

V2535

REPORT NO.: 214-MGA-97-19
SAFETY COMPLIANCE TESTING FOR
FMVSS 214 "SIDE IMPACT PROTECTION -
PASSENGER CARS"

HYUNDAI MOTOR COMPANY
1997 HYUNDAI ELANTRA 4 DOOR
NHTSA NO: CV0500

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 8, 1997

Report Date: January 16, 1997

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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15. Supplementary Notes																							
16. Abstract A 48/24 kph 90° Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject 1997 Hyundai Elantra 4 Door in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP- 214D-04 for the determination of FMVSS No. 214 Side Impact Protection compliance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on January 8, 1997. The impact velocity of the Moving Deformable Barrier (MDB) was 53.5 kph, and the ambient temperature at the struck side of the target vehicle at the time of impact was 20°C. The target vehicle post test maximum crush was 311 mm at level 2. The test vehicle's performance follows: <table border="0"> <thead> <tr> <th></th> <th><u>RIGHT FRONT PASS.</u></th> <th><u>RIGHT REAR PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Right Upper Rib (RUR) Accel., g</td> <td>65</td> <td>60</td> </tr> <tr> <td>Right Lower Rib (RLR) Accel., g</td> <td>60</td> <td>66</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td>65</td> <td>58</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>65</td> <td>62</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>82</td> <td>64</td> </tr> </tbody> </table> The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.							<u>RIGHT FRONT PASS.</u>	<u>RIGHT REAR PASS.</u>	Right Upper Rib (RUR) Accel., g	65	60	Right Lower Rib (RLR) Accel., g	60	66	Lower Spine (T ₁₂) Accel., g	65	58	Thoracic Trauma Index (TTI)	65	62	Pelvis (PEV) Accel., g	82	64
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17. Key Words Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. 202-366-4946 Attn: Robert Hornickle																			
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Prepared By: David Winkelbauer
David Winkelbauer, Project Engineer

Approved By: John J. Fleck
John Fleck, Facility Director

Approval Date: 1/21/97

FINAL REPORT ACCEPTED BY (OVSC):

Accepted By: [Signature]
Contract Technical Manager

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SECTION 1
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 96 FMVSS 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-93-C-02047. The purpose of this test was to evaluate side impact protection of a 1997 Hyundai Elantra 4 Door.

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

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

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1997 Hyundai Elantra 4 Door was impacted on the right 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 33.26 mph (53.5 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 8, 1997. Pre- and post-test photographs of the test vehicle, the MDB and the side impact dummies (SIDs) are included in Appendix A.

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

The SIDs were instrumented with the following accelerometers.

1. Right Upper Rib (RUR) uniaxial accelerometer (Y-direction)
2. Right Lower Rib (RLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

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

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

Injury Criteria	Front SID	Rear SID
TTI (g)	65	62
Pelvis (g)	82	64

TEST NOTES

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

Right Front Door on Centerline

Midrear of Right Front Door

Right Front Door Upper Centerline

Midrear of Right Rear Door

Right Rear Door Upper Centerline

Rear Seat Track

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

DATA SHEET NO. 1
GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door
Vehicle NHTSA No.: CV0500 VIN: KMHJF24M2VU396245
Vehicle Body Color: Gray Build Date: 9/96
Engine Data: 4 Cylinders; CID; 1.8 Liter; cc
Placement Longitudinal; X Lateral
Transmission: 4 speed; Manual; X Automatic; Overdrive
Final Drive: Rear Wheel Drive; X Frt. Wheel Drive; Four Wheel Drive

Odometer Reading 116 miles
Options: X A/C; X Pwr. Steering; X Pwr. Brakes; Pwr. Windows;
 Cruise Control; Tilt Wheel; Power Door Locks;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 32 Psi FRONT
32 Psi REAR
Recommended Tire Size: P175/65R14
Tires on Test Vehicle: P175/65R14 Manufacturer: Uniroyal

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; 3rd Seat 5 Total
Type of Front Seats: X Bucket; Bench; Split Bench
Type of Front Seat Back: Fixed; X Adjustable with X Lever
Vehicle Maximum Capacity Loading = 385.6 kg (A)
No. of Occupants x 68.04 kg. = 340.2 kg (B)
Cargo Capacity (A-B) = 45.4 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front	=	<u>368.8</u> kg	Right Rear	=	<u>222.7</u> kg
Left Front	=	<u>382.4</u> kg	Left Rear	=	<u>225.9</u> kg
TOTAL FRONT	=	<u>751.2</u> kg	TOTAL REAR	=	<u>448.6</u> kg
% of Total Vehicle Weight = <u>62.6</u> %;		% of Total Weight = <u>37.4</u> %			
TOTAL WEIGHT = <u>1199.8</u> kg					

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	= <u>1199.8</u> kg
Cargo Carrying Capacity of Test Vehicle	= <u>45.4</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>1406.6</u> kg

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front	= <u>426.8</u> kg	Right Rear	= <u>313.0</u> kg
Left Front	= <u>388.7</u> kg	Left Rear	= <u>278.9</u> kg
TOTAL FRONT	= <u>815.5</u> kg	TOTAL REAR	= <u>591.9</u> kg
% of Total Weight	= <u>57.9</u> %	% of Total Weight	= <u>42.1</u> %
TOTAL TEST WEIGHT	= <u>1407.4</u> kg		

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 645 mm Left Front 633 mm Right Rear 636 mm Left Rear 632 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 625 mm Left Front 630 mm Right Rear 601 mm Left Rear 609 mm

TEST ATTITUDE:

Right Front 625 mm Left Front 620 mm Right Rear 605 mm Left Rear 608 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2554 mm

C.G. = 1023 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 3926 mm

Centerline = 4240 mm

Left Side = 3926 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 230 mm

Test Position: 9th position rearward out of 16 total

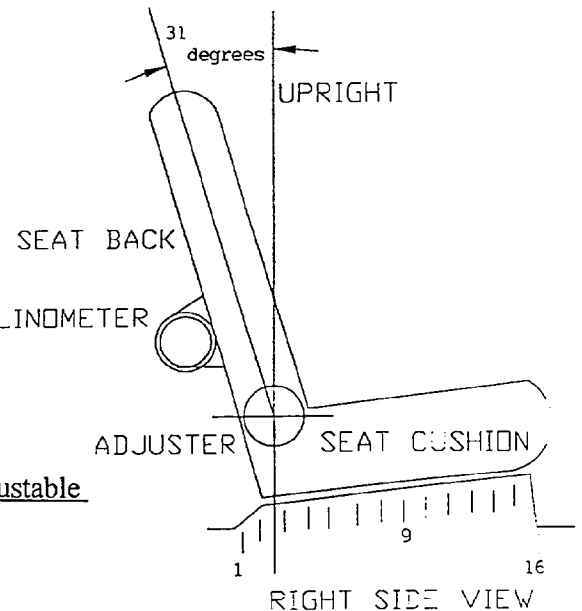
FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 31° from the vertical position

REAR POSITION SEAT:

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

Seat Back Adjustment Position: Non-adjustable



ADJUSTABLE STEERING COLUMN POSITION: Non-adjustable

WINDOW POSITIONS: Left Front Open Left Rear Open

Right Front Closed Right Rear Closed

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 55 liters

Test Volume: 51.1 liters 93 % of capacity

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

Wheelbase: = 2554 mm

Impact Point is 337 mm rearward of front axle centerline

DATA SHEET NO. 2
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

Overall Length = 4240 mm; Overall Width = 1680 mm

TEST WEIGHT:

Right Front = 425.9 kg Right Rear = 289.4 kg
Left Front = 412.3 kg Left Rear = 270.3 kg
TOTAL FRONT = 838.2 kg TOTAL REAR = 559.7 kg
% of Total Weight = 60.0 % % of Total Weight = 40.0 %
TOTAL VEHICLE WEIGHT = 1397.9 kg
Wheelbase = 2554 mm
Longitudinal C.G. from Center of Front Axle = 1023 mm
Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (236 mm above ground) = 172 mm
 2. LEVEL 2 (480 mm above ground) = 311 mm
 3. LEVEL 3 (576 mm above ground) = 285 mm
 4. LEVEL 4 (862 mm above ground) = 217 mm
 5. LEVEL 5 (1277 mm above ground) = 30 mm
- Maximum Post-Test Intrusion = 311 mm

OCCUPANTS:

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

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

Number of Vehicle Data Channels: = 20

Number of Cameras: Onboard Vehicle = 3

Offboard Vehicle = 4

Deformable Barrier = 2

TOTAL = 9

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to right

MDB DETAILS:

Overall Width of Framework Carriage	= <u>1252 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	= <u>4115 mm</u>
Wheelbase of Framework Carriage	= <u>2591 mm</u>
Tread of Framework Carriage (Front & Rear)	= <u>1880 mm</u>
C.G. Location Rearward of Front Axle	= <u>1107 mm</u>
C.G. Location From Center Line	= <u>4 mm</u>
C.G. Location Above Ground Level	= <u>506 mm</u>

MDB WEIGHT:

Left Front	= <u>399.0 kg</u>	Left Rear	= <u>276.3 kg</u>
Right Front	= <u>378.8 kg</u>	Right Rear	= <u>304.3 kg</u>
TOTAL FRONT	= <u>777.8 kg</u>	TOTAL REAR	= <u>580.6 kg</u>
TOTAL MDB WEIGHT = <u>1358.4 kg</u>			

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

Impact Speed = Primary: 33.26 mph (53.5 kph) Secondary: 33.11 mph (53.3 kph)

CRASH TEST SUMMARY FOR SIDE IMPACTOR (Cont'd)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

- | | | |
|----|---------------------------------|-----------------|
| 1. | Row A Top of Stack (813 mm) | = <u>113</u> mm |
| 2. | Row B Mid Stack (686 mm) | = <u>130</u> mm |
| 3. | Row C Top of Bumper (533 mm) | = <u>93</u> mm |
| 4. | Row D Center of Bumper (432 mm) | = <u>133</u> mm |

INSTRUMENTATION:

Number of MDB Data Channels = 7

DATA SHEET NO. 4
POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

VISIBLE DUMMY CONTACT POINTS:

	<u>RIGHT FRONT SID</u>	<u>RIGHT REAR SID</u>
Head	<u>to D Ring</u>	<u>to C Post</u>
Arm	<u>to door</u>	<u>to door</u>
Pelvis	<u>to armrest</u>	<u>to armrest</u>
Left Knee	<u>to right knee</u>	<u>to right knee</u>
Right Knee	<u>to door</u>	<u>to mid door</u>

DOOR OPENING:

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

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 5 mm forward Vertical: 7 mm high

ARM REST LOCATIONS:

Front: 230 mm from bottom of window

Rear: 247 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 10 mm Front Seat Cushion: 52 mm

Left Rear Seat Back: 93 mm Rear Seat Cushion: 148 mm

GLAZING DAMAGE:

Both right side windows broke, windshield cracked

PILLAR PERFORMANCE:

No failure noted

SILL SEPARATION:

No failure noted

OTHER NOTABLE IMPACT EFFECTS:

Both airbags deployed

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

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

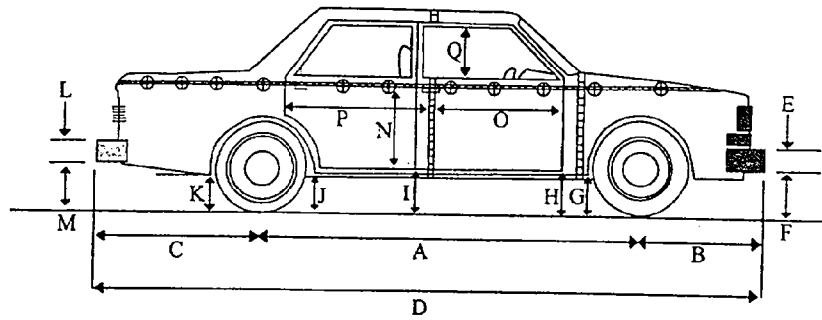
Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

	Front SID ID #275				Rear SID ID #274			
	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								
Right Upper Rib (RUR) Y	20.0	82	65.3	39	8.5	98	60.4	48
Right Lower Rib (RLR) Y	15.9	83	60.0	39	22.3	72	66.5	46
SPINE ACCELERATIONS								
Lower Lateral Y	28.9	70	65.1	33	8.5	76	58.4	49
PELVIS ACCELERATIONS								
Lateral Y	10.3	55	81.8	34	4.9	65	64.3	39

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	2554	2527	27
B	834	854	20
C	852	862	10
D	4240	4243	3
E	158	158	0
F	396	380	16
G	188	197	9
H	169	178	9
I	164	168	4
J1/J2	162/163	165/154	3/9
K	346	348	2
L*	---	---	---
M	357	368	11
N	640	580	60
O	767	742	25
P	1168	1106	62
Q	436	430	6
R	3926	3855	71
S	3926	3920	6
T	1680	1430	250

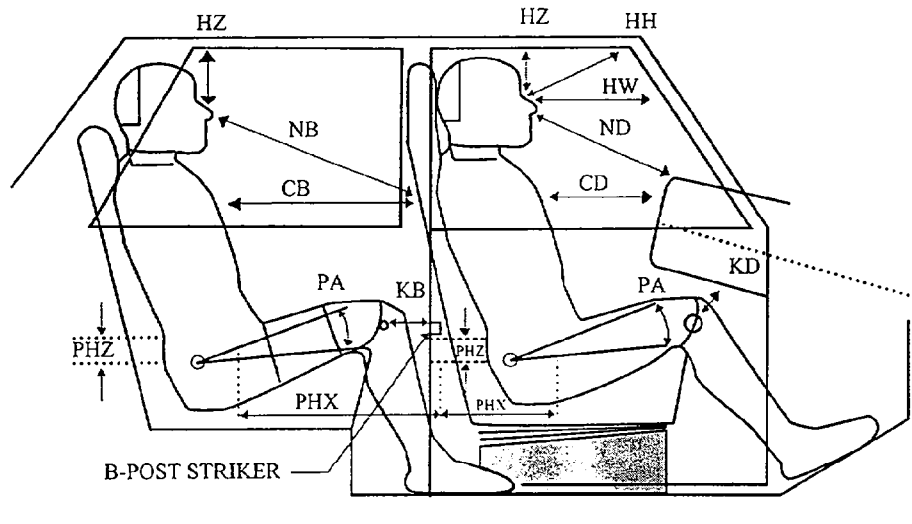
* Rear bumper removed for test

DATA SHEET NO. 7

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

NHTSA NO.: CV0500 Test Date: January 8, 1997



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

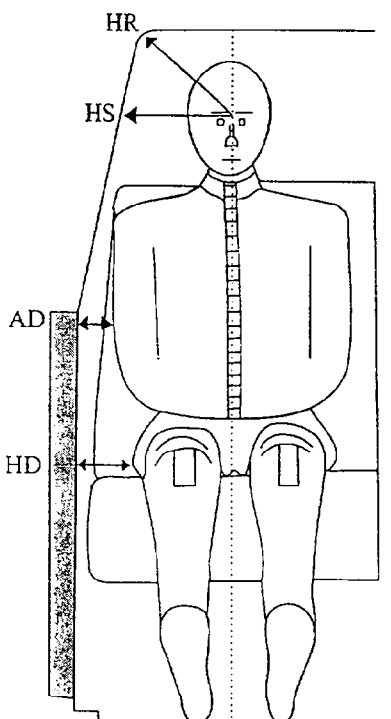
	FRONT PASSENGER ID #275		REAR PASSENGER SID ID #274
HH	413	HZ	137
HW	602	NB	587
HZ	147	CB	499
ND	785	KBL (KBA)	198 (0°)
CD	669	KBR (KBA)	196 (0°)
CS	N/A	PA°	23.8°
KDL(KDA°)	234 (0°)	PHX	193
KDR(KDA°)	228 (0°)	PHZ	240
PA°	23.7°		
PHX	212		
PHZ	133		

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 DIMENSIONS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

NHTSA NO.: CV0500 Test Date: January 8, 1997



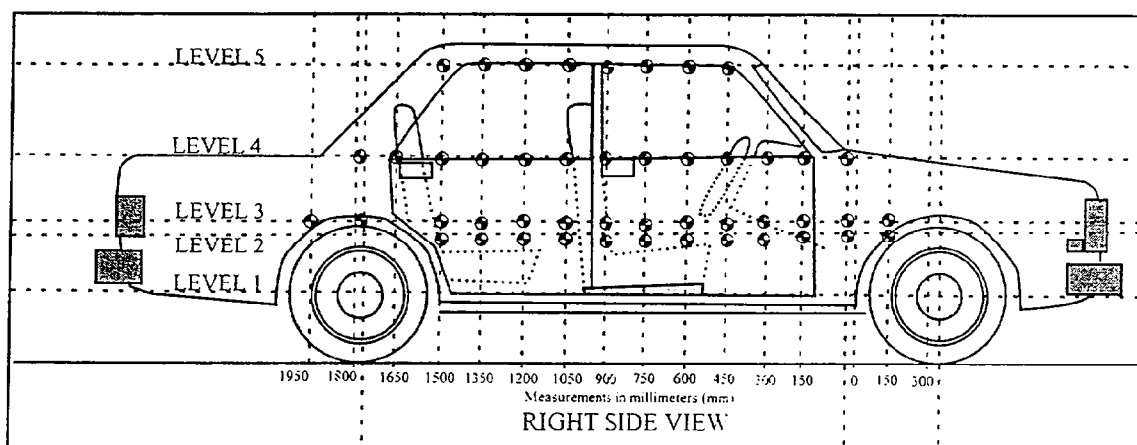
NOTE: All dimensions are in mm

	FRONT PASSENGER ID #275	REAR PASSENGER ID #274
HR	168	182
HS	282	215
AD	115	122
HD	152	182

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

NHTSA NO.: CV0500 Test Date: January 8, 1997



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

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

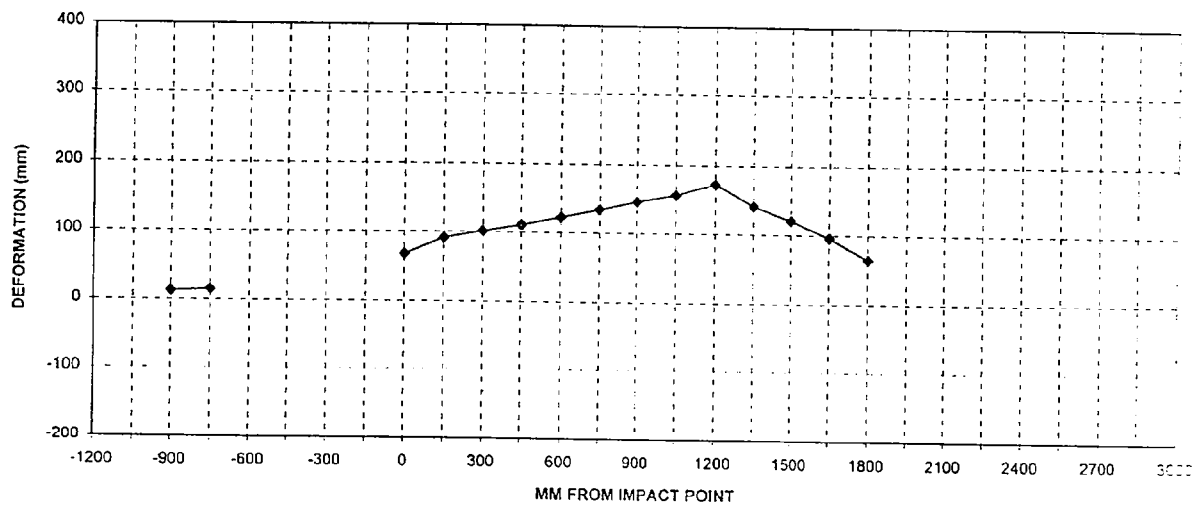
Level 1 @ Axle Centerline Height (or Sill Top Height)	= <u>236</u> mm
Level 2 @ Occupant H-Point	= <u>480</u> mm
Level 3 @ Mid Door	= <u>576</u> mm
Level 4 @ Window Sill	= <u>862</u> mm
Level 5 @ Window Top	= <u>1277</u> mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 1 - Axle Centerline		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900	897	910	13
-750	853	868	15
-600			
-450			
-300			
-150			
0 (impact point)	832	900	68
150	838	929	91
300	838	939	101
450	837	947	110
600	840	962	122
750	840	973	133
900	840	985	145
1050	841	996	155
1200	842	1014	172
1350	843	983	140
1500	842	962	120
1650	842	938	96
1800	842	907	65
1950			
2100			
2250			
2400			
2550			
2700			
2850			
3000			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



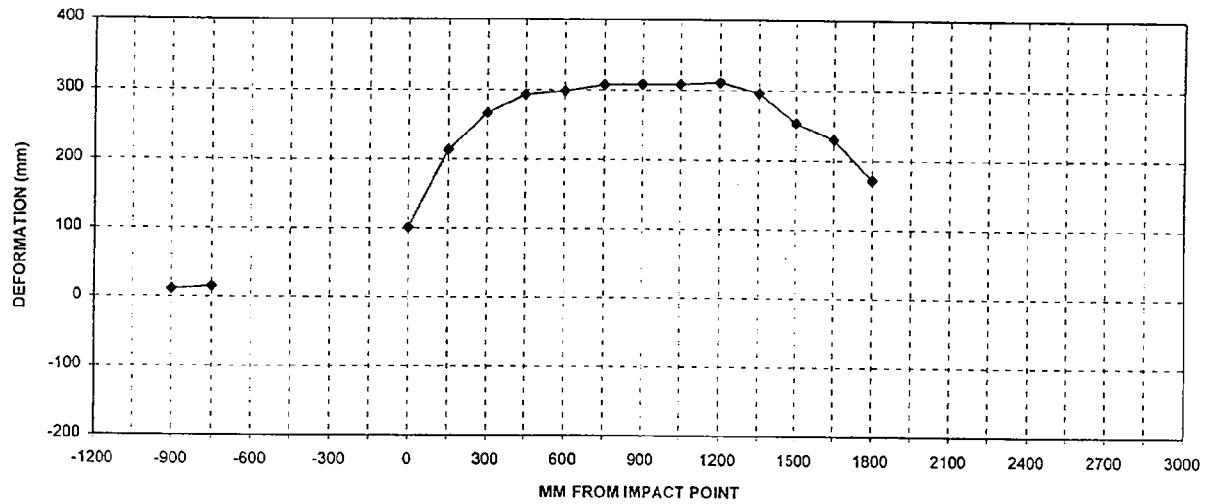
LEVEL 1 - AXLE CENTERLINE

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 2 - Occupant H Point		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900	852	863	11
-750	820	835	15
-600			
-450			
-300			
-150			
0 (impact point)	801	902	101
150	806	1019	213
300	808	1075	267
450	812	1105	293
600	814	1112	298
750	814	1121	307
900	812	1120	308
1050	811	1119	308
1200	810	1121	311
1350	810	1106	296
1500	809	1063	254
1650	809	1039	230
1800	805	977	172
1950			
2100			
2250			
2400			
2550			
2700			
2850			
3000			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



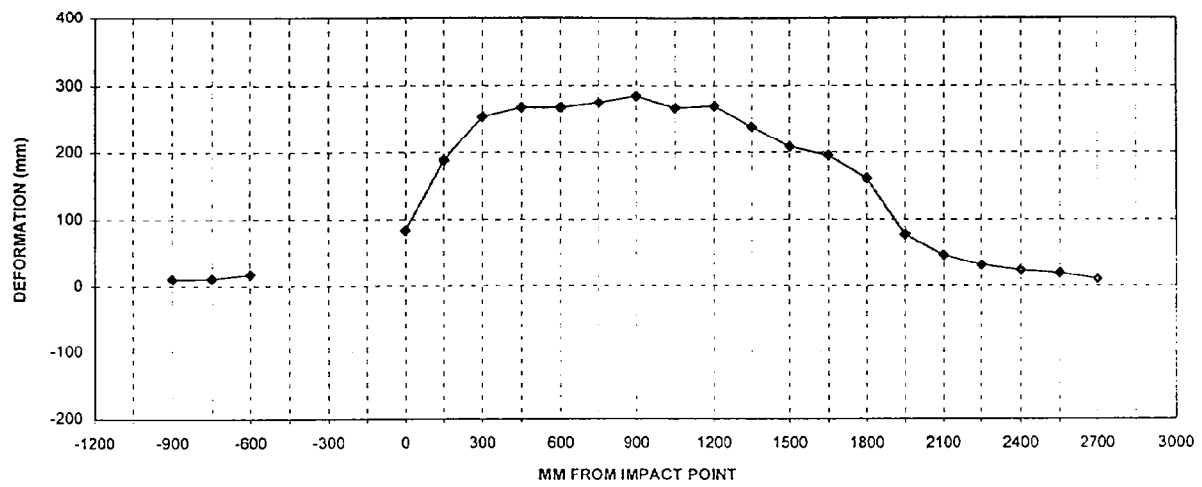
LEVEL 2 - OCCUPANT H-POINT

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 3 - Mid Door		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900	868	878	10
-750	829	840	11
-600	799	816	17
-450			
-300			
-150			
0 (impact point)	792	875	83
150	794	982	188
300	796	1050	254
450	797	1065	268
600	801	1069	268
750	802	1077	275
900	804	1089	285
1050	803	1070	267
1200	802	1072	270
1350	802	1041	239
1500	802	1010	208
1650	799	994	195
1800	797	958	161
1950	795	872	77
2100	797	843	46
2250	796	827	31
2400	803	826	23
2550	823	842	19
2700	847	857	10
2850			
3000			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



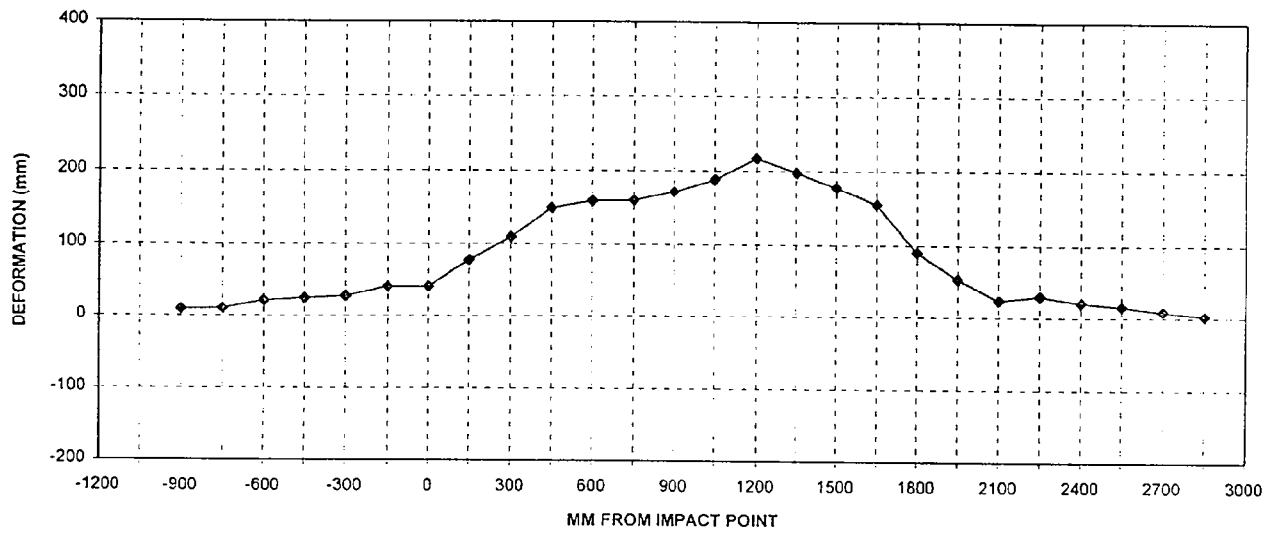
LEVEL 3 - MID DOOR

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 4 - Window Sill		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900	962	971	9
-750	941	951	10
-600	926	947	21
-450	917	941	24
-300	911	938	27
-150	900	940	40
0 (impact point)	893	933	40
150	877	954	77
300	873	982	109
450	866	1014	148
600	869	1027	158
750	871	1030	159
900	871	1042	171
1050	872	1060	188
1200	871	1088	217
1350	872	1070	198
1500	877	1055	178
1650	887	1041	154
1800	884	974	90
1950	887	940	53
2100	895	919	24
2250	911	941	30
2400	921	942	21
2550	928	944	16
2700	939	948	9
2850	963	965	2
3000			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



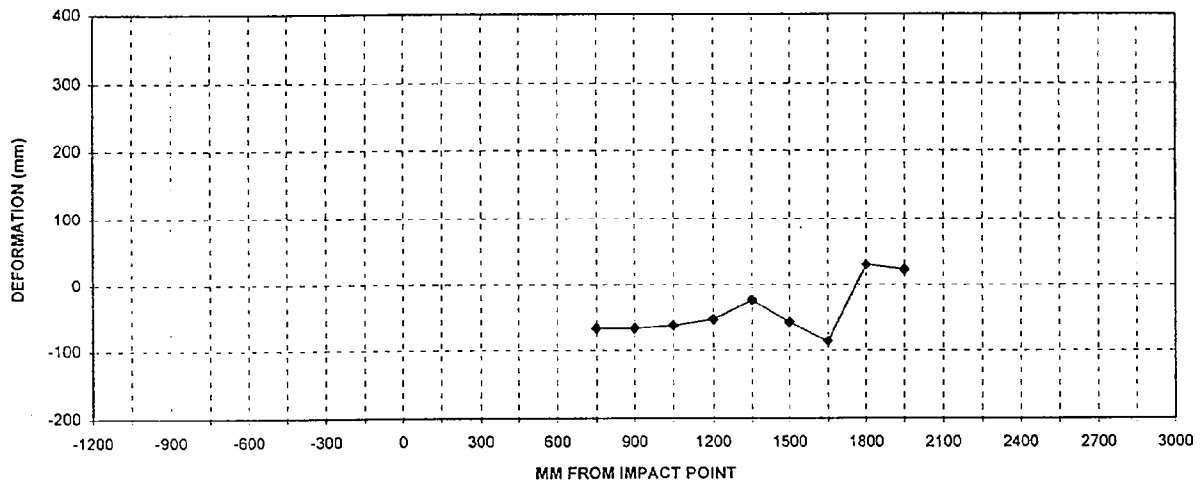
LEVEL 4 - WINDOW SILL

DATA SHEET NO. 10 (Cont'd)
VEHICLE EXTERIOR CRUSH PROFILES

Longitudinal Distance (mm)	Level 5 - Window Top		
	Pre-Test (mm)	Post-Test (mm)	Static Crush (mm)
-1200			
-1050			
-900			
-750			
-600			
-450			
-300			
-150			
0 (impact point)			
150			
300			
450			
600			
750	1074	1008	-66
900	1081	1015	-66
1050	1091	1029	-62
1200	1098	1045	-53
1350	1092	1068	-24
1500	1097	1040	-57
1650	1098	1012	-86
1800	1103	1133	30
1950	1111	1134	23
2100			
2250			
2400			
2550			
2700			
2850			
3000			

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

VEHICLE EXTERIOR STATIC CRUSH (Cont'd)



LEVEL 5 - WINDOW TOP

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door
NHTSA NO.: CV0500 Test Date: January 8, 1997

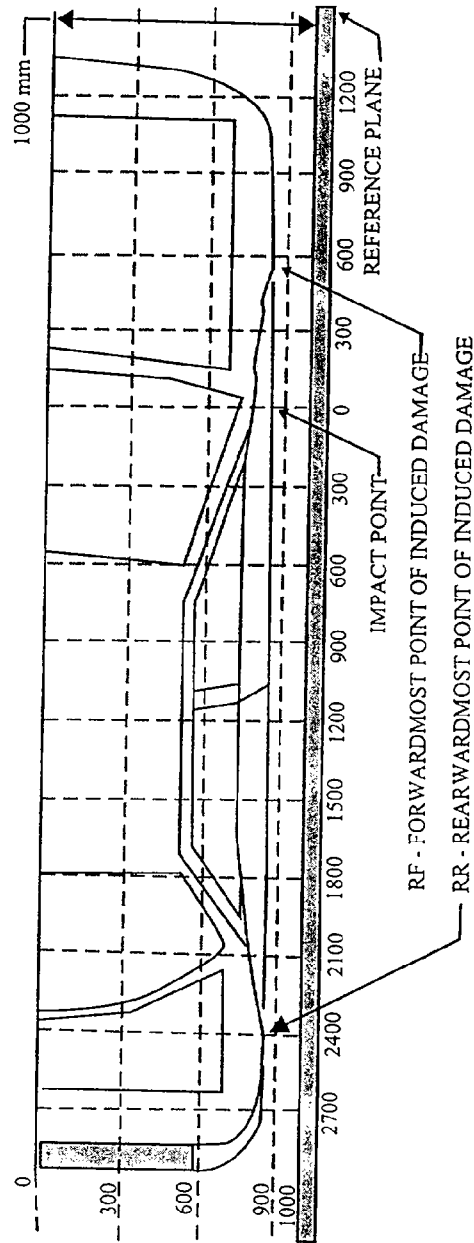


Figure is not representative of the actual test configuration

DPD MEASUREMENTS	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1. (RF = 900 mm)	878	878	0
2. -180 mm	847	794	53
3. 540 mm	1109	813	296
4. 1260 mm	1121	810	311
5. 1980 mm	880	796	84
6. (RR = 2700 mm)	857	857	0

DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

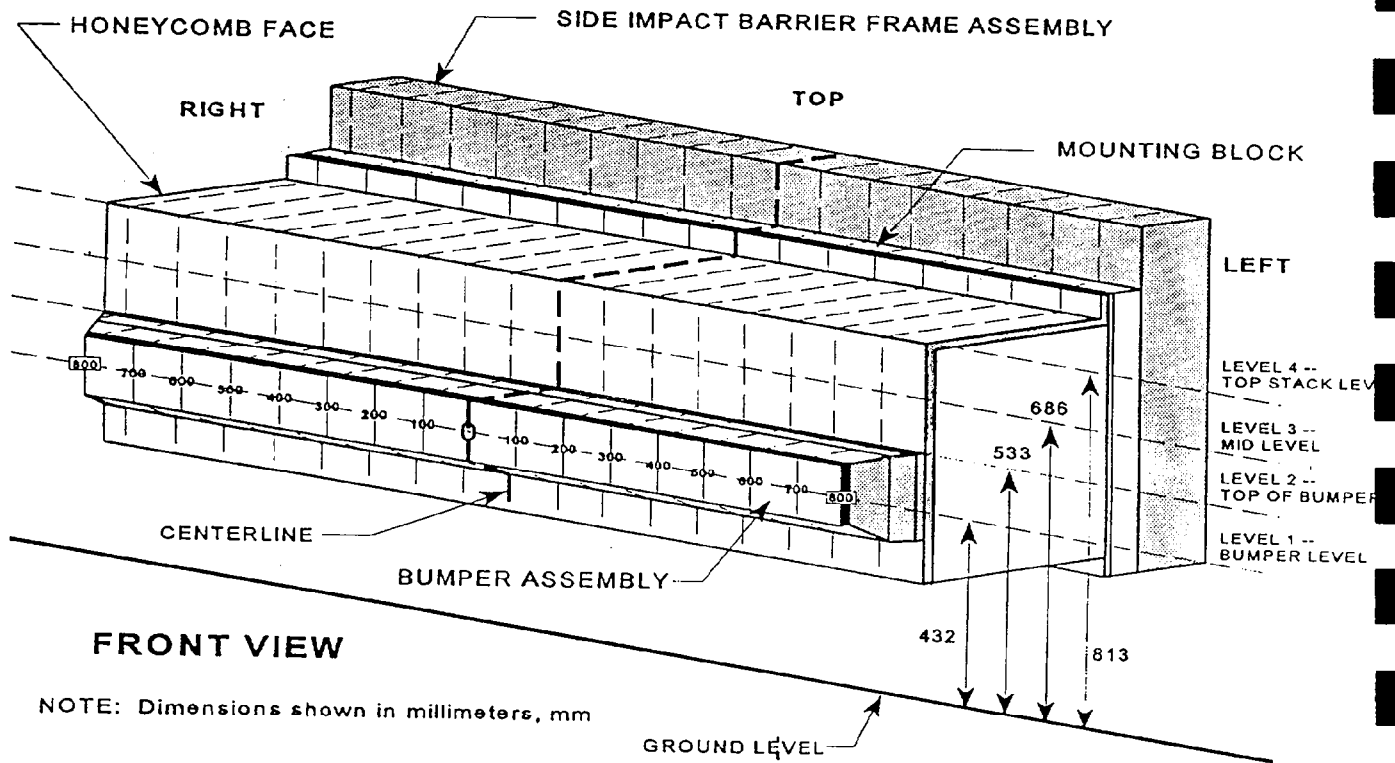
Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

		Distance Right of Center (mm)									Distance Left of Center (mm)							
Location	Height at CL*	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level 4	813 mm	113	78	47	23	5	4	2	1	-1	-1	-1	-3	-5	-5	-5	-6	26
Mid Level Level 3	686 mm	130	60	32	15	3	1	1	0	-1	0	-1	-3	-4	-5	-4	-5	26
Top Bumper Level 2	533 mm	93	61	33	18	14	11	7	6	5	4	5	7	7	11	22	35	48
Mid Bumper Level 1	432 mm	133	106	65	42	31	29	27	25	24	25	30	35	37	43	53	71	85

See next page for Barrier Face Graphic

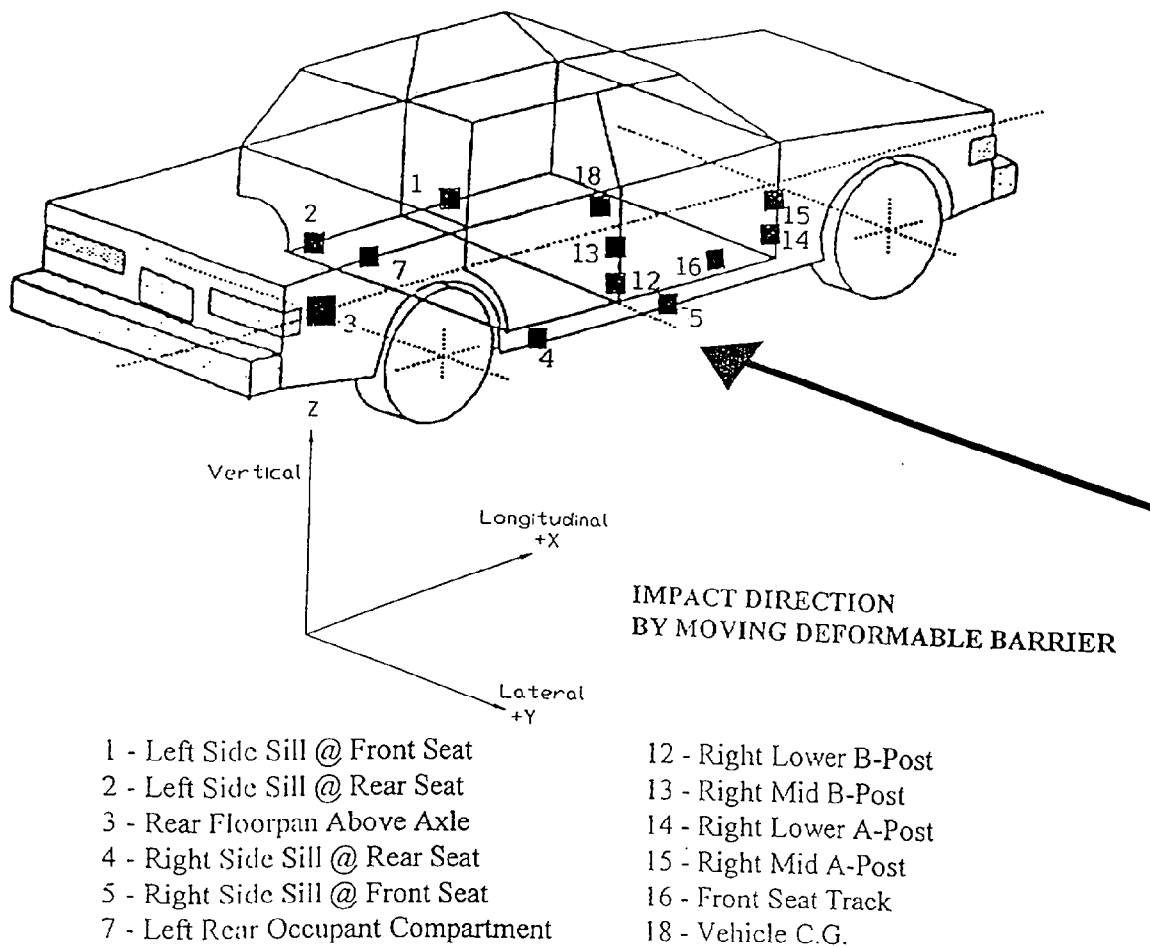
DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997



DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
1	Left Side Sill @ Front Seat	2354	-658	200	3.4	3.9	2.8	17.9	3.8	4.2	18.0
2	Left Side Sill @ Rear Seat	1376	-650	215	4.0	2.8	4.3	26.7	3.1	5.6	27.0
3	Rr. Floorpan Above Axle	730	0	536	4.0	13.4	14.6	26.0	14.5	41.2	43.2
4	Right Side Sill @ Rr. Seat	1371	650	205	---	---	8.7	36.9	---	---	---
5	Right Side Sill @ Frt. Seat	2427	658	195	---	---	2.4	31.0	---	---	---
7	Left Rear Occupant Compartment	1508	-382	394	---	---	3.3	25.9	---	---	---
12	Right Lower B-Post	1685	687	392	---	---	22.9	106.5	---	---	---
13	Right Mid B-Post	1740	646	840	---	---	61.4	126.7	---	---	---
14	Right Lower A-Post	2745	617	284	---	---	2.4	30.5	---	---	---
15	Right Mid A-Post**	2830	663	700	---	---	9.5	51.5	---	---	---
16	Right Front Passenger Seat Track	1965	585	250	---	---	42.4	89.4	---	---	---
18	Vehicle CG	2198	0	330	5.5	13.4	9.6	26.4	17.6	18.4	33.7

*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To right)

Z - Ground Level (+ Up)

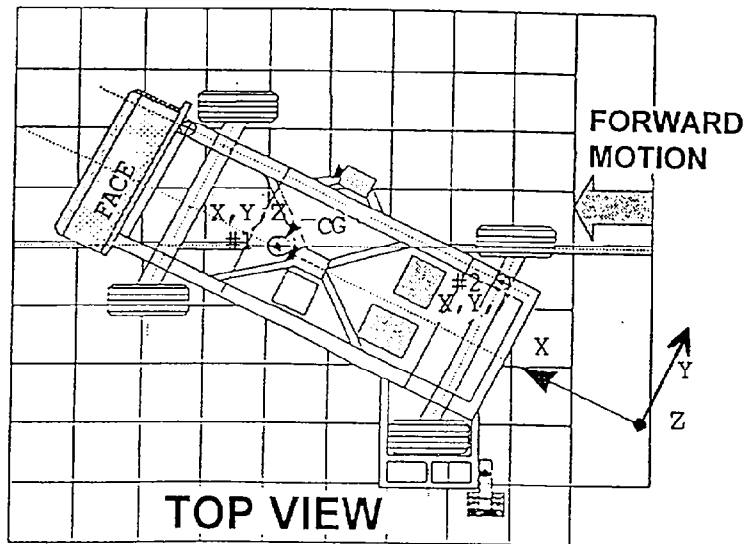
** No valid data after approximately 22 msec.

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997



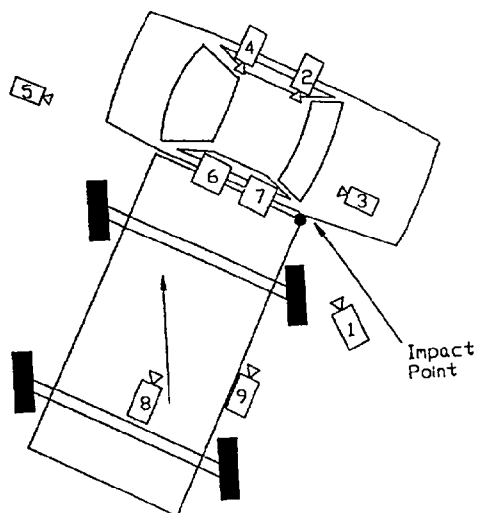
Accel. No.	Description	Coordinates (mm)*			(+) Positive		(-) Negative	
		X	Y	Z	Max. (g)	Time (msec)	Max. (g)	Time (msec)
1	MDB Center of Gravity	-1092	0	483				
	Longitudinal (X)	---	---	---	1.1	94	16.8	38
	Lateral (Y)	---	---	---	6.3	39	0.8	54
	Vertical (Z)	---	---	---	12.4	74	11.3	49
	Resultant (R)	---	---	---	19.8	43	---	---
2	Rear Frame Member	-2591	625	622				
	Longitudinal (X)	---	---	---	1.5	95	21.3	36
	Lateral (Y)	---	---	---	1.2	120	4.6	38

*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: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997



Camera No.	View	Coordinates (mm)*			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
	Real Time					13	24
1	Right Impact	-1130	2230	1630	90°	13	806
2	Onboard Front Passenger					8	926
3	Onboard Rear Passenger					8	971
4	Onboard Hood					13	1020
5	Left Impact	-170	9530	1695	90°	25	NR
6	Top Overall	-100	-1190	5000		8	1005
7	Top Impact	180	80	5000		13	855
8	Cart Wide					13	939
9	Cart Impact					35	1020

* Reference: (from impact point)

+X = Forward

+Y = To Right

+Z = Upward from floor level

DATA SHEET 16
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

TEST REQUIREMENTS:

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

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 33.26 mph (53.5 kph)

FUEL SPILLAGE MEASUREMENT:

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

FUEL SPILLAGE LOCATION(S): None

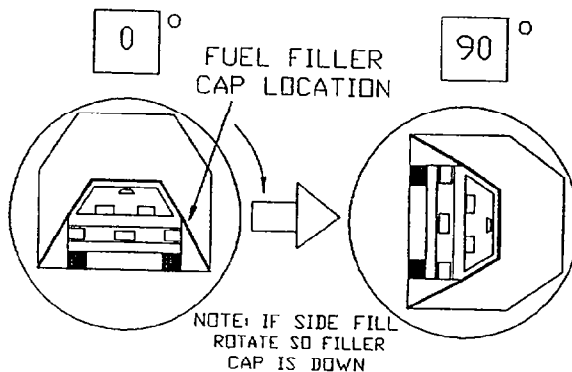
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 51 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 51 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

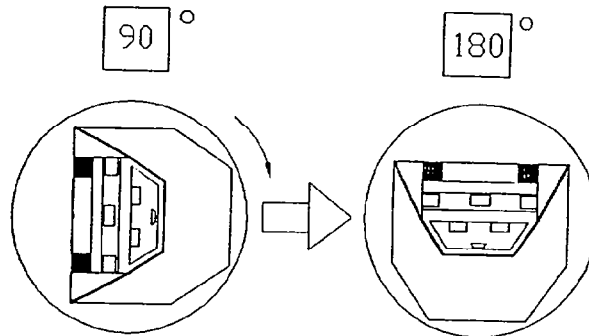
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 37 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 37 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

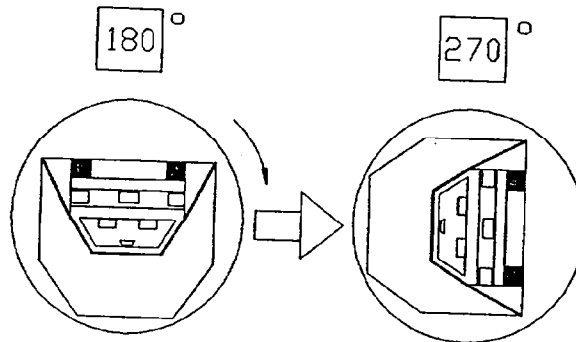
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 17 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 17 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

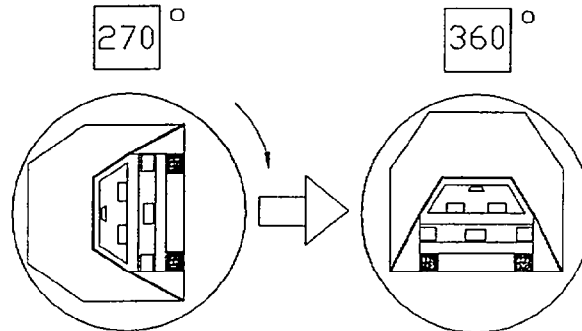
DATA SHEET 16

FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Hyundai/Elantra/4 Door

Vehicle NHTSA No.: CV0500 Test Date: January 8, 1997

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 37 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 37 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

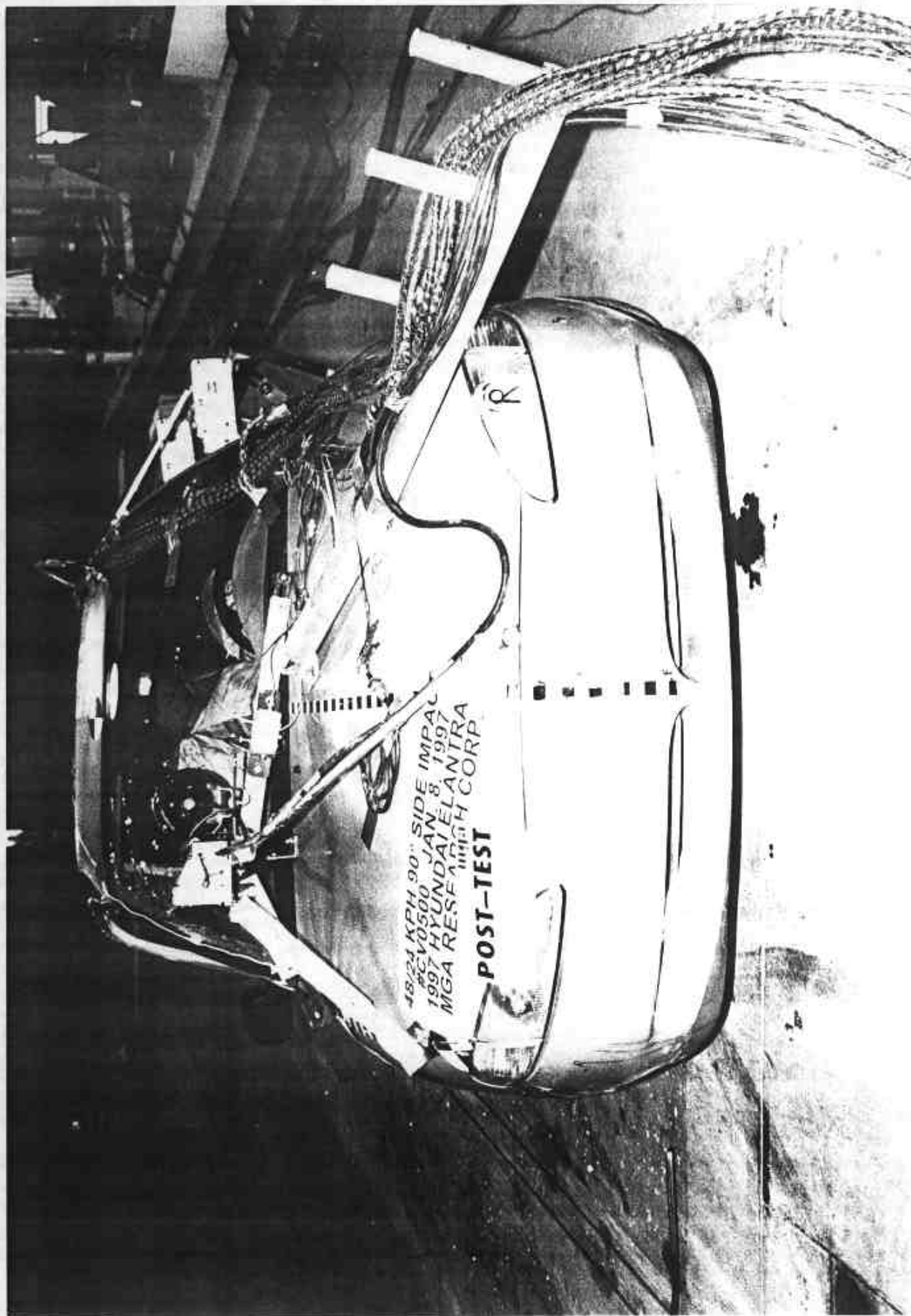


Photo No. A-2 - Post-Test Front View of Test Vehicle

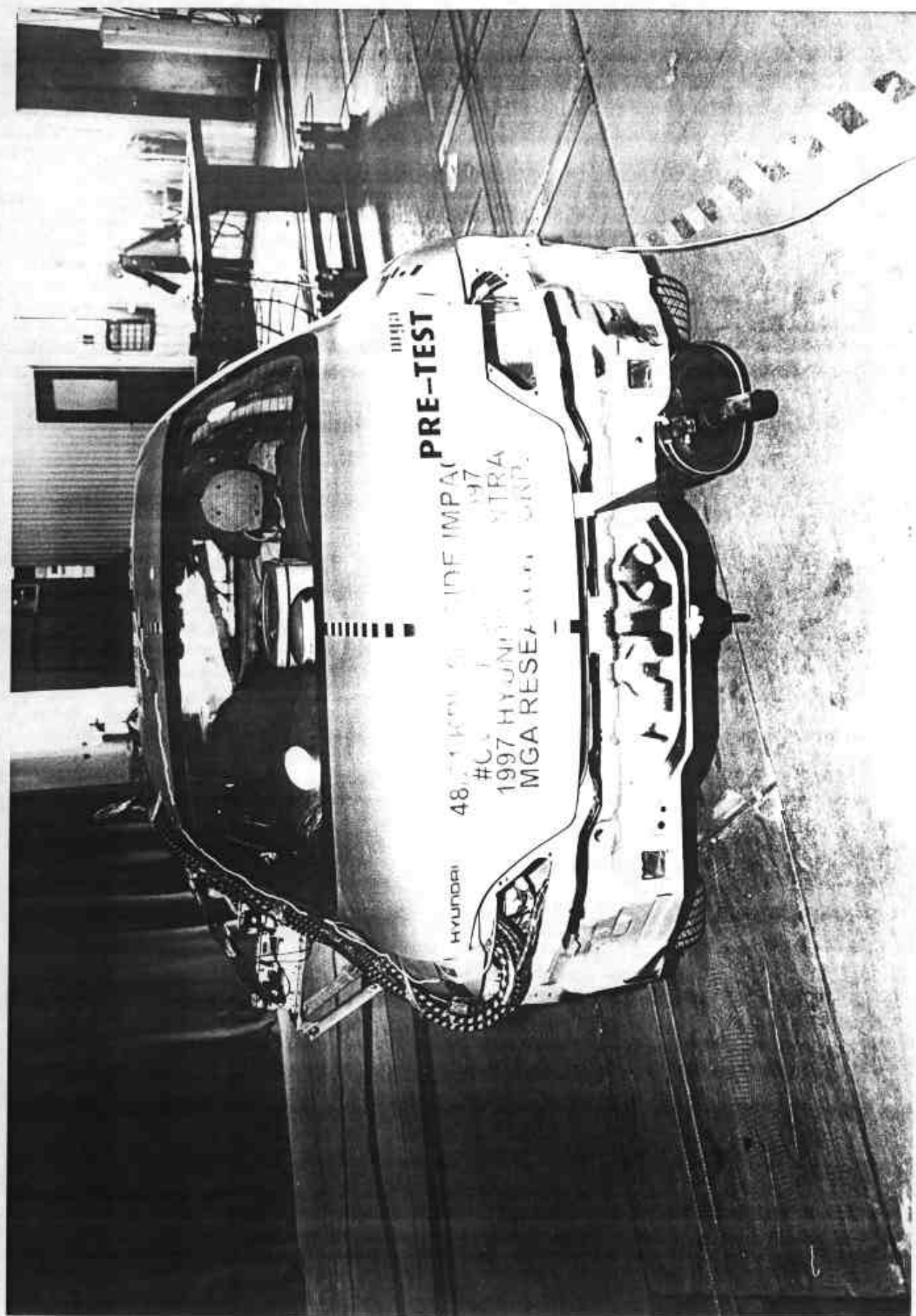


Photo No. A-3 - Pre-Test Rear View of Test Vehicle



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

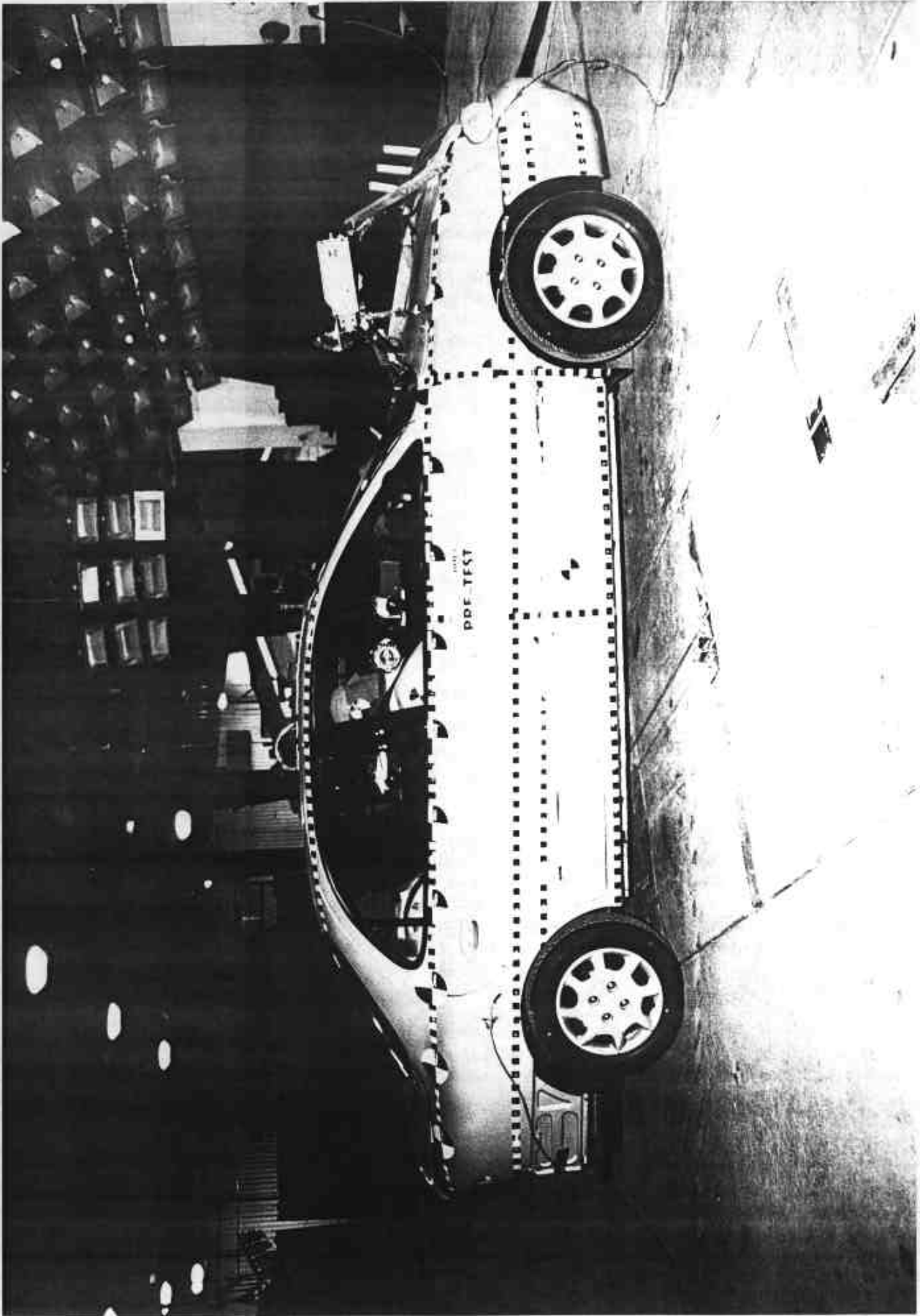


Photo No. A-5 - Pre-Test Right Side View of Test Vehicle

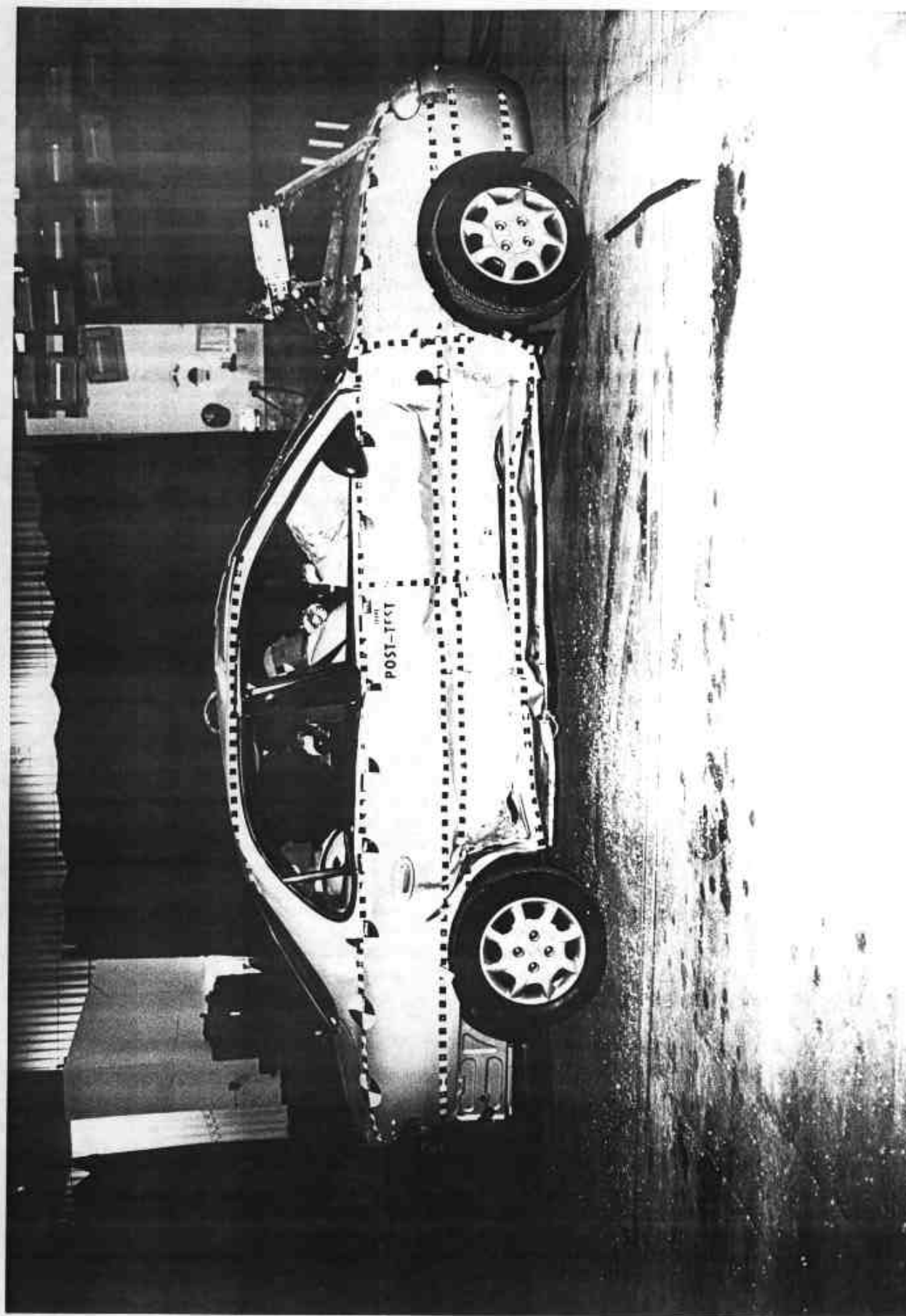


Photo No. A-6 - Post-Test Right Side View of Test Vehicle



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

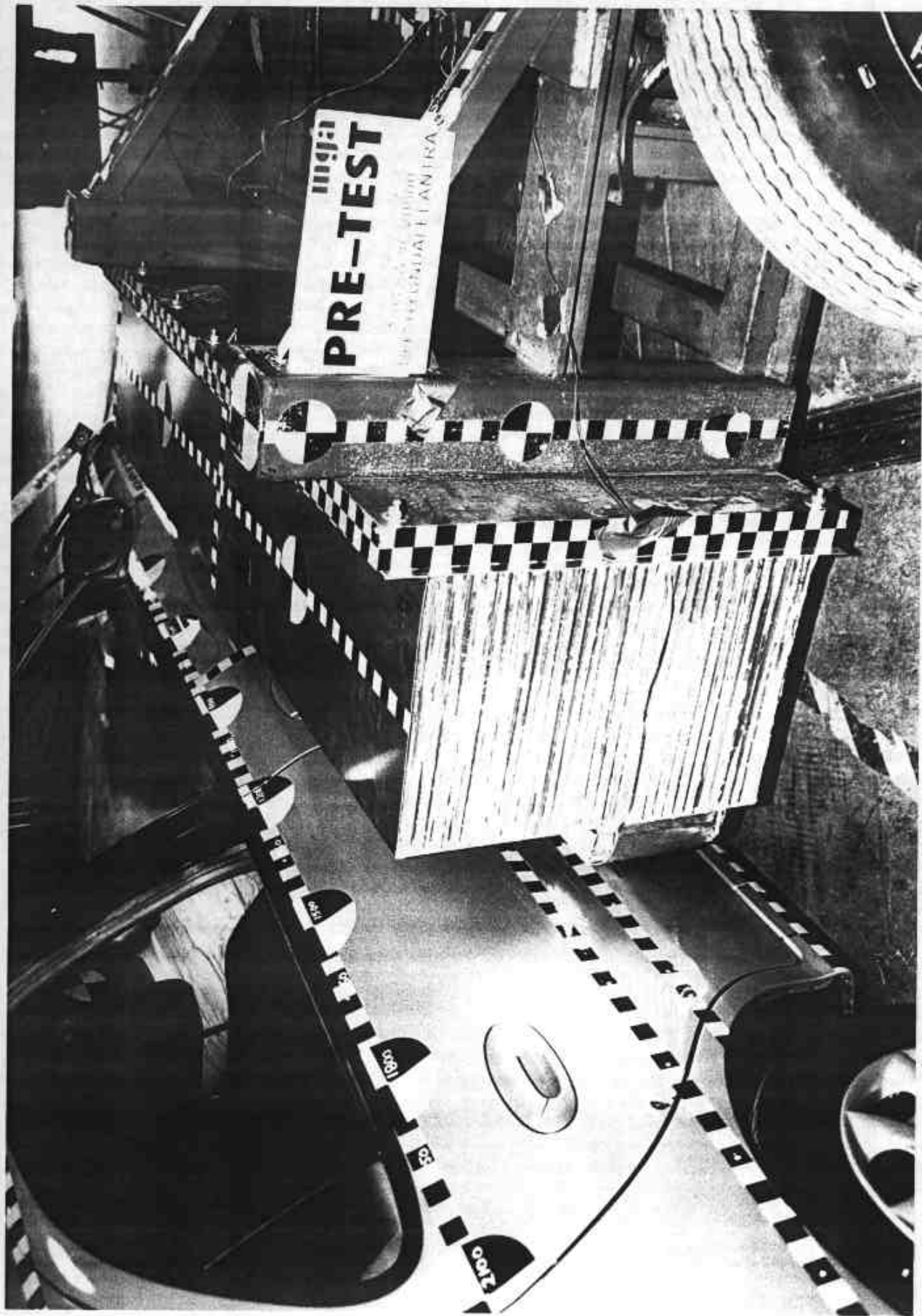


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (left side)

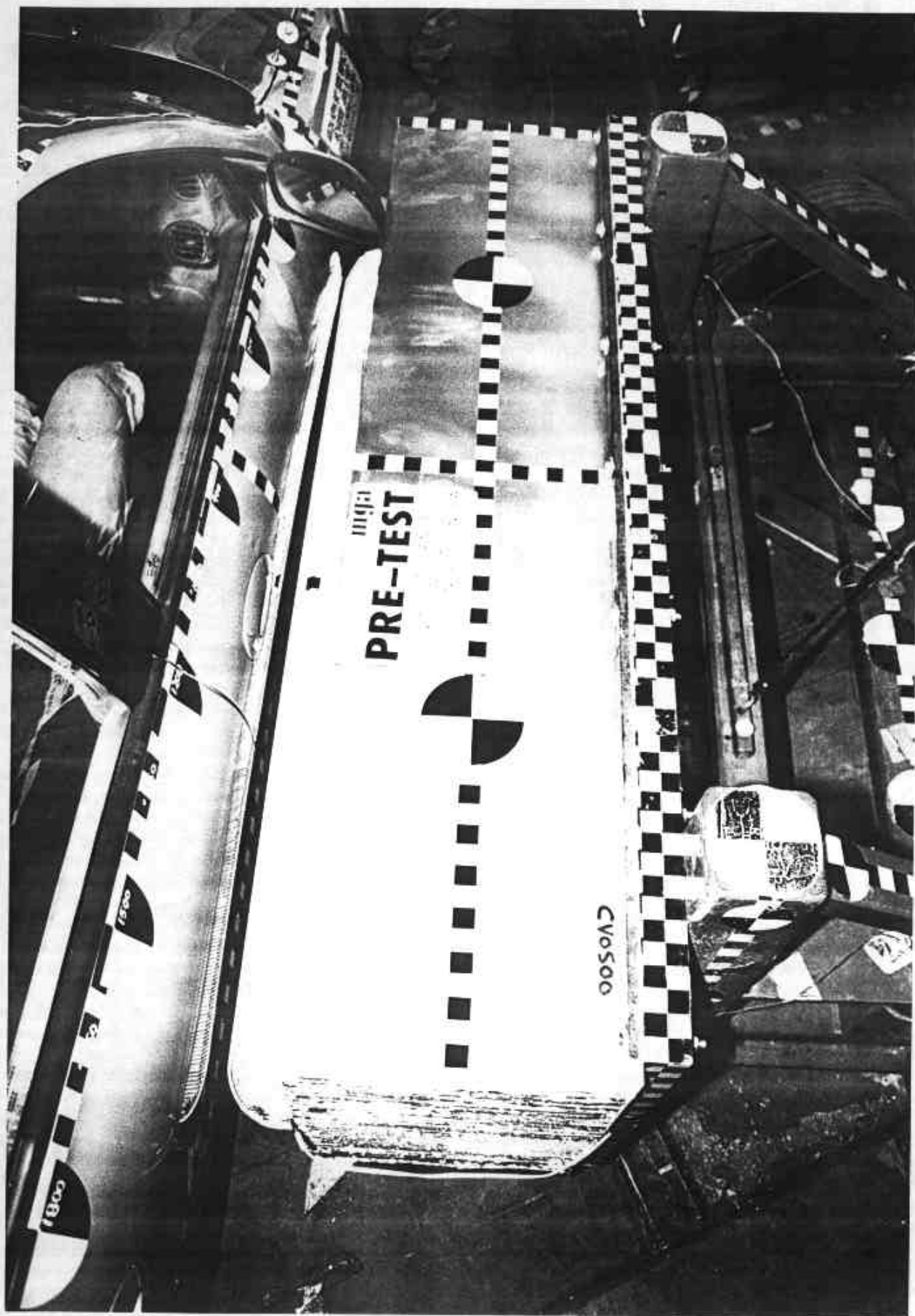


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

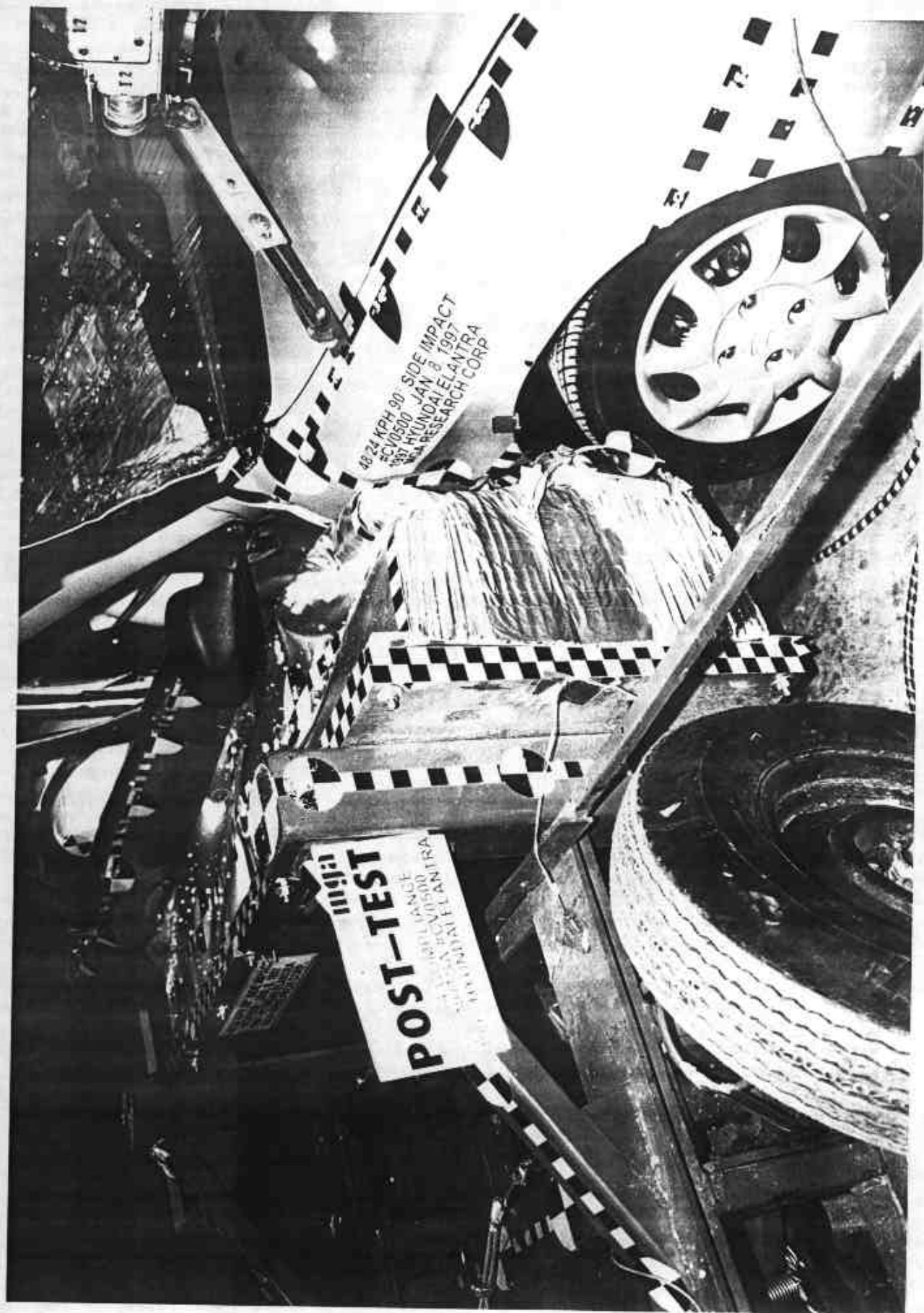


Photo No. A-10 - Post-Test MDB Positioned Against Vehicle (right side)

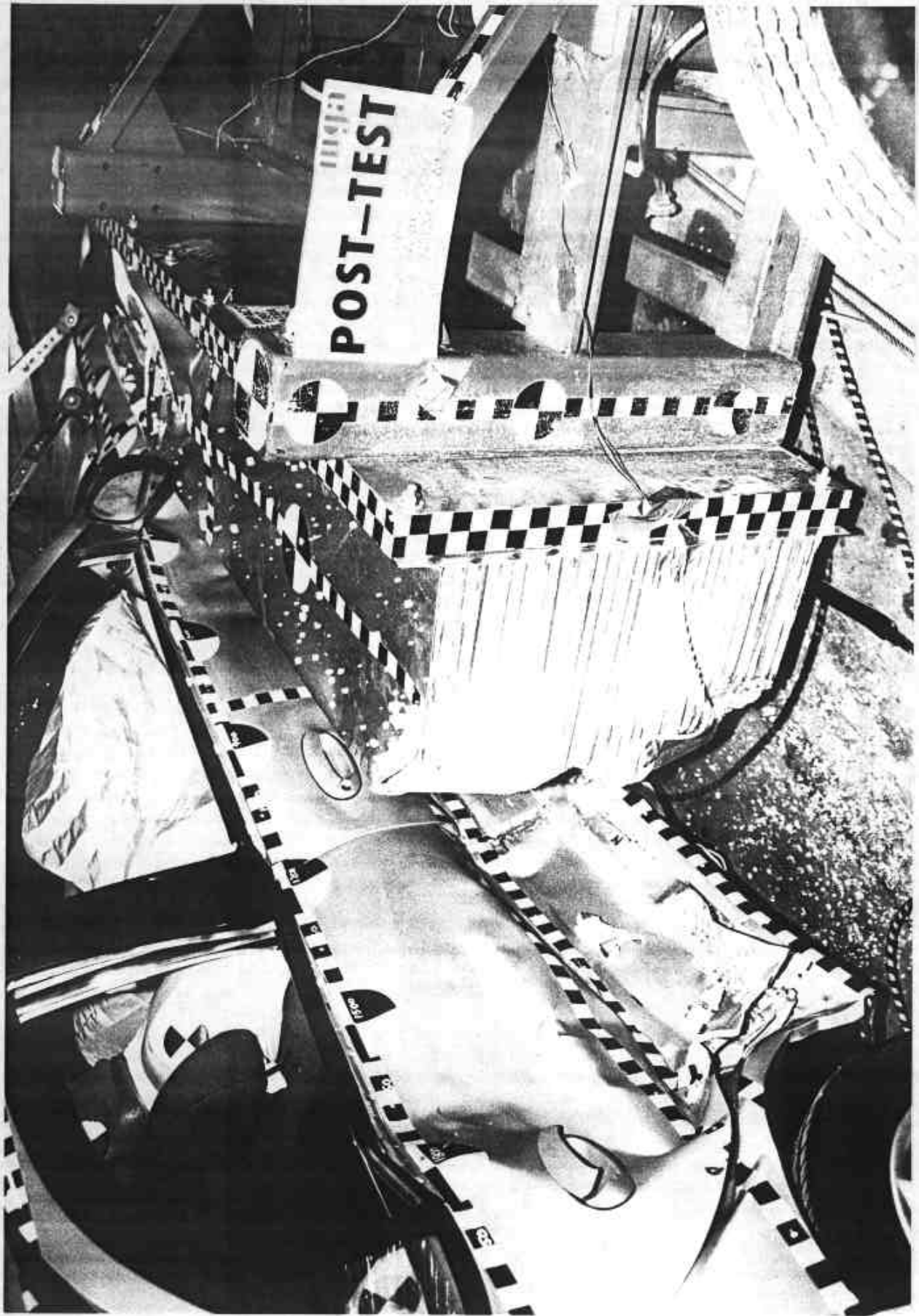


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (left side)



