

REPORT NO.: 214D-MGA-99-16

V3011

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING
PASSENGER CARS

TOYOTA MOTOR CORPORATION

1999 TOYOTA SIENNA CE MINI-VAN

NHTSA NO: MX5108

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 21, 1999

Report Date: February 1, 1999

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
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400 SEVENTH STREET, SW
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Prepared By: Chad Gadberry
Chad Gadberry, Project Engineer

Approved By: Dave Kosloske
Dave Kosloske, Program Manager

Approval Date: 2-4-99

Technicians: Al Chalmers
Wayne Dahlke
Jan Eide
Chris Kulis
Erik Nelson
Chris Novak
Paul Schlimmer
Kyle Shelton
Todd Stevenson
John Wistert

Secretary: Carol Beck

FINAL REPORT ACCEPTED BY (OCWS):

Accepted By: Hans Chan (COTR)

Acceptance Date: 03/05/99

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16. Abstract A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1999 Toyota Sienna CE Mini-Van to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on January 21, 1999. The impact velocity of the Moving Deformable Barrier (MDB) was 61.6 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 23 °C. The target vehicle post test maximum crush was 341 mm at level 3. The test vehicle's performance follows: <table border="1"> <thead> <tr> <th></th><th>DRIVER</th><th>PASS.</th></tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td><td>45</td><td>44</td></tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td><td>47</td><td>60</td></tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td><td>69</td><td>50</td></tr> <tr> <td>Thoracic Trauma Index (TTI)</td><td>58</td><td>55</td></tr> <tr> <td>Pelvis (PEV) Accel., g</td><td>84</td><td>55</td></tr> </tbody> </table> The door on the struck side of the vehicle did not separate from the body at the hinges or latche and the opposite doors did not open during the side impact event.					DRIVER	PASS.	Left Upper Rib (LUR) Accel., g	45	44	Left Lower Rib (LLR) Accel., g	47	60	Lower Spine (T ₁₂) Accel., g	69	50	Thoracic Trauma Index (TTI)	58	55	Pelvis (PEV) Accel., g	84	55
	DRIVER	PASS.																			
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17. Key Words New Car Assessment Program (NCAP) FMVSS No. 214D Side Impact Dummy (SID) Occupant Side Impact Protection		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590																			
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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY99 NCAP Side Impact Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-D-22001. The purpose of this test was to evaluate side impact protection of a 1999 Toyota Sienna CE Mini-Van.

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

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

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1999 Toyota Sienna CE Mini-Van was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 38.3 mph (61.6 kph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on January 21, 1999. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

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

The SIDs were instrumented with the following accelerometers.

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

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

The following table summarizes the results of the test:

Injury Criteria	Front SID	Rear SID
TTI (g)	58	55
Pelvis (g)	84	55

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

DATA SHEET NO. 1
GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 VIN: 4T3GF1913X4123491

Vehicle Body Color: Dark Green Build Date: 1/99

Engine Data: 6 Cylinders; CID; 3.0 Liter; cc

Placement Longitudinal; X Lateral

Transmission: 4 Speed; Manual; X Automatic; X Overdrive

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

Odometer Reading 51 miles

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

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

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 35 Psi FRONT

35 Psi REAR

Recommended Tire Size: P205/70R15 or P215/65R15

Tires on Test Vehicle: P205/70R15 Manufacturer: Firestone

Vehicle Capacity Data:

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

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

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

Vehicle Maximum Capacity Loading = 526.2 kg (A)

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

Cargo Capacity (A-B) = 49.9 kg

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

Right Front = 511.2 kg Right Rear = 362.4 kg

Left Front = 529.3 kg Left Rear = 367.9 kg

TOTAL FRONT = 1040.5 kg TOTAL REAR = 730.3 kg

% of Total Vehicle Weight = 58.8 %; % of Total Weight = 41.2 %

TOTAL WEIGHT = 1770.8 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-VanVehicle NHTSA No.: MX5108 Test Date: January 21, 1999CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	<u>1770.8</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>1982.1</u> kg

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

Right Front	=	<u>521.6</u> kg	Right Rear	=	<u>415.5</u> kg
Left Front	=	<u>586.5</u> kg	Left Rear	=	<u>458.1</u> kg
TOTAL FRONT	=	<u>1108.1</u> kg	TOTAL REAR	=	<u>873.6</u> kg
% of Total Weight	=	<u>55.9</u> %	% of Total Weight	=	<u>44.1</u> %
TOTAL WEIGHT	=	<u>1981.7</u> kg			

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 749 mm Left Front 751 mm Right Rear 762 mm Left Rear 753 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 735 mm Left Front 730 mm Right Rear 737 mm Left Rear 716 mm

TEST ATTITUDE:

Right Front 738 mm Left Front 736 mm Right Rear 740 mm Left Rear 721 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2900 mm

C.G. = 1273 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4506 mm

Centerline = 4870 mm

Left Side = 4506 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 220 mm

Test Position: 9th detent rearward of 16

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 20°

SECOND POSITION SEAT:

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

Seat Back Adjustment Position: 20°

ADJUSTABLE STEERING COLUMN POSITION: Mid Position

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

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 21.2 gallons

Test Volume: 19.7 gallons 93 % of capacity

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

Wheelbase: = 2900 mm

Impact Point is 508 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

Overall Length = 4870 mm; Overall Width = 1856 mm

TEST WEIGHT:

Right Front = 528.9 kg

Right Rear = 420.0 kg

Left Front = 580.1 kg

Left Rear = 447.2 kg

TOTAL FRONT = 1109.0 kg

TOTAL REAR = 867.2 kg

% of Total Weight = 56.1 %

% of Total Weight = 43.9 %

TOTAL VEHICLE WEIGHT = 1976.2 kg

Wheelbase = 2900 mm

Longitudinal C.G. from Center of Front Axle = 1273 mm

Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (275 mm above ground) = 50 mm

2. LEVEL 2 (723 mm above ground) = 328 mm

3. LEVEL 3 (747 mm above ground) = 341 mm

4. LEVEL 4 (1052 mm above ground) = 259 mm

5. LEVEL 5 (1595 mm above ground) = 31 mm

Maximum Post-Test Intrusion = 341 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 with</u> <u>frontal airbag</u>	<u>Type II belt</u>

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

Number of Vehicle Data Channels:		=	<u>23</u>
Number of Cameras:	Onboard Vehicle	=	<u>3</u>
	Offboard Vehicle	=	<u>4</u>
	Deformable Barrier	=	<u>2</u>
	TOTAL	=	<u>9</u>

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTSYear/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-VanVehicle NHTSA No.: MX5108 Test Date: January 21, 1999POSITION OF IMPACT (MDB) ON MONORAIL:Crabbed 27° to leftMDB DETAILS:

Overall Width of Framework Carriage	=	<u>1252 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4115 mm</u>
Wheelbase of Framework Carriage	=	<u>2591 mm</u>
Tread of Framework Carriage (Front & Rear)	=	<u>1880 mm</u>
C.G. Location Rearward of Front Axle	=	<u>1098 mm</u>
C.G. Location From Center Line	=	<u>-15 mm</u>
C.G. Location Above Ground Level	=	<u>485 mm</u>

MDB WEIGHT:

Left Front	=	<u>457.7 kg</u>	Left Rear	=	<u>235.1 kg</u>
Right Front	=	<u>328.1 kg</u>	Right Rear	=	<u>342.6 kg</u>
TOTAL FRONT	=	<u>785.8 kg</u>	TOTAL REAR	=	<u>577.7 kg</u>
TOTAL MDB WEIGHT = <u>1363.5 kg</u>					

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degreesImpact Speed = Primary: 38.3 mph (61.6 kph) Secondary: 38.4 mph (61.8 kph)

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

1. Row A Top of Stack (813 mm) = 130 mm
2. Row B Mid Stack (686 mm) = 52 mm
3. Row C Top of Bumper (533 mm) = 75 mm
4. Row D Center of Bumper (432 mm) = 193 mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head	<u>Headrest/shoulder/seatbelt</u>	<u>Headrest/shoulder/</u> <u>window sill</u>
Arm	<u>Upper-rear of door</u>	<u>Middle of side panel</u>
Pelvis	<u>Mid-rear of door/armrest</u>	<u>Lower side panel</u>
Left Knee	<u>Front center of door</u>	<u>Side panel rear B-post</u>
Right Knee	<u>Left knee</u>	<u>Left knee</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 2 mm rearward Vertical: 8 mm high

ARM REST LOCATIONS:

Front: 185 mm from bottom of window

Rear: 175 mm from bottom of window

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

Front Seat Back:	50 mm	Front Seat Cushion:	27 mm
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Left Rear Seat Back:	0 mm	Rear Seat Cushion:	204 mm
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GLAZING DAMAGE:

Left middle window broke

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

Broken weld 615 mm rearward of impact point

OTHER NOTABLE IMPACT EFFECTS:

Left front tire landed on MDB face

AIRBAG DEPLOYMENT STATUS:

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

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

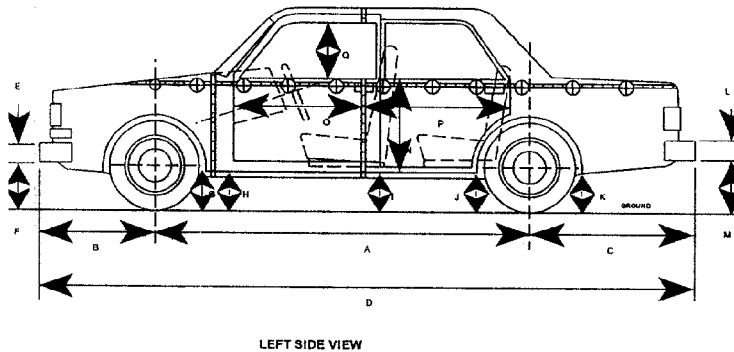
Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108
Test Date: January 21, 1999

	Driver SID ID # 272				Left Passenger SID ID # 271			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS								
Left Upper Rib (LUR) Y	45.0	37	-18.2	89	44.4	40	-3.5	105
Left Lower Rib (LLR) Y	46.5	36	-13.4	61	60.0	40	-5.3	108
SPINE ACCELERATIONS								
Lower Lateral Y	69.5	39	-15.0	61	50.3	45	-10.3	74
PELVIS ACCELERATIONS								
Lateral Y	84.4	35	-16.6	57	54.8	41	-9.9	76

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

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



D = Length at Centerline

R = Right Side Length

S = Left Side Length

T = Width at B Post

E & L = Bumper Thickness

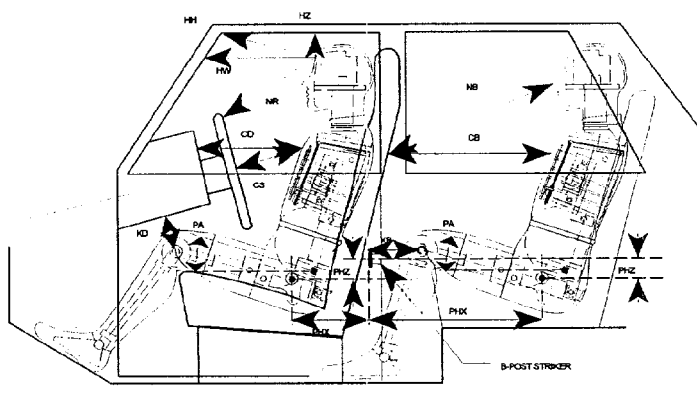
J1 = To Pinch Weld

J2 = To Sill

ALL MEASUREMENTS IN (mm)

	PRE-TEST	POST-TEST	Δ CHANGE
A	2900	2883	17
B	940	938	2
C	1030	1062	32
D	4870	4883	13
E	120	120	0
F	403	398	5
G	204	205	1
H	207	201	6
I	216	262	46
J1/J2	196/198	240/240	44/42
K	307	327	20
L	155	155	0
M	385	412	27
N	780	732	48
O	934	830	104
P	243	239	4
Q	550	541	9
R	4506	4521	15
S	4506	4470	36
T	1856	1595	261

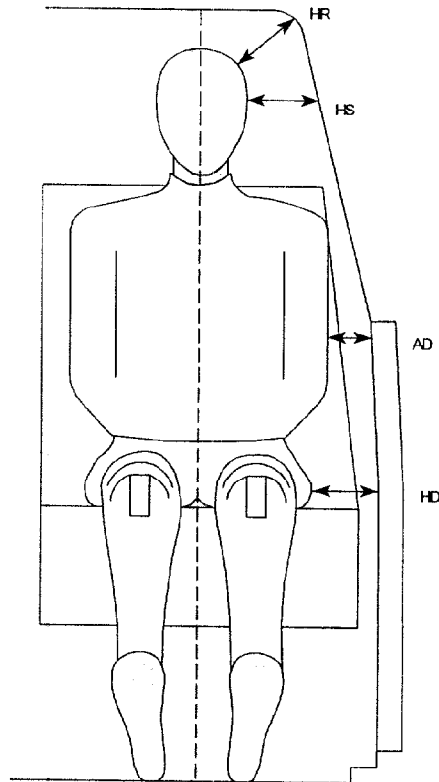
DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-VanNHTSA NO.: MX5108 Test Date: January 21, 1999NOTE: All dimensions are in mm with tolerance of ± 3 mm

	DRIVER SID ID # 272		LEFT REAR PASSENGER SID ID # 271
HH	355	HZ	212
HW	624	NB	717
HZ	196	CB	608
NR	404	KBL (KBA)	258 (0.0°)
CD	508	KBR (KBA)	265 (0.0°)
CS	319	PA°	24.9°
KDL(KDA°)	159 (0.0°)	PHX	626
KDR(KDA°)	172 (0.0°)	PHZ	108
PA°	24.8°		
PHX	332		
PHZ	160		

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

DATA SHEET NO. 8

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONSYear/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-VanNHTSA NO.: MX5108Test Date: January 21, 1999

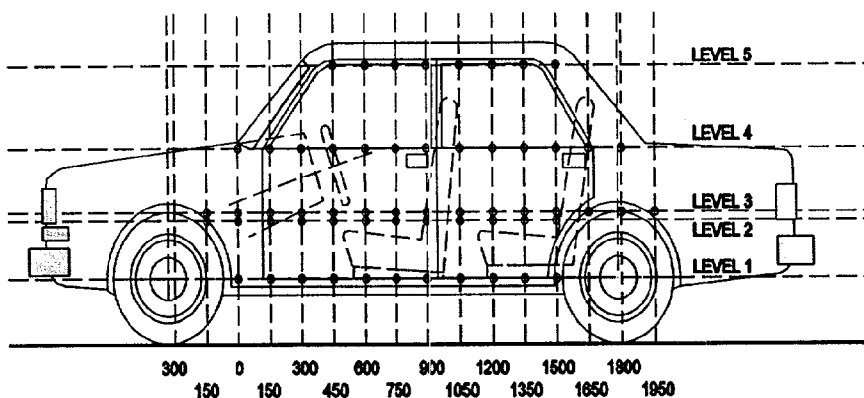
NOTE: All dimensions are in mm

	DRIVER SID ID # 272	LEFT REAR PASSENGER SID ID # 271
HR	274	242
HS	335	370
AD	110	162
HD	153	104

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

NHTSA NO.: MX5108 Test Date: January 21, 1999



LEFT SIDE VIEW

NOTE: All measurements are in millimeters (mm)

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

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

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

Level 1 @ Axle Centerline Height

(or Sill Top Height)

= 275 mm

Level 2 @ Occupant H-Point

= 723 mm

Level 3 @ Mid Door

= 747 mm

Level 4 @ Window Sill

= 1052 mm

Level 5 @ Window Top

= 1595 mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

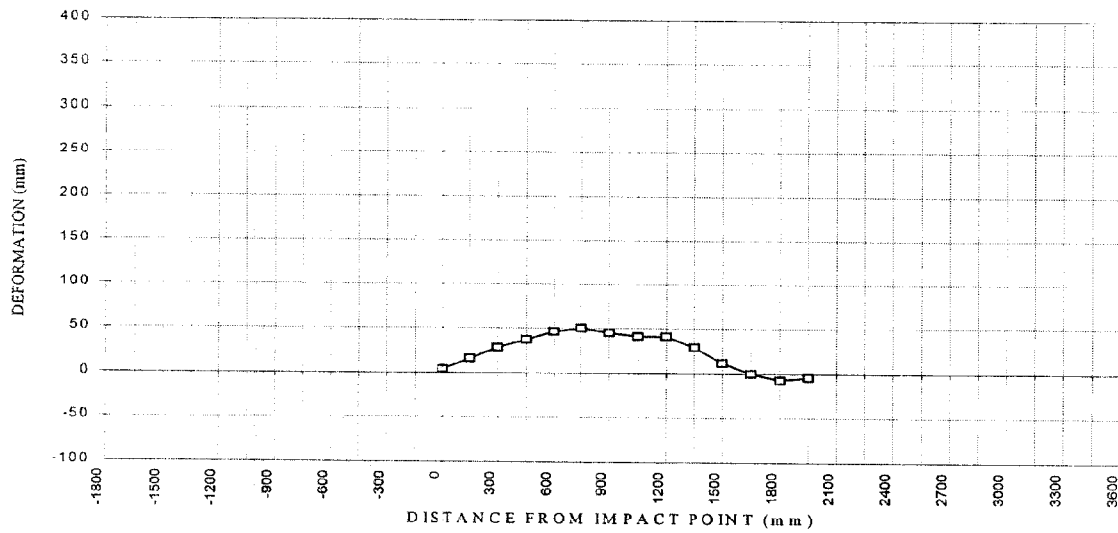
Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)	867	871	4
150	868	884	16
300	869	897	28
450	869	906	37
600	872	918	46
750	870	920	50
900	869	914	45
1050	868	909	41
1200	867	908	41
1350	867	896	29
1500	867	879	12
1650	866	866	0
1800	857	850	-7

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 1 - Axle Centerline		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	844	840	-4
2100			
2250			
2400			
2550			
2700			
2850			
3000			
3150			
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 1 - AXLE CENTERLINE

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 2 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900	815	831	16
-750	780	790	10
-600			
-450			
-300	756	770	14
-150	762	776	14
0 (impact point)	762	854	92
150	756	965	209
300	754	1001	247
450	752	1015	263
600	750	1031	281
750	750	1041	291
900	750	1042	292
1050	747	1040	293
1200	743	1071	328
1350	743	1064	321
1500	740	1059	319
1650	739	1058	319
1800	738	1048	310

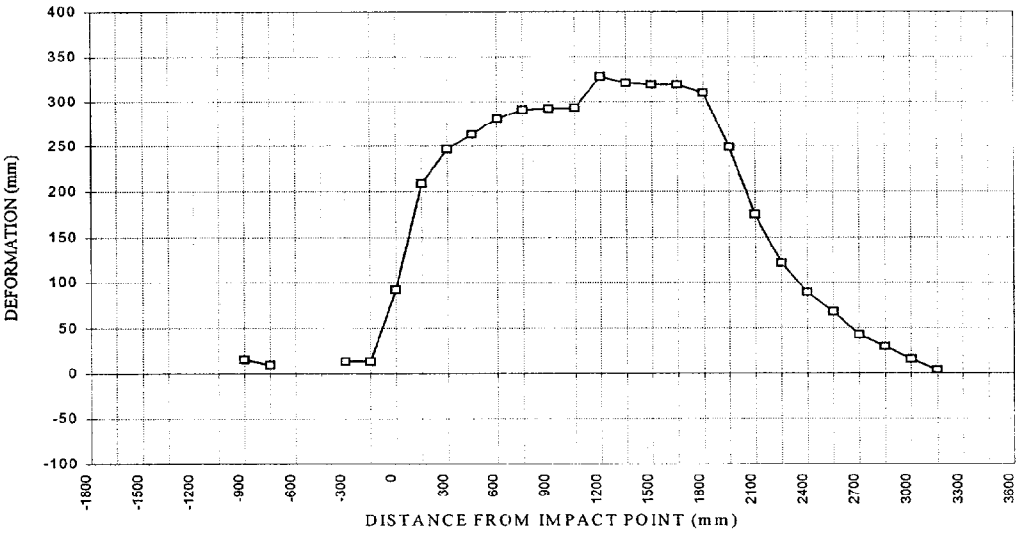
Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 2 - Occupant H-Point		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	738	987	249
2100	740	915	175
2250	740	861	121
2400	741	830	89
2550	748	816	68
2700	768	811	43
2850	783	813	30
3000	808	824	16
3150	846	850	4
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

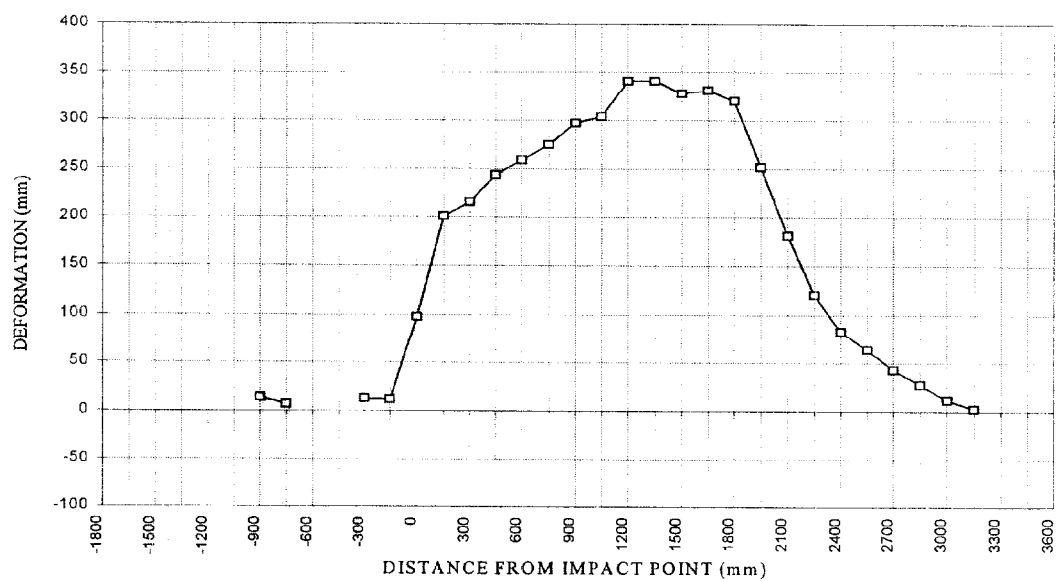
	Level 3 - Mid-Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900	816	830	14
-750	787	794	7
-600			
-450			
-300	761	774	13
-150	762	774	12
0 (impact point)	760	858	98
150	757	958	201
300	756	972	216
450	753	997	244
600	748	1007	259
750	748	1023	275
900	747	1044	297
1050	744	1048	304
1200	743	1084	341
1350	740	1081	341
1500	740	1068	328
1650	740	1071	331
1800	737	1057	320

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 3 - Mid-Door		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	736	988	252
2100	739	920	181
2250	741	862	121
2400	744	827	83
2550	752	816	64
2700	766	809	43
2850	782	810	28
3000	808	820	12
3150	846	849	3
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 3 - MID-DOOR

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

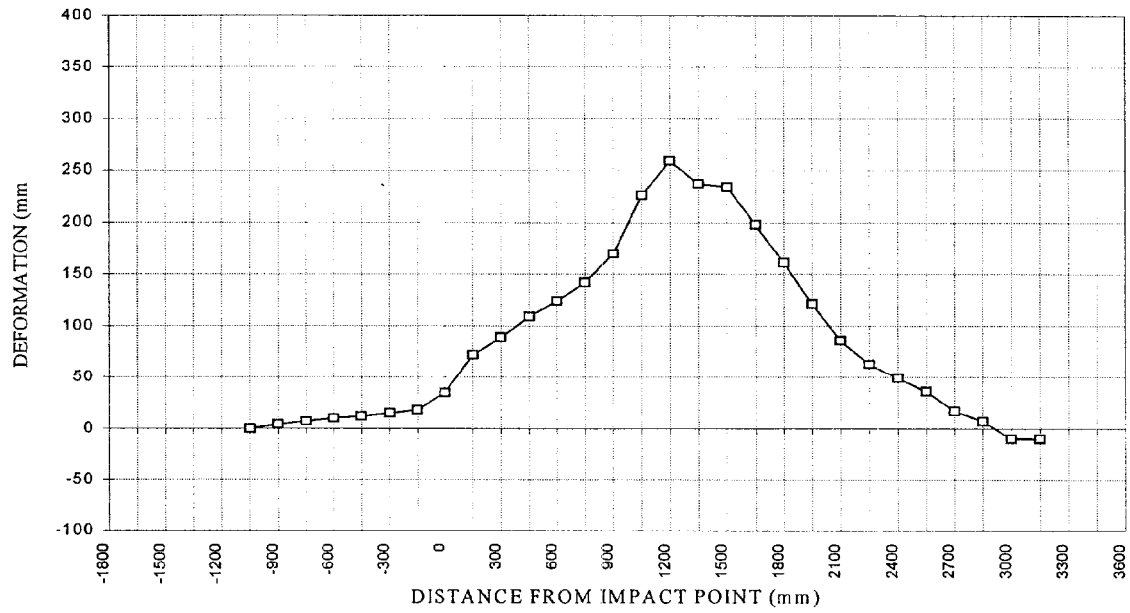
	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050	903	903	0
-900	873	877	4
-750	853	860	7
-600	835	845	10
-450	822	834	12
-300	813	828	15
-150	808	826	18
0 (impact point)	804	839	35
150	803	875	72
300	799	888	89
450	796	905	109
600	794	918	124
750	792	934	142
900	789	959	170
1050	789	1015	226
1200	789	1048	259
1350	789	1026	237
1500	789	1023	234
1650	789	987	198
1800	788	949	161

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

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 4 - Window Sill		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	787	908	121
2100	789	875	86
2250	791	854	63
2400	794	843	49
2550	798	834	36
2700	808	825	17
2850	819	826	7
3000	836	826	-10
3150	865	855	-10
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

LEVEL 4 - WINDOW SILL

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1800			
-1650			
-1500			
-1350			
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600	1011	974	-37
750	1010	995	-15
900	1010	1021	11
1050	1013	1044	31
1200	1013	1040	27
1350	1013	1037	24
1500	1013	1030	17
1650	1013	1022	9
1800	1013	1015	2

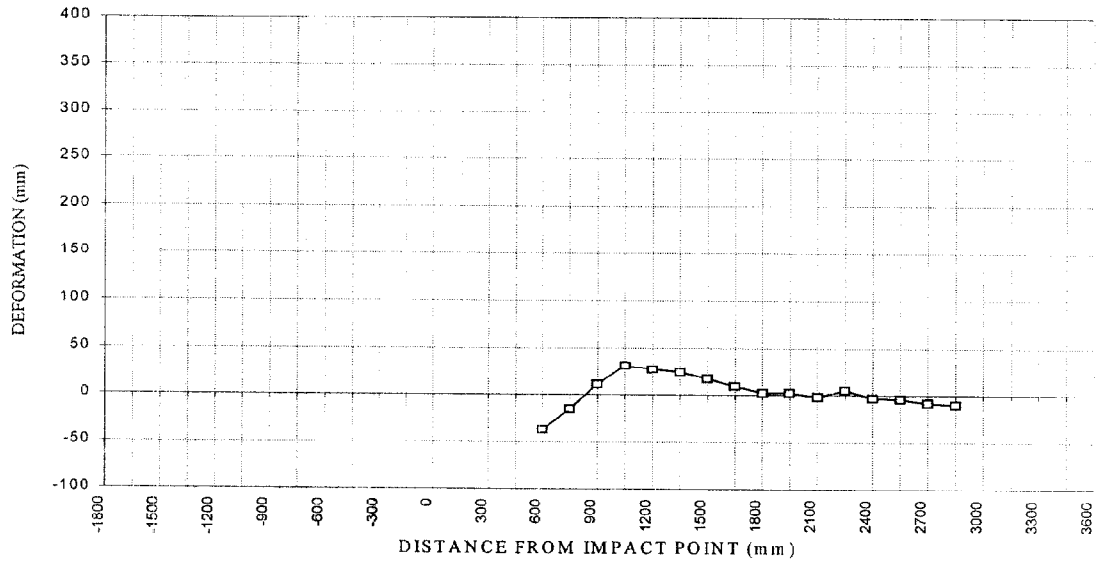
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

	Level 5 - Window Top		
Longitudinal Distance (mm)	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
1950	1013	1015	2
2100	1013	1011	-2
2250	1015	1020	5
2400	1021	1018	-3
2550	1028	1024	-4
2700	1037	1029	-8
2850	1055	1045	-10
3000			
3150			
3300			
3450			
3600			

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

VEHICLE EXTERIOR STATIC CRUSH

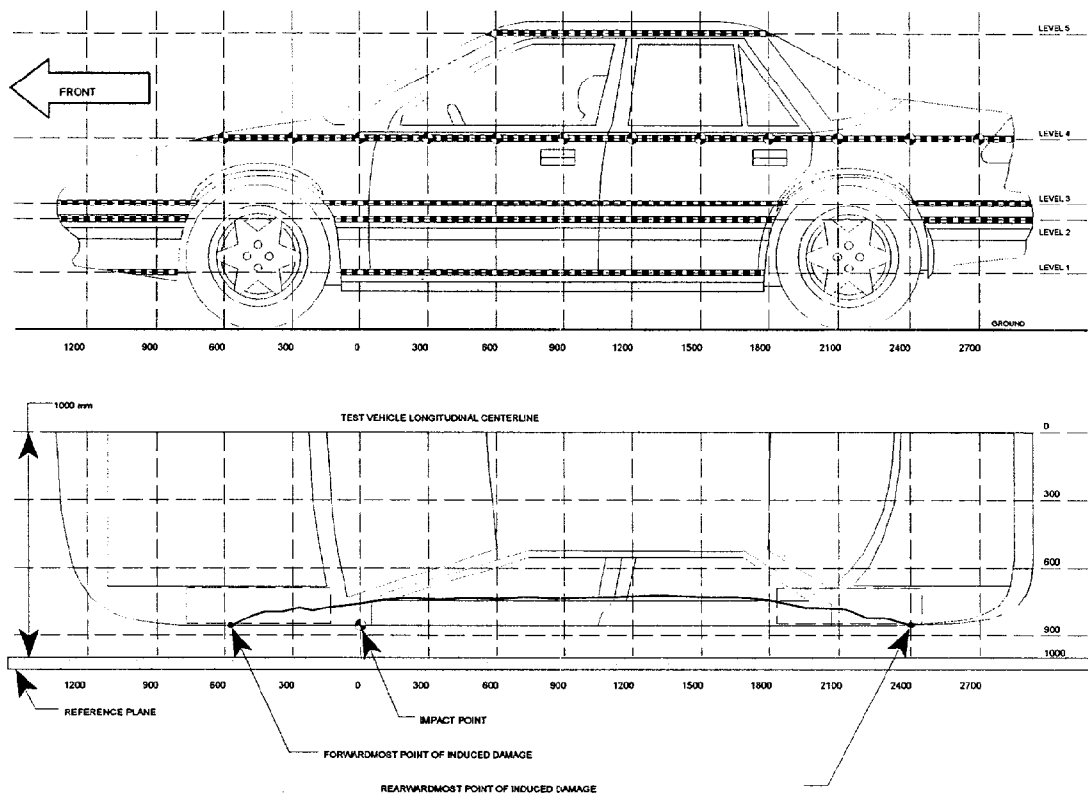


LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

NHTSA NO.: MX5108 Test Date: January 21, 1999



NOTE: All measurements are in millimeters (mm)

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (LF = <u>-1050</u> mm)	903	903	0
2. <u>-230</u> mm	777	761	16
3. <u>540</u> mm	1038	751	287
4. <u>1355</u> mm	1074	740	334
5. <u>2200</u> mm	877	740	137
6. (LR = <u>3000</u> mm)	836	836	0

DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

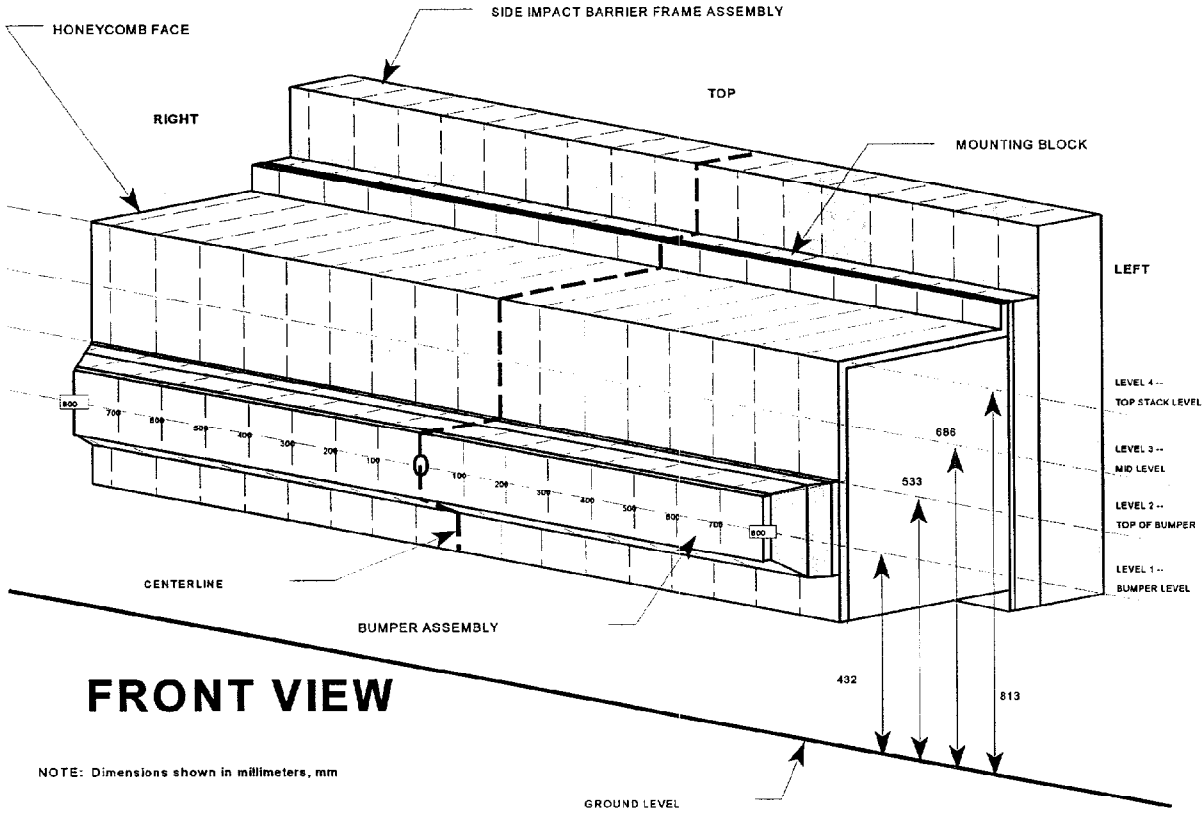
Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

Location	Height at CL	Distance Right of Center (mm)									Distance Left of Center (mm)							
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	63	46	35	26	20	19	18	27	28	34	41	54	69	83	103	130	130
Mid Level Level 3	686 mm	34	8	5	8	13	11	8	22	23	13	18	15	17	16	22	35	52
Top Bumper Level 2	533 mm	75	65	60	52	54	56	57	58	54	55	54	56	56	54	53	55	60
Mid Bumper Level 1	432 mm	193	182	172	169	166	165	163	162	164	155	152	152	153	155	153	155	154

See next page for Barrier Face Graphic

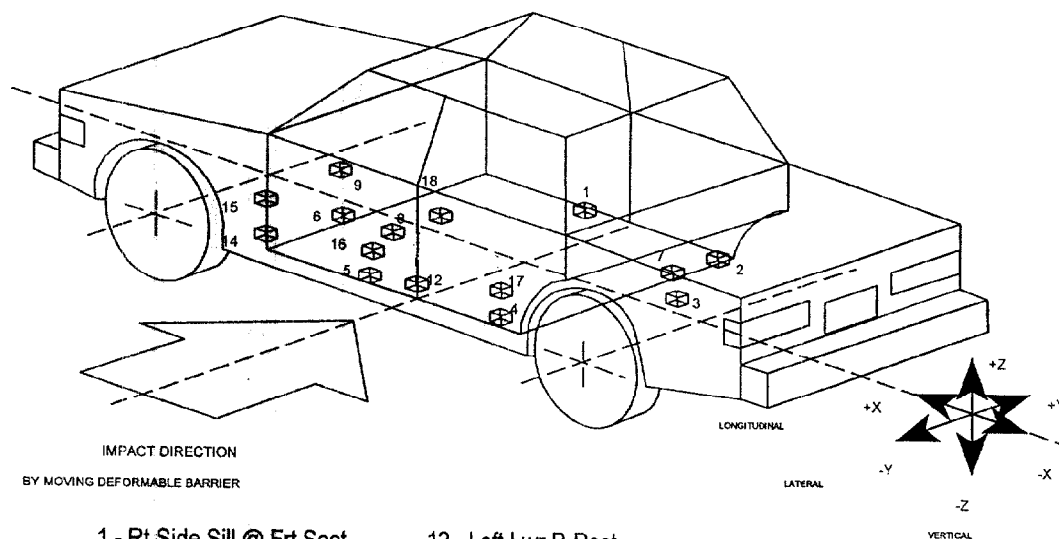
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999



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

DATA SHEET NO. 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY
Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van
Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

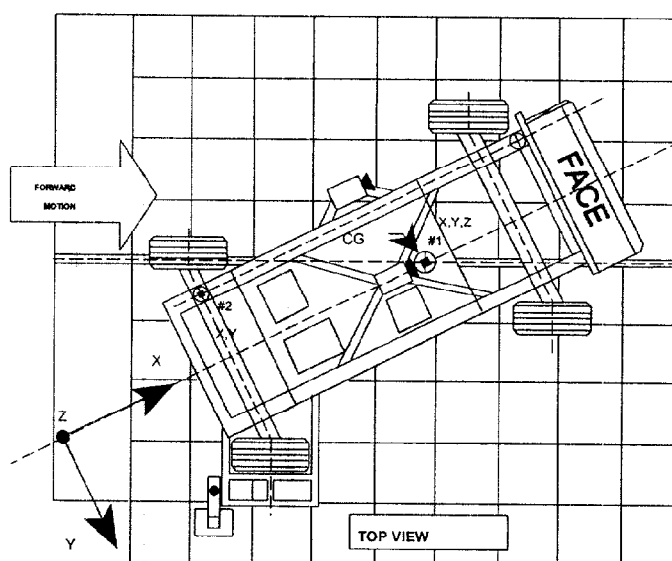
Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Rt. Side Sill @ Front Seat	2925	710	250	1.9	-5.1	29.8	-3.0	6.0	-7.0	31.0
2	Rt. Side Sill @ Rear Seat	1915	745	250	2.5	-5.8	33.6	-2.9	5.5	-10.2	34.4
3	Rr. Floorpan Above Axle	1070	0	535	2.5	-6.1	24.5	-2.5	7.6	-10.8	24.7
4	Left Side Sill @ Rr. Seat	1908	-710	243	----	----	36.5	-12.7	----	----	----
5	Left Side Sill @ Frt. Seat	2916	-745	245	----	----	40.7	-9.6	----	----	----
6	Left Front Door Centerline	2882	-820	765	----	----	124.3	-267.3	----	----	----
7	Right Rear Occupant Compartment	1910	490	450	----	----	26.5	-2.0	----	----	----
8	Mid Rear of Left Front Door	2559	-813	758	----	----	119.3	-149.7	----	----	----
9	Left Front Door Upper Centerline	2932	-821	1065	----	----	169.3	-142.8	----	----	----
12	Left Lower B-Post	2437	-670	420	----	----	82.0	-14.6	----	----	----
14	Left Lower A-Post	3370	-735	505	----	----	35.8	-5.2	----	----	----
15	Left Mid A-Post	3456	-777	1230	----	----	23.6	-3.6	----	----	----
16	Driver Seat Track	2549	-555	450	----	----	39.6	-7.4	----	----	----
17	Rear Passenger Seat Track	1630	-610	548	----	----	30.9	-4.6	----	----	----
18	Vehicle CG	2645	0	406	3.2	-4.7	26.6	-2.4	8.9	-9.5	27.6

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

DATA SHEET NO. 14
MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA
SUMMARY

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999



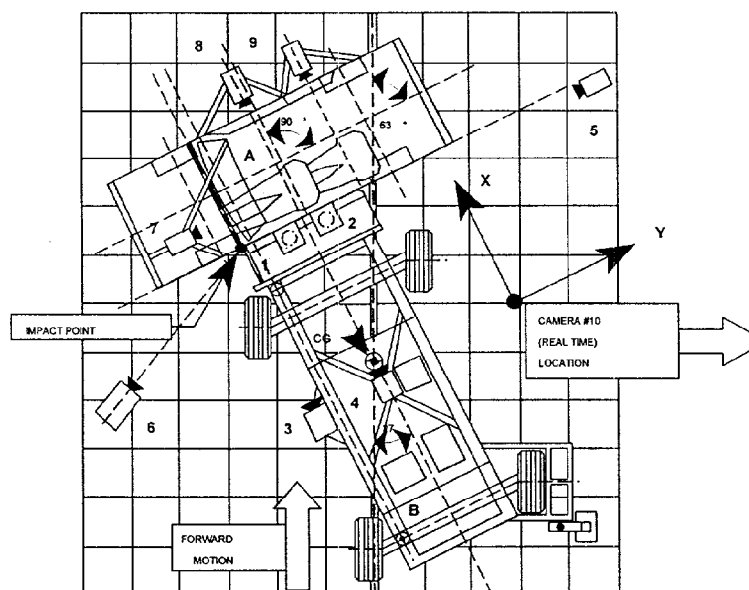
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.3	179	-19.2	34
	Lateral (Y)	---	---	---	0.6	81	-6.1	54
	Vertical (Z)	---	---	---	14.5	35	-11.3	26
	Resultant (R)	---	---	---	24.4	35	----	----
2	Rear Frame Member	-2501	-625	622				
	Longitudinal (X)	---	---	---	1.2	119	-22.4	36
	Lateral (Y)	---	---	---	5.2	28	-1.2	199

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

DATA SHEET NO. 15
HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999



Camera No.	View	Coordinates (mm)*			Lens (mm)	Film Speed (fps)
		X	Y	Z		
	Real Time					
1	Top Overall	-155	-1220	5000	8	1000
2	Top Impact	-230	-30	5000	13	952
3	Cart Pointer				35	294
4	Cart Overall				13	350
5	Right Impact	-655	10455	1830	25	1000
6	Left Impact	-285	-2840	1675	13	1005
7	Onboard Hood				13	1010
8	Onboard Driver				8	1163
9	Onboard Passenger				8	957

* Reference: (from point of impact)

+X = Forward

+Y = To Right

+Z = Upward

DATA SHEET 16
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

TEST REQUIREMENTS:

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

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

FUEL SPILLAGE MEASUREMENT:

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

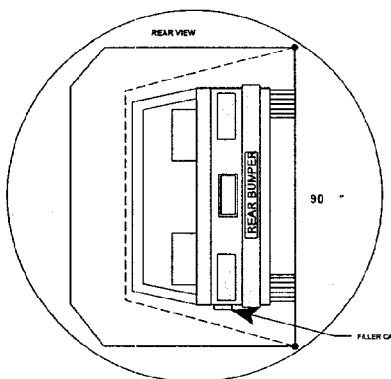
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 50 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 50 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

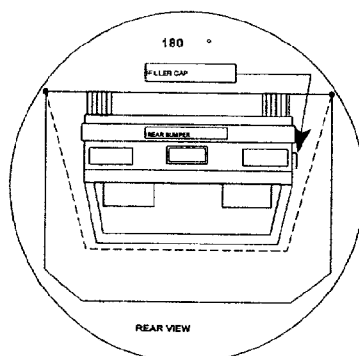
FUEL SPILLAGE LOCATIONS(S): None

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

Vehicle Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 26 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 26 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

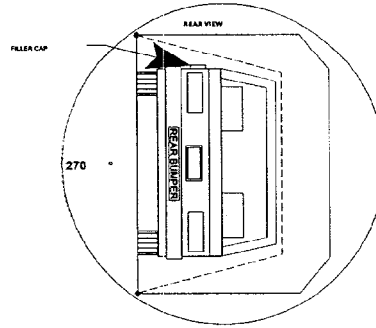
FUEL SPILLAGE LOCATIONS(S): None

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

Vehicle Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 9 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 9 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

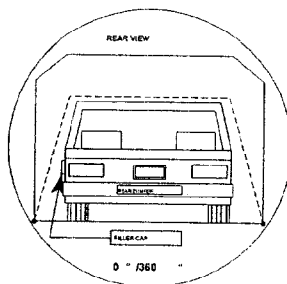
FUEL SPILLAGE LOCATIONS(S): None

DATA SHEET 16
FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1999/Toyota/Sienna CE/Mini-Van

Vehicle NHTSA No.: MX5108 Test Date: January 21, 1999

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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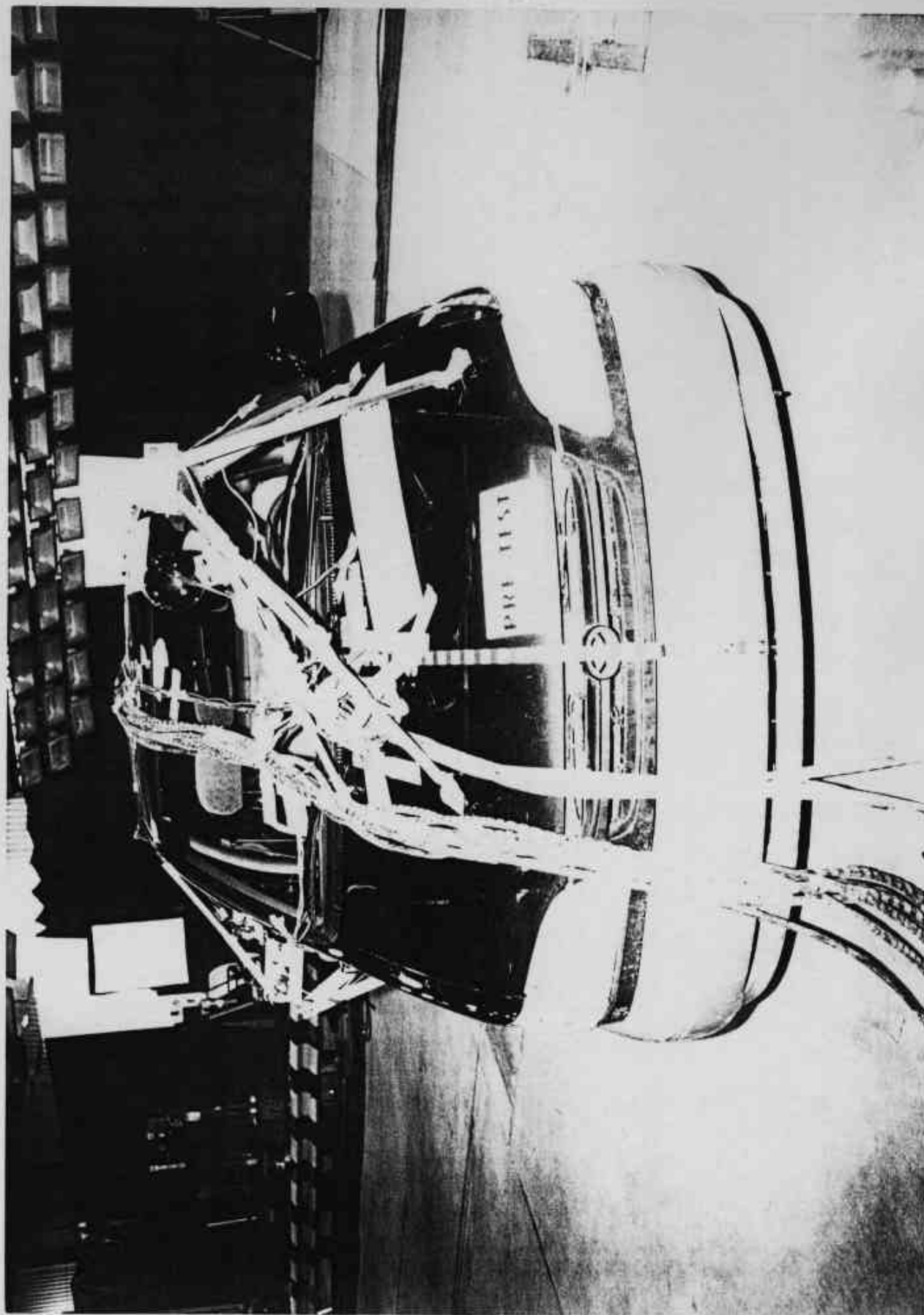


Photo No. A-1 - Pre-Test Front View of Test Vehicle

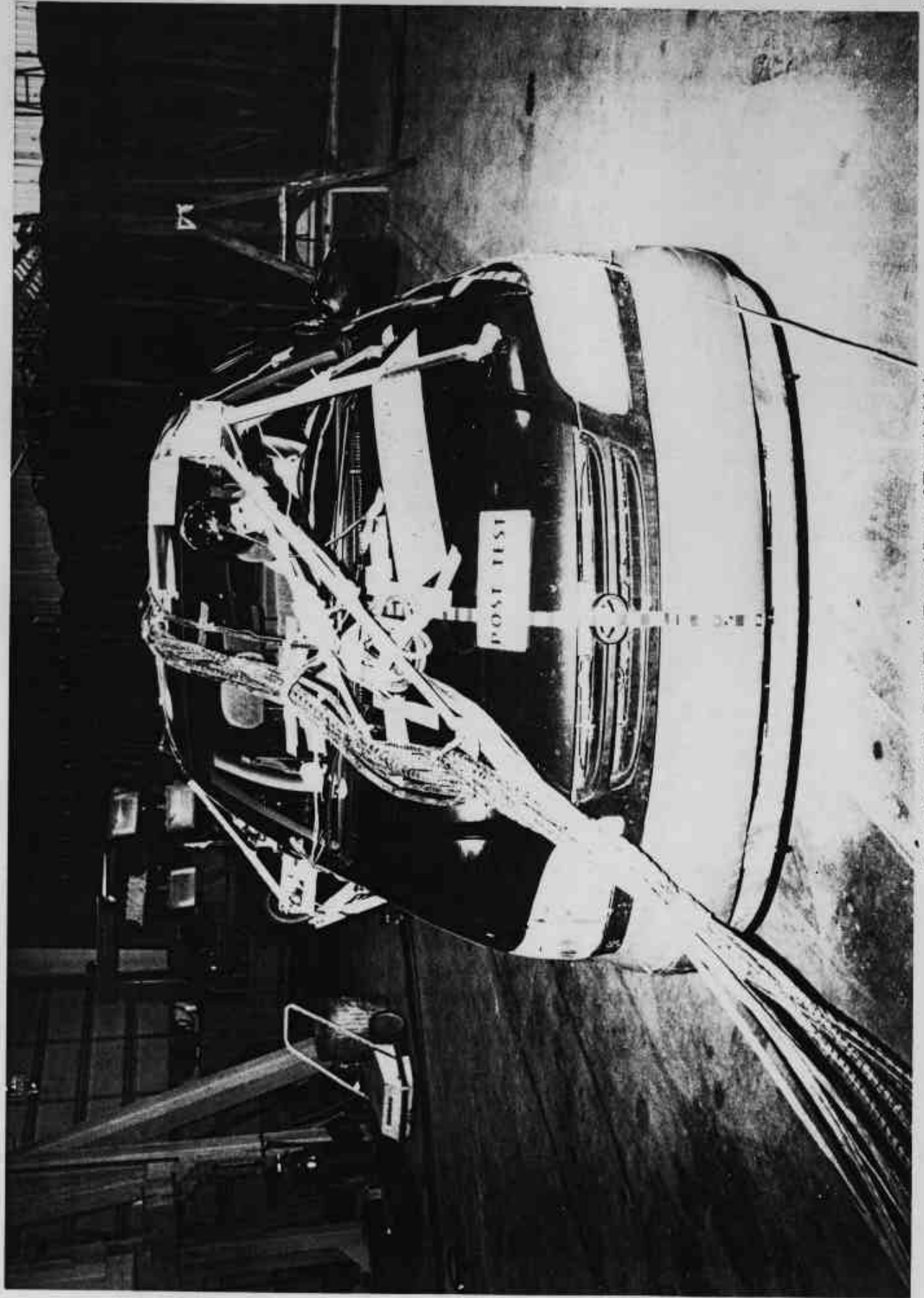
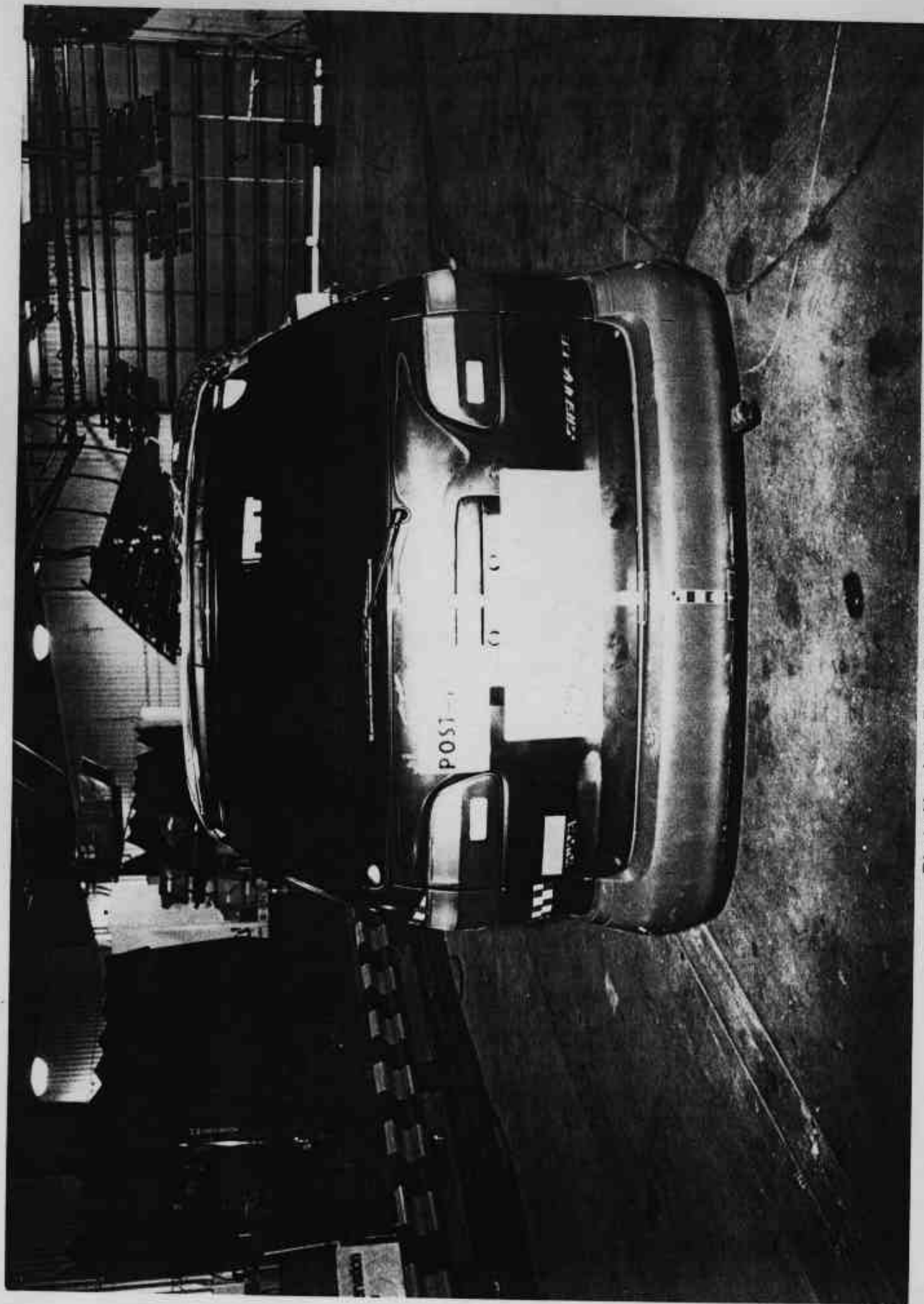


Photo No. A-2 - Post-Test Front View of Test Vehicle



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

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



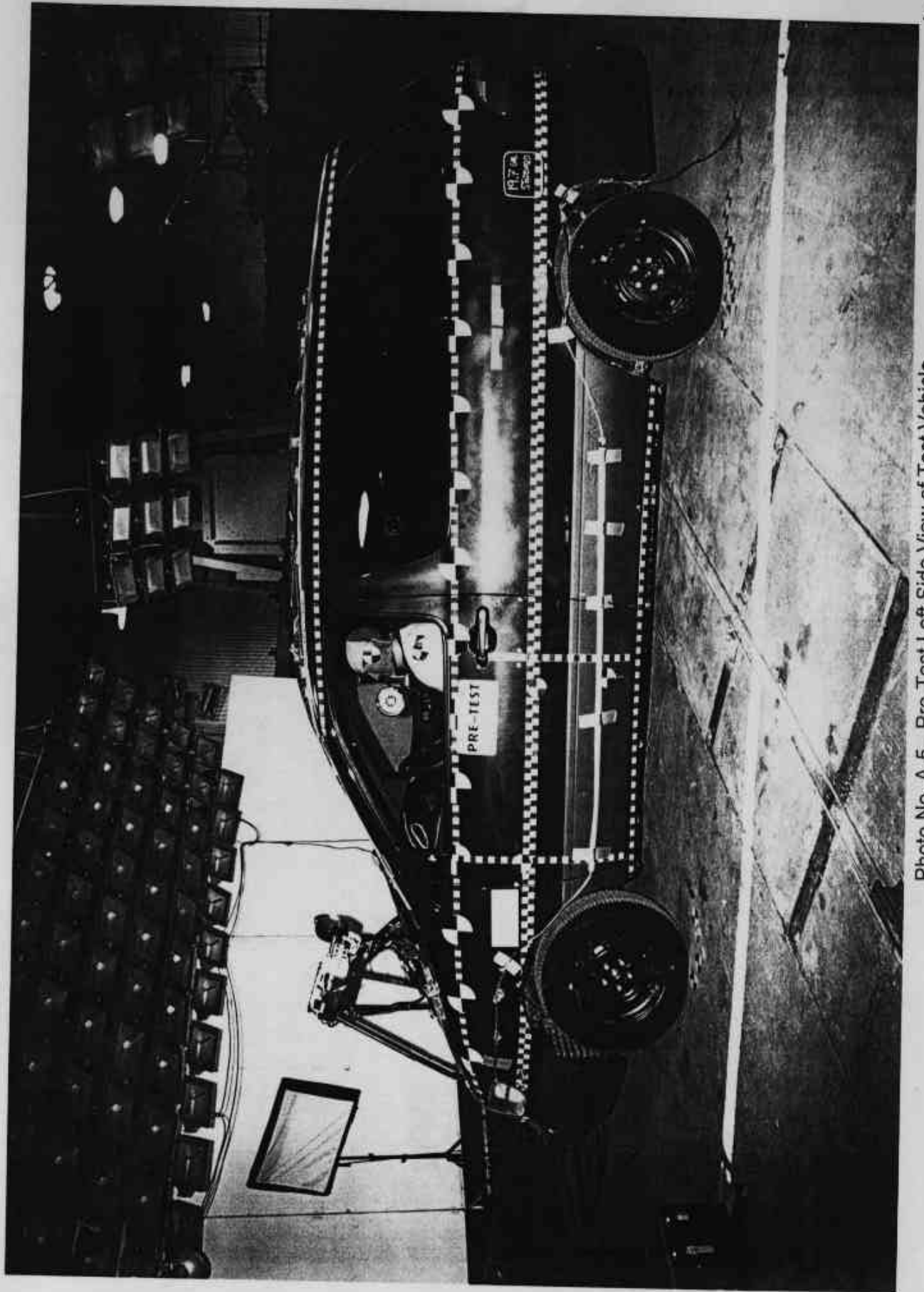


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

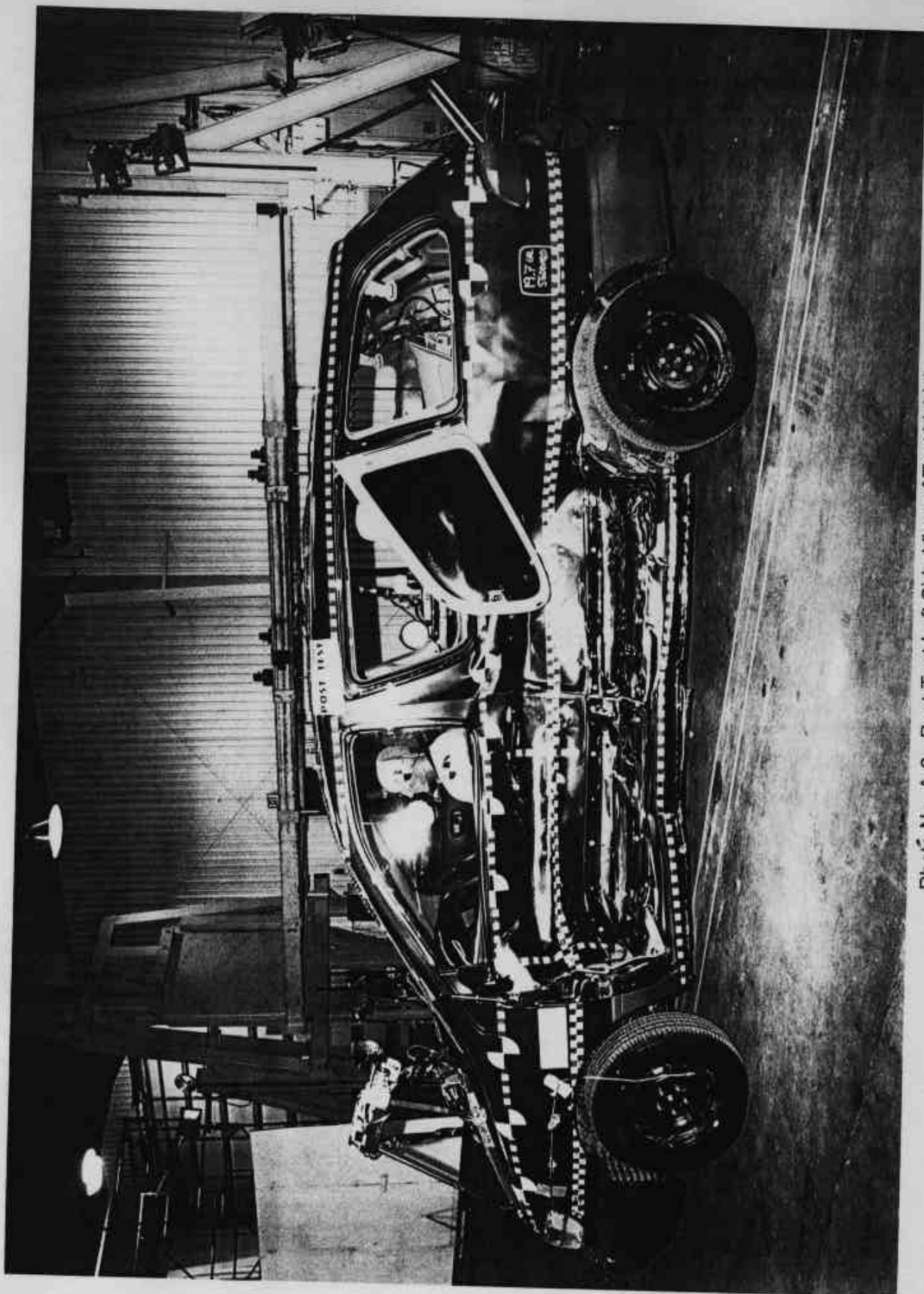


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

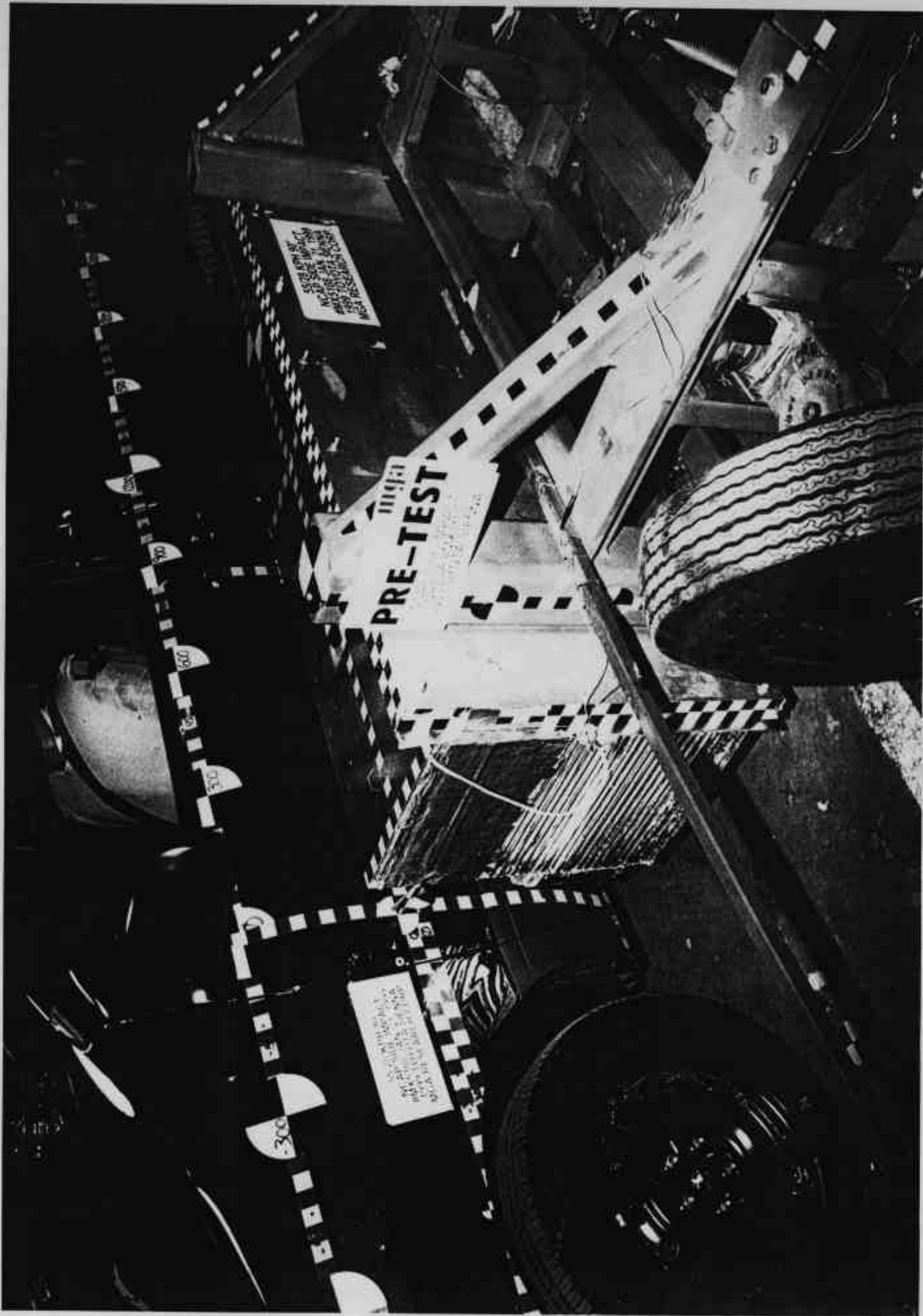


Photo No.-A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

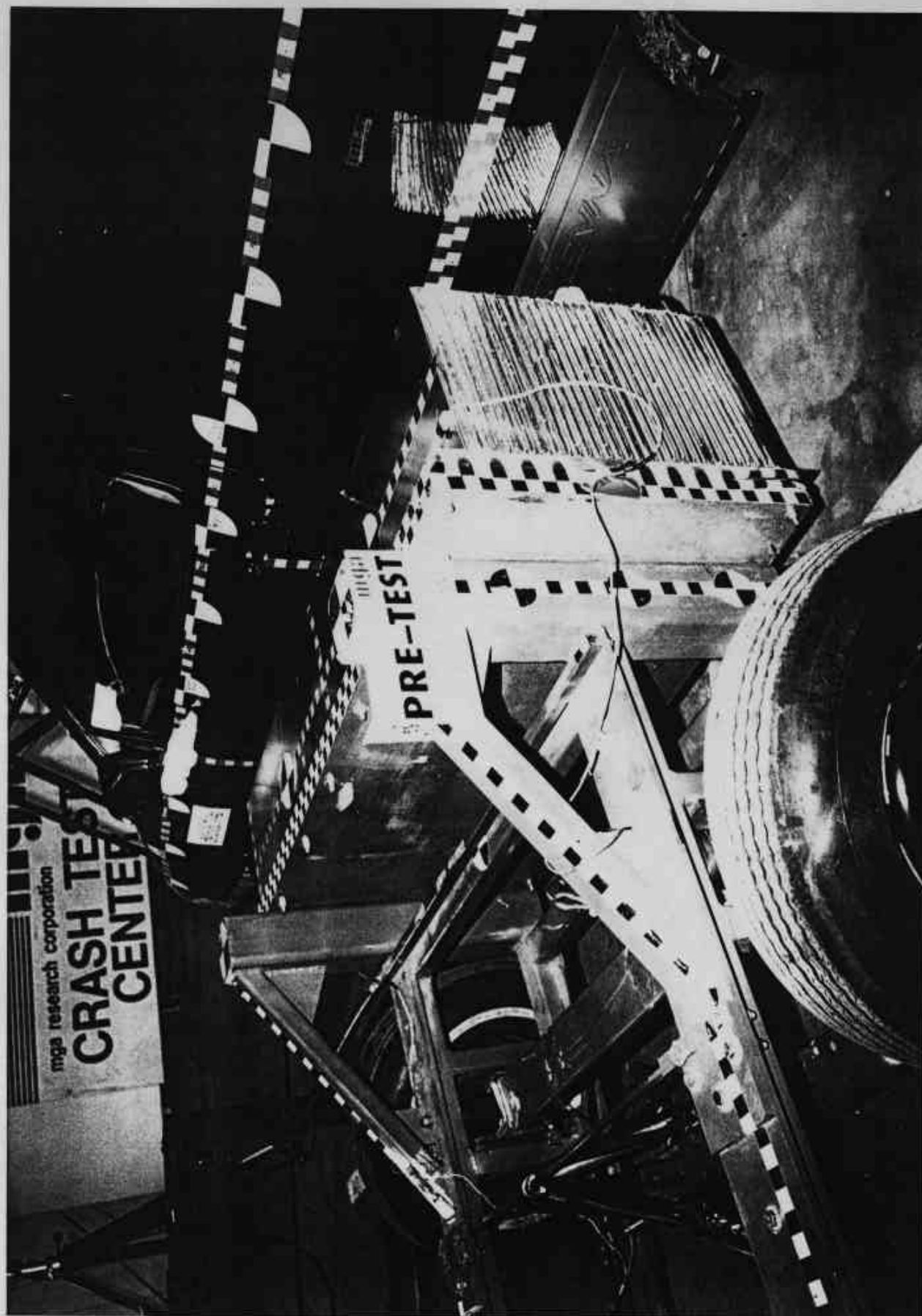


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

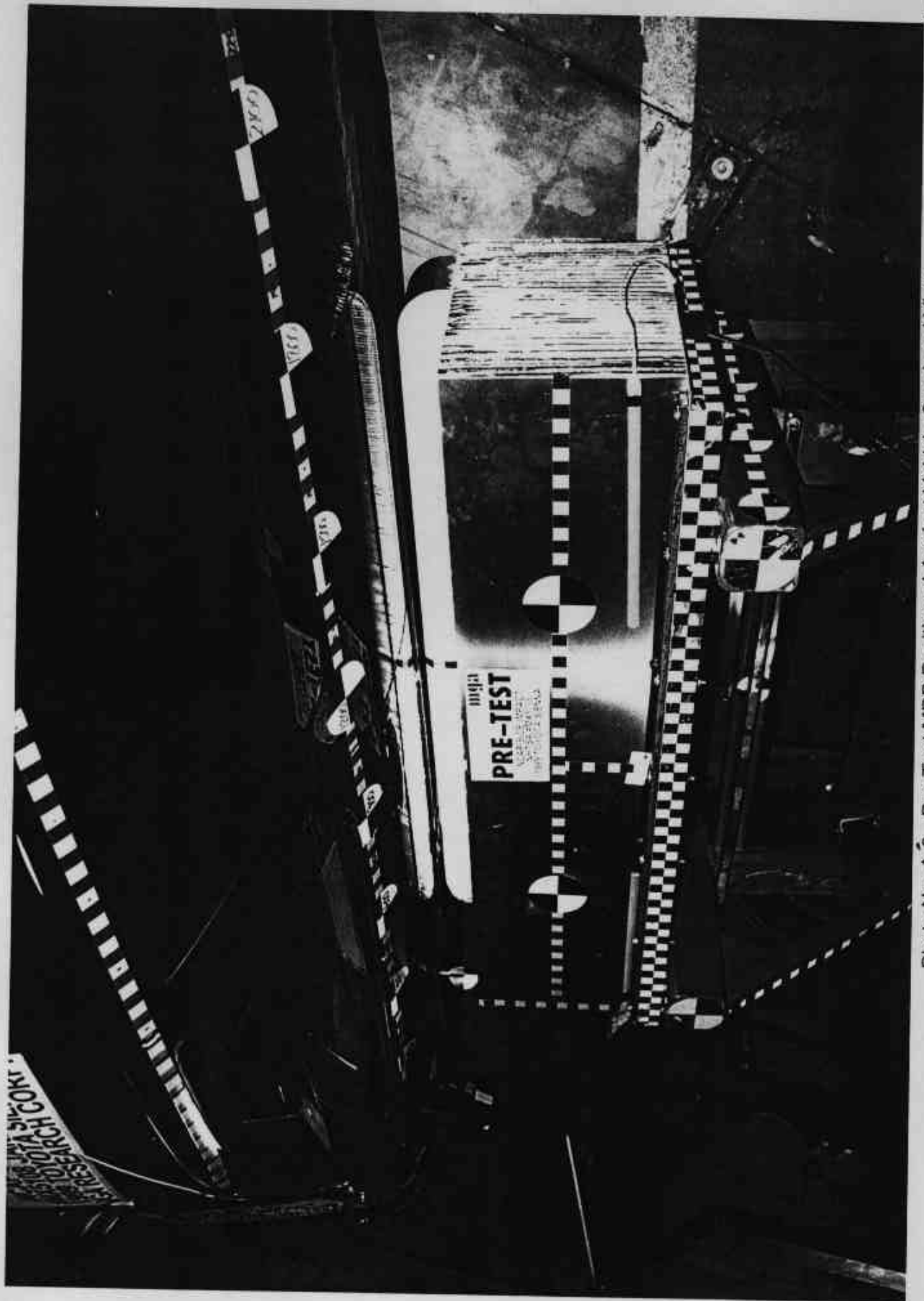


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View



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

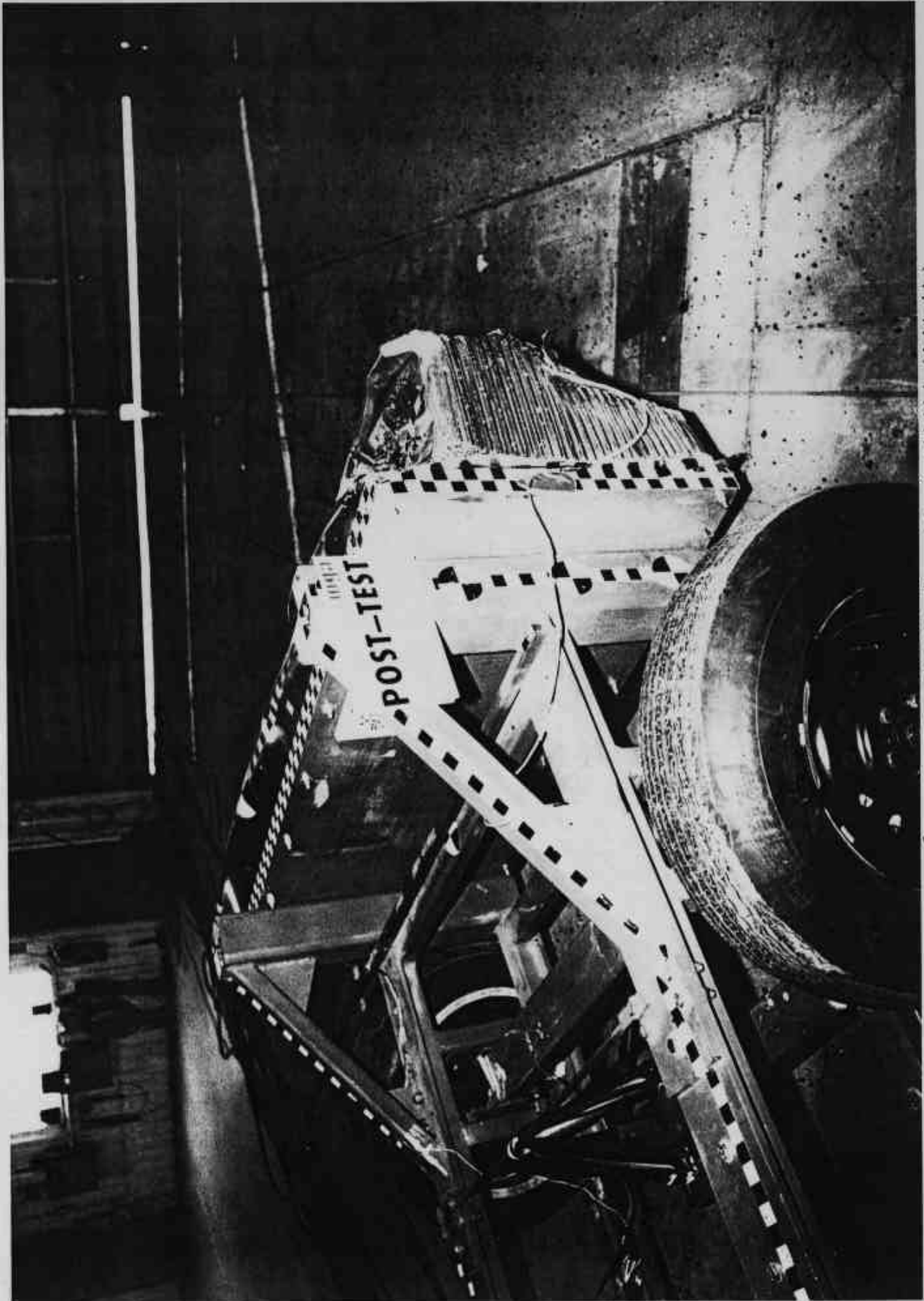


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

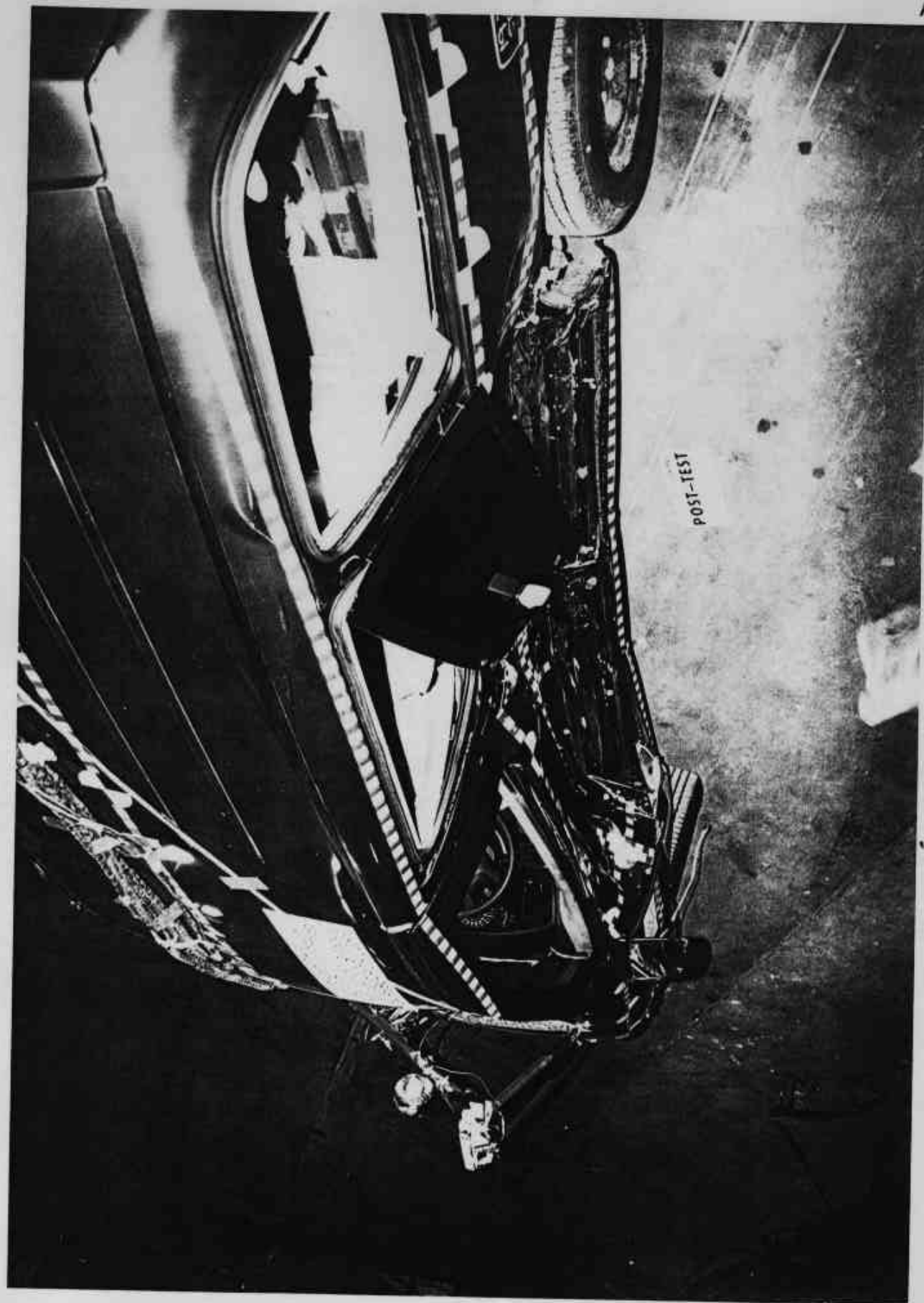


Photo No. A-12 - Post-Test MDB Positioned Against Vehicle Overhead View

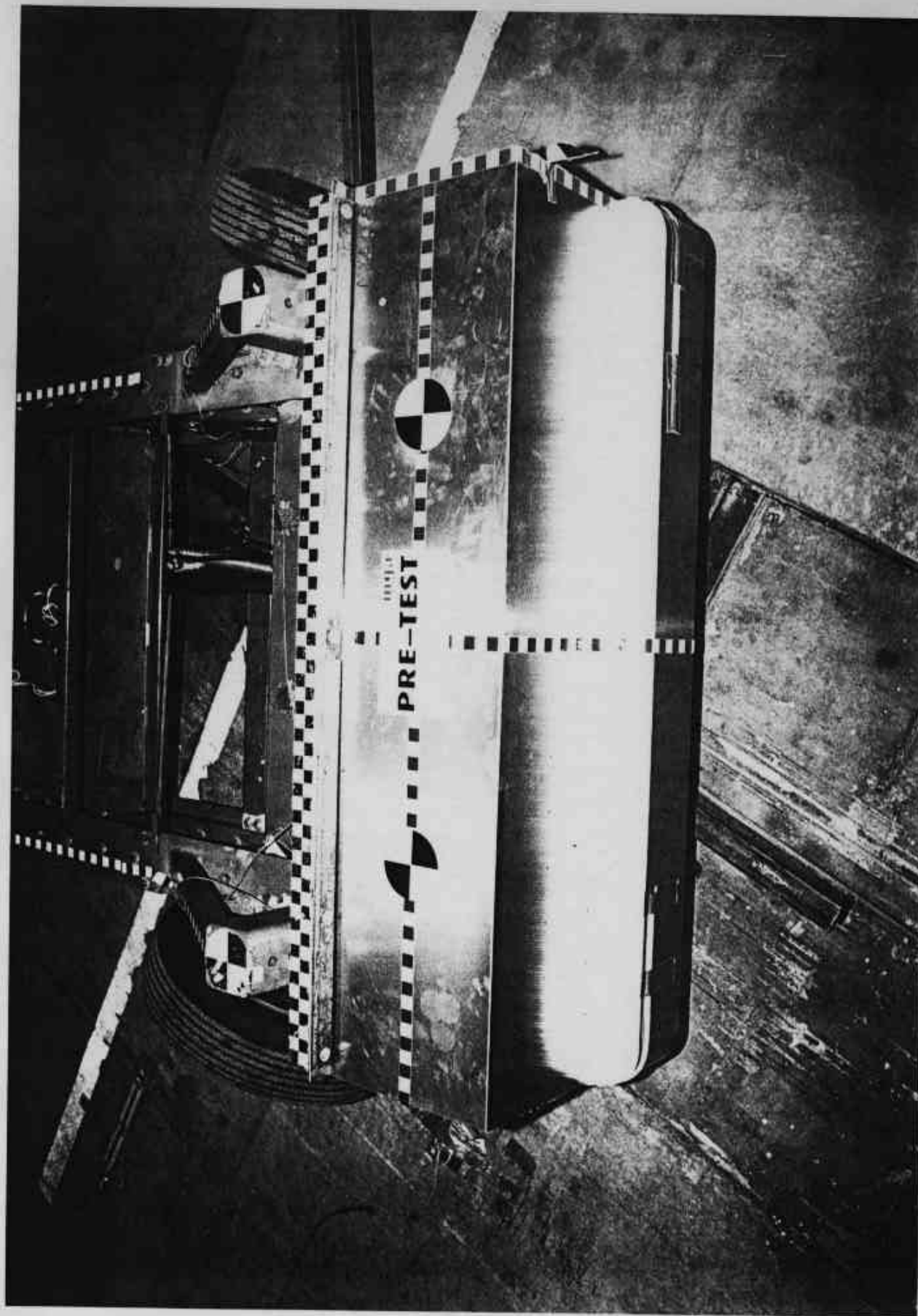


Photo No. A-13 - Pre-Test MDB Top View

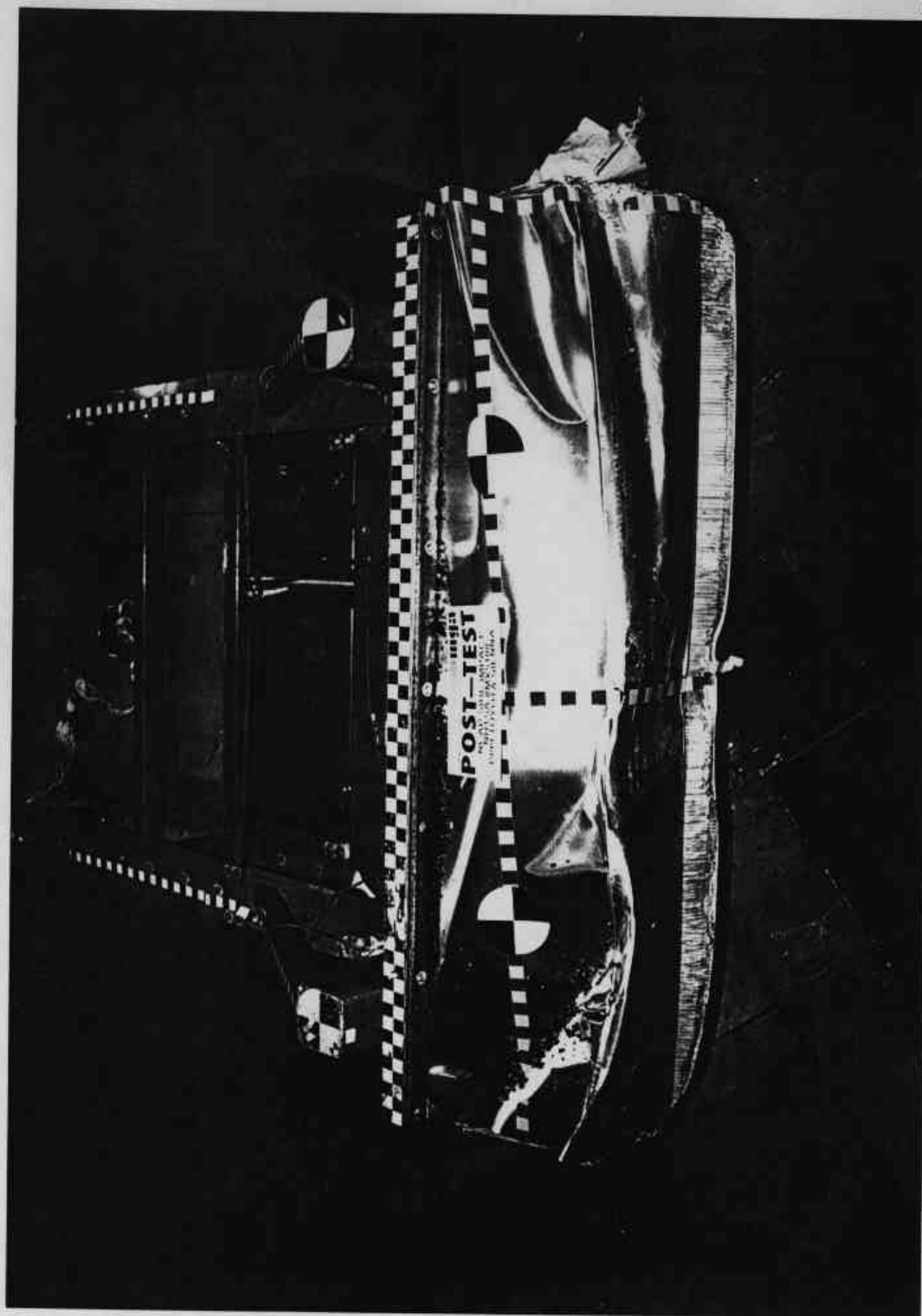


Photo No. A-14 - Post-Test MDB Top View

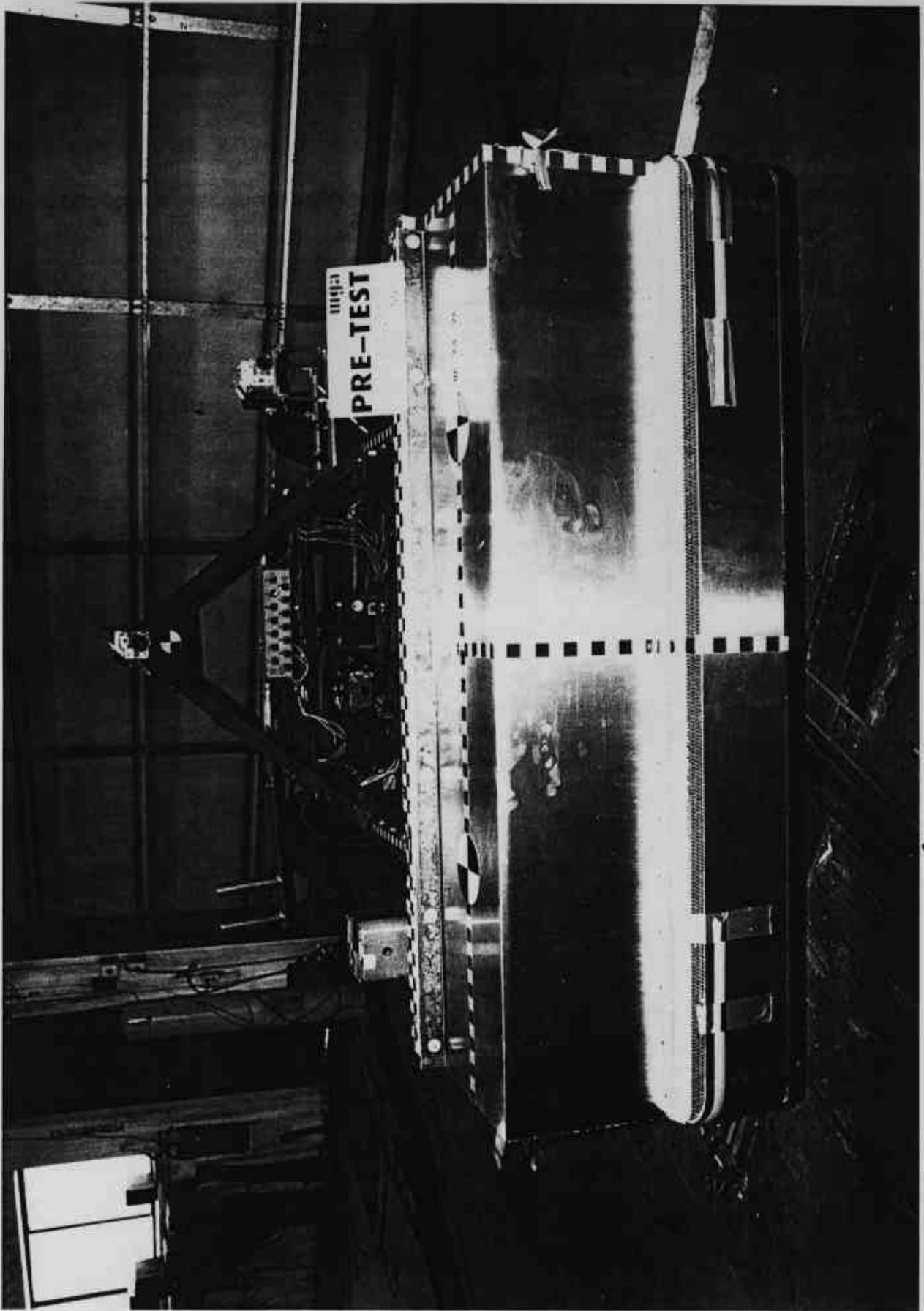
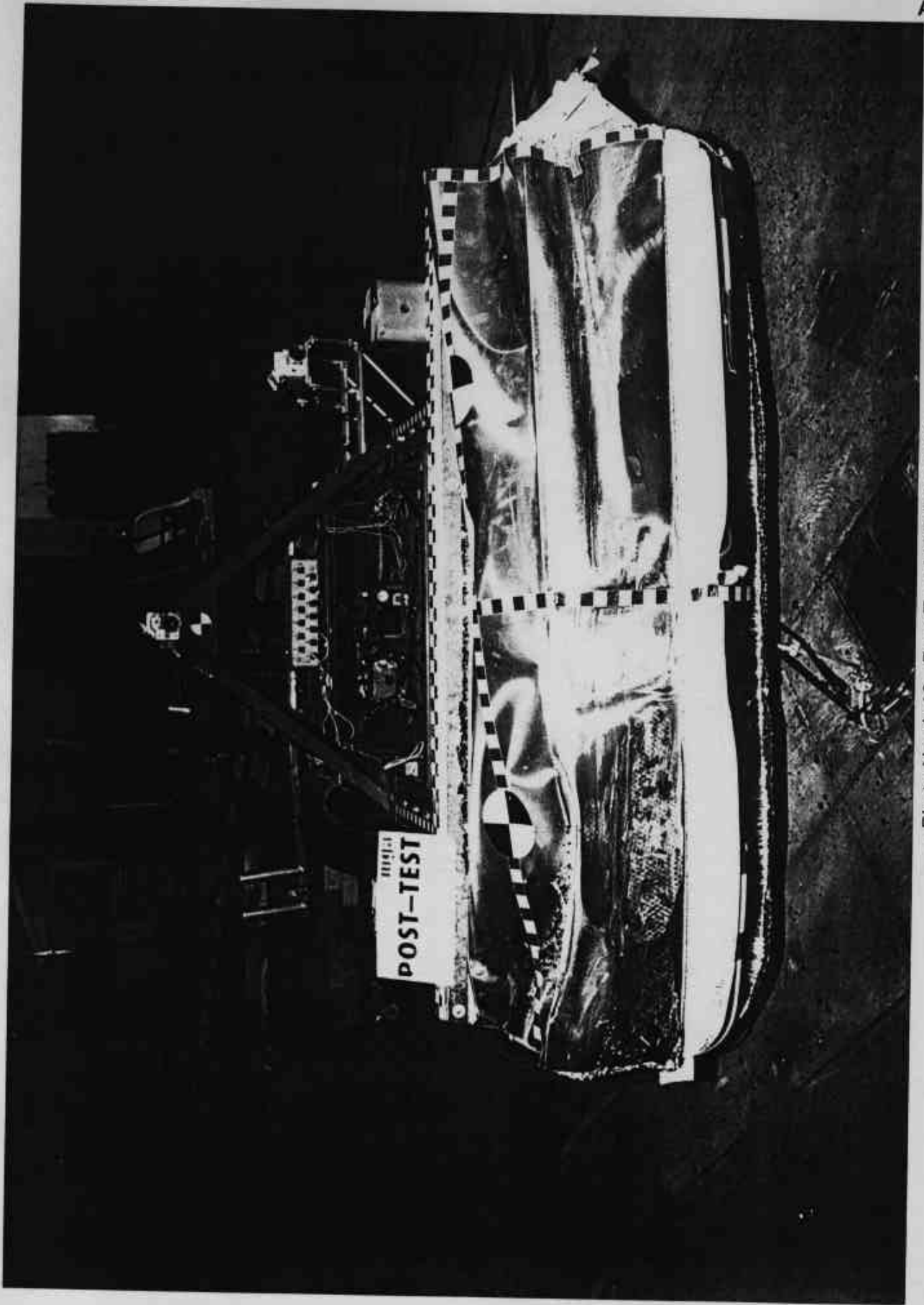


