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REPORT NO.: 214-MGA-98-05
SAFETY COMPLIANCE TESTING FOR FMVSS NO. 214
"SIDE IMPACT PROTECTION -
PASSENGER CARS"

NISSAN NORTH AMERICA, INC.
1998 NISSAN ALTIMA 4 DOOR
NHTSA NO: CW5200

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: September 26, 1997

Report Date: October 13, 1997

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
ROOM 6115 (NEF-30)
WASHINGTON, D.C. 20590

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Prepared By: *Dave Kosloske*
Dave Kosloske, Project Engineer

Approved By: *John Fleck*
John Fleck, Facility Director

Approval Date: 10-20-'97

FINAL REPORT ACCEPTED BY (OVSC):

Accepted By: *J. M. Dwyer*
Contract Technical Manager

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4. Title and Subtitle Final Report of FMVSS No.214 Compliance Side Impact Protection Testing of a 1998 Nissan Altima 4 Door NHTSA No. CW5200				5. Report Date October 13, 1997																			
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7. Author(s) Dave Kosloske, Project Engineer				8. Performing Organization Report No. MGA-DOT-214-05																			
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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 400 Seventh St., S.W., Room 6115 Washington, D.C. 20590				13. Type of Report and Period Covered Final Test Report September 26, to October 13, 1997																			
				14. Sponsoring Agency Code NSA-30																			
15. Supplementary Notes																							
16. Abstract A 48/24 kph 90° Left Side Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject 1998 Nissan Altima 4 Door in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP- 214D-04 for the determination of FMVSS No. 214 Side Impact Protection compliance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on September 26, 1997. The impact velocity of the Moving Deformable Barrier (MDB) was 52.9 kph, and the ambient temperature at the struck side of the target vehicle at the time of impact was 22°C. The target vehicle post test maximum crush was 405 mm at level 2. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th> <th><u>DRIVER.</u></th> <th><u>LEFT REAR PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>51</td> <td>46</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>55</td> <td>57</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>75</td> <td>65</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>65</td> <td>61</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>84</td> <td>94</td> </tr> </tbody> </table> The doors 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>LEFT REAR PASS.</u>	Left Upper Rib (LUR) Accel., g	51	46	Left Lower Rib (LLR) Accel., g	55	57	Lower Spine (T ₁₂) Accel., g	75	65	Thoracic Trauma Index (TTI)	65	61	Pelvis (PEV) Accel., g	84	94
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17. Key Words Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. 202-366-4946 Attn: Robert Hornickle																			
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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 98 FMVSS 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-C-11033. The purpose of this test was to evaluate side impact protection of a 1998 Nissan Altima 4 Door.

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

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes only.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1998 Nissan Altima 4 Door was impacted on the left side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 32.9 mph (52.9 kph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on September 26, 1997. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

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

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

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

The following table summarizes the results of the FMVSS 214 Left Side Impact test:

Injury Criteria	Front SID	Rear SID
THI (g)	65	61
Pelvis (g)	84	94

TEST NOTES

1. The following accelerometers were not used for this test:

Left Front Door on Centerline

Midrear of Left Front Door

Left Front Door Upper Centerline

Midrear of Left Rear Door

Left Rear Door Upper Centerline

Rear Seat Track

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

DATA SHEET NO. 1

GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 VIN: 1N4DL01D4WC114798

Vehicle Body Color: Black Build Date: 7/97

Engine Data: 4 Cylinders; CID; 2.4 Liter; cc

Placement Longitudinal; X Lateral

Transmission: 5 speed; X Manual; Automatic; Overdrive

Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 59 miles

Options: X A/C; X Pwr. Steering; X Pwr. Brakes; X Pwr. Windows;

 X Cruise Control; X Tilt Wheel; X Power Door Locks

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 Psi FRONT

29 Psi REAR

Recommended Tire Size: P195/65R15

Tires on Test Vehicle: P195/65R15 Manufacturer: General

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; 3rd Seat 5 Total

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

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

Vehicle Maximum Capacity Loading = 390.1 kg (A)

No. of Occupants x 68.04 kg. = 340.2 kg (B)

Cargo Capacity (A-B) = 49.9 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:(AS DELIVERED)

Right Front = 402.7 kg

Right Rear = 266.7 kg

Left Front = 411.9 kg

Left Rear = 254.5 kg

TOTAL FRONT = 814.6 kg

TOTAL REAR = 521.2 kg

% of Total Vehicle Weight = 61.0 %;

% of Total Weight = 39.0 %

TOTAL WEIGHT = 1335.8 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	= <u>1335.8</u> kg
Cargo Carrying Capacity of Test Vehicle	= <u>49.9</u> kg
Weight of 2 Side Impact Dummies (2 x <u>80.7</u> kg.)	= <u>161.4</u> kg
TEST VEHICLE TARGET WEIGHT	= <u>1547.1</u> kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO: (FULLY LOADED)

Right Front	= <u>416.0</u> kg	Right Rear	= <u>320.7</u> kg
Left Front	= <u>458.1</u> kg	Left Rear	= <u>352.4</u> kg
TOTAL FRONT	= <u>874.1</u> kg	TOTAL REAR	= <u>673.1</u> kg
% of Total Weight	= <u>56.5</u> %	% of Total Weight	= <u>43.5</u> %
TOTAL WEIGHT	= <u>1547.2</u> kg		

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 694 mm Left Front 704 mm Right Rear 690 mm Left Rear 682 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 686 mm Left Front 685 mm Right Rear 659 mm Left Rear 639 mm

TEST ATTITUDE:

Right Front 680 mm Left Front 688 mm Right Rear 660 mm Left Rear 649 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2626 mm

C.G. As Tested = 1100 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4300 mm

Centerline = 4664 mm

Left Side = 4300 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

FRONT SEAT CUSHION PLACEMENT:

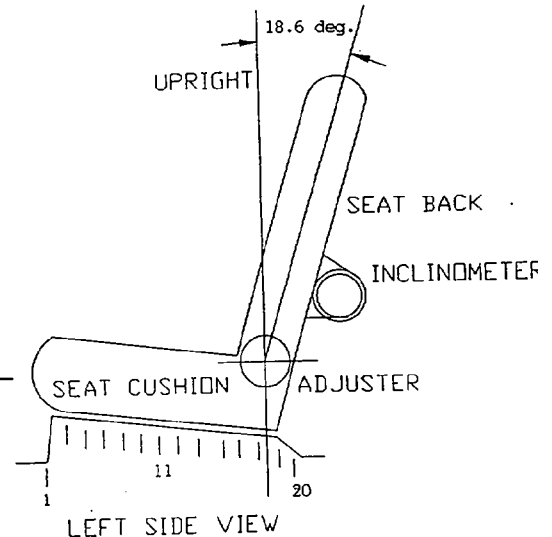
Total Length of Adjustment Travel: 230 mm

Test Position: 11th position rearward out of 20 total

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 7th locking position from upright as 0

18.6°



REAR POSITION SEAT:

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

Seat Back Adjustment Position: Non-Adjustable

ADJUSTABLE STEERING COLUMN POSITION: Mid (24°)

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

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 59.8 liters

Test Volume: 55.0 liters 92 % of capacity

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

Wheelbase: = 2626 mm

Impact Point is 373 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door
Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997
Overall Length = 4664 mm; Overall Width = 1735 mm

TEST WEIGHT:

Right Front = 433.2 kg Right Rear = 315.2 kg
Left Front = 462.2 kg Left Rear = 329.8 kg
TOTAL FRONT = 895.4 kg TOTAL REAR = 645.0 kg
% of Total Weight = 58.1 % % of Total Weight = 41.9 %
TOTAL VEHICLE WEIGHT = 1540.4 kg
Wheelbase = 2626 mm
Longitudinal C.G. from Center of Front Axle = 1100 mm
Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (258 mm above ground) = 239 mm
 2. LEVEL 2 (478 mm above ground) = 405 mm
 3. LEVEL 3 (604 mm above ground) = 342 mm
 4. LEVEL 4 (884 mm above ground) = 280 mm
 5. LEVEL 5 (1308 mm above ground) = 101 mm
- Maximum Post-Test Intrusion = 405 mm

OCCUPANTS:

	<u>Driver</u>	<u>Left Rear Passenger</u>
Type of Dummy	<u>SID</u>	<u>SID</u>
Restraints Used	<u>type II belt</u> <u>with frontal airbag</u>	<u>type II belt</u>

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels: = 20

Number of Cameras: Onboard Vehicle = 3

Offboard Vehicle = 4

Deformable Barrier = 2

TOTAL = 9

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	= <u>1252 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	= <u>4115 mm</u>
Wheelbase of Framework Carriage	= <u>2591 mm</u>
Tread of Framework Carriage (Front & Rear)	= <u>1880 mm</u>
C.G. Location Rearward of Front Axle	= <u>1105 mm</u>
C.G. Location From Center Line	= <u>-12 mm</u>
C.G. Location Above Ground Level	= <u>484 mm</u>

MDB WEIGHT:

Left Front	= <u>440.1 kg</u>	Left Rear	= <u>246.6 kg</u>
Right Front	= <u>338.2 kg</u>	Right Rear	= <u>331.9 kg</u>
TOTAL FRONT	= <u>778.3 kg</u>	TOTAL REAR	= <u>578.5 kg</u>
TOTAL MDB WEIGHT = <u>1356.8 kg</u>			

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

Impact Speed = Primary: 32.9 mph (52.9 kph) Secondary: 33.0 mph (53.1 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

- | | | |
|----|---------------------------------|-----------------|
| 1. | Row A Top of Stack (813 mm) | = <u>159</u> mm |
| 2. | Row B Mid Stack (686 mm) | = <u>121</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = <u>75</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = <u>106</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4

POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>to B-Post and passenger</u> <u>seat headrest</u>	<u>to C Post and rear window</u> <u>header</u>
Arm	<u>to door panel</u>	<u>to door panel</u>
Pelvis	<u>to armrest</u>	<u>to armrest</u>
Left Knee	<u>to door panel</u>	<u>to door panel</u>
Right Knee	<u>to left knee</u>	<u>to left knee</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 20 mm forward Vertical: 3 mm high

ARM REST LOCATIONS:

Front: 225 mm from bottom of window
Rear: 230 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 115 mm Front Seat Cushion: 113 mm

Left Rear Seat Back: 190 mm Rear Seat Cushion: 228 mm

GLAZING DAMAGE:

Windshield cracked, front and rear left side door glass broken

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

None noted

OTHER NOTABLE IMPACT EFFECTS:

Airbags did not deploy

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

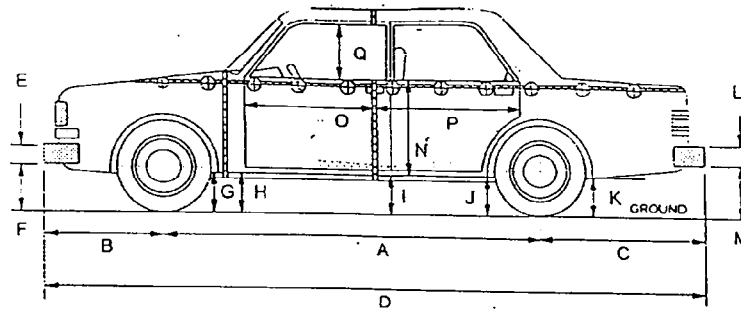
DATA SHEET NO. 5
SIDE IMPACT DUMMY (SID) INSTRUMENTATION DATA

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door
Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

	Front SID ID #048				Rear SID ID #049			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y	50.9	29	-33.9	72	45.8	47	-4.9	168
Left Lower Rib (LLR) Y	55.4	31	-20.1	71	57.0	49	-14.9	82
SPINE ACCELERATIONS								
Lower Lateral Y	74.6	32	-16.9	88	64.7	43	-26.5	76
PELVIS ACCELERATIONS								
Lateral Y	84.4	32	-19.2	56	93.6	39	-16.8	66

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

LEFT SIDE VIEW

ALL MEASUREMENTS IN (mm)

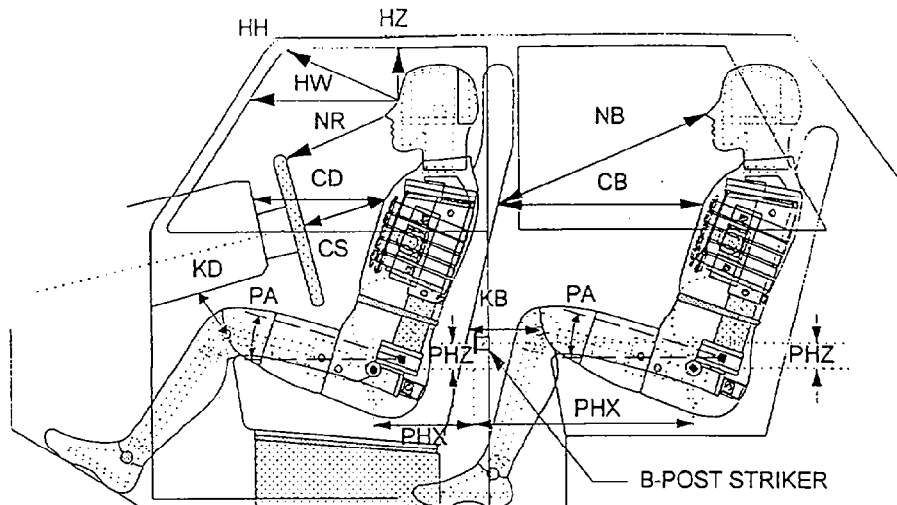
	PRE-TEST	POST-TEST	Δ CHANGE
A	2626	2532	-94
B	948	937	-11
C	1090	1023	-67
D	4664	4492	-172
E	120	120	0
F	408	424	16
G	190	212	22
H	198	224	26
I	188	237	49
J1/J2	182/180	174/184	-8/4
K	252	260	8
L	180	182	2
M	454	472	18
N	630	559	-71
O	707	697	-10
P	1205	1076	-129
Q	420	387	-33
R	4300	4300	0
S	4300	4208	-92
T	1735	1623	-112

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

NHTSA NO.: CW5200 Test Date: September 26, 1997



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

	FRONT PASSENGER ID #048		REAR PASSENGER SID ID #049
HH	398	HZ	155
HW	608	NB	582
HZ	170	CB	477
NR	512	KBL (KBA)	211 (0.0°)
CD	568	KBR (KBA)	210 (0.0°)
CS	384	PA°	24.2°
KDL(KDA°)	196 (22.8°)	PHX*	269
KDR(KDA°)	190 (24.3°)	PHZ*	326
PA°	24.1°		
PHX	164		
PHZ	150		

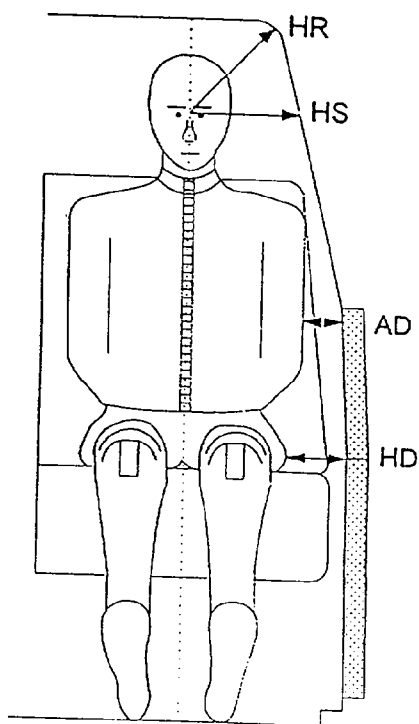
NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

* Measured from rear striker

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

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

NHTSA NO.: CW5200 Test Date: September 26, 1997



NOTE: All dimensions are in mm

	FRONT PASSENGER ID #048	REAR PASSENGER ID #049
HR	188	221
HS	328	351
AD	108	120
HD	144	179

DATA SHEET NO. 9
DUMMY POSITIONING - DRIVER

Driver H-Point

HP to Floor Z = 124
HP to Hinge X = 806
HP to Sill Y = 188
HP to Striker X = 338
HP to Dash X = 588
HP to Header Z = 782

Driver Dummy Position

HP to Floor Z = 118
HP to Hinge X = 812
HP to Sill Y = 190
HP to Striker X = 342
HP to Dash X = 595
HP to Header Z = 785
Pelvis Angle = 24.1°

H-Point Machine

Left Knee = 132°
Right Knee = 132°
Left Foot = 98°
Right Foot = 88°
Left Leg = 178
Right Leg = 160
Hip Angle = 100°
Back Angle = 25°

DATA SHEET NO. 9 (Cont'd)
DUMMY POSITIONING - LEFT REAR PASSENGER

Passenger H-Point

HP to Floor Z = 10
HP to Hinge X = 722
HP to Sill Y = 198
HP to Striker X = 530
HP to Dash X = 644
HP to Header Z = 762

Passenger Position

HP to Floor Z = 4
HP to Hinge X = 728
HP to Sill Y = 208
HP to Striker X = 538
HP to Dash X = 650
HP to Header Z = 774
Pelvis Angle = 24.2°

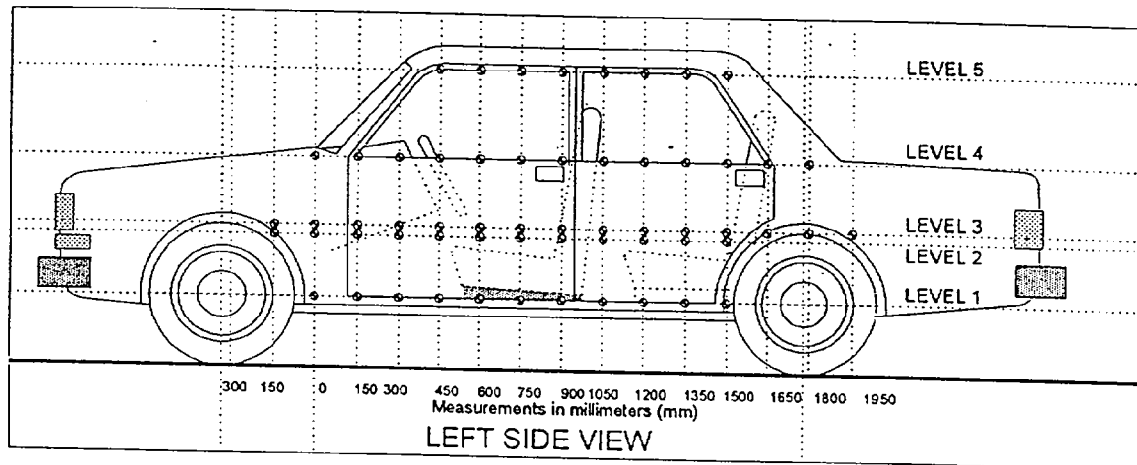
H-Point Machine

Left Knee = 124°
Right Knee = 124°
Left Foot = 140°
Right Foot = 140°
Left Leg = 138
Right Leg = 68
Hip Angle = 101°
Back Angle = 24°

DATA SHEET NO. 10
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

NHTSA NO.: CW5200 Test Date: September 26, 1997



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

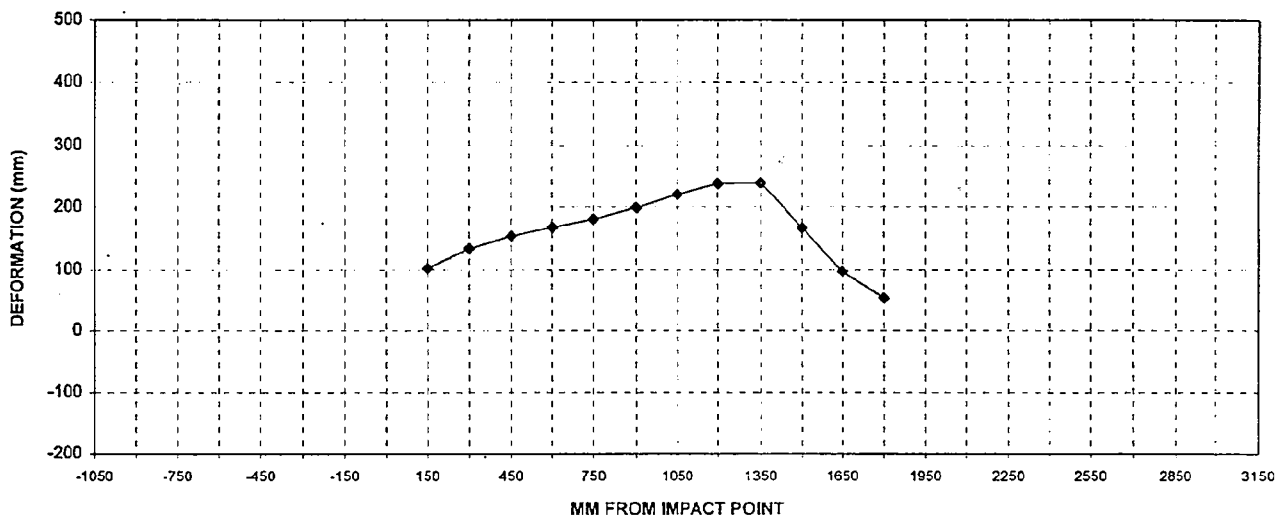
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>258</u> mm
Level 2 @ Occupant H-Point	= <u>478</u> mm
Level 3 @ Mid Door	= <u>604</u> mm
Level 4 @ Window Sill	= <u>884</u> mm
Level 5 @ Window Top	= <u>1308</u> mm

DATA SHEET NO. 11
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150	708	810	102
300	708	842	134
450	708	862	154
600	708	876	168
750	708	889	181
900	708	907	199
1050	708	928	220
1200	708	946	238
1350	708	947	239
1500	708	875	167
1650	708	805	97
1800	706	759	53
1950			
2100			
2250			
2400			
2550			
2700			
2850			
3000			
3150			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



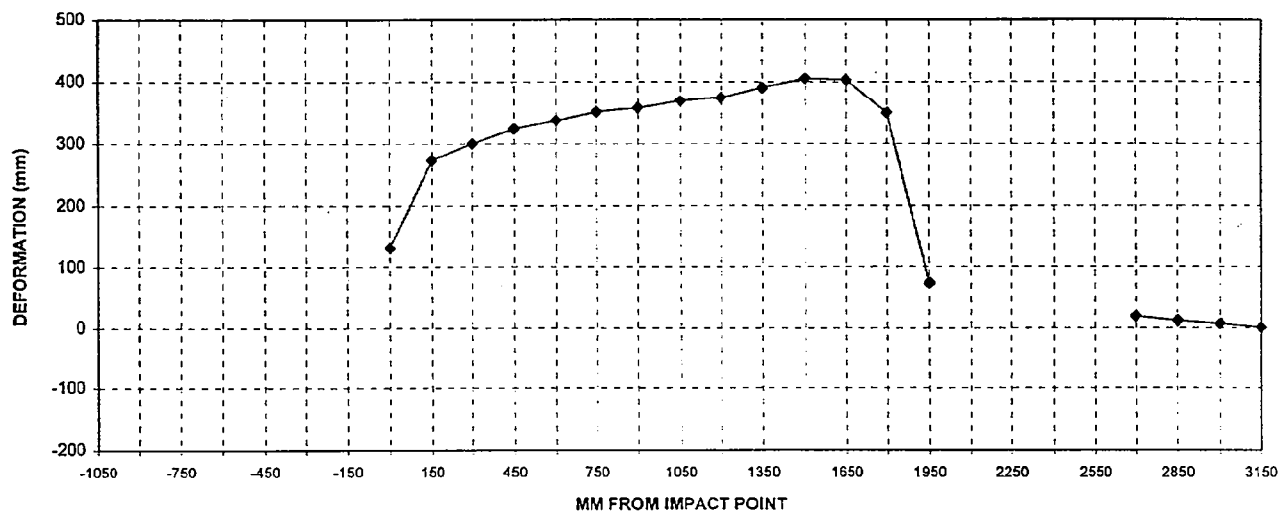
LEVEL 1 - AXLE CENTERLINE

DATA SHEET NO. 11 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 2 - Occupant H Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1050	727	732	5
-900	682	695	13
-750	655	677	22
-600			
-450			
-300			
-150			
0 (impact point)	657	788	131
150	657	930	273
300	657	957	300
450	657	980	323
600	658	995	337
750	657	1008	351
900	657	1015	358
1050	656	1025	369
1200	655	1029	374
1350	655	1045	390
1500	654	1059	405
1650	654	1057	403
1800	651	1001	350
1950	651	725	74
2100			
2250			
2400			
2550			
2700	661	680	19
2850	678	690	12
3000	702	709	7
3150	742	743	1

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



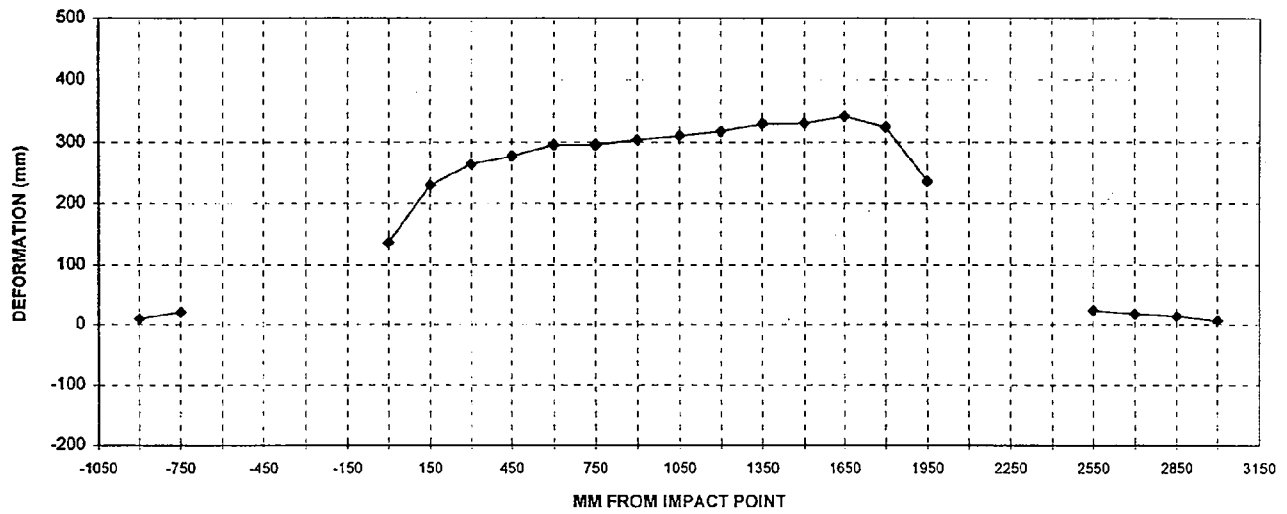
LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 11 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 3 - Mid Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1050			
-900	699	708	9
-750	665	685	20
-600			
-450			
-300			
-150			
0 (impact point)	645	781	136
150	645	874	229
300	645	908	263
450	646	923	277
600	646	942	296
750	646	942	296
900	646	950	304
1050	646	957	311
1200	646	964	318
1350	645	975	330
1500	645	976	331
1650	643	985	342
1800	640	965	325
1950	640	875	235
2100			
2250			
2400			
2550	655	678	23
2700	672	689	17
2850	689	702	13
3000	719	725	6
3150			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



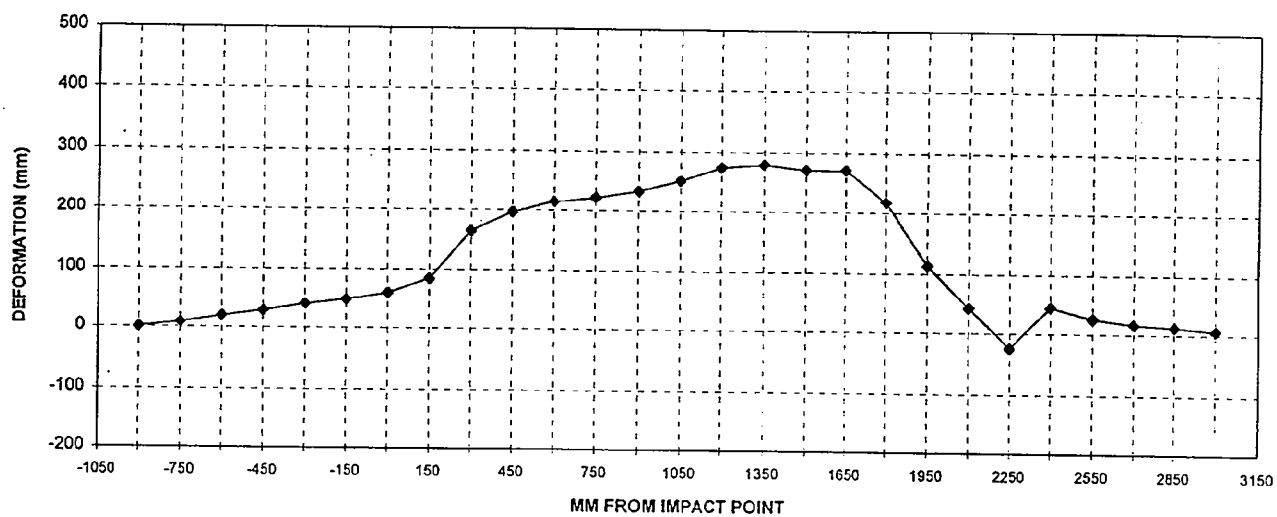
LEVEL 3 - MID DOOR

DATA SHEET NO. 11 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 4 - Window Sill		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1050			
-900	789	790	1
-750	752	760	8
-600	731	750	19
-450	715	743	28
-300	707	747	40
-150	704	752	48
0 (impact point)	703	763	60
150	703	788	85
300	706	871	165
450	707	903	196
600	708	922	214
750	707	929	222
900	706	939	233
1050	705	956	251
1200	704	979	275
1350	704	984	280
1500	706	978	272
1650	705	977	272
1800	706	924	218
1950	708	822	114
2100	710	752	42
2250	710	686	-24
2400	720	764	44
2550	735	760	25
2700	756	772	16
2850	778	790	12
3000	820	826	6
3150			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



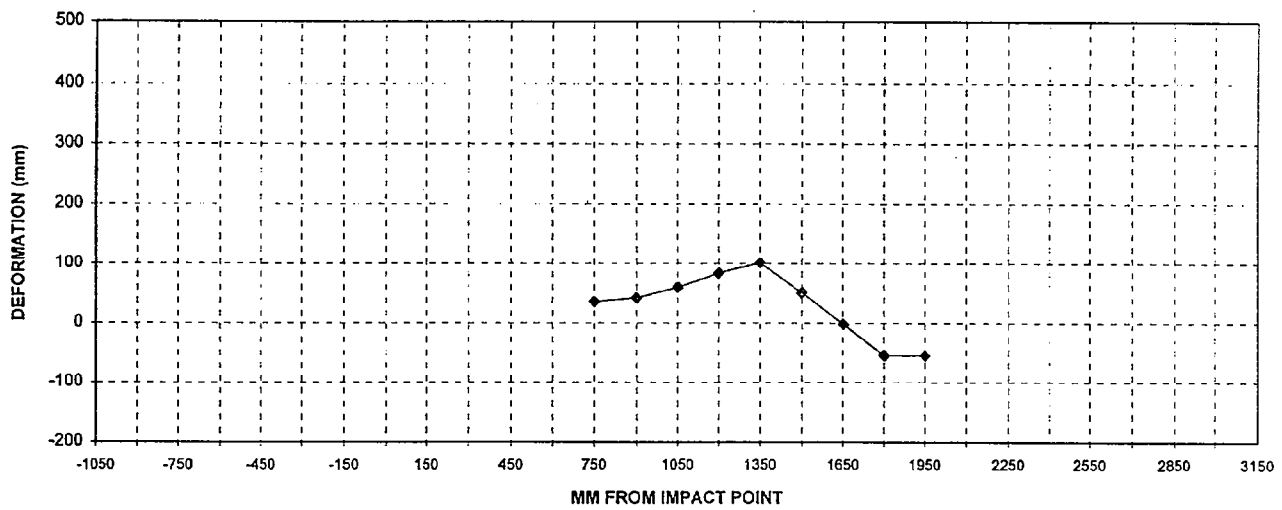
LEVEL 4 - WINDOW SILL

DATA SHEET NO. 11 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600			
750	905	940	35
900	901	942	41
1050	905	964	59
1200	908	991	83
1350	912	1013	101
1500	913	963	50
1650	918	916	-2
1800	923	869	-54
1950	935	990	-55
2100			
2250			
2400			
2550			
2700			
2850			
3000			
3150			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)

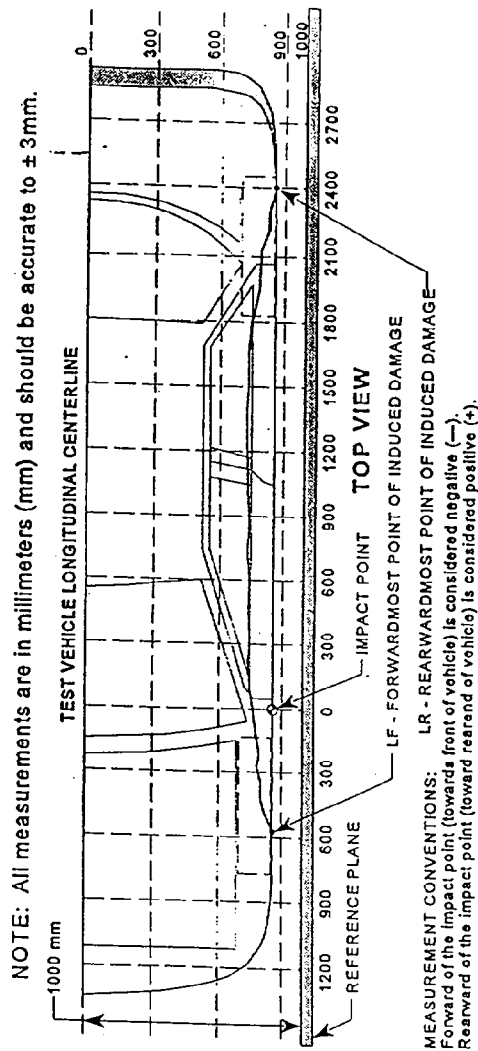


LEVEL 5 - WINDOW TOP

DATA SHEET NO. 12
VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

NHTSA NO.: CW5200 Test Date: September 26, 1997



DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = <u>-1050</u> mm)	732	727	5
2. <u>-221</u> mm	750	705	45
3. <u>558</u> mm	989	657	332
4. <u>1383</u> mm	1045	655	390
5. <u>2352</u> mm	762	717	45
6. (LR = <u>3150</u> mm)	743	742	1

DATA SHEET NO. 13

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

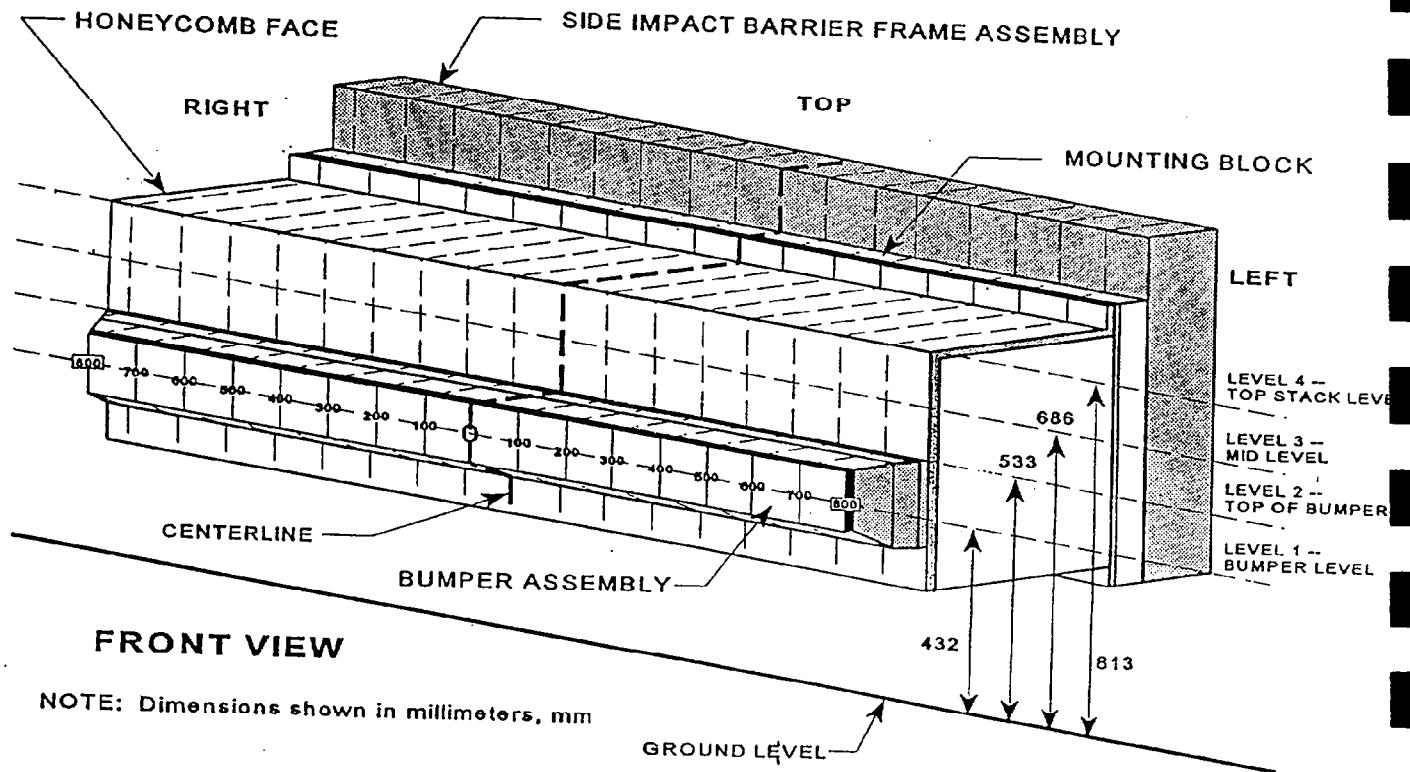
Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

		Distance Right of Center (mm)										Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800	
Location	Height at CL*																		
Top Stack Level 4	813 mm	12	-1	-1	-1	0	1	3	4	7	8	10	15	21	34	62	116	159	
Mid Level Level 3	686 mm	8	2	-1	0	1	1	2	2	2	3	4	5	8	10	22	71	121	
Top Bumper Level 2	533 mm	9	1	-3	3	3	5	6	6	4	8	12	16	18	19	31	53	75	
Mid Bumper Level 1	432 mm	29	18	16	19	27	31	29	27	28	32	37	41	46	52	69	99	106	

See next page for Barrier Face Graphic

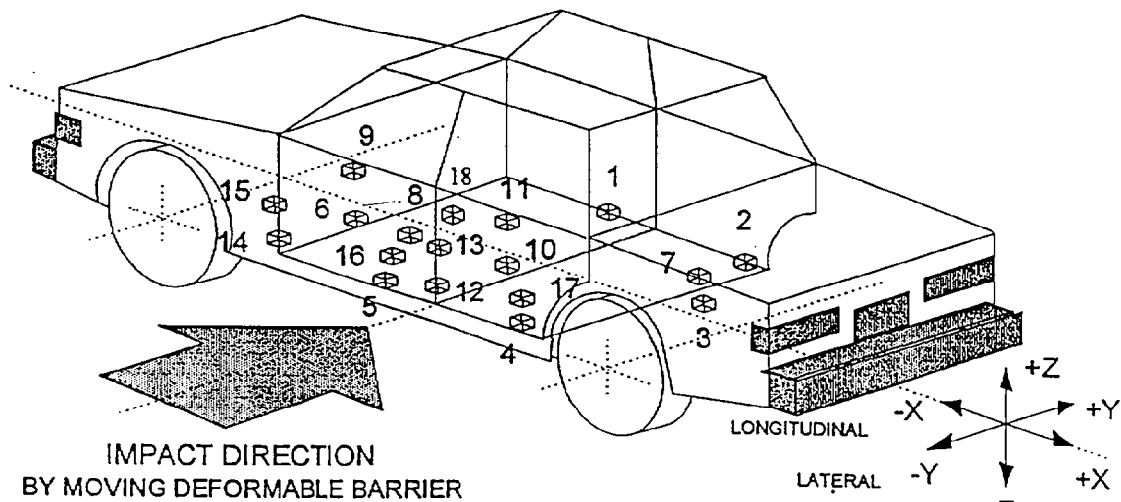
DATA SHEET NO. 13 (Cont'd)



DATA SHEET 14
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997



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

DATA SHEET NO. 14 (Cont'd)

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Right Side Sill @ Front Seat	2642	688	222	3	-6	19	-3	3	-6	19
2	Right Side Sill @ Rear Seat	1718	690	228	2	-8	19	-3	6	-6	20
3	Rear Floorpan Above Axle	1180	0	443	7	-8	16	-2	8	-5	19
4	Left Side Sill @ Rear Seat	1725	-693	226			31	-9			
5	Left Side Sill @ Front Seat	2640	-692	221			35	-7			
7	Right Rear Occupant Compartment	1828	254	342			21	-3			
12	Left Lower B-Post	2116	-677	316			65	-9			
13	Left Mid B-Post	2043	-701	924			116	-39			
14	Left Lower A-Post	3169	-709	349			93	-24			
15	Left Mid A-Post	3186	-760	880			31	-1			
16	Driver Seat Track	2256	-555	264			118	-56			
18	Vehicle CG*	2538	20	400	---	---	---	---	---	---	---

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

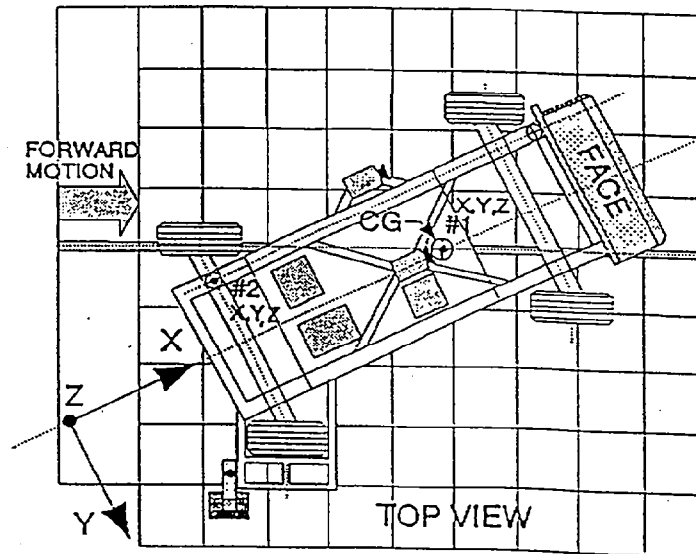
* No valid data collected

DATA SHEET NO. 15

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997



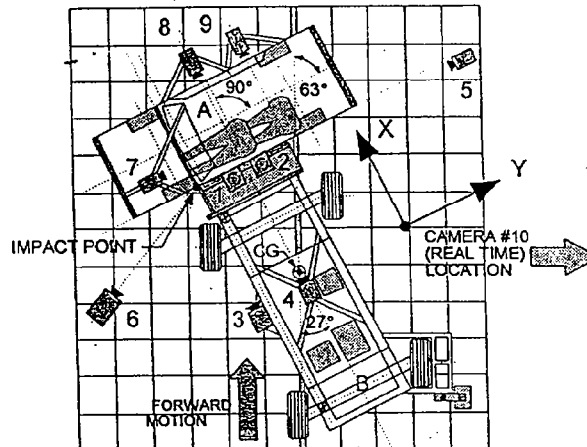
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	1105	-12	484				
	Longitudinal (X)	---	---	---	1	137	-17	34
	Lateral (Y)	---	---	---	3	57	-6	24
	Vertical (Z)	---	---	---	13	60	-17	66
	Resultant (R)	---	---	---	18	34	---	---
2	Rear Frame Member	-2591	-625	622				
	Longitudinal (X)	---	---	---	2	167	-21	36
	Lateral (Y)	---	---	---	5	29	-1	199

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

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997



Camera No.	View	Coordinates (mm)*			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
	Real Time					13	24
6	Left Impact	-450	-2270	1800		13	707
7	Onboard Hood					13	1010
8	Onboard Front Occupant					8	926
9	Onboard Rear Occupant					8	1081
5	Right Impact	-410	10480	1670		25	962
2	Top Overall	20	1320	5000		8	985
1	Top Impact	-260	0	5000		13	1000
4	Cart Overall					13	877
3	Cart Impact					35	1015

* Reference: (from impact point)
 +X = Forward
 +Y = To Right
 +Z = Upward from floor level

DATA SHEET 17
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE: X Left Side Impact MDB 32.9 mph (52.9 kph)

FUEL SPILLAGE MEASUREMENT:

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

FUEL SPILLAGE LOCATION(S): None

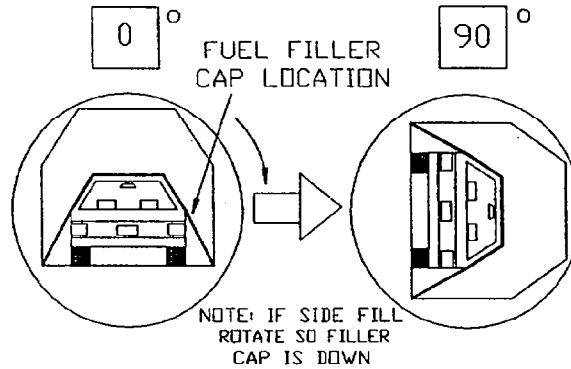
DATA SHEET 17

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 52 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 52 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

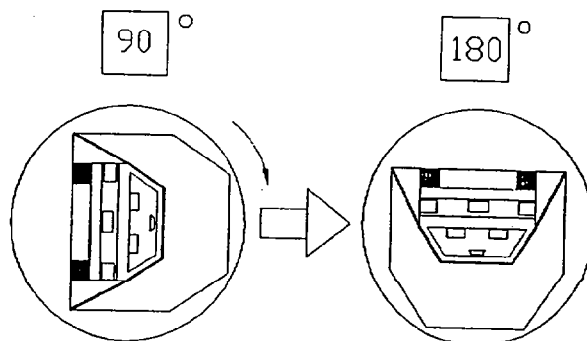
DATA SHEET 17

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 33 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 33 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

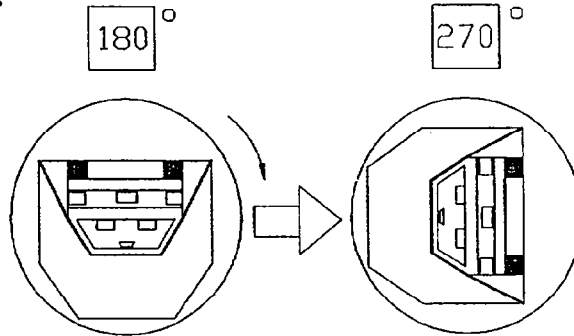
DATA SHEET 17

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 26, 1997

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

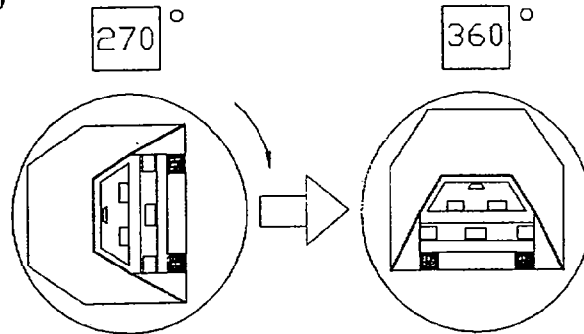
DATA SHEET 17

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1998/Nissan/Altima/4 Door

Vehicle NHTSA No.: CW5200 Test Date: September 19, 1997

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 38 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 38 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

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

FUEL SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

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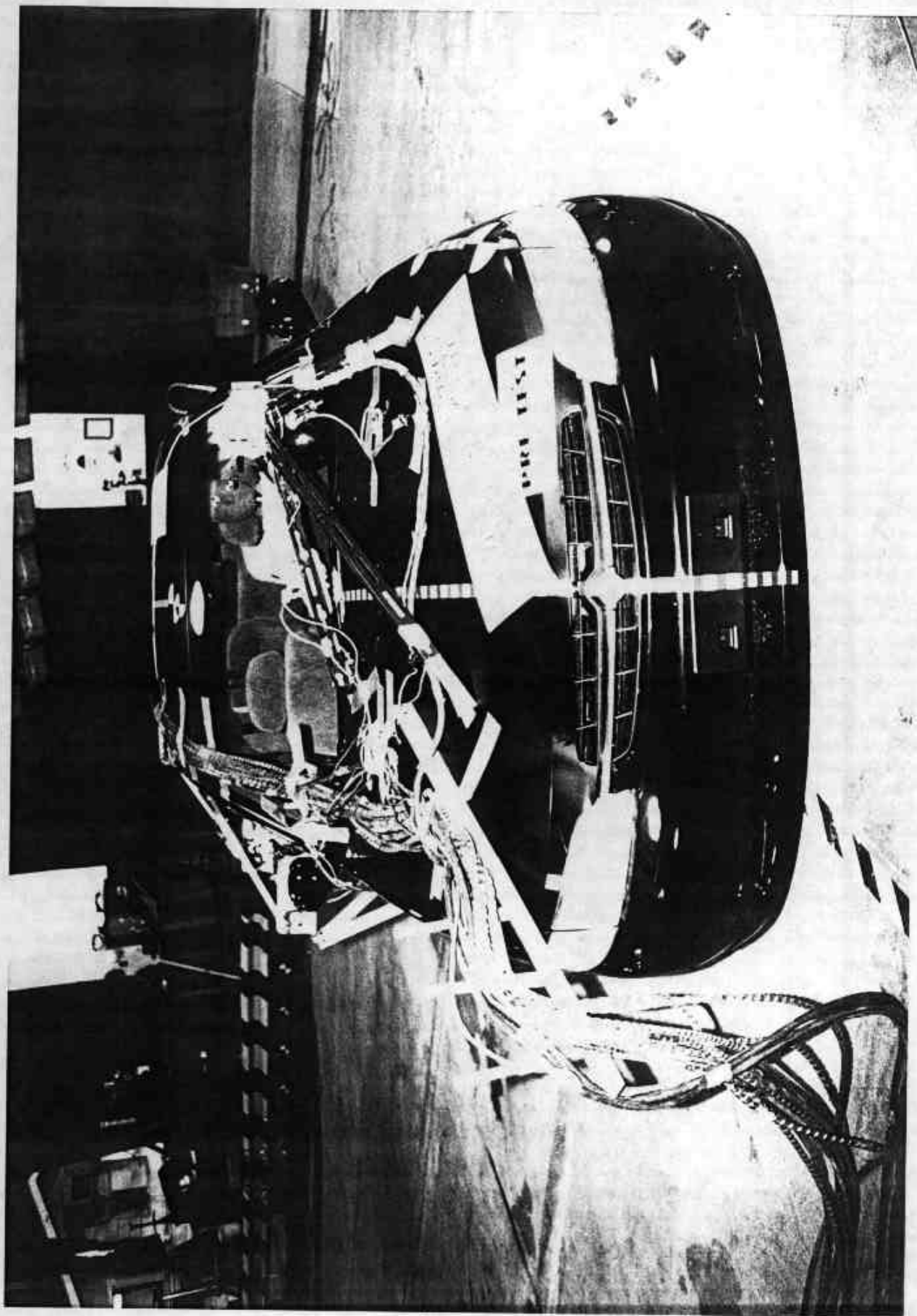


Photo No. A-1 - Pre-Test Front View of Test Vehicle

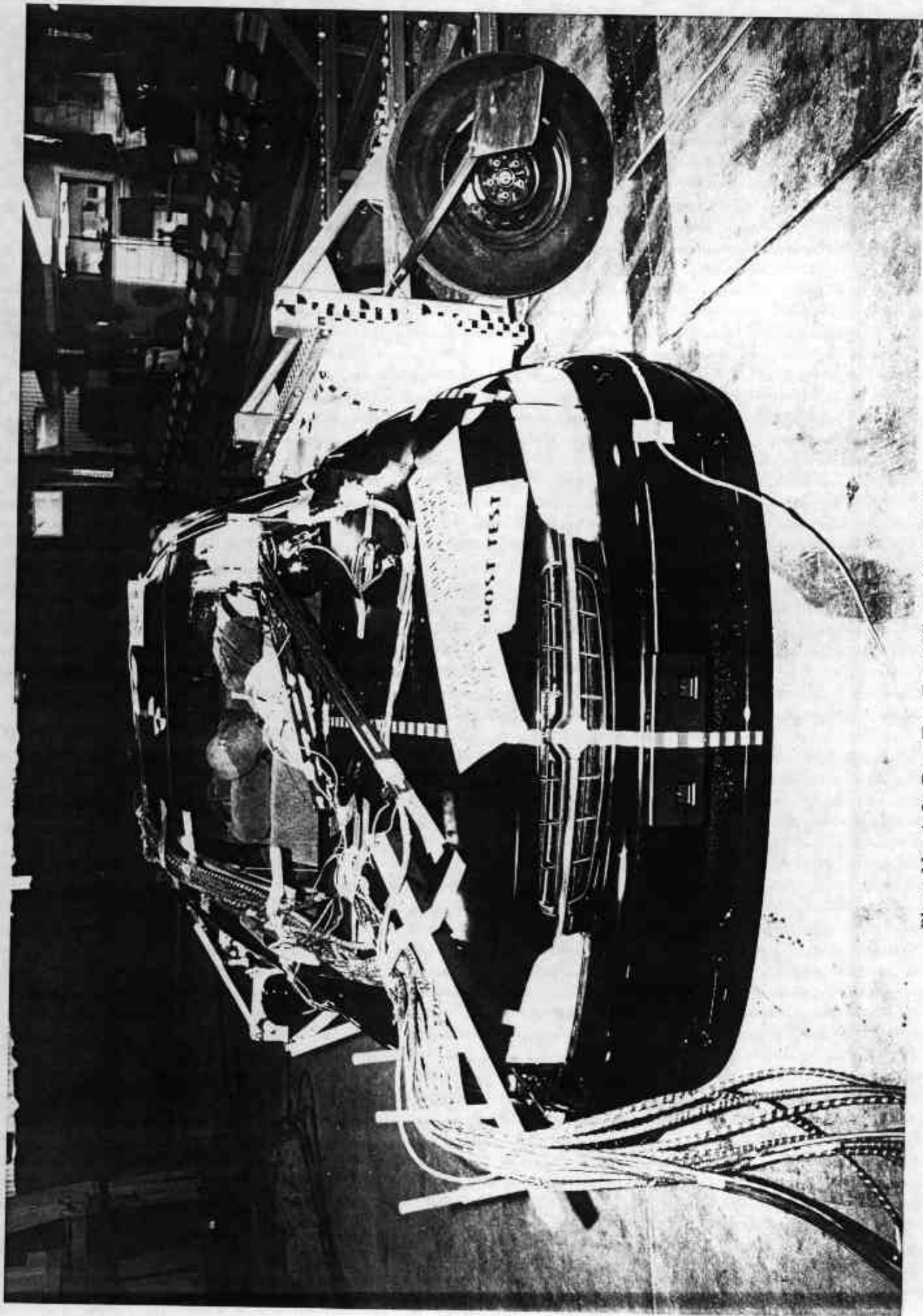
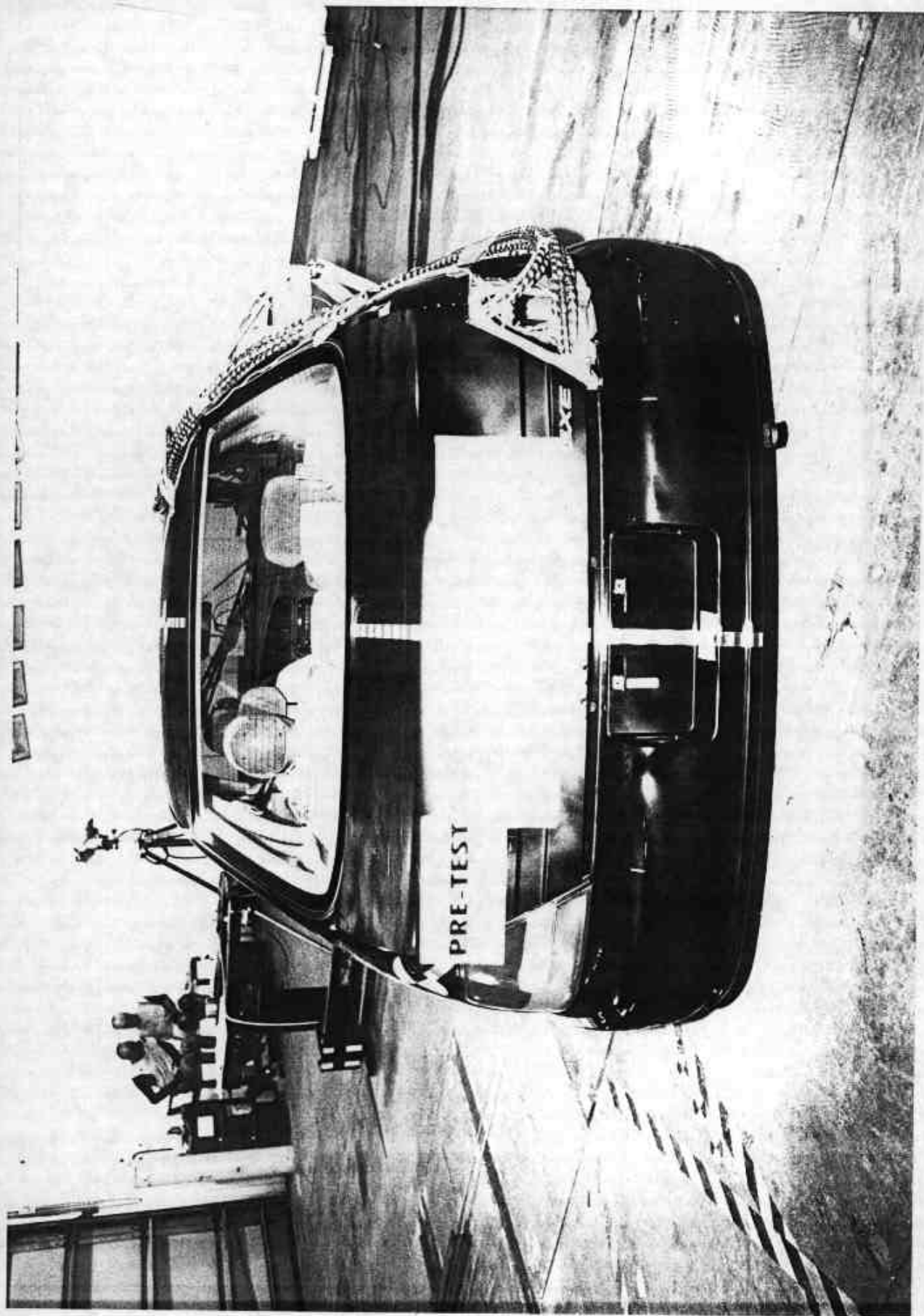


Photo No. A-2 - Post-Test Front View of Test Vehicle



A-3

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

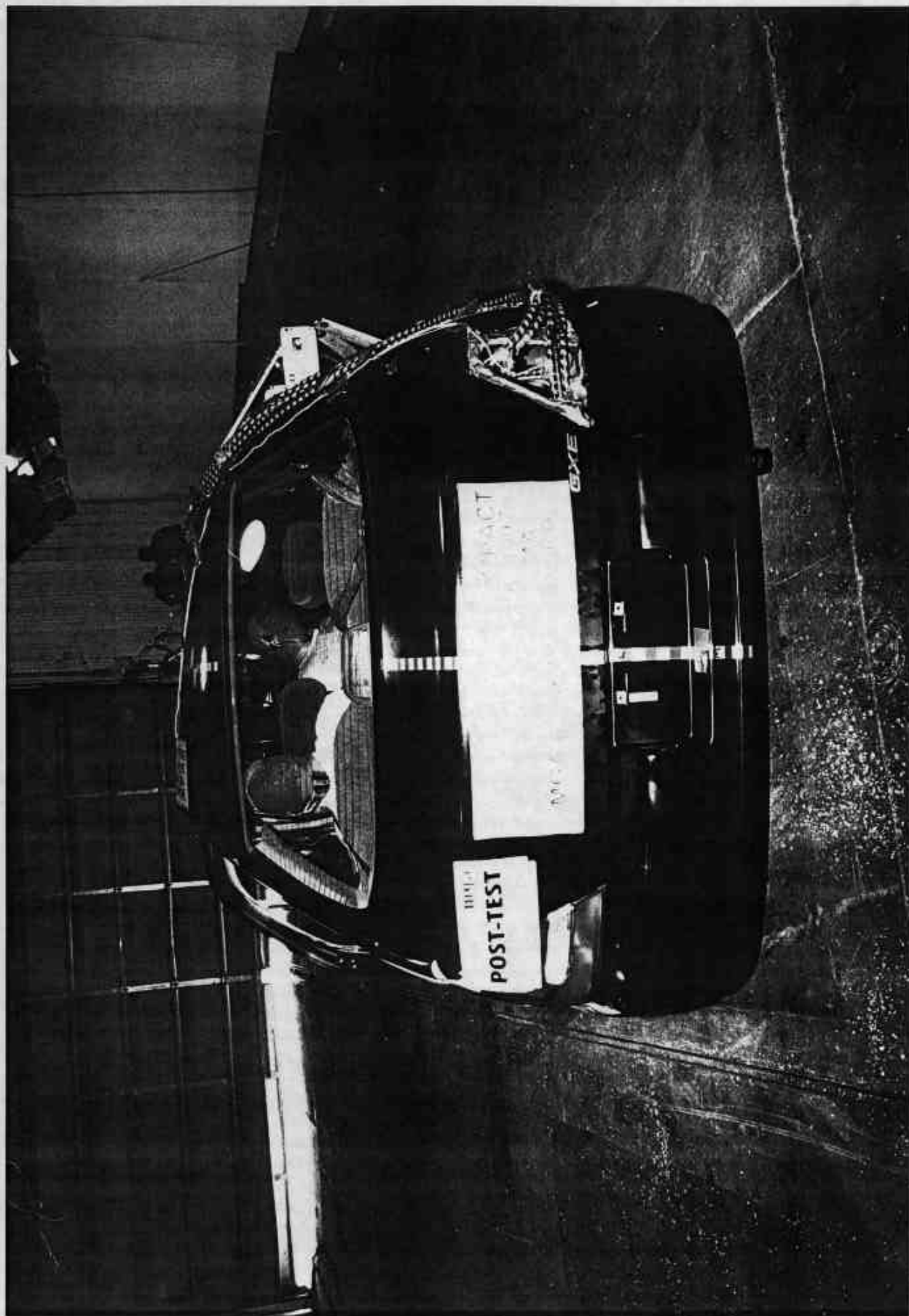


Photo No. A-4 - Post-Test Rear View of Test Vehicle

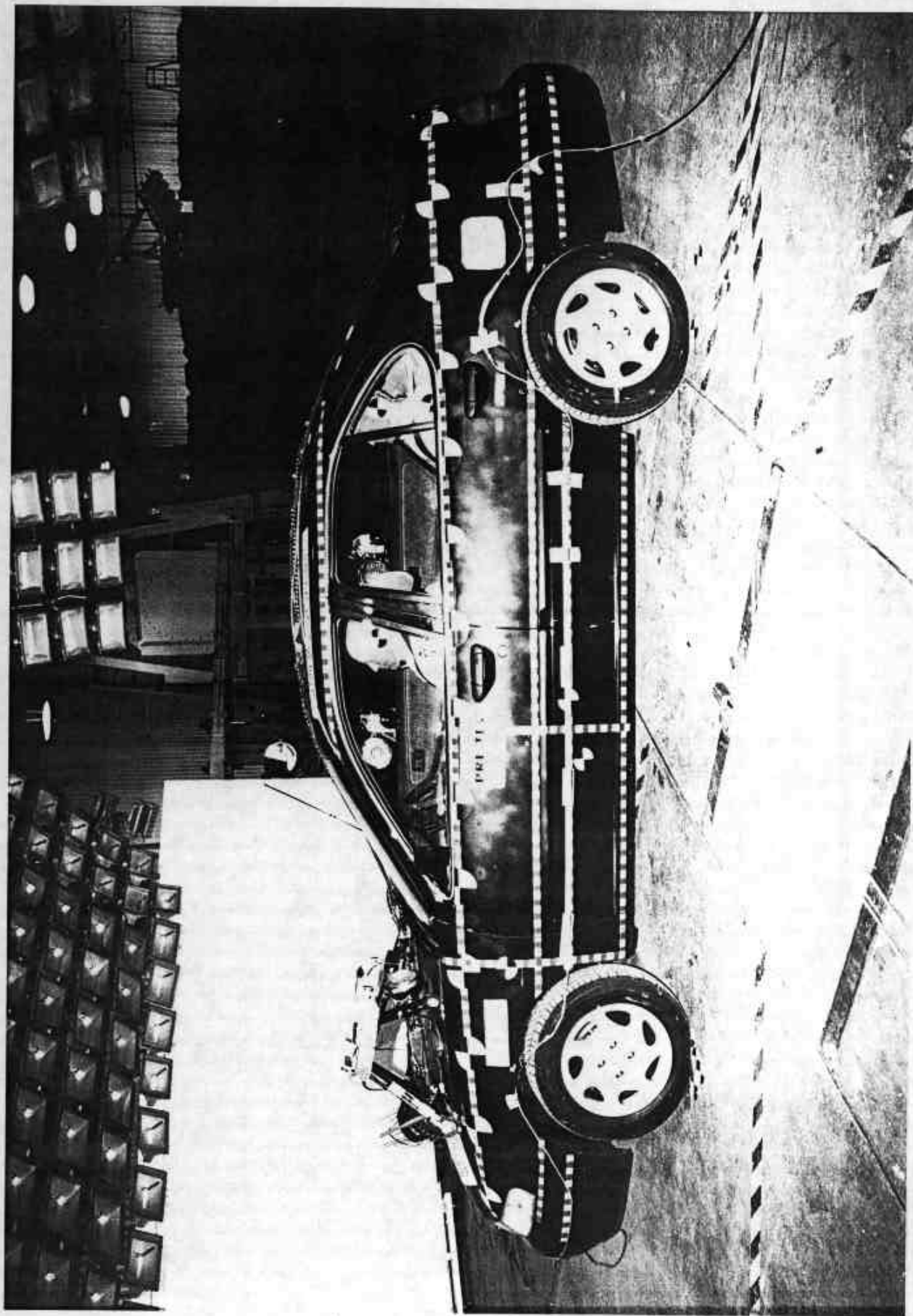


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

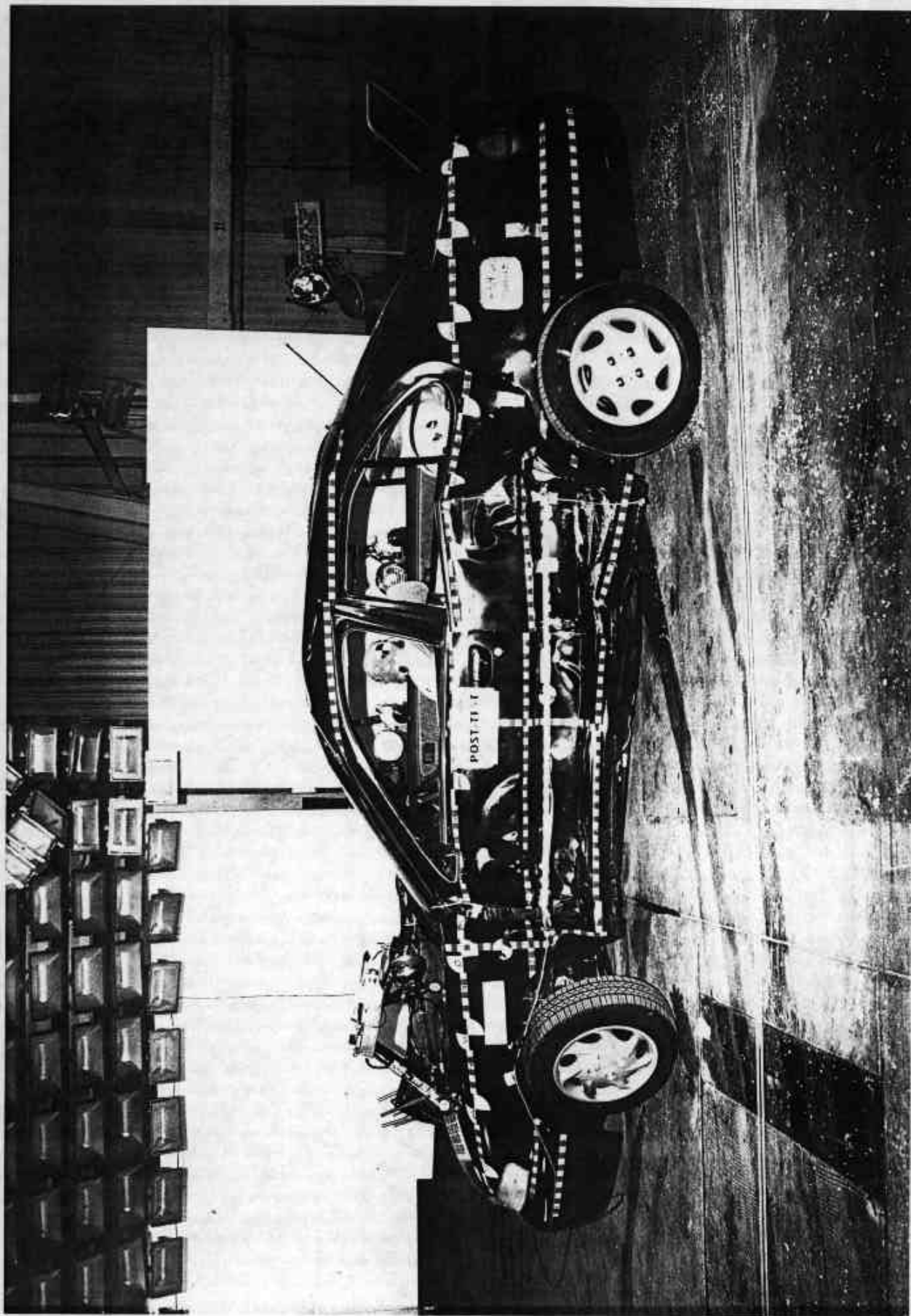


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

A-6

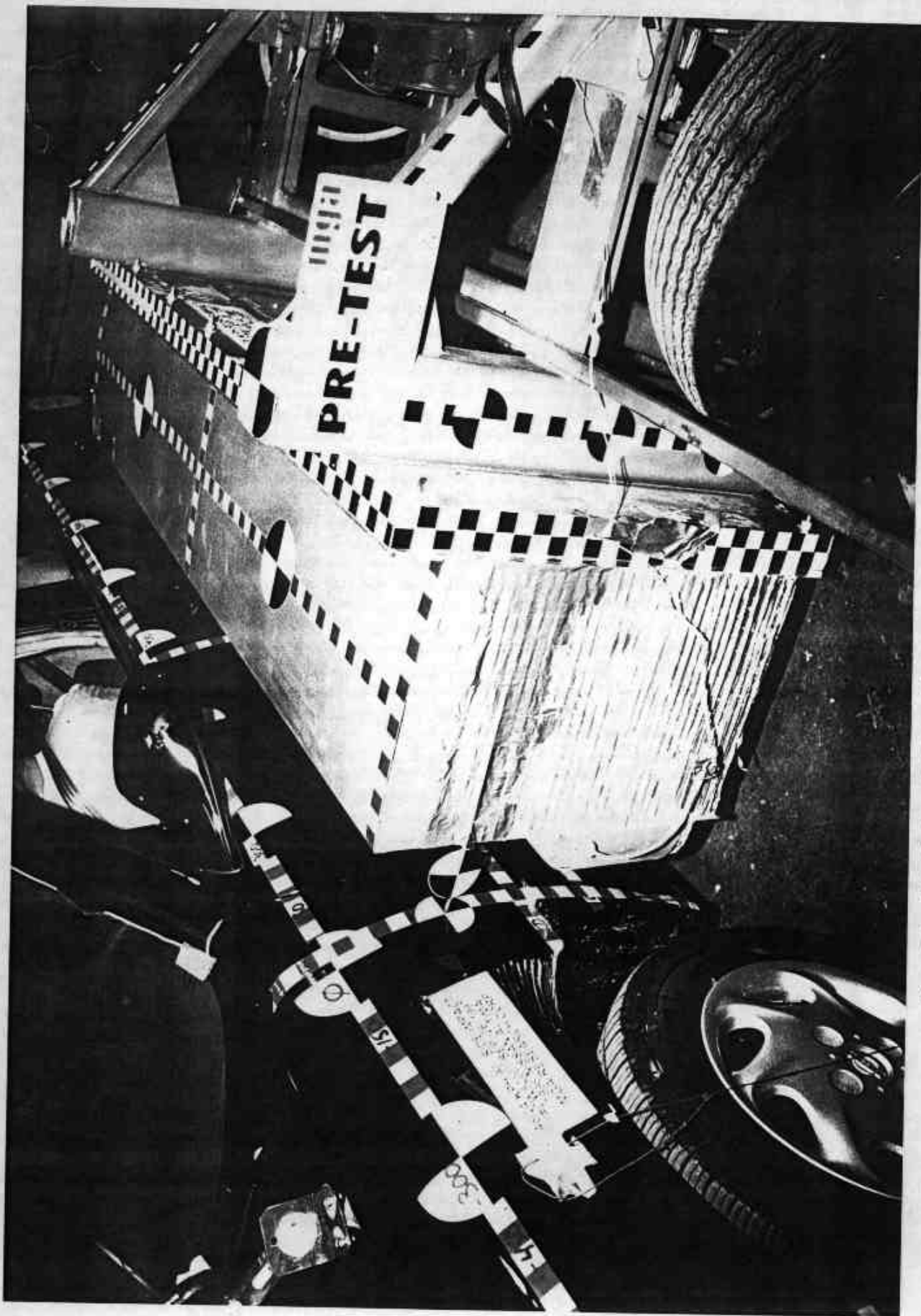


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

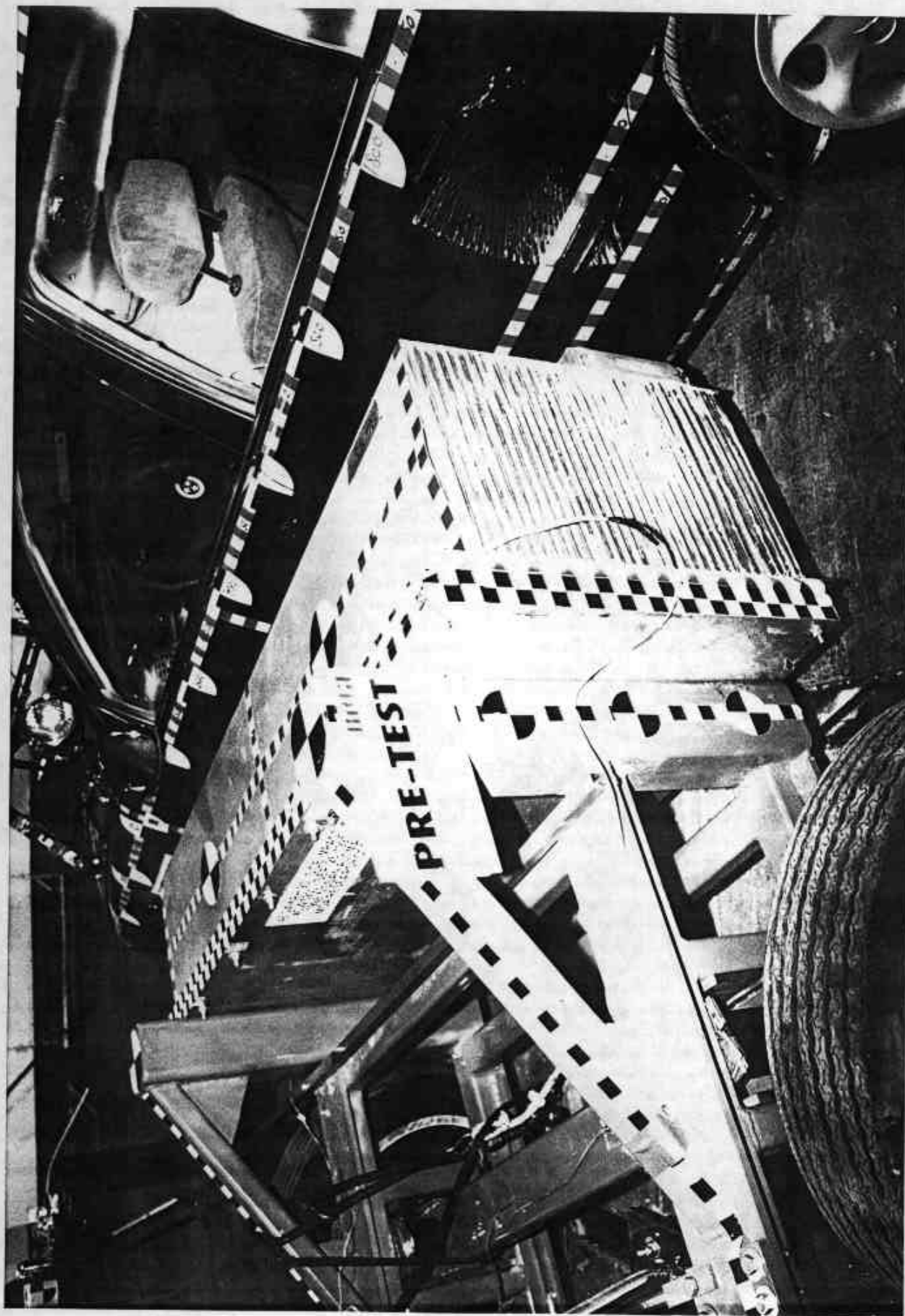


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

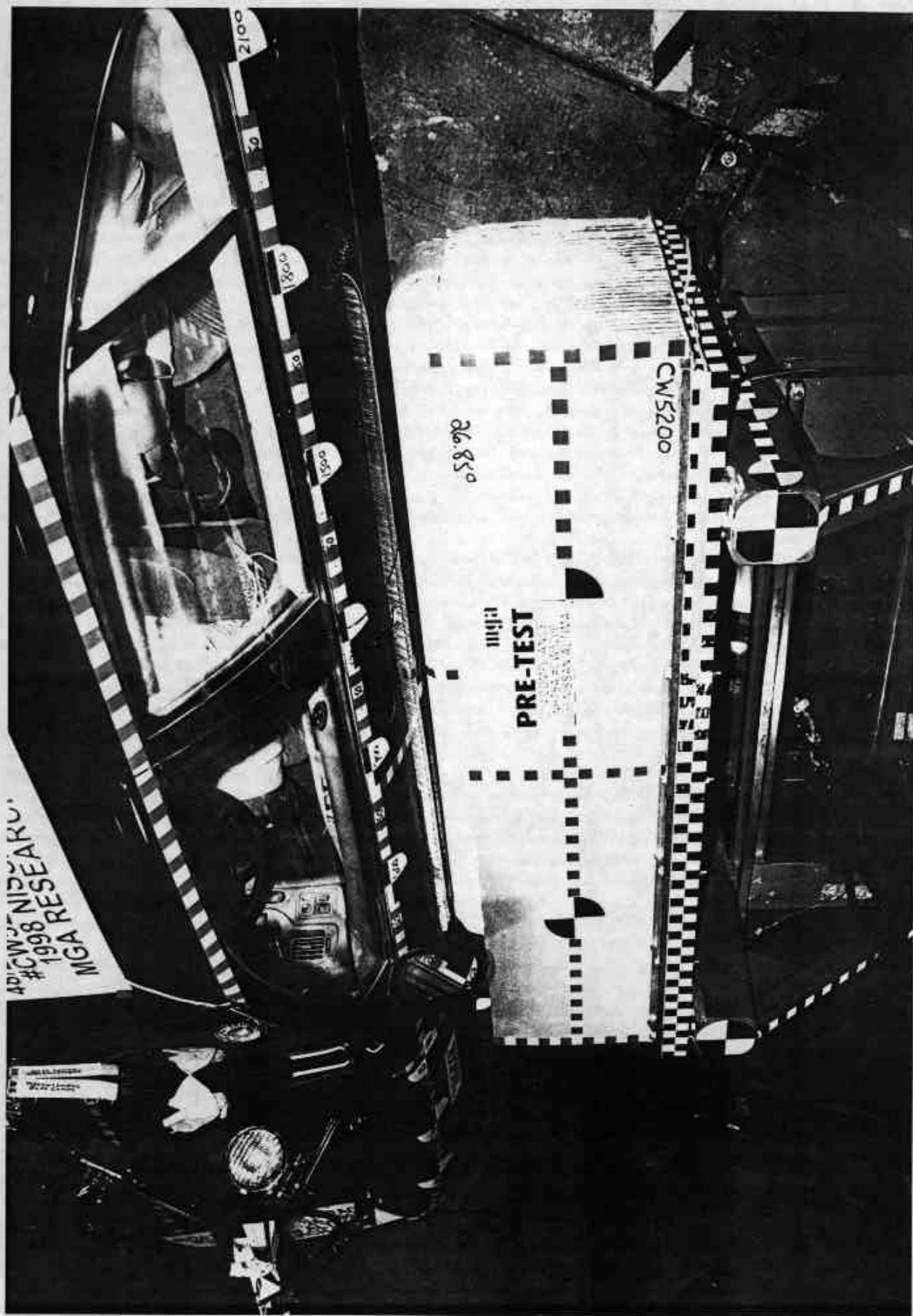


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

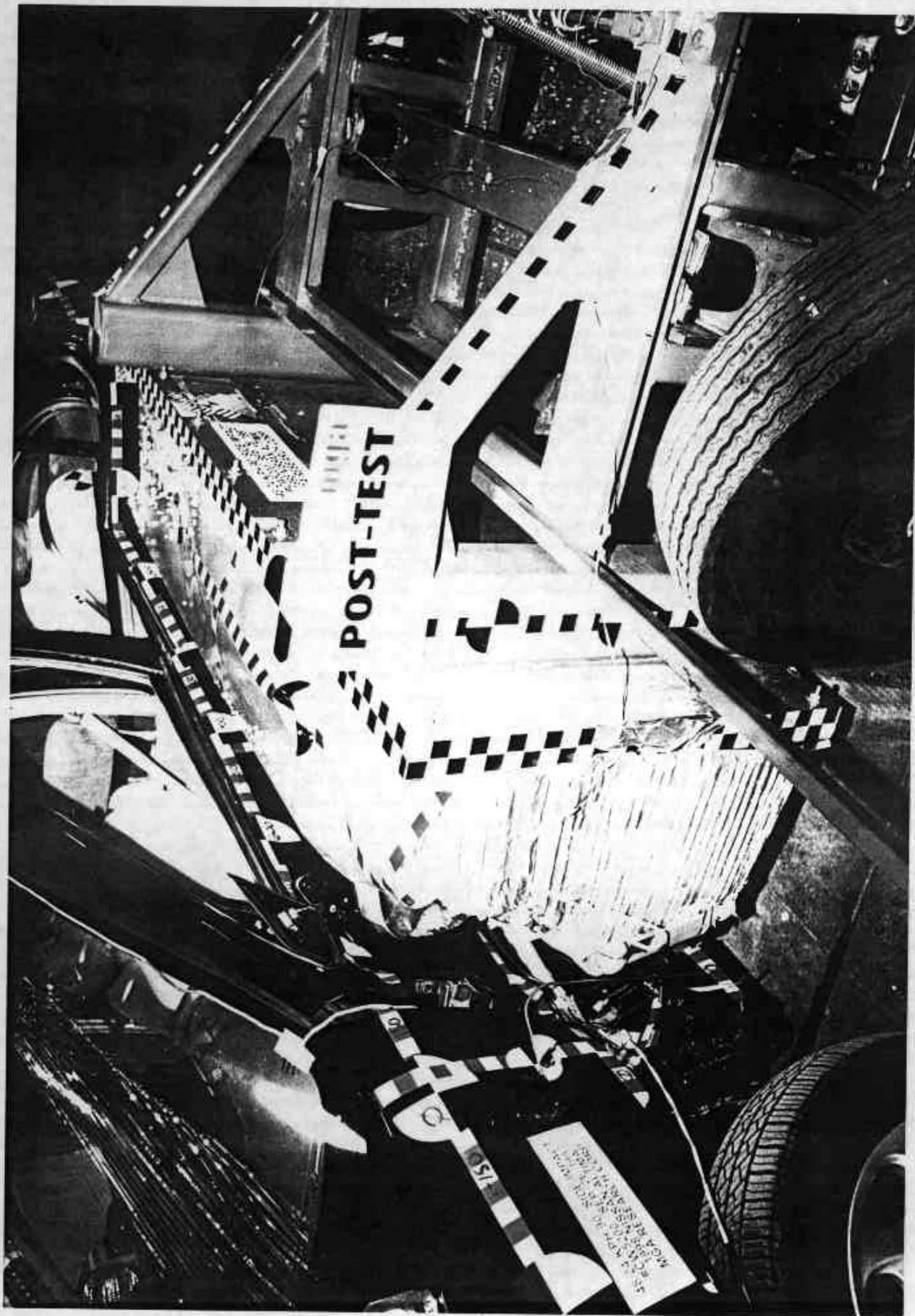


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (left side)