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

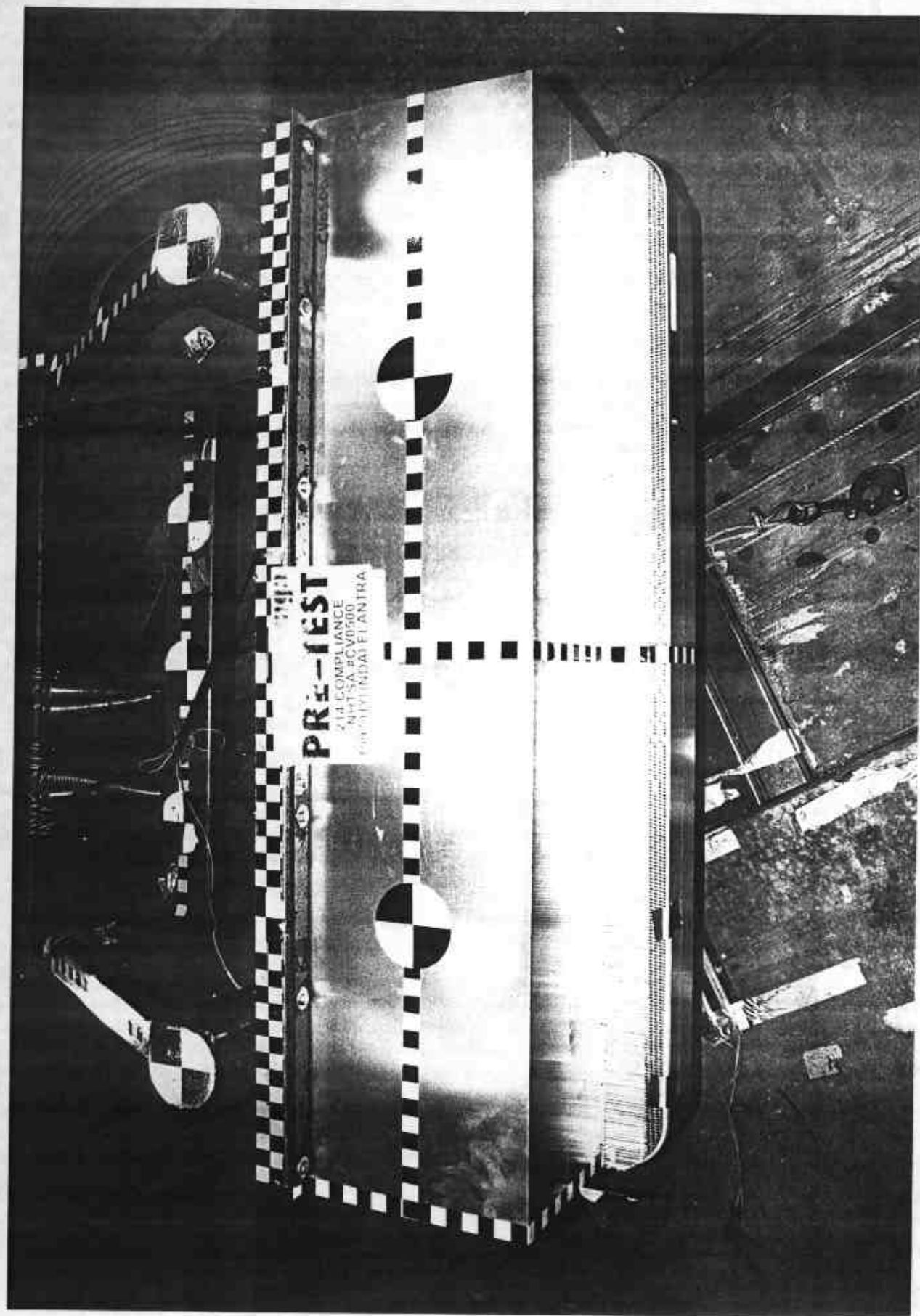


Photo No. A-13 - Pre-Test MDB Top View

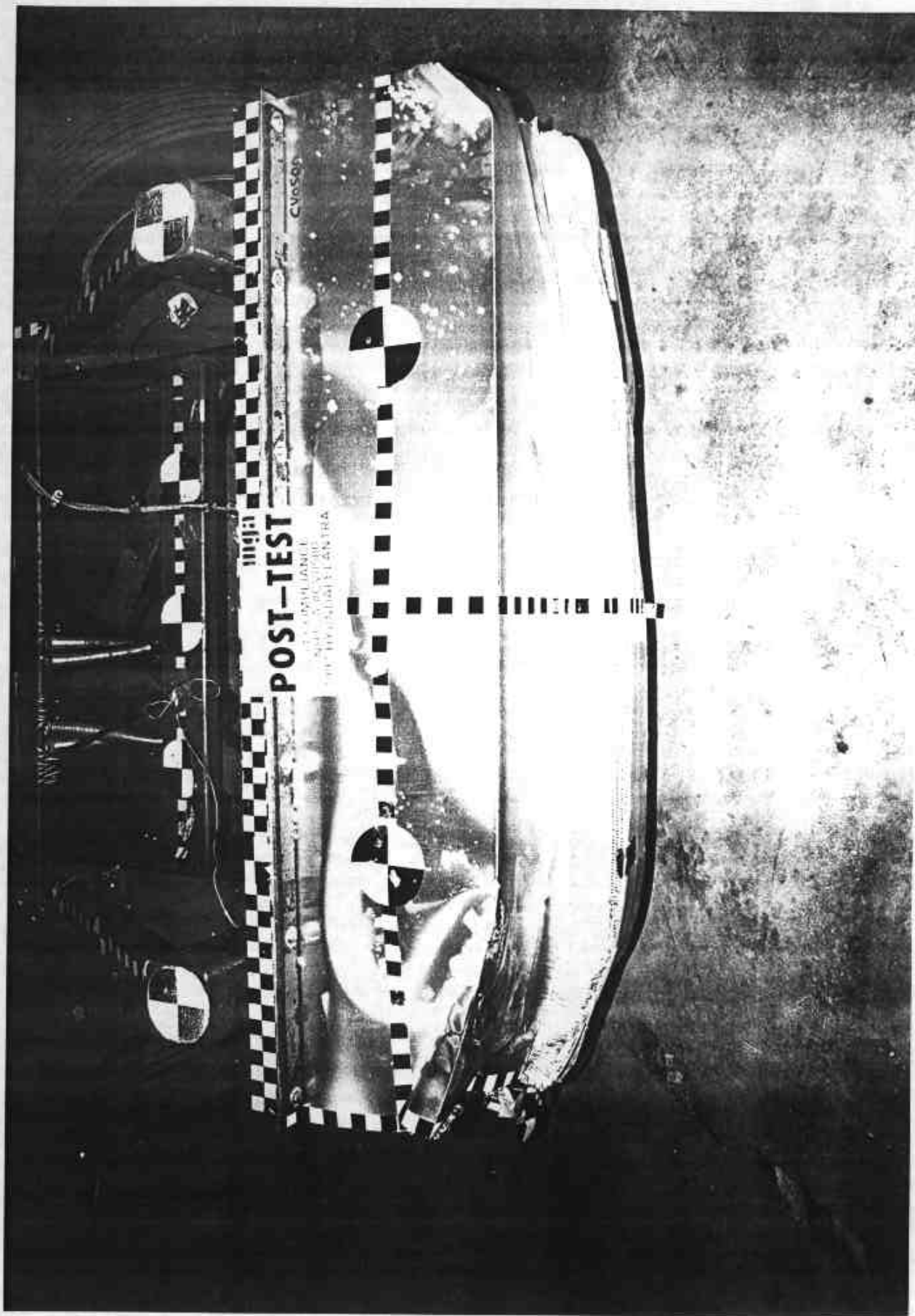
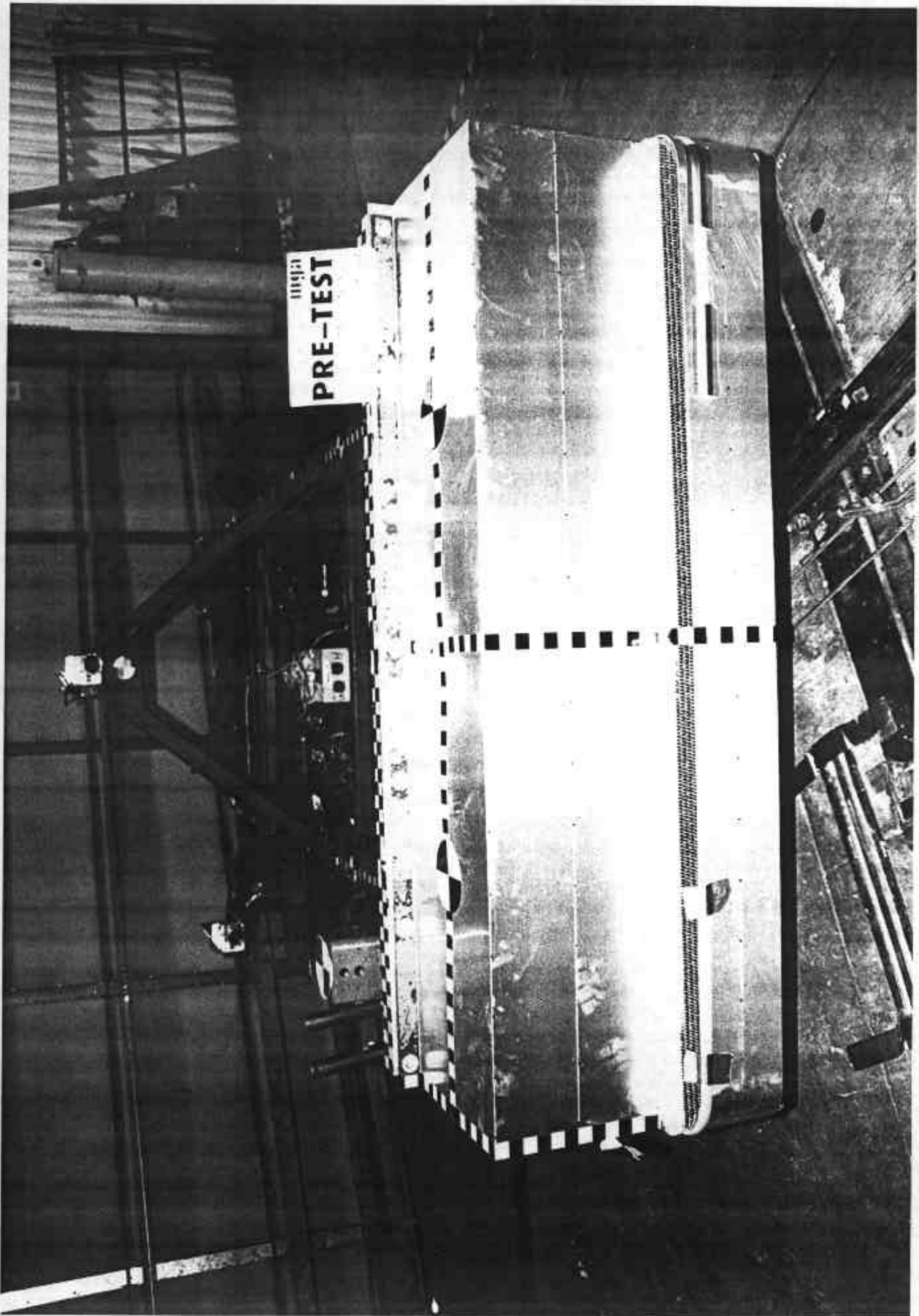


Photo No. A-14 - Post-Test MDB Top View



A-15

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

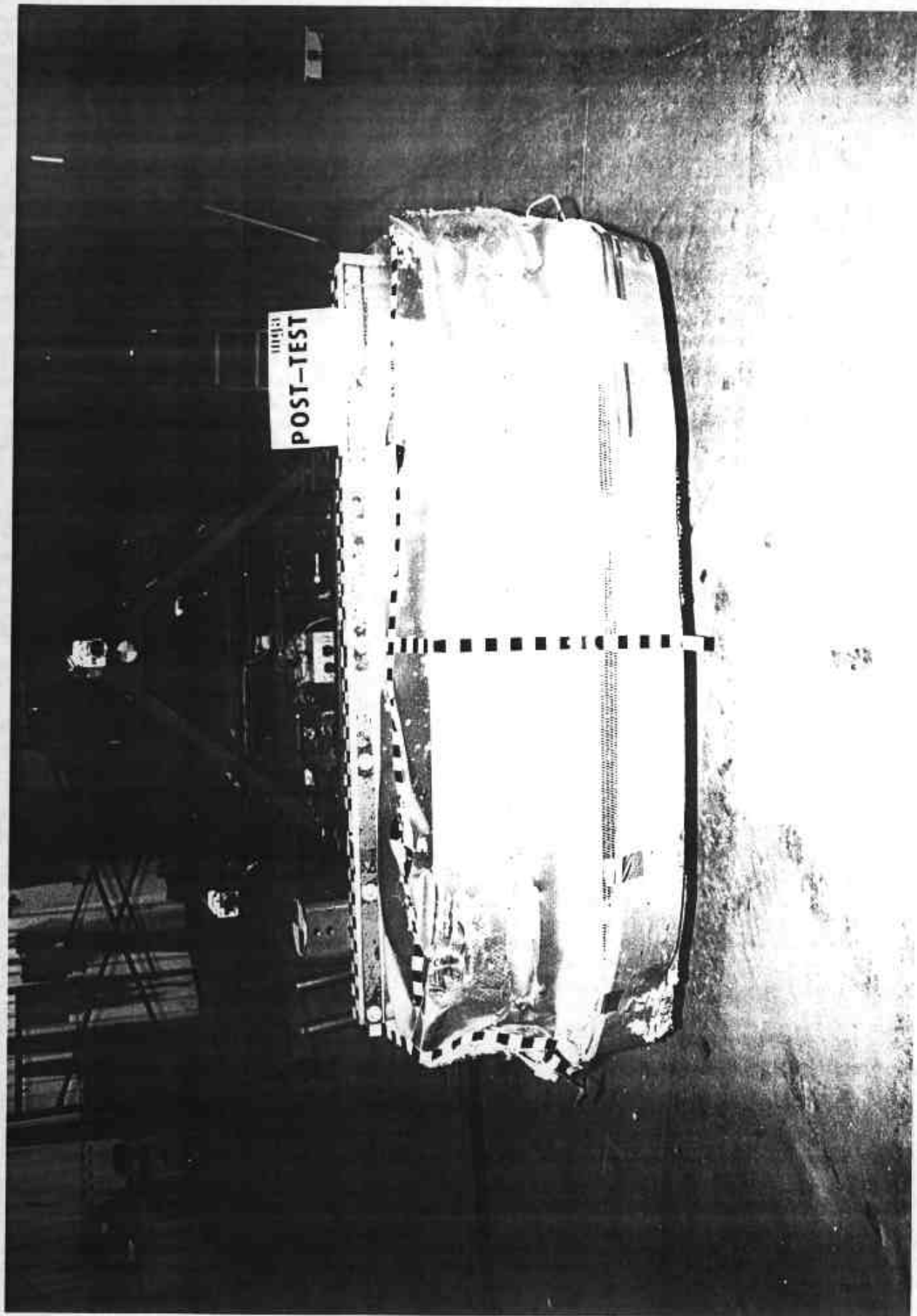


Photo No. A-16 - Post-Test MDB Front View

A-16

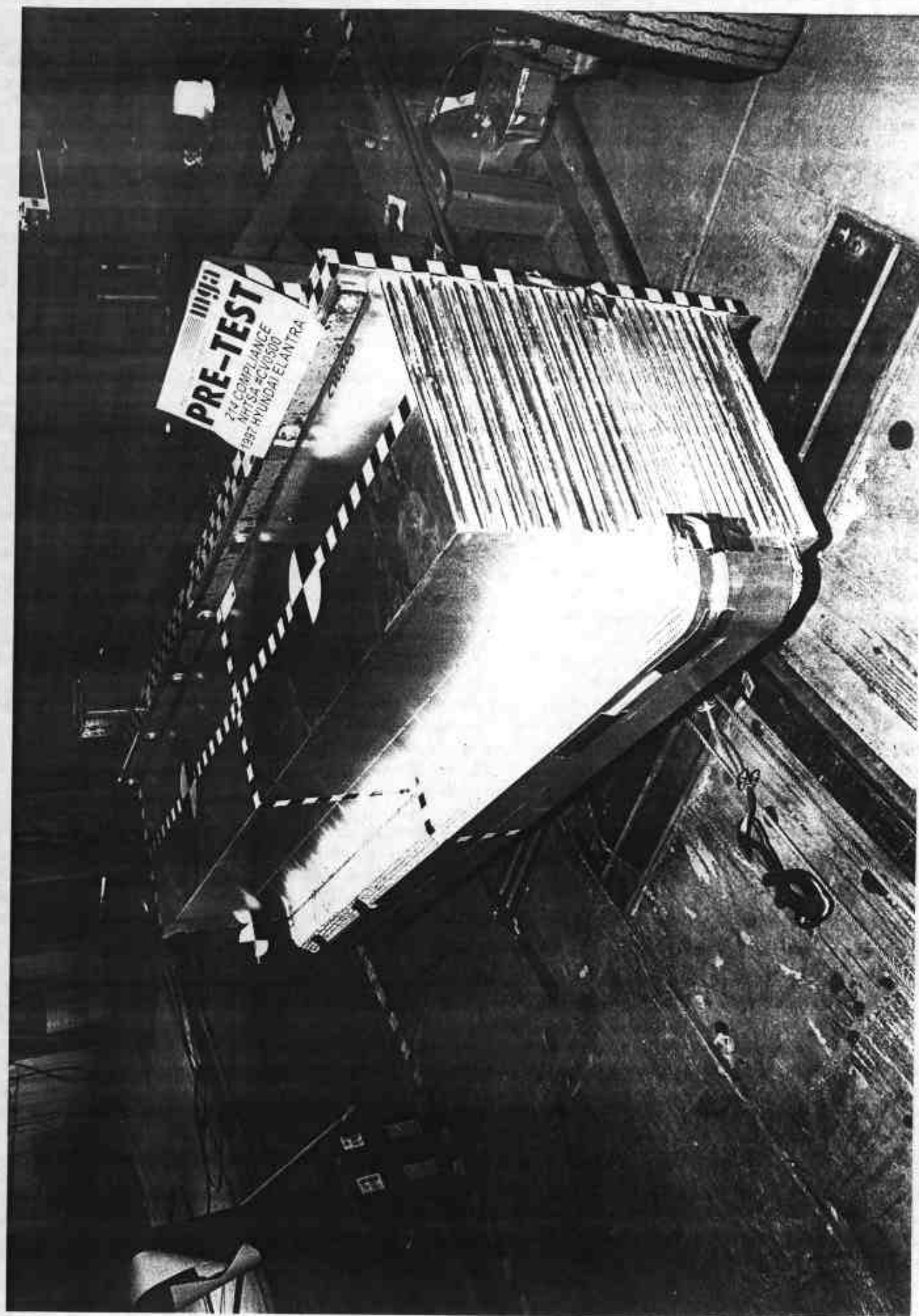


Photo No. A-17 - Pre-Test MDB Left Side View

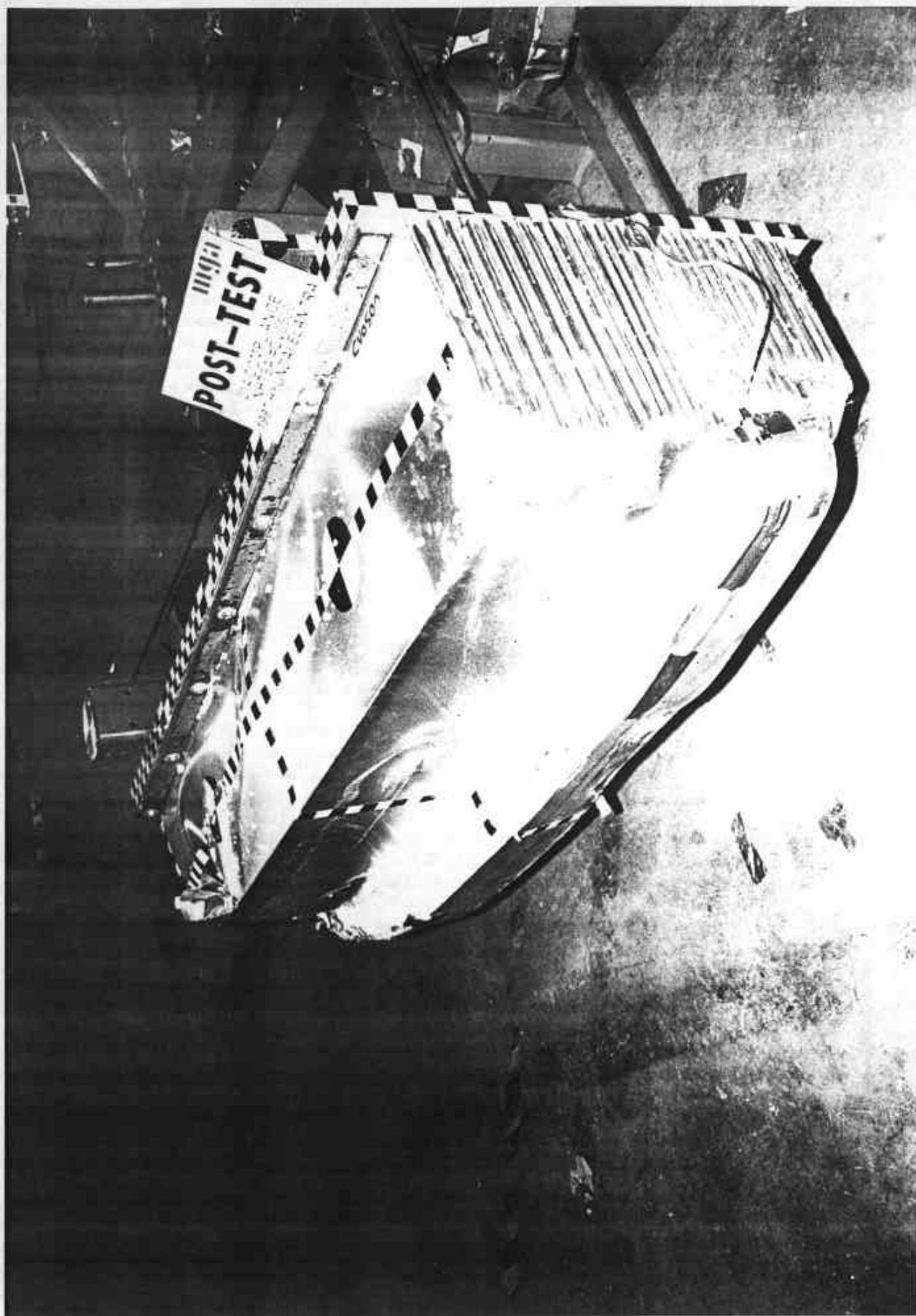


Photo No. A-18 - Post-Test MDB Left Side View

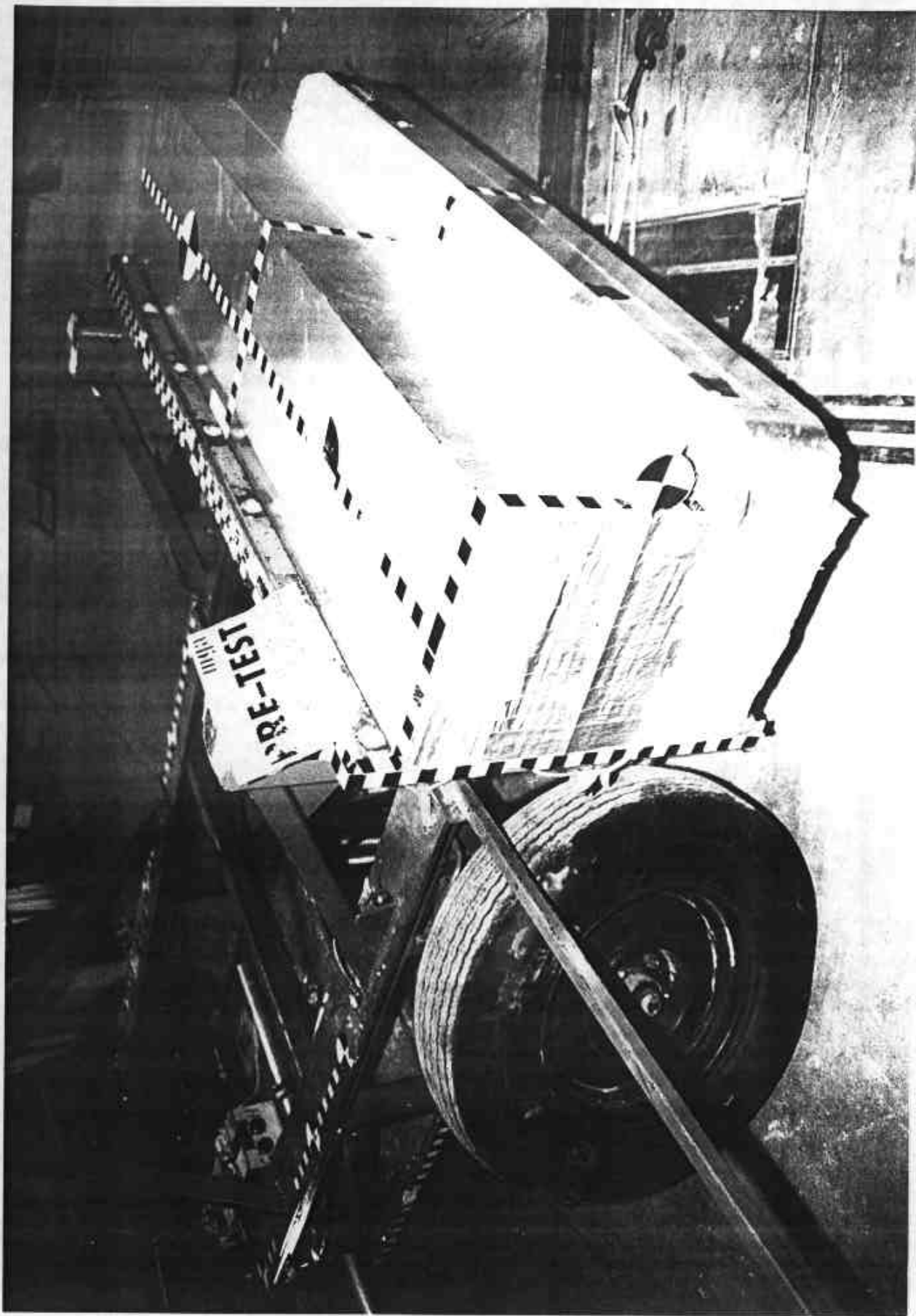


Photo No. A-19 - Pre-Test MDB Right Side View

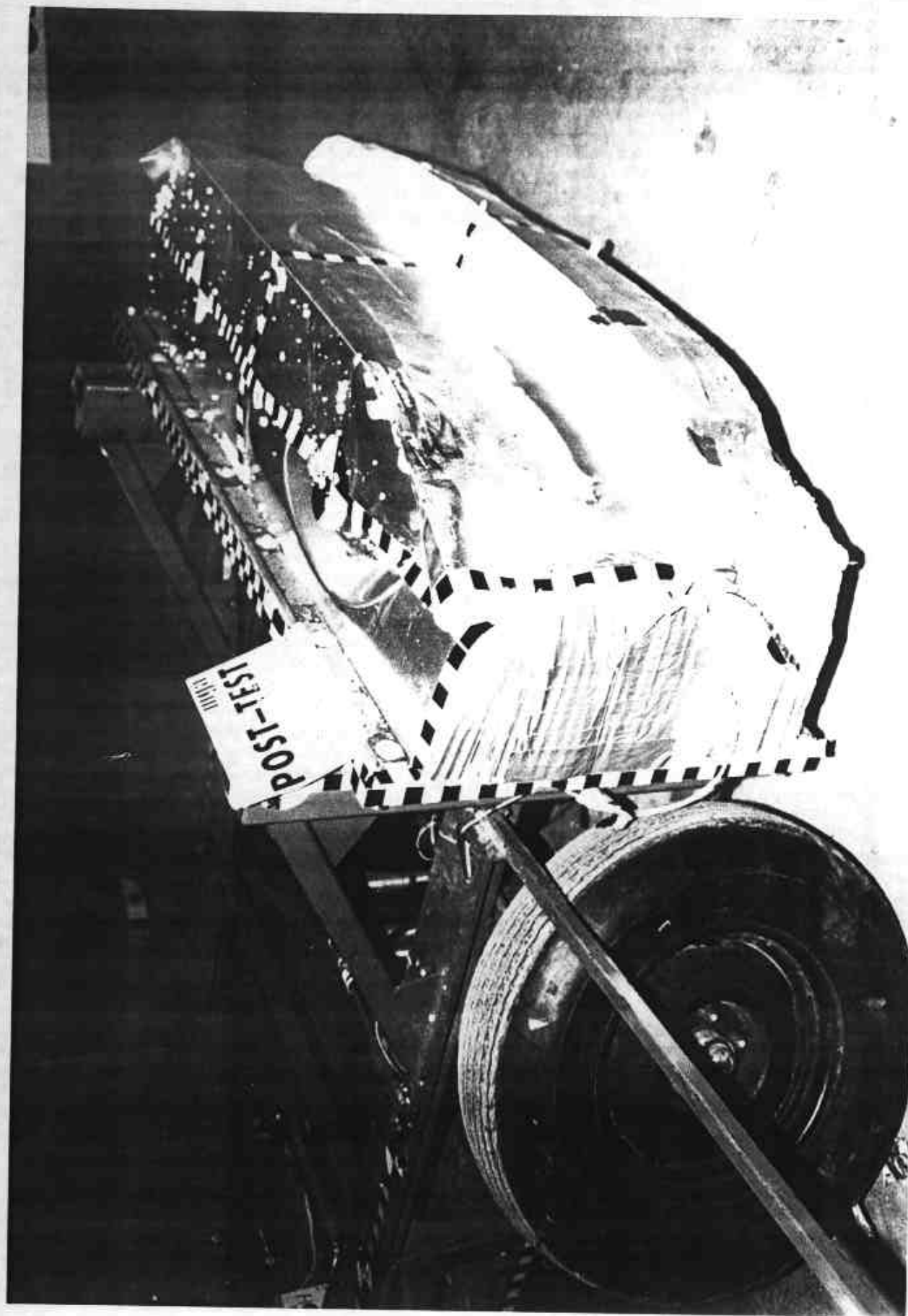


Photo No. A-20 - Post-Test MDB Right Side View

A-20



Photo No. A-21 - Pre-Test Right Front Seat Position View



Photo No. A-22 - Pre-Test Front Passenger Dummy Left Side View

A-22



Photo No. A-23 - Post-Test Front Passenger Dummy Left Side View

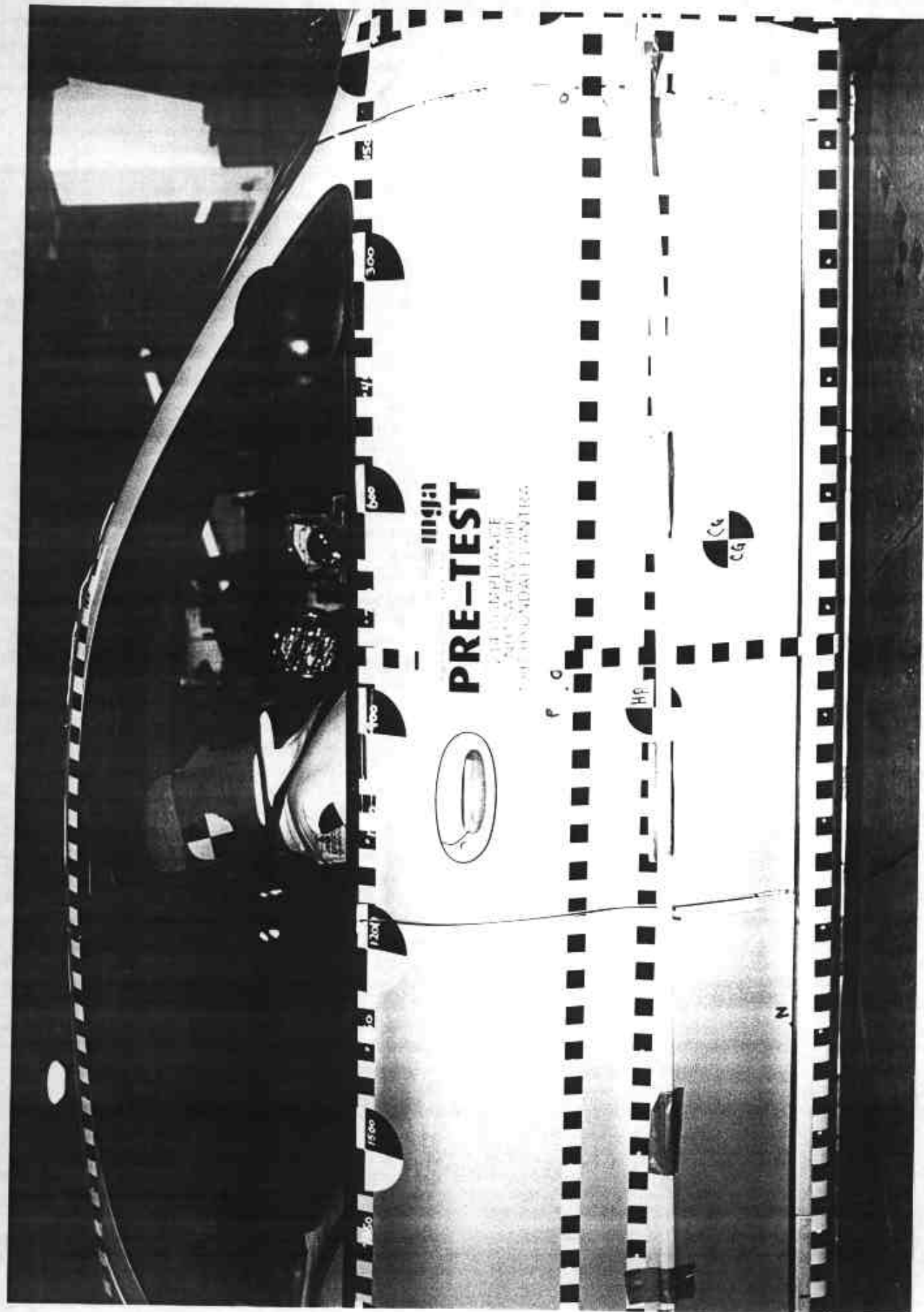


Photo No. A-24 - Pre-Test Front Passenger Dummy Right Side View

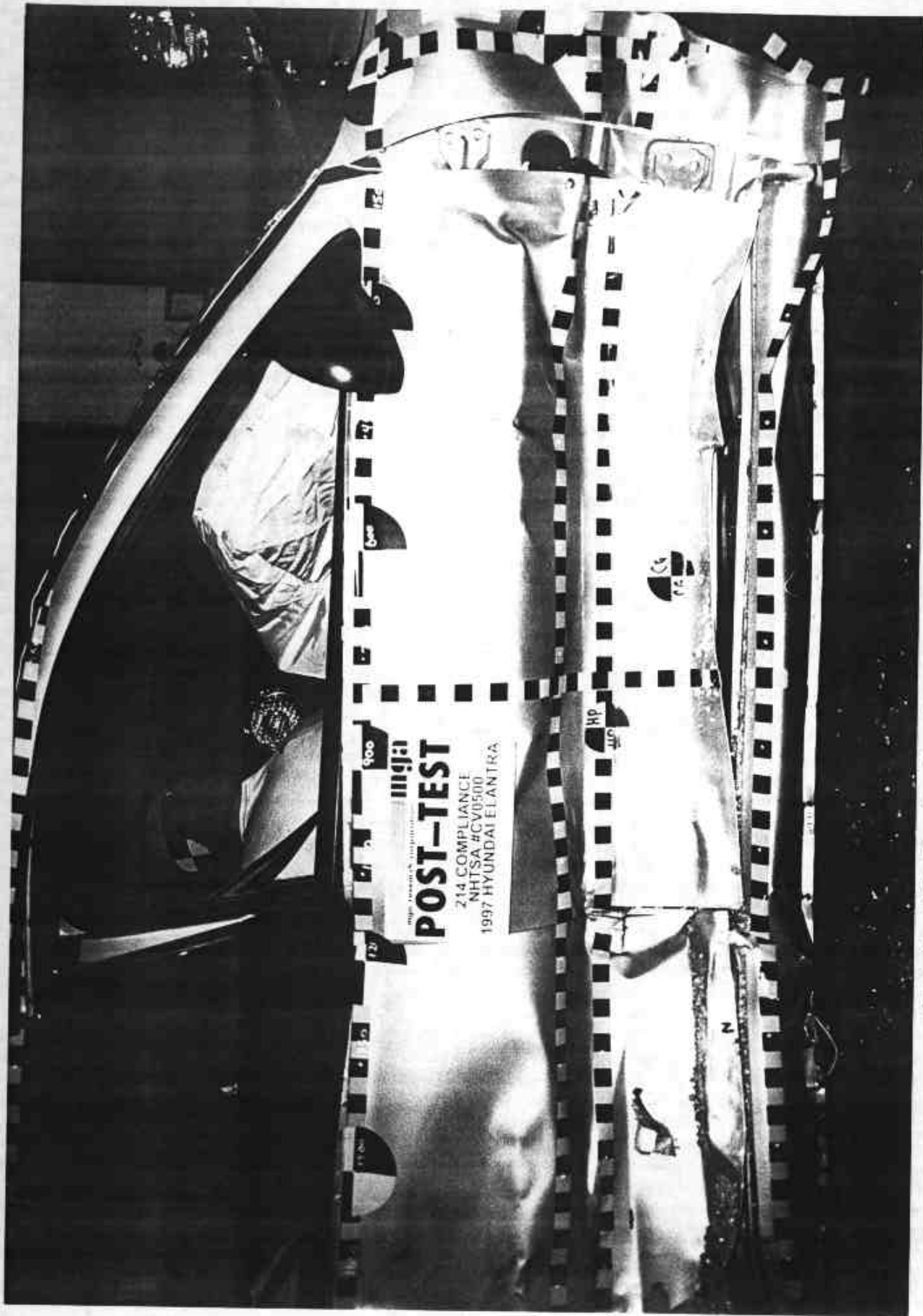


Photo No. A-25 - Post-Test Front Passenger Dummy Right Side View

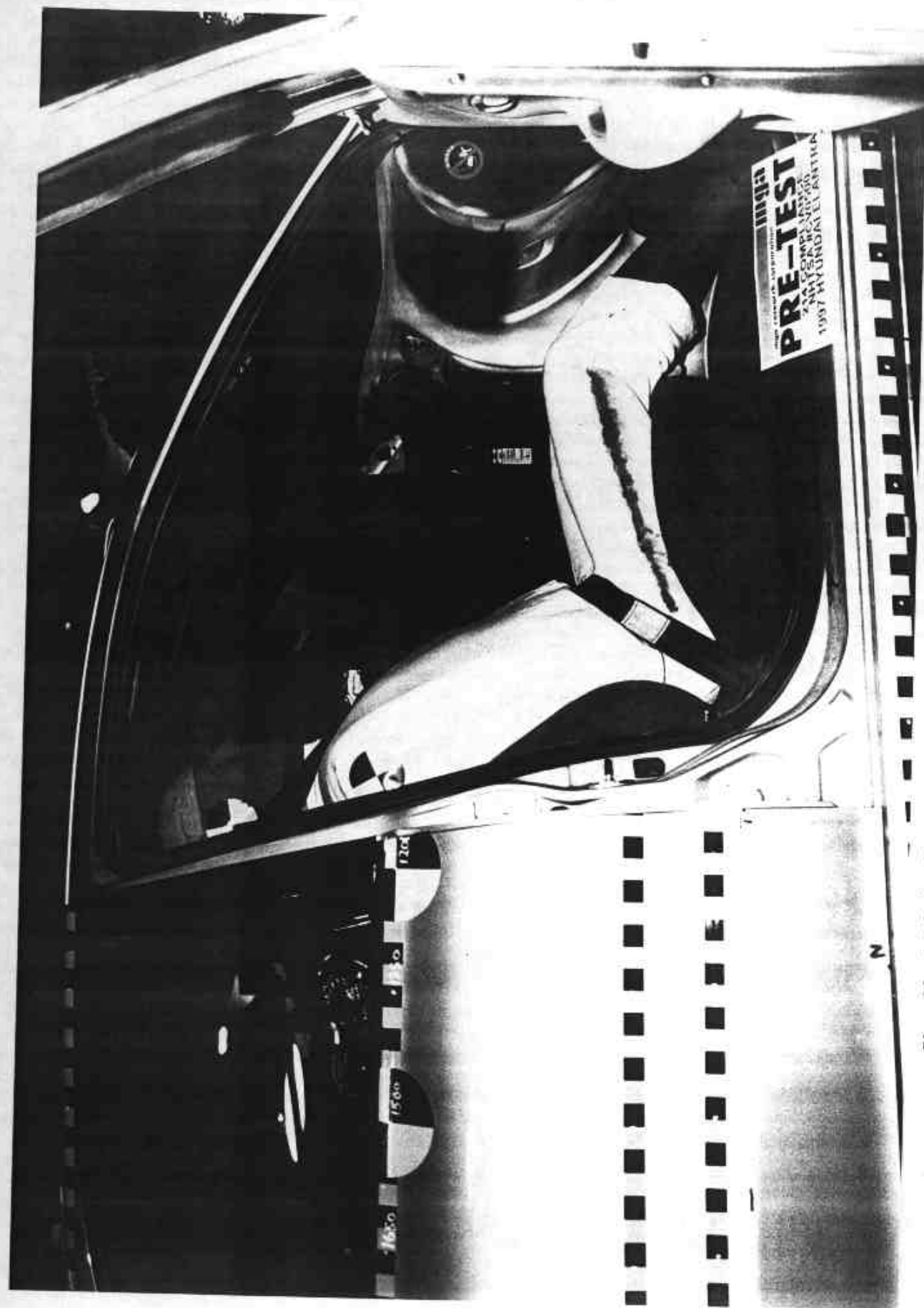


Photo No. A-26 - Pre-Test Front Passenger Dummy Right Side View (Door Open)

A-26



Photo No. A-27 - Pre-Test Front Passenger Shoulder and Door Top View



Photo No. A-28 - Post-Test Front Passenger Shoulder and Door Top View

A-28



Photo No. A-29 - Post-Test Front Passenger Dummy Contact

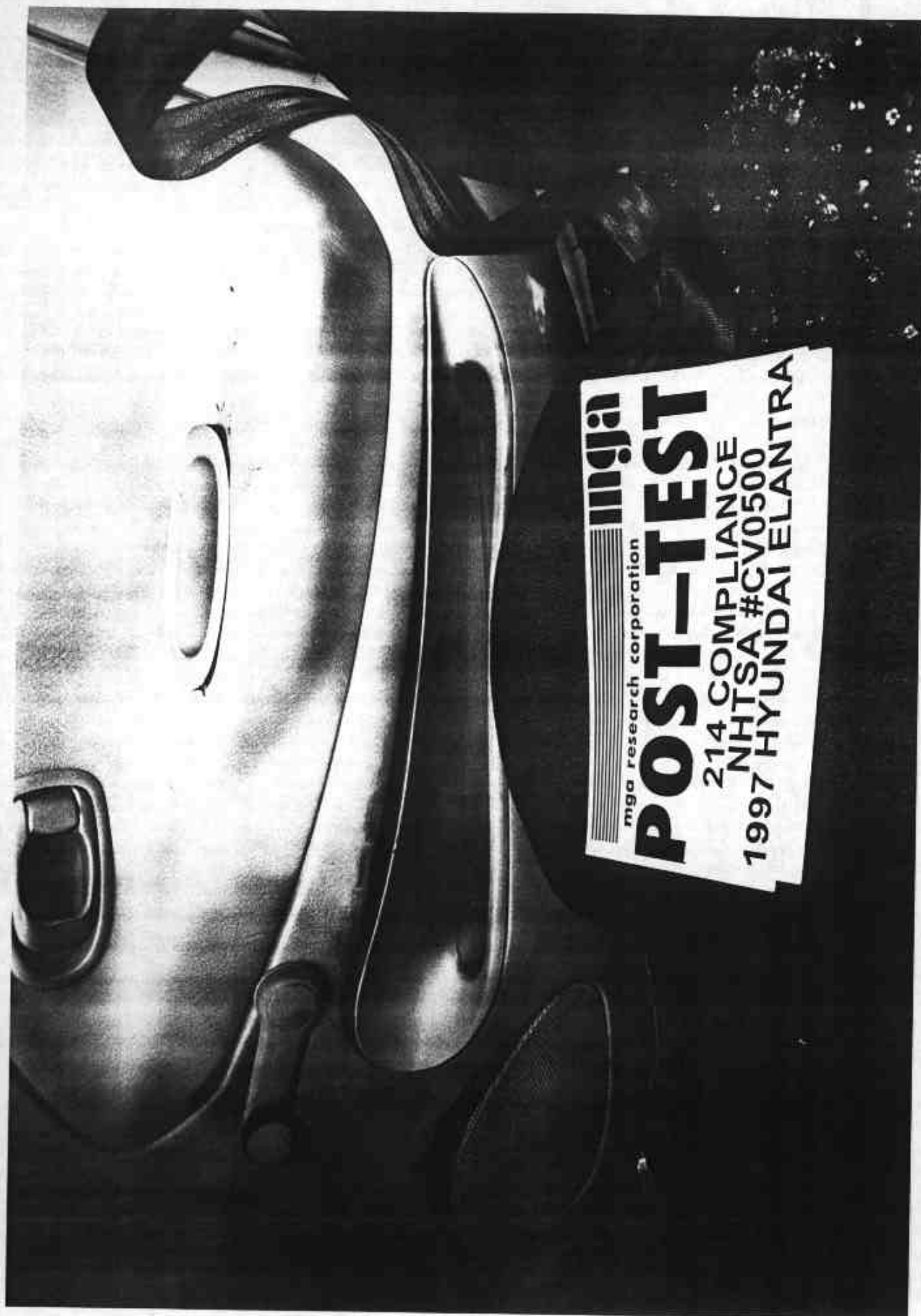


Photo No. A-30 - Post-Test Front Passenger Dummy Contact



Photo No. A-31 - Post-Test Front Passenger Head Contact



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



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

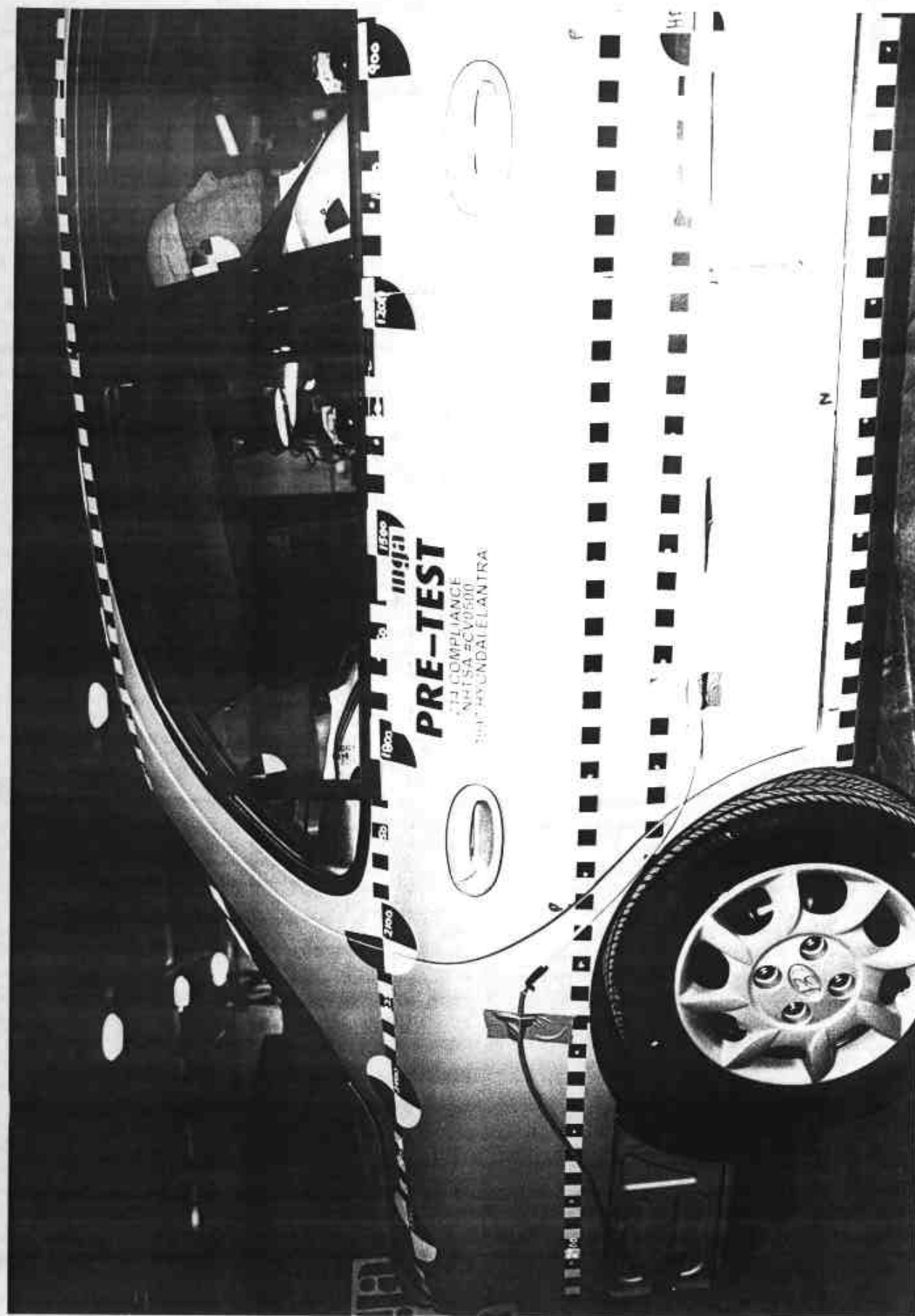


Photo No. A-34 - Pre-Test Rear Passenger Dummy Right Side View

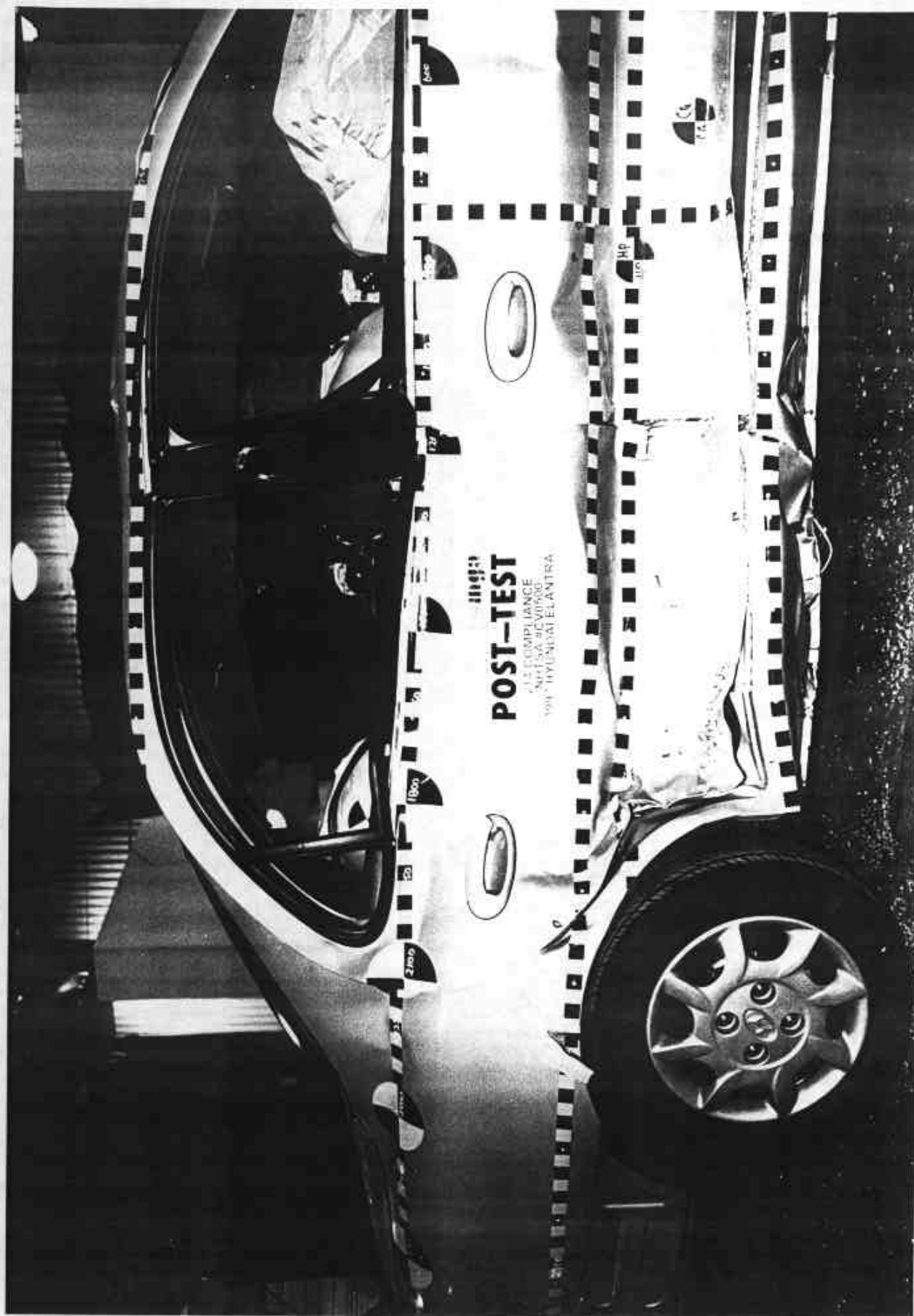


Photo No. A-35 - Post-Test Rear Passenger Dummy Right Side View

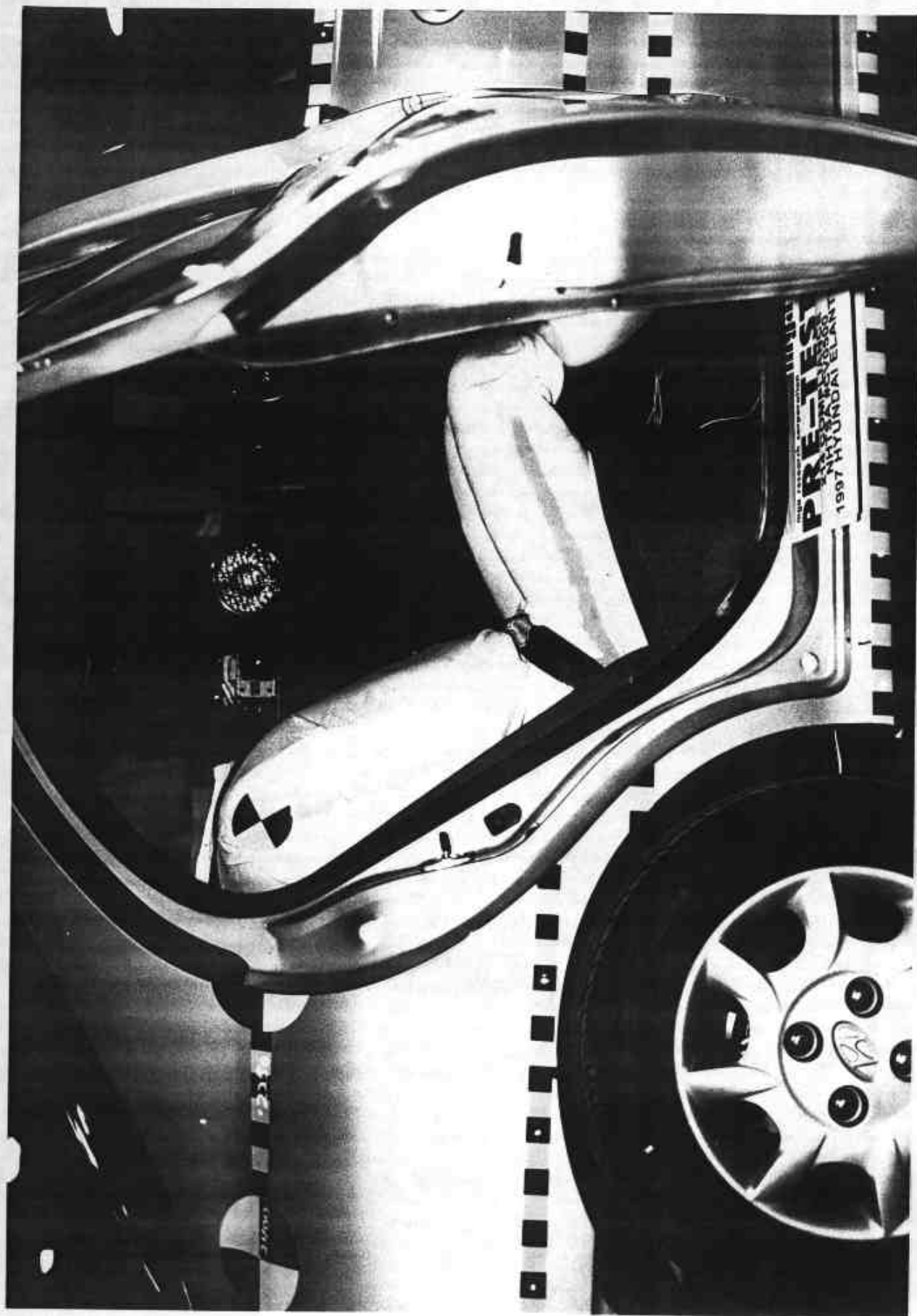


Photo No. A-36 - Pre-Test Rear Passenger Dummy Right Side View (Door Open)

A-36



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



Photo No. A-38 - Post-Test Rear Passenger Dummy Shoulder and Door Top View



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



Photo No. A-40 - Post-Test Rear Passenger Dummy Head Contact



Photo No. A-41 - Pre-Test Right Front Impact Point on Vehicle

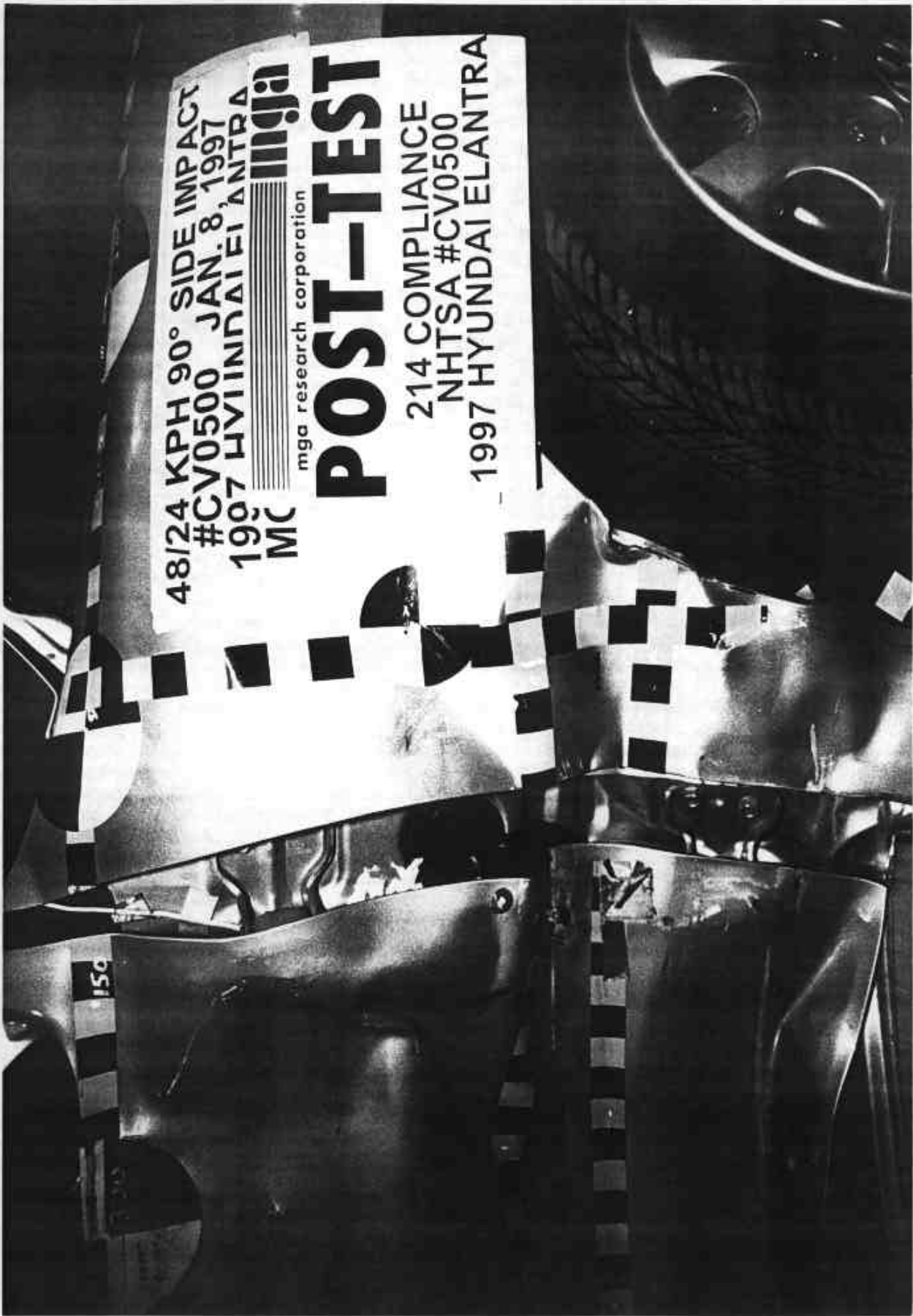


Photo No. A-42 - Post-Test Right Front Impact Point on Vehicle

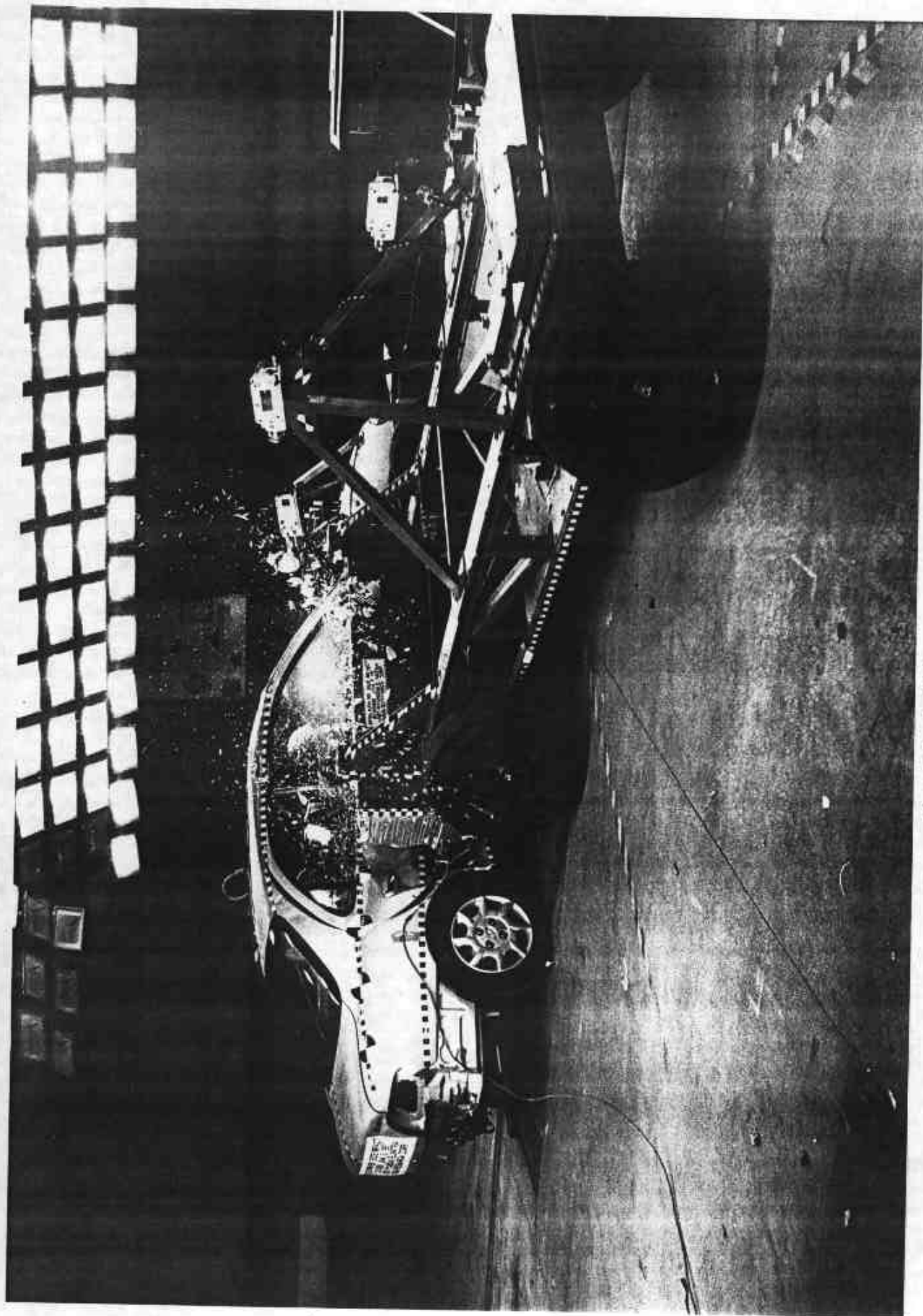


Photo No. A-43 - Impact

A-43

MANUFACTURED IN KOREA BY
HYUNDAI MOTOR COMPANY

SEP/2/96

GVWR 3660 LBS PAINT OU

GAWR FRONT 1962 LBS

GAWR REAR 1720 LBS

TRIM LG



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

V.I.N. KMHJ124M2VU396245

Photo No. A-44 - Vehicle Certification Label

TIRE INFLATION PRESSURE				
VEHICLE CAPACITY WEIGHT, LBS : 850				
SEATING CAPACITY: TOTAL5 FRONT2 REAR3				
TIRE PRESSURES-COLD, KPA (PSI) :				
TIRE SIZE	LOAD UP TO 2 PERSONS		MAX. VEHICLE WEIGHT LIMIT	
	FRT	RR	FRT	RR
P175/65 R14	210 (30)	210 (30)	220 (32)	220 (32)
P195/60 R14	210 (30)	210 (30)	210 (30)	210 (30)
T125/70 D15	420 (60)	420 (60)	420 (60)	420 (60)

A-45

Photo No. A-45 - Tire Placard

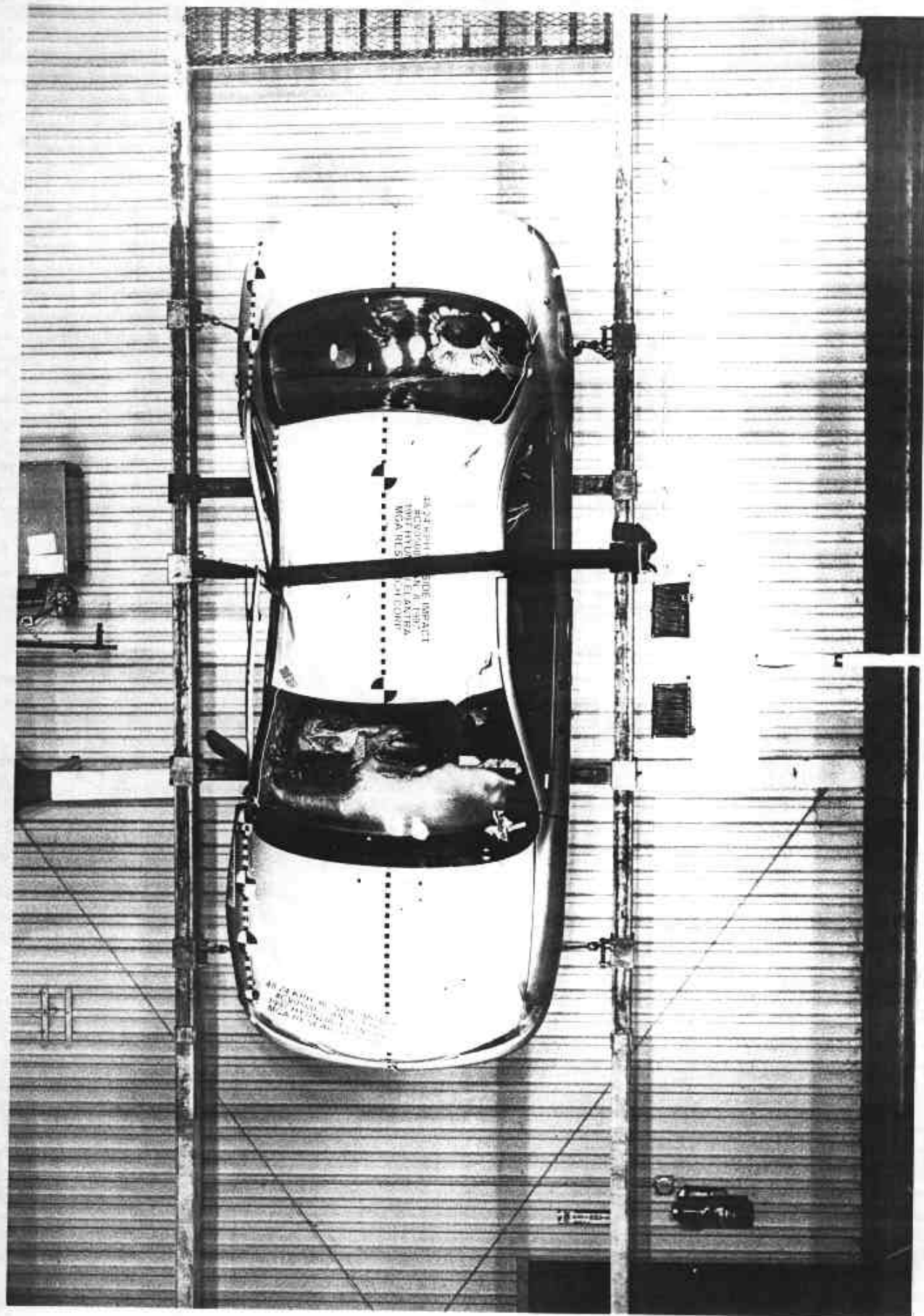


Photo No. A-46 - Rollover 90°

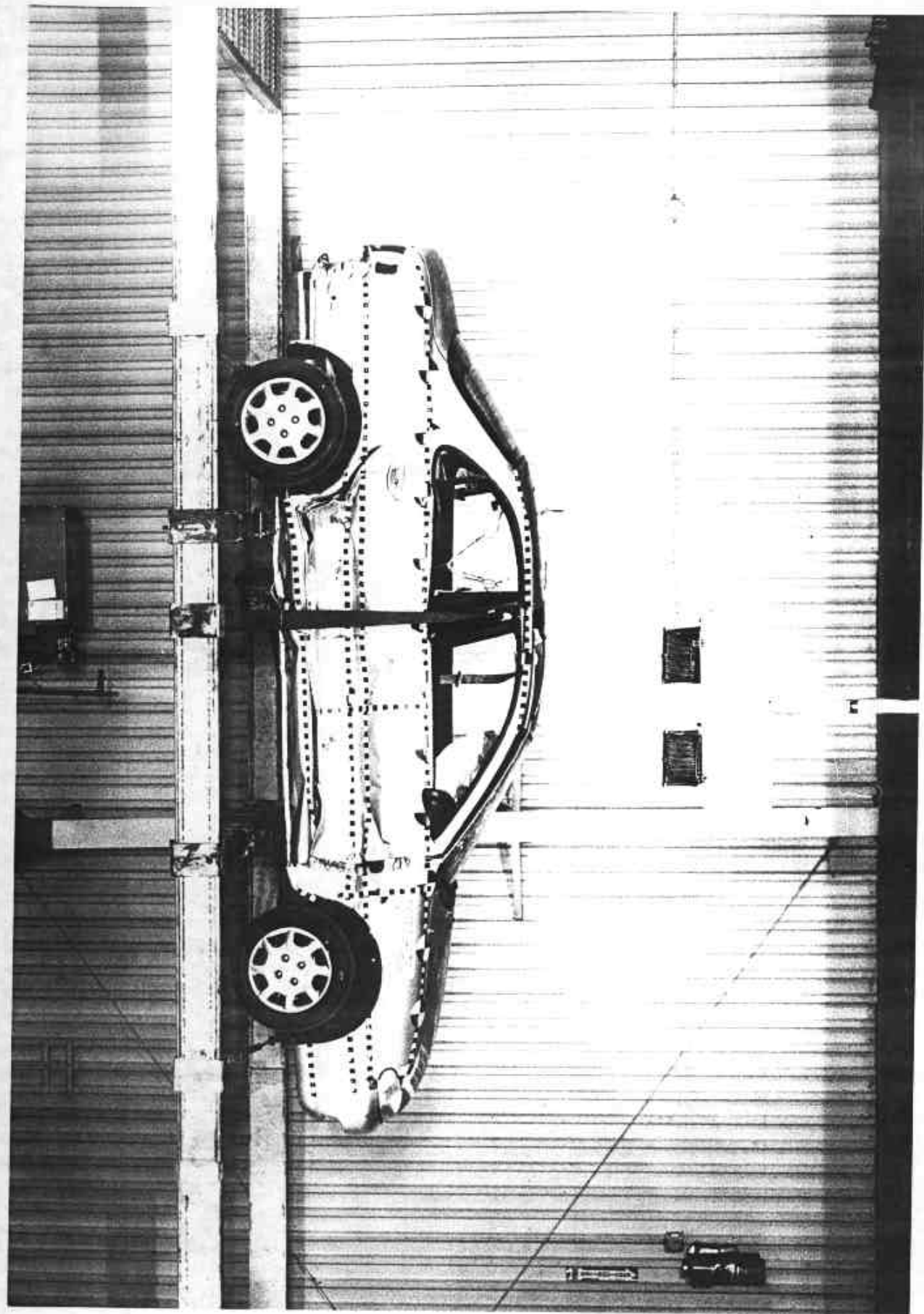
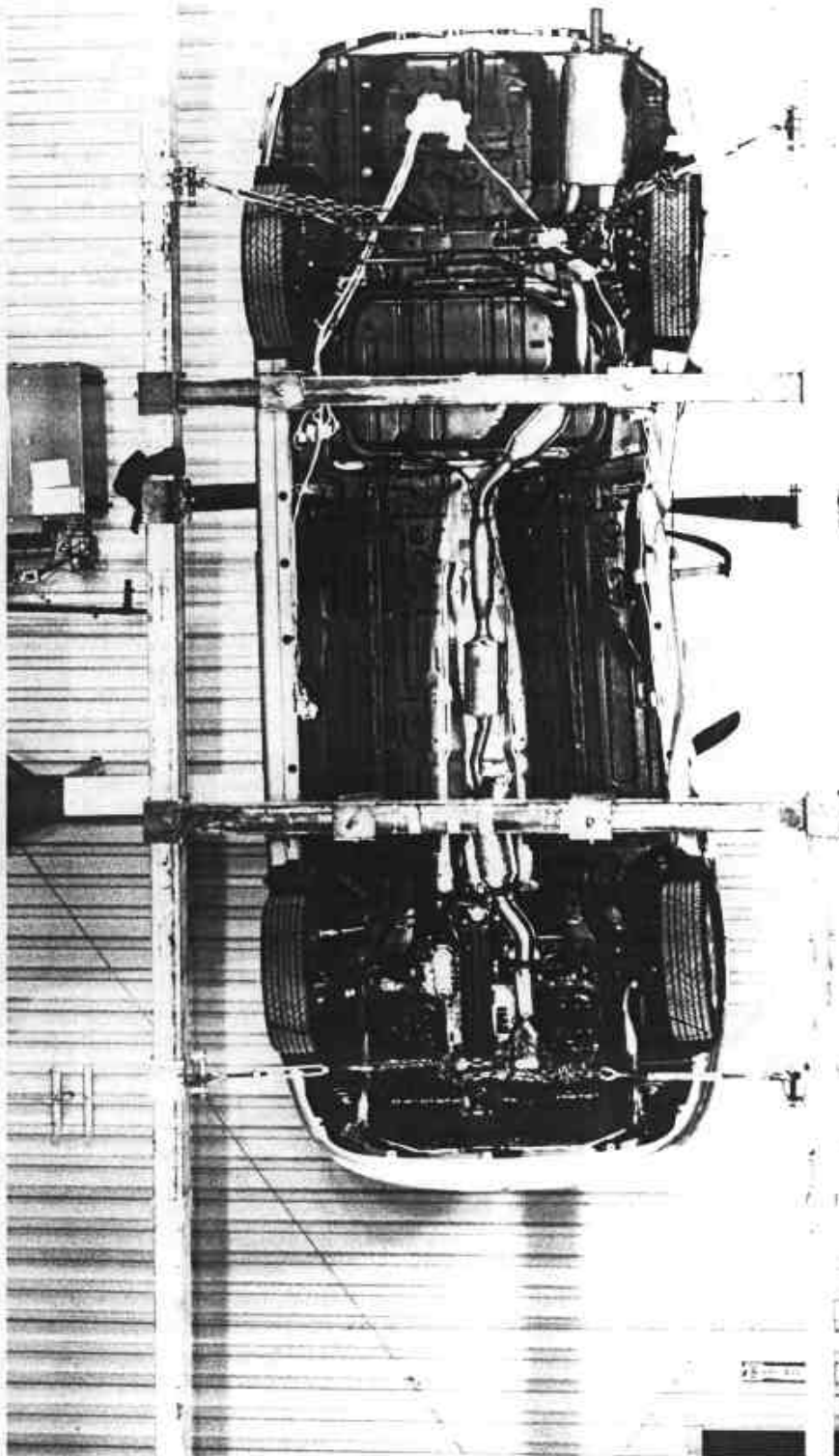


Photo No. A-47 - Rollover 180°

A-47



A-48

Photo No. A-48 - Rollover 270°

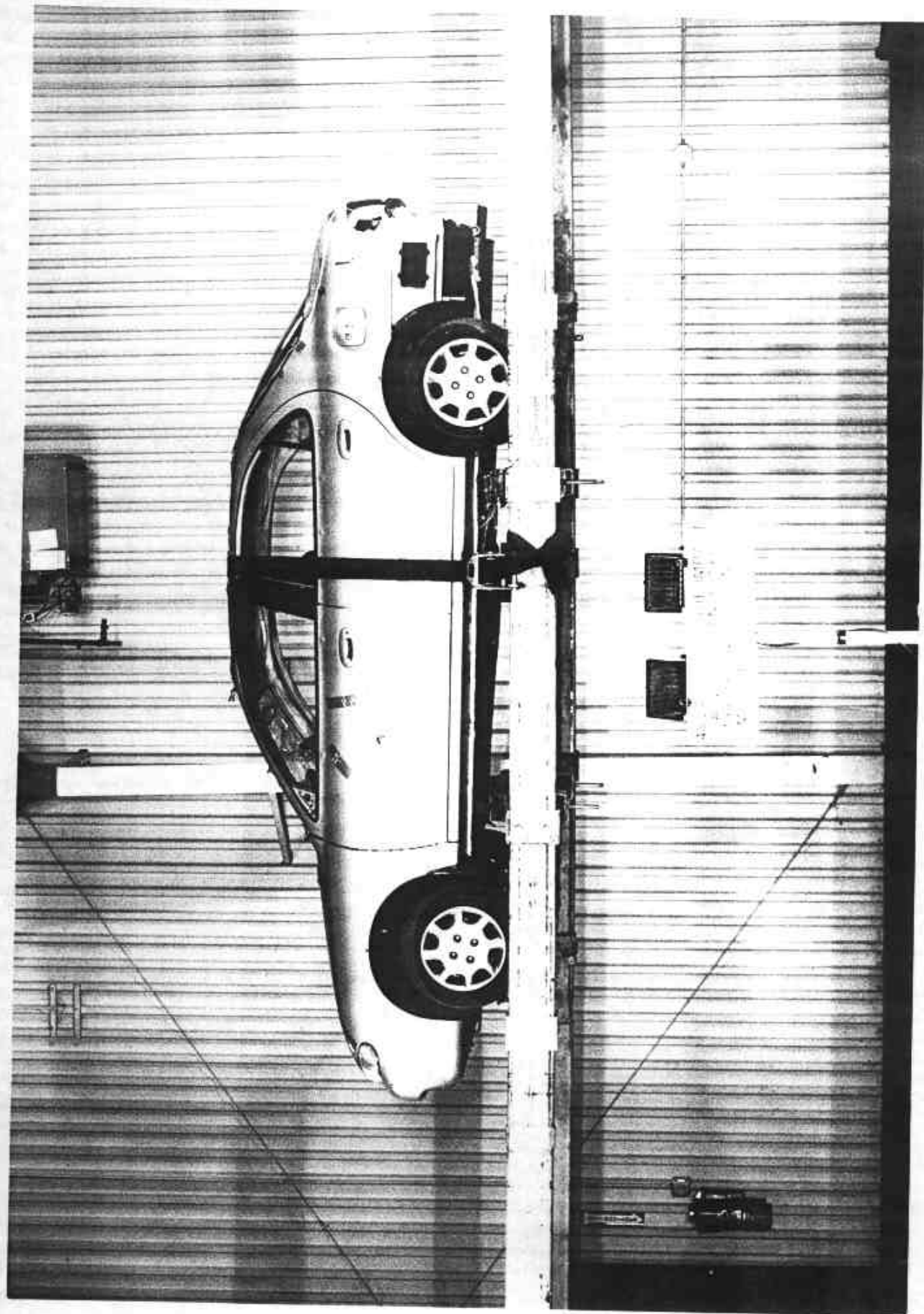


Photo No. A-49 - Rollover 360°

A-49



Photo No. A-51 - Left Front Attitude Point

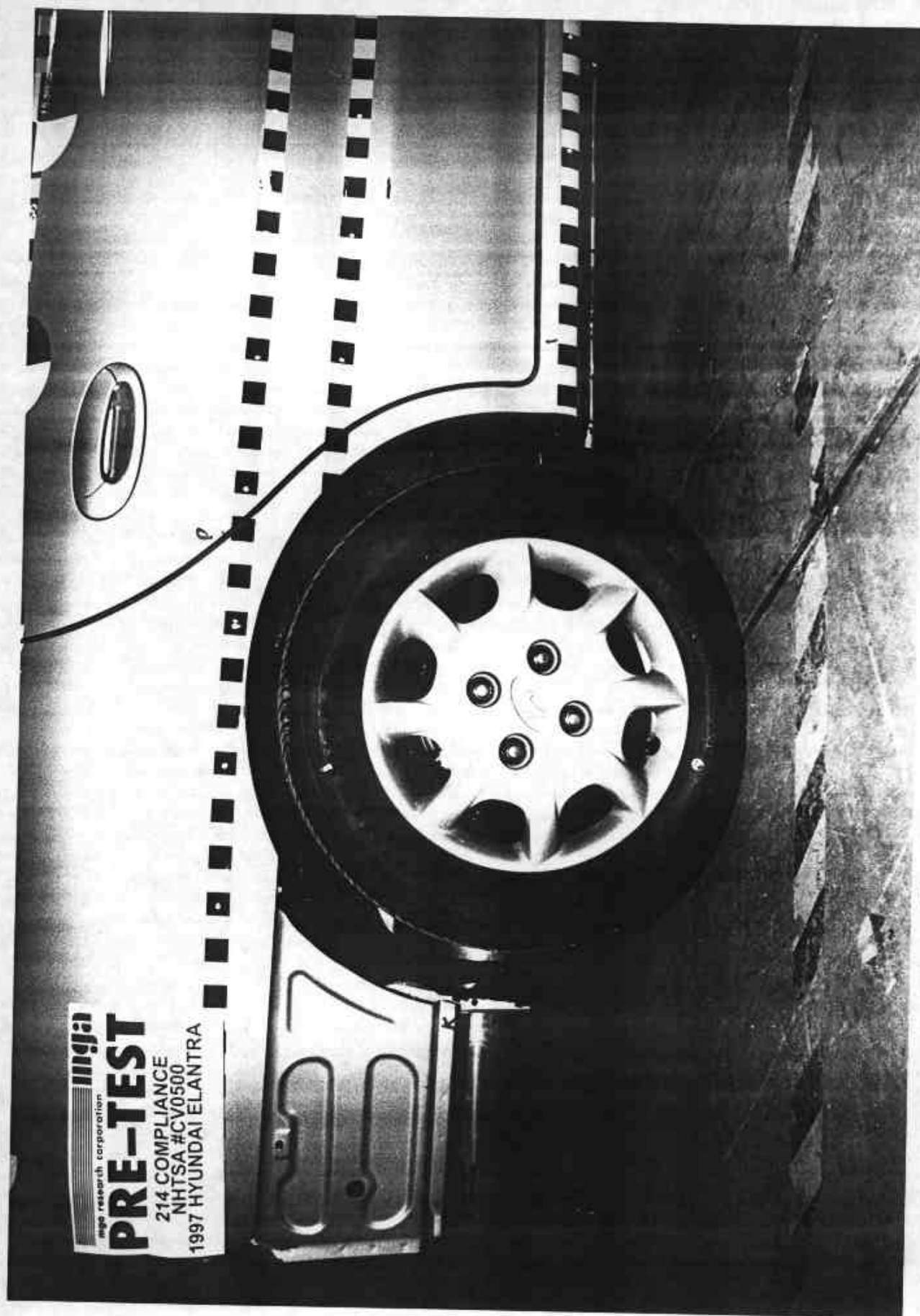


Photo No. A-52 - Right Rear Attitude Point



Photo No. A-53 - Left Rear Attitude Point

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TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 19.65 G'S at 82 msec

Minimum = -68.76 G'S at 37 msec

FRONT PASSENGER UPPER RIB Y ACCELERATION

1 B97005AF.A15 FilterClass (180)

20

10

0

-10

-20

-30

-40

-50

-60

-70

G.S

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME (SECONDS)

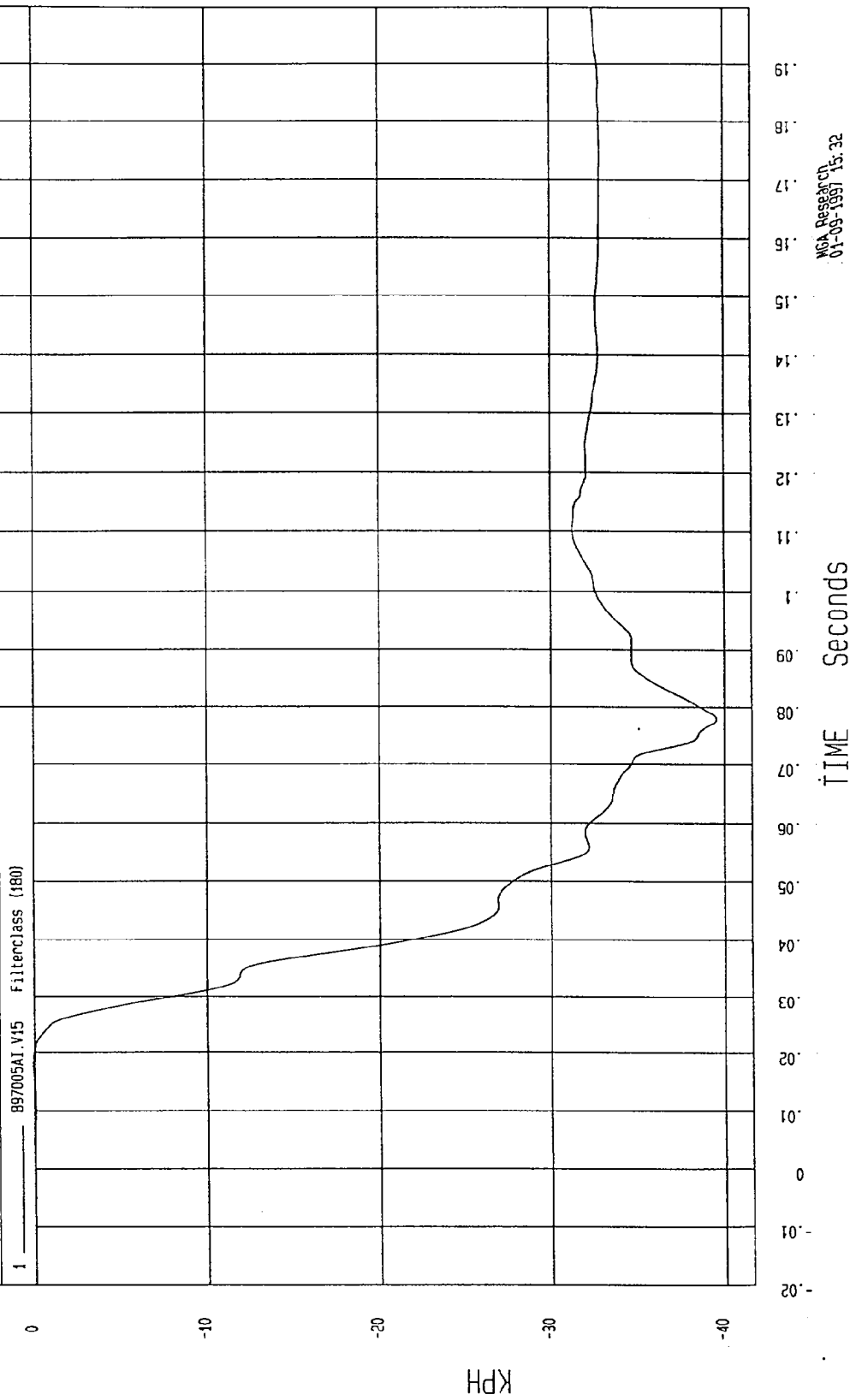
MCA Research
01-08-1997 12:03

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -39.56 KPH at 78 msec Maximum = 6.28E-02 KPH at 18 msec