Photo No. A-15 - Pre-Test MDB Front View



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

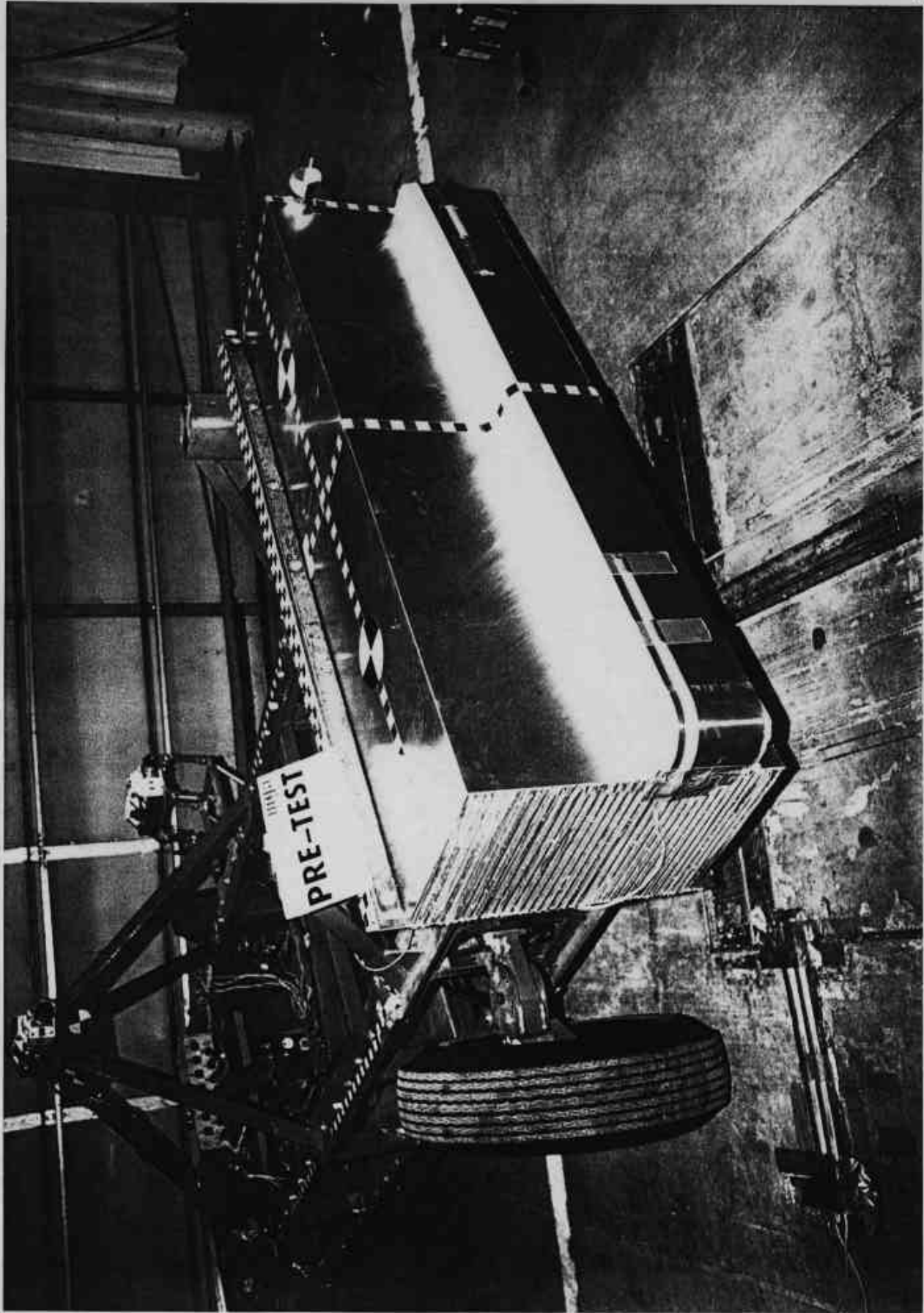


Photo No. A-17 - Pre-Test MDB Right Side View

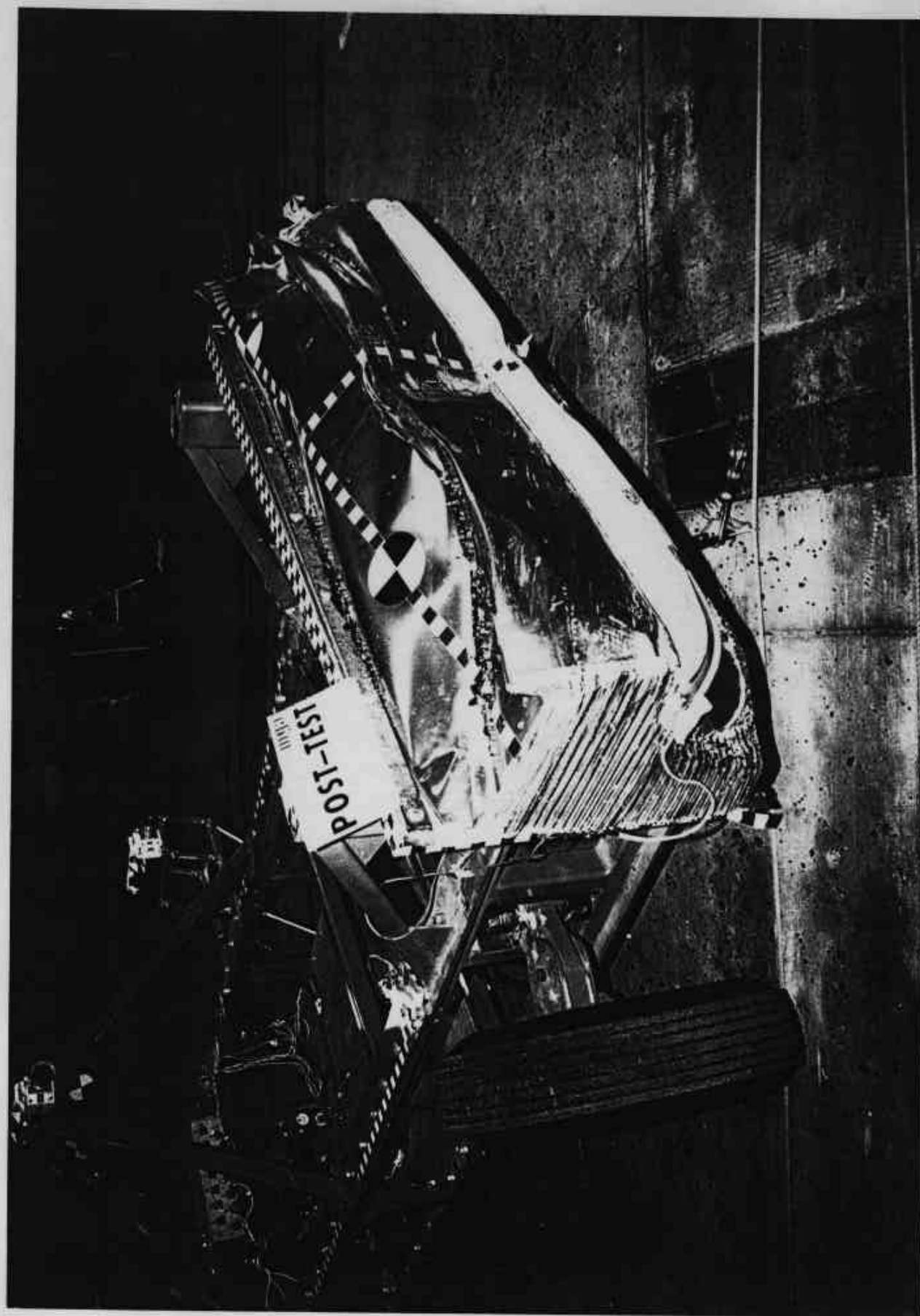


Photo No. A-18 - Post-Test MDB Right Side View



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

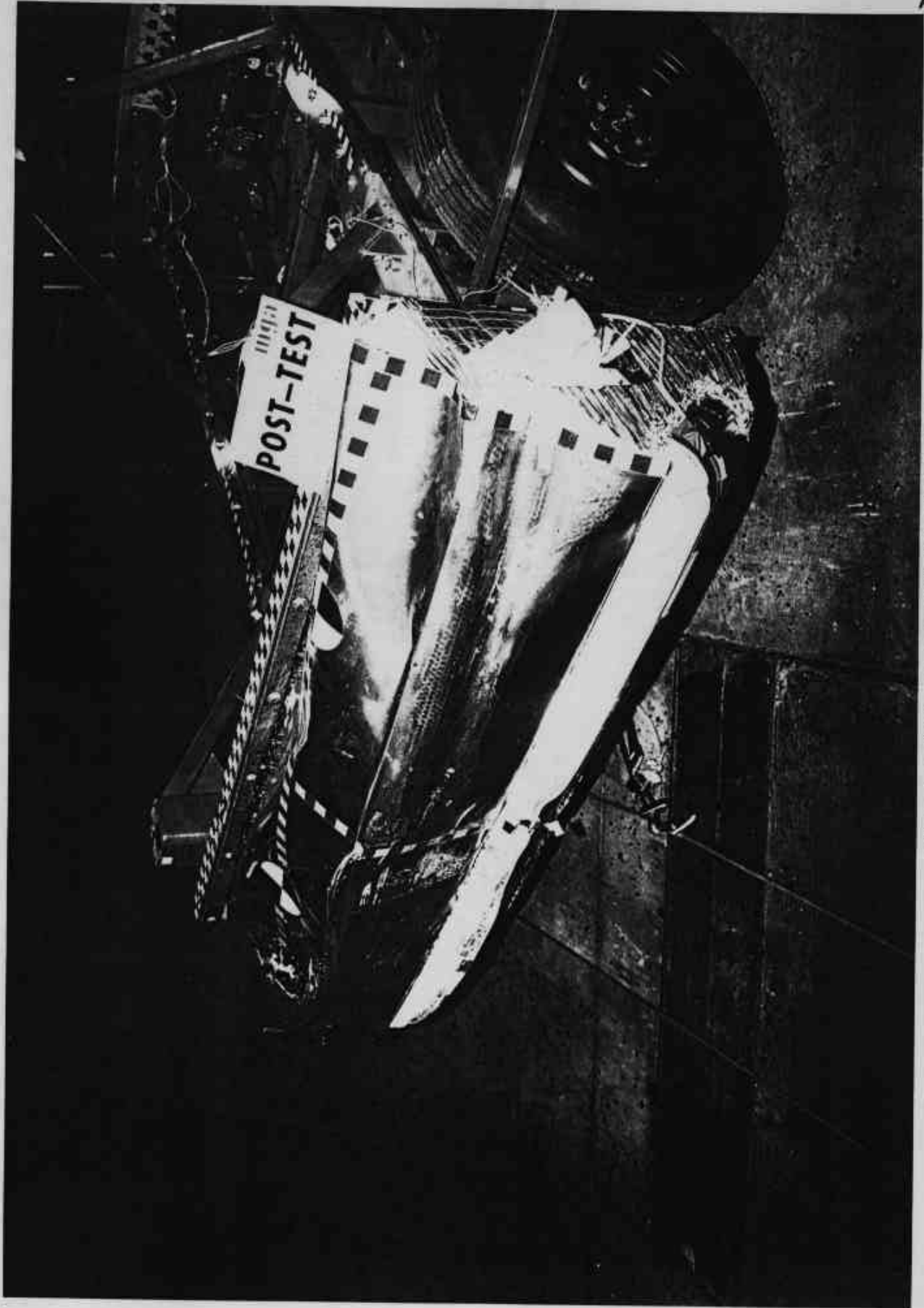


Photo No. A-20 - Post-Test MDB Left Side View



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



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



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



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



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



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

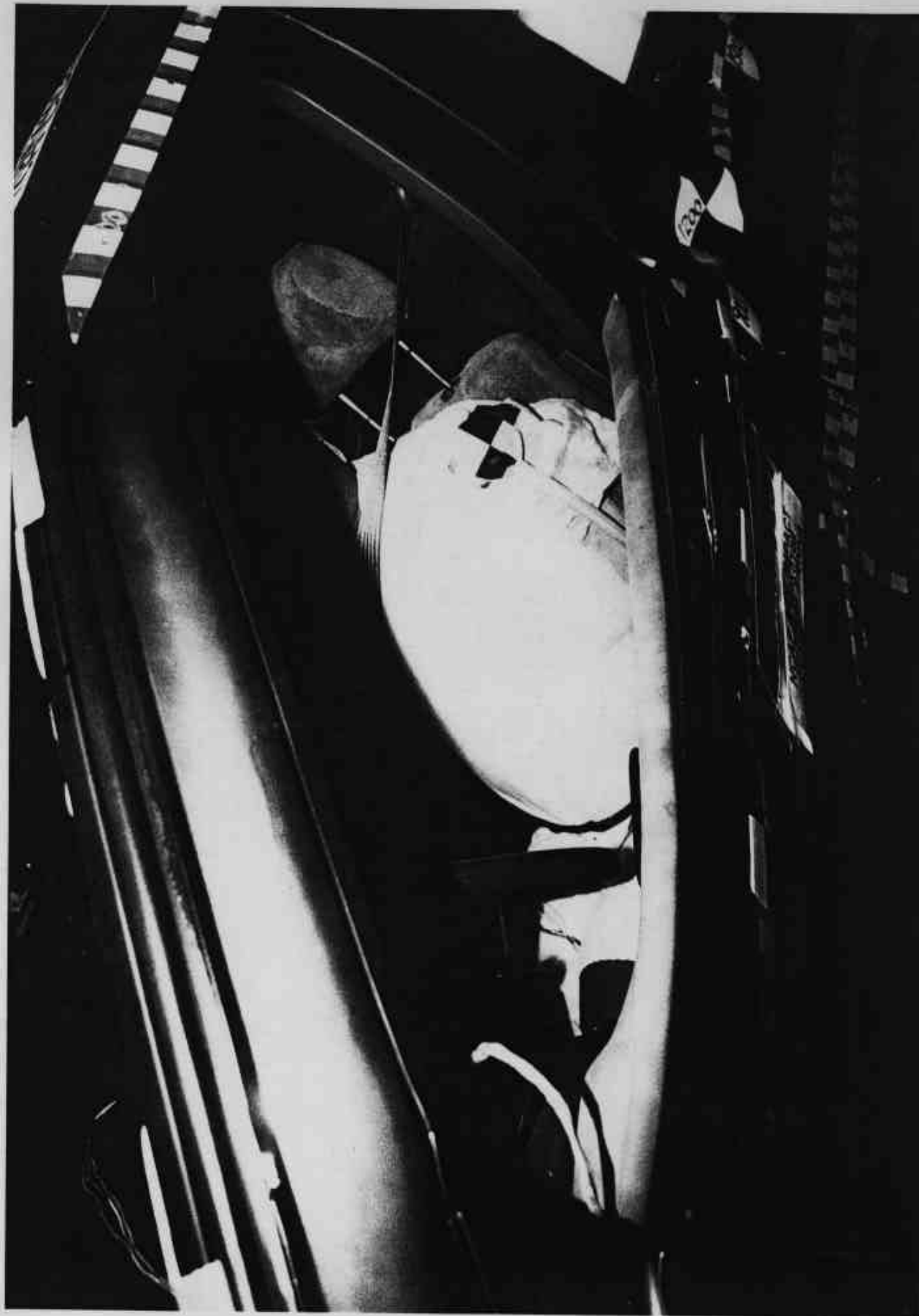


Photo No. A-27 - Post-Test Driver Dummy Shoulder and Door Top View



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



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



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

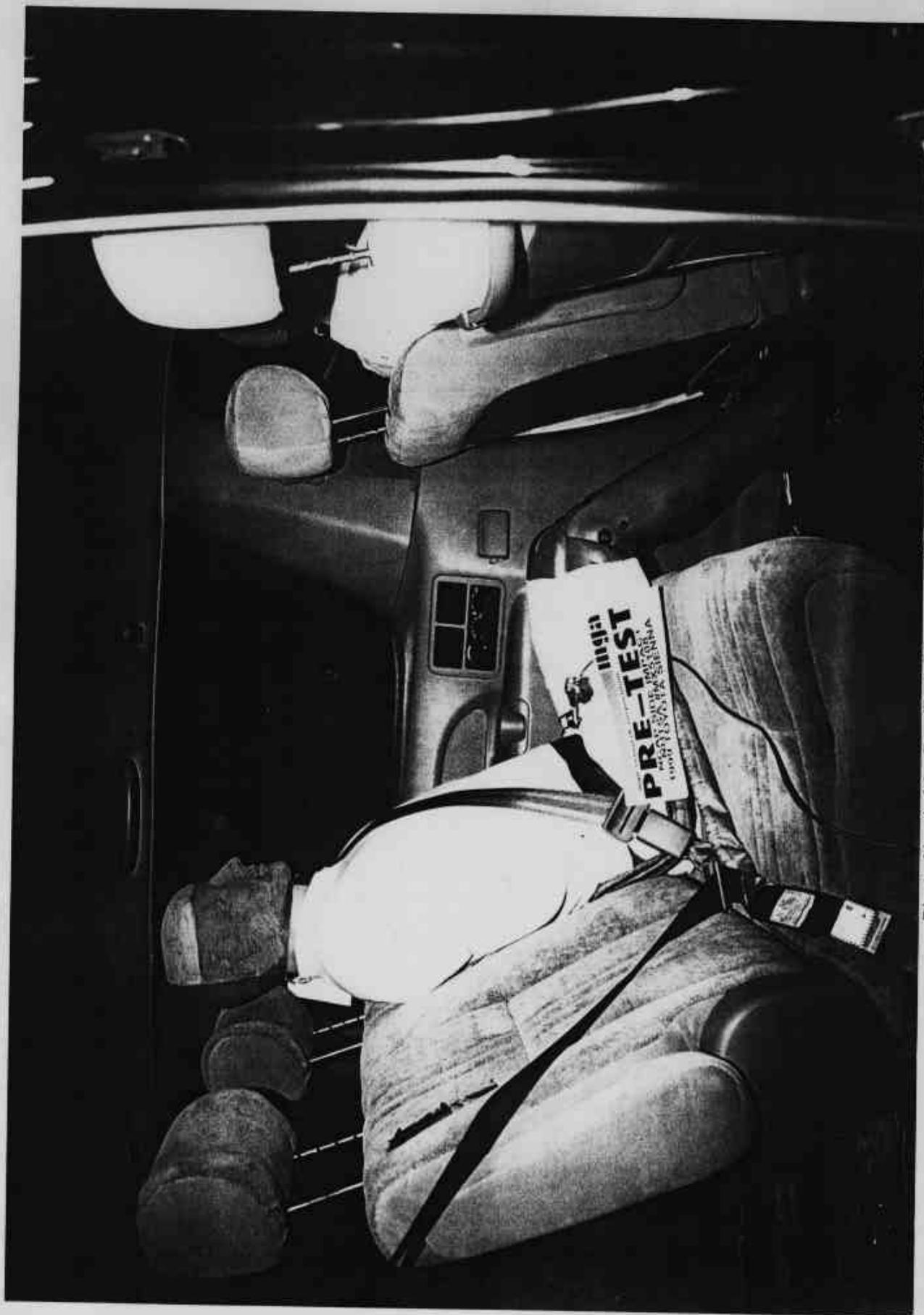


Photo No. A-31 - Pre-Test Passenger Dummy Right Side View



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

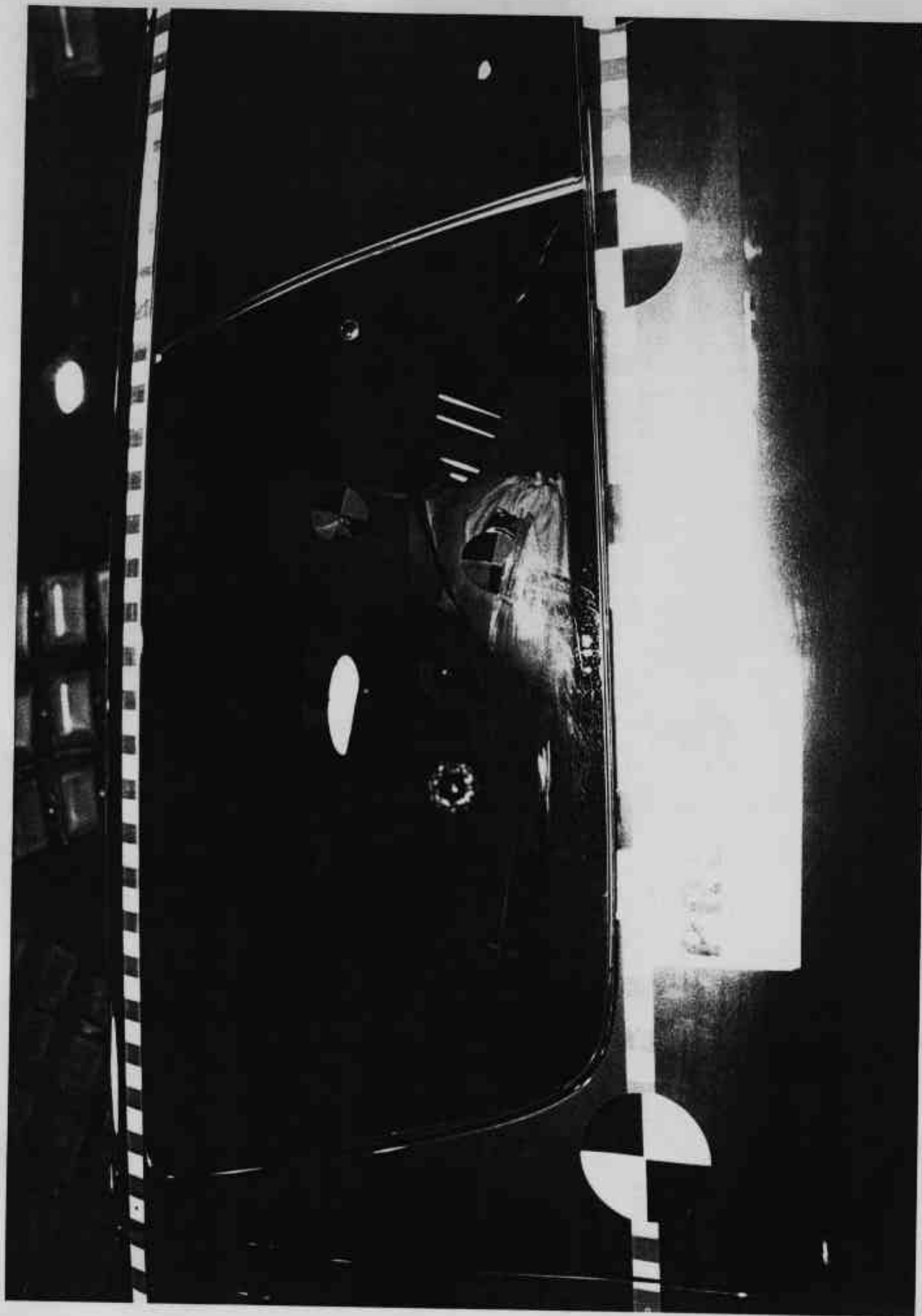


Photo No. A-33 - Pre-Test Passenger Dummy Left Side View



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

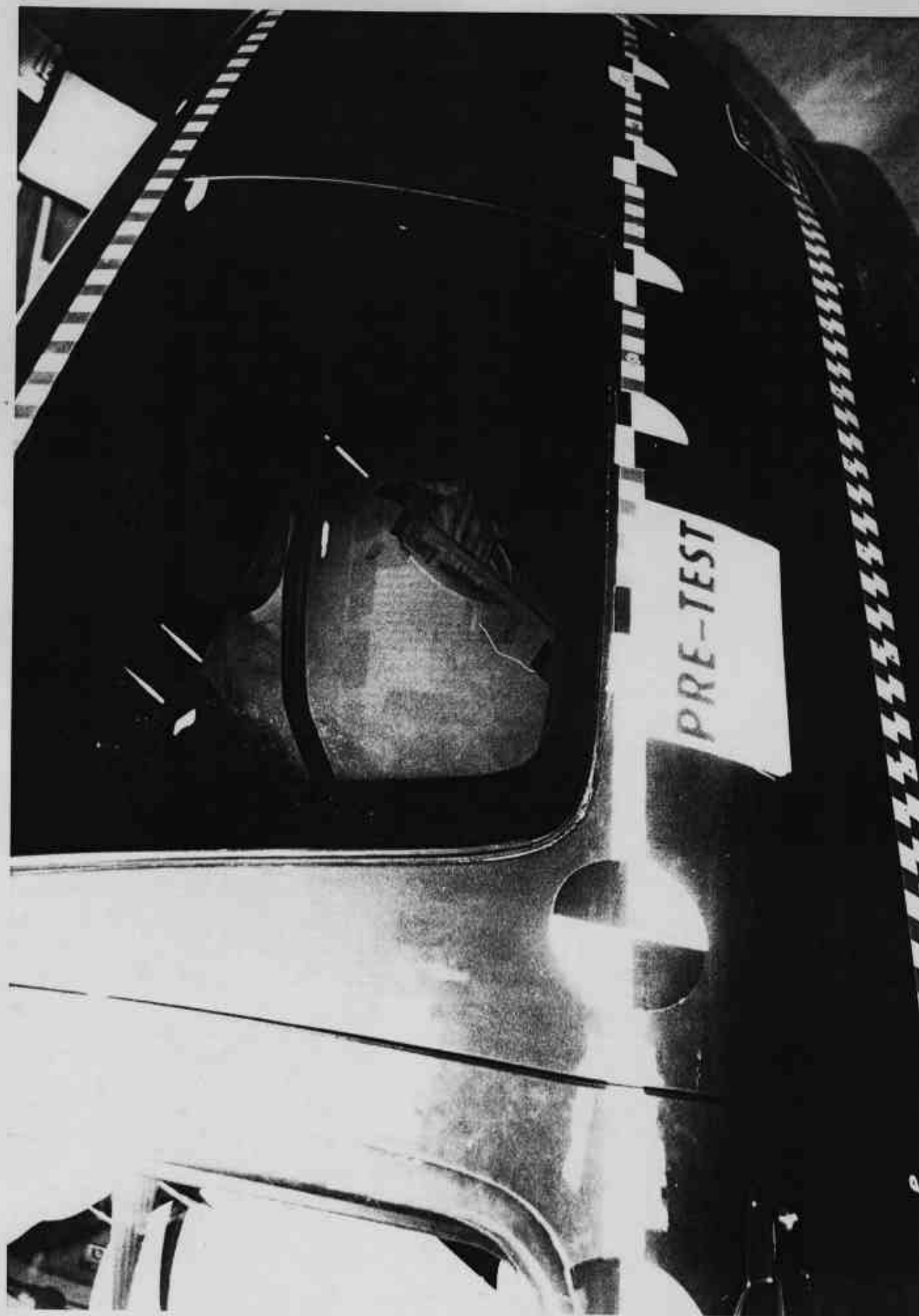


Photo No. A-35 - Pre-Test Passenger Dummy Shoulder and Door Top View



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



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



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

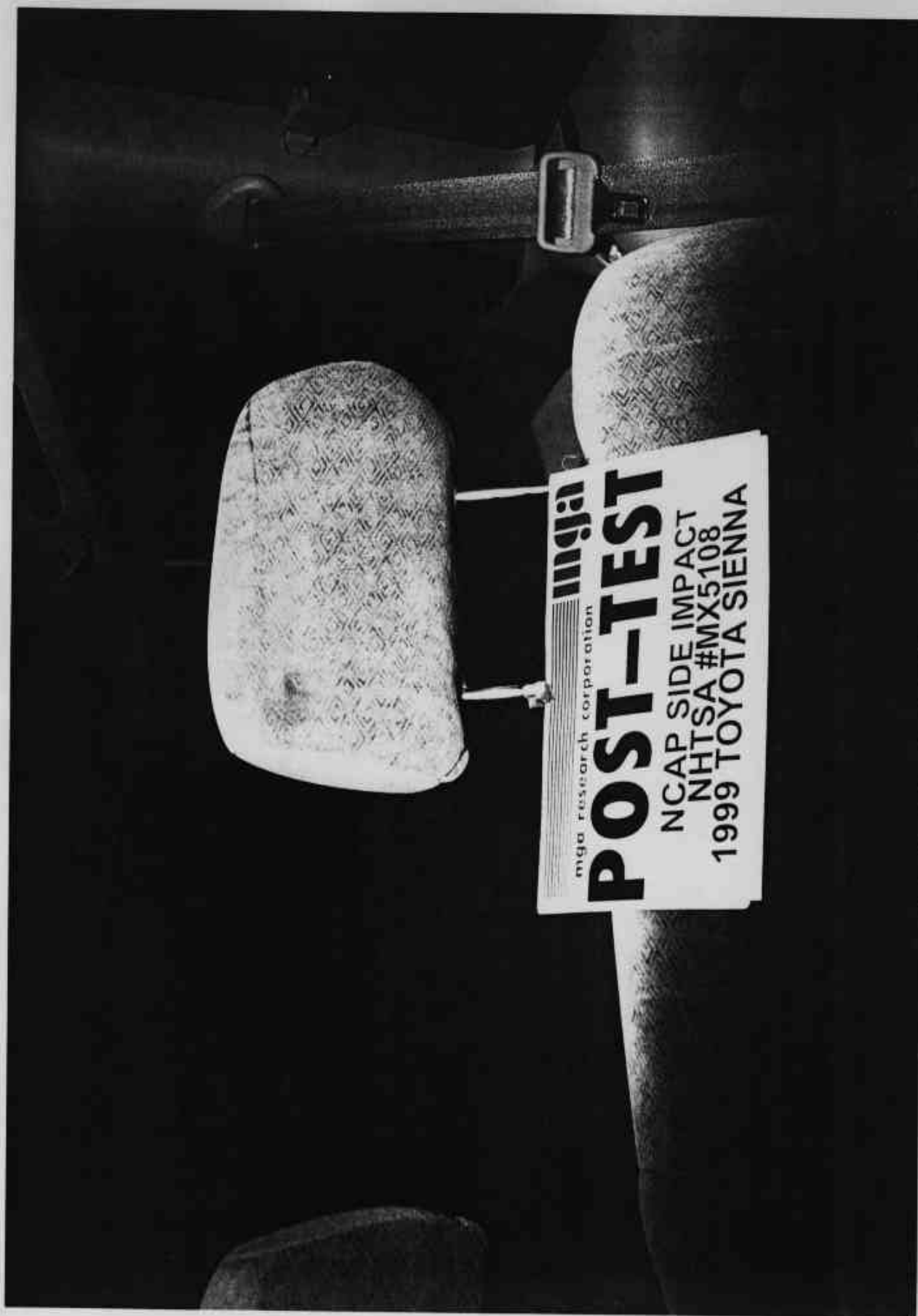


Photo-No. A-39 - Post-Test Passenger Dummy Head Contact



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



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

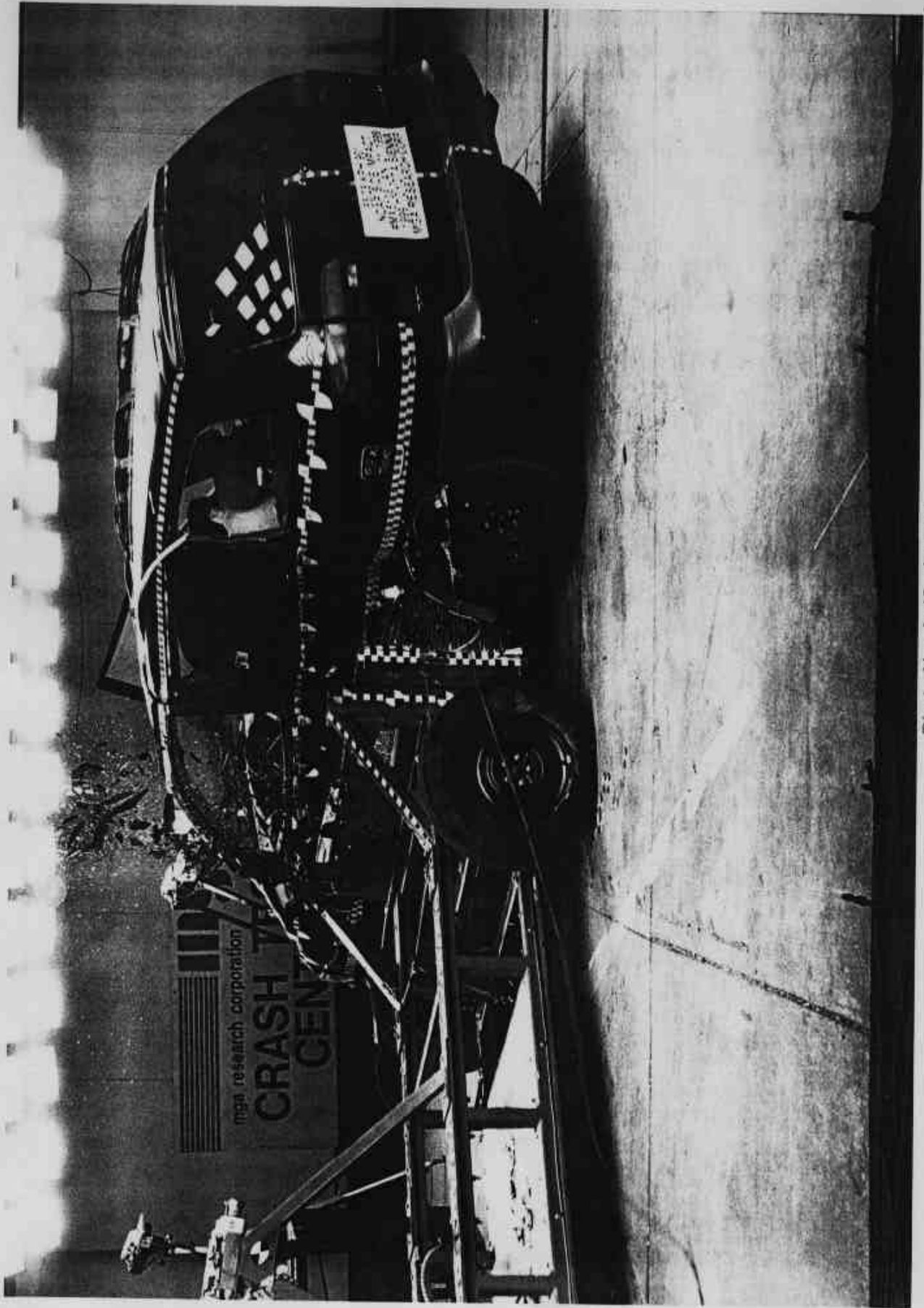


Photo No. A-42 - Impact

MFD BY: TOYOTA MOTOR '1ANU' ACTURING
 KENTUCKY, INC. DATE 01/99
 GVWR 5250LB GAWR FR 2725LB RR 2725LB
 WITH P205/70R15 OR P215/65R15 TIRES
 15X6 5JJ RIMS AT 40KPA (35PSI) COLD
 THIS VEHICLE CONFORMS TO ALL APPLICABLE
 FEDERAL MOTOR VEHICLE SAFETY AND
 THEFT PREVENTION STANDARDS IN EFFECT ON
 THE DATE OF MANUFACTURE SHOWN ABOVE
 4T3GF19C3KUI23491 TYPE MDV



C/TR: 6R1/FA11
 A/TM: 01A/A540E

MODEL: MCL10L-GFSDKA
 83573

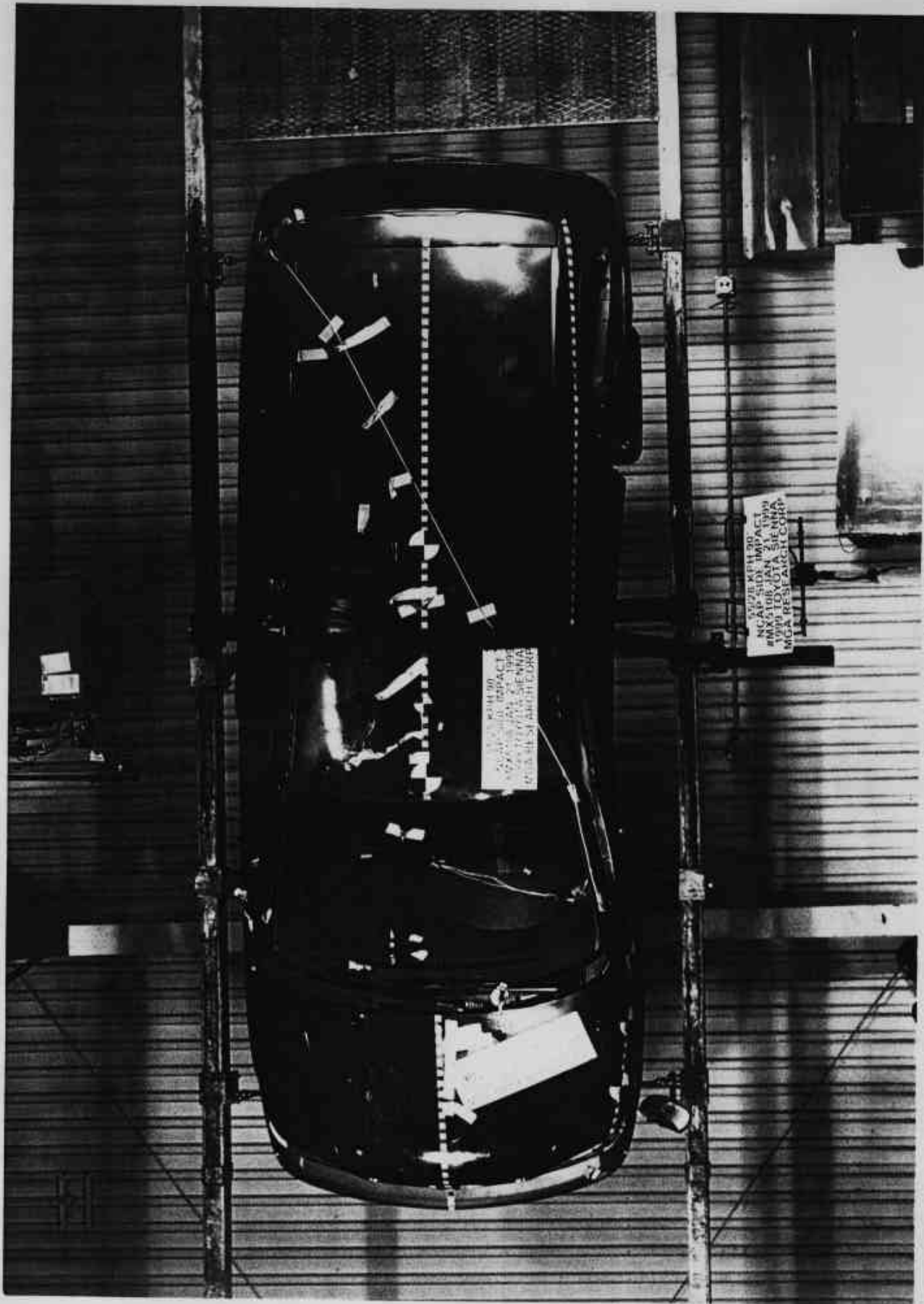


Photo No. A-45 - Rollover 90°

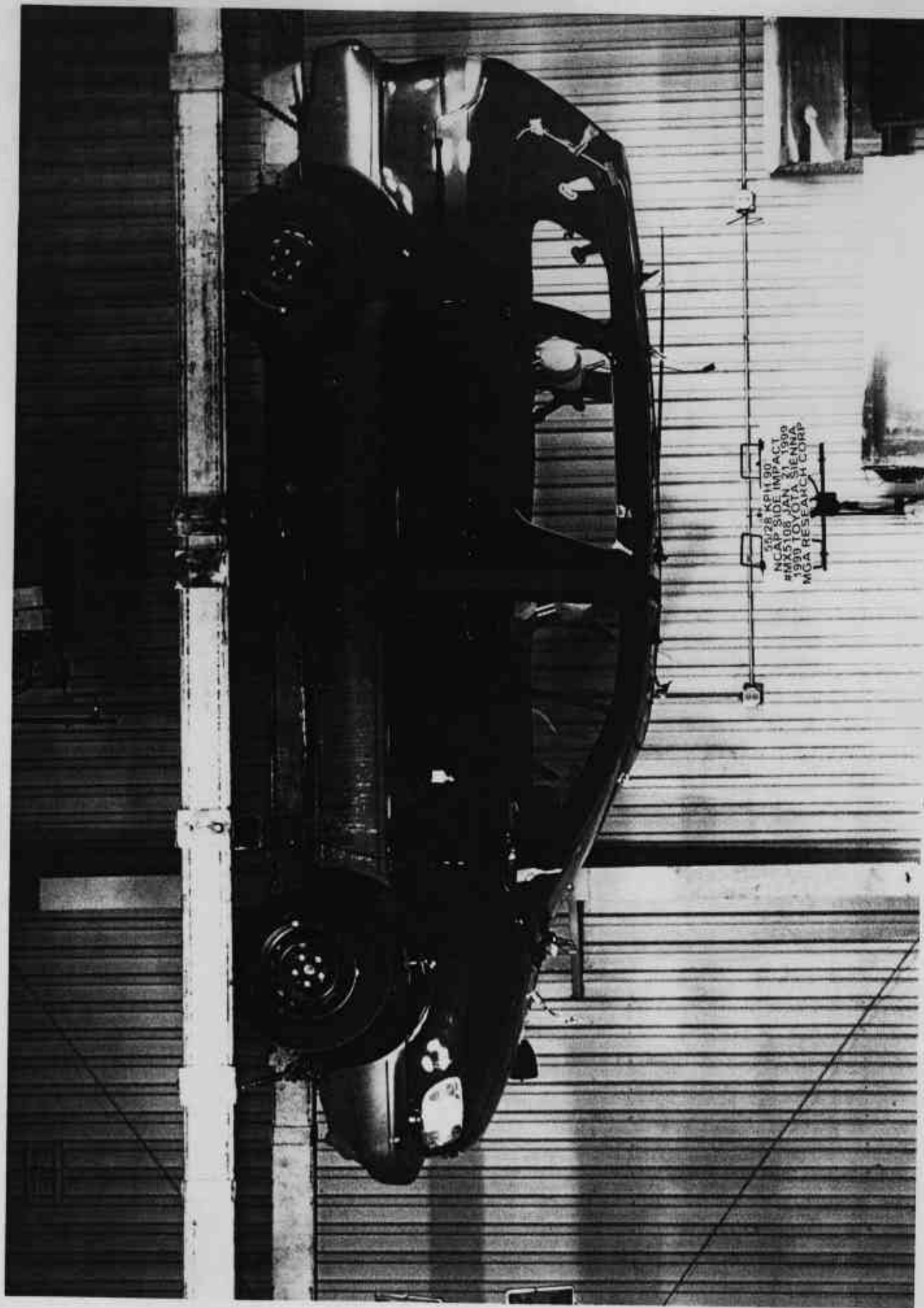


Photo No. A-46 - Rollover 180°

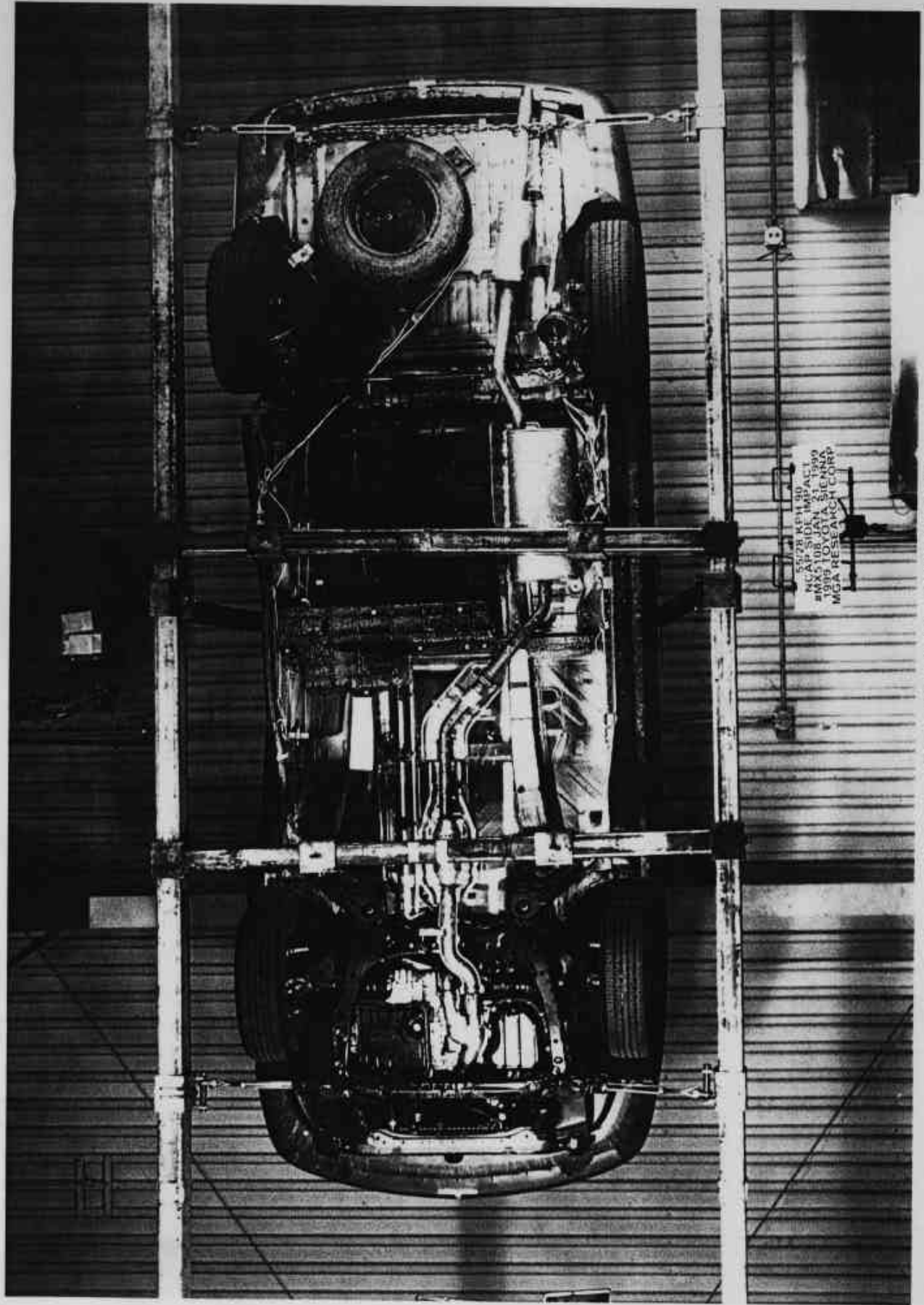


Photo No. A-47 - Rollover 270°

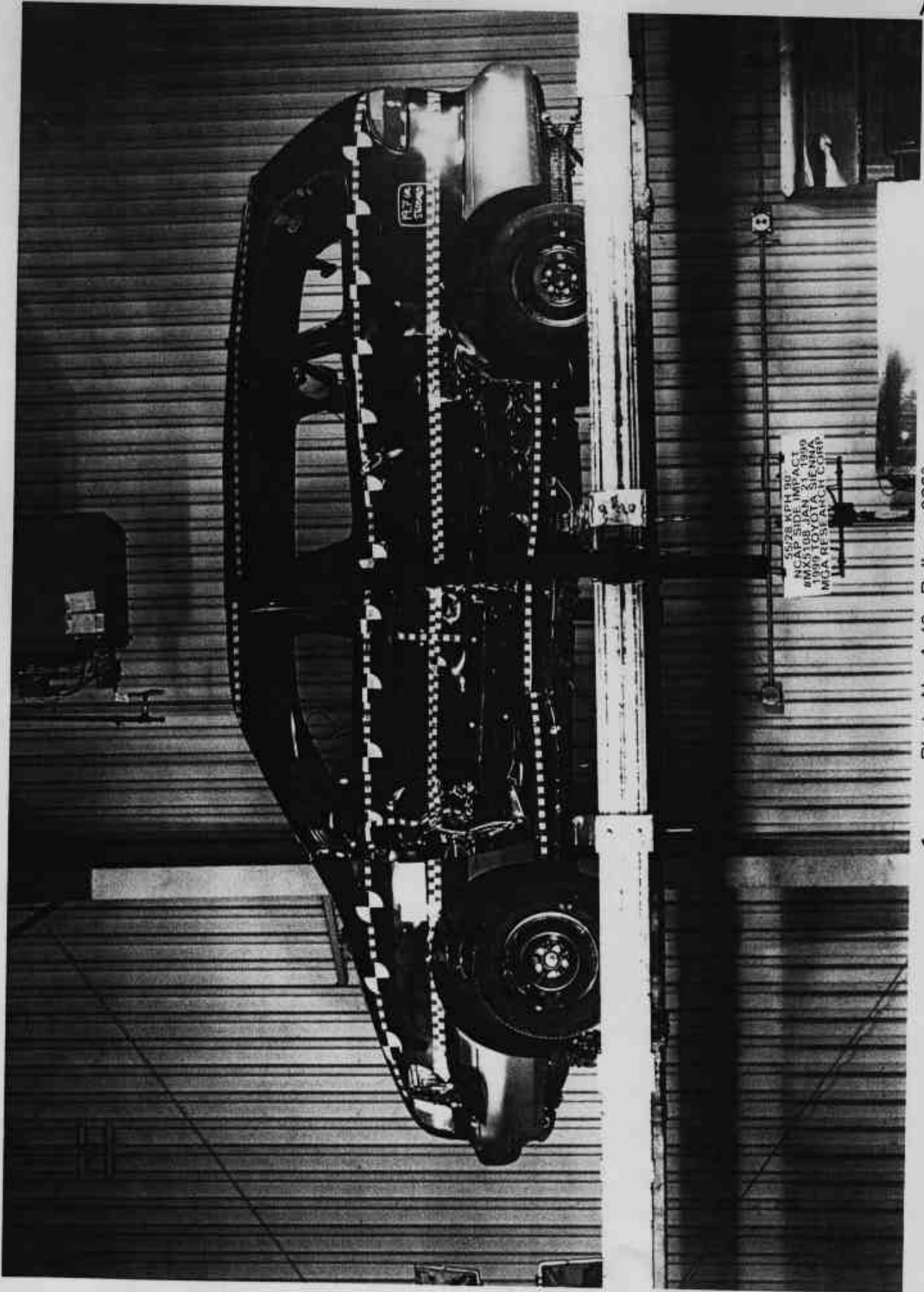
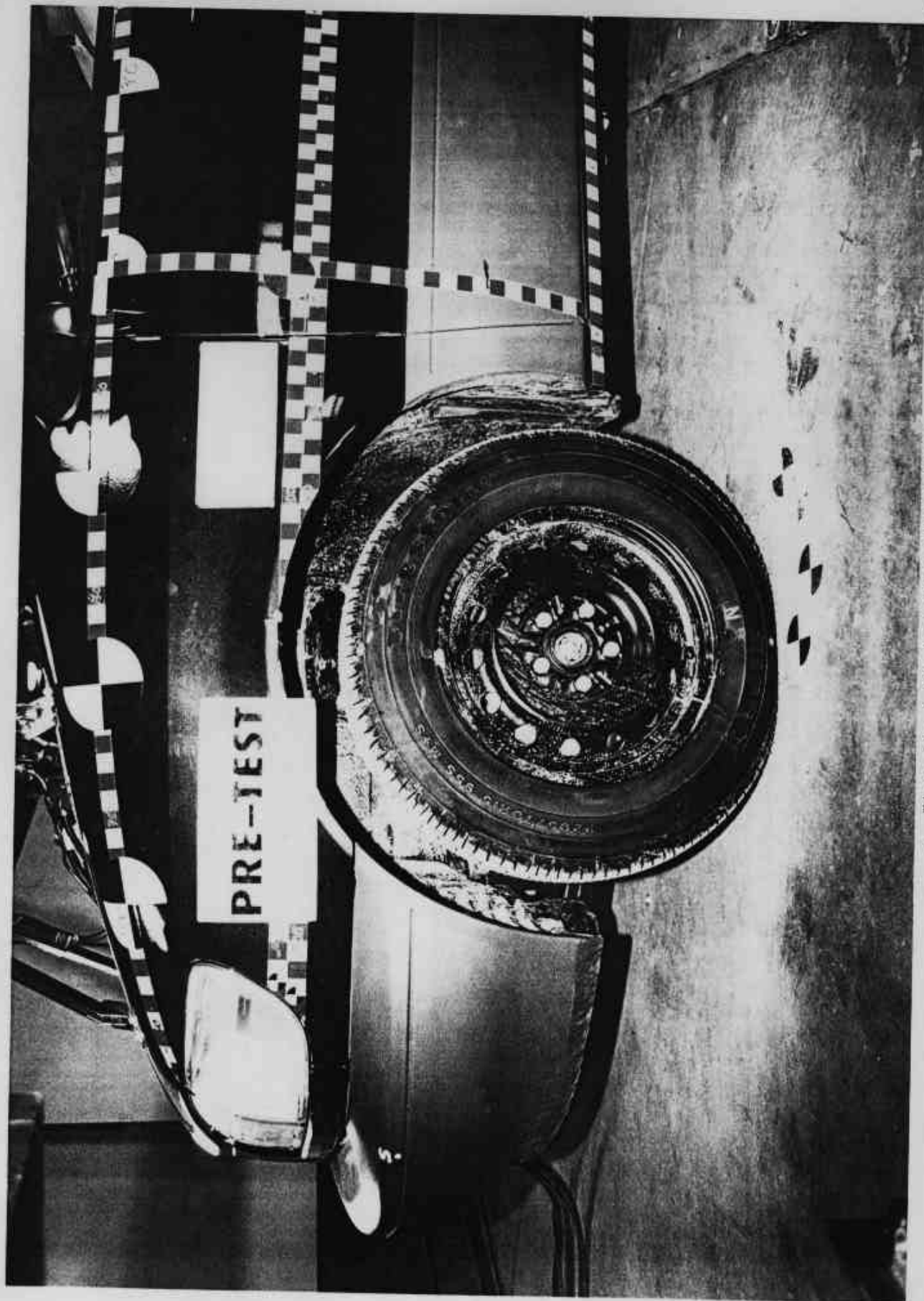
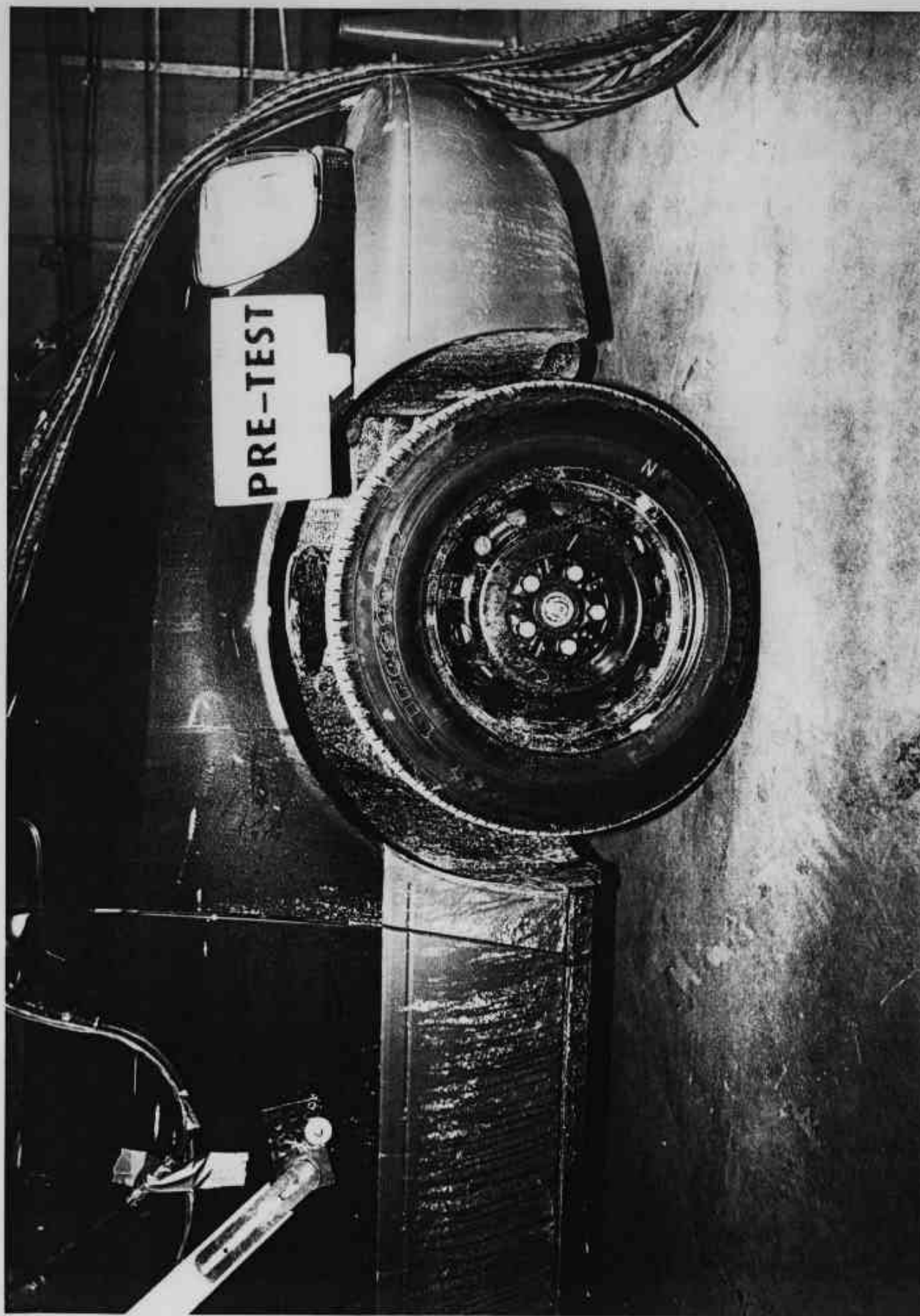


Photo No. A-48 - Rollover 360°



• Photo No. A-49 - Left Front Attitude Point



• Photo No. A-50 - Right Front Attitude Point

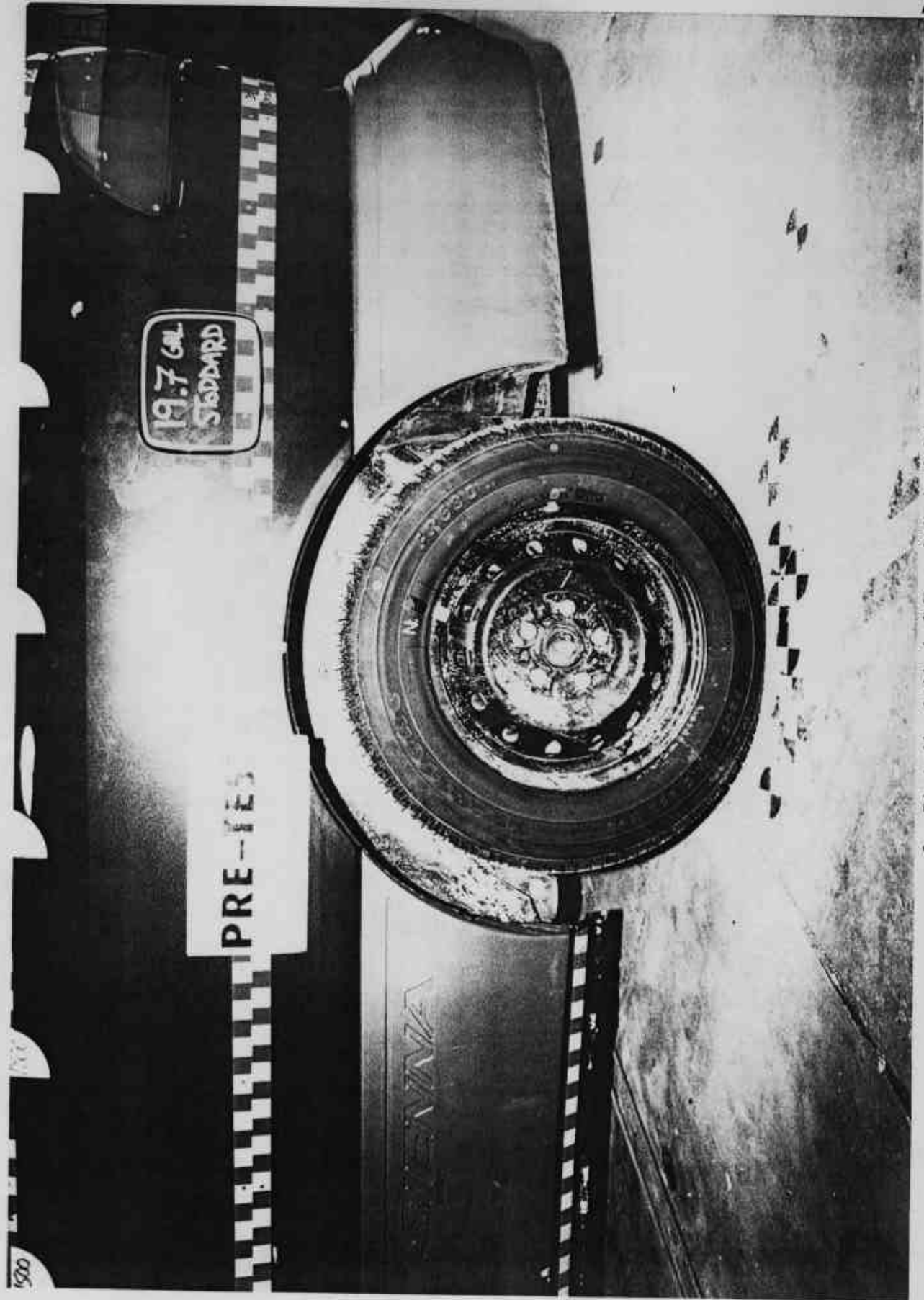
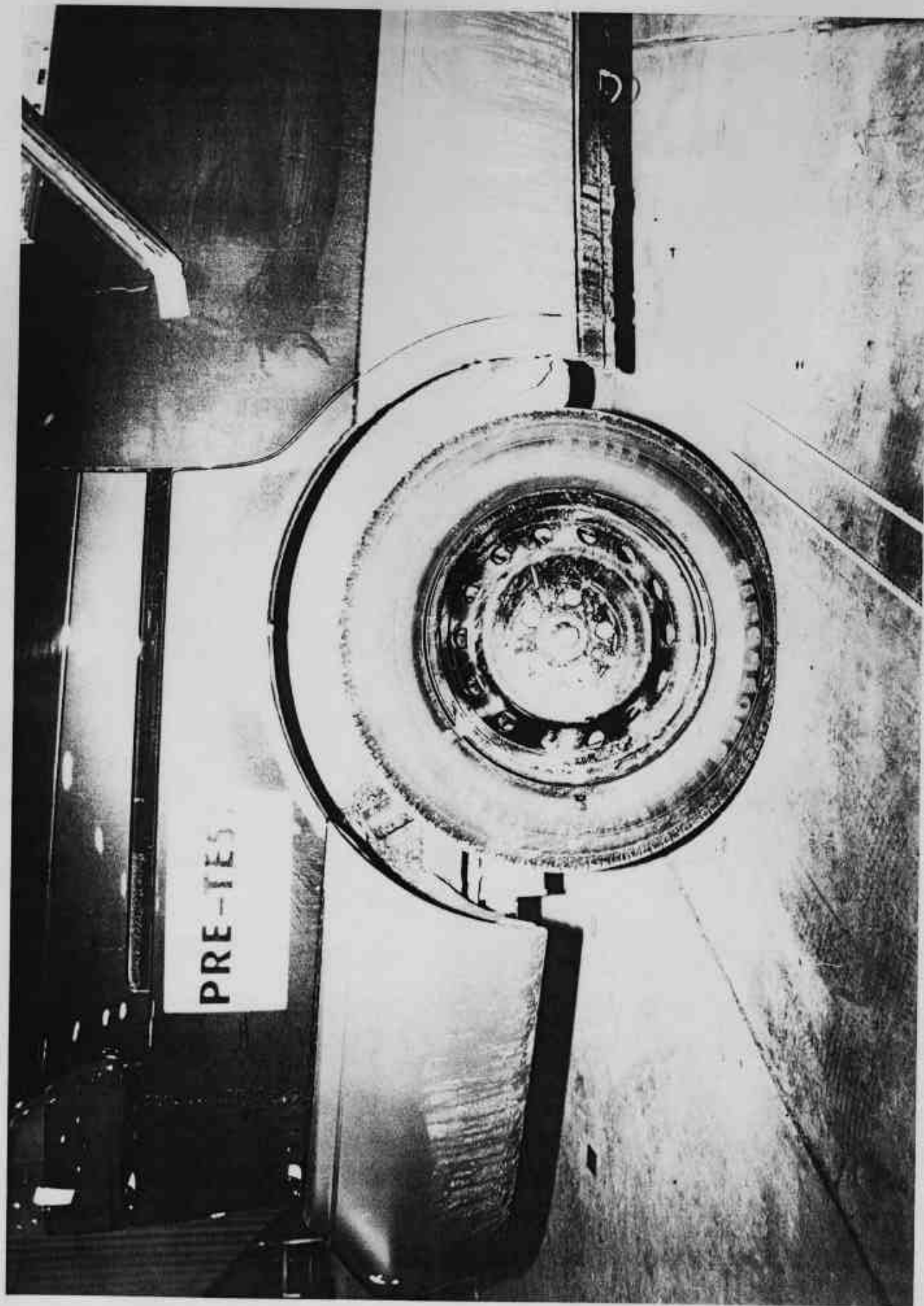


Photo No. A-51 - Left Rear Attitude Point



• Photo No. A-52 - Right Rear Attitude Point

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* Data not valid after approximately 44 msec.

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FIR Filter:

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* Data not valid after approximately 44 msec.

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

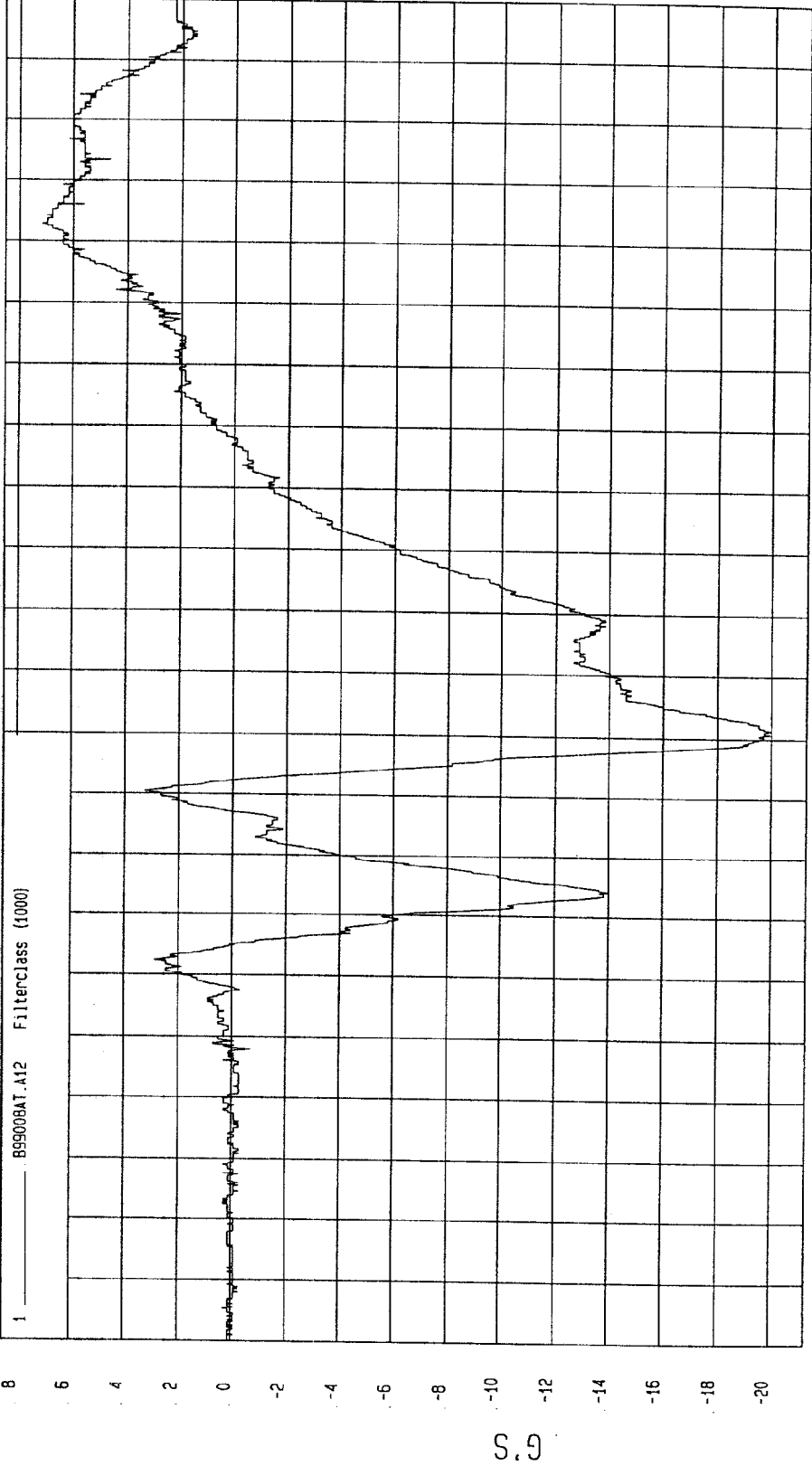
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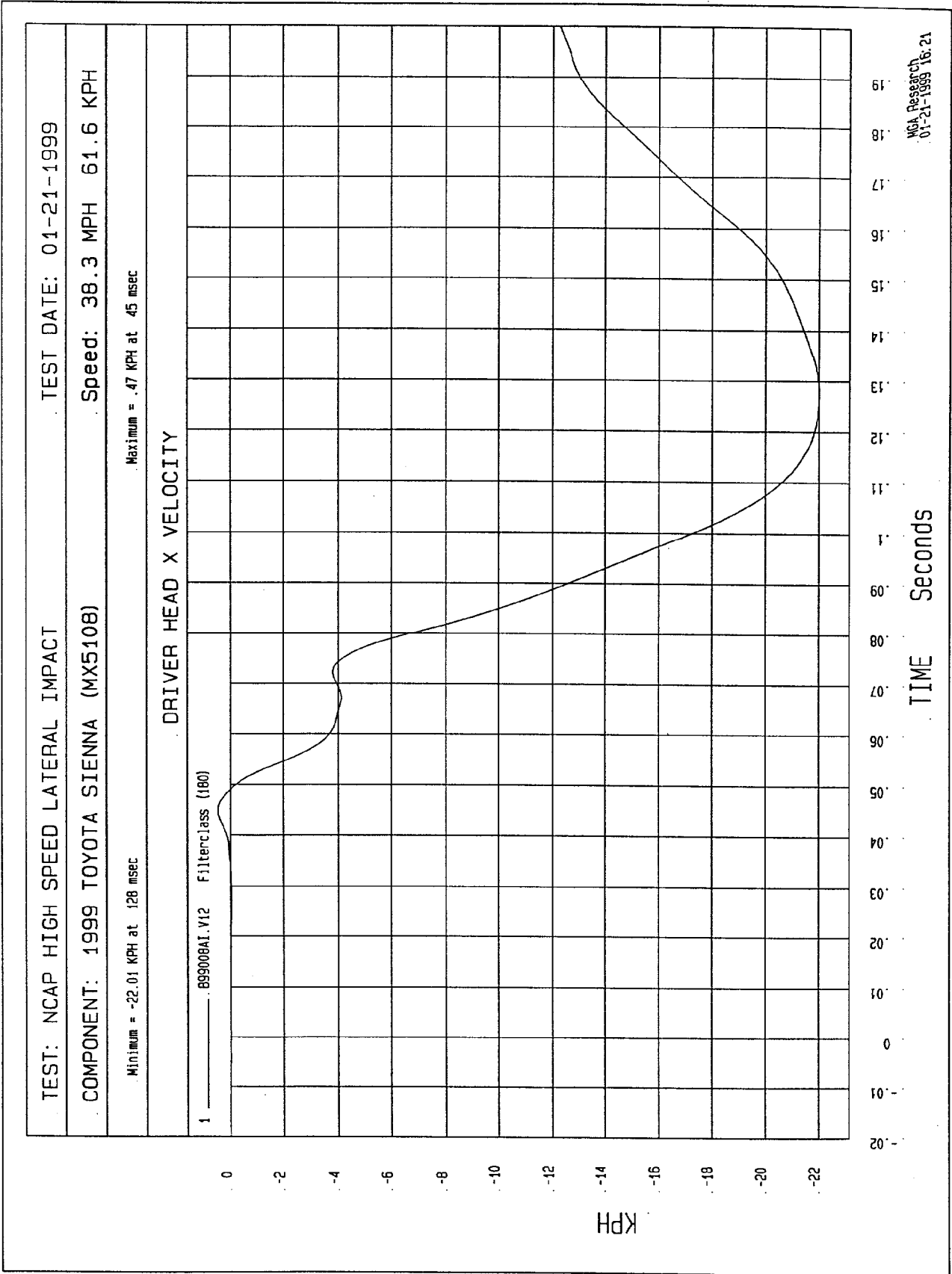
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 7.17 G'S at 153 msec

Minimum = -19.93 G'S at 81 msec

DRIVER HEAD X ACCELERATION



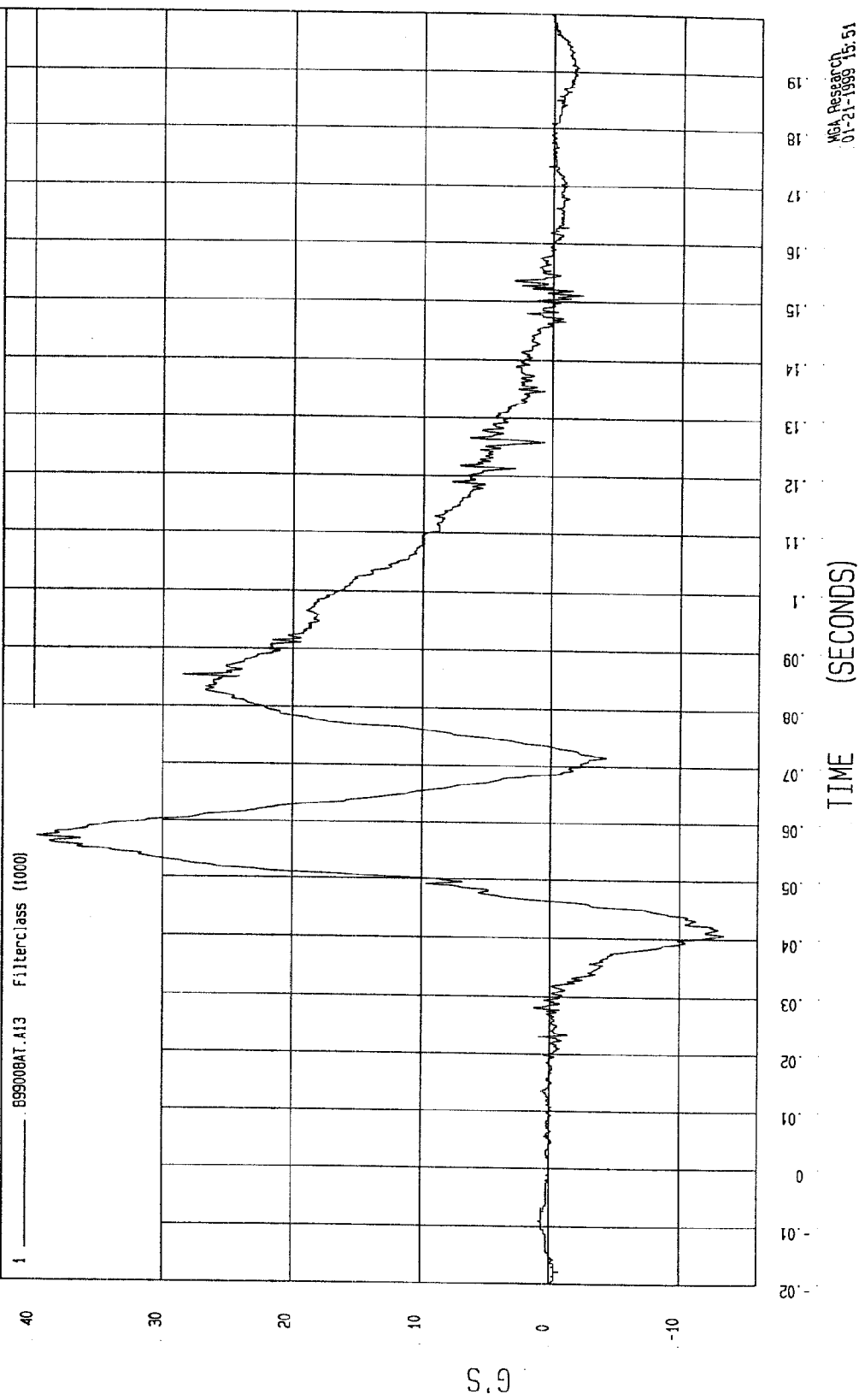


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

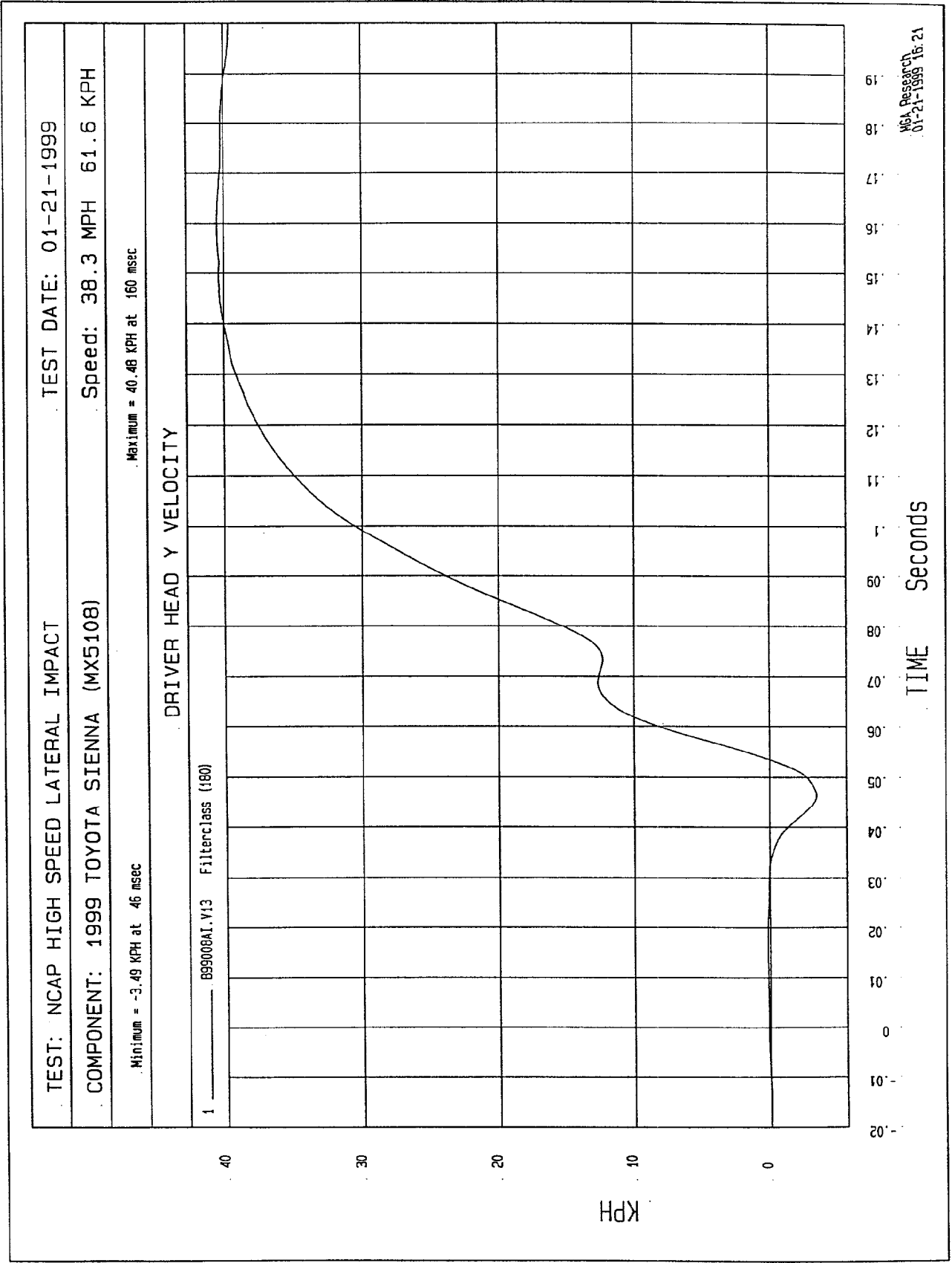
COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -13.39 G'S at 41 msec Maximum = 39.74 G'S at 57 msec

DRIVER HEAD Y ACCELERATION



MGA Research
01-21-1999 15:51



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

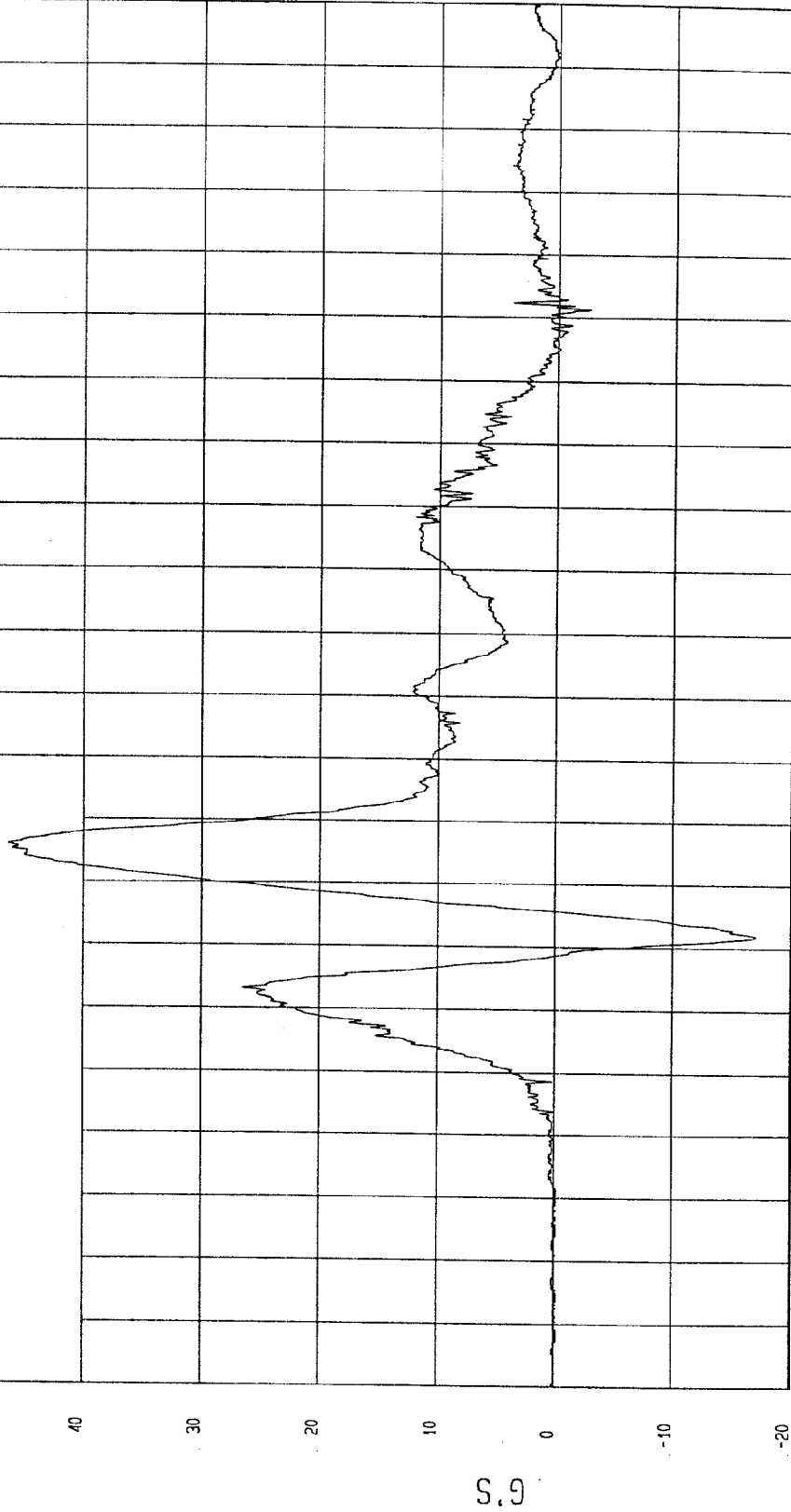
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 46.3 G'S at 66 msec

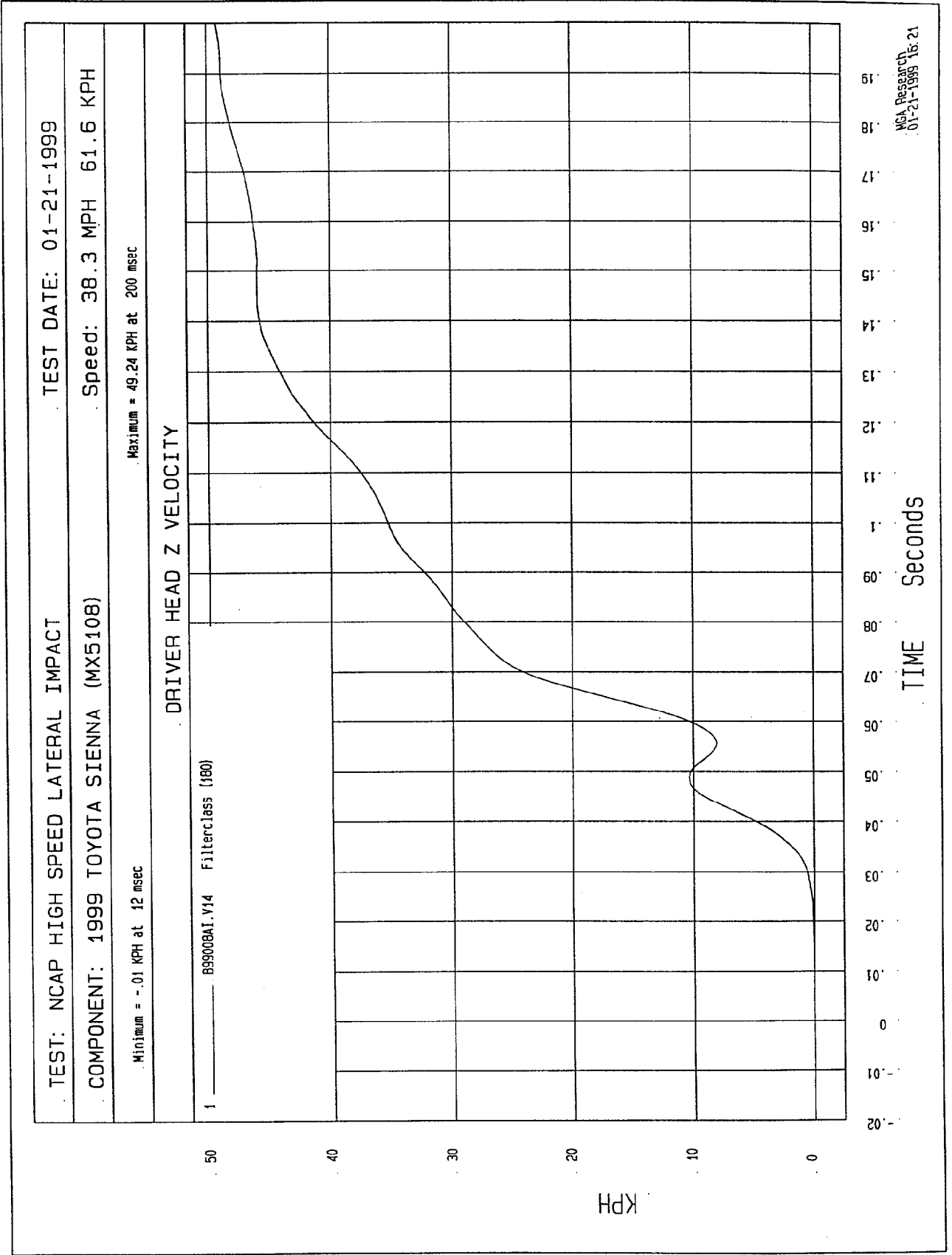
Minimum = -16.99 G'S at 52 msec

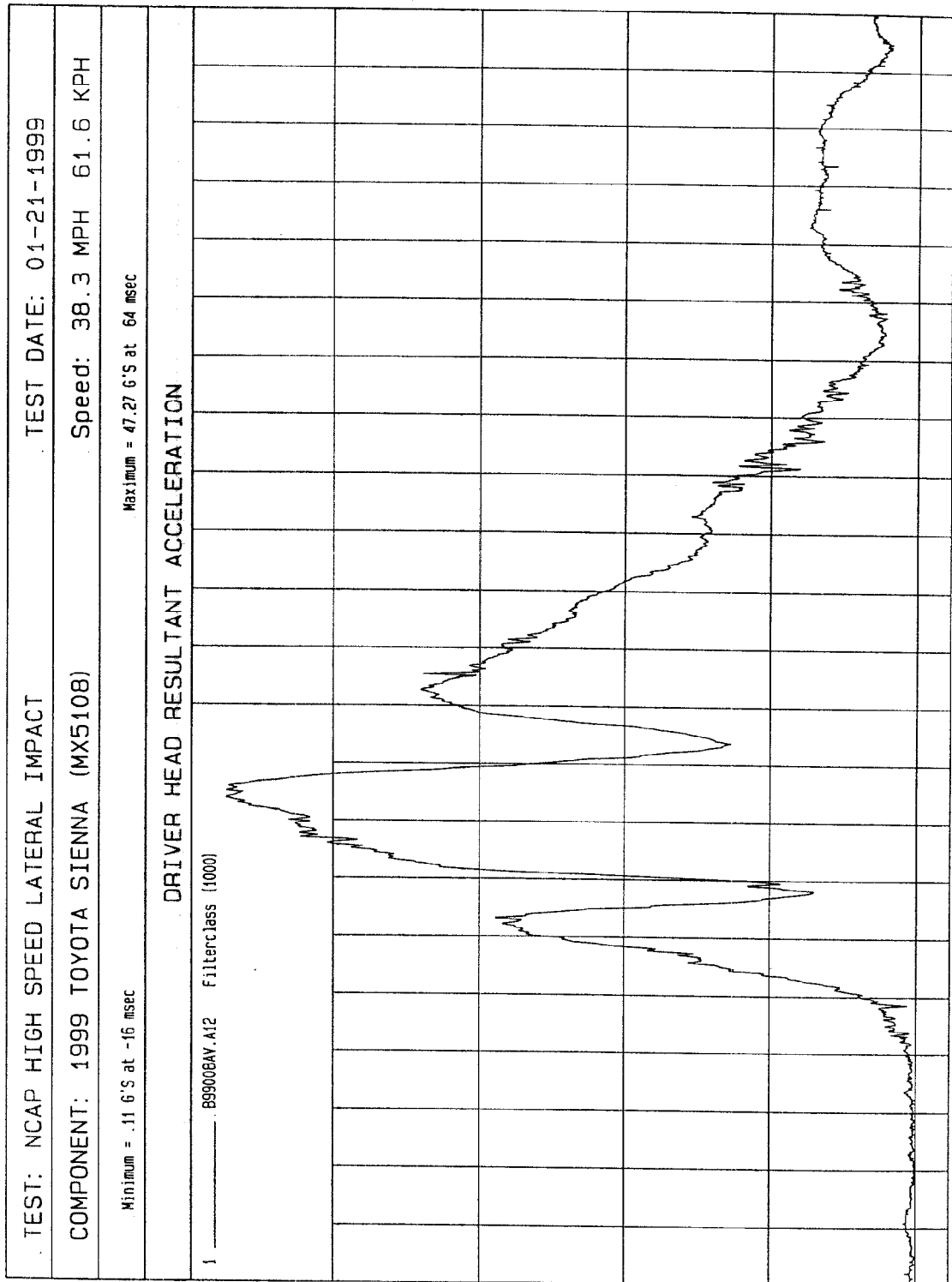
DRIVER HEAD Z ACCELERATION

1 _____ B99008AT.A14 FilterClass (1000)



