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Test no
3226

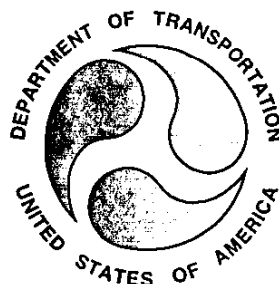
NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST

FORD MOTOR COMPANY

2000 FORD WINDSTAR MINIVAN

NHTSA NO: MY0200

MGA WISCONSIN OPERATIONS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: December 7, 1999

Report Date: December 14, 1999

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
OFFICE OF CRASHWORTHINESS STANDARDS
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WASHINGTON, D.C. 20590

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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 2000 Ford Windstar 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 7, 1999. The impact velocity of the Moving Deformable Barrier (MDB) was 61.6 kph, and the ambient temperature at the struck driver's side of the target vehicle at the time of impact was 22 °C. The target vehicle post test maximum crush was 458 mm at level 3. The test vehicle's performance follows: <table border="0"> <thead> <tr> <th></th> <th><u>DRIVER</u></th> <th><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>56</td> <td>49</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>53</td> <td>54</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>65</td> <td>78</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>61</td> <td>66</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>79</td> <td>117</td> </tr> </tbody> </table> The door on the struck side of the vehicle did not separate from the body at the hinges or latch and the opposite doors did not open during the side impact event.							<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	56	49	Left Lower Rib (LLR) Accel., g	53	54	Lower Spine (T ₁₂) Accel., g	65	78	Thoracic Trauma Index (TTI)	61	66	Pelvis (PEV) Accel., g	79	117
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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 FY2000 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 2000 Ford Windstar Minivan.

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 2000 Ford Windstar Minivan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 38.3 mph (61.6 kph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on December 7, 1999. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

Two Side Impact Dummies (SIDs) were placed in the driver and left rear designated seating positions according to instructions specified in the New Car Assessment Program Side Impact Laboratory Test Procedure which is dated October 1996. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)
5. Head Center of Gravity triaxial accelerometers (X, Y, and Z-direction)

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

The following table summarizes the results of the test:

Injury Criteria	Front SID	Rear SID
TTI (g)	61	66
Pelvis (g)	79	117

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: 2000/Ford/Windstar/Minivan
Vehicle NHTSA No.: MY0200 VIN: 2FMZA5147BA14955
Vehicle Body Color: Red Build Date: 8/99
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 136 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: P205/70/R15
Tires on Test Vehicle: P205/70/R15 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; 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 =	<u>551.1</u> kg	Right Rear =	<u>372.0</u> kg
Left Front =	<u>545.2</u> kg	Left Rear =	<u>358.8</u> kg
TOTAL FRONT =	<u>1096.3</u> kg	TOTAL REAR =	<u>730.8</u> kg
% of Total Weight =	<u>60.0</u> %	% of Total Weight =	<u>40.0</u> %
TOTAL WEIGHT =	<u>1827.1</u> kg		

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 2000/Ford/Windstar/MinivanVehicle NHTSA No.: MY0200 Test Date: December 7, 1999CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1827.1</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>2056.5</u> kg

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

Right Front =	<u>562.0</u> kg	Right Rear =	<u>440.4</u> kg
Left Front =	<u>601.0</u> kg	Left Rear =	<u>452.2</u> kg
TOTAL FRONT =	<u>1163.0</u> kg	TOTAL REAR =	<u>892.6</u> kg
% of Total Weight =	<u>56.6</u> %	% of Total Weight =	<u>43.4</u> %
TOTAL WEIGHT =	<u>2055.6</u> kg		

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 730 mm Left Front 740 mm Right Rear 758 mm Left Rear 756 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 719 mm Left Front 715 mm Right Rear 727 mm Left Rear 716 mm

TEST ATTITUDE:

Right Front 717 mm Left Front 719 mm Right Rear 729 mm Left Rear 722 mm* light trucks and MPV's RCW is 136 kgs or manufacturer's value, whichever is less

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 3076 mm

C.G. = 1313 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4073 mm

Centerline = 5090 mm

Left Side = 4077 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 2000/Ford/Windstar/MinivanVehicle NHTSA No.: MY0200 Test Date: December 7, 1999FRONT SEAT CUSHION PLACEMENT:Total Length of Adjustment Travel: 180 mmTest Position: 10th detent rearward of 19 totalFRONT SEAT BACK ADJUSTMENT POSITION:Seat Back Angle = 20.9 degreesSECOND POSITION SEAT:Total Length of Fore/Aft Adjustment Travel: 100 mmSeat Back Adjustment Position: 1st notch rearward from full upADJUSTABLE STEERING COLUMN POSITION: 3rd position of 5

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

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:Fuel system usable capacity = 26 gallonsTest Volume: 23.92 gallons 92 % of capacityLOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:Wheelbase: = 3076 mmImpact Point is 508 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan
 Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999
 Overall Length = 5090 mm; Overall Width = 1944 mm

TEST WEIGHT:

Right Front =	<u>572.4</u> kg	Right Rear =	<u>431.8</u> kg
Left Front =	<u>601.5</u> kg	Left Rear =	<u>442.7</u> kg
TOTAL FRONT =	<u>1173.9</u> kg	TOTAL REAR =	<u>874.5</u> kg
% of Total Weight =	<u>57.3</u> %	% of Total Weight =	<u>42.7</u> %
TOTAL WEIGHT =	<u>2048.4</u> kg		
Wheelbase =	<u>3076</u> mm		
Longitudinal C.G. from Center of Front Axle	= <u>1313</u> mm		
Impact Angle with Respect to Impactor	= <u>90°</u> degrees		

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (253 mm above ground) = 313 mm
2. LEVEL 2 (648 mm above ground) = 447 mm
3. LEVEL 3 (765 mm above ground) = 458 mm
4. LEVEL 4 (990 mm above ground) = 426 mm
5. LEVEL 5 (1600 mm above ground) = 140 mm

Maximum Post-Test Intrusion = 458 mm

OCCUPANTS:

	<u>Driver</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>Seat Belt</u>	<u>Seat 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: 2000/Ford/Windstar/MinivanVehicle NHTSA No.: MY0200 Test Date: December 7, 1999POSITION OF IMPACT (MDB) ON MONORAIL:Crabbed 27° to leftMDB DETAILS:

Overall Width of Framework Carriage	=	<u>1252 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4115 mm</u>
Wheelbase of Framework Carriage	=	<u>2591 mm</u>
Tread of Framework Carriage (Front & Rear)	=	<u>1880 mm</u>
C.G. Location Rearward of Front Axle	=	<u>1100 mm</u>
C.G. Location From Center Line	=	<u>-10 mm</u>
C.G. Location Above Ground Level	=	<u>477 mm</u>

MDB WEIGHT:

Left Front	=	<u>458.8 kg</u>	Left Rear	=	<u>230.3 kg</u>
Right Front	=	<u>324.4 kg</u>	Right Rear	=	<u>350.6 kg</u>
TOTAL FRONT	=	<u>783.2 kg</u>	TOTAL REAR	=	<u>580.9 kg</u>
TOTAL MDB WEIGHT =		<u>1364.1 kg</u>			

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degreesImpact Speed = Primary: 38.3 mph (61.6 kph) Secondary: 38.5 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) | = | <u>129</u> mm |
| 2. | Row B Mid Stack (686 mm) | = | <u>58</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = | <u>84</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = | <u>170</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 5

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Headrest, left shoulder</u>	<u>Side window, seat belt</u>
Arm	<u>Trim panel</u>	<u>Trim panel</u>
Pelvis	<u>Trim panel</u>	<u>Trim panel</u>
Left Knee	<u>Trim panel</u>	<u>Trim 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>N/A</u>	<u>remained closed</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 28 mm forward Vertical: 11 mm high

ARM REST LOCATIONS:

Front: 132 mm from below window

Rear: 138 mm from below window

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

Front Seat Back: 7 mm Front Seat Cushion: 5 mm
Left Rear Seat Back: 21 mm Rear Seat Cushion: 27 mm

GLAZING DAMAGE:

Left rear window broke, windshield cracked

PILLAR PERFORMANCE:

No failures noted

SILL SEPARATION:

None noted

OTHER NOTABLE IMPACT EFFECTS:

None noted

AIRBAG DEPLOYMENT STATUS:

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

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

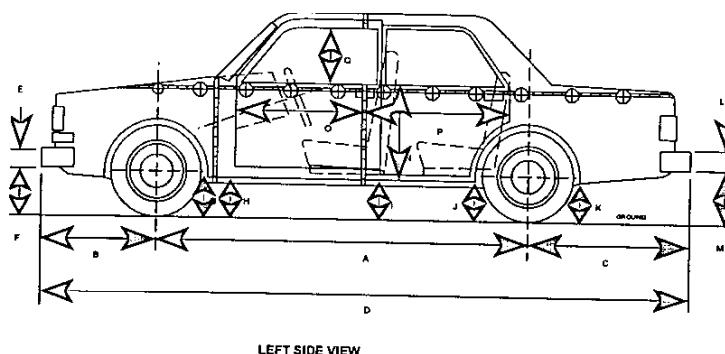
DATA SHEET NO. 5
SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan
Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

	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)
HEAD ACCELERATIONS								
Longitudinal	8.9	192	18.8	86	7.7	190	19.2	96
Lateral	33.9	55	8.7	192	40.5	87	13.2	54
Vertical	53.0	64	3.1	150	79.7	87	11.4	67
Resultant	55.4	63	---	---	90.7	87	---	---
HIC	---	---	256	---	---	264	---	---
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y	56.1	51	8.8	104	49.2	51	6.0	108
Left Lower Rib (LLR) Y	53.4	39	9.2	88	53.7	49	9.8	107
SPINE ACCELERATIONS								
Lower Lateral Y	65.1	48	8.5	61	78.5	54	6.6	109
PELVIS ACCELERATIONS								
Lateral Y	78.8	41	13.6	134	117.3	49	9.8	115

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

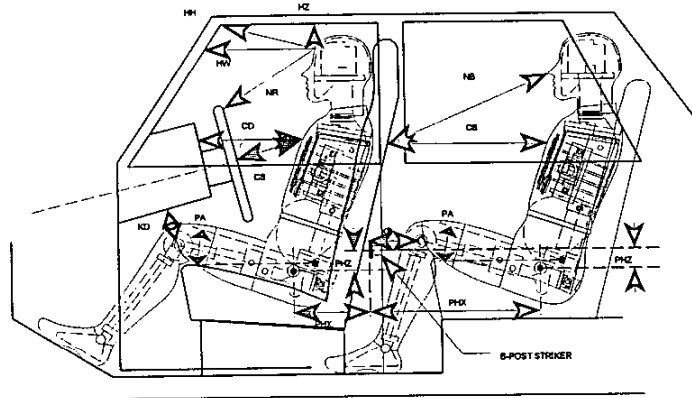
J1 = To Pinch Weld

J2 = To Sill

ALL MEASUREMENTS IN (mm)

	PRE-TEST	POST-TEST	Δ CHANGE
A	3076	3030	46
B	998	1004	6
C	1016	1004	12
D	5090	5038	52
E	135	135	0
F	379	412	33
G	172	208	36
H	170	209	39
I	176	238	62
J1/J2	192/184	290/270	98/86
K	256	276	20
L	170	170	0
M	318	325	7
N	765	682	83
O	941	823	118
P	268	268	0
Q	605	598	7
R	4073	4090	17
S	4077	3975	102
T	1944	1768	176

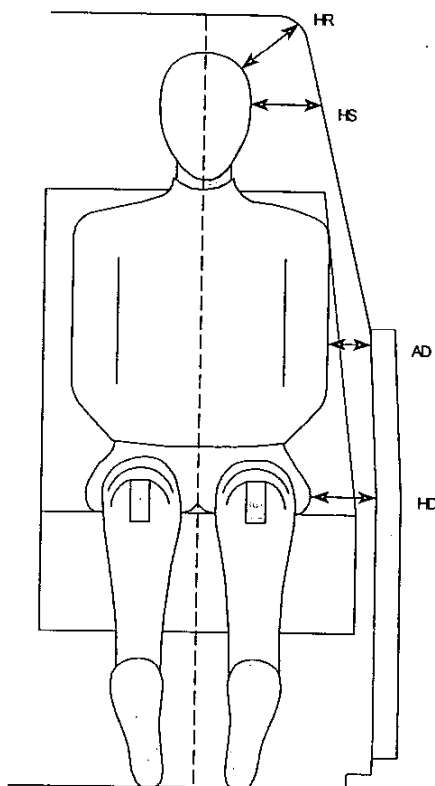
DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 2000/Ford/Windstar/MinivanNHTSA NO.: MY0200 Test Date: December 7, 1999NOTE: All dimensions are in mm with tolerance of ± 3 mm

	DRIVER SID ID # 269		LEFT REAR PASSENGER SID ID # 270
HH	372	HZ	245
HW	595	NB	651
HZ	170	CB	598
NR	420	KBL (KBA)	259/0.0
CD	542	KBR (KBA)	265/0.0
CS	328	PA°	24.8
KDL(KDA°)	175/24.8	PHX	692
KDR(KDA°)	160/17.2	PHZ	76
PA°	23.1		
PHX	207		
PHZ	35		

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

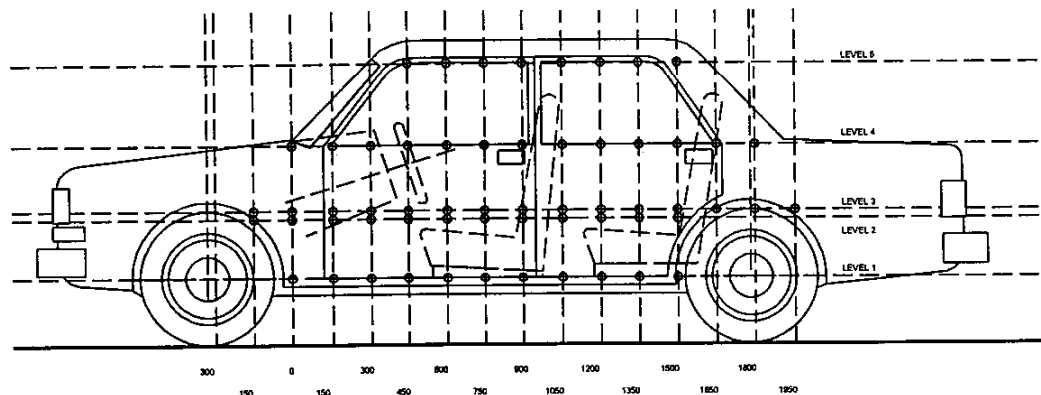
SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 2000/Ford/WindstarNHTSA NO.: MY0200Test Date: December 7, 1999

NOTE: All dimensions are in mm

	DRIVER SID ID # 269	LEFT REAR PASSENGER SID ID # 270
HR	319	340
HS	217	463
AD	122	155
HD	165	426

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 2000/Ford/Windstar
NHTSA NO.: MY0200 Test Date: December 7, 1999



LEFT SIDE VIEW

NOTE: All measurements are in millimeters (mm)

LEVEL 5 - WINDOW TOP
LEVEL 4 - WINDOW SILL
LEVEL 3 - MID-DOOR
LEVEL 2 - OCCUPANT H-POINT
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)	= <u>253</u> mm
Level 2 @ Occupant H-Point	= <u>648</u> mm
Level 3 @ Mid Door	= <u>765</u> mm
Level 4 @ Window Sill	= <u>990</u> mm
Level 5 @ Window Top	= <u>1600</u> mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

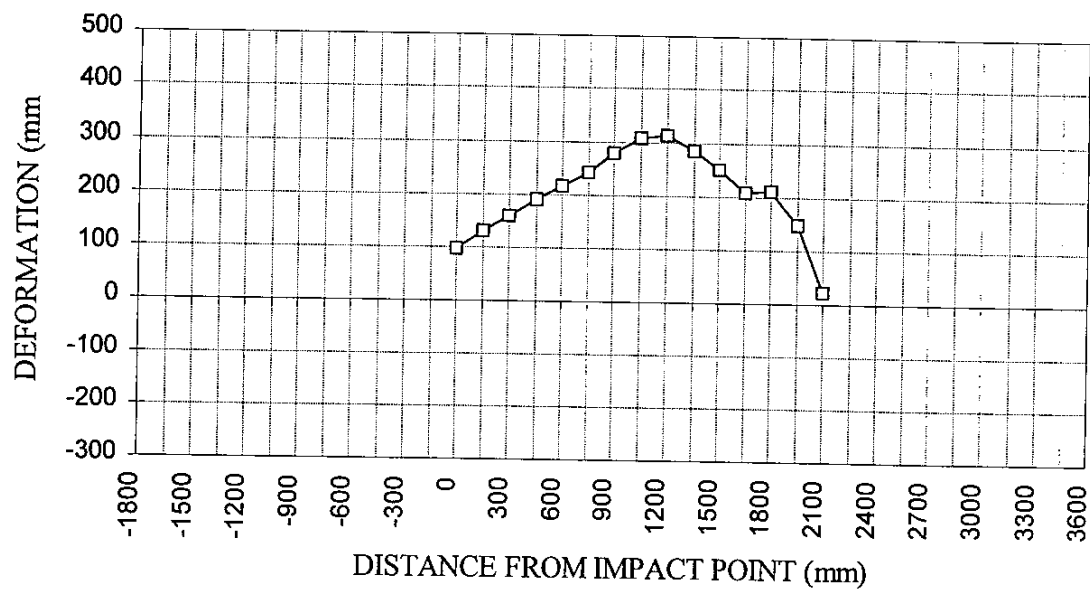
Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	690	786	96
150	691	822	131
300	691	850	159
450	691	881	190
600	690	907	217
750	690	931	241
900	689	968	279
1050	689	996	307
1200	687	1000	313
1350	687	970	283
1500	687	936	249
1650	685	892	207
1800	684	894	210

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	684	832	148
2100	682	706	24
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

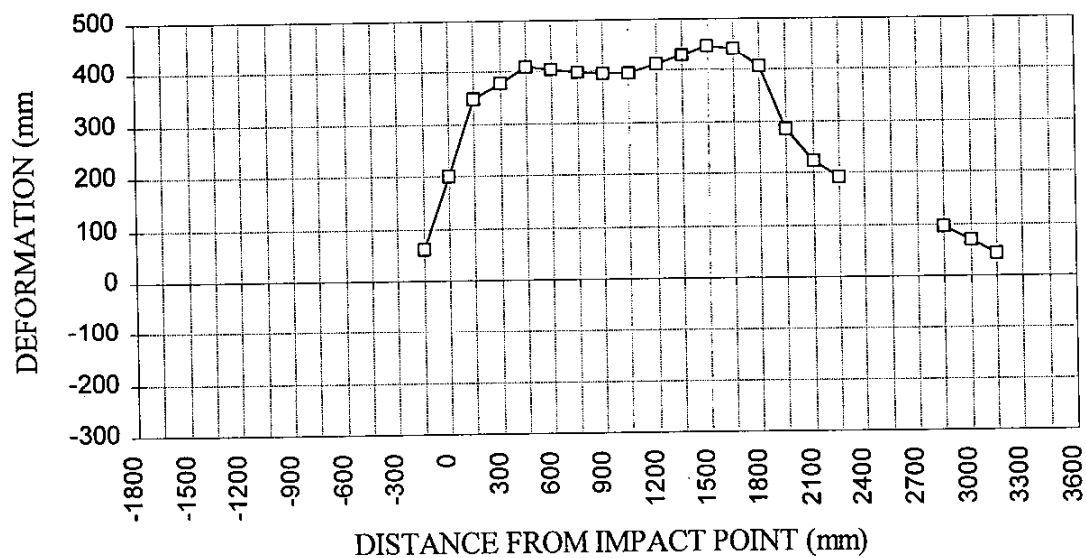
Longitudinal Distance (mm)	Level 2 - Occupant H-Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150	642	703	61
0 (impact point)	647	848	201
150	645	993	348
300	642	1020	378
450	641	1050	409
600	638	1042	404
750	636	1033	397
900	634	1028	394
1050	634	1030	396
1200	636	1048	412
1350	636	1066	430
1500	636	1083	447
1650	637	1080	443
1800	638	1044	406

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 2 - Occupant H-Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	638	924	286
2100	632	855	223
2250	625	818	193
2400			
2550			
2700			
2850	638	733	95
3000	660	729	69
3150	684	726	42
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

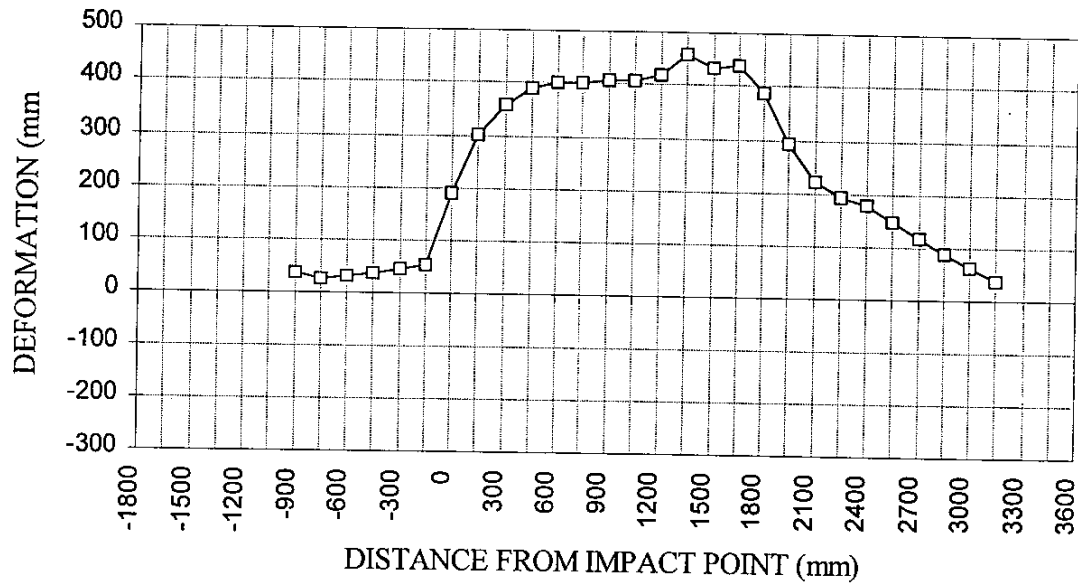
Longitudinal Distance (mm)	Level 3 - Mid-Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1650			
-1500			
-1350			
-1200			
-1050			
-900	661	700	39
-750	650	677	27
-600	640	673	33
-450	635	674	39
-300	634	681	47
-150	636	691	55
0 (impact point)	639	831	192
150	640	942	302
300	638	996	358
450	636	1025	389
600	633	1035	402
750	632	1034	402
900	630	1037	407
1050	628	1033	405
1200	630	1048	418
1350	632	1090	458
1500	633	1066	433
1650	635	1074	439
1800	635	1022	387

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 3 - Mid-Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	635	927	292
2100	628	851	223
2250	626	821	195
2400	621	800	179
2550	620	767	147
2700	626	743	117
2850	638	727	89
3000	655	719	64
3150	680	719	39
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 3 - MID-DOOR

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

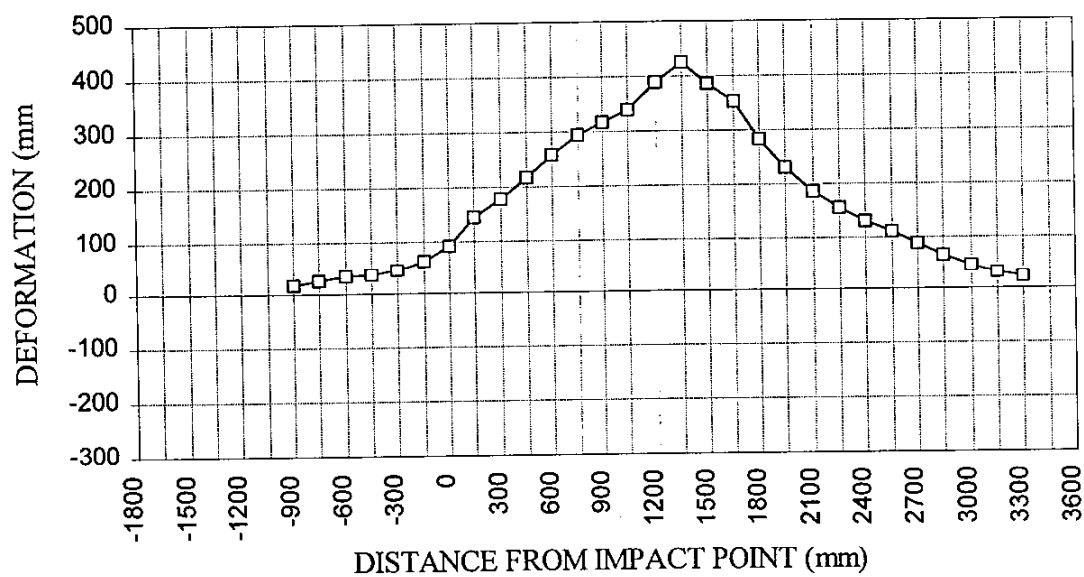
Longitudinal Distance (mm)	Level 4 - Window Sill		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1650			
-1500			
-1350			
-1200			
-1050			
-900	773	792	19
-750	741	767	26
-600	715	750	35
-450	698	735	37
-300	688	734	46
-150	683	745	62
0 (impact point)	681	772	91
150	681	825	144
300	678	856	178
450	675	891	216
600	673	931	258
750	673	966	293
900	671	986	315
1050	671	1008	337
1200	671	1059	388
1350	671	1097	426
1500	674	1059	385
1650	673	1025	352
1800	676	959	283

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 4 - Window Sill		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	675	906	231
2100	678	863	185
2250	681	835	154
2400	685	814	129
2550	689	800	111
2700	695	782	87
2850	704	769	65
3000	710	757	47
3150	716	747	31
3300	735	757	22
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

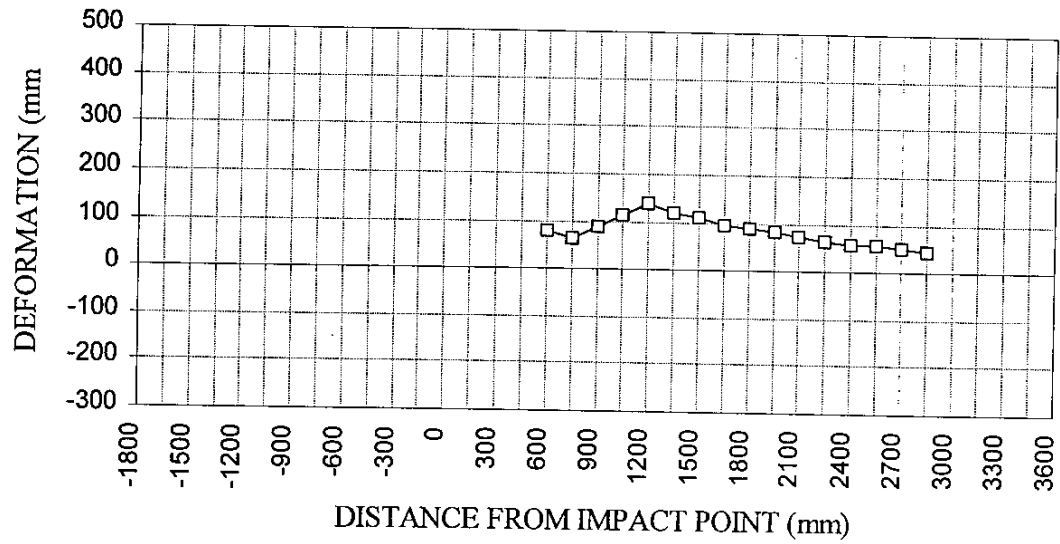
Longitudinal Distance (mm)	Level 5 - Window Top		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600	935	1015	80
750	927	992	65
900	926	1016	90
1050	929	1042	113
1200	926	1066	140
1350	925	1047	122
1500	926	1036	110
1650	926	1022	96
1800	926	1014	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

Longitudinal Distance (mm)	Level 5 - Window Top		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	927	1011	84
2100	929	1003	74
2250	934	998	64
2400	936	993	57
2550	939	995	56
2700	945	996	51
2850	954	1000	46
3000			
3150			
3300			
3450			
3600			

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

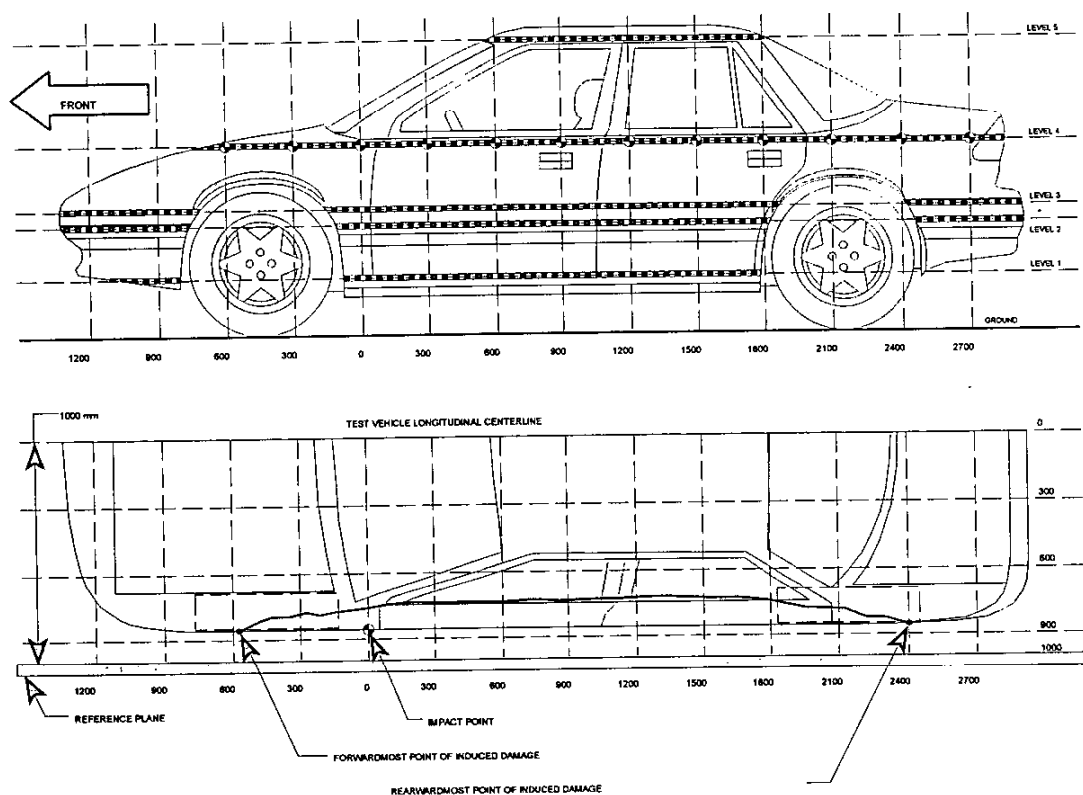
VEHICLE EXTERIOR STATIC CRUSH

LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

NHTSA NO.: MY0200 Test Date: December 7, 1999



NOTE: All measurements are in millimeters (mm)

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LR = <u>3300</u> mm)	757	735	22
2. 2480 mm	783	620	163
3. 1572 mm	1111	636	475
4. 740 mm	1091	636	455
5. -85 mm	715	644	71
6. (LF = <u>-900</u> mm)	792	773	19

DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR.

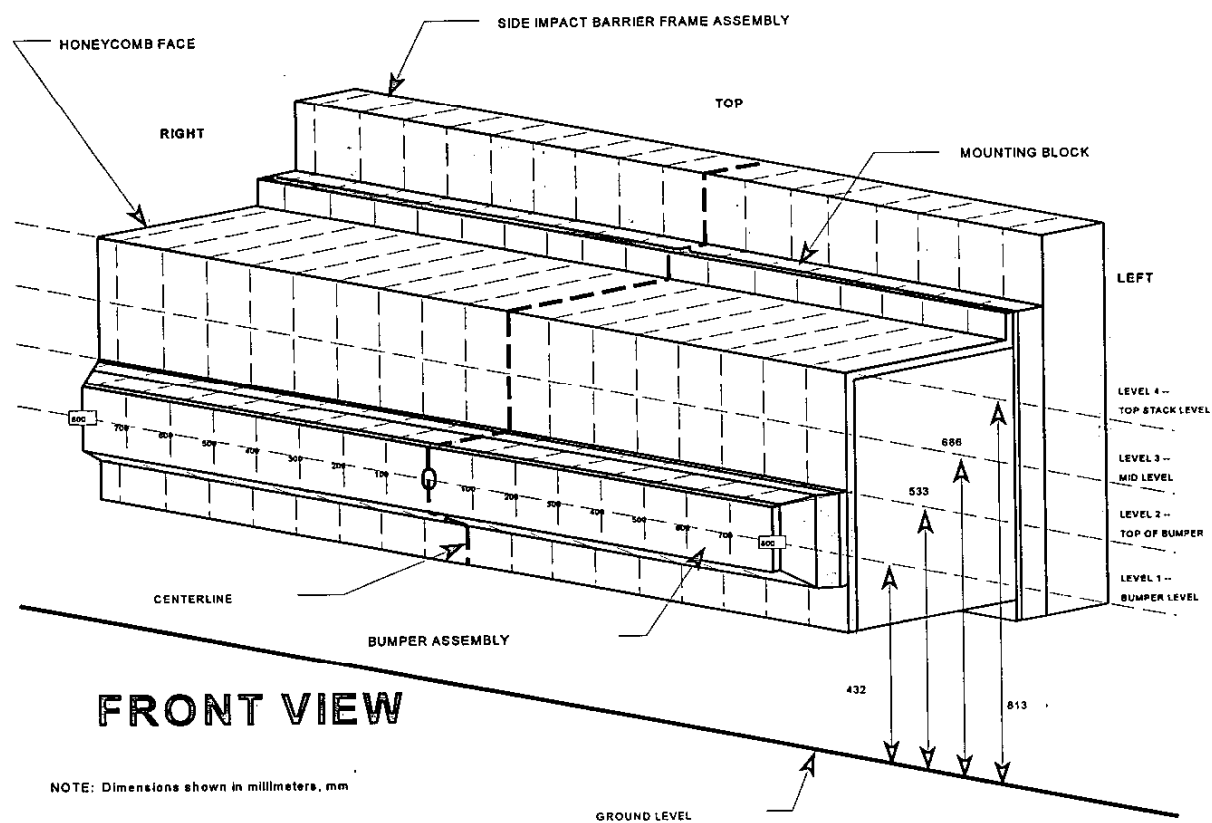
Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

		Distance Right of Center (mm)											Distance Left of Center (mm)									
Location	Height at CL	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800				
Top Stack Level 4	813 mm	88	36	12	6	7	13	16	27	27	22	17	22	36	46	69	95	129				
Mid Level Level 3	686 mm	55	18	19	11	3	4	11	12	5	3	6	8	11	12	21	36	58				
Top Bumper Level 2	533 mm	84	54	37	25	21	19	18	17	17	21	24	26	27	32	37	44	54				
Mid Bumper Level 1	432 mm	170	132	99	76	65	58	56	55	52	54	57	56	59	61	65	73	80				

See next page for Barrier Face Graphic

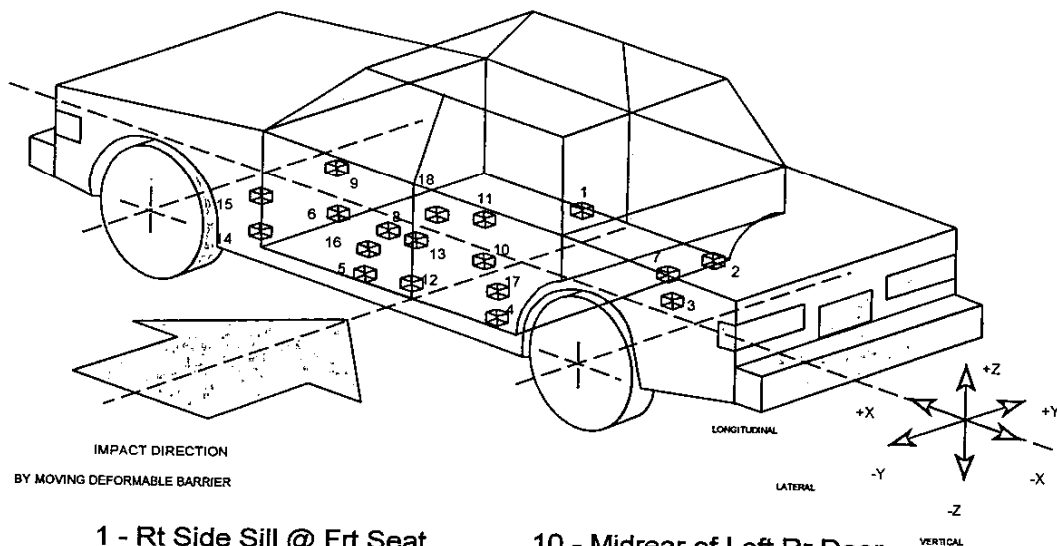
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999



- | | |
|---------------------------------|------------------------------|
| 1 - Rt Side Sill @ Frt Seat | 10 - Midrear of Left Rr Door |
| 2 - Rt Side Sill @ Rr Seat | 11 - Left Rr Door Up C/Line |
| 3 - Rr Floorpan Above Axle | 12 - Left Lwr B-Post |
| 4 - Left Side Sill @ Rr Seat | 13 - Left Middle B-Post |
| 5 - Left Side Sill @ Frt Seat | 14 - Left Lwr A-Post |
| 6 - Left Frt Door on Centerline | 15 - Left Middle A-Post |
| 7 - Rt Rr Occ Compartment | 16 - Frt Seat Track |
| 8 - Midrear of Left Frt Door | 17 - Rr Seat Track |
| 9 - Left Frt Door Up C/Line | 18 - Vehicle C.G. |

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

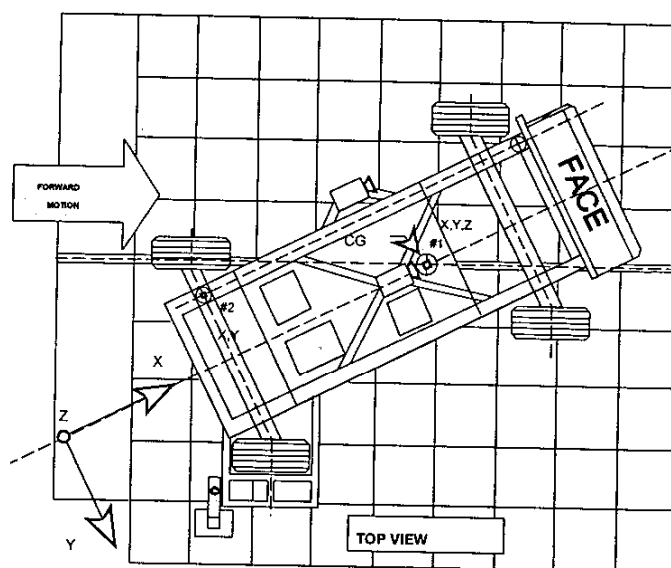
Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Rt. Side Sill @ Front Seat	2967	735	258	5.1	3.7	22.9	3.5	4.5	9.0	23.8
2	Rt. Side Sill @ Rear Seat	1508	745	267	5.0	4.4	21.7	3.7	4.8	9.5	22.0
3	Rr. Floorpan Above Axle	1024	0	515	3.0	2.9	52.5	40.0	13.8	9.1	53.3
4	Left Side Sill @ Rr. Seat	1594	-805	226	---	---	39.0	24.4	---	---	---
5	Left Side Sill @ Frt. Seat	2978	-795	213	---	---	65.7	21.1	---	---	---
6	Left Front Door Centerline	3042	-804	766	---	---	256.0	222.8	---	---	---
7	Right Rear Occupant Compartment	2178	284	563	---	---	19.1	2.8	---	---	---
8	Mid Rear of Left Front Door	2667	-806	747	---	---	181.9	87.5	---	---	---
9	Left Front Door Upper Centerline	3049	-804	1005	---	---	67.8	62.9	---	---	---
10	Left Rear Door Mid Rear	1736	-826	960	---	---	87.4***	6.8***	---	---	---
11	Left Rear Door Upper Centerline	2076	-830	947	---	---	198.8	187.0	---	---	---
12	Left Lower B-Post	2499	-772	429	---	---	283.8	149.2	---	---	---
13	Left Mid B-Post	2459	-758	1175	---	---	88.9	43.1	---	---	---
14	Left Lower A-Post	3522	-724	458	---	---	67.7	26.3	---	---	---
15	Left Mid A-Post	3627	-852	1095	---	---	21.1**	3.8**	---	---	---
16	Driver Left Seat Track	2639	-675	470	---	---	120.5	29.1	---	---	---
17	Rear Seat Track	1720	-483	490	---	---	119.9	50.0	---	---	---
18	Vehicle CG	2751	0	422	2.3	6.8	18.9	13.9	64.7	47.3	66.1

*Reference: X - Rear Bumper (+ Forward)
** No valid data after 26 msec.

Y - Vehicle Centerline (+ To right)
No valid data after 30 msec.

Z - Ground Level (+ Up)

DATA SHEET NO. 14

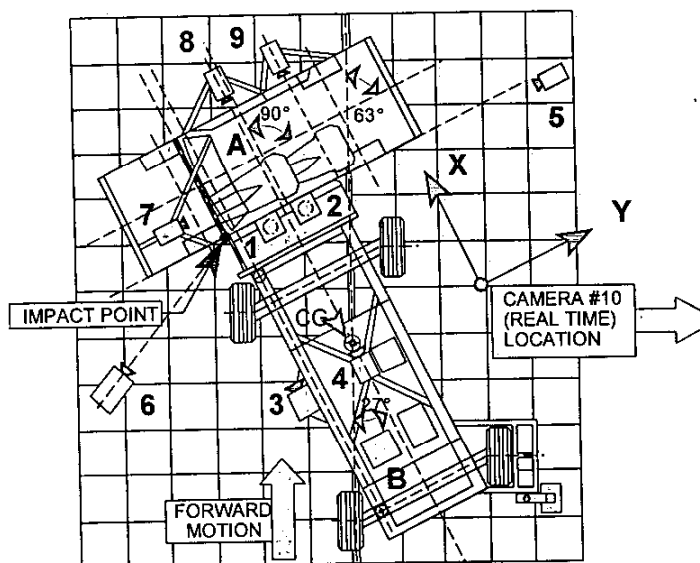
MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARYYear/Make/Model/Body Style: 2000/Ford/Windstar/MinivanVehicle NHTSA No.: MY0200 Test Date: December 7, 1999

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)	---	---	---	2.2	132	17.6	57
	Lateral (Y)	---	---	---	1.0	65	9.1	52
	Vertical (Z)	---	---	---	14.3	70	-16.4	62
	Resultant (R)	---	---	---	21.6	62	--	--
2	Rear Frame Member	-2501	-625	622				
	Longitudinal (X)	---	---	---	1.9	151	19.7	52
	Lateral (Y)	---	---	---	2.7	29	2.7	67

*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: 2000/Ford/Windstar/Minivan
 Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999



Camera No.	View	Coordinates (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
	Real Time					
1	Top Overall	150	1280	5000	8	1042
2	Top Impact	190	40	5000	13	1000
3	Cart Pointer				35	897
4	Cart Overall				13	1005
5	Right Impact	-3840	4100	1370	50	862
6	Left Impact	-1720	-2510	2000	13	1000
7	Onboard Hood				13	1010
8	Onboard Driver				8	1010
9	Onboard Rear Passenger				8	1005

* Reference: (from point of impact)

+X = Forward

+Y = To Right

+Z = Upward

DATA SHEET 16
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 38.3 mph (61.6 kph)

FUEL SPILLAGE MEASUREMENT:

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

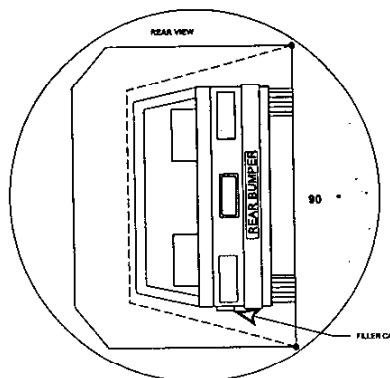
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

TEST PHASE: 0° - 90°



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:

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

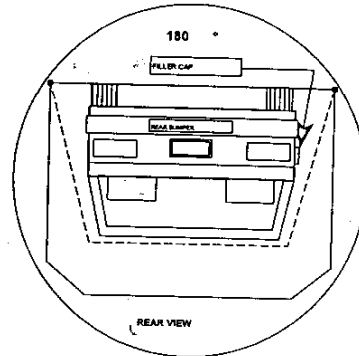
FUEL SPILLAGE LOCATIONS(S): None

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

Vehicle Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 28 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 28 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

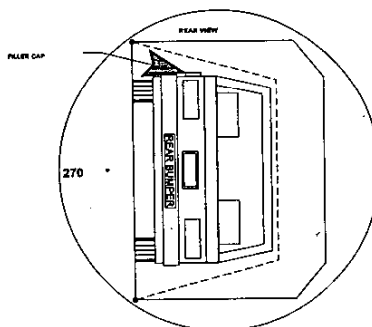
FUEL SPILLAGE LOCATIONS(S): None

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

Vehicle Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 15 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 15 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

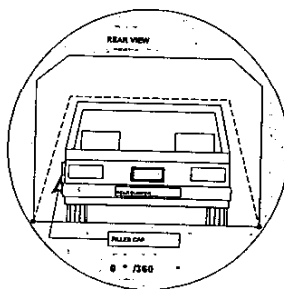
FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 2000/Ford/Windstar/Minivan

Vehicle NHTSA No.: MY0200 Test Date: December 7, 1999

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 39 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 39 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

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

FUEL SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

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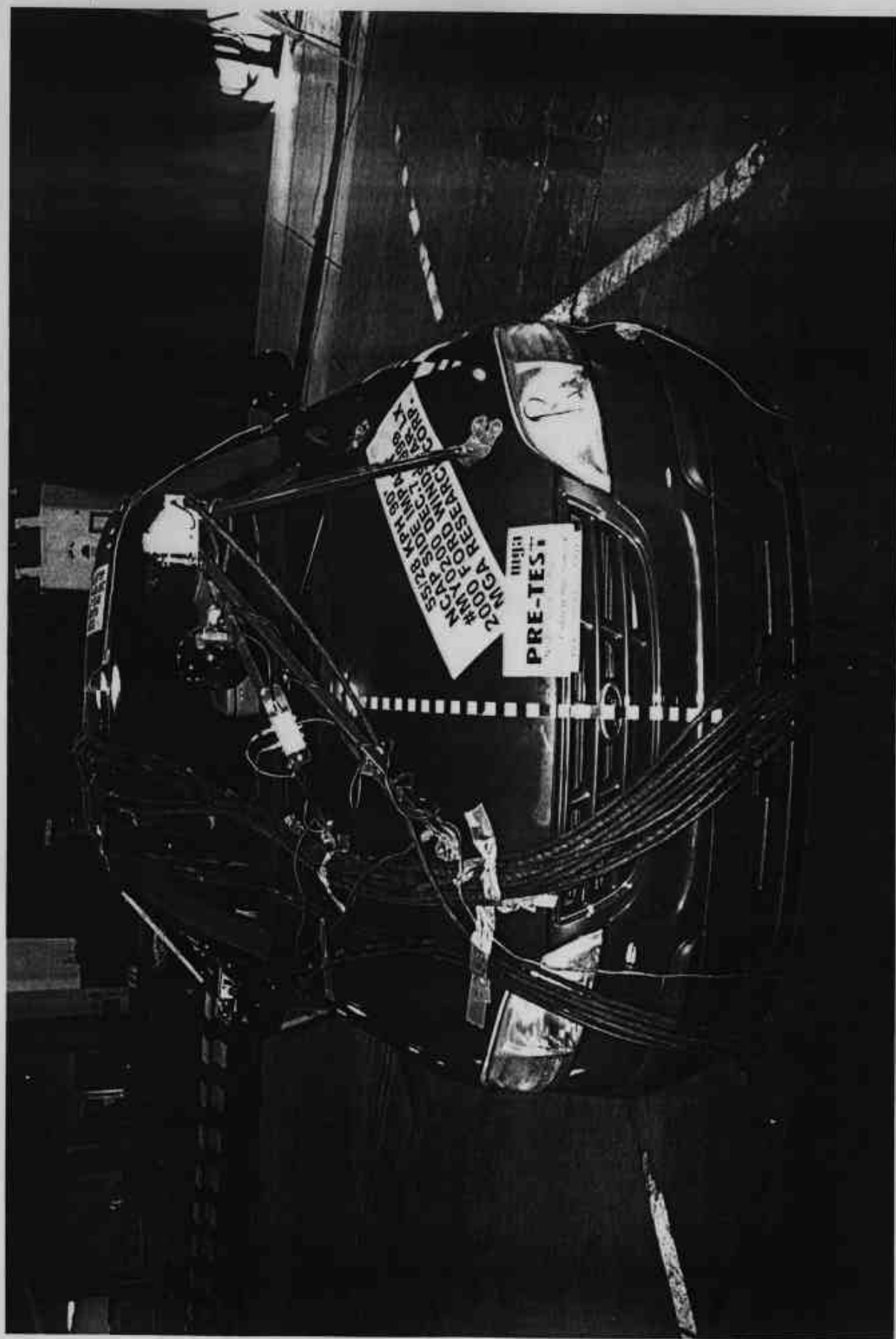


Photo No. A-1 - Pre-Test Front View of Test Vehicle



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

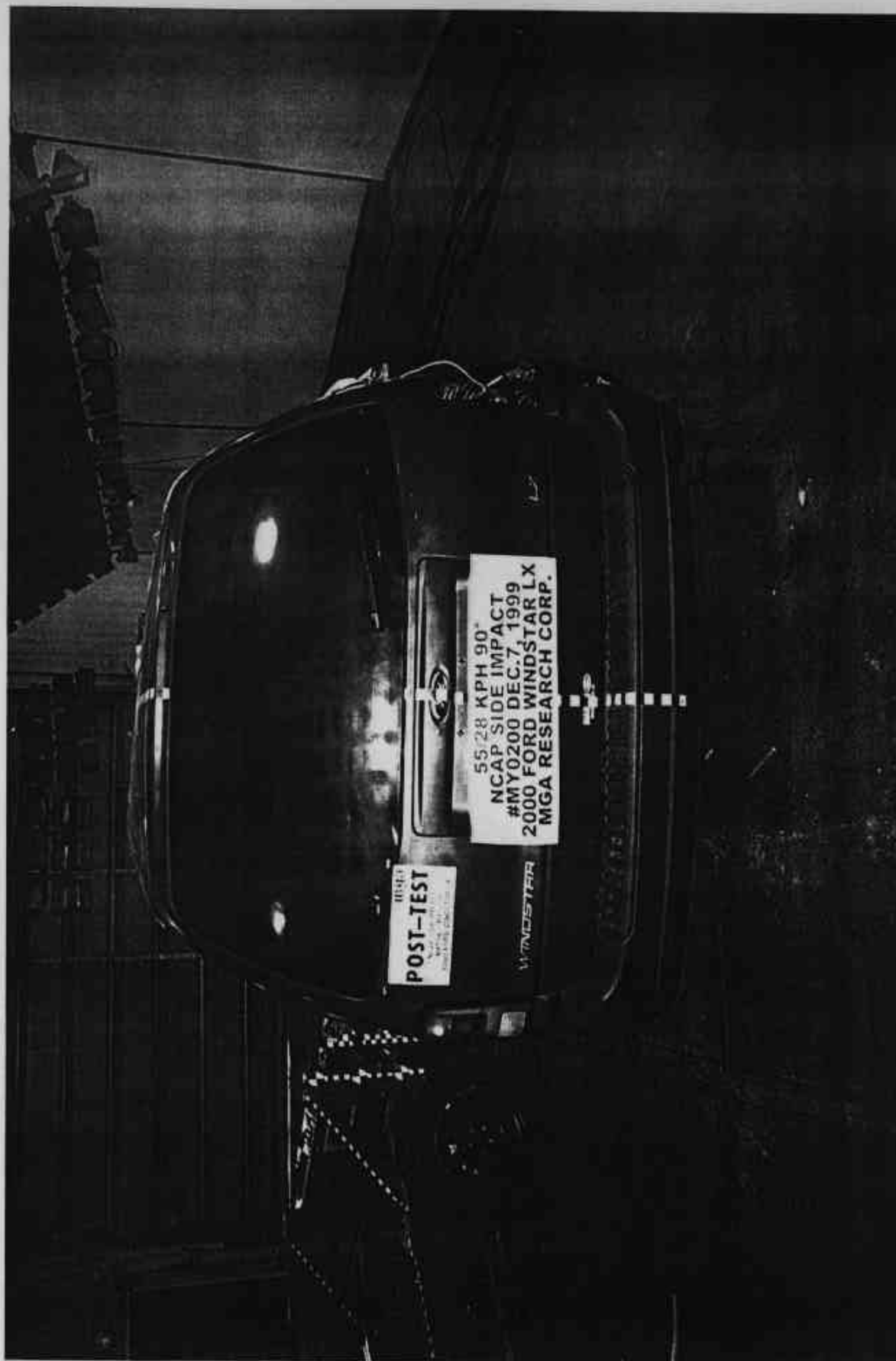


Photo No. A-4 - Post-Test Rear View of Test Vehicle

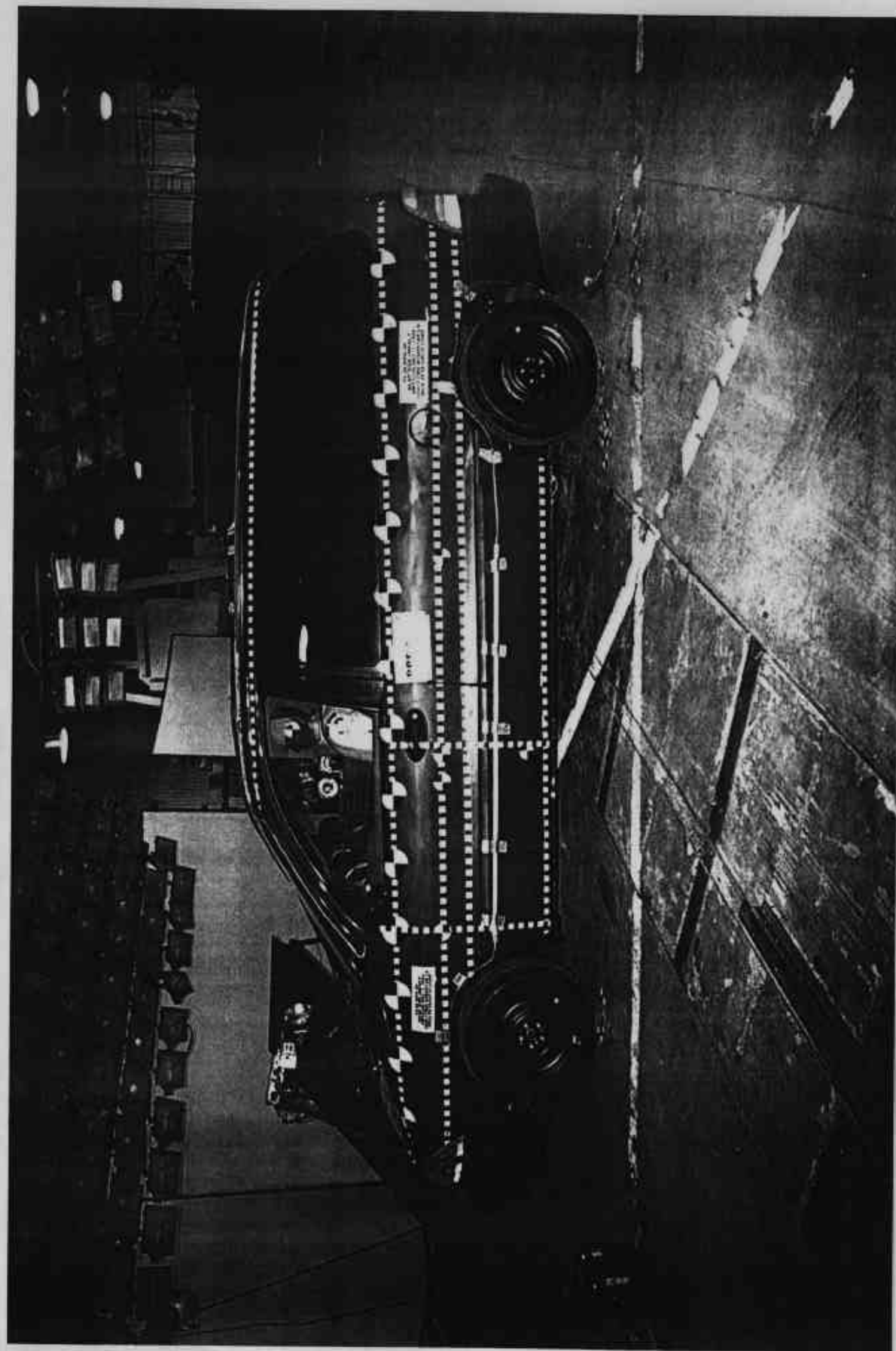


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

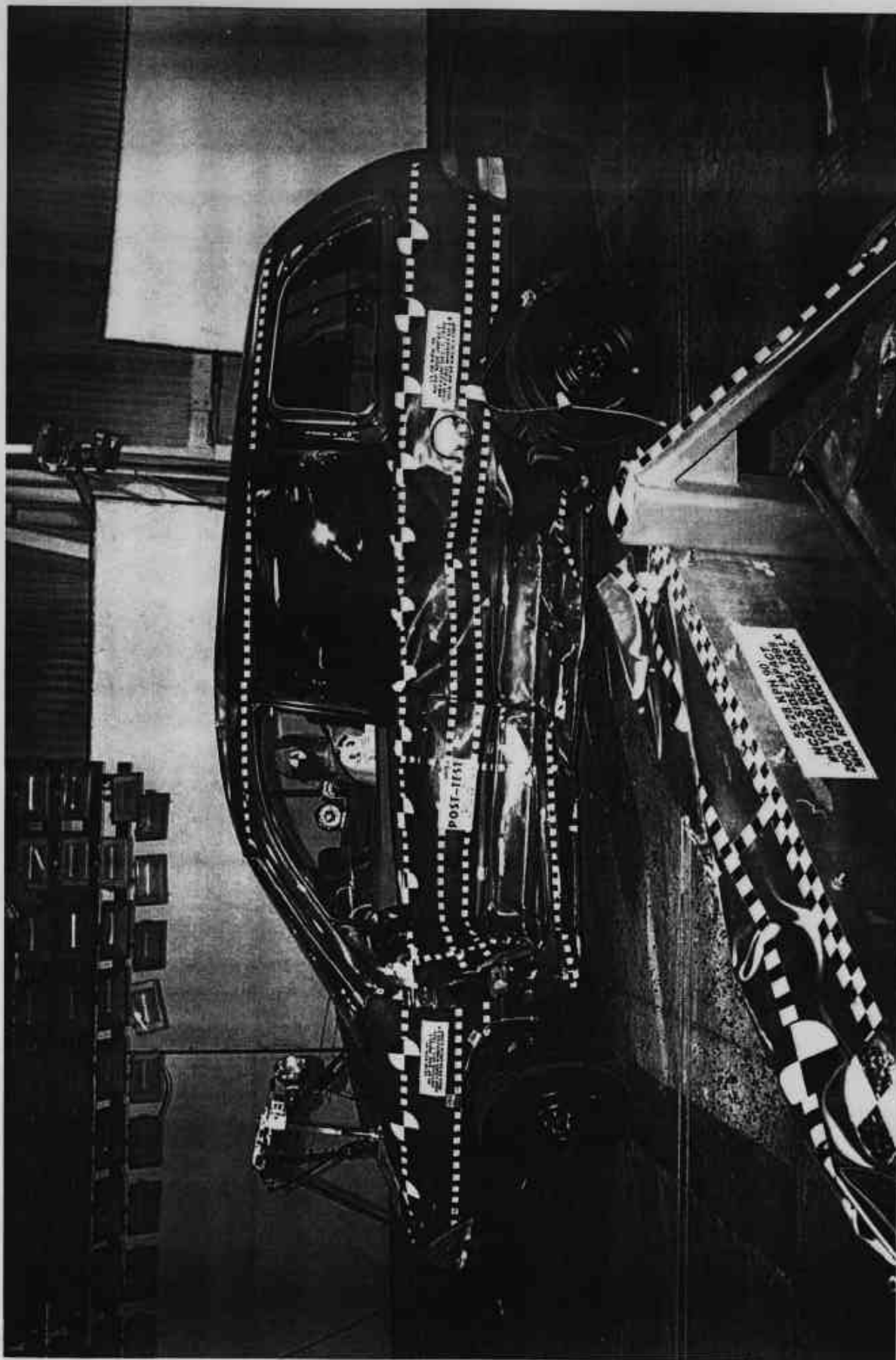


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

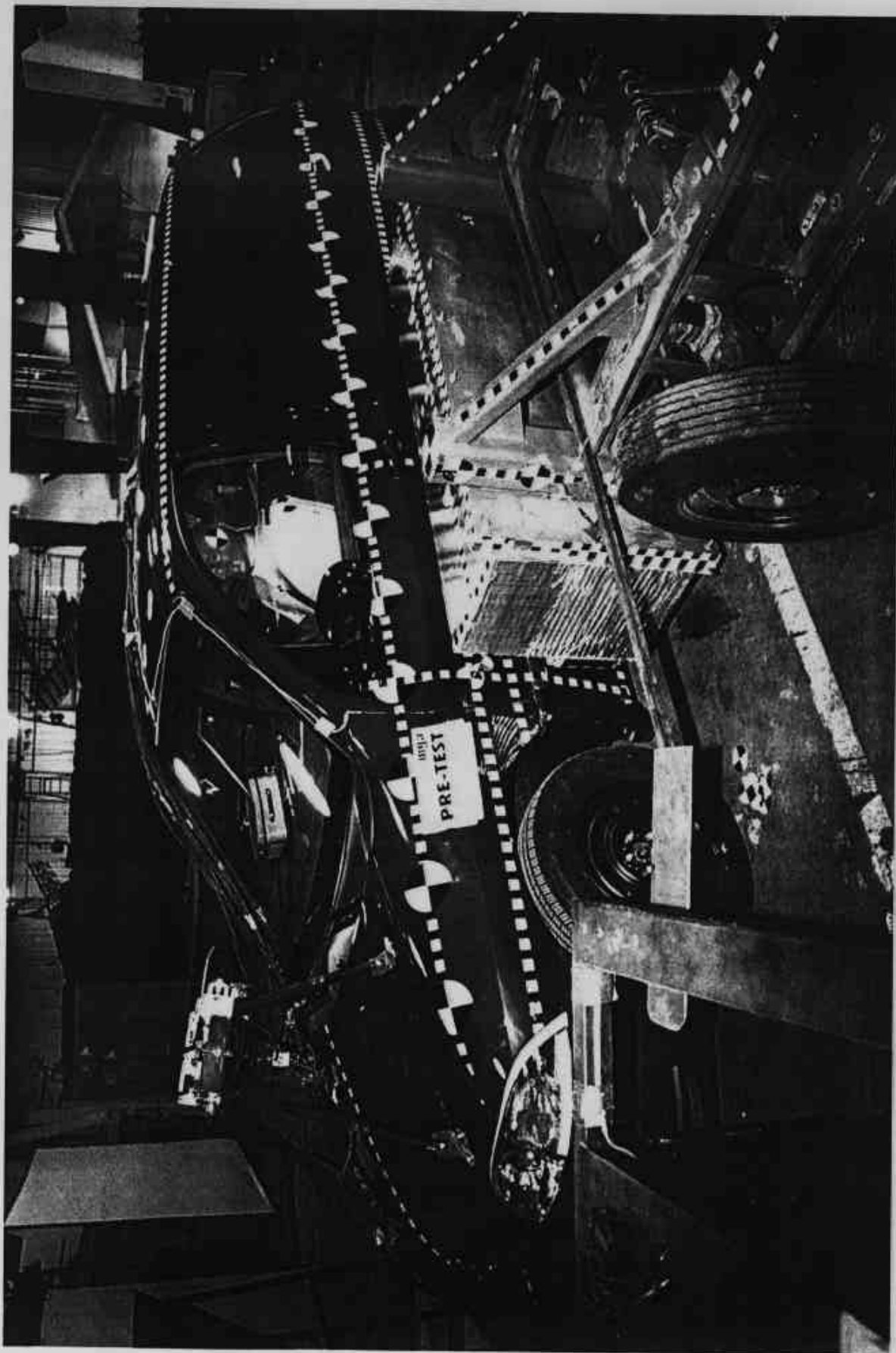


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)



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

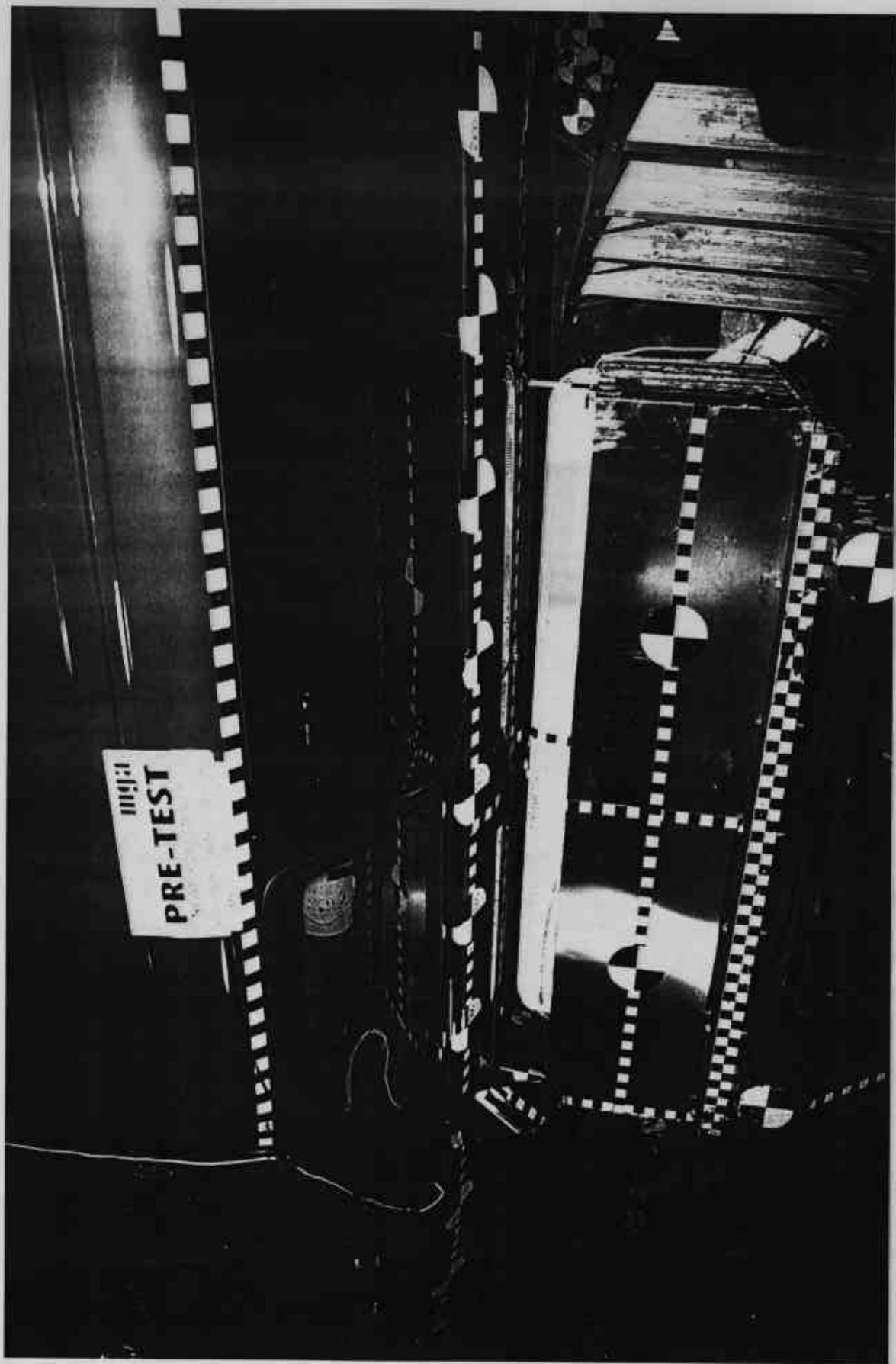


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

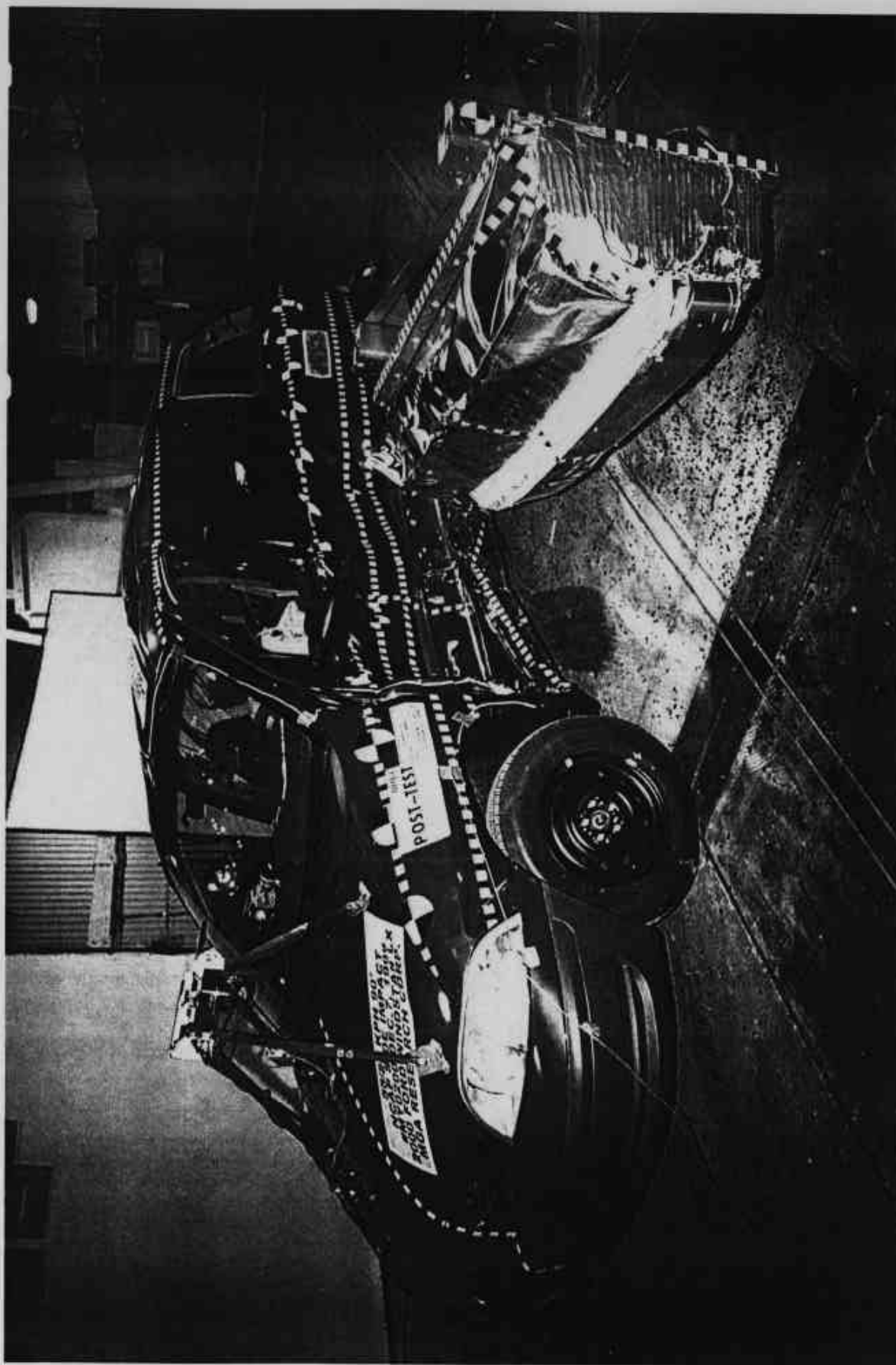
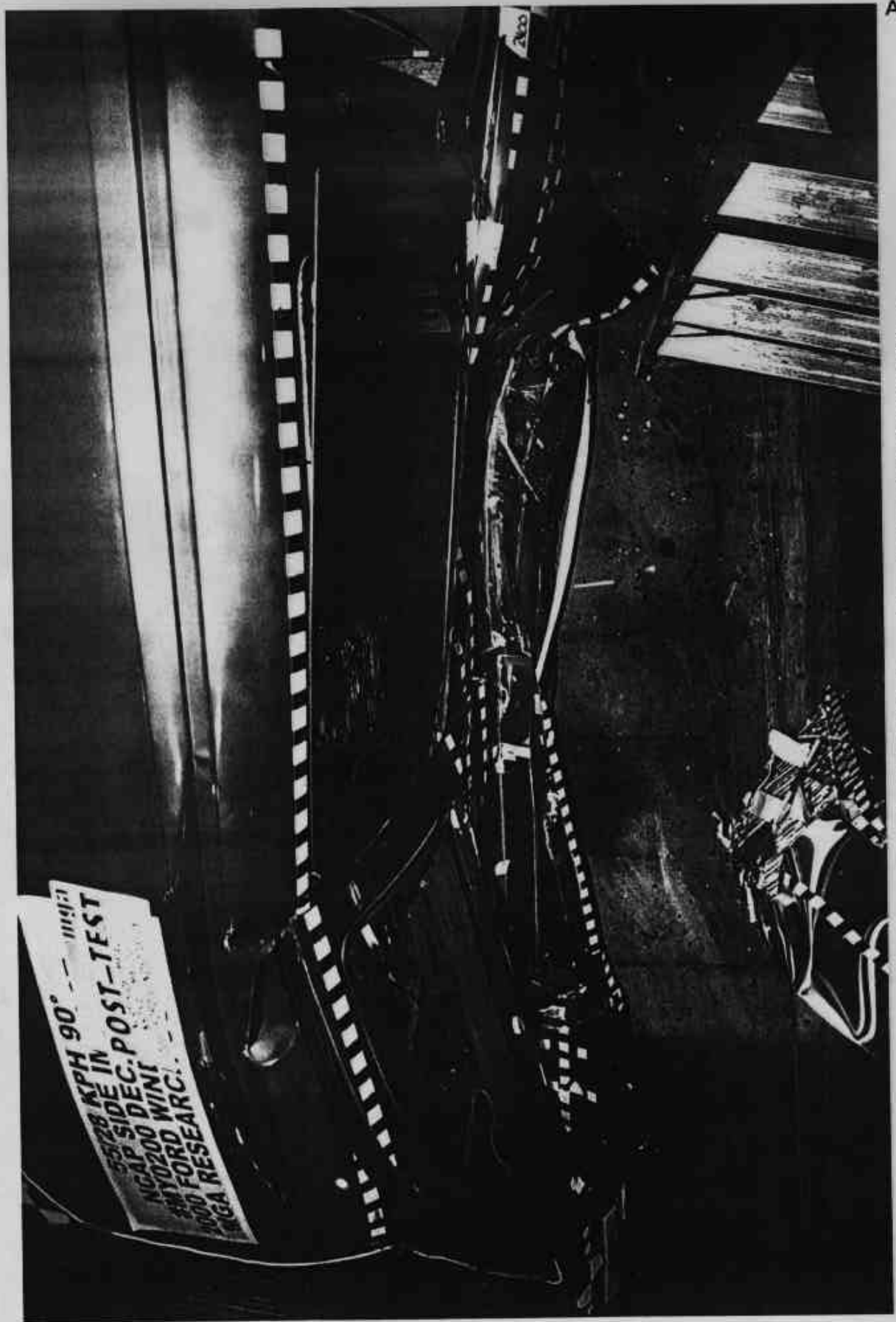


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)



A-12

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

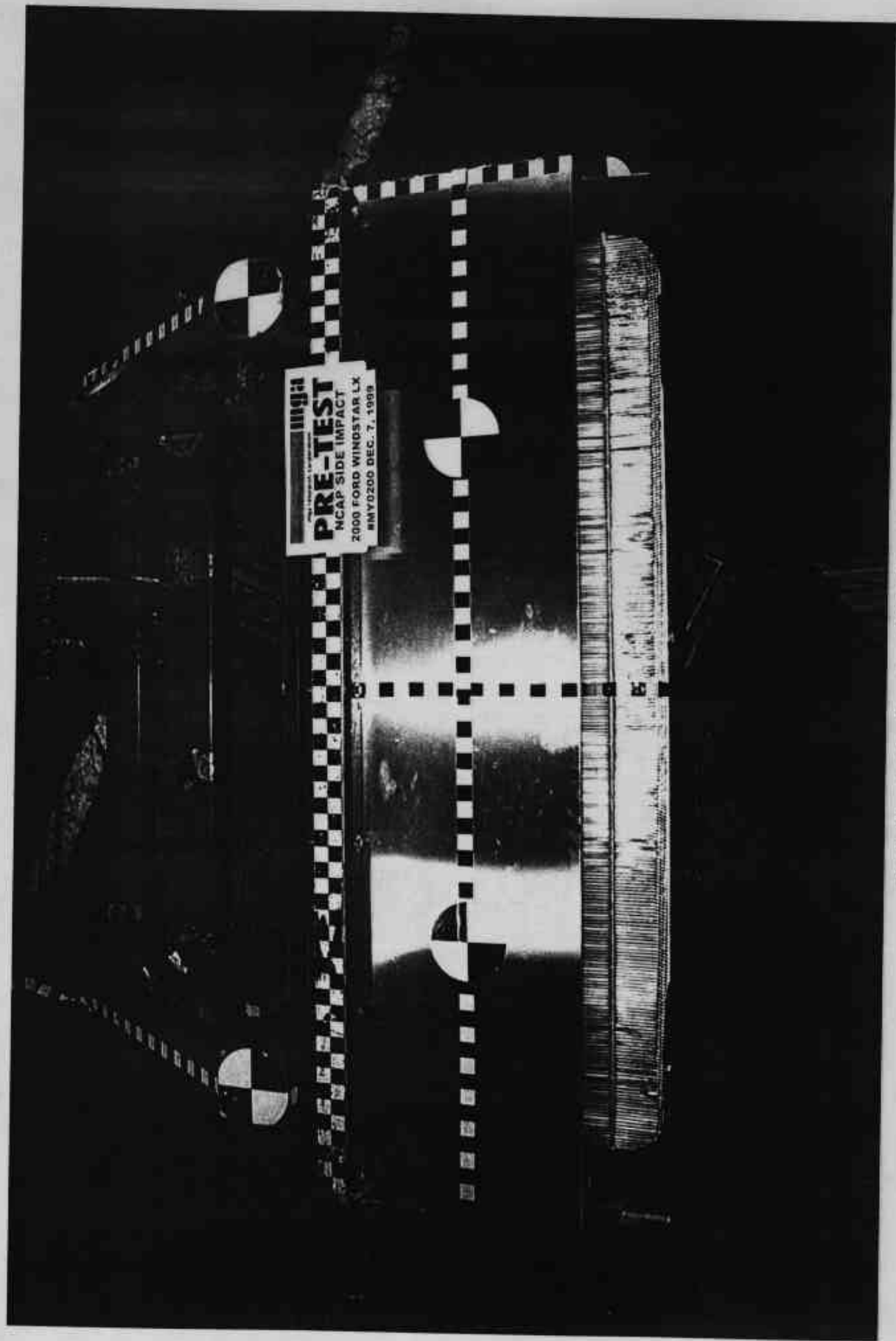


Photo No. A-13 - Pre-Test MDB Top View

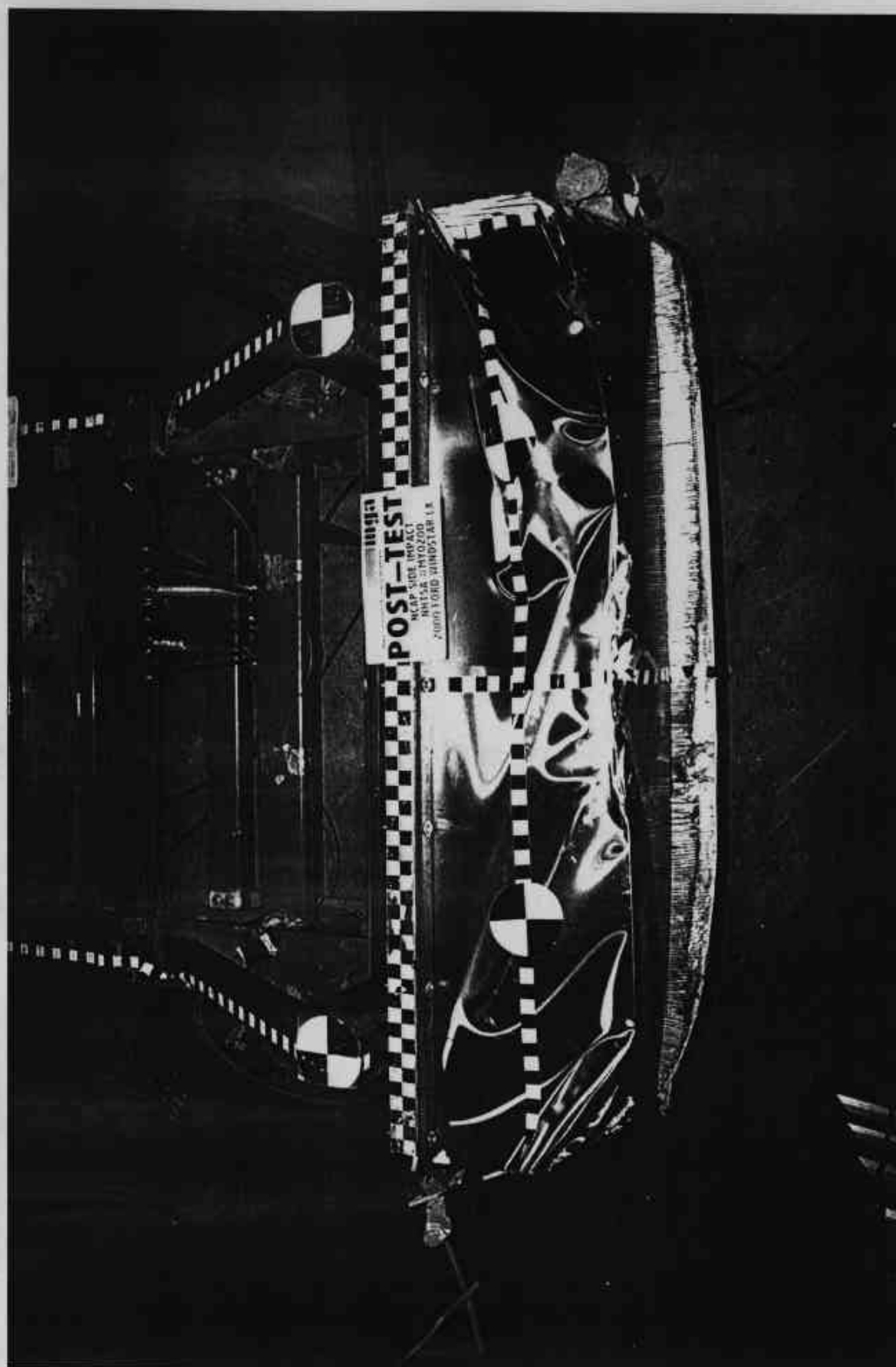
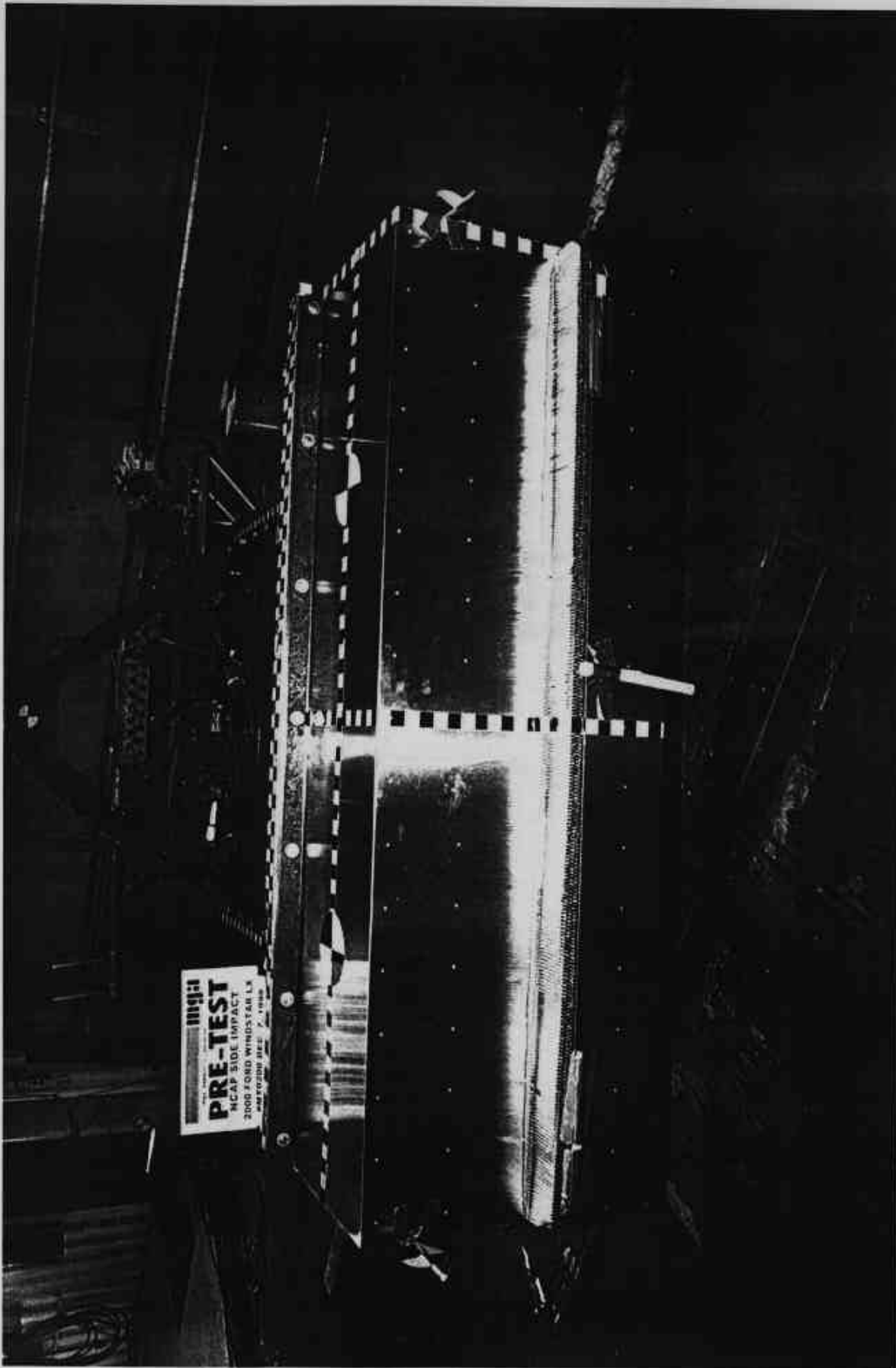
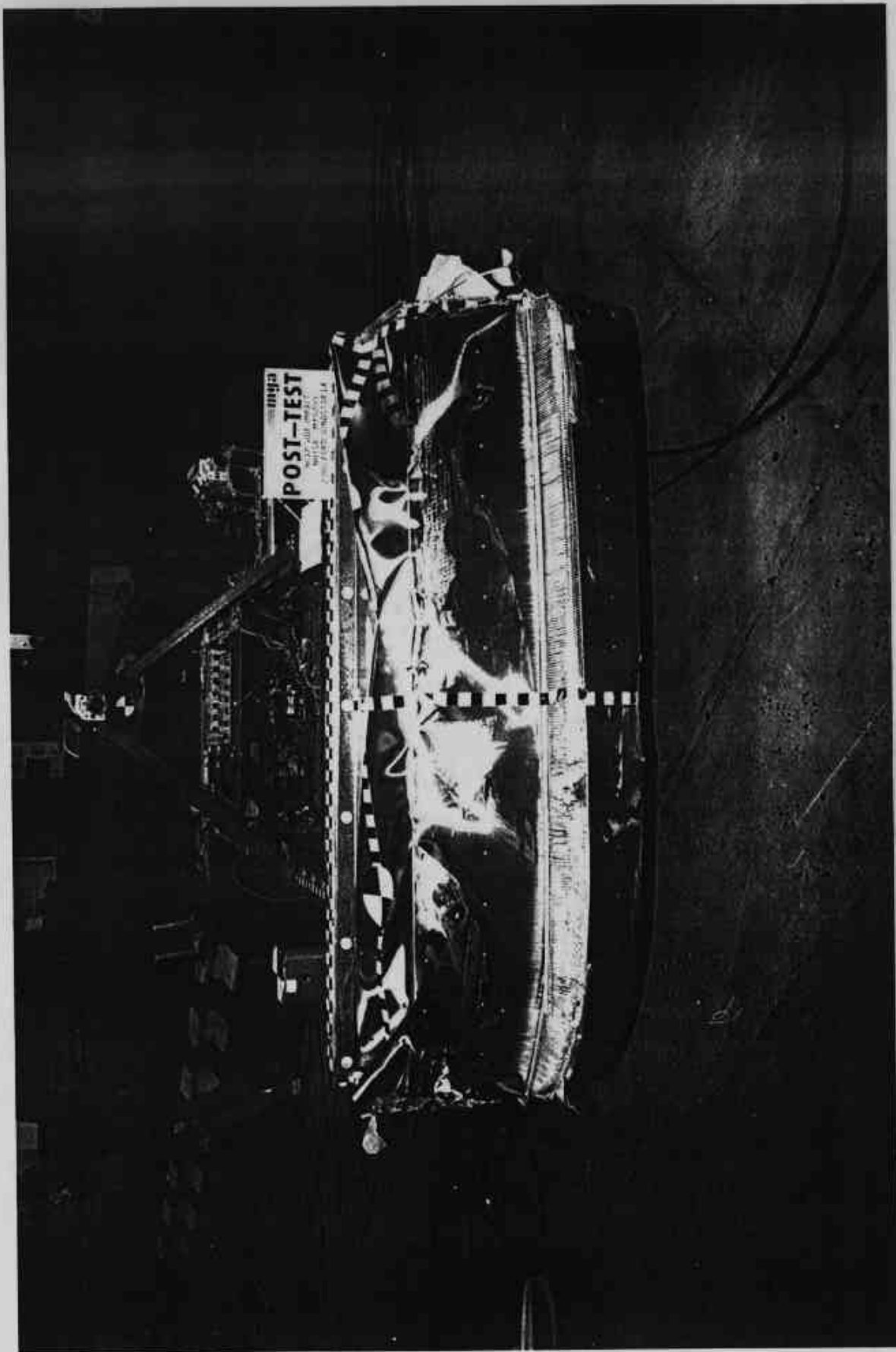