FRONT PASSENGER UPPER RIB Y VELOCITY



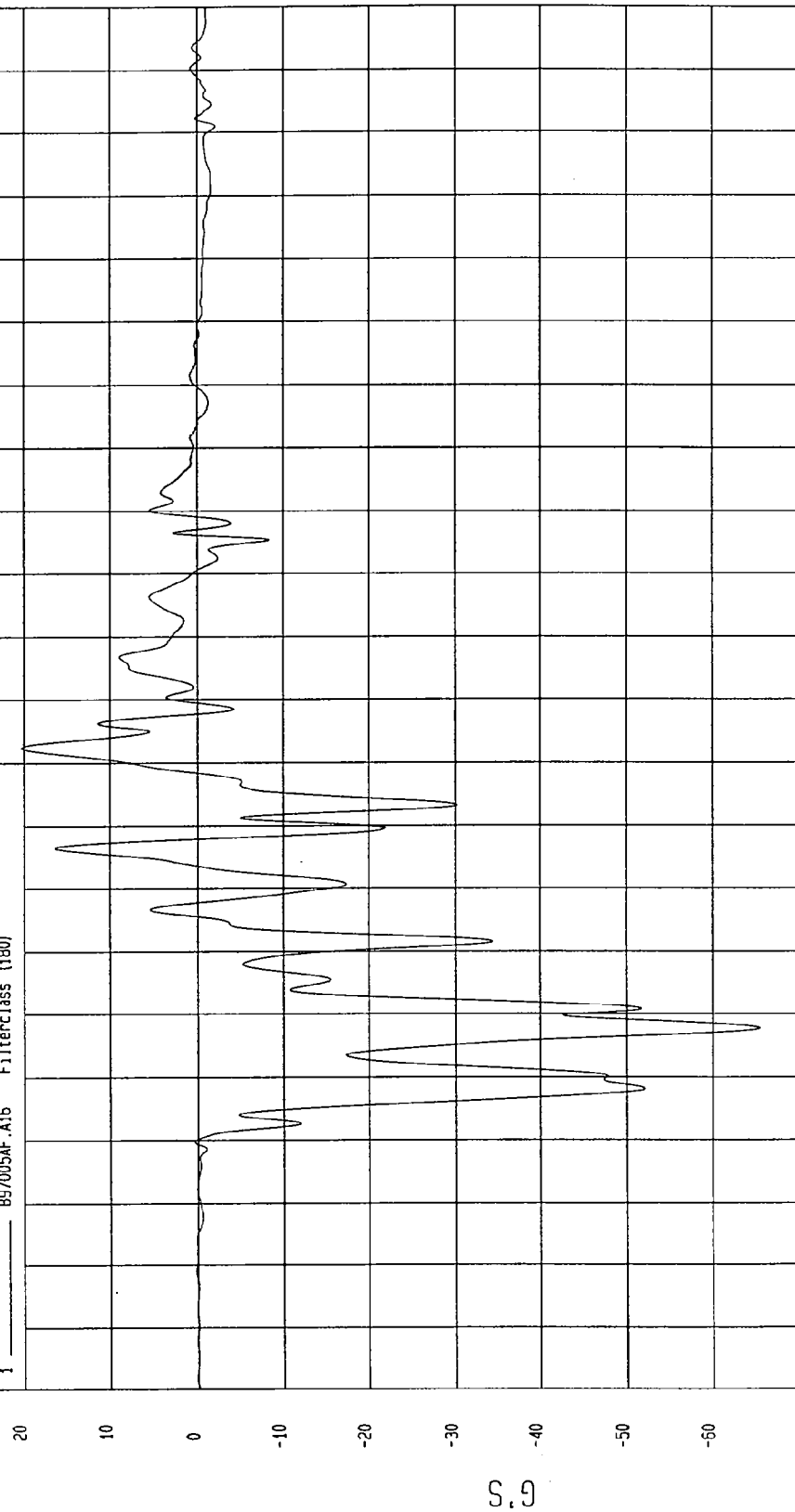
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -65.34 G's at 38 msec
Maximum = 20.25 G's at 82 msec

FRONT PASSENGER LOWER RIB Y ACCELERATION

1 ——— B57005AF.A16 Filterclass (180)



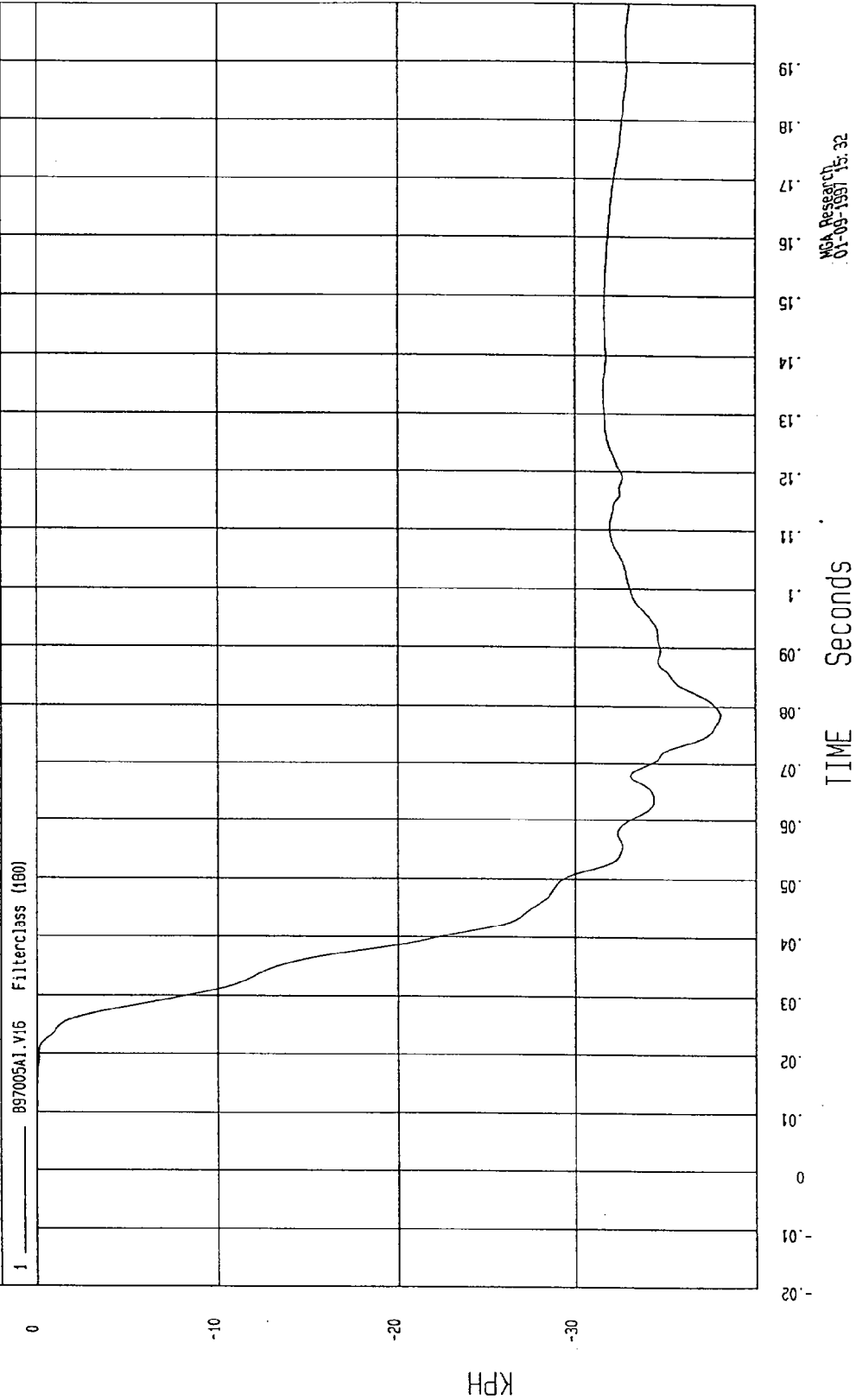
MSA Research
01-08-1997 12:04

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -37.97 KPH at 70 msec Maximum = 3.70E-02 KPH at 5 msec

FRONT PASSENGER LOWER RIB Y VELOCITY



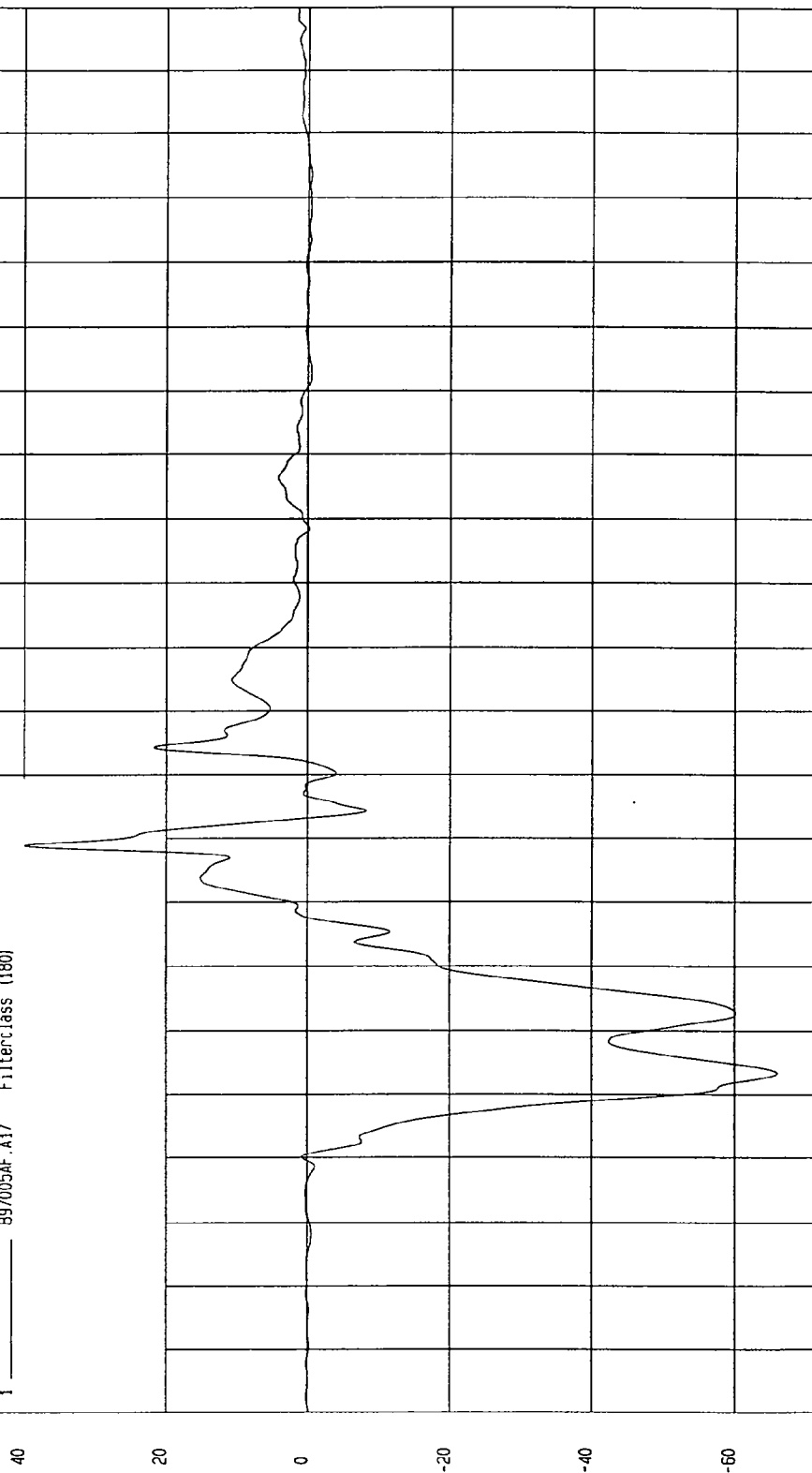
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -65.88 G'S at 33 msec Maximum = 40.01 G'S at 69 msec

FRONT PASSENGER LOWER SPINE Y ACCELERATION

1 897005AF A17 FilterClass (180)



TIME (SECONDS)

MGA Research
01-09-1997 12:04

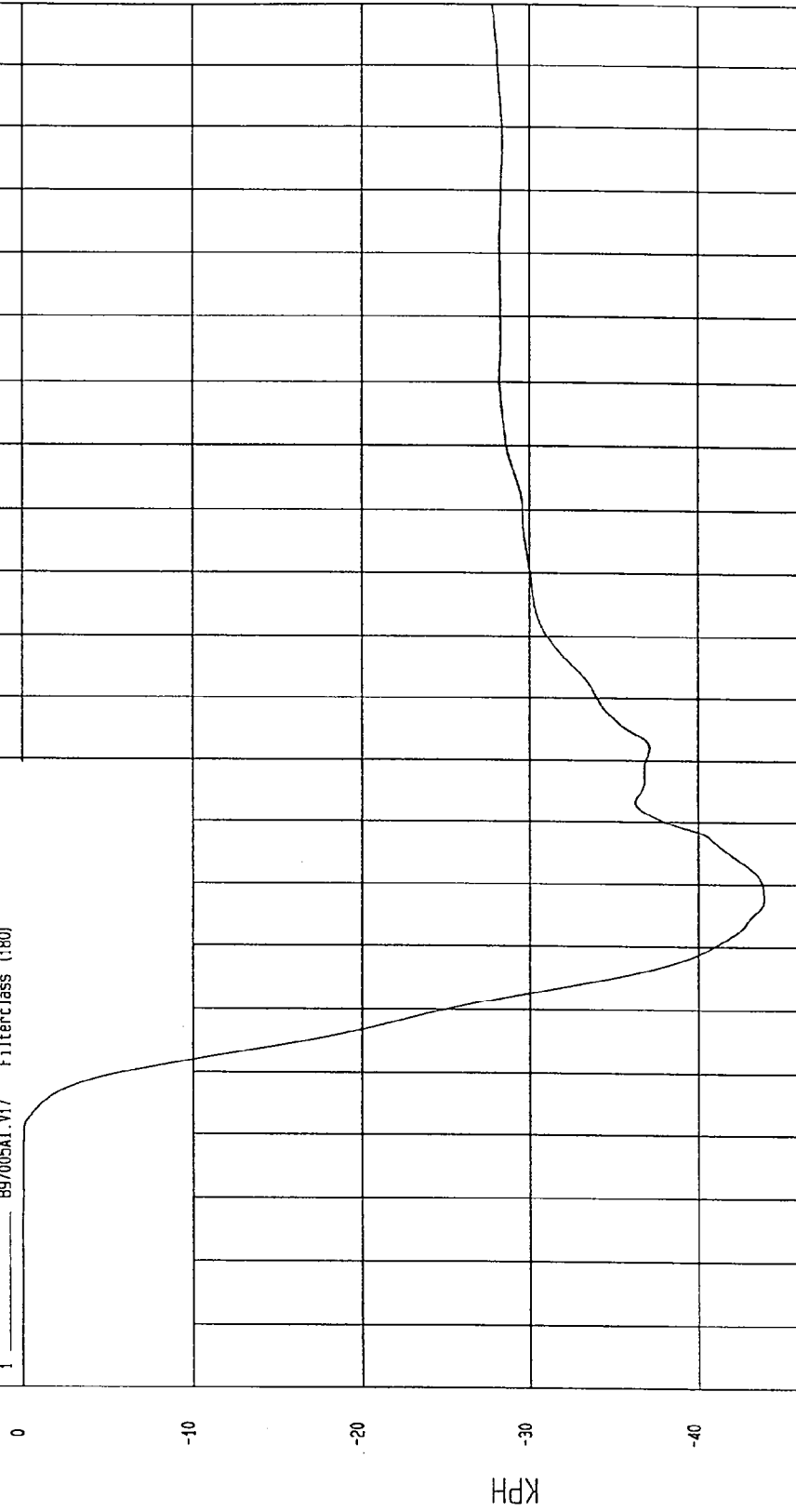
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -43.80 KPH at 58 msec Maximum = .01 KPH at -11 msec

FRONT PASSENGER LOWER SPINE Y VELOCITY

1 ——— B97005A1.V17 Filterclass (180)



MOA Research
01-09-1997 15:33

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

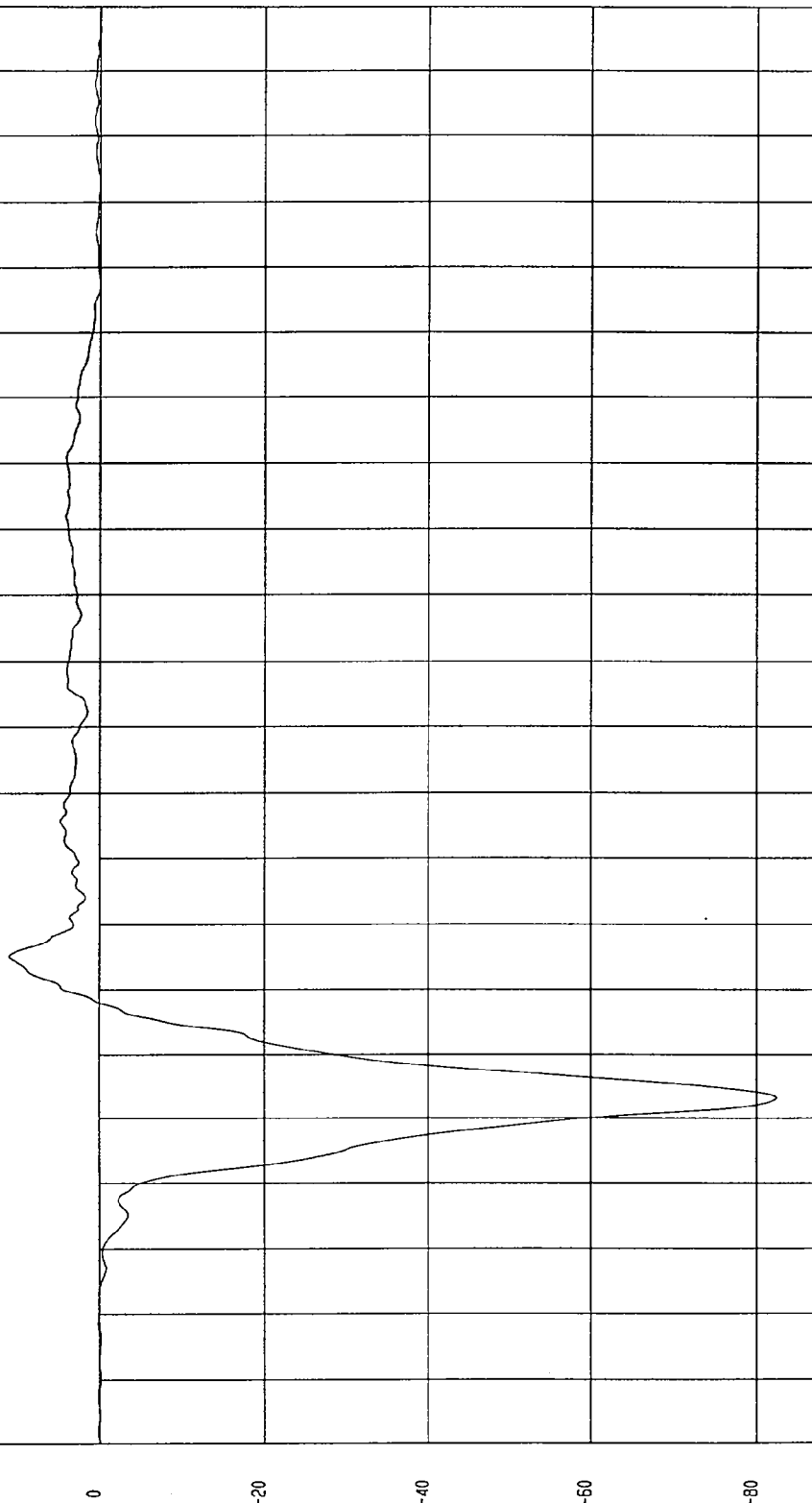
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 14.00 G'S at 55 msec

Minimum = -82.35 G'S at 33 msec

FRONT PASSENGER PELVIS Y ACCELERATION

1 897005AF.A18 Filterclass (180)



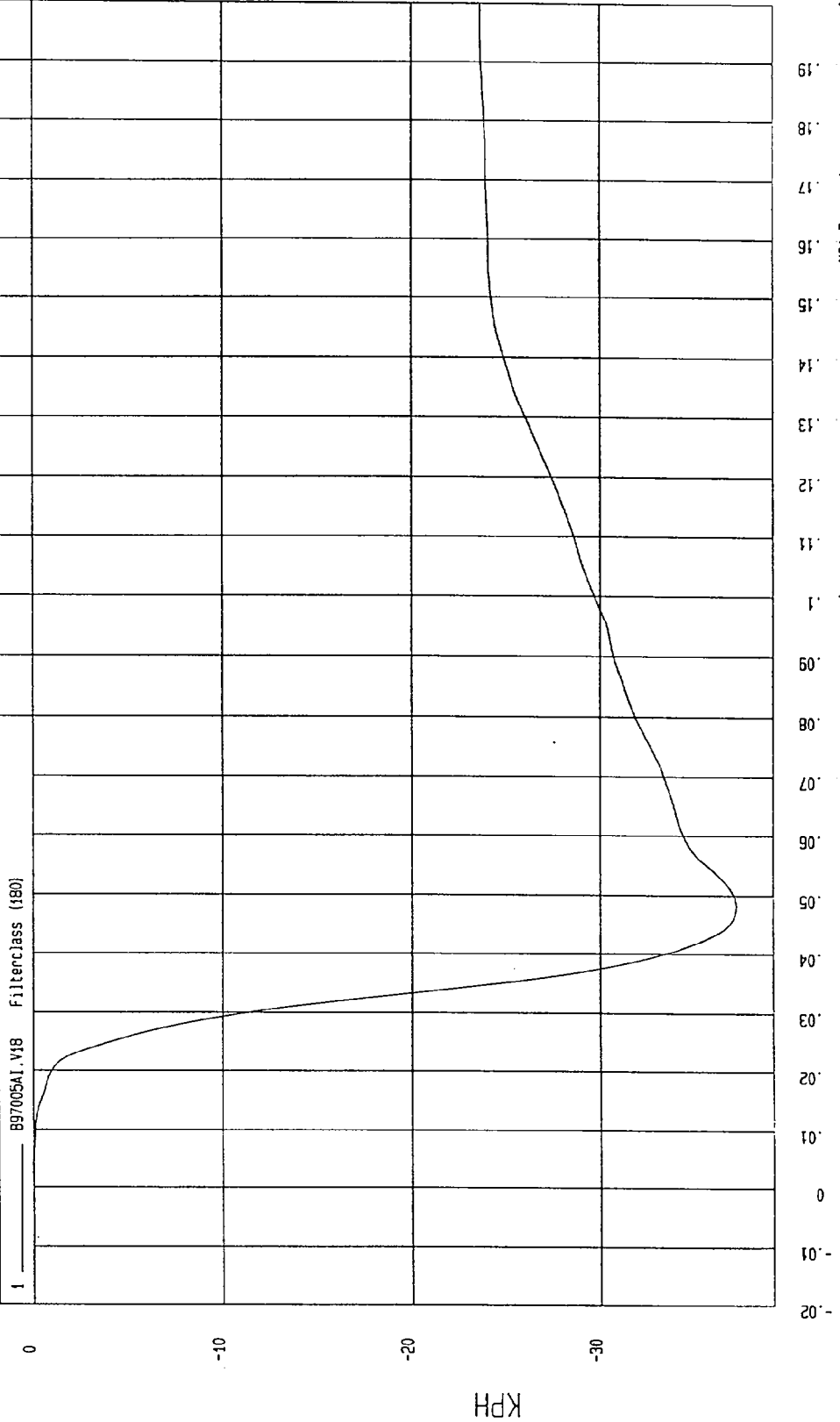
NCA Research
01-09-1997 12:04

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -36.97 KPH at 48 msec Maximum = 1.39E-02 KPH at -11 msec

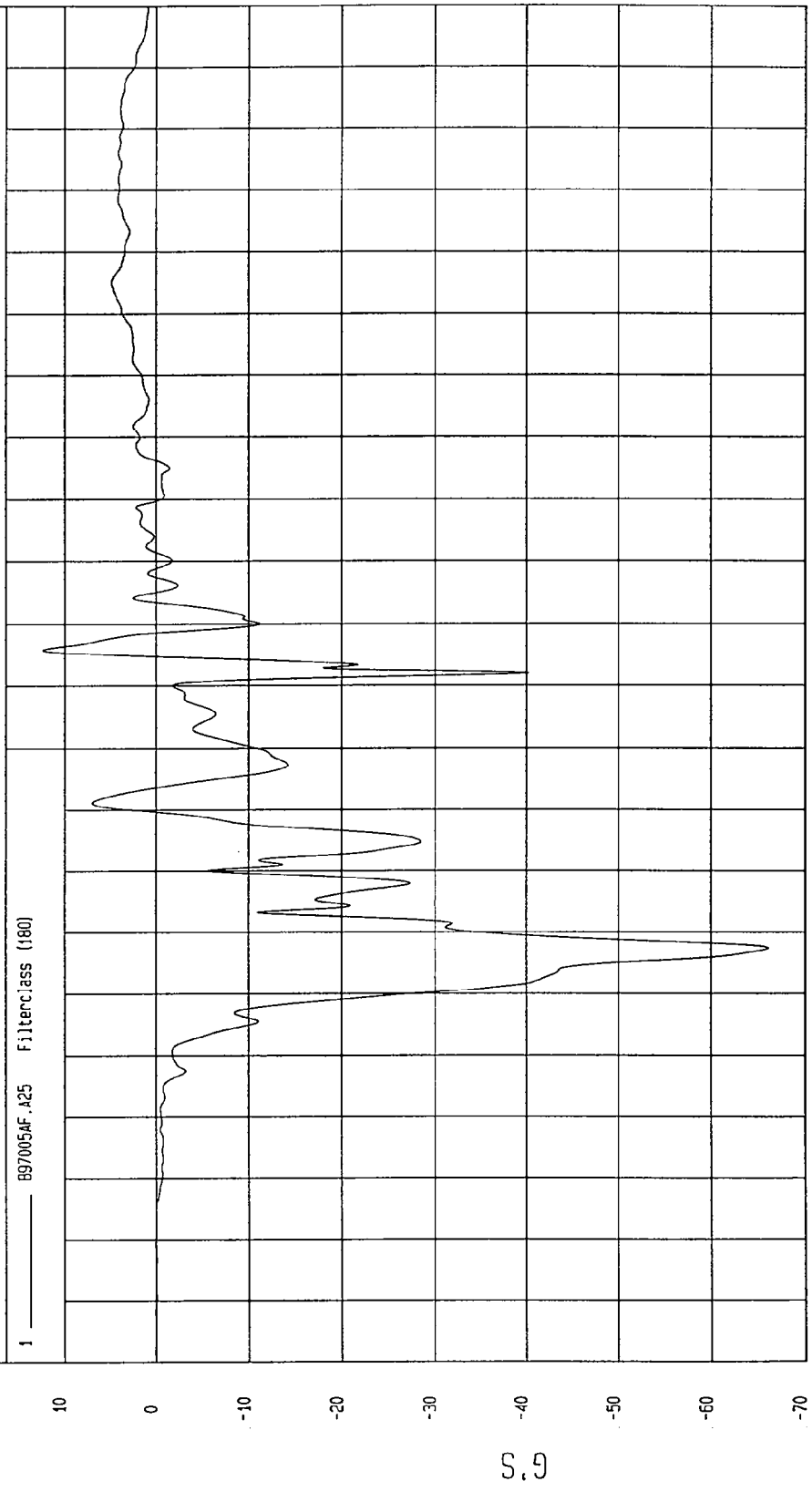
FRONT PASSENGER PELVIS Y VELOCITY



MCA Research
01-09-1997 15:33

TEST: FMVSS 214 RIGHT SIDE IMPACT	TEST DATE: 01-08-1997
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)	Speed: 33.26 MPH 53.5 KPH
Minimum = -66.14 G'S at 47 msec	Maximum = 12.29 G'S at 96 msec

REAR PASSENGER UPPER RIB 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
01-09-1997 12.04

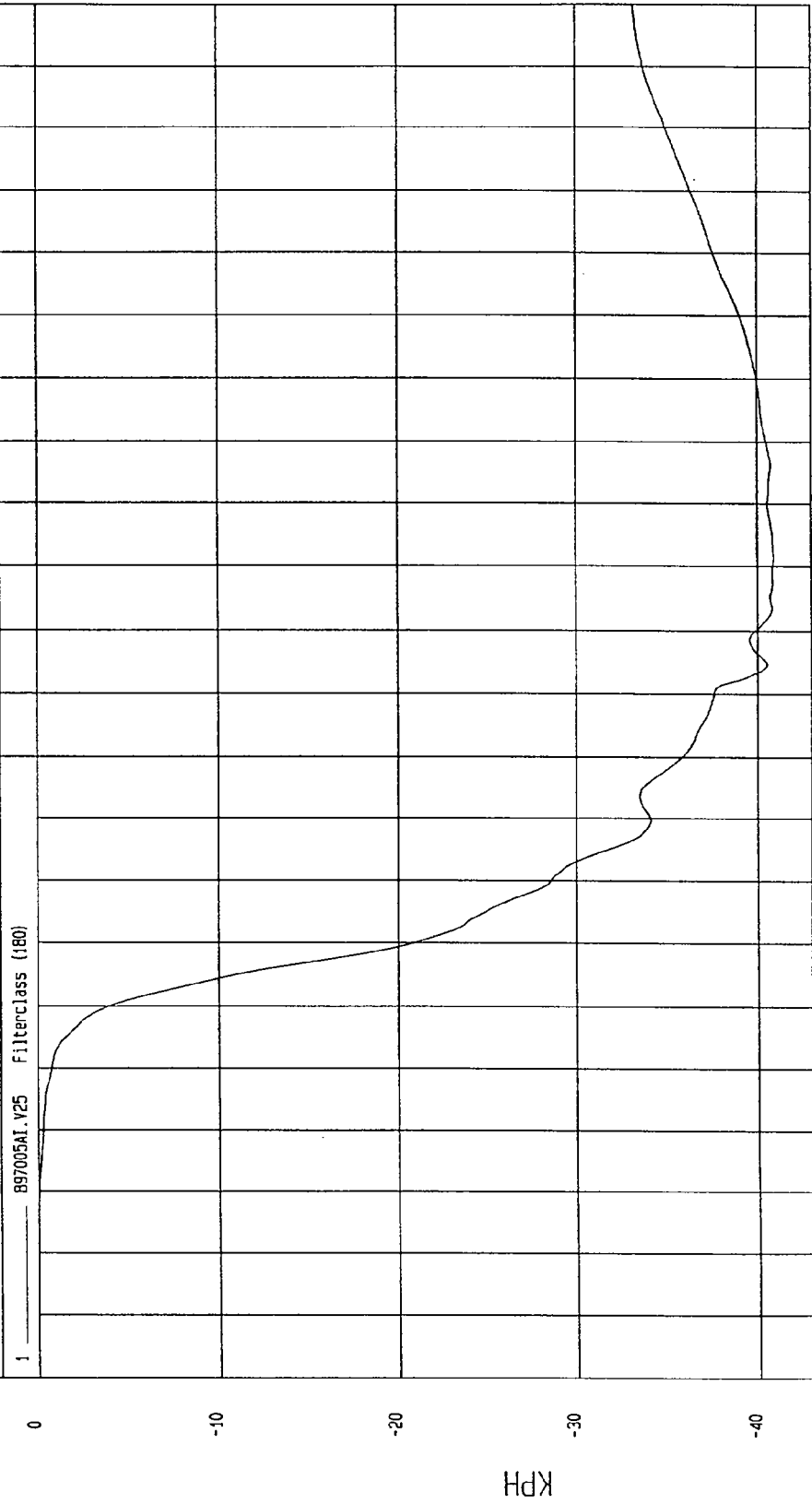
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -40.88 KPH at 111 msec Maximum = 1.73E-02 KPH at 6 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 897005AI.V25 FilterClass (180)



TIME Seconds

MGA Research
01-09-1997 15:33

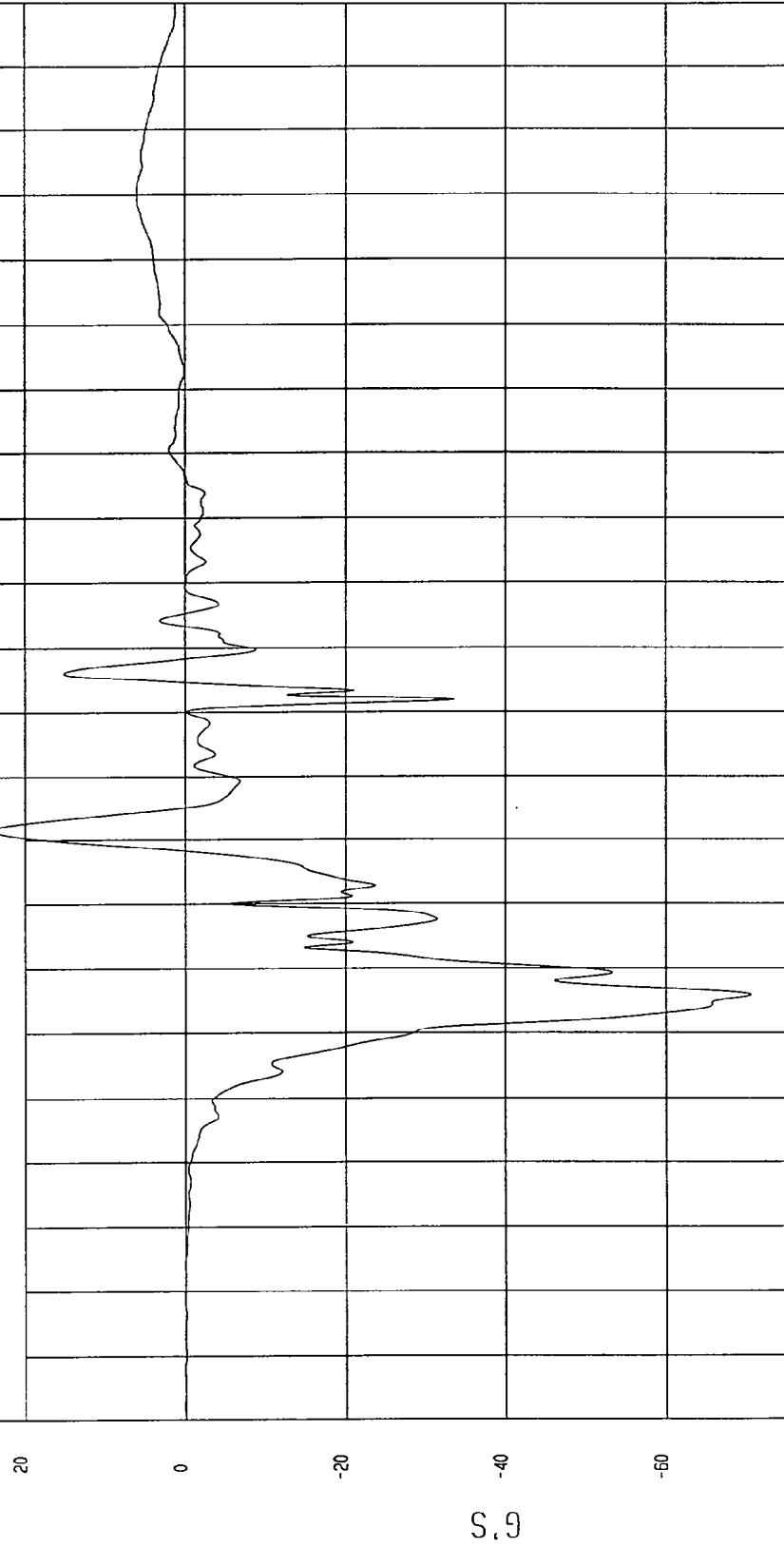
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -70.51 G'S at 46 msec Maximum = 24.00 G'S at 72 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 897005AF.A26 FilterClass (180)



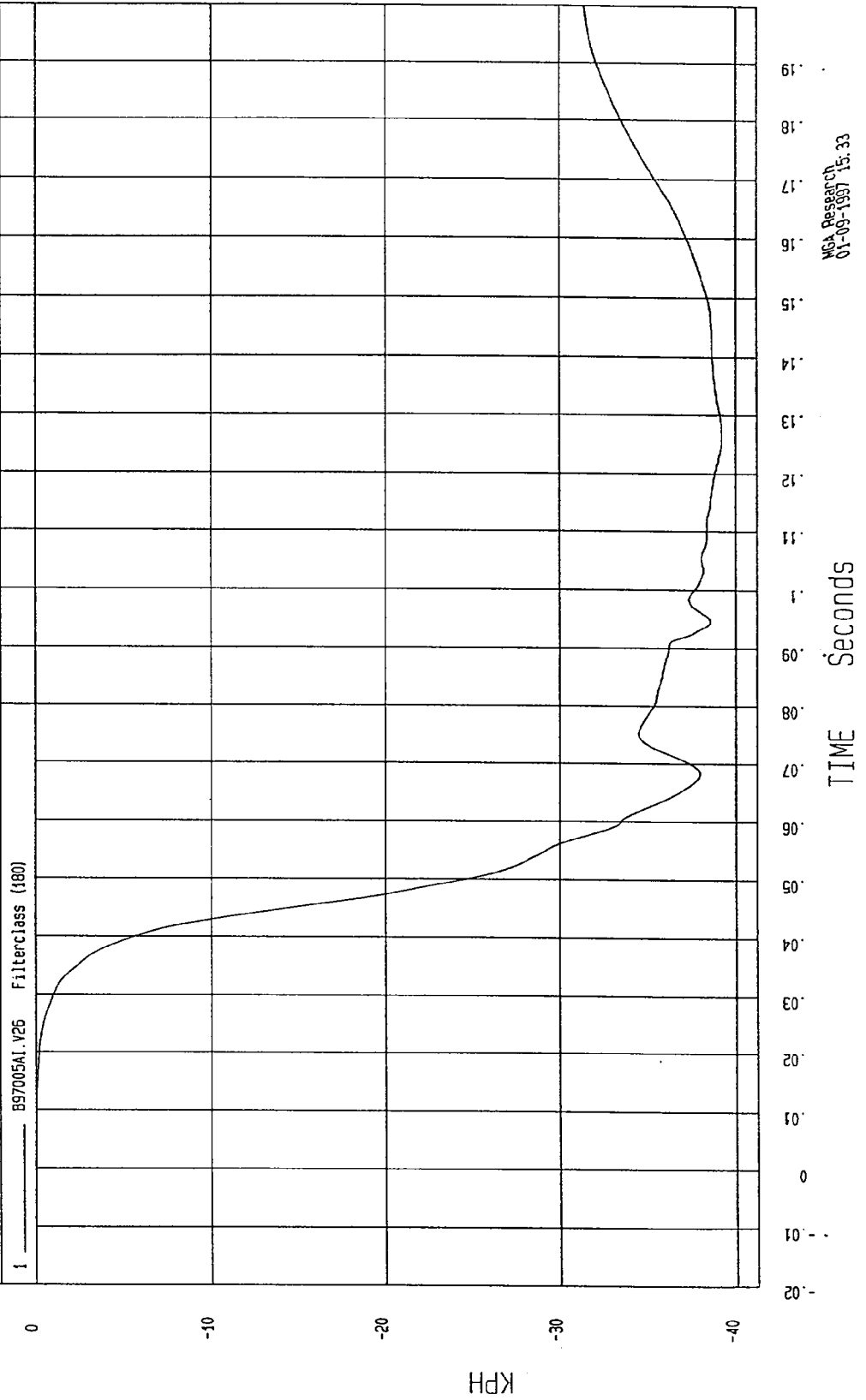
TIME (SECONDS) WGA Research 01-08-1997 12:04

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -39.22 KPH at 126 msec Maximum = 1.90E-02 KPH at 5 msec

REAR PASSENGER LOWER RIB Y VELOCITY

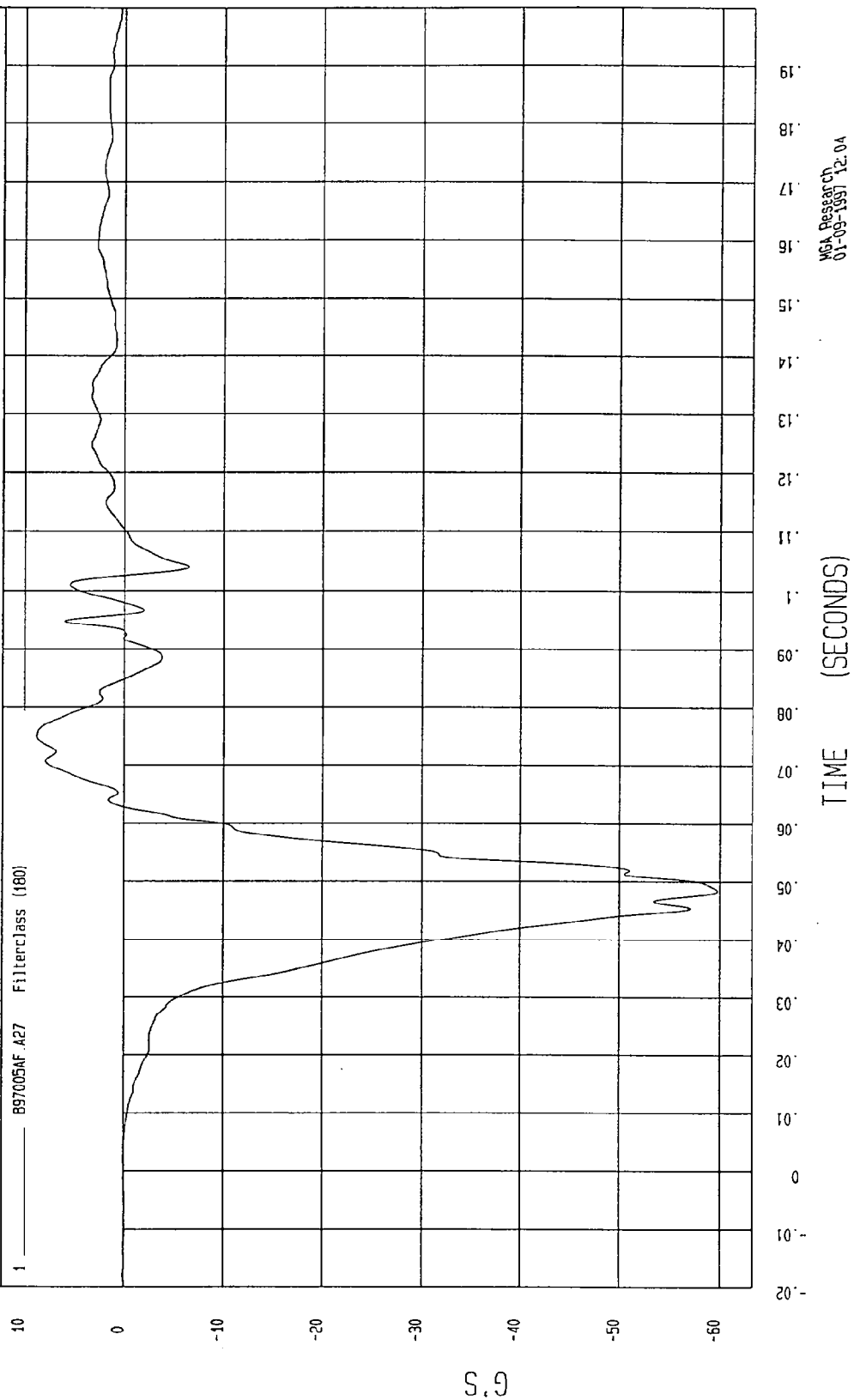


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -59.78 G'S at 48 msec Maximum = 8.75 G'S at 75 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

SPEED: 33.26 MPH 53.5 KPH

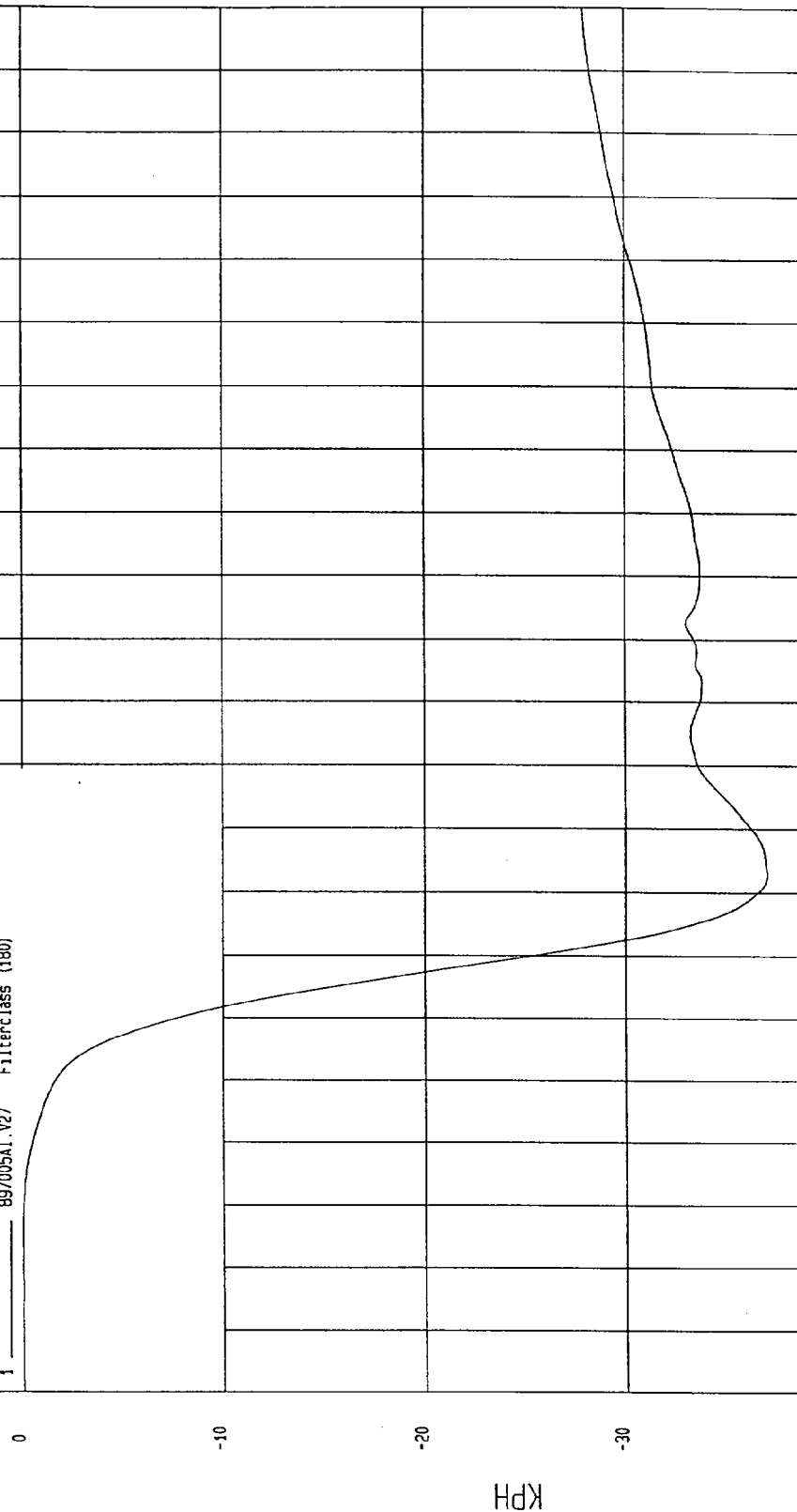
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 1.04E-02 KPH at 5 msec

Minimum = -35.98 KPH at 63 msec

REAR PASSENGER LOWER SPINE Y VELOCITY

1 ——— B97005A1.V27 Filterclass (180)

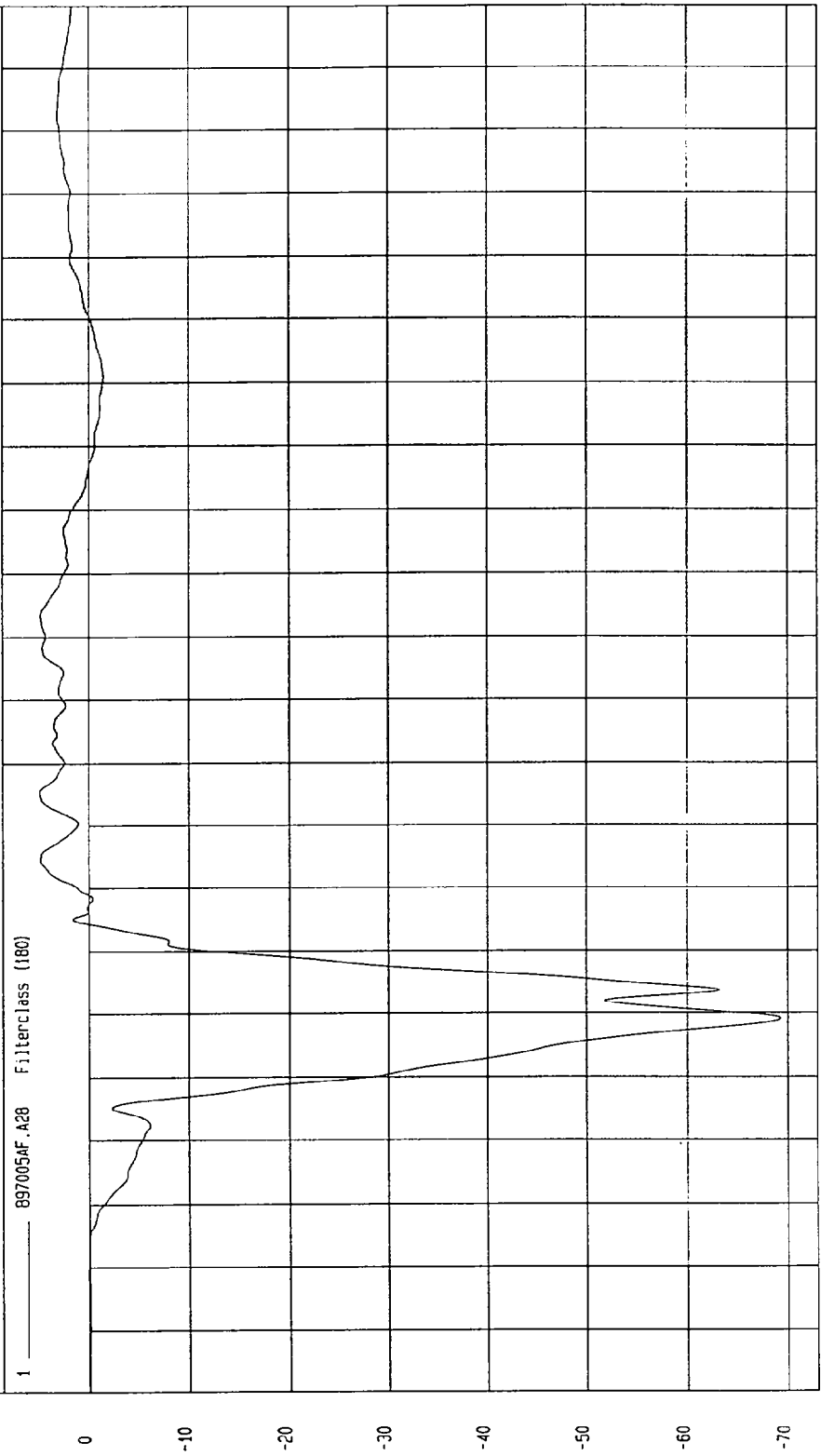


MGA Research
01-09-1997 15:33

TIME Seconds

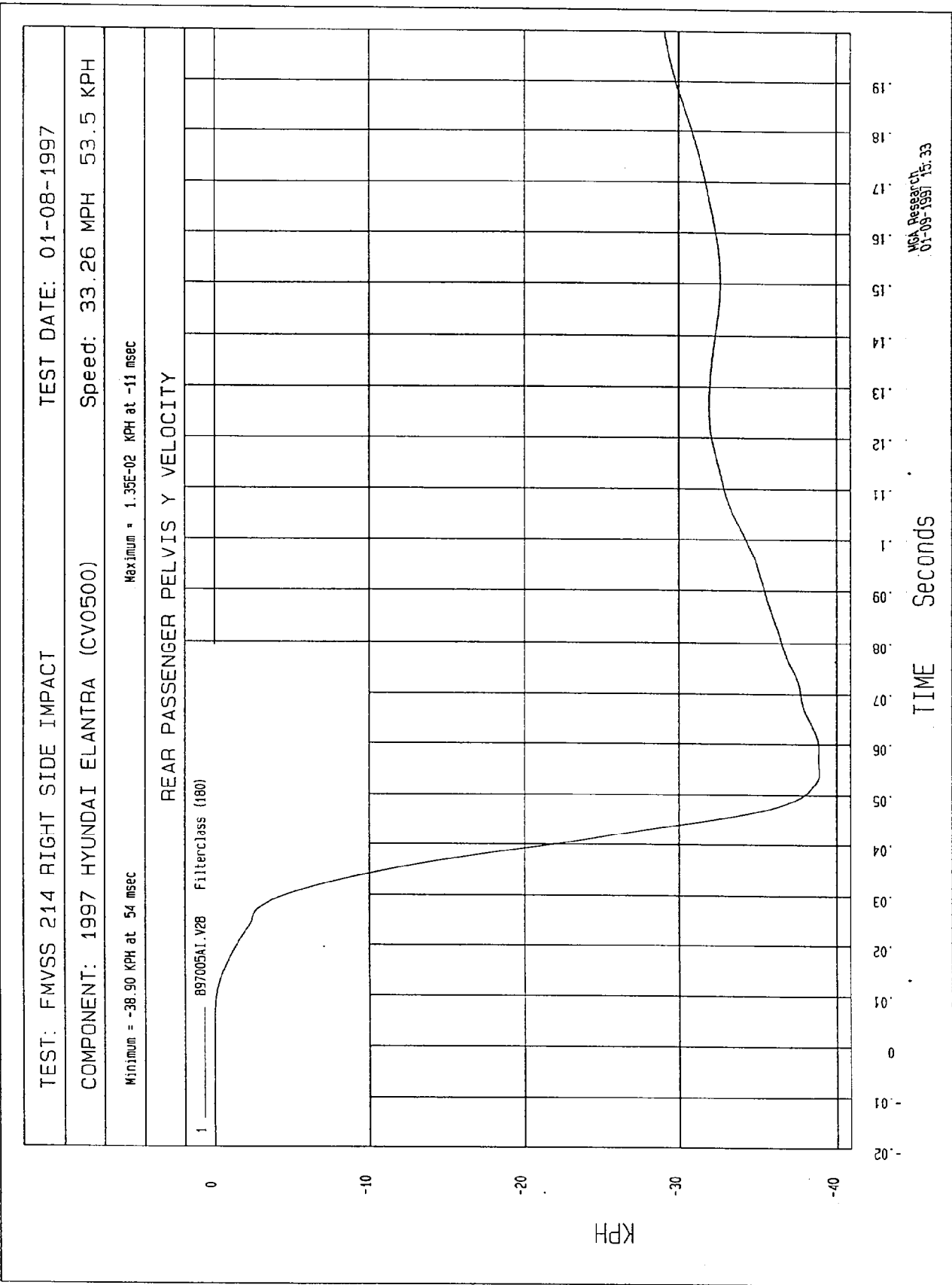
TEST: FMVSS 214 RIGHT SIDE IMPACT	TEST DATE: 01-08-1997
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)	Speed: 33.26 MPH 53.5 KPH
Minimum = -69.30 G'S at 39 msec	Maximum = 4.81 G'S at 75 msec

REAR PASSENGER PELVIS Y ACCELERATION



TIME (SECONDS)

MoA Research
01-09-1997 12:04



TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

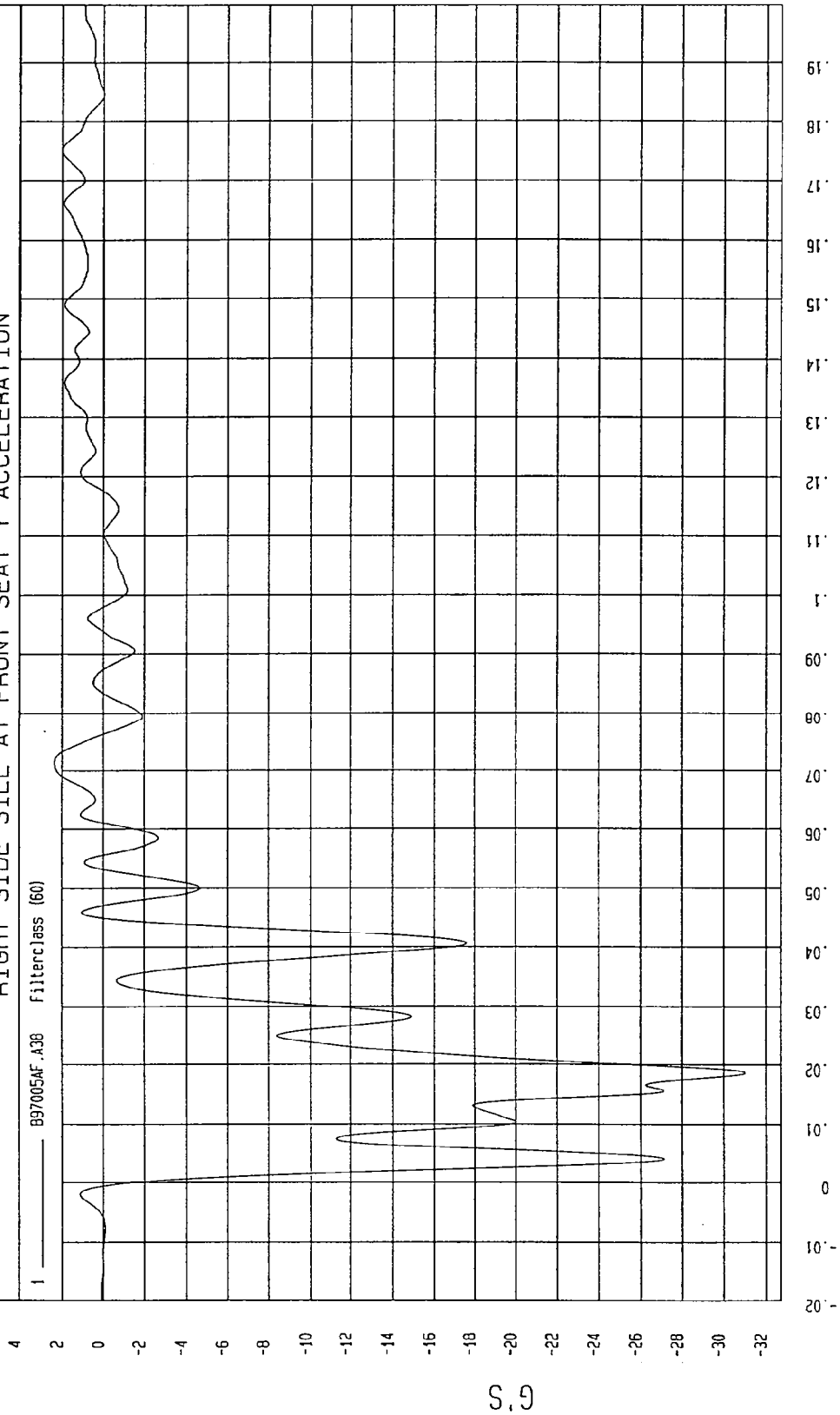
Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 2.35 G'S at 71 msec

Minimum = -31.03 G'S at 19 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION



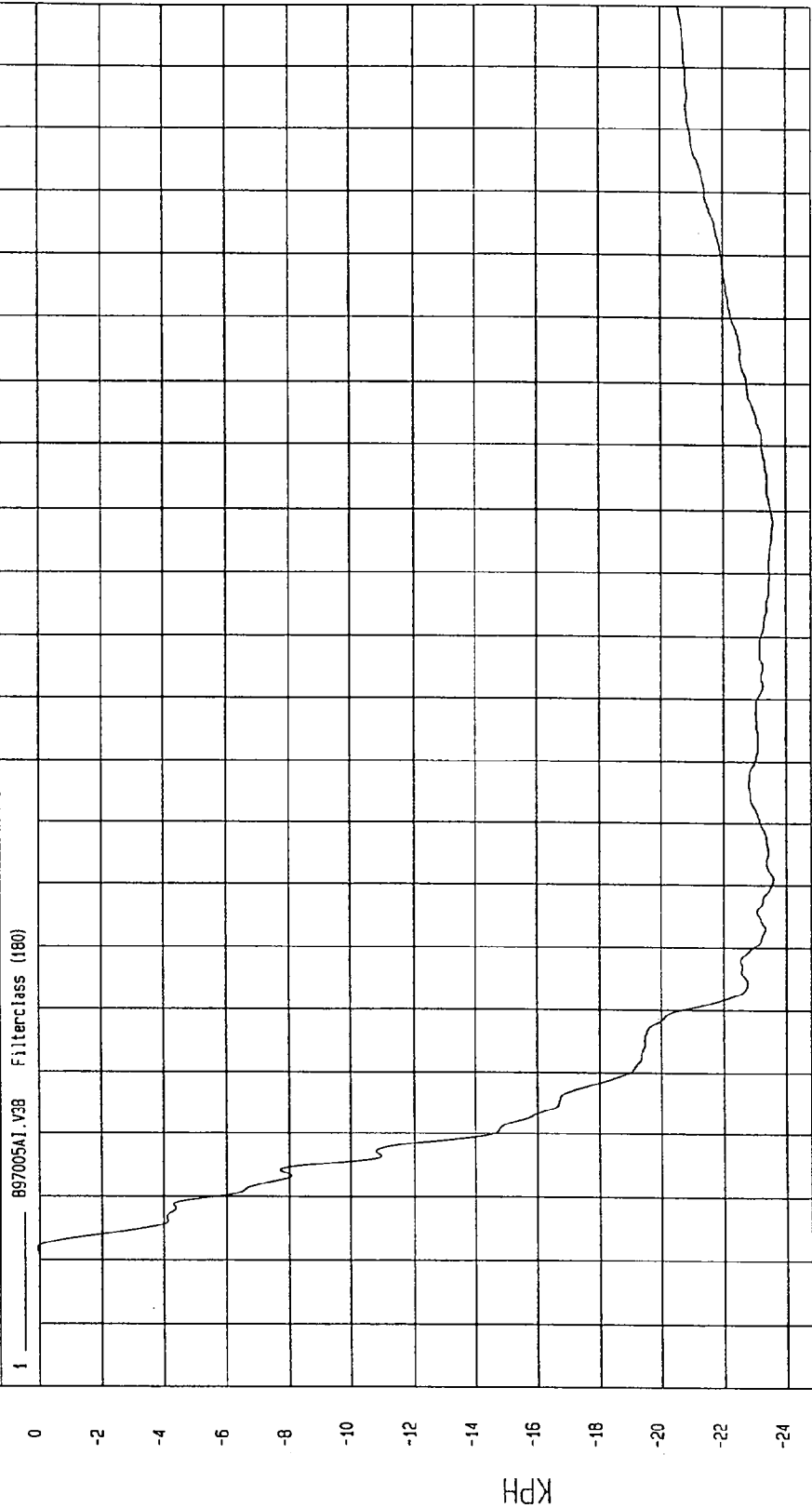
MGA Research
01-09-1997 14:53

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -23.60 KPH at 61 msec Maximum = 7.23E-02 KPH at 2 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY



TIME Seconds

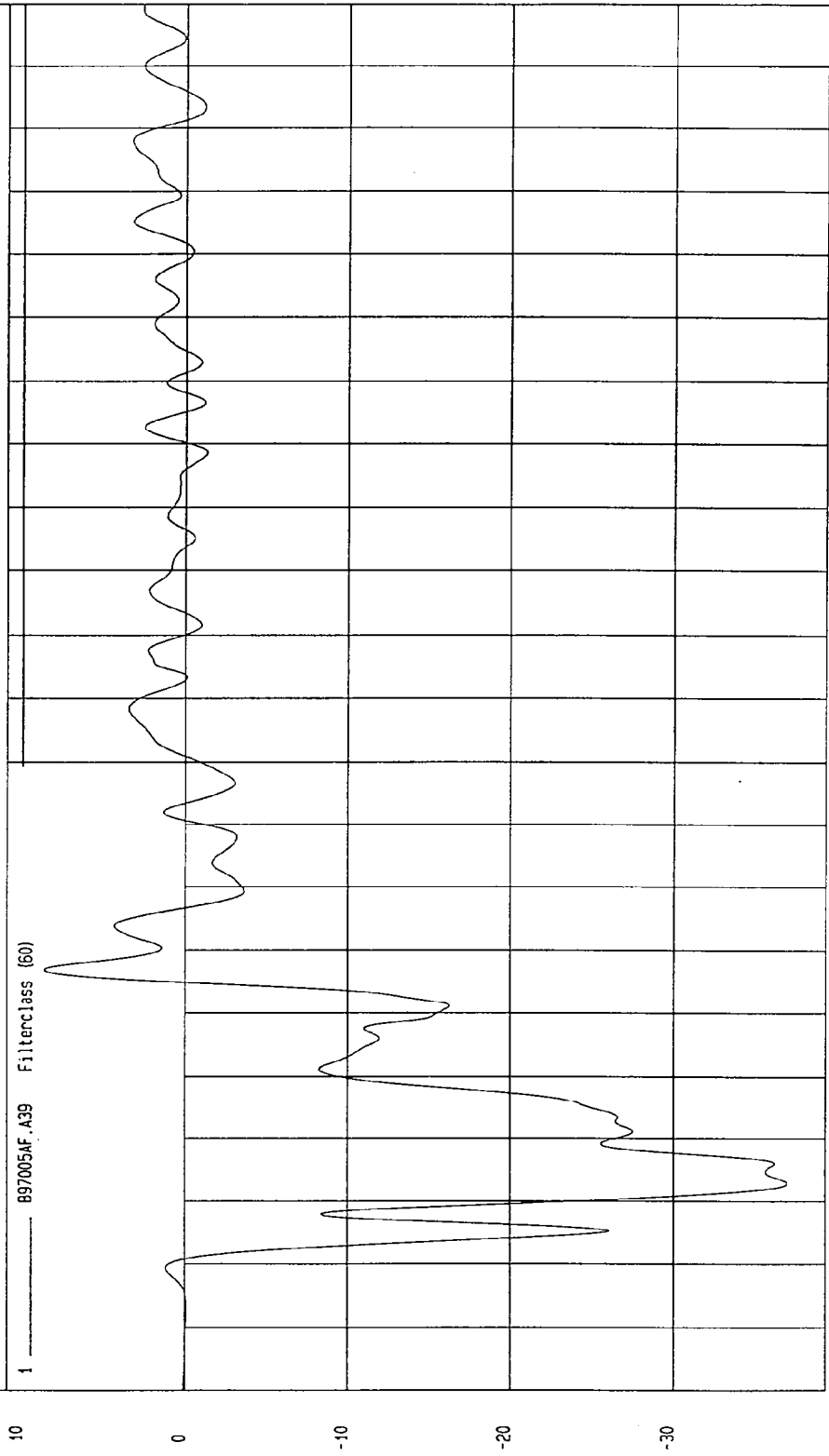
MCA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -36.88 G'S at 13 msec Maximum = 8.68 G'S at 47 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION



TIME (SECONDS)

MCA Research
01-09-1997 14:53

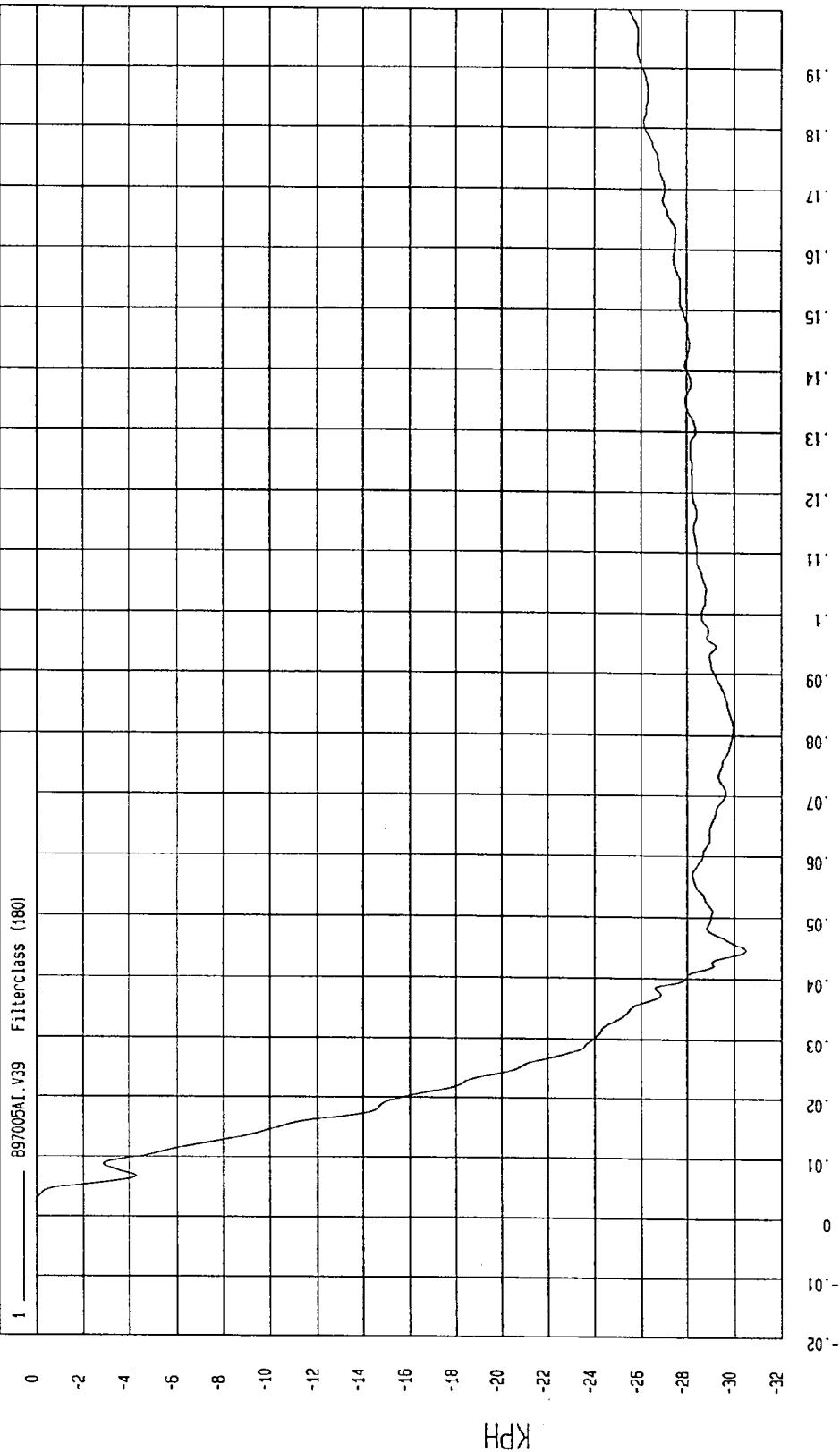
TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -30.48 KPH at 45 msec Maximum = 5.31E-02 KPH at 2 msec

RIGHT SIDE SILL AT REAR SEAT Y VELOCITY



MGA Research
01-08-1997 15:30

TIME Seconds

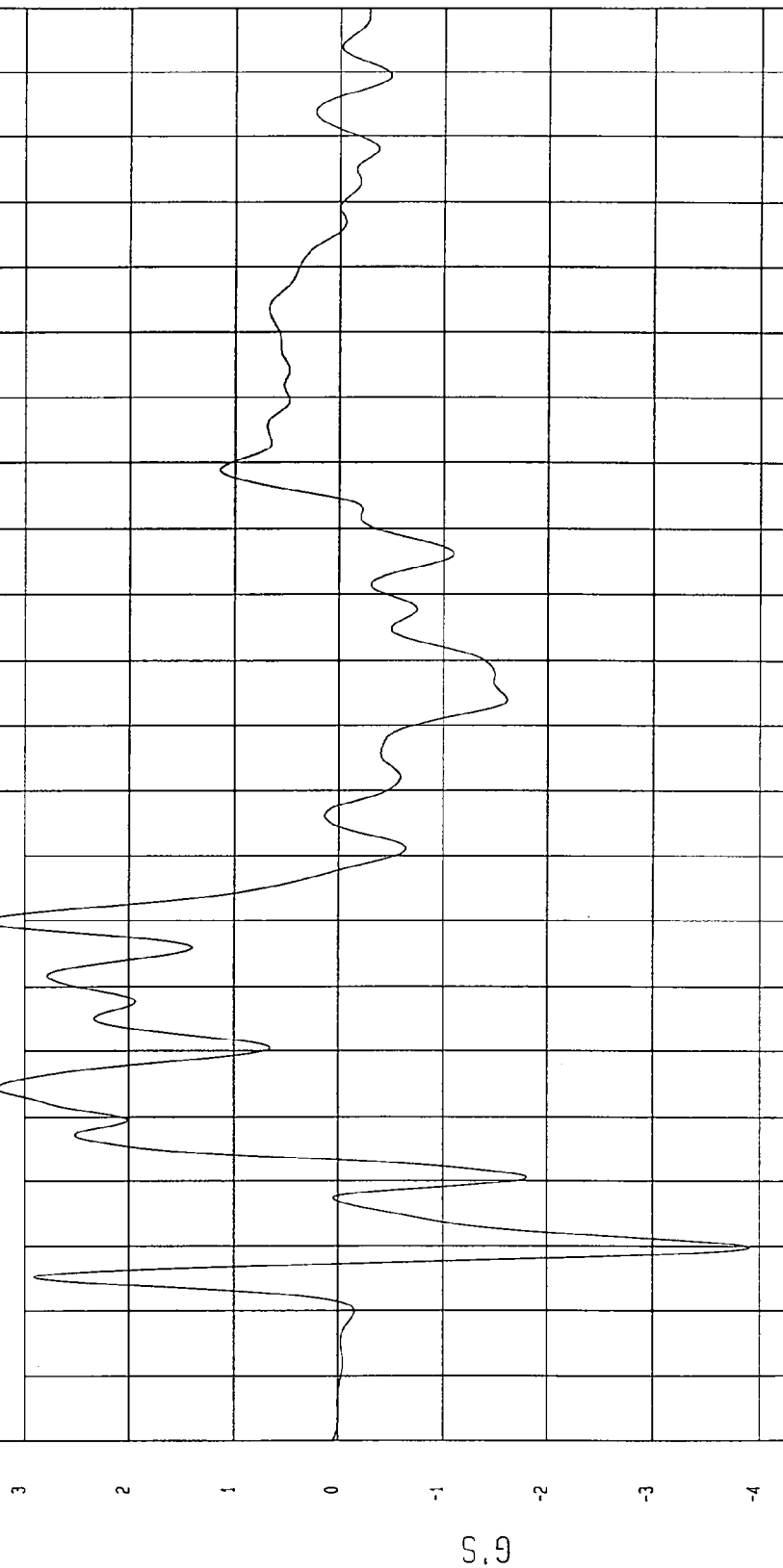
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -3.90 G'S at 10 msec
Maximum = 3.42 G'S at 60 msec

LEFT SIDE SILL AT FRONT SEAT X ACCELERATION

1 — 897005AF.A32 Filterclass (60)

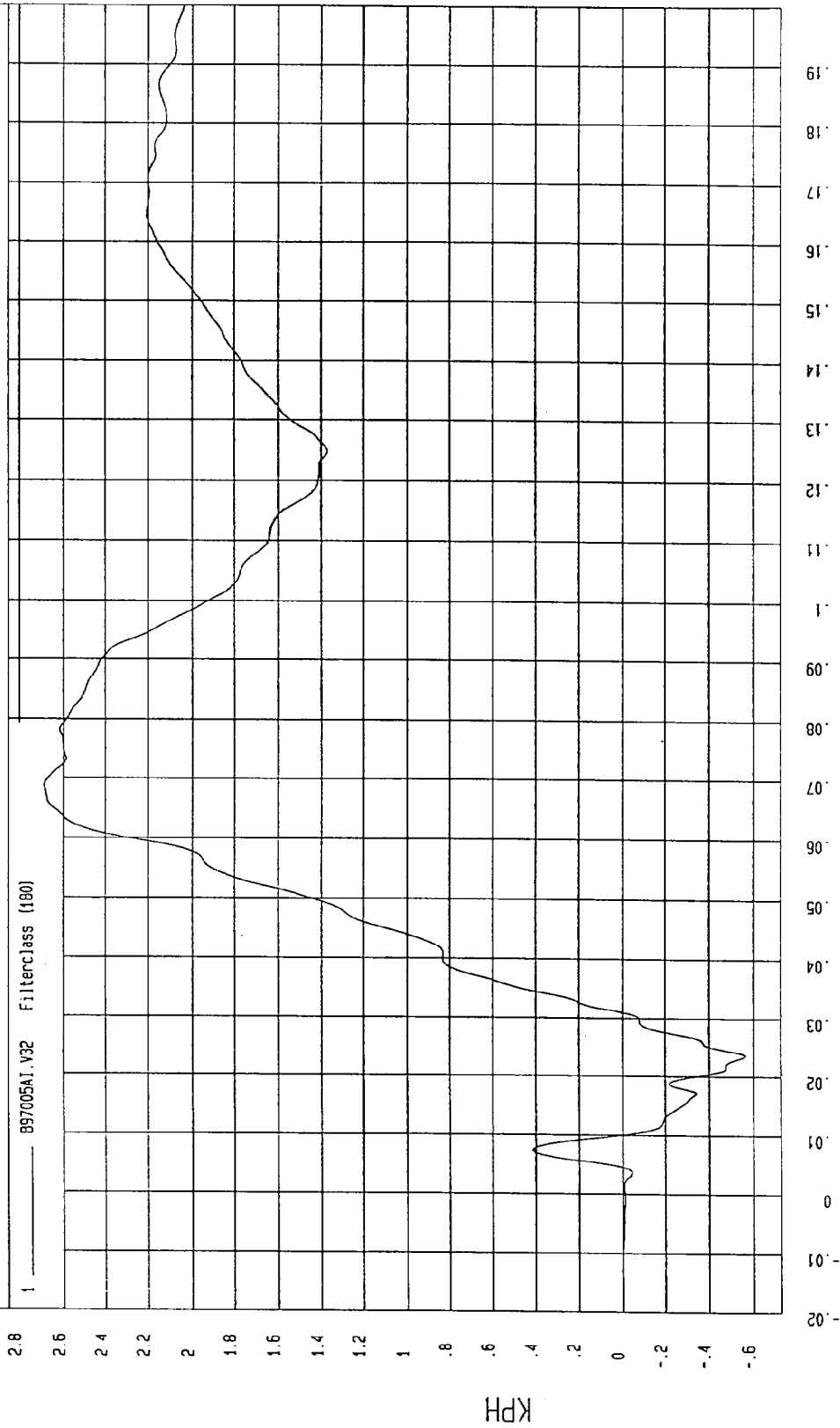


MCA Research
01-09-1997 14:53

TIME (SECONDS)

TEST: FMVSS 214 RIGHT SIDE IMPACT	TEST DATE: 01-08-1997
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)	Speed: 33.26 MPH 53.5 KPH
Minimum = -.56 KPH at 24 msec	Maximum = 2.68 KPH at 69 msec

LEFT SIDE SILL AT FRONT SEAT X VELOCITY



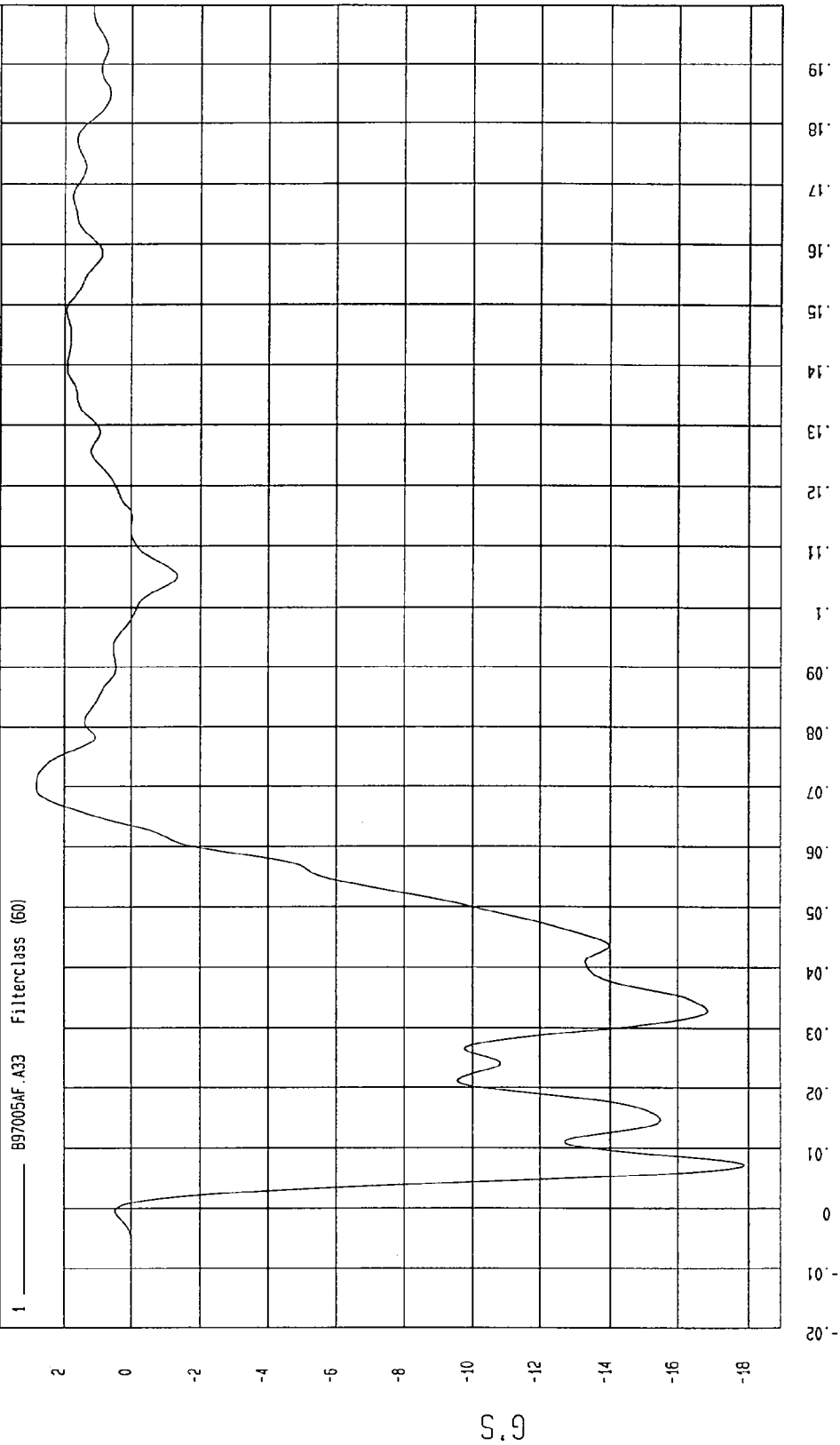
WCA Research
01-09-1997 15:29

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -17.08 G'S at 7 msec Maximum = 2.80 G'S at 70 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION



