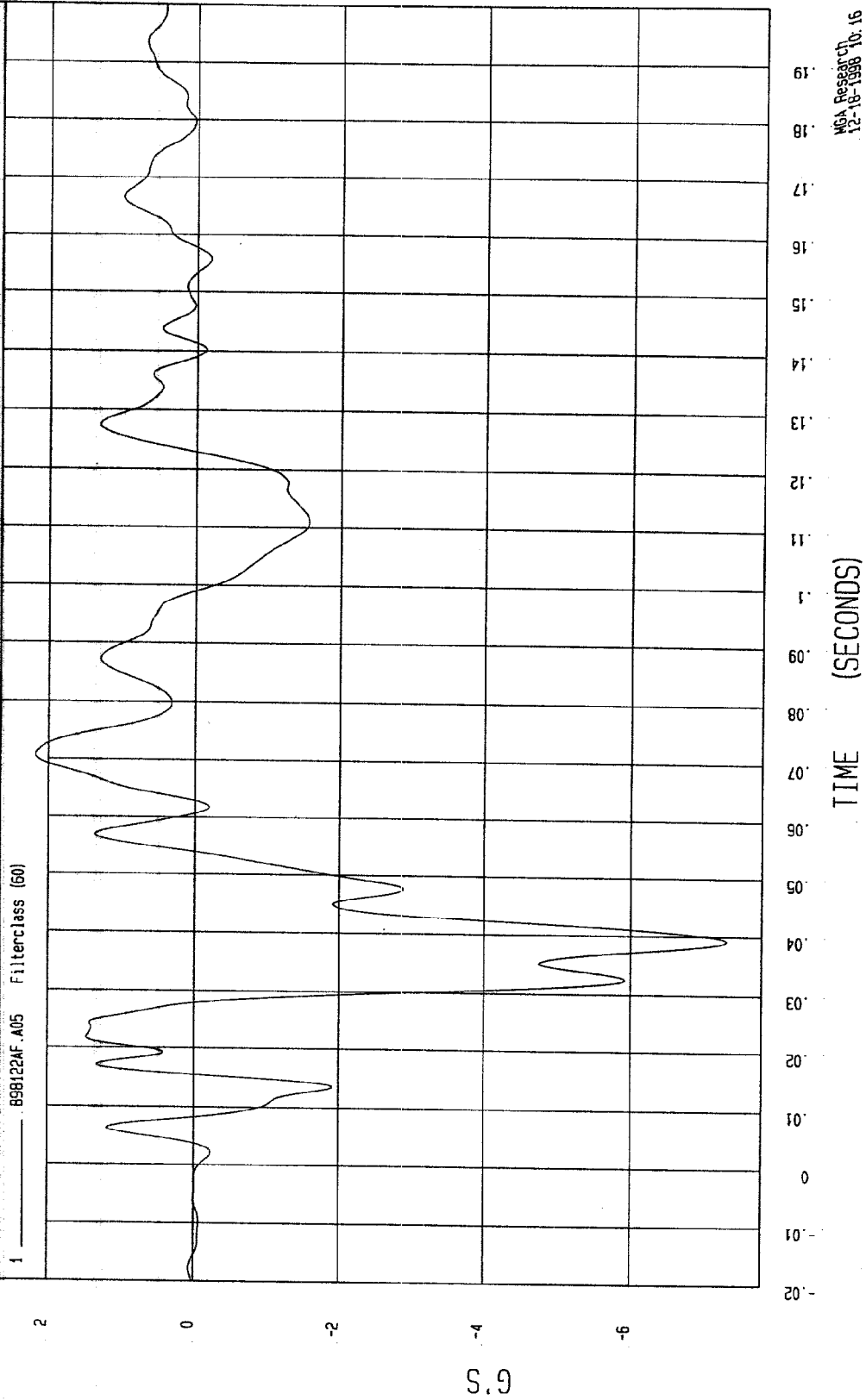
MSA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -7.3 G'S at 39 msec Maximum = 2.48 G'S at 71 msec

VEHICLE CG X ACCELERATION

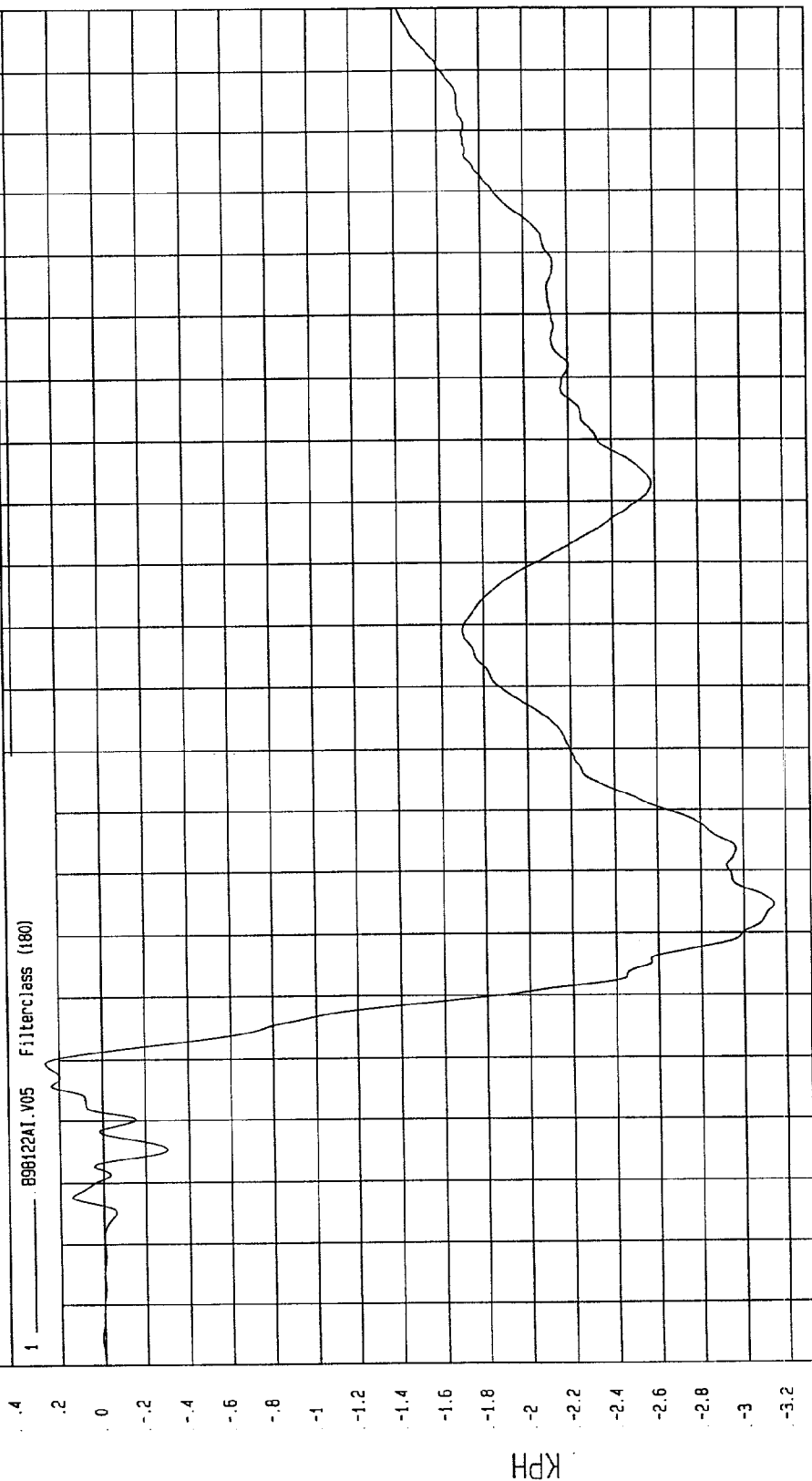


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -3.14 KPH at 54 msec Maximum = .26 KPH at 29 msec

VEHICLE CG X VELOCITY



MCA Research
12-18-1998 10:16

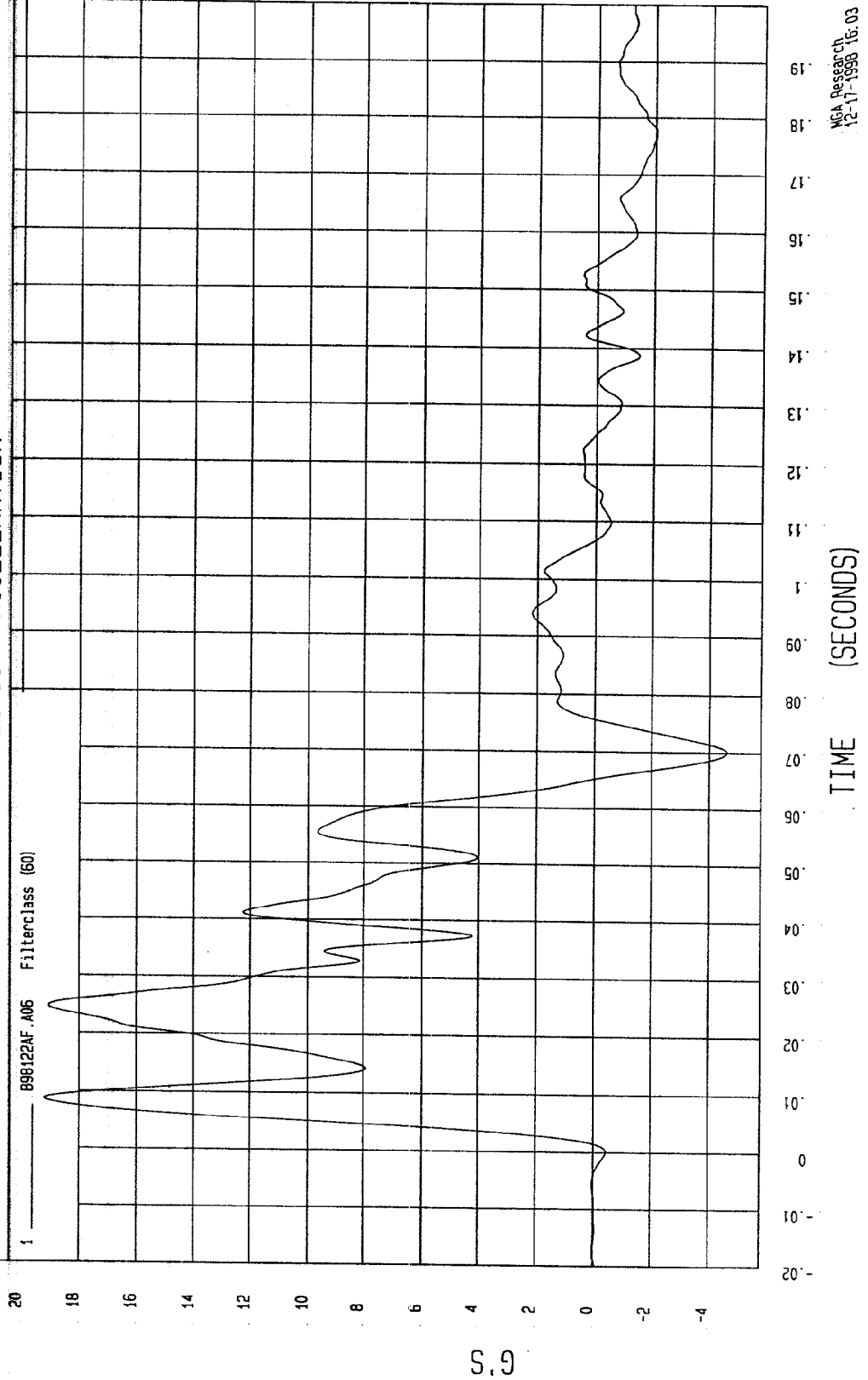
TIME Seconds

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.62 G's at 70 msec Maximum = 19.23 G's at 9 msec

VEHICLE CG Y ACCELERATION



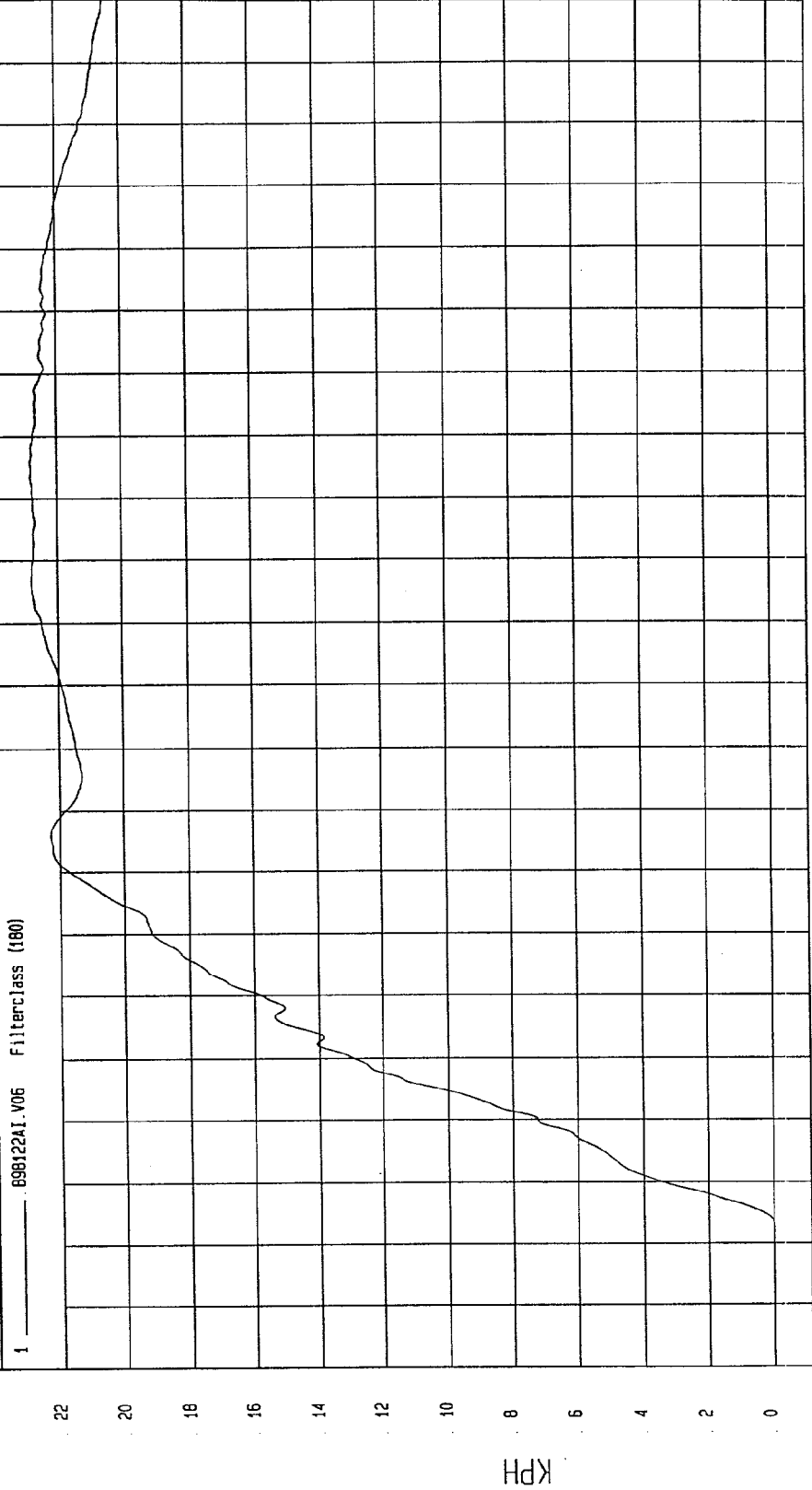
MCA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.23E-02 KPH at 2 msec Maximum = 22.82 KPH at 124 msec

VEHICLE CG Y VELOCITY



TIME Seconds

MGA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

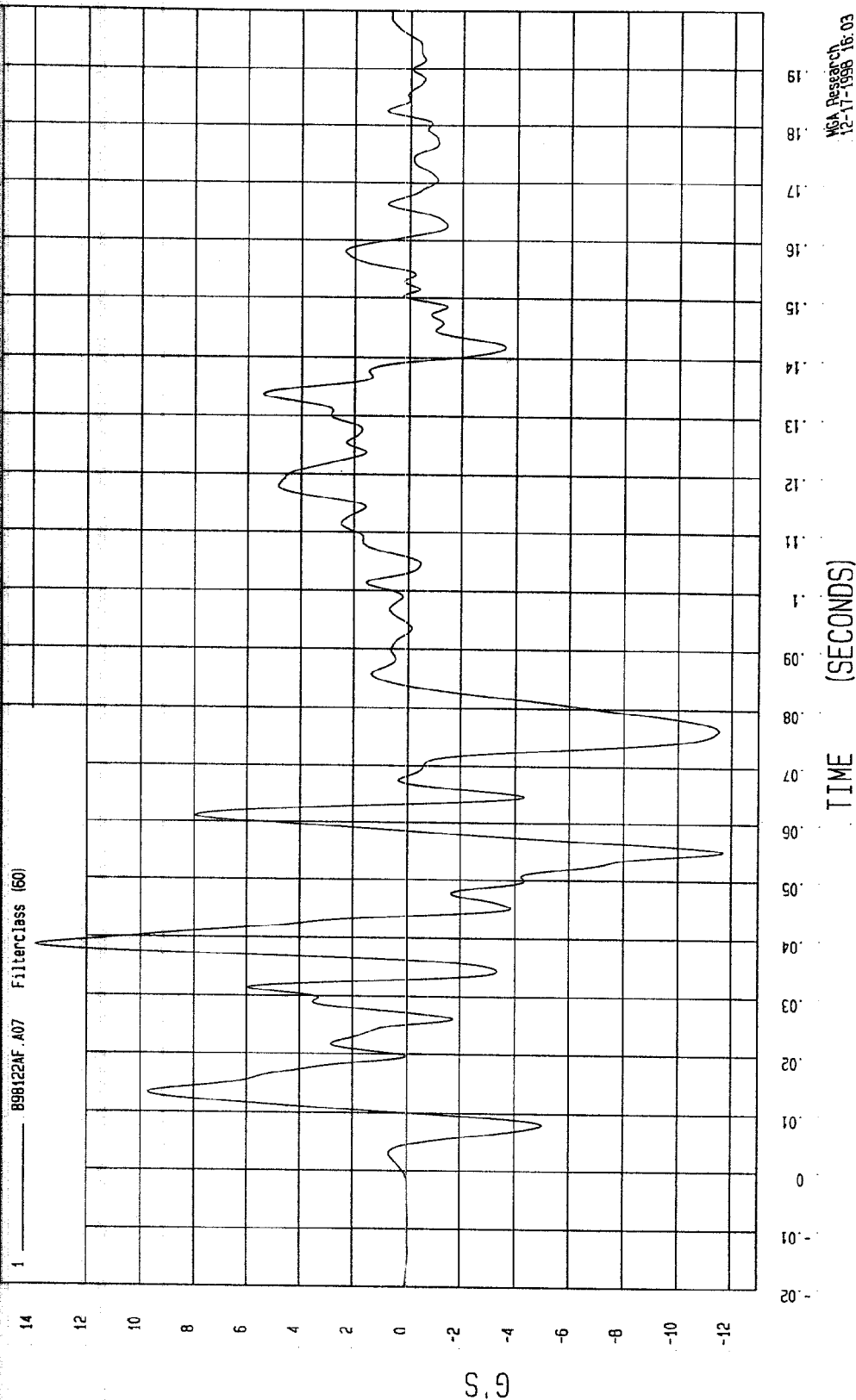
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Speed: 38.46 MPH 61.9 KPH

Minimum = -11.69 G'S at 55 msec

Maximum = 13.89 G'S at 38 msec

VEHICLE CG Z ACCELERATION

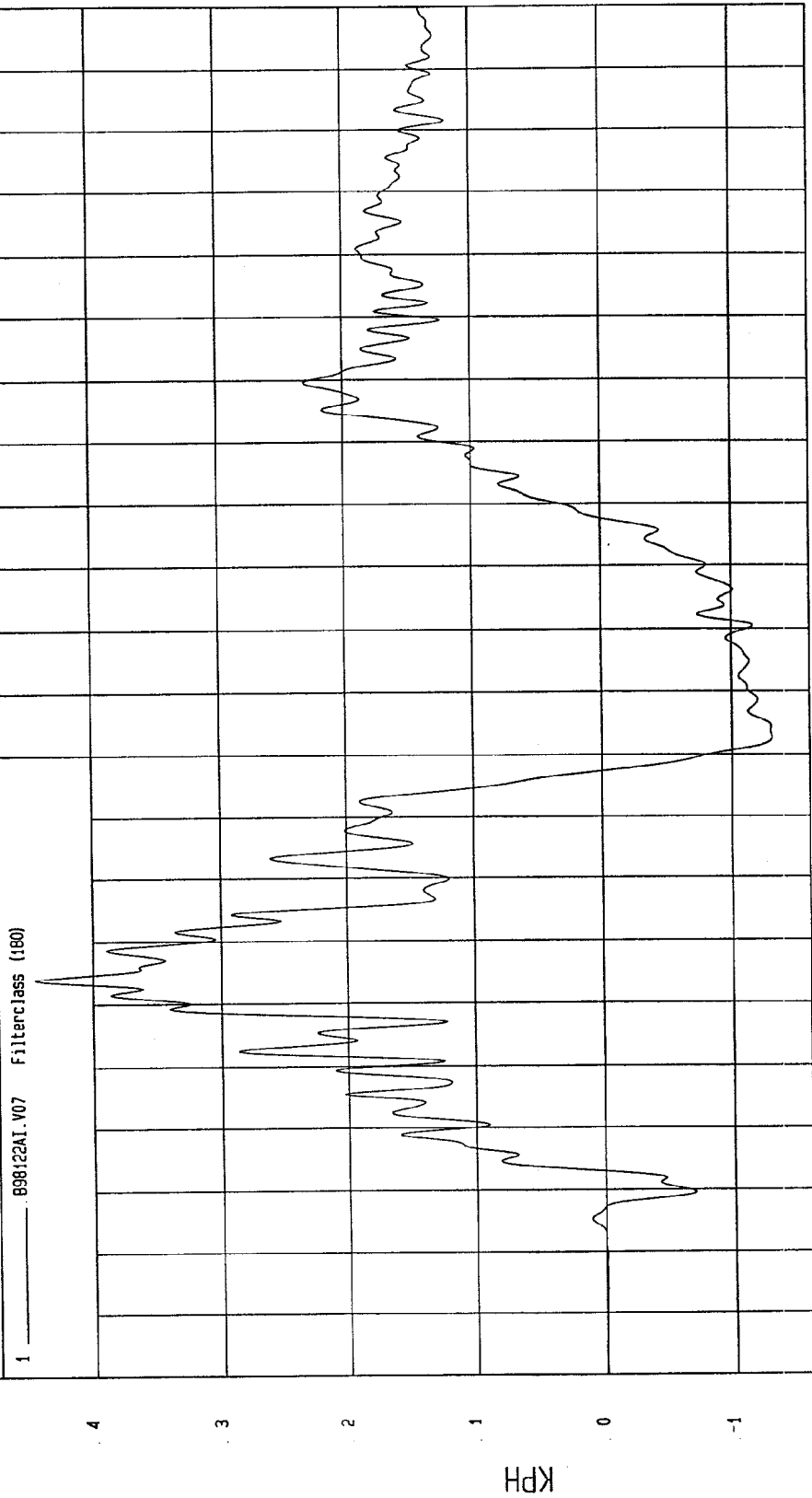


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.31 KPH at 83 msec Maximum = 4.45 KPH at 44 msec

VEHICLE CG Z VELOCITY



MGA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

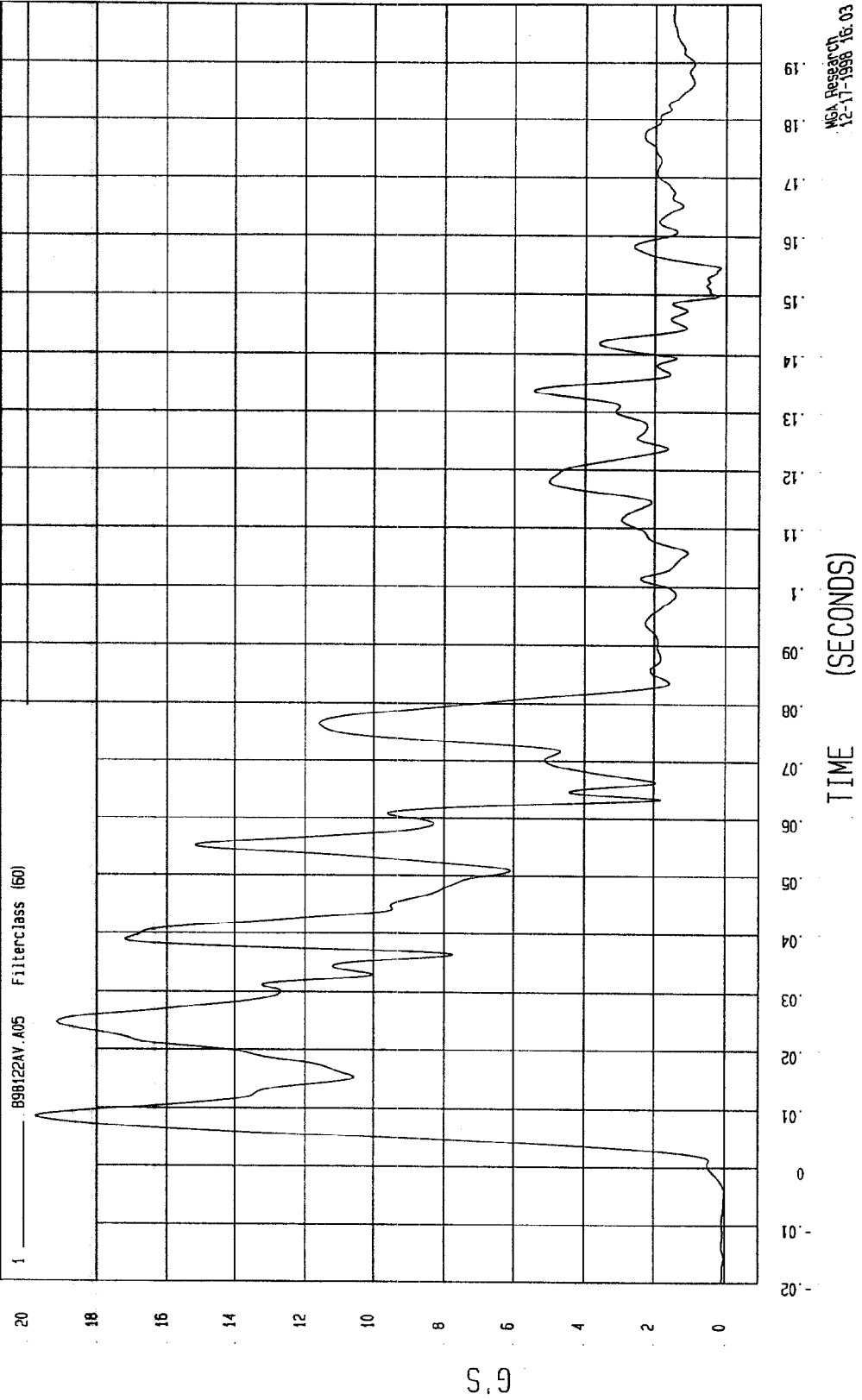
Speed: 38.46 MPH 61.9 KPH

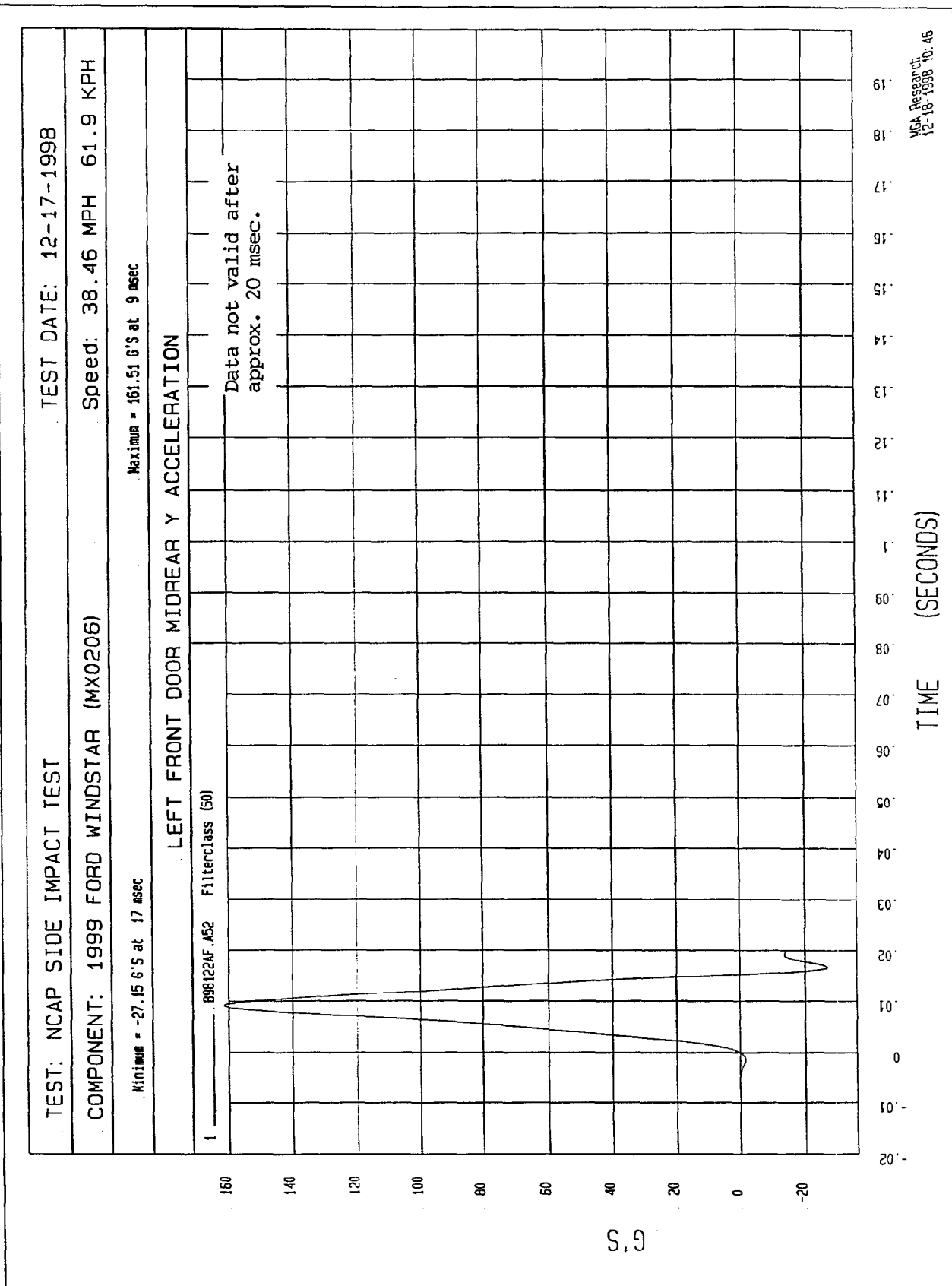
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 19.77 G's at 8 msec

Minimum = 1.63E-02 G's at -4 msec

VEHICLE CG RESULTANT ACCELERATION



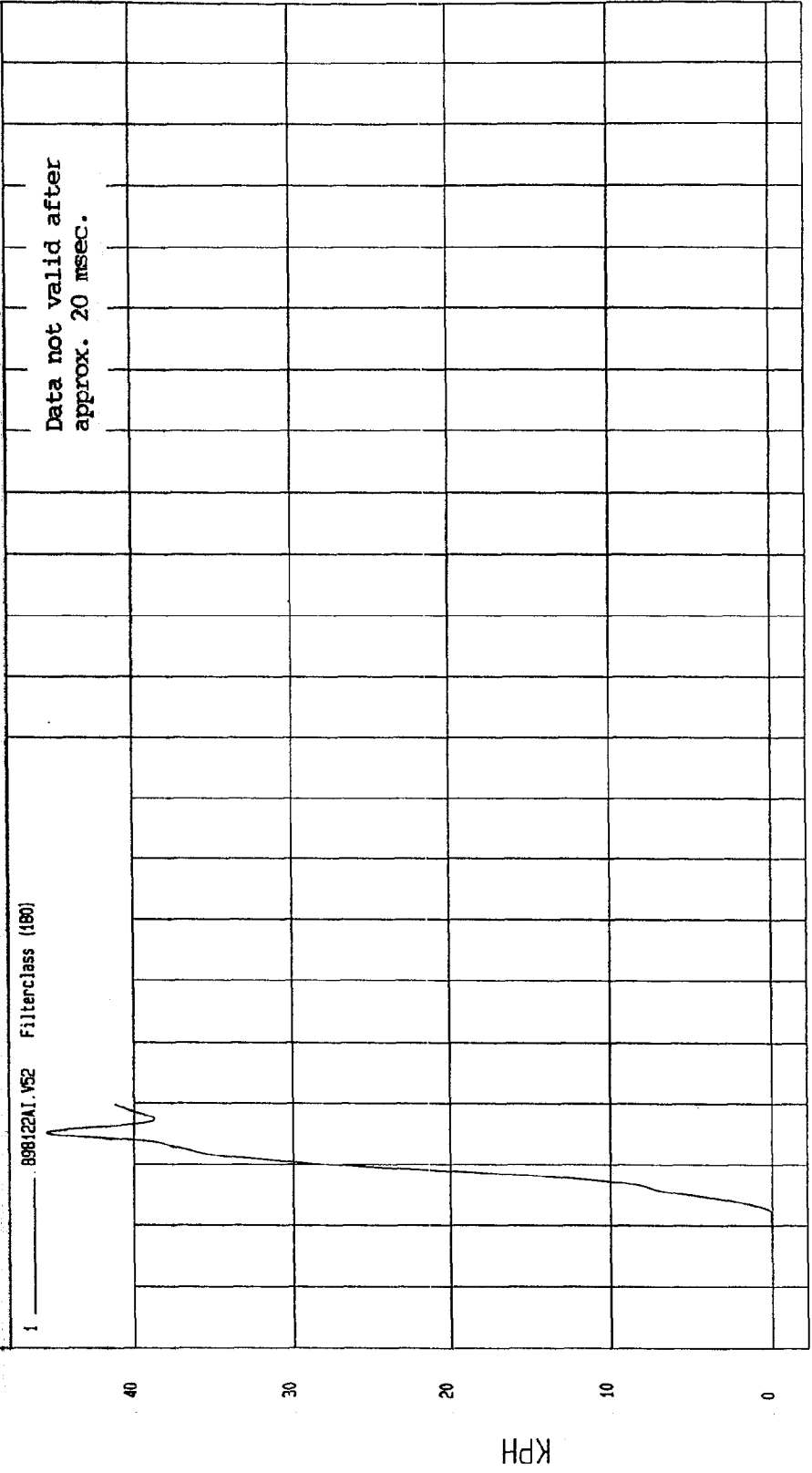


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4.43E-03 KPH at -8 msec Maximum = 45.49 KPH at 15 msec

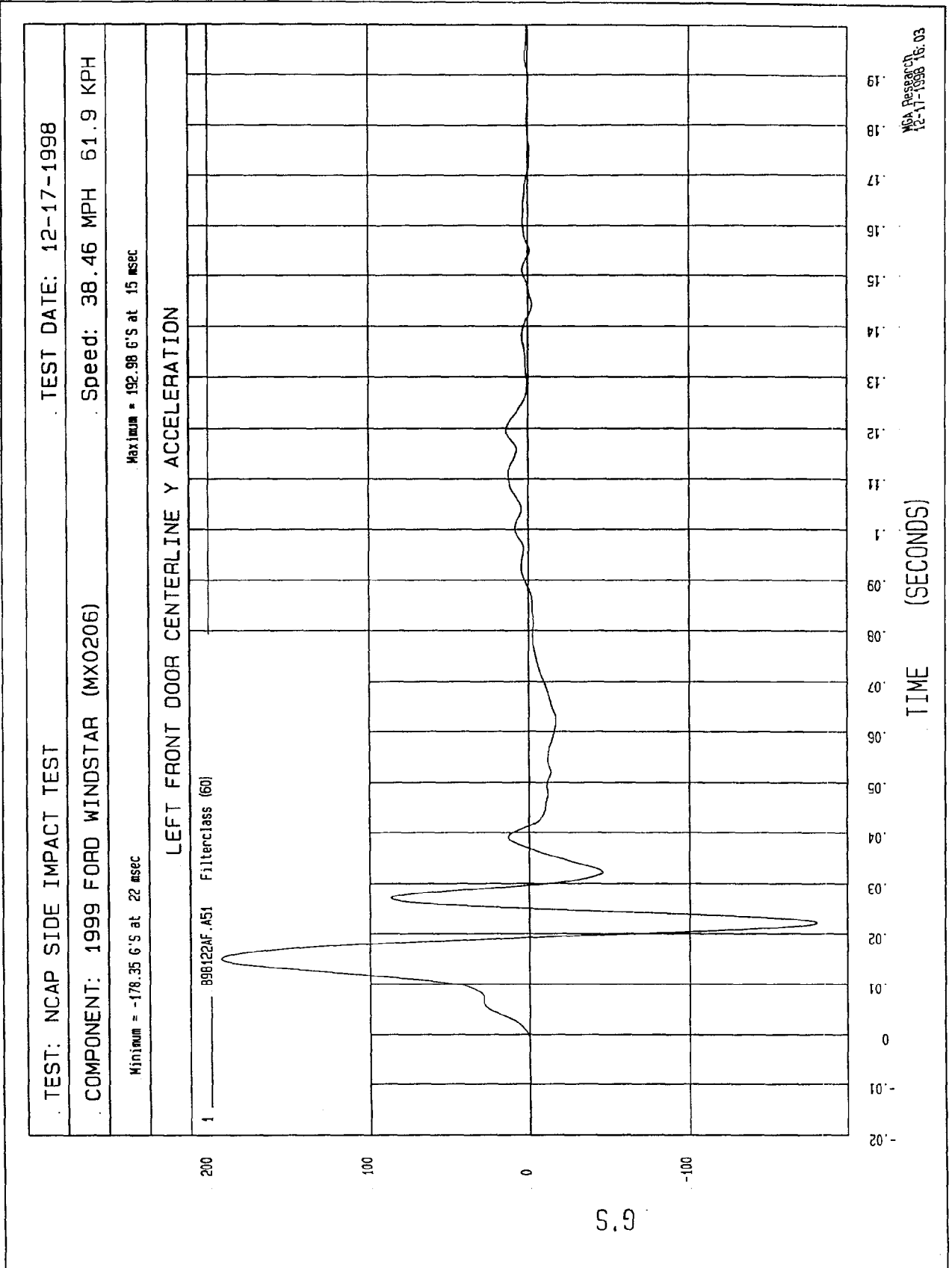
LEFT FRONT DOOR MIDREAR Y VELOCITY



TIME Seconds

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MCA Research
12-18-1998 10:46

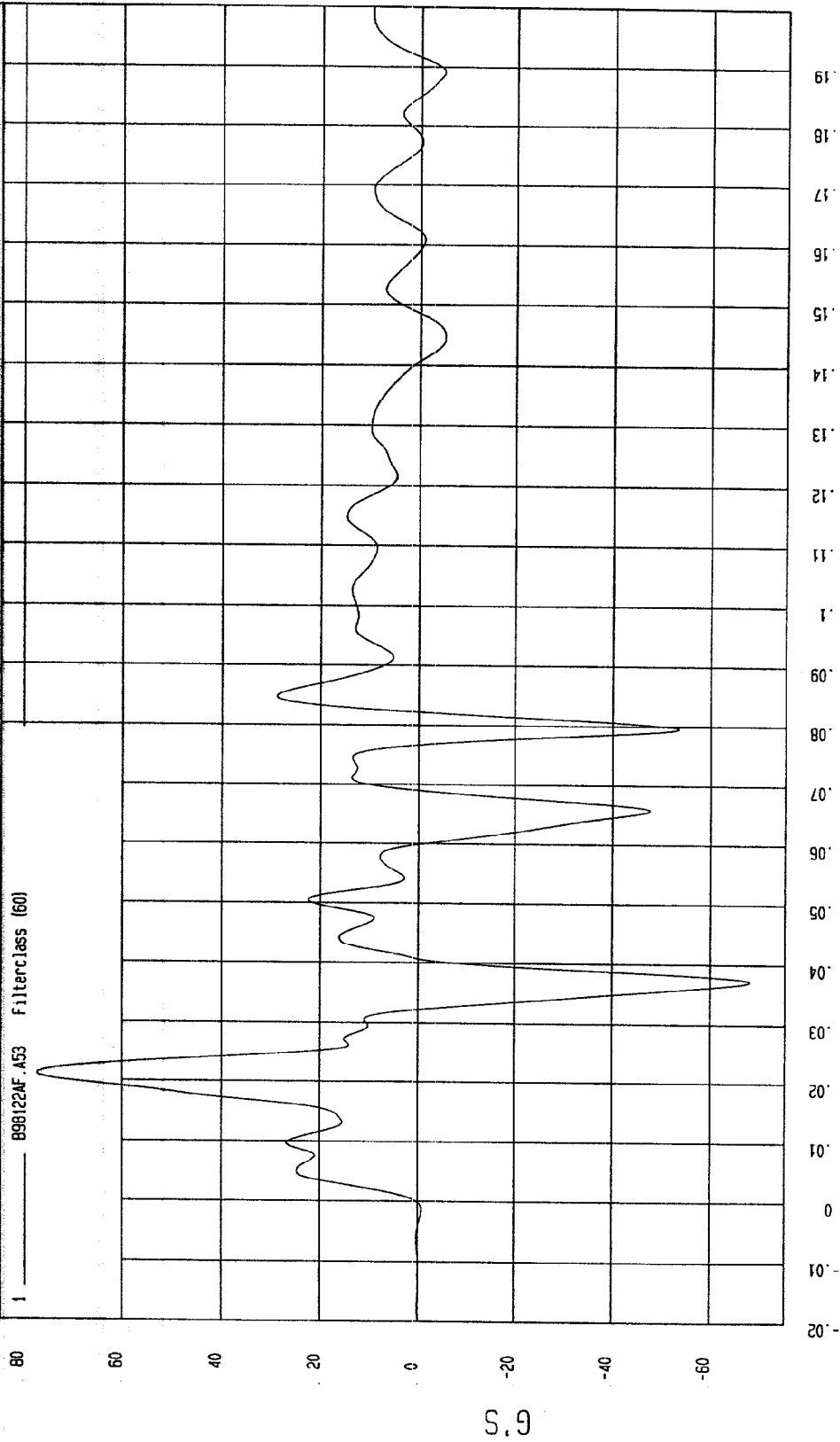


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -67.99 G'S at 37 msec Maximum = 77.27 G'S at 21 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION



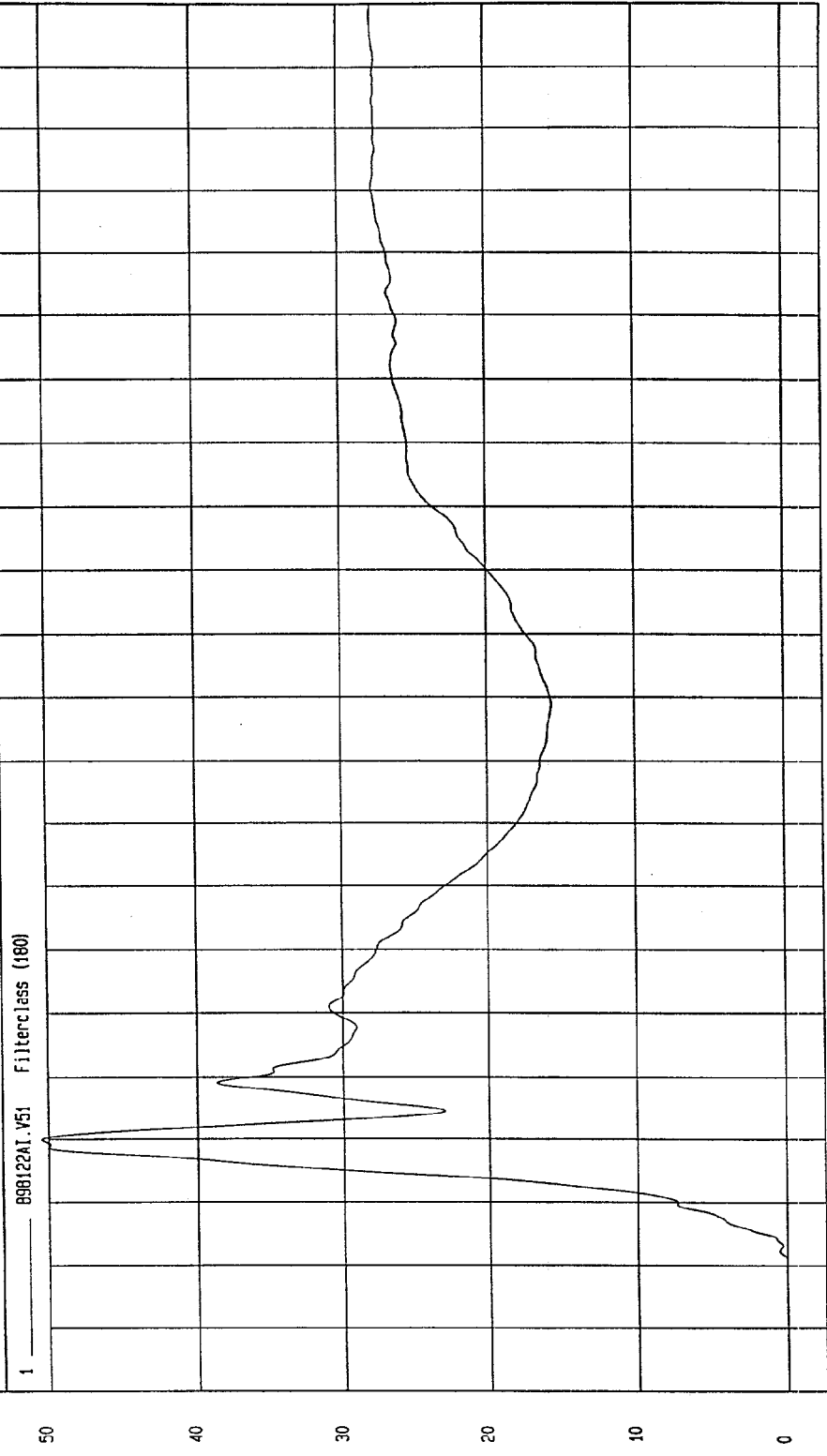
MEA Research
12-17-1998 15:04

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.45 MPH 61.9 KPH

Minimum = -02 KPH at -8 msec Maximum = 50.43 KPH at 20 msec

LEFT FRONT DOOR CENTERLINE Y VELOCITY



TIME Seconds

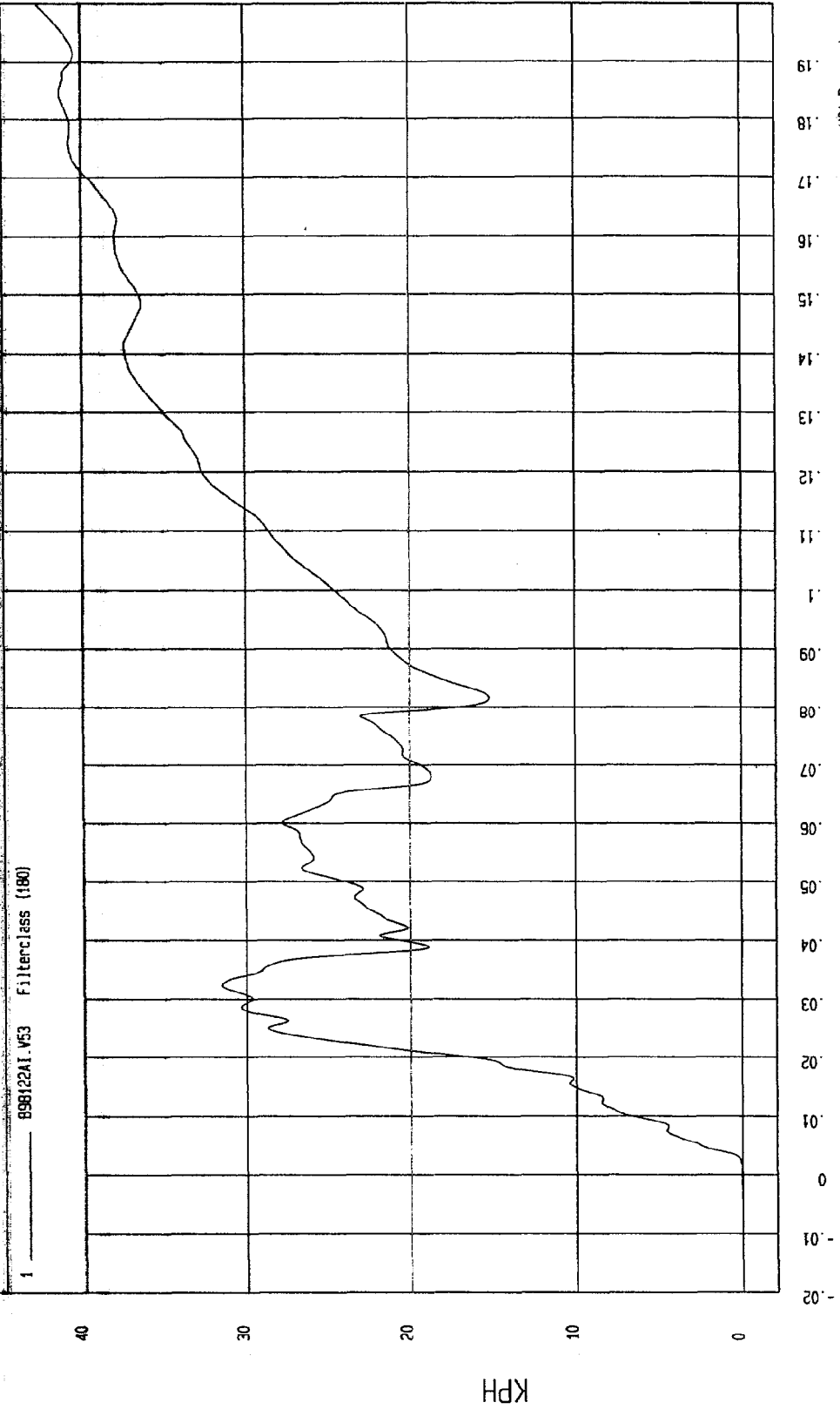
MGA Research
12-17-1998 16:03

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 42.67 KPH at 200 msec

LEFT FRONT DOOR UPPER CENTERLINE Y VELOCITY



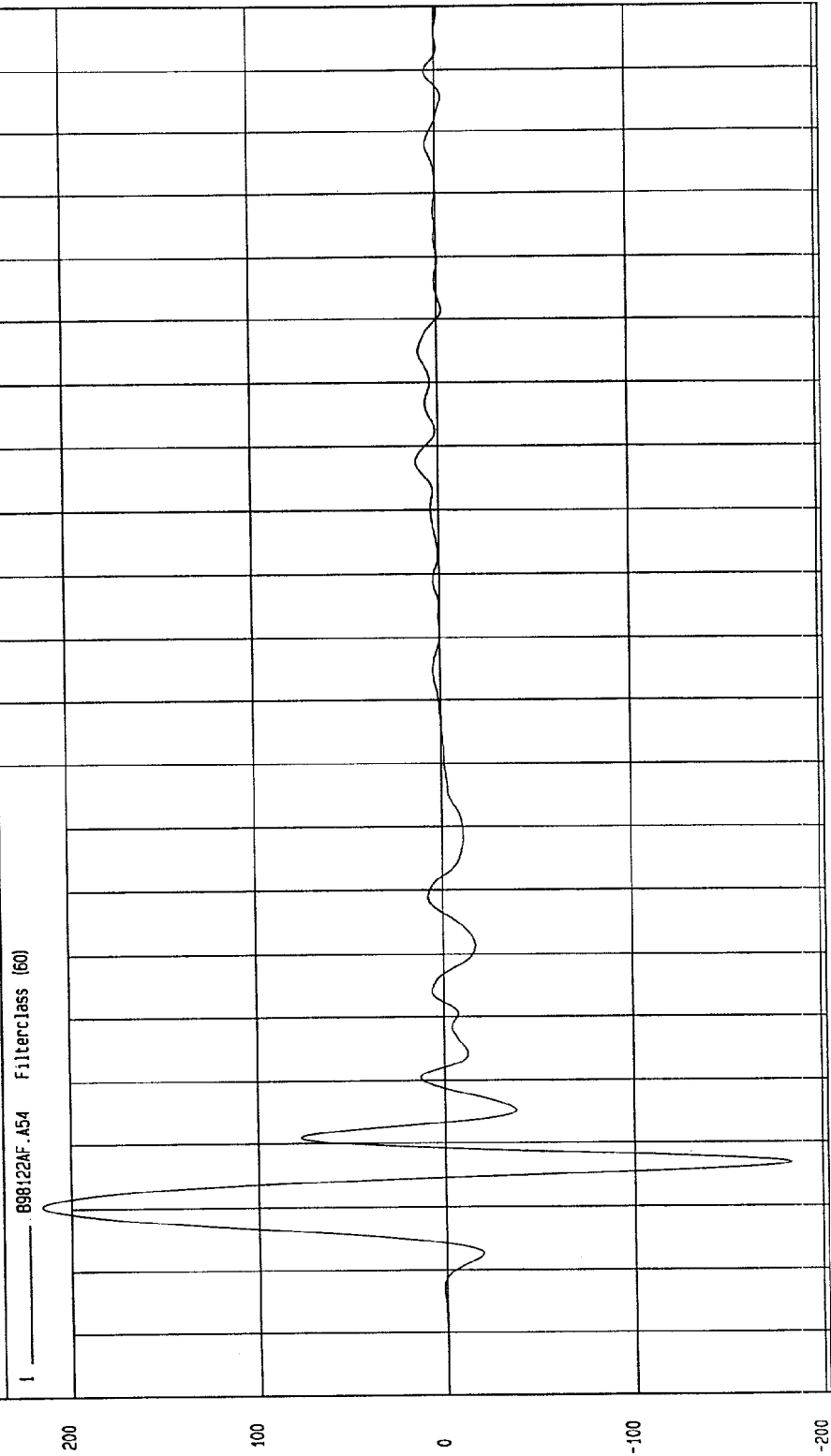
MCA Research
12-17-1998 16:04

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -182.89 G'S at 17 msec Maximum = 215.33 G'S at 10 msec