Photo No. A-14 - Post-Test MDB Top View



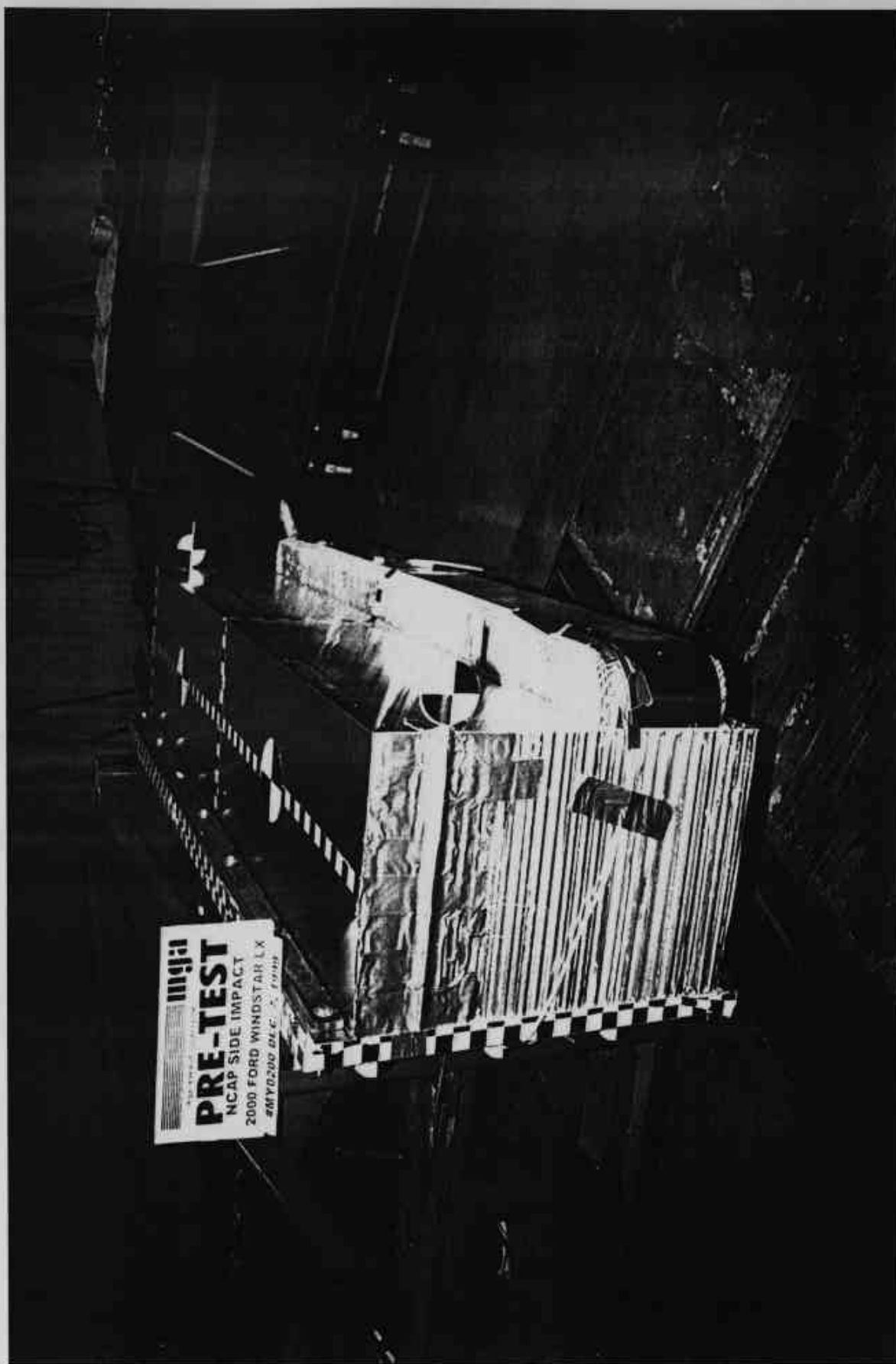
A-15

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



A-16

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



A-17

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

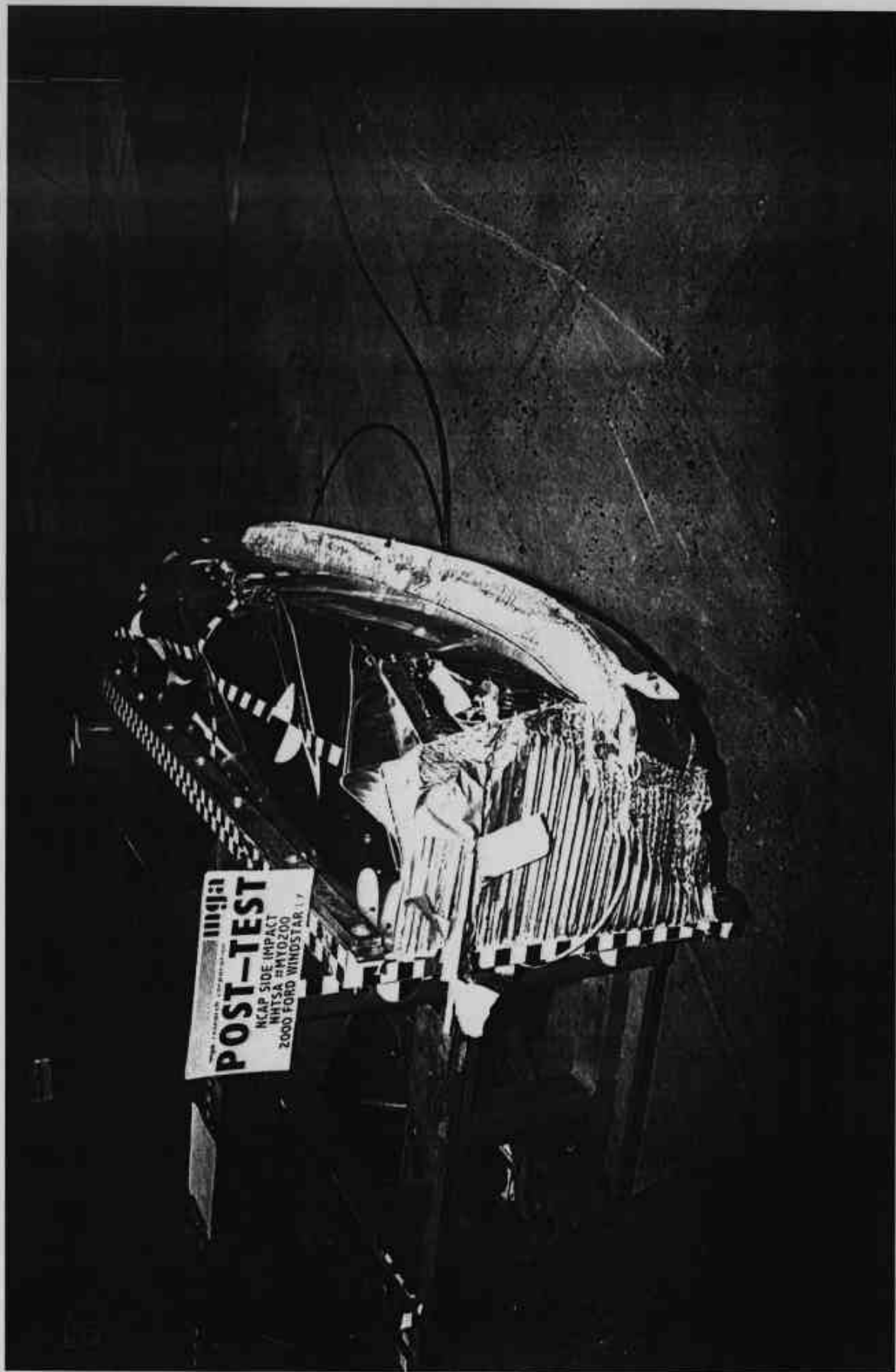


Photo No. A-18 - Post-Test MDB Right Side View



A-19

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

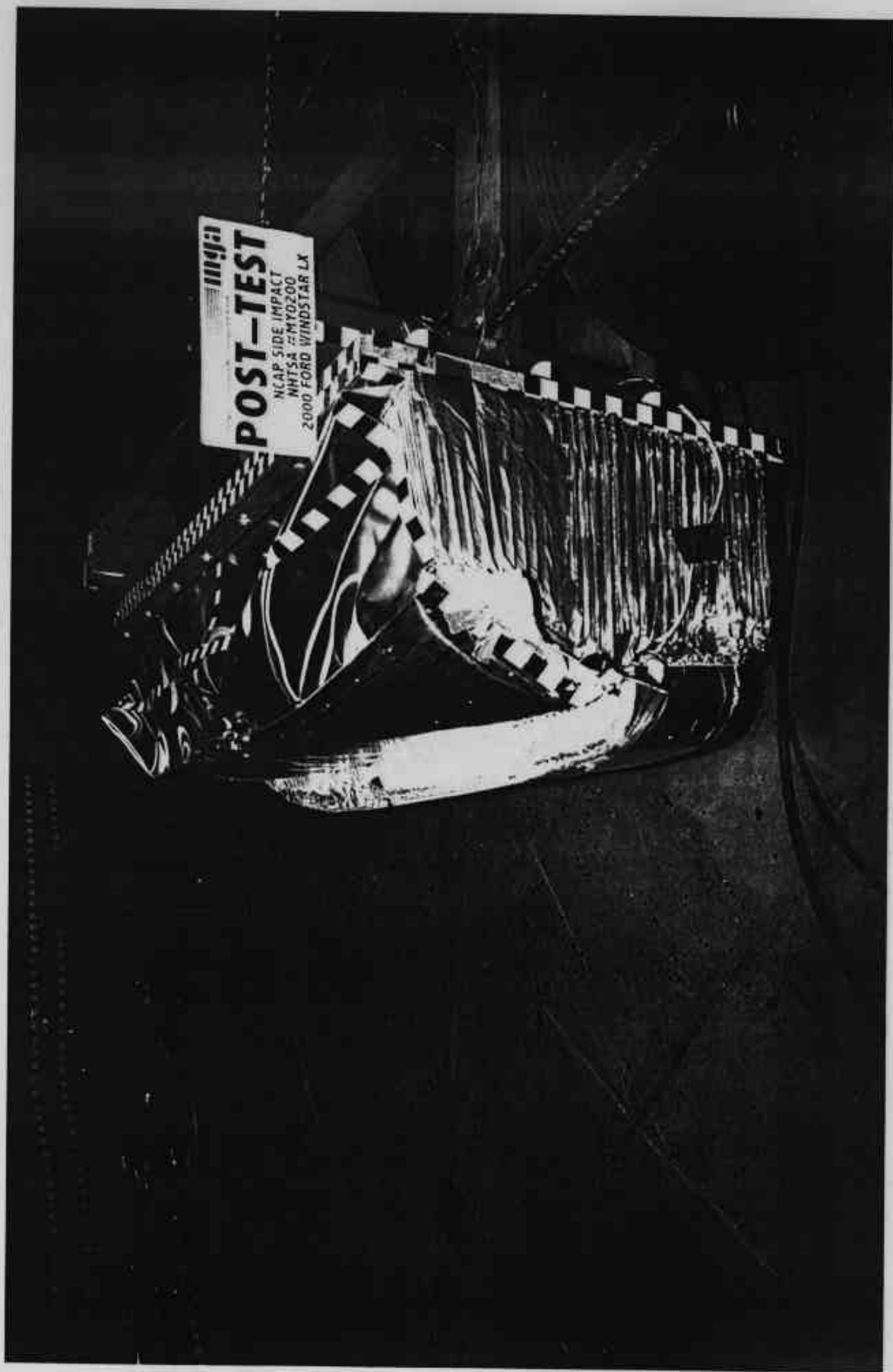


Photo No. A-20 - Post-Test MDB Left Side View



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



A-22

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

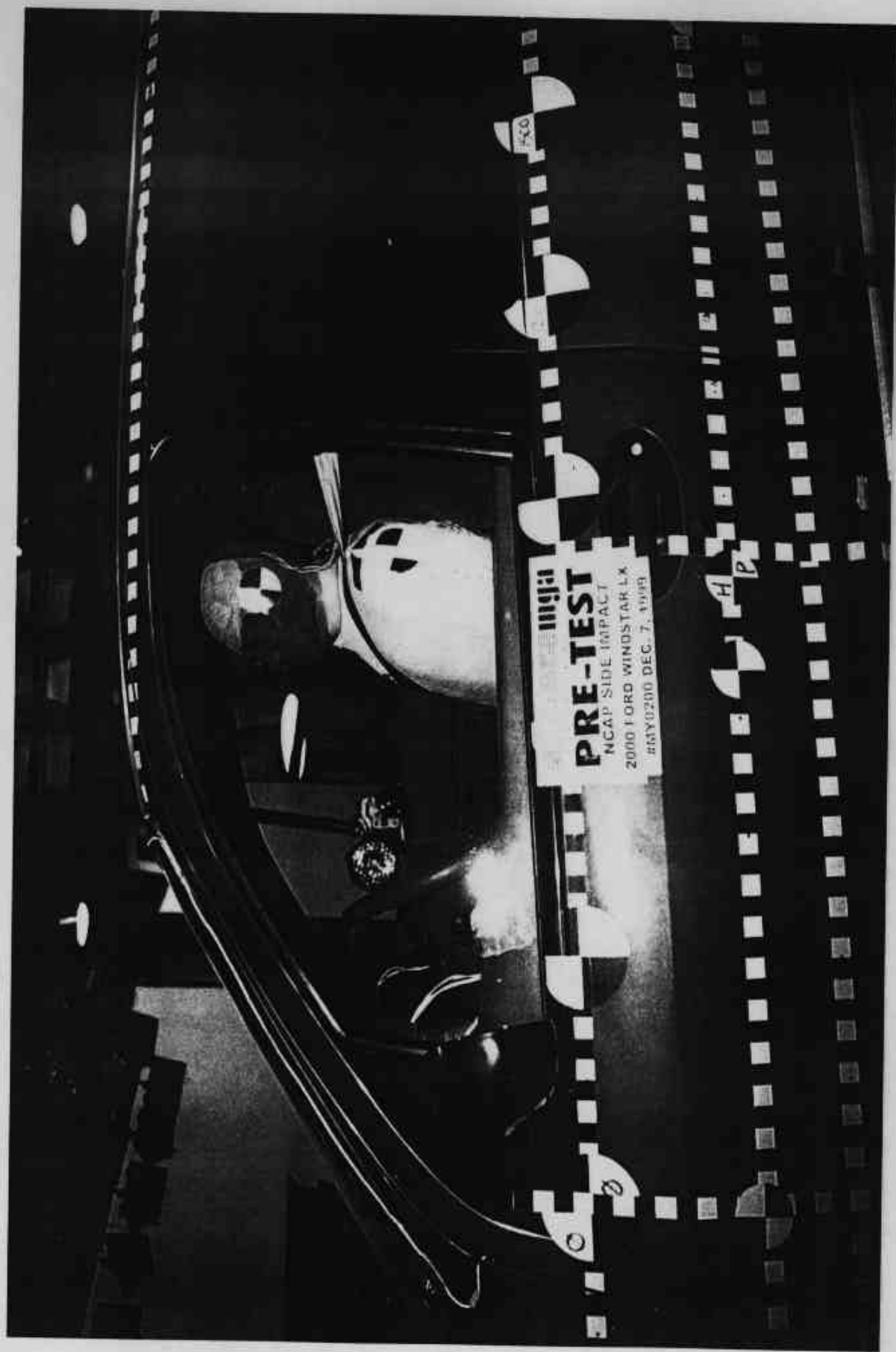
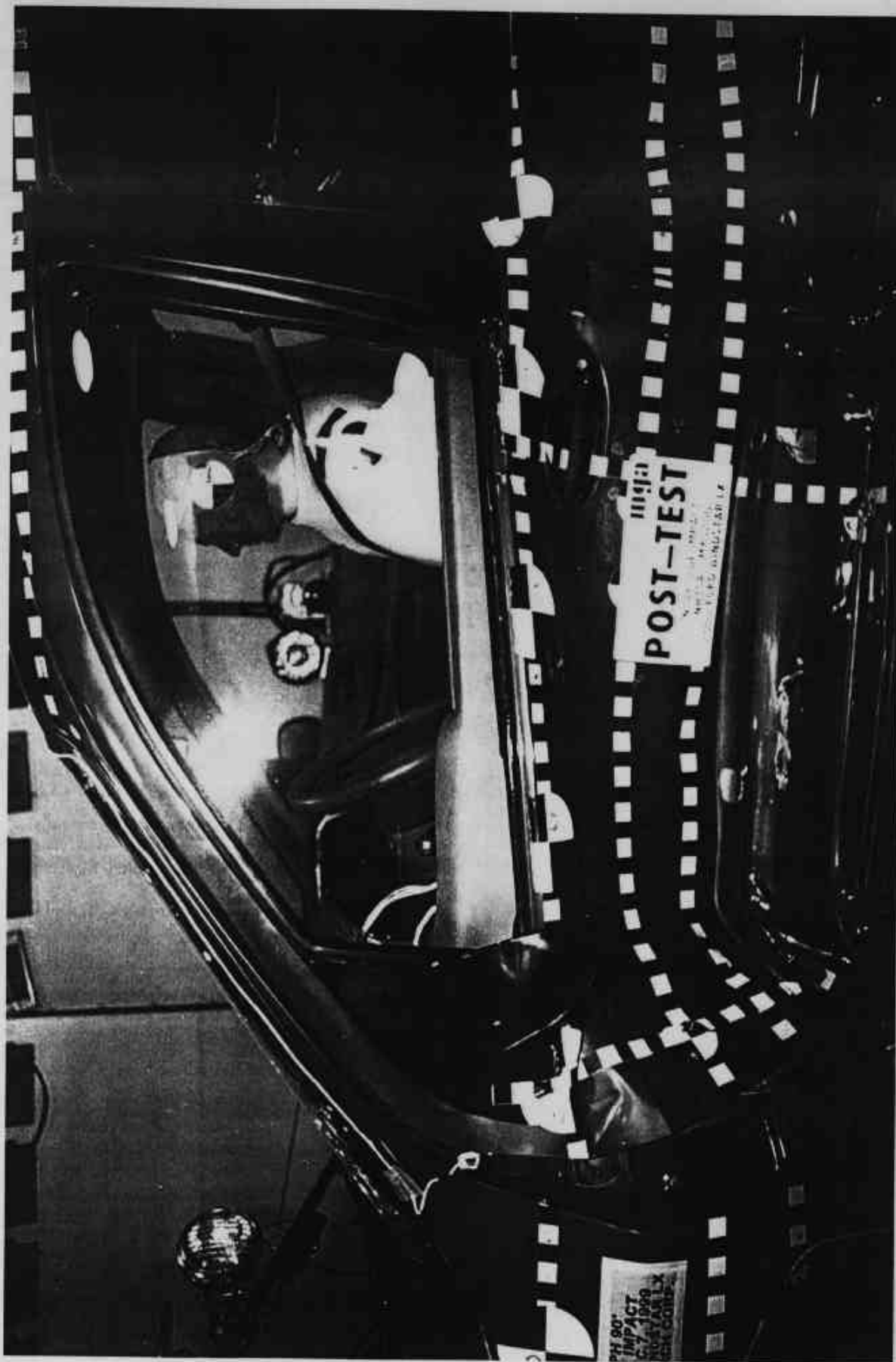
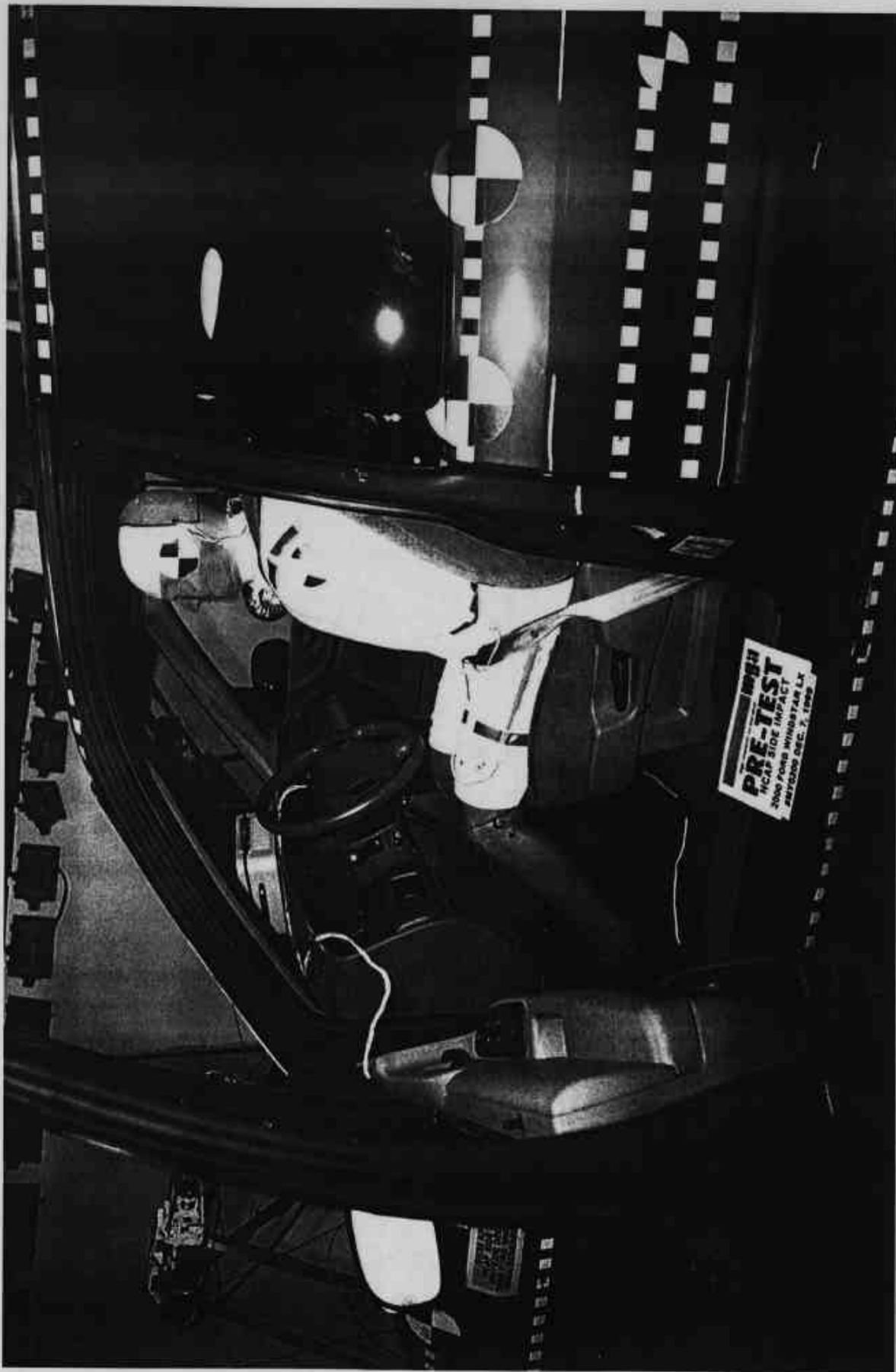


Photo No. A-23 - Pre-Test Driver Dummy Left Side View



A-24

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



A-25

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



A-26

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



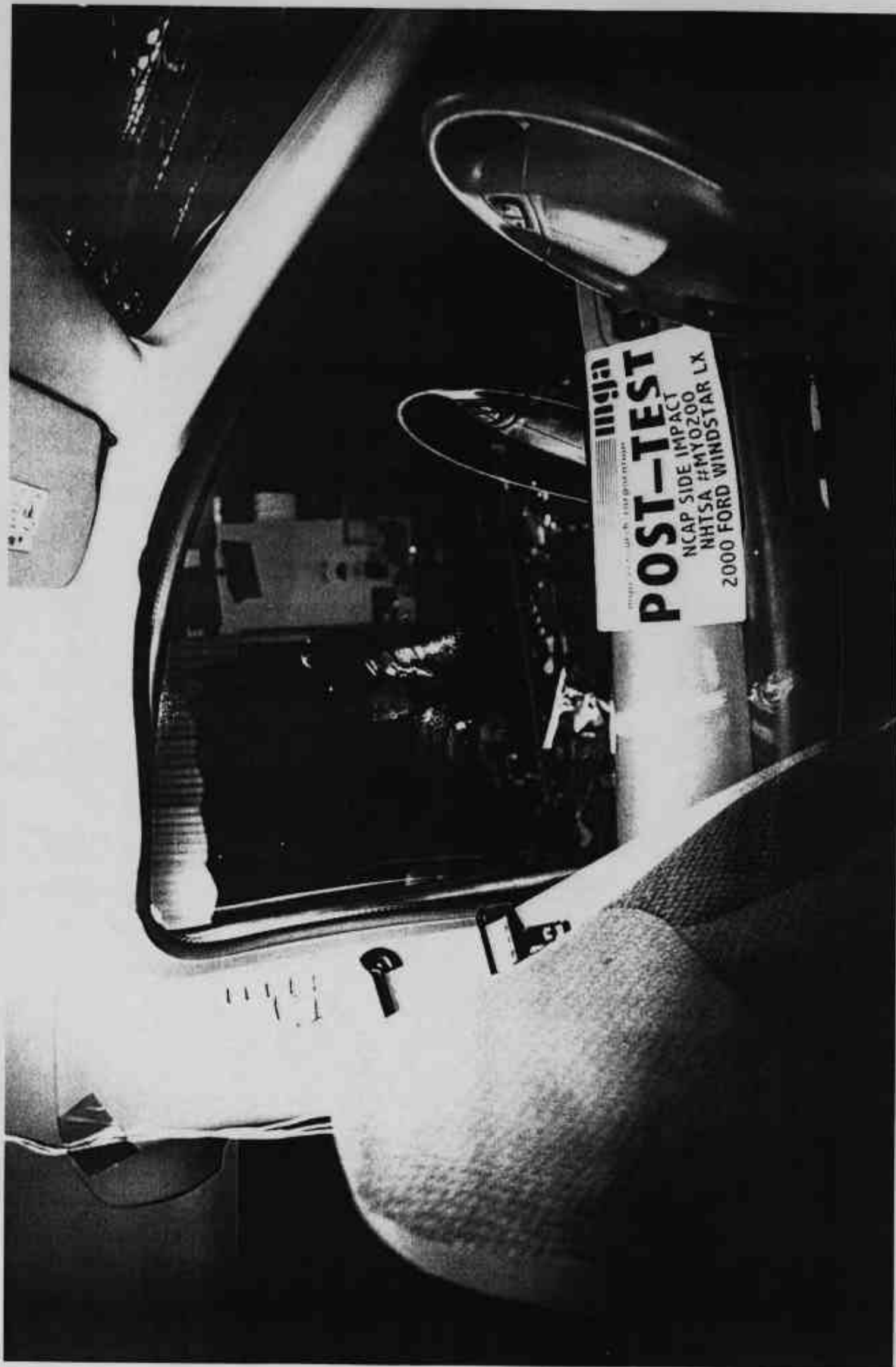
A-27

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



A-28

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



A-29

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

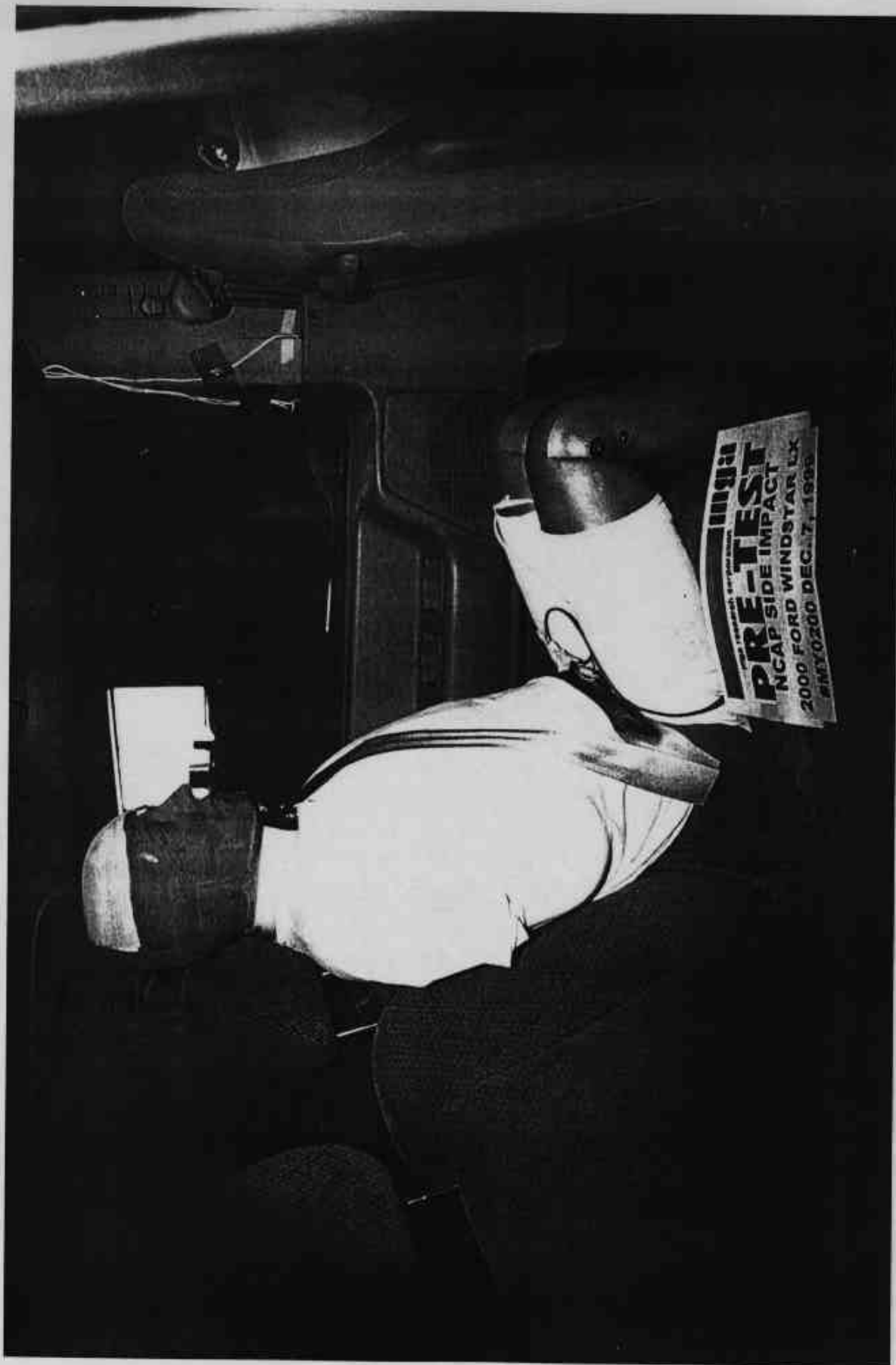


Photo No. A-30 - Pre-Test Passenger Dummy Right Side View

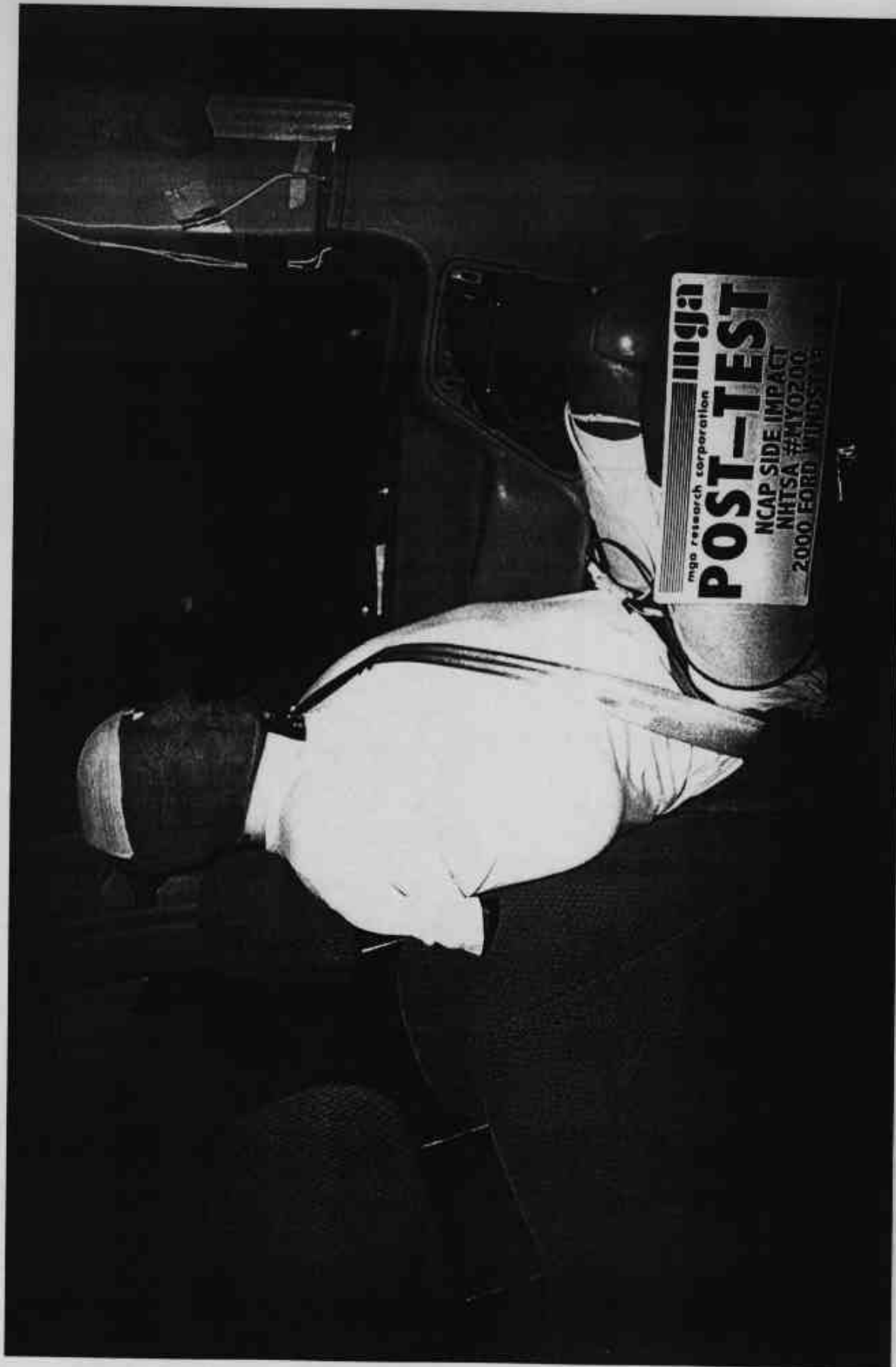


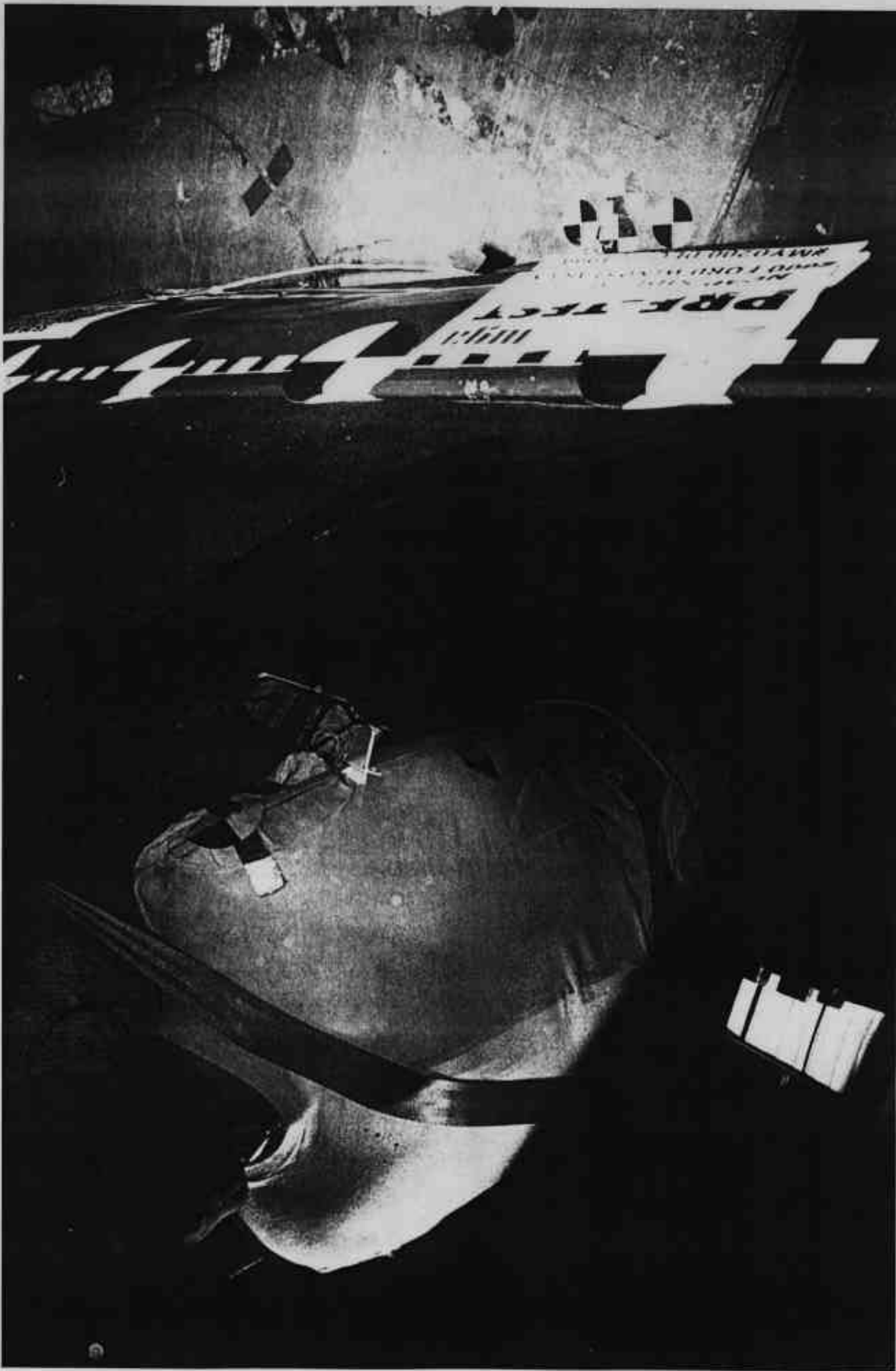
Photo No. A-31 - Post-Test Passenger Dummy Right Side View



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

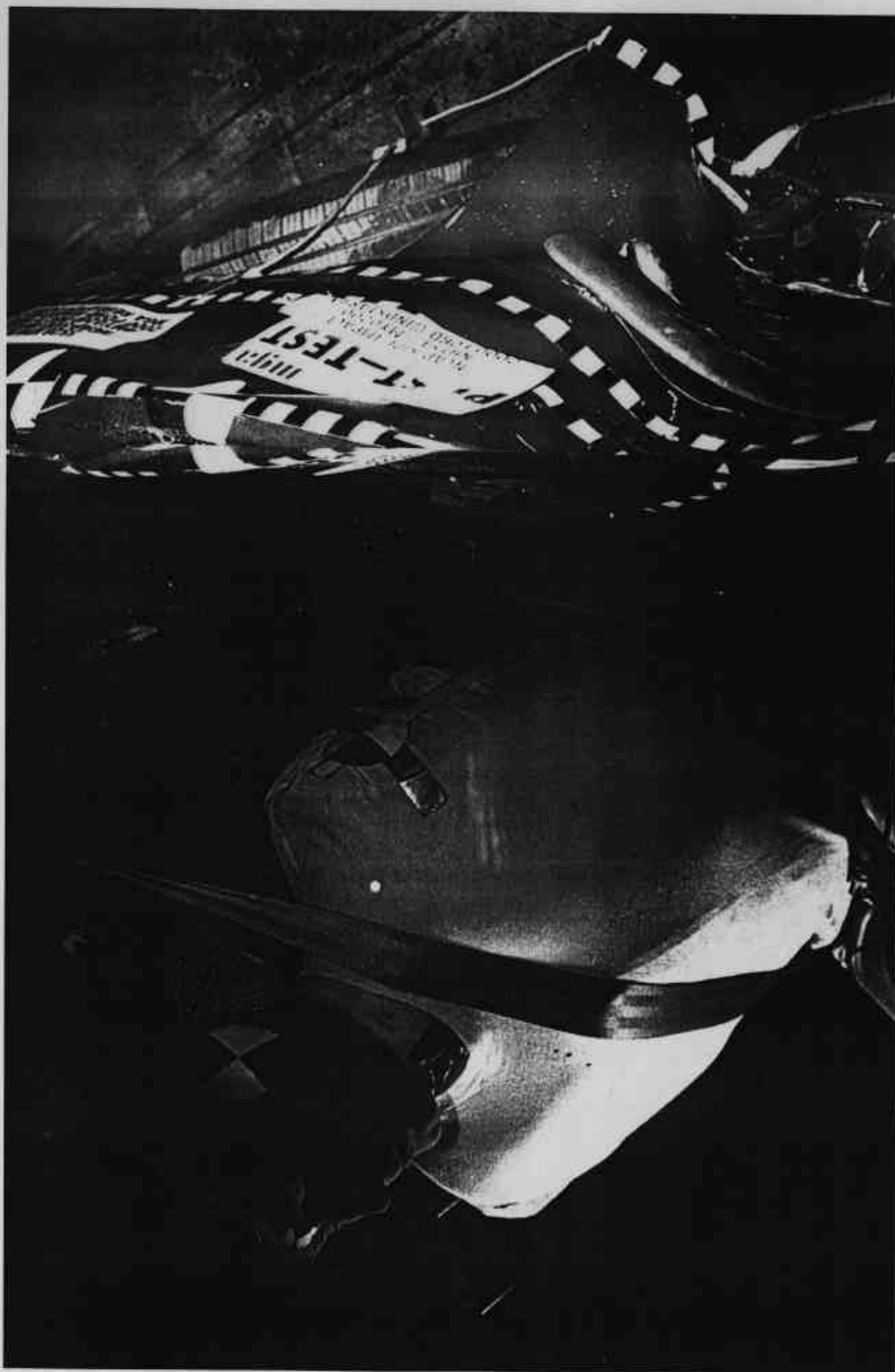


Photo No. A-33 - Post-Test Passenger Dummy Left Side View



A-34

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



A-35

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

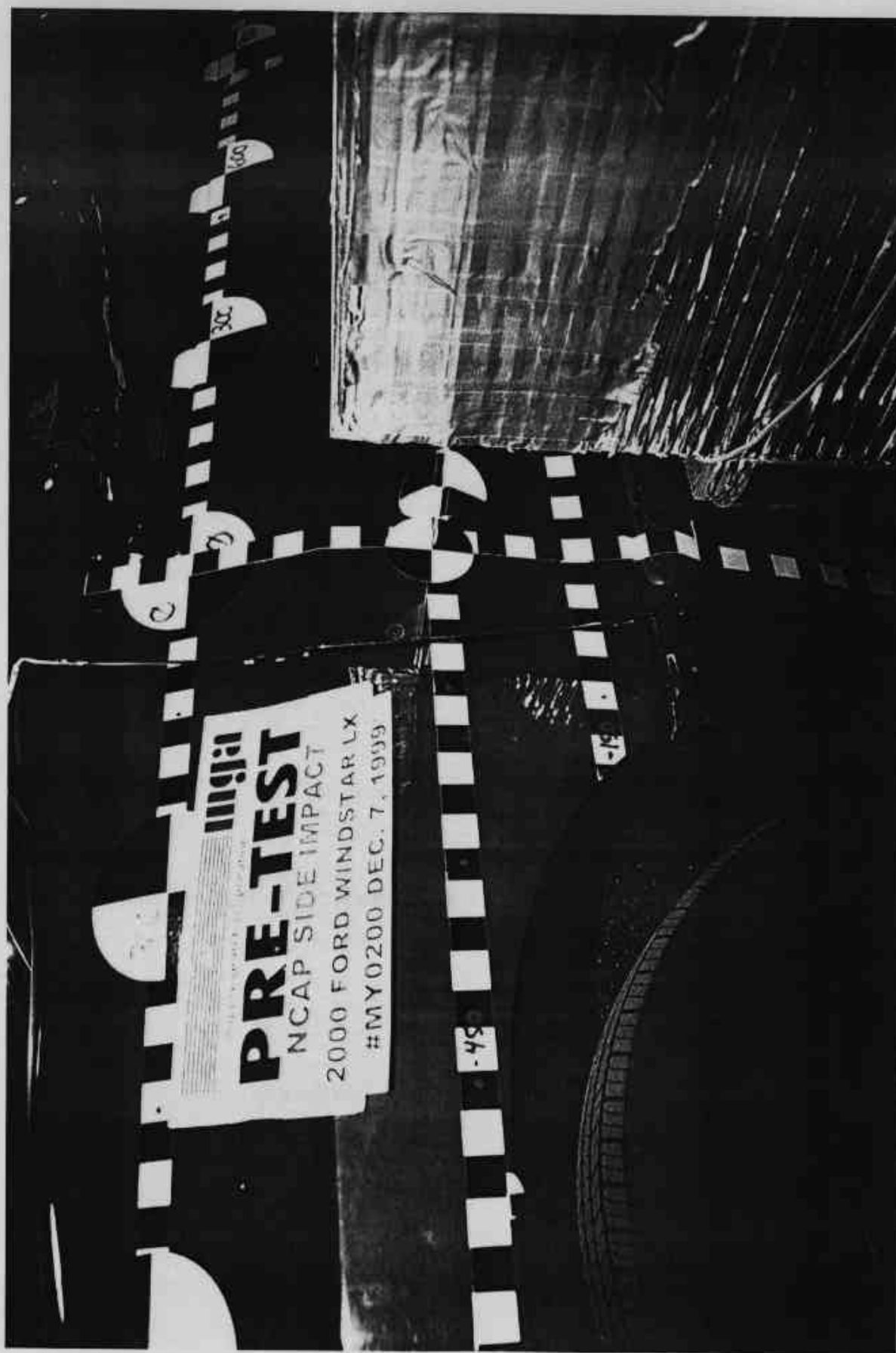


A-36

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



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



A-38

Photo No. A-38 - Pre-Test Left Front Impact Point on Vehicle



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

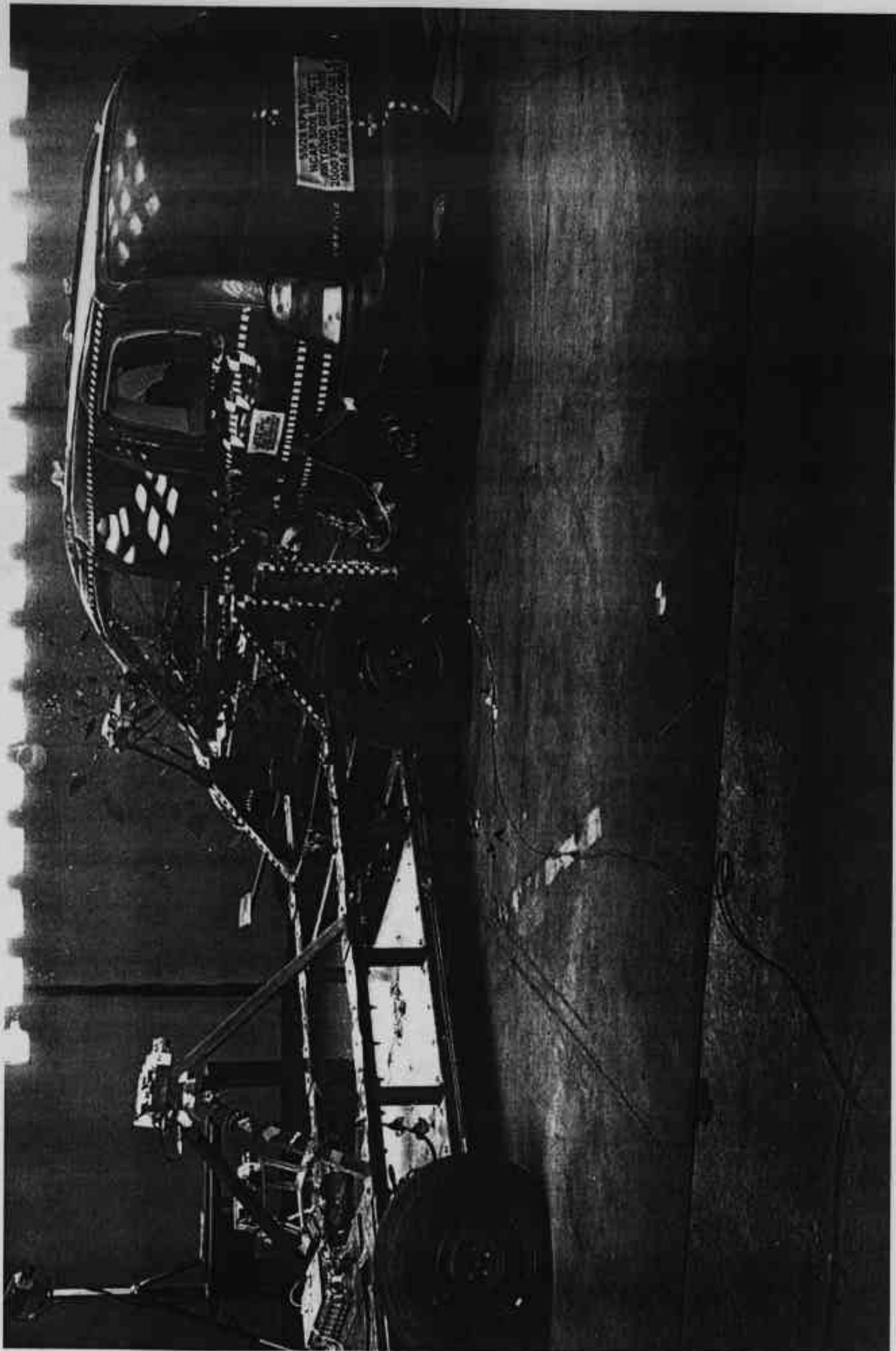


Photo No. A-40 - Impact

MFD. BY FORD MOTOR CO.

DATE: 08/99
 FRONT GAWR: 1235KG/2724LB
 REAR GAWR: 1167KG/2574LB
 GVWR: 2376KG/5240LB

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: 2FMDZAS147YBA14955 TYPE: MPV
 MAXIMUM LOAD - OCCUPANTS + LUGGAGE = 544KG/1200LB
 OCCUPANTS = 7 TOTAL

OCCUPANTS		LUGGAGE	
2 FRONT	2 REAR	400KG/900LB	272KG/600LB
2	4	4	7

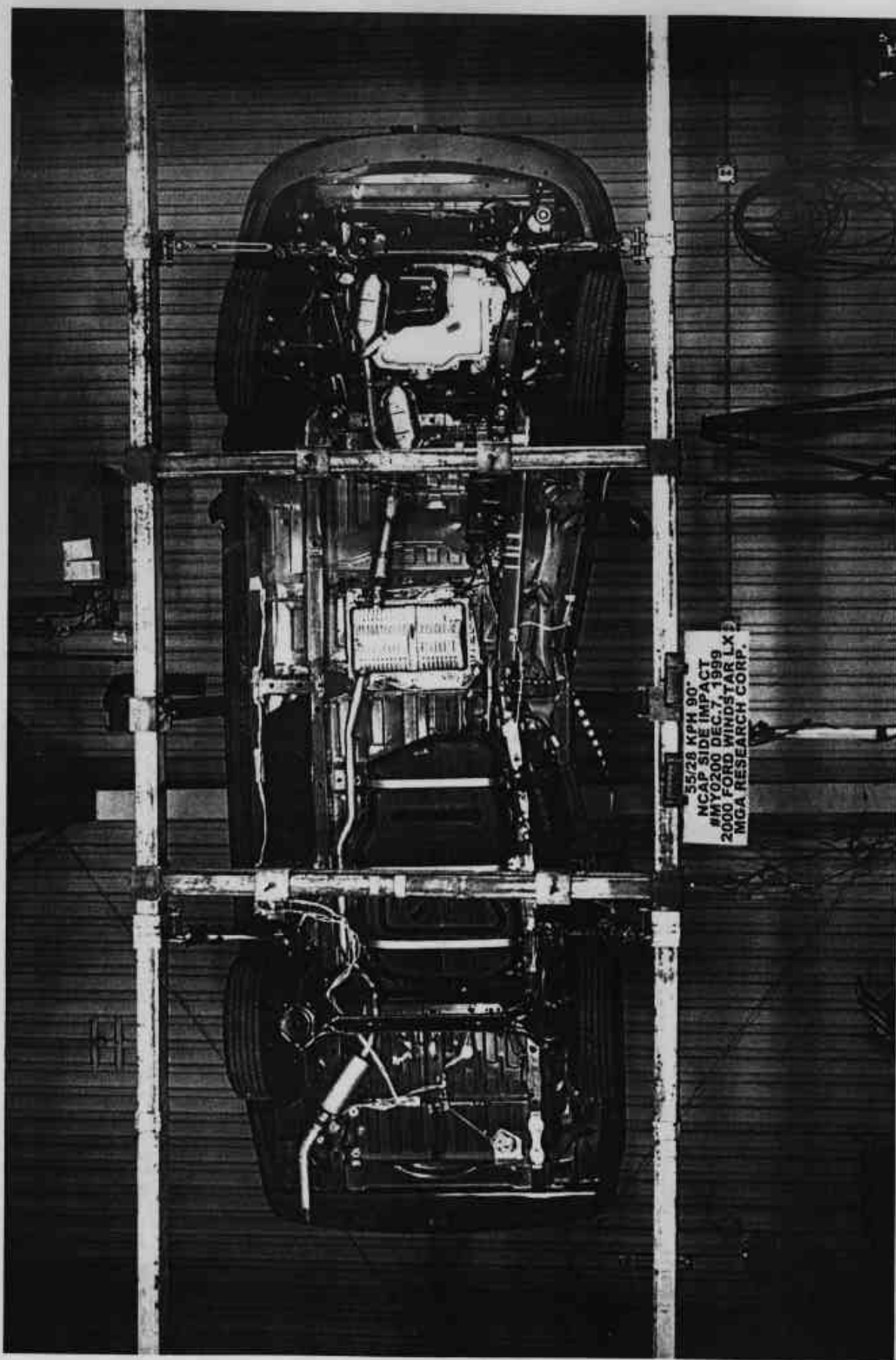
MSRP: P205/70R15
 PRESSURE: 241 12-35 PSI COLD
 PRESSURE: 241 12-35 PSI COLD

2FMDZAS147YBA14955

DATE: 08/99
 TIME: 11:00
 BY: [Signature]
 FOR: [Signature]



Photo No. A-41 - Vehicle Certification Label and Tire Placard



55/28 KPH 90°
NCA SIDE IMPACT
#M10200 DEC. 7, 1999
2000 FORD WINDSTAR LX
MGA RESEARCH CORP.

Photo No. A-42 -Rollover 90°

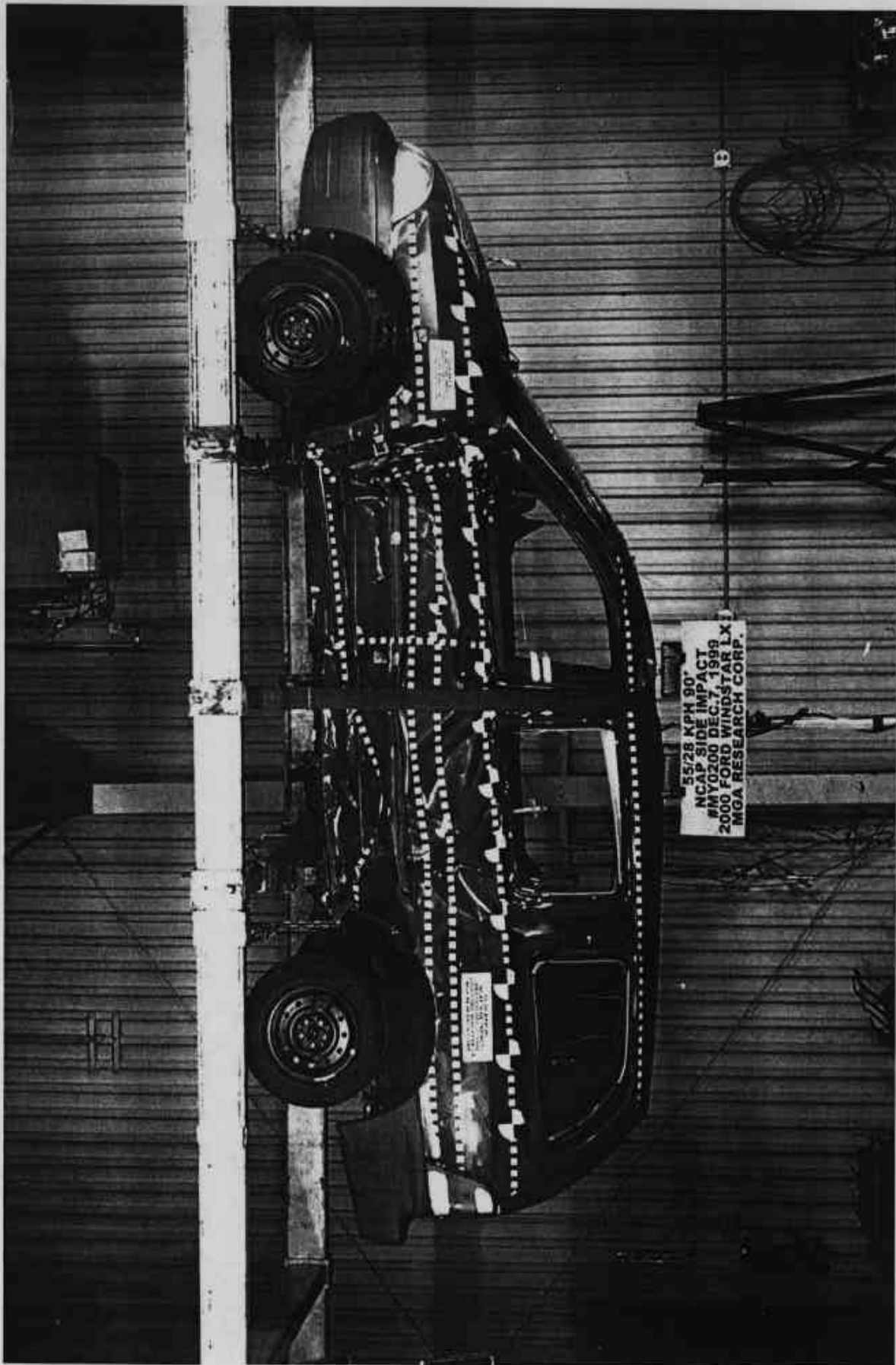


Photo No. A-43 - Rollover 180°

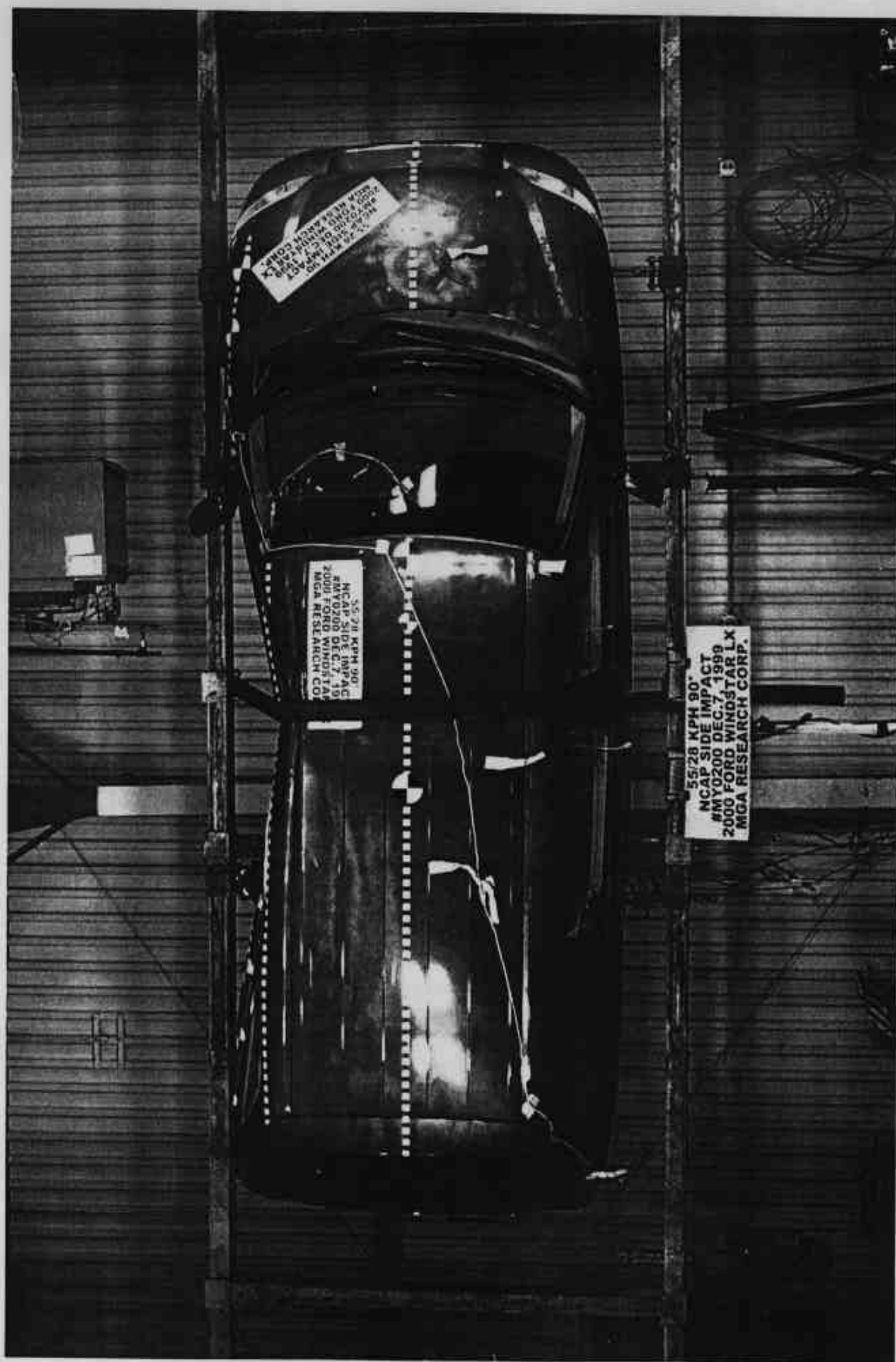
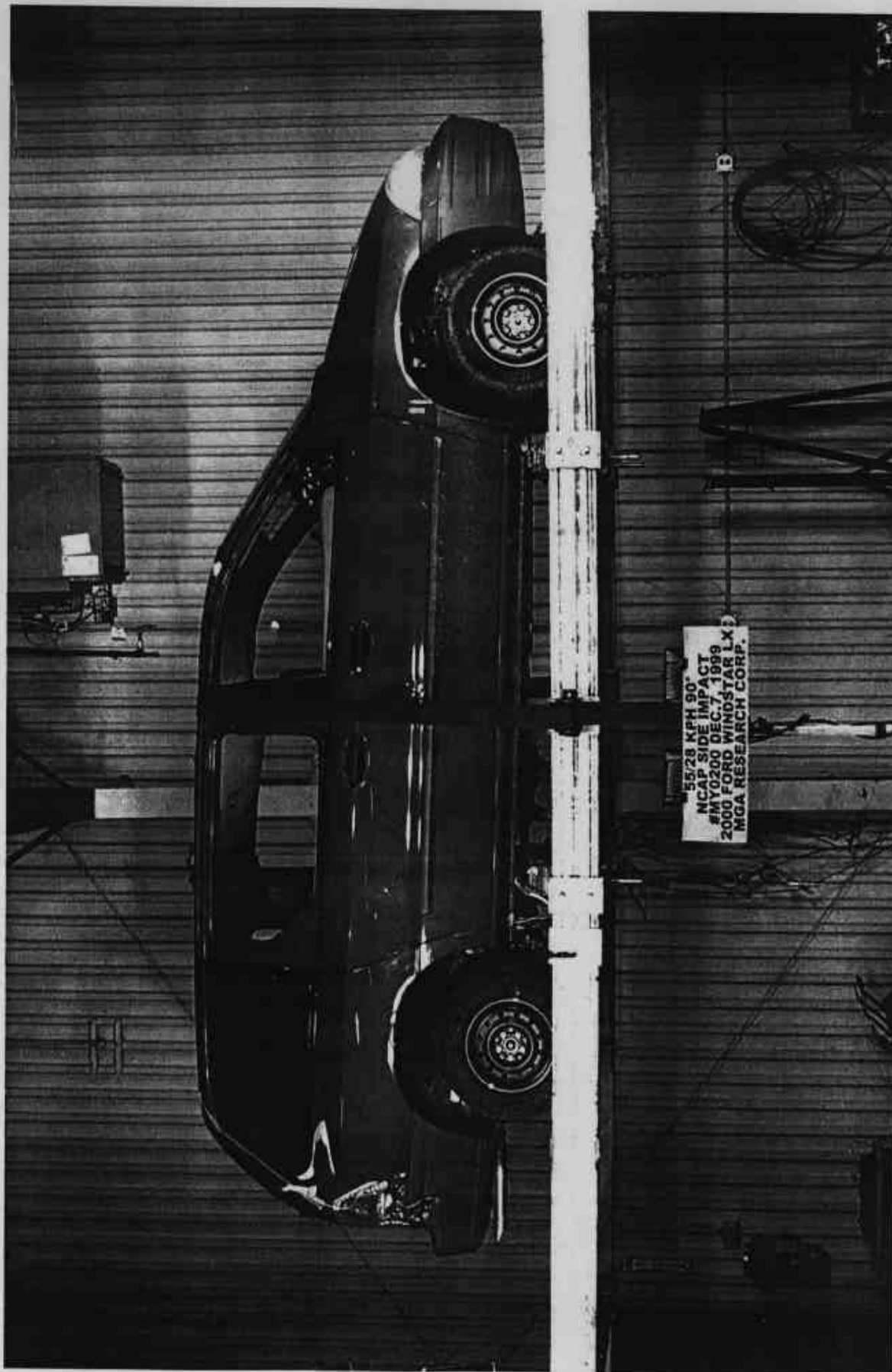


Photo No. A-44 -Rollover 270°



A-45

Photo No. A-45 - Rollover 360°

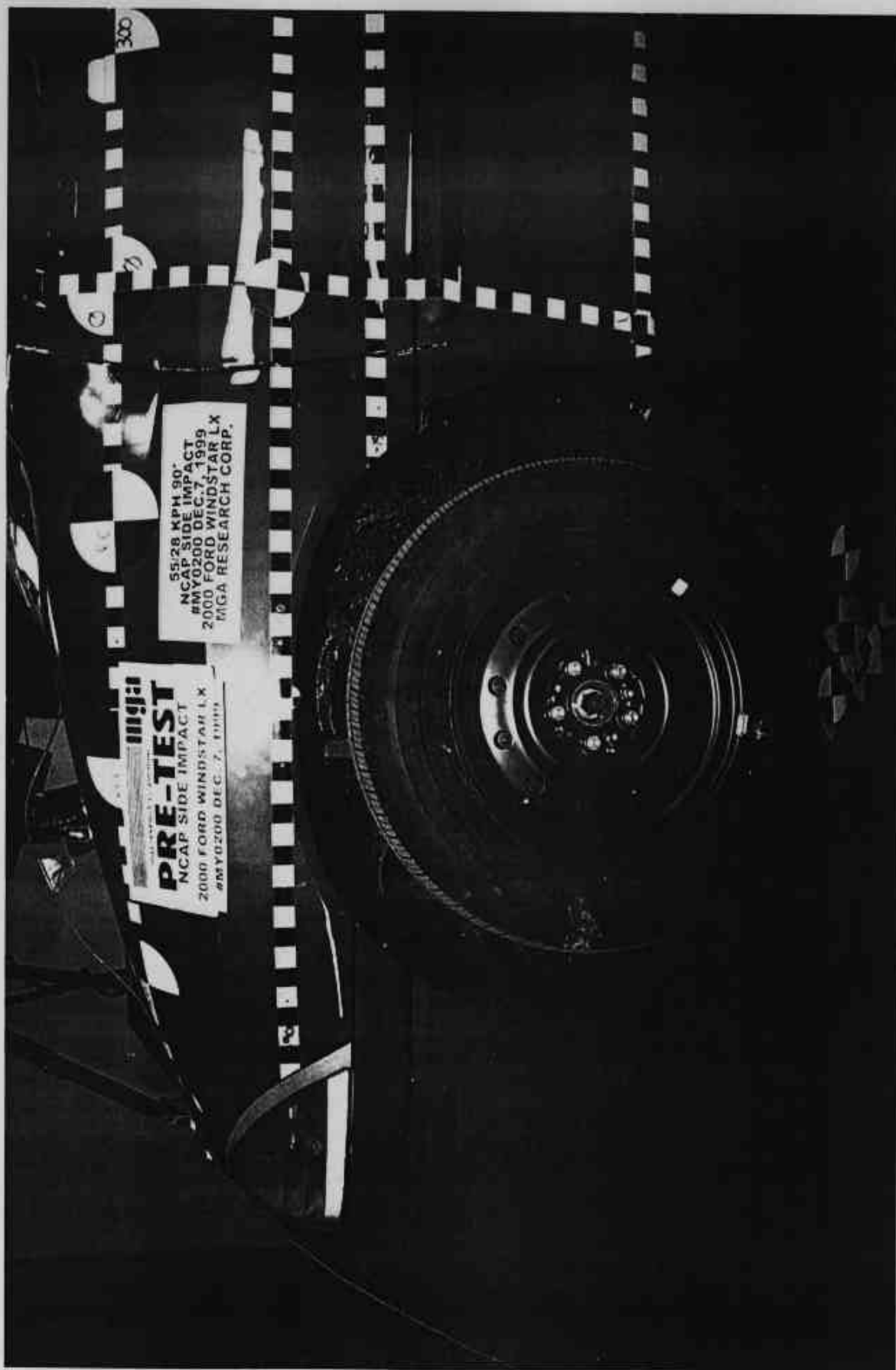
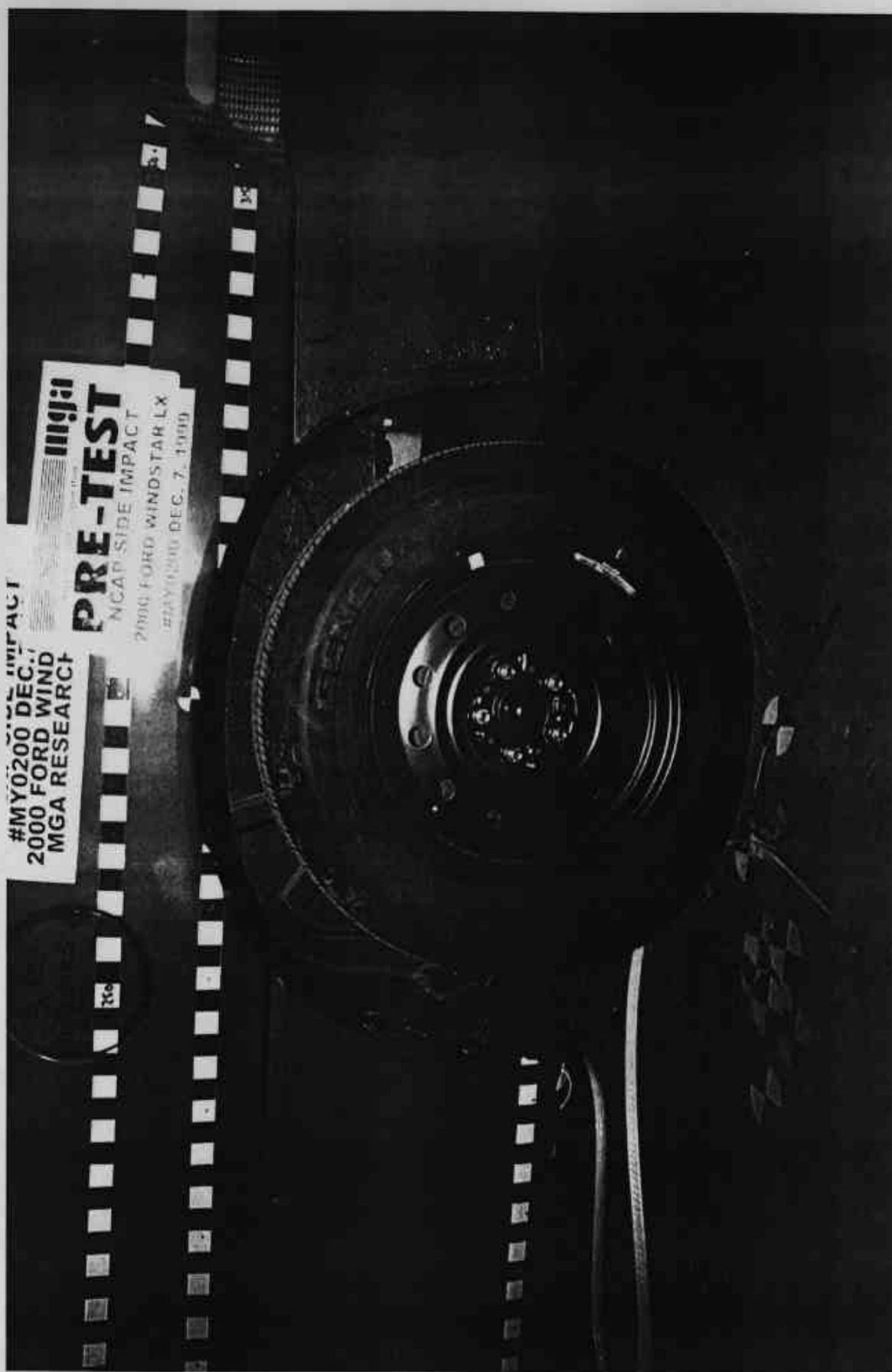


Photo No. A-46 - Left Front Attitude Point



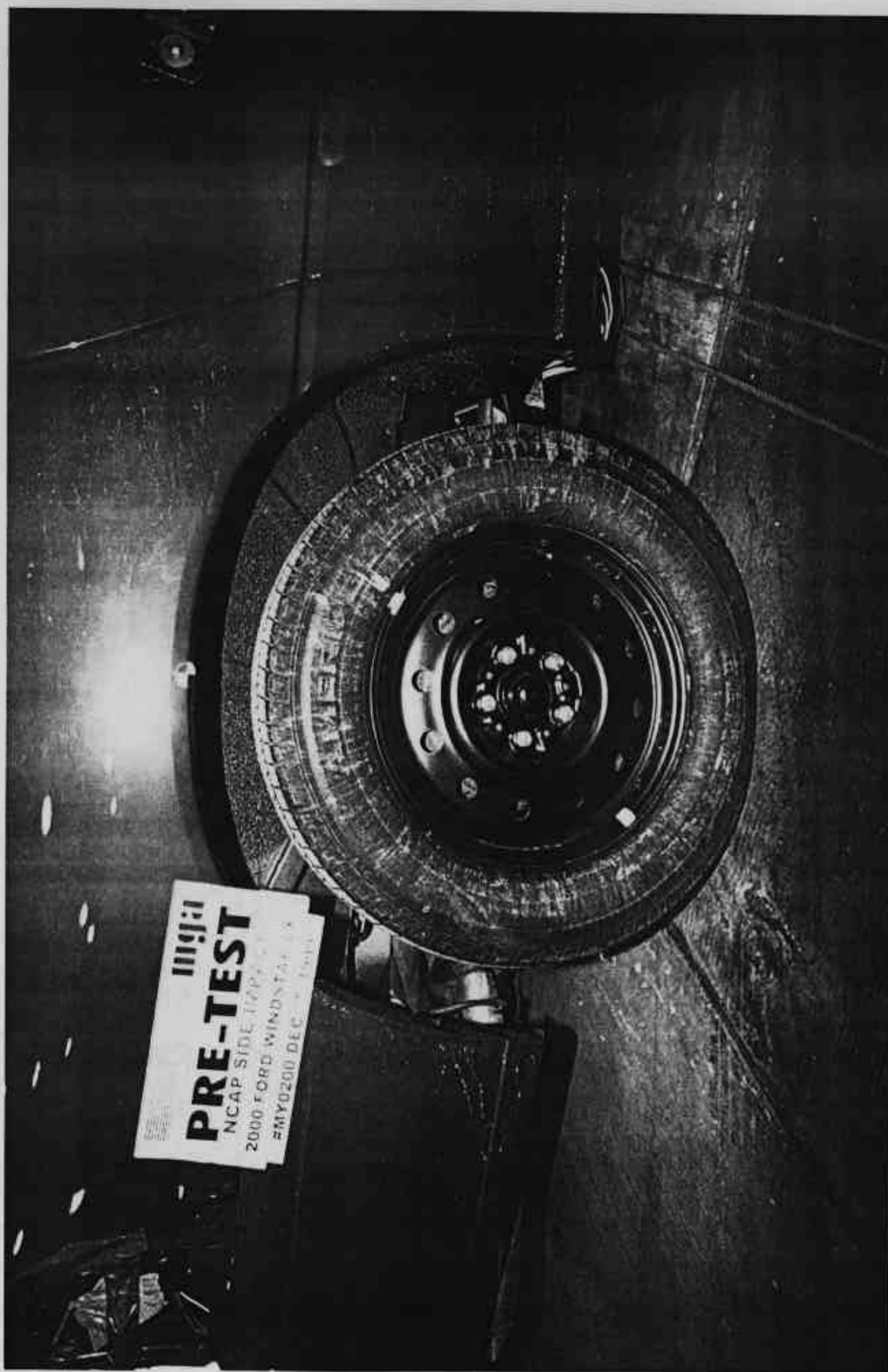
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Photo No. A-47 - Right Front Attitude Point



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Photo No. A-48 - Left Rear Attitude Point



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Photo No. A-49 - Right Rear Attitude Point

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* No valid data after approximately 26 msec.

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* No valid data collected after approximately 30 msec.

** No valid data collected

*** No valid data collected after approximately 90 msec.

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FIR Filtered

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* No valid data collected

** No valid data after approximately 90 msec.

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

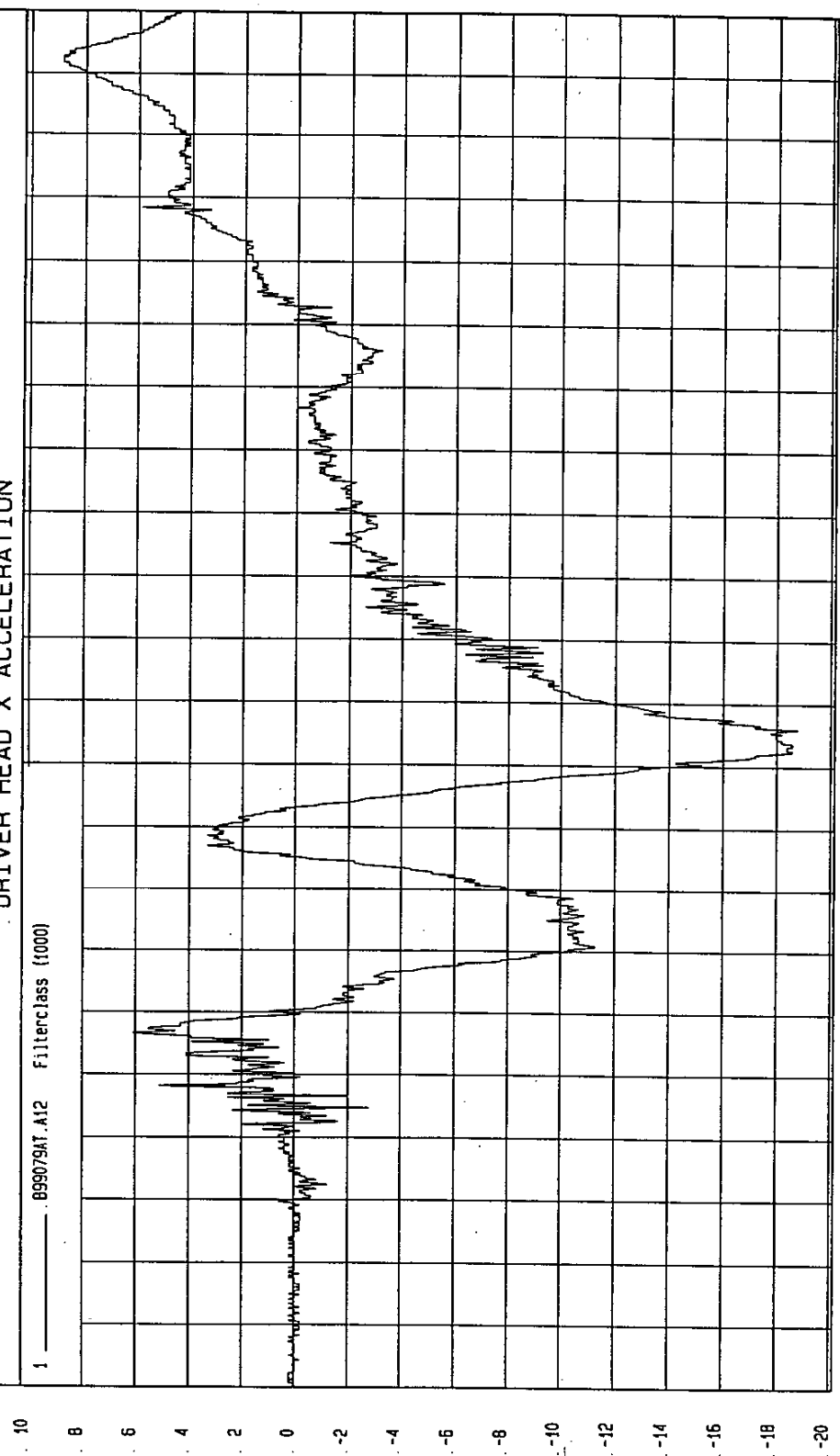
Speed: 38.3 MPH 61.6 KPH

Minimum = -18.77 G'S at 86 msec

Maximum = 8.05 G'S at 192 msec

DRIVER HEAD X ACCELERATION

1 ——— .899079AT.A12 Filterclass (1000)



MSA Research
12-07-1999 16:19

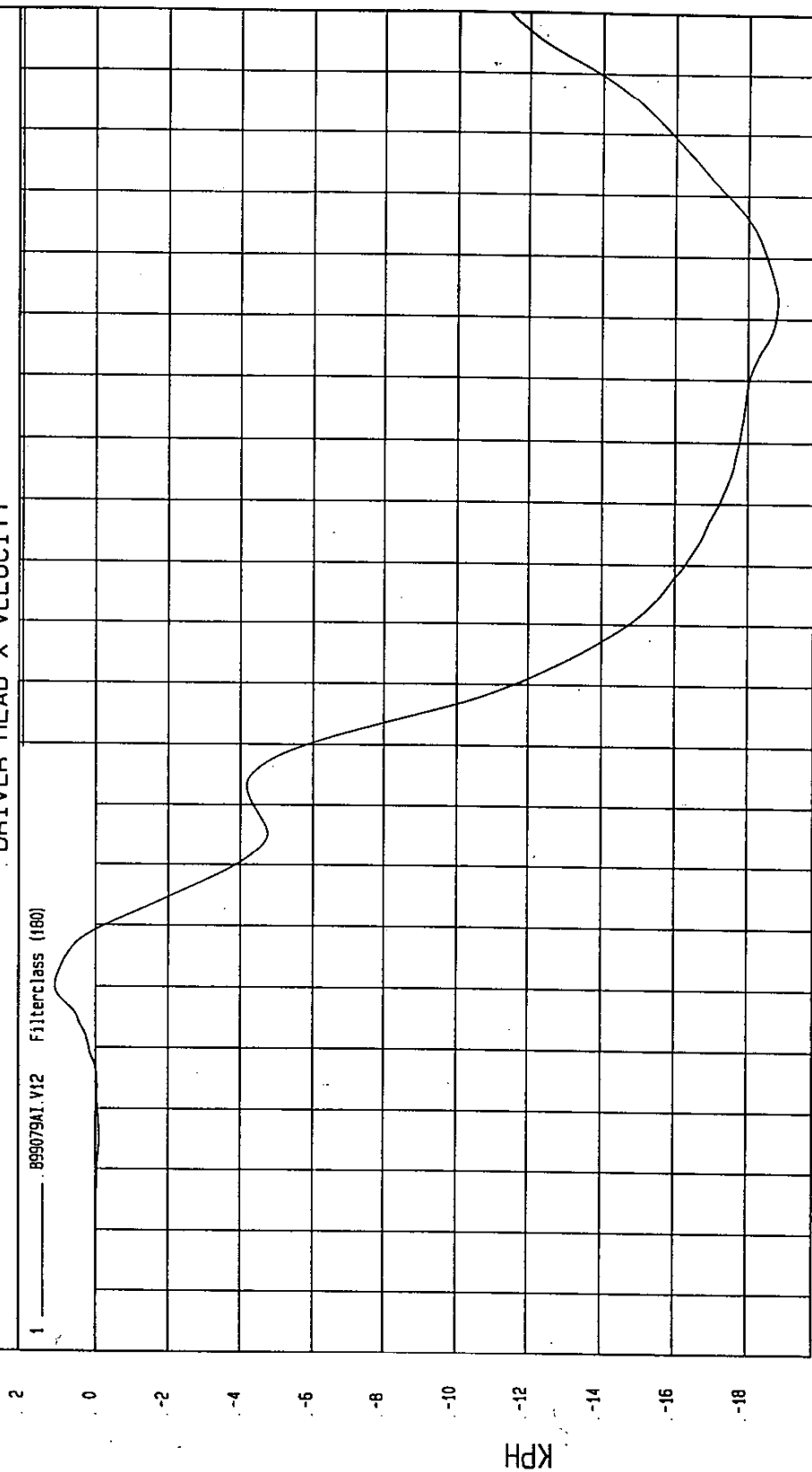
TIME (SECONDS)

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -18.82 KPH at 153 msec Maximum = 1.11 KPH at 40 msec

DRIVER HEAD X VELOCITY



TIME Seconds

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

KPH

WCA Research
12-07-1999 18:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

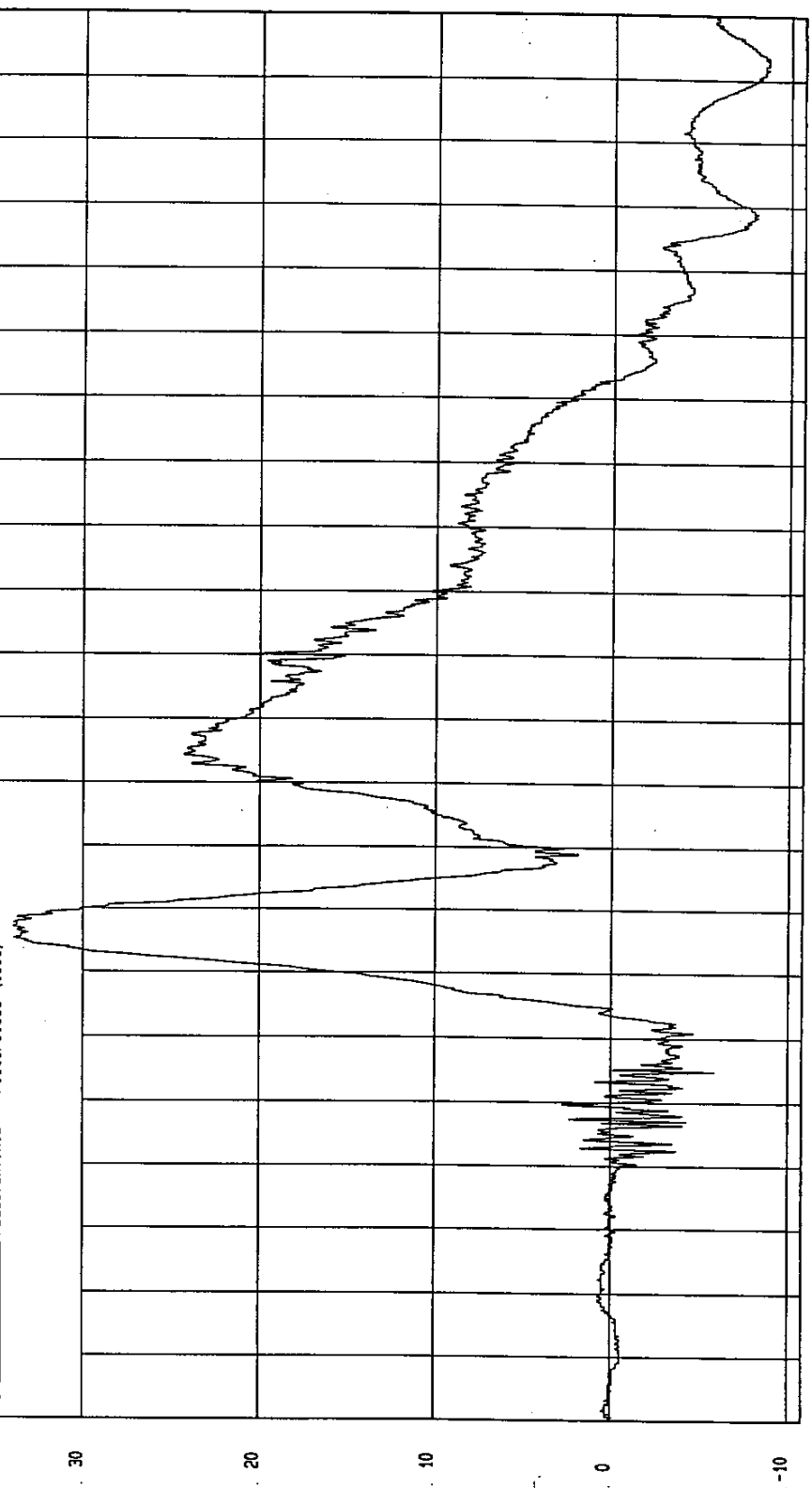
Speed: 38.3 MPH 61.6 KPH

Minimum = -8.67 G'S at 192 msec

Maximum = 33.94 G'S at 55 msec

DRIVER HEAD Y ACCELERATION

1 ——— .899079AT.A13 Filterclass (1000)



WCA Research
12-01-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

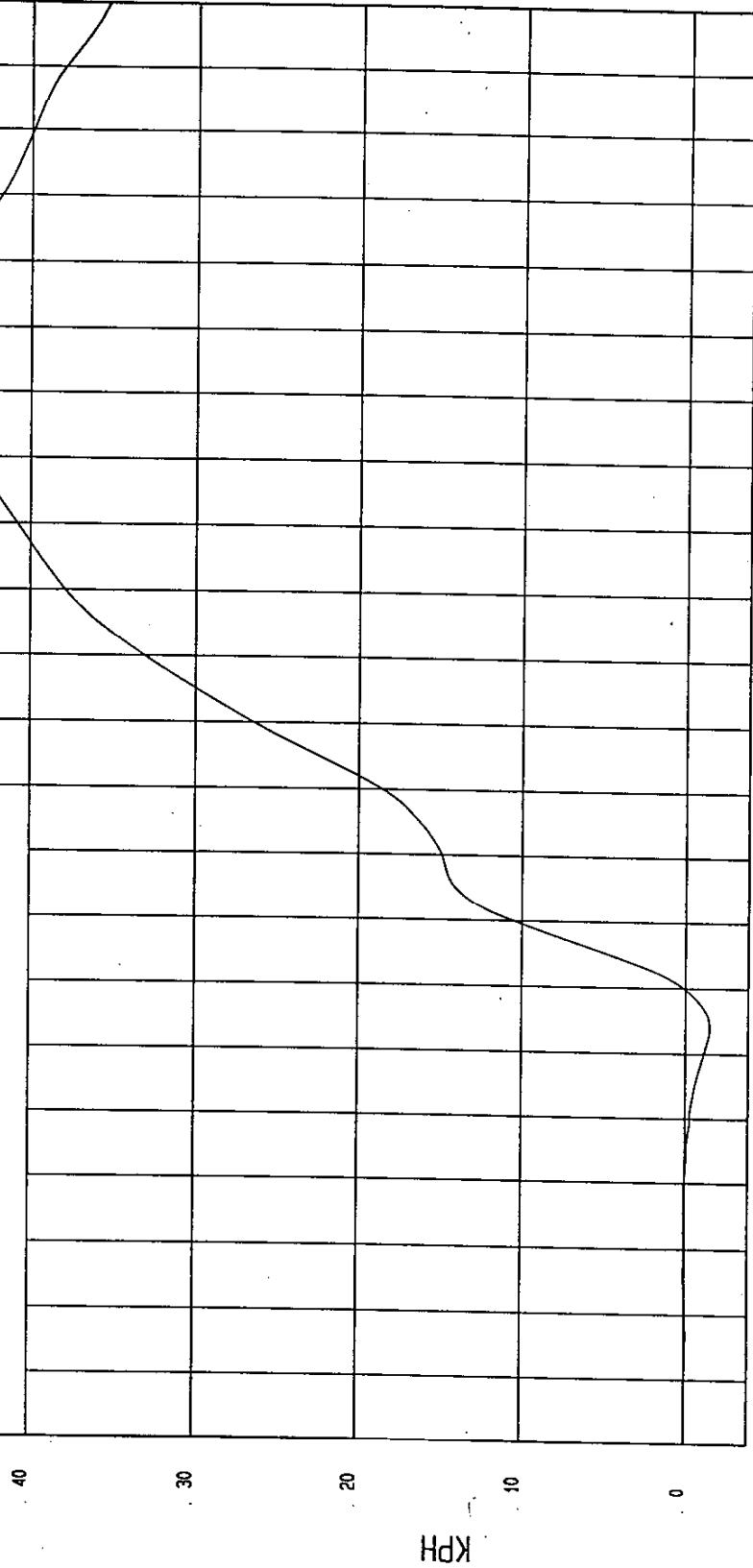
Speed: 38.3 MPH 61.6 KPH

Minimum = -1.49 KPH at 44 msec

Maximum = 45.23 KPH at 143 msec

DRIVER HEAD Y VELOCITY

1 899079A1.V13 Filterclass (180)



TIME Seconds

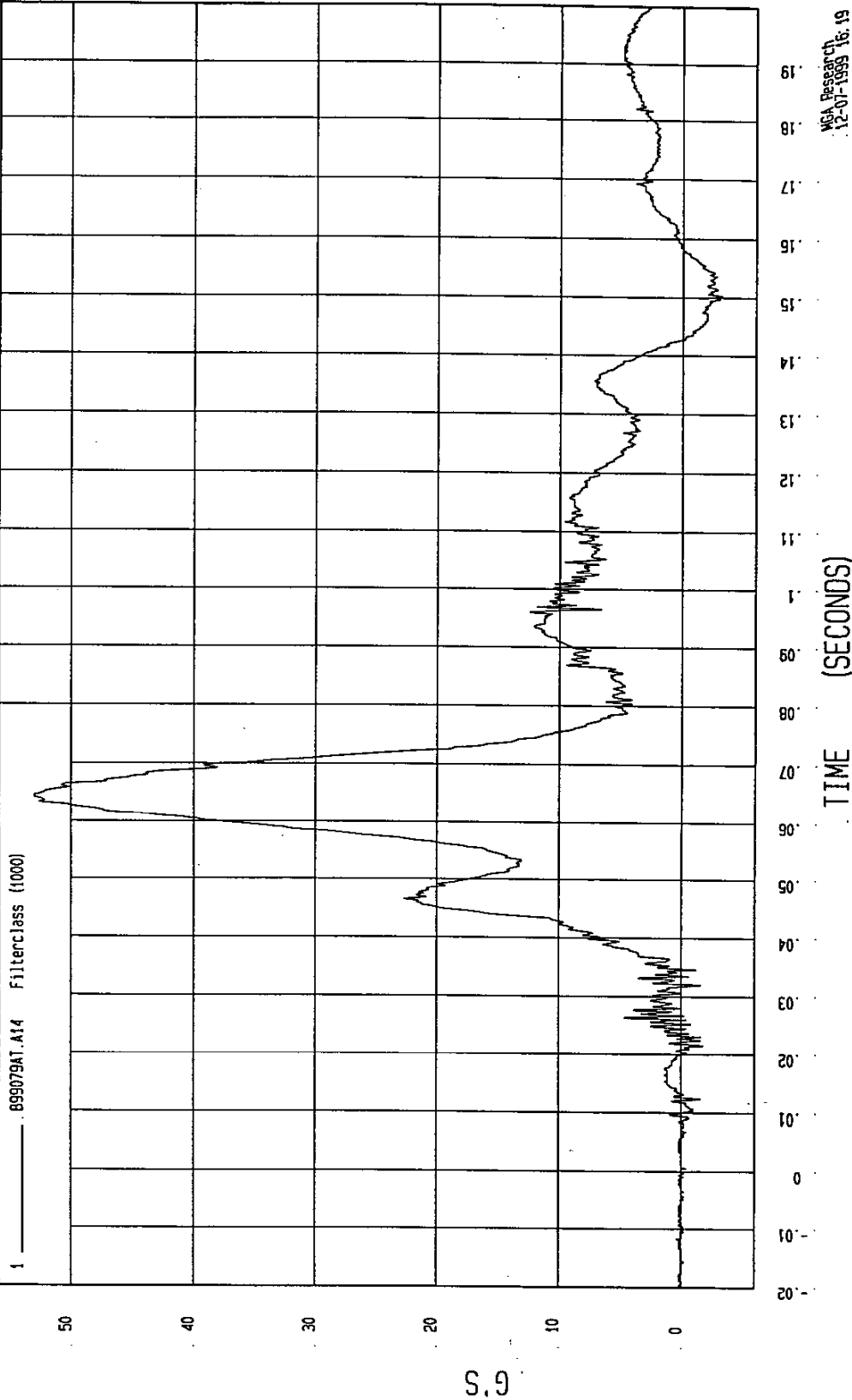
MSA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.16 G'S at 150 msec Maximum = 52.96 G'S at 64 msec

DRIVER HEAD Z ACCELERATION



TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -2.77E-02 KPH at 13 msec

Maximum = 54.61 KPH at 200 msec

DRIVER HEAD Z VELOCITY

1 899079A1.V14 Filterclass (180)

50

40

30

20

10

0

KPH

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

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.16

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.18

.19

TIME Seconds

NSA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

SPEED: 38.3 MPH 61.6 KPH

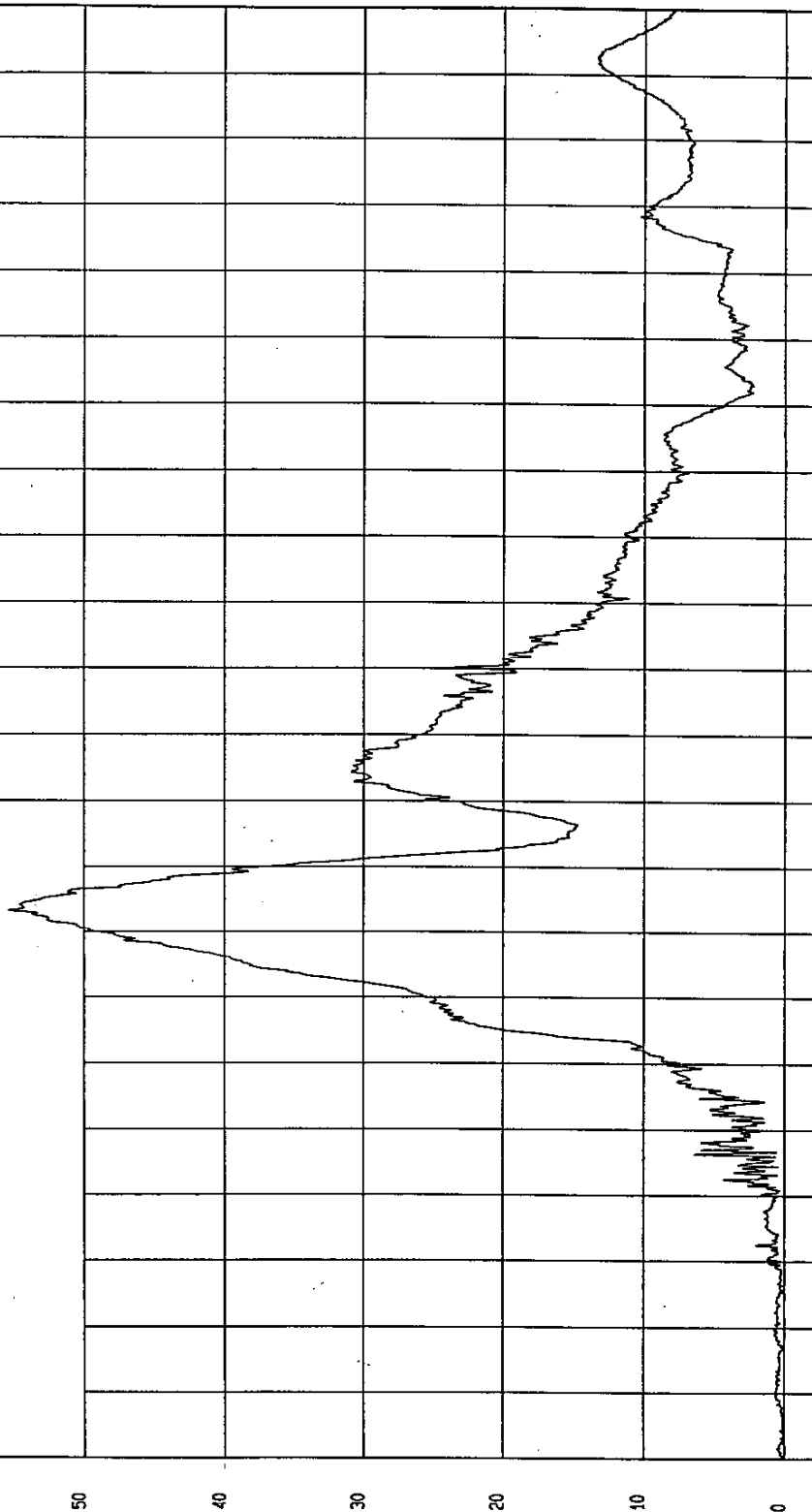
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 55.37 G'S at 63 msec

Minimum = .09 G'S at -20 msec

DRIVER HEAD RESULTANT ACCELERATION

1 ——— 899079AV.A12 Filterclass (1000)



MCA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

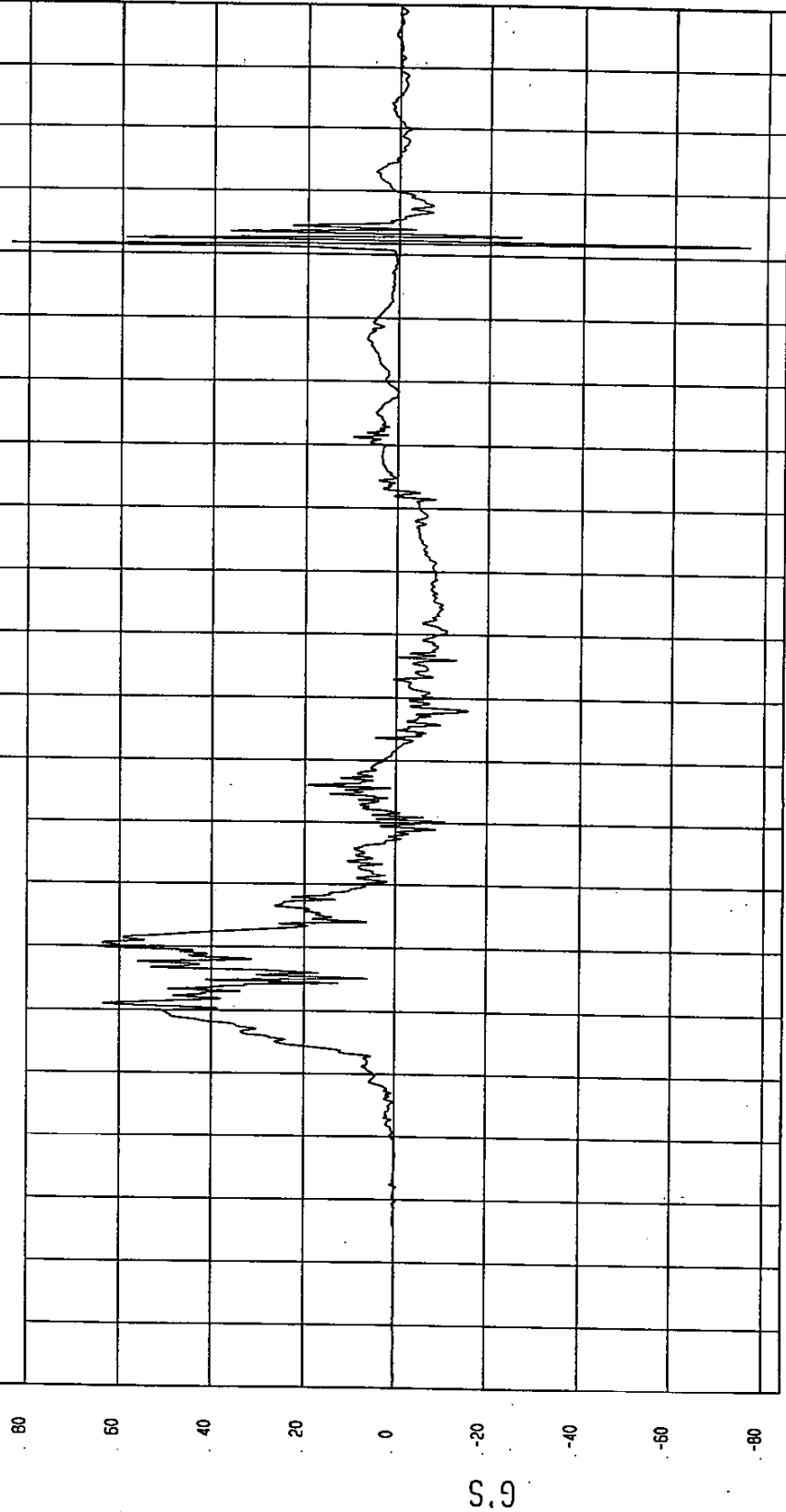
Speed: 38.3 MPH 61.6 KPH

Minimum = -76.15 G'S at 162 msec

Maximum = 83.89 G'S at 161 msec

DRIVER UPPER RIB Y ACCELERATION

1 ——— B99079A1.A15 Filterclass (1000)