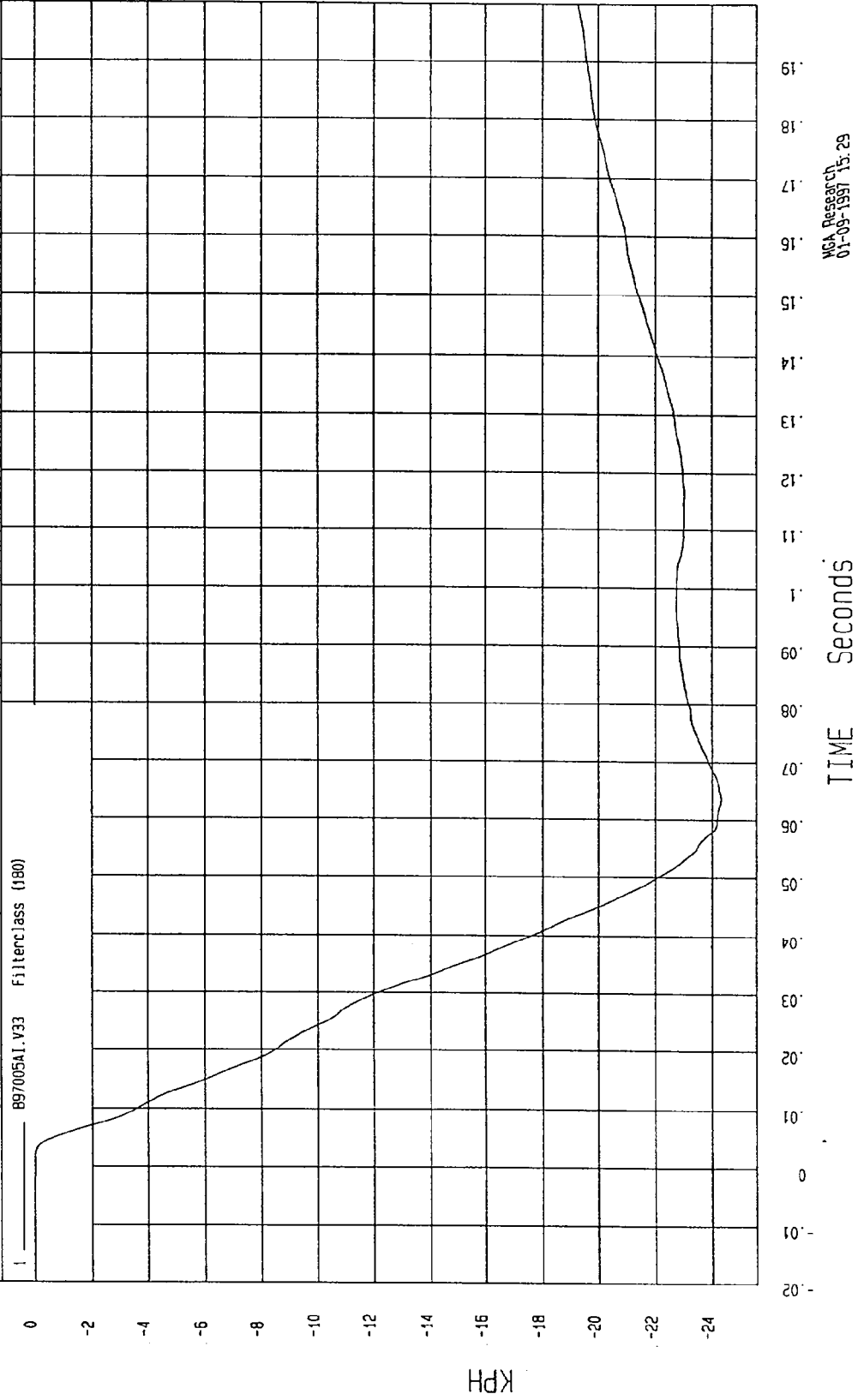
MCA Research
01-09-1997 14:54

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -24.32 KPH at 64 msec Maximum = 2.92E-04 KPH at -19 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY



NSA Research
01-09-1997 15:29

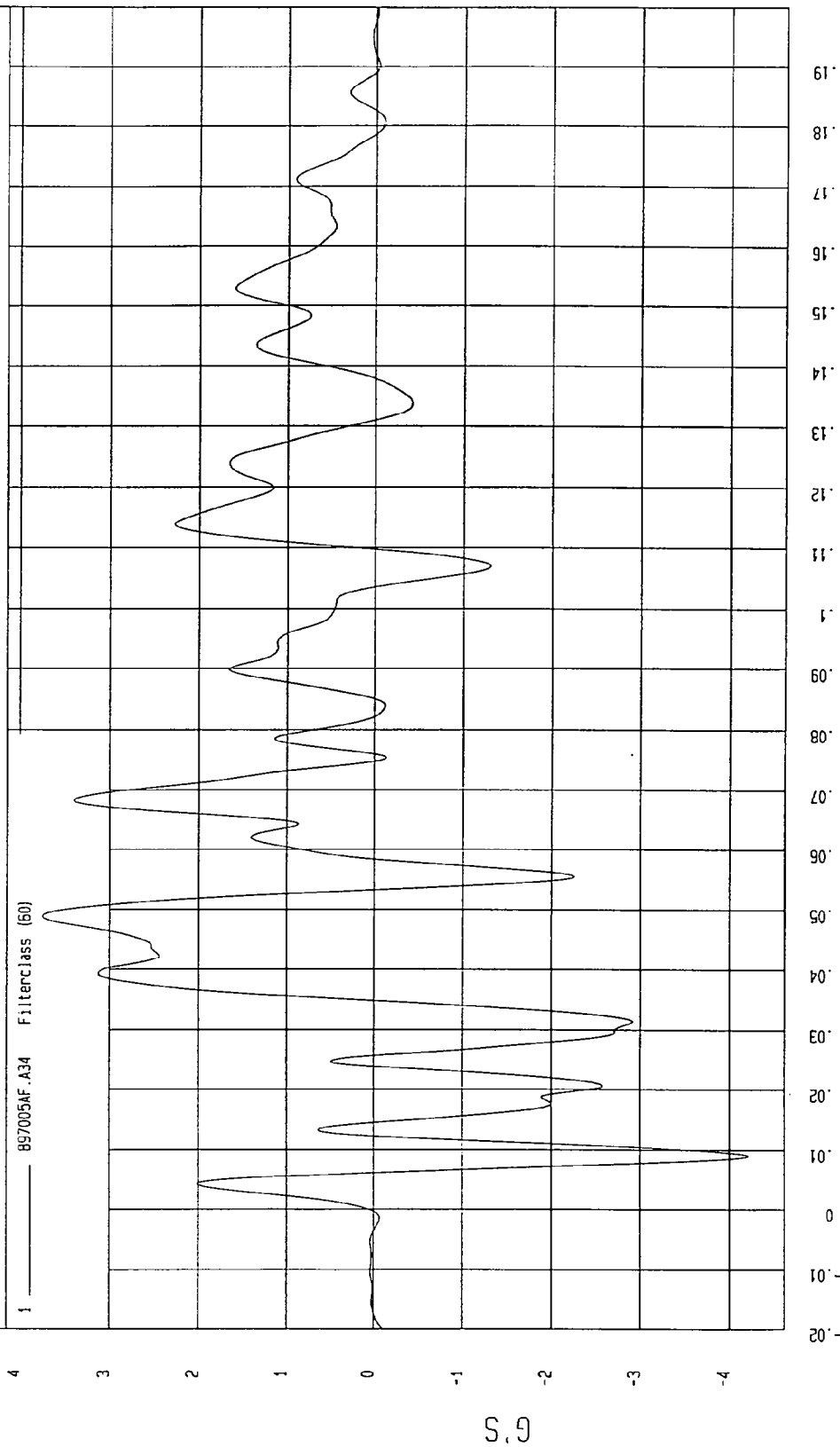
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -4.20 G'S at 9 msec
Maximum = 3.75 G'S at 49 msec

LEFT SIDE SILL AT FRONT SEAT Z ACCELERATION

1 — 897005AF.A34 Filterclass (50)



MGA Research
01-09-1997 14:54

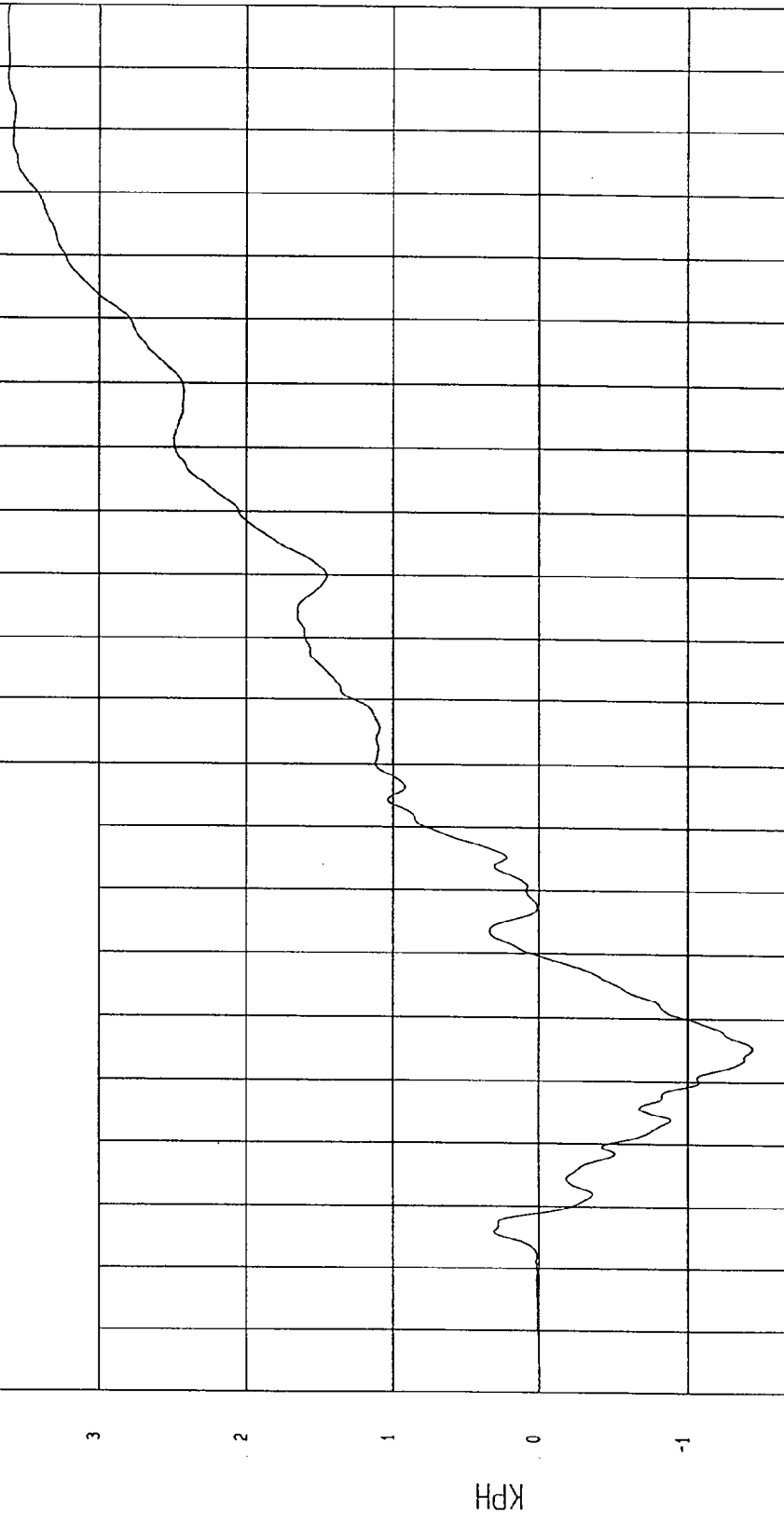
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -1.43 KPH at 35 msec Maximum = 3.62 KPH at 198 msec

LEFT SIDE SILL AT FRONT SEAT Z VELOCITY

1 89700541.V34 Filterclass (180)



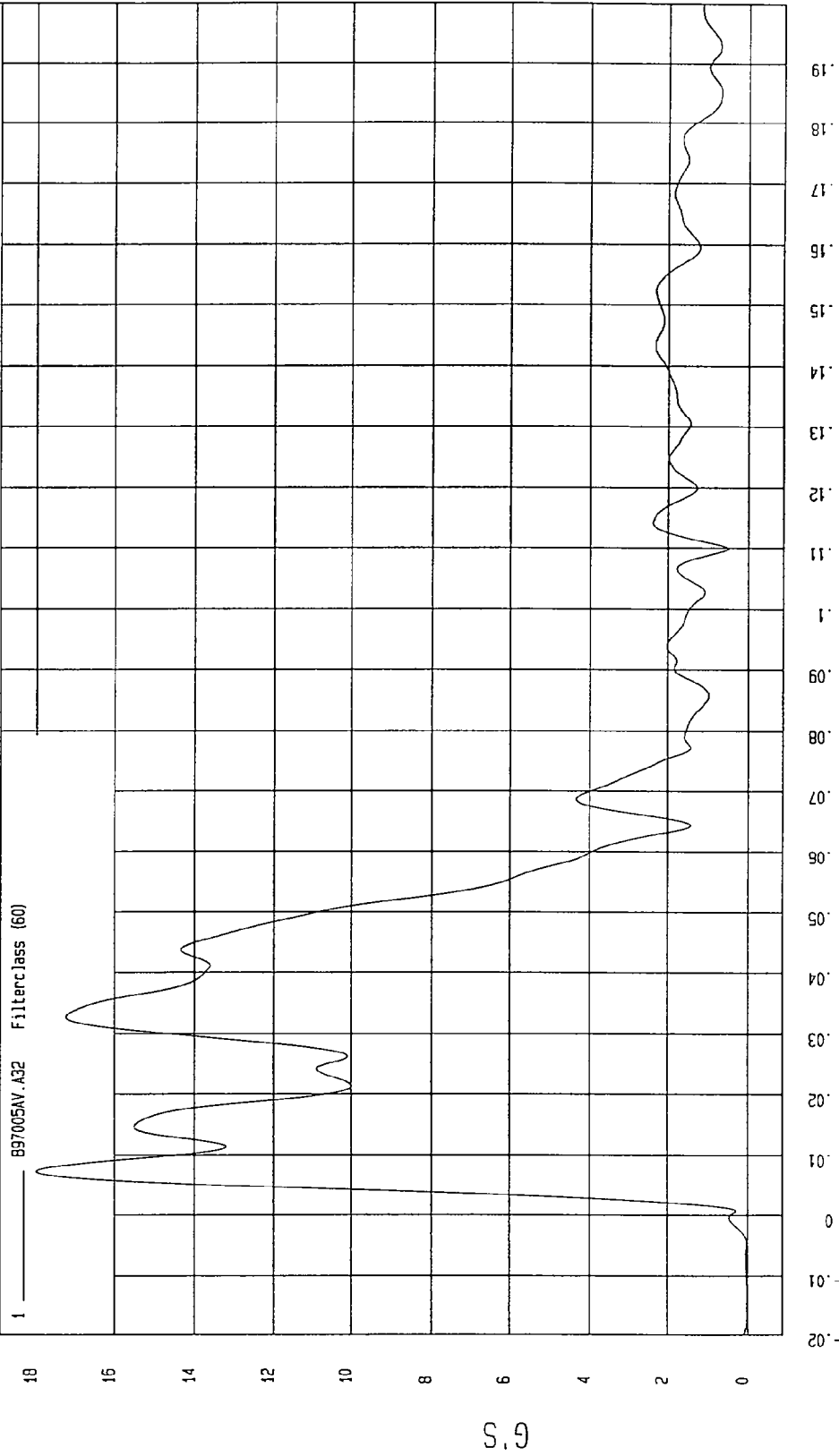
TIME Seconds
MCA Research
01-08-1997 15:29

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = 1.39E-02 G'S at -17 msec
Maximum = 18.00 G'S at 7 msec

LEFT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION



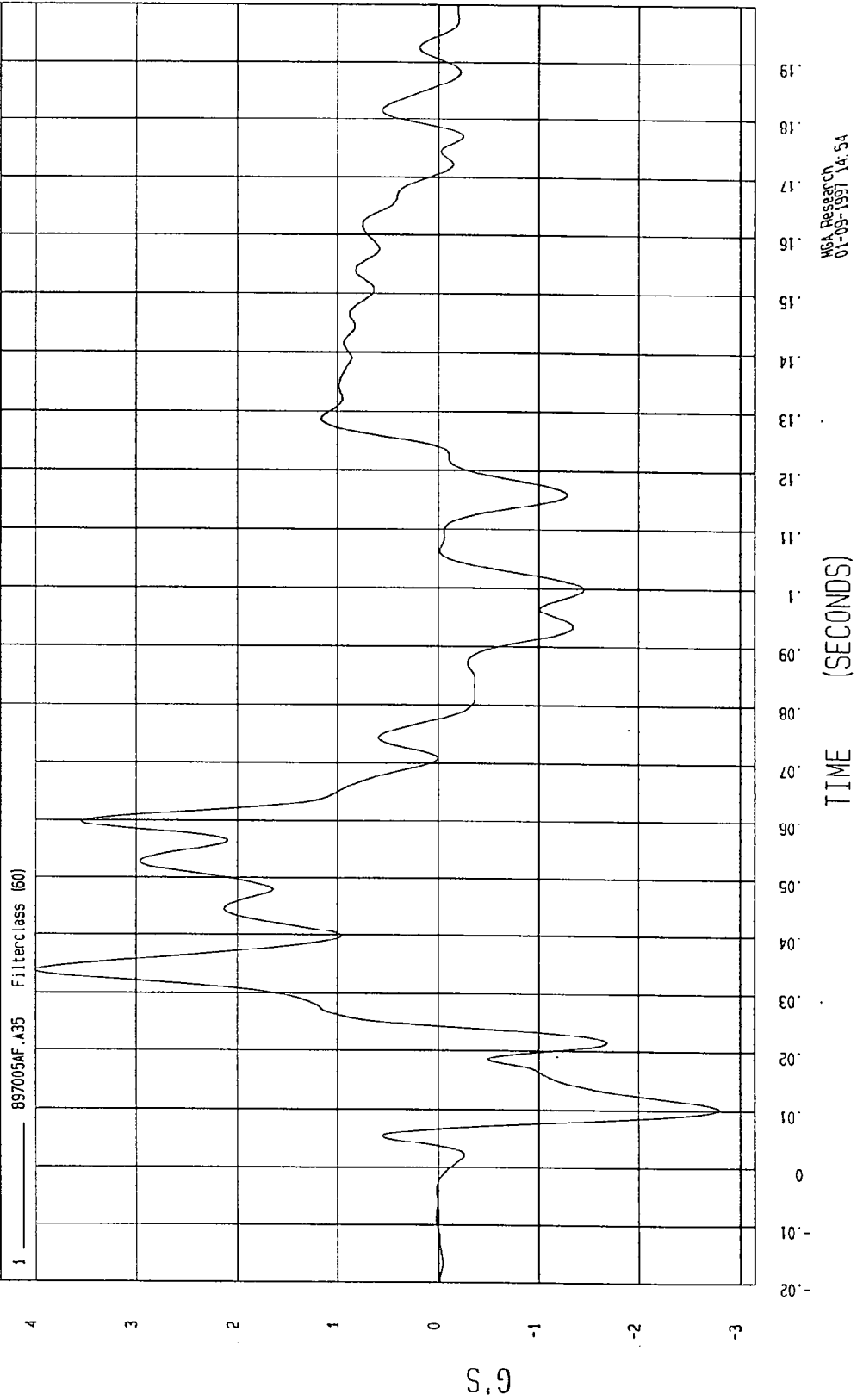
NSA Research
01-09-1997 14:58

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -2.79 G'S at 10 msec Maximum = 4.00 G'S at 34 msec

LEFT SIDE SILL AT REAR SEAT X ACCELERATION

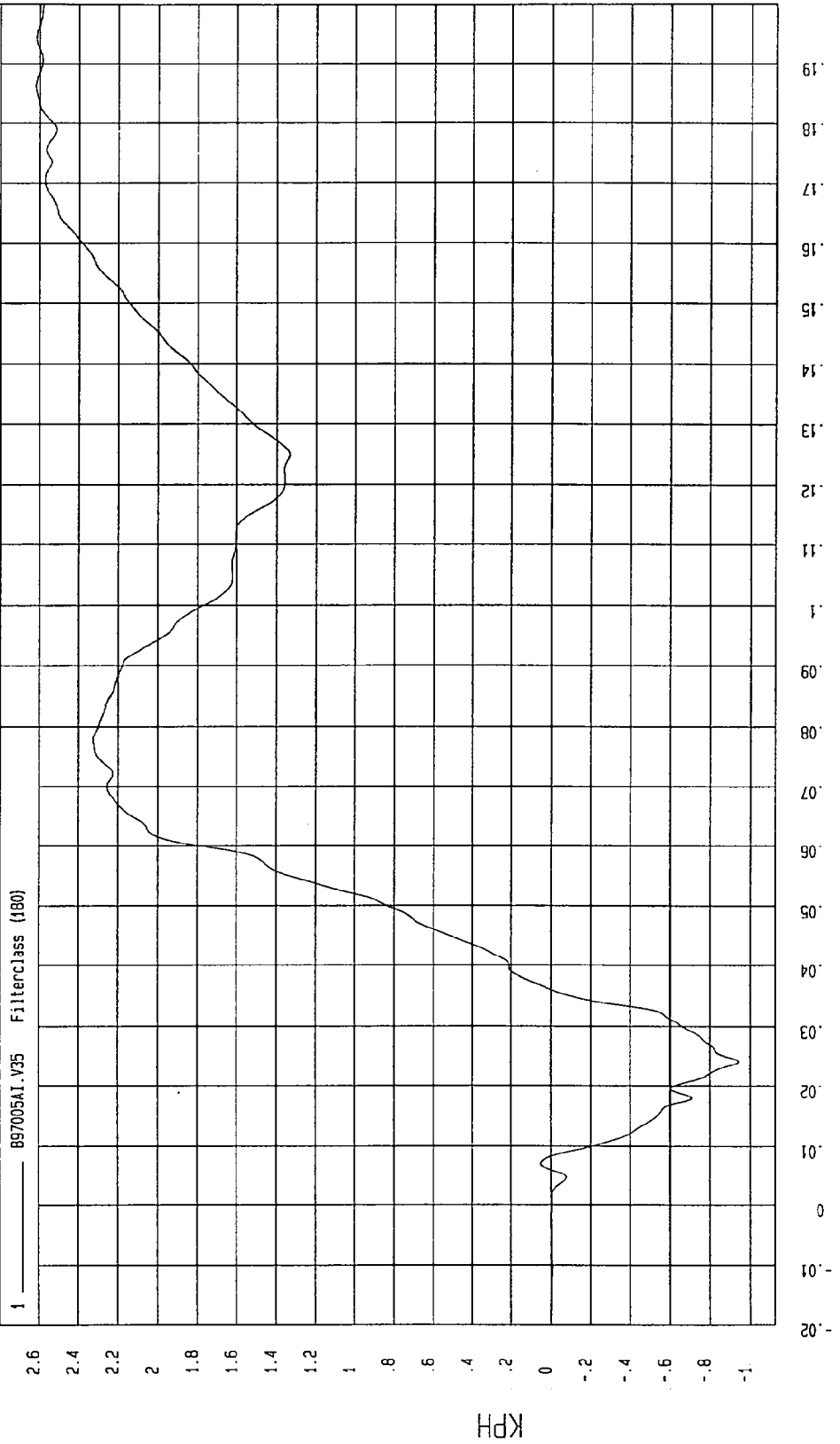


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = - 94 KPH at 24 msec Maximum = 2.61 KPH at 186 msec

LEFT SIDE SILL AT REAR SEAT X VELOCITY



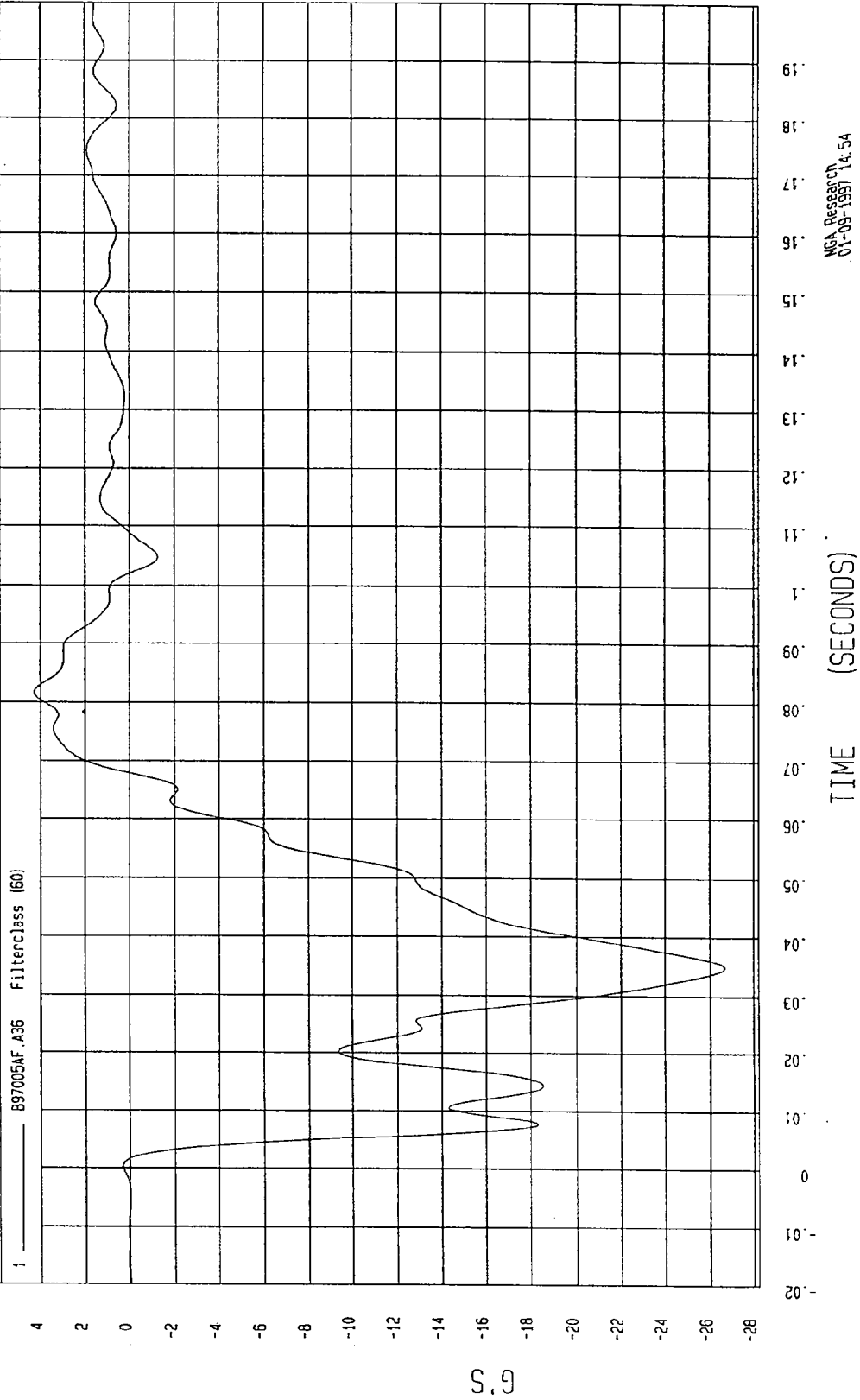
NCA Research
01-09-1997 15:29

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -26.66 G'S at 35 msec Maximum = 4.28 G'S at 82 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION

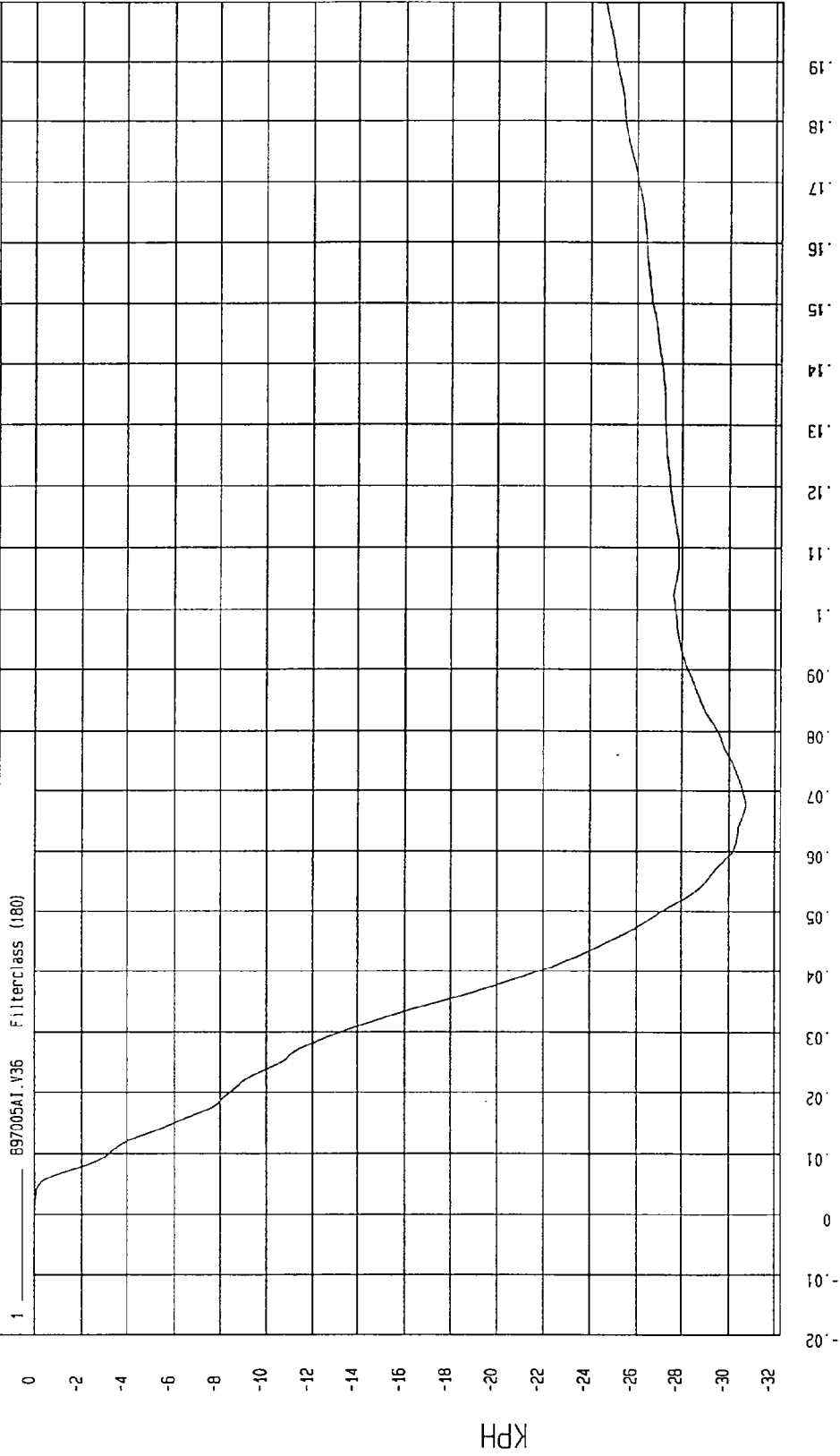


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -30.72 KPH at 68 msec Maximum = 1.43E-02 KPH at -9 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY



MCA Research
01-08-1997 15:29

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

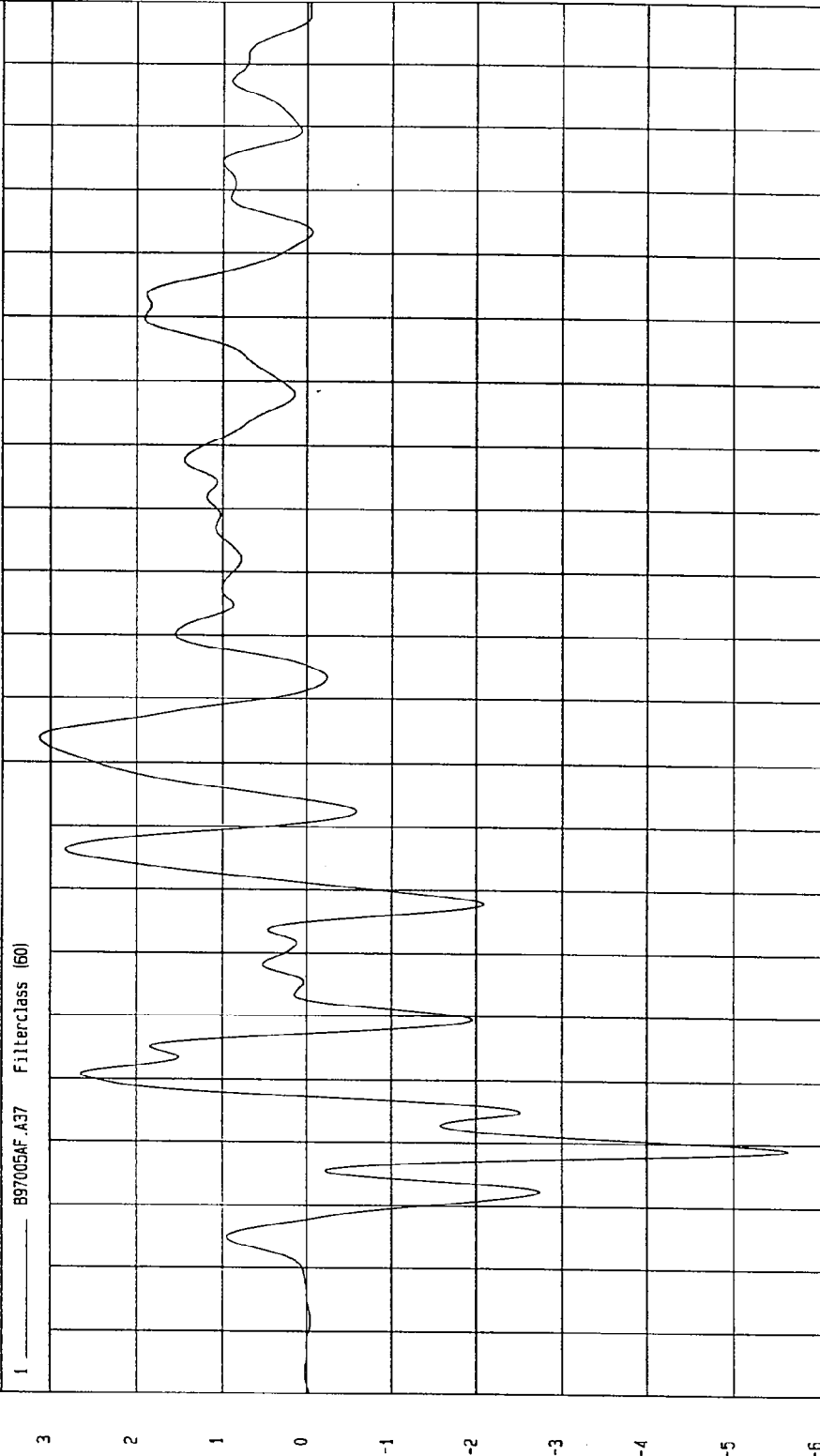
Speed: 33.26 MPH 53.5 KPH

Minimum = -5.63 G'S at 19 msec

Maximum = 3.12 G'S at 84 msec

LEFT SIDE SILL AT REAR SEAT Z ACCELERATION

1 B97005AF.A37 Filterclass (60)



MCA Research
01-09-1997 14:54

TEST: FMVSS 214 RIGHT SIDE IMPACT

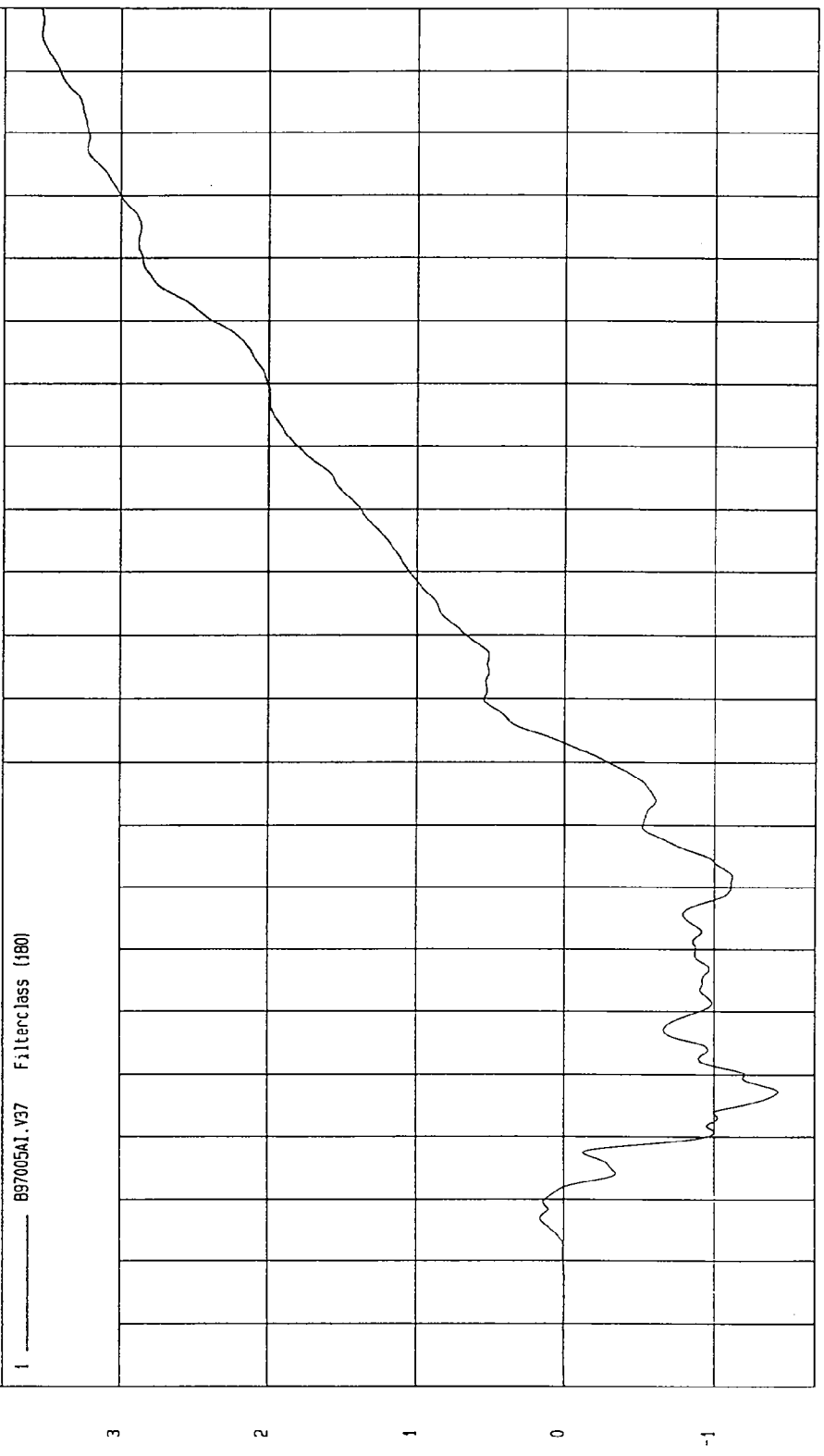
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -1.42 KPH at 27 msec Maximum = 3.54 KPH at 200 msec

LEFT SIDE SILL AT REAR SEAT Z VELOCITY

1 _____ B97005A1.V37 Filterclass (180)



TIME Seconds

NEA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 26.97 G'S at 35 msec

Minimum = 1.83E-02 G'S at -3 msec

LEFT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION

1 ——— B97005AV.A35 Filterc:ass (60)

28
26
24
22
20
18
16
14
12
10
8
6
4
2
0

G.S

TIME (SECONDS)

MCA Research
01-09-1997 14:58

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

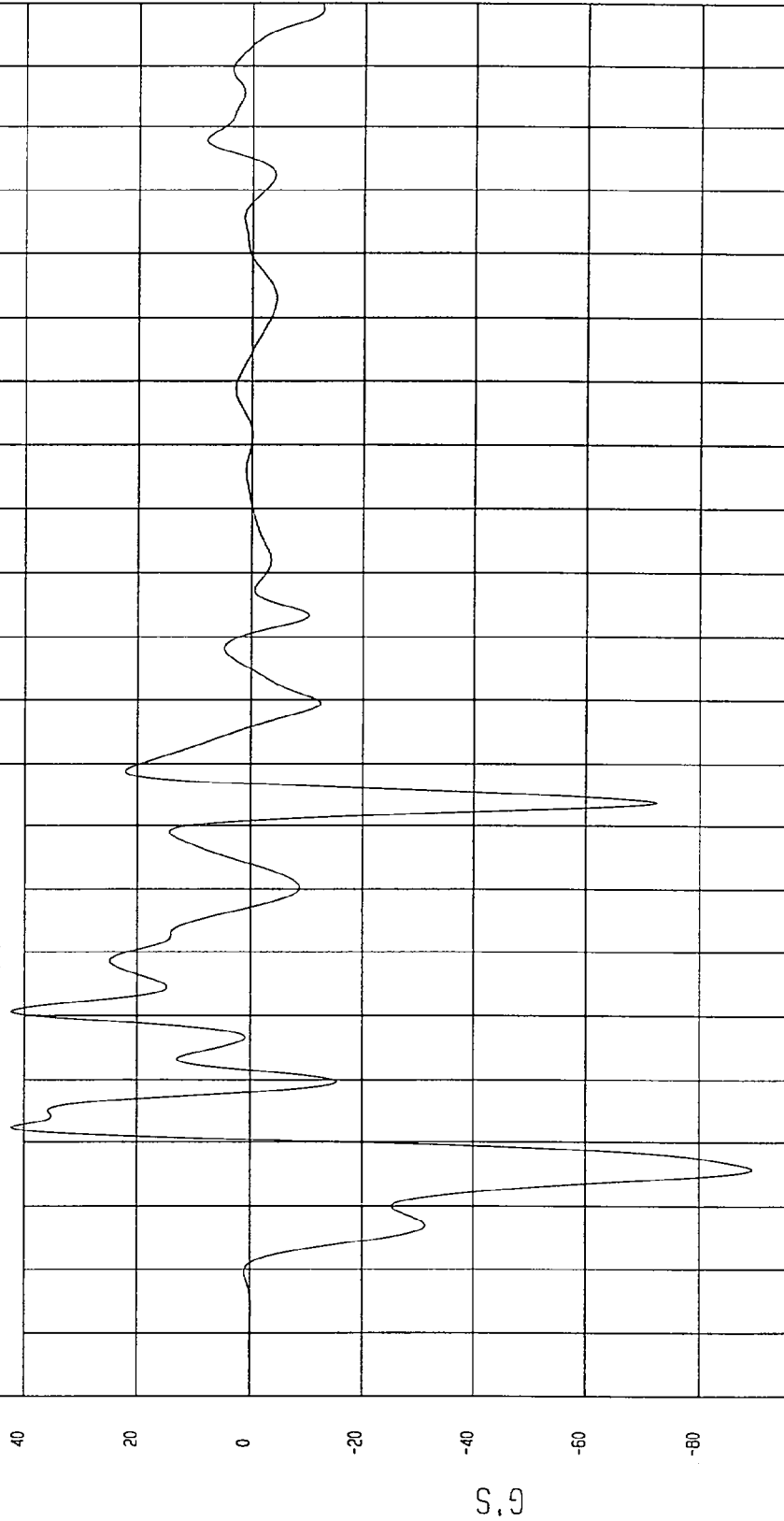
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Minimum = -89.35 G'S at 16 msec

Maximum = 42.43 G'S at 41 msec

RIGHT FRONT PASSENGER SEAT TRACK Y ACCELERATION

1 897005AF.A40 Filter: class (60)



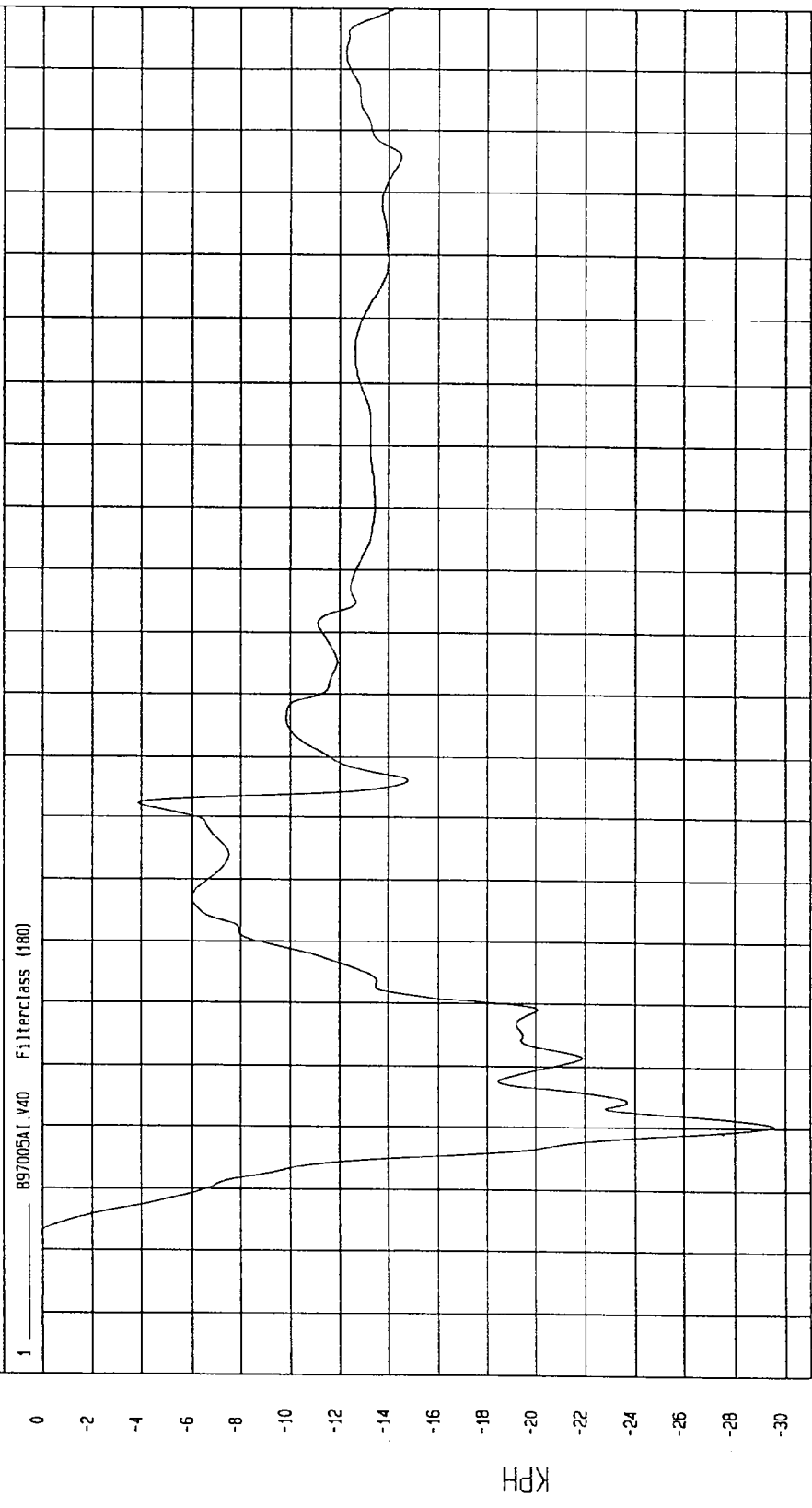
NCA Research
01-08-1997 14:54

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -29.53 KPH at 20 msec Maximum = 3.29E-02 KPH at 3 msec

RIGHT FRONT PASSENGER SEAT TRACK Y VELOCITY



TIME Seconds

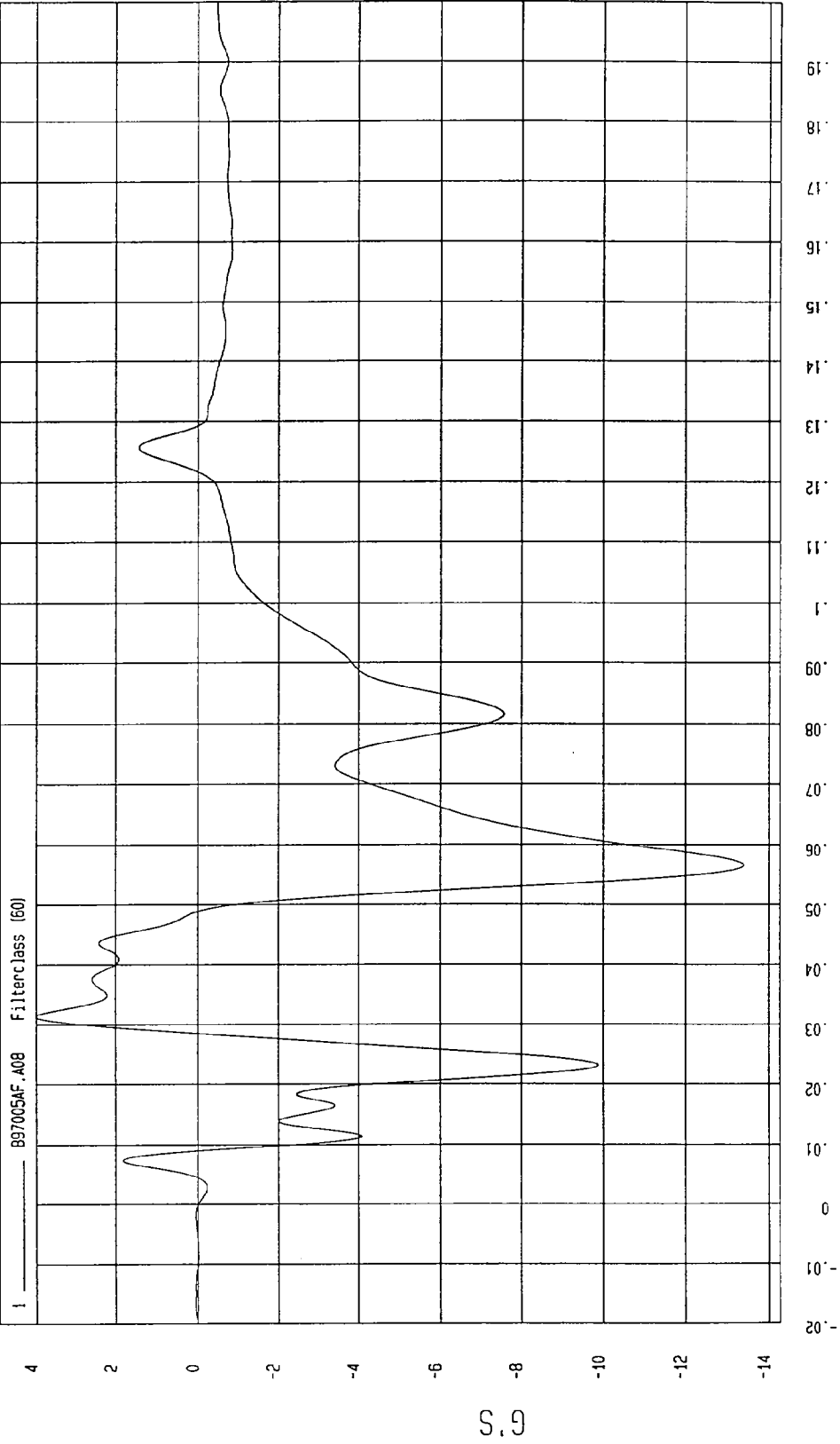
MCA Research
01-08-1997 15:31

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -13.39 G'S at 56 msec Maximum = 4.02 G'S at 31 msec

REAR FLOORPAN ABOVE AXLE X ACCELERATION



WCA Research
01-09-1997 14:55

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -13.84 KPH at 200 msec
Maximum = .30 KPH at 10 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY

1 — 897005AI.V08 Filterclass (180)



TIME Seconds

MEA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -26.04 G'S at 49 msec
Maximum = 14.60 G'S at 85 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

1 ——— B97005AF.A09 Filterclass (60)

10

0

-10

-20

G.S

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME (SECONDS)

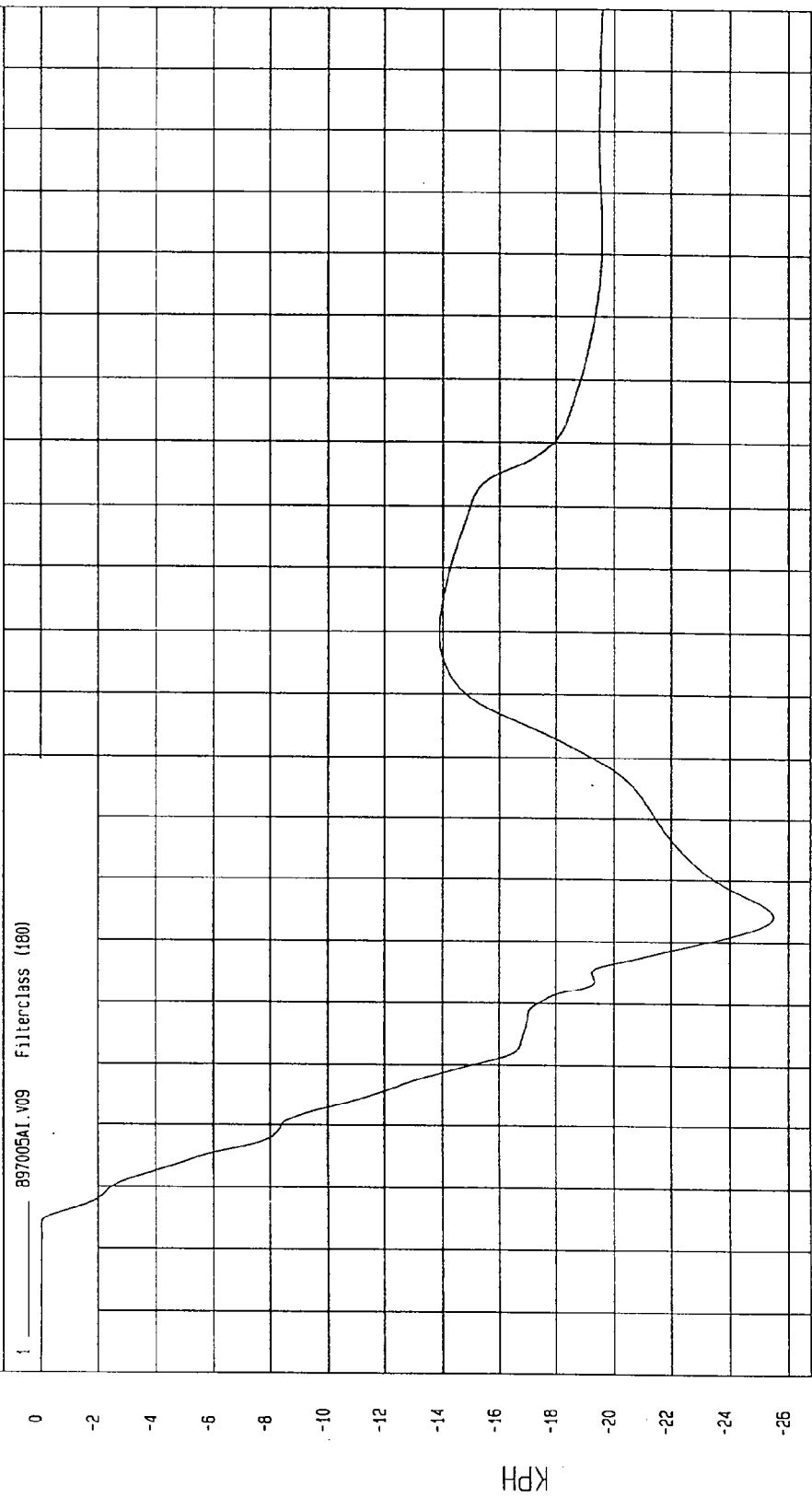
NSA Research
01-09-1997 14:55

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -25.49 KPH at 54 msec Maximum = 6.02E-04 KPH at -19 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY



TIME Seconds

MGA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

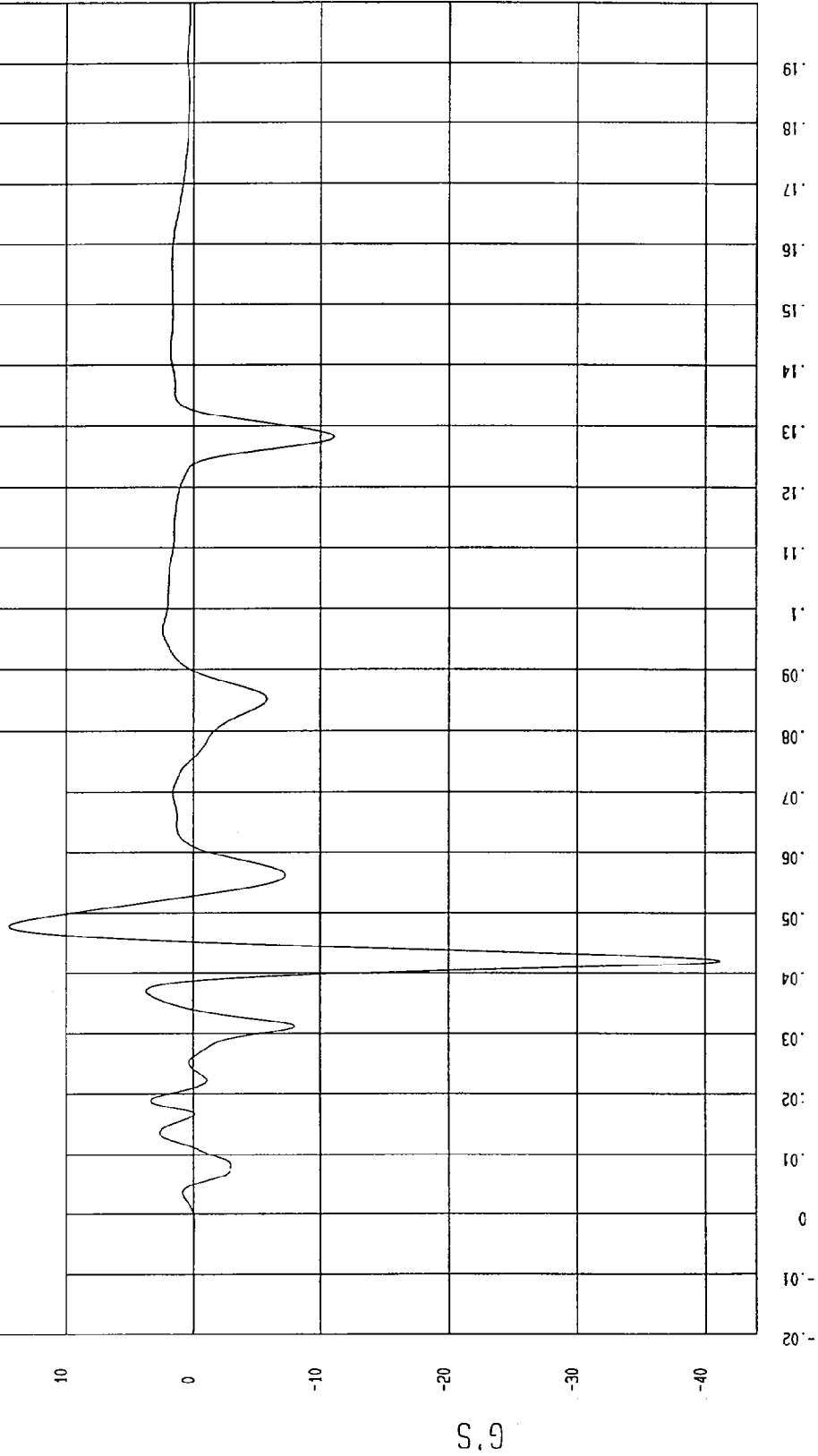
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -41.16 G'S at 42 msec

Maximum = 14.45 G'S at 48 msec

REAR FLOORPAN ABOVE AXLE Z ACCELERATION

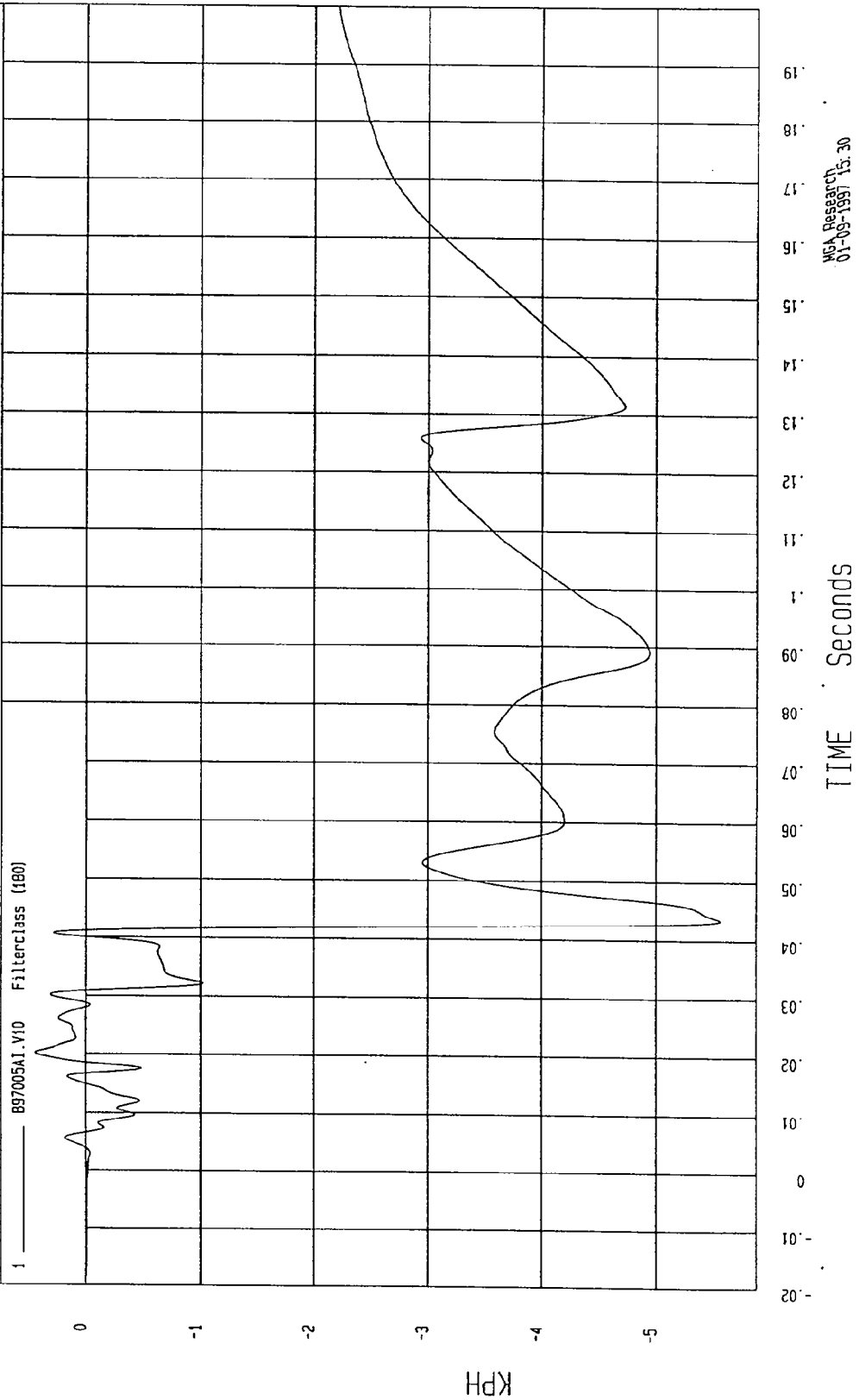
1 ——— B97005AF.A10 Filterclass (60)



MOA Research
01-08-1997 14:55

TEST: FMVSS 214 RIGHT SIDE IMPACT	TEST DATE: 01-08-1997
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)	Speed: 33.26 MPH 53.5 KPH
Minimum = -5.56 KPH at 44 msec	Maximum = .43 KPH at 20 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY



WCA Research
01-09-1997 15:30

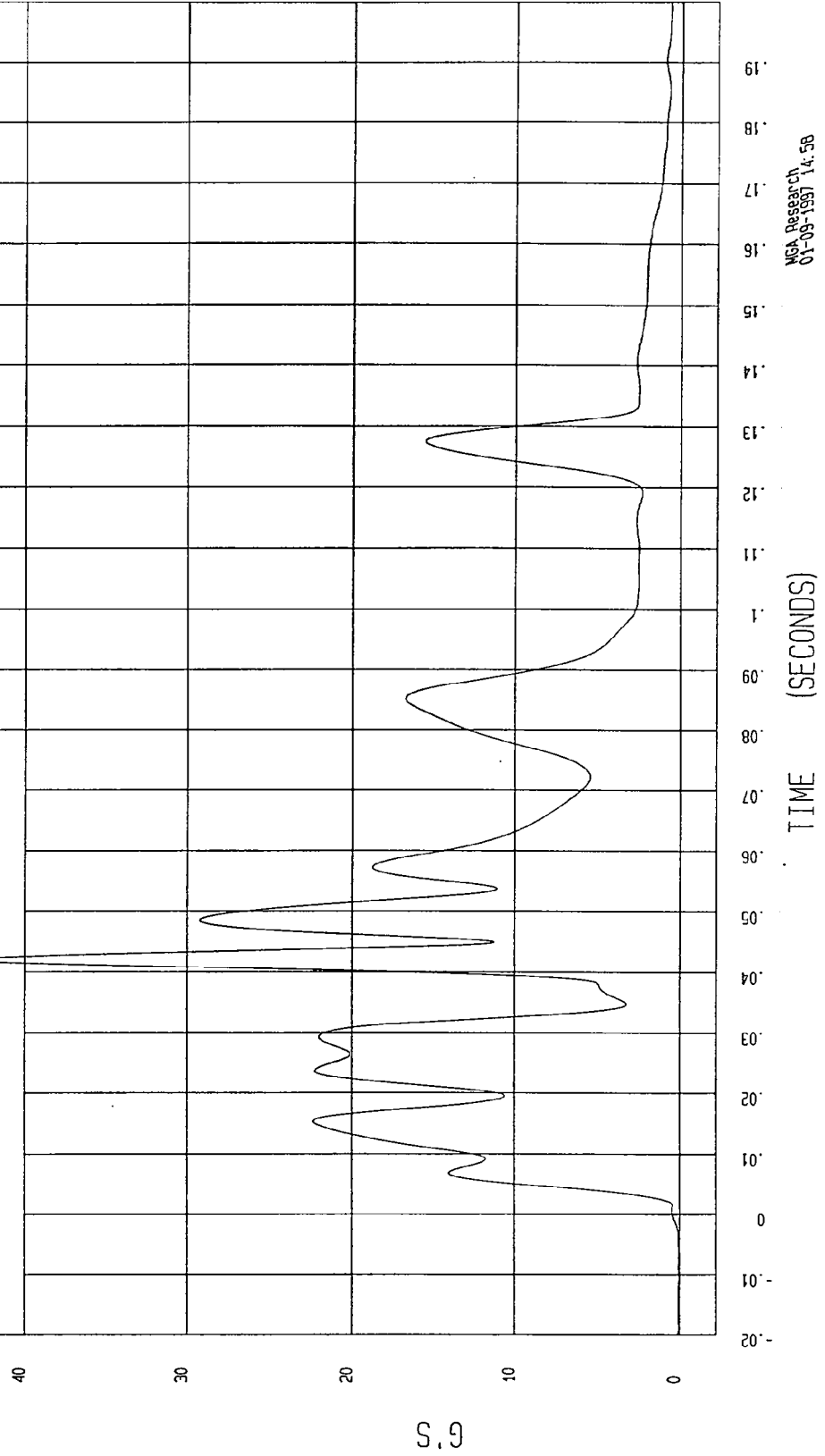
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = 6.80E-03 G'S at -11 msec Maximum = 43.23 G'S at 42 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 ——— B97005AV.A08 filterclass (60)



MCA Research
01-08-1997 14:58

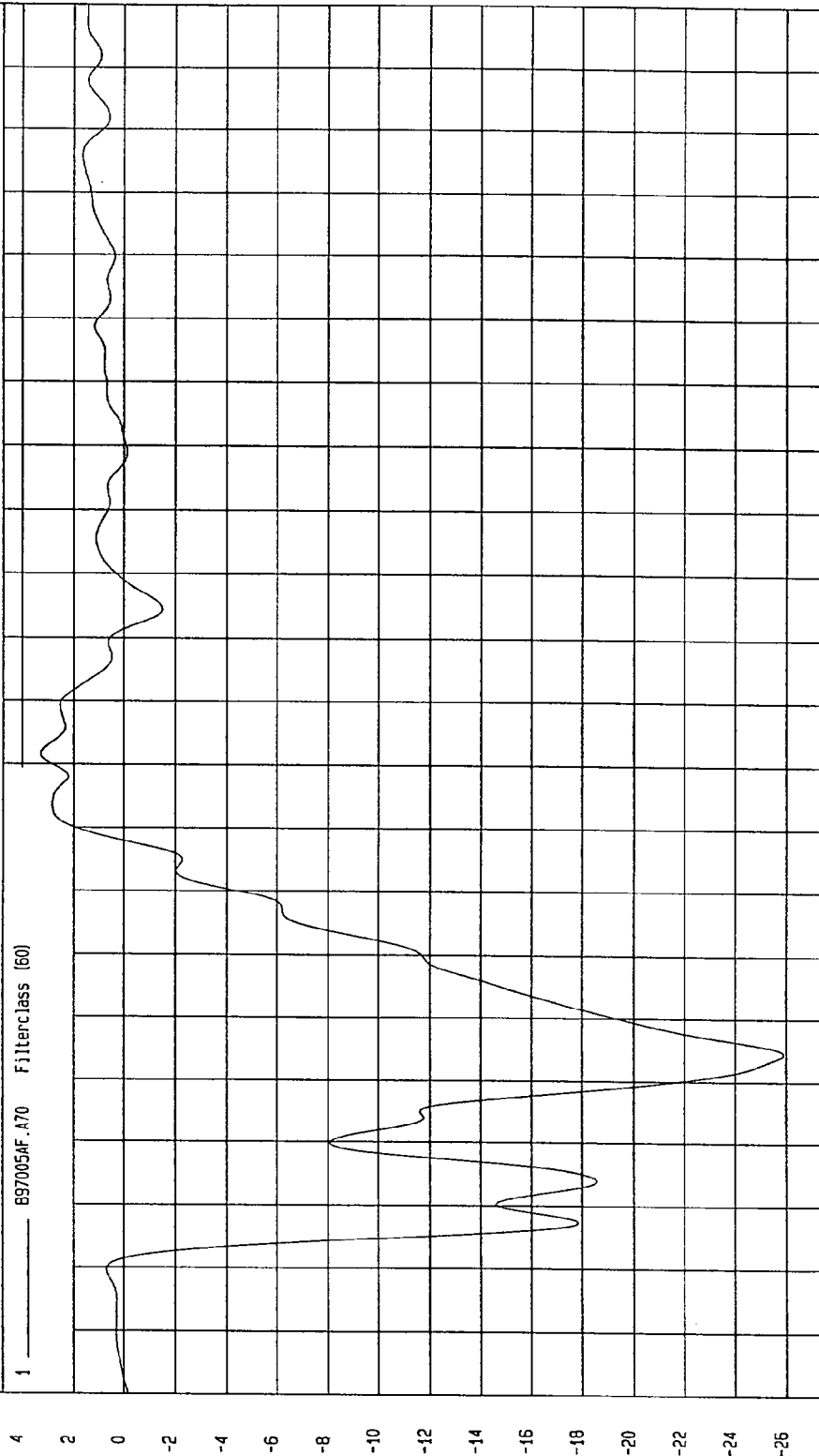
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -25.88 G'S at 34 msec Maximum = 3.28 G'S at 82 msec

LEFT REAR OCCUPANT COMPARTMENT Y ACCELERATION

1 ——— 897005AF.A70 Filterclass (60)



TIME (SECONDS)

NGA Research
01-09-1997 14:55

S.9

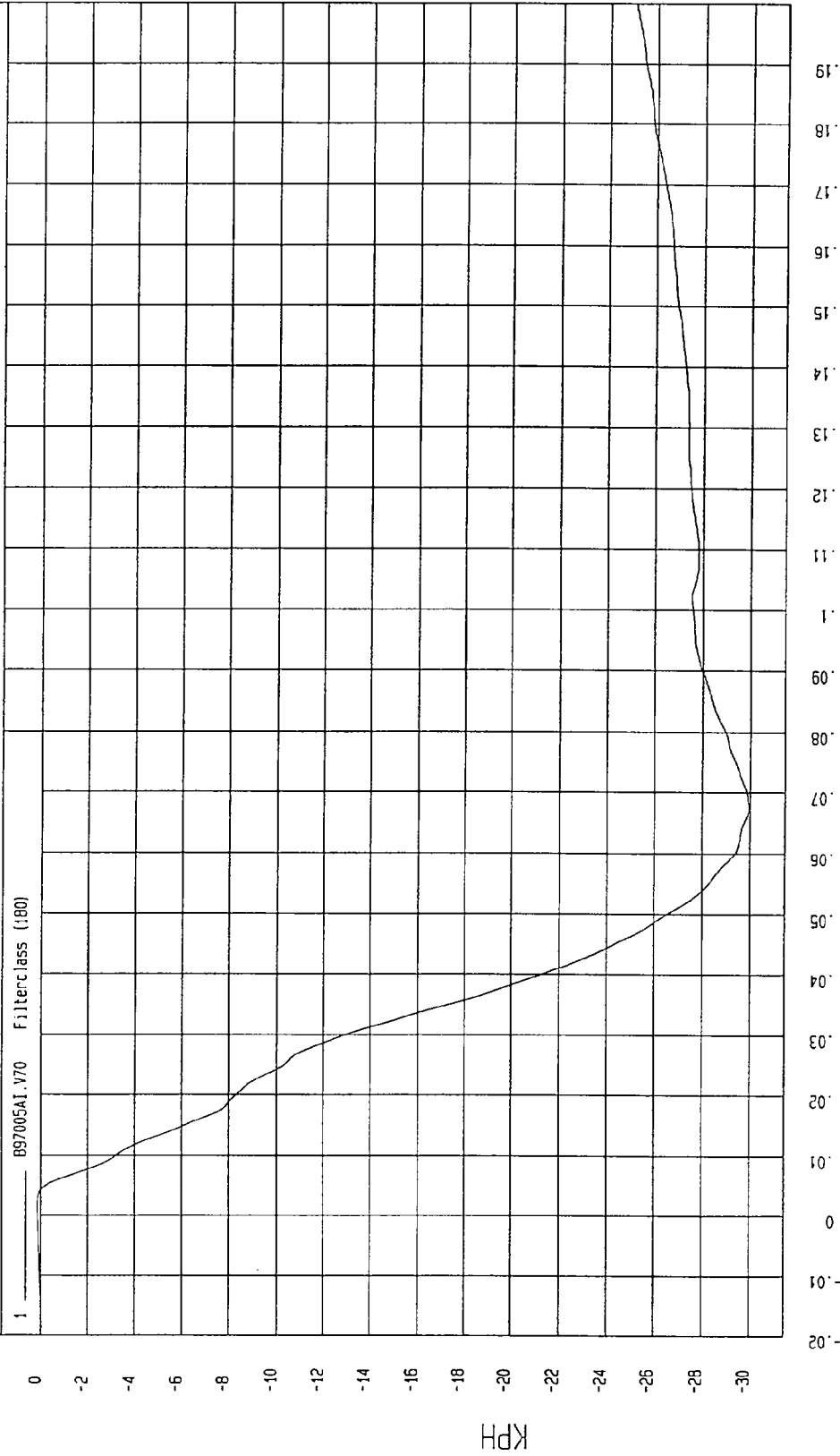
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -29.95 KPH at 67 msec

Maximum = .16 KPH at 2 msec

LEFT REAR OCCUPANT COMPARTMENT Y VELOCITY



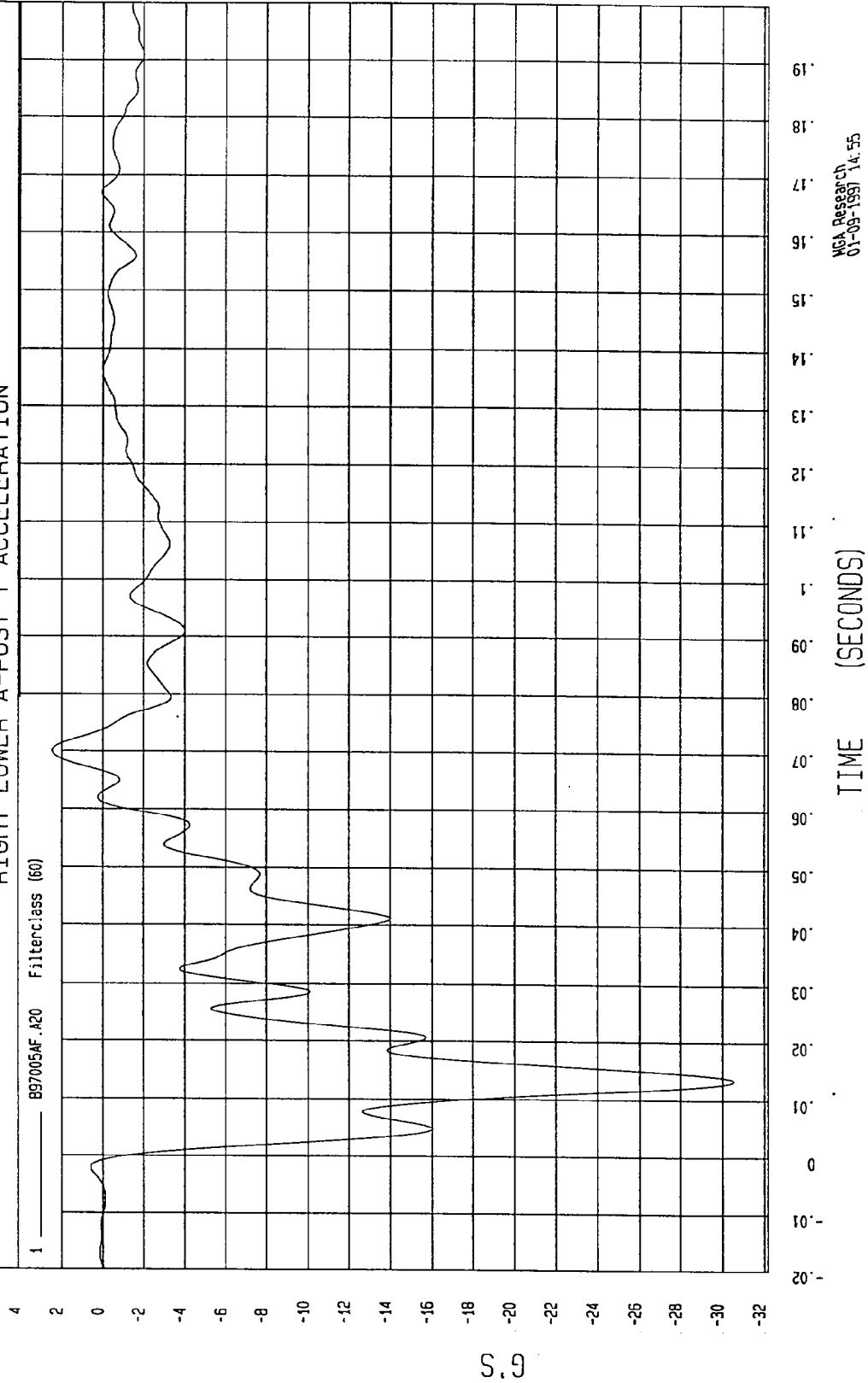
MSA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -30.54 G'S at 13 msec Maximum = 2.44 G'S at 70 msec

