

NEW CAR ASSESSMENT PROGRAM  
SIDE IMPACT TESTING  
PASSENGER CARS

1997 CHEVROLET MALIBU  
4-DOOR SEDAN  
NHTSA NO: MV0115

MGA PROVING GROUNDS  
5000 WARREN ROAD  
BURLINGTON, WI 53105



Test Date: February 4, 1997

Report Date: February 18, 1997

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
SAFETY PERFORMANCE STANDARDS  
OFFICE OF CRASHWORTHINESS STANDARDS  
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Approval Date: 2-21-97

FINAL REPORT ACCEPTED BY (OCWS):

Accepted By: \_\_\_\_\_  
Contract Technical Manager

Acceptance Date: \_\_\_\_\_

# TECHNICAL REPORT STANDARD TITLE PAGE

| 1. Report No.<br>214D-MGA-97-15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                      | 2. Government Accession No.                                                                                                                                                                                                                                                     |           | 3. Recipient's Catalog No. |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
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| 4. Title and Subtitle<br>New Car Assessment Program<br>Side Impact Test of a 1997 Chevrolet Malibu<br>4-Door Sedan<br>NHTSA No. MV0115                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                      | 5. Report Date<br>February 18, 1997                                                                                                                                                                                                                                             |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                      | 6. Performing Organization Code<br>MGA                                                                                                                                                                                                                                          |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| 7. Author(s)<br>John Fleck, Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                      | 8. Performing Organization Report No.<br>MGA-DOT-214-0                                                                                                                                                                                                                          |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| 9. Performing Organization Name and Address<br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                      | 10. Work Unit No.                                                                                                                                                                                                                                                               |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                      | 11. Contract or Grant No.<br>DTNH22-93-C-02047                                                                                                                                                                                                                                  |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| 12. Sponsoring Agency Name and Address<br><br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards<br>400 Seventh St., S.W. Washington, D.C. 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                      | 13. Type of Report and Period Covered<br>Final Test Report<br>February 4, 1997 to February 18, 1997                                                                                                                                                                             |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                      | 14. Sponsoring Agency Code<br>NPS-10                                                                                                                                                                                                                                            |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                      |                                                                                                                                                                                                                                                                                 |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| <p>16. Abstract</p> <p>A 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 1997 Chevrolet Malibu 4-Door to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on February 4, 1997.</p> <p>The impact velocity of the Moving Deformable Barrier (MDB) was 61.1 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 21 °C. The target vehicle post test maximum crush was 414 mm at level 2. The test vehicle's performance follows:</p> <table border="1"> <thead> <tr> <th></th> <th><u>DRIVER</u></th> <th><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td>83</td> <td>90</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td>95</td> <td>89</td> </tr> <tr> <td>Lower Spine (T<sub>12</sub>) Accel., g</td> <td>106</td> <td>85</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td>100</td> <td>88</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td>110</td> <td>85</td> </tr> </tbody> </table> <p>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.</p> |                                                      |                                                                                                                                                                                                                                                                                 |           |                            |  |  | <u>DRIVER</u> | <u>PASS.</u> | Left Upper Rib (LUR) Accel., g | 83 | 90 | Left Lower Rib (LLR) Accel., g | 95 | 89 | Lower Spine (T <sub>12</sub> ) Accel., g | 106 | 85 | Thoracic Trauma Index (TTI) | 100 | 88 | Pelvis (PEV) Accel., g | 110 | 85 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <u>DRIVER</u>                                        | <u>PASS.</u>                                                                                                                                                                                                                                                                    |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| Left Upper Rib (LUR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 83                                                   | 90                                                                                                                                                                                                                                                                              |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| Left Lower Rib (LLR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 95                                                   | 89                                                                                                                                                                                                                                                                              |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| Lower Spine (T <sub>12</sub> ) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 106                                                  | 85                                                                                                                                                                                                                                                                              |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| Thoracic Trauma Index (TTI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 100                                                  | 88                                                                                                                                                                                                                                                                              |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| Pelvis (PEV) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 110                                                  | 85                                                                                                                                                                                                                                                                              |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
| 17. Key Words<br>New Car Assessment Program (NCAP)<br>FMVSS No. 214D<br>Side Impact Dummy (SID)<br>Occupant Side Impact Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                      | 18. Distribution Statement<br>Copies of this report are available from:<br>National Highway Traffic Safety Adm.<br>Technical Ref. Division,<br>Room 5108 (NAD-52)<br>400 Seventh Street, S.W.<br>Washington, D.C. 20590<br>Telephone No. 202-366-4946<br>Attn: Robert Hornickle |           |                            |  |  |               |              |                                |    |    |                                |    |    |                                          |     |    |                             |     |    |                        |     |    |
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SECTION 1  
PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY97 NCAP Side Impact 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 Chevrolet Malibu 4-Door.

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

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

## SECTION 2

### SUMMARY OF SIDE IMPACT TEST

A 1997 Chevrolet Malibu 4-Door was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 38 mph (61.1 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 February 4, 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 driver and left rear designated seating positions according to instructions specified in the New Car Assessment Program Side Impact Laboratory Test Procedure which is dated October 1996. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T<sub>12</sub>) 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 test:

| Injury Criteria | Front SID | Rear SID |
|-----------------|-----------|----------|
| TTI (g)         | 100       | 88       |
| Pelvis (g)      | 110       | 85       |

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/Chevrolet/Malibu/4-Door  
Vehicle NHTSA No.: MV0115 VIN: 1G1ND52M8V6101470  
Vehicle Body Color: White Build Date: 12/96  
Engine Data: 6 Cylinders;     CID; 3.1 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 87 miles  
Options:   X   A/C;   X   Pwr. Steering;   X   Pwr. Brakes;   X   Pwr. Windows;  
  X   Cruise Control;   X   Tilt Wheel;   X   Power Door Locks;

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 29 Psi FRONT  
26 Psi REAR  
Recommended Tire Size: P215/60R/15  
Tires on Test Vehicle: P215/60R/15 Manufacturer: Firestone

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 = 416.0 kg (A)  
No. of Occupants x 68.04 kg. = 340.2 kg (B)  
Cargo Capacity (A-B) = 75.8 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front = 443.2 kg

Right Rear = 244.9 kg

Left Front = 444.5 kg

Left Rear = 248.1 kg

TOTAL FRONT = 887.7 kg

TOTAL REAR = 493.0 kg

% of Total Vehicle Weight = 64 %;

% of Total Weight = 36 %

TOTAL WEIGHT = 1380.7 kg

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

|                                                         |   |                  |
|---------------------------------------------------------|---|------------------|
| Total Test Vehicle Delivered Weight with Maximum Fluids | = | <u>1380.7</u> kg |
| Cargo Carrying Capacity of Test Vehicle                 | = | <u>75.8</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>1617.9</u> kg |

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

|                   |   |                  |                   |   |                 |
|-------------------|---|------------------|-------------------|---|-----------------|
| Right Front       | = | <u>452.7</u> kg  | Right Rear        | = | <u>311.2</u> kg |
| Left Front        | = | <u>495.8</u> kg  | Left Rear         | = | <u>357.8</u> kg |
| TOTAL FRONT       | = | <u>948.5</u> kg  | TOTAL REAR        | = | <u>669.0</u> kg |
| % of Total Weight | = | <u>59</u> %      | % of Total Weight | = | <u>41</u> %     |
| TOTAL TEST WEIGHT | = | <u>1617.5</u> kg |                   |   |                 |

TEST VEHICLE ATTITUDE:

CURB WEIGHT ATTITUDE:

Right Front 702 mm Left Front 705 mm Right Rear 703 mm Left Rear 697 mm

FULLY LOADED WEIGHT ATTITUDE:

Right Front 695 mm Left Front 691 mm Right Rear 667 mm Left Rear 646 mm

TEST ATTITUDE:

Right Front 691 mm Left Front 698 mm Right Rear 669 mm Left Rear 655 mm

GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Test Vehicle Wheelbase: 2718 mm

C.G. = 1104 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4512 mm

Centerline = 4810 mm

Left Side = 4512 mm



GENERAL VEHICLE TEST PARAMETER DATA (Cont'd)

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

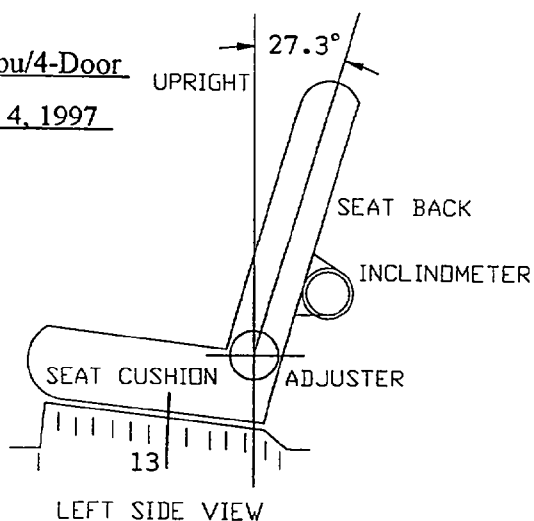
FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 240 mm

Test Position: 13th notch from  
foremost locking position

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 27.3° (6th locking position from full up)



SECOND POSITION SEAT:

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

Seat Back Adjustment Position: Non-adjustable

ADJUSTABLE STEERING COLUMN POSITION: Mid Position

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

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 15.2 gallons

Test Volume: 14.1 gallons: 93 % of capacity

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

Wheelbase: = 2718 mm

Impact Point is 419 mm rearward of front axle centerline

DATA SHEET NO. 2  
TEST VEHICLE SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door  
Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997  
Overall Length = 4810 mm; Overall Width = 1748 mm

TEST WEIGHT:

Right Front = 471.3 kg      Right Rear = 320.2 kg  
Left Front = 484.9 kg      Left Rear = 333.4 kg  
TOTAL FRONT = 956.2 kg      TOTAL REAR = 653.6 kg  
% of Total Weight = 59 %      % of Total Weight = 41 %  
TOTAL VEHICLE WEIGHT = 1609.8 kg  
Wheelbase = 2718 mm  
Longitudinal C.G. from Center of Front Axle = 1104 mm  
Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (247 mm above ground) = 271 mm
  2. LEVEL 2 (504 mm above ground) = 414 mm
  3. LEVEL 3 (595 mm above ground) = 365 mm
  4. LEVEL 4 (898 mm above ground) = 317 mm
  5. LEVEL 5 (1352 mm above ground) = 90 mm
- Maximum Post-Test Intrusion = 414 mm

OCCUPANTS:

|                 | <u>Left Front Passenger</u>              | <u>Left Rear Passenger</u> |
|-----------------|------------------------------------------|----------------------------|
| Type of Dummy   | <u>SID</u>                               | <u>SID</u>                 |
| Restraints Used | <u>type II belt</u><br><u>and airbag</u> | <u>type II belt</u>        |

TEST VEHICLE SUMMARY OF RESULTS (Cont'd)

INSTRUMENTATION:

|                                    |   |           |
|------------------------------------|---|-----------|
| Number of Vehicle Data Channels:   | = | <u>25</u> |
| Number of Cameras: Onboard Vehicle | = | <u>3</u>  |
| Offboard Vehicle                   | = | <u>4</u>  |
| Deformable Barrier                 | = | <u>2</u>  |
| TOTAL                              | = | <u>9</u>  |

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

|                                                     |   |                |
|-----------------------------------------------------|---|----------------|
| Overall Width of Framework Carriage                 | = | <u>1252 mm</u> |
| Overall Length of MDB (incl. honeycomb impact face) | = | <u>4115 mm</u> |
| Wheelbase of Framework Carriage                     | = | <u>2591 mm</u> |
| Tread of Framework Carriage (Front & Rear)          | = | <u>1880 mm</u> |
| C.G. Location Rearward of Front Axle                | = | <u>1102 mm</u> |
| C.G. Location From Center Line                      | = | <u>-23 mm</u>  |
| C.G. Location Above Ground Level                    | = | <u>508 mm</u>  |

MDB WEIGHT:

|                                     |   |                 |            |   |                 |
|-------------------------------------|---|-----------------|------------|---|-----------------|
| Left Front                          | = | <u>396.1 kg</u> | Left Rear  | = | <u>284.4 kg</u> |
| Right Front                         | = | <u>383.4 kg</u> | Right Rear | = | <u>293.8 kg</u> |
| TOTAL FRONT                         | = | <u>779.5 kg</u> | TOTAL REAR | = | <u>578.2 kg</u> |
| TOTAL MDB WEIGHT = <u>1357.7 kg</u> |   |                 |            |   |                 |

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

Impact Speed = Primary: 37.97 mph (61.1 kph) Secondary: 38.13 mph (61.3 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>153</u> | mm |
| 2. | Row B Mid Stack (686 mm)        | = | <u>89</u>  | mm |
| 3. | Row C Top of Bumper (533 mm)    | = | <u>66</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/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

VISIBLE DUMMY CONTACT POINTS:

|            | <u>LEFT FRONT SID</u>            | <u>LEFT REAR SID</u> |
|------------|----------------------------------|----------------------|
| Head       | <u>to left shoulder and belt</u> | <u>to C-Post</u>     |
| Arm        | <u>to door</u>                   | <u>to door</u>       |
| Pelvis     | <u>to door</u>                   | <u>to door</u>       |
| Left Knee  | <u>to door</u>                   | <u>to door</u>       |
| Right Knee | <u>to left knee</u>              | <u>to left knee</u>  |

DOOR OPENING:

|       | <u>LEFT SIDE</u>       | <u>RIGHT SIDE</u>      |
|-------|------------------------|------------------------|
| Front | <u>Remained closed</u> | <u>Remained closed</u> |
| Rear  | <u>Remained closed</u> | <u>Remained closed</u> |

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 5 mm rearward      Vertical: 9 mm high

ARM REST LOCATIONS:

Front: 236 mm from bottom of window  
Rear: 237 mm from bottom of window

POST-TEST OBSERVATIONS (Cont'd)

SEAT CRUSH:

Front Seat Back: 134 mm    Front Seat Cushion: 97 mm  
Left Rear Seat Back: 168 mm    Rear Seat Cushion: 208 mm

GLAZING DAMAGE:

Impact side door glass broken and windshield cracked

PILLAR PERFORMANCE:

No separation noted

SILL SEPARATION:

No separation noted

OTHER NOTABLE IMPACT EFFECTS:

The driver and passenger airbags did not deploy

SECTION 4  
OCCUPANT AND VEHICLE INFORMATION



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

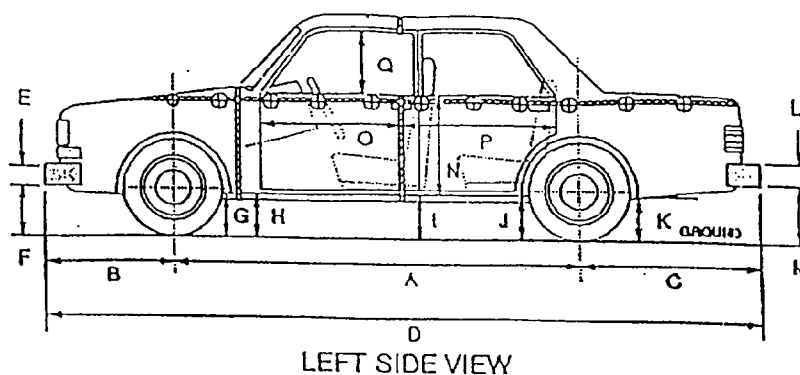
Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

| Front Dummy ID # 275   |             |             |             | Rear Dummy 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      |             |             |             |                     |             |             |             |      |    |       |     |
| Left Upper Rib (LUR) Y |             |             |             | 82.9                | 30          | -25.5       | 68          | 90.1 | 37 | -5.6  | 116 |
| Left Lower Rib (LLR) Y |             |             |             | 95.2                | 31          | -20.9       | 77          | 89.1 | 36 | -24.0 | 71  |
|                        |             |             |             |                     |             |             |             |      |    |       |     |
| SPINE ACCELERATIONS    |             |             |             |                     |             |             |             |      |    |       |     |
| Lower Lateral Y        |             |             |             | 105.6               | 32          | -21.3       | 62          | 85.1 | 41 | -38.8 | 68  |
|                        |             |             |             |                     |             |             |             |      |    |       |     |
| PELVIS ACCELERATIONS   |             |             |             |                     |             |             |             |      |    |       |     |
| Lateral Y              |             |             |             | 109.8               | 28          | -23.4       | 49          | 84.9 | 32 | -17.4 | 77  |

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)

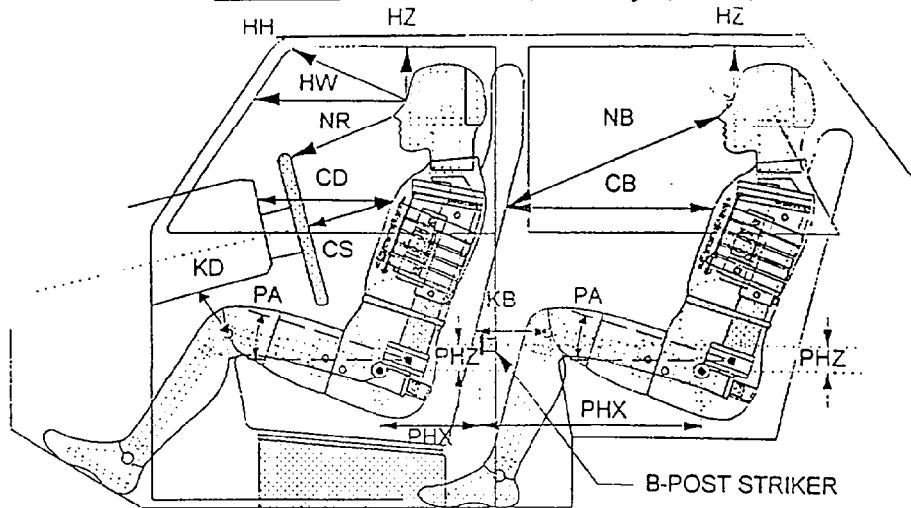
|       | PRE-TEST | POST-TEST | Δ CHANGE |
|-------|----------|-----------|----------|
| A     | 2718     | 2673      | 45       |
| B     | 1010     | 1015      | 5        |
| C     | 1082     | 1111      | 29       |
| D     | 4810     | 4799      | 11       |
| E     | 135      | 135       | 0        |
| F     | 400      | 414       | 14       |
| G     | 185      | 189       | 4        |
| H     | 187      | 187       | 0        |
| I     | 184      | 152       | 32       |
| J1/J2 | 182/190  | 165/170   | 17/20    |
| K     | 215      | 227       | 12       |
| L     | 280      | 280       | 0        |
| M     | 312      | 325       | 13       |
| N     | 663      | 593       | 70       |
| O     | 768      | 721       | 47       |
| P     | 1176     | 1063      | 113      |
| Q     | 441      | 420       | 21       |
| R     | 4512     | 4499      | 13       |
| S     | 4512     | 4453      | 59       |
| T     | 1748     | 1387      | 361      |

# DATA SHEET NO. 7

## SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

NHTSA NO.: MV0115 Test Date: February 4, 1997



NOTE: All dimensions are in mm with tolerance of  $\pm 3$  mm

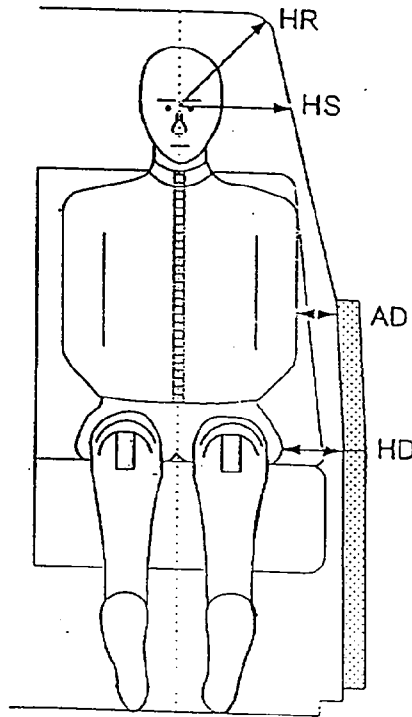
|           | DRIVER SID<br>ID # 275 |           | LEFT REAR<br>PASSENGER<br>SID ID # 274 |
|-----------|------------------------|-----------|----------------------------------------|
| HH        | 386                    | HZ        | 118                                    |
| HW        | 632                    | NB        | 672                                    |
| HZ        | 154                    | CB        | 570                                    |
| NR        | 446                    | KBL (KBA) | 221 (0.0°)                             |
| CD        | 556                    | KBR (KBA) | 238 (0.0°)                             |
| CS        | 367                    | PA°       | 24.7                                   |
| KDL(KDA°) | 181 (13.5°)            | PHX       | 253                                    |
| KDR(KDA°) | 156 (36.3°)            | PHZ       | 273                                    |
| PA°       | 23.6                   |           |                                        |
| PHX       | 217                    |           |                                        |
| PHZ       | 91                     |           |                                        |

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/Chevrolet/Malibu/4-Door

NHTSA NO.: MV0115      Test Date: February 4, 1997



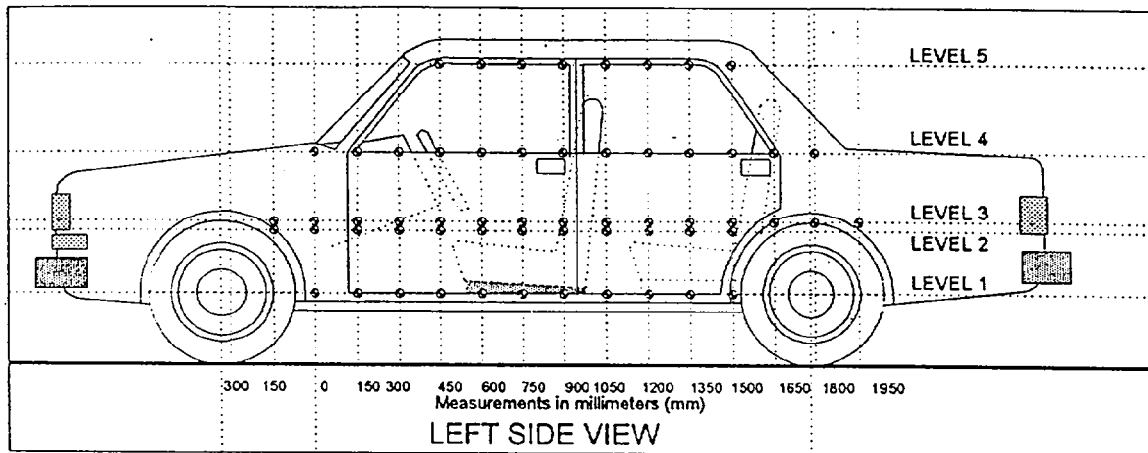
NOTE: All dimensions are in mm

|    | DRIVER SID<br>ID # 275 | LEFT REAR PASSENGER<br>SID ID # 274 |
|----|------------------------|-------------------------------------|
| HR | 177                    | 182                                 |
| HS | 304                    | 212                                 |
| AD | 107                    | 102                                 |
| HD | 138                    | 129                                 |

DATA SHEET NO. 9  
VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

NHTSA NO.: MV0115 Test Date: February 4, 1997



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

MEASUREMENTS ALONG THE VERTICAL 750 mm. LINE SHOWN ABOVE

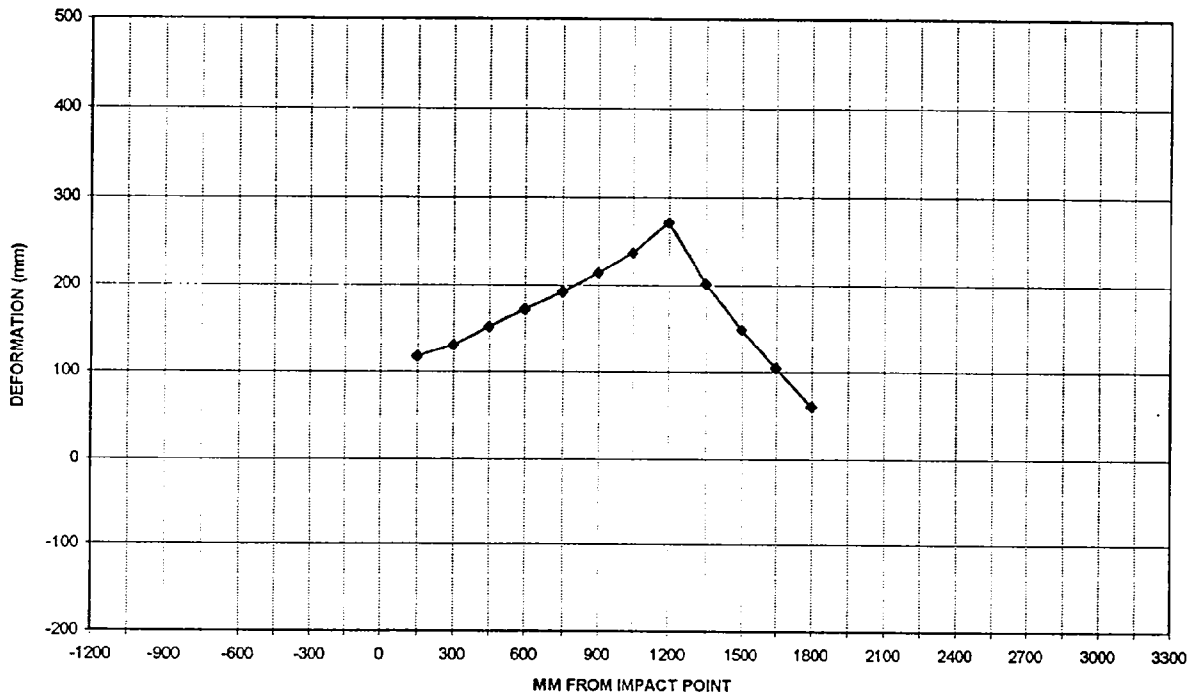
|                                                          |                  |
|----------------------------------------------------------|------------------|
| Level 1 @ Axle Centerline Height<br>(or Sill Top Height) | = <u>247</u> mm  |
| Level 2 @ Occupant H-Point                               | = <u>504</u> mm  |
| Level 3 @ Mid Door                                       | = <u>595</u> mm  |
| Level 4 @ Window Sill                                    | = <u>898</u> mm  |
| Level 5 @ Window Top                                     | = <u>1352</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) |
| -1050                      |                           |                |                   |
| -900                       |                           |                |                   |
| -750                       |                           |                |                   |
| -600                       |                           |                |                   |
| -450                       |                           |                |                   |
| -300                       |                           |                |                   |
| -150                       |                           |                |                   |
| 0 (impact point)           |                           |                |                   |
| 150                        | 735                       | 853            | 118               |
| 300                        | 736                       | 867            | 131               |
| 450                        | 739                       | 892            | 153               |
| 600                        | 740                       | 913            | 173               |
| 750                        | 742                       | 935            | 193               |
| 900                        | 740                       | 954            | 214               |
| 1050                       | 742                       | 978            | 236               |
| 1200                       | 740                       | 1011           | 271               |
| 1350                       | 739                       | 941            | 202               |
| 1500                       | 738                       | 888            | 150               |
| 1650                       | 736                       | 840            | 104               |
| 1800                       | 733                       | 793            | 60                |
| 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



LEVEL 1 - AXLE CENTERLINE

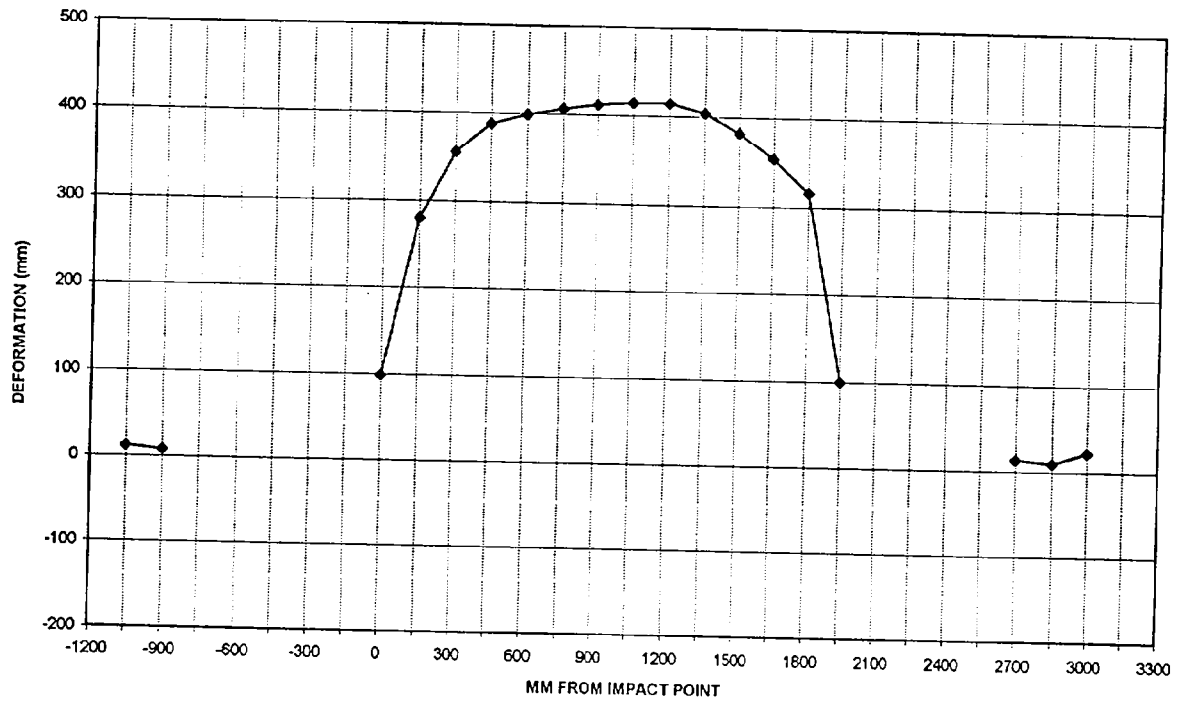
**DATA SHEET NO. 10**  
**VEHICLE EXTERIOR CRUSH PROFILES**

| Longitudinal Distance (mm) | Level 2 - Occupant H Point |                |                   |
|----------------------------|----------------------------|----------------|-------------------|
|                            | Pre-Test (mm)              | Post-Test (mm) | Static Crush (mm) |
| -1050                      | 740                        | 752            | 12                |
| -900                       | 718                        | 726            | 8                 |
| -750                       |                            |                |                   |
| -600                       |                            |                |                   |
| -450                       |                            |                |                   |
| -300                       |                            |                |                   |
| -150                       |                            |                |                   |
| 0 (impact point)           | 685                        | 784            | 99                |
| 150                        | 685                        | 965            | 280               |
| 300                        | 686                        | 1041           | 355               |
| 450                        | 685                        | 1073           | 388               |
| 600                        | 685                        | 1084           | 399               |
| 750                        | 684                        | 1090           | 406               |
| 900                        | 684                        | 1095           | 411               |
| 1050                       | 684                        | 1098           | 414               |
| 1200                       | 683                        | 1097           | 414               |
| 1350                       | 683                        | 1087           | 404               |
| 1500                       | 683                        | 1065           | 382               |
| 1650                       | 683                        | 1037           | 354               |
| 1800                       | 682                        | 998            | 316               |
| 1950                       | 682                        | 782            | 100               |
| 2100                       |                            |                |                   |
| 2250                       |                            |                |                   |
| 2400                       |                            |                |                   |
| 2550                       |                            |                |                   |
| 2700                       | 695                        | 709            | 14                |
| 2850                       | 710                        | 720            | 10                |
| 3000                       | 730                        | 753            | 23                |