LEFT REAR DOOR MIDREAR Y ACCELERATION



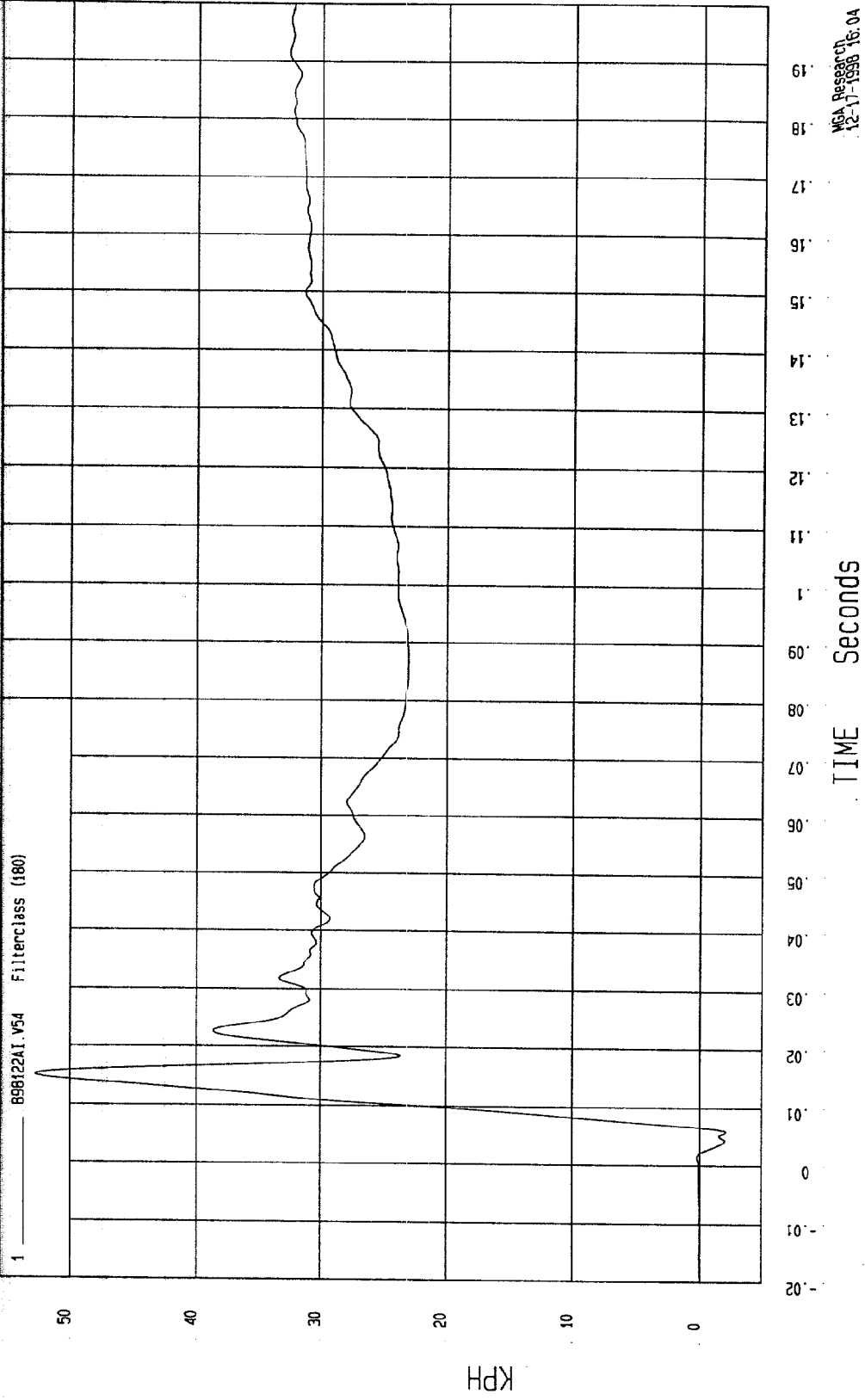
WGA Research
12-17-1998 16:04

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.1 KPH at 6 msec Maximum = 52.76 KPH at 15 msec

LEFT REAR DOOR MIDREAR Y VELOCITY

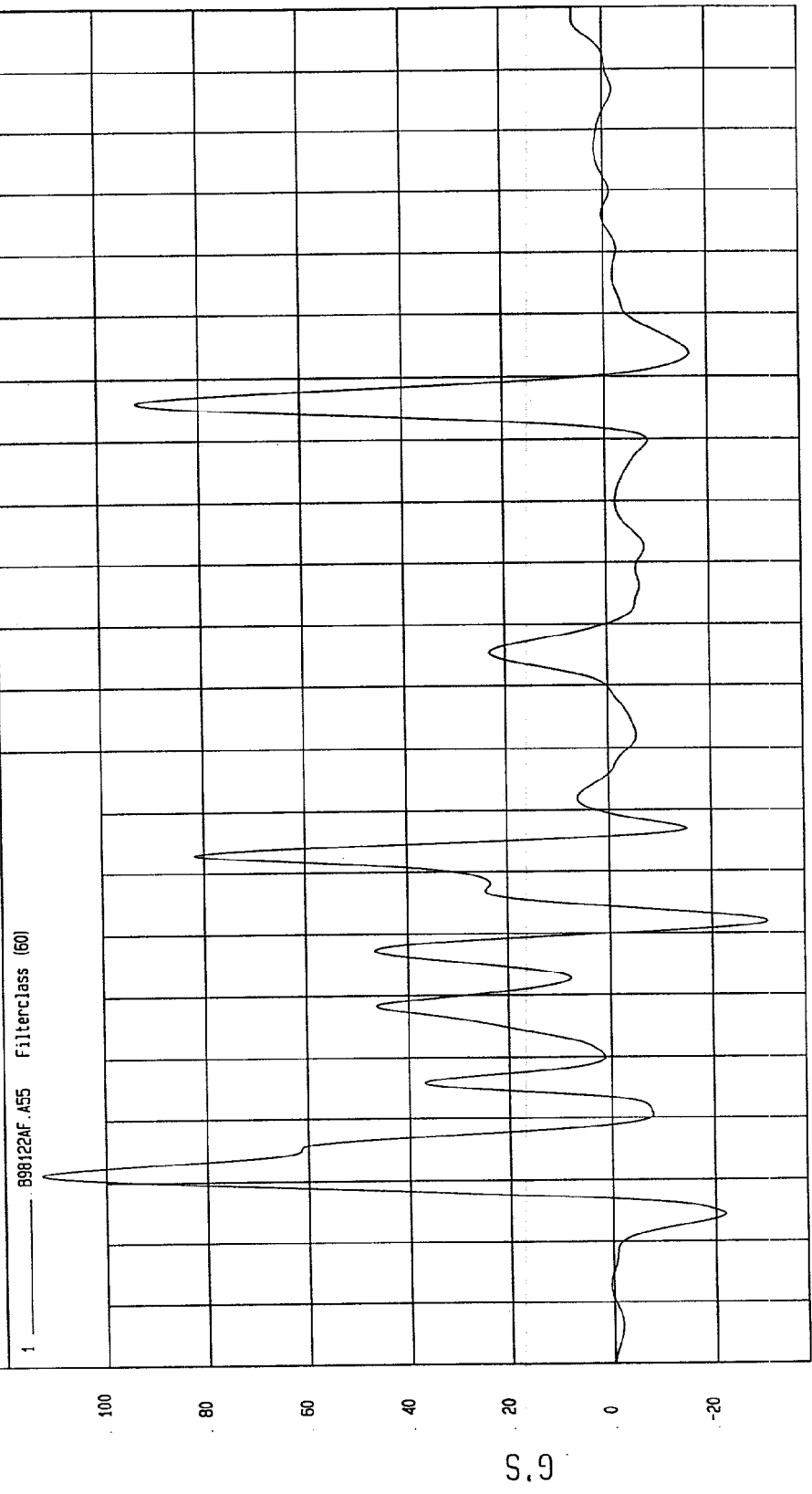


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -31.1 G'S at 52 msec Maximum = 112.47 G'S at 11 msec

LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION



WCA Research
12-17-1998 16.04

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206)

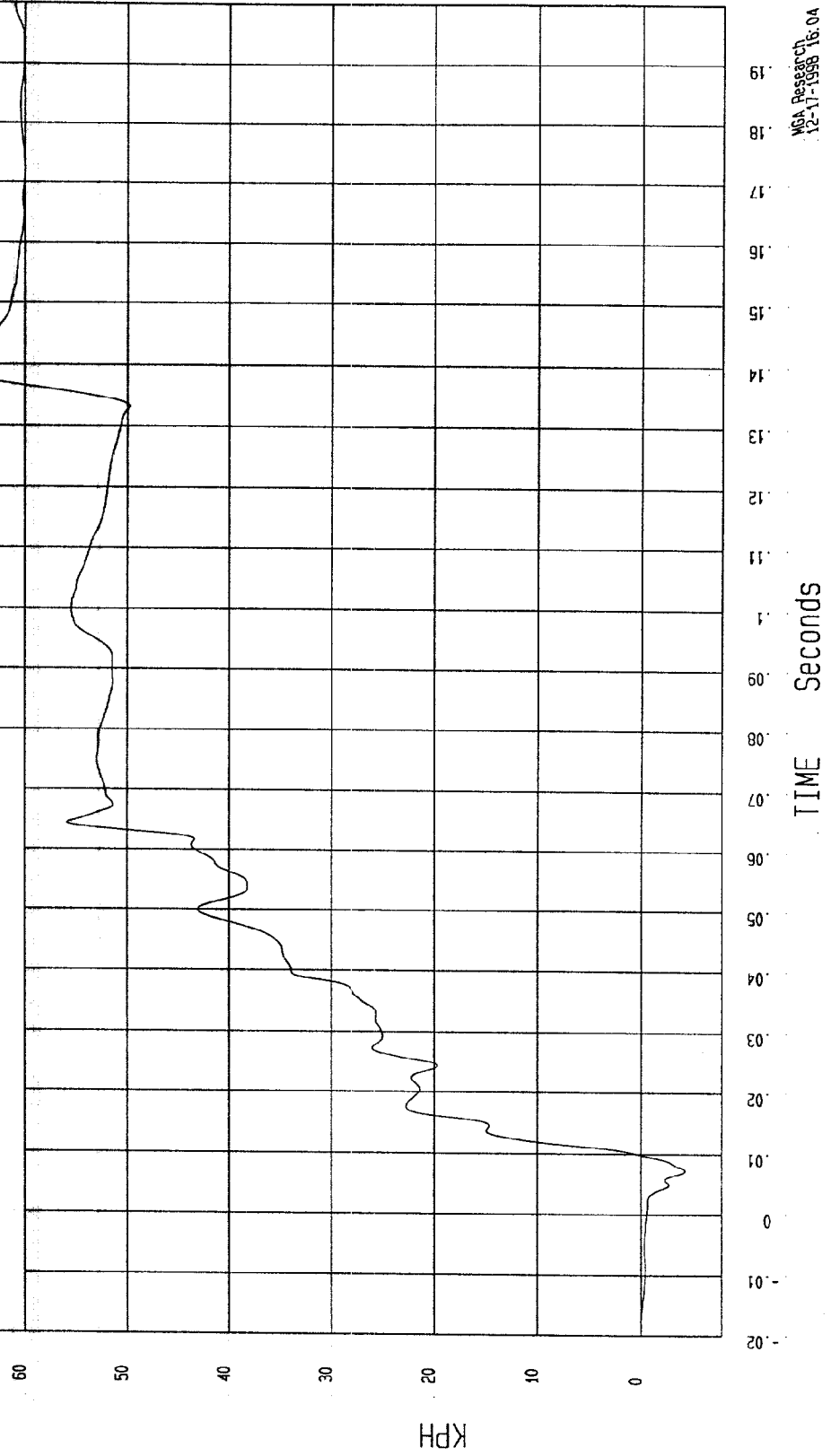
Speed: 38.46 MPH 61.9 KPH

Minimum = -4.36 KPH at 7 msec

Maximum = 65.27 KPH at 139 msec

LEFT REAR DOOR UPPER CENTERLINE Y VELOCITY

1 898122A1.V55 Filterclass (100)



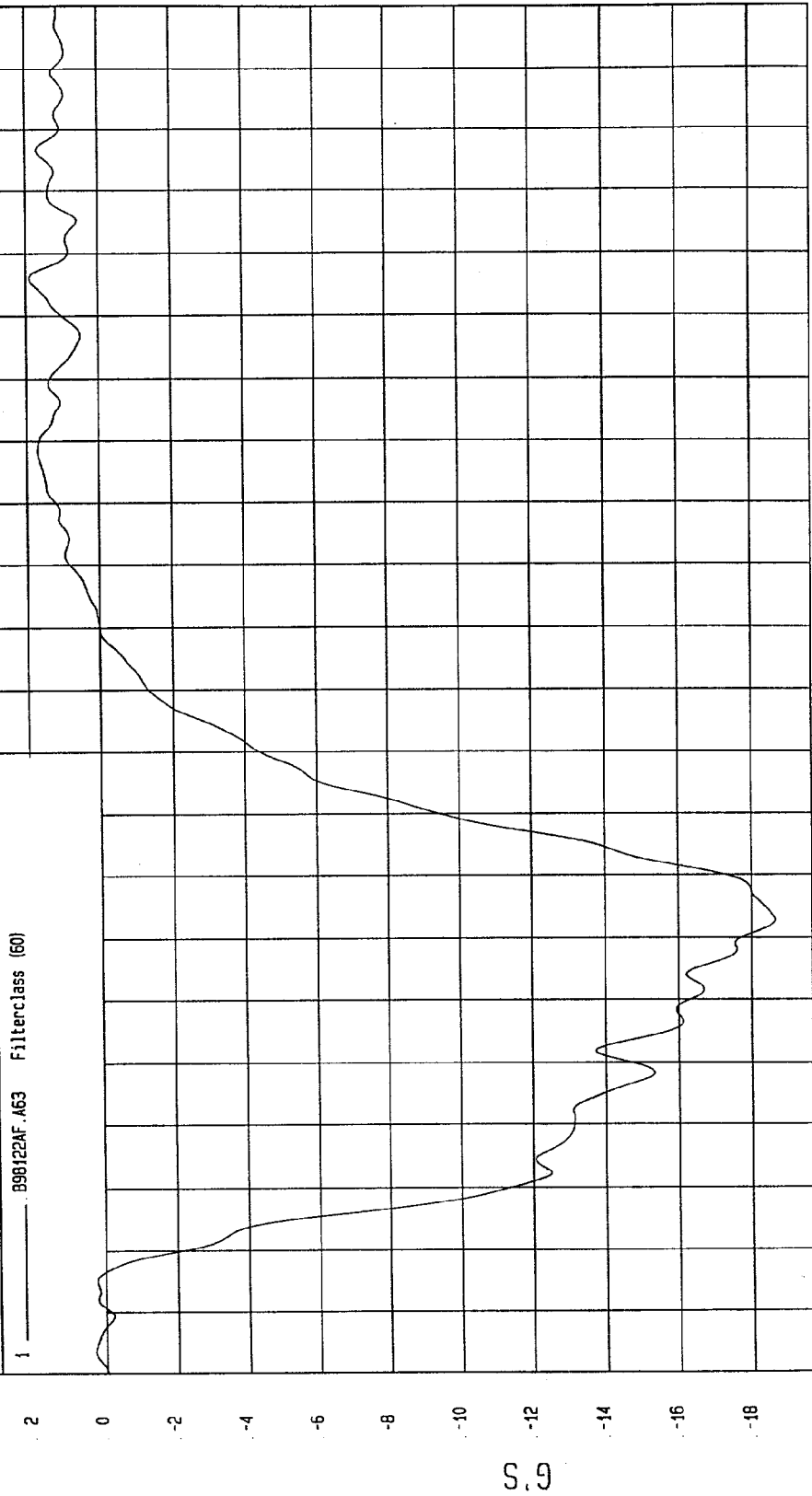
MCA Research
12-17-1998 16.04

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -18.66 G's at 53 msec Maximum = 1.9 G's at 156 msec

MOVING BARRIER CG X ACCELERATION



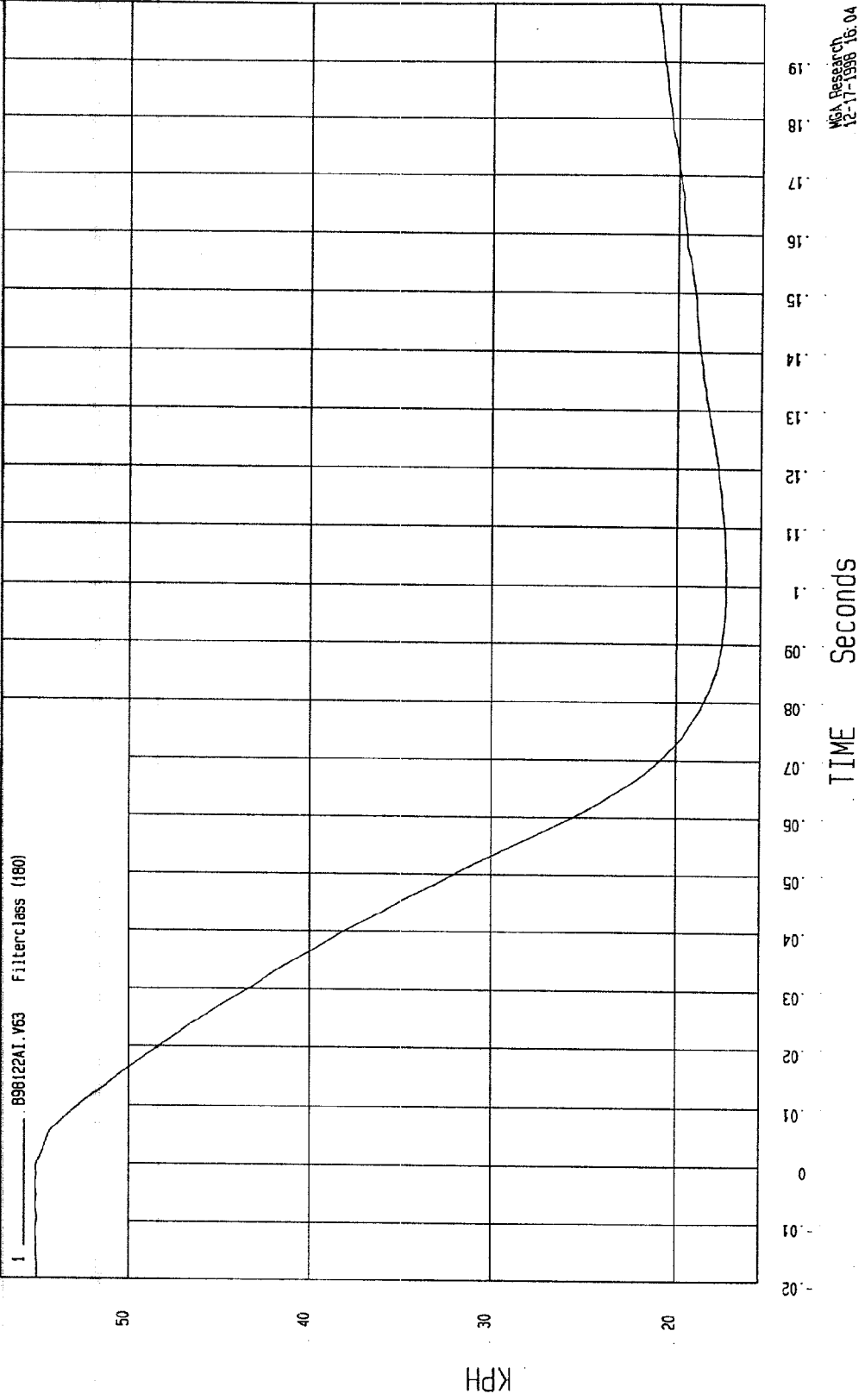
WCA Research
12-17-1998 16:04

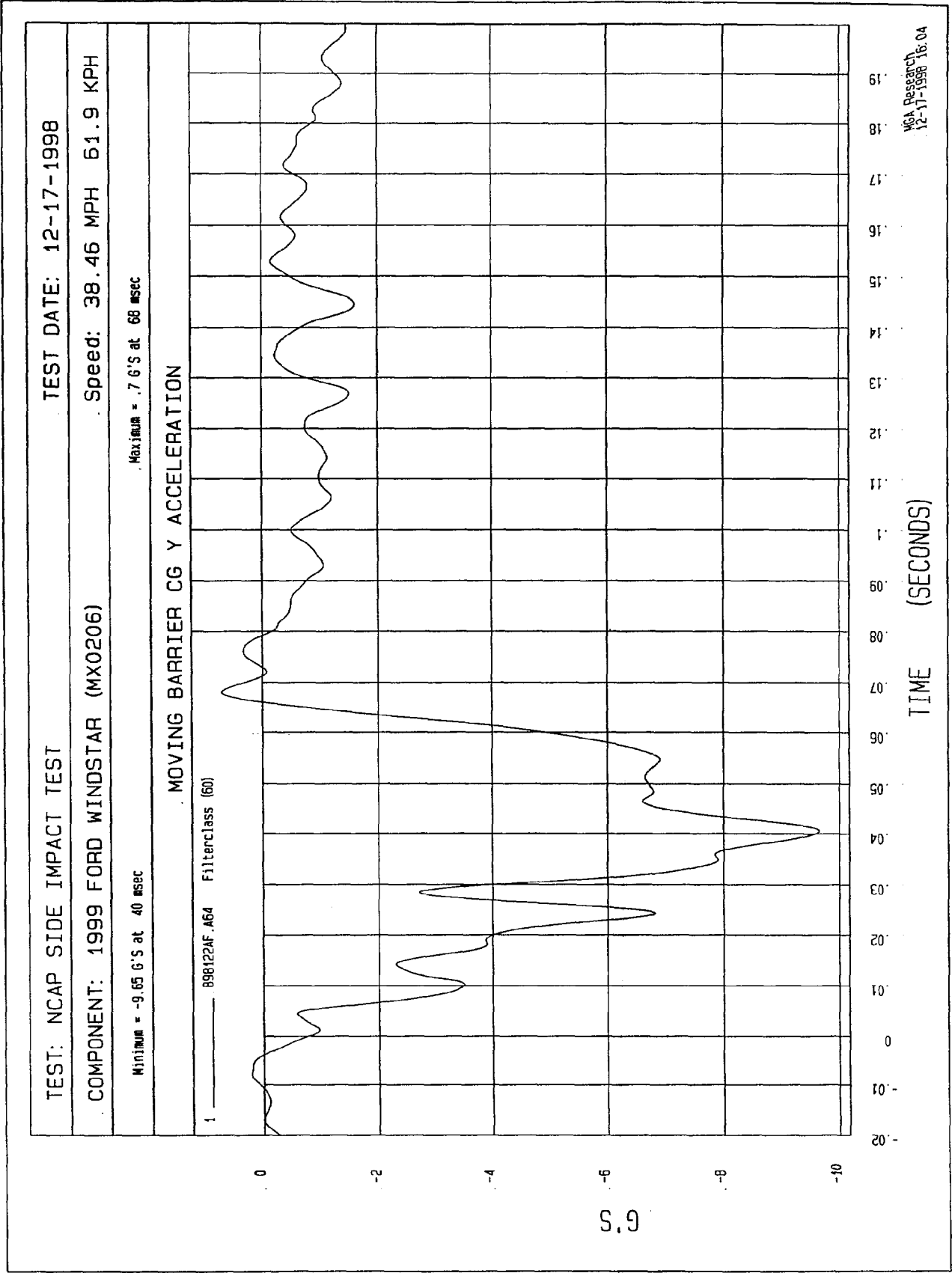
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 17.32 KPH at 101 msec Maximum = 55.07 KPH at -4 msec

MOVING BARRIER CG X VELOCITY



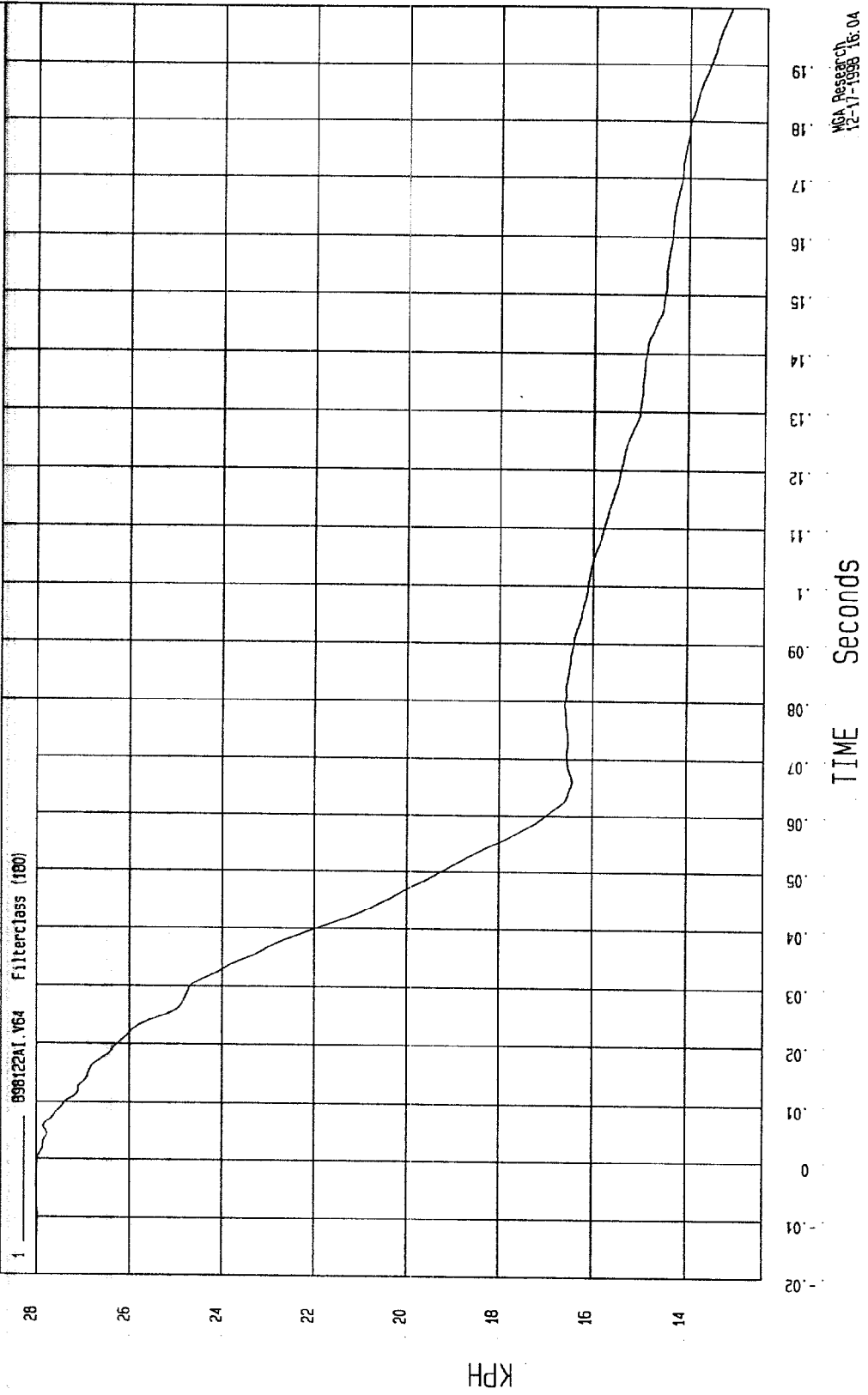


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 13.12 KPH at 200 msec Maximum = 28.02 KPH at -4 msec

MOVING BARRIER CG Y VELOCITY

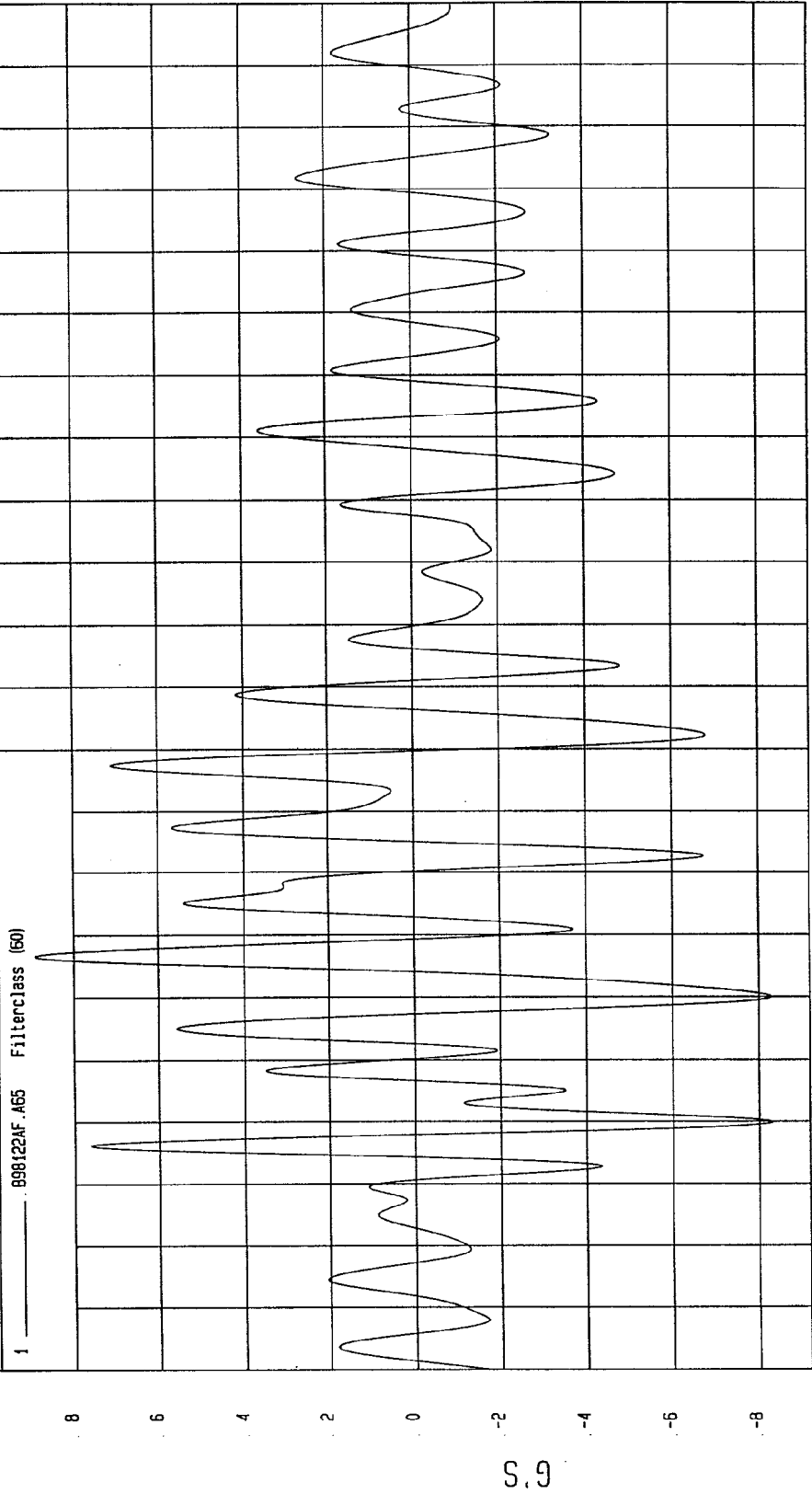


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

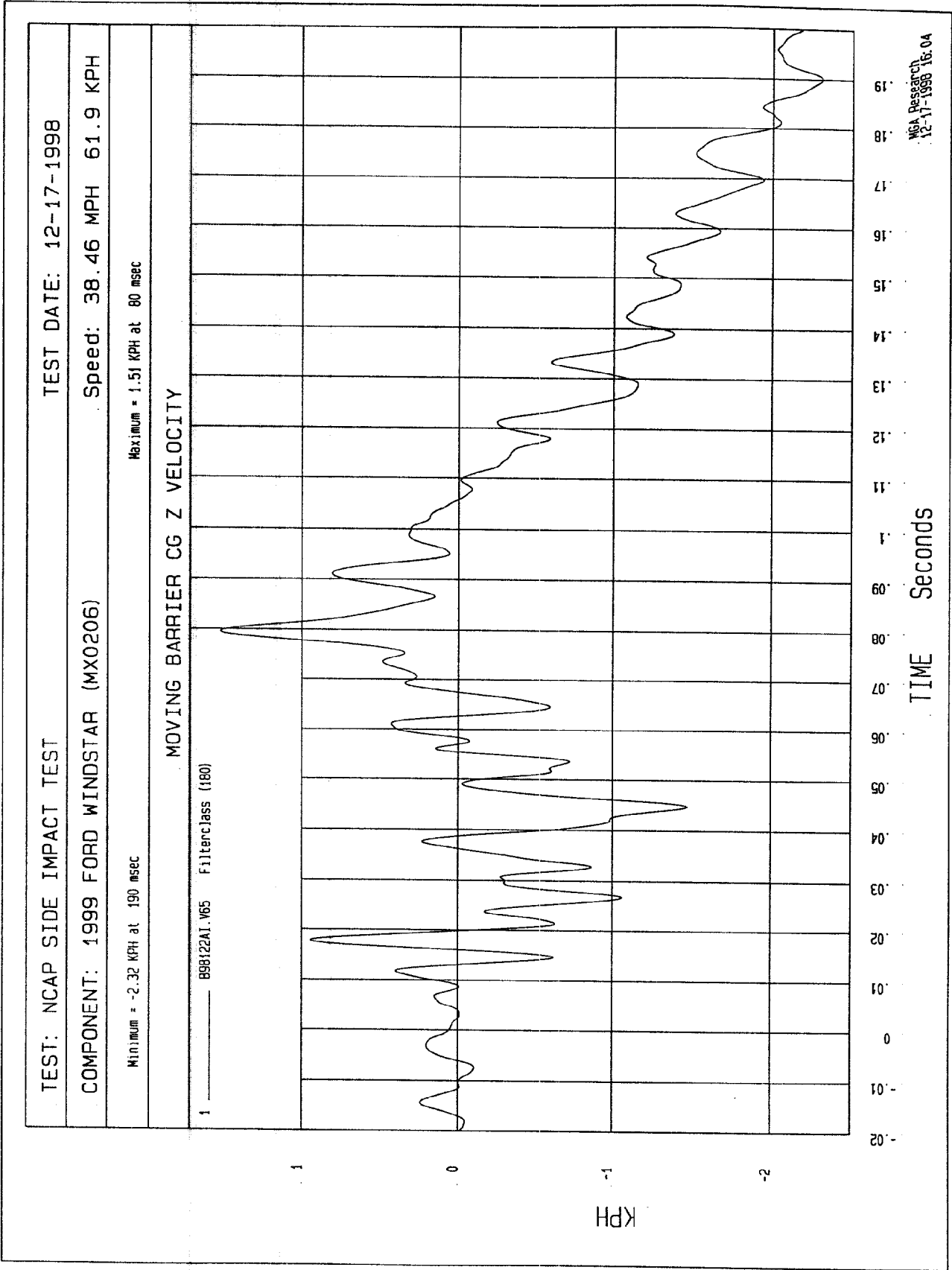
COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

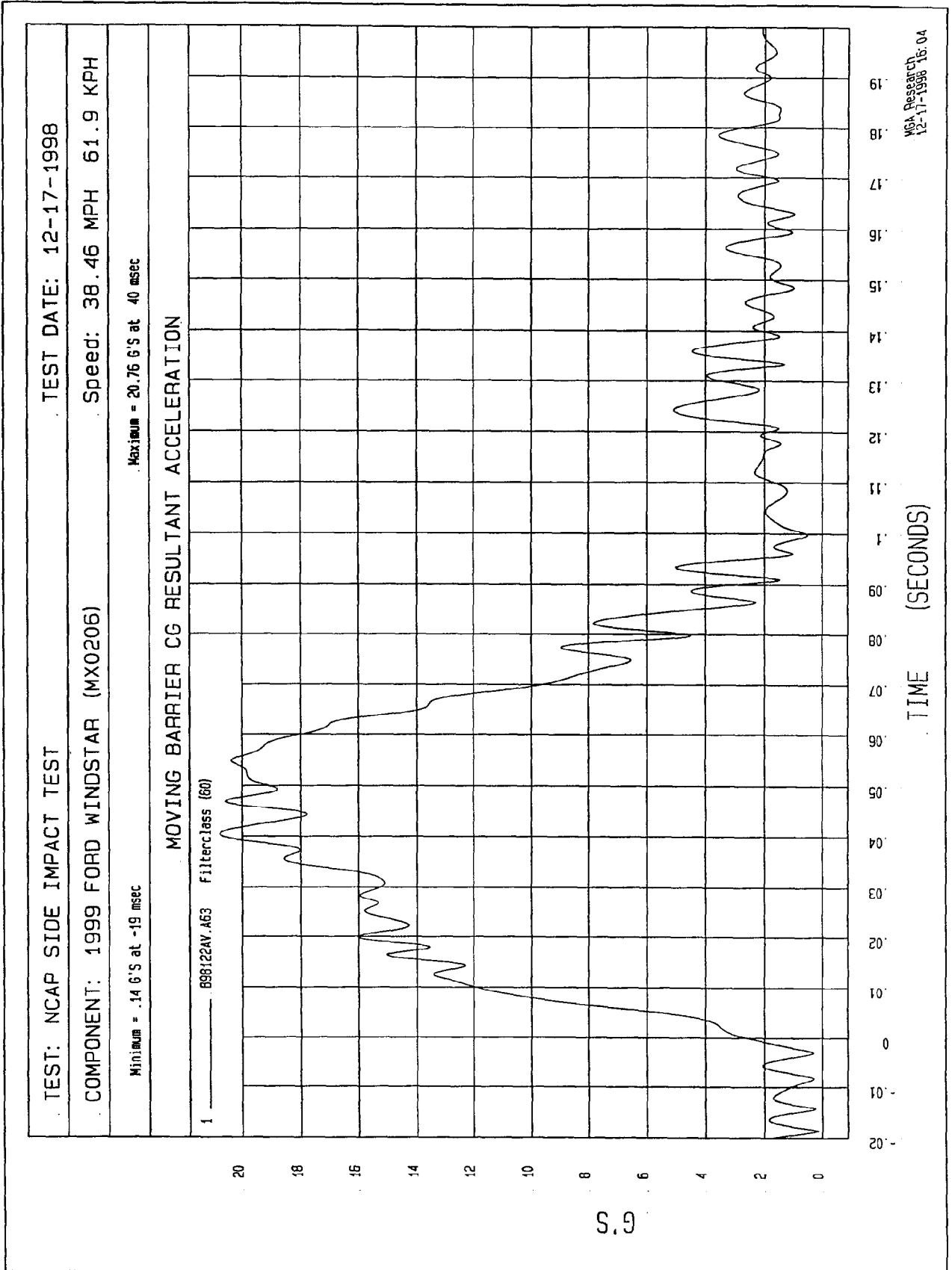
Minimum = -0.32 G'S at 20 msec Maximum = 8.89 G'S at 47 msec

MOVING BARRIER CG Z ACCELERATION



MSA Research
12-17-1998 16:04



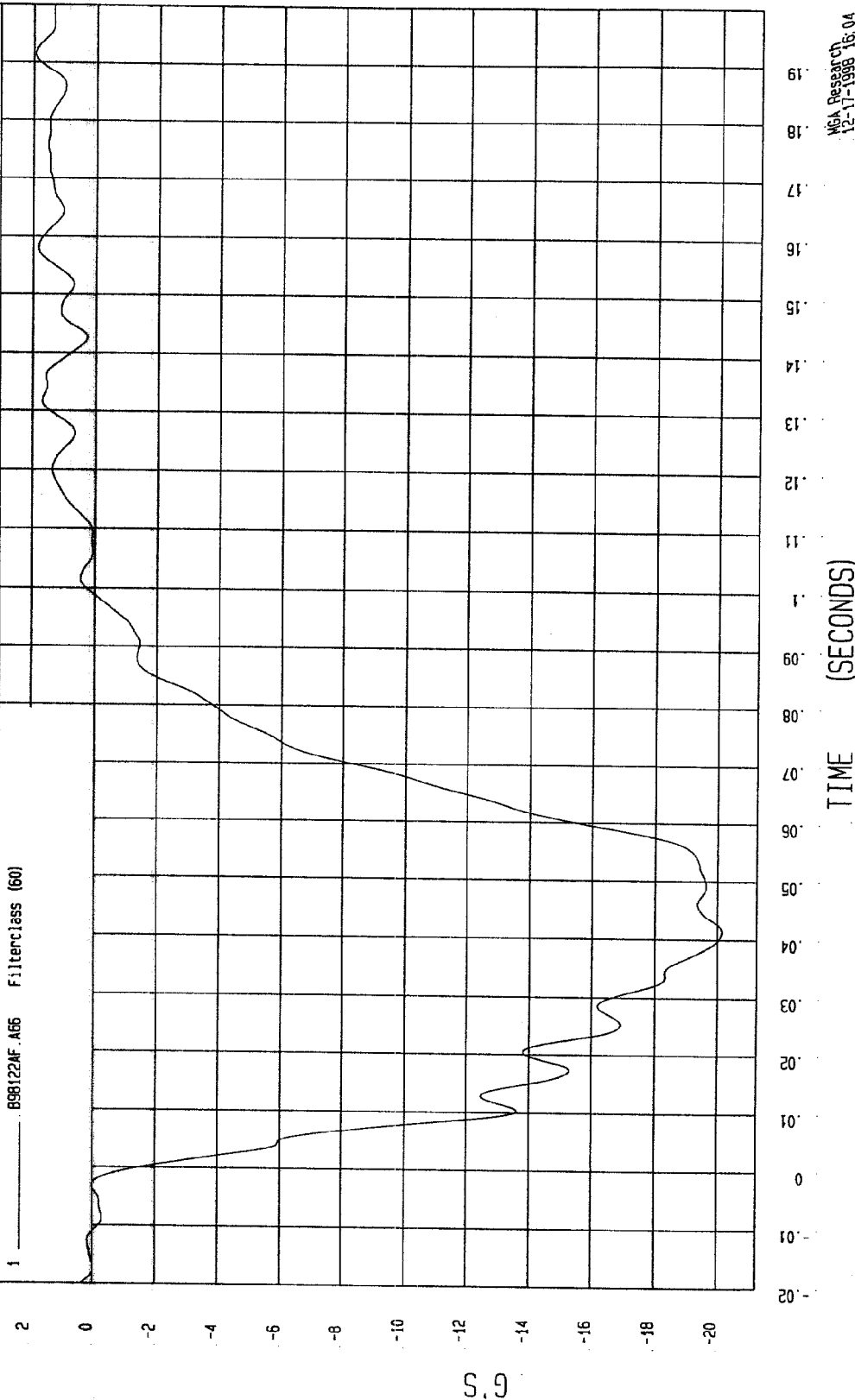


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -20.13 G'S at 41 msec Maximum = 1.92 G'S at 192 msec

MOVING BARRIER REAR AXLE X ACCELERATION



MEA Research
12-17-1998 16:04

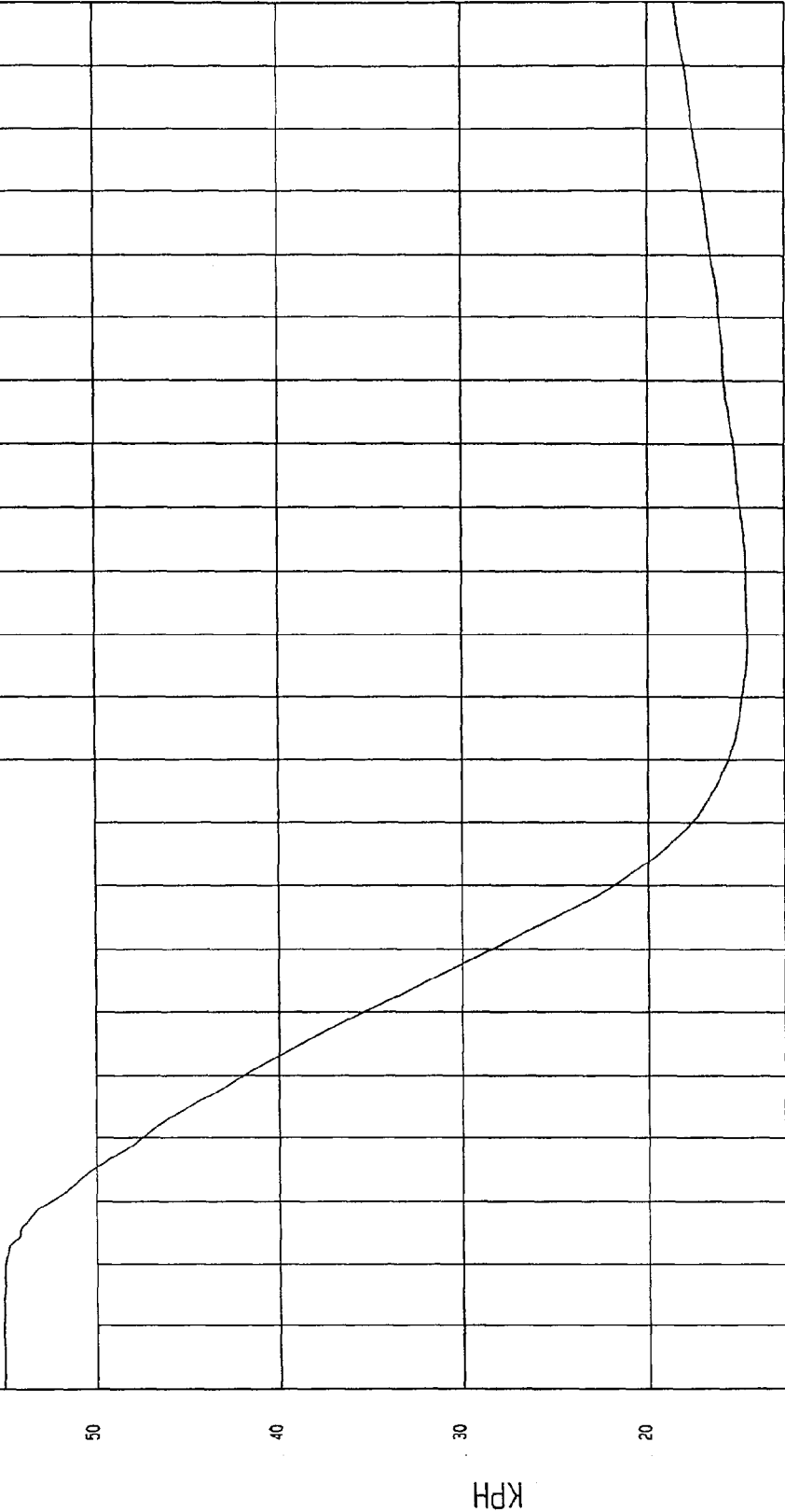
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 14.66 KPH at 100 msec Maximum = 55.03 KPH at -11 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 B98122A1.V65 Filterclass (180)