MOA Research
01-21-1999 15:51





MGA Research
01-21-1999 15:51

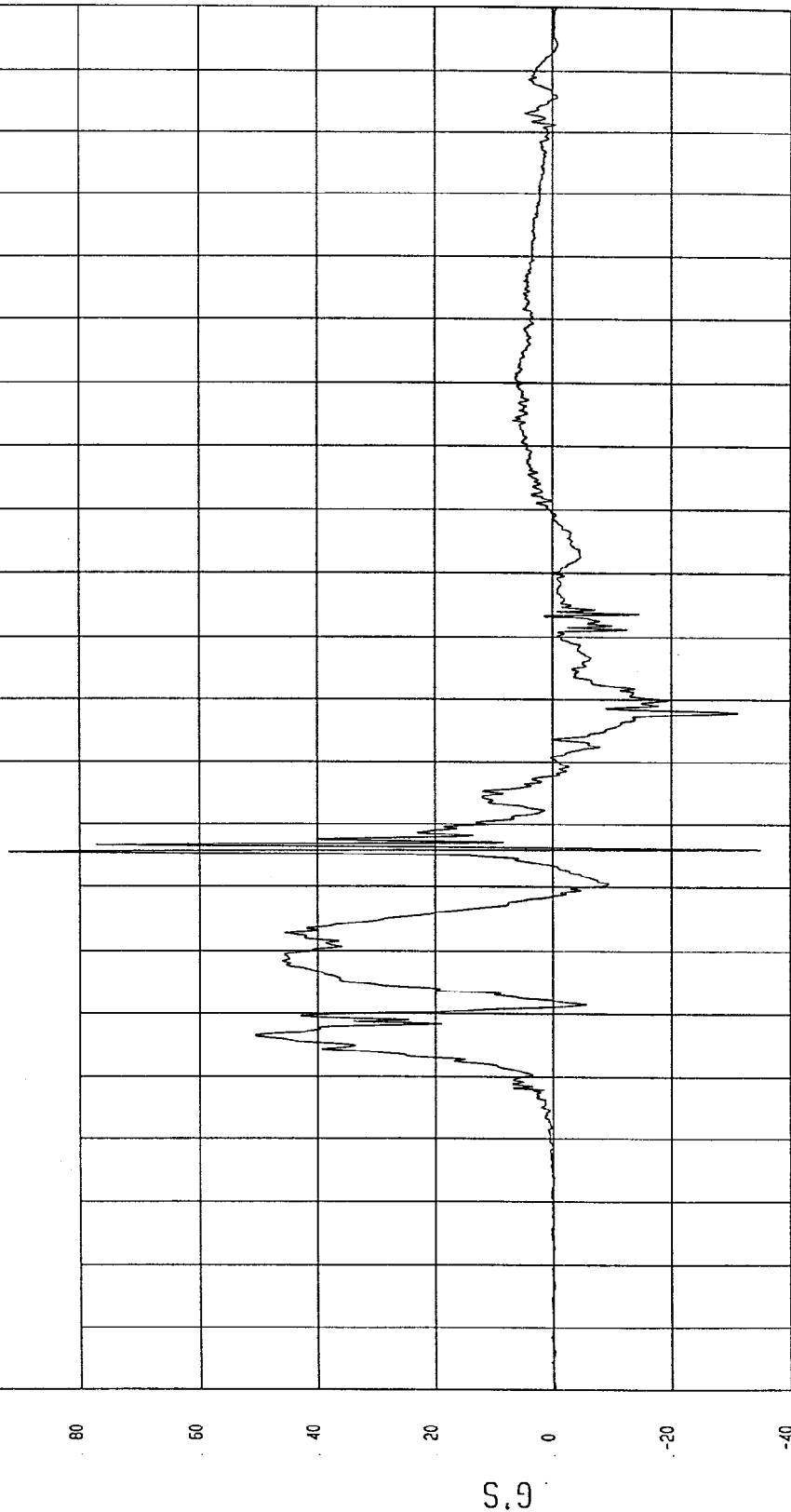
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -34.87 G'S at 66 msec Maximum = 92.17 G'S at 66 msec

DRIVER UPPER RIB Y ACCELERATION

1 899008AT.A15 FilterClass (1000)



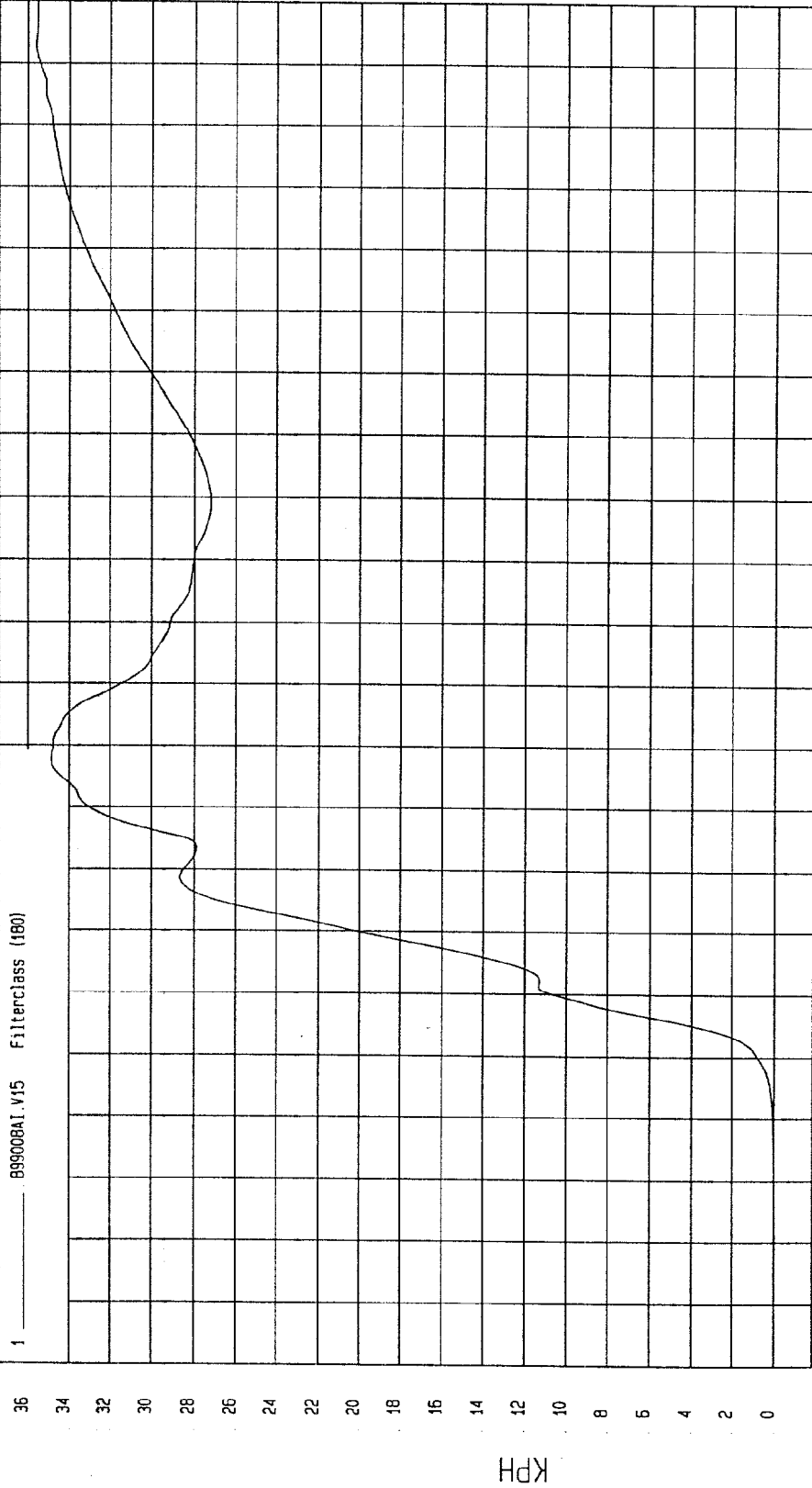
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.27E-02 KPH at -13 msec Maximum = 35.6 KPH at 193 msec

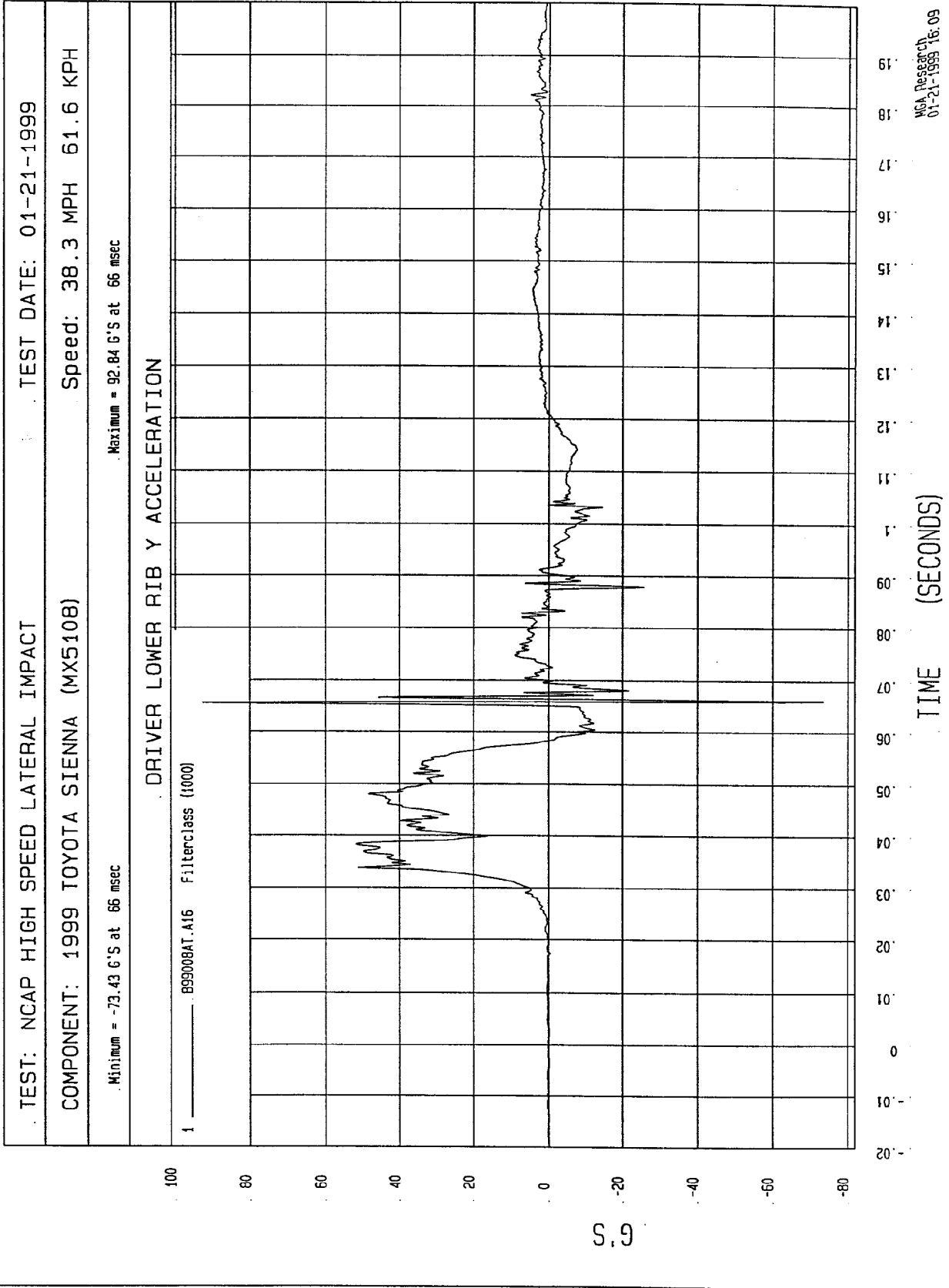
DRIVER UPPER RIB Y VELOCITY

1 B99008A1.V15 FilterClass (180)



TIME Seconds

NGA Research
01-21-1999 16:21



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

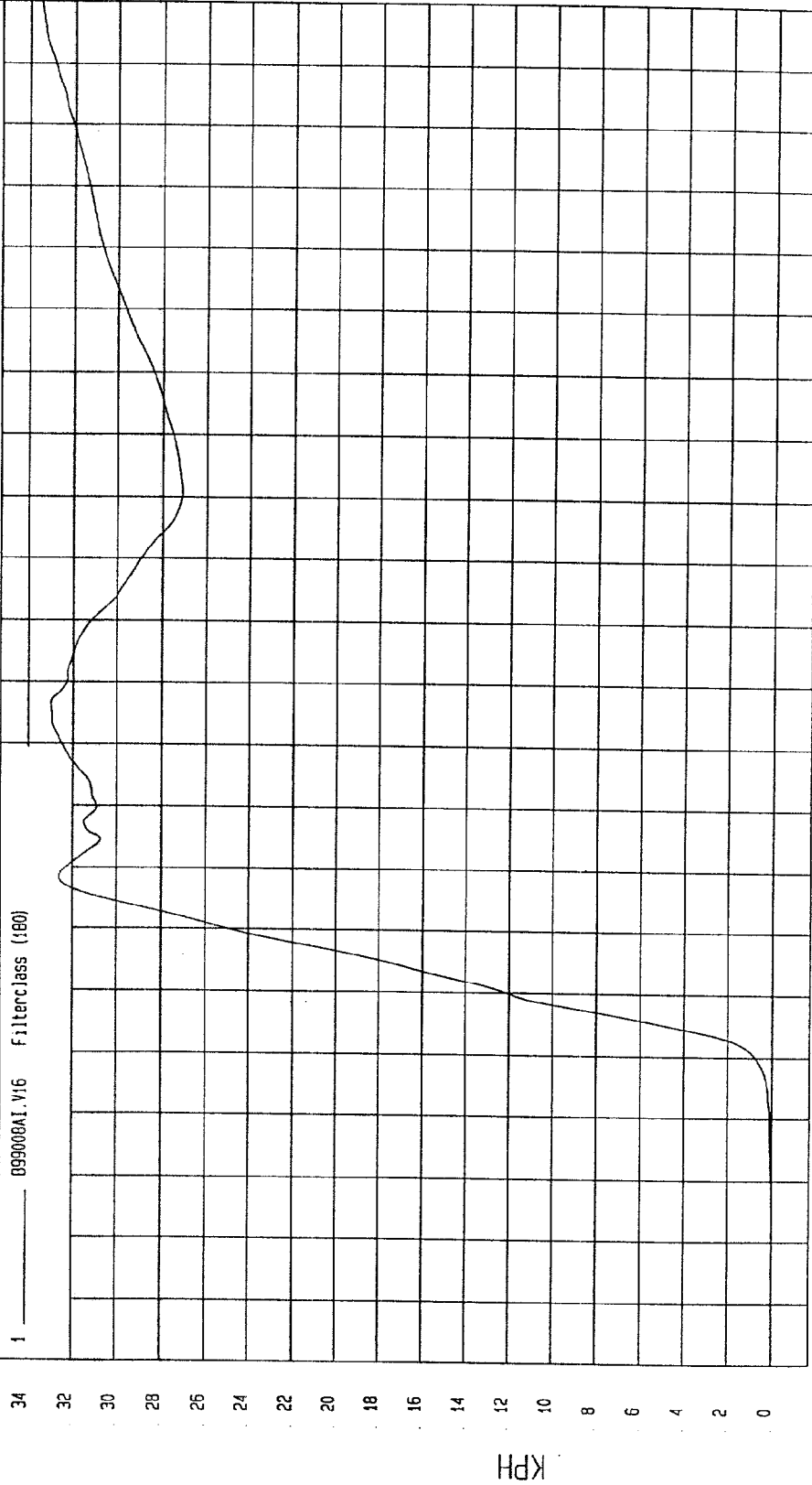
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 33.5 KPH at 200 msec

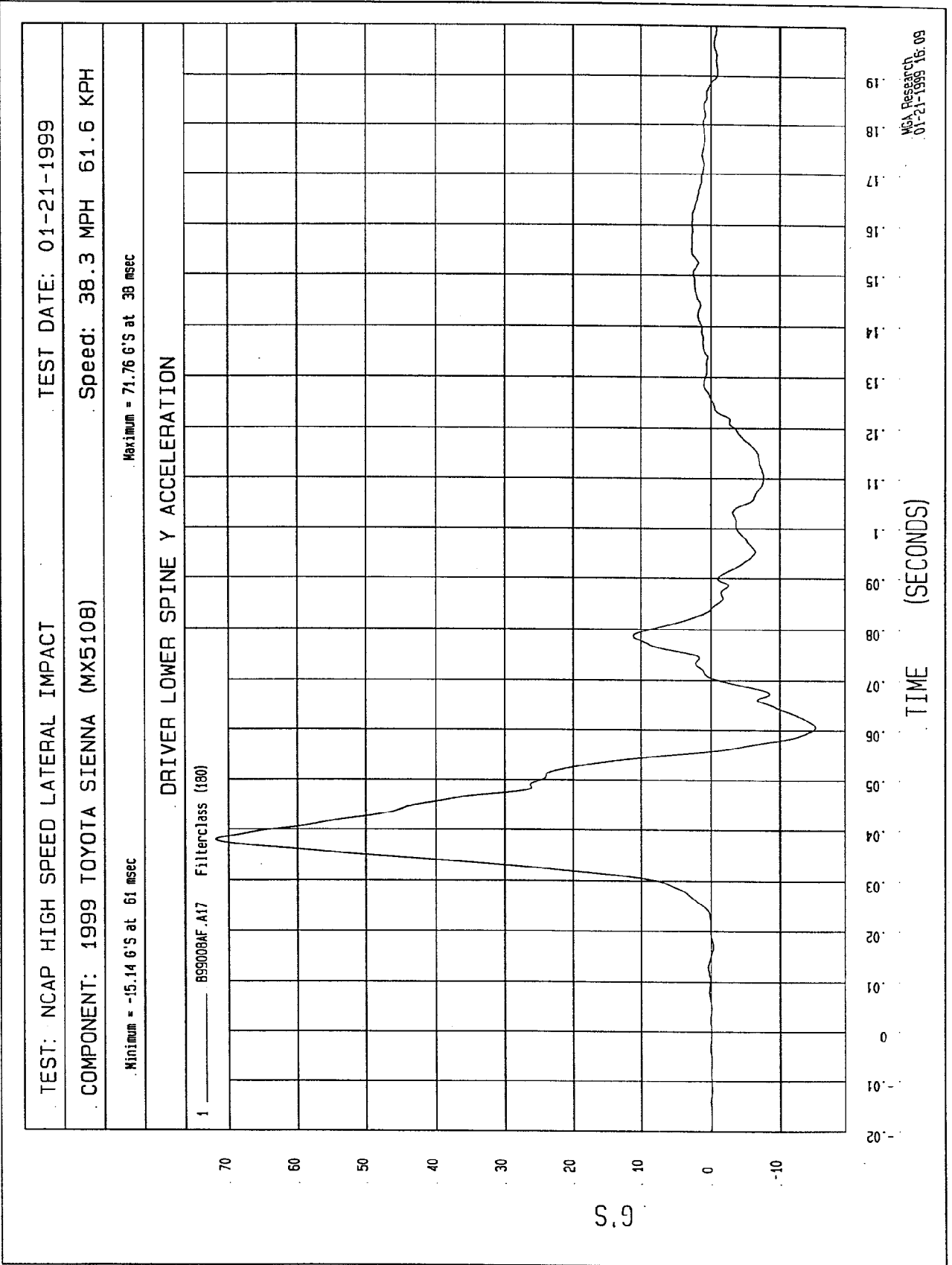
Minimum = -1.14E-02 KPH at -13 msec

DRIVER LOWER RIB Y VELOCITY



TIME Seconds

WCA Research
01-21-1999 16:21

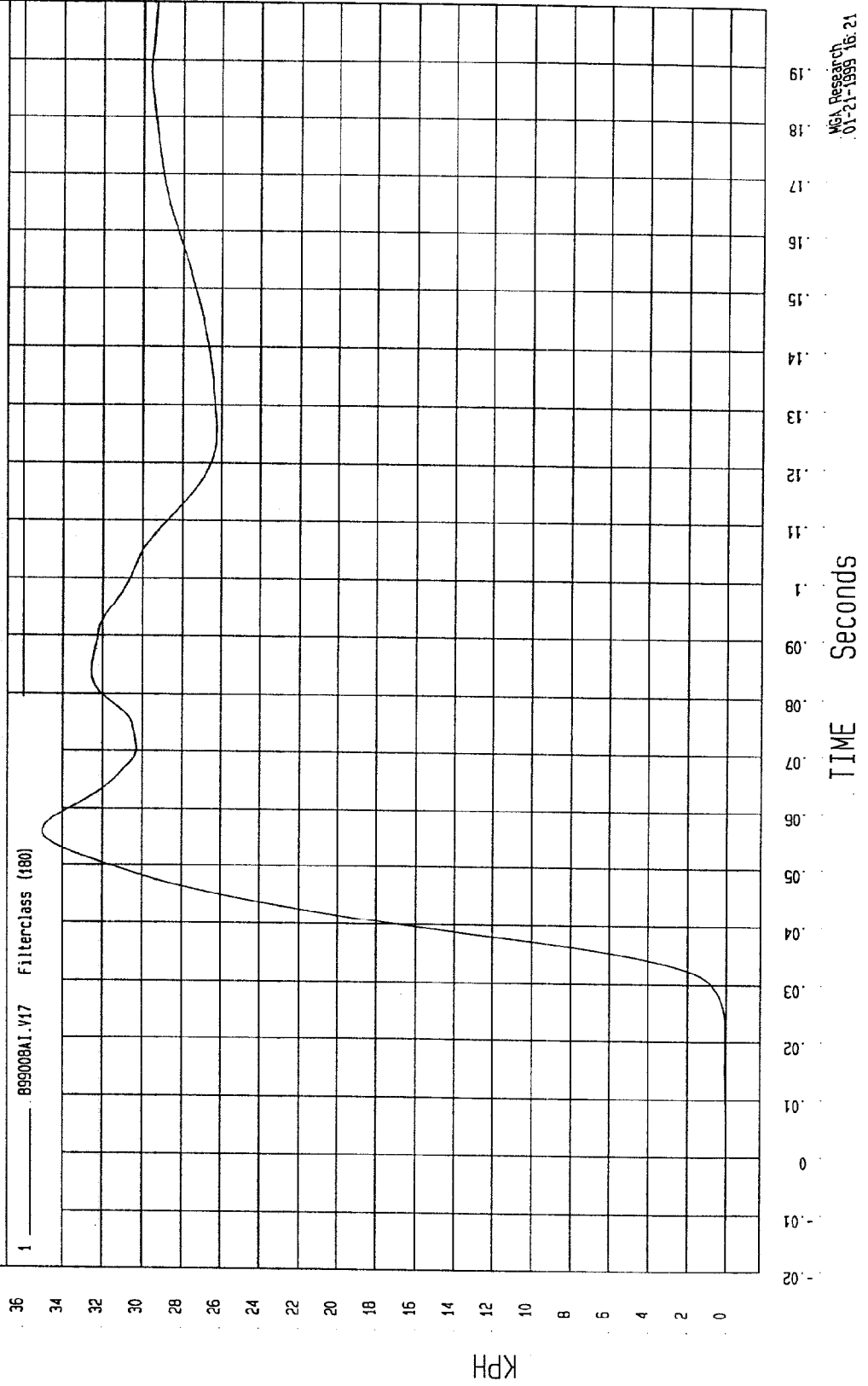


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.95E-03 KPH at -5 msec Maximum = 35.03 KPH at 56 msec

DRIVER LOWER SPINE Y VELOCITY

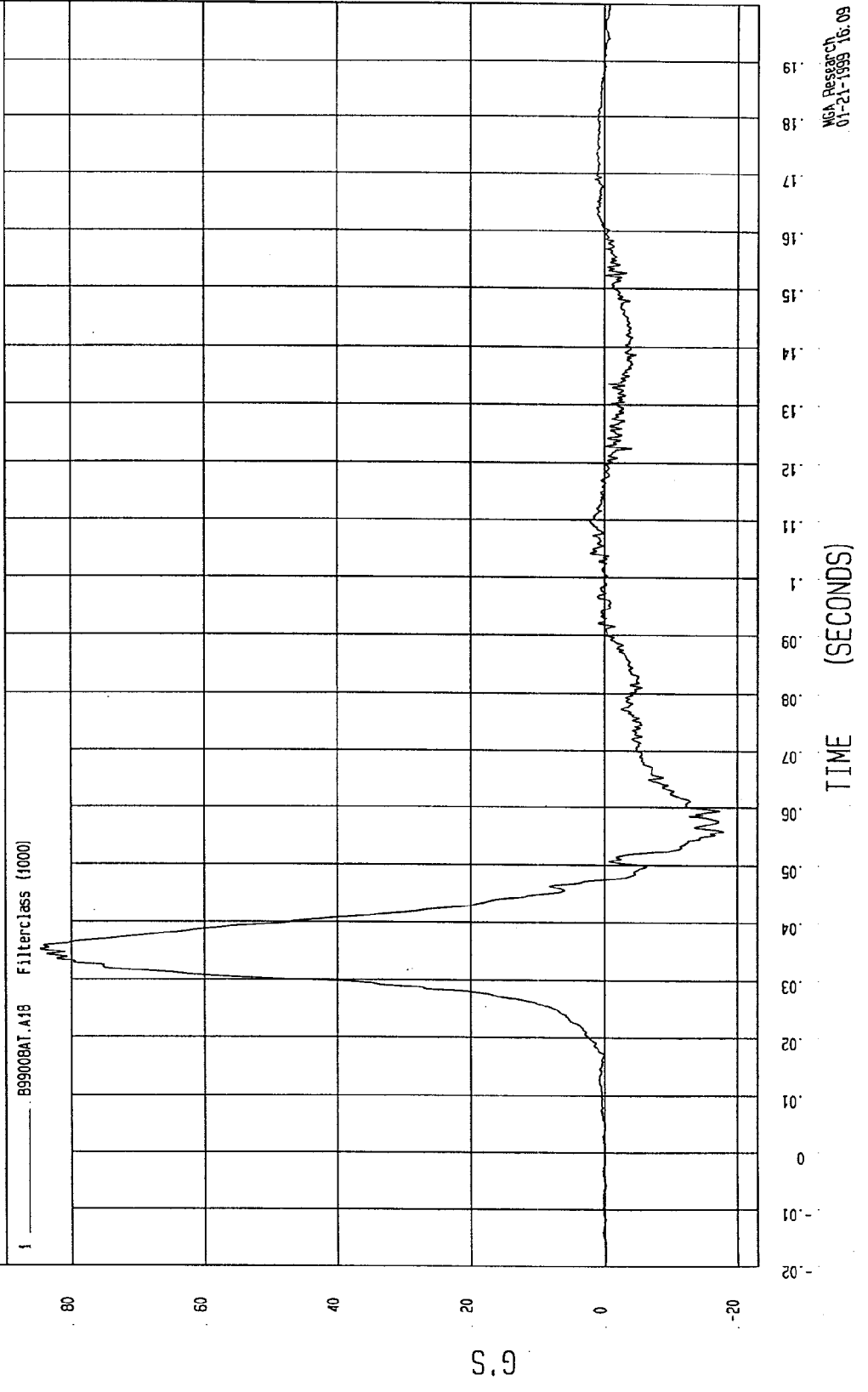


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -17.84 G'S at 56 msec Maximum = 84.66 G'S at 35 msec

DRIVER PELVIS Y ACCELERATION



WCA Research
01-21-1999 16:09

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

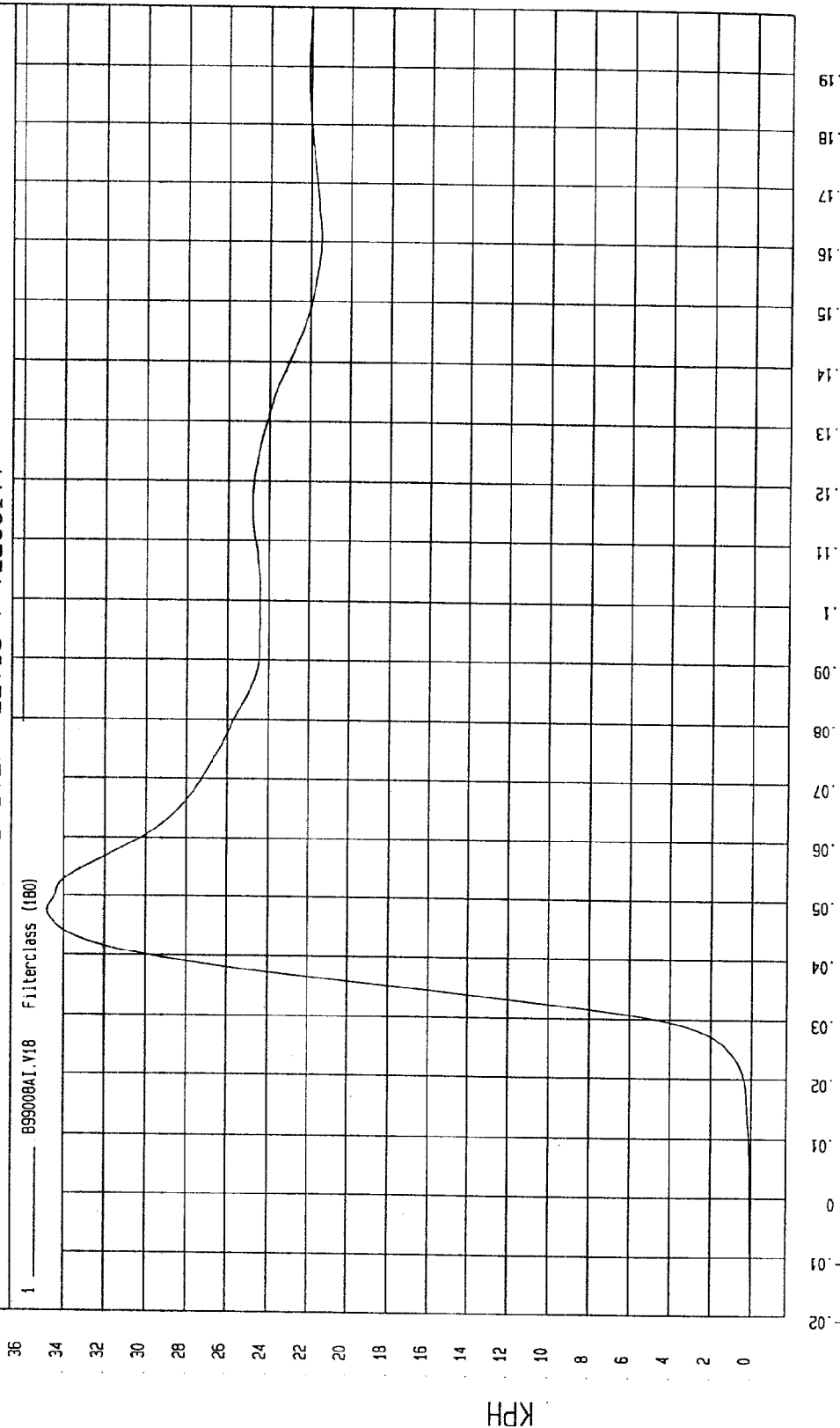
SPEED: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 34.81 KPH at 48 msec

Minimum = -8.16E-03 KPH at -16 msec

DRIVER PELVIS Y VELOCITY



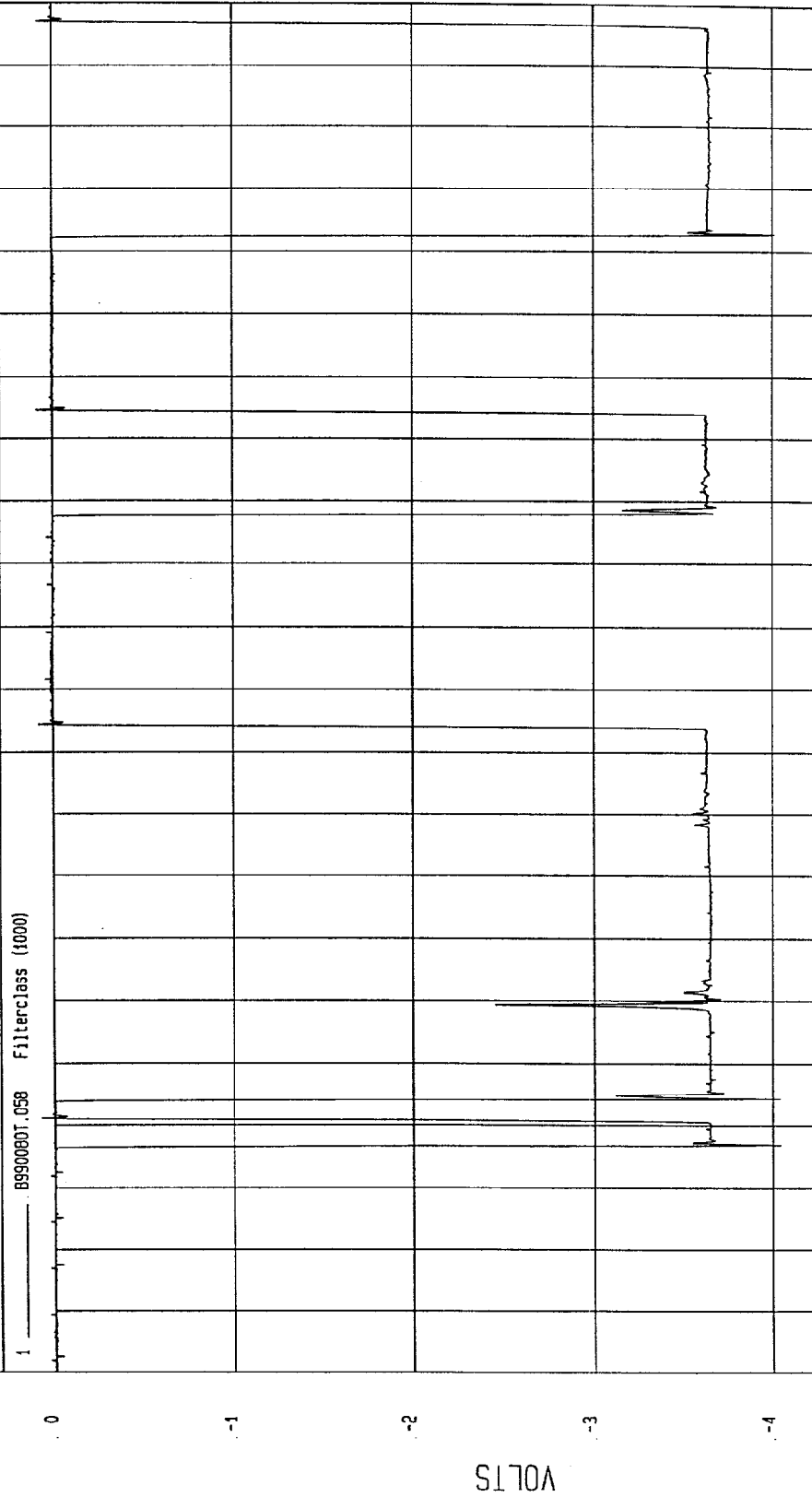
MOA Research
01-21-1999 16:21

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

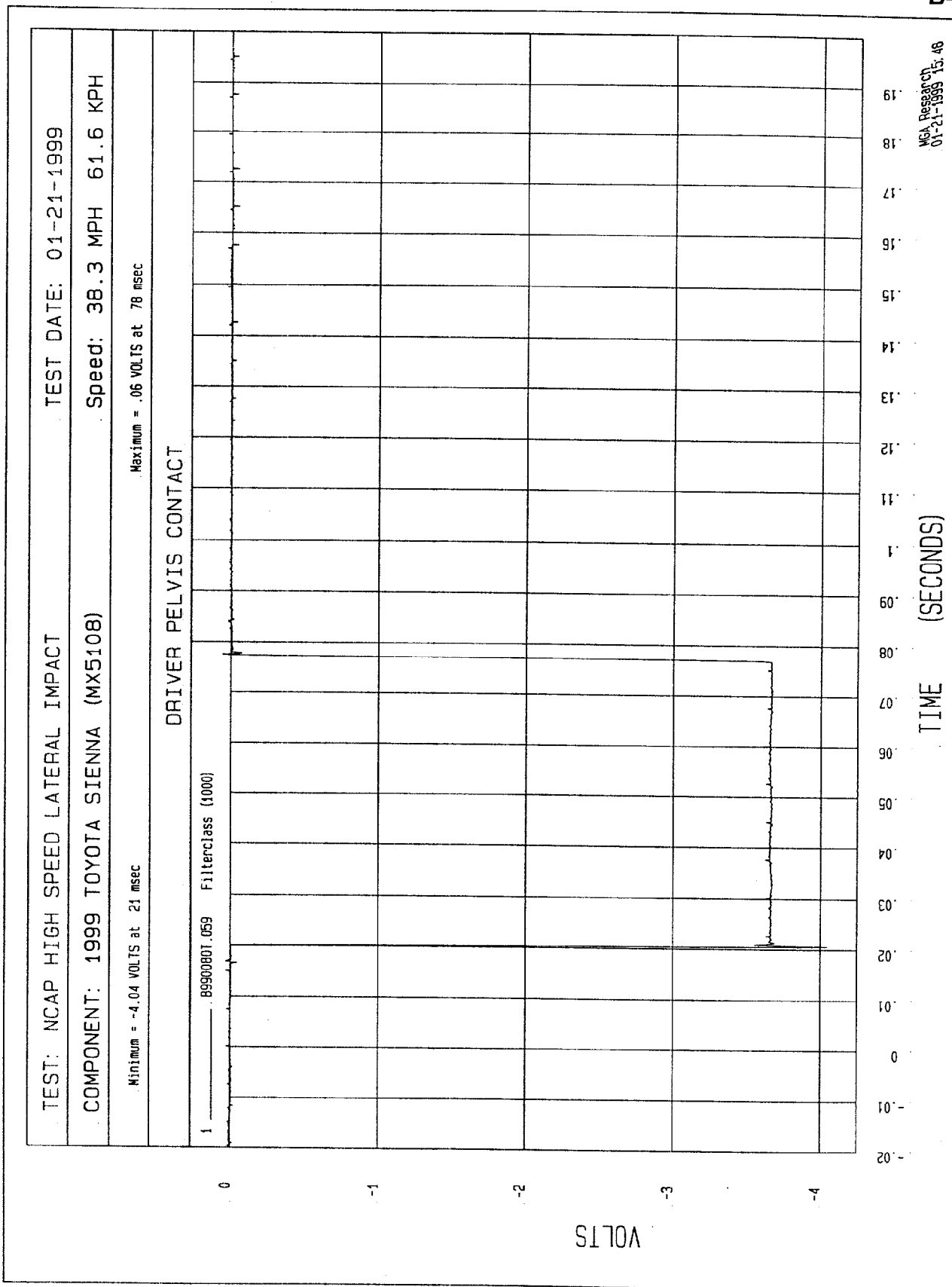
COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

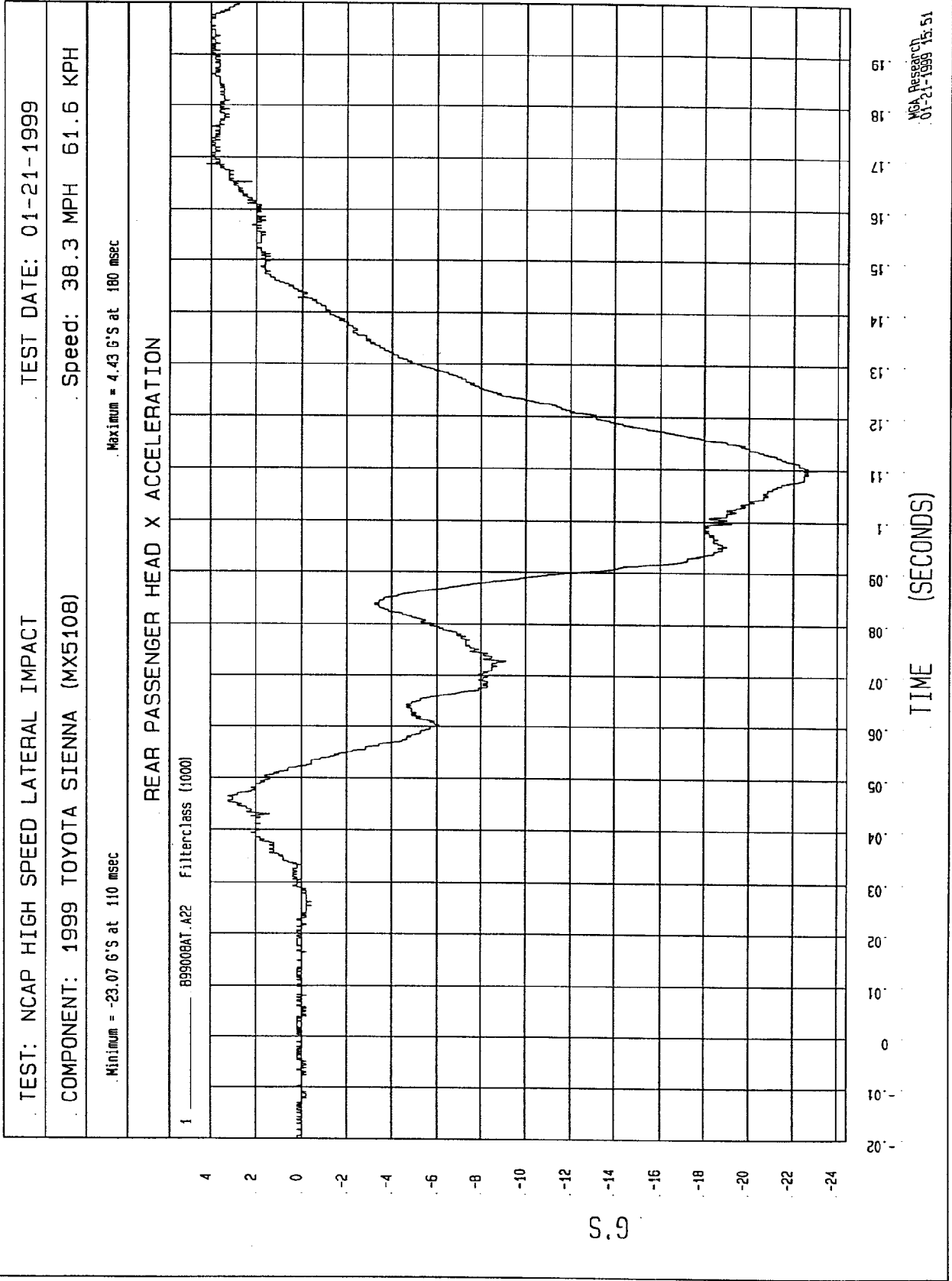
Minimum = -4.04 VOLTS at 17 msec Maximum = 8.82E-02 VOLTS at 135 msec

DRIVER SHOULDER CONTACT



NCA Research
01-21-1999 15:48





TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

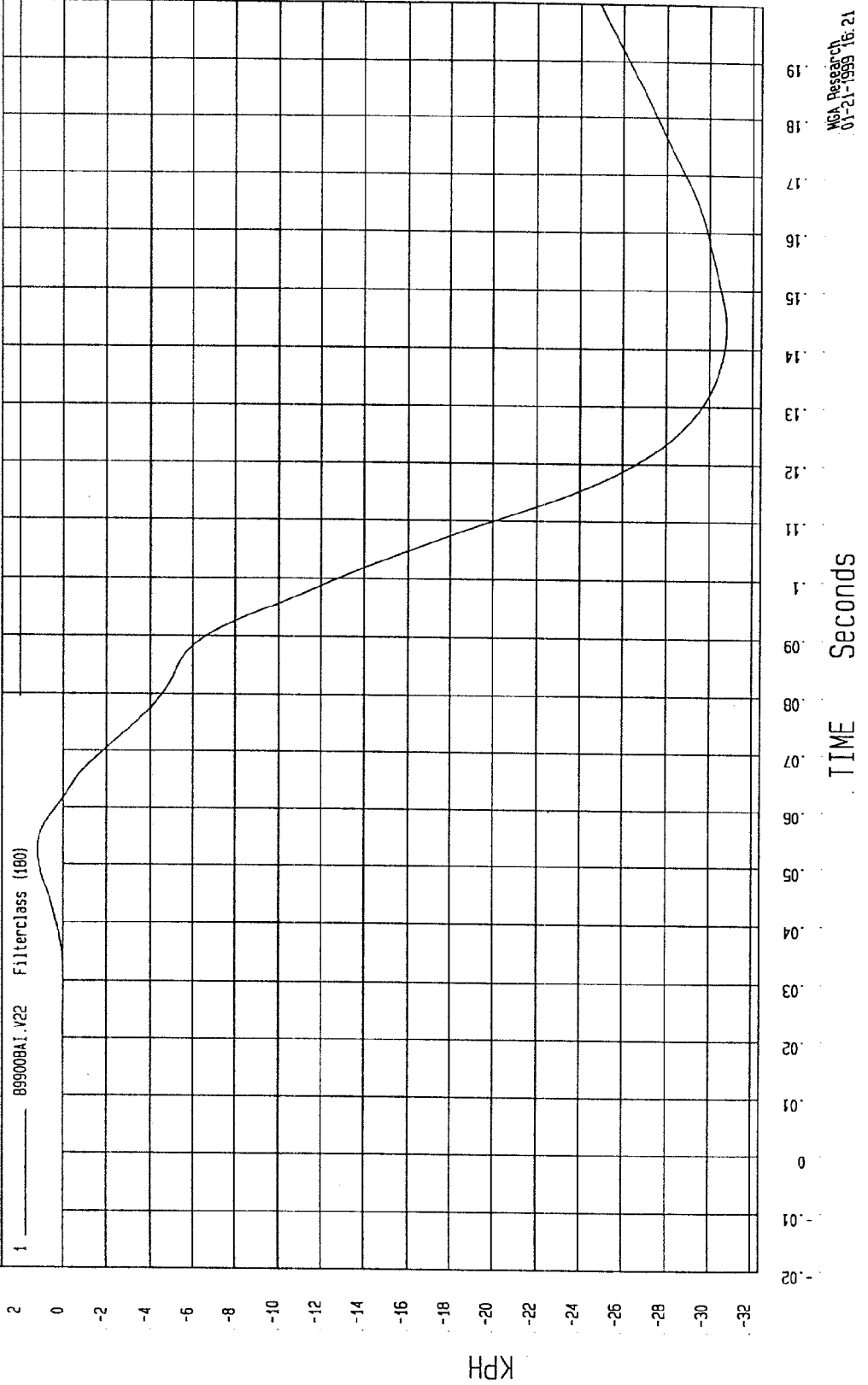
SPEED: 38.3 MPH 61.6 KPH

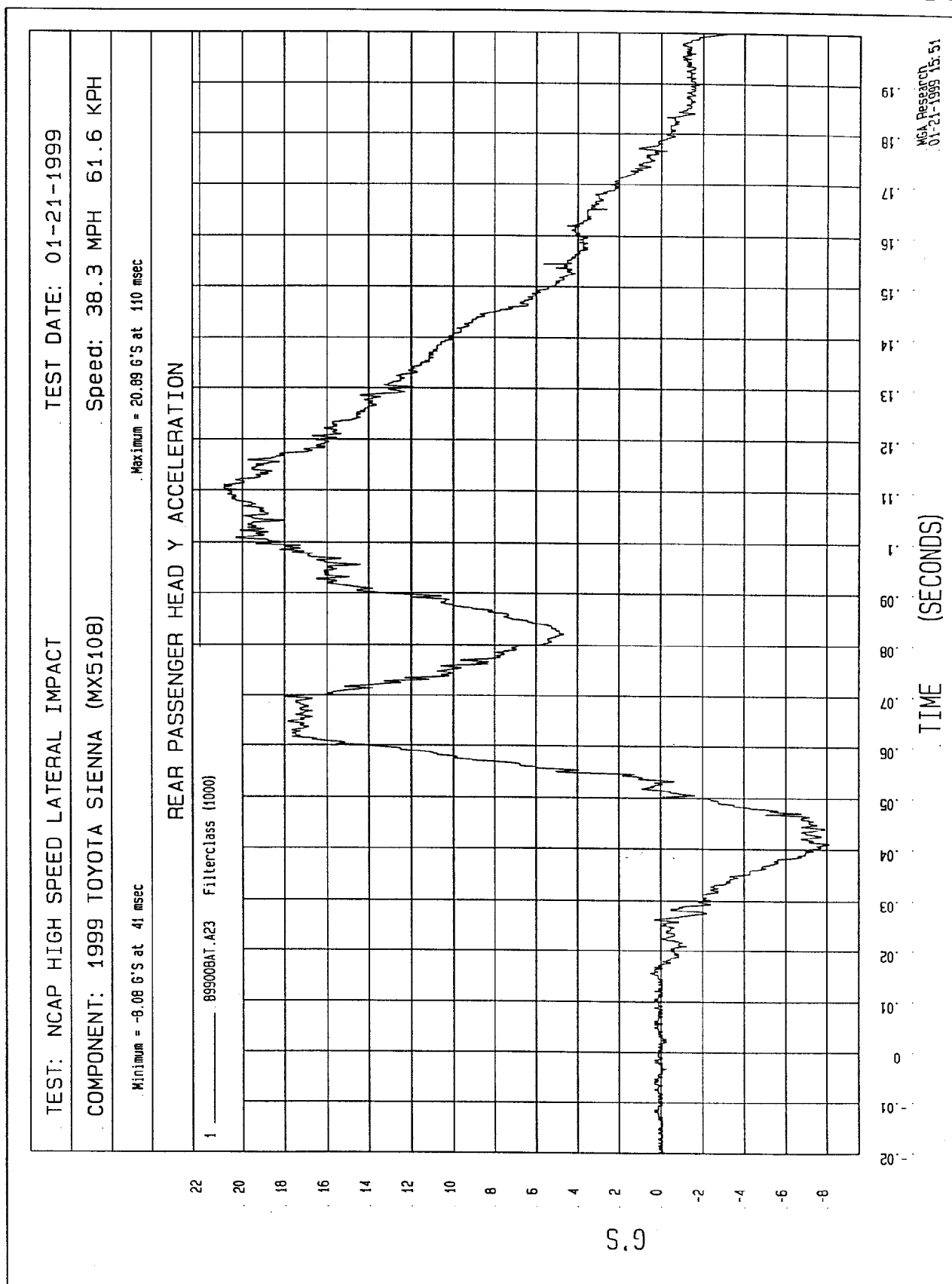
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 1.2 KPH at 52 msec

Minimum = -30.78 KPH at 144 msec

REAR PASSENGER HEAD X VELOCITY





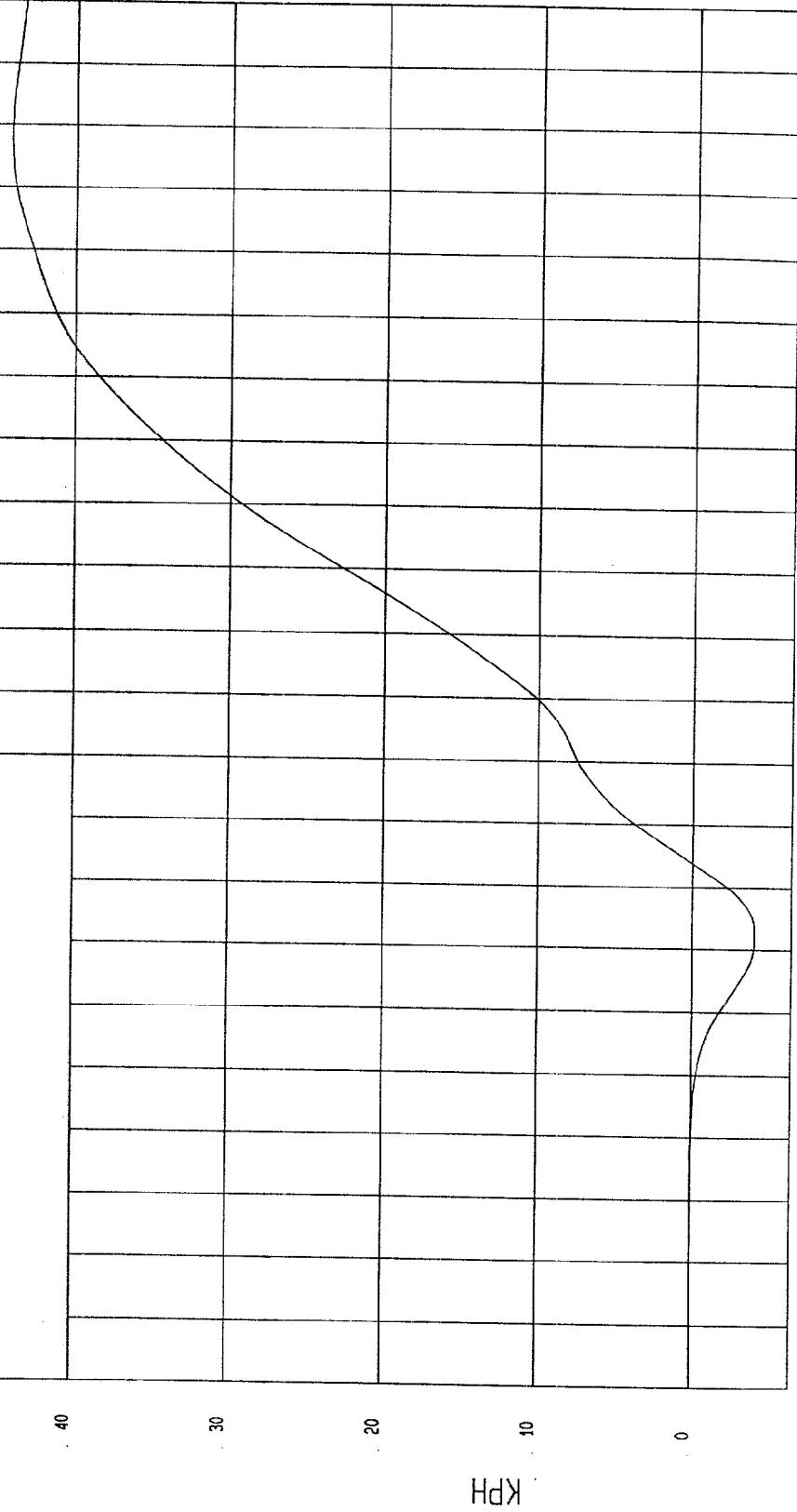
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

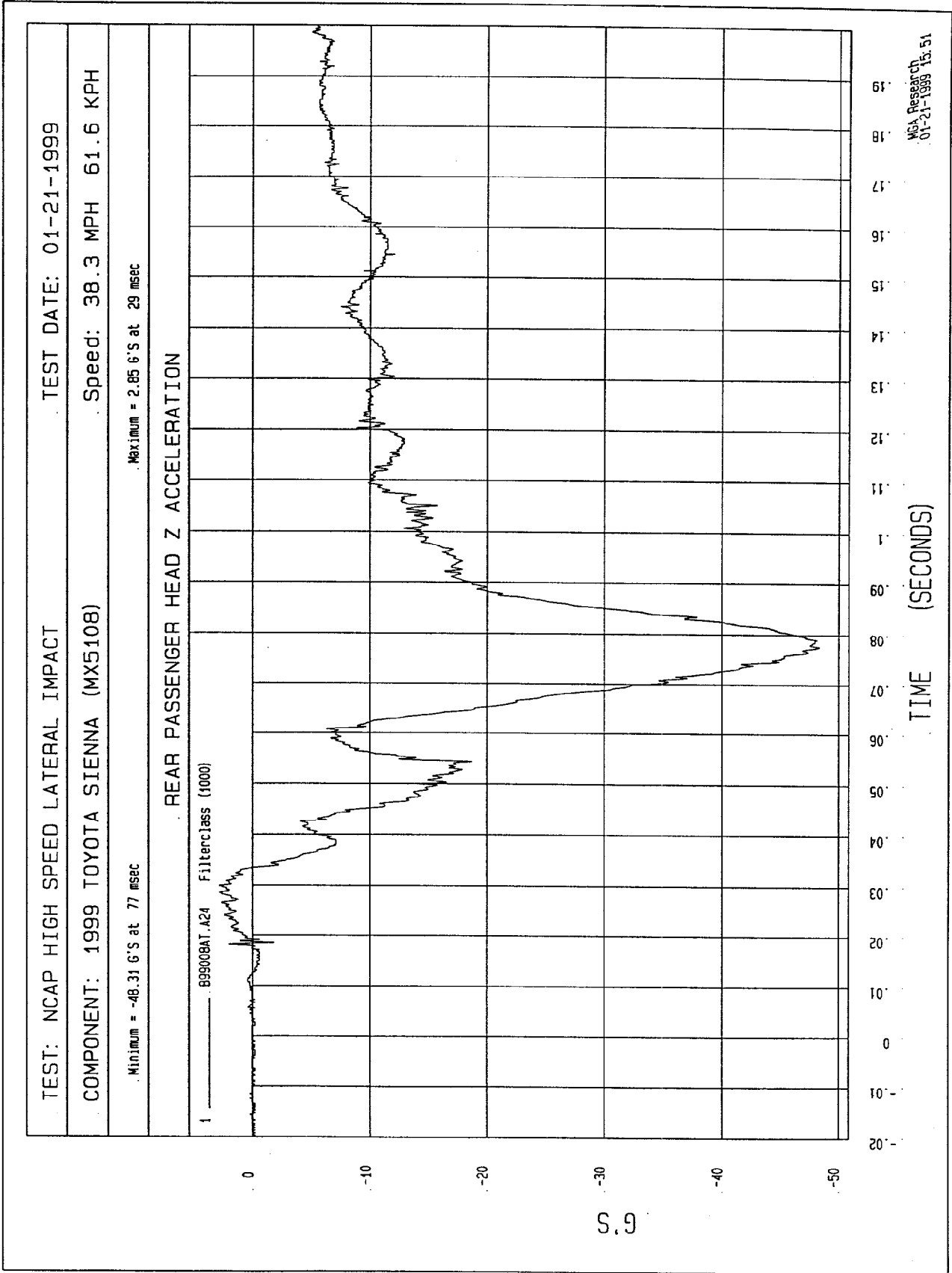
Minimum = -3.97 KPH at 51 msec
Maximum = 44.22 KPH at 178 msec

REAR PASSENGER HEAD Y VELOCITY

1 _____ B99008A1.V23 Filterclass (180)



TIME Seconds
MCA Research
01-21-1999 16:21

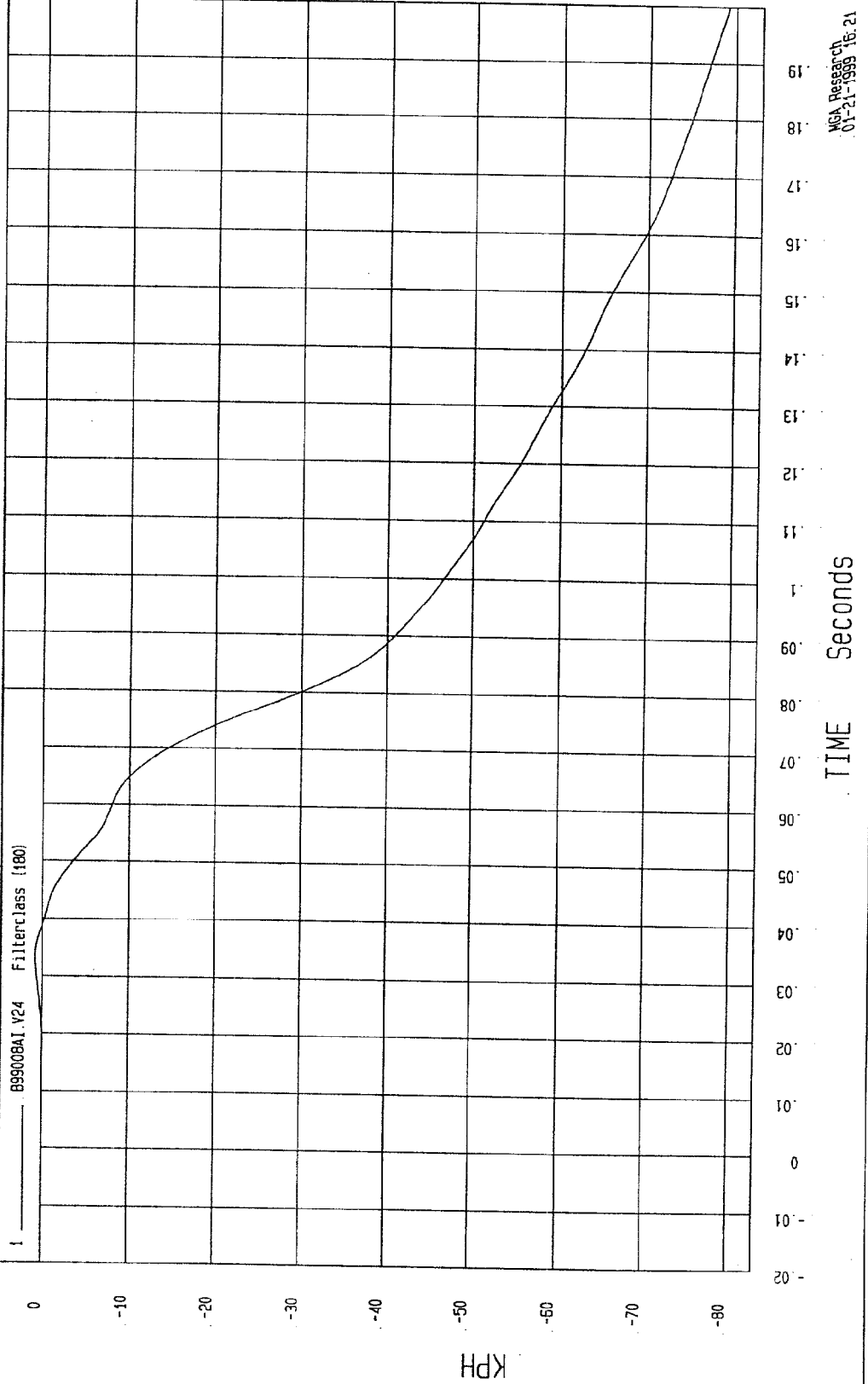


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -79.1 KPH at 200 msec Maximum = .81 KPH at 33 msec

REAR PASSENGER HEAD Z VELOCITY



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

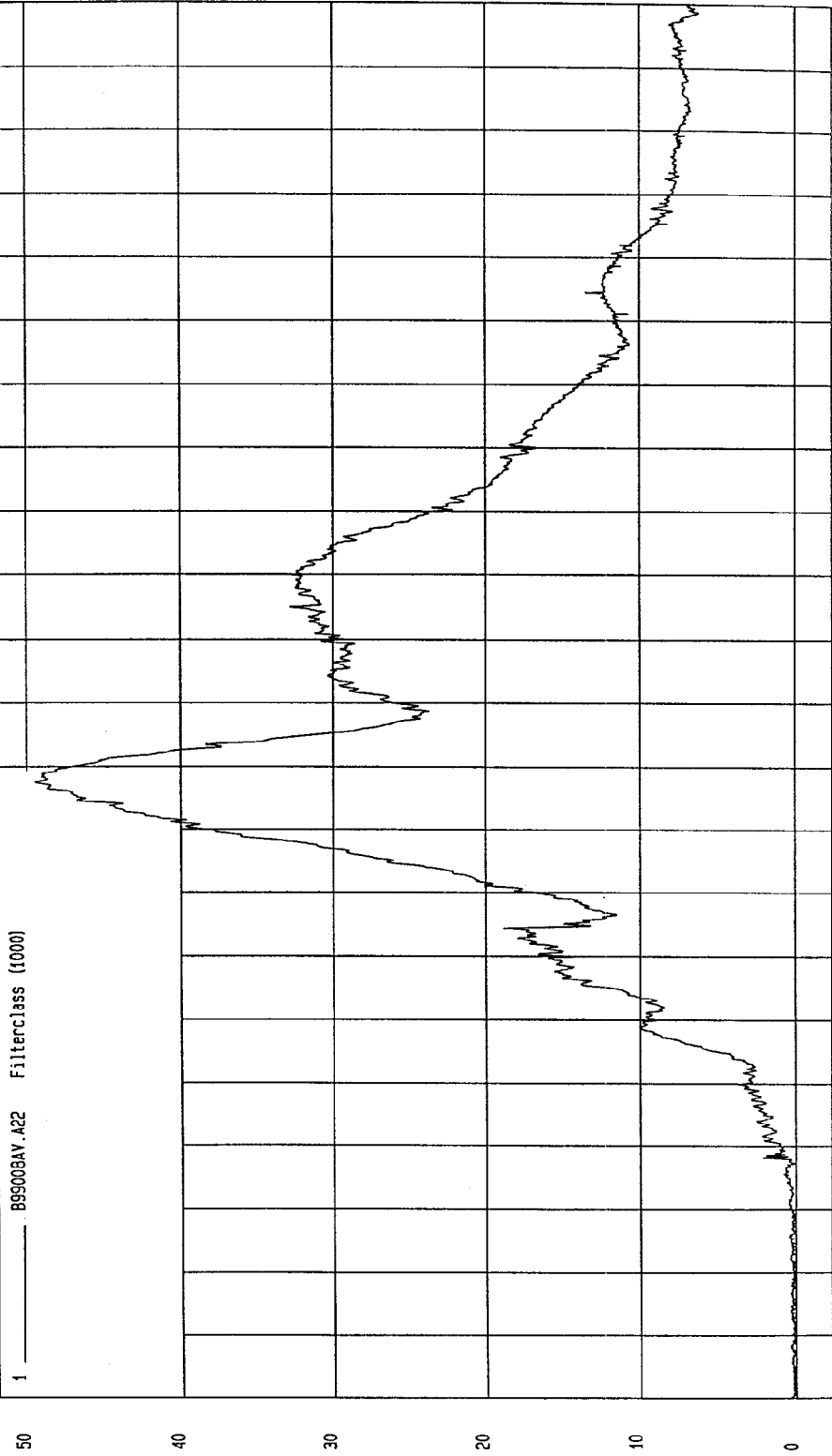
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Minimum = 8.79E-02 G's at -19 msec

Maximum = 49.47 G's at 79 msec

REAR PASSENGER HEAD RESULTANT ACCELERATION

1 B99003AV.A22 Filterclass (1000)



MGA Research
01-21-1999 15:51

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

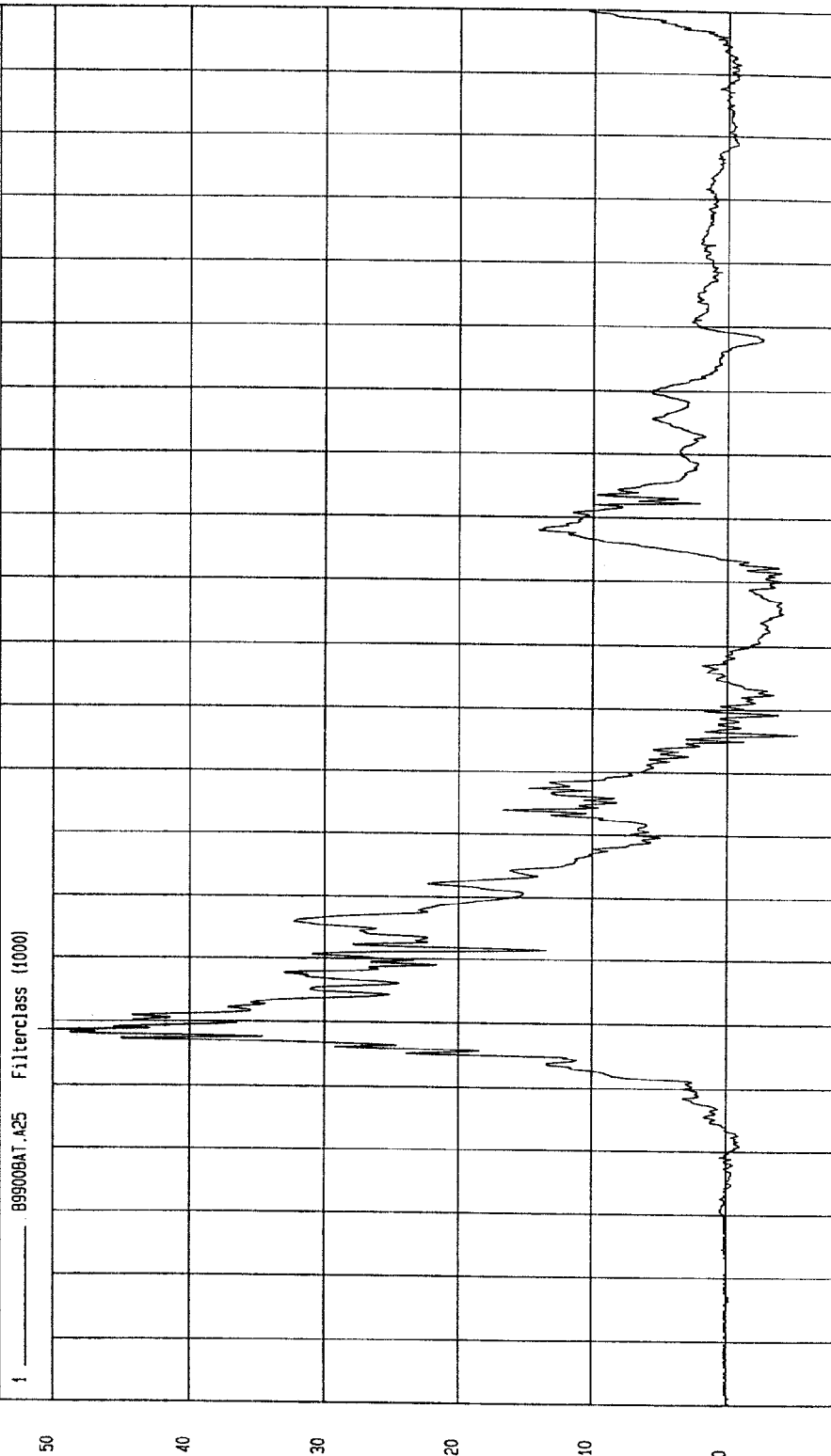
SPEED: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

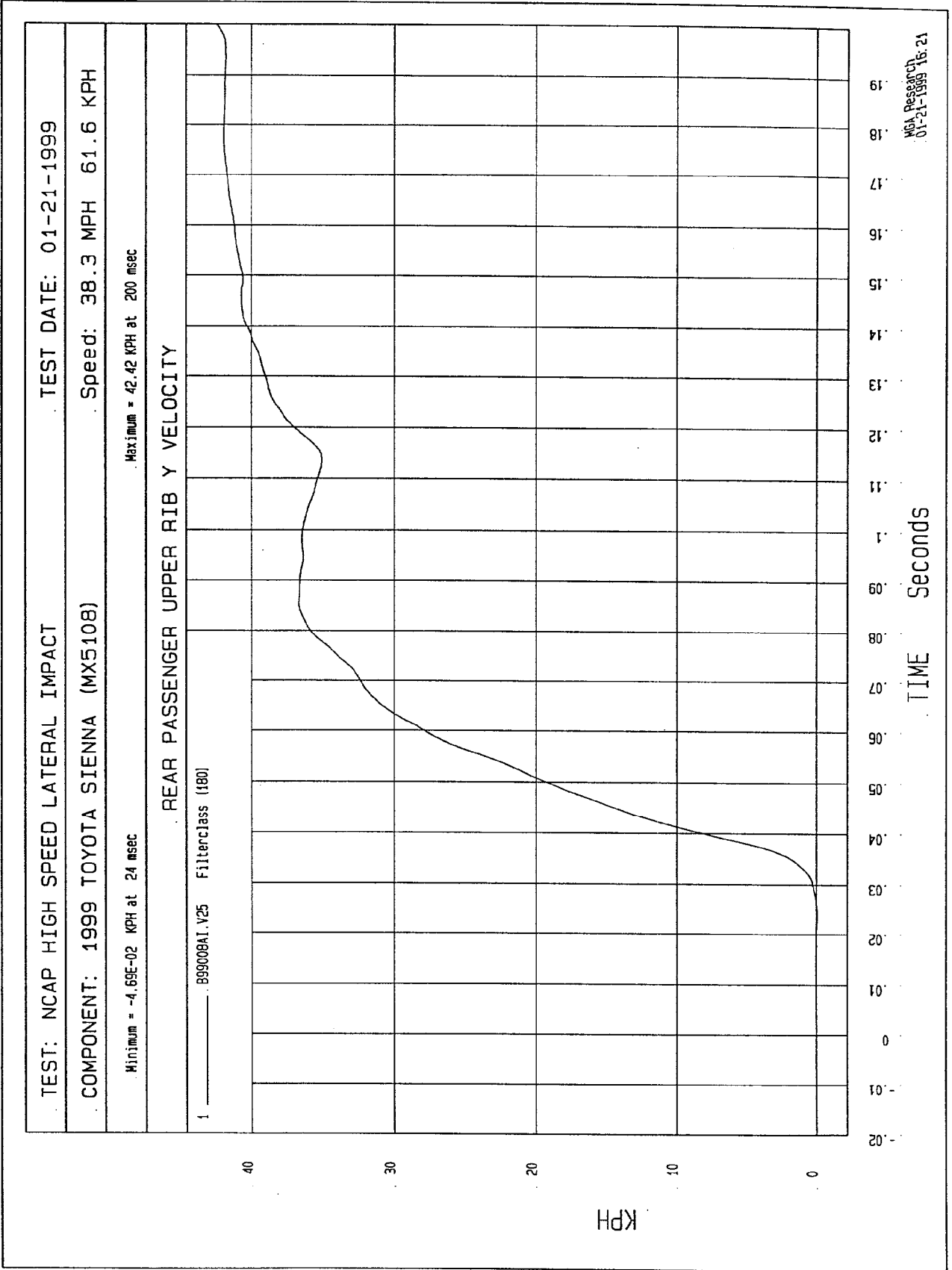
Maximum = 51.06 G'S at 39 msec

Minimum = -5.2 G'S at 86 msec

REAR PASSENGER UPPER RIB Y ACCELERATION



NCAP Research
01-21-1999 16.09

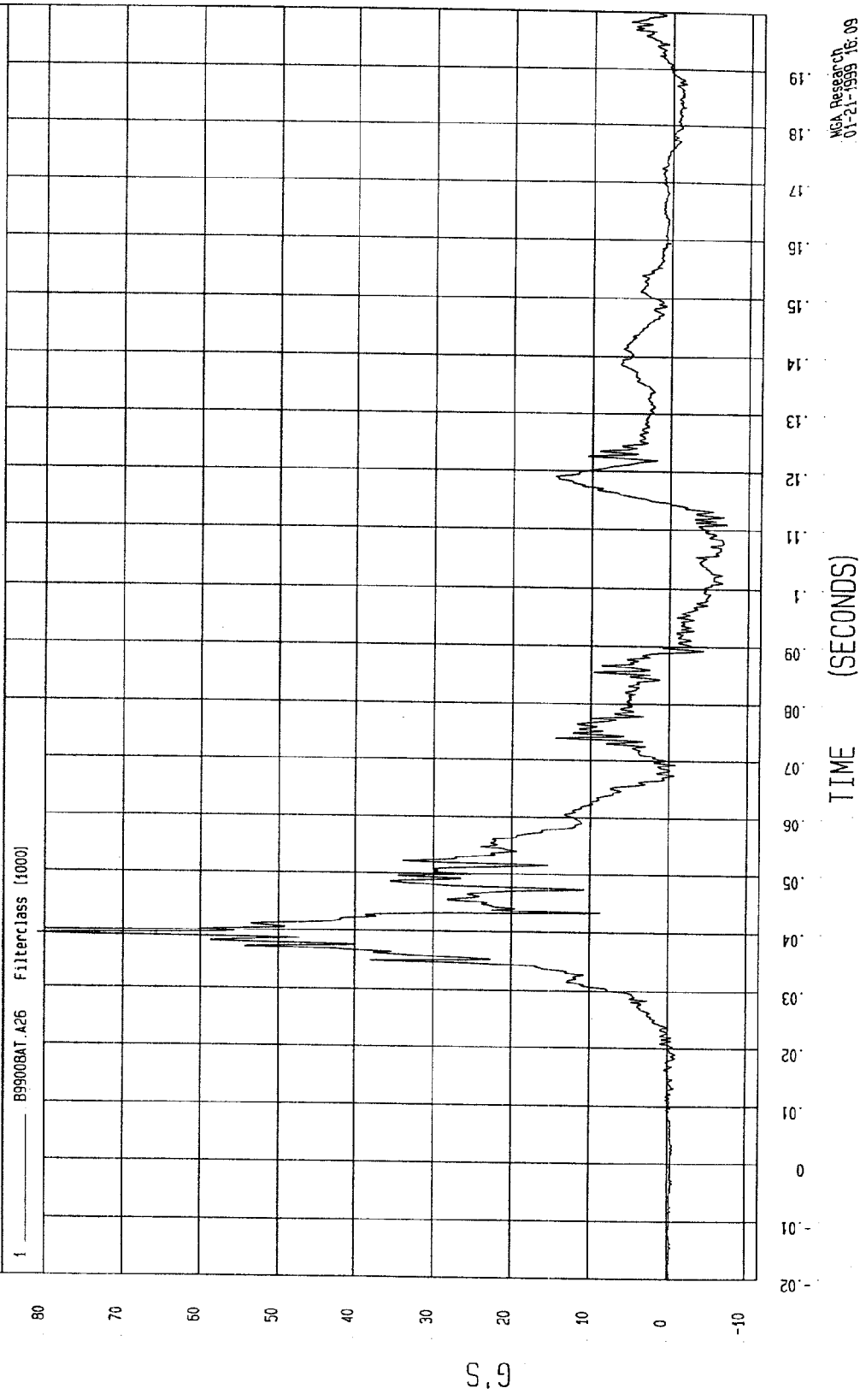


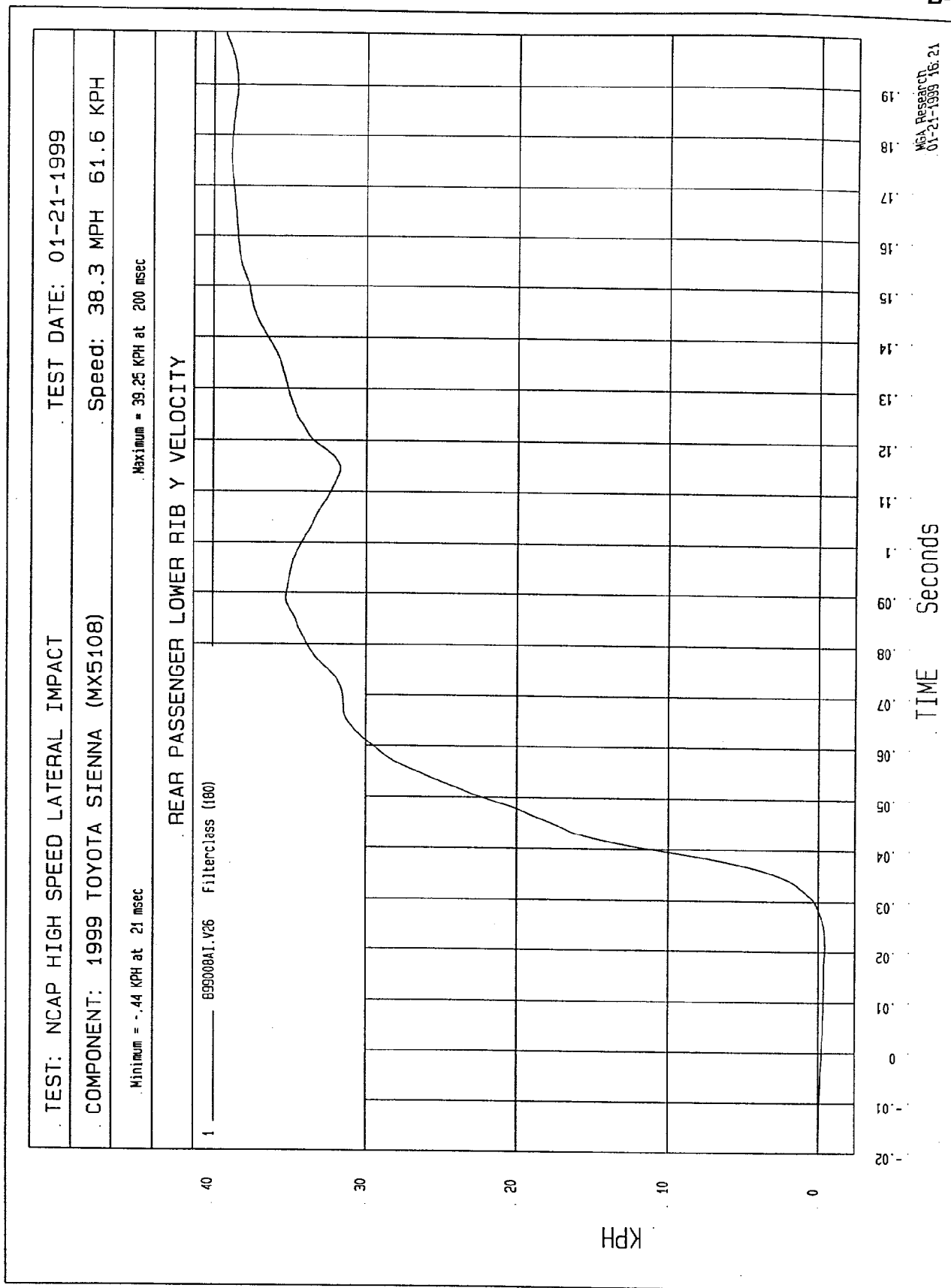
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -7.21 G'S at 111 msec Maximum = 80.99 G'S at 39 msec

REAR PASSENGER LOWER RIB Y ACCELERATION





TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

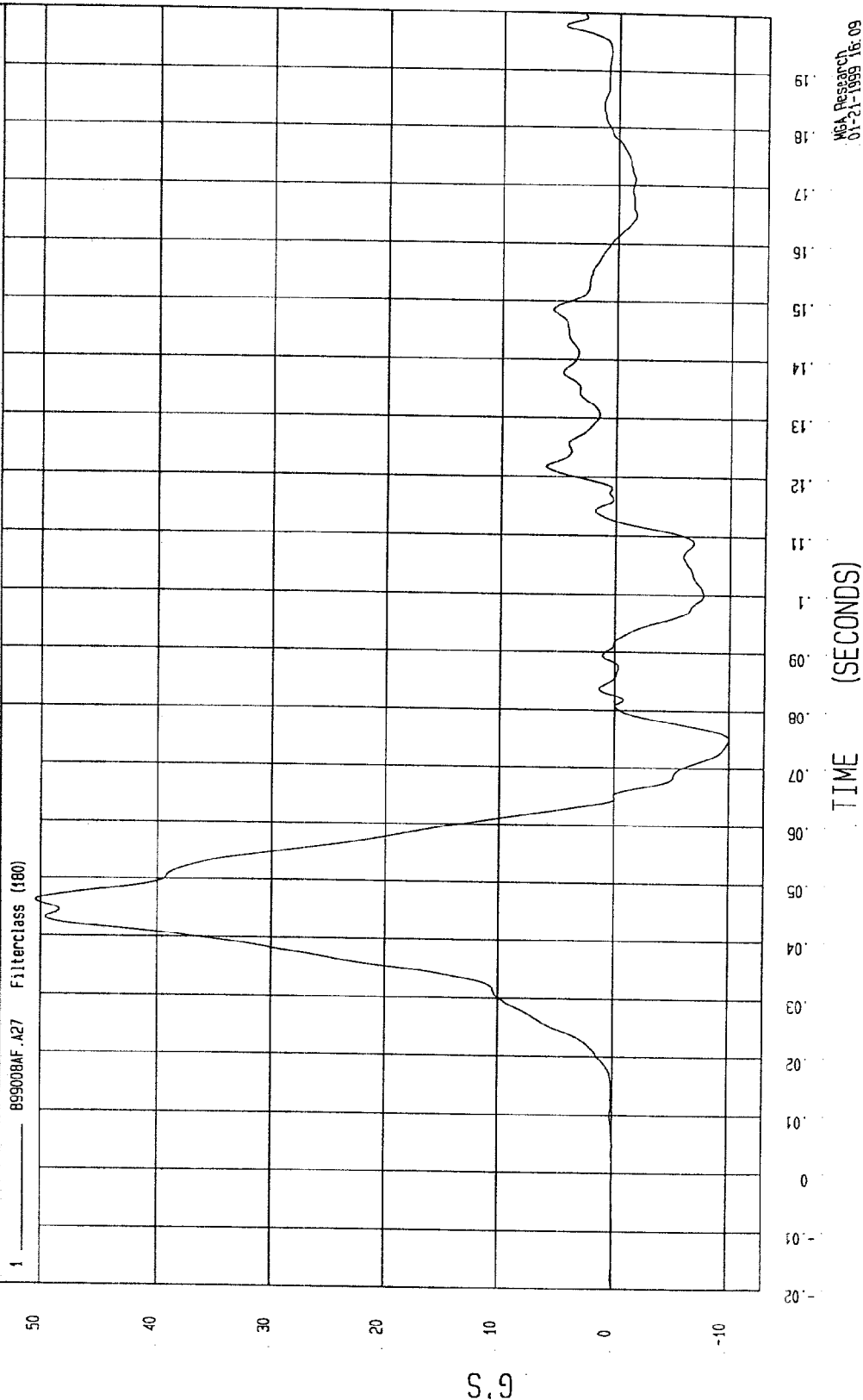
SPEED: 38.3 MPH 61.6 KPH

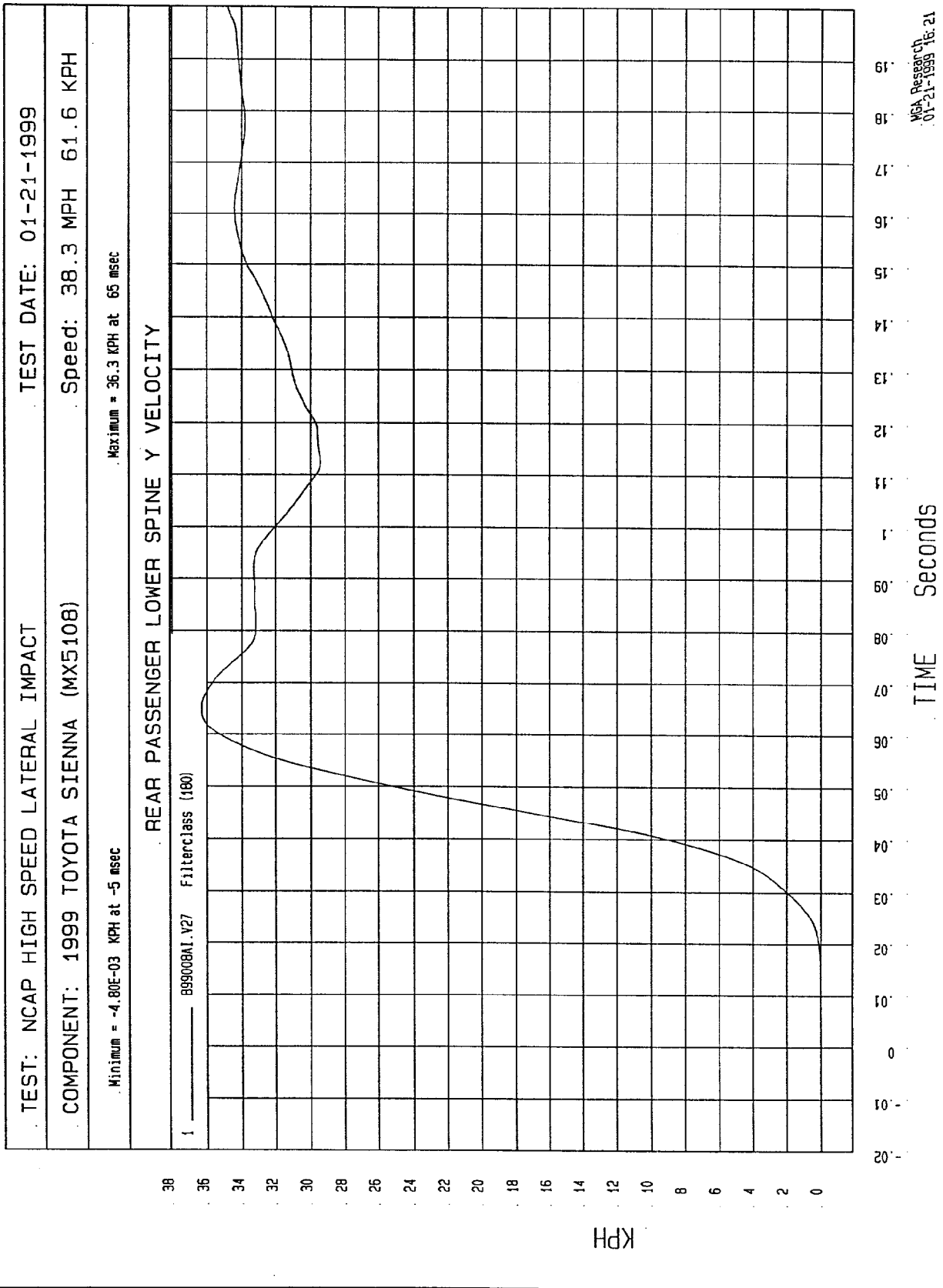
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 50.46 G'S at 46 msec