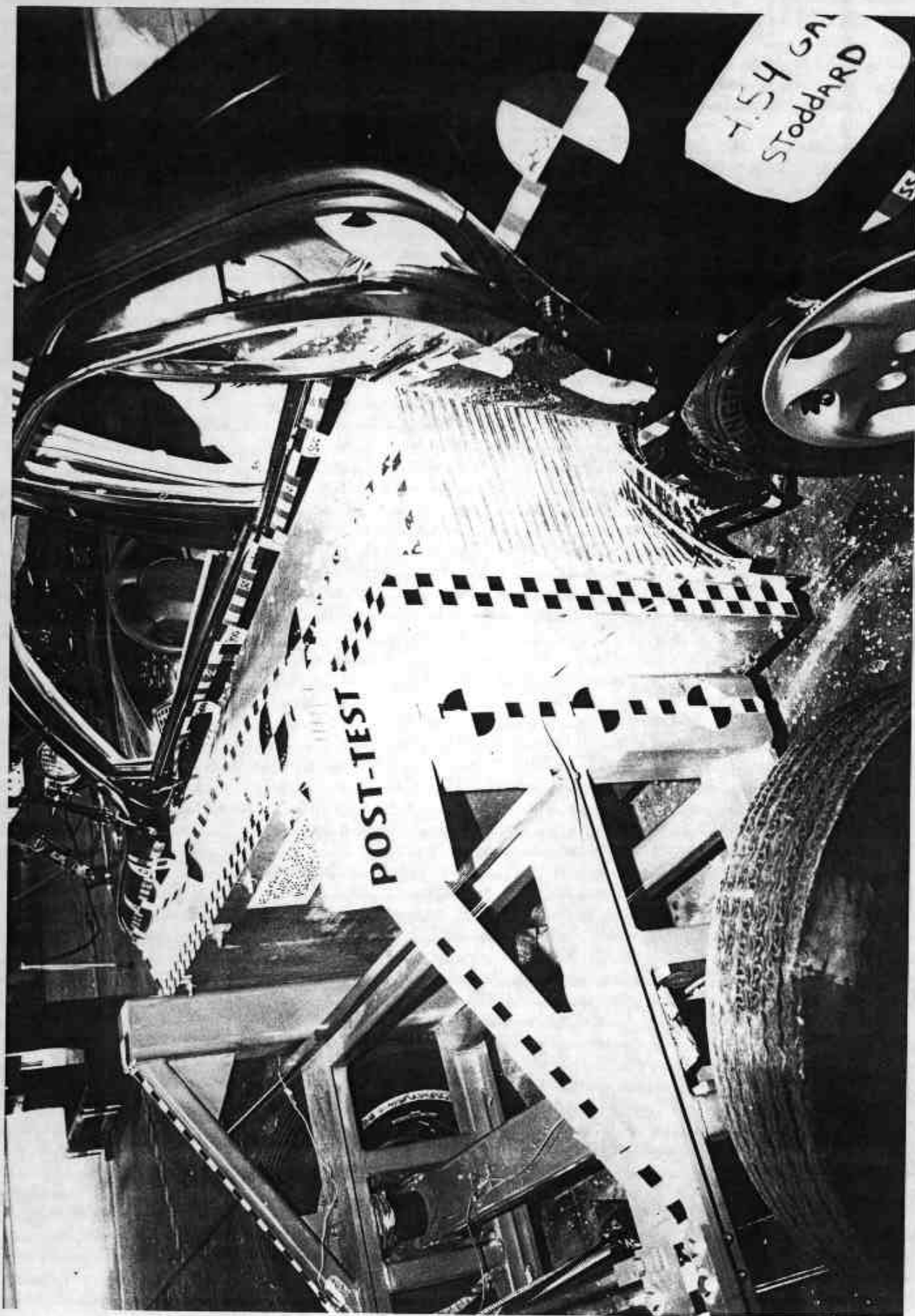


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

A-11

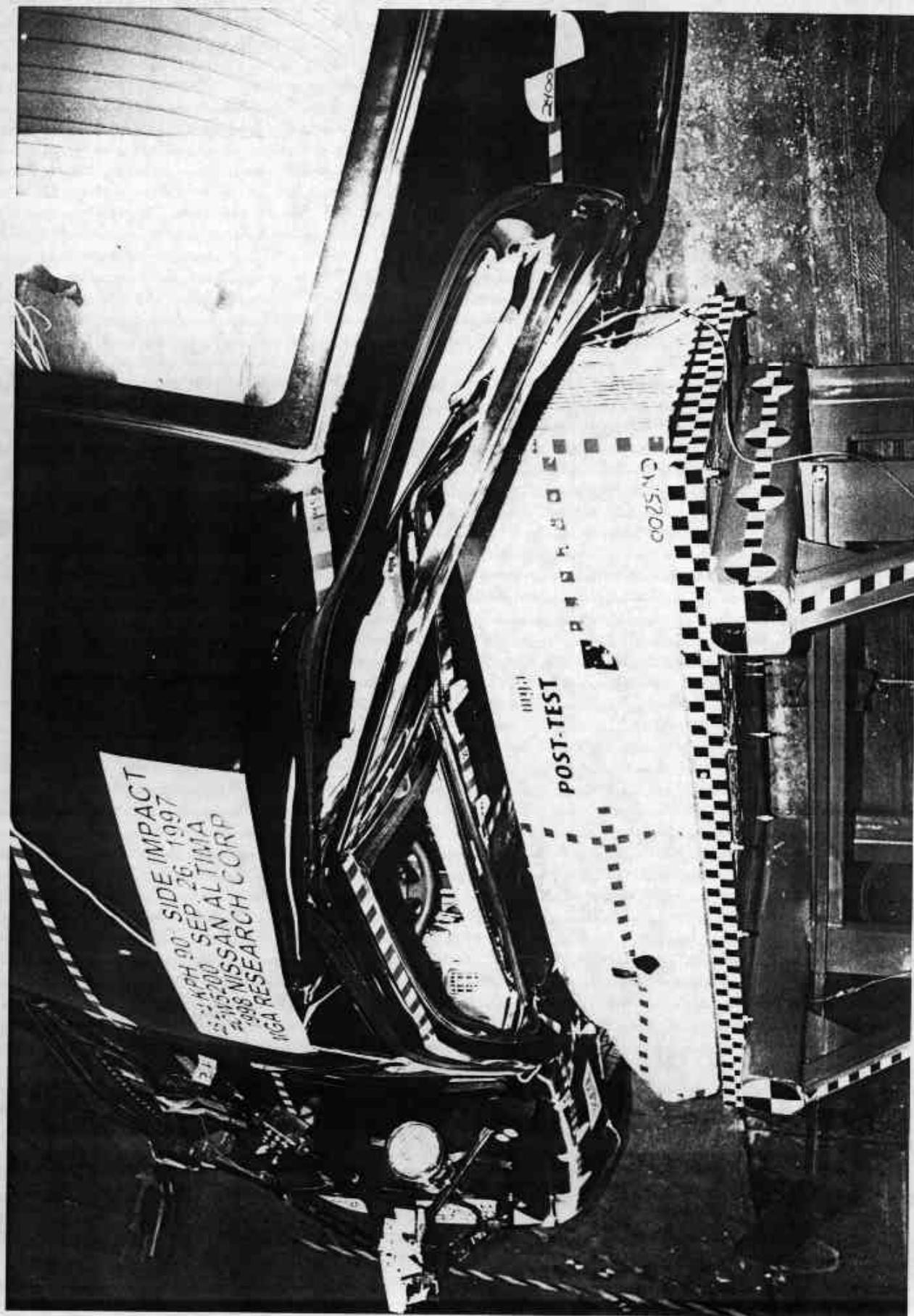


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View

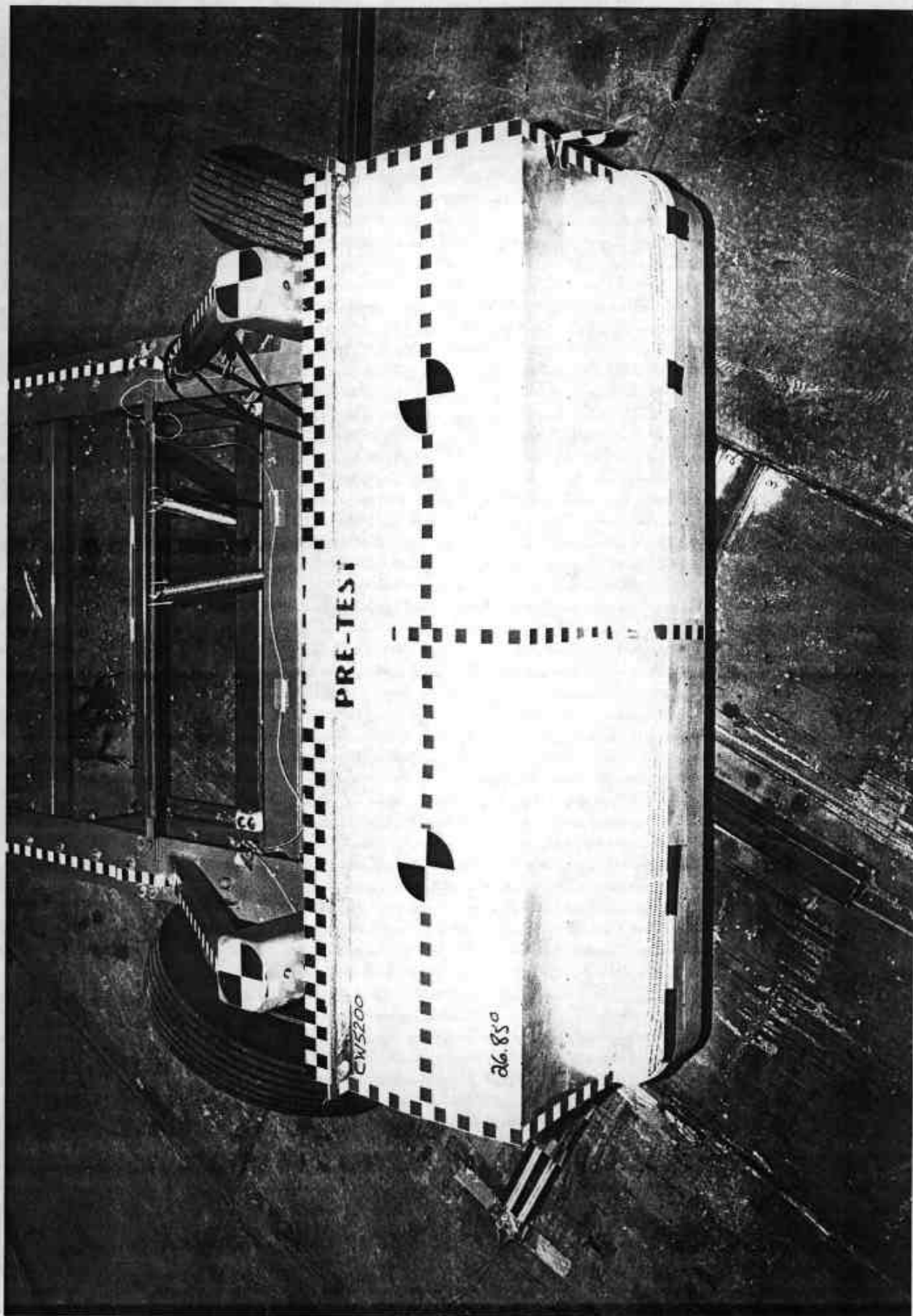


Photo No. A-13 - Pre-Test MDB Top View

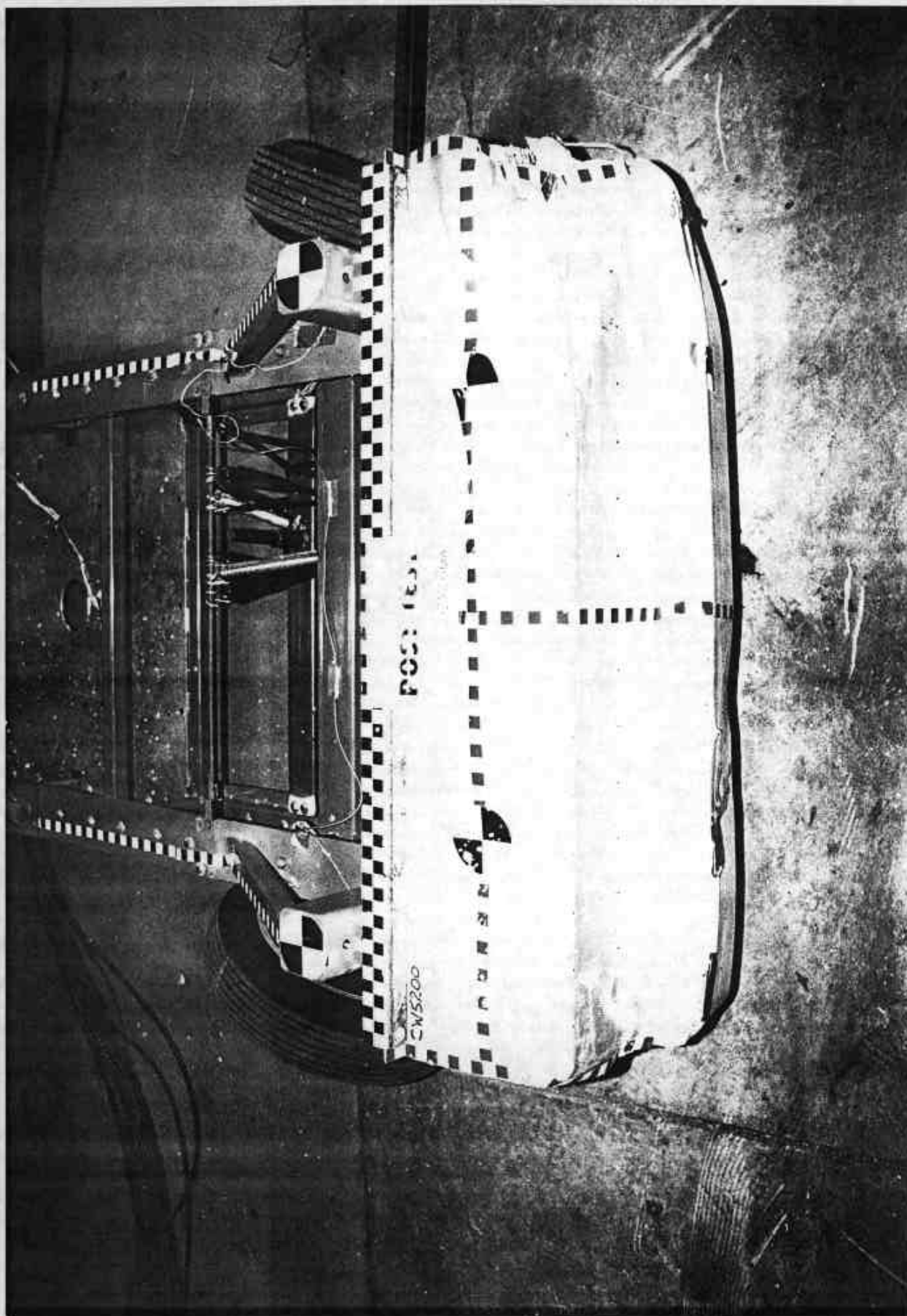
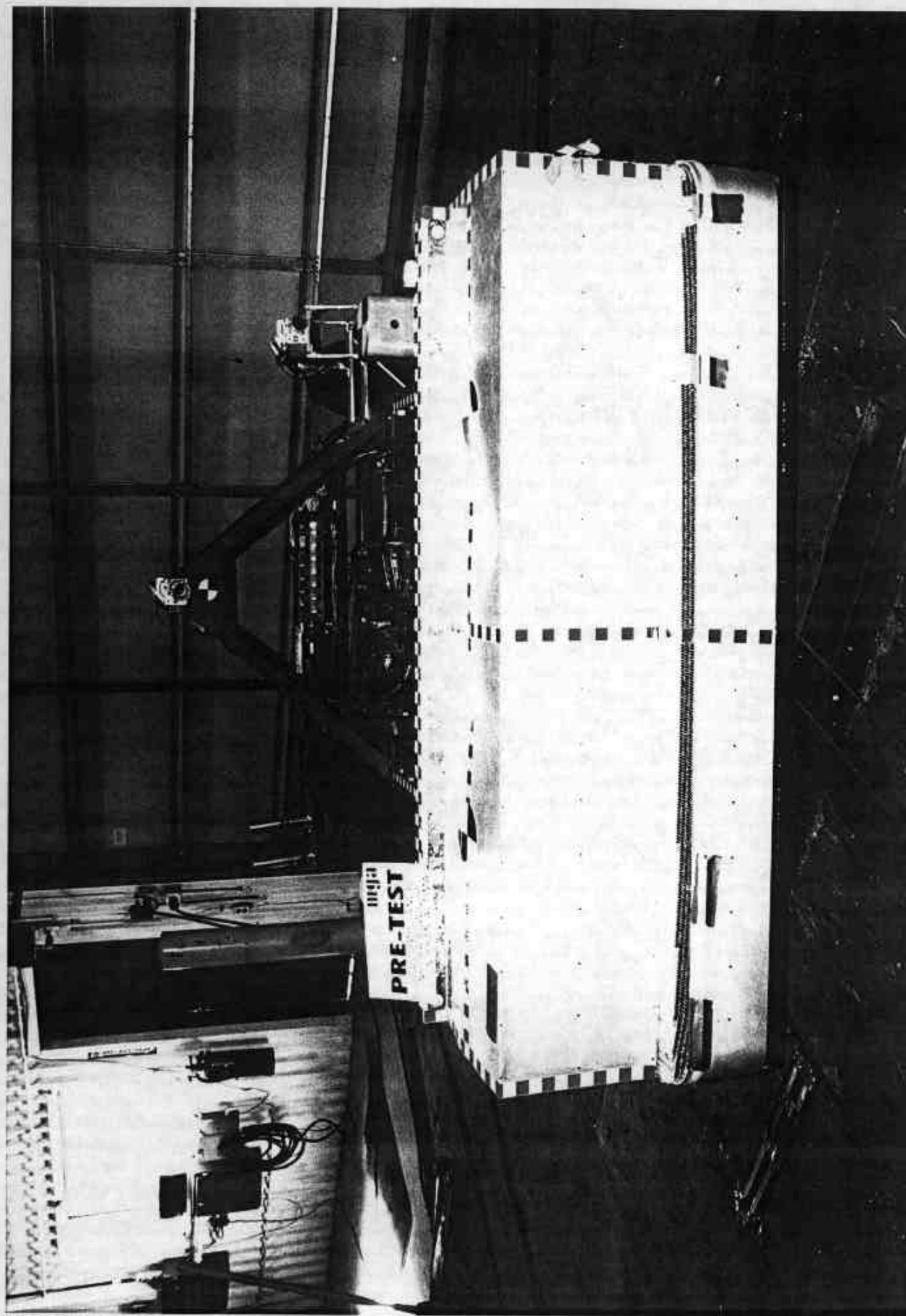


Photo No. A-14 - Post-Test MDB Top View



A-15

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

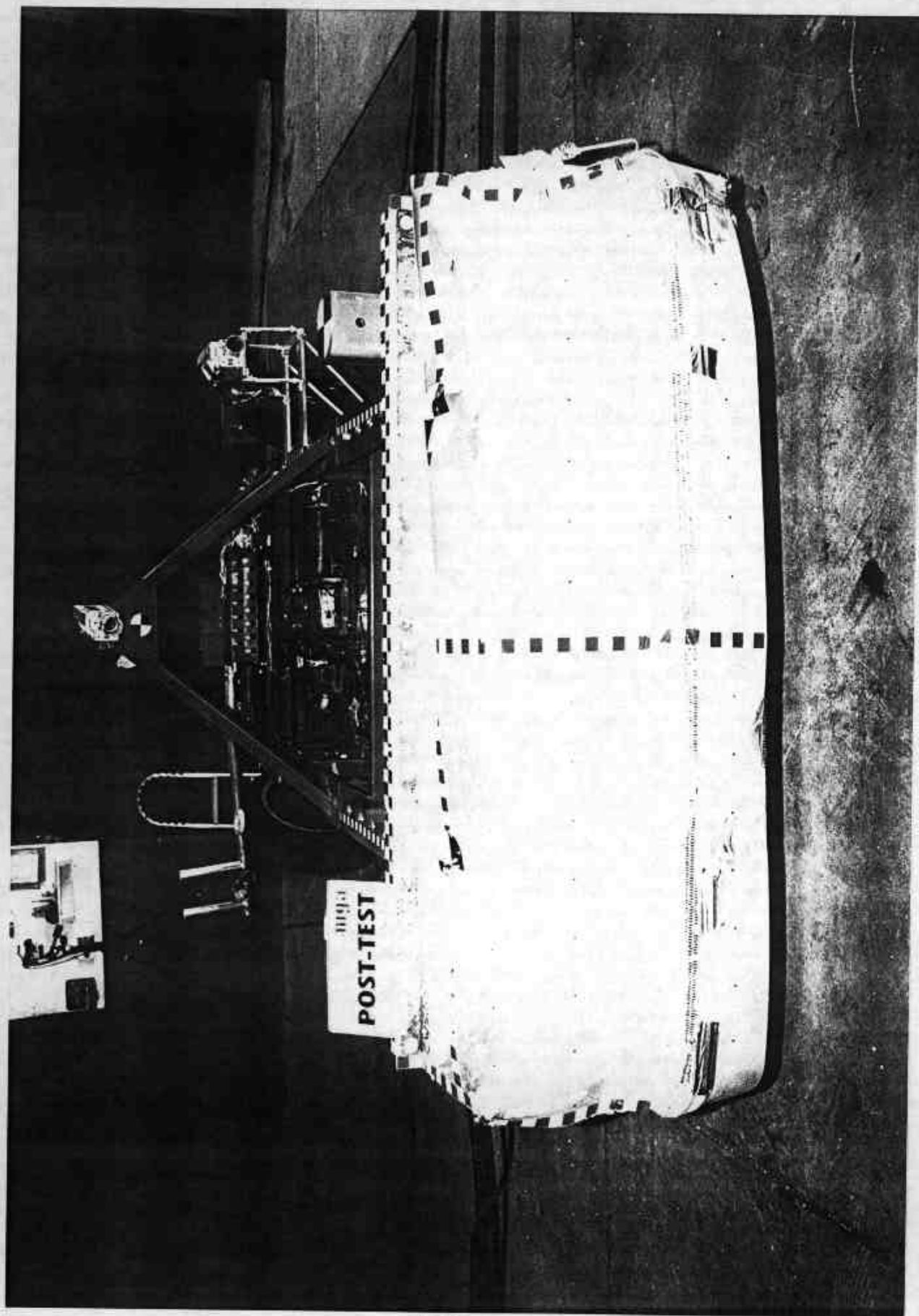


Photo No. A-16 - Post-Test MDB Front View

A-16

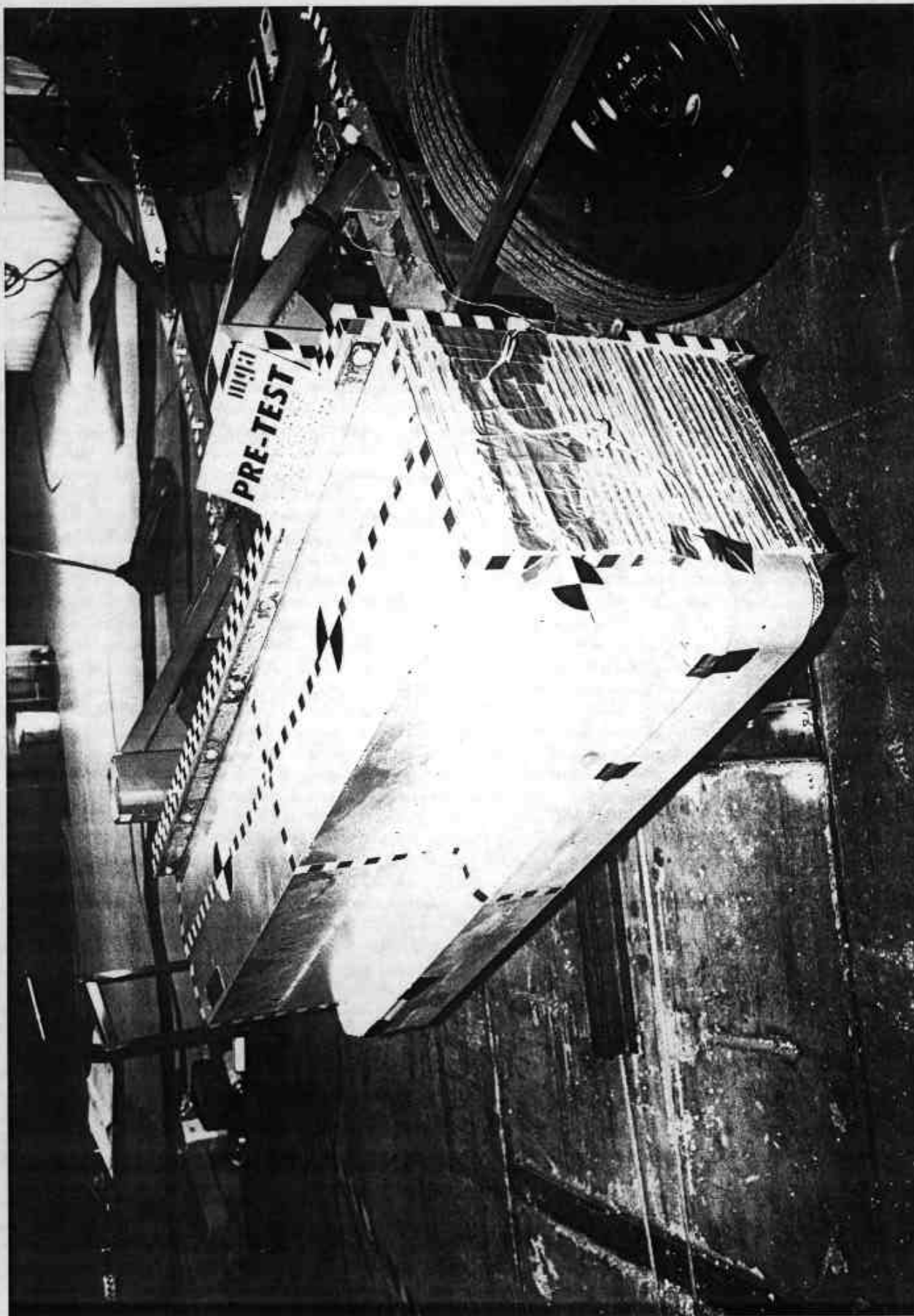


Photo No. A-17 - Pre-Test MDB Left Side View

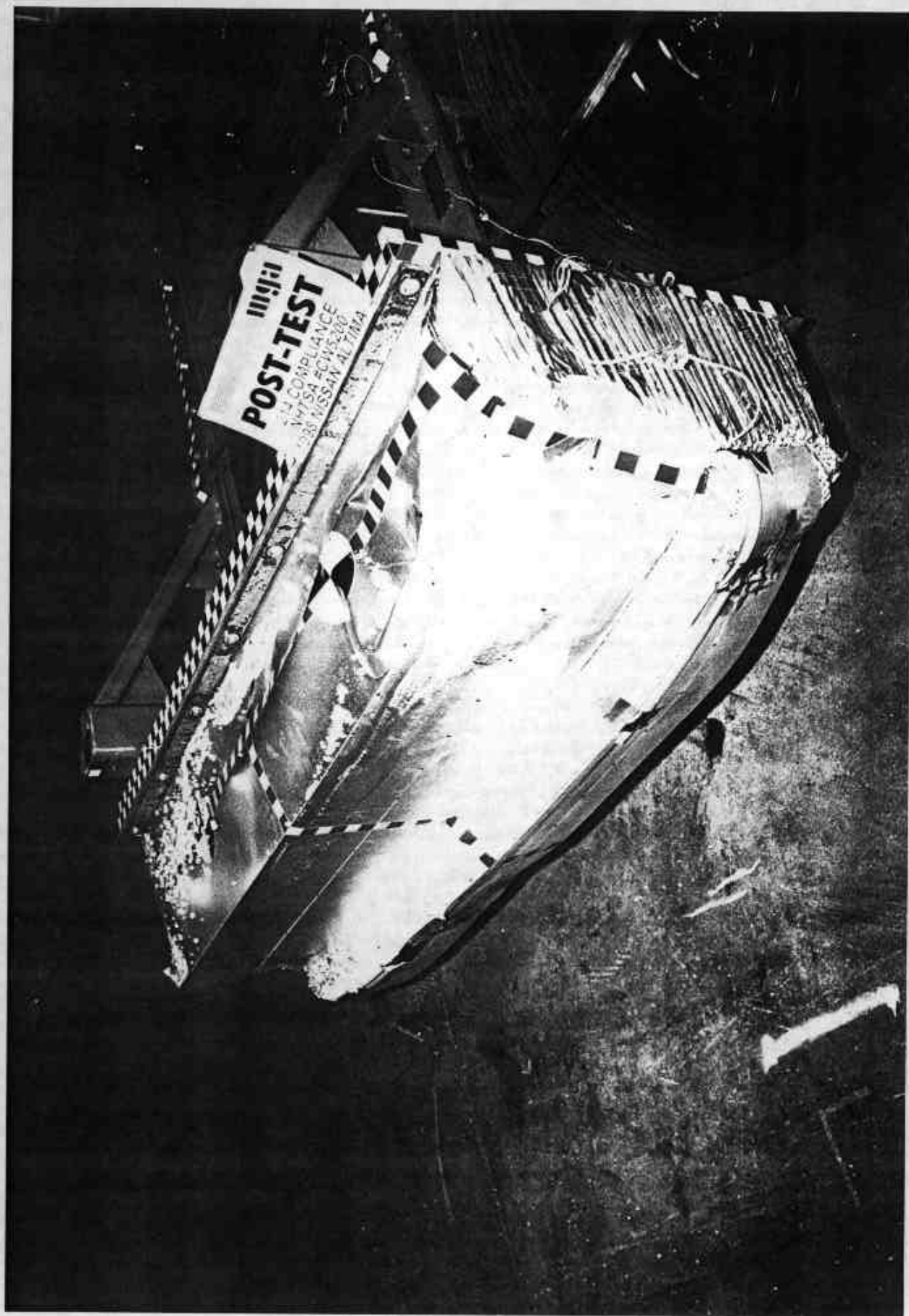


Photo No. A-18 - Post-Test MDB Left Side View

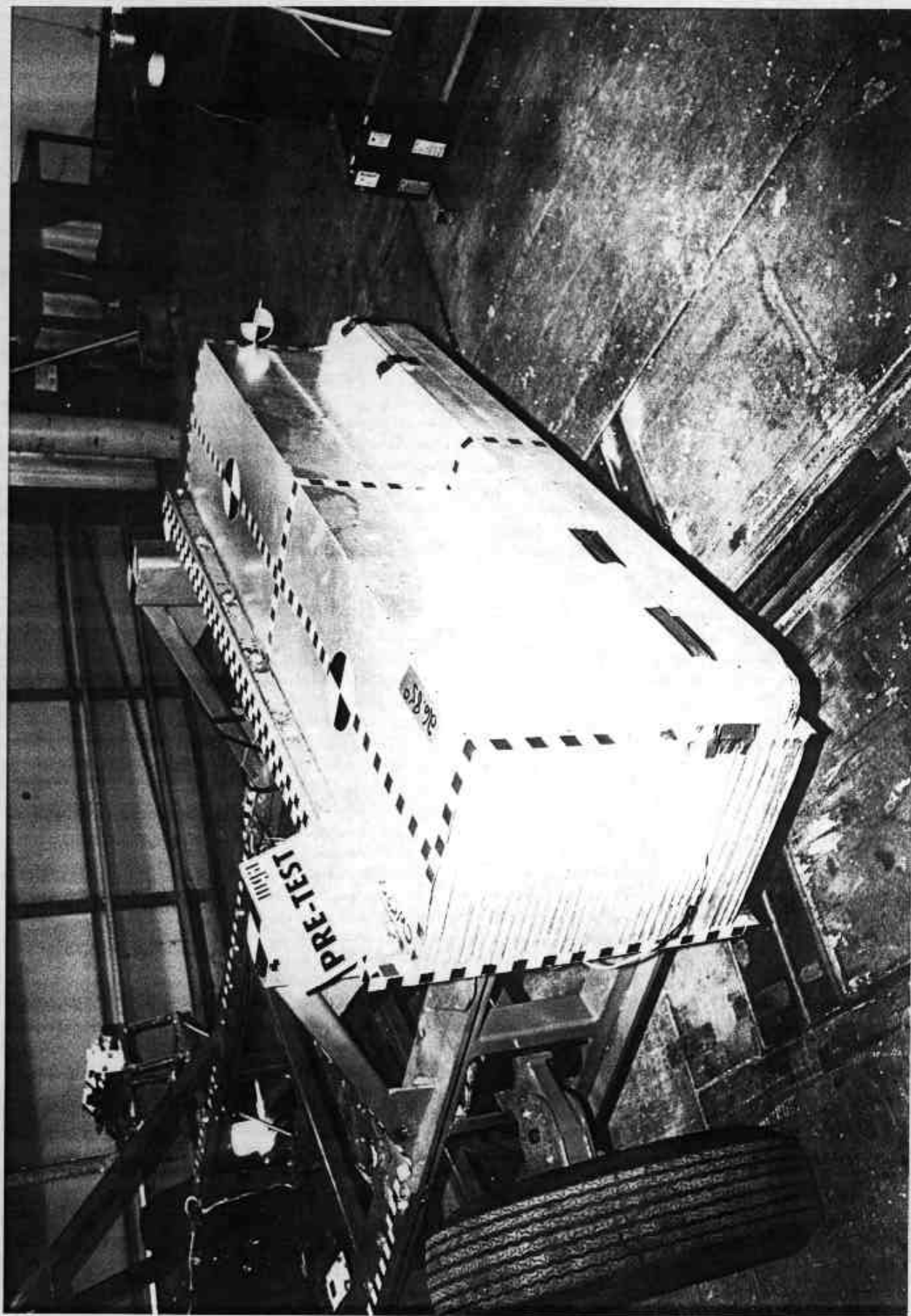


Photo No. A-19 - Pre-Test MDB Right Side View

A-19.

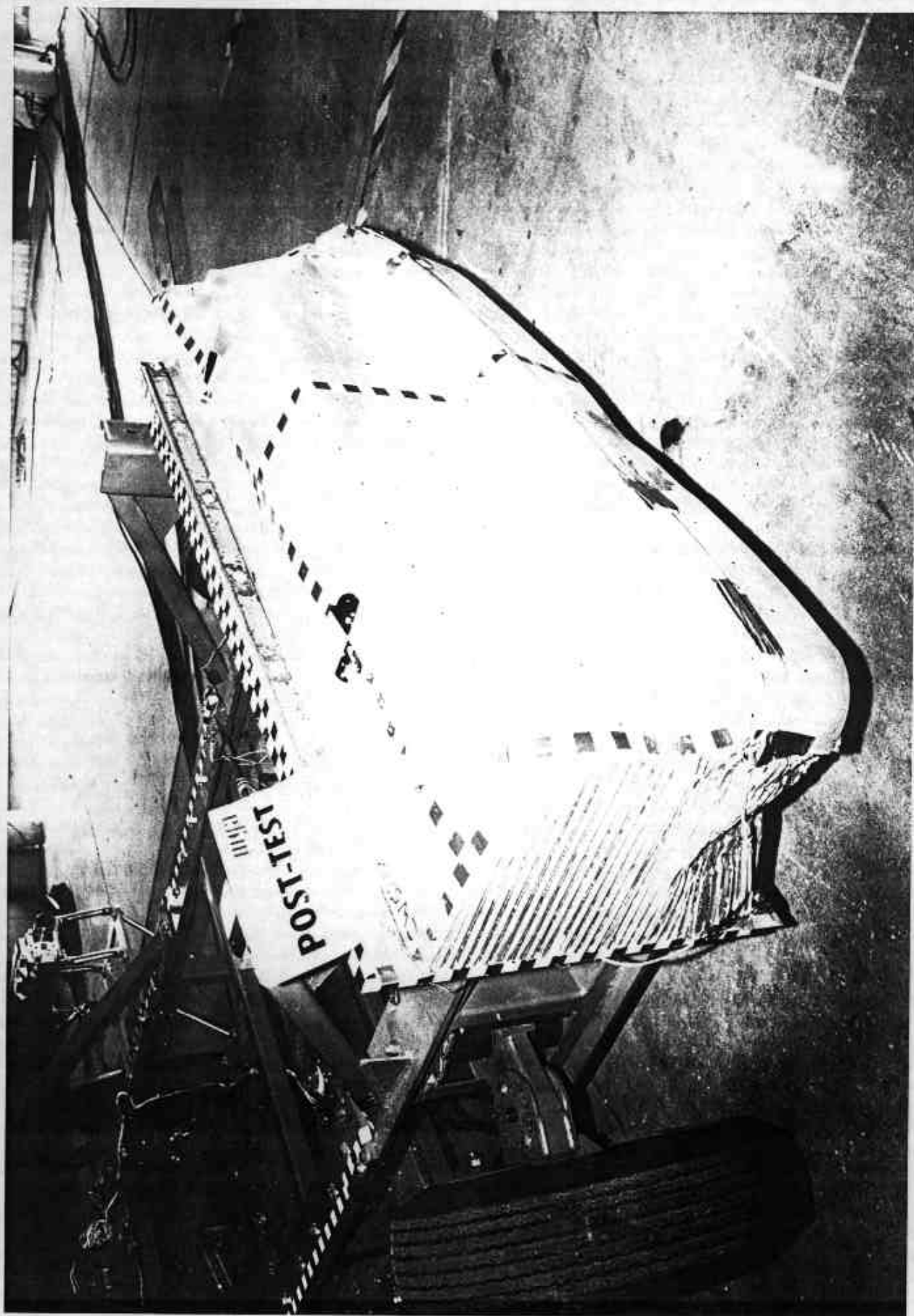


Photo No. A-20 - Post-Test MDB Right Side View

A-20

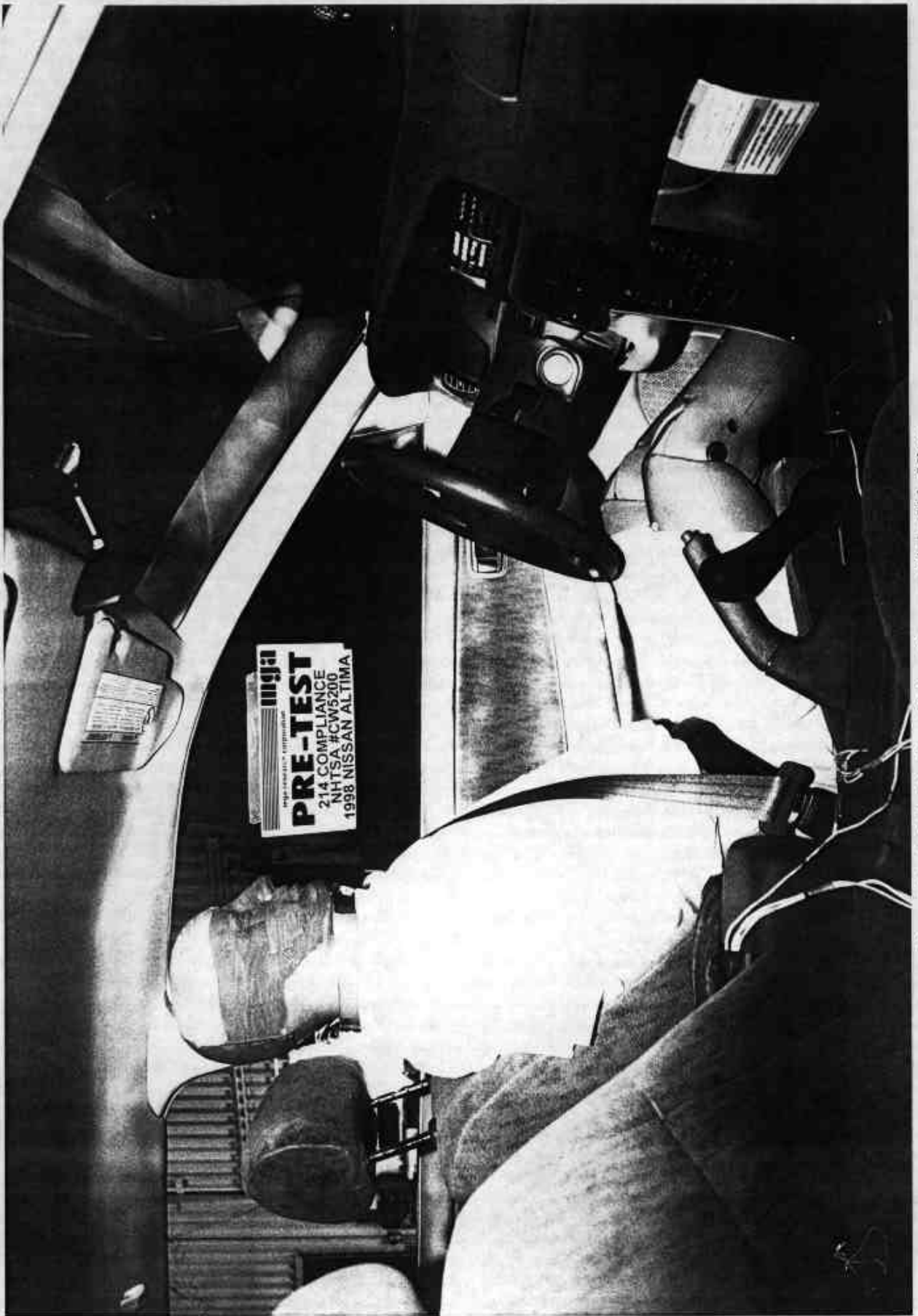


Photo No. A-21 - Pre-Test Driver Dummy Right Side View



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

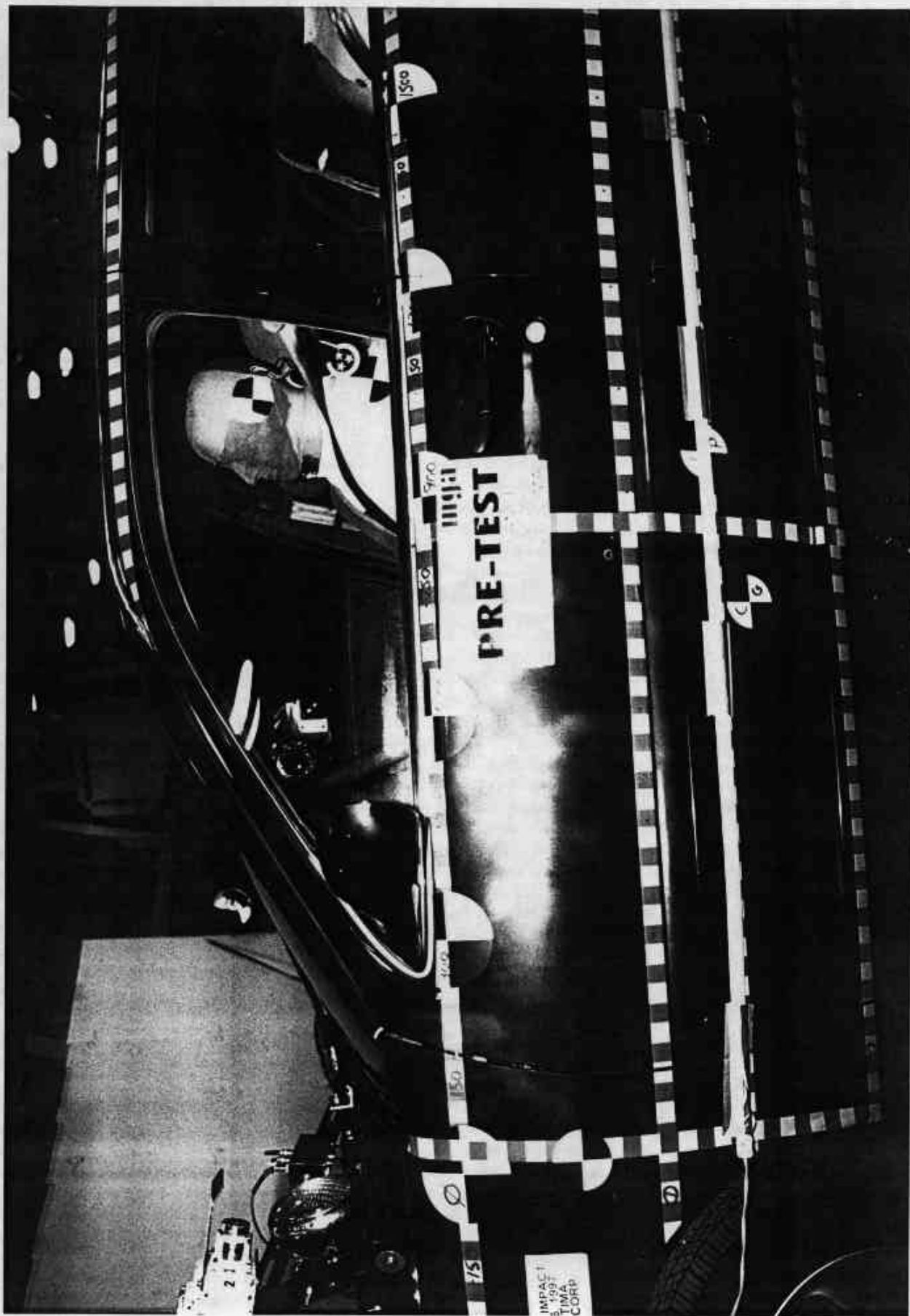


Photo No. A-23 - Pre-Test Driver Dummy Left Side View

A-23

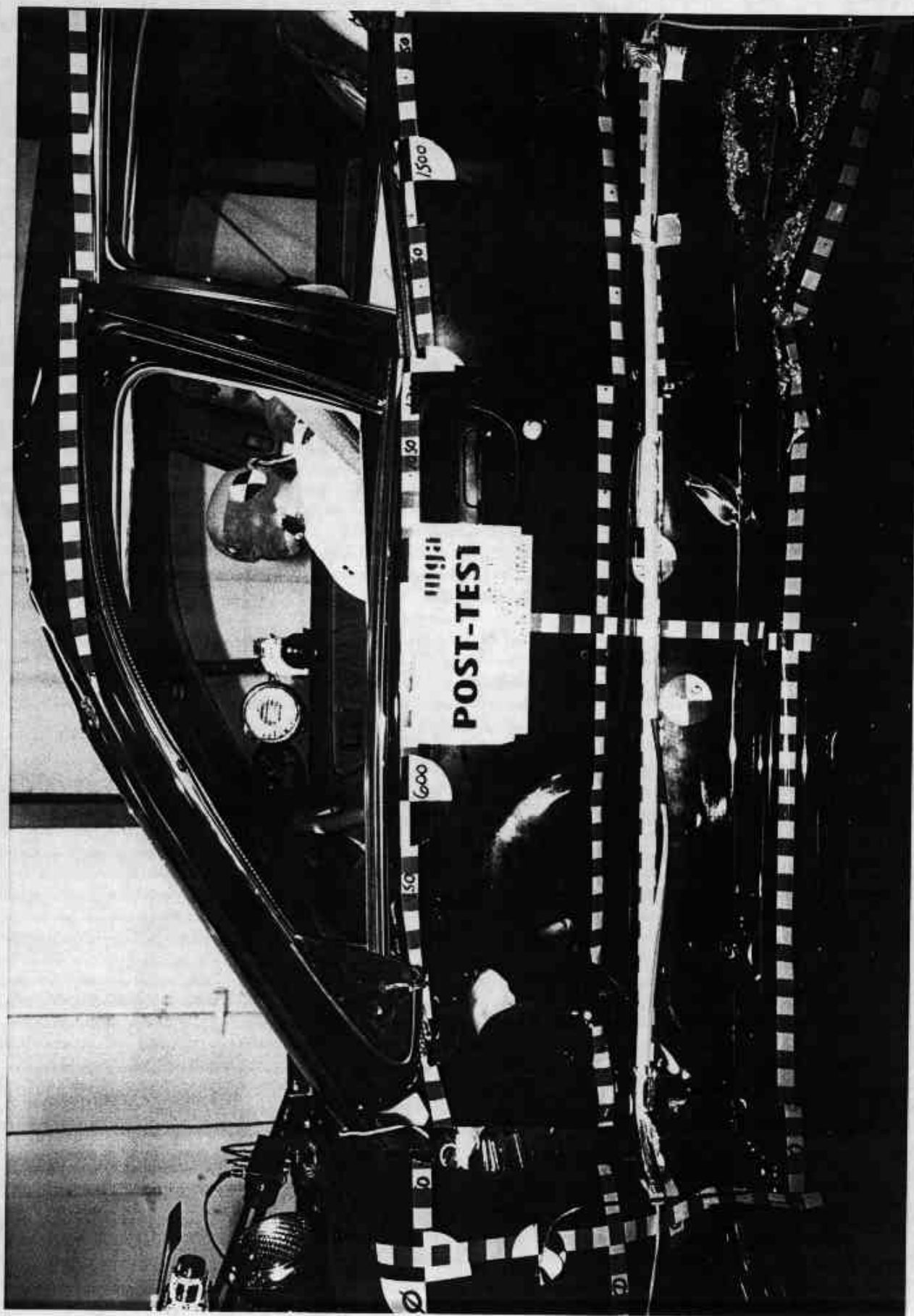


Photo No. A-24 - Post-Test Driver Dummy Left Side View

A-24

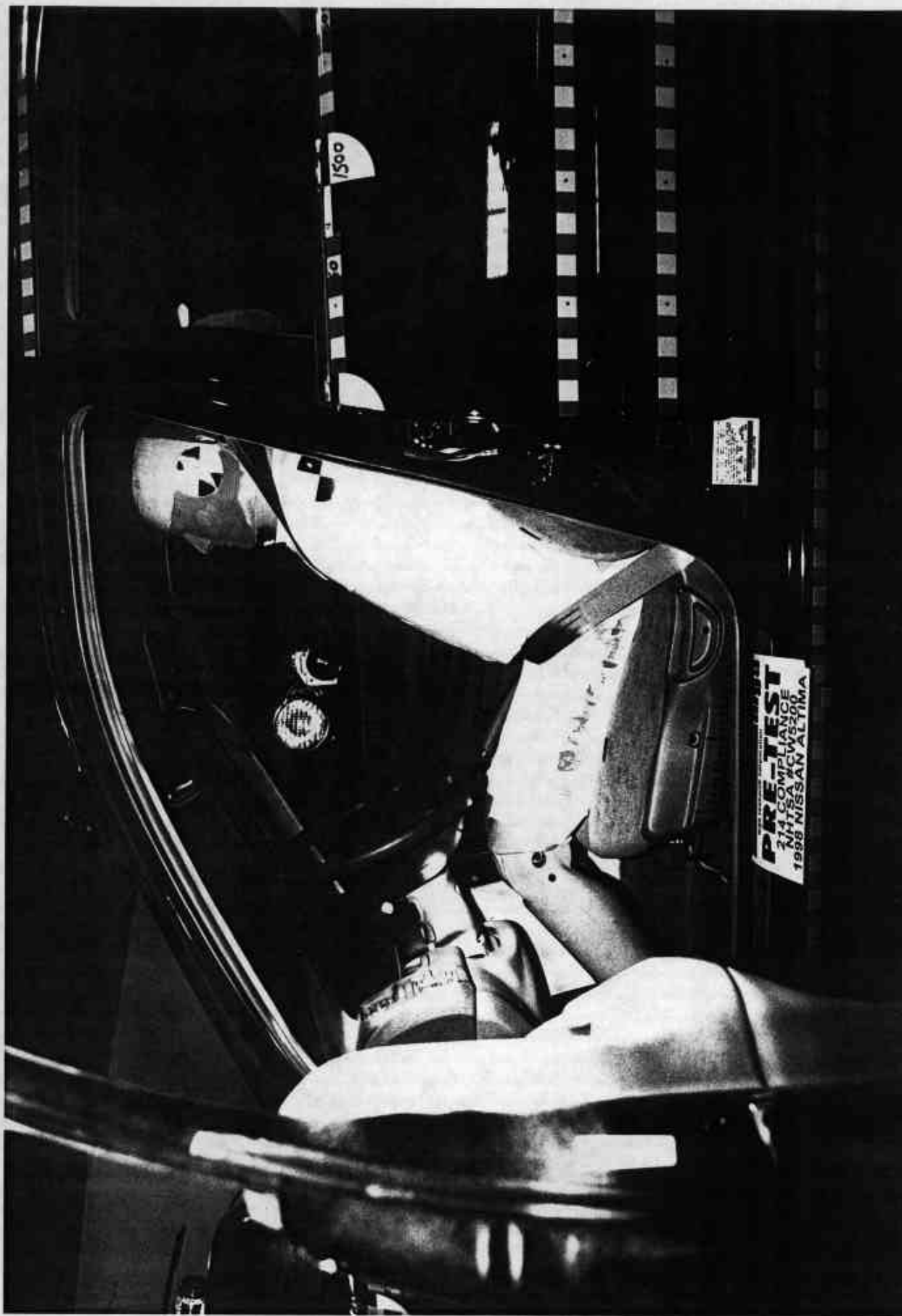
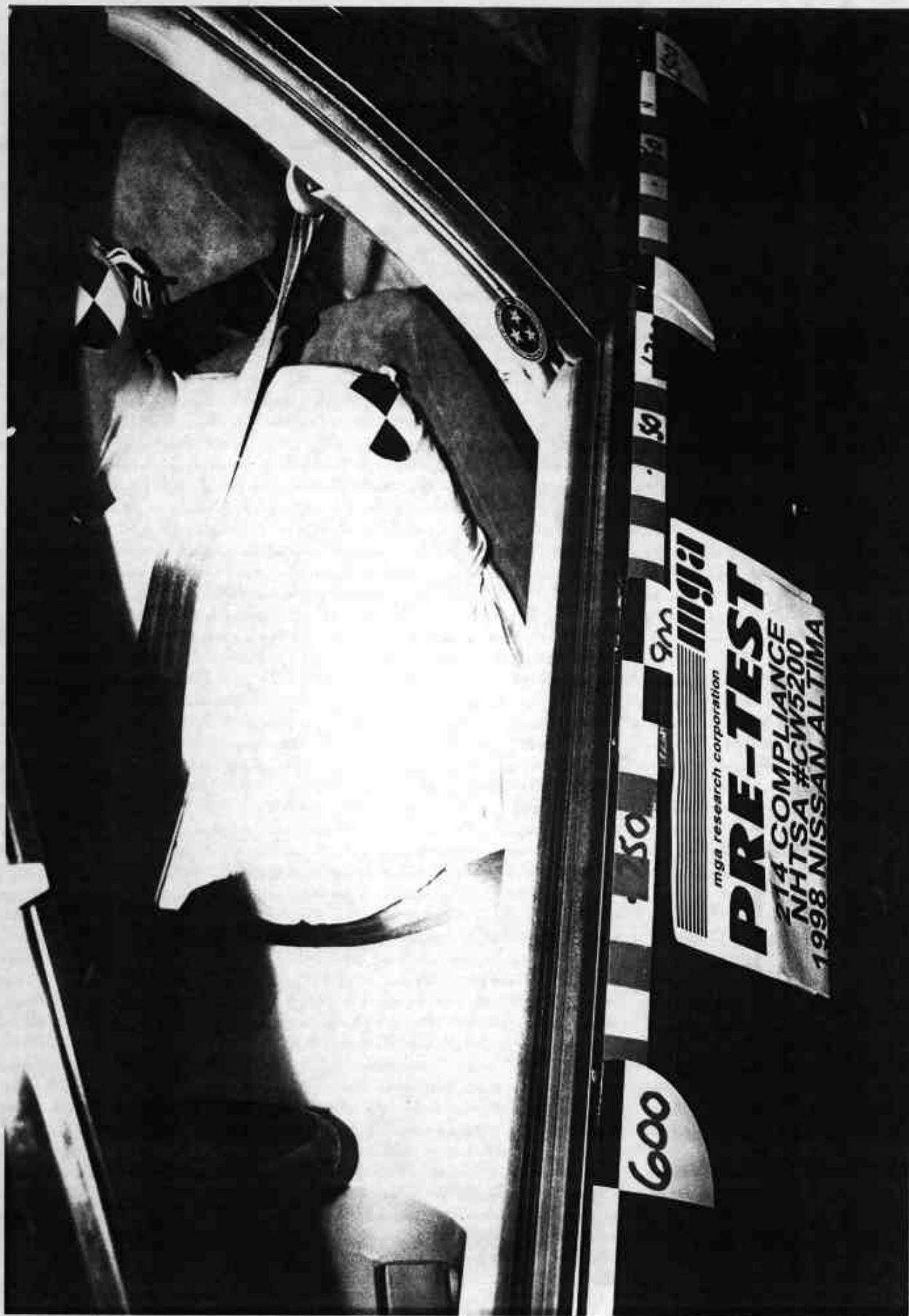


Photo No. A-25 - Pre-Test Driver Dummy Left Side View (Door Open)



A-26

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



A-27

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



A-28

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

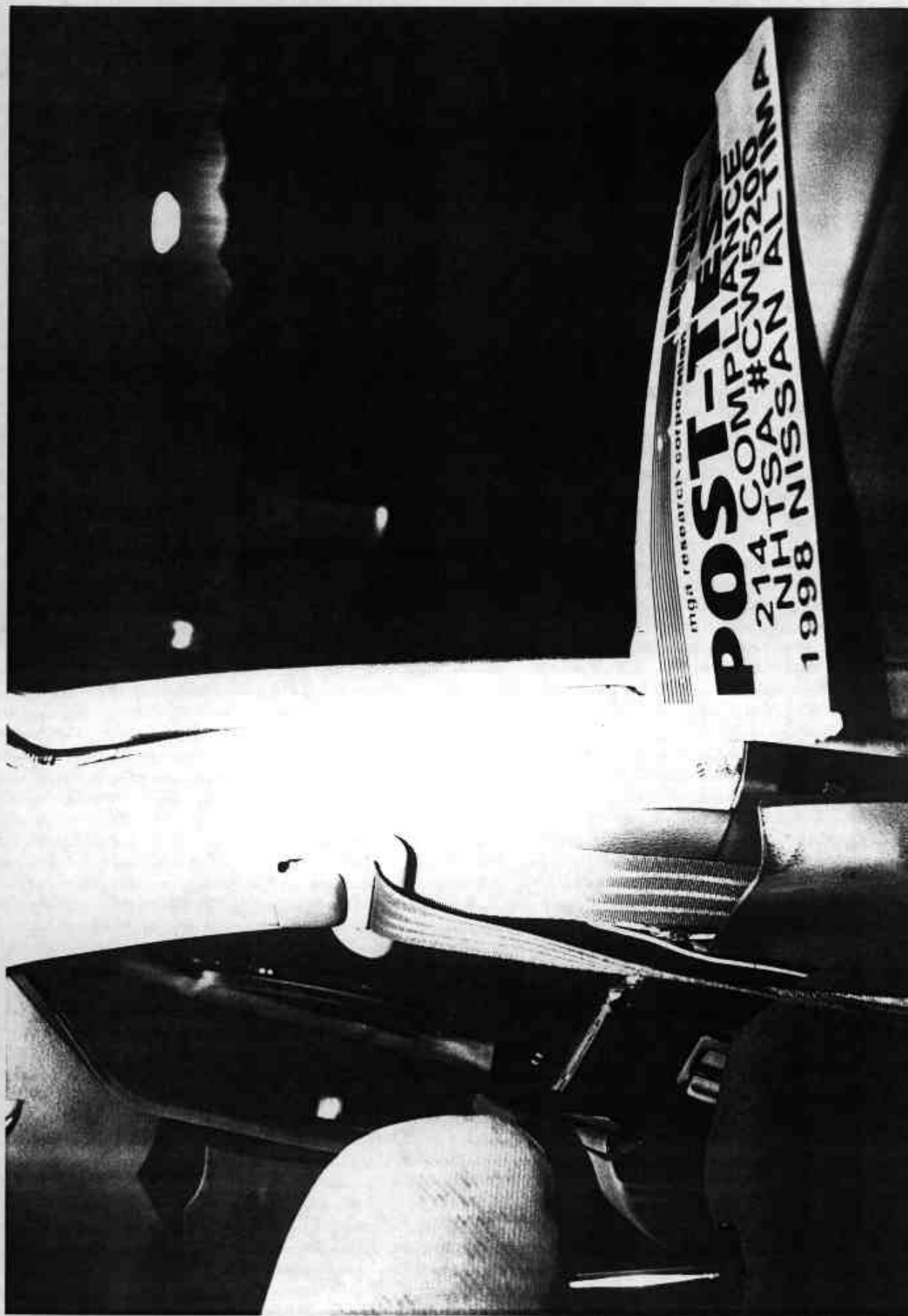


Photo No. A-29 - Post-Test Driver Dummy Head Contact



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



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

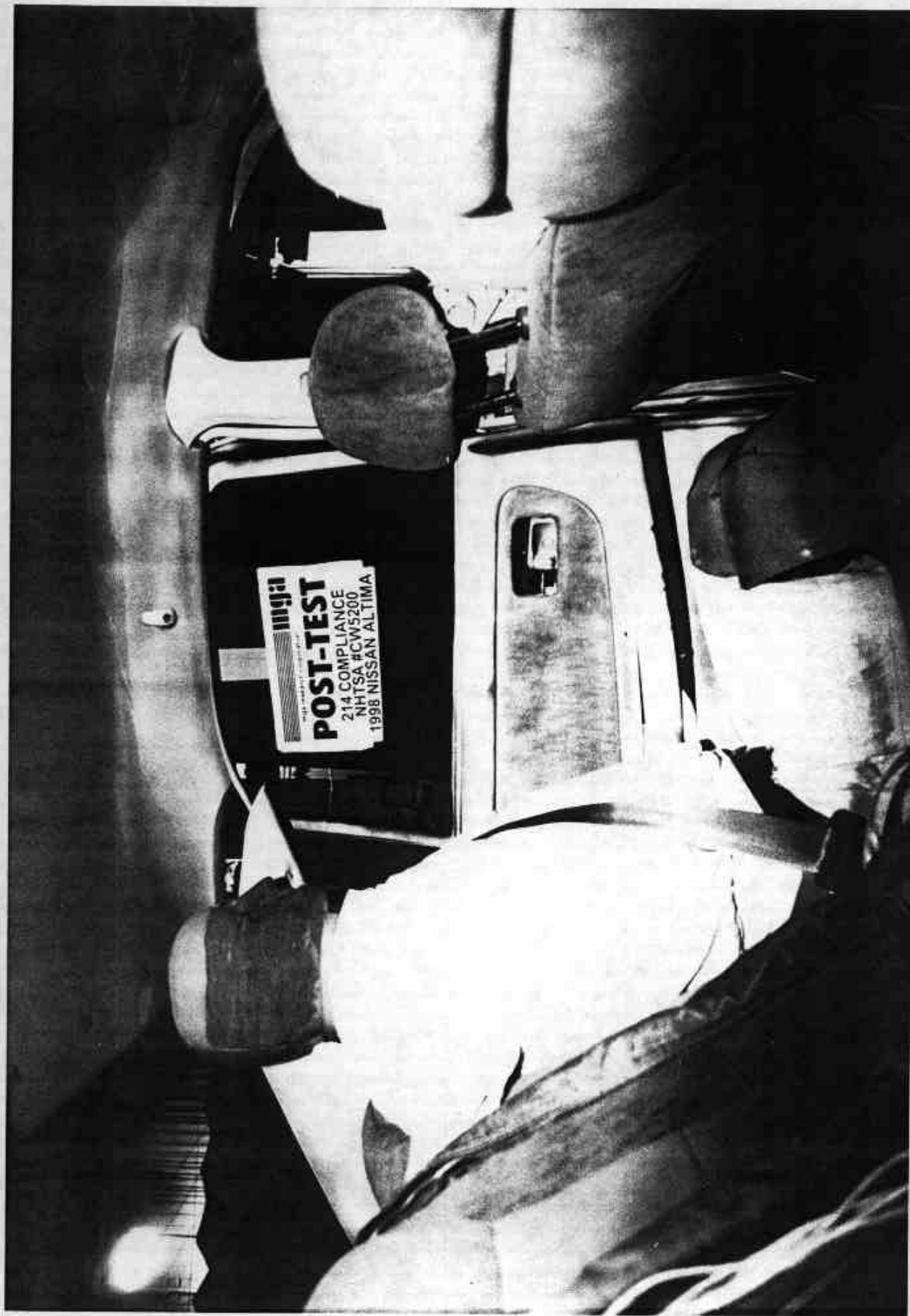


Photo No. A-32 - Post-Test Rear Passenger Dummy Right Side View

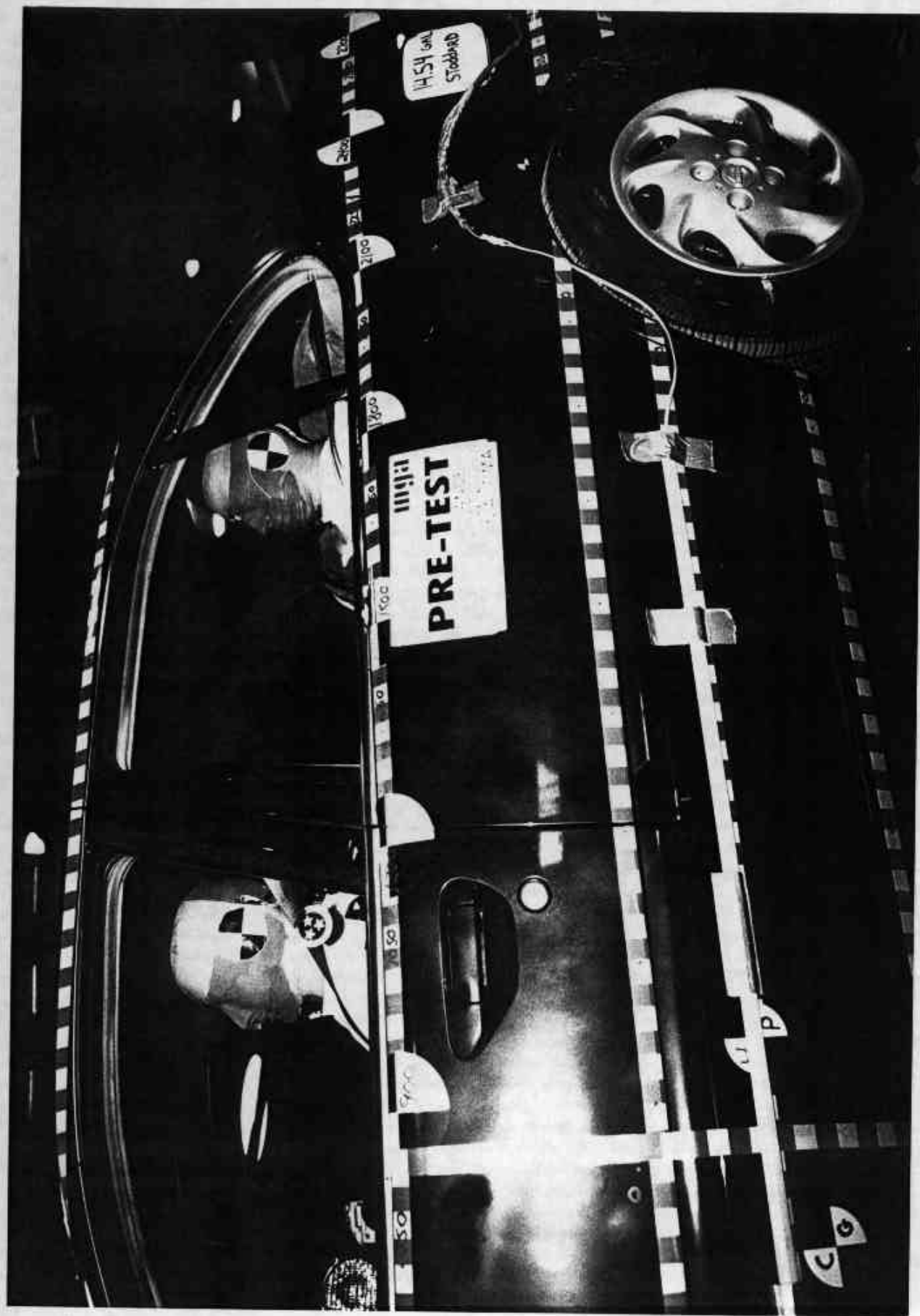


Photo No. A-33 - Pre-Test Rear Passenger Dummy Left Side View

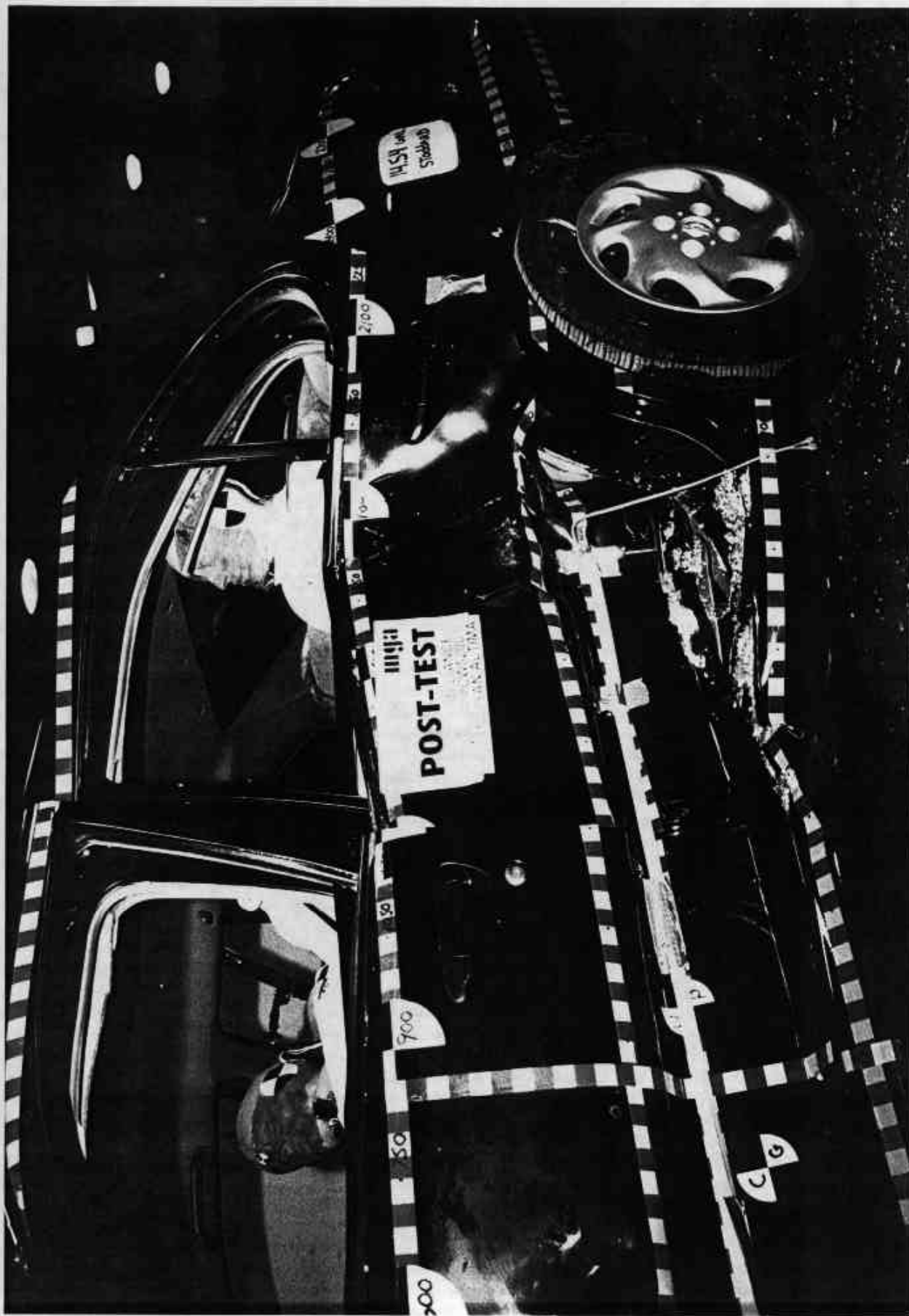


Photo No. A-34 - Post-Test Rear Passenger Dummy Left Side View

A-34

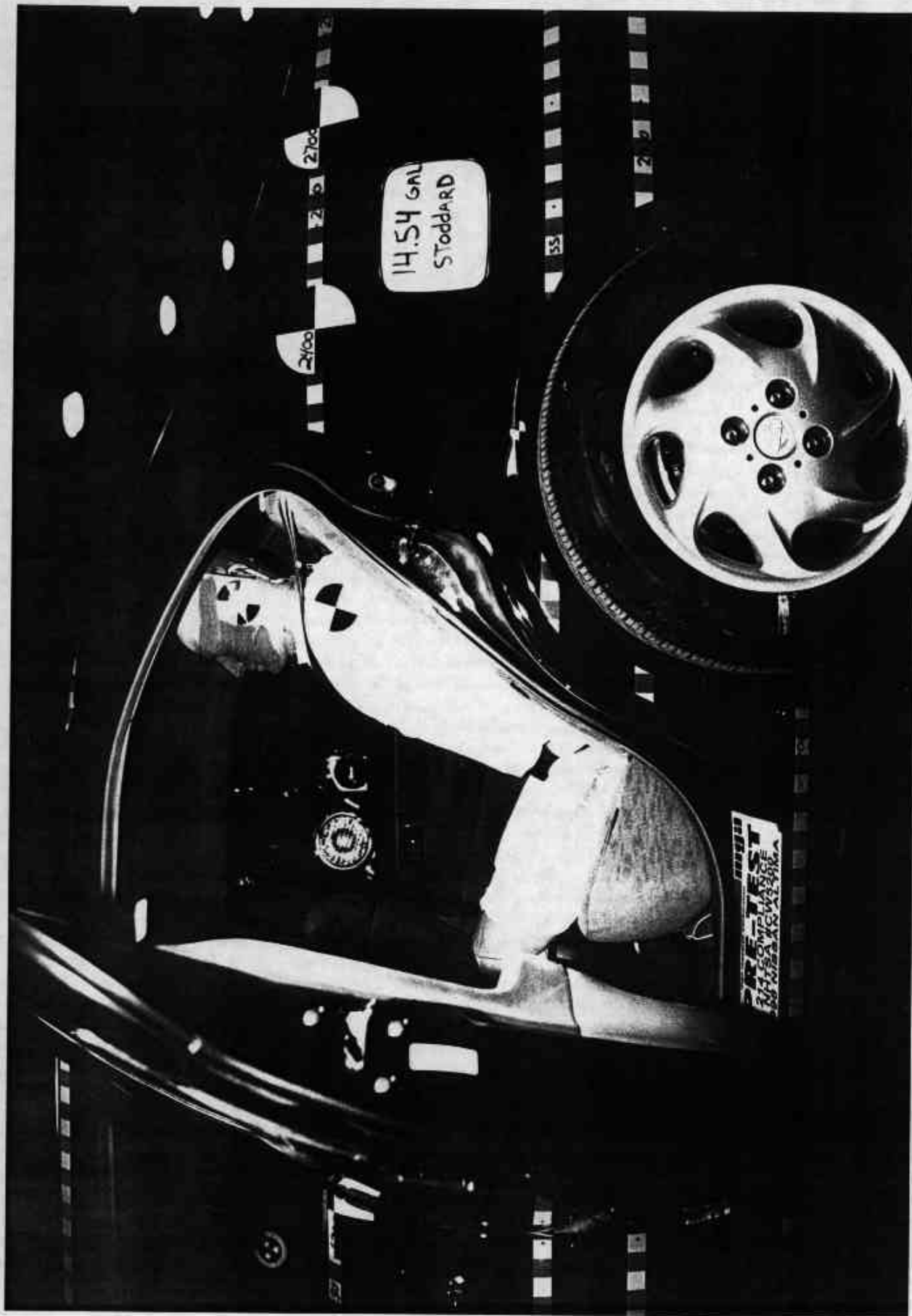


Photo No. A-35 - Pre-Test Rear Passenger Dummy Left Side View (Door Open)



A-36

Photo No. A-36 - Pre-Test Rear Passenger Dummy Shoulder View



Photo No. A-37 - Post-Test Rear Passenger Dummy Shoulder View

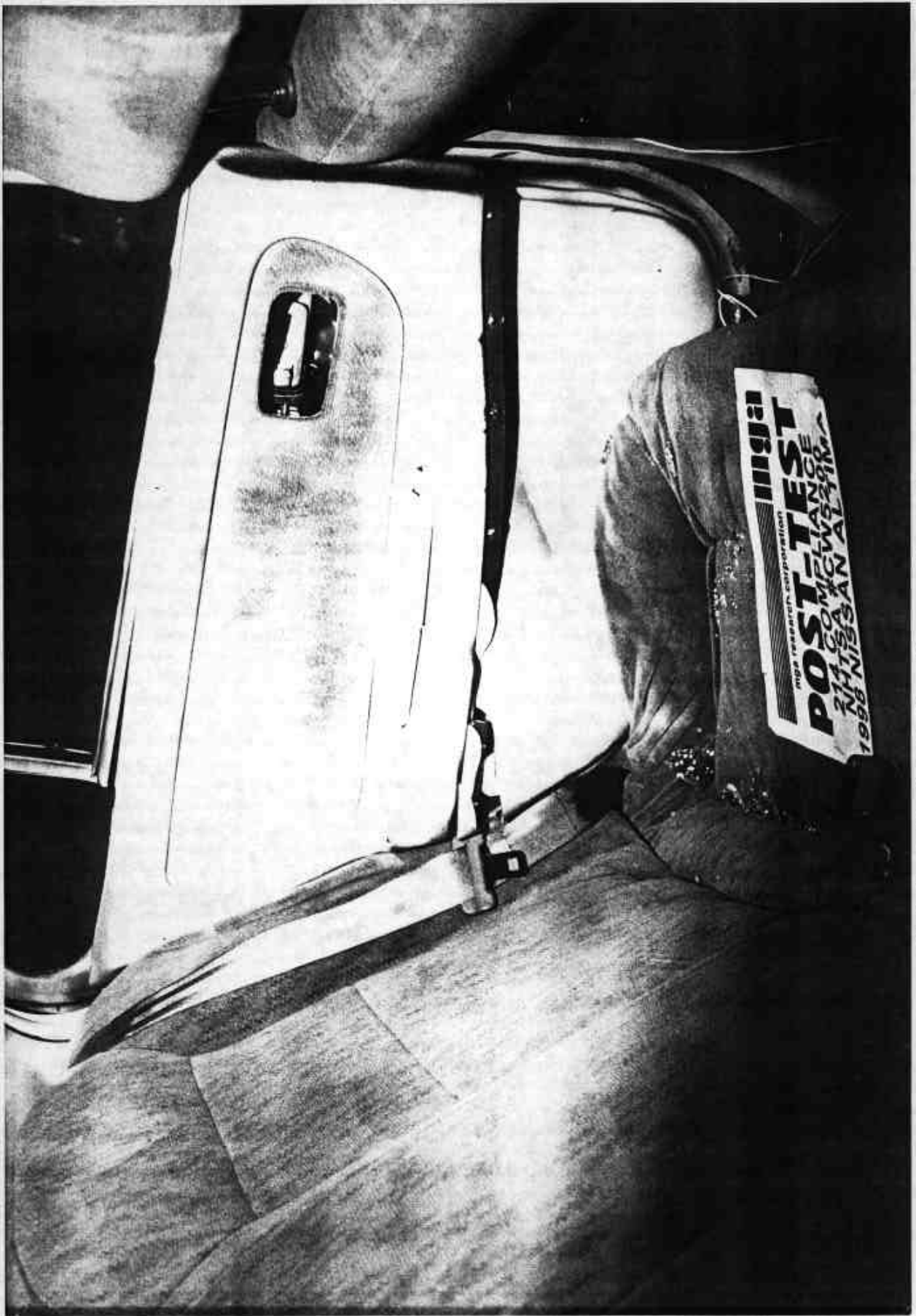


Photo No. A-38 - Post-Test Rear Passenger Dummy Contact



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

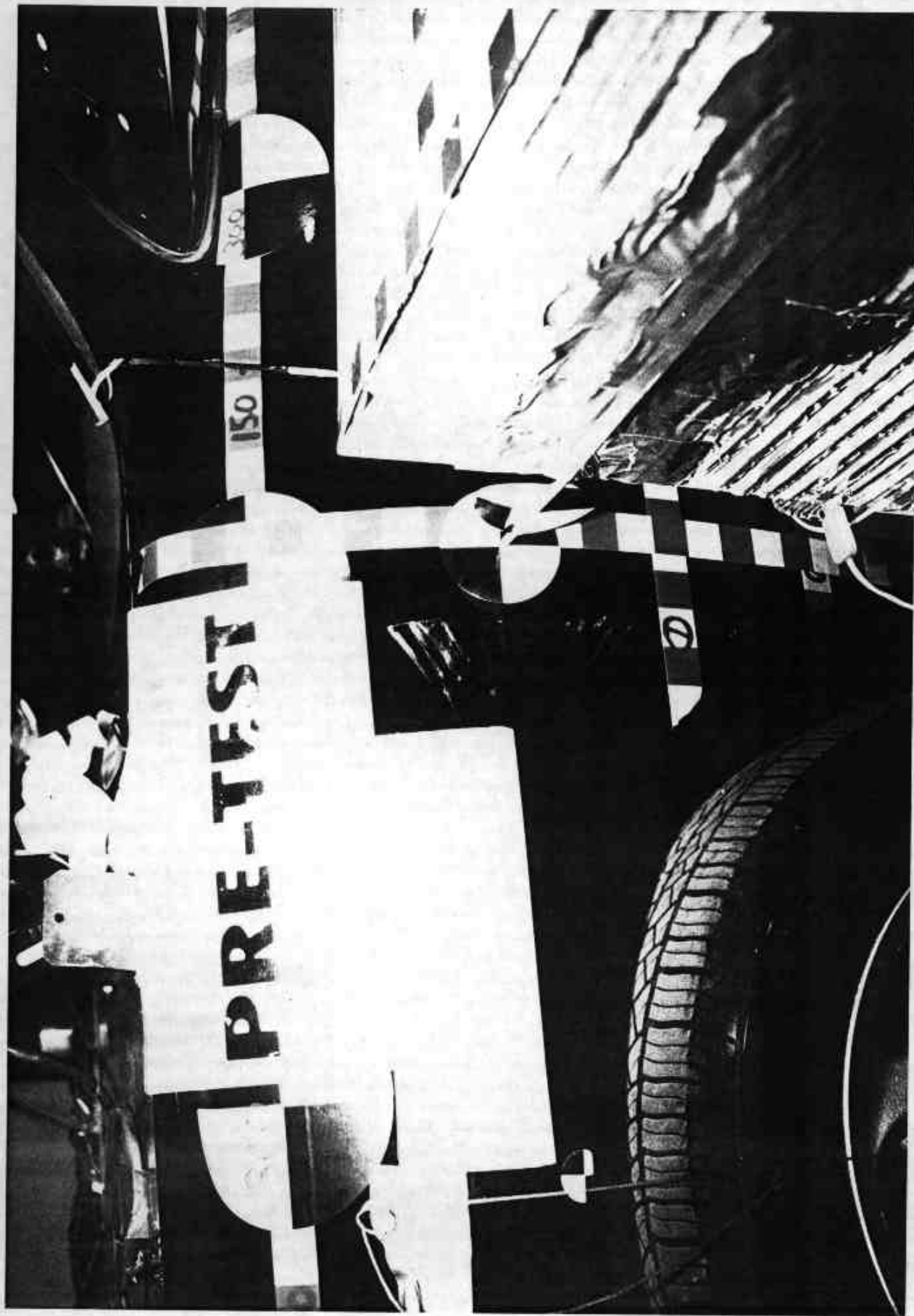


Photo No. A-40 - Pre-Test Left Front Impact Point on Vehicle



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

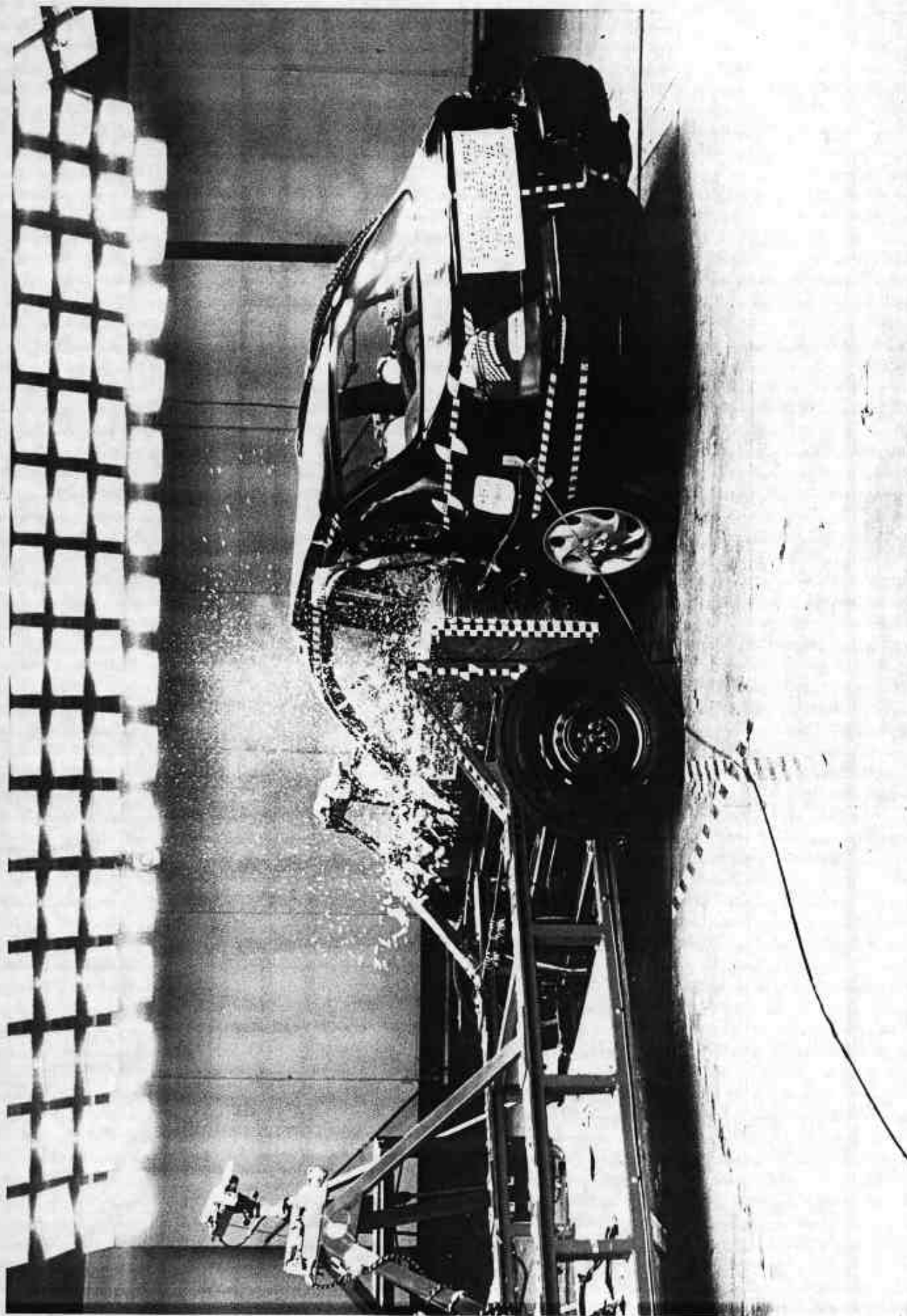


Photo No. A-42 - Impact

A-42

MANUFACTURED BY NISSAN MOTOR CO., LTD.