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



## VEHICLE EXTERIOR STATIC CRUSH



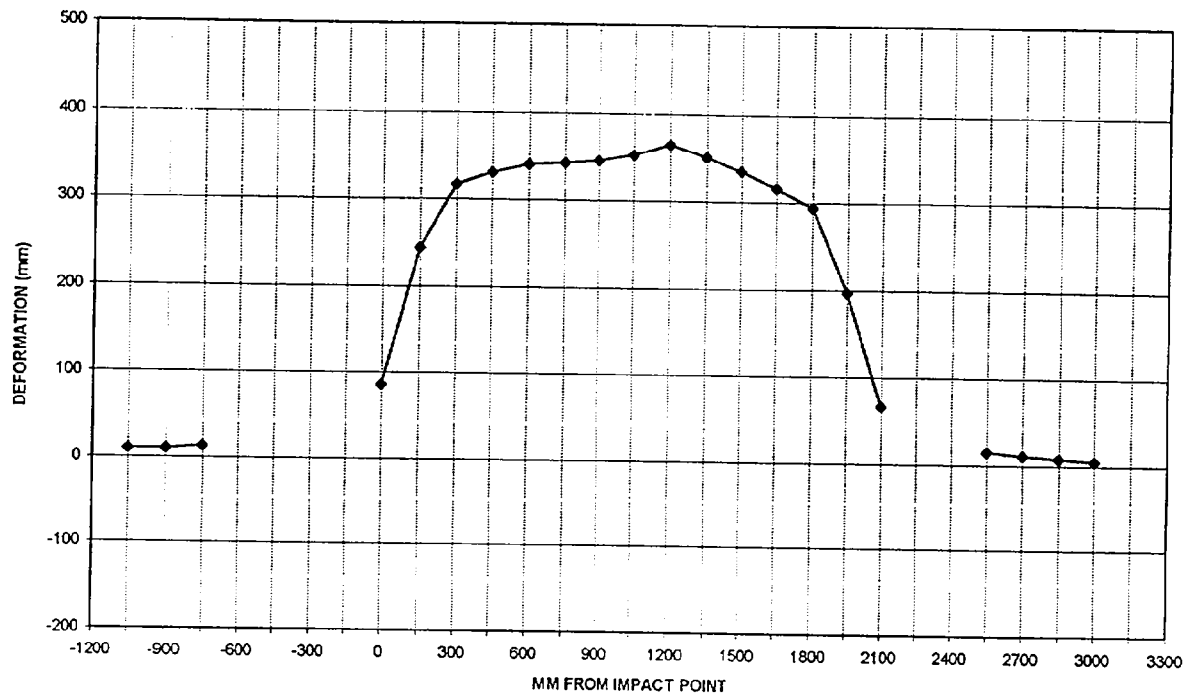
LEVEL 2 - OCCUPANT H-POINT

**DATA SHEET NO. 10**  
**VEHICLE EXTERIOR CRUSH PROFILES**

| Longitudinal Distance (mm) | Level 3 - Mid Door |                |                   |
|----------------------------|--------------------|----------------|-------------------|
|                            | Pre-Test (mm)      | Post-Test (mm) | Static Crush (mm) |
| -1050                      | 758                | 768            | 10                |
| -900                       | 730                | 740            | 10                |
| -750                       | 702                | 715            | 13                |
| -600                       |                    |                |                   |
| -450                       |                    |                |                   |
| -300                       |                    |                |                   |
| -150                       |                    |                |                   |
| 0 (impact point)           | 684                | 770            | 86                |
| 150                        | 682                | 926            | 244               |
| 300                        | 678                | 995            | 317               |
| 450                        | 676                | 1007           | 331               |
| 600                        | 675                | 1016           | 341               |
| 750                        | 675                | 1018           | 343               |
| 900                        | 675                | 1021           | 346               |
| 1050                       | 675                | 1028           | 353               |
| 1200                       | 680                | 1045           | 365               |
| 1350                       | 674                | 1025           | 351               |
| 1500                       | 674                | 1009           | 335               |
| 1650                       | 675                | 991            | 316               |
| 1800                       | 675                | 969            | 294               |
| 1950                       | 680                | 877            | 197               |
| 2100                       | 674                | 740            | 66                |
| 2250                       |                    |                |                   |
| 2400                       |                    |                |                   |
| 2550                       | 681                | 696            | 15                |
| 2700                       | 701                | 712            | 11                |
| 2850                       | 720                | 728            | 8                 |
| 3000                       | 744                | 749            | 5                 |

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

## VEHICLE EXTERIOR STATIC CRUSH



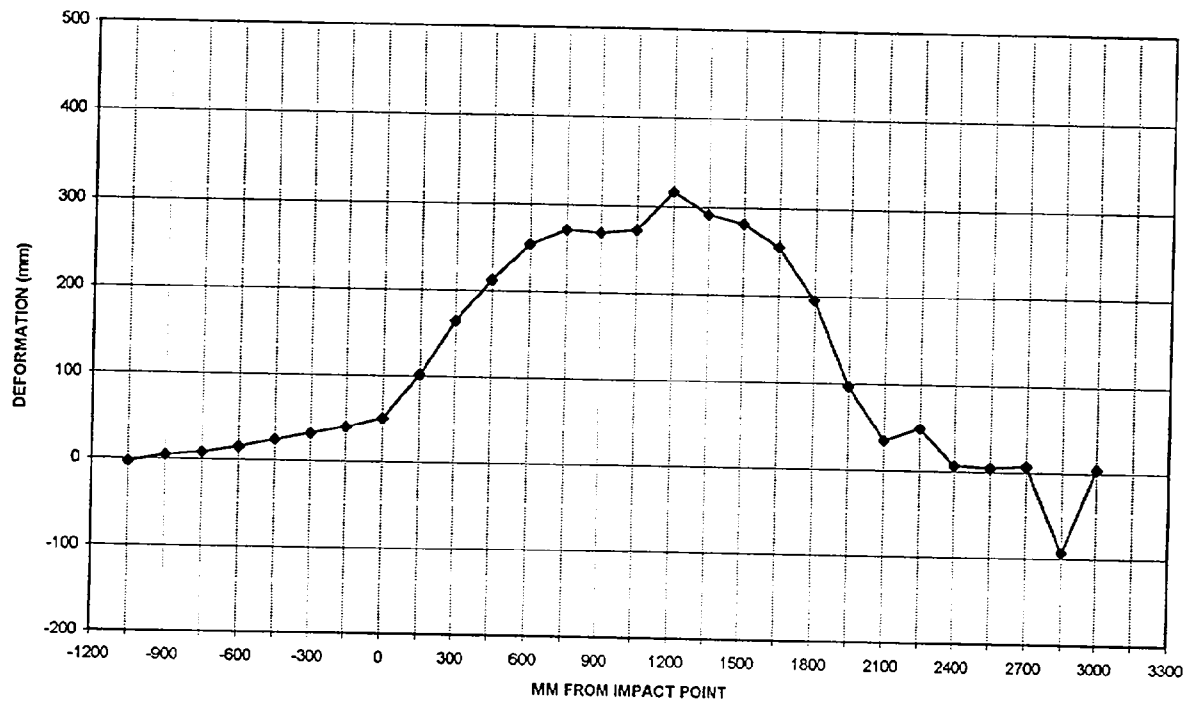
LEVEL 3 - MID DOOR

**DATA SHEET NO. 10**  
**VEHICLE EXTERIOR CRUSH PROFILES**

| Longitudinal Distance (mm) | Level 4 - Window Sill |                |                   |
|----------------------------|-----------------------|----------------|-------------------|
|                            | Pre-Test (mm)         | Post-Test (mm) | Static Crush (mm) |
| -1050                      | 818                   | 815            | -3                |
| -900                       | 791                   | 796            | 5                 |
| -750                       | 776                   | 784            | 8                 |
| -600                       | 764                   | 779            | 15                |
| -450                       | 751                   | 775            | 24                |
| -300                       | 745                   | 777            | 32                |
| -150                       | 740                   | 780            | 40                |
| 0 (impact point)           | 738                   | 789            | 51                |
| 150                        | 738                   | 840            | 102               |
| 300                        | 738                   | 902            | 164               |
| 450                        | 736                   | 948            | 212               |
| 600                        | 739                   | 992            | 253               |
| 750                        | 740                   | 1011           | 271               |
| 900                        | 740                   | 1008           | 268               |
| 1050                       | 743                   | 1015           | 272               |
| 1200                       | 743                   | 1060           | 317               |
| 1350                       | 746                   | 1037           | 291               |
| 1500                       | 750                   | 1031           | 281               |
| 1650                       | 753                   | 1008           | 255               |
| 1800                       | 756                   | 951            | 195               |
| 1950                       | 758                   | 855            | 97                |
| 2100                       | 760                   | 795            | 35                |
| 2250                       | 762                   | 811            | 49                |
| 2400                       | 770                   | 777            | 7                 |
| 2550                       | 779                   | 784            | 5                 |
| 2700                       | 791                   | 798            | 7                 |
| 2850                       | 804                   | 711            | -93               |
| 3000                       | 827                   | 831            | 4                 |

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

## VEHICLE EXTERIOR STATIC CRUSH



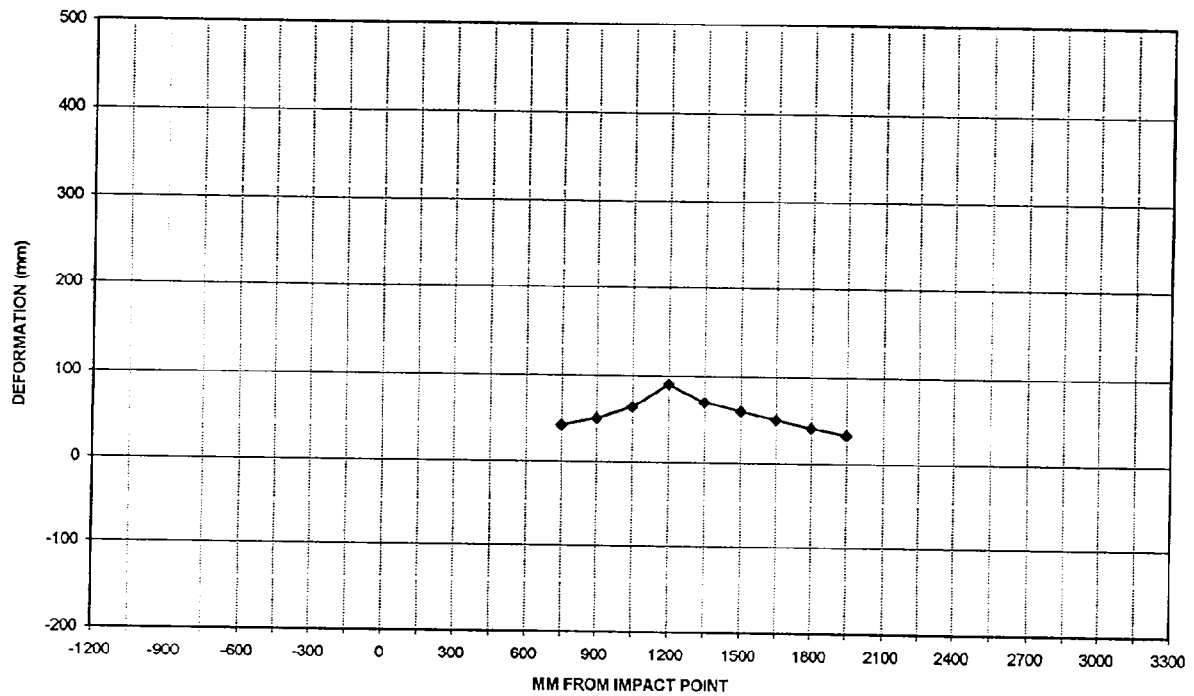
LEVEL 4 - WINDOW SILL

**DATA SHEET NO. 10**  
**VEHICLE EXTERIOR CRUSH PROFILES**

| Longitudinal Distance (mm) | Level 5 - Window Top |                |                   |
|----------------------------|----------------------|----------------|-------------------|
|                            | Pre-Test (mm)        | Post-Test (mm) | Static Crush (mm) |
| -1050                      |                      |                |                   |
| -900                       |                      |                |                   |
| -750                       |                      |                |                   |
| -600                       |                      |                |                   |
| -450                       |                      |                |                   |
| -300                       |                      |                |                   |
| -150                       |                      |                |                   |
| 0 (impact point)           |                      |                |                   |
| 150                        |                      |                |                   |
| 300                        |                      |                |                   |
| 450                        |                      |                |                   |
| 600                        |                      |                |                   |
| 750                        | 986                  | 1027           | 41                |
| 900                        | 985                  | 1034           | 49                |
| 1050                       | 985                  | 1048           | 63                |
| 1200                       | 986                  | 1076           | 90                |
| 1350                       | 986                  | 1055           | 69                |
| 1500                       | 983                  | 1042           | 59                |
| 1650                       | 981                  | 1030           | 49                |
| 1800                       | 980                  | 1020           | 40                |
| 1950                       | 985                  | 1017           | 32                |
| 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



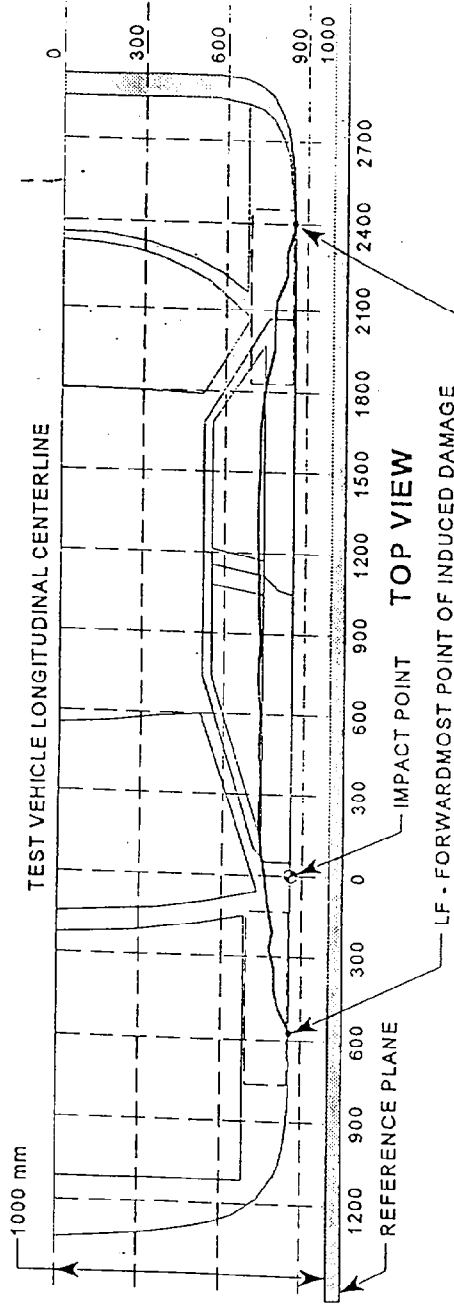
LEVEL 5 - WINDOW TOP

# DATA SHEET NO. 11

## VEHICLE DAMAGE PROFILE DISTANCES

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

NHTSA NO.: MV0115 Test Date: February 4, 1997



| DPD MEASUREMENTS  | POST-TEST (mm) | PRE-TEST (mm) | STATIC CRUSH (mm) |
|-------------------|----------------|---------------|-------------------|
| 1. (LF = -900 mm) | 726            | 718           | 8                 |
| 2. -97 mm         | 752            | 684           | 68                |
| 3. 673 mm         | 1086           | 685           | 401               |
| 4. 1500 mm        | 1065           | 683           | 382               |
| 5. 2388 mm        | 771            | 769           | 2                 |
| 6. (LR = 3150 mm) | 758            | 755           | 3                 |



DATA SHEET NO. 12

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

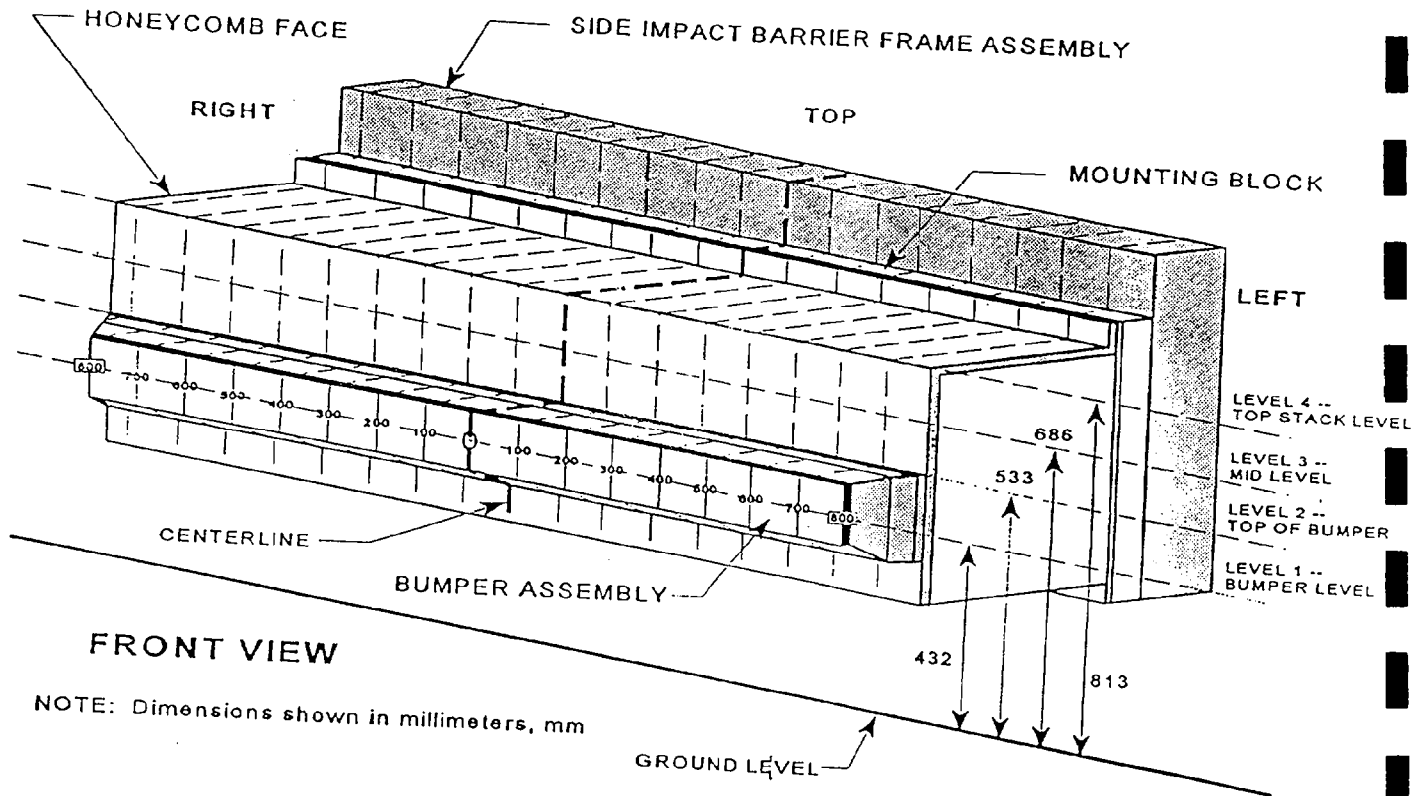
Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

|                       |                  | Distance Right of Center (mm) |     |     |     |     |     |     |     |    | Distance Left of Center (mm) |     |     |     |     |     |     |     |
|-----------------------|------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|----|------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Location              | Height<br>at CL* | 800                           | 700 | 600 | 500 | 400 | 300 | 200 | 100 | 0  | 100                          | 200 | 300 | 400 | 500 | 600 | 700 | 800 |
| Top Stack<br>Level 4  | 813 mm           | 72                            | 35  | 6   | 0   | 0   | 1   | 3   | 3   | 3  | 4                            | 6   | 9   | 21  | 52  | 82  | 107 | 153 |
| Mid Level<br>Level 3  | 686 mm           | 35                            | 9   | 0   | 0   | -2  | -1  | 3   | 5   | 1  | 0                            | 1   | 2   | 2   | 5   | 11  | 37  | 89  |
| Top Bumper<br>Level 2 | 533 mm           | 66                            | 52  | 43  | 25  | 17  | 14  | 7   | 4   | 2  | 7                            | 8   | 10  | 12  | 15  | 20  | 35  | 60  |
| Mid Bumper<br>Level 1 | 432 mm           | 133                           | 114 | 87  | 66  | 52  | 52  | 41  | 31  | 28 | 29                           | 29  | 30  | 32  | 35  | 42  | 65  | 98  |

See next page for Barrier Face Graphic

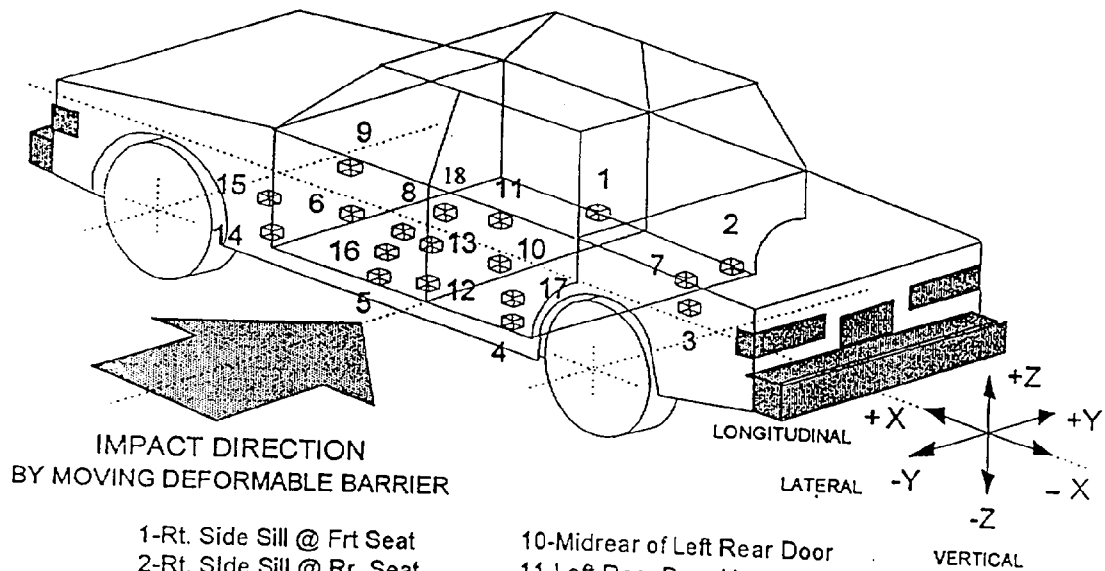
# DATA SHEET NO. 12 (Cont'd)



DATA SHEET 13  
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115      Test Date: February 4, 1997



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

DATA SHEET NO. 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 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          | Rt. Side Sill @ Front Seat       | 2801              | 610  | 232  | 4.5                      | -4.2  | 20.1                    | -1.9  | 6.5                      | -7.5  | 20.6            |
| 2          | Rt. Side Sill @ Rear Seat        | 1598              | 630  | 228  | 2.8                      | -4.7  | 20.9                    | -2.0  | 4.6                      | -7.5  | 21.3            |
| 3          | Rr. Floorpan Above Axle          | 1240              | 0    | 466  | 6.6                      | -5.3  | 18.9                    | -1.7  | 9.1                      | -8.7  | 20.3            |
| 4          | Left Side Sill @ Rr. Seat        | 1587              | -650 | 232  | ---                      | ---   | 42.5                    | -19.7 | ---                      | ---   | ---             |
| 5          | Left Side Sill @ Frt. Seat       | 2789              | -630 | 230  | ---                      | ---   | 124.7                   | -40.5 | ---                      | ---   | ---             |
| 6          | Left Front Door Centerline       | 2843              | -774 | 721  | ---                      | ---   | 202.0                   | -63.3 | ---                      | ---   | ---             |
| 7          | Right Rear Occupant Compartment  | 2008              | 288  | 364  | ---                      | ---   | 20.1                    | -2.7  | ---                      | ---   | ---             |
| 8          | Left Front Door Midrear          | 2323              | -754 | 730  | ---                      | ---   | 137.2                   | -53.9 | ---                      | ---   | ---             |
| 9          | Left Front Door Upper Centerline | 2760              | -748 | 890  | ---                      | ---   | 311.4                   | -79.5 | ---                      | ---   | ---             |
| 10         | Left Rear Door Midrear           | 2238              | -754 | 691  | ---                      | ---   | 146.7                   | -57.0 | ---                      | ---   | ---             |
| 11         | Left Rear Door Upper Centerline  | 1827              | -716 | 936  | ---                      | ---   | 89.7                    | -46.2 | ---                      | ---   | ---             |
| 12         | Left Lower B-Post                | 2113              | -646 | 350  | ---                      | ---   | 102.2                   | -32.9 | ---                      | ---   | ---             |
| 13         | Left Mid B-Post                  | 2183              | -642 | 1010 | ---                      | ---   | 118.7                   | -23.4 | ---                      | ---   | ---             |
| 14         | Left Lower A-Post                | 3207              | -644 | 384  | ---                      | ---   | 58.1                    | -21.2 | ---                      | ---   | ---             |
| 15         | Left Mid A-Post                  | 3297              | -746 | 870  | ---                      | ---   | 33.4                    | -3.2  | ---                      | ---   | ---             |
| 16         | Driver Left Seat Track           | 2410              | -548 | 324  | ---                      | ---   | 38.7                    | -60.1 | ---                      | ---   | ---             |
| 18         | Vehicle CG                       | 2208              | 0    | 425  | 11.8                     | -16.9 | 78.8                    | -13.4 | 26.1                     | -22.1 | 80.2            |

\*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To right)

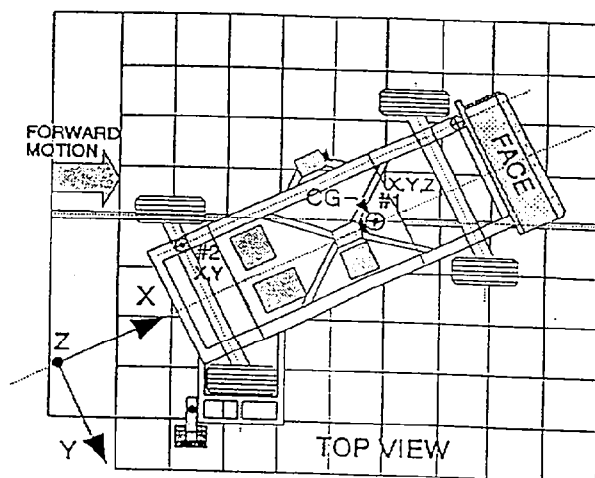
Z - Ground Level (+ Up)

DATA SHEET NO. 14

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997



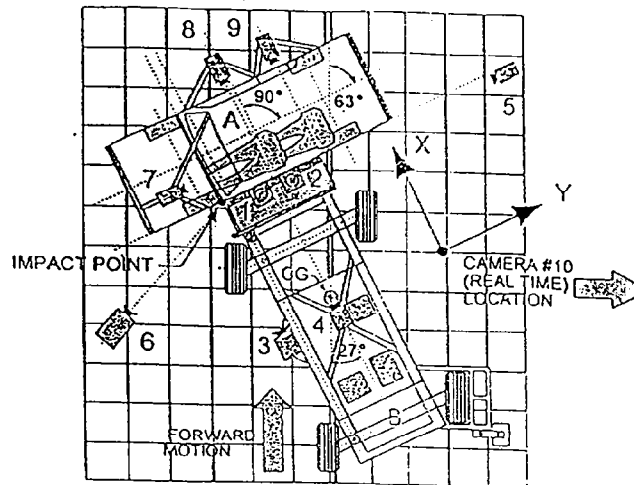
| Accel. No. | Description           | Coordinates (mm)* |      |     | (+ ) Positive |             | (- ) Negative |             |
|------------|-----------------------|-------------------|------|-----|---------------|-------------|---------------|-------------|
|            |                       | X                 | Y    | Z   | Max. (g)      | Time (msec) | Max. (g)      | Time (msec) |
| 1          | MDB Center of Gravity | -1092             | 0    | 483 |               |             |               |             |
|            | Longitudinal (X)      | ---               | ---  | --- | 1.5           | 199         | -17.4         | 36          |
|            | Lateral (Y)           | ---               | ---  | --- | 5.4           | 44          | -.9           | 2           |
|            | Vertical (Z)          | ---               | ---  | --- | 12.7          | 33          | -16.8         | 21          |
|            | Resultant (R)         | ---               | ---  | --- | 21.9          | 21          | ---           | ---         |
| 2          | Rear Frame Member     | -2591             | -625 | 622 |               |             |               |             |
|            | Longitudinal (X)      | ---               | ---  | --- | 1.7           | 160         | -22.5         | 32          |
|            | Lateral (Y)           | ---               | ---  | --- | 3.7           | 22          | -.6           | 162         |

\*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/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997



| Camera No. | View              | Coordinates (mm)* |       |      | Angle | Lens (mm) | Film Speed (fps) |
|------------|-------------------|-------------------|-------|------|-------|-----------|------------------|
|            |                   | X                 | Y     | Z    |       |           |                  |
|            | Real Time         |                   |       |      |       |           |                  |
| 6          | Left Impact       | -845              | -2260 | 1685 |       | 13        | 962              |
| 8          | Onboard Driver    |                   |       |      |       | 8         | 858              |
| 9          | Onboard Passenger |                   |       |      |       | 8         | 1020             |
| 7          | Onboard Hood      |                   |       |      |       | 13        | 671              |
| 5          | Right Impact      | -515              | 10490 | 1875 |       | 25        | 1015             |
| 1          | Top Overall       | -185              | 1270  | 5000 |       | 8         | 1087             |
| 2          | Top Impact        | -310              | 30    | 5000 |       | 13        | 855              |
| 4          | Cart Overall      |                   |       |      |       | 13        | 1010             |
| 3          | Cart Pointer      |                   |       |      |       | 35        | 1005             |

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

DATA SHEET 16  
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115      Test Date: February 4, 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 38.0 mph (61.1 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

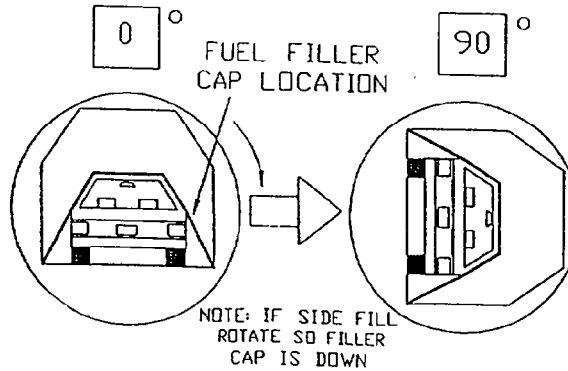
# DATA SHEET 16

## FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

TEST PHASE: 0° - 90°



### DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 47 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 47 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



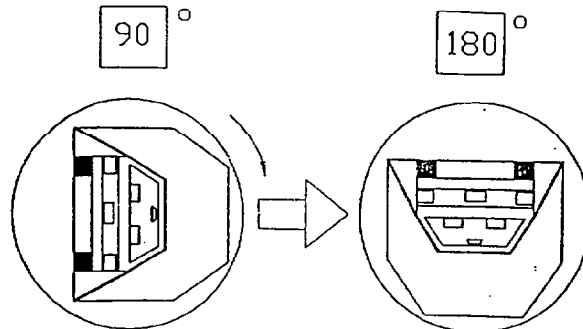
# DATA SHEET 16

## FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

TEST PHASE: 90° - 180°



### DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 31 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 31 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

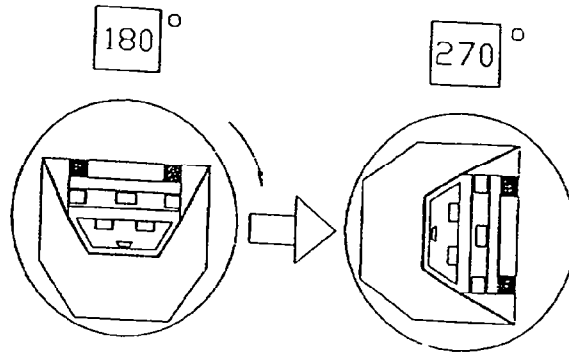
# DATA SHEET 16

## FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

Vehicle Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

TEST PHASE: 180° - 270°



### DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 16 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 16 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