TIME Seconds

MOA Research
12-17-1998 16:04

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

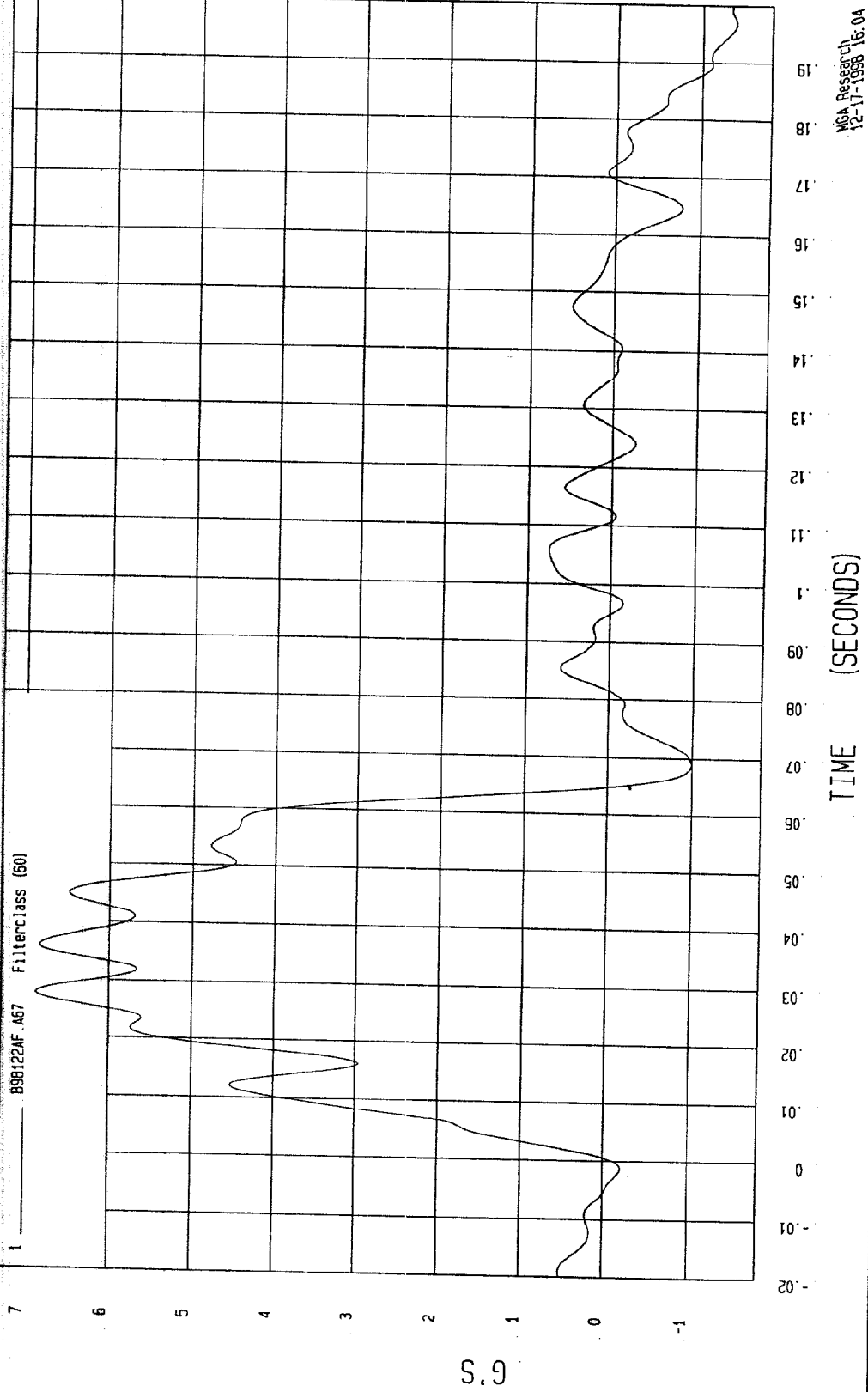
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Speed: 38.46 MPH 61.9 KPH

Minimum = -1.4 G'S at 197 msec

Maximum = 6.87 G'S at 28 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

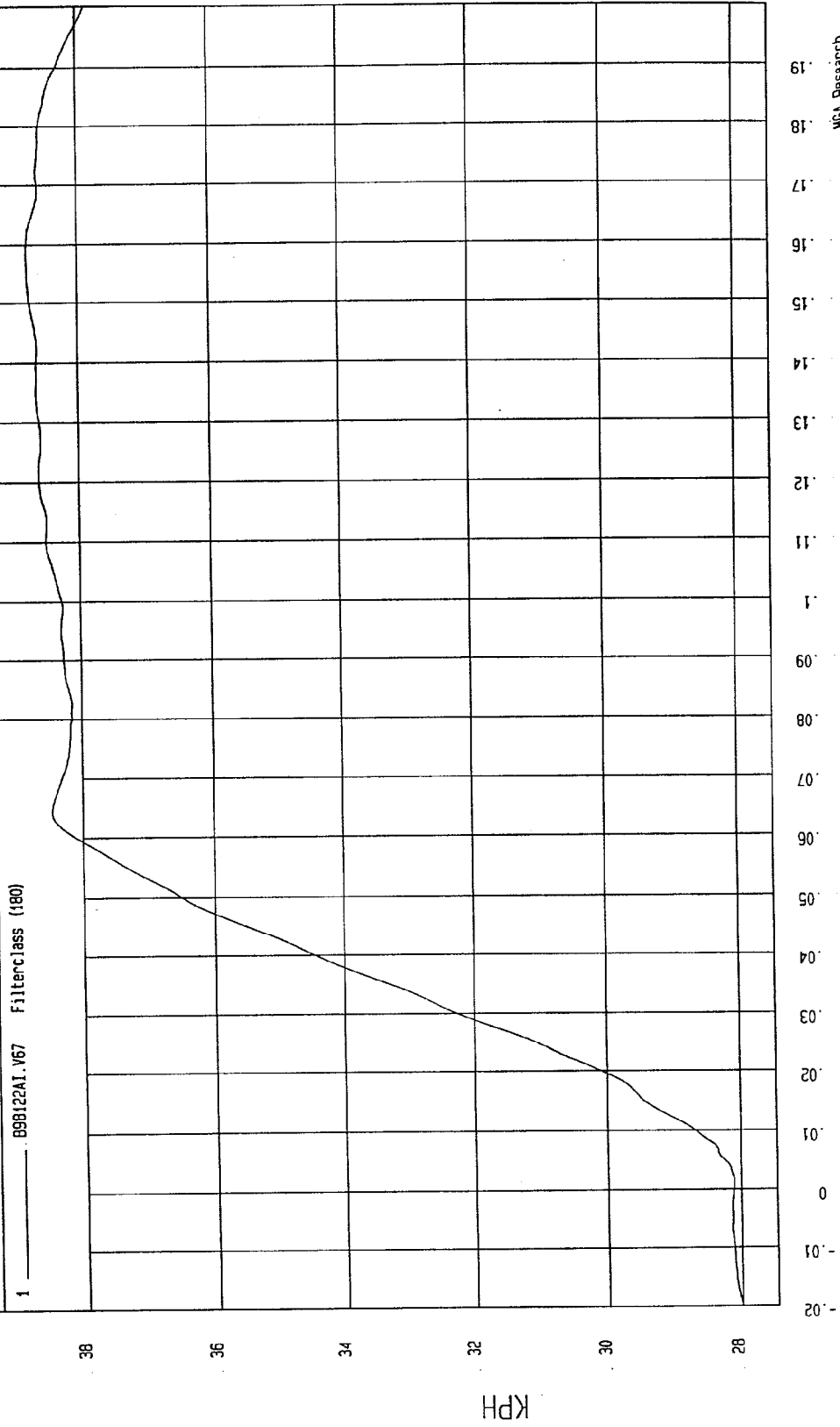


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 28 KPH at -20 msec Maximum = 38.76 KPH at 159 msec

MOVING BARRIER REAR AXLE Y VELOCITY



MOA Research
12-17-1998 16:04

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

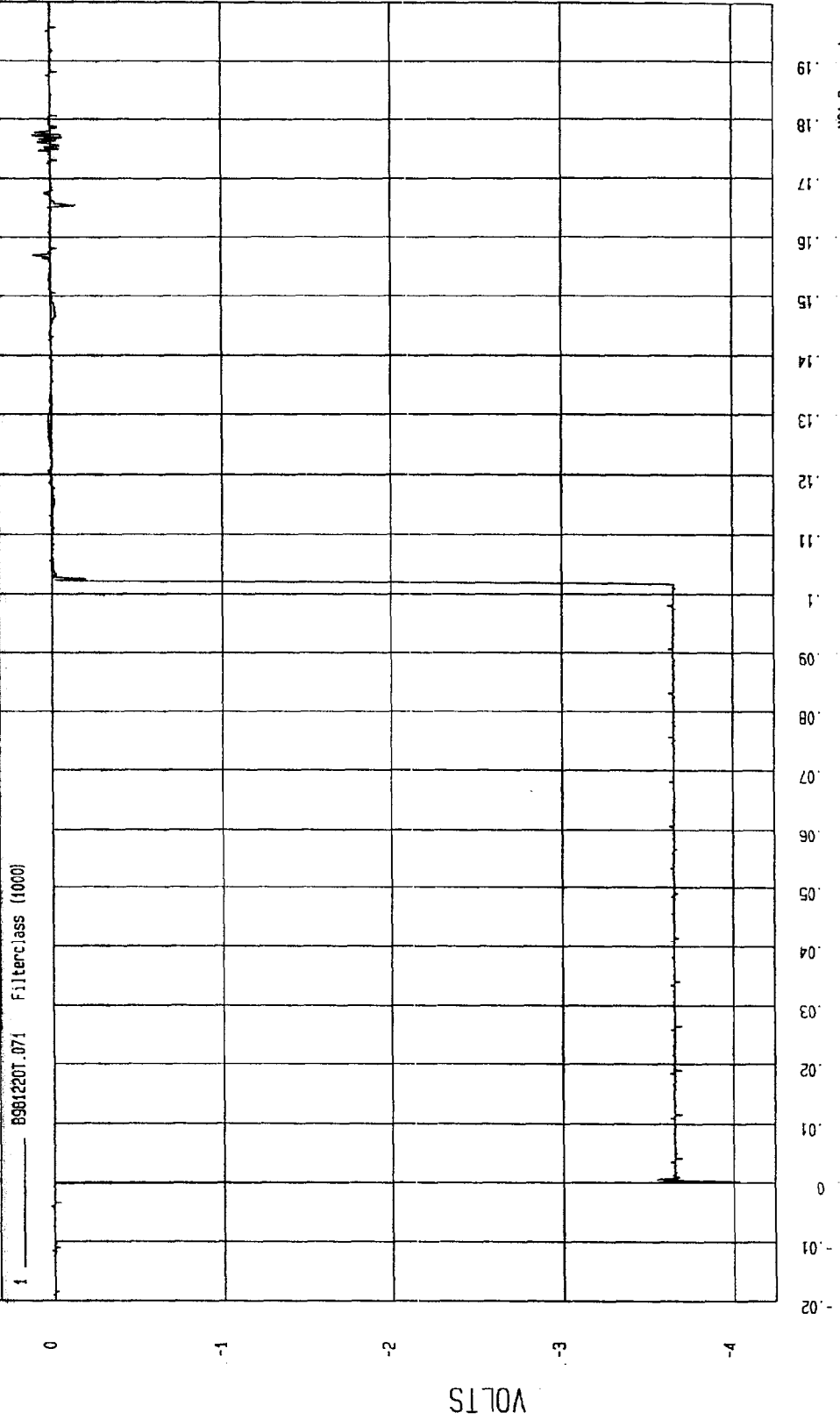
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Minimum = -4.03 VOLTS at 0 msec

Maximum = .11 VOLTS at 177 msec

LEFT BARRIER CONTACT



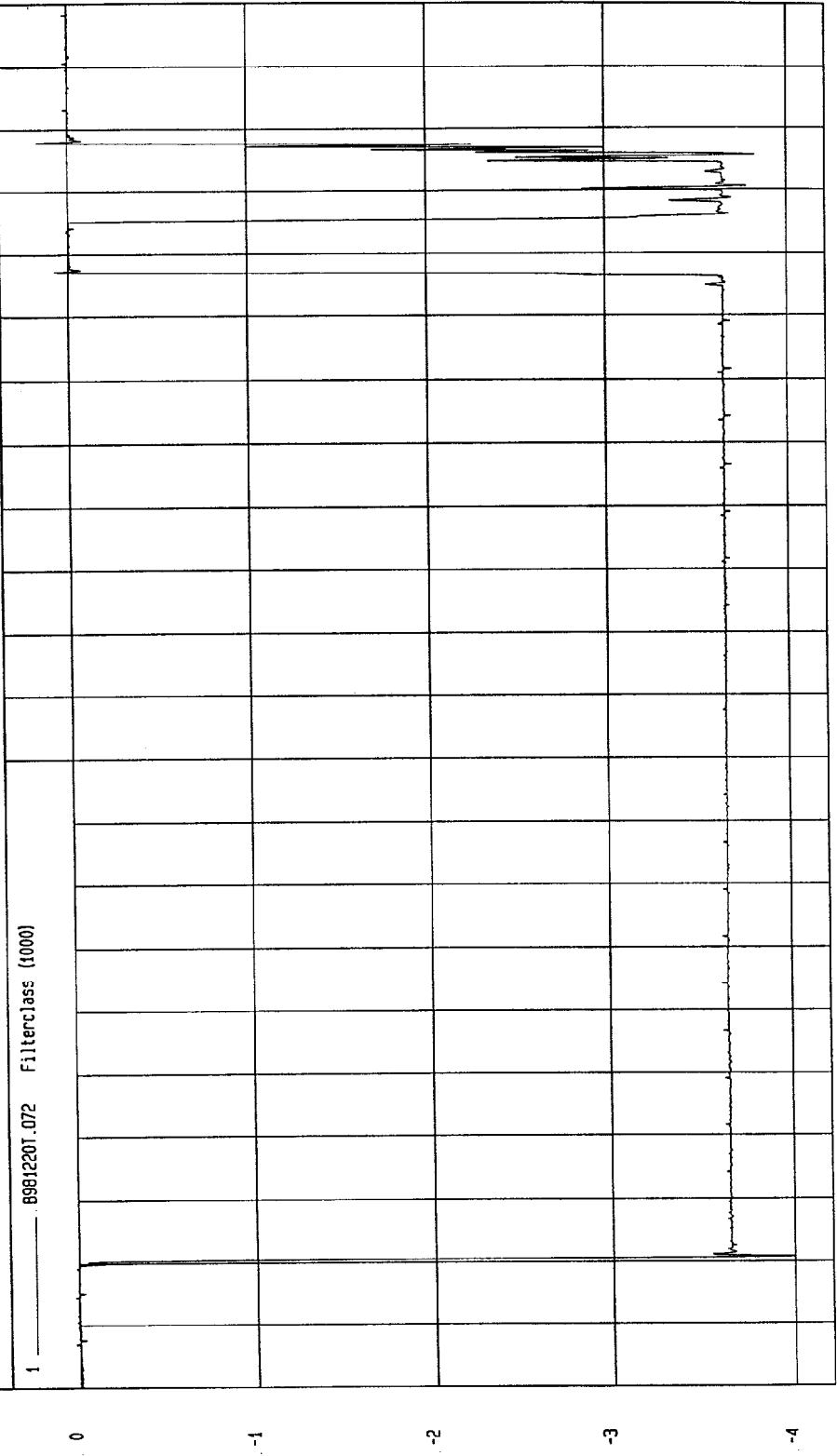
MGA Research
12-17-1998 16:04

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -4 VOLTS at 1 msec Maximum = .17 VOLTS at 178 msec

RIGHT BARRIER CONTACT



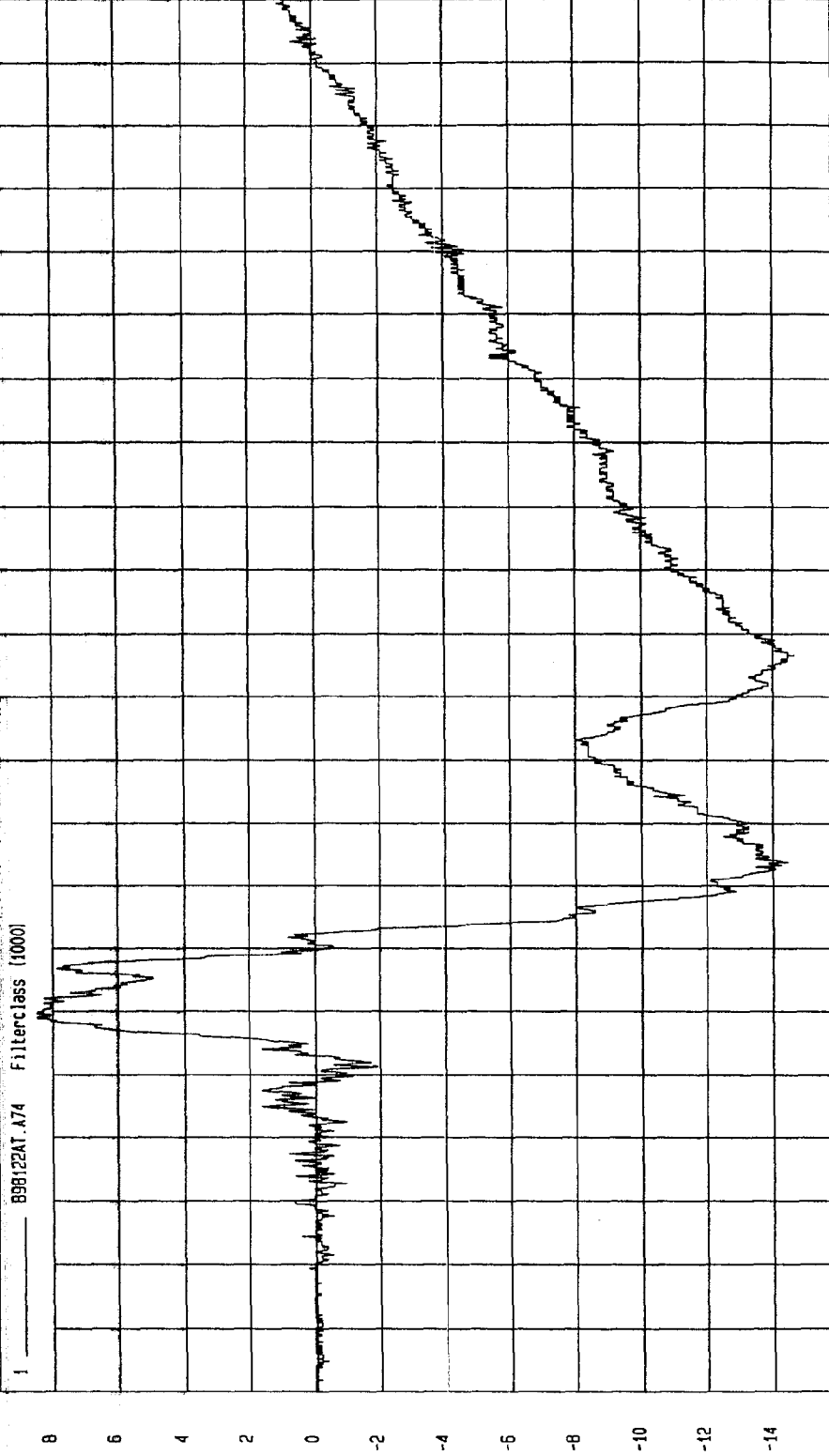
MSA Research
12-17-1998 15:05

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -14.66 G'S at 96 msec Maximum = 8.47 G'S at 39 msec

DRIVER HEAD X REDUNDANT ACCELERATION



TIME (SECONDS)

MSA Research
12-21-1998 10:26

G.S

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206)

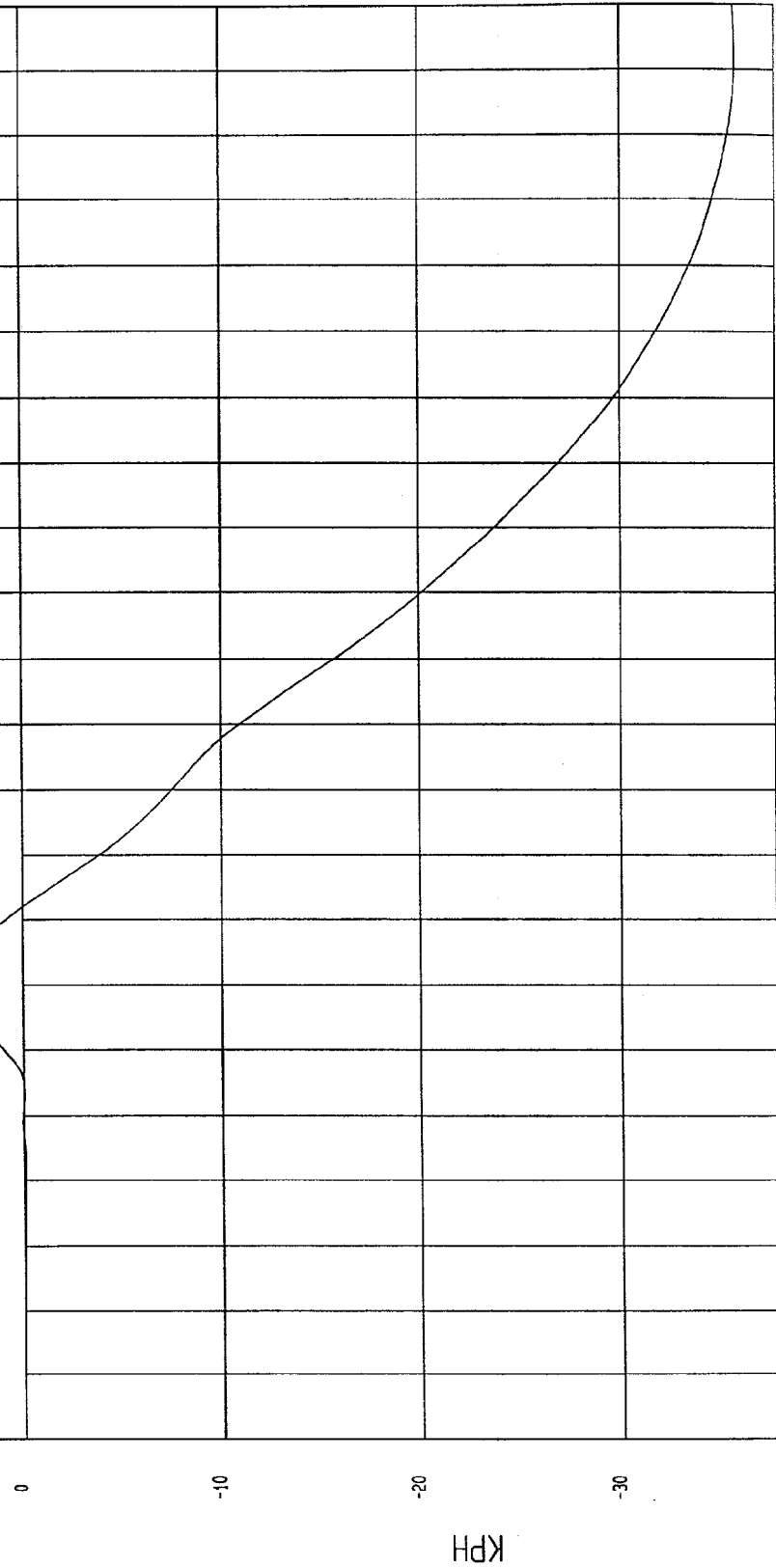
Speed: 38.46 MPH 61.9 KPH

Minimum = -35.73 KPH at 192 msec

Maximum = 3.12 KPH at 52 msec

DRIVER HEAD X REDUNDANT VELOCITY

1 898122A1.V74 Filterclass (180)



TIME Seconds

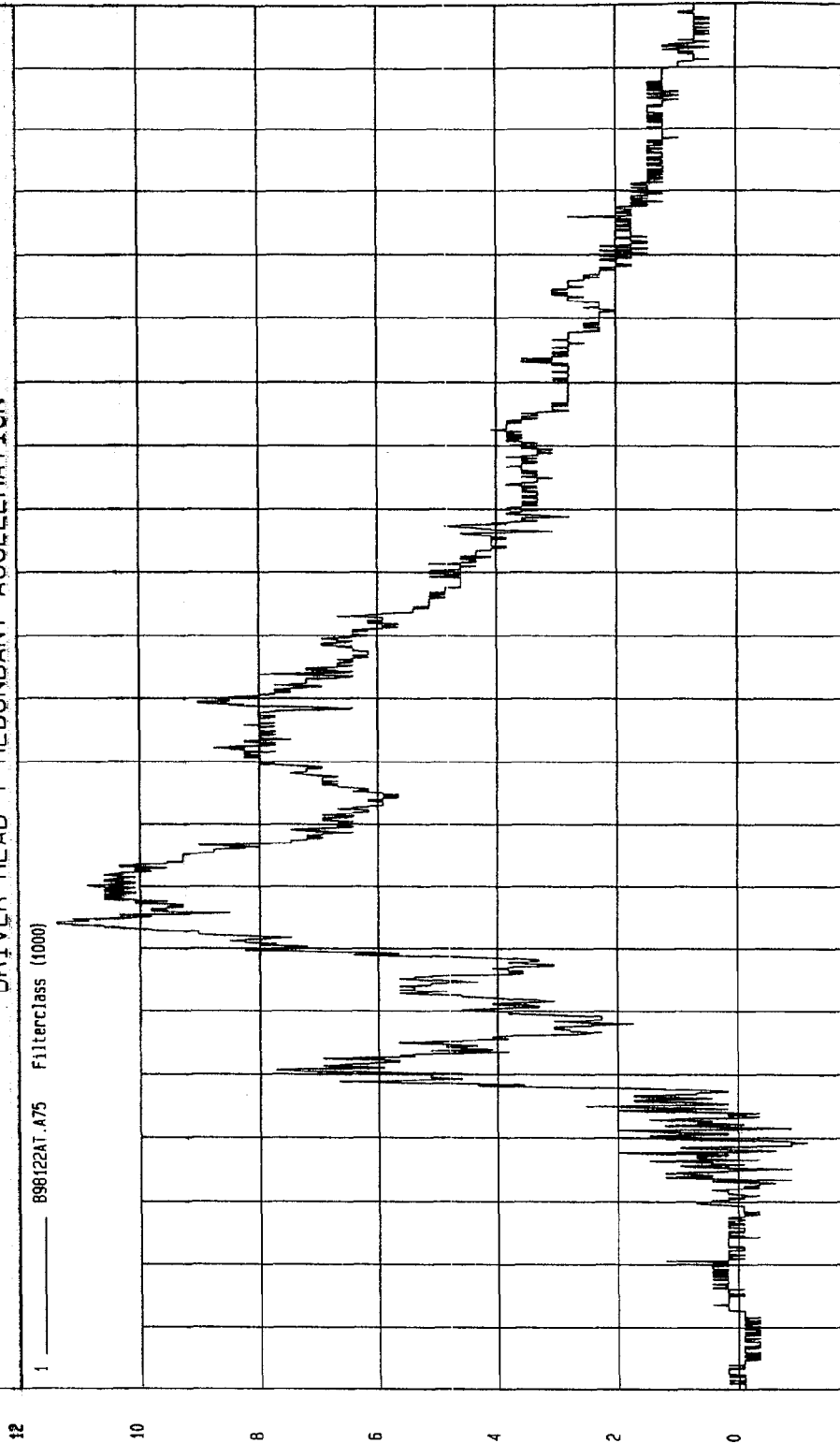
MGA Research
12-21-1998 10:26

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -1.13 G'S at 19 msec Maximum = 11.38 G'S at 54 msec

DRIVER HEAD Y REDUNDANT ACCELERATION



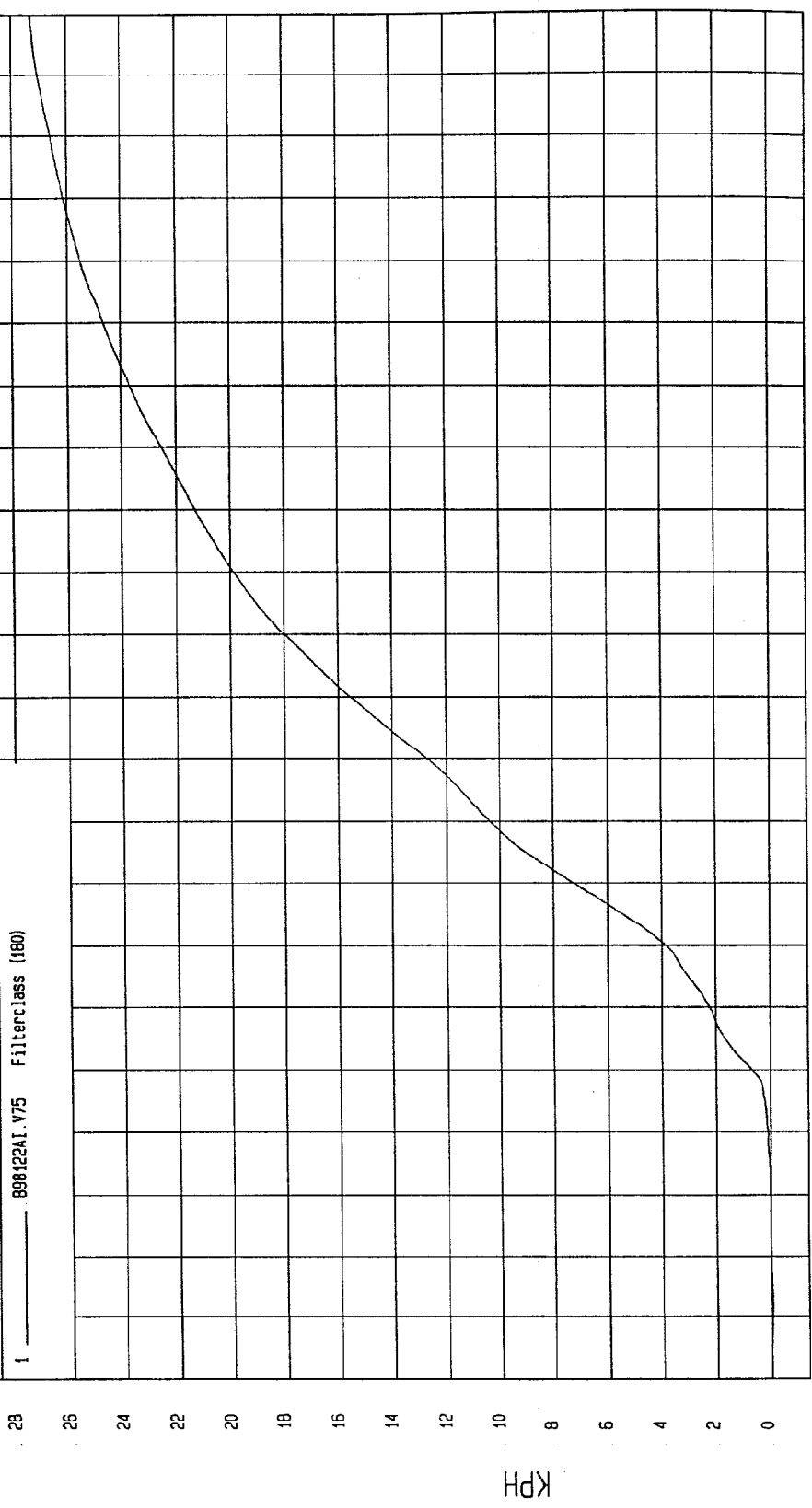
NSA Research
12-21-1998 10:26

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -5.58E-02 KPH at -8 msec Maximum = 27.31 KPH at 200 msec

DRIVER HEAD Y REDUNDANT VELOCITY



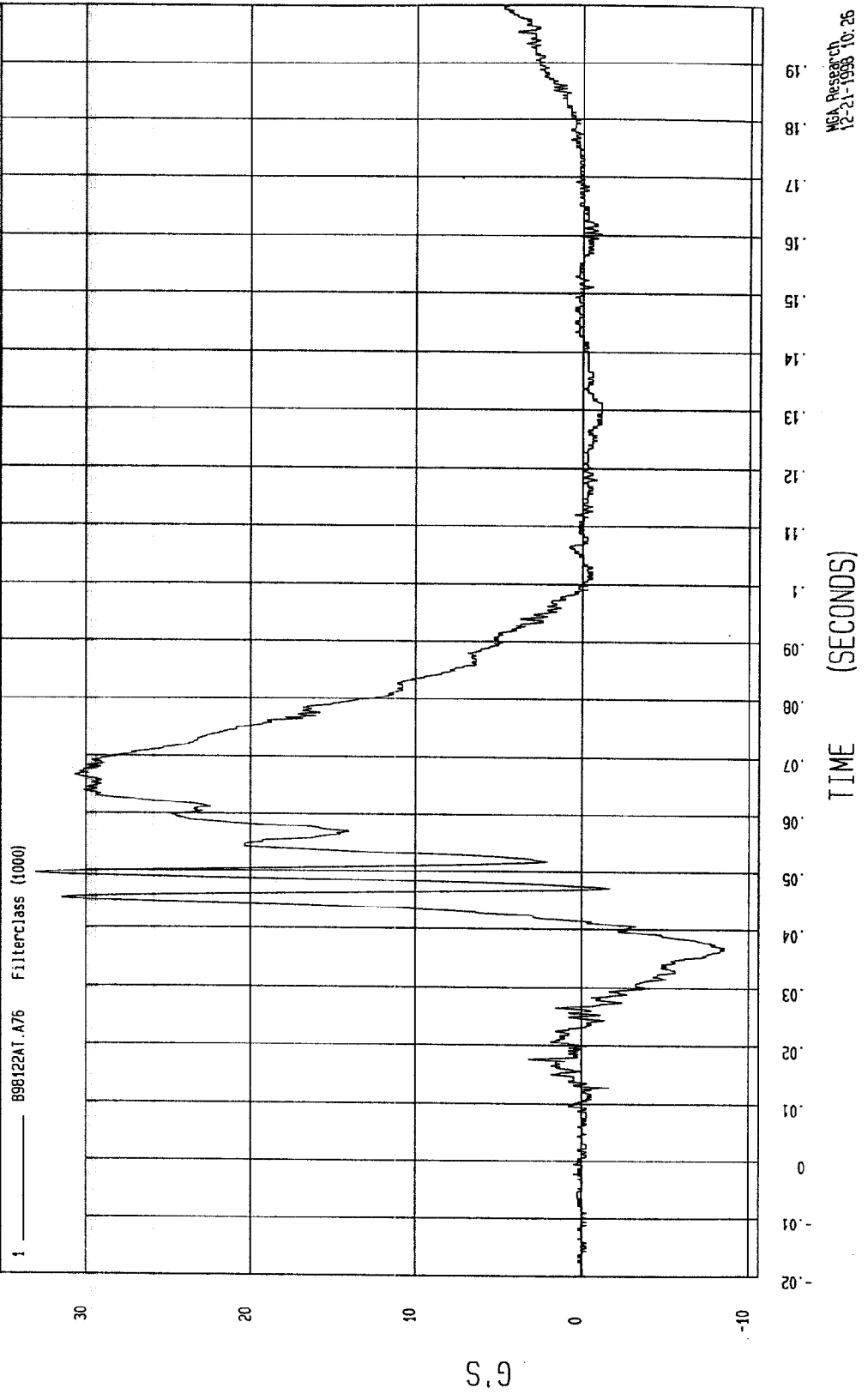
MCA Research
12-21-1998 10:26

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -8.55 G'S at 36 msec Maximum = 33.08 G'S at 50 msec

DRIVER HEAD Z REDUNDANT ACCELERATION

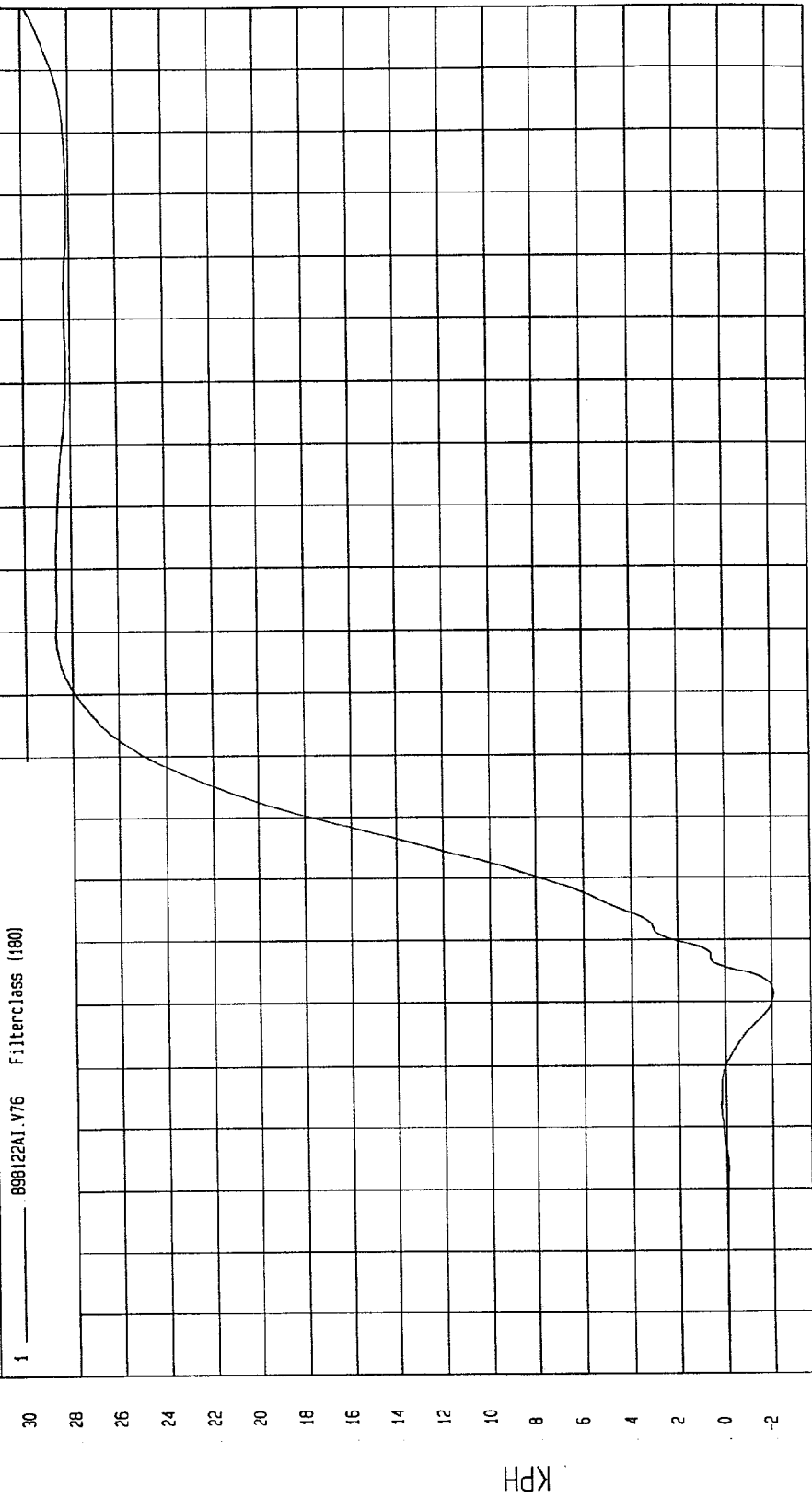


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.07 KPH at 41 msec Maximum = 29.83 KPH at 200 msec

DRIVER HEAD Z REDUNDANT VELOCITY



TIME Seconds

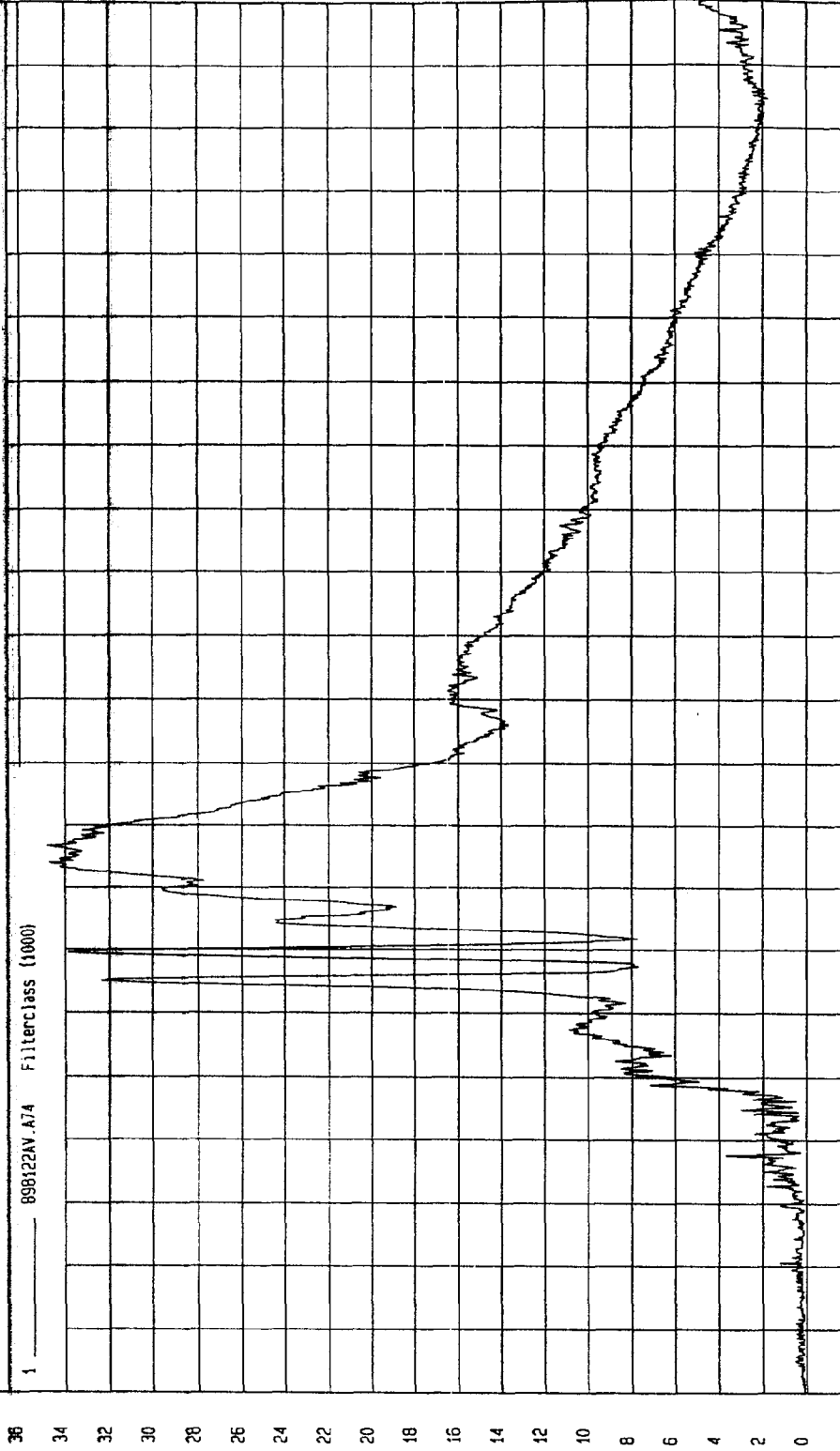
MGA Research
12-21-1998 10:26

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = .12 G'S at -20 msec Maximum = 34.8 G'S at 67 msec

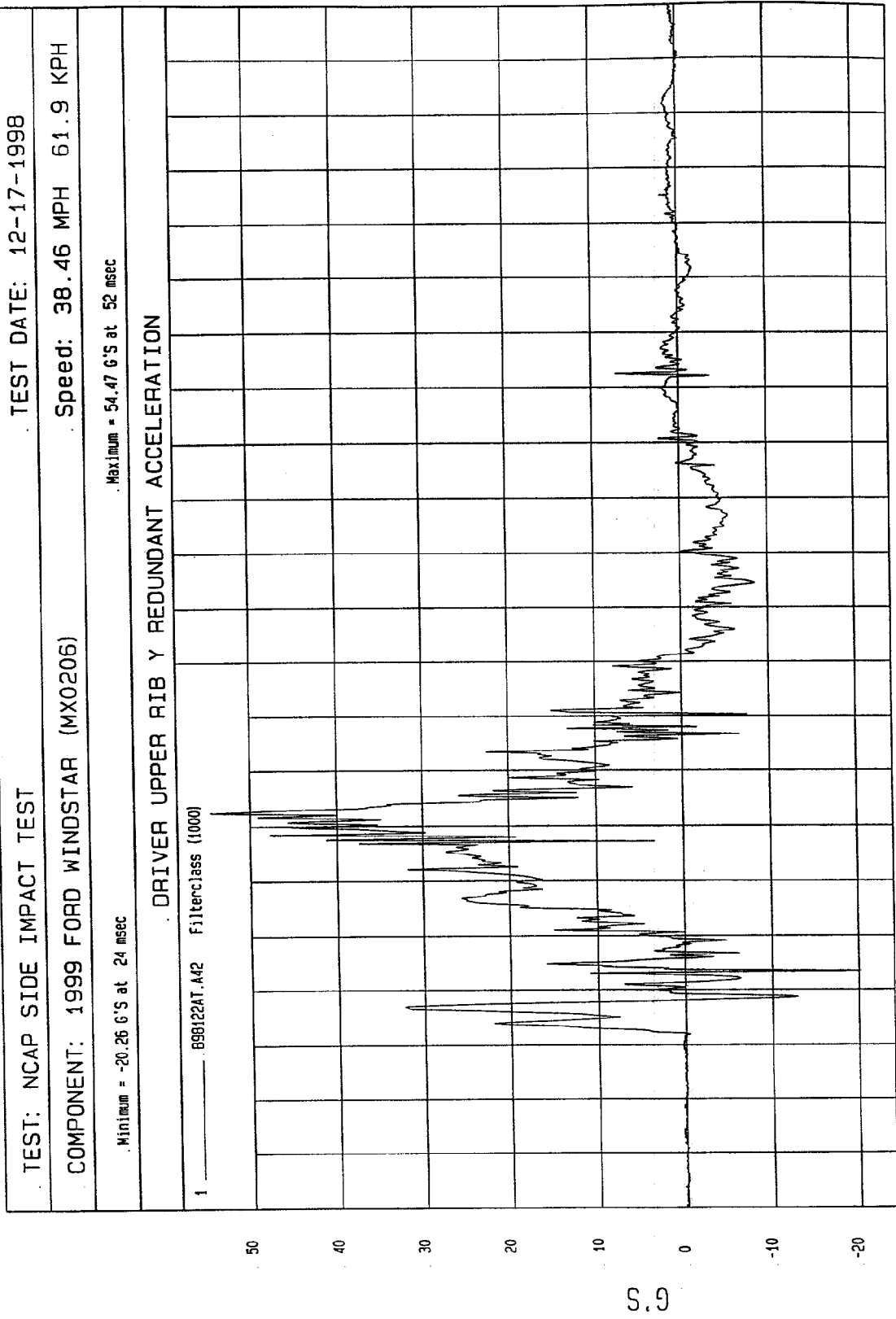
DRIVER HEAD REDUNDANT RESULTANT ACCELERATION



MCA Research
12-21-1998 10:26

TIME (SECONDS)

G's



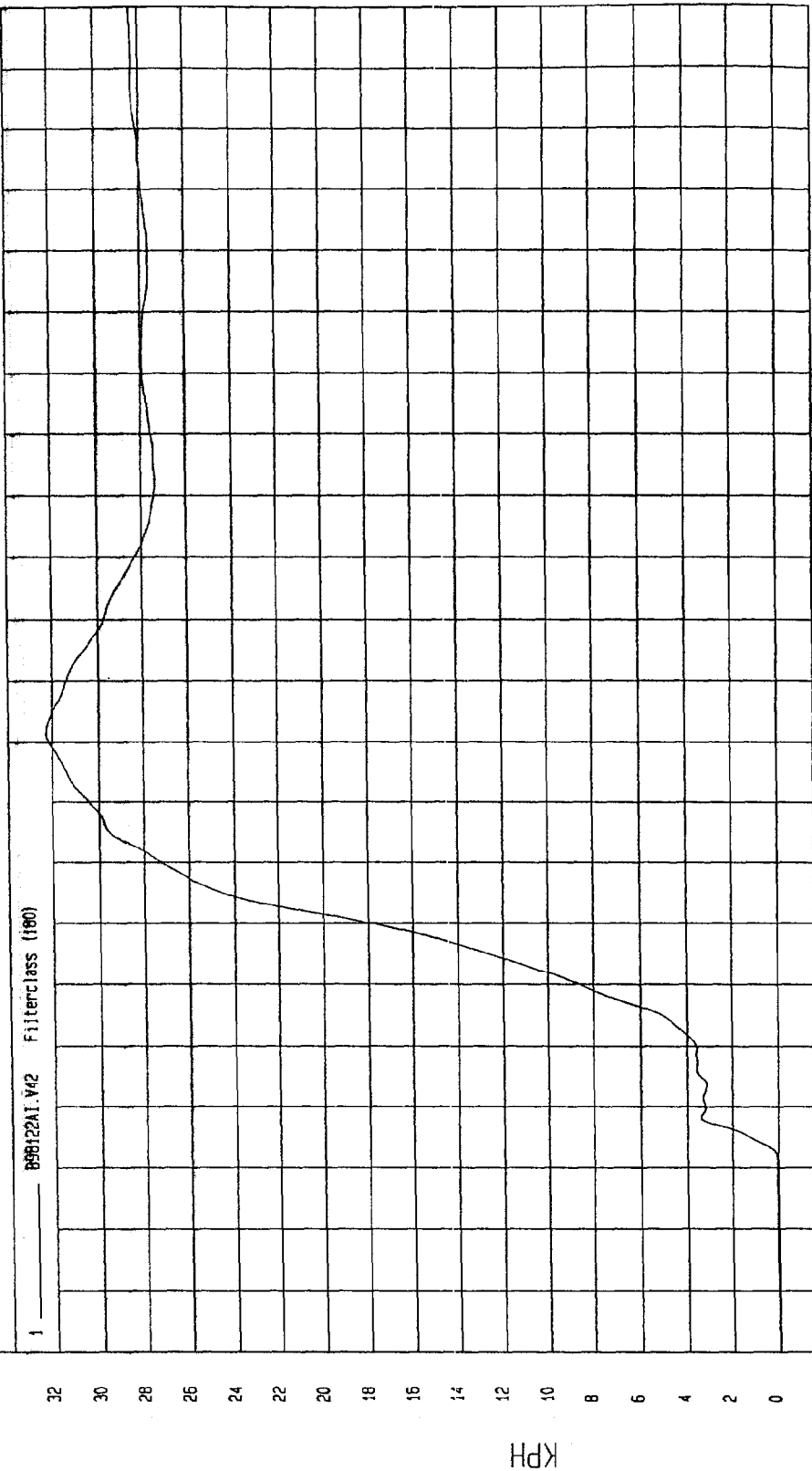
MSA Research
12-17-1998 16:06

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

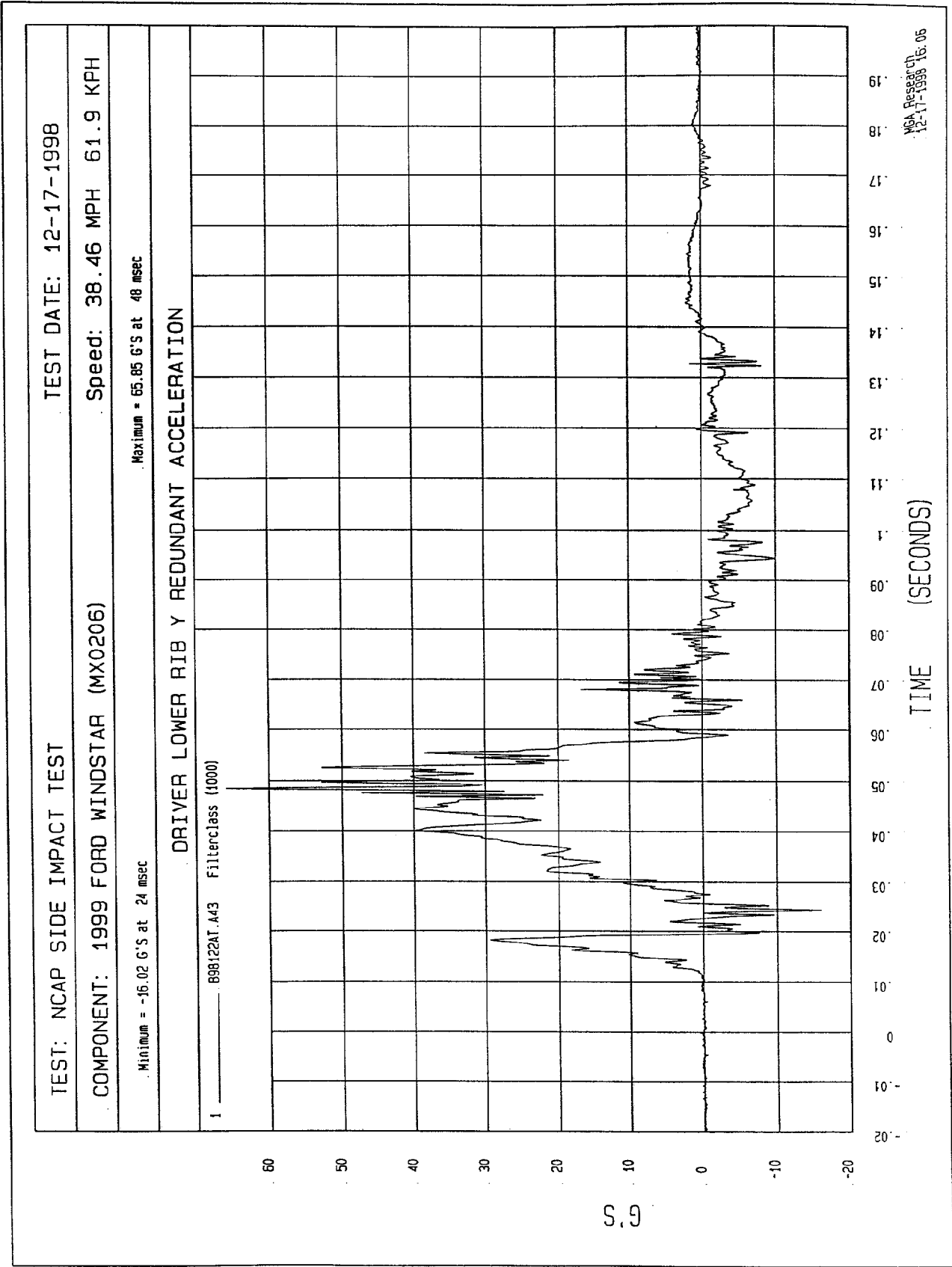
COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 32.26 KPH at 82 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY



MSA Research
12-17-1998 16:06

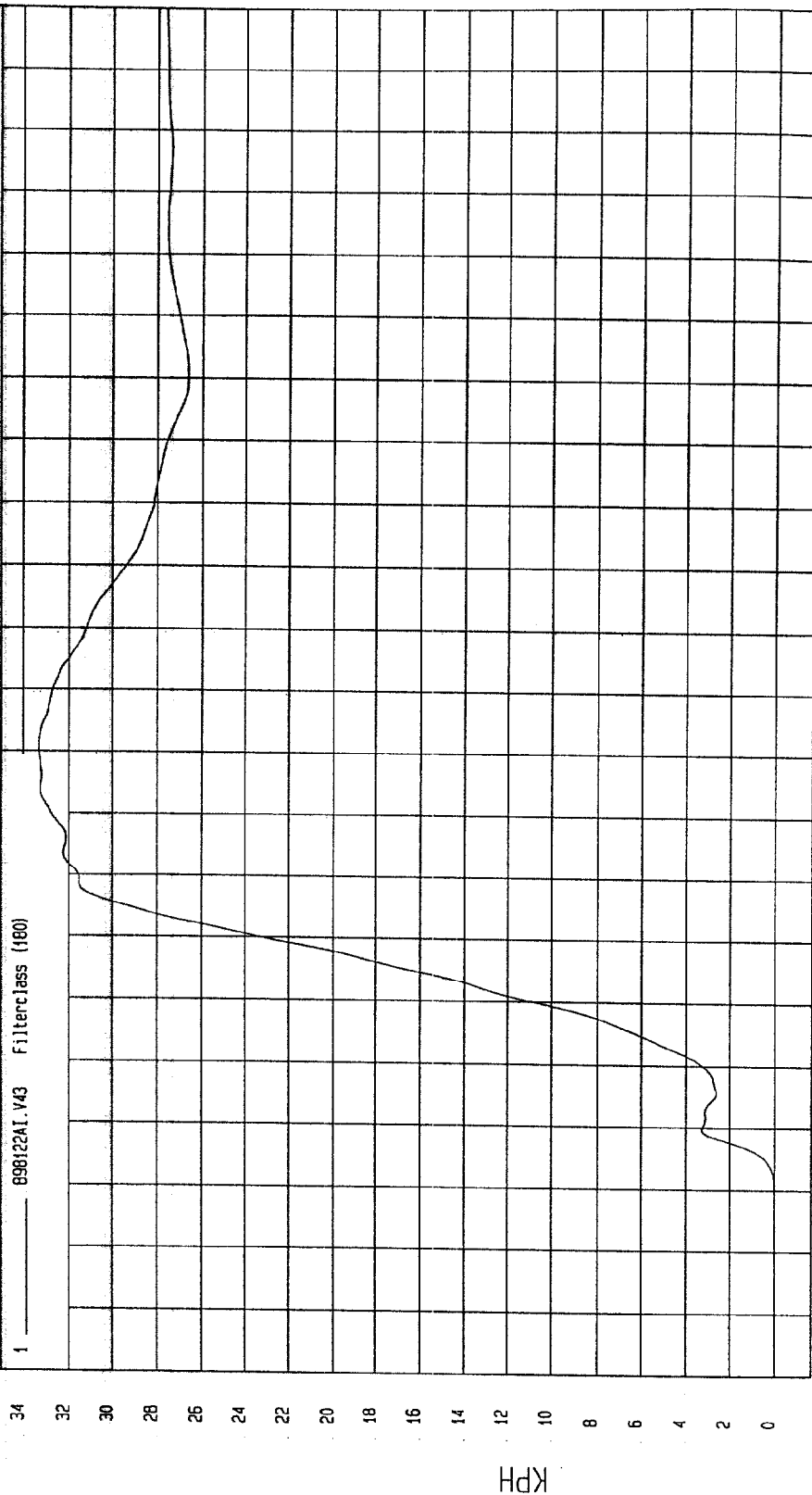


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -3.85E-03 KPH at -8 msec Maximum = 33.32 KPH at 80 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY



NSA Research
12-17-1998 16:06

TIME Seconds

TEST DATE: 12-17-1998

TEST: NCAP SIDE IMPACT TEST

Speed: 38.46 MPH 61.9 KPH

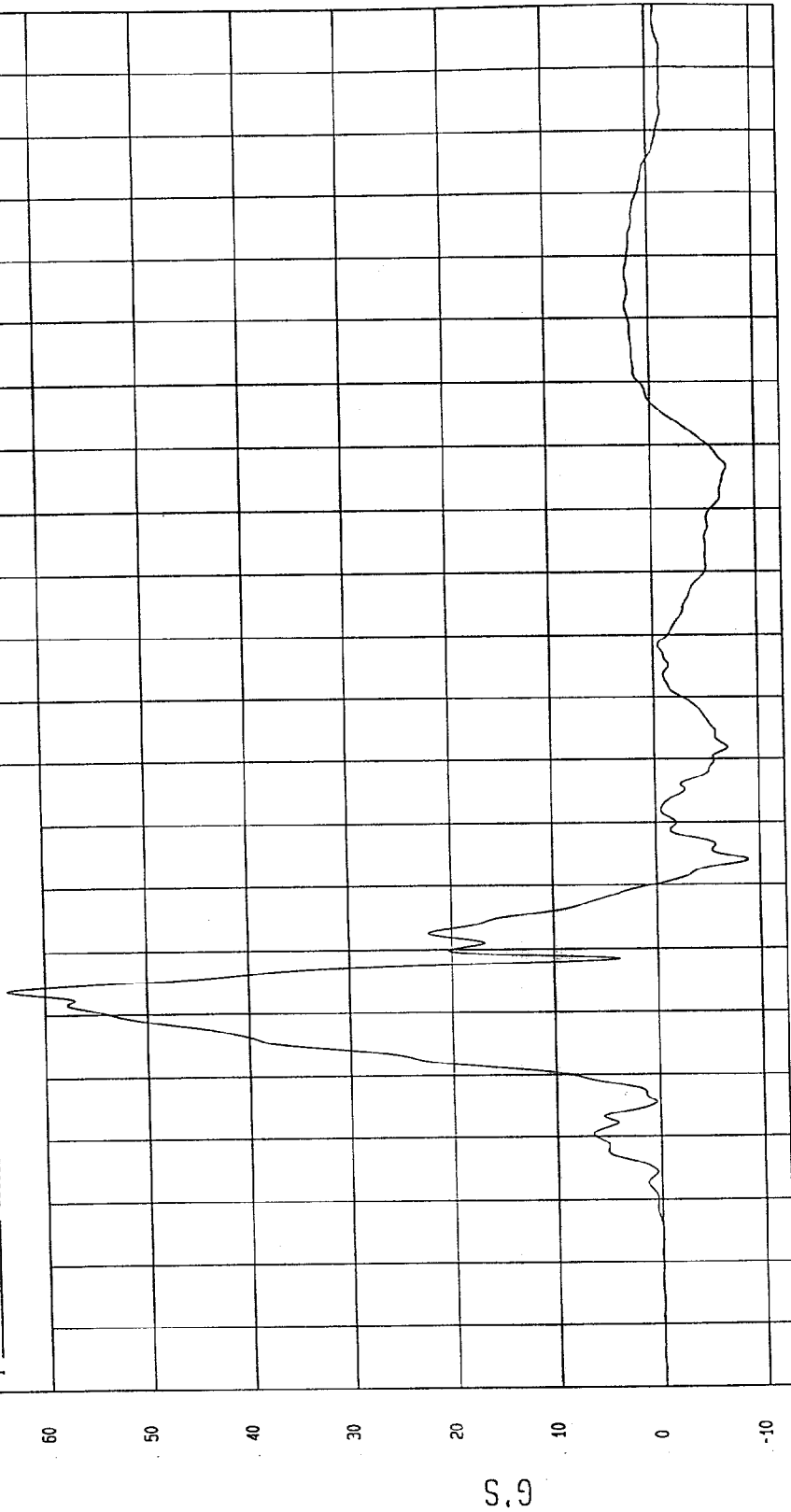
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 63.52 G'S at 44 msec

Minimum = -8.83 G'S at 64 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 B98122AF.A44 Filterclass (180)



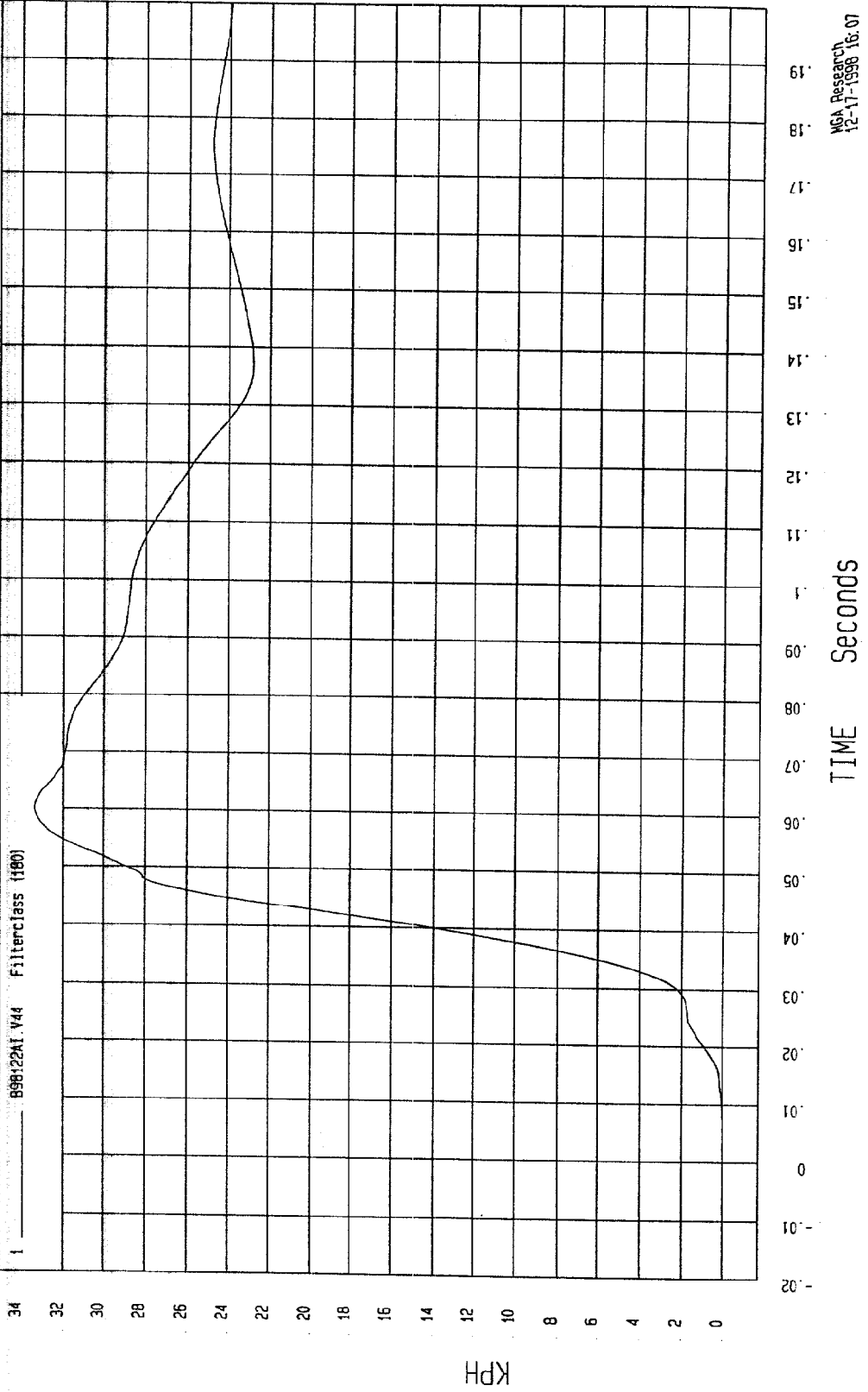
MGA Research
12-17-1998 16:07

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -2.40E-03 KPH at -16 msec
Maximum = 33.36 KPH at 60 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

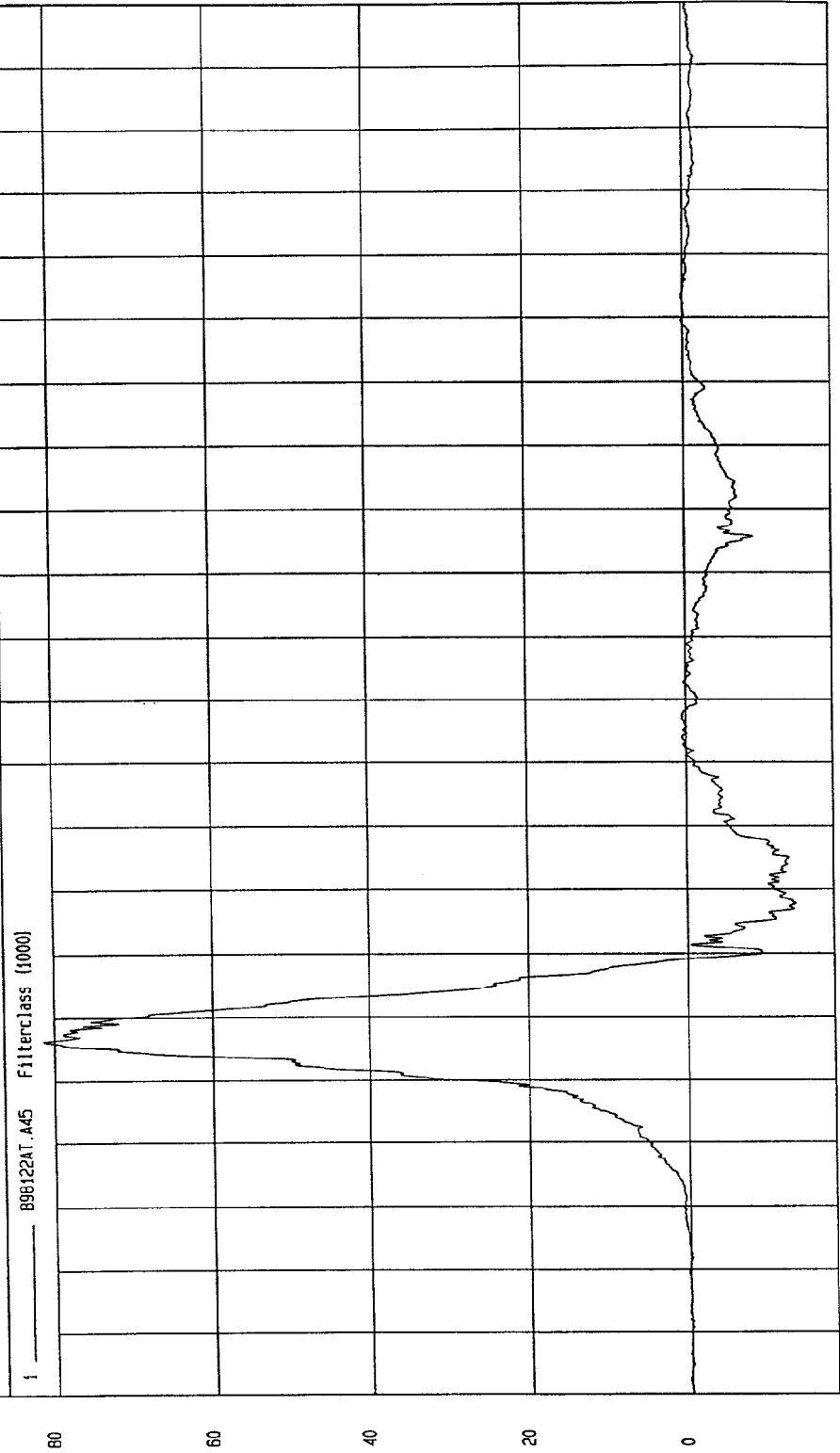


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -13.51 G'S at 58 msec Maximum = 81.33 G'S at 36 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



TIME (SECONDS)

MGA Research
12-17-1998 16:07

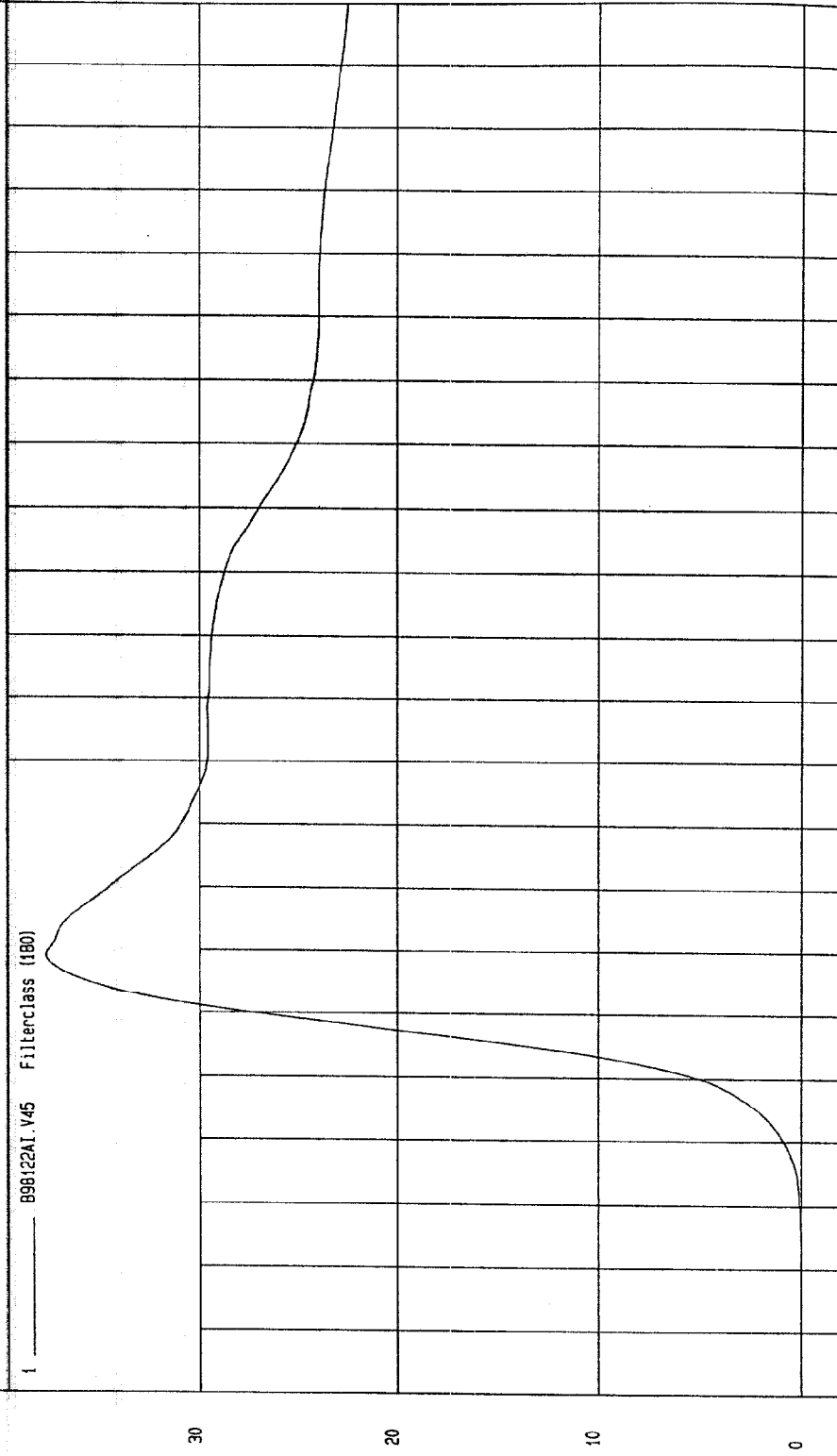
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -5.25E-03 KPH at -8 msec
Maximum = 37.65 KPH at 49 msec

DRIVER PELVIS Y REDUNDANT VELOCITY

1 — 898122A1.V45 Filterclass (180)



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

SPEED: 38.46 MPH 61.9 KPH

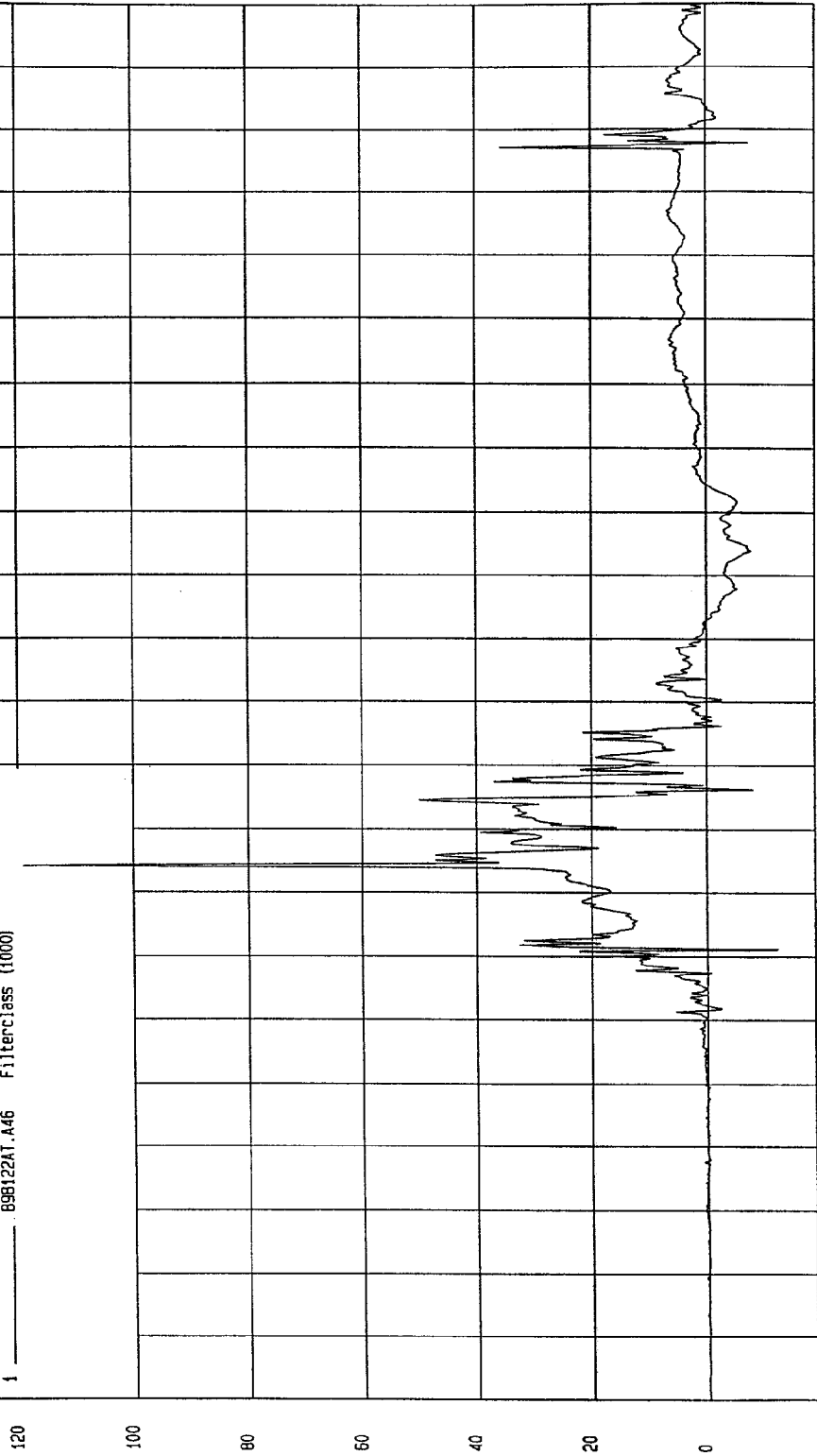
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 119.06 G'S at 64 msec

Minimum = -12.13 G'S at 51 msec

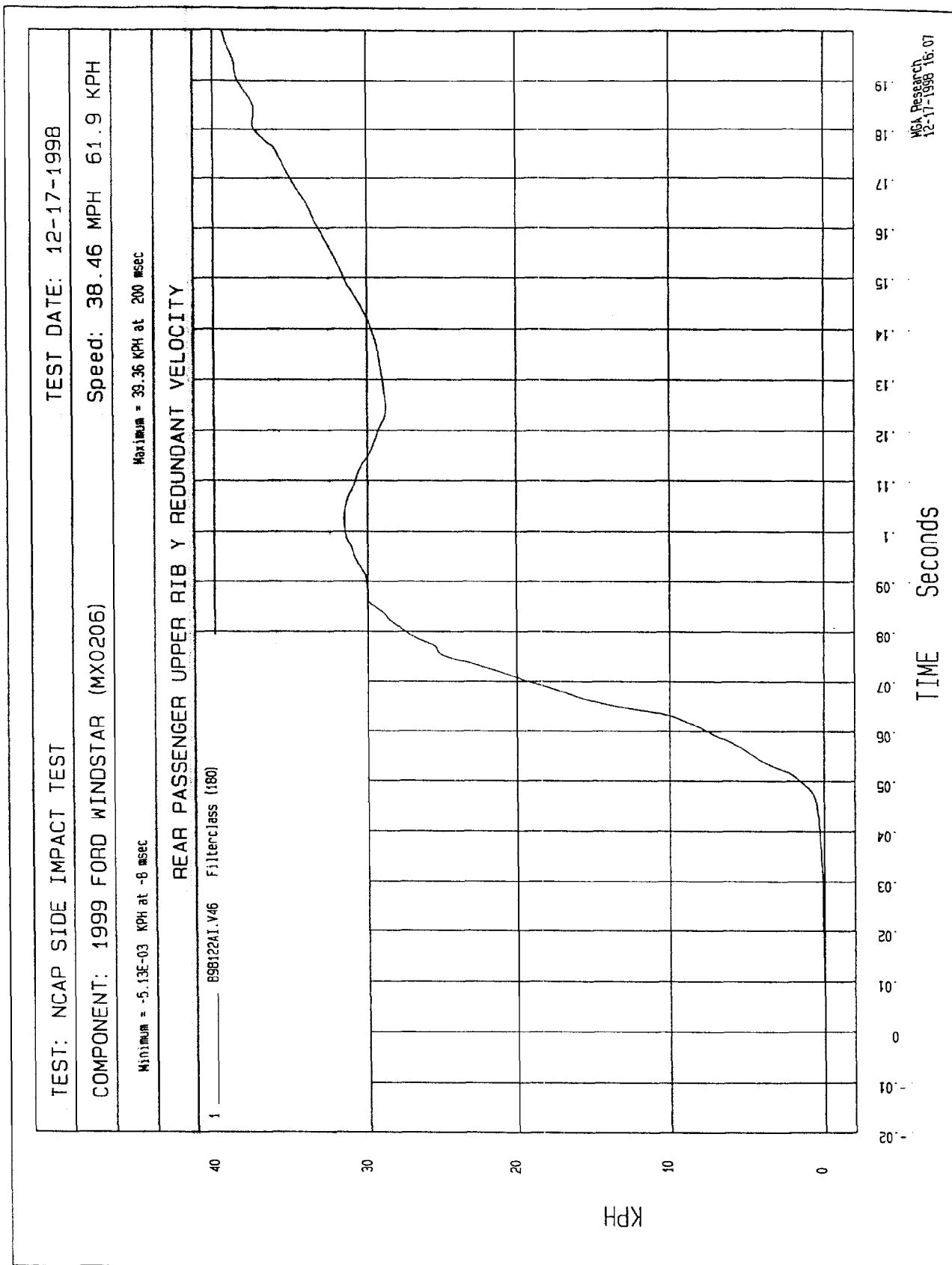
REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 898122AT.A46 Filterclass (1000)



WCA Research
12-17-1998 16.07

S.9



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

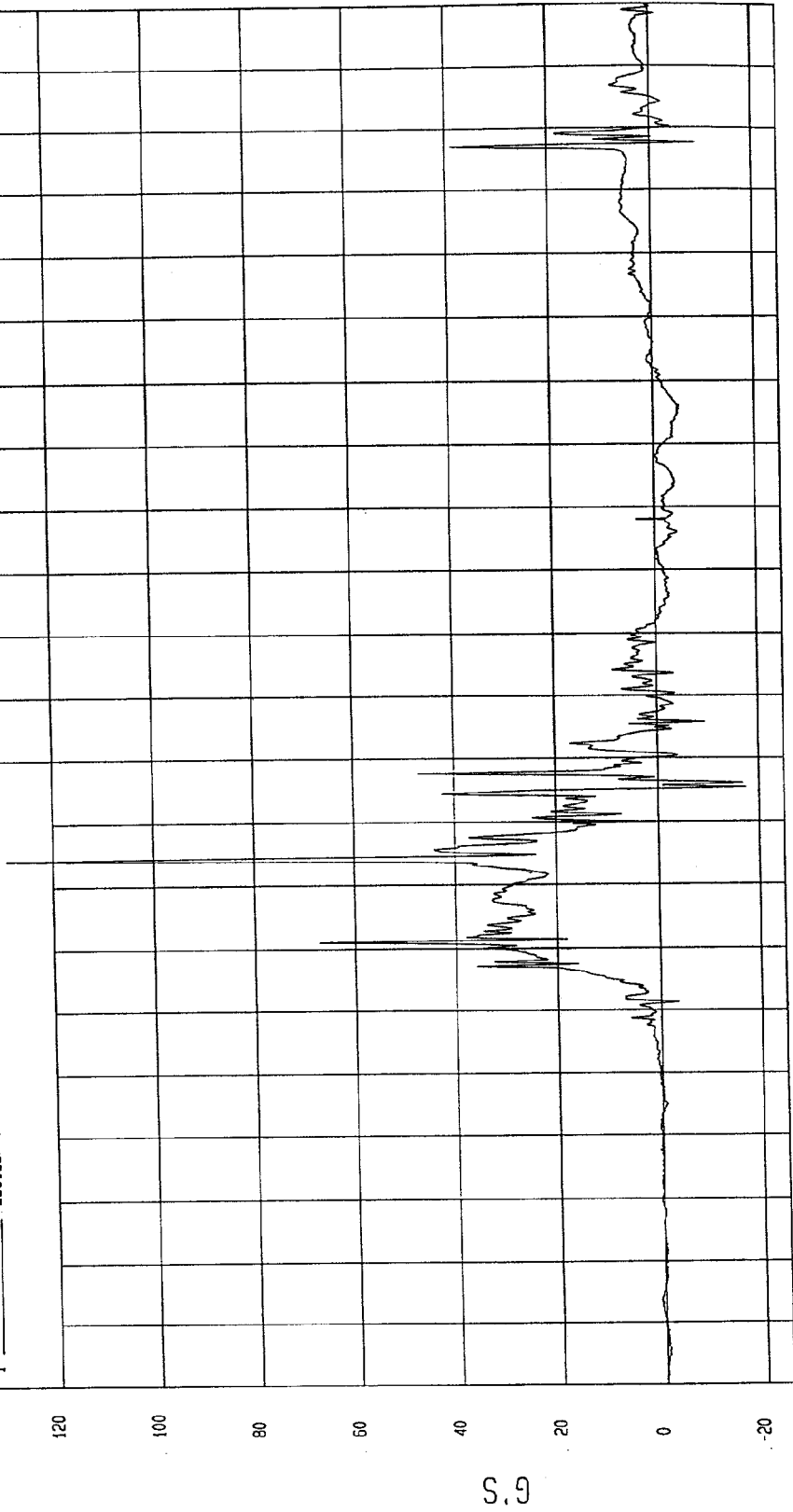
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 129.15 G'S at 64 msec

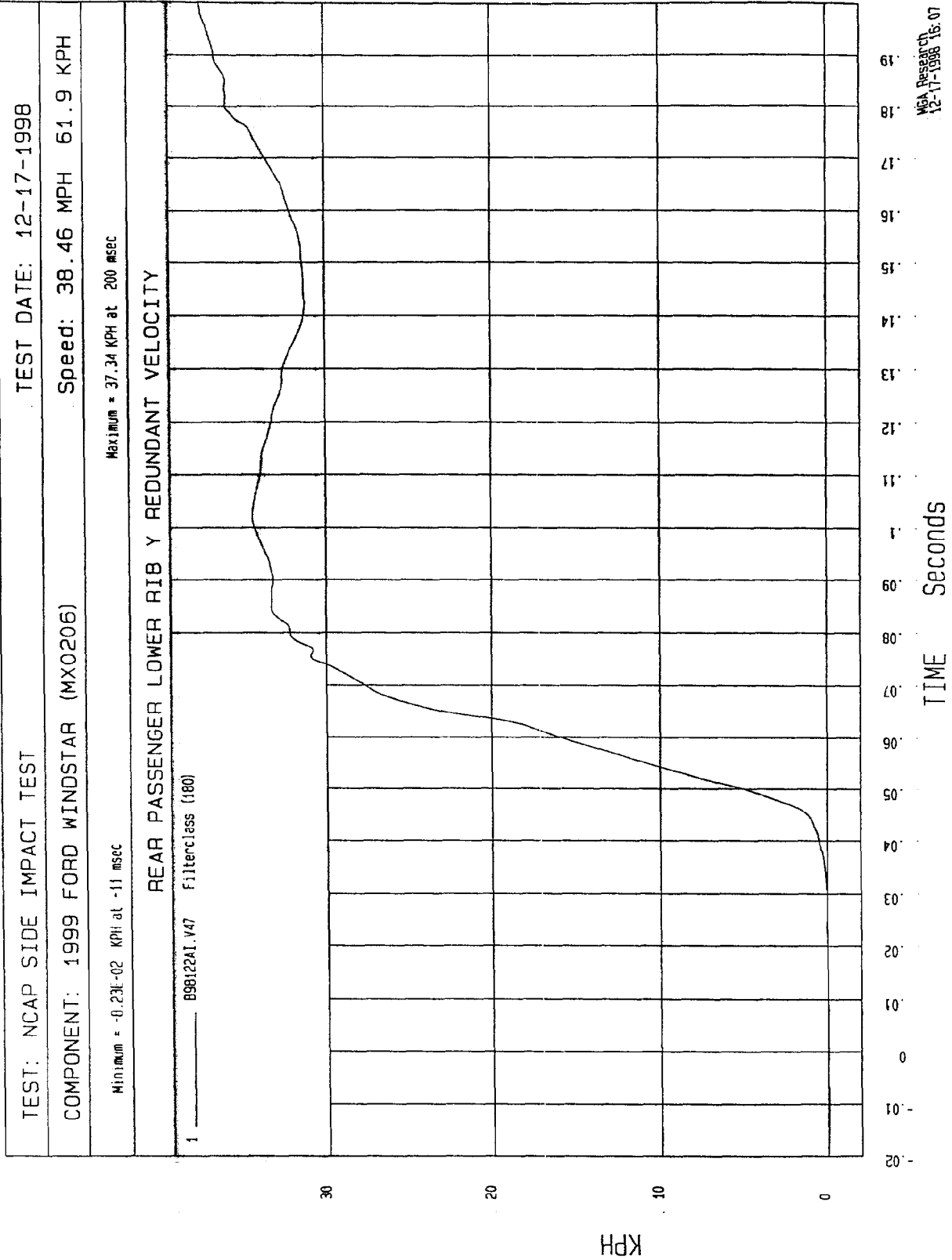
Minimum = -17.45 G'S at 75 msec

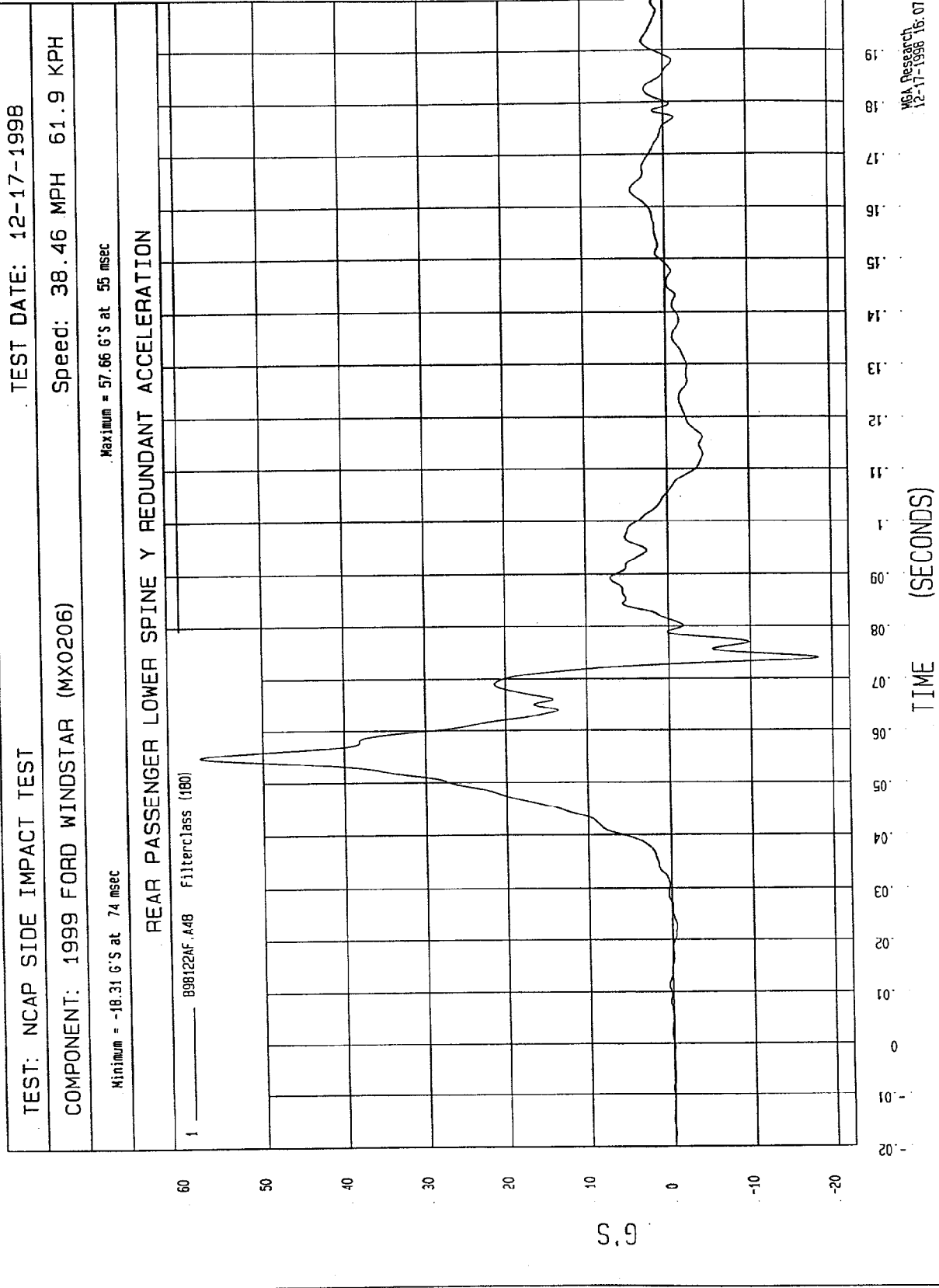
REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 B98122AT.A47 Filterclass (1000)



MCA Research
12-17-1998 16:07





TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

Speed: 38.46 MPH 61.9 KPH

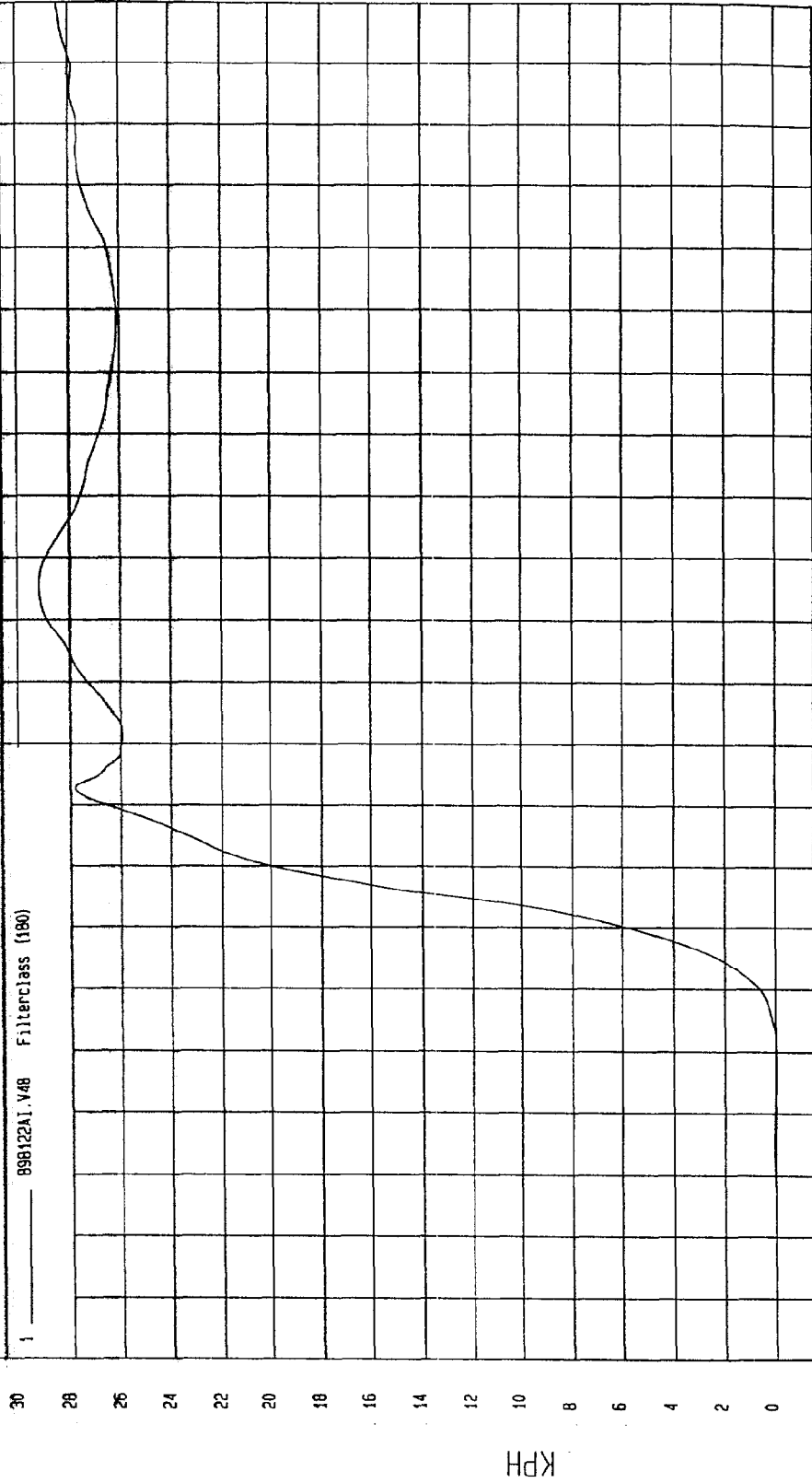
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 29.16 KPH at 105 msec

Minimum = -5.79E-02 KPH at 27 msec

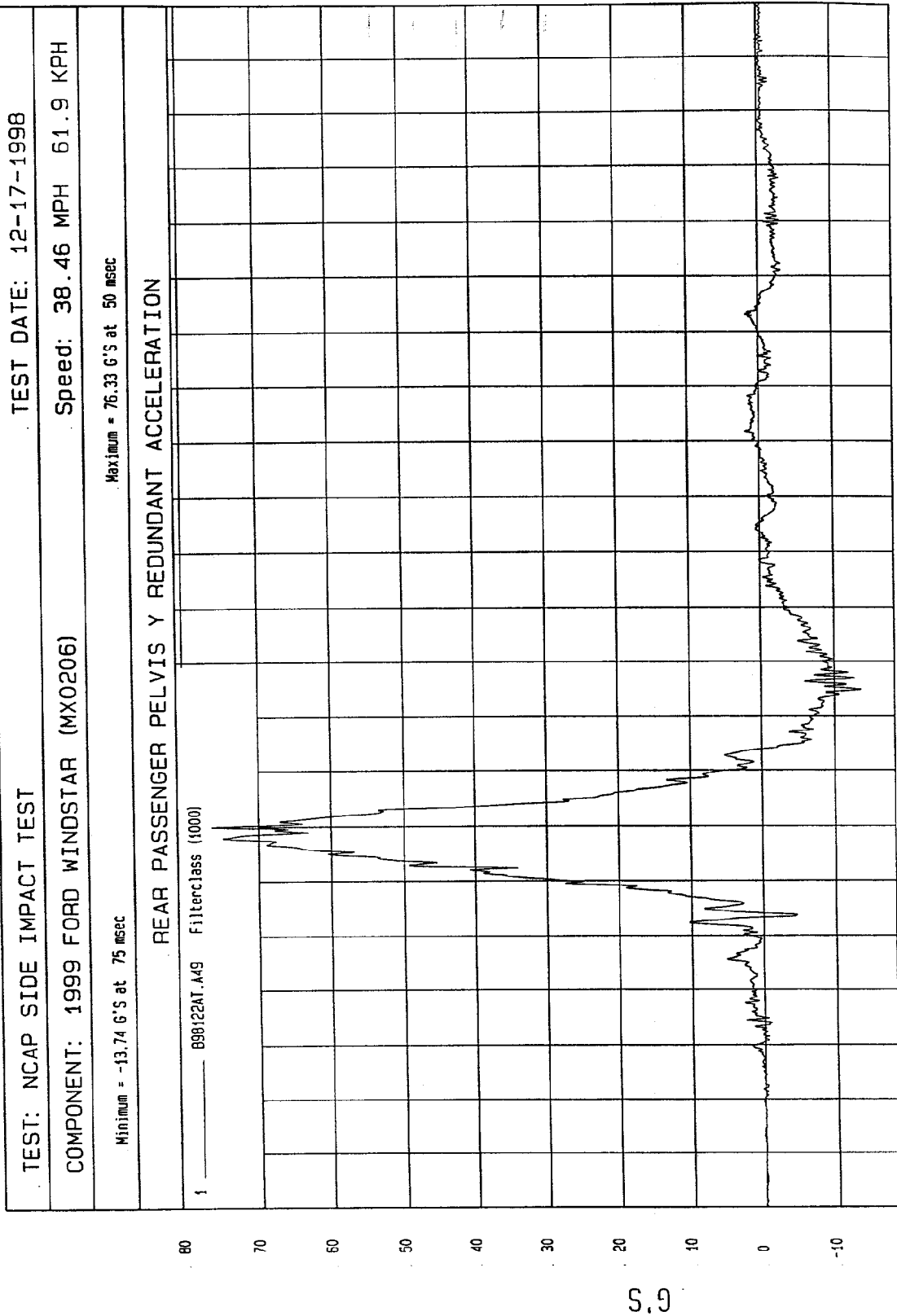
REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 898122A1.V48 Filterclass (190)



MSA Research
12-17-1998 16:07

TIME Seconds



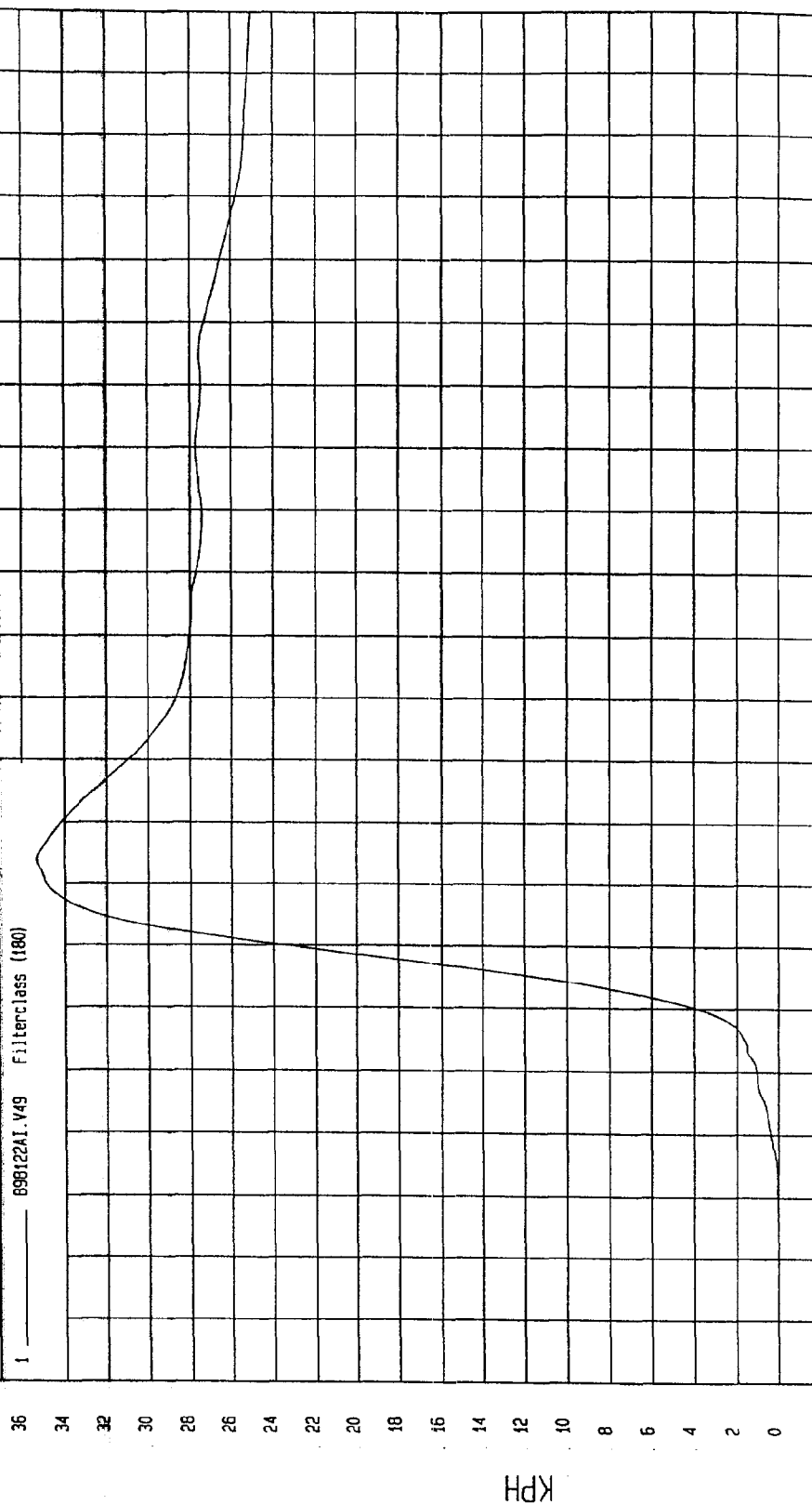
NGA Research
12-17-1998 15:07

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -0.60E-03 KPH at -8 msec Maximum = 35.31 KPH at 64 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY



TIME Seconds

WGA Research
12-17-1998 16:07

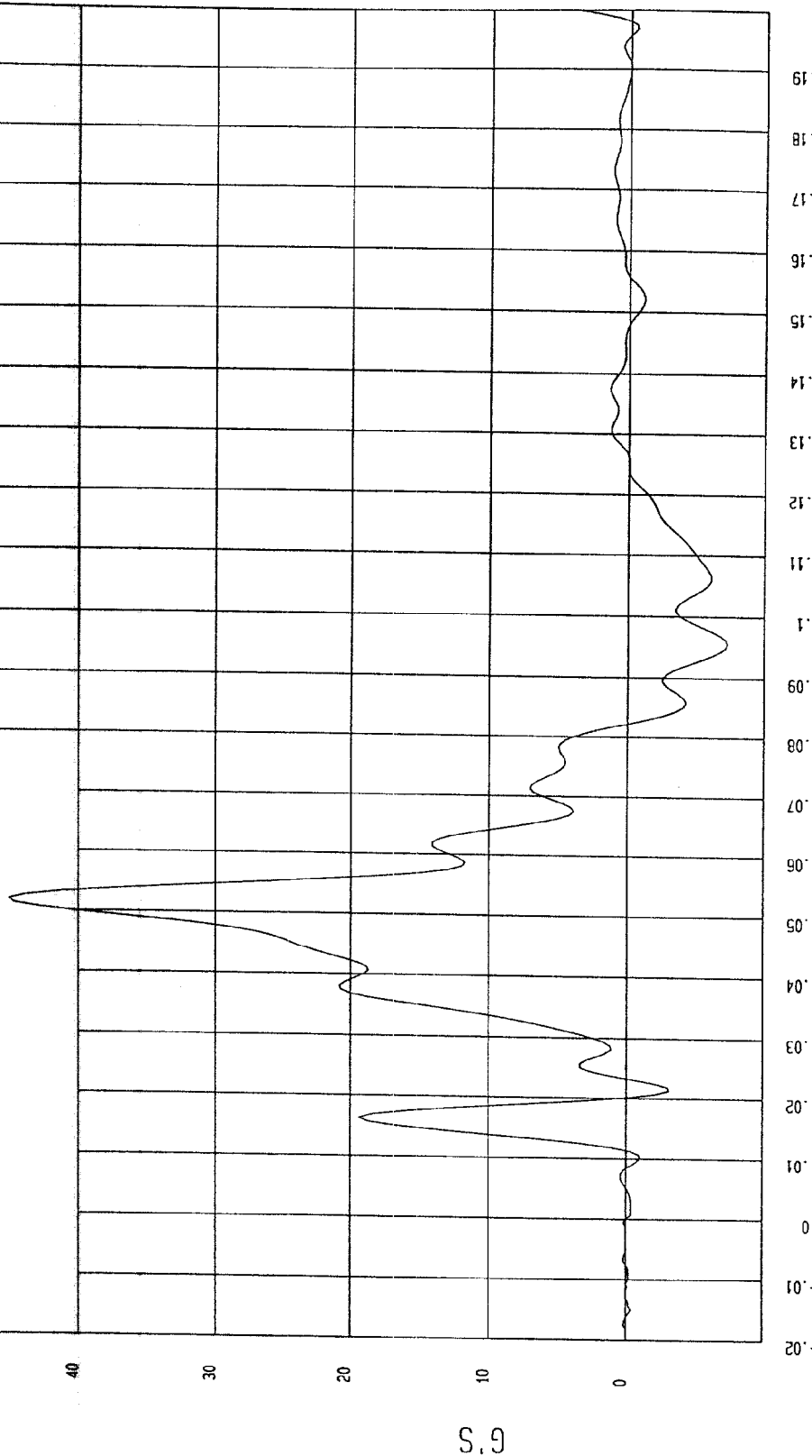
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -7.15 G'S at 96 msec Maximum = 44.96 G'S at 52 msec

DRIVER UPPER RIB Y ACCELERATION

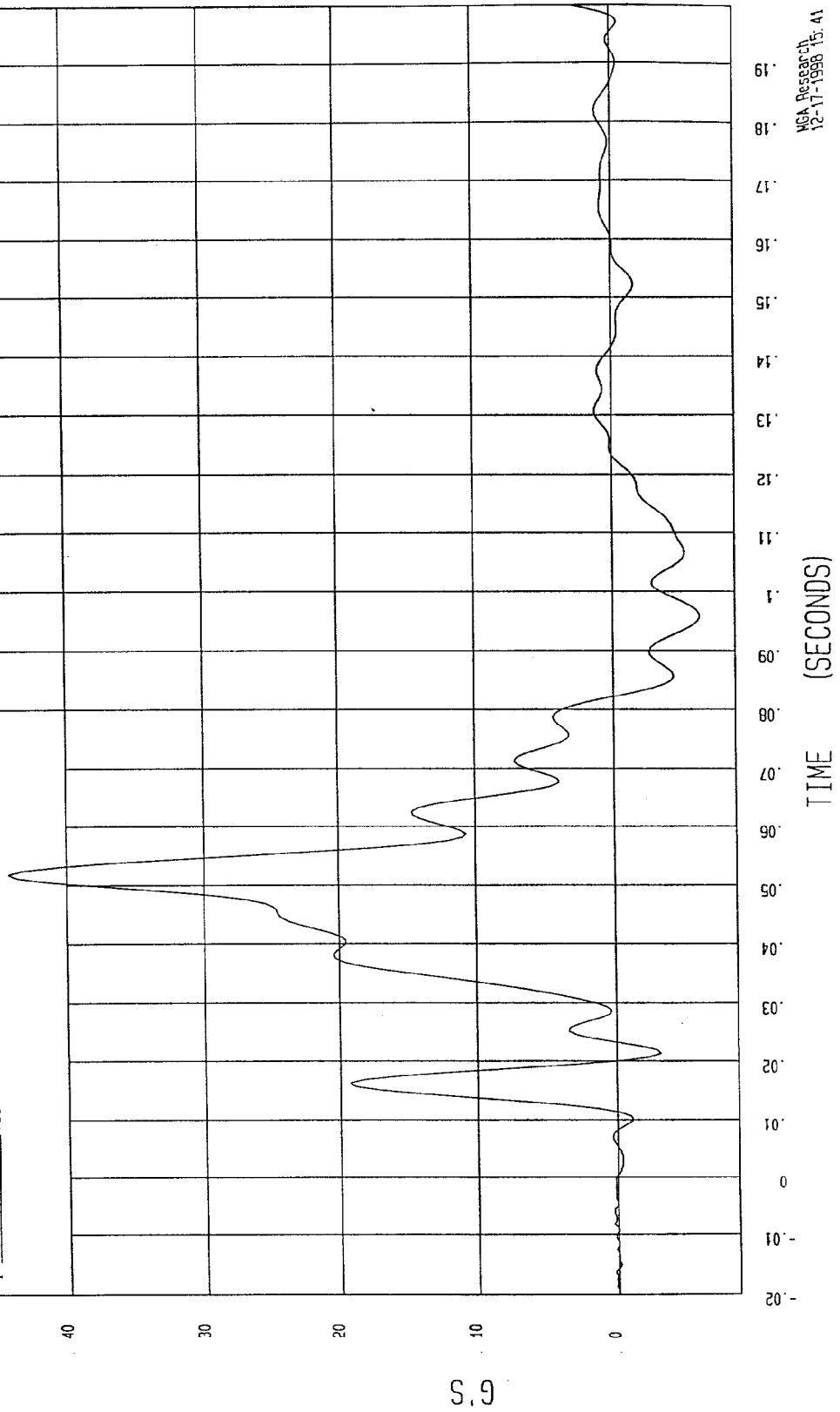
1 898122F1.R15 Filterclass (FIR Filtered)



VCA Research
12-17-1998 15.59

OBJTVER UPPER RIB Y REDUNDANT ACCELERATION

	Filterclass	Filterclass (FIR Filtered)
1	898122F1.R42	

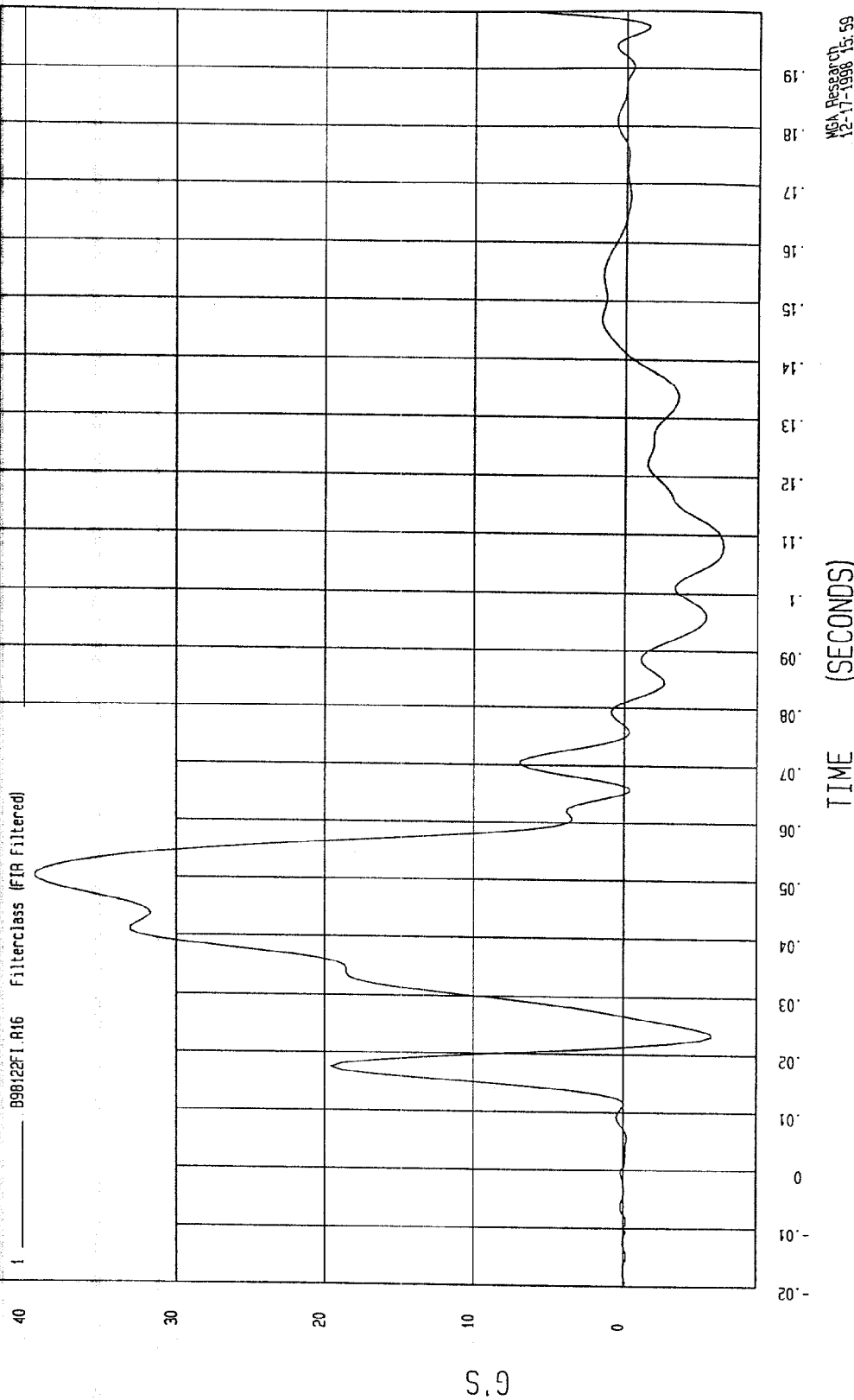


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -6.44 G'S at 108 msec Maximum = 39.35 G'S at 50 msec

DRIVER LOWER RIB Y ACCELERATION

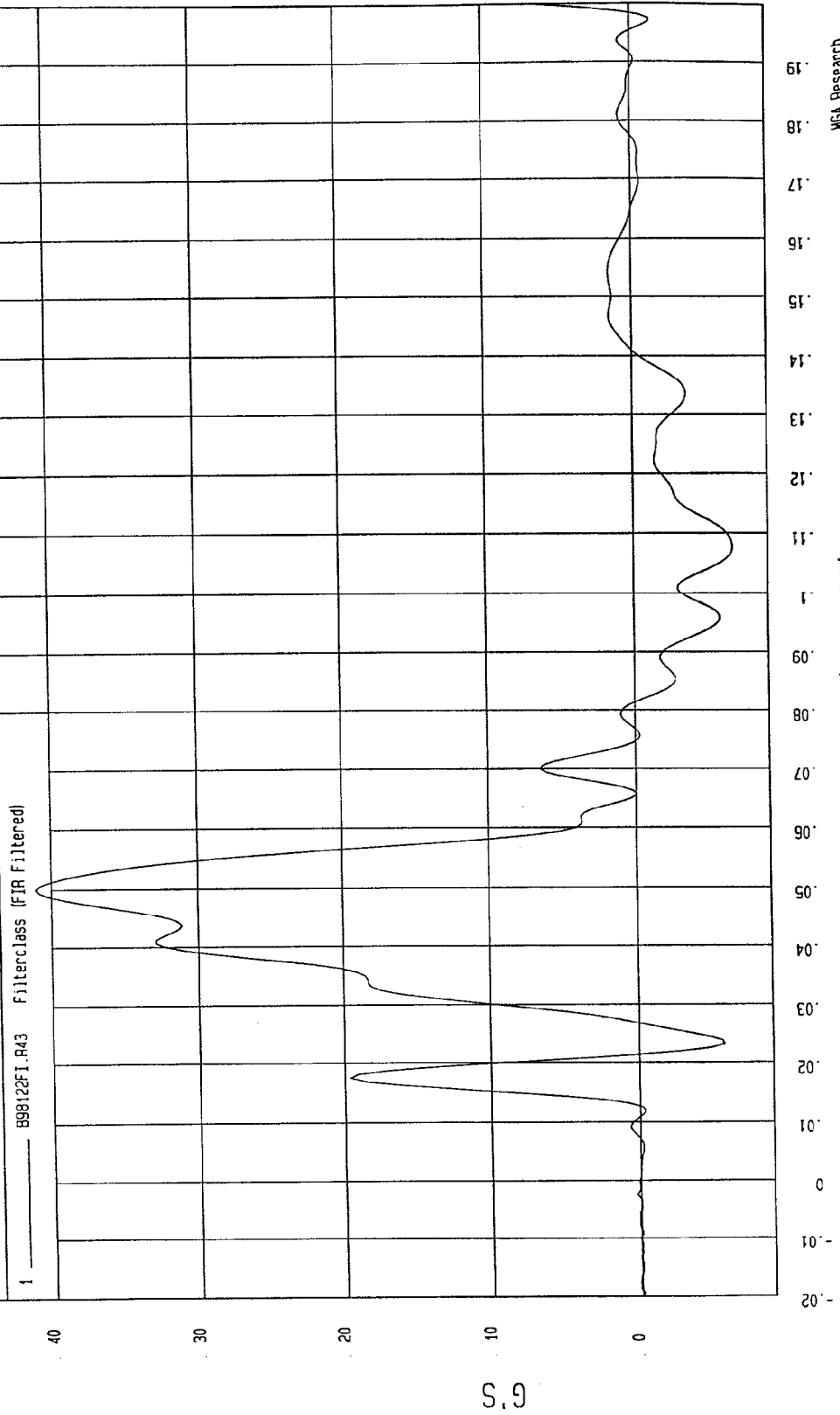


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -6.51 G'S at 108 msec Maximum = 41.03 G'S at 50 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION



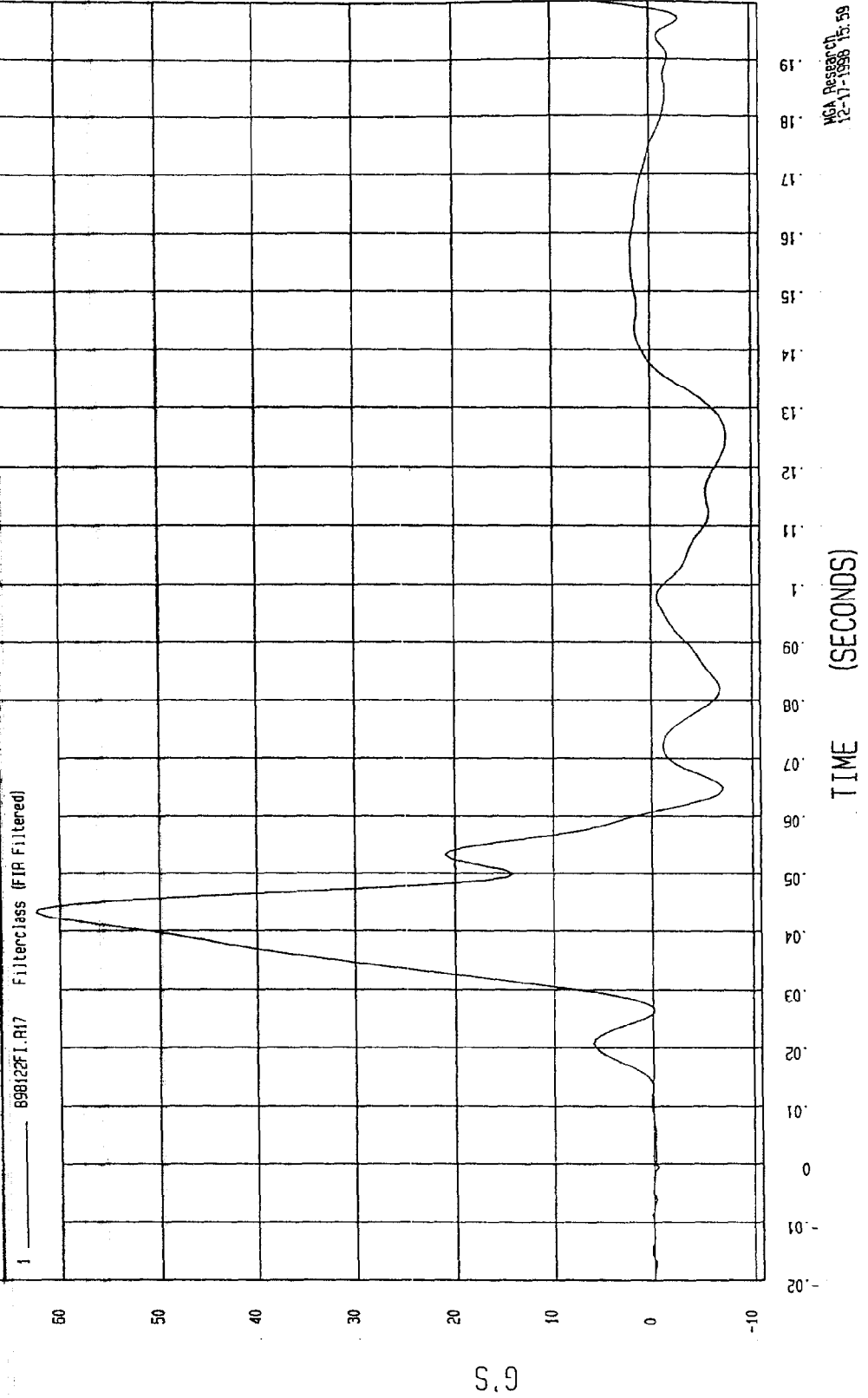
WSA Research
12-17-1998 15: 41

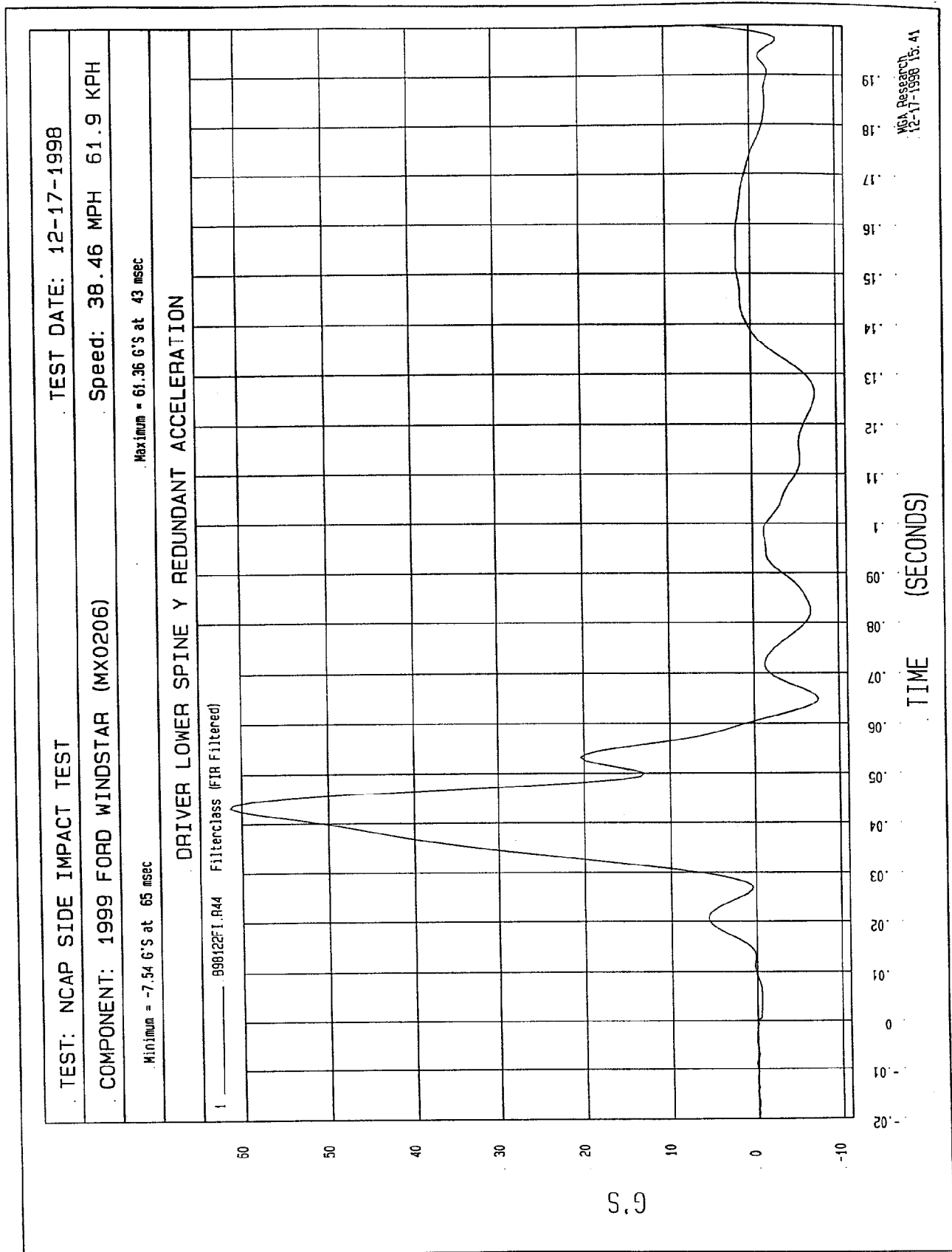
TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -7.35 G'S at 125 msec Maximum = 62.4 G'S at 43 msec

DRIVER LOWER SPINE Y ACCELERATION





NSA Research
12-17-1998 13:41

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

SPEED: 38.46 MPH 61.9 KPH

Maximum = 79.35 G'S at 38 msec

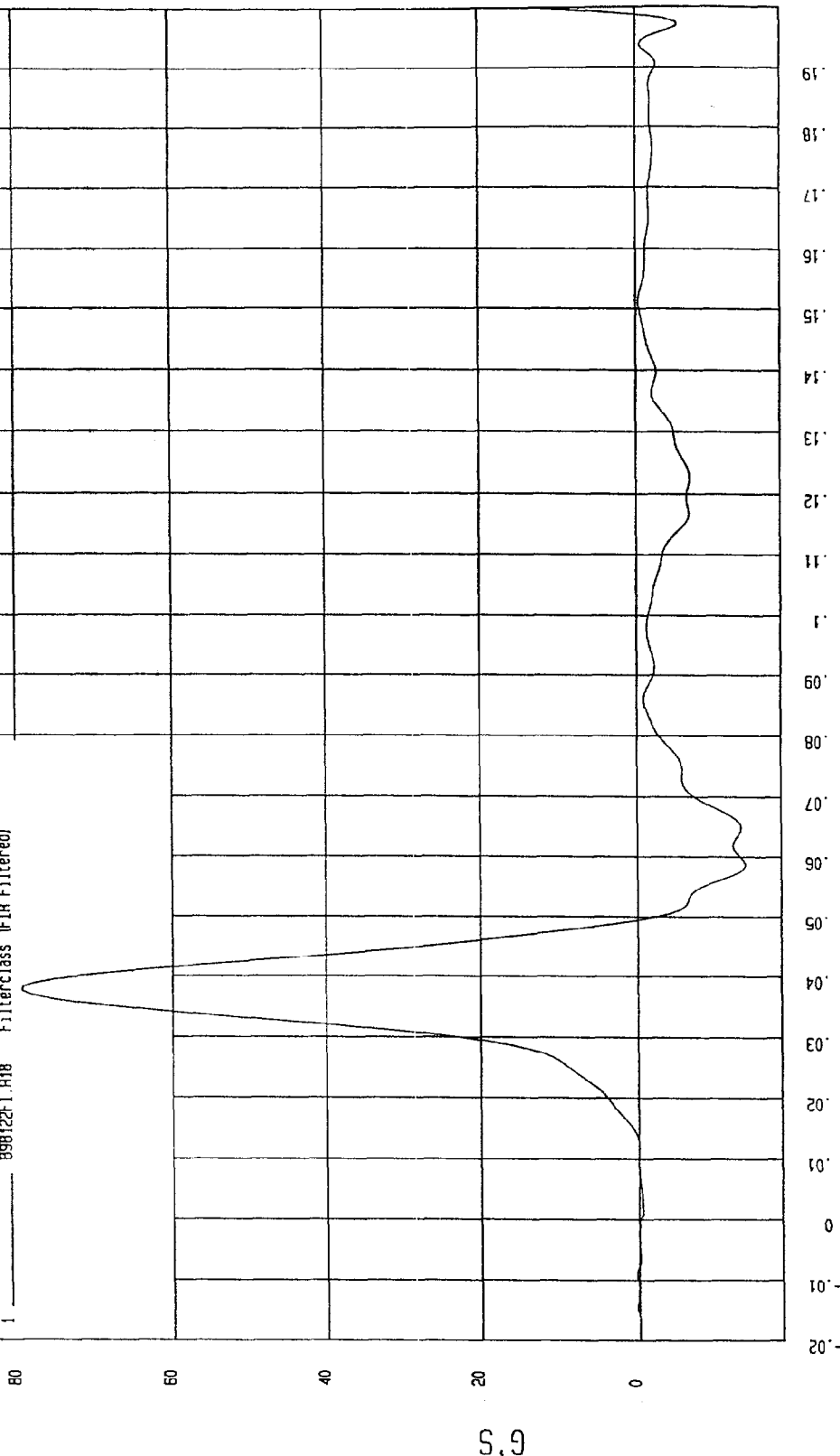
TEST: NCAP SIDE IMPACT TEST

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Minimum = -13.64 G'S at 59 msec

DRIVER PELVIS Y ACCELERATION

1 998122F1.R18 Filterclass (FIR Filtered)



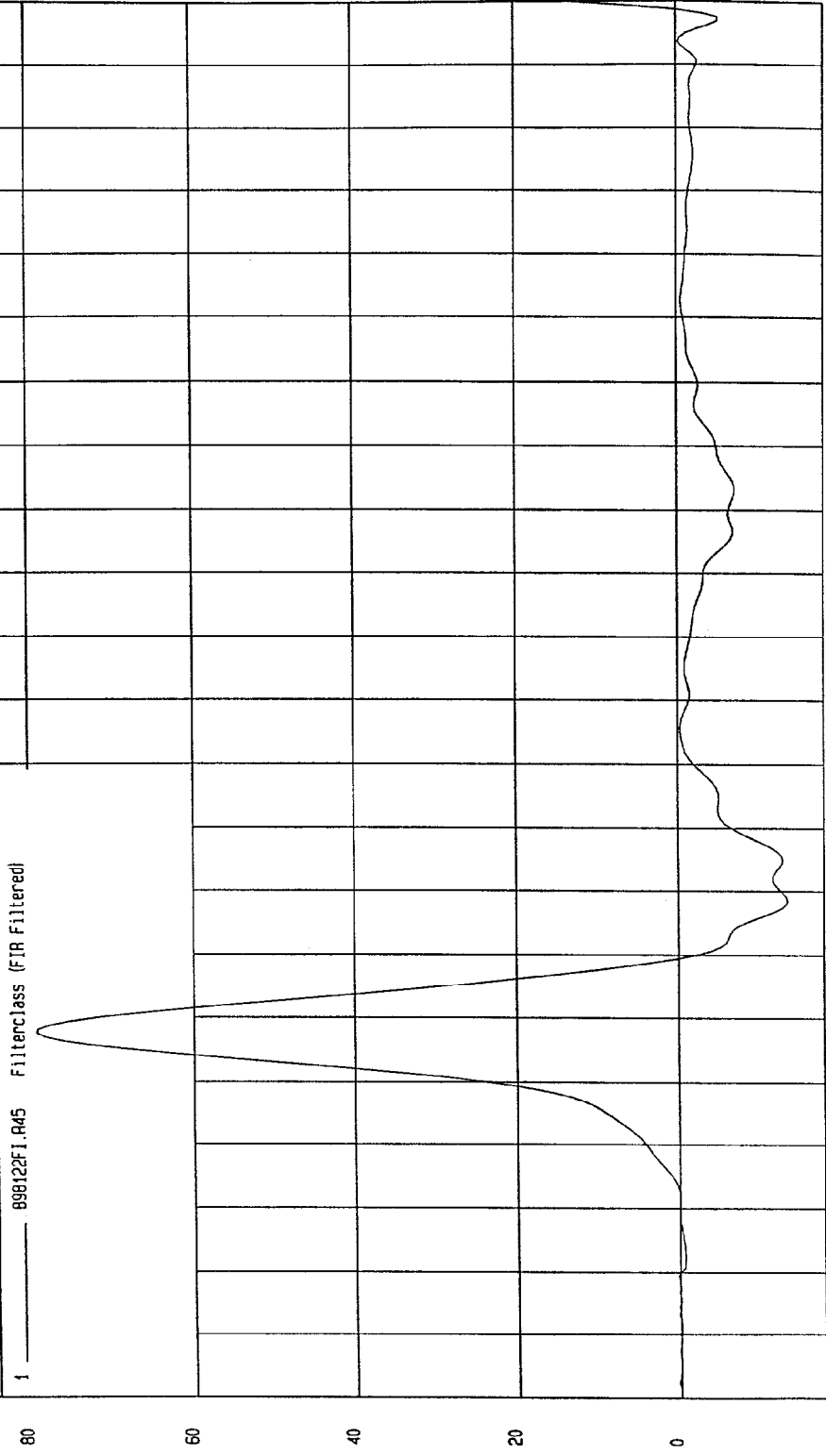
MGA Research
12-17-1998 16.00

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -13.26 G'S at 59 msec Maximum = 79.16 G'S at 38 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



MGA Research
12-17-1998 15:41

TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

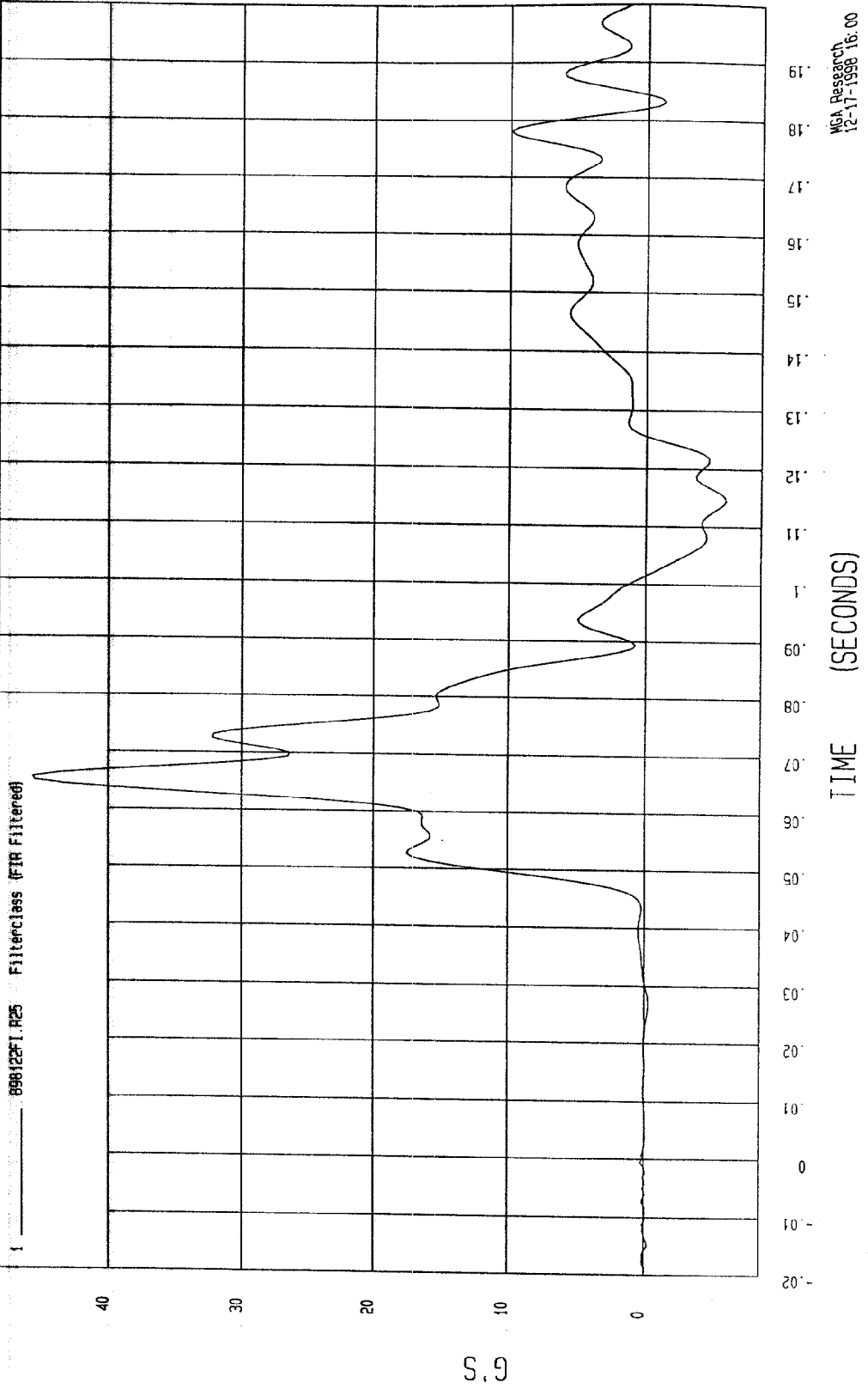
Speed: 38.46 MPH 61.9 KPH

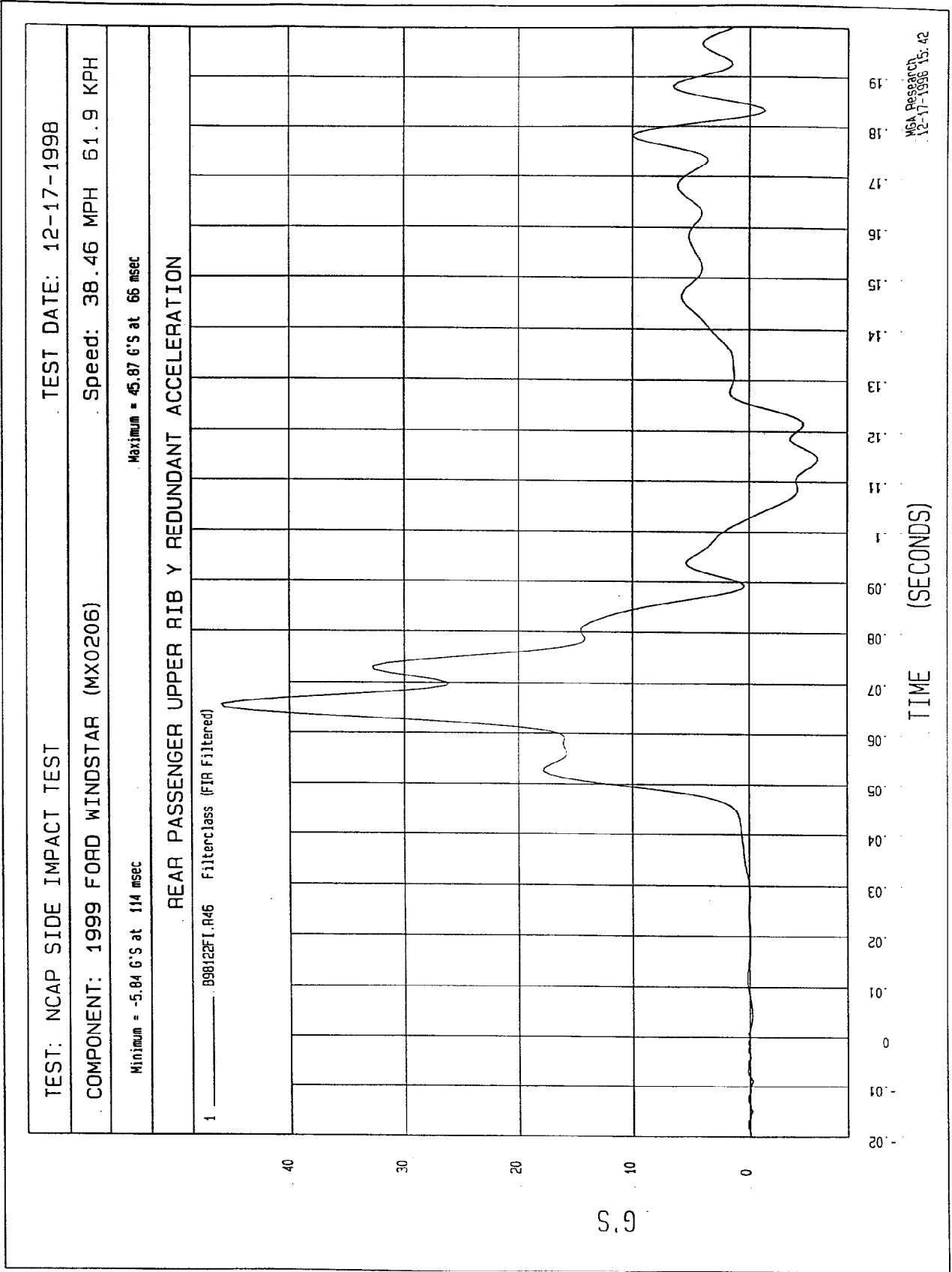
COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 45.63 G'S at 66 msec

Minimum = -5.84 G'S at 114 msec

REAR PASSENGER UPPER RIB Y ACCELERATION



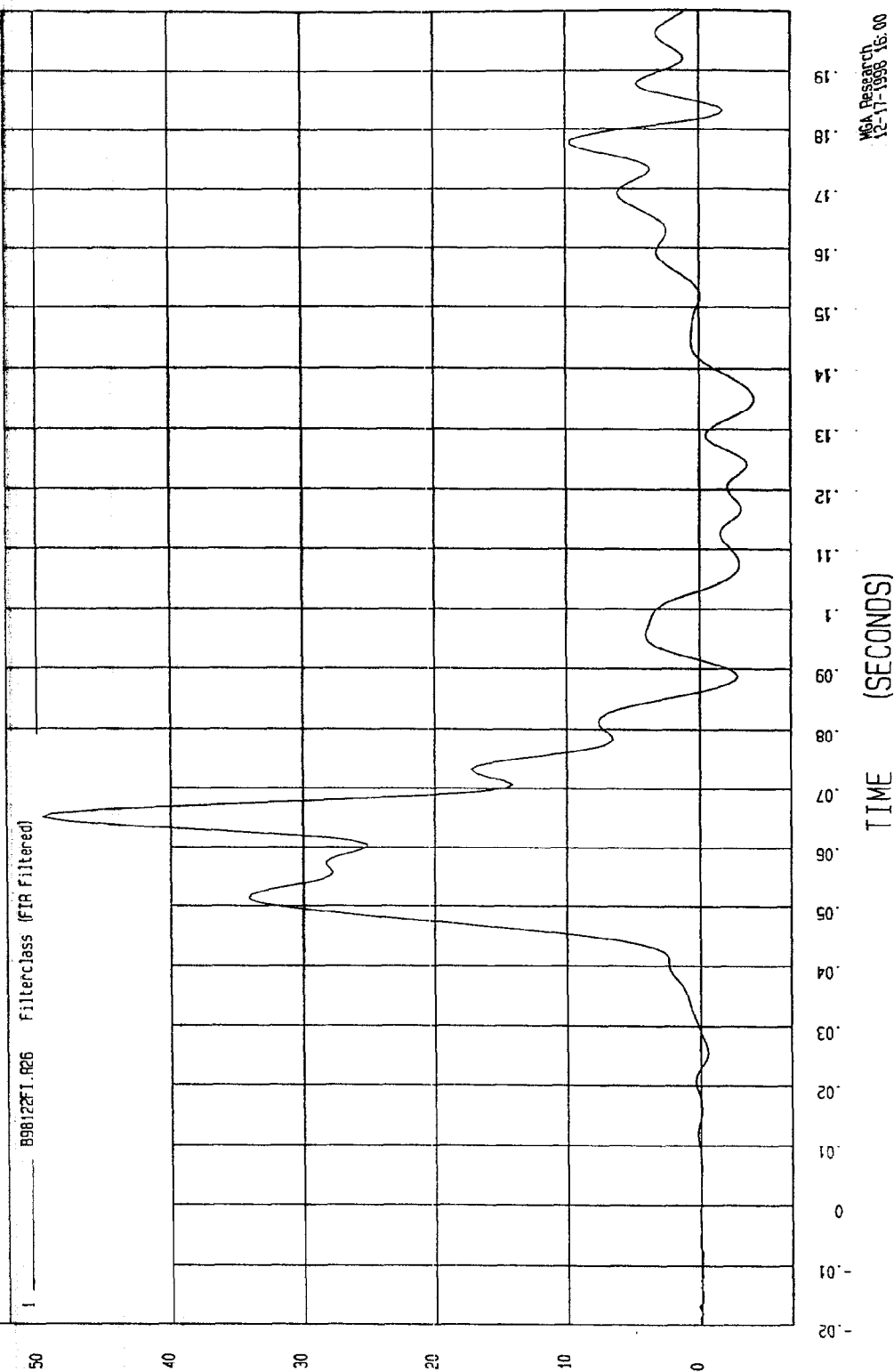


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

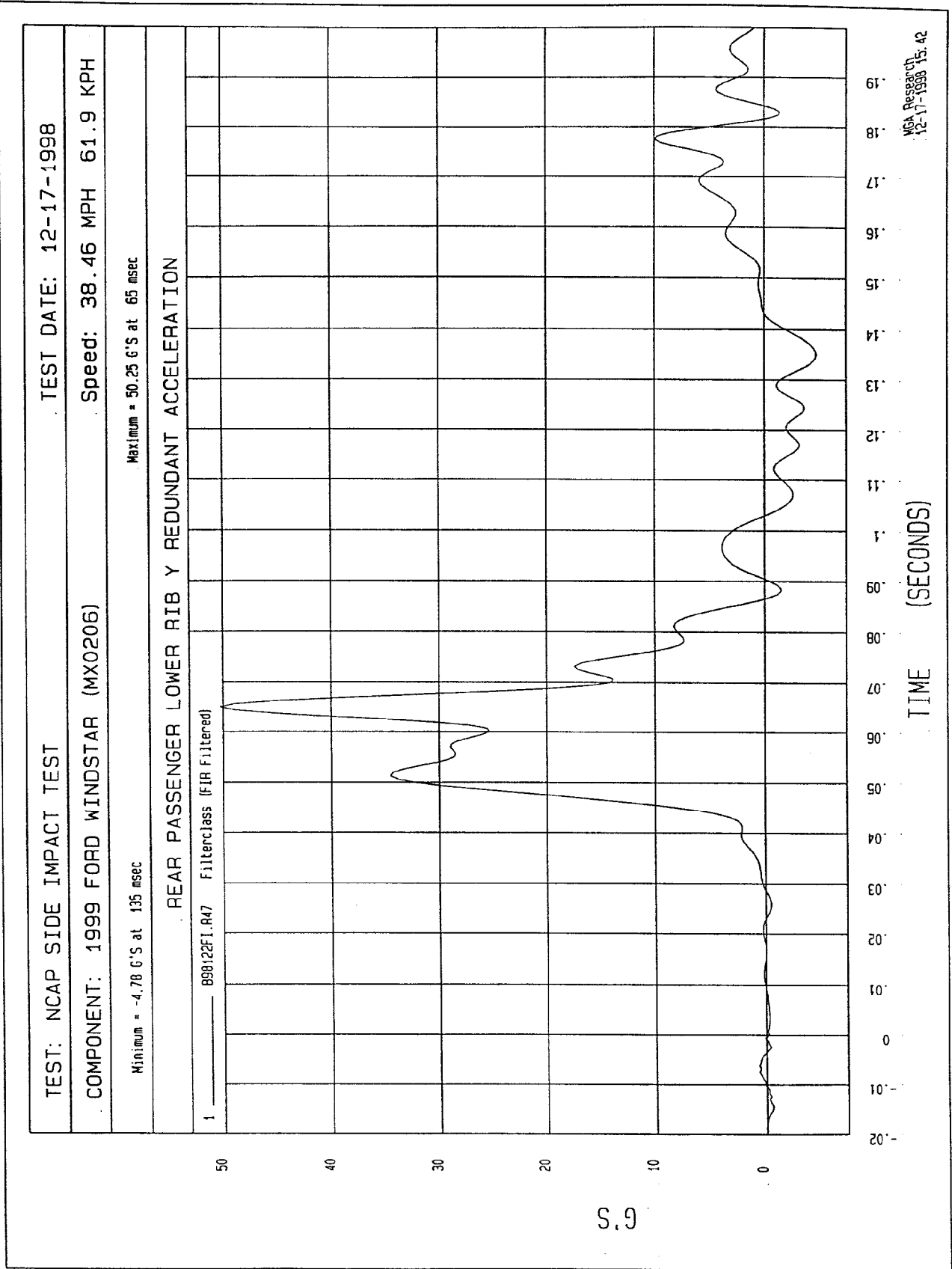
Minimum = -4.14 G'S at 135 msec Maximum = 49.63 G'S at 65 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



MSA Research
12-17-1998 16:00

S.G

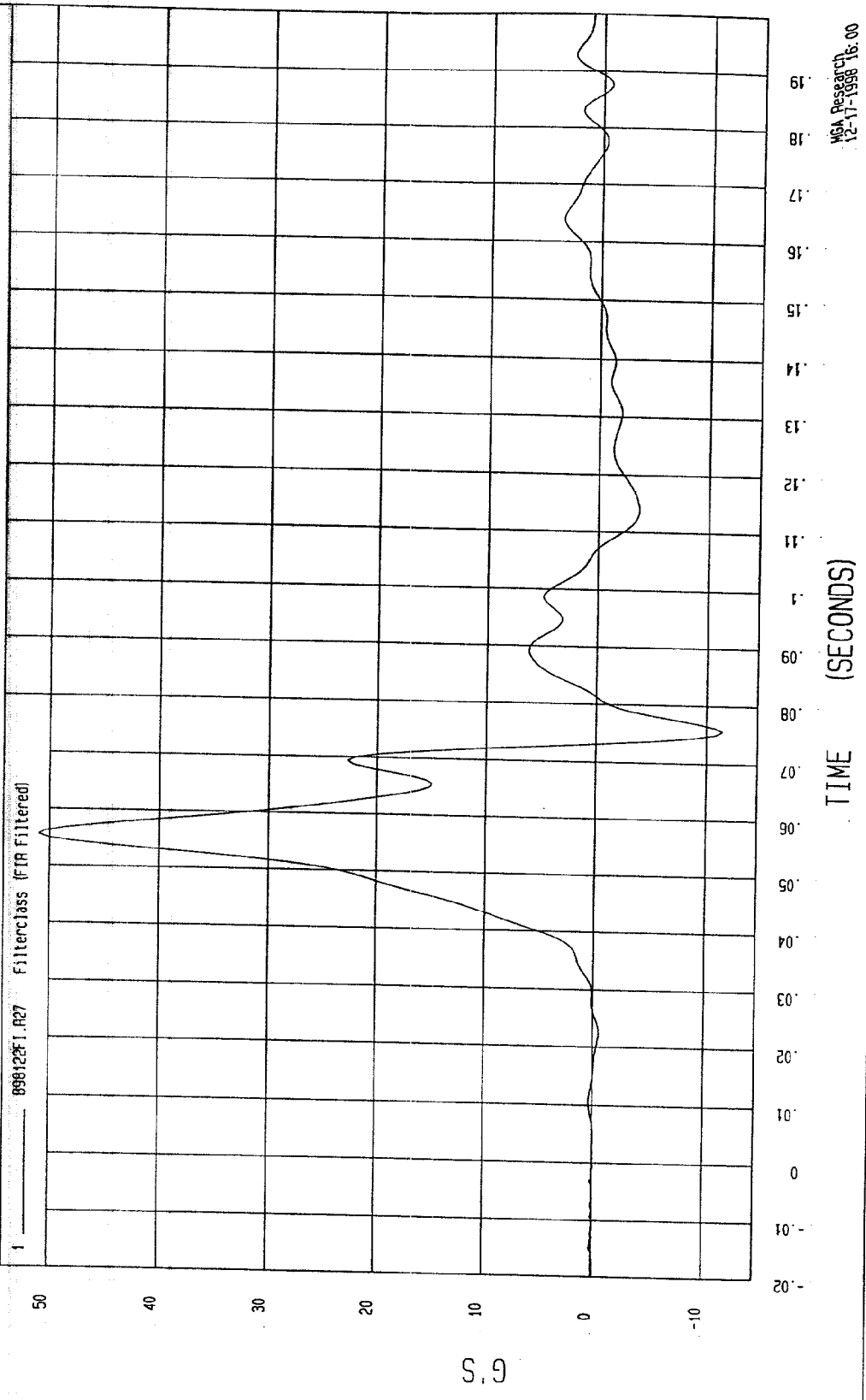


TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -11.44 G'S at 76 msec Maximum = 50.97 G'S at 56 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