WCA Research
12-07-1999 16:20

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

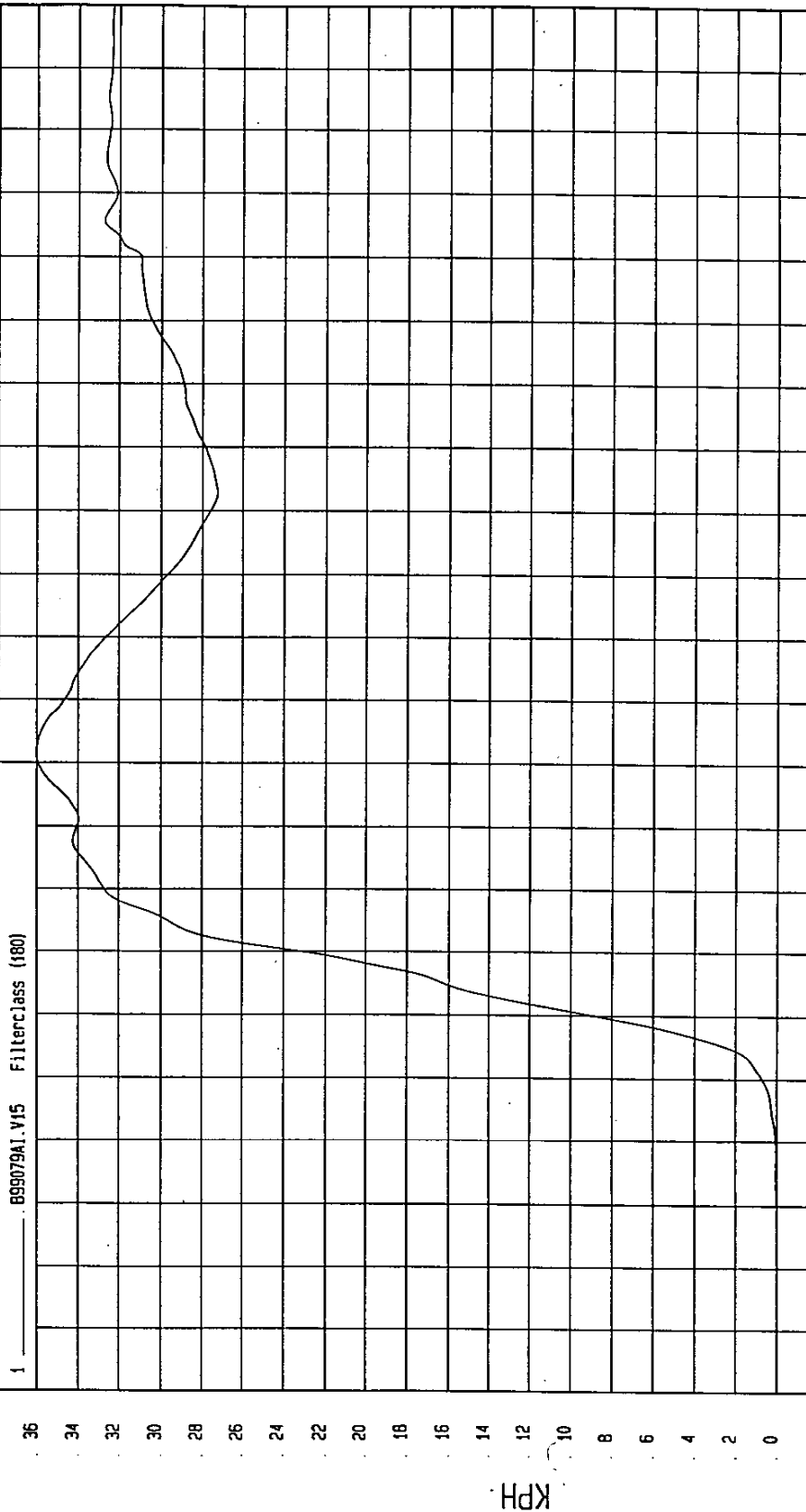
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 36.02 KPH at 82 msec

Minimum = -6.57E-03 KPH at 5 msec

DRIVER UPPER RIB Y VELOCITY



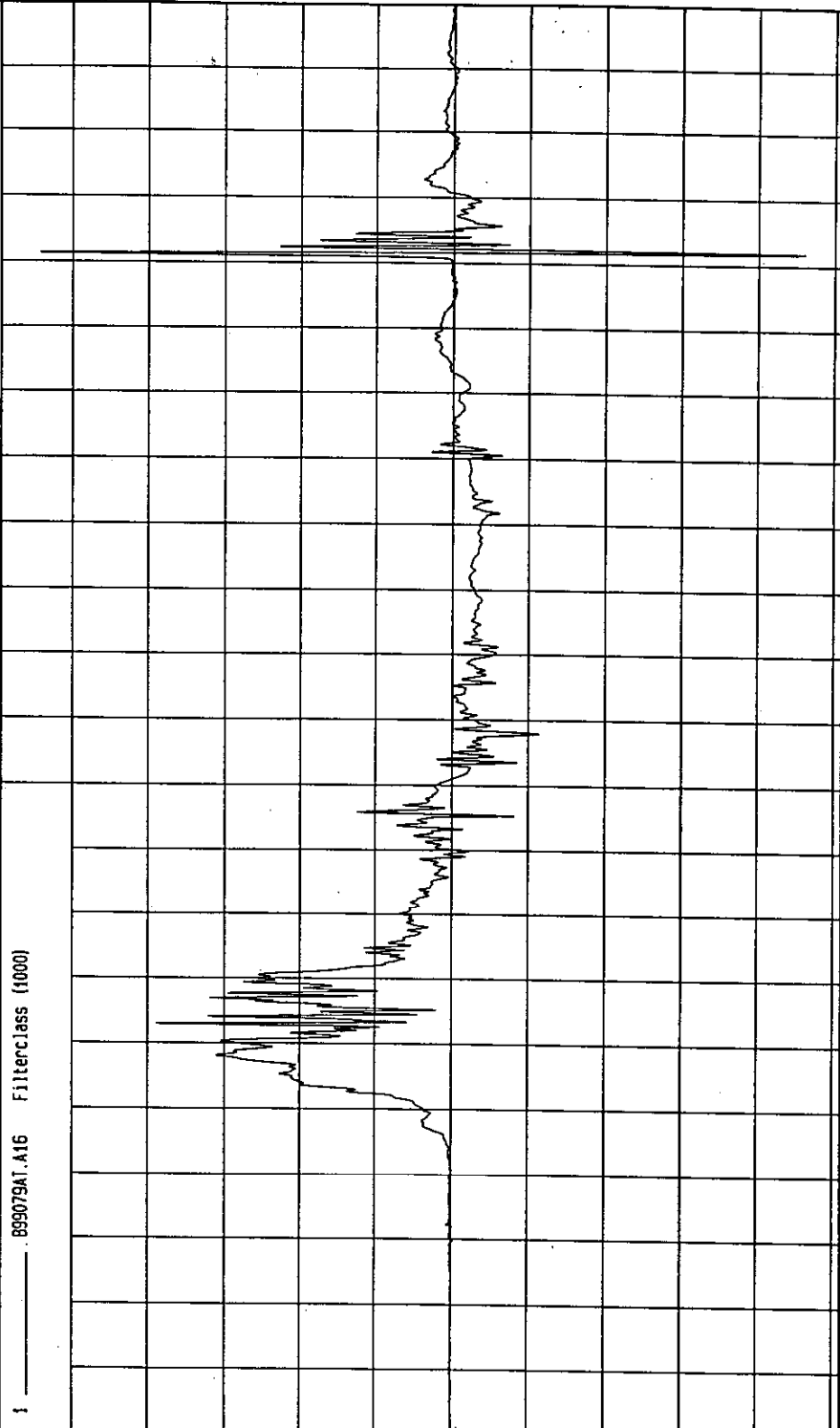
VEA Research
12-07-1999 16:20

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -92.19 G'S at 162 msec Maximum = 108.45 G'S at 161 msec

DRIVER LOWER RIB Y ACCELERATION



NSA Research
12-07-1999 16:20

TIME (SECONDS)

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

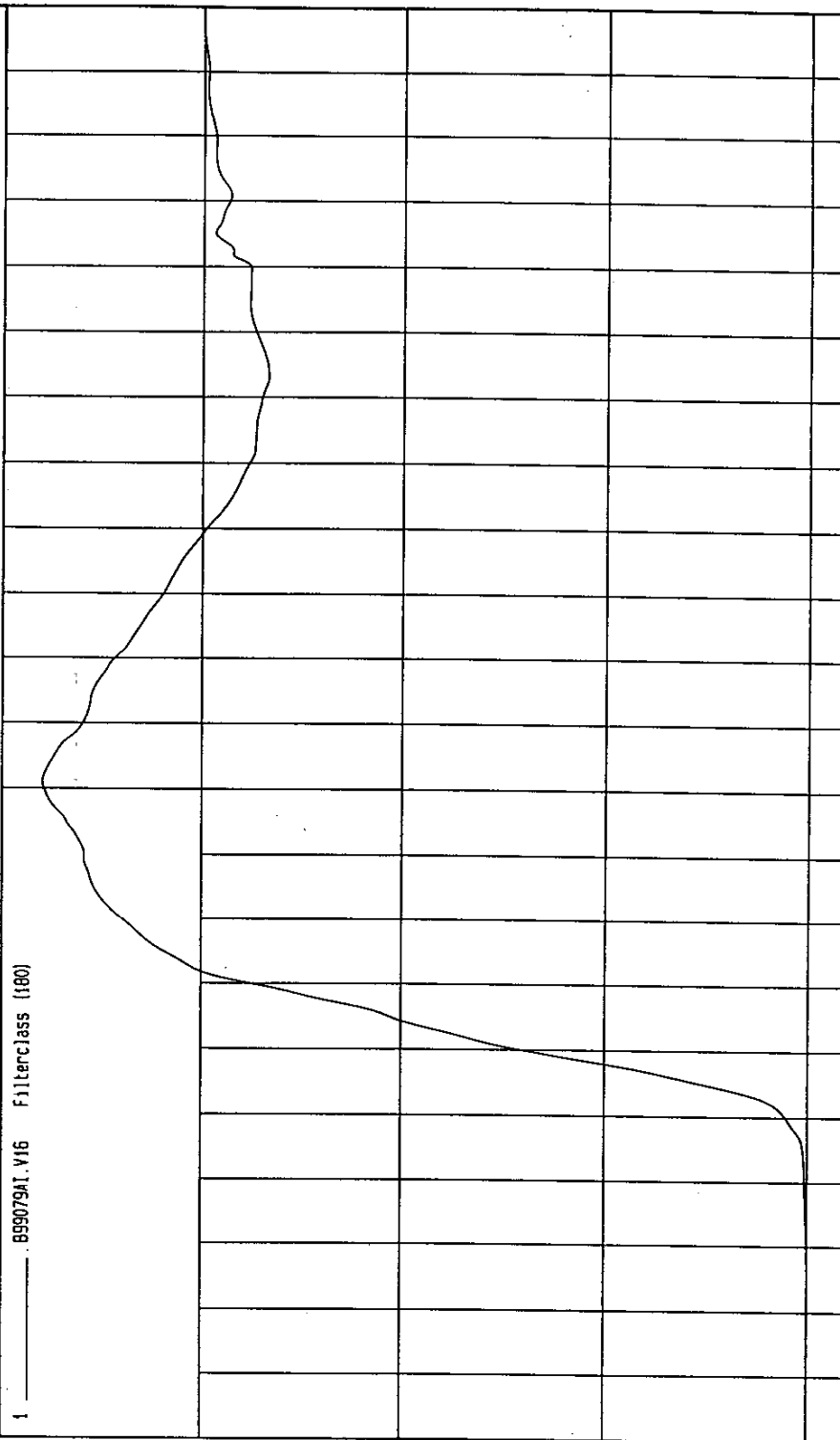
Speed: 38.3 MPH 61.6 KPH

Minimum = -1.07E-02 KPH at -12 msec

Maximum = 37.79 KPH at 81 msec

DRIVER LOWER RIB Y VELOCITY

1 _____ 899079AT.V16 Filterclass (100)



MOA Research
12-07-1999 16:20

TIME Seconds

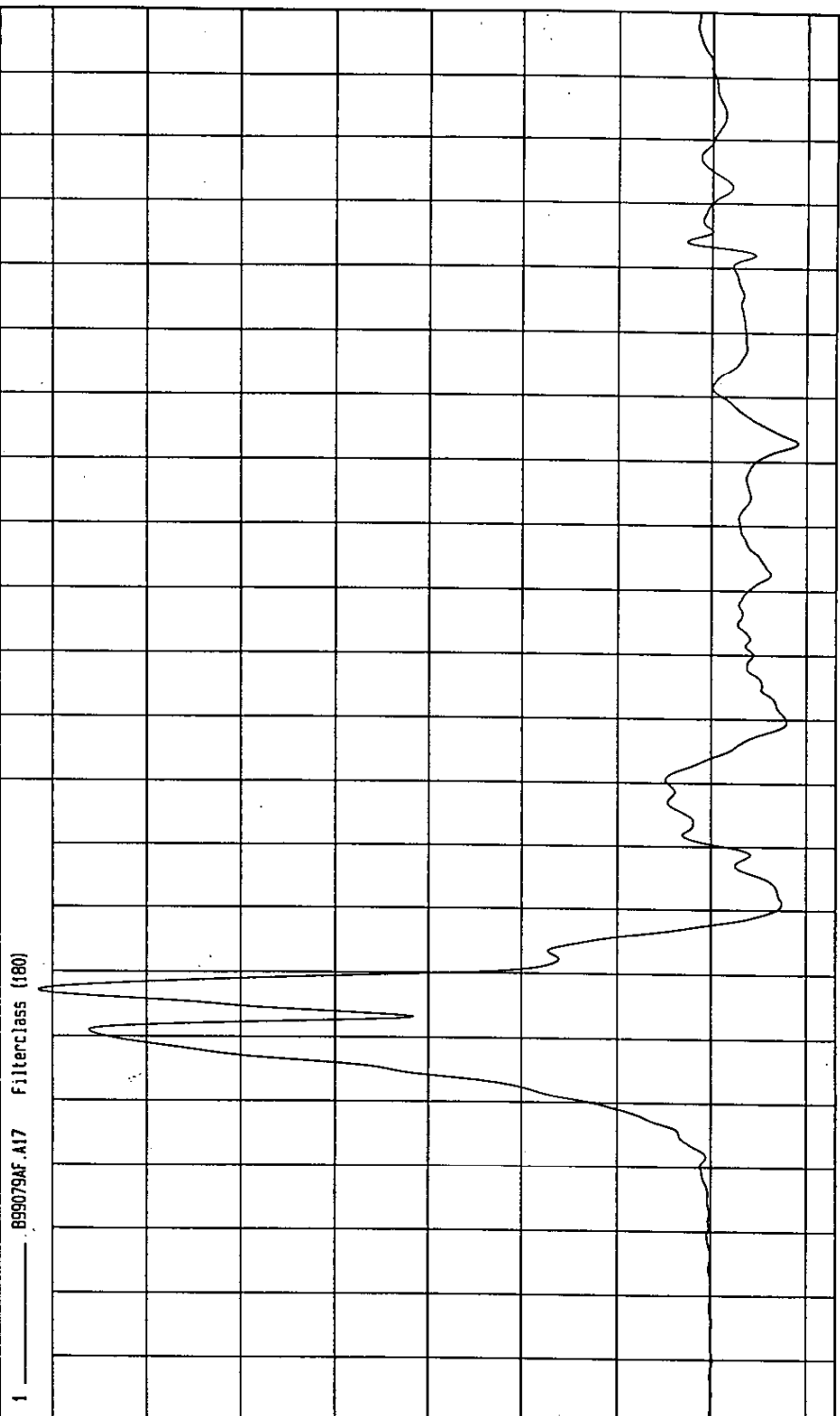
KPH

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.1 G'S at 133 msec Maximum = 71.51 G'S at 47 msec

DRIVER LOWER SPINE Y ACCELERATION



TIME (SECONDS)

NSA Research
12-07-1999 16:20

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

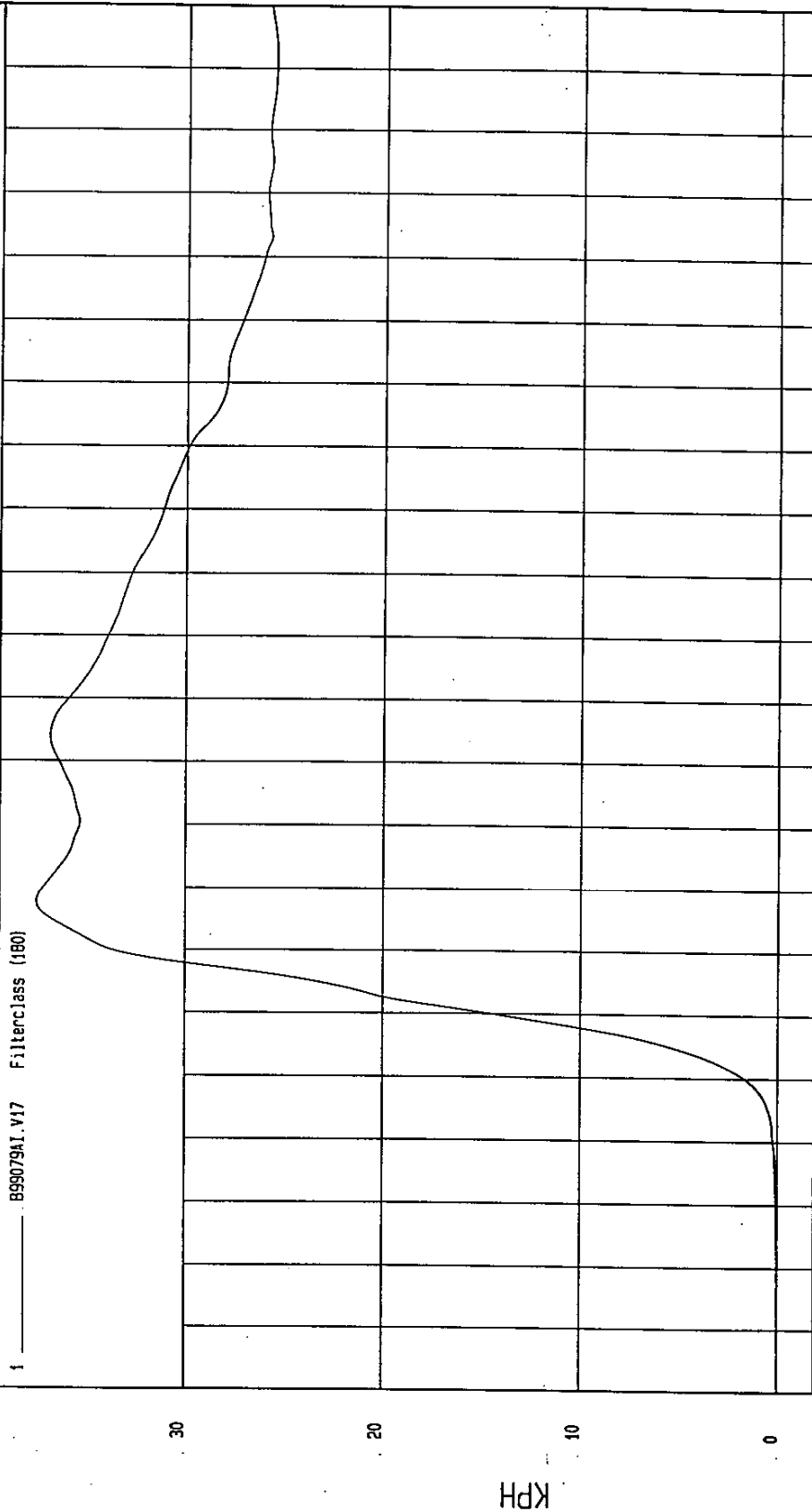
Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 37.47 KPH at 58 msec

DRIVER LOWER SPINE Y VELOCITY

1 B99079A1.V17 FilterClass (180)



TIME Seconds

WCA Research
12-07-1999 16:20

S.9

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

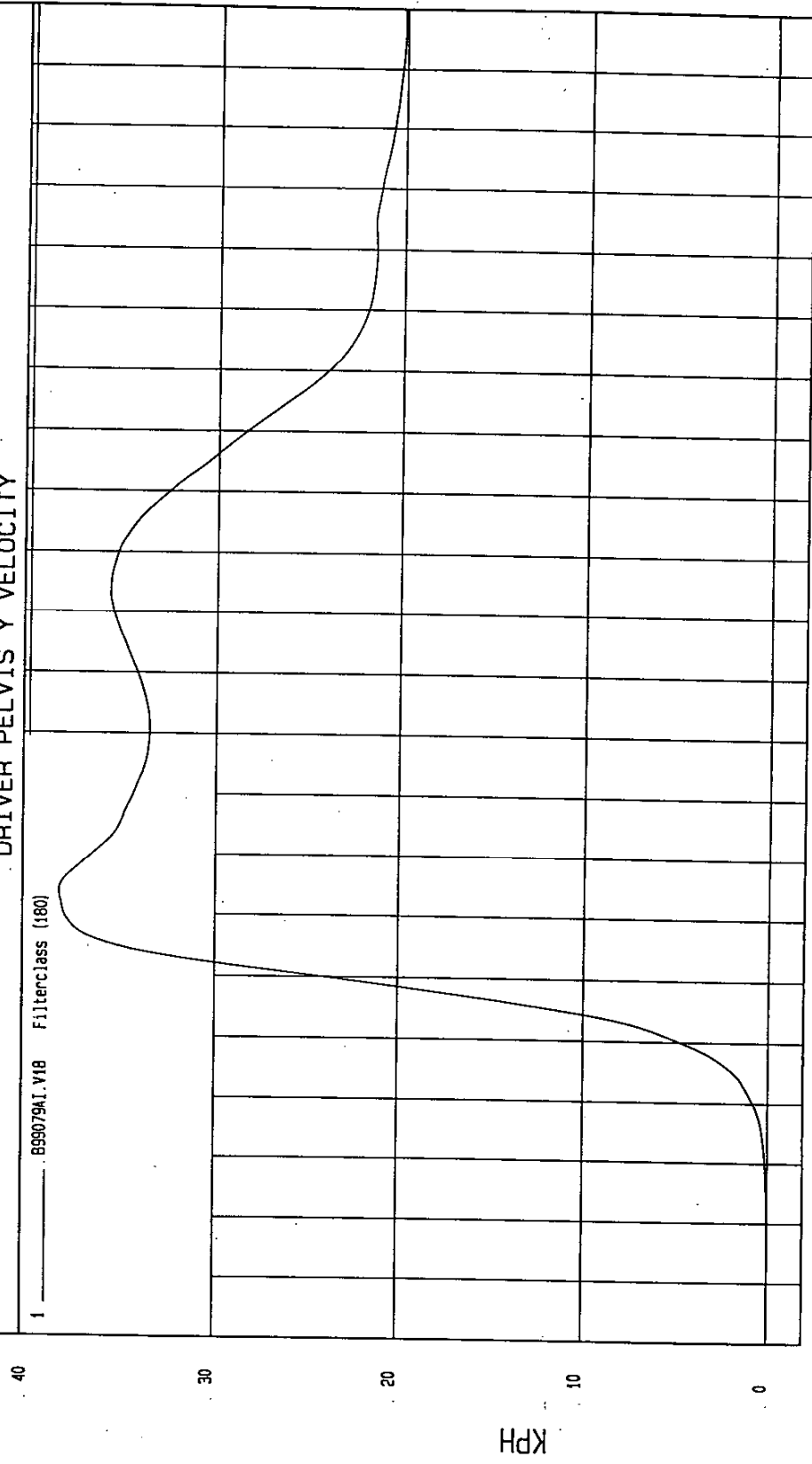
Speed: 38.3 MPH 61.6 KPH

Minimum = -1.81E-02 KPH at -4 msec

Maximum = 38.39 KPH at 54 msec

DRIVER PELVIS Y VELOCITY

1 ——— B99079A1.V18 Filterclass (180)



TIME Seconds

12-07-1999 16:20

USA Research

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

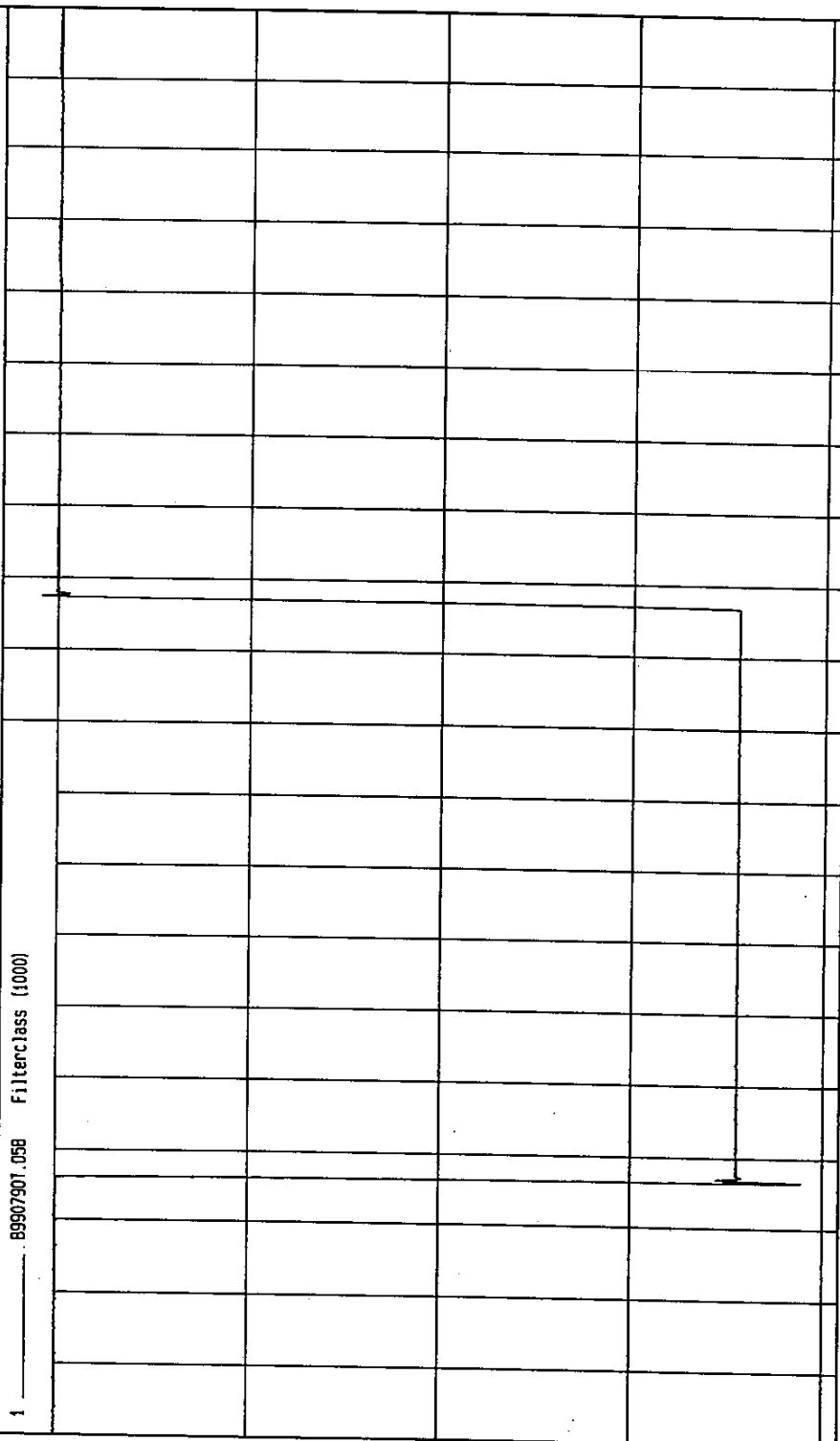
Speed: 38.3 MPH 61.6 KPH

Minimum = -3.89 VOLTS at 17 msec

Maximum = 8.65E-02 VOLTS at 98 msec

DRIVER SHOULDER CONTACT

1 _____ B9907907.056 Filterclass (1000)



NA Research
01-11-2000 08:34

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

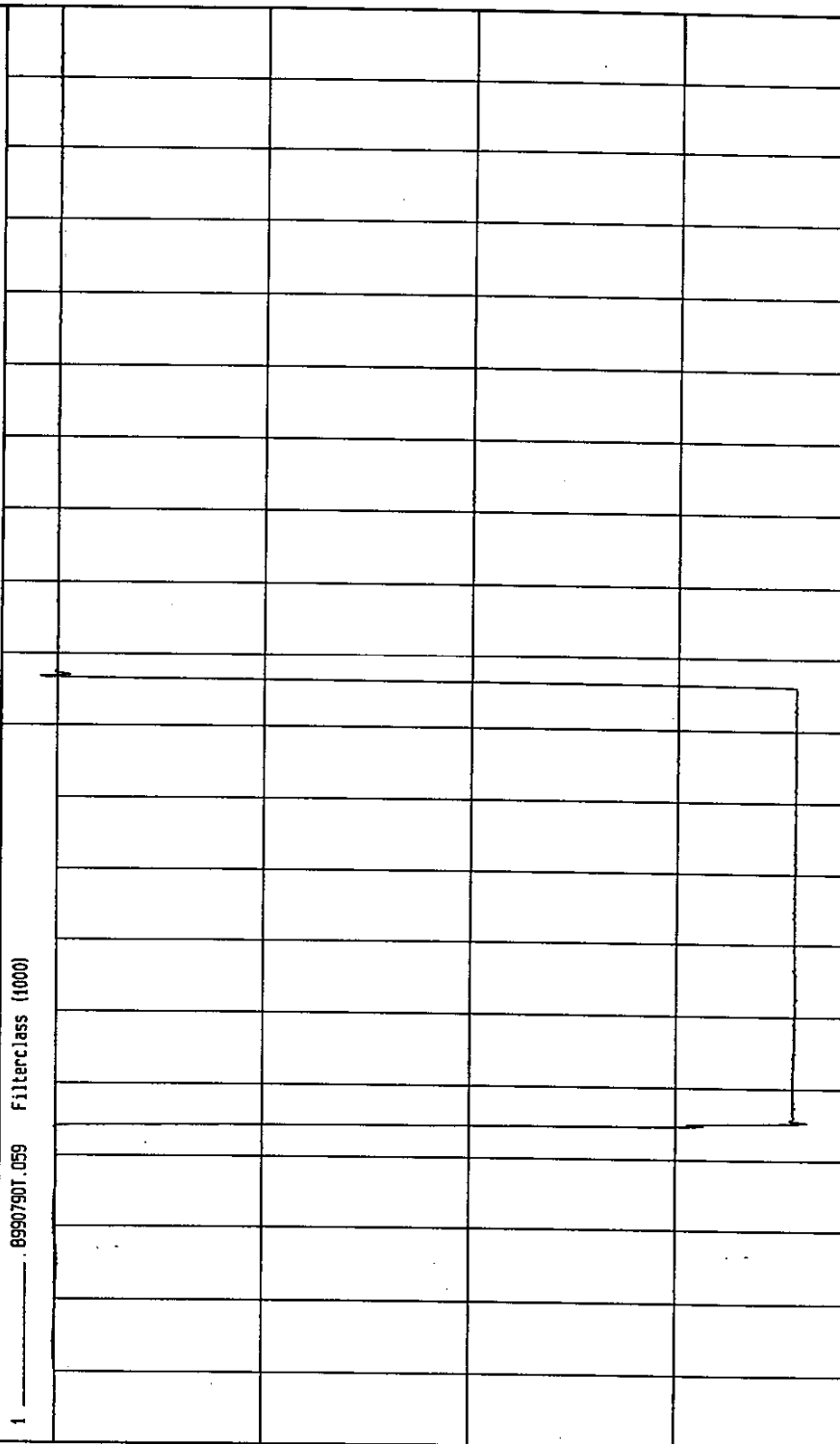
Speed: 38.3 MPH 61.6 KPH

Minimum = -3.63 VOLTS at 25 msec

Maximum = 8.17E-02 VOLTS at 87 msec

DRIVER PELVIS CONTACT

1 _____ .8990790T.059 FilterClass (1000)



TIME (SECONDS)

0.17
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0.02
0.01
0
-0.01
-0.02

0
-1
-2
-3

01-11-2000 08:34
NCA Research

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

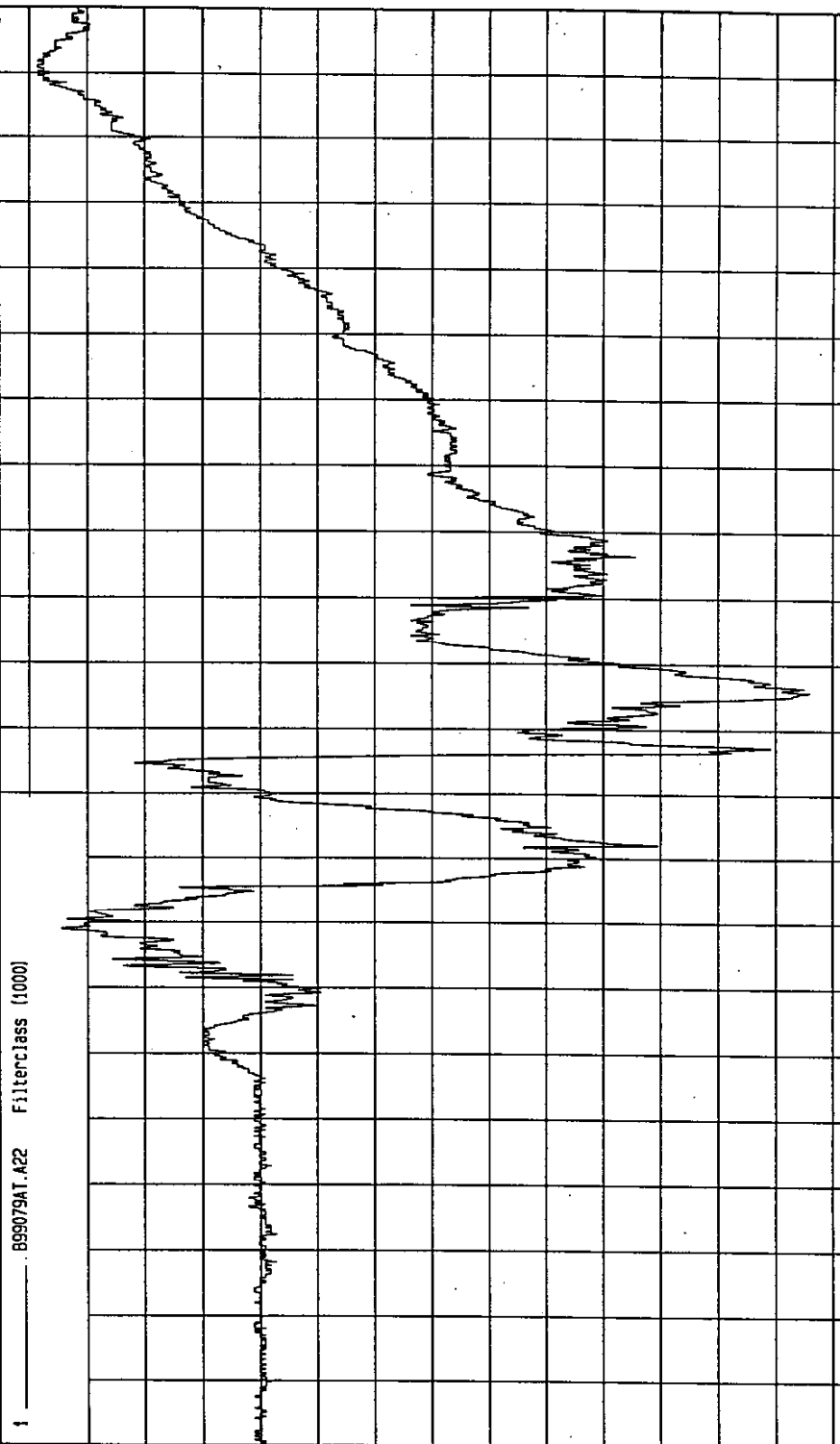
Speed: 38.3 MPH 61.6 KPH

Minimum = -19.2 G'S at 95 msec

Maximum = 7.7 G'S at 190 msec

REAR PASSENGER HEAD X ACCELERATION

1 899079AT.A22 Filterclass (1000)



NSA Research
12-07-1999 16:19

TIME (SECONDS)

G's

TEST: NCAP SIDE IMPACT

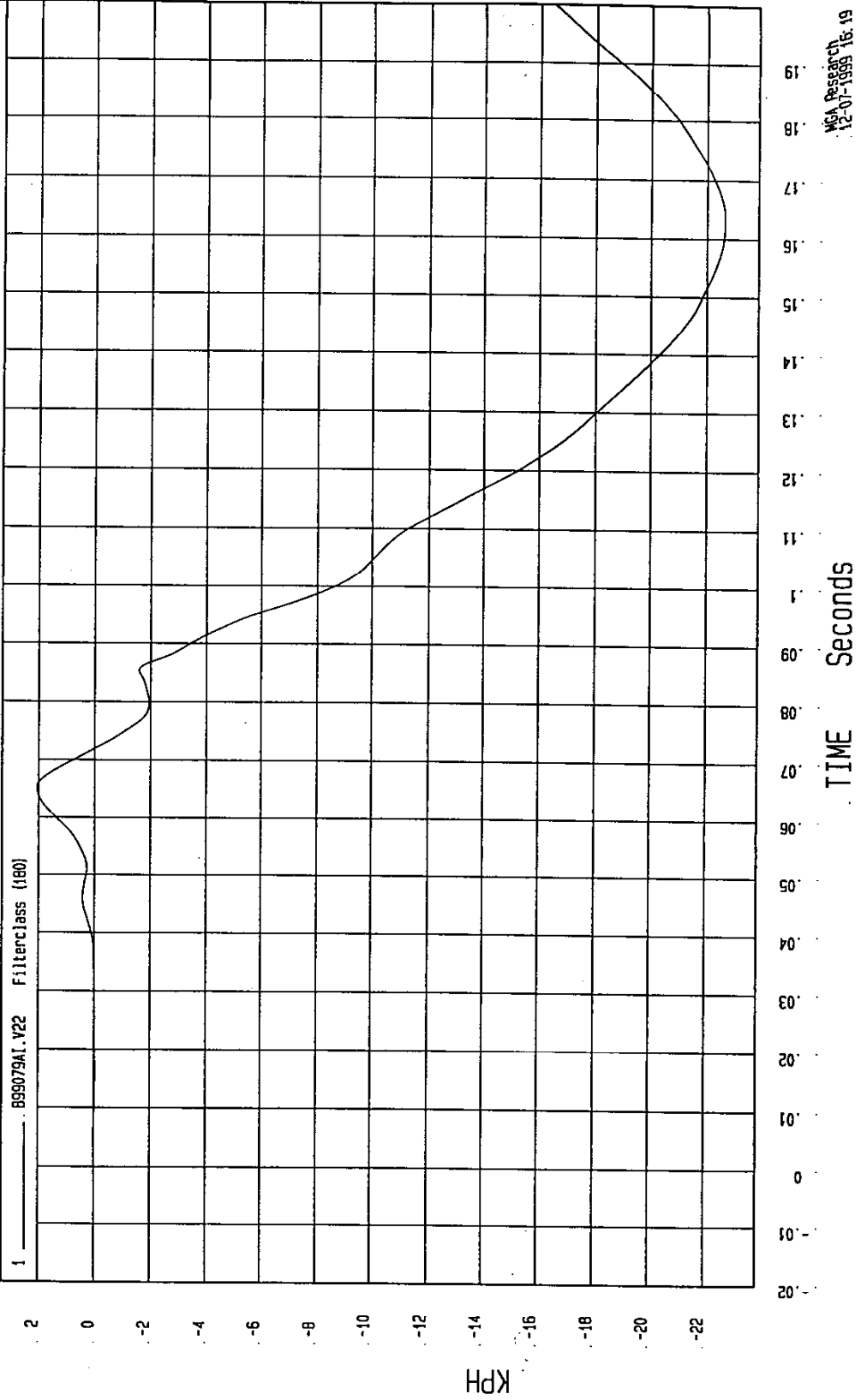
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -22.65 KPH at 164 msec

Maximum = 2.06 KPH at 65 msec

REAR PASSENGER HEAD X VELOCITY

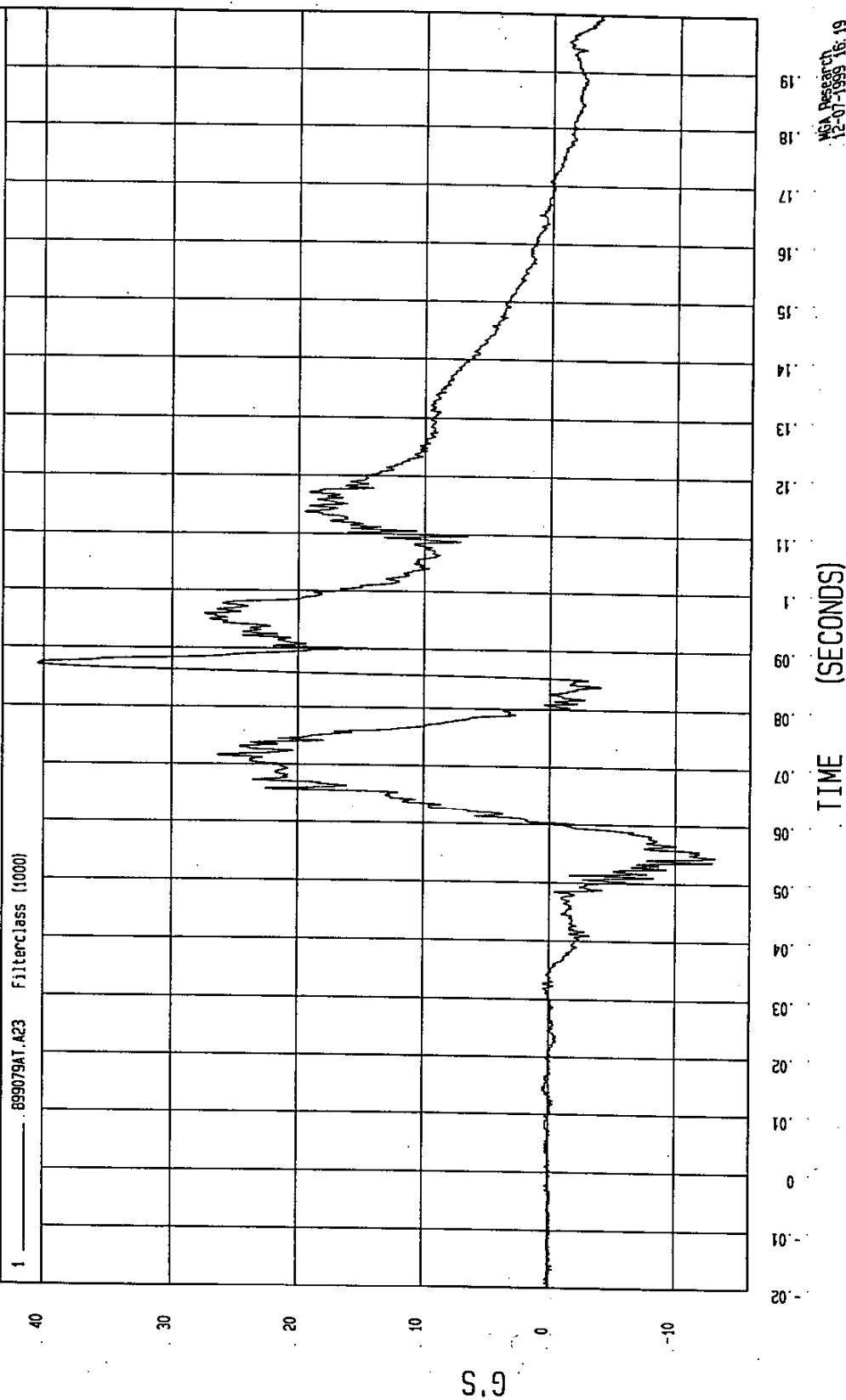


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -13.15 G'S at 54 msec Maximum = 40.5 G'S at 87 msec

REAR PASSENGER HEAD Y ACCELERATION

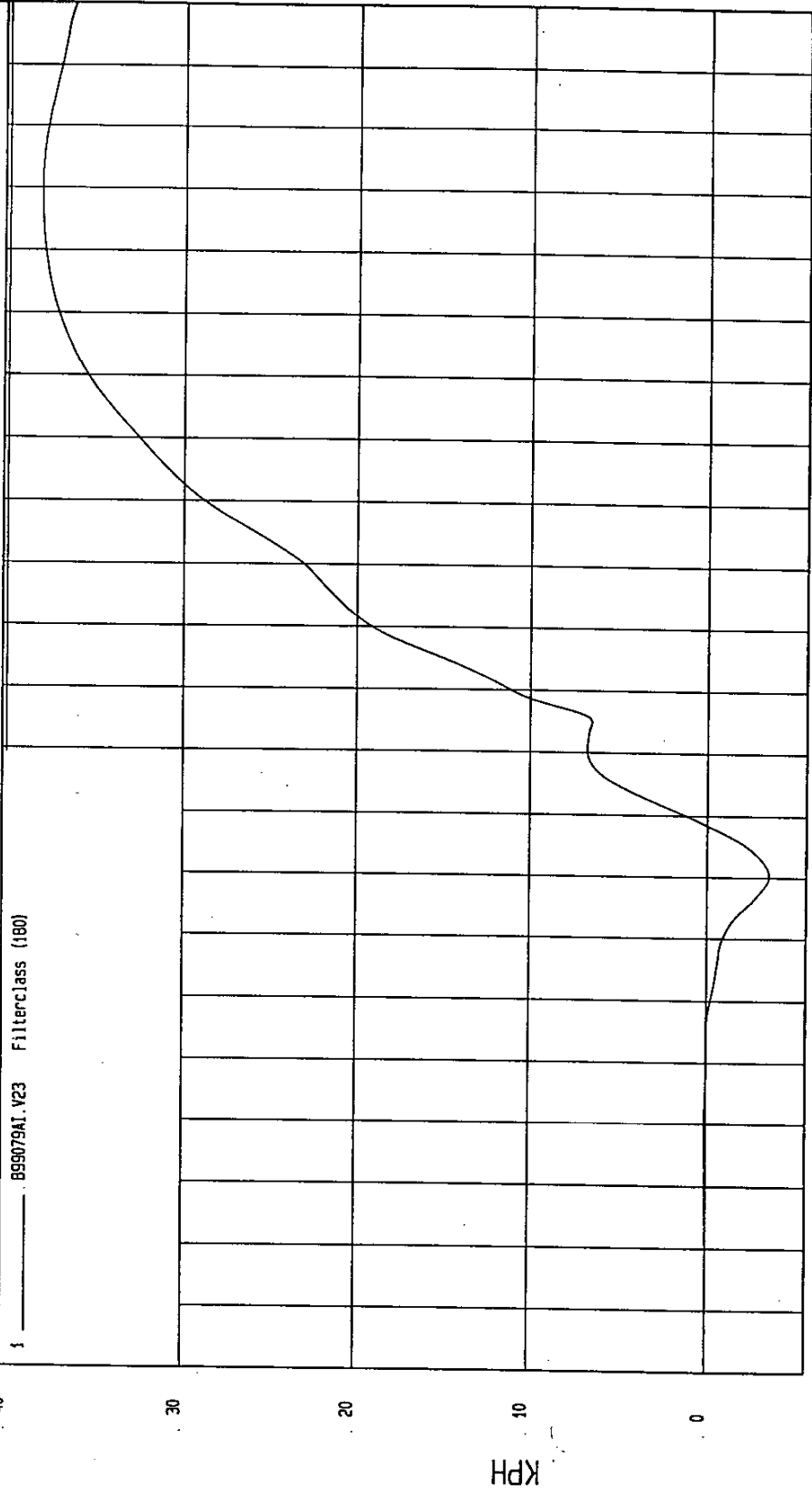


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.54 KPH at 60 msec Maximum = 38.17 KPH at 171 msec

REAR PASSENGER HEAD Y VELOCITY



TIME Seconds

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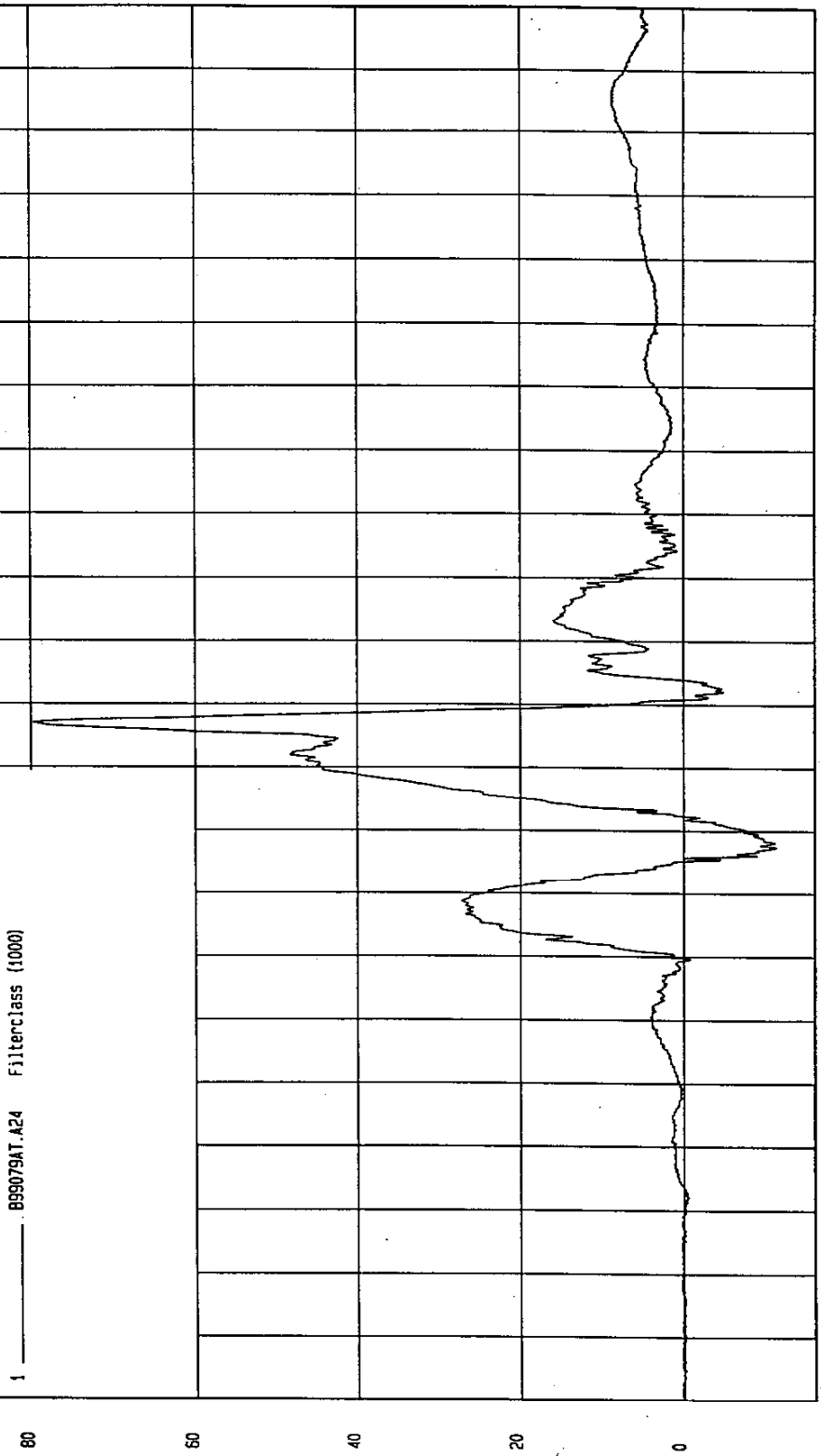
MOA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -11.43 G'S at 67 msec Maximum = 79.74 G'S at 87 msec

REAR PASSENGER HEAD Z ACCELERATION

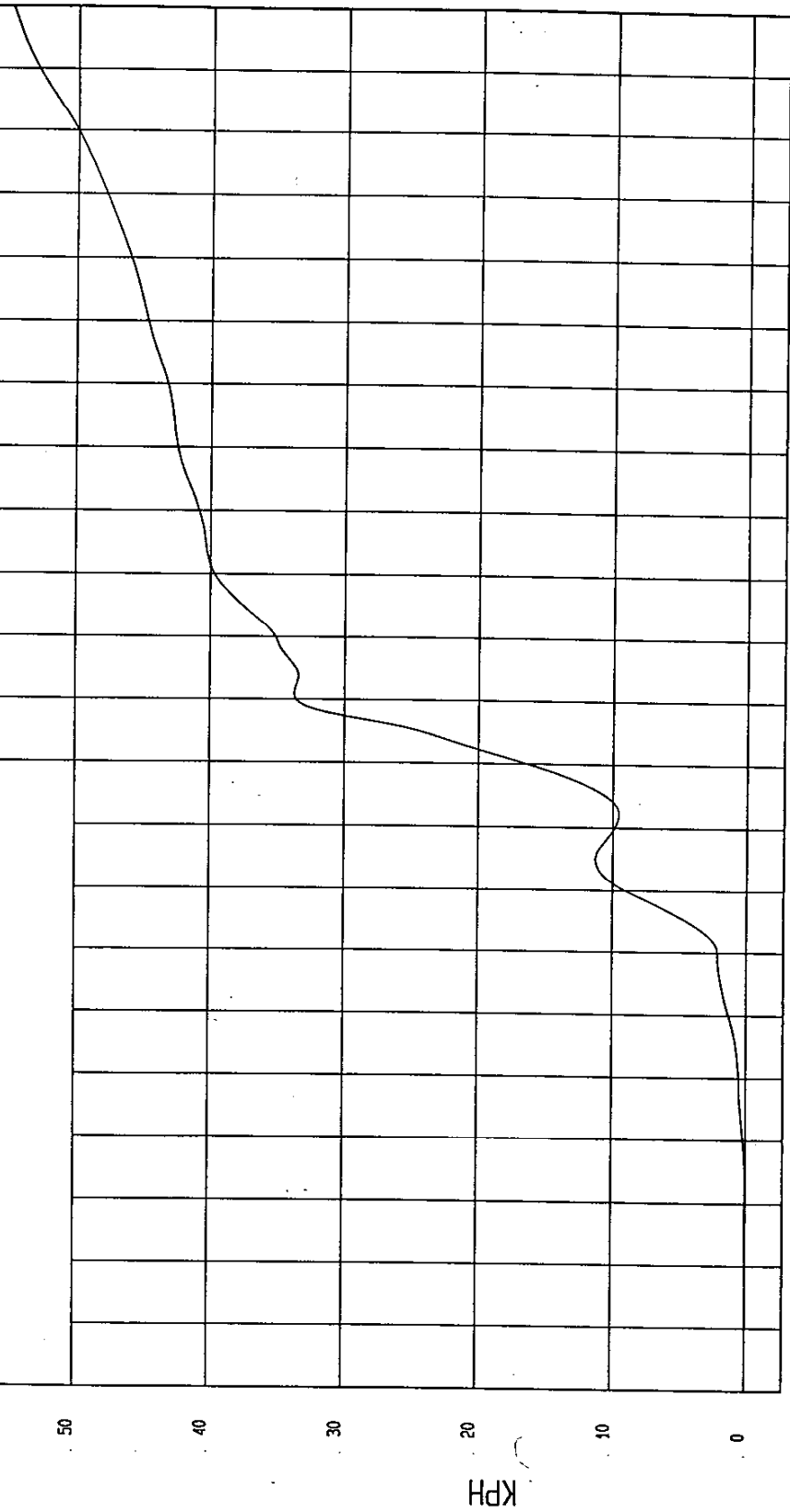


MCA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 TEST DATE: 12-07-1999
 Speed: 38.3 MPH 61.6 KPH
 Minimum = 0 KPH at -20 msec
 Maximum = 54.88 KPH at 200 msec

REAR PASSENGER HEAD Z VELOCITY

1 _____ B99079A1.V24 Filterclass (180)



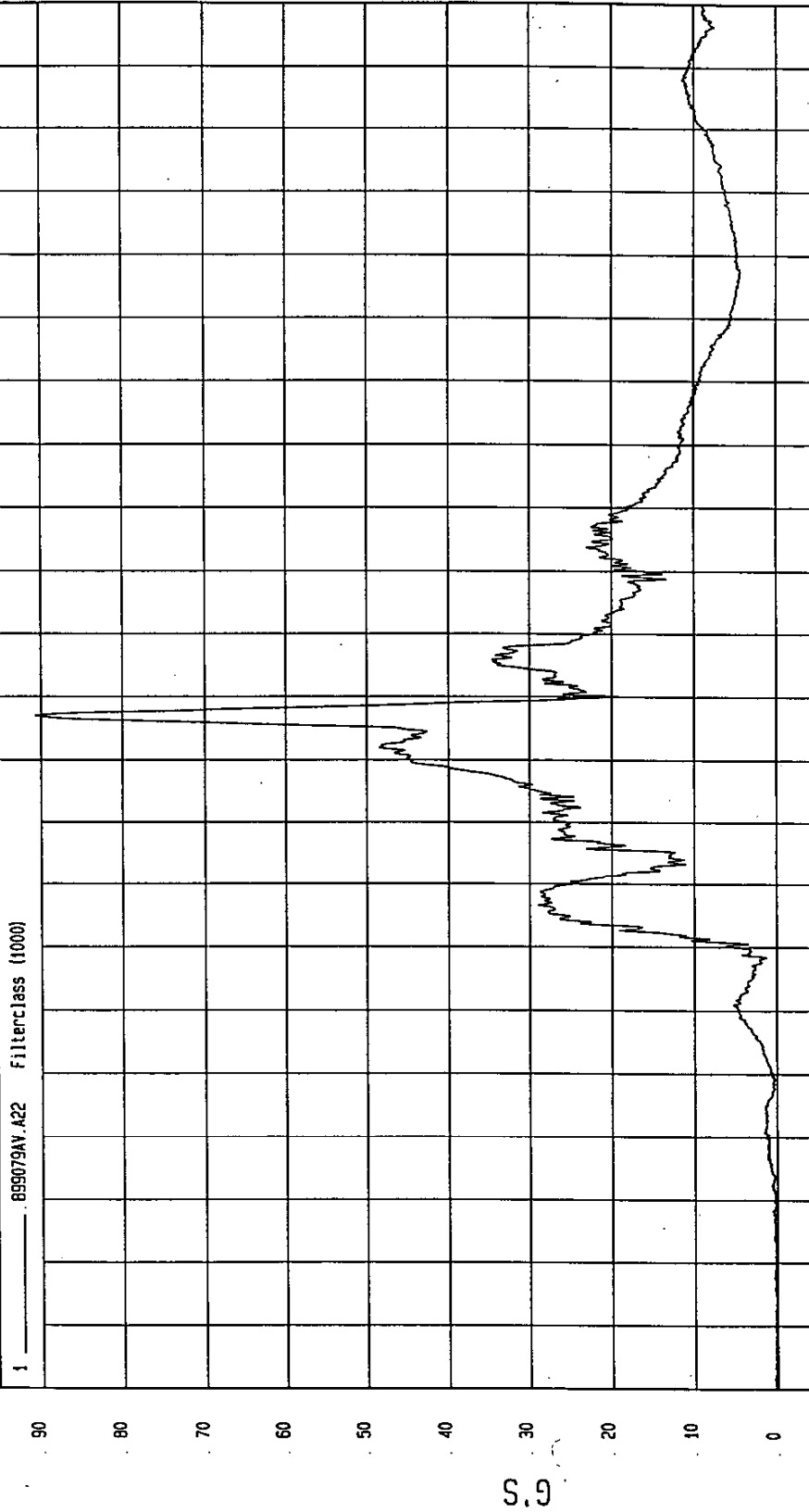
MOA Research
 12-07-1999 16:20

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = 7.35E-02 G'S at -20 msec Maximum = 90.72 G'S at 87 msec

REAR PASSENGER HEAD RESULTANT ACCELERATION



MCA Research
12-07-1999 16:20

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

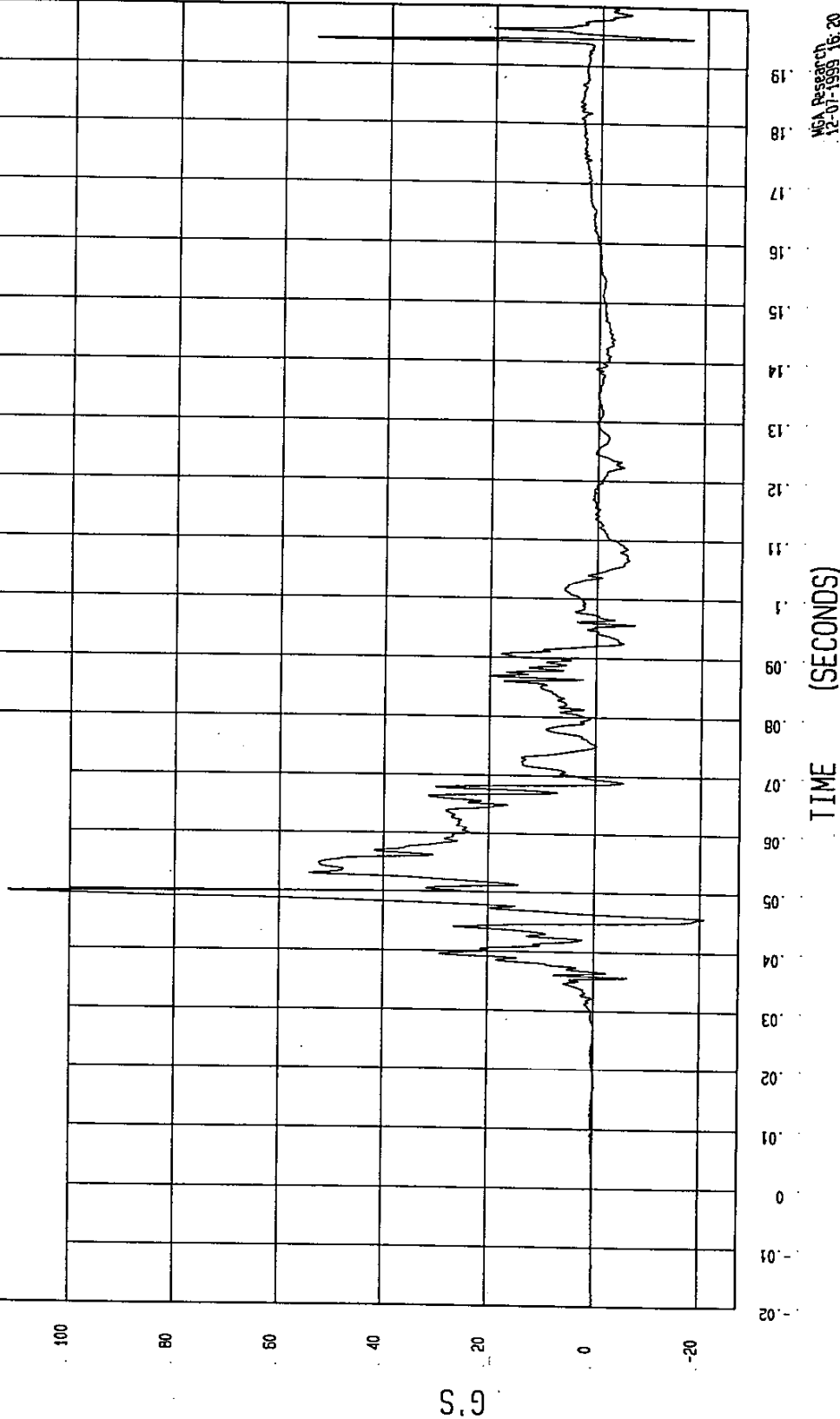
Speed: 38.3 MPH 61.6 KPH

Minimum = -20.81 G'S at 46 msec

Maximum = 111.77 G'S at 50 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 ——— 899079AT.A25 FilterClass (1000)

MGA Research
12-07-1999 16:20

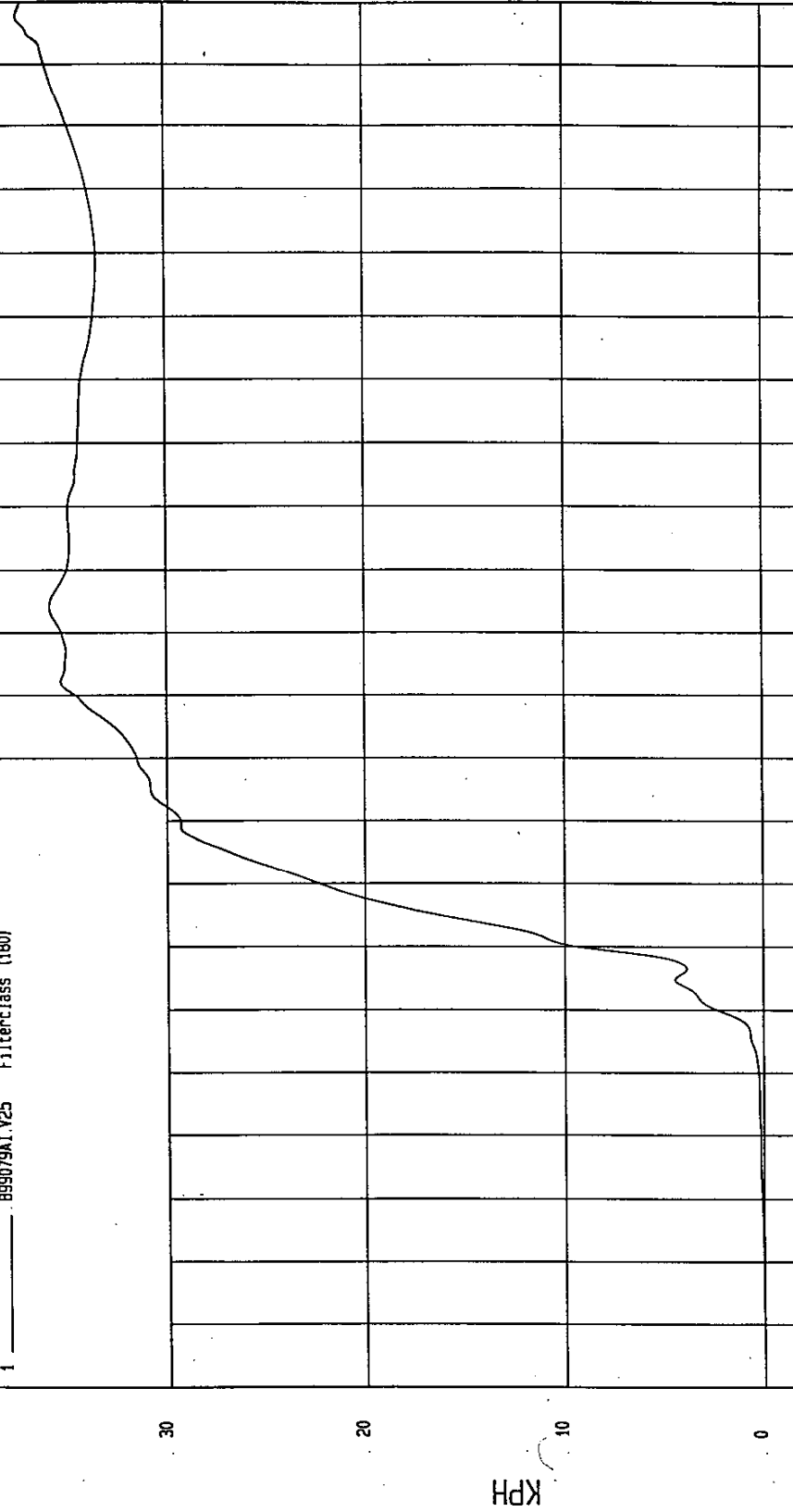
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.60E-03 KPH at -18 msec
Maximum = 37.31 KPH at 198 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 899079A1.V25 FilterClass (180)

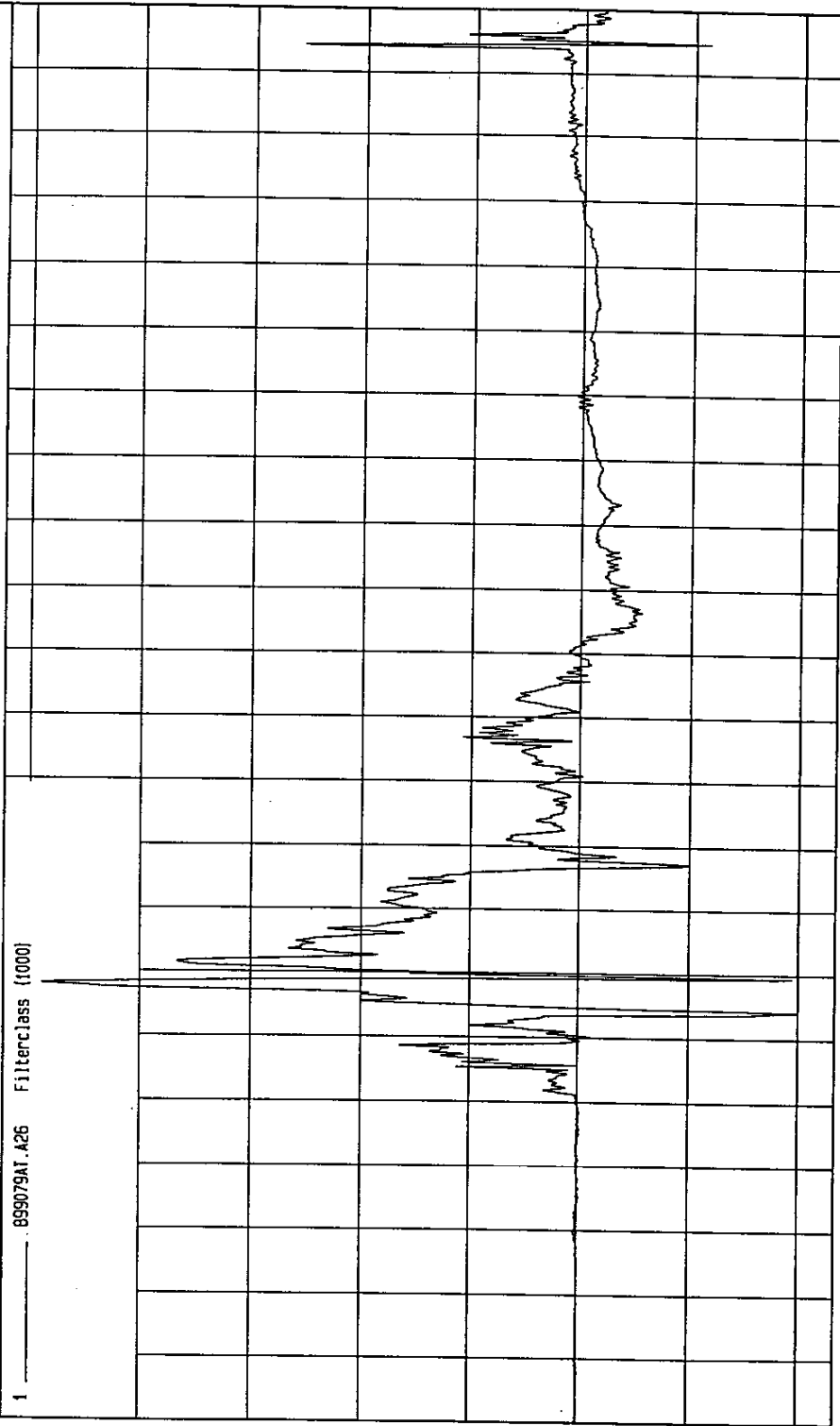


MGA Research
12-07-1999 16:20

TIME Seconds

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH
 Minimum = -39.68 G'S at 44 msec
 Maximum = 97.81 G'S at 48 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



TIME (SECONDS)

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0
-01
-02

97.81
-39.68

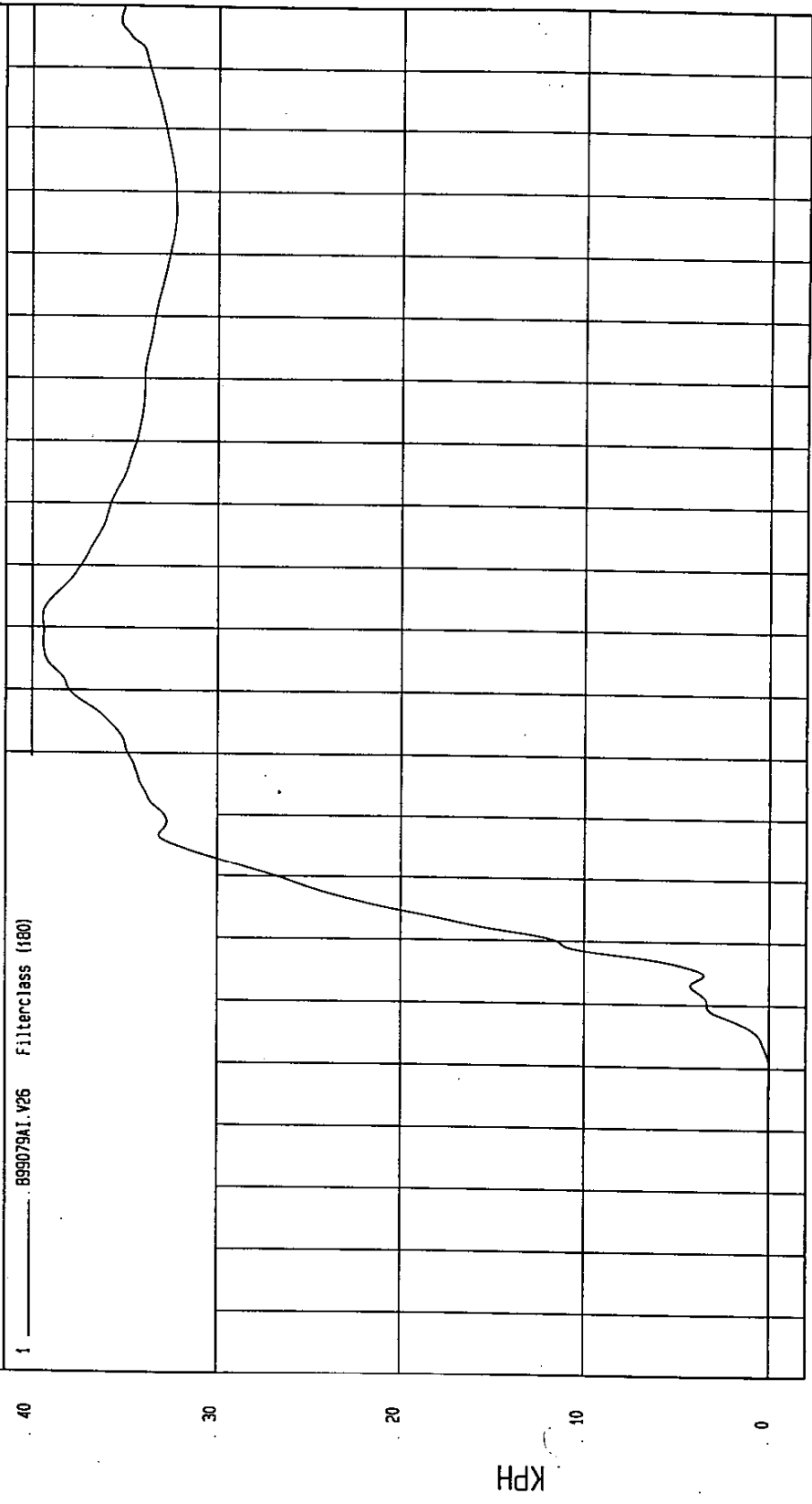
12-07-1999 16:20

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.35E-02 KPH at 6 msec Maximum = 39.43 KPH at 102 msec

REAR PASSENGER LOWER RIB Y VELOCITY



TIME Seconds

NSA Research
12-07-1999 16:20

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

SPEED: 38.3 MPH 61.6 KPH

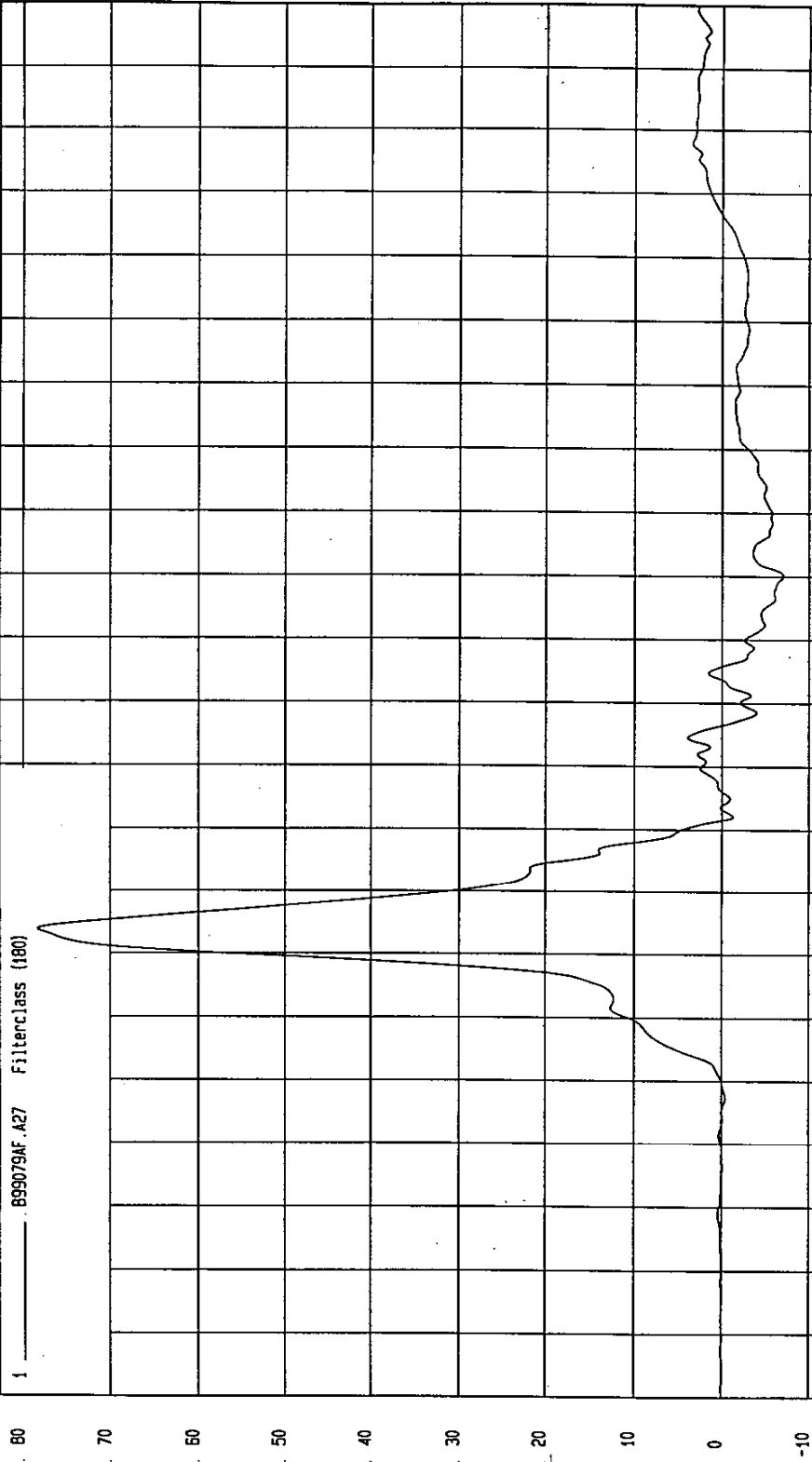
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 76.38 G'S at 54 msec

Minimum = -7.02 G'S at 110 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 B95079AF.A27 Filterclass (180)

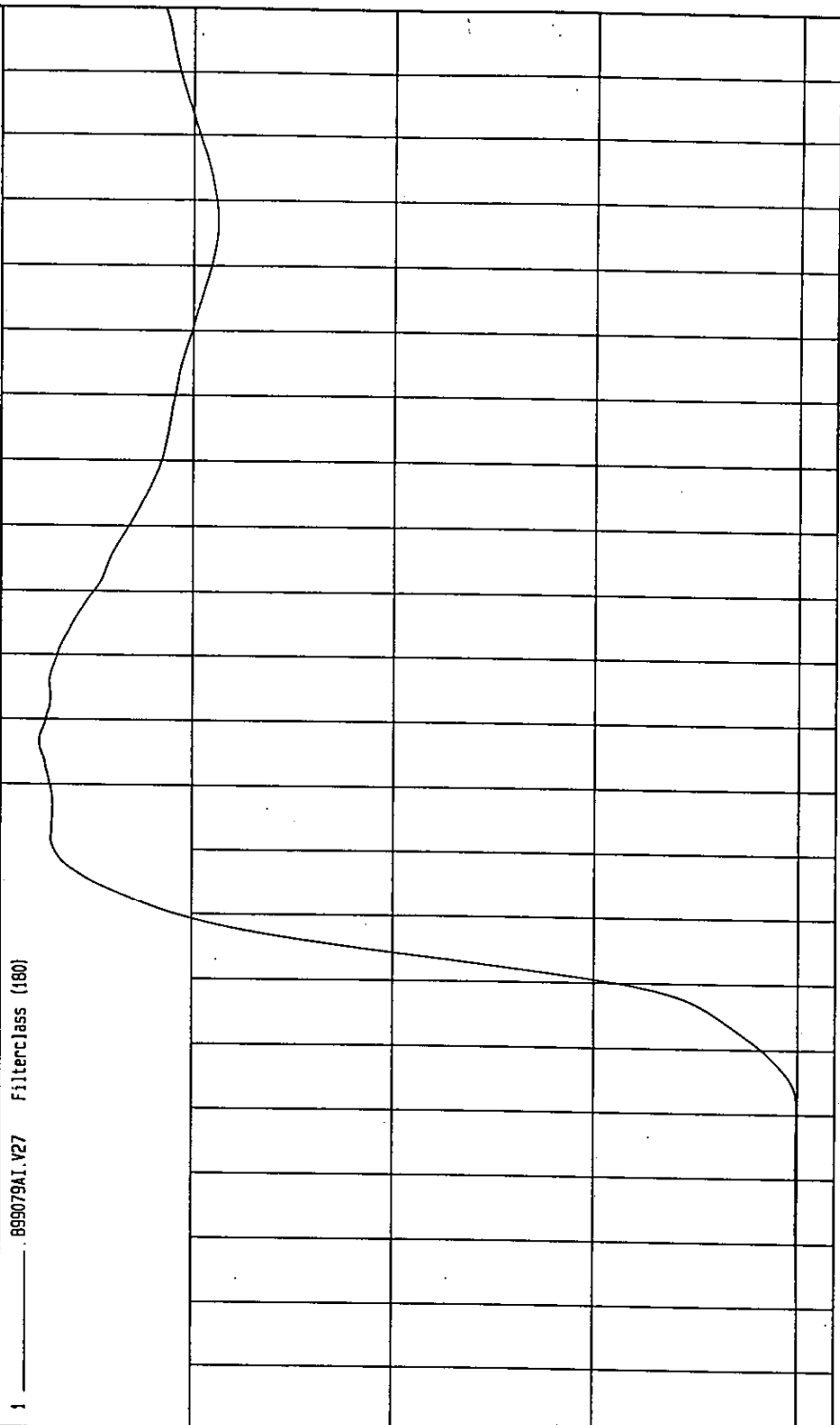


WCA Research
12-07-1999 16:20

TIME (SECONDS)

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Minimum = -2.08E-03 KPH at -14 msec
 Speed: 38.3 MPH 61.6 KPH
 Maximum = 37.53 KPH at 86 msec

REAR PASSENGER LOWER SPINE Y VELOCITY



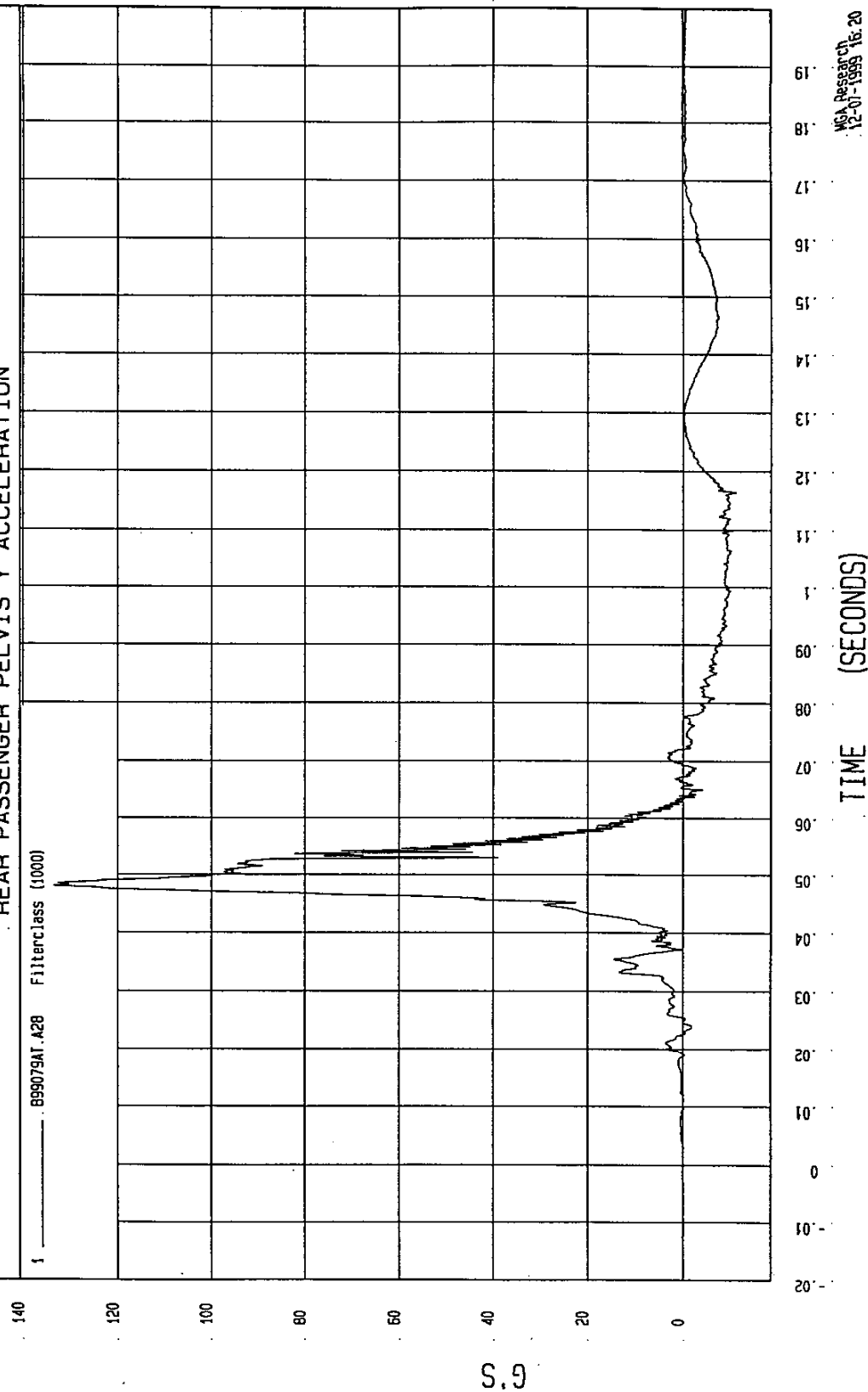
MSA Research
 12-07-1999 16:20

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -10.88 G'S at 116 msec Maximum = 133.46 G'S at 48 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 ——— 899079AT.A28 Filterclass (1000)



MSA Research
 12-01-1999 16:20

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

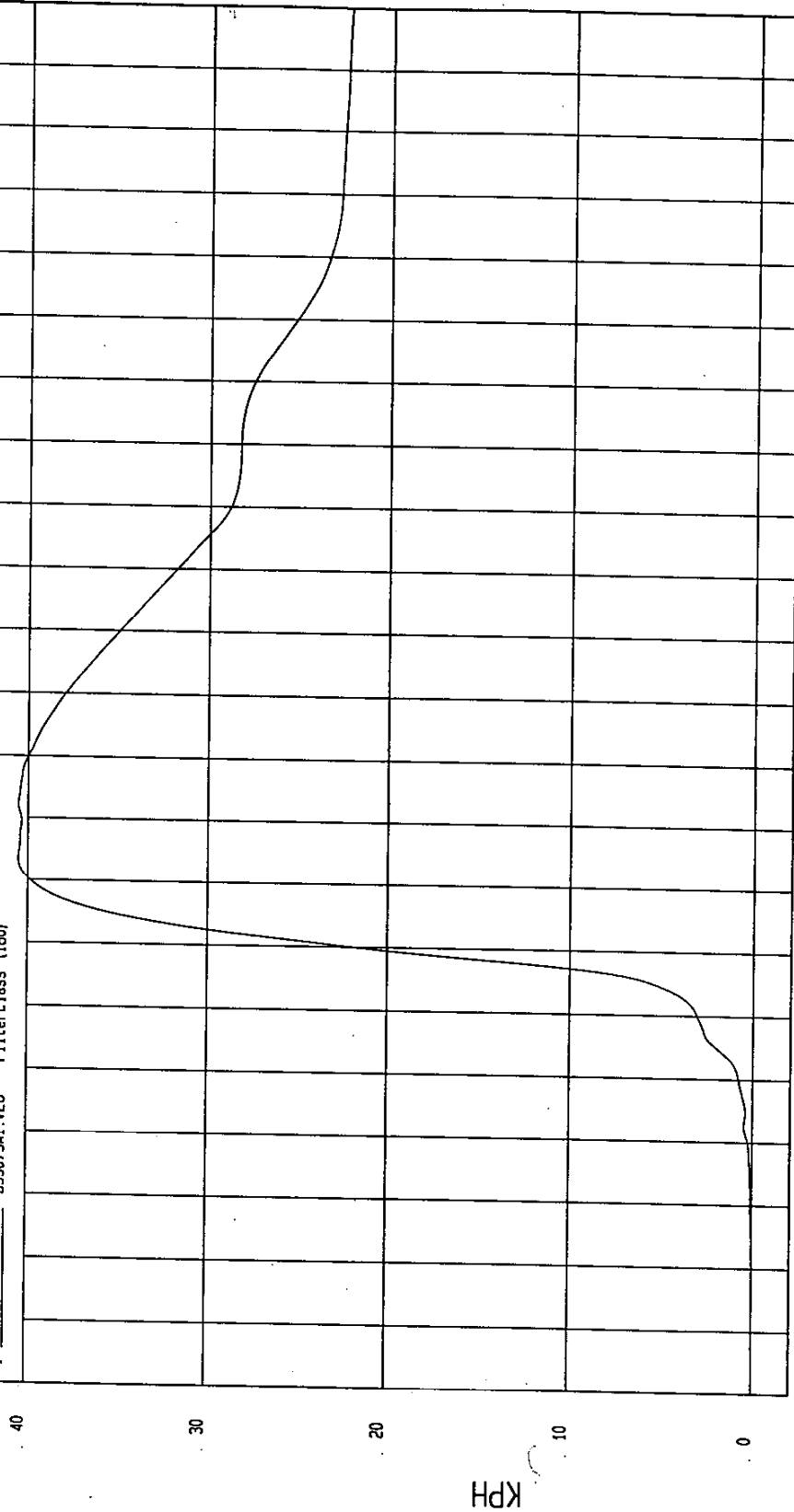
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.59E-03 KPH at -3 msec

Maximum = 40.55 KPH at 72 msec

REAR PASSENGER PELVIS Y VELOCITY

1 899079A1.V28 Filterclass (180)



MSA Research
12-07-1999 16: 21

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

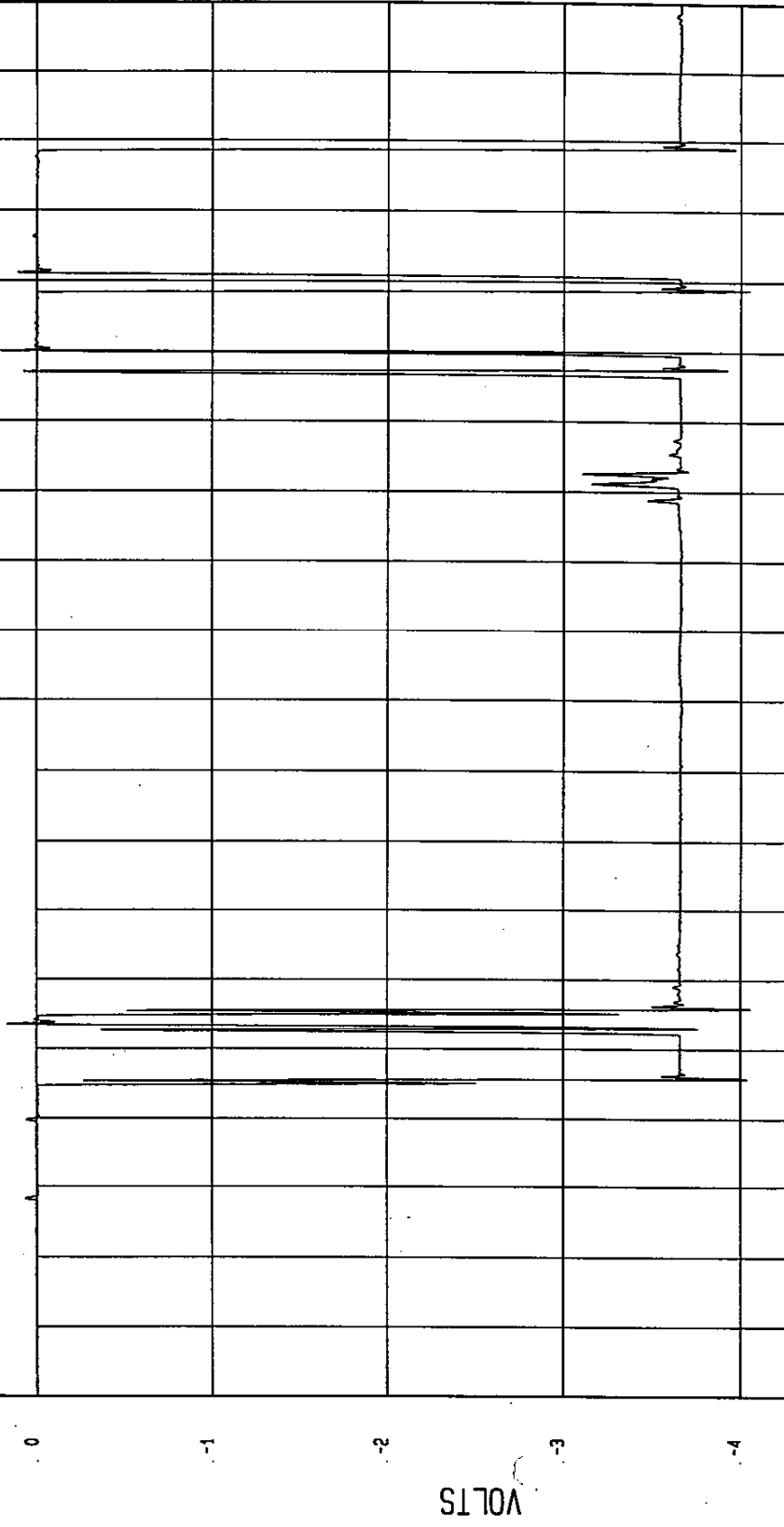
Speed: 38.3 MPH 61.6 KPH

Minimum = -4.06 VOLTS at 36 msec

Maximum = .17 VOLTS at 34 msec

REAR PASSENGER SHOULDER CONTACT

1 89907907.060 Filterclass (1000)



NGA Report
01-11-2000 08:34

TIME (SECONDS)

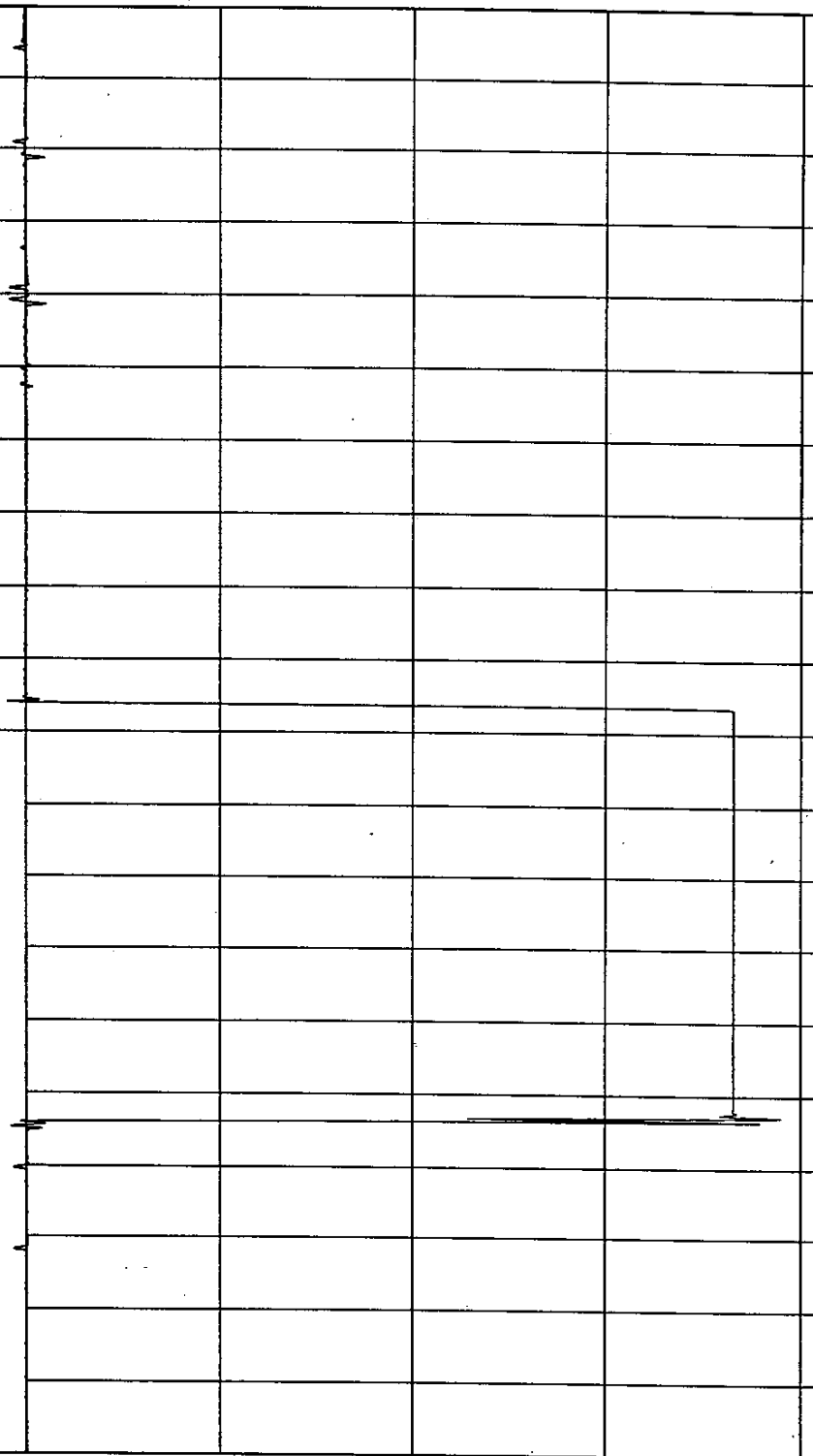
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.9 VOLTS at 27 msec Maximum = 9.43E-02 VOLTS at 84 msec

REAR PASSENGER PELVIS CONTACT

1 89907901.061 Filterclass (1000)