Minimum = -10 G'S at 75 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION





TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

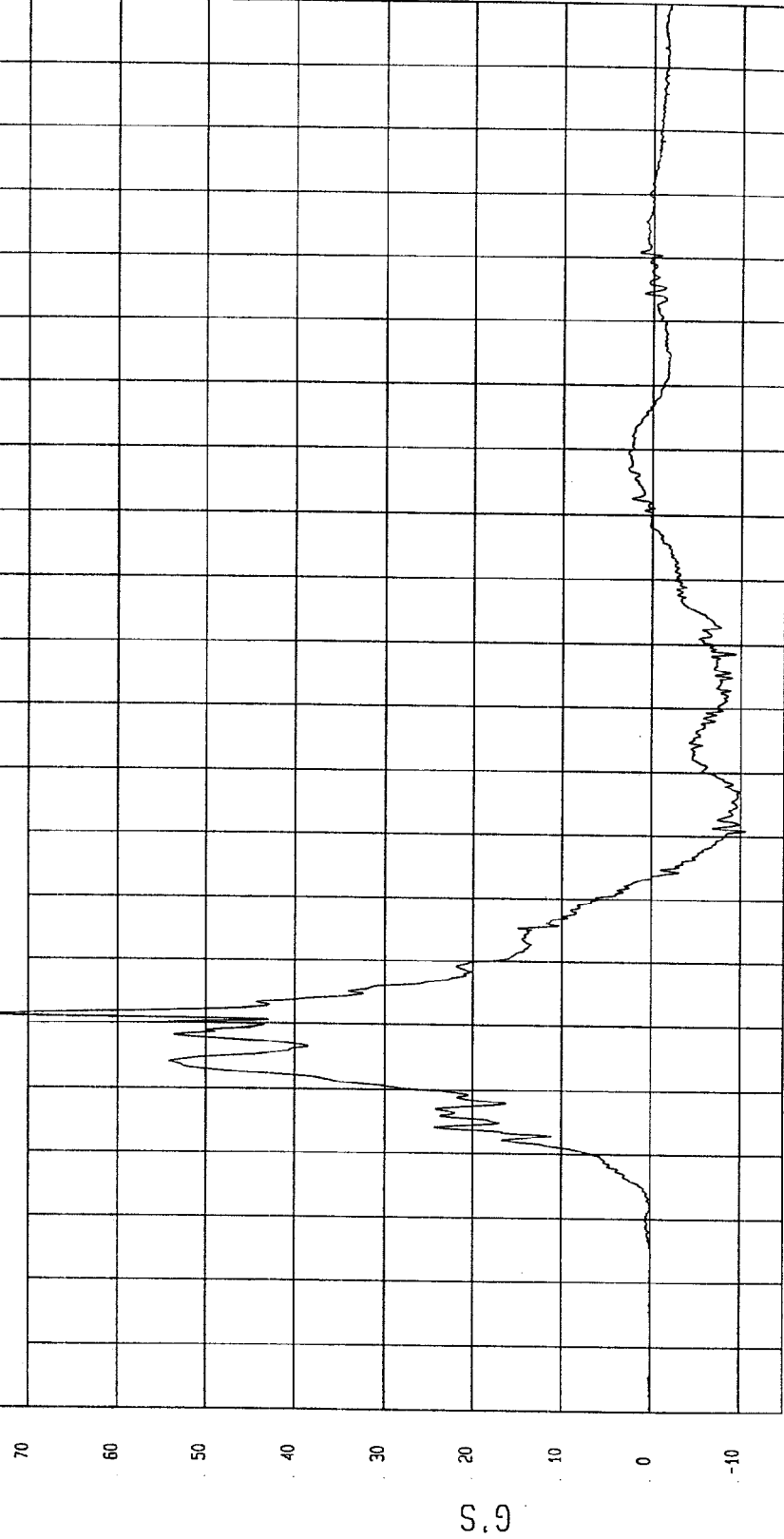
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 75.5 G'S at 41 msec

Minimum = -10.59 G'S at 71 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 B9900BAT.A28 FilterClass (1000)



NCA Research
01-21-1999 16.09

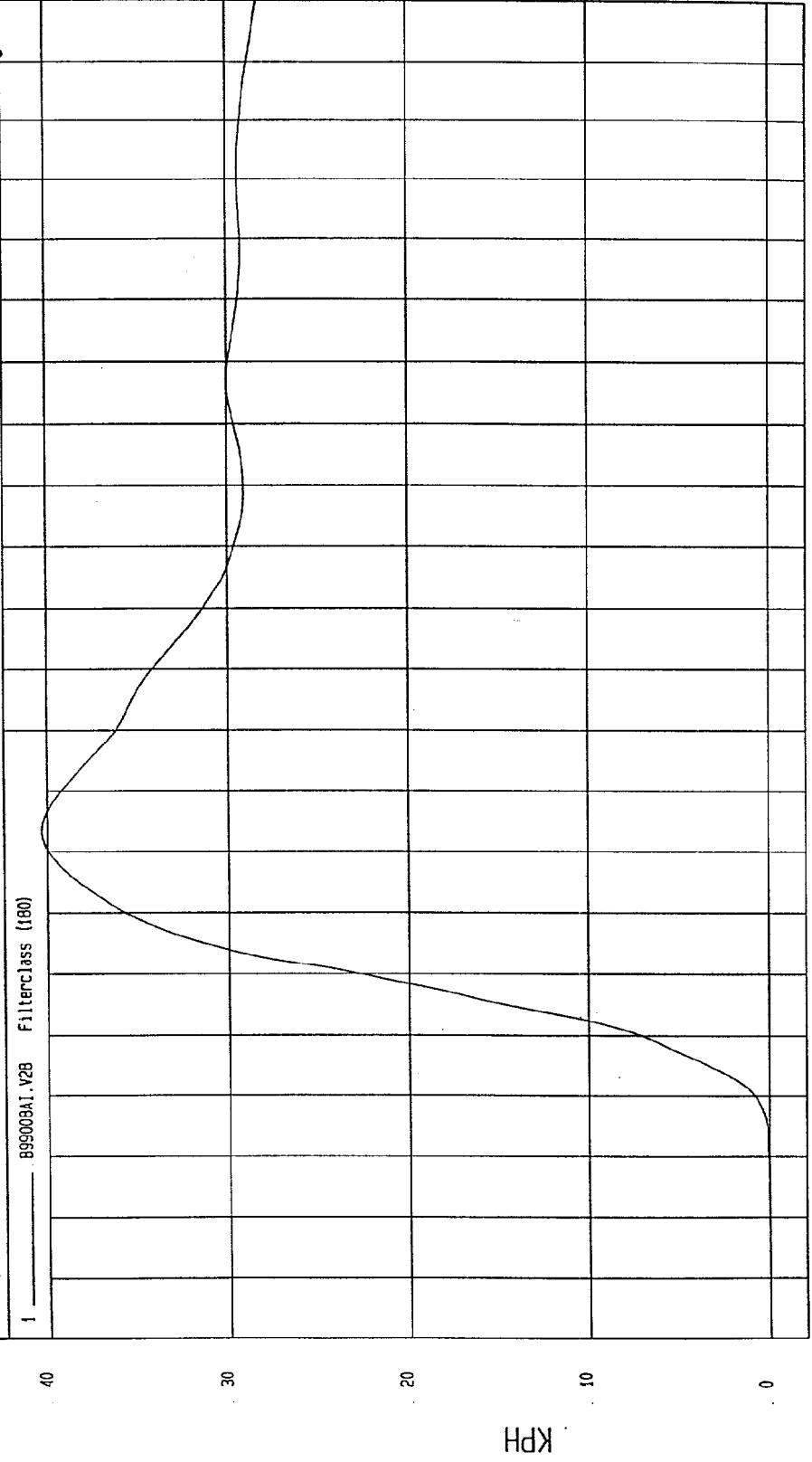
TIME (SECONDS)

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec Maximum = 40.3 KPH at 64 msec

REAR PASSENGER PELVIS Y VELOCITY



TIME Seconds

WCA Research
01-21-1999 16:21

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

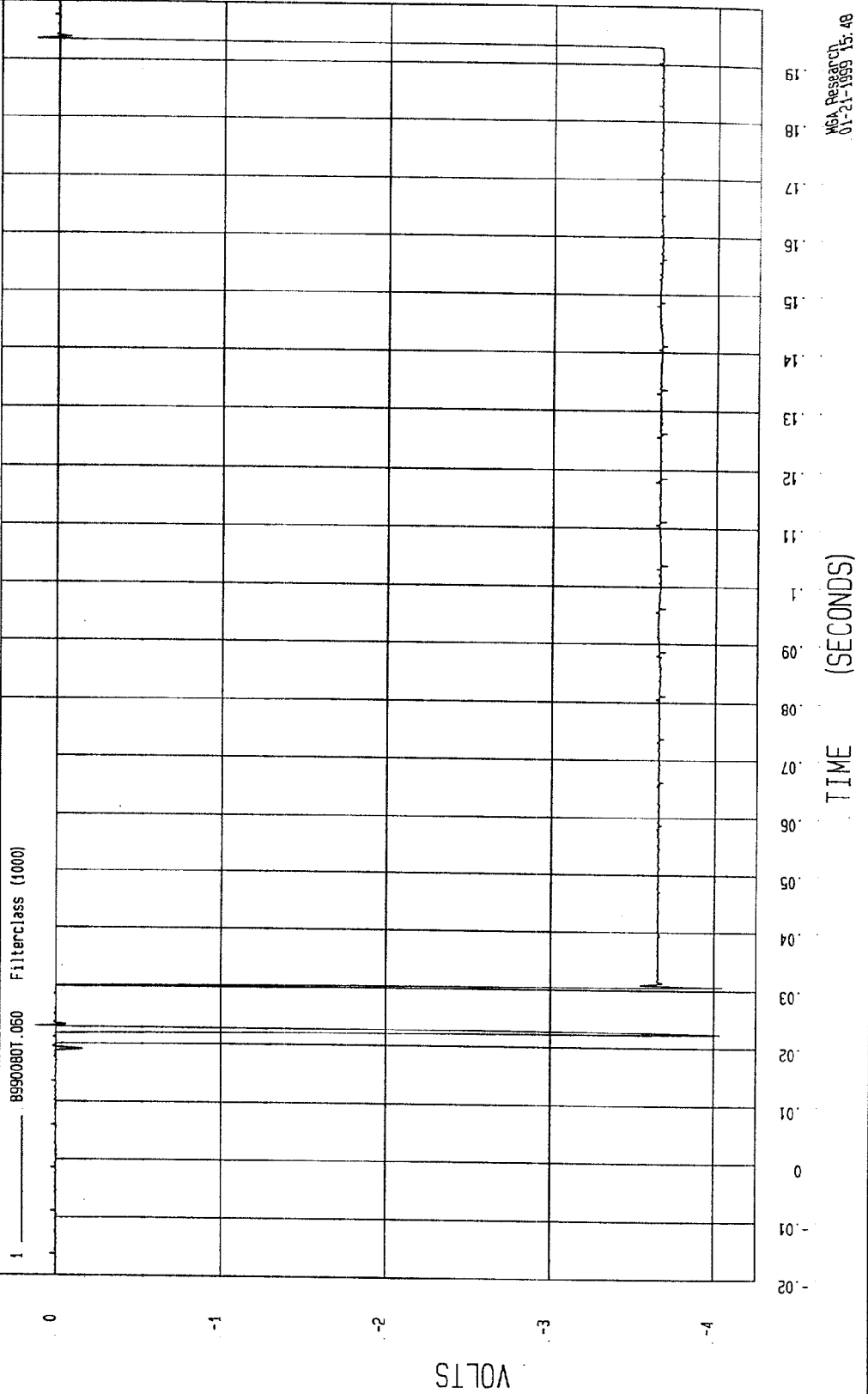
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Minimum = -4.05 VOLTS at 31 msec

Maximum = .14 VOLTS at 194 msec

REAR PASSENGER SHOULDER CONTACT

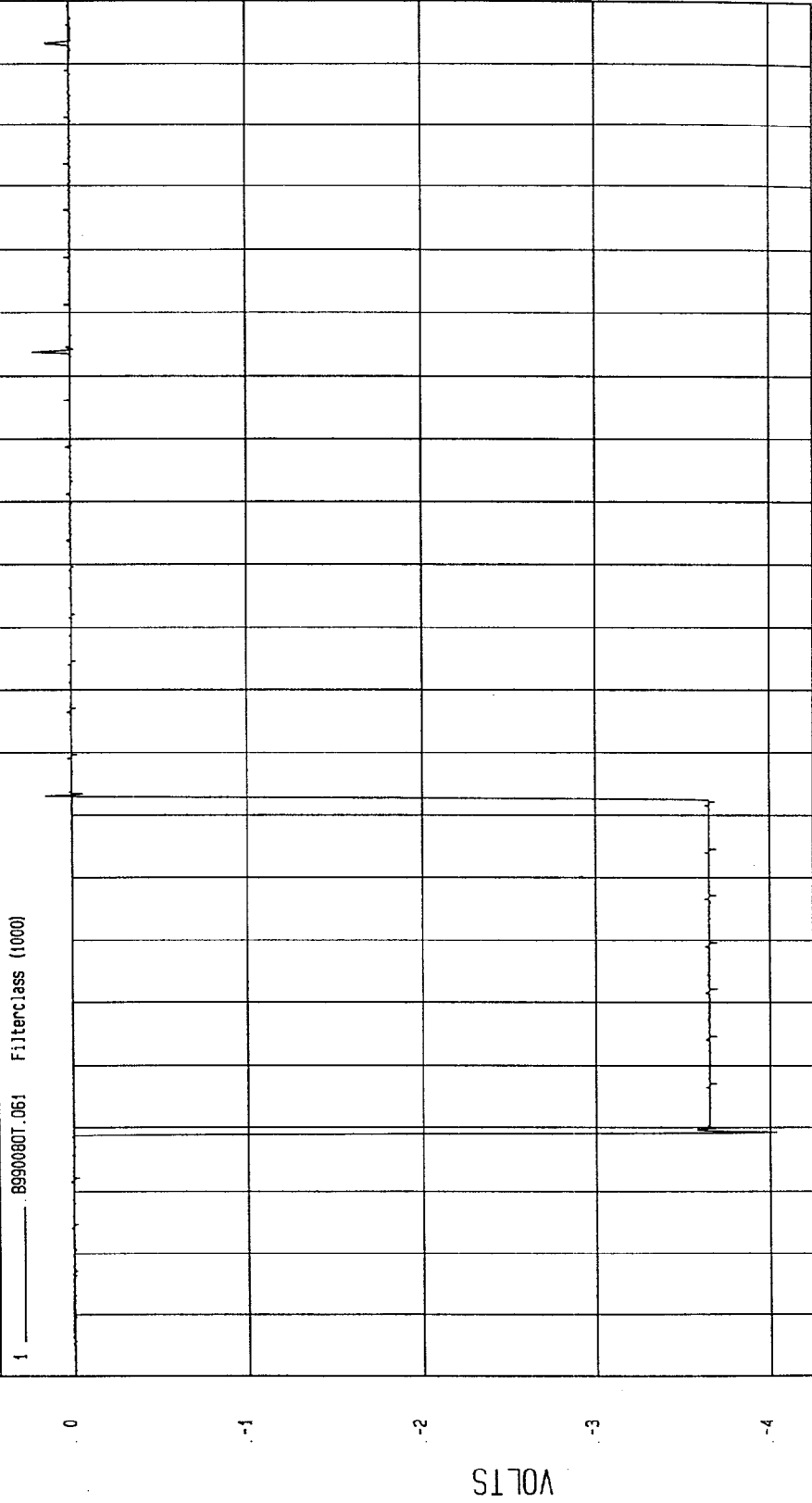


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -4.04 VOLTS at 19 msec Maximum = .21 VOLTS at 144 msec

REAR PASSENGER PELVIS CONTACT



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

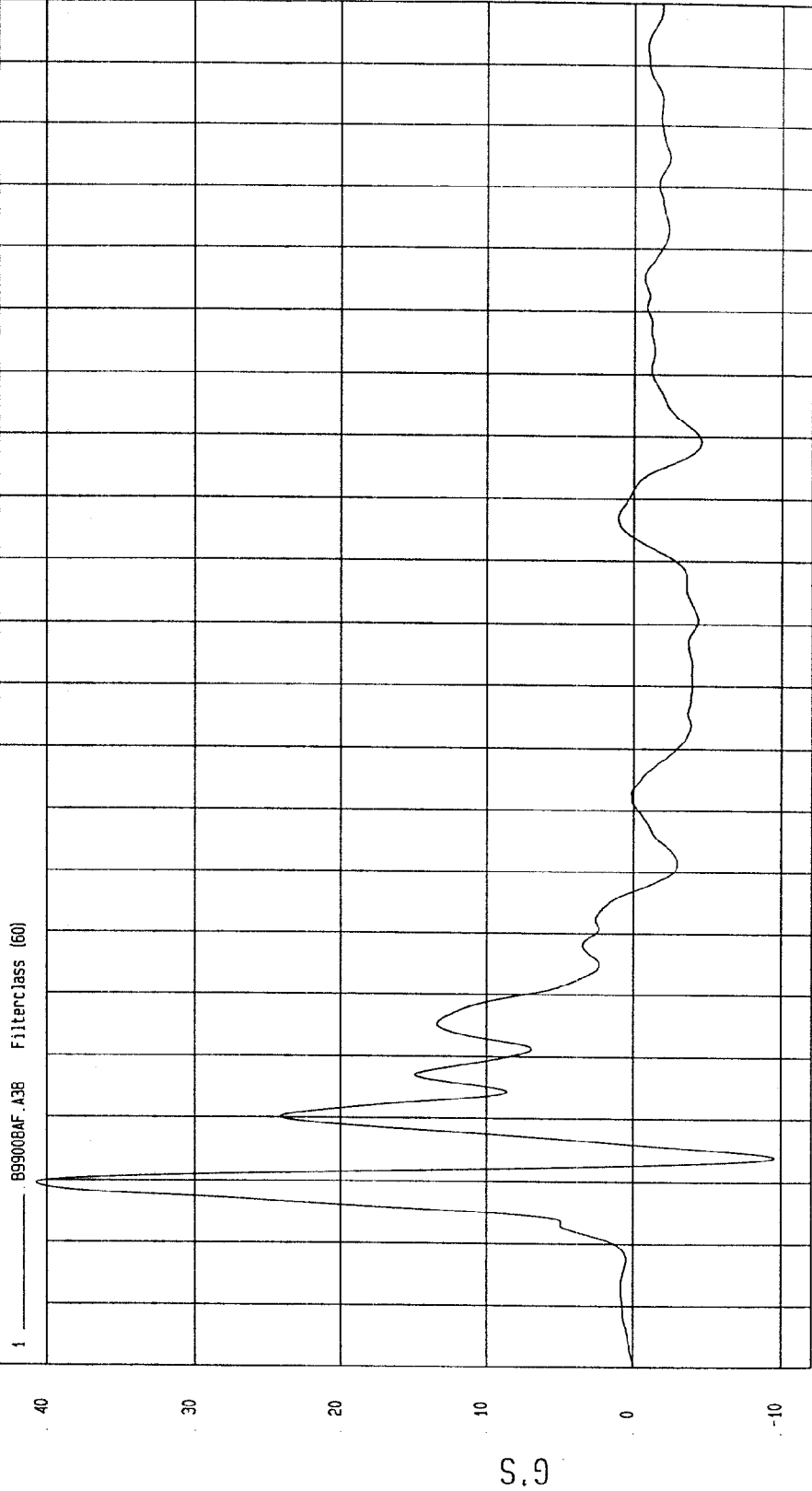
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 40.7 G'S at 10 msec

Minimum = -9.57 G'S at 14 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 ——— B99008AF.A38 Filterclass (60)



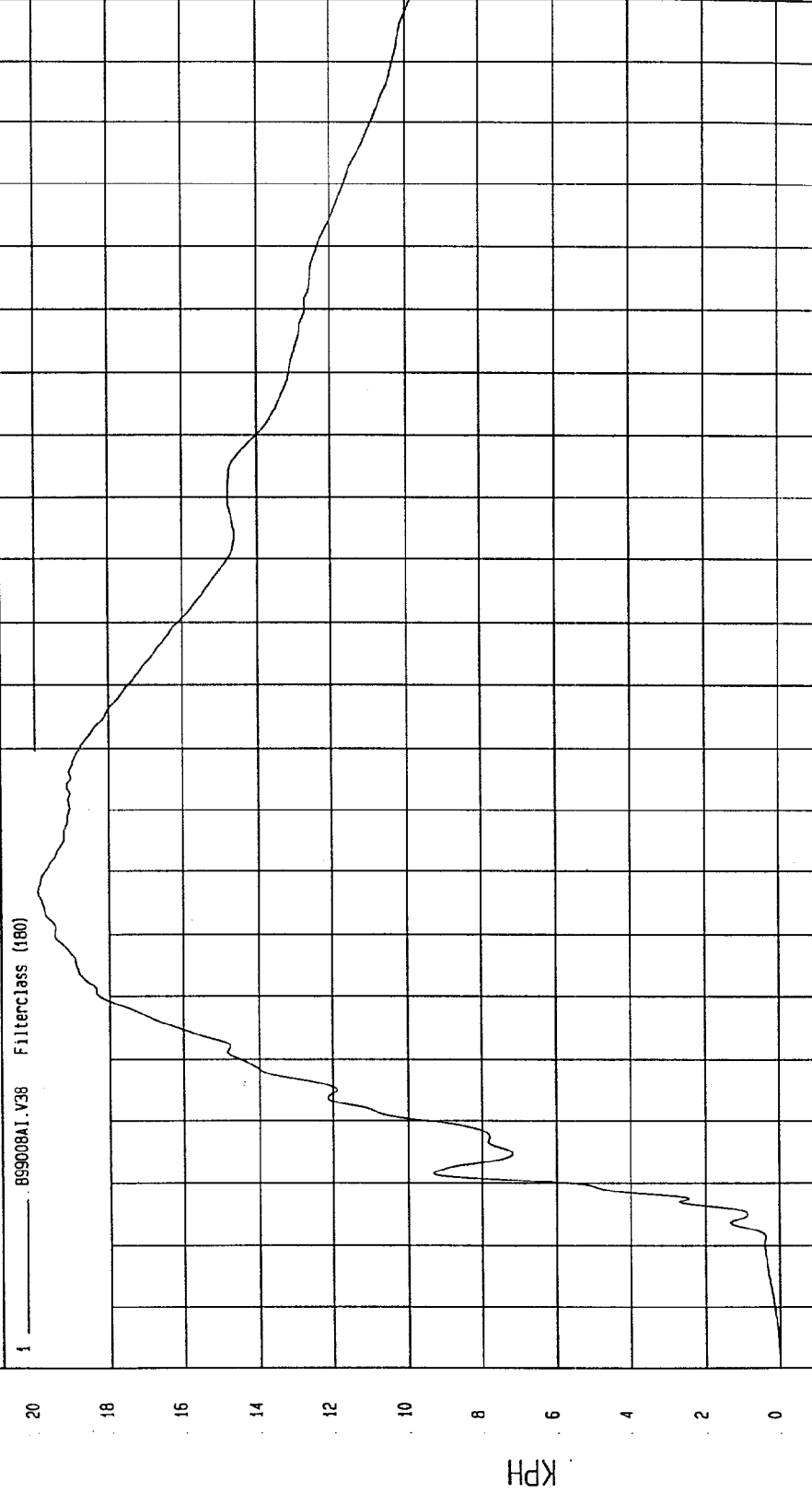
WCA Research
01-21-1999 16:28

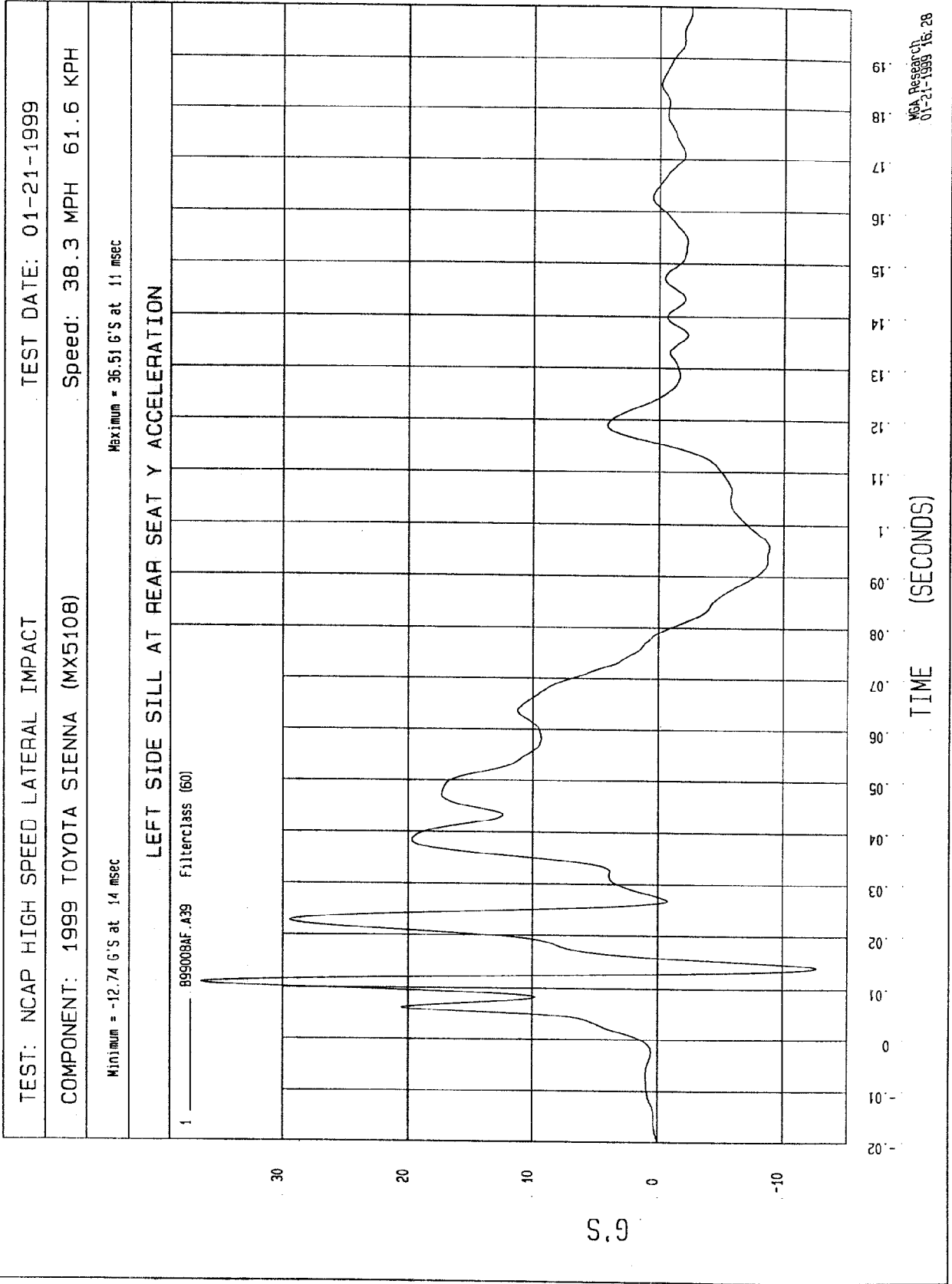
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -7.76E-04 KPH at -19 msec Maximum = 19.92 KPH at 57 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



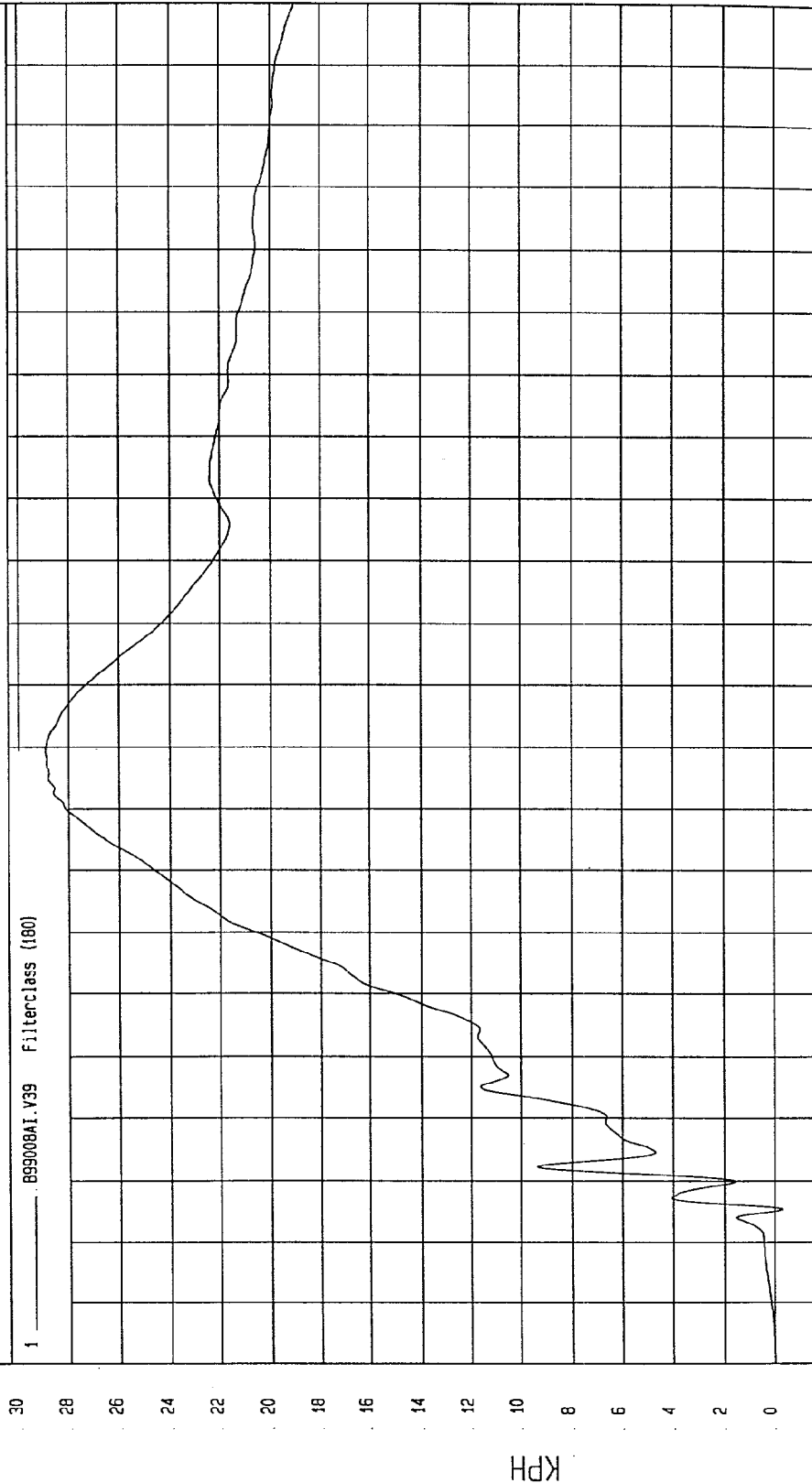


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -34 KPH at 5 msec Maximum = 28.93 KPH at 79 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY



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01-21-1999 16:33

TIME Seconds

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

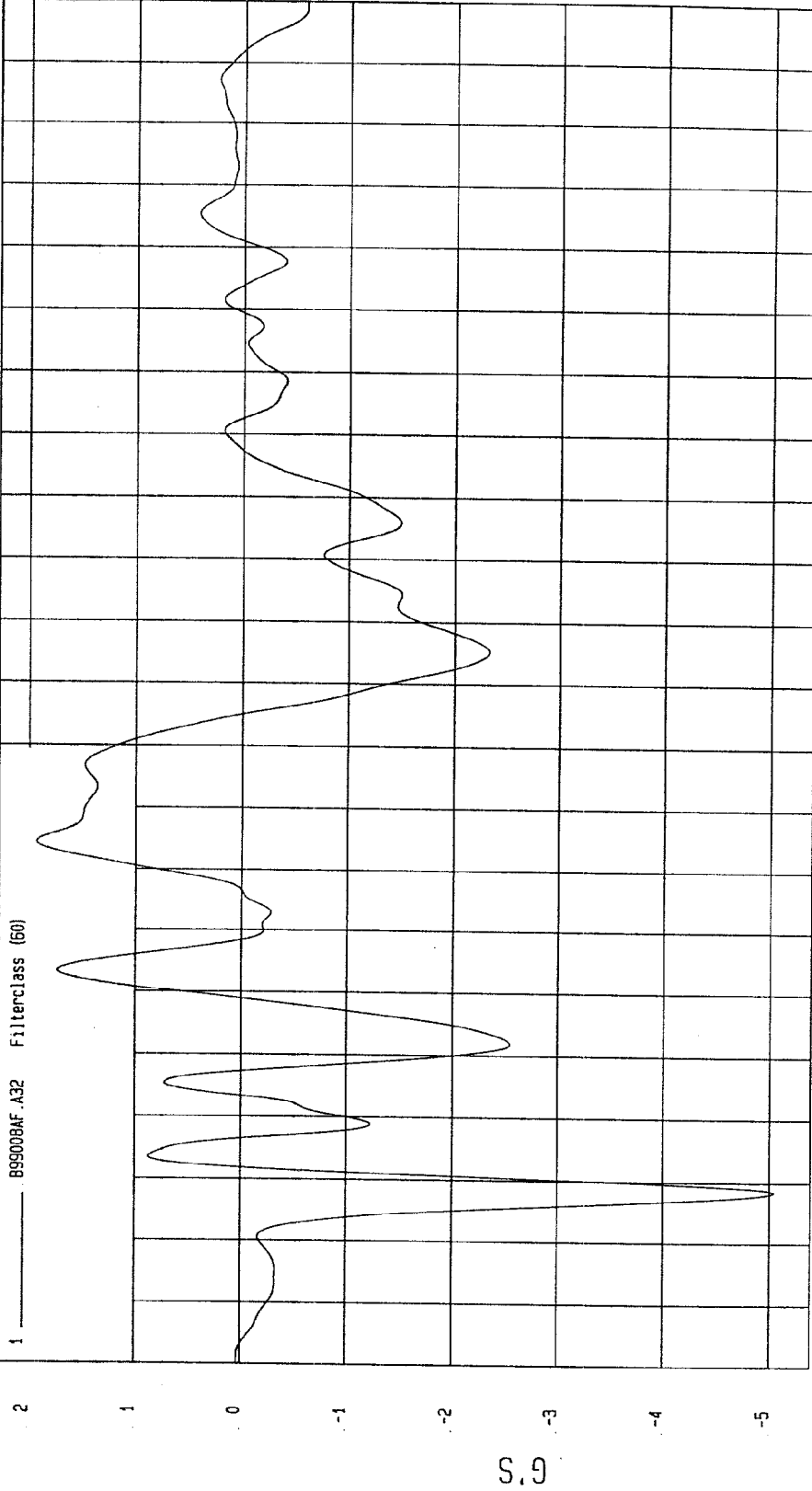
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 1.93 G'S at 54 msec

Minimum = -5.05 G'S at 8 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 ——— 899008AF.A32 Filterclass (60)



WGA Research
01-21-1999 16:28

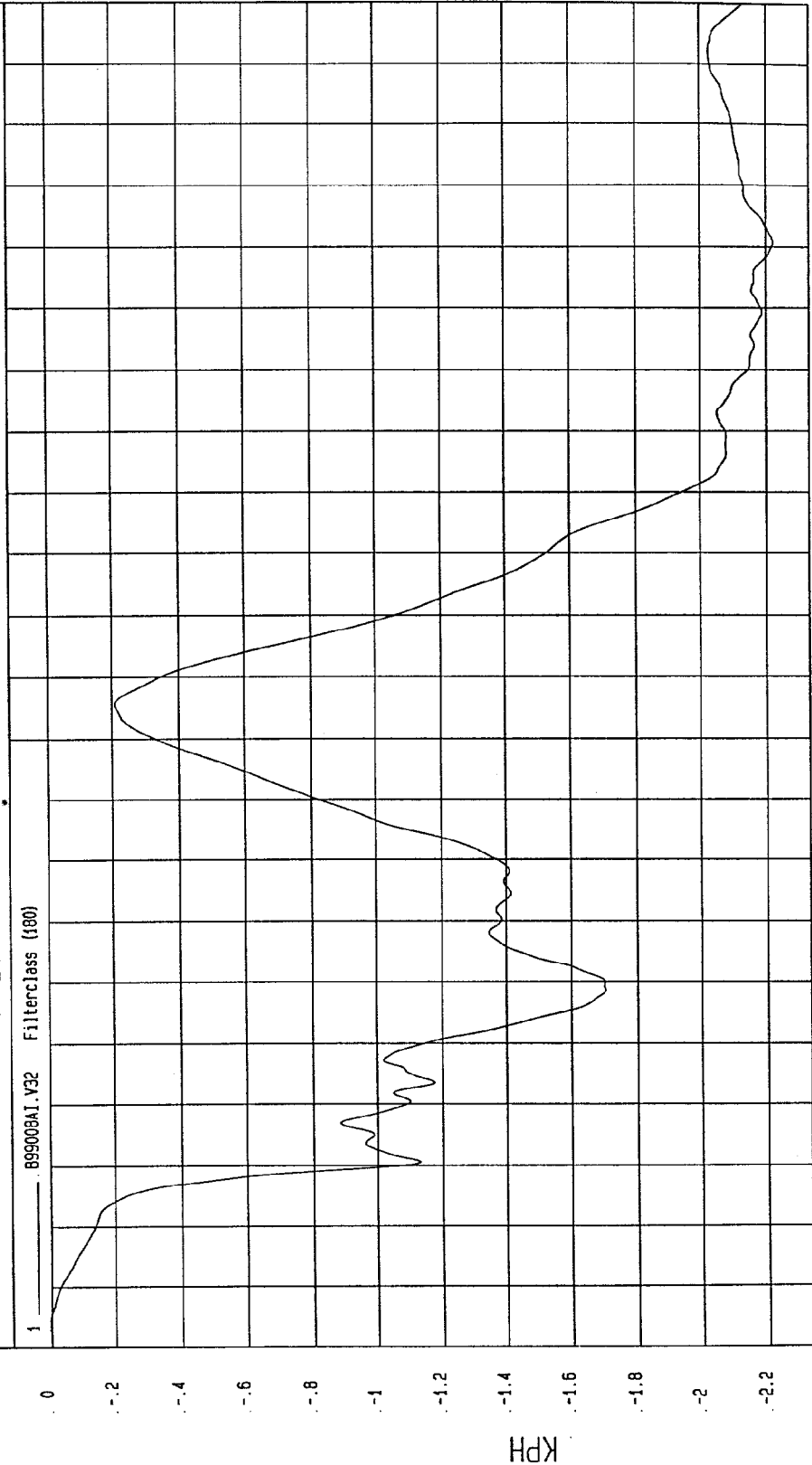
TIME (SECONDS)

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.22 KPH at .161 msec Maximum = 4.21E-03 KPH at .16 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY



NGA Research
01-21-1999 16:33

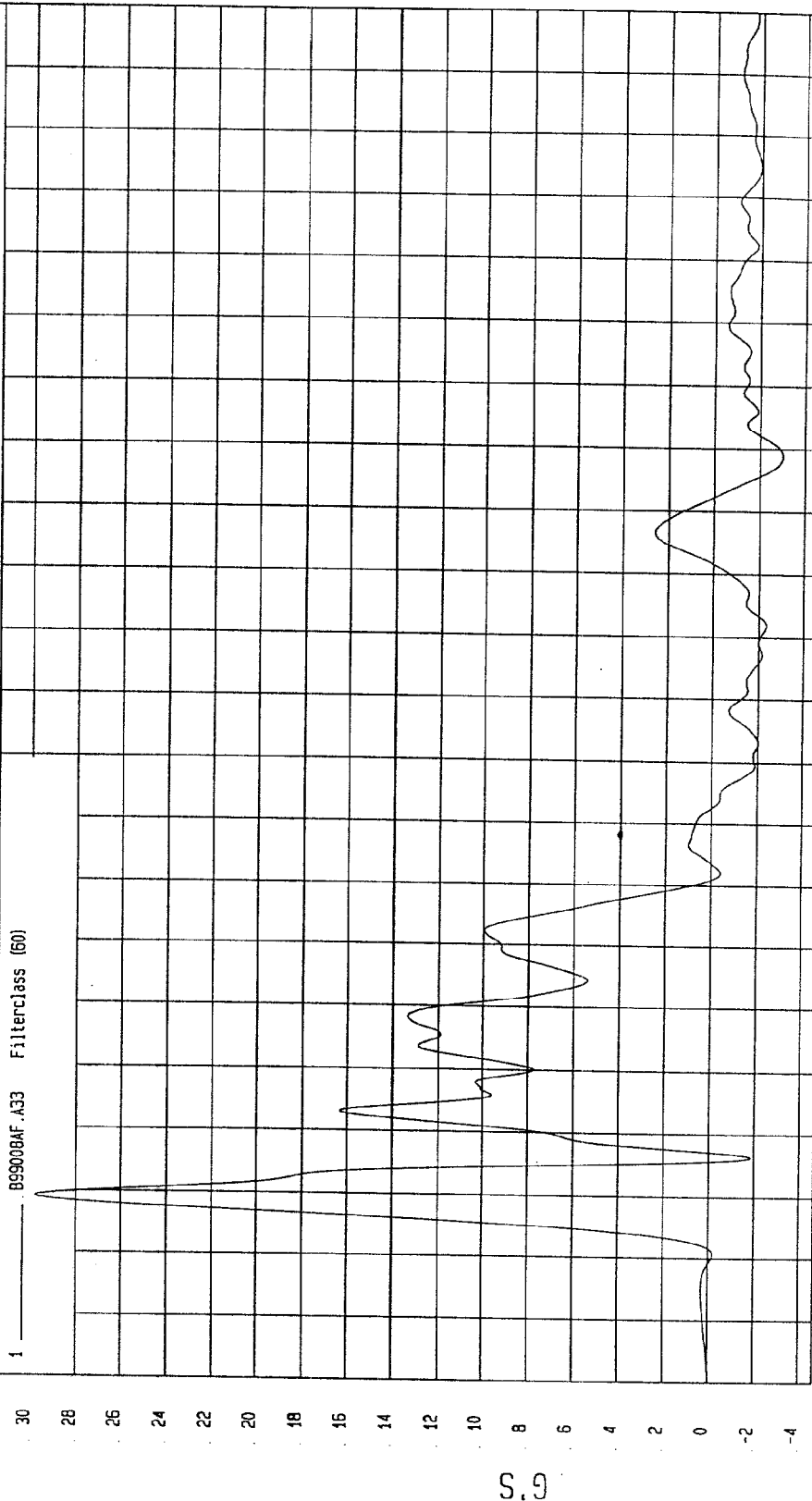
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.02 G'S at 129 msec Maximum = 29.8 G'S at 9 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 B99008AF.A33 Filterclass (60)



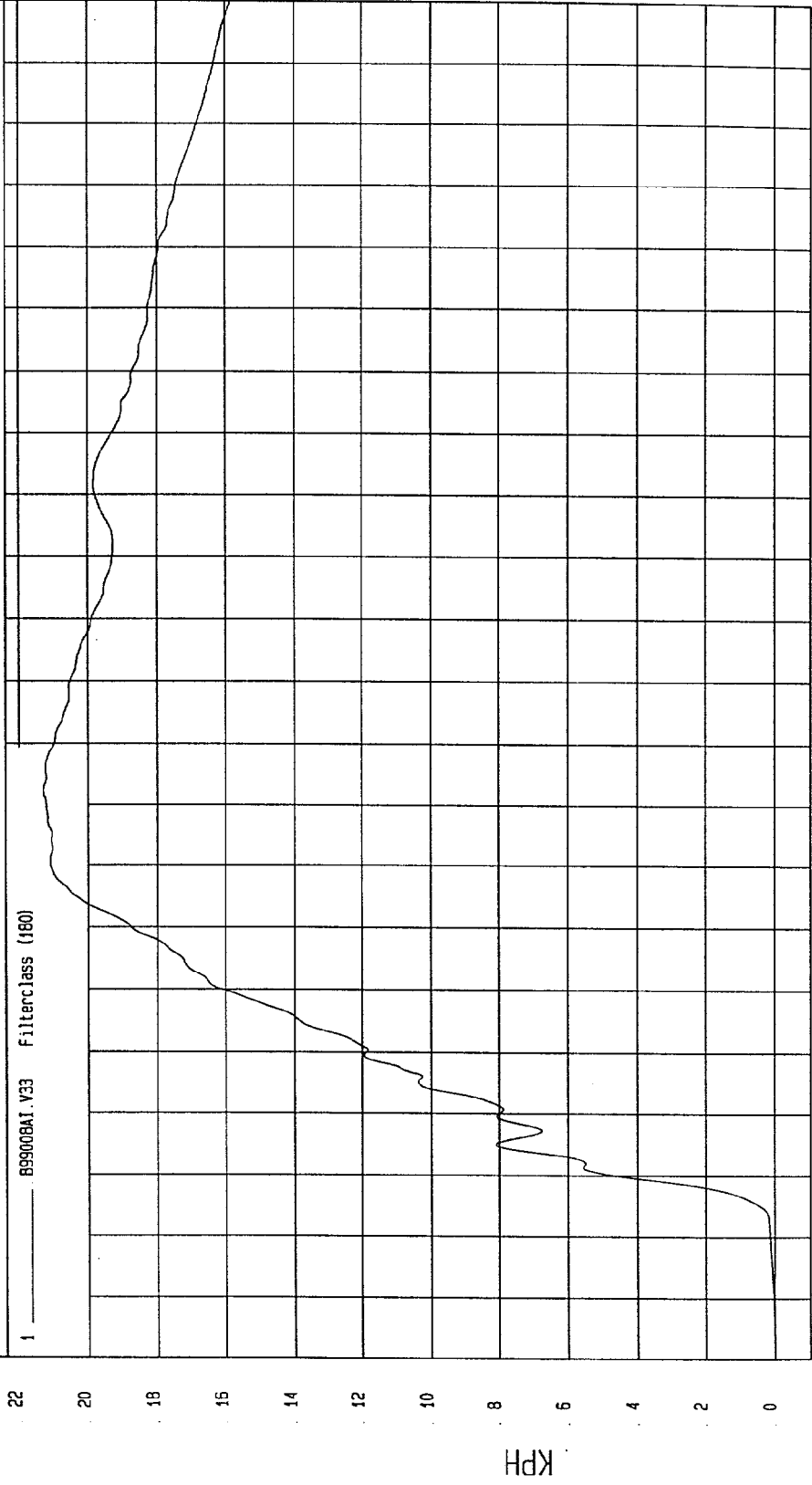
MGA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.97E-03 KPH at -49 msec Maximum = 21.3 KPH at 72 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY



TIME Seconds

WCA Research
01-21-1999 16:33

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

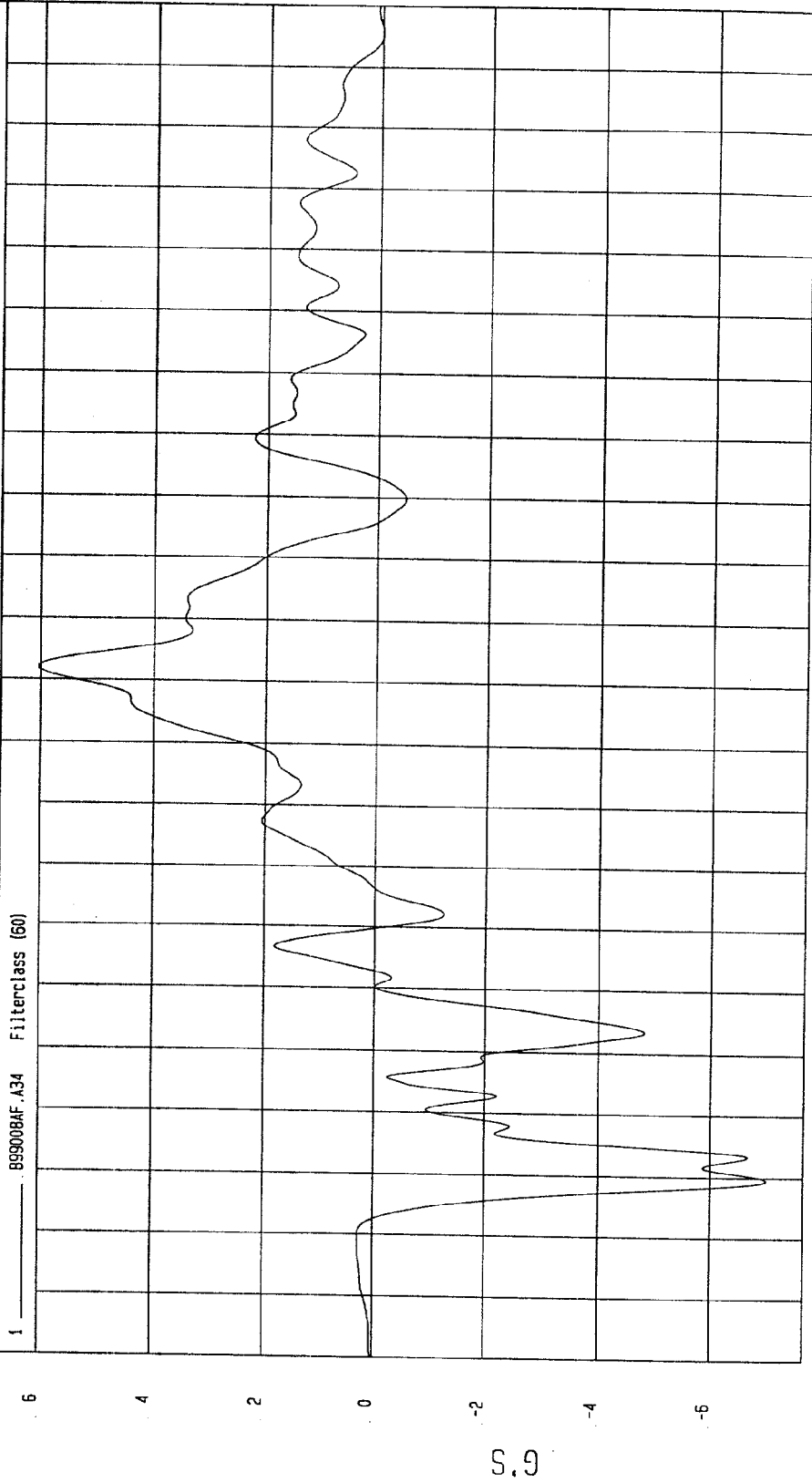
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 6.04 G'S at 92 msec

Minimum = -6.99 G'S at 10 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION



TIME (SECONDS)

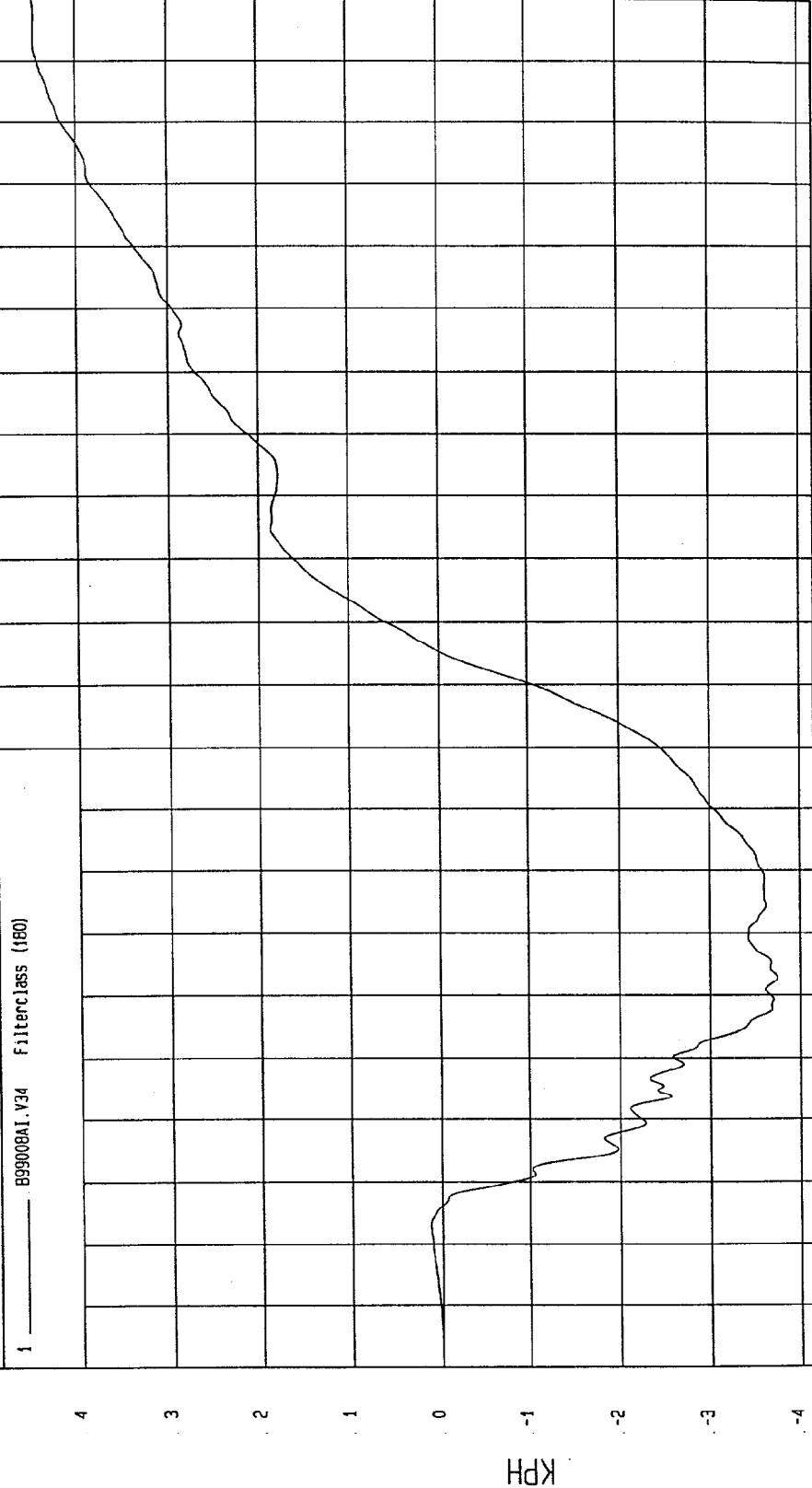
WCA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.75 KPH at .43 msec Maximum = 4.47 KPH at 200 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY



TIME Seconds

NSA Research
01-21-1999 16:33

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 30.95 G'S at 9 msec

Minimum = .05 G'S at -20 msec

RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION

1 899008AV.A32 Filterclass (50)

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

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

.19

TIME (SECONDS)

MGA Research
01-21-1999 16:28

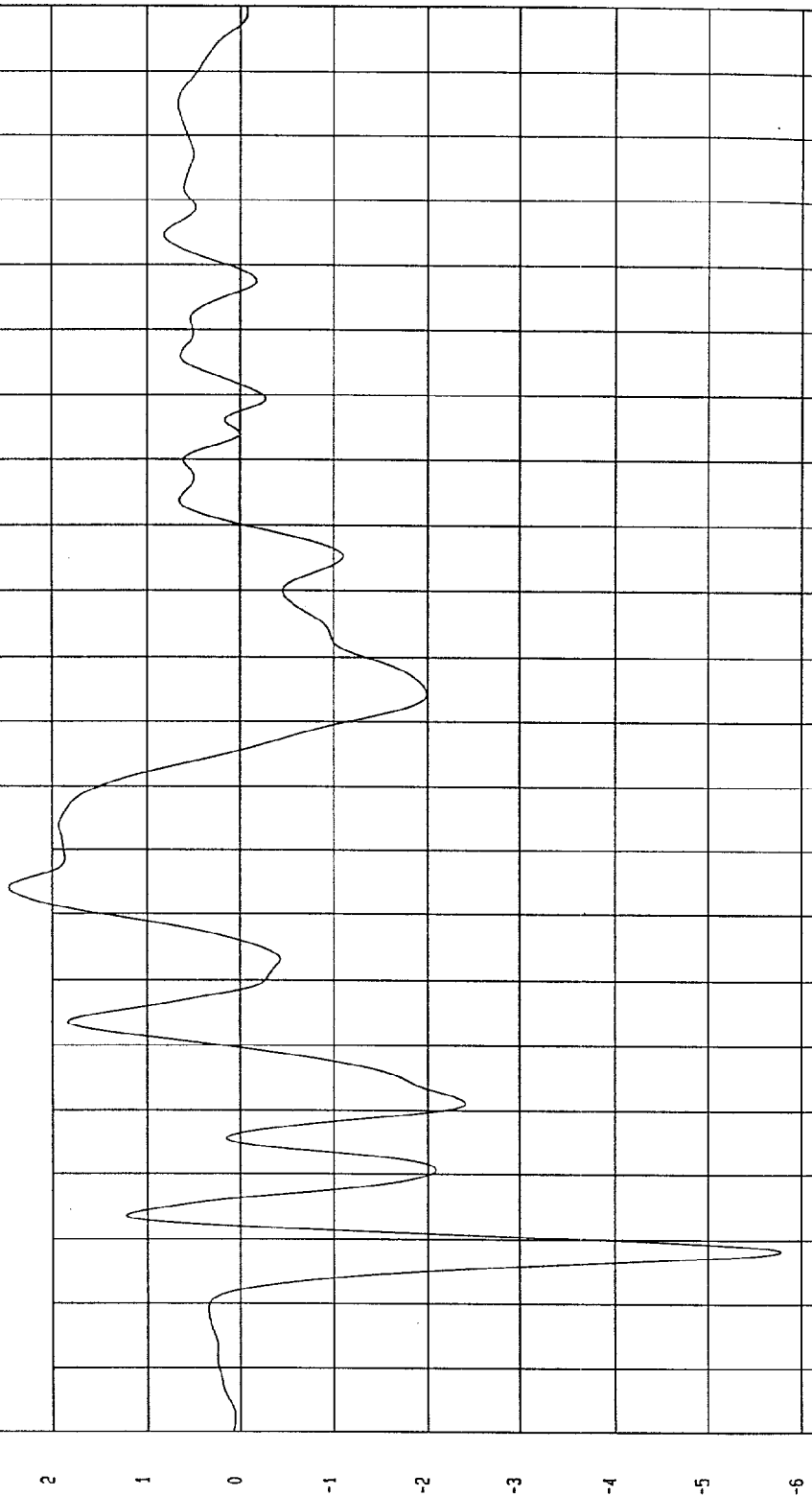
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.77 G'S at 8 msec Maximum = 2.46 G'S at 64 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION

1 B99008AF.A35 Filterclass (60)



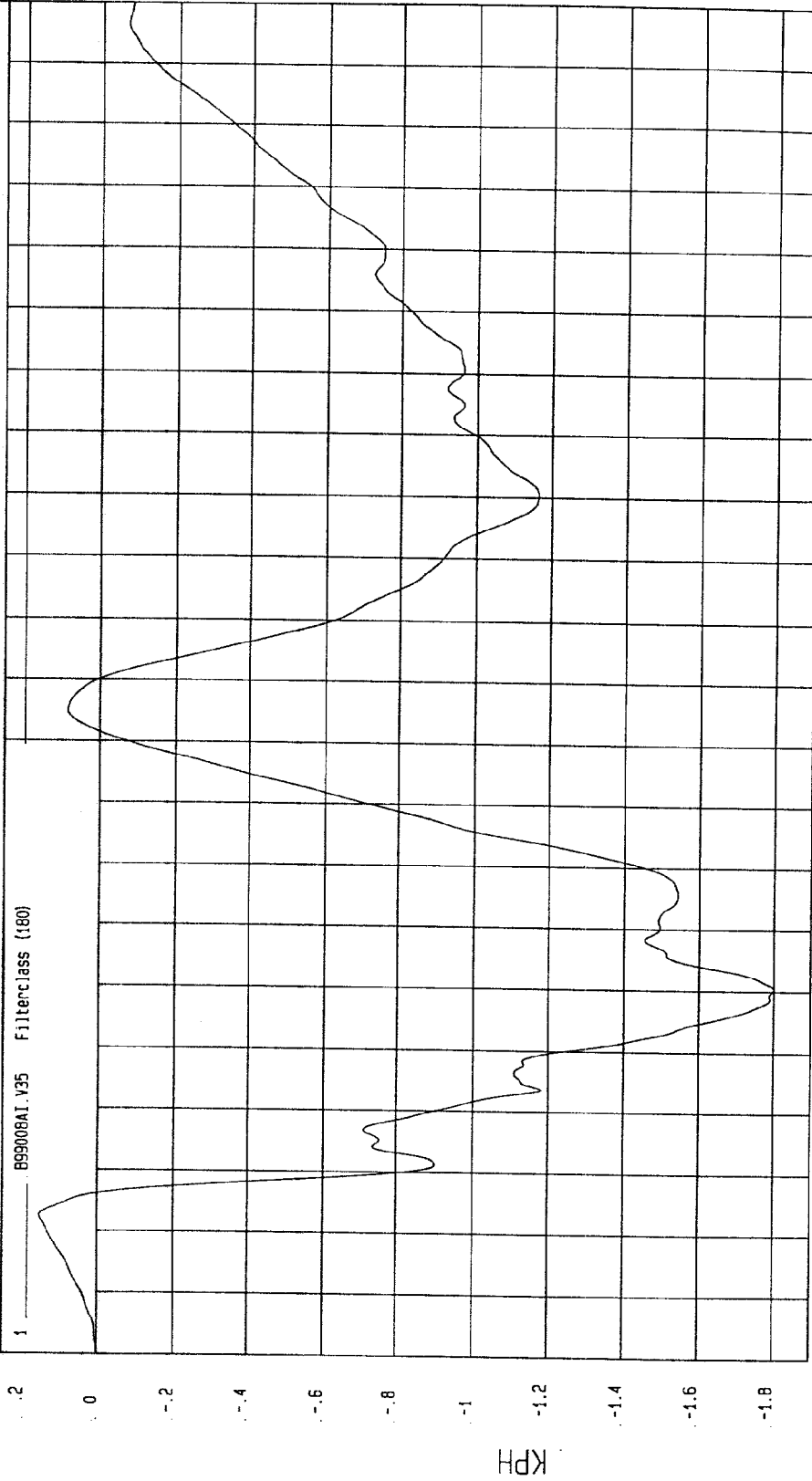
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.8 KPH at 40 msec Maximum = .15 KPH at 2 msec

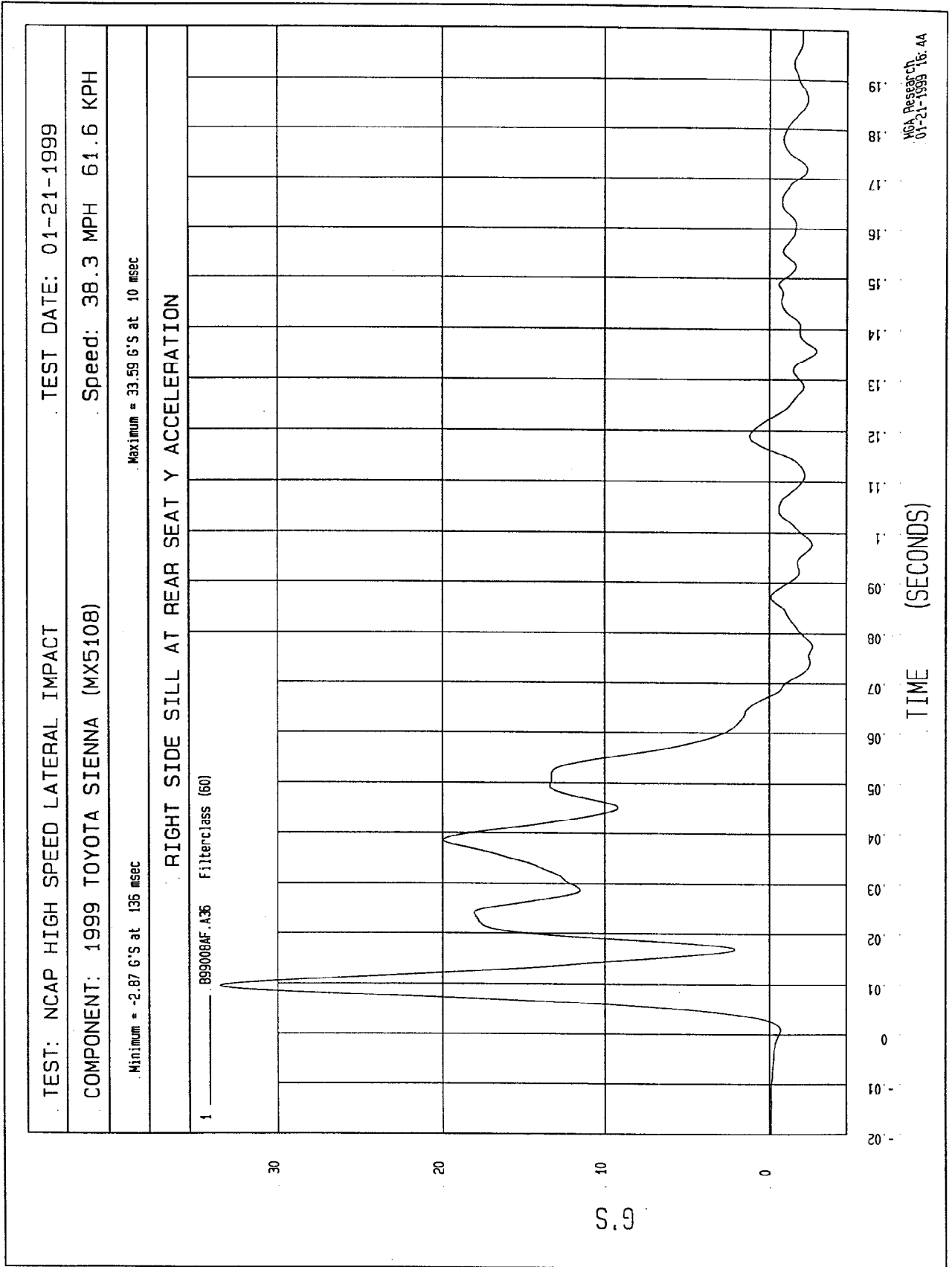
RIGHT SIDE SILL AT REAR SEAT X VELOCITY

1 B99008A1.V35 Filterclass (180)



MSA Research
01-21-1999 16:33

TIME Seconds



TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Speed: 38.3 MPH 61.6 KPH

Minimum = -14 KPH at 3 msec

Maximum = 27.37 KPH at 68 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY

1 ——— B99008A1.V36 Filterclass (180)

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

KPH

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

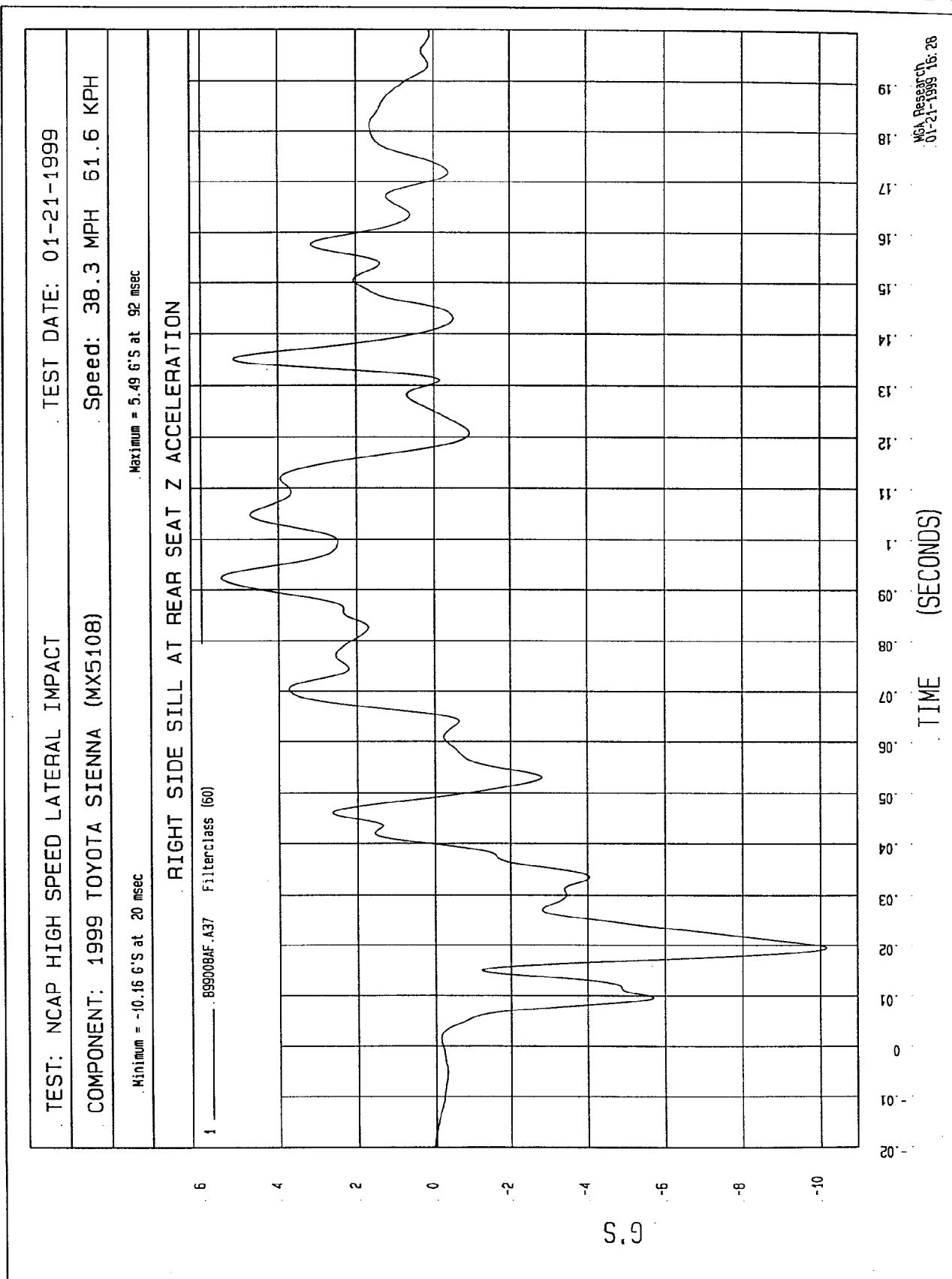
17

18

19

TIME Seconds

WCA Research
01-21-1999 16:46



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

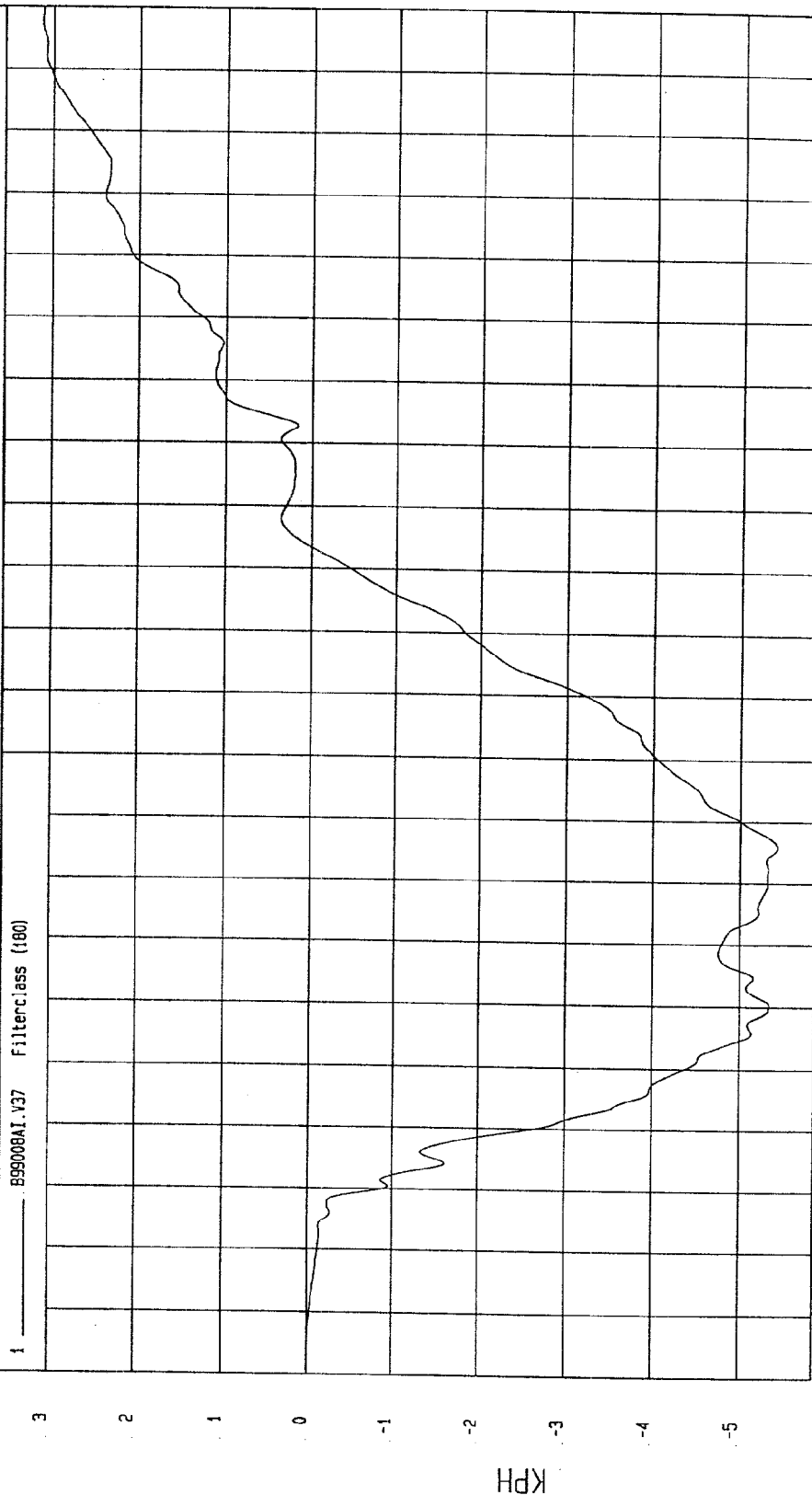
Speed: 38.3 MPH 61.6 KPH

Minimum = -5.43 KPH at 66 msec

Maximum = 3.12 KPH at 198 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

1 ——— B99008A1.V37 Filterclass (180)



TIME Seconds

NSA Research
01-21-1999 16:33

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

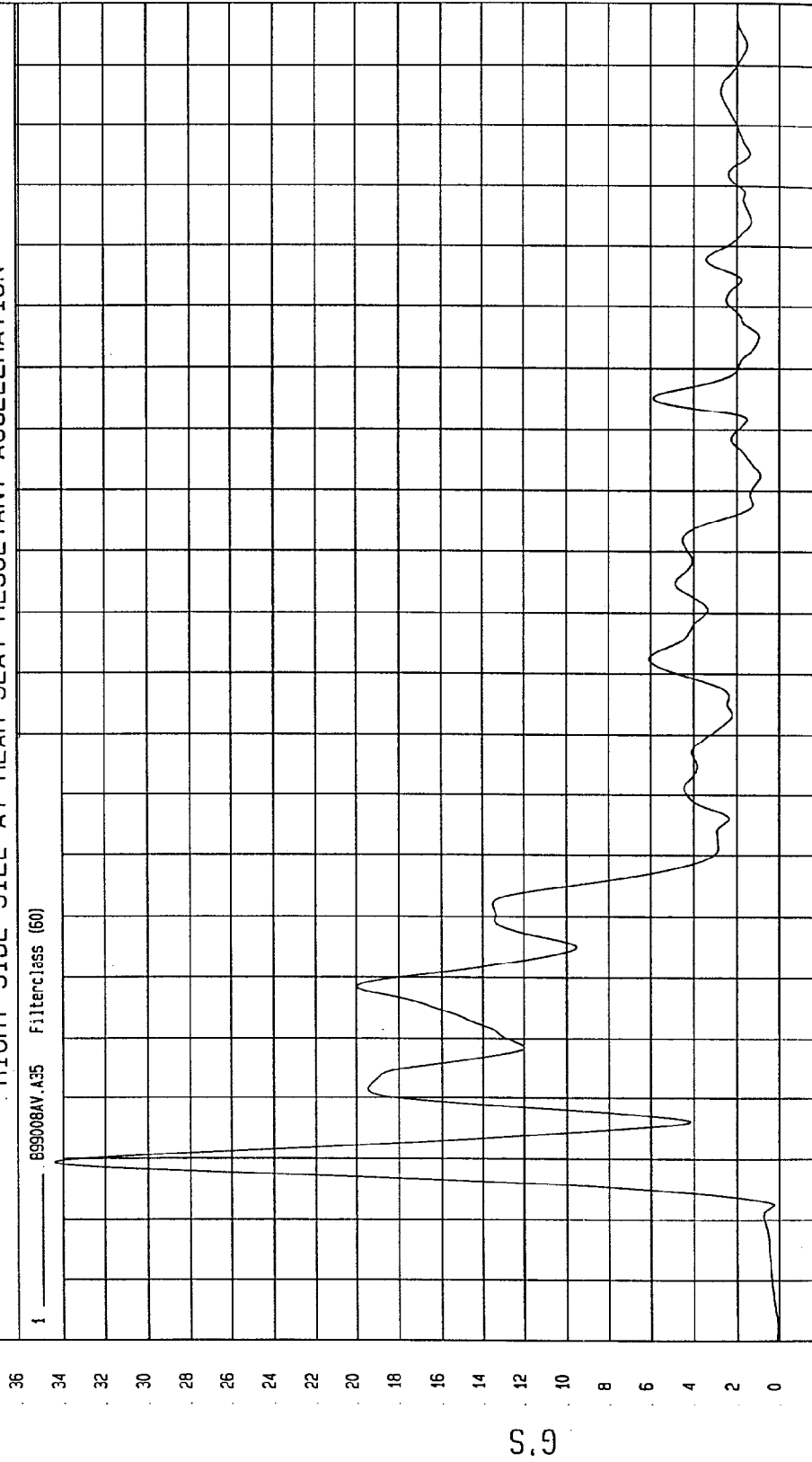
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 34.41 G'S at 9 msec

Minimum = .08 G'S at -18 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION



MGA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

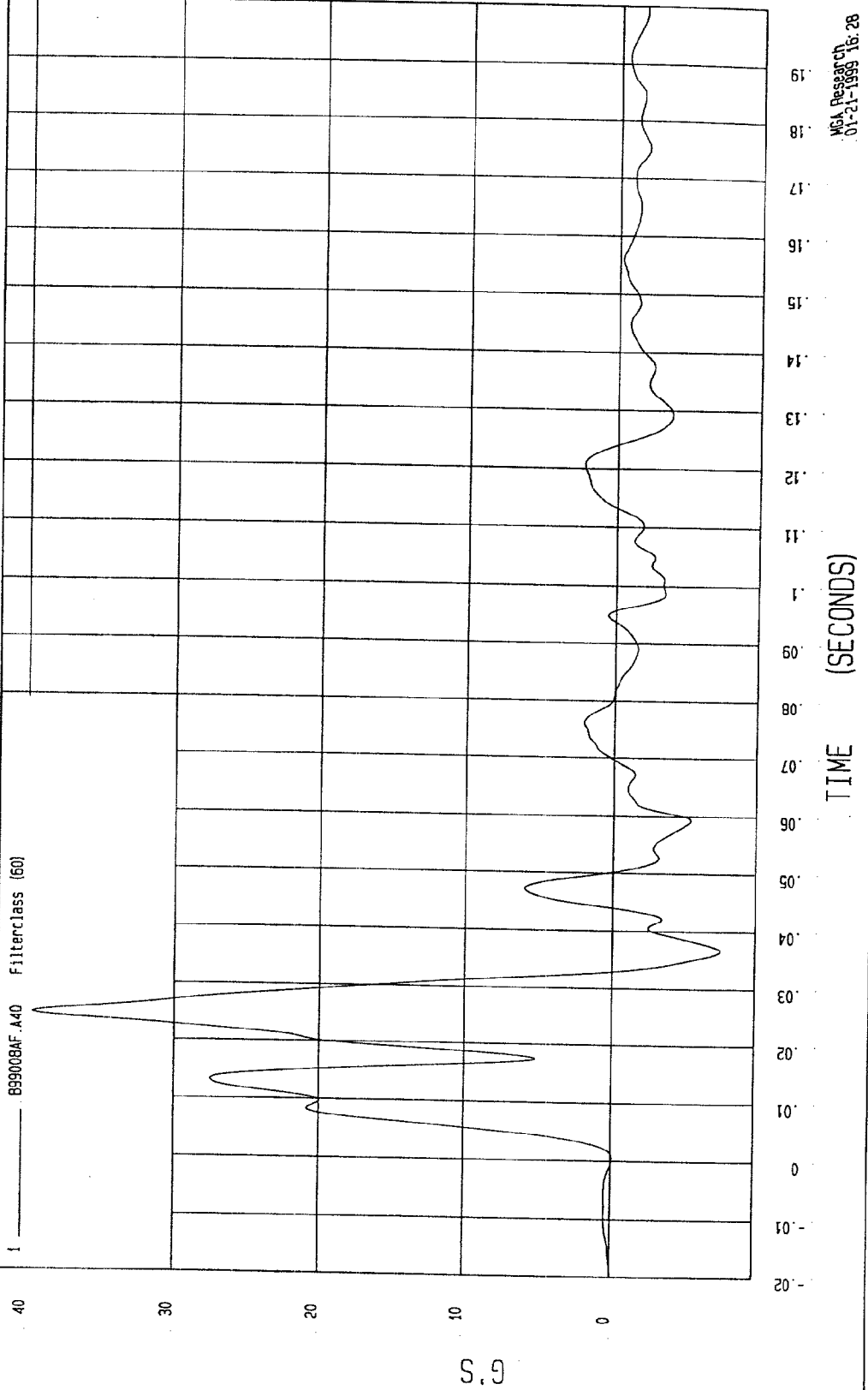
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 39.5 G'S at 25 msec

Minimum = -7.39 G'S at 37 msec

DRIVER SEAT TRACK Y ACCELERATION

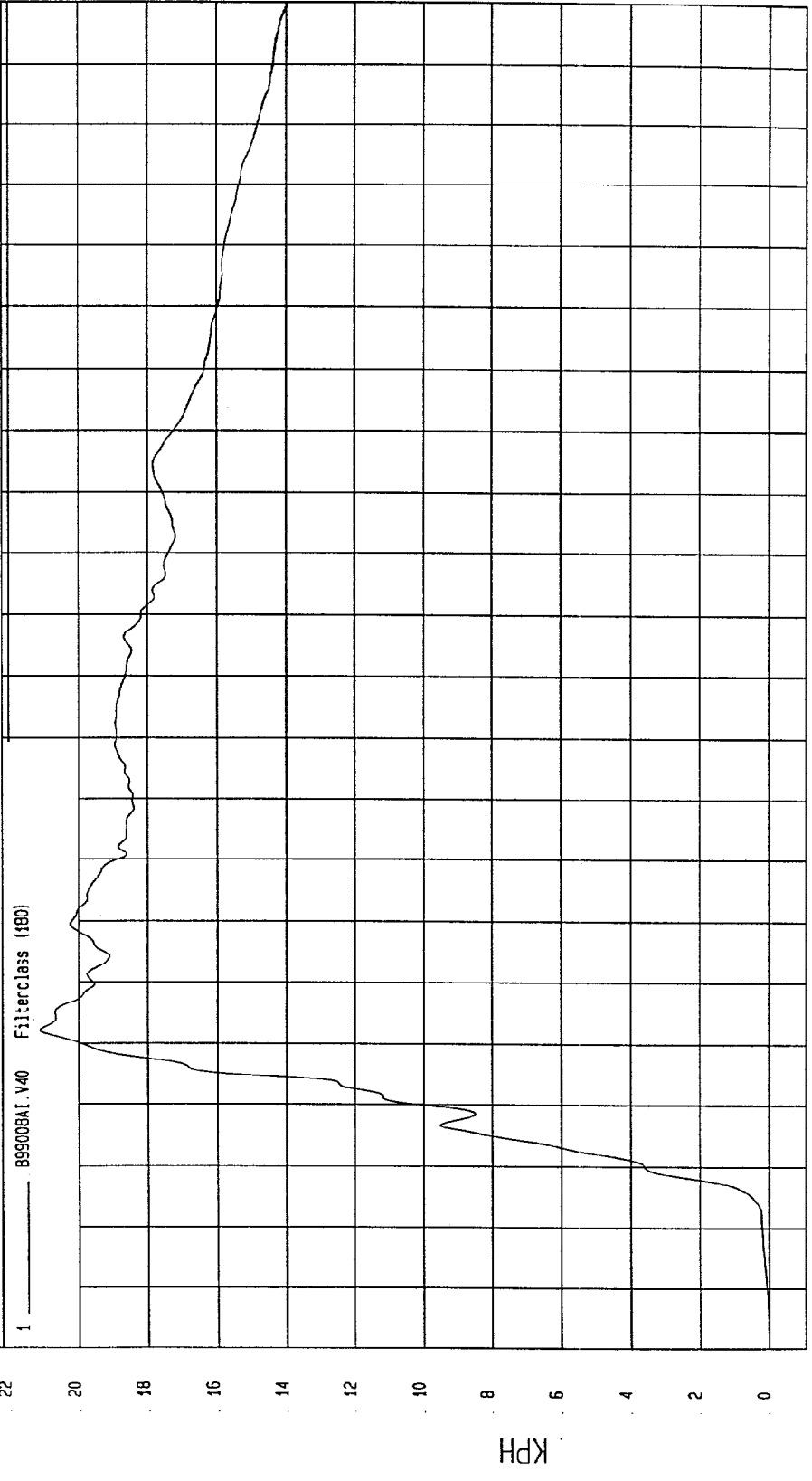


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.46E-03 KPH at -19 msec Maximum = 21.13 KPH at 32 msec

DRIVER SEAT TRACK Y VELOCITY



TIME Seconds

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

NCAP Research
01-21-1999 16:33

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

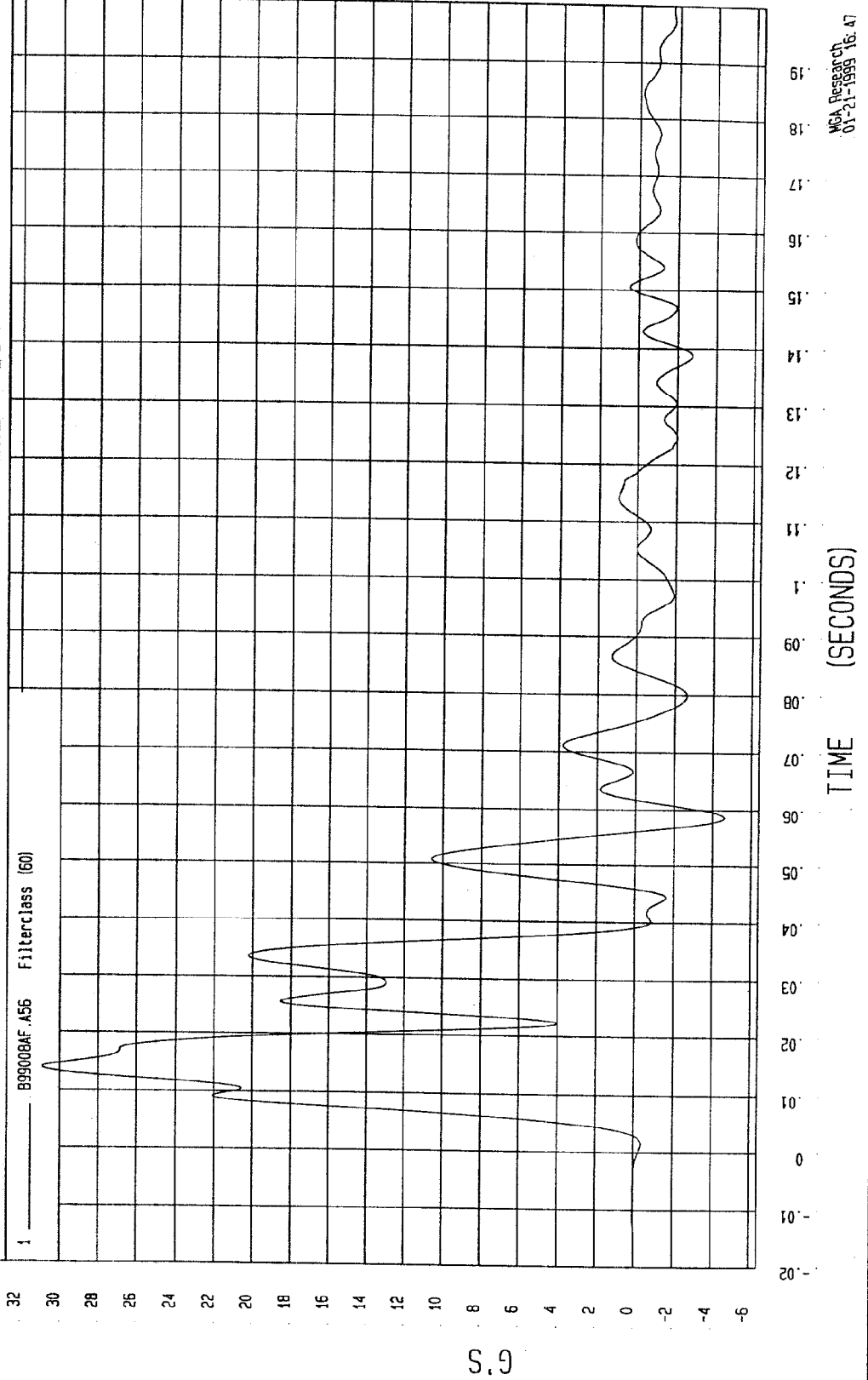
Speed: 38.3 MPH 61.6 KPH

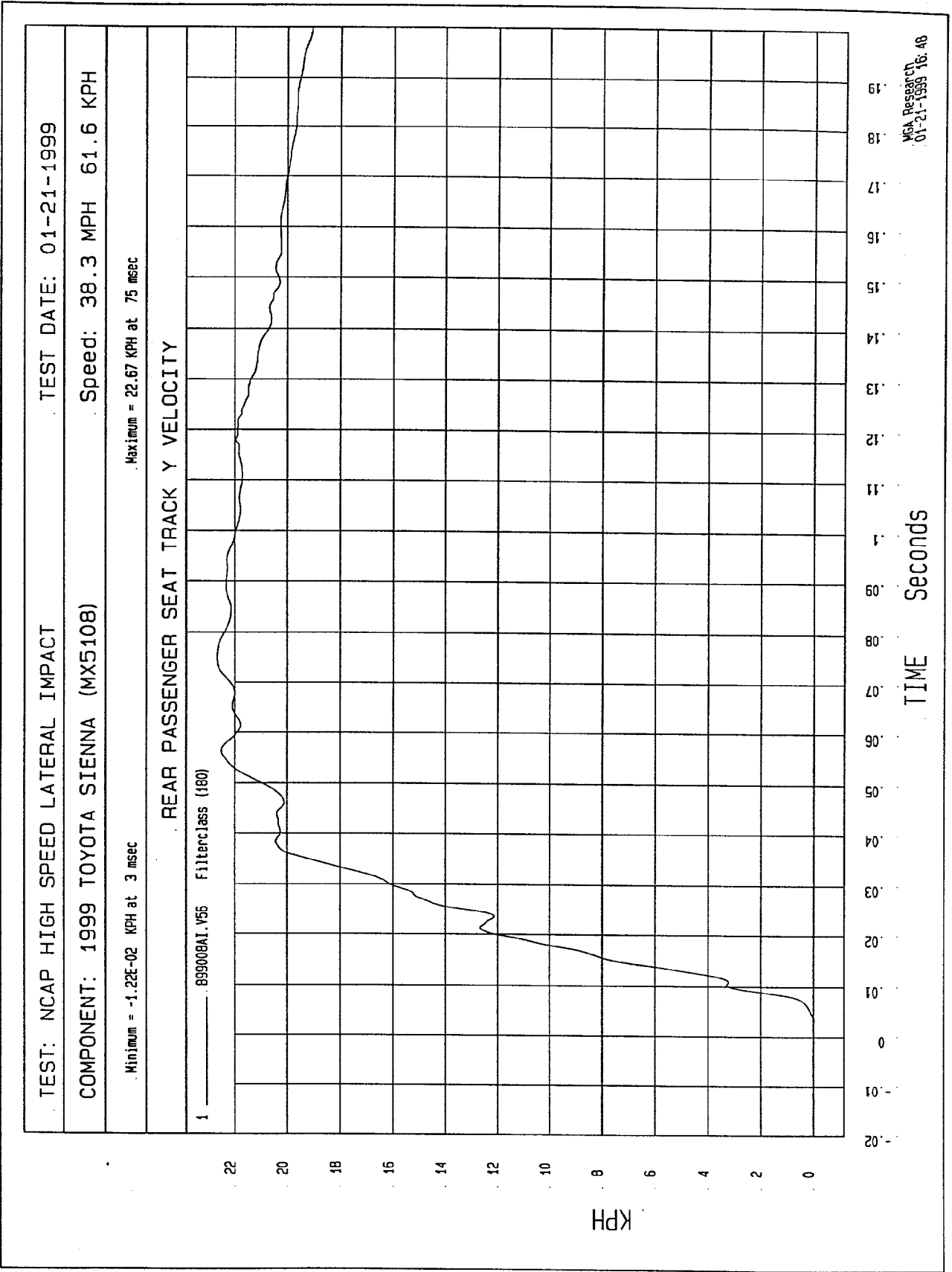
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 30.91 G'S at 14 msec