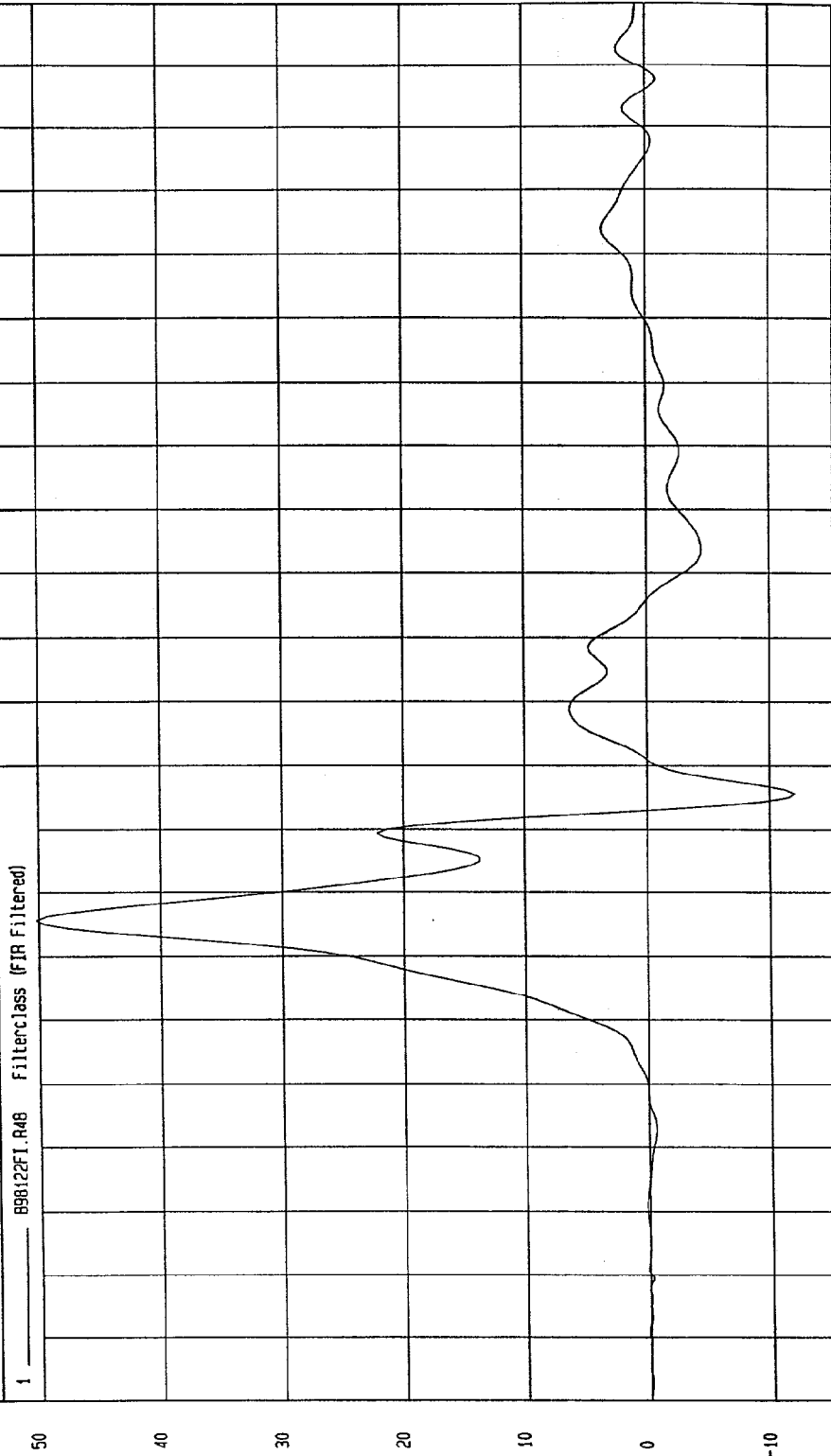
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 50.19 G'S at 56 msec

Minimum = -12.1 G'S at 76 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



TIME (SECONDS)

MGA Research
12-17-1998 15:42

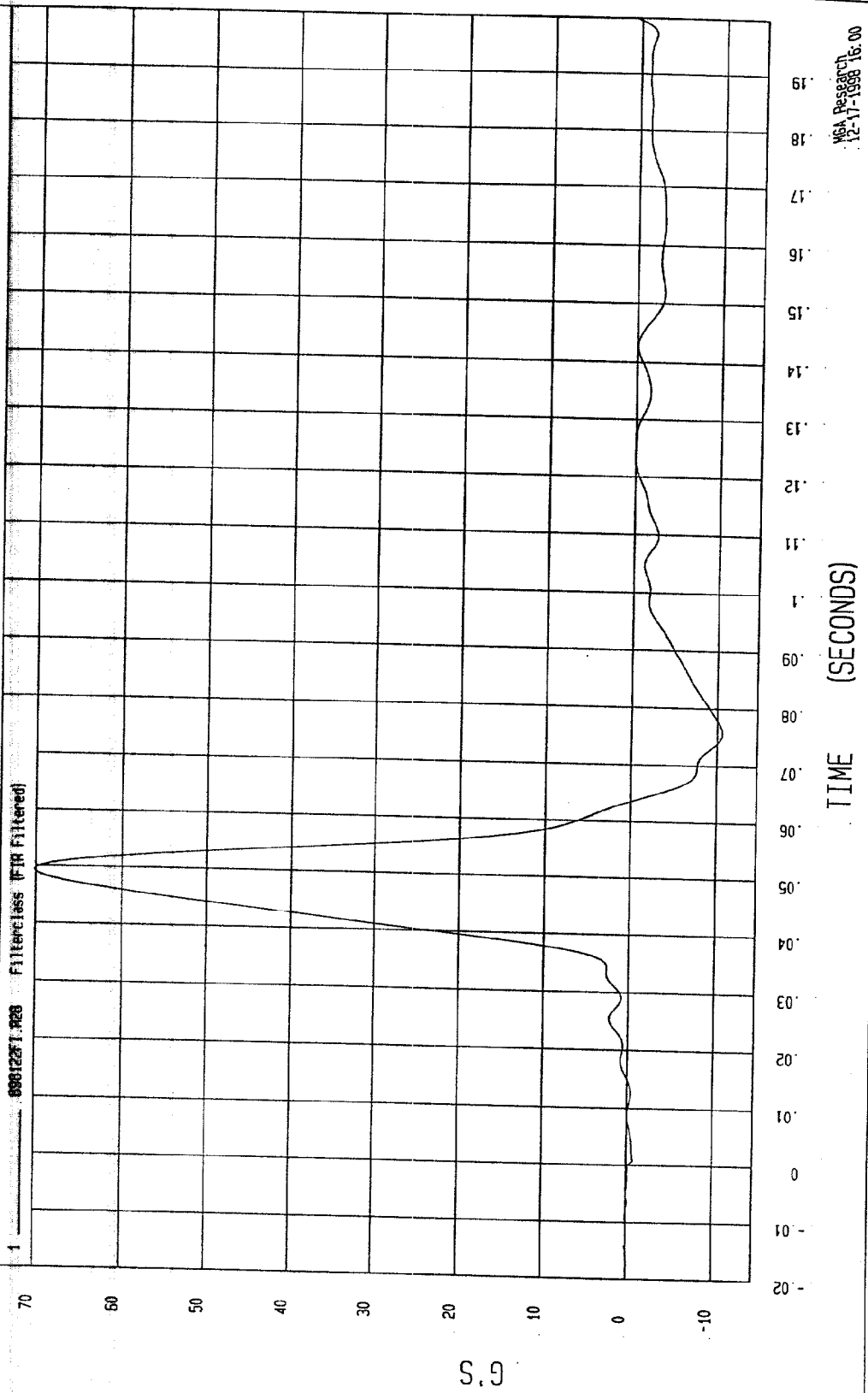
S.G

TEST: NCAP SIDE IMPACT TEST TEST DATE: 12-17-1998

COMPONENT: 1999 FORD WINDSTAR (MX0206) Speed: 38.46 MPH 61.9 KPH

Minimum = -10.64 G'S at 76 msec Maximum = 70.16 G'S at 49 msec

REAR PASSENGER PELVIS Y ACCELERATION



TEST: NCAP SIDE IMPACT TEST

TEST DATE: 12-17-1998

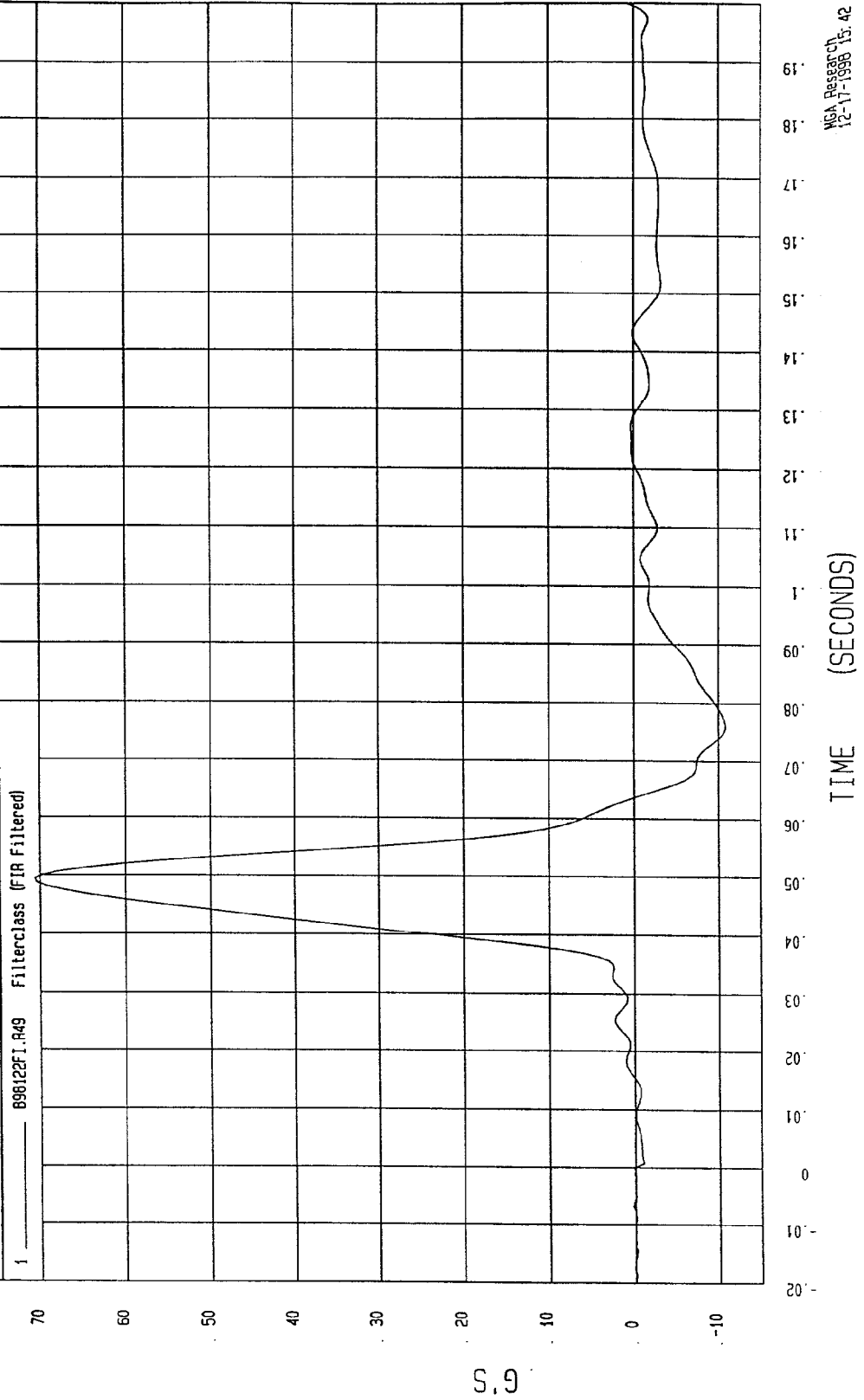
Speed: 38.46 MPH 61.9 KPH

COMPONENT: 1999 FORD WINDSTAR (MX0206)

Maximum = 70.6 G'S at 49 msec

Minimum = -10.81 G'S at 76 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION



APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 269

Calibration Test Results Summary

Driver Dummy Serial Number: 269

Pre-Test Calibration

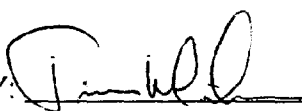
External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis 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 SERIAL NUMBER: 269DATE OF VERIFICATION: December 16, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	895
RH - Rib Height (mm)	501 - 521	508
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	232
KV - Knee Pivot From Back Line (mm)	511 - 526	523
SW - Knee Pivot to Floor (mm)	490 - 505	501
HW - Hip Width (mm)	356 - 391	382

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

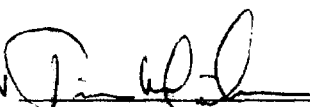
HEAD DROP TEST (LATERAL)

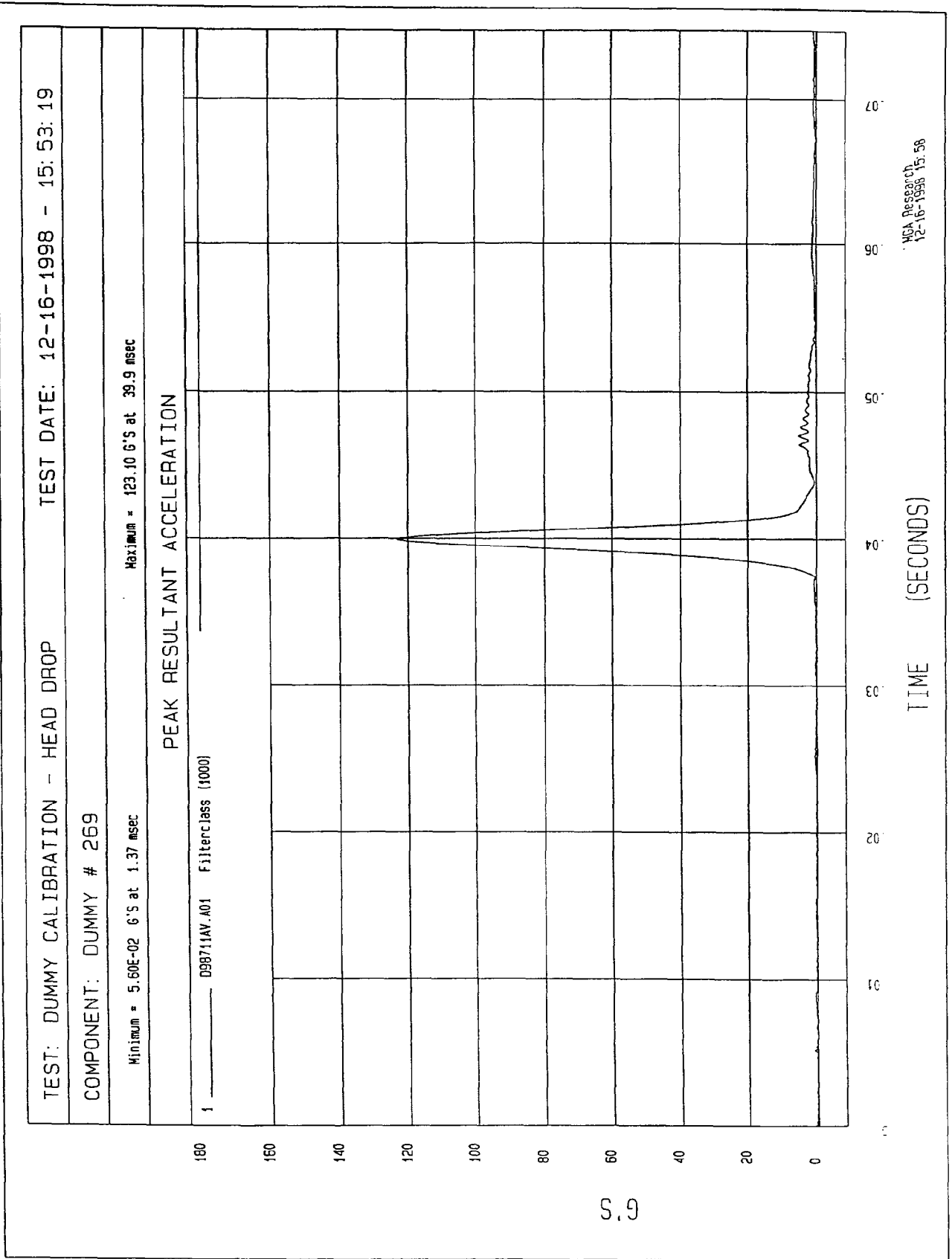
SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 269 TEST NUMBER: D981711

	SPECIFICATION	MEASUREMENT
Laboratory Temperature	66° - 78°	21.0°
Laboratory Relative Humidity	10% - 70%	23%
Peak Resultant Acceleration	120 - 150 G's	123
Is Resultant Curve Unimodal	within 15% of peak	Yes
Peak Longitudinal Acceleration	± 15 G max	-11

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 



TEST: DUMMY CALIBRATION - HEAD DROP TEST DATE: 12-16-1998 - 15:53

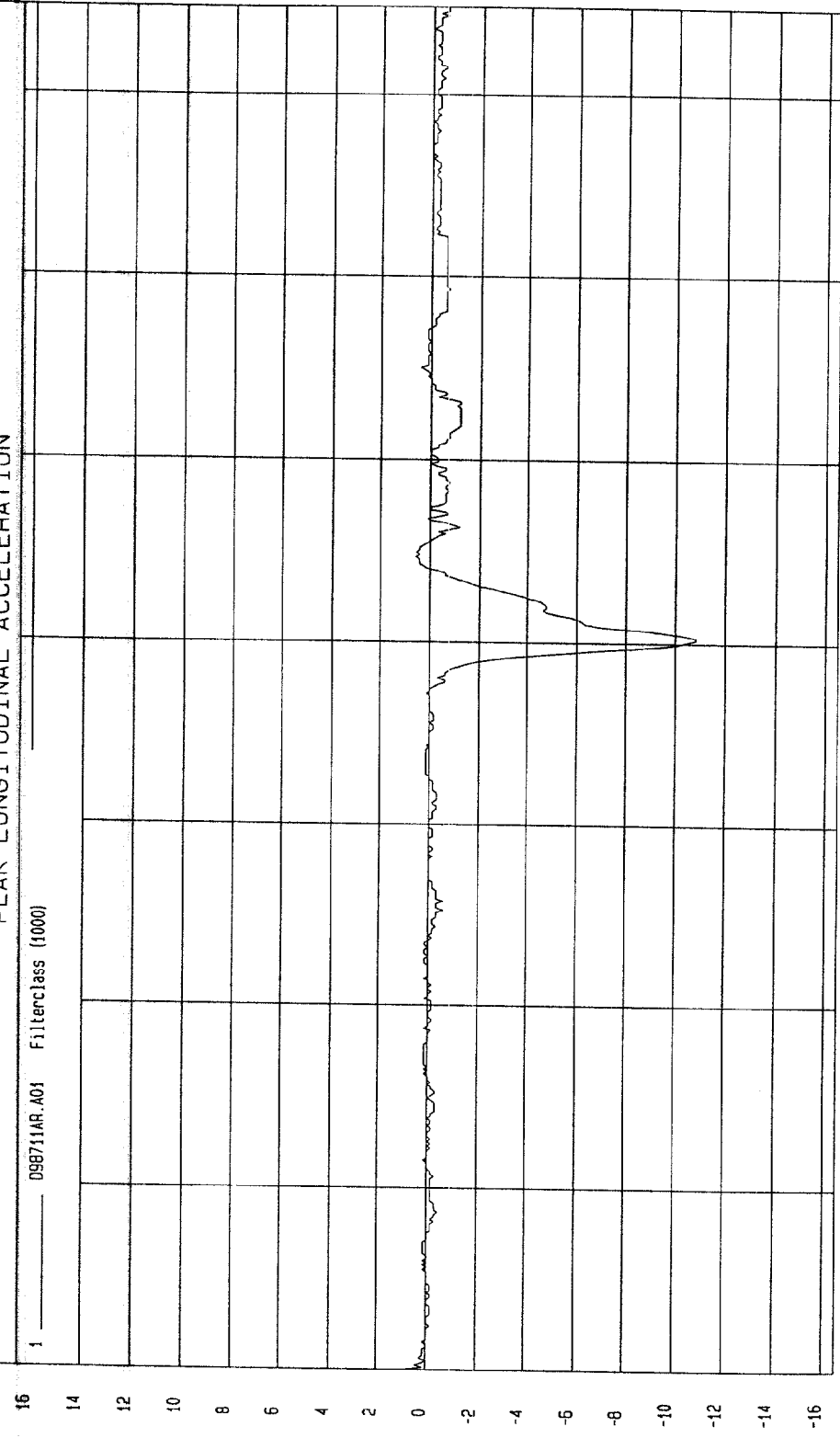
COMPONENT: DUMMY # 269

Minimum = -10.81 G'S at 40.1 msec

Maximum = 10.07 G'S at 99.4 msec

PEAK LONGITUDINAL ACCELERATION

1 _____ 098711AR.A01 Filterclass (1000)



0 2 4 6 8 10 12 14 16 0.01 0.02 0.03 0.04 0.05 0.06 0.07

TIME (SECONDS) M&A Research
12-16-1998 15:59

MGA RESEARCH CORPORATION

NECK PENDULUM TEST

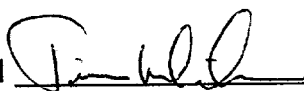
SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981719

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)		10 - 70	22%
IMPACT VELOCITY		6.89 - 7.13 MS	7.0
PENDULUM DECELERATION	10 MS	1.96 - 2.55 MS	2.35
	20 MS	4.12 - 5.10 MS	4.56
	30 MS	5.73 - 7.01 MS	6.27
	40 - 70 MS	6.27 - 7.64 MS	7.13
MIDSAGITAL PLANE MAX ROTATION		64° - 78°	72°
HEAD ROTATION PEAK TO ZERO - DECAY TIME		50 - 70 MS	63
MAX. M _x AT OCCIPITAL CONDYLES		88.1 - 108.5 NM	88.6
M _x PEAK TO ZERO - DECAY TIME		40 - 60 MS	51
M _x PEAK TO MAX. HEAD ROTATION		0 - 20 MS	6

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



TEST: LATERAL NECK BENDING

TEST DATE: 12-16-1998 - 14:30:37

COMPONENT: DUMMY # 269

Velocity: 22.95 FT/SEC 7 M/SEC

Minimum = 0 M/SEC at 0 msec

Maximum = 8.79 M/SEC at 190 msec

PENDULUM DECELERATION

1 _____ 098710A1.A04 Filterclass (1000)

10

8

6

4

2

0

M/SEC

0

10

20

30

40

50

60

70

TIME SEC

MGA Research
12-16-1998 15:03

TEST DATE: 12-16-1998 - 14:28:09

Velocity: 22.95 FT/SEC 7 M/SEC

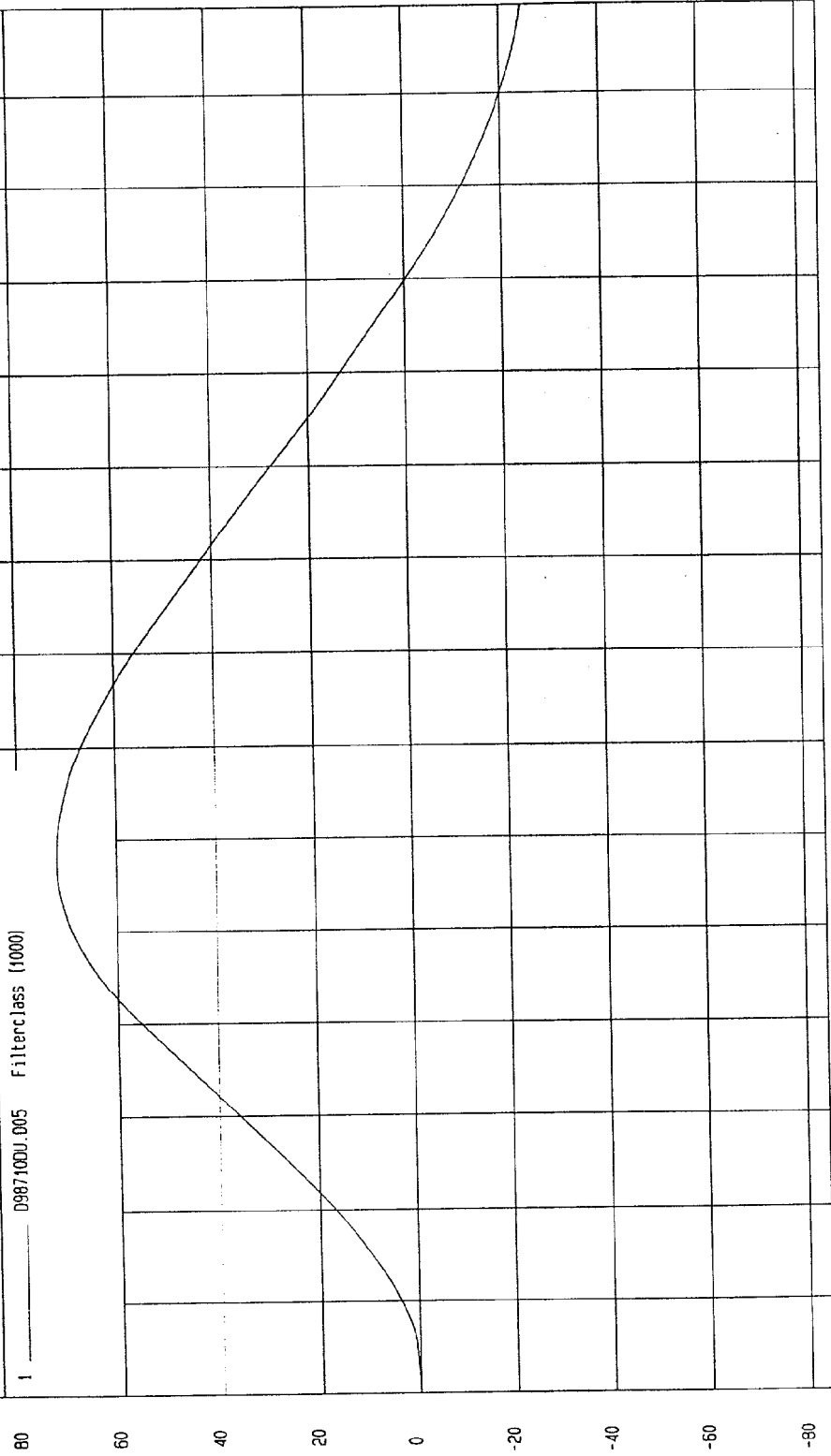
COMPONENT: DUMMY # 269

Maximum = 72.26 DEG at 57.0 msec

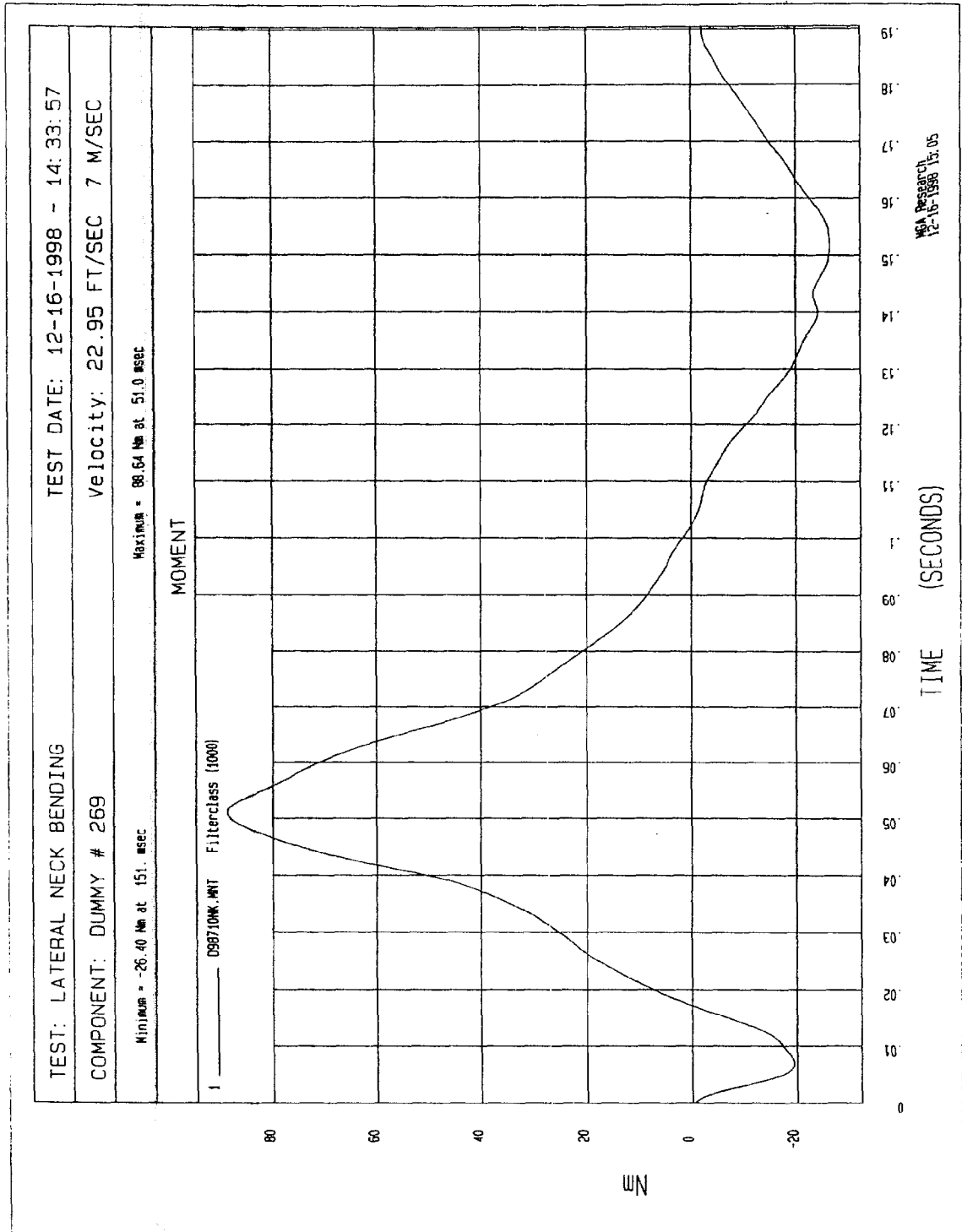
Minimum = -25.65 DEG at 157. msec

NECK ROTATION

1 0987100U.005 Filterclass (1000)



WCA Research
12-16-1998 15:03



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

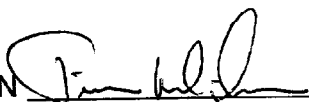
SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981712

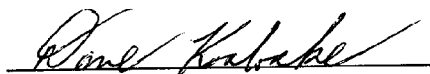
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.30
UPPER RIB (g's)	37 - 46 g's	44
LOWER RIB (g's)	37 - 46 g's	42
LOWER SPINE (g's)	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1998 - 10:02

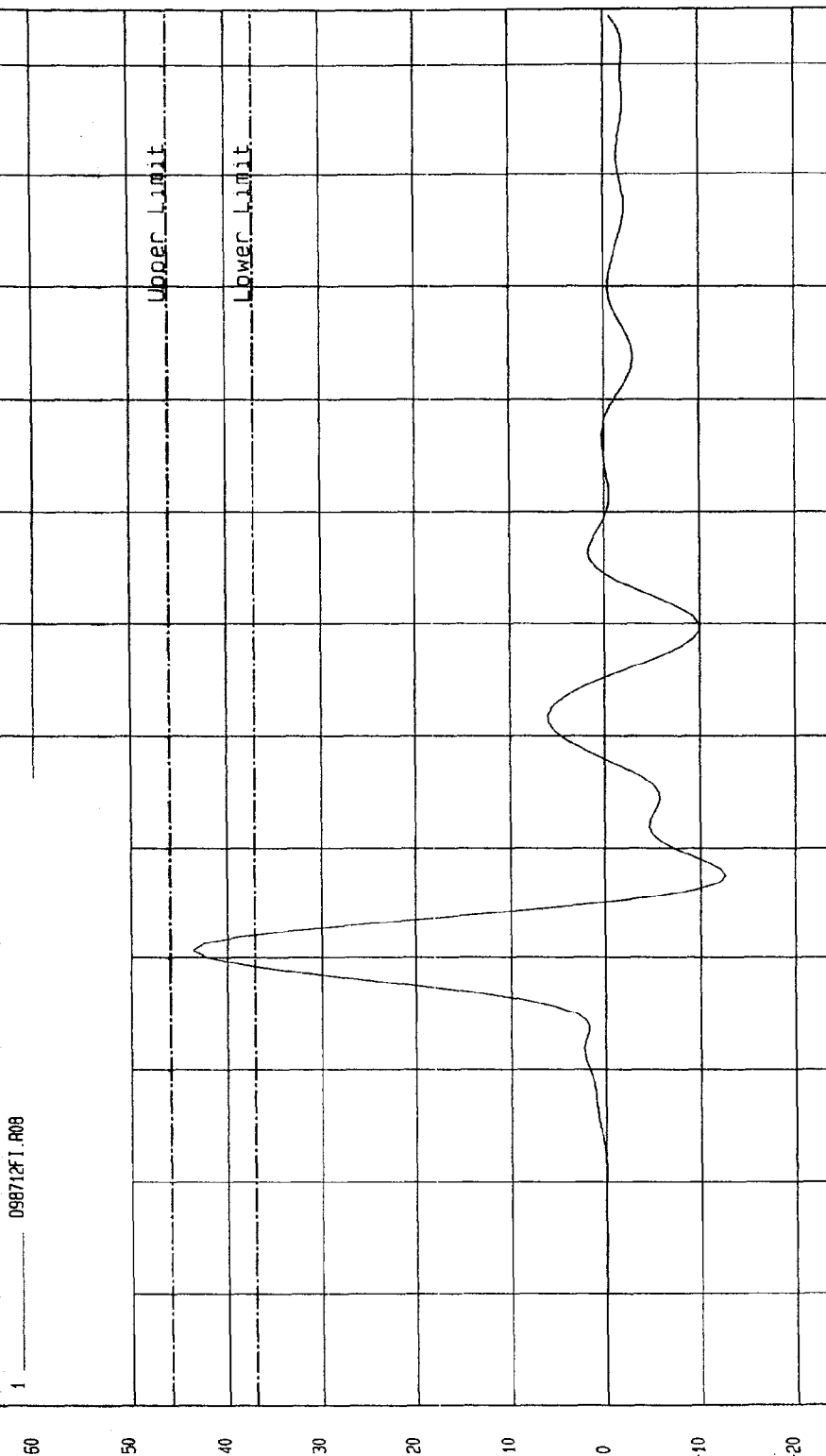
COMPONENT: DUMMY # 269 Velocity: 14.094 FT/SEC 4.3 M/SEC

Minimum = -12.68 G'S at 47.5 msec

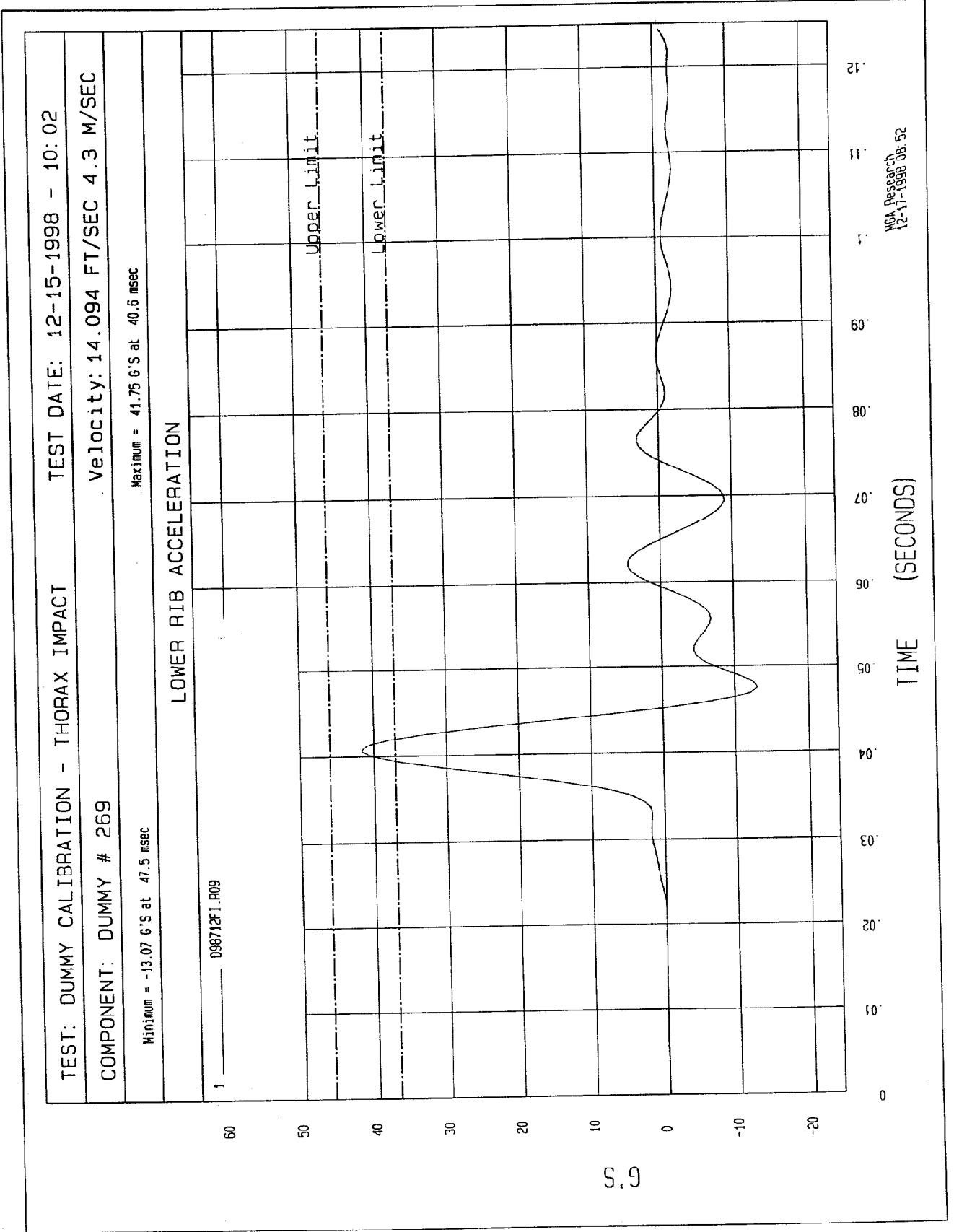
Maximum = 43.67 G'S at 40.6 msec

UPPER RIB ACCELERATION

1 098712F1.R08



MGA Research
12-17-1998 08:52



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-15-1998 - 10:02

COMPONENT: DUMMY # 269 Velocity: 14.094 FT/SEC 4.3 M/SEC

Minimum = -6.06 G'S at 64.3 msec

Maximum = 20.47 G'S at 45.6 msec

LOWER SPINE ACCELERATION

1 ——— D98712F1.R10

30

20

10

0

-10

-20

S.G

Upper Limit

Lower Limit

12

11

10

9

8

7

6

5

4

3

2

1

0

MCA Research
12-17-1998 08:53

TIME (SECONDS)

MGA RESEARCH CORPORATION

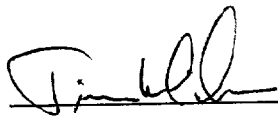
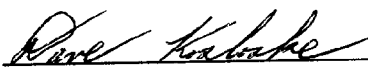
PELVIS IMPACT TEST

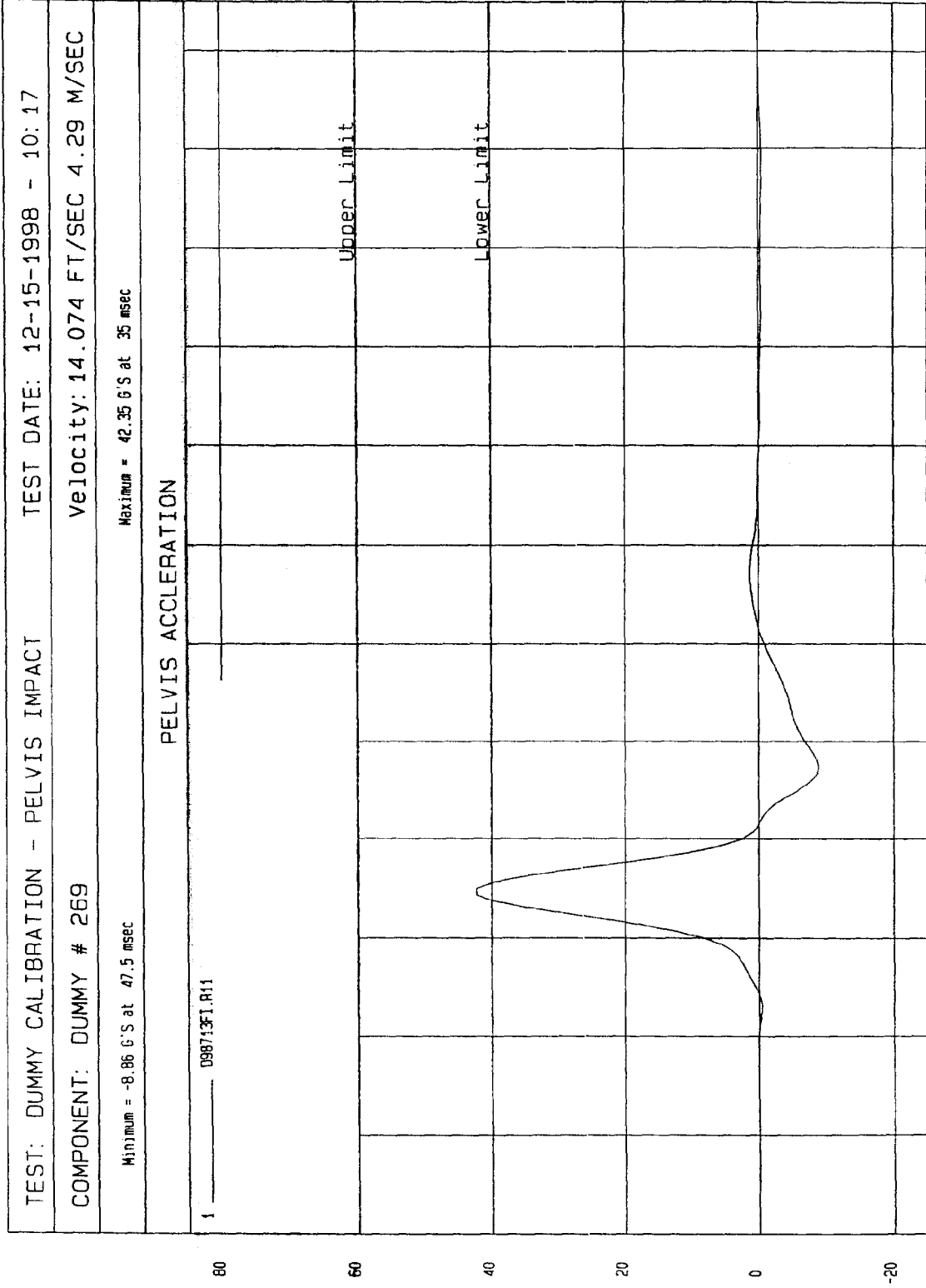
SIDE IMPACT DUMMY (SID)

DATE: December 15, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981713

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	42

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 



MCA Research
12-17-1998 08:53

TIME (SECONDS)

G

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ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

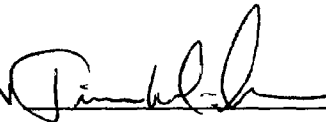
SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981714

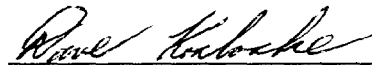
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 12.7 mm	104 - 162	140
FORCE @ 19.0 mm	163 - 222	201
FORCE @ 25.4 mm	222 - 280	263
FORCE @ 33 mm	325 - 391	357

TEST MEETS SPECIFICATIONS

TECHNICIAN



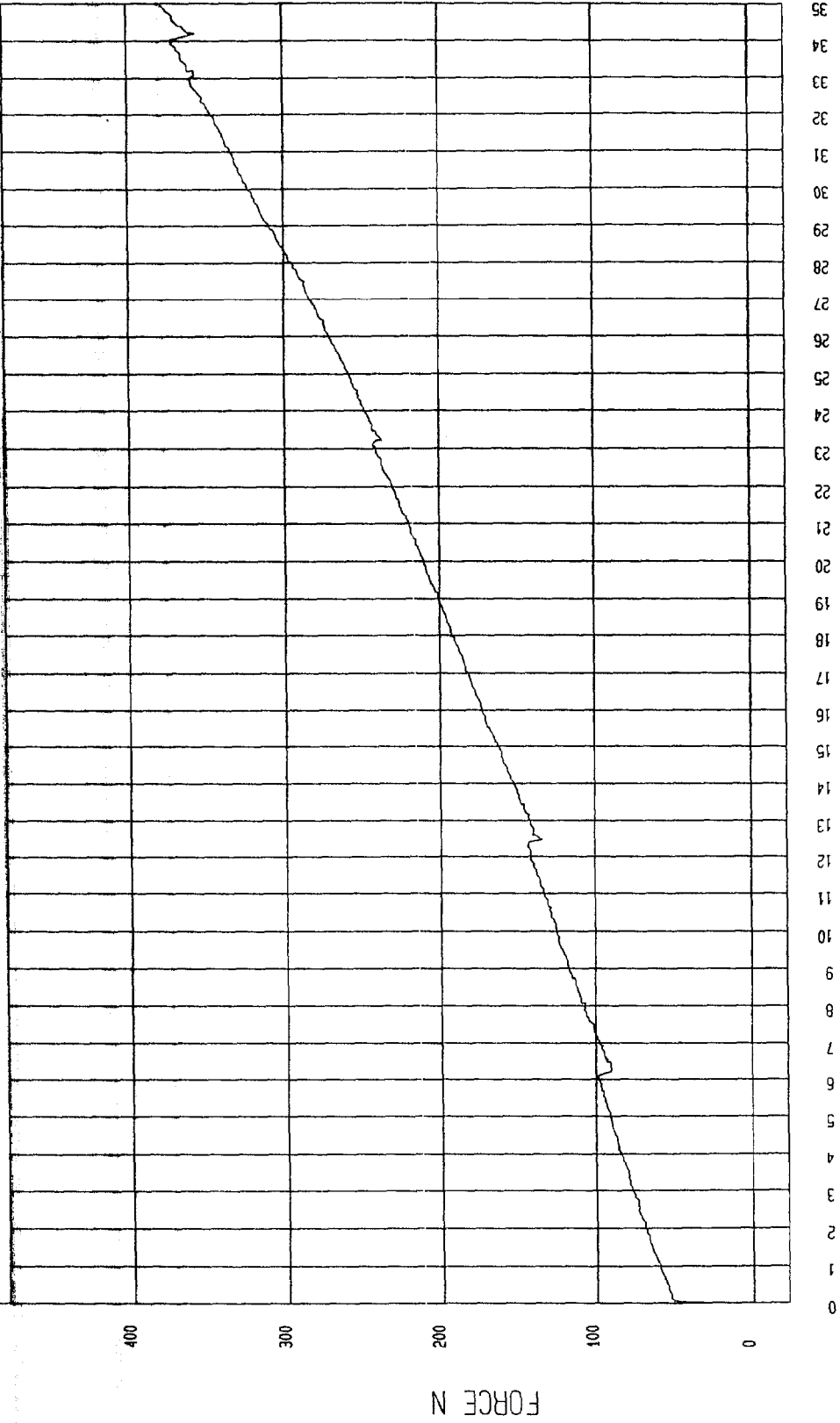
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-16-1998 - 09:19:47

COMPONENT: DUMMY # 269

FORCE as a function of FORCE



MSA Research
12-17-1998 09:17

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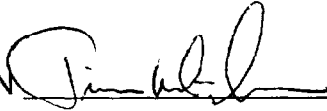
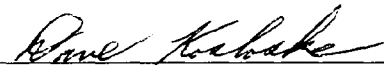
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 16, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981715

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	148.1
FORCE @ 30°	151.2 - 204.6	176.2
FORCE @ 40°	204.6 - 258.0	220.3
RETURN ANGLE	12° maximum	5°

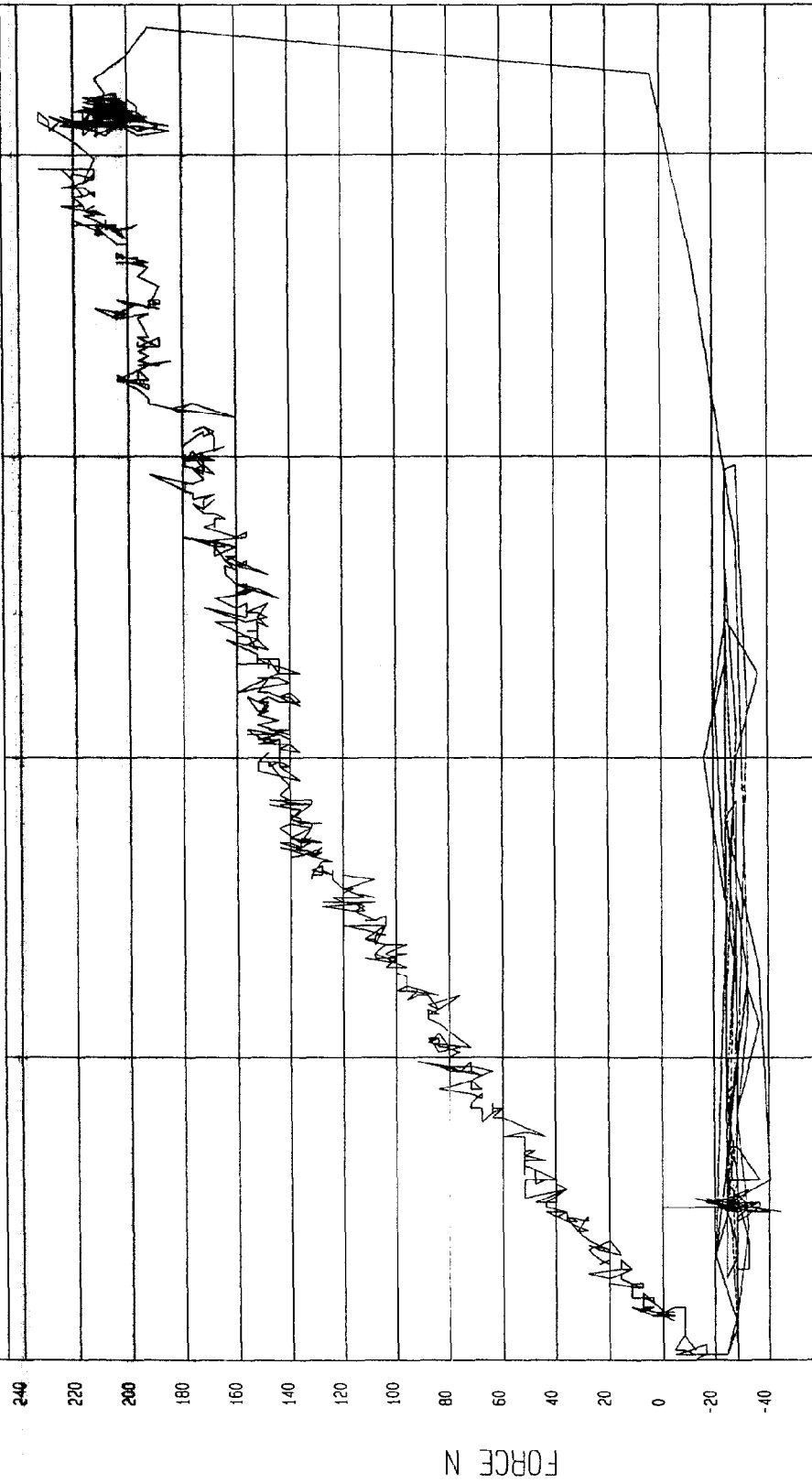
TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-16-1998 - 10:52:45