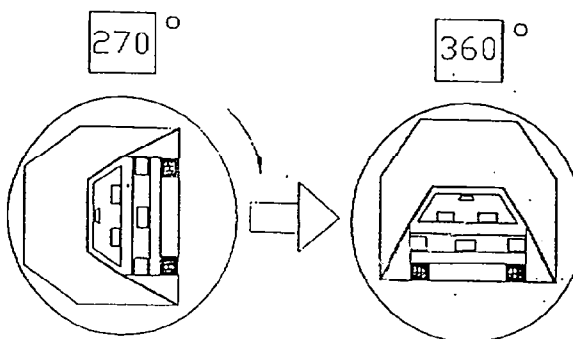
# DATA SHEET 16

## FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Chevrolet/Malibu/4-Door

Vehicle NHTSA No.: MV0115 Test Date: February 4, 1997

TEST PHASE: 270° - 360°



### DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 47 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 47 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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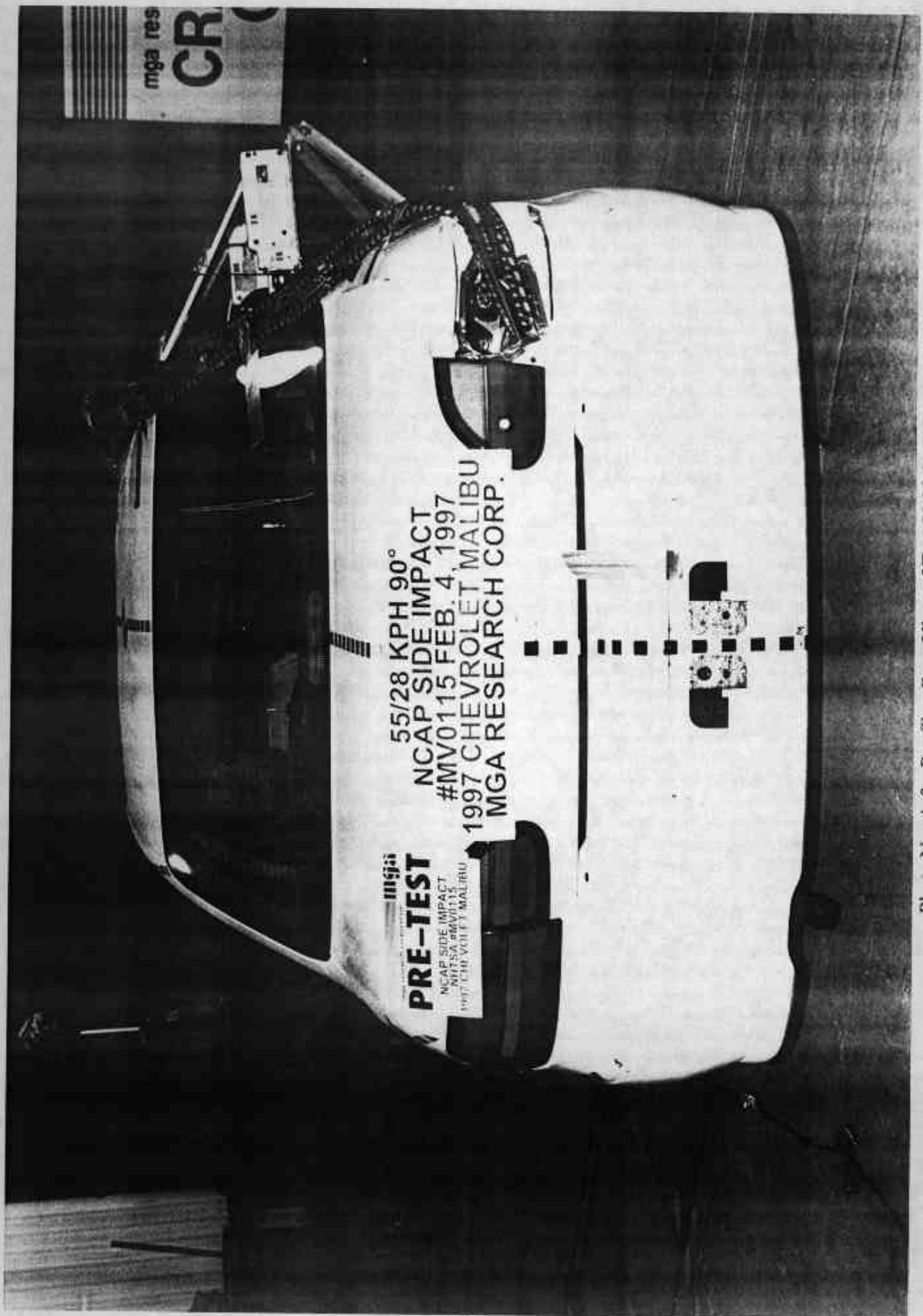


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

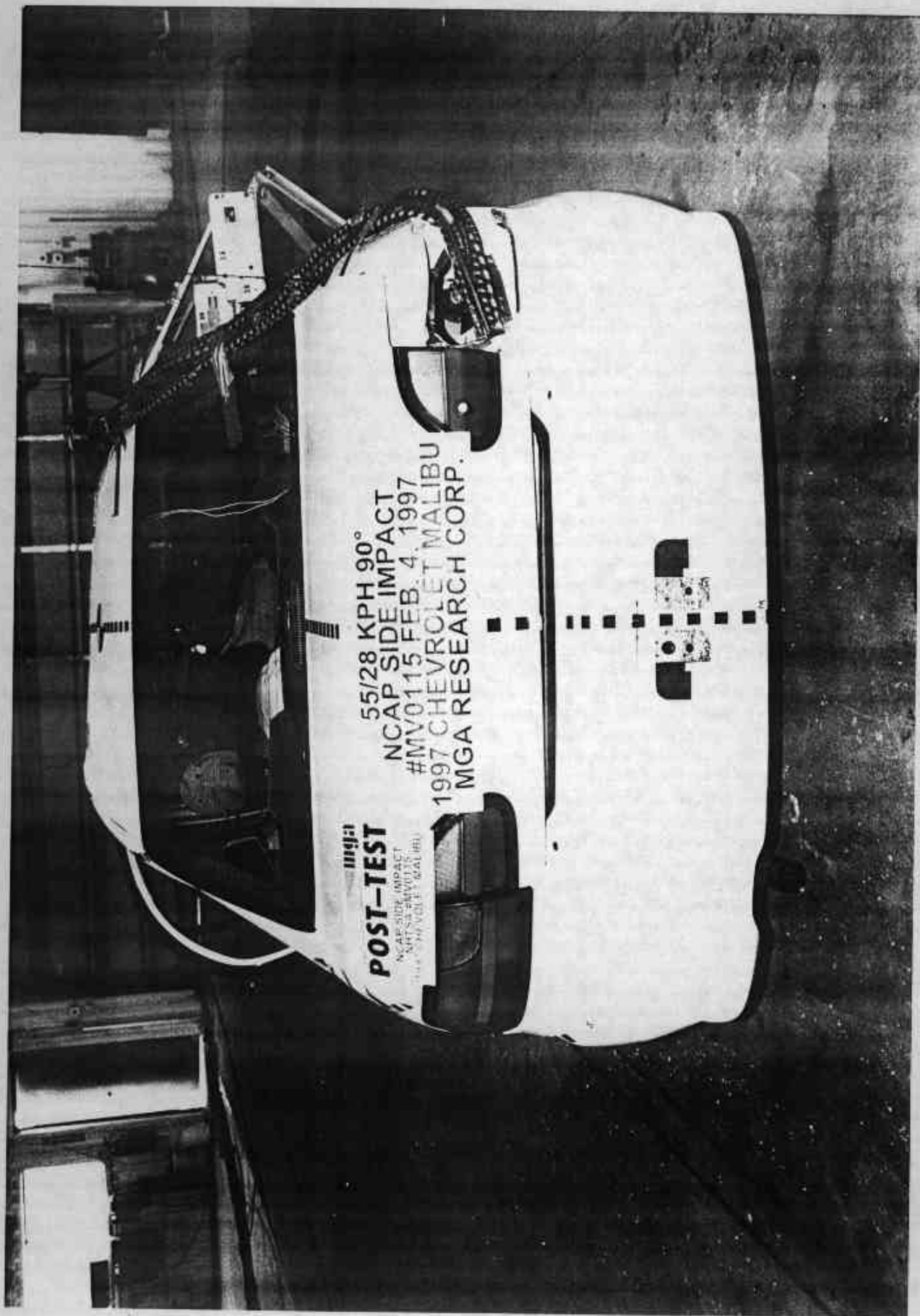


Photo No. A-4 - Post-Test Rear View of Test Vehicle

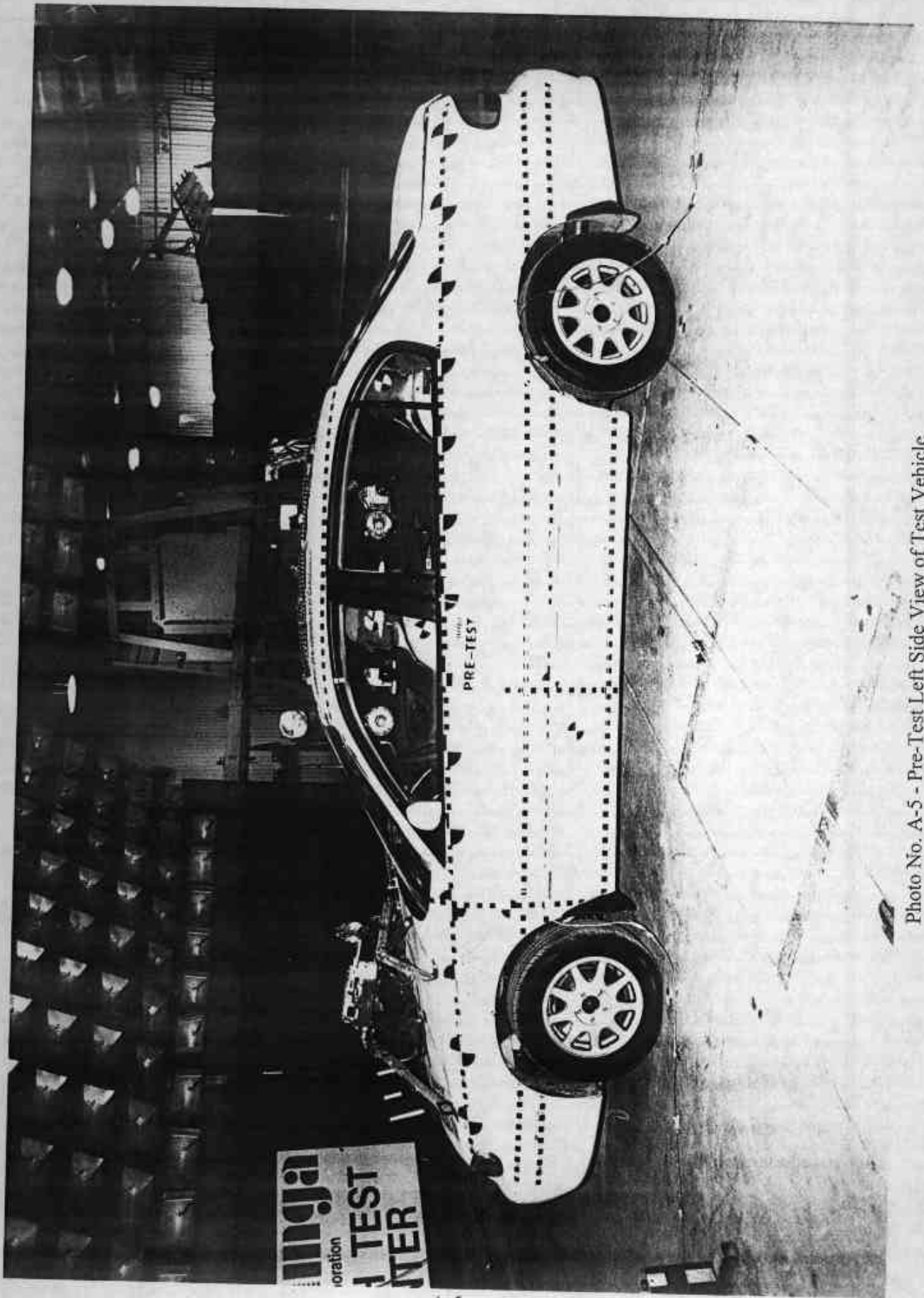


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

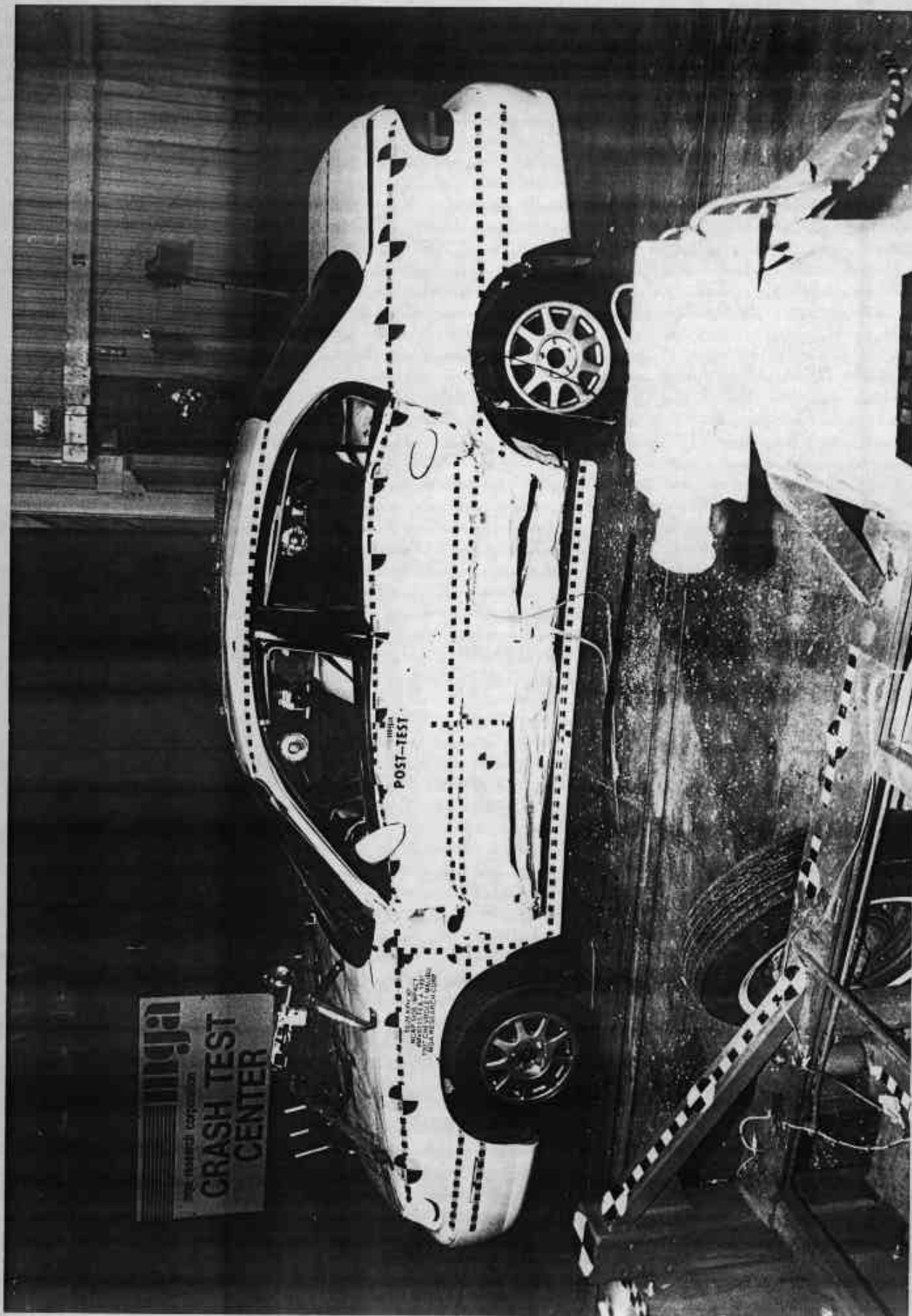


Photo No. A-6 - Post-Test Left Side View of Test Vehicle



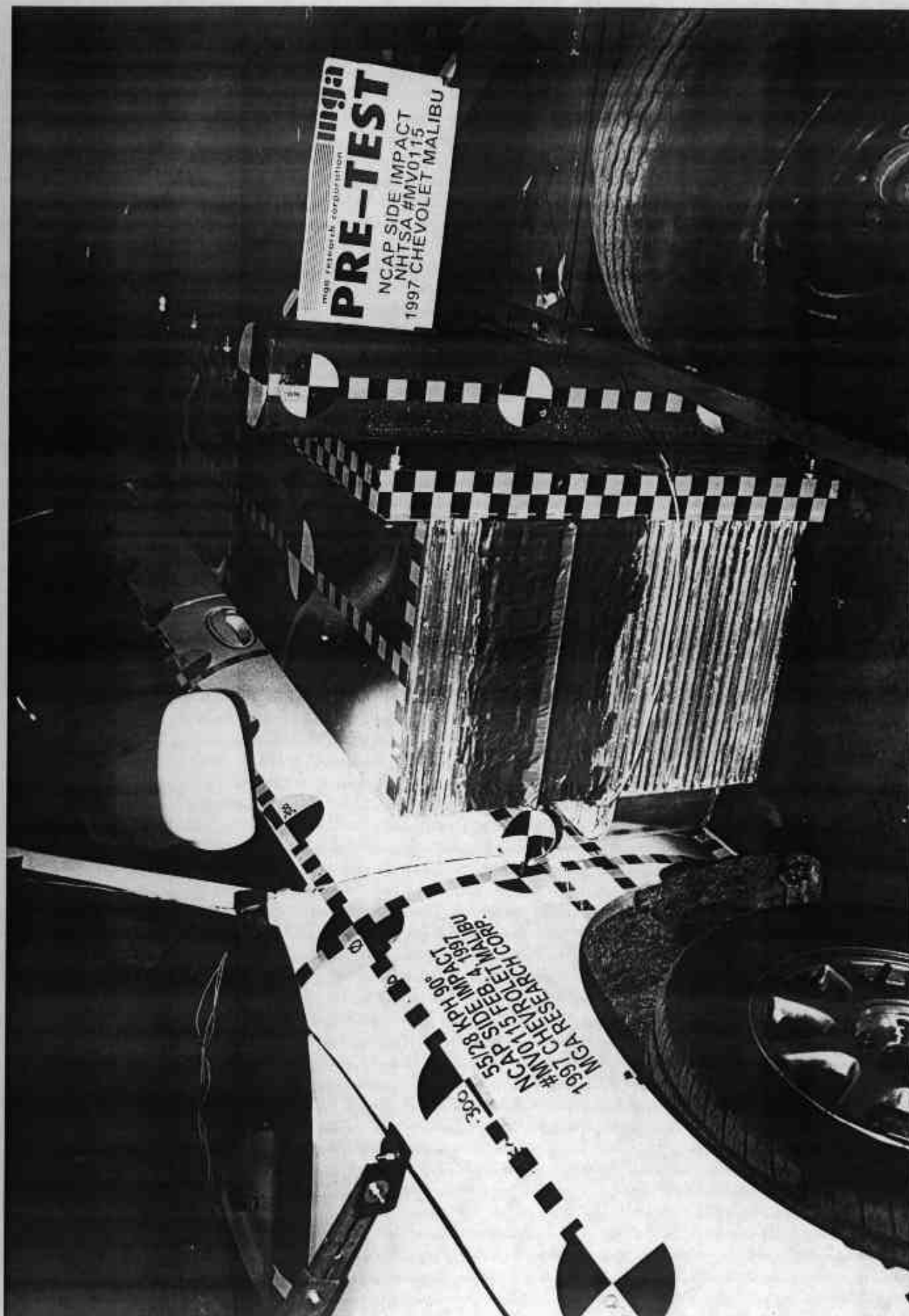


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)