RIGHT LOWER A-POST Y ACCELERATION

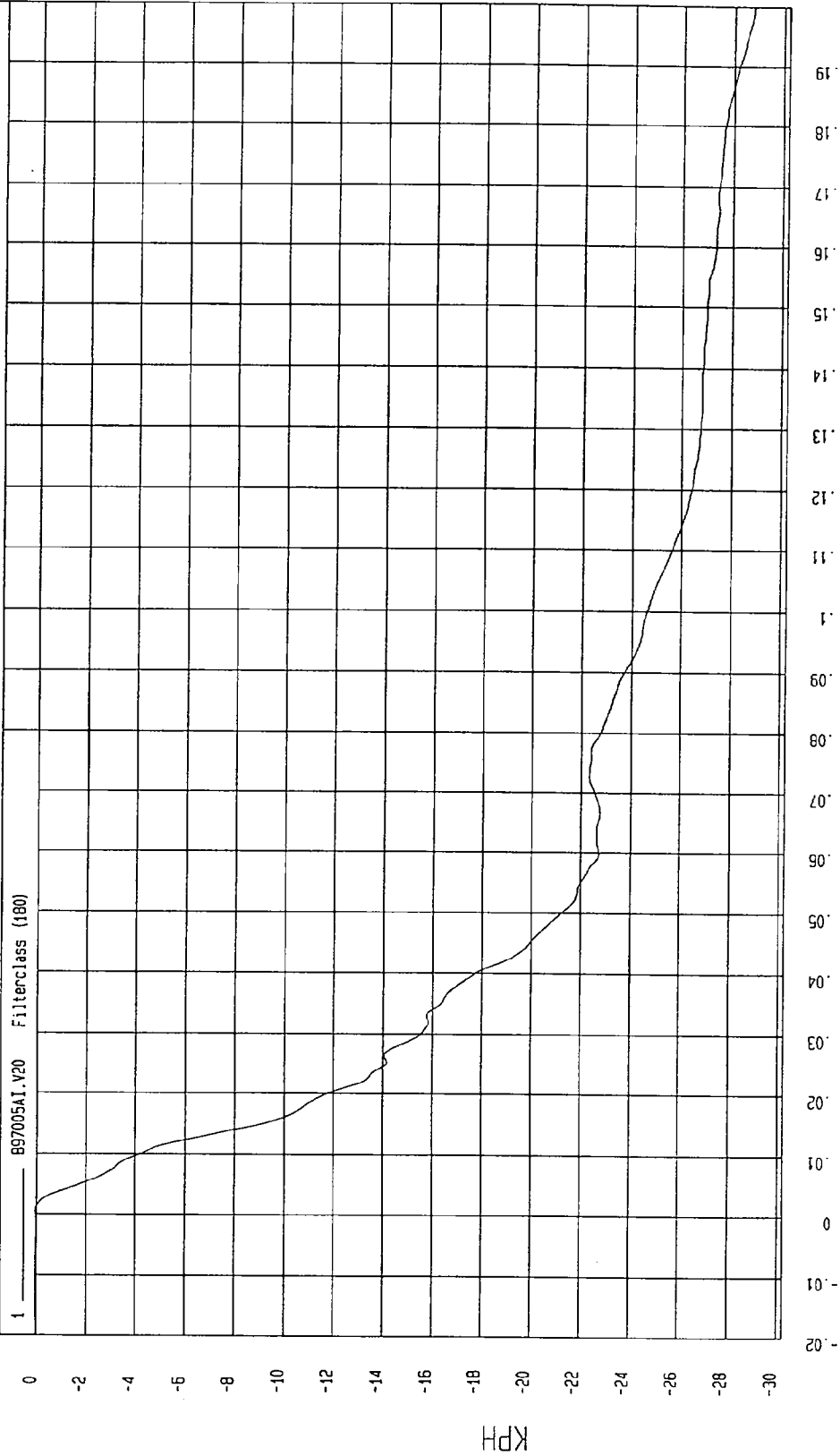


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

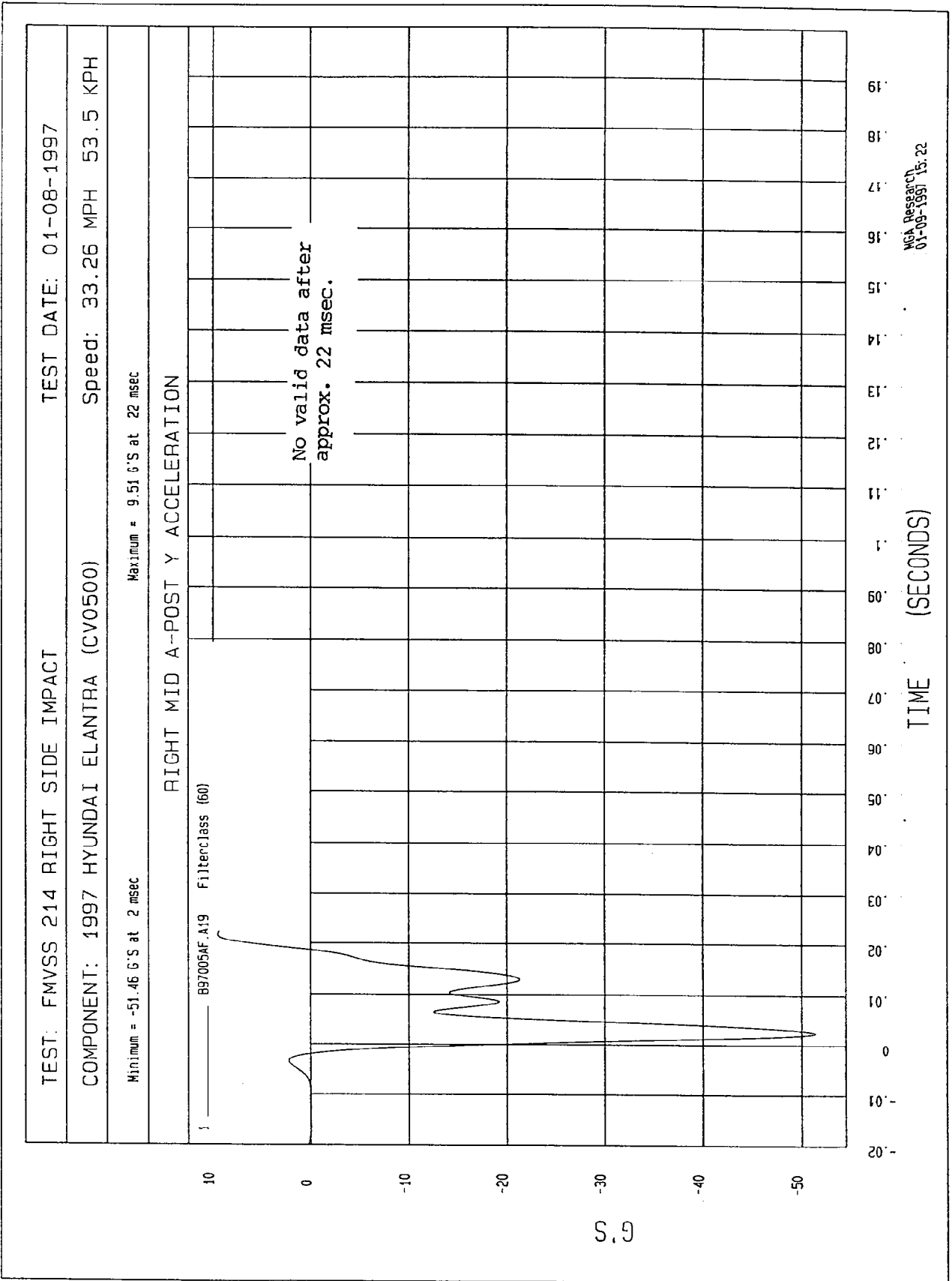
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -28.78 KPH at 200 msec Maximum = 3.53E-02 KPH at 0 msec

RIGHT LOWER A-POST Y VELOCITY



MCA Research
01-09-1997 15:30



TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

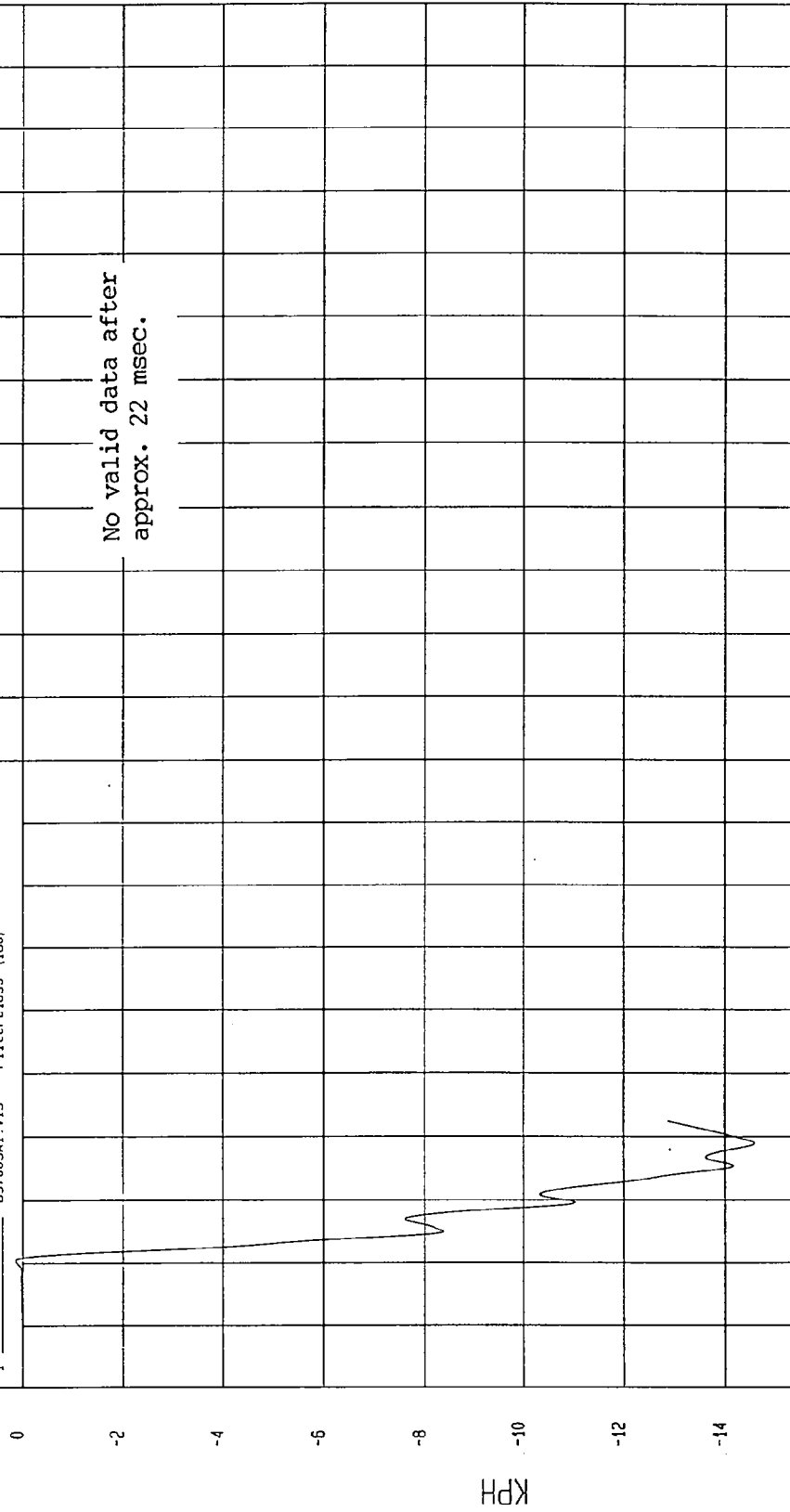
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -14.58 KPH at 19 msec

Maximum = .14 KPH at 0 msec

RIGHT MID A-POST Y VELOCITY

1 ——— B97005A1.V19 Filterclass (180)



MCA Research
01-08-1997 15:30

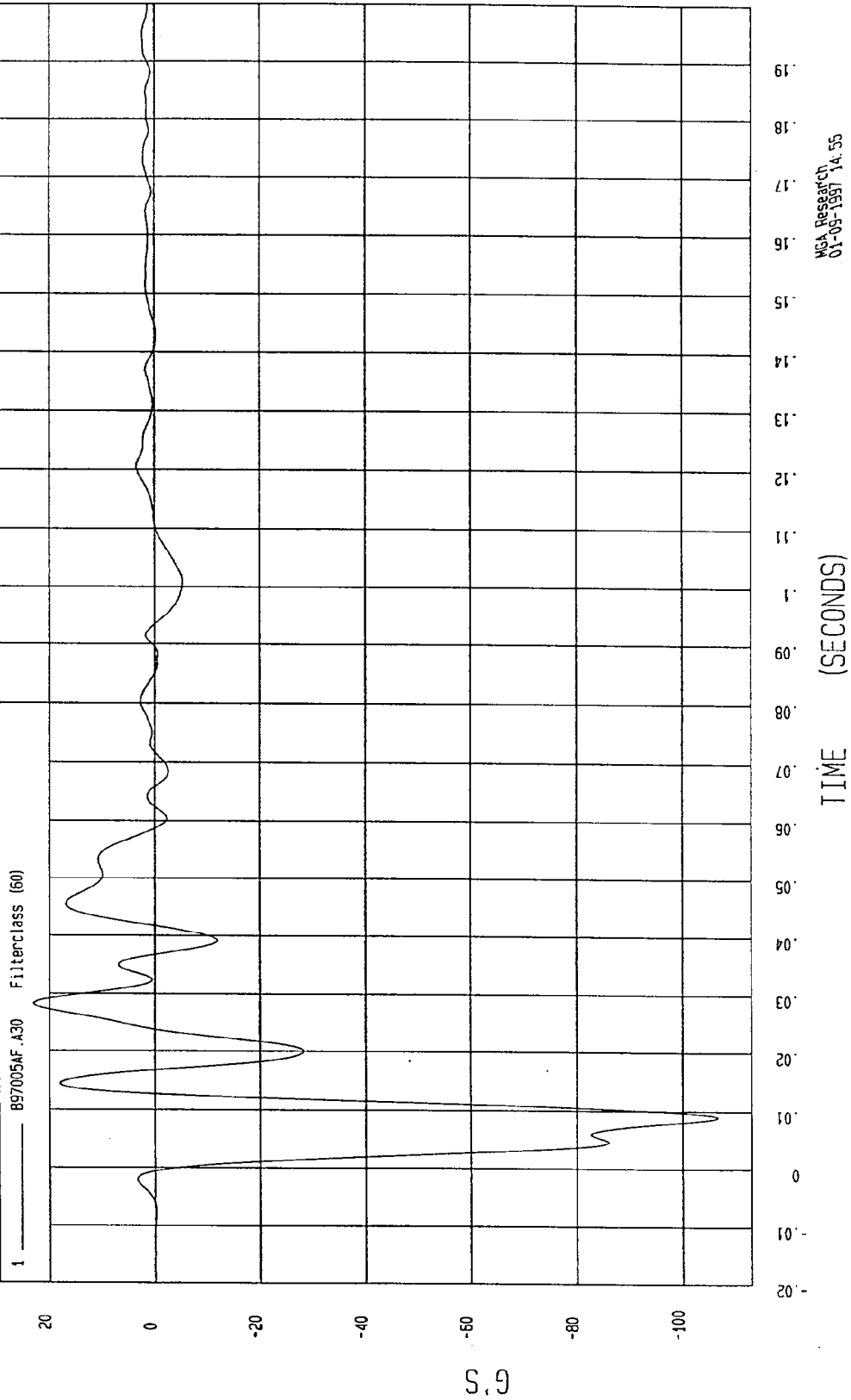
TIME Seconds

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -106.47 G'S at 9 msec Maximum = 22.94 G'S at 28 msec

RIGHT LOWER B-POST Y ACCELERATION

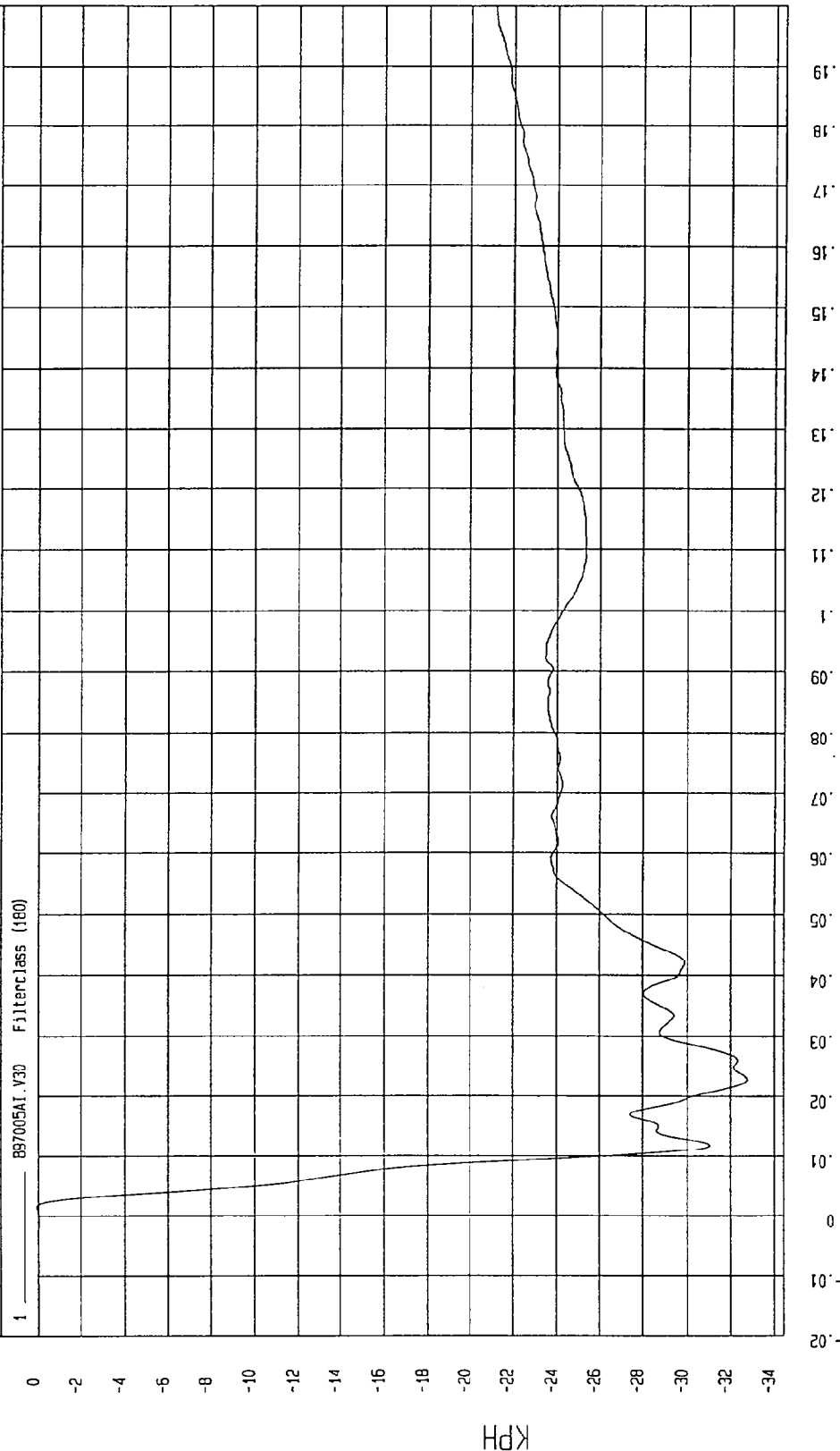


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -32.78 KPH at 23 msec Maximum = 8.98E-02 KPH at 1 msec

RIGHT LOWER B-POST Y VELOCITY



MCA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

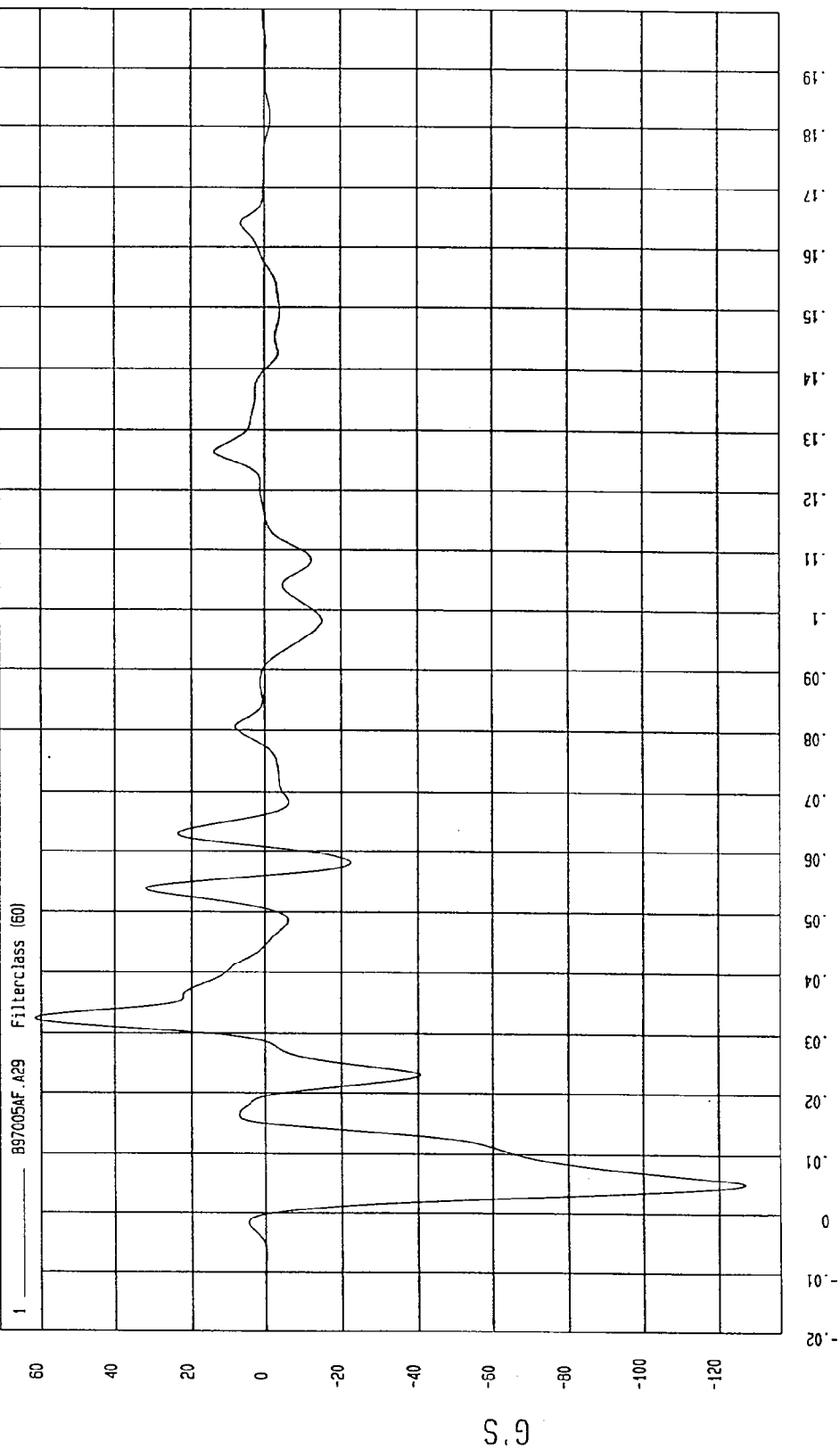
Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 61.39 G'S at 32 msec

Minimum = -126.69 G'S at 5 msec

RIGHT MID B-POST Y ACCELERATION



NSA Research
01-09-1997 14:56

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

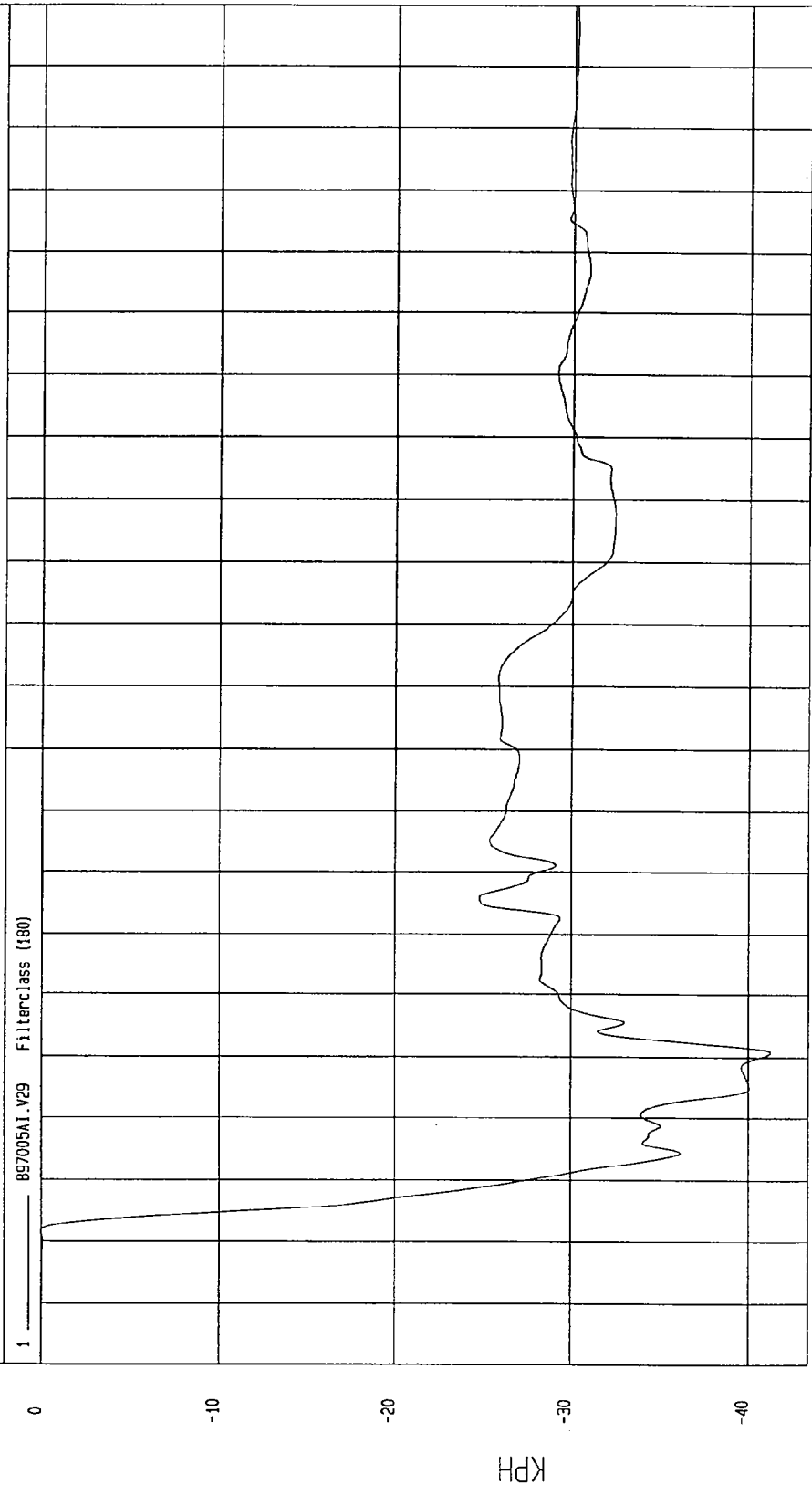
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Speed: 33.26 MPH 53.5 KPH

Minimum = -41.19 KPH at 31 msec

Maximum = 3.83E-02 KPH at 2 msec

RIGHT MID B-POST Y VELOCITY



TIME Seconds

MGA Research
01-09-1997 15:30

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

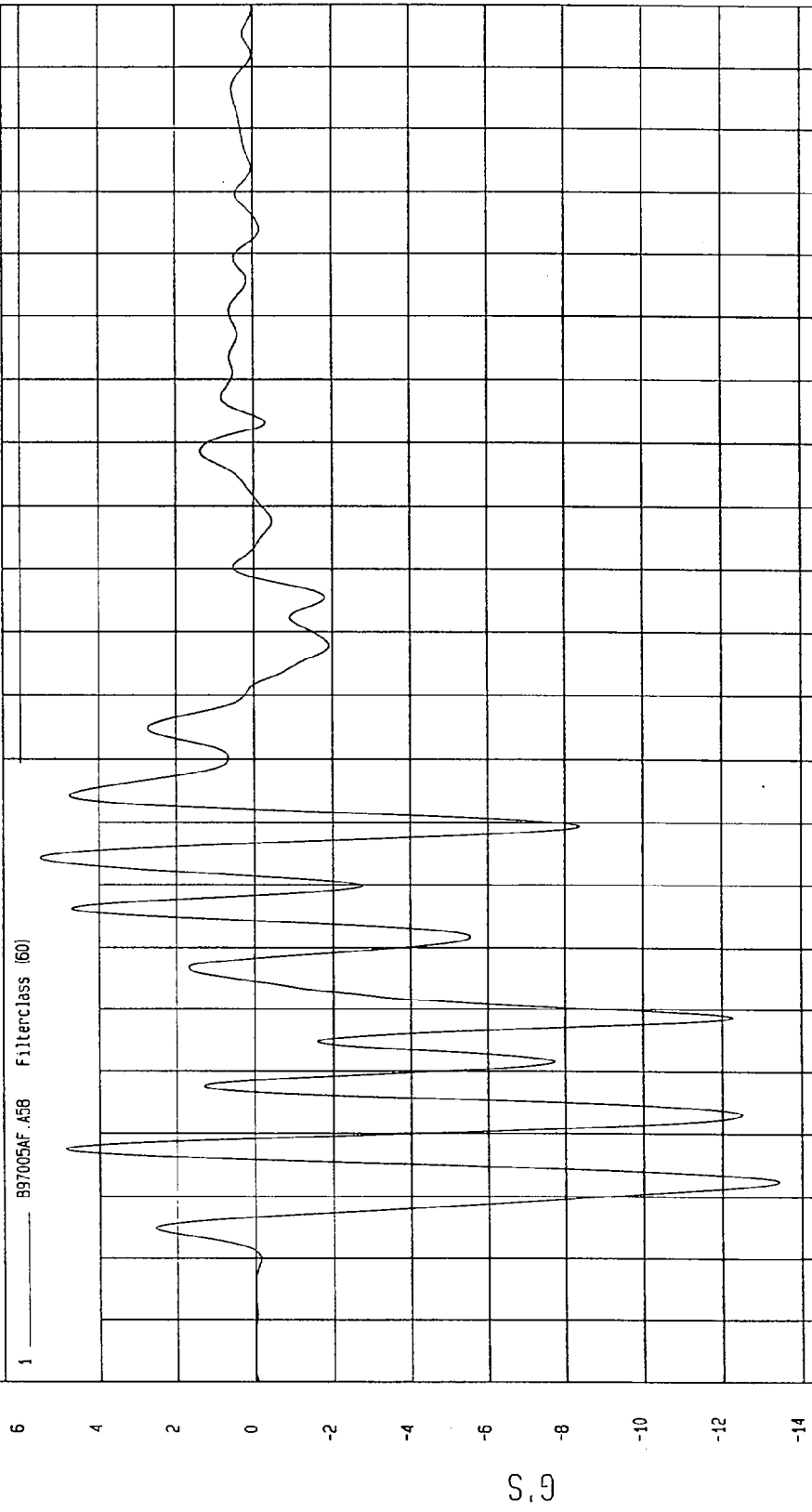
Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 5.50 G'S at 64 msec

Minimum = -13.44 G'S at 12 msec

VEHICLE CG X ACCELERATION



TIME (SECONDS)

MCA Research
01-09-1997 14:56

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

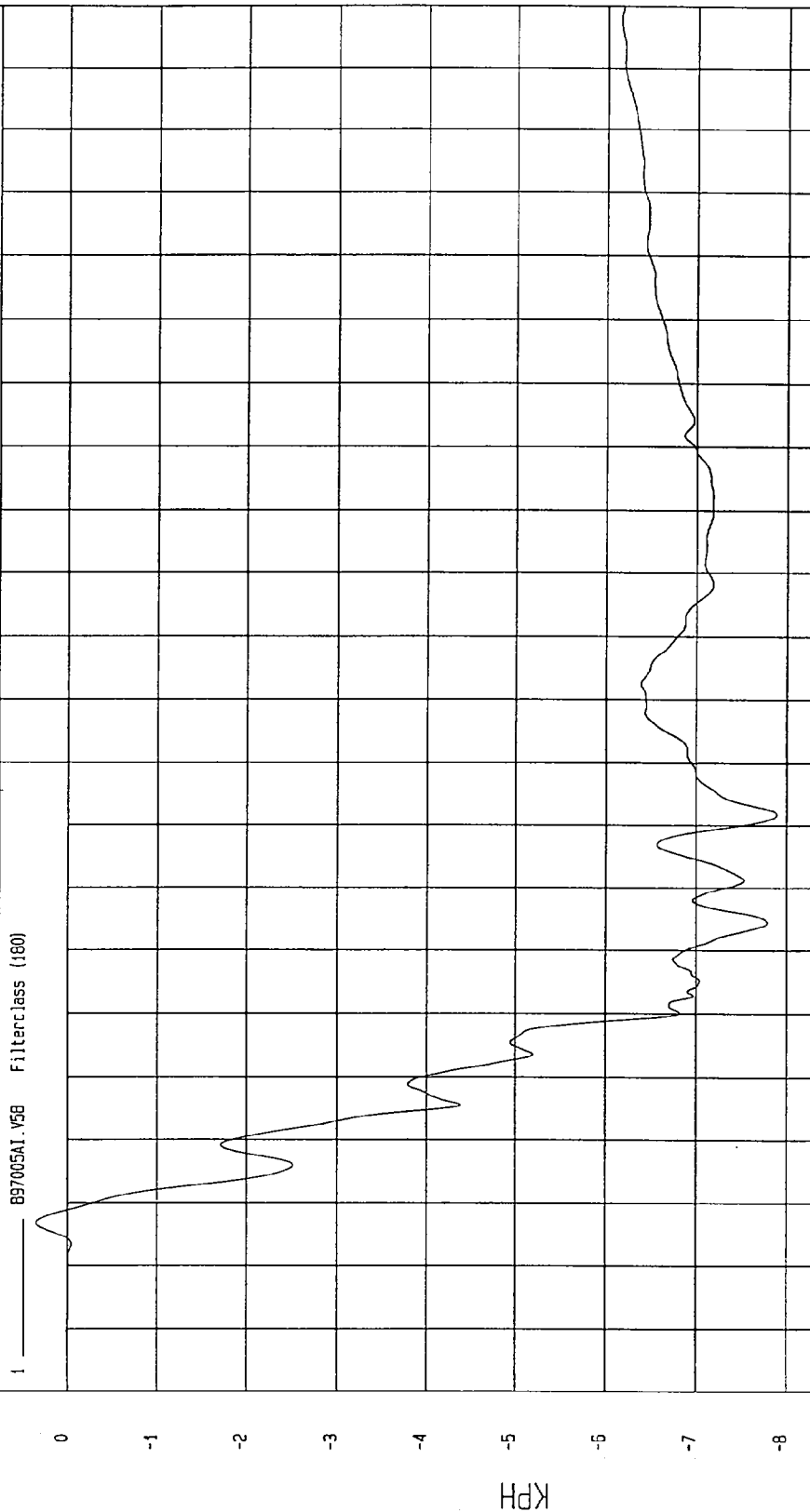
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -7.09 KPH at 72 msec

Maximum = 34 KPH at 7 msec

1 ——— B97005AI.V58 Filterclass (180)

VEHICLE CG X VELOCITY



MCA Research
01-09-1997 15:31

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -26.4 G'S at 22 msec Maximum = 9.62 G'S at 54 msec

VEHICLE CG Y ACCELERATION

1 ——— 897005AF.A59 Filterclass (60)

10

0

-10

-20

G.S

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

MSA Research
01-09-1997 14:56

TIME (SECONDS)

-02
-01
0
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

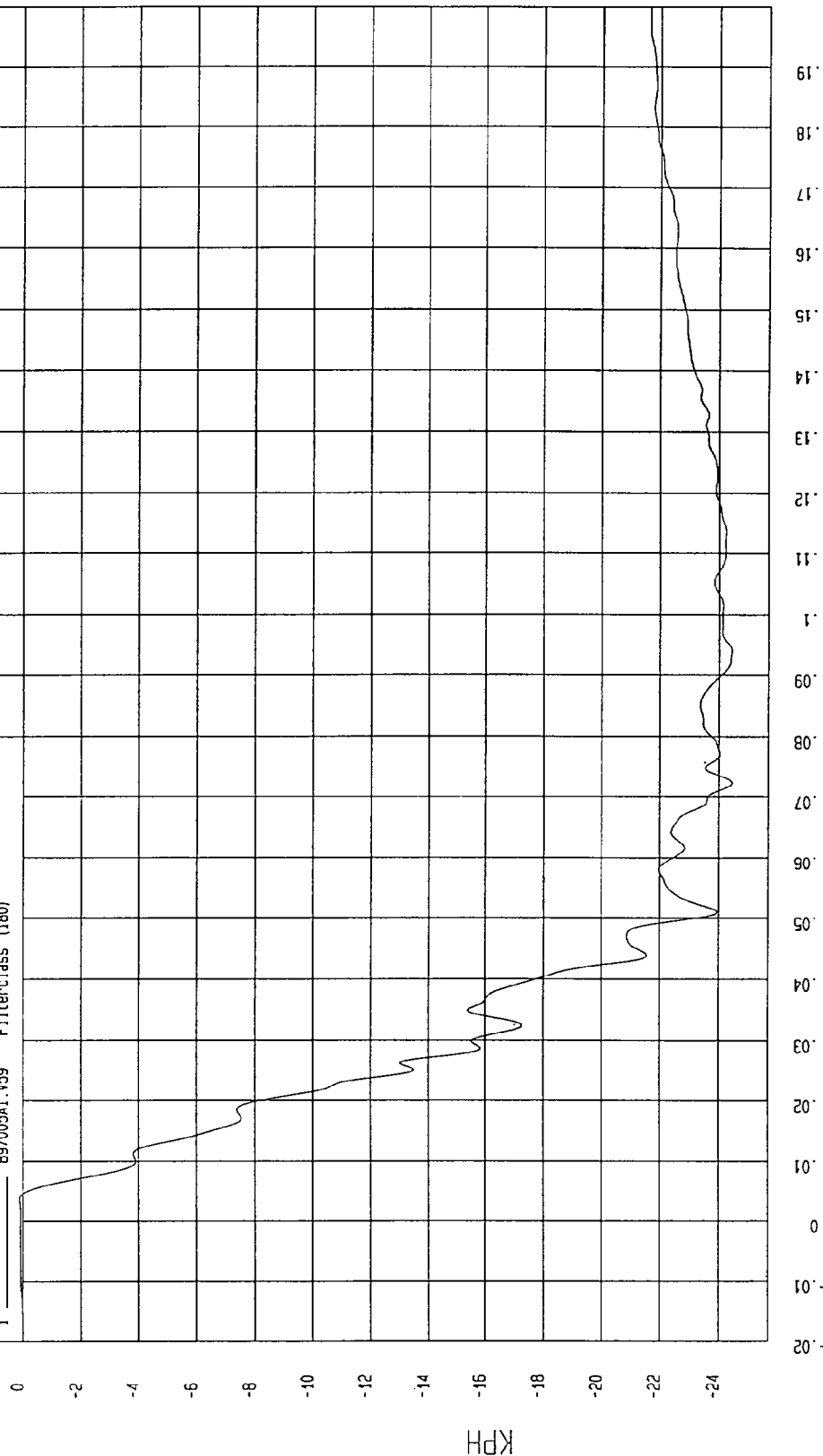
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -24.45 KPH at 72 msec

Maximum = .12 KPH at 4 msec

VEHICLE CG Y VELOCITY

1 897005A1.V59 Filterclass (180)



NGA Research
01-09-1997 15:31

TIME Seconds

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

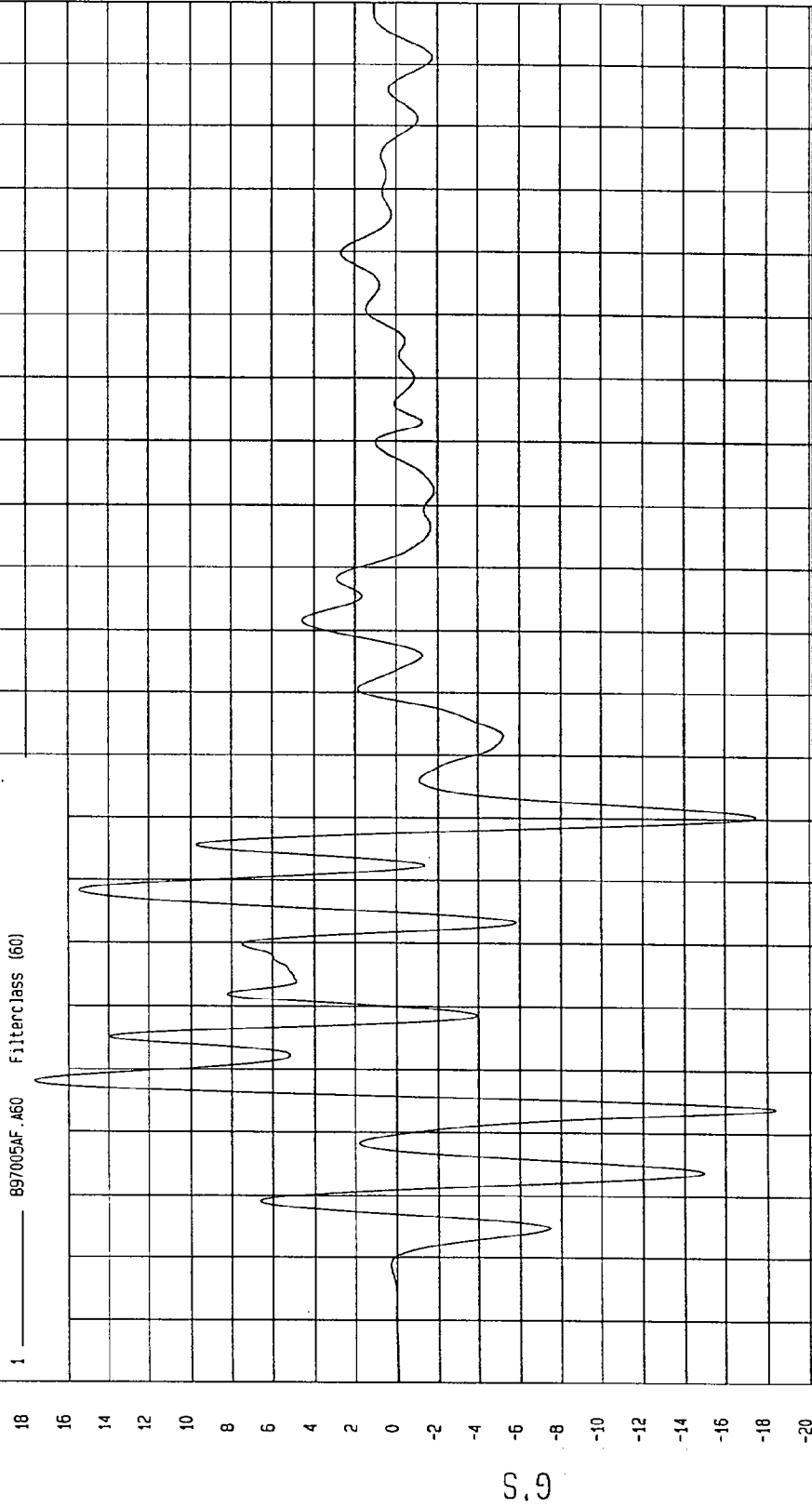
Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 17.59 G'S at 28 msec

Minimum = -18.39 G'S at 24 msec

VEHICLE CG Z ACCELERATION



MGA Research
01-09-1997 14:56

TIME (SECONDS)

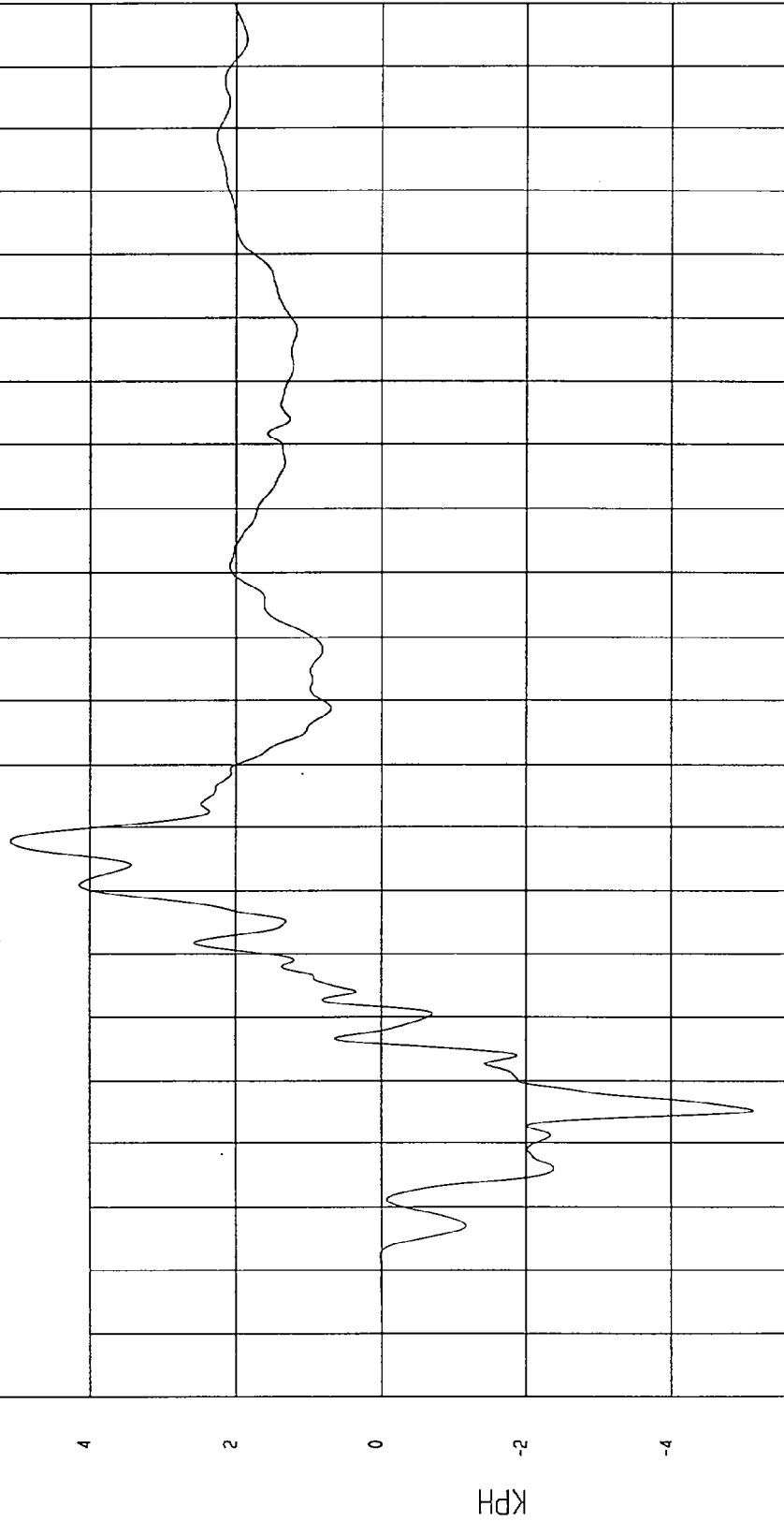
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -5.11 KPH at 25 msec
Maximum = 5.08 KPH at 68 msec

VEHICLE CG Z VELOCITY

1 897005A1.V60 Filterclass (180)



WCA Research
01-08-1997 15:31

TIME Seconds

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

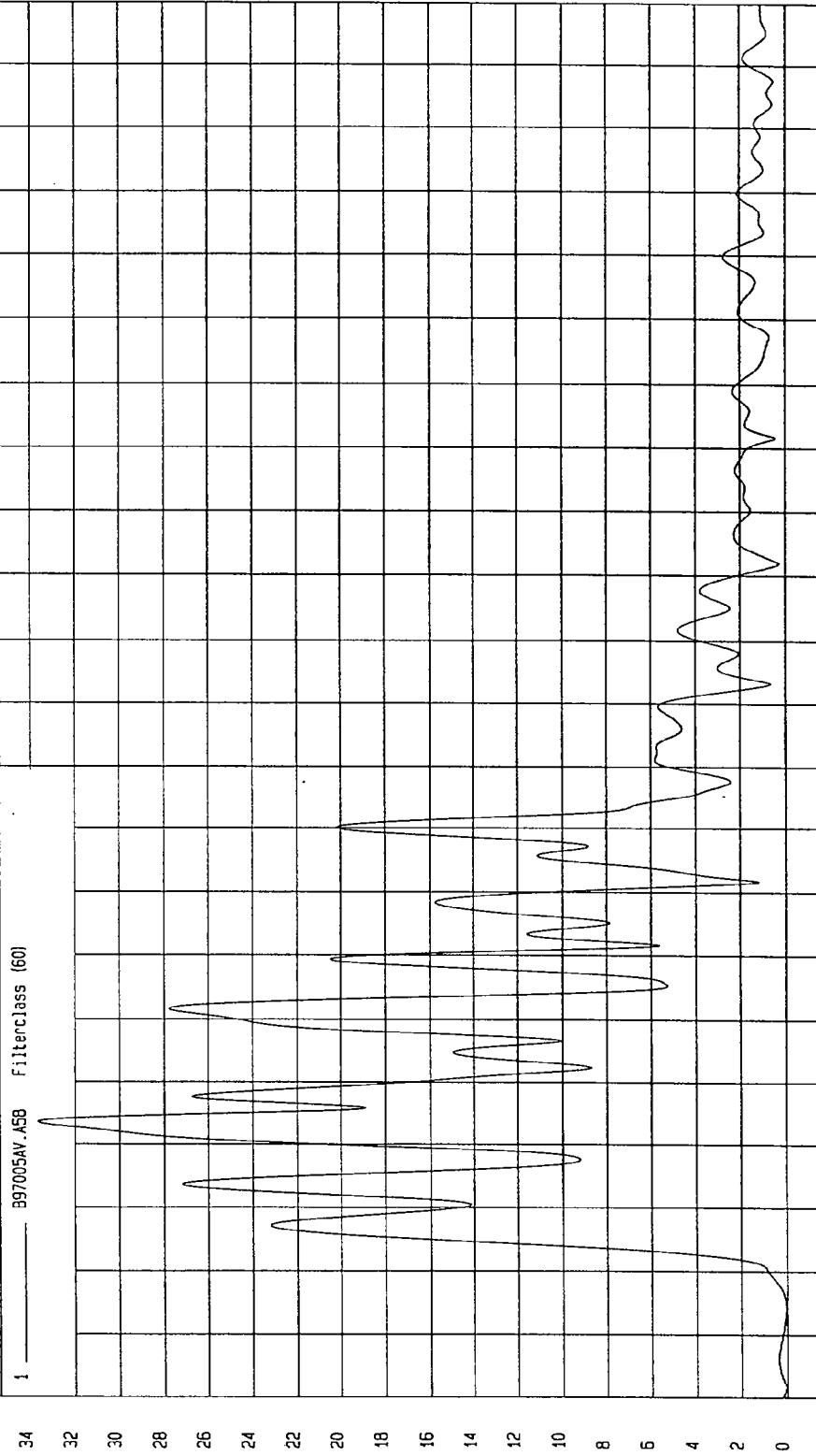
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Minimum = 5.07E-02 G'S at -6 msec

Maximum = 33.69 G'S at 24 msec

VEHICLE CG RESULTANT ACCELERATION

1 ——— B97005AV.A5B Filterclass (60)



WCA Research
01-09-1997 14:58

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -16.76 G'S at 38 msec

Maximum = 1.05 G'S at 94 msec

MOVING BARRIER CG X ACCELERATION

1 ——— B97005AF.A02 Filterclass (60)

G'S

-2

-4

-6

-8

-10

-12

-14

-16

.19

.18

.17

.16

.15

.14

.13

.12

.11

.1

.09

.08

.07

.06

.05

.04

.03

.02

.01

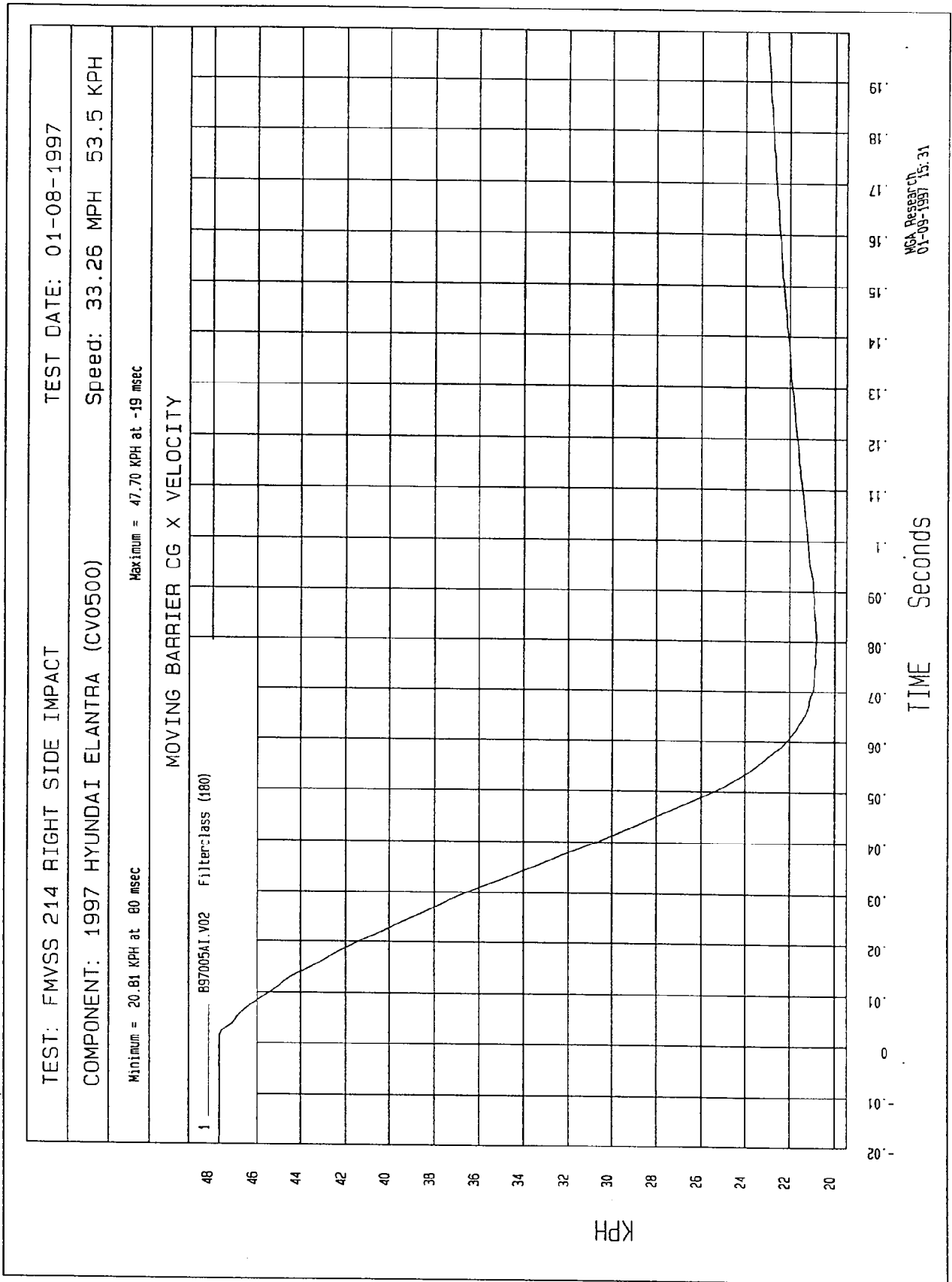
0

-.01

-.02

TIME (SECONDS)

NCA Research
01-09-1997 14:56



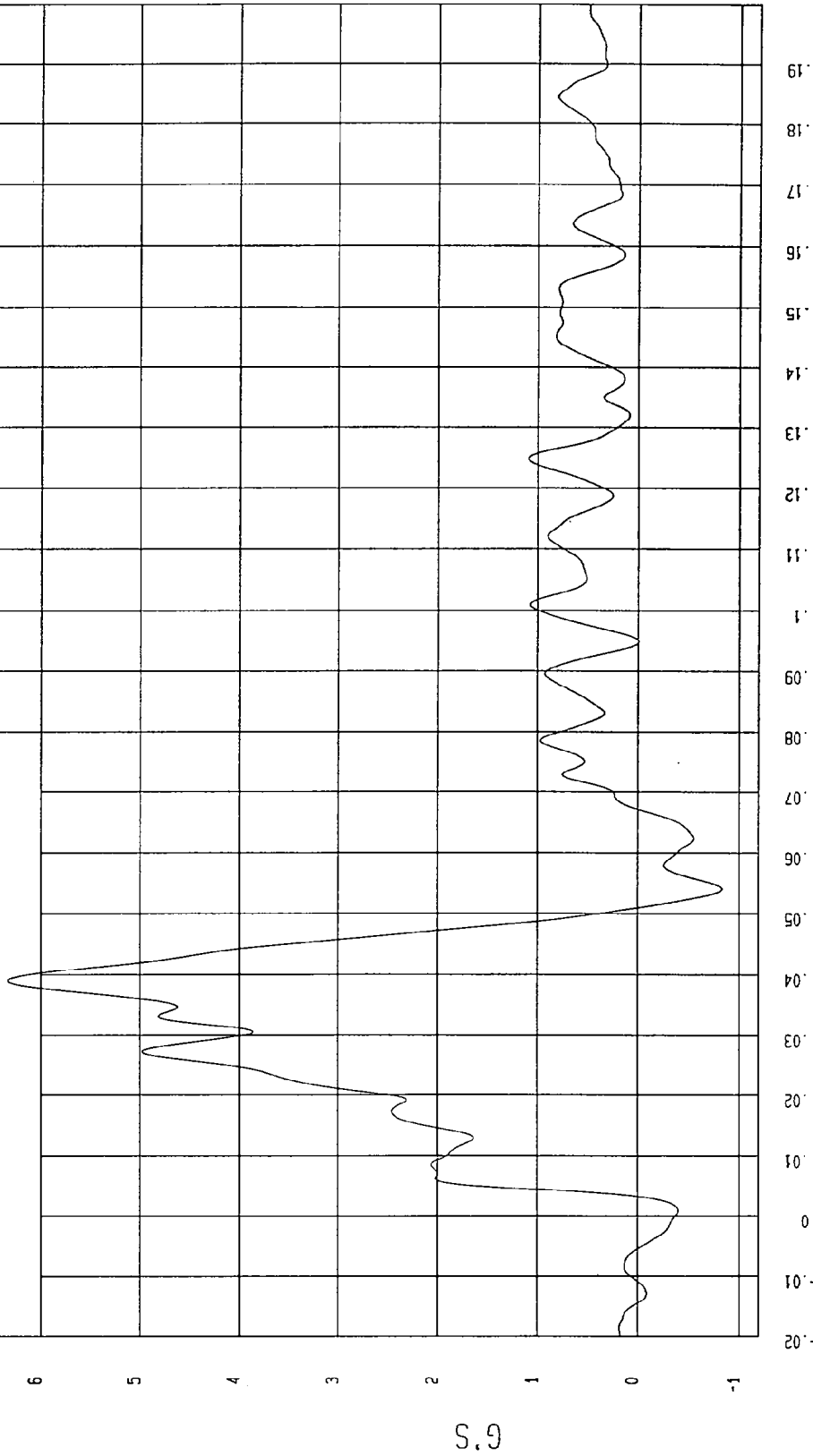
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -.83 G'S at 54 msec Maximum = 6.33 G'S at 39 msec

MOVING BARRIER CG Y ACCELERATION

1 ——— 897005AF.A03 filterclass (60)



WSA Research
01-09-1997 14:56

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

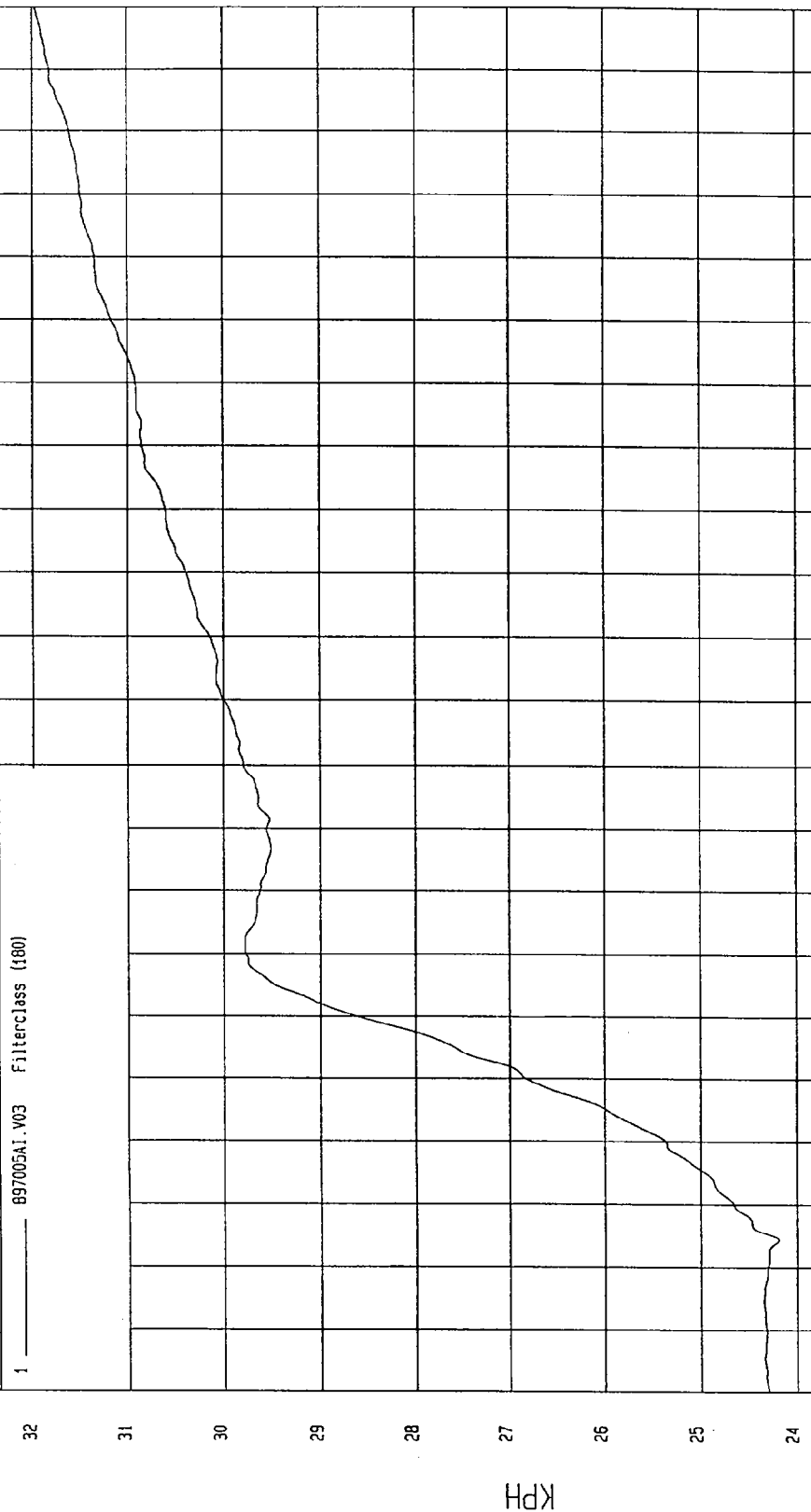
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Minimum = 24.18 KPH at 4 msec

Maximum = 31.97 KPH at 200 msec

MOVING BARRIER CG Y VELOCITY

1 ——— 897005A1.V03 Filterclass (180)



NCA Research
01-09-1997 15:31

TIME Seconds

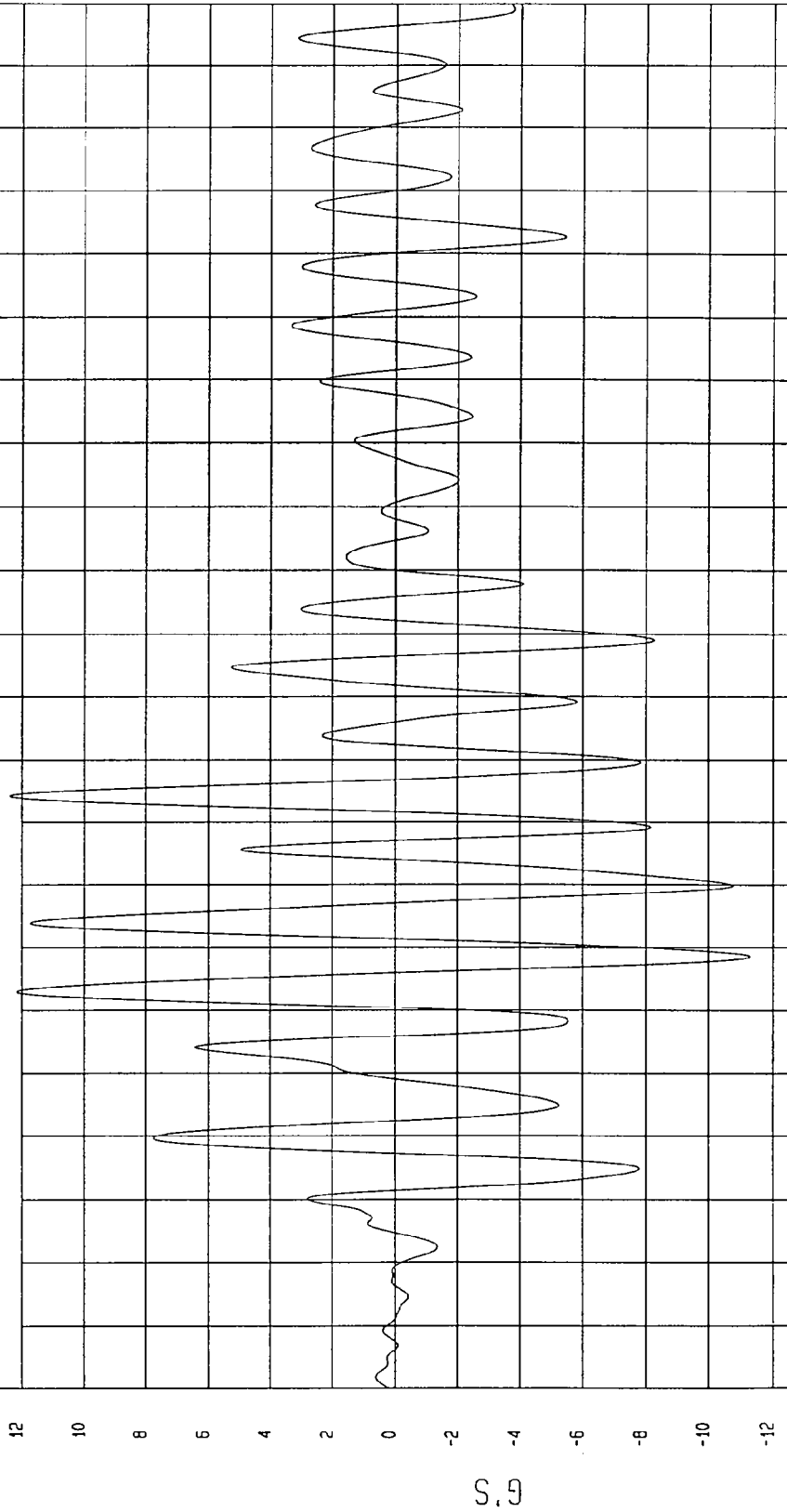
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -11.31 G'S at 49 msec Maximum = 12.38 G'S at 74 msec

MOVING BARRIER CG Z ACCELERATION

1 ——— B97005AF.A04 Filterclass (50)



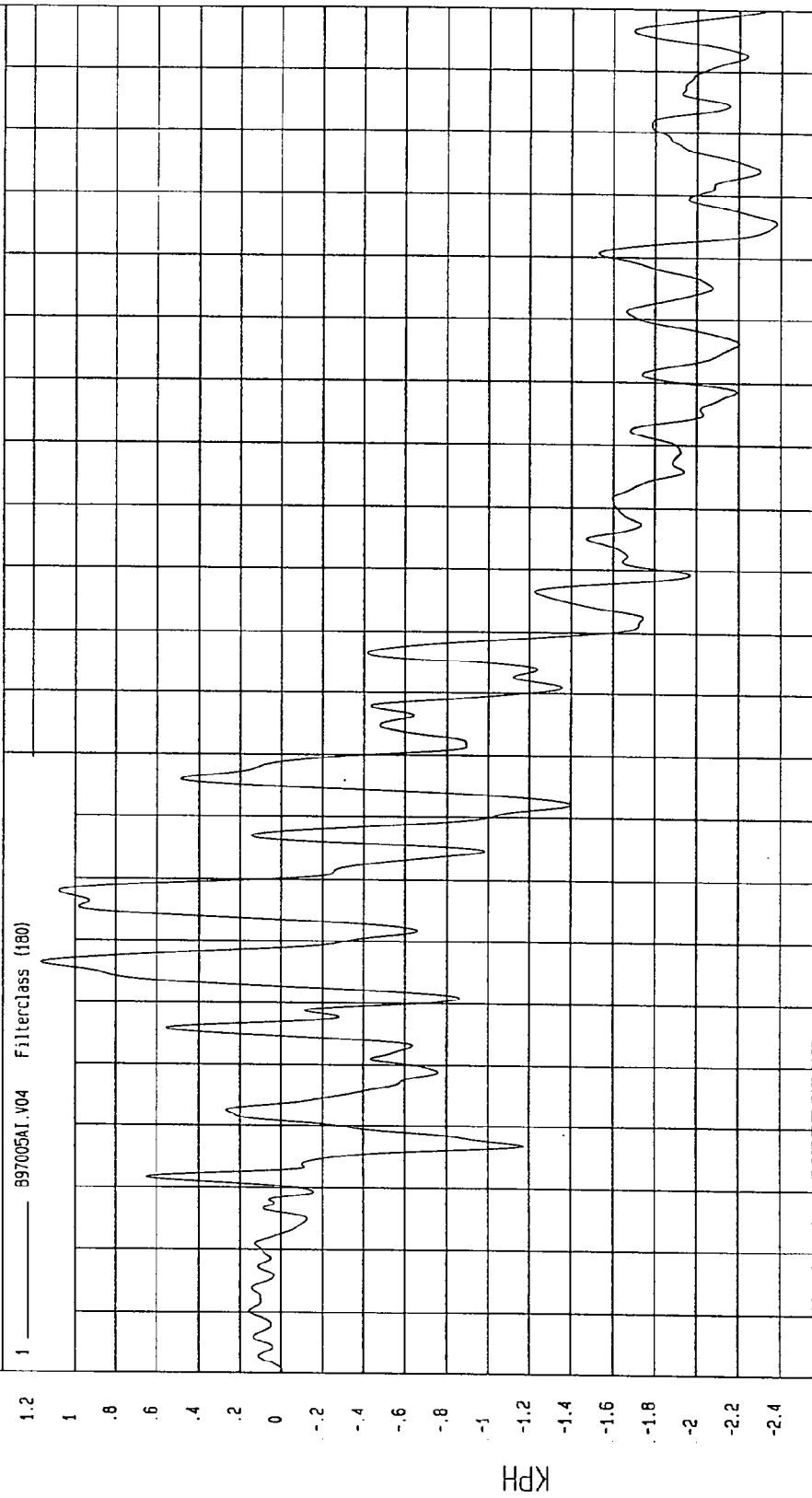
WCA Research
01-09-1997 14:57

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -2.38 KPH at 166 msec Maximum = 1.16 KPH at 46 msec

MOVING BARRIER CG Z VELOCITY



TIME Seconds

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

1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
-2.2
-2.4

KPH

897005AI.V04
01-08-1997 15:31

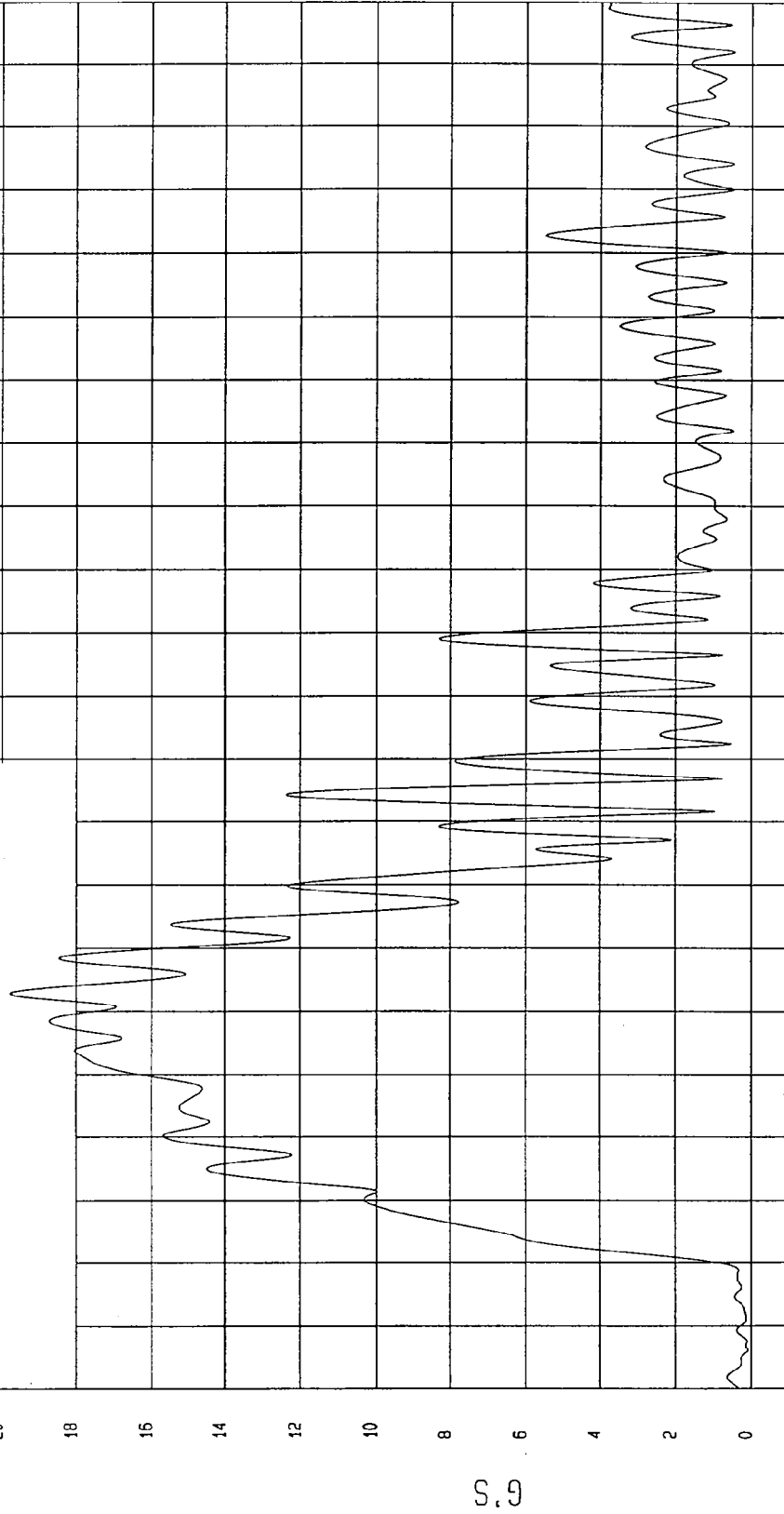
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = 7.90E-02 G'S at -14 msec
Maximum = 19.78 G'S at 43 msec

MOVING BARRIER CG RESULTANT ACCELERATION

1 ——— B97005AV.A02 Filterclass (60)



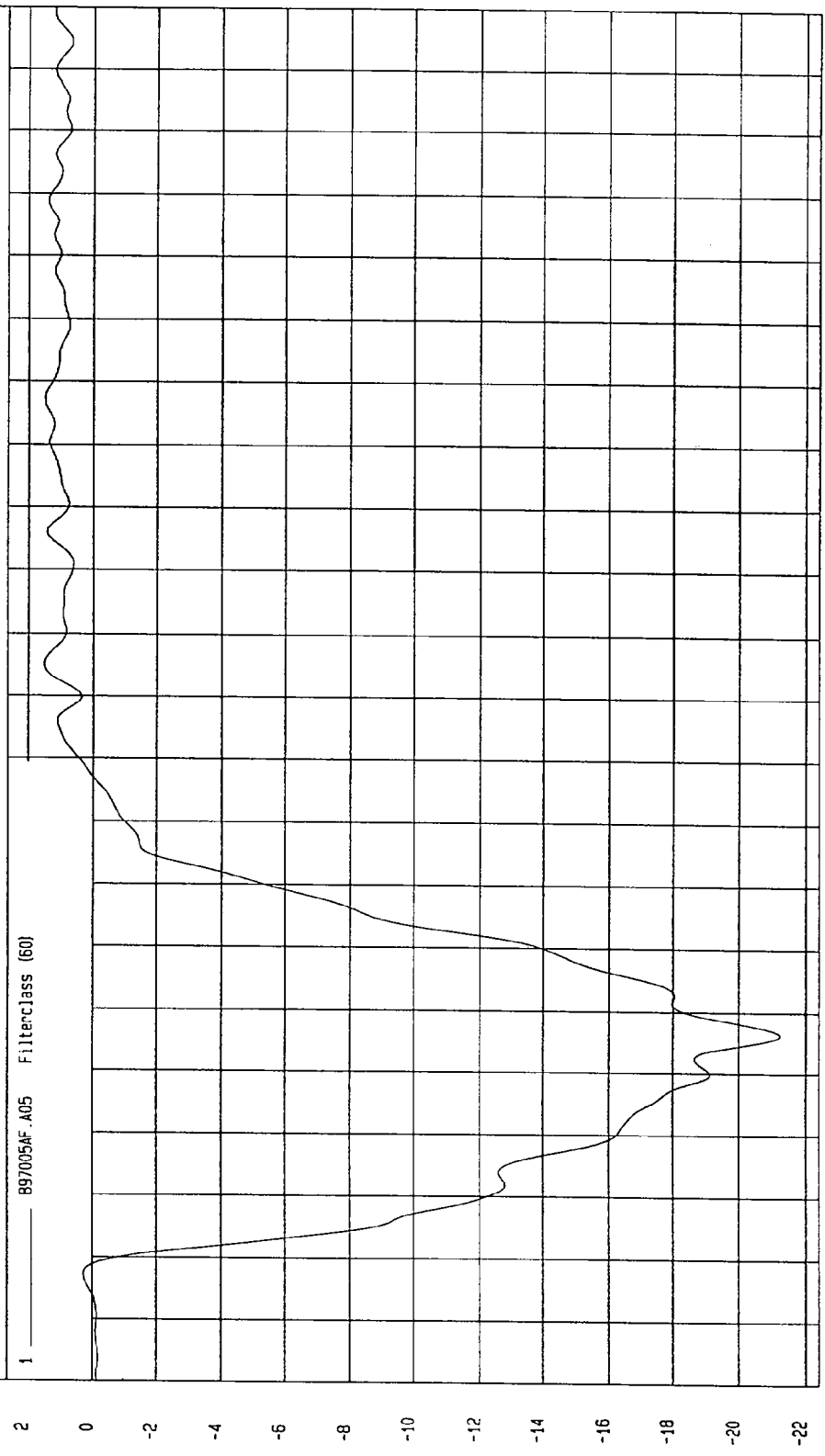
NCA Research
01-09-1997 14:58

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -21.26 G'S at 36 msec
Maximum = 1.49 G'S at 95 msec

MOVING BARRIER REAR AXLE X ACCELERATION



TIME (SECONDS)

MGA Research
01-09-1997 14:51

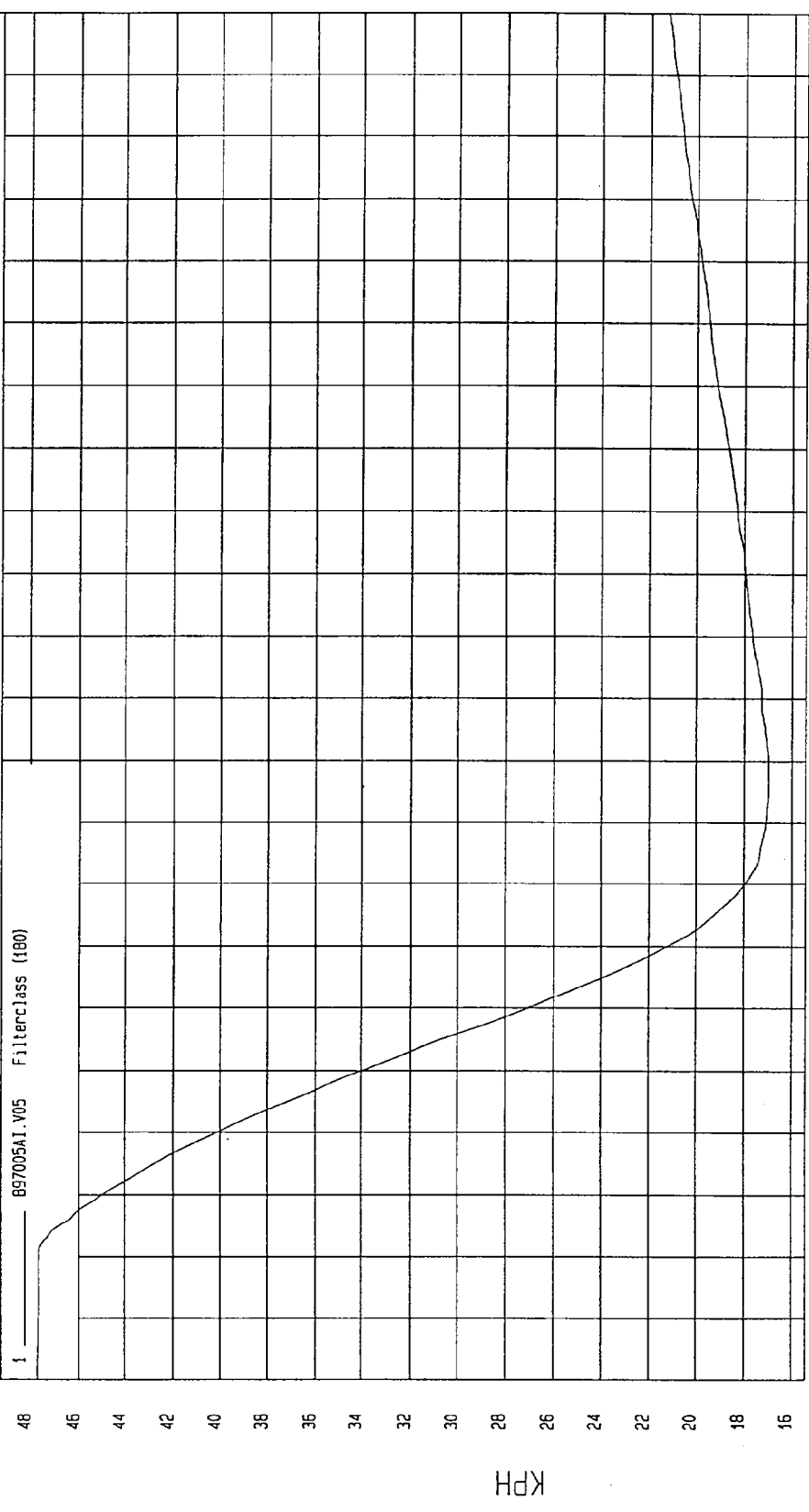
TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = 16.95 KPH at 76 msec Maximum = 47.70 KPH at -18 msec

MOVING BARRIER REAR AXLE X VELOCITY



MGA Research
01-09-1997 15:31

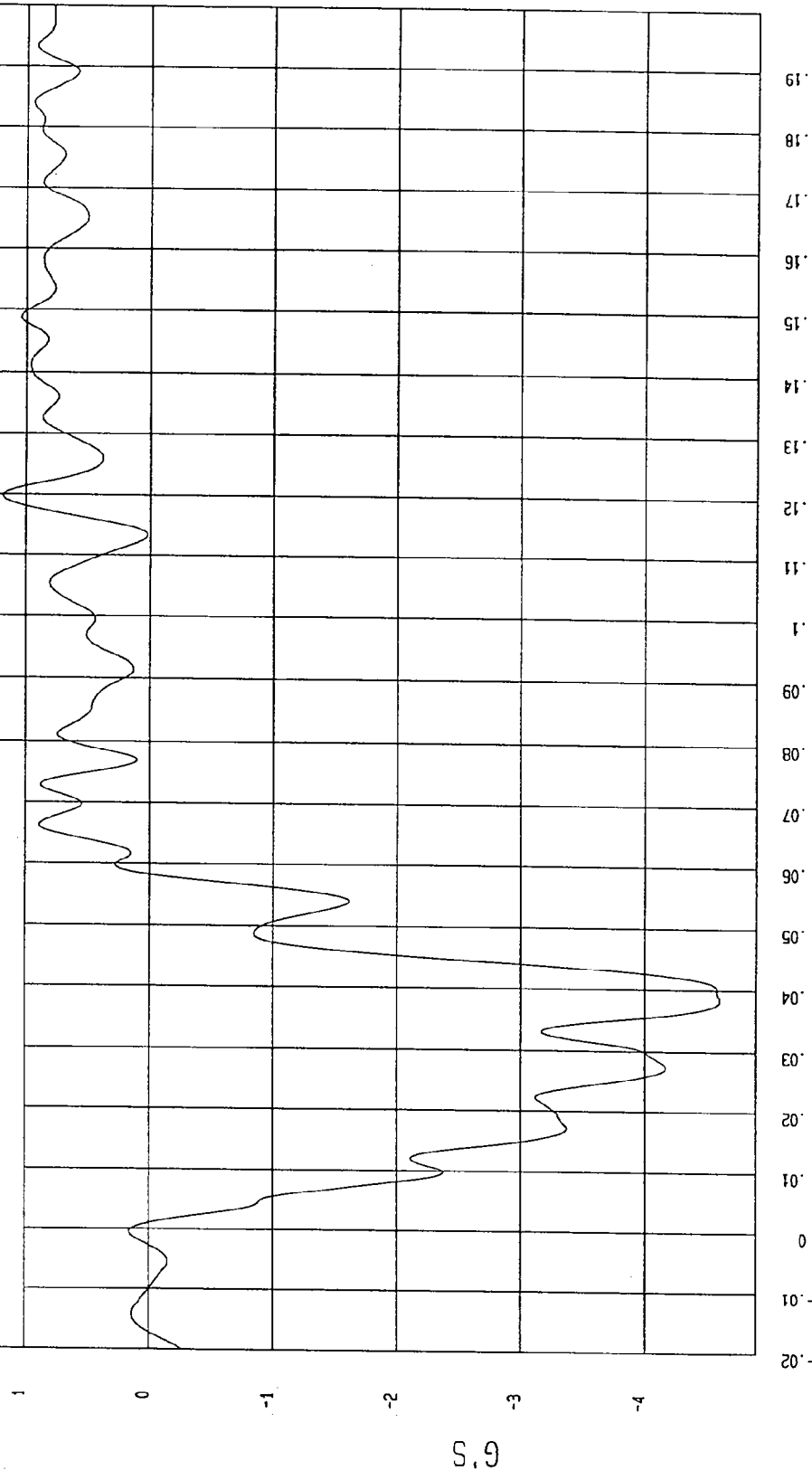
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -4.59 G'S at 38 msec Maximum = 1.18 G'S at 120 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