Minimum = -4.62 G'S at 59 msec

REAR PASSENGER SEAT TRACK Y ACCELERATION





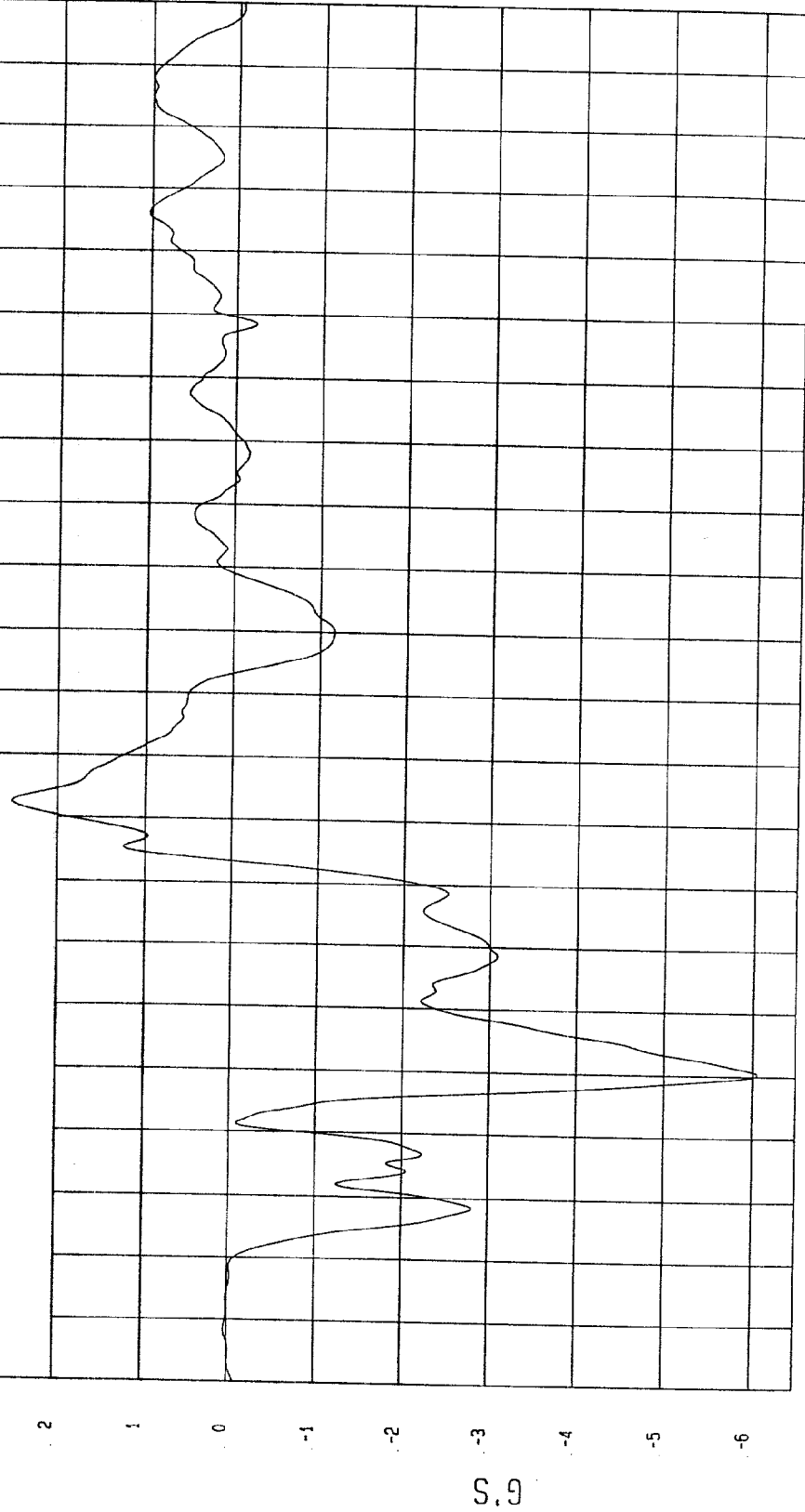
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -6.05 G'S at 30 msec Maximum = 2.52 G'S at 72 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION

1 — B99008AF.A08 Filterclass (60)



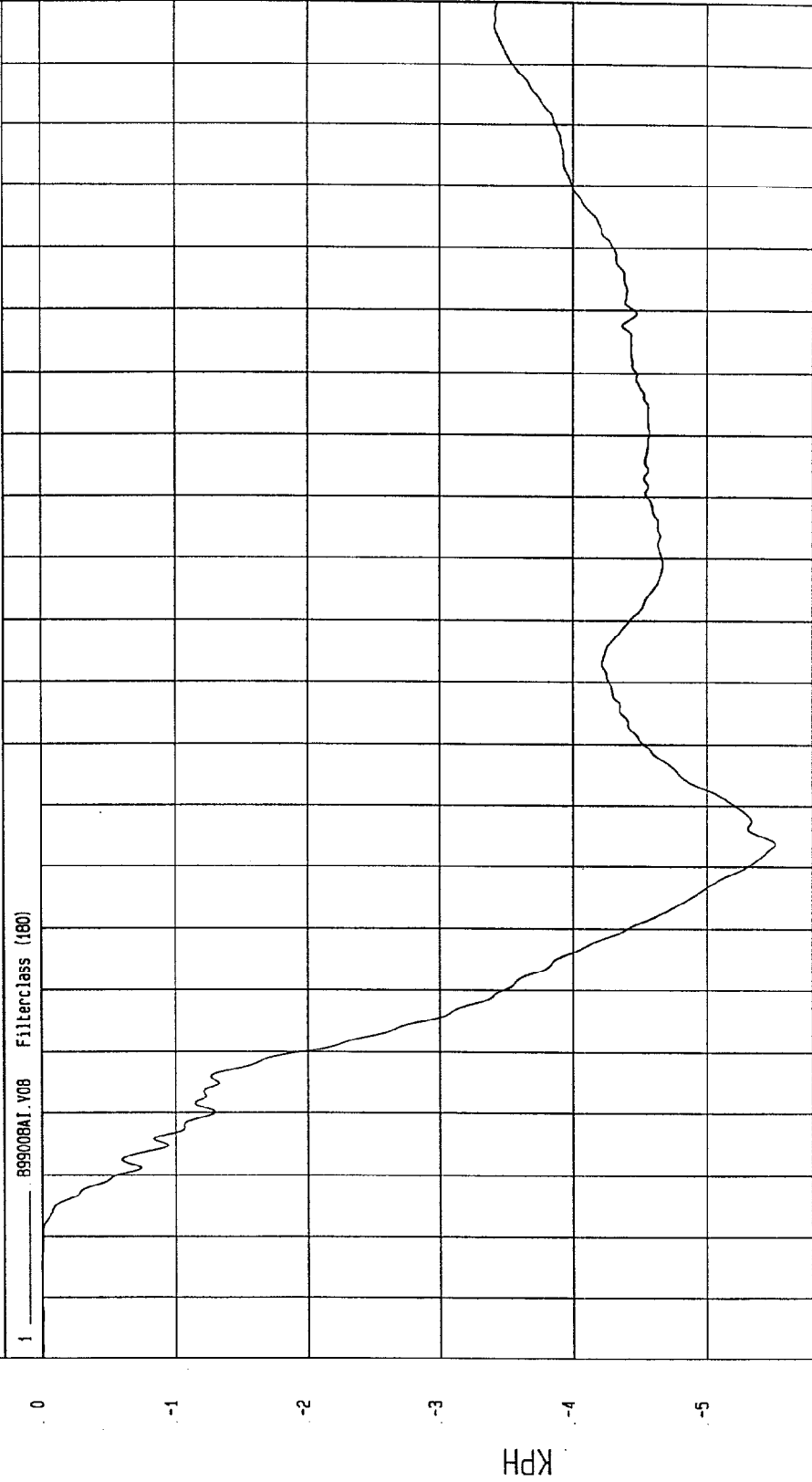
MCA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.51 KPH at 64 msec Maximum = 3.29E-03 KPH at -5 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY



WCA Research
01-21-1999 16:33

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

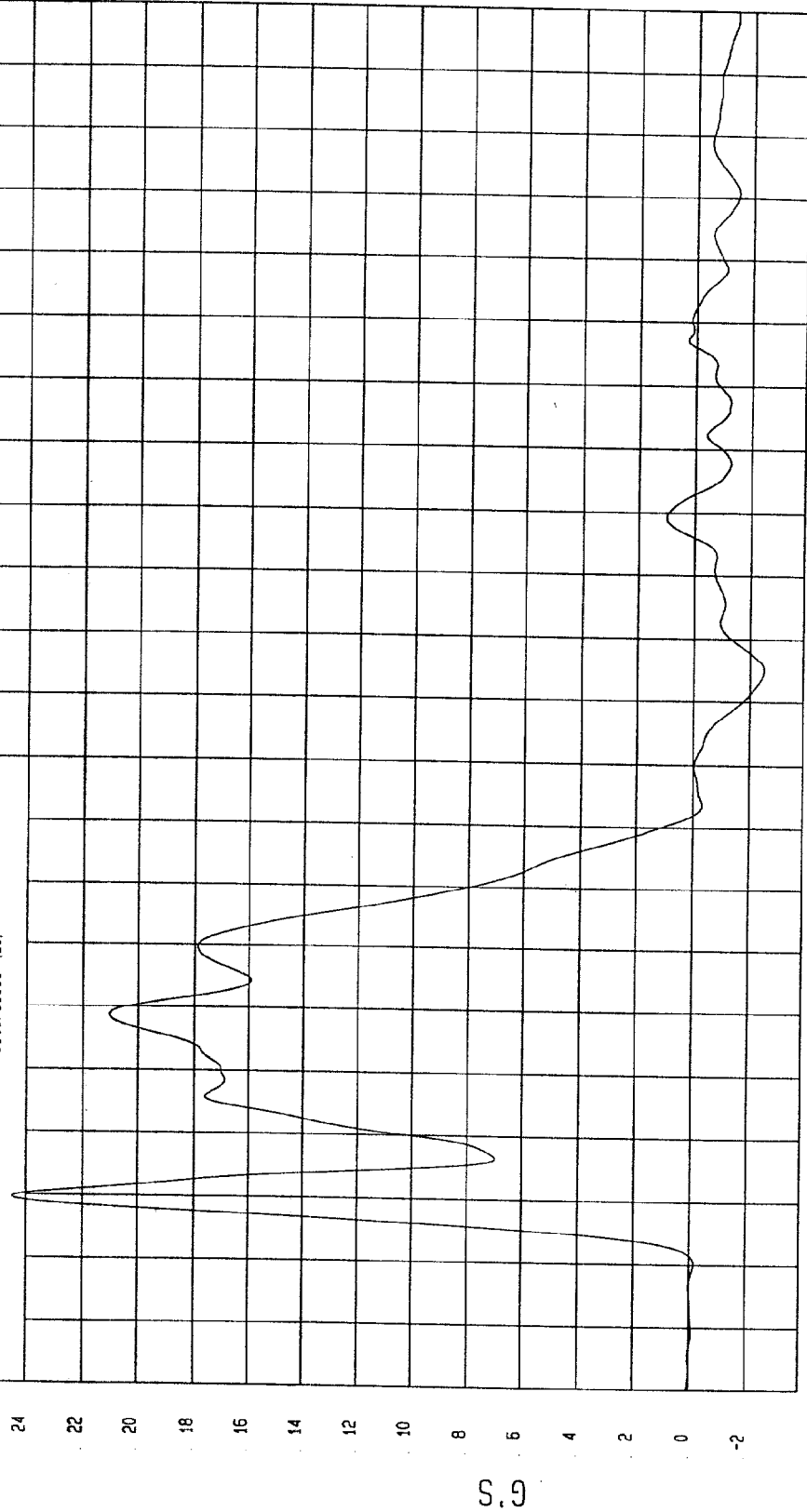
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 24.51 G'S at 10 msec

Minimum = -2.51 G'S at 95 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

1 ——— B99008AF.A09 Filterclass (60)

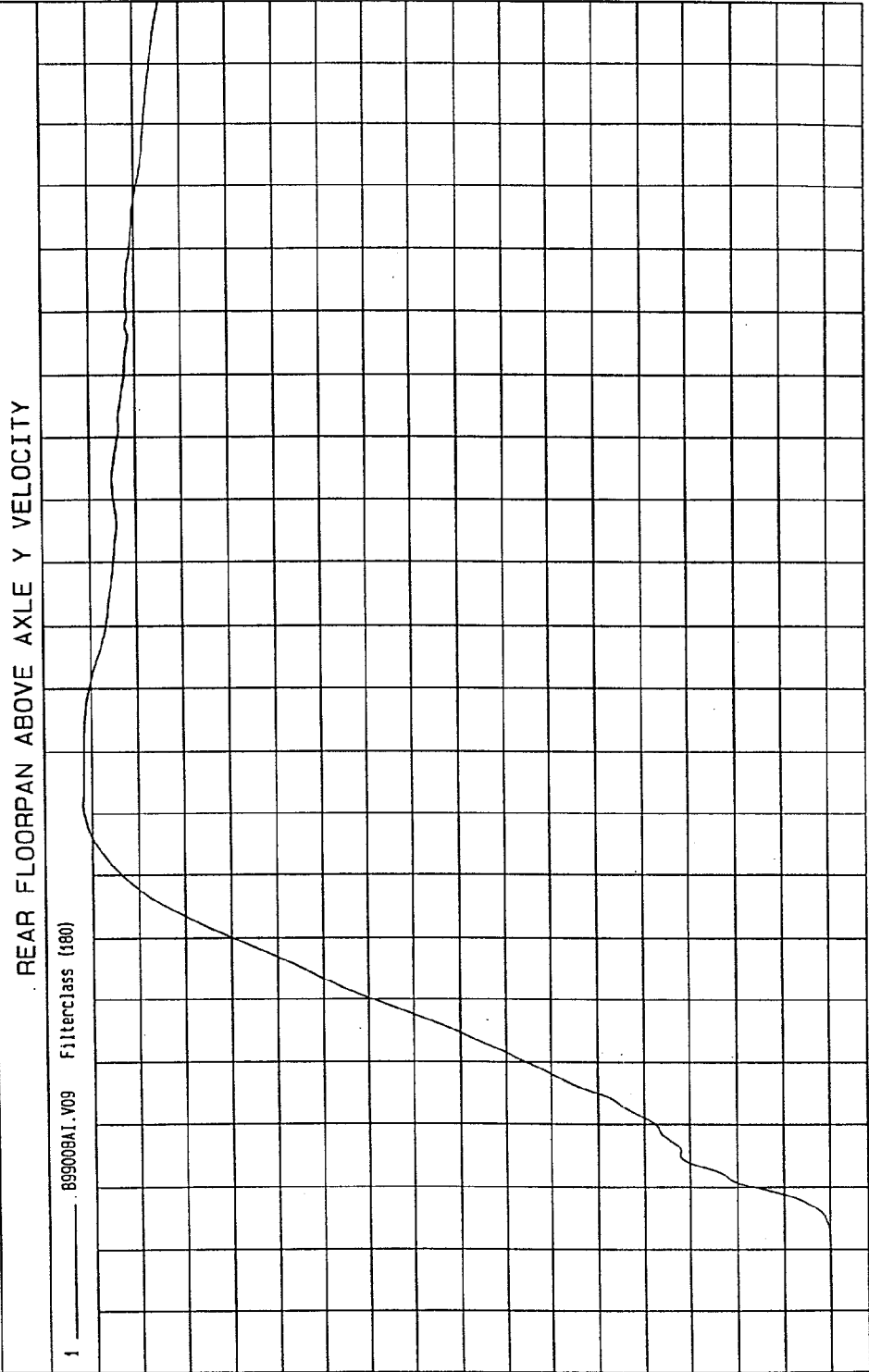


MGA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -8.92E-03 KPH at -4 msec Maximum = 32.39 KPH at 71 msec



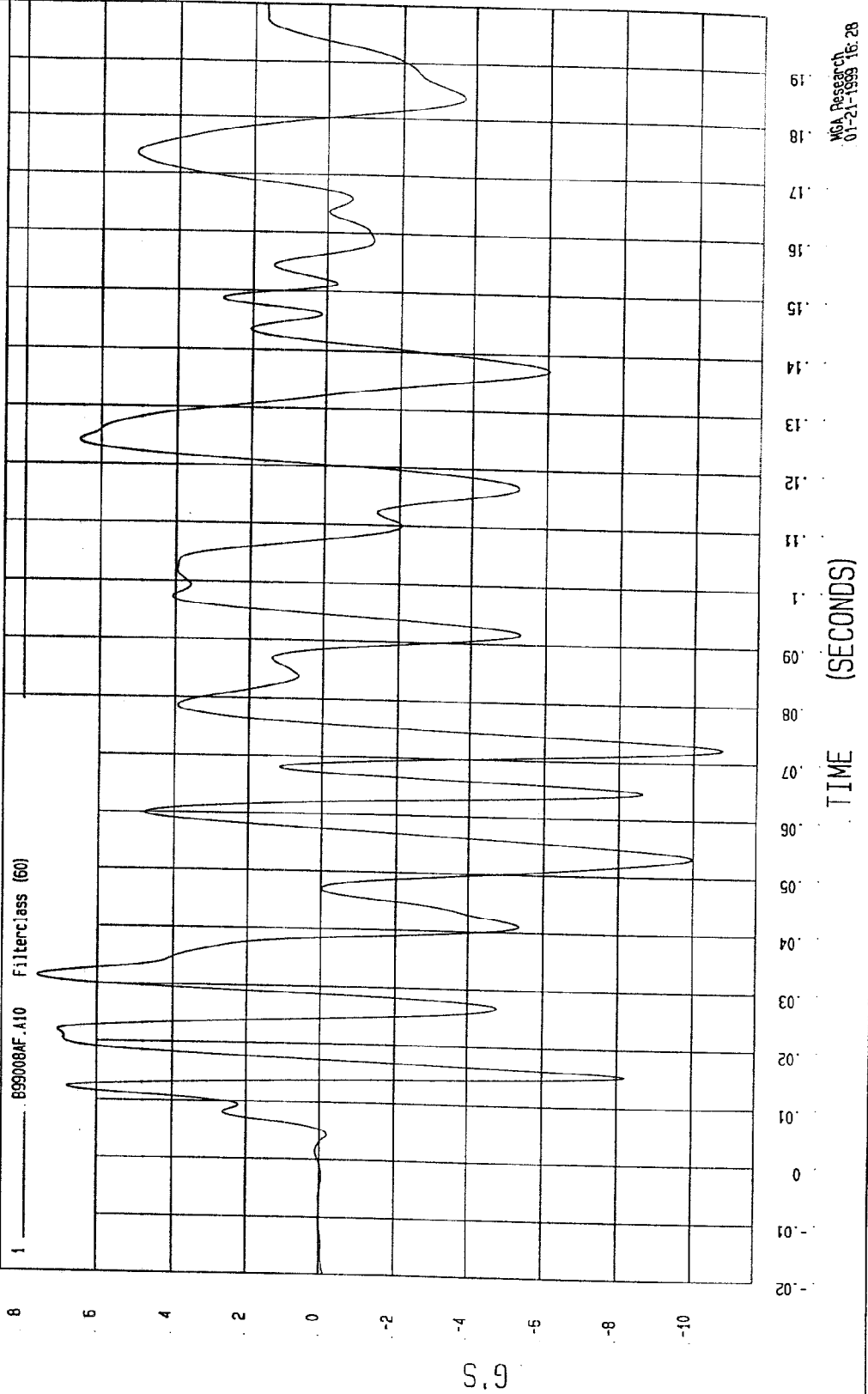
WCA Research
01-21-1999 16:34

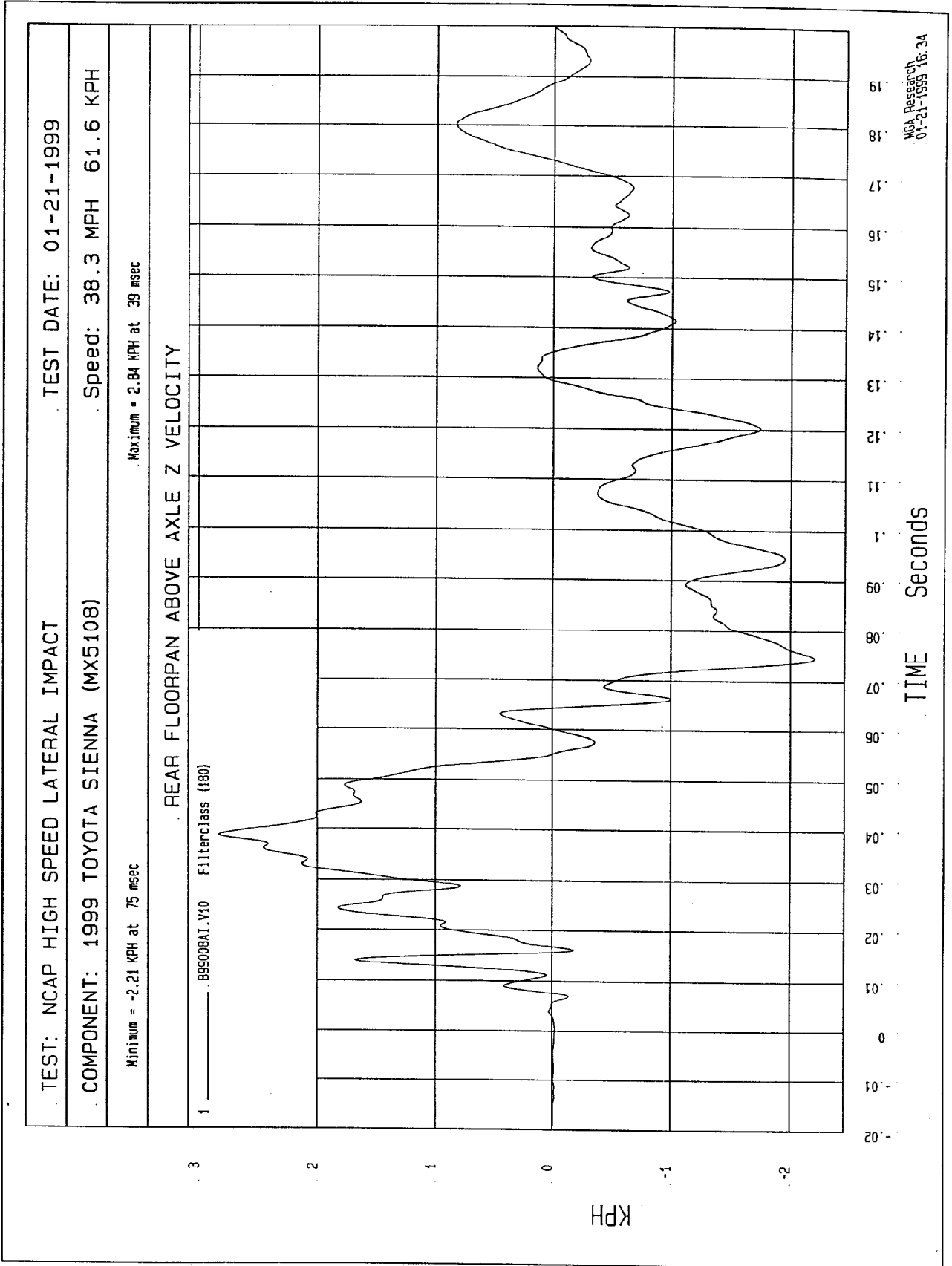
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -10.76 G'S at 72 msec Maximum = 7.61 G'S at 31 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION





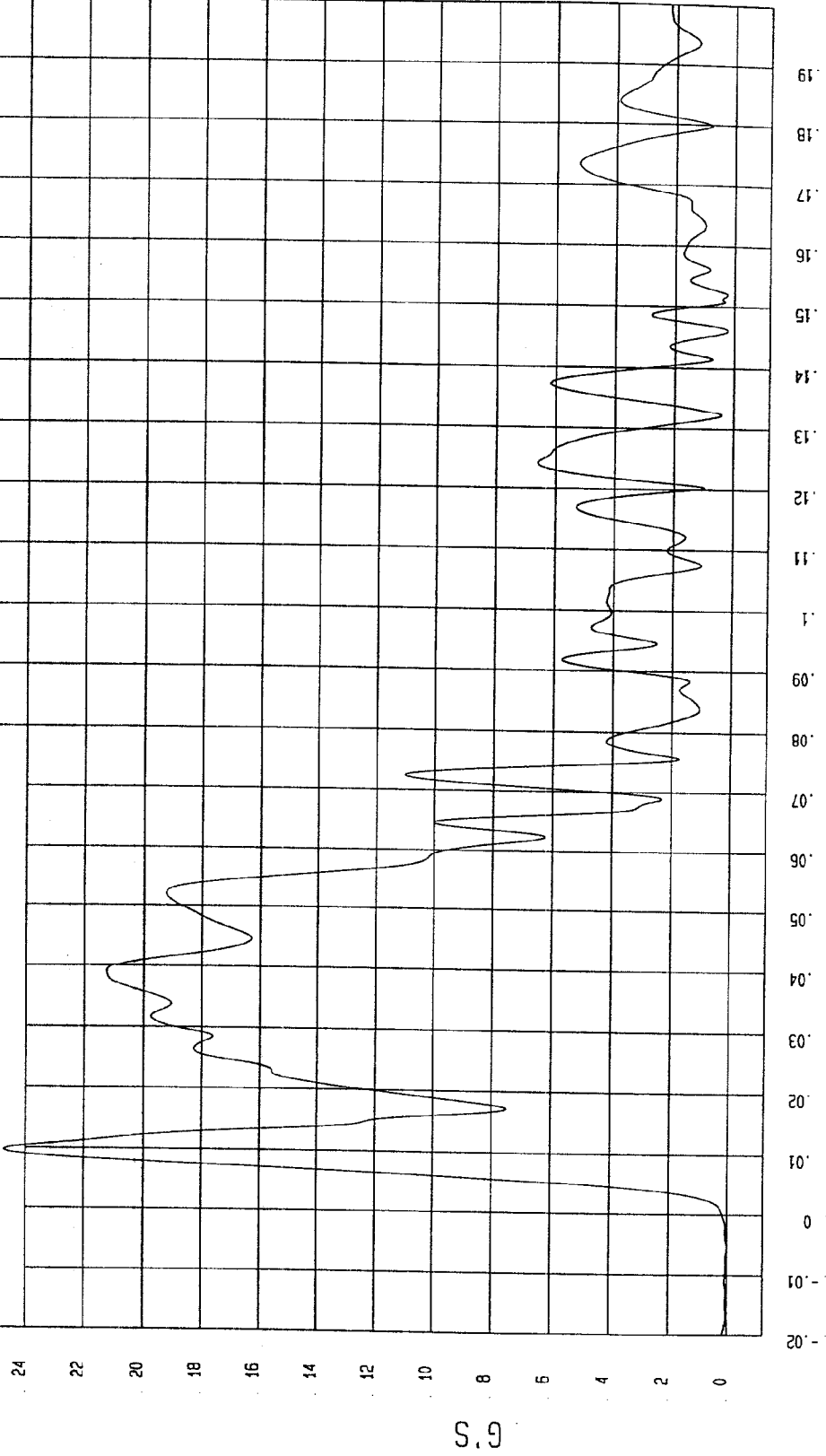
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX510B) Speed: 38.3 MPH 61.6 KPH

Minimum = 1.03E-02 G'S at -5 msec Maximum = 24.74 G'S at 10 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 899008AV.A08 Filterclass (60)



NSA Research
01-21-1999 16:28

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

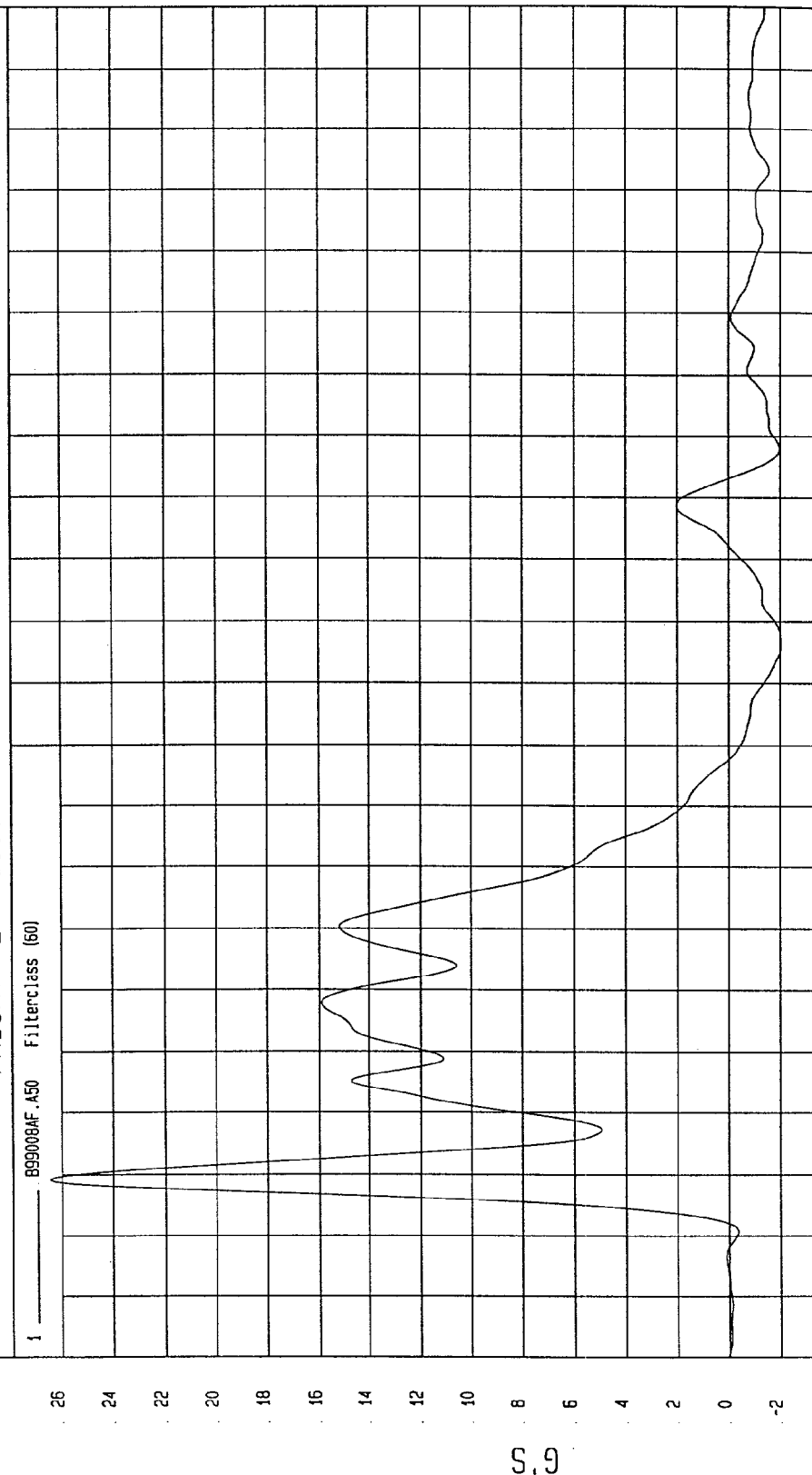
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 26.45 G'S at 9 msec

Minimum = -2.03 G'S at 96 msec

RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION



MSA Research
01-21-1999 16:29

TIME (SECONDS)

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

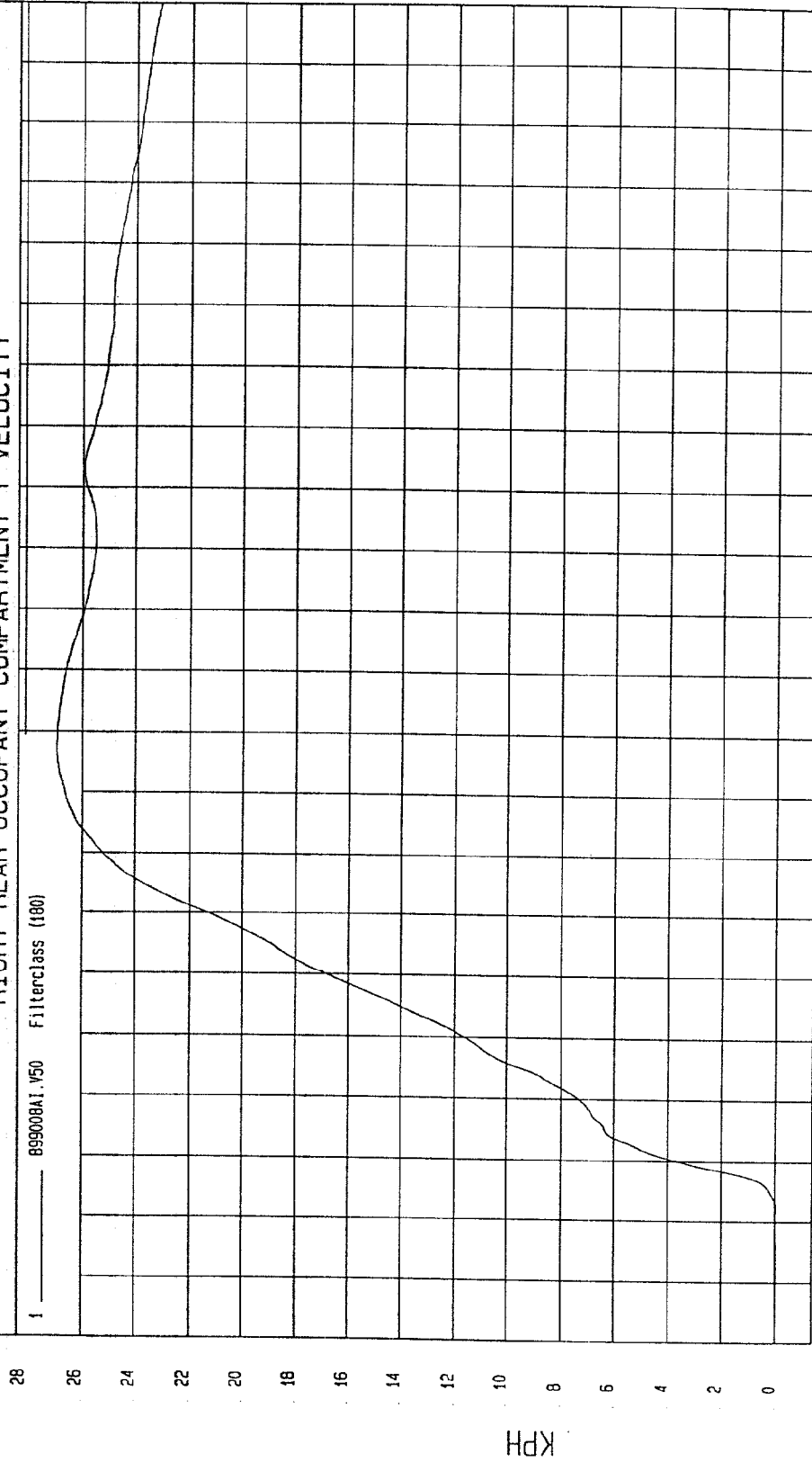
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 26.91 KPH at 77 msec

Minimum = -.03 KPH at -5 msec

RIGHT REAR OCCUPANT COMPARTMENT Y VELOCITY

1 _____ 899008A1.V50 Filterclass (180)



NGA Research
01-21-1999 16:34

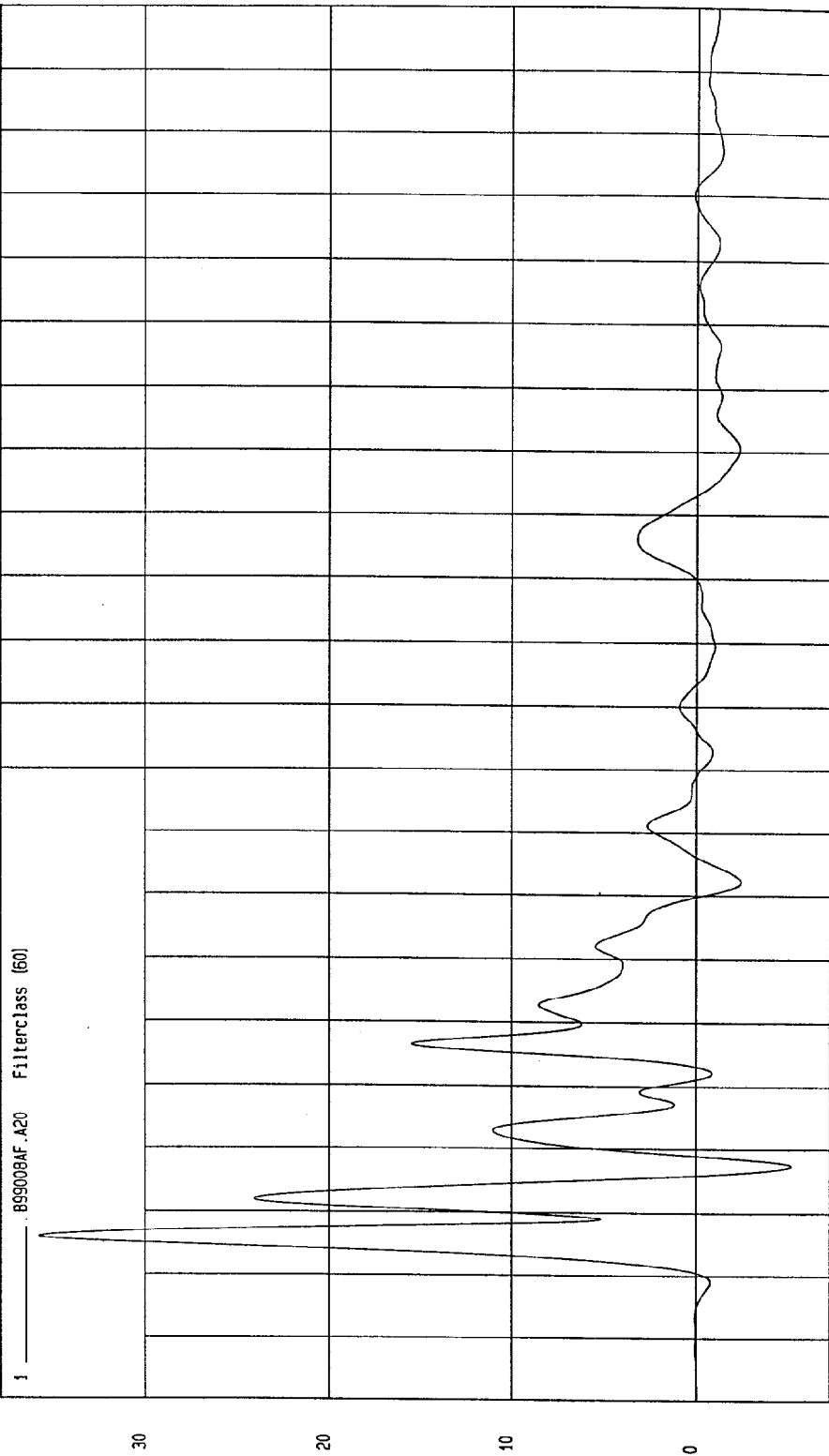
TIME Seconds

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.21 G'S at 17 msec Maximum = 35.79 G'S at 6 msec

LEFT LOWER A-POST Y ACCELERATION



TIME (SECONDS)

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

NCAP Research
01-21-1999 16:29

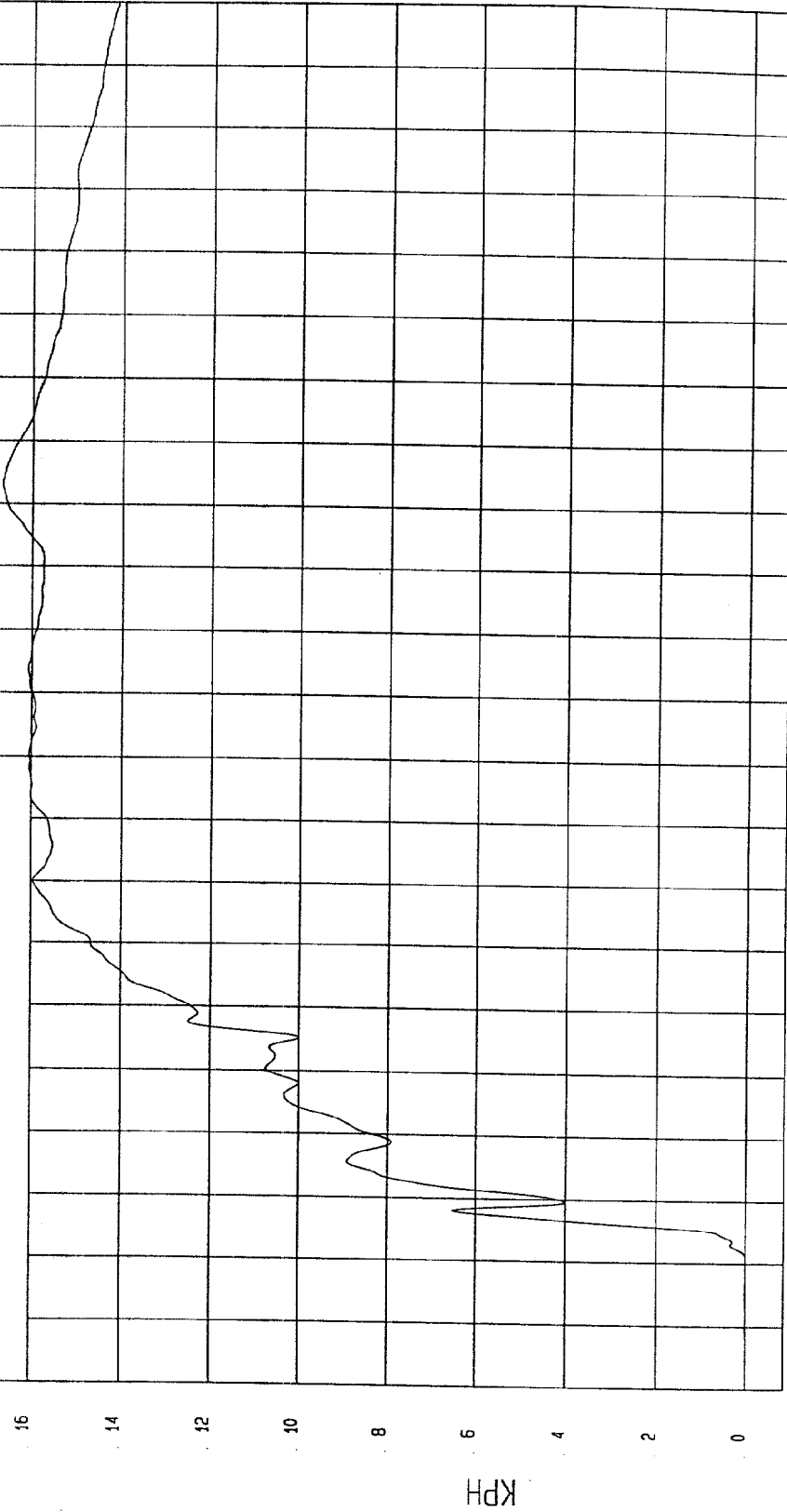
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.79E-03 KPH at -13 msec Maximum = 16.64 KPH at 123 msec

LEFT LOWER A-POST Y VELOCITY

1 ——— B9900BA1.V20 Filterclass (180)



WCA Research
01-21-1999 16:34

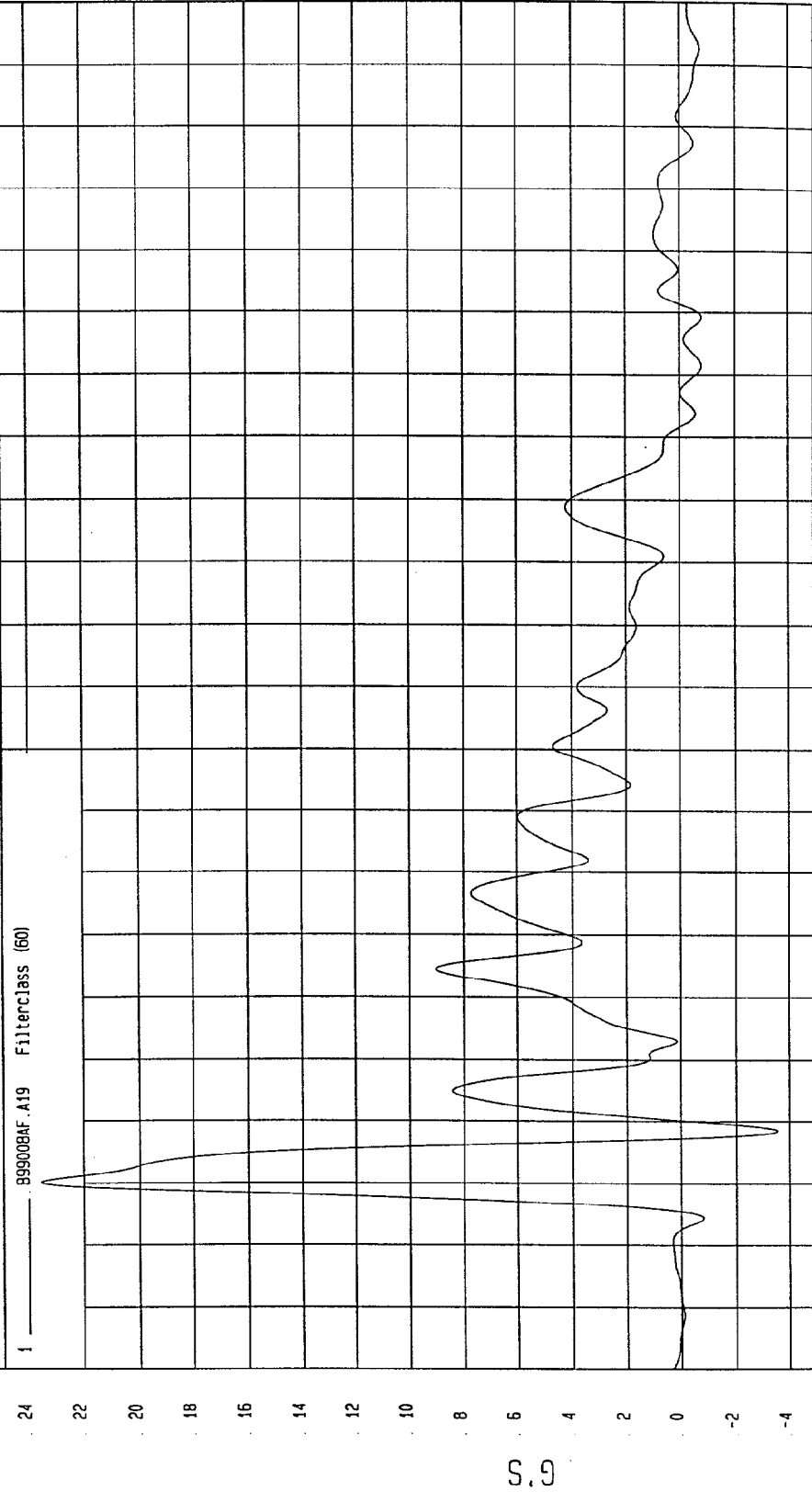
TIME Seconds

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -3.56 G's at 18 msec Maximum = 23.55 G's at 10 msec

LEFT MID A-POST Y ACCELERATION



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

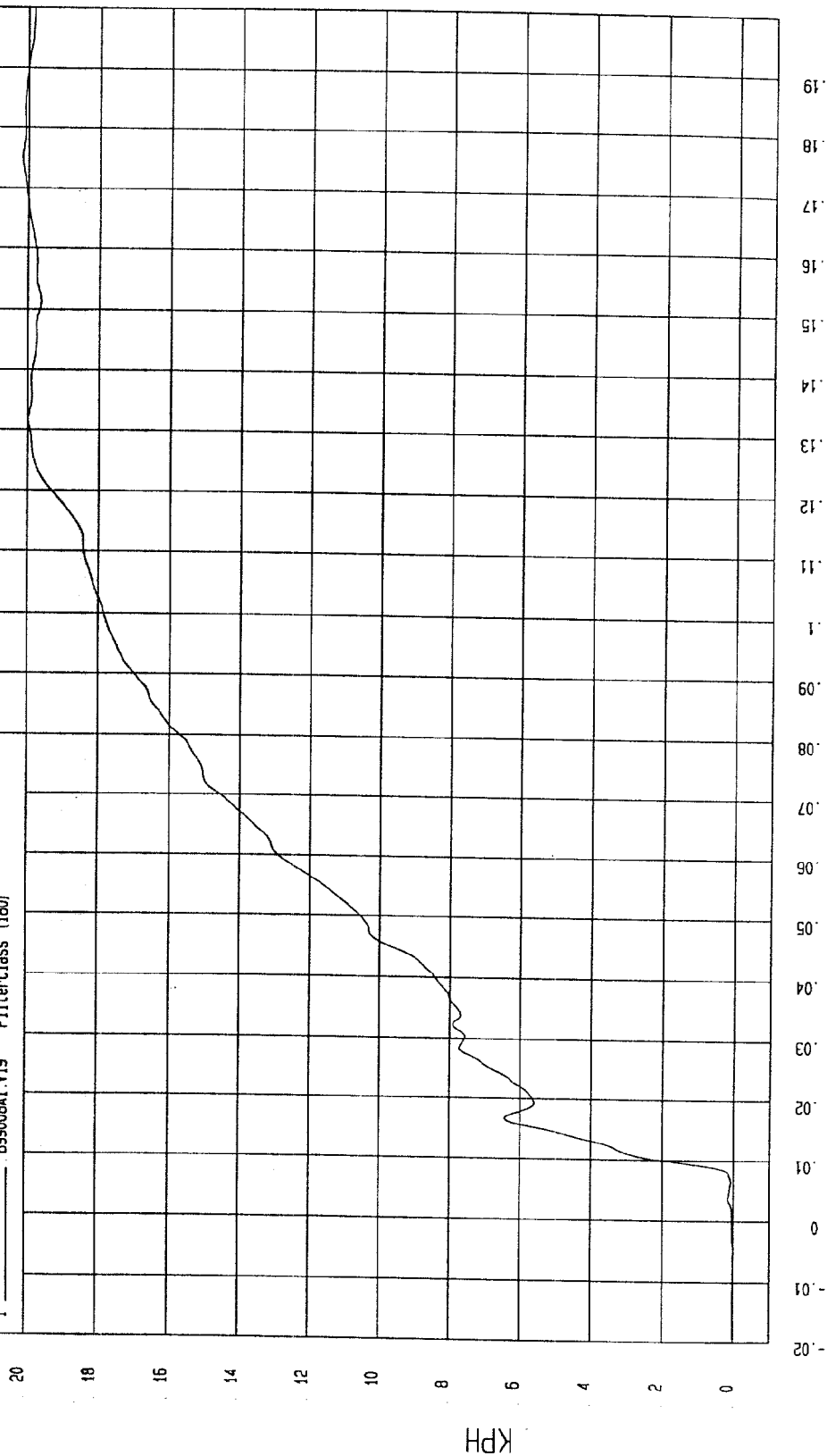
Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 20.16 KPH at 175 msec

LEFT MID A-POST Y VELOCITY

1 — B99008A1.V19 Filterclass (180)



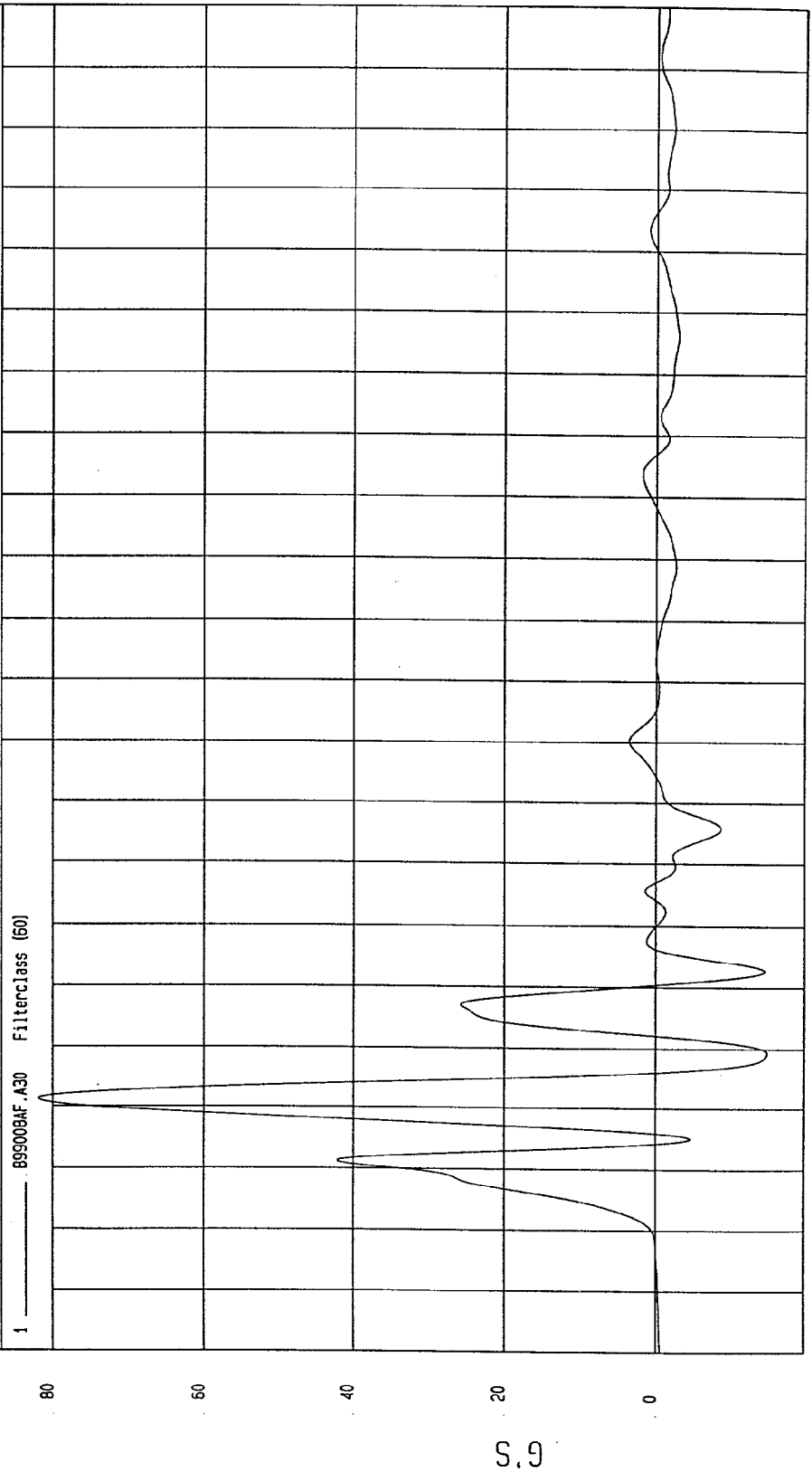
MGA Research
01-21-1999 16:34

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -14.62 G'S at 29 msec Maximum = 81.98 G'S at 21 msec

LEFT LOWER B-POST Y ACCELERATION



TIME (SECONDS)

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

NCA Research
01-21-1999 16:29

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -17 KPH at -5 msec Maximum = 28.6 KPH at 41 msec

LEFT LOWER B-POST Y VELOCITY

1 ——— B99006A1.V30 Filterclass (160)

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

KPH

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

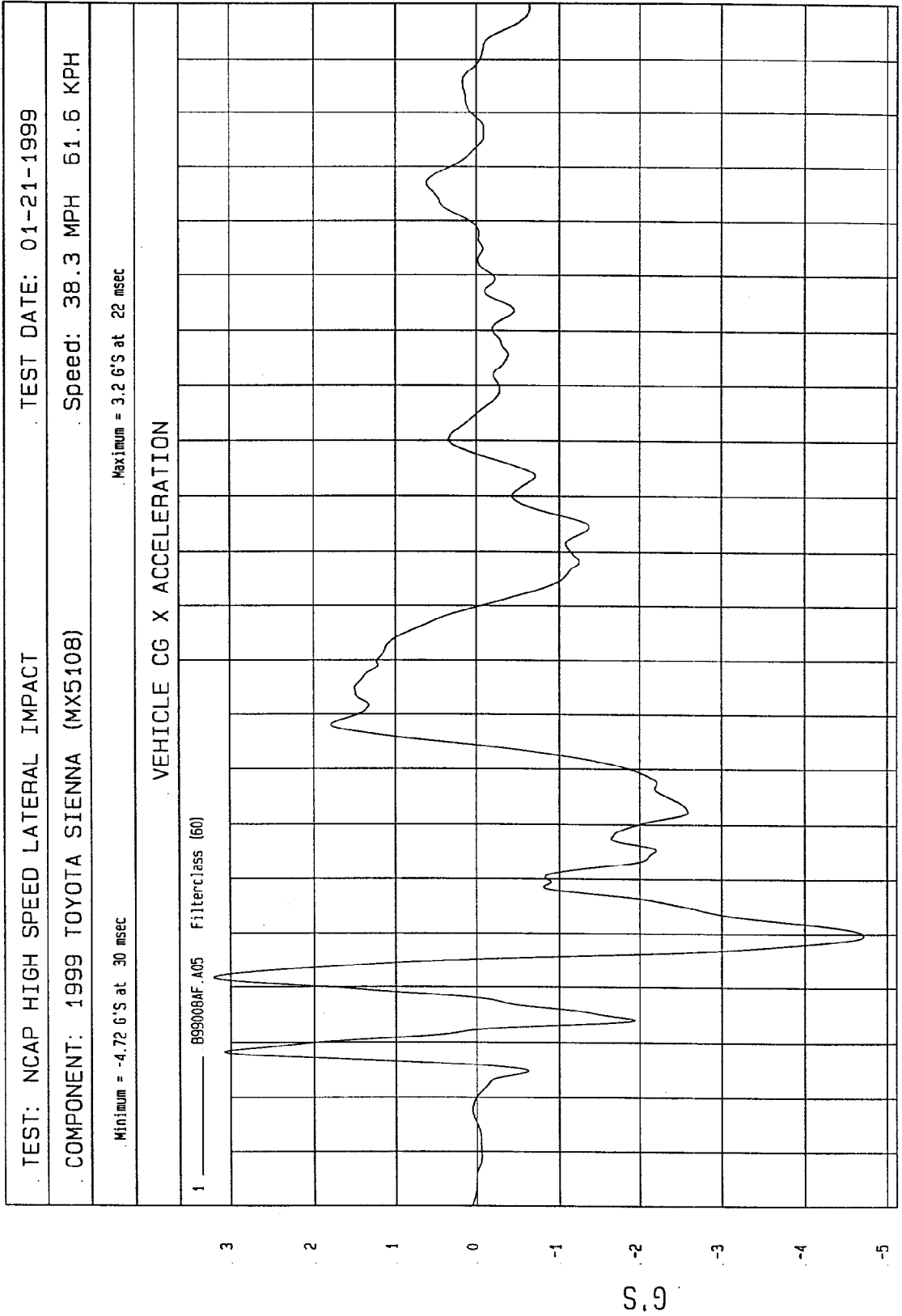
.17

.18

.19

TIME Seconds

MOA Research
01-21-1999 16:34



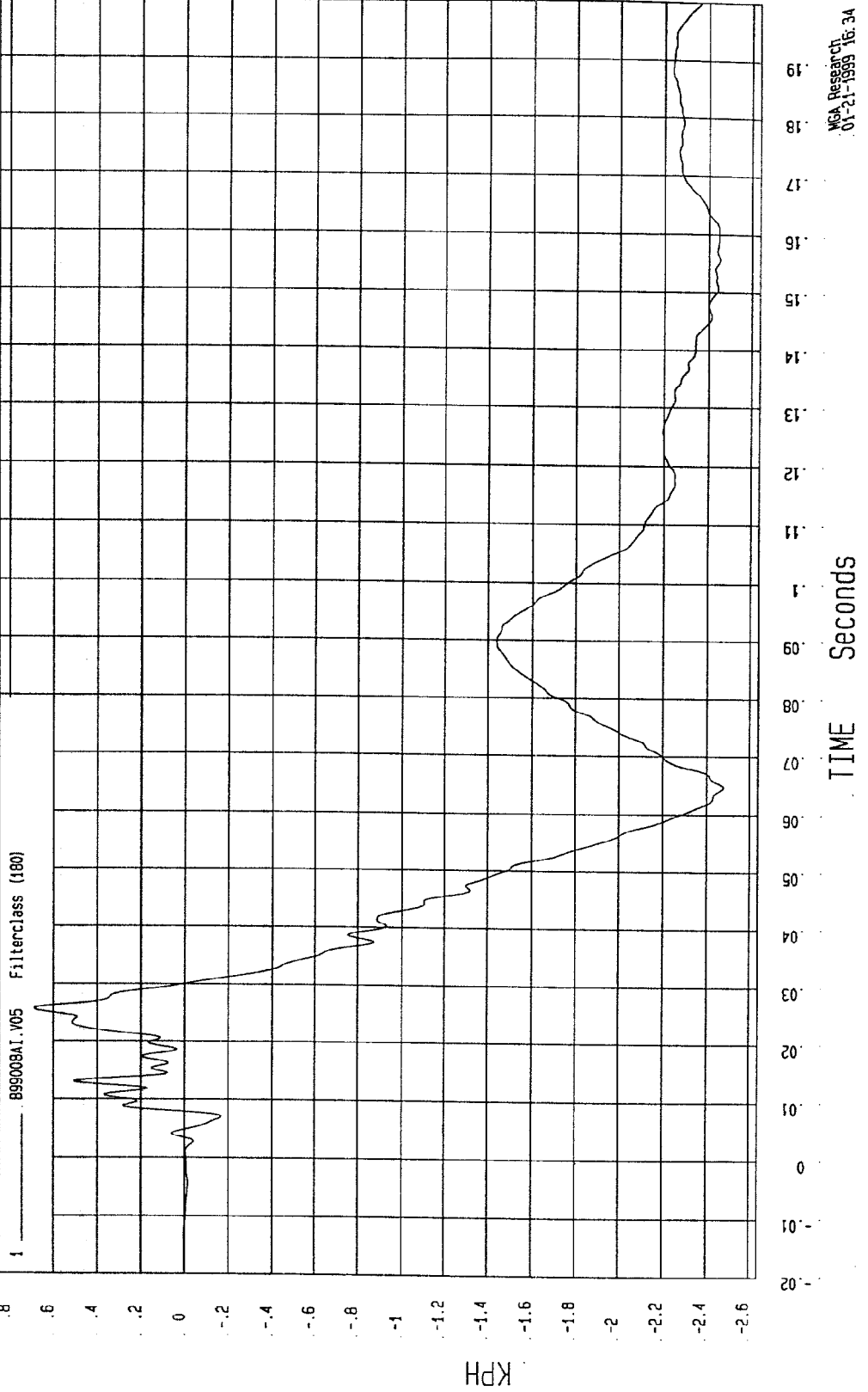
WCA Research
01-21-1999 16:29

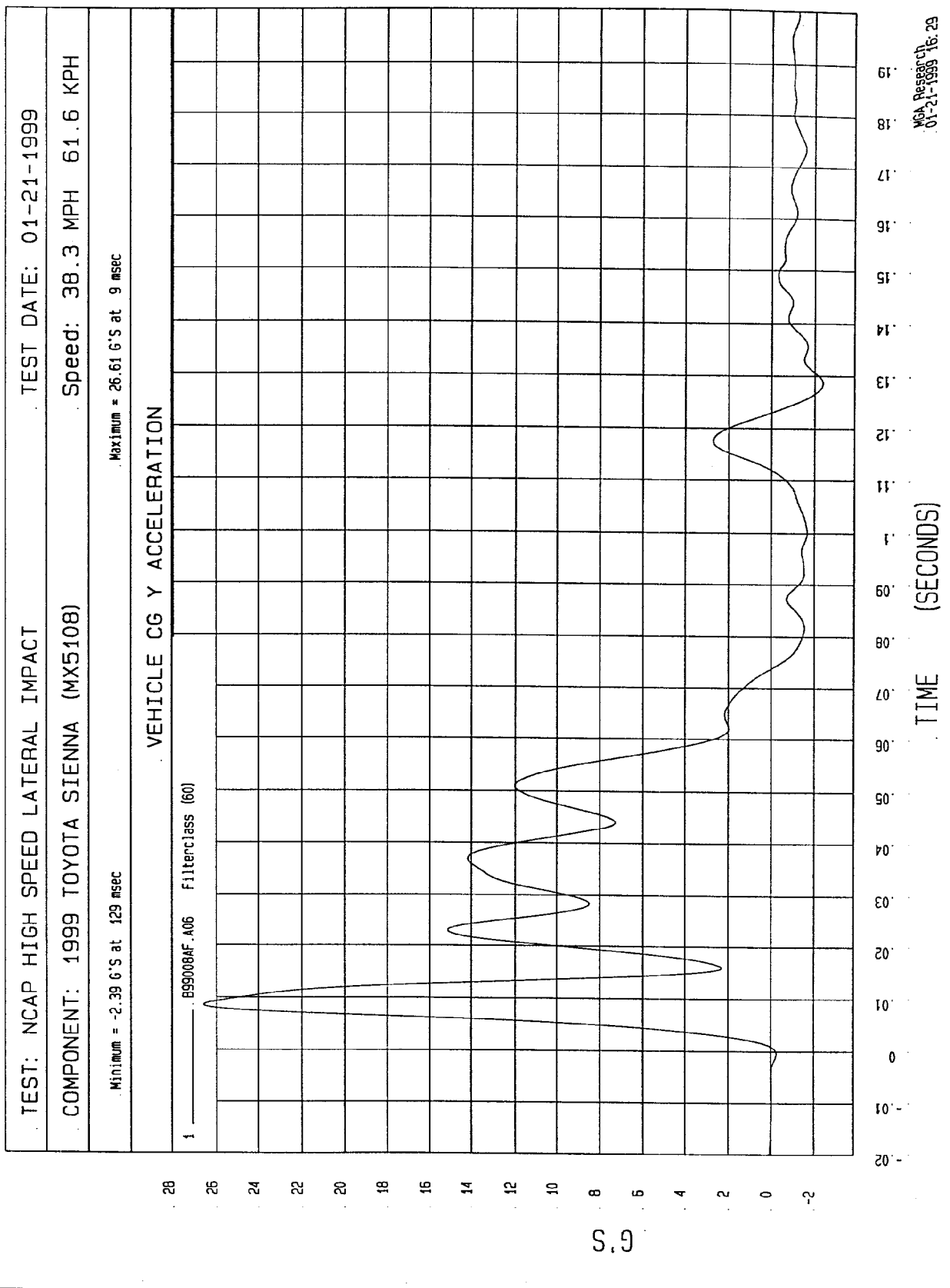
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -2.48 KPH at 65 msec Maximum = .69 KPH at 26 msec

VEHICLE CG X VELOCITY





TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 23.48 KPH at 74 msec

Minimum = -3.16E-03 KPH at -4 msec

VEHICLE CG Y VELOCITY

1 ——— B99008A1.V06 Filterclass (180)

24

22

20

18

16

14

12

10

8

6

4

2

0

KPH

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME Seconds

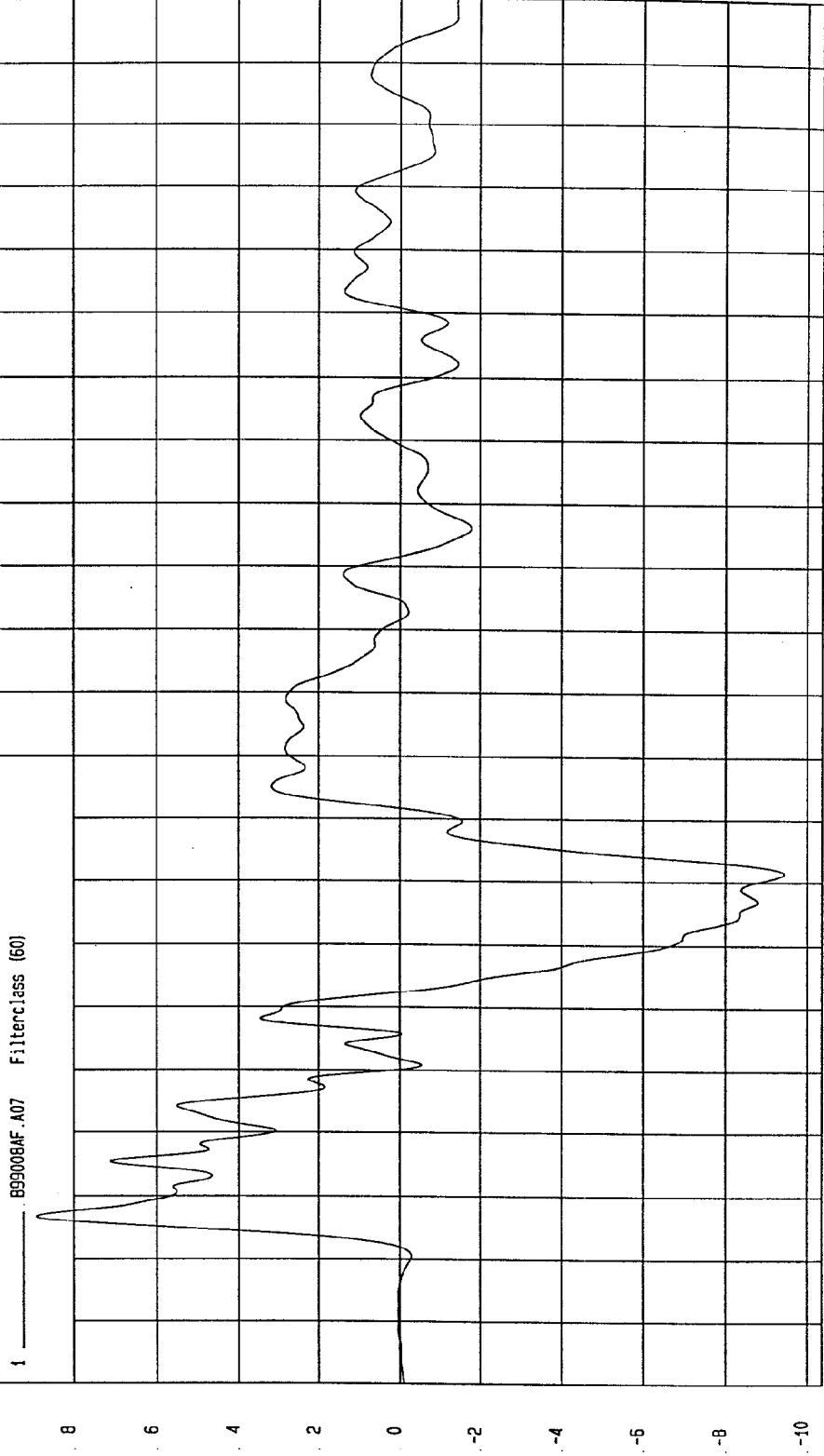
WCA Research
01-21-1999 16:34

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -9.45 G'S at 52 msec Maximum = 8.89 G'S at 7 msec

VEHICLE CG Z ACCELERATION



TIME (SECONDS)

W&A Research
01-21-1999 16:29

G

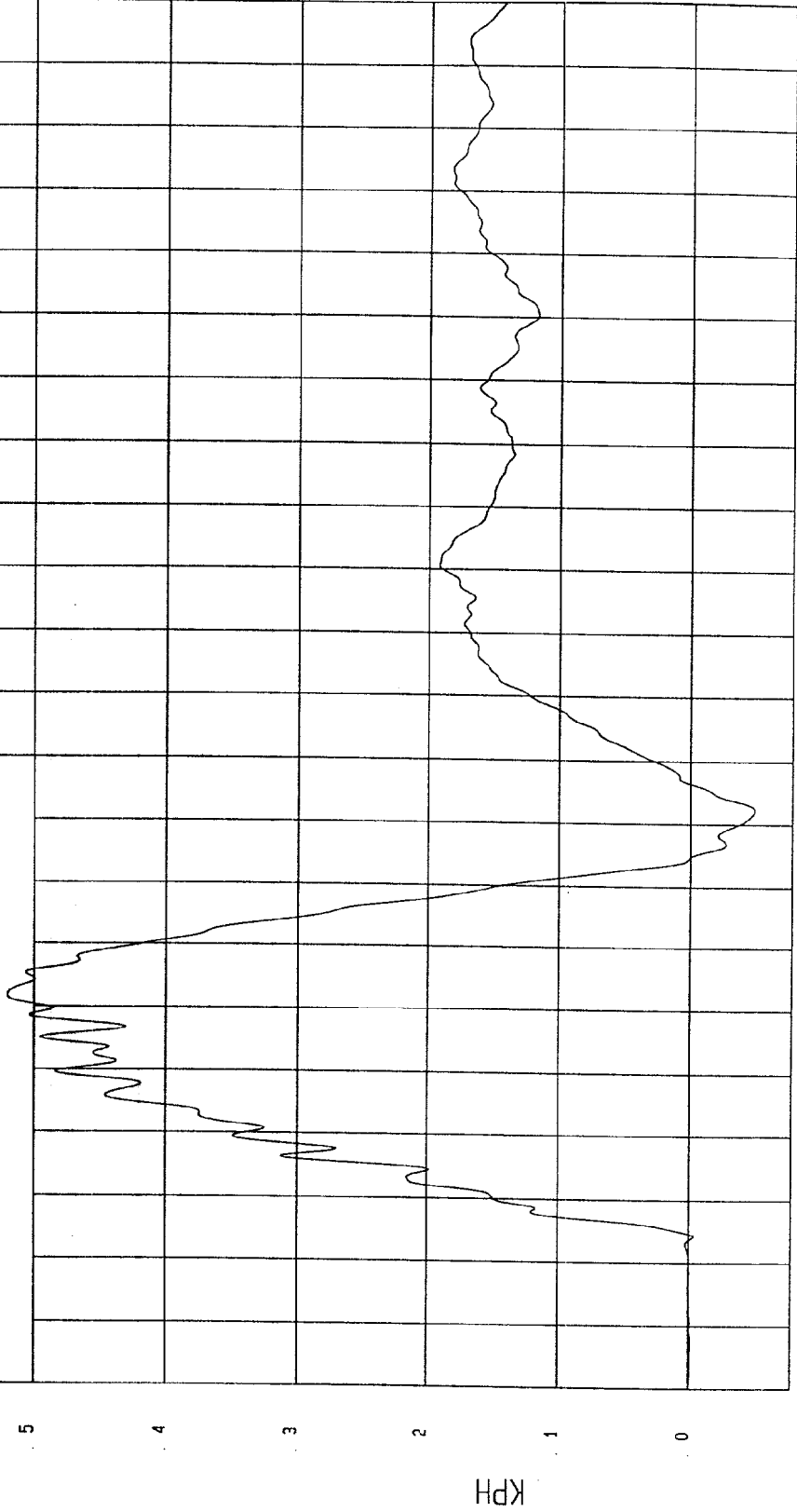
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -.49 KPH at 72 msec Maximum = 5.19 KPH at 42 msec

VEHICLE CG Z VELOCITY

1 ——— B99008A1.V07 Filterclass (480)



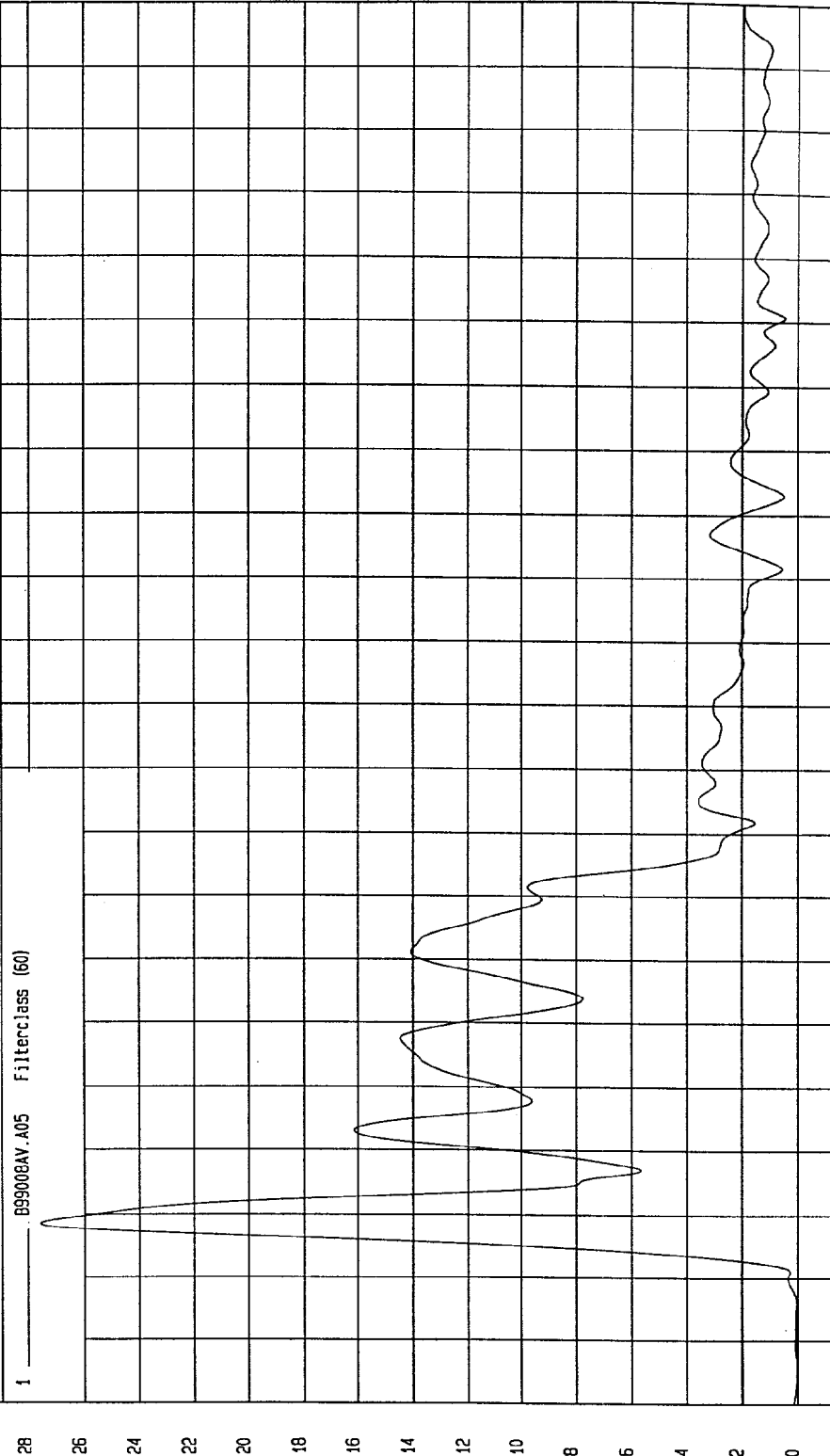
MCA Research
01-21-1999 18:34

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 1.80E-02 G'S at -14 msec Maximum = 27.62 G'S at 8 msec

VEHICLE CG RESULTANT ACCELERATION



MGA Research
01-21-1999 16:29

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

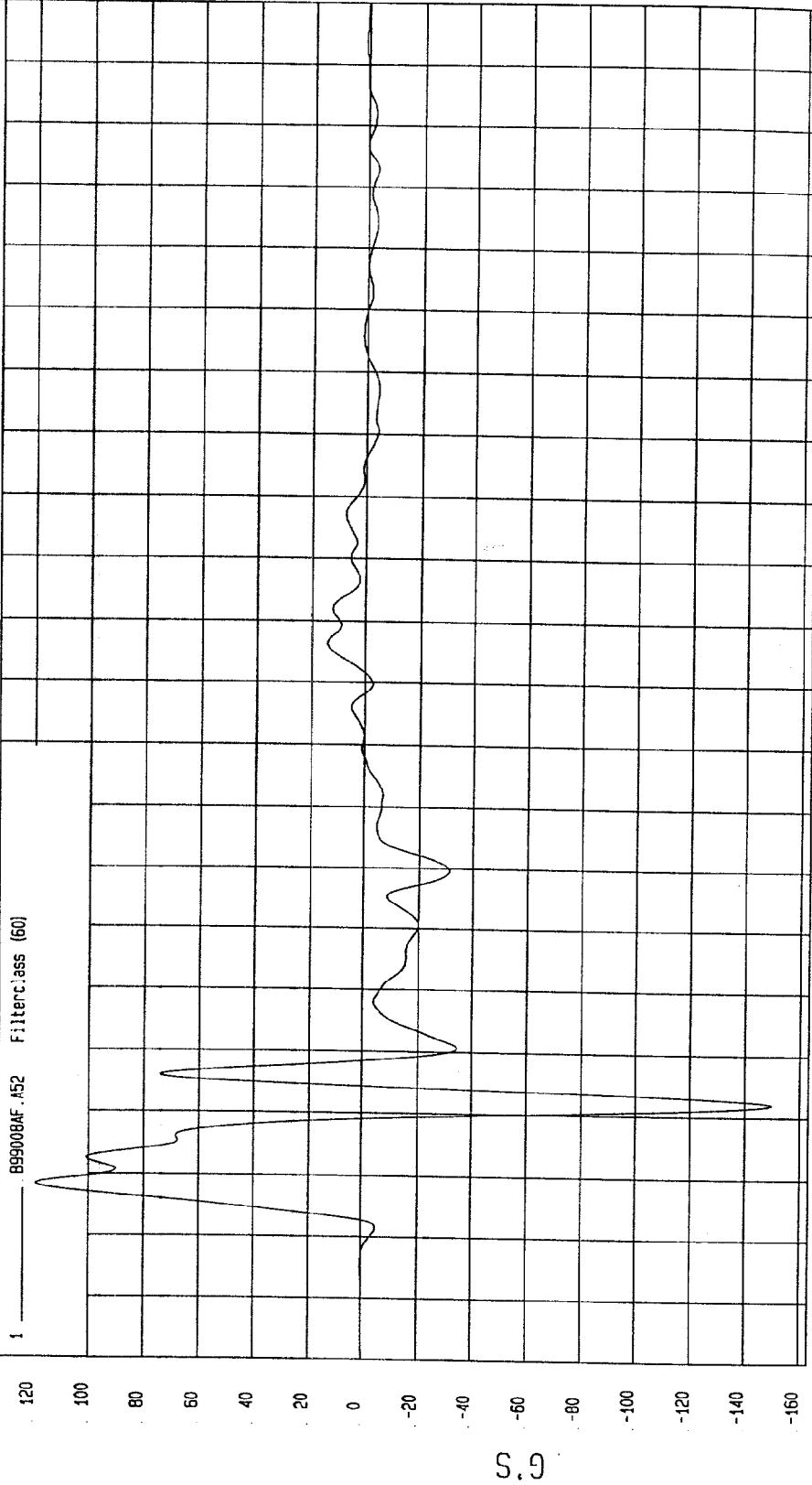
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 119.34 G'S at 8 msec

Minimum = -149.71 G'S at 22 msec

LEFT FRONT DOOR MIDREAR Y ACCELERATION

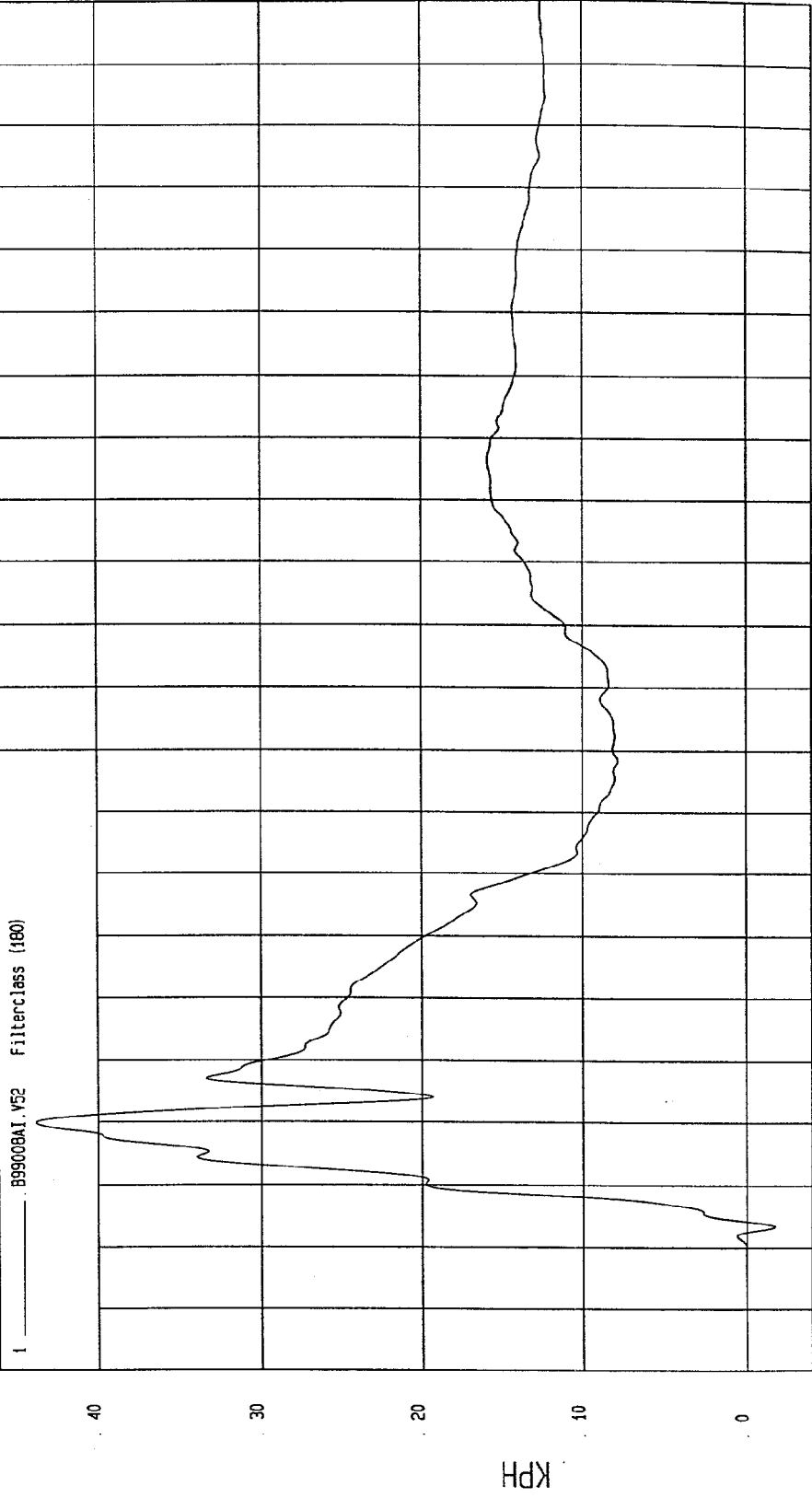


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.75 KPH at 3 msec Maximum = 43.85 KPH at 20 msec

LEFT FRONT DOOR MIDREAR Y VELOCITY



TIME Seconds

WCA Research
01-21-1999 16:34

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

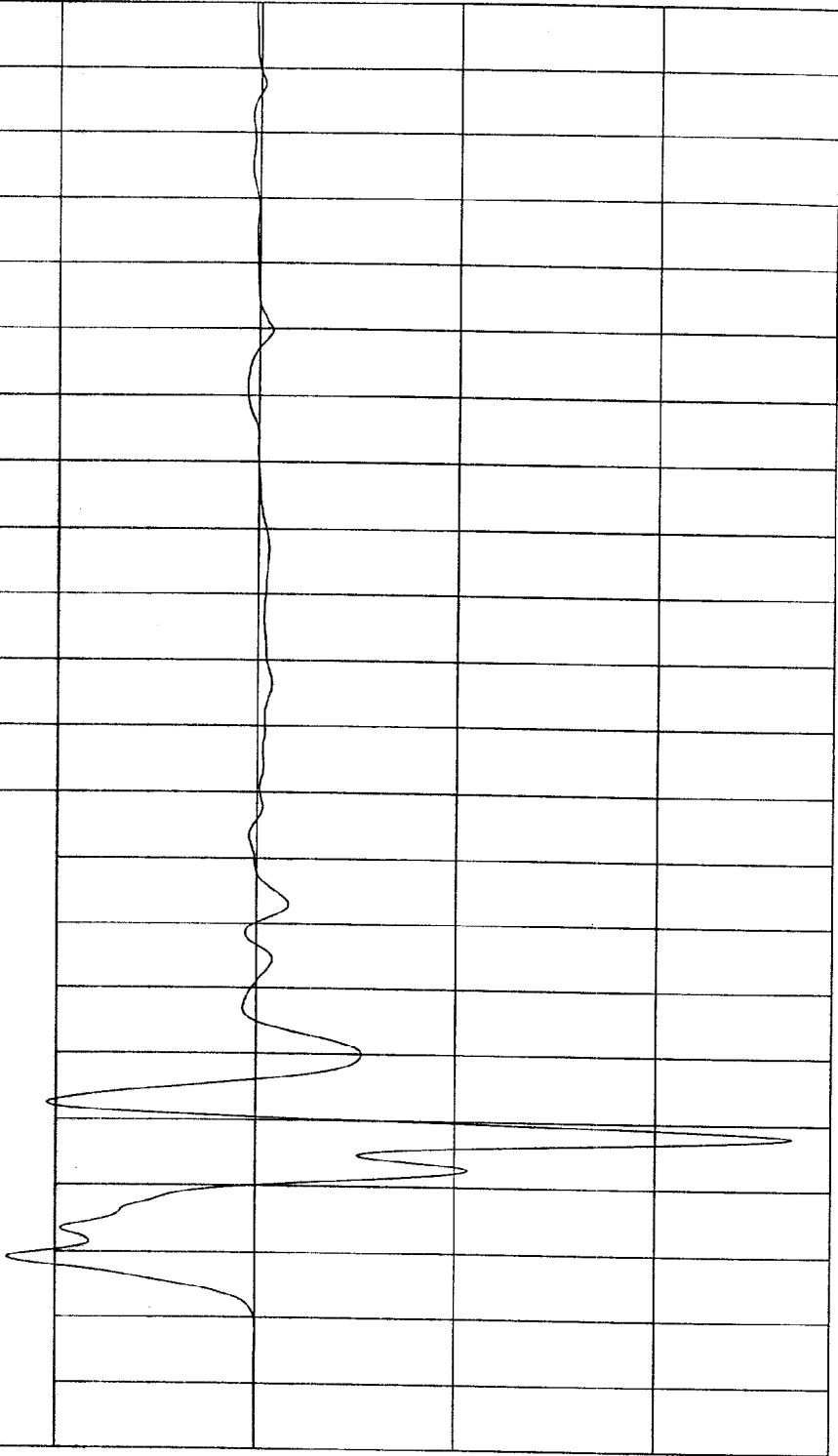
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Minimum = -267.33 G'S at 28 msec

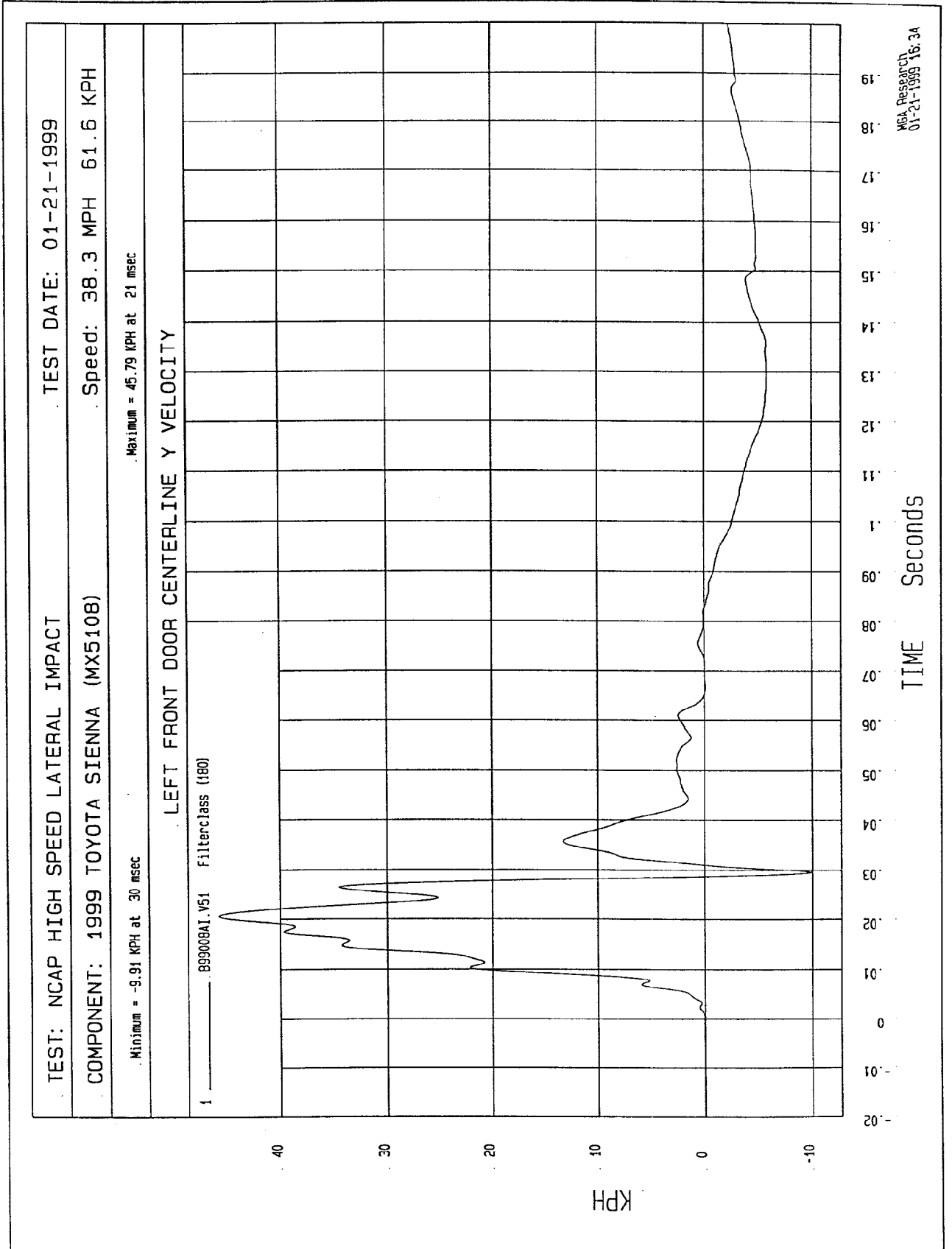
Maximum = 124.32 G'S at 9 msec

LEFT FRONT DOOR CENTERLINE Y ACCELERATION

1 899008AF.A51 Filterclass (60)