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

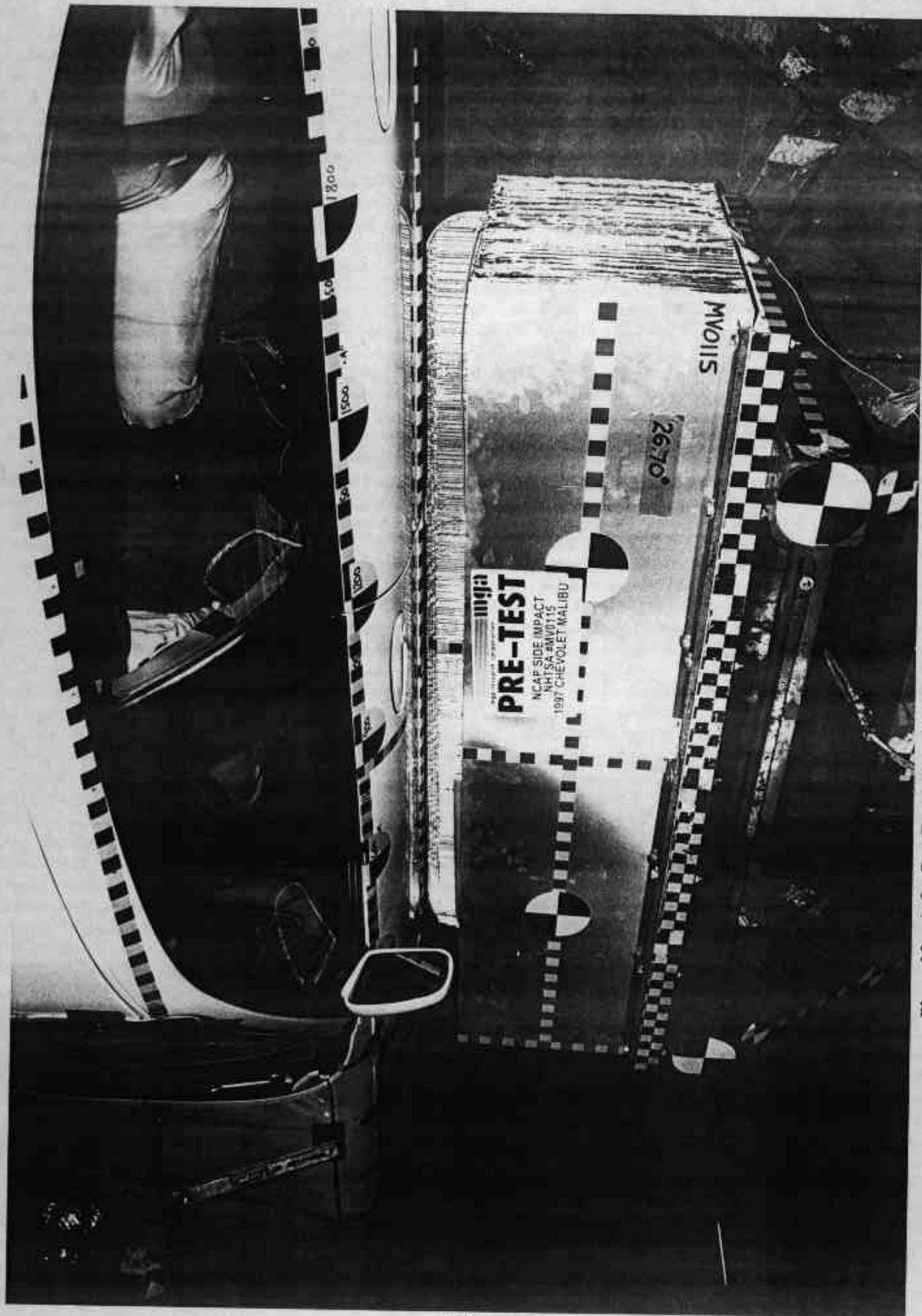


Photo No. A-9 - Pre-Test MDB Positioned Against Vehicle Overhead View

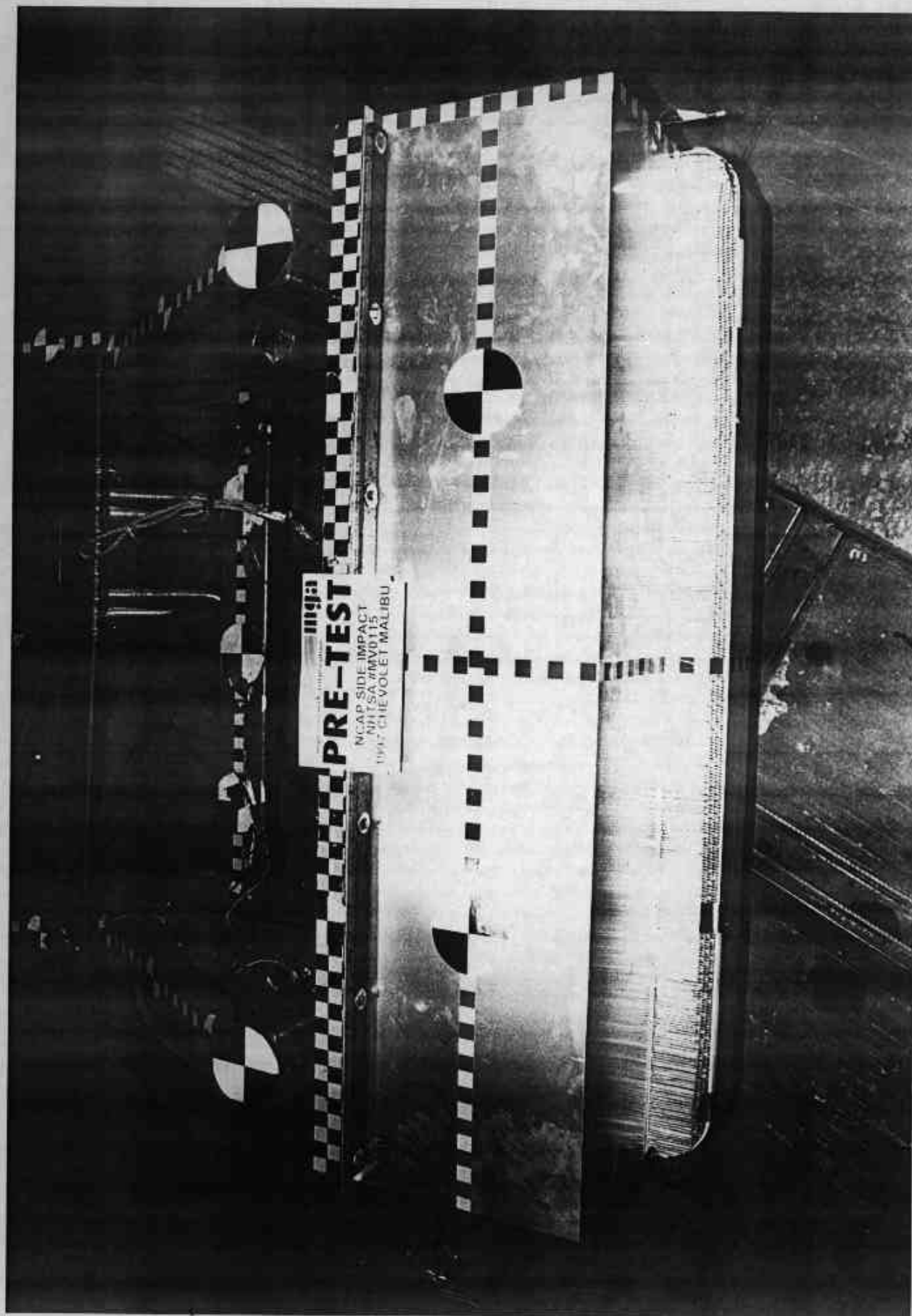


Photo No. A-10 - Pre-Test MDB Top View



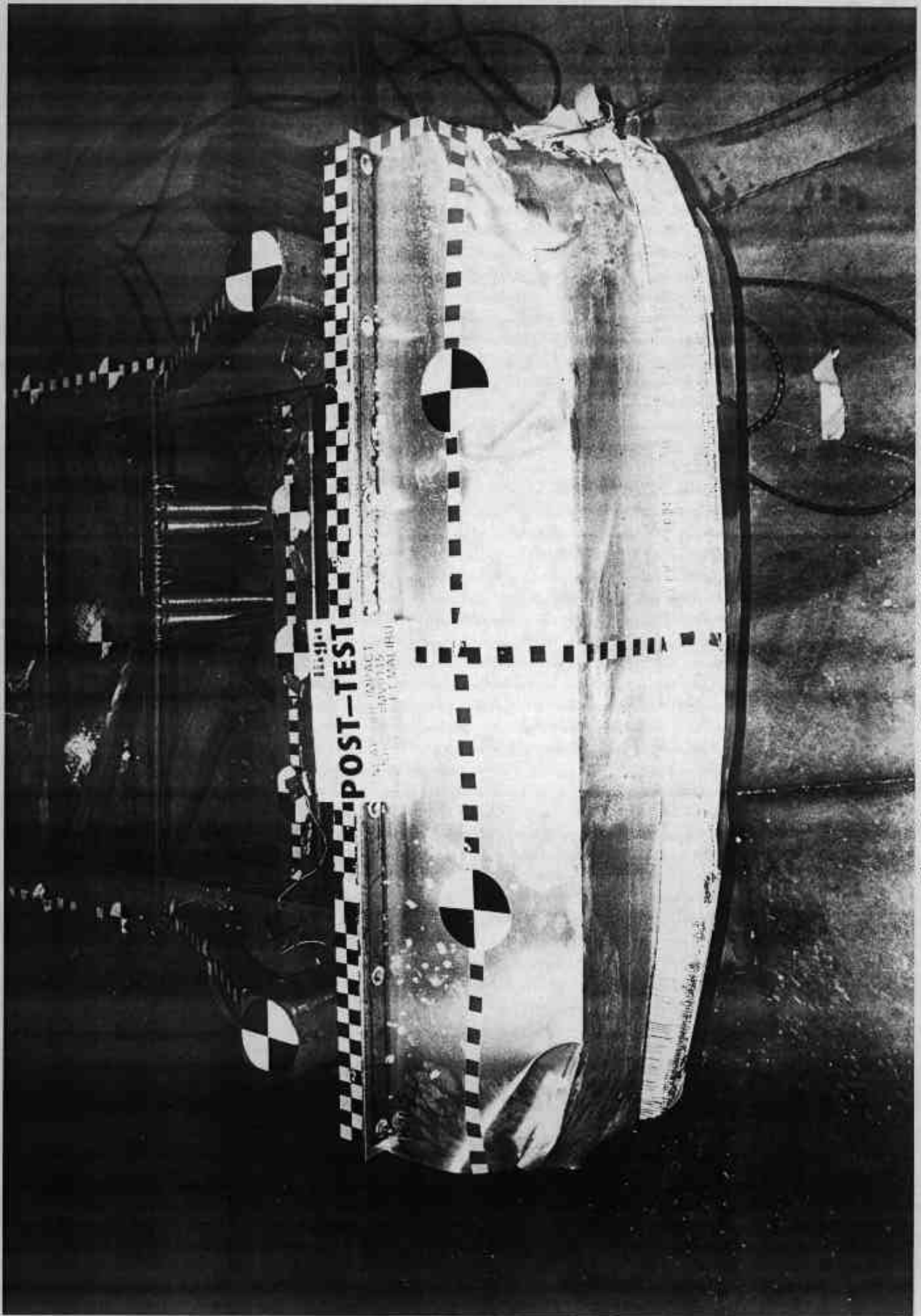


Photo No. A-11 - Post-Test MDB Top View

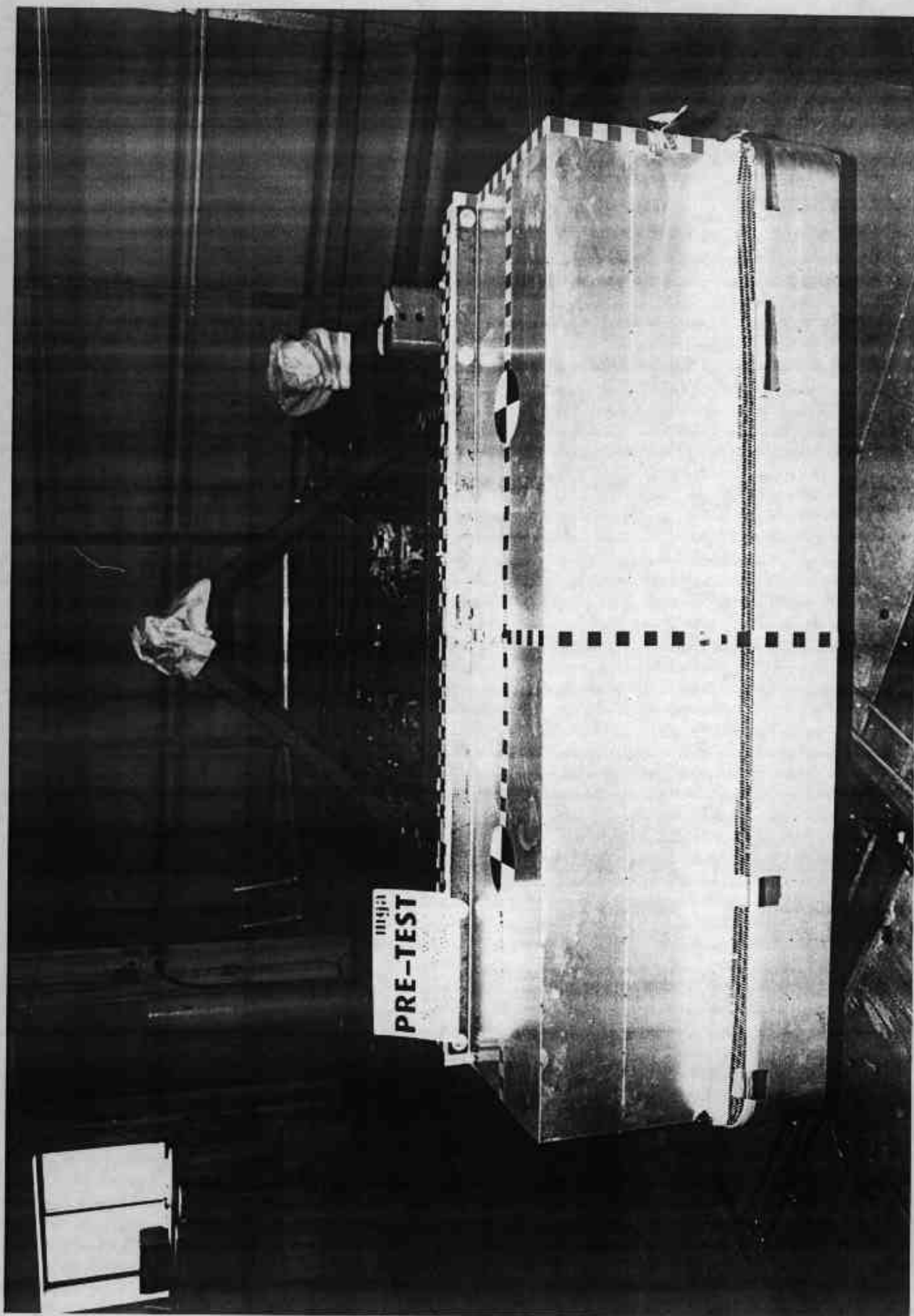


Photo No. A-12 - Pre-Test MDB Front View

A-12

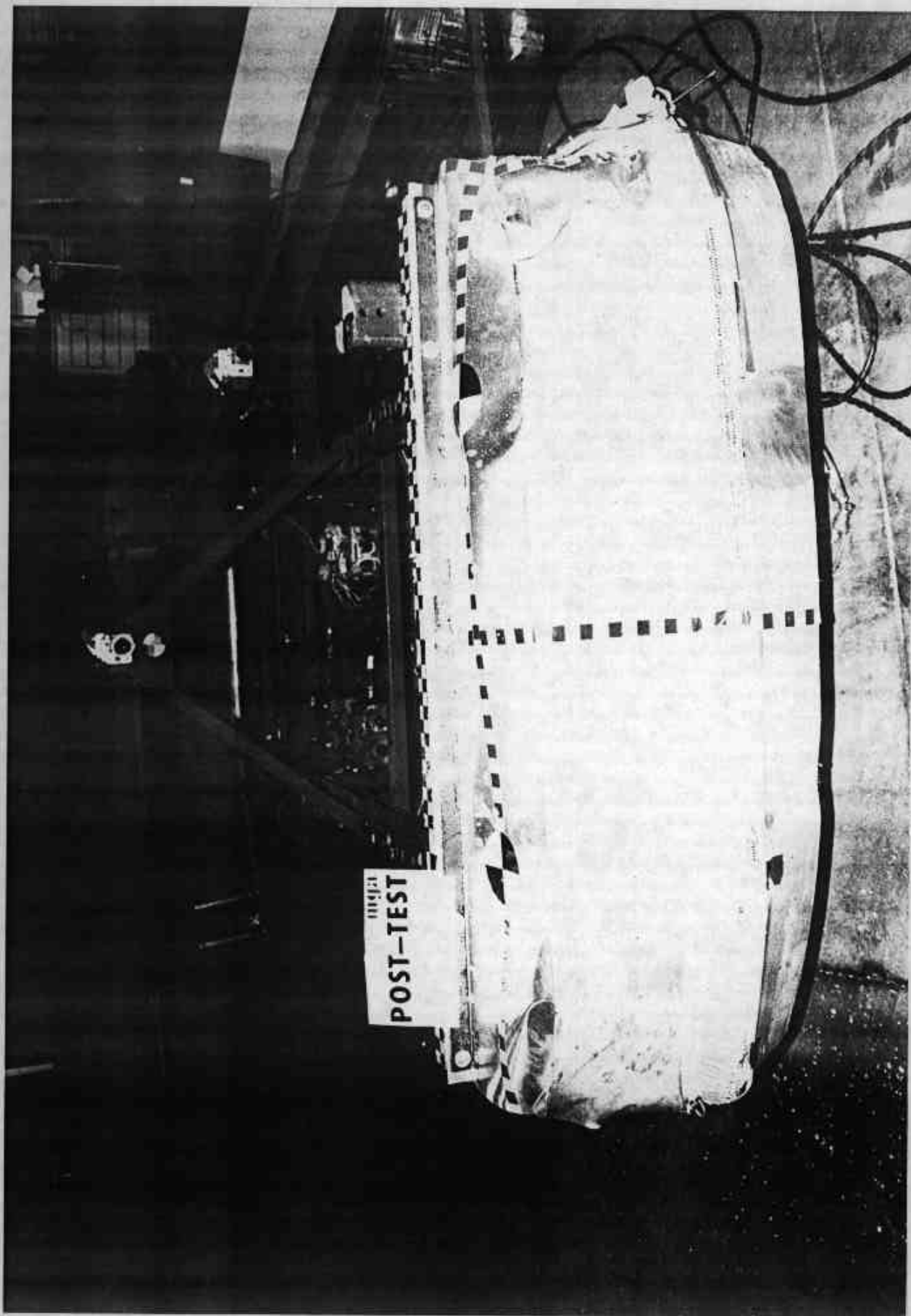


Photo No. A-13 - Post-Test MDB Front View

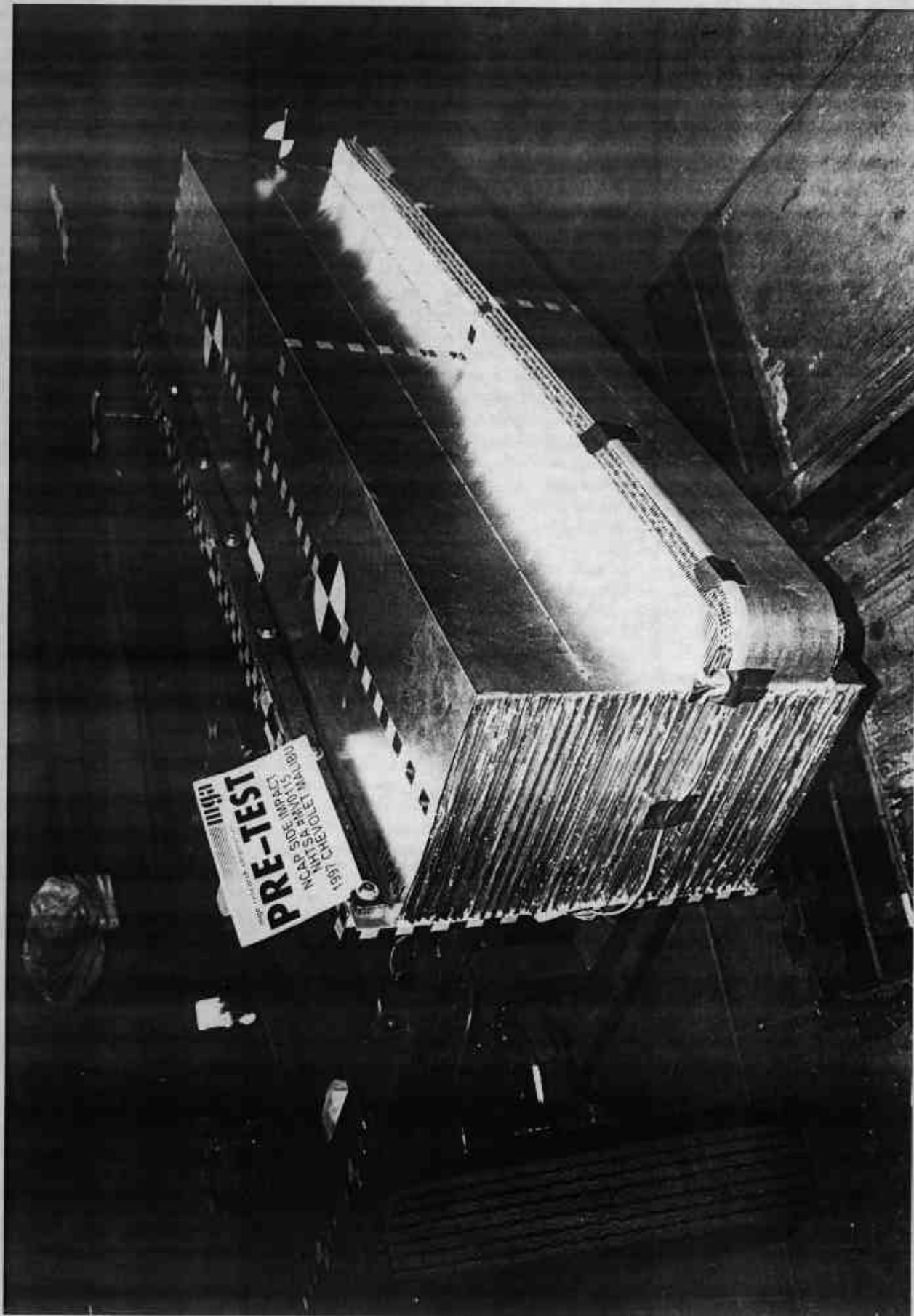


Photo No. A-14 - Pre-Test MDB Right Side View

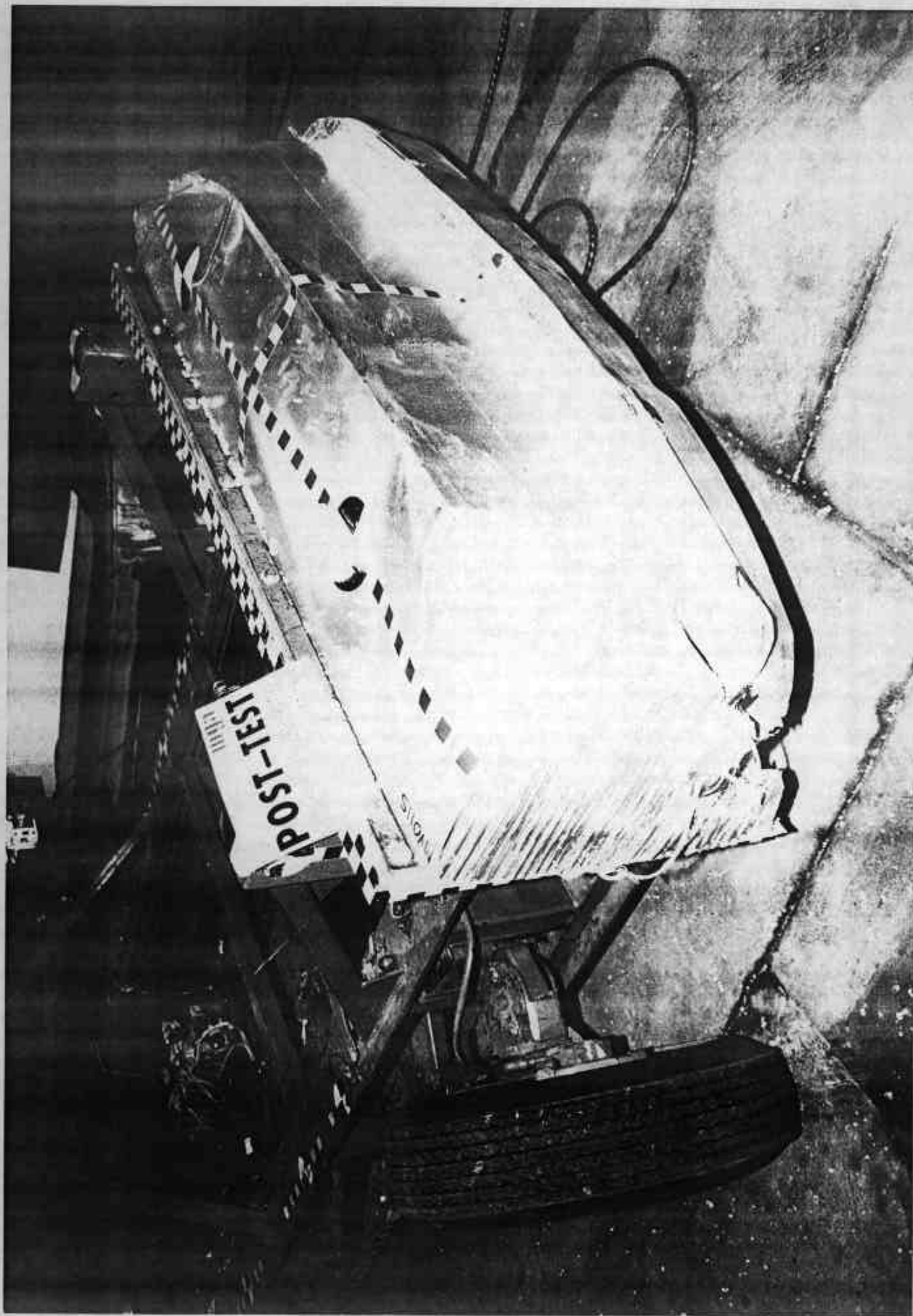


Photo No. A-15 - Post-Test MDB Right Side View

A-15



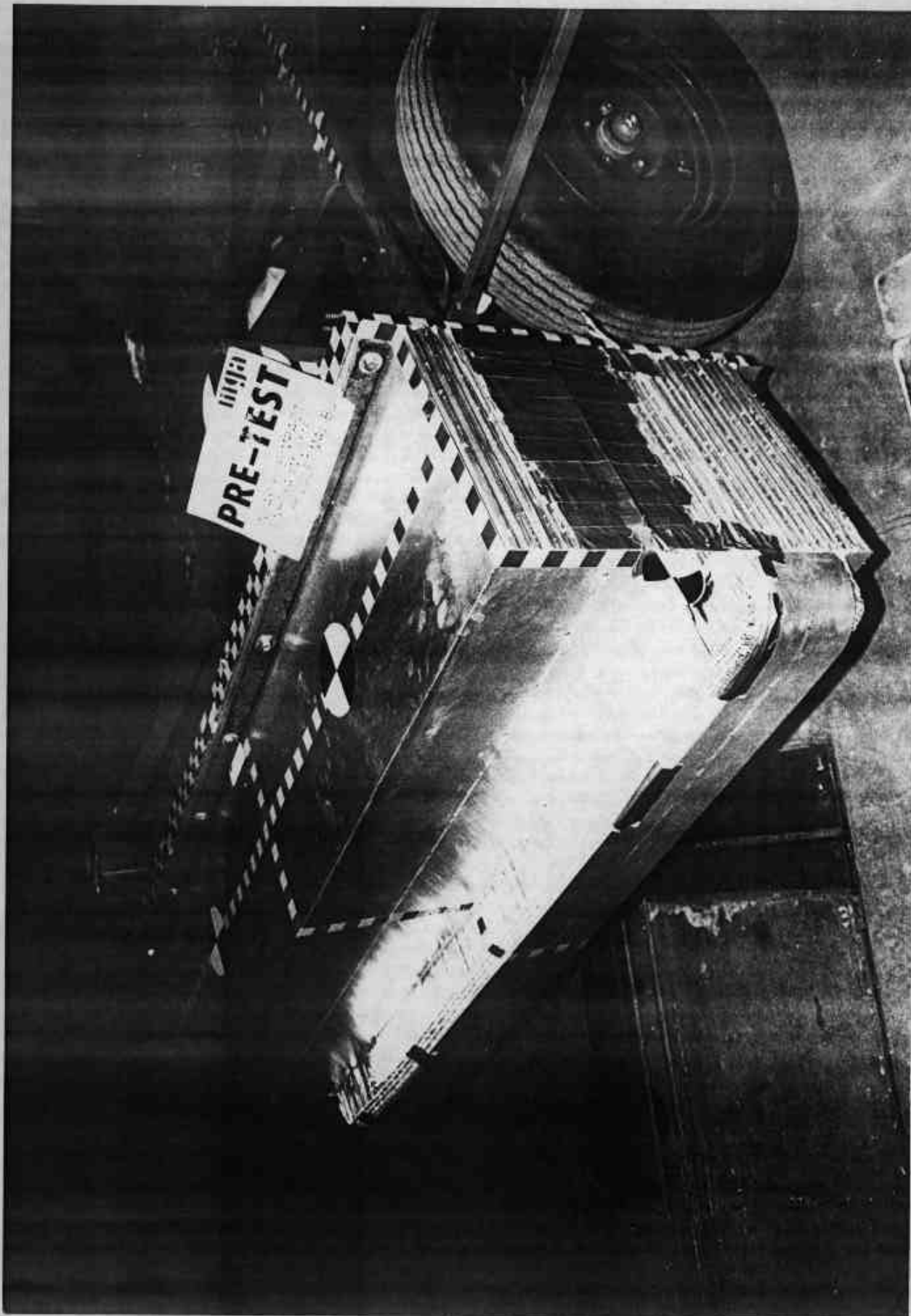


Photo No. A-16 - Pre-Test MDB Left Side View

A-16

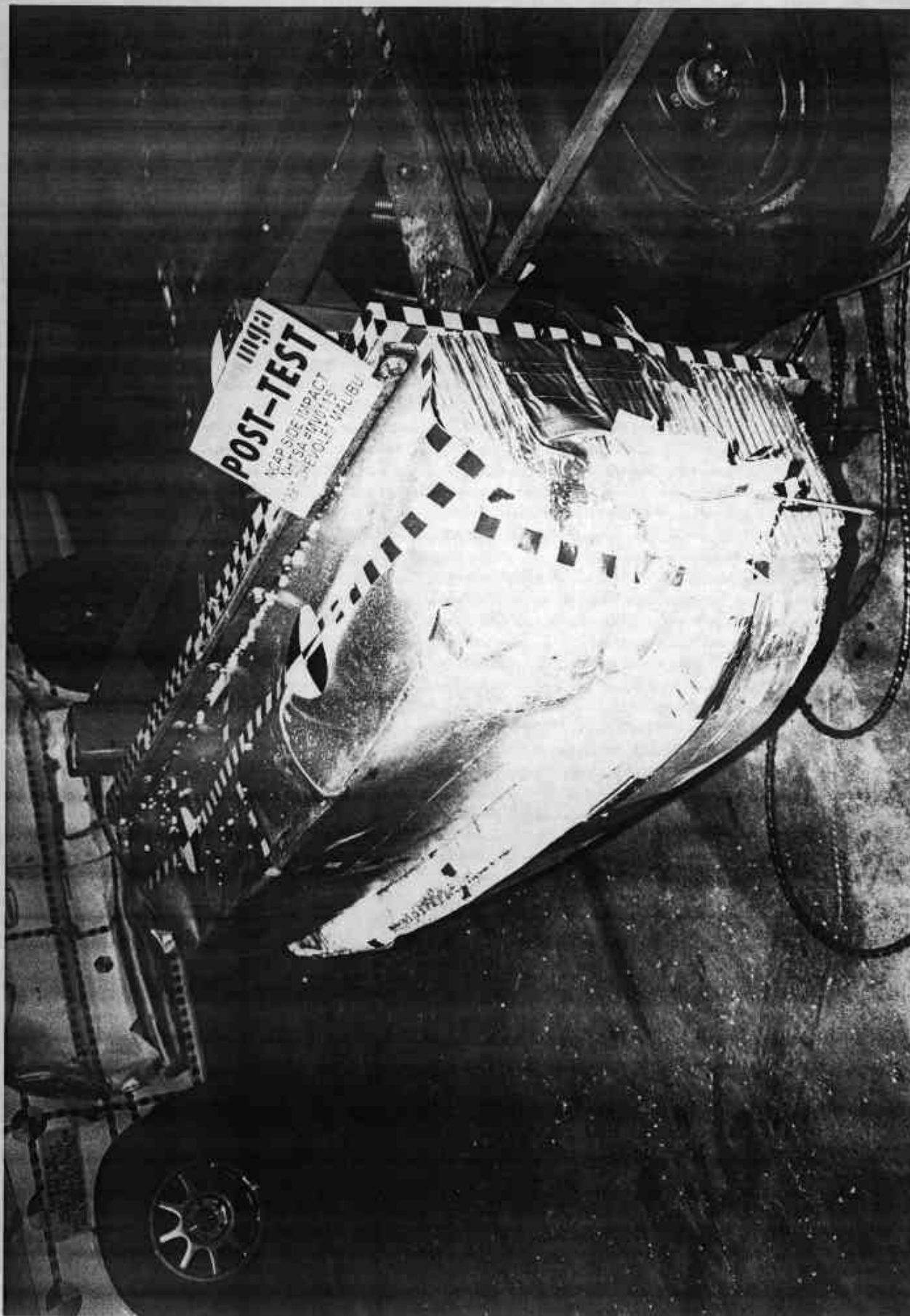


Photo No. A-17 - Post-Test MDB Left Side View

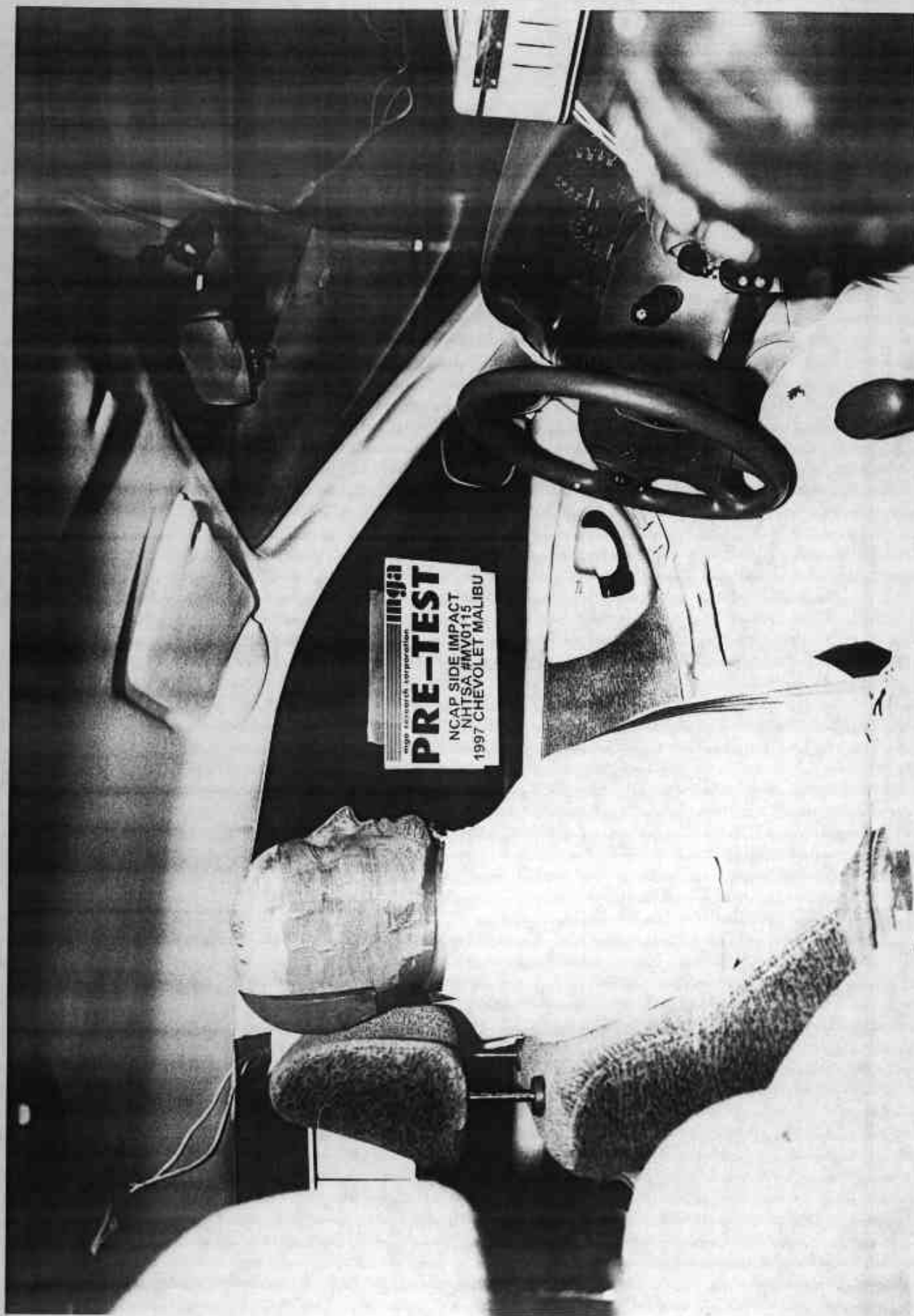


Photo No. A-18 - Pre-Test Driver Dummy Right Side View



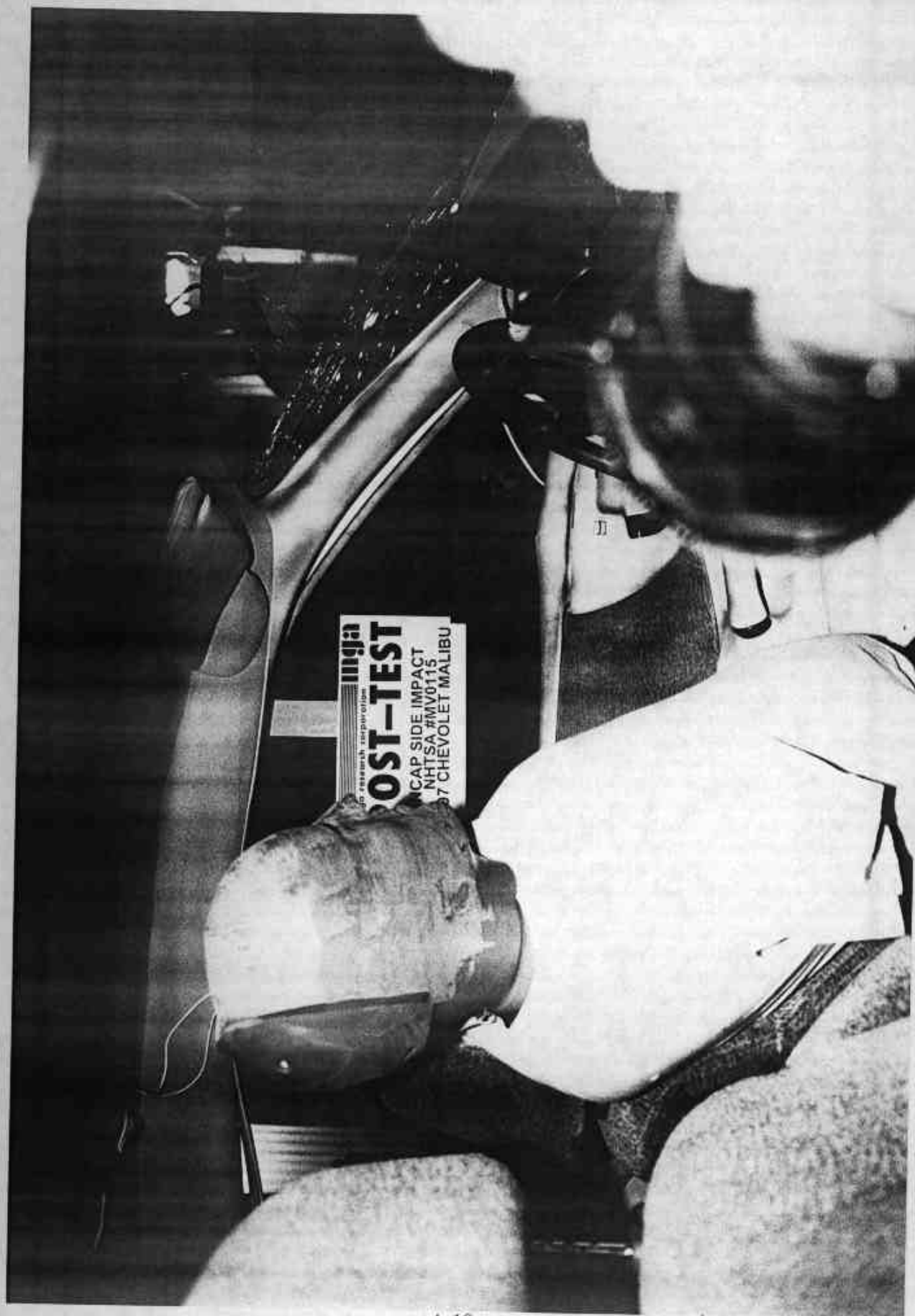


Photo No. A-19 - Post-Test Driver Dummy Right Side View

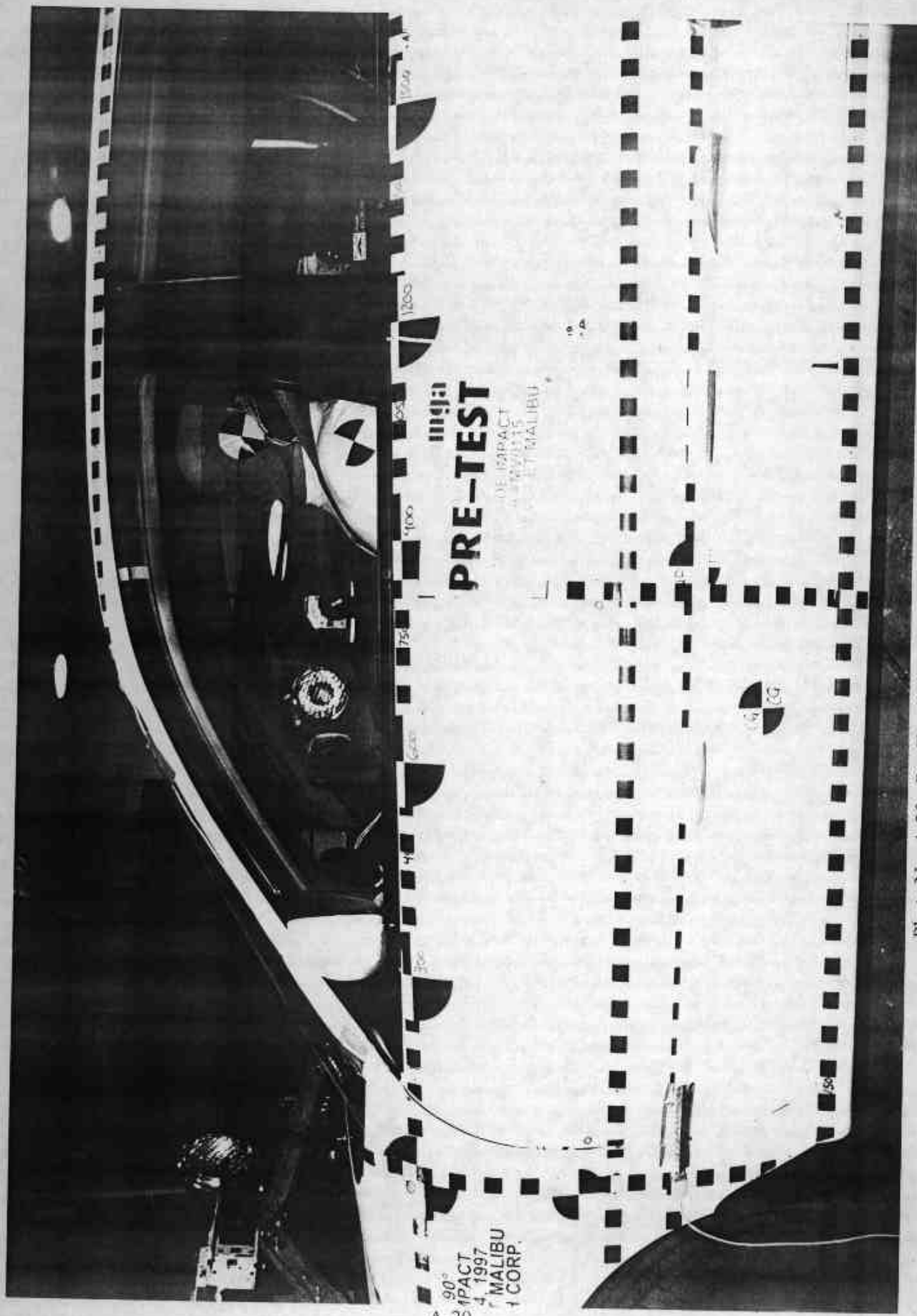


Photo No. A-20 - Pre-Test Driver Dummy Left Side View

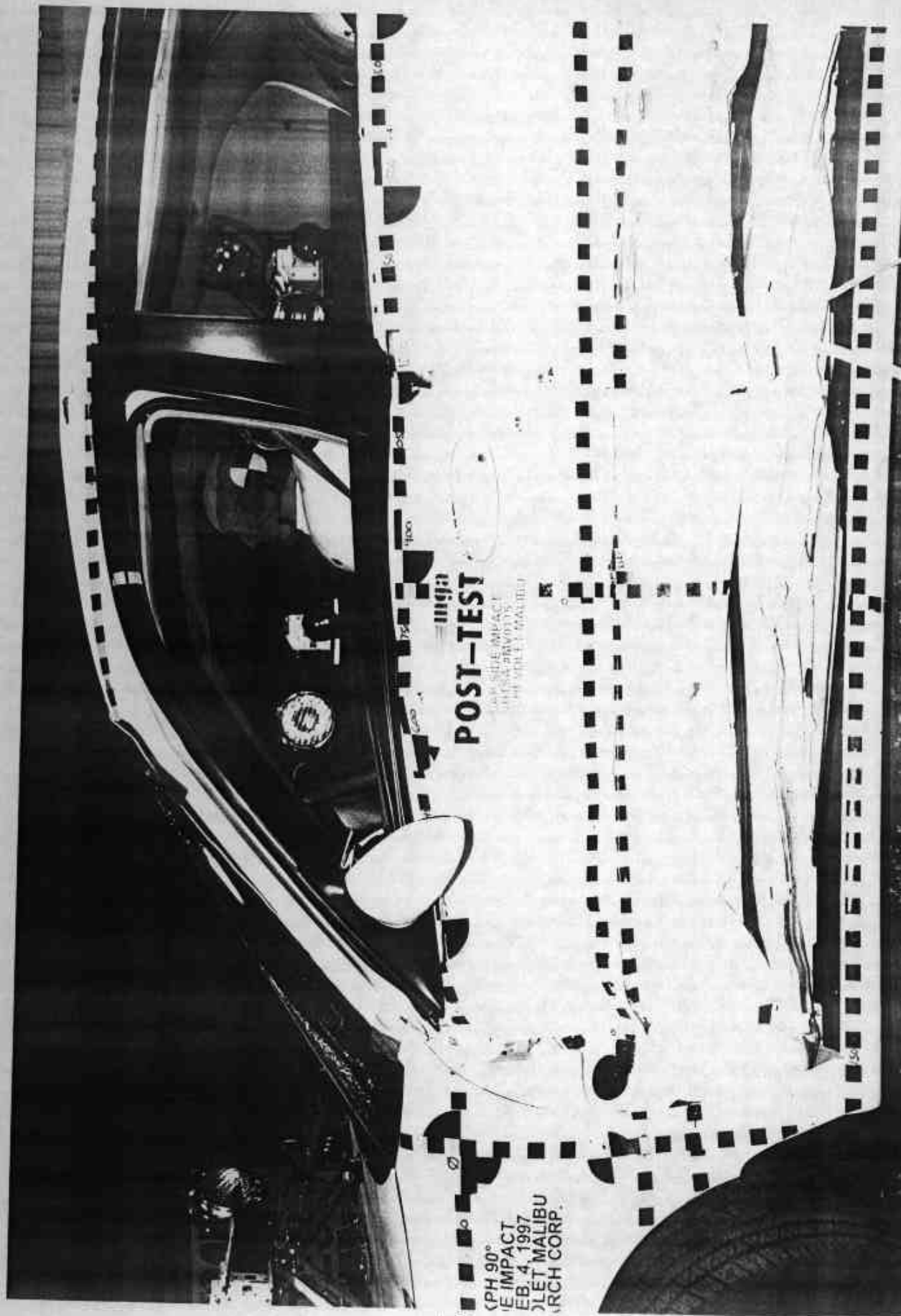


Photo No. A-21 - Post-Test Driver Dummy Left Side View

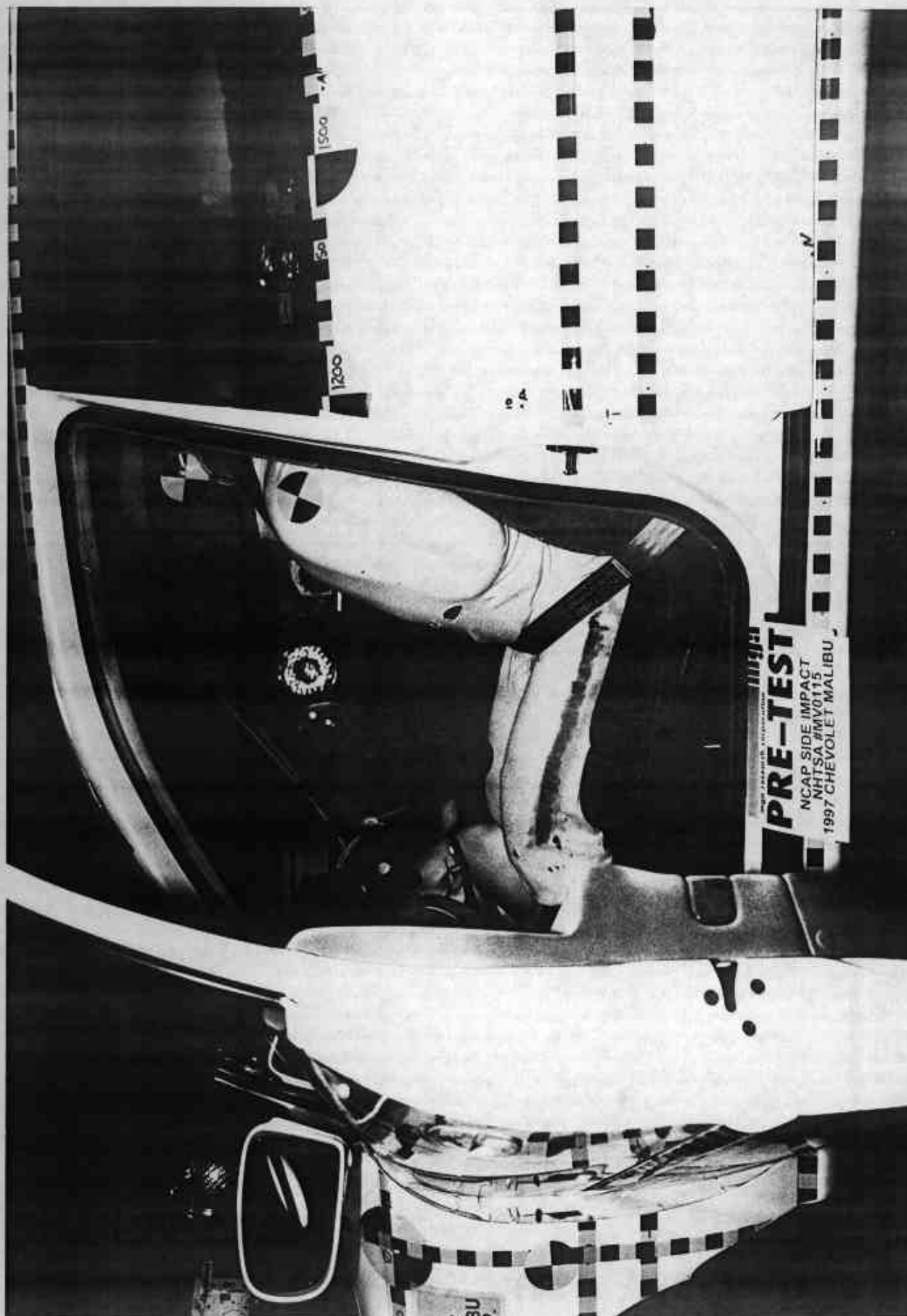


Photo No. A-22 - Pre-Test Driver Dummy Left Side View (Door Open)



A-23

Photo No. A-23 - Pre-Test Driver Dummy Shoulder and Door Top View





A-24

Photo No. A-24 - Post-Test Driver Dummy Shoulder and Door Top View



Photo No. A-25 - Post-Test Driver Dummy Contact

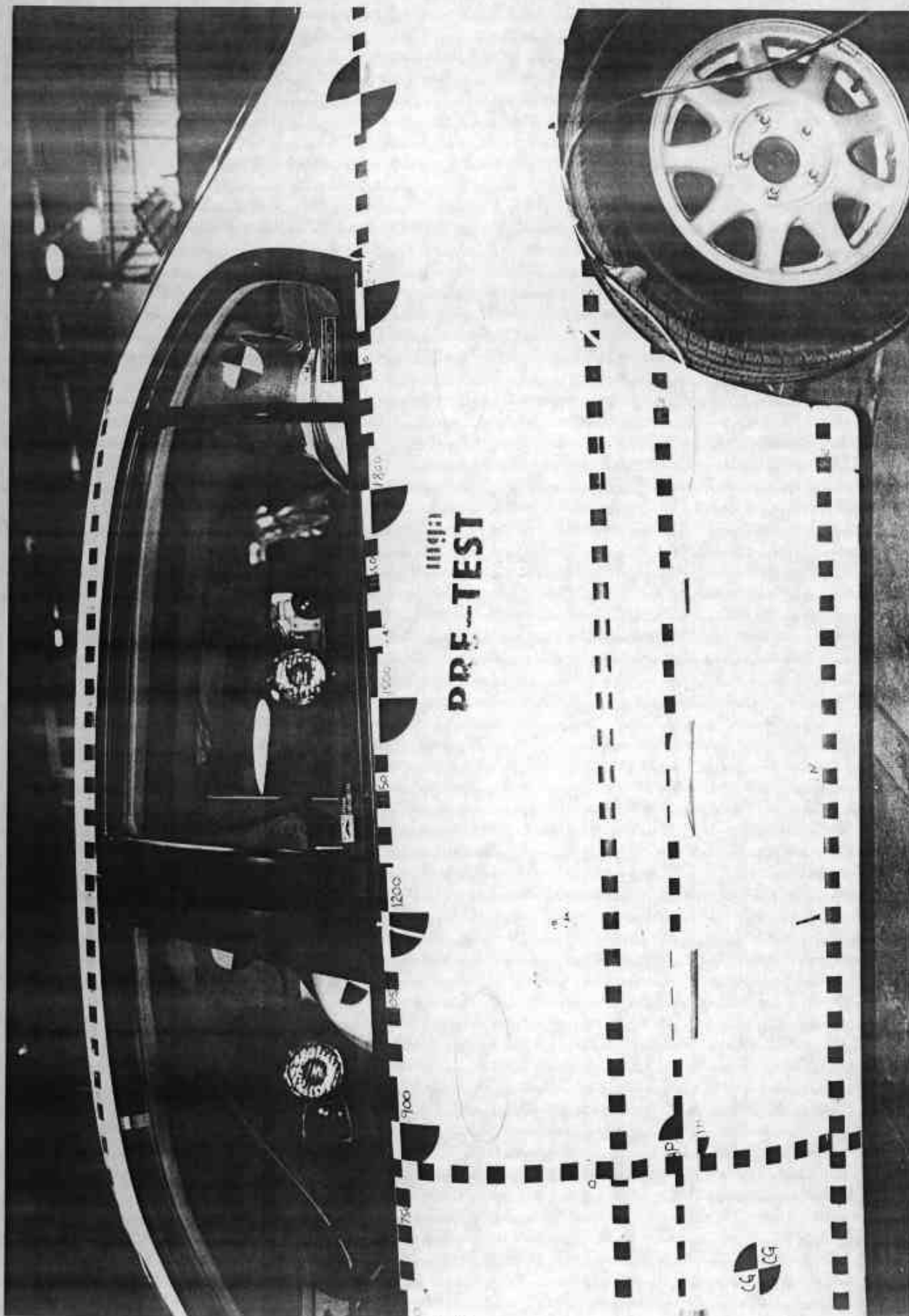


Photo No. A-26 - Pre-Test Passenger Dummy Right Side View