WCA Research
01-11-2000 08:34

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

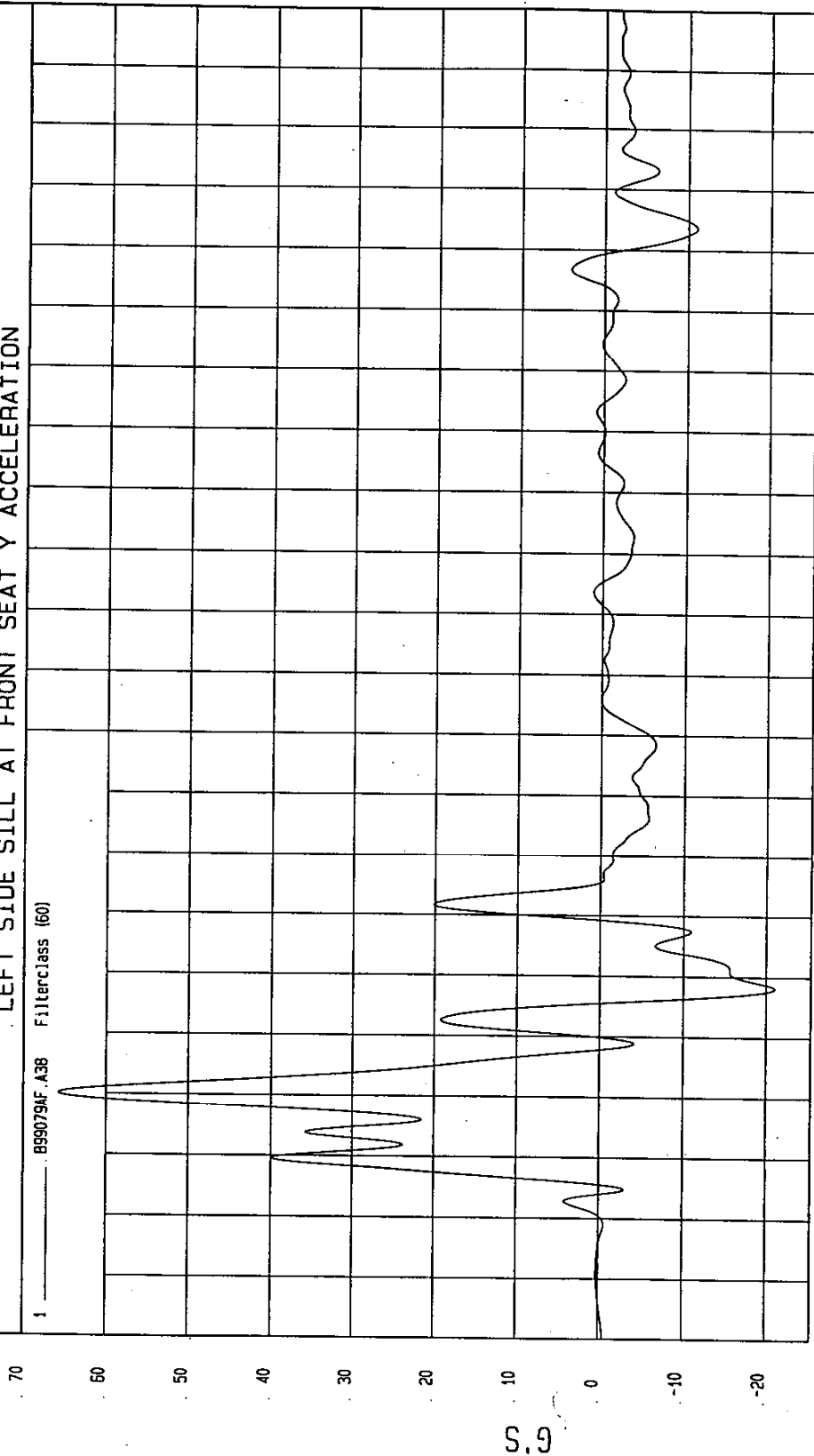
Speed: 38.3 MPH 61.6 KPH

Minimum = -21.06 G'S at 38 msec

Maximum = 65.72 G'S at 20 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 ——— B99079AF.A38 Filterclass (60)



TIME (SECONDS)

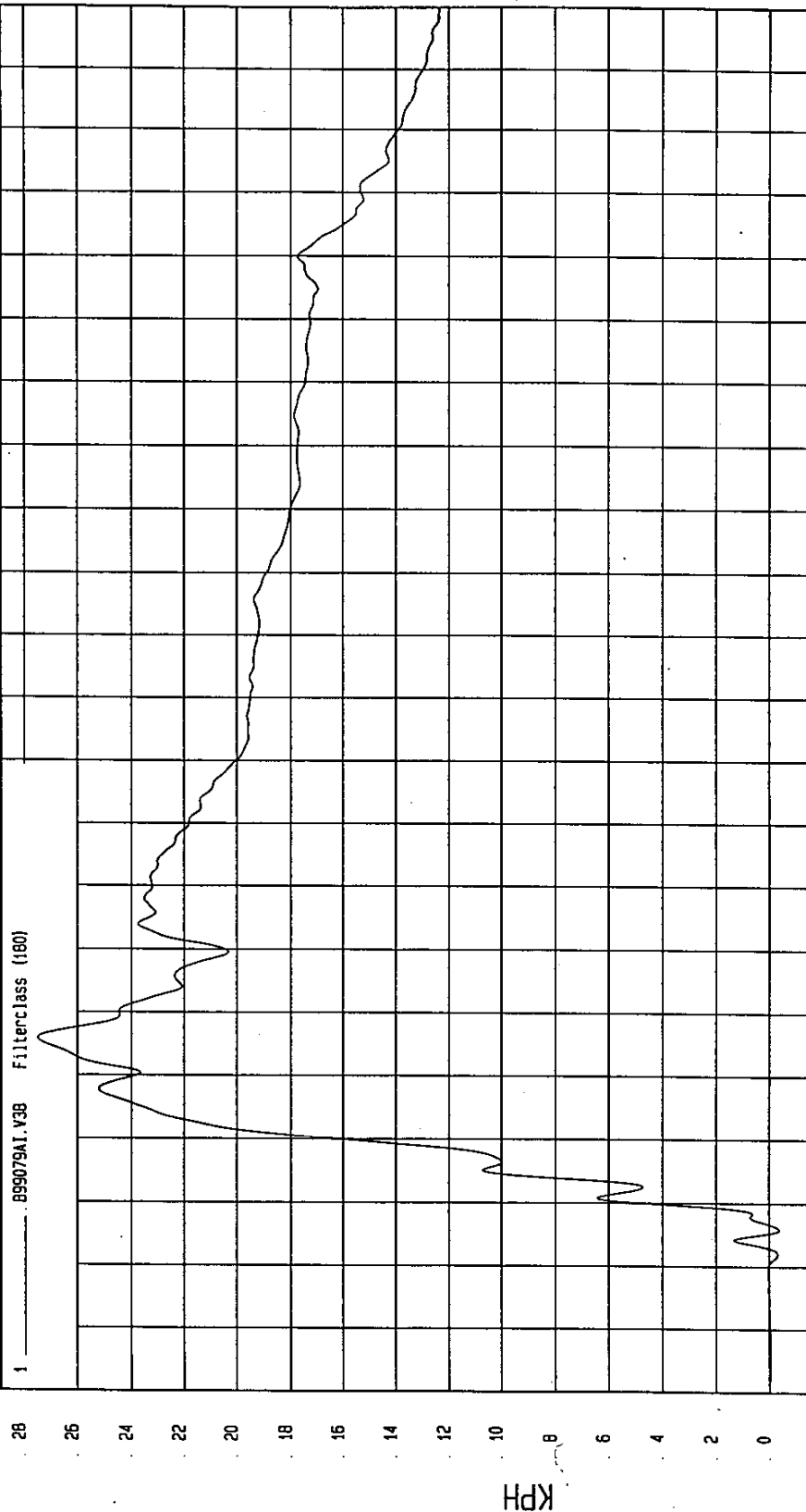
NSA Research
12-07-1999 16:15

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -.38 KPH at 6 msec Maximum = 27.5 KPH at 35 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



TIME Seconds

19. 18. 17. 16. 15. 14. 13. 12. 11. 10. 09. 08. 07. 06. 05. 04. 03. 02. 01. 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19

MCA Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

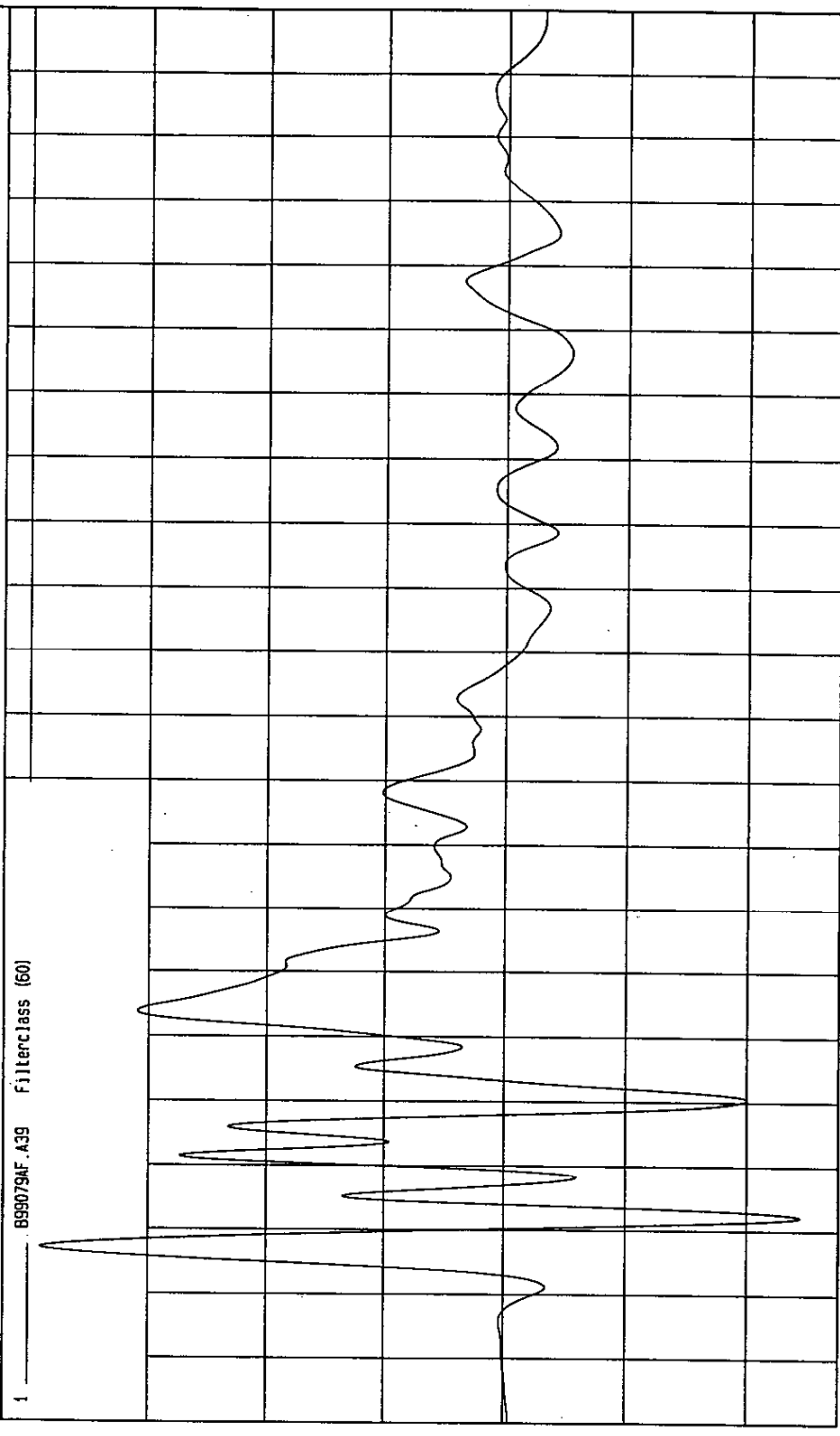
Speed: 38.3 MPH 61.6 KPH

Minimum = -24.4 G'S at 12 msec

Maximum = 39.03 G'S at 7 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION

1 899079AF.A39 Filterclass (60)



TIME (SECONDS)

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W&A Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

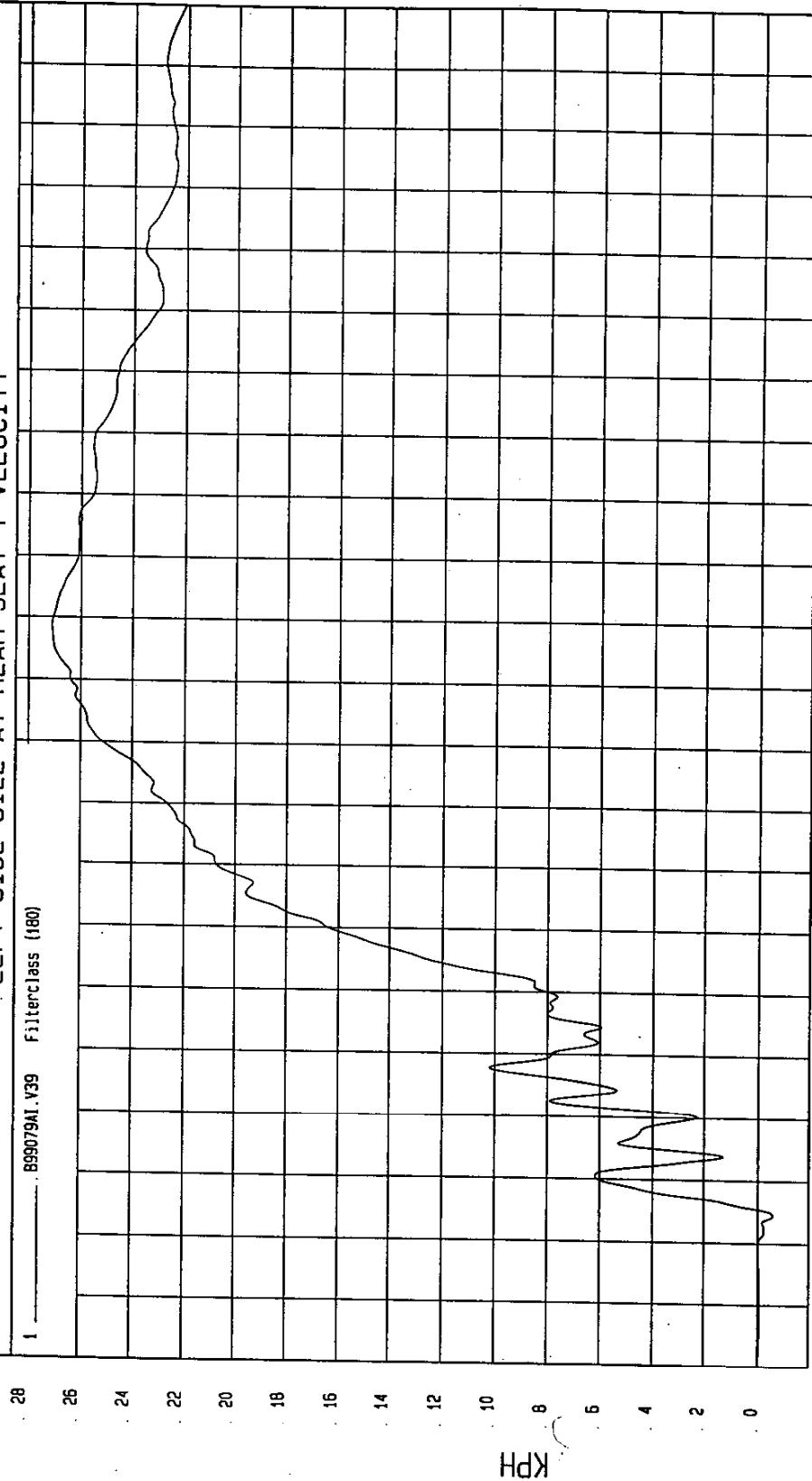
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -56 KPH at 4 msec Maximum = 27.11 KPH at 99 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY

1 B99079A1.V39 Filterclass (180)



TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

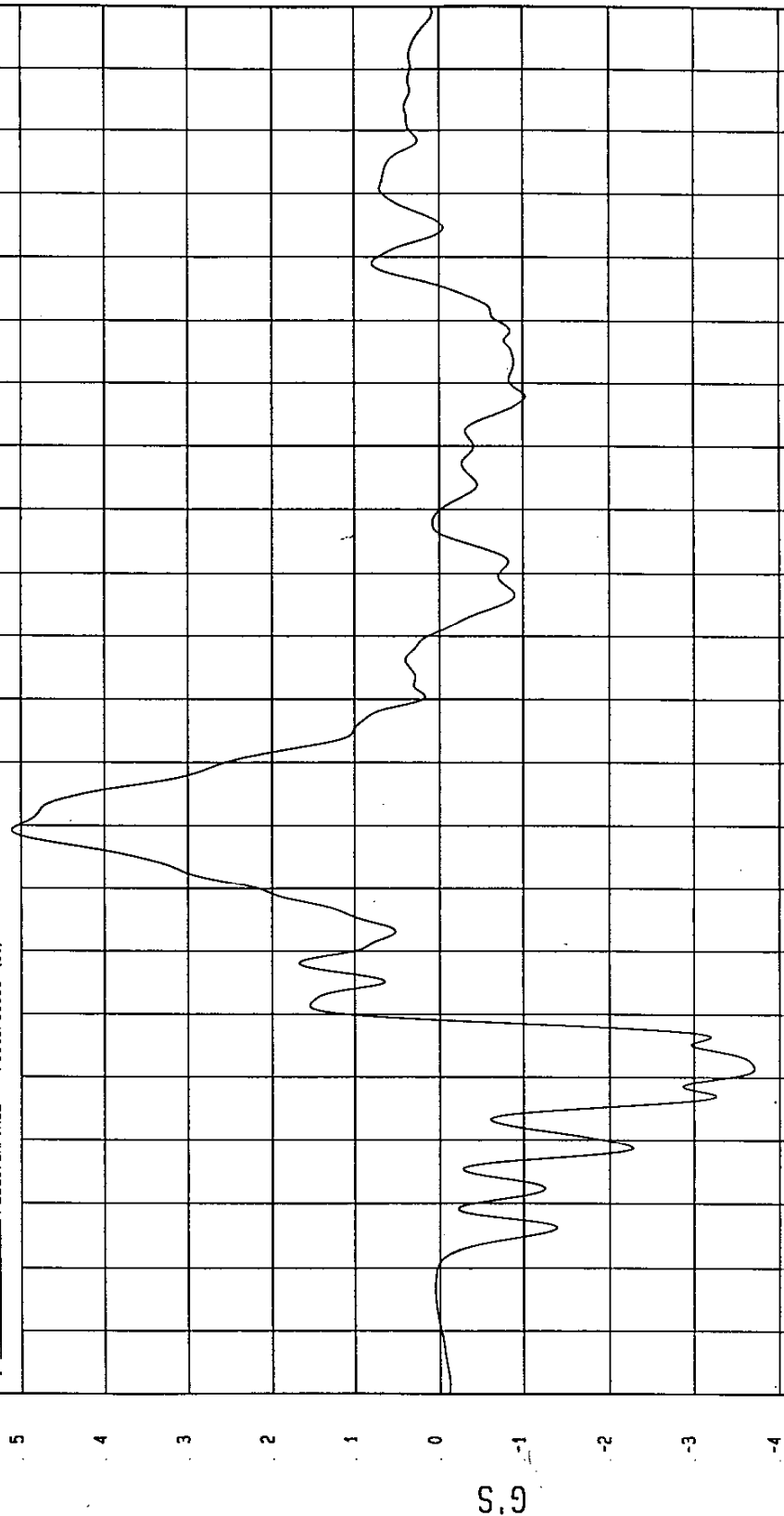
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 5.11 G'S at 69 msec

Minimum = -3.7 G'S at 31 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 B99079AF.A32 Filterclass (60)

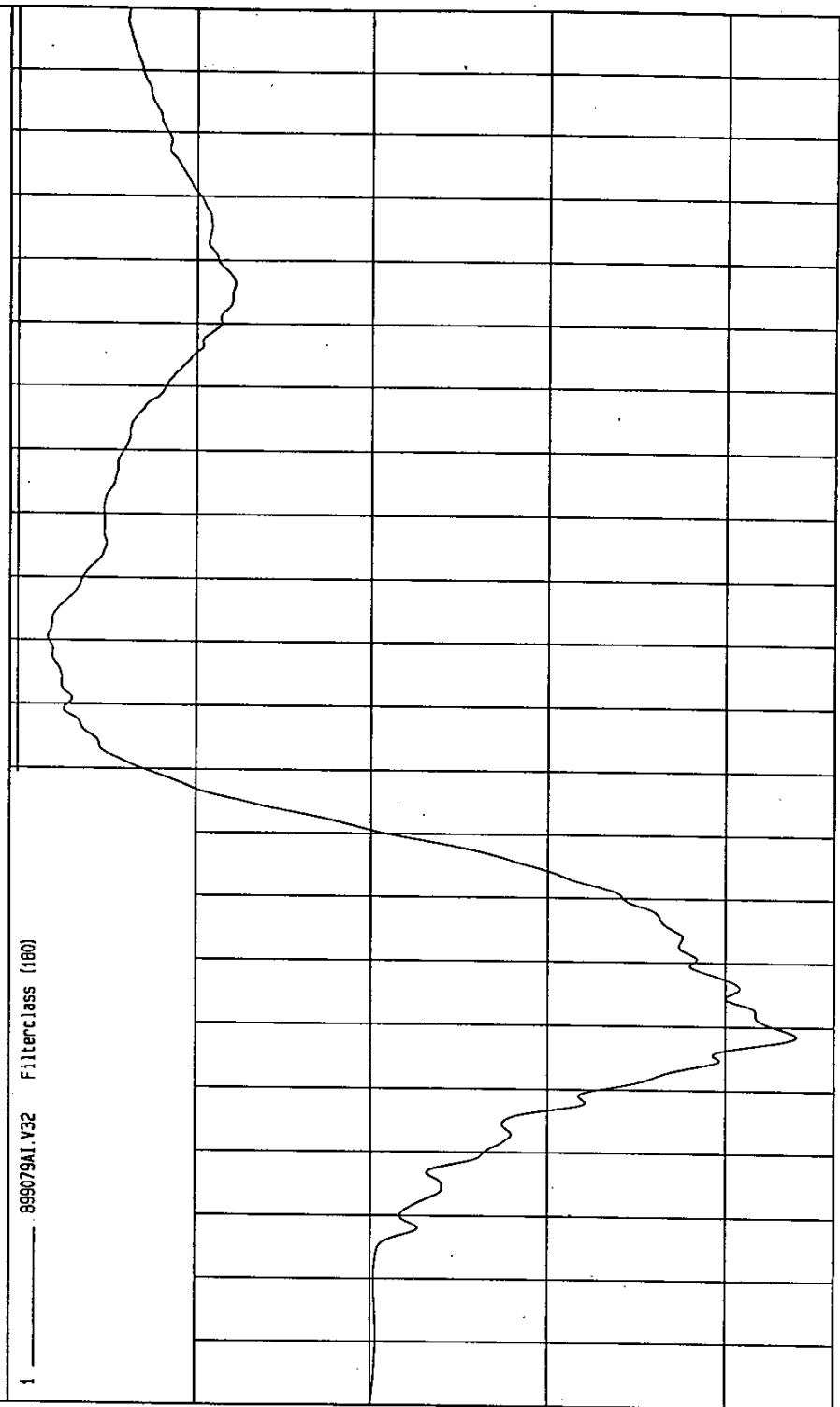


NSA Research
12-01-1999 16: 16

TIME (SECONDS)

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 TEST DATE: 12-07-1999
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -2.39 KPH at 38 msec
 Maximum = 1.83 KPH at 101 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY



MSA Research
 12-07-1999 16:16

TIME Seconds

KPH

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

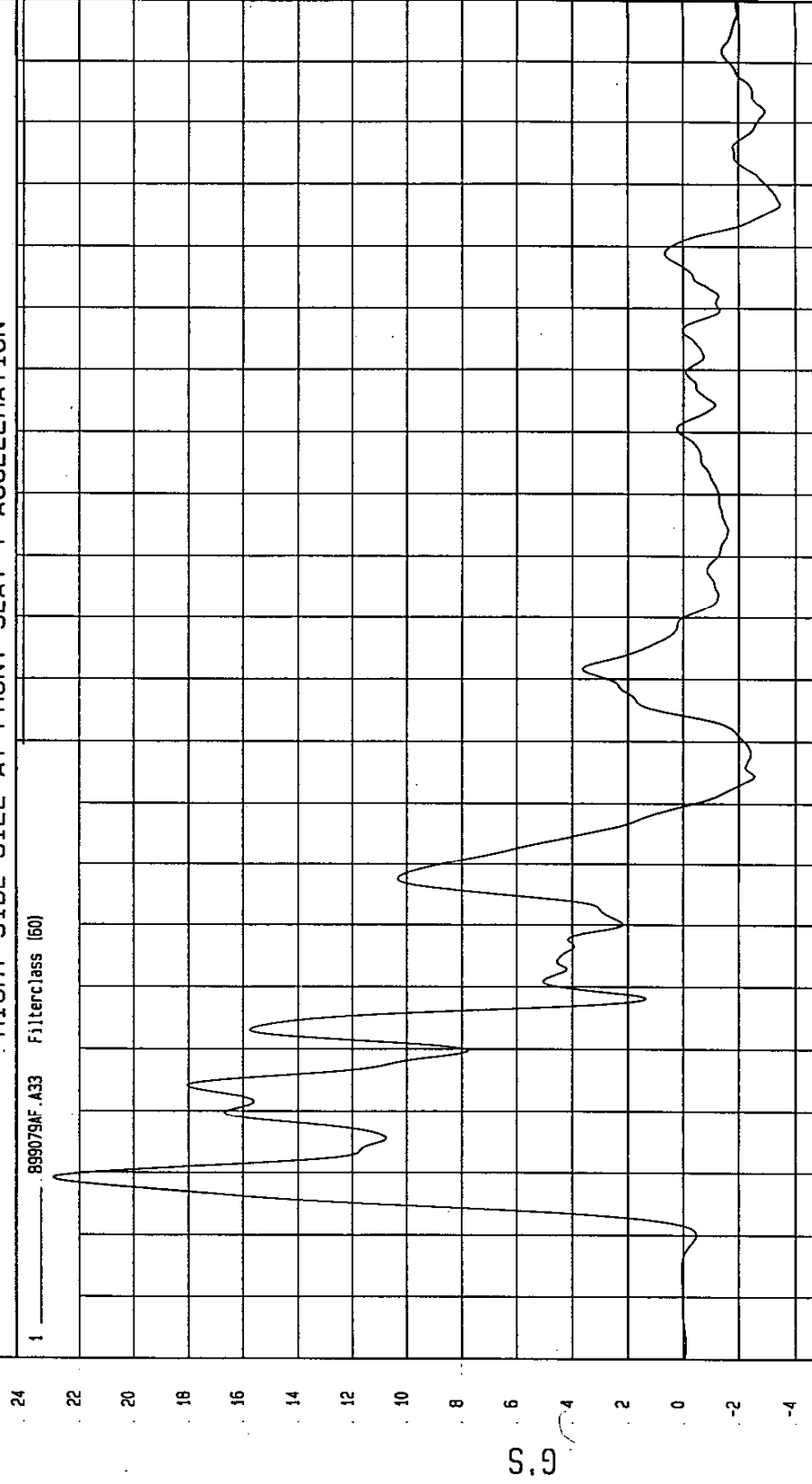
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 22.94 G's at 9 msec

Minimum = -3.46 G's at 167 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 899079AF.A33 Filterclass (50)



WCA Research
12-07-1999 16:16

TIME (SECONDS)

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

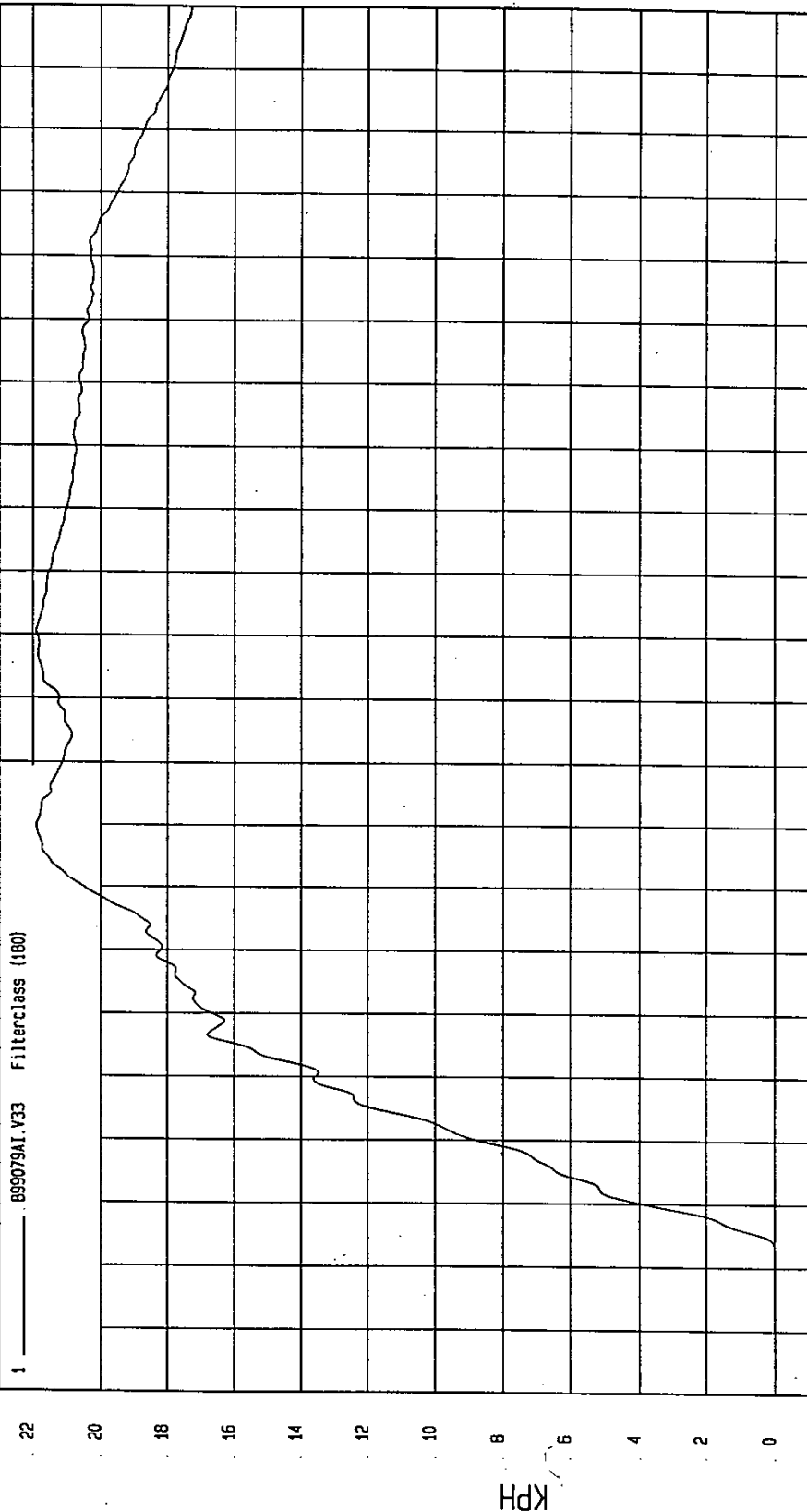
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Minimum = -1.70E-02 KPH at -15 msec

Maximum = 21.91 KPH at 101 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

1 899079A1.V33 Filterclass (180)



MSA Research
12-07-1999 16:16

TIME Seconds

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

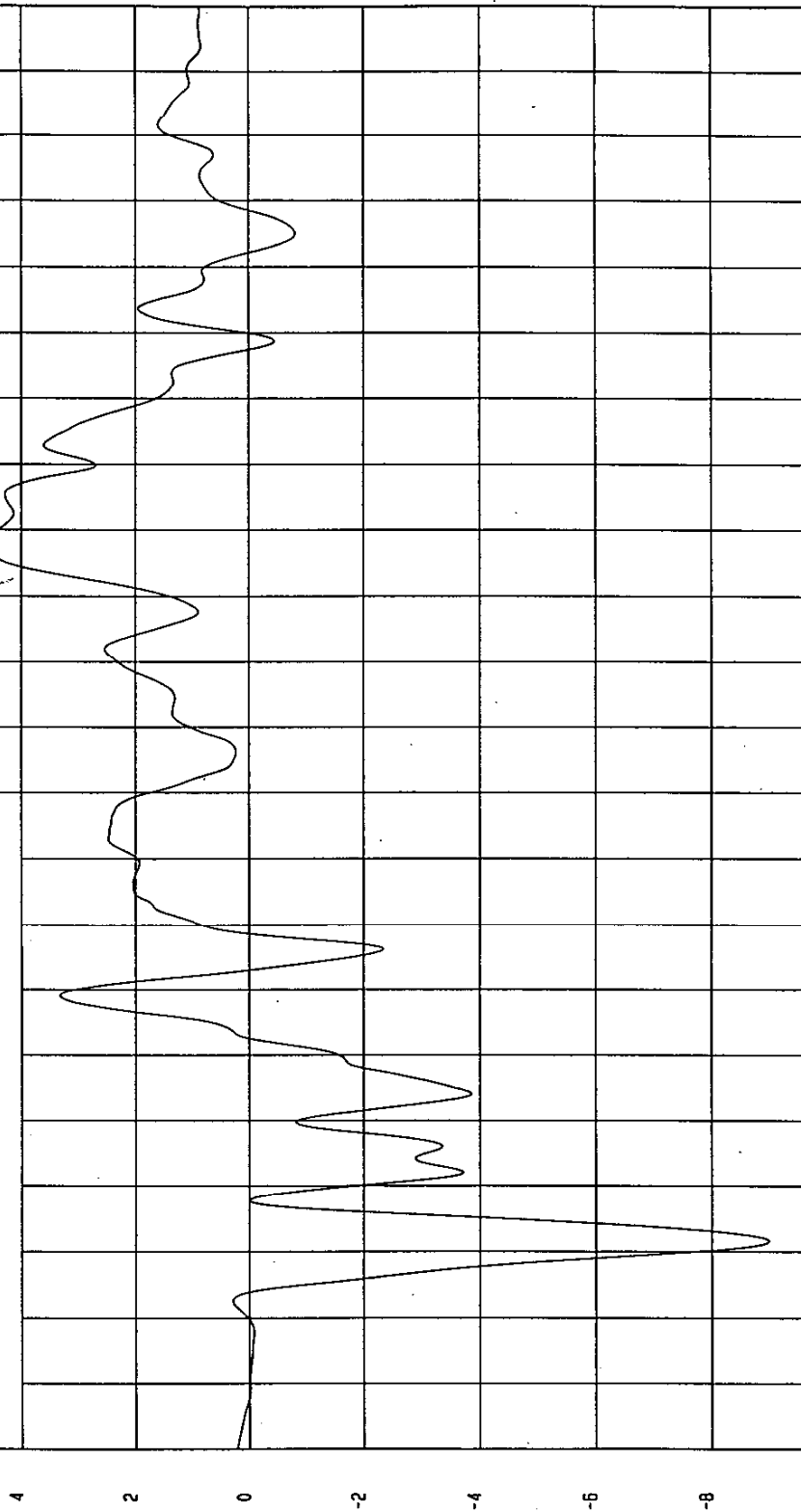
Speed: 38.3 MPH 61.6 KPH

Maximum = 4.47 G'S at 119 msec

Minimum = -8.98 G'S at 12 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION

1 899079AF.A34 Filterclass (60)



TIME (SECONDS)

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MO. Research
12-01-1999 16:16

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

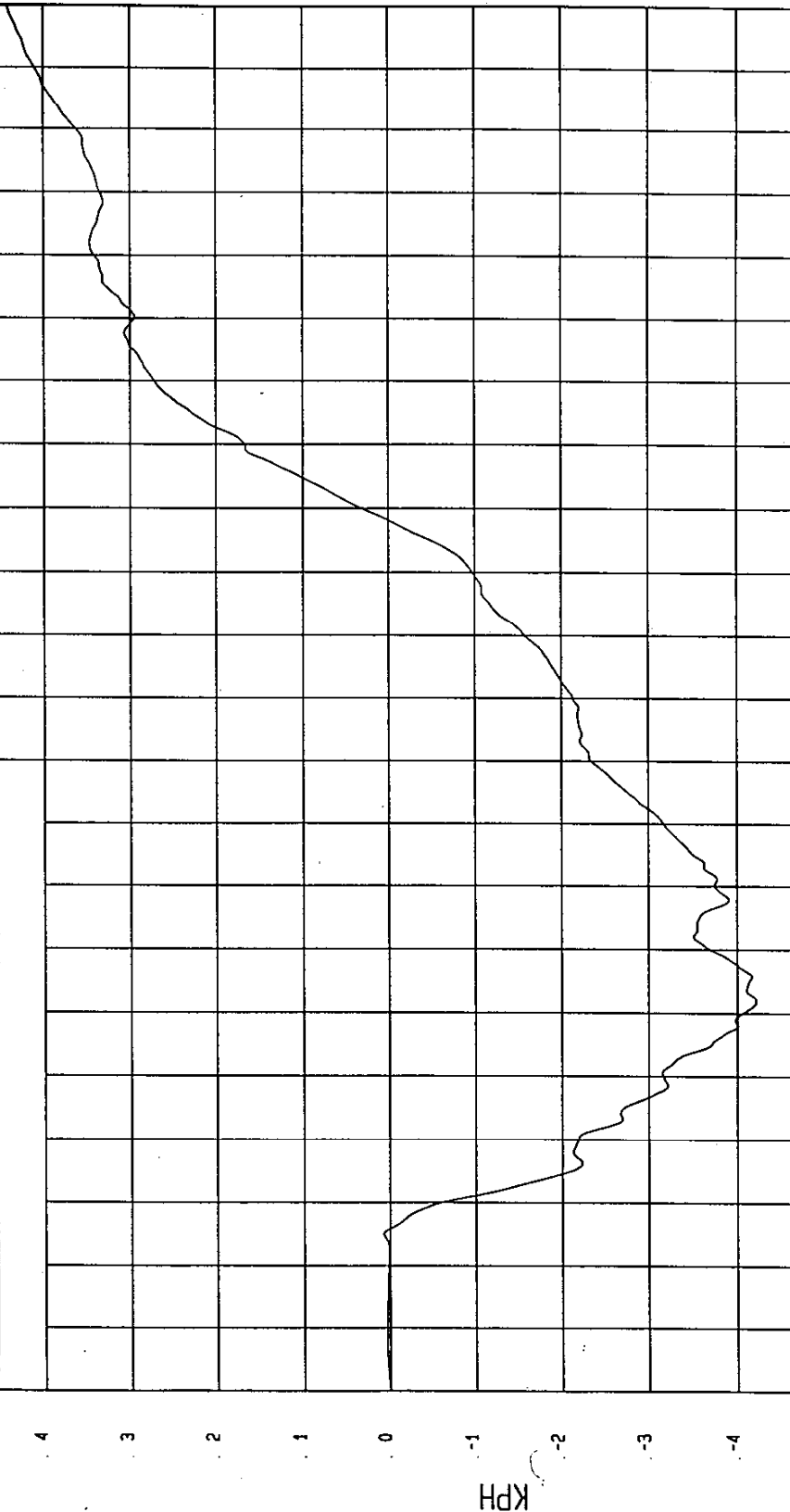
Speed: 38.3 MPH 61.6 KPH

Minimum = -4.21 KPH at 42 msec

Maximum = 4.42 KPH at 200 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY

1 _____ B99079A1.V34 Filterclass (180)

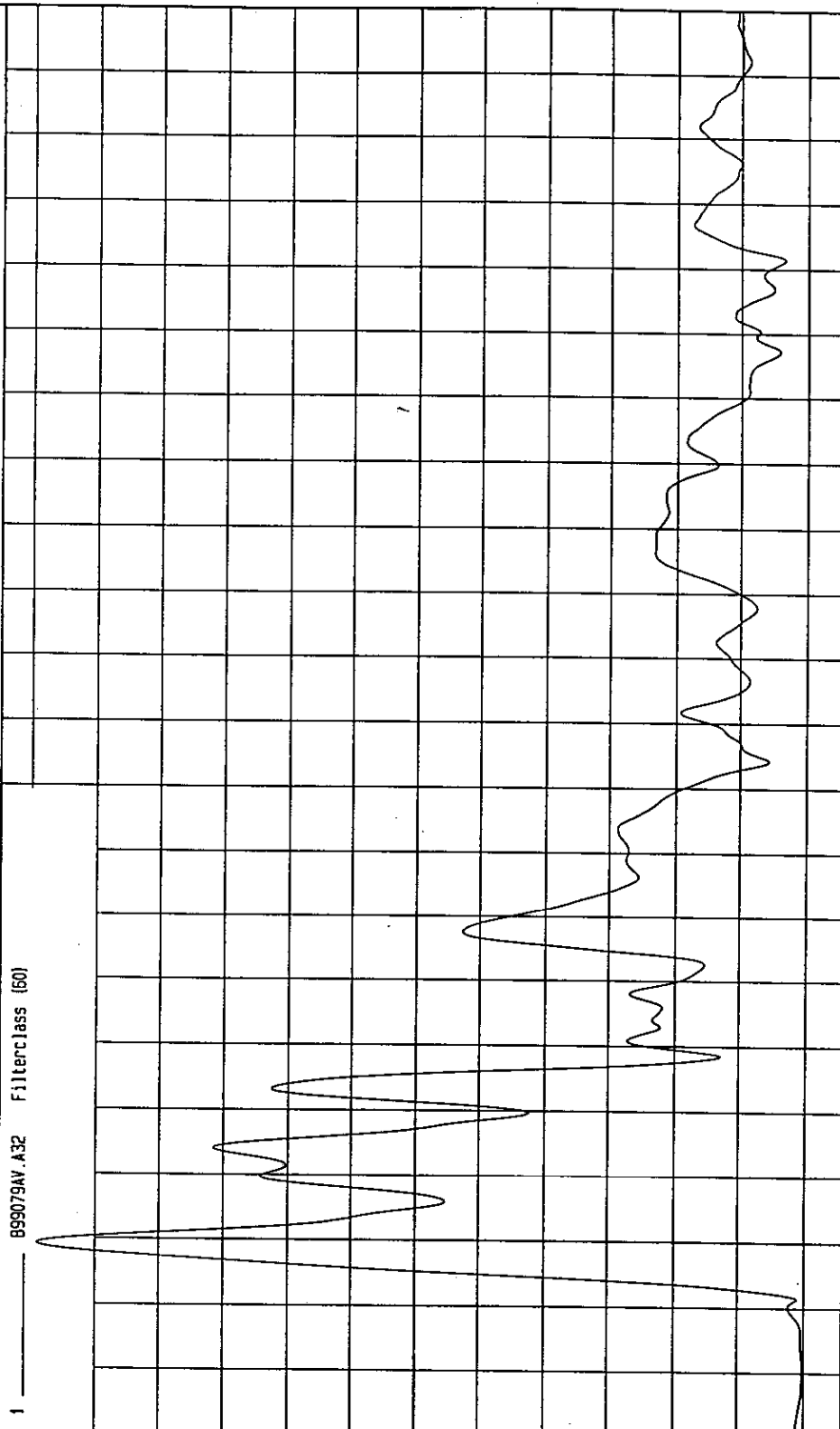


NSA Research
12-0-1999 16:16

TIME Seconds

TEST: NCAP SIDE IMPACT
TEST DATE: 12-07-1999
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH
Minimum = 4.02E-02 G'S at -9 msec
Maximum = 23.79 G'S at 9 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



TIME (SECONDS)

MOA Research
12-07-1999 16:16

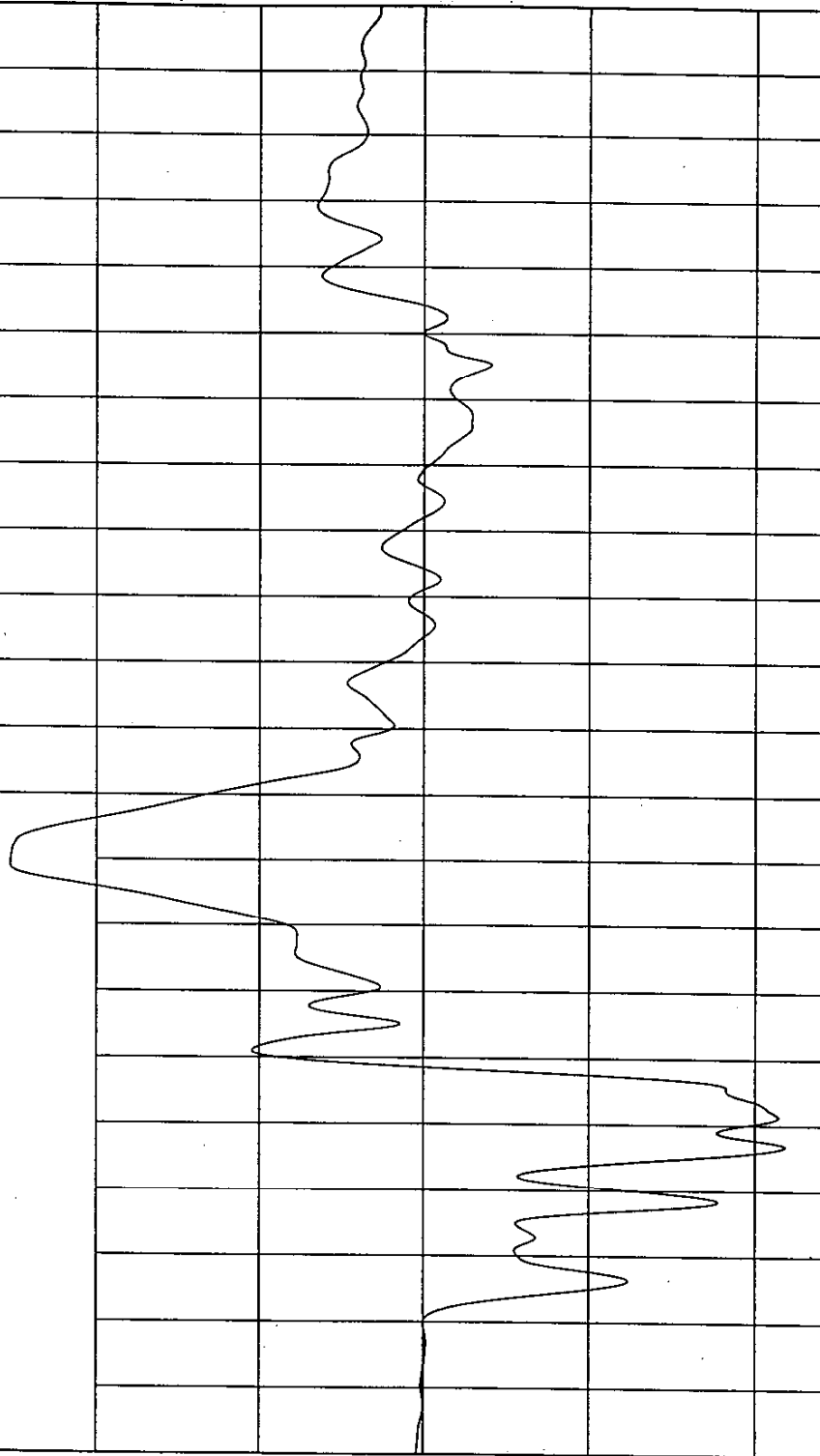
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -4.36 G'S at 27 msec Maximum = 5.04 G'S at 69 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION

1 _____ B99079AF.A35 Filterclass (60)



TIME (SECONDS)

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MOA Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

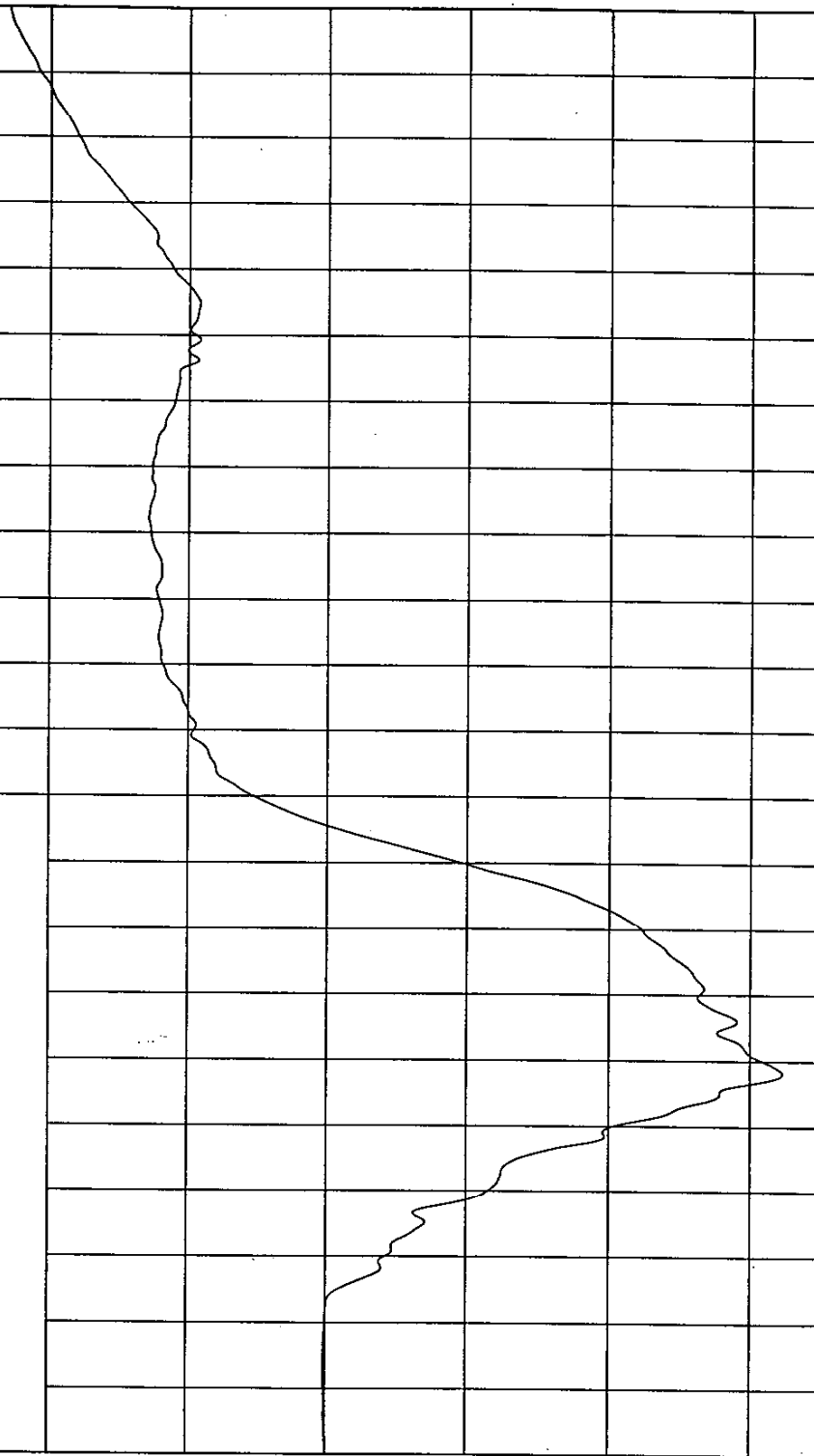
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 2.29 KPH at 200 msec

Minimum = -3.23 KPH at 38 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY

1 ——— B99079A1.V35 Filterclass (160)



NSA Research
12-07-1999 16:16

TIME Seconds

KPH

TEST: NCAP SIDE IMPACT

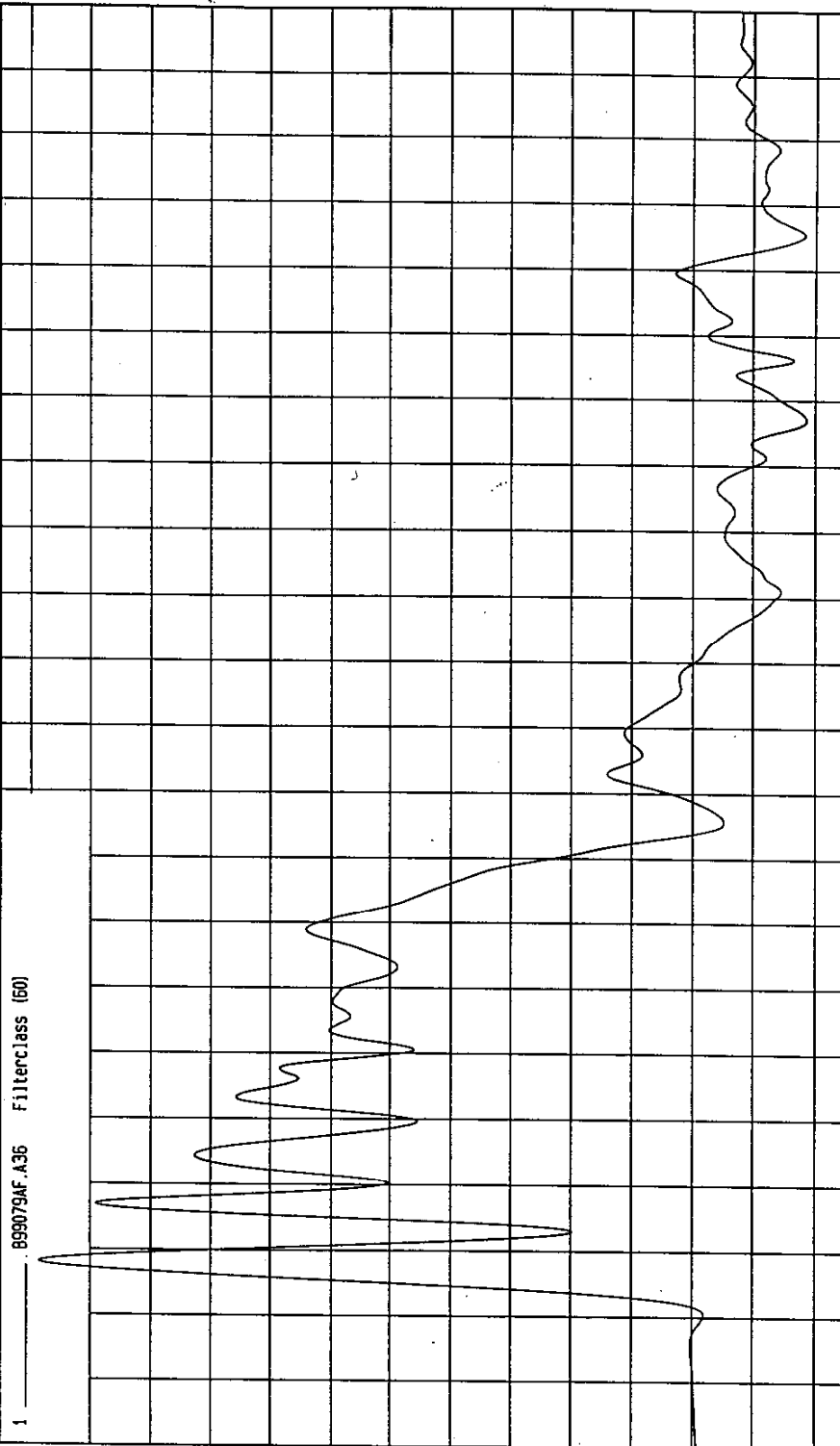
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.73 G'S at 137 msec Maximum = 21.73 G'S at 8 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION

1 899079AF.A35 Filterclass (50)



MSA Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

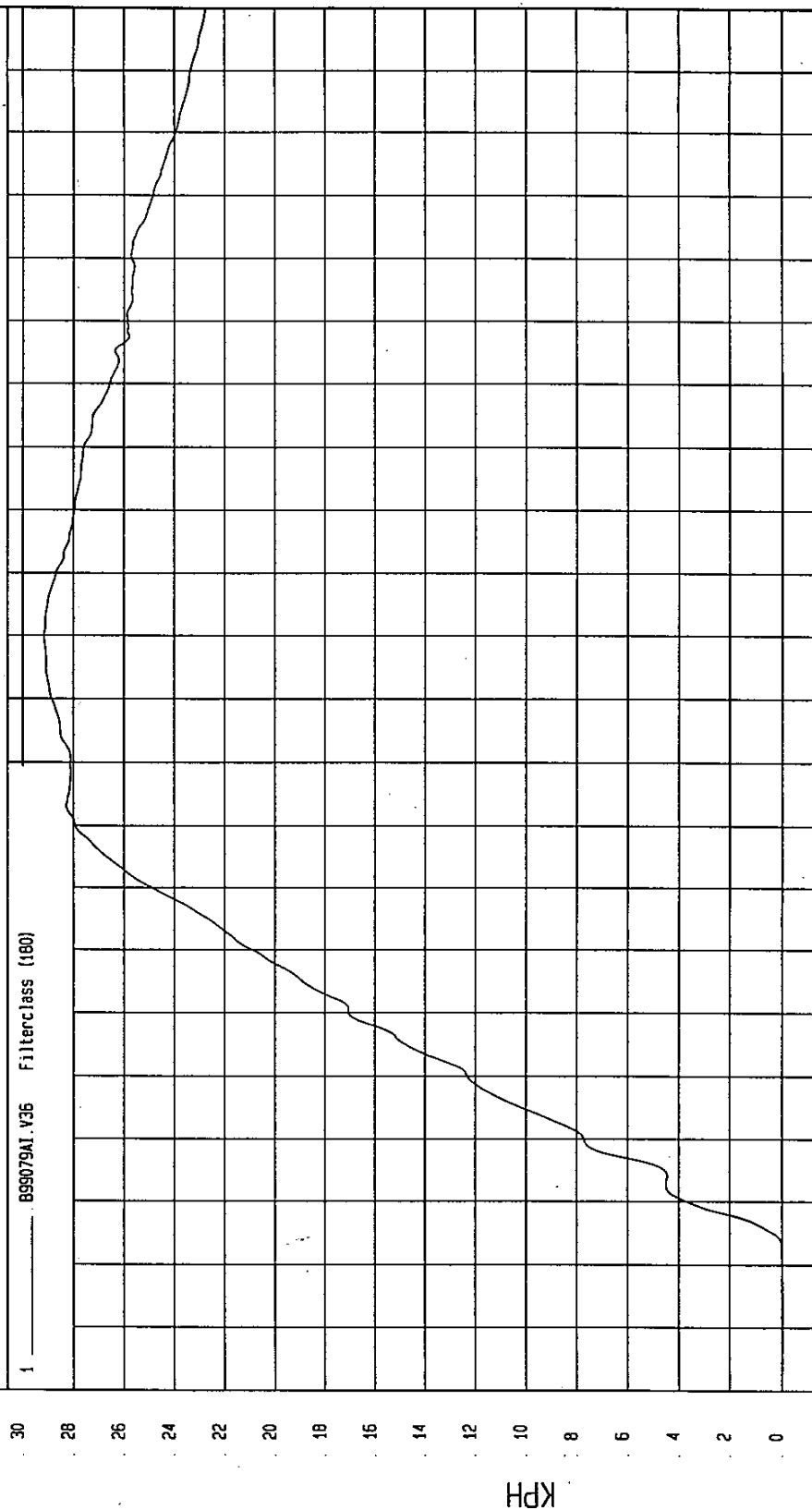
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.95E-02 KPH at -7 msec Maximum = 29.15 KPH at 100 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY

1 B99079A1.V36 Filterclass (180)



WCA Research
12-07-1999 16:16

TIME Seconds

TEST: NCAP SIDE IMPACT

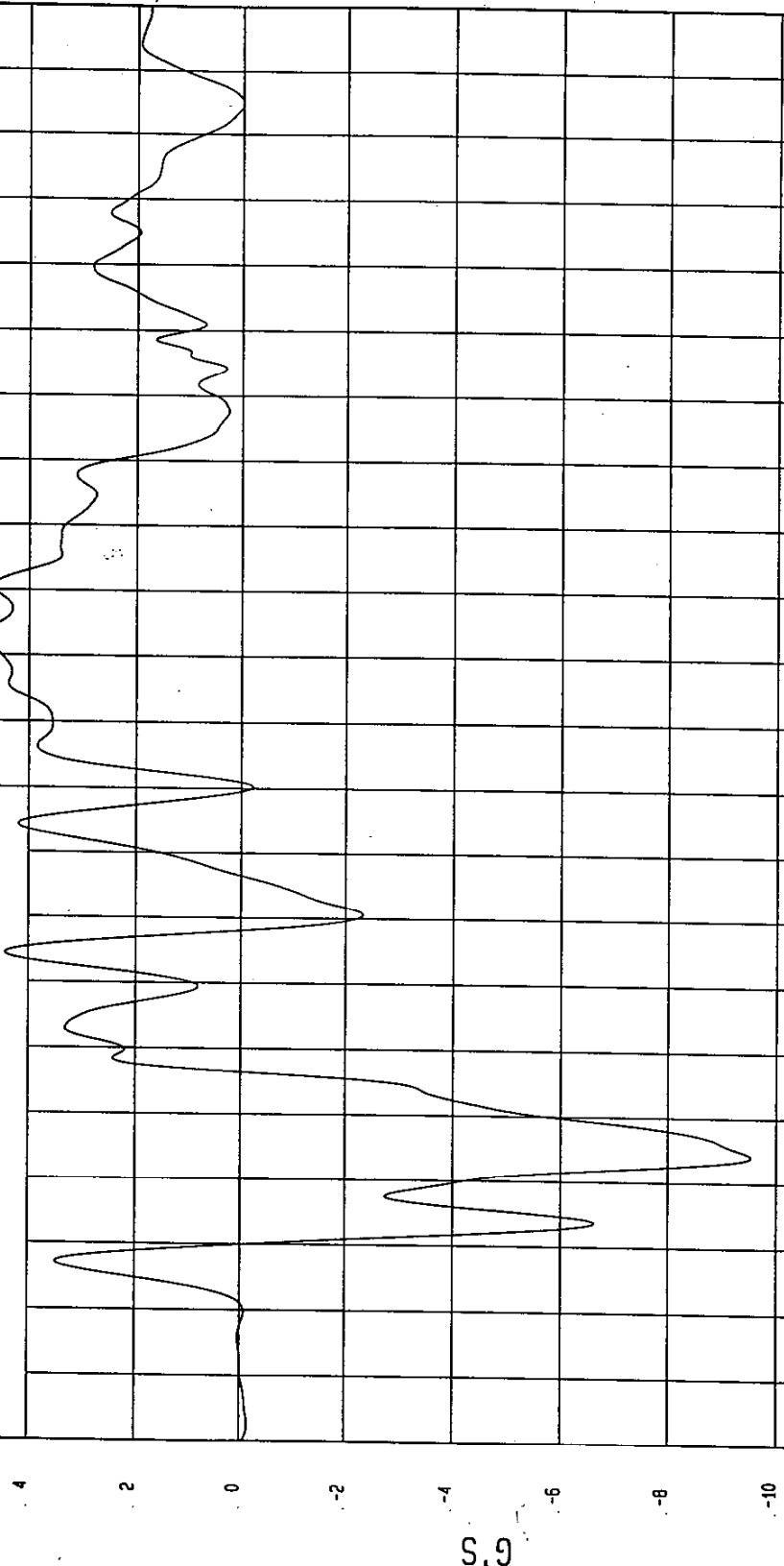
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.53 G'S at 24 msec Maximum = 4.84 G'S at 103 msec

RIGHT SIDE SILL AT REAR SEAT Z ACCELERATION

1 _____ 895079AF.A37 Filterclass (50)



MCA Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

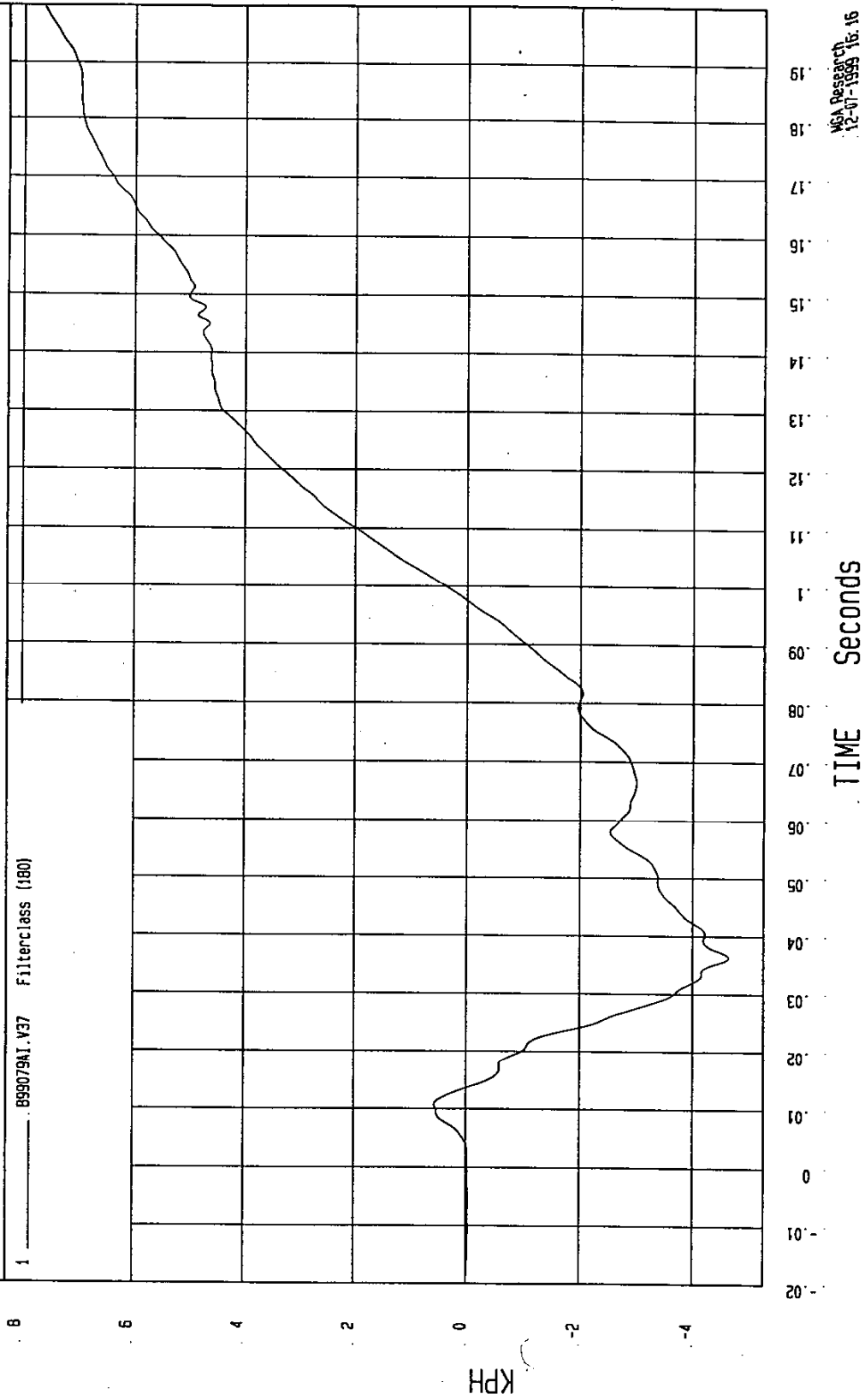
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -4.53 KPH at 35 msec

Maximum = 7.65 KPH at 200 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

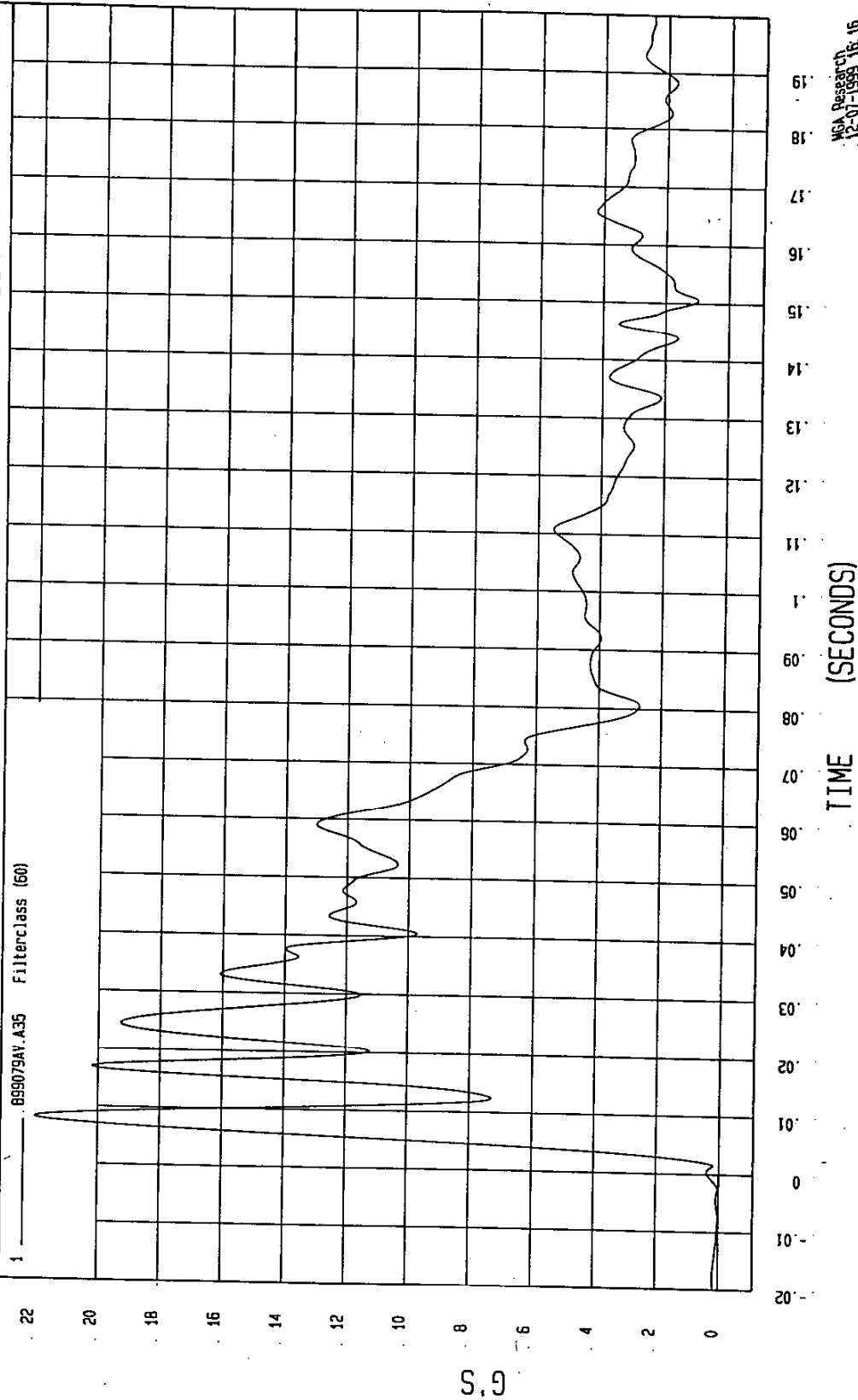


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = .01 G'S at -8 msec Maximum = 22.01 G'S at 8 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION

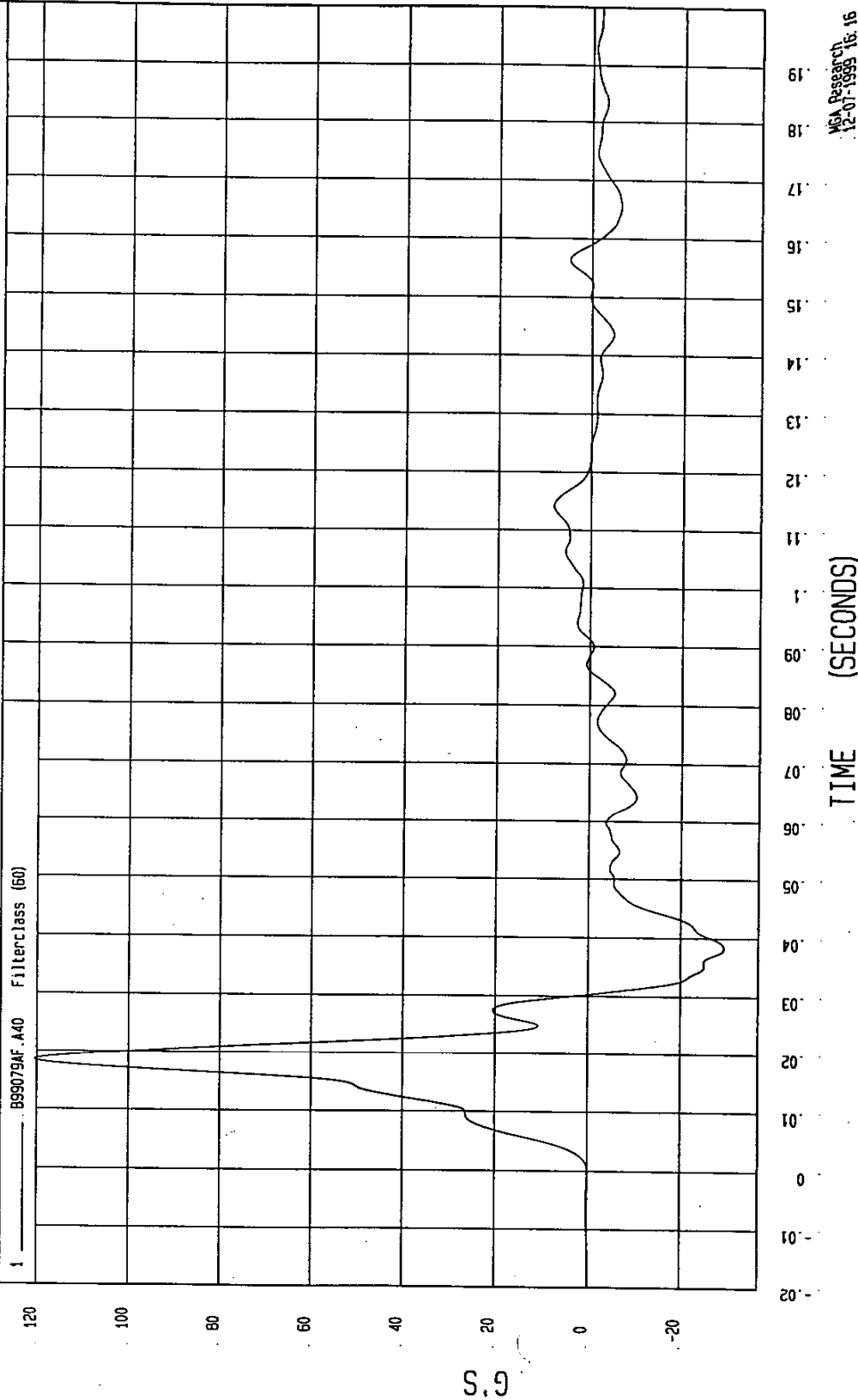


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -29.07 G'S at 38 msec Maximum = 120.53 G'S at 18 msec

DRIVER SEAT TRACK Y ACCELERATION



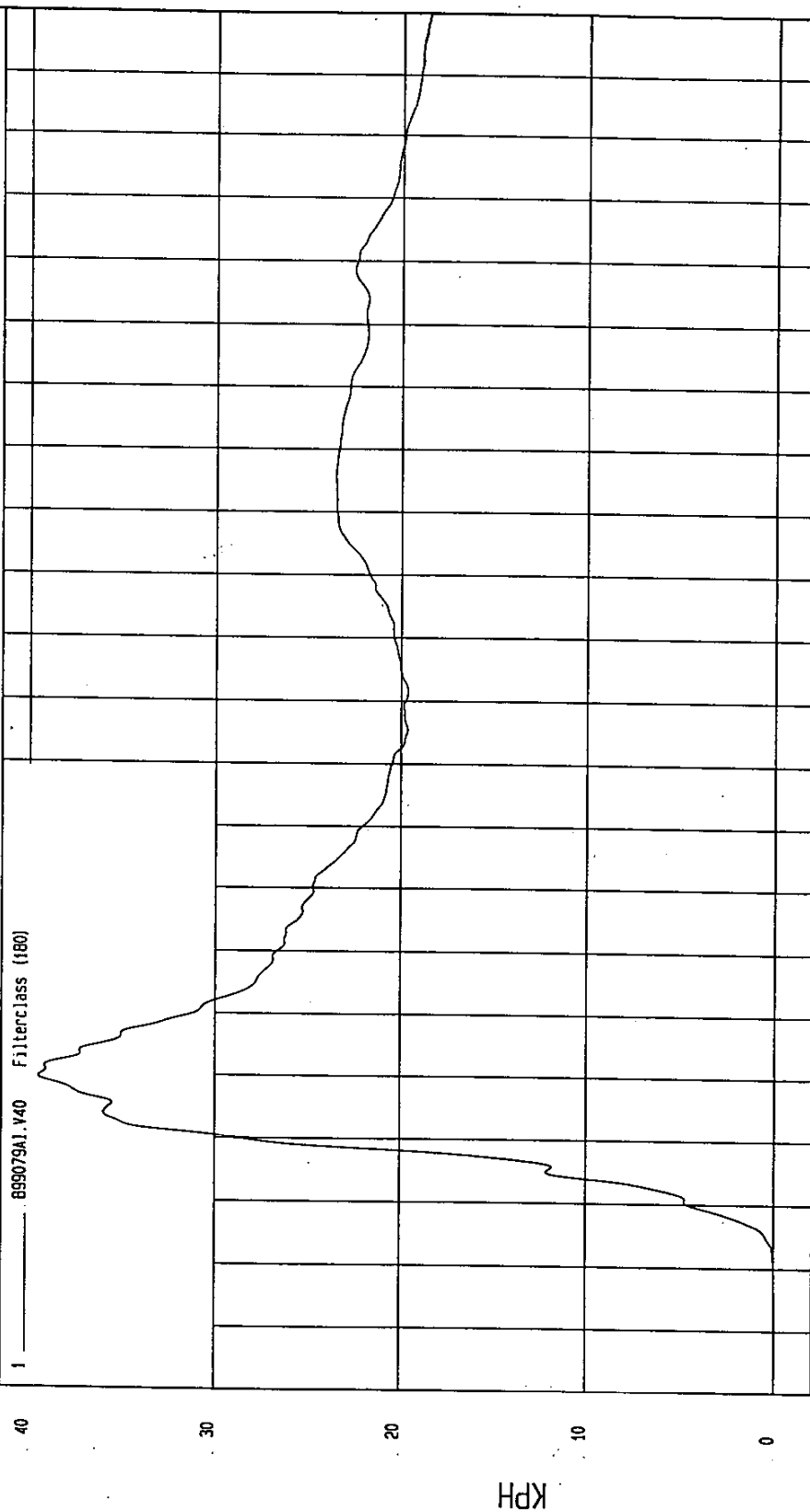
MGA Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -.05 KPH at -11 msec Maximum = 39.53 KPH at 30 msec

DRIVER SEAT TRACK Y VELOCITY



M&A Research
12-07-1999 16:16

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

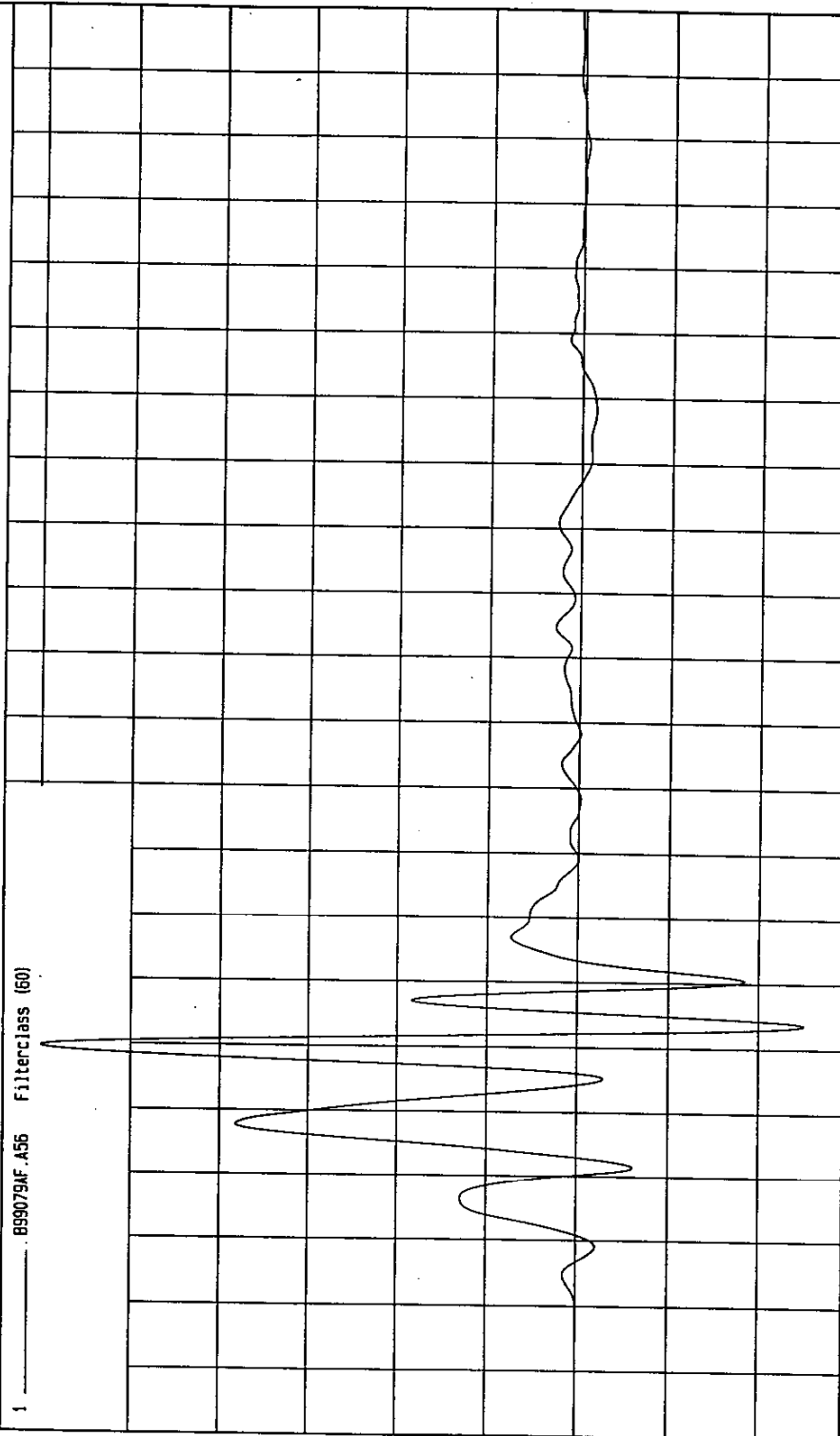
Speed: 38.3 MPH 61.6 KPH

Minimum = -49.98 G'S at 44 msec

Maximum = 119.91 G'S at 40 msec

REAR PASSENGER SEAT TRACK Y ACCELERATION

1 899079AF.A55 Filterclass (50)



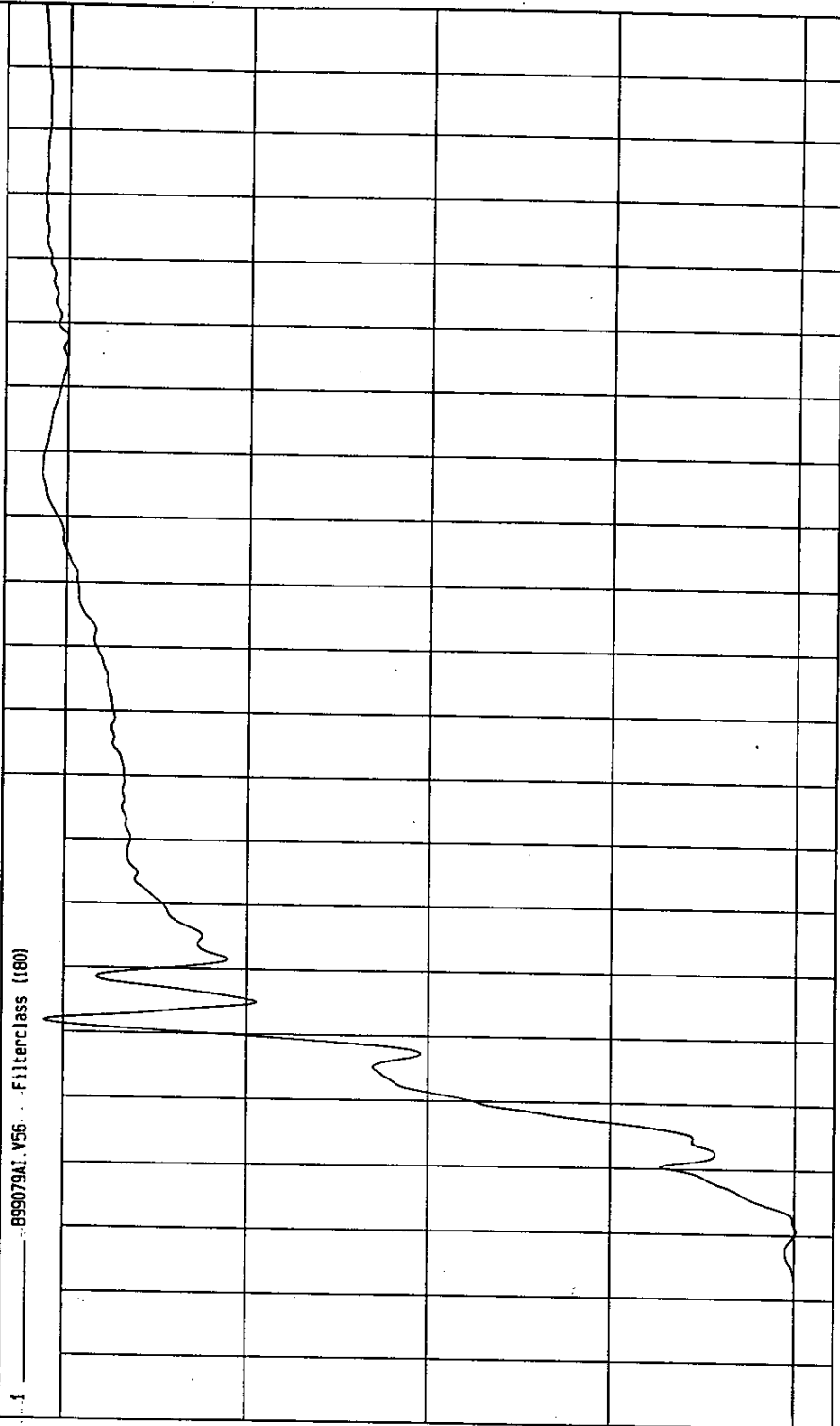
NSA Research
12-09-1999 12:10

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -11 KPH at 11 msec Maximum = 41.34 KPH at 127 msec

REAR PASSENGER SEAT TRACK Y VELOCITY



TIME Seconds

0.19
0.18
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0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02

40
30
20
10
0

KPH

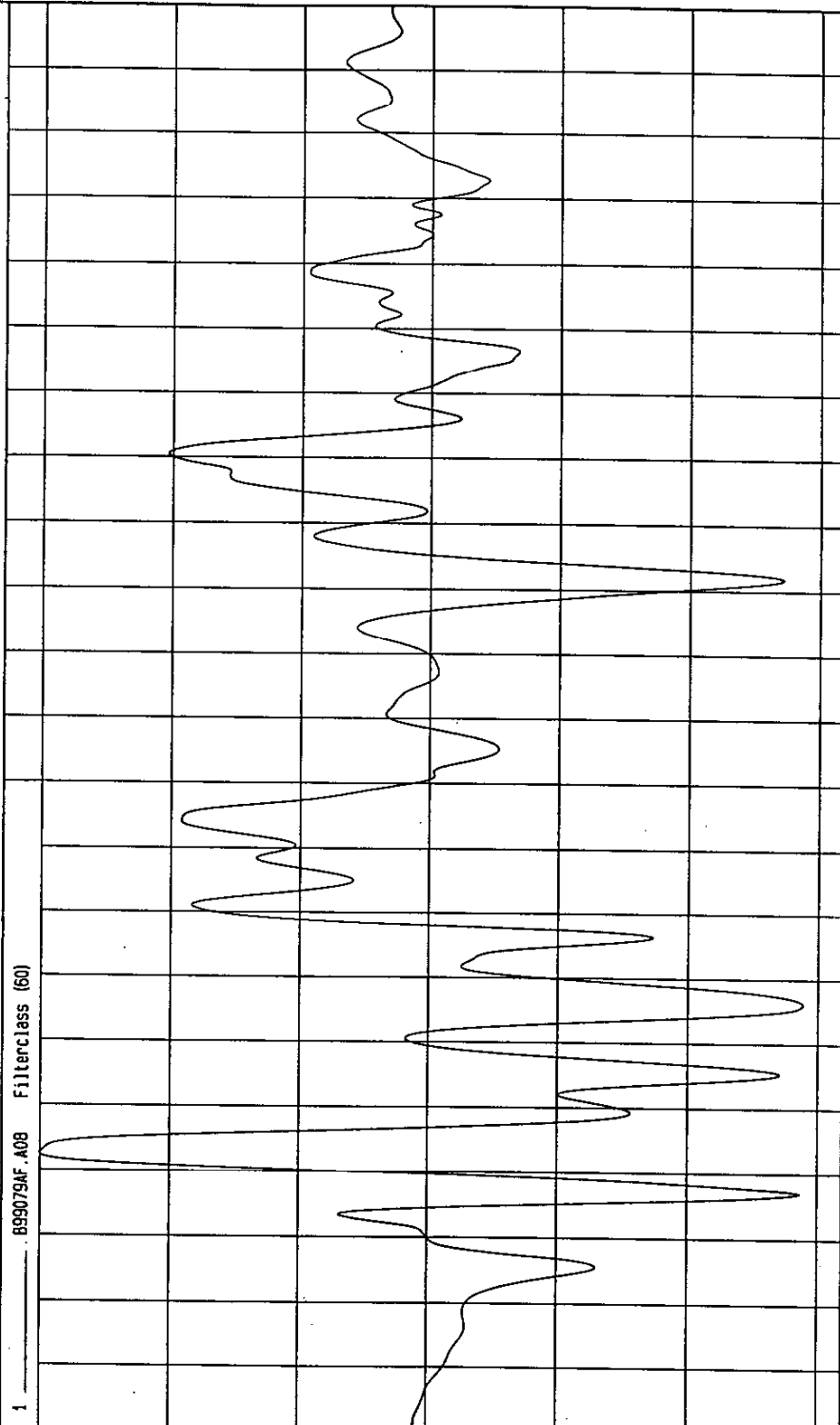
NSA Research
12-09-1999 12:10

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.89 G'S at 46 msec Maximum = 3 G'S at 23 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION



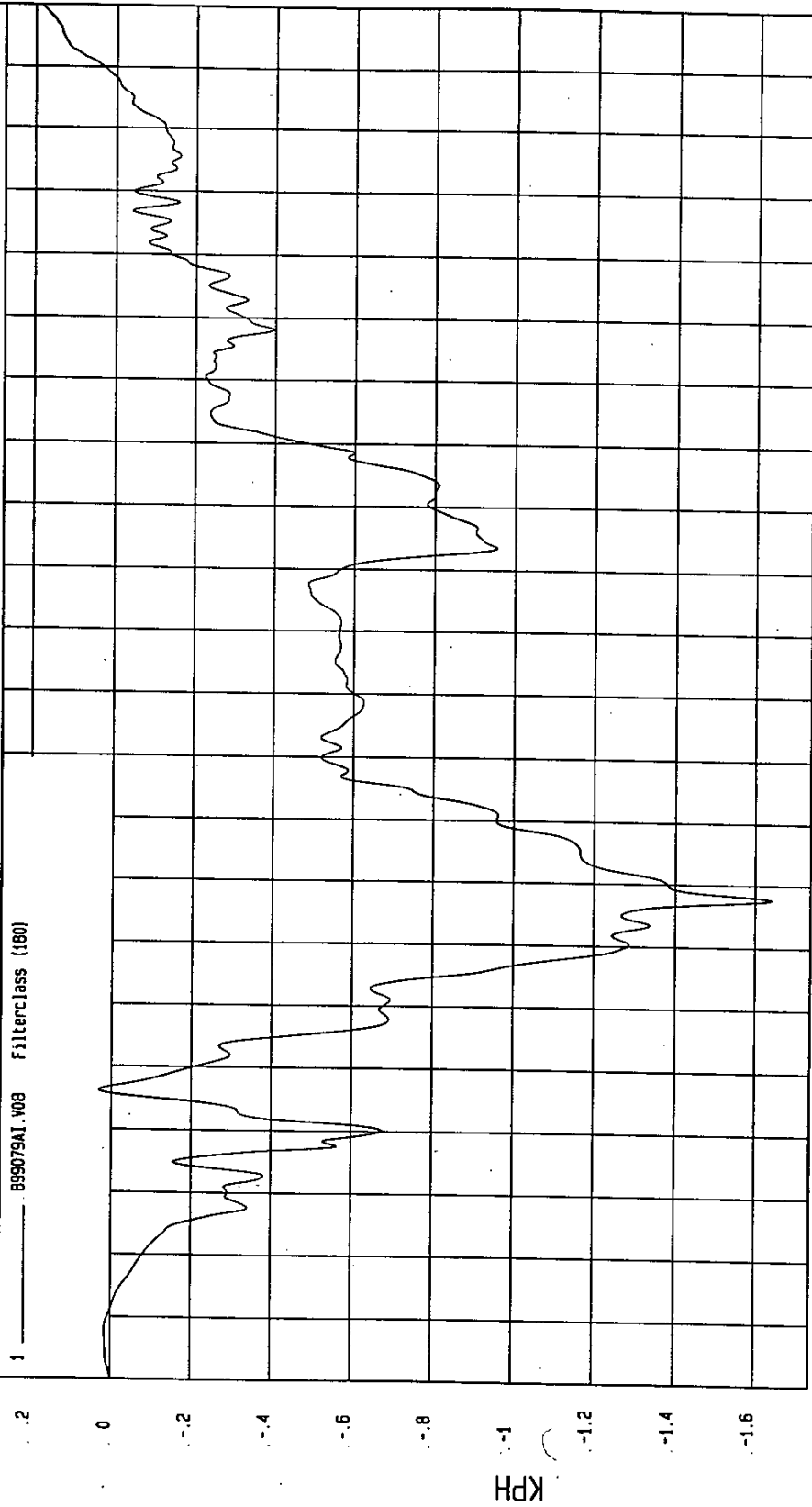
TIME (SECONDS)

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

NGA Research
12-07-1999 16:15

TEST: NCAP SIDE IMPACT
 TEST DATE: 12-07-1999
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -1.64 KPH at 58 msec
 Maximum = .18 KPH at 200 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY



TIME Seconds
 0.19
 0.18
 0.17
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 0.14
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 0.10
 0.09
 0.08
 0.07
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 0.05
 0.04
 0.03
 0.02
 0.01
 0
 -0.01
 -0.02

KPH
 0.2
 0
 -0.2
 -0.4
 -0.6
 -0.8
 -1
 -1.2
 -1.4
 -1.6

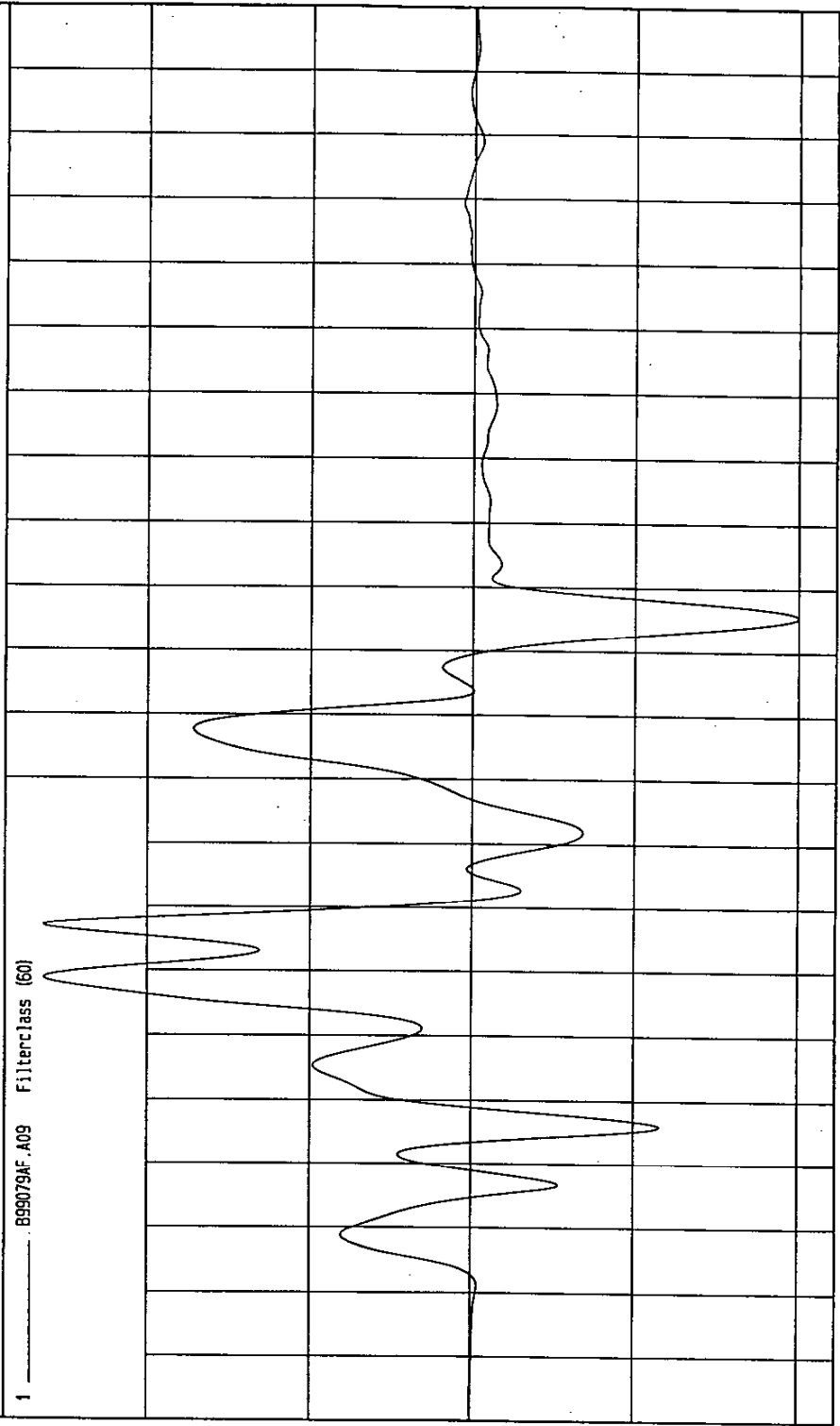
NGA Research
 12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -40.01 G'S at 106 msec Maximum = 52.52 G'S at 57 msec