COMPONENT: DUMMY # 269

FORCE as a function of TORSO ROTATION



40
30
20
10
0
TORSO ROTATION DEGREES
MCA Research
12-17-1998 09:17

PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 270

Calibration Test Results Summary

Passenger Dummy Serial Number: 270

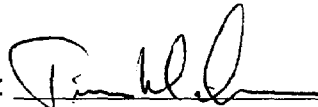
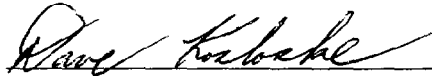
Pre-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NUMBER: 270DATE OF VERIFICATION: December 10, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	894
RH - Rib Height (mm)	501 - 521	514
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	238
KV - Knee Pivot From Back Line (mm)	511 - 526	519
SW - Knee Pivot to Floor (mm)	490 - 505	494
HW - Hip Width (mm)	356 - 391	371

MEASUREMENTS BY: APPROVED BY: 

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THORAX IMPACT TEST

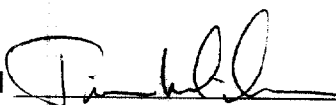
SIDE IMPACT DUMMY (SID)

DATE: December 10, 1998DUMMY SERIAL NUMBER: 270 TEST NUMBER: D981582

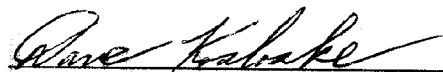
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46 g's	38
LOWER RIB (g's)	37 - 46 g's	42
LOWER SPINE (g's)	15 - 22 g's	22

TEST MEETS SPECIFICATIONS

TECHNICIAN

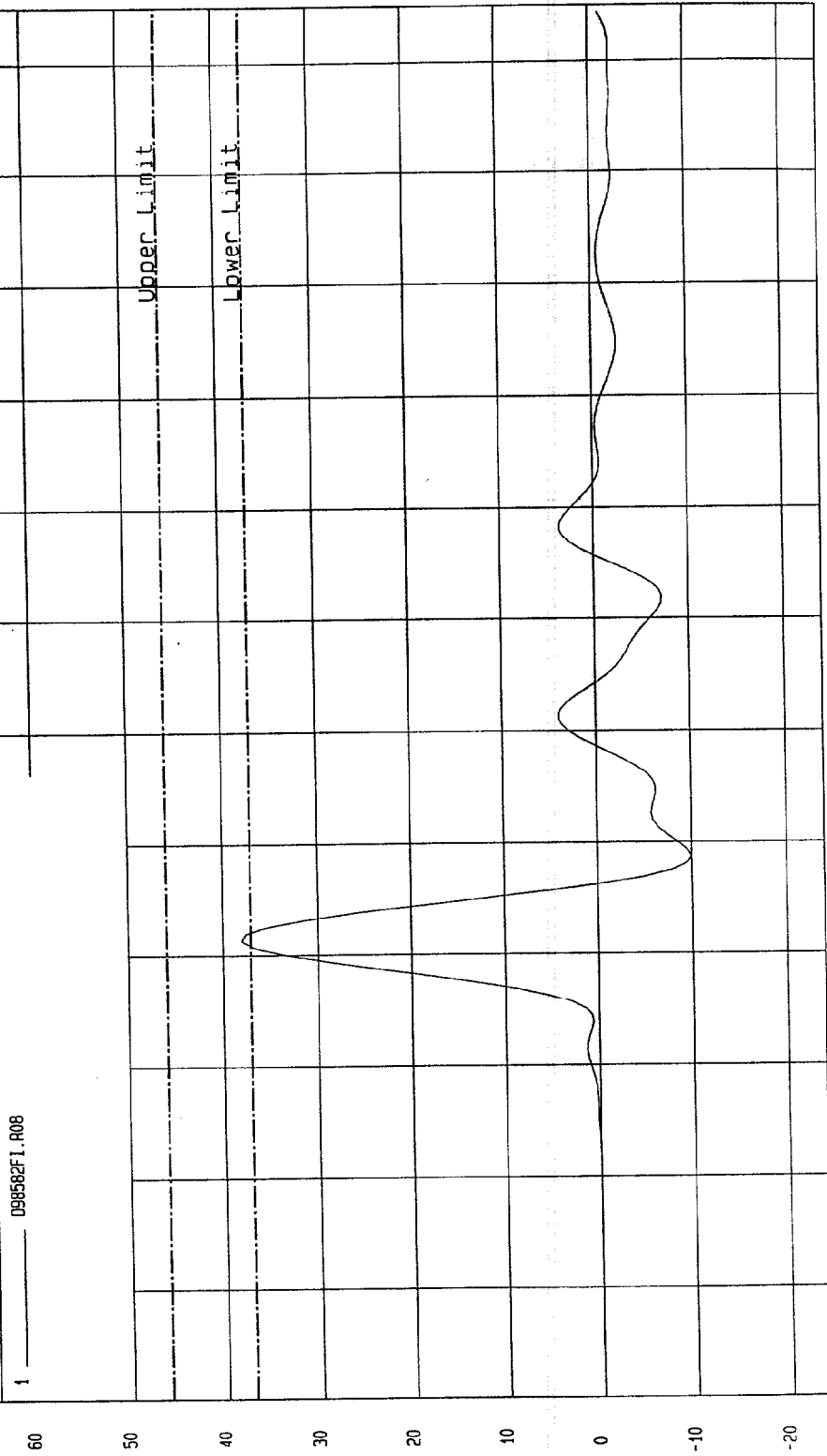


APPROVED BY



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-10-1998 - 15:18
 COMPONENT: DUMMY # 270 Velocity: 14.02 FT/SEC 4.27 M/SEC
 Minimum = -9.97 G'S at 48.7 msec Maximum = 37.98 G'S at 41.2 msec

UPPER RIB ACCELERATION



TIME (SECONDS)

WCA Research
12-10-1998 21:50

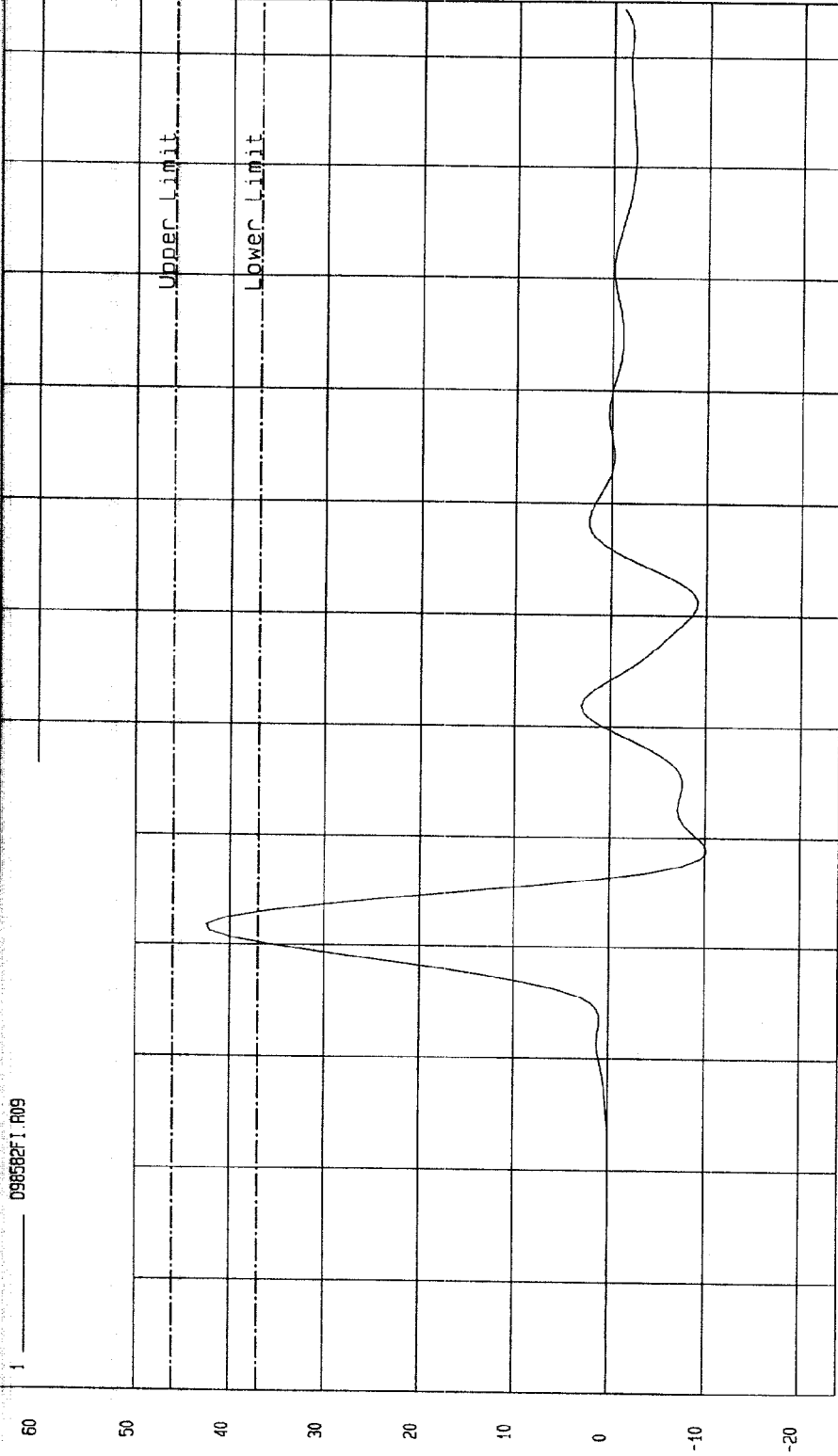
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-10-1998 - 15:18

COMPONENT: DUMMY # 270 Velocity: 14.02 FT/SEC 4.27 M/SEC

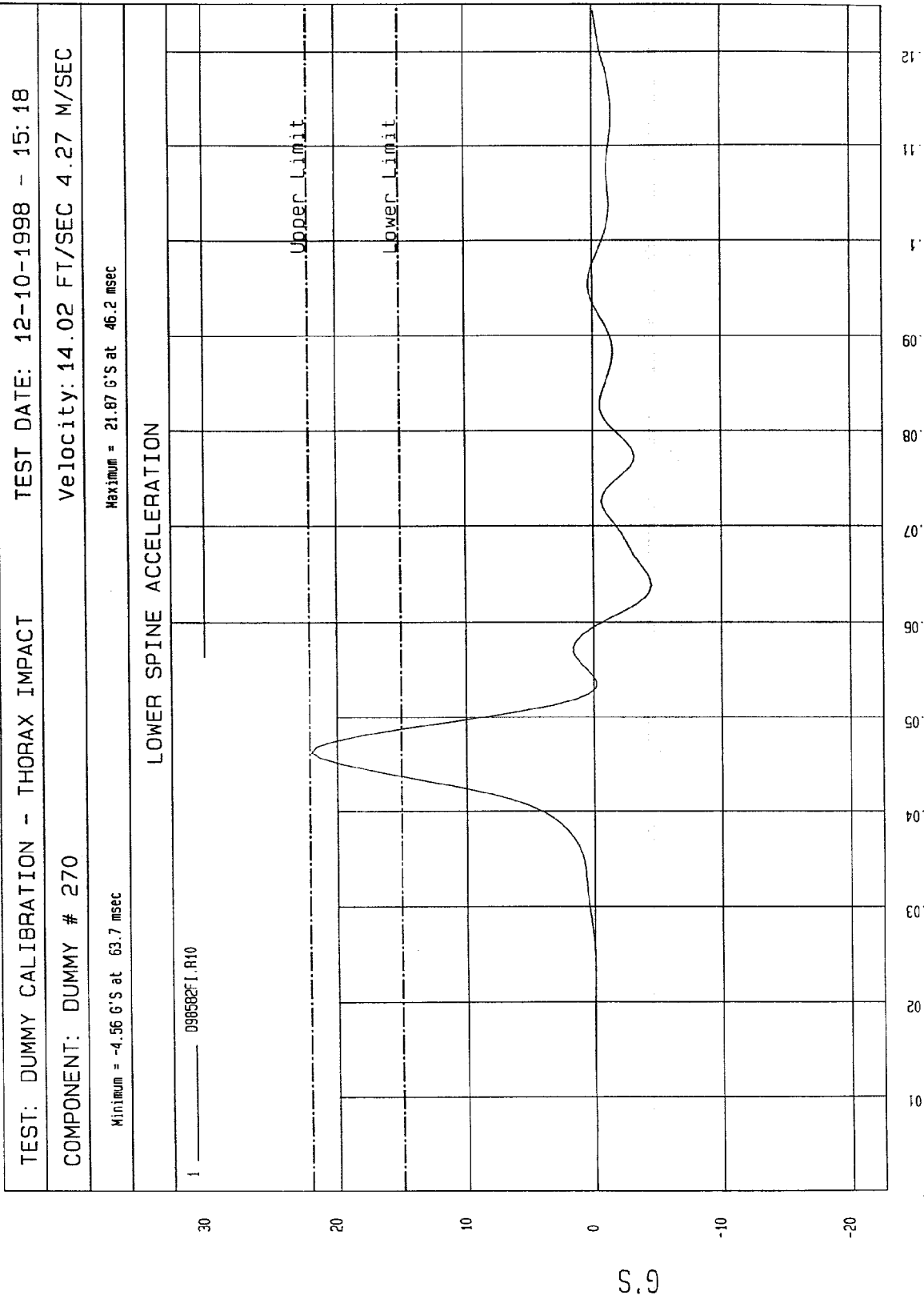
Minimum = -10.16 G'S at 48.7 msec Maximum = 42.41 G'S at 41.8 msec

LOWER RIB ACCELERATION

1 _____ D98582FI R09



MCA Research
12-10-1998 21:50

WSA Research
12-10-1998 21:51

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

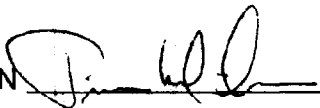
SIDE IMPACT DUMMY (SID)

DATE: December 10, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981583

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	22%
PROBE SPEED (m/s)	4.27 - 4.33	4.28
PELVIS ACCELERATION (g's)	40 - 60	44

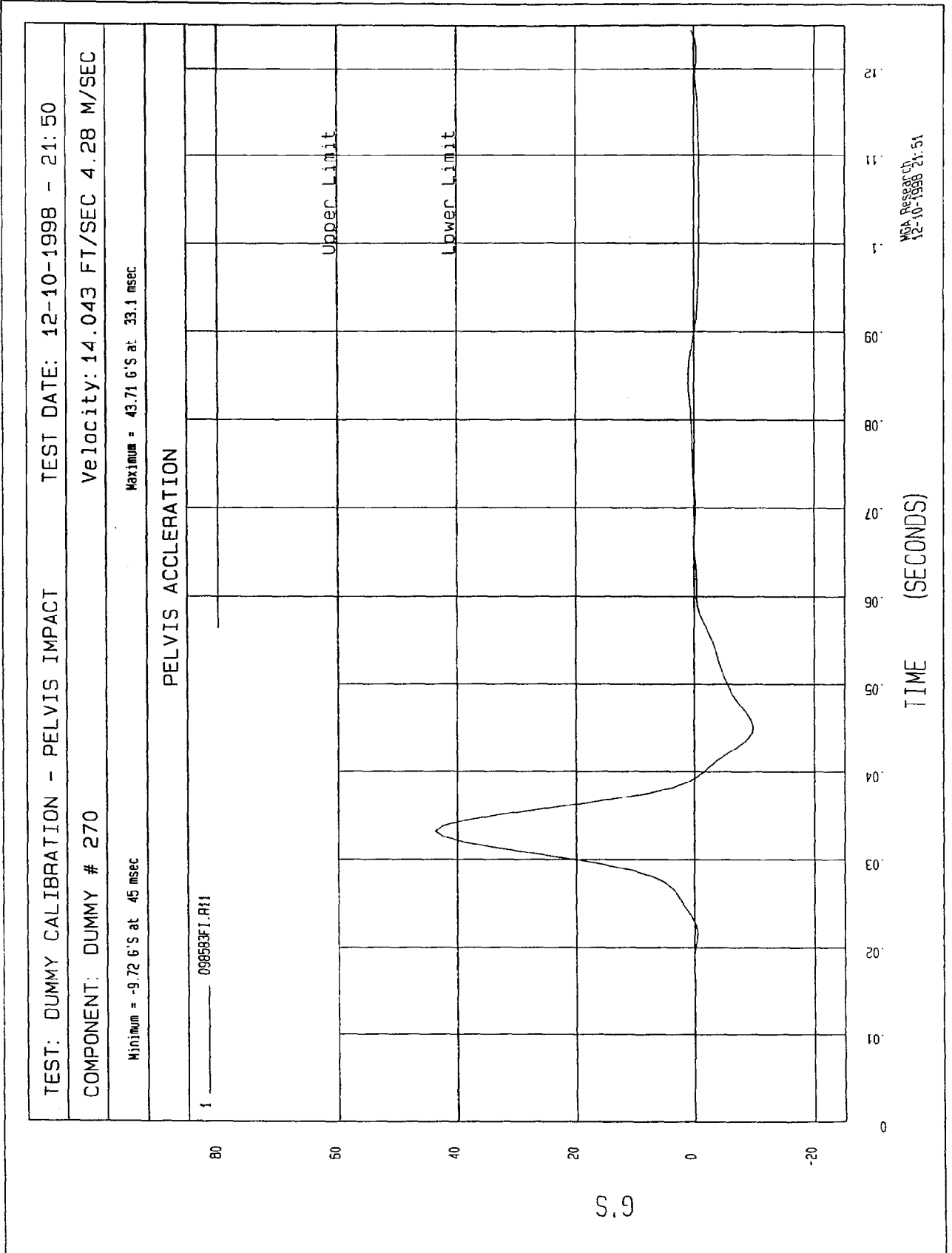
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981584

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	23%
FORCE @ 12.7 mm	104 - 162	135
FORCE @ 19.0 mm	163 - 222	184
FORCE @ 25.4 mm	222 - 280	246
FORCE @ 33 mm	325 - 391	342

TEST MEETS SPECIFICATIONS

TECHNICIAN



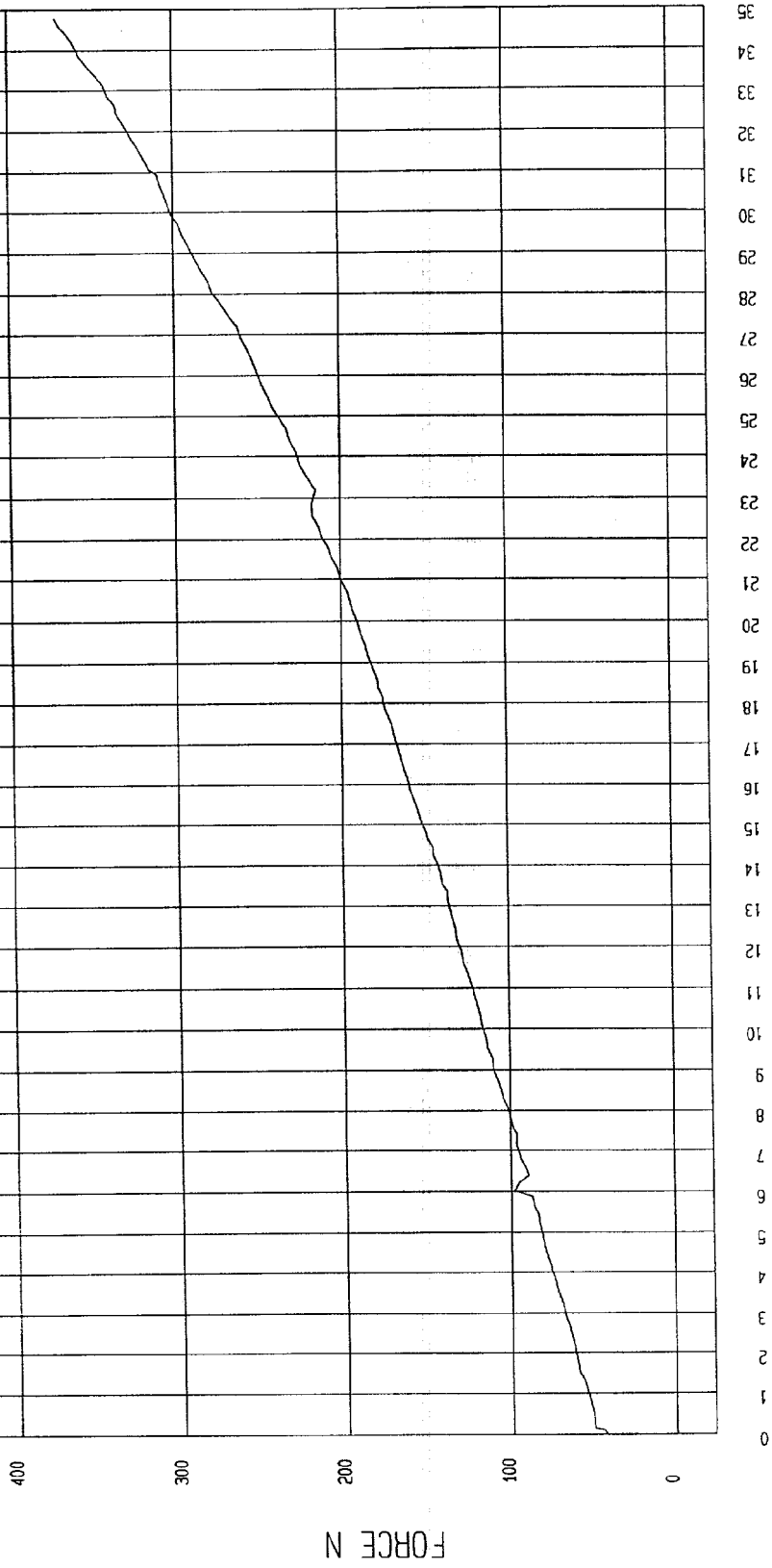
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-10-1998 - 13:48:36

COMPONENT: DUMMY # 270

FORCE as a function of DISPLACEMENT



W&A Research
12-10-1998 14.02

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

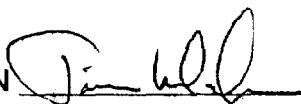
SIDE IMPACT DUMMY (SID)

DATE: December 10, 1988DUMMY SERIAL NUMBER: 270TEST NUMBER: D981585

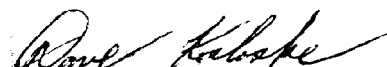
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	24%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	133.5
FORCE @ 30°	151.2 - 204.6	185.7
FORCE @ 40°	204.6 - 258.0	229.8
RETURN ANGLE	12° maximum	6°

TEST MEETS SPECIFICATIONS

TECHNICIAN



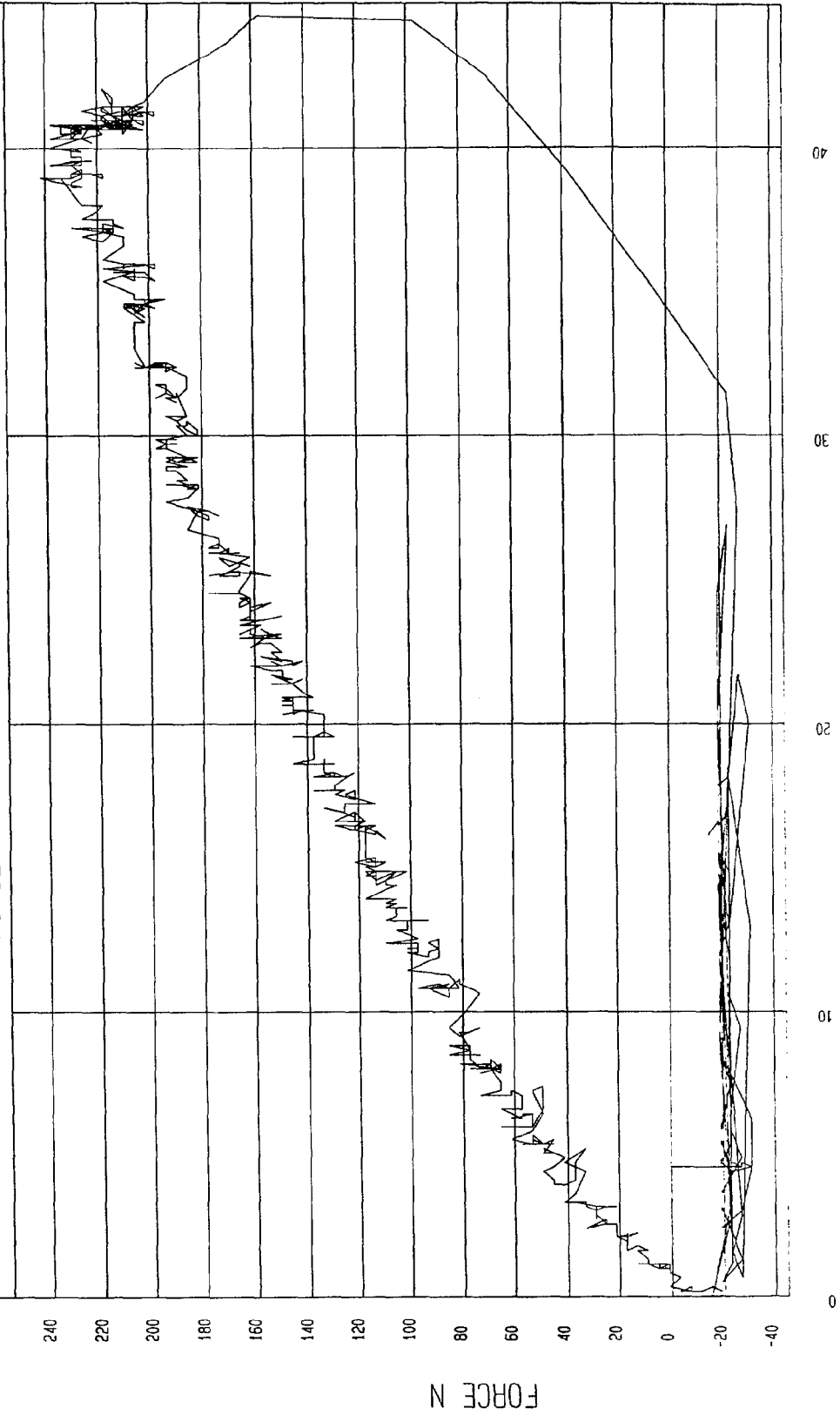
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-10-1998 - 11:25:54

COMPONENT: DUMMY # 270

FORCE as a function of TORSO ROTATION



MSA Research
12-10-1998 11:54

TORSO ROTATION DEGREES

POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 269

Calibration Test Results Summary

Driver Dummy Serial Number: 269

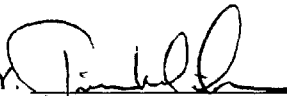
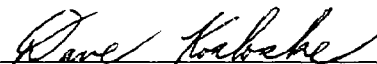
Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test 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 SERIAL NUMBER: 269DATE OF VERIFICATION: December 23, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	895
RH - Rib Height (mm)	501 - 521	508
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	232
KV - Knee Pivot From Back Line (mm)	511 - 526	523
SW - Knee Pivot to Floor (mm)	490 - 505	501
HW - Hip Width (mm)	356 - 391	382

MEASUREMENTS BY: APPROVED BY: 

MGA RESEARCH CORPORATION

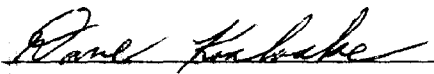
HEAD DROP TEST (LATERAL)

SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981721

	SPECIFICATION	MEASUREMENT
Laboratory Temperature	66° - 78°	21.0°
Laboratory Relative Humidity	10% - 70%	21%
Peak Resultant Acceleration	120 - 150 G's	137
Is Resultant Curve Unimodal	within 15% of peak	Yes
Peak Longitudinal Acceleration	± 15 G max	-8

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - HEAD DROP TEST DATE: 12-23-1998 - 11:44:57

COMPONENT: DUMMY # 269

Minimum = .06 G'S at .75 msec

Maximum = 137.19 G'S at 41.1 msec

PEAK RESULTANT ACCELERATION

1 _____ D98721AV.A01 Filterclass (1000)

180

160

140

120

100

80

60

40

20

0

G.S

.07

.06

.05

.04

.03

.02

.01

0

TIME (SECONDS)

MCA Research
12-23-1998 11:48

TEST: DUMMY CALIBRATION - HEAD DROP TEST DATE: 12-23-1998 - 11:47:52

COMPONENT: DUMMY # 269

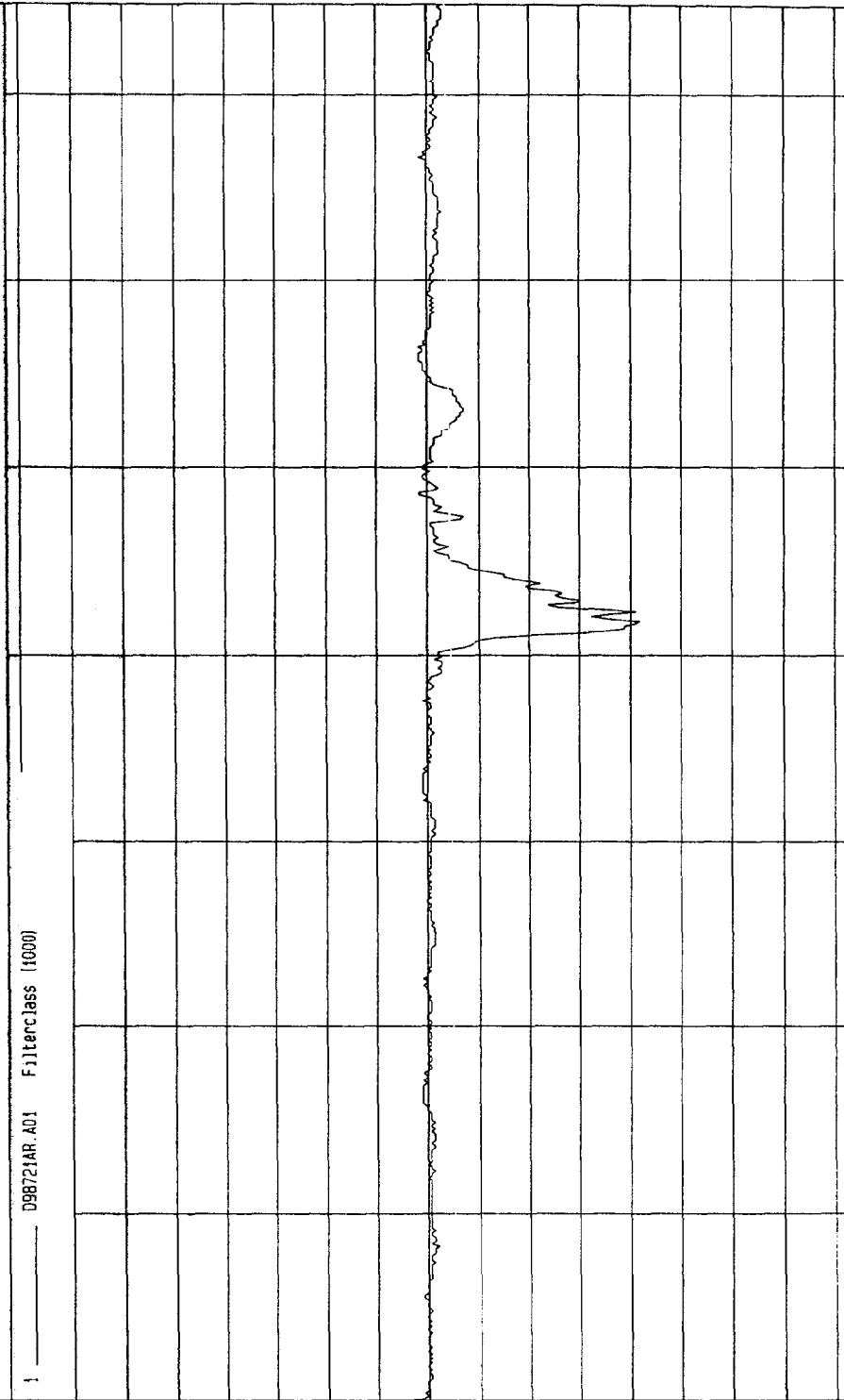
Minimum = -8.35 G'S at 41.8 msec

Maximum = 1.18 G'S at 0 msec

PEAK LONGITUDINAL ACCELERATION

1 _____ D98721AR.A01 Filterclass (1000)

G.S



40

90

50

40

30

20

10

0

NCA Research
12-23-1998 11:48

TIME (SECONDS)

MGA RESEARCH CORPORATION

NECK PENDULUM TEST

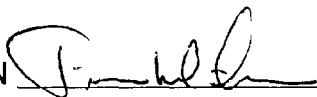
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D98172

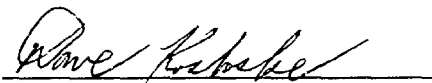
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)		10 - 70	18%
IMPACT VELOCITY		6.89 - 7.13 MS	7.01
PENDULUM DECELERATION	10 MS	1.96 - 2.55 MS	2.14
	20 MS	4.12 - 5.10 MS	4.38
	30 MS	5.73 - 7.01 MS	6.09
	40 - 70 MS	6.27 - 7.64 MS	6.95
MIDSAGITAL PLANE MAX ROTATION		64° - 78°	72°
HEAD ROTATION PEAK TO ZERO - DECAY TIME		50 - 70 MS	62
MAX. M_x AT OCCIPITAL CONDYLES		88.1 - 108.5 NM	88.2
M_x PEAK TO ZERO - DECAY TIME		40 - 60 MS	55
M_x PEAK TO MAX. HEAD ROTATION		0 - 20 MS	7

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

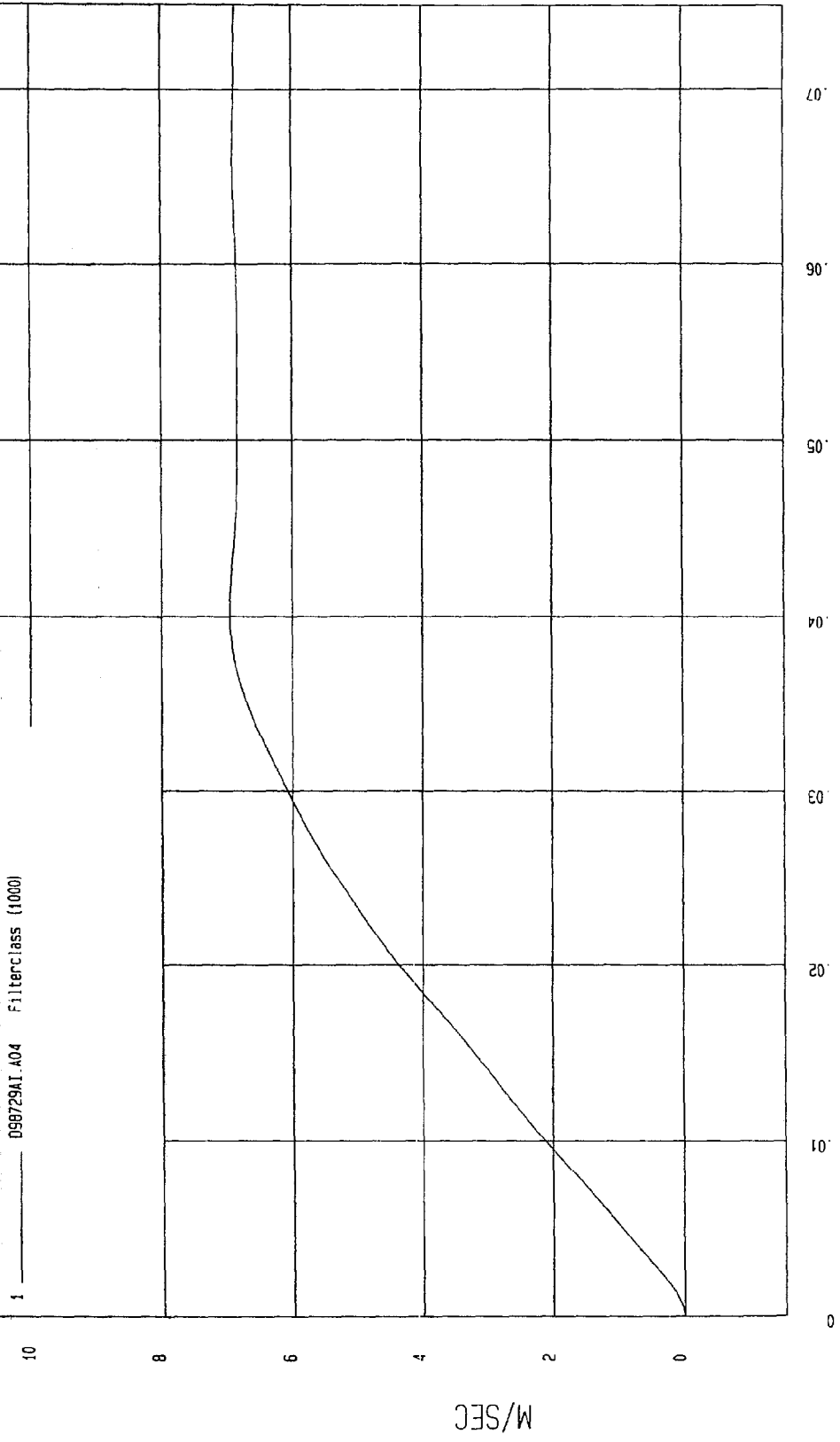


TEST: LATERAL NECK BEND LH TEST DATE: 12-23-1998 - 08:25

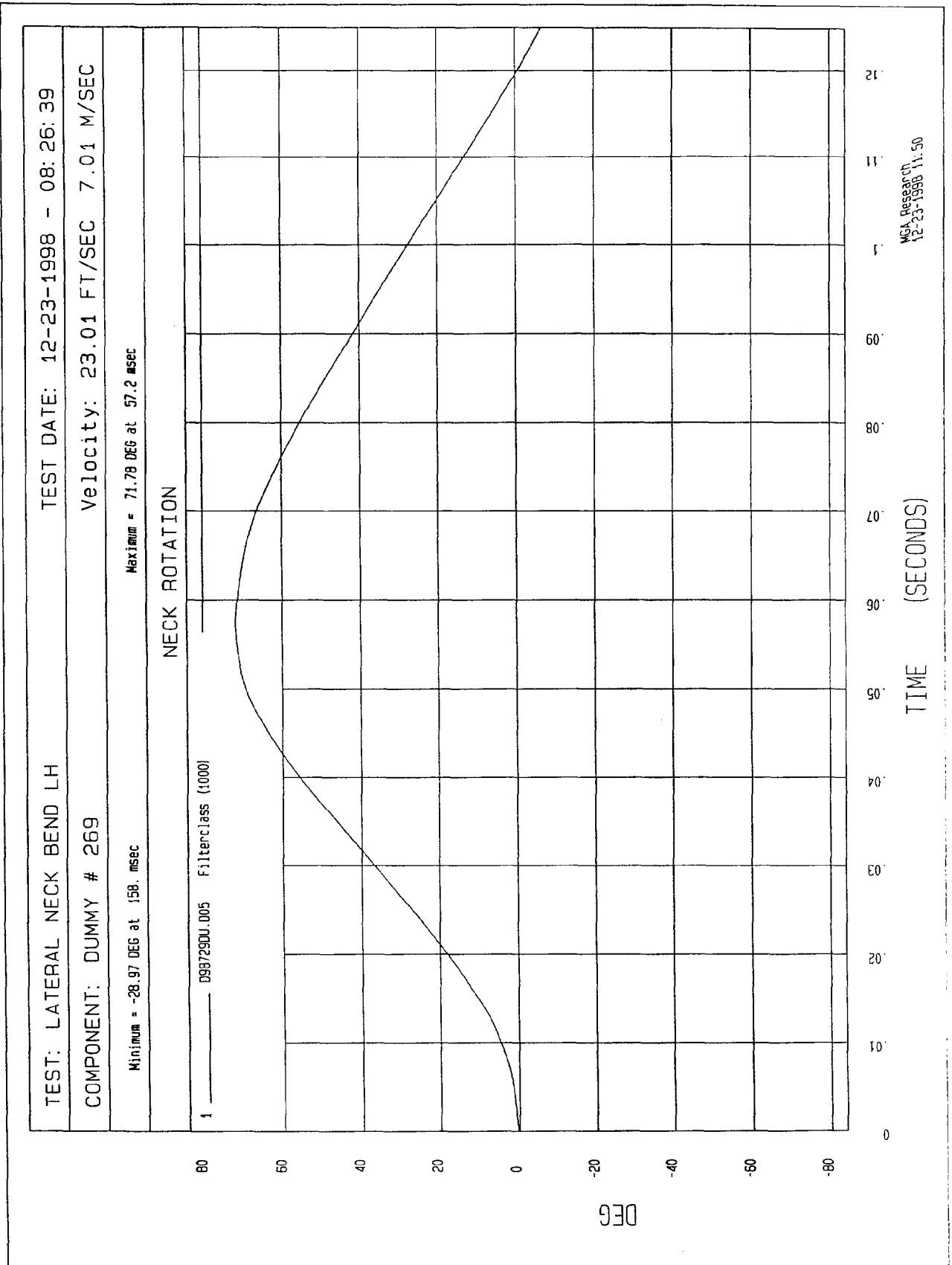
COMPONENT: DUMMY # 269 Velocity: 23.01 FT/SEC 7.01 M/SEC

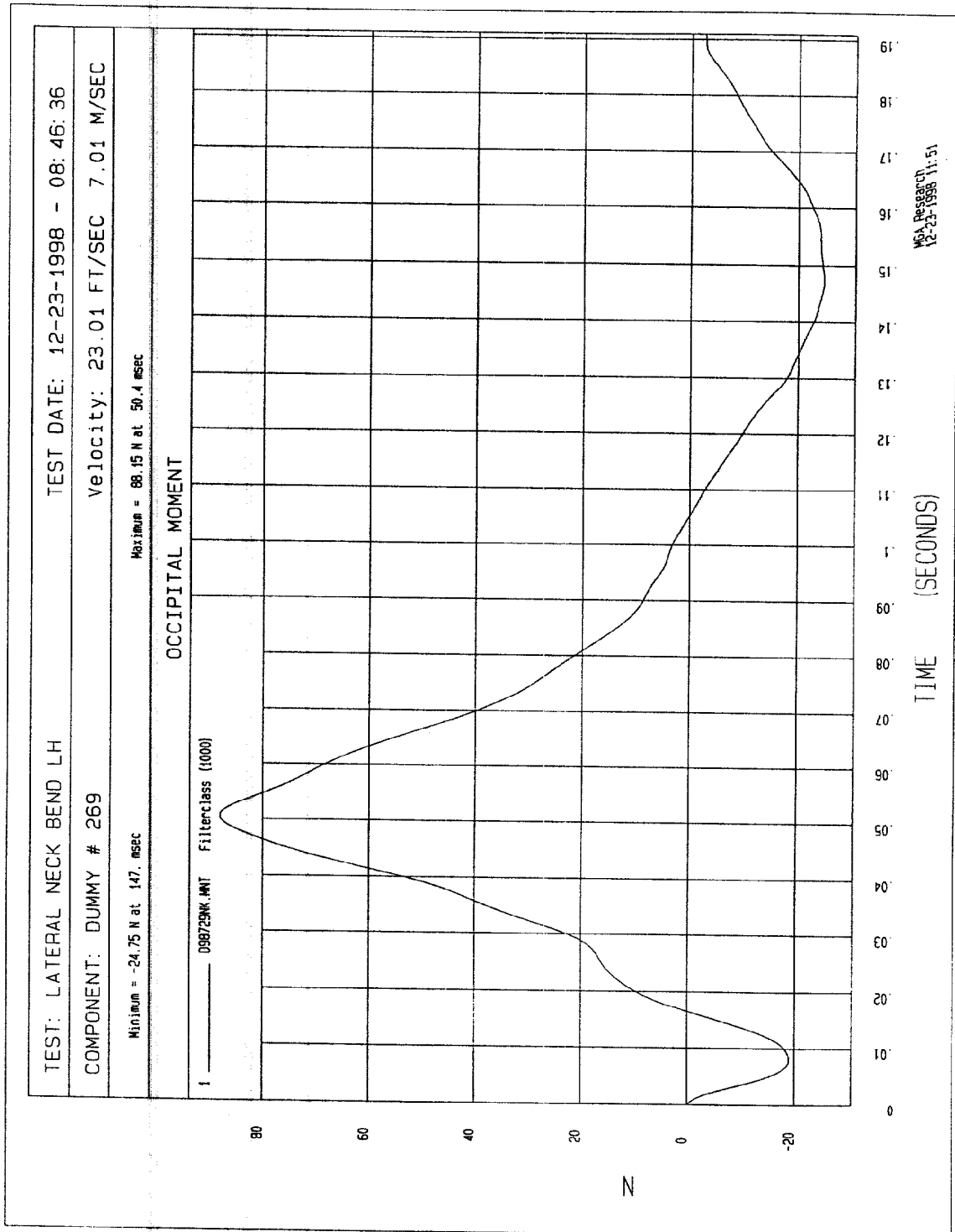
Minimum = 0 M/SEC at 0 msec Maximum = 8.66 M/SEC at 190. msec

PENDULUM DECELERATION



MGA Research
12-23-1998 11:50





MGA RESEARCH CORPORATION

THORAX IMPACT TEST

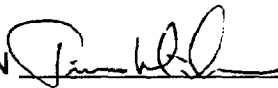
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981722

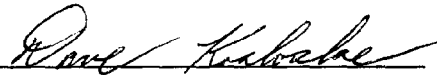
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.30
UPPER RIB (g's)	37 - 46 g's	41
LOWER RIB (g's)	37 - 46 g's	43
LOWER SPINE (g's)	15 - 22 g's	20

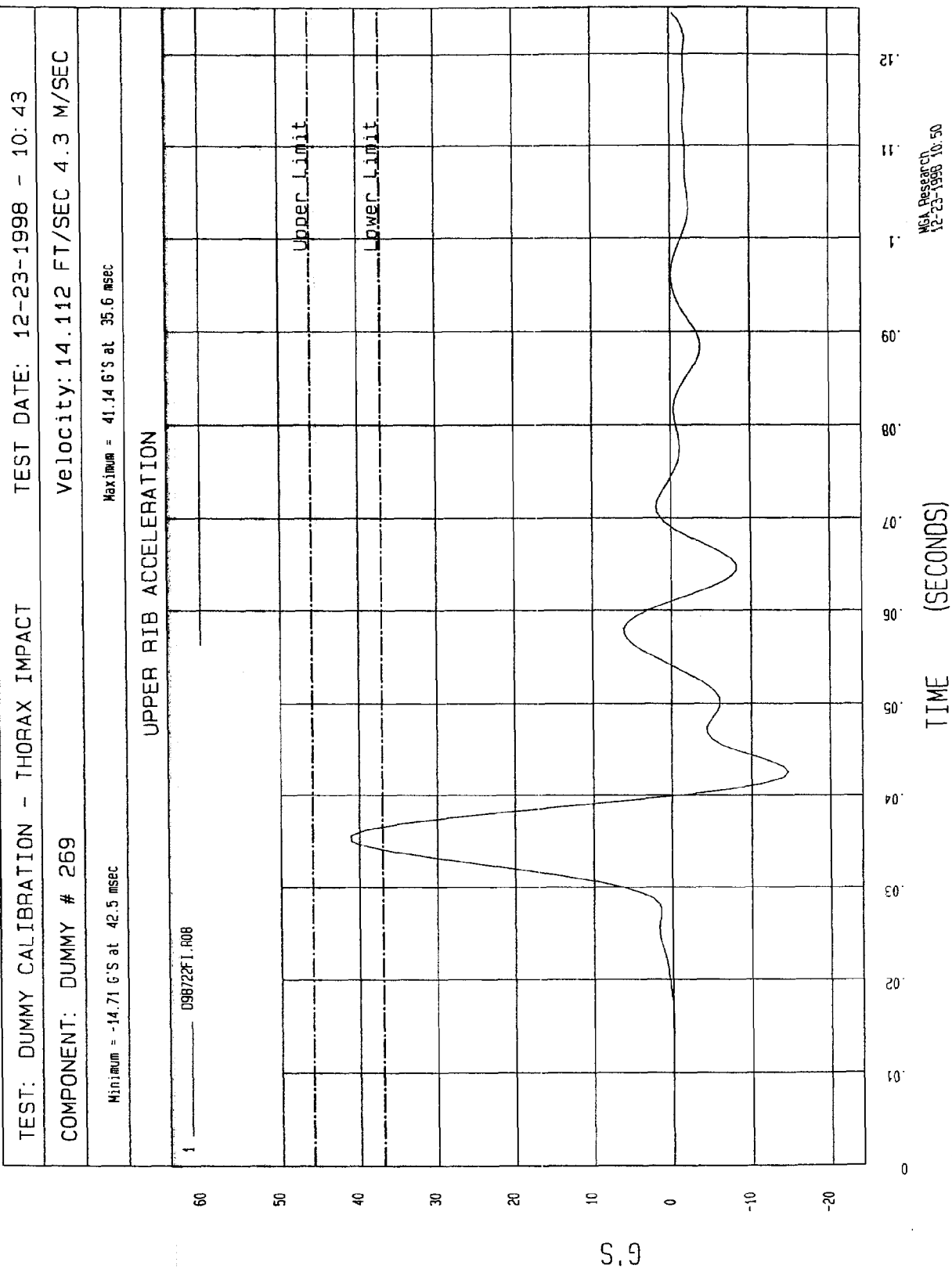
TEST MEETS SPECIFICATIONS

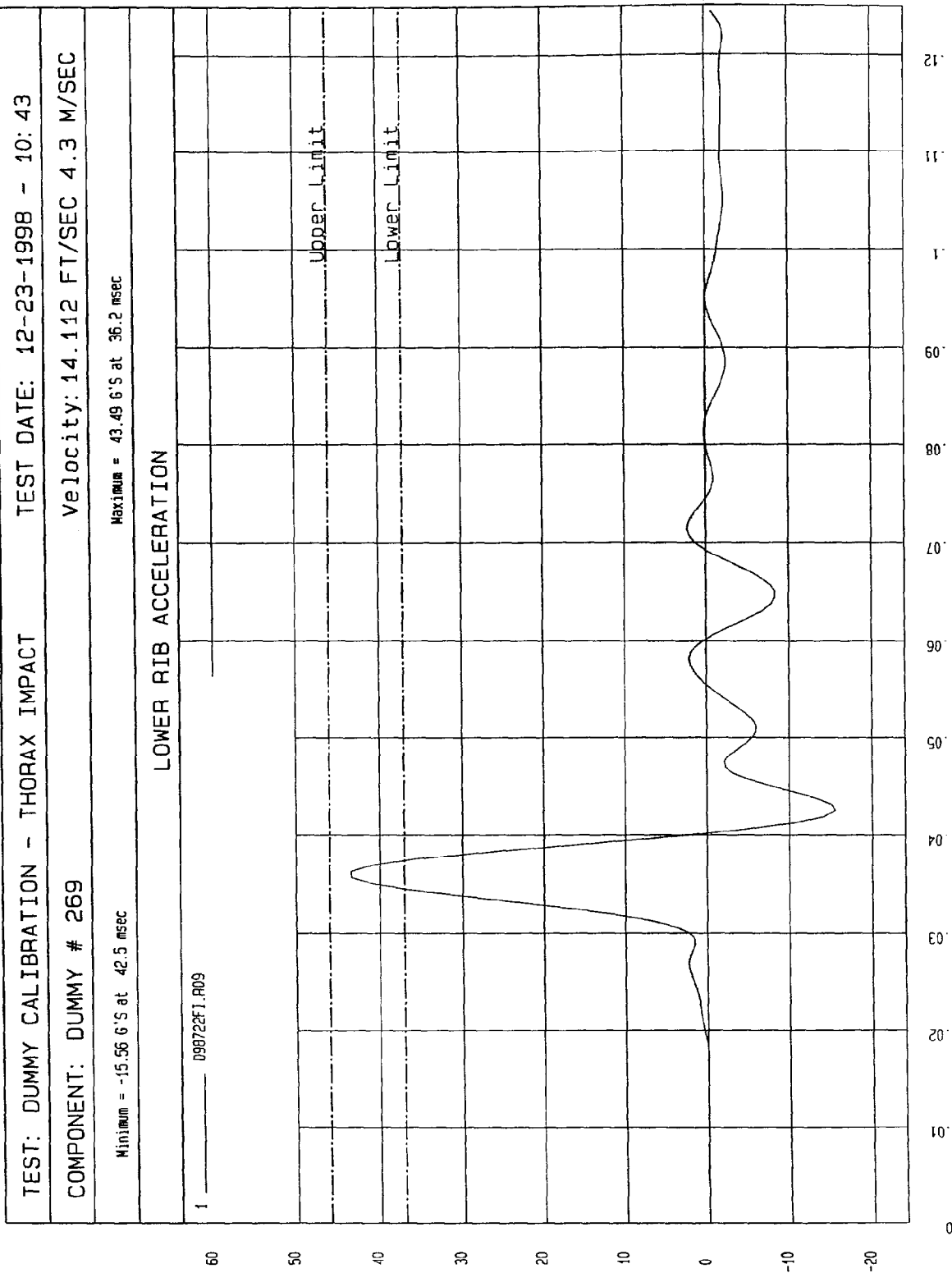
TECHNICIAN



APPROVED BY







MCA Research
12-23-1998 10:50

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-23-1998 - 10:43

COMPONENT: DUMMY # 269 Velocity: 14.112 FT/SEC 4.3 M/SEC

Minimum = -6.69 G'S at 60 msec

Maximum = 20.22 G'S at 40.6 msec

LOWER SPINE ACCELERATION

1 _____ 098722F1.R10

30

20

10

0

-10

-20

S.G

Upper Limit

Lower Limit

12

11

10

60

80

40

90

50

40

30

20

10

0

TIME (SECONDS)