Photo No. A-27 - Post-Test Passenger Dummy Right Side View



A-28

Photo No. A-28 - Pre-Test Passenger Dummy Left Side View

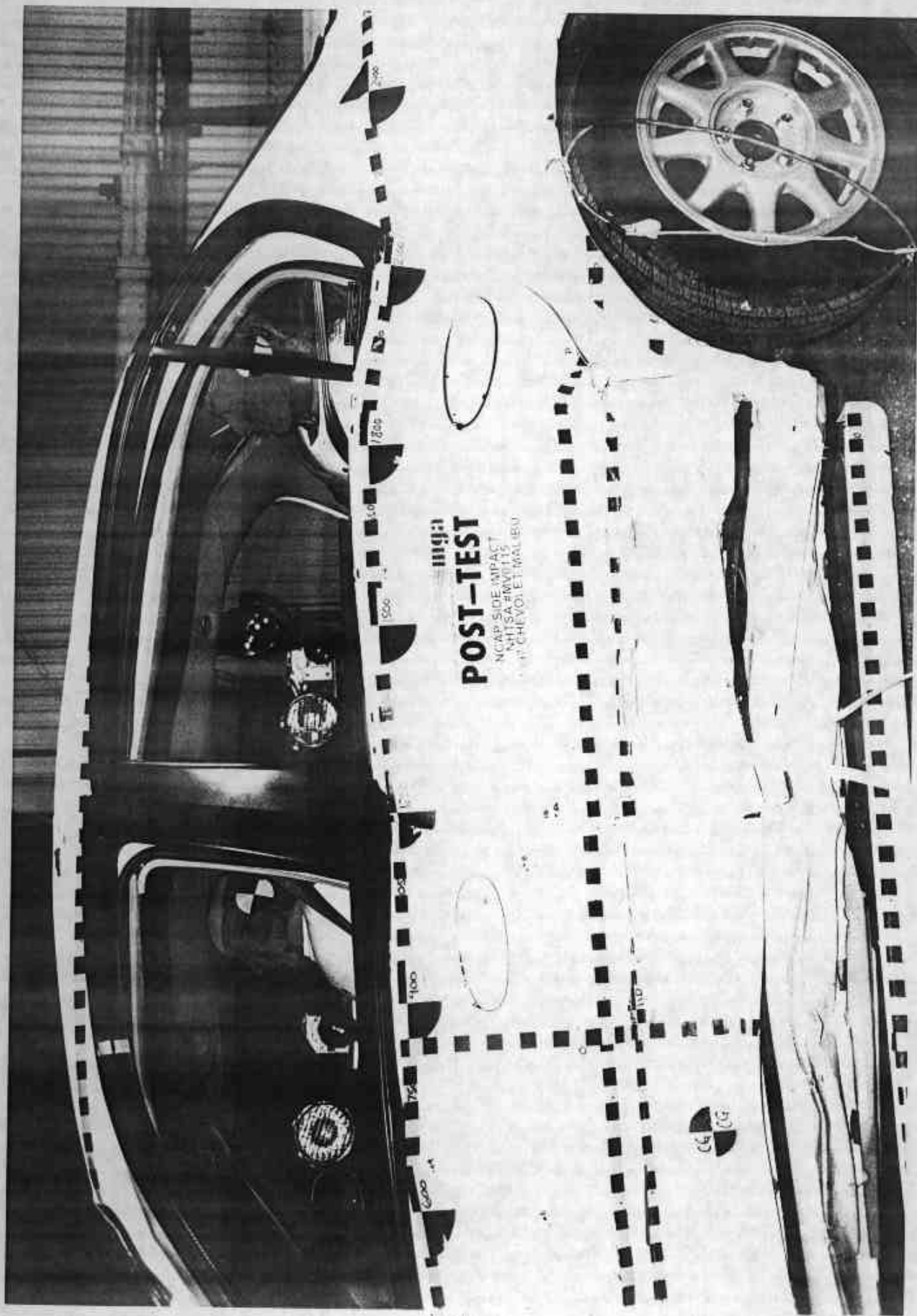


Photo No. A-29 - Post-Test Passenger Dummy Left Side View

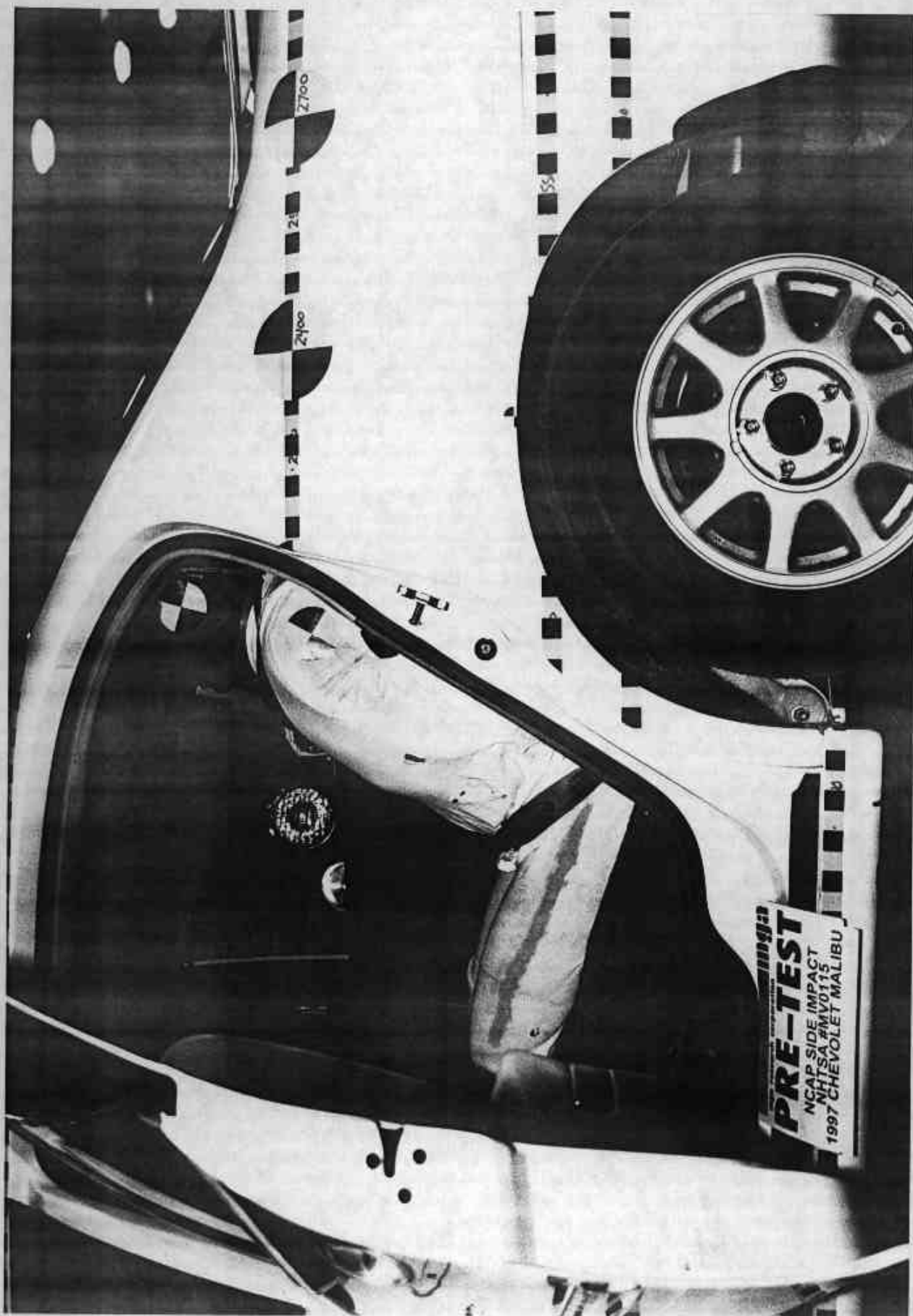


Photo No. A-30 - Pre-Test Passenger Dummy Left Side View (Door Open)



Photo No. A-31 - Pre-Test Passenger Dummy Shoulder and Door Top View





Photo No. A-32 - Post-Test Passenger Dummy Shoulder and Door Top View



Photo No. A-33 - Post-Test Passenger Dummy Contact



Photo No. A-34 - Post-Test Passenger Dummy Head Contact





Photo No. A-35 - Pre-Test Left Front Impact Point on Vehicle

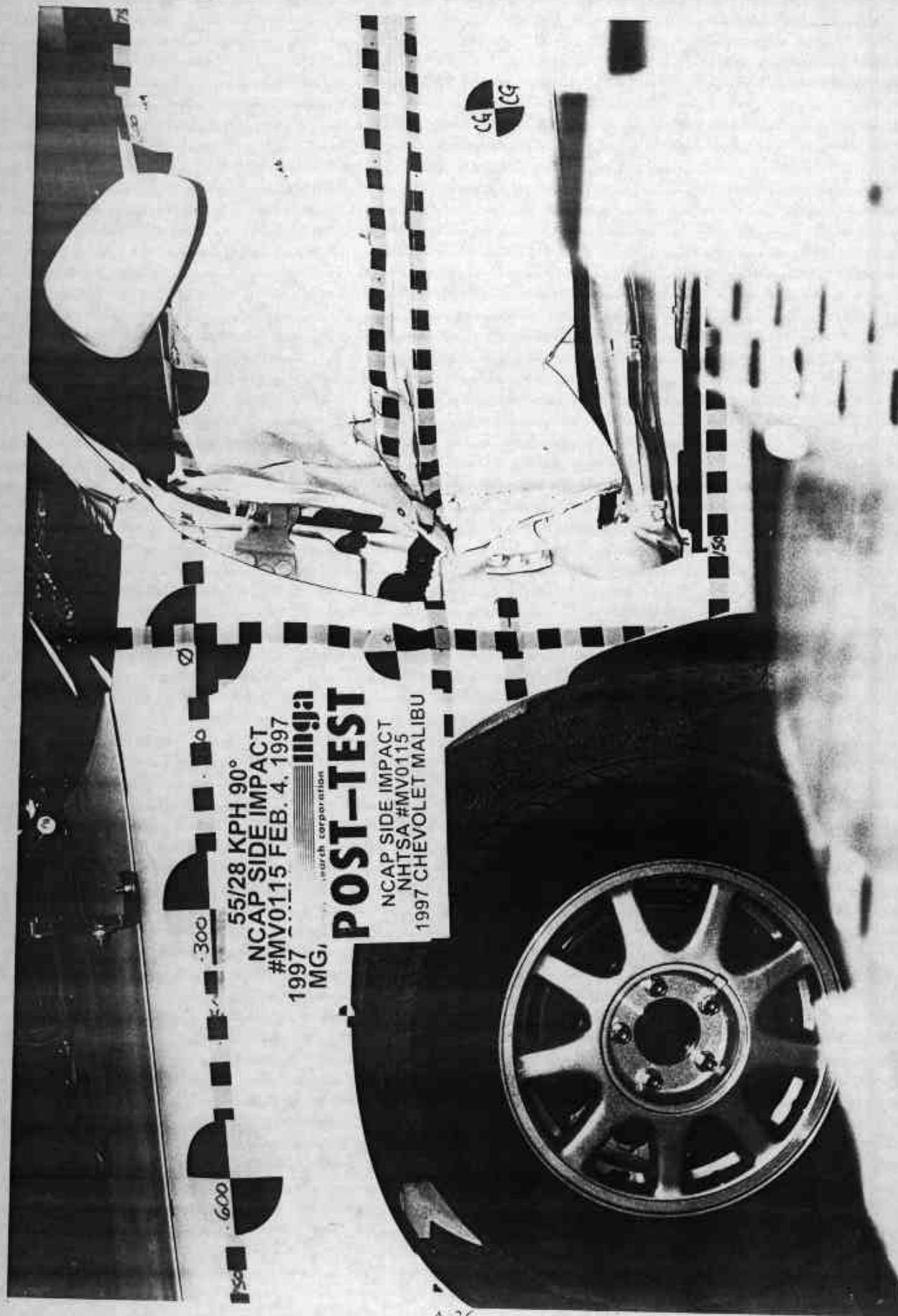


Photo No. A-36 - Post-Test Left Front Impact Point on Vehicle

A-36



MFD BY GENERAL MOTORS CORP

DATE  
12/96

GVWR  
4001 LB  
1815 KG

GAWR FRT  
2237 LB  
1015 KG

GAWR RR  
1764 LB  
800 KG

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

1G1ND52M8V6101470

TYPE: PASS CAR



# TIRE-LOADING INFORMATION

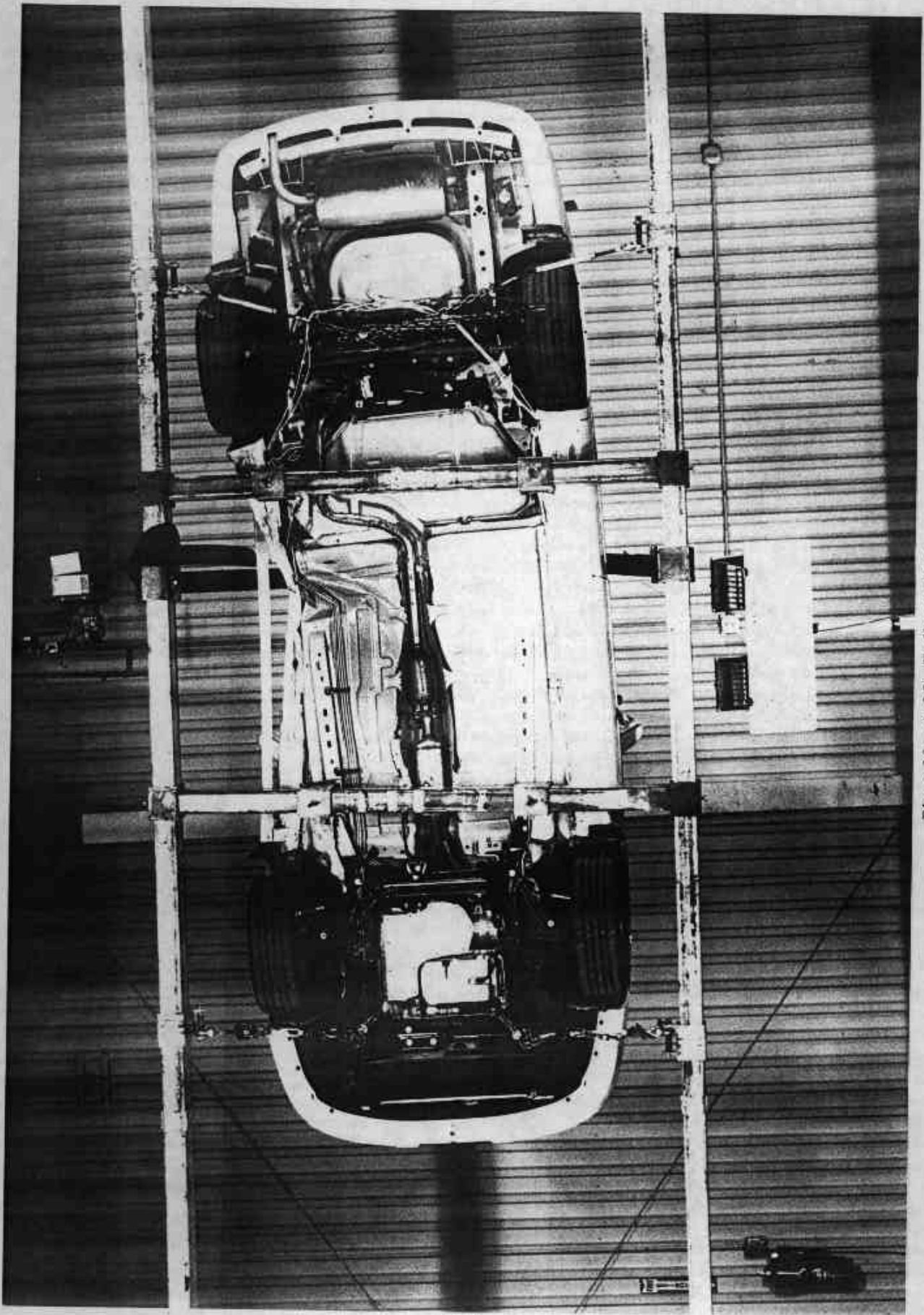
| OCCUPANTS |      |     | VEHICLE CAP. WT. |     |
|-----------|------|-----|------------------|-----|
| FRT.      | CTR. | RR. | TOTAL            | LBS |
| 2         | 0    | 3   | 5                | 917 |
|           |      |     |                  | 416 |

MAX. LOADING @ GVWR SAME AS VEHICLE CAPACITY WEIGHT.  
1G1ND52M8V6101470  
MODEL: ND69 NBA

| TIRE SIZE |            | SPEED RTG | COLD TIRE PRESSURE |
|-----------|------------|-----------|--------------------|
| FRT       | P215/60R15 | S         | 29/200 PSI/KPA     |
| RR        | P215/60R15 | S         | 26/180 PSI/KPA     |
| SPA       | T125/70D15 | M         | 60/420 PSI/KPA     |