DATE 07/97 GWR 3990 LB
GWR FR. 2152 LB GWR RR. 1863 LB

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

VIN: 1N4DL01D4WC114798 PASSENGER CAR

COLOR TRIM TRANS AXLE ENGINE
KH3 K R55F50A FG36 KA24DE 2389CC
MODEL: BBGALBF-EUR 551 02000



1N4DL01D4WC114798

FRONT AVANT		REAR ARRIERE		TOTAL TOTAL	
30 psi		200 kPa		5	
TIRE INFLATION PRESSURE. PNEUS RECOMMANDEES DES PNEUS FROIDS.					
FRONT AVANT		REAR ARRIERE			
30 psi		200 kPa 29 psi			

SPARE TIRE ROUE DE SECOURS	kPa	psi
T125/70D15	42	60
DO NOT USE IN EMERGENCY. 50 MPH, 80 km/h SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION. UTILISATION A URGENCE MAX 50 MPH, 80 km/h POUR LES DETAIL AU MANUEL DU PROPRIETAIRE		

Photo No. A-44 - Tire Placard

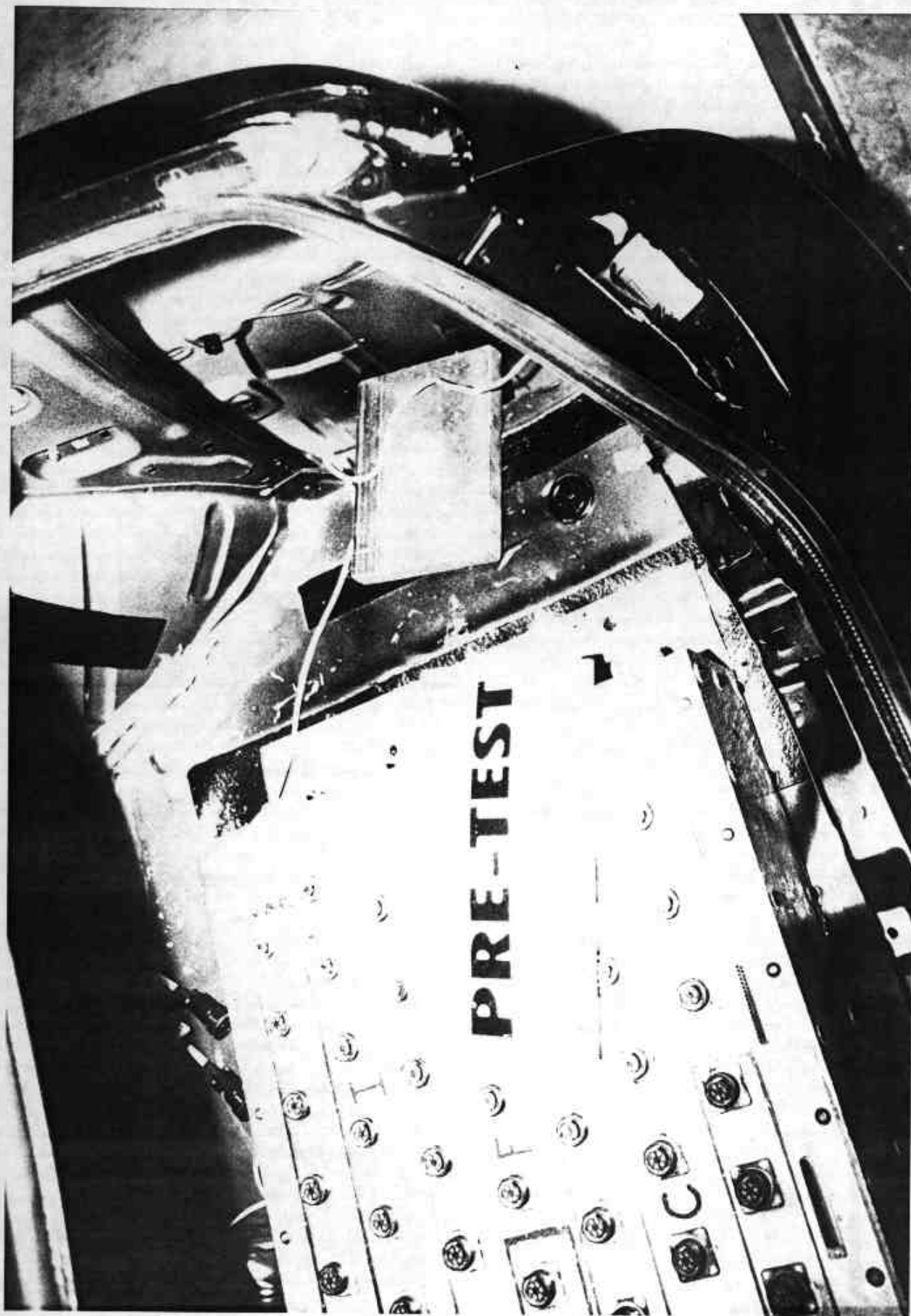


Photo No. A-45 - Vehicle Ballast Weight

A-45

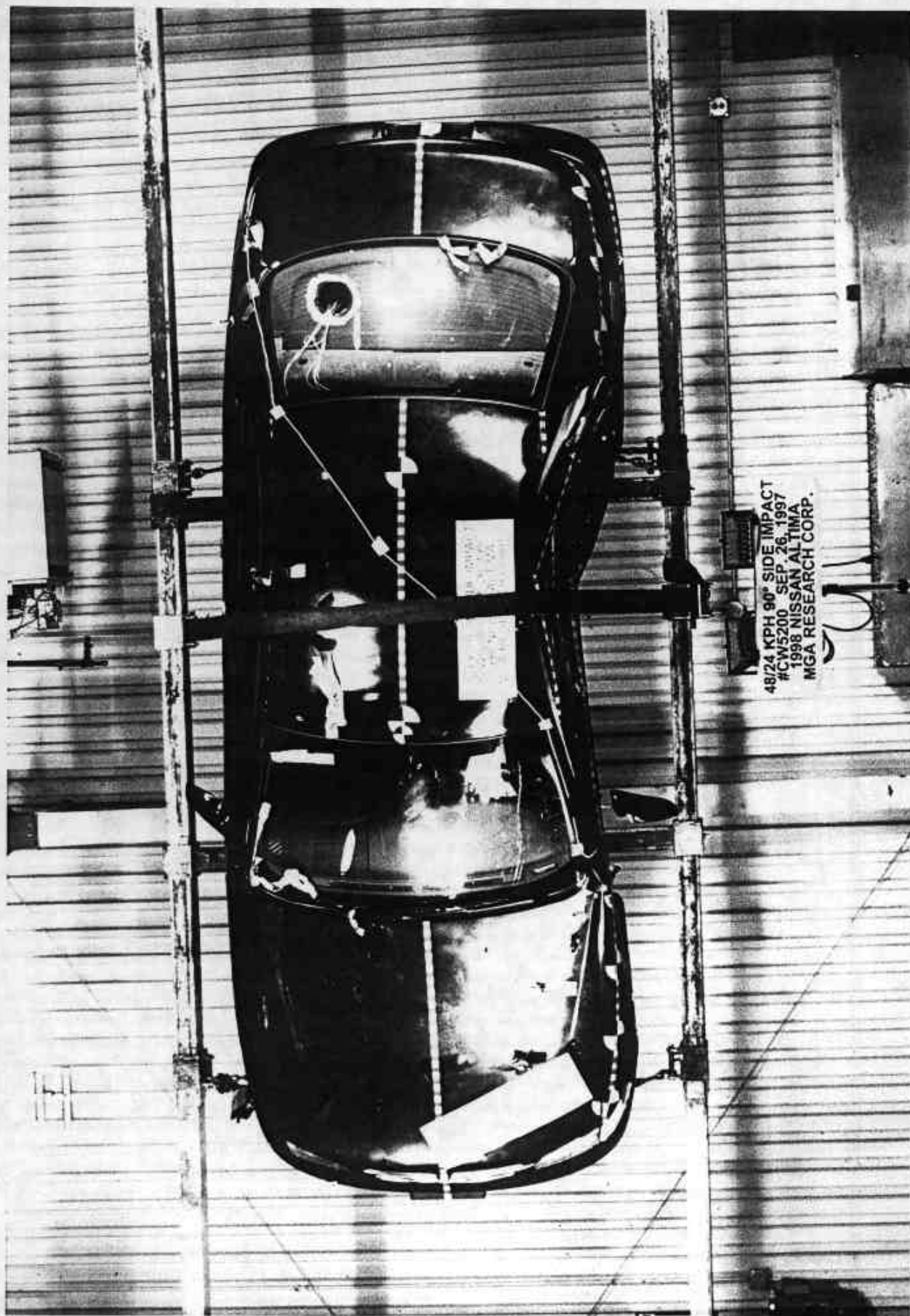
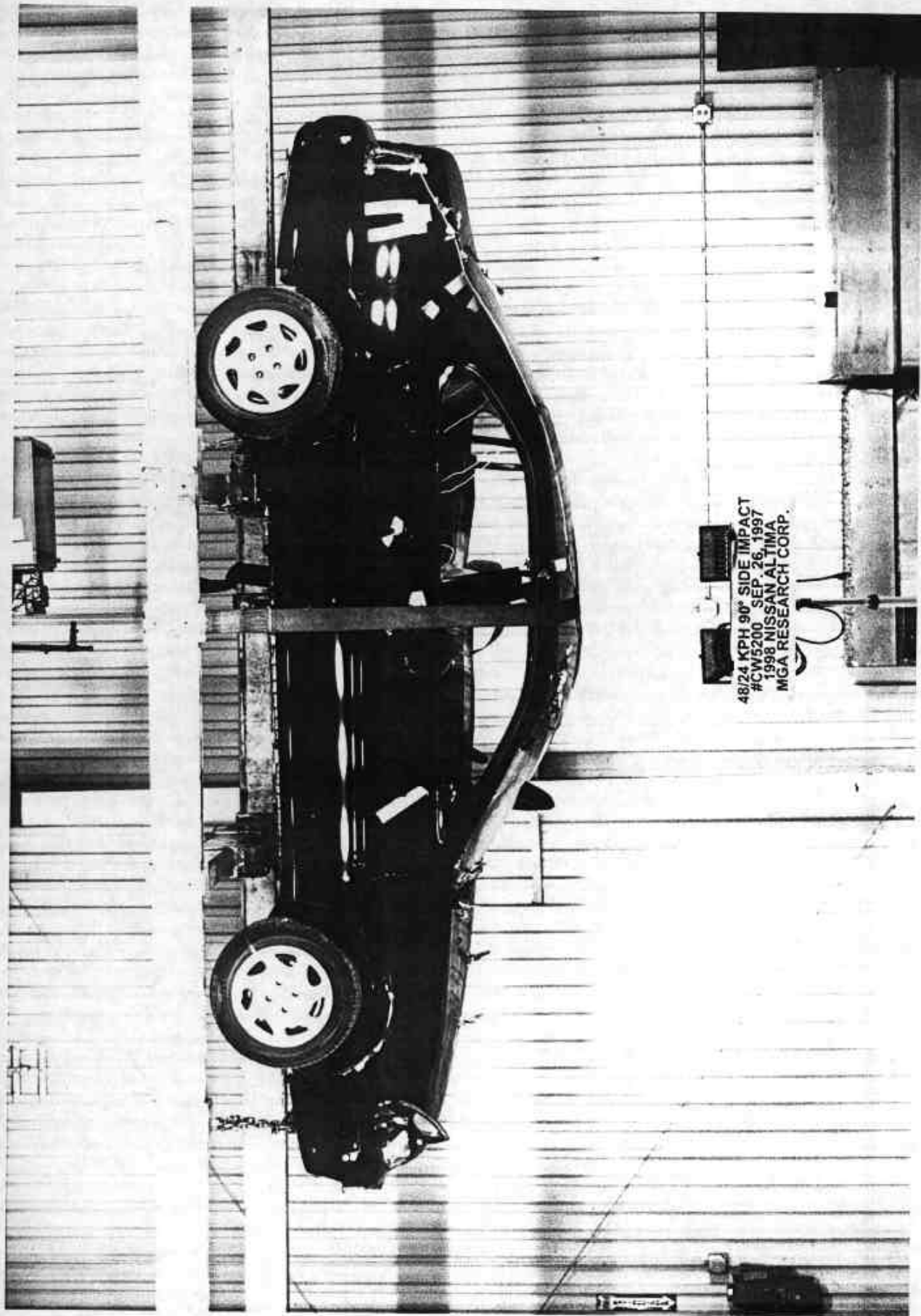
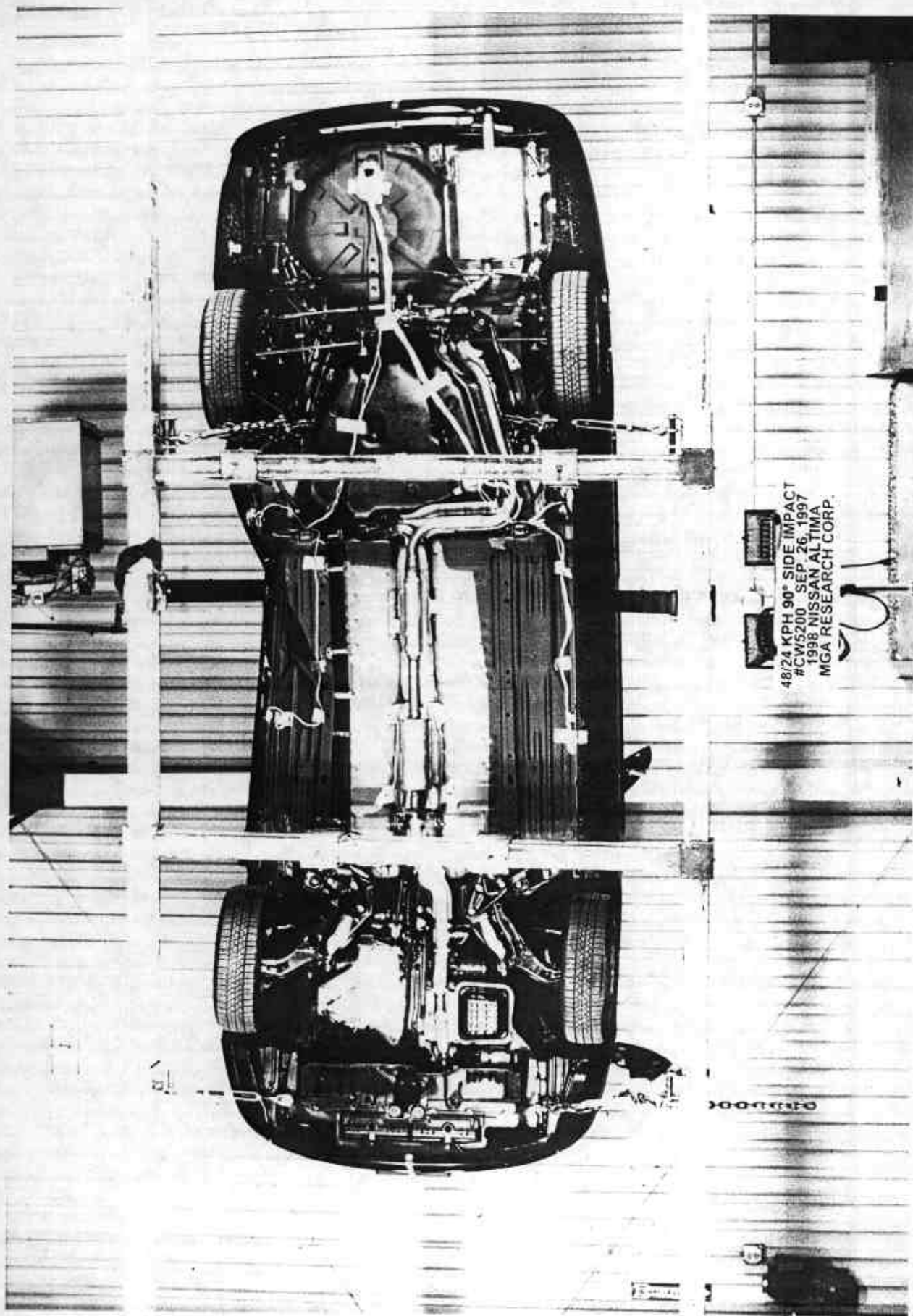


Photo No. A-46 - Rollover 90°



48/24 KPH 90° SIDE IMPACT
#CW5200 SEP. 26, 1997
1998 NISSAN ALTIMA
MGA RESEARCH CORP.

Photo No. A-47 - Rollover 180°



48/24 KPH 90° SIDE IMPACT
#CW5200 SEP. 26, 1997
1998 NISSAN ALTIMA
MGA RESEARCH CORP.

201

Photo No. A-48 - Rollover 270°

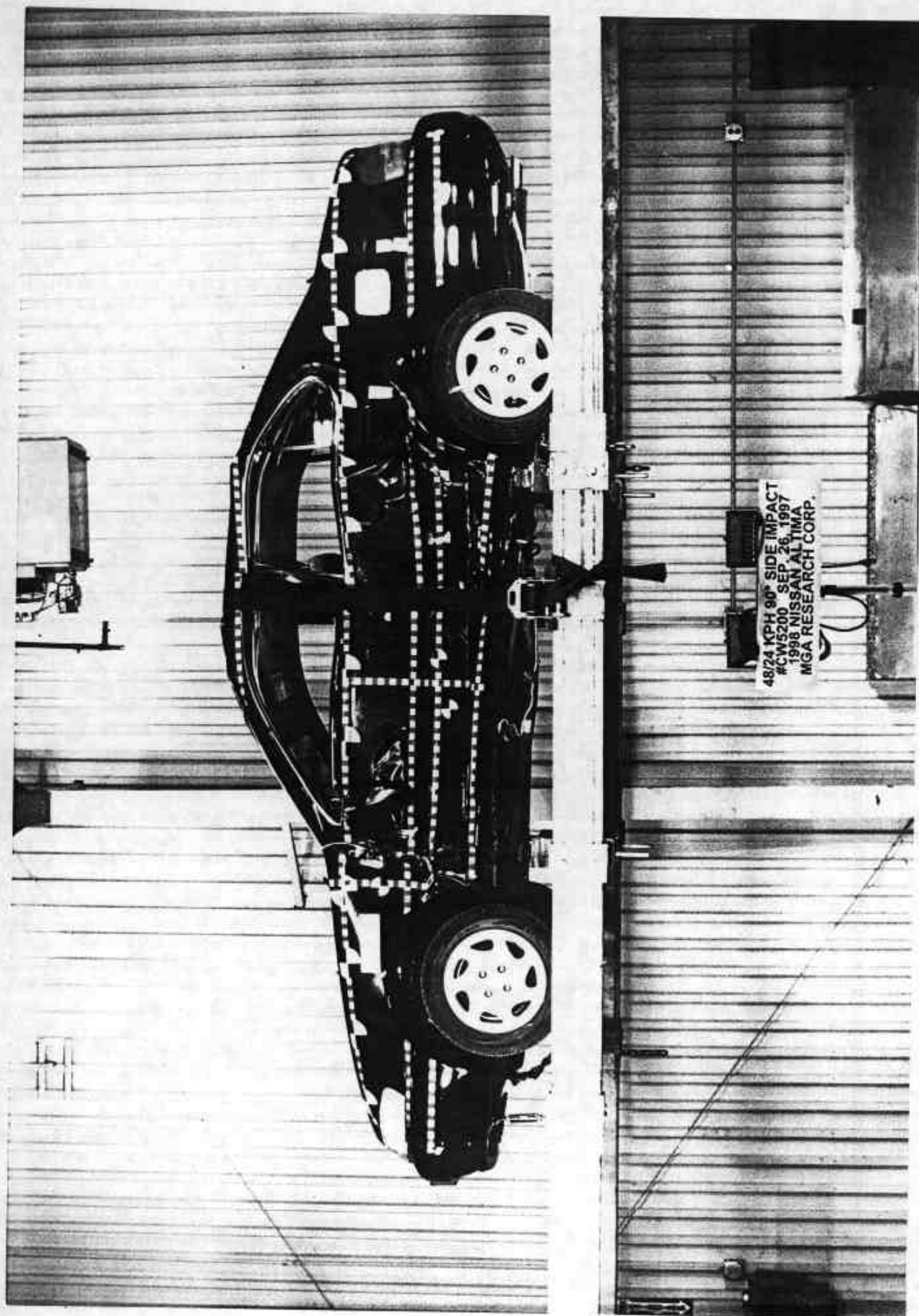


Photo No. A-49 - Rollover 360°

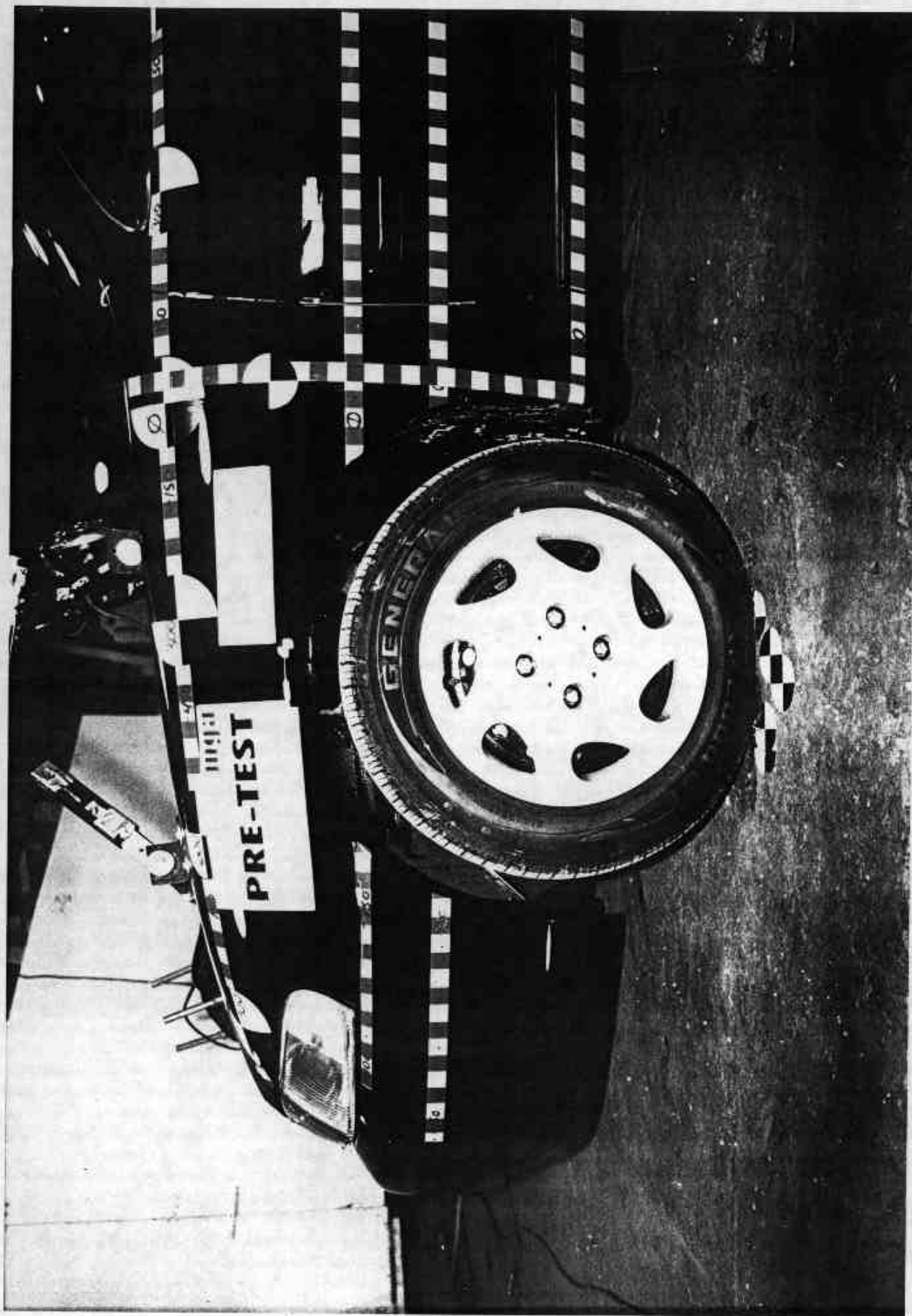


Photo No. A-50 - Left Front Attitude Point

A-50

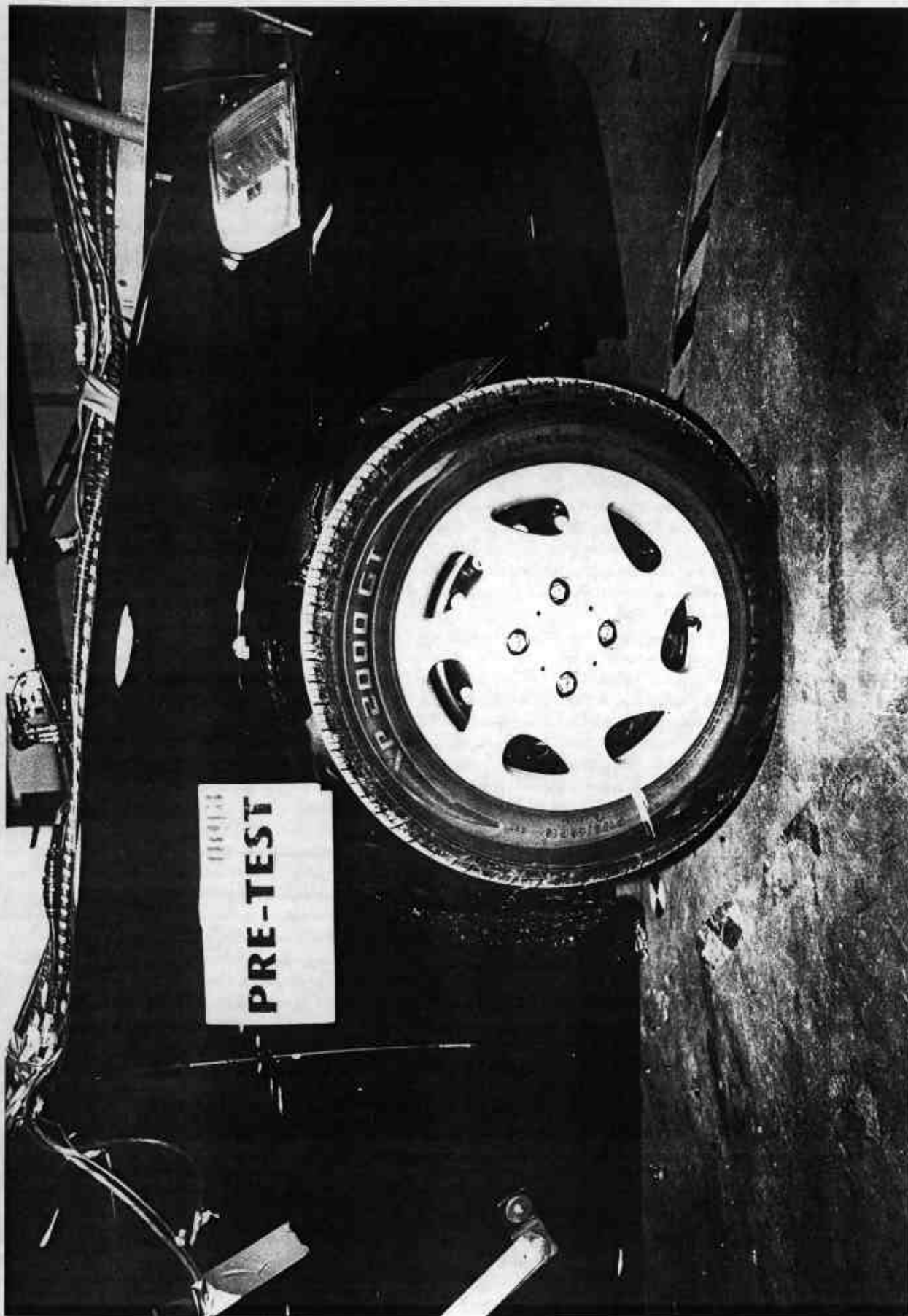


Photo No. A-51 - Right Front Attitude Point

A-51

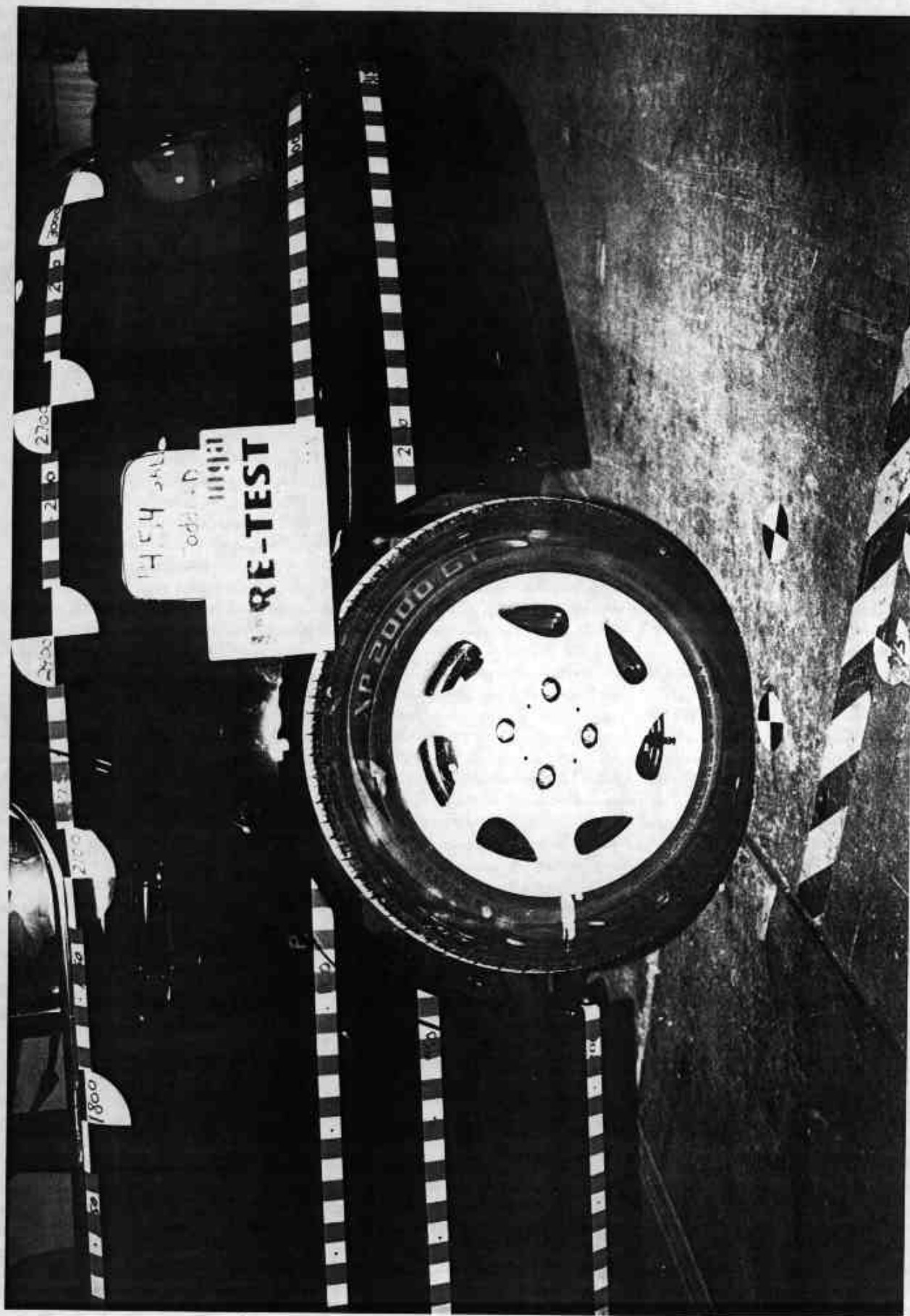


Photo No. A-52 - Left Rear Attitude Point



Photo No. A-53 - Right Rear Attitude Point

A-53

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* No valid data collected

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FIR Filter

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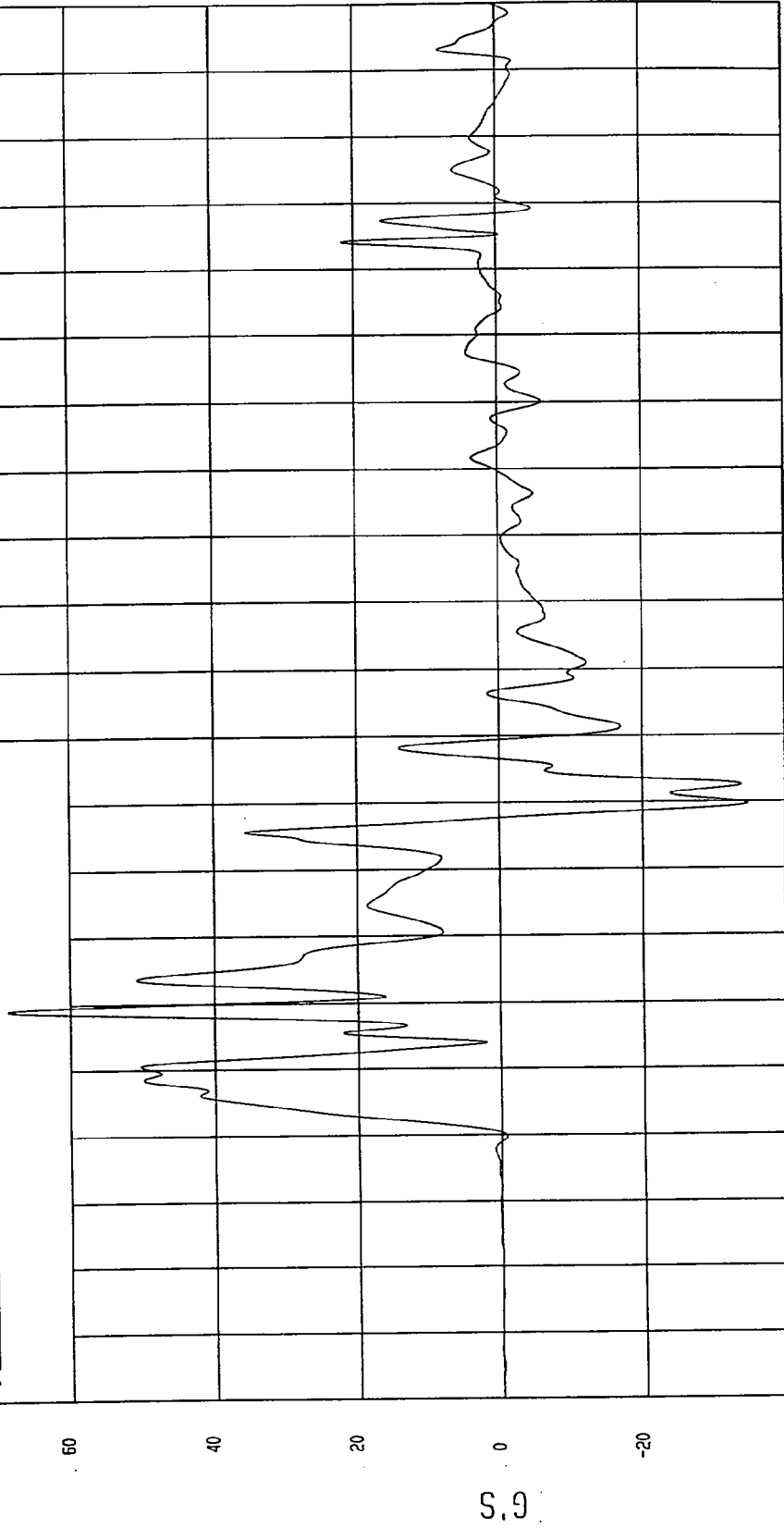
Figure B-101 - Rear Passenger Pelvis Y Redundant Acceleration vs. Time

B-101

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH
Minimum = -34.50 G'S at 70 msec Maximum = 68.75 G'S at 39 msec

DRIVER UPPER RIB Y ACCELERATION

1 ——— 897112AF.M15 Filterclass (180)



TIME (SECONDS)

MGA Research
10-08-1997 18:14

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

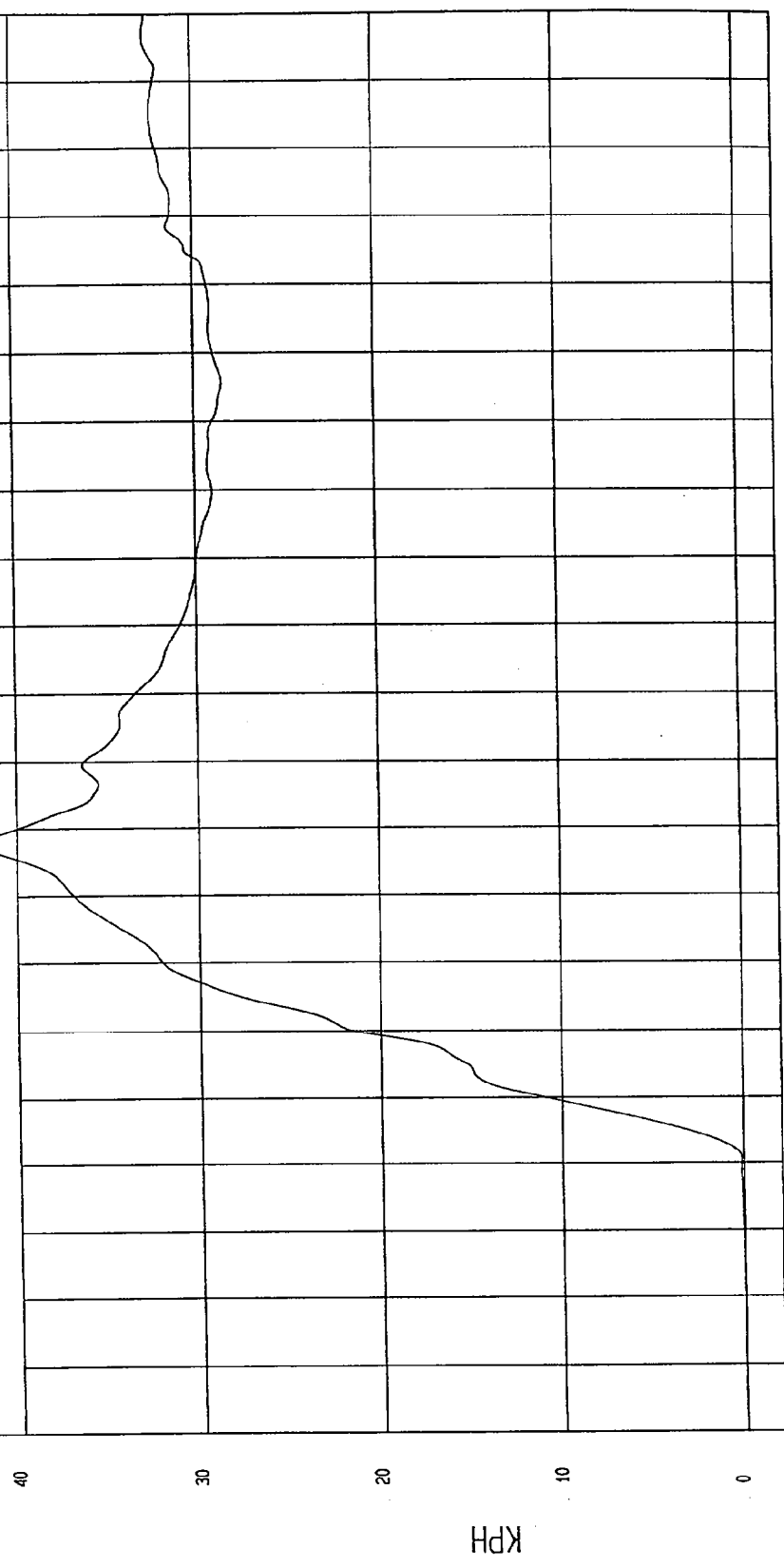
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Minimum = -7.30E-03 KPH at -14 msec

Maximum = 41.69 KPH at 68 msec

DRIVER UPPER RIB Y VELOCITY

1 — B97112A1.V15 FilterClass (180)



TIME Seconds

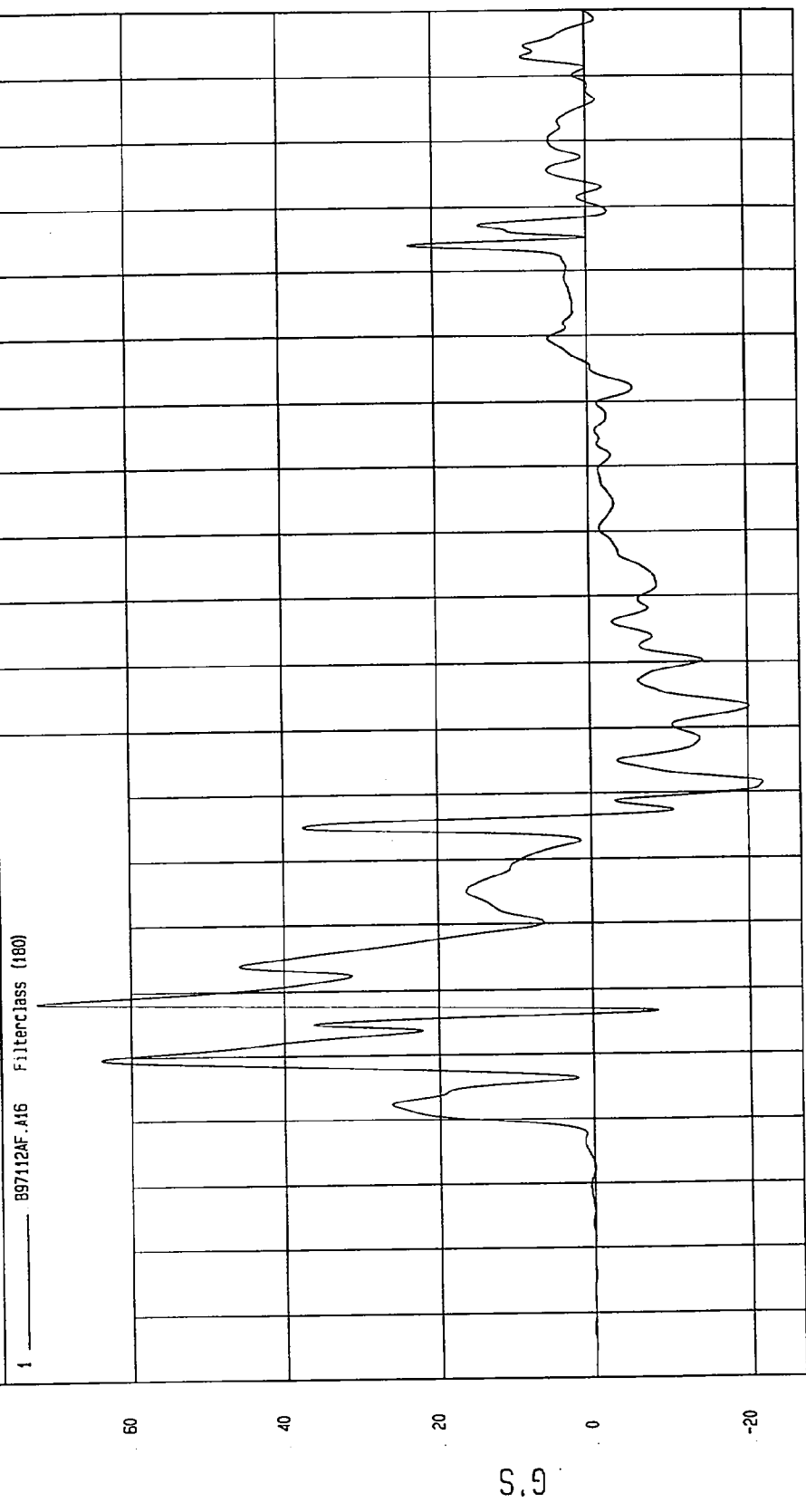
W&A Research, Inc.
10-08-1997 18:19

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -21.82 G'S at 72 msec Maximum = 72.12 G'S at 38 msec

DRIVER LOWER RIB Y ACCELERATION



NSA Research
10-08-1997 18.14

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

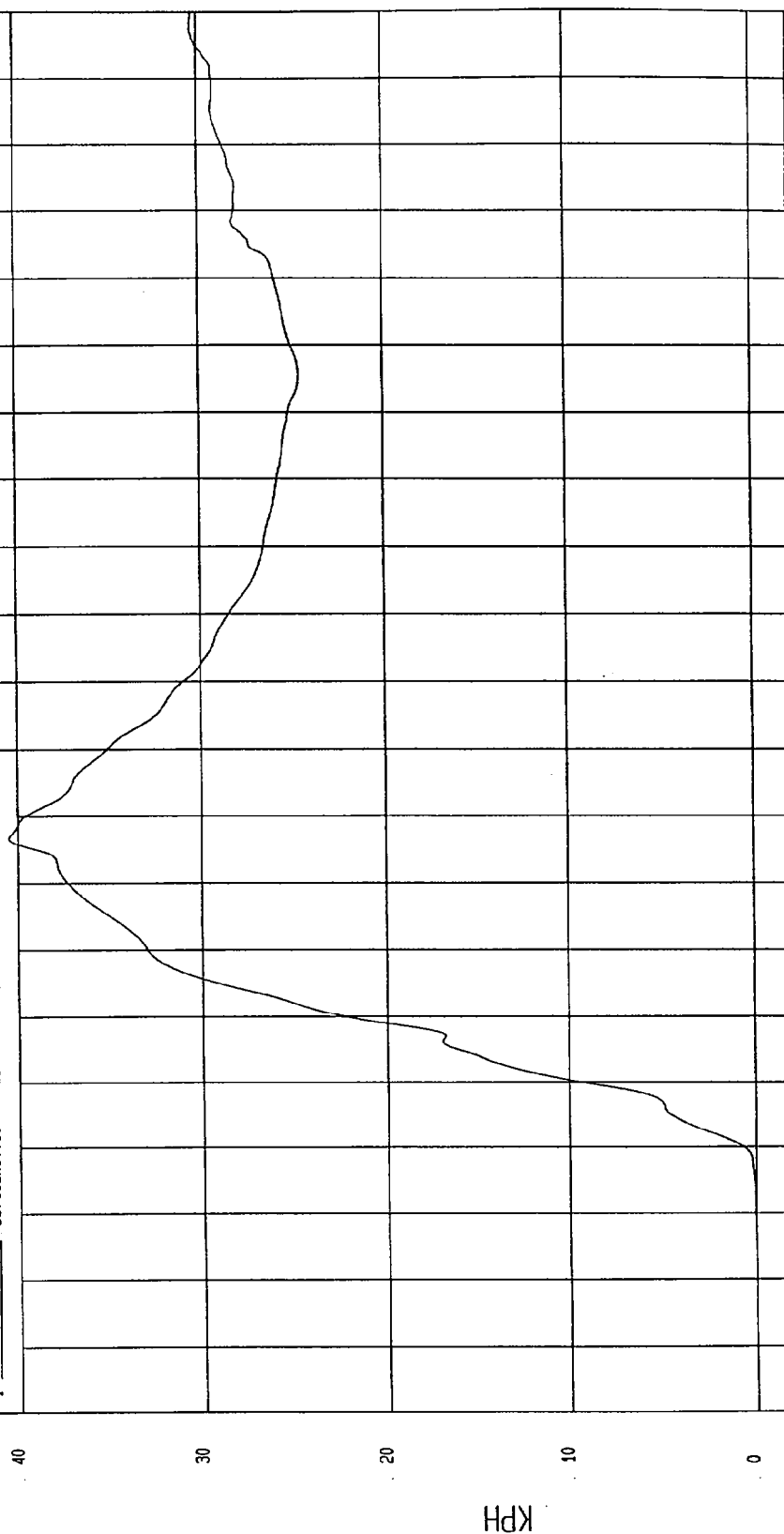
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 40.49 KPH at 67 msec

Minimum = -5.01E-03 KPH at -14 msec

DRIVER LOWER RIB Y VELOCITY

1 897112A1.V16 Filterclass (180)



TIME Seconds
MCA Research
10-08-1997 18:19

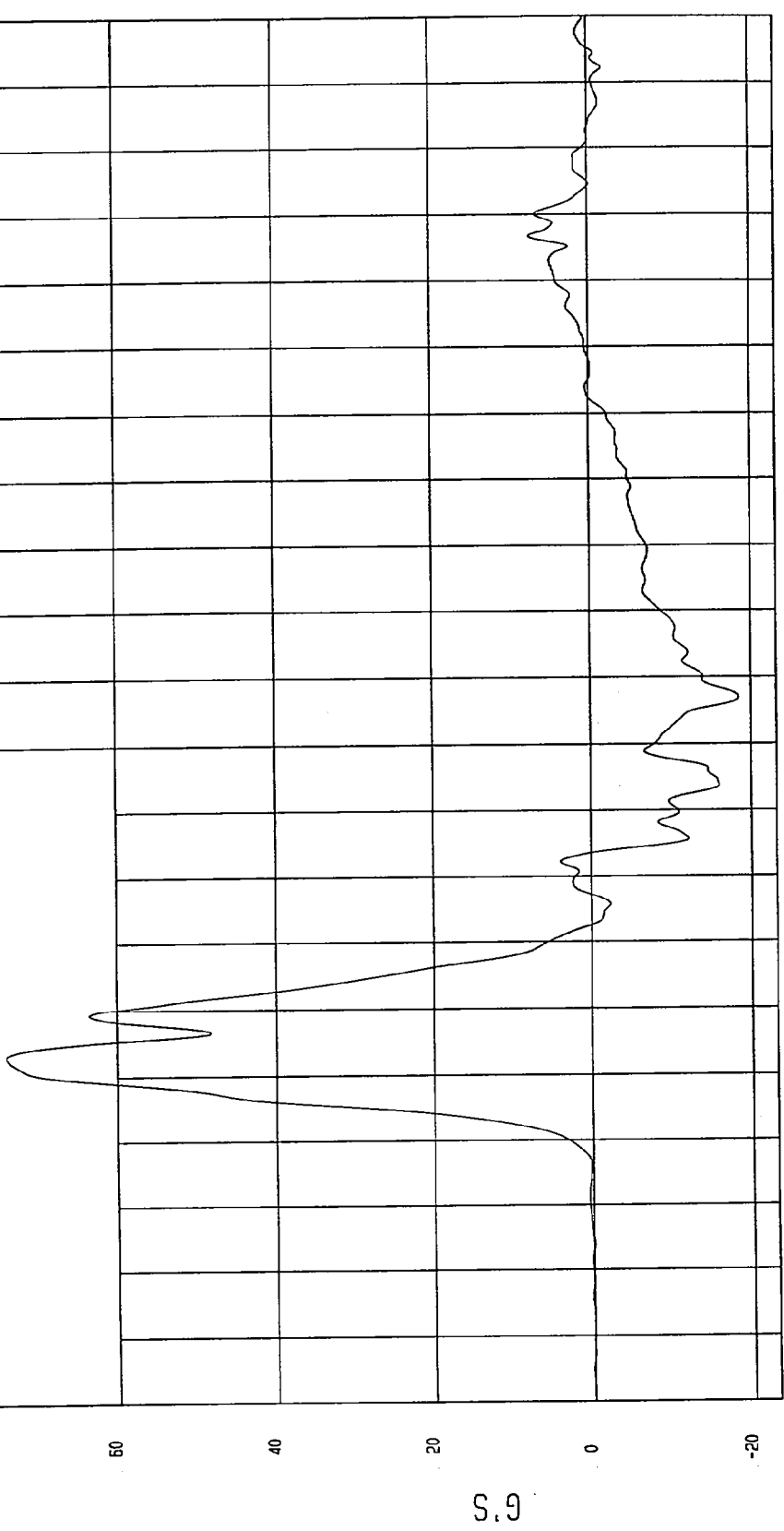
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -18.47 G'S at 87 msec Maximum = 73.87 G'S at 33 msec

DRIVER LOWER SPINE Y ACCELERATION

1 _____ B97112AF.A17 Filterclass (180)



TIME (SECONDS)

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

60
40
20
0
-20

G.S

MCA Research
10-08-1997 18:14

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 44.12 KPH at 64 msec

Minimum = -4.86E-05 KPH at -20 msec

DRIVER LOWER SPINE Y VELOCITY

1 897112AI.V17 Filterclass (f80)

40

30

20

10

0

KPH

.18

.17

.16

.15

.14

.13

.12

.11

.1

.09

.08

.07

.06

.05

.04

.03

.02

.01

0

-.01

-.02

MSA Research
10-08-1997 18.19

TIME Seconds

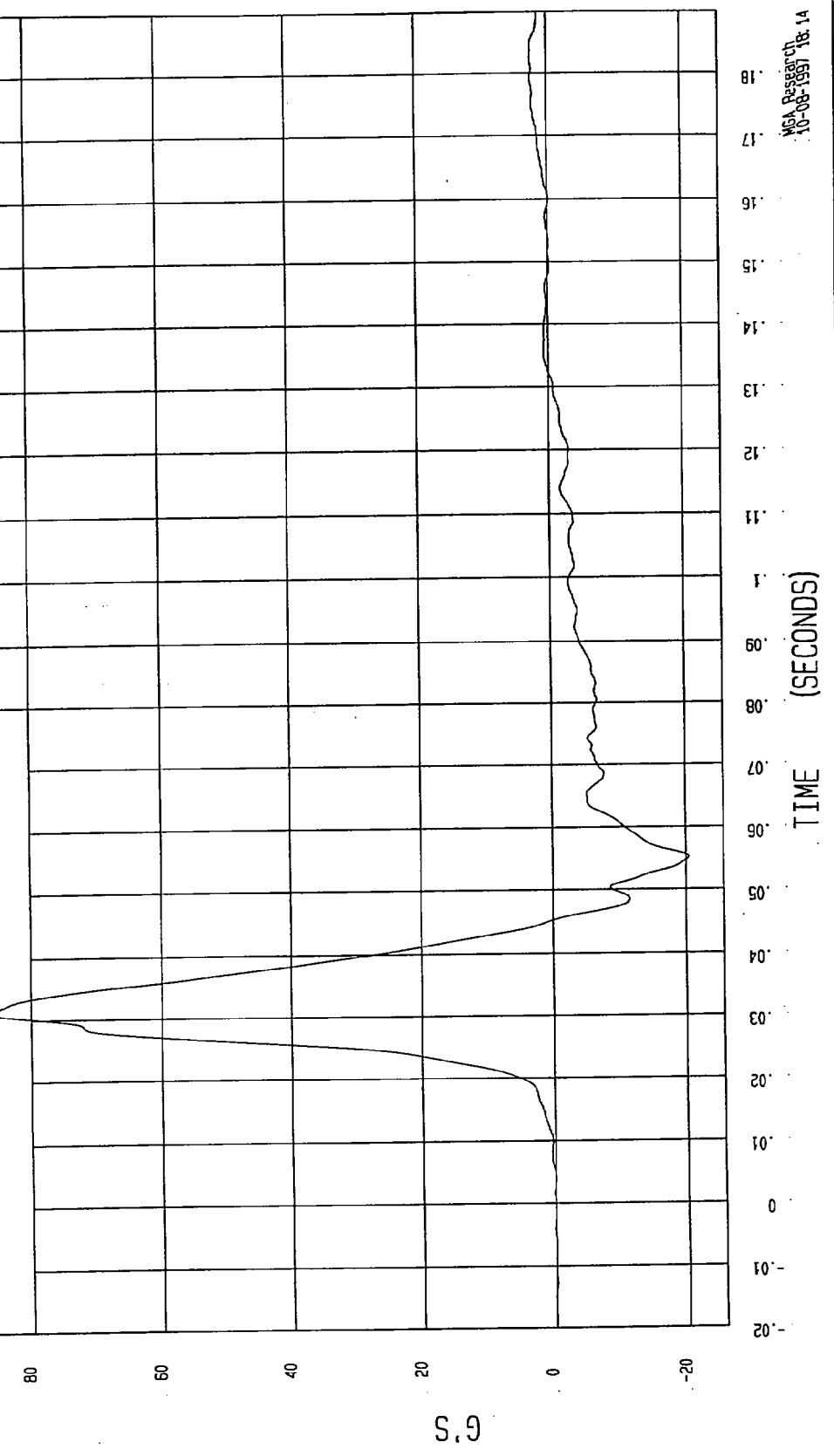
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -20.45 G'S at 55 msec Maximum = 85.98 G'S at 31 msec

DRIVER PELVIS Y ACCELERATION

1 897112AF.A1B Filterclass (180)



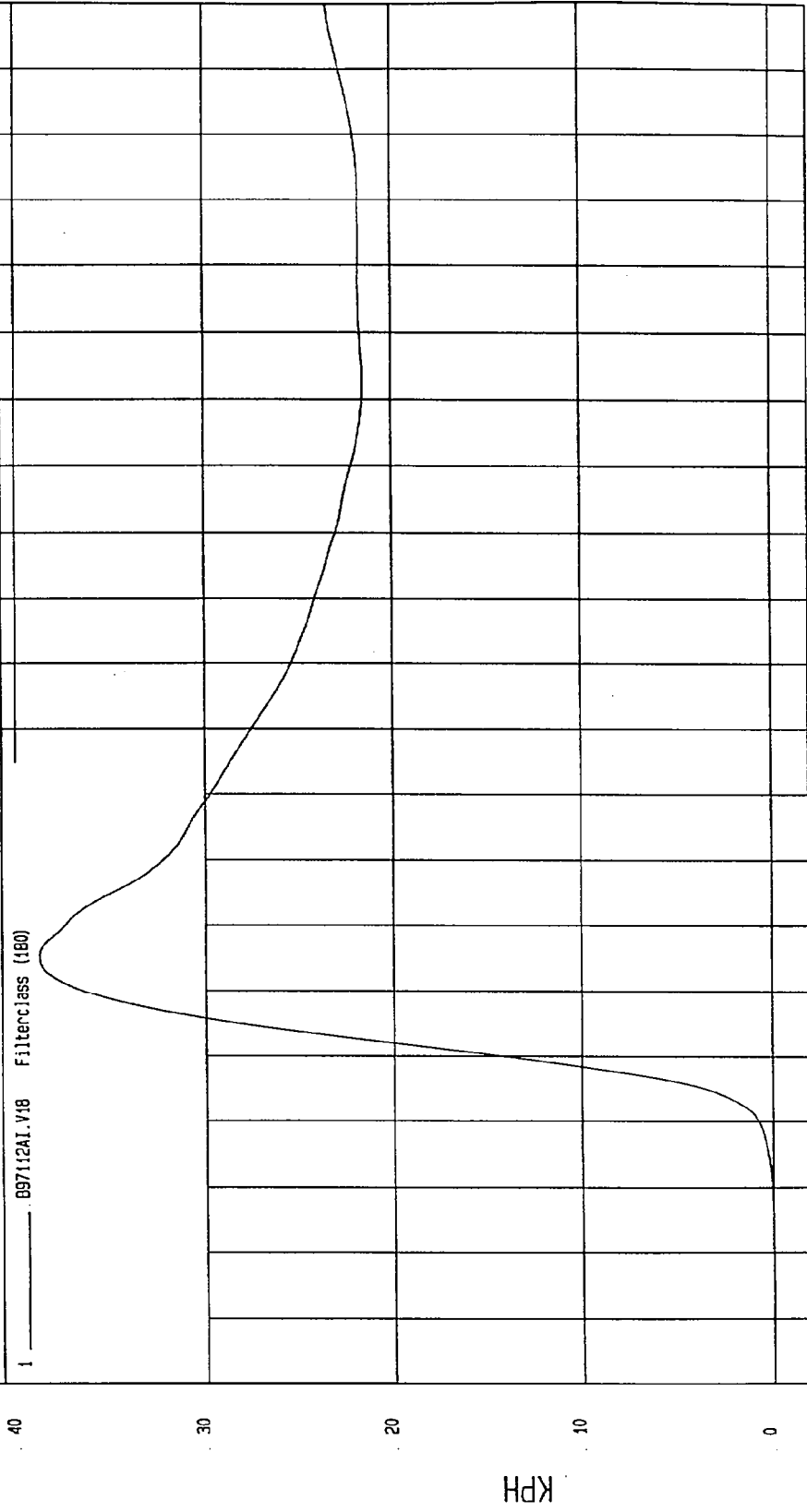
NSA Research
10-08-1997 18.14

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.66E-02 KPH at -5 msec Maximum = 38.80 KPH at 45 msec

DRIVER PELVIS Y VELOCITY



TIME Seconds

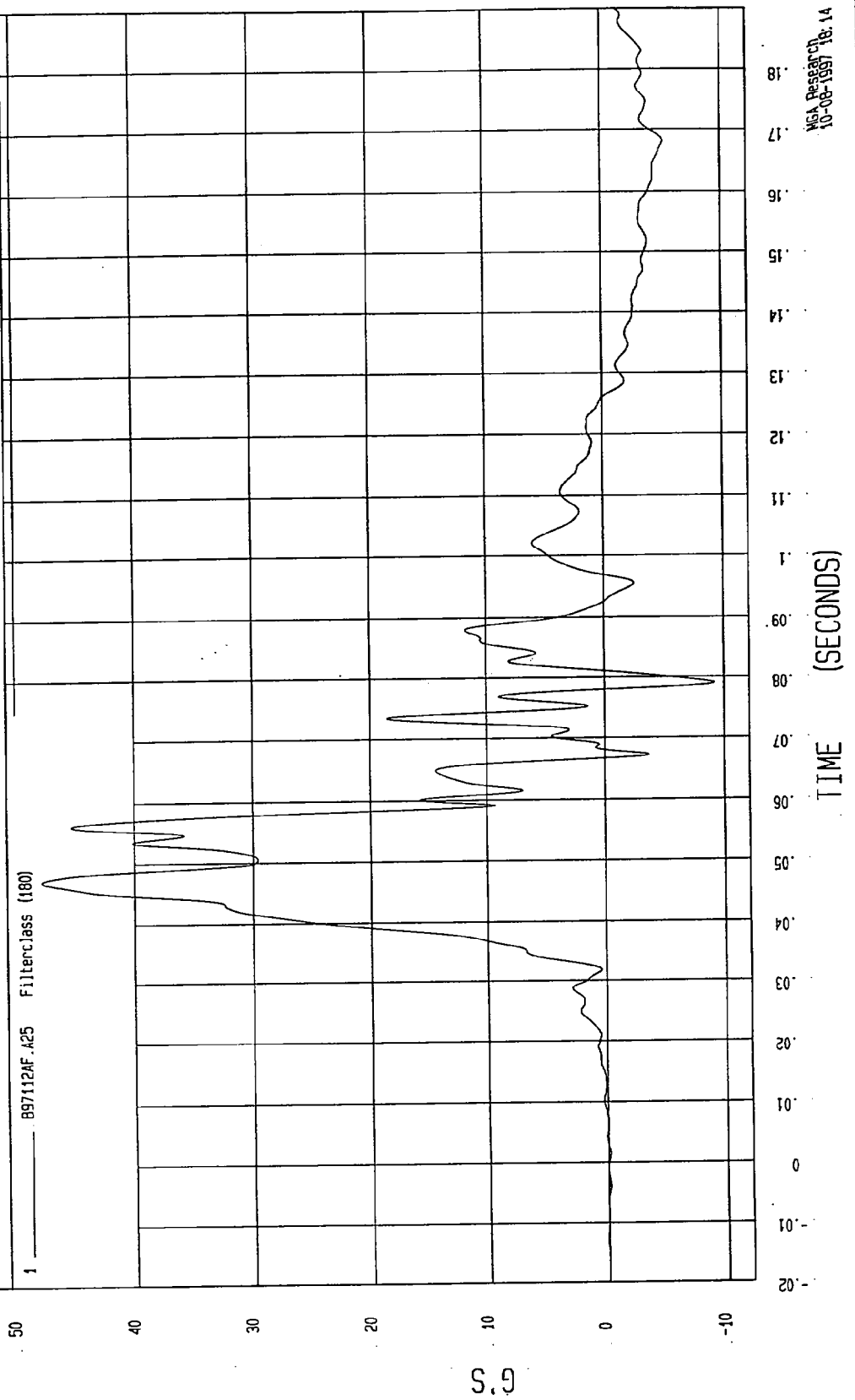
NCA Research
10-08-1997 16:19

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -9.20 G's at 79 msec Maximum = 47.84 G's at 47 msec

REAR PASSENGER UPPER RIB Y ACCELERATION



NSA Research
10-08-1997 18:14

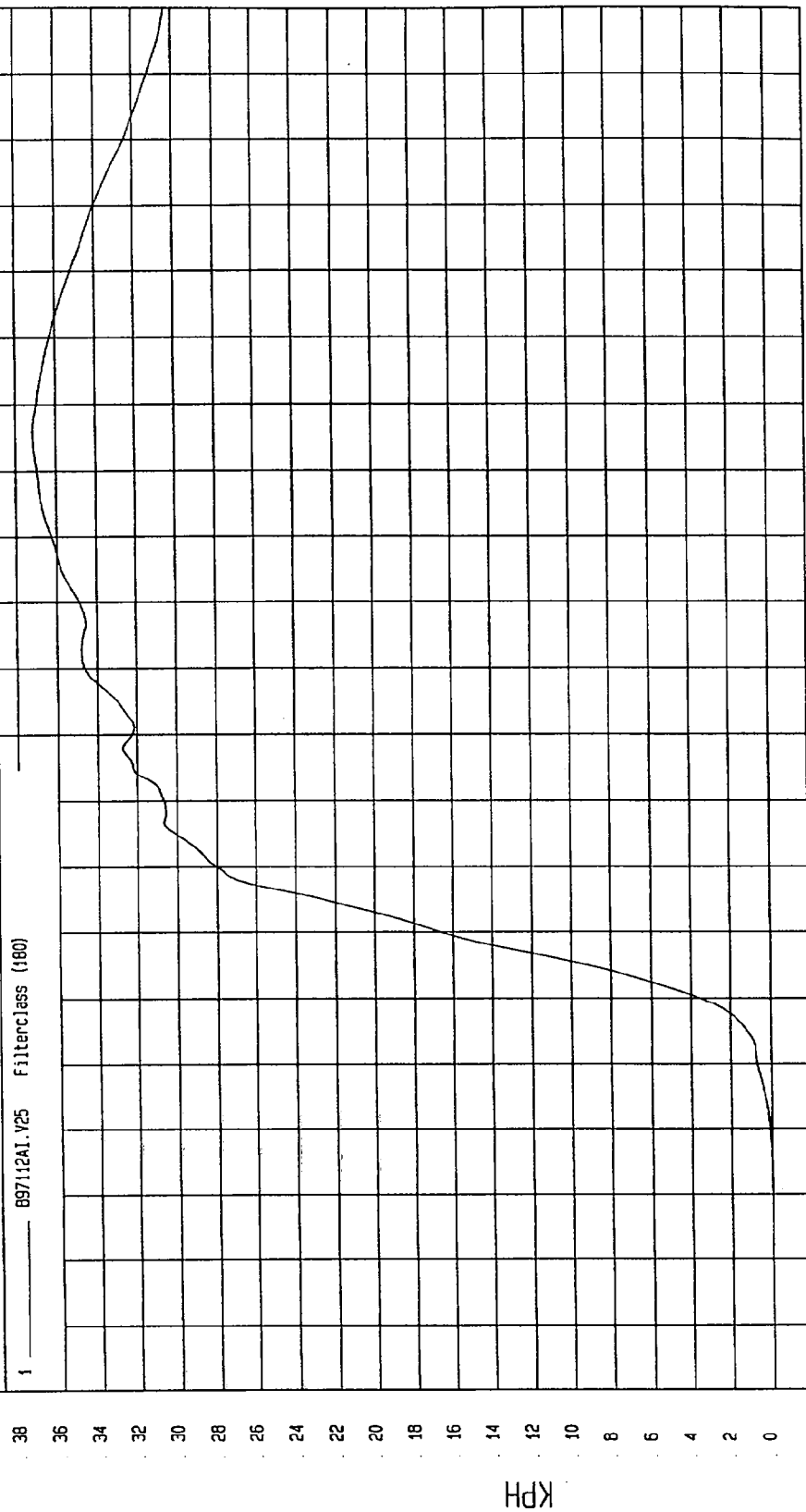
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -4.00E-02 KPH at 8 msec Maximum = 37.13 KPH at 126 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 _____ 897112A1.V25 Filterclass (180)