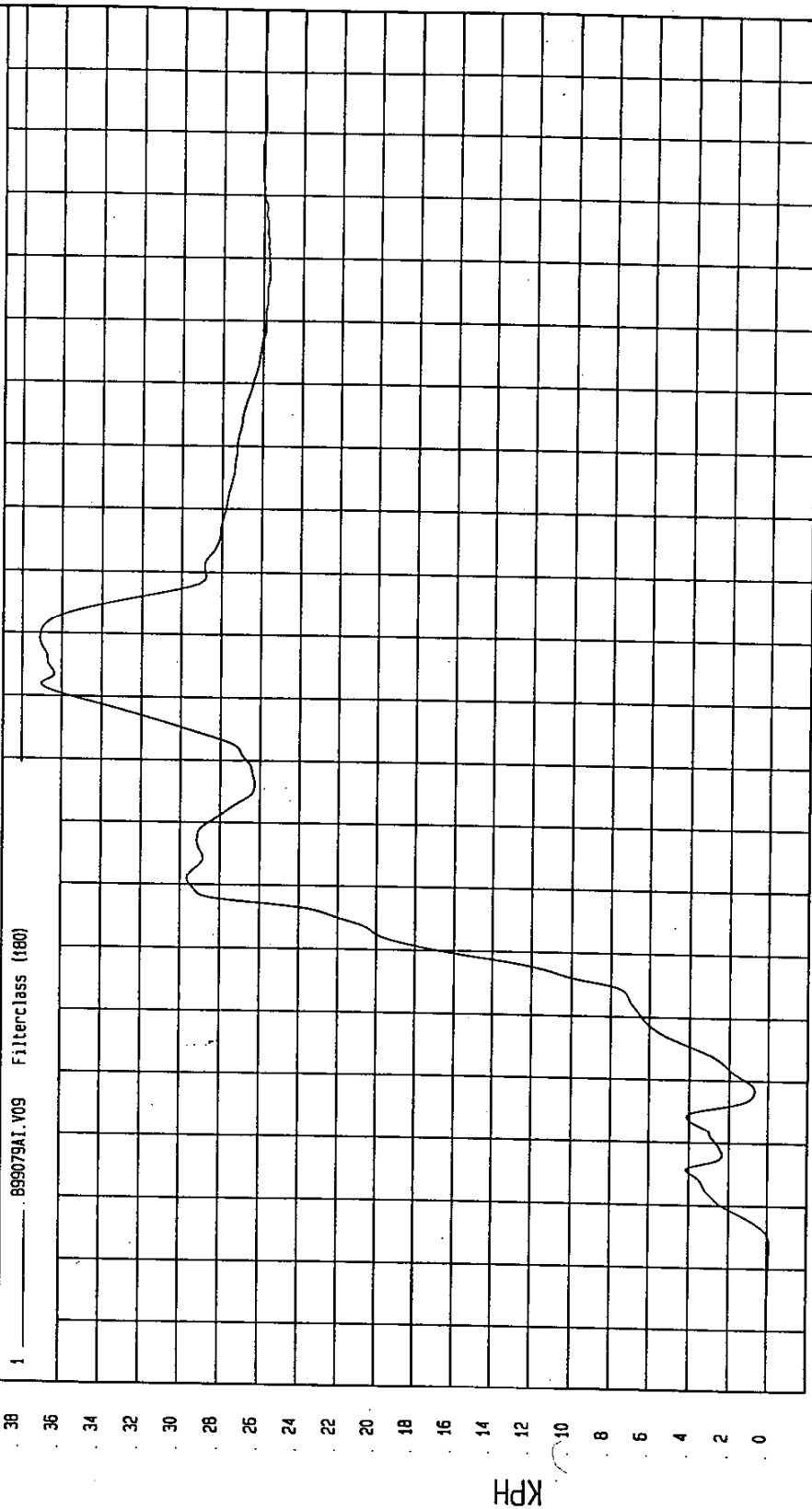
REAR FLOORPAN ABOVE AXLE Y ACCELERATION



MOA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT
 TEST DATE: 12-07-1999
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -.1 KPH at 4 msec
 Maximum = 37.11 KPH at 99 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY



WEA Research
 12-07-1999 18:17

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

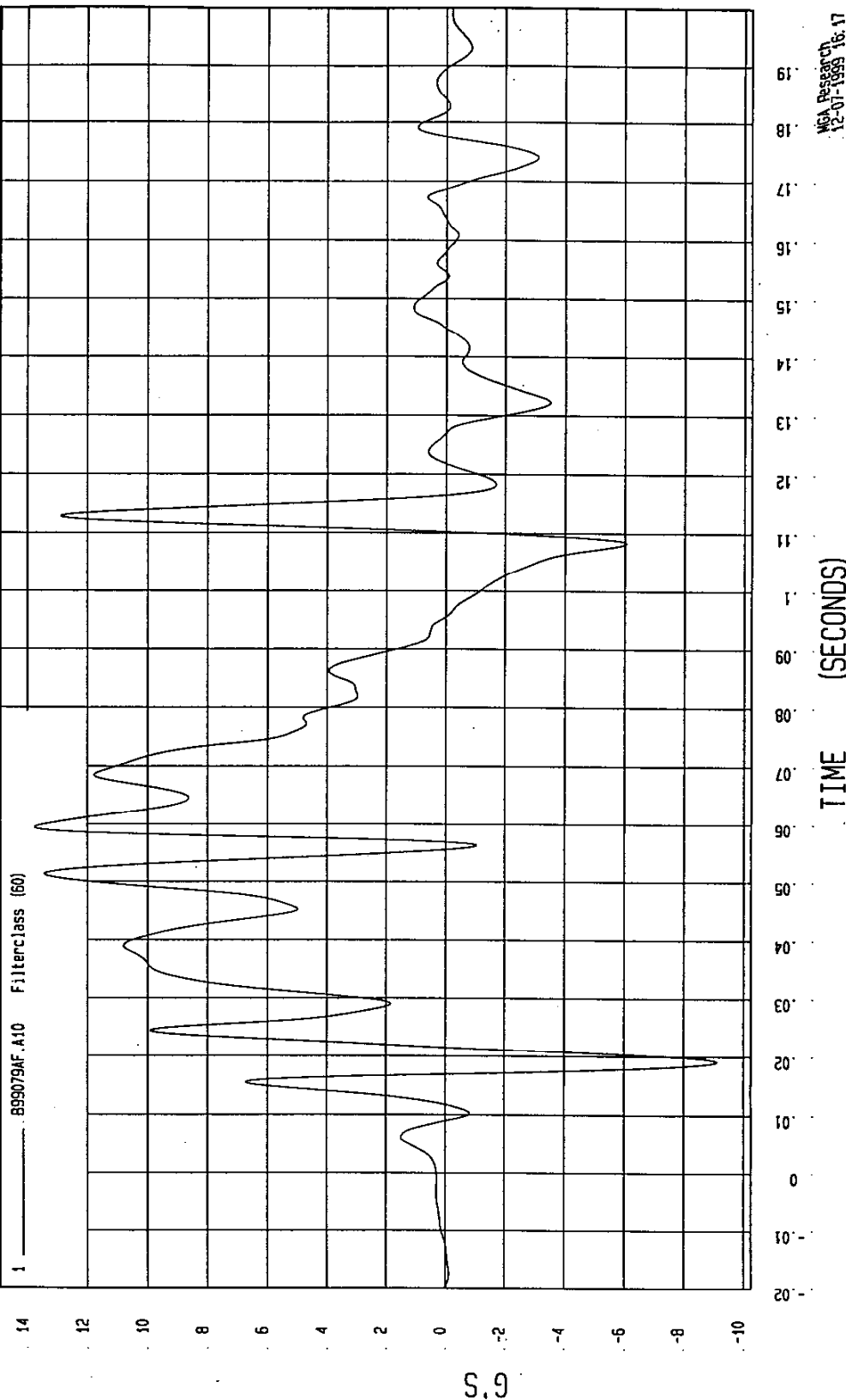
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 13.76 G'S at 59 msec

Minimum = -9.11 G'S at 19 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION

1 899079AF.A10 Filterclass (50)

MCA Research
12-07-1999 16:17

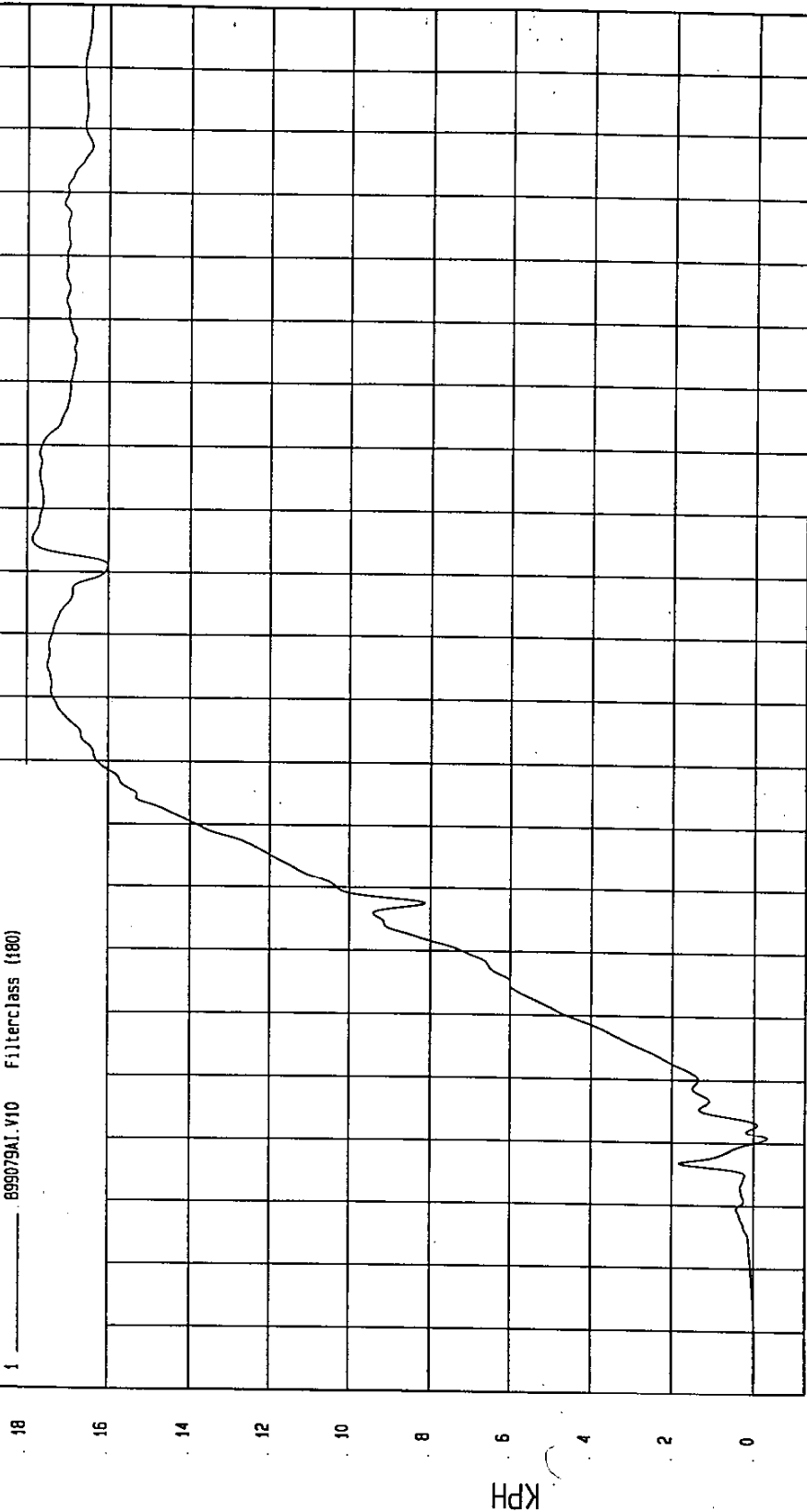
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -.33 KPH at 21 msec Maximum = 17.87 KPH at 115 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY

1 _____ B99079A1.V10 Filterclass (f80)

NCA Research
12-07-1999 18:17

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

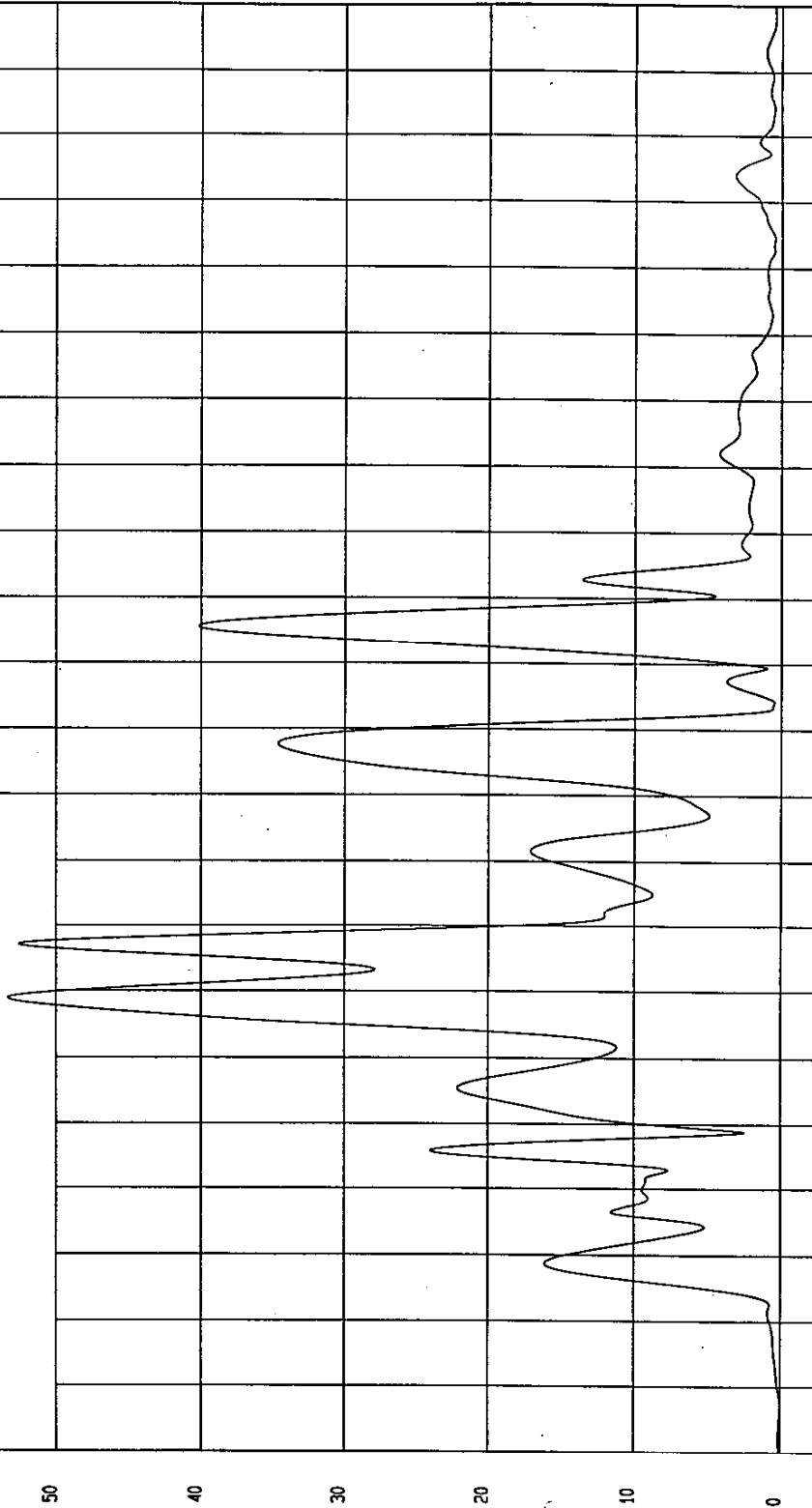
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 53.27 G'S at 49 msec

Minimum = 2.32E-02 G'S at -13 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 _____ B99079AV.A08 Filterclass (60)



NSA Research
12-07-1999 16:17

TIME (SECONDS)

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

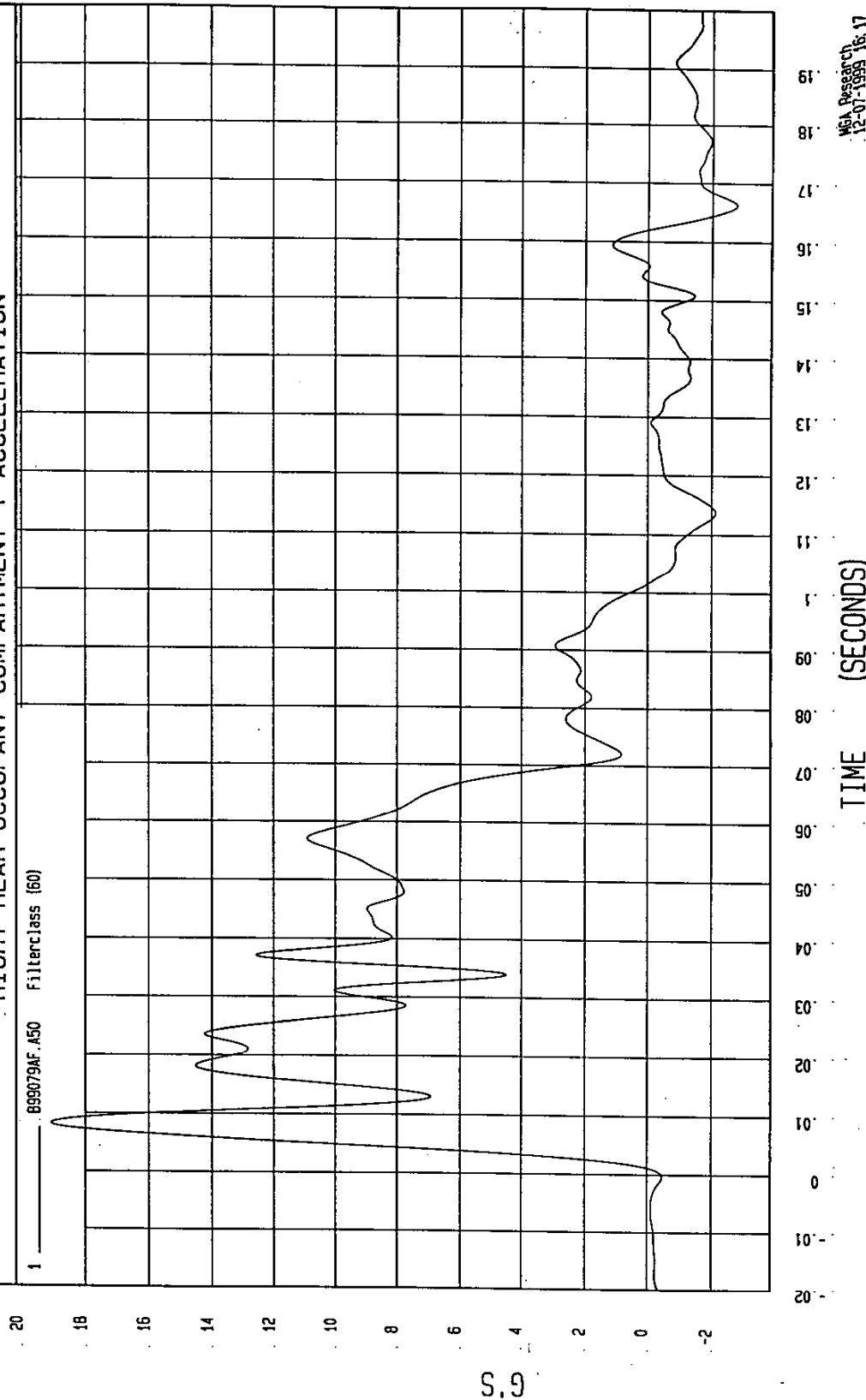
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 19.08 G'S at 8 msec

Minimum = -2.78 G'S at 166 msec

RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION

1 899079AF.A50 Filterclass (60)



MSA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

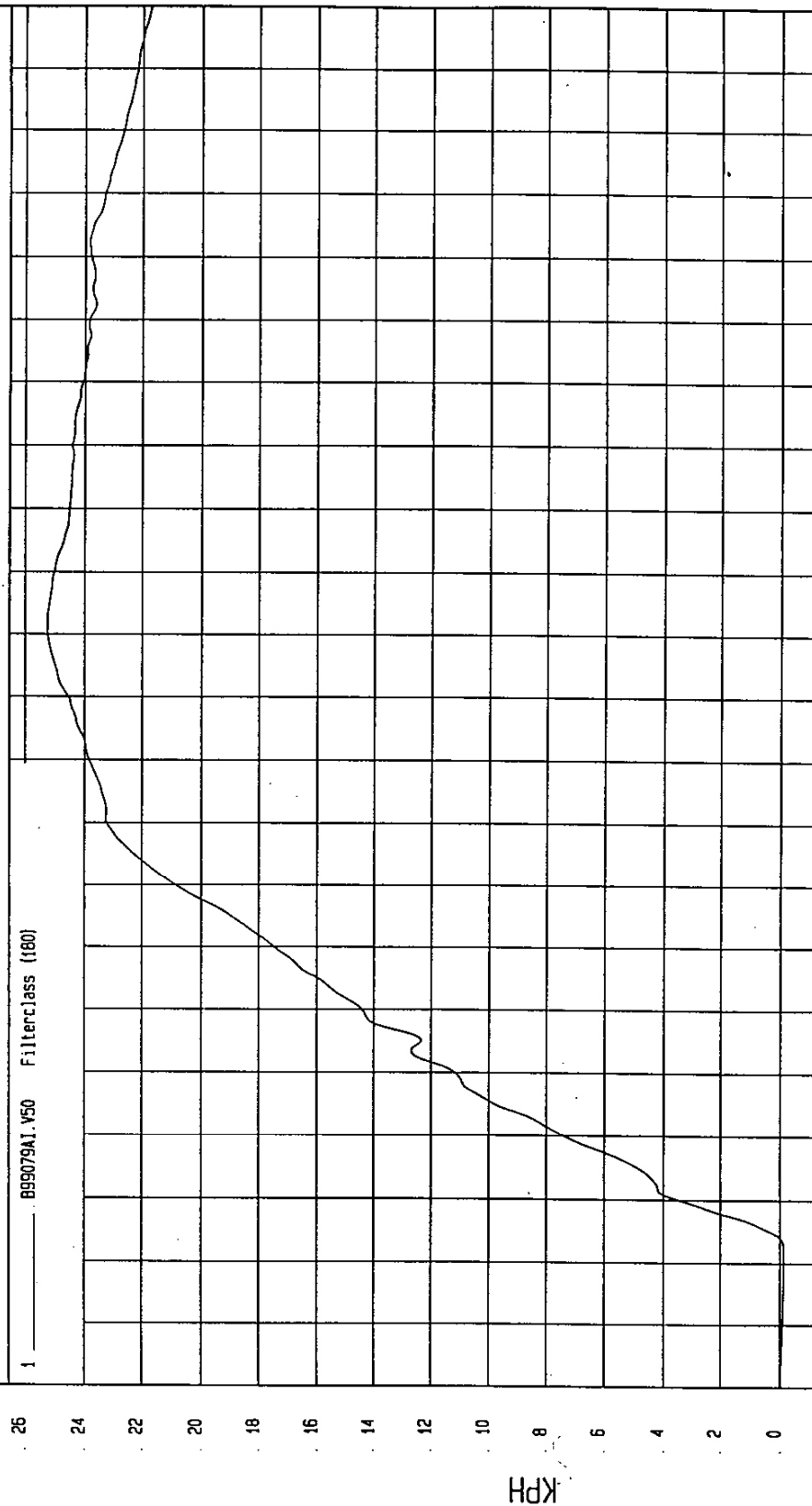
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Minimum = -.12 KPH at 1 msec

Maximum = 25.26 KPH at 101 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY

1 B99079A1.V50 Filterclass (180)

NSA Research
12-07-1999 16:17

TIME Seconds

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

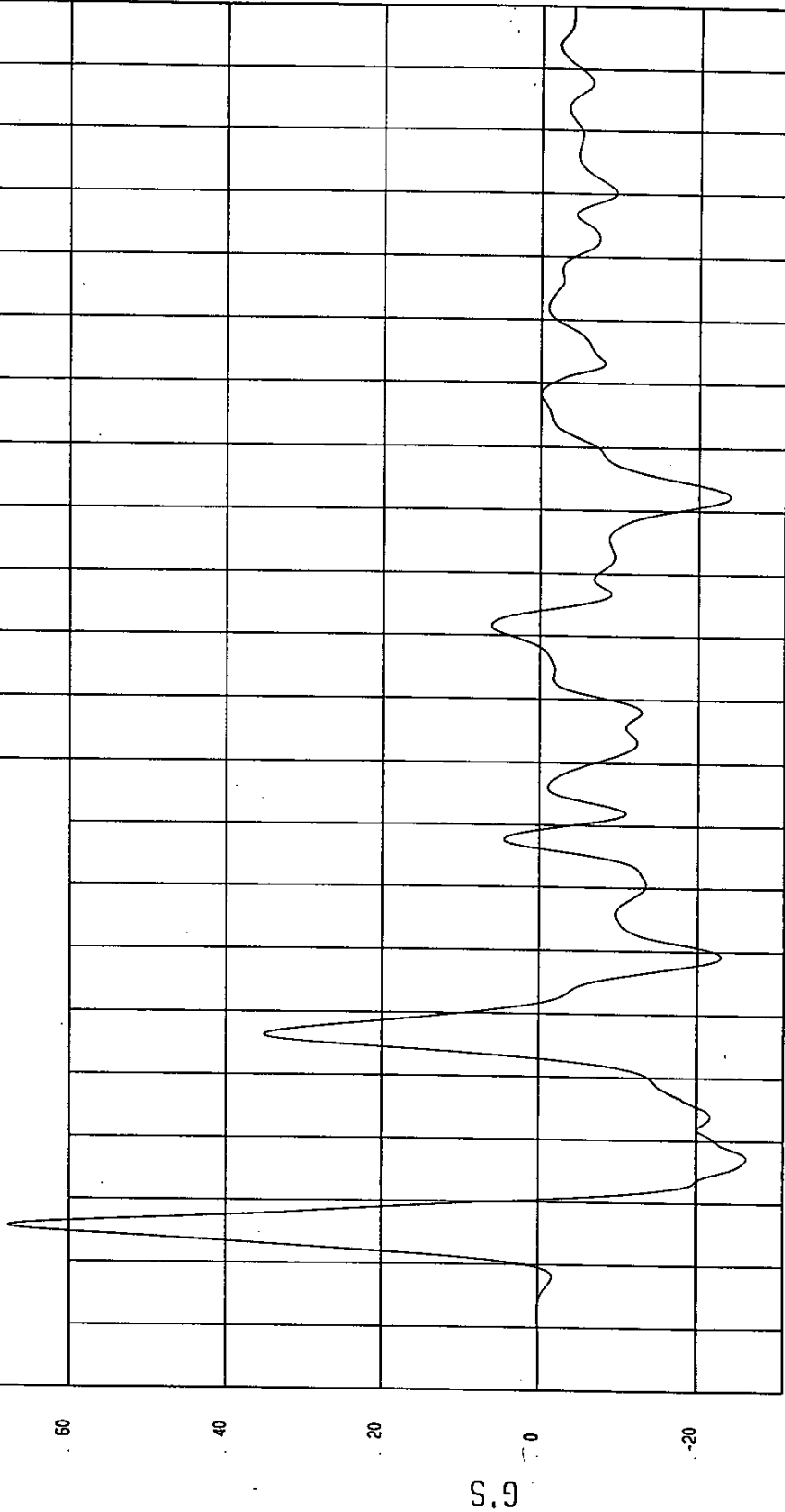
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -26.29 G'S at 17 msec

Maximum = 67.71 G'S at 6 msec

LEFT LOWER A-POST Y ACCELERATION

1 B99079AF.A20 Filterclass (50)



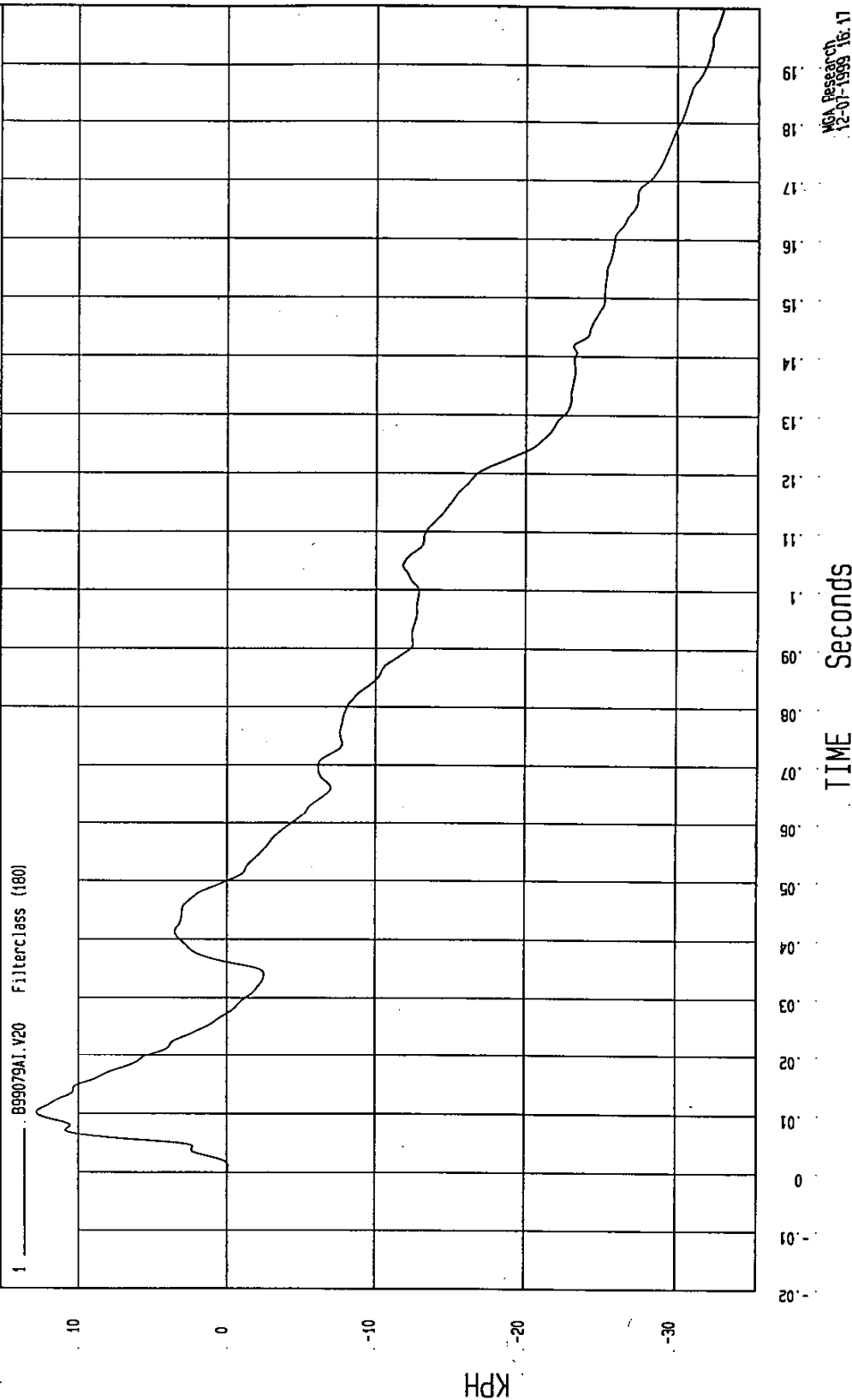
NSA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -33.04 KPH at 200 msec Maximum = 12.81 KPH at 10 msec

LEFT LOWER A-POST Y VELOCITY

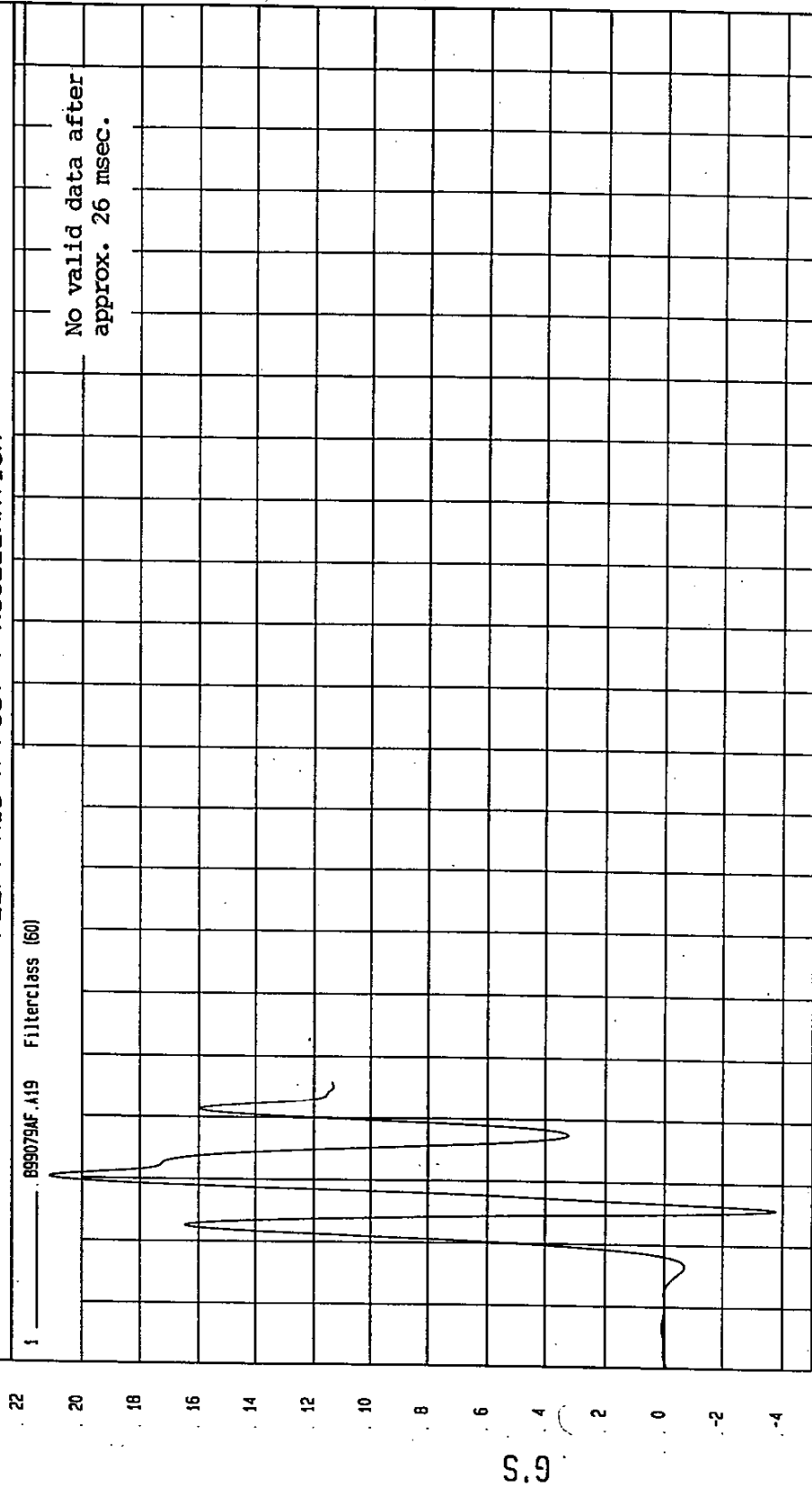
MCA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.79 G'S at 6 msec Maximum = 21.12 G'S at 10 msec

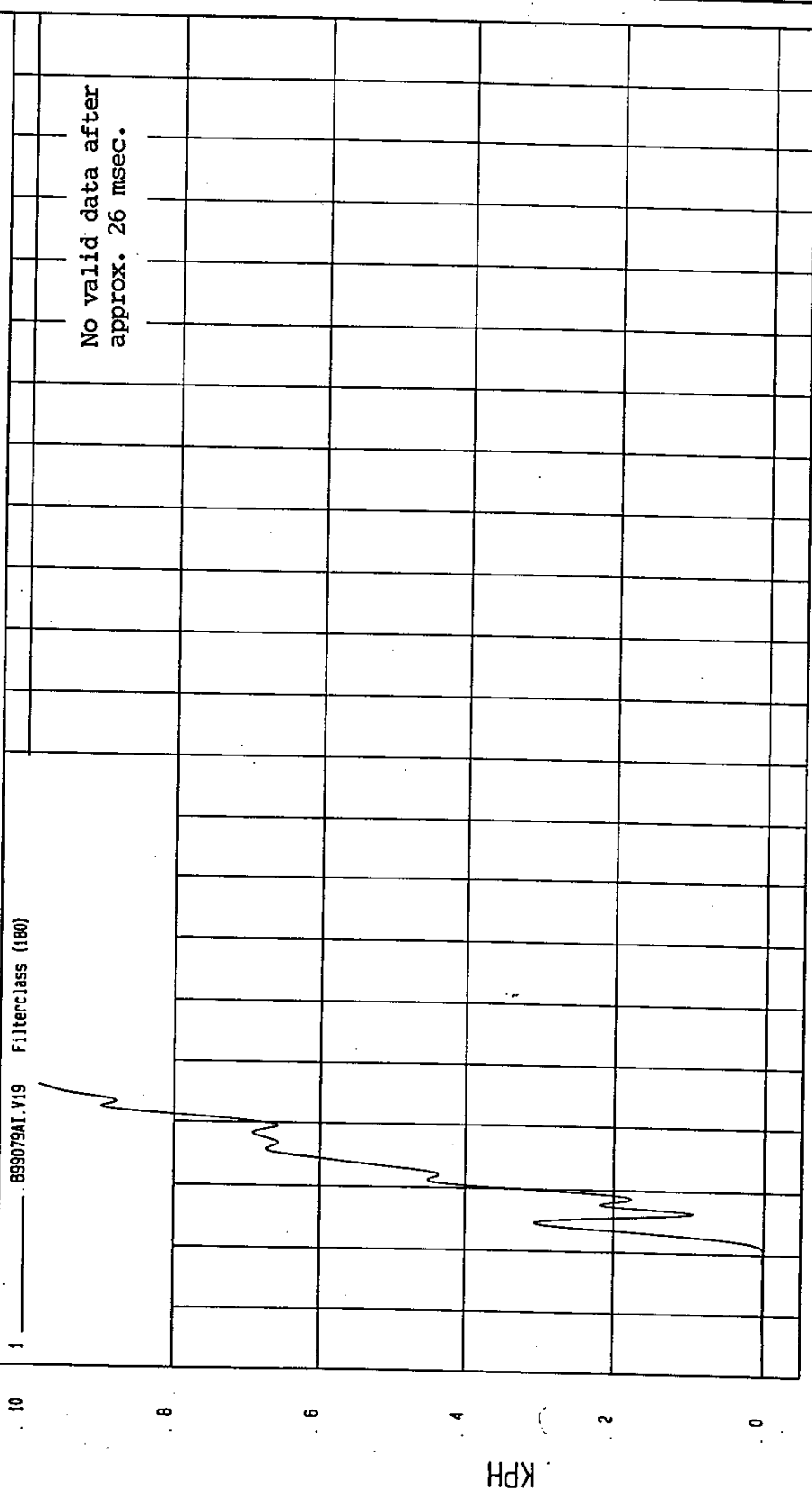
LEFT MID A-POST Y ACCELERATION



NSA Research
12-07-1999 16:52

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 TEST DATE: 12-07-1999
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -3.35E-03 KPH at -19 msec
 Maximum = 9.85 KPH at 26 msec

LEFT MID A-POST Y VELOCITY

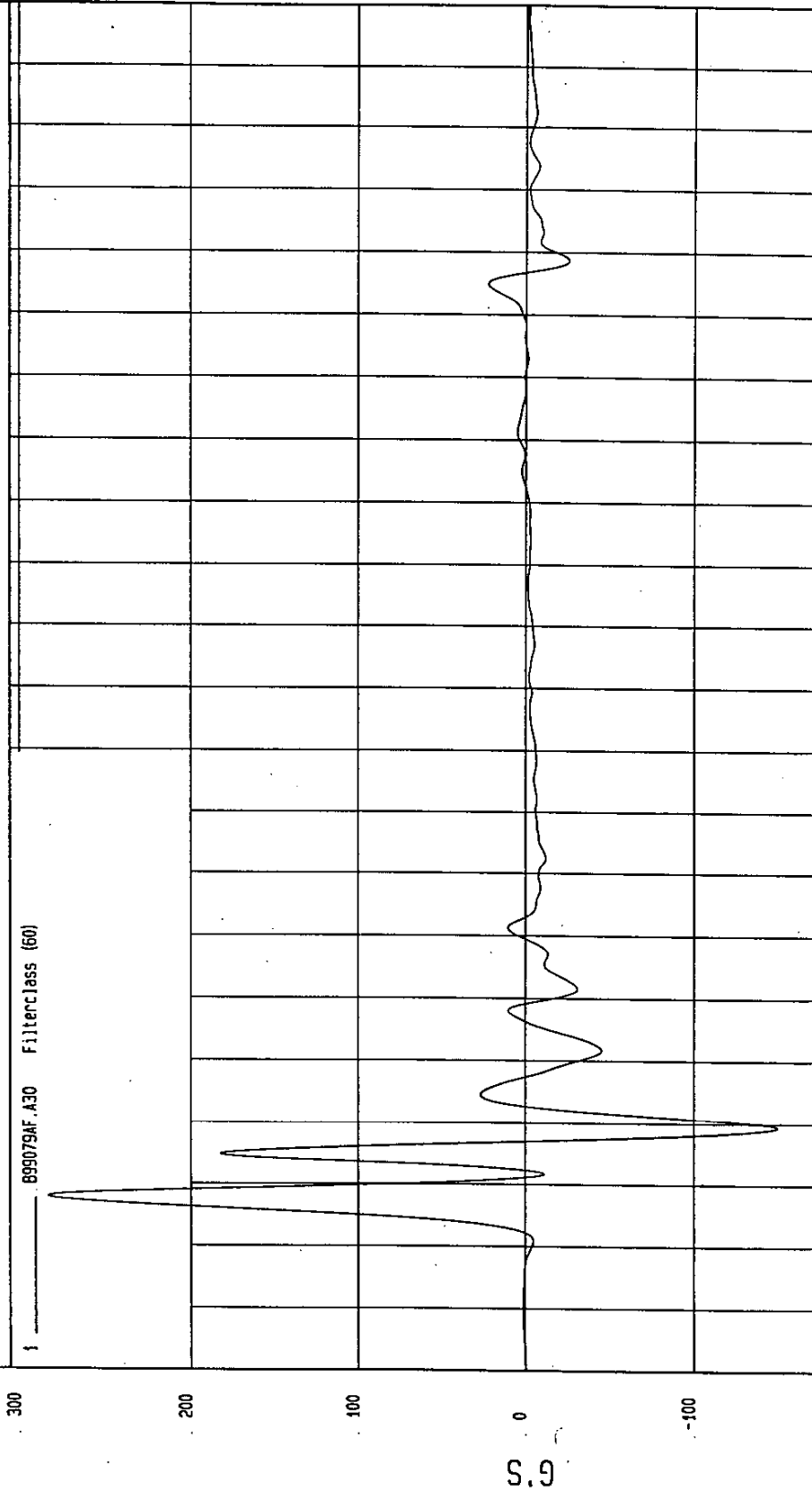


TIME Seconds
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WCA Research
 12-07-1999 16:52

TEST: NCAP SIDE IMPACT
 TEST DATE: 12-07-1999
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -149.18 G'S at 19 msec
 Maximum = 283.77 G'S at 8 msec

LEFT LOWER B-POST Y ACCELERATION



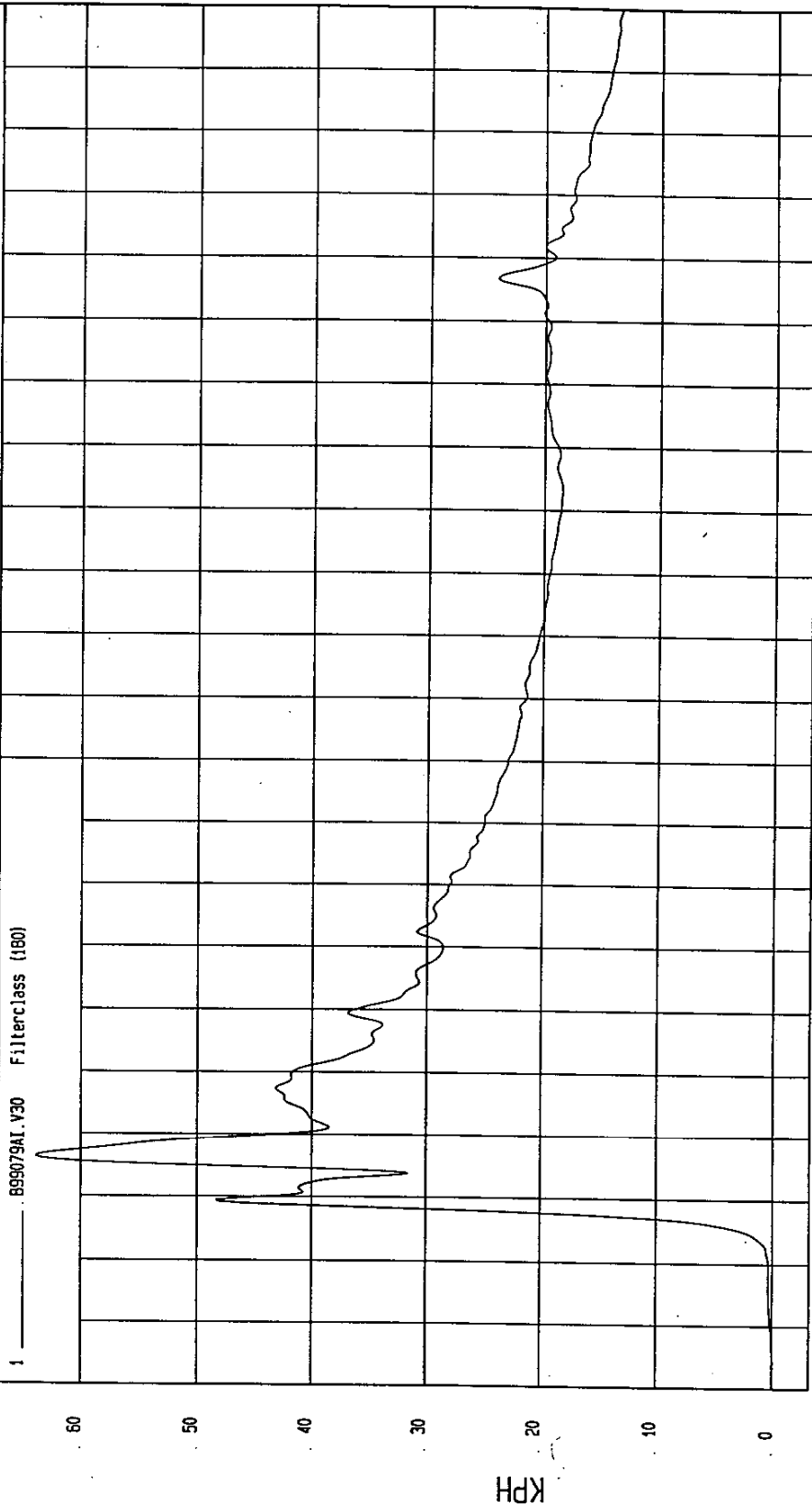
NSA Research
 12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.96E-02 KPH at -17 msec Maximum = 63.87 KPH at 16 msec

LEFT LOWER B-POST Y VELOCITY



1 ——— 899079AL.V30 Filterclass (180)

TIME Seconds

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KPH

MOA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT

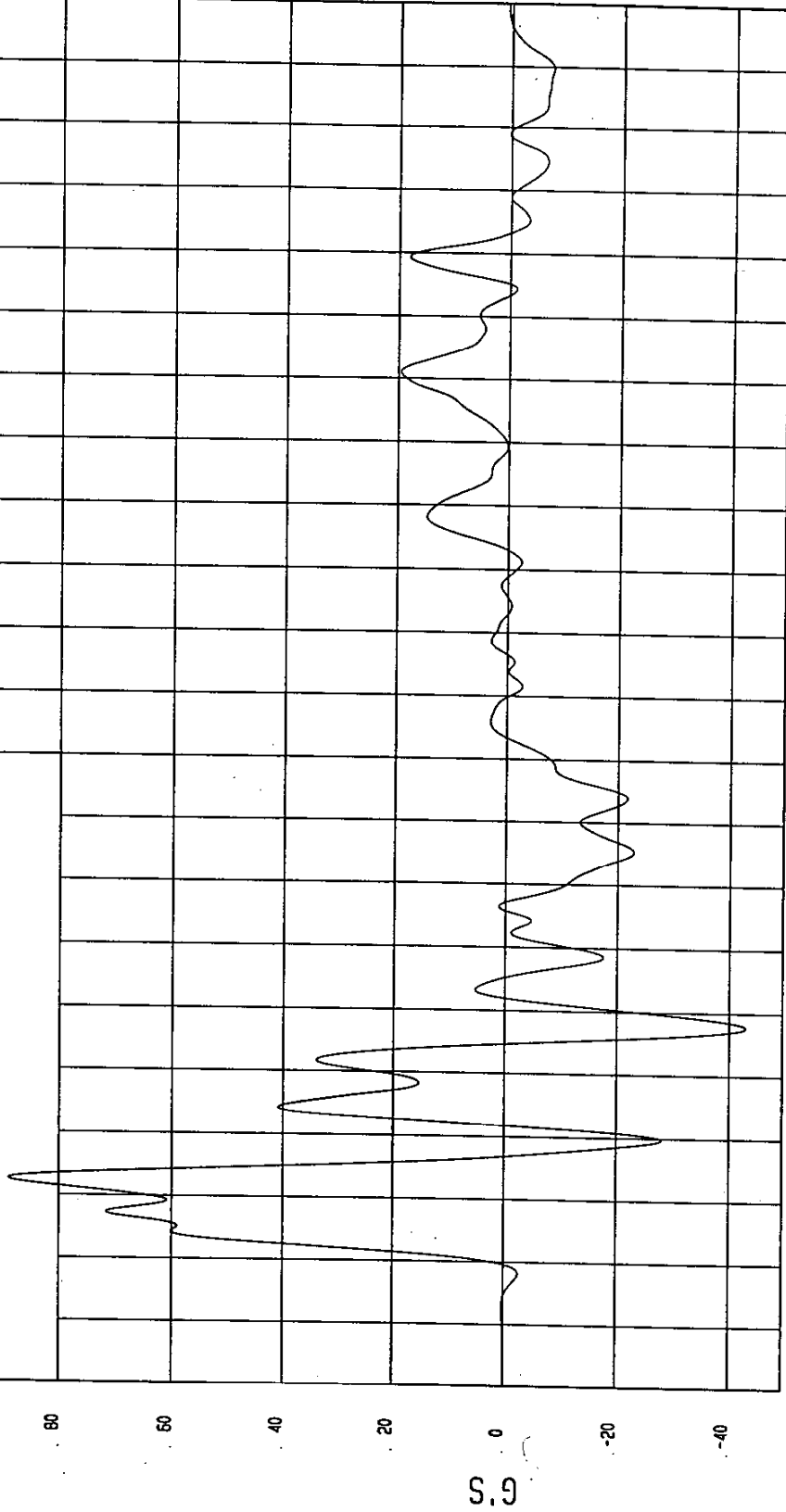
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -43.06 G'S at 38 msec Maximum = 88.91 G'S at 13 msec

LEFT MID 8-POST Y ACCELERATION

1 899079AF.A29 Filterclass (60)



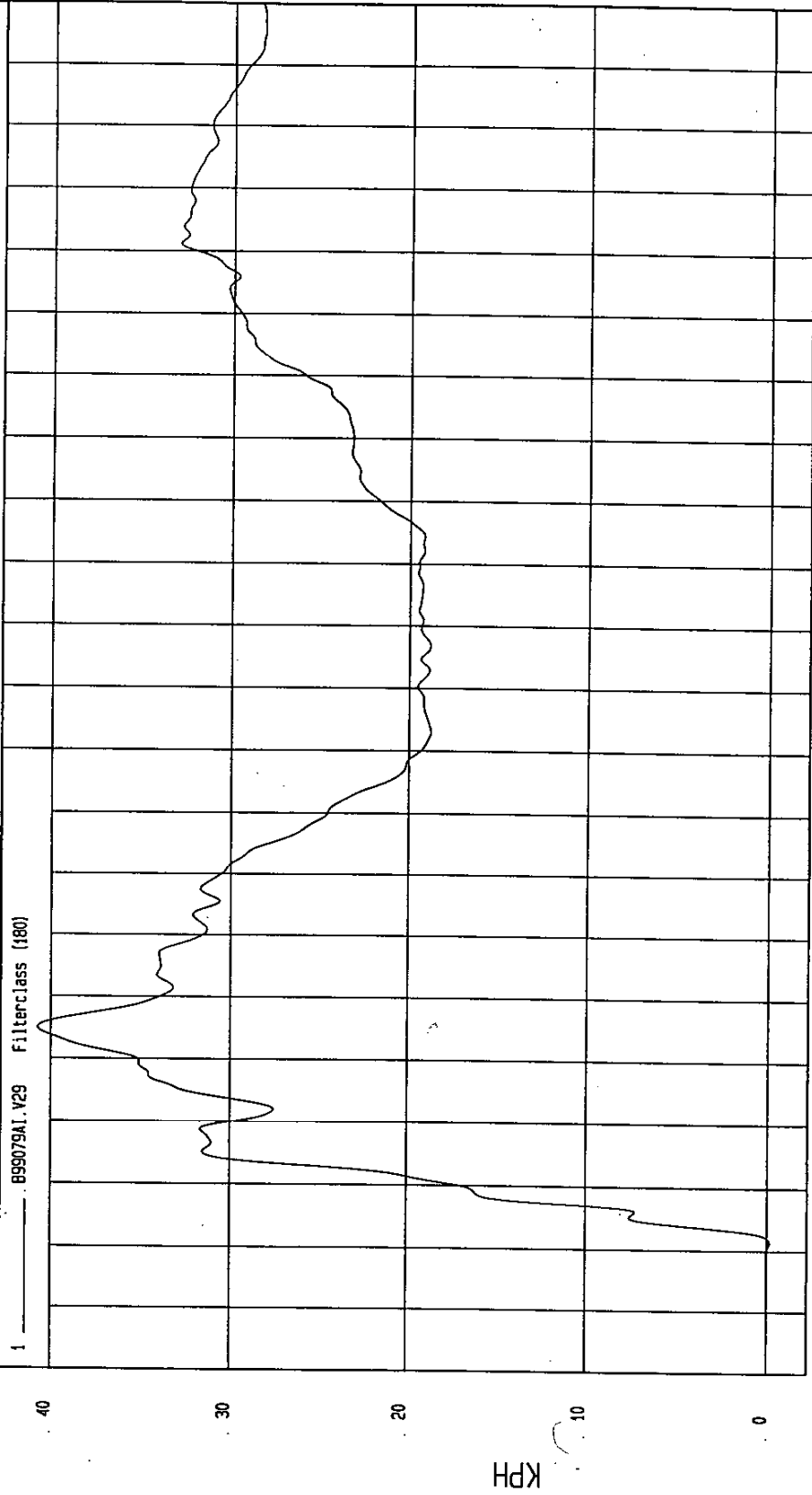
NSA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -16 KPH at 1 msec Maximum = 40.72 KPH at 35 msec

LEFT MID B-POST Y VELOCITY



TIME Seconds

MCA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

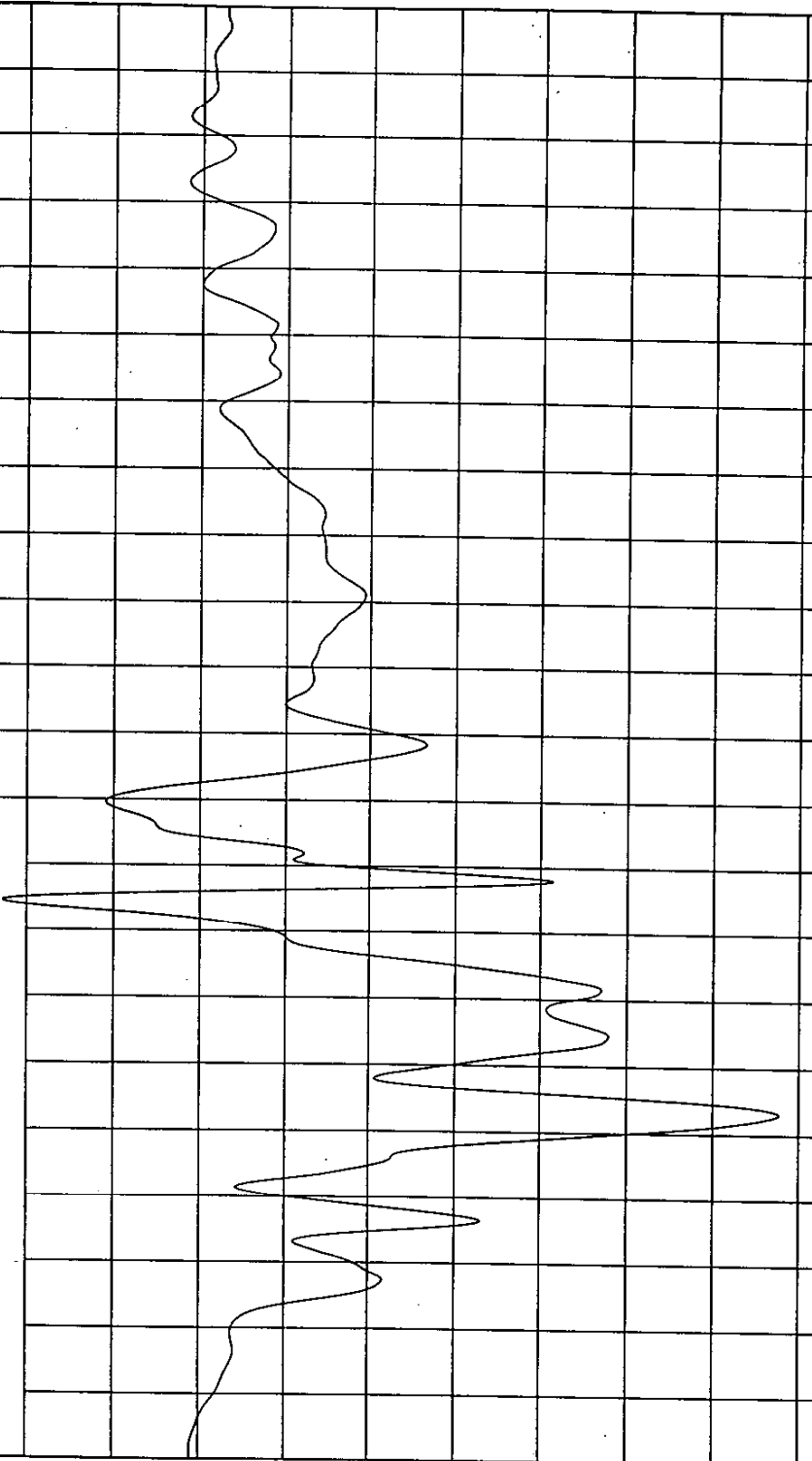
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 2.28 G'S at 64 msec

Minimum = -6.77 G'S at 33 msec

VEHICLE CG X ACCELERATION

1 B99079AF.A05 FilterClass (60)



TIME (SECONDS)

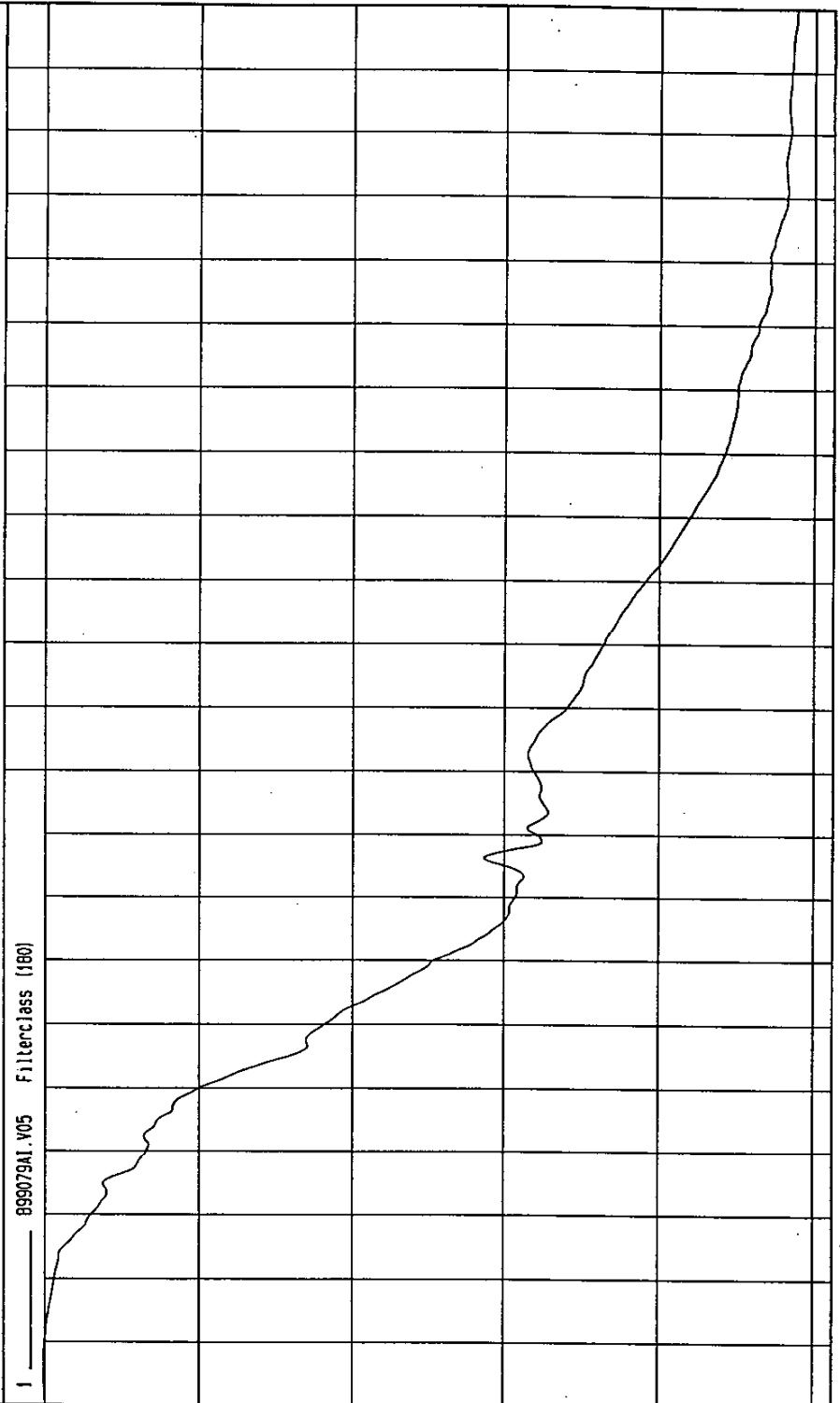
MCA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.77 KPH at 200 msec Maximum = 1.57E-02 KPH at -14 msec

VEHICLE CG X VELOCITY



MSA Research
12-07-1999 16:17

TIME Seconds

KPH

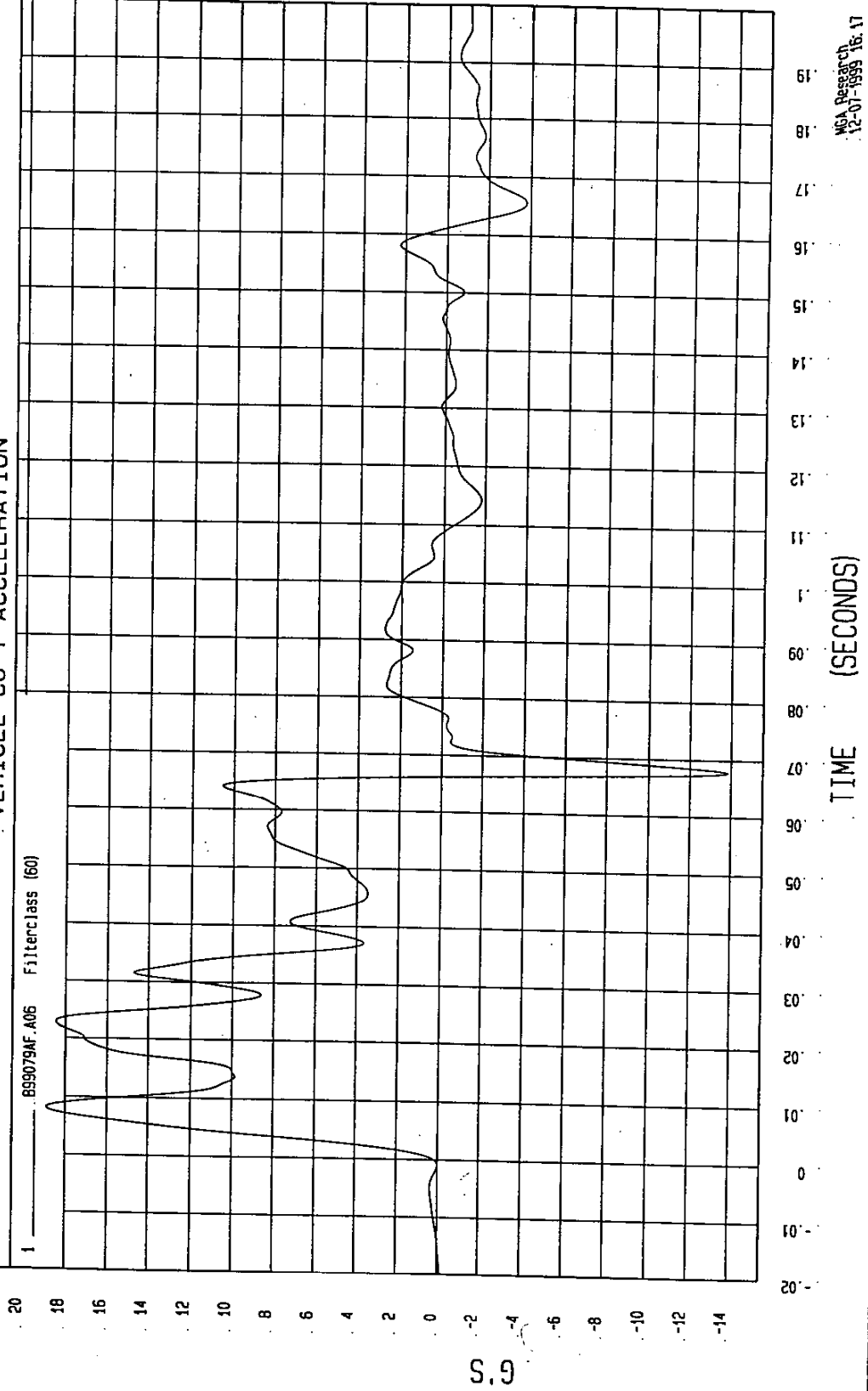
TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -13.86 G'S at 68 msec Maximum = 18.89 G'S at 8 msec

VEHICLE CG Y ACCELERATION

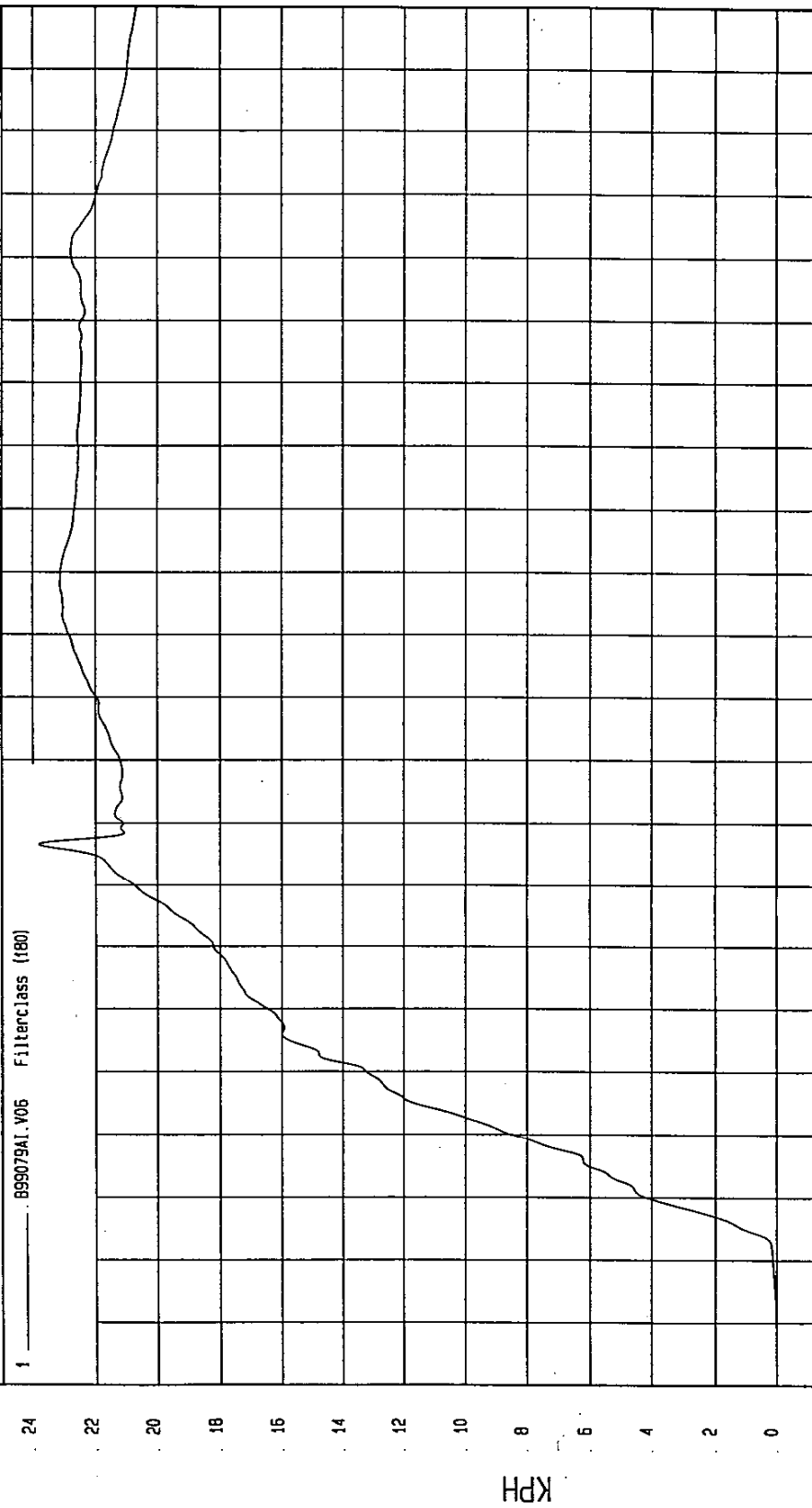


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.37E-02 KPH at -14 msec Maximum = 23.81 KPH at 67 msec

VEHICLE CG Y VELOCITY



MSA Research
12-07-1999 16:17

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

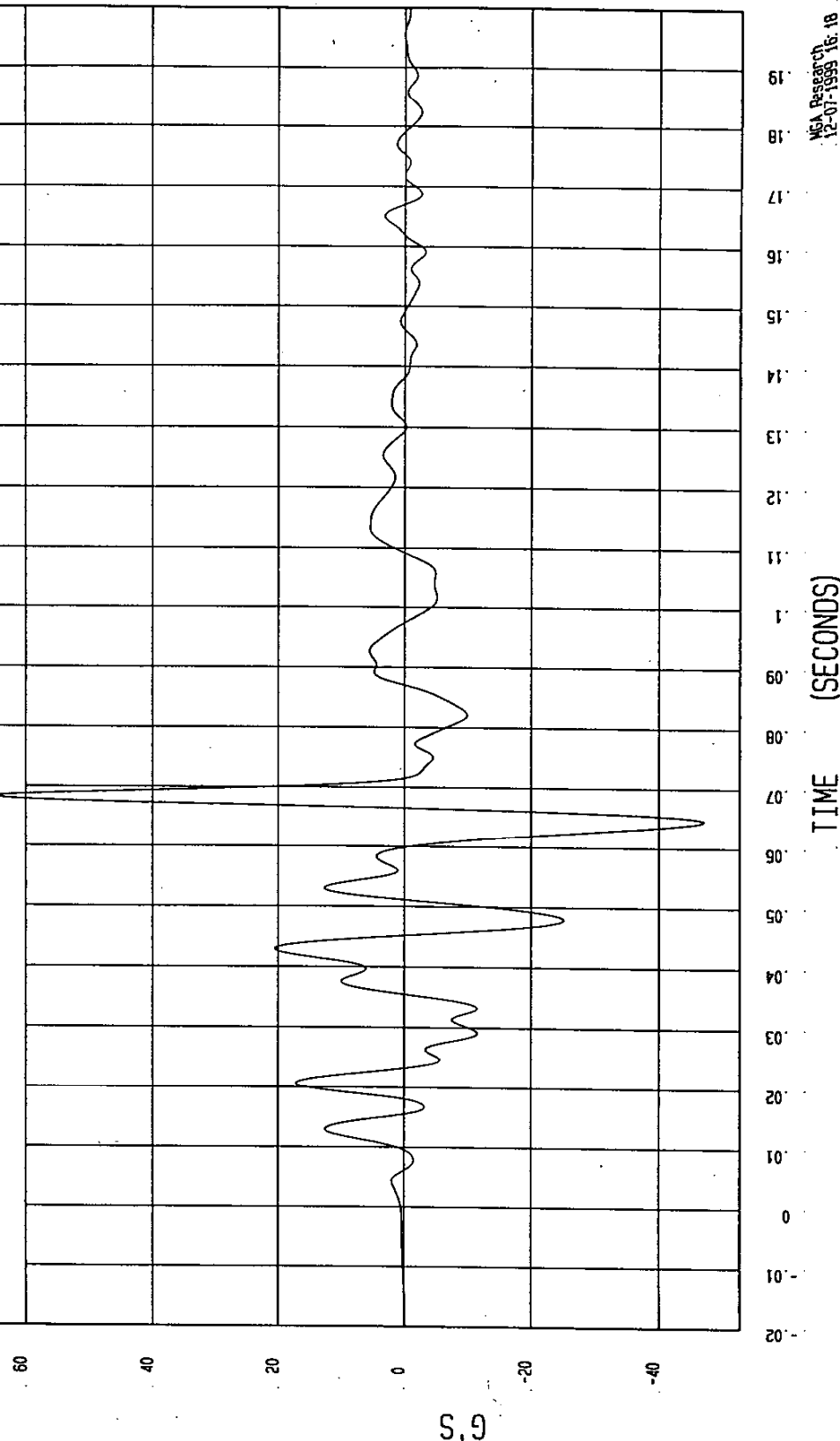
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Minimum = -47.28 G'S at 65 msec

Maximum = 64.74 G'S at 68 msec

VEHICLE CG Z ACCELERATION

1 _____ B99079AF.A07 Filterclass (50)

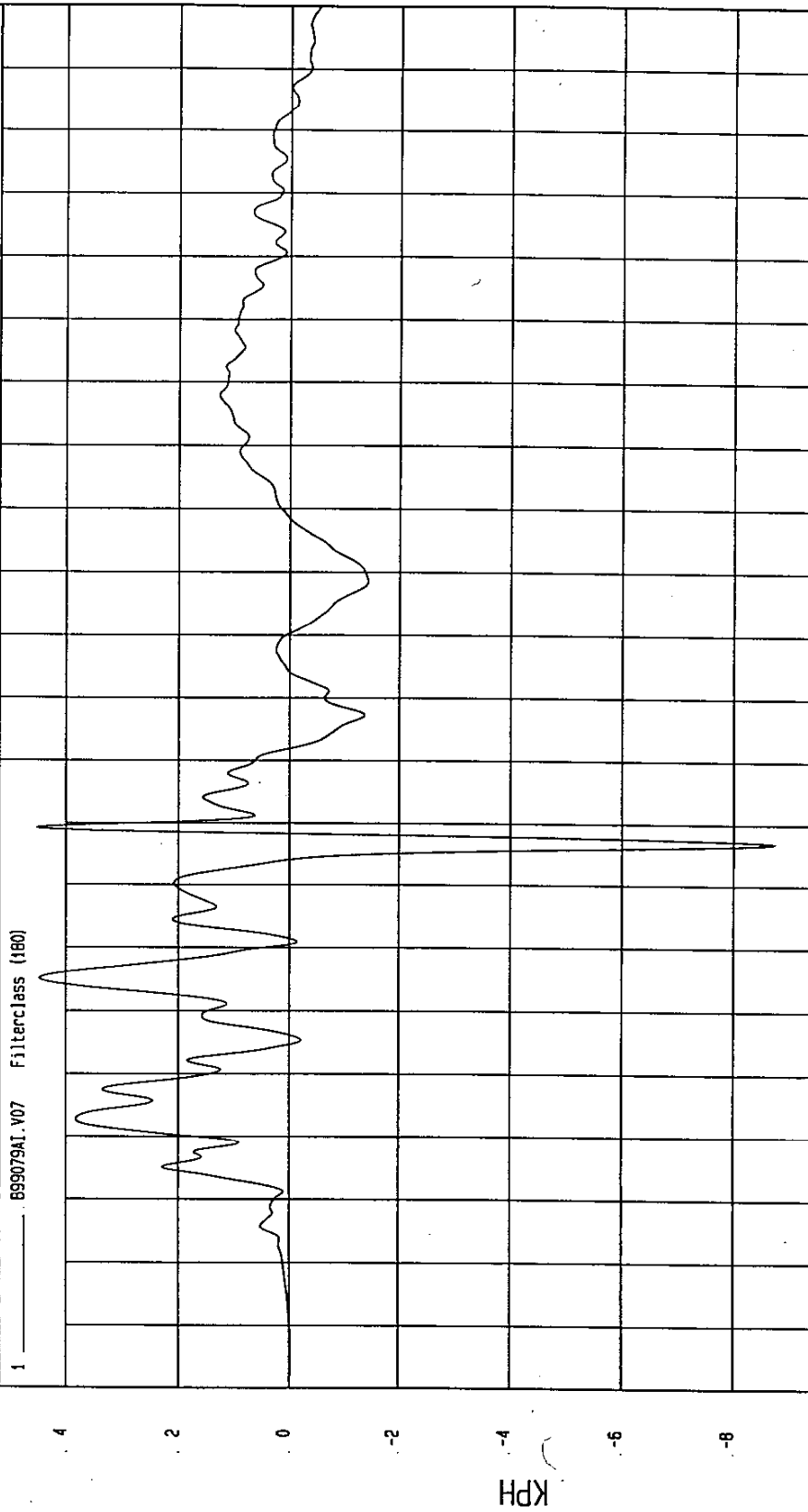
NCA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.75 KPH at 67 msec Maximum = 4.53 KPH at 69 msec

VEHICLE CG Z VELOCITY



TIME Seconds

NSA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

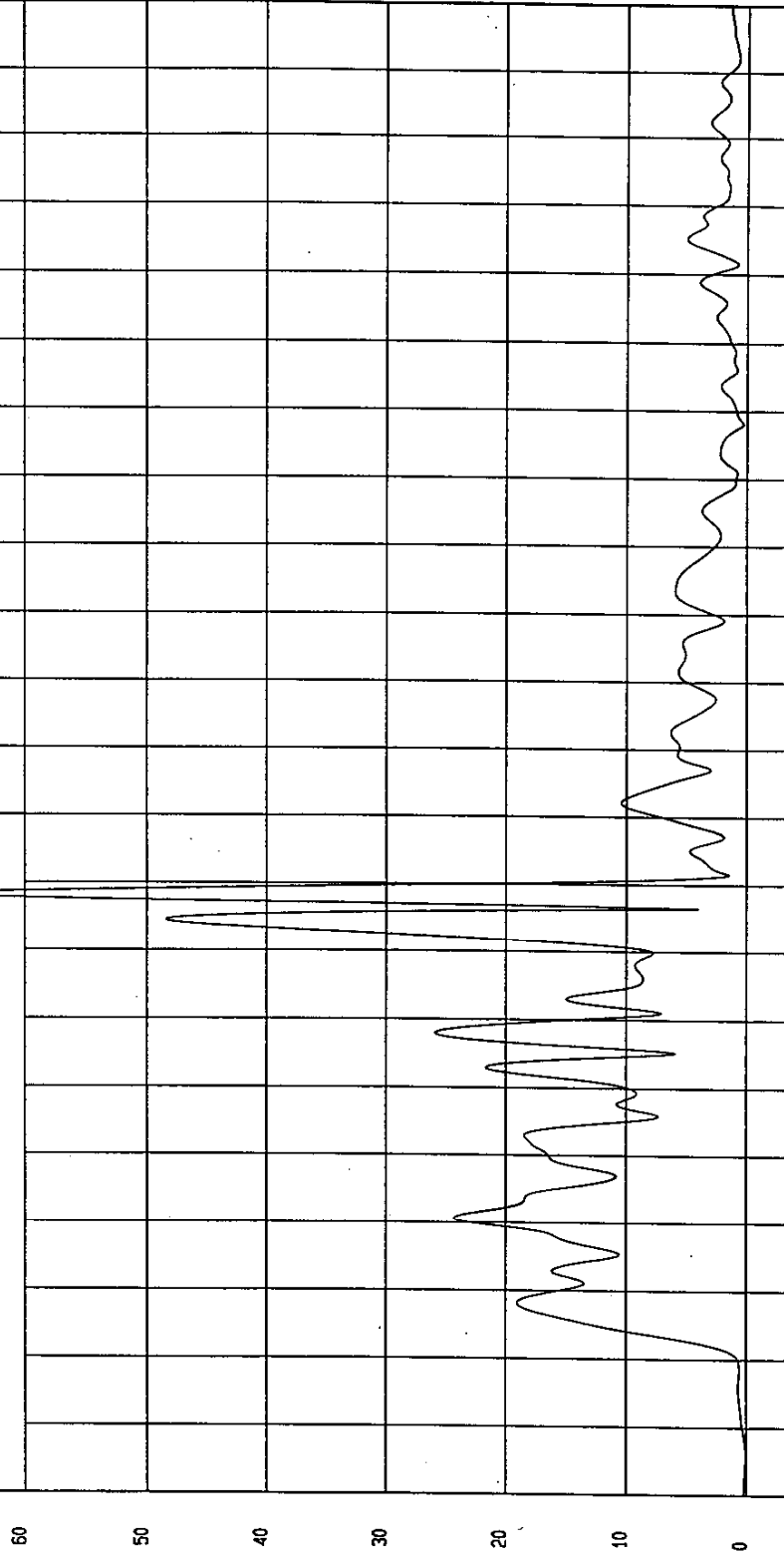
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 66.13 G'S at 68 msec

Minimum = 1.32E-02 G'S at -14 msec

VEHICLE CG RESULTANT ACCELERATION

1 899079AV A05 Filterclass (60)



TIME (SECONDS)

MSA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

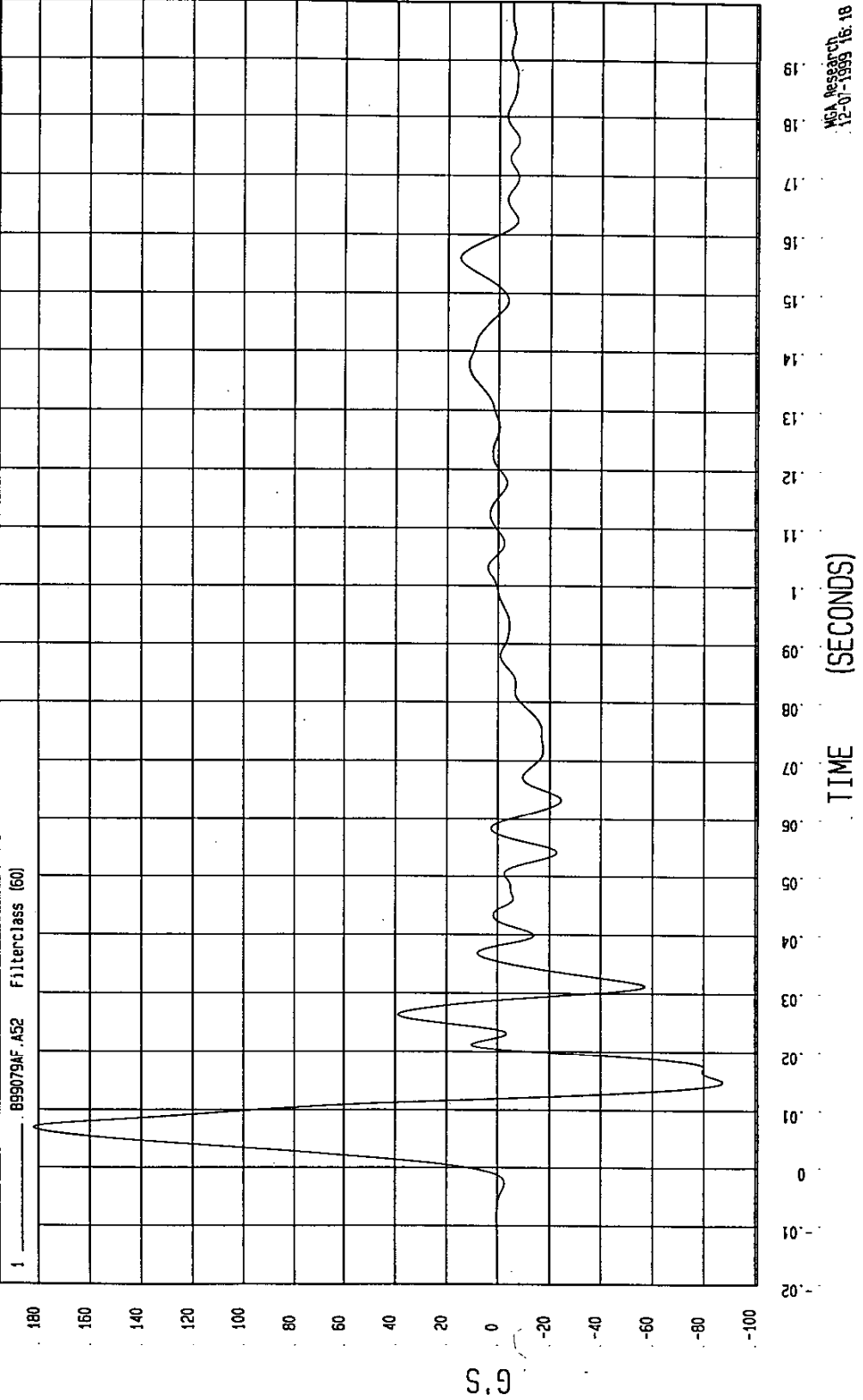
Speed: 38.3 MPH 61.6 KPH

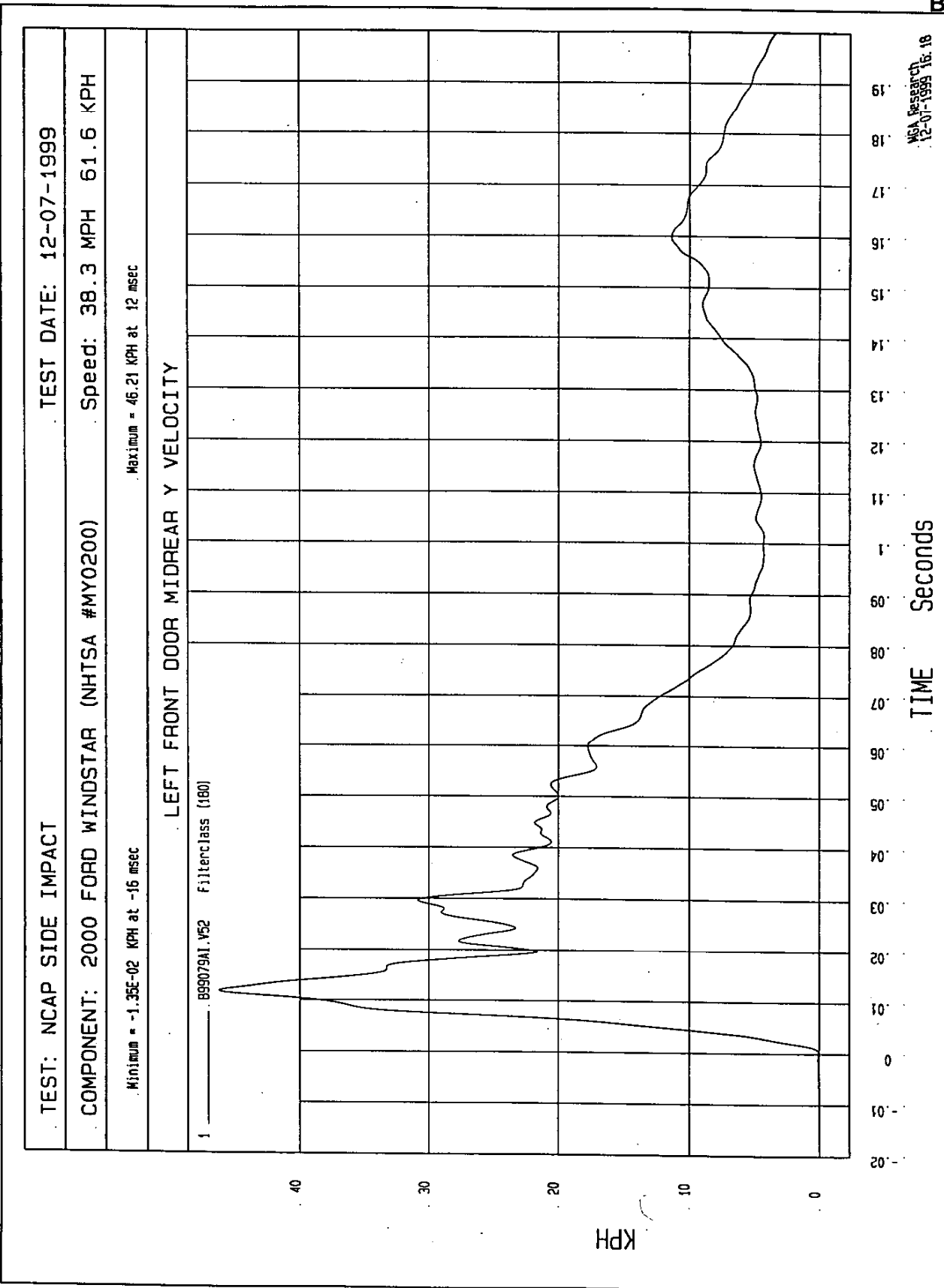
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 181.93 G'S at 7 msec

Minimum = -87.53 G'S at 15 msec

LEFT FRONT DOOR MIDREAR Y ACCELERATION





TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

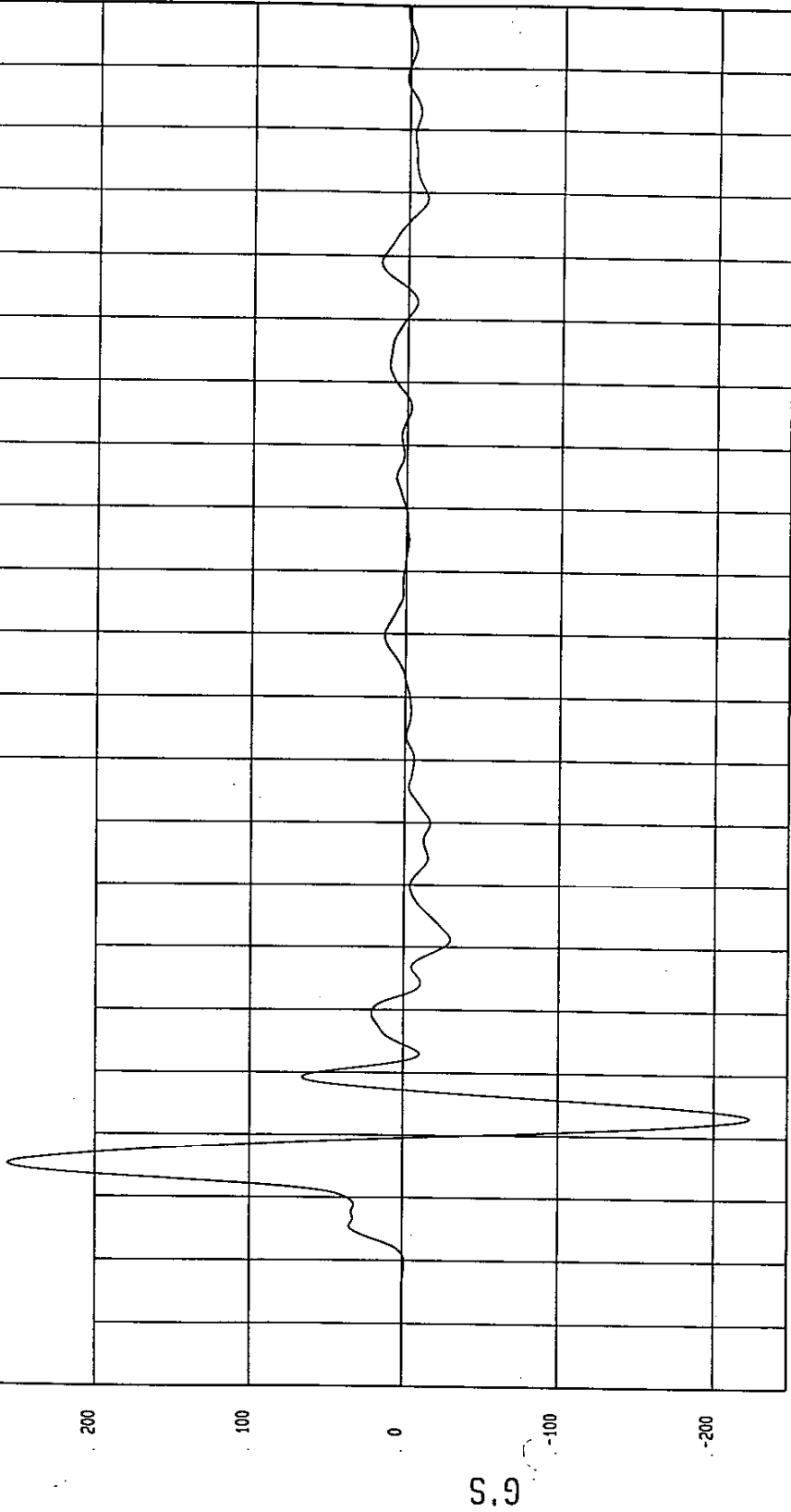
Speed: 38.3 MPH 61.6 KPH

Minimum = -222.75 G'S at 23 msec

Maximum = 256.04 G'S at 15 msec

LEFT FRONT DOOR CENTERLINE Y ACCELERATION

1 _____ 899079AF AS1 Filterclass (60)



TIME (SECONDS)

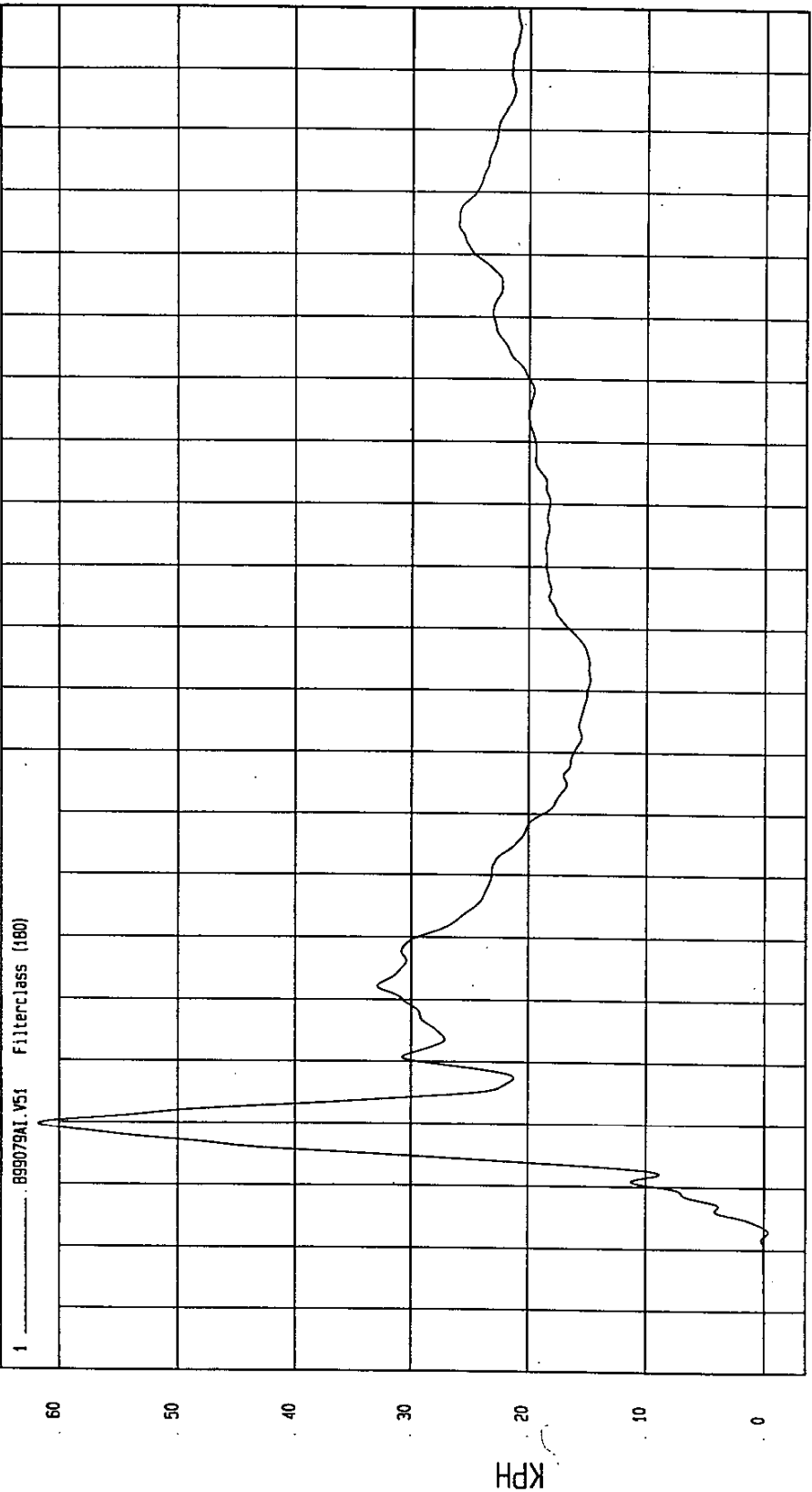
NSA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -36 KPH at 3 msec Maximum = 61.78 KPH at 20 msec

LEFT FRONT DOOR CENTERLINE Y VELOCITY



TIME Seconds

61.78 KPH at 20 msec

NCAP Research
12-07-1999 10:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

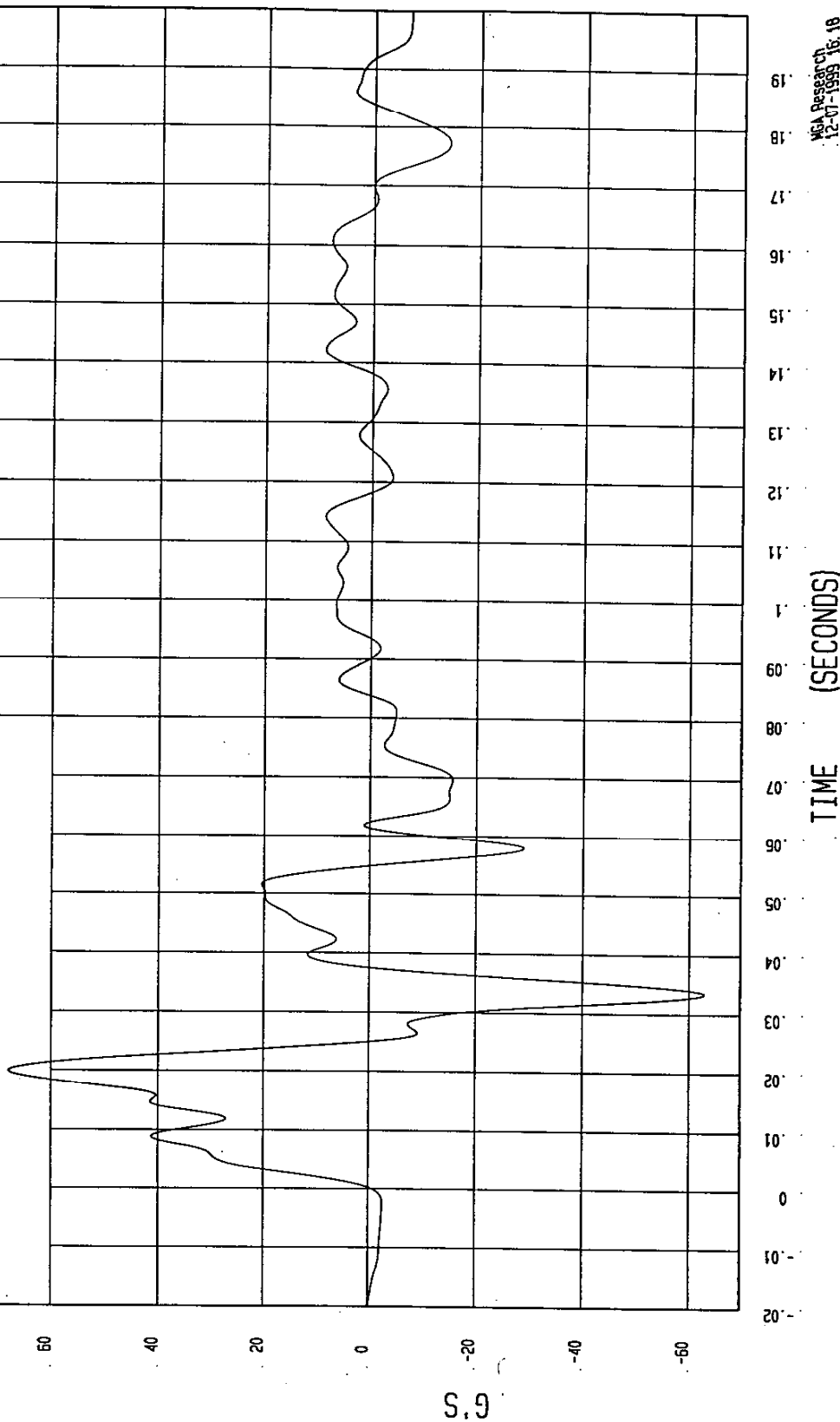
Speed: 38.3 MPH 61.6 KPH

Minimum = -62.68 G'S at 33 msec

Maximum = 67.78 G'S at 20 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION

1 ——— B99079AF.A53 Filterclass (60)

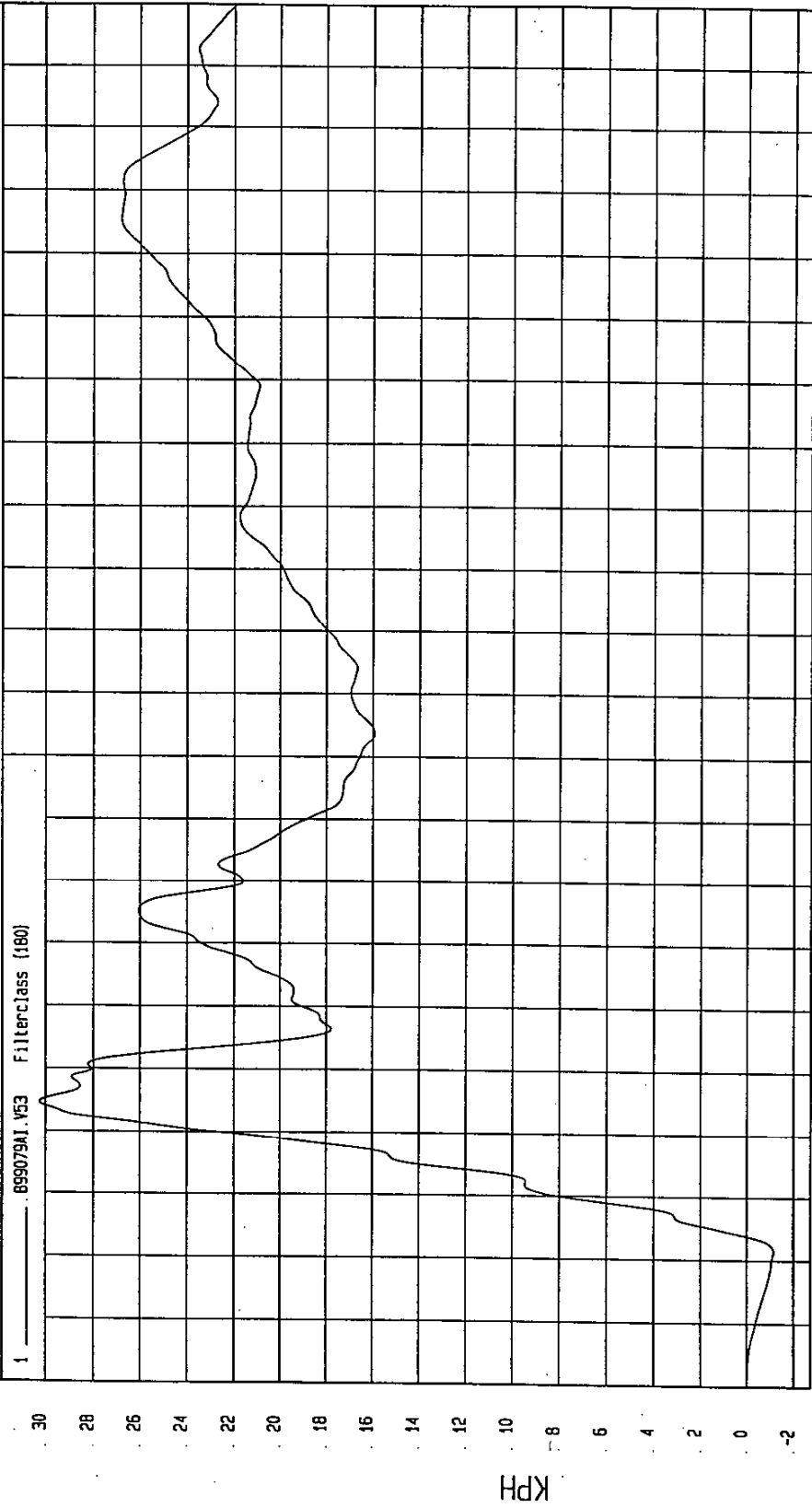
MCA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.16 KPH at 1 msec Maximum = 30.27 KPH at 25 msec

LEFT FRONT DOOR UPPER CENTERLINE Y VELOCITY



TIME Seconds

WCA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -6.77 G'S at 28 msec

Maximum = 87.39 G'S at 7 msec

LEFT REAR DOOR MIDREAR Y ACCELERATION

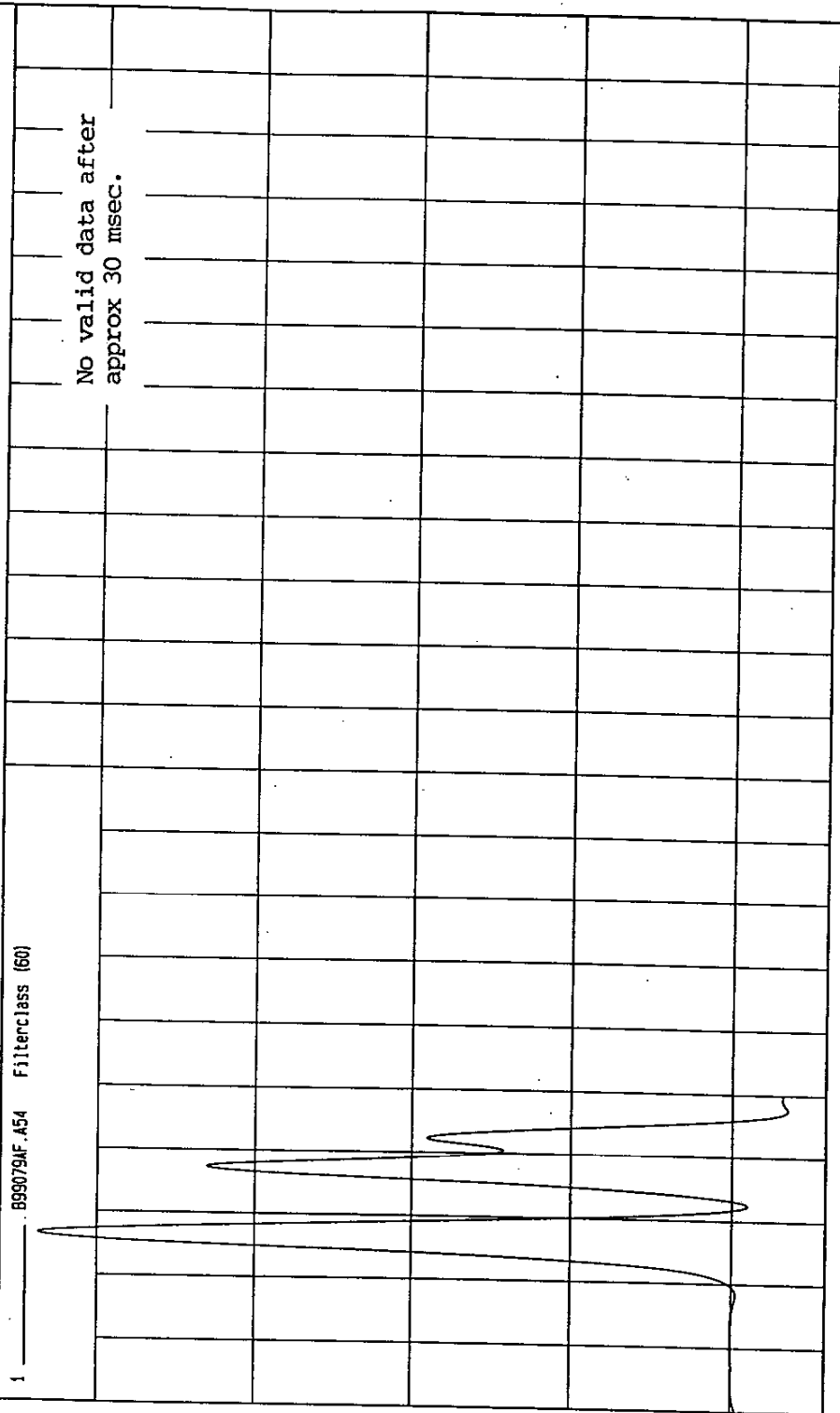
1 899079AF.A54 Filterclass (60)

No valid data after
approx 30 msec.