1 ——— B97005AF.A06 Filterclass (60)



NCA Research
01-08-1997 14:51

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Speed: 33.26 MPH 53.5 KPH

Minimum = 18.99 KPH at 58 msec

Maximum = 24.31 KPH at -10 msec

MOVING BARRIER REAR AXLE Y VELOCITY

1 — 897005A1.V05 Filterclass (480)

24

23

22

21

20

19

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

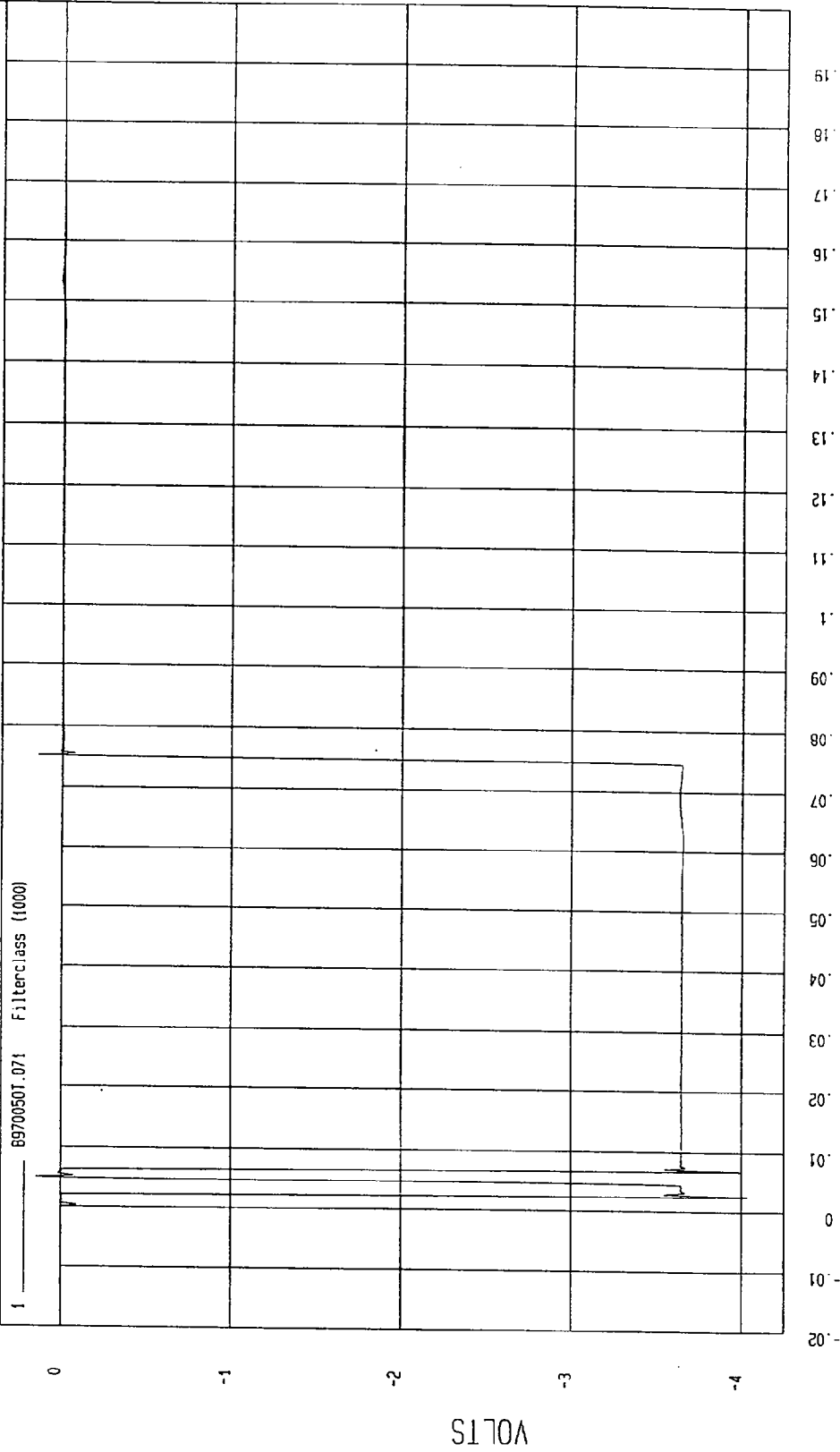
HGA Research
01-09-1997 15:31

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

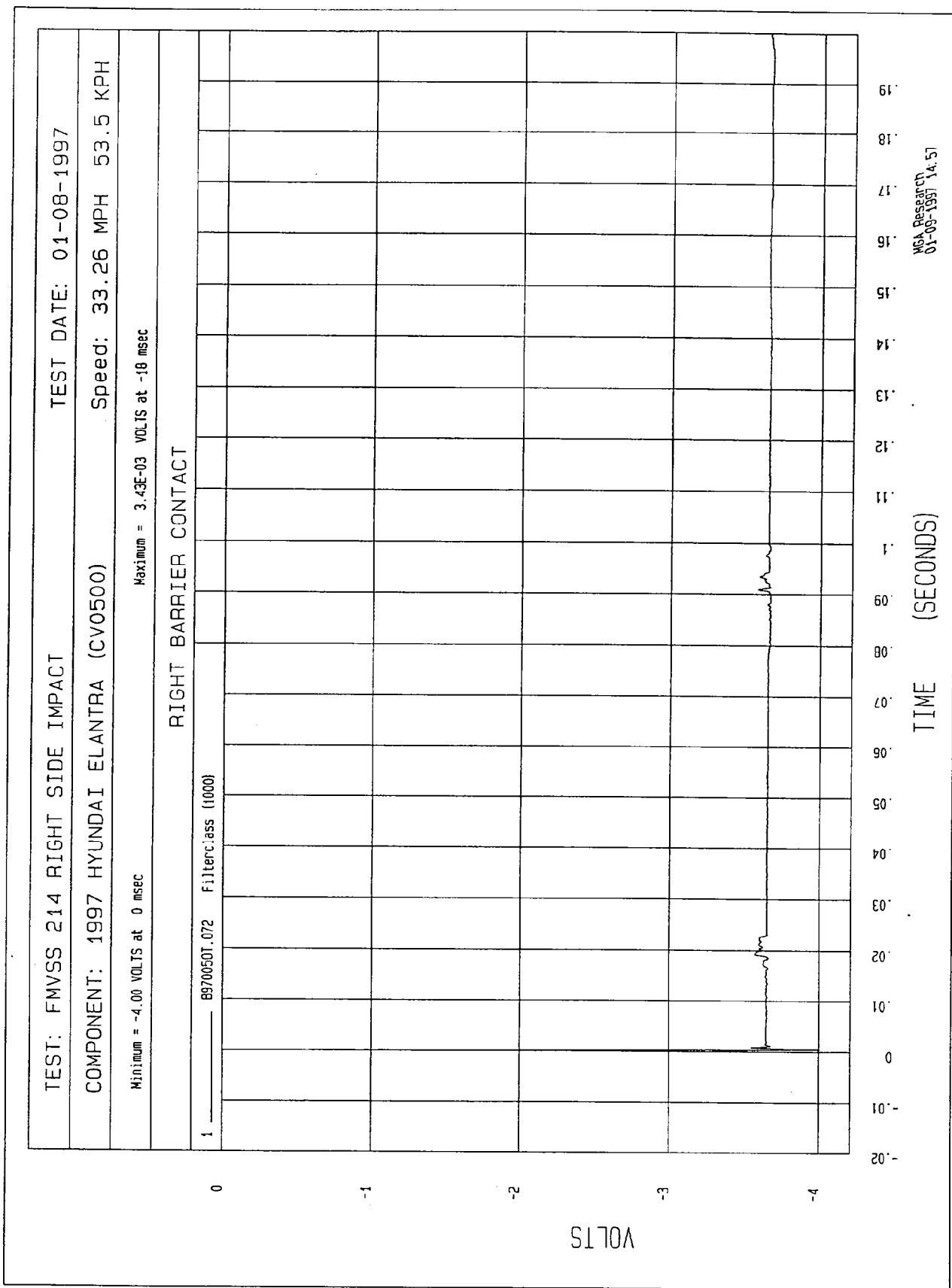
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

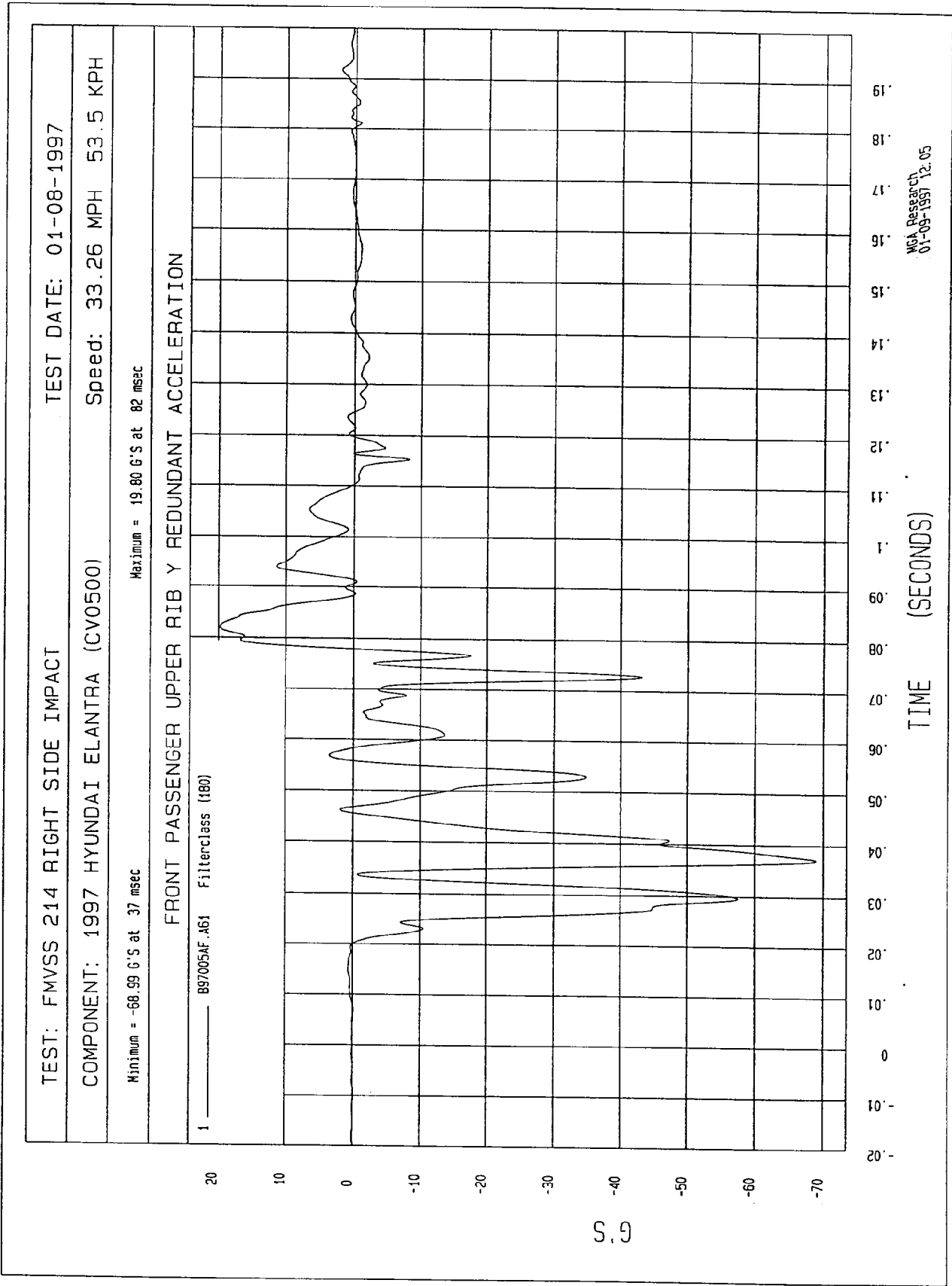
Minimum = -4.03 VOLTS at 2 msec Maximum = .14 VOLTS at 5 msec

LEFT BARRIER CONTACT



MCA Research
01-09-1997 14:57





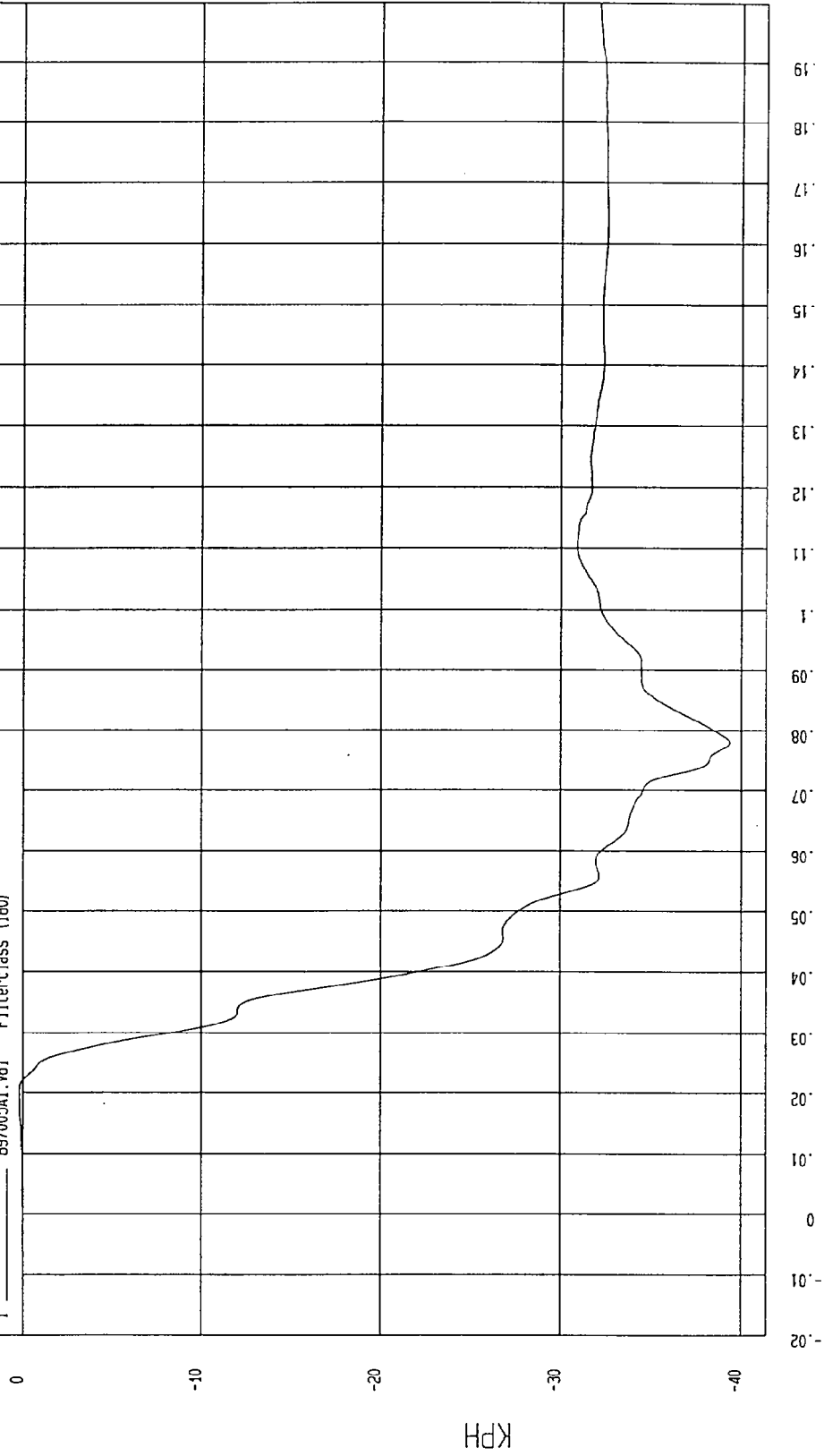
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

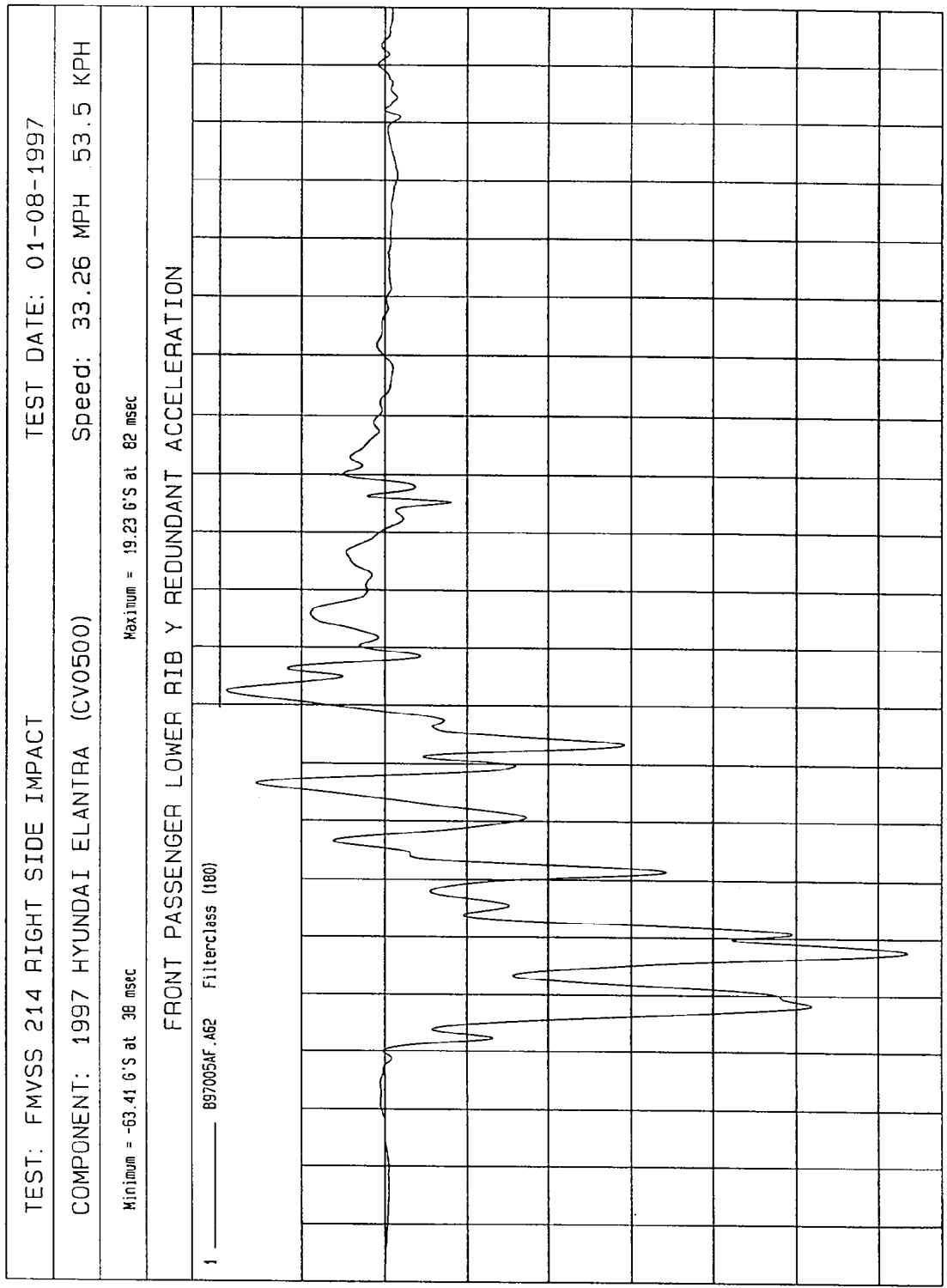
Minimum = -39.37 KPH at 78 msec Maximum = .20 KPH at 20 msec

FRONT PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 897005AI.V61 Filterclass (100)



WGA Research
01-09-1997 15:33



TIME (SECONDS)

WCA Research
01-09-1997 12:05

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

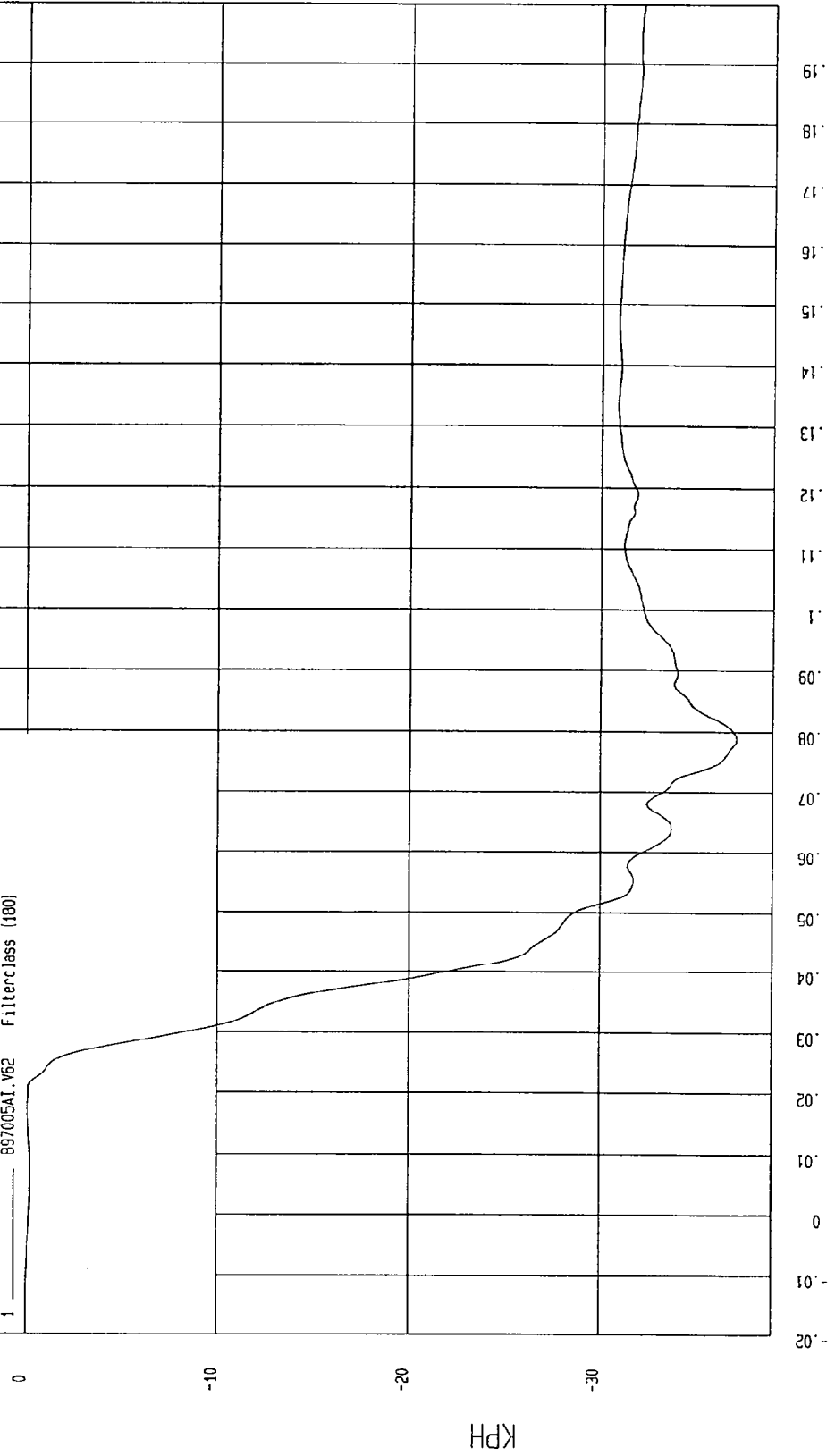
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 7.70E-03 KPH at -17 msec

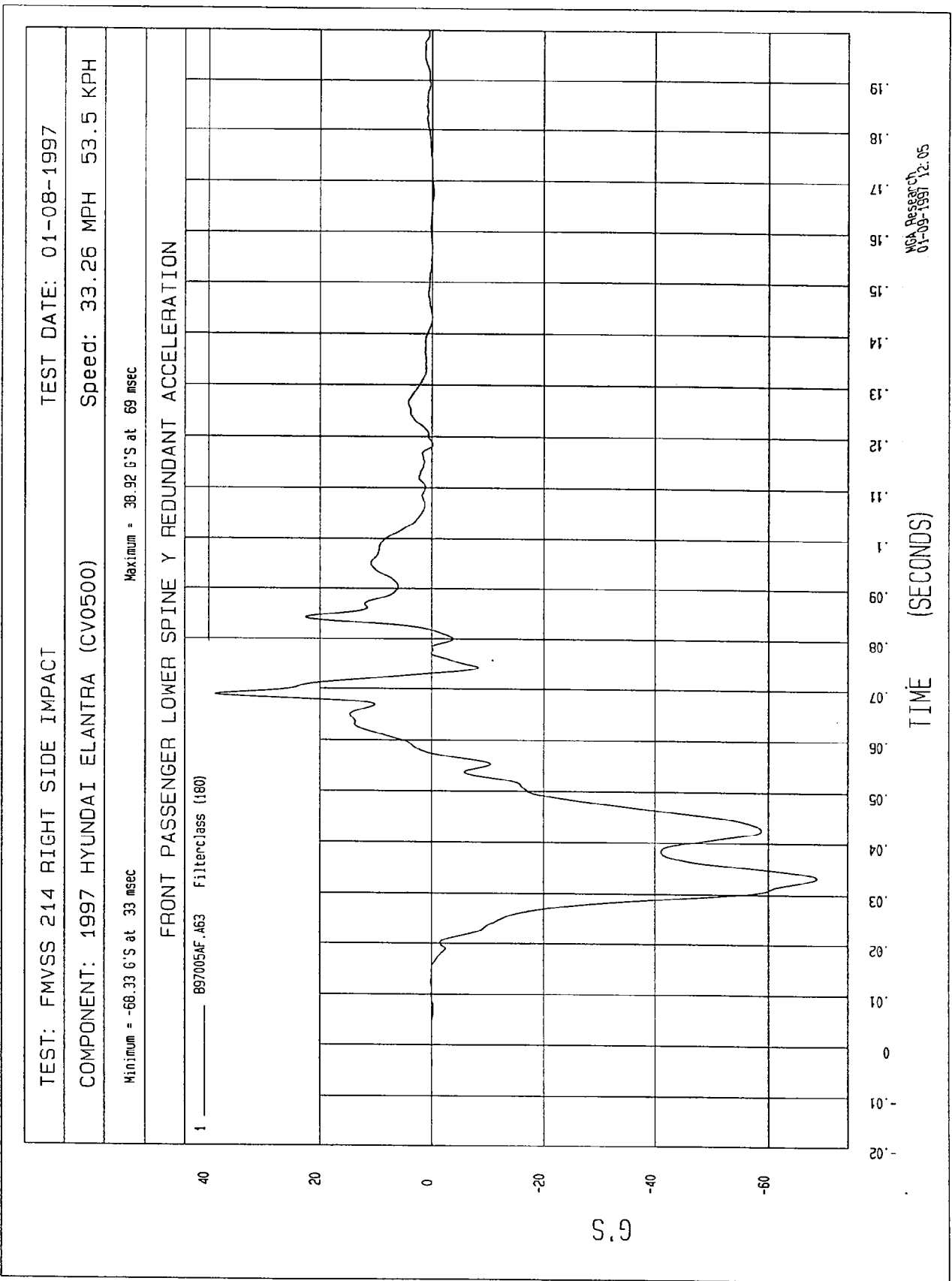
Minimum = -37.02 KPH at 79 msec

FRONT PASSENGER LOWER RIB Y REDUNDANT VELOCITY

1 ——— B97005AT.V62 Filterclass (100)



WGA Research
01-09-1997 15:33



TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Speed: 33.26 MPH 53.5 KPH

Minimum = -43.47 KPH at 57 msec

Maximum = 2.74E-03 KPH at -16 msec

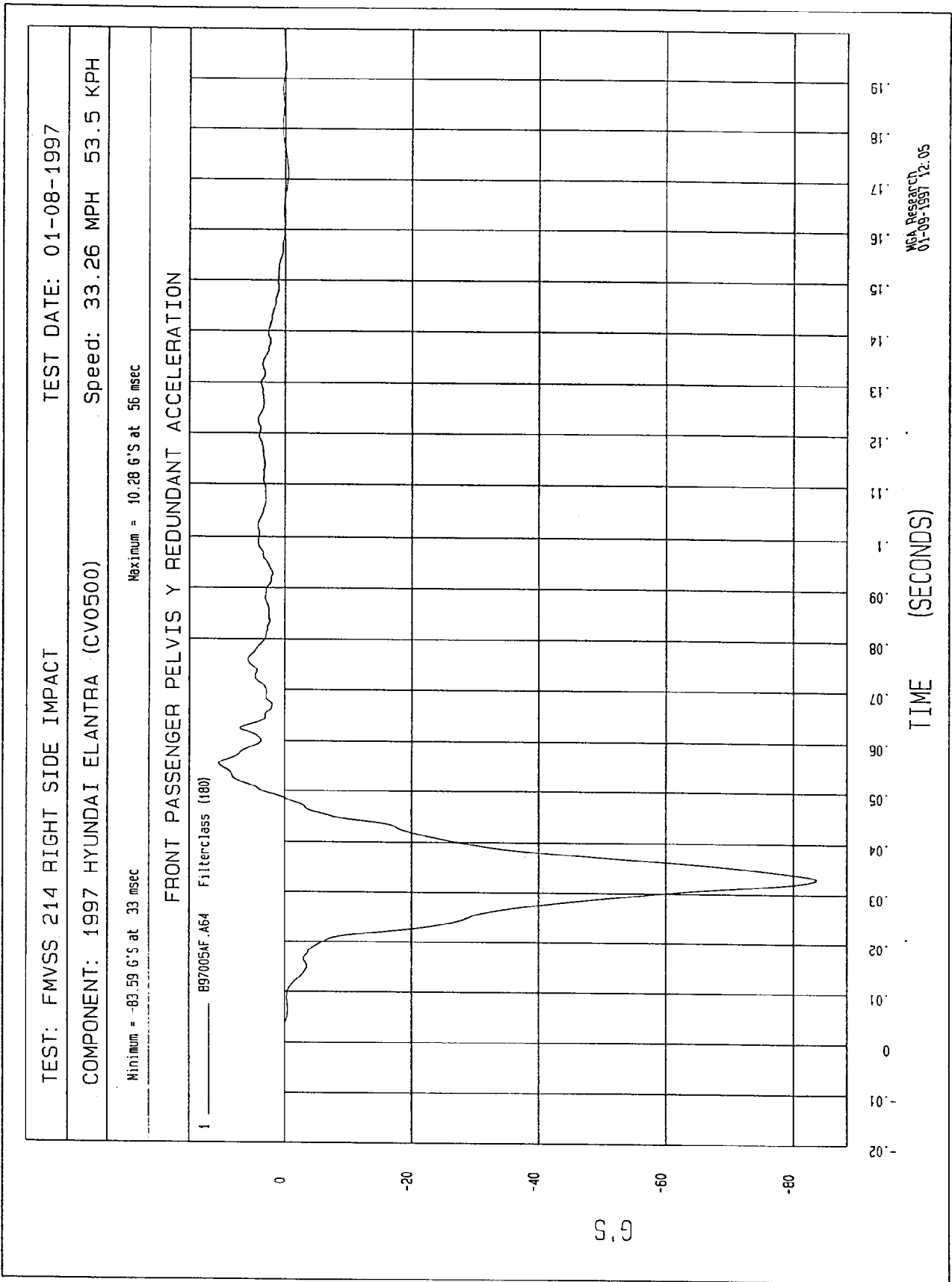
FRONT PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— B97005A1.V63 Filterclass (180)



NCA Research
01-09-1997 15:33

TIME Seconds

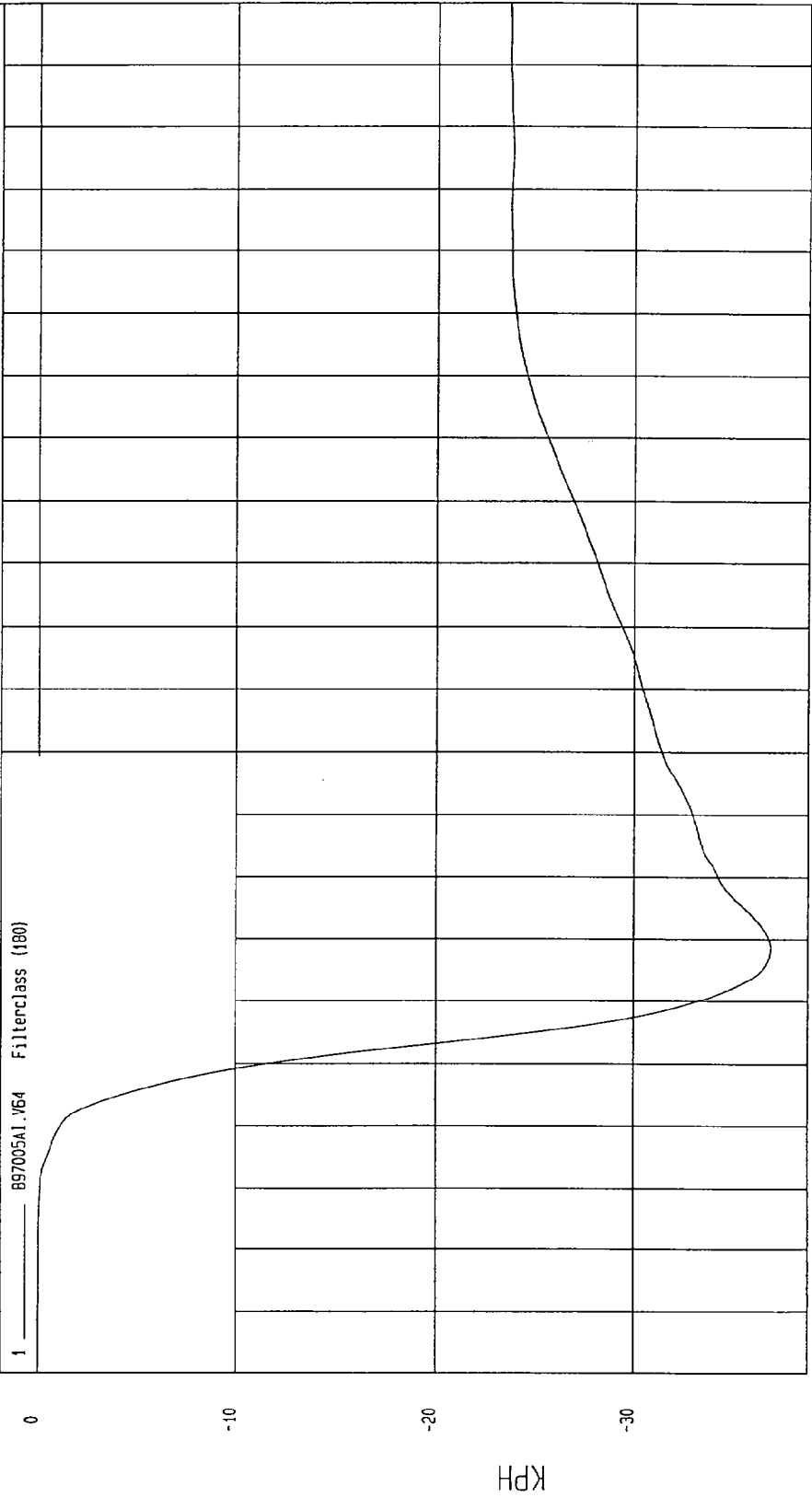


TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -36.85 KPH at 48 msec Maximum = 4.49E-03 KPH at -14 msec

FRONT PASSENGER PELVIS Y REDUNDANT VELOCITY



MGA Research
01-09-1997 15:33

TEST: FMVSS 214 RIGHT SIDE IMPACT

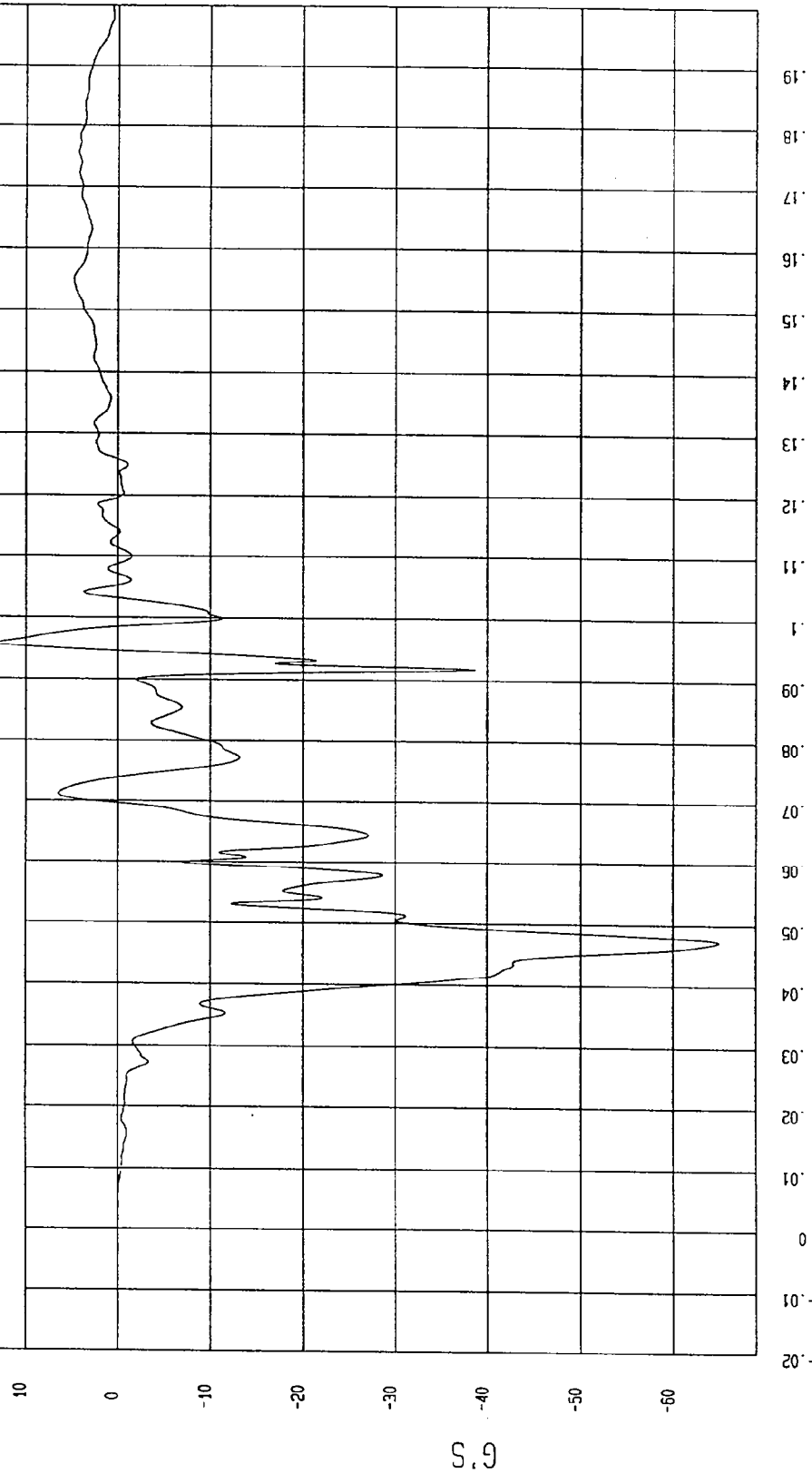
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -64.80 G'S at 47 msec Maximum = 13.13 G'S at 96 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 — 897005AF.466 Filterclass (180)



NCA Research
01-09-1997 12.05

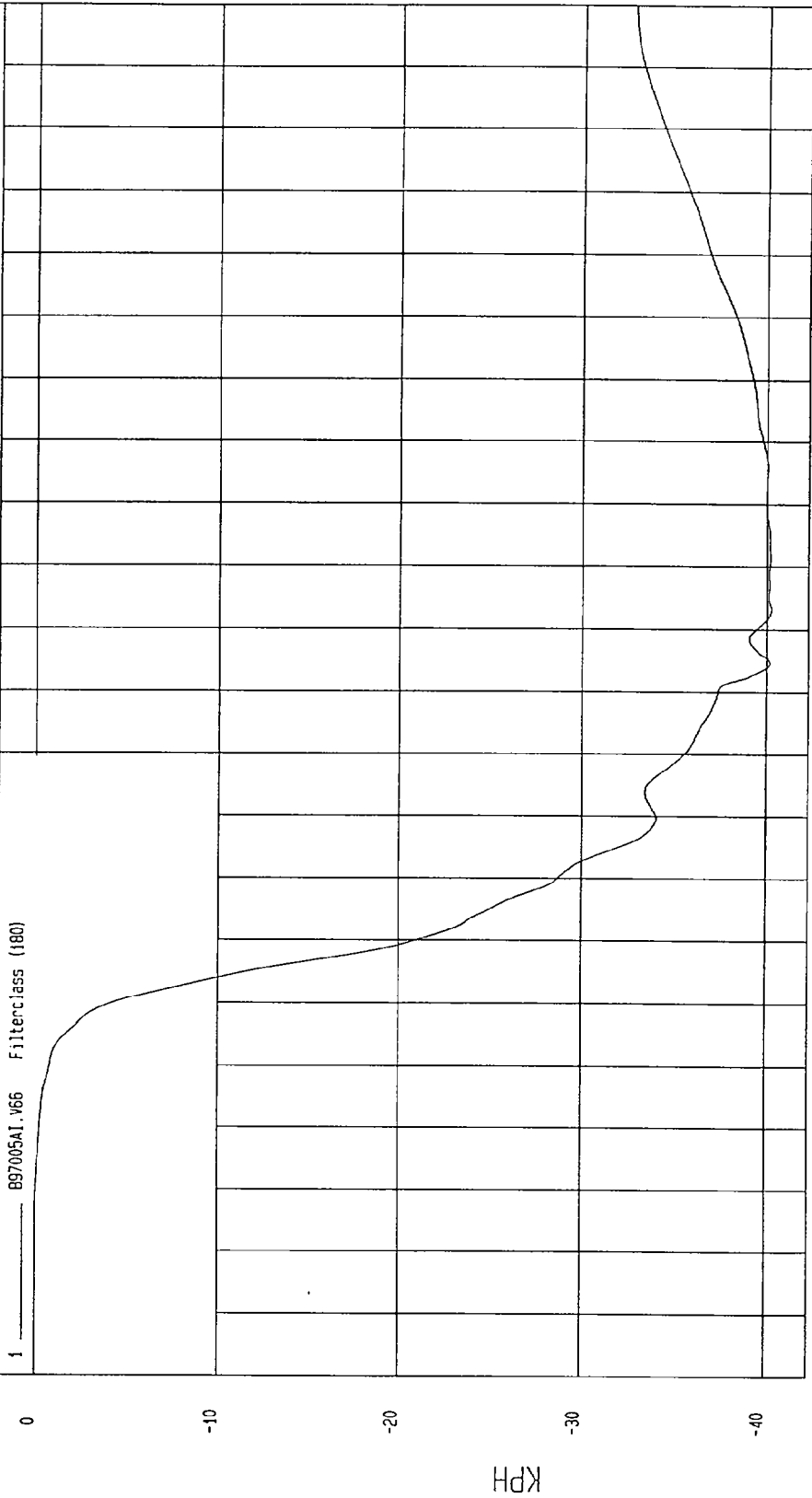
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -40.26 KPH at 103 msec Maximum = 3.65E-04 KPH at -18 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 897005A1.V66 Filterclass (180)



WCA Research
01-09-1997 15:34

TIME Seconds

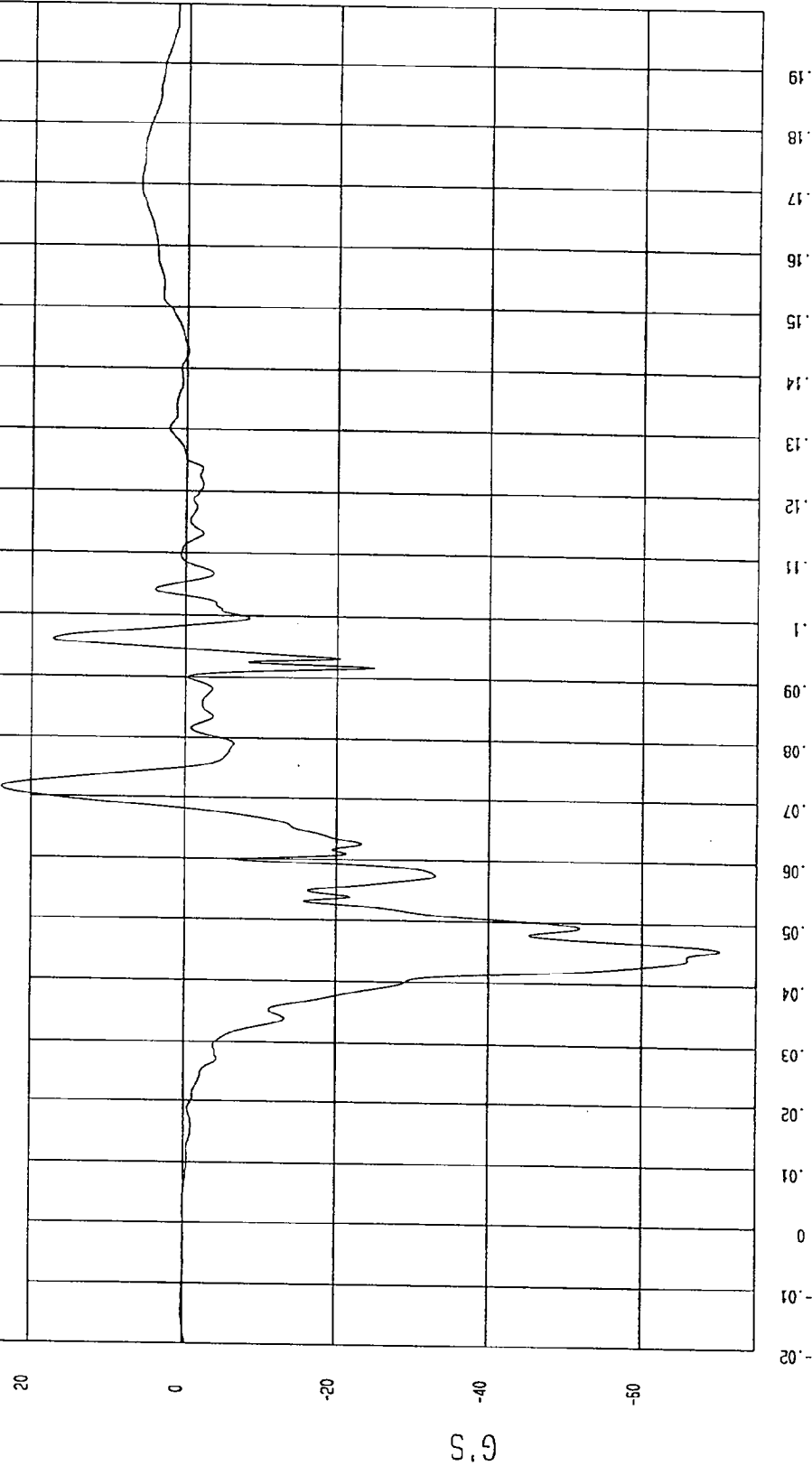
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -70.11 G'S at 46 msec
Maximum = 23.79 G'S at 72 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 ——— B97005AF.A67 Filterclass (180)



MCA Research
01-09-1997 12.05

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

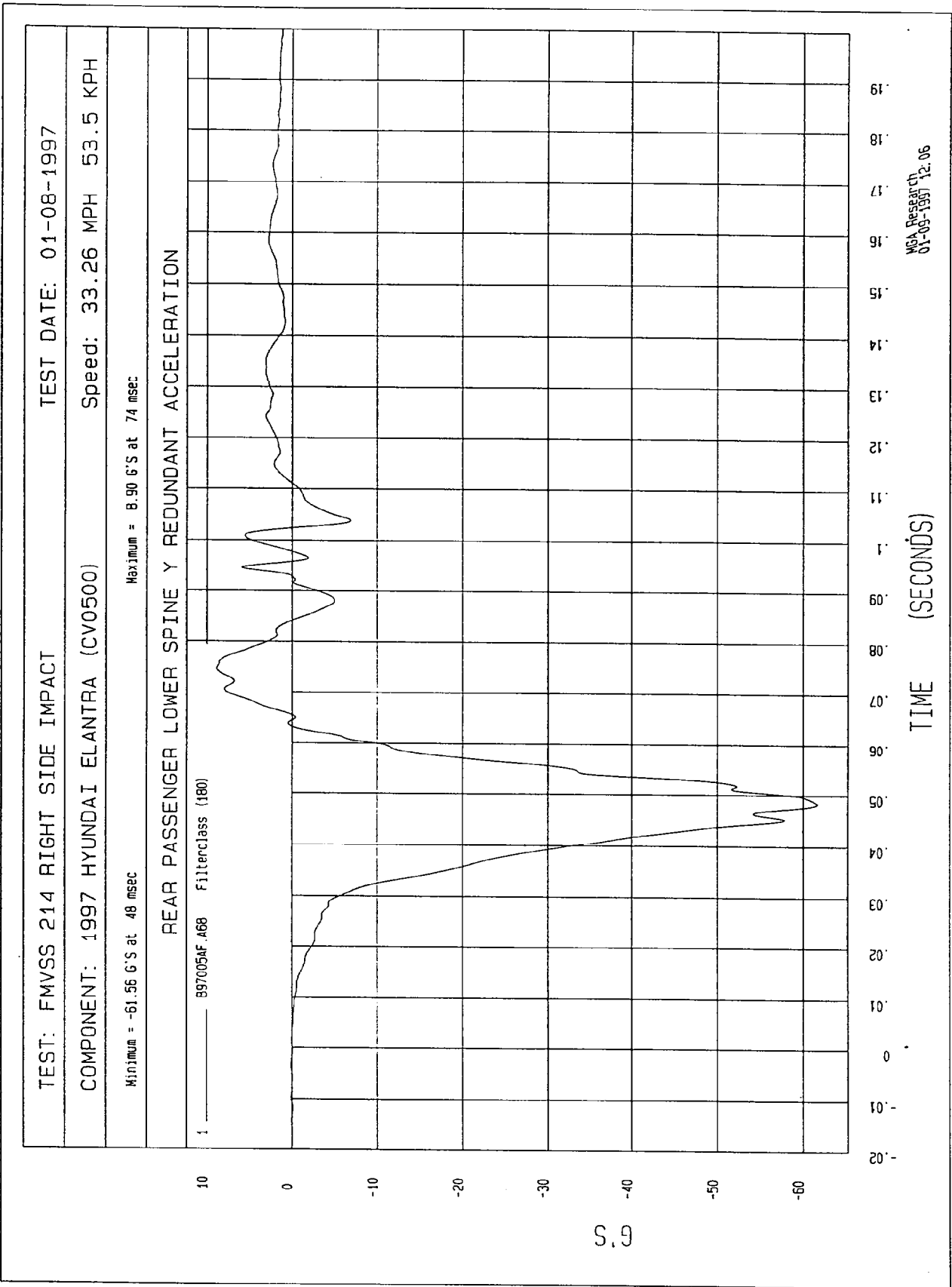
Minimum = -38.71 KPH at 126 msec Maximum = .03 KPH at 5 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY



TIME Seconds

MCA Research
01-09-1997 15:34



TEST: FMVSS 214 RIGHT SIDE IMPACT

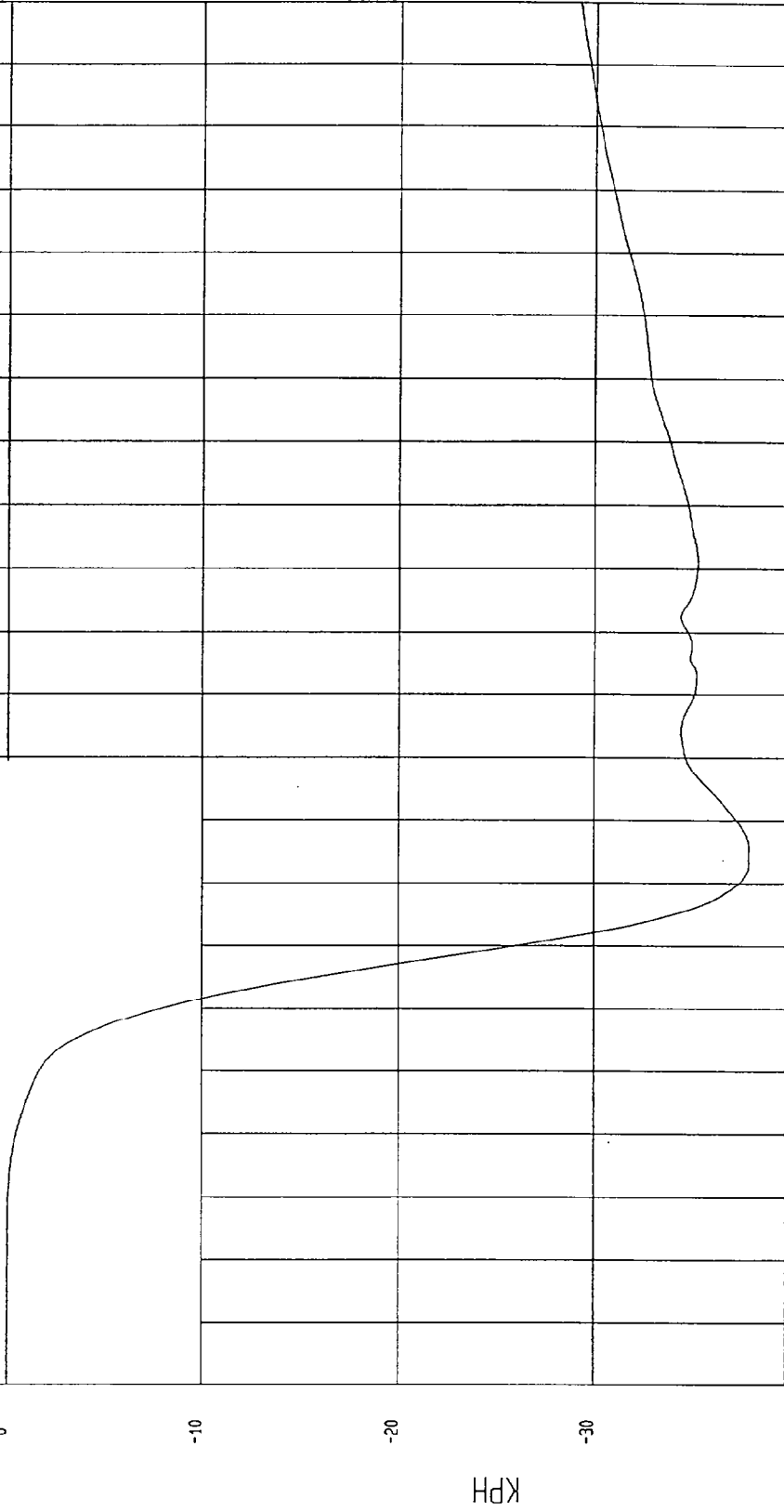
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -37.90 KPH at 63 msec Maximum = 8.57E-04 KPH at -19 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 B97005A1.V68 Filterclass (180)



TIME Seconds

NGA Research
01-09-1997 15:34

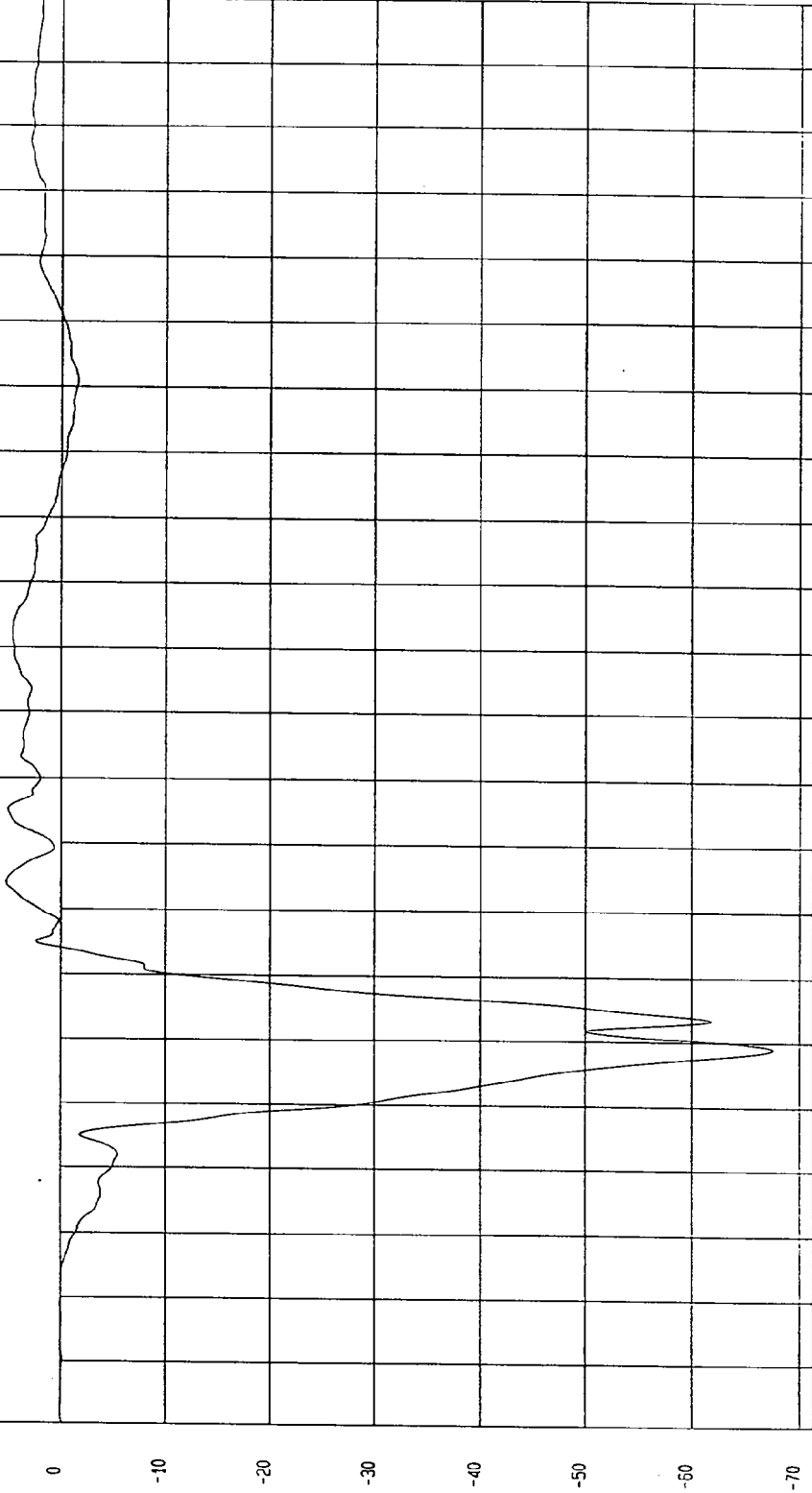
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -67.57 G'S at 39 msec
Maximum = 5.09 G'S at 64 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 ——— BS7005AF A69 Filterclass (180)



MGA Research
01-09-1997 12:06

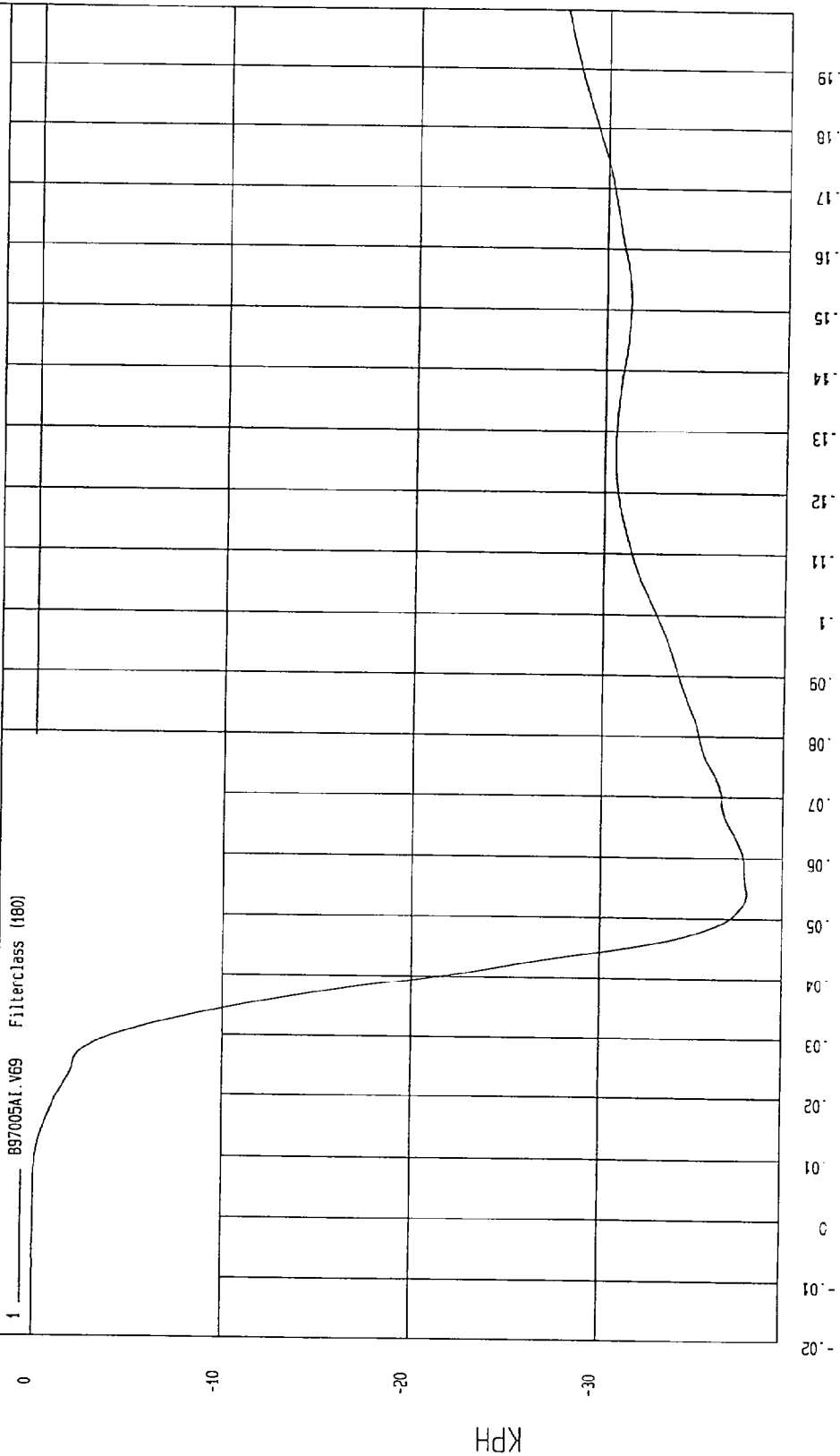
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -37.65 KPH at 54 msec Maximum = 4.11E-03 KPH at -14 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

1 B97005A1.V69 FilterClass (f80)



HGA Research
01-09-1997 15:34

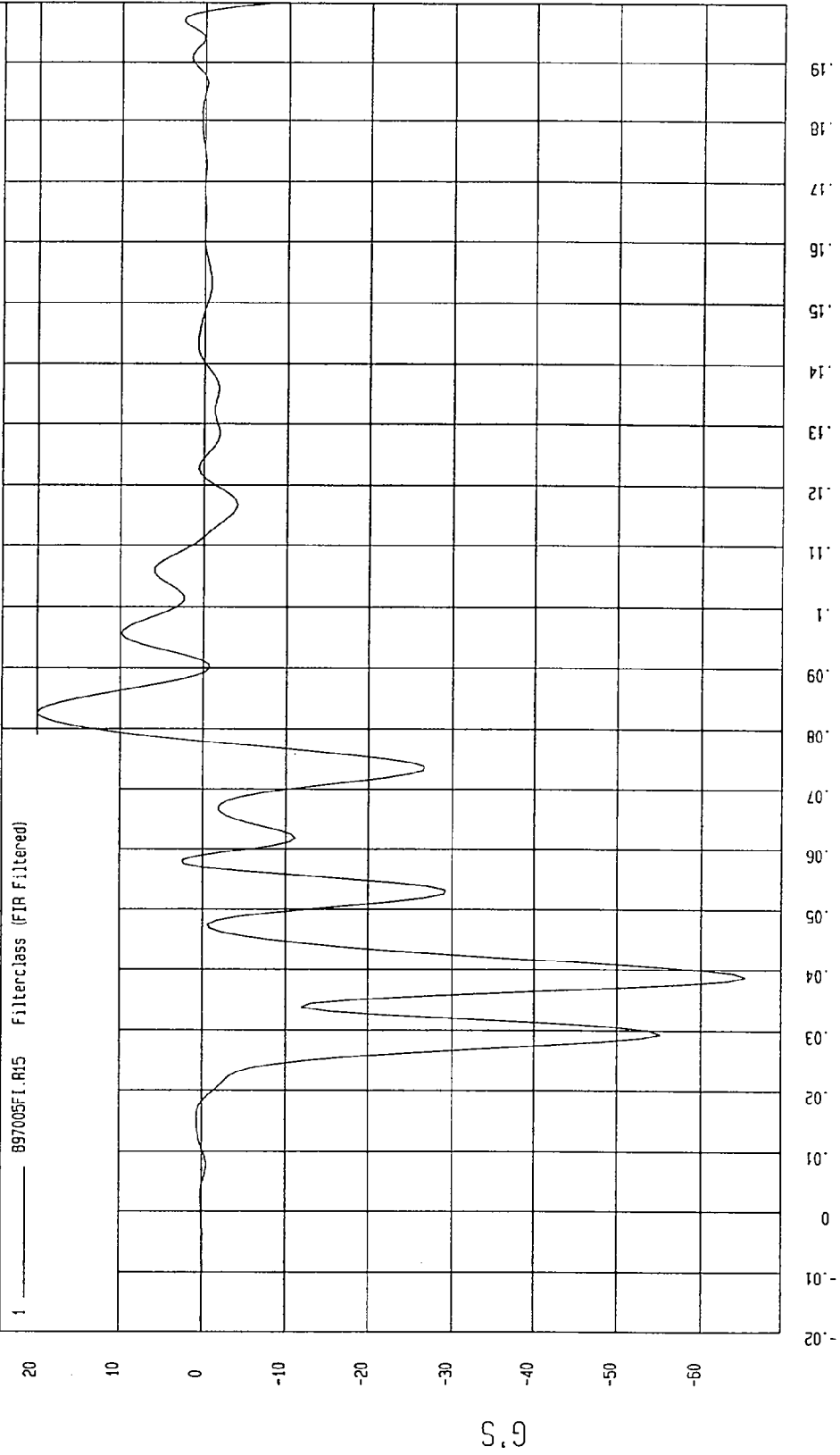
FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

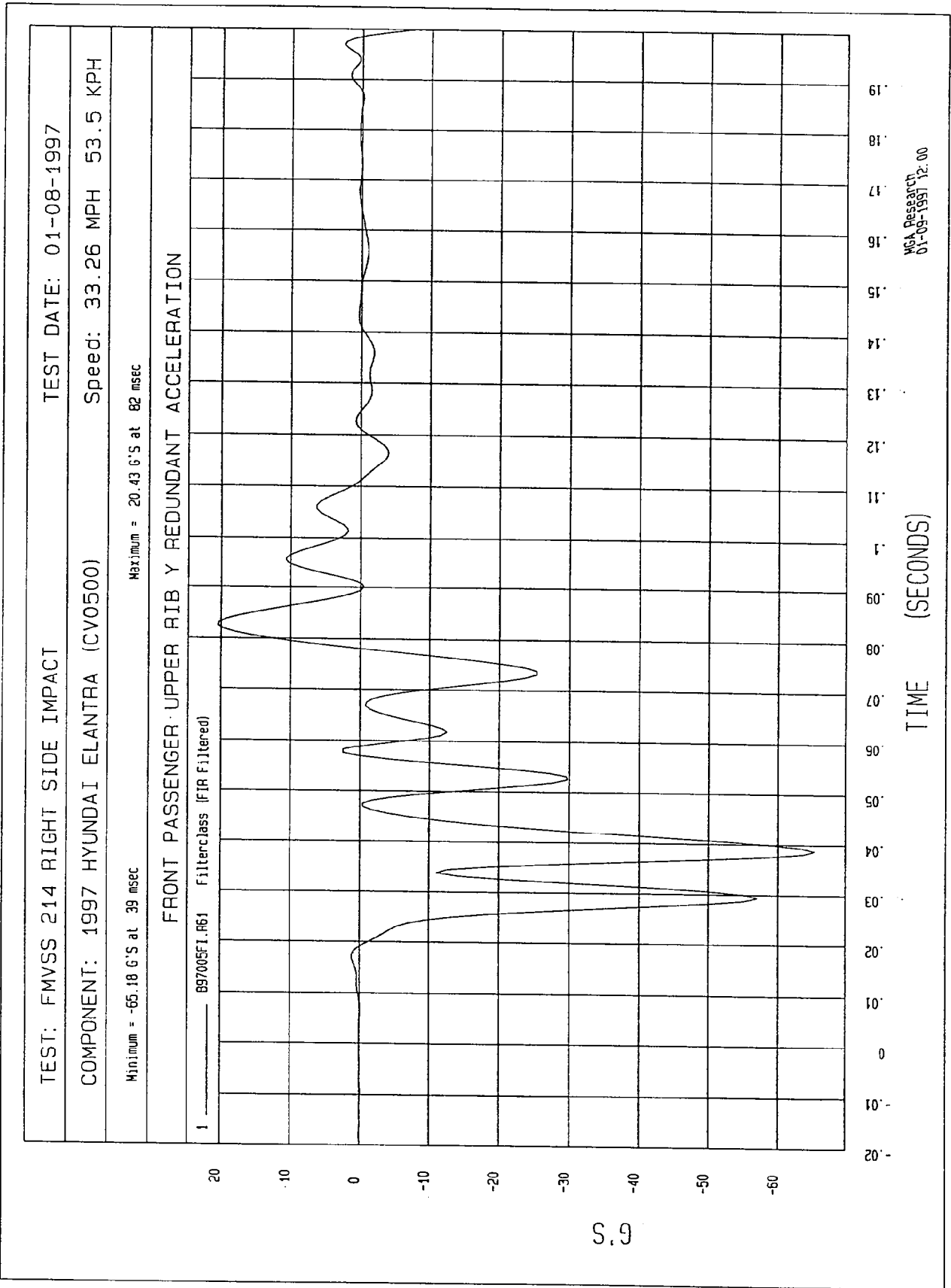
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -65.30 G'S at 39 msec
Maximum = 19.98 G'S at 82 msec

FRONT PASSENGER UPPER RIB Y ACCELERATION



MCA Research
01-09-1997 12:00



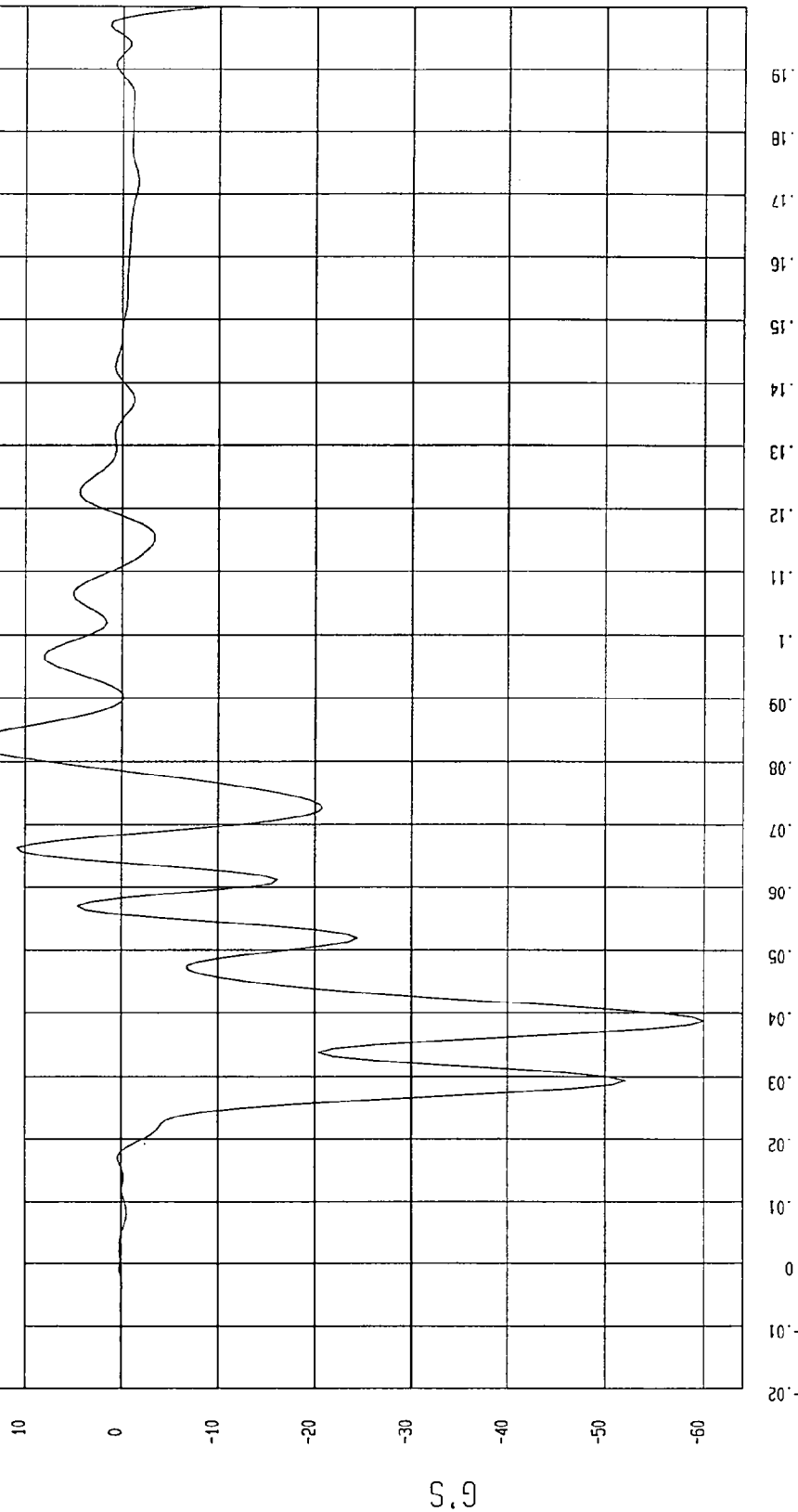
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

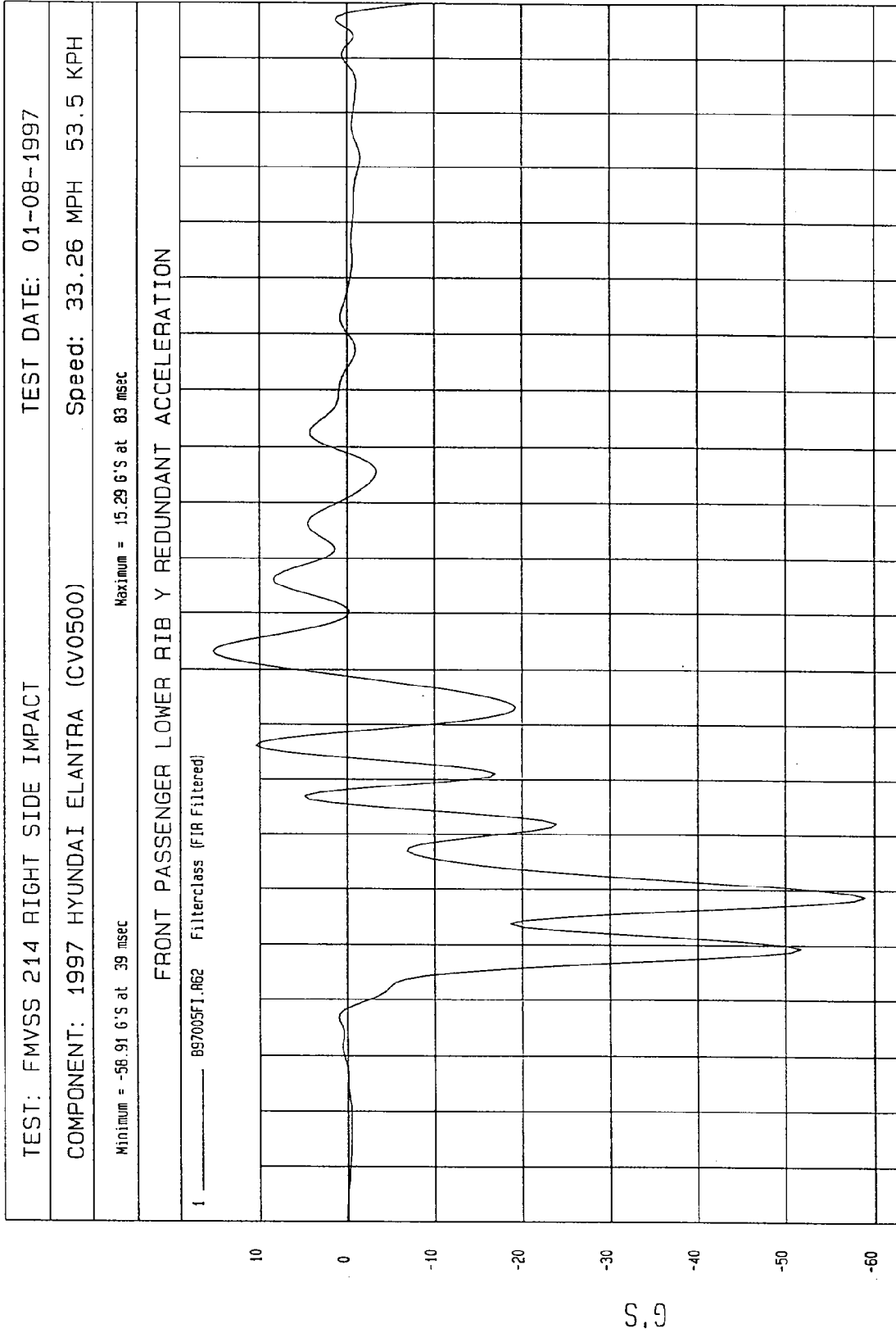
Minimum = -60.04 G'S at 39 msec Maximum = 15.94 G'S at 83 msec

FRONT PASSENGER LOWER RIB Y ACCELERATION

1 897005FI.R16 Filterclass (FIR Filtered)