TIME Seconds

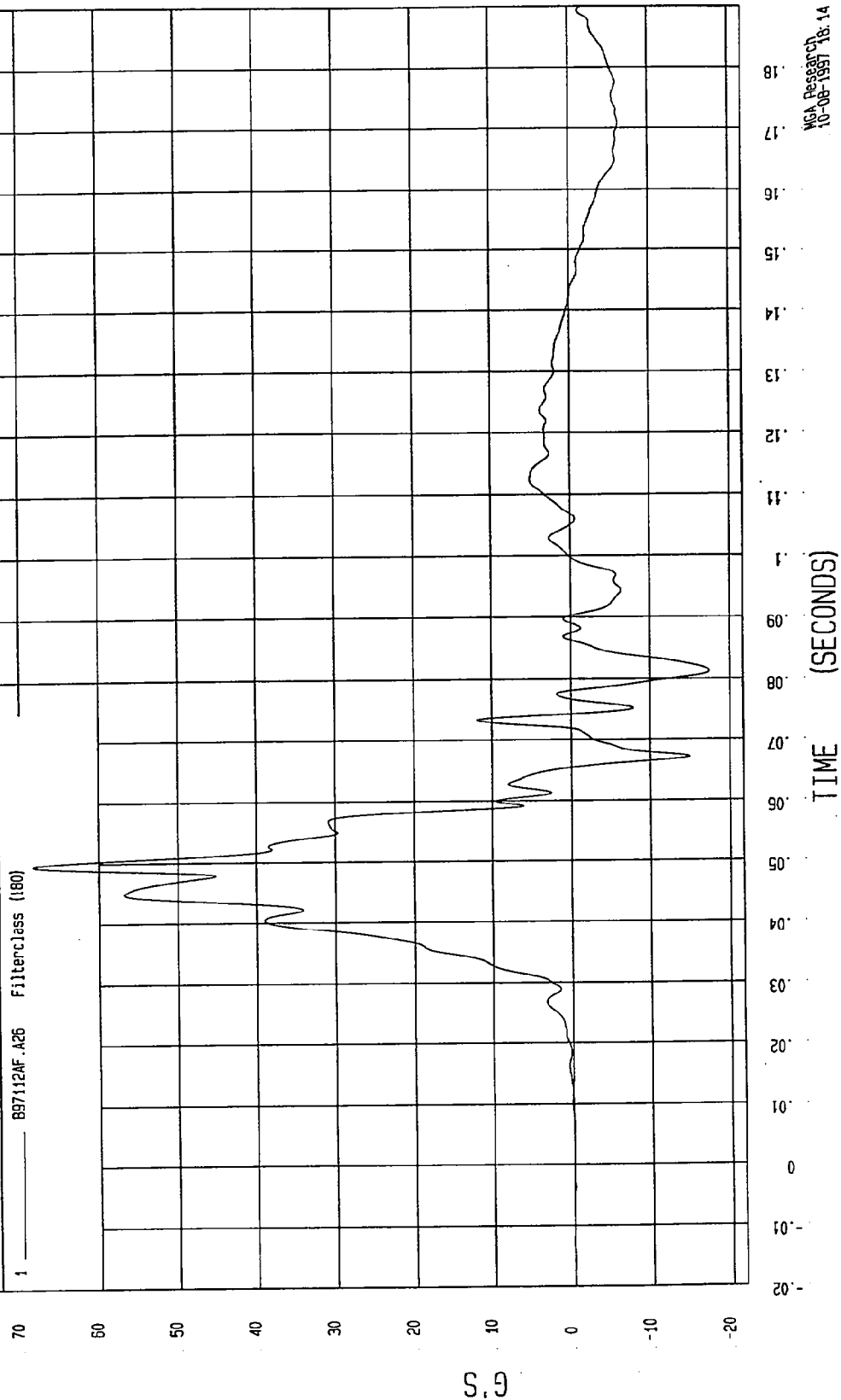
MSA Report of
10-06-1997 18.19

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -17.39 G'S at 81 msec Maximum = 68.30 G'S at 50 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



MCA Research
10-06-1997 18:14

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

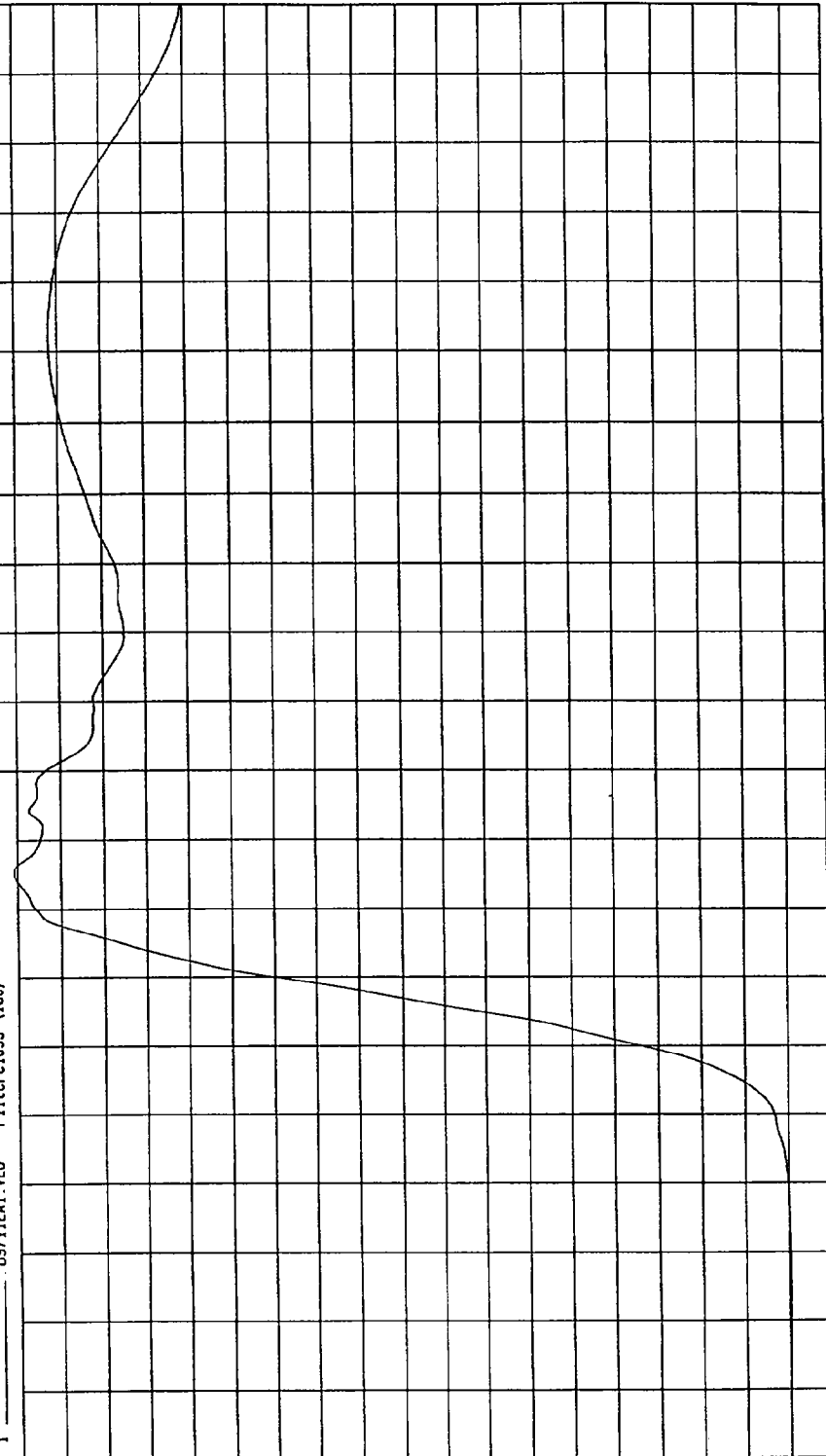
Maximum = 36.18 KPH at 65 msec

Minimum = -5.89E-02 KPH at 8 msec

REAR PASSENGER LOWER RIB Y VELOCITY

1 897112A1.V26 Filterclass (180)

KPH



TIME Seconds

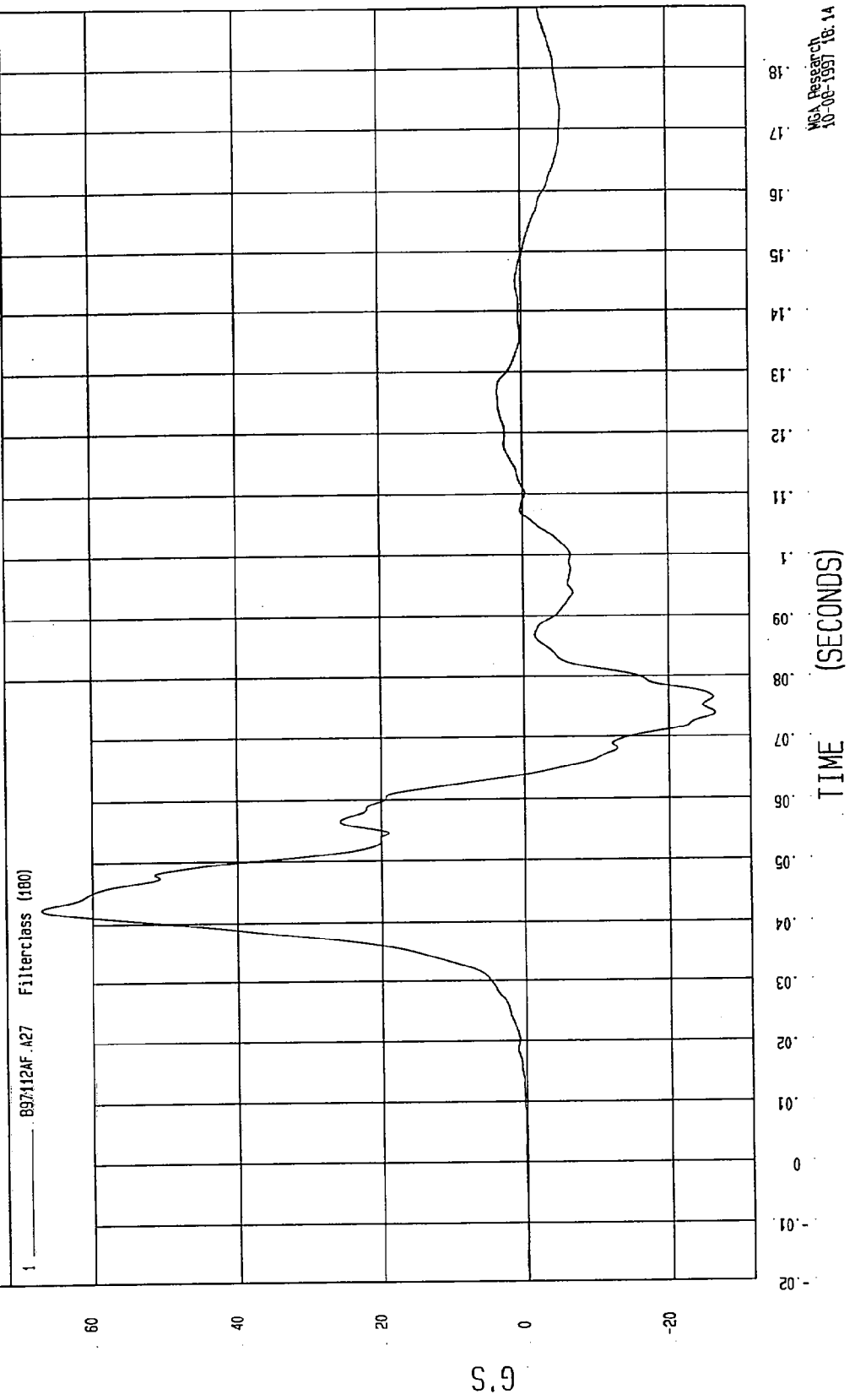
MSA Research
10-08-1997 18:19

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -26.25 G'S at 74 msec Maximum = 67.09 G'S at 42 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



MSA Research
10-06-1997 18:14

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

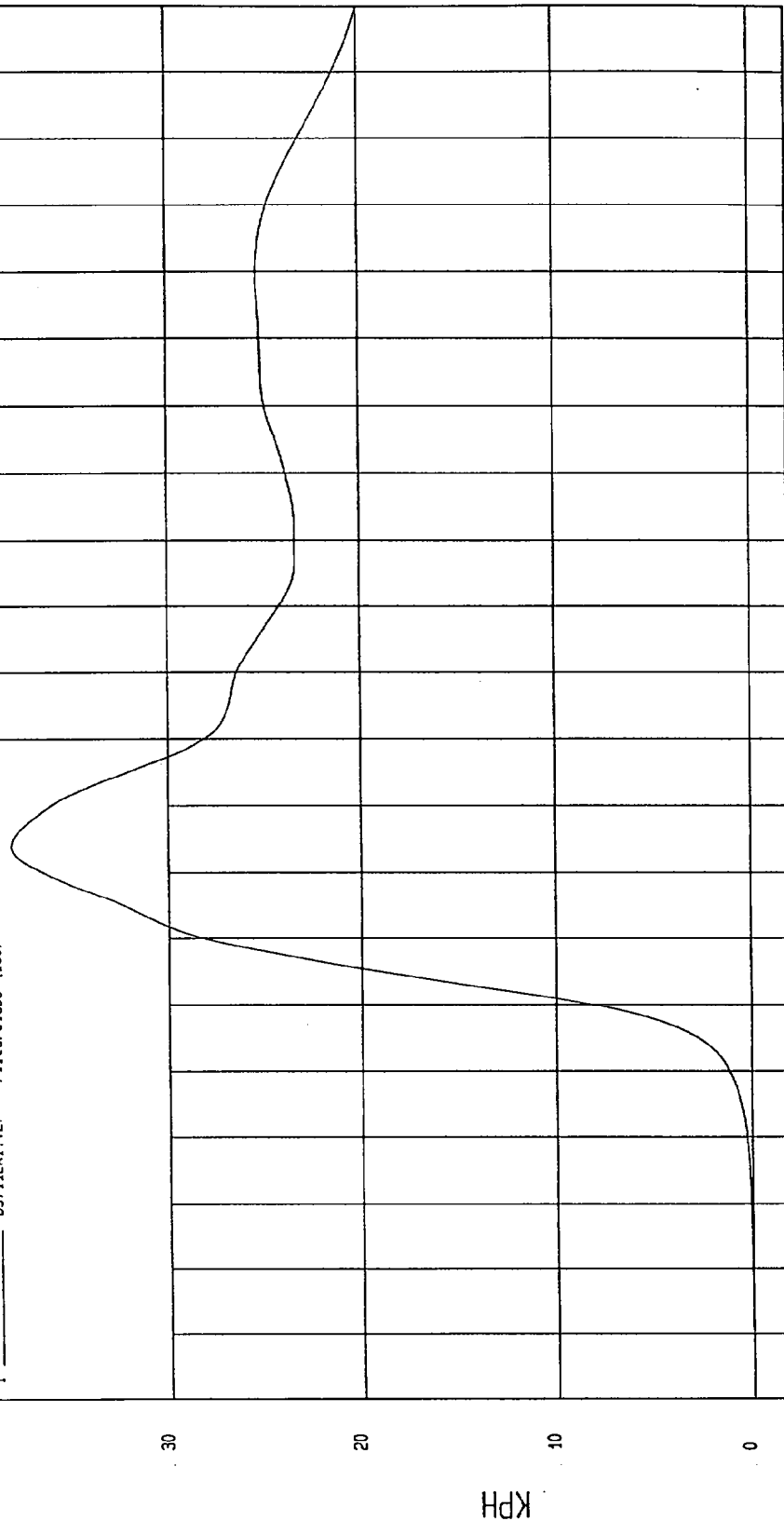
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 38.04 KPH at 64 msec

Minimum = 0 KPH at -20 msec

REAR PASSENGER LOWER SPINE Y VELOCITY

1 _____ 89712A1.V27 Filterclass (180)



TIME Seconds

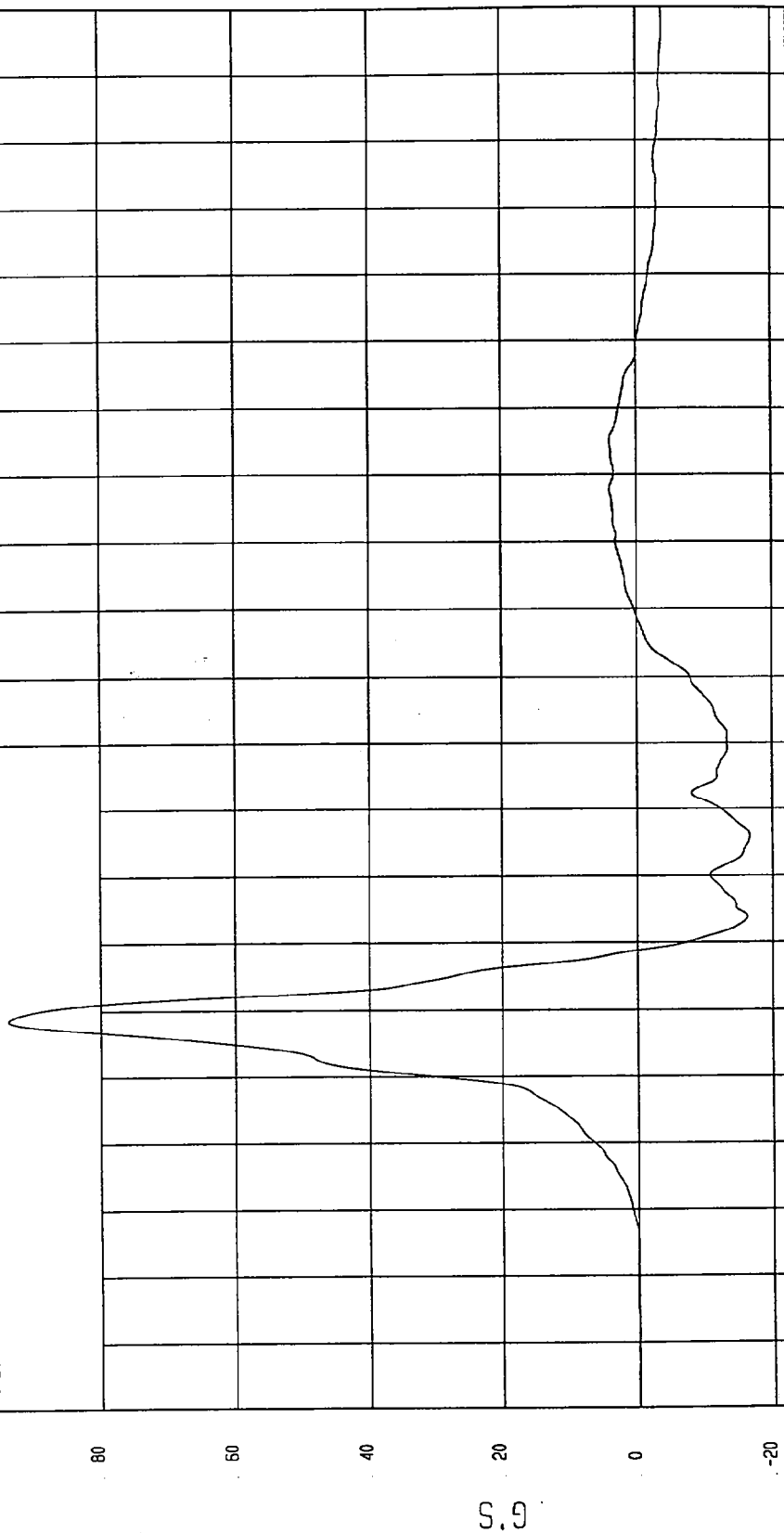
WGA Research
10-08-1997 18:19

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -16.73 G'S at 65 msec Maximum = 93.56 G'S at 39 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 ——— B97112AF.A28 Filterclass (180)



TIME (SECONDS)

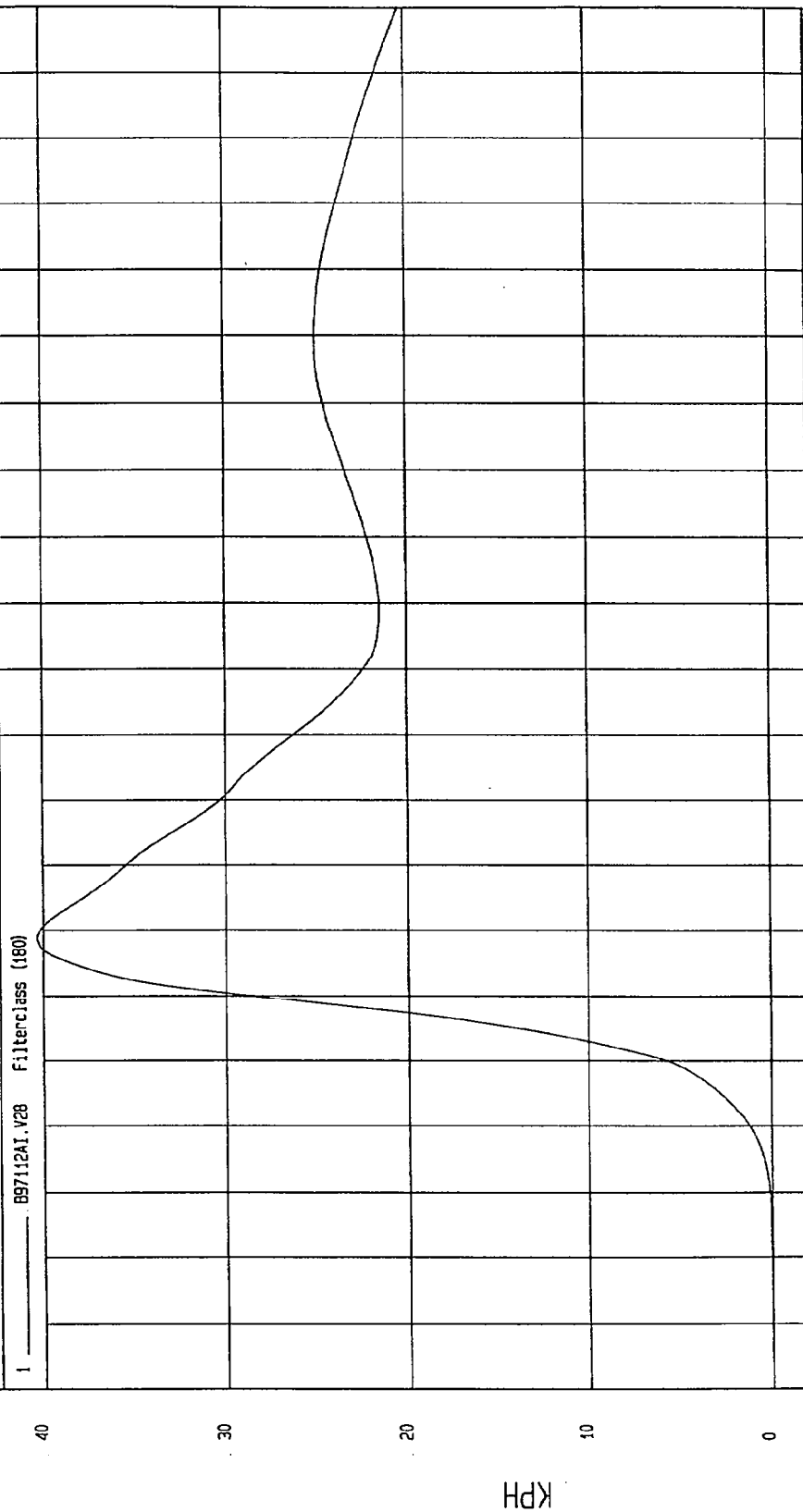
MSA Research
10-08-1997 18.15

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 40.34 KPH at 49 msec

REAR PASSENGER PELVIS Y VELOCITY



MGA Research
10-06-1997 18:19

TIME Seconds

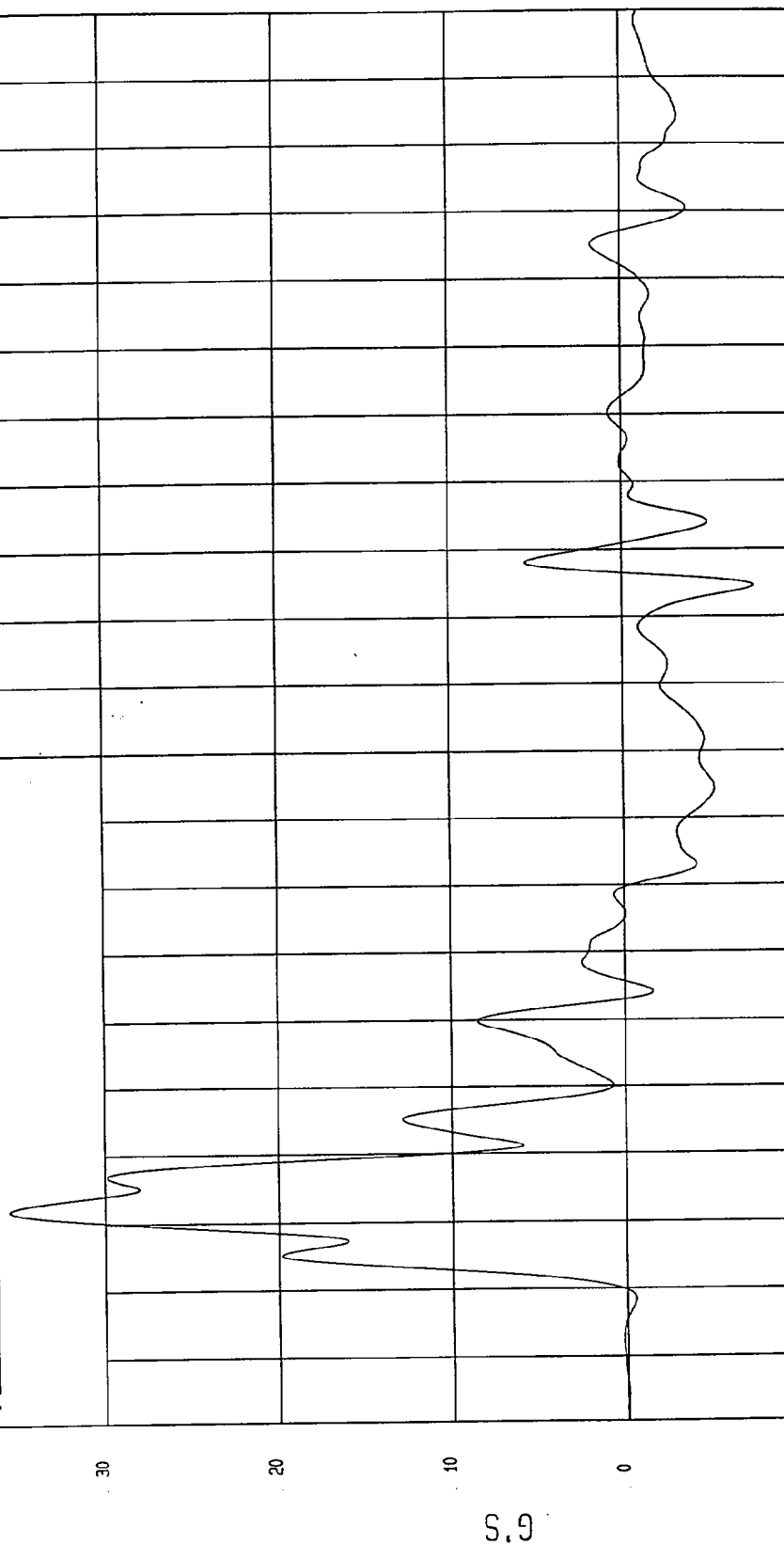
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -7.47 G'S at 104 msec Maximum = 35.43 G'S at 12 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 — 897112AF.A38 Filterclass (60)

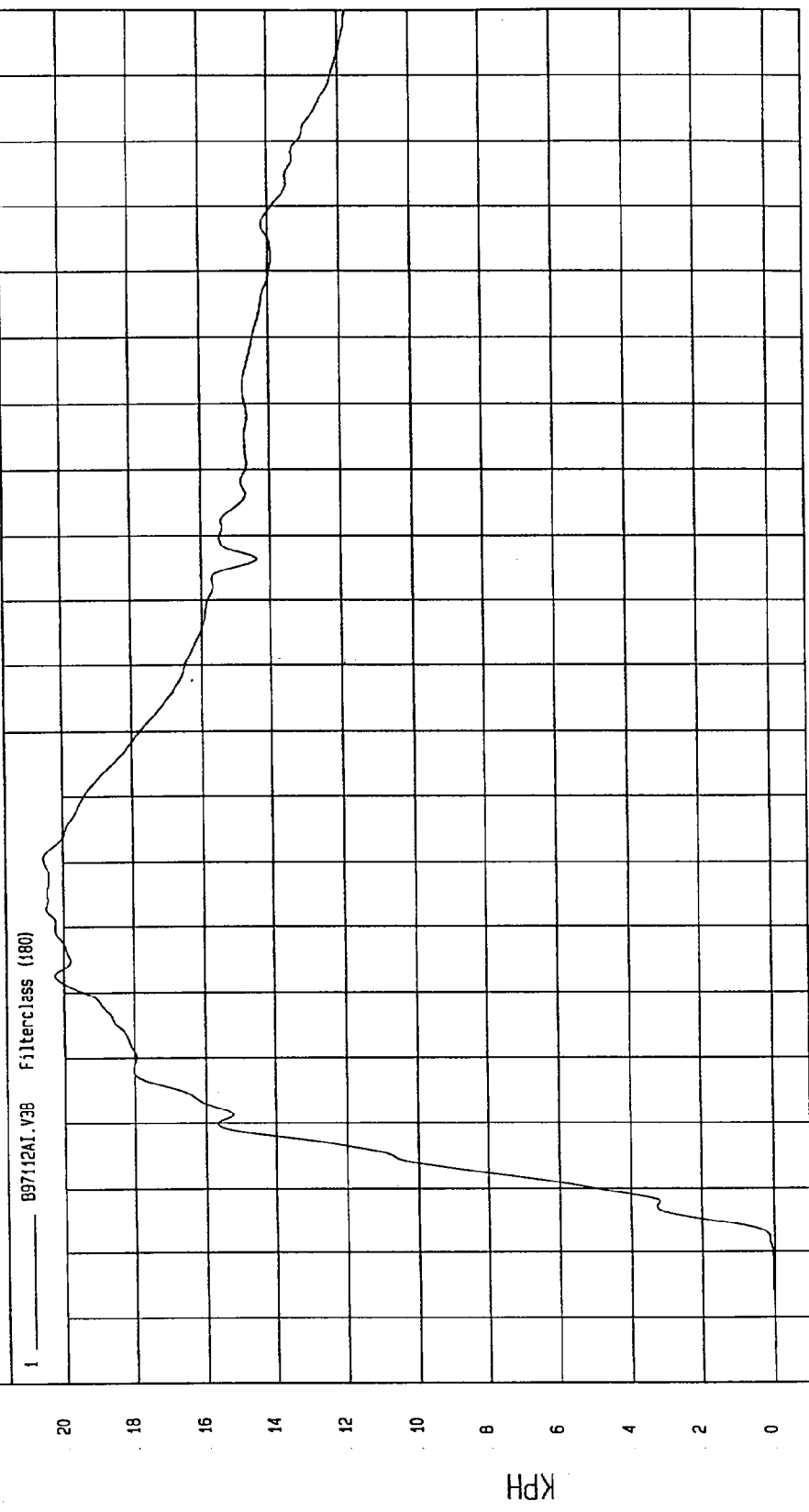


MCA Research
10-06-1997 16:37

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.13E-02 KPH at -14 msec Maximum = 20.55 KPH at 61 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



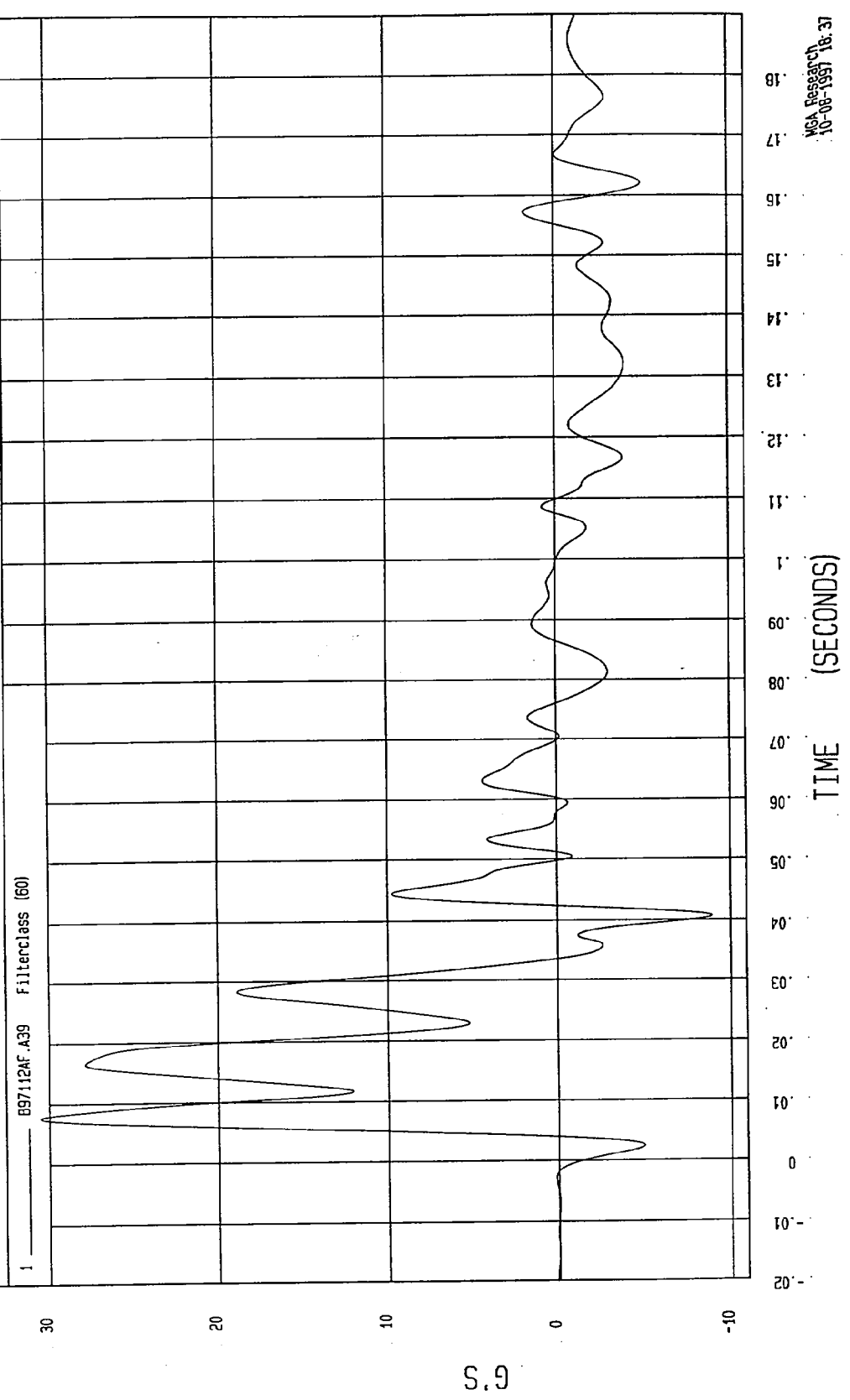
TIME Seconds
NCA Research
10-06-1997 18:34

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -8.94 G'S at 41 msec Maximum = 30.52 G'S at 8 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION



MGA Research
10-06-1997 18:37

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 18.14 KPH at 76 msec

Minimum = -0.72 KPH at 5 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY

1 B97112A1.V39 Filterclass (180)



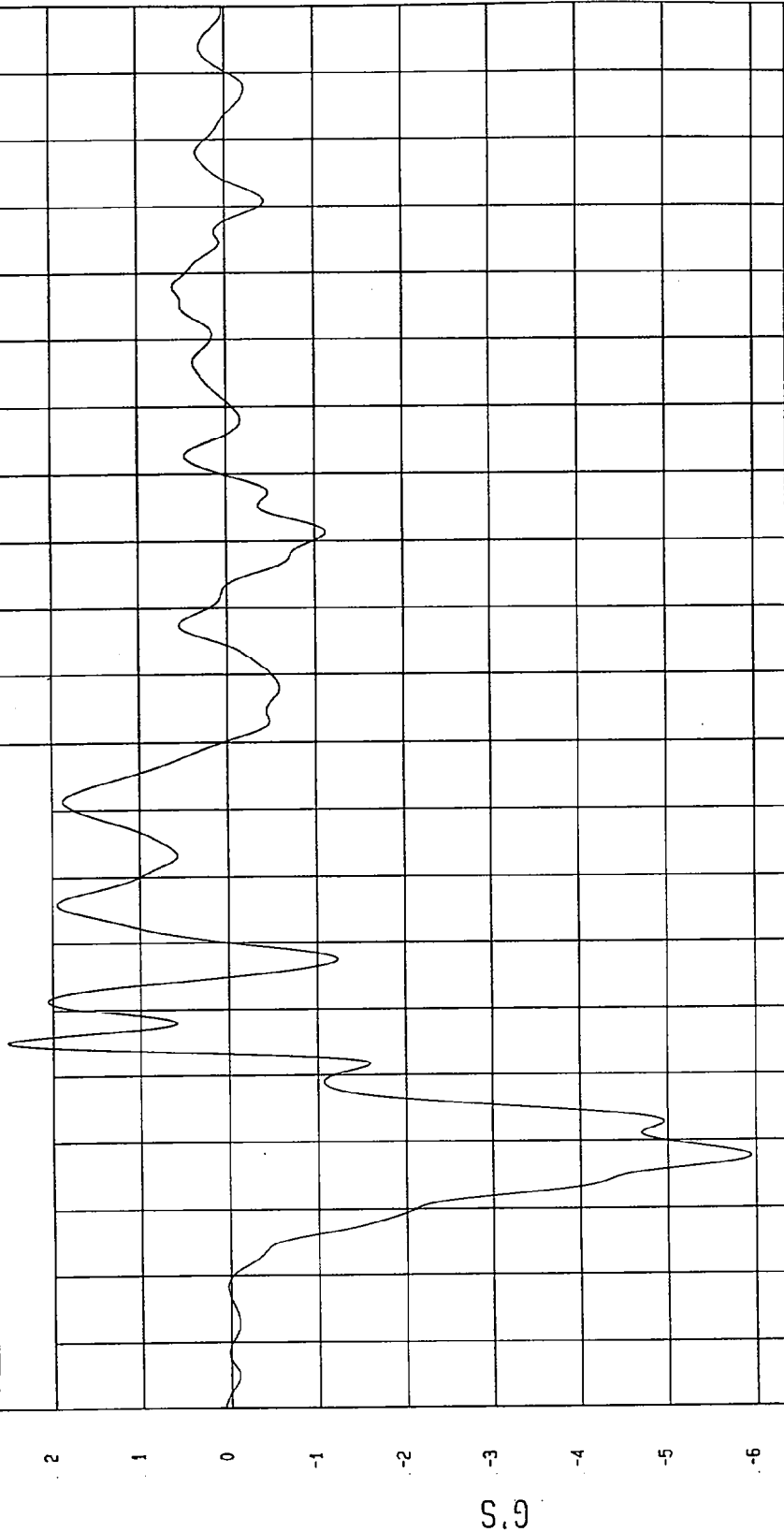
MCA Research
10-08-1997 18:34

TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH
Minimum = -5.94 G's at 18 msec Maximum = 2.50 G's at 35 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 _____ 897112AF A32 Filterclass (60)



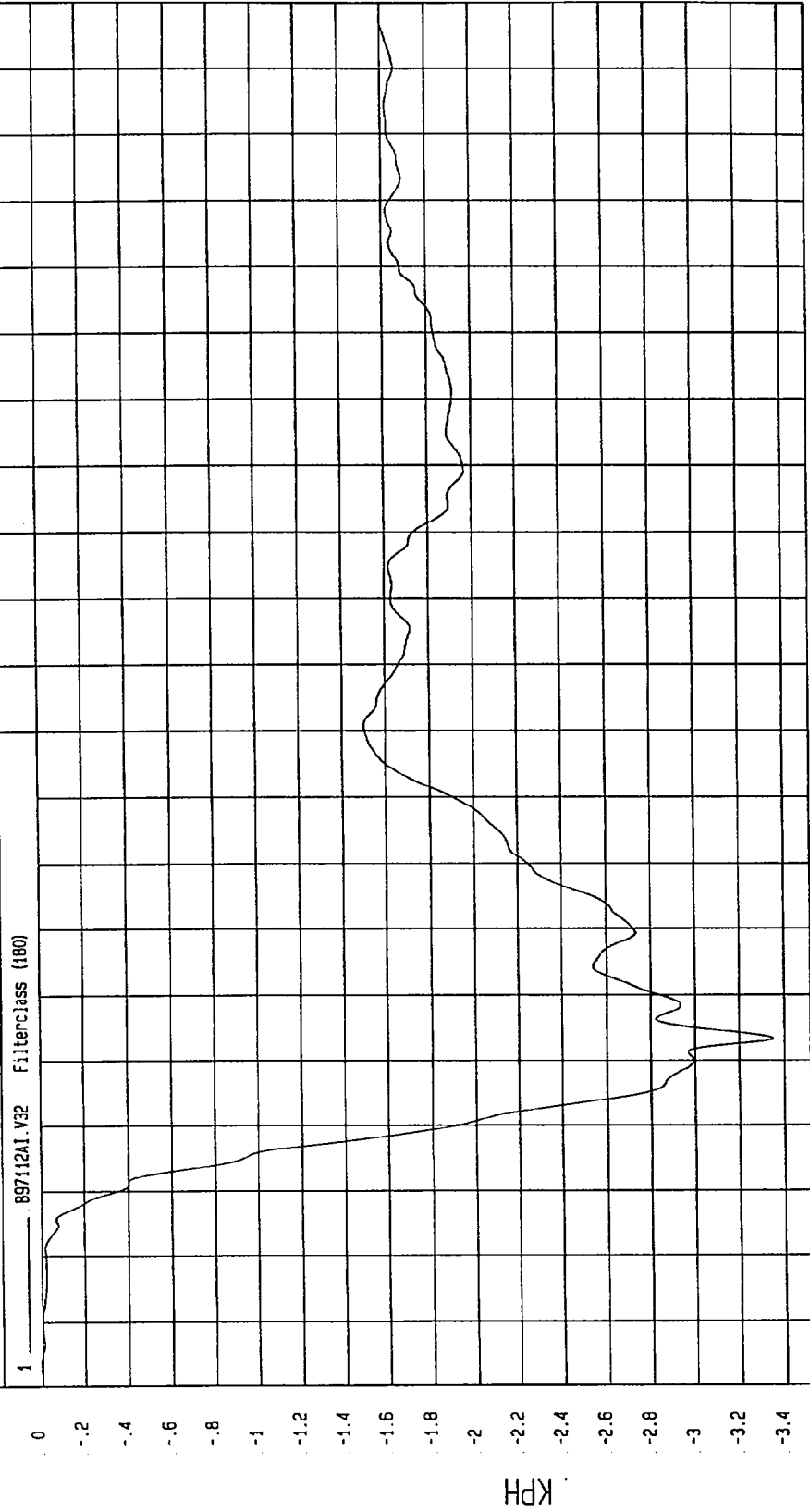
TIME (SECONDS)

MCA Research
10-08-1997 18:37

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.35 KPH at 33 msec Maximum = 5.64E-03 KPH at -17 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY



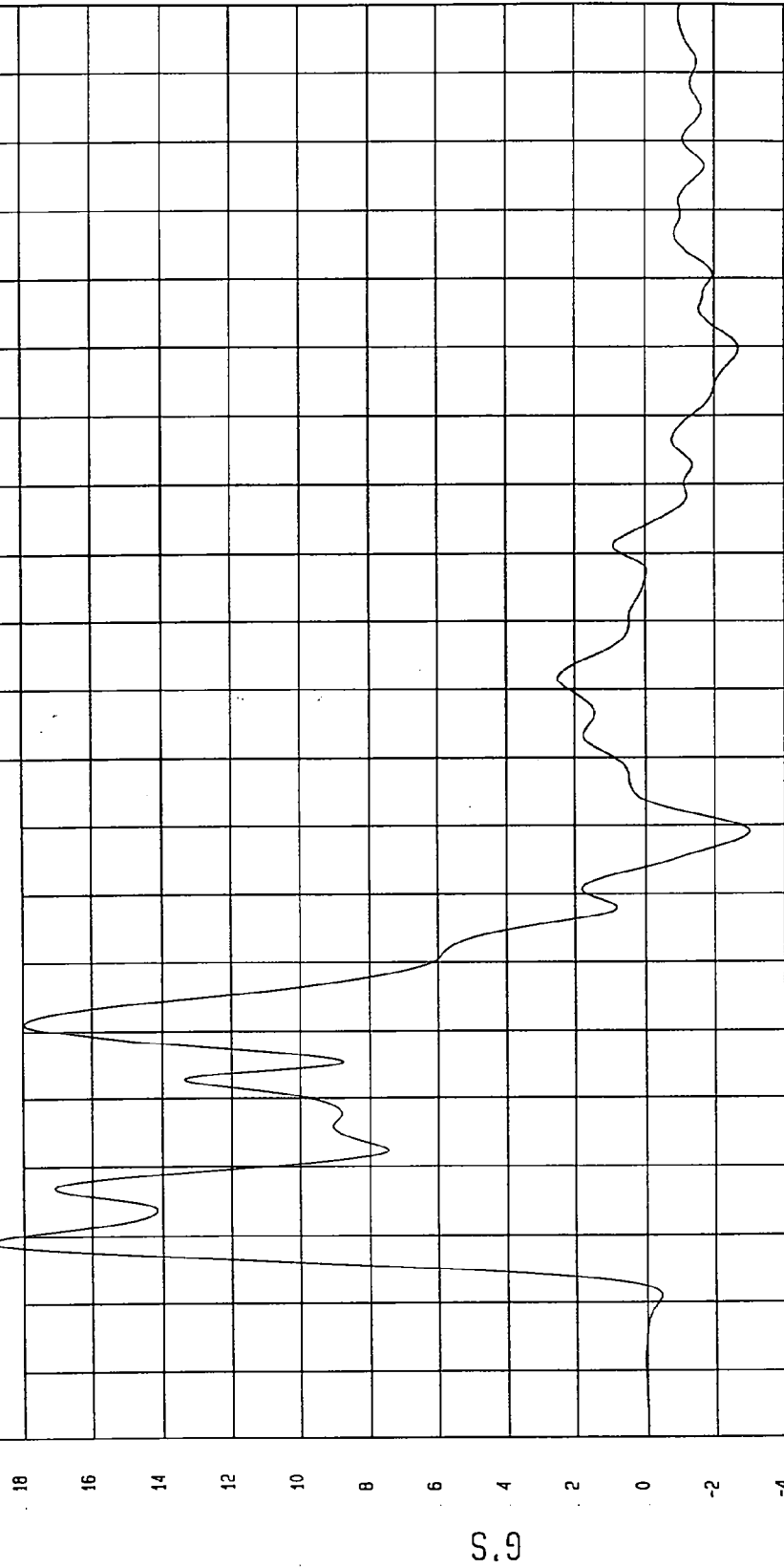
TIME Seconds
MSA Research
10-08-1997 16:34

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -2.99 G's at 69 msec Maximum = 18.90 G's at 9 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 897112AF A33 Filterclass (60)



TIME (SECONDS)

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TEST DATE: 09-26-1997

TEST: FMVSS 214 LEFT SIDE IMPACT

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

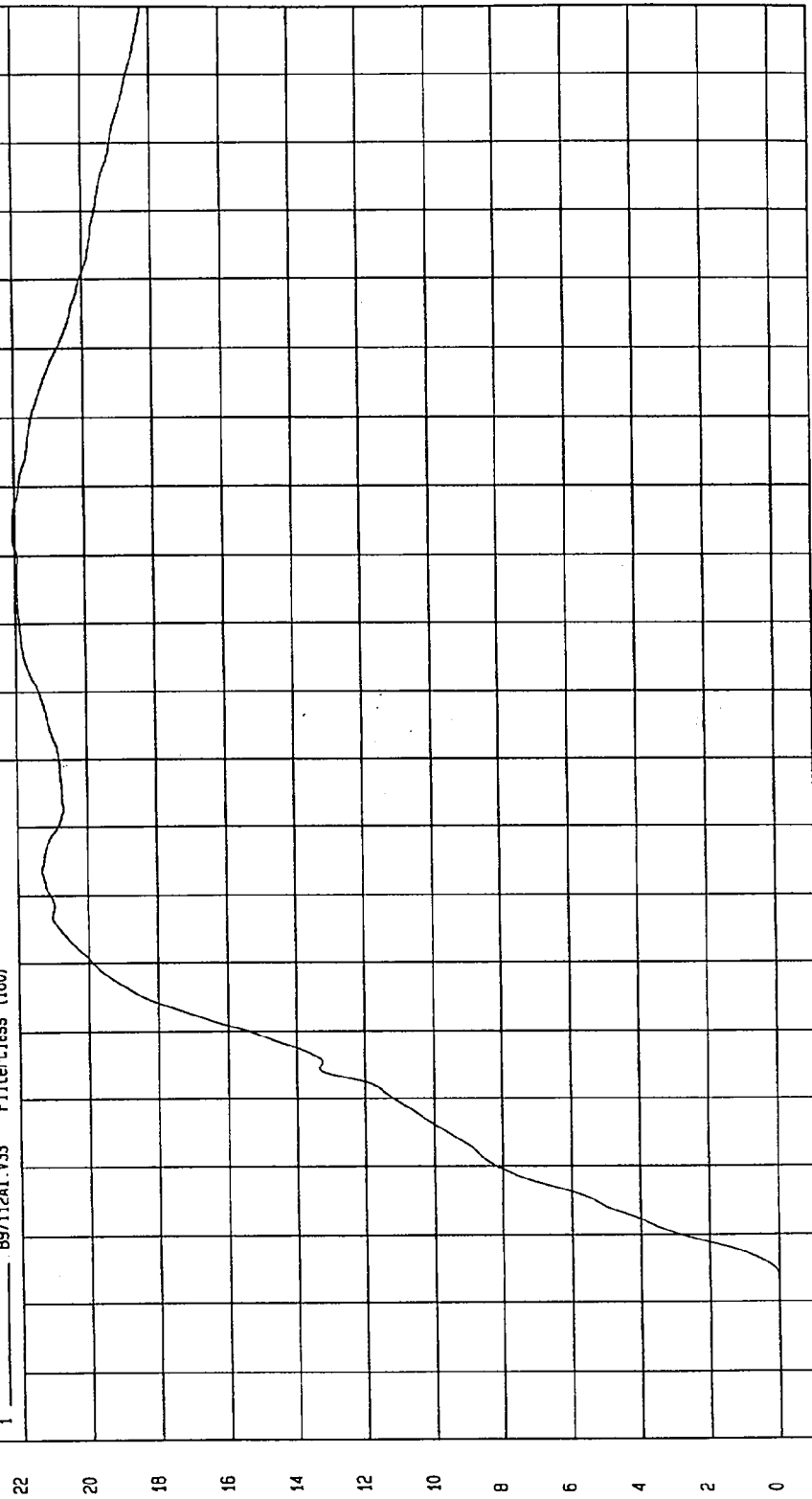
Maximum = 22.06 KPH at 113 msec

Minimum = -1.99E-03 KPH at -15 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

1 897112A1.V33 Filterclass (180)

KPH



MCA Research
10-08-1997 18:34

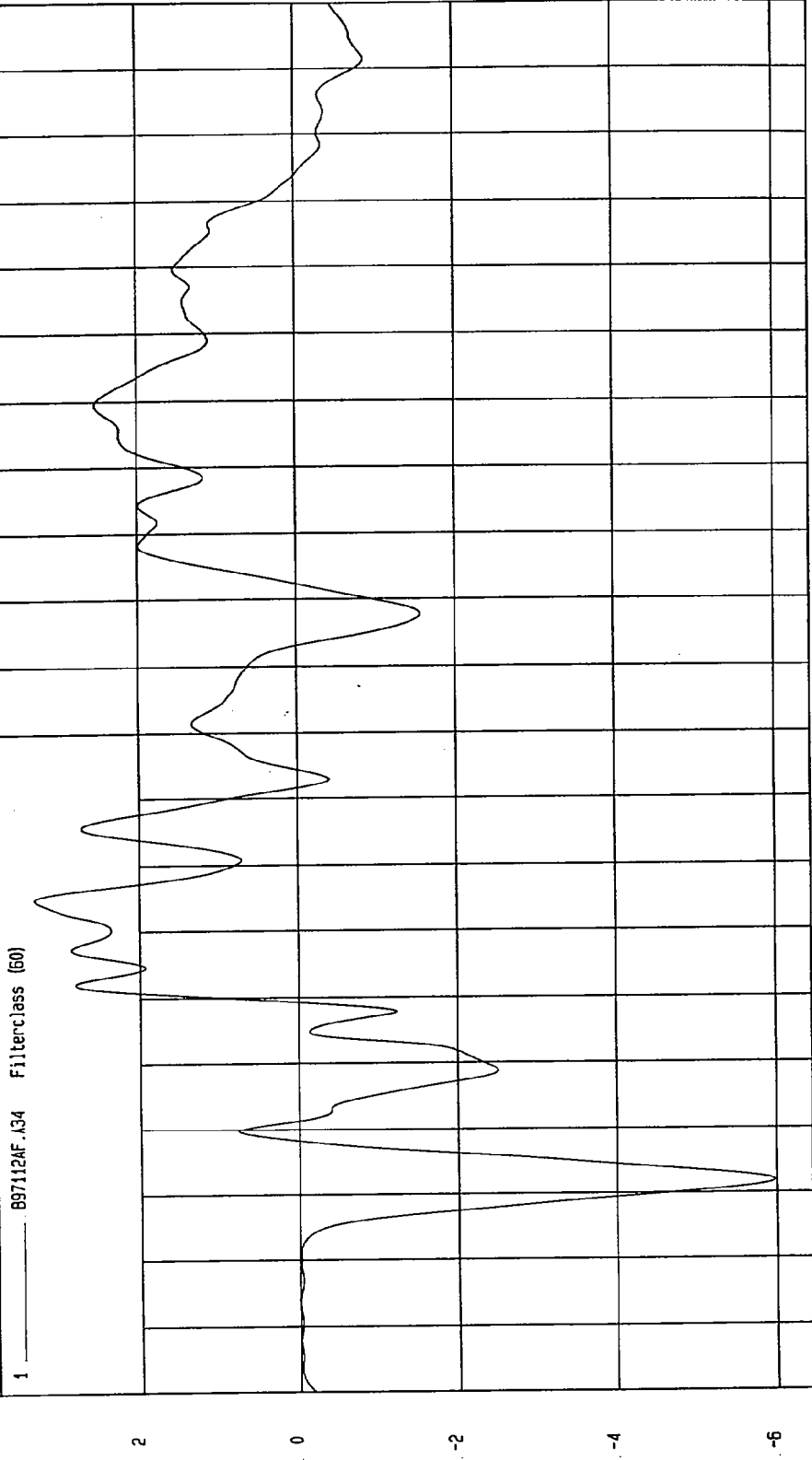
TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -5.97 G'S at 12 msec Maximum = 3.32 G'S at 55 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION



TIME (SECONDS)

0.18
0.17
0.16
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0.05
0.04
0.03
0.02
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-0.01
-0.02

NCA Research
10-08-1997 18:37

TEST DATE: 09-26-1997

TEST: FMVSS 214 LEFT SIDE IMPACT

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 3.56 KPH at 163 msec

Minimum = -2.26 KPH at 39 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY

1 _____ 897112A1.V34 Filterclass (180)

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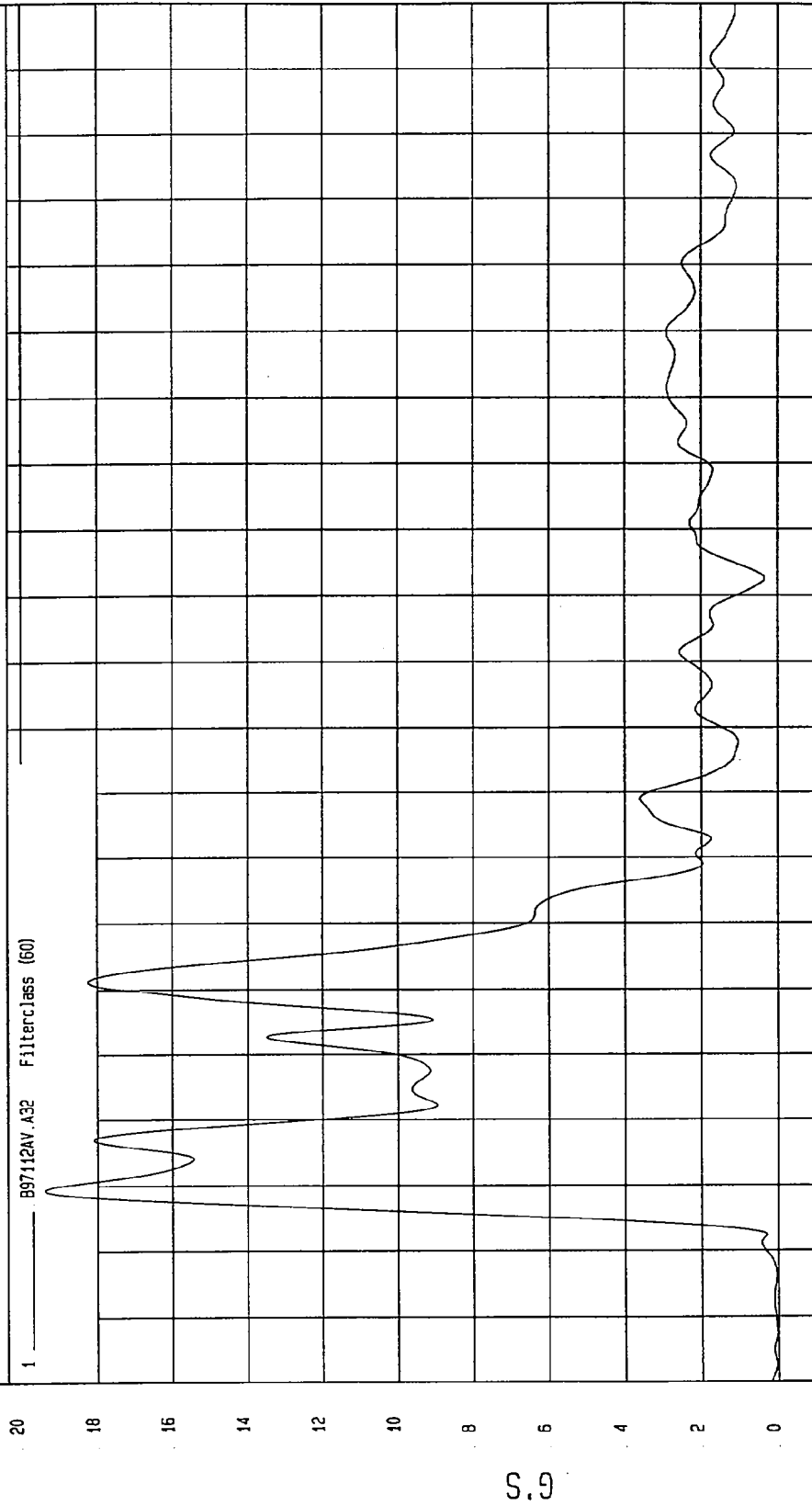
TIME Seconds

MCA Research
10-08-1997 18:34

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 2.84E-02 G'S at -13 msec Maximum = 19.38 G'S at 9 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



TIME (SECONDS)

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-0.20

NGA Research
10-06-1997 18:40

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

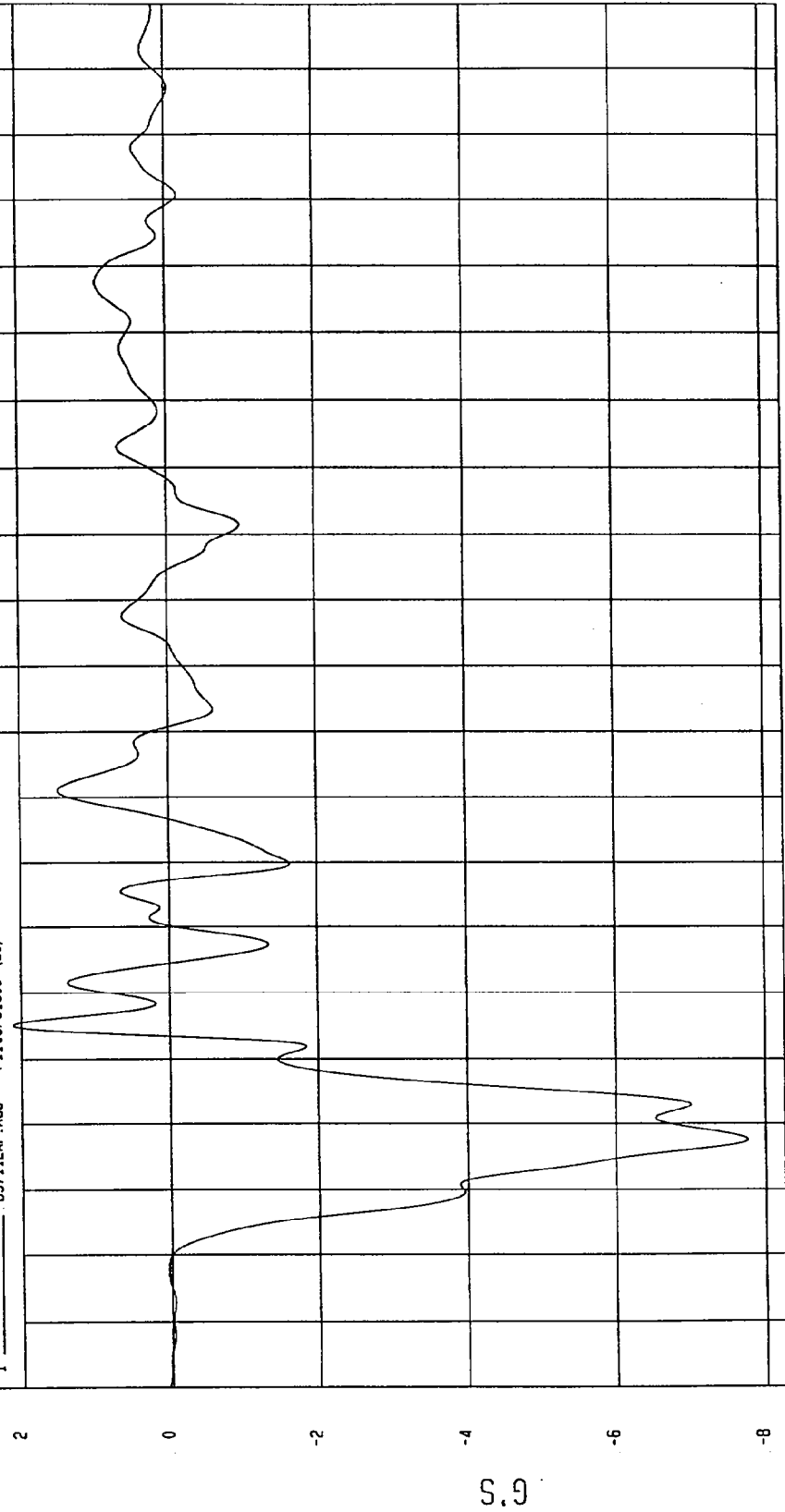
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 2.11 G'S at 35 msec

Minimum = -7.76 G'S at 18 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION

1 _____ 897112AF.A35 Filterclass (60)



TIME (SECONDS)

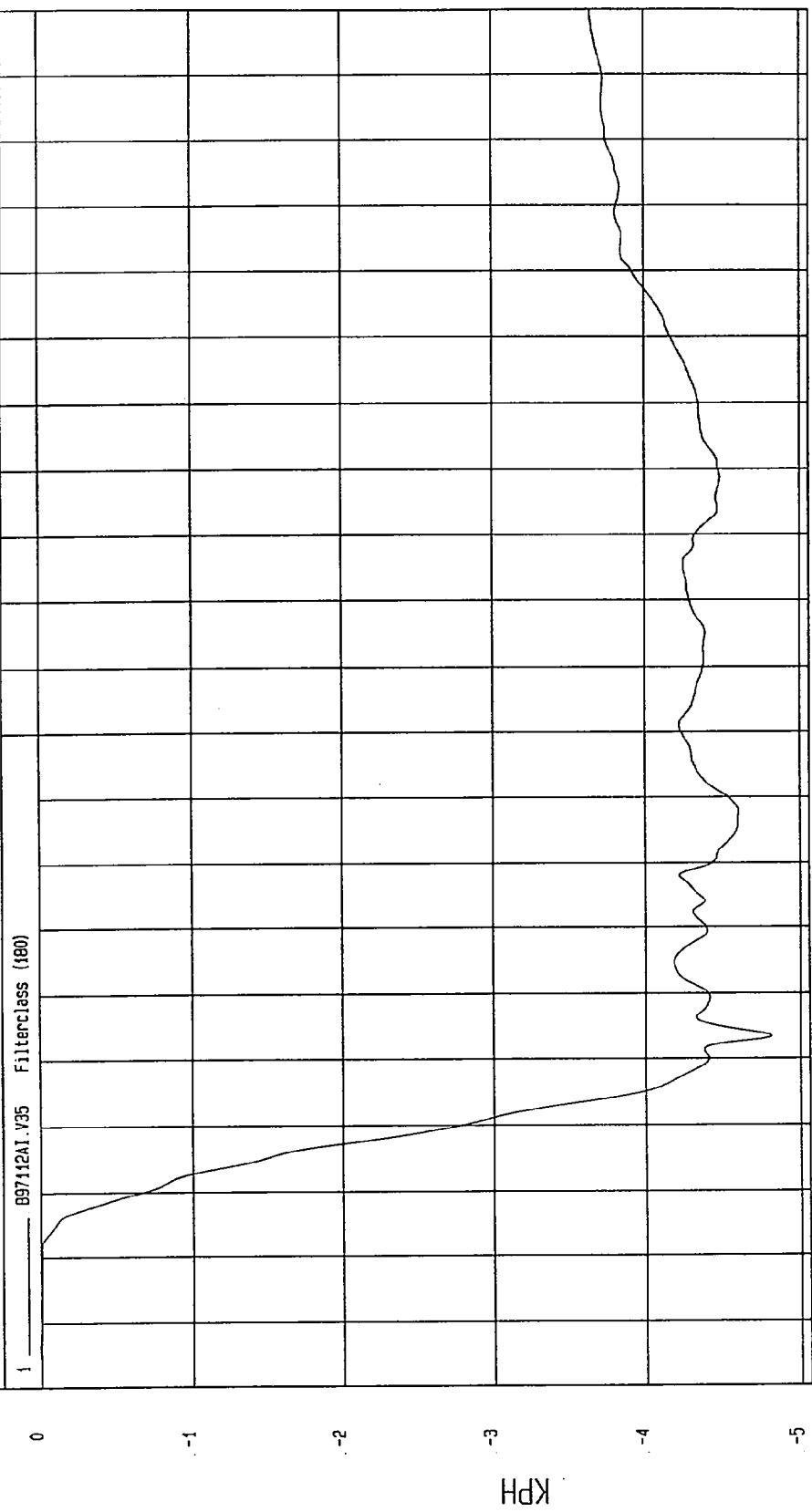
NCA Research
10-08-1997 18: 37

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -4.81 KPH at 33 msec Maximum = 5.07E-03 KPH at -14 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY



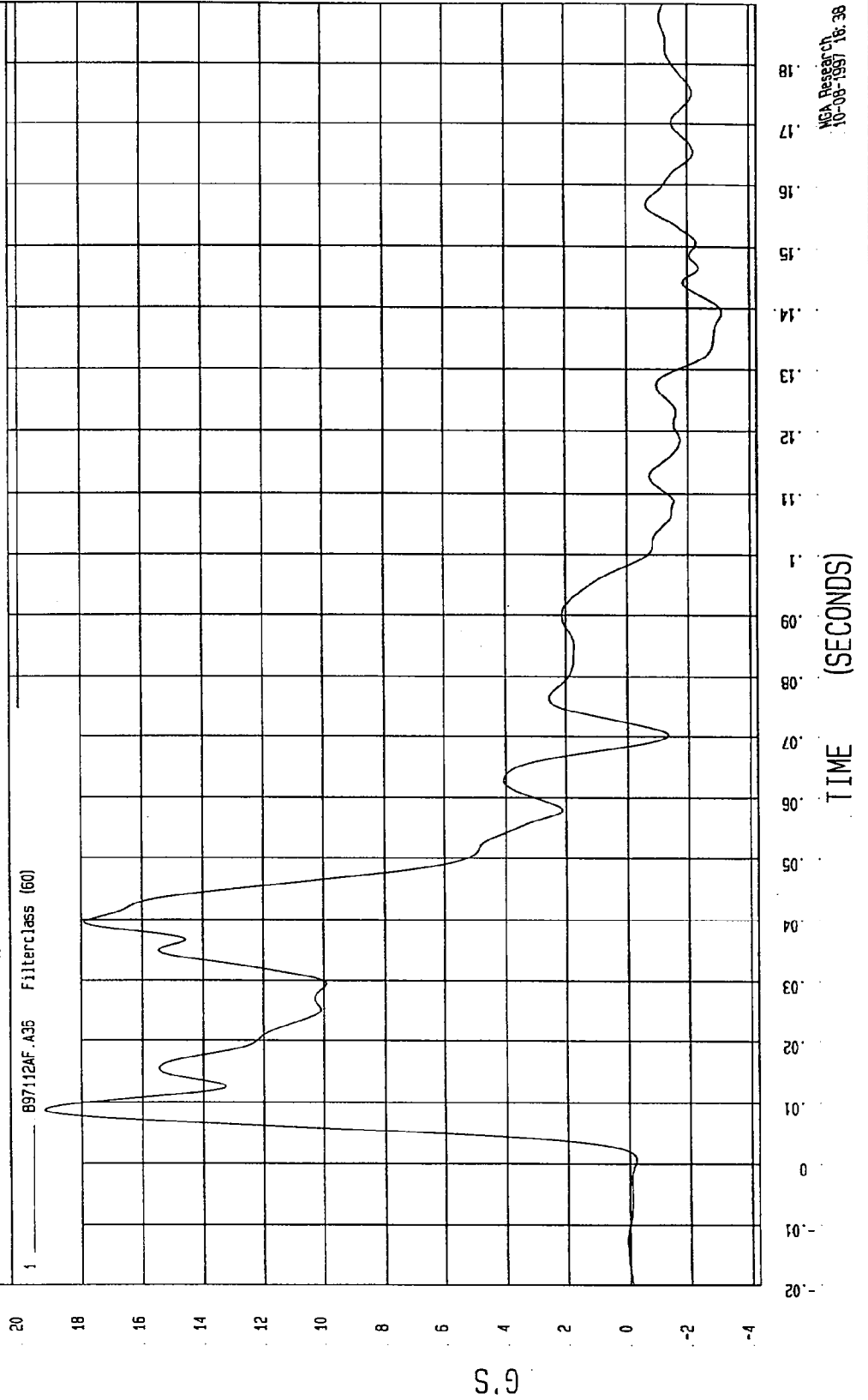
NSA Research
10-08-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.11 G'S at 139 msec Maximum = 19.18 G'S at 9 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION



NCA Research
10-06-1997 16:36

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

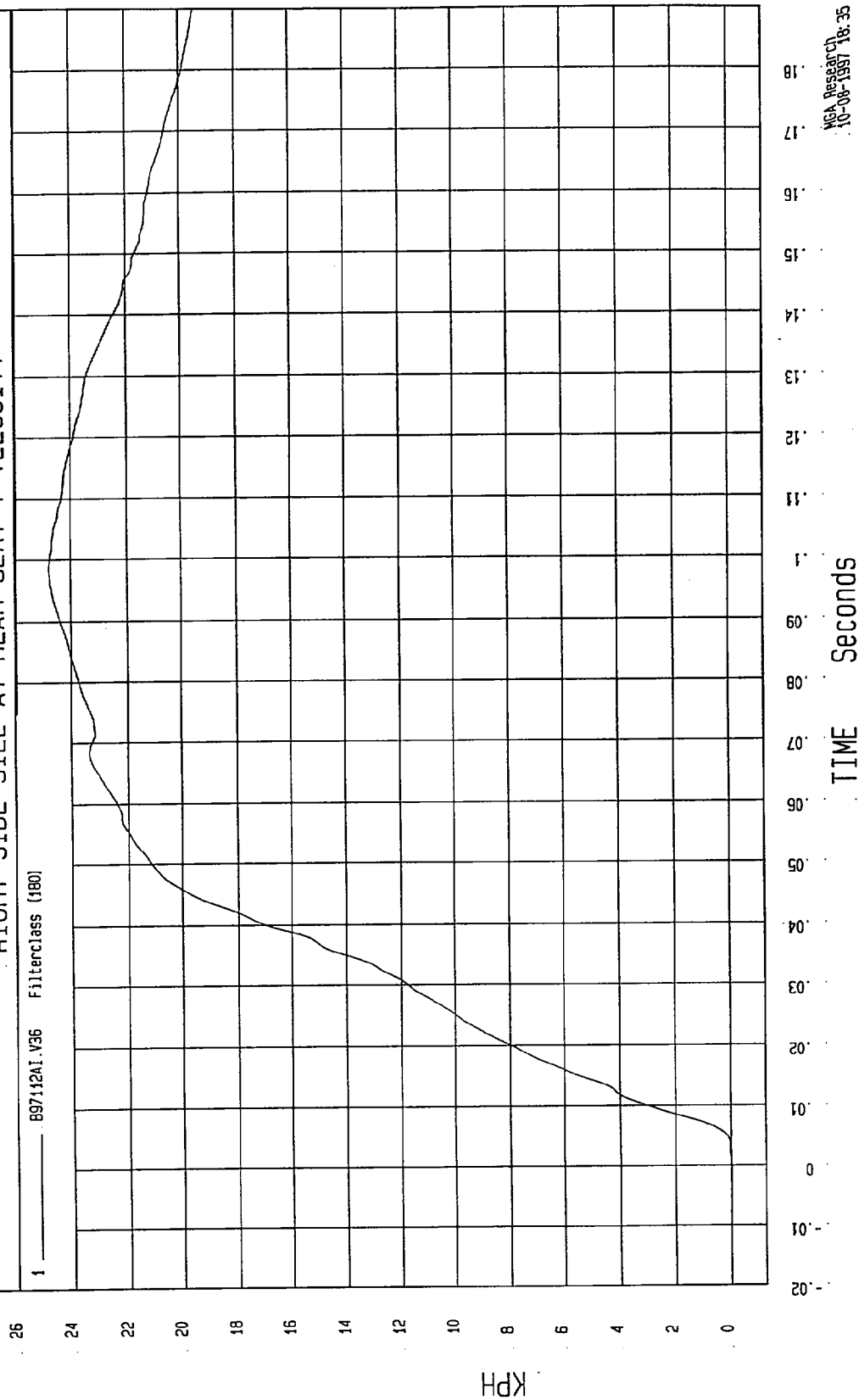
Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 24.79 KPH at 98 msec

Minimum = -1.49E-02 KPH at -2 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY



TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

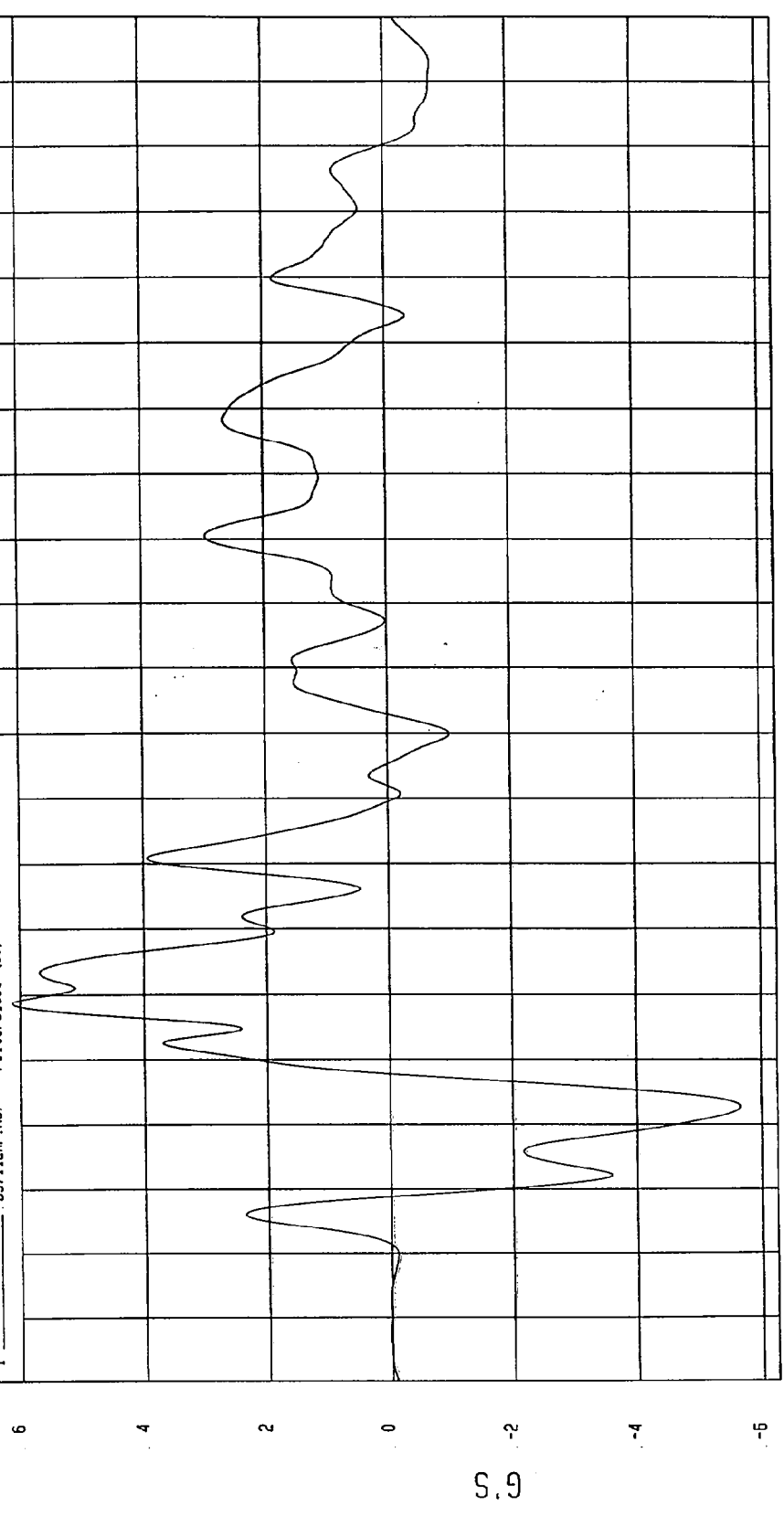
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 6.12 G'S at 39 msec

Minimum = -5.65 G'S at 23 msec

RIGHT SIDE SILL AT REAR SEAT Z ACCELERATION

1 ——— .097112AF.A37 Filterclass (60)



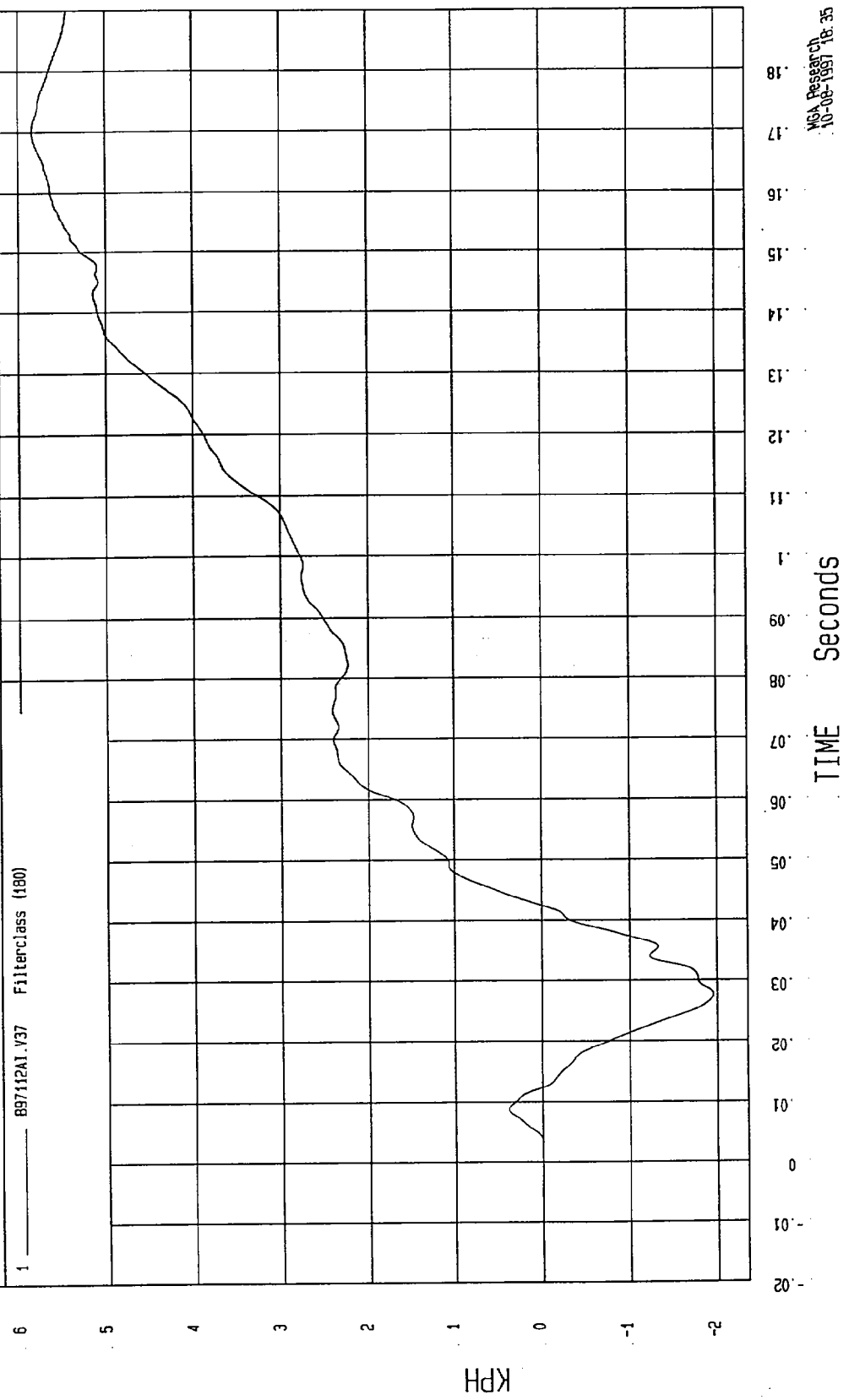
MCA Research
10-08-1997 18:38

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.96 KPH at 28 msec Maximum = 5.83 KPH at 170 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY



MCA Research
10-06-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

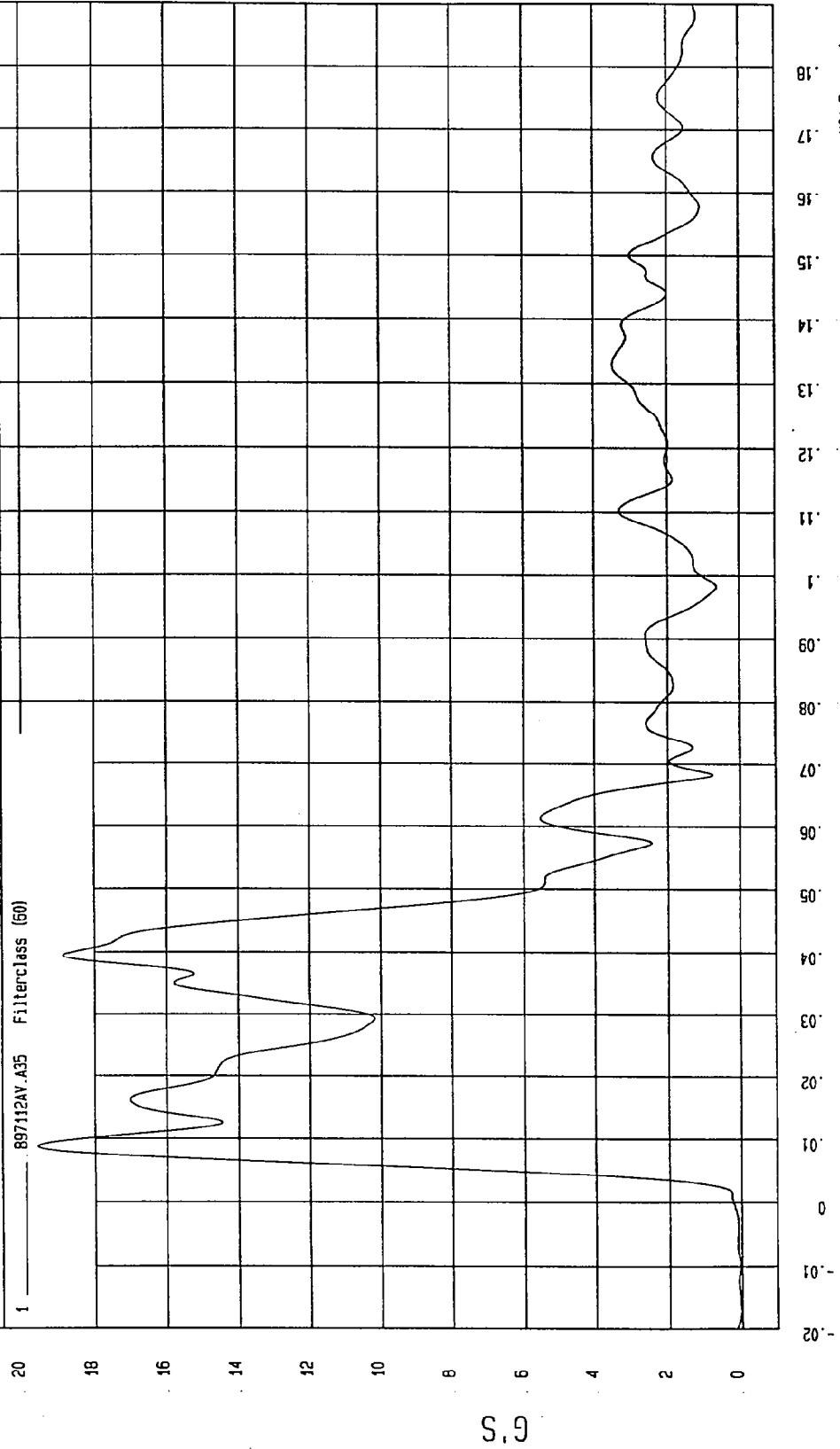
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 19.56 G's at 9 msec

Minimum = 1.70E-02 G's at -17 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION

1 897112AV.A35 Filterclass (50)



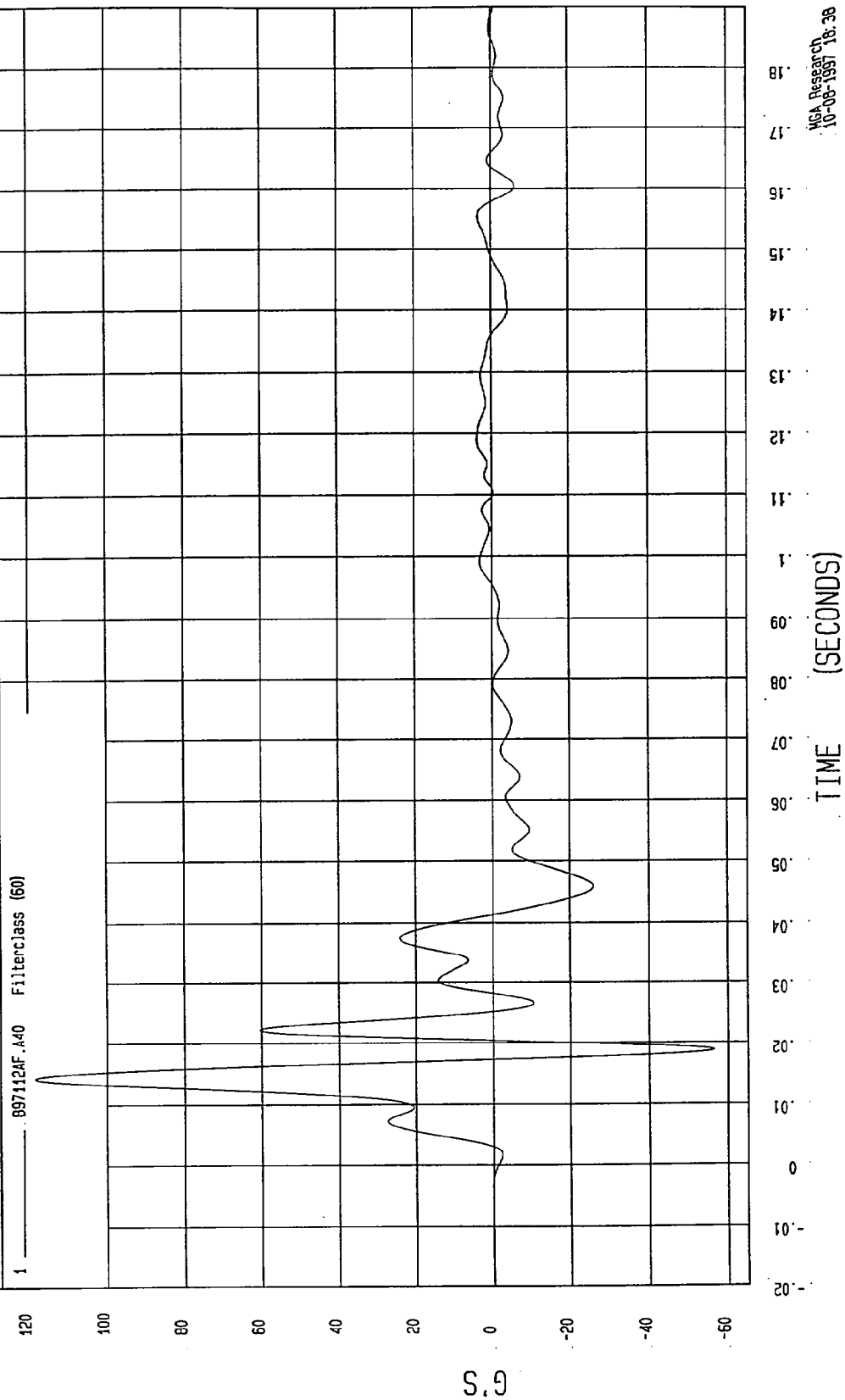
MCA Research
10-08-1997 18:41

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -56.34 G'S at 19 msec Maximum = 118.45 G'S at 14 msec

LEFT FRONT SEAT TRACK Y ACCELERATION



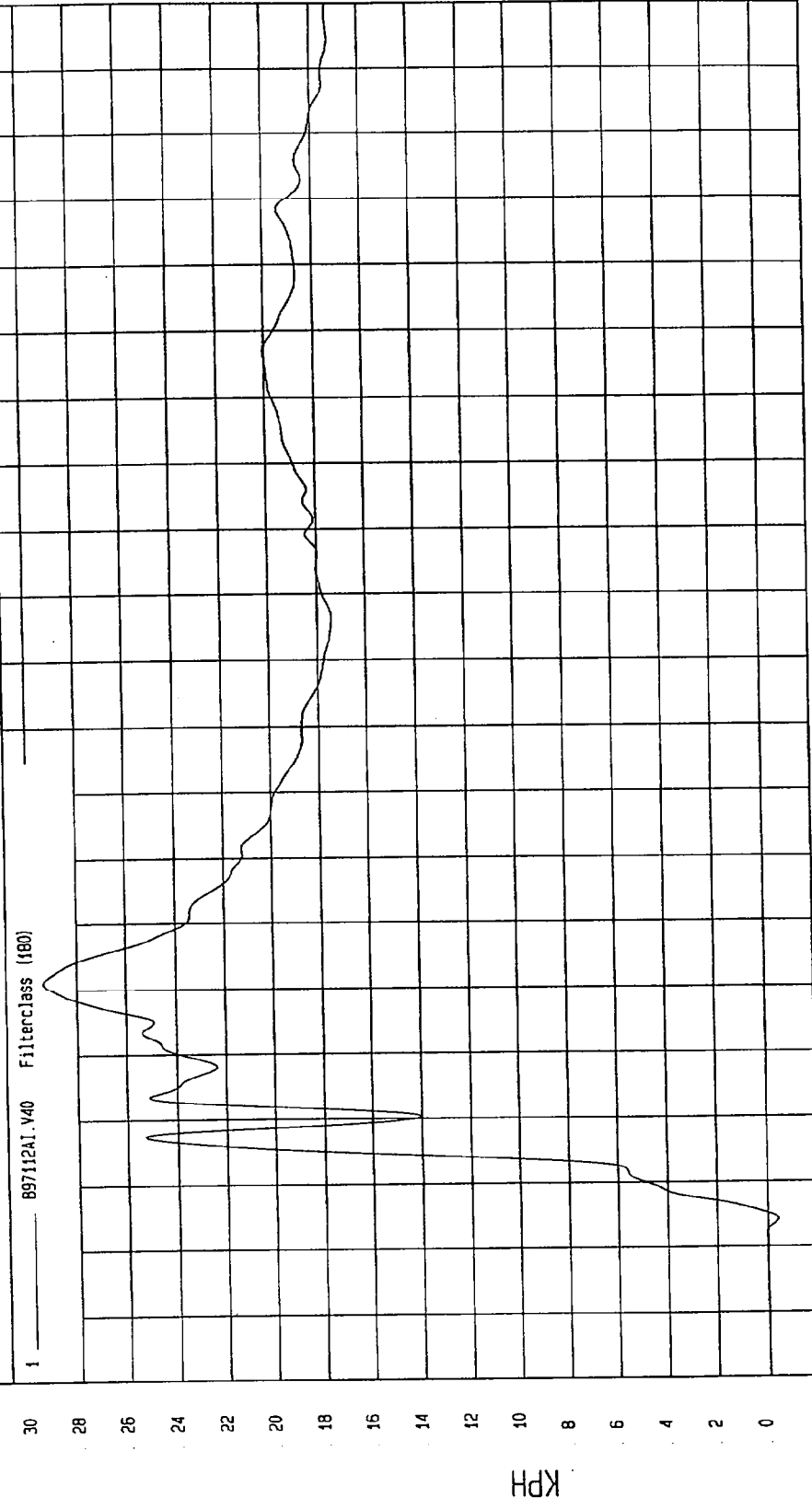
MCA Research
10-08-1997 18:38

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -.42 KPH at 4 msec Maximum = 29.38 KPH at 41 msec

LEFT FRONT SEAT TRACK Y VELOCITY



TIME Seconds

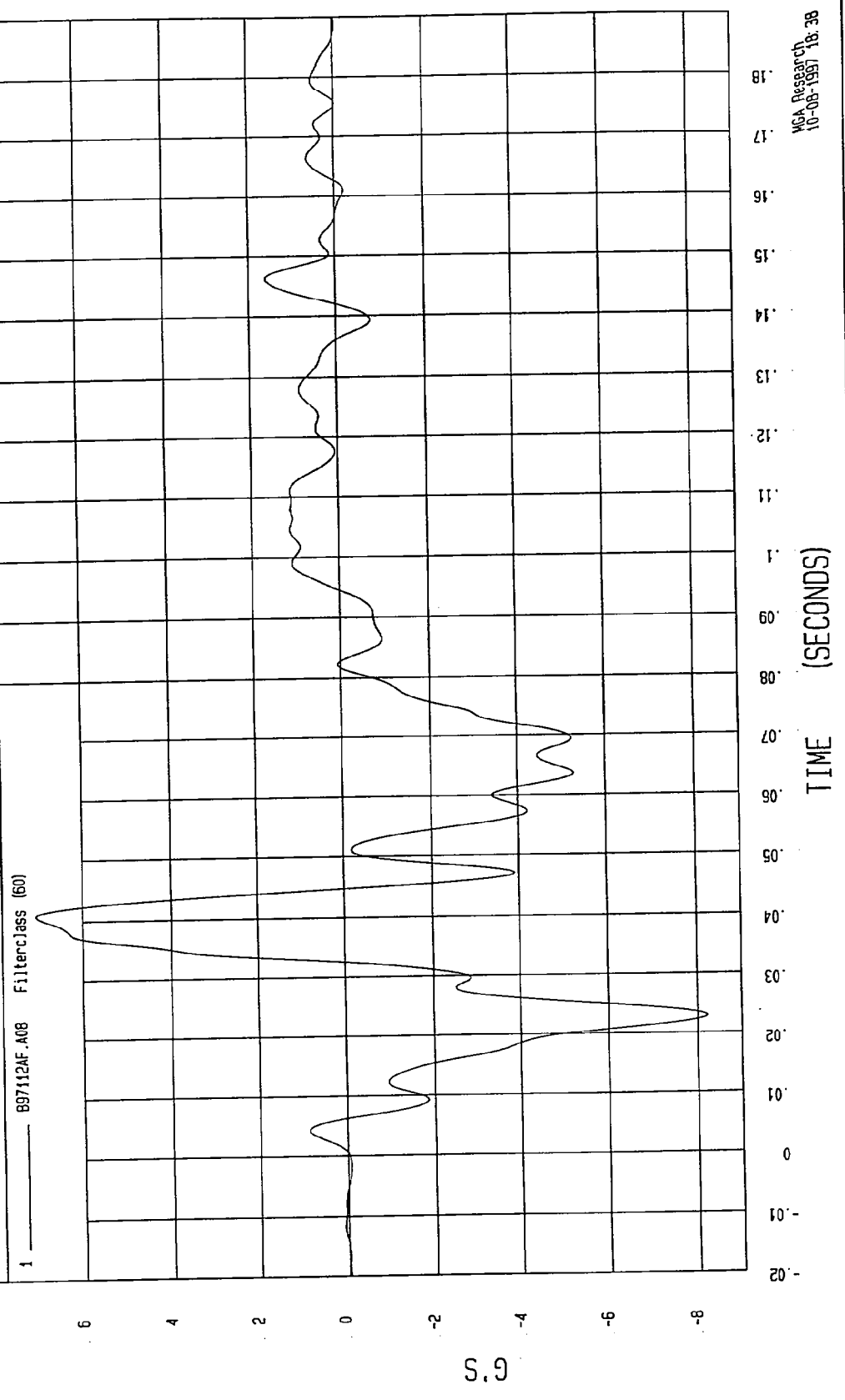
MCA Research
10-08-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -8.22 G'S at 23 msec Maximum = 7.08 G'S at 41 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION



TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

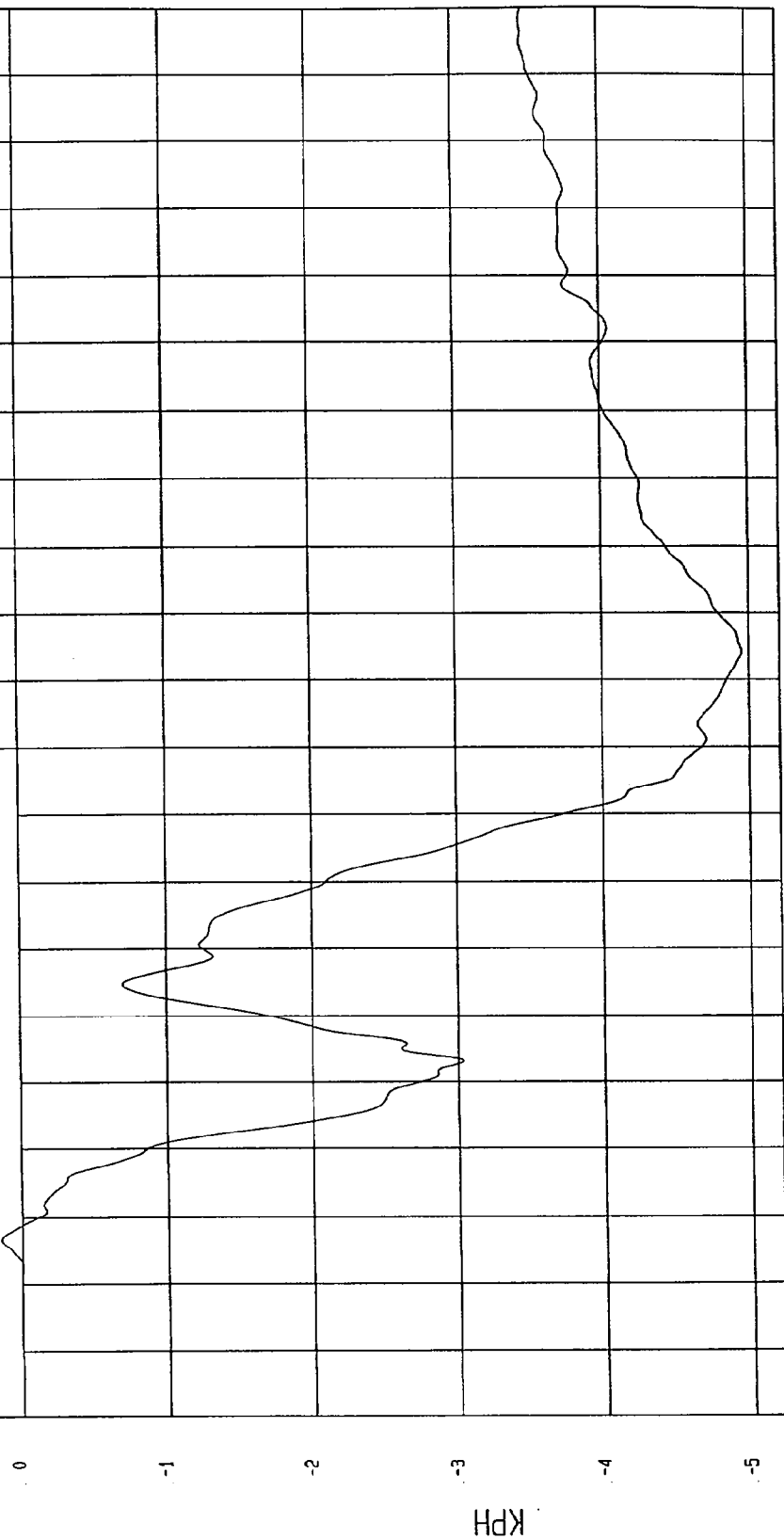
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = .14 KPH at 7 msec

Minimum = -4.95 KPH at 94 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY

1 897112A1.V08 Filterclass (180)



MCA Research
10-06-1997 18:35

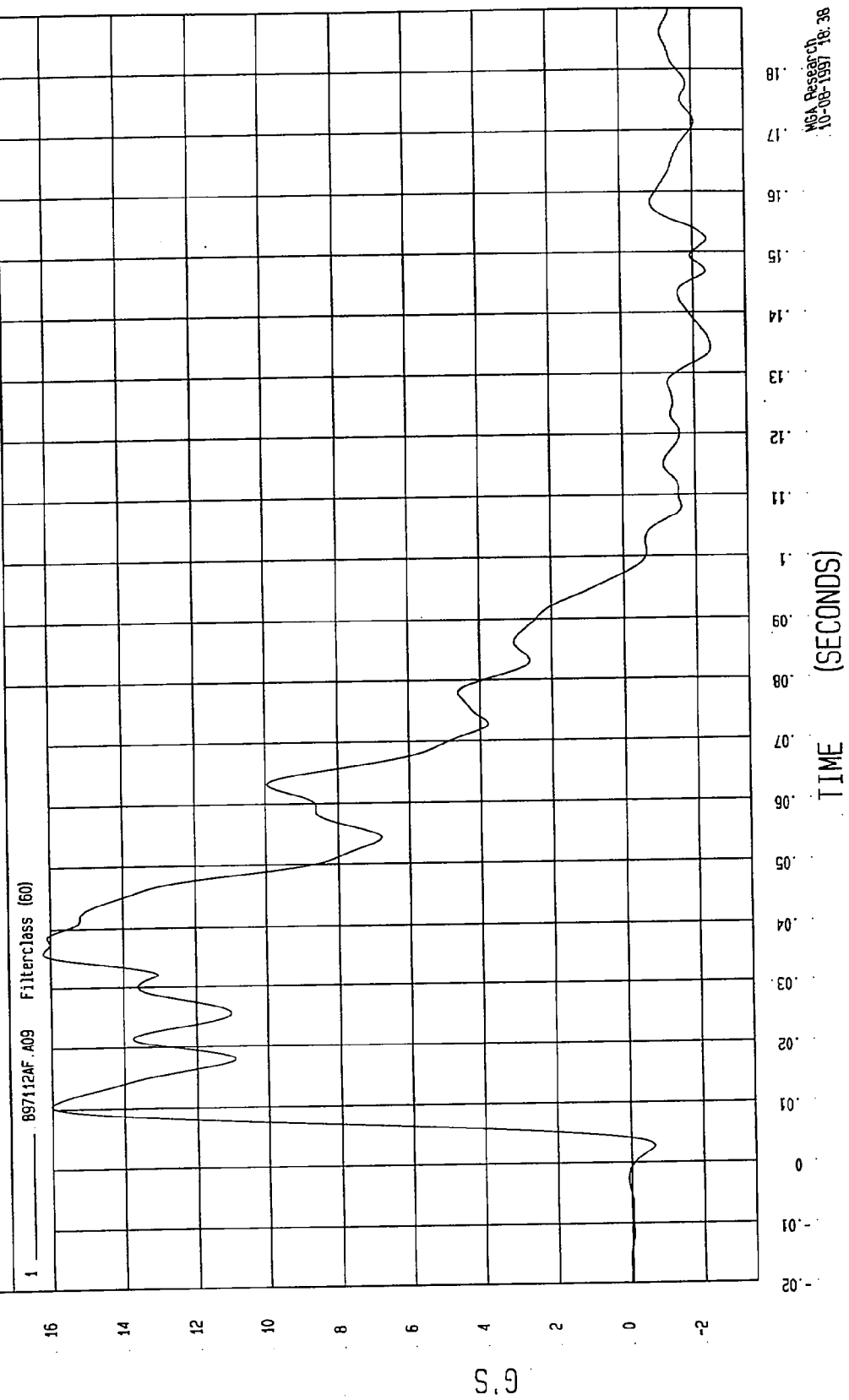
TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -2.46 G'S at 134 msec Maximum = 16.20 G'S at 36 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION



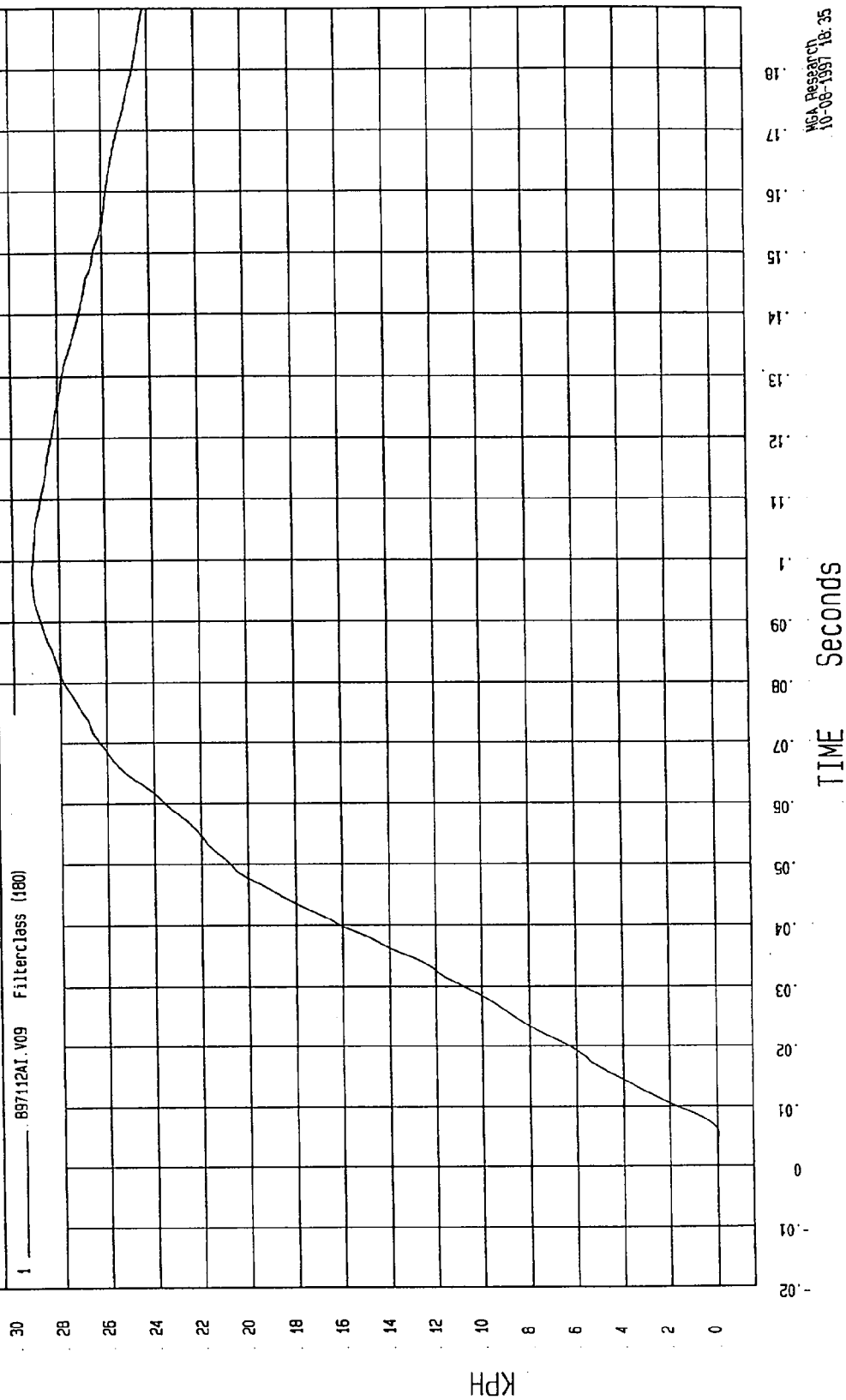
NSA Research
10-08-1997 18:38

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -5.53E-02 KPH at 5 msec Maximum = 29.18 KPH at 97 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY



MGA Research
10-08-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

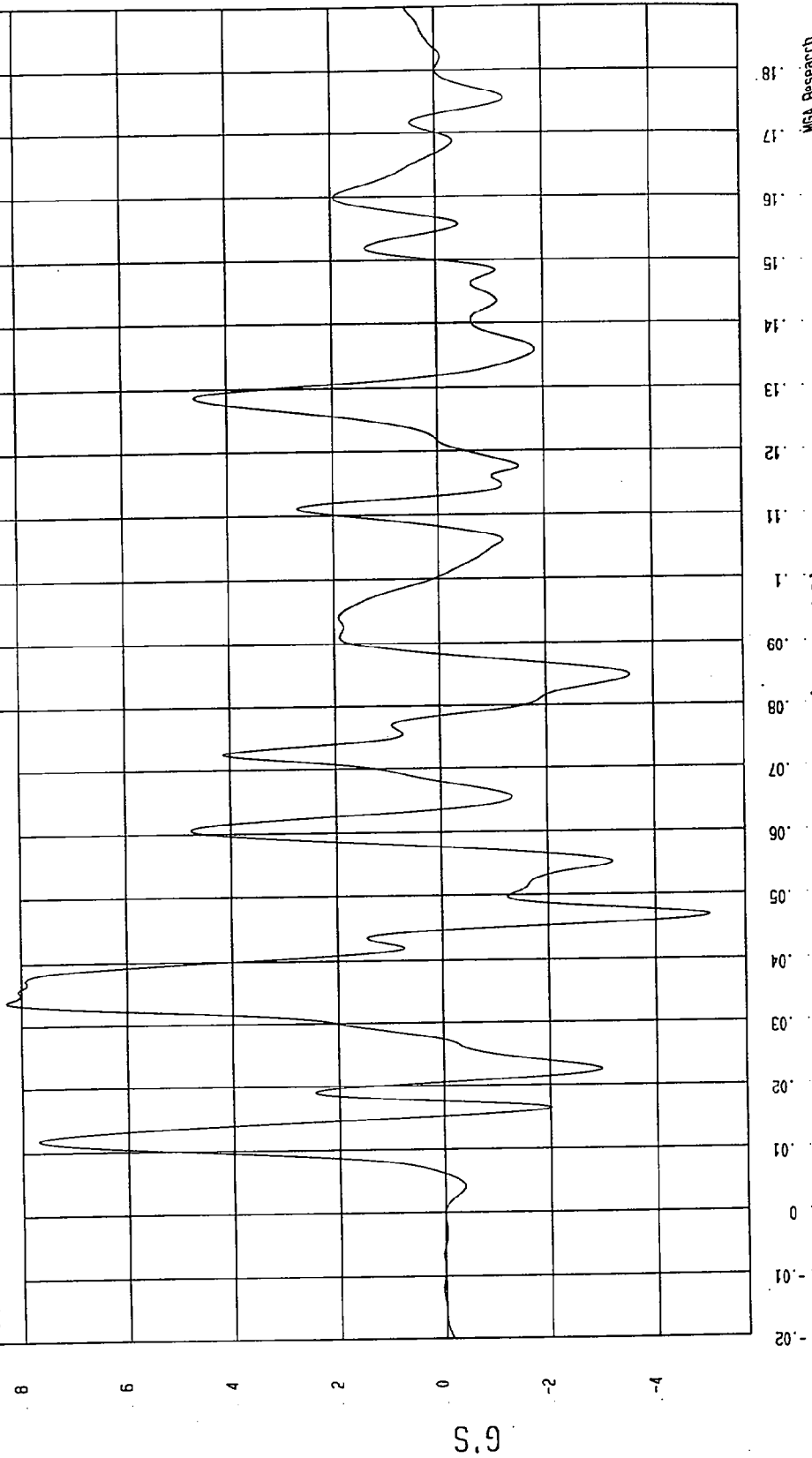
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 8.29 G's at 34 msec

Minimum = -5.01 G's at 47 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION

1 897112AF.A10 Filterclass (60)



MSA Research
10-06-1997 18:38

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

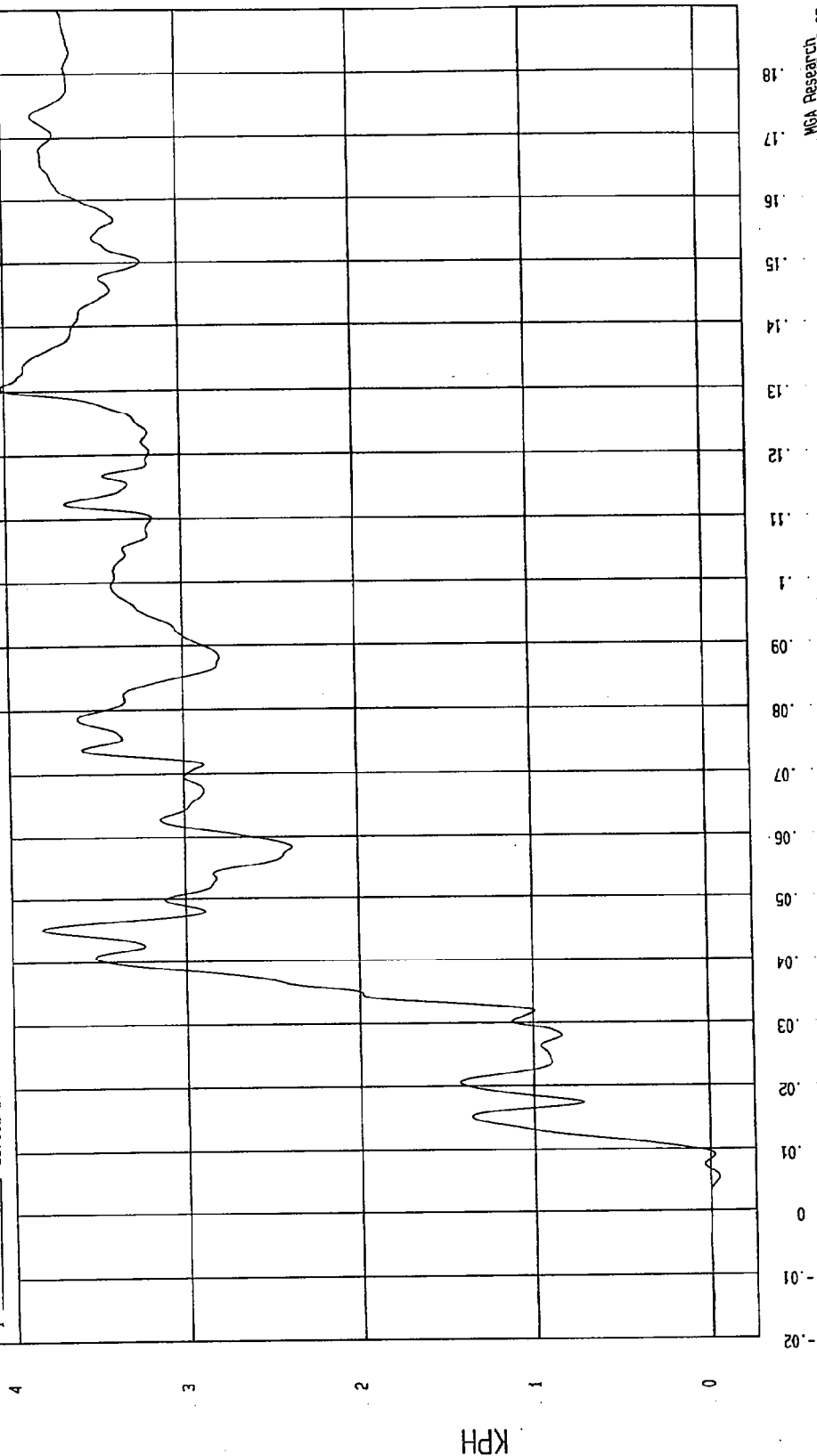
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 4.02 KPH at 130 msec

Minimum = -4.80E-02 KPH at 6 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY

1 B97112A1.V10 Filterclass (180)



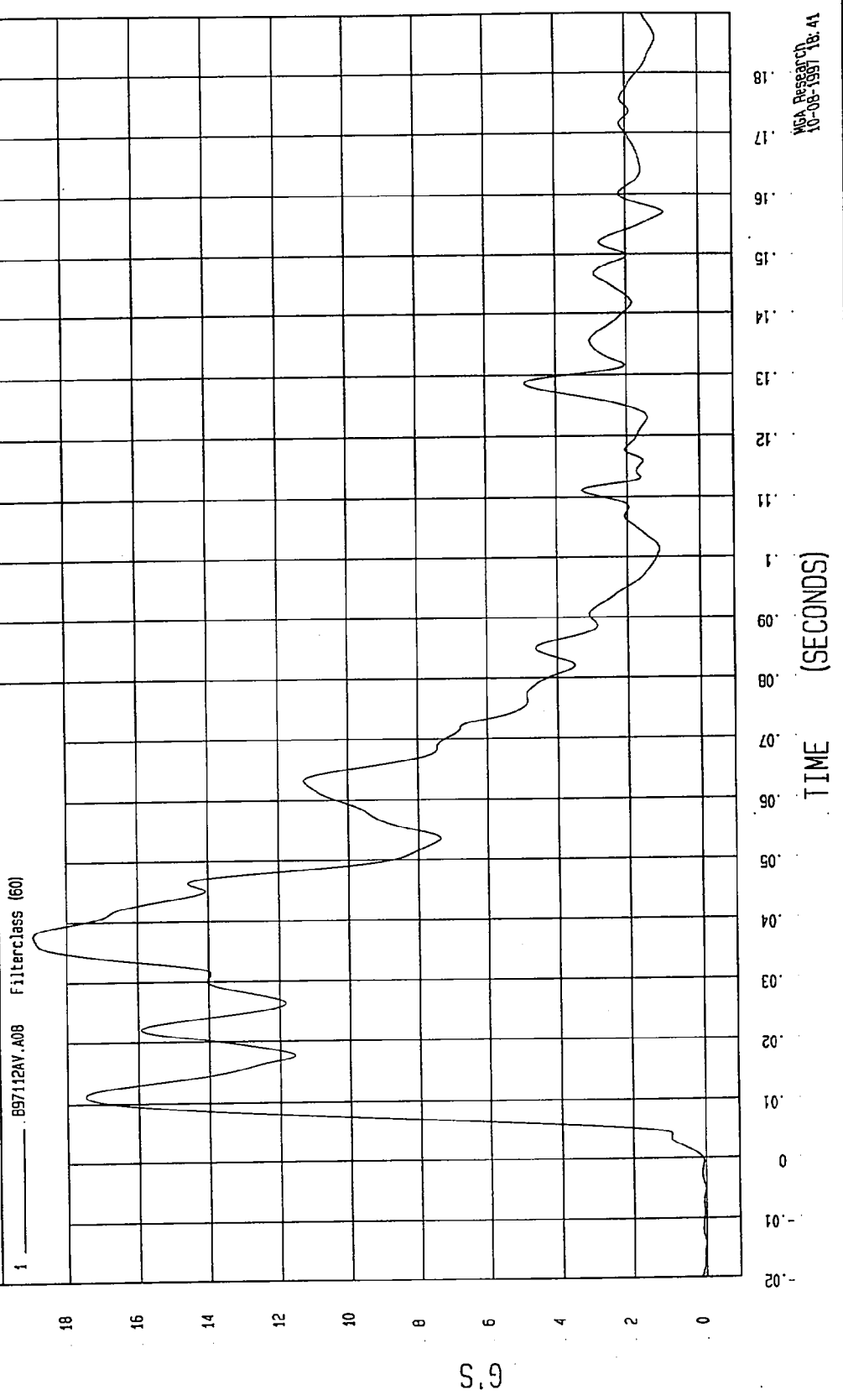
MGA Research
10-08-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 8.51E-03 G'S at -5 msec Maximum = 18.92 G'S at 38 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

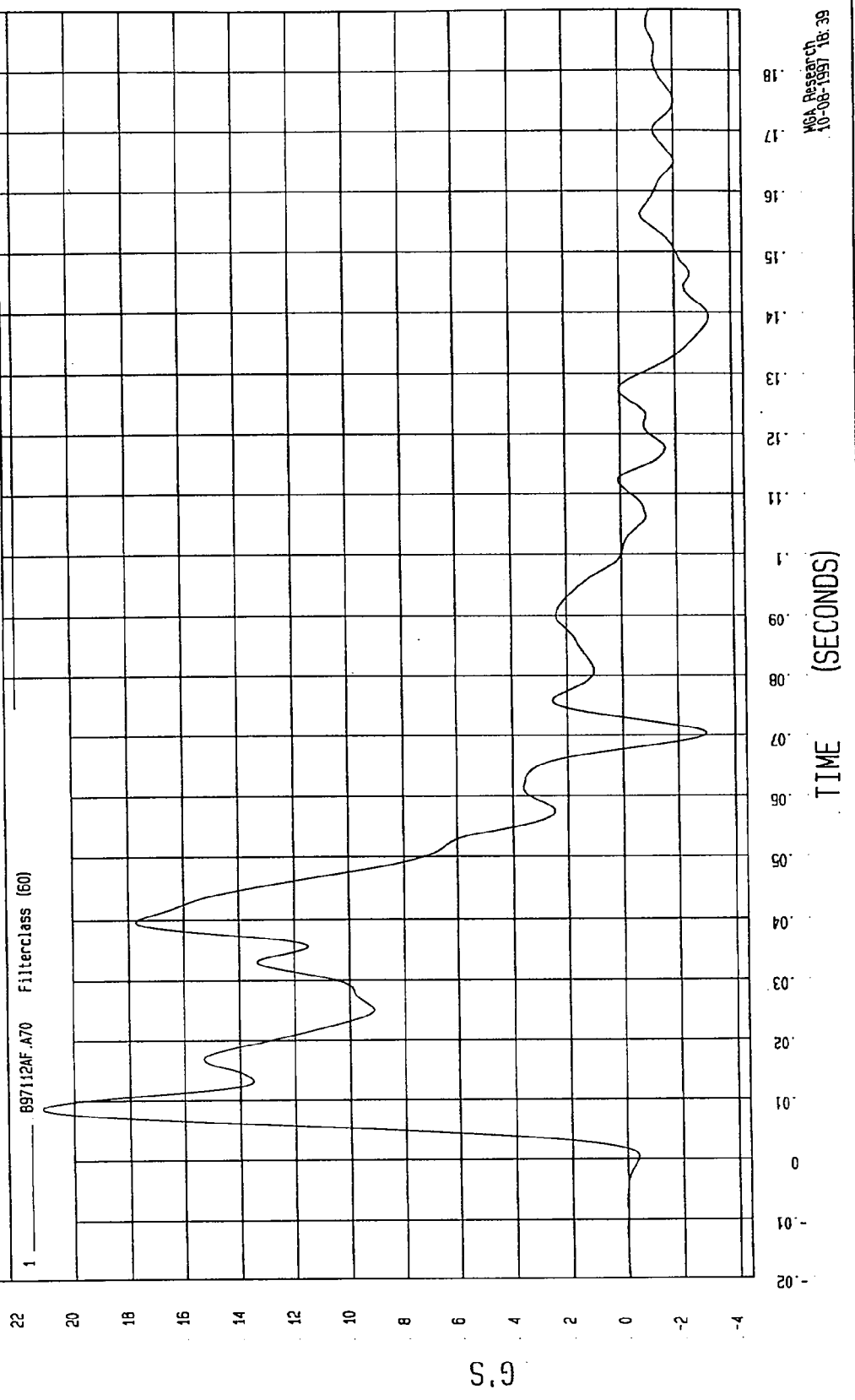


WCA Research
10-08-1997 18:41

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.19 G'S at 139 msec Maximum = 21.15 G'S at 9 msec

RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION



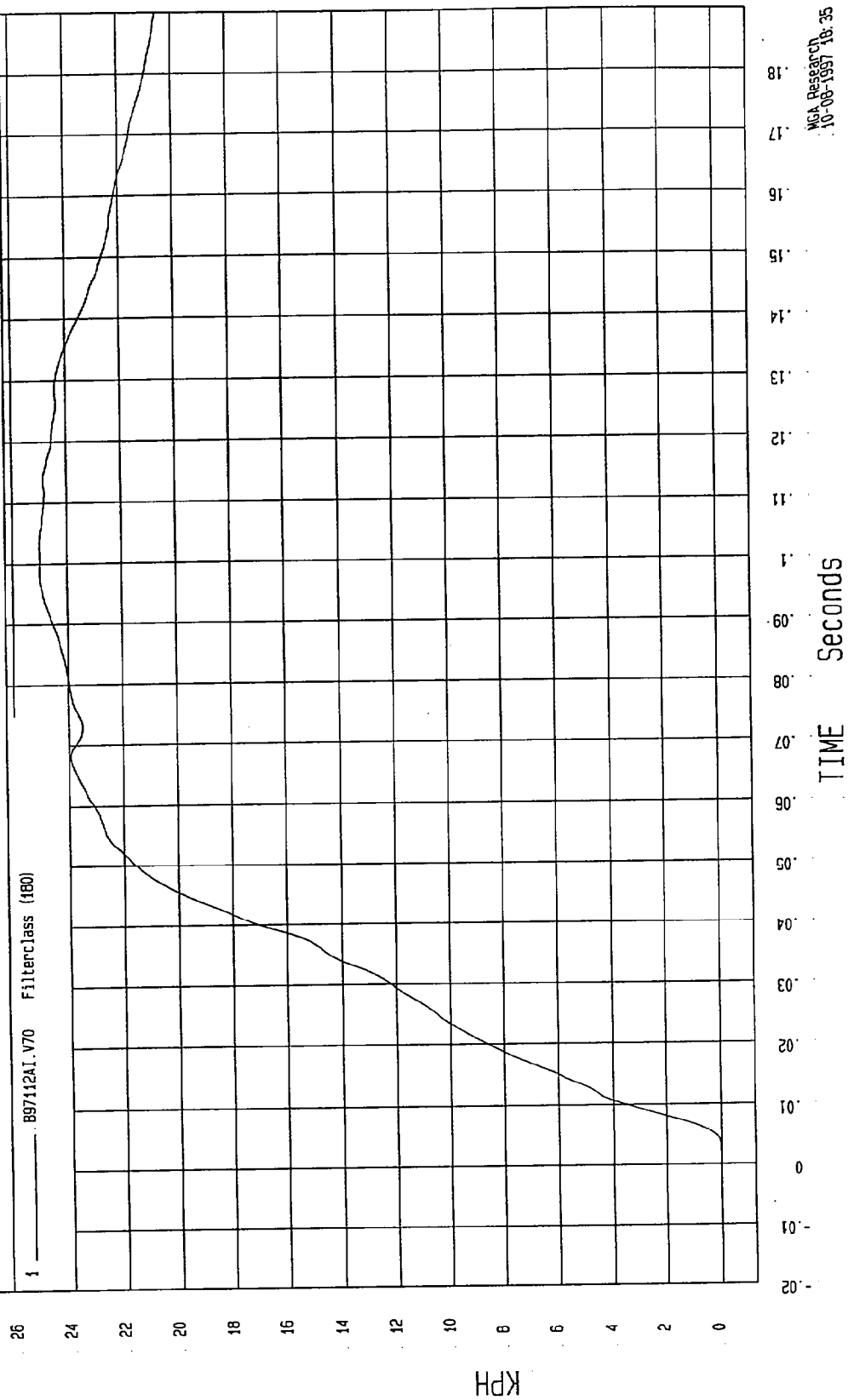
MCA Research
10-06-1997 18:39

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.02E-03 KPH at -19 msec Maximum = 25.01 KPH at 99 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY



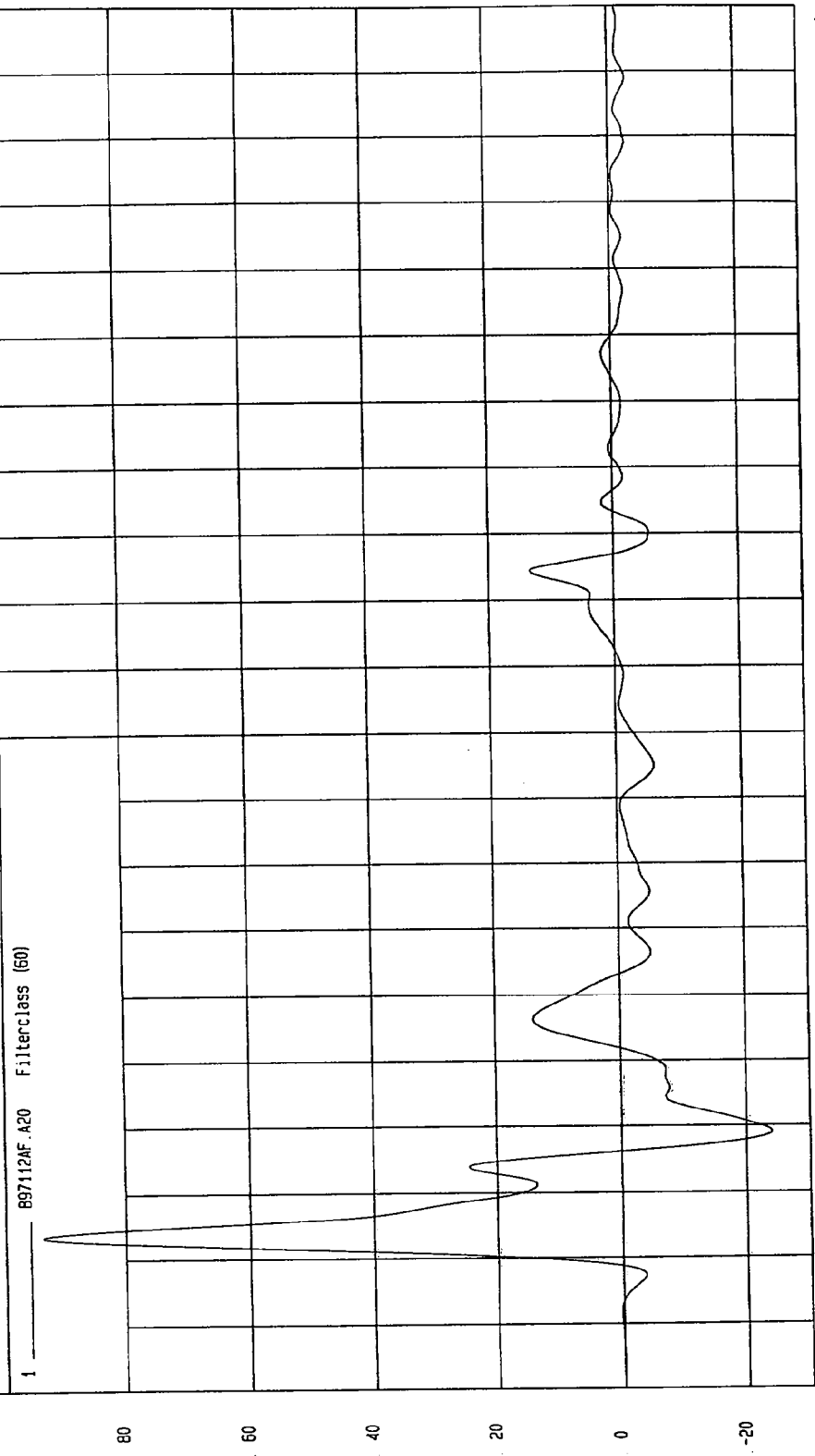
MCA Research
10-08-1997 18:35

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -24.15 G'S at 19 msec Maximum = 93.26 G'S at 4 msec

LEFT LOWER A-POST Y ACCELERATION



TIME (SECONDS)

NCA Research
10-06-1997 18:57

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 22.16 KPH at 16 msec

Minimum = -9.71E-02 KPH at 1 msec

LEFT LOWER A-POST Y VELOCITY

1 897112AI.V20 Filterclass (180)



NCA Research
10-06-1997 16:57

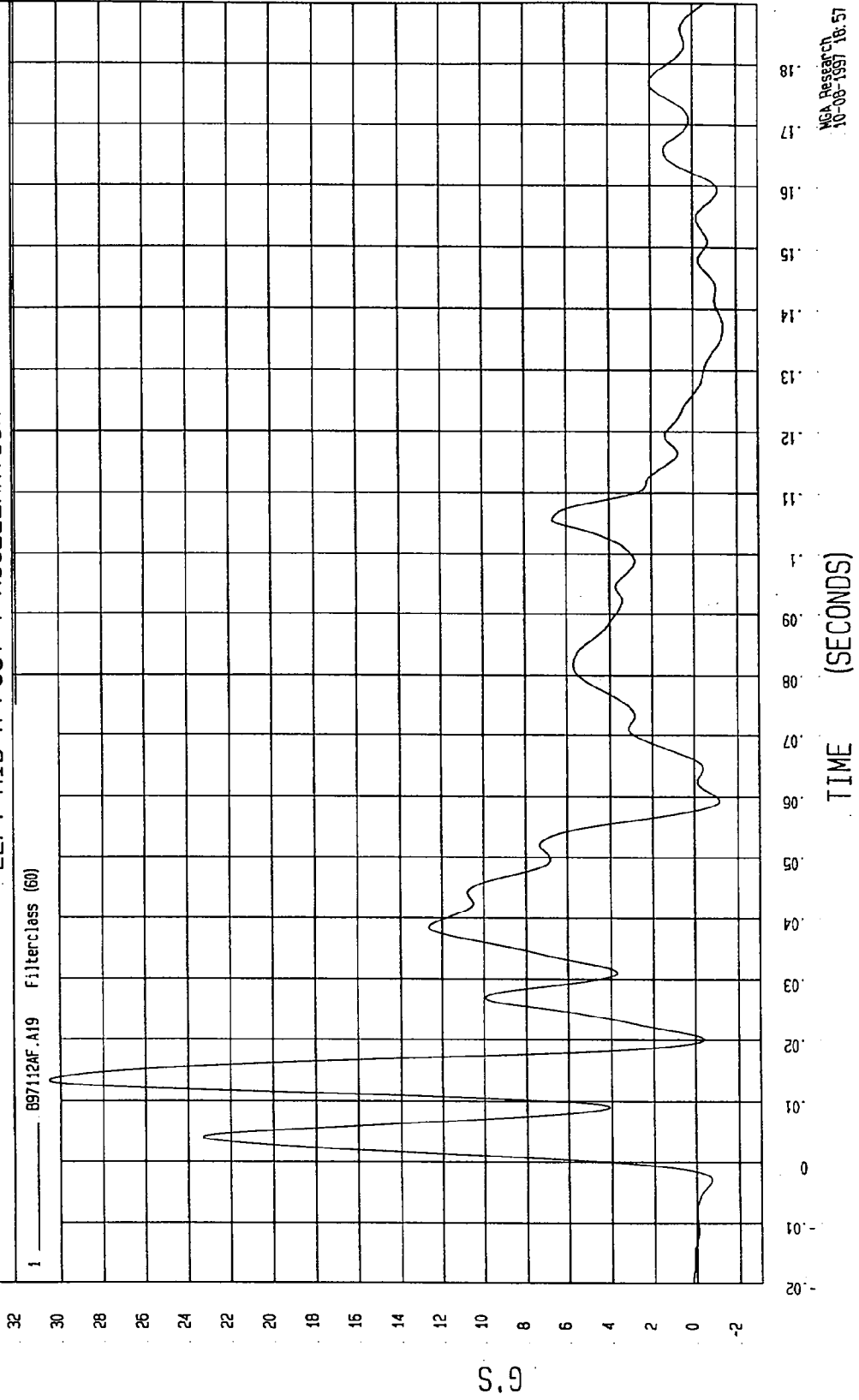
TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.40 G'S at 137 msec Maximum = 30.53 G'S at 13 msec

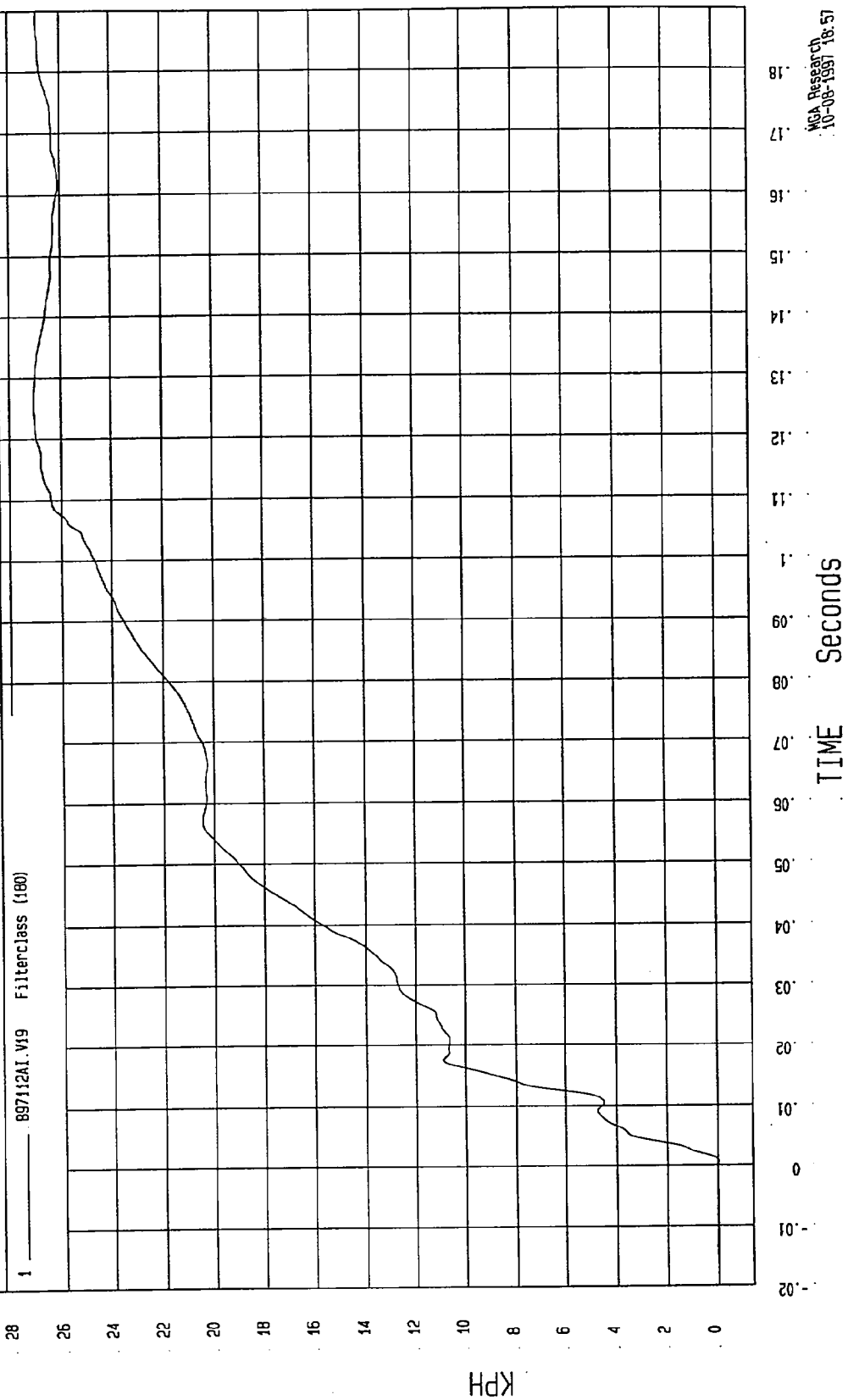
LEFT MID A-POST Y ACCELERATION



TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -2.35E-02 KPH at 1 msec Maximum = 27.05 KPH at 126 msec

LEFT MID A-POST Y VELOCITY

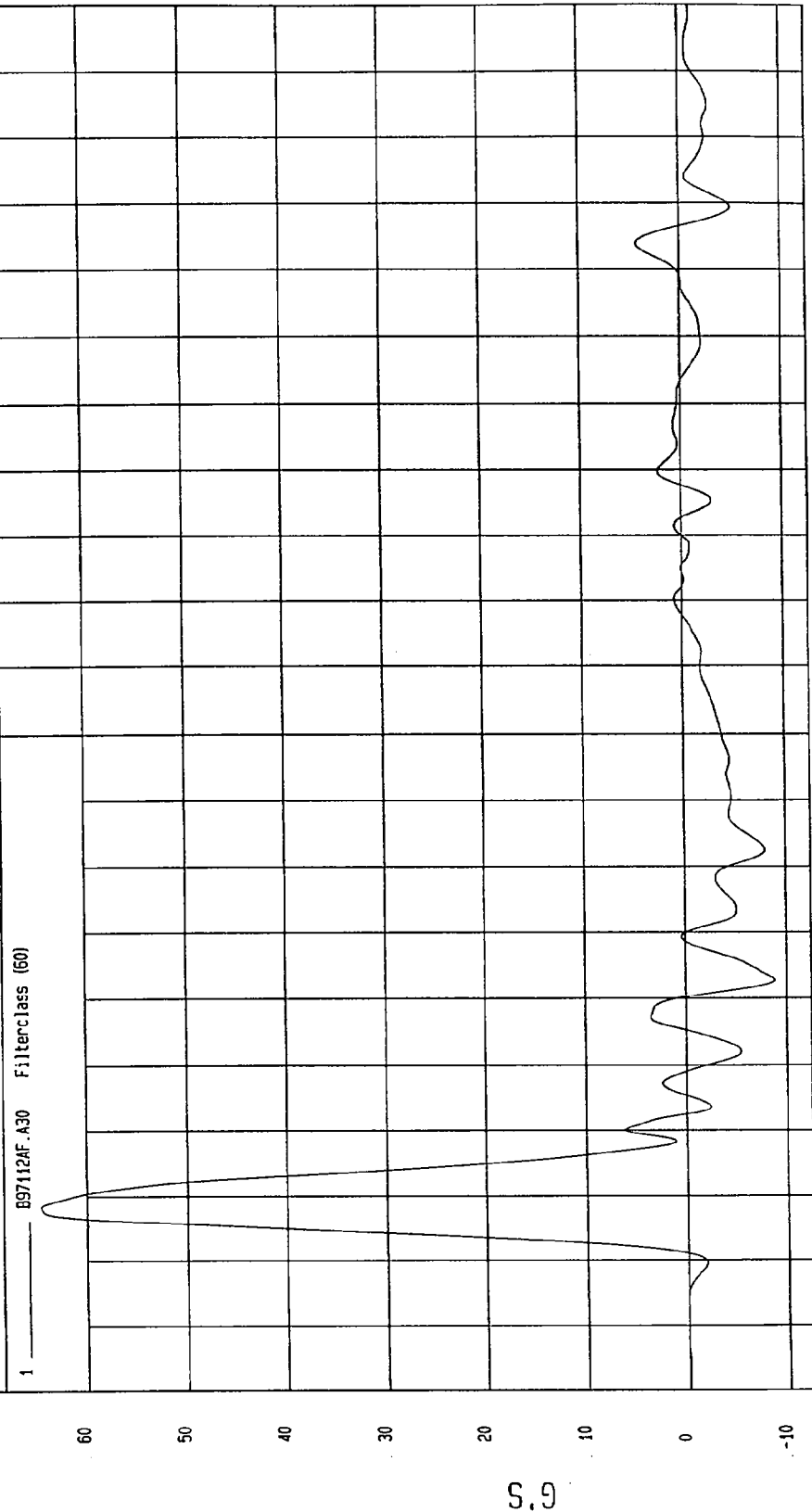


TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -8.82 G'S at 43 msec Maximum = 64.59 G'S at 8 msec

LEFT LOWER B-POST Y ACCELERATION



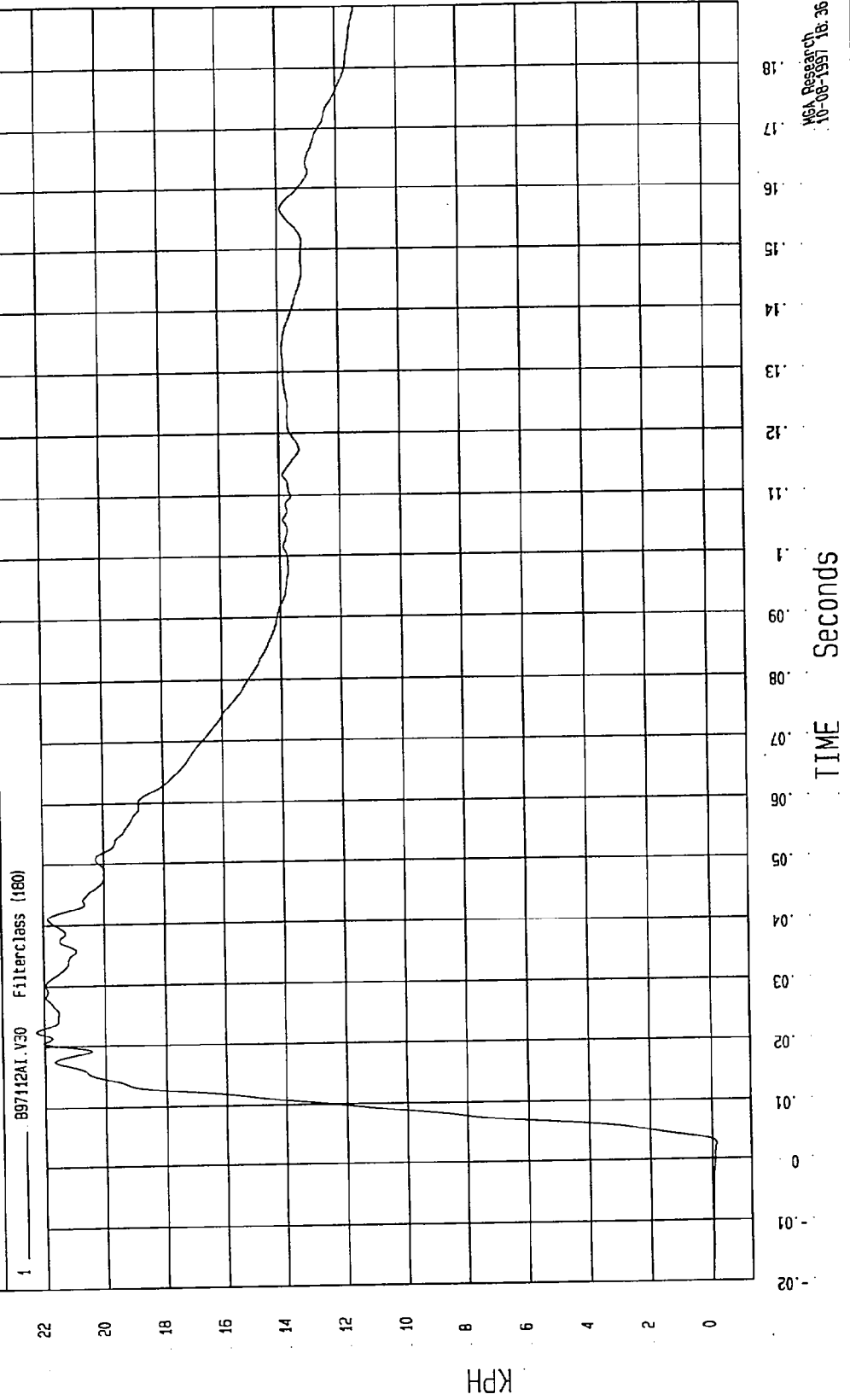
K&A Research
10-08-1997 16:39

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -.14 KPH at 3 msec Maximum = 22.26 KPH at 22 msec

LEFT LOWER B-POST Y VELOCITY



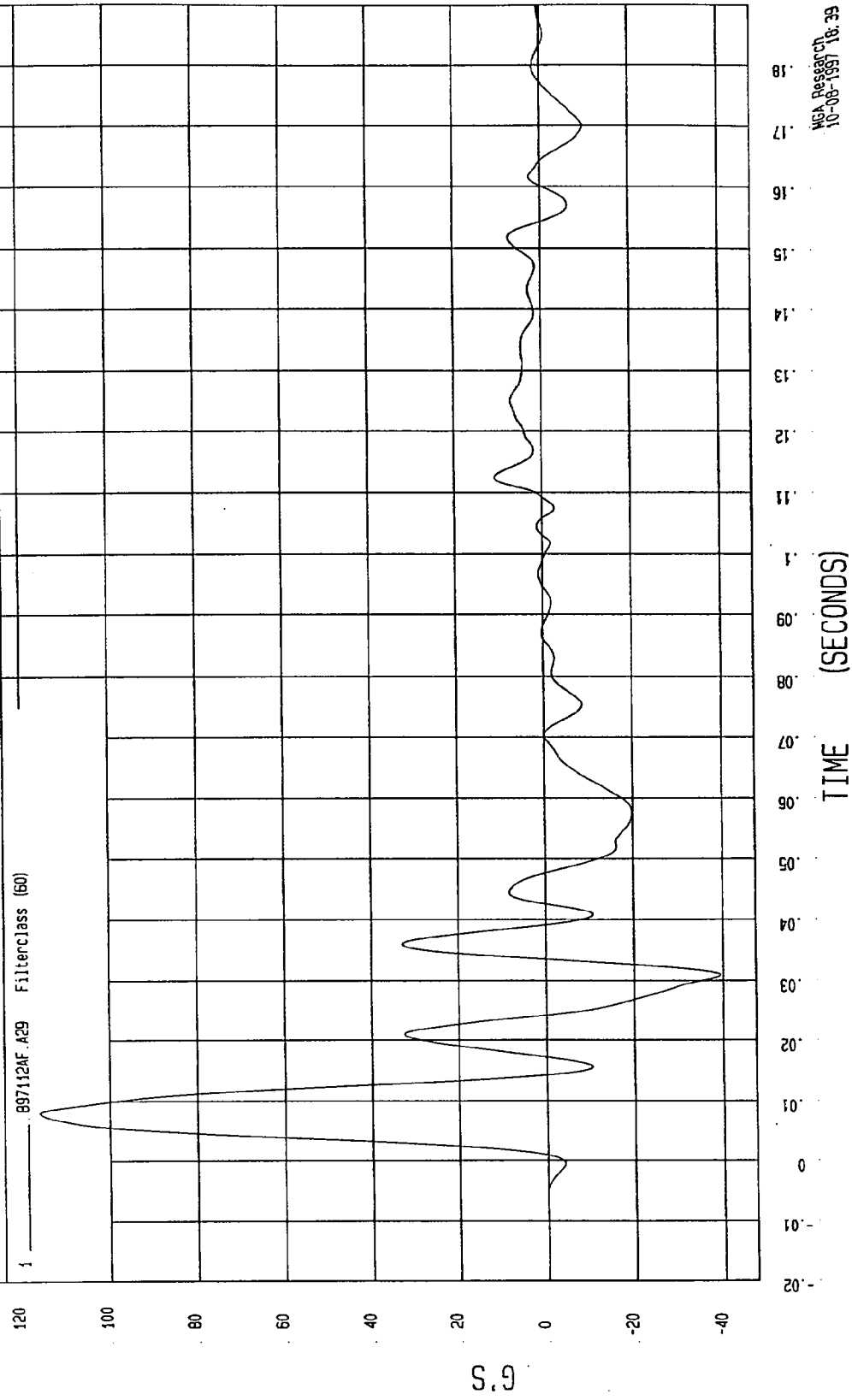
MSA Research
10-08-1997 18:36

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -39.36 G'S at 31 msec Maximum = 116.08 G'S at 8 msec

LEFT MID B-POST Y ACCELERATION



MCA Research
10-08-1997 18:39

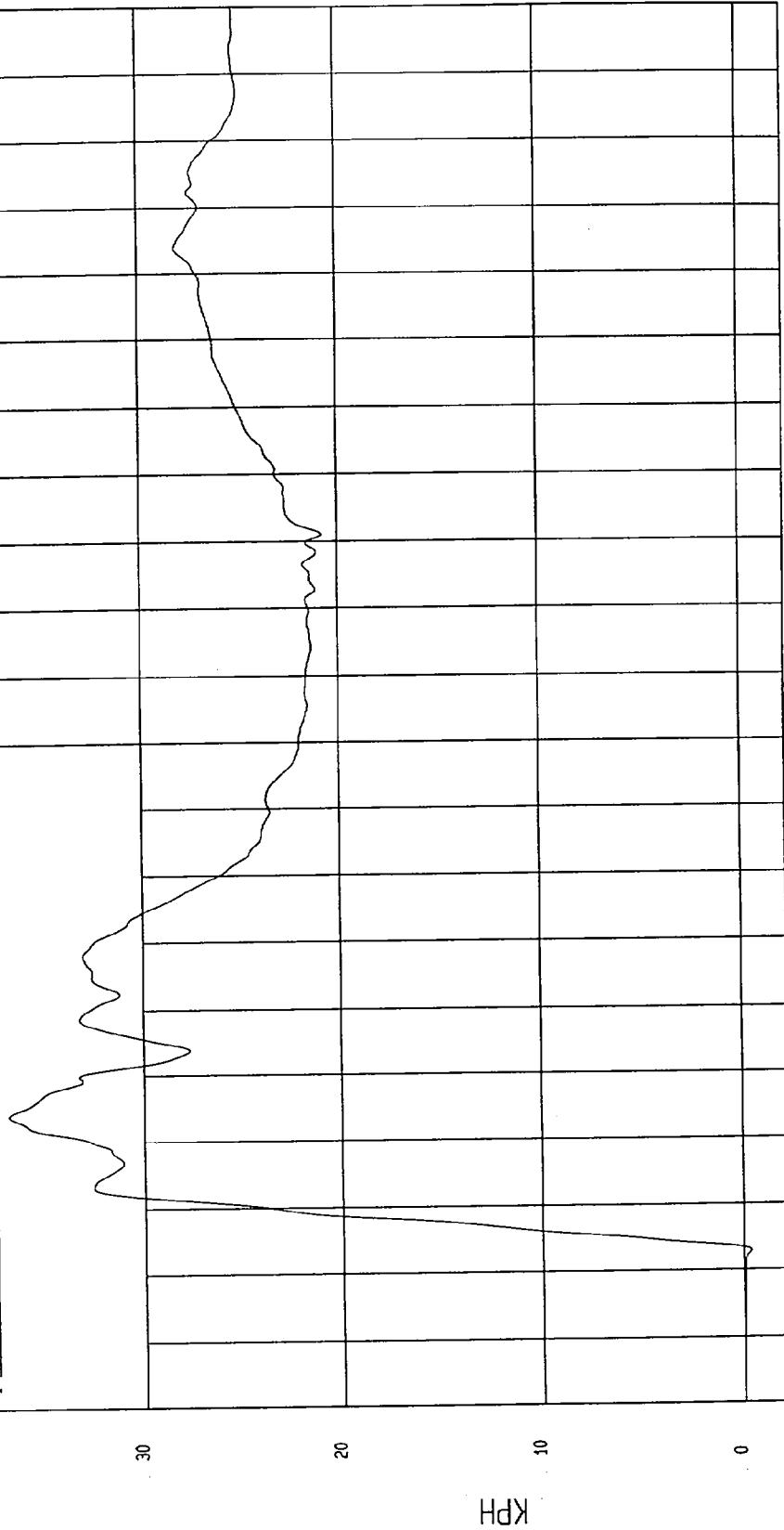
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -.36 KPH at 3 msec Maximum = 36.77 KPH at 24 msec

LEFT MID B-POST Y VELOCITY

1 _____ B97112A1.Y29 Filterclass (180)



TIME Seconds

MSA Research
10-08-1997 18:36

VEHICLE CG X ACCELERATION VS. TIME
NO VALID DATA COLLECTED

VEHICLE CG Y ACCELERATION VS. TIME

NO VALID DATA COLLECTED

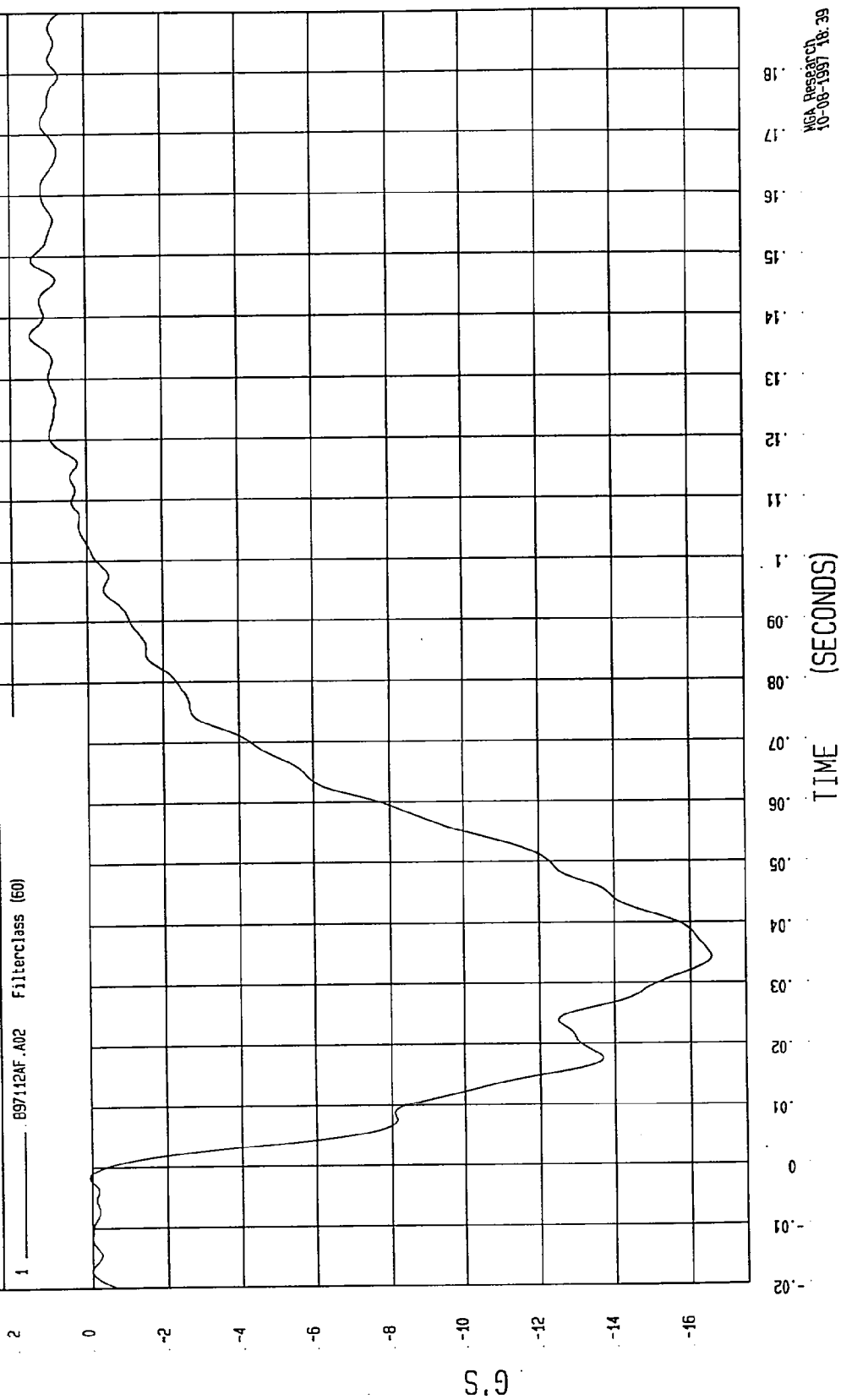
VEHICLE CG Z ACCELERATION VS. TIME
NO VALID DATA COLLECTED

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -16.56 G'S at 34 msec Maximum = 1.48 G'S at 137 msec