MCA Research
01-21-1999 16:29



TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -142.76 G'S at 34 msec Maximum = 169.31 G'S at 16 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION

1 899008AF.A53 Filterclass (60)

180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
-140

G.S

TIME (SECONDS)

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

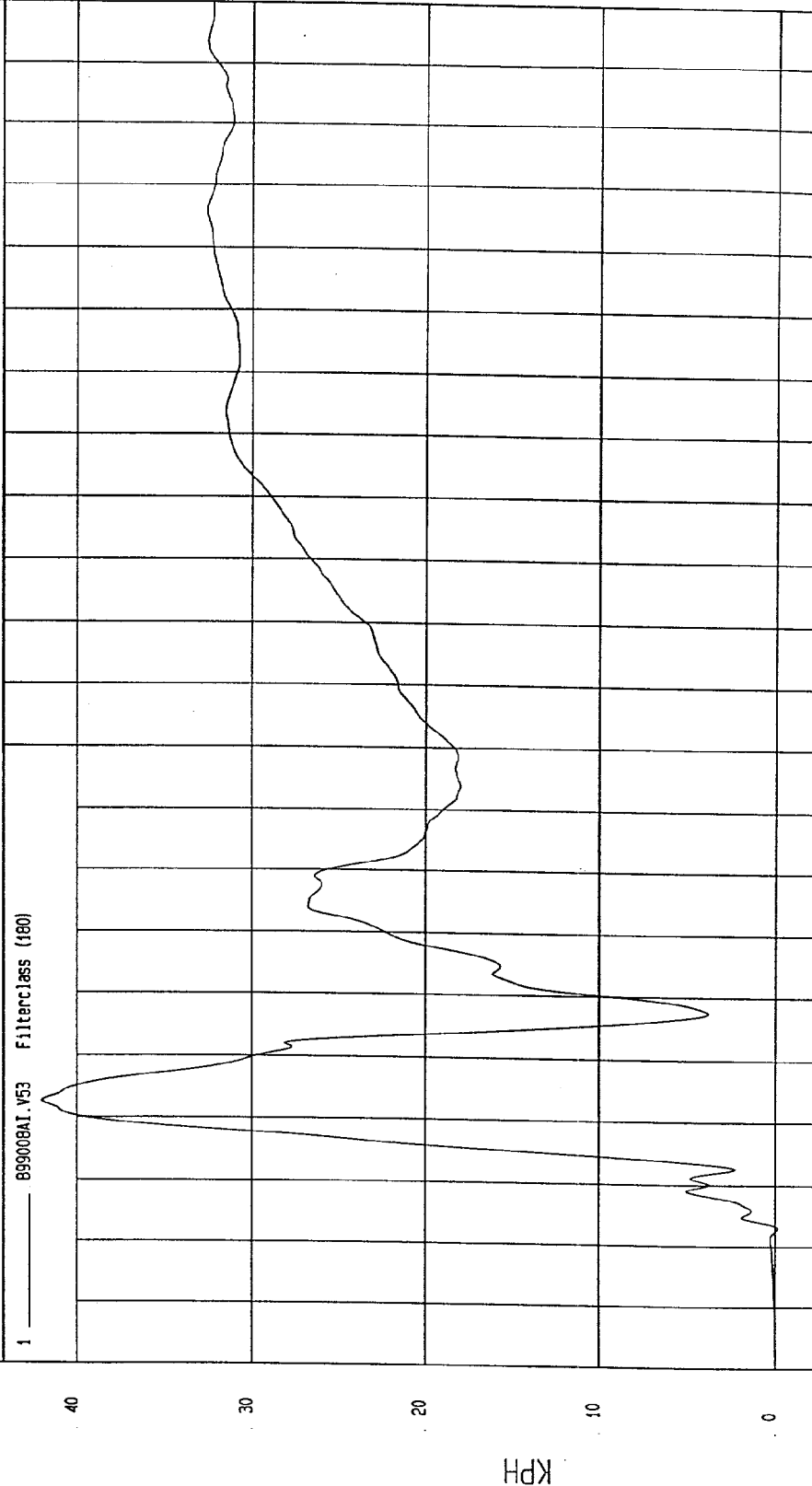
NSA Research
01-21-1999 16:29

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -.16 KPH at 3 msec Maximum = 42.05 KPH at 23 msec

LEFT FRONT DOOR UPPER CENTERLINE Y VELOCITY



TIME Seconds

MGA Research
01-21-1999 16:34

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

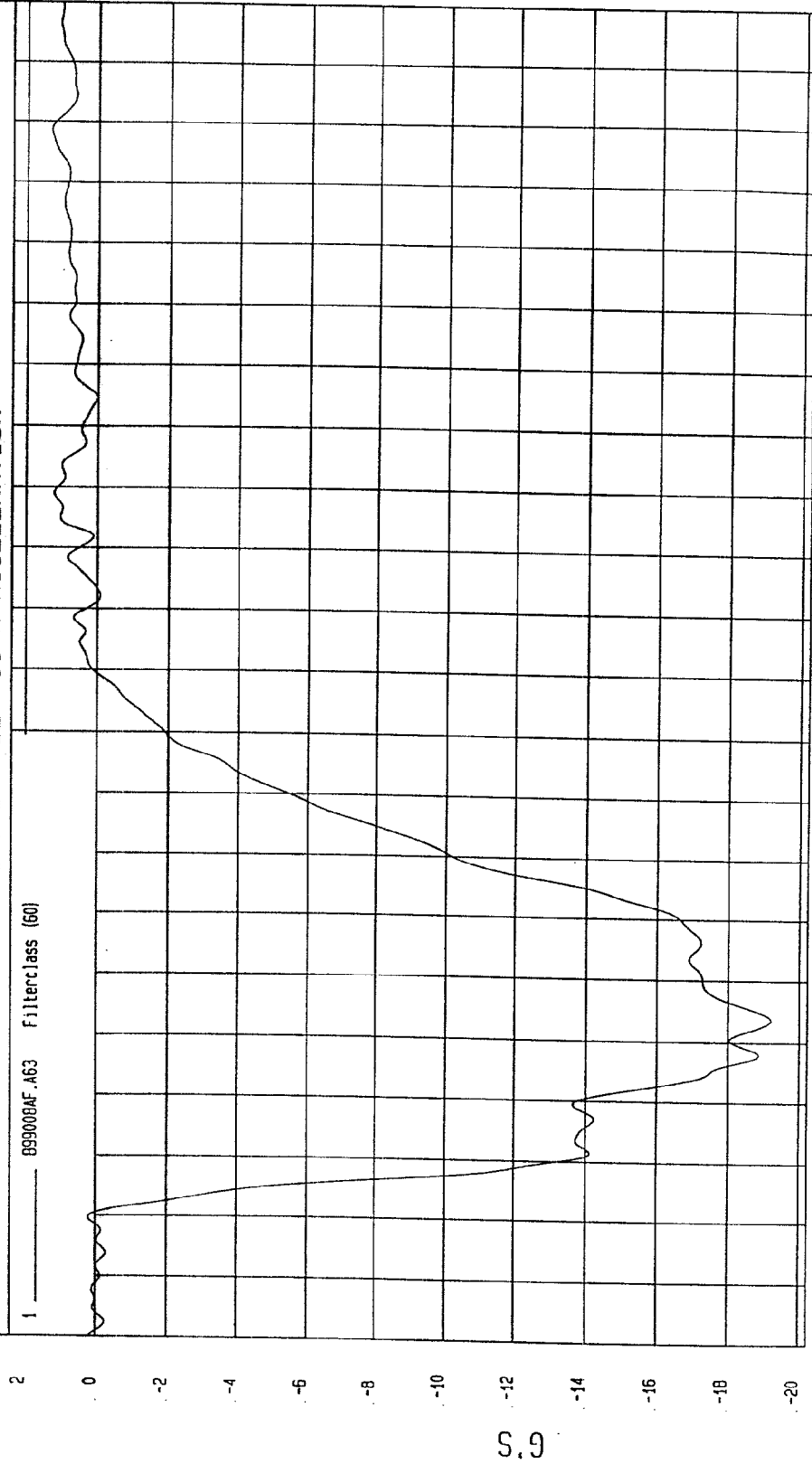
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Minimum = -19.2 G'S at 34 msec

Maximum = 1.34 G'S at 179 msec

MOVING BARRIER CG X ACCELERATION

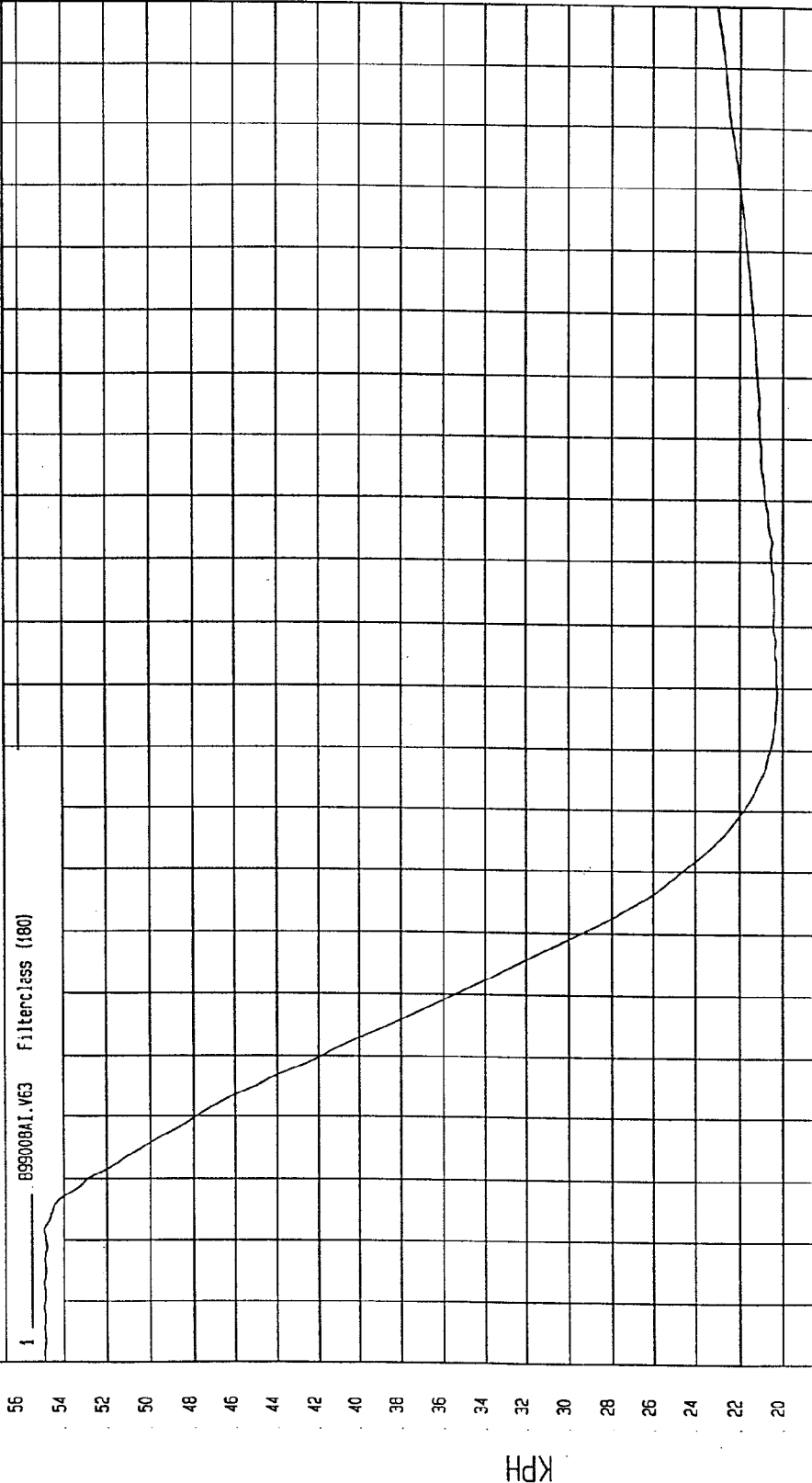


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 20.24 KPH at 89 msec Maximum = 54.92 KPH at 2 msec

MOVING BARRIER CG X VELOCITY



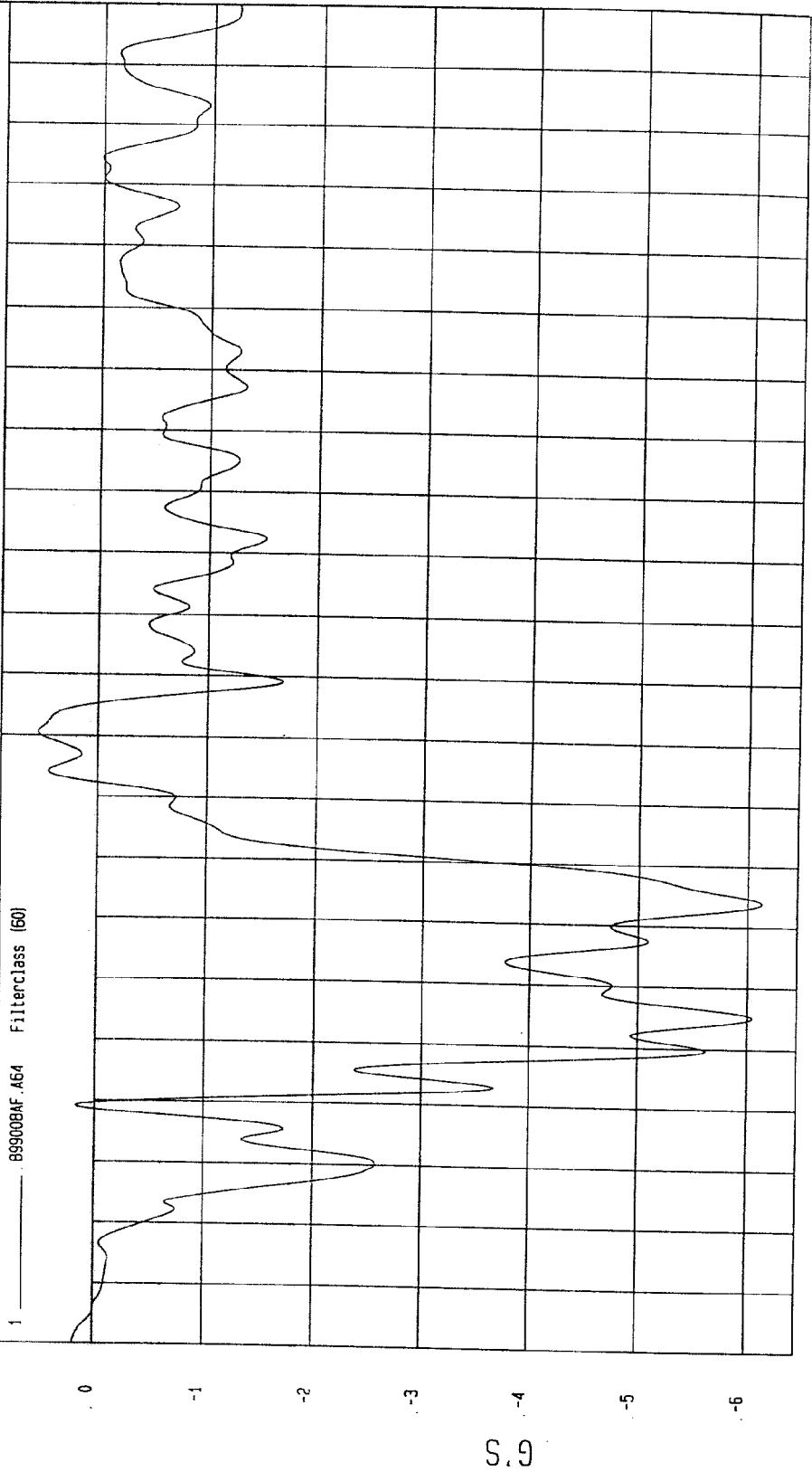
WCA Research
01-21-1999 16:37

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -6.13 G'S at 54 msec Maximum = .56 G'S at 81 msec

MOVING BARRIER CG Y ACCELERATION

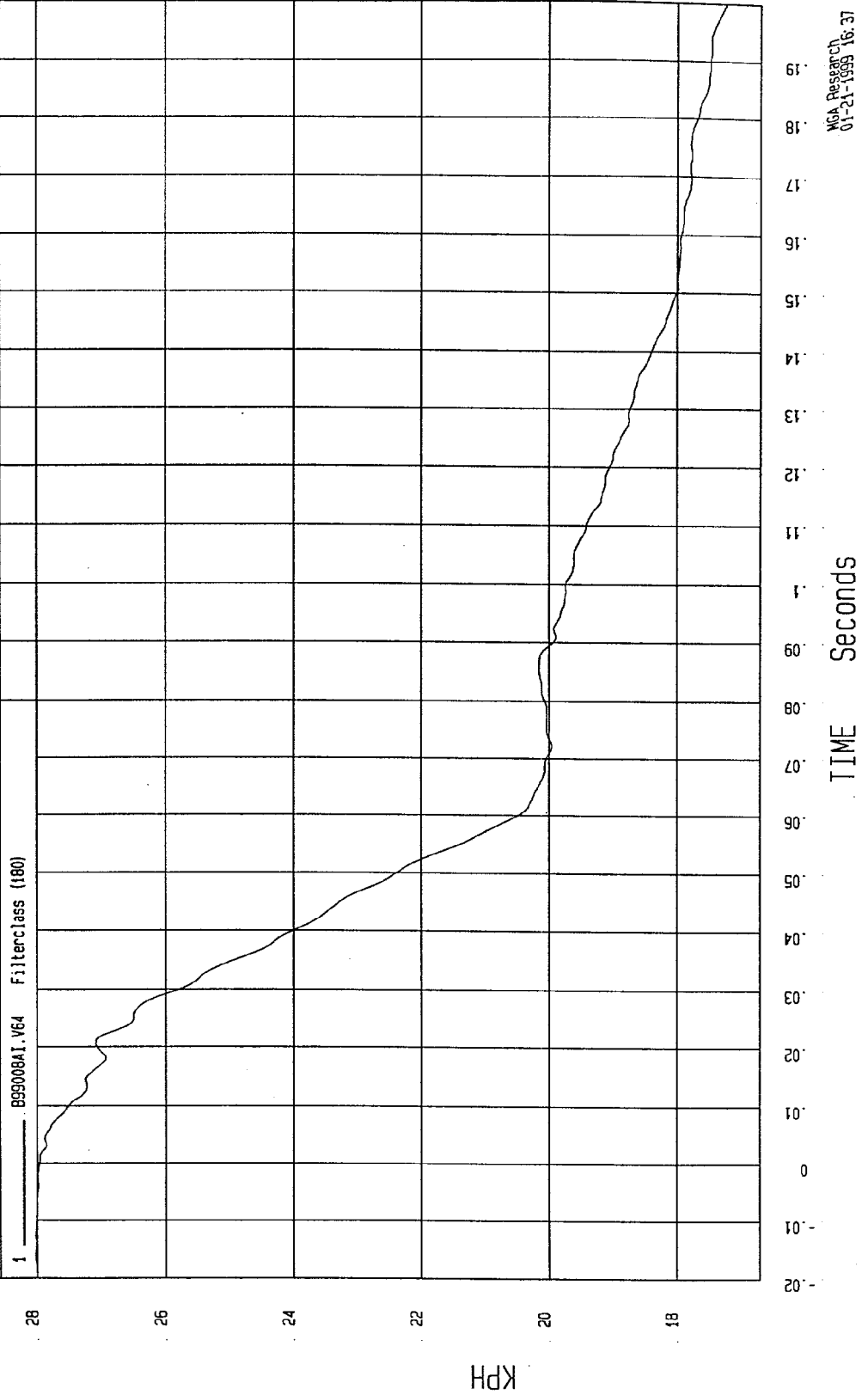


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 17.25 KPH at 200 msec Maximum = 28.03 KPH at -13 msec

MOVING BARRIER CG Y VELOCITY

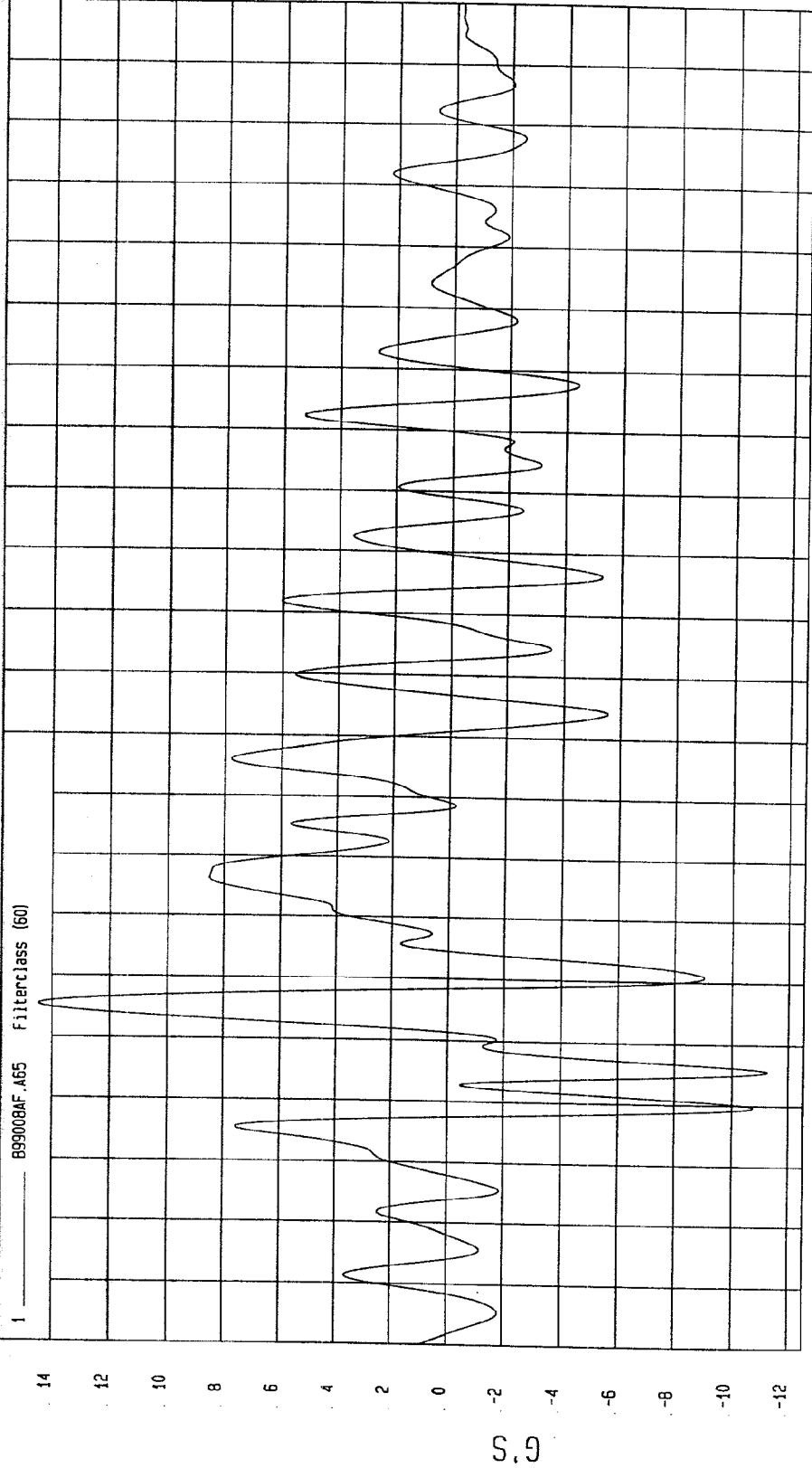


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -11.26 G'S at 26 msec Maximum = 14.48 G'S at 35 msec

MOVING BARRIER CG Z ACCELERATION

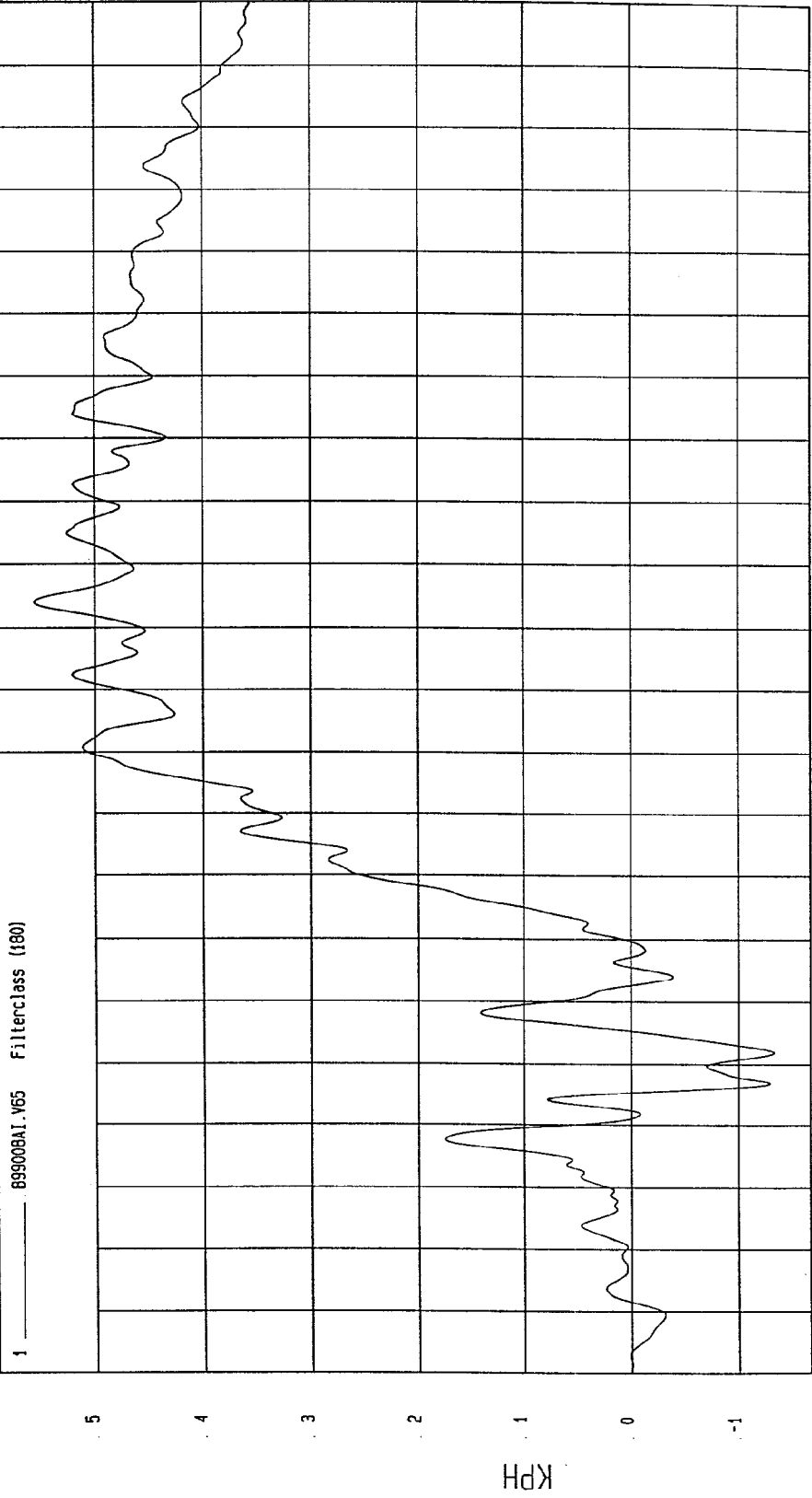


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.34 KPH at 32 msec Maximum = 5.55 KPH at 104 msec

MOVING BARRIER CG Z VELOCITY



TIME Seconds

WCA Research
01-21-1999 16:34

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

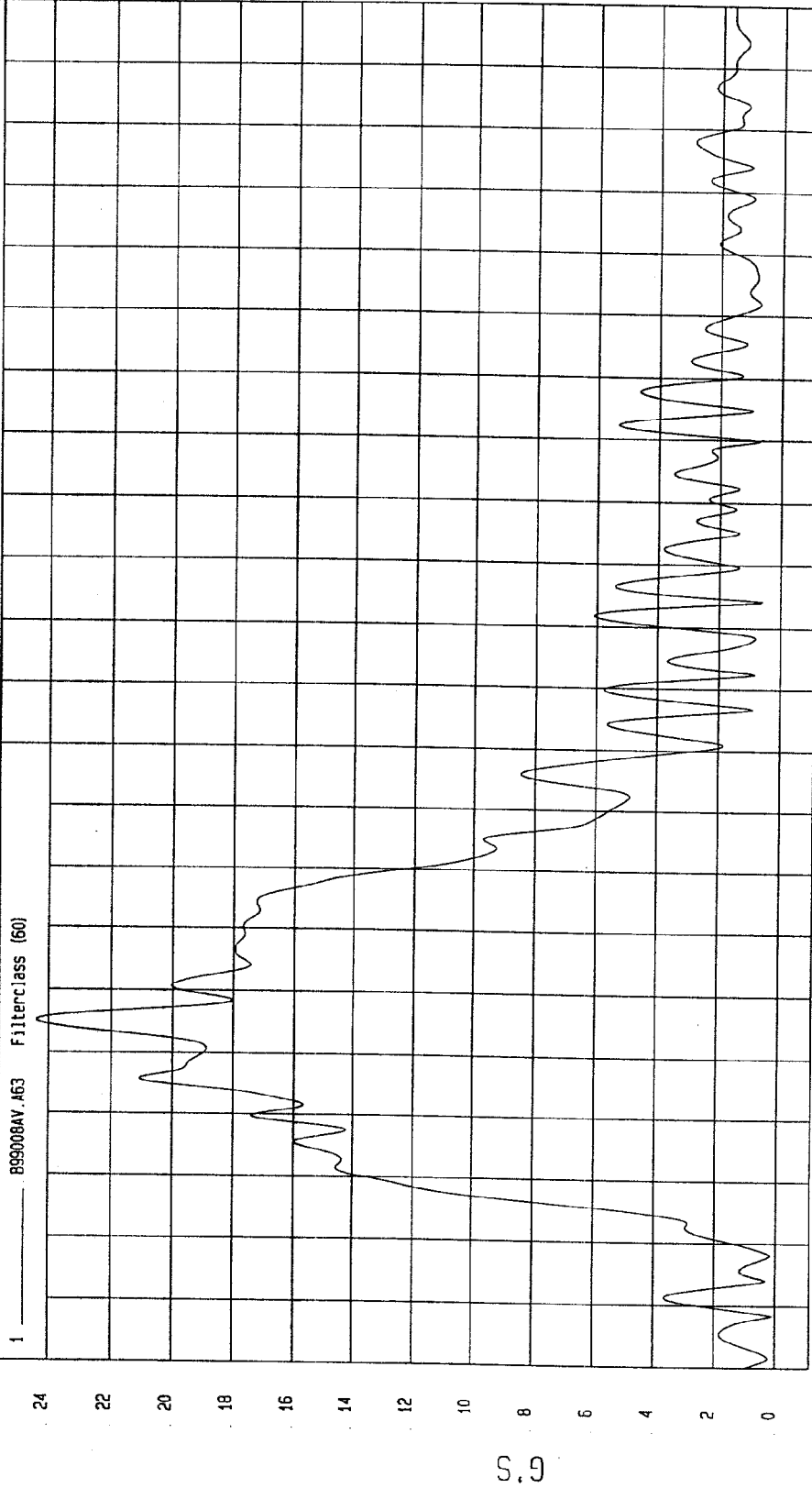
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 24.4 G'S at 35 msec

Minimum = .1 G'S at -12 msec

MOVING BARRIER CG RESULTANT ACCELERATION

1 B99008AV A63 Filterclass (60)



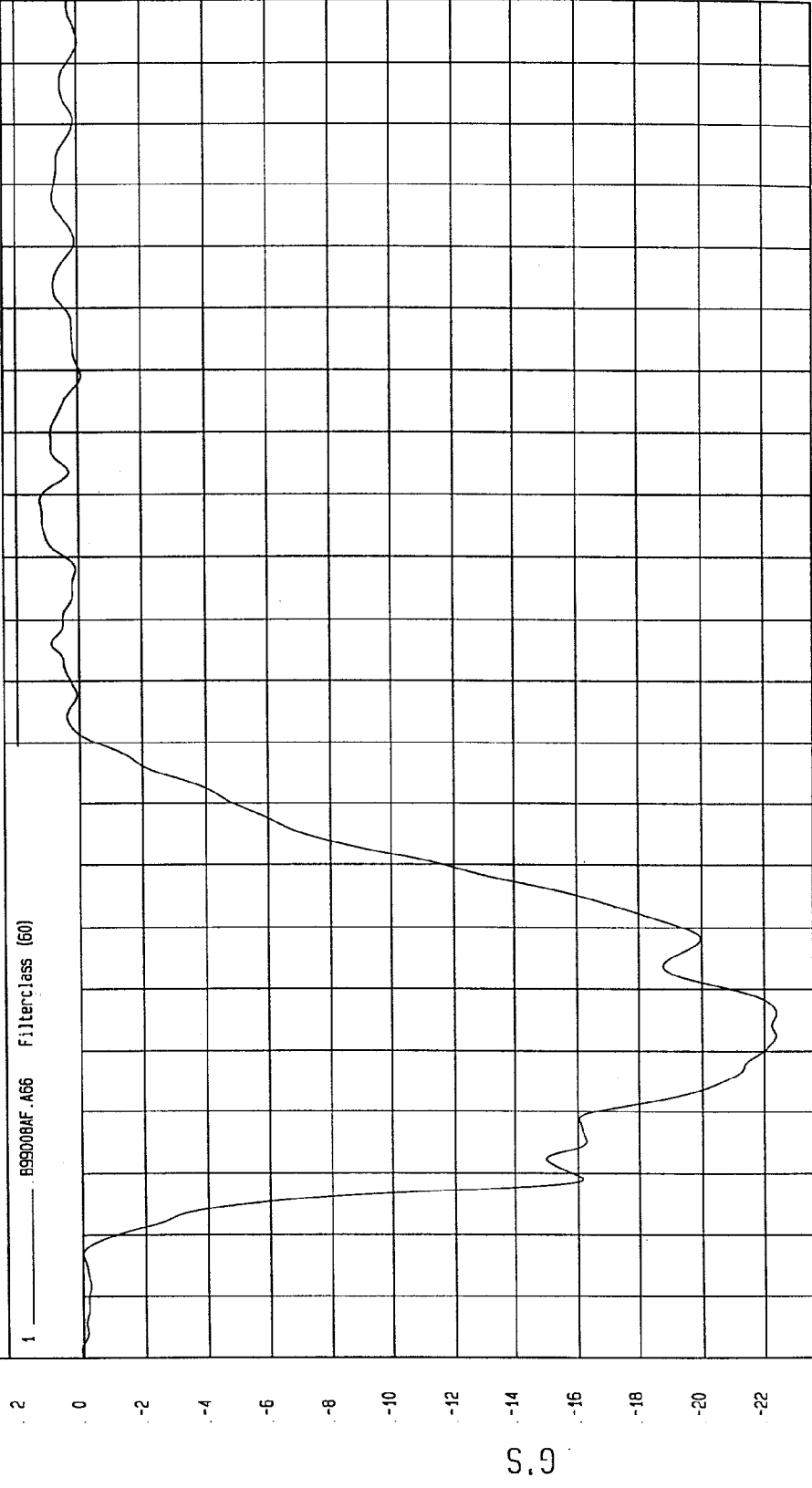
WGA Research
01-21-1999 16:29

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -22.39 G'S at 36 msec Maximum = 1.24 G'S at 119 msec

MOVING BARRIER REAR AXLE X ACCELERATION



TIME (SECONDS)

MOA Research
01-21-1999 16:29

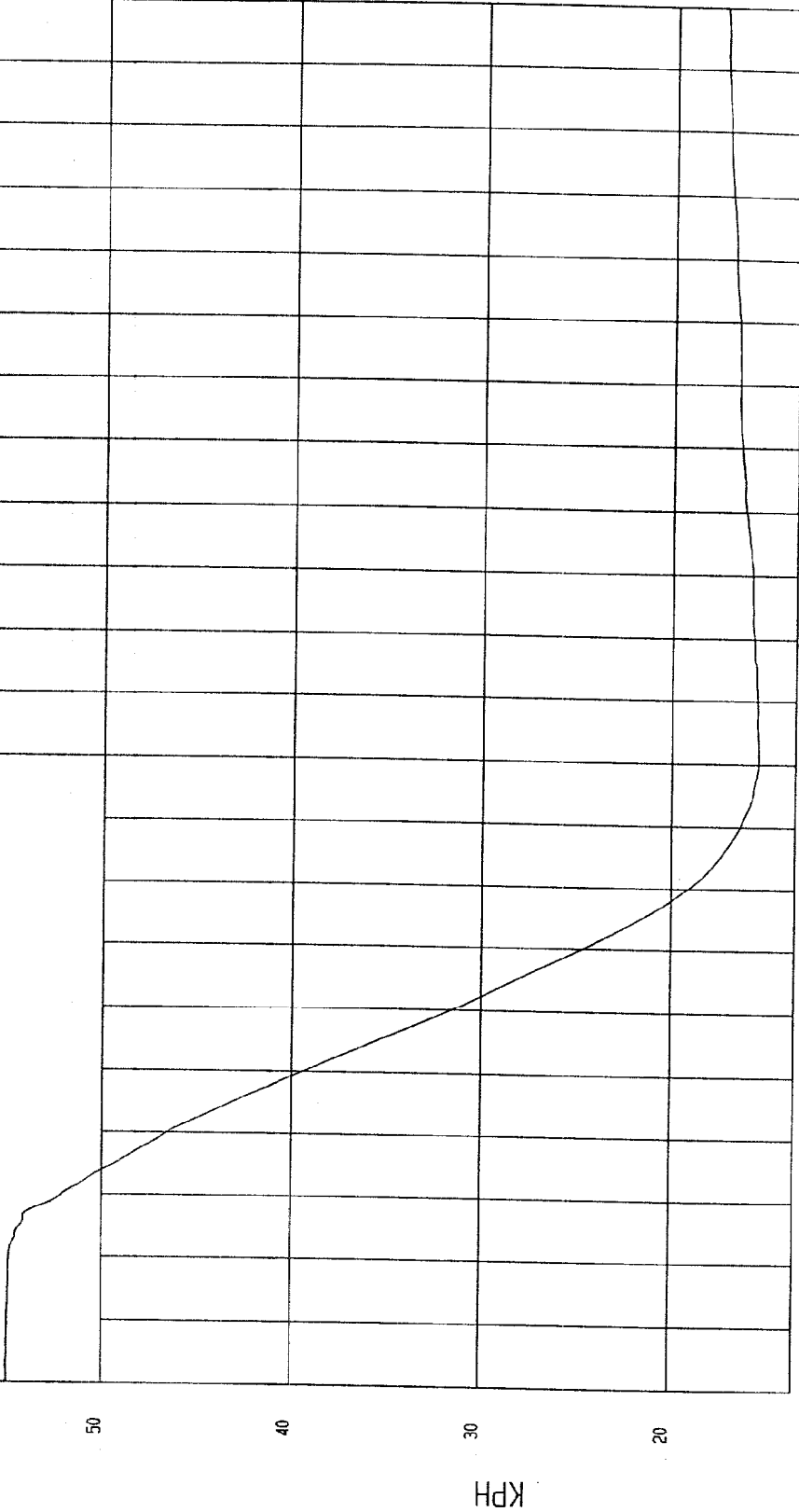
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 15.46 KPH at 80 msec Maximum = 54.92 KPH at -17 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 ——— B99008A1.V66 Filterclass (180)

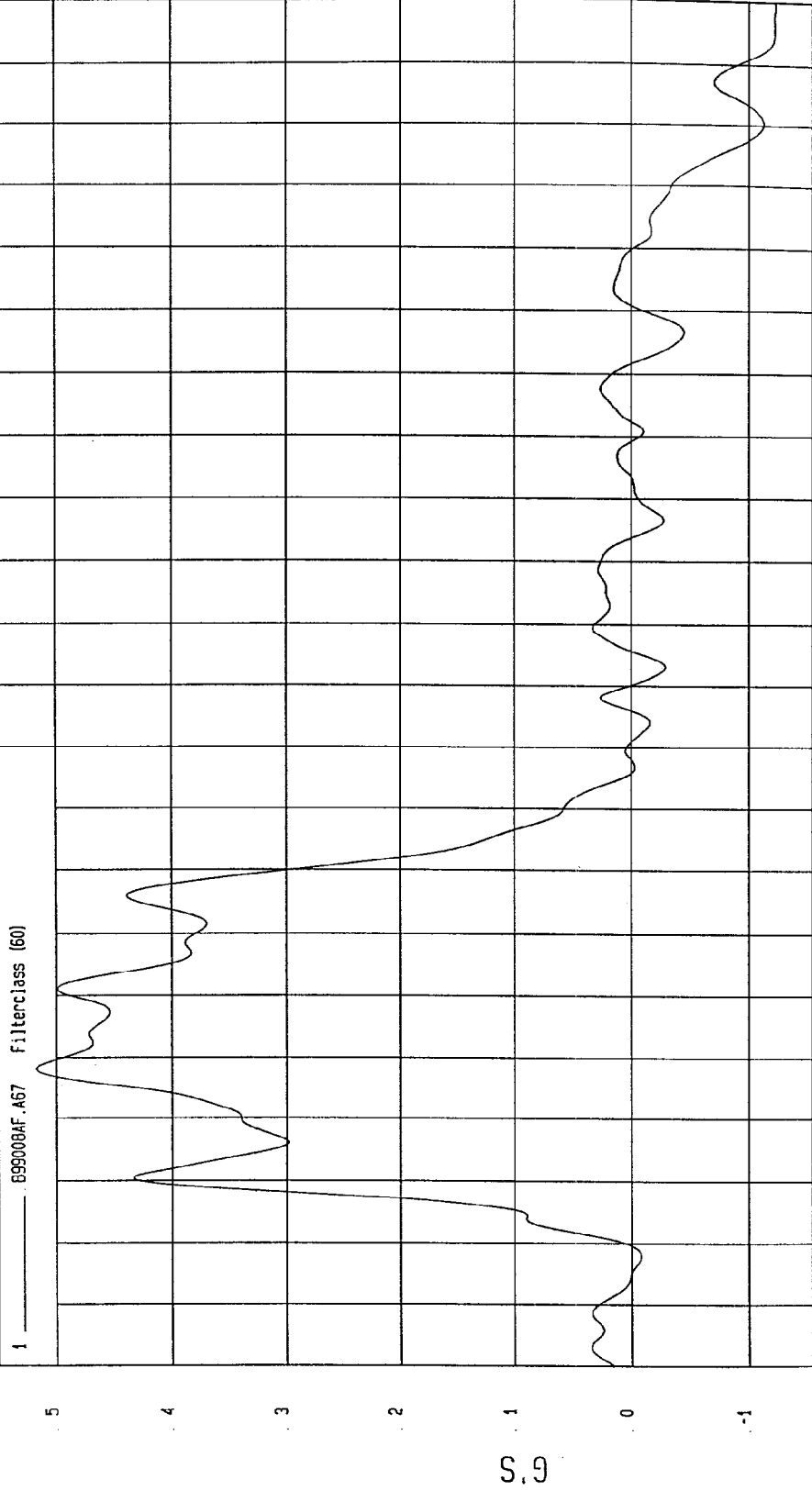


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -1.23 G'S at 199 msec Maximum = 5.18 G'S at 28 msec

MOVING BARRIER REAR AXLE Y ACCELERATION



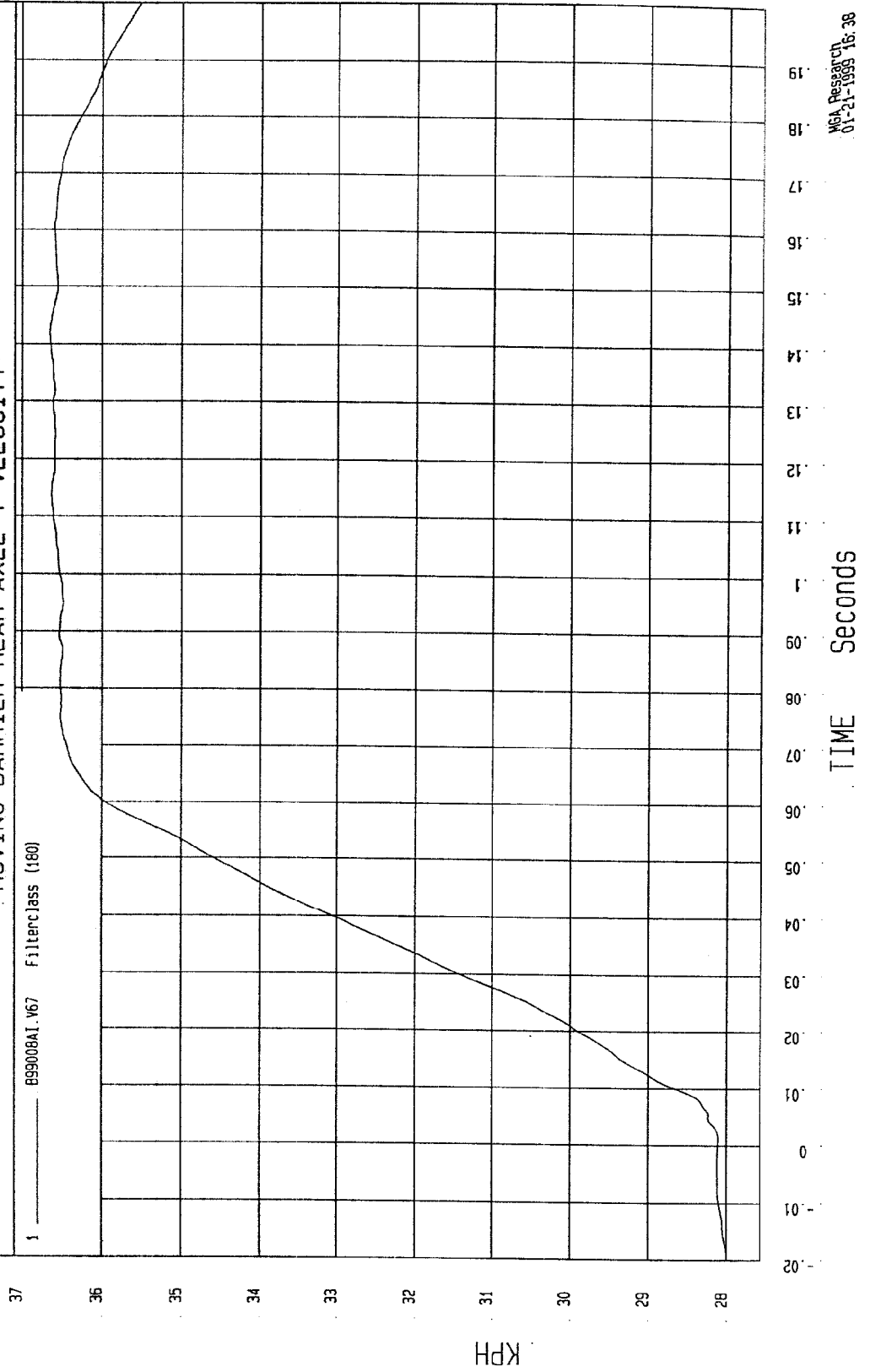
TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

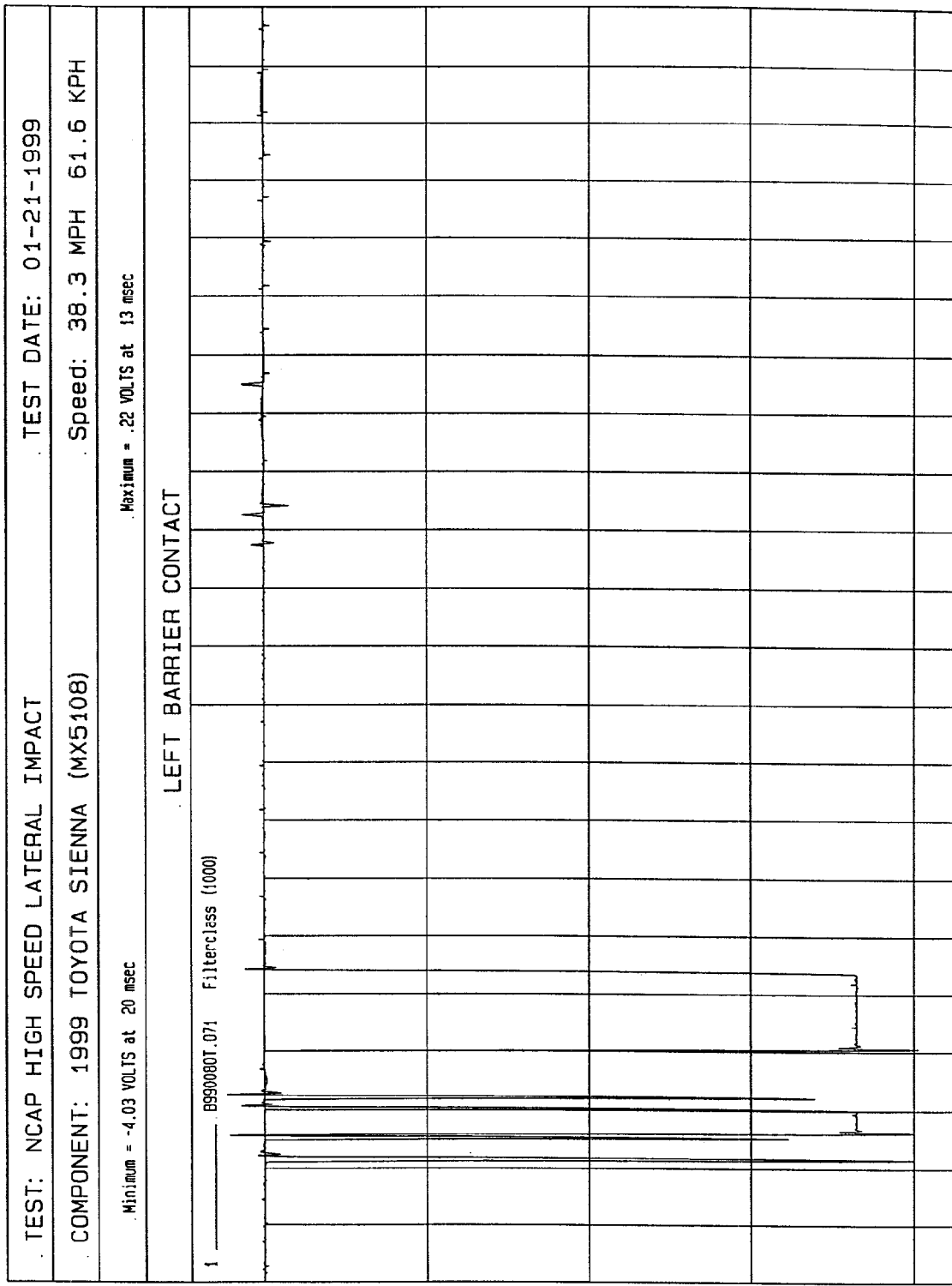
COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = 28 KPH at -20 msec Maximum = 36.65 KPH at 142 msec

MOVING BARRIER REAR AXLE Y VELOCITY



MGA Research
01-21-1999 16:38



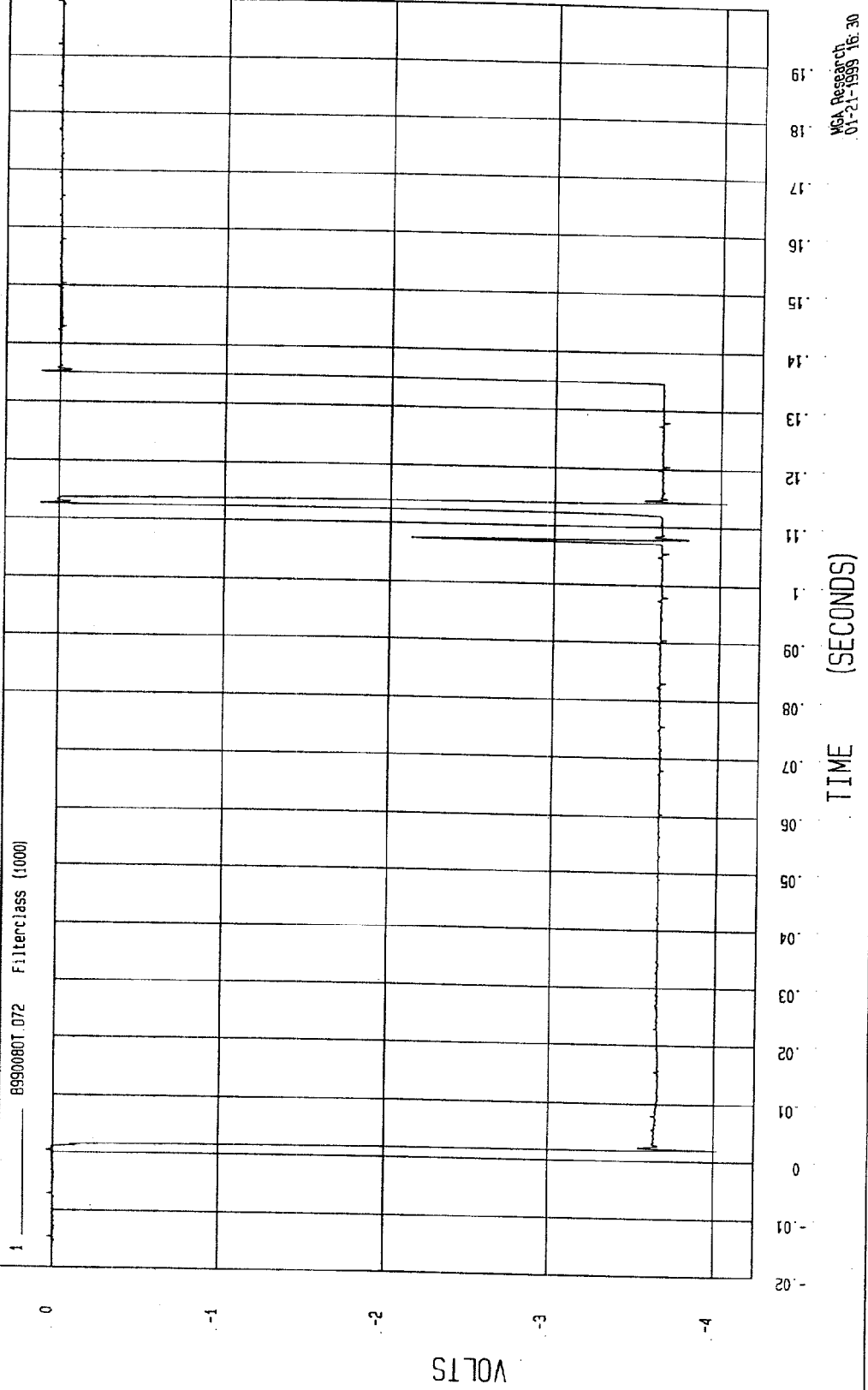
NSA Research
01-21-1999 16:30

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -4.04 VOLTS at 114 msec Maximum = .11 VOLTS at 113 msec

RIGHT BARRIER CONTACT

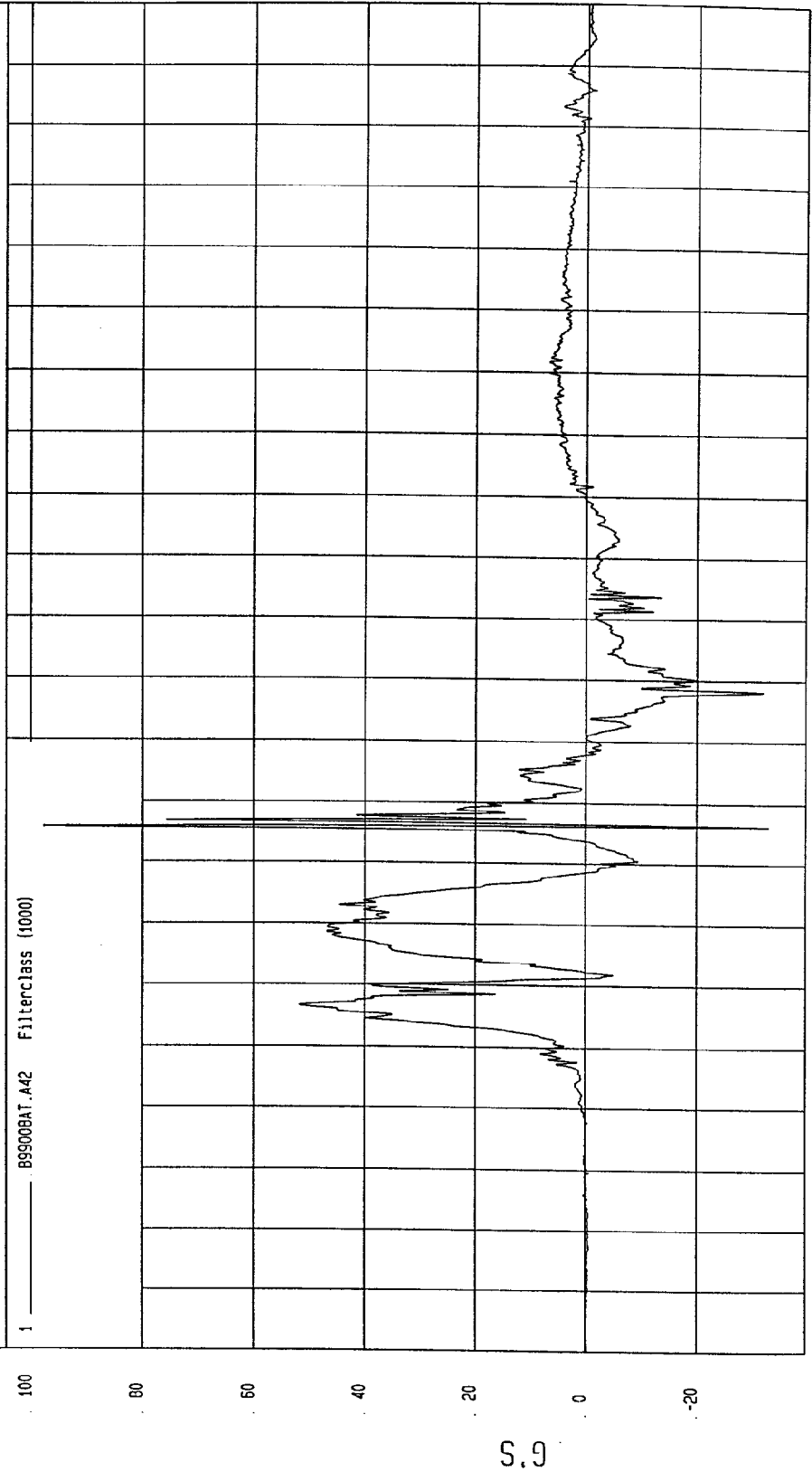


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -33.01 G'S at 66 msec Maximum = 97.79 G'S at 66 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TIME (SECONDS)

NCA Research
01-21-1999 16.09

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -22 KPH at 8 msec Maximum = 34.33 KPH at 78 msec

DRIVER UPPER RIB Y REDUNDANT VELOCITY

1 ——— B99008A1.V42 Filterclass (180)

36

34

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

KPH

-0.02

-0.01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME Seconds

MGA Research
01-21-1999 16:21

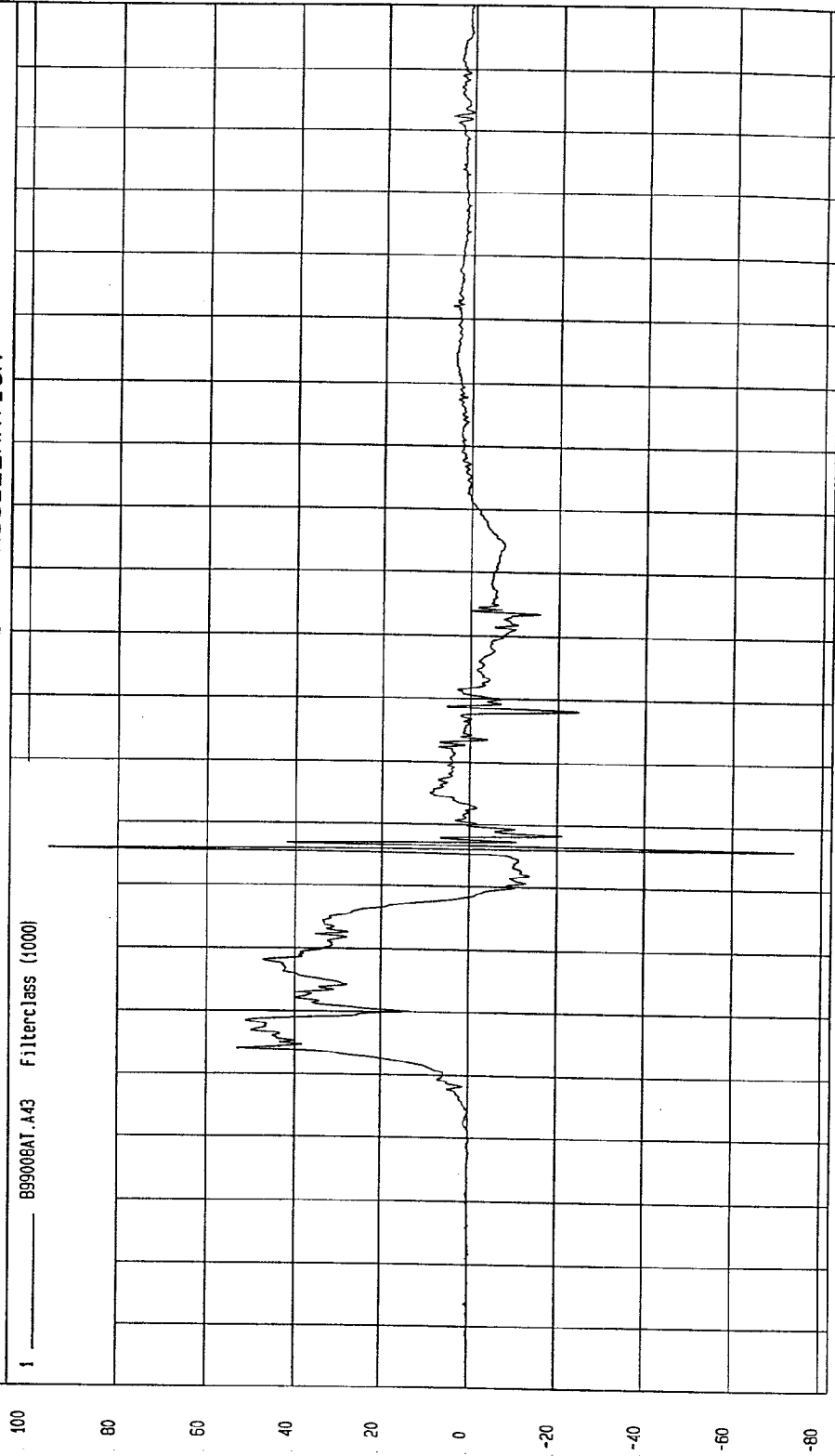
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -73.76 G'S at 66 msec Maximum = 95.54 G'S at 66 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION

1 B99008AT.A43 Filterclass (1000)



NCA Research
01-21-1999 16.09

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Speed: 38.3 MPH 61.6 KPH

Minimum = -8.32E-03 KPH at -13 msec

Maximum = 32.97 KPH at 200 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY

1 ——— B59008A1.V43 Filterclass (180)

34

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

KPH

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME Seconds

MCA Research
01-21-1999 16:21

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 71.81 G'S at 38 msec

Minimum = -2.1 G'S at 16 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 ——— B99008AF.A44 Filterclass (180)

Data not valid after approx. 44 msec.

70

60

50

40

30

20

10

0

G.S

TIME (SECONDS)

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

MGA Research
01-21-1999 16:16

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

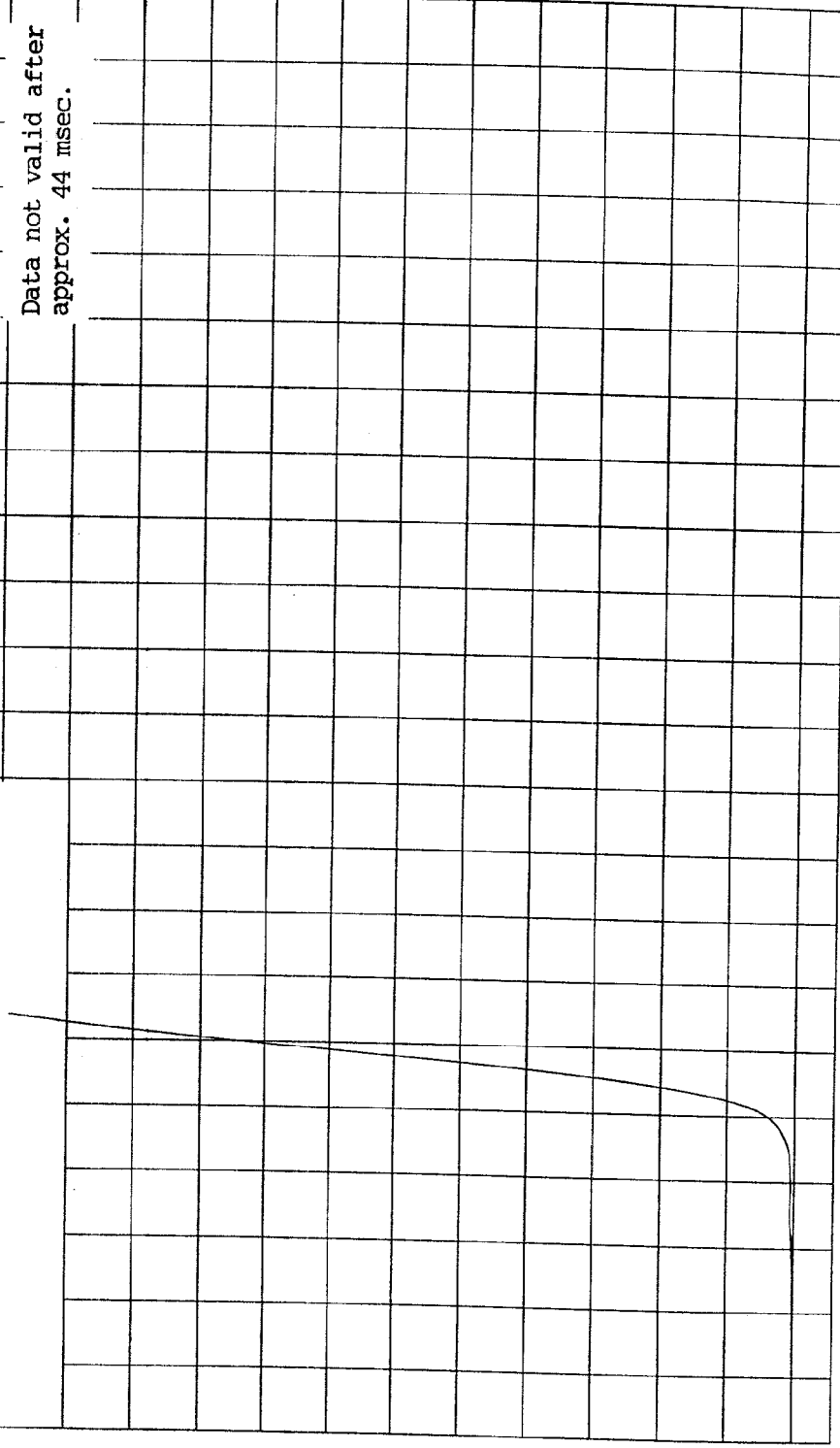
Minimum = 0 KPH at -20 msec Maximum = 23.77 KPH at 44 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 89900BA1.V44 Filterclass (100)

Data not valid after approx. 44 msec.

KPH

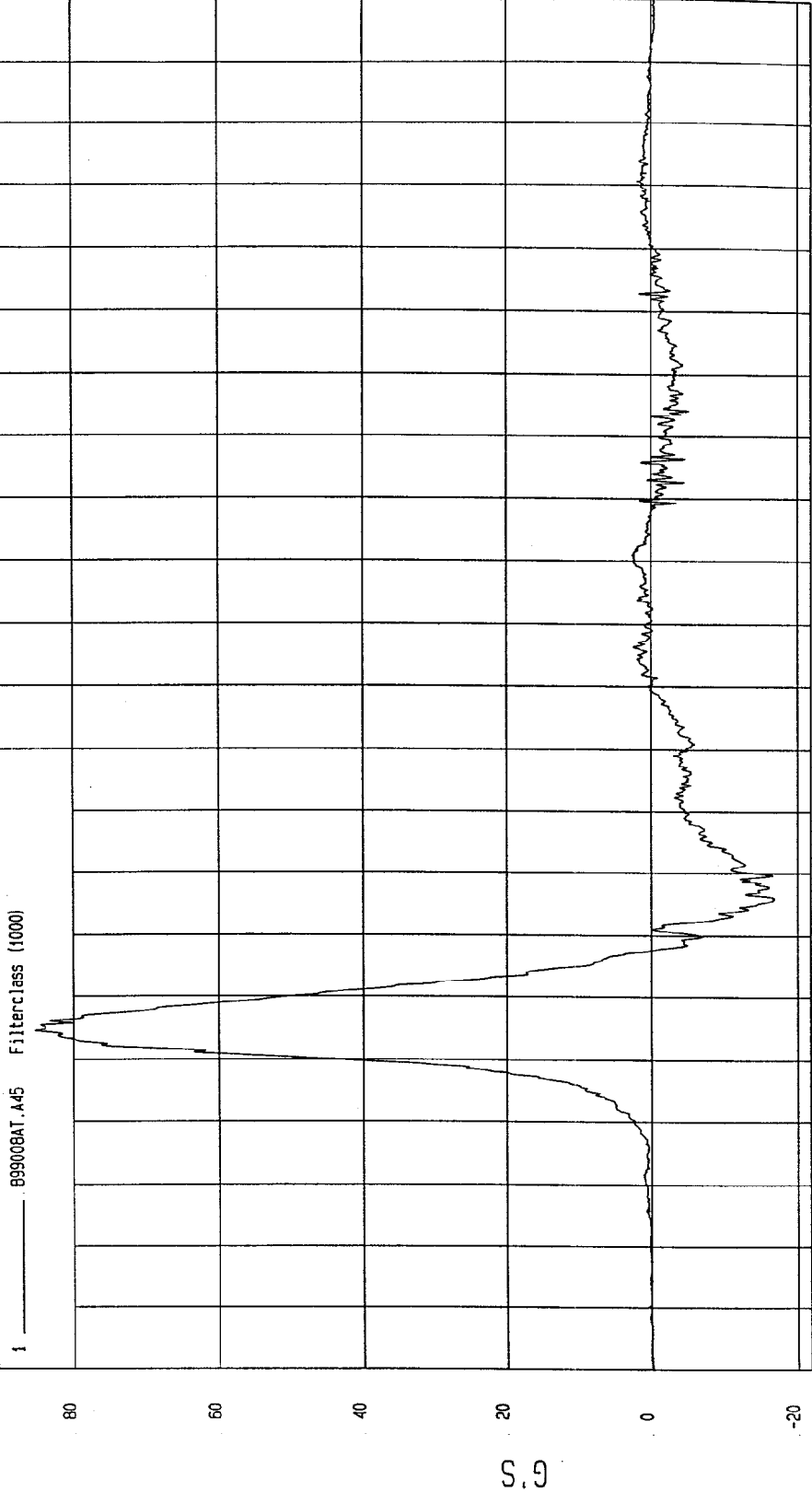


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -16.67 G'S at 56 msec Maximum = 85.52 G'S at 34 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -4.97E-03 KPH at -13 msec

Maximum = 35.74 KPH at 48 msec

DRIVER PELVIS Y REDUNDANT VELOCITY

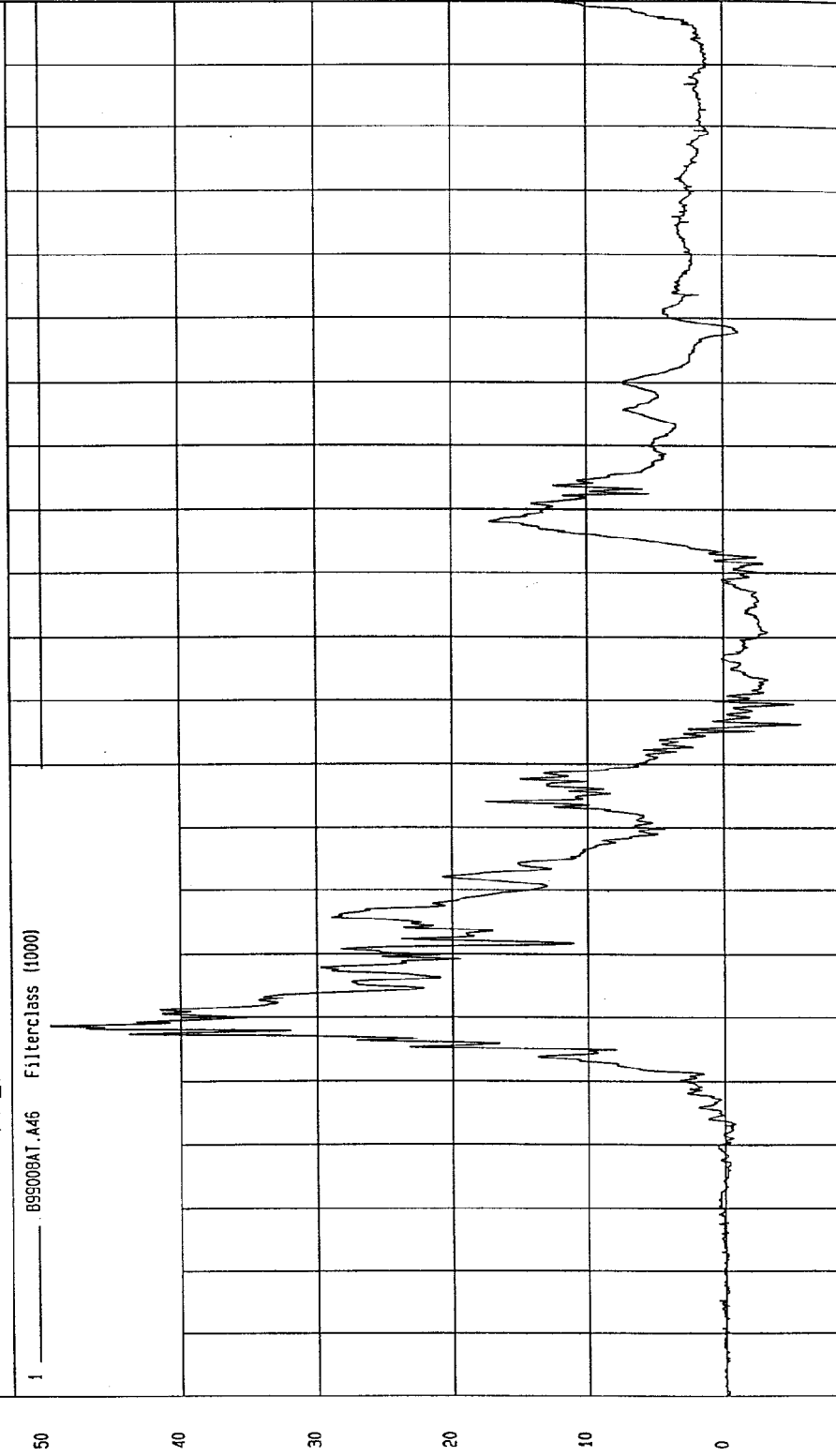


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.75 G'S at 86 msec Maximum = 49.5 G'S at 39 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION



TIME (SECONDS)

WCA Research
01-21-1999 16:09

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

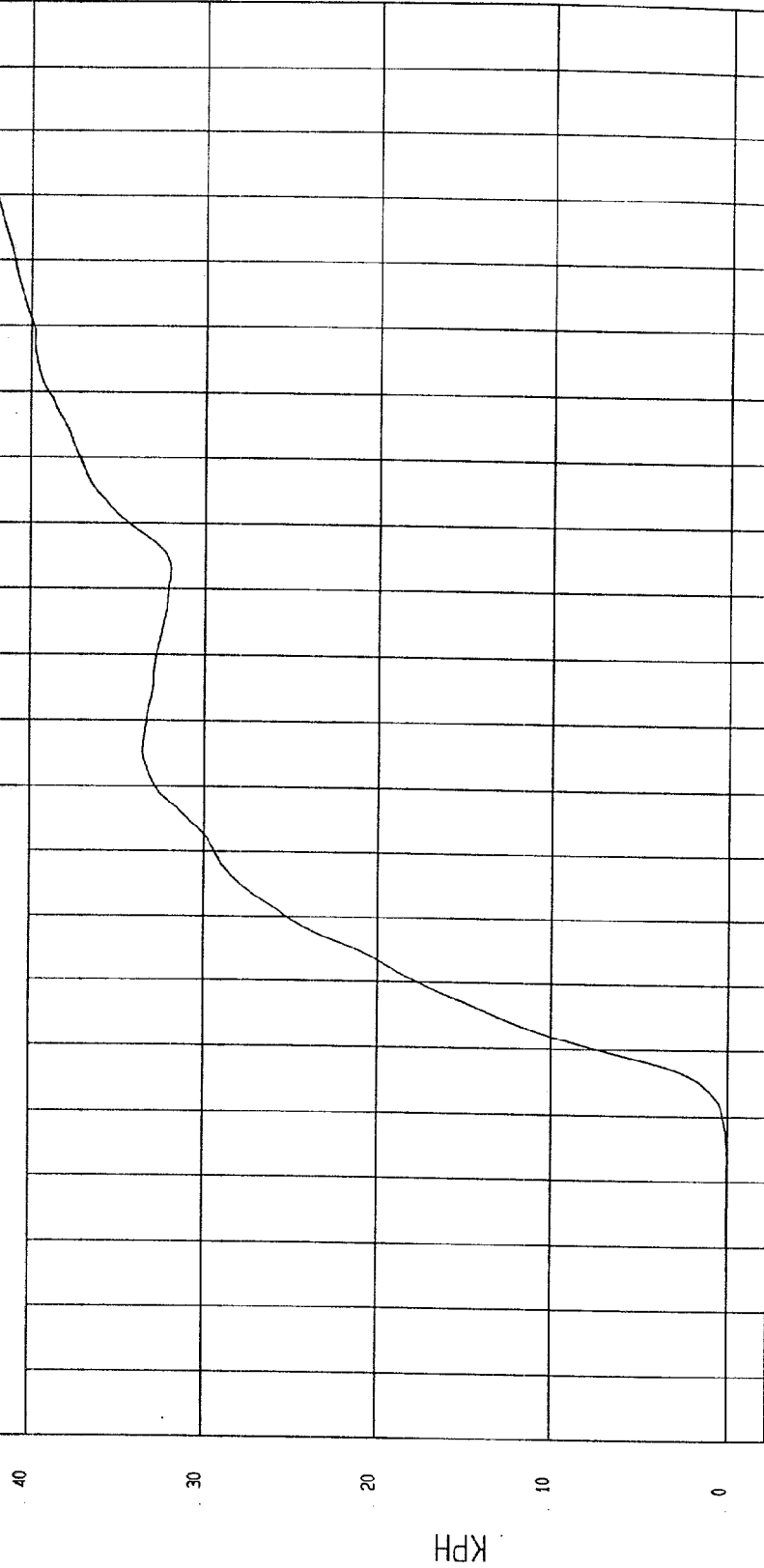
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

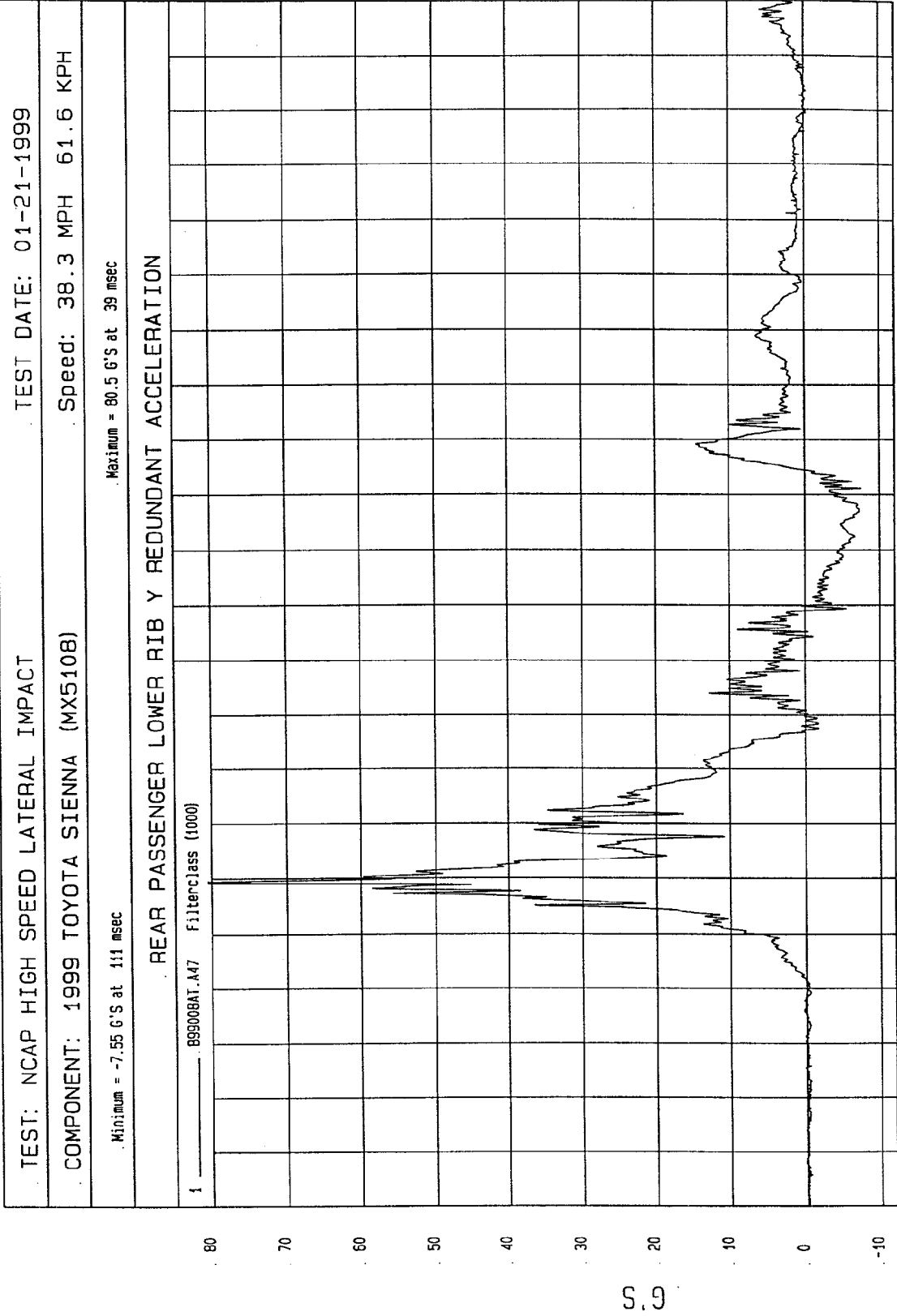
Minimum = -8.59E-03 KPH at -13 msec

Maximum = 44.4 KPH at 200 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 ——— B99008A1.V46 Filterclass (180)





TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

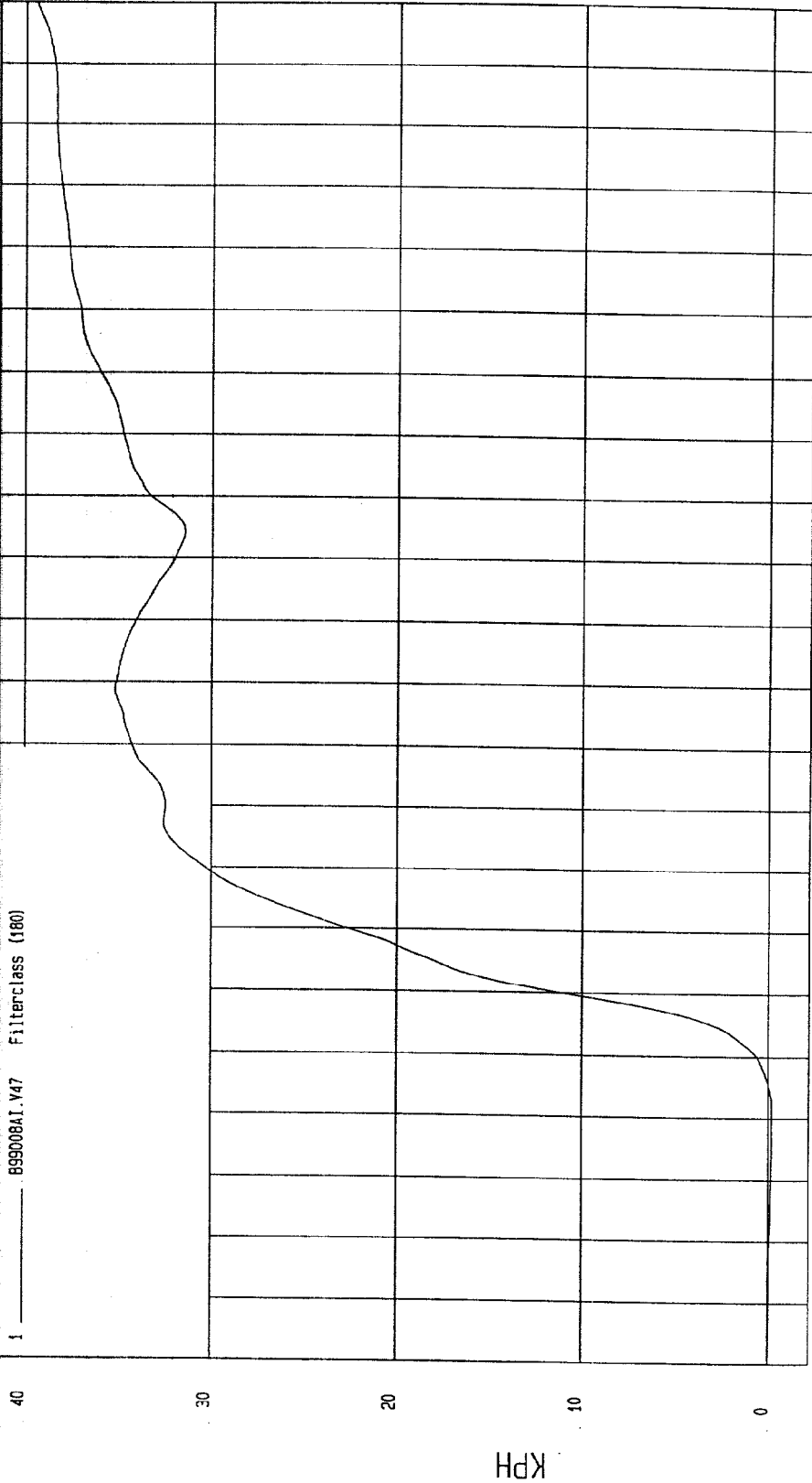
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 39.44 KPH at 200 msec

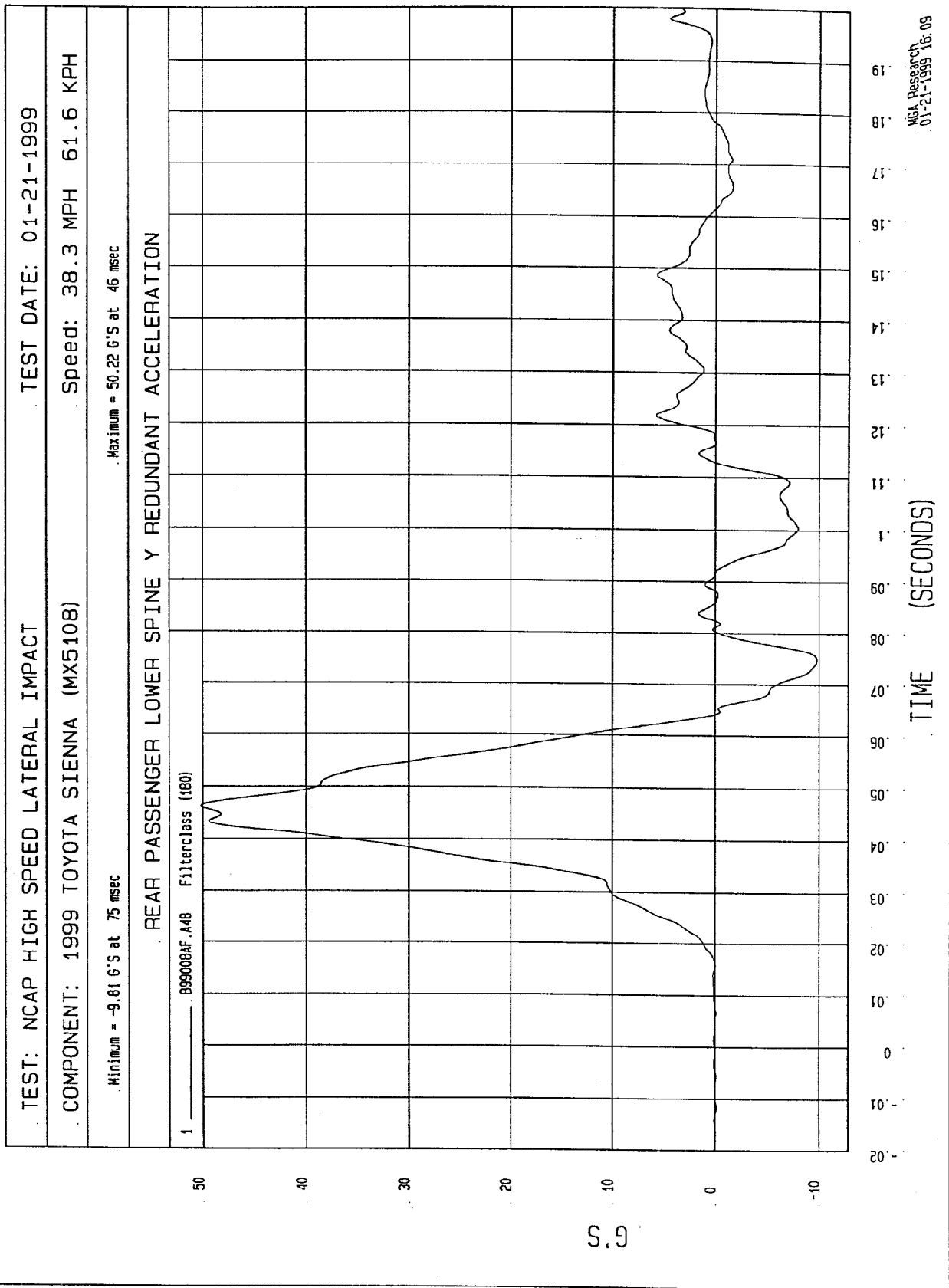
Minimum = -2 KPH at 21 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY

1 899008A1.V47 Filterclass (180)