IF TIRES ARE HOT, ADD 4 PSI / 28 KPA  
SEE OWNER'S MANUAL FOR MORE INFORMATION





A-39

Photo No. A-39 - Rollover 90°

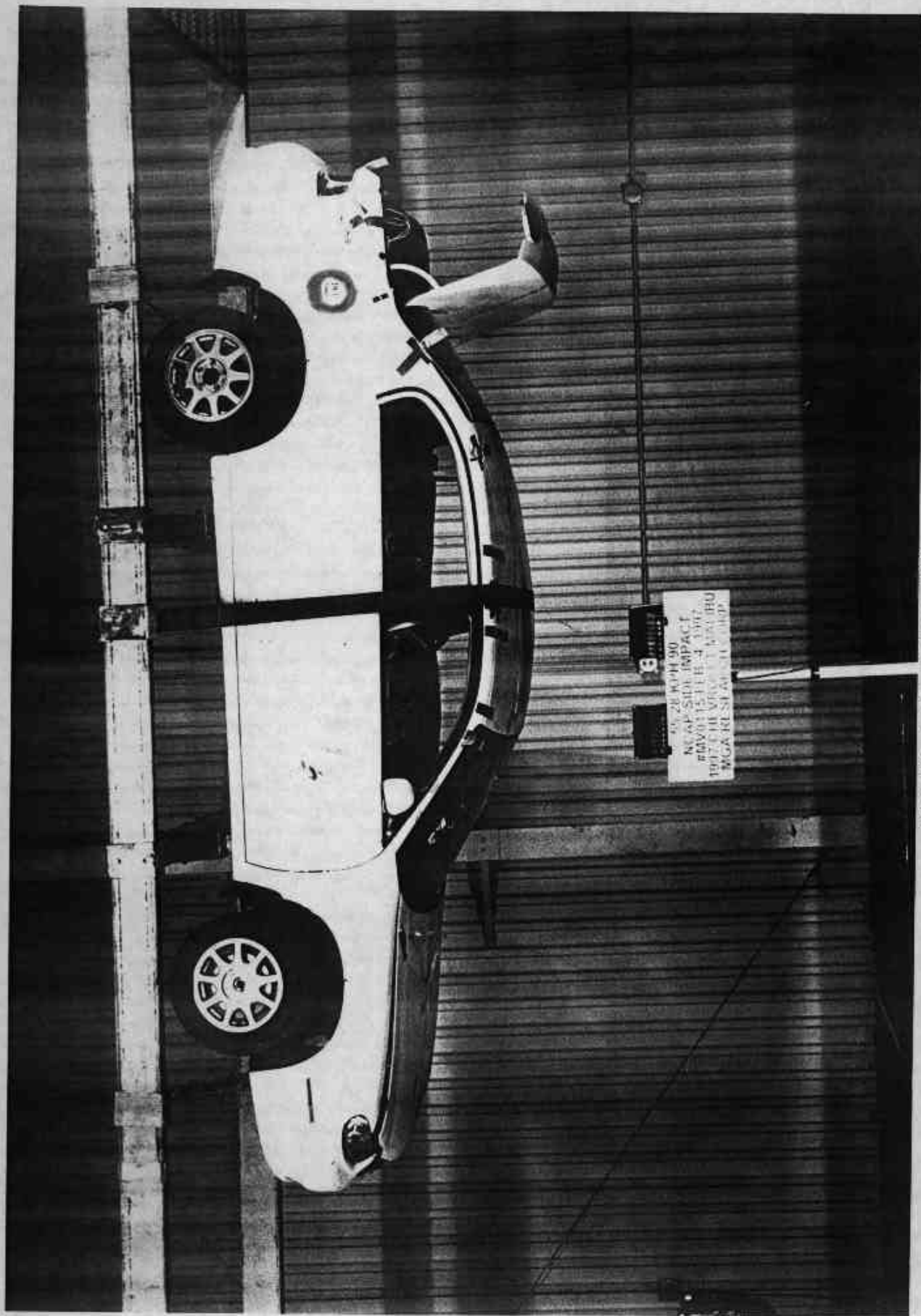


Photo No. A-40 - Rollover 180°

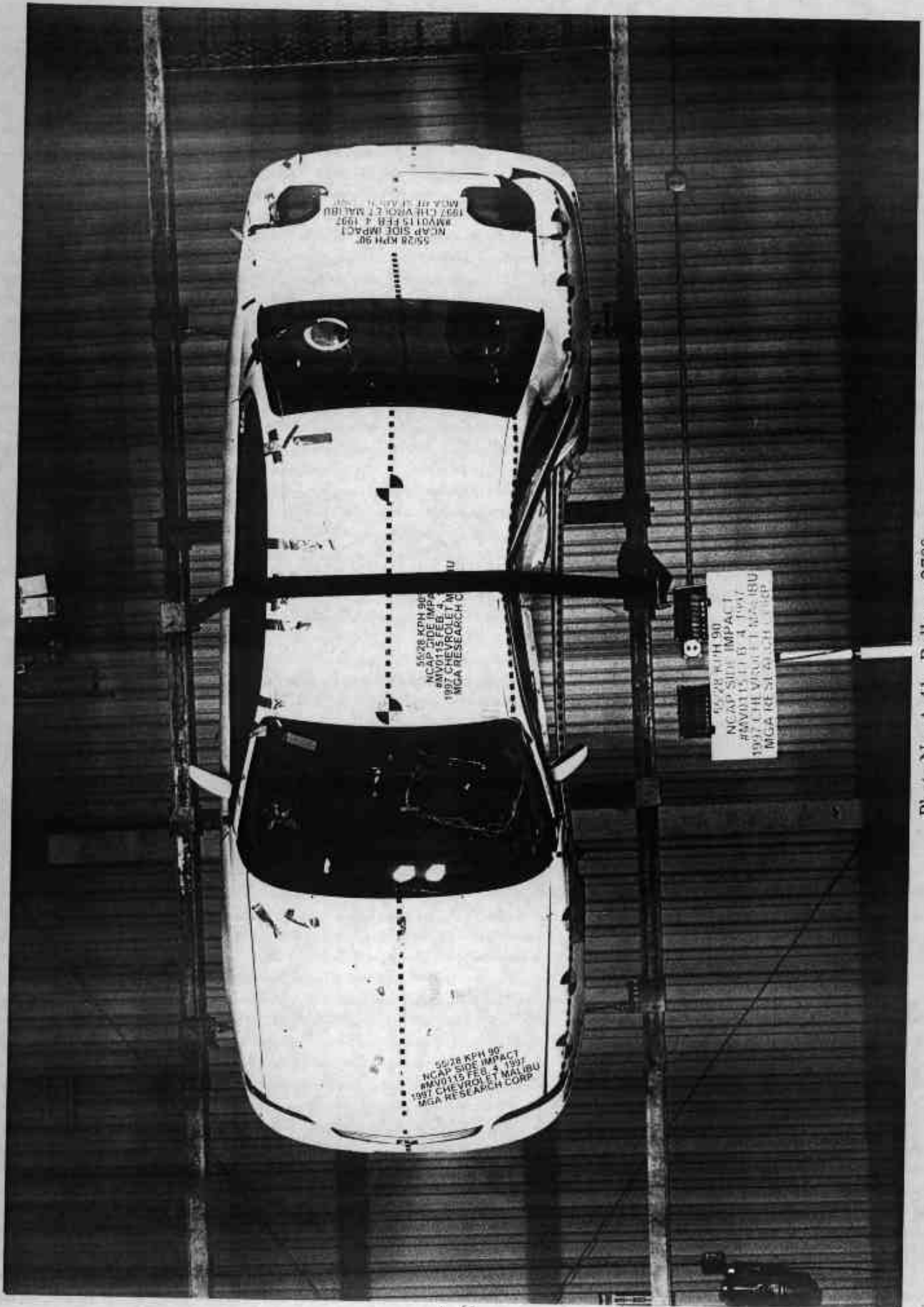
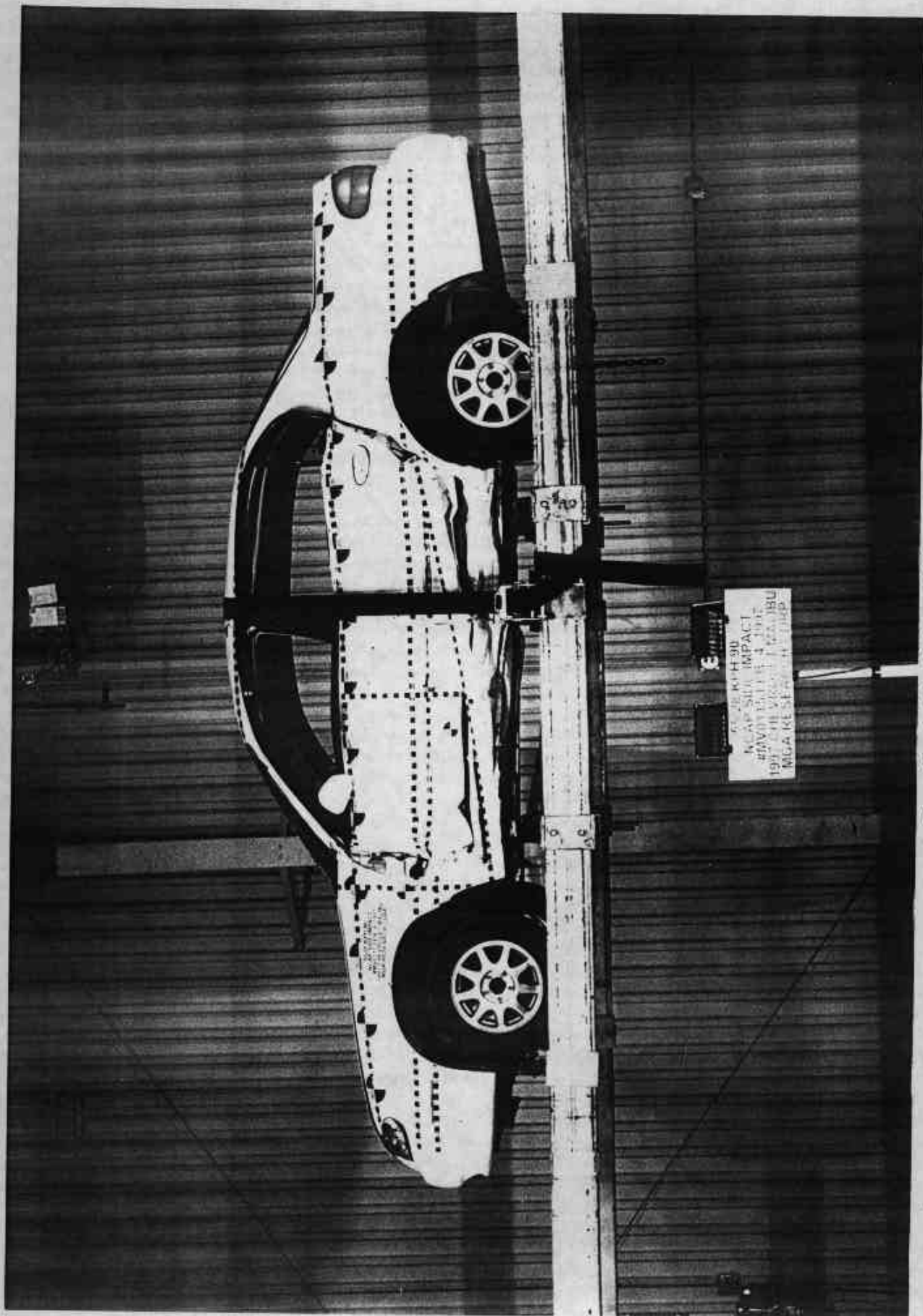


Photo No. A-41 - Rollover 270°



6. 25 KPH 30  
N. A. P. 500 IMPACT  
#1000 1000 1 4 1000  
1917 1000 1000 1 4 1000  
MGA KE 500 1000 1 4 1000

A-42

Photo No. A-42 - Rollover 360°





Photo No. A-43 - Left Front Attitude Point



Photo No. A-44 - Right Front Attitude Point





14.1  
Added

**PRE-TEST**  
nga research corporation

NCAP SIDE IMPACT  
NHTSA #MV0115  
1997 CHEVOLET MALIBU



Photo No. A-46 - Right Rear Attitude Point

APPENDIX B - VEHICLE AND SID RESPONSE DATA

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| Figure B-3 - Driver Head Z Acceleration vs. Time                   | B-3             |
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| Figure B-7 - Driver Lower Rib Y Acceleration vs. Time              | B-7             |
| Figure B-8 - Driver Lower Rib Y Velocity vs. Time                  | B-8             |
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| Figure B-14 - Rear Passenger Head Y Acceleration vs. Time          | B-14            |
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|                                                                             |       |
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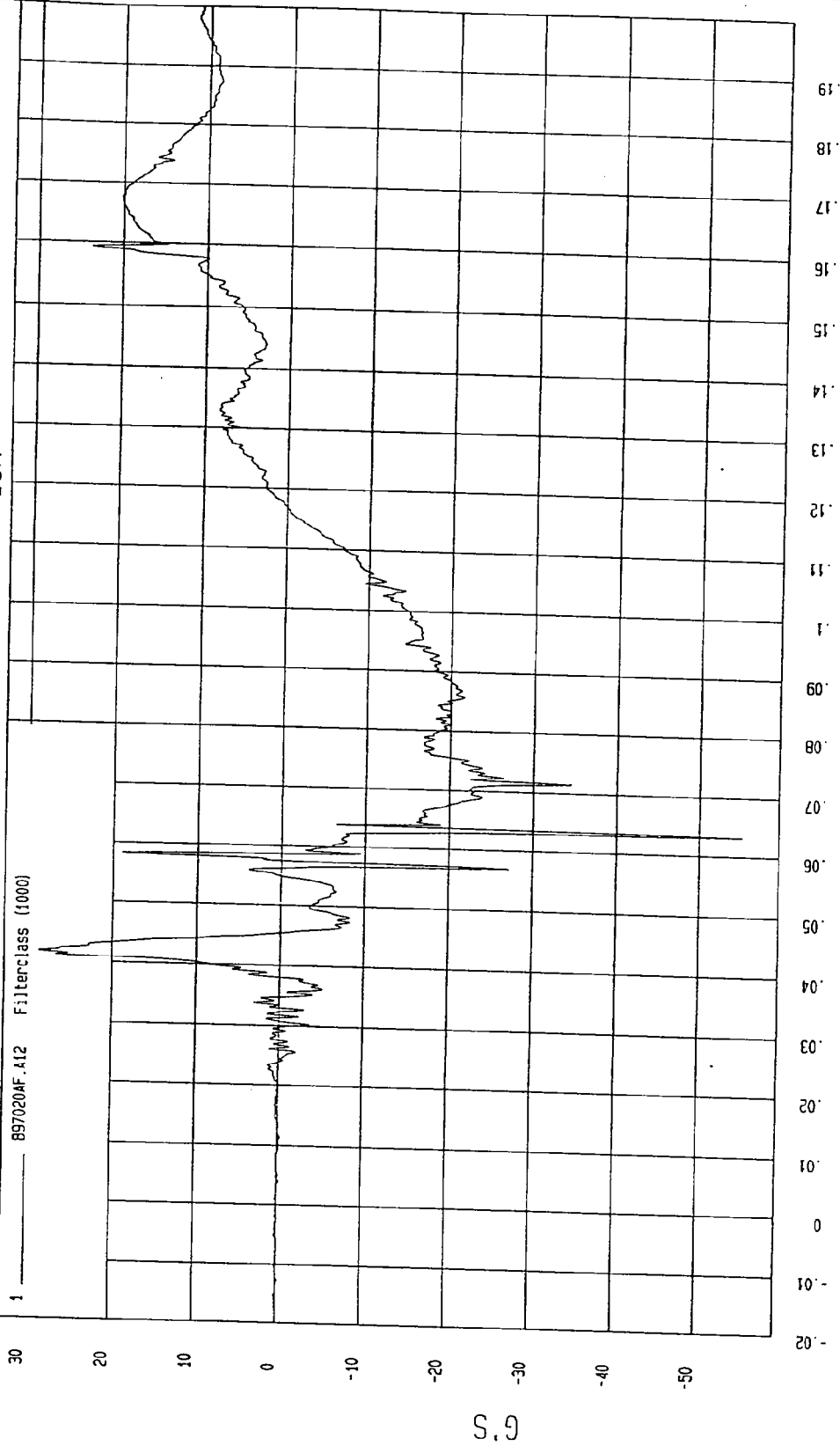
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MVO115) Speed: 37.97 MPH 61.1 KPH

Minimum = -54.93 G'S at 63 msec Maximum = 28.65 G'S at 42 msec

DRIVER HEAD X ACCELERATION

1 857020AF.A12 Filterclass (1000)



MGA Research  
02-08-1997 11:20

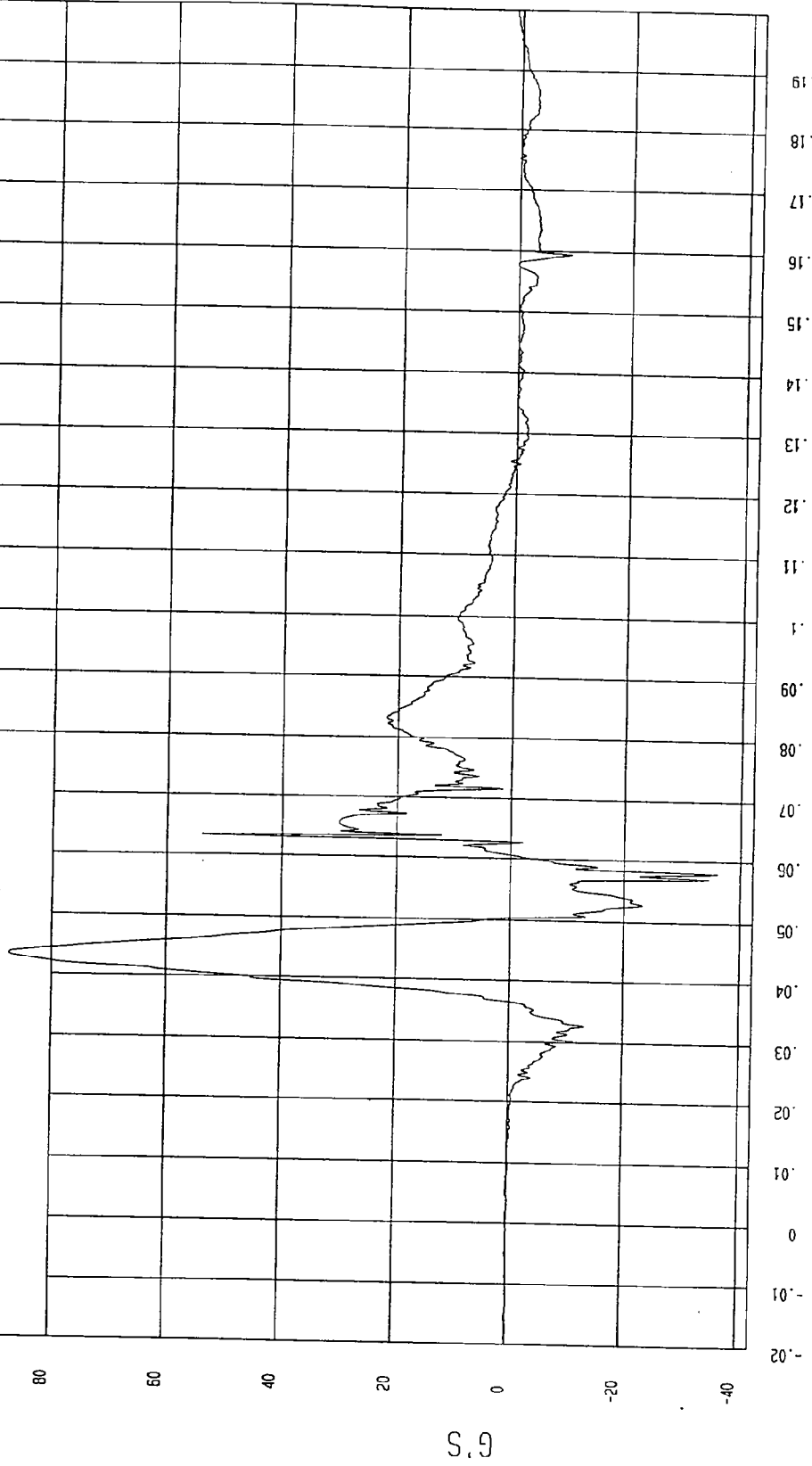
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -36.03 G'S at 58 msec Maximum = 87.42 G'S at 43 msec

DRIVER HEAD Y ACCELERATION

1 B97020AF.A13 Filterclass (1000)



MGA Research  
02-08-1997 11:20

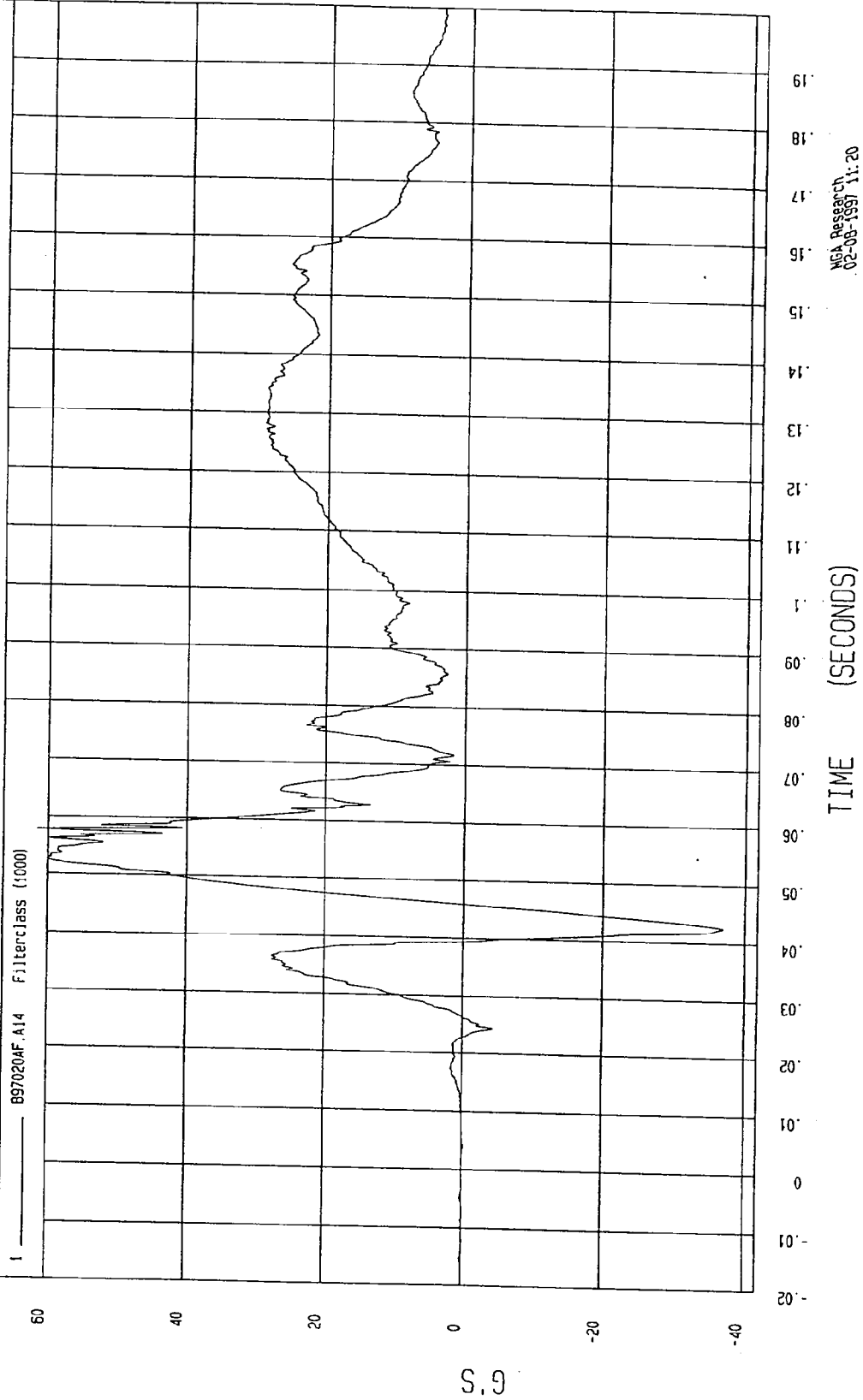
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -36.85 G'S at 43 msec

Maximum = 61.61 G'S at 56 msec

DRIVER HEAD Z ACCELERATION



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 7.77E-03 G'S at -11 msec

Maximum = 95.86 G'S at 43 msec

DRIVER HEAD RESULTANT

1 \_\_\_\_\_ B97020AV.A12 Filter: class (1000)

100

80

60

40

20

0

G

-20

-10

0

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

180

190

TIME (SECONDS)

NCA Research  
02-08-1997 11:20

TEST: HIGH SPEED LATERAL IMPACT TEST      TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)      Speed: 37.97 MPH 61.1 KPH

Minimum = -44.39 G'S at 67 msec      Maximum = 83.33 G'S at 29 msec

DRIVER UPPER RIB Y ACCELERATION

1 ——— B97020AF.A15 Filterclass (180)

200  
180  
160  
140  
120  
100  
80  
60  
40  
20  
0  
-20  
-40  
-60  
-80

G

TIME (SECONDS)

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

MSA Research  
02-08-1997 11:31

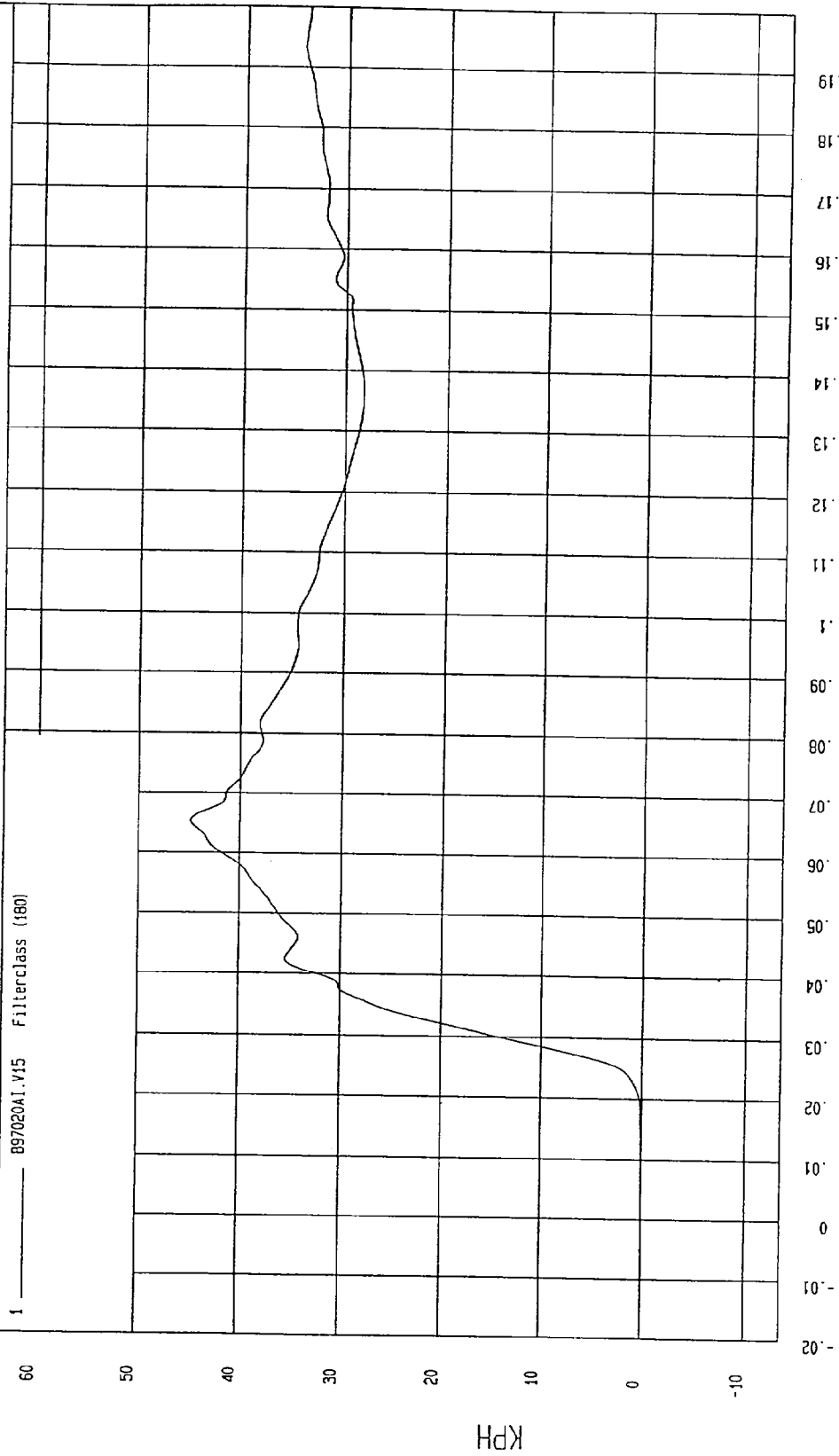
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -8.27E-03 KPH at -14 msec Maximum = 44.95 KPH at 65 msec

DRIVER UPPER RIB Y VELOCITY

1 ——— B97020A1.V15 Filterclass (180)



MSA Research  
02-08-1997 11:25



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -28.77 G'S at 76 msec Maximum = 107.80 G'S at 31 msec

DRIVER LOWER RIB Y ACCELERATION

1 ——— B97020AF.A15 Filterclass (180)

200  
180  
160  
140  
120  
100  
80  
60  
40  
20  
0  
-20  
-40  
-60  
-80  
G.S

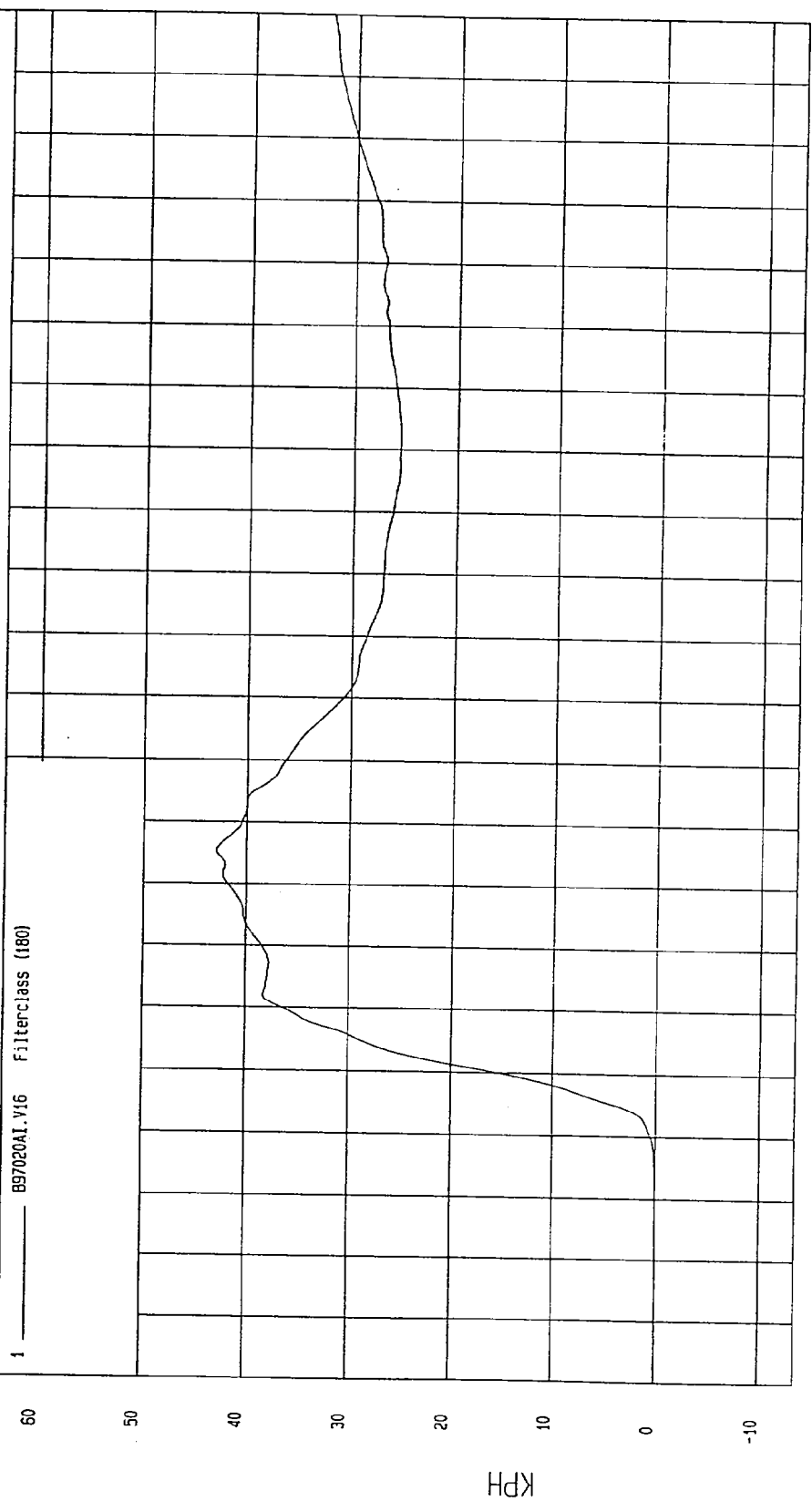
TIME (SECONDS)  
-0.02 -0.01 0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18 .19

MCA Research  
02-08-1997 11:31

TEST: HIGH SPEED LATERAL IMPACT TEST      TEST DATE: 02-04-1997  
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)      Speed: 37.97 MPH 61.1 KPH  
Minimum = -3.28E-03 KPH at -14 msec      Maximum = 42.97 KPH at 65 msec

DRIVER LOWER RIB Y VELOCITY

1 ——— BS7020AI.V16      Filterclass (180)



TIME Seconds  
MCA Research  
02-08-1997 11:25

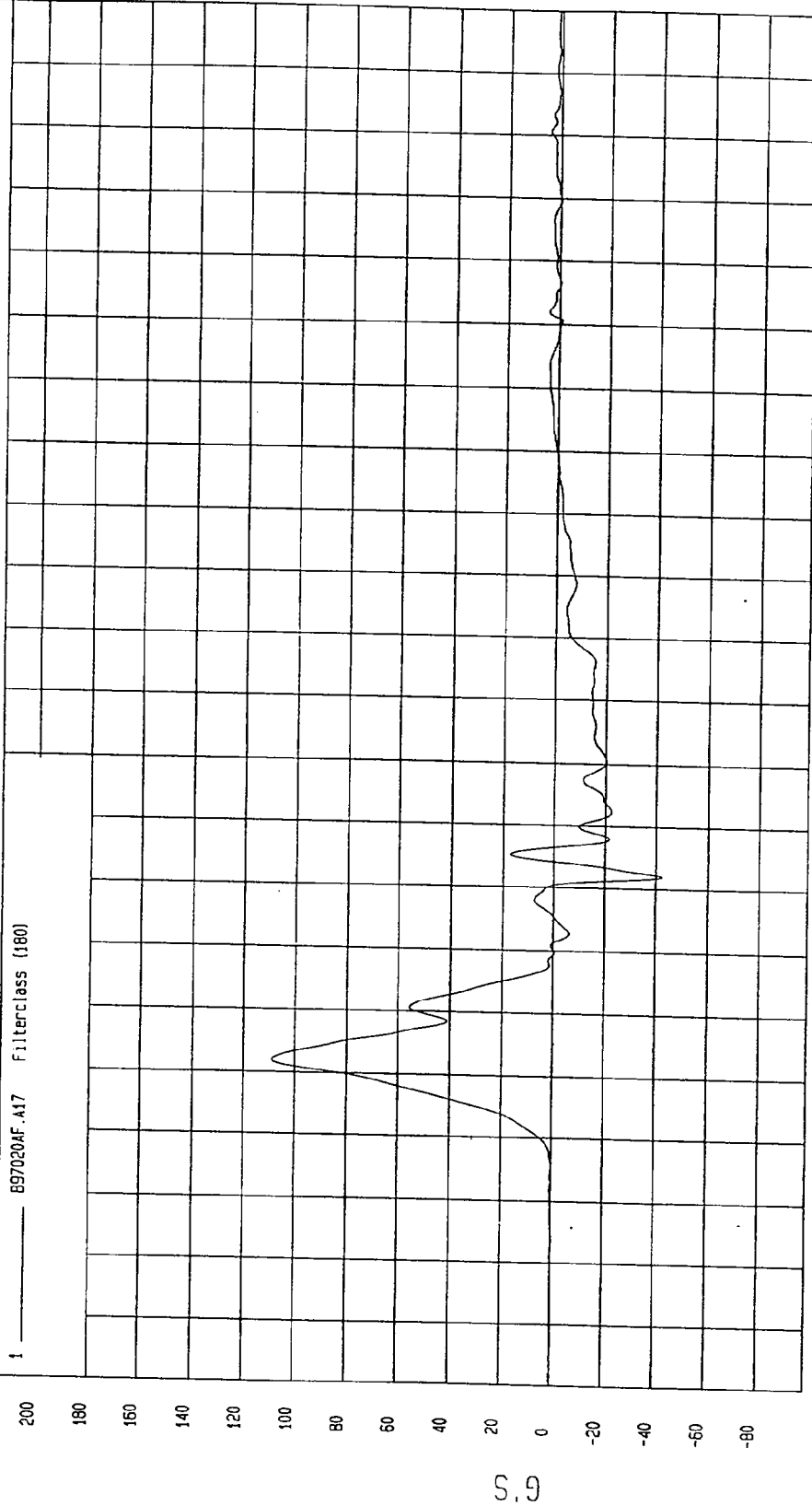
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -42.29 G'S at 62 msec Maximum = 109.05 G'S at 32 msec

DRIVER LOWER SPINE Y ACCELERATION

1 — 897020AF.A17 Filterclass (180)