MOVING BARRIER CG X ACCELERATION



TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 47.14 KPH at -16 msec

Minimum = 18.16 KPH at 102 msec

MOVING BARRIER CG X VELOCITY

1 B97112A1.V02 Filterclass (180)

48

46

44

42

40

38

36

34

32

30

28

26

24

22

20

18

KPH

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

WGA Research
10-06-1997 18:36

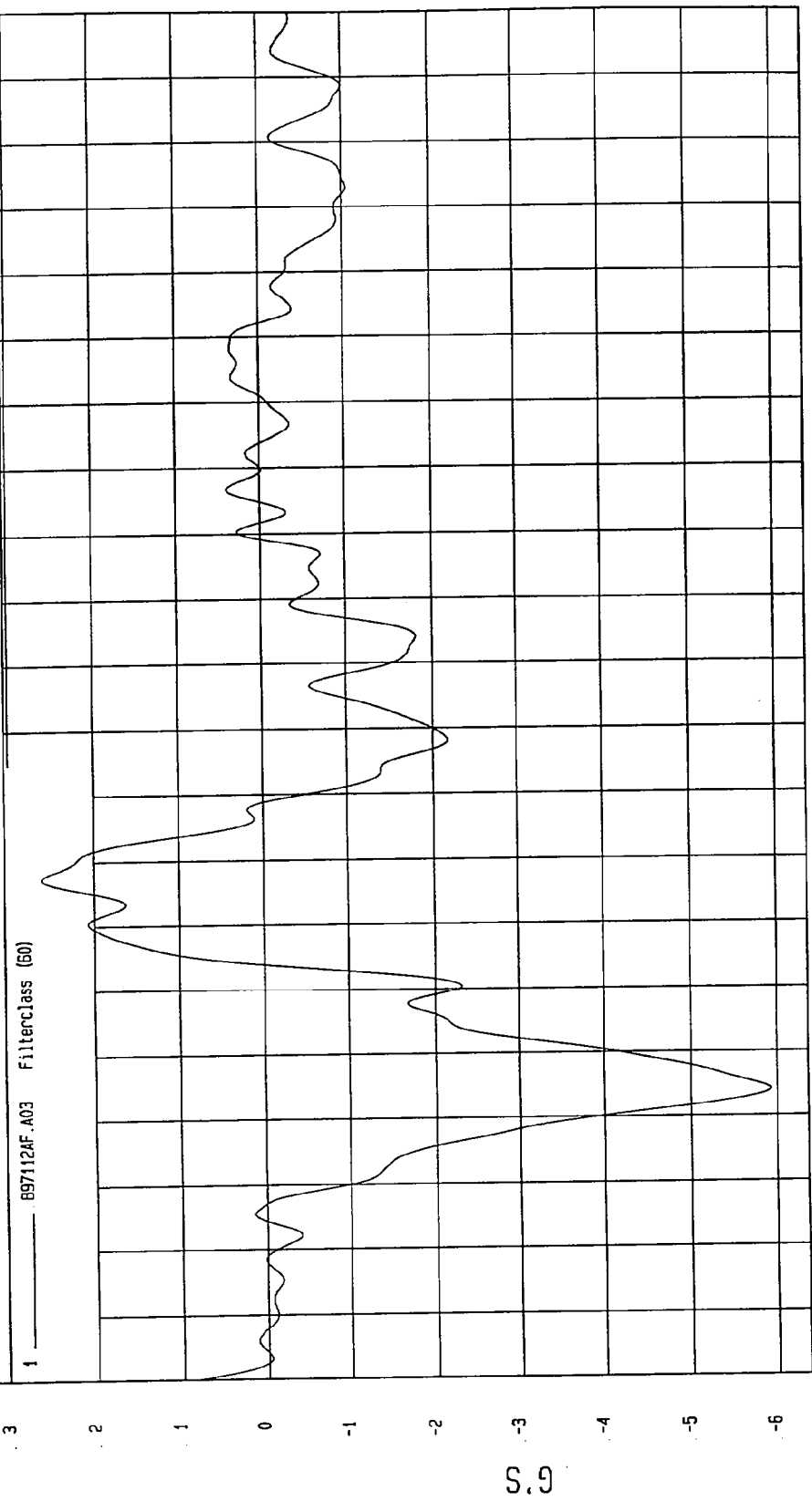
TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -5.93 G'S at 24 msec Maximum = 2.61 G'S at 57 msec

MOVING BARRIER CG Y ACCELERATION



TIME (SECONDS)

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

3
2
1
0
-1
-2
-3
-4
-5
-6

1 ——— 697112AF.A03 Filterclass (50)

MGA Research
10-08-1997 18:40

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = -24.00 KPH at -12 msec

Minimum = -29.11 KPH at 200 msec

MOVING BARRIER CG Y VELOCITY

Filterclass (180)

1 897112AI.V03

-24

-25

-26

-27

-28

-29

KPH

18

17

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

0

-1

-2

-3

-4

-5

-6

-7

-8

-9

-10

-11

-12

TIME Seconds

MCA Research
10-09-1997 18.36

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 13.42 G'S at 60 msec

Minimum = -16.72 G'S at 66 msec

MOVING BARRIER CG Z ACCELERATION

1 ——— 897112AF.A04 Filterclass (50)

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

G'S

-0.02 -0.01 0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18

TIME (SECONDS)

MCA Research
10-08-1997 16.40

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

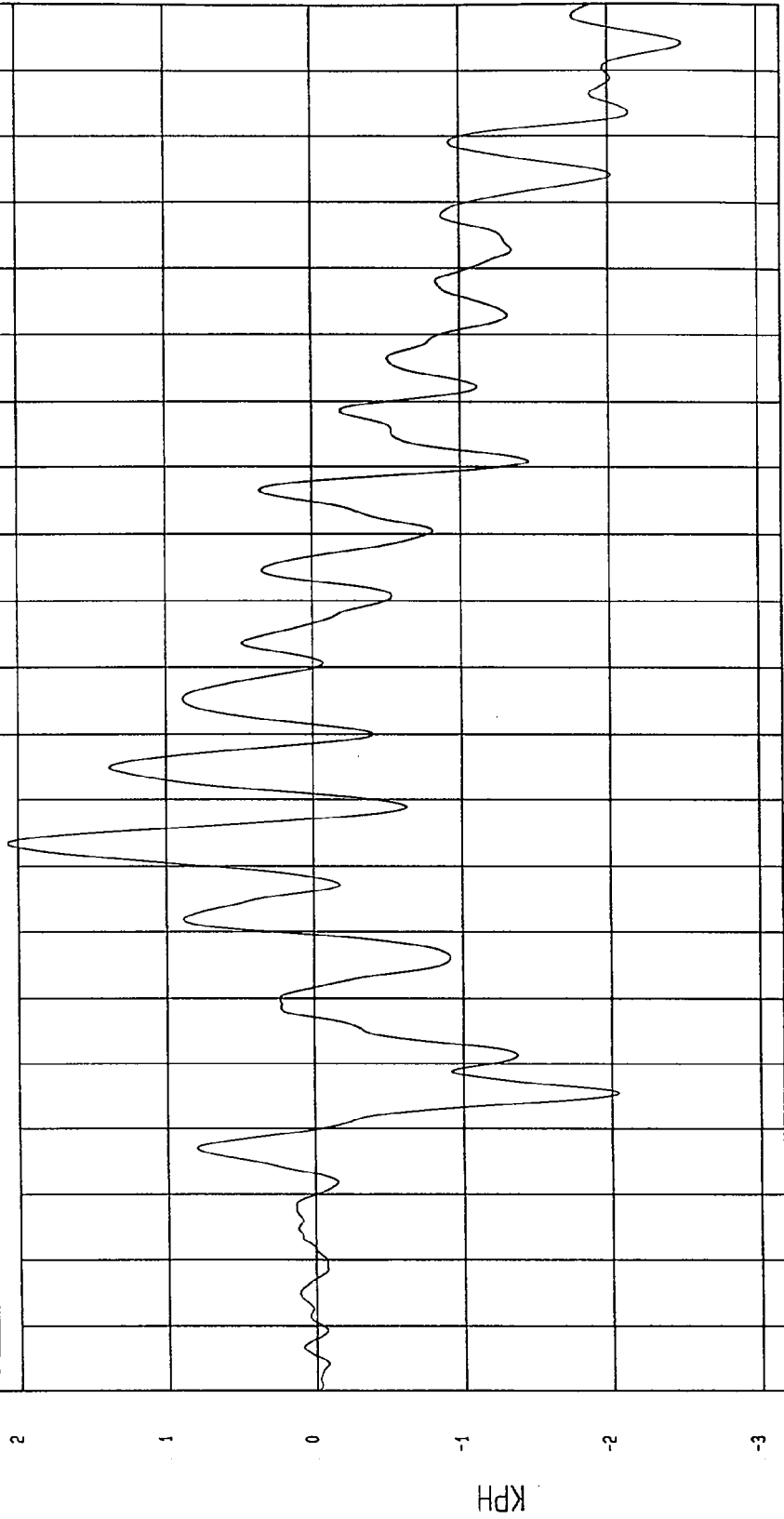
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Minimum = -2.90 KPH at 195 msec

Maximum = 2.07 KPH at 63 msec

MOVING BARRIER CG Z VELOCITY

1 897112AI.Y04 Filterclass (180)



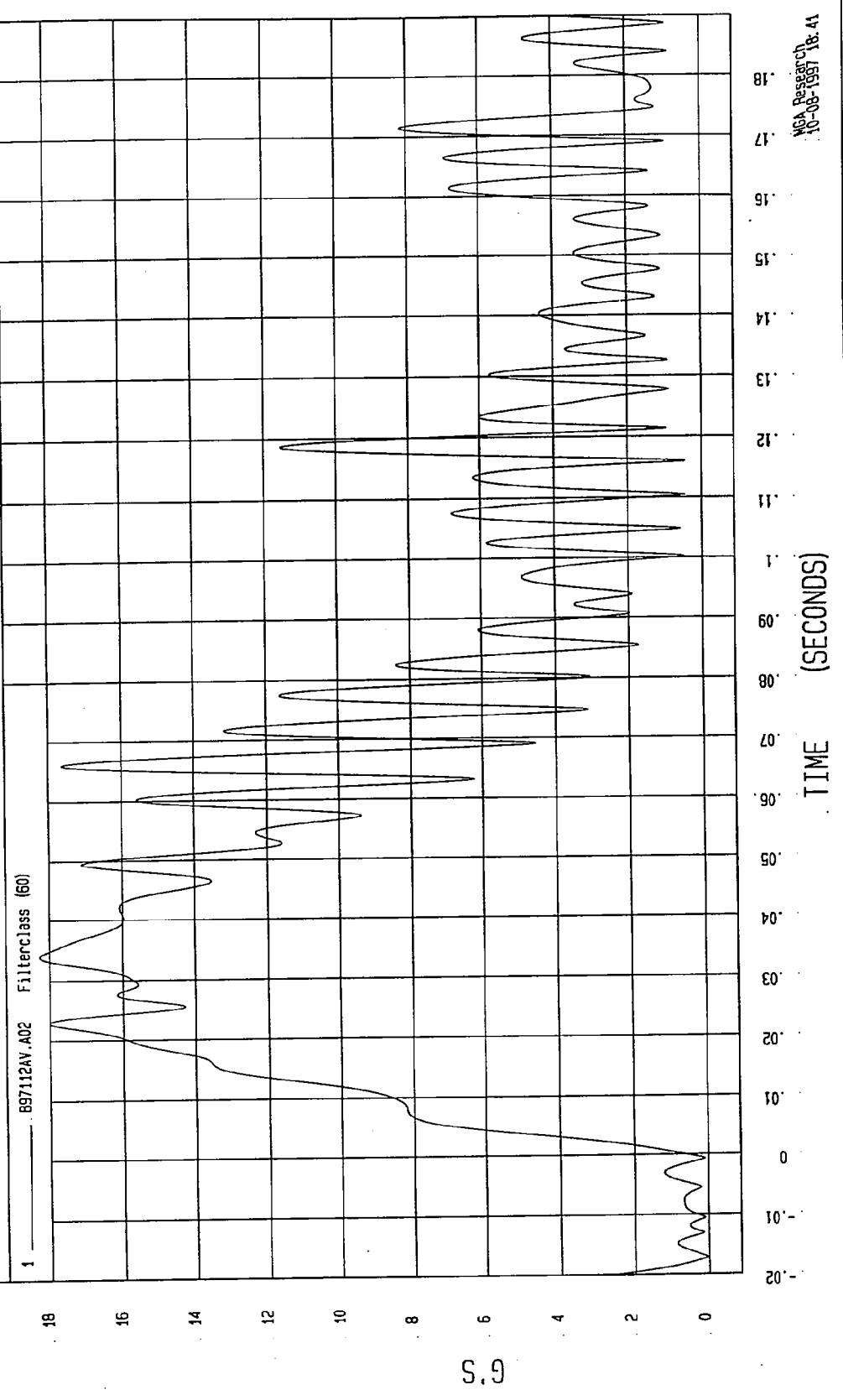
TIME Seconds
MGA Research
10-08-1997 18:36

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 3.33E-02 G'S at -17 msec Maximum = 18.26 G'S at 34 msec

MOVING BARRIER CG RESULTANT ACCELERATION

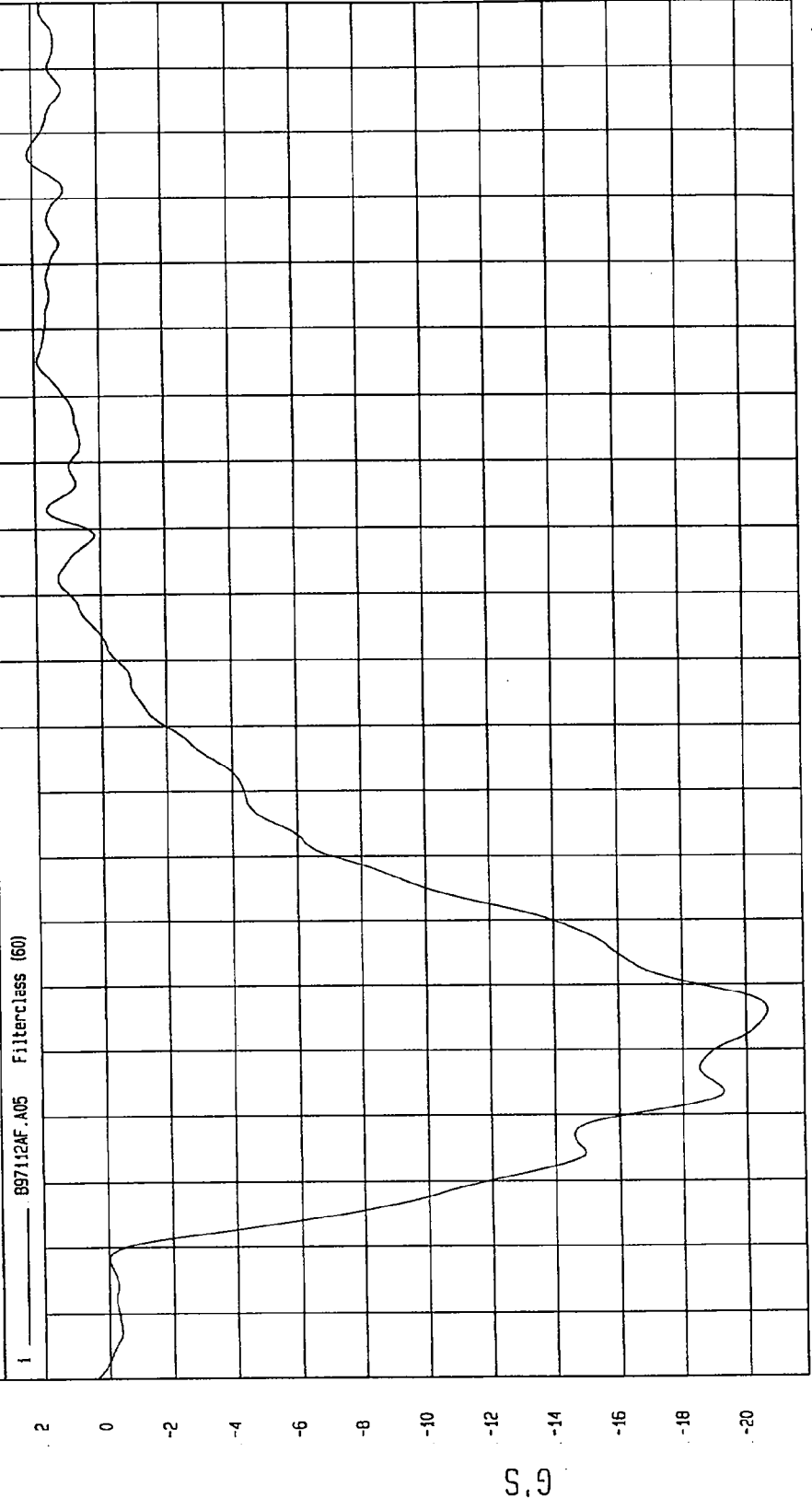


TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -20.65 G'S at 36 msec Maximum = 2.15 G'S at 167 msec

MOVING BARRIER REAR AXLE X ACCELERATION



TIME (SECONDS)

18. 17. 16. 15. 14. 13. 12. 11. 10. 9. 8. 7. 6. 5. 4. 3. 2. 1. 0. -1. -2. -3. -4. -5. -6. -7. -8. -9. -10. -11. -12. -13. -14. -15. -16. -17. -18. -19. -20.

NGA Research
10-06-1997 18:40

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 13.05 KPH at 94 msec Maximum = 47.14 KPH at -18 msec

MOVING BARRIER REAR AXLE X VELOCITY



TIME Seconds

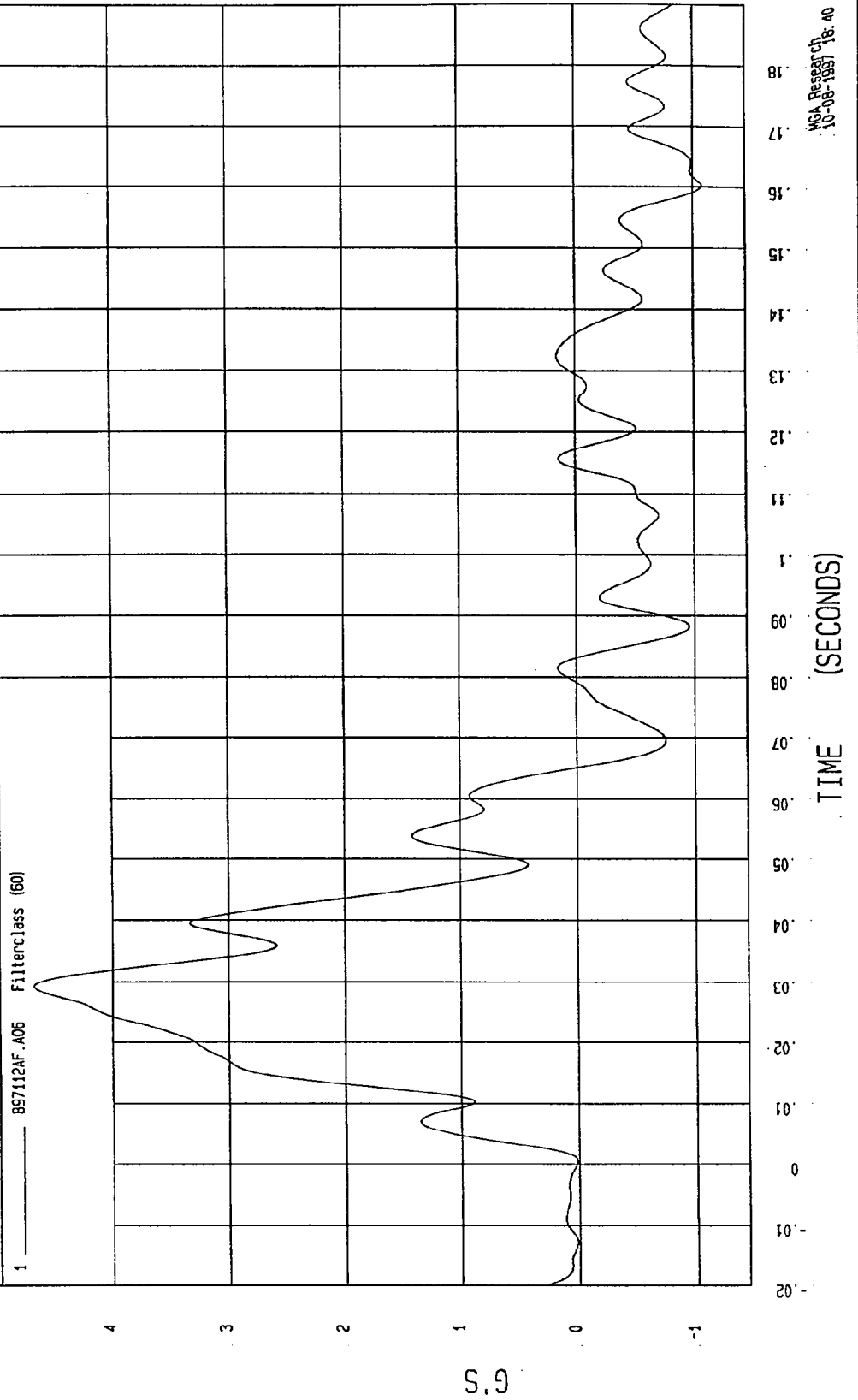
MSA Research
10-08-1997 18:36

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -1.14 G'S at .199 msec Maximum = 4.65 G'S at 29 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

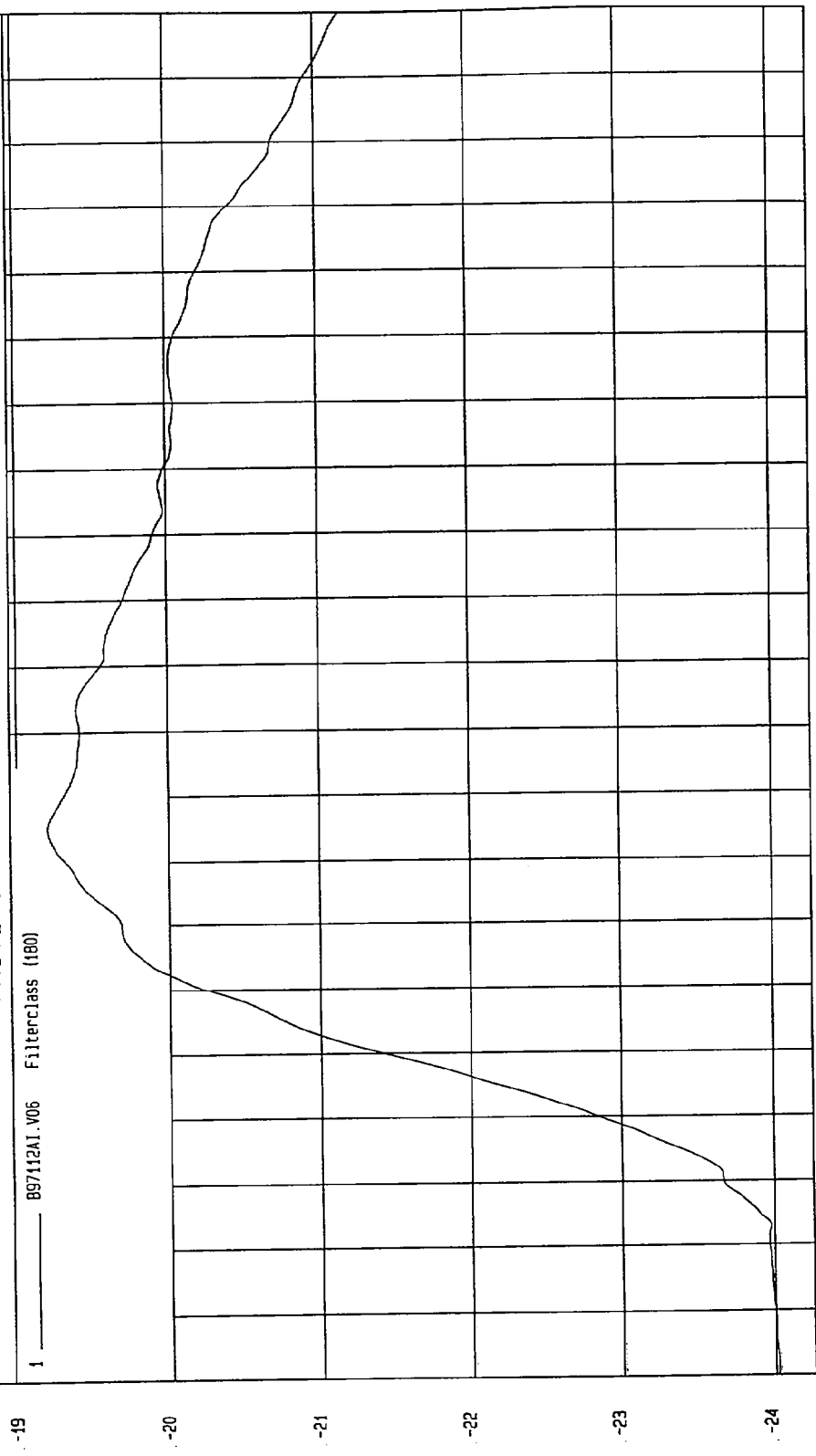


TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -24.02 KPH at -20 msec Maximum = -19.19 KPH at 65 msec

MOVING BARRIER REAR AXLE Y VELOCITY



TIME Seconds

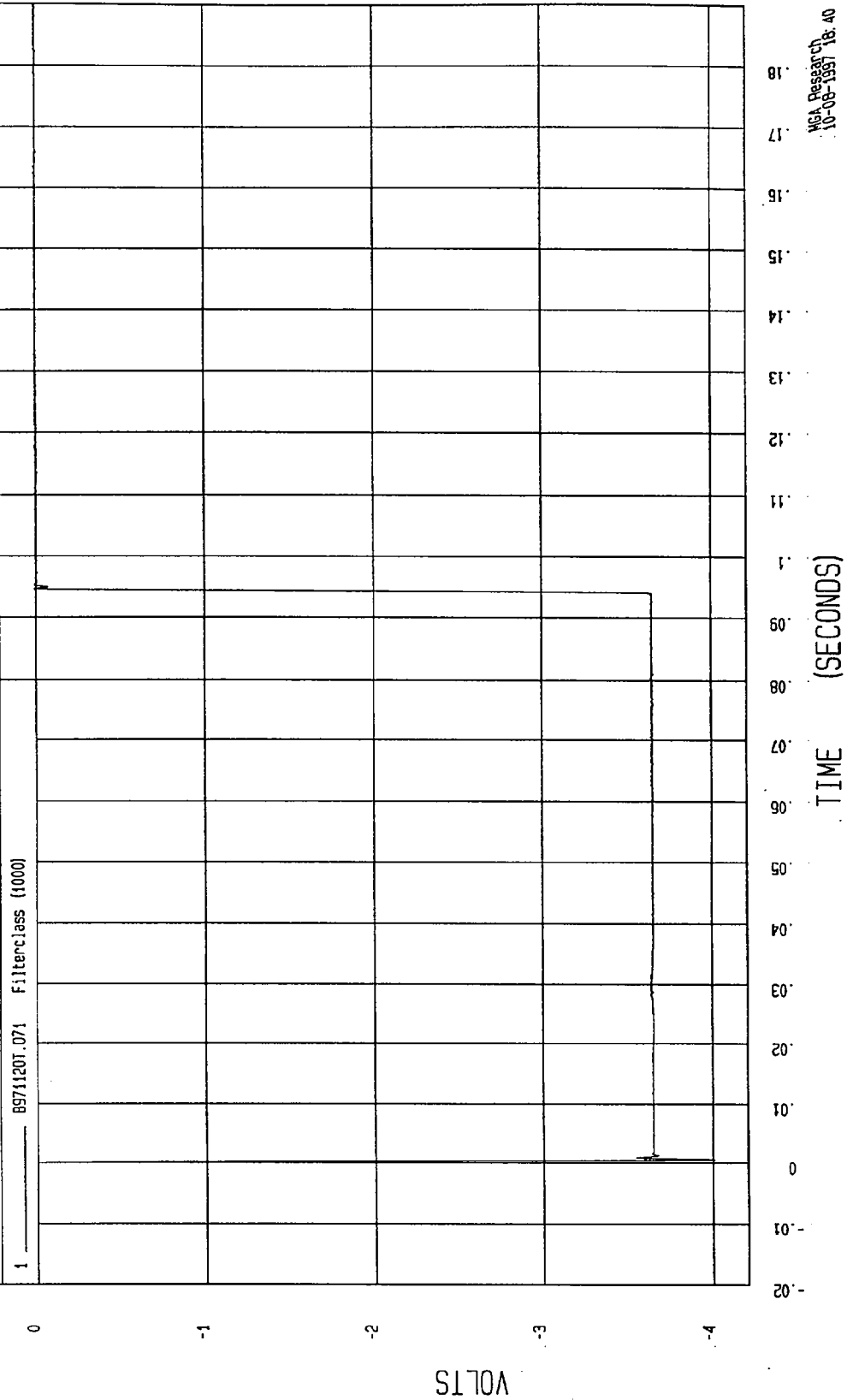
18.36
10-08-1997
MGA Research

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -4.00 VOLTS at 0 msec Maximum = 1.07E-02 VOLTS at 95 msec

LEFT BARRIER CONTACT



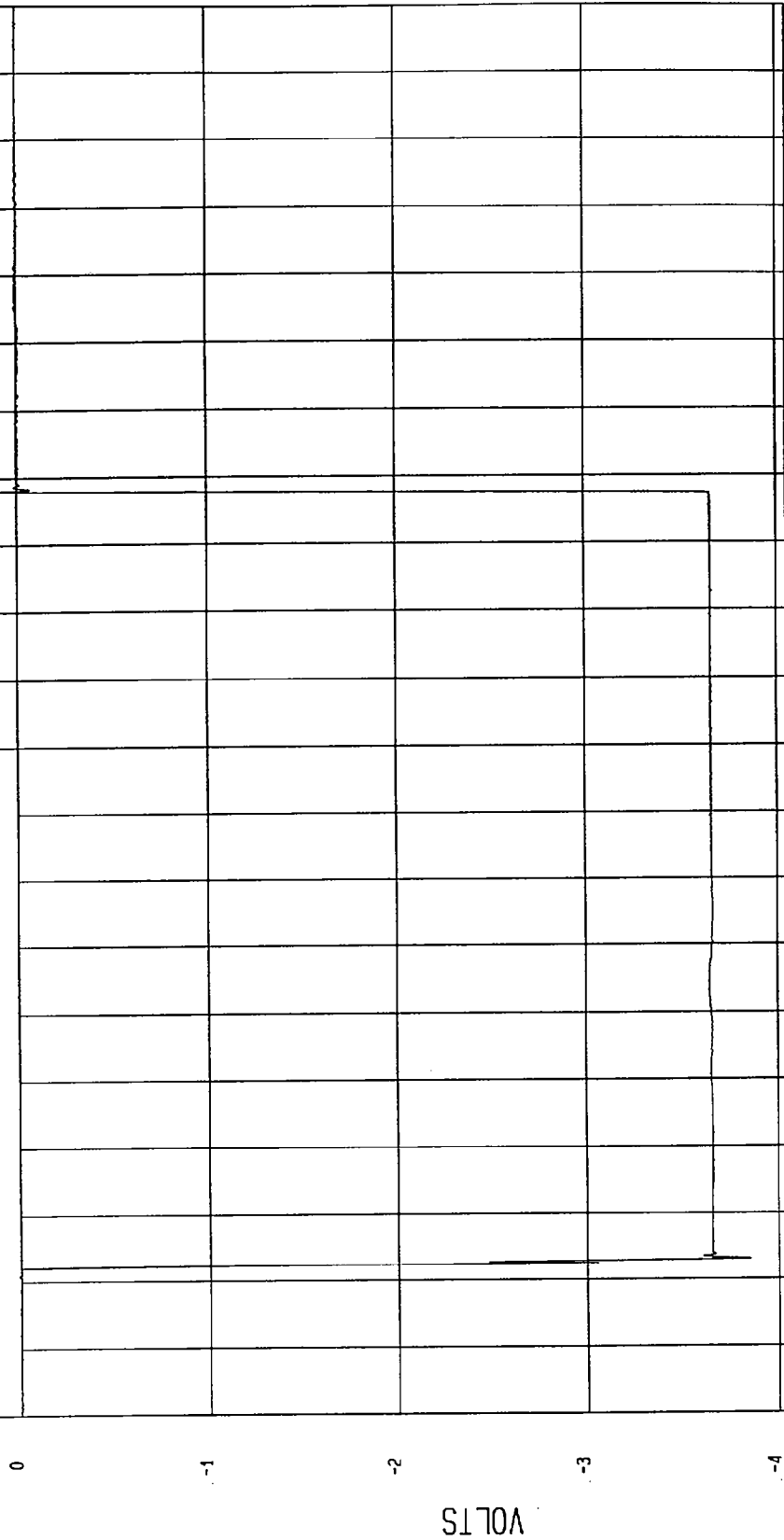
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.85 VOLTS at 3 msec Maximum = 9.52E-02 VOLTS at 118 msec

RIGHT BARRIER CONTACT

1 _____ 8971120T.072 Filterclass (1000)



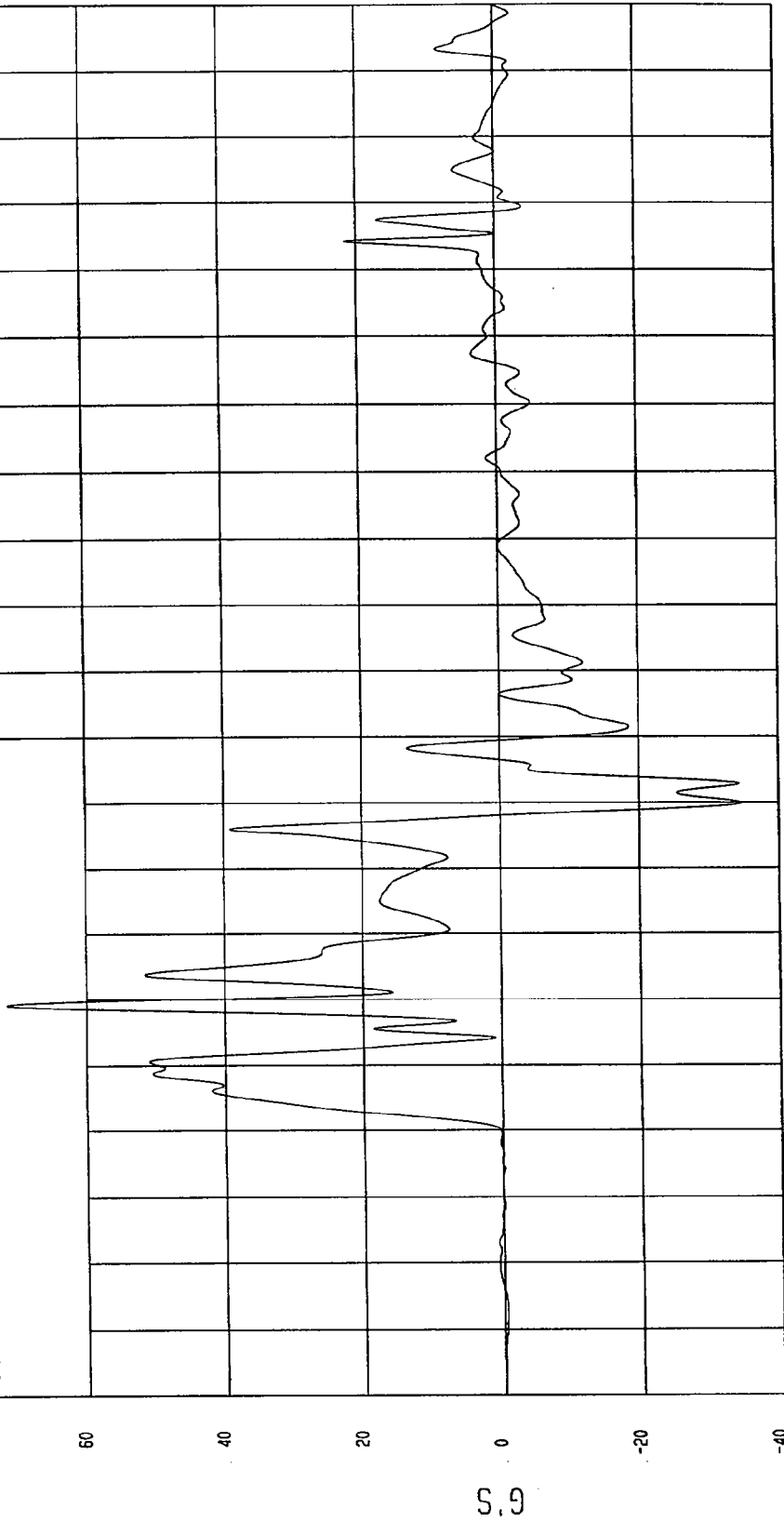
TIME (SECONDS)

NSA Research
10-06-1991 18:40

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH
Minimum = -34.75 G'S at 70 msec Maximum = 71.37 G'S at 39 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

1 _____ 897112AF.A61 FilterClass (180)



TIME (SECONDS)

NCA Research
10-08-1997 18:15

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

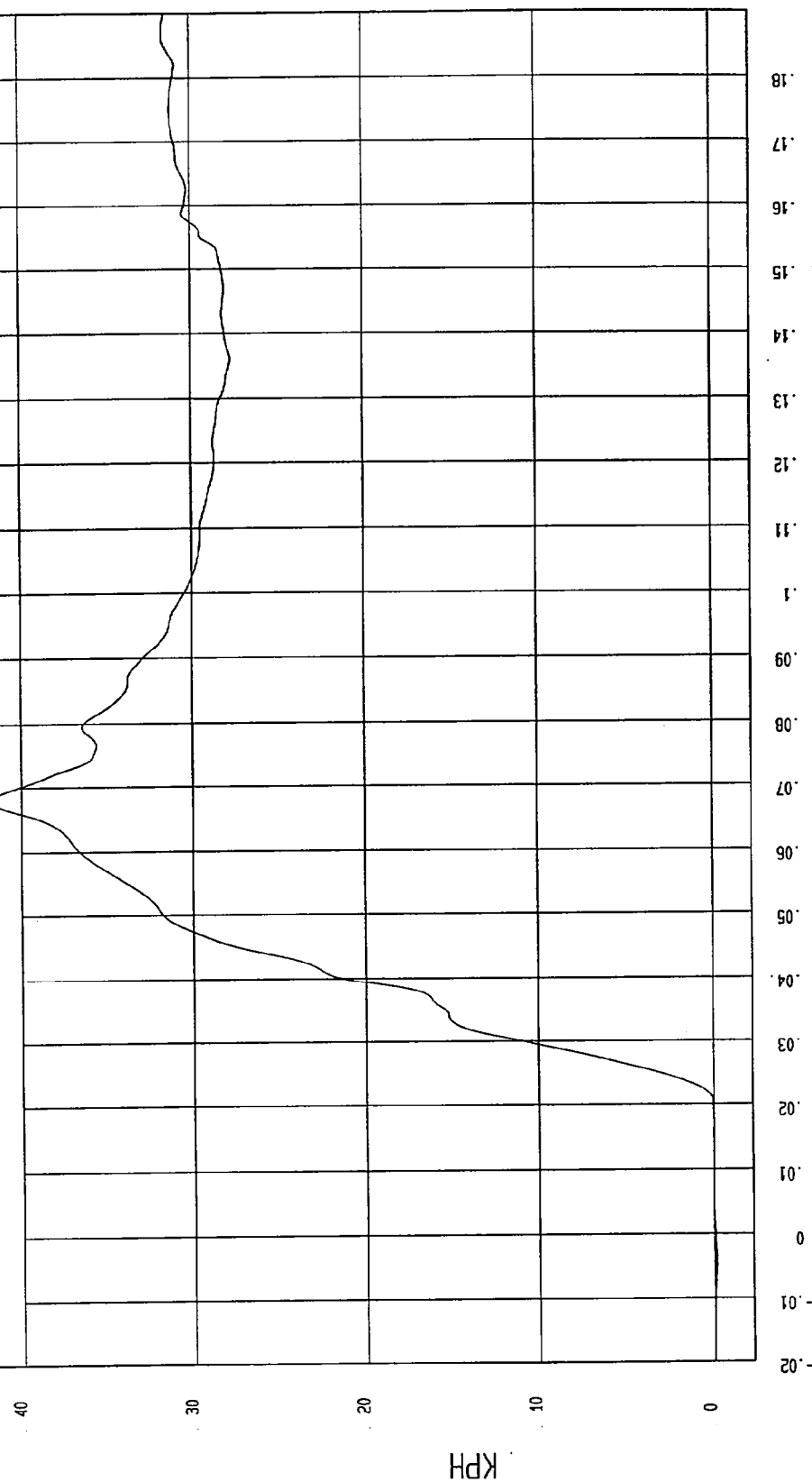
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 41.61 KPH at 68 msec

Minimum = -12 KPH at -4 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

1 _____ B97112A1.V61 Filterclass (180)



MCA Research
10-08-1997 18.19

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

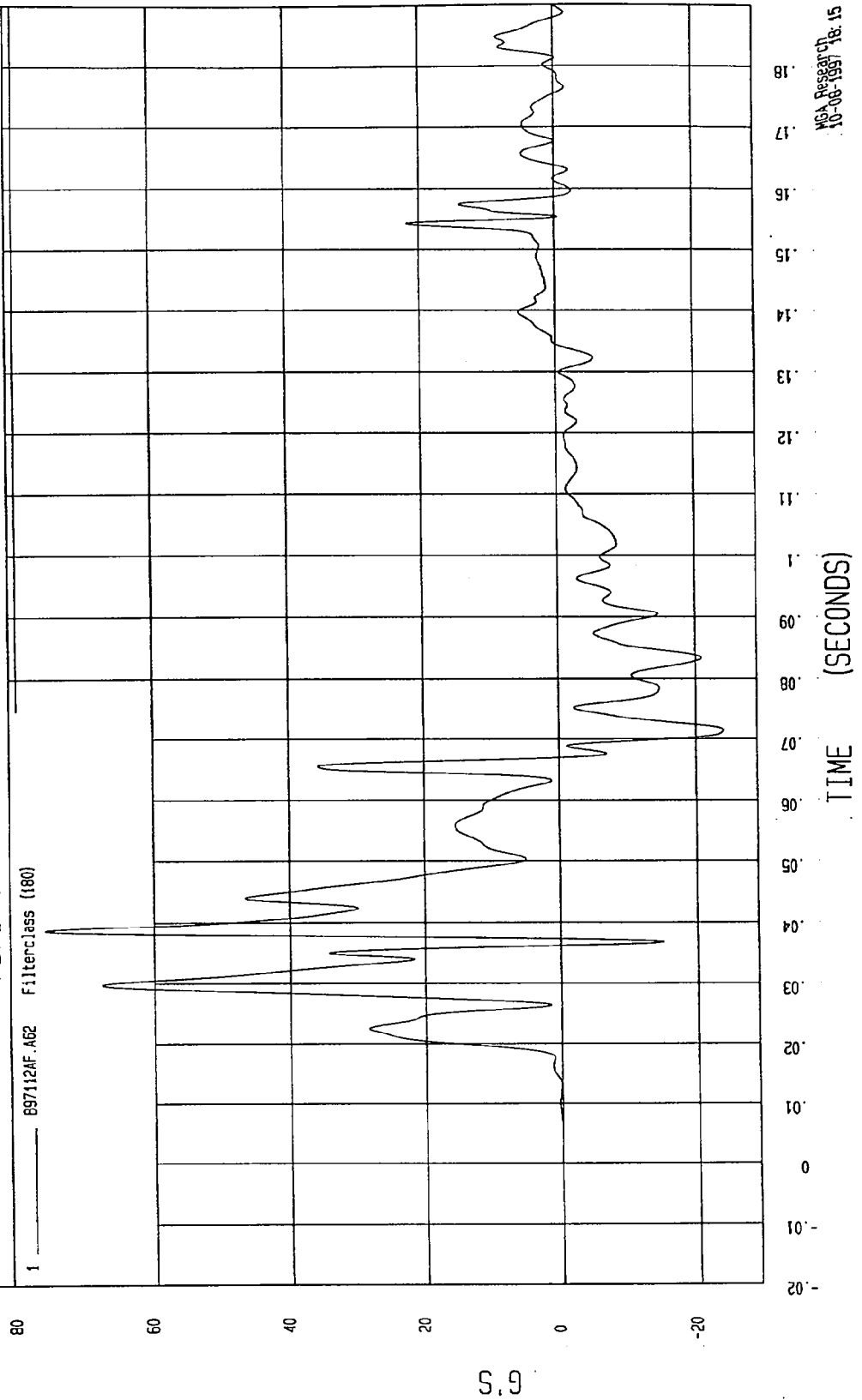
Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 76.04 G'S at 39 msec

Minimum = -23.93 G'S at 72 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION

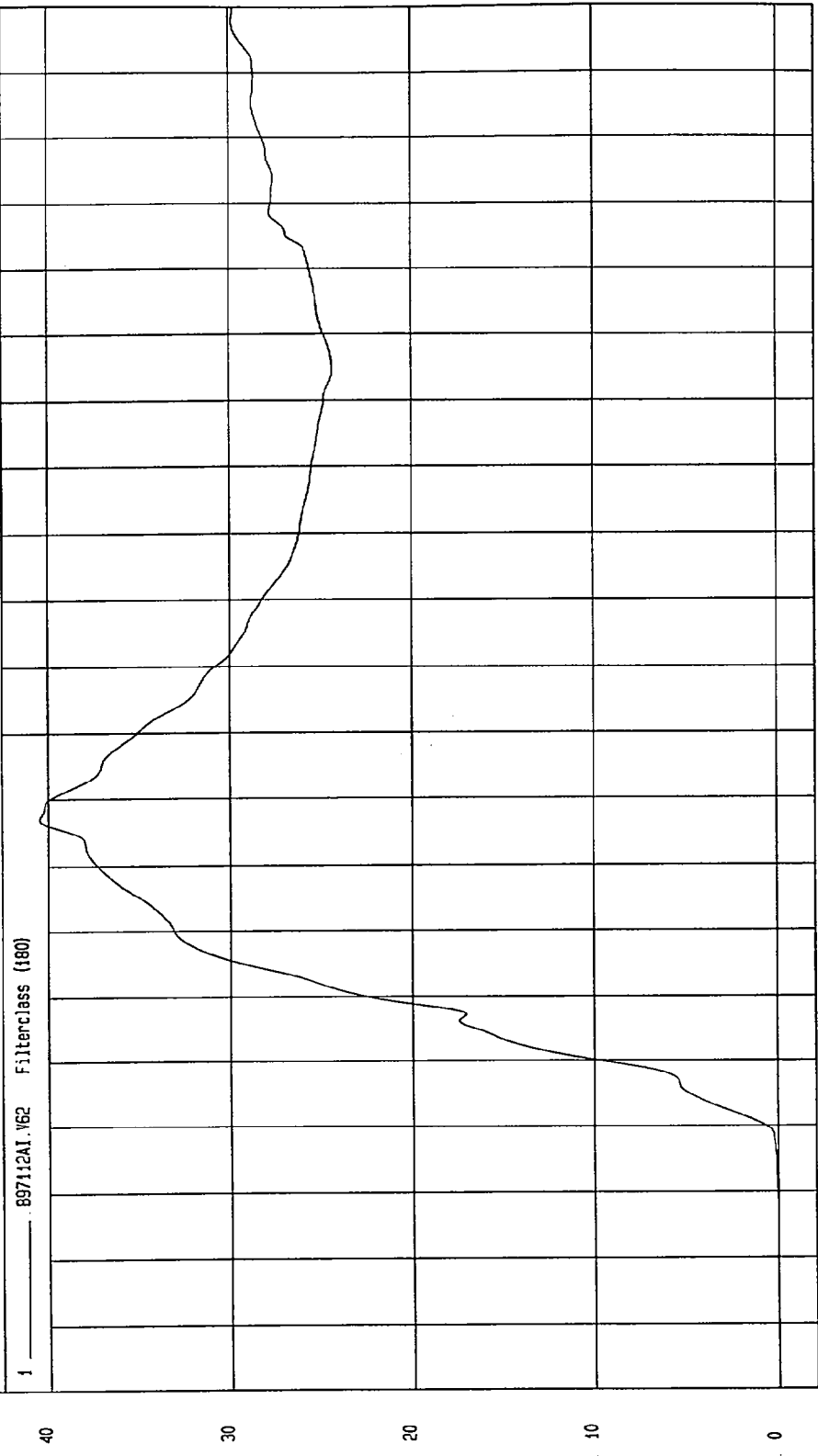


TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.72E-03 KPH at -15 msec Maximum = 40.47 KPH at 67 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY



1 897112A1.V62 Filterclass (180)

TIME Seconds

NEA Research
10-06-1997 18:20

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

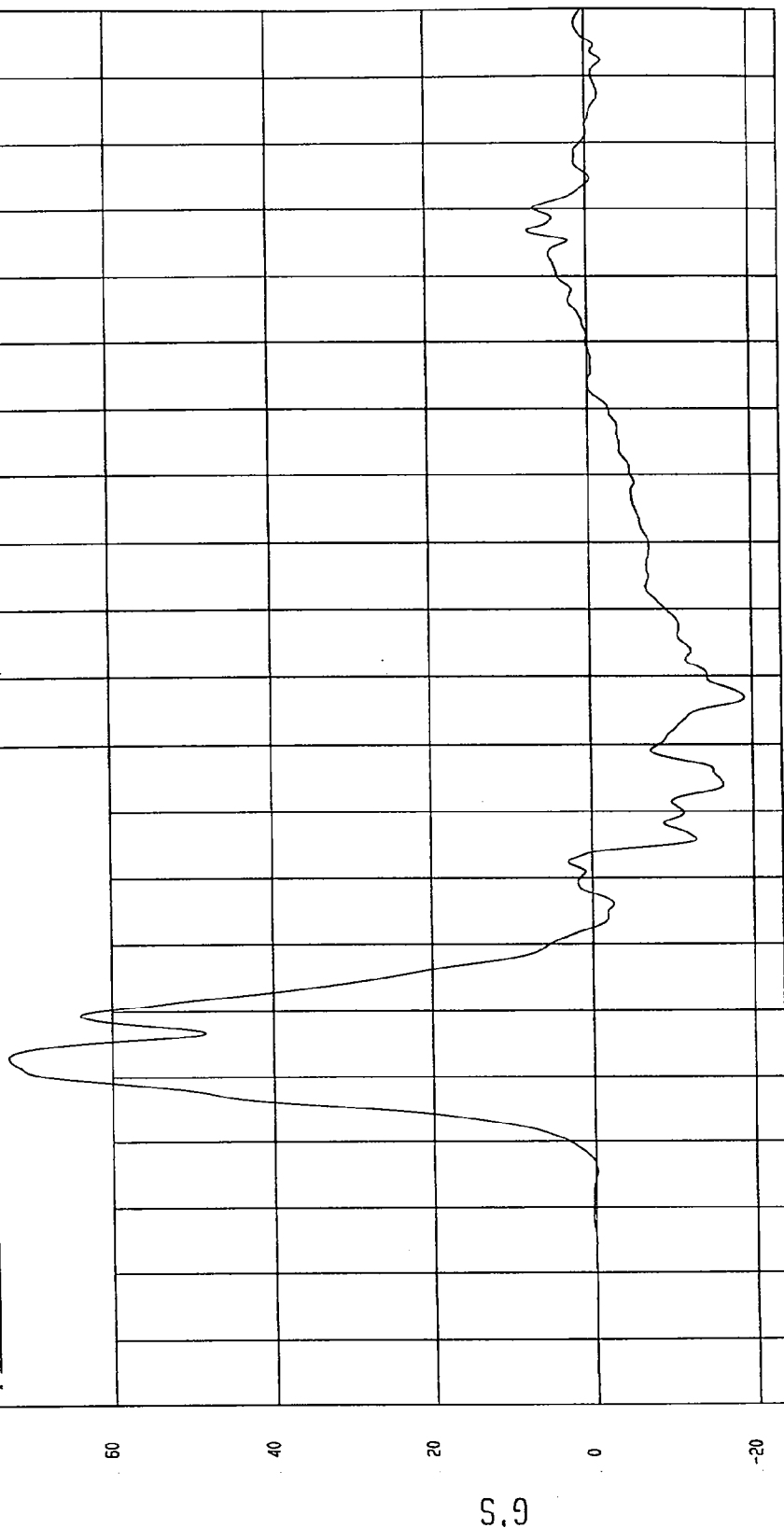
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 72.76 G'S at 33 msec

Minimum = -18.99 G'S at 87 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 897112AF.A53 Filterclass (180)



TIME (SECONDS)

MCA Research
10-08-1997 18: 15

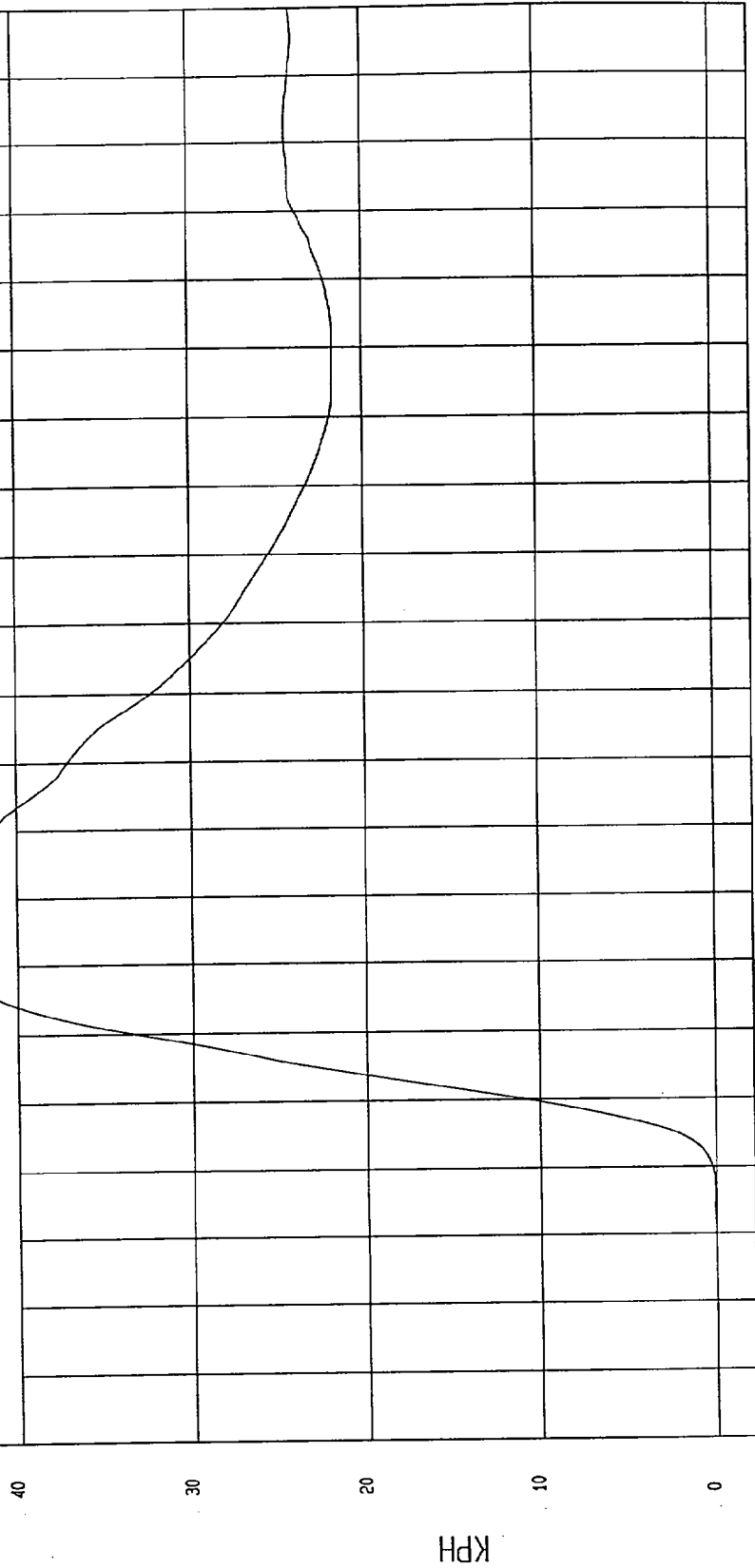
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -2.22E-03 KPH at -16 msec Maximum = 43.67 KPH at 64 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— 897112A1.V63 Filterclass (180)



TIME Seconds

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
10-06-1997 16:20

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 87.94 G'S at 31 msec

Minimum = -20.59 G'S at 55 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

1 — 897112AF.A65 Filterclass (180)

G.S



MSA Research
10-06-1997 18:15

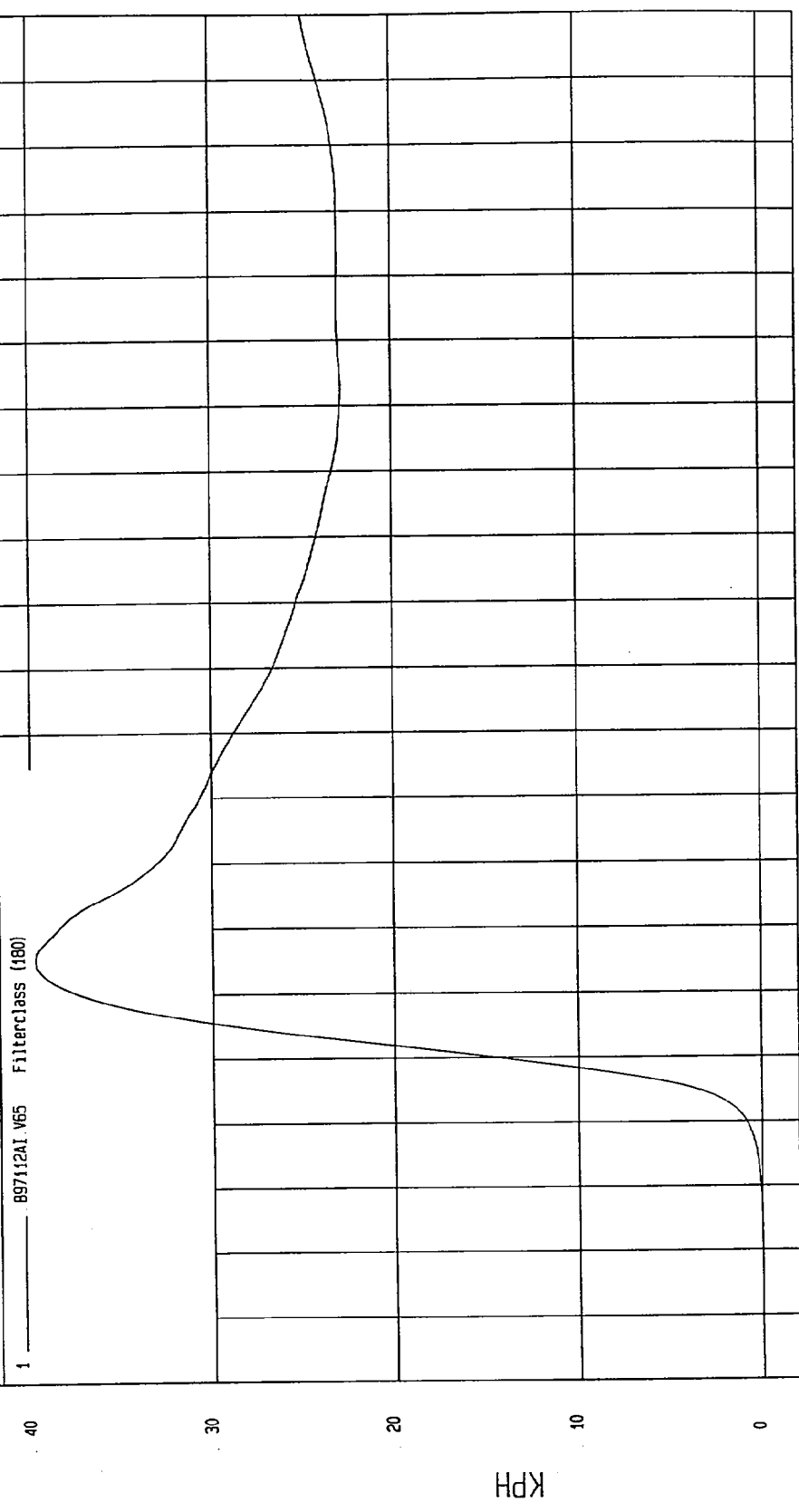
TIME (SECONDS)

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = 0 KPH at -20 msec Maximum = 39.74 KPH at 46 msec

DRIVER PELVIS Y REDUNDANT VELOCITY



MCA Research
10-08-1997 18:20

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 48.24 G'S at 47 msec

Minimum = -9.90 G'S at 79 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 897112AF.A66 Filterclass (180)

50

40

30

20

10

0

-10

G'S

.18

.17

.16

.15

.14

.13

.12

.11

.1

.09

.08

.07

.06

.05

.04

.03

.02

.01

0

-.01

-.02

TIME (SECONDS)

MGA Research
10-08-1997 18:15

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

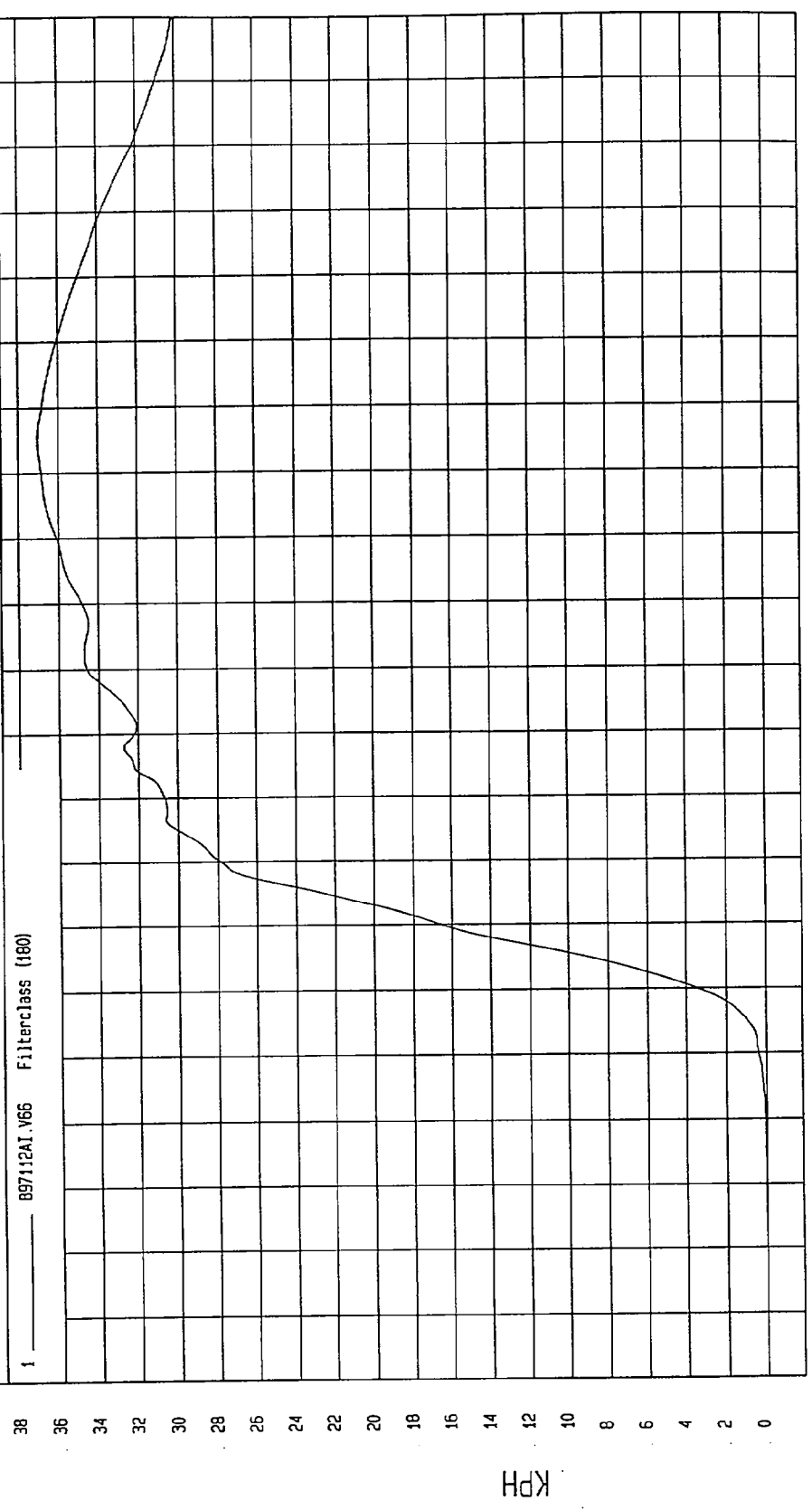
SPEED: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 37.02 KPH at 125 msec

Minimum = -2.17E-03 KPH at -17 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY



WCA Research
10-08-1997 18:20

TIME Seconds

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

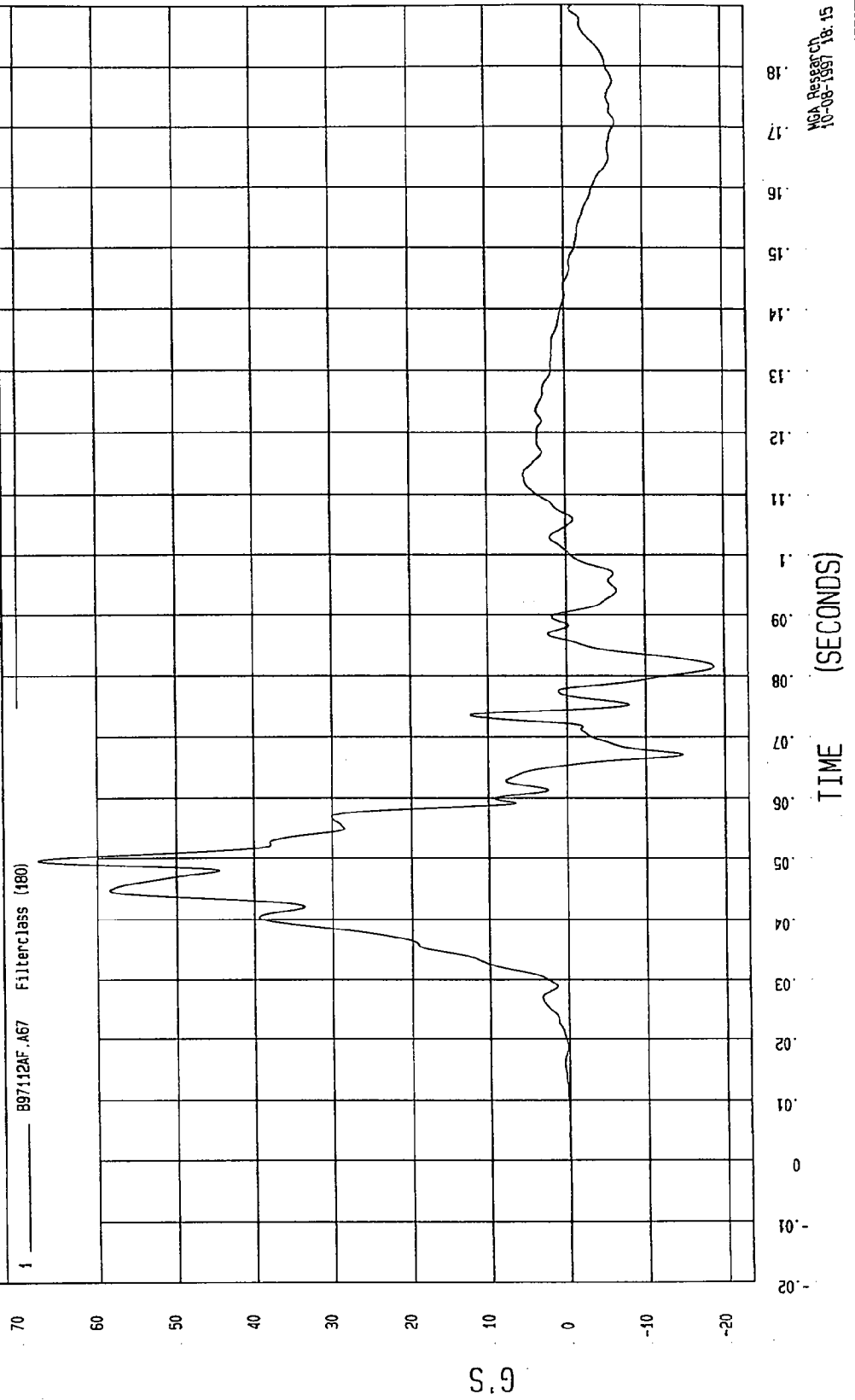
Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 67.51 G's at 50 msec

Minimum = -19.66 G's at 82 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION



MCA Research
10-08-1997 18:15

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

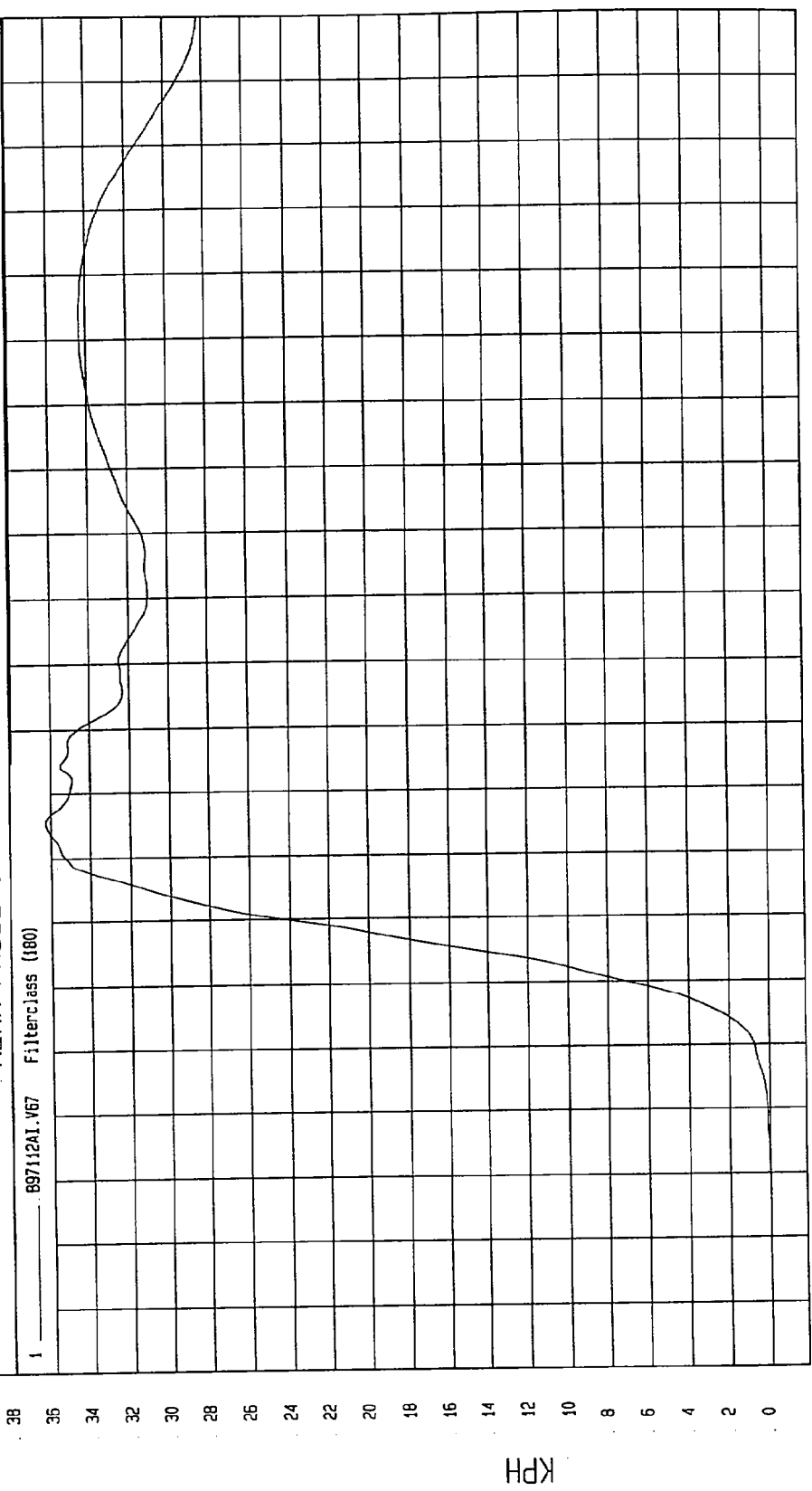
Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 36.27 KPH at 65 msec

Minimum = -3.22E-03 KPH at -17 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY



WCA Research
10-06-1997 16:20

TIME Seconds

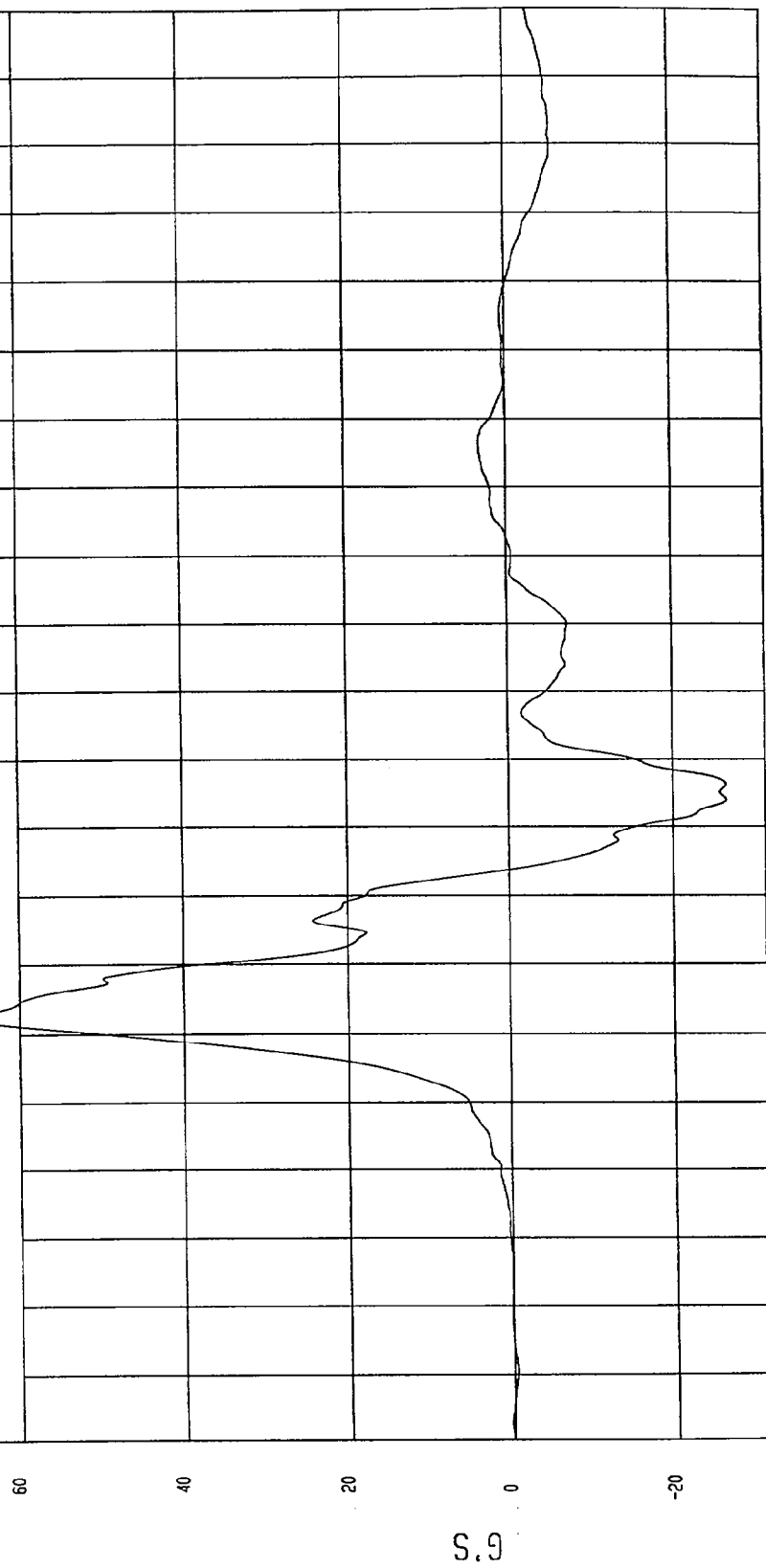
TEST: FMVSS 214 LEFT SIDE IMPACT
SPEED: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Minimum = -26.46 G'S at 74 msec
Maximum = 66.28 G'S at 42 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 897112AF.A68 Filterclass (180)



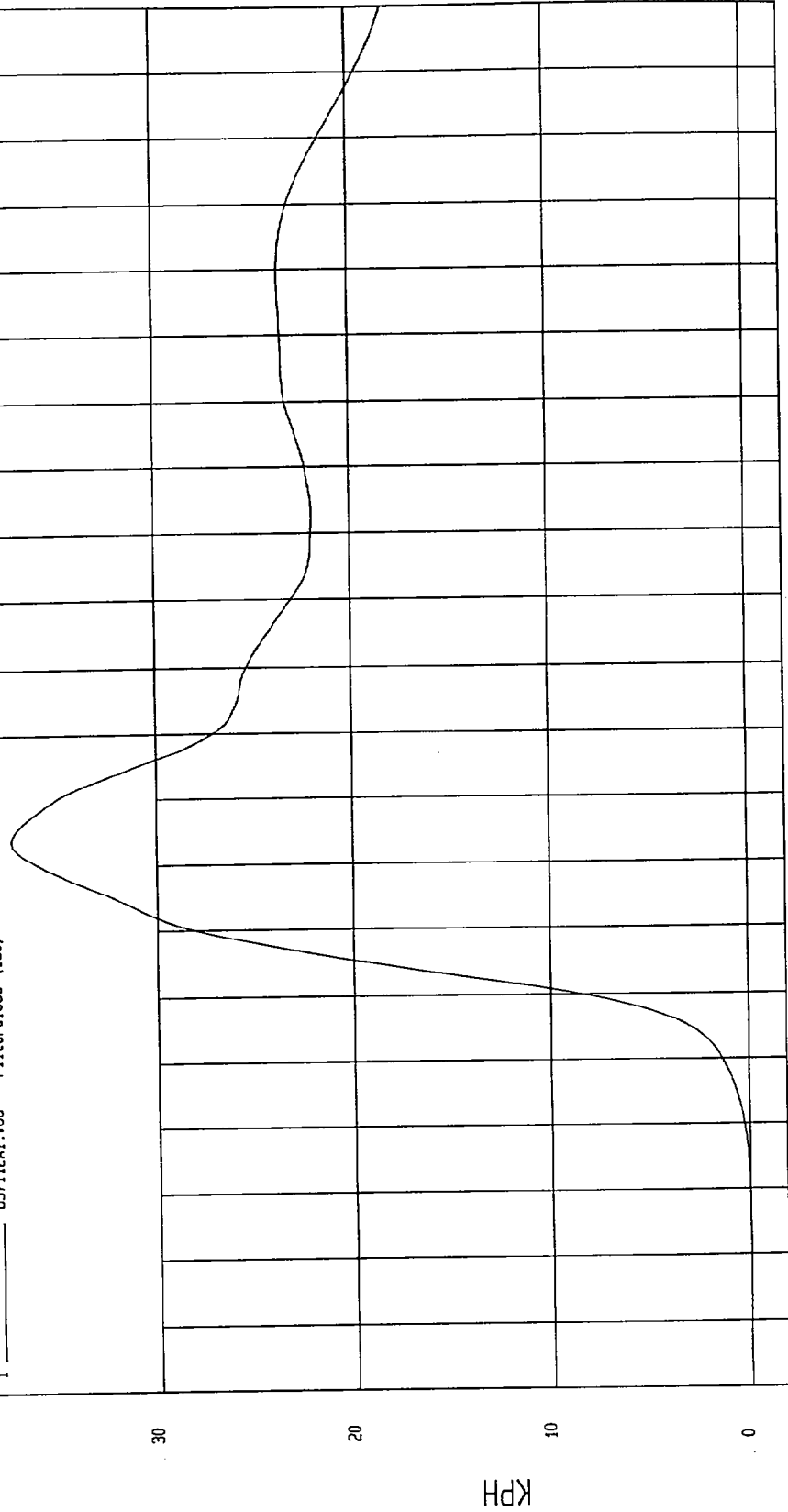
MCA Research
10-08-1997 18.15

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -3.57E-02 KPH at -4 msec Maximum = 37.33 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— B97112A1.V68 Filterclass (180)