G'S

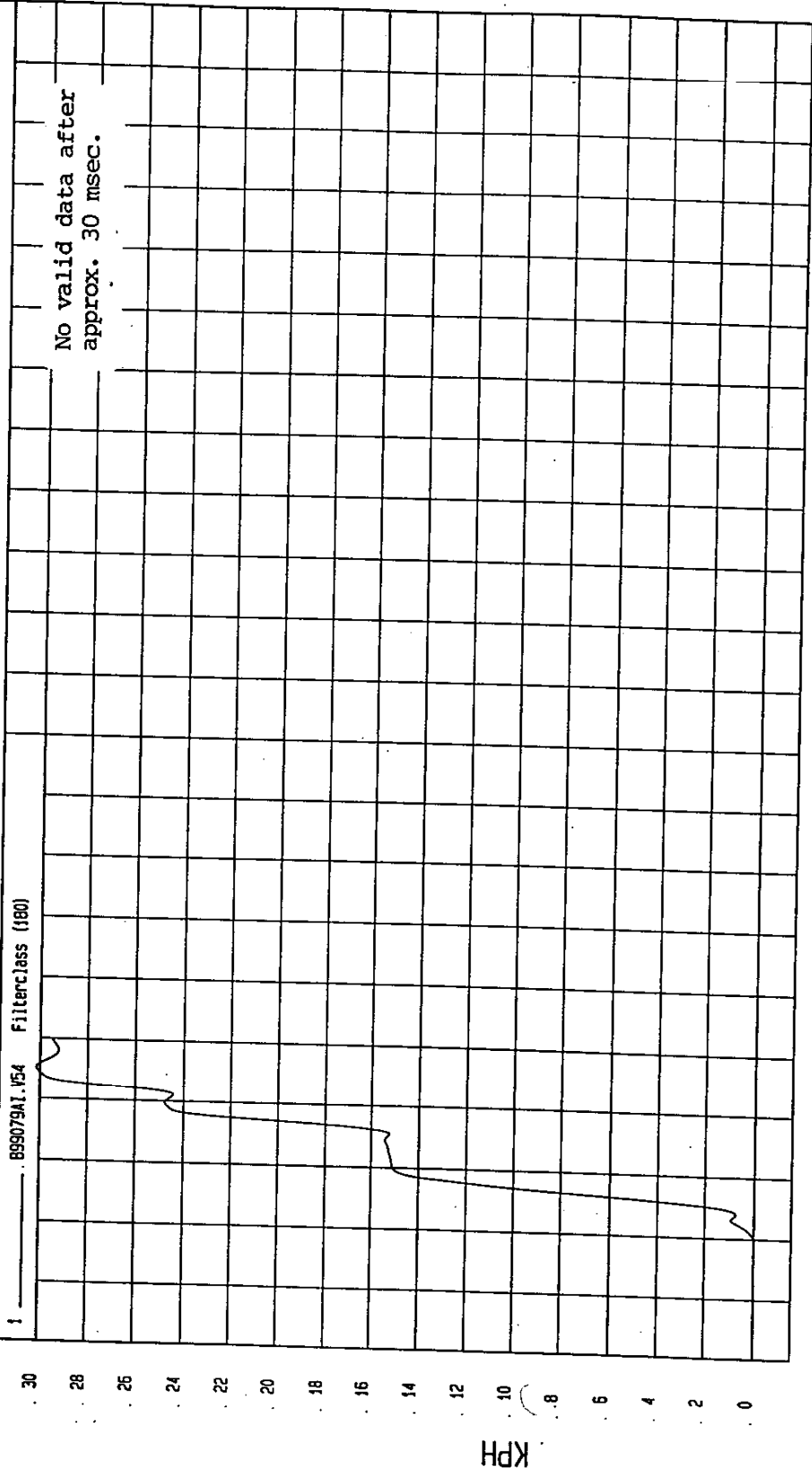
TIME (SECONDS)

MCA Research
12-07-1999 16:48



TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 TEST DATE: 12-07-1999
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -2.52E-02 KPH at -11 msec
 Maximum = 30.15 KPH at 25 msec

LEFT REAR DOOR MIDREAR Y VELOCITY



TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

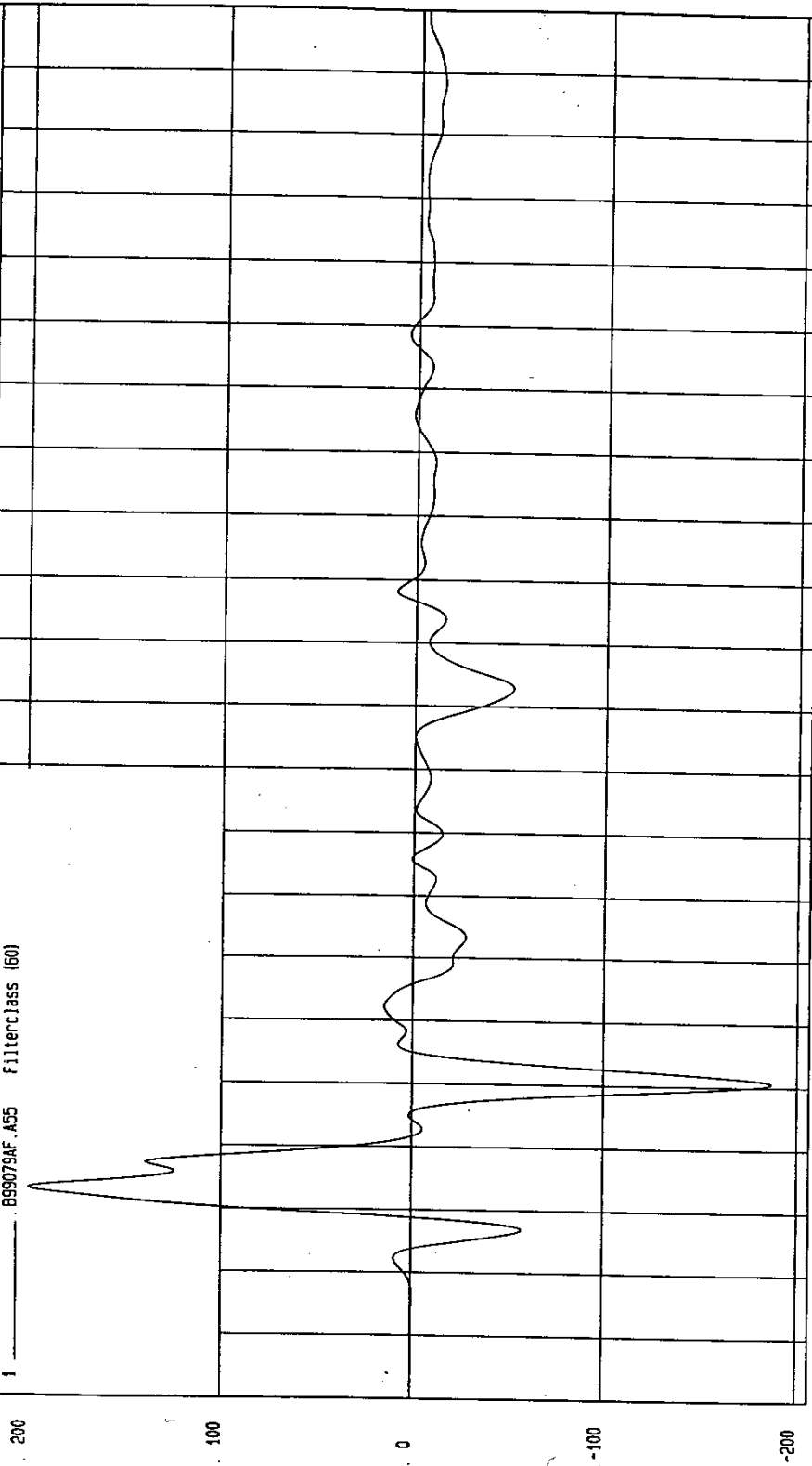
Speed: 38.3 MPH 61.6 KPH

Minimum = -186.99 G'S at 30 msec

Maximum = 198.75 G'S at 13 msec

LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION

1 B89079AF.A55 FilterClass (60)



WCA Research
12-01-1999 16:18

TIME (SECONDS)

G.S

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

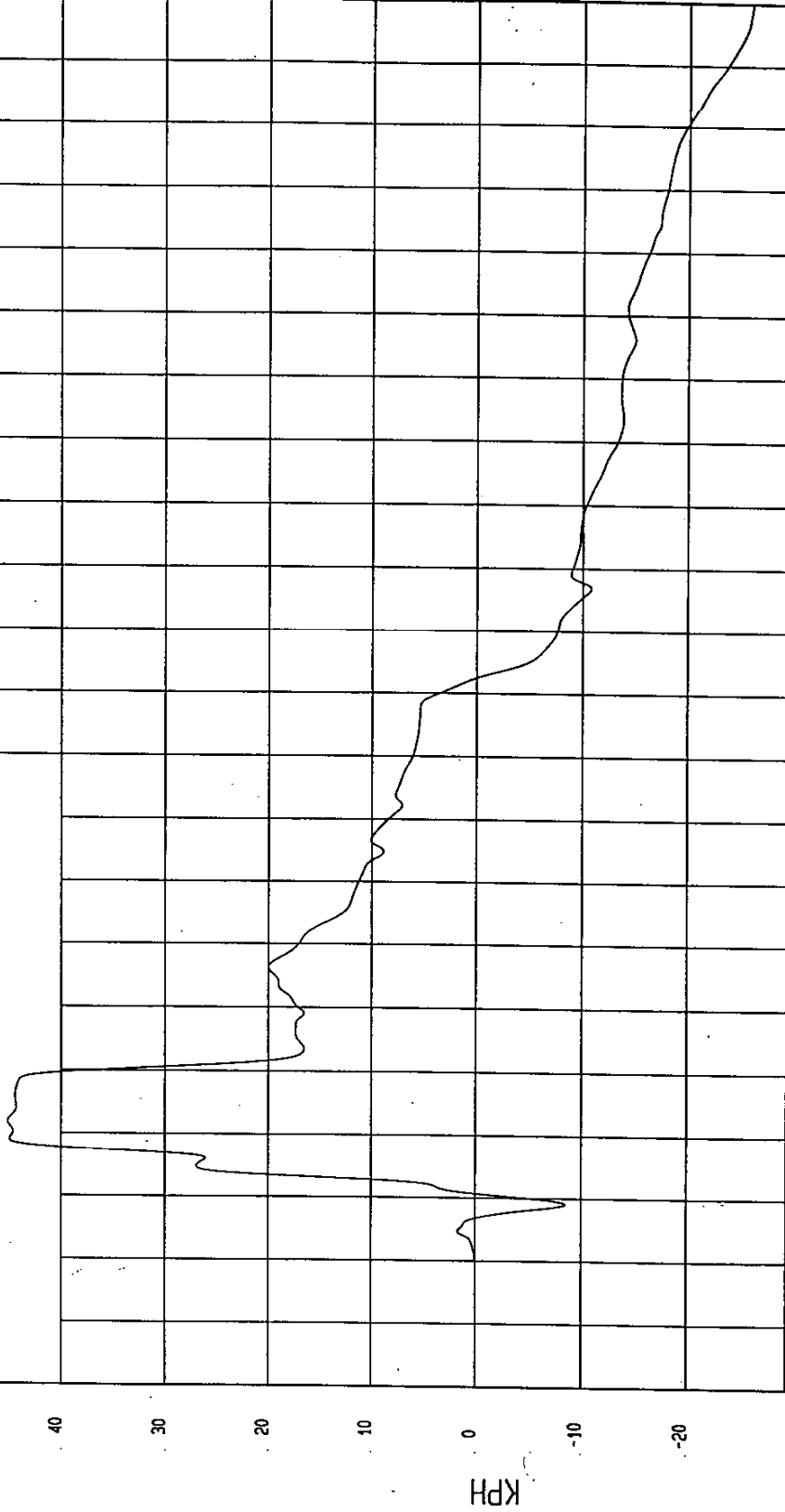
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 45.1 KPH at 22 msec

Minimum = -25.97 KPH at 200 msec

LEFT REAR DOOR UPPER CENTERLINE Y VELOCITY

1 ——— .899079A1.V55 Filterclass (180)



MOA Research
12-07-1999 16:18

TIME Seconds

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -17.62 G'S at 57 msec

Maximum = 2.2 G'S at 132 msec

MOVING BARRIER CG X ACCELERATION

1 899079AF.A63 Filterclass (60)



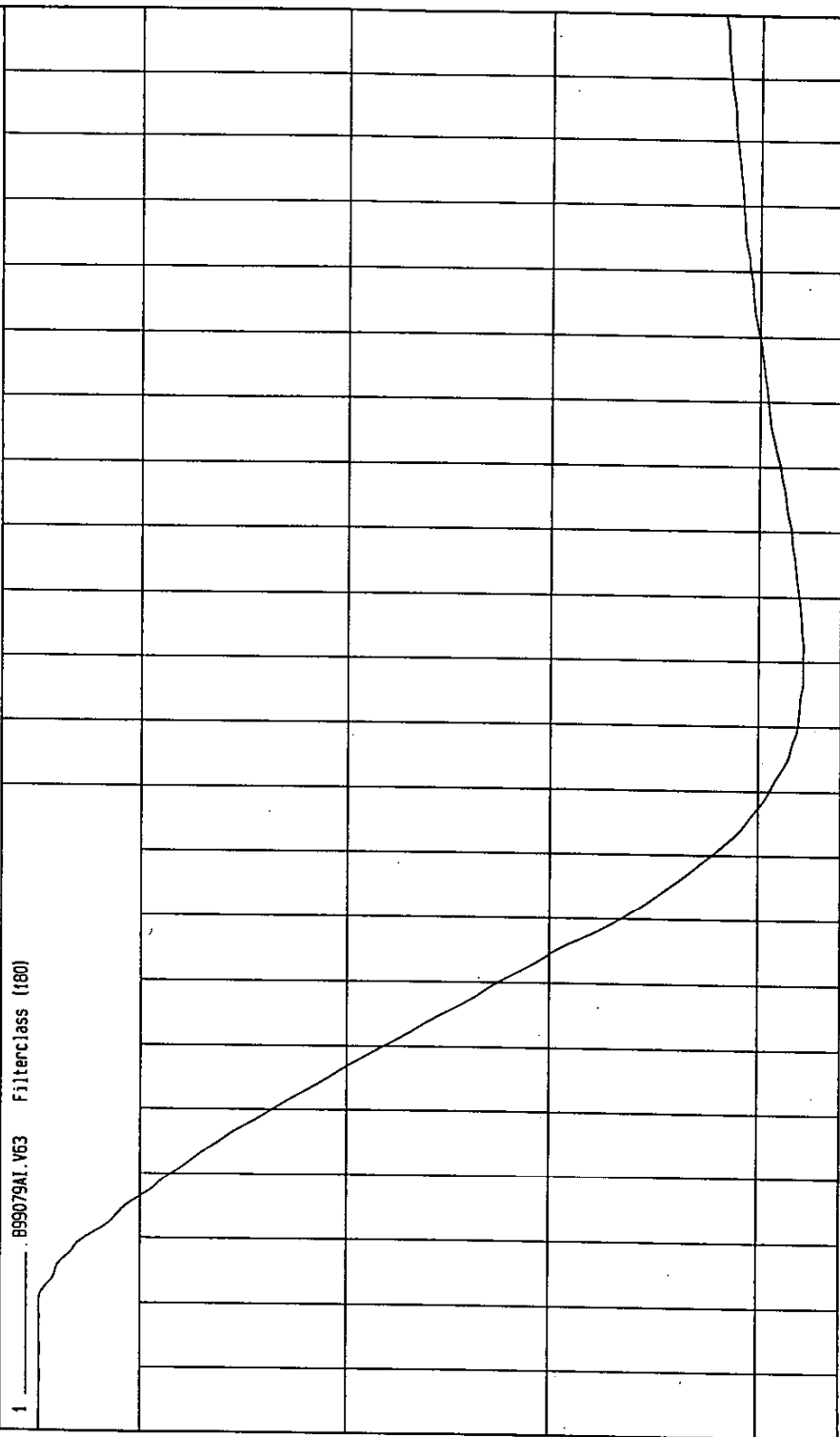
W&A Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = 17.61 KPH at 102 msec Maximum = 54.91 KPH at -19 msec

MOVING BARRIER CG X VELOCITY



TIME Seconds

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

KPH

50
40
30
20

NGA Research
12-01-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

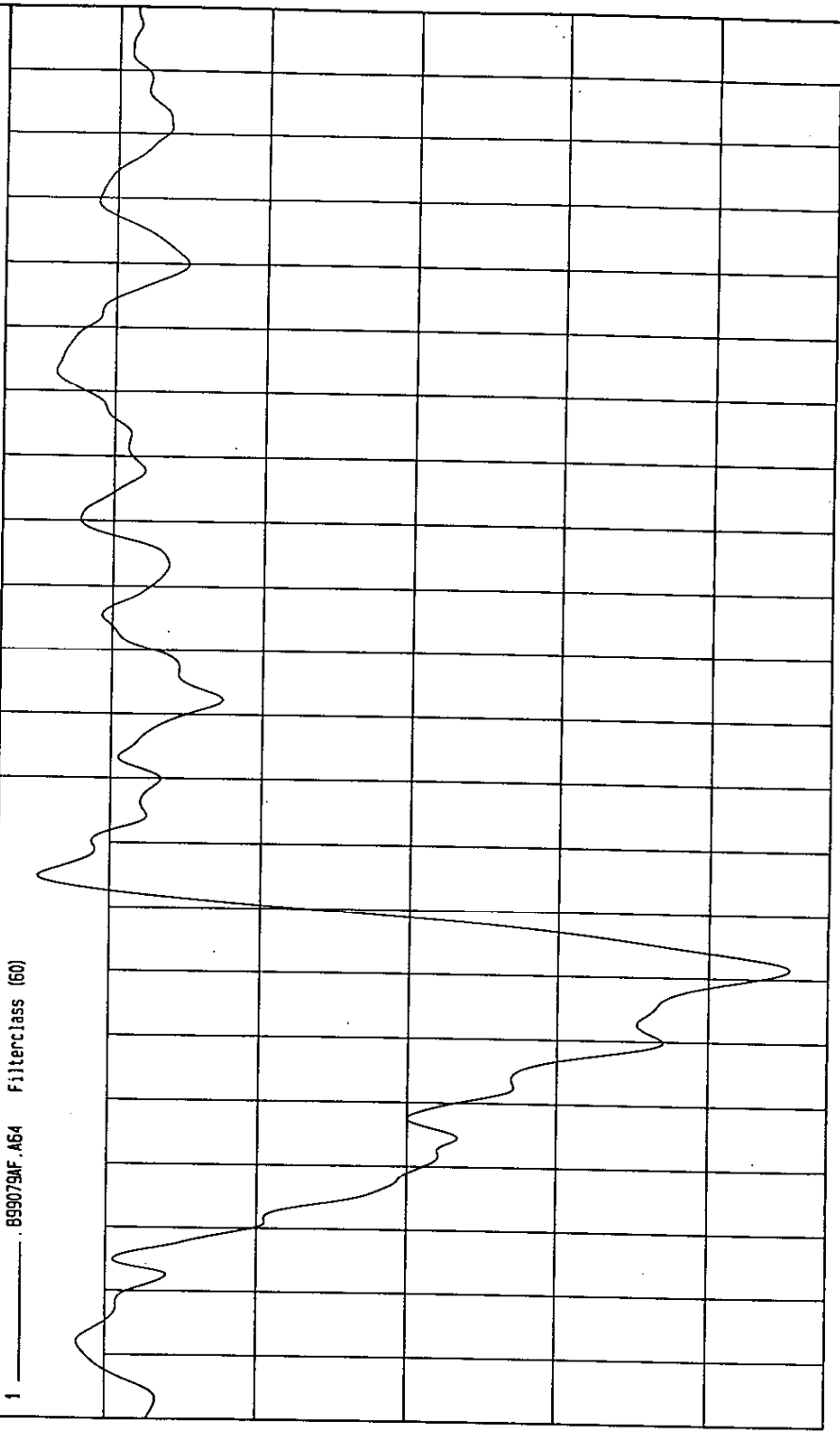
Speed: 38.3 MPH 61.6 KPH

Minimum = -9.08 G'S at 52 msec

Maximum = .97 G'S at 65 msec

MOVING BARRIER CG Y ACCELERATION

1 ——— .899079AF.A64 Filterclass (60)



MCA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

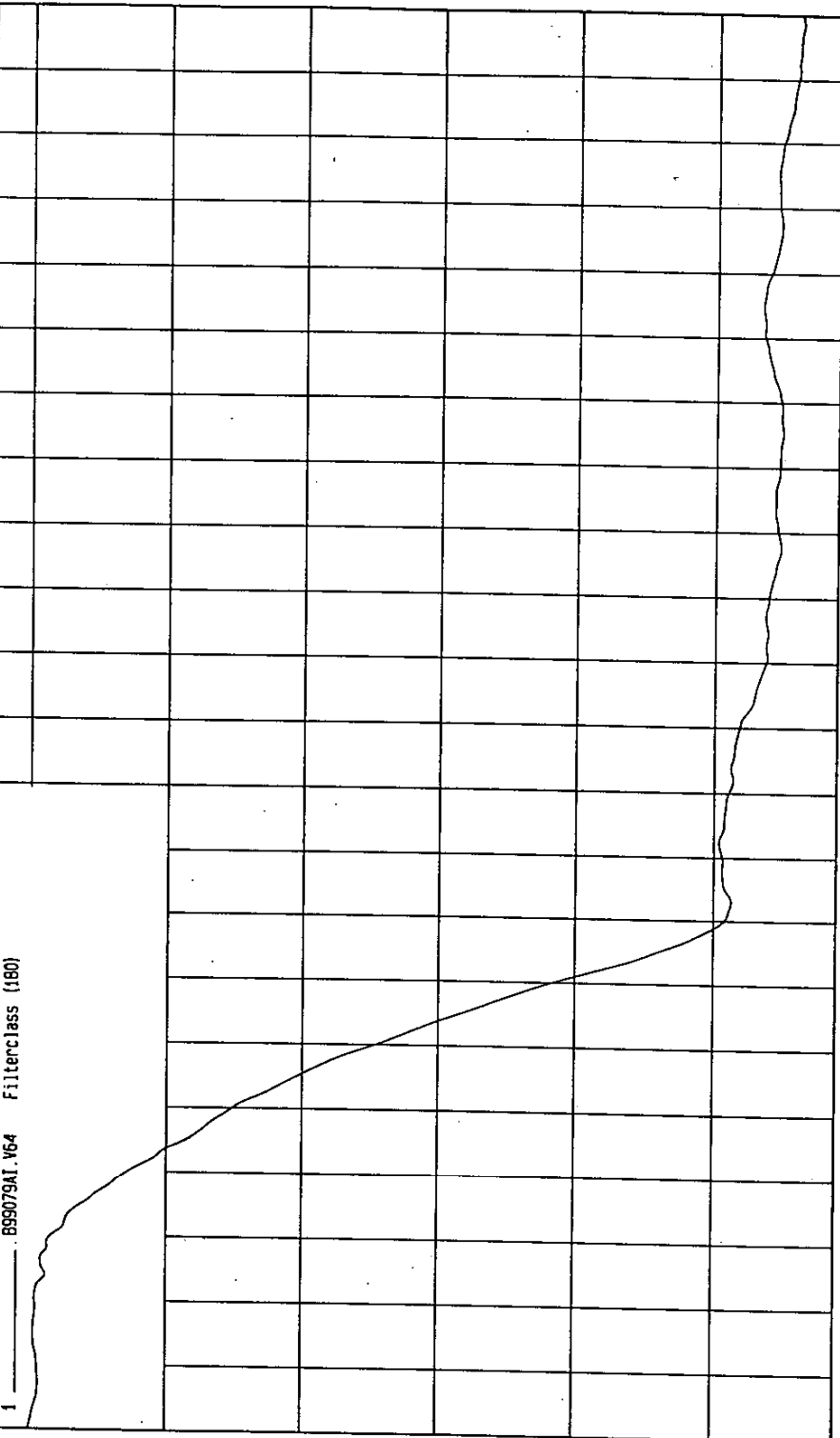
Speed: 38.3 MPH 61.6 KPH

Minimum = 16.78 KPH at 198 msec

Maximum = 28 KPH at -20 msec

MOVING BARRIER CG Y VELOCITY

1 ——— B99079A1.V64 Filterclass (160)



MGA Research
12-07-1999 16:18

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

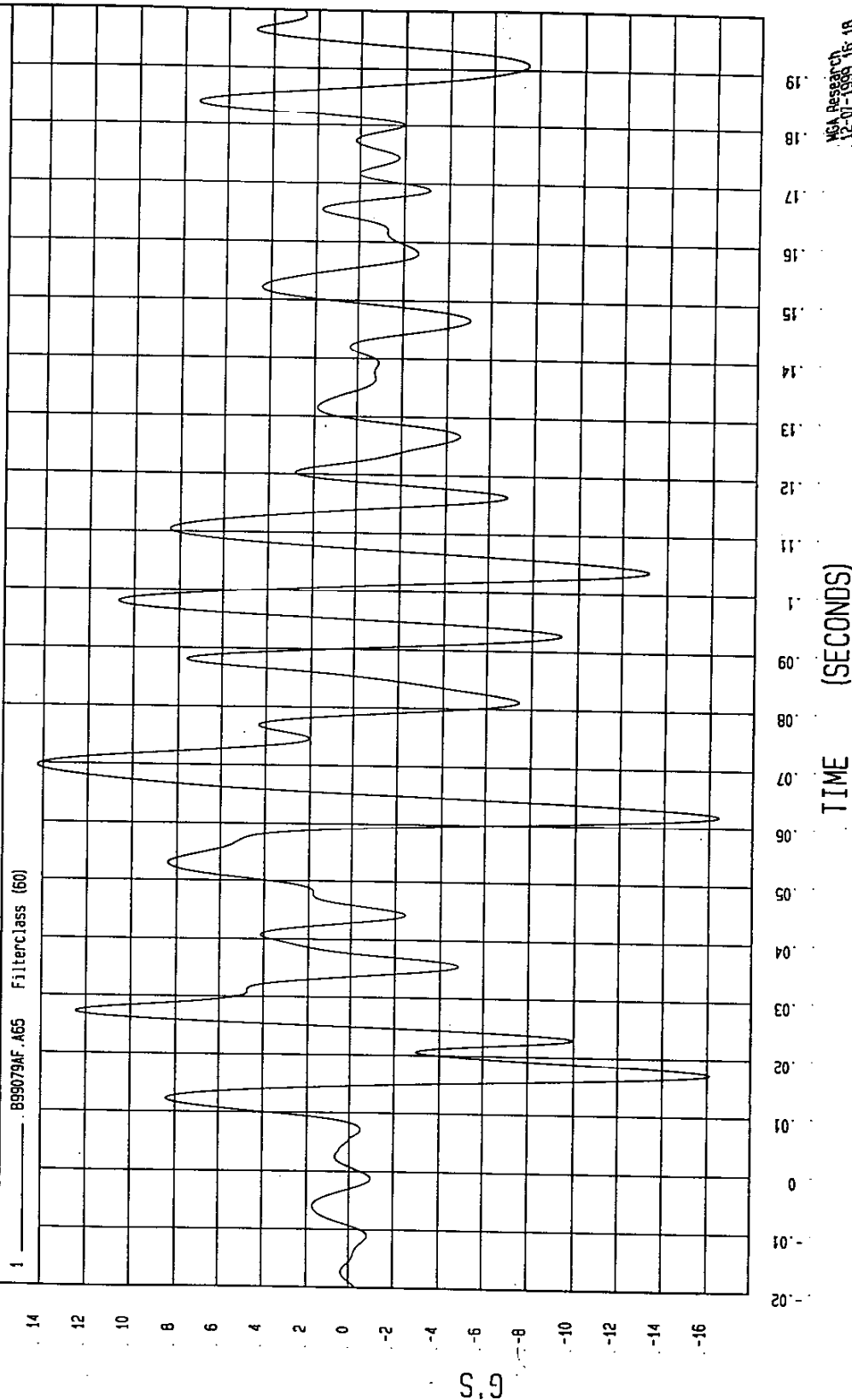
Speed: 38.3 MPH 61.6 KPH

Minimum = -16.45 G'S at 62 msec

Maximum = 14.25 G'S at 70 msec

MOVING BARRIER CG Z ACCELERATION

1 ——— B99079AF.A65 Filterclass (50)

WCA Research
12-07-1999 16:18

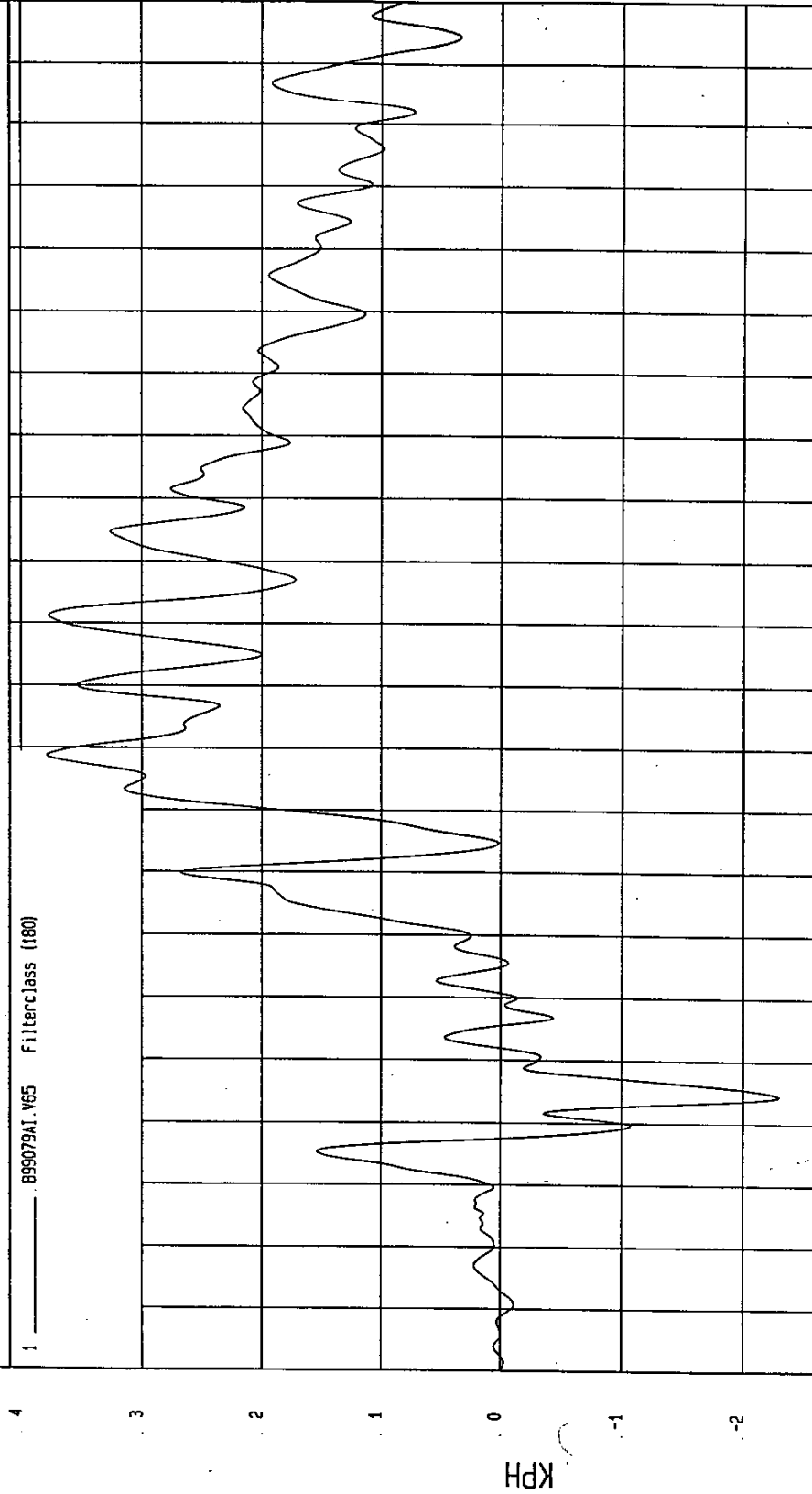
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.3 KPH at 25 msec
Maximum = 3.79 KPH at 79 msec

MOVING BARRIER CG Z VELOCITY

1 899079A1.V65 Filterclass (180)



McA Research
12-07-1999 16:18

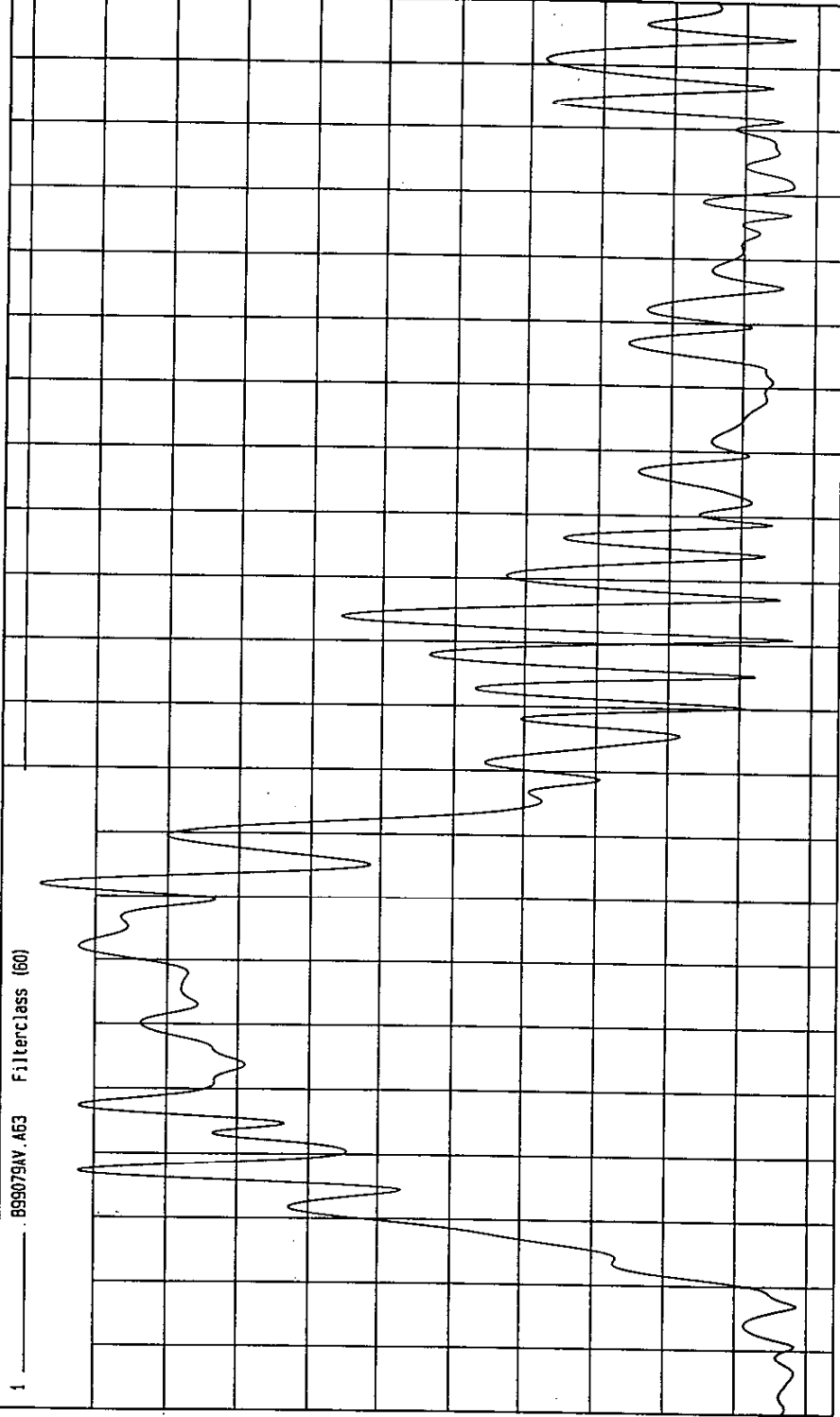
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = .28 G'S at -3 msec Maximum = 21.55 G'S at 62 msec

MOVING BARRIER CG RESULTANT ACCELERATION

1 899079AV.A63 Filterclass (60)



MCA Research
12-07-1999 16:18

TIME (SECONDS)

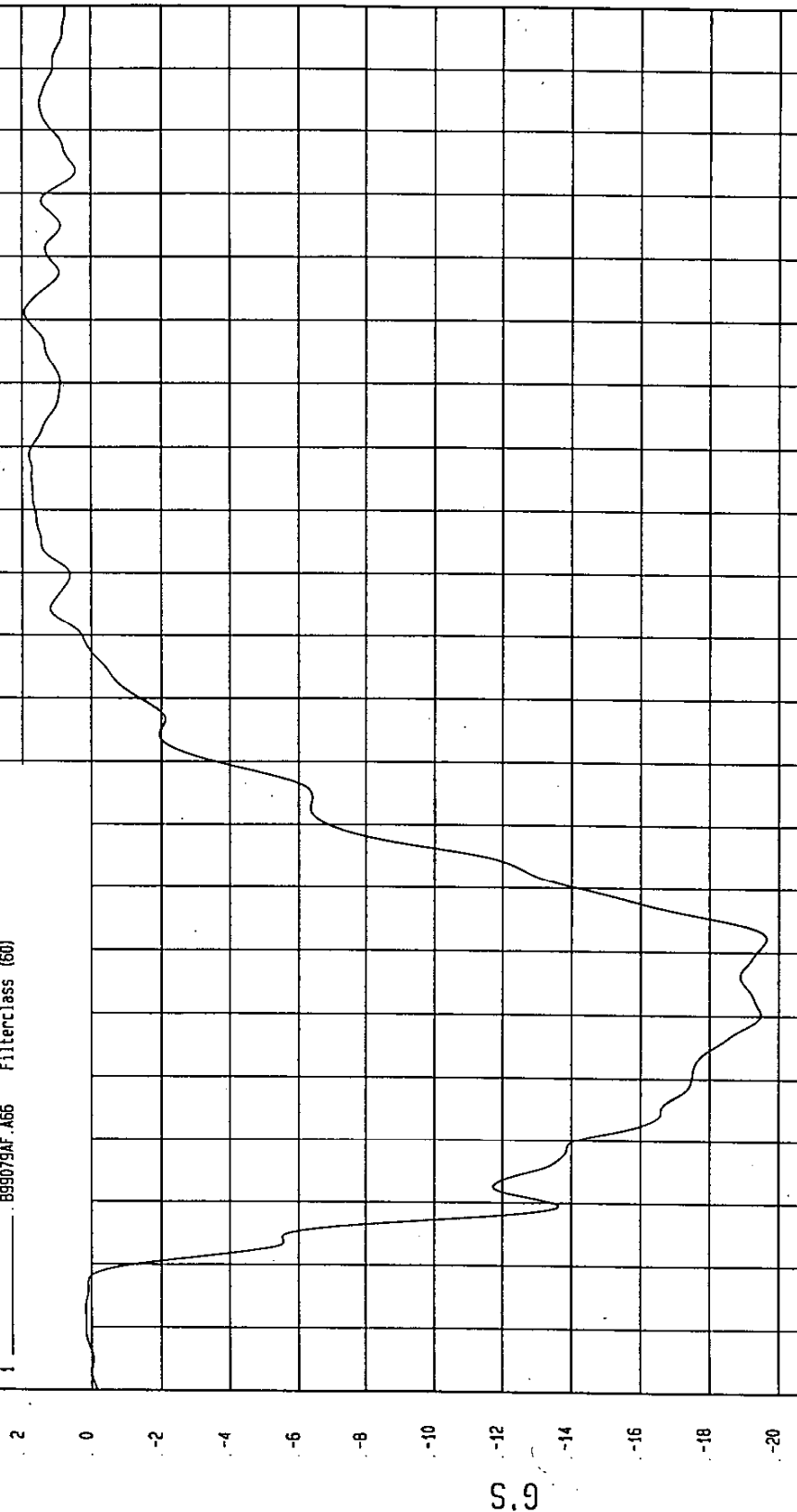
G's

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -19.65 G'S at 52 msec Maximum = 1.94 G'S at 151 msec

MOVING BARRIER REAR AXLE X ACCELERATION

1 _____ B99079AF.A66 Filterclass (60)



MCA Research
12-07-1999 15:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

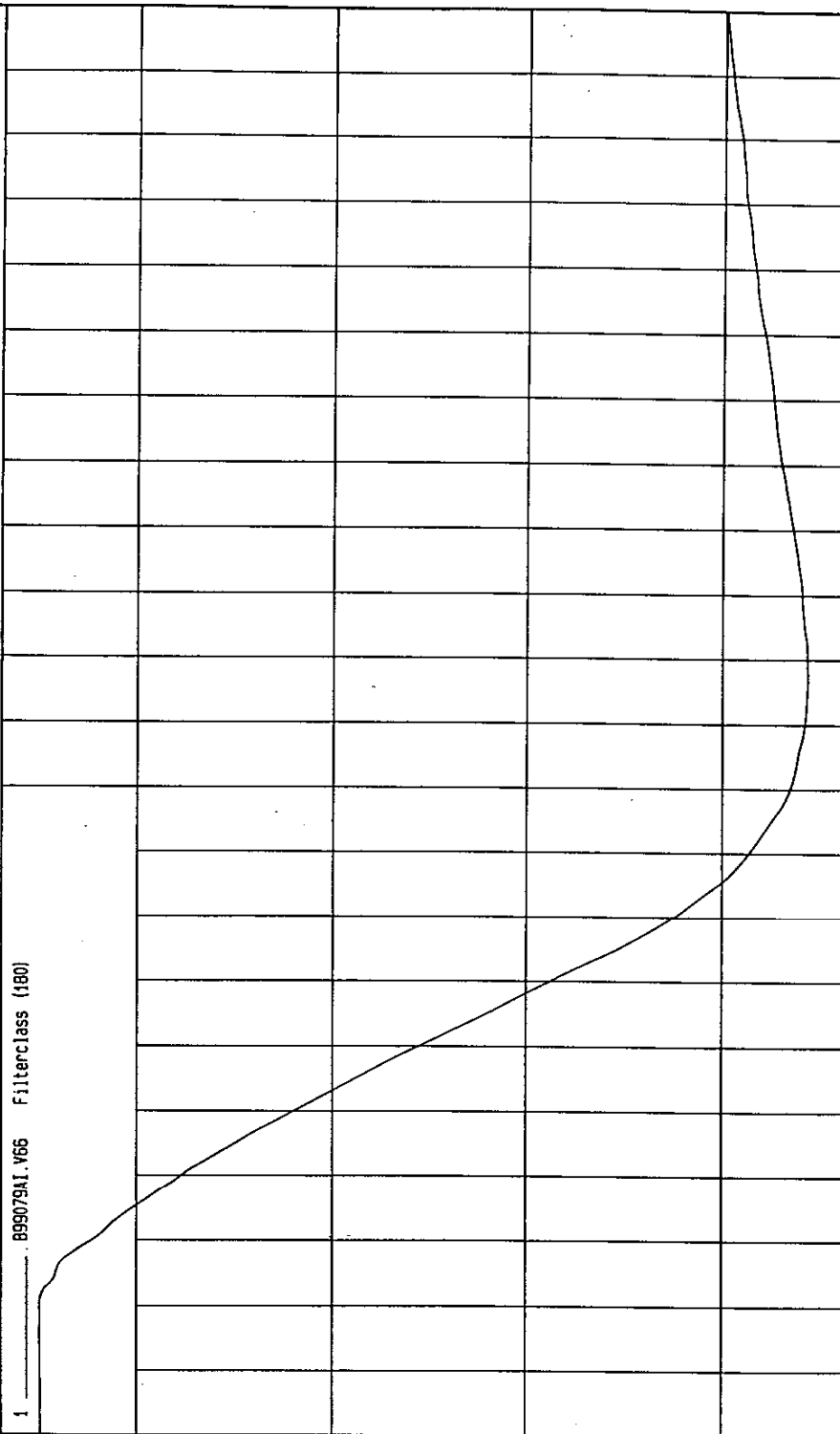
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 54.94 KPH at -5 msec

Minimum = 15.68 KPH at 96 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 ——— .B99079A1.V66 Filterclass (180)



MCA Research
12-07-1999 16:19

TIME Seconds

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.10

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

KPH

20

30

40

50

TEST: NCAP SIDE IMPACT

Speed: 38.3 MPH 61.6 KPH

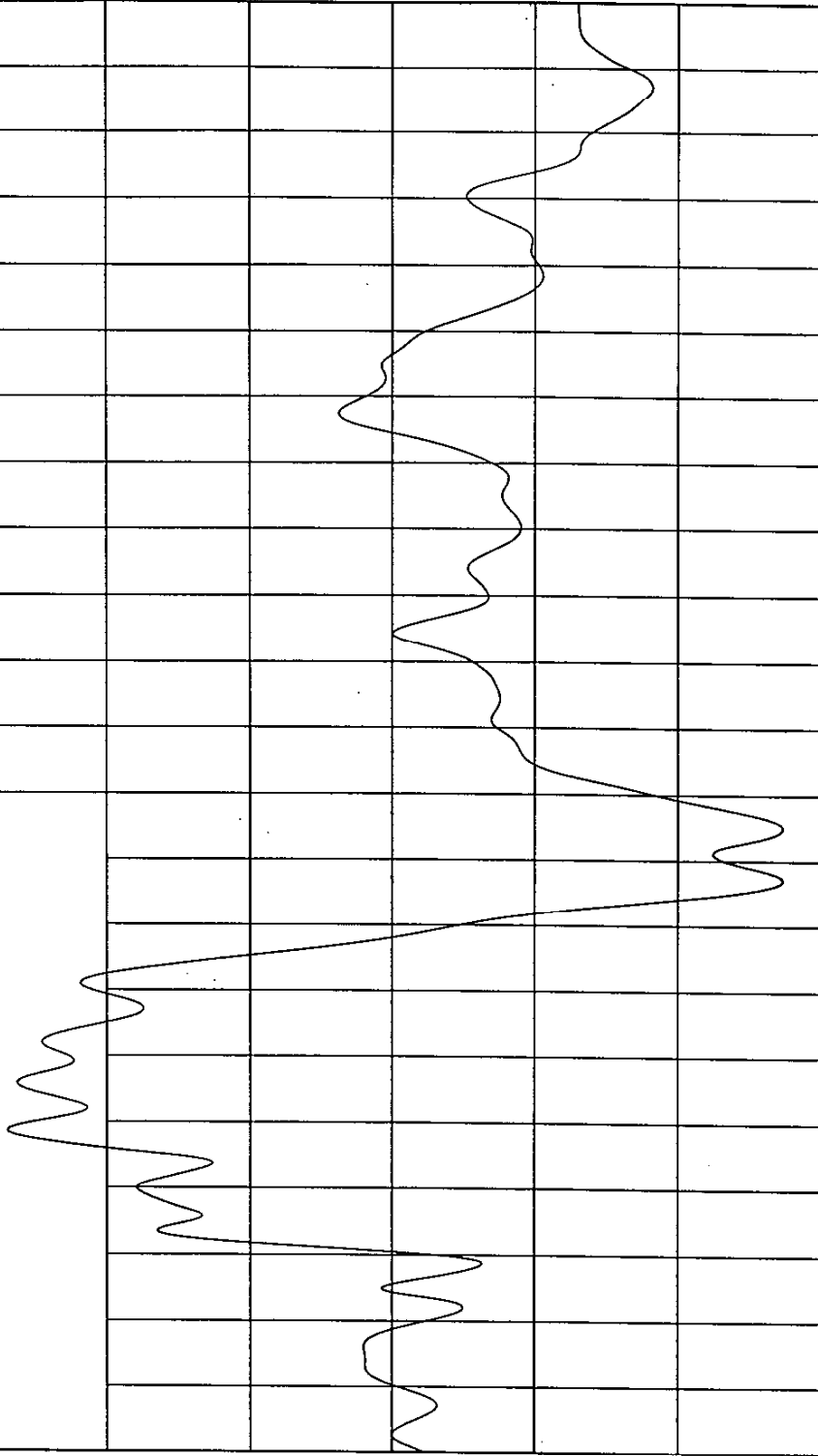
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 2.69 G'S at 20 msec

Minimum = -2.74 G'S at 67 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

1 ——— B99079AF.AG7 Filterclass (60)



TIME (SECONDS)

MGA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

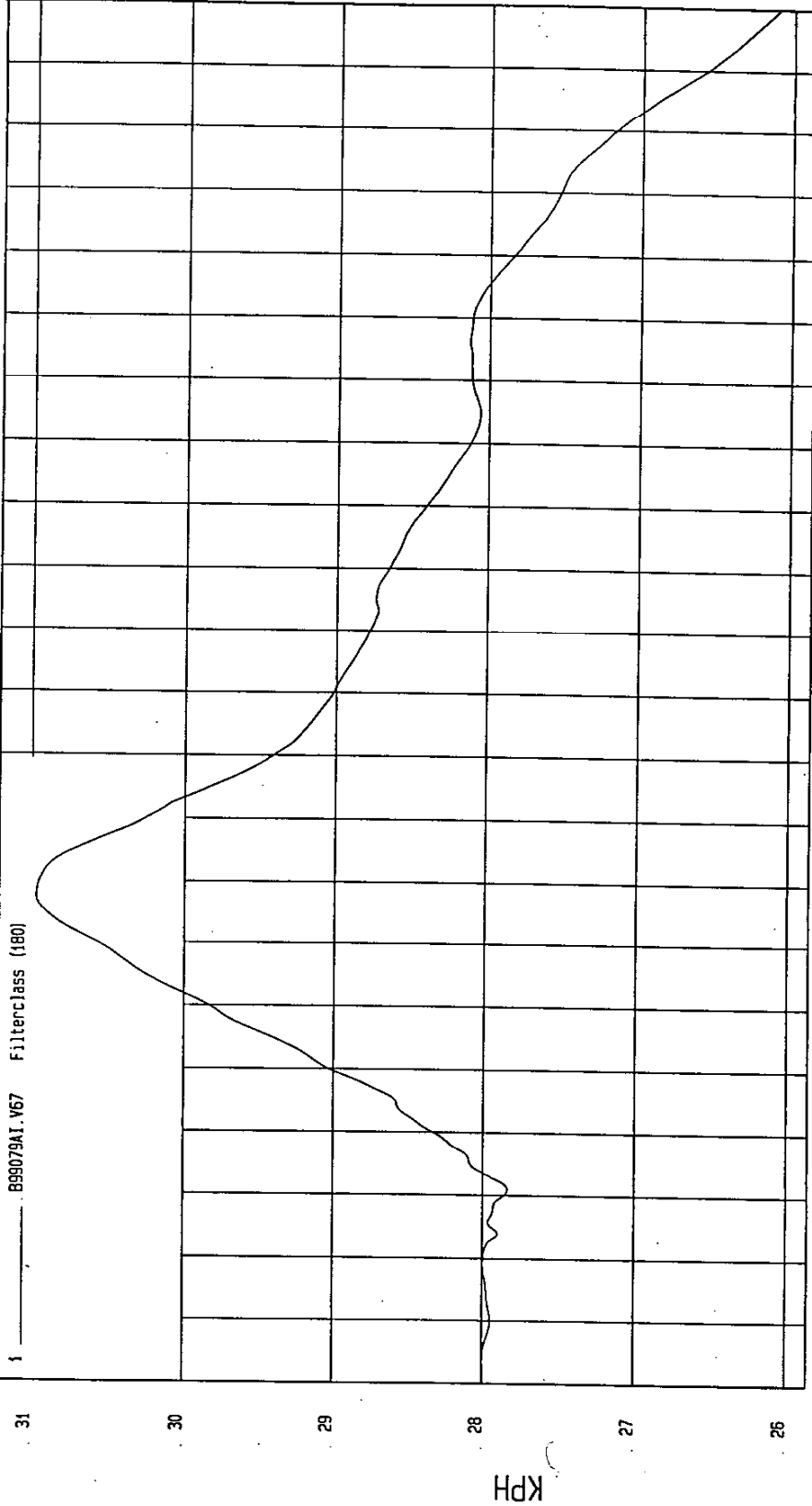
Speed: 38.3 MPH 61.6 KPH

Minimum = 26.1 KPH at 200 msec

Maximum = 30.97 KPH at 57 msec

MOVING BARRIER REAR AXLE Y VELOCITY

1 B99079A1.V67 Filterclass (180)



TIME Seconds

NSA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

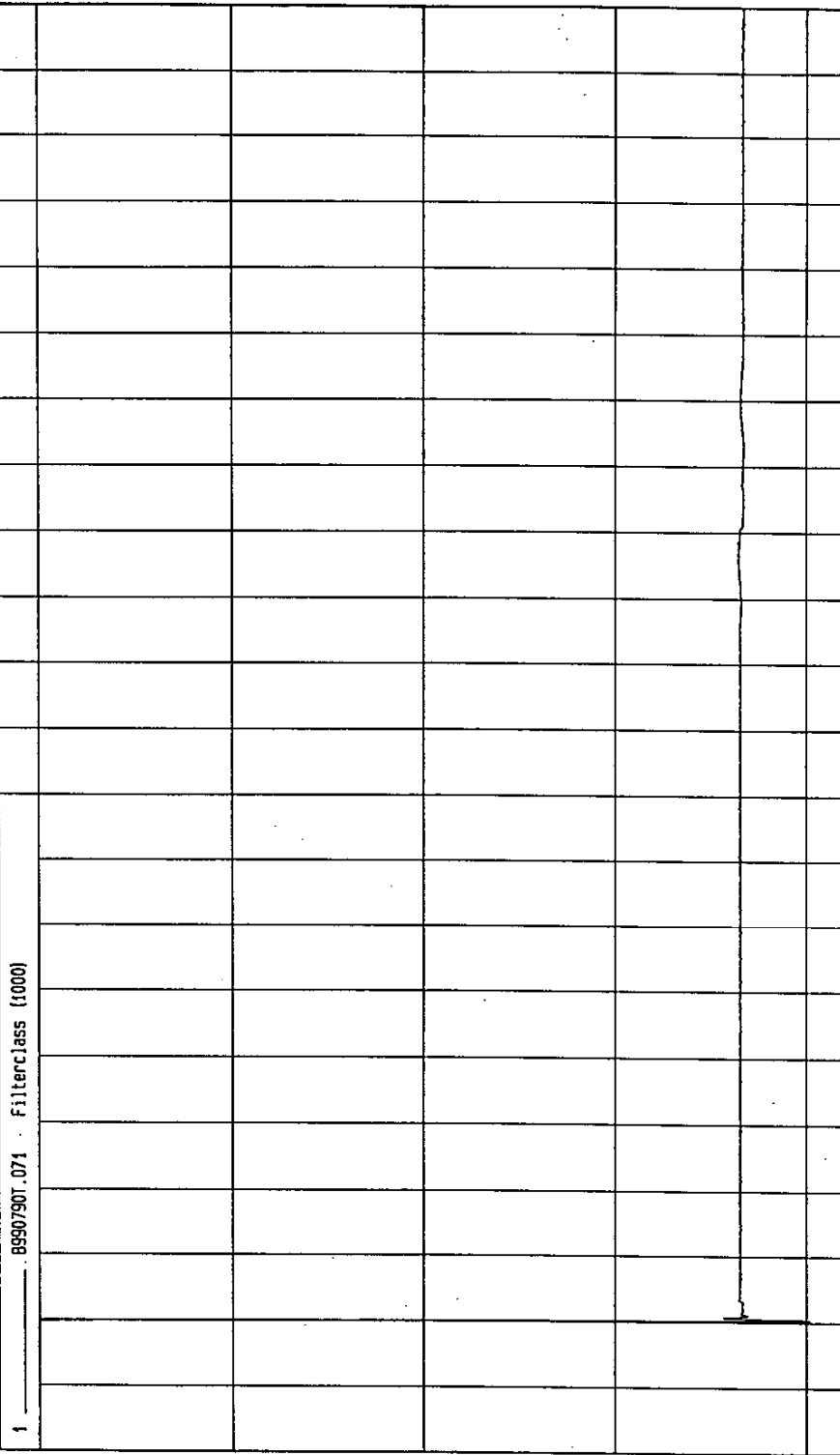
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 7.41E-03 VOLTS at -18 msec

Minimum = -4.02 VOLTS at 0 msec

LEFT BARRIER CONTACT

1 8990790T.071 Filterclass (1000)



TIME (SECONDS)

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

WCA Research
12-07-1999 16:19

VOLTS

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

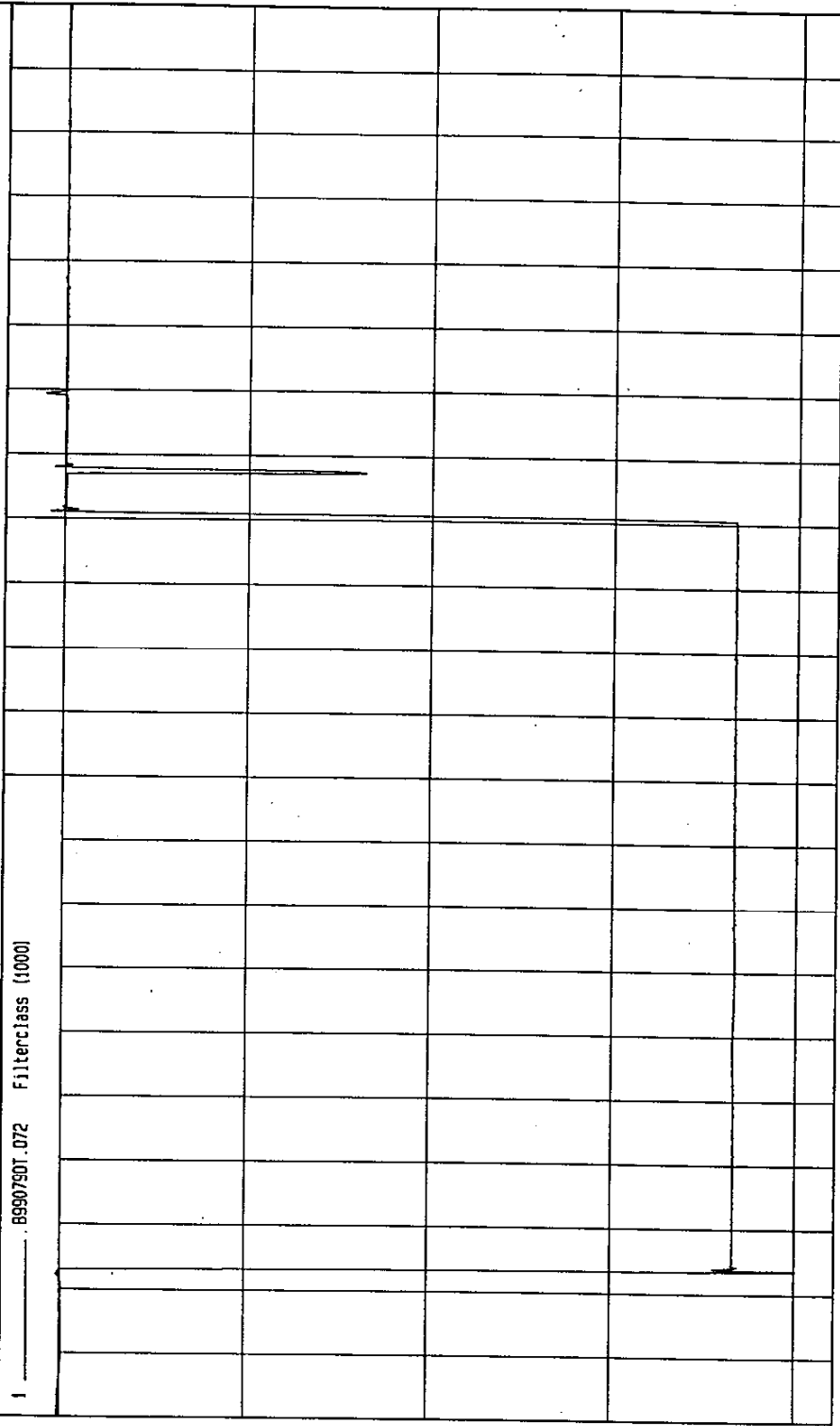
Speed: 38.3 MPH 61.6 KPH

Minimum = -4.01 VOLTS at 4 msec

Maximum = .11 VOLTS at 139 msec

RIGHT BARRIER CONTACT

1 _____ .89507501.072 Filterclass (1000)



WGA Research
12-07-1999 16:19

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

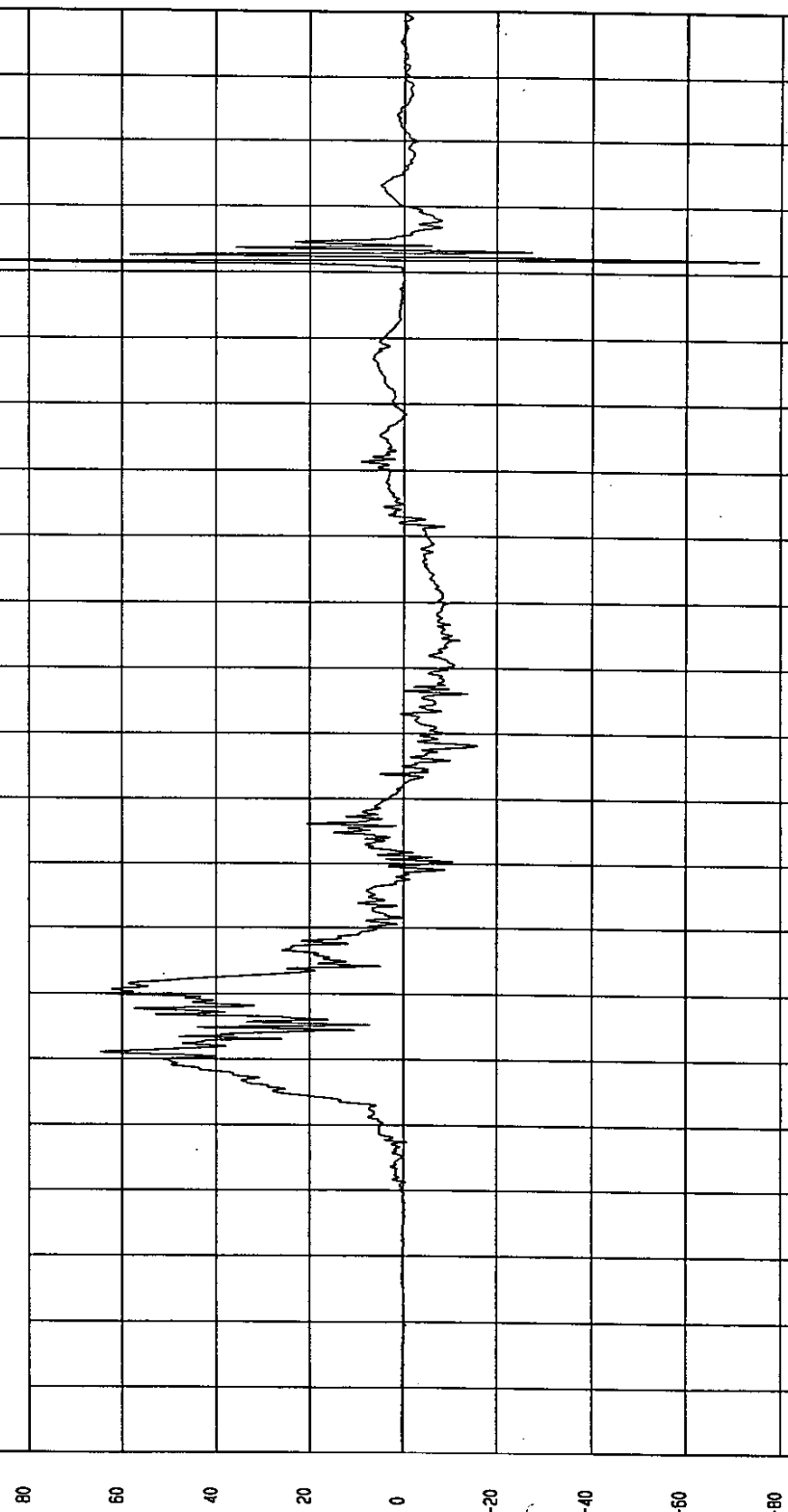
Speed: 38.3 MPH 61.6 KPH

Minimum = -75.29 G's at 162 msec

Maximum = 89.03 G's at 162 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

1 899079AT.A42 Filterclass (1000)

WCA Research
12-07-1999 16:32

TIME (SECONDS)

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

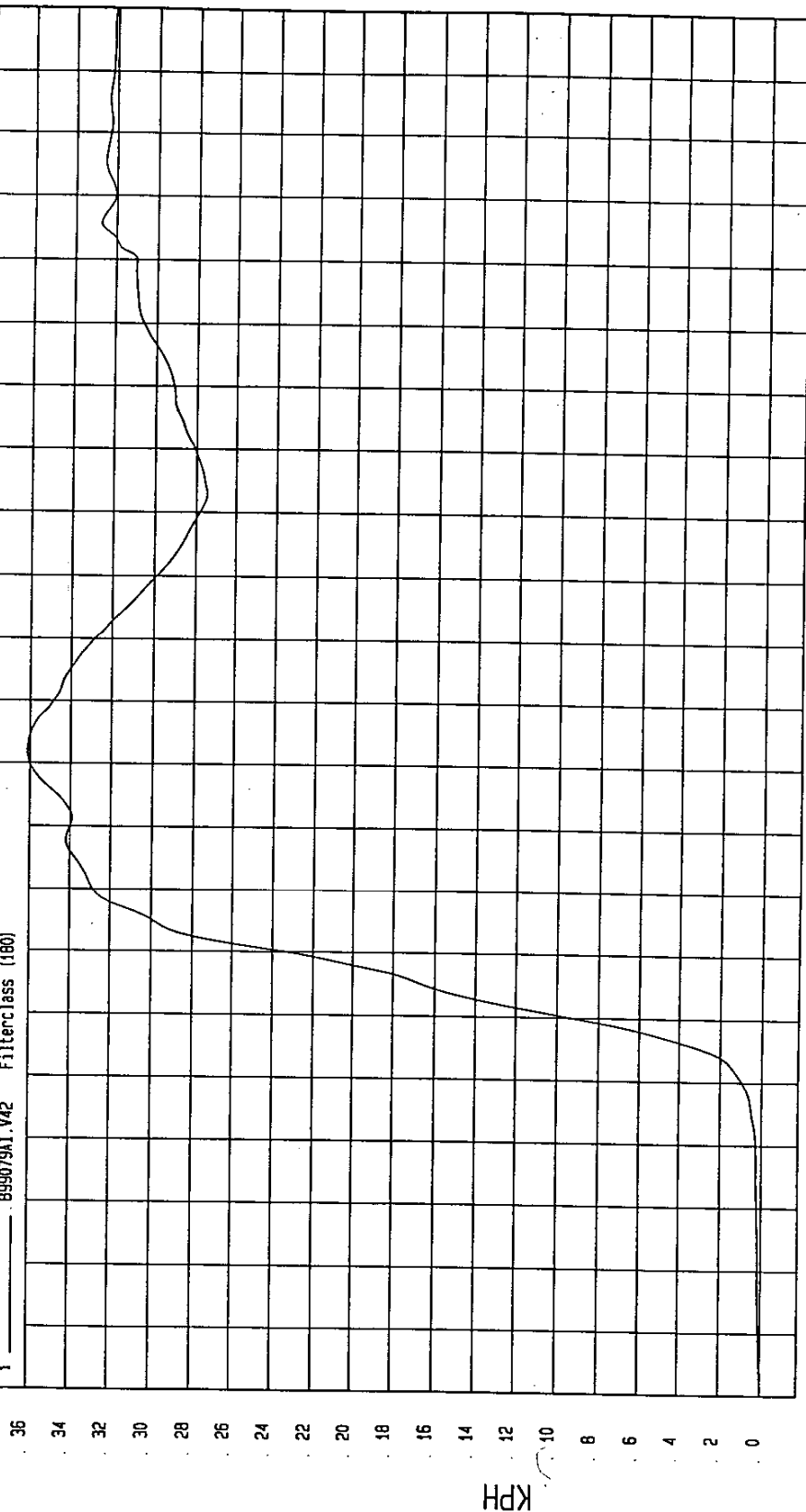
Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 36.12 KPH at 82 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

1 899079A1.V42 Filterclass (180)



NSA Research
12-07-1999 16:32

DRIVER LOWER RIB Y REDUNDANT ACCELERATION VS. TIME

NO VALID DATA COLLECTED

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

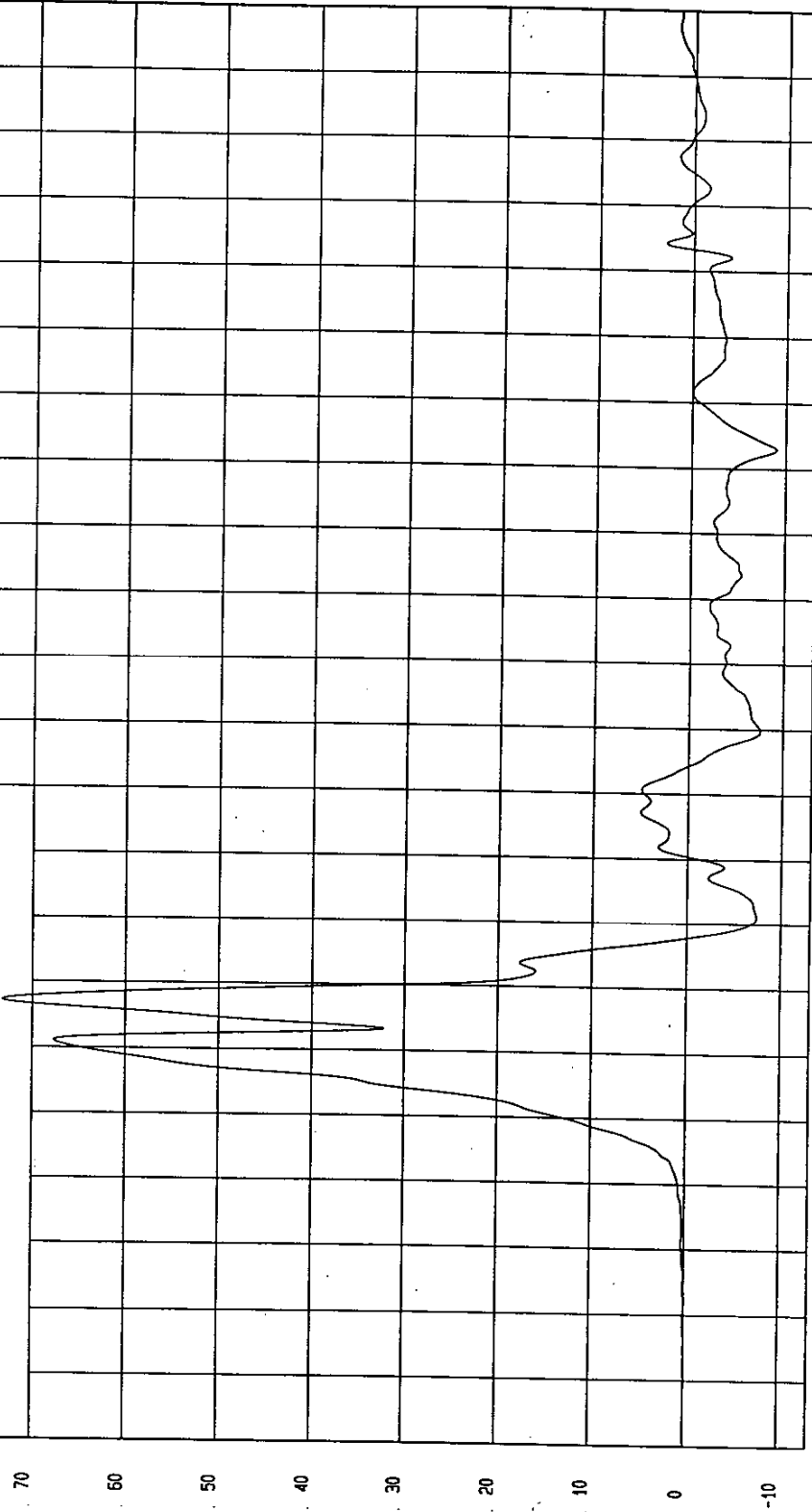
Speed: 38.3 MPH 61.6 KPH

Minimum = -9.01 G'S at 133 msec

Maximum = 73.12 G'S at 47 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 _____ B99079AF.A44 Filterclass (180)

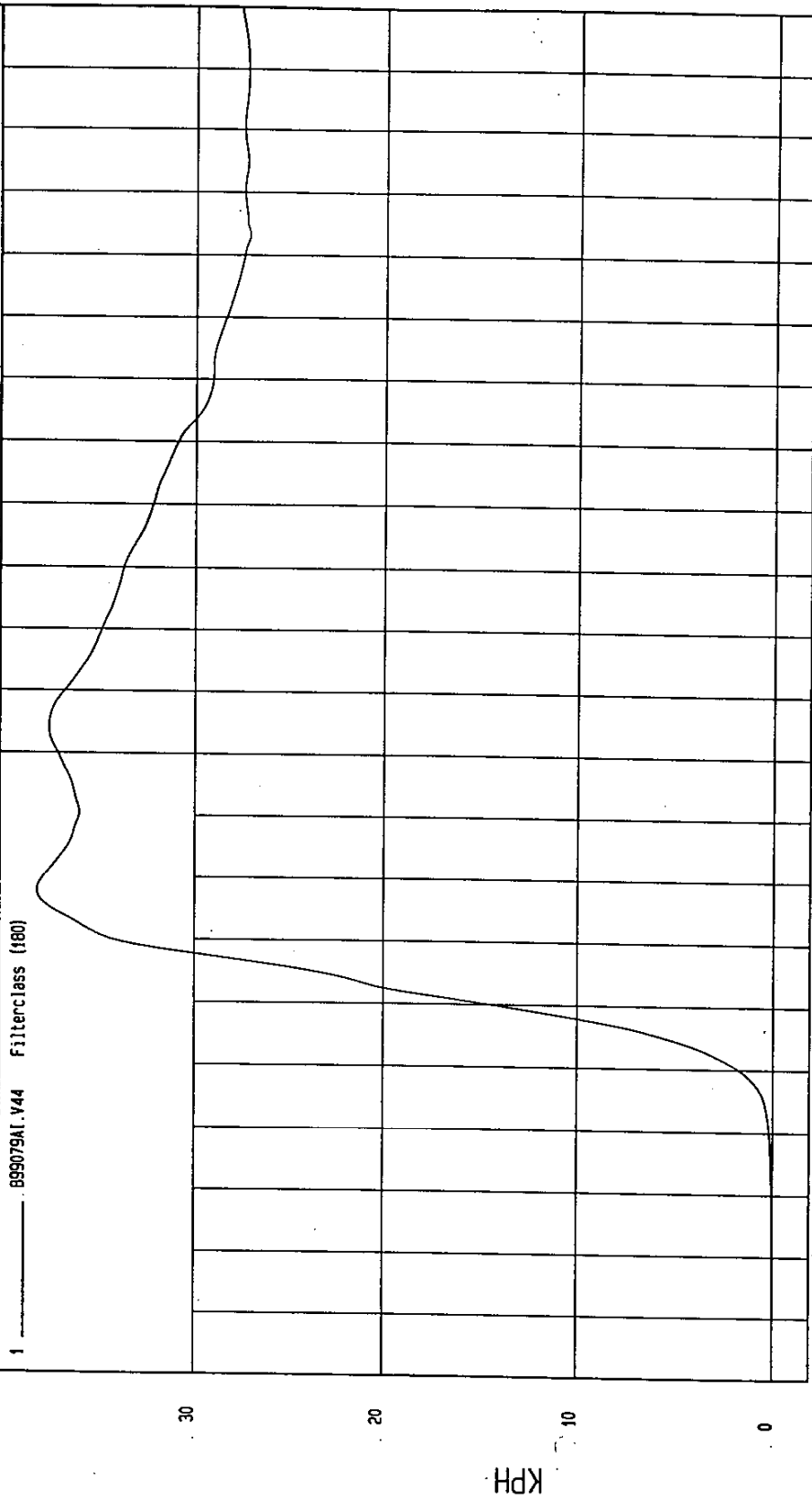


TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.89E-03 KPH at -3 msec Maximum = 38.1 KPH at 58 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY



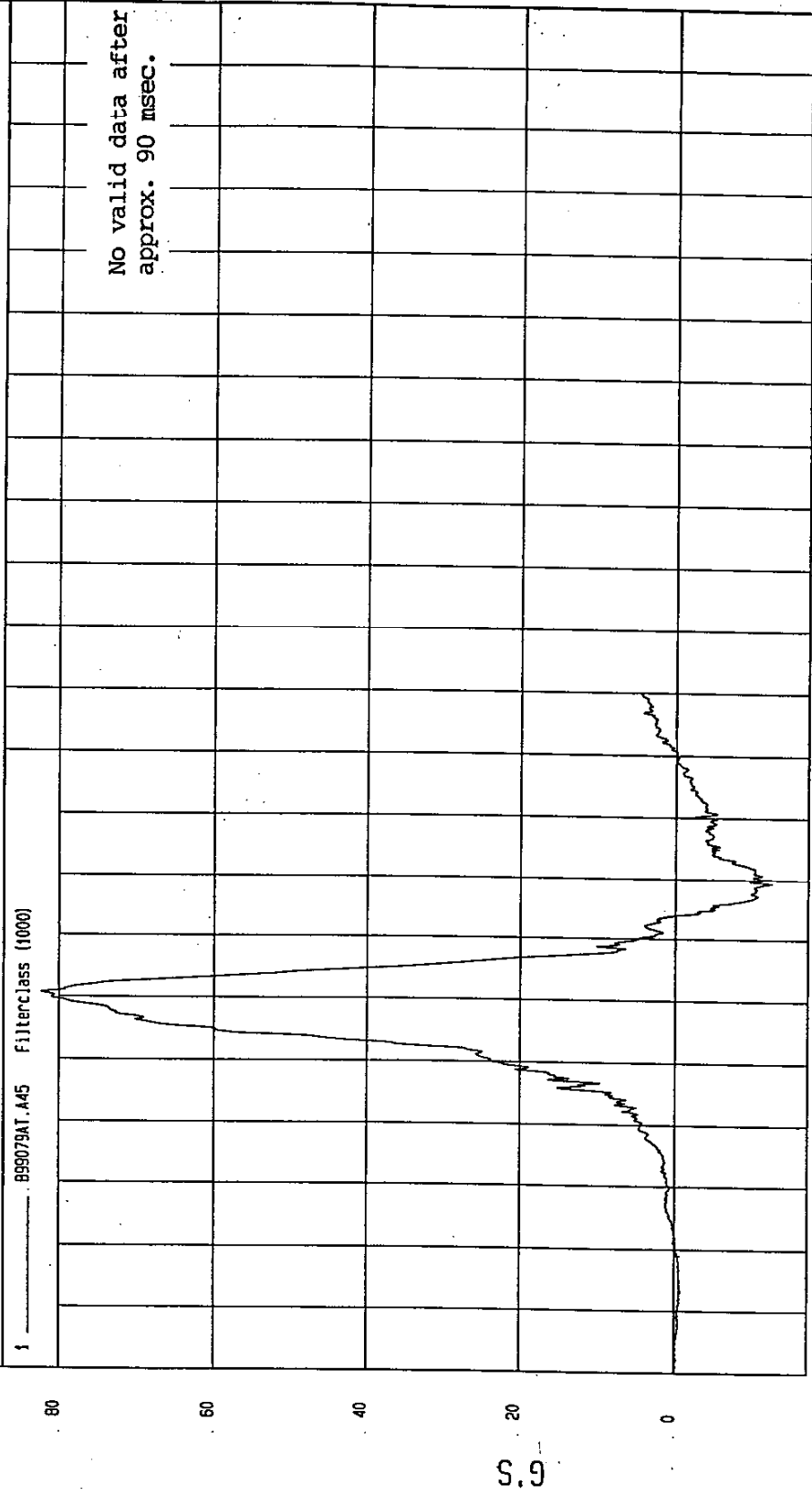
NSA Research
12-07-1999 16:33

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -12.38 G'S at 59 msec
Maximum = 82.34 G'S at 41 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



TIME (SECONDS)

WCA Research
12-07-1999 16:40

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -26 KPH at 2 msec Maximum = 38.8 KPH at 54 msec

DRIVER PELVIS Y REDUNDANT VELOCITY

40

1 899079A1.V45 Filterclass (180)



No valid data after
approx. 90 msec.