MCA Research
01-09-1997 12:00



MCA Research
01-03-1997 12:00

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

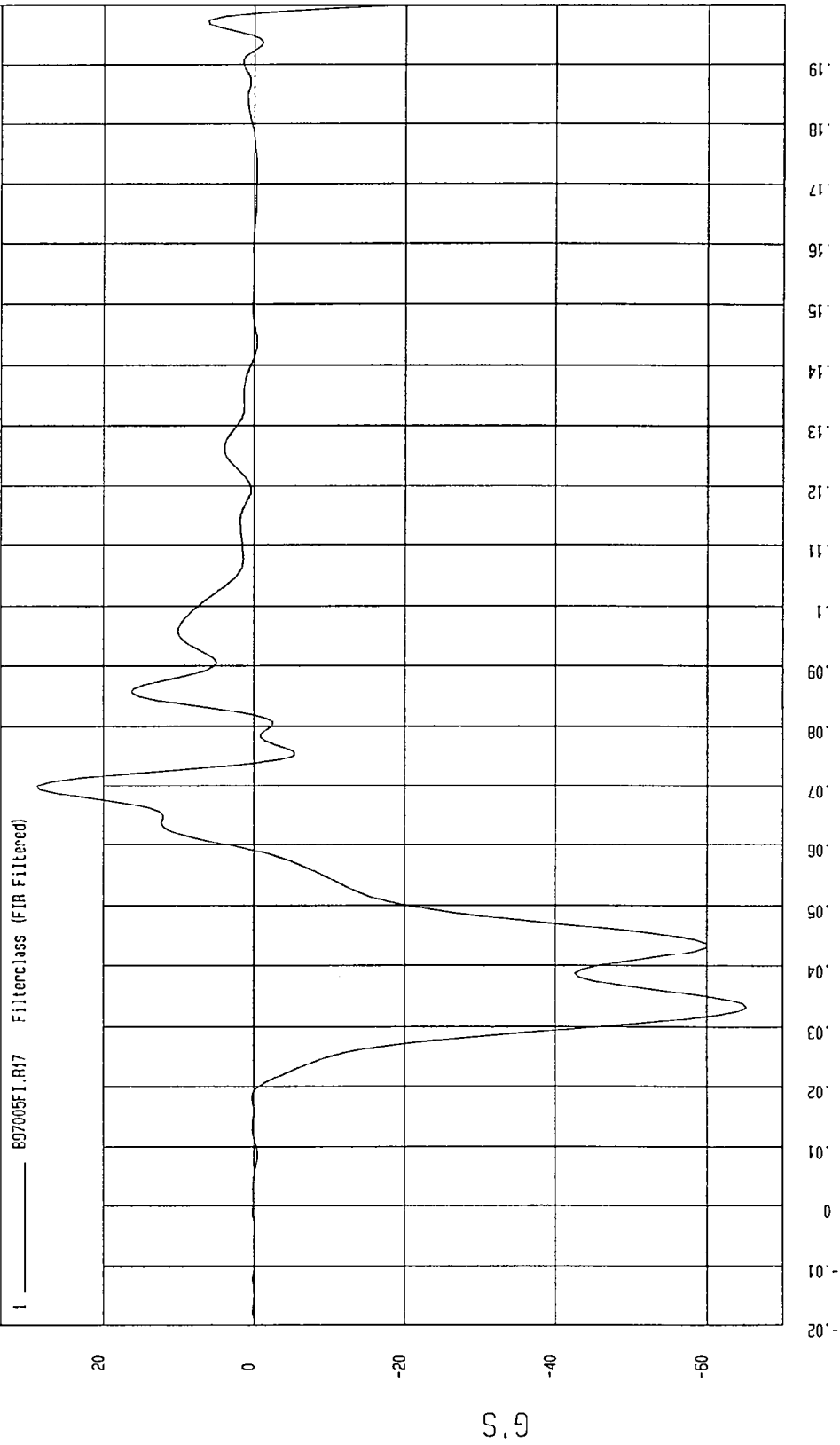
Speed: 33.26 MPH 53.5 KPH

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 28.87 G'S at 70 msec

Minimum = -05.07 G'S at 33 msec

FRONT PASSENGER LOWER SPINE Y ACCELERATION



TEST: FMVSS 214 RIGHT SIDE IMPACT

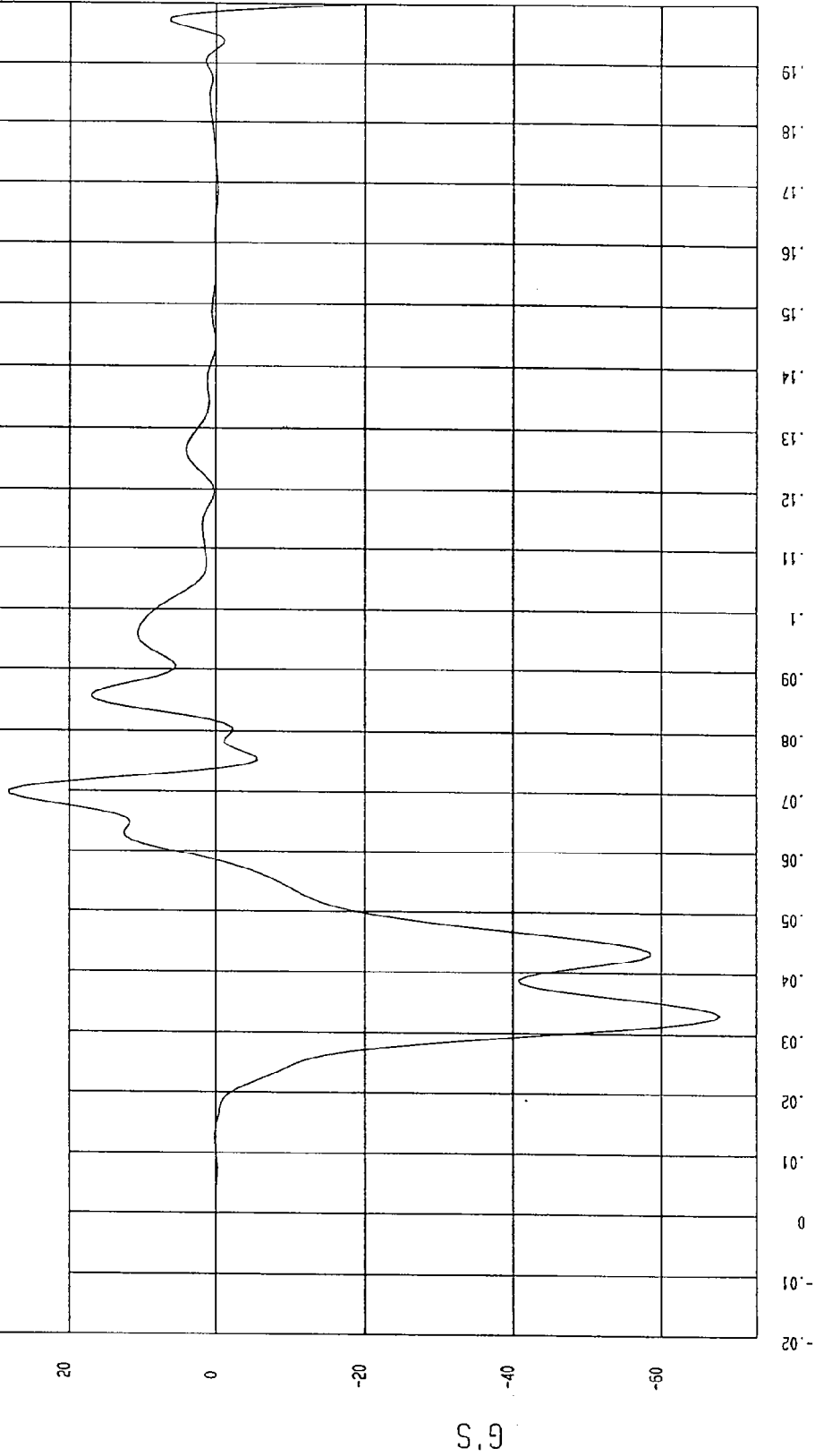
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -67.84 G'S at 33 msec Maximum = 28.04 G'S at 70 msec

FRONT PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 897005F1.D63 Filterclass (FIR Filtered)



MGA Research
01-09-1997 12:01

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

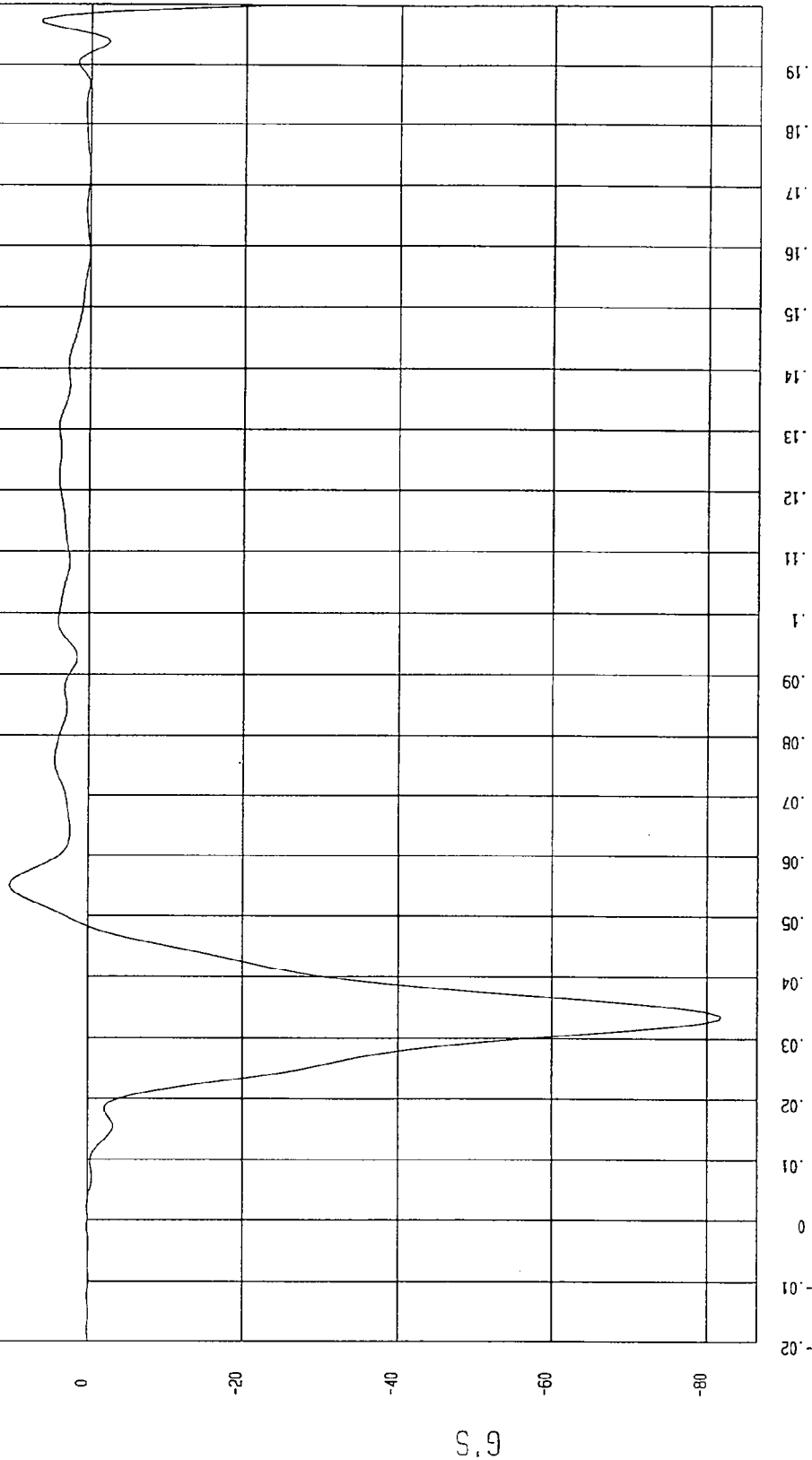
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 10.32 G'S at 55 msec

Minimum = -81.79 G'S at 34 msec

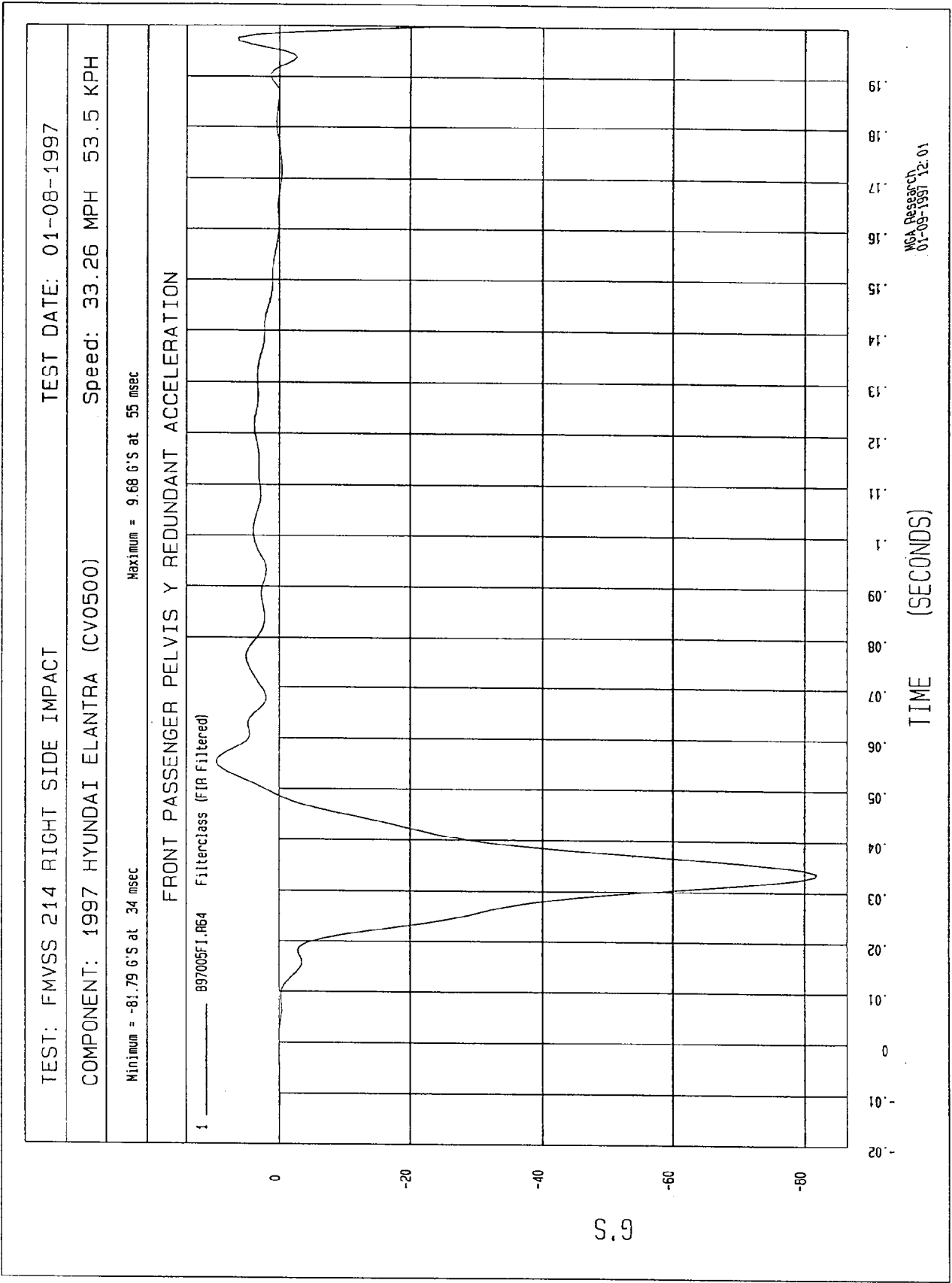
FRONT PASSENGER PELVIS Y ACCELERATION

1 ——— B97005F1.R18 Filterclass (FIR Filtered)



MCA Research
01-09-1997 12:01

TIME (SECONDS)



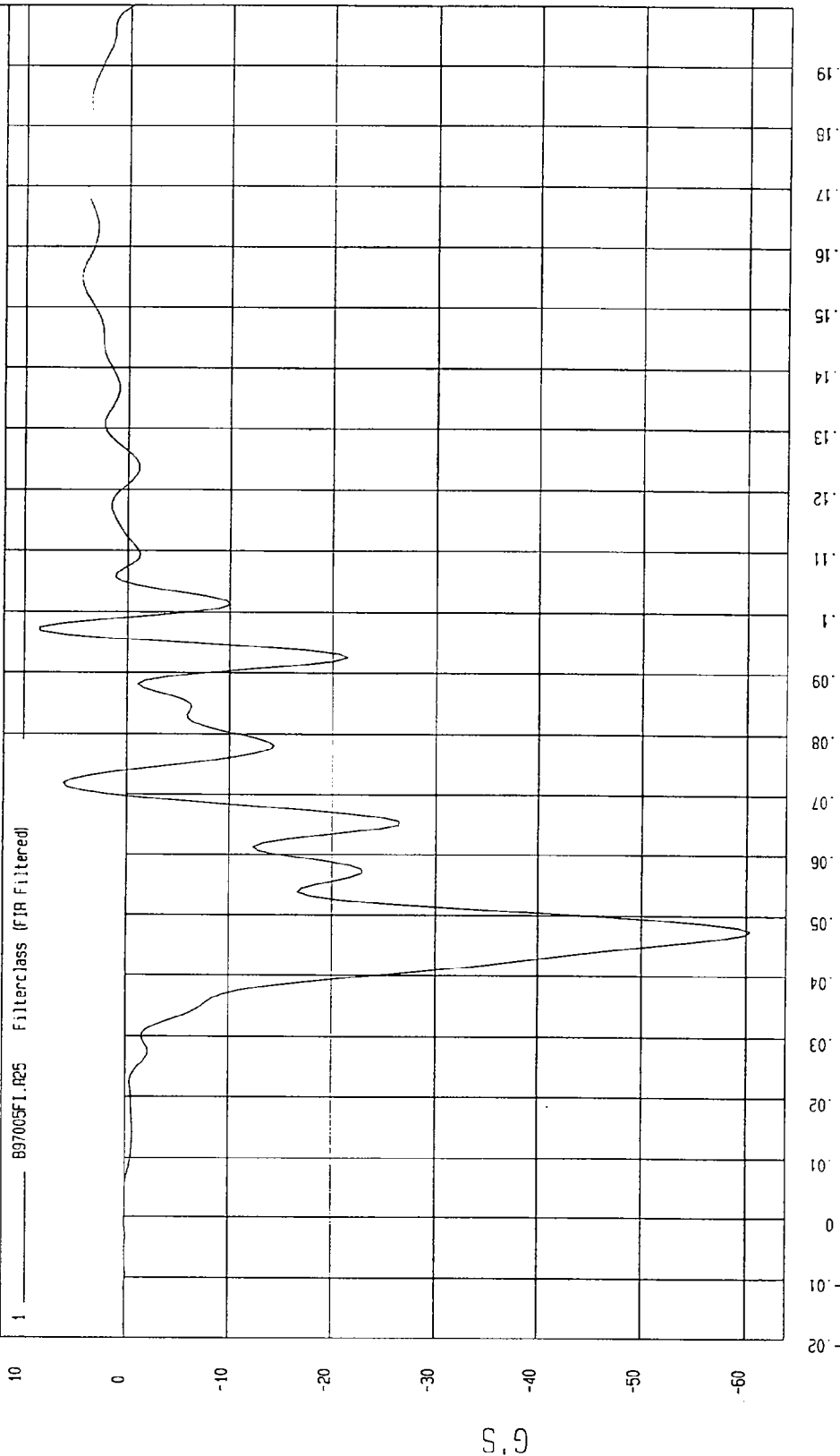
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -60.39 G'S at 48 msec Maximum = 8.53 G'S at 98 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 B97005F1.R25 FilterClass (FIR Filtered)



MEA Research
01-09-1997 12:01

TEST: FMVSS 214 RIGHT SIDE IMPACT

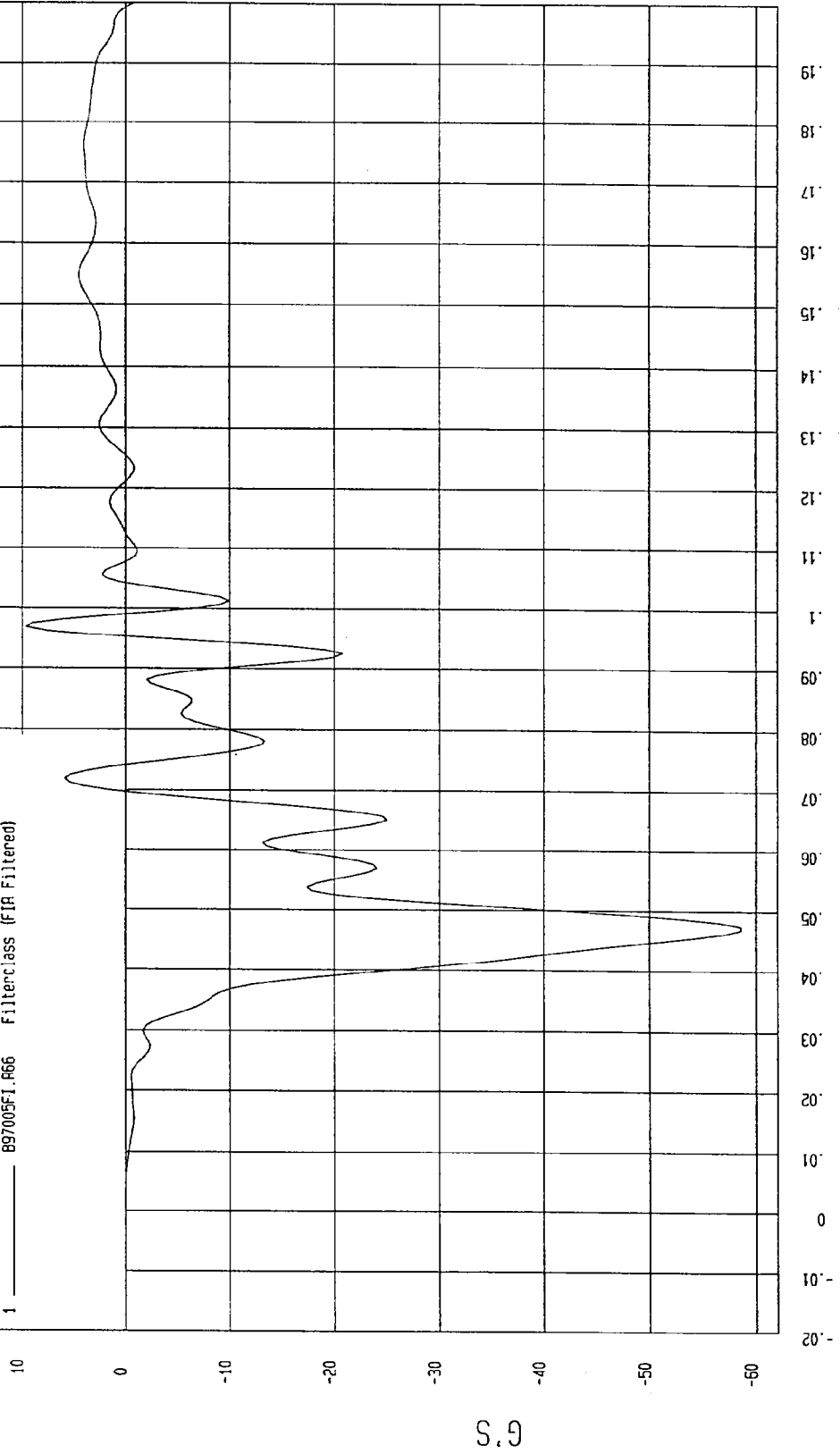
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -58.59 G'S at 47 msec Maximum = 9.62 G'S at 97 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 ——— B97005F1.R66 Filterclass (FIR Filtered)



MCA Research
01-09-1997 12:02

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

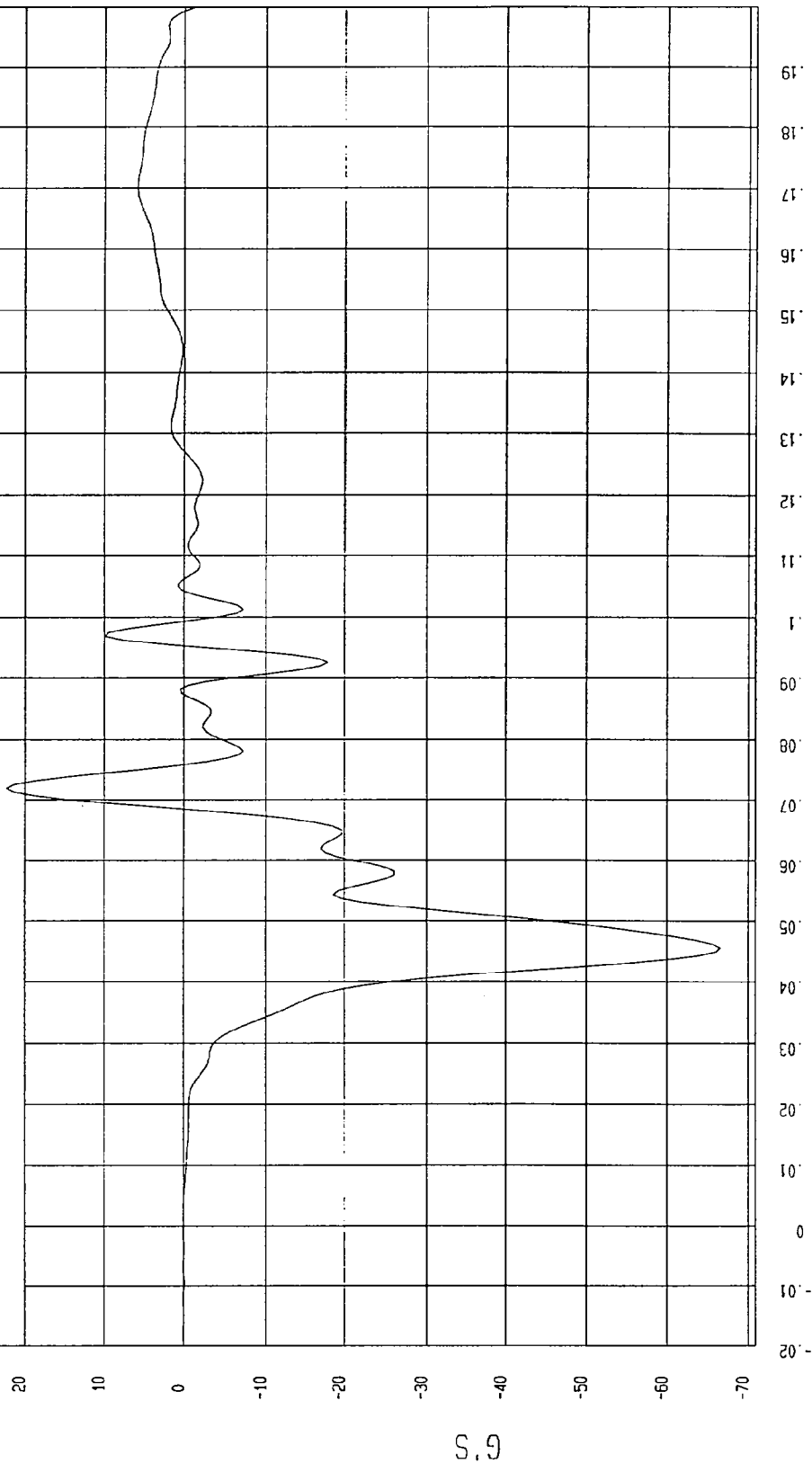
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 22.31 G's at 72 msec

Minimum = -66.47 G's at 46 msec

REAR PASSENGER LOWER RIB Y ACCELERATION

1 897005F1.R26 Filterclass (FIR Filtered)



MEK Research
01-08-1997 12:02

TEST: FMVSS 214 RIGHT SIDE IMPACT

TEST DATE: 01-08-1997

Speed: 33.26 MPH 53.5 KPH

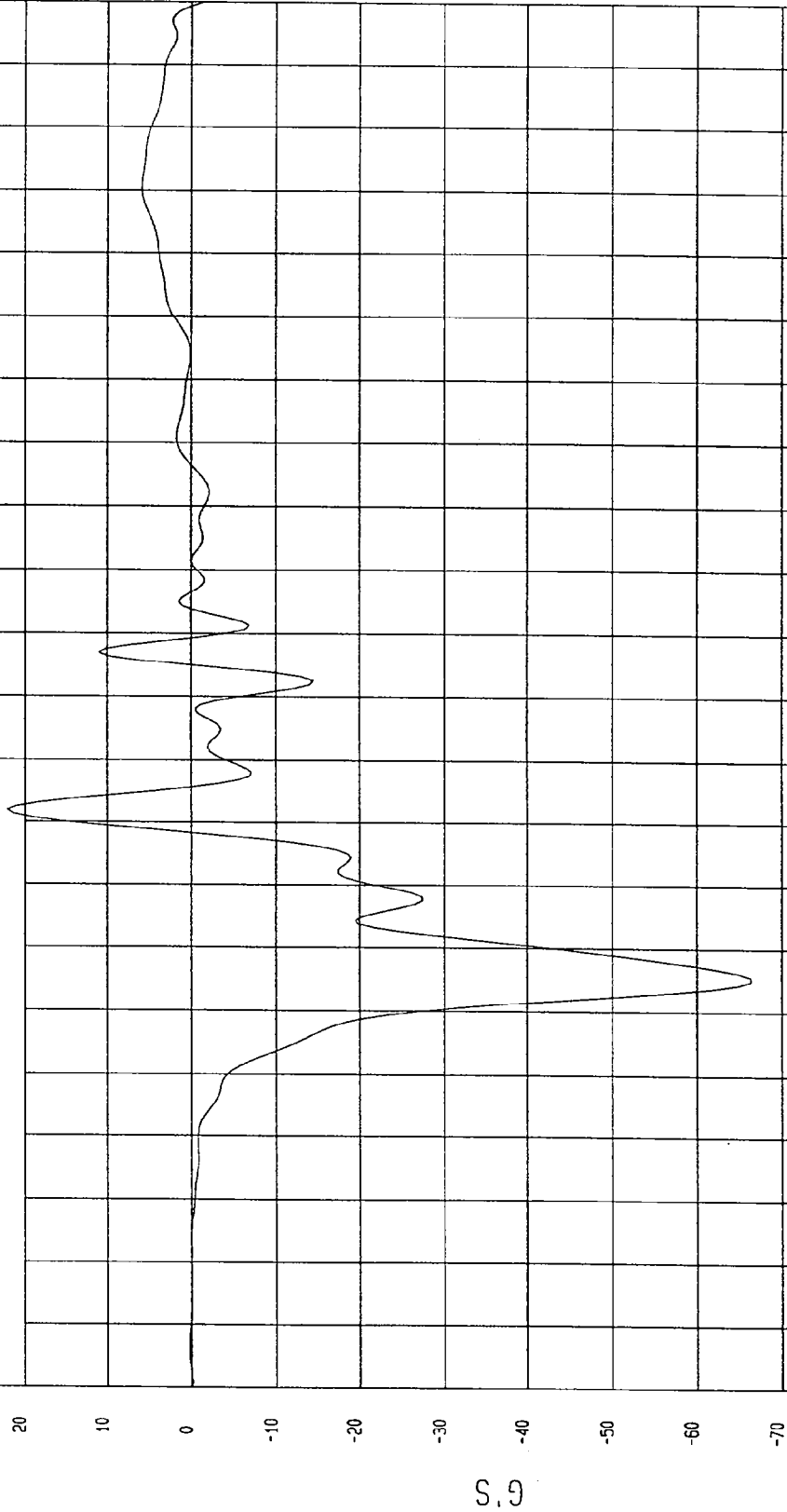
COMPONENT: 1997 HYUNDAI ELANTRA (CV0500)

Maximum = 22.12 G'S at 72 msec

Minimum = -66.37 G'S at 45 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 897005F1.067 Filter: class (FIR Filtered)



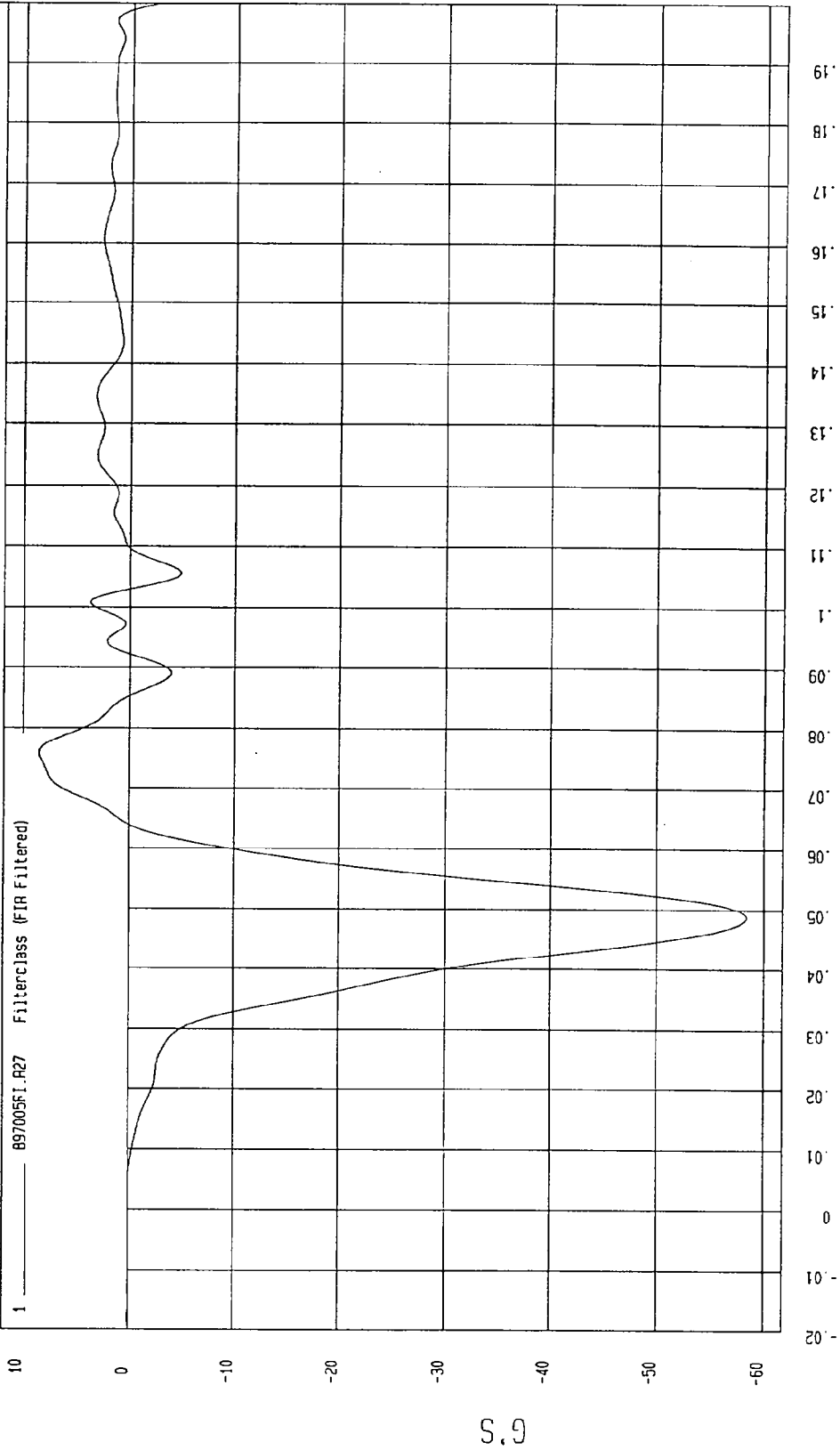
MOA Research
01-09-1997 12:02

TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -58.38 G'S at 49 msec
Maximum = 8.54 G'S at 76 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION



MCA Research
01-09-1997 12:02

TEST: FMVSS 214 RIGHT SIDE IMPACT

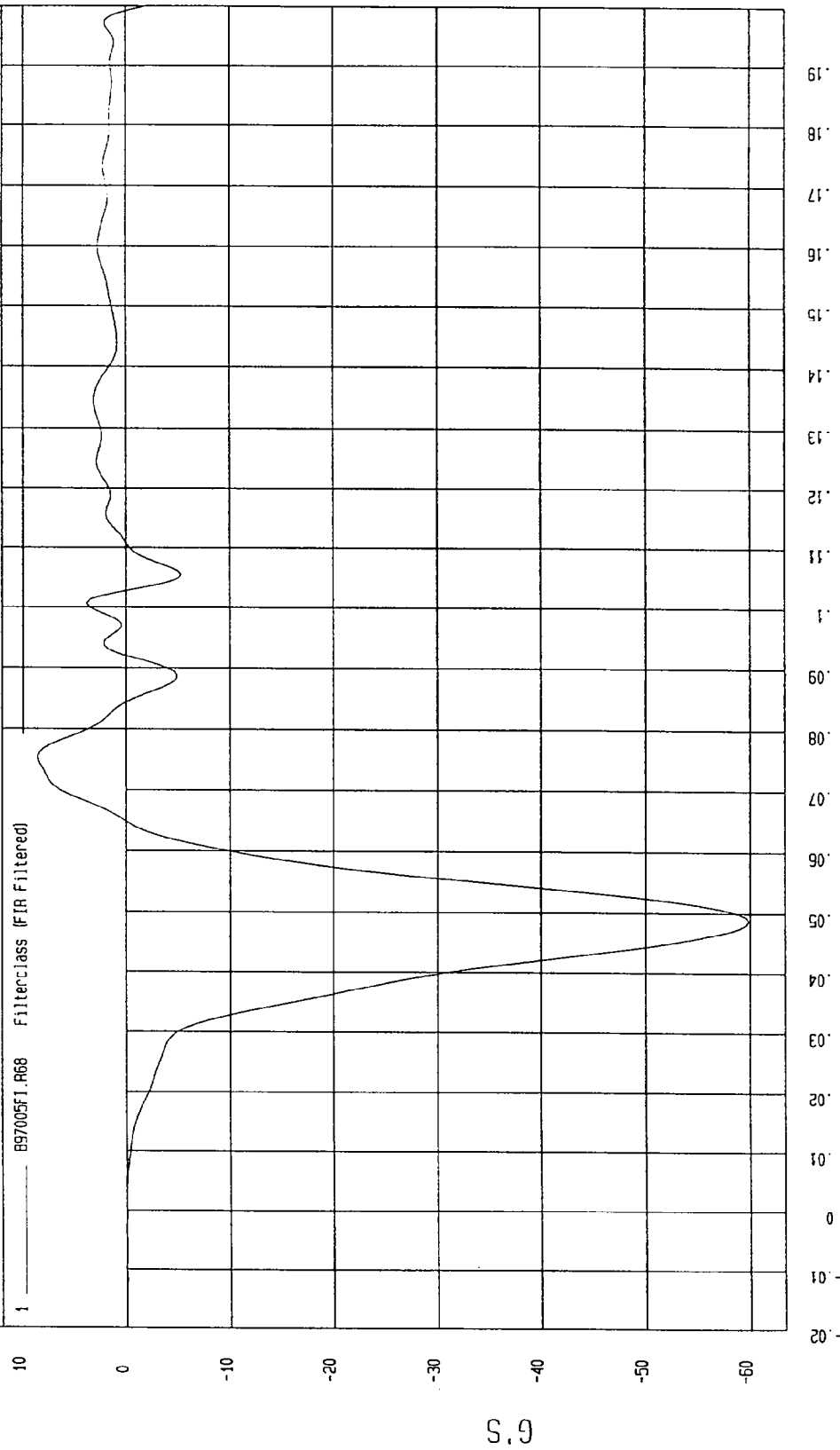
TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -59.87 G'S at 49 msec

Maximum = 8.61 G'S at 76 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION



MCA Research
01-08-1997 12:02

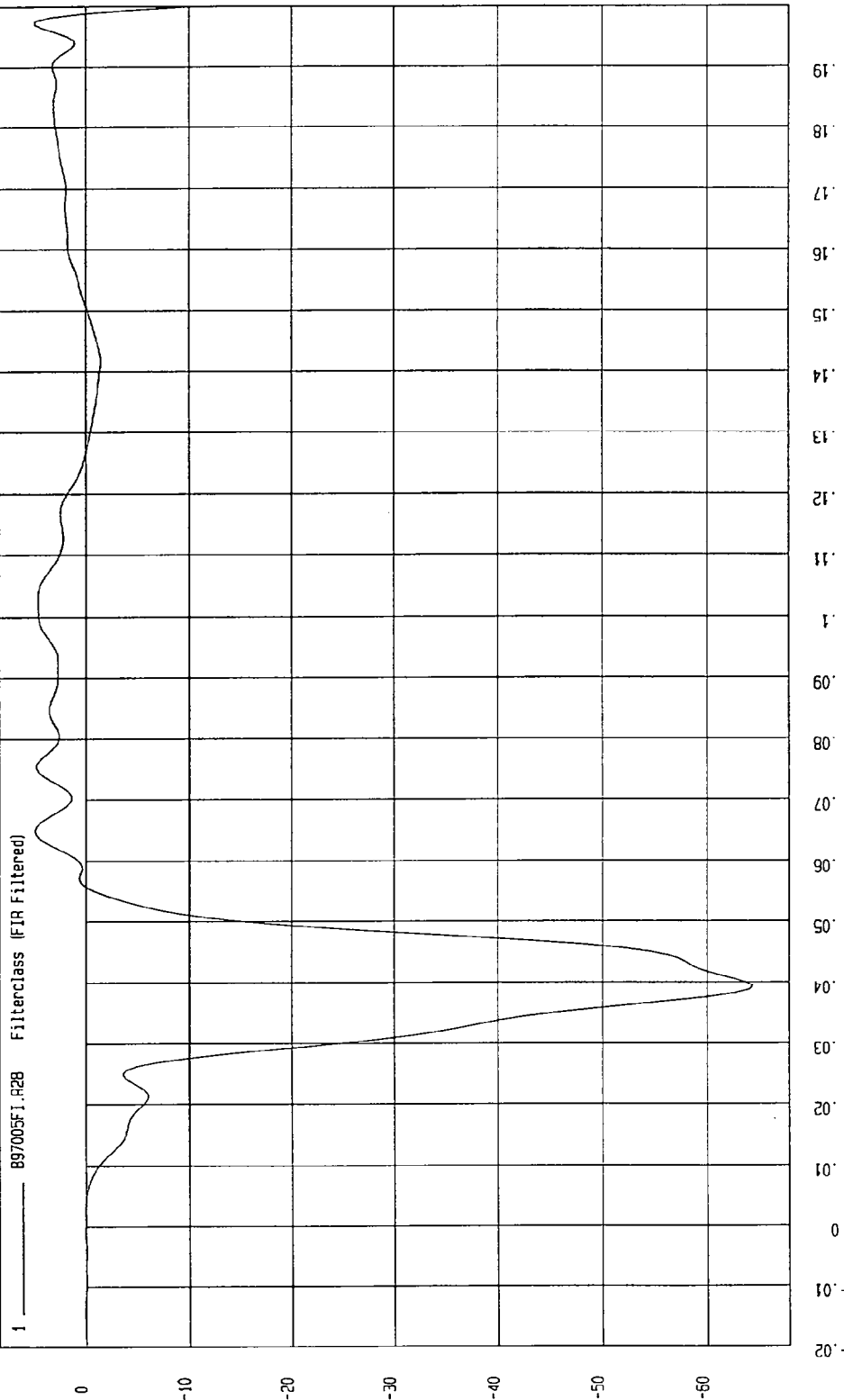
TEST: FMVSS 214 RIGHT SIDE IMPACT TEST DATE: 01-08-1997

COMPONENT: 1997 HYUNDAI ELANTRA (CV0500) Speed: 33.26 MPH 53.5 KPH

Minimum = -64.31 G'S at 39 msec

Maximum = 4.90 G'S at 65 msec

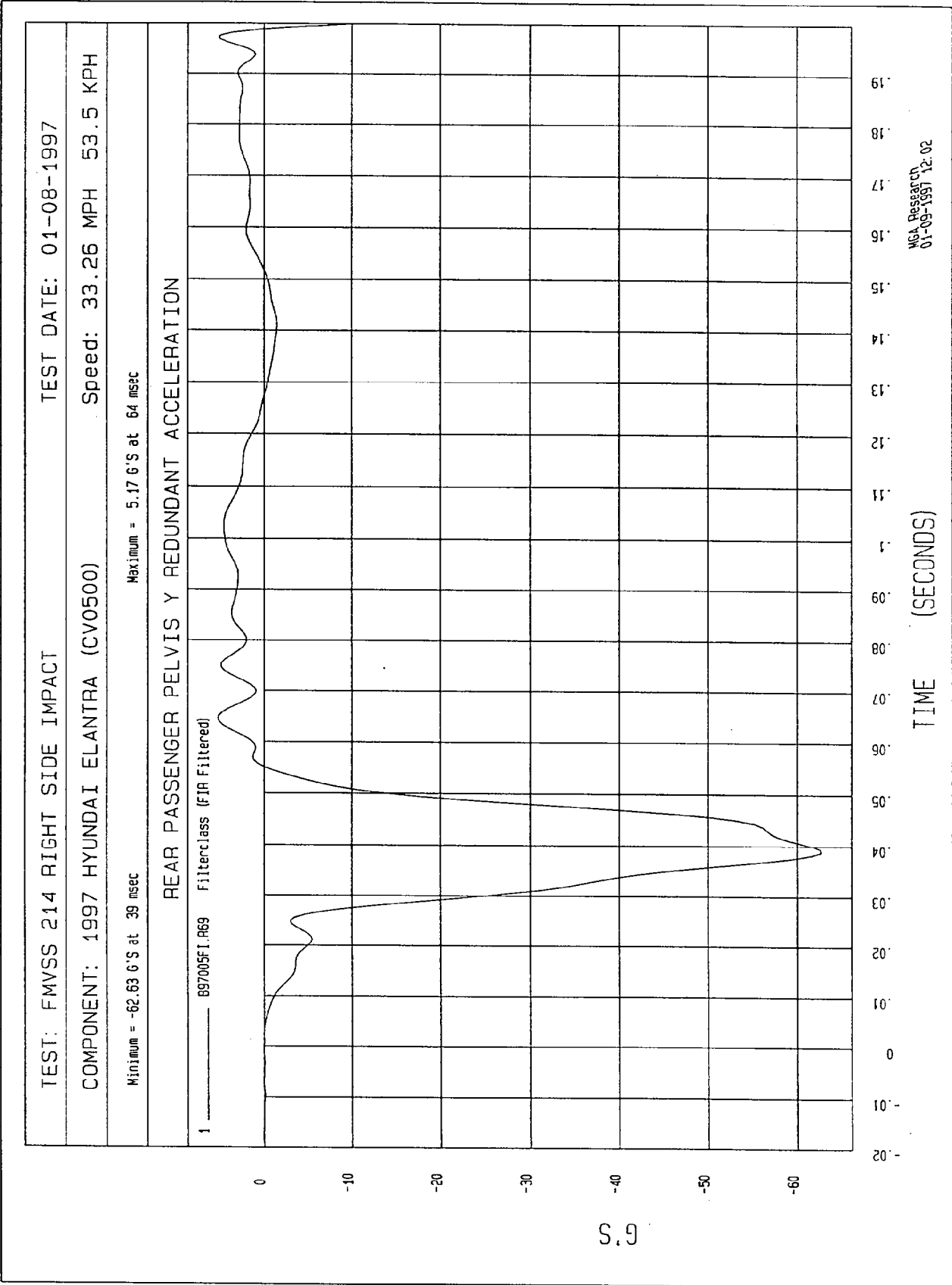
REAR PASSENGER PELVIS Y ACCELERATION



MCA Research
01-09-1997 12:02

TIME (SECONDS)

G



APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-96-DC19

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

HYUNDAI MOTOR COMPANY
1997 HYUNDAI ELANTRA 4 DOOR
NHTSA NO. CV0500

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: January 8, 1997

Report Date: January 16, 1997

FINAL REPORT

Prepared For:

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

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	VEHICLE AND DUMMY TEMPERATURE	7-1

PRE-TEST CERTIFICATION DATA

Front Dummy Serial Number: 275

Calibration Test Results Summary

Dummy Serial Number: 275

Pre-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 275

DATE OF VERIFICATION: January 7, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.00
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.1
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.4
HW - Hip Width	14.0" - 15.4"	14.5

MEASUREMENTS BY: Tim White

APPROVED BY: Steve Kosloski

MGA RESEARCH CORPORATION
THORACIC SHOCK ABSORBER TEST
SIDE IMPACT DUMMY (SID)

DATE: January 3, 1997

DUMMY NUMBER: 275

TEST NUMBER: D9701678

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		66° - 78° F	70°
RELATIVE HUMIDITY		10 - 70%	26%
VELOCITY 10 ft/s	FORCE (lb.)	188 - 253	209
	DISPLACEMENT (in.)	1.18 - 1.38	1.37
VELOCITY 14 ft/s	FORCE (lb.)	389 - 472	397
	DISPLACEMENT (in.)	1.26 - 1.47	1.46
VELOCITY 20 ft/s	FORCE (lb.)	841 - 1000	853
	DISPLACEMENT (in.)	1.30 - 1.57	1.56

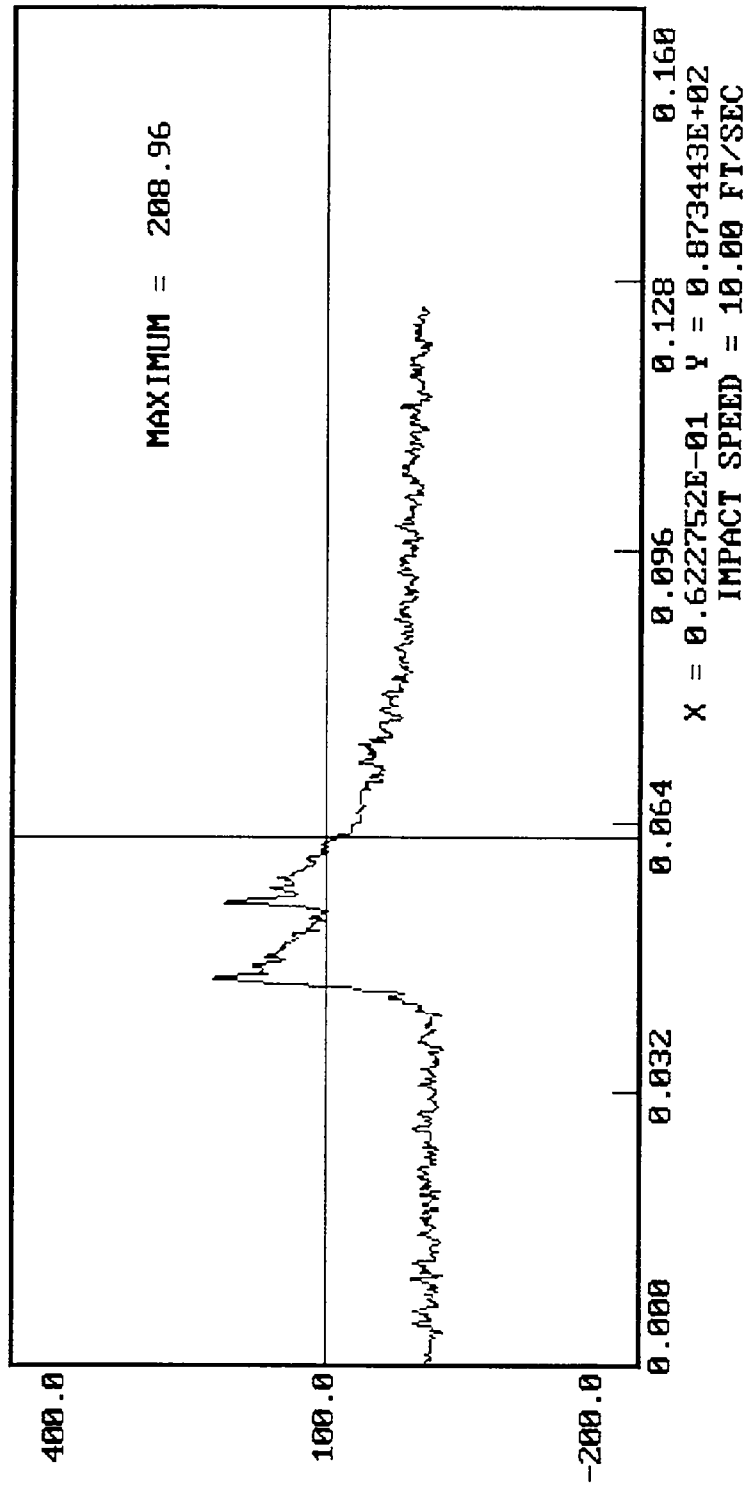
TEST MEETS SPECIFICATIONS

TECHNICIAN Jim M. Quinn

APPROVED BY Don K. L. L. L.

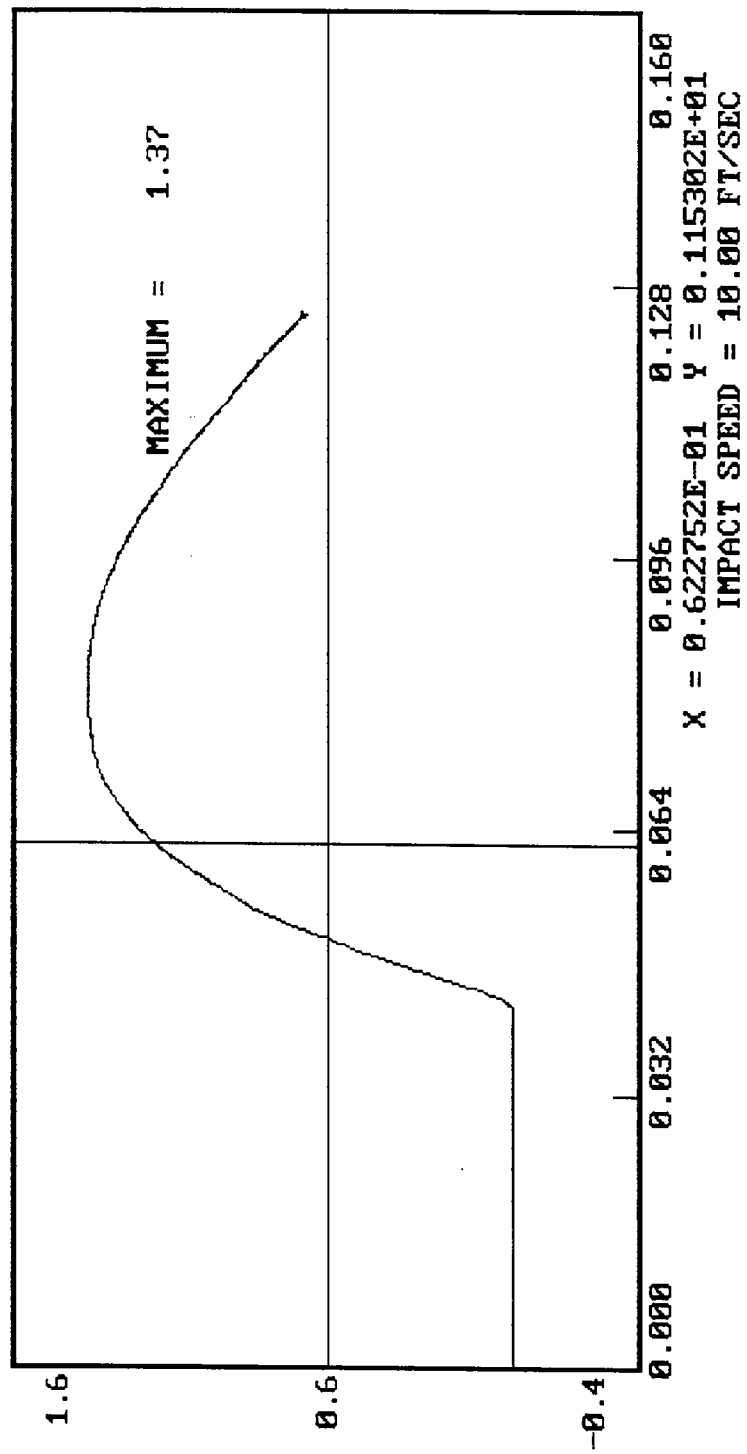
DUMMY CALIBRATION - DAMPENER BENCH TEST
 DUMMY # 275
 FORCE (LBS) VS. TIME ((SECONDS))

01-03-1997 10:21



01-03-1997 10:21

DUMMY CALIBRATION - DAMPENER BENCH TEST
DUMMY # 275
DISPLACEMENT (IN) VS. TIME ((SECONDS))

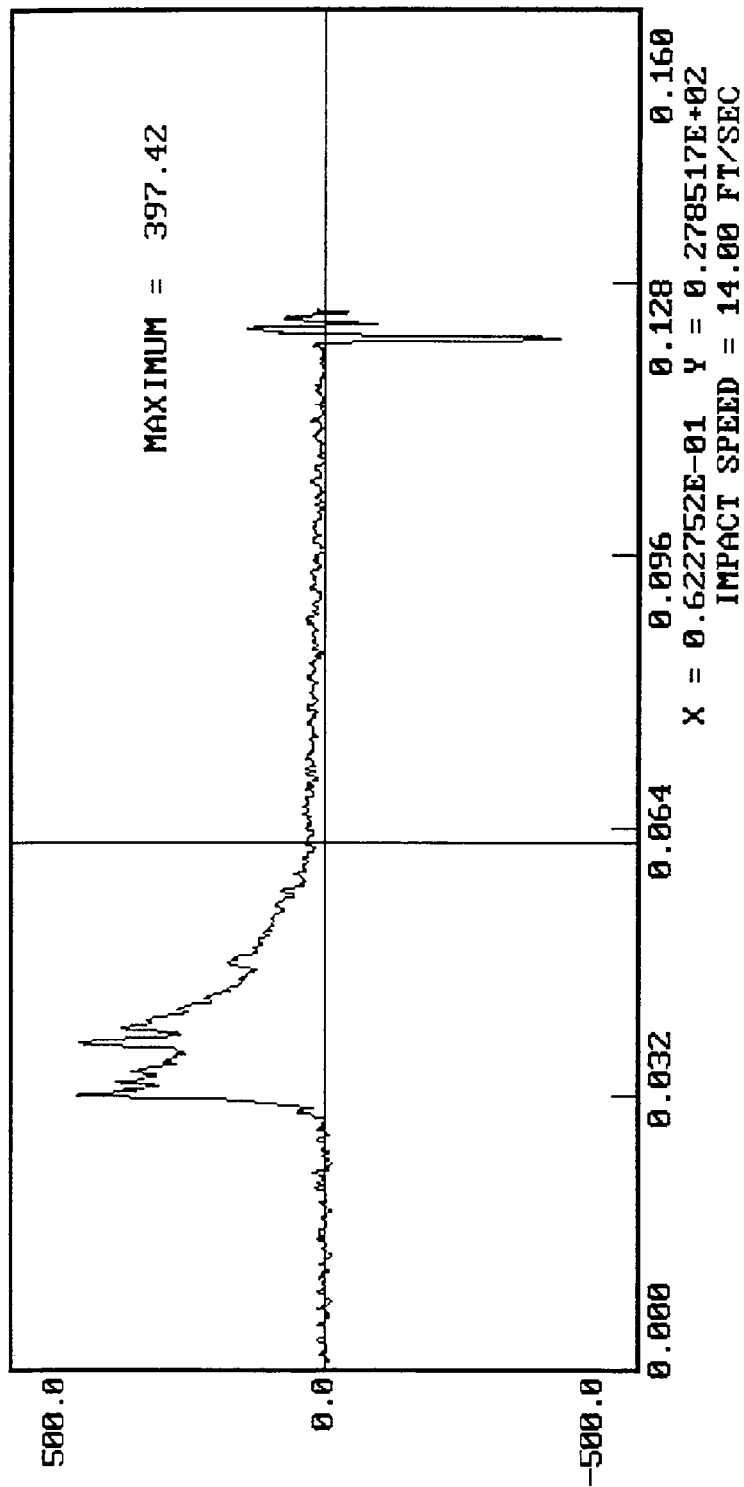


01-03-1997 10:28

DUMMY CALIBRATION - DAMPENER BENCH TEST

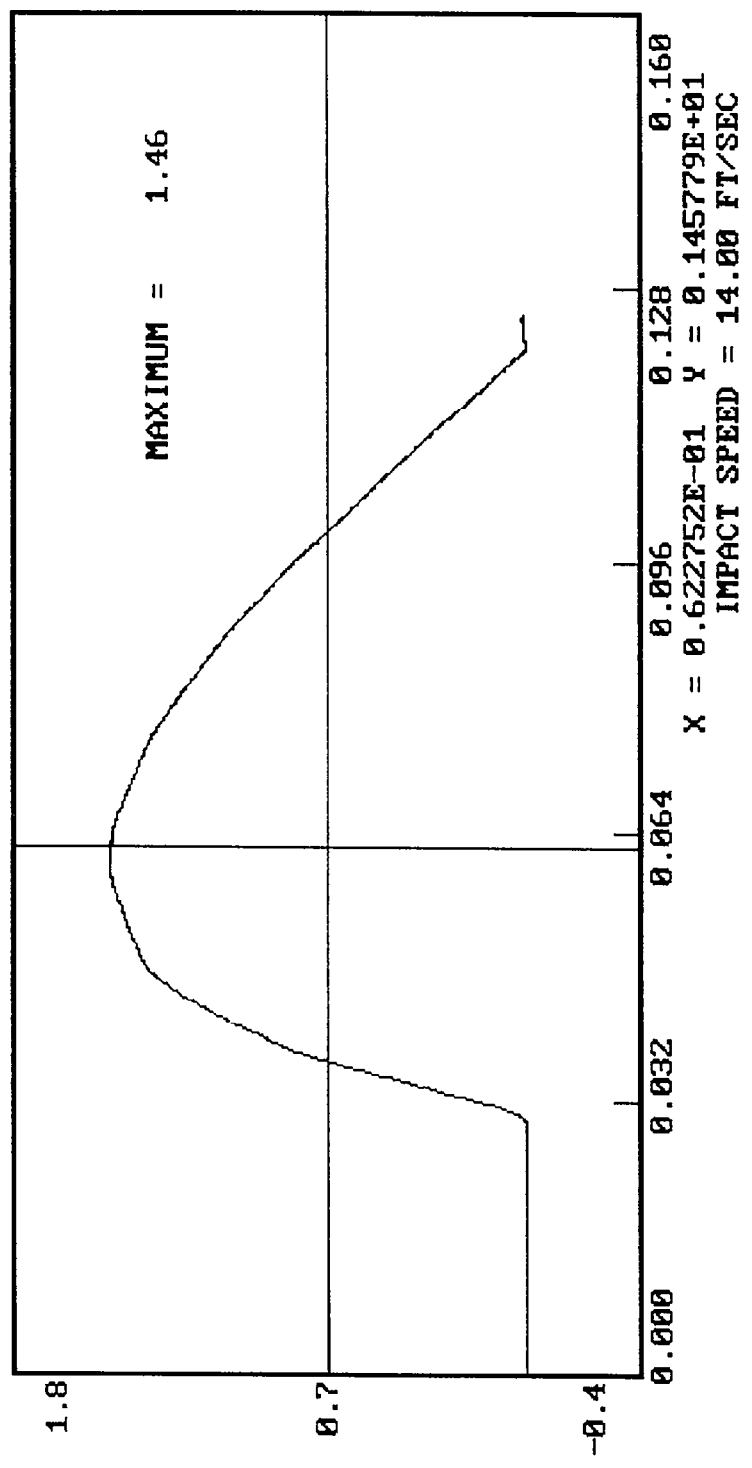
DUMMY # 275

FORCE (LBS) VS. TIME ((SECONDS))



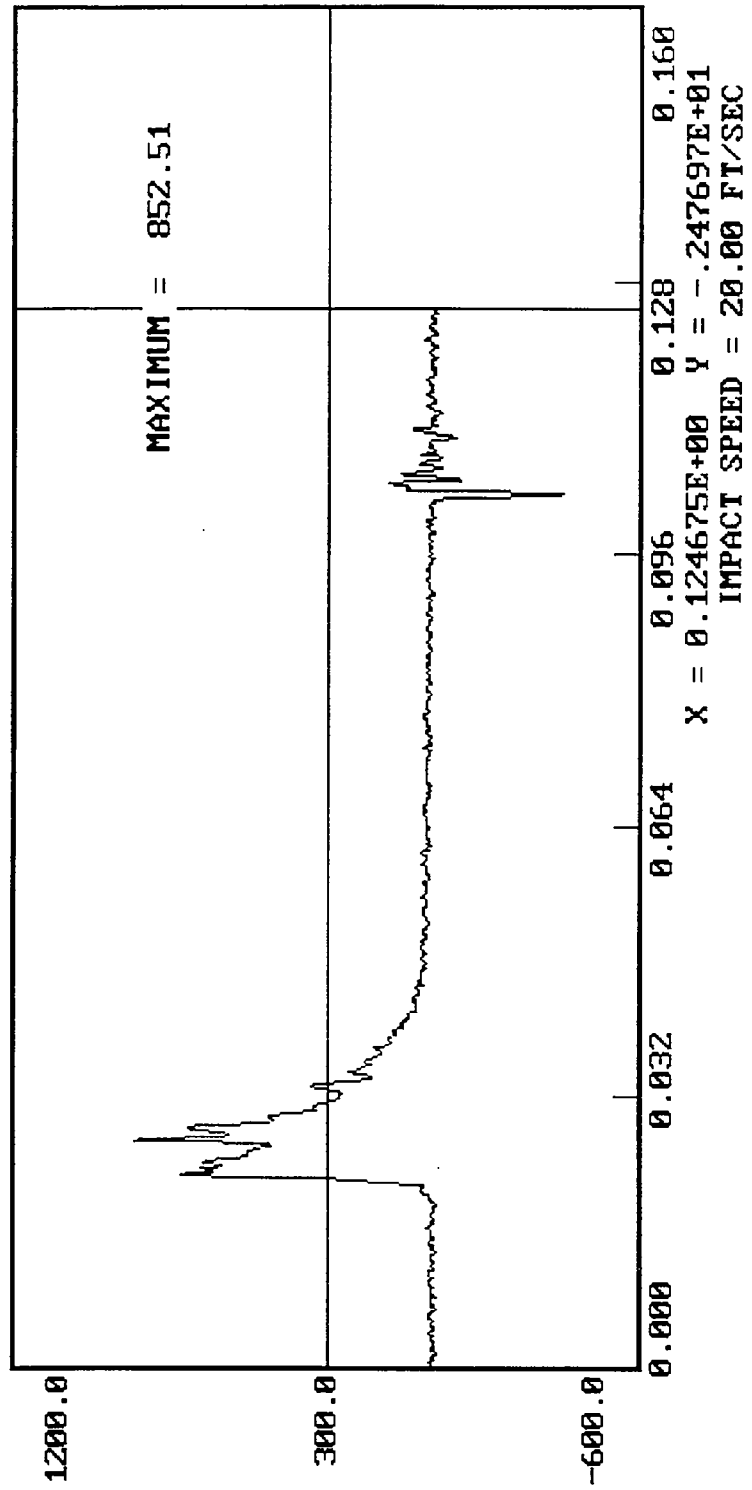
01-03-1997 10:28

DUMMY CALIBRATION - DAMPENER BENCH TEST
DUMMY # 275
DISPLACEMENT (IN) VS. TIME ((SECONDS))



DUMMY CALIBRATION - DAMPENER BENCH TEST
 DUMMY # 275
 FORCE (LBS) VS. TIME ((SECONDS))

01-03-1997 10:35

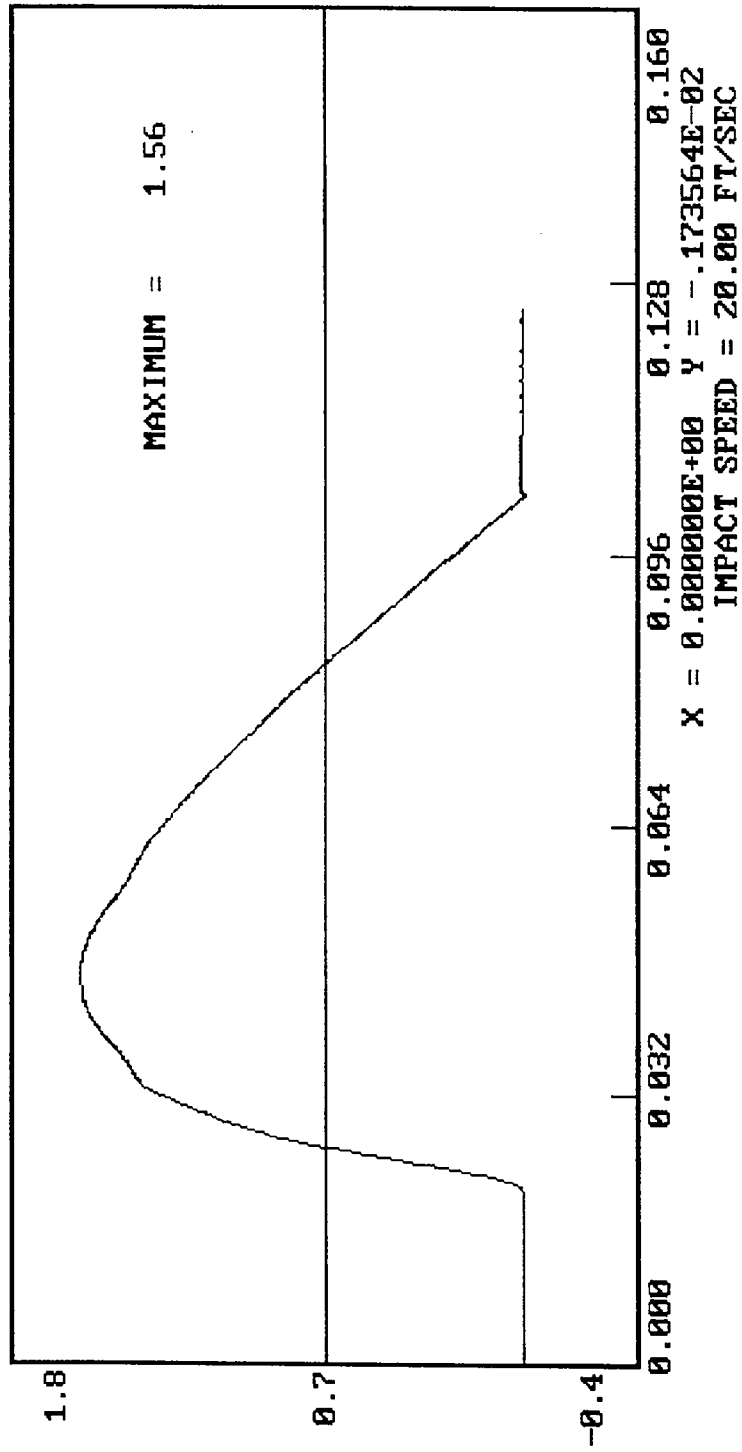


01-03-1997 10:35

DUMMY CALIBRATION - DAMPENER BENCH TEST

DUMMY # 275

DISPLACEMENT (IN) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

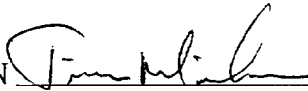
DUMMY NUMBER: 275

TEST NUMBER: D97012

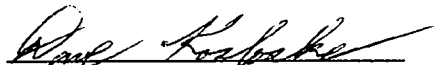
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	12%
PROBE SPEED	13.8 - 14.2 fps	14.1
UPPER RIB	37 - 46 g's	41
LOWER RIB	37 - 46 g's	39
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN

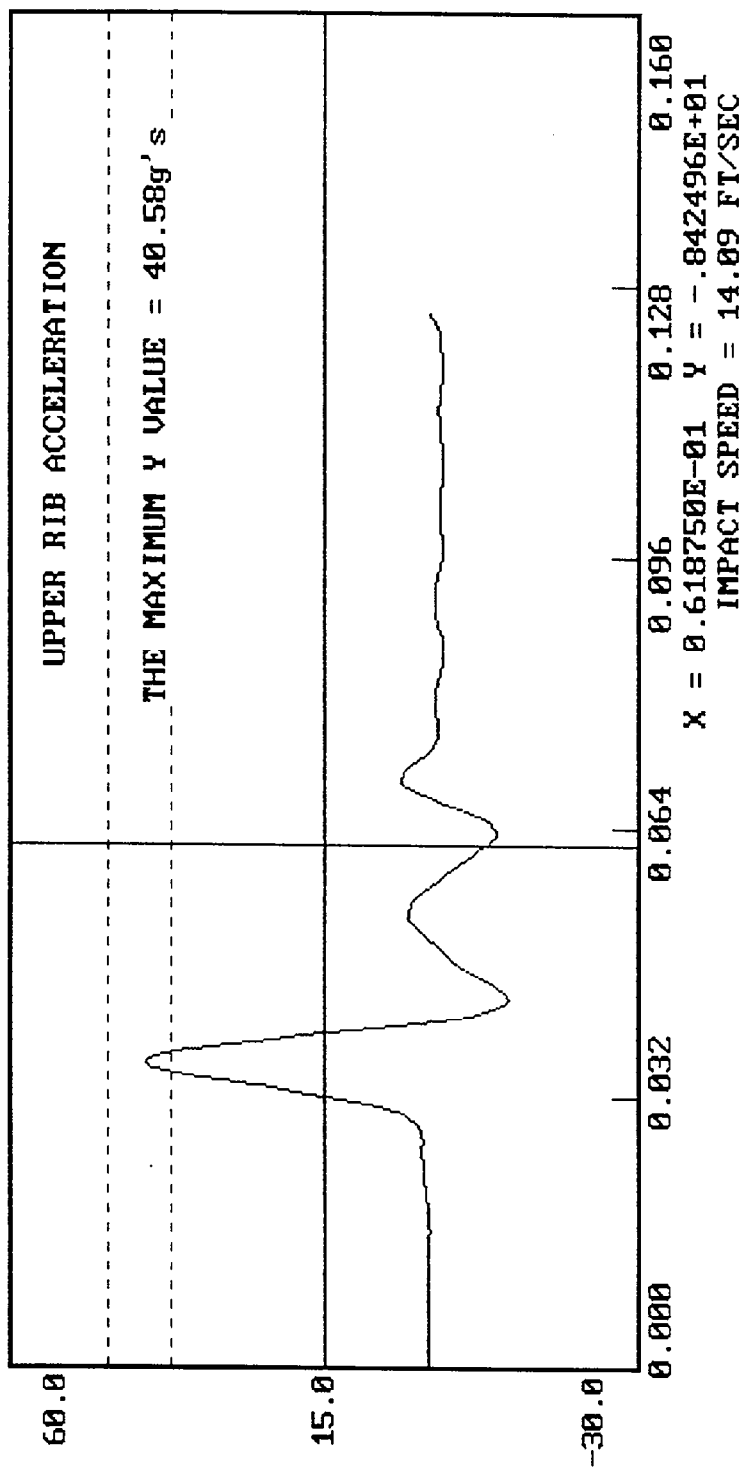


APPROVED BY

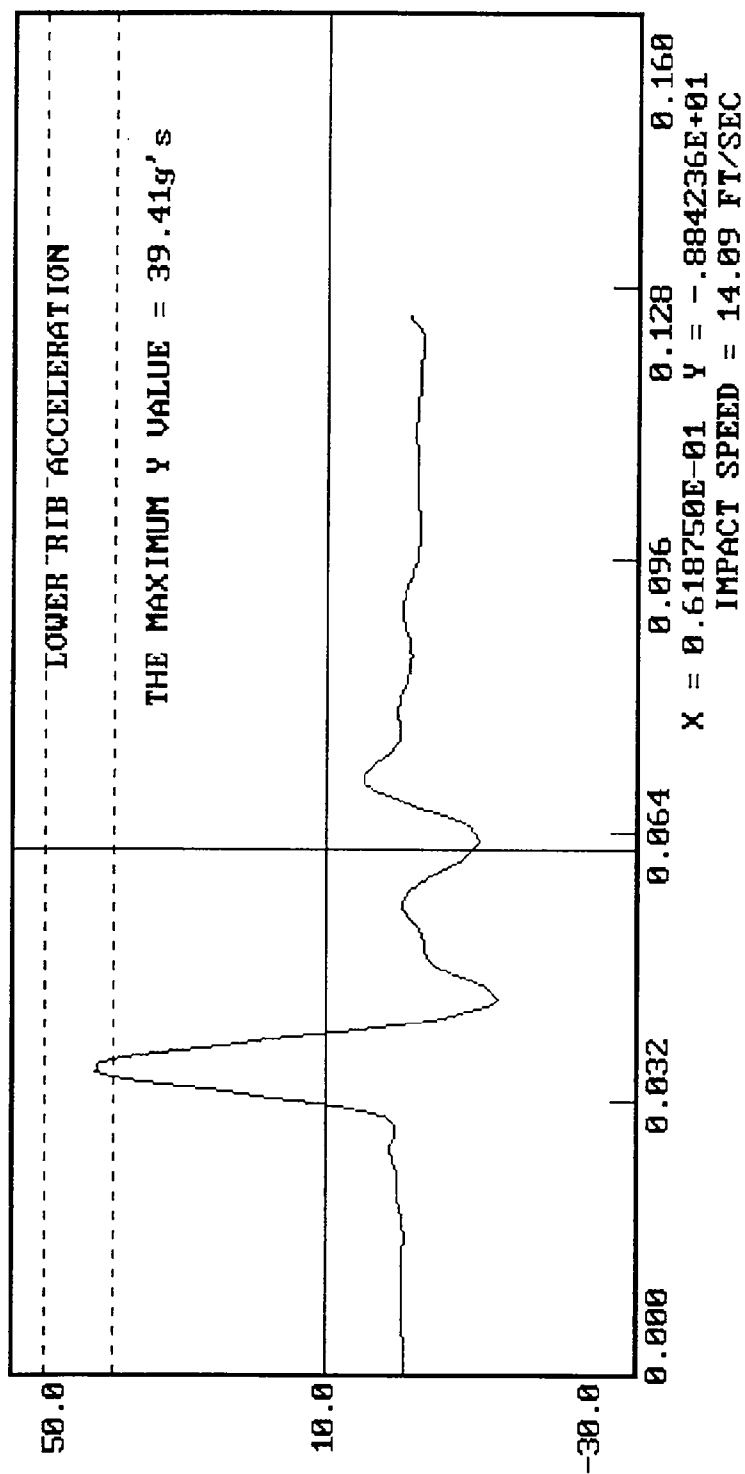


DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 275
 ACCELERATION (G'S) VS. TIME ((SECONDS))

01-07-1997 14:39



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 275
 01-07-1997 14:39
 ACCELERATION (G'S) VS. TIME ((SECONDS))

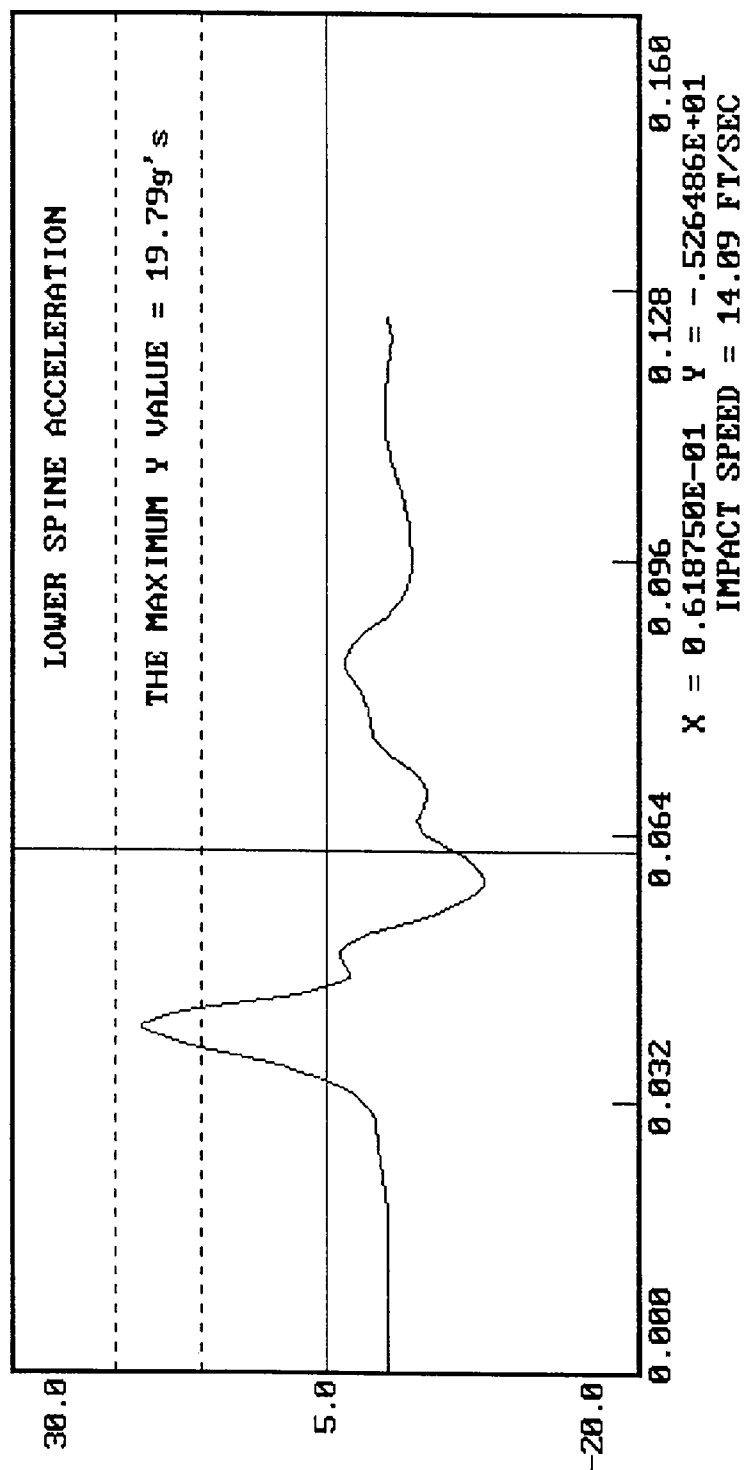


01-07-1997 14:39

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 275

ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97013

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	12%
PROBE SPEED	13.8 - 14.2 f/s	14.2
PELVIS ACCELERATION	40 - 60 g's	41

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim W. L.

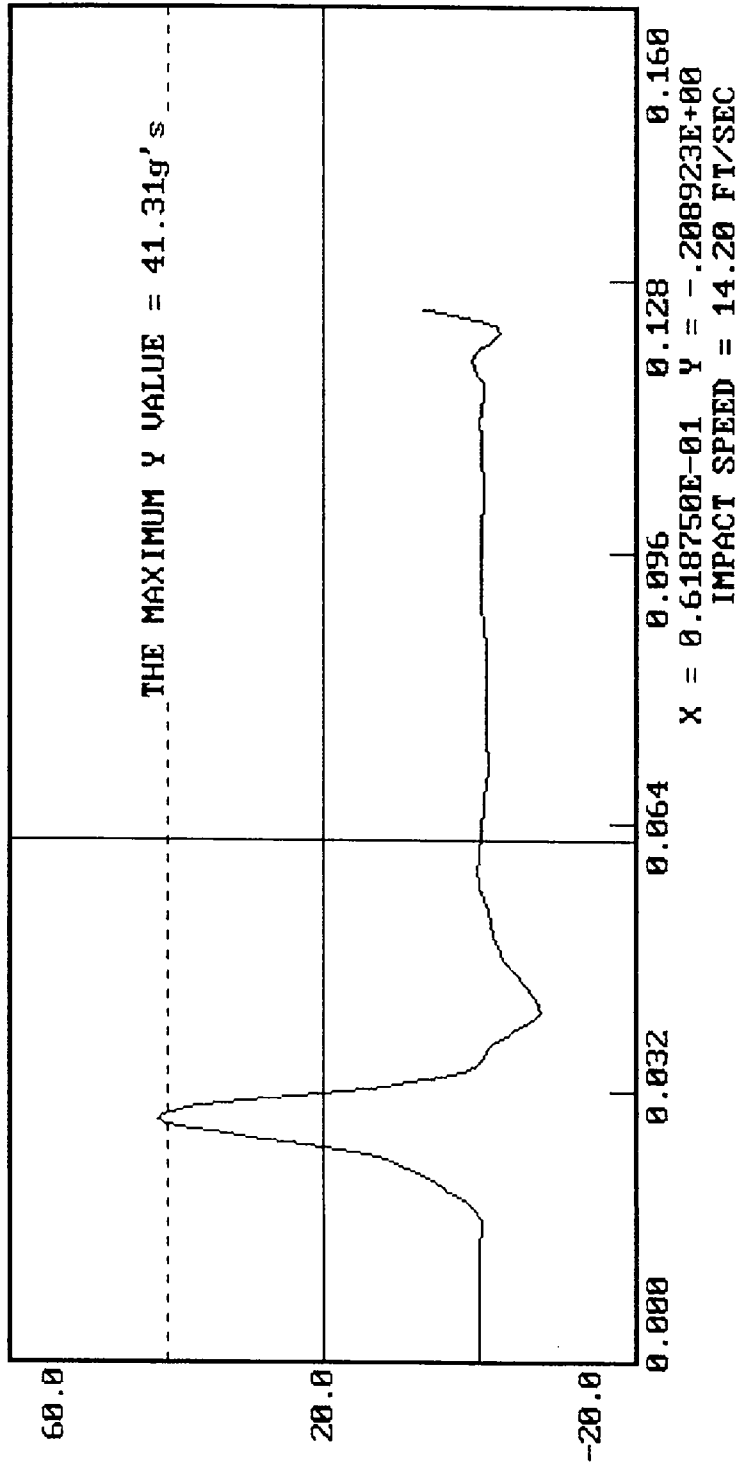
APPROVED BY Rene K. K.