TIME Seconds
NCA Research
10-08-1997 18:20

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

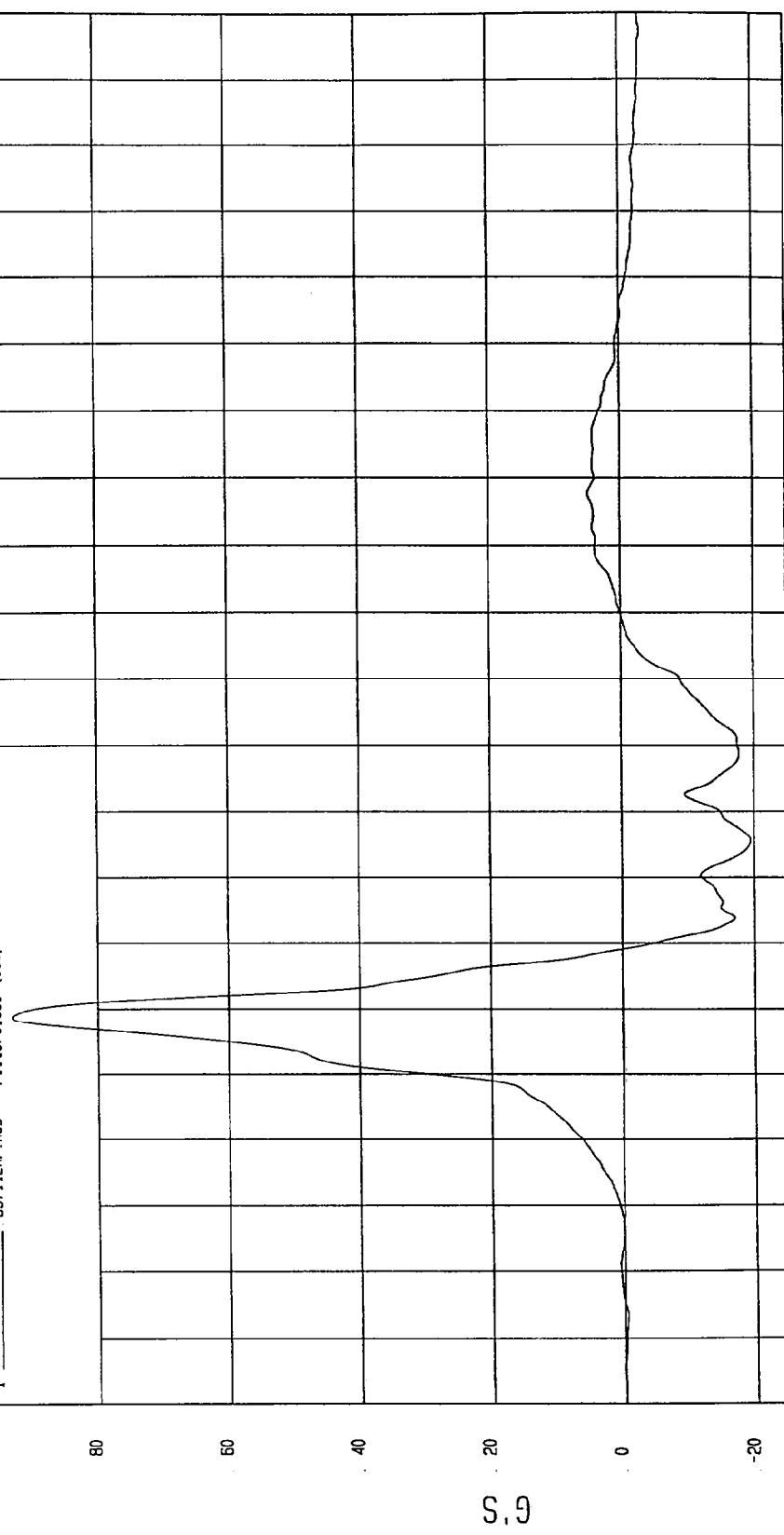
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 92.94 G'S at 39 msec

Minimum = -19.41 G'S at 66 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 _____ B97112AF.A69 Filterclass (180)



MCA Research
10-08-1997 16.16

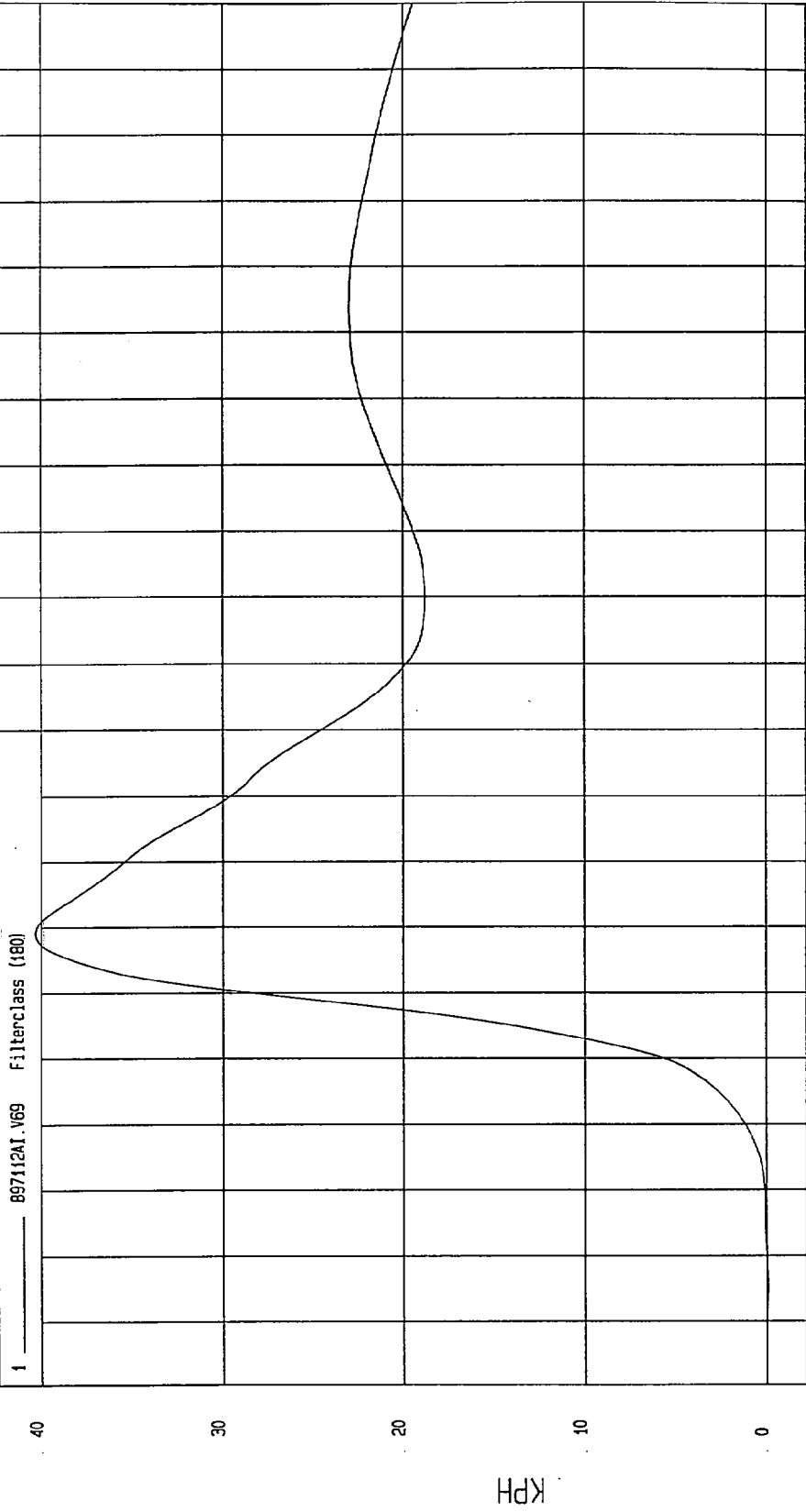
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

Maximum = 40.32 KPH at 49 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

Minimum = -8.12E-02 KPH at -5 msec



McA Research
10-08-1997 18:20

TIME Seconds

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

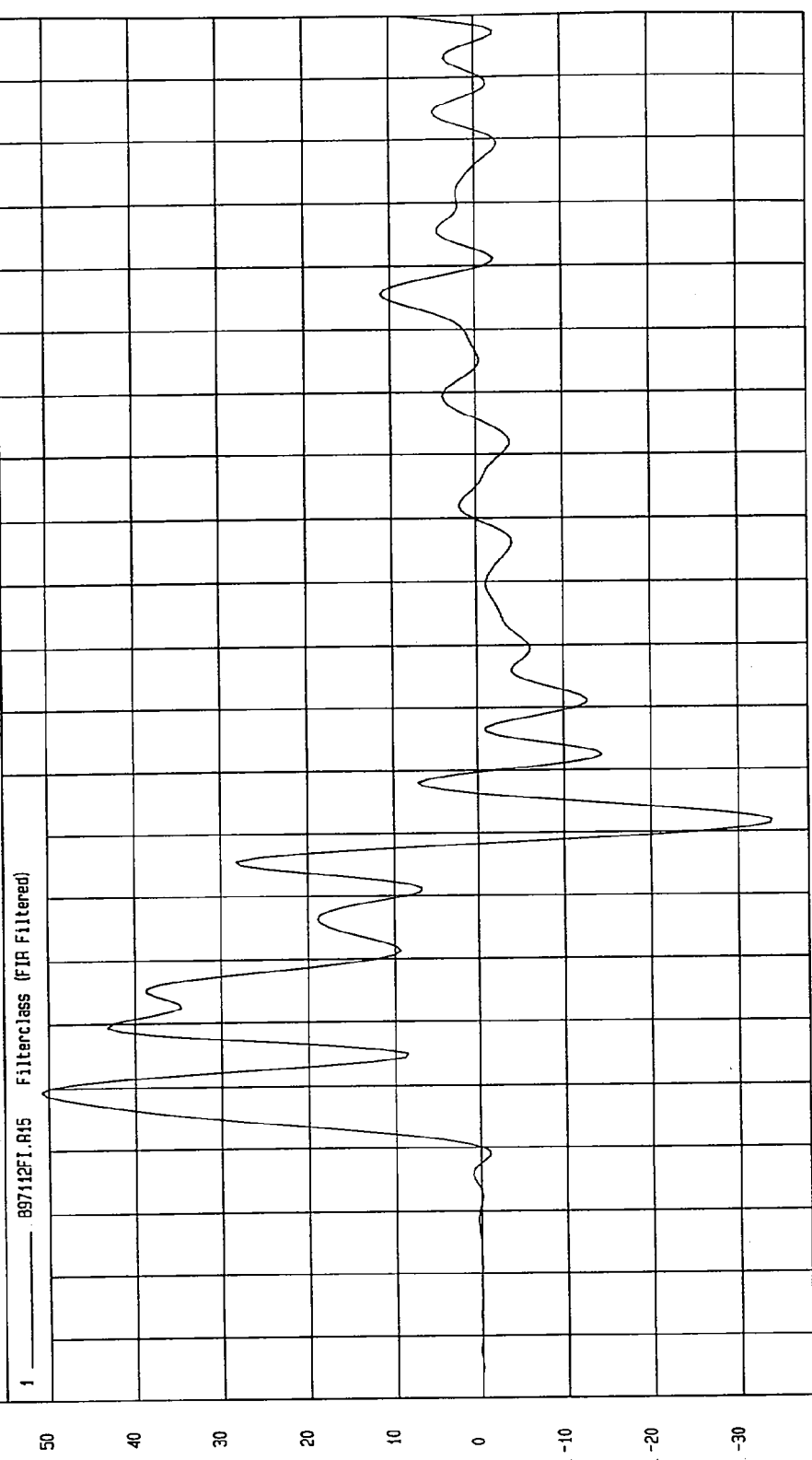
Speed: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 50.86 G'S at 29 msec

Minimum = -33.89 G'S at 72 msec

DRIVER UPPER RIB Y ACCELERATION



MEA Research
09-27-1997 14:44

TIME (SECONDS)

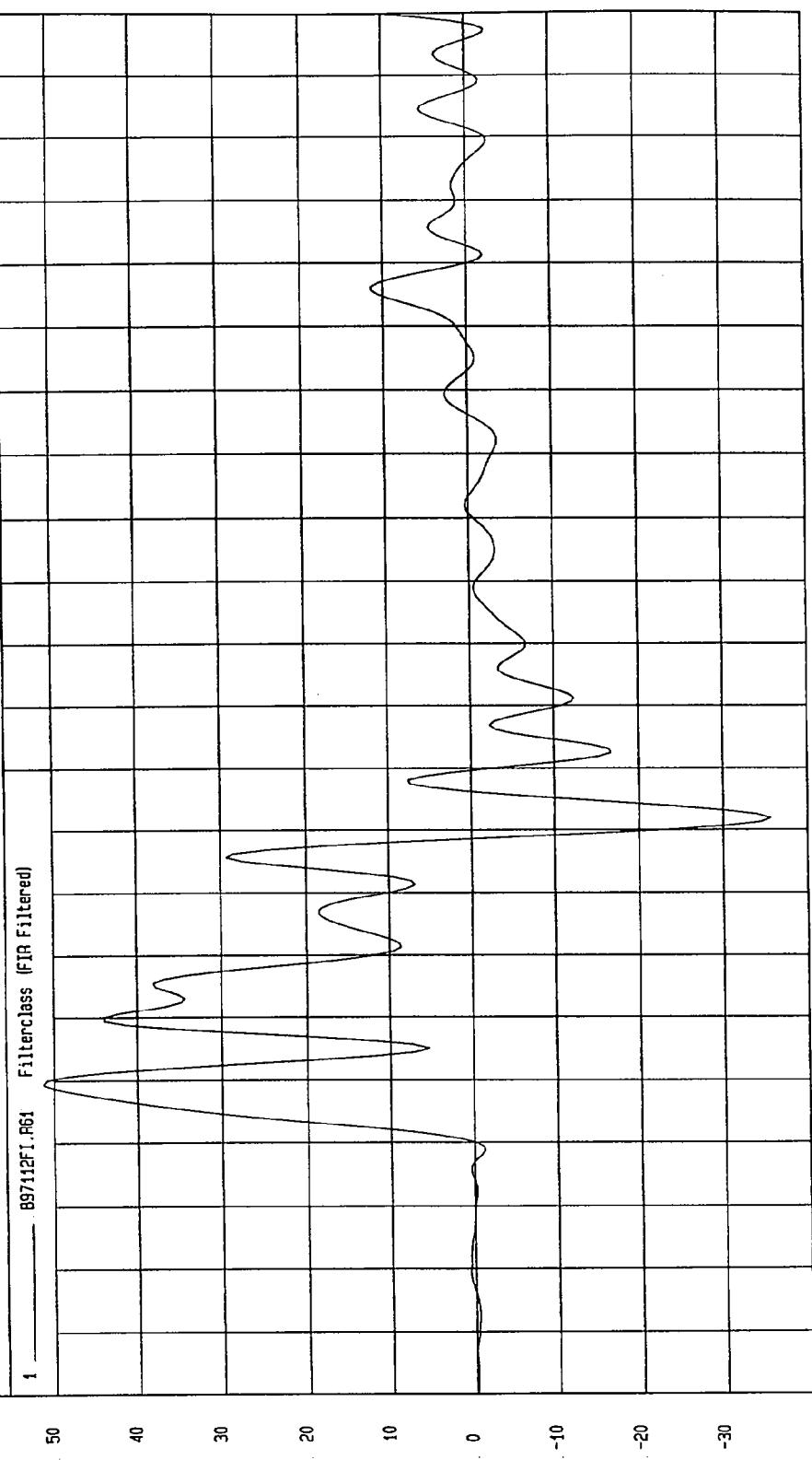
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Minimum = -35.61 G'S at 72 msec Maximum = 51.29 G'S at 29 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



MOA Research
09-27-1997 14: 44

TIME (SECONDS)

G.S

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

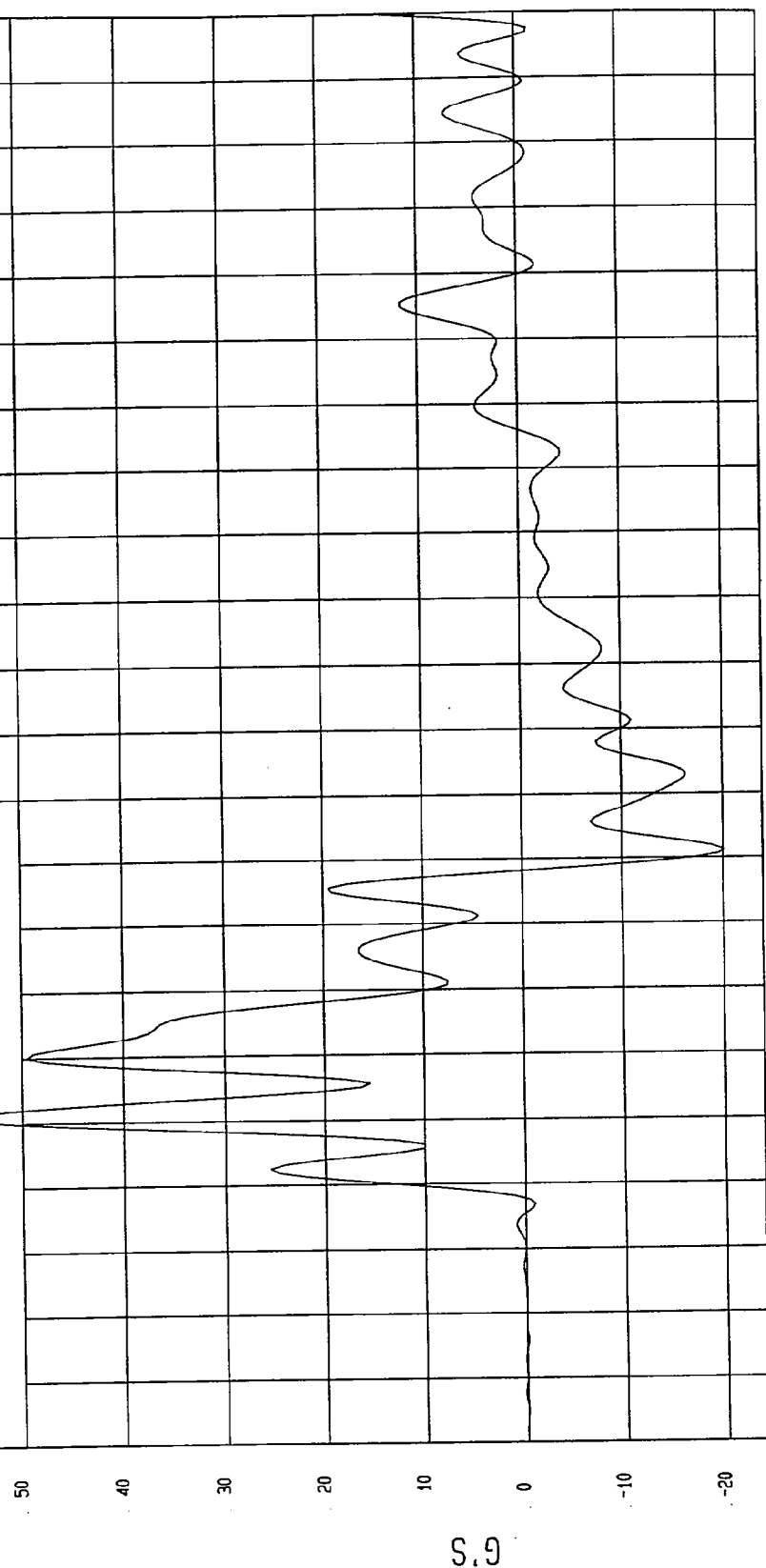
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 55.44 G'S at 31 msec

Minimum = -20.10 G'S at 71 msec

DRIVER LOWER RIB Y ACCELERATION

1 897112FI.R16 Filterclass (FIR Filtered)



NCA Research
09-27-1997 14:44

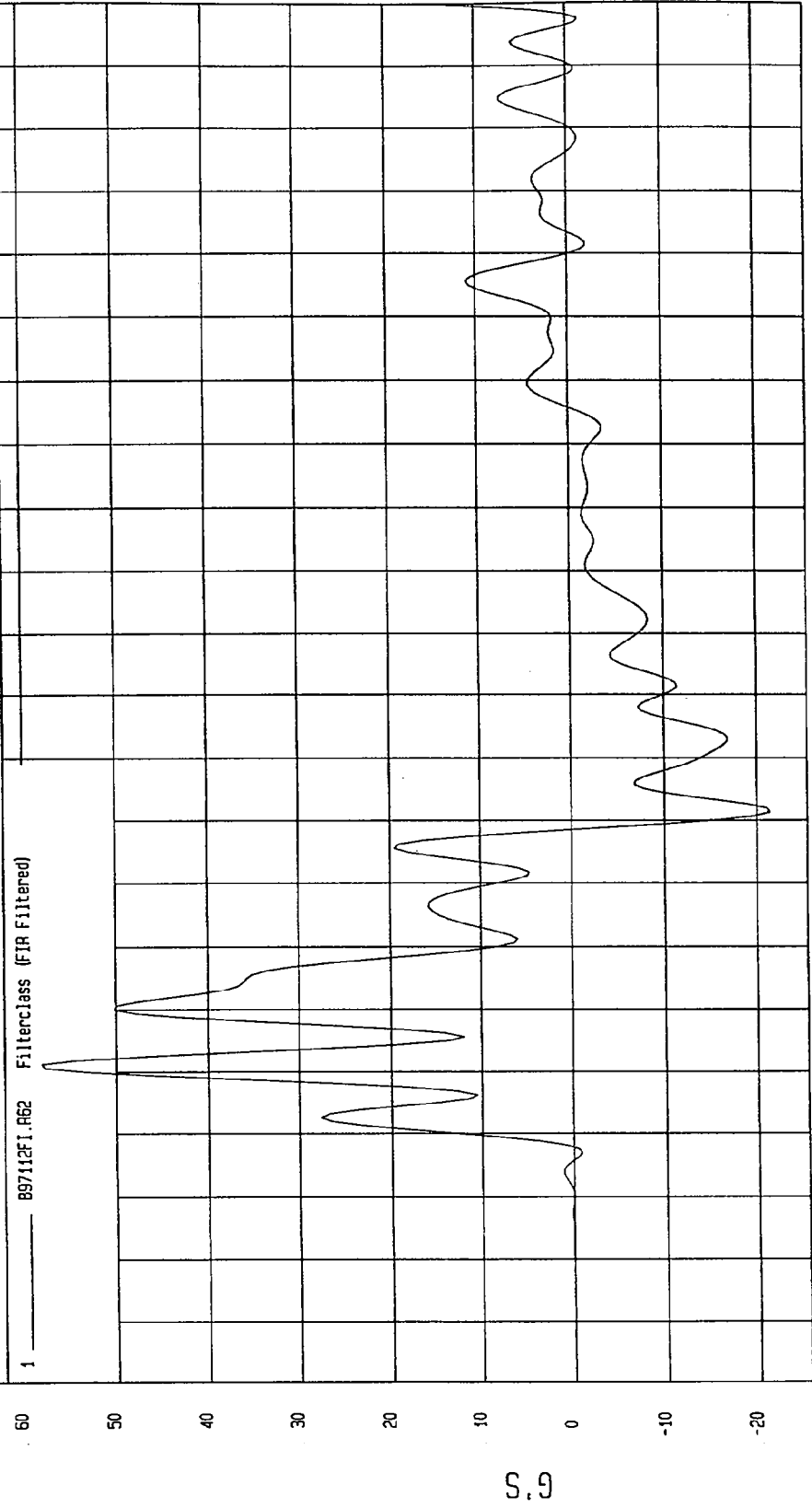
TIME (SECONDS)

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -21.40 G'S at 71 msec Maximum = 58.07 G'S at 31 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION



NSA Research
09-27-1997 14: 44

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

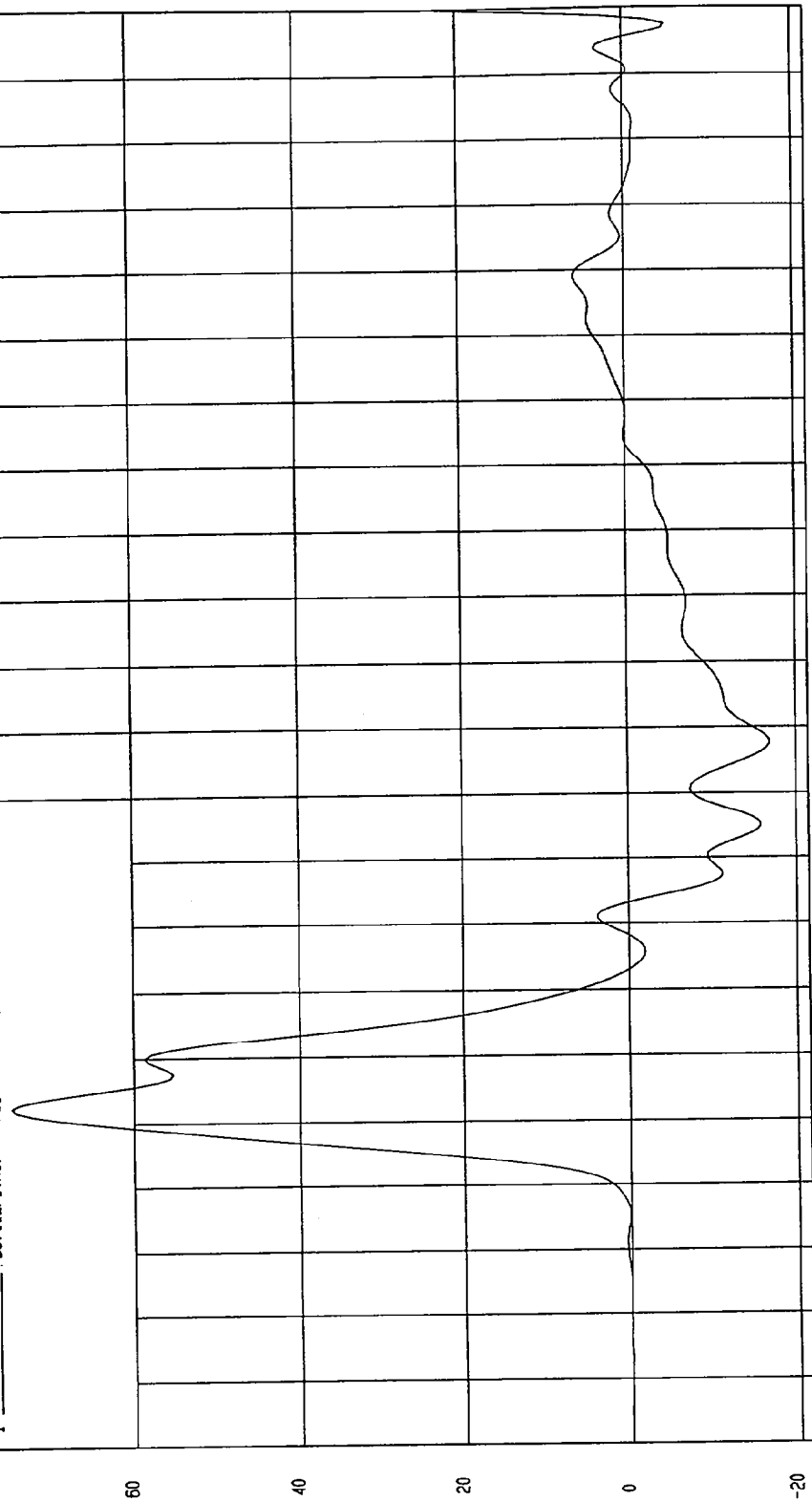
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 74.61 G'S at 32 msec

Minimum = -16.91 G'S at 88 msec

DRIVER LOWER SPINE Y ACCELERATION

1 897112FI.R17 Filterclass (FIR Filtered)



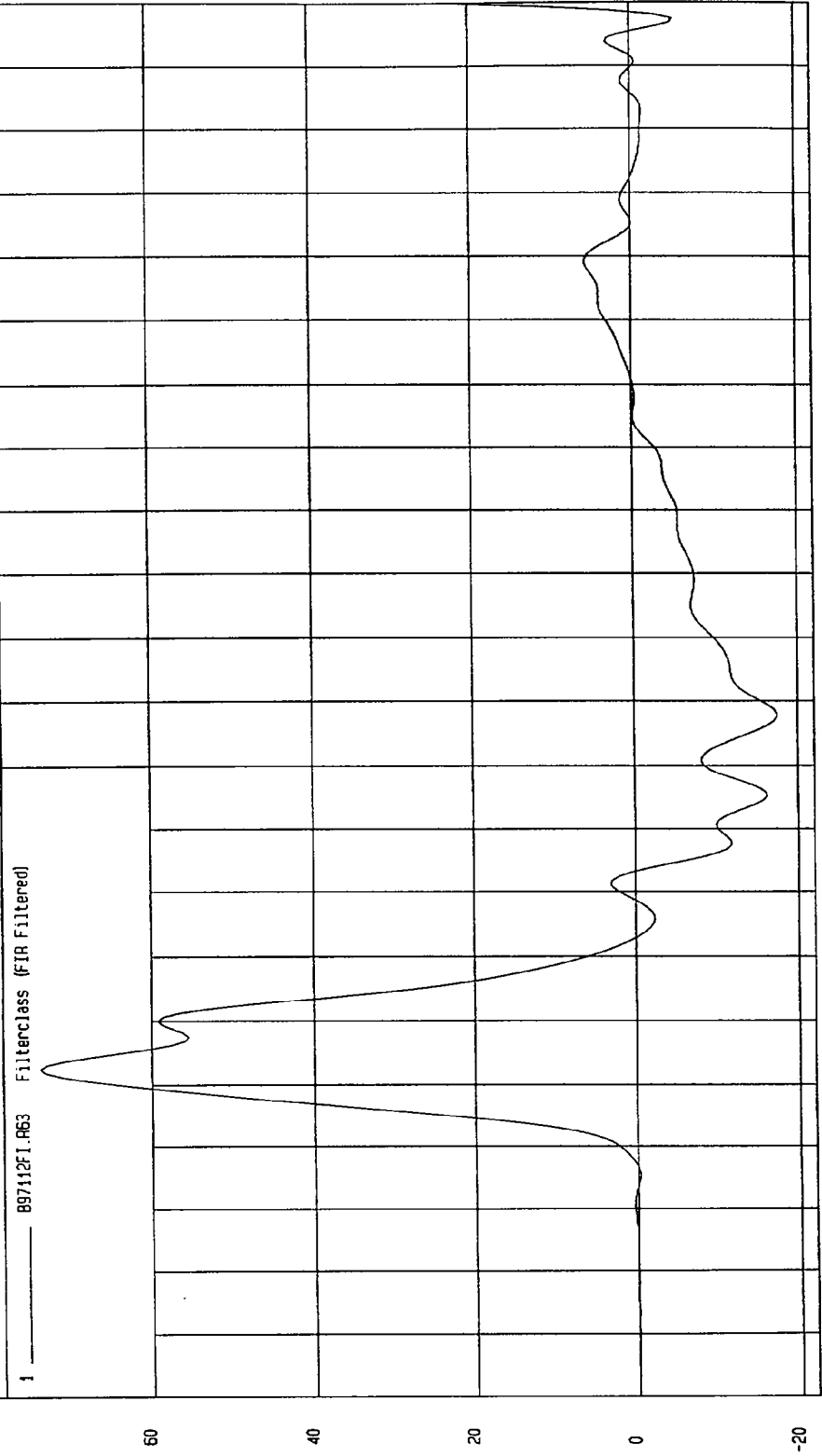
MPA Research
09-27-1997 14:44

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -17.44 G'S at 88 msec Maximum = 73.63 G'S at 32 msec

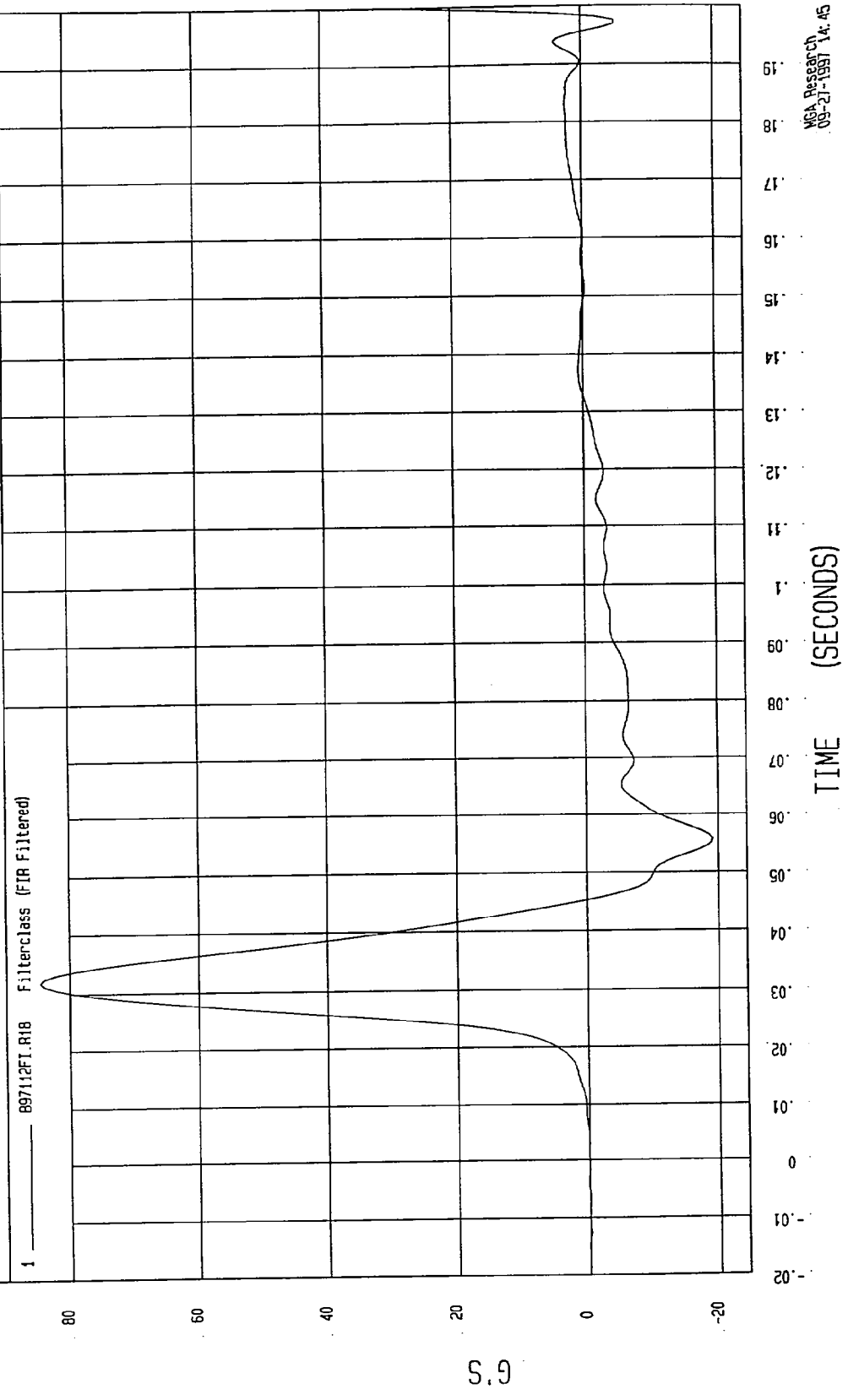
DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

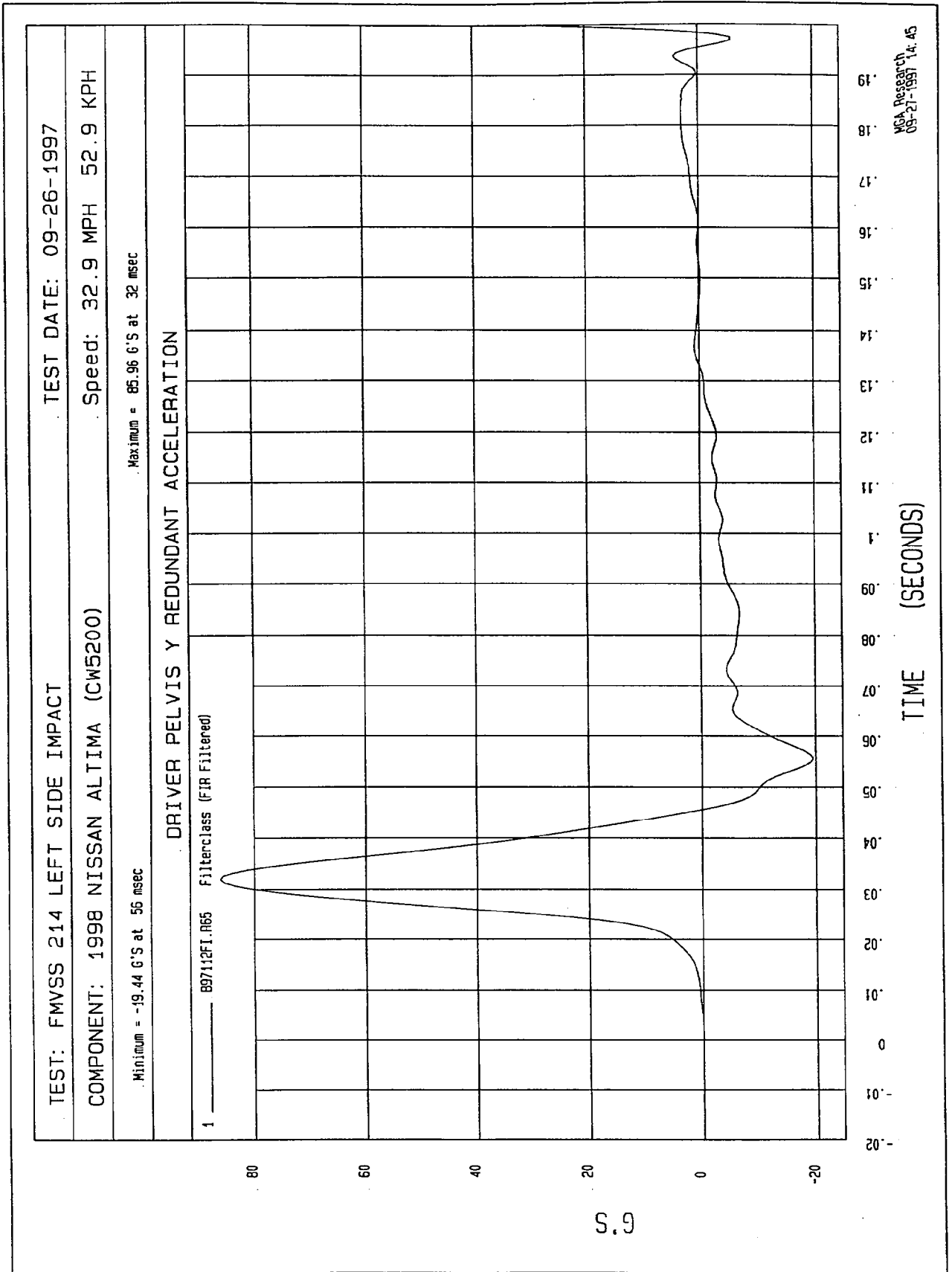


MGA Research
09-27-1997 1A: 45

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH
Minimum = -19.17 G's at 56 msec Maximum = 84.43 G's at 32 msec

DRIVER PELVIS Y ACCELERATION





TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

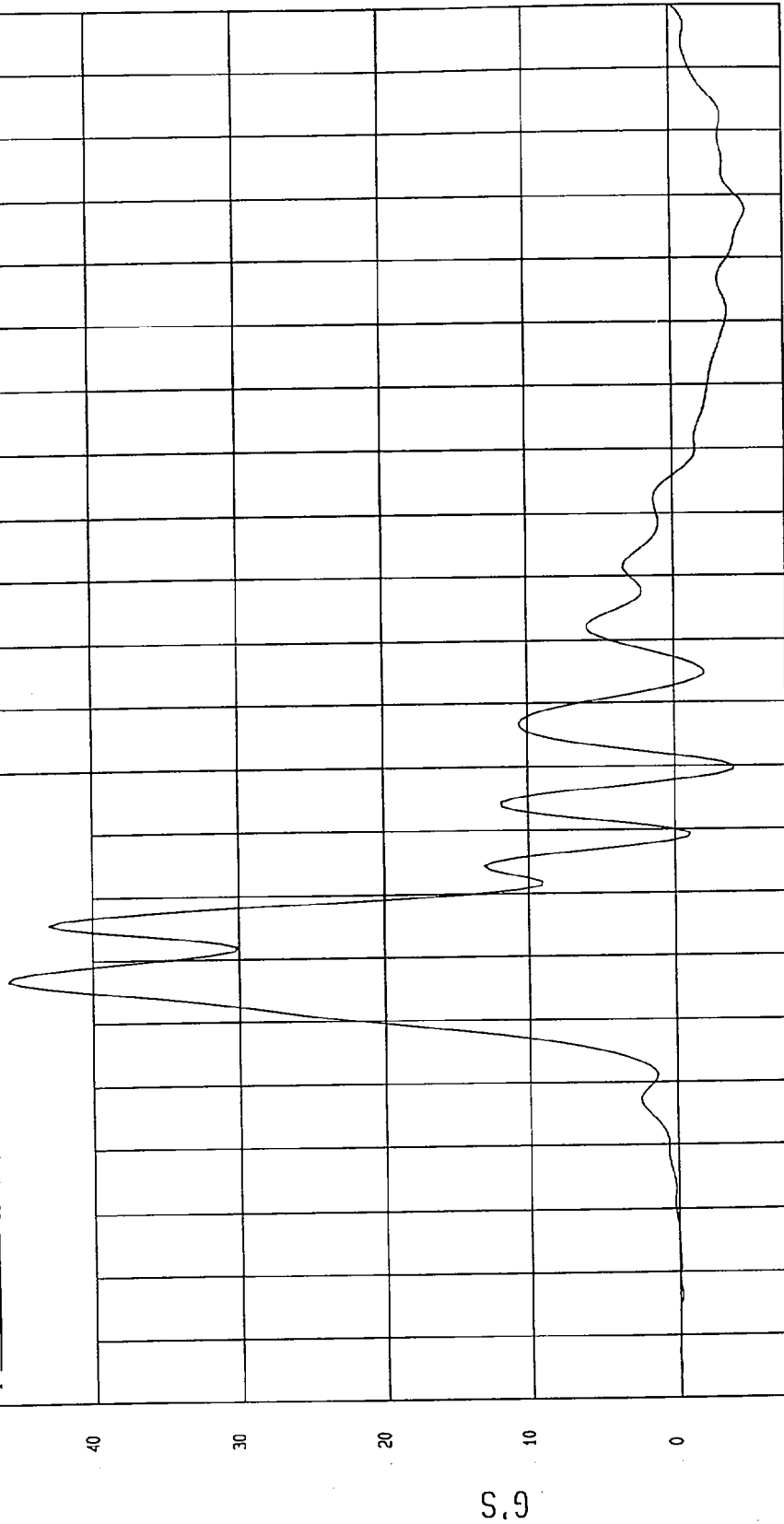
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 45.79 G's at 47 msec

Minimum = -4.93 G's at 168 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 897112F1.R25 Filterclass (FIR Filtered)



MCA Research
09-27-1997 14:45

TIME (SECONDS)

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

SPEED: 32.9 MPH 52.9 KPH

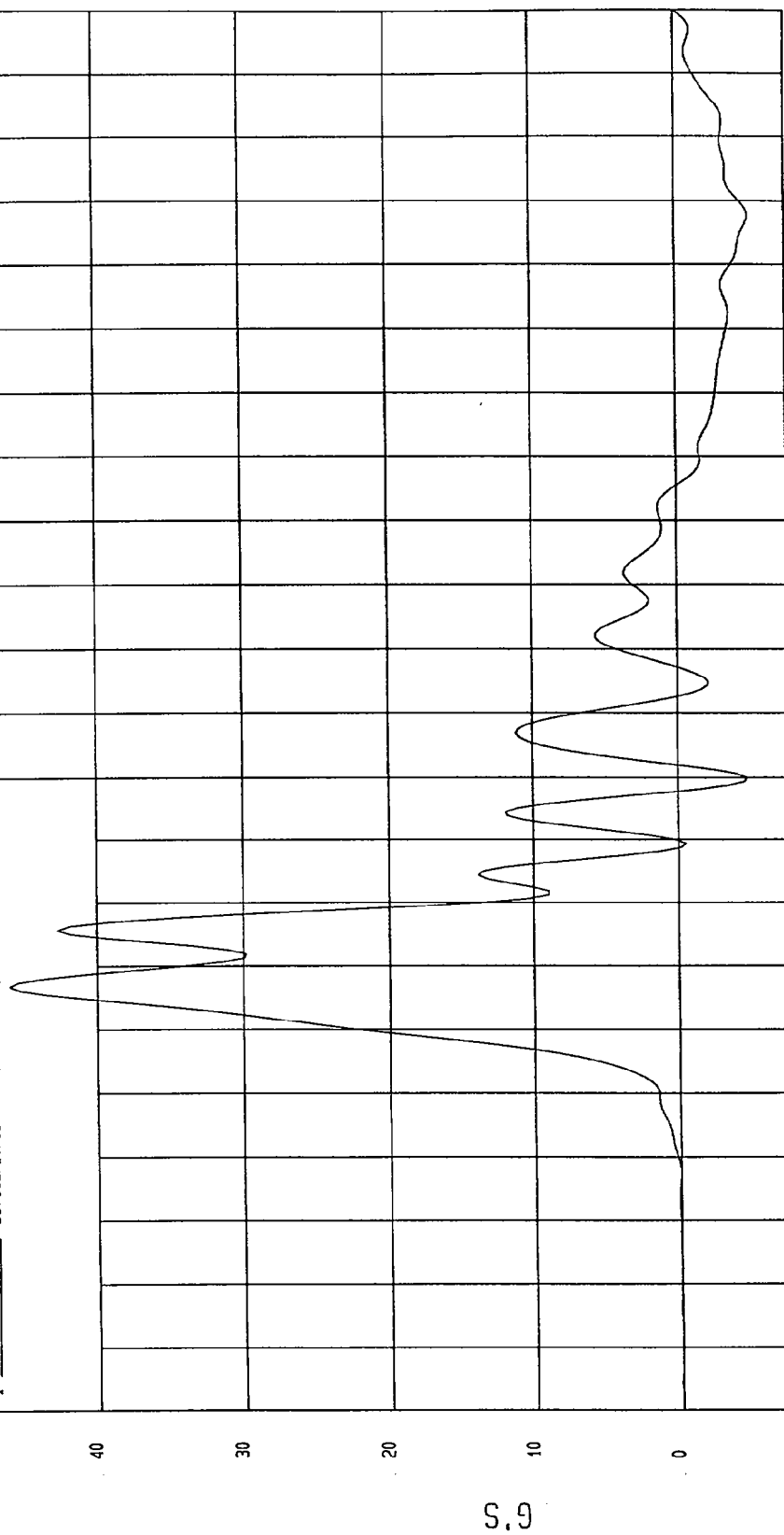
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 45.96 G'S at 47 msec

Minimum = -4.95 G'S at 168 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 897112FI.R66 Filterclass (FIR Filtered)

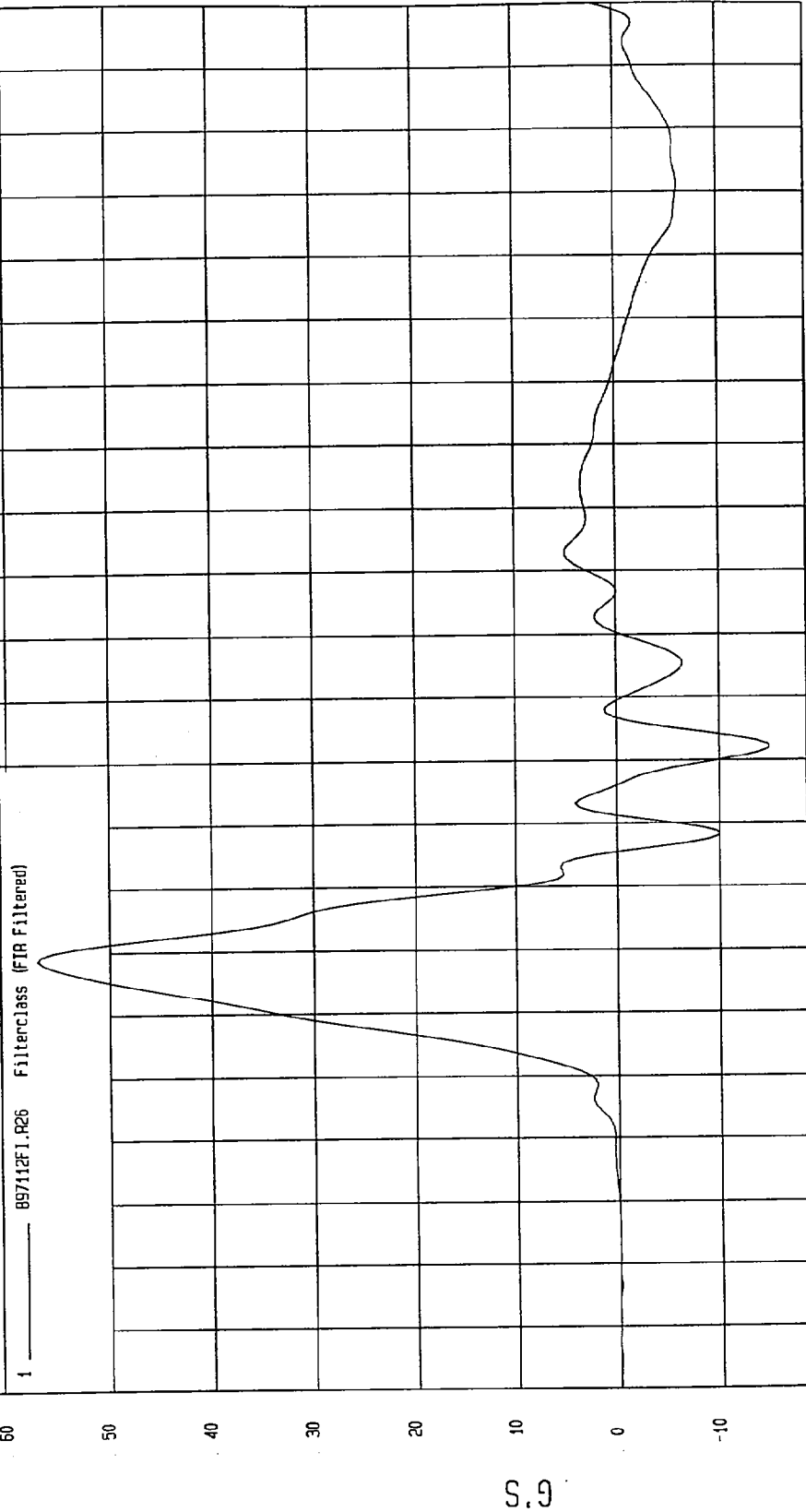


MGA Research
09-27-1997 14:45

TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997
COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -14.88 G'S at 82 msec Maximum = 57.02 G'S at 49 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



MGA Research
09-27-1997 14.45

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200)

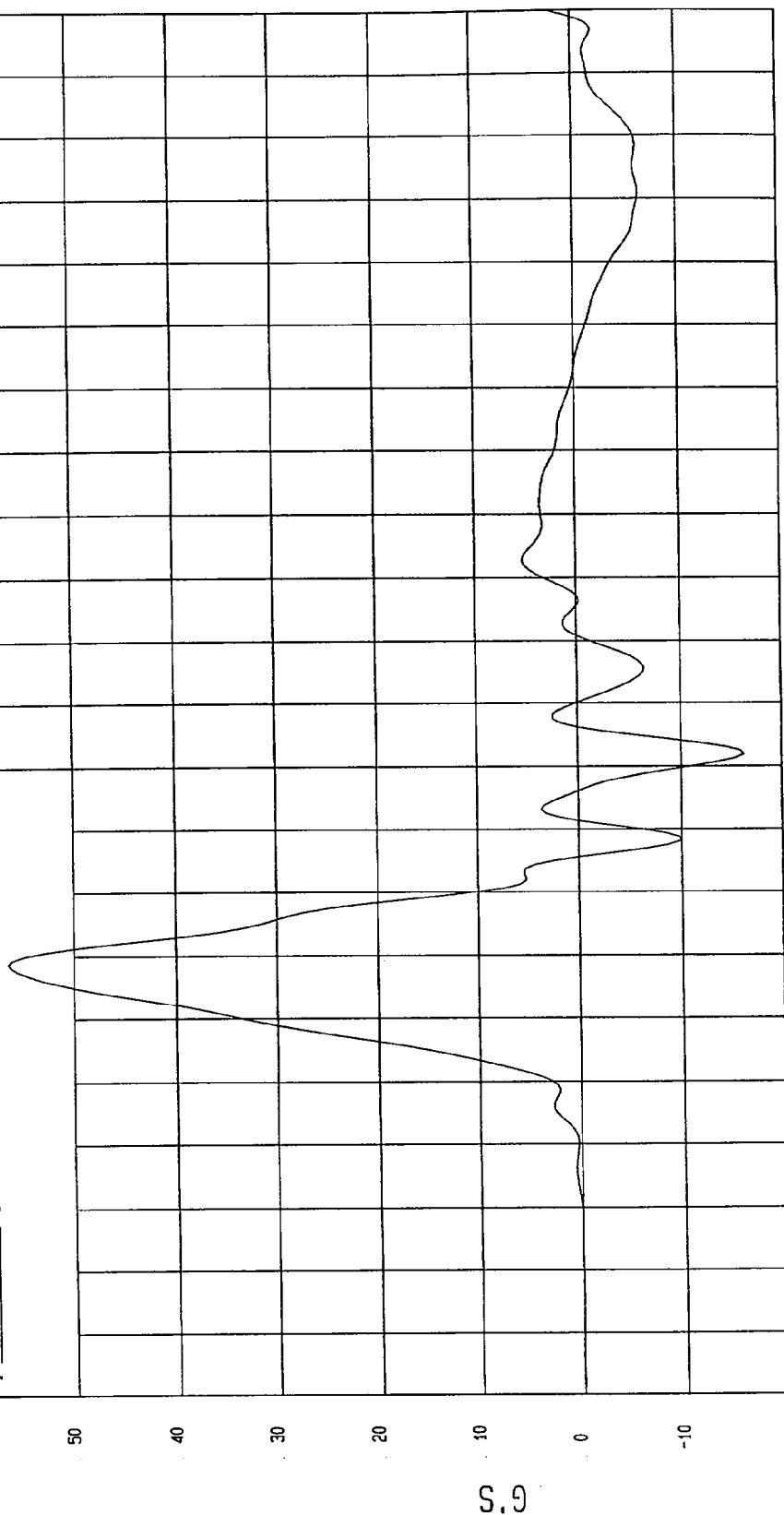
Speed: 32.9 MPH 52.9 KPH

Minimum = -15.99 G'S at 82 msec

Maximum = 56.34 G'S at 49 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 897112F1.R67 Filterclass (FIR Filtered)



MGA Research
09-27-1997 14.45

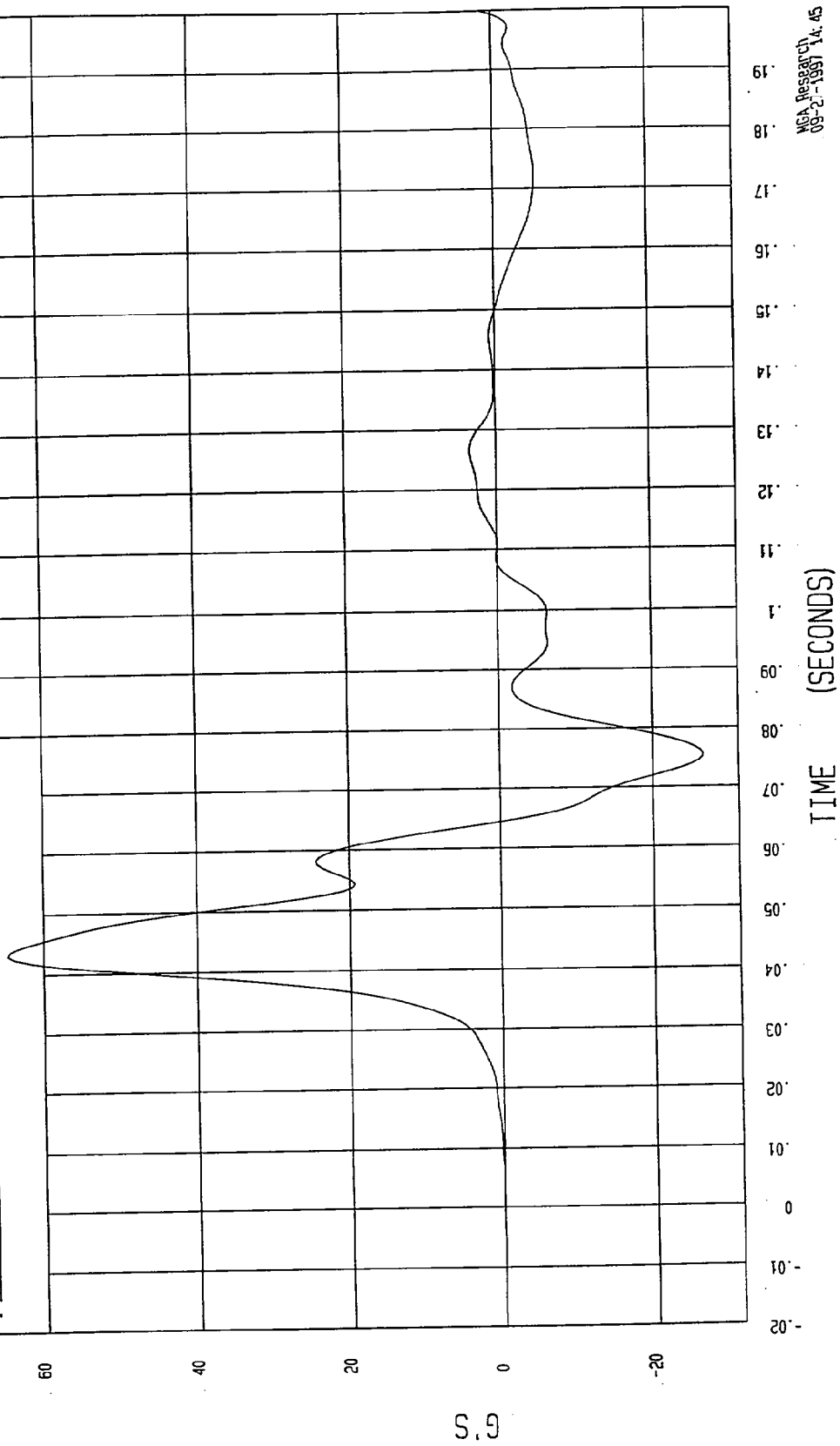
TEST: FMVSS 214 LEFT SIDE IMPACT TEST DATE: 09-26-1997

COMPONENT: 1998 NISSAN ALTIMA (CW5200) Speed: 32.9 MPH 52.9 KPH

Minimum = -26.46 G'S at 76 msec Maximum = 64.66 G'S at 43 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 897112F1.R27 Filterclass (FIR Filtered)



NGA Research
09-26-1997 14:45

TEST DATE: 09-26-1997

TEST: FMVSS 214 LEFT SIDE IMPACT

Speed: 32.9 MPH 52.9 KPH

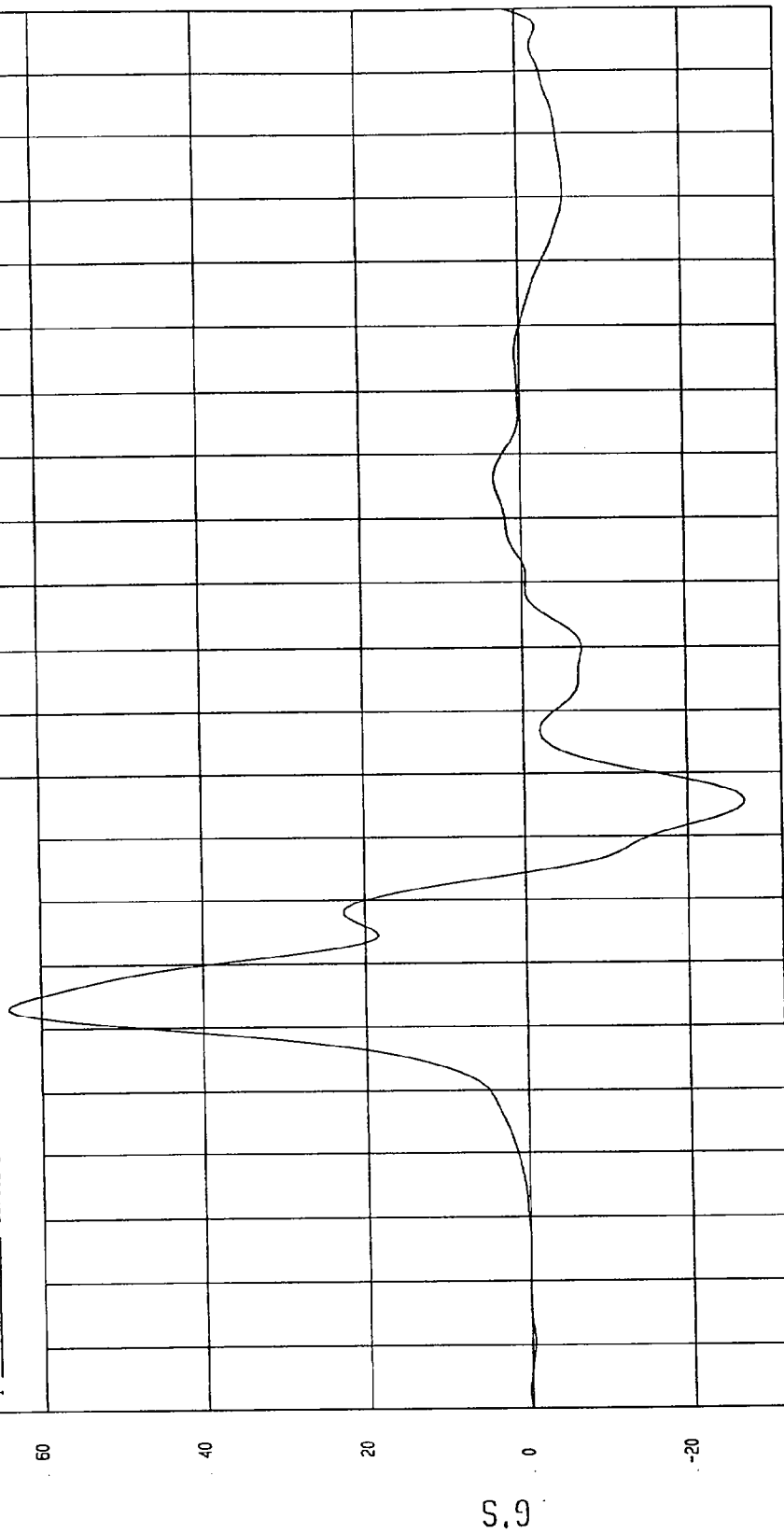
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 63.97 G'S at 43 msec

Minimum = -26.98 G'S at 76 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 B97112F1.068 Filterclass (FIR Filtered)



MOA Research
09-27-1997 1A: 45

TIME (SECONDS)

G's

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

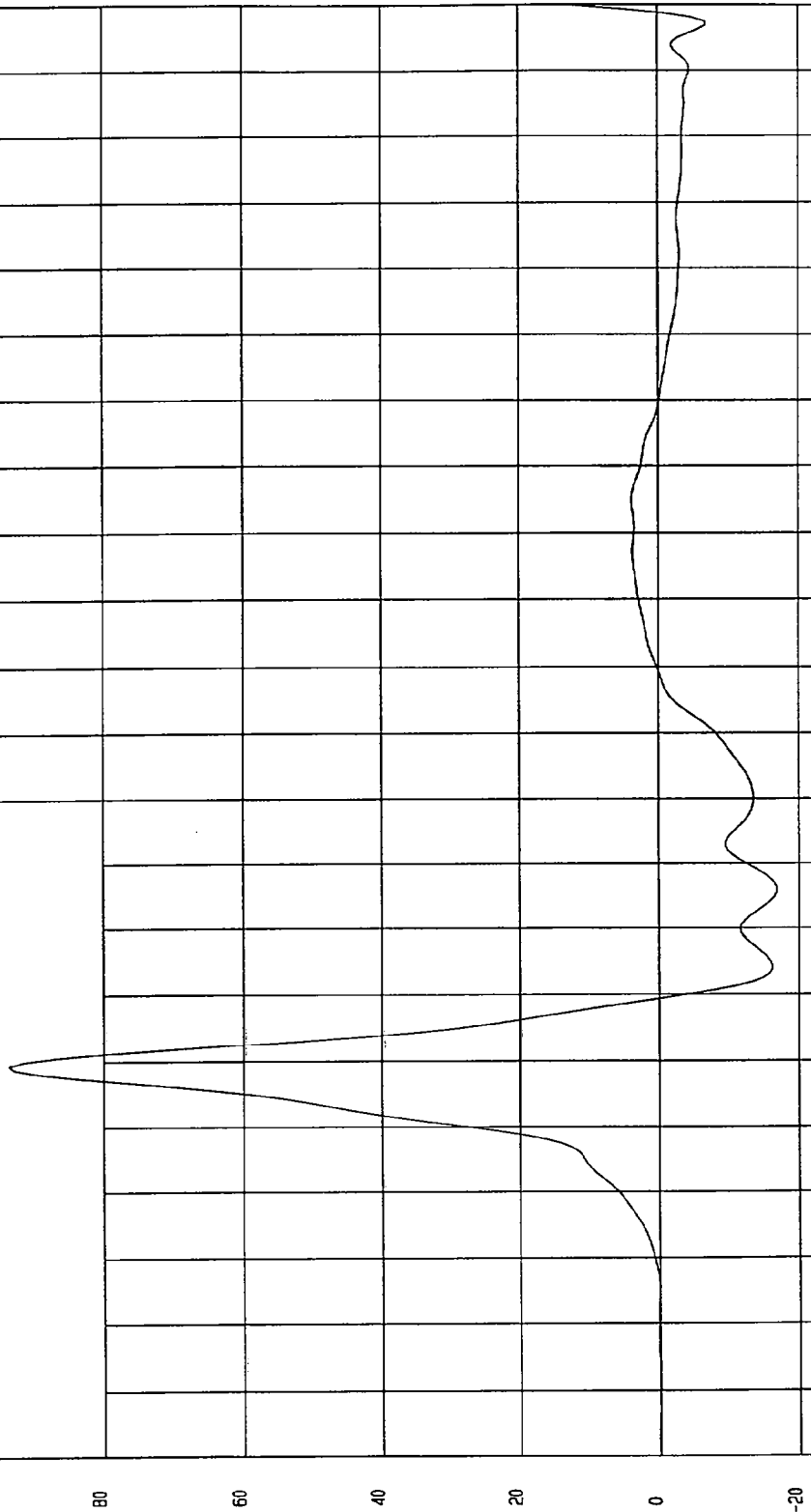
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Maximum = 93.56 G'S at 39 msec

Minimum = -16.76 G'S at 66 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 997112FLR20 Filterclass (FIR Filtered)



MSA Research
09-27-1997 14:45

TIME (SECONDS)

G's

TEST: FMVSS 214 LEFT SIDE IMPACT

TEST DATE: 09-26-1997

Speed: 32.9 MPH 52.9 KPH

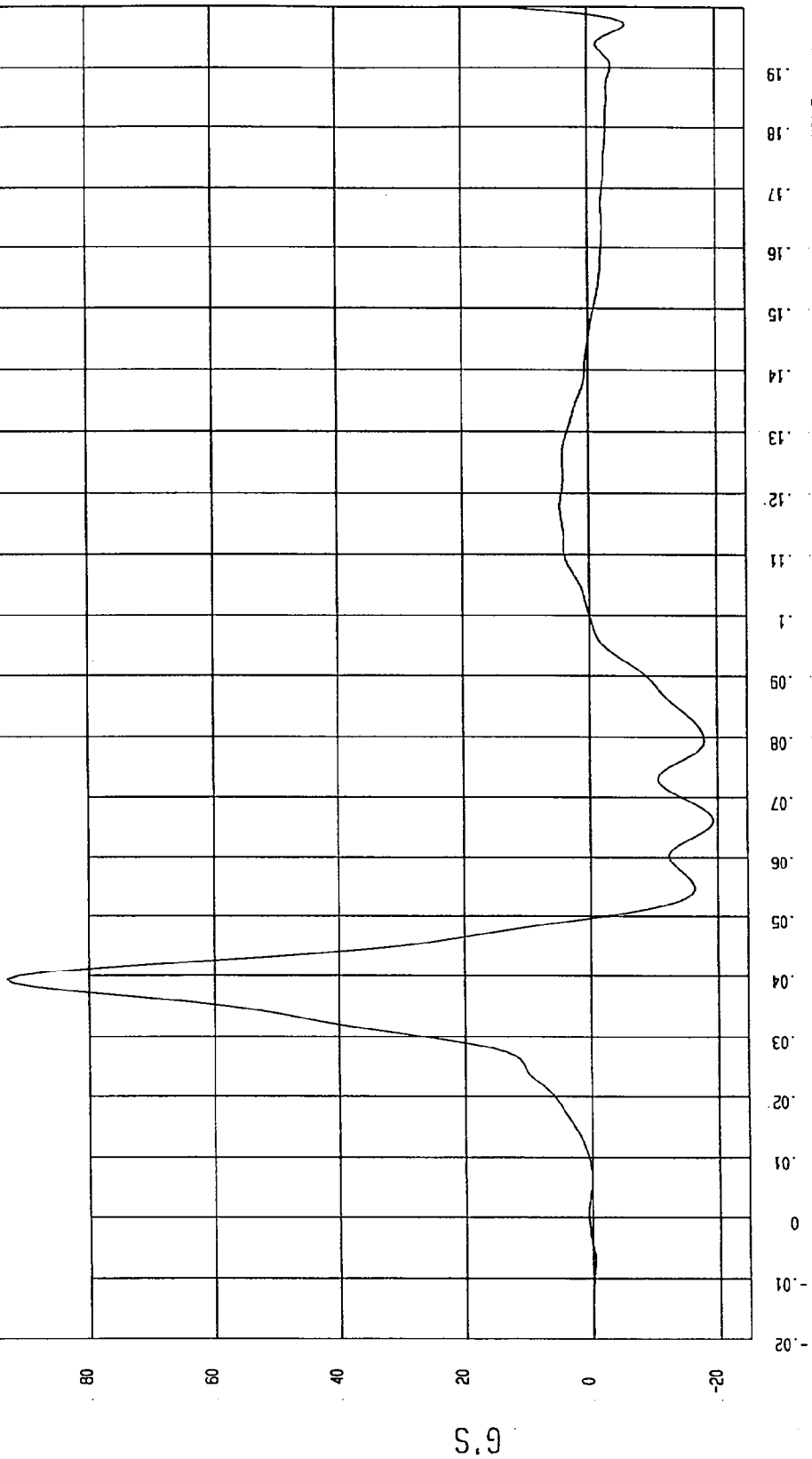
COMPONENT: 1998 NISSAN ALTIMA (CW5200)

Minimum = -19.26 G's at 66 msec

Maximum = 92.92 G's at 39 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 897112FI.R69 Filterclass (FIR Filtered)



MECA Research
09-27-1997 14:45

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-98-DC05

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

NISSAN NORTH AMERICAL INC.
1998 NISSAN ALTIMA 4 DOOR
NHTSA NO. CW5200

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: September 26, 1997

Report Date: October 13, 1997

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NEF-30
400 SEVENTH STREET, S.W., ROOM 6115
Washington, D.C. 20590

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| DUMMY S/N: 048 | POST-TEST INSPECTION CHECKLIST | 5-1 |
| DUMMY S/N: 049 | POST-TEST INSPECTION CHECKLIST | 6-1 |
| | VEHICLE AND DUMMY TEMPERATURE | 7-1 |

PRE-TEST CERTIFICATION DATA

Front Dummy Serial Number: 048

Calibration Test Results Summary

Dummy Serial Number: 048

Pre-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 048

DATE OF VERIFICATION: September 26, 1997

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| SH - Seated Height | 35.0" - 35.8" | 35.3 |
| RH - Rib Height | 19.75" - 20.50" | 19.90 |
| HP - Hip Pivot Height | 3.9" ref. | 3.9 |
| RD - Rib From Back Line | 9.0" to 9.5" | 9.2 |
| KV - Knee Pivot From Back Line | 20.1" - 20.7" | 20.4 |
| SW - Knee Pivot to Floor | 19.3" - 19.9" | 19.4 |
| HW - Hip Width | 14.0" - 15.4" | 14.8 |

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: September 26, 1997

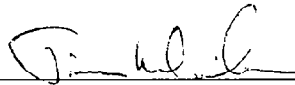
DUMMY NUMBER: 048

TEST NUMBER: D971642

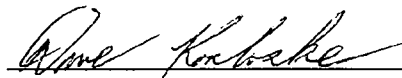
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 43% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 42 |
| LOWER RIB | 37 - 46 g's | 44 |
| LOWER SPINE | 15 - 22 g's | 20 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



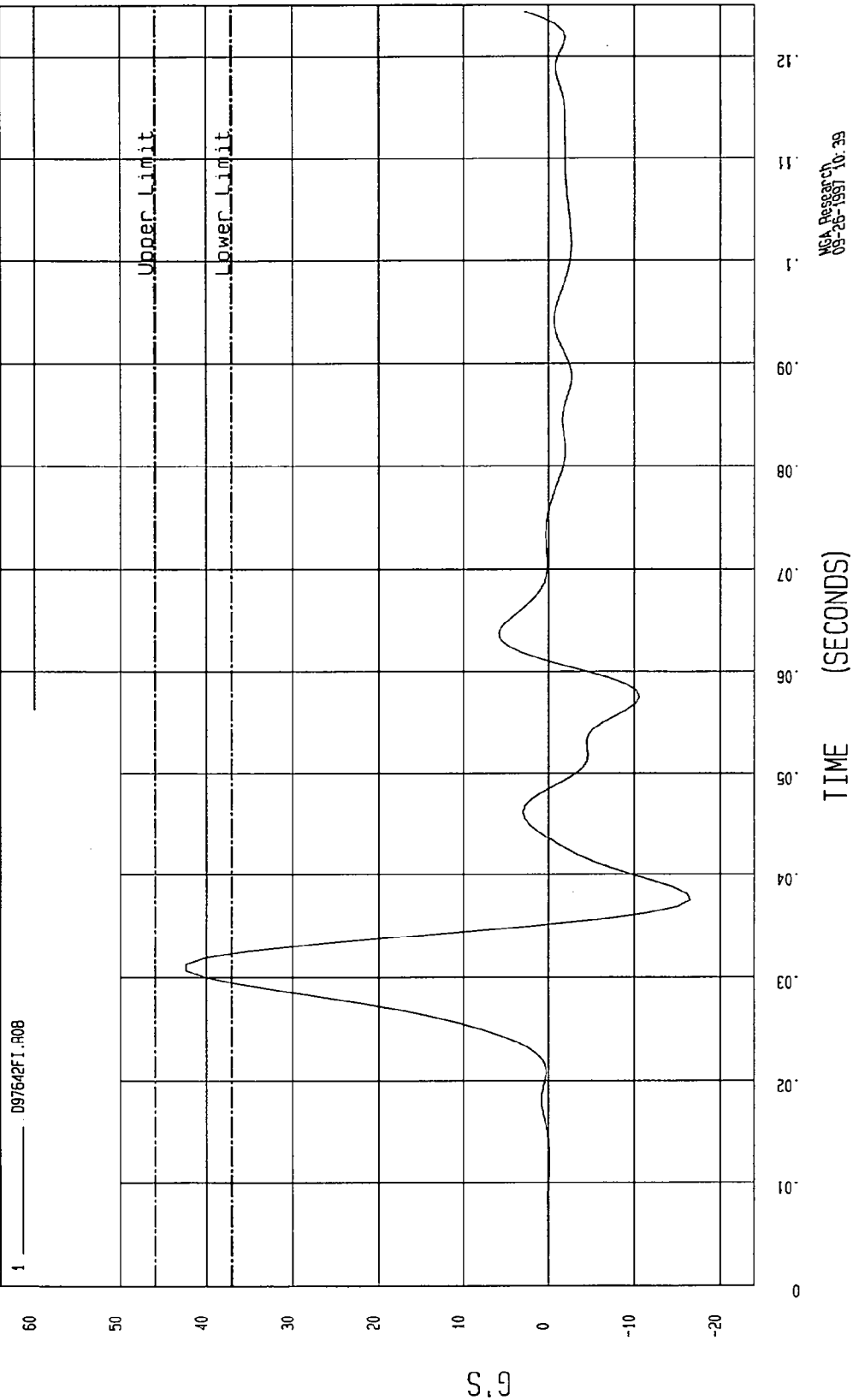
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:05

COMPONENT: DUMMY # 048 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -16.43 G'S at 37.5 msec

Maximum = 42.42 G'S at 31.2 msec

UPPER RIB ACCELERATION

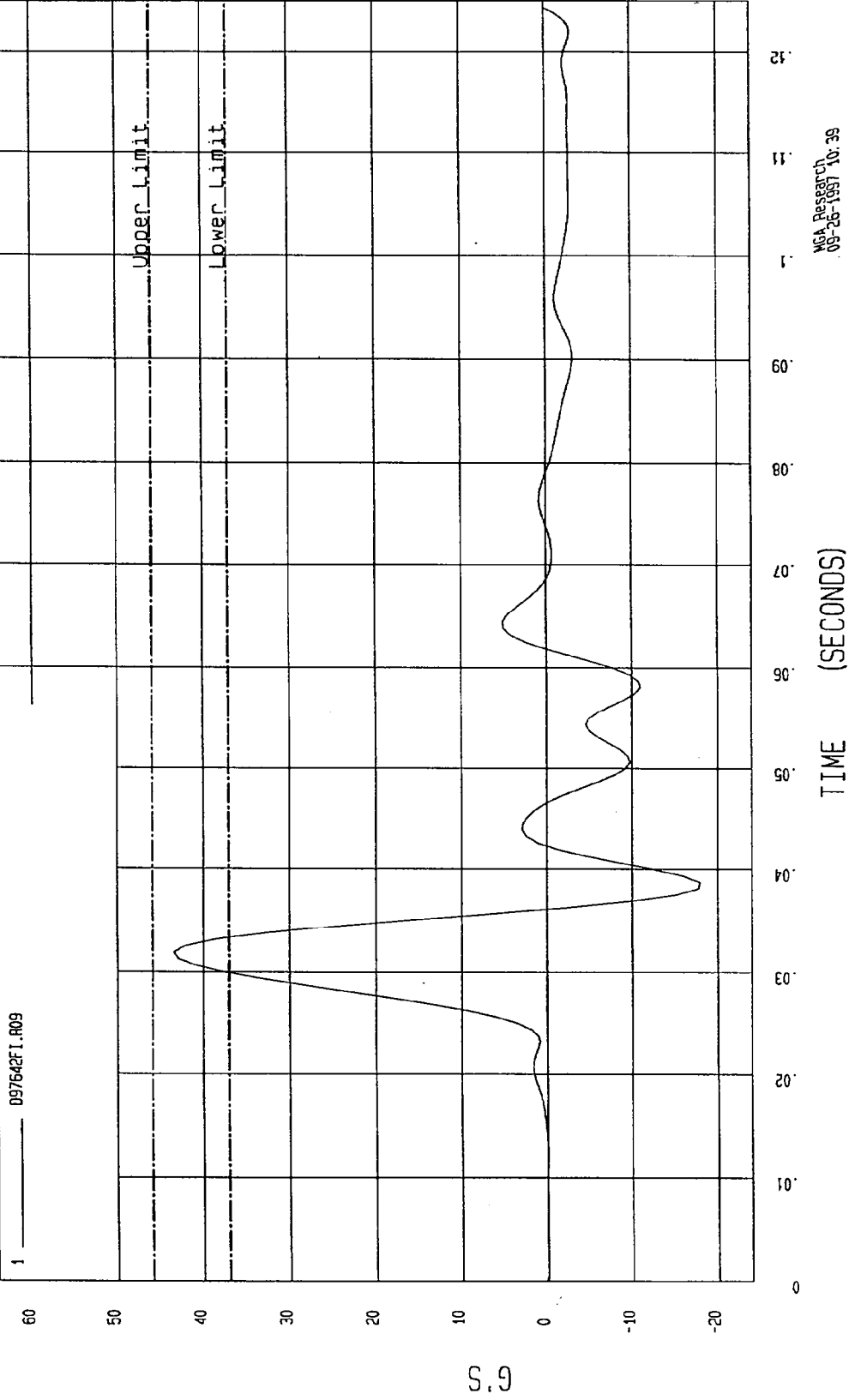


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:08:01

COMPONENT: DUMMY # 048 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -17.91 G'S at 36.7 msec Maximum = 43.52 G'S at 31.8 msec