30

20

10

0

KPH

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

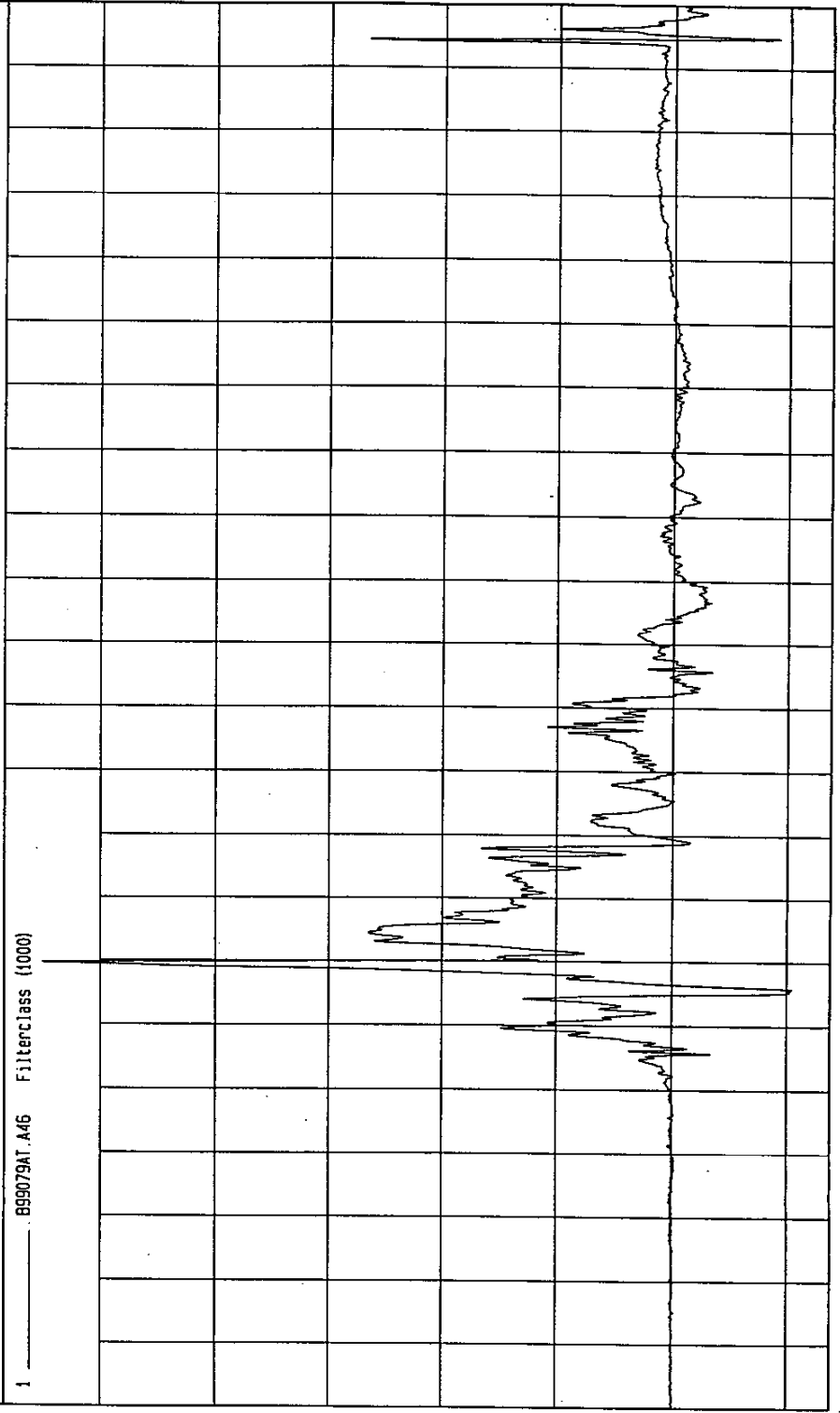
TIME Seconds

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -20.86 G'S at 46 msec Maximum = 110.14 G'S at 50 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION



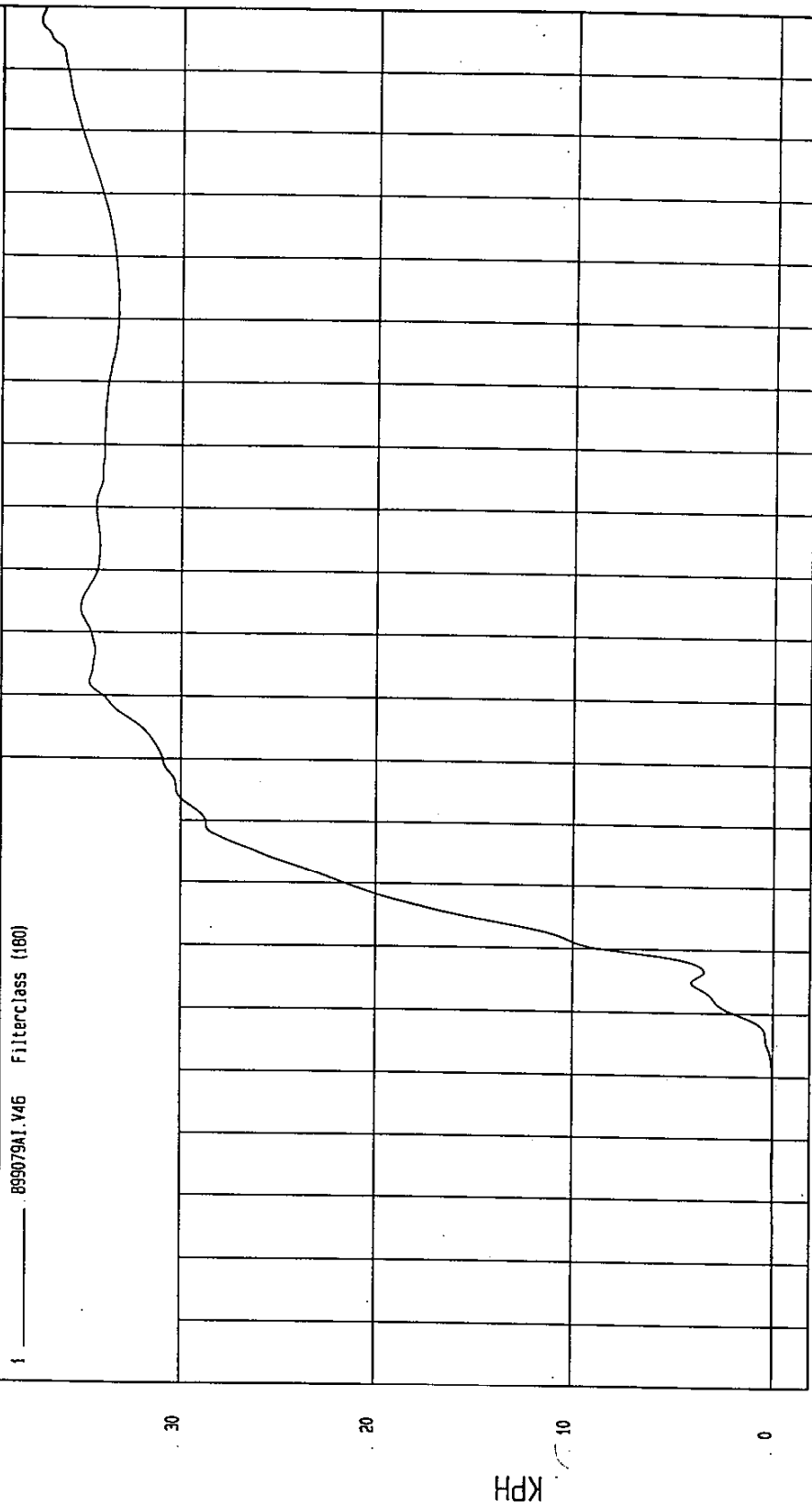
WCA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -.01 KPH at -.11 msec Maximum = 37.14 KPH at 198 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY



TIME Seconds

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

MCA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -40.25 G'S at 44 msec

Maximum = 95.39 G'S at 48 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 .B99079AT.A47 Filterclass (1000)

100

80

60

40

20

G.S

0

-20

-40

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

MSA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

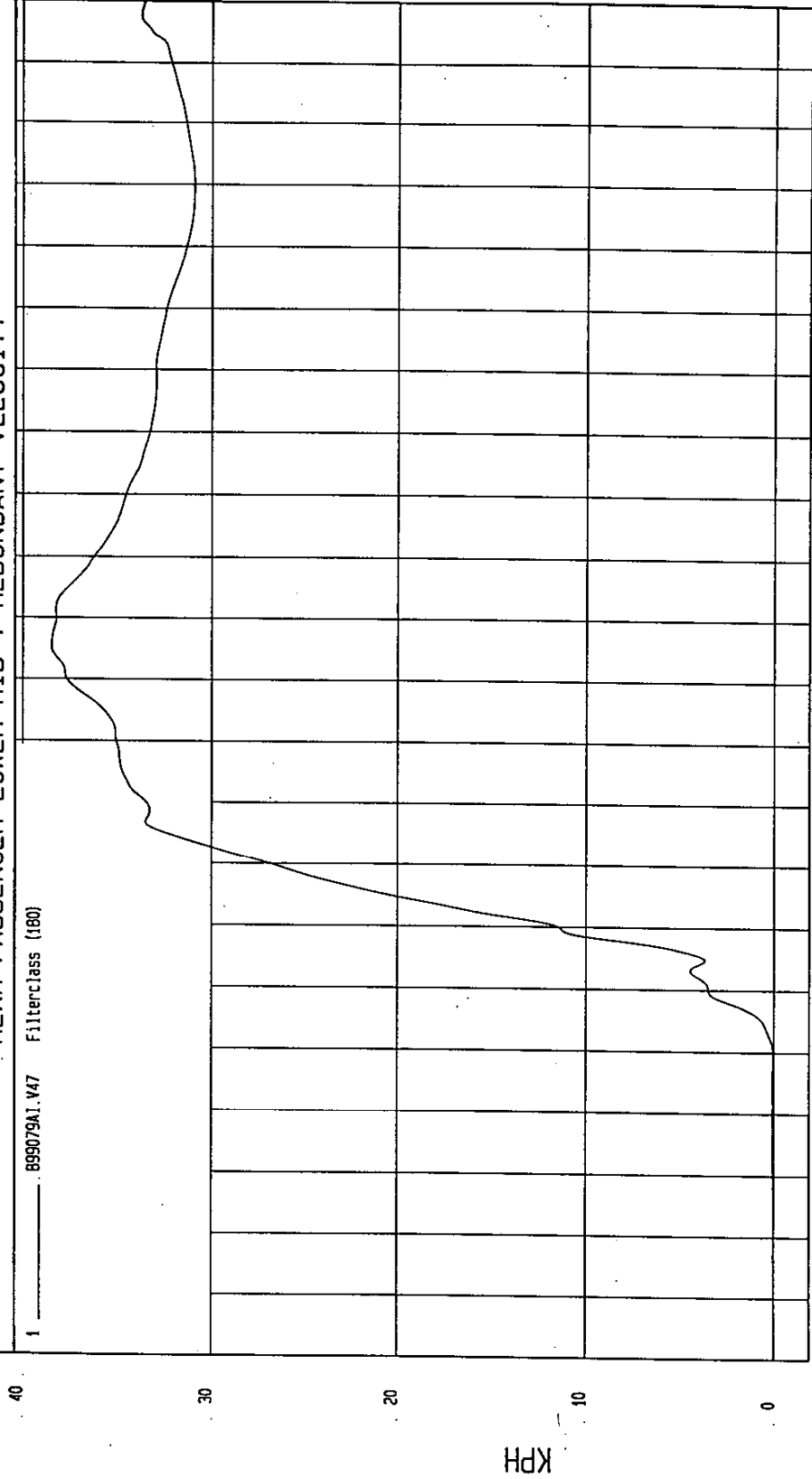
Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 38.48 KPH at 95 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY

1 899079A1.V47 FilterClass (180)



MGA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT

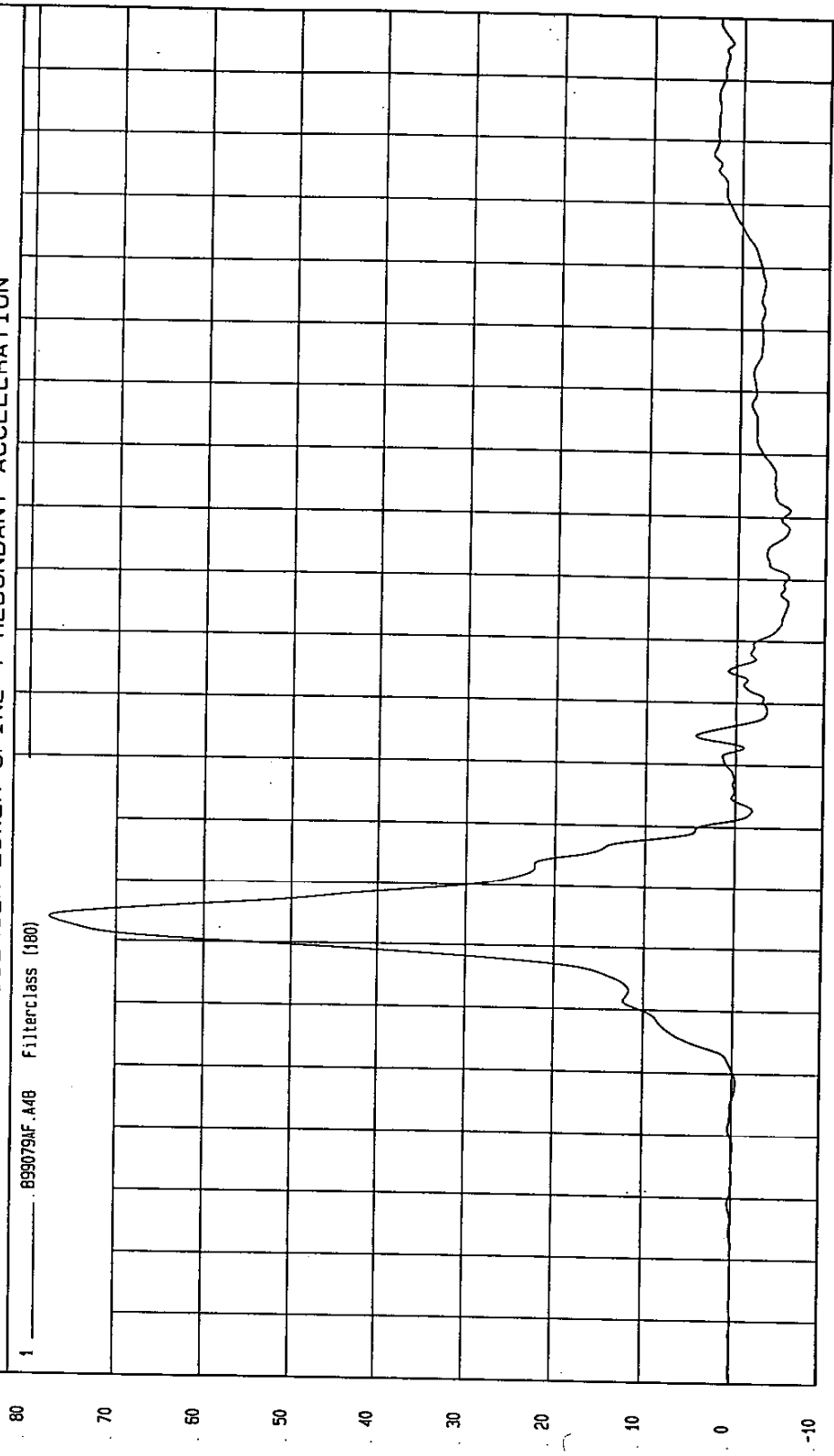
TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.93 G'S at 121 msec Maximum = 77.61 G'S at 54 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 899079AF.A4B Filterclass (180)



TIME (SECONDS)

NCA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 36.37 KPH at 86 msec

Minimum = -1.17E-04 KPH at -20 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

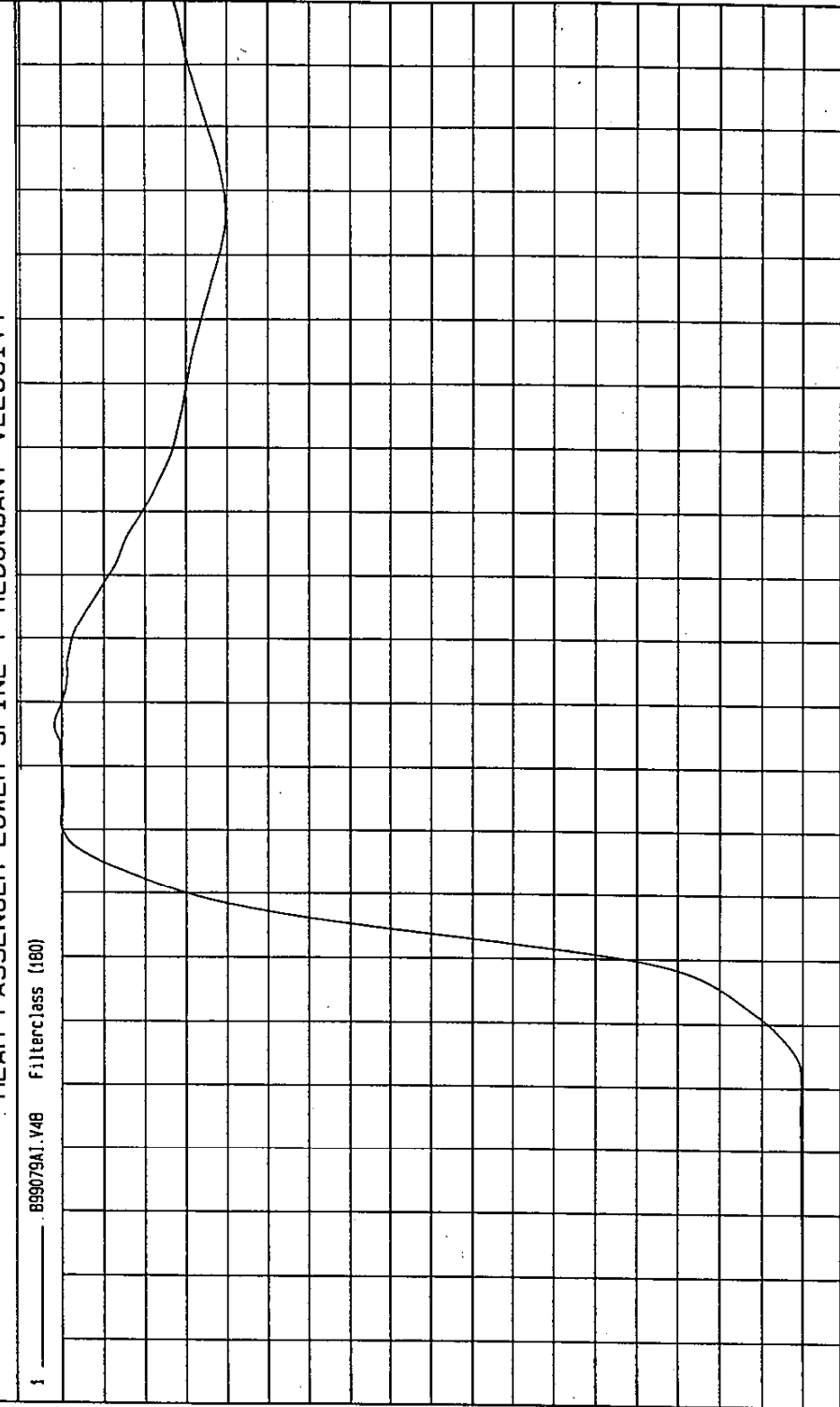
1 B99079A1.V48 Filterclass (180)

KPH

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

TIME Seconds

0.02 0.01 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9



MOA Research
12-07-1999 16:30

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -11.41 G's at 104 msec

Maximum = 135.11 G's at 48 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 _____ 899079AT.A49 Filterclass (1000)

140

120

100

80

60

40

20

0

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

NSA Research
12-07-1999 16:30

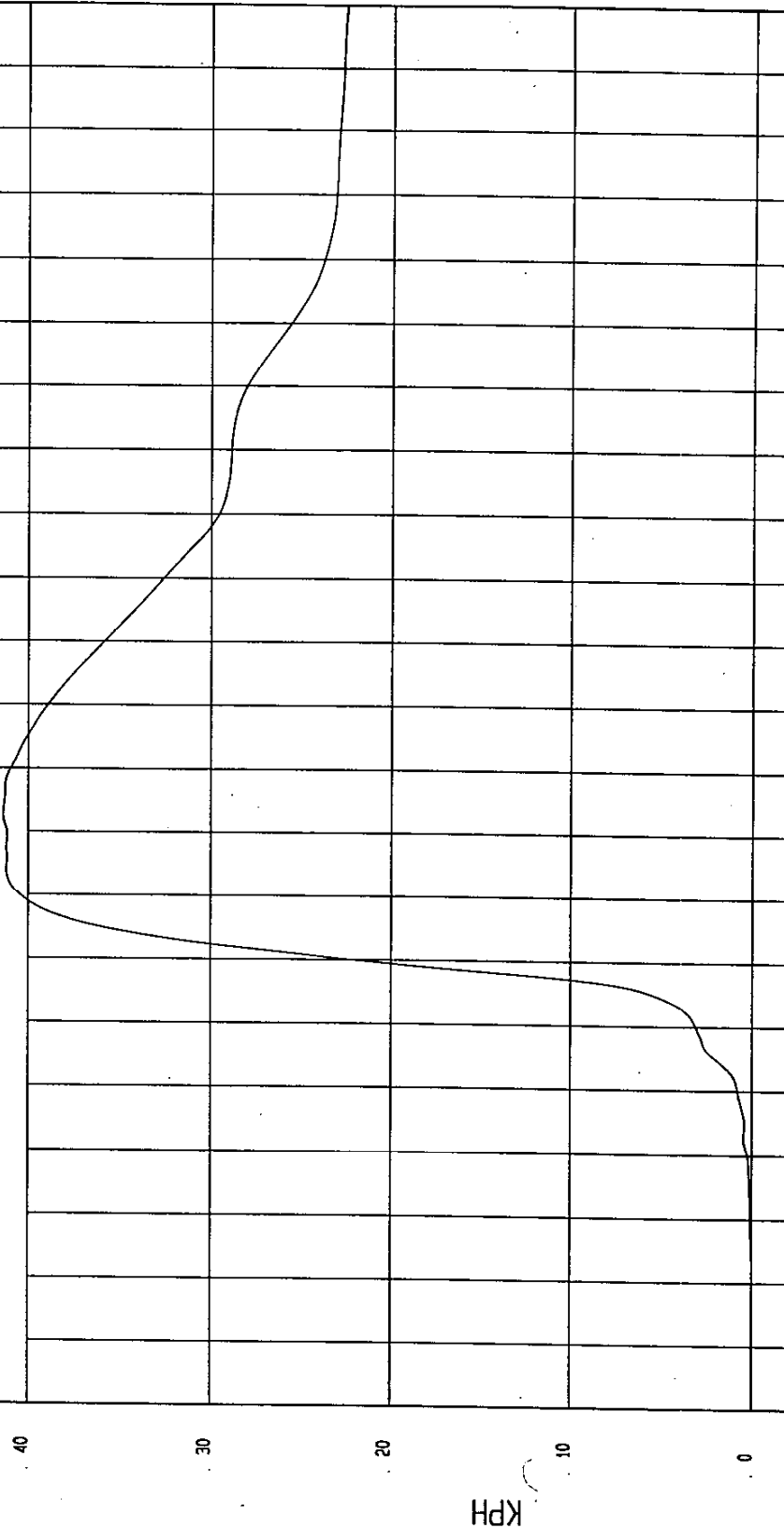
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.52E-03 KPH at -17 msec Maximum = 41.35 KPH at 73 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

1 B99079A1.V49 Filterclass (180)



WCA Research
12-07-1999 16:30

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

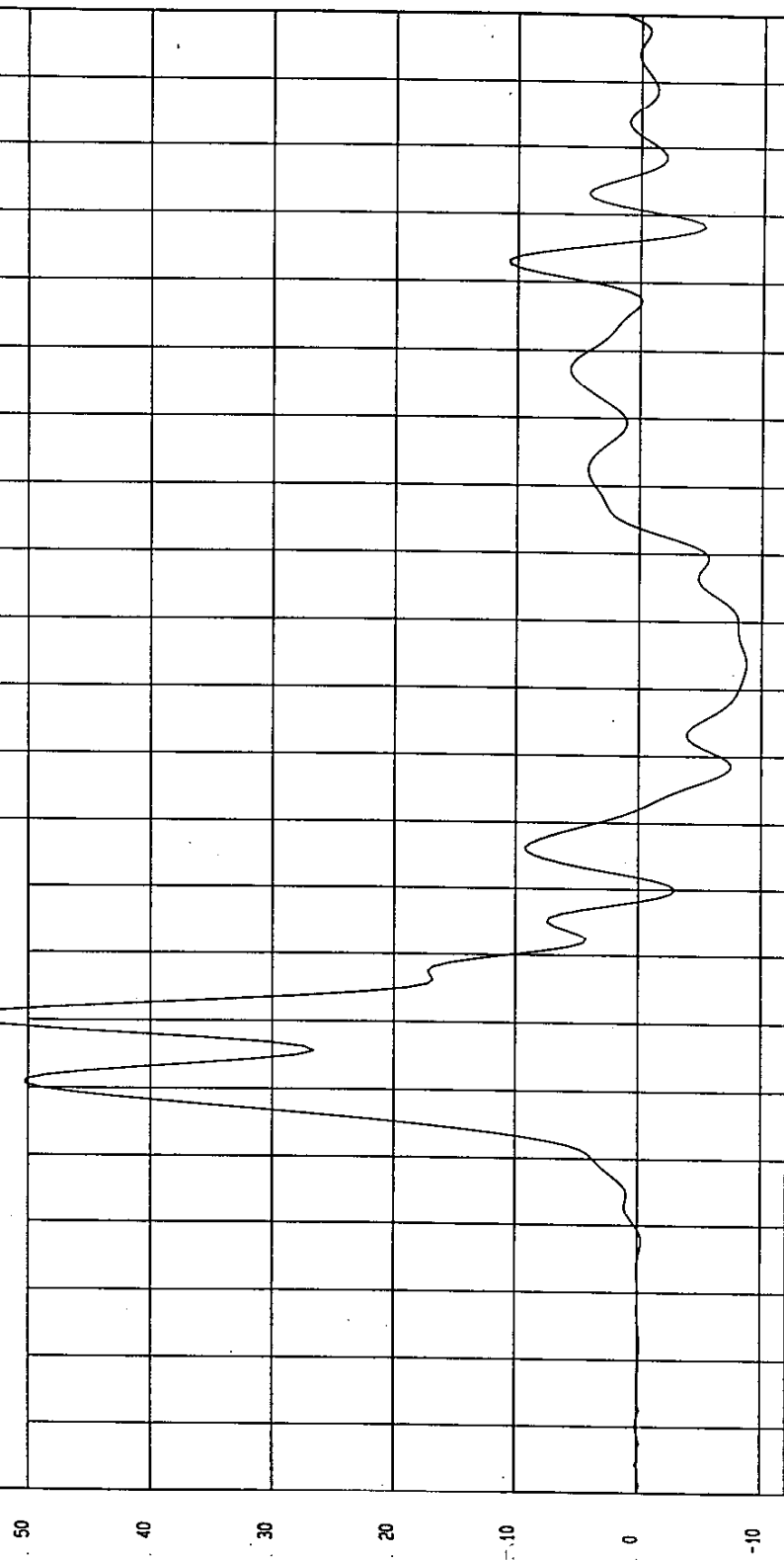
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.78 G'S at 104 msec Maximum = 56.07 G'S at 51 msec

DRIVER UPPER RIB Y ACCELERATION

1 099079F1.R15 Filterclass (FIR Filtered)



TIME (SECONDS)

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

56.07 G'S at 51 msec

Minimum = -8.78 G'S at 104 msec

099079F1.R15 Filterclass (FIR Filtered)

1

50
40
30
20
10
0
-10

G's

NGA Research
12-07-1999 15:50

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

SPEED: 38.3 MPH 61.6 KPH

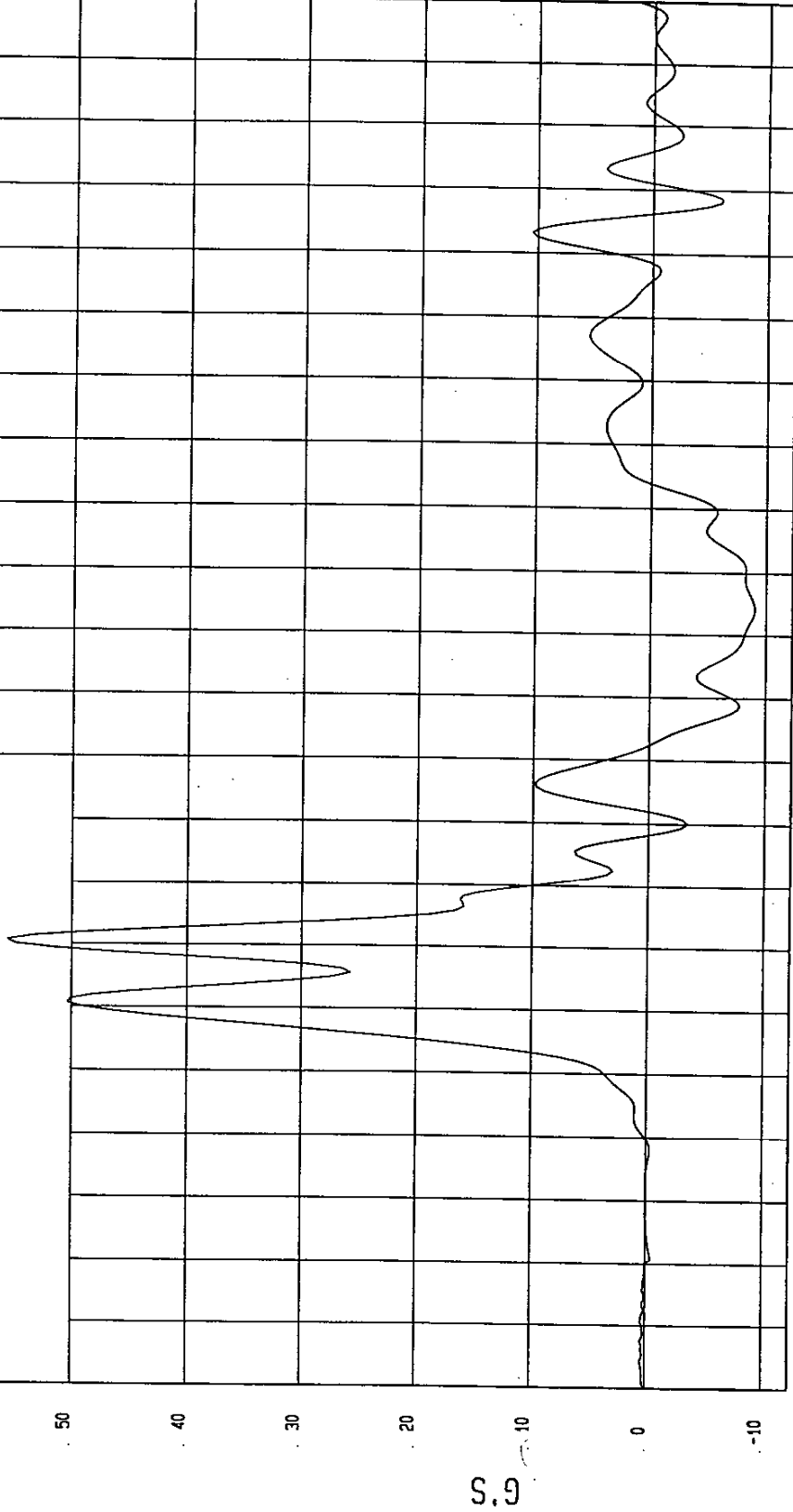
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 55.49 G'S at 51 msec

Minimum = -9 G'S at 104 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

1 899079FI.R42 Filterclass (FIR Filtered)



TIME (SECONDS)

MSA Research
12-07-1999 15:50

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

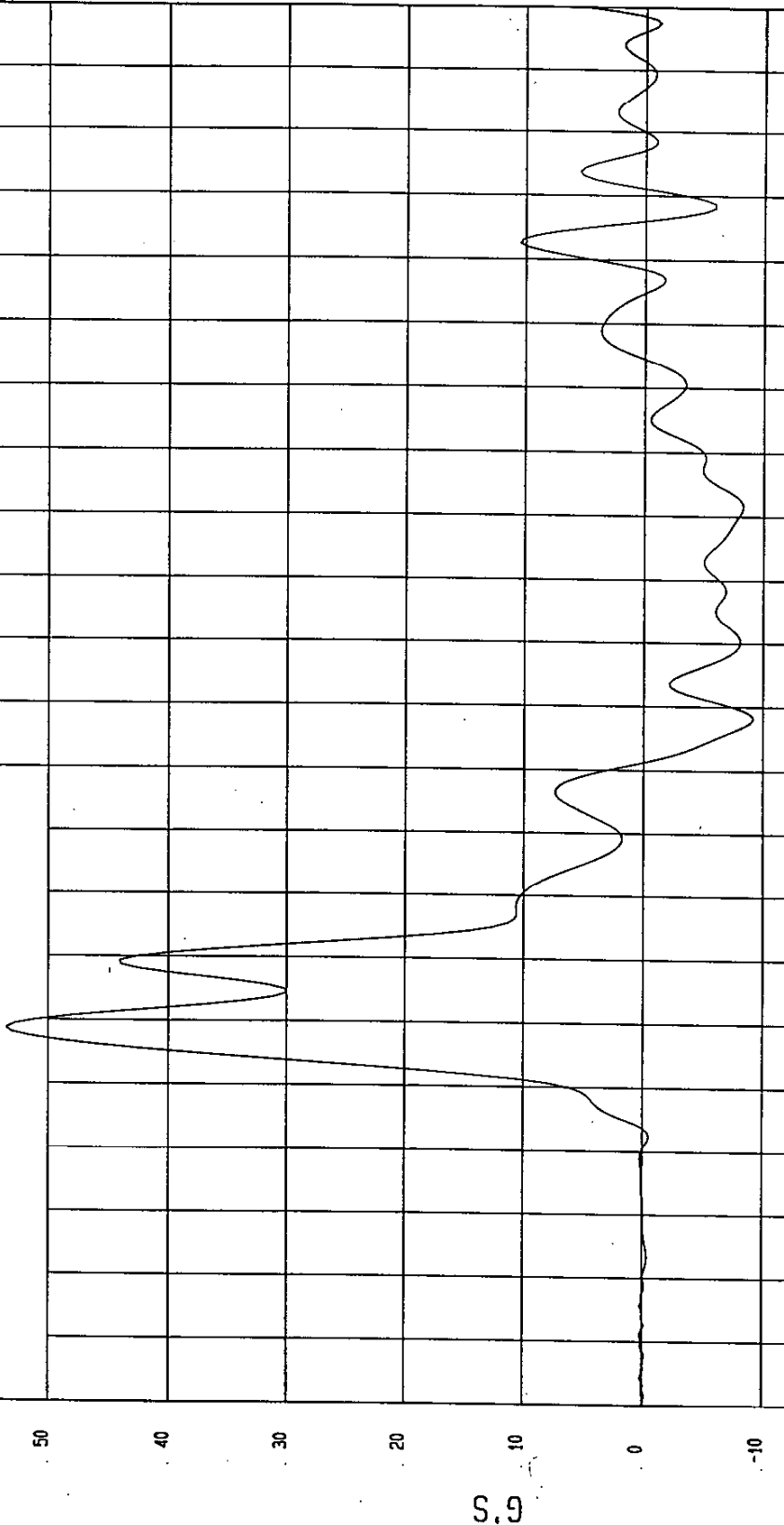
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 53.42 G'S at 39 msec

Minimum = -9.21 G'S at 88 msec

DRIVER LOWER RIB Y ACCELERATION

1 899079F1.R16 FilterClass (FIR Filtered)



SEA Research
12-07-1999 15:50

TIME (SECONDS)

DRIVER LOWER RIB Y REDUNDANT VS. TIME

NO VALID DATA COLLECTED

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

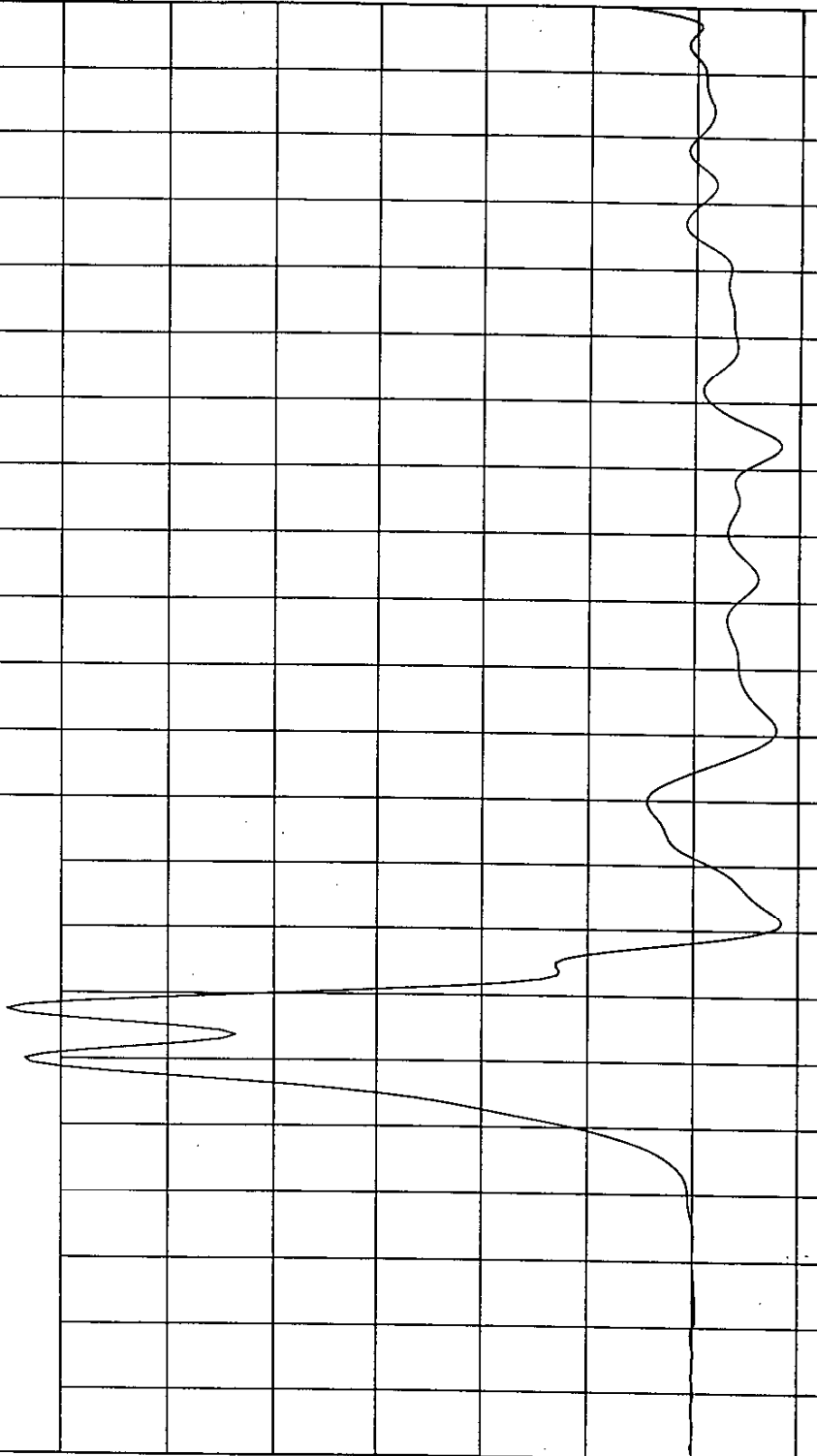
COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 65.13 G'S at 48 msec

Minimum = -8.46 G'S at 61 msec

DRIVER LOWER SPINE Y ACCELERATION

1 B99079F1.R17 Filterclass (FIR Filtered)



MCA Research
12-07-1999 15:50

TIME (SECONDS)

G.S

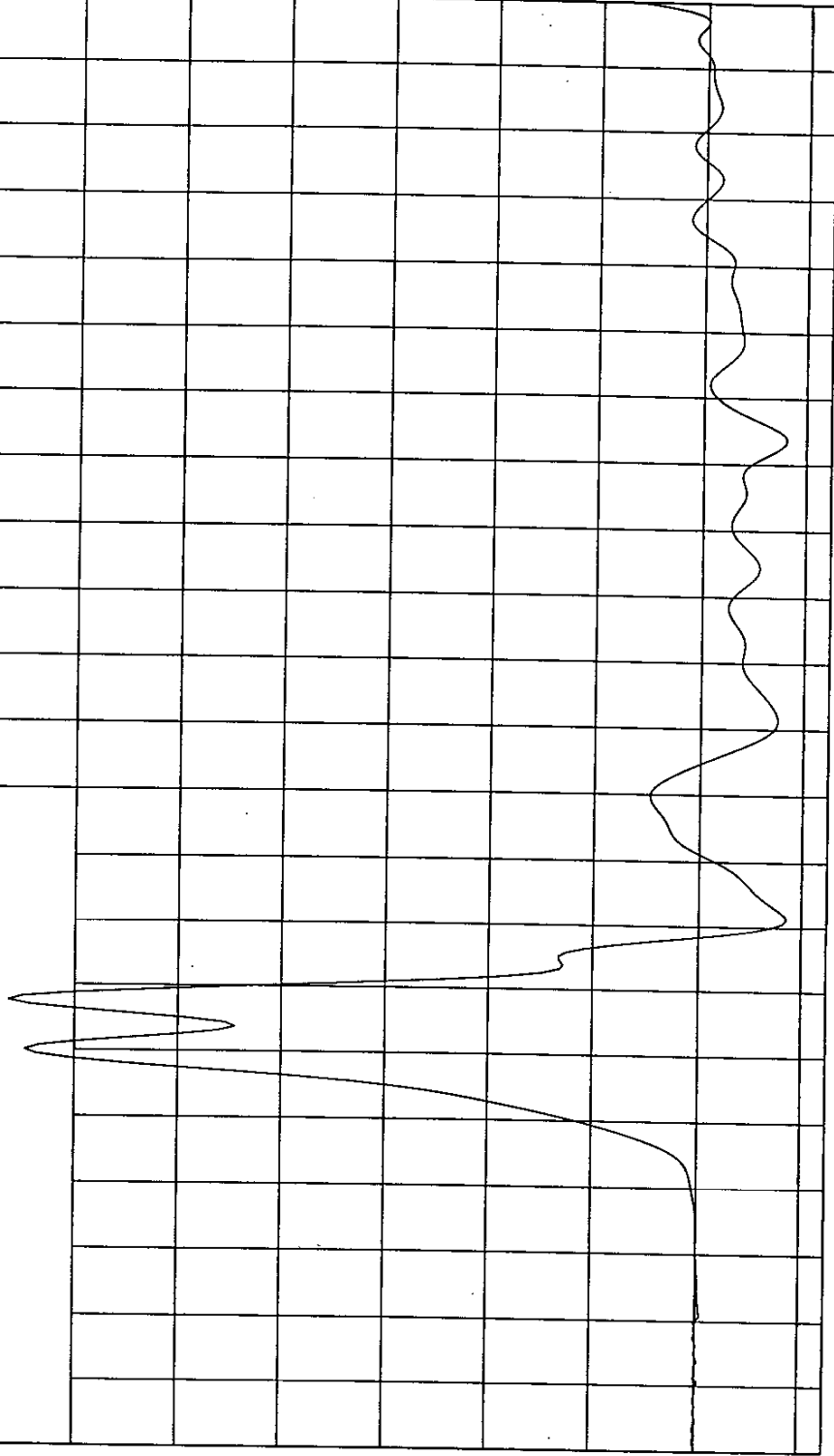
TEST: NCAP SIDE IMPACT TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.56 G'S at 61 msec
Maximum = 66.34 G'S at 48 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 ——— .899079F1.R44 FilterClass (FIR Filtered)



MOA Research
12-07-1999 15:50

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

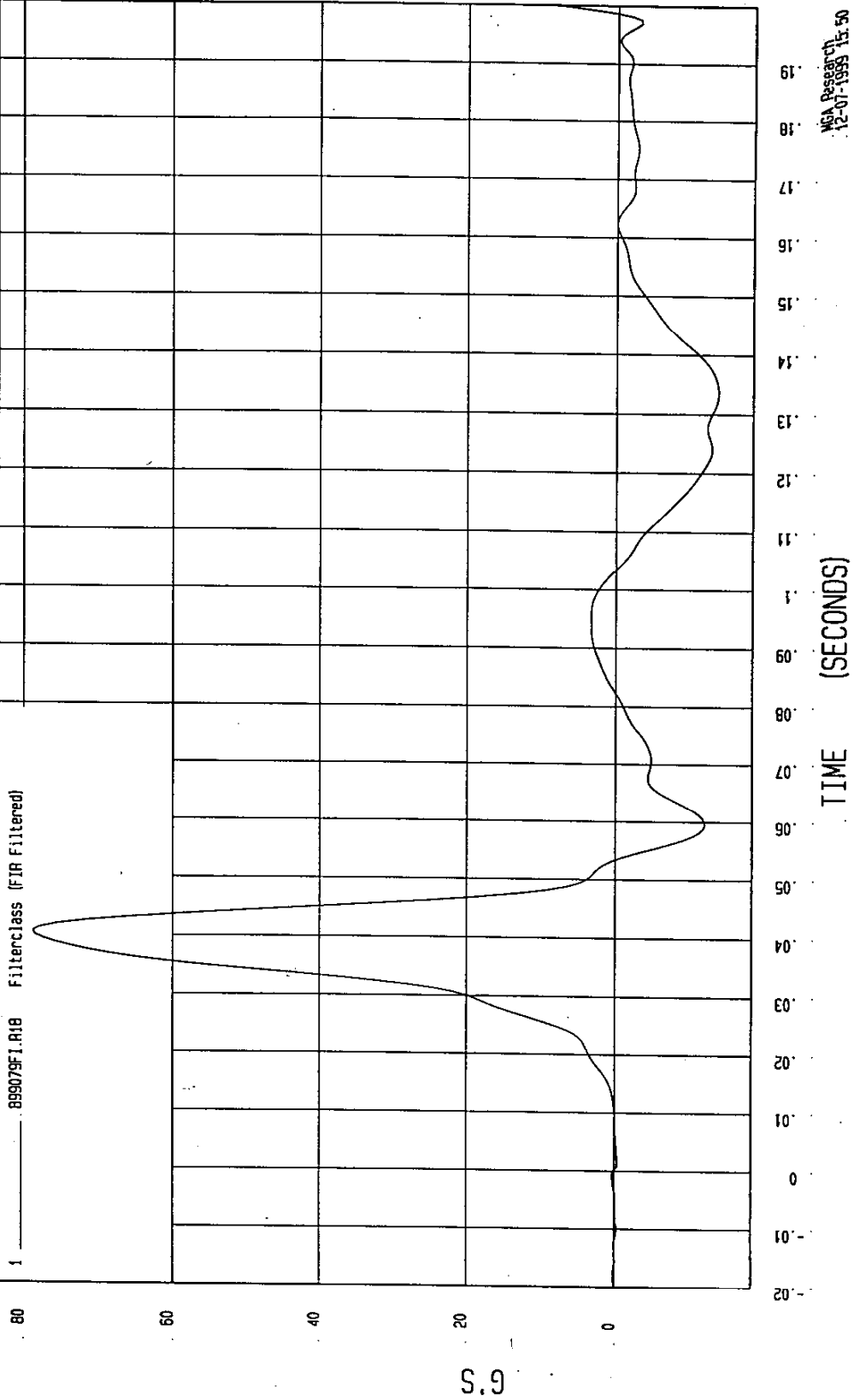
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 78.8 G'S at 41 msec

Minimum = -13.6 G'S at 134 msec

DRIVER PELVIS Y ACCELERATION



NGA Research
12-07-1999 15:50

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -12.48 G'S at 59 msec

Maximum = 79.2 G'S at 41 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

1 899079FI.R45 Filterclass (FIR Filtered)

No valid data after
approx. 90 msec.

80

60

40

20

0

G.S

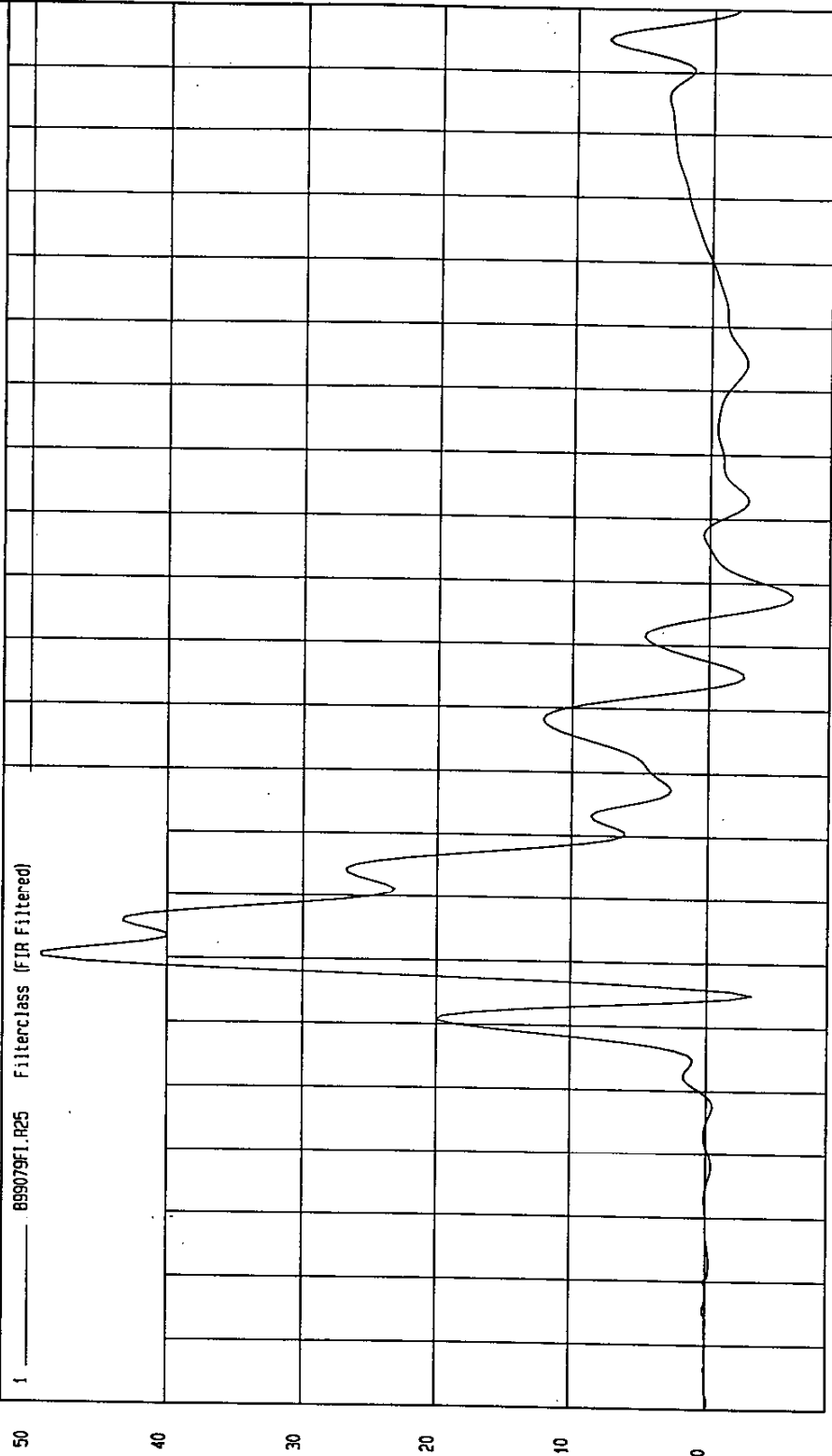
TIME (SECONDS)

McGraw-Hill Research
12-07-1999 16:40

B-126

TEST: NCAP SIDE IMPACT
 TEST DATE: 12-07-1999
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Speed: 38.3 MPH 61.6 KPH
 Minimum = -6.02 G'S at 108 msec
 Maximum = 49.2 G'S at 51 msec

REAR PASSENGER UPPER RIB Y ACCELERATION



MCA Research
 12-07-1999 15:51

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -5.77 G's at 108 msec

Maximum = 48.19 G's at 51 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 899079F1.R46 Filterclass (FIR Filtered)

50

40

30

20

10

0

G's

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

MGA Research
12-07-1999 15:51

B-128

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

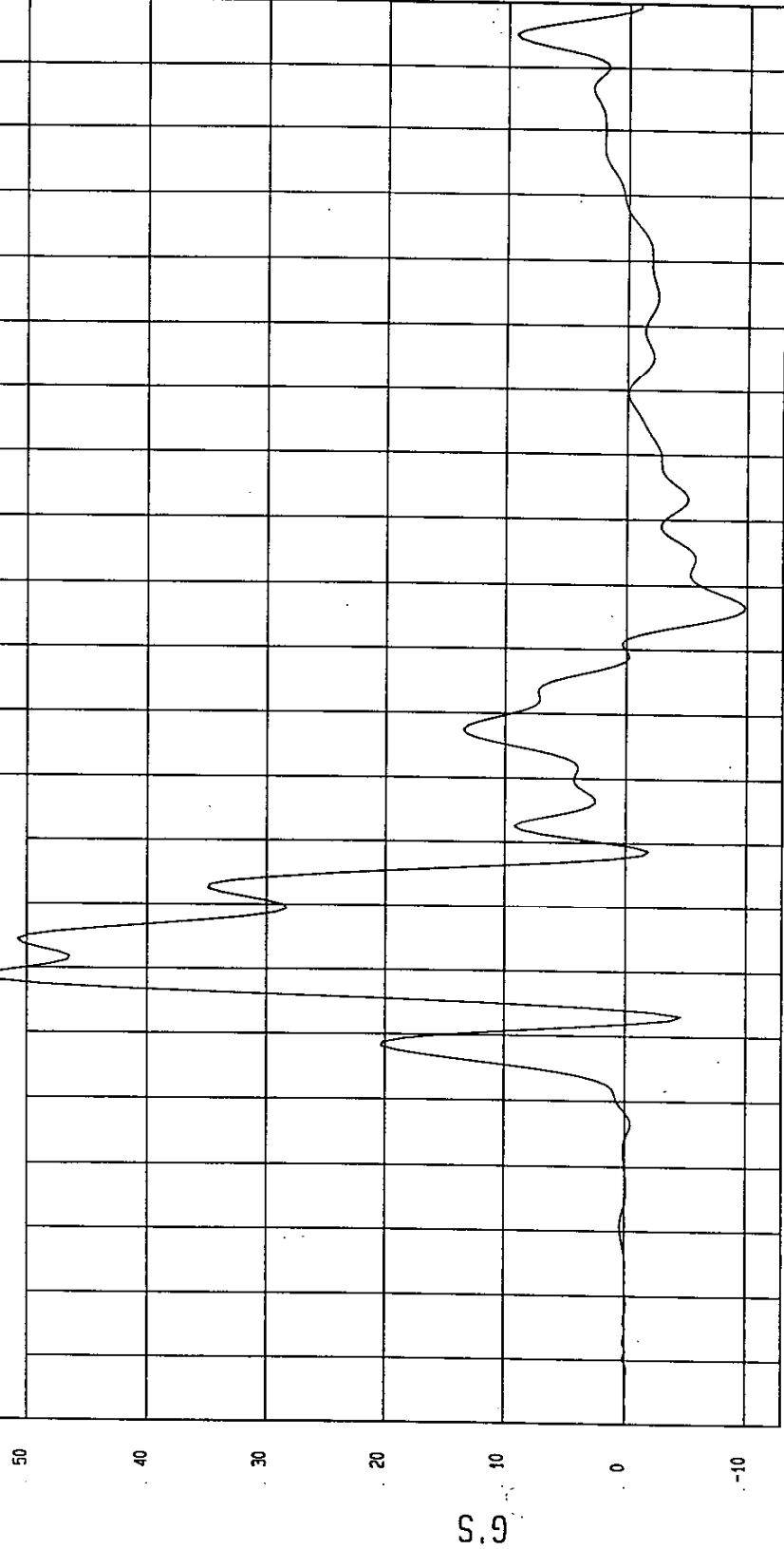
Speed: 38.3 MPH 61.6 KPH

Minimum = -9.82 G'S at 107 msec

Maximum = 53.73 G'S at 49 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 _____ B9907961.R26 FilterClass (FIR Filtered)



NSA Research
12-07-1999 15:51

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

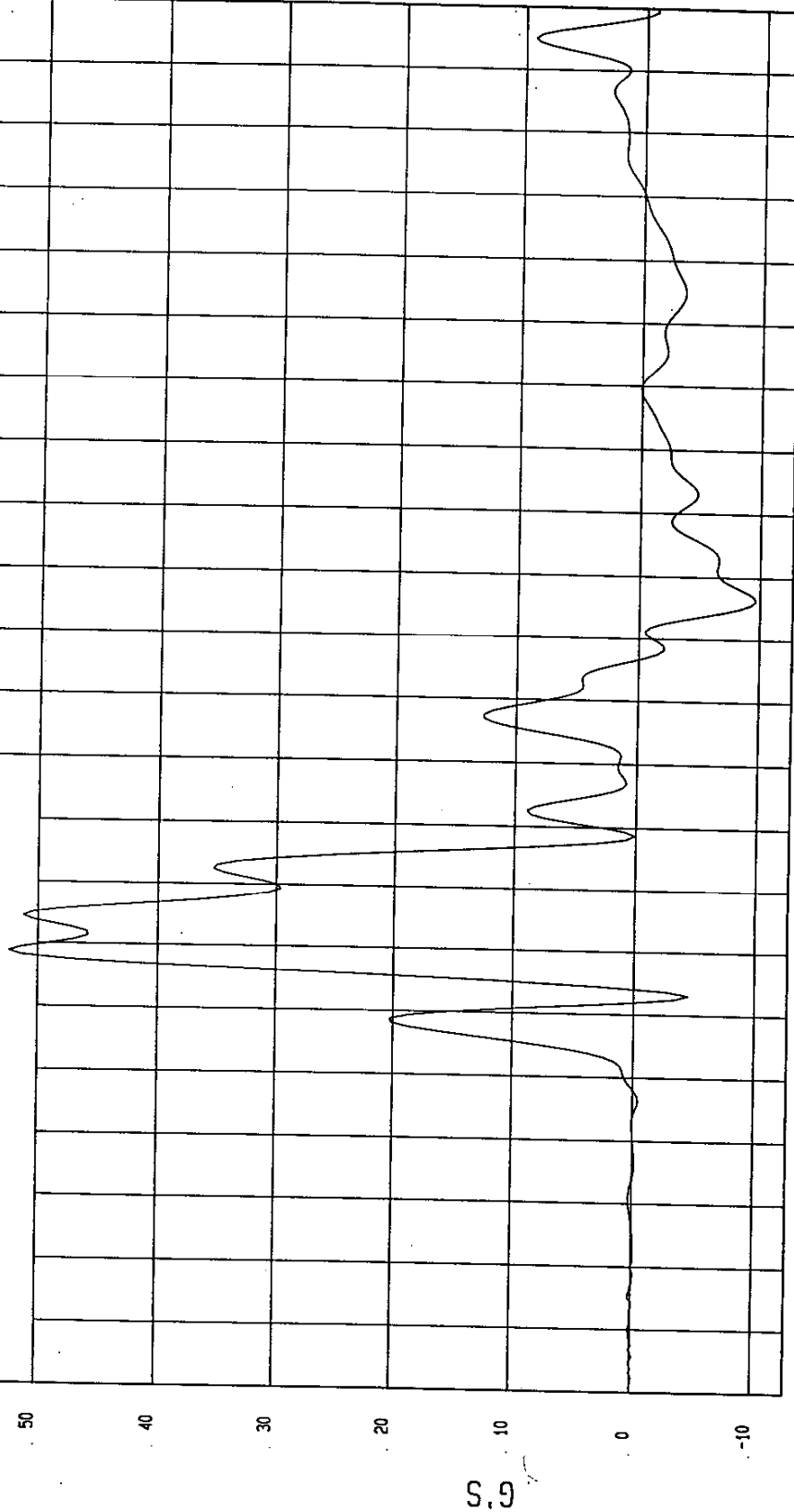
Speed: 38.3 MPH 61.6 KPH

Minimum = -9.63 G's at 106 msec

Maximum = 52.36 G's at 49 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 899079FI.R47 Filterclass (FIR Filtered)



TIME (SECONDS)

M&A Research
12-07-1999 15:51

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -6.64 G'S at 109 msec

Maximum = 78.54 G'S at 54 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 Filterclass (FIR Filtered)

899079F1.R27

1

80

70

60

50

40

30

20

10

0

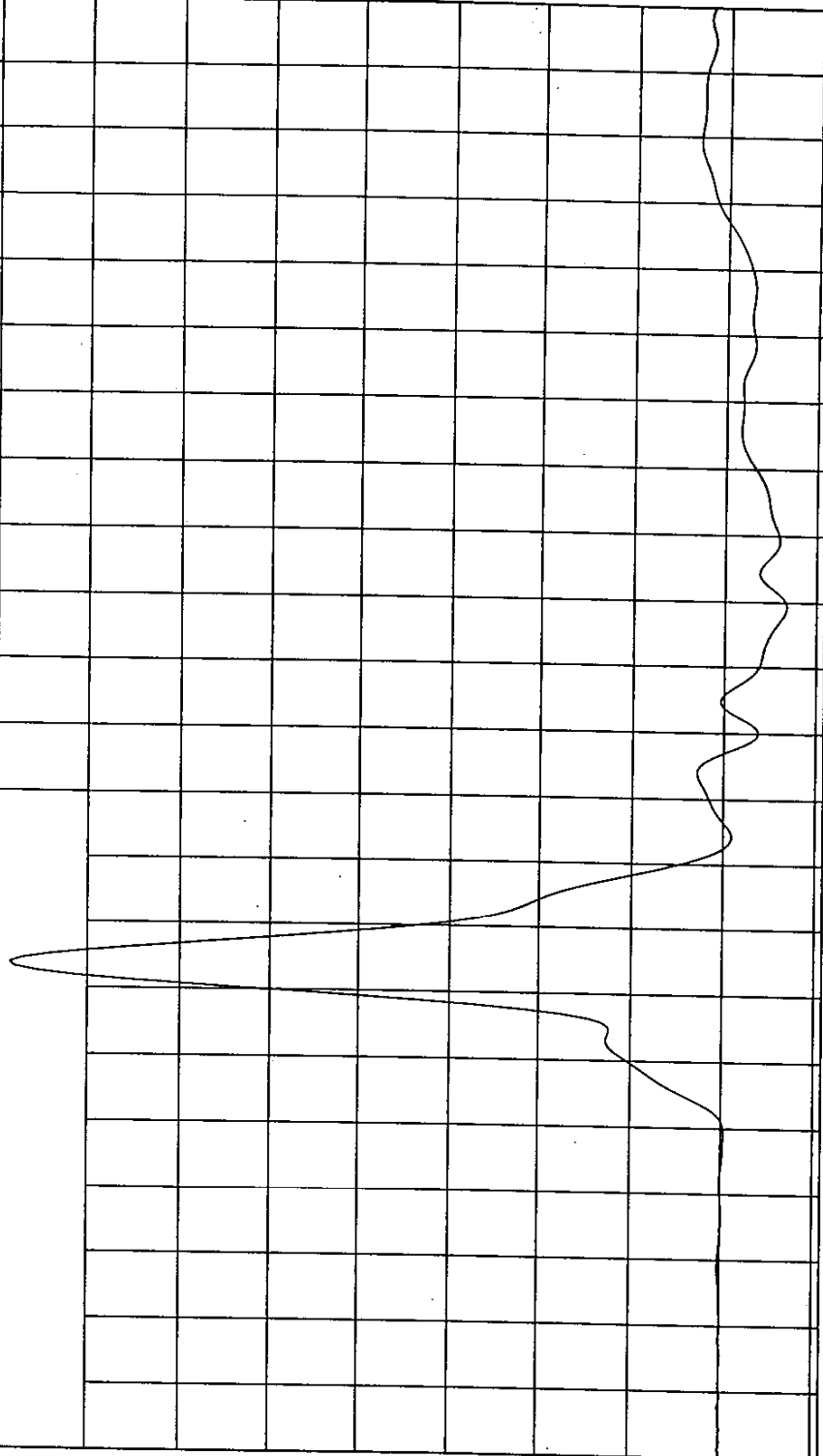
-10

G.S

NSA Research
12-07-1999 15:51

TIME (SECONDS)

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



TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Speed: 38.3 MPH 61.6 KPH

Minimum = -5.82 G'S at 119 msec

Maximum = 77.71 G'S at 54 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 B99079F1.R48 FilterClass (FIR Filtered)

80

70

60

50

40

30

20

10

0

G.S

-02

-01

0

10

20

30

40

50

60

70

80

TIME (SECONDS)

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

MCA Research
12-07-1999 15:51

TEST: NCAP SIDE IMPACT

TEST DATE: 12-07-1999

Speed: 38.3 MPH 61.6 KPH

COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)

Maximum = 118.89 G'S at 49 msec

Minimum = -10 G'S at 115 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

Filterclass (FIR Filtered)

899079F1.R49

1

120

100

80

60

40

20

0

G's

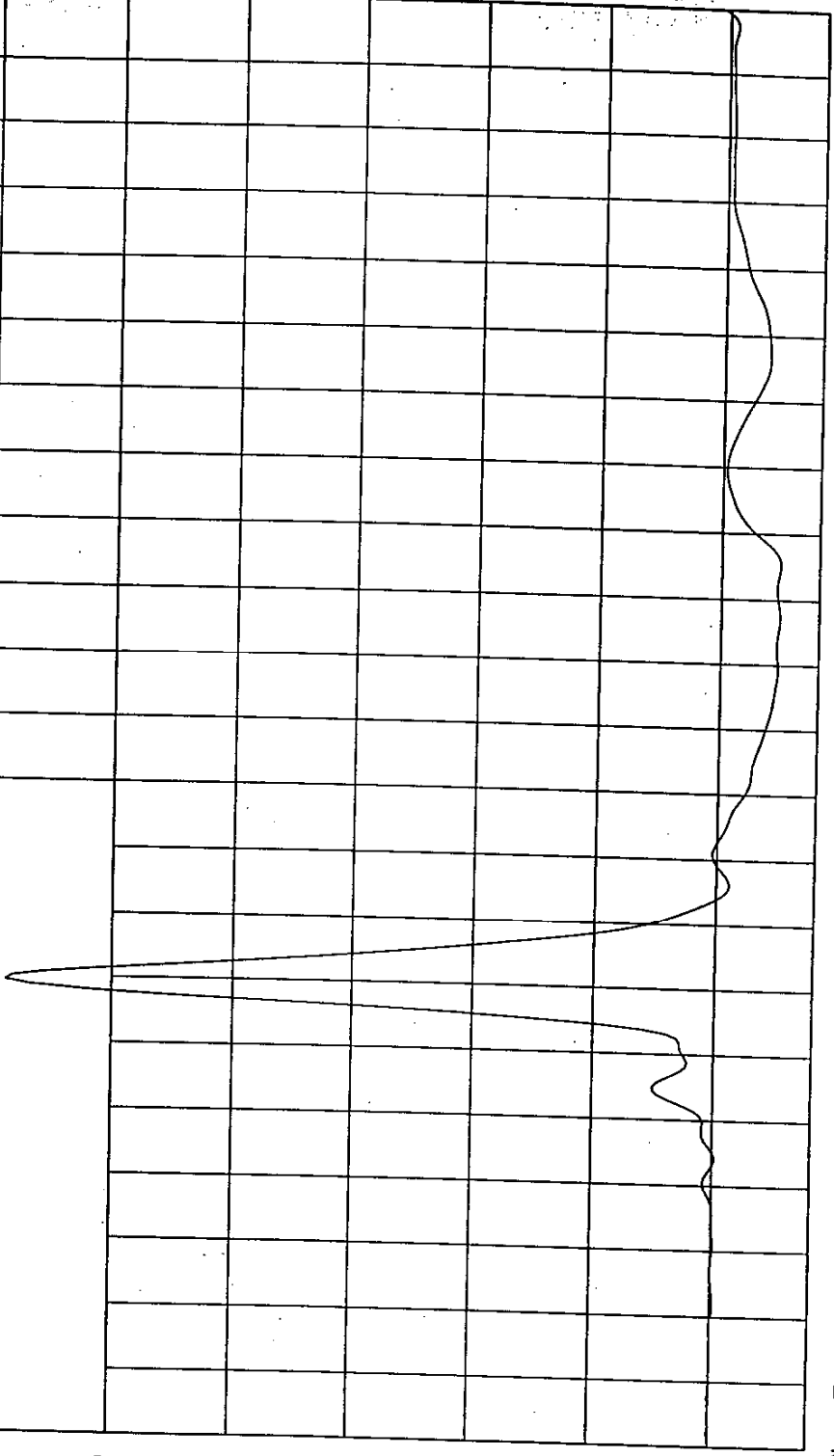
TIME (SECONDS)

12-07-1999 15:51

TEST: NCAP SIDE IMPACT
 COMPONENT: 2000 FORD WINDSTAR (NHTSA #MY0200)
 Minimum = -9.78 G'S at 115 msec
 Speed: 38.3 MPH 61.6 KPH
 Maximum = 117.31 G'S at 49 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 899079F1.R28 Filterclass (FIR Filtered)



TIME (SECONDS)

MCA Research
 12-07-1999 15:51

G.S

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

PRE-TEST CERTIFICATION DATA

C-1

Driver Dummy Serial Number: 269

Calibration Test Results Summary

C-2

Driver Dummy Serial Number: 269

Pre-Test Calibration

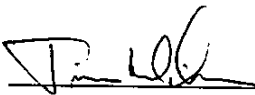
| | |
|-----------------------------|---|
| External Dimensions: | The dummy passed all external dimension requirements. |
| Thorax Impact Test: | The thorax passed all impact test requirements. |
| Pelvic Impact Test: | The pelvis passed all impact test requirements. |
| Abdominal Compression Test: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

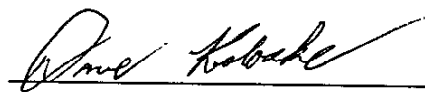
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA C-3

DUMMY SERIAL NUMBER: 269

DATE OF VERIFICATION: November 22, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 899 |
| RH - Rib Height (mm) | 501 - 521 | 518 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 231 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 520 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 495 |
| HW - Hip Width (mm) | 356 - 391 | 371 |

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

C-4

HEAD DROP TEST

SIDE IMPACT DUMMY (SID)

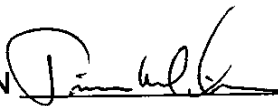
DATE: November 19, 1999

DUMMY NUMBER: 269

TEST NUMBER: D991331

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| TEMPERATURE | 18.9° - 25.5° C | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 37% |
| PEAK RESULTANT
ACCELERATION | 210 - 260 g's | 258 |
| PEAK LATERAL ACCELERATION | < 10 g's | -7 |
| TIME ABOVE 100 G. | 0.9 - 1.5 msec. | 1.2 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

TEST: Dummy Calibration - Head Drop TEST DATE: 11-19-1999 - 15:17:18

COMPONENT: Dummy # 269

Minimum = 7.21E-02 G'S at .6 msec

Maximum = 258.31 G'S at 25.3 msec

PEAK RESULTANT ACCELERATION

1 ——— 099331AV.A01 Filterclass (1000)

300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0

G.S

0

0.01

0.02

0.03

0.04

0.05

TIME (sec.)

HCA Research
11-19-1999 15:19

TEST: Dummy Calibration - Head Drop TEST DATE: 11-19-1999 - 15:17:18

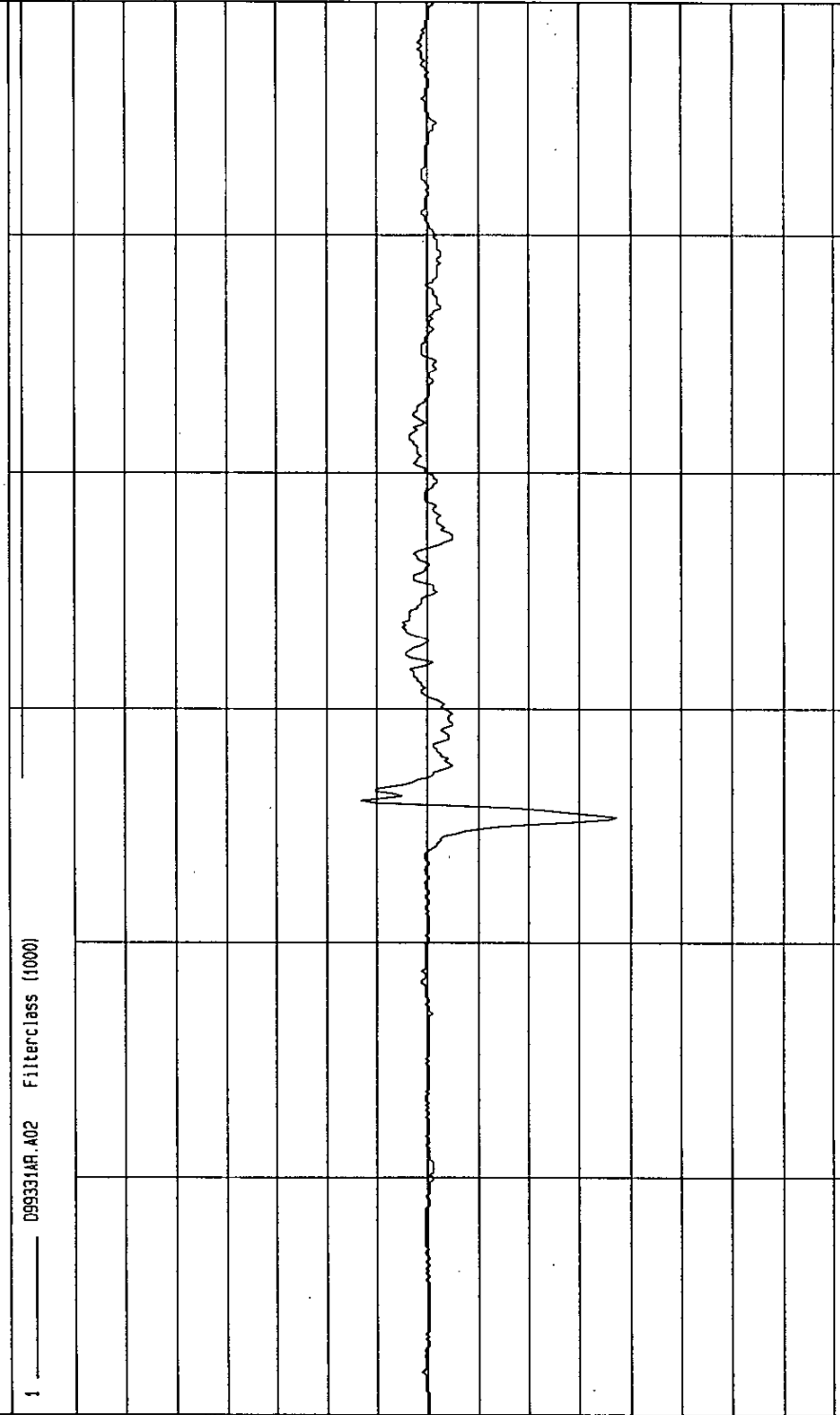
COMPONENT: Dummy # 269

Minimum = -7.45 G'S at 25.4 msec Maximum = 2.64 G'S at 26.1 msec

PEAK LATERAL ACCELERATION

1 _____ D99331AR.A02 Filterclass (1000)

G.S.



TIME (sec.)

WCA Research
11-19-1999 15:19

MGA RESEARCH CORPORATION

C-7

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 19, 1999

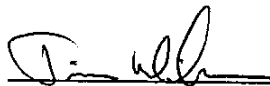
DUMMY SERIAL NUMBER: 269

TEST NUMBER: D991332

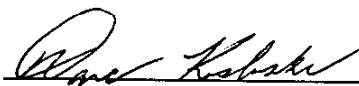
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 22.0 |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.28 |
| UPPER RIB (g's) | 37 - 46 g's | 42 |
| LOWER RIB (g's) | 37 - 46 g's | 44 |
| LOWER SPINE (g's) | 15 - 22 g's | 21 |

TEST MEETS SPECIFICATIONS

TECHNICIAN

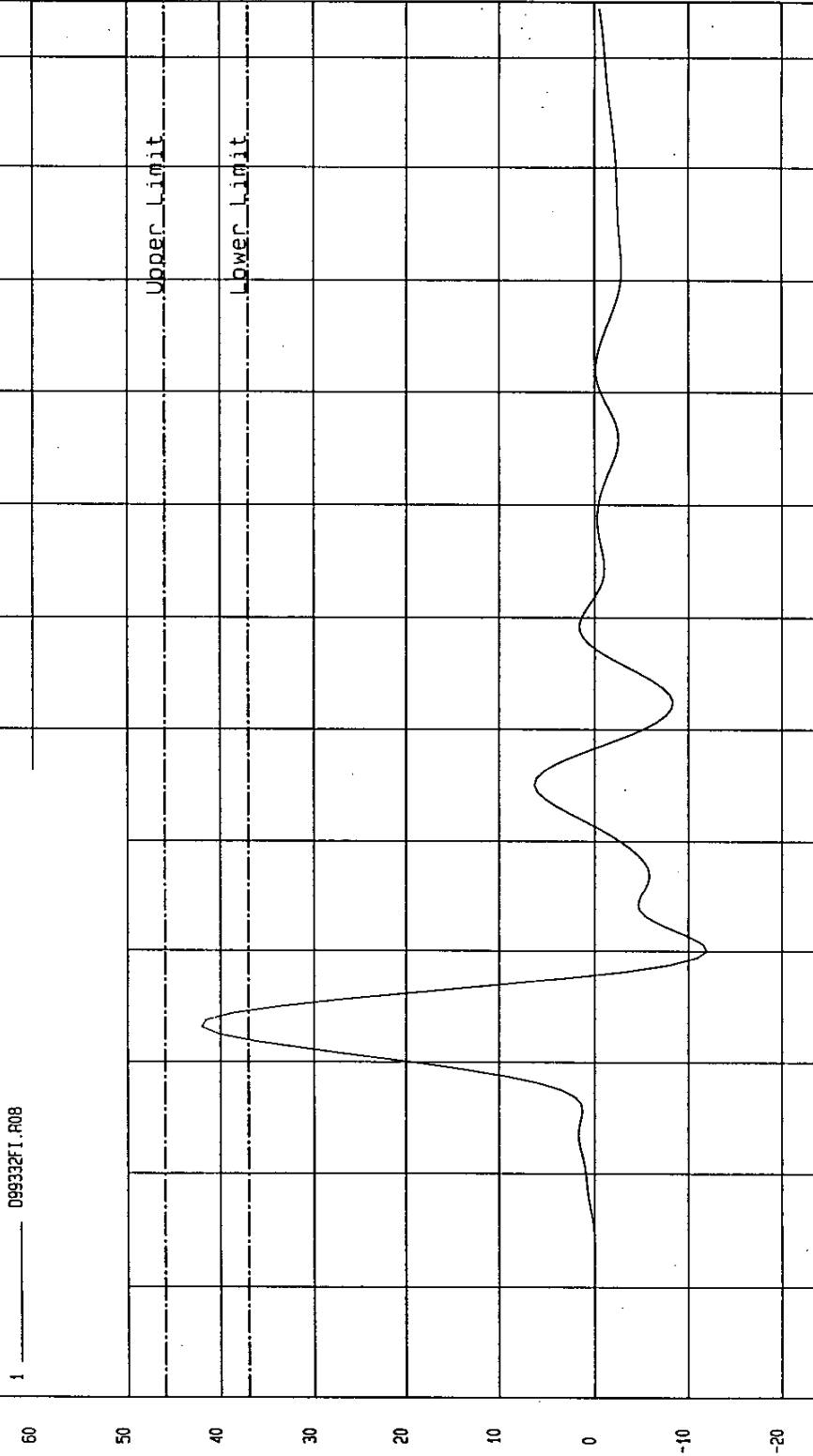


APPROVED BY



TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:13:31
COMPONENT: Dummy # 269 Velocity: 14.045 FT/SEC 4.28 M/SEC
Minimum = -11.90 G'S at 40 msec Maximum = 42.01 G'S at 33.1 msec

UPPER RIB ACCELERATION



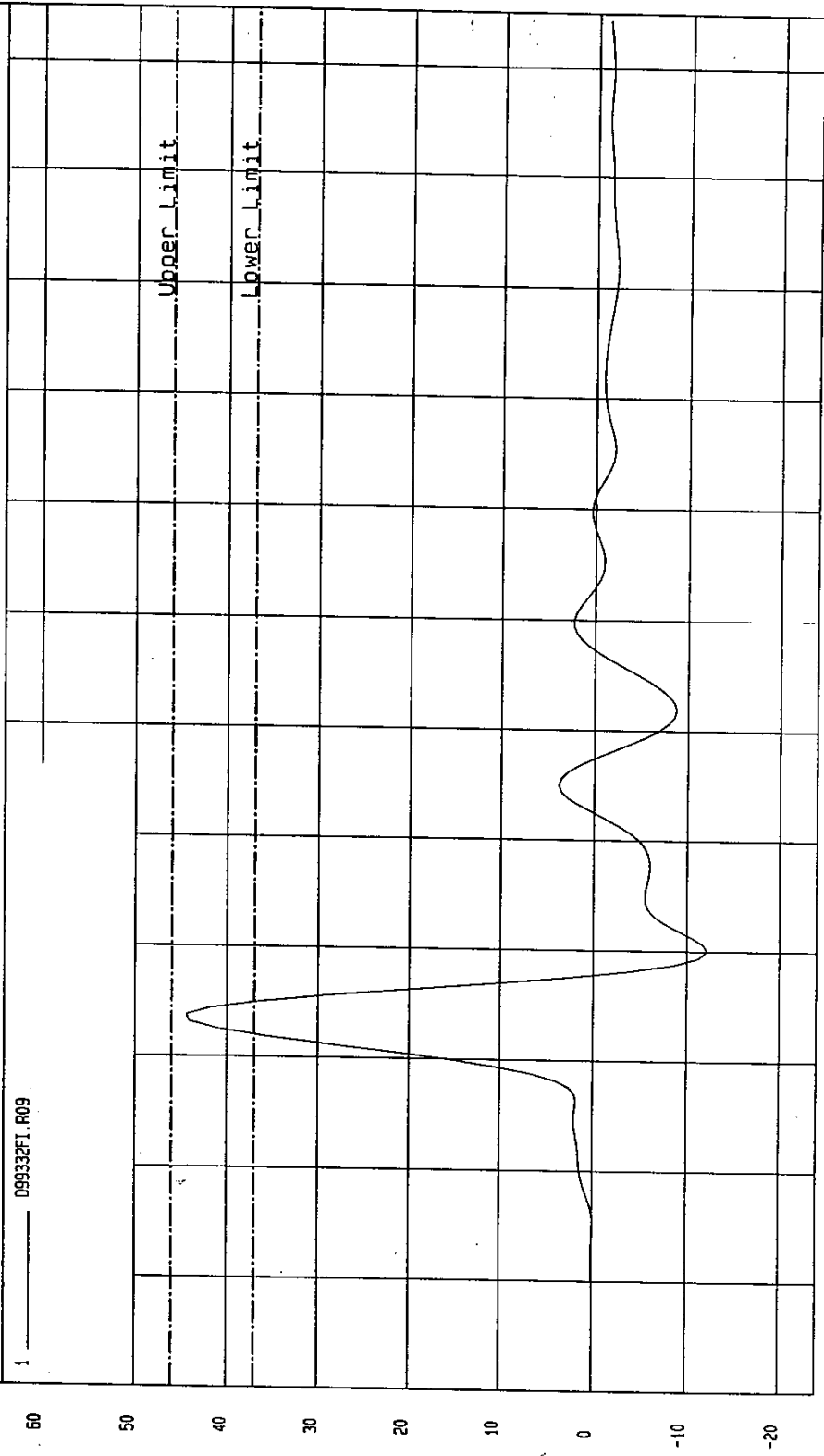
TIME (sec.)

WCA Research
11-19-1999 10:24

TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:13:31
COMPONENT: Dummy # 269 Velocity: 14.045 FT/SEC 4.28 M/SEC

Minimum = -12.14 G'S at 40 msec Maximum = 44.40 G'S at 33.7 msec

LOWER RIB ACCELERATION



TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:14:45

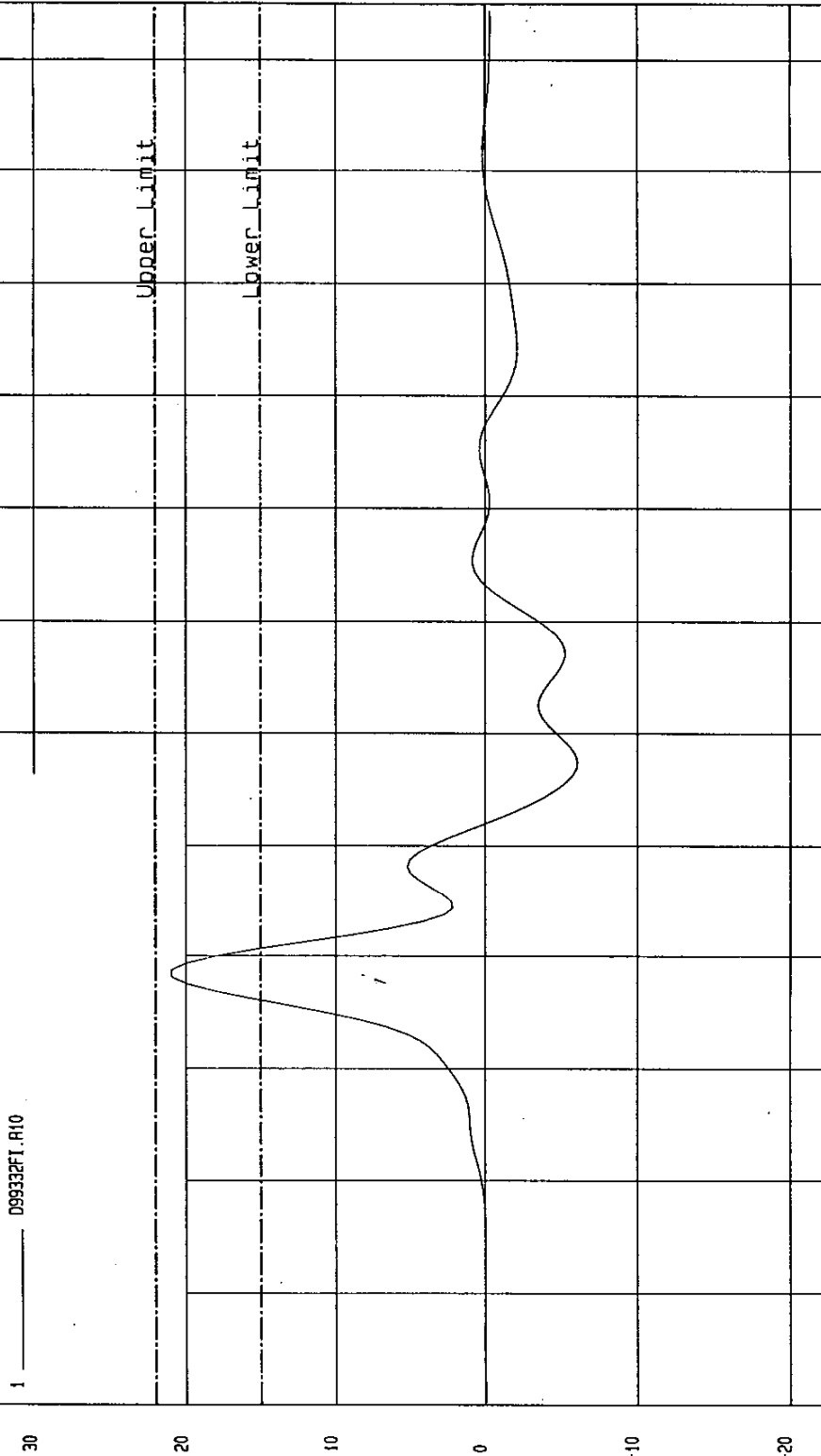
COMPONENT: Dummy # 269 Velocity: 14.045 FT/SEC 4.28 M/SEC

Minimum = -6.11 G'S at 57.5 msec

Maximum = 20.97 G'S at 38.7 msec

LOWER SPINE ACCELERATION

1 _____ D99332FT.R10



NEA Research
11-19-1999 10:24

MGA RESEARCH CORPORATION

C-11

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 19, 1999

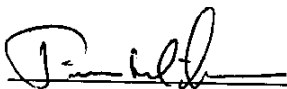
DUMMY SERIAL NUMBER: 269

TEST NUMBER: D991333

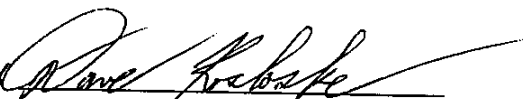
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 27.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.28 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 44 |

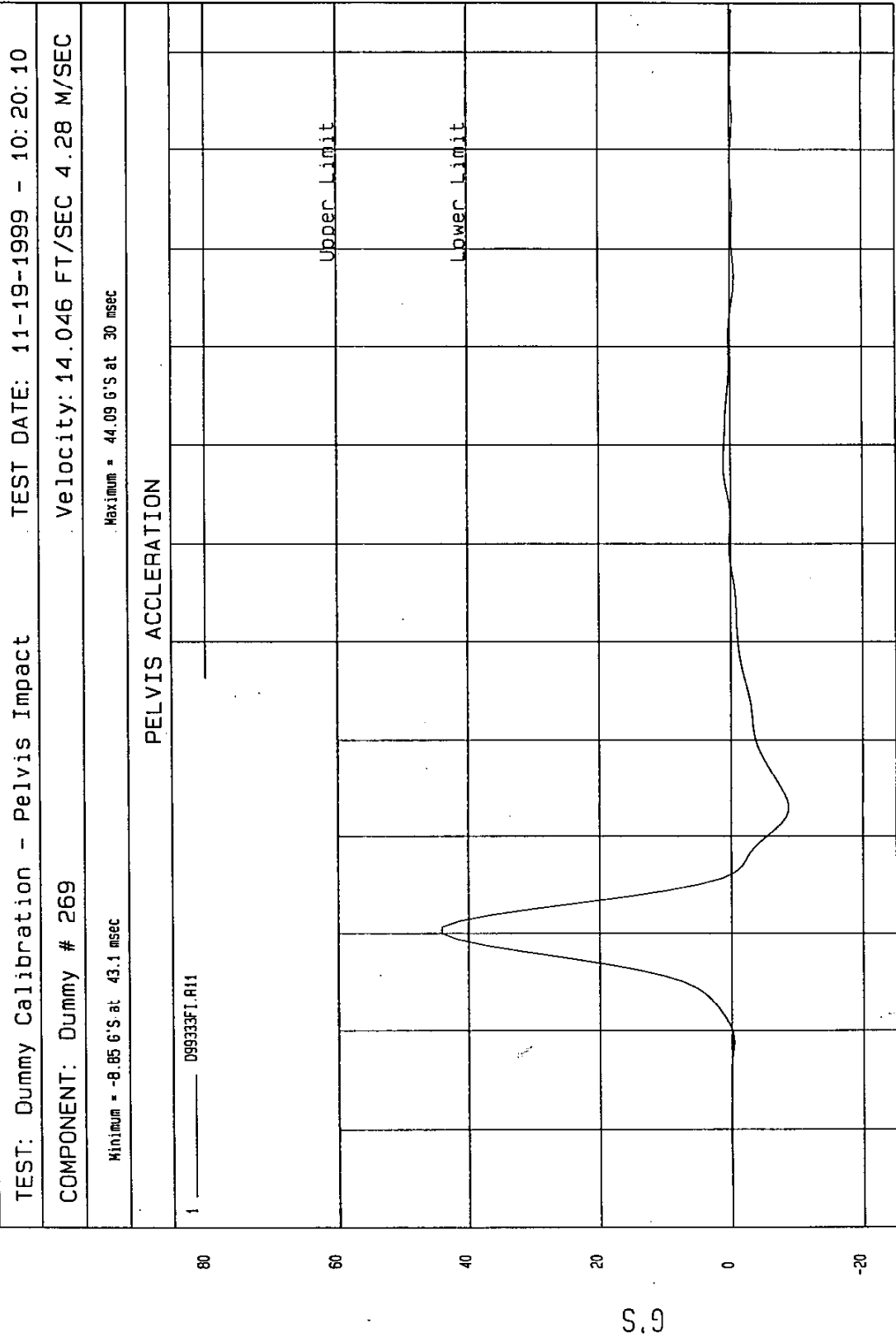
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





MGA Research
11-19-1999 10:24

MGA RESEARCH CORPORATION

C-13

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: November 22, 1999

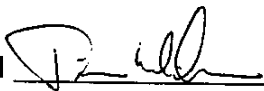
DUMMY SERIAL NUMBER: 269

TEST NUMBER: D991334

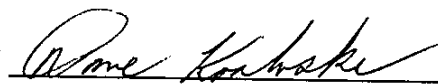
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| FORCE @ 12.7 mm | 104 - 162 | 138 |
| FORCE @ 19.0 mm | 163 - 222 | 193 |
| FORCE @ 25.4 mm | 222 - 280 | 257 |
| FORCE @ 33 mm | 325 - 391 | 348 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



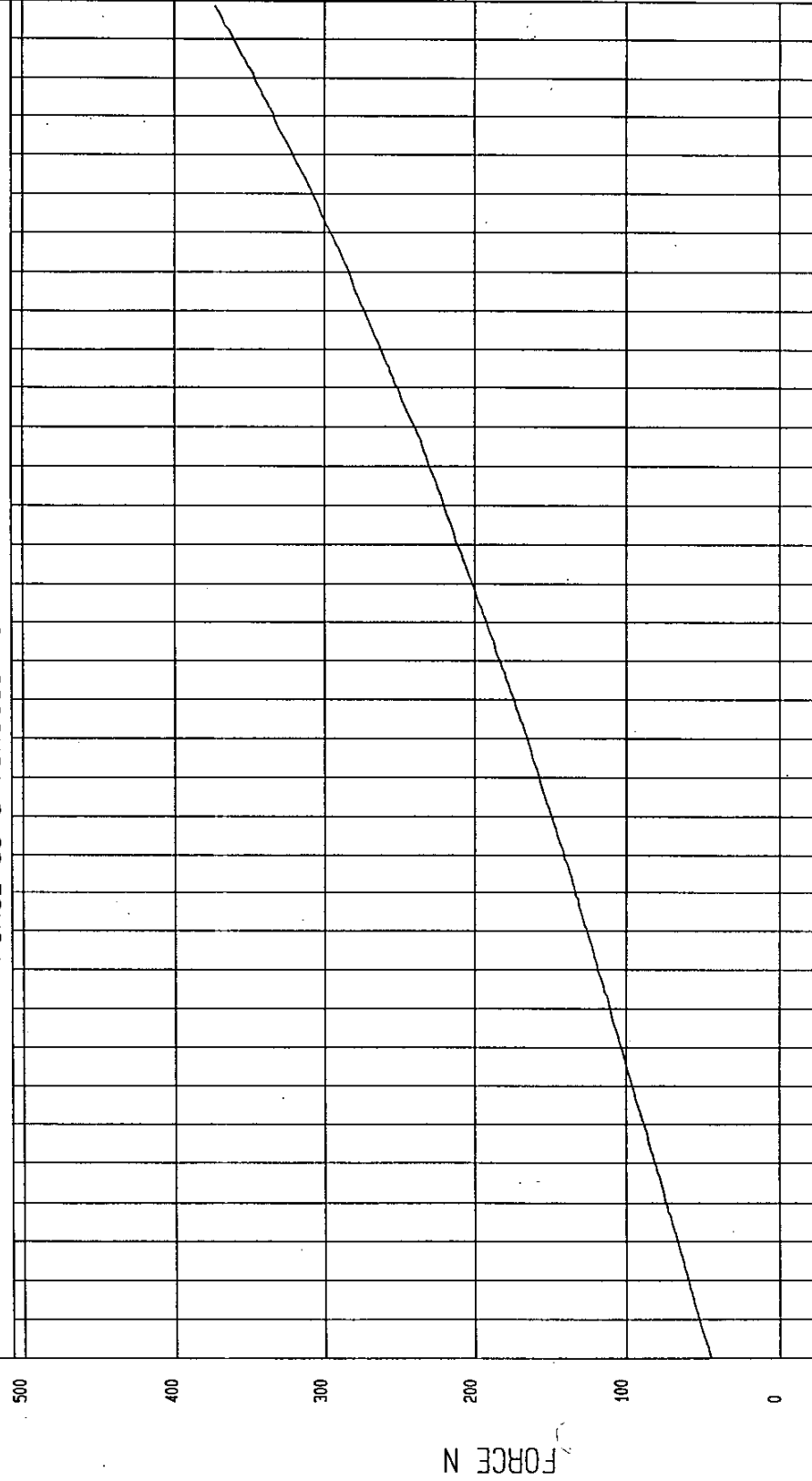
NSA Research
11-24-1999 10:43

DISPLACEMENT mm

FORCE as a function of DISPLACEMENT

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-22-1999 - 11:15:40

COMPONENT: DUMMY # 269



MGA RESEARCH CORPORATION

C-15

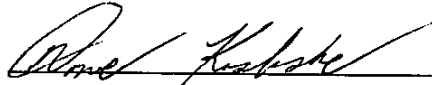
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: November 22, 1999DUMMY SERIAL NUMBER: 269TEST NUMBER: D991335

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 38% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 118.7 |
| FORCE @ 30° | 151.2 - 204.6 | 154.6 |
| FORCE @ 40° | 204.6 - 258.0 | 206.4 |
| RETURN ANGLE | 12° maximum | 2° |

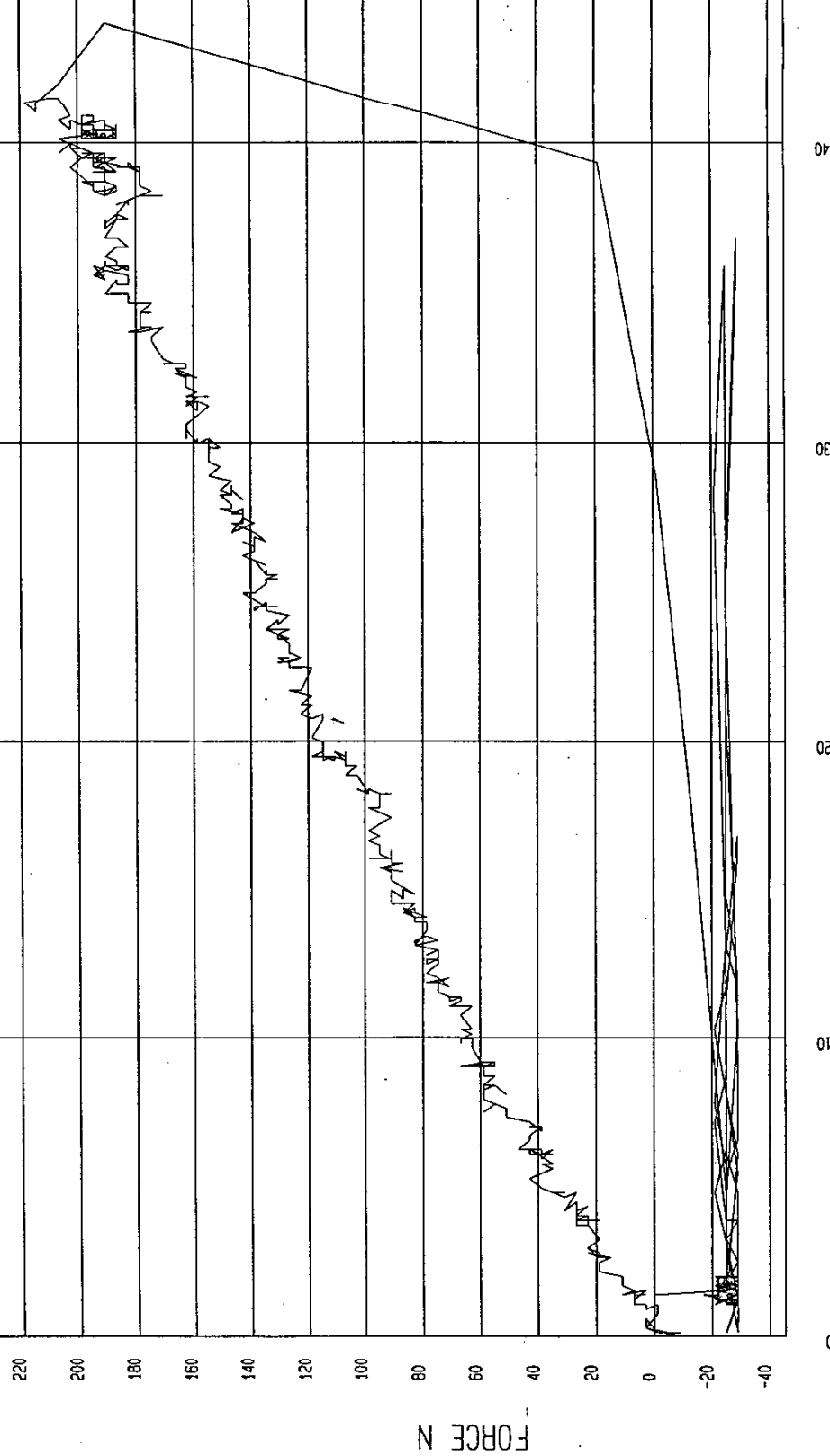
TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-22-1999 - 10:19:35

COMPONENT: DUMMY # 269

FORCE as a function of TORSO ROTATION



NCA Research
11-24-1999 10:19

TORSO ROTATION DEGREES

PRE-TEST CERTIFICATION DATA

C-17

Passenger Dummy Serial Number: 270

Calibration Test Results Summary

C-18

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. |

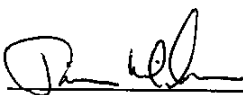
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA C-19

DUMMY SERIAL NUMBER: 270

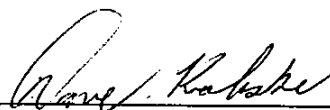
DATE OF VERIFICATION: November 22, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 898 |
| RH - Rib Height (mm) | 501 - 521 | 503 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 230 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 525 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 500 |
| HW - Hip Width (mm) | 356 - 391 | 368 |

MEASUREMENTS BY:



APPROVED BY:



MGA RESEARCH CORPORATION

C-20

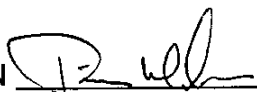
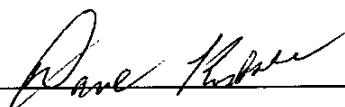
HEAD DROP TEST

SIDE IMPACT DUMMY (SID)

DATE: November 19, 1999DUMMY NUMBER: 270TEST NUMBER: D991340

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| TEMPERATURE | 18.9° - 25.5° C | 21.0° |
| RELATIVE HUMIDITY | 10 - 70% | 37% |
| PEAK RESULTANT
ACCELERATION | 210 - 260 g's | 250 |
| PEAK LATERAL ACCELERATION | < 10 g's | -5 |
| TIME ABOVE 100 G. | 0.9 - 1.5 msec. | 1.2 |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: Dummy Calibration - Head Drop TEST DATE: 11-19-1999 - 15:50:45

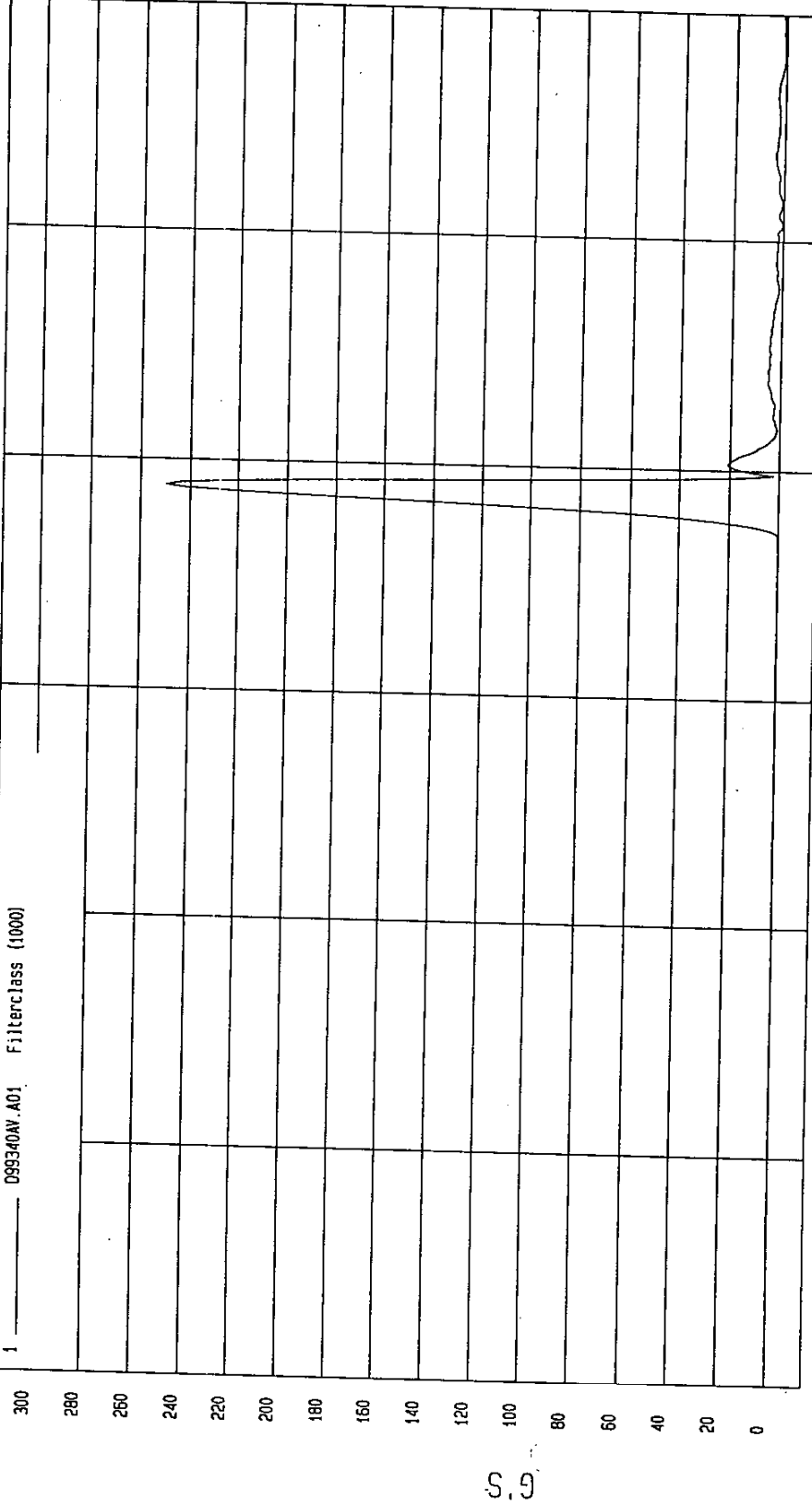
COMPONENT: Dummy # 270

Minimum = 3.35E-02 G'S at .2 msec

Maximum = 249.84 G'S at 38.9 msec

PEAK RESULTANT ACCELERATION

1 ——— D99340AV A01 Filterclass (1000)



TIME (sec.)