MGA Research
12-23-1998 10:50

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

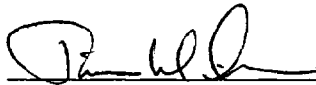
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981723

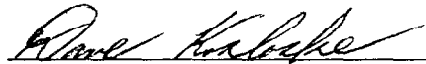
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.31
PELVIS ACCELERATION (g's)	40 - 60	43

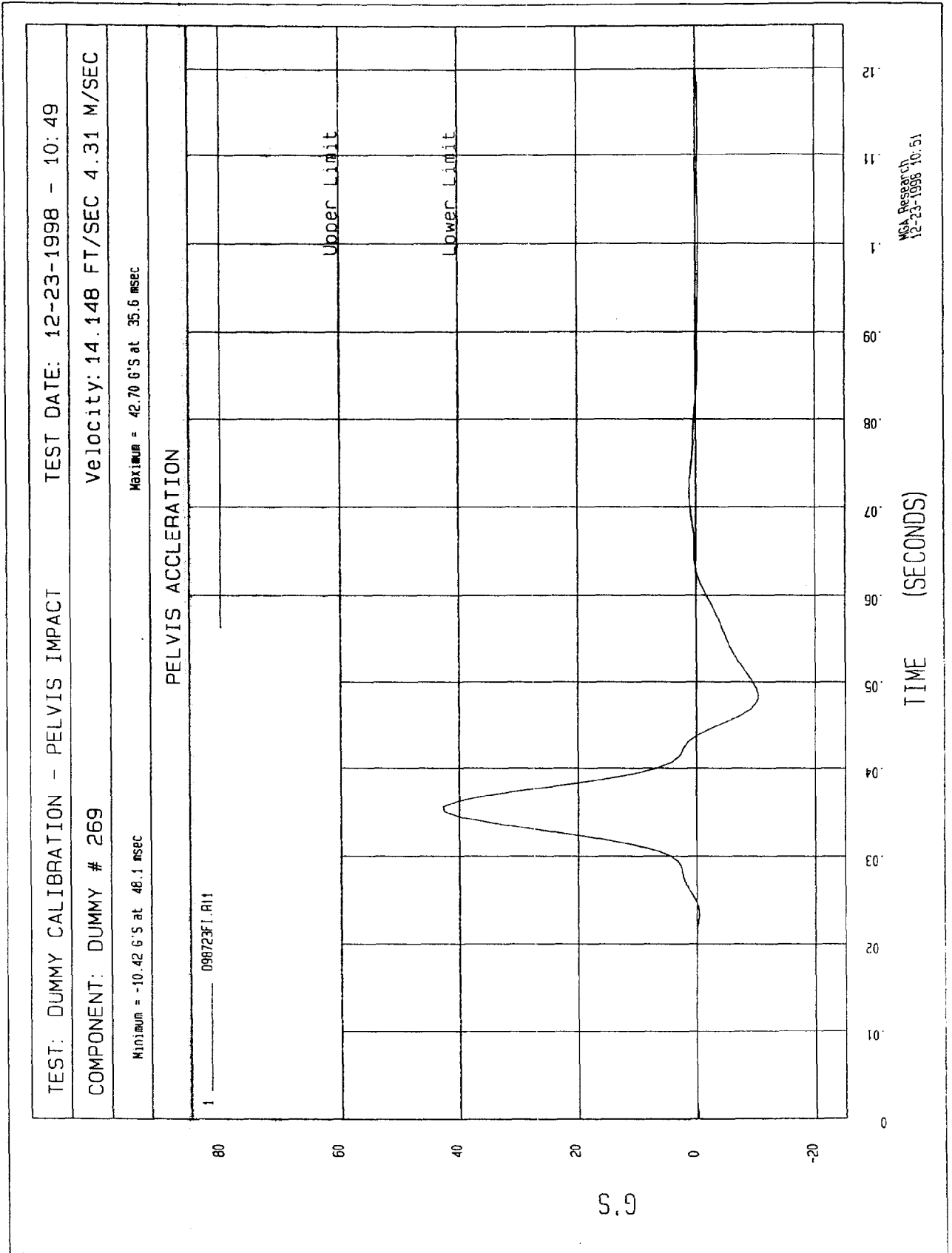
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

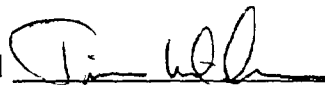
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981724

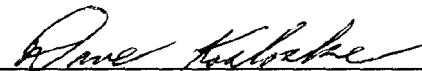
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
FORCE @ 12.7 mm	104 - 162	154
FORCE @ 19.0 mm	163 - 222	212
FORCE @ 25.4 mm	222 - 280	276
FORCE @ 33 mm	325 - 391	375

TEST MEETS SPECIFICATIONS

TECHNICIAN



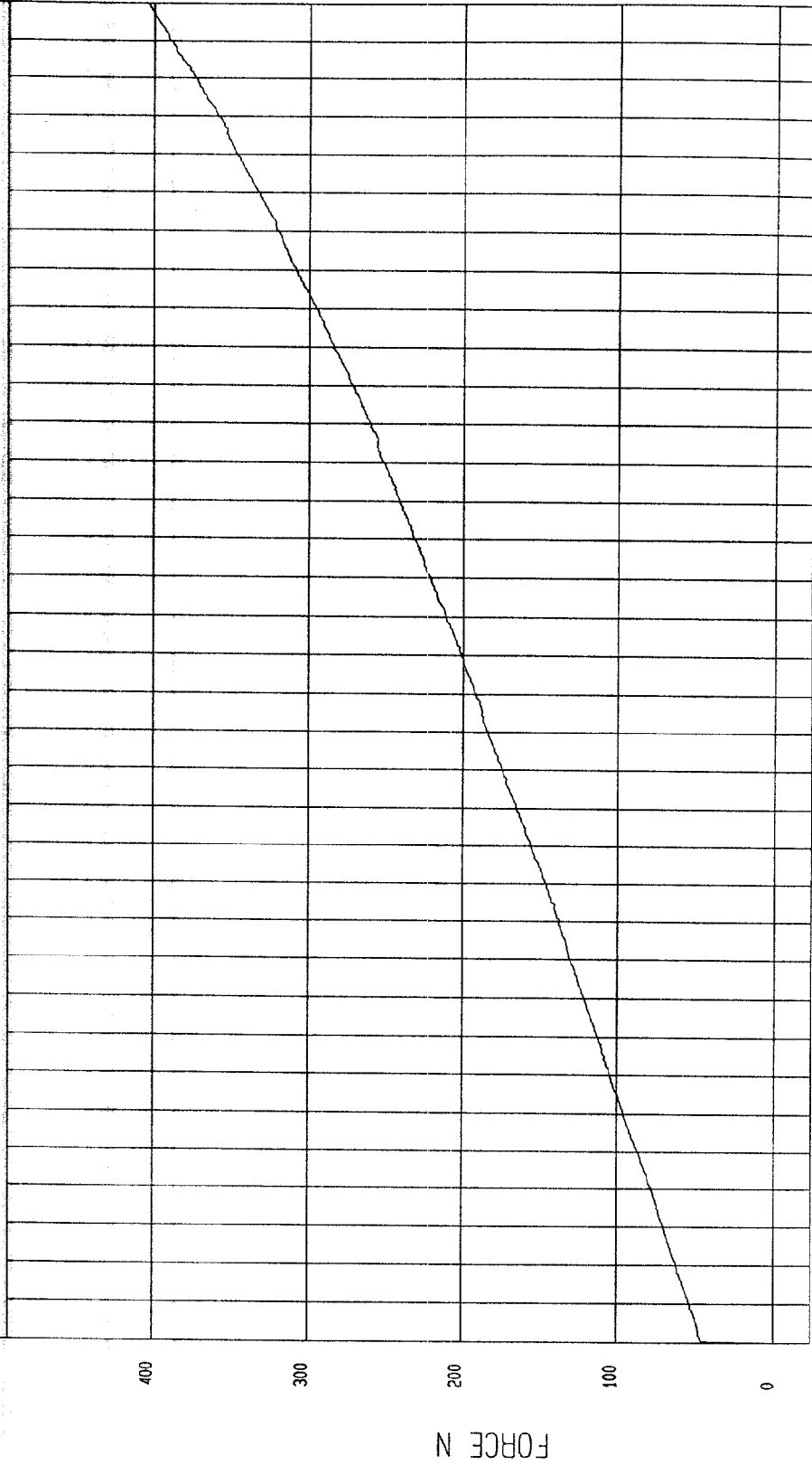
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-23-1998 - 09:44:49

COMPONENT: DUMMY # 269

FORCE as a function of DISPLACEMENT



NSA Research
12-23-1998 09:53

DISPLACEMENT mm

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

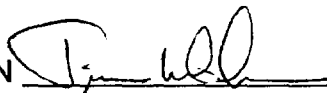
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 269TEST NUMBER: D981725

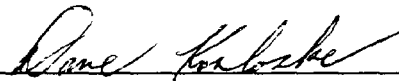
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	20%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	126.6
FORCE @ 30°	151.2 - 204.6	174.8
FORCE @ 40°	204.6 - 258.0	206.9
RETURN ANGLE	12° maximum	5°

TEST MEETS SPECIFICATIONS

TECHNICIAN



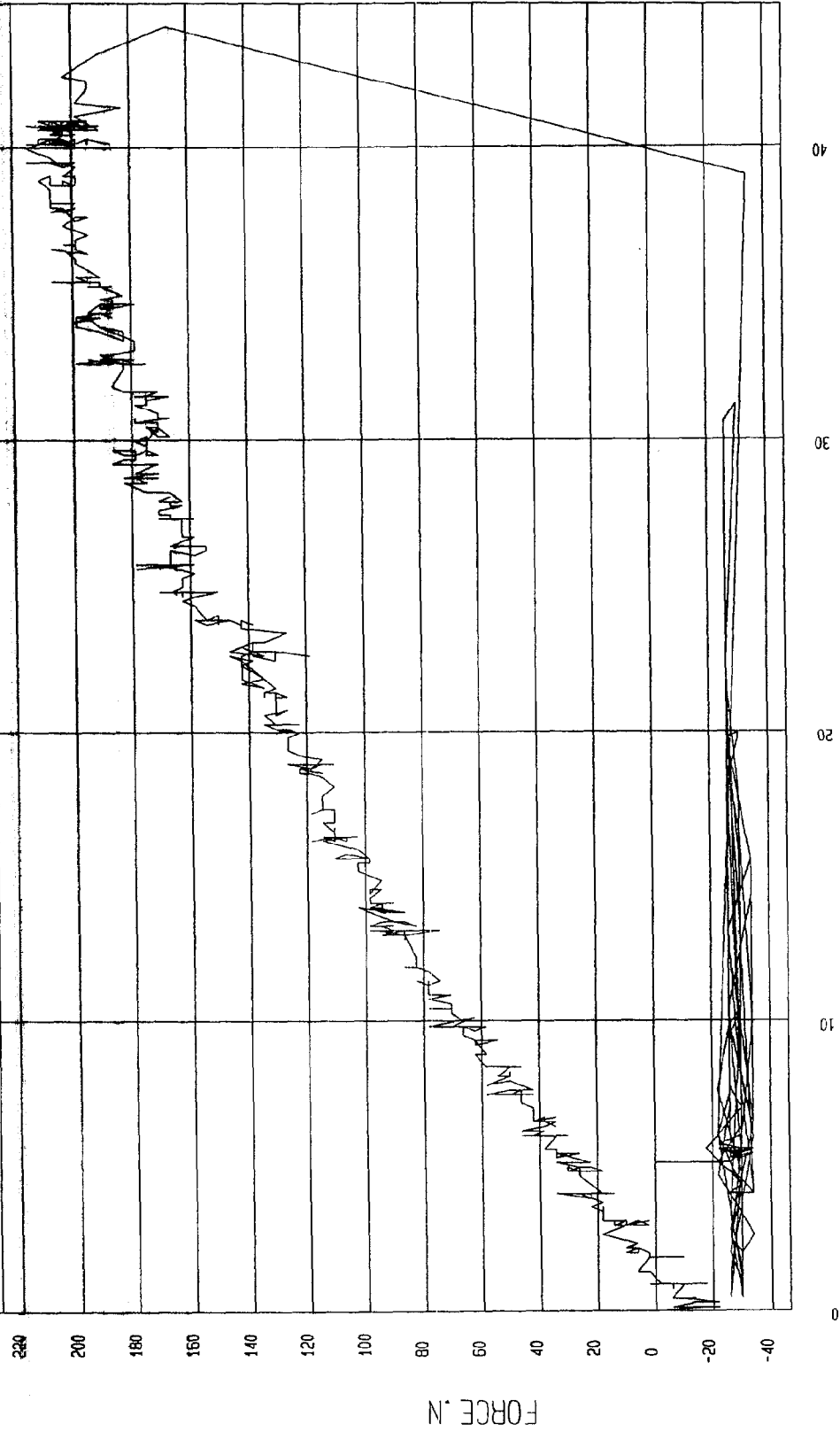
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-23-1998 - 09:09:26

COMPONENT: DUMMY # 269

FORCE as a function of TORSO ROTATION



MSA Research
12-23-1998 09:31

POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 270

Calibration Test Results Summary

Passenger Dummy Serial Number: 270

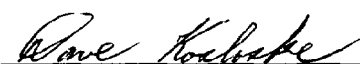
Post-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NUMBER: 270DATE OF VERIFICATION: December 23, 1998

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height (mm)	889 - 909	894
RH - Rib Height (mm)	501 - 521	514
HP - Hip Pivot Height (mm)	99 ref.	99
RD - Rib From Back Line (mm)	229 - 241	238
KV - Knee Pivot From Back Line (mm)	511 - 526	519
SW - Knee Pivot to Floor (mm)	490 - 505	494
HW - Hip Width (mm)	356 - 391	371

MEASUREMENTS BY: APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

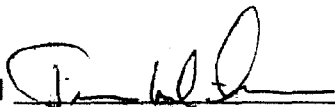
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981732

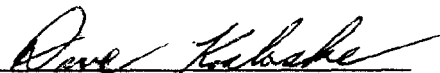
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46 g's	43
LOWER RIB (g's)	37 - 46 g's	42
LOWER SPINE (g's)	15 - 22 g's	22

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY

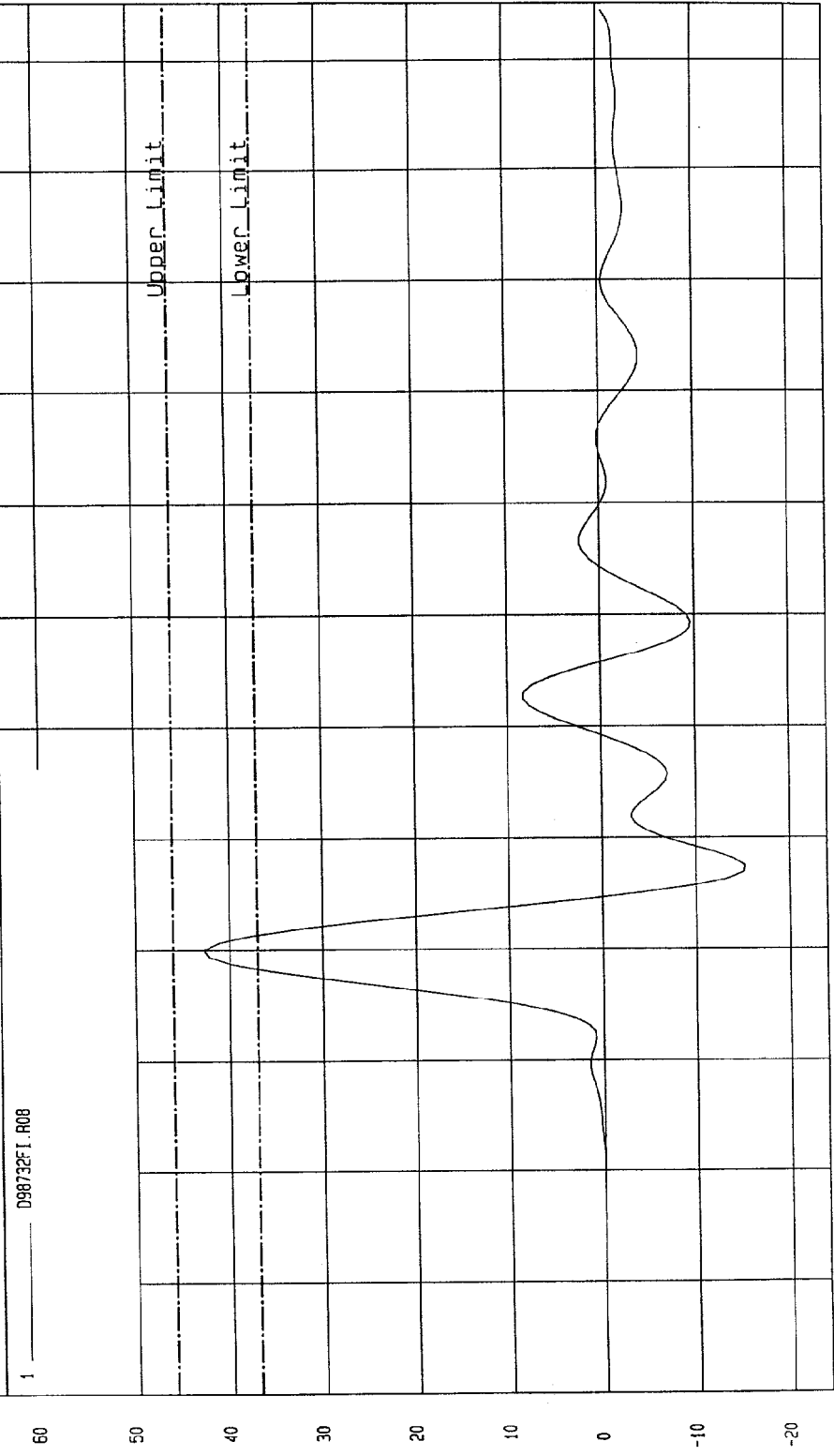


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-23-1998 - 11:17
COMPONENT: DUMMY # 270 Velocity: 14.087 FT/SEC 4.29 M/SEC

Maximum = 42.74 G'S at 40 msec

Minimum = -15.12 G'S at 47.5 msec

UPPER RIB ACCELERATION



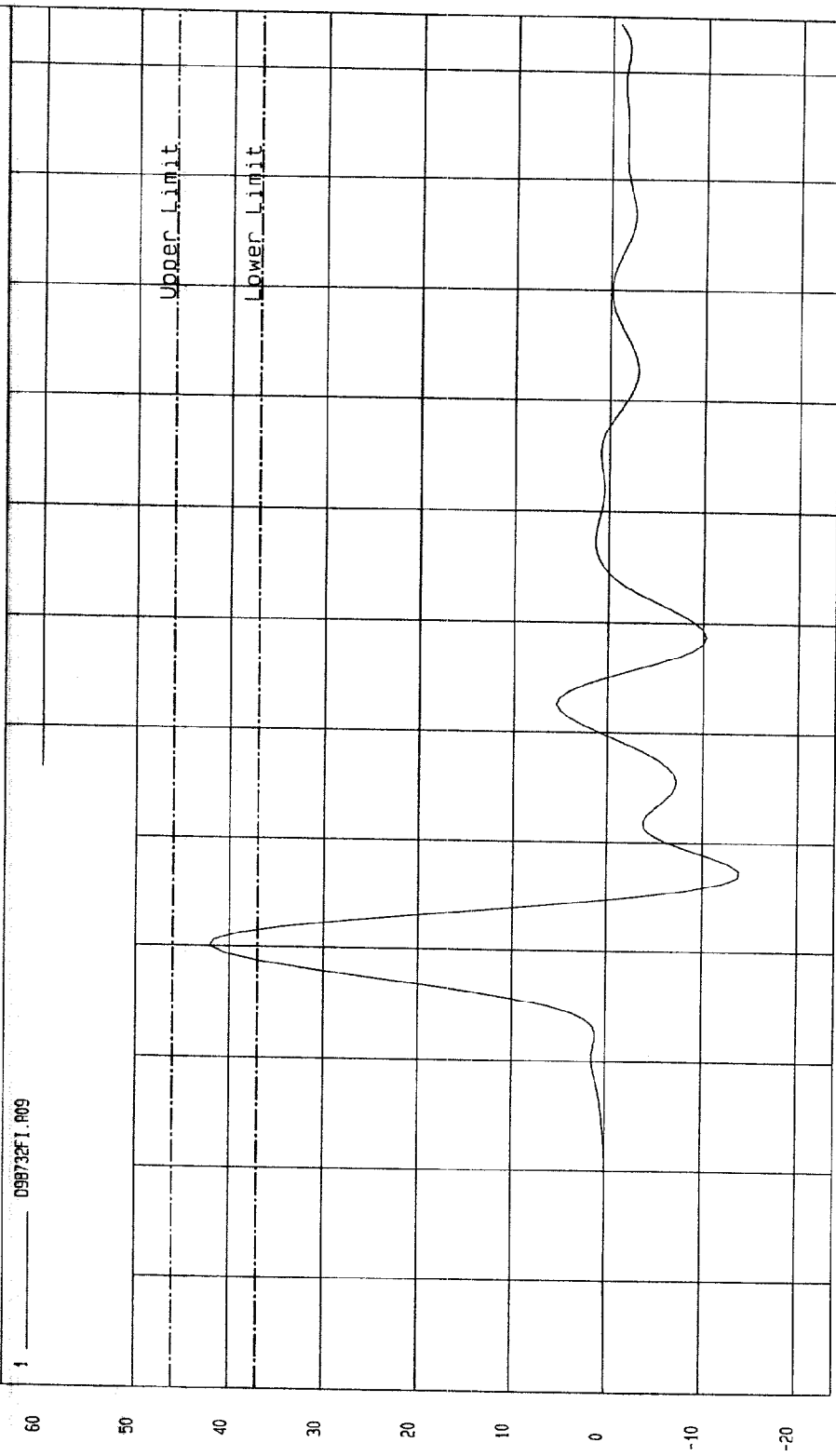
NCA Research
12-23-1998 11:22

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-23-1998 - 11:17

COMPONENT: DUMMY # 270 Velocity: 14.087 FT/SEC 4.29 M/SEC

Minimum = -13.84 G'S at 47.5 msec Maximum = 42.08 G'S at 40 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

MOA Research
12-23-1998 11:23

S.9

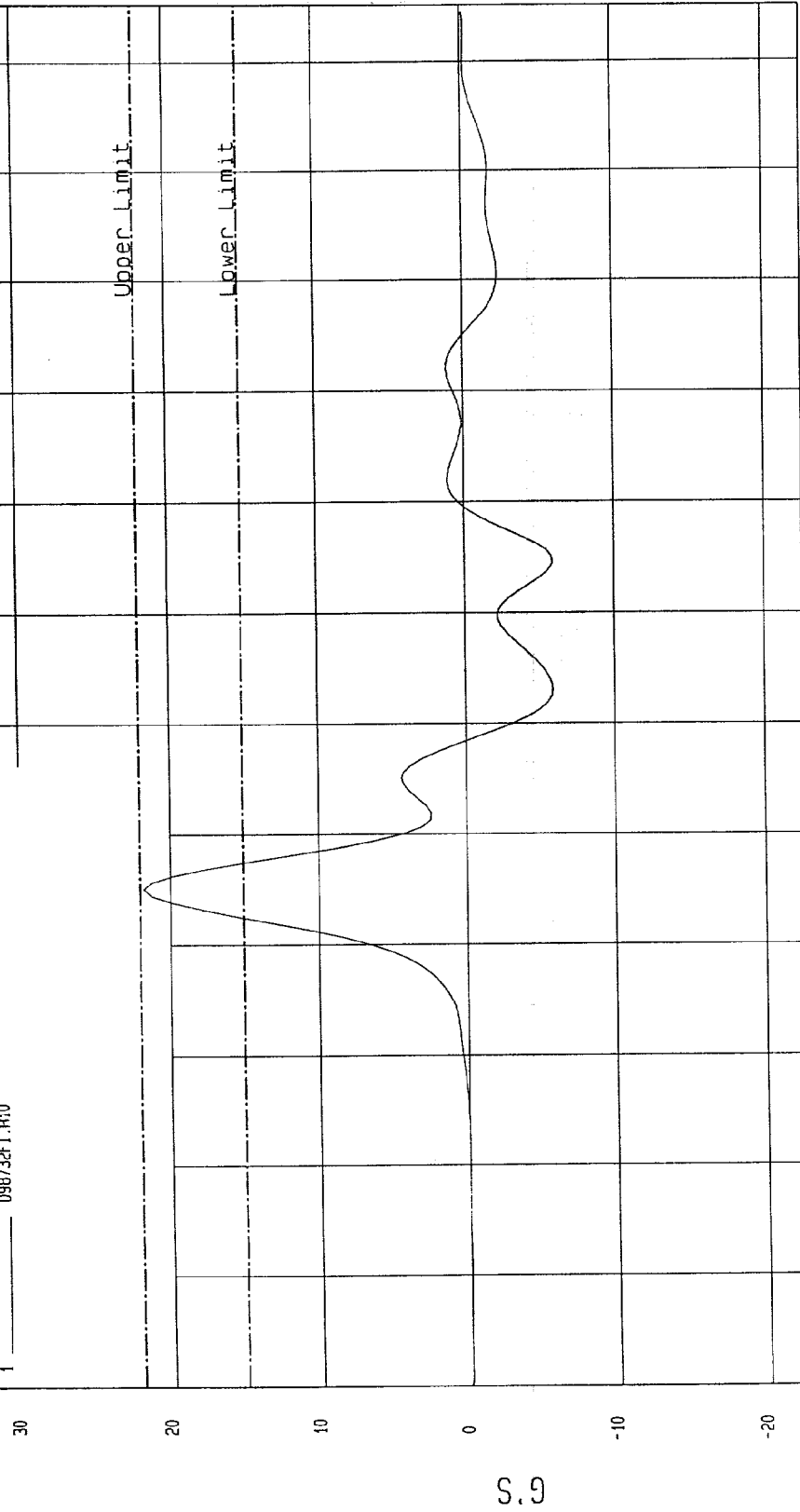
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 12-23-1998 - 11:17

COMPONENT: DUMMY # 270 Velocity: 14.087 FT/SEC 4.29 M/SEC

Minimum = -5.92 G'S at 63.1 msec Maximum = 21.75 G'S at 45 msec

LOWER SPINE ACCELERATION

1 090732F1.R10



MSA Research
12-23-1998 11:23

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981733

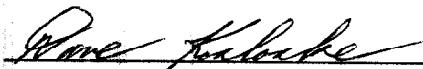
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
PROBE SPEED (m/s)	4.27 - 4.33	4.29
PELVIS ACCELERATION (g's)	40 - 60	41

TEST MEETS SPECIFICATIONS

TECHNICIAN



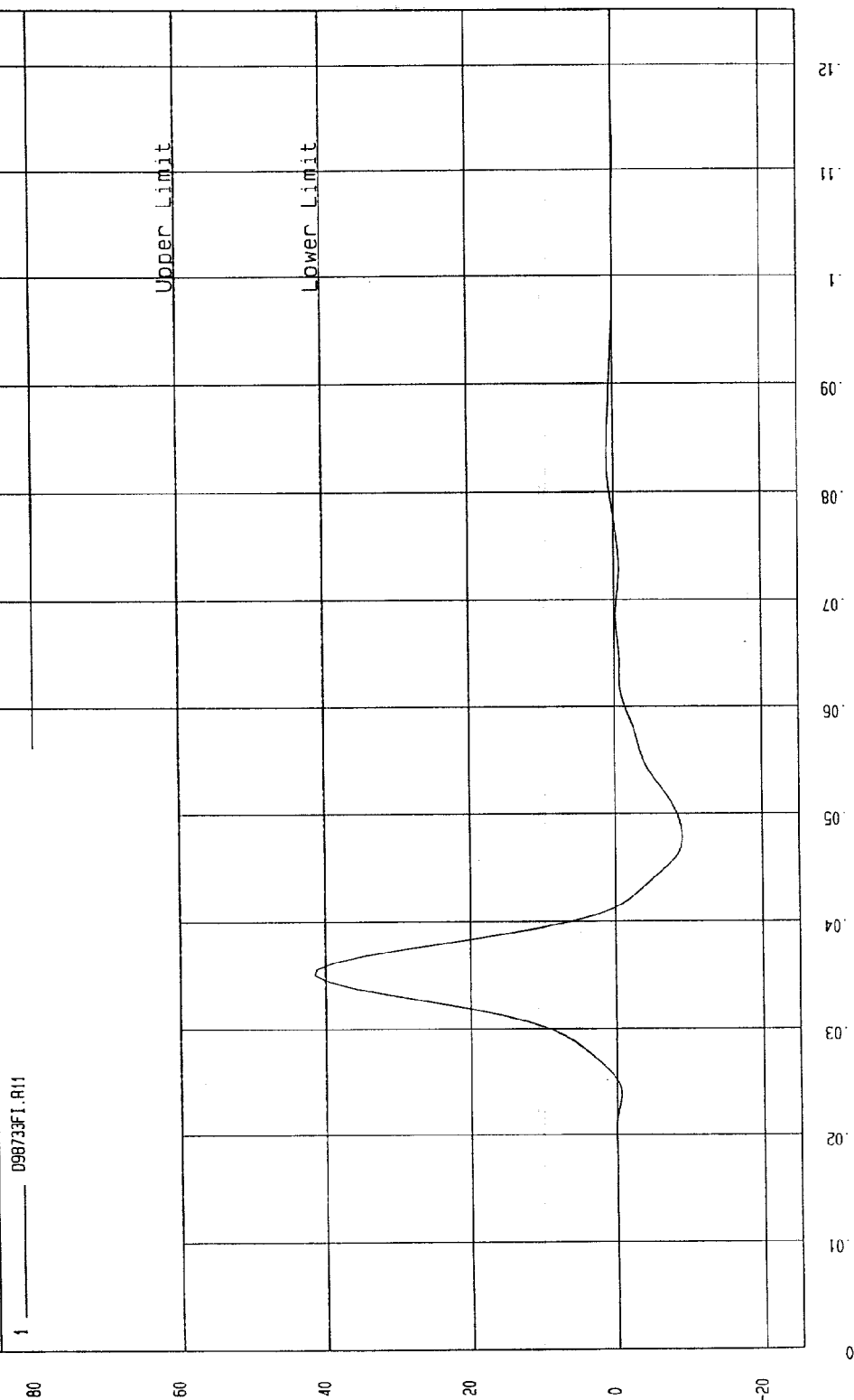
APPROVED BY



TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 12-23-1998 - 11:22
COMPONENT: DUMMY # 270 Velocity: 14.087 FT/SEC 4.29 M/SEC

Minimum = -9.23 G'S at 48.1 msec
Maximum = 41.46 G'S at 35 msec

PELVIS ACCELERATION



HGA Research
12-23-1998 11:23

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

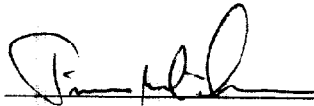
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981734

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
FORCE @ 12.7 mm	104 - 162	139
FORCE @ 19.0 mm	163 - 222	195
FORCE @ 25.4 mm	222 - 280	256
FORCE @ 33 mm	325 - 391	351

TEST MEETS SPECIFICATIONS

TECHNICIAN



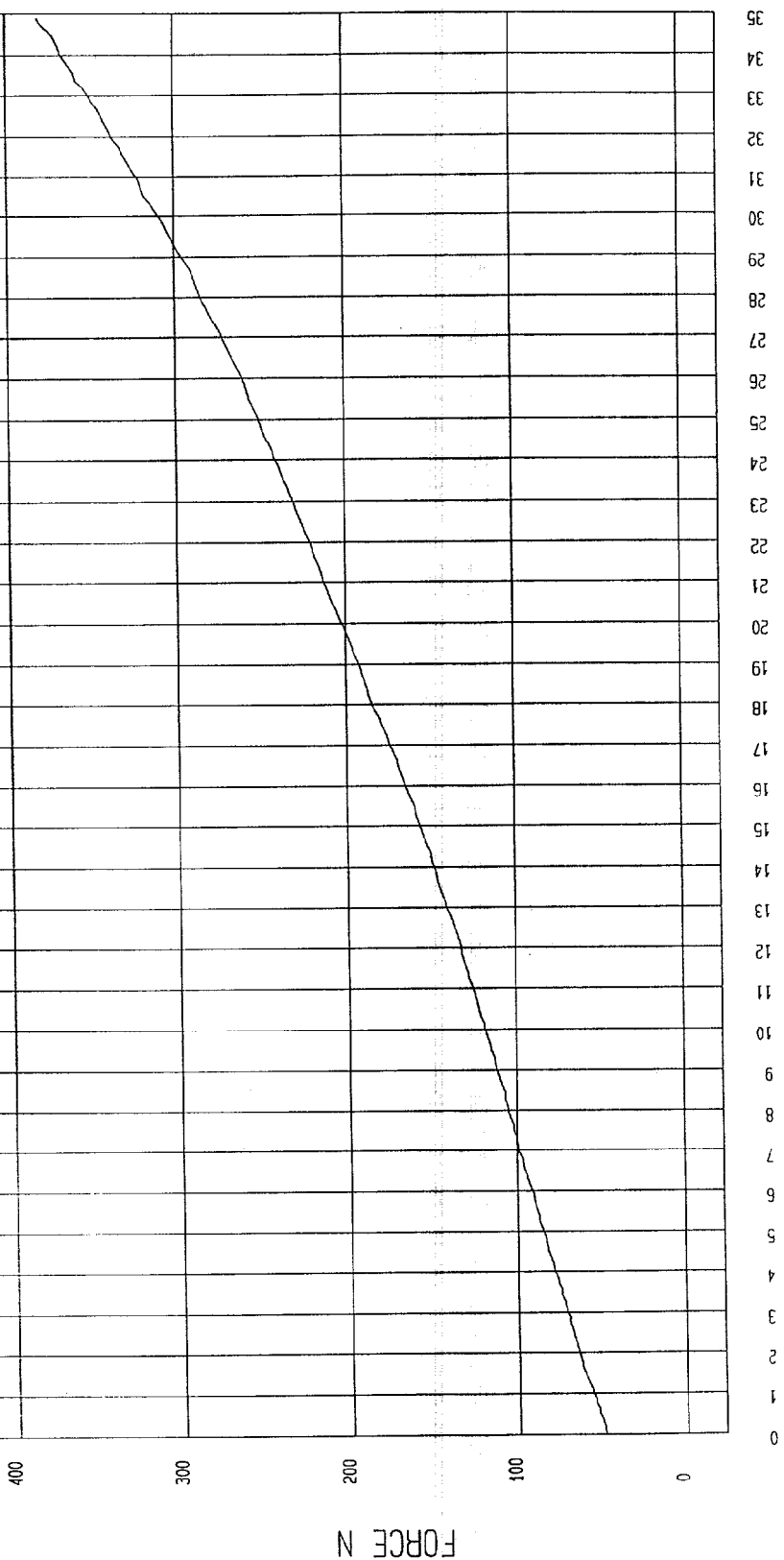
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-23-1998 - 09:53:04

COMPONENT: DUMMY # 270

FORCE as a function of DISPLACEMENT



NGA Research
12-23-1998 09:54

DISPLACEMENT mm

FORCE N

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

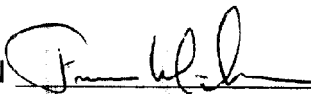
SIDE IMPACT DUMMY (SID)

DATE: December 23, 1998DUMMY SERIAL NUMBER: 270TEST NUMBER: D981735

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.0°
RELATIVE HUMIDITY (%)	10 - 70	21%
FORCE @ 0°	0 - 26.7	0
FORCE @ 20°	97.9 - 151.2	141.0
FORCE @ 30°	151.2 - 204.6	185.1
FORCE @ 40°	204.6 - 258.0	257.4
RETURN ANGLE	12° maximum	2°

TEST MEETS SPECIFICATIONS

TECHNICIAN



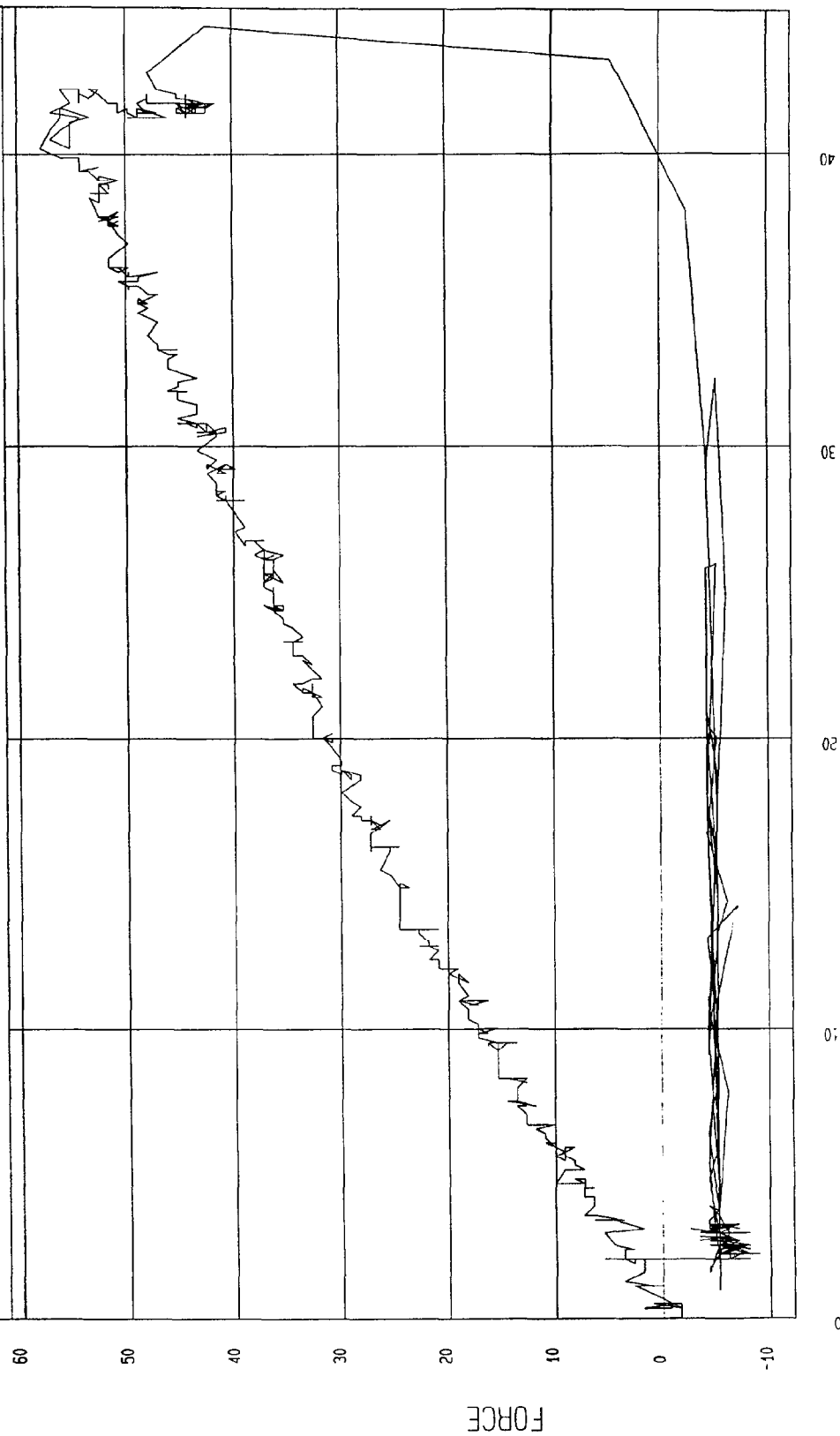
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-23-1998 - 09:29

COMPONENT: DUMMY # 270

FORCE as a function of TORSO ROTATION

MCA Research
12-23-1998 09:31

TORSO ROTATION DEGREES

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 269

Inspected By: Tim Michnay

Date: December 23, 1998

<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: 270

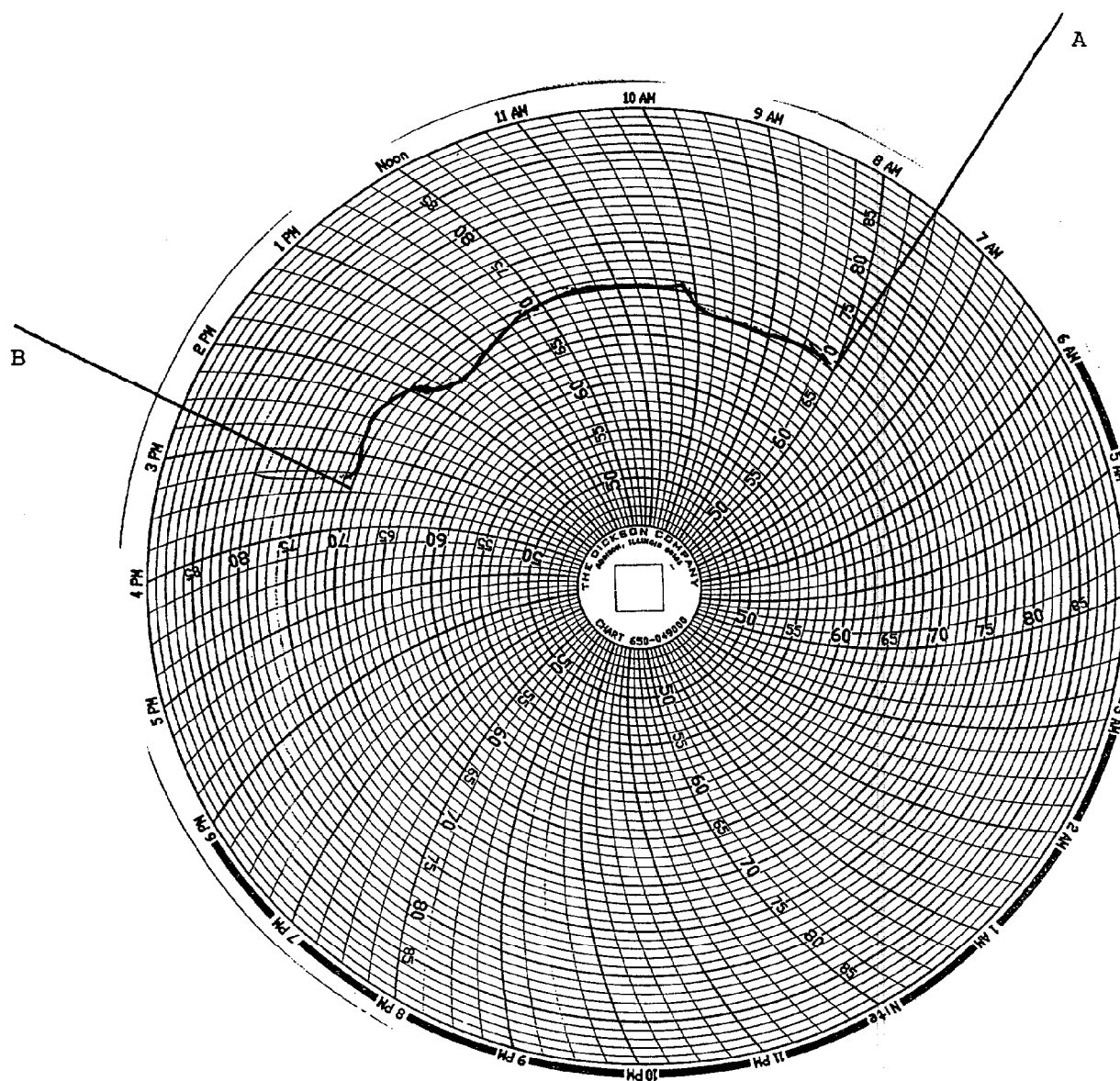
Inspected By: Tim Michnay

Date: December 23, 1998

<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. 269

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	ALFJ7	Endevco	October 20, 1998
Lower Rib Y	APYN0	Endevco	October 20, 1998
Lower Spine Y	ANAP1	Endevco	October 20, 1998
Pelvis Y	AP0G2	Endevco	October 20, 1998
Upper Rib Redundant Y	ALDD6	Endevco	October 20, 1998
Lower Rib Redundant Y	APYN3	Endevco	October 20, 1998
Lower Spine Redundant Y	ANAT6	Endevco	October 20, 1998
Pelvis Redundant Y	AP138	Endevco	October 20, 1998
Head Center of Gravity X	J13990	Endevco	September 27, 1998
Head Center of Gravity Y	J13631	Endevco	September 27, 1998
Head Center of Gravity Z	J13930	Endevco	September 27, 1998
Upper Neck FX	443	Denton	October 14, 1998
Upper Neck FY	443	Denton	October 14, 1998
Upper Neck FZ	443	Denton	October 14, 1998
Upper Neck MX	443	Denton	October 14, 1998
Upper Neck MY	443	Denton	October 14, 1998
Upper Neck MZ	443	Denton	October 14, 1998

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR PASSENGER DUMMY NO. 270

LEFT REAR PASSENGER			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AP2D8	Endevco	October 20, 1998
Lower Rib Y	AP170	Endevco	October 14, 1998
Lower Spine Y	AGTP7	Endevco	October 20, 1998
Pelvis Y	ANBP7	Endevco	October 20, 1998
Upper Rib Redundant Y	AP2A4	Endevco	October 20, 1998
Lower Rib Redundant Y	AP2G9	Endevco	October 20, 1998
Lower Spine Redundant Y	AGT04	Endevco	October 20, 1998
Pelvis Redundant Y	AP1C6	Endevco	October 20, 1998
Head Center of Gravity X	AP179	Endevco	October 20, 1998
Head Center of Gravity Y	ALFP1	Endevco	October 20, 1998
Head Center of Gravity Z	AHTY4	Endevco	October 20, 1998

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	J06-D22	Entran	June 22, 1998
Moving Barrier CG Y	I18-E18	Entran	September 16, 1998
Moving Barrier CG Z	F12-G02	Entran	June 28, 1998
Moving Barrier Rear Axle X	H02-J02	Entran	December 15, 1998
Moving Barrier Rear Axle Y	J04-F12	Entran	December 15, 1998
Left Mid A-Post Y	F18-G06	Entran	December 16, 1998
Left Lower A-Post Y	F07-A16	Entran	December 16, 1998
Left Mid B-Post Y	I26-D03	Entran	December 16, 1998
Left Lower B-Post Y	B14-R01	Entran	December 16, 1998
Rear Floorpan Above Axle X	K16-X06	Entran	September 15, 1998
Rear Floorpan Above Axle Y	B14-R14	Entran	August 26, 1998
Rear Floorpan Above Axle Z	D05-R13	Entran	December 15, 1998
Driver Seat Track Y	F20-G07	Entran	September 24, 1998
Right Side Sill at Front Seat X	D05-R20	Entran	December 8, 1998
Right Side Sill at Front Seat Y	H02-J05	Entran	December 8, 1998
Right Side Sill at Front Seat Z	D05-R09	Entran	December 8, 1998
Right Side Sill at Rear Seat X	I26-D17	Entran	June 17, 1998
Right Side Sill at Rear Seat Y	E10-F13	Entran	June 22, 1998
Right Side Sill at Rear Seat Z	G01-J14	Entran	August 26, 1998

VEHICLE INSTRUMENT CALIBRATION

VEHICLE ACCELEROMETERS			
	SERIAL NO	MANUFACTURER	CALIBRATION DATE
Left Side Sill at Front Seat Y	C06-G08	Entran	August 26, 1998
Left Side Sill at Rear Seat Y	I25-J06	Entran	September 24, 1998
Right Rear Occupant Compartment Y	F07-A24	Entran	December 15, 1998
Vehicle CG X	B14-R11	Entran	December 16, 1998
Vehicle CG Y	A10-G07	Entran	December 16, 1998
Vehicle CG Z	I18-E02	Entran	December 16, 1998
Left Front Door on Centerline Y	G01-J05	Entran	August 26, 1998
Midrear of Left Front Door Y	H02-J03	Entran	December 16, 1998
Left Front Door Upper Centerline Y	F18-G01	Entran	September 15, 1998
Midrear of Left Rear Door Y	F12-G08	Entran	December 16, 1998
Left Rear Door Upper Centerline Y	H02-J14	Entran	December 16, 1998
Left Rear Seat Track Y	A09-G09	Entran	December 15, 1998

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