MSA Research  
02-08-1997 11:31

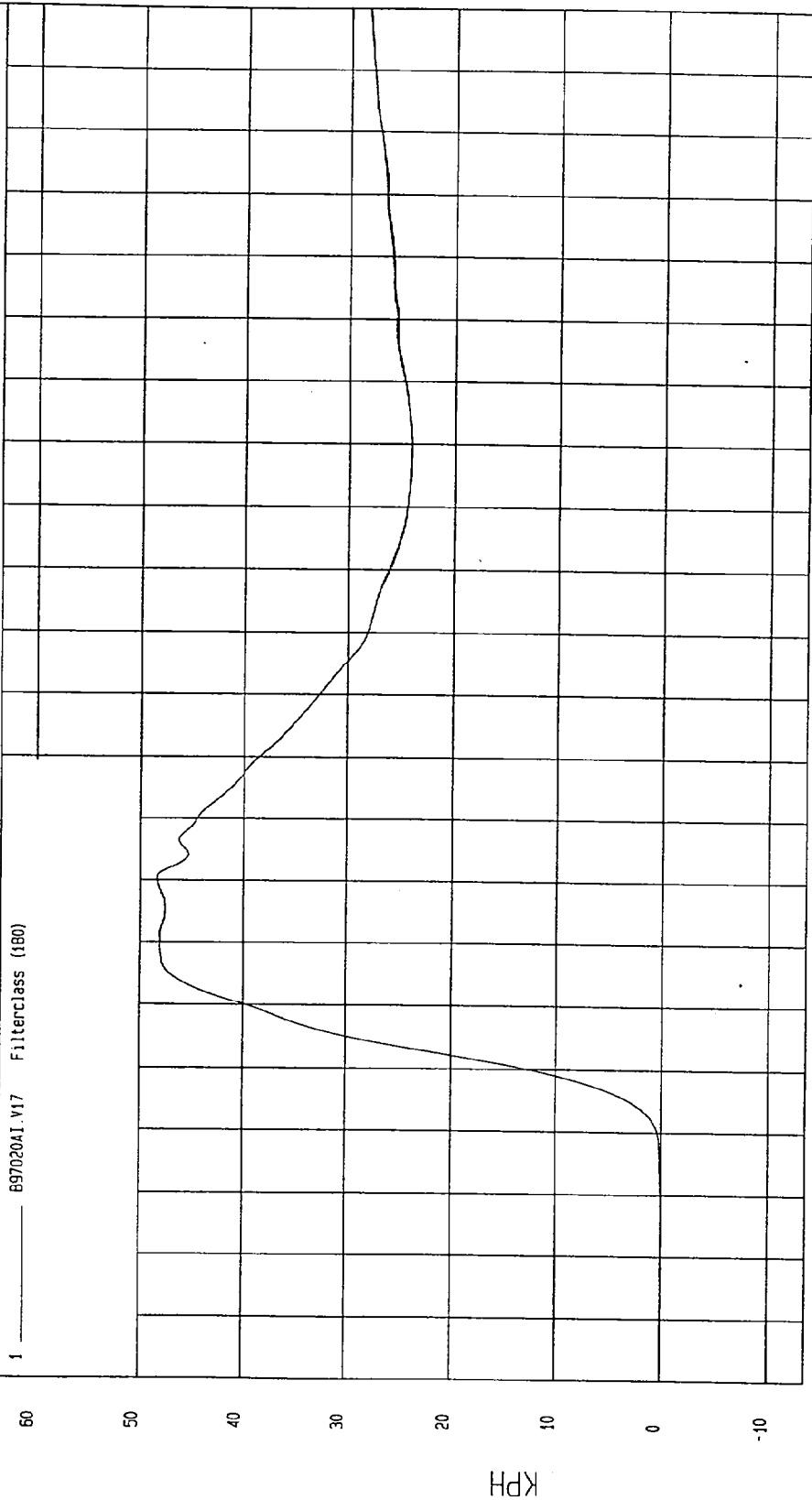
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -3.07E-03 KPH at -6 msec Maximum = 48.39 KPH at 60 msec

DRIVER LOWER SPINE Y VELOCITY

1 B97020A1.V17 Filterclass (180)



MCA Research  
02-08-1997 11:25



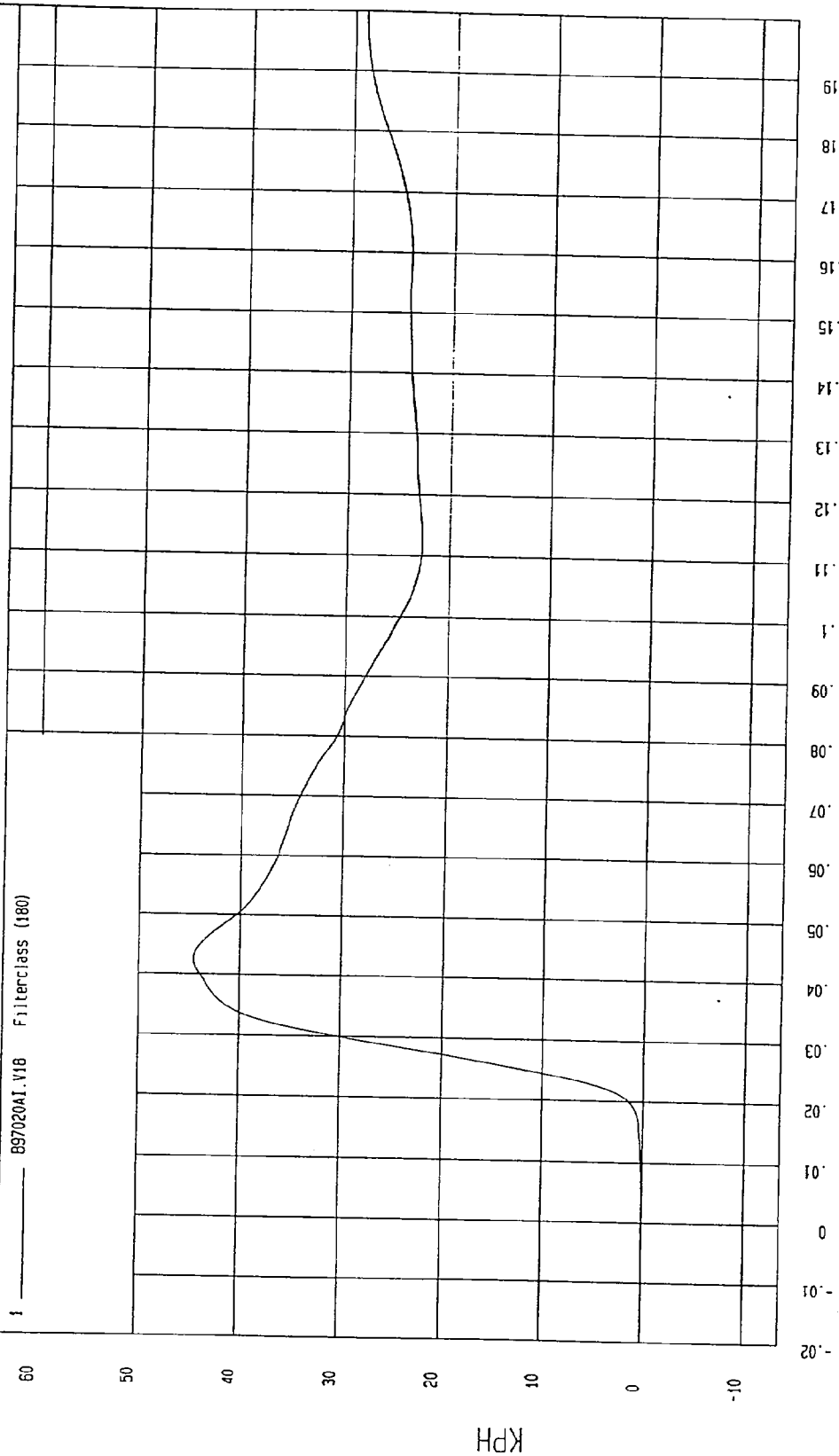
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 0 KPH at -20 msec Maximum = 44.70 KPH at 43 msec

DRIVER PELVIS Y VELOCITY

1 ——— B97020A1.V18 Filterclass (180)



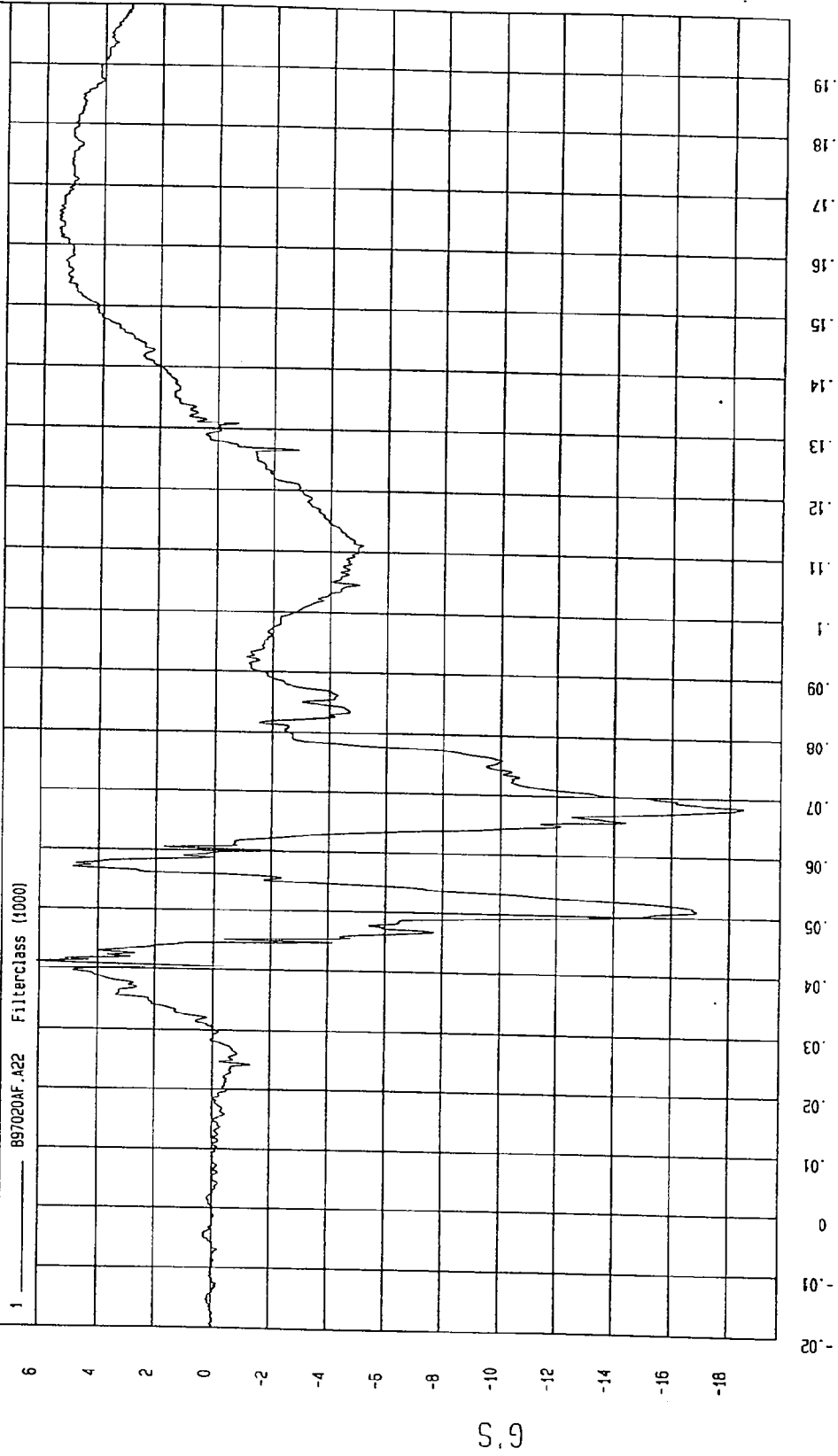
NSA Research  
02-08-1997 11:25

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -18.46 G'S at 68 msec Maximum = 6.08 G'S at 41 msec

REAR PASSENGER HEAD X ACCELERATION



MCA Research  
02-06-1997 11:20

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

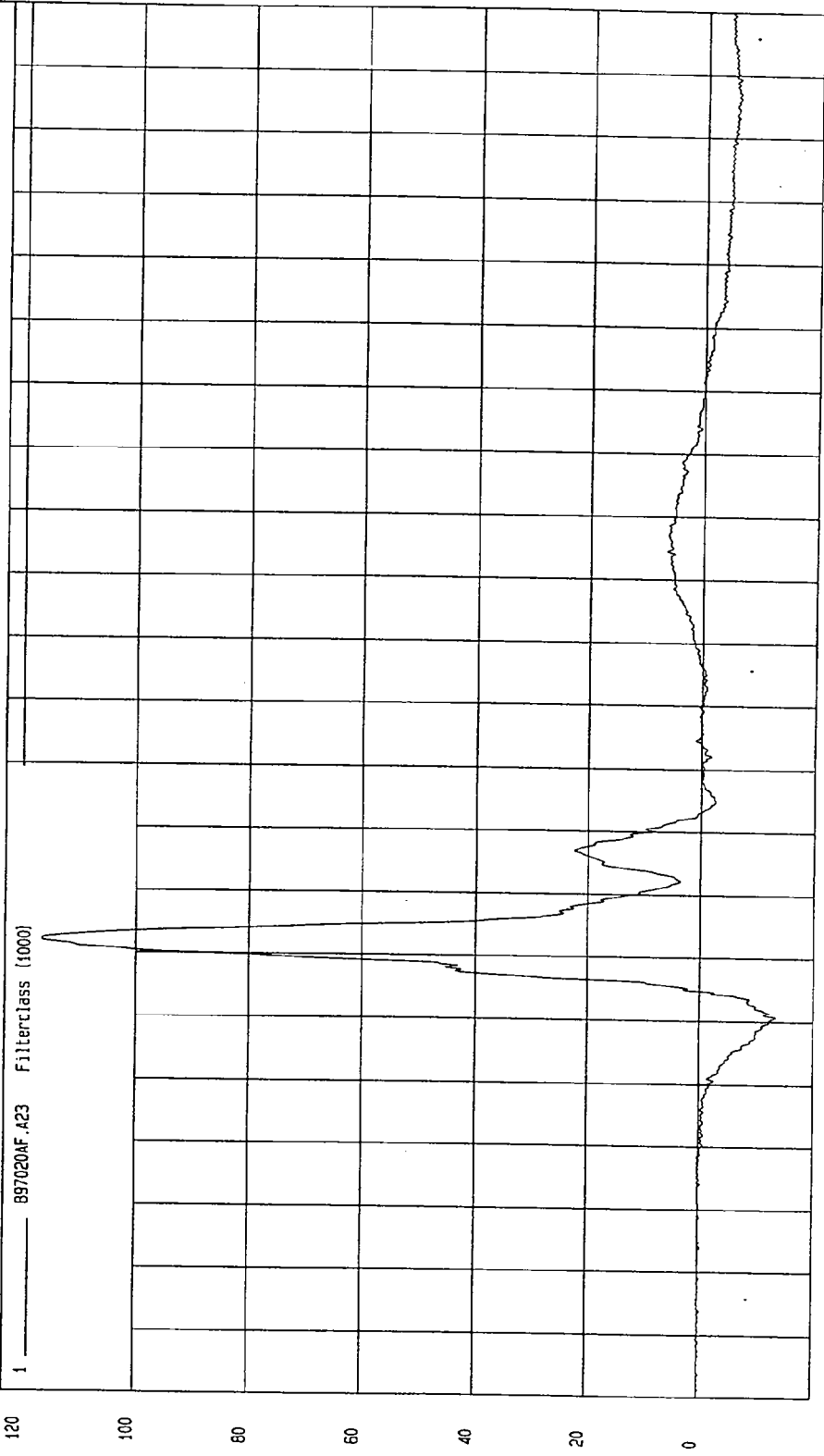
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -13.46 G'S at 41 msec

Maximum = 116.57 G'S at 52 msec

REAR PASSENGER HEAD Y ACCELERATION



TIME (SECONDS)

MGA Research  
02-08-1997 11:20



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -45.91 G'S at 55 msec

Maximum = 26.82 G'S at 44 msec

REAR PASSENGER HEAD Z ACCELERATION

1 897020AF.A24 Filterclass (1000)

30

20

10

0

-10

-20

-30

-40

-50

G.S

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

MGA Research  
02-08-1997 11:20

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

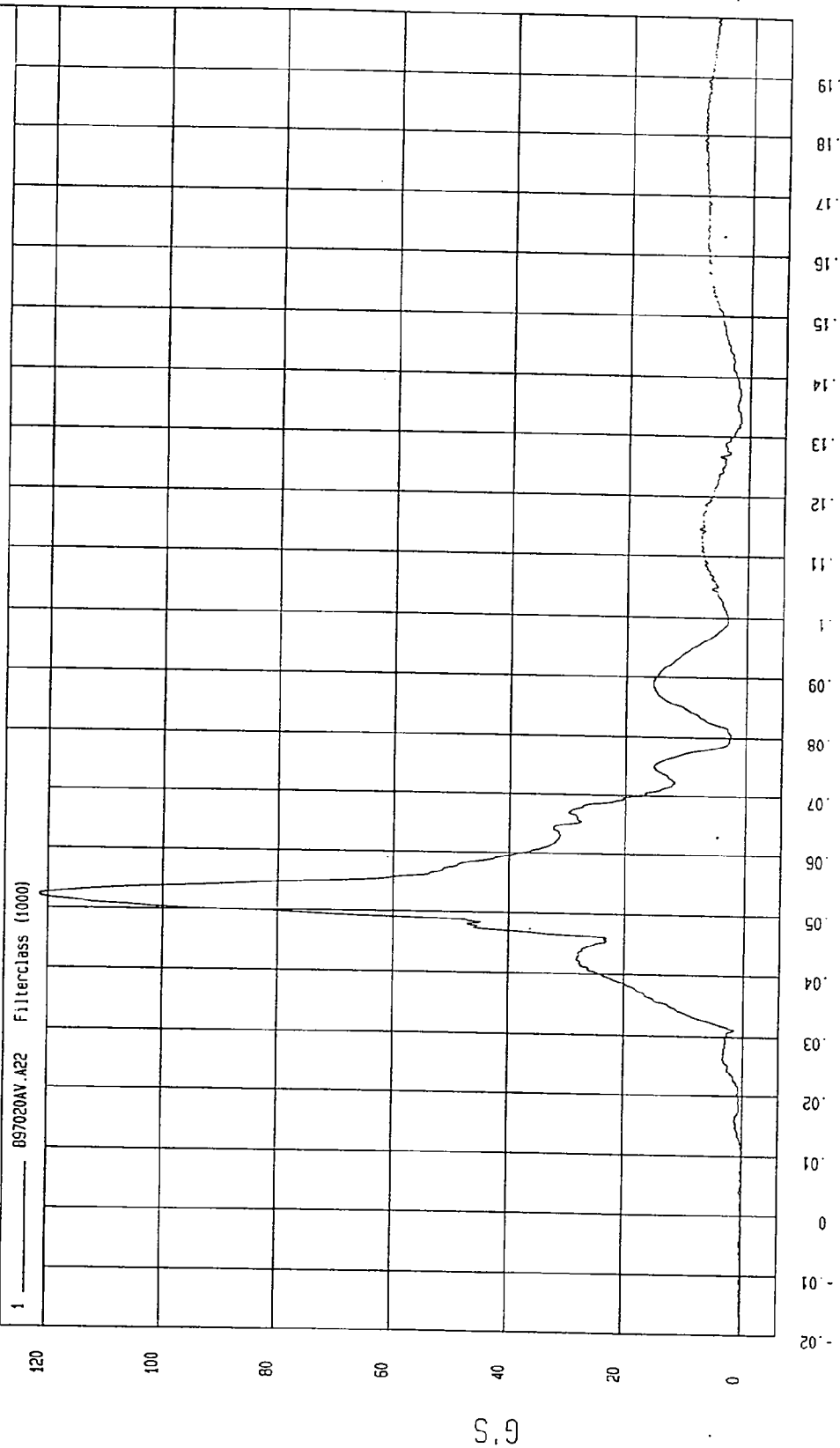
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = 3.57E-02 G'S at -18 msec

Maximum = 121.39 G'S at 52 msec

REAR PASSENGER HEAD RESULTANT



MSA Research  
02-08-1997 11:21

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

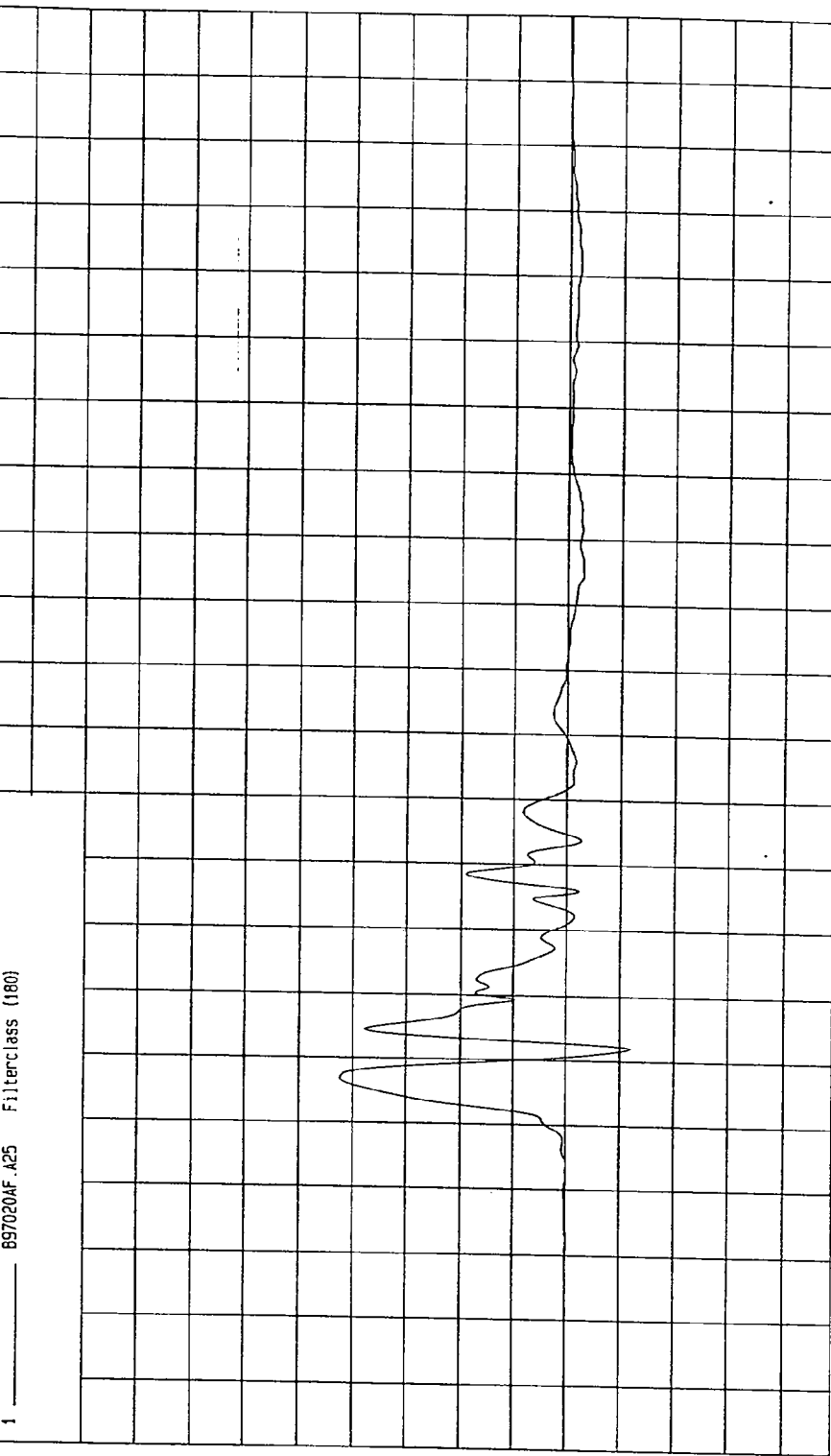
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -24.02 G'S at 42 msec Maximum = 84.93 G'S at 37 msec

REAR PASSENGER UPPER RIB Y ACCELERATION

1 ——— B97020AF.A25 FilterClass (180)

G



MCA Research  
02-08-1997 11:32

TIME (SECONDS)

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

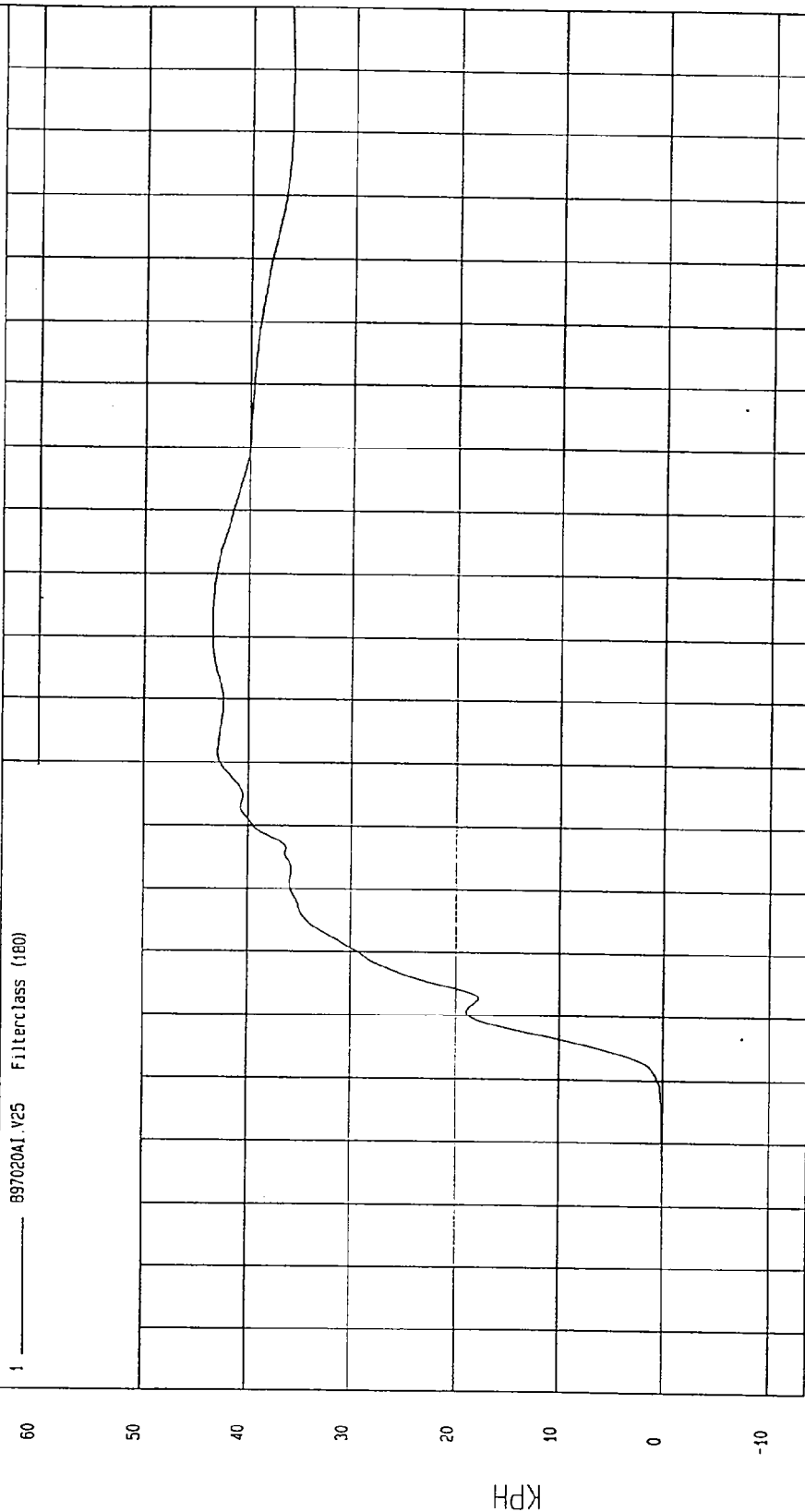
Speed: 37.97 MPH 61.1 KPH

Minimum = -6.02E-04 KPH at -15 msec

Maximum = 43.47 KPH at 102 msec

REAR PASSENGER UPPER RIB Y VELOCITY

1 — 897020A1.V25 Filterclass (180)



MGA Research  
02-08-1997 11:25

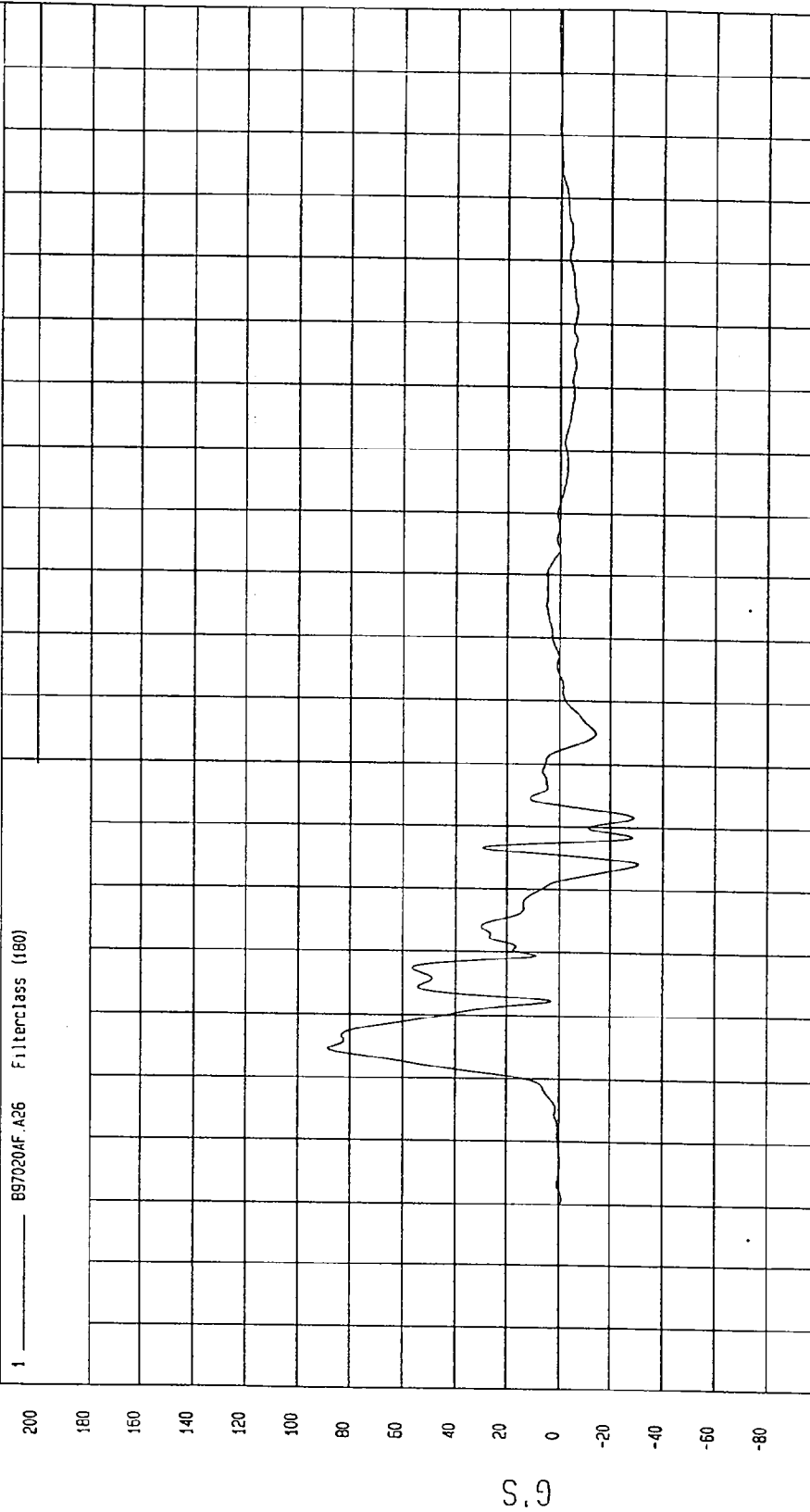
TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -30.78 G'S at 64 msec Maximum = 88.63 G'S at 34 msec

REAR PASSENGER LOWER RIB Y ACCELERATION



MCA Research  
02-04-1997 11:32

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 43.64 KPH at 61 msec

Minimum = -3.47E-02 KPH at 12 msec

REAR PASSENGER LOWER RIB Y VELOCITY

1 897020A1.V25 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME Seconds

MCA Research  
02-08-1997 11:25

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -42.11 G'S at 65 msec

Maximum = 87.43 G'S at 41 msec

REAR PASSENGER LOWER SPINE Y ACCELERATION

1 B97020AF.A27 Filterclass (180)

G

200  
180  
160  
140  
120  
100  
80  
60  
40  
20  
0  
-20  
-40  
-60  
-80

TIME (SECONDS)