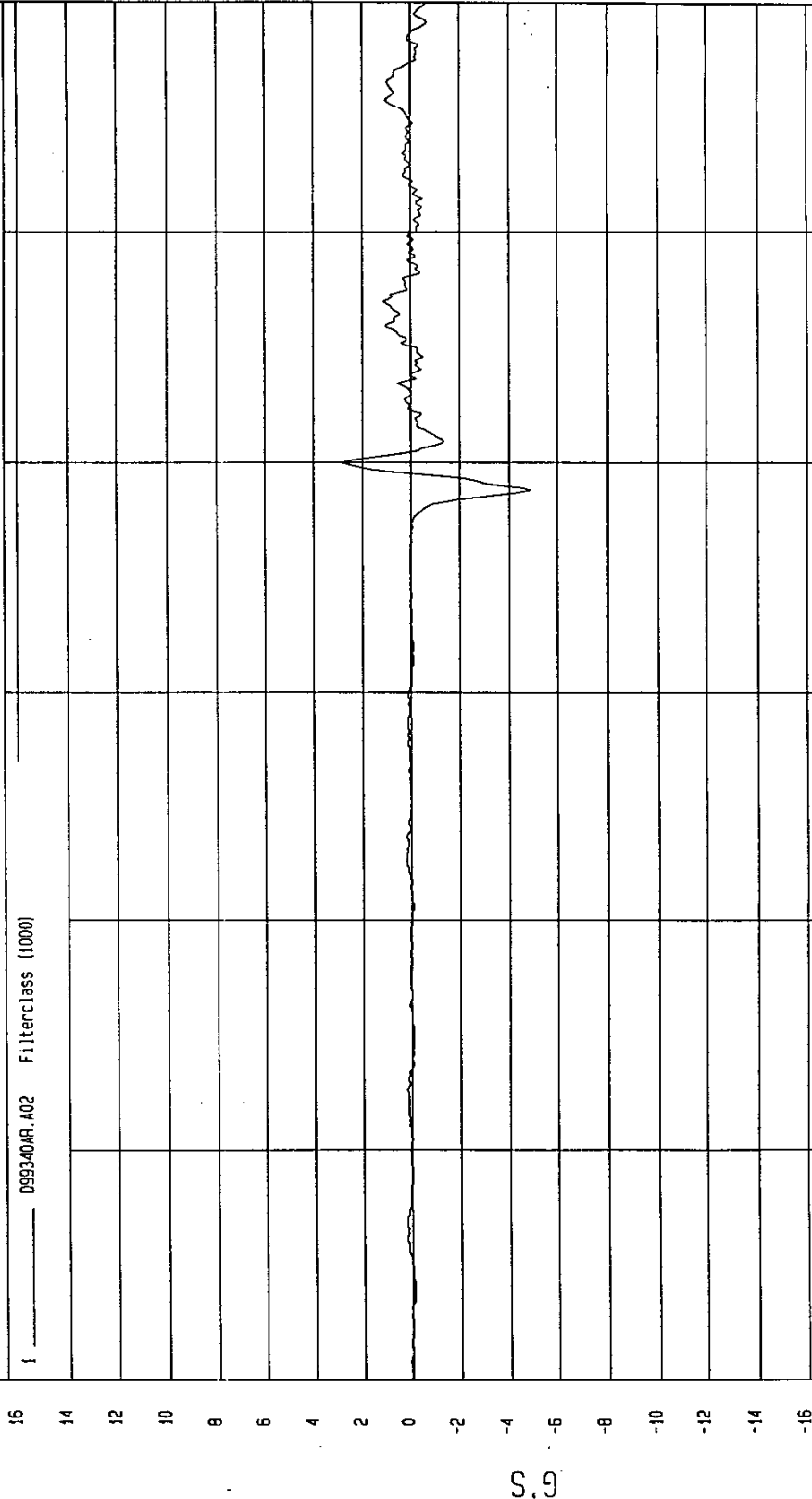
MOA Research
11-19-1999 15:52

TEST: Dummy Calibration - Head Drop TEST DATE: 11-19-1999 - 15:50:45

COMPONENT: Dummy # 270

Minimum = -4.88 G'S at 38.8 msec Maximum = 2.91 G'S at 40 msec

PEAK LATERAL ACCELERATION



MGA RESEARCH CORPORATION

C-23

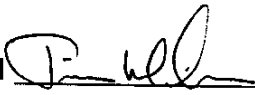
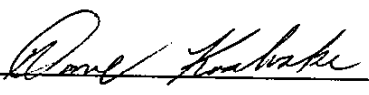
THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 19, 1999DUMMY SERIAL NUMBER: 270TEST NUMBER: D991342

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 22.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| UPPER RIB (g's) | 37 - 46 g's | 42 |
| LOWER RIB (g's) | 37 - 46 g's | 41 |
| LOWER SPINE (g's) | 15 - 22 g's | 21 |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

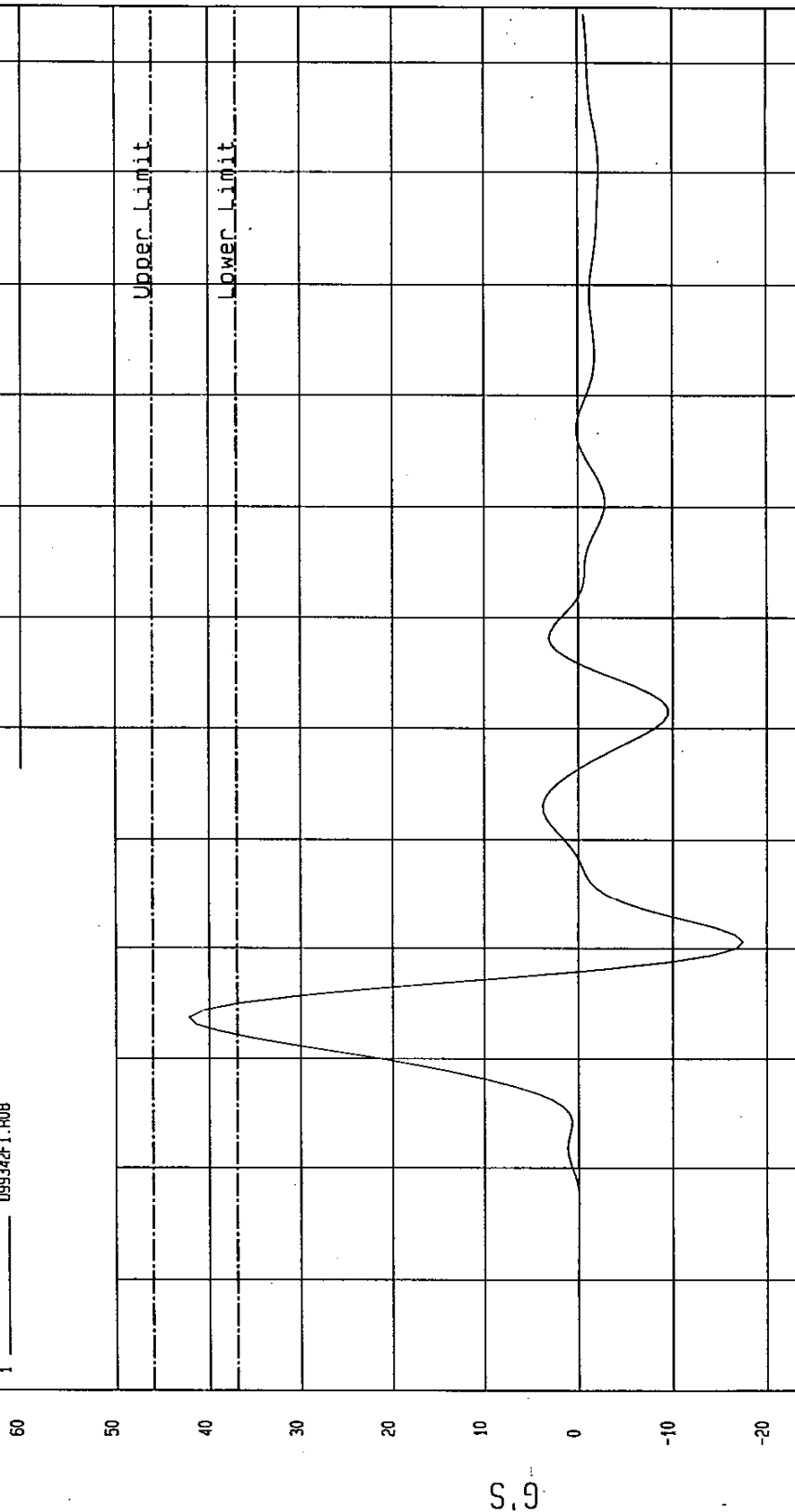
TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:49:00

COMPONENT: Dummy # 270 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -17.45 G'S at 40.6 msec Maximum = 42.13 G'S at 33.7 msec

UPPER RIB ACCELERATION

1 ——— D99342F1.R08



HGA Research
11-19-1999 10:58

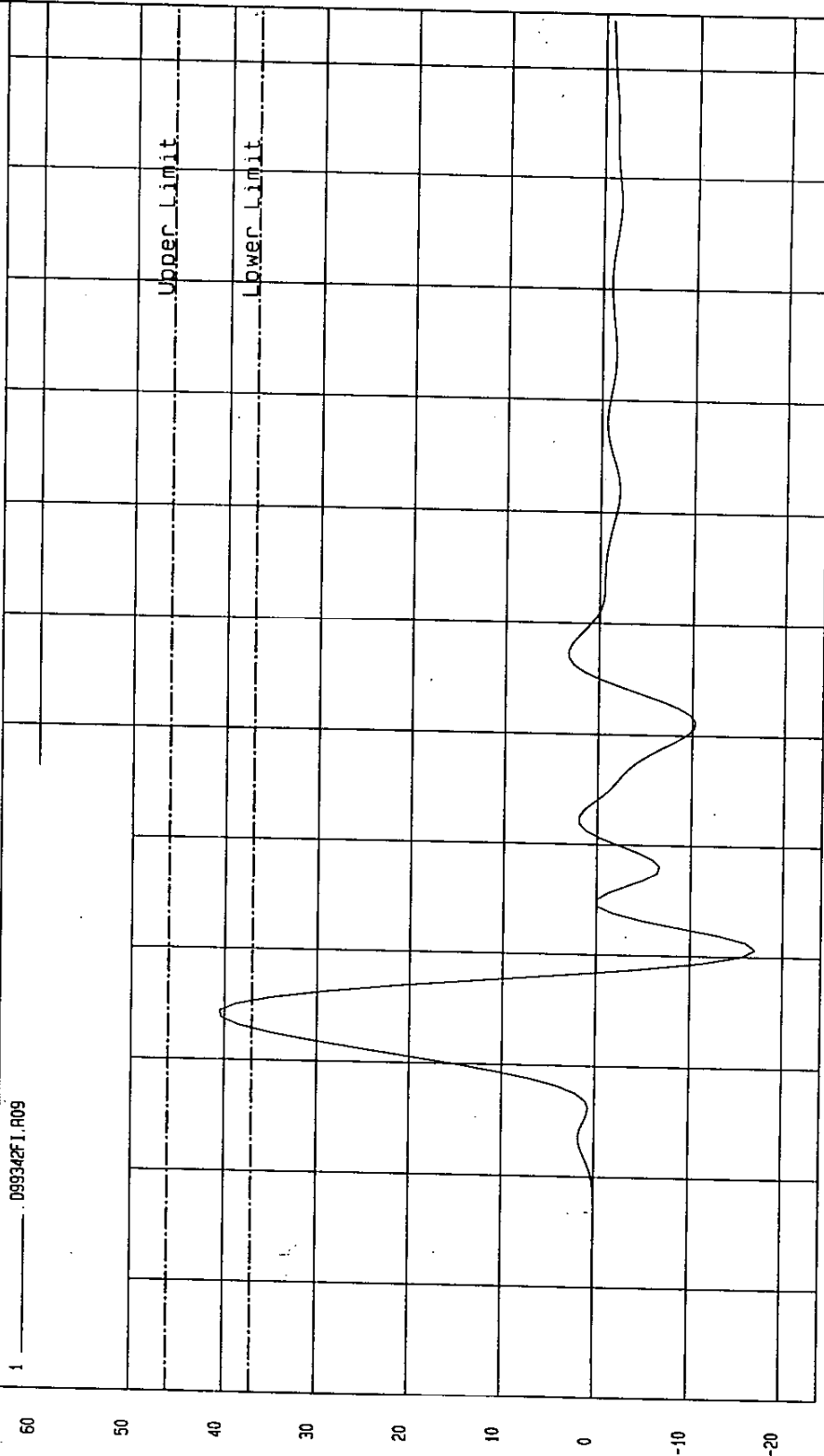
TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:49:00

COMPONENT: Dummy # 270 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -17.04 G'S at 40.6 msec

Maximum = 40.53 G'S at 34.3 msec

LOWER RIB ACCELERATION



HSA Research
11-19-1999 10:58

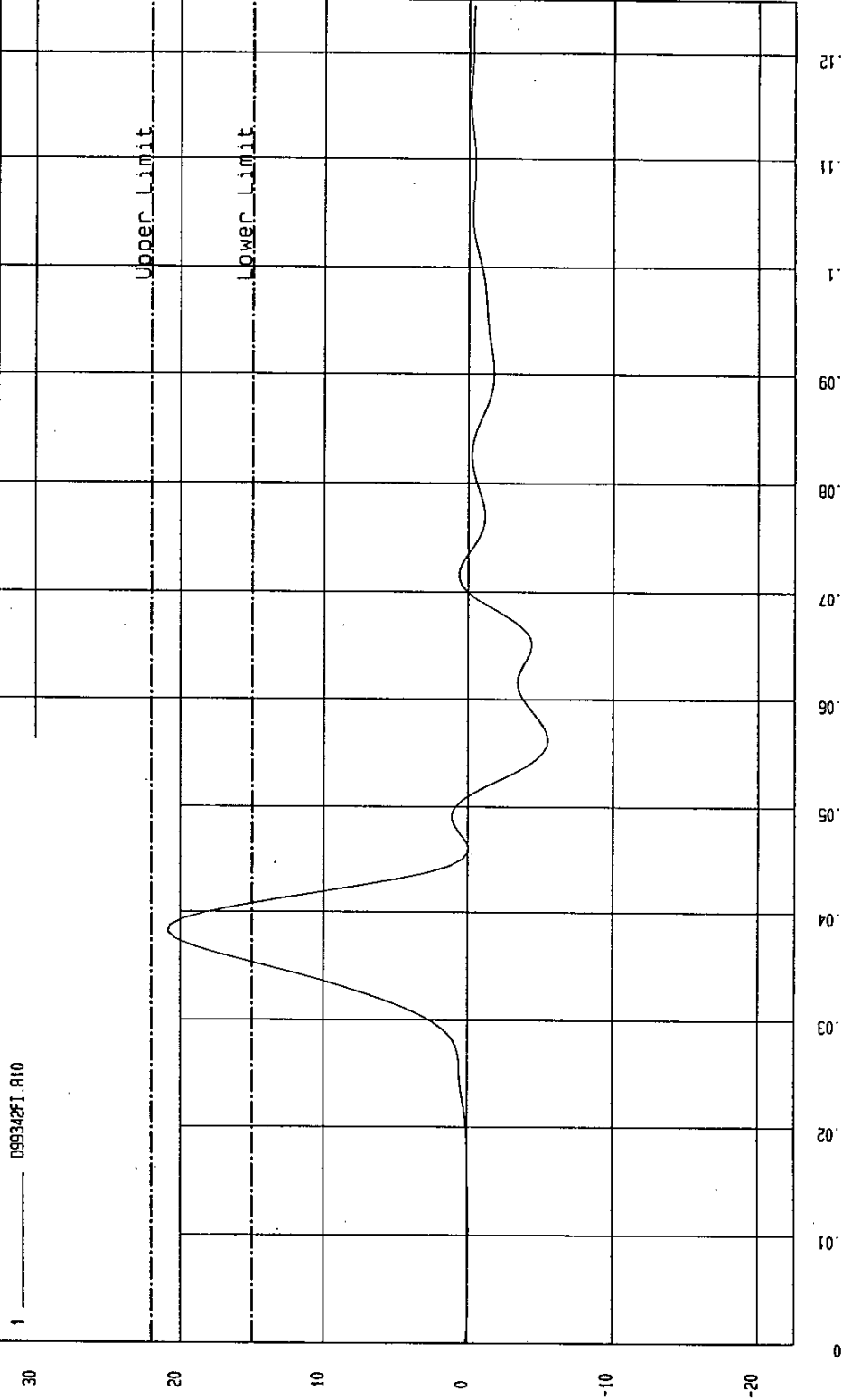
TEST: Dummy Calibration - Thorax Impact TEST DATE: 11-19-1999 - 10:49:00

COMPONENT: Dummy # 270 Velocity: 14.083 FT/SEC 4.29 M/SEC

Minimum = -5.49 G'S at 56.2 msec

Maximum = 20.88 G'S at 38.1 msec

LOWER SPINE ACCELERATION



WCA Research
11-19-1999 10:58

TIME (sec.)

MGA RESEARCH CORPORATION

C-27

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: November 19, 1999

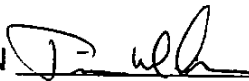
DUMMY SERIAL NUMBER: 270

TEST NUMBER: D991343

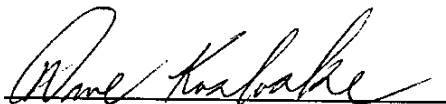
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 22.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.31 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 41 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



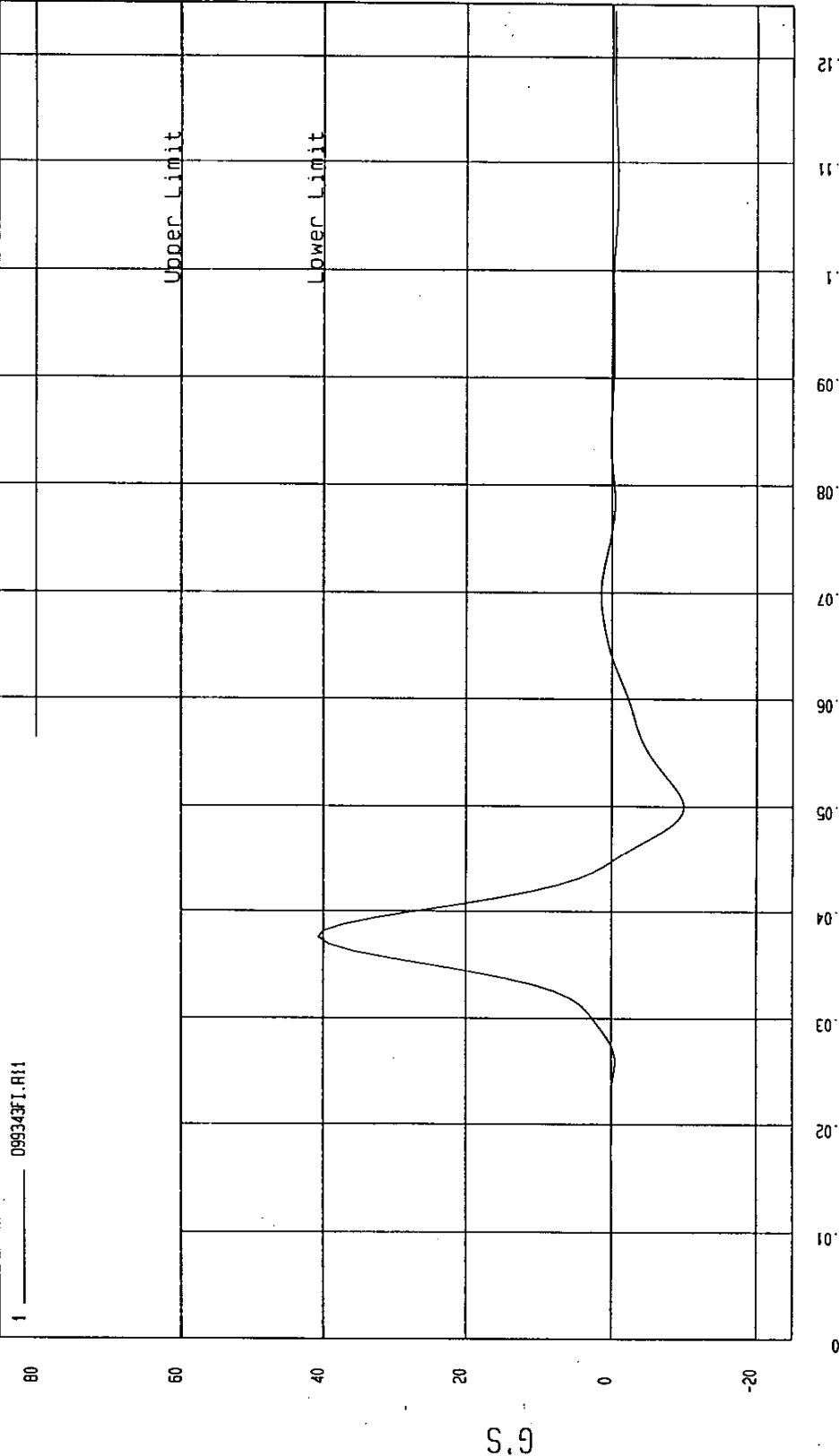
TEST: Dummy Calibration - Pelvis Impact TEST DATE: 11-19-1999 - 10:57:52

COMPONENT: Dummy # 270 Velocity: 14.152 FT/SEC 4.31 M/SEC

Minimum = -10.07 G'S at 50 msec

Maximum = 40.72 G'S at 37.5 msec

PELVIS ACCELERATION



WCA Research
11-19-1999 10:58

MGA RESEARCH CORPORATION

C-29

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: November 22, 1999

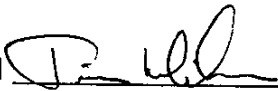
DUMMY SERIAL NUMBER: 270

TEST NUMBER: D991344

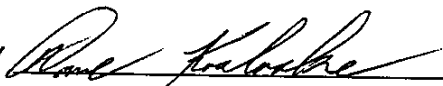
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 37% |
| FORCE @ 12.7 mm | 104 - 162 | 140 |
| FORCE @ 19.0 mm | 163 - 222 | 193 |
| FORCE @ 25.4 mm | 222 - 280 | 251 |
| FORCE @ 33 mm | 325 - 391 | 351 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



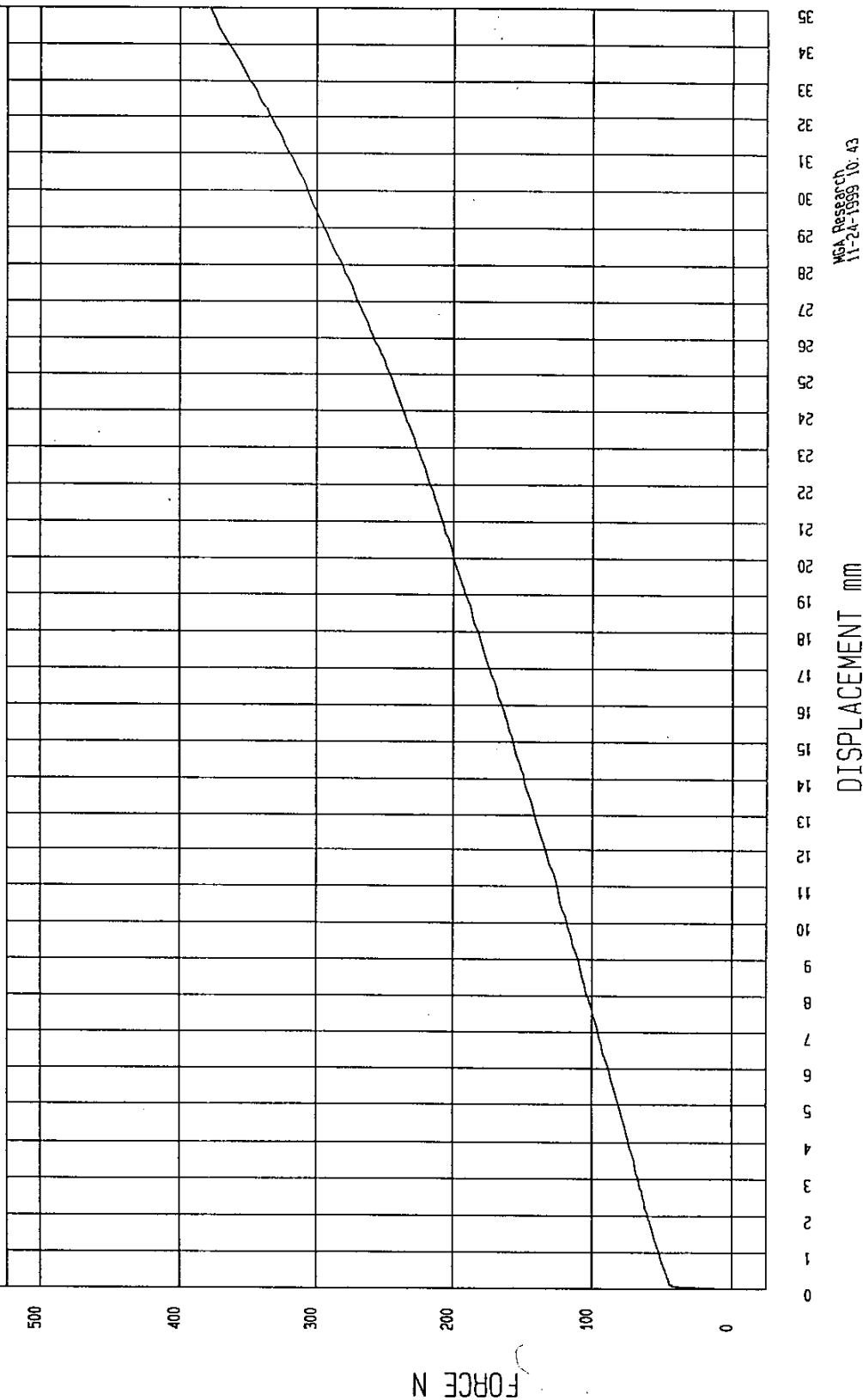
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 11-22-1999 - 11:26:08

COMPONENT: DUMMY # 270

FORCE as a function of DISPLACEMENT



MGA RESEARCH CORPORATION

C-31

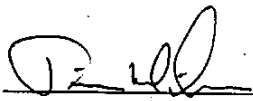
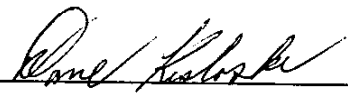
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: November 22, 1999DUMMY SERIAL NUMBER: 270TEST NUMBER: D991345

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 38% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 110.2 |
| FORCE @ 30° | 151.2 - 204.6 | 154.0 |
| FORCE @ 40° | 204.6 - 258.0 | 209.9 |
| RETURN ANGLE | 12° maximum | 1° |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 11-22-1999 - 10:44:17

COMPONENT: DUMMY # 270

FORCE as a function of TORSO ROTATION



POST-TEST CERTIFICATION DATA

C-33

Driver Dummy Serial Number: 269

Calibration Test Results Summary

C-34

Driver Dummy Serial Number: 269

Post-Test Calibration

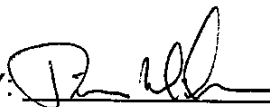
| | |
|-----------------------------|---|
| External Dimensions: | The dummy passed all external dimension requirements. |
| Thorax Impact Test: | The thorax passed all impact test requirements. |
| Pelvic Impact Test: | The pelvis passed all impact test requirements. |
| Abdominal Compression Test: | 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 ^{C-35}

DUMMY SERIAL NUMBER: 269

DATE OF VERIFICATION: December 10, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 899 |
| RH - Rib Height (mm) | 501 - 521 | 518 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 231 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 520 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 495 |
| HW - Hip Width (mm) | 356 - 391 | 371 |

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

C-36

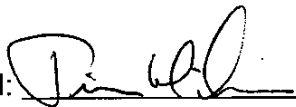
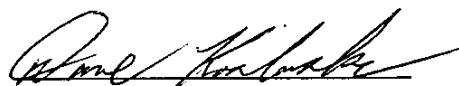
HEAD DROP TEST

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1999DUMMY SERIAL NUMBER: 269TEST NUMBER: D991451

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------------|-----------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5° C | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70% | 26% |
| PEAK RESULTANT ACCELERATION | 120 - 150 g's | 238 |
| PEAK LATERAL ACCELERATION | <10 g's | -7 |
| TIME ABOVE 100 G. | 0.9 - 1.5 msec. | 1.2 |

TEST MEETS SPECIFICATIONS

TECHNICIAN: APPROVED BY: 

TEST: Dummy Calibration - Head Drop TEST DATE: 12-10-1999 - 15:13:34

COMPONENT: Dummy # 269

Minimum = 6.89E-02 G'S at .6 msec

Maximum = 238.22 G'S at 36.6 msec

PEAK RESULTANT ACCELERATION

1 ——— 099451AV.A01 Filterclass (1000)

300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0

G.S

TIME (sec.)

.05
.04
.03
.02
.01
0

WSA Research
12-10-1999 15:14

TEST: Dummy Calibration - Head Drop TEST DATE: 12-10-1999 - 15:13:34

COMPONENT: Dummy # 269

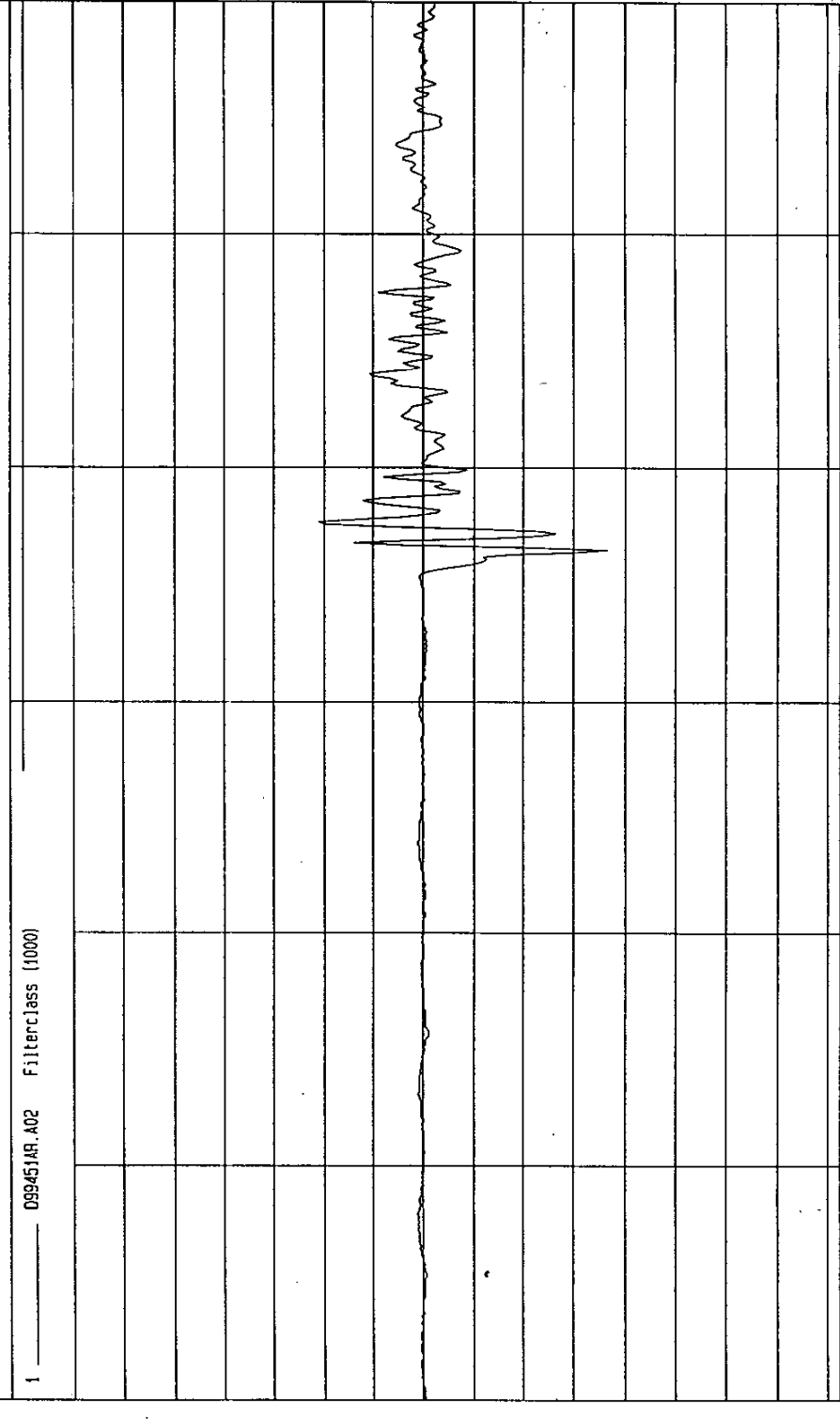
Minimum = -7.30 G'S at 36.5 msec

Maximum = 4.22 G'S at 37.7 msec

PEAK LATERAL ACCELERATION

1 _____ 099451AR.A02 Filterclass (1000)

G'S



TIME (sec.)

MCA Research
12-10-1999 15:14

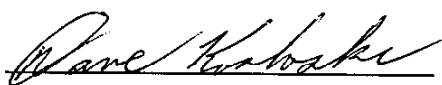
THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 9, 1999DUMMY SERIAL NUMBER: 269TEST NUMBER: D991452

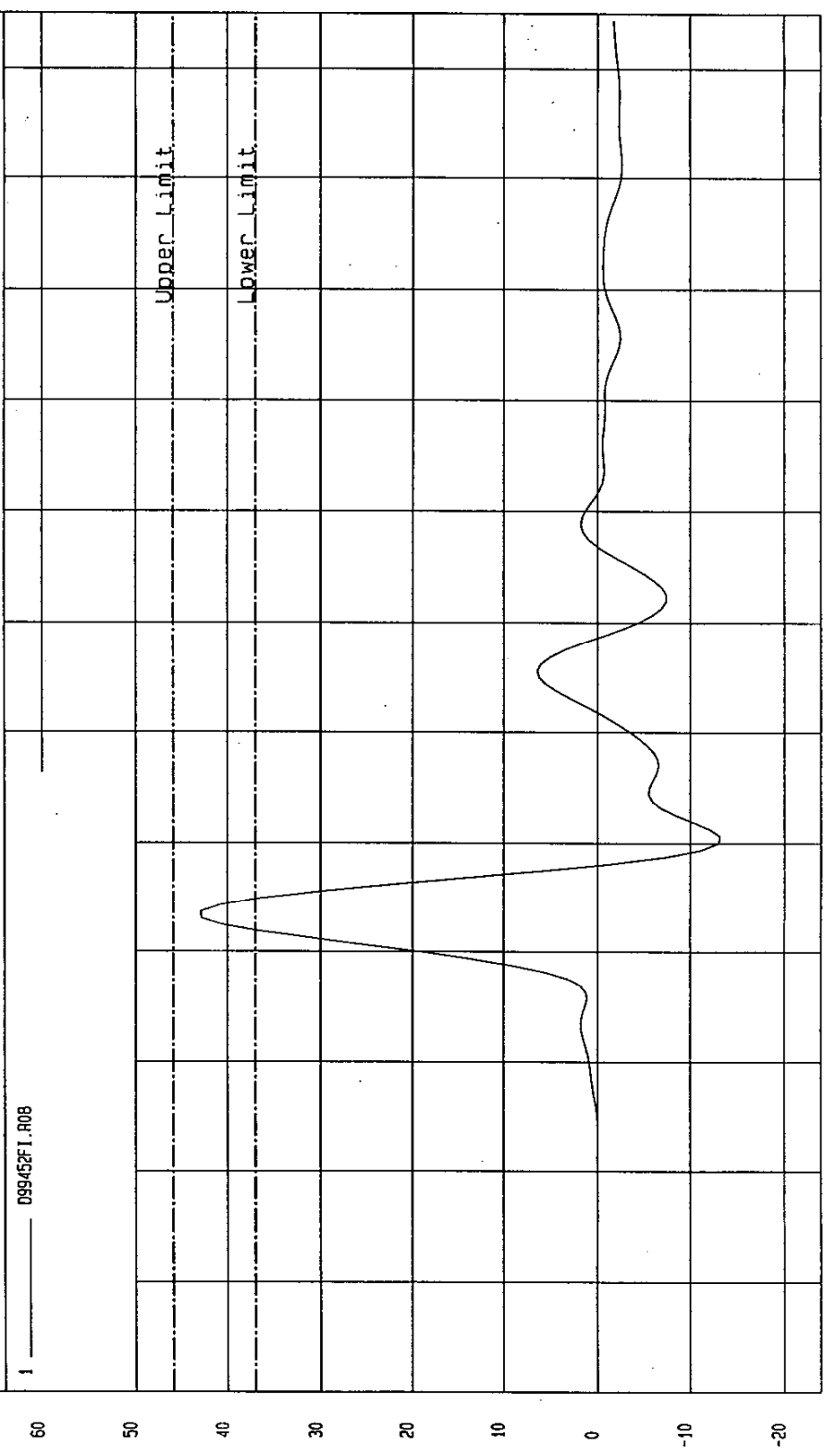
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| UPPER RIB (g's) | 37 - 46 g's | 43 |
| LOWER RIB (g's) | 37 - 46 g's | 46 |
| LOWER SPINE (g's) | 15 - 22 g's | 19 |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

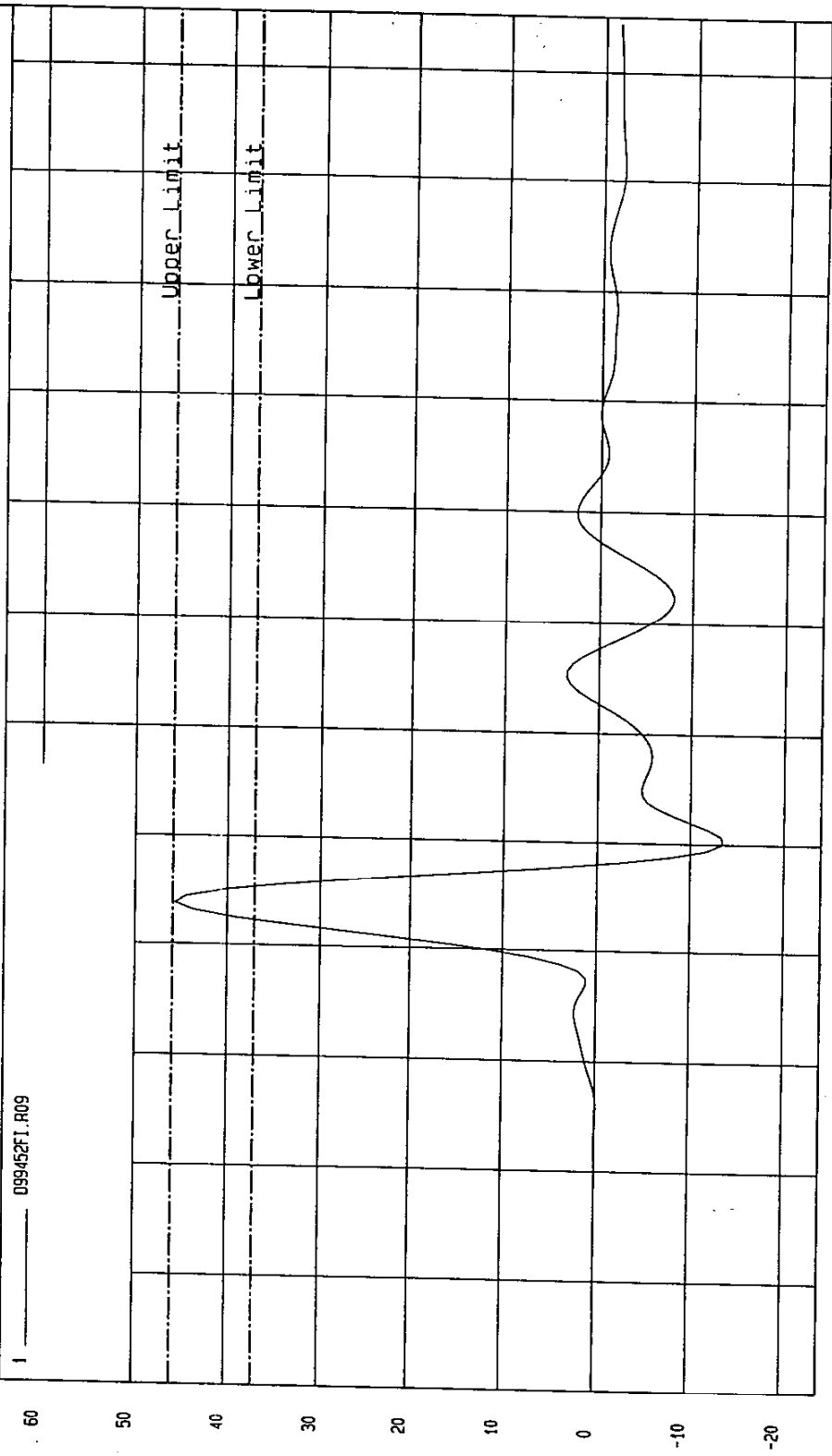
TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 12:43:29
COMPONENT: Dummy # 269 Velocity: 14.068 FT/SEC 4.29 M/SEC
Minimum = -13.13 G'S at 50.6 msec Maximum = 42.98 G'S at 43.7 msec

UPPER RIB ACCELERATION



TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 12:45:51
COMPONENT: Dummy # 269 Velocity: 14.068 FT/SEC 4.29 M/SEC
Minimum = -13.34 G'S at 50 msec Maximum = 45.73 G'S at 43.7 msec

LOWER RIB ACCELERATION



TIME (sec.)

NSA Research
12-09-1999 12:54

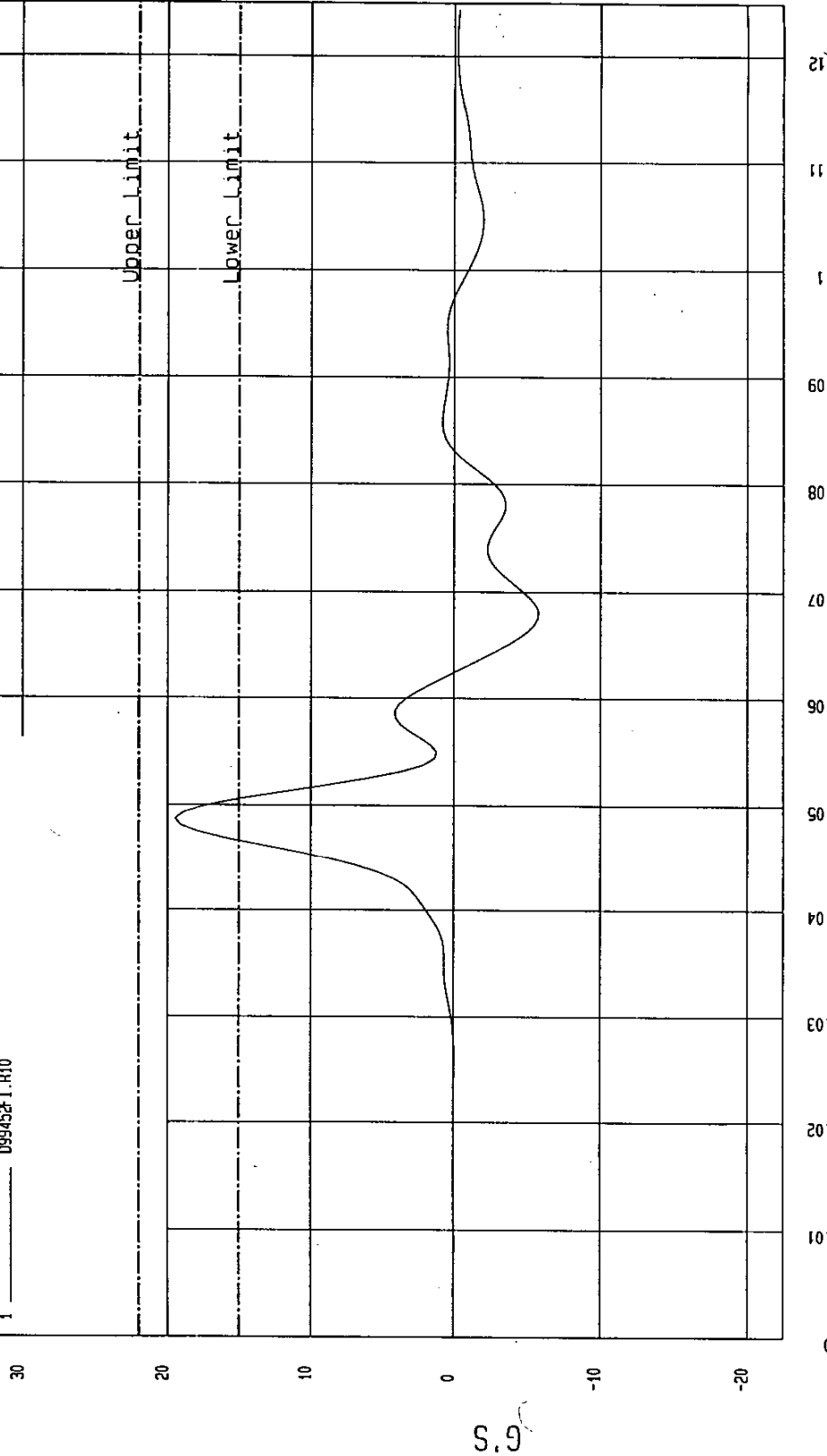
TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 12:43:29

COMPONENT: Dummy # 269 Velocity: 14.068 FT/SEC 4.29 M/SEC

Minimum = -5.81 G'S at 68.1 msec Maximum = 19.47 G'S at 48.7 msec

LOWER SPINE ACCELERATION

1 _____ D99452F1.R10



MGA RESEARCH CORPORATION

C-43

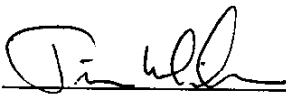
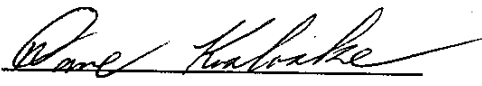
PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 9, 1999DUMMY SERIAL NUMBER: 269TEST NUMBER: D991453

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.28 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 44 |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: Dummy Calibration - Pelvis Impact TEST DATE: 12-09-1999 - 12:53:16

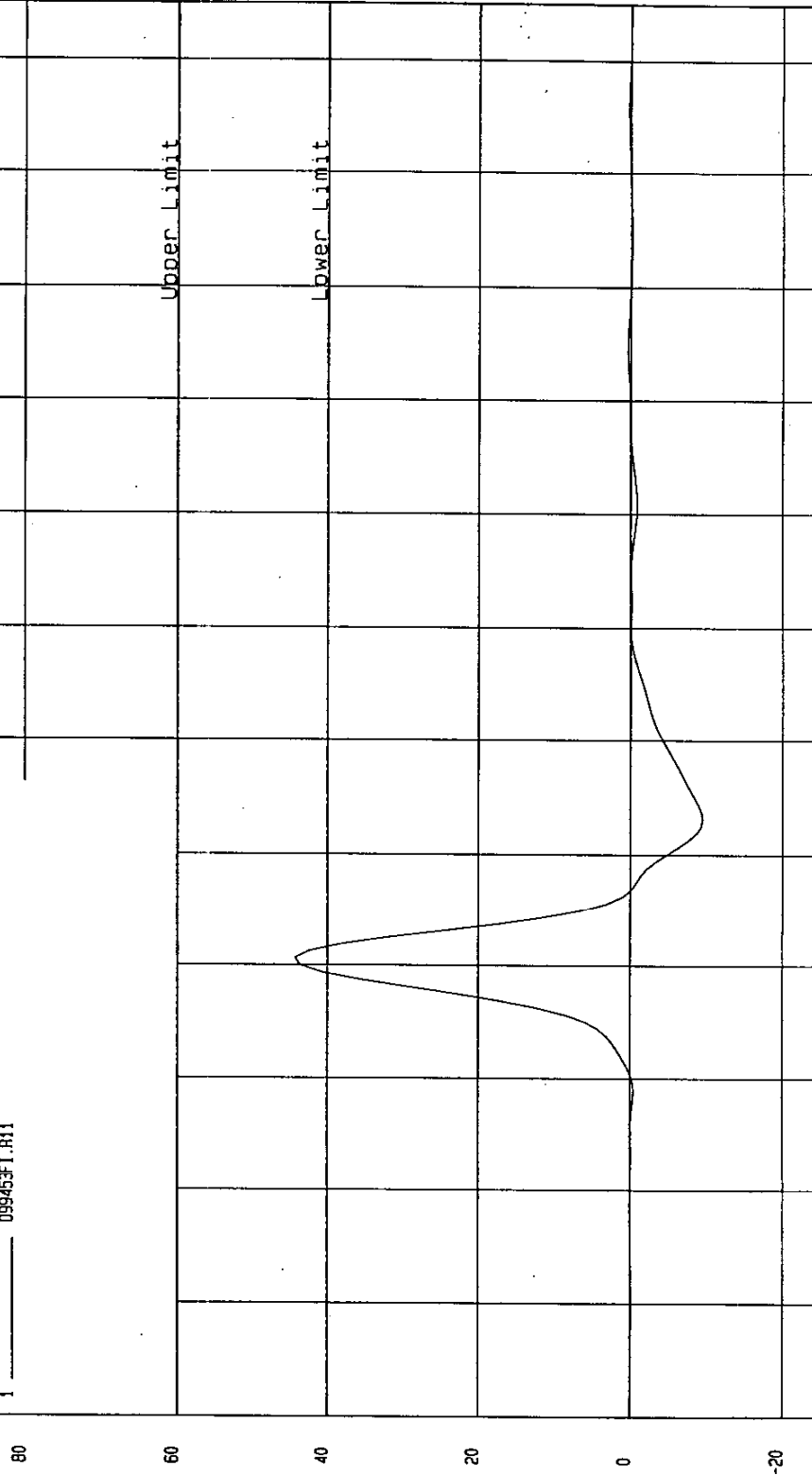
COMPONENT: Dummy # 269 Velocity: 14.046 FT/SEC 4.28 M/SEC

Minimum = -9.42 G'S at 53.1 msec

Maximum = 44.41 G'S at 40.6 msec

PELVIS ACCELERATION

1 0994531.R11



TIME (sec.)

MGA Research
12-09-1999 12:55

MGA RESEARCH CORPORATION

C-45

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1999

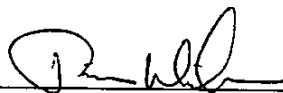
DUMMY SERIAL NUMBER: 269

TEST NUMBER: D991454

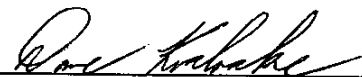
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 23% |
| FORCE @ 12.7 mm | 104 - 162 | 141 |
| FORCE @ 19.0 mm | 163 - 222 | 195 |
| FORCE @ 25.4 mm | 222 - 280 | 256 |
| FORCE @ 33 mm | 325 - 391 | 340 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



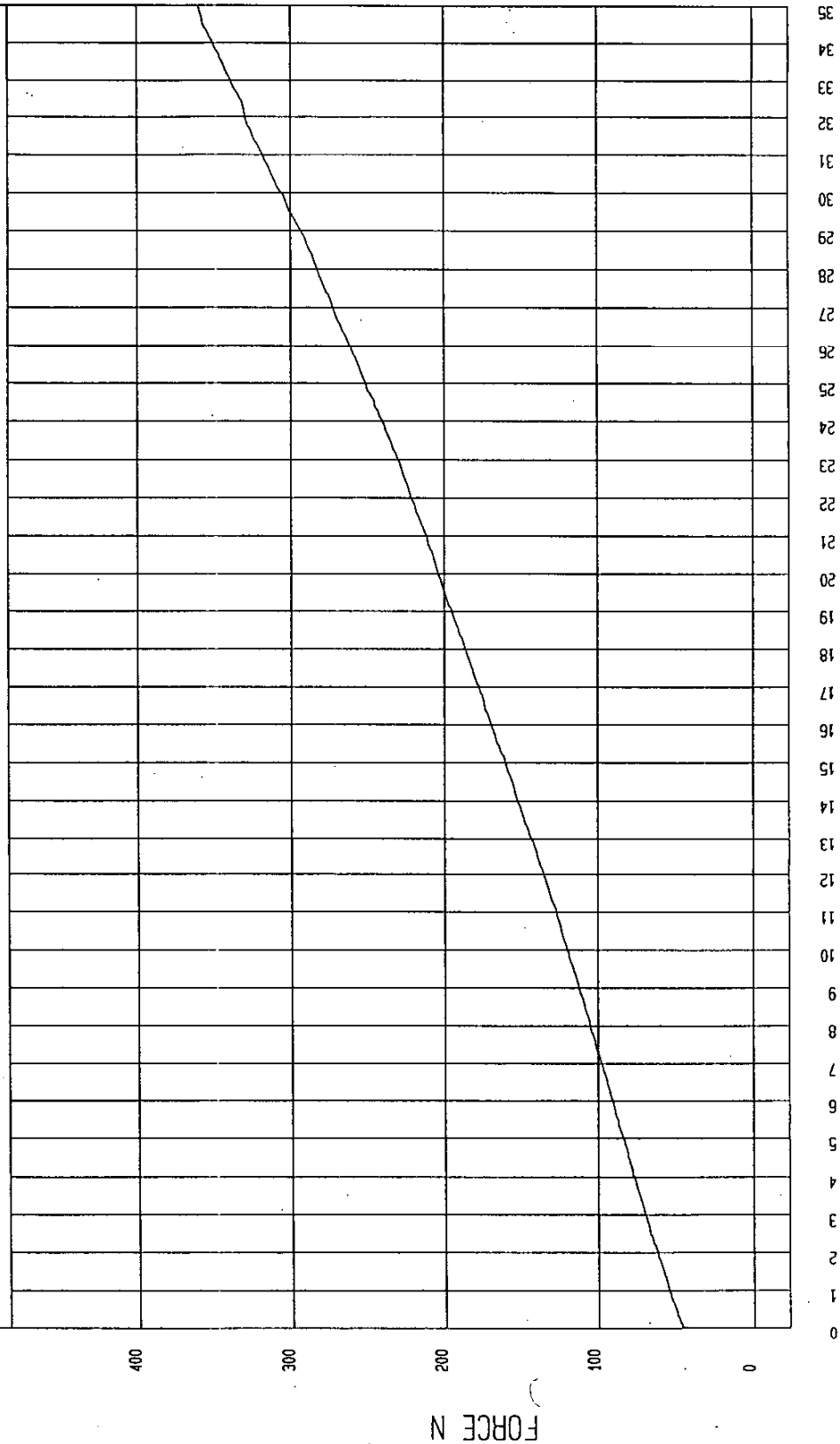
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-10-1999 - 12:43:37

COMPONENT: DUMMY # 269

FORCE as a function of DISPLACEMENT



MCA Research
12-10-1999 15:34

MGA RESEARCH CORPORATION

C-47

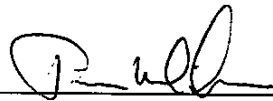
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1999DUMMY SERIAL NUMBER: 269TEST NUMBER: D991455

| 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 | 104.6 |
| FORCE @ 30° | 151.2 - 204.6 | 156.4 |
| FORCE @ 40° | 204.6 - 258.0 | 208.3 |
| RETURN ANGLE | 12° maximum | 2° |

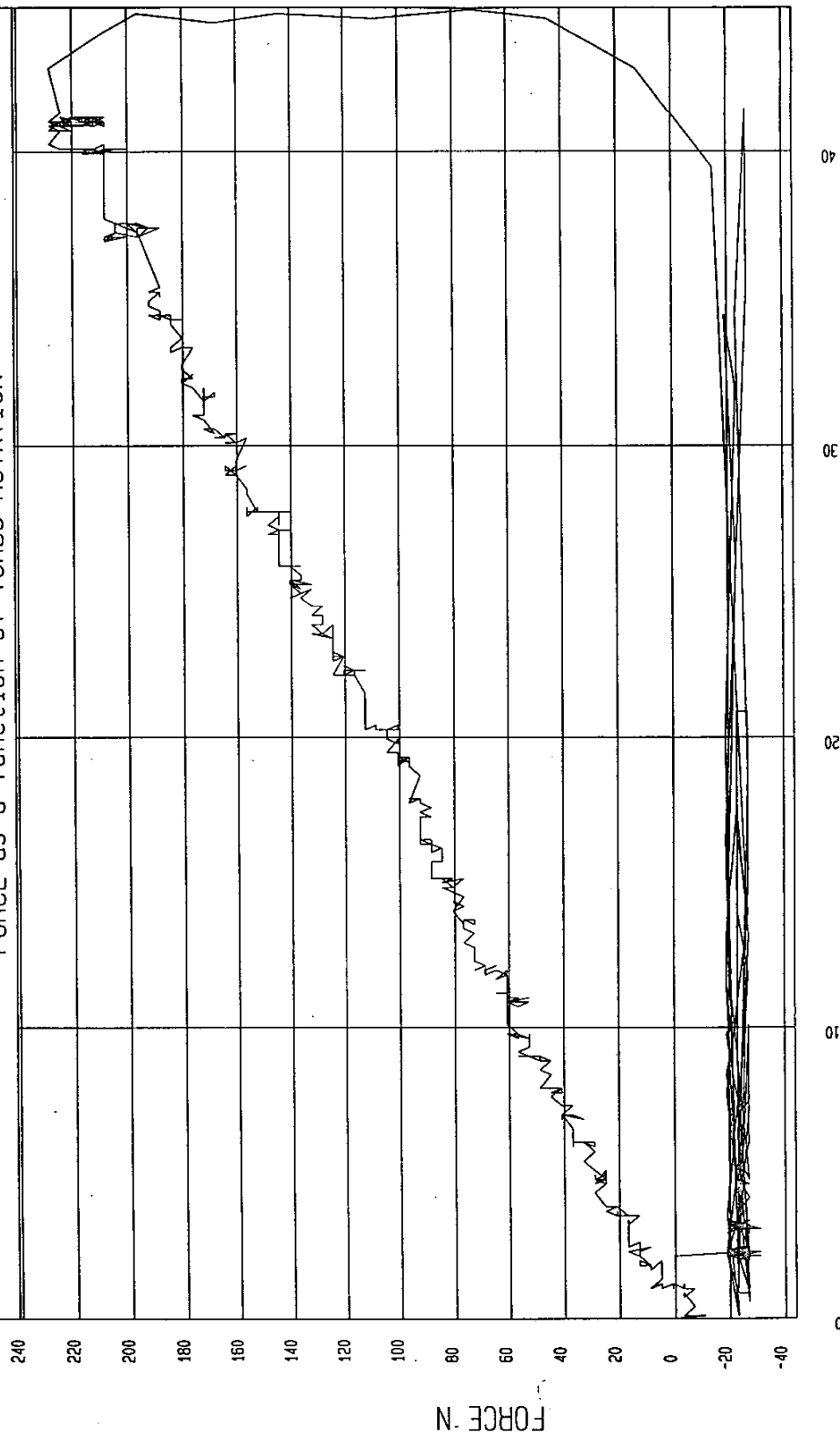
TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-10-1999 - 11:31:54

COMPONENT: DUMMY # 269

FORCE as a function of TORSO ROTATION



MGA Research
12-10-1999 15:34

TORSO ROTATION DEGREES

POST-TEST CERTIFICATION DATA

C-49

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 did not meet 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. |

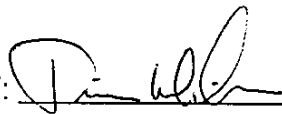
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA C-51

DUMMY SERIAL NUMBER: 270

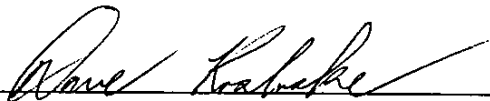
DATE OF VERIFICATION: December 10, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 898 |
| RH - Rib Height (mm) | 501 - 521 | 503 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 230 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 525 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 500 |
| HW - Hip Width (mm) | 356 - 391 | 368 |

MEASUREMENTS BY:



APPROVED BY:



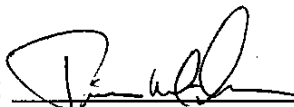
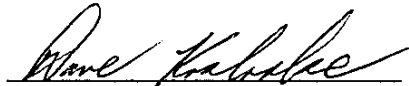
HEAD DROP TEST

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1999DUMMY SERIAL NUMBER: 270TEST NUMBER: D991461

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------------|-----------------|--------------|
| TEMPERATURE (°C) | 18.9° - 25.5°C | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70% | 26% |
| PEAK RESULTANT ACCELERATION | 210 - 260 g's | 258 |
| PEAK LATERAL ACCELERATION | <10 g's | 3 |
| TIME ABOVE 100 G. | 0.9 - 1.5 msec. | 1.2 |

TEST MEETS SPECIFICATIONS

TECHNICIAN: APPROVED BY: 

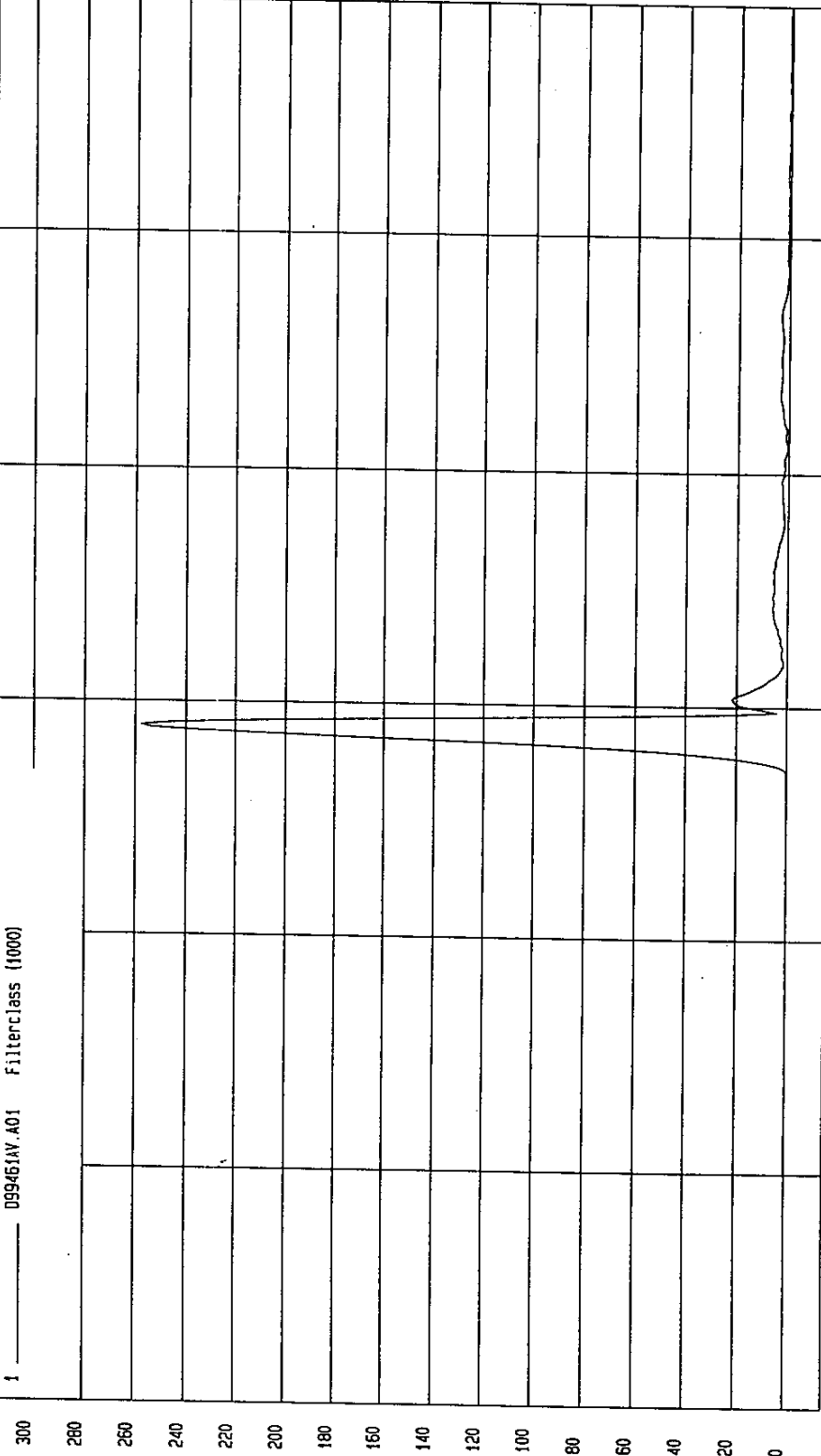
TEST: Dummy Calibration - Head Drop TEST DATE: 12-10-1999 - 14:57:19

COMPONENT: Dummy # 270

Minimum = .04 G'S at 1.2 msec Maximum = 257.74 G'S at 29 msec

PEAK RESULTANT ACCELERATION

1 _____ 099461W.A01 Filterclass (1000)



MSA Research
12-10-1999 14:58

TEST: Dummy Calibration - Head Drop TEST DATE: 12-10-1999 - 14:57:19

COMPONENT: Dummy # 270

Minimum = -1.77 G's at 82.4 msec

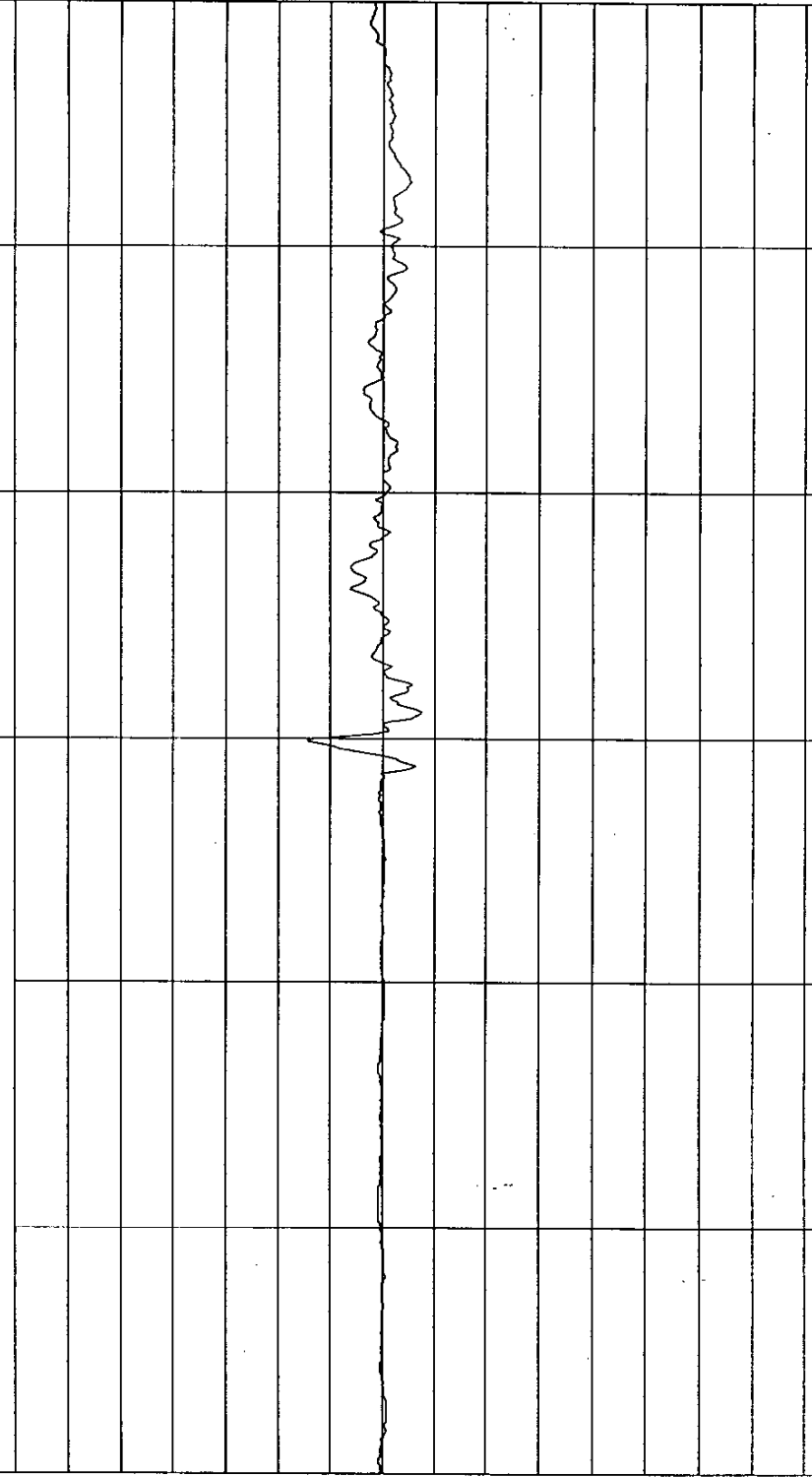
Maximum = 2.87 G's at 29.9 msec

PEAK LATERAL ACCELERATION

1 _____ D99461AR.A02 Filterclass (1000)

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

S.G



0 10 20 30 40 50

TIME (sec.)

MCA Research
12-10-1999 14:58

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C-55

THORAX IMPACT TEST

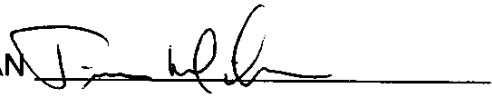
SIDE IMPACT DUMMY (SID)

DATE: December 9, 1999DUMMY SERIAL NUMBER: 270TEST NUMBER: D991462

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.28 |
| UPPER RIB (g's) | 37 - 46 g's | 45 |
| LOWER RIB (g's) | 37 - 46 g's | 46.4* |
| LOWER SPINE (g's) | 15 - 22 g's | 23.5* |

* Failure - Does not meet Specifications.

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

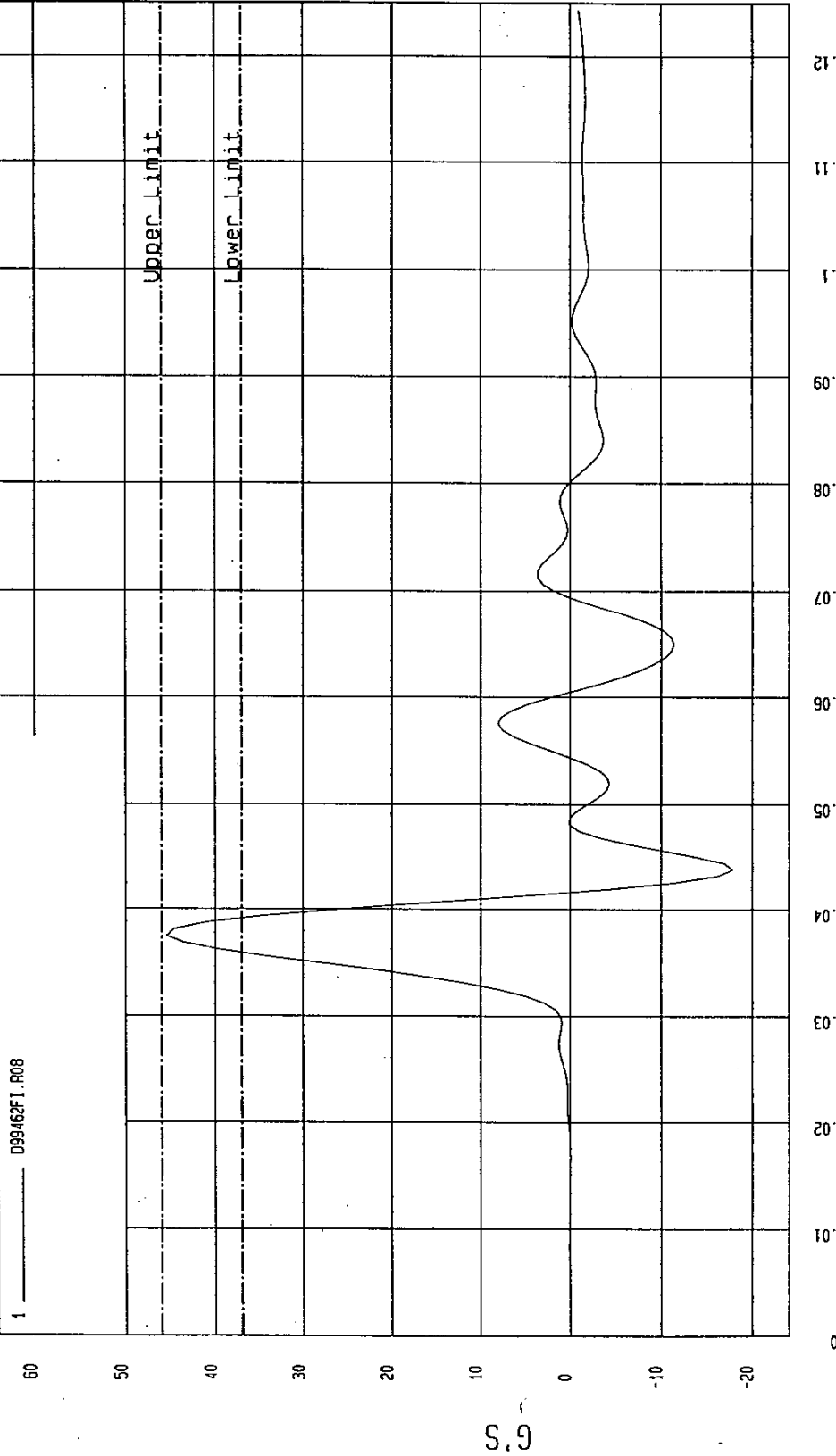
TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 13:35:23

COMPONENT: Dummy # 270 Velocity: 14.048 FT/SEC 4.28 M/SEC

Minimum = -17.84 G'S at 43.7 msec

Maximum = 45.43 G'S at 37.5 msec

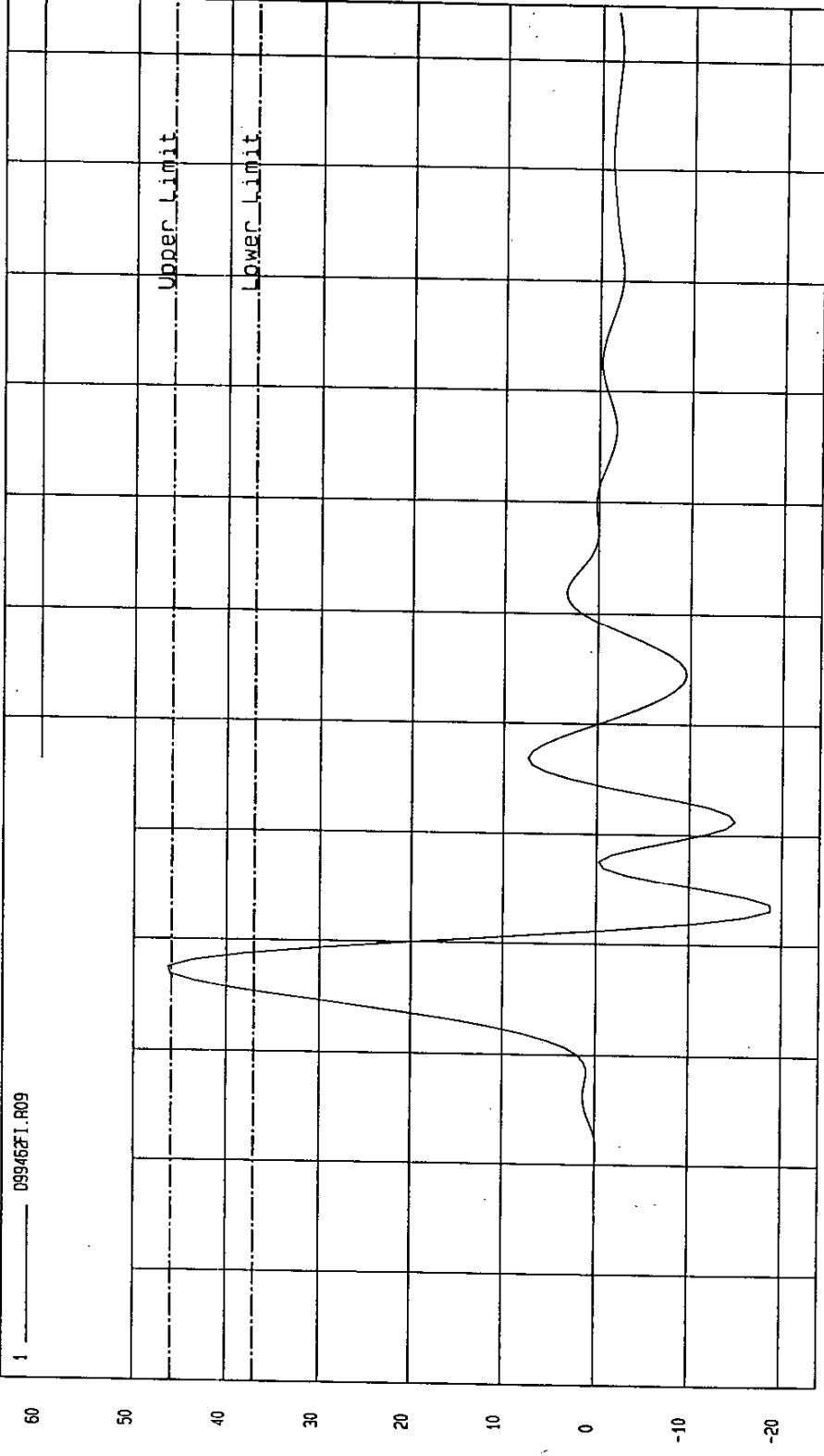
UPPER RIB ACCELERATION



TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 13:35:23
COMPONENT: Dummy # 270 Velocity: 14.048 FT/SEC 4.28 M/SEC

Minimum = -18.80 G'S at 43.1 msec Maximum = 46.36 G'S at 37.5 msec

LOWER RIB ACCELERATION



TIME (sec.)

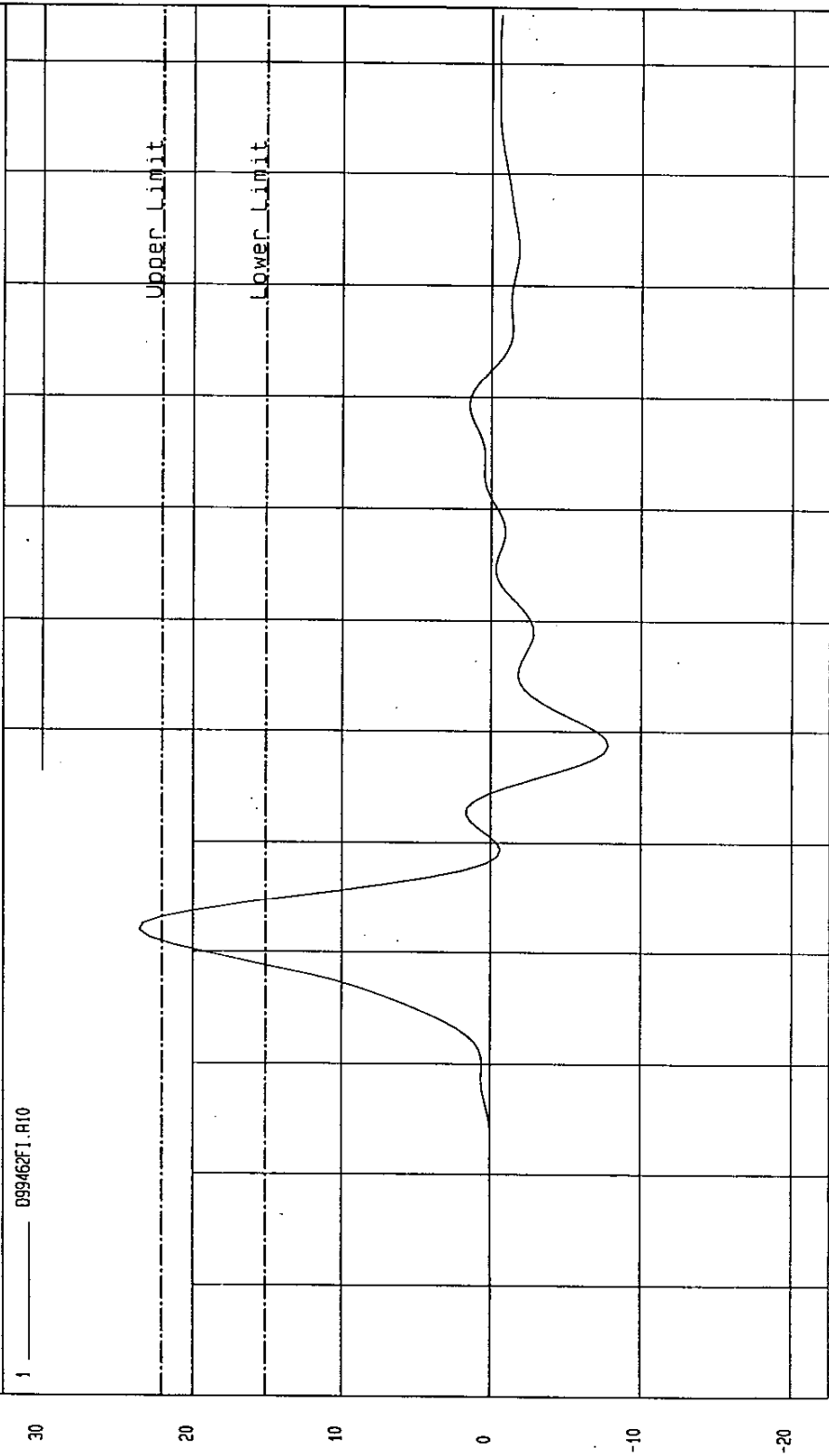
MGA Research
12-09-1999 13:56

G-57

TEST: Dummy Calibration - Thorax Impact TEST DATE: 12-09-1999 - 13:35:23
COMPONENT: Dummy # 270 Velocity: 14.048 FT/SEC 4.28 M/SEC

Minimum = -7.84 G'S at 58.7 msec Maximum = 23.49 G'S at 41.8 msec

LOWER SPINE ACCELERATION



PELVIS IMPACT TEST

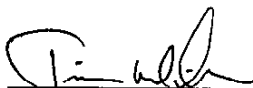
SIDE IMPACT DUMMY (SID)

DATE: December 9, 1999DUMMY SERIAL NUMBER: 270TEST NUMBER: D991463

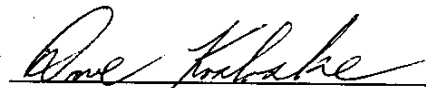
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 41 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



TEST: Dummy Calibration - Pelvis Impact TEST DATE: 12-09-1999 - 13:55:58

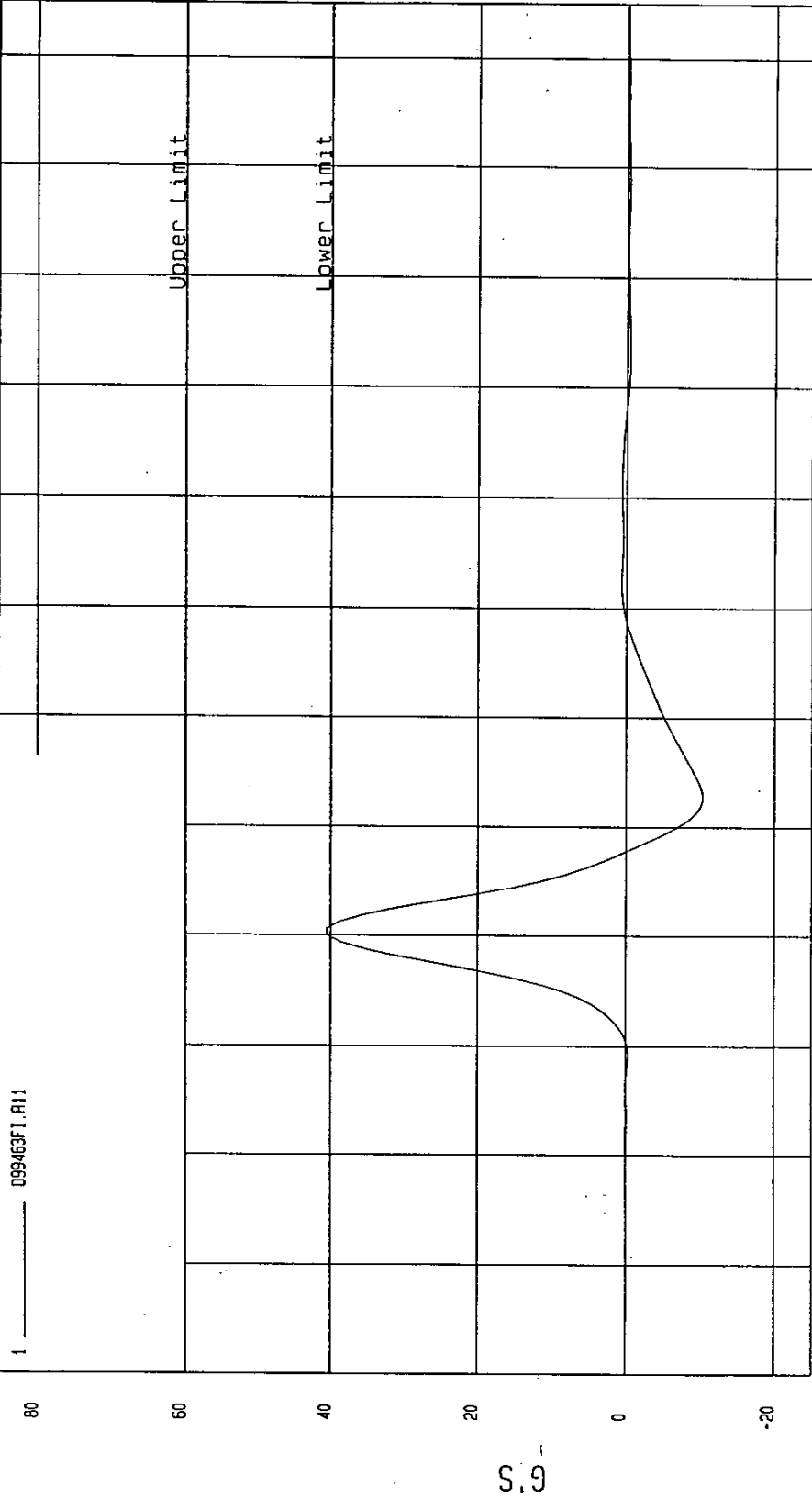
COMPONENT: Dummy # 270 Velocity: 14.064 FT/SEC 4.29 M/SEC

Minimum = -10.33 G'S at 52.5 msec

Maximum = 40.56 G'S at 40.6 msec

PELVIS ACCELERATION

1 ——— 099463FT.R11



TIME (sec.)

MCA Research
12-09-1999 13:56

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ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

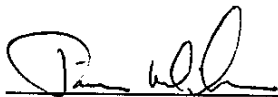
DATE: December 10, 1999

DUMMY SERIAL NUMBER: 270 TEST NUMBER: D991464

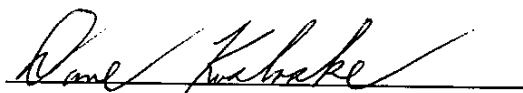
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 23% |
| FORCE @ 12.7 mm | 104 - 162 | 143 |
| FORCE @ 19.0 mm | 163 - 222 | 193 |
| FORCE @ 25.4 mm | 222 - 280 | 250 |
| FORCE @ 33 mm | 325 - 391 | 335 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



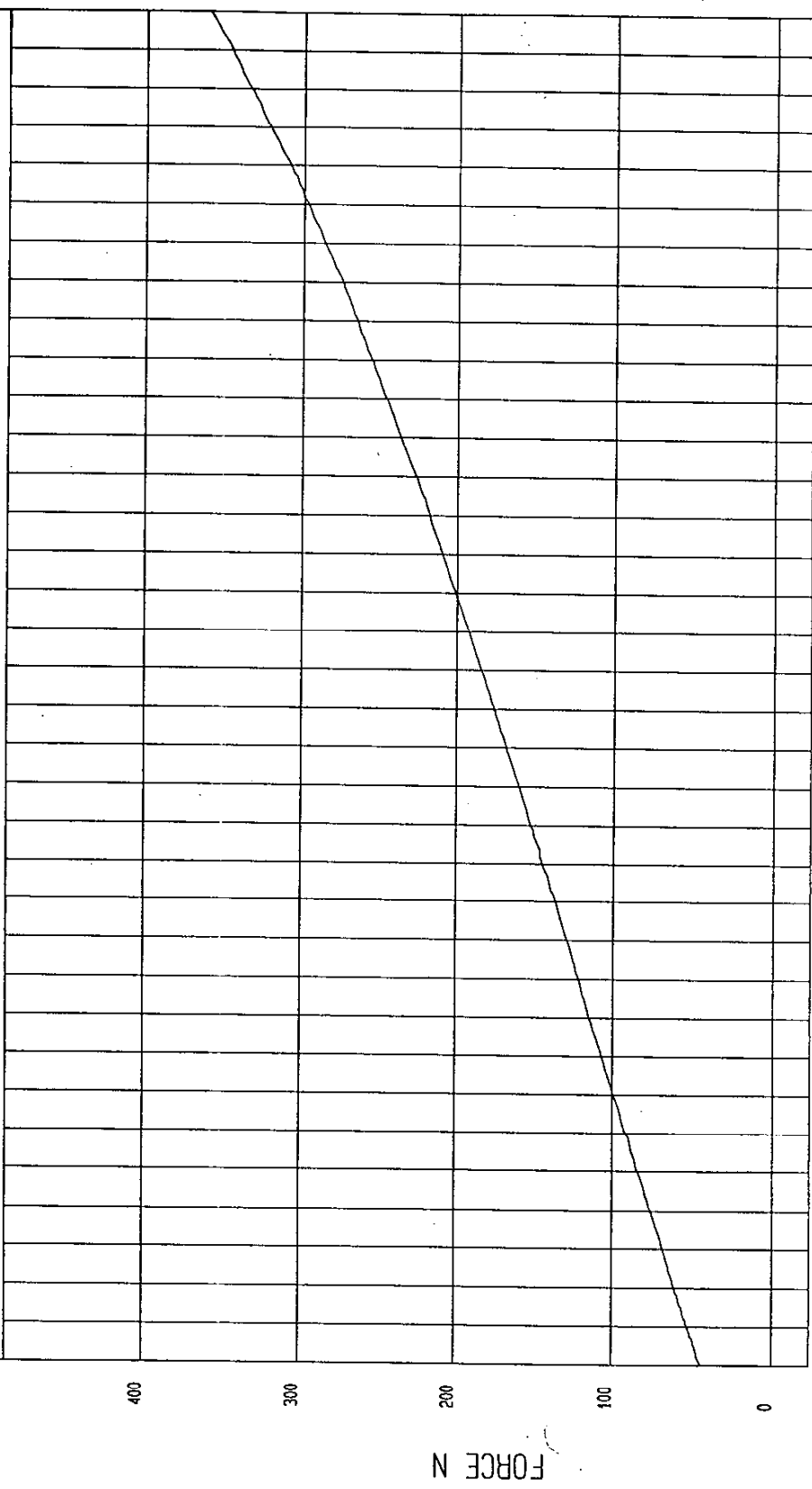
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 12-10-1999 - 12:47:32

COMPONENT: DUMMY # 270

FORCE as a function of DISPLACEMENT



WCA Research
12-10-1999 15:34

DISPLACEMENT mm

FORCE N

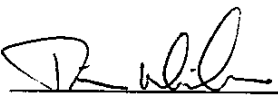
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 10, 1999DUMMY SERIAL NUMBER: 270 TEST NUMBER: D991465

| 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 | 100.5 |
| FORCE @ 30° | 151.2 - 204.6 | 160.3 |
| FORCE @ 40° | 204.6 - 258.0 | 232.0 |
| RETURN ANGLE | 12° maximum | 4° |

TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 12-10-1999 - 11:52:51

COMPONENT: DUMMY # 270

FORCE as a function of TORSO ROTATION



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

C-65

Type: Side Impact Dummy

Serial Number: 269

Inspected By: Tim Michnay

Date: December 10, 1999

| <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

C-66

Type: Side Impact Dummy

Serial Number: 270

Inspected By: Tim Michnay

Date: December 10, 1999

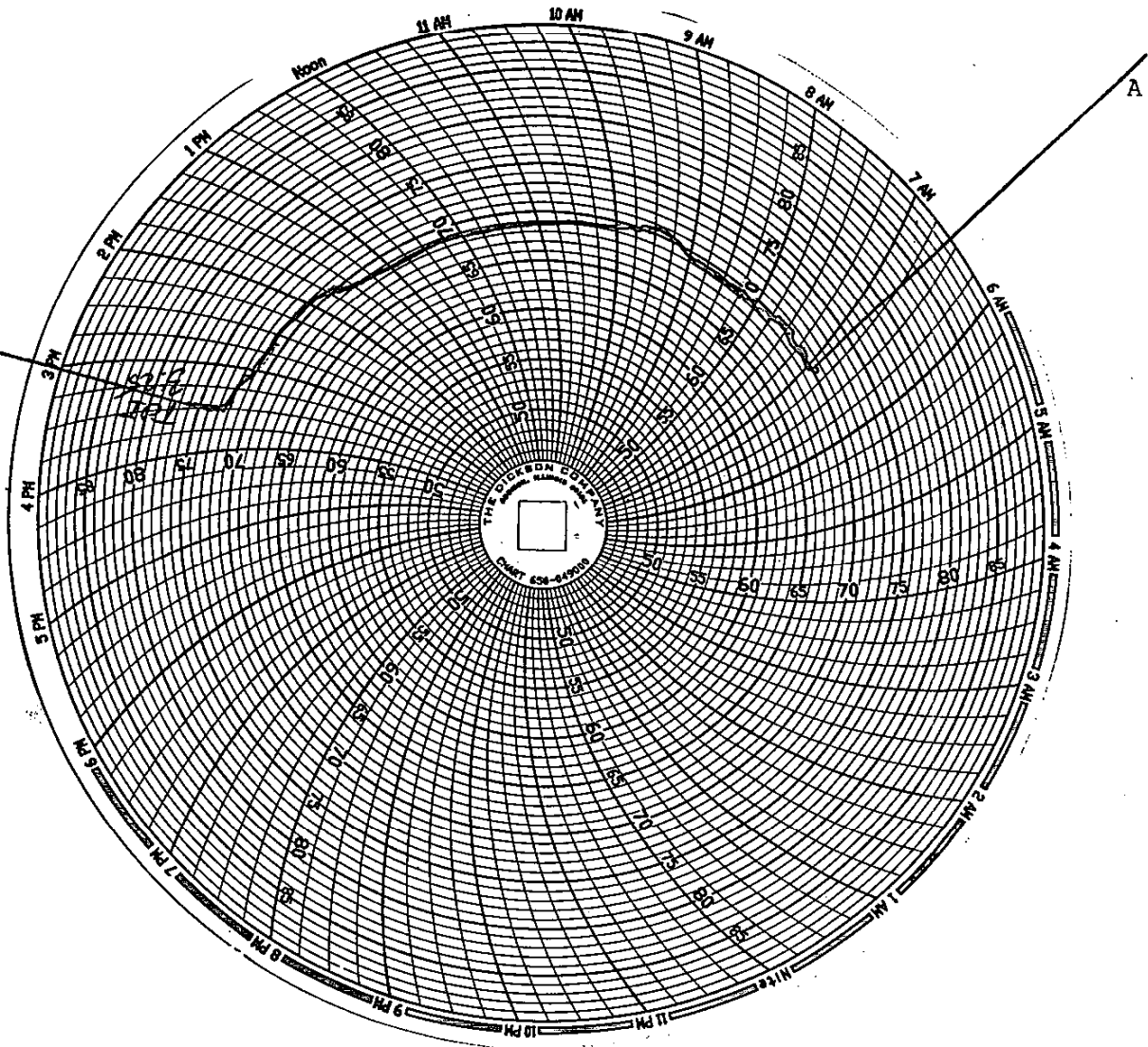
| <u>Part</u> | <u>Items Checked</u> | <u>Comments</u> |
|--------------|--|-----------------|
| Skin | visual inspection | OK |
| Head | visual, ballast, accelerometer mount | OK |
| Neck | visual | OK |
| Spine box | visual, ballast, weldment, accelerometer mount | OK |
| Rib cage | visual, measure | 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 | Arm Foam | Damaged |

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

Arm foam torn on impact side – Replaced.

VEHICLE AND DUMMY TEMPERATURE

C-67



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 | AP2D8 | Endevco | 11/8/99 |
| Lower Rib Y | AJ411 | Endevco | 11/8/99 |
| Lower Spine Y | AGTP7 | Endevco | 11/8/99 |
| Pelvis Y | AJ8T5 | Endevco | 11/8/99 |
| Upper Rib Redundant Y | AP2A4 | Endevco | 11/8/99 |
| Lower Rib Redundant Y | AGTM8 | Endevco | 11/8/99 |
| Lower Spine Redundant Y | AGT04 | Endevco | 11/8/99 |
| Pelvis Redundant Y | AGP28 | Endevco | 11/8/99 |
| Head Center of Gravity X | AJ9H0 | Endevco | 11/8/99 |
| Head Center of Gravity Y | ANAN3 | Endevco | 11/8/99 |
| Head Center of Gravity Z | ANAN6 | Endevco | 11/8/99 |

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

| | LEFT REAR PASSENGER | | |
|--------------------------|---------------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y | J10195 | Endevco | 11/8/99 |
| Lower Rib Y | AP170 | Endevco | 11/8/99 |
| Lower Spine Y | ANAP1 | Endevco | 11/8/99 |
| Pelvis Y | AP1T8 | Endevco | 11/8/99 |
| Upper Rib Redundant Y | J13942 | Endevco | 11/8/99 |
| Lower Rib Redundant Y | AP2G9 | Endevco | 11/8/99 |
| Lower Spine Redundant Y | ANAT6 | Endevco | 11/8/99 |
| Pelvis Redundant Y | AP2D7 | Endevco | 11/8/99 |
| Head Center of Gravity X | AP120 | Endevco | 11/8/99 |
| Head Center of Gravity Y | ALEK9 | Endevco | 11/8/99 |
| Head Center of Gravity Z | AP042 | Endevco | 11/8/99 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE ACCELEROMETERS | | |
|---------------------------------|------------------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Moving Barrier CG X | J10-E05 | Entran | 8/17/99 |
| Moving Barrier CG Y | J04-F10 | Entran | 8/16/99 |
| Moving Barrier CG Z | I18-E18 | Entran | 8/17/99 |
| Moving Barrier Rear Axle X | C25-A17 | Entran | 8/6/99 |
| Moving Barrier Rear Axle Y | I25-J12 | Entran | 8/6/99 |
| Left Mid A-Post Y | F12-G06 | Entran | 11/5/99 |
| Left Lower A-Post Y | K11-J09 | Entran | 11/22/99 |
| Left Mid B-Post Y | F11-G02 | Entran | 11/22/99 |
| Left Lower B-Post Y | B12-G06 | Entran | 11/22/99 |
| Rear Floorpan Above Axle X | K16-X03 | Entran | 8/17/99 |
| Rear Floorpan Above Axle Y | G01-J14 | Entran | 8/17/99 |
| Rear Floorpan Above Axle Z | I26-D17 | Entran | 8/17/99 |
| Driver Seat Track Y | I18-E02 | Entran | 11/22/99 |
| Right Side Sill at Front Seat X | E13-D06 | Entran | 9/24/99 |
| Right Side Sill at Front Seat Y | E25-G07 | Entran | 9/24/99 |
| Right Side Sill at Front Seat Z | I25-J10 | Entran | 9/24/99 |
| Right Side Sill at Rear Seat X | J23-E13 | Entran | 9/24/99 |
| Right Side Sill at Rear Seat Y | A09-G06 | Entran | 9/24/99 |
| Right Side Sill at Rear Seat Z | F20-G12 | Entran | 9/24/99 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE ACCELEROMETERS | | |
|-----------------------------------|------------------------|--------------|------------------|
| | SERIAL NO | MANUFACTURER | CALIBRATION DATE |
| Left Side Sill at Front Seat Y | K11-J11 | Entran | 11/22/99 |
| Left Side Sill at Rear Seat Y | J06-D20 | Entran | 11/5/99 |
| Right Rear Occupant Compartment Y | E23-R10 | Entran | 11/22/99 |
| Vehicle CG X | E10-F13 | Entran | 11/5/99 |
| Vehicle CG Y | E10-F18 | Entran | 11/5/99 |
| Vehicle CG Z | F07-A14 | Entran | 8/16/99 |
| Left Front Door on Centerline | I25-J08 | Entran | 8/16/99 |
| Midrear of Left Front Door | A09-G09 | Entran | 8/16/99 |
| Left Front Door Upper Centerline | H02-J02 | Entran | 8/16/99 |
| Midrear of Left Rear Door | I14-D05 | Entran | 11/22/99 |
| Left Rear Door Upper Centerline | C18-G09 | Entran | 11/22/99 |
| Rear Passenger Seat Track Y | A09-G07 | Entran | 11/22/99 |

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