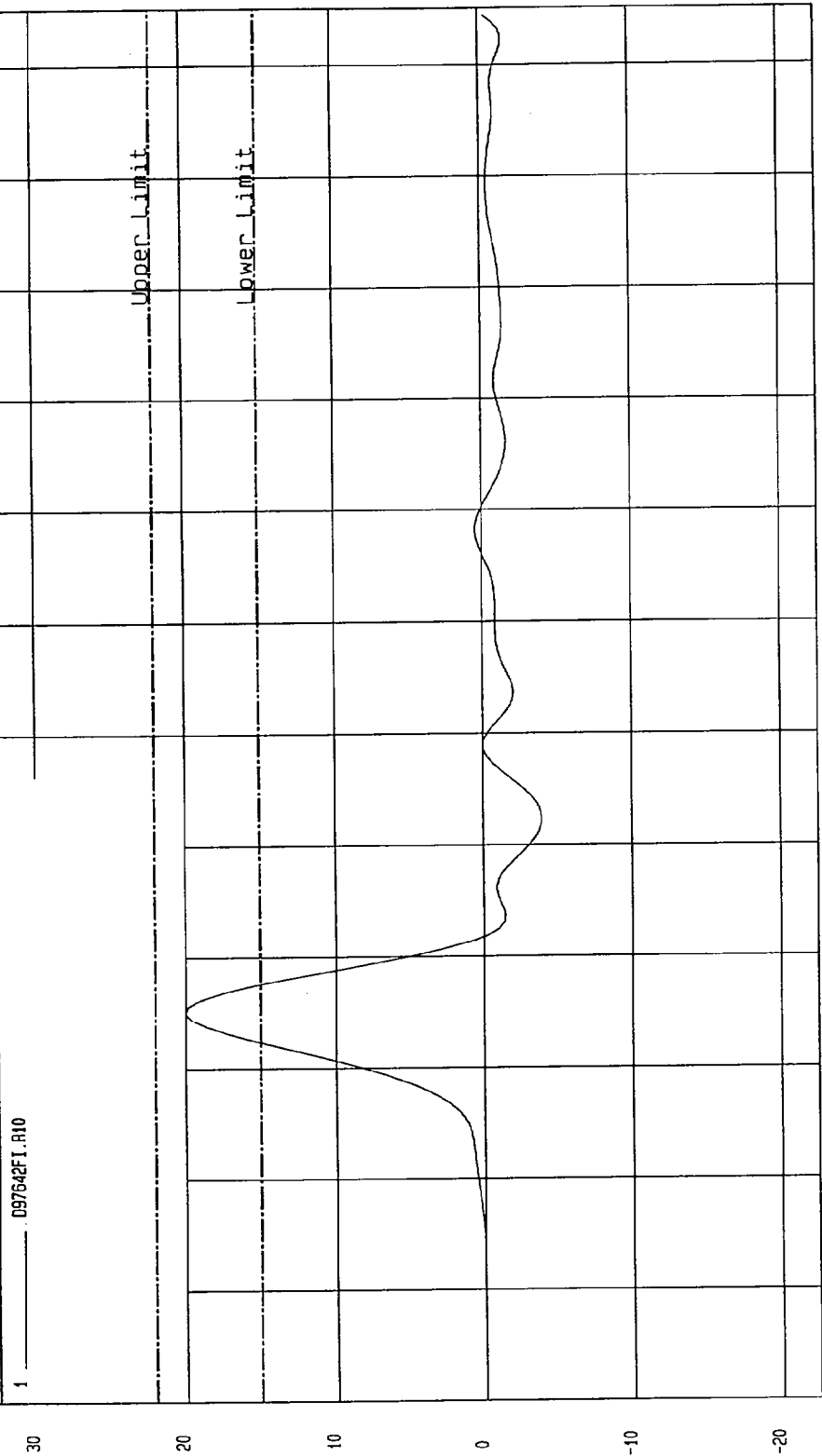
LOWER RIB ACCELERATION



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:05
COMPONENT: DUMMY # 048 Velocity: 14.05 FT/SEC 4.28 M/SEC

Minimum = -3.91 G's at 52.5 msec Maximum = 20.03 G's at 35 msec

LOWER SPINE ACCELERATION



MGA Research
09-26-1997 09:10

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

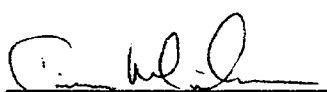
DATE: September 26, 1997

DUMMY NUMBER: 048

TEST NUMBER: D971643

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 43% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.2 |
| PELVIS ACCELERATION | 40 - 60 g's | 53 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 09-26-1997 - 10:44:25

COMPONENT: DUMMY # 048 Velocity: 14.174 FT/SEC 4.32 M/SEC

Minimum = -8.43 G'S at 57.5 msec

Maximum = 53.21 G'S at 44.3 msec

PELVIS ACCELERATION

1 _____ 097643F1.R11

Upper Limit

Lower Limit

G.S

TIME (SECONDS)

MSA Research
09-26-1997 10:45

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

DATE: September 25, 1997

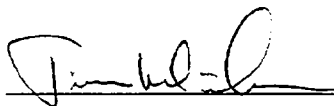
DUMMY NUMBER: 048

TEST NUMBER: D971644

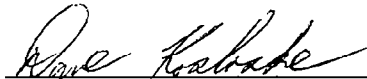
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 40% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 32.5 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 43.5 |
| FORCE @ 1.0 in | 50 - 63 lbs | 56 |
| FORCE @ 1.3 in | 73 - 88 lbs | 76 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



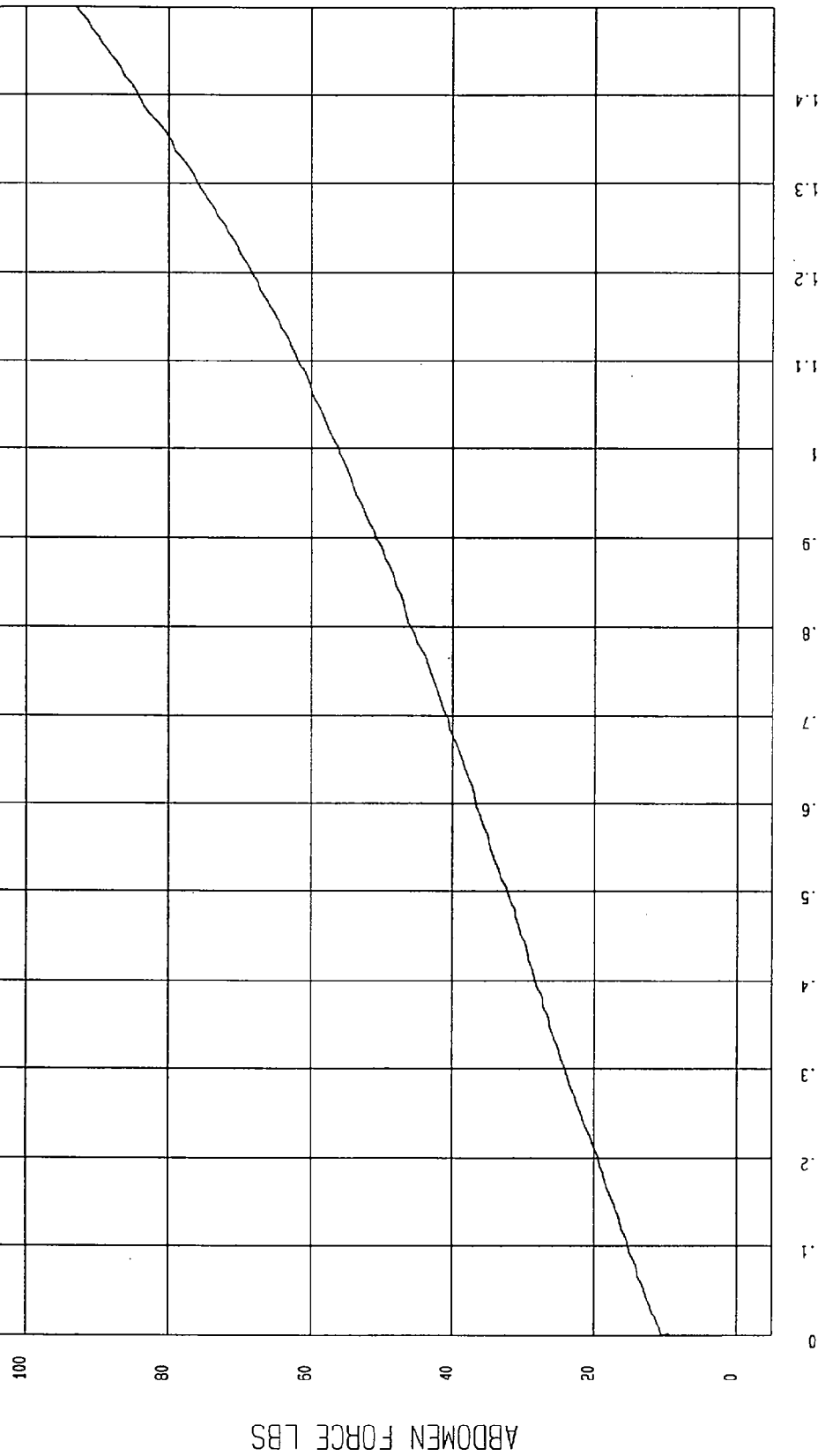
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 09-25-1997 - 22:41

COMPONENT: DUMMY # 048

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



WGA Research
09-26-1997 10:37

ABDOMEN DISPLACEMENT INCHES

ABDOMEN FORCE LBS

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: September 25, 1997

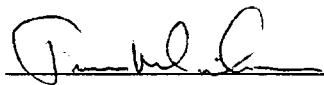
DUMMY NUMBER: 048

TEST NUMBER: D971645

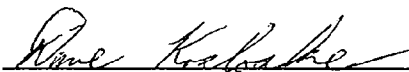
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 40% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 26 |
| FORCE @ 30° | 34 - 46 lbs | 39 |
| FORCE @ 40° | 46 - 58 lbs | 57 |
| RETURN ANGLE | 12° maximum | 1° |

TEST MEETS SPECIFICATIONS

TECHNICIAN



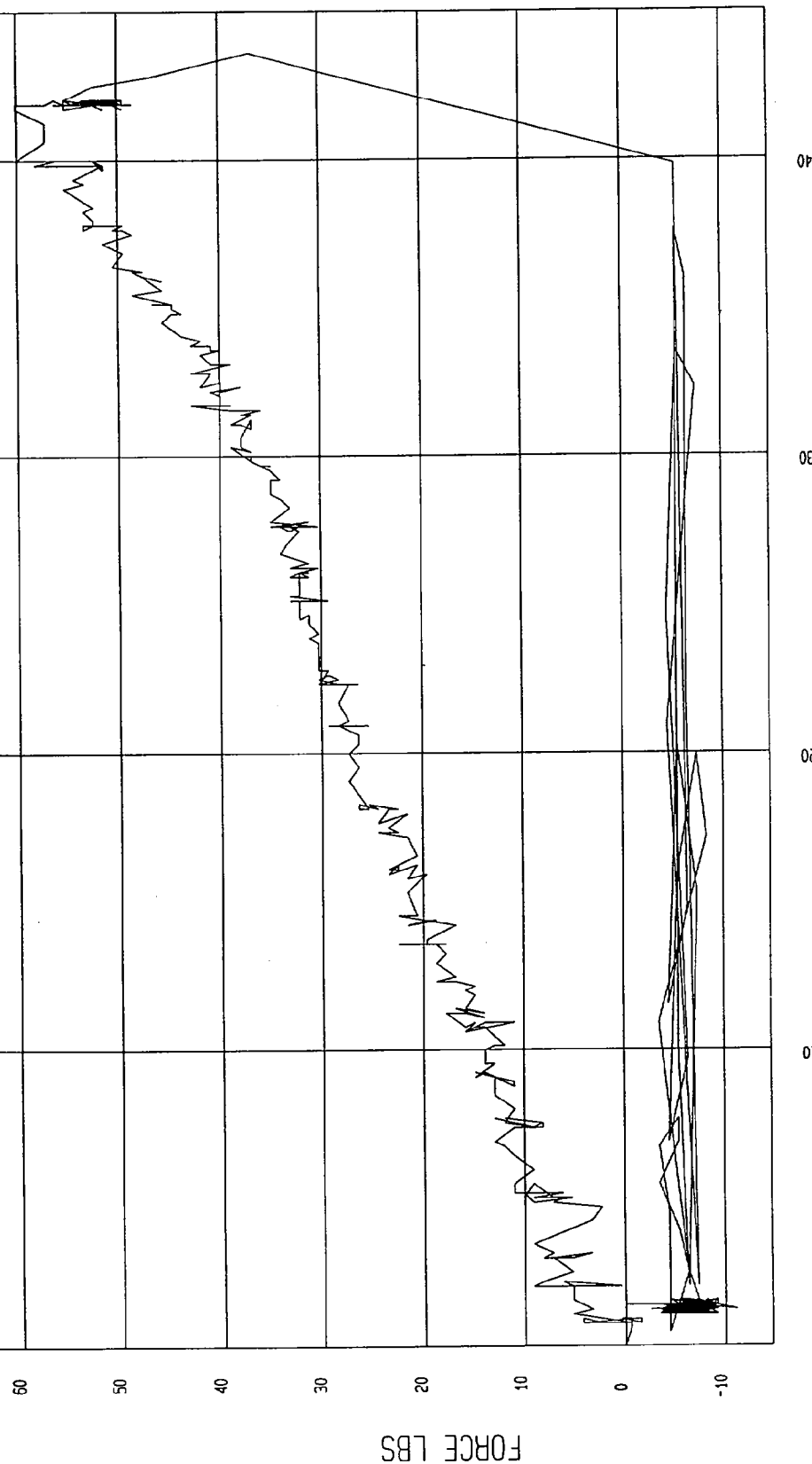
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 09-25-1997 - 22:57

COMPONENT: DUMMY # 04B

FORCE as a function of TORSO ROTATION



MGA Research
09-26-1997 10:35

PRE-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 049

Calibration Test Results Summary

Dummy Serial Number: 049

Pre-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 049

DATE OF VERIFICATION: September 26, 1997

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| SH - Seated Height | 35.0" - 35.8" | 35.2 |
| RH - Rib Height | 19.75" - 20.50" | 20.00 |
| HP - Hip Pivot Height | 3.9" ref. | 3.9 |
| RD - Rib From Back Line | 9.0" to 9.5" | 9.3 |
| KV - Knee Pivot From Back Line | 20.1" - 20.7" | 20.5 |
| SW - Knee Pivot to Floor | 19.3" - 19.9" | 19.5 |
| HW - Hip Width | 14.0" - 15.4" | 14.7 |

MEASUREMENTS BY: Jim Hill

APPROVED BY: Don Korbak

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: September 26, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971652

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 43% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.2 |
| UPPER RIB | 37 - 46 g's | 38 |
| LOWER RIB | 37 - 46 g's | 41 |
| LOWER SPINE | 15 - 22 g's | 20 |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Jim H. Lee

APPROVED BY

Steve Korbake

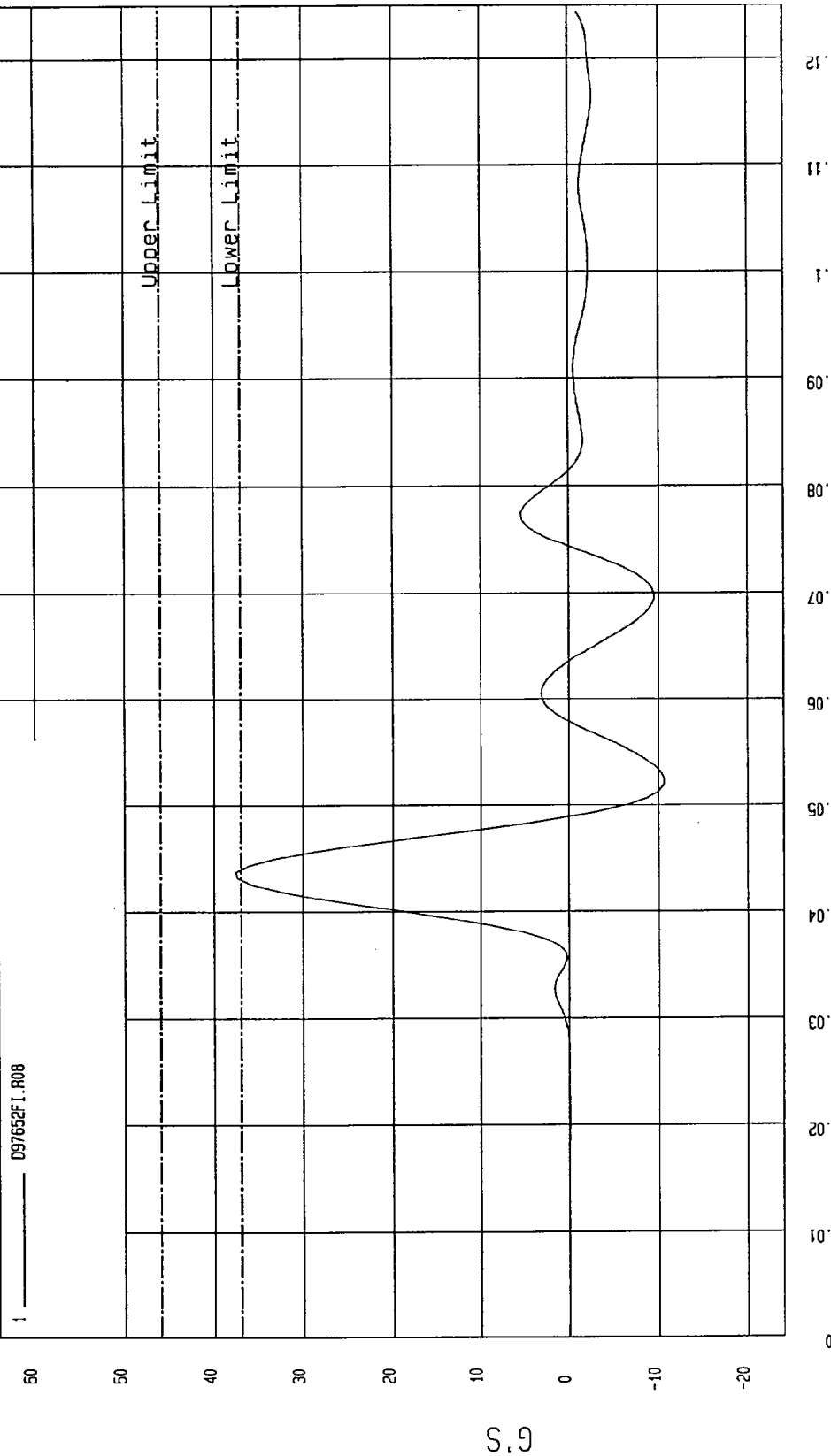
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:28

COMPONENT: DUMMY # 049 Velocity: 14.177 FT/SEC 4.32 M/SEC

Minimum = -10.58 G'S at 52.5 msec

Maximum = 37.59 G'S at 43.7 msec

UPPER RIB ACCELERATION



MCA Research
09-26-1997 10:31

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:28

COMPONENT: DUMMY # 049

Velocity: 14.177 FT/SEC 4.32 M/SEC

Minimum = -10.11 G'S at 52.5 msec

Maximum = 41.07 G'S at 43.7 msec

LOWER RIB ACCELERATION

1 ——— D97652F1.R09

60

50

40

30

20

10

0

-10

-20

G'S

Upper Limit

Lower Limit

12

11

10

60

80

40

60

50

40

30

20

10

0

TIME (SECONDS)

MCA Research
09-26-1997 10:31

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 09-26-1997 - 09:28

COMPONENT: DUMMY # 049 Velocity: 14.177 FT/SEC 4.32 M/SEC

Minimum = -4.62 G'S at 66.2 msec

Maximum = 19.65 G'S at 48.1 msec

LOWER SPINE ACCELERATION

1 097652F1.R10

30

20

10

0

-10

-20

G.S.

Upper Limit

Lower Limit

TIME (SECONDS)

12

11

10

09

08

07

06

05

04

03

02

01

0

NSA Research
09-26-1997 10:31

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: September 26, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971653

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 43% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 51 |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim W. Q.

APPROVED BY Paul Korbake

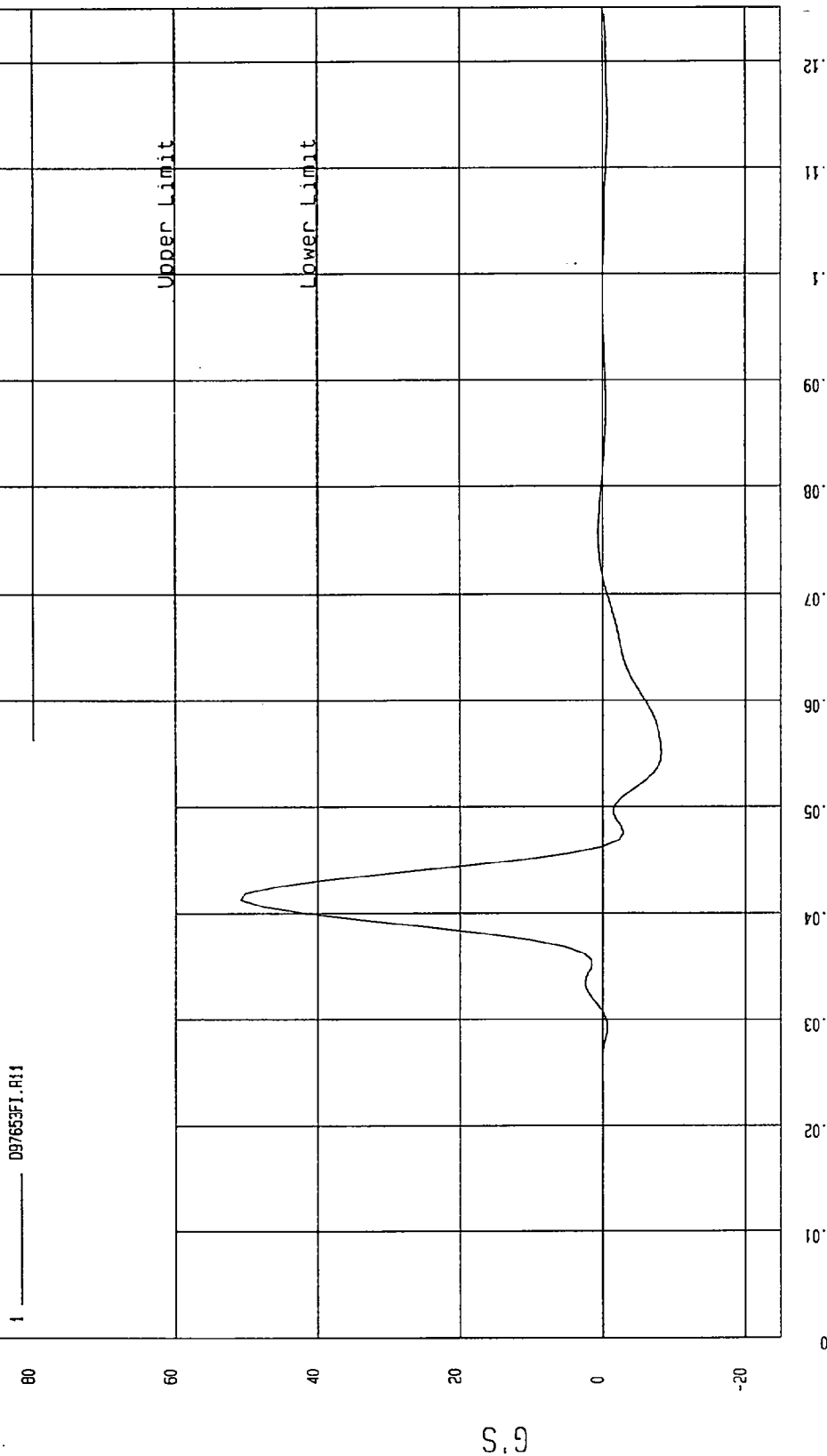
TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 09-26-1997 - 09:37:46

COMPONENT: DUMMY # 049 Velocity: 14.141 FT/SEC 4.31 M/SEC

Minimum = -8.24 G'S at 55 msec

Maximum = 50.86 G'S at 41.2 msec

PELVIS ACCELERATION



MCA Research
09-26-1997 10:32

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

DATE: September 25, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971654

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 40% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 32.0 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 42.5 |
| FORCE @ 1.0 in | 50 - 63 lbs | 56 |
| FORCE @ 1.3 in | 73 - 88 lbs | 74 |

TEST MEETS SPECIFICATIONS

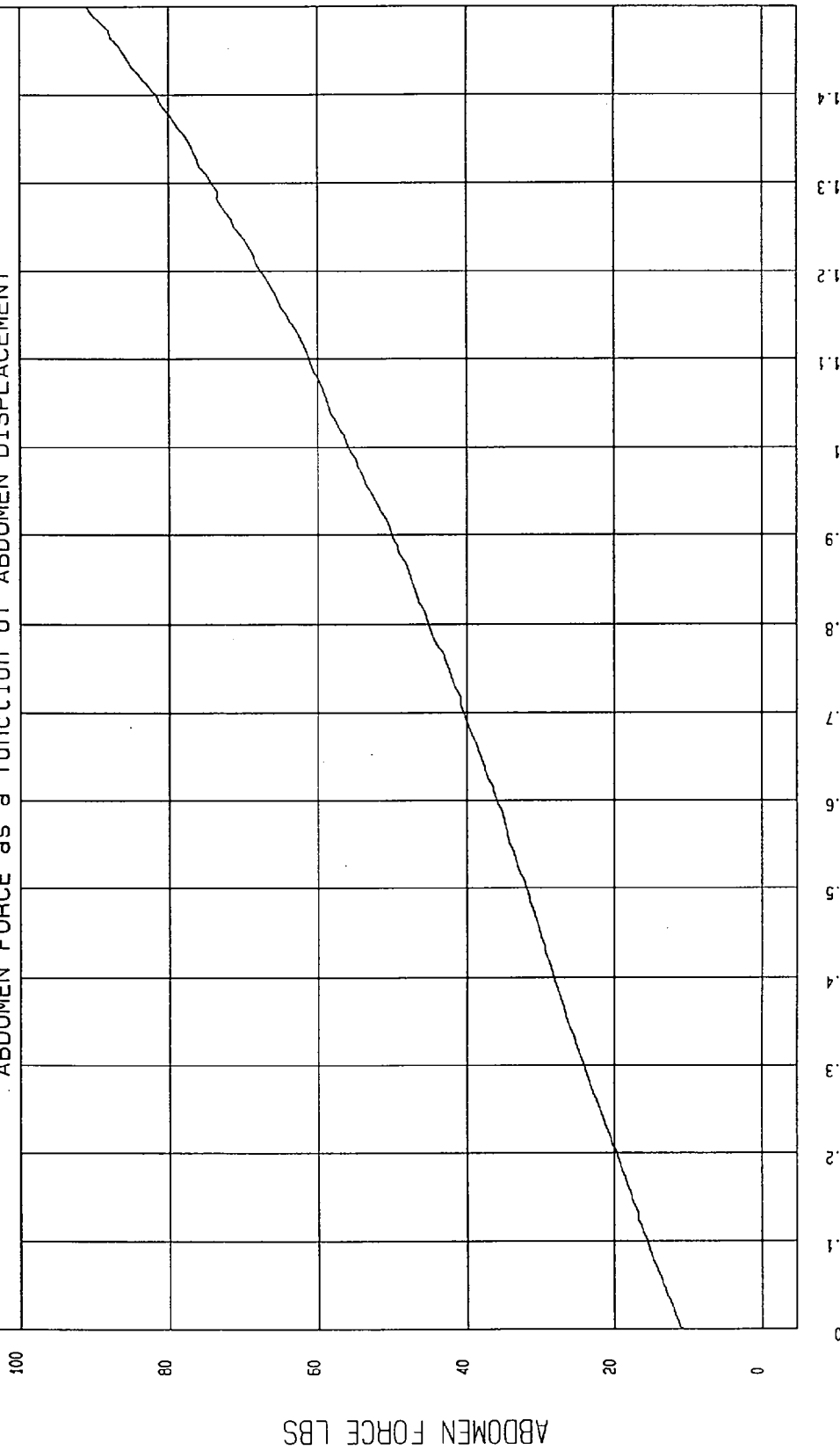
TECHNICIAN Tim H. L.

APPROVED BY Dave Korbake

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 09-25-1997 - 22:43

COMPONENT: DUMMY # 049

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



NCA Research
09-26-1997 10:37

ABDOMEN DISPLACEMENT INCHES

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: September 25, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971655

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 40% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 25 |
| FORCE @ 30° | 34 - 46 lbs | 43 |
| FORCE @ 40° | 46 - 58 lbs | 57 |
| RETURN ANGLE | 12° maximum | 1° |

TEST MEETS SPECIFICATIONS

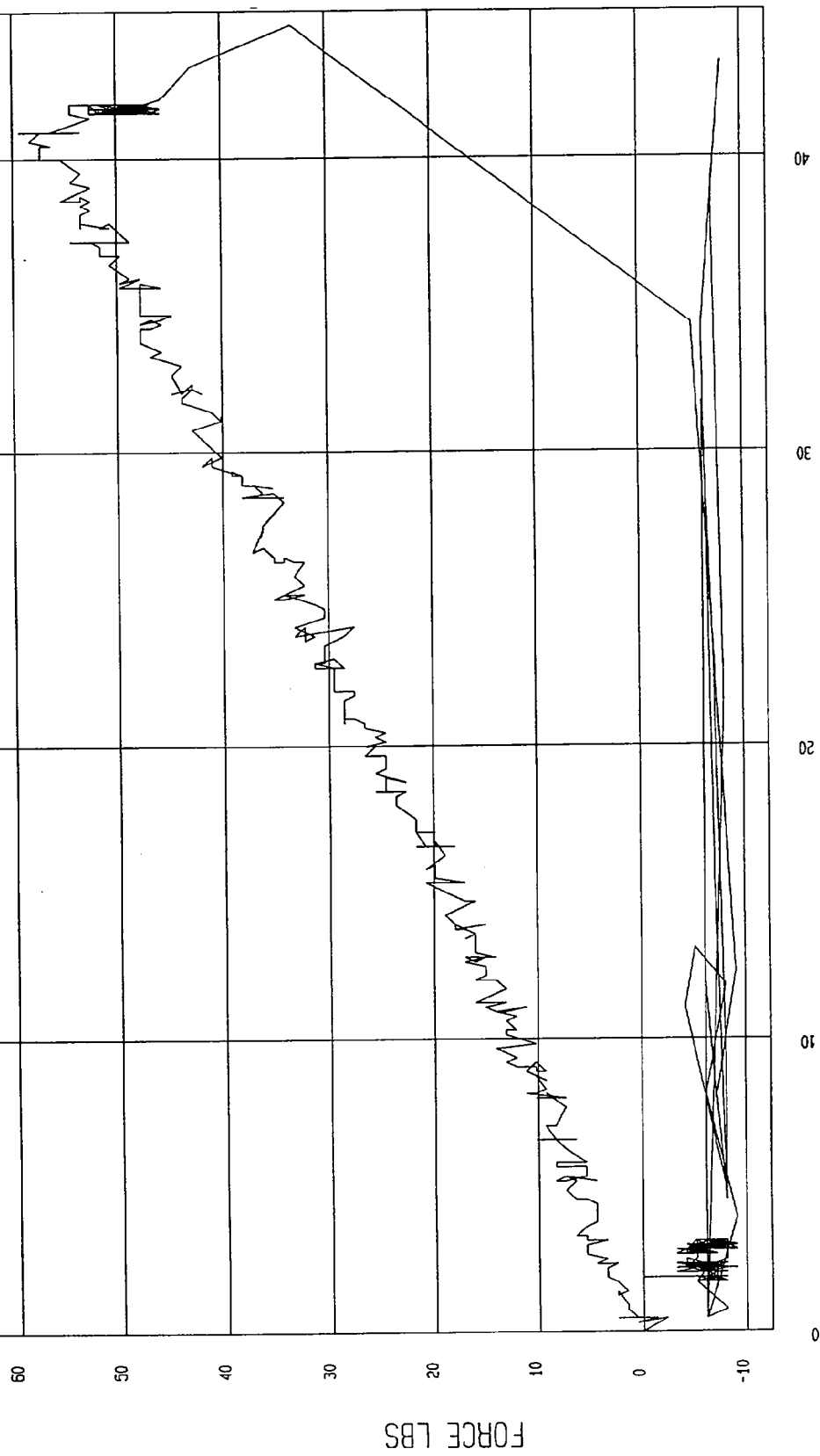
TECHNICIAN Jim W. L.

APPROVED BY Paul K. Kabeke

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 09-25-1997 - 23:09

COMPONENT: DUMMY # 049

FORCE as a function of TORSO ROTATION



MSA Research
09-26-1997 10:35

POST-TEST CERTIFICATION DATA

Front Dummy Serial Number: 048

Calibration Test Results Summary

Dummy Serial Number: 048

Post-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 048

DATE OF VERIFICATION: October 16, 1997

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| SH - Seated Height | 35.0" - 35.8" | 35.3 |
| RH - Rib Height | 19.75" - 20.50" | 19.90 |
| HP - Hip Pivot Height | 3.9" ref. | 3.9 |
| RD - Rib From Back Line | 9.0" to 9.5" | 9.2 |
| KV - Knee Pivot From Back Line | 20.1" - 20.7" | 20.4 |
| SW - Knee Pivot to Floor | 19.3" - 19.9" | 19.4 |
| HW - Hip Width | 14.0" - 15.4" | 14.8 |

MEASUREMENTS BY: Jim W. C.

APPROVED BY: Paul Kabele

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

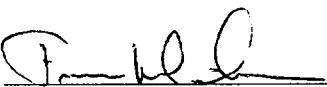
DATE: October 16, 1997

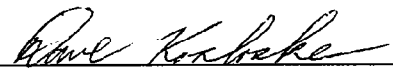
DUMMY NUMBER: 048

TEST NUMBER: D971832

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 30% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 37 |
| LOWER RIB | 37 - 46 g's | 37 |
| LOWER SPINE | 15 - 22 g's | 19 |

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 10:42

COMPONENT: DUMMY # 048 Velocity: 14.064 FT/SEC 4.29 M/SEC

Minimum = -13.03 G'S at 63.1 msec

Maximum = 37.38 G'S at 55 msec

UPPER RIB ACCELERATION

1 097832F1.R08

60

50

40

30

20

10

0

-10

-20

G'S

Upper Limit

Lower Limit

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

MSA Research
10-16-1997 11:00

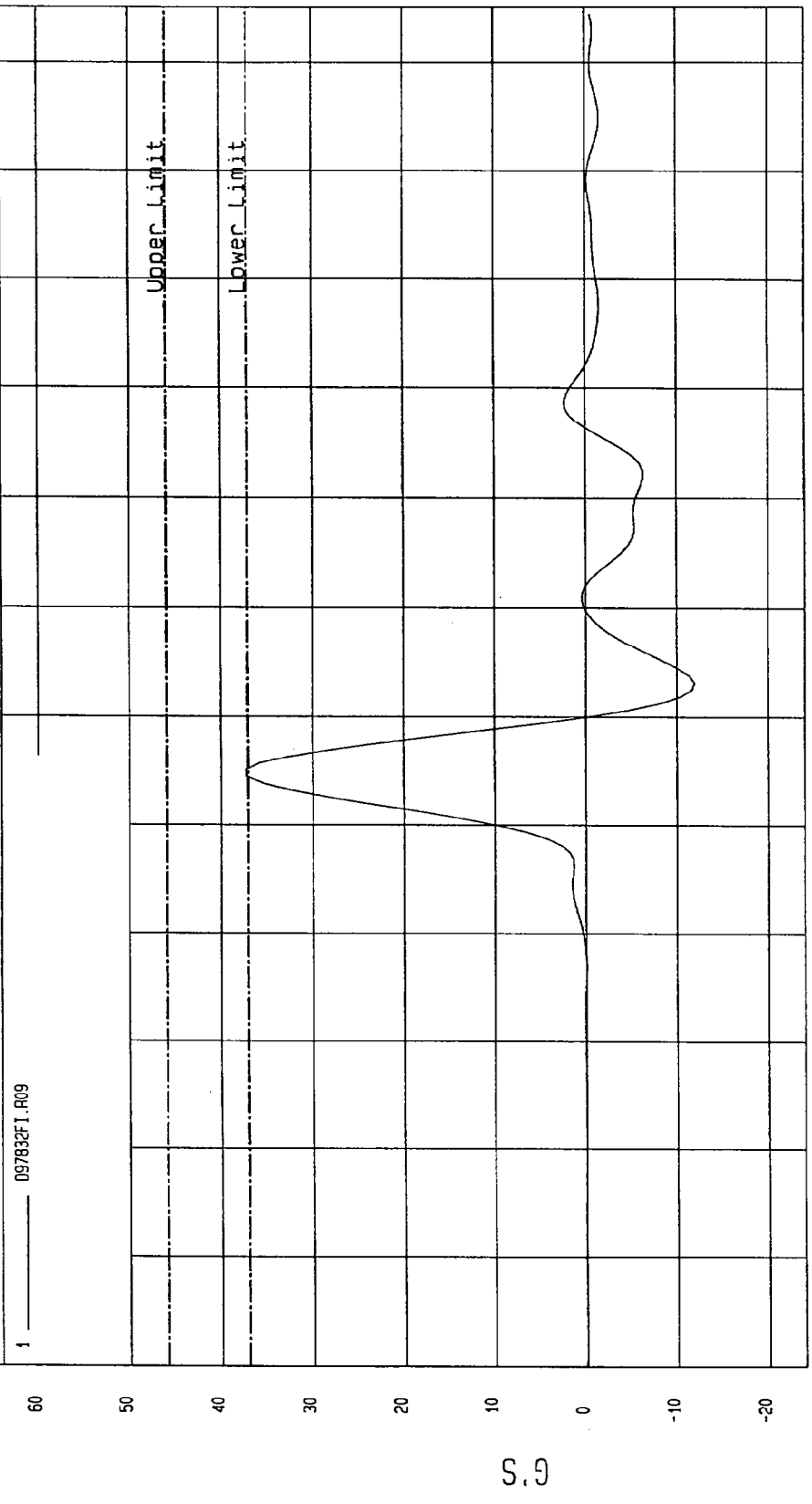
TIME (SECONDS)

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 10:44:06

COMPONENT: DUMMY # 048 Velocity: 14.064 FT/SEC 4.29 M/SEC

Minimum = -11.93 G's at 63.1 msec Maximum = 37.26 G's at 55 msec

LOWER RIB ACCELERATION



TIME (SECONDS)

MCA Research
10-16-1997 11:01

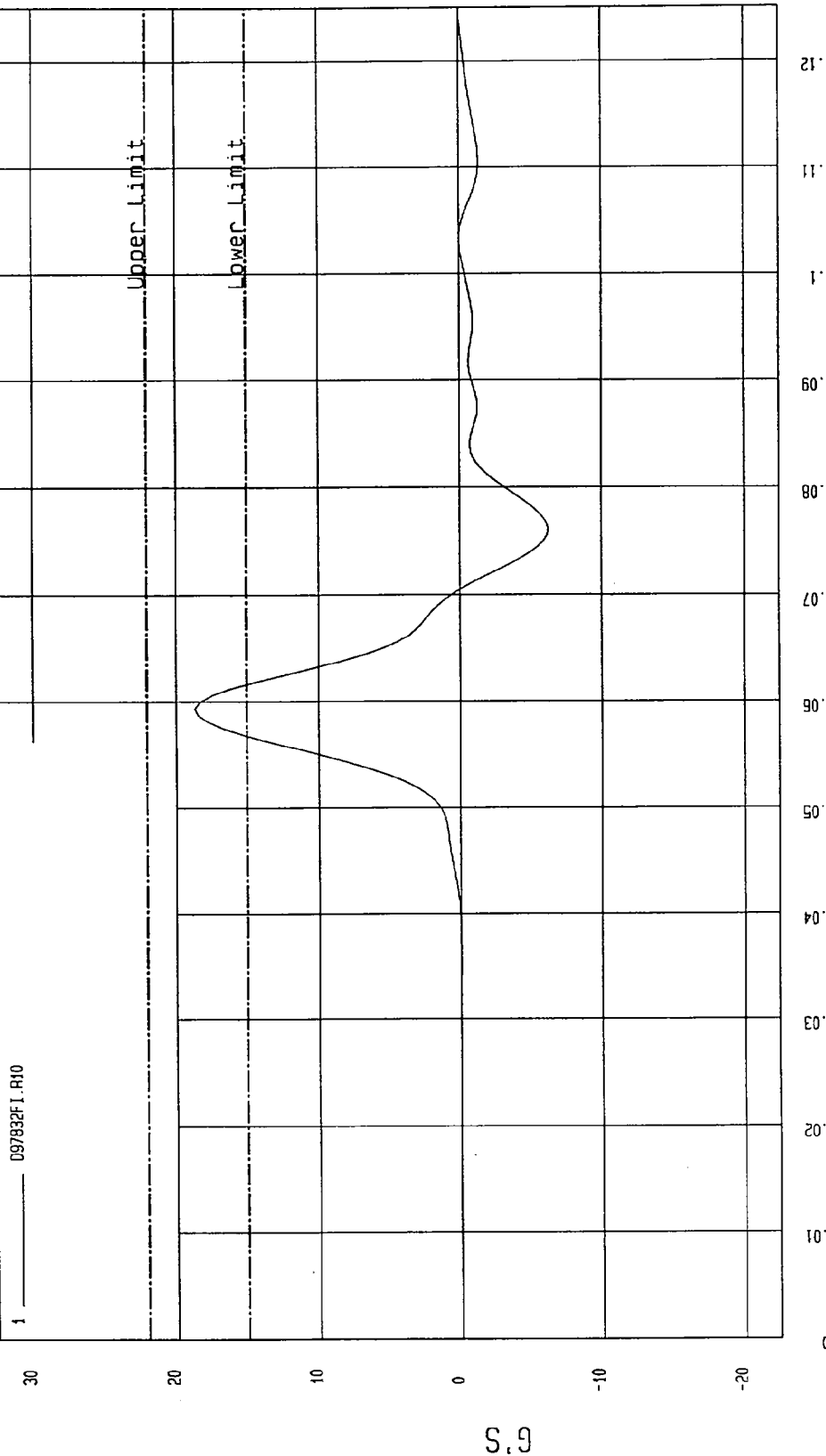
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 10:42

COMPONENT: DUMMY # 048 Velocity: 14.064 FT/SEC 4.29 M/SEC

Minimum = -6.24 G's at 76.2 msec

Maximum = 18.66 G's at 59.3 msec

LOWER SPINE ACCELERATION



MCA Research
10-16-1997 11:01

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 16, 1997

DUMMY NUMBER: 048

TEST NUMBER: D971833

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 30% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 52 |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim H. L.

APPROVED BY Rome Kabske

TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 10-16-1997 - 10: 49

COMPONENT: DUMMY # 048 Velocity: 14.089 FT/SEC 4.29 M/SEC

Minimum = -8.02 G'S at 65.6 msec

Maximum = 51.56 G'S at 51.8 msec

PELVIS ACCELERATION

1 _____ 097833FI.R11

80

60

40

20

0

-20

G

Upper Limit

Lower Limit

TIME (SECONDS)

12

11

10

09

08

07

06

05

04

03

02

01

0

MCA Research
10-16-1997 11:01

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

DATE: October 15, 1997

DUMMY NUMBER: 048

TEST NUMBER: D971834

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 26% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 33.1 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 44.5 |
| FORCE @ 1.0 in | 50 - 63 lbs | 60 |
| FORCE @ 1.3 in | 73 - 88 lbs | 83 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



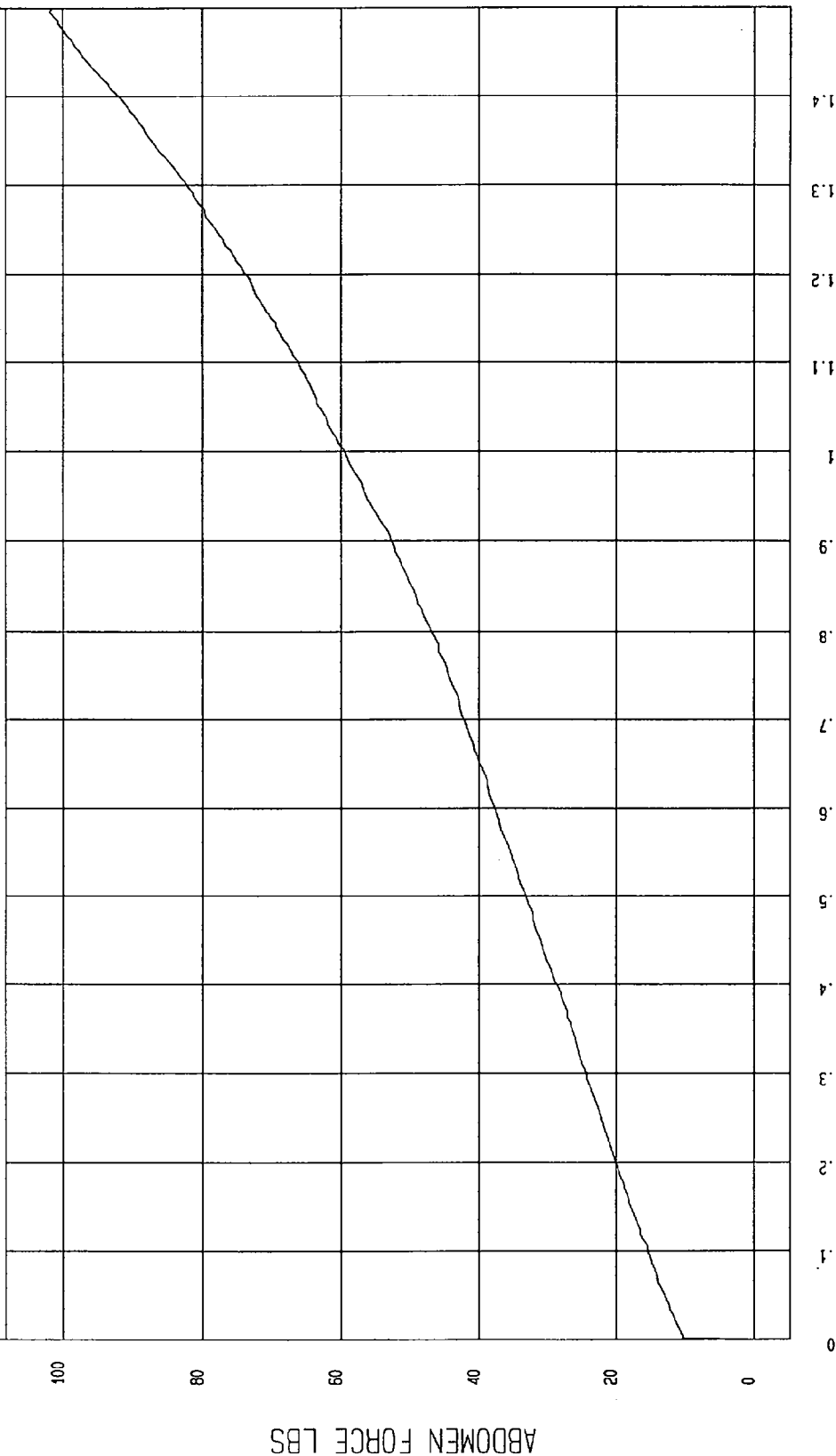
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 10-15-1997 - 15:09

COMPONENT: DUMMY # 048

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT



MCA Research
10-15-1997 15:14

ABDOMEN DISPLACEMENT INCHES

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

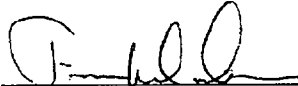
DATE: October 15, 1997

DUMMY NUMBER: 048

TEST NUMBER: D971835

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 26% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 23 |
| FORCE @ 30° | 34 - 46 lbs | 35 |
| FORCE @ 40° | 46 - 58 lbs | 51 |
| RETURN ANGLE | 12° maximum | 6° |

TEST MEETS SPECIFICATIONS

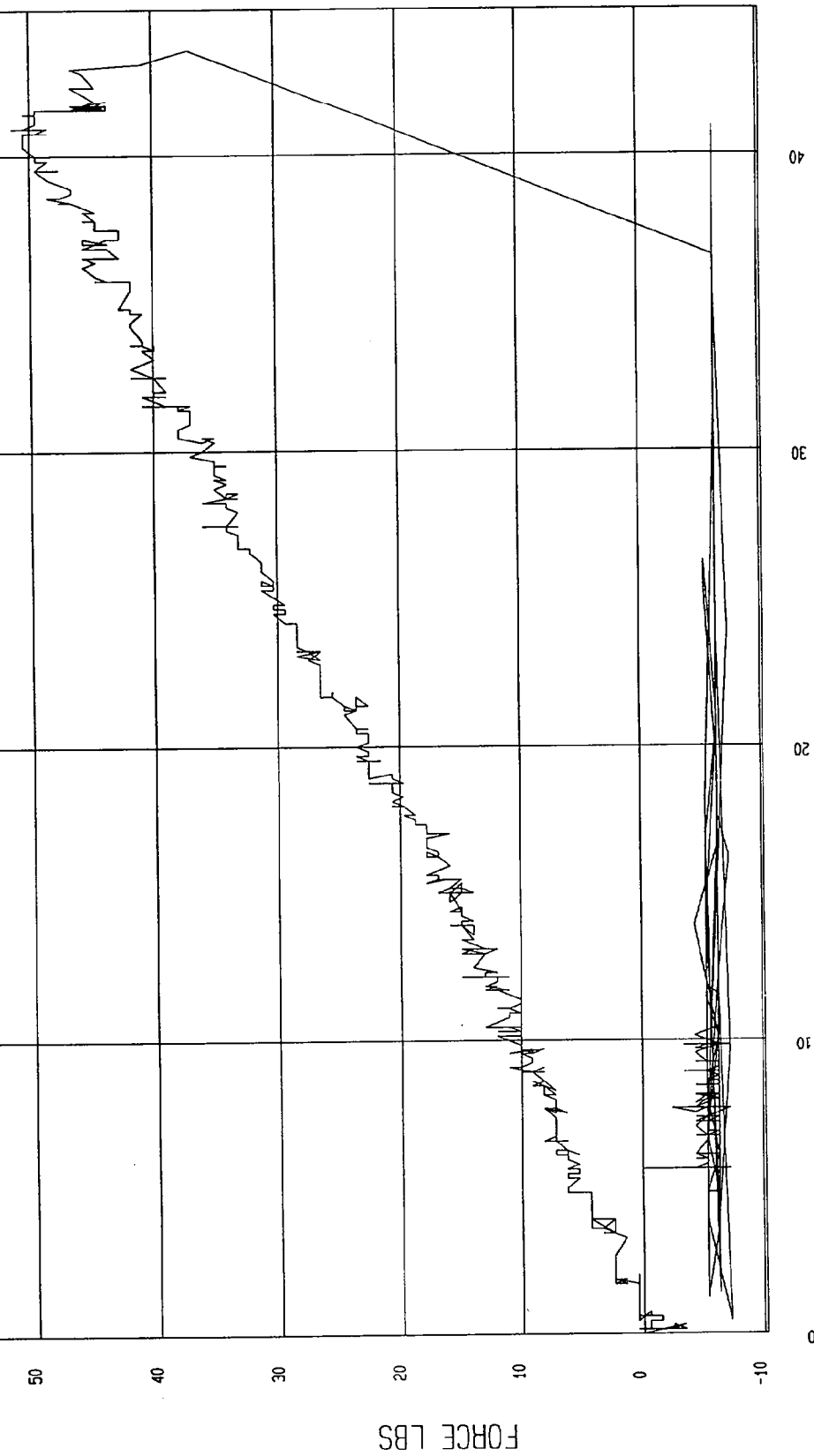
TECHNICIAN 

APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 10-15-1997 - 15:25

COMPONENT: DUMMY # 048

FORCE as a function of TORSO ROTATION



MGA Research
10-16-1997 09:21

POST-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 049

Calibration Test Results Summary

Dummy Serial Number: 049

Post-Test Calibration

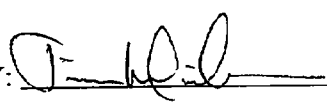
| | |
|-----------------------------|---|
| External Dimensions: | The dummy passed all external dimension requirements. |
| Thorax Impact Test: | The thorax passed all impact test requirements. |
| Pelvic Impact Test: | The pelvis passed all impact test requirements. |
| Abdominal Compression Test: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

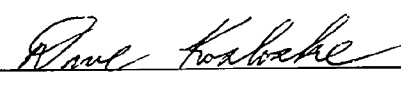
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 049

DATE OF VERIFICATION: October 16, 1997

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|--------------------------------|-----------------|--------------|
| SH - Seated Height | 35.0" - 35.8" | 35.2 |
| RH - Rib Height | 19.75" - 20.50" | 20.00 |
| HP - Hip Pivot Height | 3.9" ref. | 3.9 |
| RD - Rib From Back Line | 9.0" to 9.5" | 9.3 |
| KV - Knee Pivot From Back Line | 20.1" - 20.7" | 20.5 |
| SW - Knee Pivot to Floor | 19.3" - 19.9" | 19.5 |
| HW - Hip Width | 14.0" - 15.4" | 14.7 |

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 16, 1997

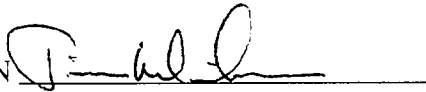
DUMMY NUMBER: 049

TEST NUMBER: D971842

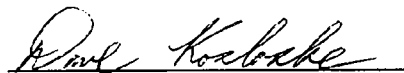
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 30% |
| PROBE SPEED | 14.0 - 14.2 fps | 14.1 |
| UPPER RIB | 37 - 46 g's | 37 |
| LOWER RIB | 37 - 46 g's | 41 |
| LOWER SPINE | 15 - 22 g's | 21 |

TEST MEETS SPECIFICATIONS

TECHNICIAN

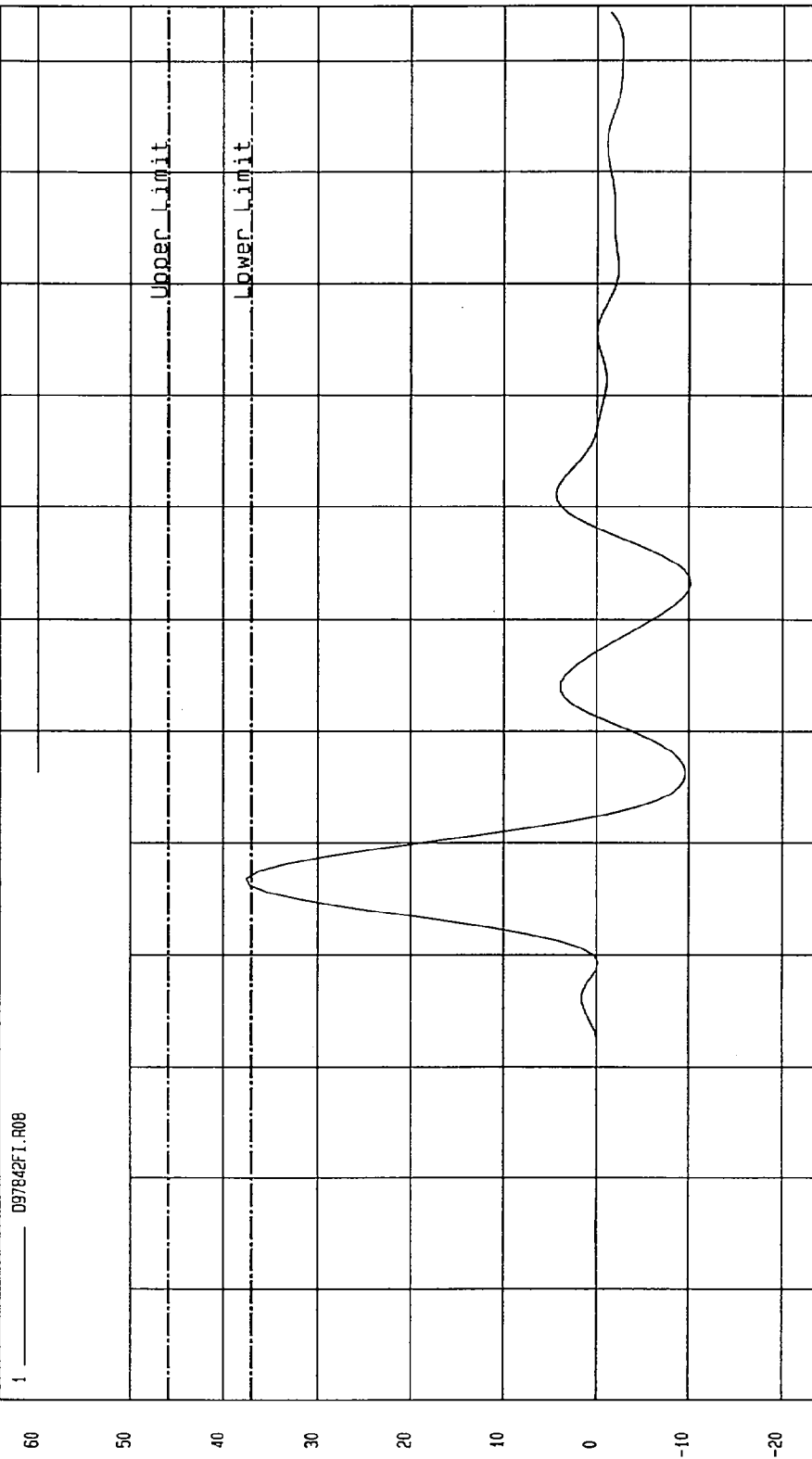


APPROVED BY



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 11:24
 COMPONENT: DUMMY # 049 Velocity: 14.112 FT/SEC 4.3 M/SEC
 Minimum = -10.16 G'S at 73.1 msec Maximum = 37.49 G'S at 46.8 msec

UPPER RIB ACCELERATION



TIME (SECONDS)

MGA Research
10-16-1997 11:29

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 11:24

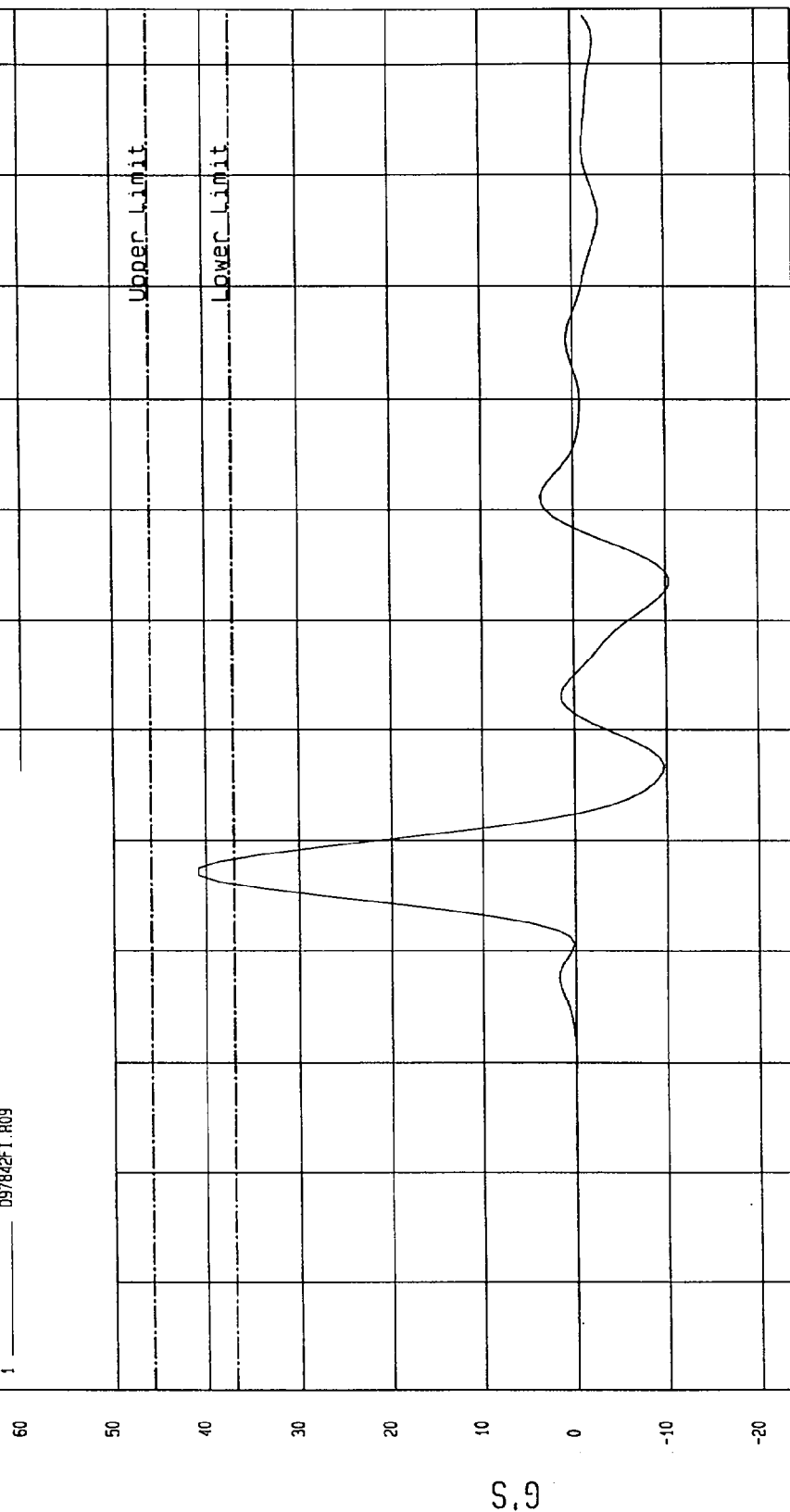
COMPONENT: DUMMY # 049 Velocity: 14.112 FT/SEC 4.3 M/SEC

Minimum = -10.34 G'S at 73.7 msec

Maximum = 40.88 G'S at 47.5 msec

LOWER RIB ACCELERATION

1 D97842F1.R03

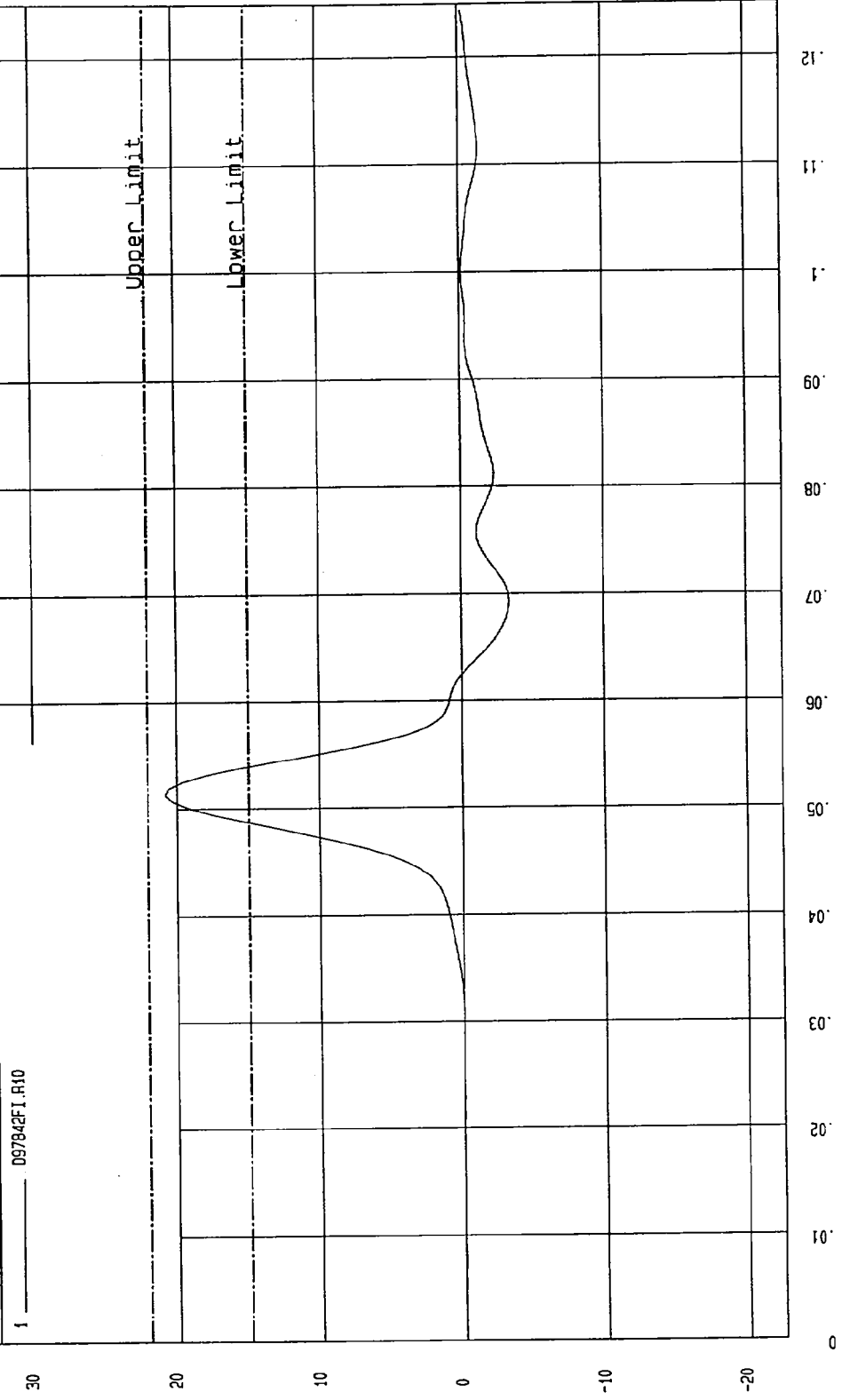


MCA Research
10-16-1997 11:29

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 10-16-1997 - 11:24
COMPONENT: DUMMY # 049 Velocity: 14.112 FT/SEC 4.3 M/SEC

Minimum = -3.36 G'S at 69.3 msec Maximum = 20.79 G'S at 51.2 msec

LOWER SPINE ACCELERATION



WSA Research
10-16-1997 11:29

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: October 16, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971843

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 30% |
| PROBE SPEED | 14.0 - 14.2 f/s | 14.1 |
| PELVIS ACCELERATION | 40 - 60 g's | 48 |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim W. L.

APPROVED BY Paul Krashinsky

TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 10-16-1997 - 11:28:38

COMPONENT: DUMMY # 049 Velocity: 14.086 FT/SEC 4.29 M/SEC

Minimum = -7.82 G'S at 73.1 msec

Maximum = 48.27 G'S at 50 msec

PELVIS ACCELERATION

1 ——— 097843F1.R11

80

60

40

20

0

-20

Upper Limit

Lower Limit

S.9

MCA Research
10-16-1997 11:29

TIME (SECONDS)

12

11

10

09

08

07

06

05

04

03

02

01

0

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

DATE: October 15, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971844

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 26% |
| FORCE @ 0.5 in | 23.3 - 36.5 lbs | 32.8 |
| FORCE @ 0.75 in | 36.7 - 49.8 lbs | 45.4 |
| FORCE @ 1.0 in | 50 - 63 lbs | 60 |
| FORCE @ 1.3 in | 73 - 88 lbs | 83 |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim W. L.

APPROVED BY Bob Korbake

TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 10-15-1997 - 15:12

COMPONENT: DUMMY # 049

ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT

100

80

60

40

20

0

ABDOMEN FORCE LBS

1.4

1.3

1.2

1.1

1.0

0.9

0.8

0.7

0.6

0.5

0.4

0.3

0.2

0.1

0

WGA Research
10-15-1997 15:14

ABDOMEN DISPLACEMENT INCHES

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: October 16, 1997

DUMMY NUMBER: 049

TEST NUMBER: D971845

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE | 66 - 78° F | 70° |
| RELATIVE HUMIDITY | 10 - 70% | 30% |
| FORCE @ 0° | 0 - 6 lbs | 0 |
| FORCE @ 20° | 22 - 34 lbs | 23 |
| FORCE @ 30° | 34 - 46 lbs | 35 |
| FORCE @ 40° | 46 - 58 lbs | 53 |
| RETURN ANGLE | 12° maximum | 7° |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Tim White

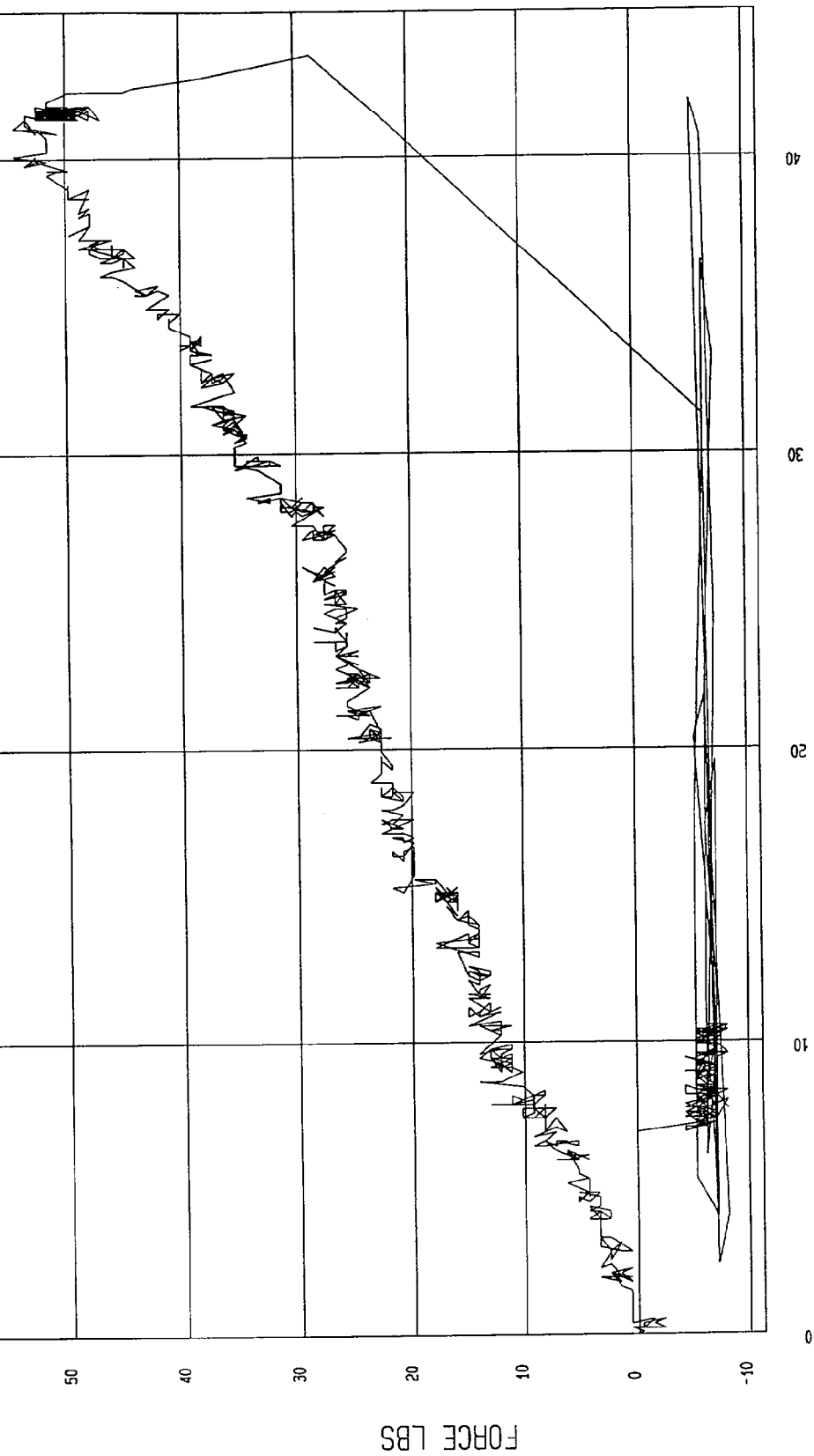
APPROVED BY

Rene Korbake

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 10-16-1997 - 09:19

COMPONENT: DUMMY # 049

FORCE as a function of TORSO ROTATION



MCA Research
10-16-1997 09:21

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 048

Inspected By: Tim Michnay

Date: October 16, 1997

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

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

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 049

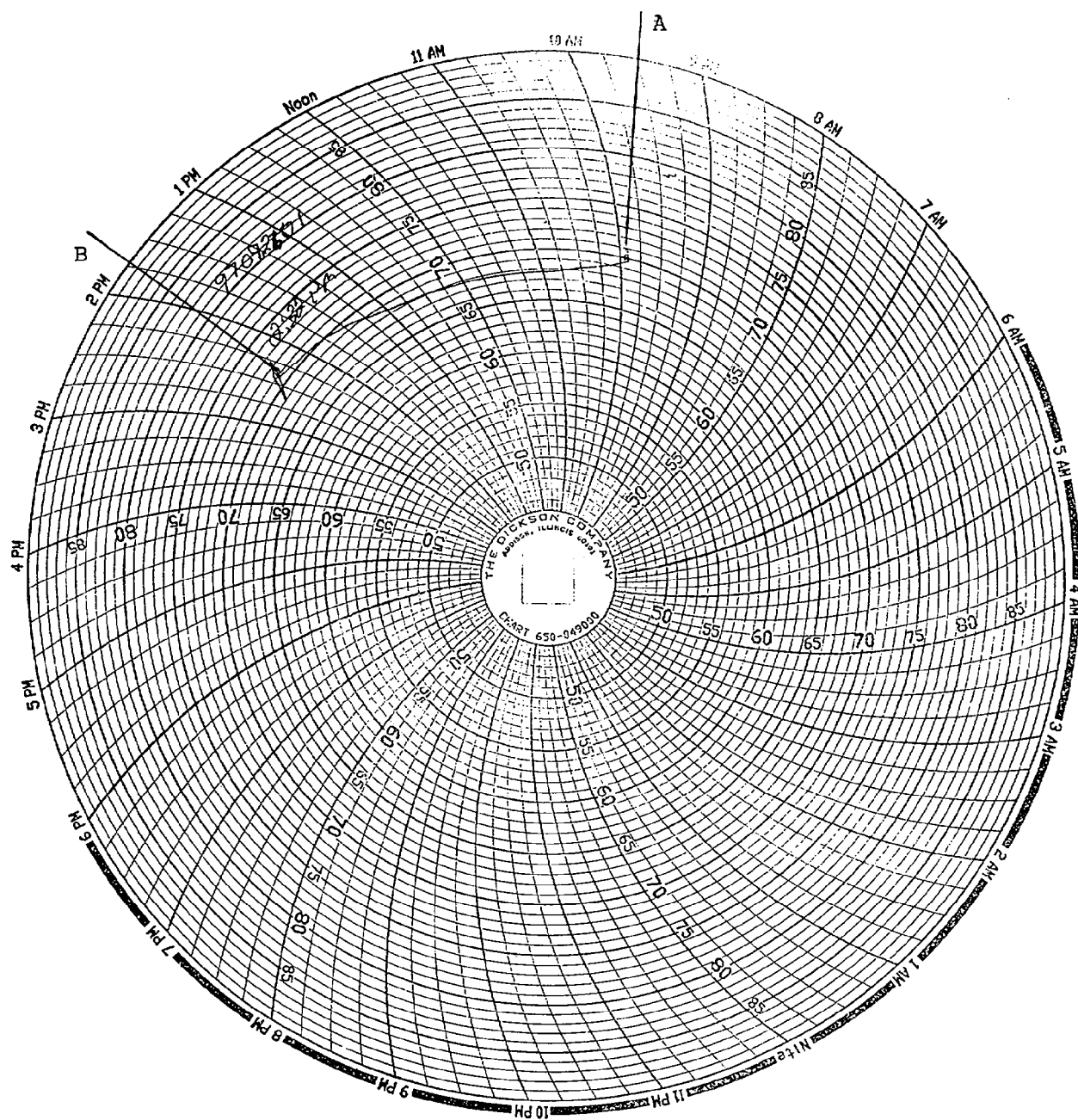
Inspected By: Tim Michnay

Date: October 16, 1997

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

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

VEHICLE AND DUMMY TEMPERATURE



A = Dummies installed in vehicle
 B = Test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR DRIVER DUMMY NO. 048

| | DRIVER | | |
|-------------------------|------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y | AN8L6 | Endevco | August 18, 1997 |
| Lower Rib Y | J12465 | Endevco | August 18, 1997 |
| Lower Spine Y | J12450 | Endevco | August 18, 1997 |
| Pelvis Y | AGTP7 | Endevco | August 18, 1997 |
| Upper Rib Redundant Y | APY13 | Endevco | August 18, 1997 |
| Lower Rib Redundant Y | J11361 | Endevco | August 18, 1997 |
| Lower Spine Redundant Y | J12461 | Endevco | August 18, 1997 |
| Pelvis Redundant Y | AGT04 | Endevco | August 18, 1997 |

INSTRUMENTS FOR LEFT REAR PASSENGER DUMMY NO. 049

| | LEFT REAR PASSENGER | | |
|-------------------------|---------------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y | ANRP6 | Endevco | August 18, 1997 |
| Lower Rib Y | J11630 | Endevco | August 18, 1997 |
| Lower Spine Y | AHT20 | Endevco | August 18, 1997 |
| Pelvis Y | AJ417 | Endevco | August 18, 1997 |
| Upper Rib Redundant Y | AJ412 | Endevco | August 18, 1997 |
| Lower Rib Redundant Y | J11166 | Endevco | August 18, 1997 |
| Lower Spine Redundant Y | AH0N9 | Endevco | August 18, 1997 |
| Pelvis Redundant Y | AGP20 | Endevco | August 18, 1997 |

VEHICLE INSTRUMENT CALIBRATION

| VEHICLE AND MDB ACCELEROMETERS | | | |
|---------------------------------|------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Moving Barrier CG X | J04-F10 | Entran | August 7, 1997 |
| Moving Barrier CG Y | F11-G04 | Entran | August 7, 1997 |
| Moving Barrier CG Z | J04-F12 | Entran | August 7, 1997 |
| Moving Barrier Rear Axle X | G13-B07 | Entran | August 6, 1997 |
| Moving Barrier Rear Axle Y | L14-D04 | Entran | August 4, 1997 |
| Left Mid A-Post Y | H07-A10 | Entran | April 23, 1997 |
| Left Lower A-Post Y | L14-D13 | Entran | August 1, 1997 |
| Left Mid B-Post Y | F12-G02 | Entran | July 11, 1997 |
| Left Lower B-Post Y | H02-J04 | Entran | August 7, 1997 |
| Rear Floorpan Above Axle X | G01-J10 | Entran | August 7, 1997 |
| Rear Floorpan Above Axle Y | J10-E03 | Entran | August 4, 1997 |
| Rear Floorpan Above Axle Z | L18-E18 | Entran | June 12, 1997 |
| Driver Seat Track Y | C06-G12 | Entran | April 23, 1997 |
| Right Side Sill at Front Seat X | I25-J20 | Entran | August 7, 1997 |
| Right Side Sill at Front Seat Y | J04-F16 | Entran | August 7, 1997 |
| Right Side Sill at Front Seat Z | J04-F13 | Entran | August 7, 1997 |
| Right Side Sill at Rear Seat X | G01-J06 | Entran | August 5, 1997 |
| Right Side Sill at Rear Seat Y | C14-Z05 | Entran | August 1, 1997 |
| Right Side Sill at Rear Seat Z | F20-G03 | Entran | August 7, 1997 |
| Right Side Sill at Front Seat Y | C05-Z10 | Entran | April 23, 1997 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE AND MDB ACCELEROMETERS | | |
|-------------------------------|--------------------------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Left Side Sill at Rear Seat Y | B14-R03 | Entran | August 4, 1997 |
| Rear Occupant Compartment Y | J06-D16 | Entran | August 1, 1997 |
| Vehicle CG X | H02-J05 | Entran | August 6, 1997 |
| Vehicle CG Y | L18-E02 | Entran | August 6, 1997 |
| Vehicle CG Z | H02-J02 | Entran | August 6, 1997 |

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