McA Research
01-21-1999 16:21



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

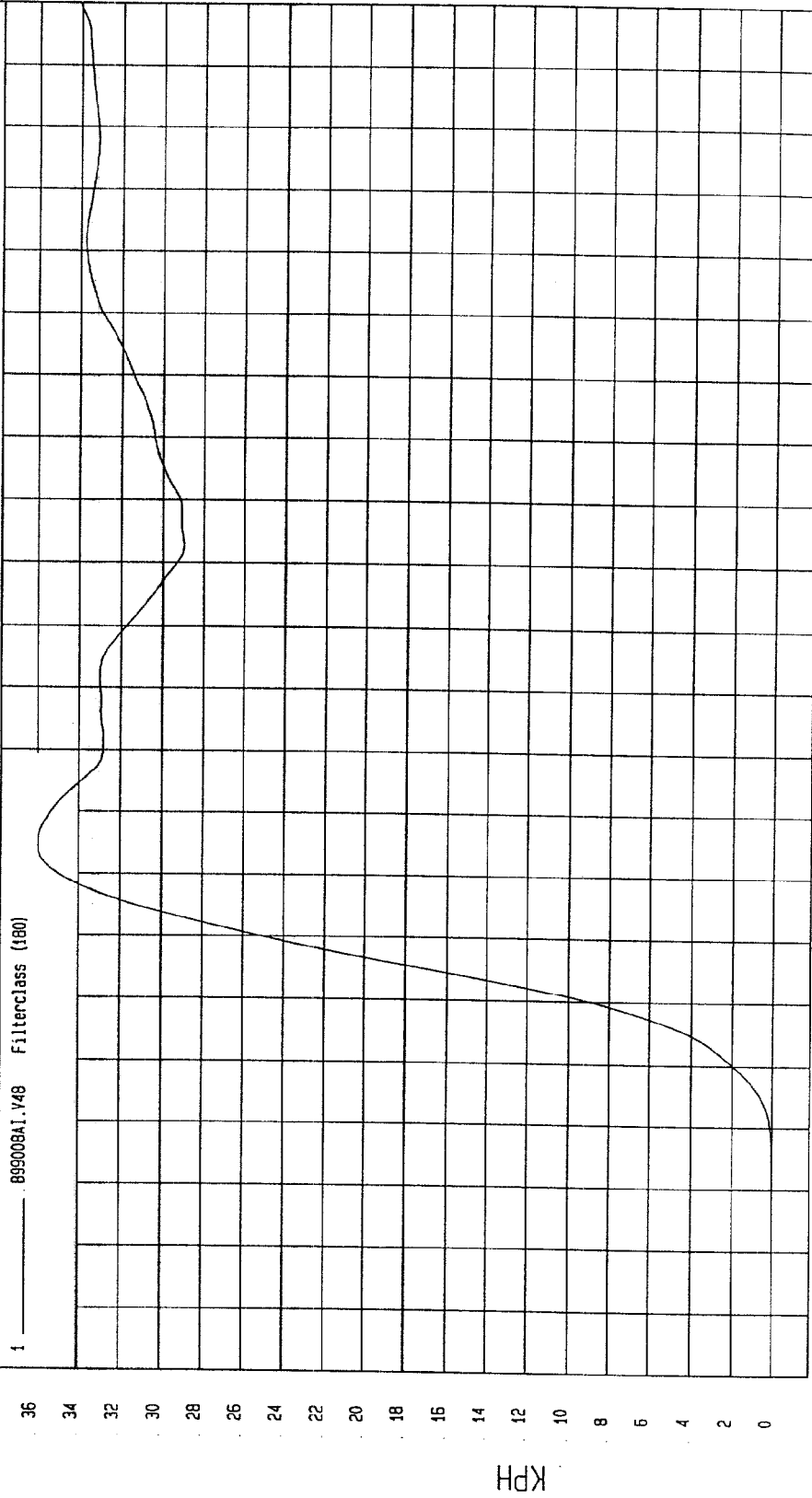
Speed: 38.3 MPH 61.6 KPH

Minimum = 0 KPH at -20 msec

Maximum = 35.97 KPH at 64 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 _____ B99008A1.V48 Filterclass (180)



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

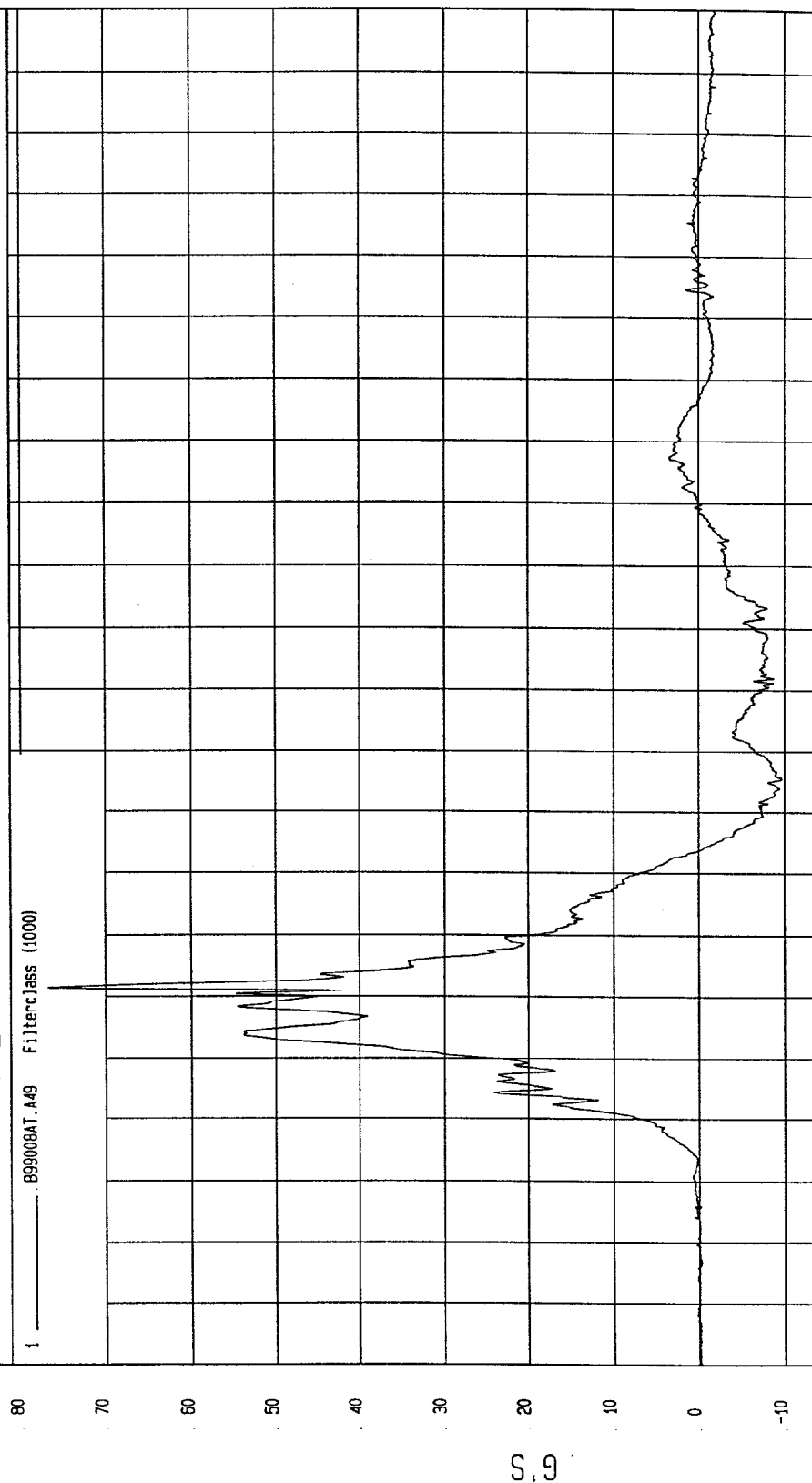
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

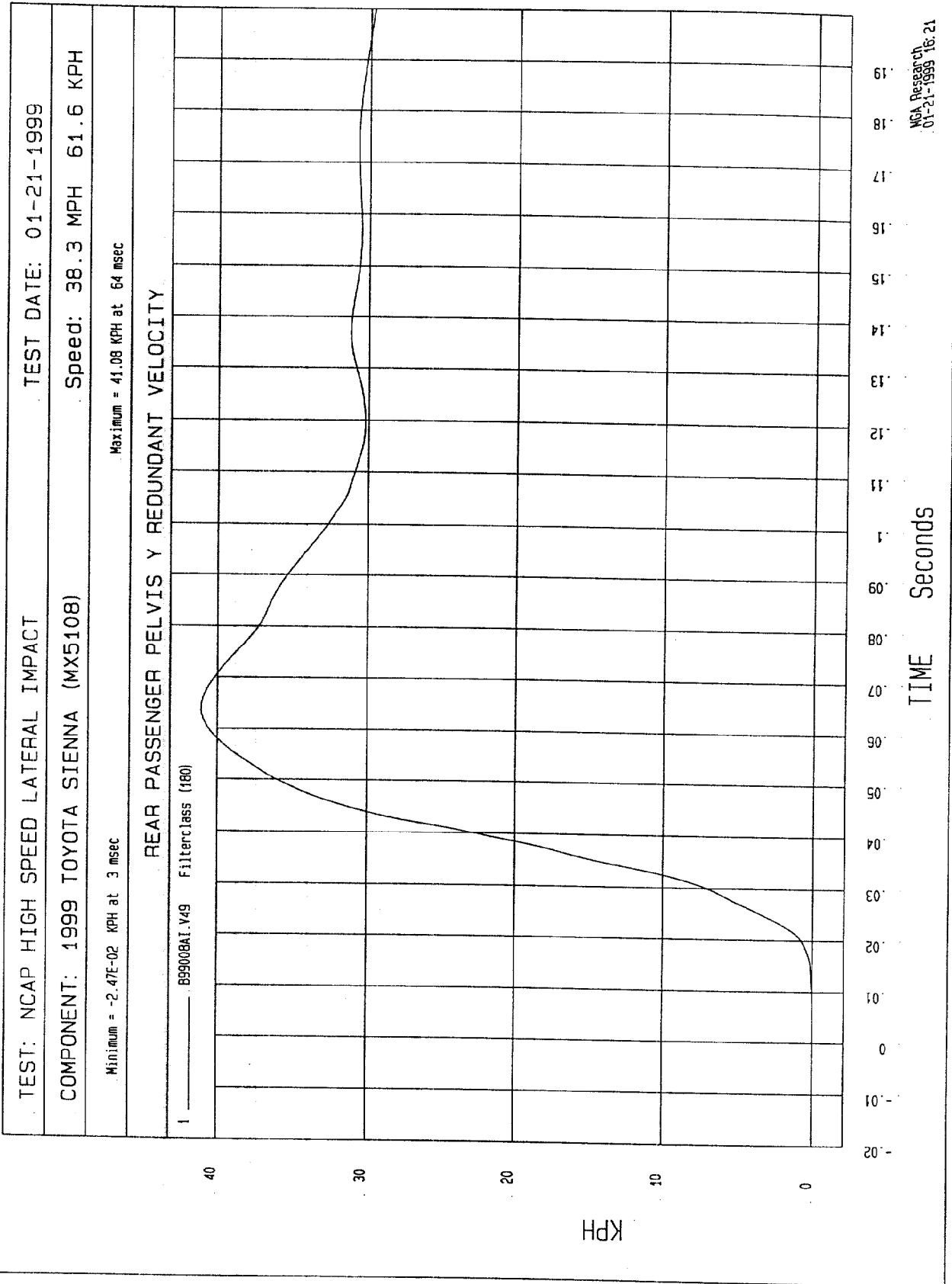
Maximum = 76.89 G'S at 41 msec

Minimum = -9.64 G'S at 75 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 _____ B99008AT.A49 FilterClass (1000)

MCA Research
01-21-1999 16:10



MOA Research
01-21-1999 16:21

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

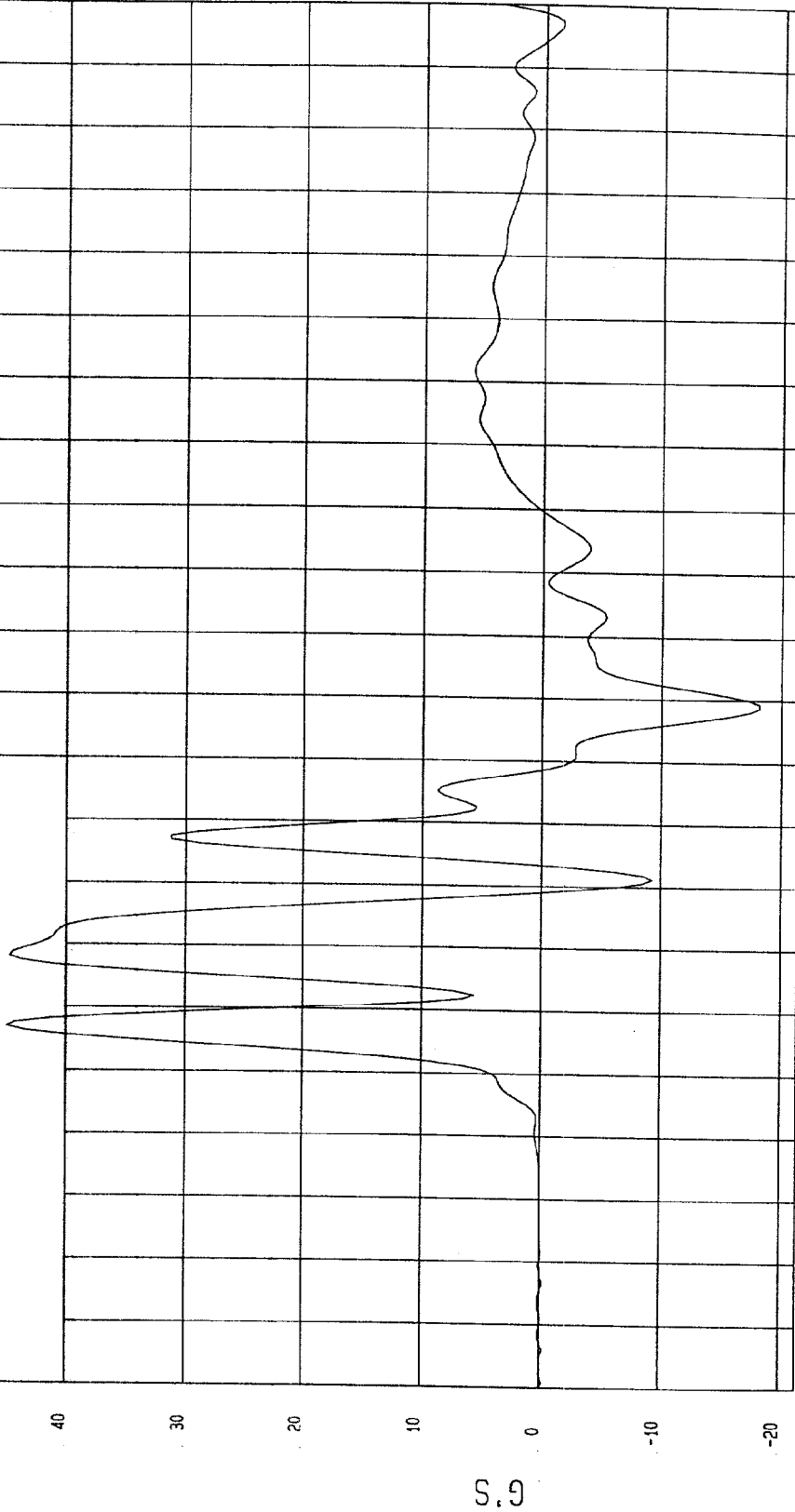
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 45.01 G'S at 37 msec

Minimum = -18.21 G'S at 89 msec

DRIVER UPPER RIB Y ACCELERATION

1 — 895008F1.R15 FilterClass (FIR Filtered)



TIME (SECONDS)

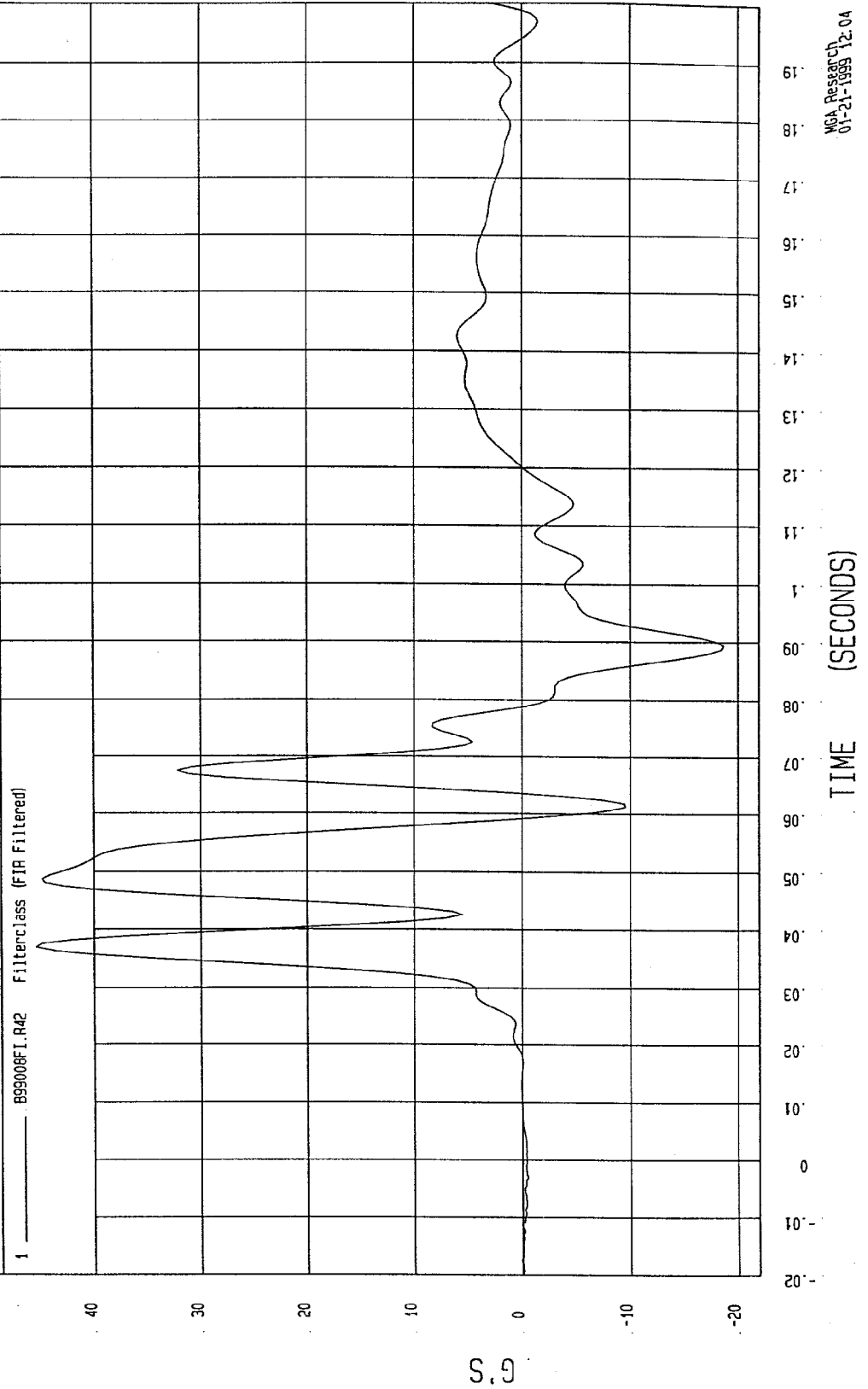
MOA Research
01-21-1999 15:47

TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -18.73 G's at 89 msec Maximum = 45.44 G's at 37 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION



TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

SPEED: 38.3 MPH 61.6 KPH

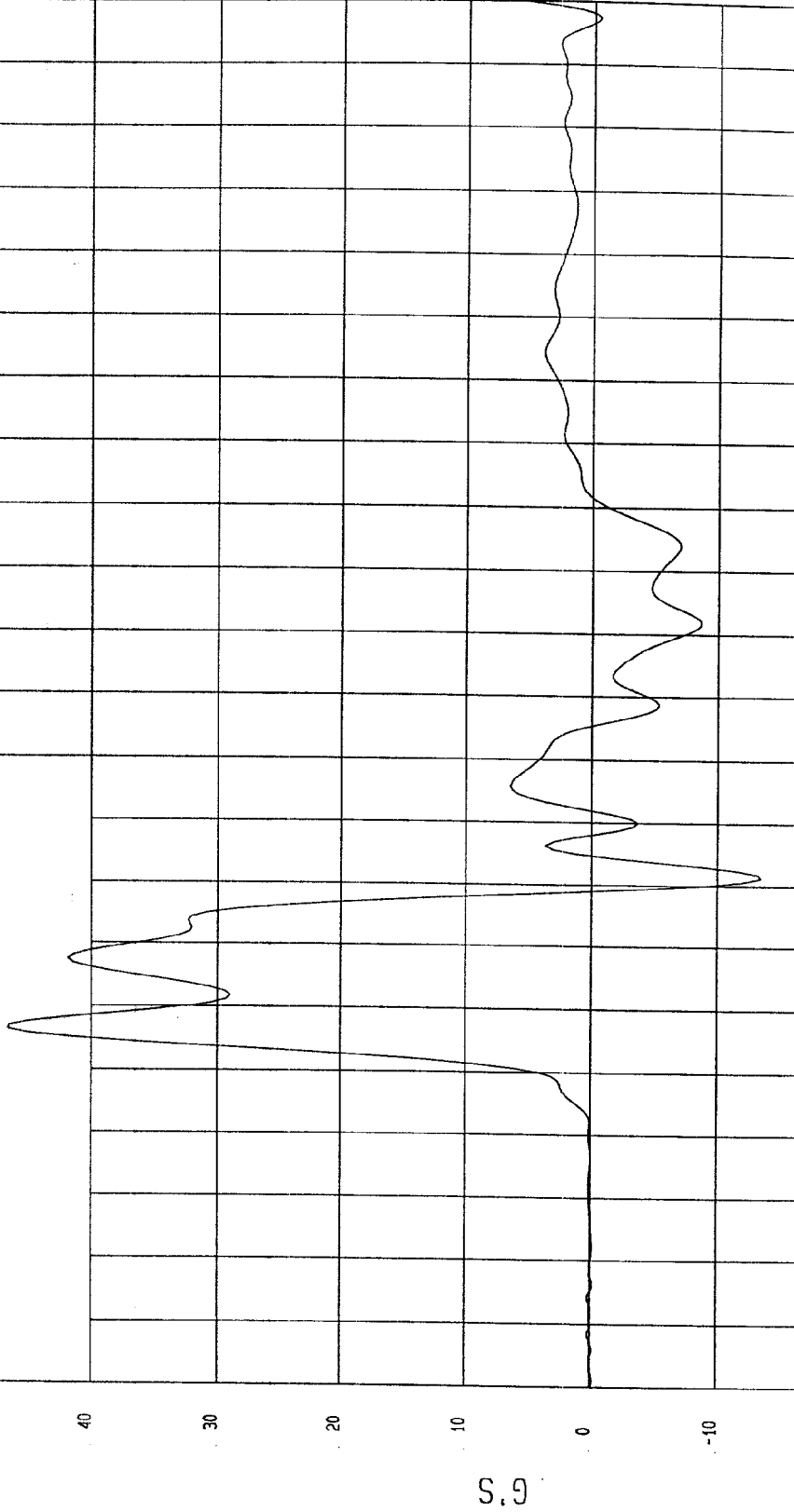
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 46.53 G'S at 36 msec

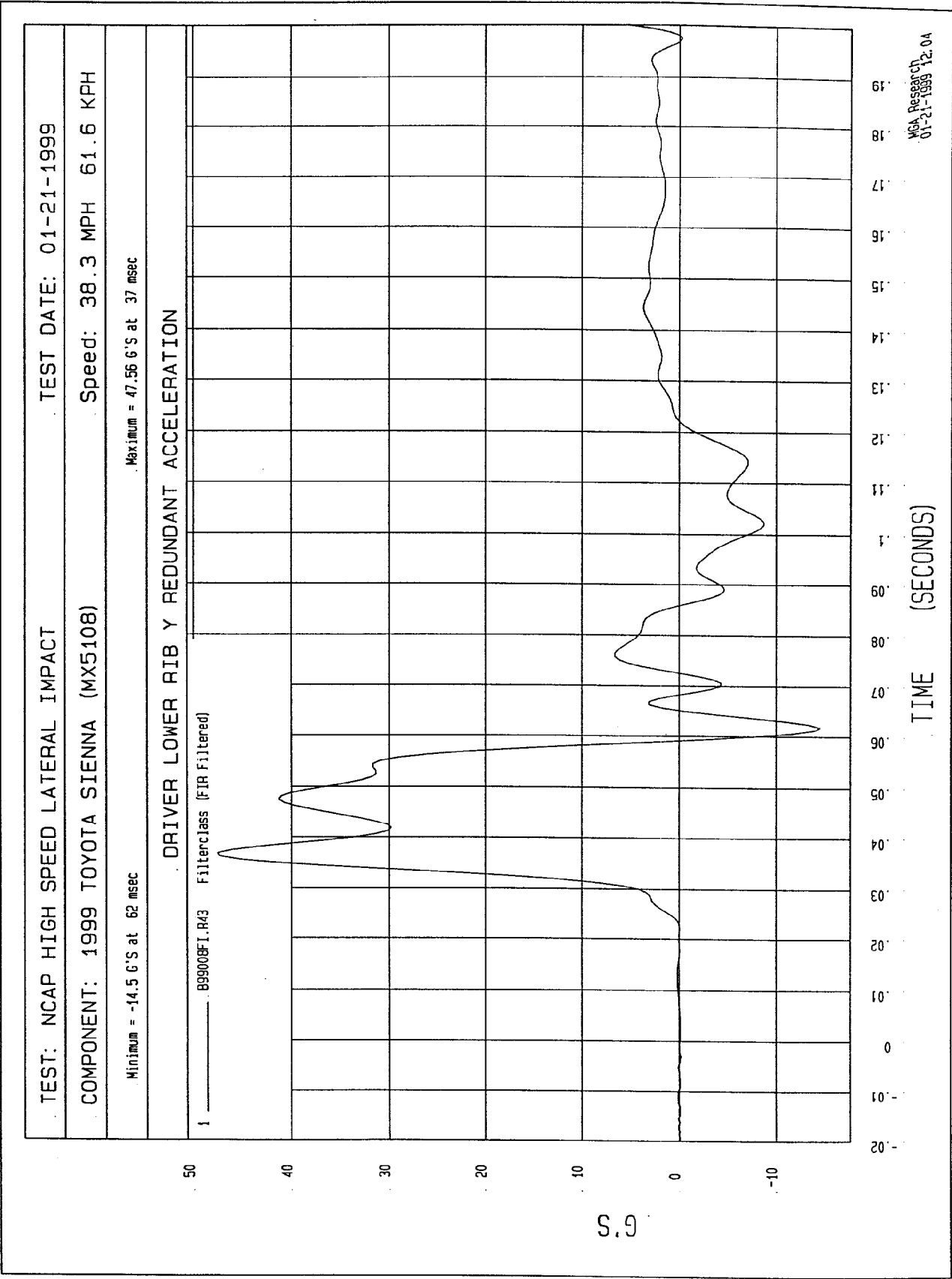
Minimum = -13.38 G'S at 61 msec

DRIVER LOWER RIB Y ACCELERATION

1 _____ B95008F1.R16 Filterclass (FIR Filtered)



TIME (SECONDS)

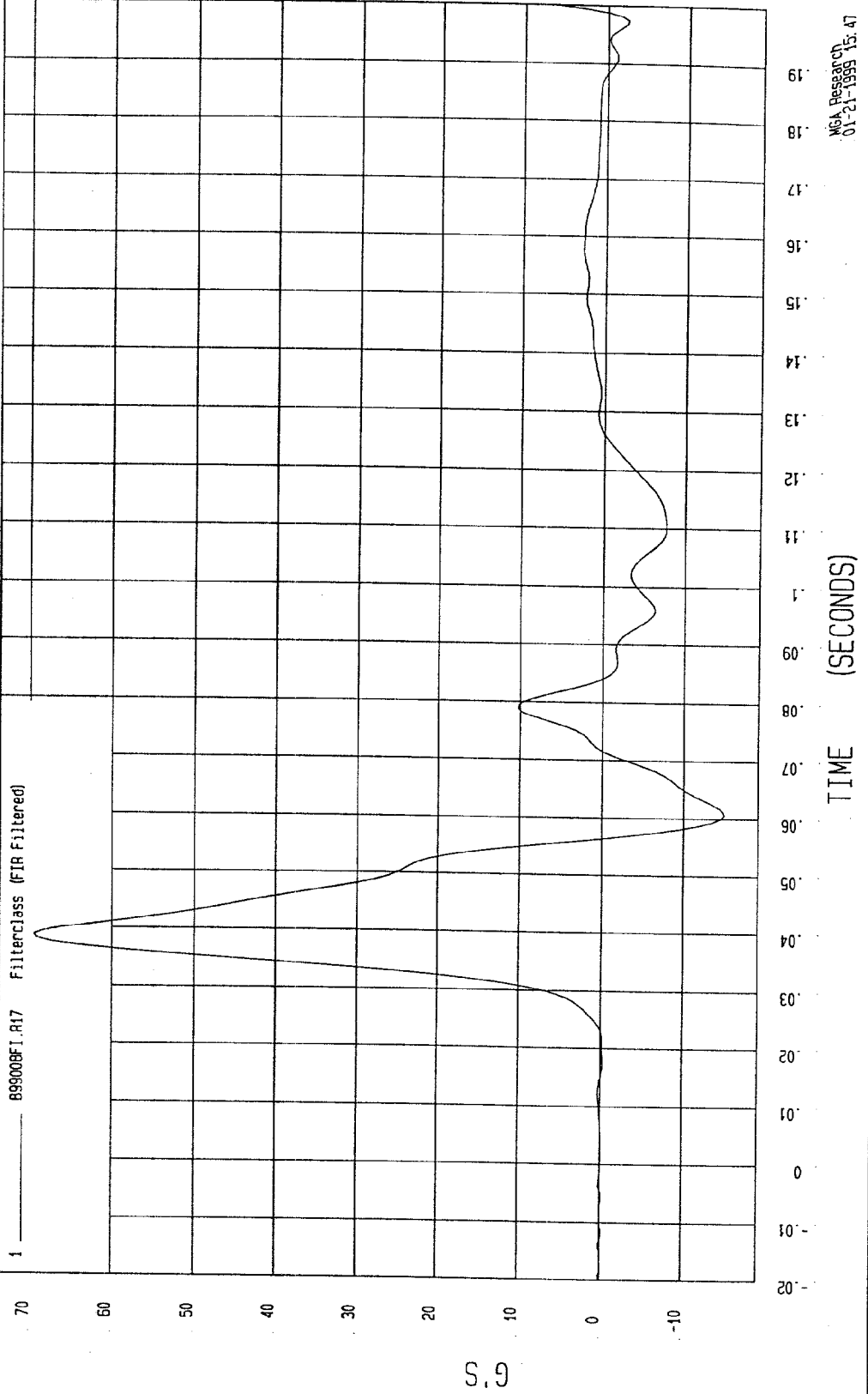


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -14.99 G'S at 61 msec Maximum = 69.48 G'S at 39 msec

DRIVER LOWER SPINE Y ACCELERATION

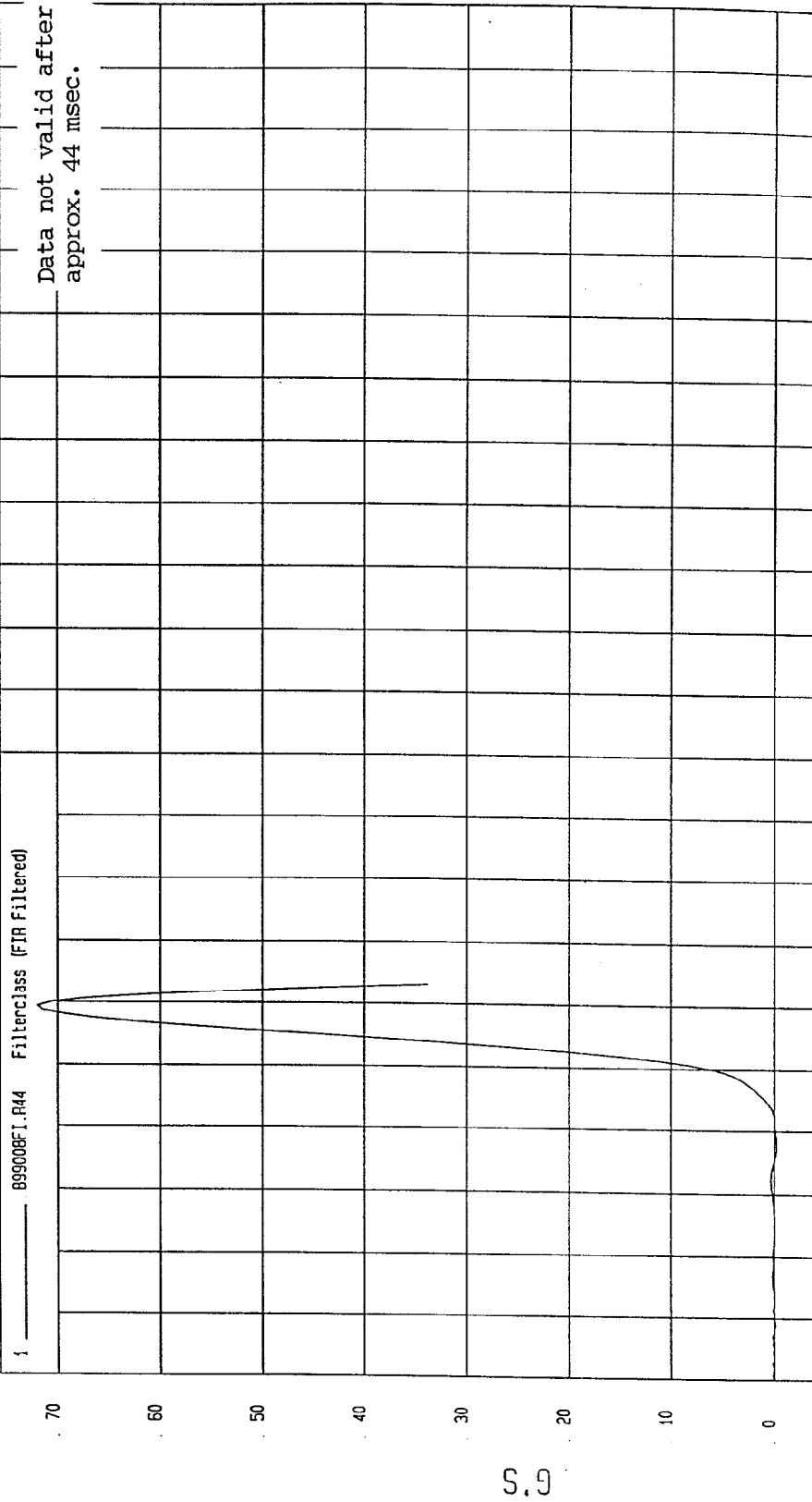


TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -.25 G'S at .18 msec
Maximum = 71.92 G'S at .39 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

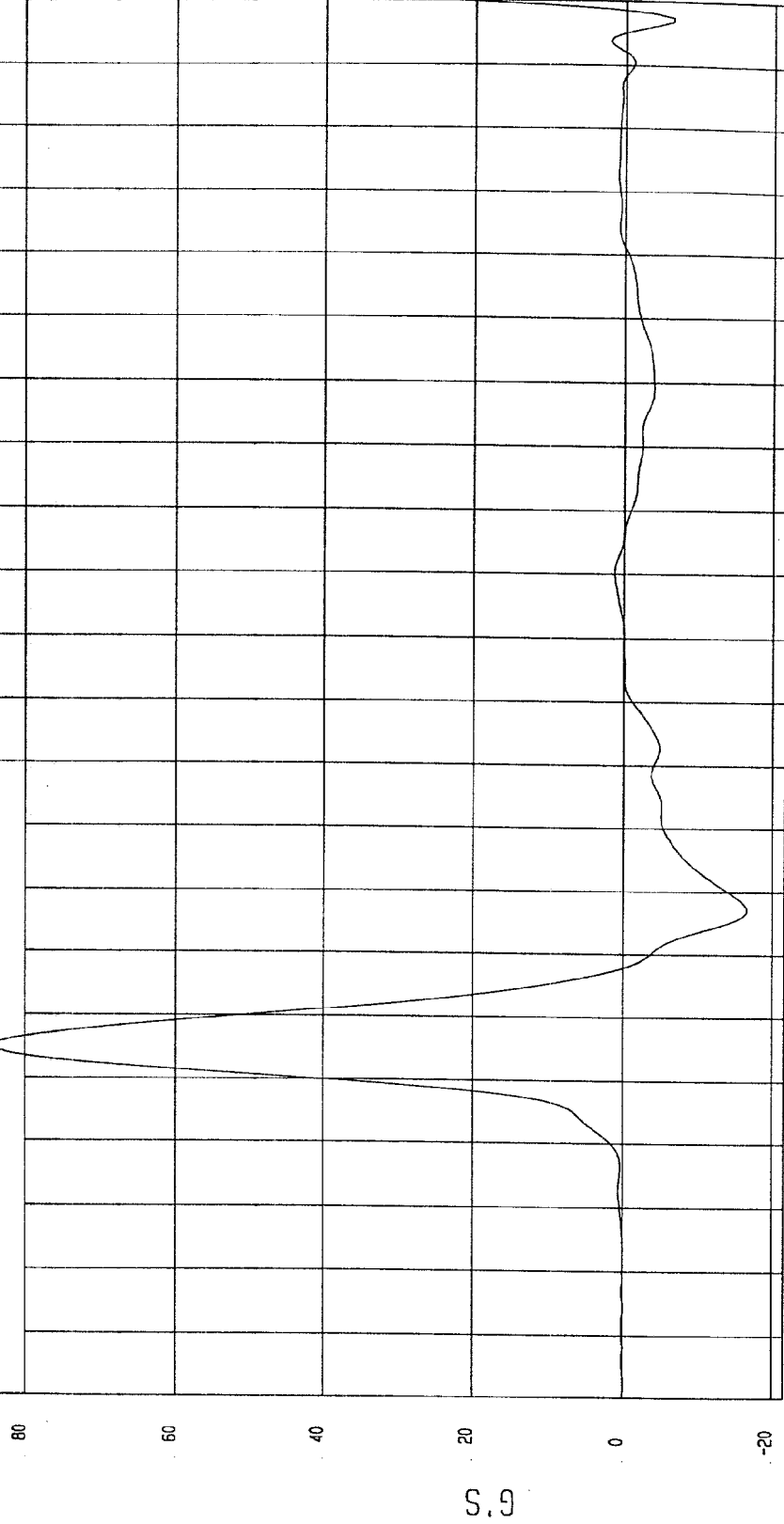
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 84.44 G'S at 35 msec

Minimum = -16.58 G'S at 57 msec

DRIVER PELVIS Y ACCELERATION

1 _____ B99000F1.R18 FilterClass (FIR Filtered)



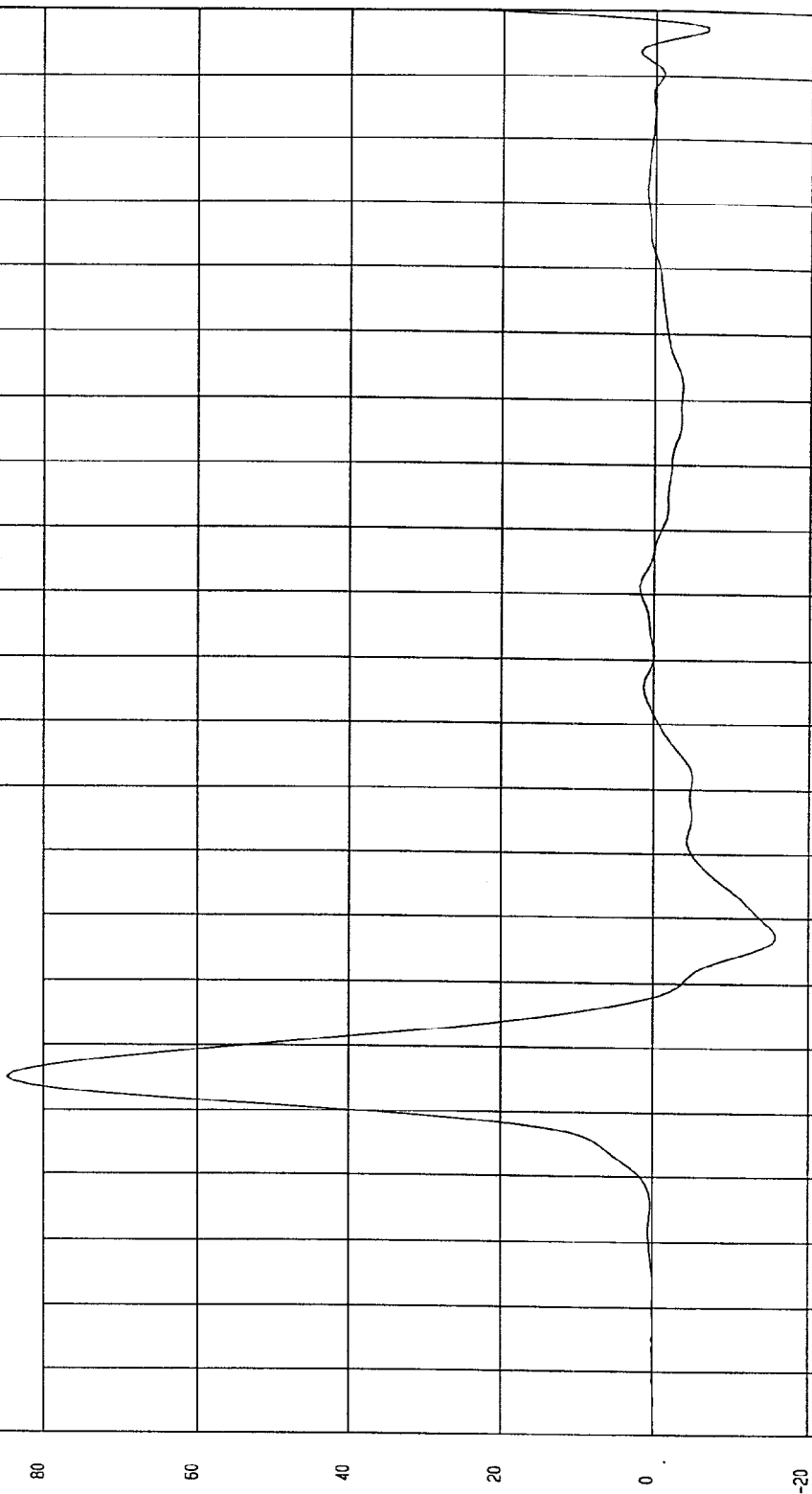
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -15.77 G'S at 58 msec
Maximum = 84.84 G'S at 35 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

1 B99008F1.R45 Filterclass (FIR Filtered)



TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

SPEED: 38.3 MPH 61.6 KPH

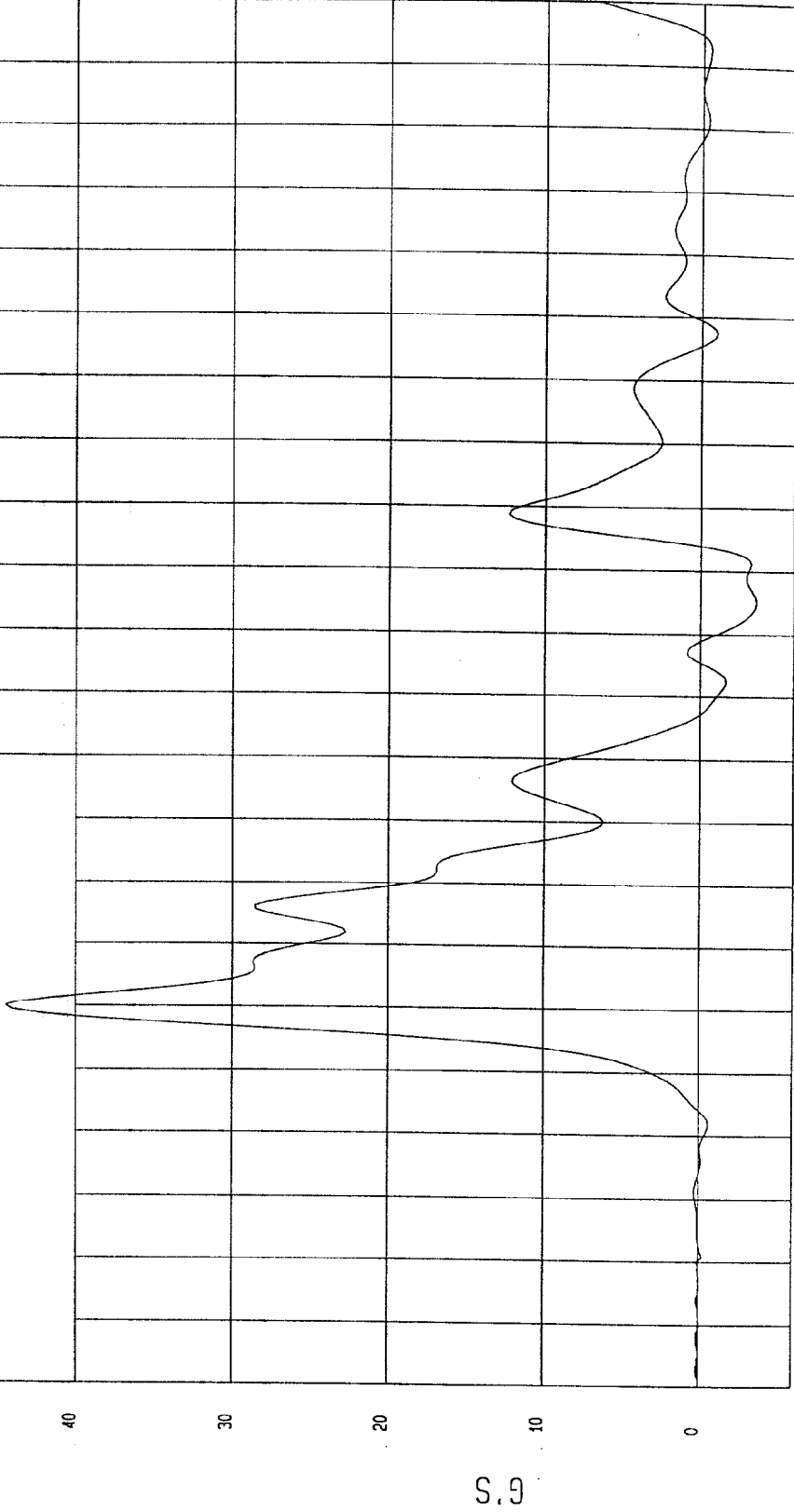
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 44.44 G'S at 40 msec

Minimum = -3.51 G'S at 105 msec

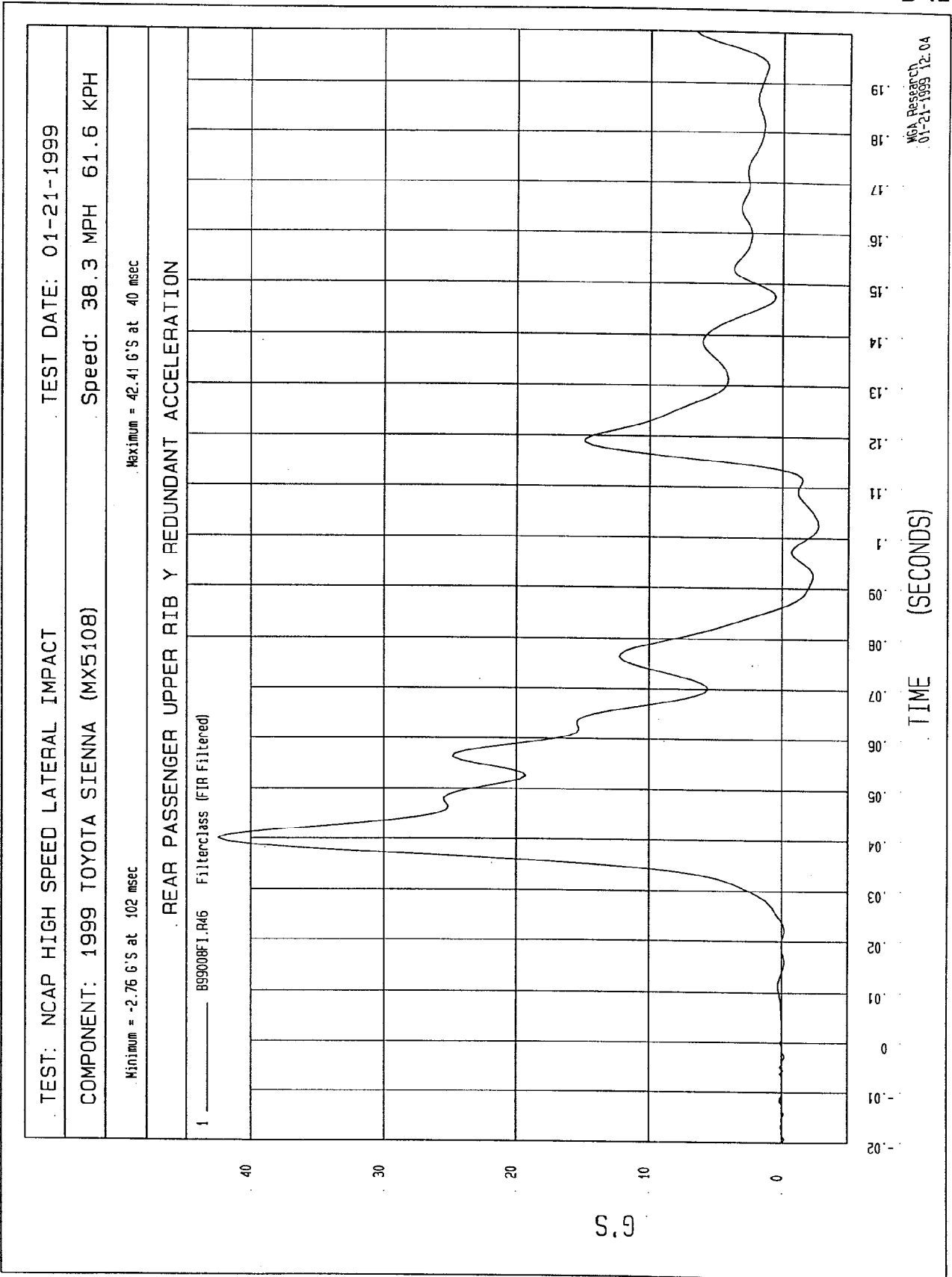
REAR PASSENGER UPPER RIB Y ACCELERATION

1 899008F1.R25 FilterClass (FIR Filtered)



TIME (SECONDS)

MSA Research
01-21-1999 15.48

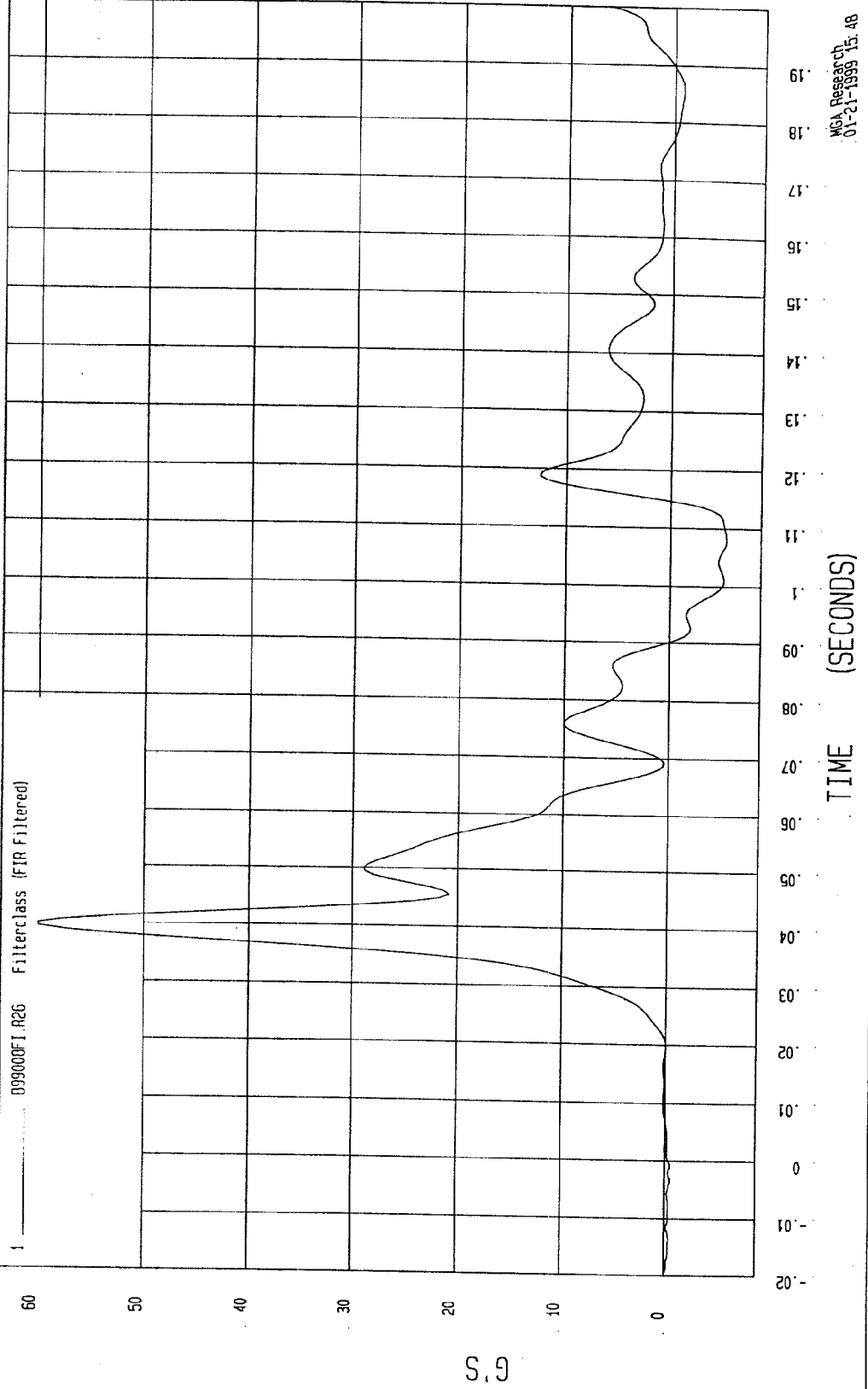


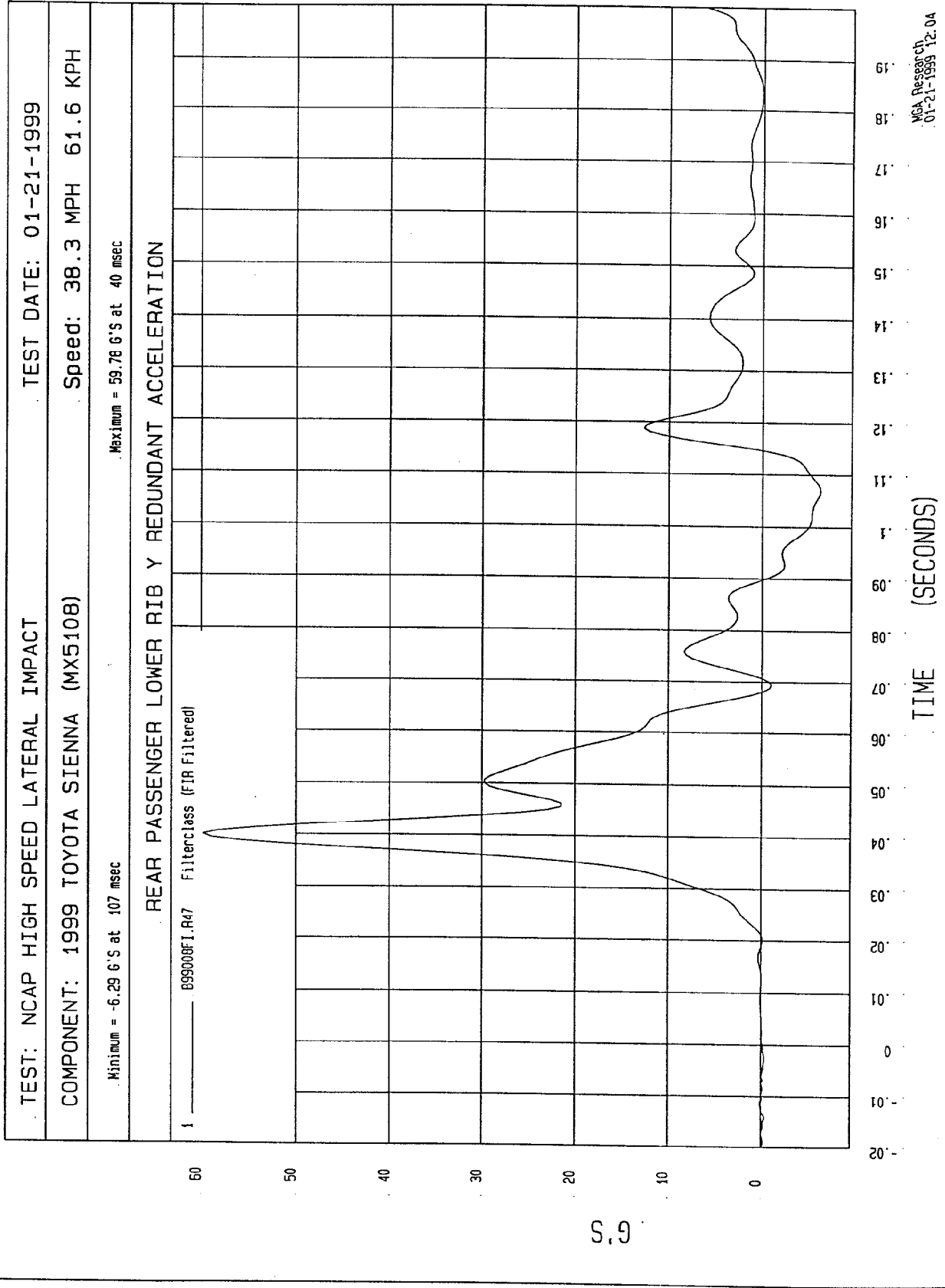
TEST: NCAP HIGH SPEED LATERAL IMPACT TEST DATE: 01-21-1999

COMPONENT: 1999 TOYOTA SIENNA (MX5108) Speed: 38.3 MPH 61.6 KPH

Minimum = -5.33 G'S at 108 msec Maximum = 60.01 G'S at 40 msec

REAR PASSENGER LOWER RIB Y ACCELERATION





TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

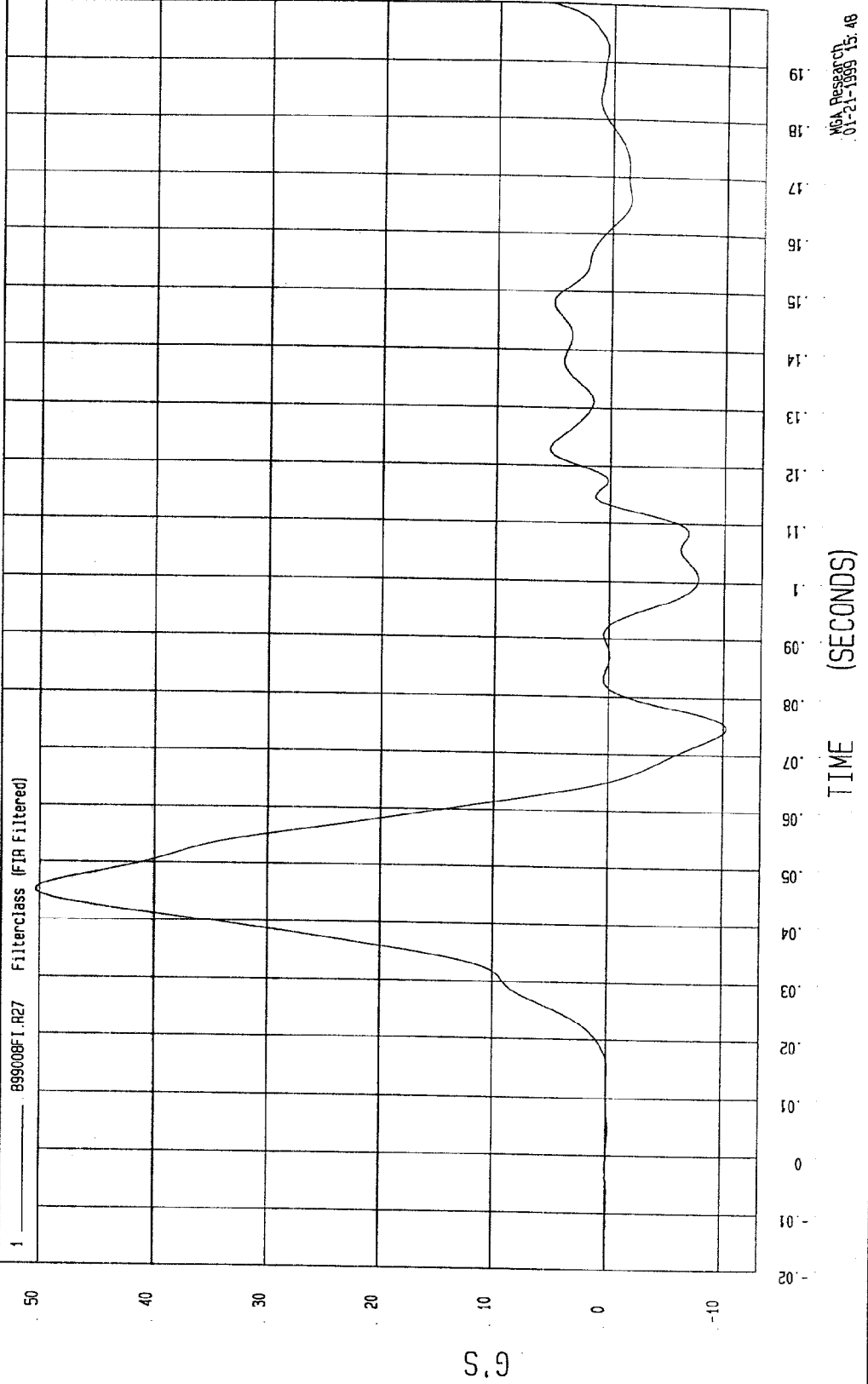
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 50.33 G'S at 45 msec

Minimum = -10.26 G'S at 74 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



MGA Research
01-21-1999 15:48

TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

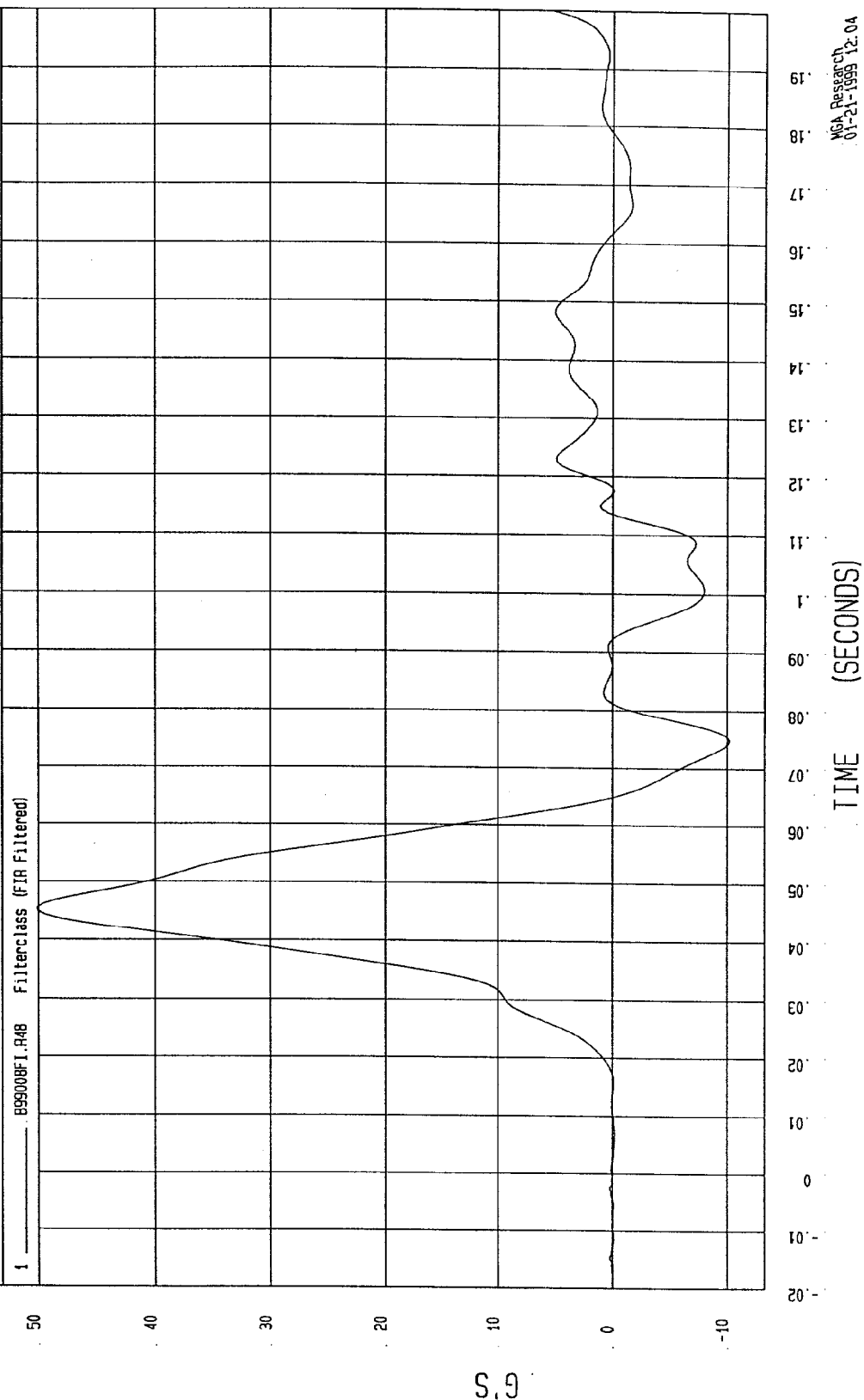
Speed: 38.3 MPH 61.6 KPH

COMPONENT: 1999 TOYOTA SIENNA (MX5108)

Maximum = 50.08 G'S at 46 msec

Minimum = -10.18 G'S at 75 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



TEST: NCAP HIGH SPEED LATERAL IMPACT

TEST DATE: 01-21-1999

Speed: 38.3 MPH 61.6 KPH

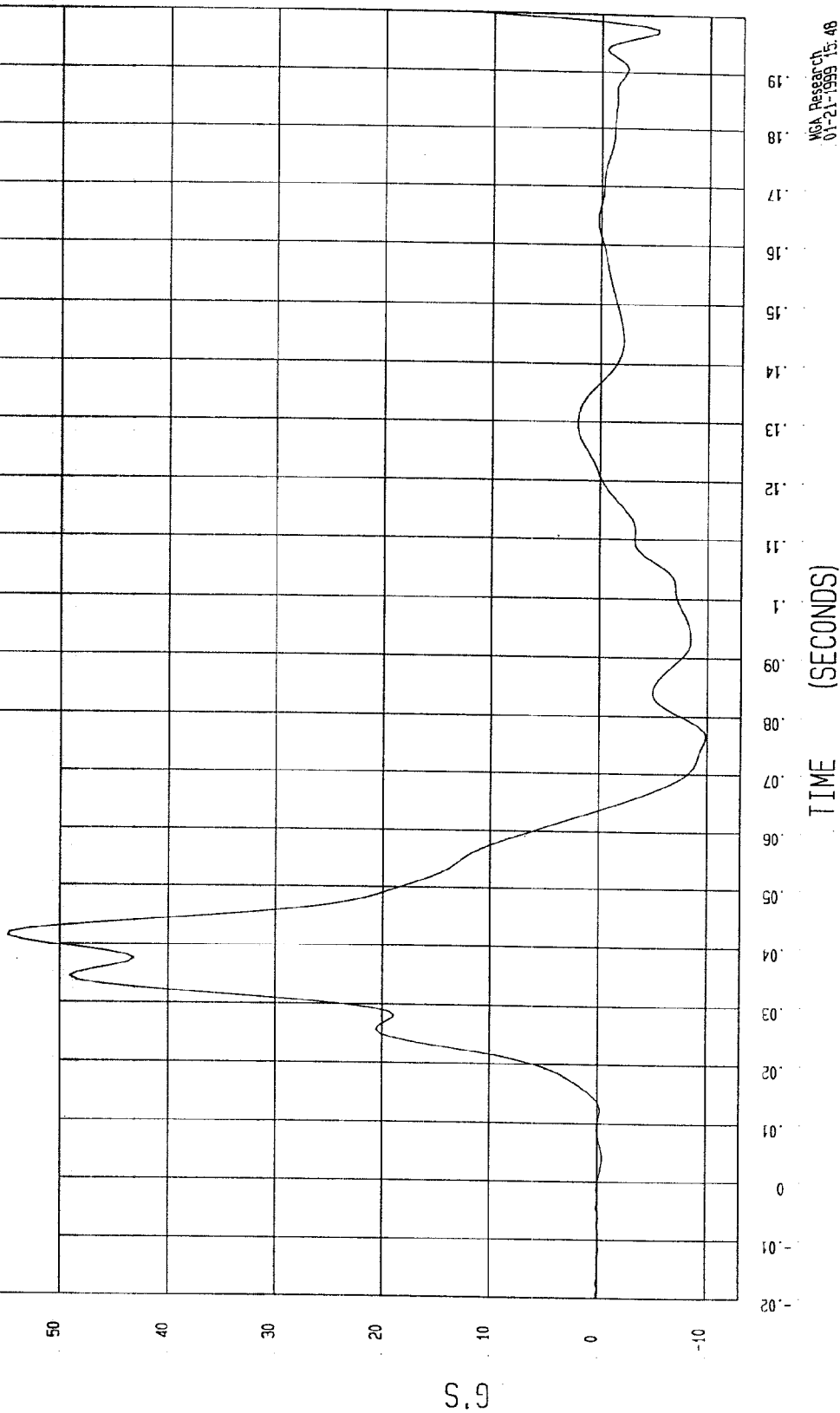
COMPONENT: 1999 TOYOTA SIENNA (MX5108)

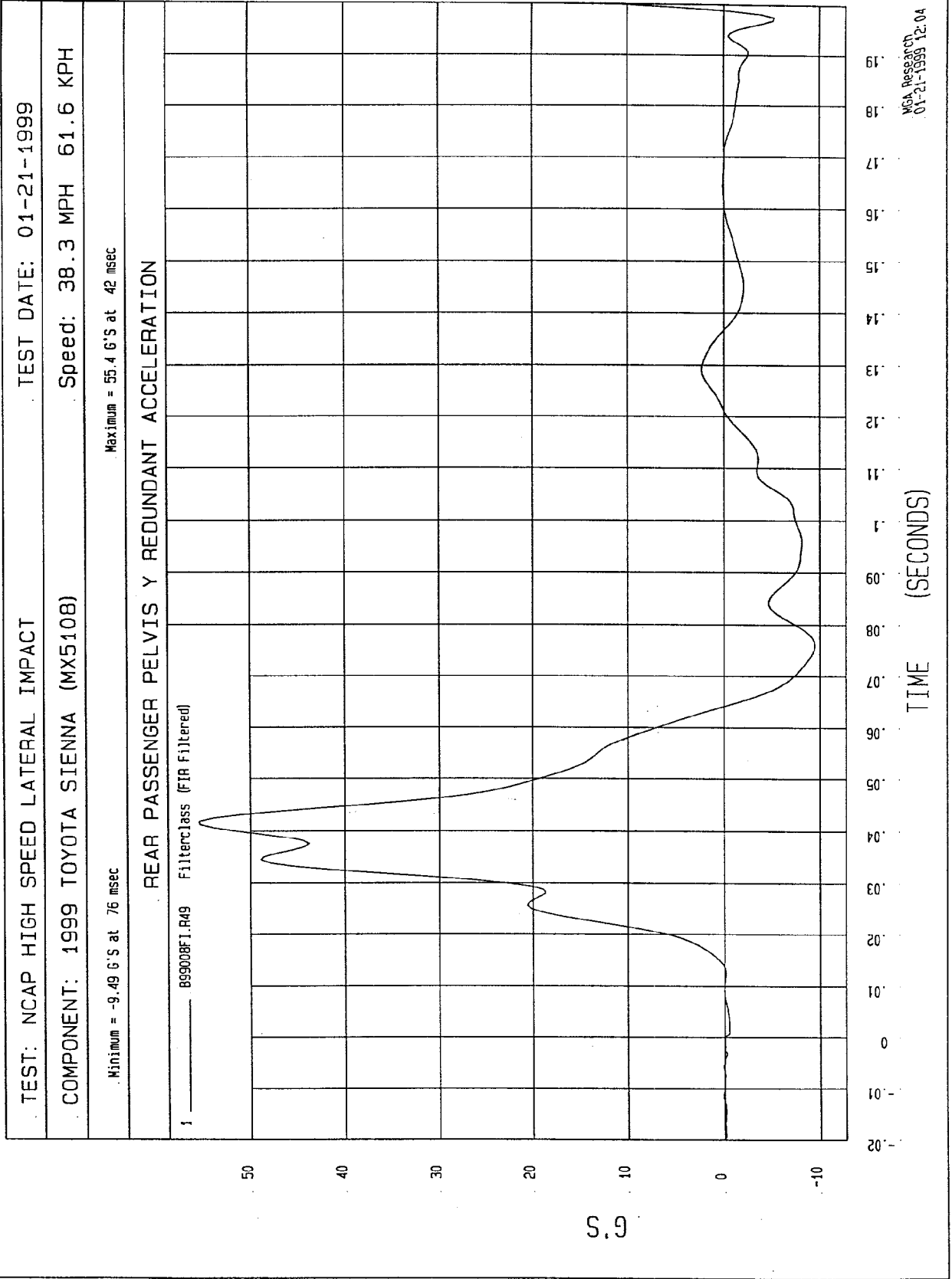
Maximum = 54.3 G'S at 41 msec

Minimum = -9.85 G'S at 76 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 — B9900BF1.R28 Filterclass (FIR Filtered)





APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION

Driver Dummy Serial Number: 272

Pre-Test Calibration

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

PRE-TEST CERTIFICATION DATA

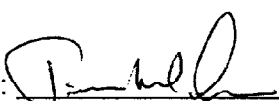
Driver Dummy Serial Number: 272

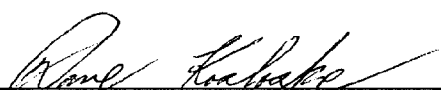
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA C-3

DUMMY SERIAL NUMBER: 272

DATE OF VERIFICATION: January 19, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 892 |
| RH - Rib Height (mm) | 501 - 521 | 512 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 238 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 523 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 493 |
| HW - Hip Width (mm) | 356 - 391 | 378 |

MEASUREMENTS BY: 

APPROVED BY: 

THORAX IMPACT TEST

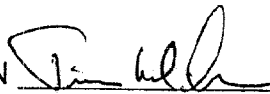
SIDE IMPACT DUMMY (SID)

DATE: January 15, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99192

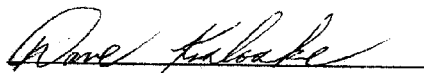
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 22% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.30 |
| UPPER RIB (g's) | 37 - 46 g's | 44 |
| LOWER RIB (g's) | 37 - 46 g's | 42 |
| LOWER SPINE (g's) | 15 - 22 g's | 16 |

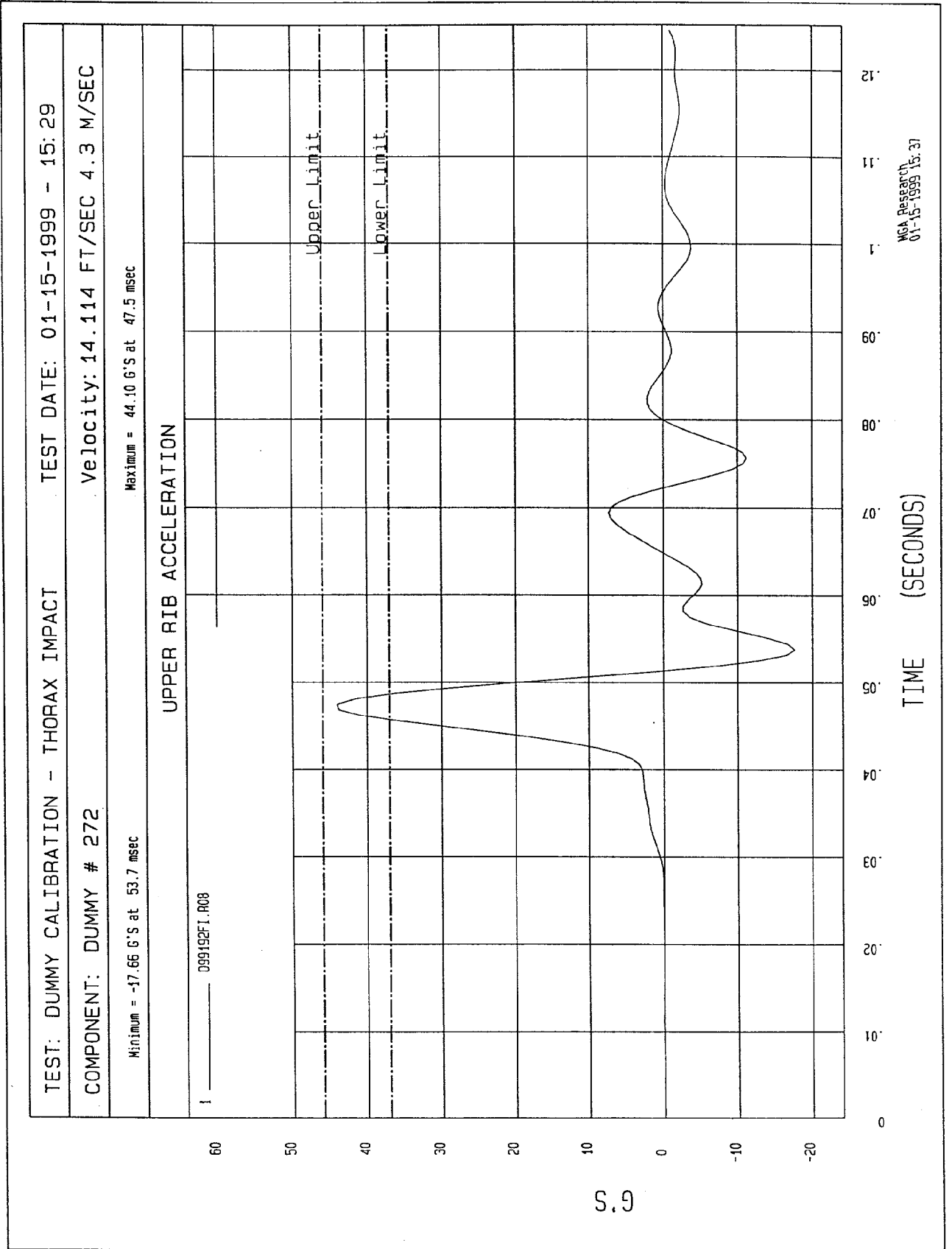
TEST MEETS SPECIFICATIONS

TECHNICIAN



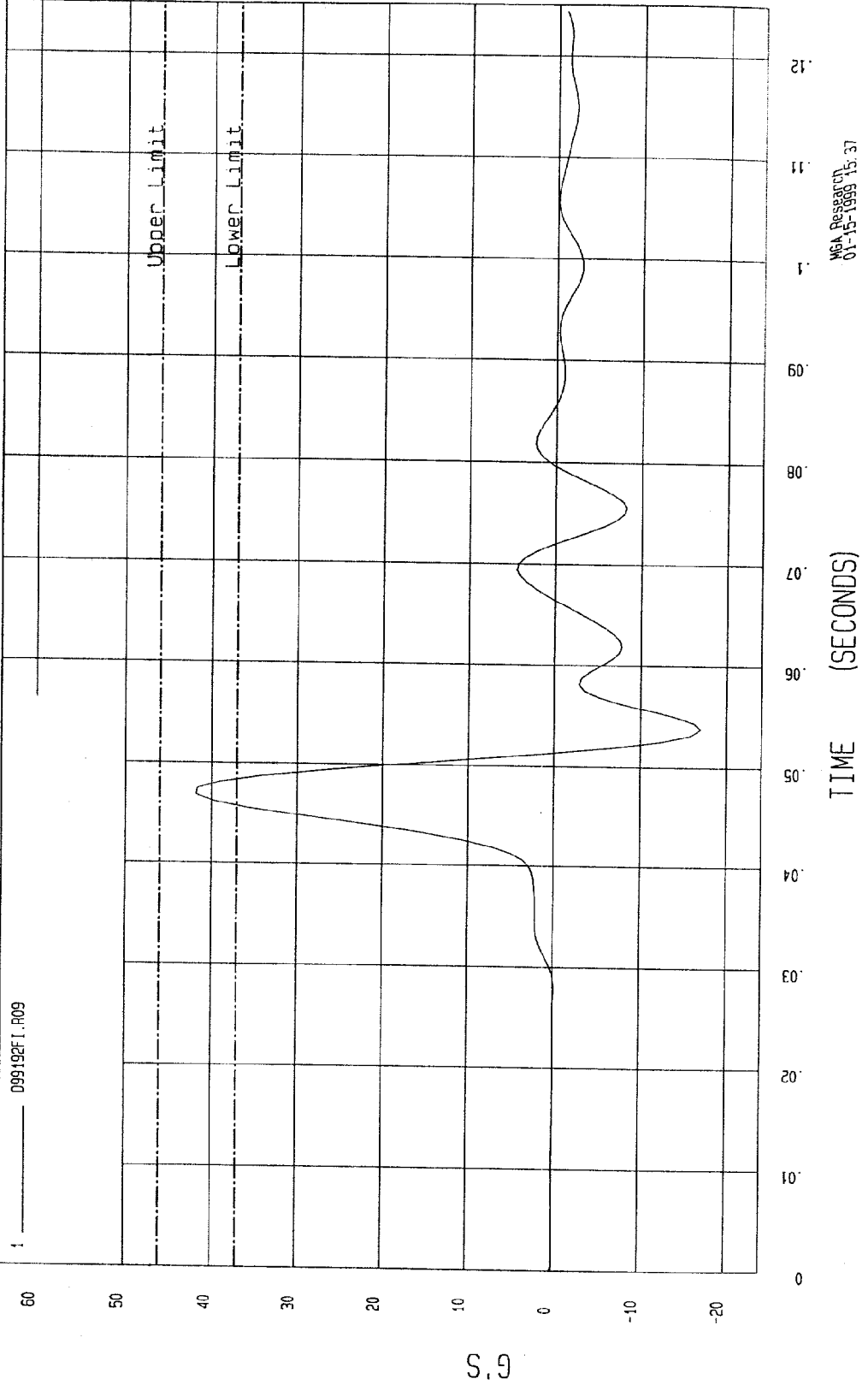
APPROVED BY

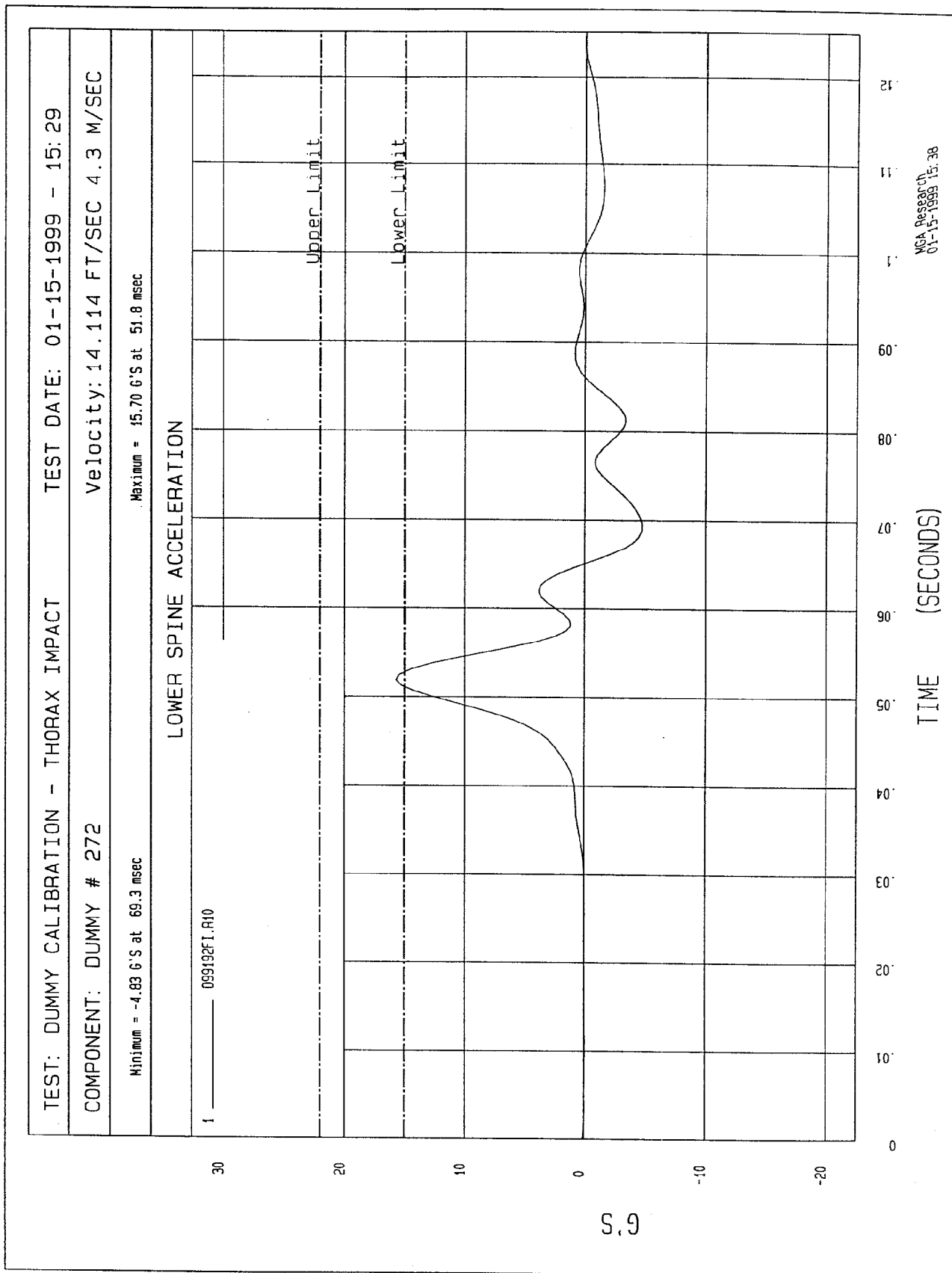




TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 01-15-1999 - 15:29
 COMPONENT: DUMMY # 272 Velocity: 14.114 FT/SEC 4.3 M/SEC
 Minimum = -16.97 G'S at 53.7 msec Maximum = 41.87 G'S at 46.8 msec

LOWER RIB ACCELERATION





PELVIS IMPACT TEST

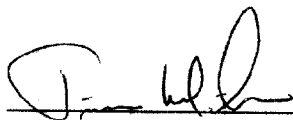
SIDE IMPACT DUMMY (SID)

DATE: January 15, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99193

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 22% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.27 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 59 |

TEST MEETS SPECIFICATIONS

TECHNICIAN

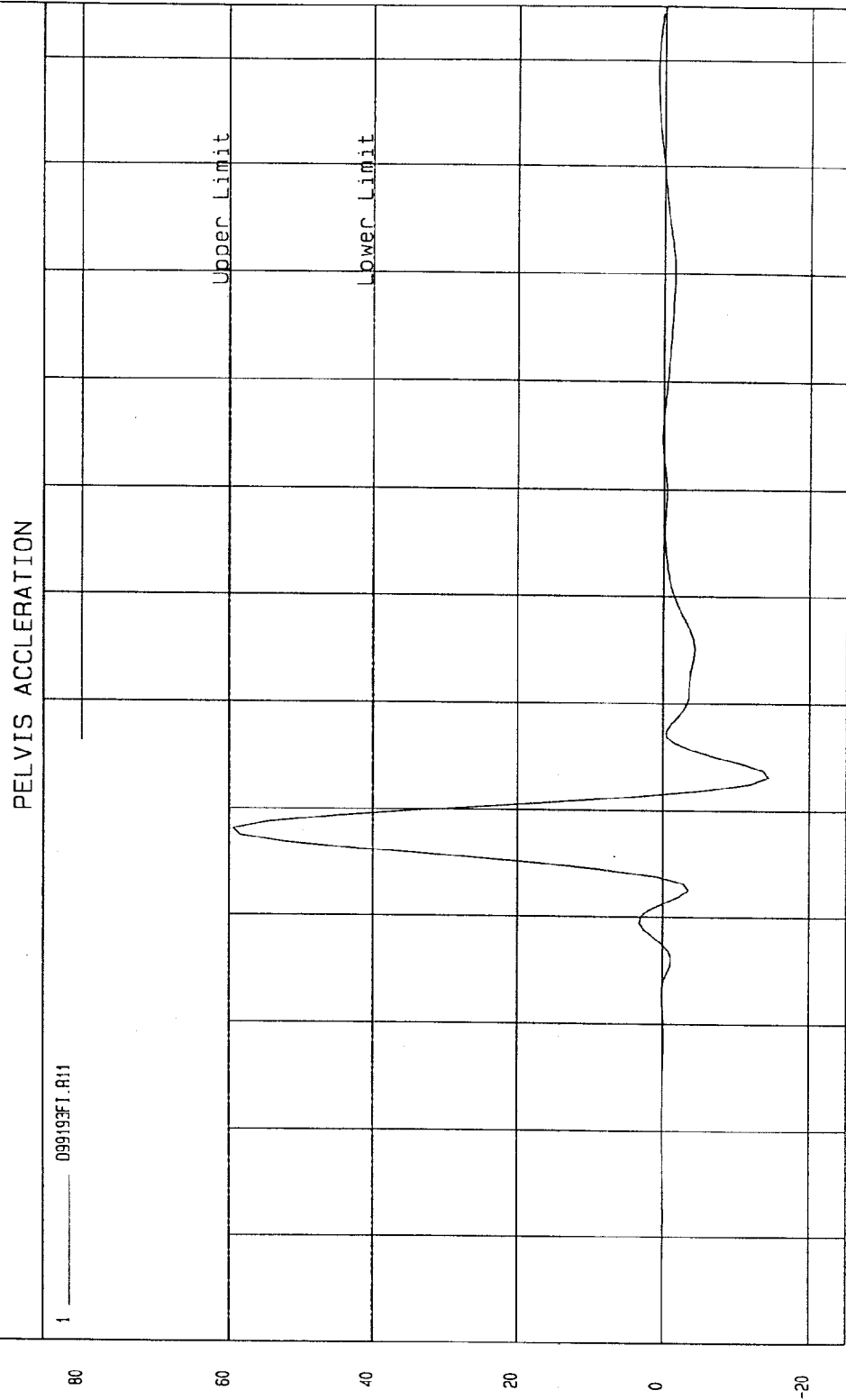


APPROVED BY



TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 01-15-1999 - 15:37
COMPONENT: DUMMY # 272 Velocity: 14.022 FT/SEC 4.27 M/SEC

Minimum = -14.49 G'S at 53.1 msec Maximum = 59.41 G'S at 48.1 msec



ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

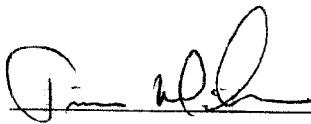
SIDE IMPACT DUMMY (SID)

DATE: January 18, 1999DUMMY SERIAL NUMBER: 272 TEST NUMBER: D99194

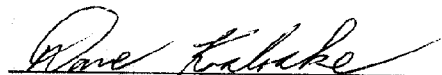
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 24% |
| FORCE @ 12.7 mm | 104 - 162 | 142 |
| FORCE @ 19.0 mm | 163 - 222 | 192 |
| FORCE @ 25.4 mm | 222 - 280 | 248 |
| FORCE @ 33 mm | 325 - 391 | 335 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



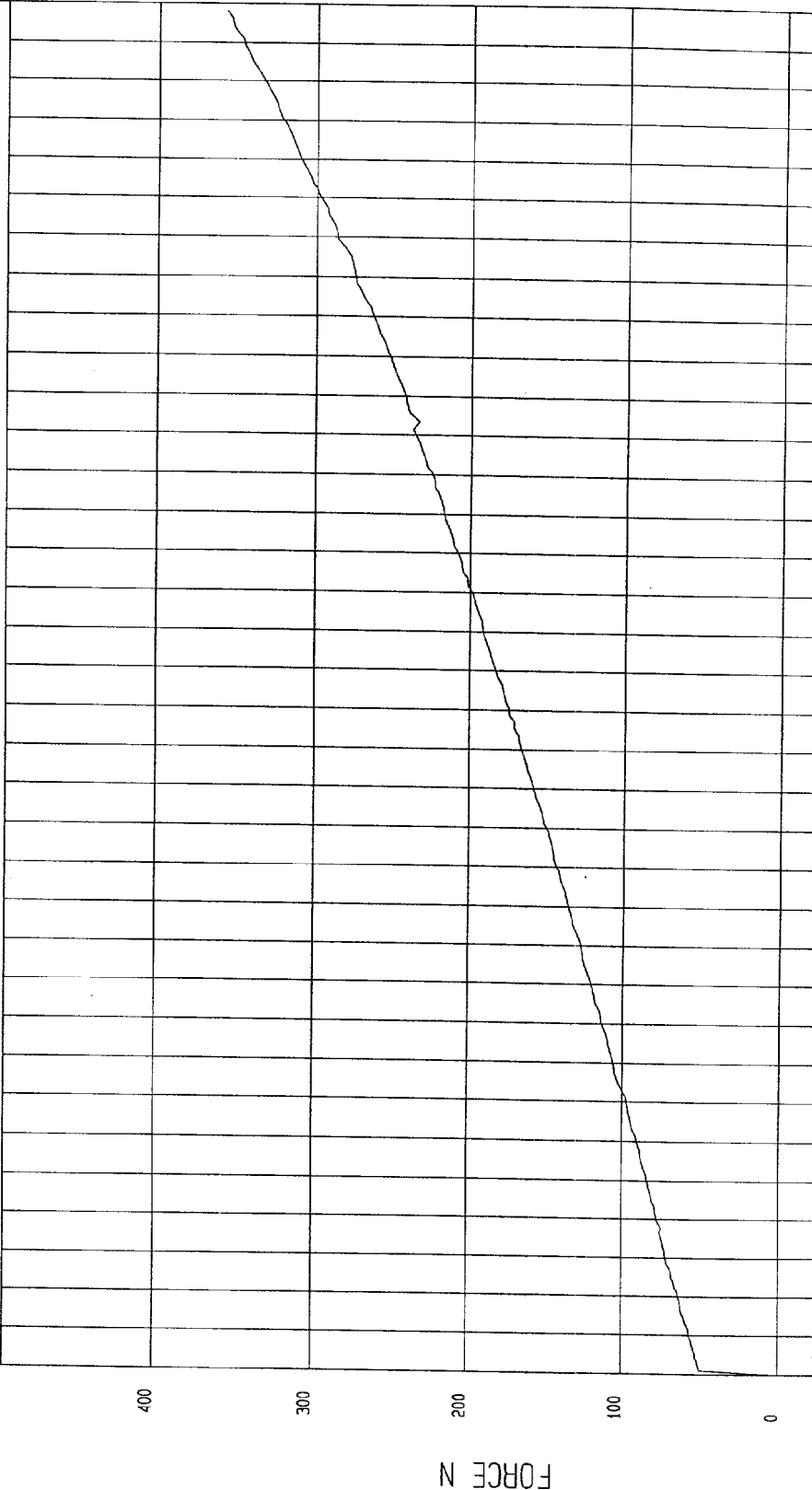
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-18-1999 - 09:38:43