01-07-1997 15:11

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 275

ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 7, 1997

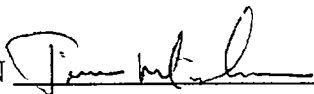
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TEST NUMBER: D97014

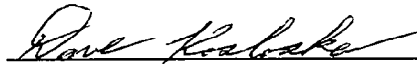
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.9
FORCE @ 0.75 in	36.7 - 49.8 lbs	43.6
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	80

TEST MEETS SPECIFICATIONS

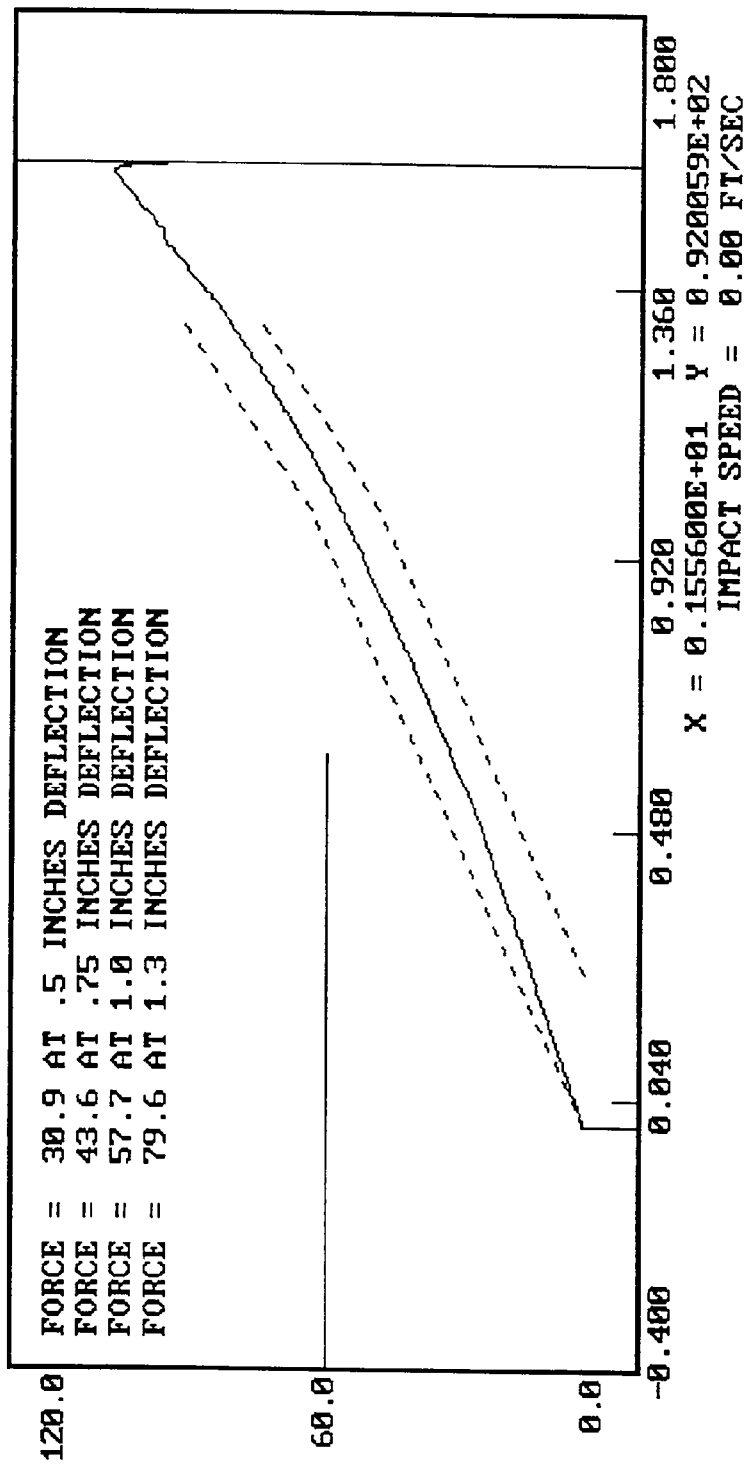
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 275
 01-07-1997 18:04
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97015

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	12%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	33
FORCE @ 30°	34 - 46 lbs	42
FORCE @ 40°	46 - 58 lbs	49
RETURN ANGLE	12° maximum	2°

TEST MEETS SPECIFICATIONS

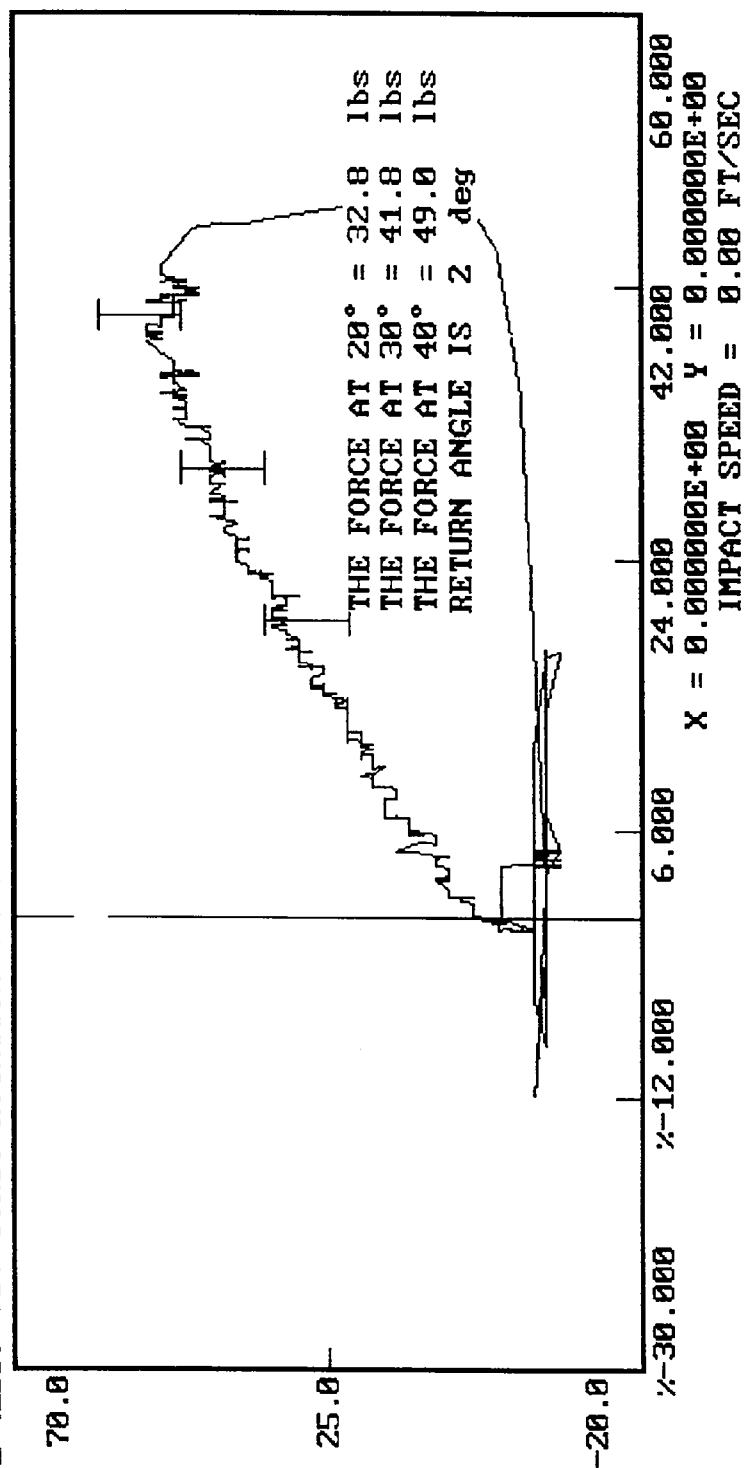
TECHNICIAN Jim Miller

APPROVED BY Dave Kabske

DUMMY CALIBRATION - LUMBAR FLEXION
DUMMY # 275
FORCE (LBS) VS. TORSO ROTATION (DEGREES)

DUMMY # 275

FORCE (LBS) VS. TORSO ROTATION (DEGREES)



PRE-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 274

Calibration Test Results Summary

Passenger Serial Number: 274

Pre-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 274

DATE OF VERIFICATION: January 7, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.1
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	14.6

MEASUREMENTS BY: Jim M. Quinn

APPROVED BY: Dave Korbache

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97042

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 fps	14.0
UPPER RIB	37 - 46 g's	38
LOWER RIB	37 - 46 g's	37
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN

Jim White

APPROVED BY

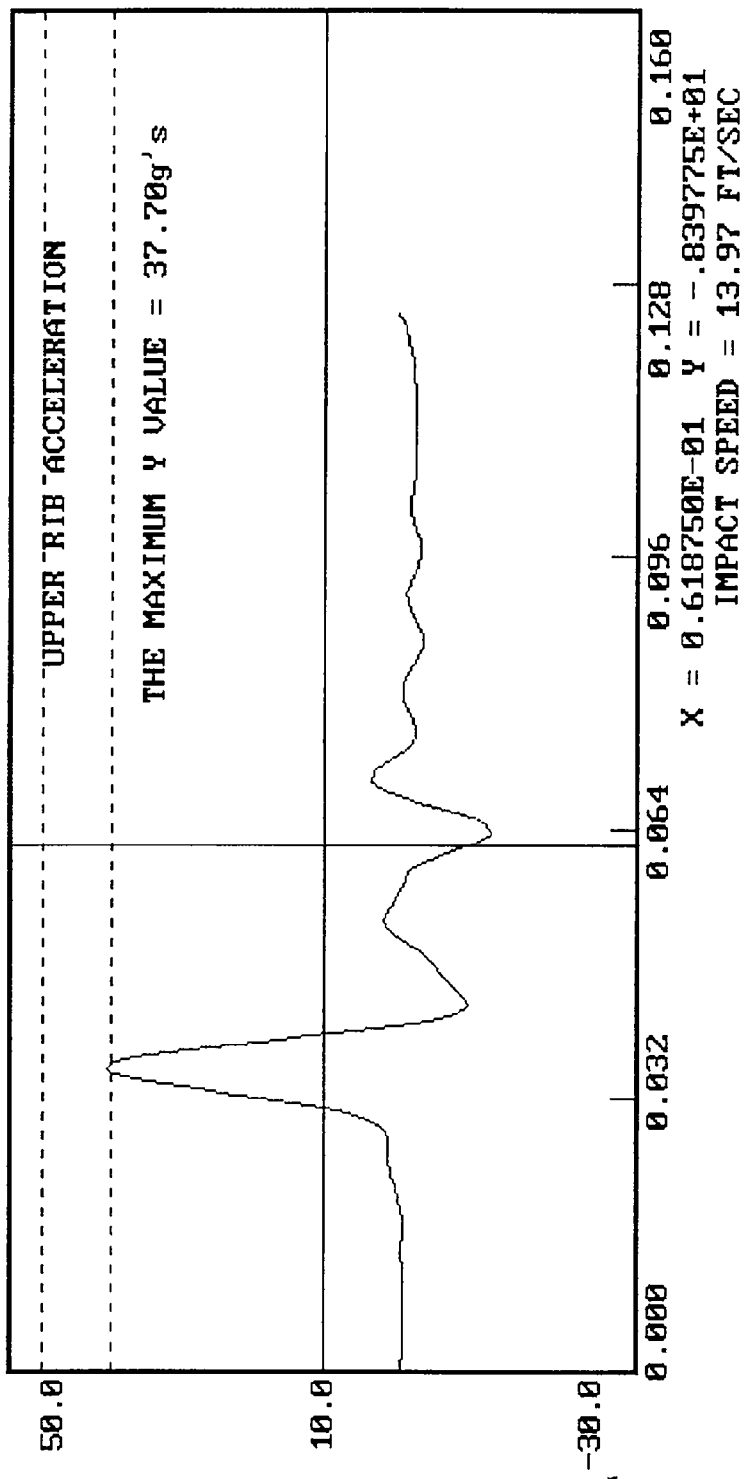
Rose Kaloupek

01-07-1997 16:57

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 274

ACCELERATION (G'S) VS. TIME ((SECONDS))

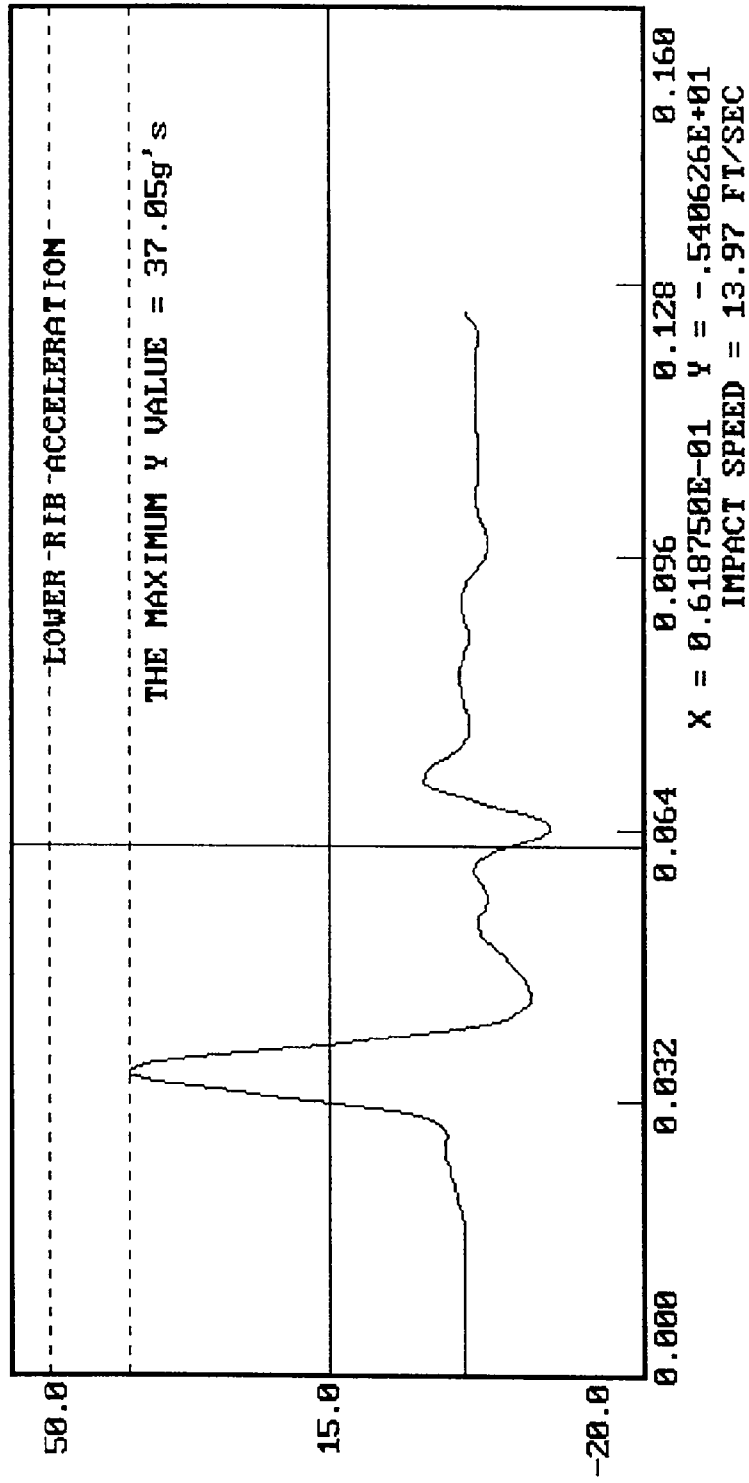


DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 274

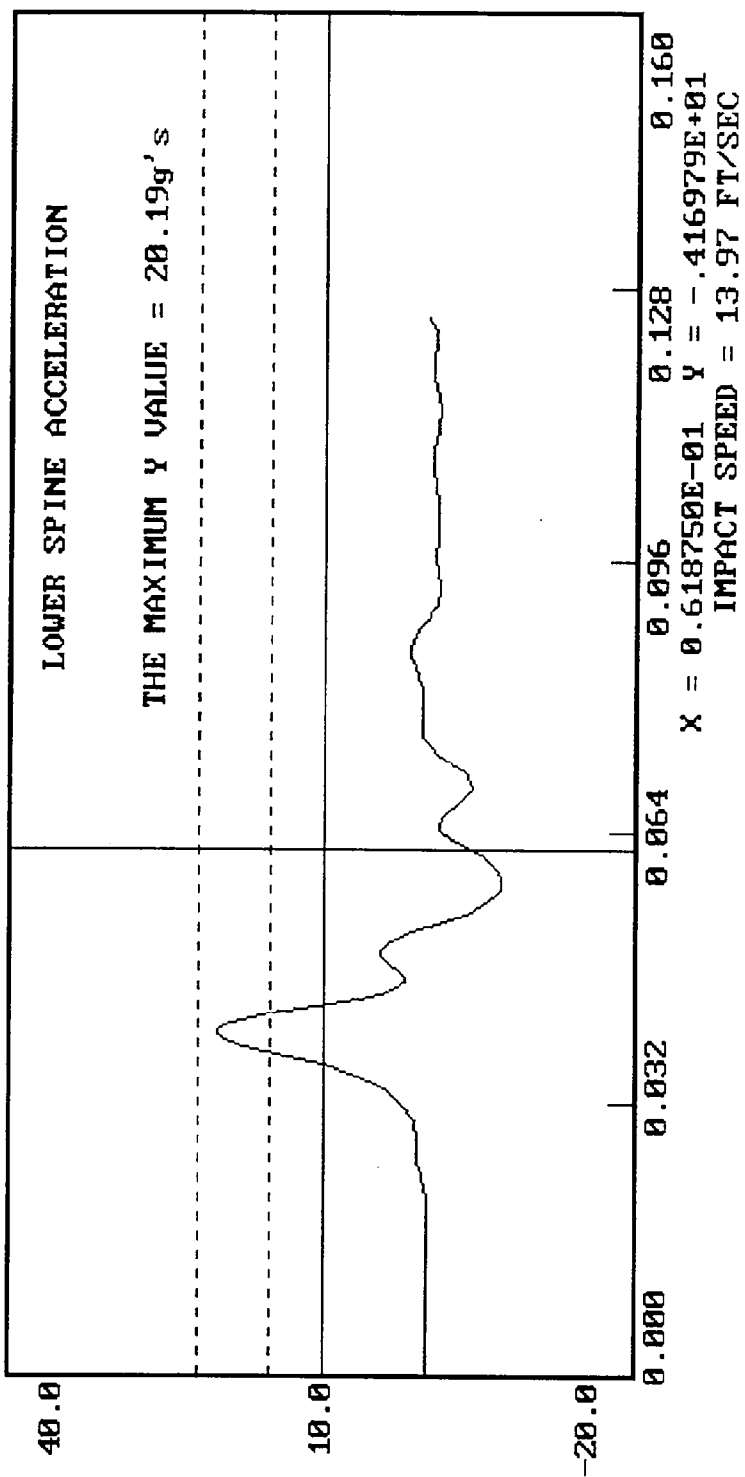
ACCELERATION (G'S) VS. TIME ((SECONDS))

01-07-1997 16:57



DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 274
01-07-1997 16:57

ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97043

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
PROBE SPEED	13.8 - 14.2 f/s	14.0
PELVIS ACCELERATION	40 - 60 g's	47

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim M. L.

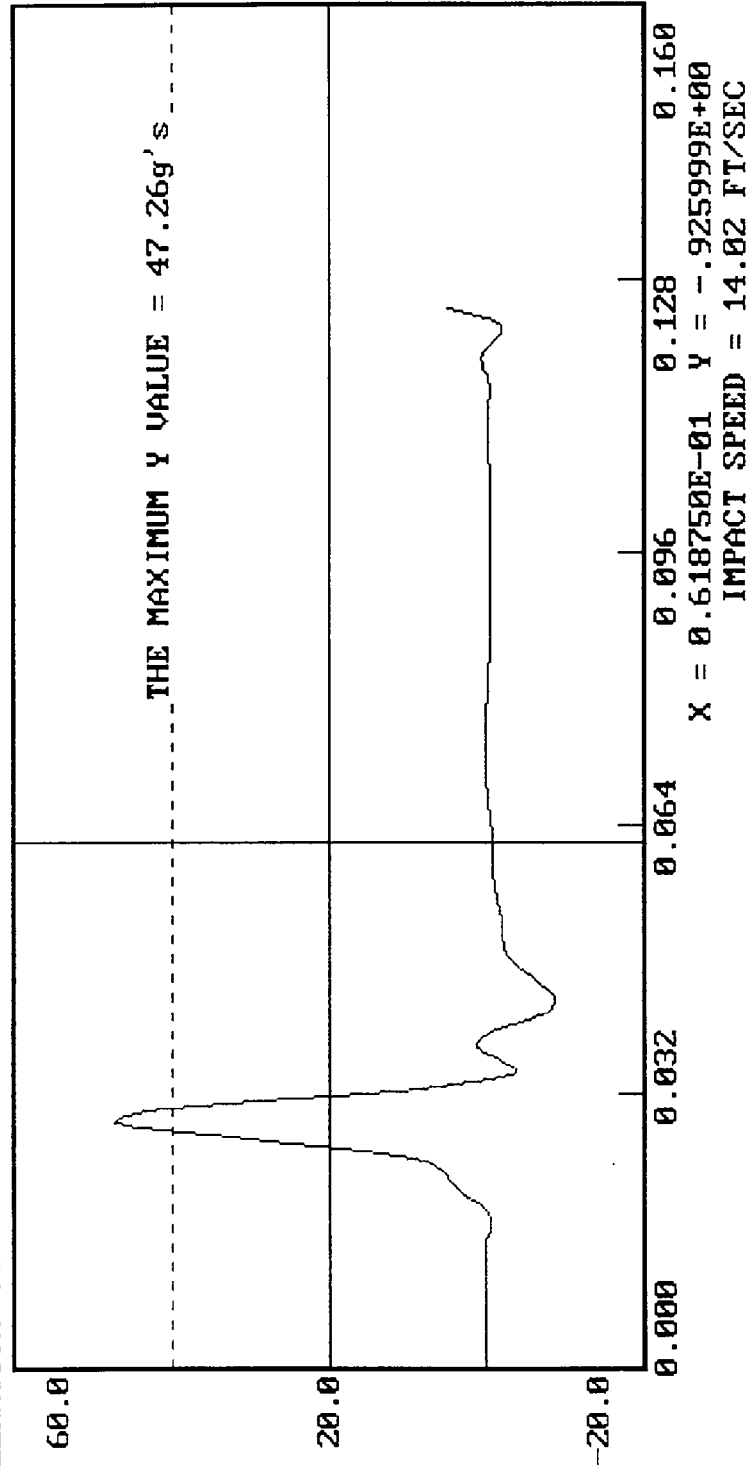
APPROVED BY Glenn K. K.

01-07-1997 17:09

DUMMY CALIBRATION - PELVIS IMPACT

DUMMY # 274

ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 7, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97044

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
FORCE @ 0.5 in	23.3 - 36.5 lbs	29.5
FORCE @ 0.75 in	36.7 - 49.8 lbs	41.2
FORCE @ 1.0 in	50 - 63 lbs	55
FORCE @ 1.3 in	73 - 88 lbs	74

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim M. L.

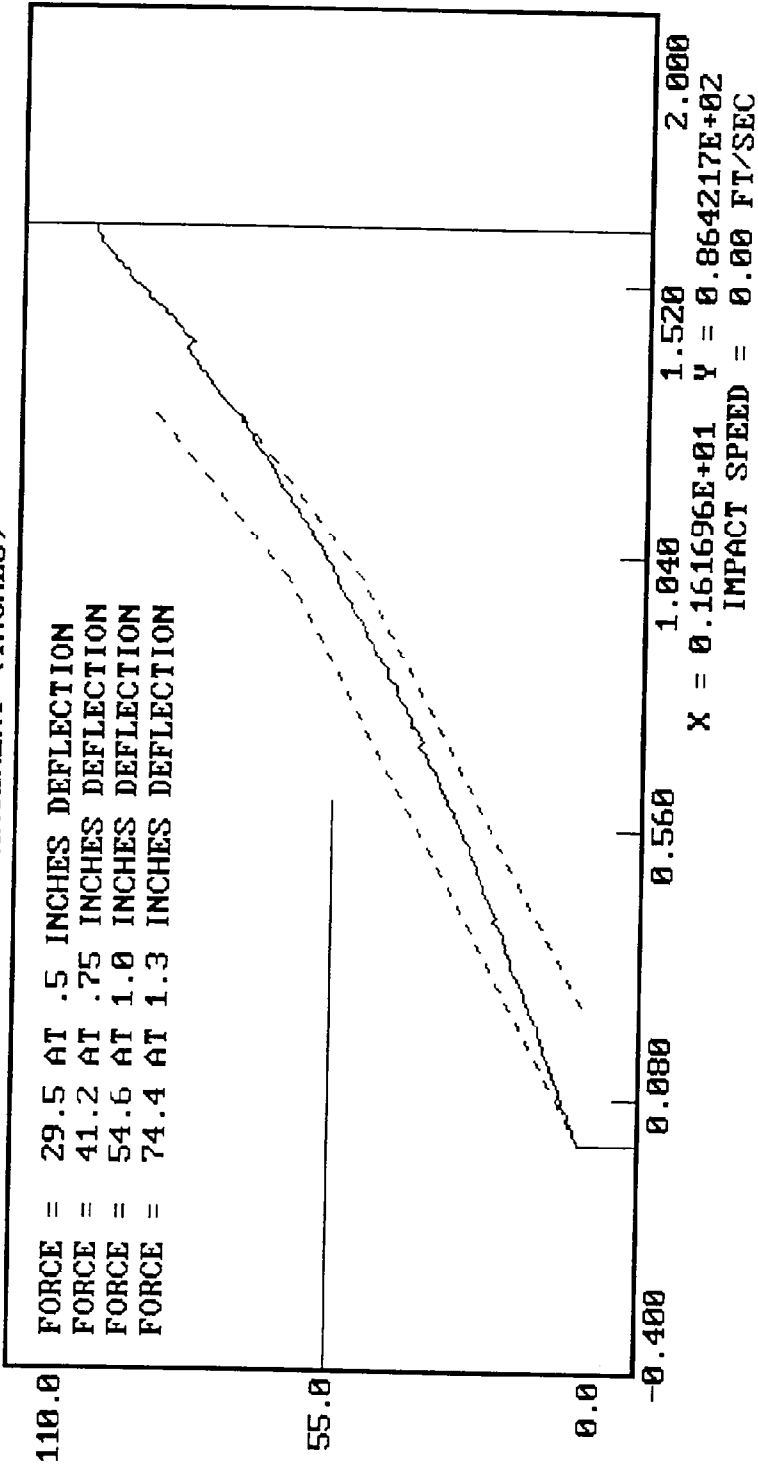
APPROVED BY Rene Habeske

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 274

01-07-1997 17:45

ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)

FORCE = 29.5 AT .5 INCHES DEFLECTION
 FORCE = 41.2 AT .75 INCHES DEFLECTION
 FORCE = 54.6 AT 1.0 INCHES DEFLECTION
 FORCE = 74.4 AT 1.3 INCHES DEFLECTION



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 7, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97045

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	15%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	26
FORCE @ 30°	34 - 46 lbs	39
FORCE @ 40°	46 - 58 lbs	48
RETURN ANGLE	12° maximum	1°

TEST MEETS SPECIFICATIONS

TECHNICIAN

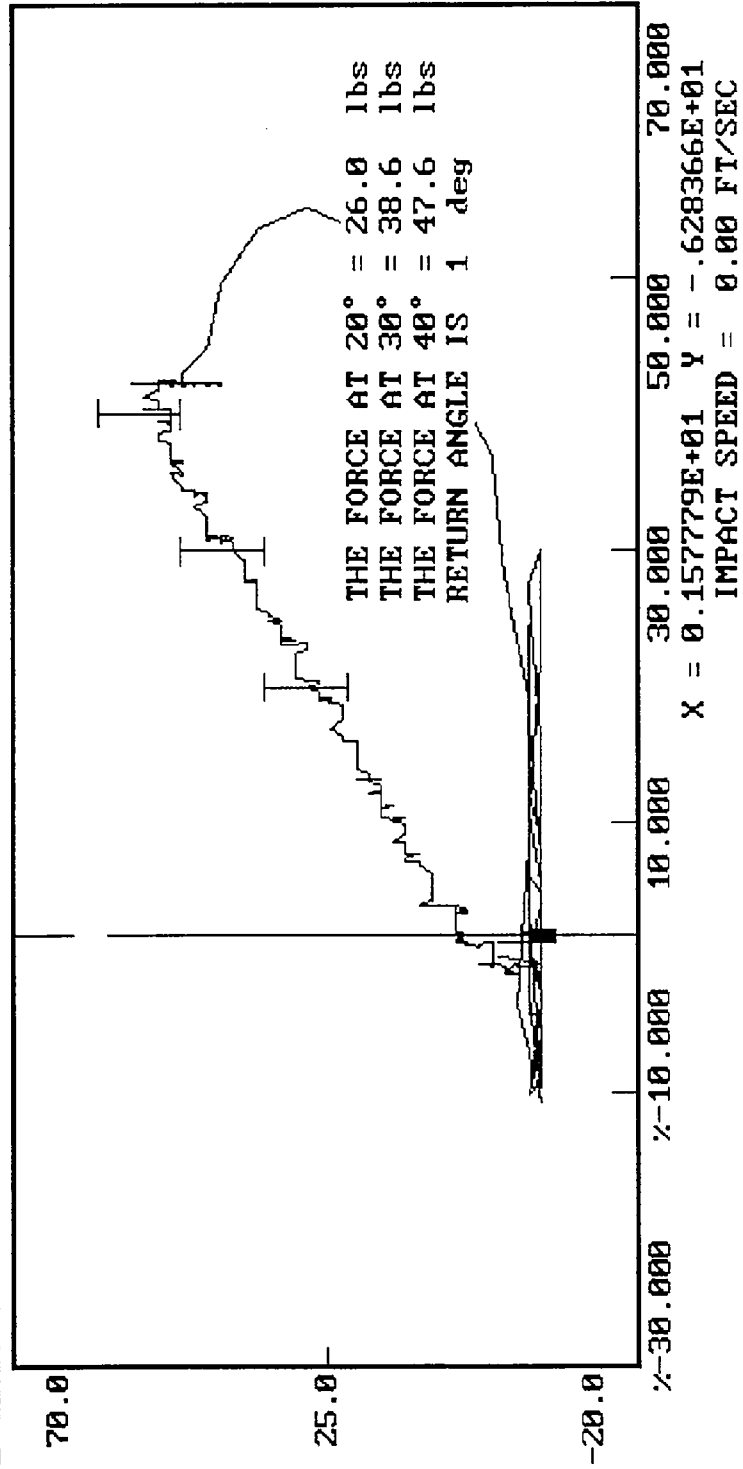
Tim W. L.

APPROVED BY

Paul K. K.

01-07-1997 17:32

DUMMY CALIBRATION - LUMBAR FLEXION
DUMMY # 274
FORCE (LBS) VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Front Dummy Serial Number: 275

Calibration Test Results Summary

Dummy Serial Number: 275

Post-Test Calibration

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

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 275

DATE OF VERIFICATION: January 15, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.00
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.1
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.4
HW - Hip Width	14.0" - 15.4"	14.5

MEASUREMENTS BY: Tim White

APPROVED BY: Dave Kosloske

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97172

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
PROBE SPEED	13.8 - 14.2 fps	14.2
UPPER RIB	37 - 46 g's	39
LOWER RIB	37 - 46 g's	37
LOWER SPINE	15 - 22 g's	18

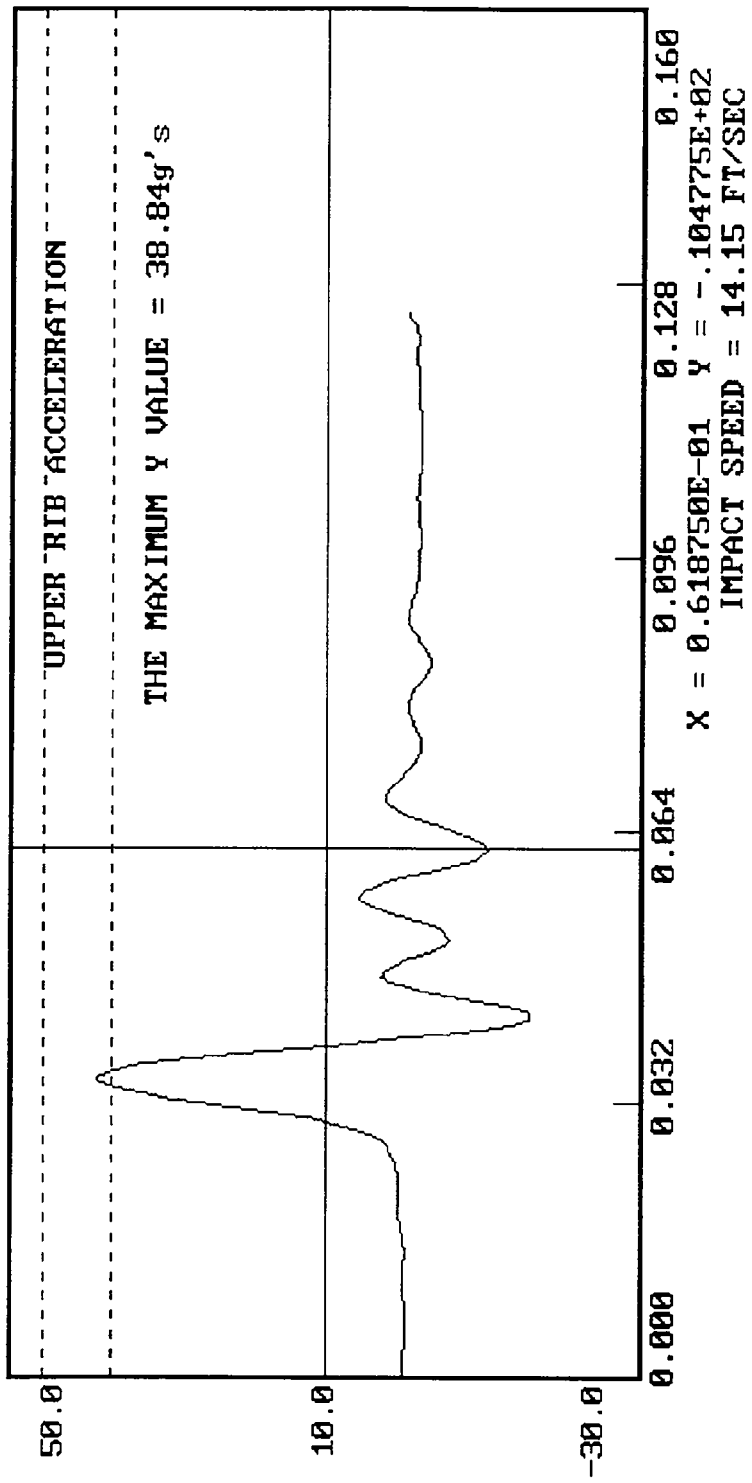
TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Walsh

APPROVED BY Dore Kelsche

DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 275
 ACCELERATION (G'S) VS. TIME ((SECONDS))

01-15-1997 16:16

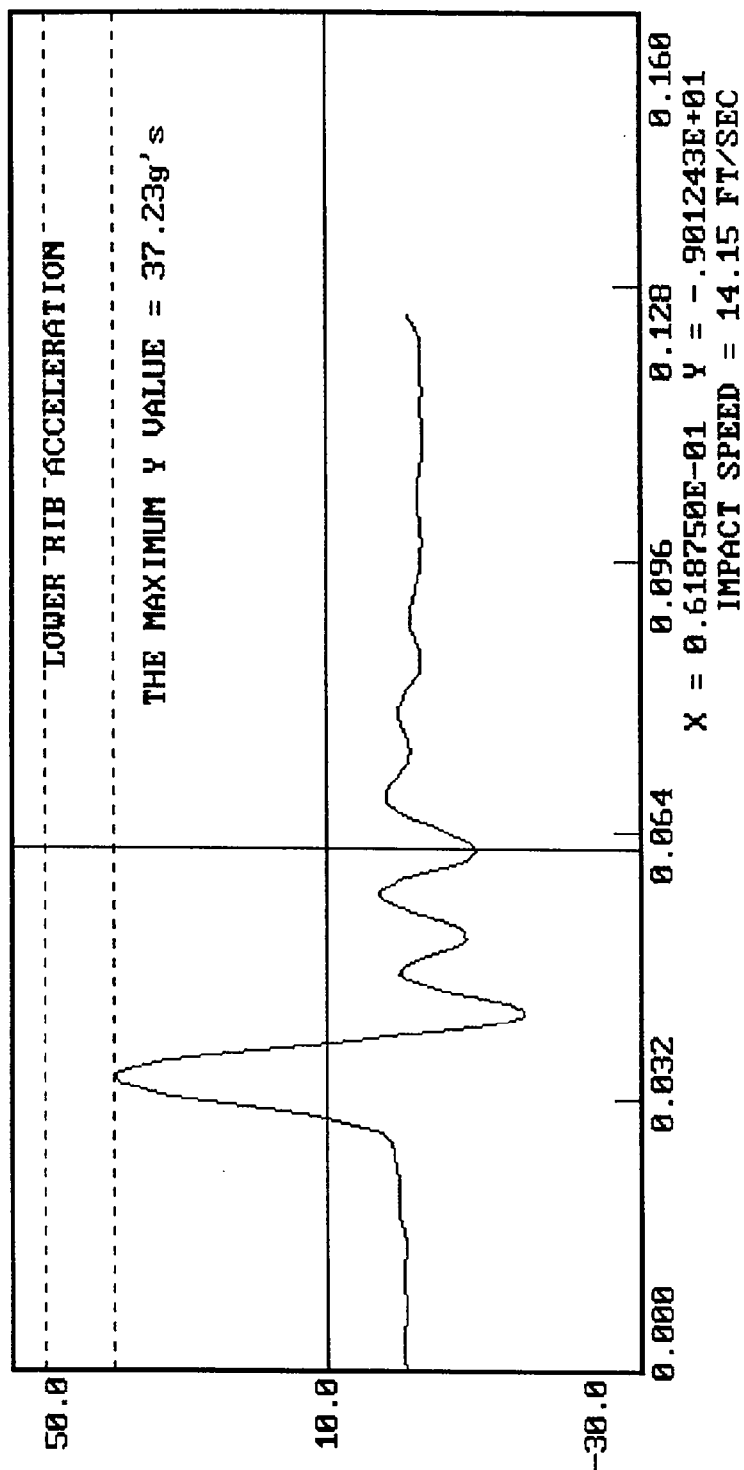


01-15-1997 16:16

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 275

ACCELERATION (G'S) VS. TIME ((SECONDS))

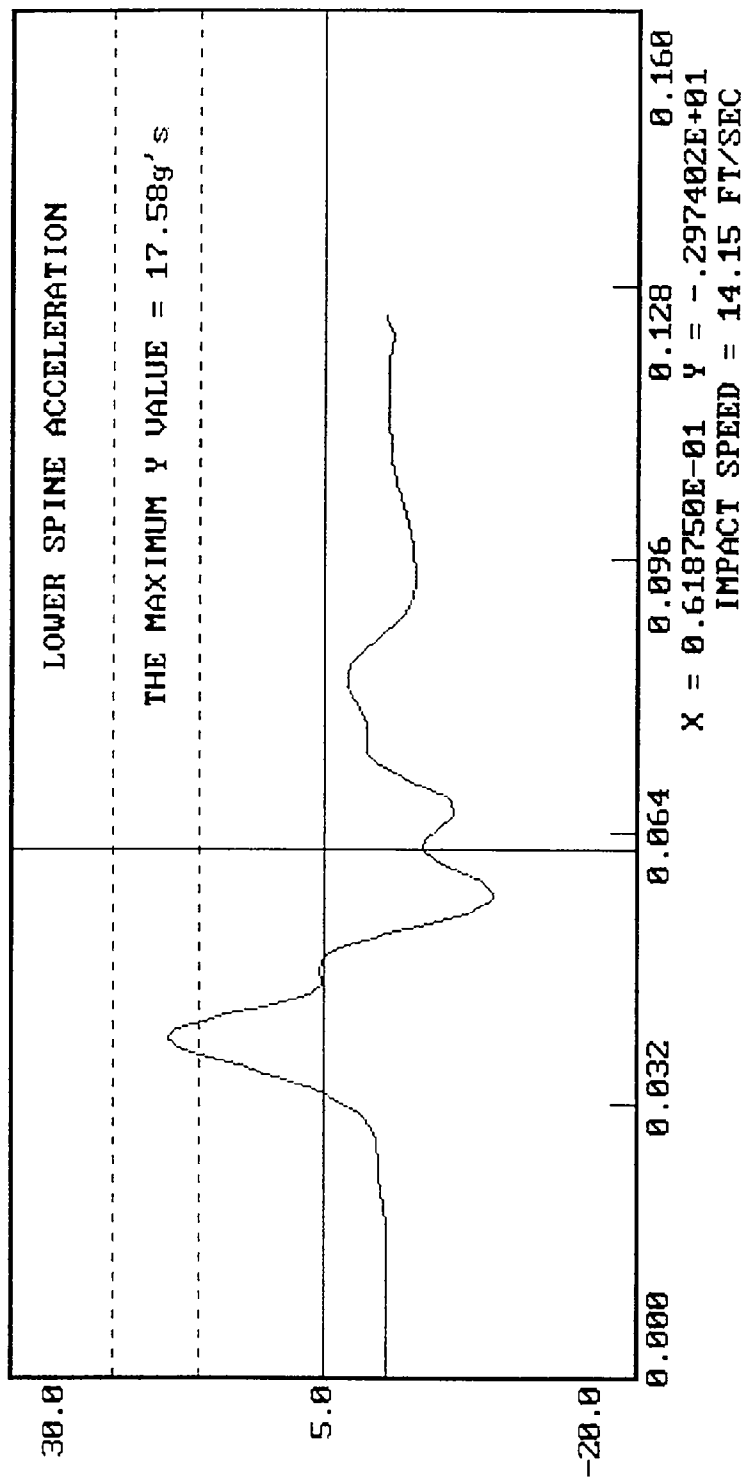


01-15-1997 16:16

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 275

ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

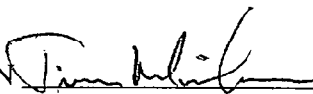
DUMMY NUMBER: 275

TEST NUMBER: D97173

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	24%
PROBE SPEED	13.8 - 14.2 f/s	14.2
PELVIS ACCELERATION	40 - 60 g's	44

TEST MEETS SPECIFICATIONS

TECHNICIAN

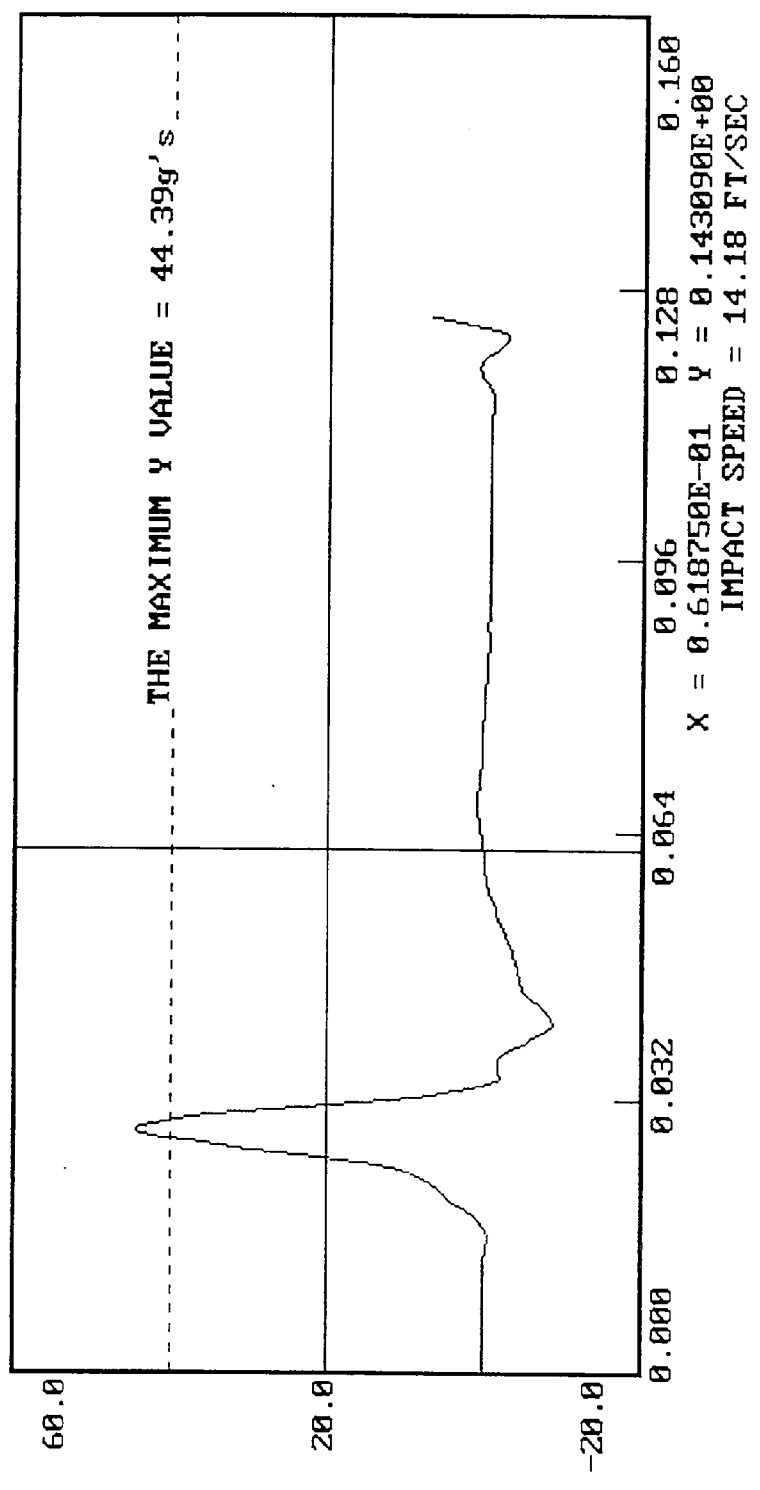


APPROVED BY



01-15-1997 16:35

DUMMY CALIBRATION - PELVIS IMPACT
DUMMY # 275
ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 15, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97174

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.7
FORCE @ 0.75 in	36.7 - 49.8 lbs	43.9
FORCE @ 1.0 in	50 - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	77

TEST MEETS SPECIFICATIONS

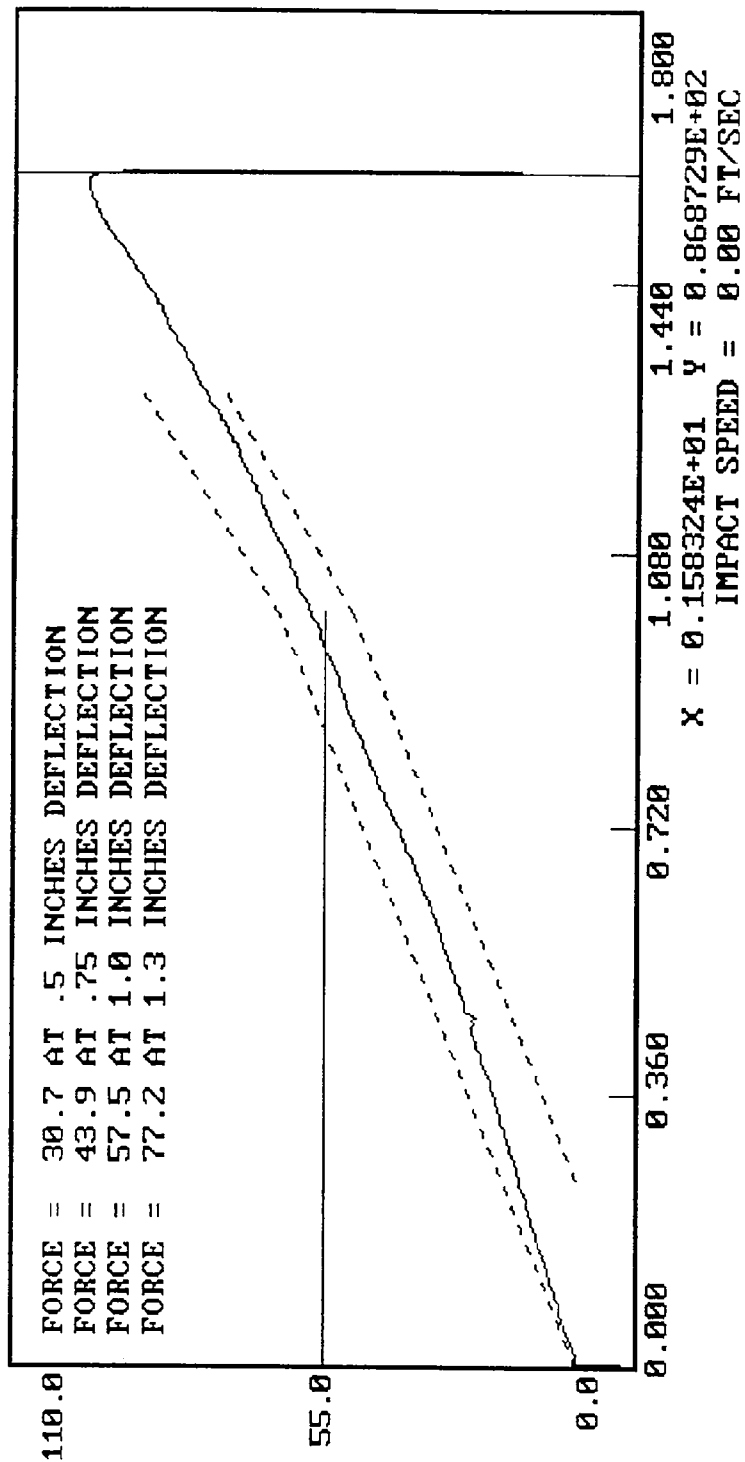
TECHNICIAN

Tim Hinch

APPROVED BY

Rene Korbach

DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 275
 01-15-1997 10:37



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

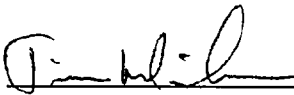
DUMMY NUMBER: 275

TEST NUMBER: D97175

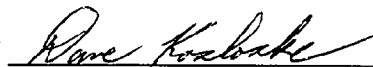
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	39
FORCE @ 40°	46 - 58 lbs	49
RETURN ANGLE	12° maximum	1°

TEST MEETS SPECIFICATIONS

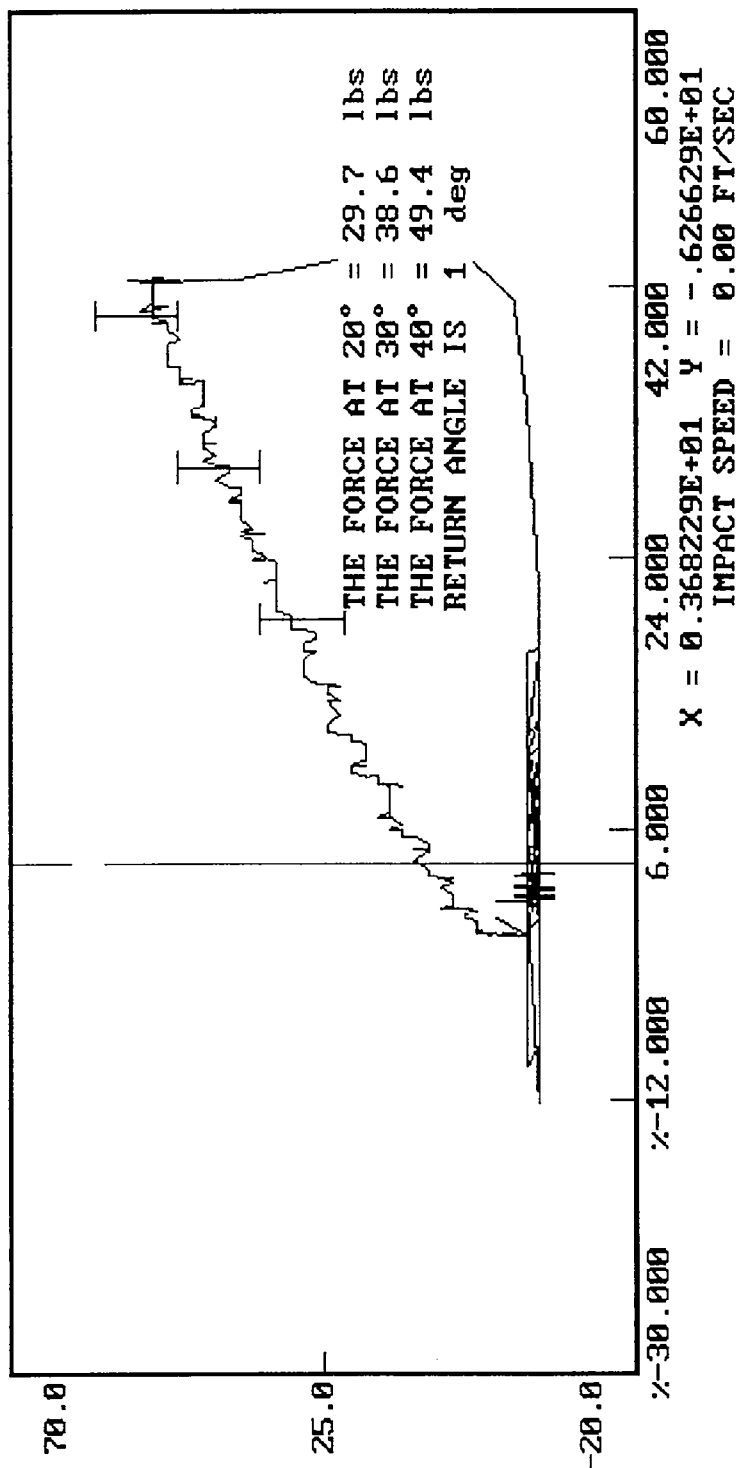
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - LUMBAR FLEXION
 DUMMY # 275
 01-15-1997 10:03
 FORCE (LBS) VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 274

Calibration Test Results Summary

Dummy Serial Number: 274

Post-Test Calibration

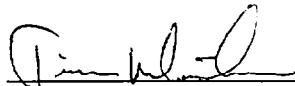
External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion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

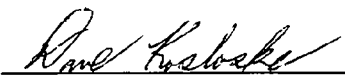
SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 274

DATE OF VERIFICATION: January 15, 1997

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.4
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.1
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.6
HW - Hip Width	14.0" - 15.4"	14.6

MEASUREMENTS BY: 

APPROVED BY: 

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97152

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
PROBE SPEED	13.8 - 14.2 fps	14.2
UPPER RIB	37 - 46 g's	39
LOWER RIB	37 - 46 g's	37
LOWER SPINE	15 - 22 g's	21

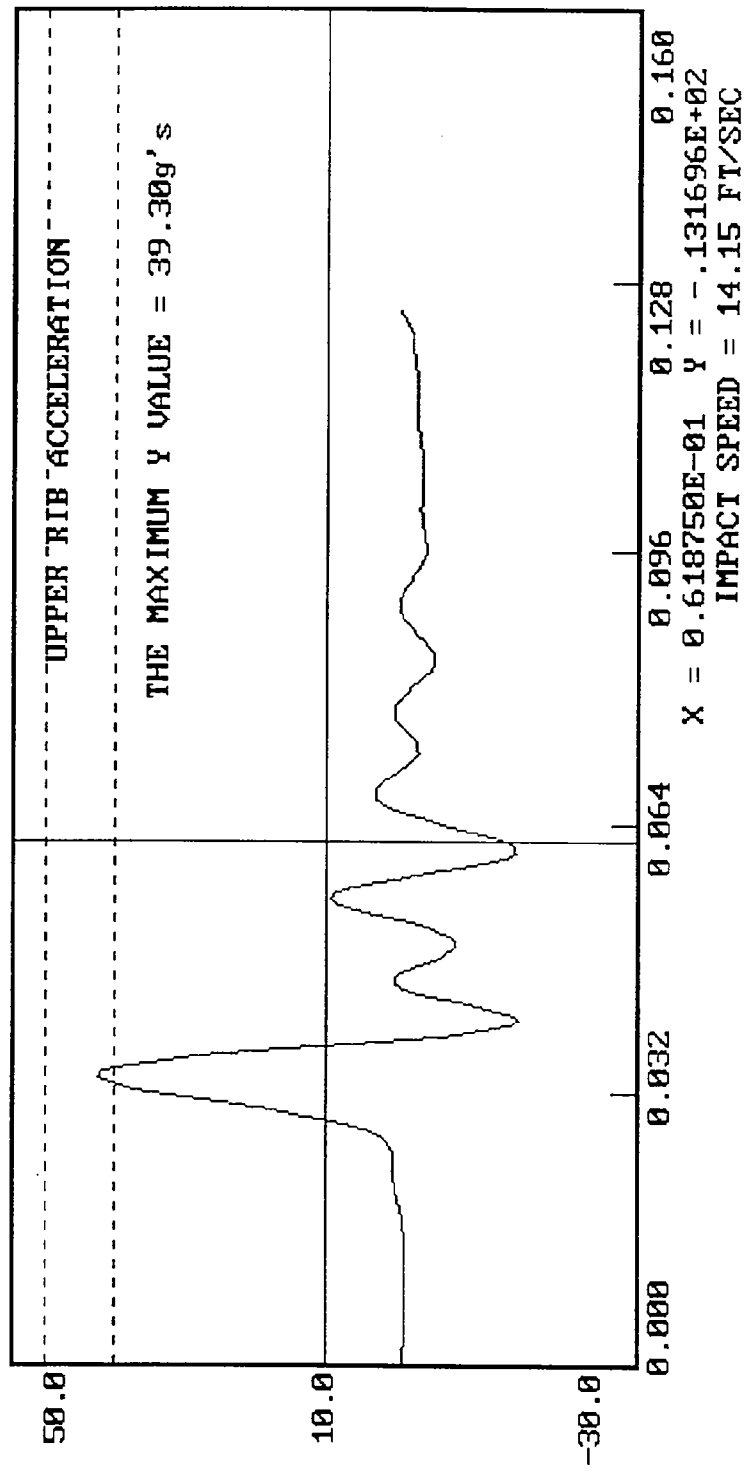
TEST MEETS SPECIFICATIONS

TECHNICIAN Tim White

APPROVED BY Rene Kurbake

DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 274
 01-15-1997 12:19

ACCELERATION (G'S) VS. TIME ((SECONDS))

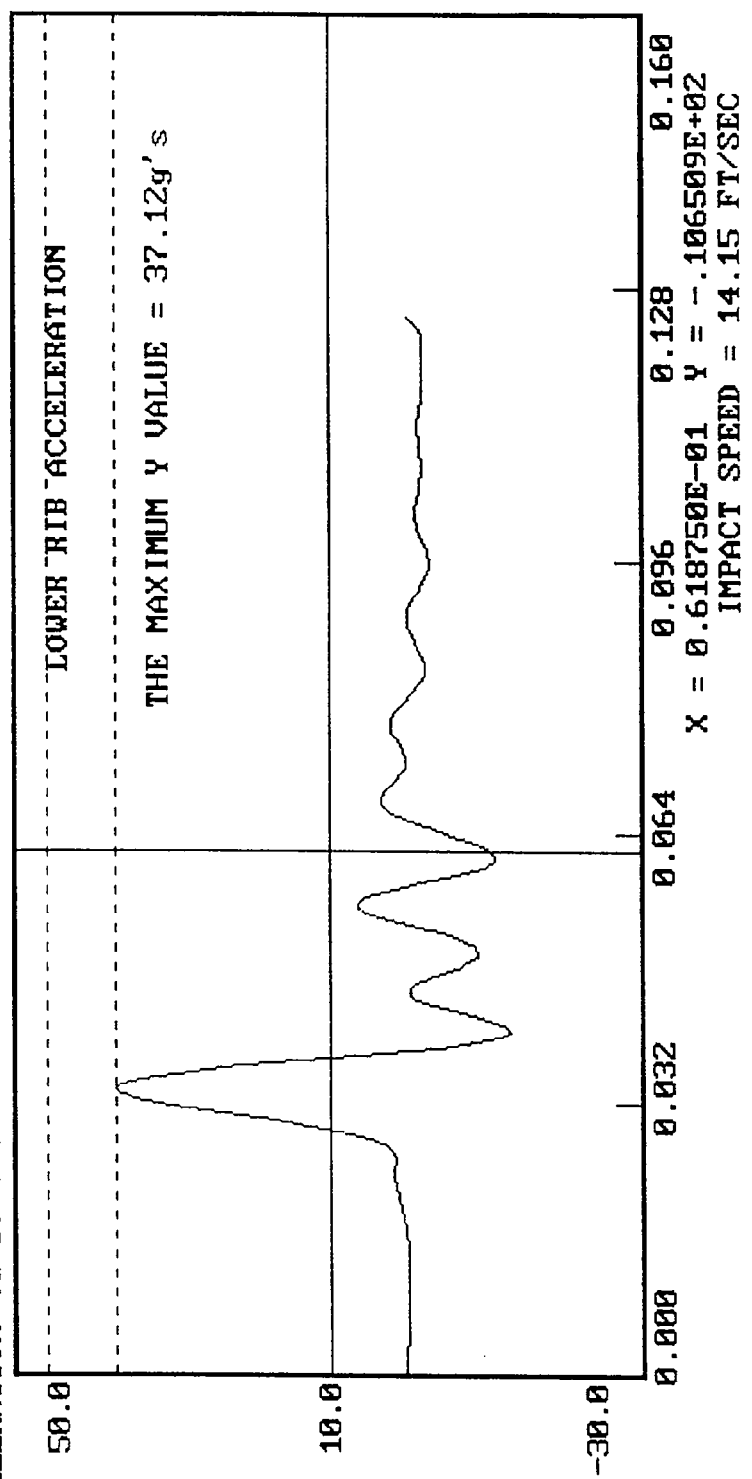


01-15-1997 12:19

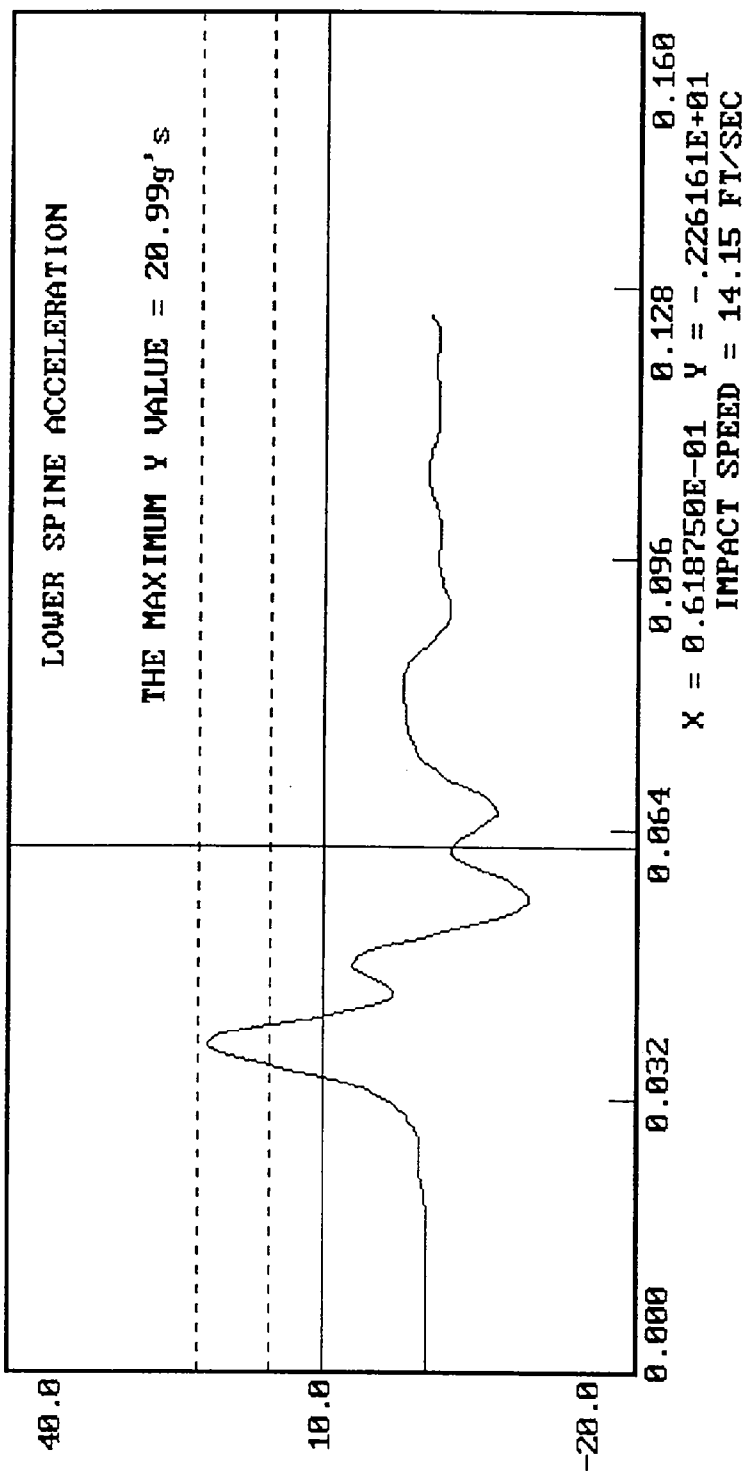
DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 274

ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT
 DUMMY # 274
 01-15-1997 12:19
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97153

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
PROBE SPEED	13.8 - 14.2 f/s	14.2
PELVIS ACCELERATION	40 - 60 g's	55

TEST MEETS SPECIFICATIONS

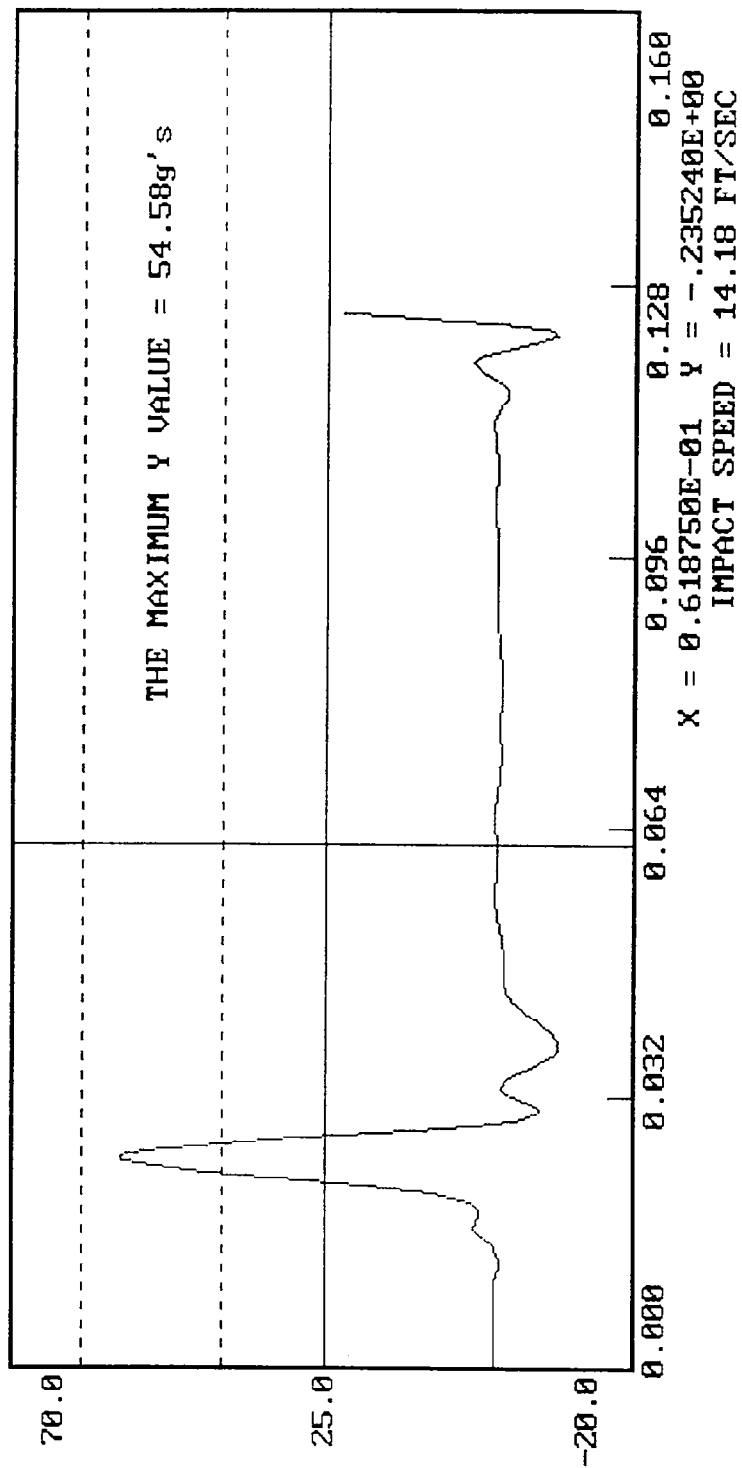
TECHNICIAN

Tim H. L.

APPROVED BY

Rene K. K.

DUMMY CALIBRATION - PELVIS IMPACT
 DUMMY # 274
 01-15-1997 12:29
 ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 15, 1997

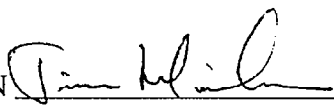
DUMMY NUMBER: 274

TEST NUMBER: D97154

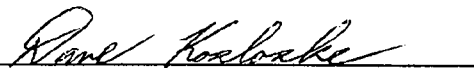
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0.5 in	23.3 - 36.5 lbs	28.4
FORCE @ 0.75 in	36.7 - 49.8 lbs	40.4
FORCE @ 1.0 in	50 - 63 lbs	54
FORCE @ 1.3 in	73 - 88 lbs	74

TEST MEETS SPECIFICATIONS

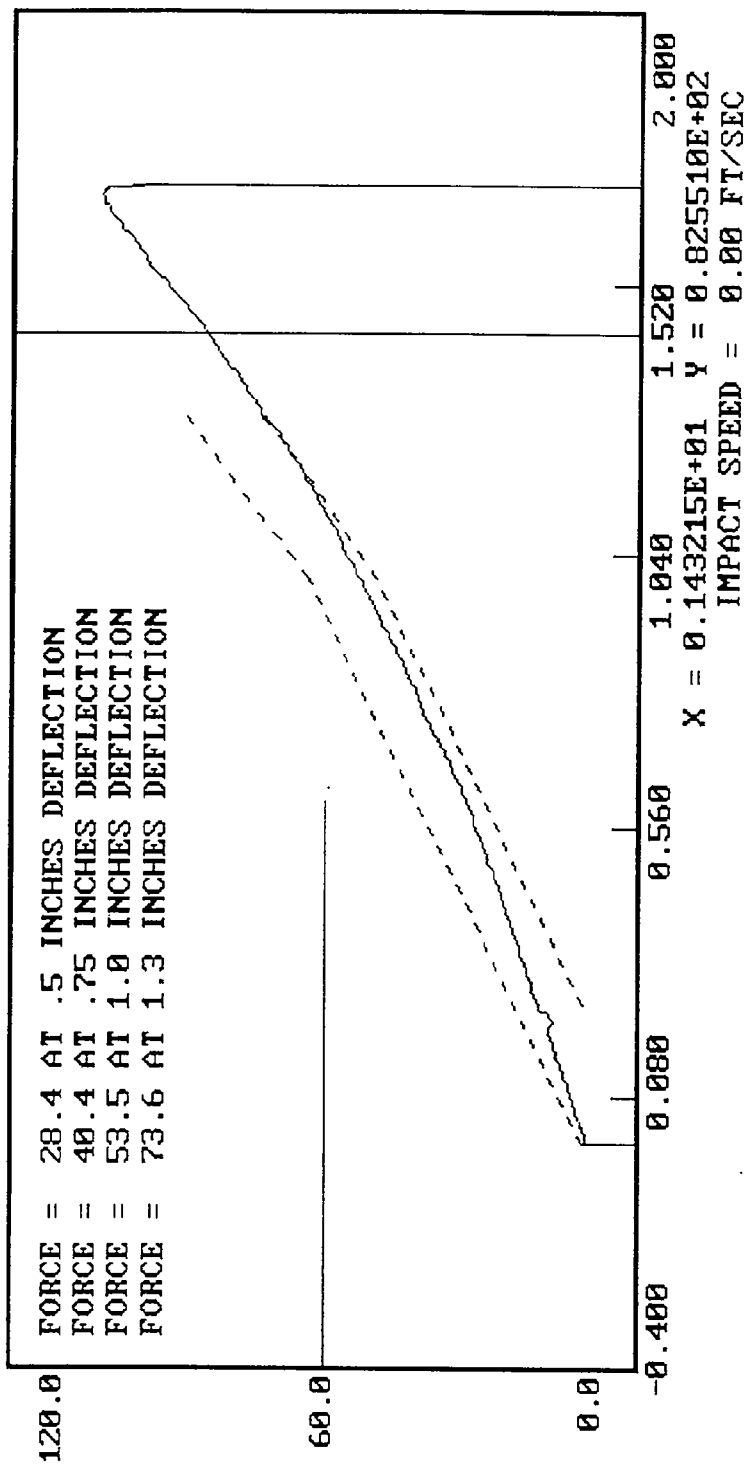
TECHNICIAN



APPROVED BY



DUMMY CALIBRATION - ABDOMEN COMPRESSION
 DUMMY # 274
 01-15-1997 10:25
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 15, 1997

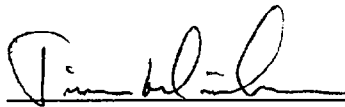
DUMMY NUMBER: 274

TEST NUMBER: D97155

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	41
FORCE @ 40°	46 - 58 lbs	50
RETURN ANGLE	12° maximum	1°

TEST MEETS SPECIFICATIONS

TECHNICIAN

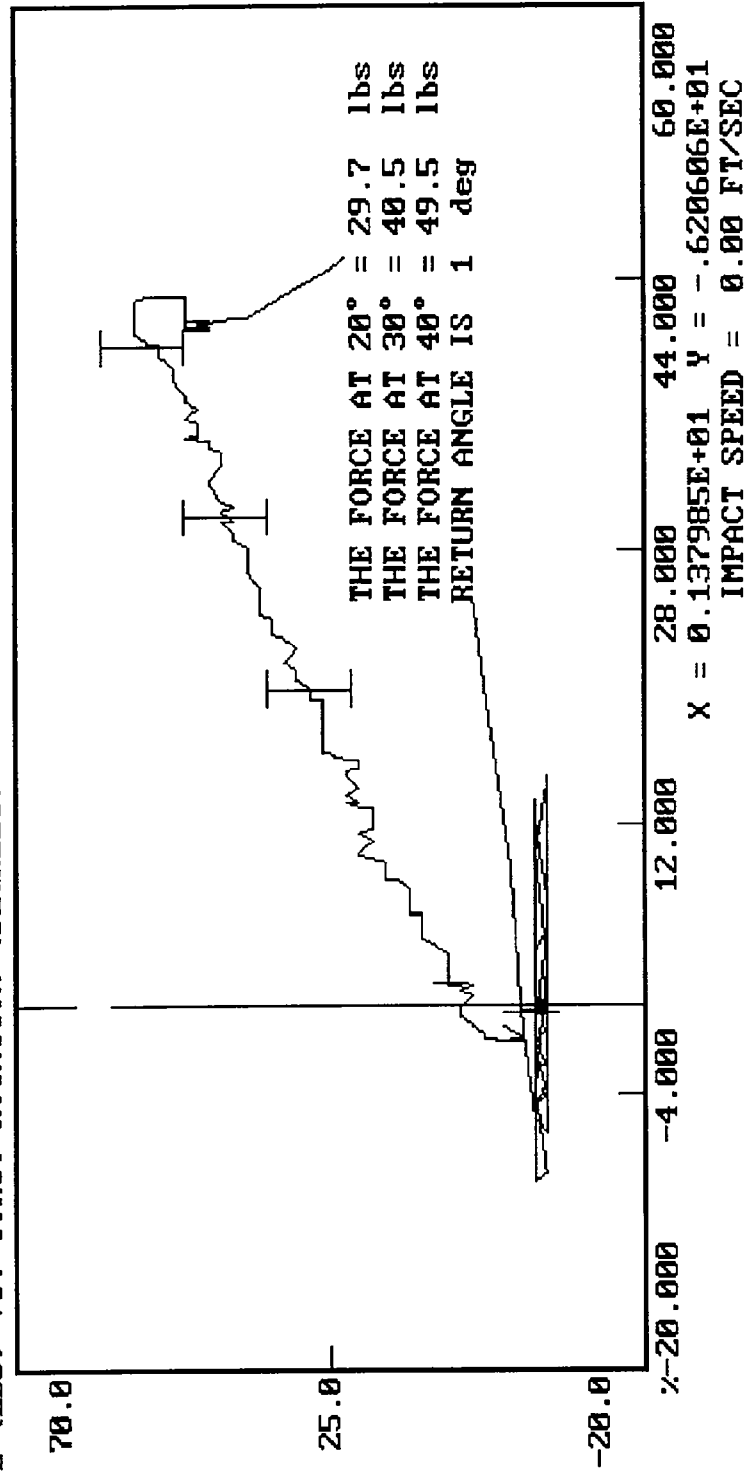


APPROVED BY



01-15-1997 09:44

DUMMY CALIBRATION - LUMBAR FLEXION
DUMMY # 274
FORCE (LBS) VS. TORSO ROTATION (DEGREES)



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 275

Inspected By: Tim Michnay

Date: January 15, 1997

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

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

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 274

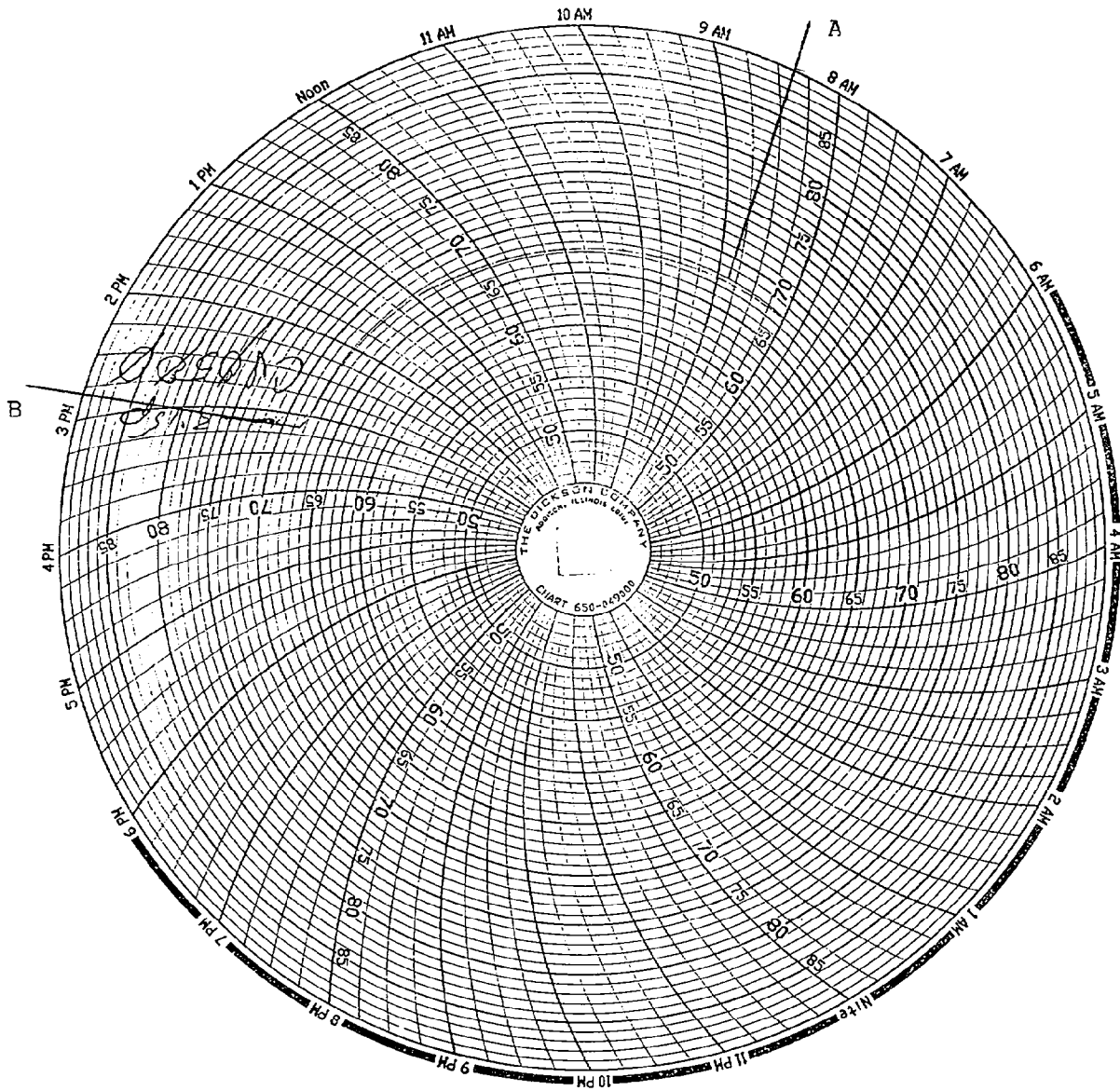
Inspected By: Tim Michnay

Date: January 15, 1997

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

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

VEHICLE AND DUMMY TEMPERATURE



A = Dummies installed in vehicle
B = Test conducted

APPENDIX D
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA
INSTRUMENTS FOR RIGHT FRONT PASSENGER DUMMY NO. 275

	RIGHT FRONT PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AHRP6	Endevco	January 2, 1997
Lower Rib Y	AJ8T5	Endevco	January 2, 1997
Lower Spine Y	AHT20	Endevco	January 2, 1997
Pelvis Y	AJ417	Endevco	January 2, 1997
Upper Rib Redundant Y	AJ412	Endevco	January 2, 1997
Lower Rib Redundant Y	APYR7	Endevco	January 2, 1997
Lower Spine Redundant Y	AH0N9	Endevco	January 2, 1997
Pelvis Redundant Y	AGP20	Endevco	January 2, 1997

INSTRUMENTS FOR RIGHT REAR PASSENGER DUMMY NO. 274

	RIGHT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AN8L6	Endevco	January 2, 1997
Lower Rib Y	J12465	Endevco	January 2, 1997
Lower Spine Y	J12450	Endevco	January 2, 1997
Pelvis Y	AGTP7	Endevco	January 2, 1997
Upper Rib Redundant Y	APY13	Endevco	January 2, 1997
Lower Rib Redundant Y	J11361	Endevco	January 2, 1997
Lower Spine Redundant Y	J12461	Endevco	January 2, 1997
Pelvis Redundant Y	AGT04	Endevco	January 2, 1997

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE AND MDB ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Moving Barrier CG X	C14-Z10	Entran	July 12, 1996
Moving Barrier CG Y	B14-R01	Entran	July 15, 1996
Moving Barrier CG Z	B13-Z05	Entran	July 11, 1996
Moving Barrier Rear Axle X	B14-R03	Entran	July 11, 1996
Moving Barrier Rear Axle Y	B14-R13	Entran	July 15, 1996
Right Mid A-Post Y	L18-E10	Entran	January 3, 1997
Right Lower A-Post Y	D05-R03	Entran	January 3, 1997
Right Mid B-Post Y	H16-X19	Entran	January 3, 1997
Right Lower B-Post Y	H07-A15	Entran	January 3, 1997
Rear Floorpan Above Axle X	B14-R11	Entran	January 3, 1997
Rear Floorpan Above Axle Y	B14-G09	Entran	January 3, 1997
Rear Floorpan Above Axle Z	A10-G05	Entran	January 3, 1997
Right Front Passenger Seat Track Y	J10-E12	Entran	January 3, 1997
Left Side Sill at Front Seat X	E24-G10	Entran	January 2, 1997
Left Side Sill at Front Seat Y	L18-E01	Entran	January 2, 1997
Left Side Sill at Front Seat Z	J23-E01	Entran	January 2, 1997
Left Side Sill at Rear Seat X	H07-A25	Entran	January 2, 1997
Left Side Sill at Rear Seat Y	F07-A08	Entran	January 2, 1997
Left Side Sill at Rear Seat Z	D05-R08	Entran	January 2, 1997
Right Side Sill at Front Seat Y	L18-F02	Entran	January 3, 1997

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE AND MDB ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Right Side Sill at Rear Seat Y	L18-E13	Entran	January 3, 1997
Right Rear Occupant Compartment Y	J10-E08	Entran	January 3, 1997
Vehicle CG X	L14-D01	Entran	January 3, 1997
Vehicle CG Y	H07-A05	Entran	January 3, 1997
Vehicle CG Z	E25-G07	Entran	January 3, 1997

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