COMPONENT: DUMMY # 272

FORCE as a function of DISPLACEMENT



NSA Research
01-18-1999 09:39

DISPLACEMENT mm

FORCE N

LUMBAR FLEXION TEST

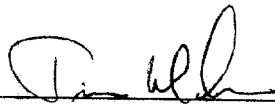
SIDE IMPACT DUMMY (SID)

DATE: January 18, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99195

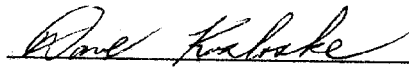
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 24% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 112.8 |
| FORCE @ 30° | 151.2 - 204.6 | 160.9 |
| FORCE @ 40° | 204.6 - 258.0 | 209.1 |
| RETURN ANGLE | 12° maximum | 6° |

TEST MEETS SPECIFICATIONS

TECHNICIAN



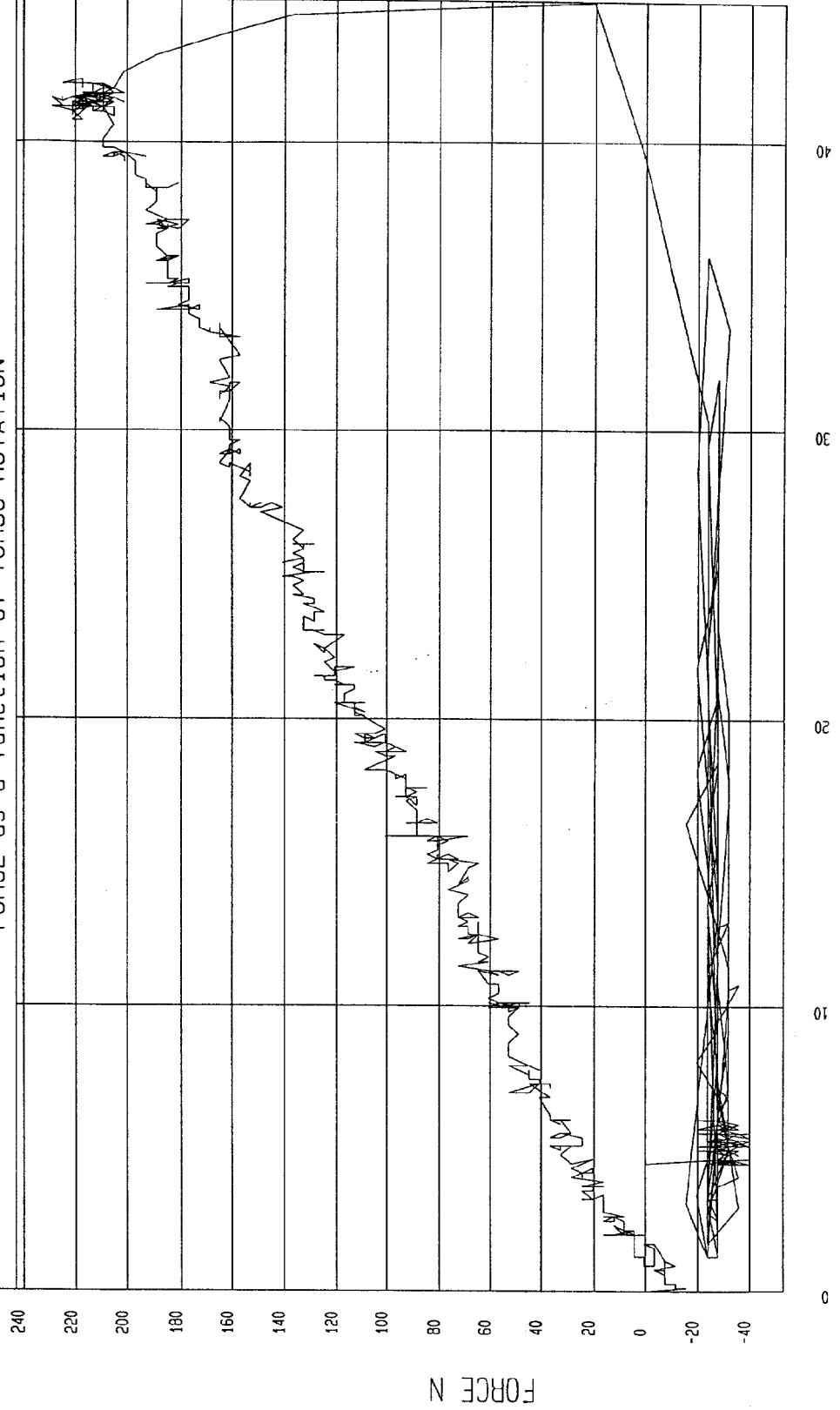
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-18-1999 - 09:55:01

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



WCA Research
01-18-1999 10:30

PRE-TEST CERTIFICATION DATA

C-14

Passenger Dummy Serial Number: 271

Passenger Dummy Serial Number: 271

Pre-Test Calibration

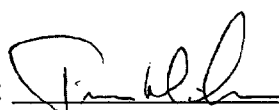
| | |
|-----------------------------|---|
| External Dimensions: | The dummy passed all external dimension requirements. |
| Thorax Impact Test: | The thorax passed all impact test requirements. |
| Pelvic Impact Test: | The pelvis passed all impact test requirements. |
| Abdominal Compression Test: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

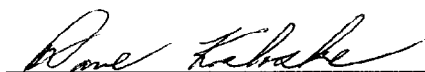
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA ^{C-16}

DUMMY SERIAL NUMBER: 271

DATE OF VERIFICATION: January 18, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 895 |
| RH - Rib Height (mm) | 501 - 521 | 505 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 236 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 518 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 493 |
| HW - Hip Width (mm) | 356 - 391 | 373 |

MEASUREMENTS BY: 

APPROVED BY: 

THORAX IMPACT TEST

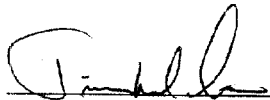
SIDE IMPACT DUMMY (SID)

DATE: January 15, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99182

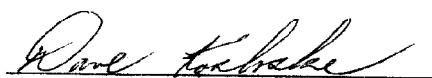
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 22% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| UPPER RIB (g's) | 37 - 46 g's | 45 |
| LOWER RIB (g's) | 37 - 46 g's | 45 |
| LOWER SPINE (g's) | 15 - 22 g's | 22 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY



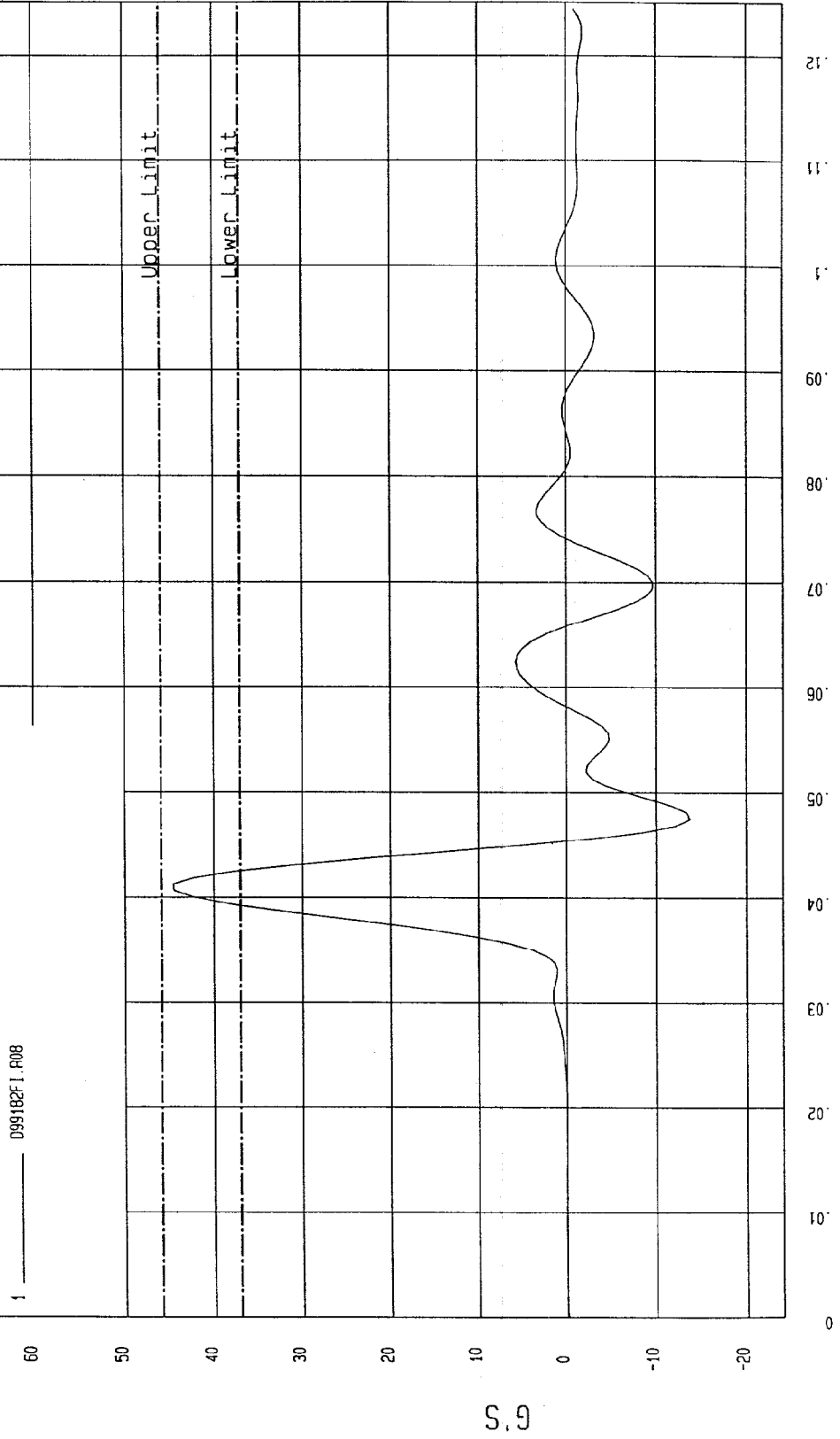
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 01-15-1999 - 14:39

COMPONENT: DUMMY # 271 Velocity: 14.065 FT/SEC 4.29 M/SEC

Minimum = -13.72 G'S at 47.5 msec

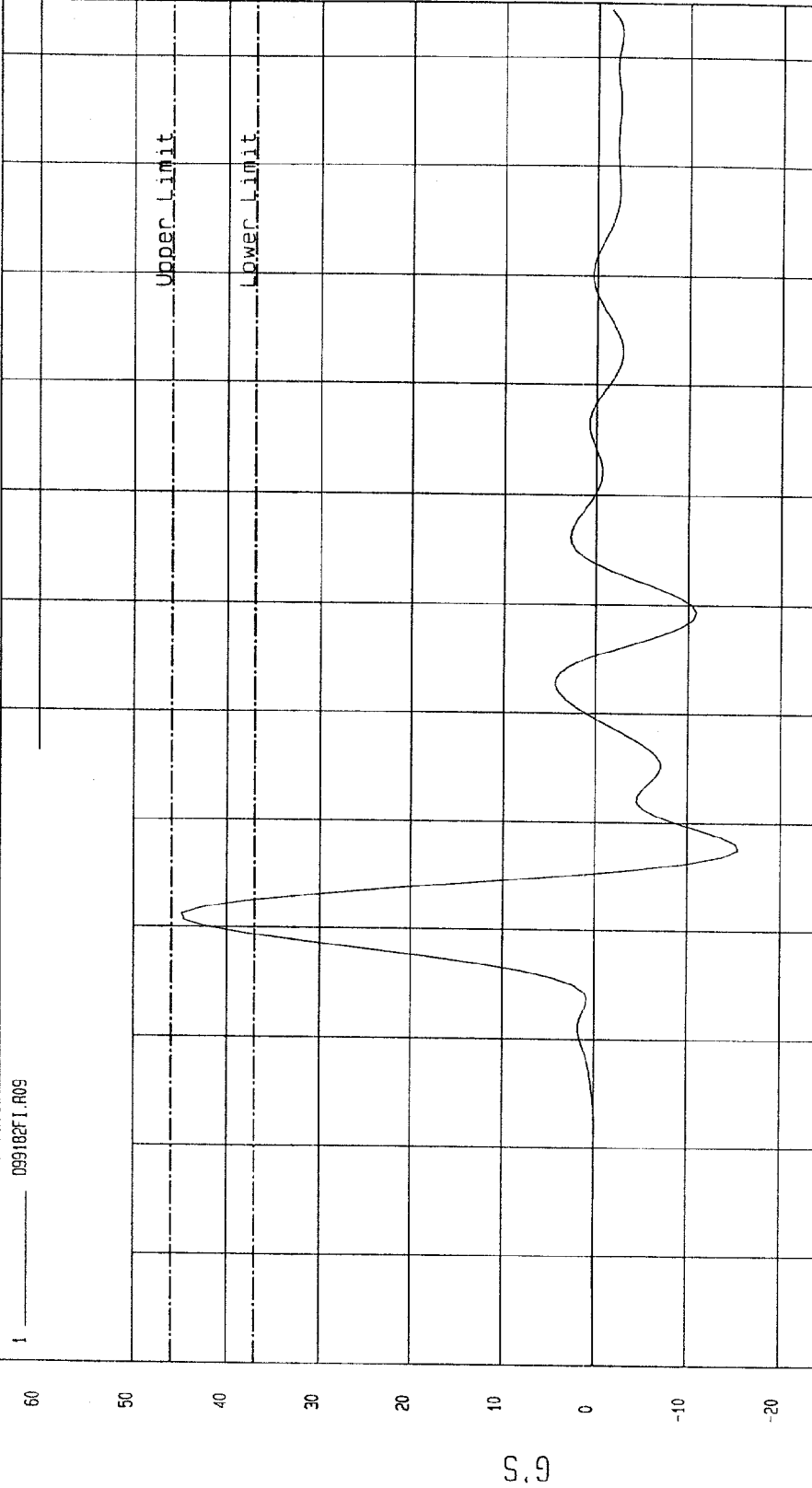
Maximum = 44.71 G'S at 41.2 msec

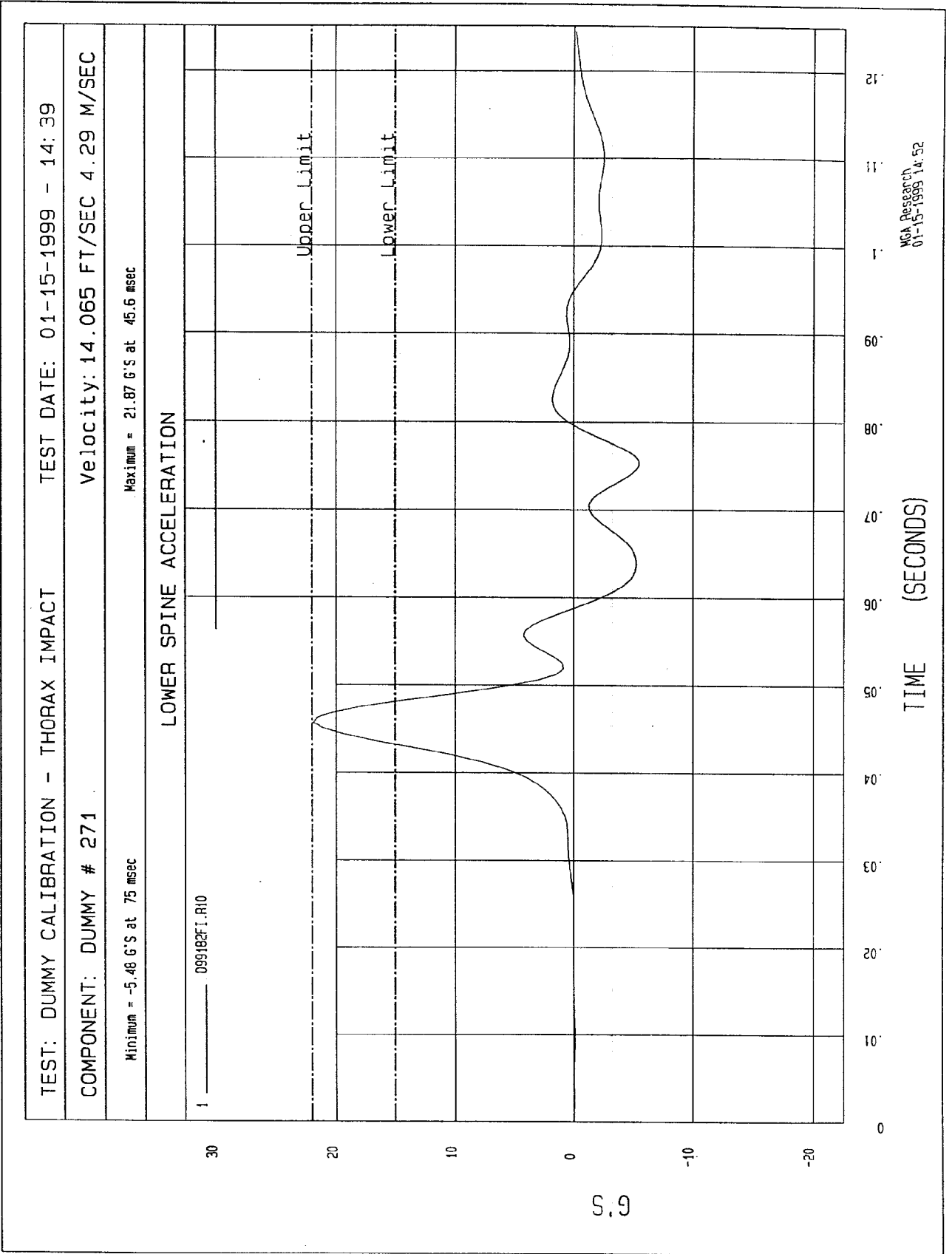
UPPER RIB ACCELERATION



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 01-15-1999 - 14:39
COMPONENT: DUMMY # 271 Velocity: 14.065 FT/SEC 4.29 M/SEC
Minimum = -15.45 G'S at 47.5 msec Maximum = 44.91 G'S at 41.2 msec

LOWER RIB ACCELERATION





PELVIS IMPACT TEST

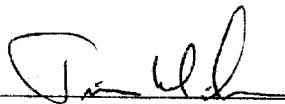
SIDE IMPACT DUMMY (SID)

DATE: January 15, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99182

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 22% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.28 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 58 |

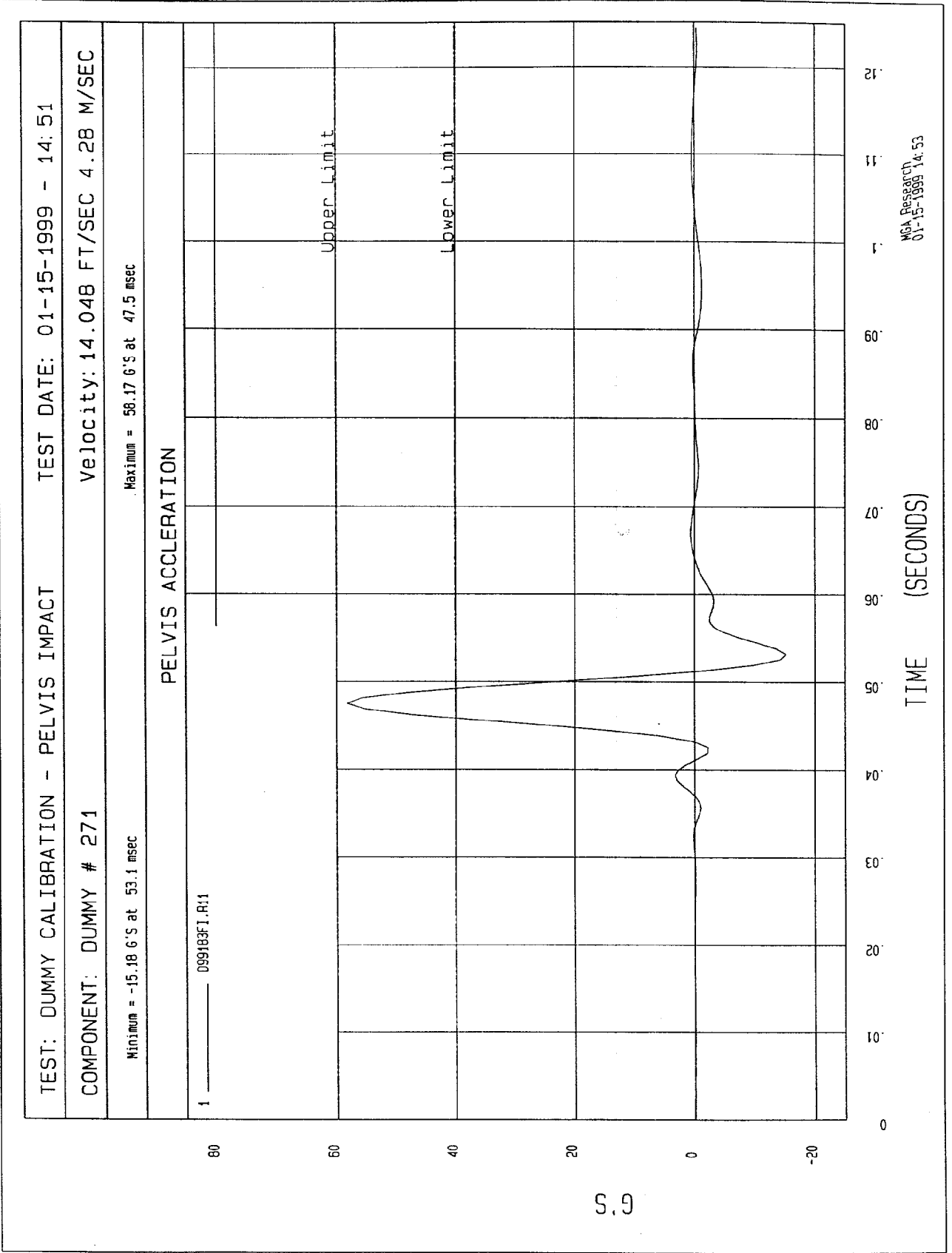
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

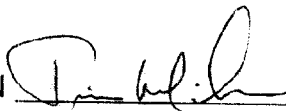
SIDE IMPACT DUMMY (SID)

DATE: January 18, 1999DUMMY SERIAL NUMBER: 271 TEST NUMBER: D99184

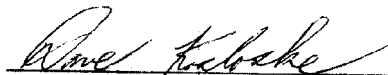
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 24% |
| FORCE @ 12.7 mm | 104 - 162 | 144 |
| FORCE @ 19.0 mm | 163 - 222 | 196 |
| FORCE @ 25.4 mm | 222 - 280 | 259 |
| FORCE @ 33 mm | 325 - 391 | 351 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



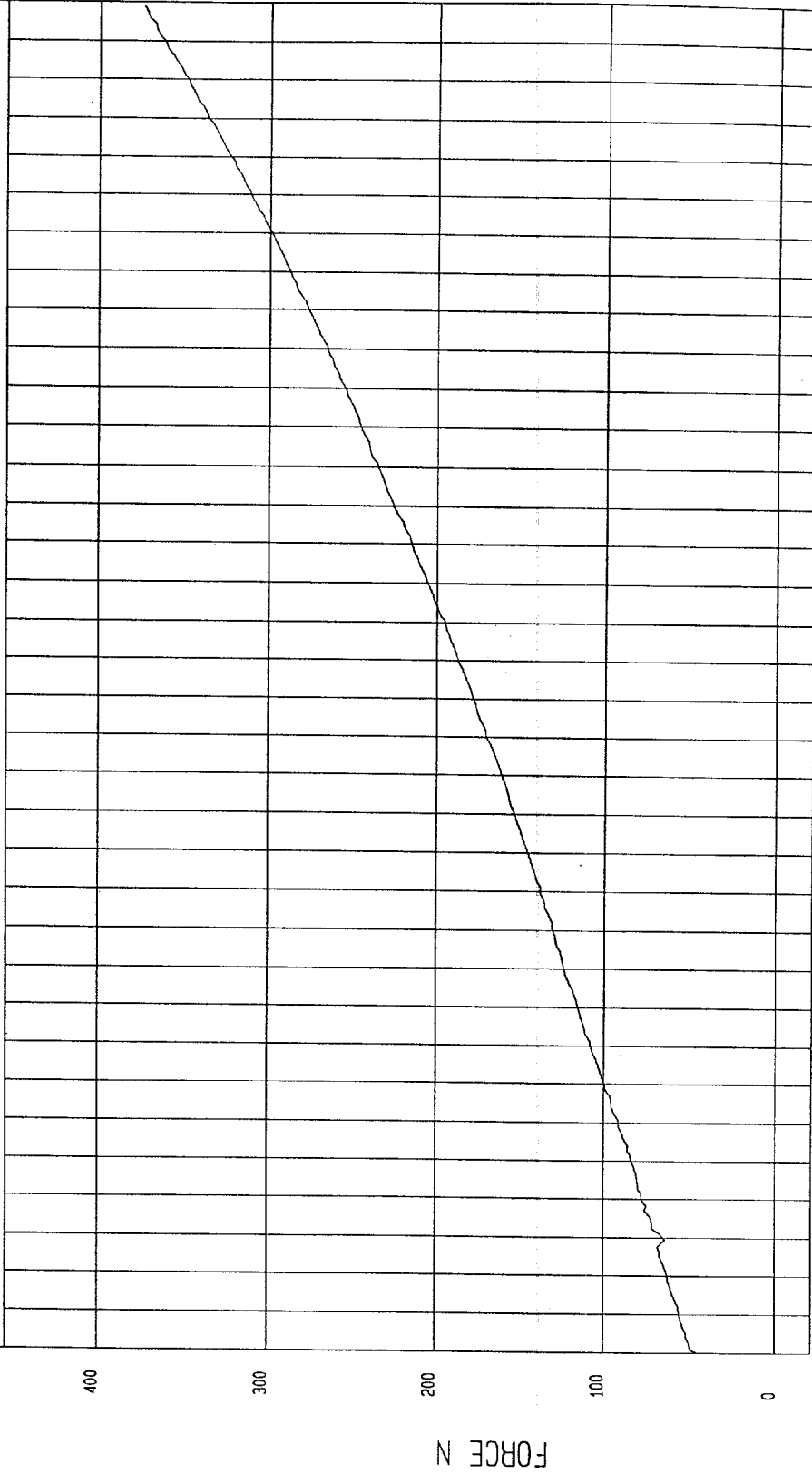
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 01-18-1999 - 09:32:41

COMPONENT: DUMMY # 271

FORCE as a function of DISPLACEMENT



MOA Research
01-18-1999 09:39

DISPLACEMENT mm

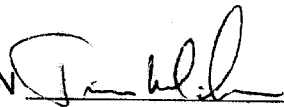
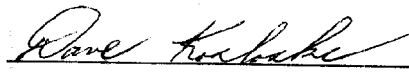
LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 18, 1999DUMMY SERIAL NUMBER: 271 TEST NUMBER: D99185

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 24% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 115.4 |
| FORCE @ 30° | 151.2 - 204.6 | 175.6 |
| FORCE @ 40° | 204.6 - 258.0 | 211.7 |
| RETURN ANGLE | 12° maximum | 4° |

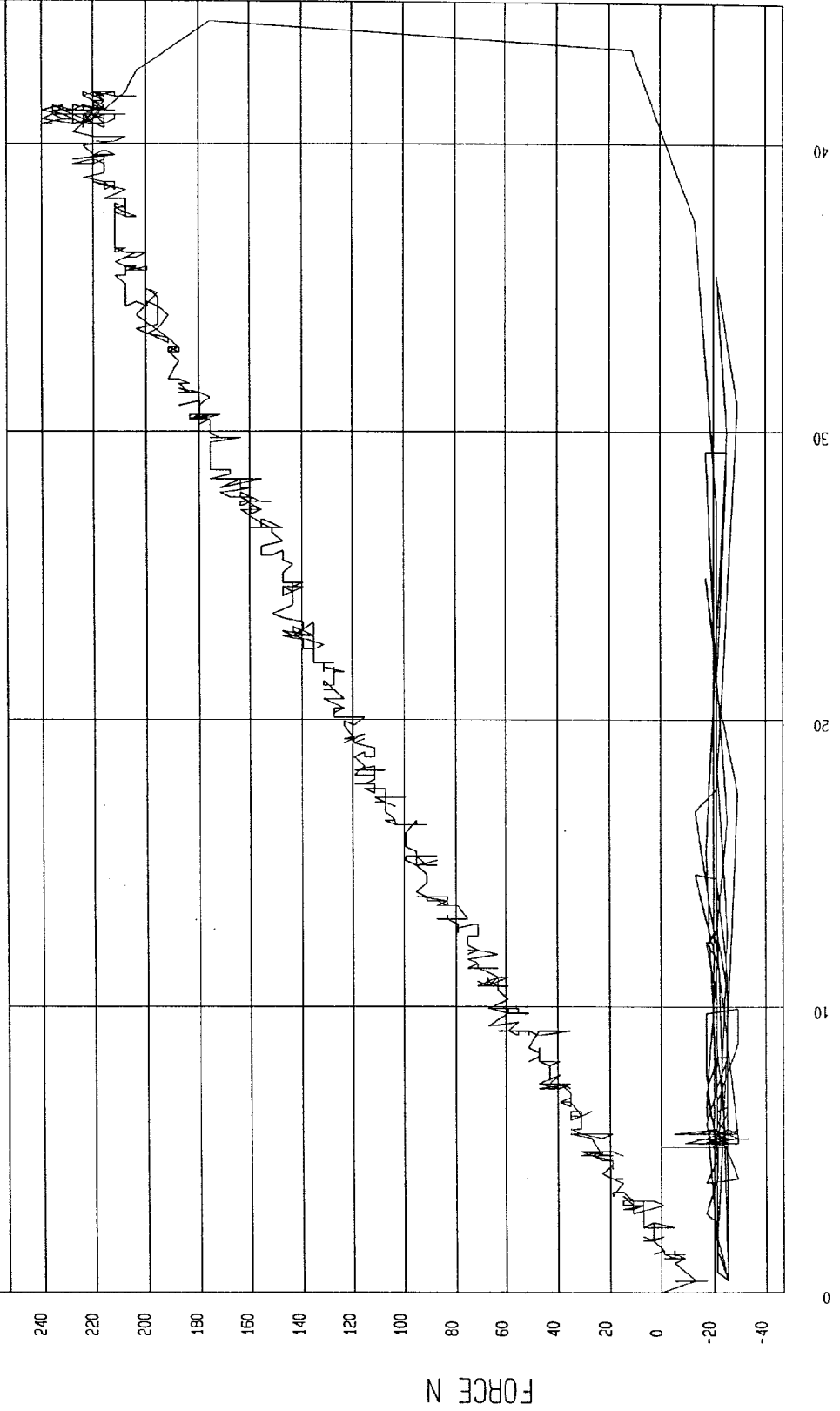
TEST MEETS SPECIFICATIONS

TECHNICIAN APPROVED BY 

TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 01-18-1999 - 10:29:54

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



MGA Research
01-18-1999 10:30

POST-TEST CERTIFICATION DATA

C-27

Driver Dummy Serial Number: 272

Driver Dummy Serial Number: 272

Post-Test Calibration

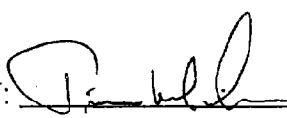
| | |
|-----------------------------|---|
| External Dimensions: | The dummy passed all external dimension requirements. |
| Thorax Impact Test: | The thorax passed all impact test requirements. |
| Pelvic Impact Test: | The pelvis passed all impact test requirements. |
| Abdominal Compression Test: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

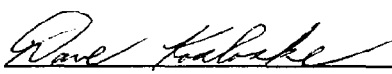
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA ^{C-29}

DUMMY SERIAL NUMBER: 272

DATE OF VERIFICATION: February 2, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 892 |
| RH - Rib Height (mm) | 501 - 521 | 512 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 238 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 523 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 493 |
| HW - Hip Width (mm) | 356 - 391 | 378 |

MEASUREMENTS BY: 

APPROVED BY: 

THORAX IMPACT TEST

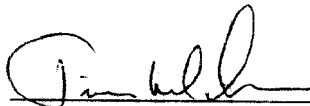
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99332

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 34% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.27 |
| UPPER RIB (g's) | 37 - 46 g's | 45 |
| LOWER RIB (g's) | 37 - 46 g's | 43 |
| LOWER SPINE (g's) | 15 - 22 g's | 21 |

TEST MEETS SPECIFICATIONS

TECHNICIAN

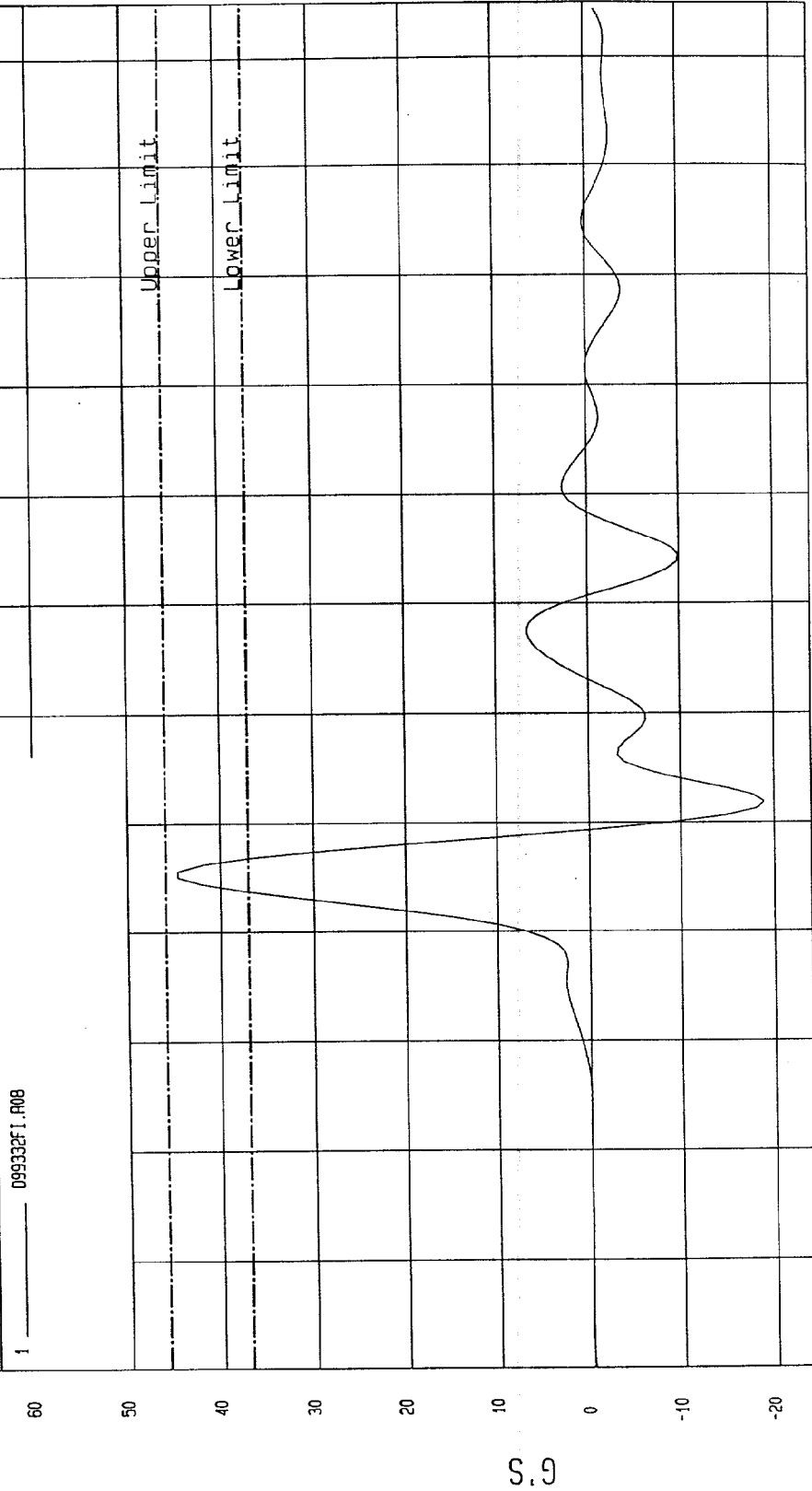


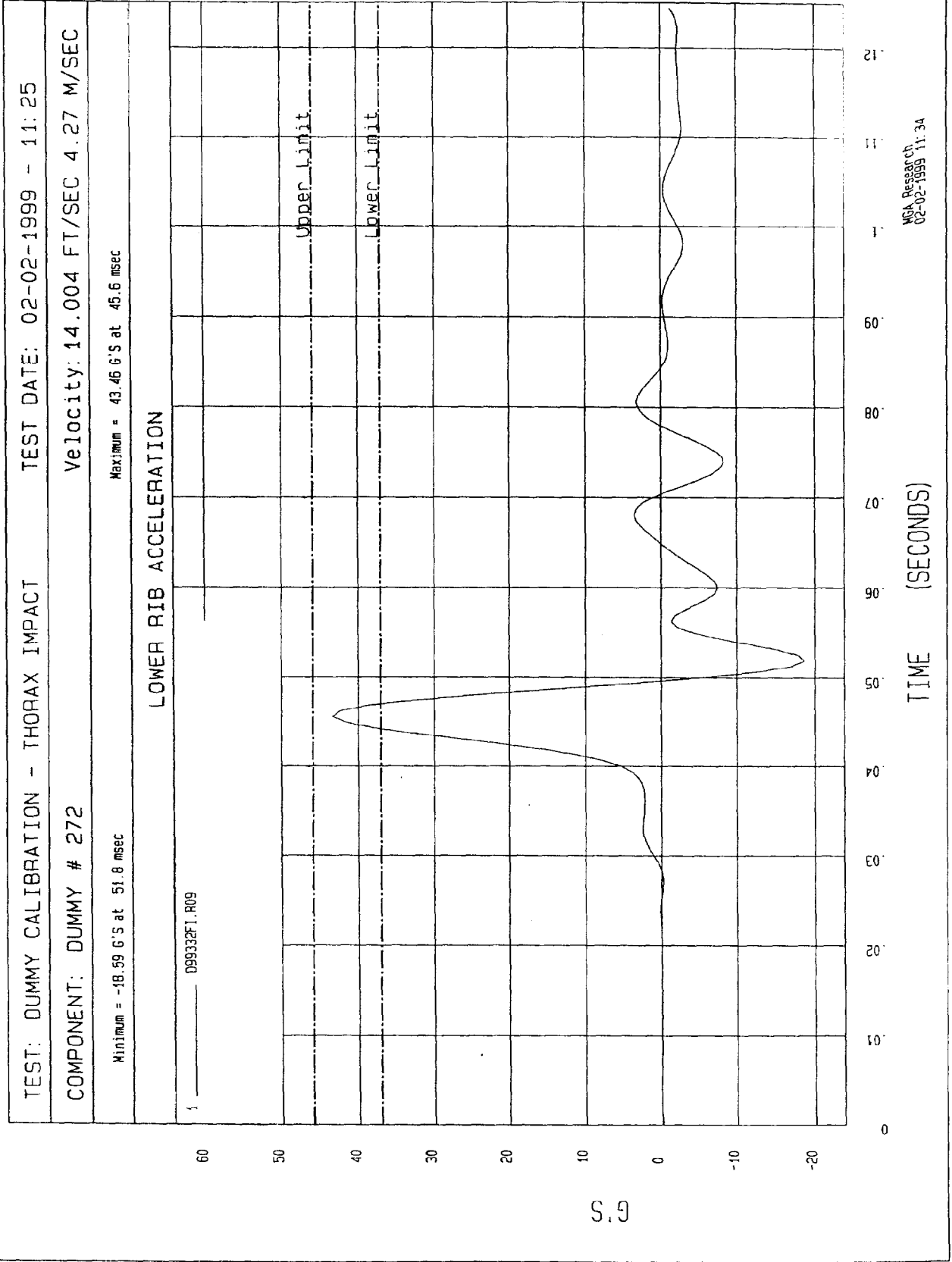
APPROVED BY

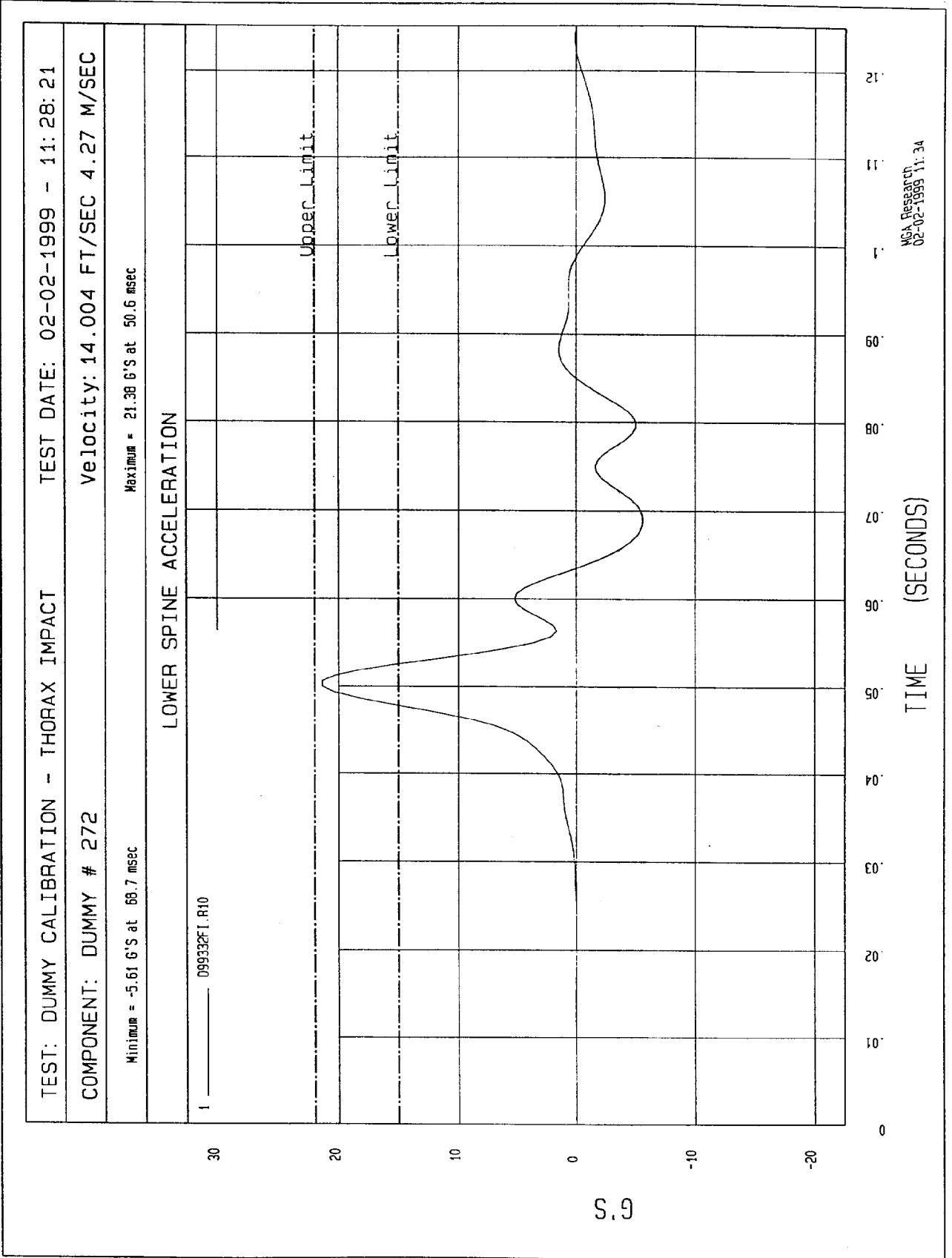


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 02-02-1999 - 11:25
 COMPONENT: DUMMY # 272 Velocity: 14.004 FT/SEC 4.27 M/SEC
 Minimum = -18.91 G'S at 51.8 msec Maximum = 44.72 G'S at 45.6 msec

UPPER RIB ACCELERATION







PELVIS IMPACT TEST

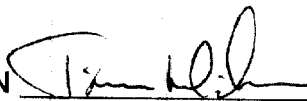
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99333

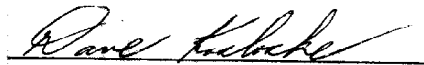
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 34% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.27 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 50 |

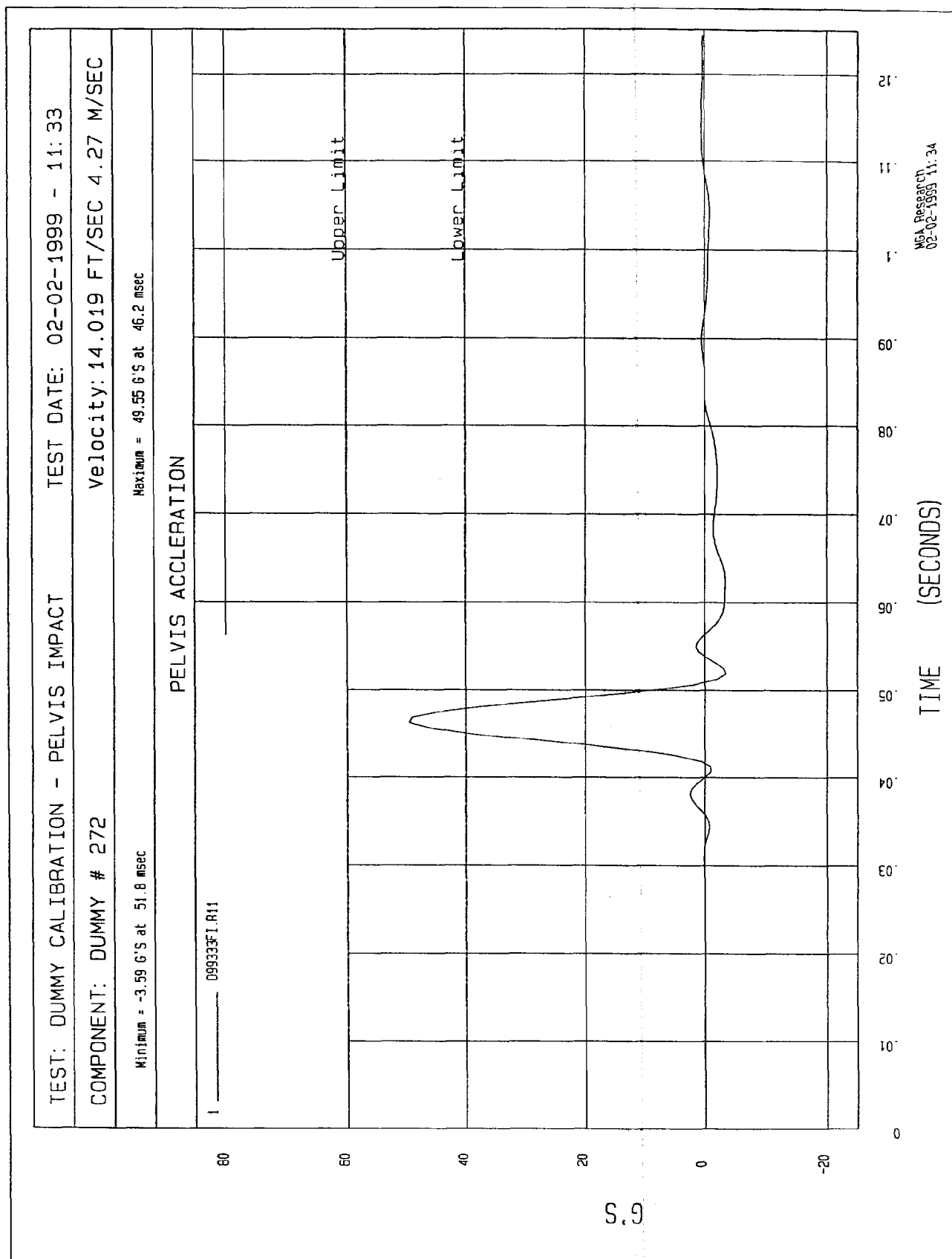
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

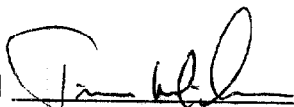
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99334

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| FORCE @ 12.7 mm | 104 - 162 | 132 |
| FORCE @ 19.0 mm | 163 - 222 | 180 |
| FORCE @ 25.4 mm | 222 - 280 | 245 |
| FORCE @ 33 mm | 325 - 391 | 341 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



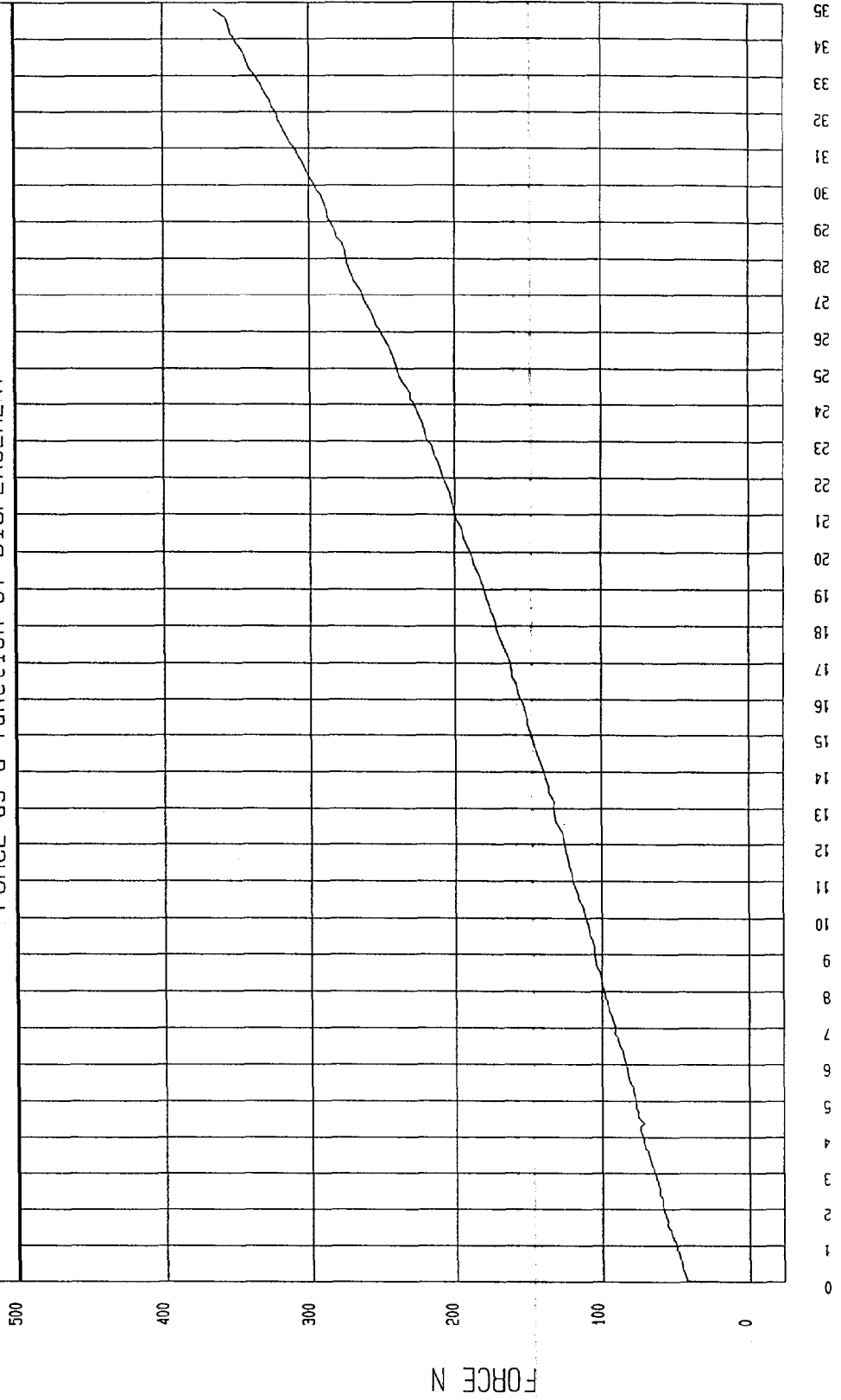
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 02-02-1999 - 14:03:38

COMPONENT: DUMMY # 272

FORCE as a function of DISPLACEMENT



MCA Research
02-02-1999 14:04

LUMBAR FLEXION TEST

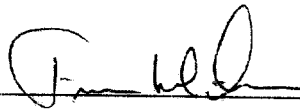
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 272TEST NUMBER: D99335

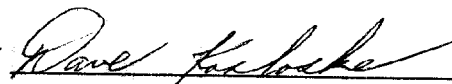
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 30% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 111.3 |
| FORCE @ 30° | 151.2 - 204.6 | 167.5 |
| FORCE @ 40° | 204.6 - 258.0 | 235.7 |
| RETURN ANGLE | 12° maximum | 2° |

TEST MEETS SPECIFICATIONS

TECHNICIAN



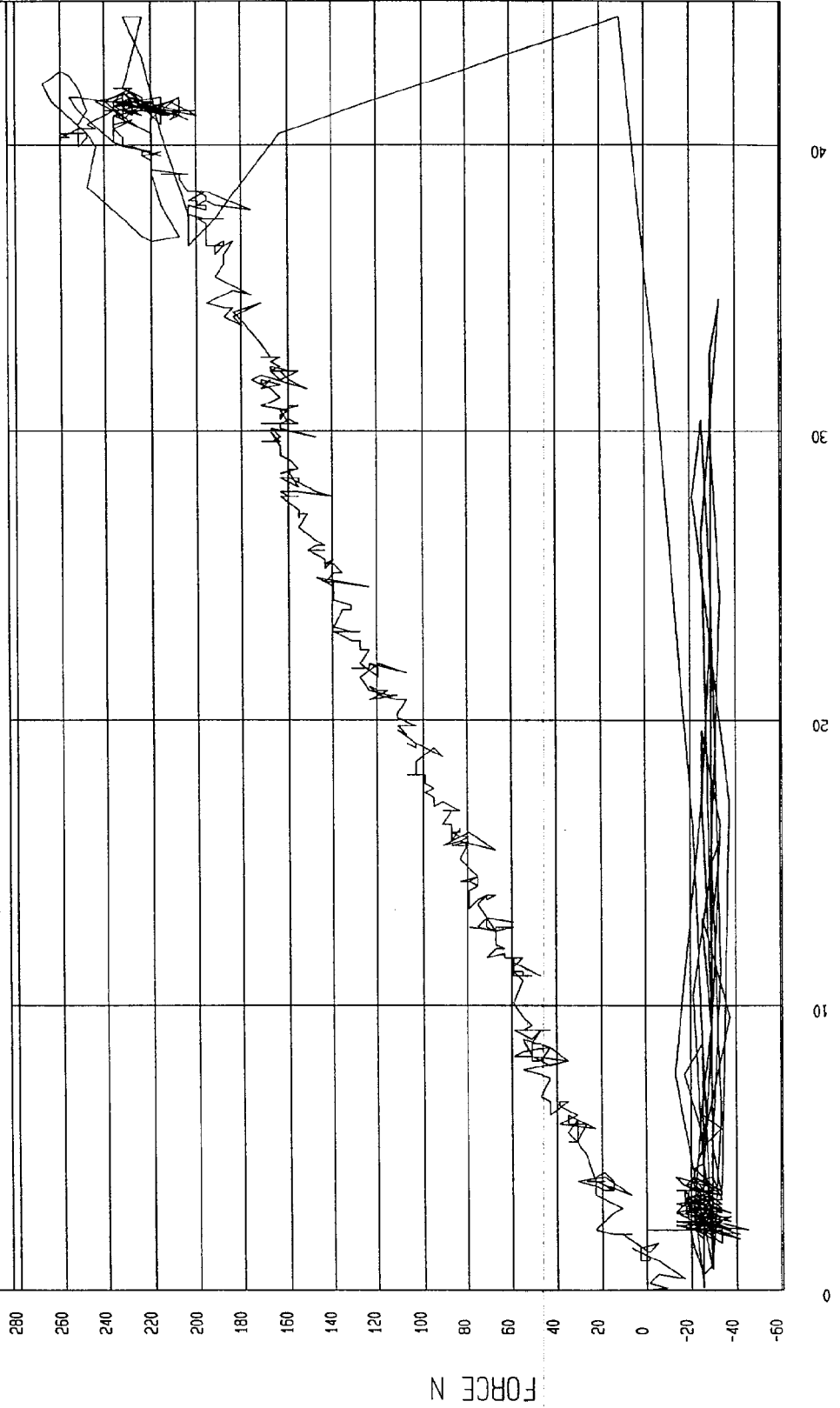
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 02-02-1999 - 15:49:48

COMPONENT: DUMMY # 272

FORCE as a function of TORSO ROTATION



POST-TEST CERTIFICATION DATA

C-40

Passenger Dummy Serial Number: 271

Calibration Test Results Summary

Passenger Dummy Serial Number: 271

Post-Test Calibration

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

C-42

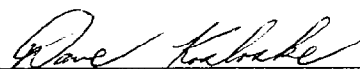
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY SERIAL NUMBER: 271

DATE OF VERIFICATION: February 2, 1999

| DESCRIPTION | SPECIFICATION | TEST RESULTS |
|-------------------------------------|---------------|--------------|
| SH - Seated Height (mm) | 889 - 909 | 895 |
| RH - Rib Height (mm) | 501 - 521 | 505 |
| HP - Hip Pivot Height (mm) | 99 ref. | 99 |
| RD - Rib From Back Line (mm) | 229 - 241 | 236 |
| KV - Knee Pivot From Back Line (mm) | 511 - 526 | 518 |
| SW - Knee Pivot to Floor (mm) | 490 - 505 | 493 |
| HW - Hip Width (mm) | 356 - 391 | 373 |

MEASUREMENTS BY: 

APPROVED BY: 

THORAX IMPACT TEST

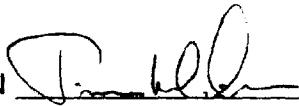
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99322

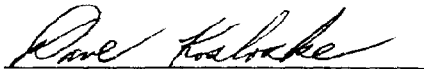
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 34% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| UPPER RIB (g's) | 37 - 46 g's | 43 |
| LOWER RIB (g's) | 37 - 46 g's | 42 |
| LOWER SPINE (g's) | 15 - 22 g's | 22 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



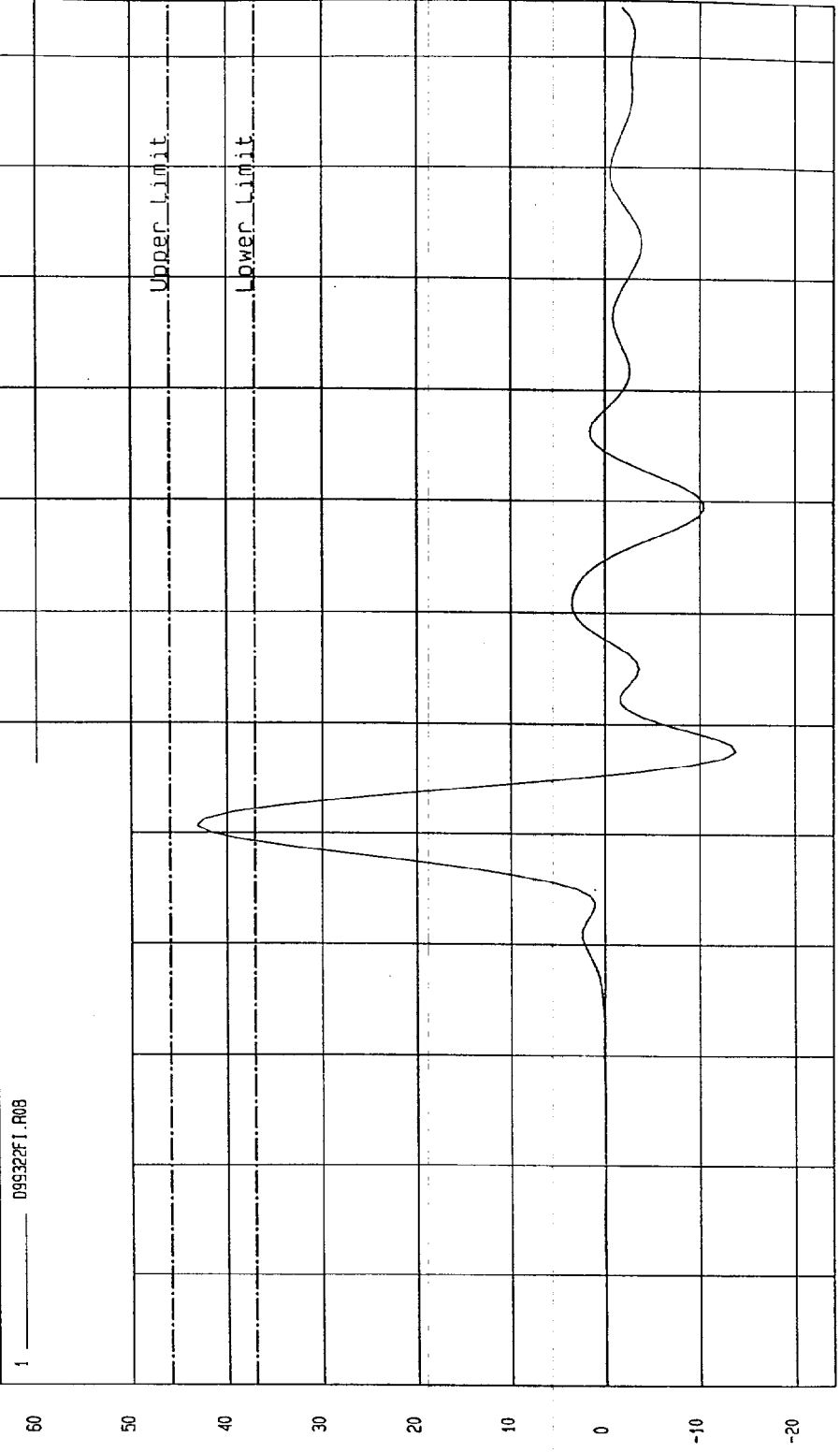
APPROVED BY



TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 02-02-1999 - 10:07
 COMPONENT: DUMMY # 271 Velocity: 14.077 FT/SEC 4.29 M/SEC

Minimum = -13.56 G'S at 57.5 msec Maximum = 43.19 G'S at 50.6 msec

UPPER RIB ACCELERATION



TIME (SECONDS)

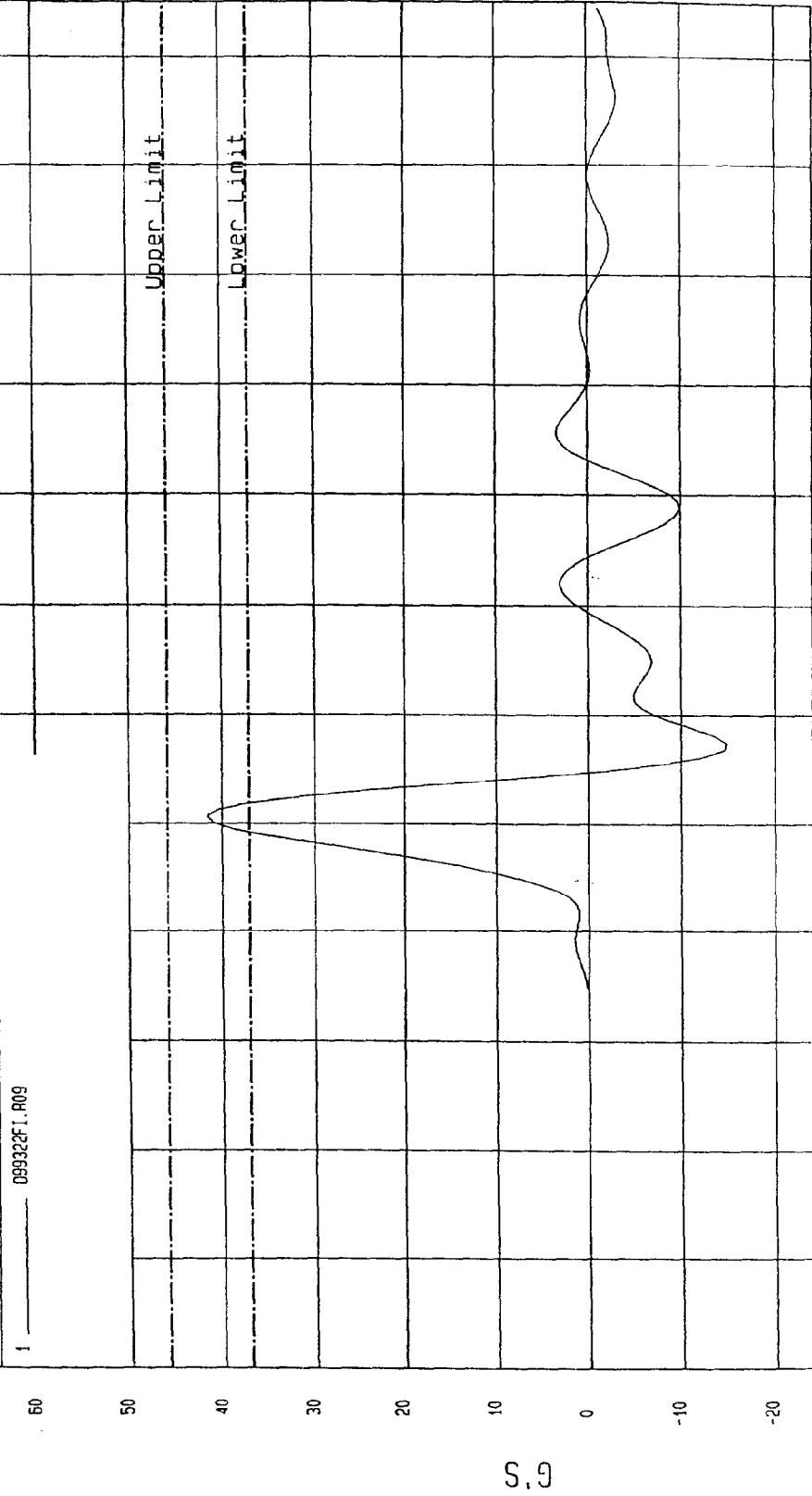
MSA Research
 02-02-1999 10:35

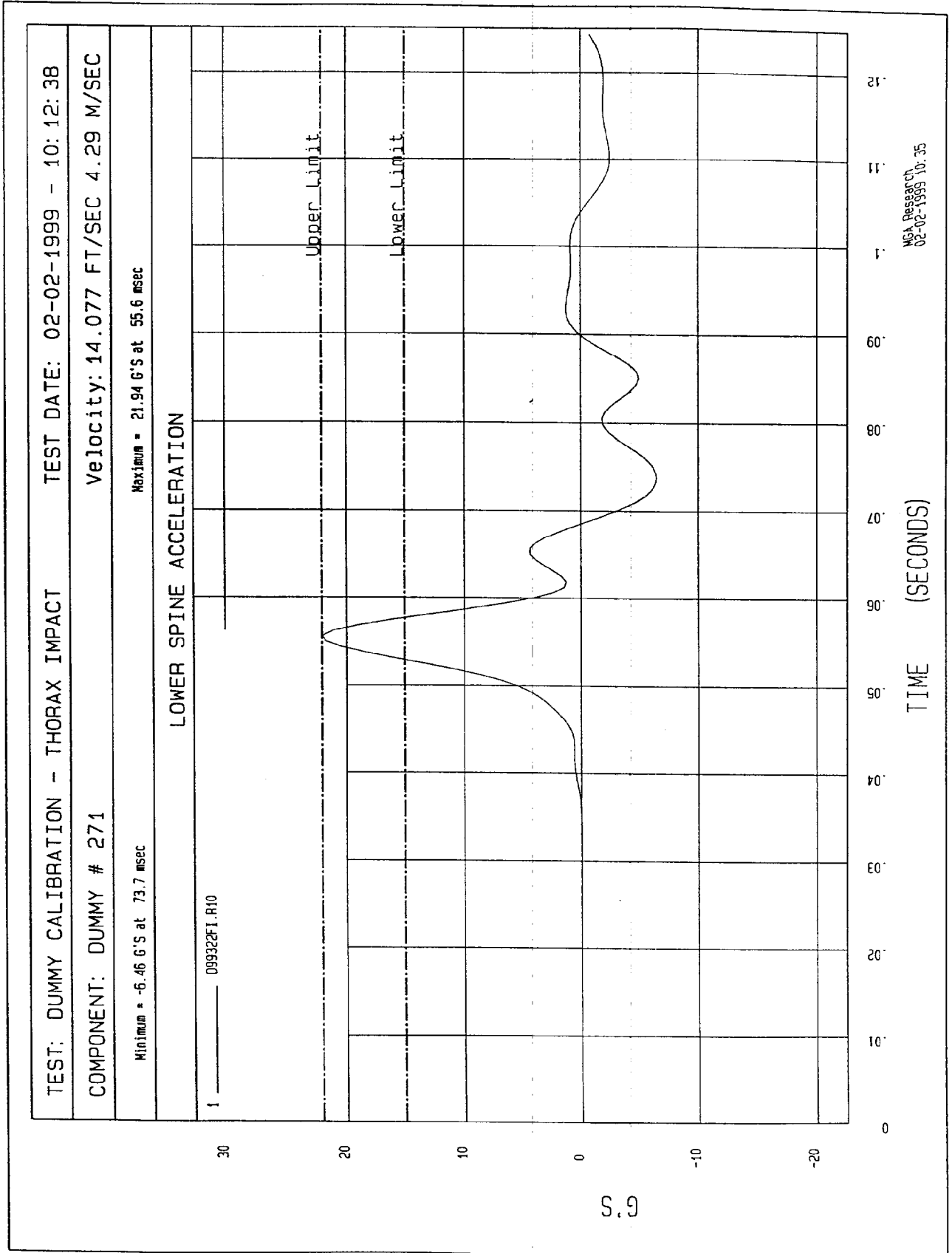
TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 02-02-1999 - 10:07

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

Minimum = -14.87 G'S at 57.5 msec Maximum = 41.74 G'S at 50.6 msec

LOWER RIB ACCELERATION

MCA Research
02-02-1999 10:35



PELVIS IMPACT TEST

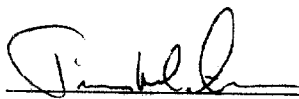
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 271TEST NUMBER: D99323

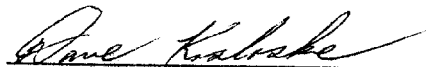
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---------------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0 |
| RELATIVE HUMIDITY (%) | 10 - 70 | 34% |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 |
| PELVIS ACCELERATION (g's) | 40 - 60 | 54 |

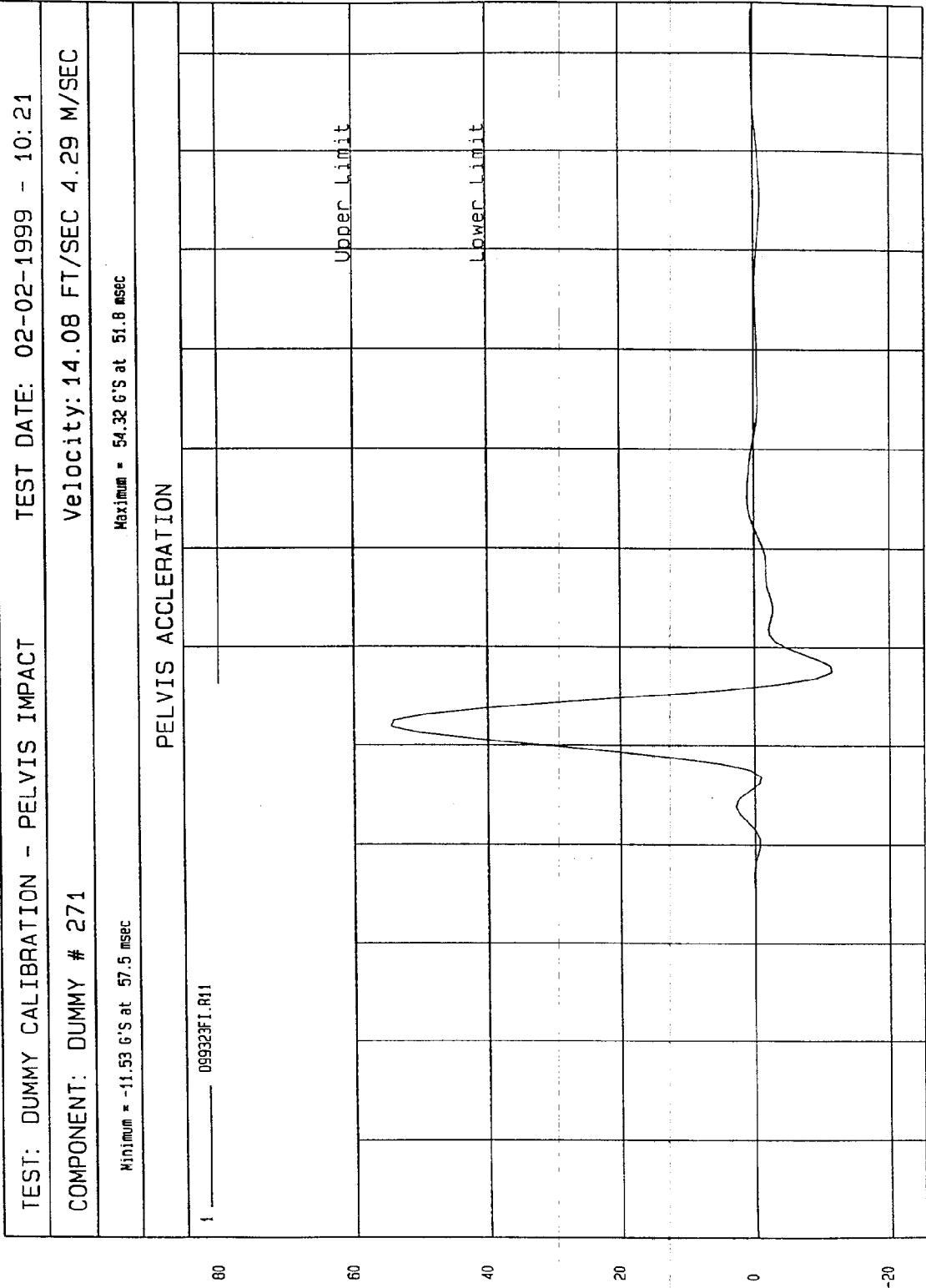
TEST MEETS SPECIFICATIONS

TECHNICIAN



APPROVED BY





NSA Research
02-02-1999 10:36

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

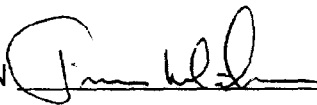
SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 271 TEST NUMBER: D99324

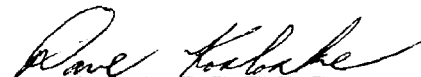
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33% |
| FORCE @ 12.7 mm | 104 - 162 | 143 |
| FORCE @ 19.0 mm | 163 - 222 | 198 |
| FORCE @ 25.4 mm | 222 - 280 | 262 |
| FORCE @ 33 mm | 325 - 391 | 362 |

TEST MEETS SPECIFICATIONS

TECHNICIAN



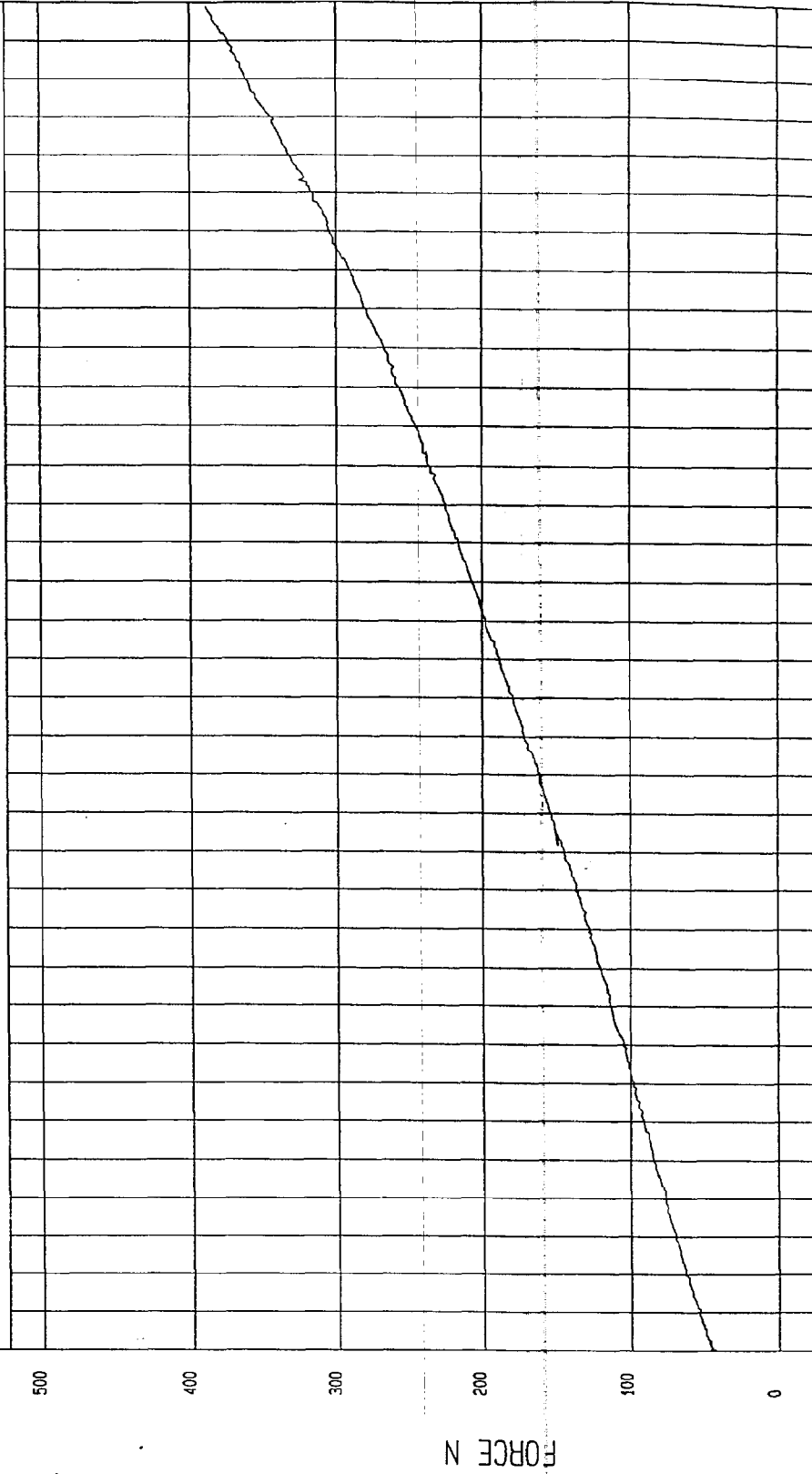
APPROVED BY



TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSION TEST DATE: 02-02-1999 - 13:58:50

COMPONENT: DUMMY # 271

FORCE as a function of DISPLACEMENT



MCA Research
02-02-1999 14:04

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: February 2, 1999DUMMY SERIAL NUMBER: 271 TEST NUMBER: D99325

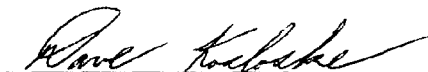
| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|-----------------------|---------------|--------------|
| TEMPERATURE (°C) | 18.9 - 25.5 | 21.0° |
| RELATIVE HUMIDITY (%) | 10 - 70 | 30% |
| FORCE @ 0° | 0 - 26.7 | 0 |
| FORCE @ 20° | 97.9 - 151.2 | 123.4 |
| FORCE @ 30° | 151.2 - 204.6 | 155.5 |
| FORCE @ 40° | 204.6 - 258.0 | 207.7 |
| RETURN ANGLE | 12° maximum | 2° |

TEST MEETS SPECIFICATIONS

TECHNICIAN



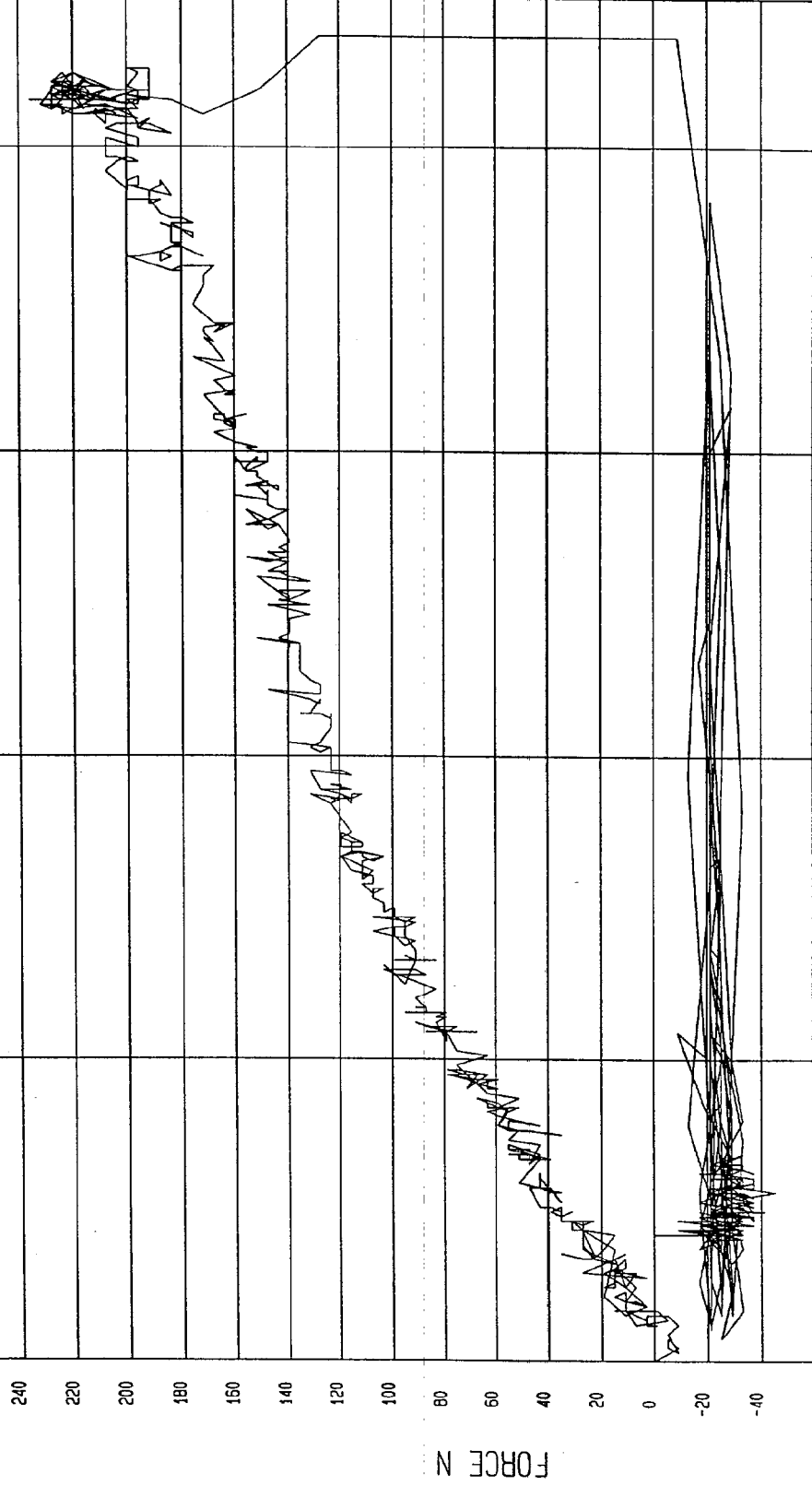
APPROVED BY



TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 02-02-1999 - 16:06:06

COMPONENT: DUMMY # 271

FORCE as a function of TORSO ROTATION



POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

C-53

Type: Side Impact Dummy

Serial Number: 271

Inspected By: Tim Michnay

Date: February 2, 1999

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

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

POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

C-54

Type: Side Impact Dummy

Serial Number: 272

Inspected By: Tim Michnay

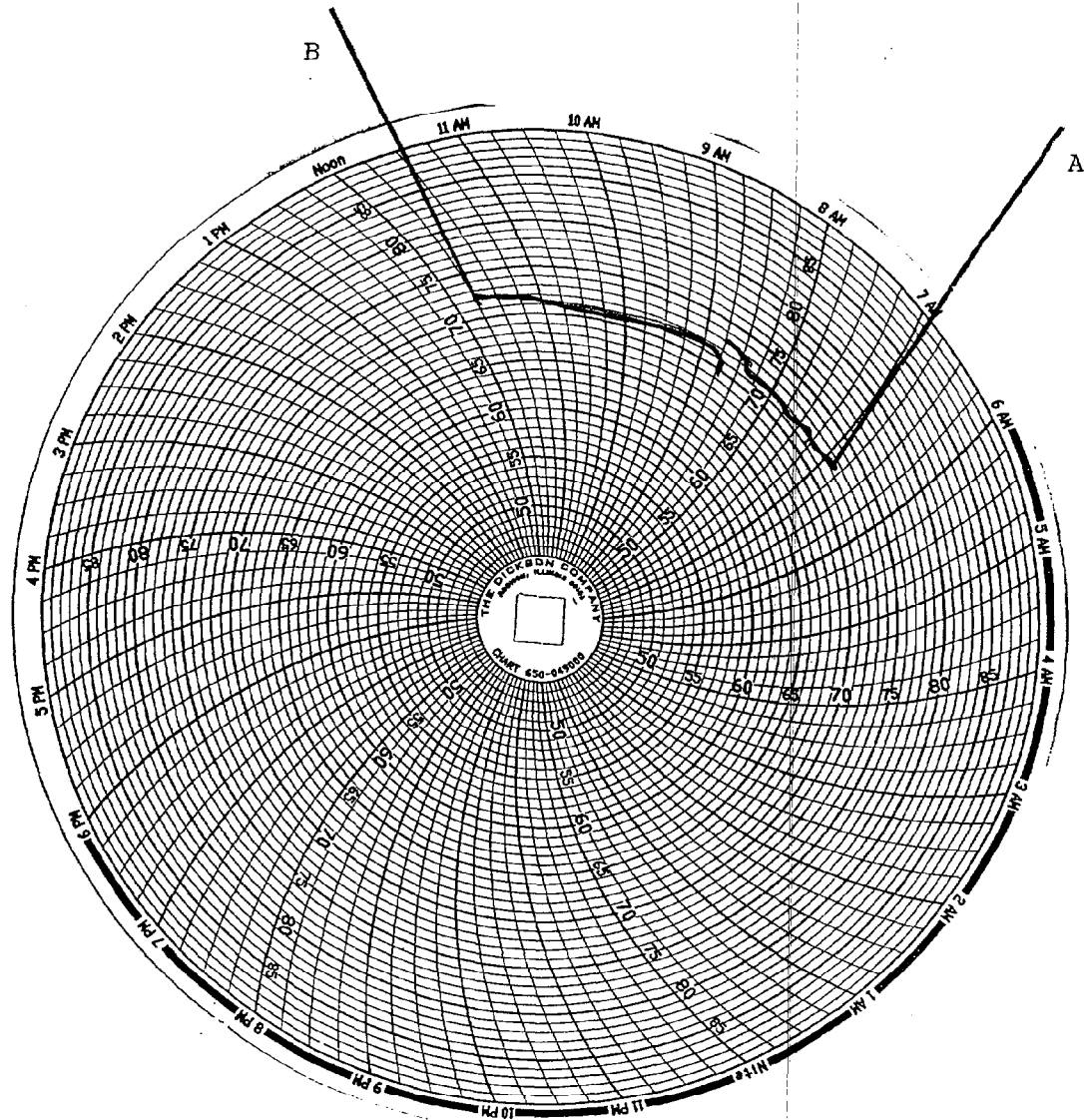
Date: February 2, 1999

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

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

VEHICLE AND DUMMY TEMPERATURE

C-55



A = dummies installed in vehicle
B = test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

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

| | DRIVER | | |
|--------------------------|------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y | AKAF3 | Endevco | October 9, 1998 |
| Lower Rib Y | ALEC1 | Endevco | October 9, 1998 |
| Lower Spine Y | J14120 | Endevco | October 14, 1998 |
| Pelvis Y | AGM32 | Endevco | October 14, 1998 |
| Upper Rib Redundant Y | ALCN | Endevco | October 9, 1998 |
| Lower Rib Redundant Y | J10411 | Endevco | October 9, 1998 |
| Lower Spine Redundant Y | AP2F7 | Endevco | October 14, 1998 |
| Pelvis Redundant Y | AKAH3 | Endevco | October 14, 1998 |
| Head Center of Gravity X | AJ9B0 | Endevco | October 14, 1998 |
| Head Center of Gravity Y | AHTR2 | Endevco | October 14, 1998 |
| Head Center of Gravity Z | AGTE9 | Endevco | October 14, 1998 |

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR PASSENGER DUMMY NO. 271

| LEFT REAR PASSENGER | | | |
|--------------------------|------------|--------------|------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y | AH0N9 | Endevco | October 20, 1998 |
| Lower Rib Y | AGP53 | Endevco | October 20, 1998 |
| Lower Spine Y | J12450 | Endevco | October 20, 1998 |
| Pelvis Y | AJ417 | Endevco | October 20, 1998 |
| Upper Rib Redundant Y | AHT20 | Endevco | October 20, 1998 |
| Lower Rib Redundant Y | AHTC3 | Endevco | October 20, 1998 |
| Lower Spine Redundant Y | J12461 | Endevco | October 20, 1998 |
| Pelvis Redundant Y | AGP20 | Endevco | October 20, 1998 |
| Head Center of Gravity X | J20392 | Endevco | July 28, 1998 |
| Head Center of Gravity Y | AGT18 | Endevco | July 28, 1998 |
| Head Center of Gravity Z | ALBA7 | Endevco | July 28, 1998 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE ACCELEROMETERS | | |
|---------------------------------|------------------------|--------------|--------------------|
| | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Moving Barrier CG X | K19-A11 | Entran | August 27, 1998 |
| Moving Barrier CG Y | K19-A15 | Entran | August 27, 1998 |
| Moving Barrier CG Z | K11-J17 | Entran | August 28, 1998 |
| Moving Barrier Rear Axle X | H02-J02 | Entran | December 15, 1998 |
| Moving Barrier Rear Axle Y | J04-F16 | Entran | December 15, 1998 |
| Left Mid A-Post Y | J04-F12 | Entran | December 16, 1998 |
| Left Lower A-Post Y | F10-D02 | Entran | December 16, 1998 |
| Left Lower B-Post Y | K16-X05 | Entran | August 28, 1998 |
| Rear Floorpan Above Axle X | K16-X04 | Entran | August 28, 1998 |
| Rear Floorpan Above Axle Y | K16-X08 | Entran | August 28, 1998 |
| Rear Floorpan Above Axle Z | J13-F22 | Entran | August 28, 1998 |
| Driver Seat Track Y | C25-A22 | Entran | December 15, 1998 |
| Right Side Sill at Front Seat X | J10-E12 | Entran | December 8, 1998 |
| Right Side Sill at Front Seat Y | B14-R16 | Entran | September 16, 1998 |
| Right Side Sill at Front Seat Z | F18-G11 | Entran | September 15, 1998 |
| Right Side Sill at Rear Seat X | I18-G01 | Entran | January 7, 1999 |
| Right Side Sill at Rear Seat Y | F18-G08 | Entran | September 16, 1998 |
| Right Side Sill at Rear Seat Z | J04-F10 | Entran | December 16, 1998 |
| Rear Passenger Seat Track Y | C25-A06 | Entran | December 8, 1998 |

VEHICLE INSTRUMENT CALIBRATION

| | VEHICLE ACCELEROMETERS | | |
|-----------------------------------|------------------------|--------------|--------------------|
| | SERIAL NO | MANUFACTURER | CALIBRATION DATE |
| Left Side Sill at Front Seat Y | K11-J10 | Entran | August 27, 1998 |
| Left Side Sill at Rear Seat Y | K11-J12 | Entran | August 28, 1998 |
| Right Rear Occupant Compartment Y | K16-X07 | Entran | August 27, 1998 |
| Vehicle CG X | C06-G08 | Entran | August 26, 1998 |
| Vehicle CG Y | C05-Z13 | Entran | January 7, 1999 |
| Vehicle CG Z | F07-A14 | Entran | December 21, 1998 |
| Left Front Door on Centerline | G08-B04 | Entran | January 7, 1999 |
| Midrear of Left Front Door | F18-G01 | Entran | September 15, 1998 |
| Left Front Door Upper Centerline | F18-G03 | Entran | January 7, 1999 |

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