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

MGA Research  
02-08-1997 11:32

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

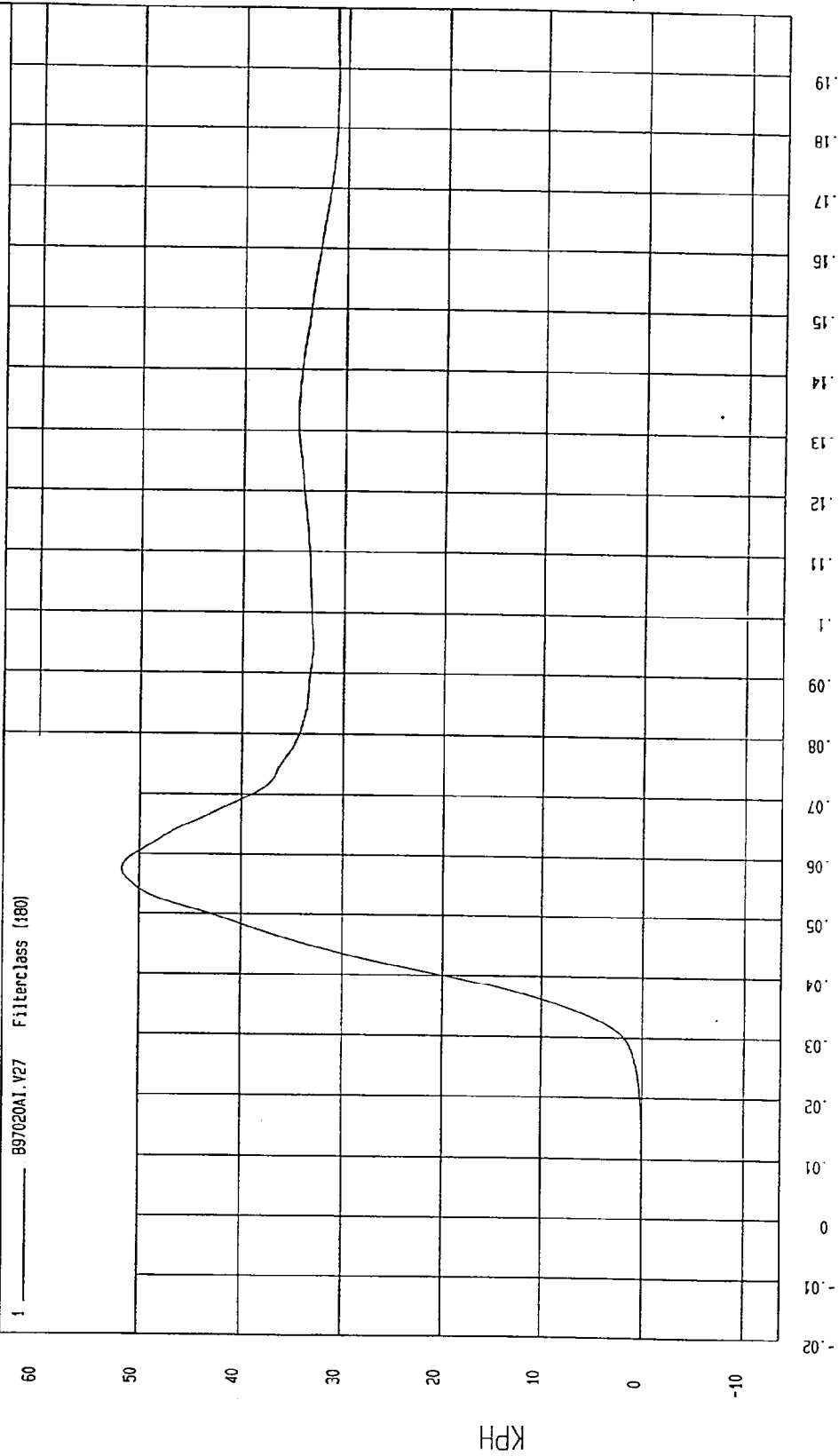
Speed: 37.97 MPH 61.1 KPH

Minimum = 0 KPH at -20 msec

Maximum = 51.78 KPH at 58 msec

REAR PASSENGER LOWER SPINE Y VELOCITY

1 ——— B97020A1.V27 Filterclass (180)



MCA Research  
02-08-1997 11:25



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

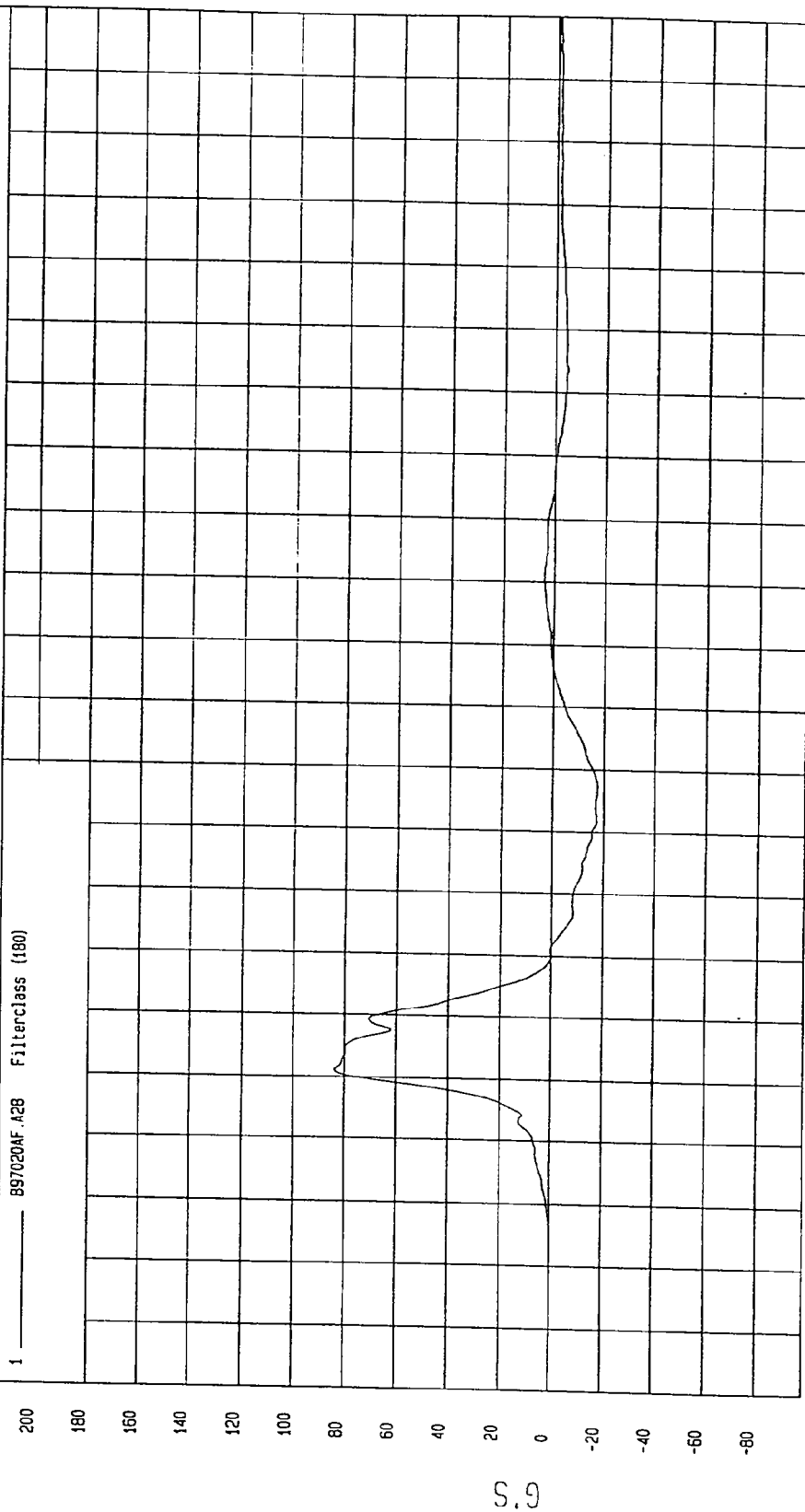
Speed: 37.97 MPH 61.1 KPH

Minimum = -17.61 G'S at 77 msec

Maximum = 83.70 G'S at 31 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 ——— B97020AF.A28 Filterclass (180)



MGA Research  
02-08-1997 11:32

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

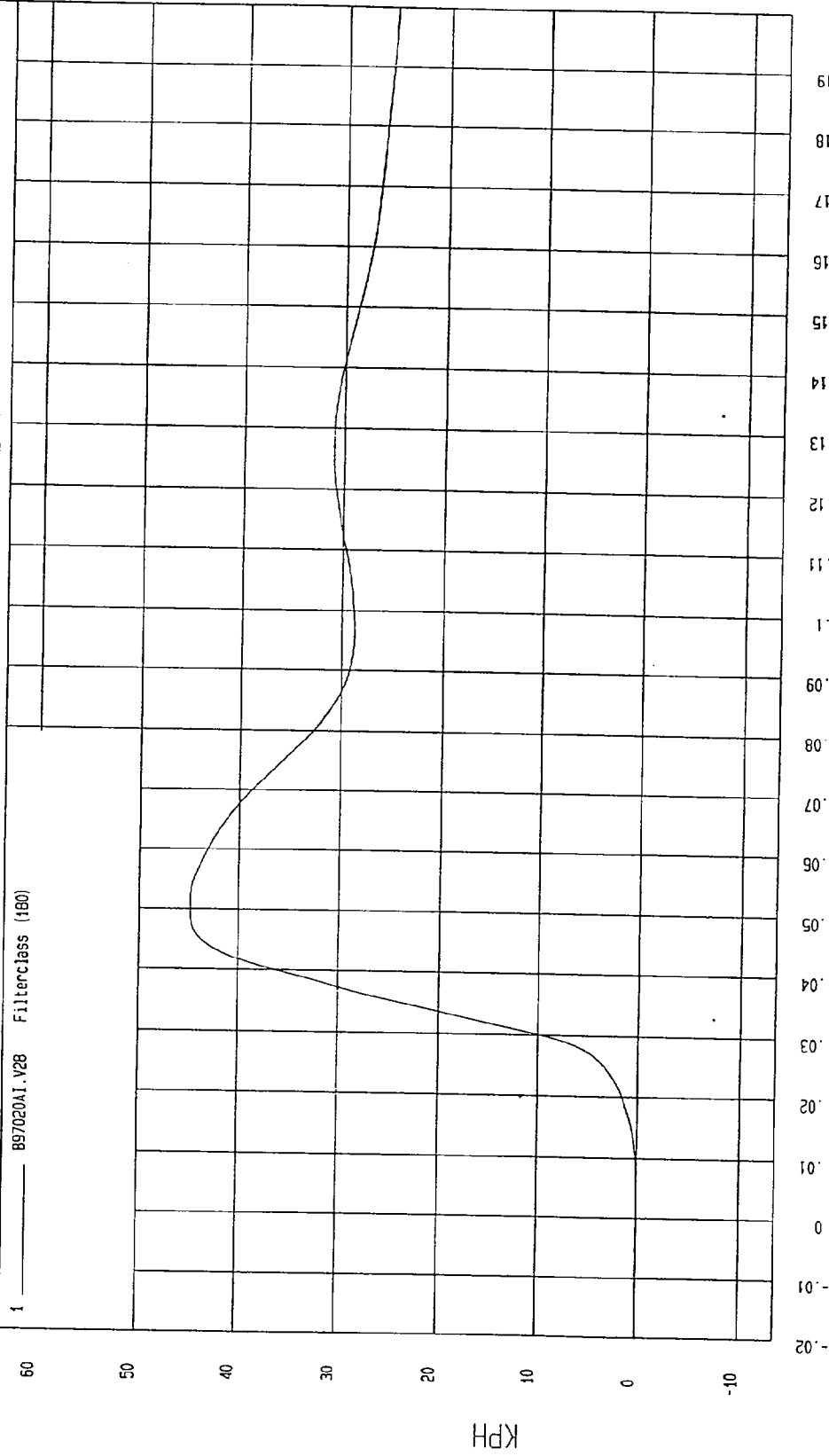
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.49E-04 KPH at -19 msec

Maximum = 44.91 KPH at 52 msec

REAR PASSENGER PELVIS Y VELOCITY

1 ——— B97020A1.V28 Filterclass (180)



MGA Research  
02-08-1997 11:25

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -40.45 G'S at 82 msec

Maximum = 124.66 G'S at 22 msec

LEFT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 B97020AF.A38 Filter: class (60)

120

100

80

60

40

20

0

-20

-40

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

MGA Research  
02-08-1997 11:25

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -172.81 KPH at 200 msec

Maximum = 38.98 KPH at 25 msec

LEFT SIDE SILL AT FRONT SEAT Y VELOCITY

1 — 897020A1.V38 Filterclass (180)

60

50

40

30

20

10

0

-10

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

MGA Research  
02-08-1997 11:22

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

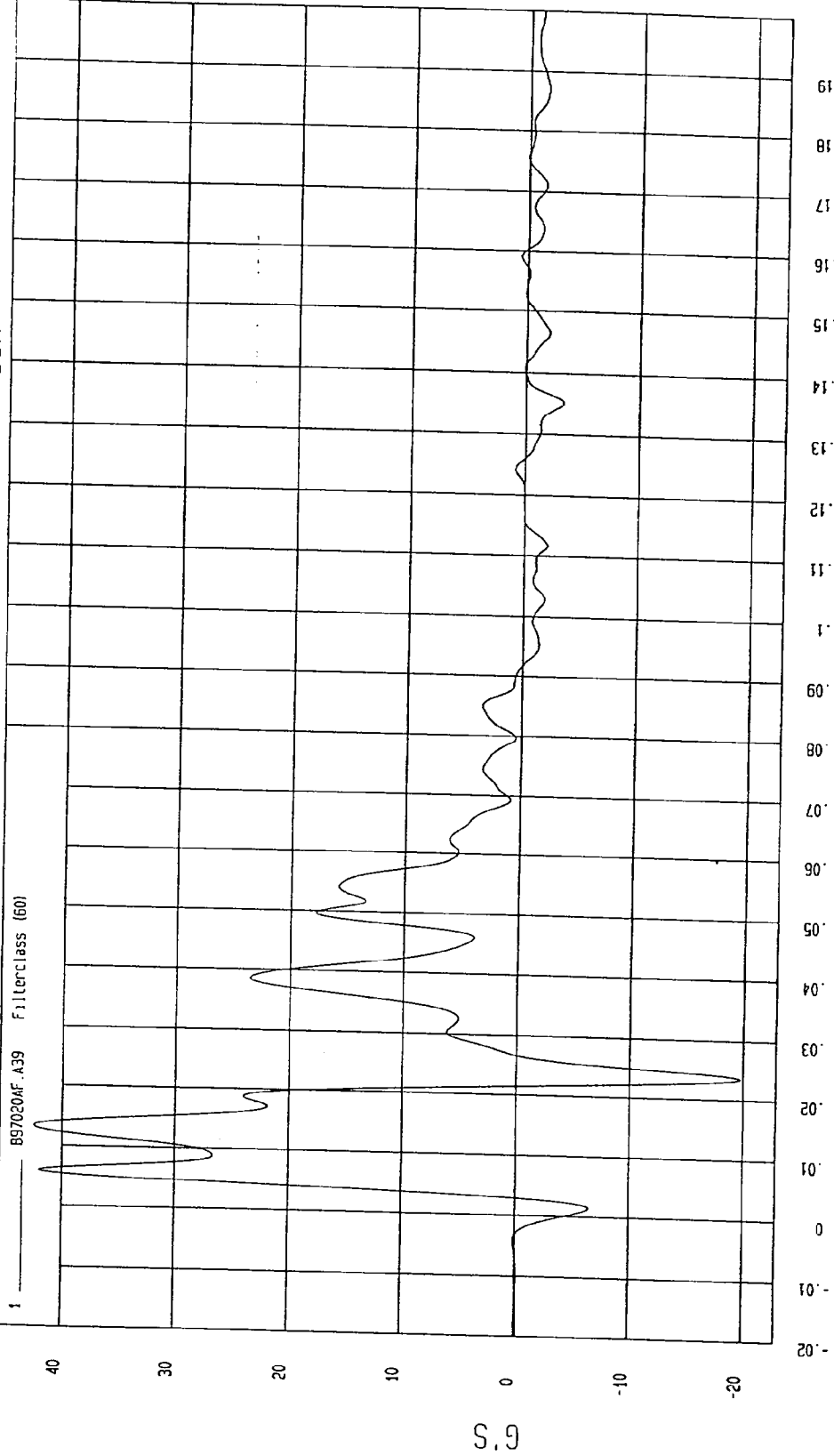
Speed: 37.97 MPH 61.1 KPH

Minimum = -19.71 G'S at 24 msec

Maximum = 42.50 G'S at 13 msec

LEFT SIDE SILL AT REAR SEAT Y ACCELERATION

1 ——— BS7020AF A39 Filterclass (60)



MCA Research  
02-08-1997 11:25

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -1.44 KPH at 4 msec

Maximum = 31.58 KPH at 93 msec

LEFT SIDE SILL AT REAR SEAT Y VELOCITY

1 ——— B97020A1.V39 Filterclass (480)

60

50

40

30

20

10

0

-10

KPH

-02

-01

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME Seconds

MSA Research  
02-08-1997 11:22

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

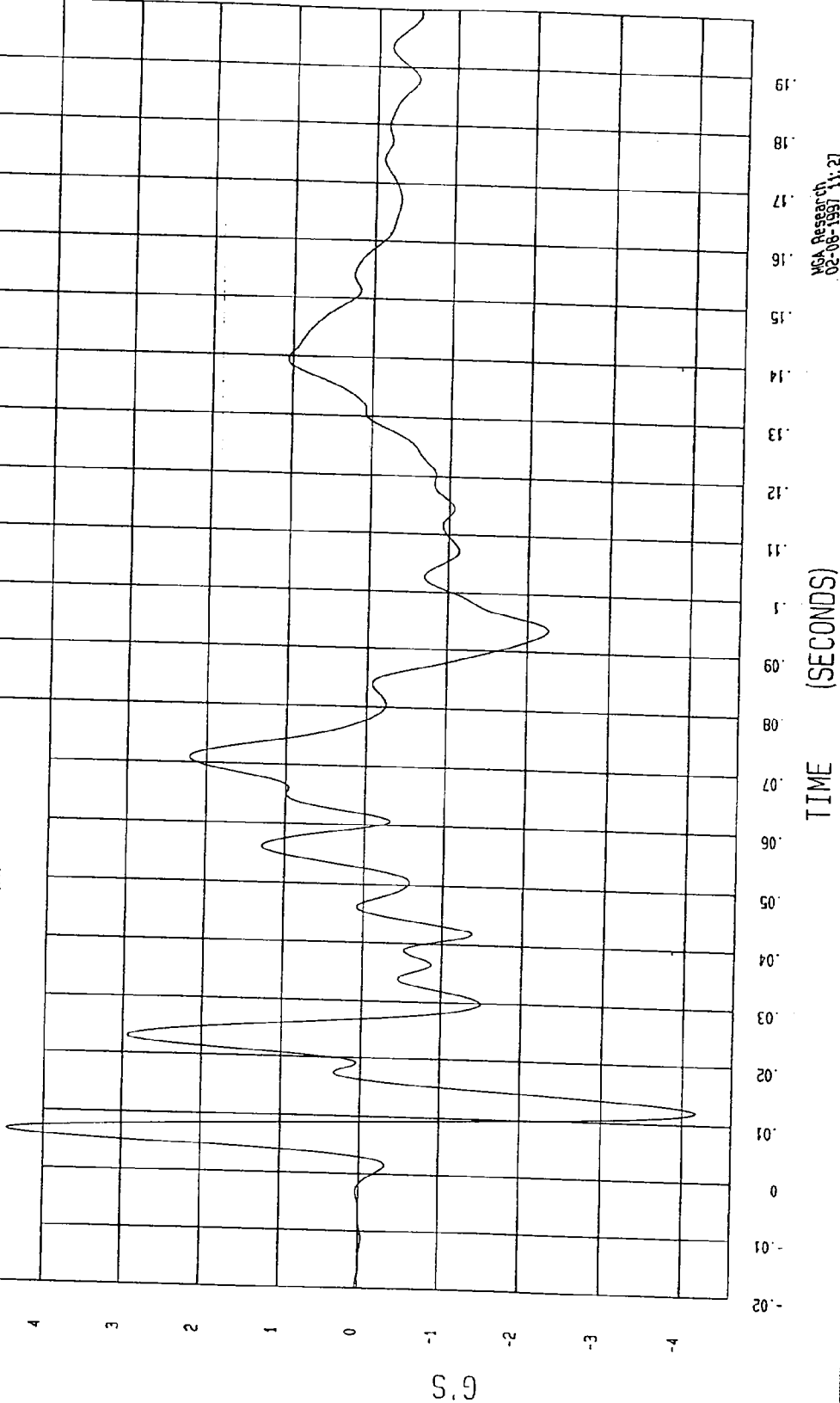
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -4.16 G'S at 12 msec

Maximum = 4.46 G'S at 7 msec

RIGHT SIDE SILL AT FRONT SEAT X ACCELERATION

1 B97020AF.A32 Filterclass (60)



MCA Research  
02-08-1997 11:21

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.11 KPH at 129 msec  
Maximum = .63 KPH at 9 msec

RIGHT SIDE SILL AT FRONT SEAT X VELOCITY

1 \_\_\_\_\_ B97020AT.V32 FilterClass (180)

60

50

40

30

20

10

0

-10

KPH

-.02 -.01 0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18 .19

TIME Seconds

MGA Research  
02-08-1997 11:21



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -1.94 G'S at 170 msec

Maximum = 20.12 G'S at 7 msec

RIGHT SIDE SILL AT FRONT SEAT Y ACCELERATION

1 — 897020AF.A33 Filterclass (60)



HSA Research  
02-08-1997 11:27

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -1.64E-03 KPH at -19 msec

Maximum = 23.44 KPH at 66 msec

RIGHT SIDE SILL AT FRONT SEAT Y VELOCITY

1 ——— 897020A1.V33 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

NCA Research  
02-08-1997 11:21

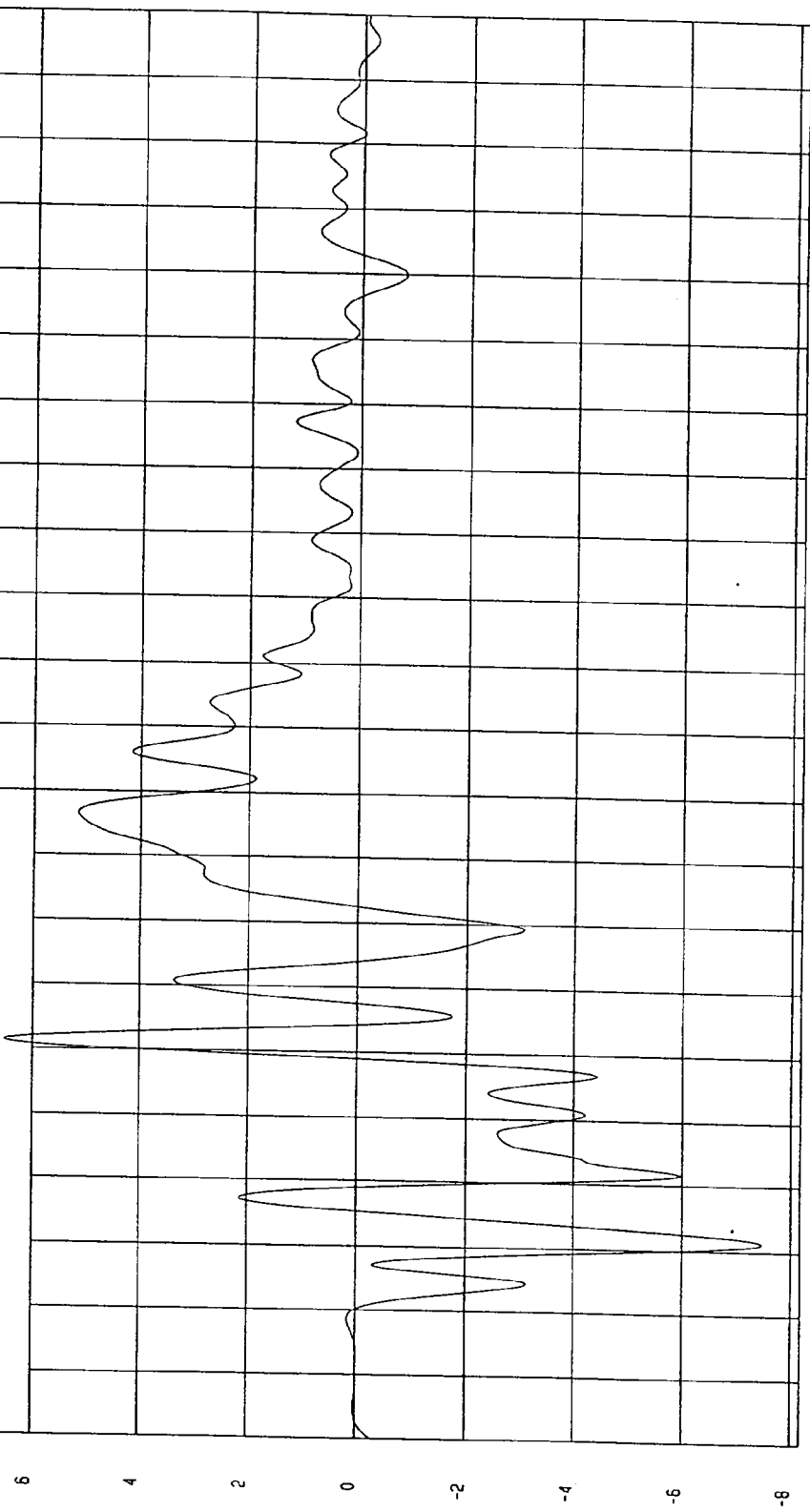
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -7.47 G'S at 11 msec Maximum = 6.51 G'S at 41 msec

RIGHT SIDE SILL AT FRONT SEAT Z ACCELERATION

1 — 897020AF.A34 Filterclass (50)



TIME (SECONDS)

MCA Research  
02-08-1997 11:27

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Minimum = -3.94 KPH at 39 msec

Maximum = 2.20 KPH at 194 msec

RIGHT SIDE SILL AT FRONT SEAT Z VELOCITY

1 ——— B97020AI.V34 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

-20

-10

0

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

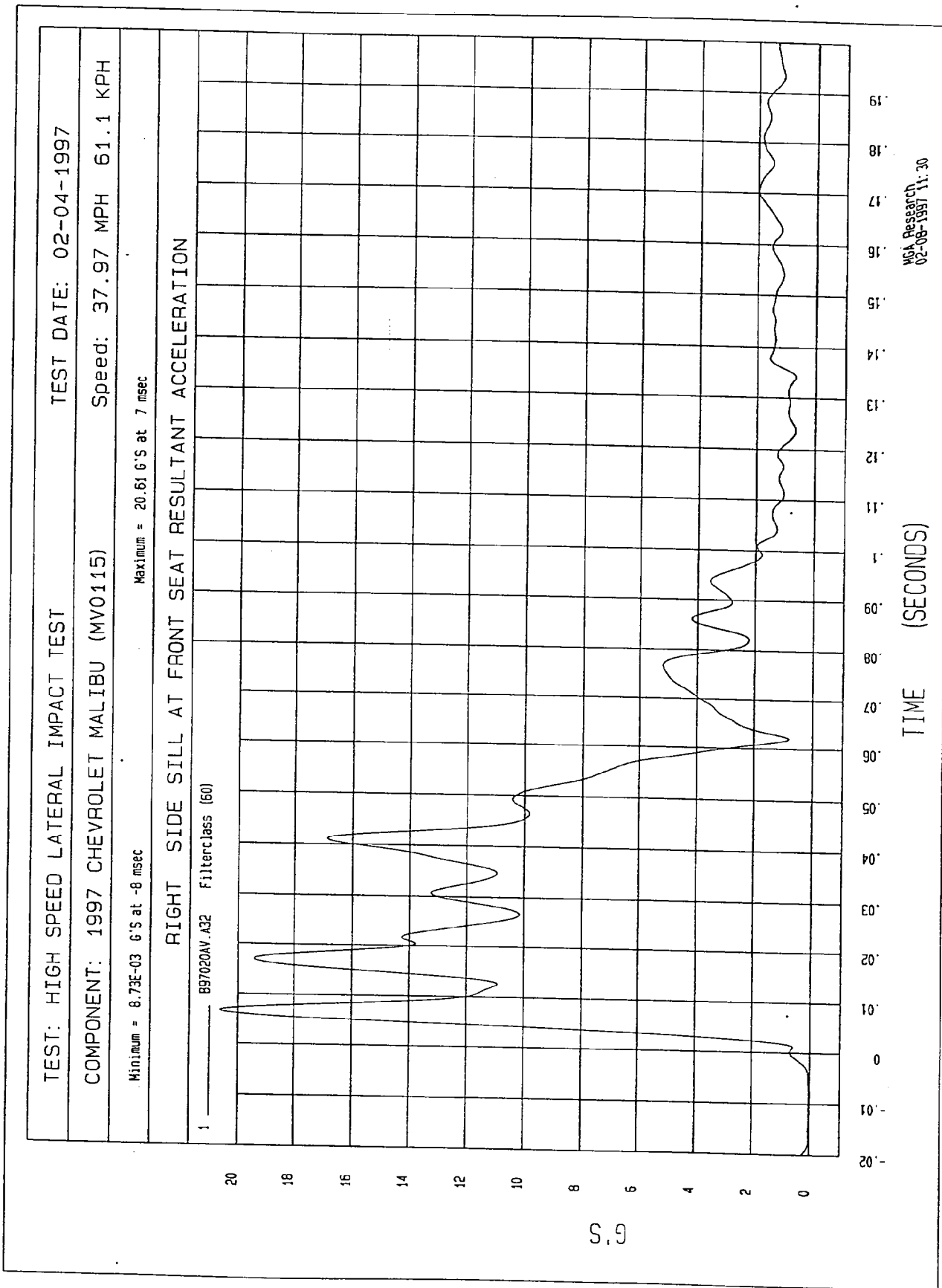
180

190

200

TIME Seconds

MCA Research  
02-08-1997 11:21



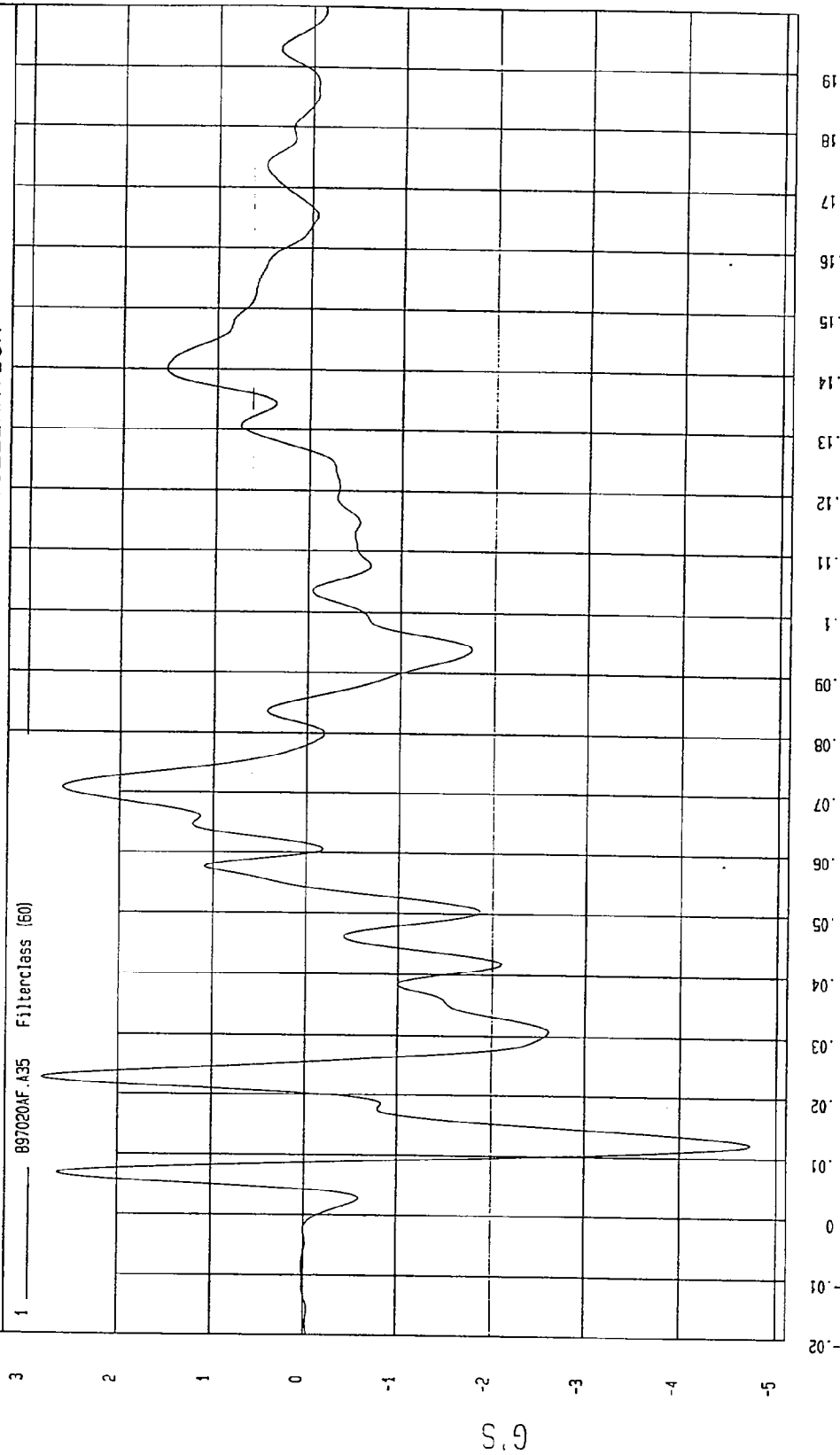
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -4.72 G'S at 12 msec Maximum = 2.83 G'S at 23 msec

RIGHT SIDE SILL AT REAR SEAT X ACCELERATION

1 — 897020AF.A35 Filterclass (60)



MCA Research  
02-08-1997 11:27

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

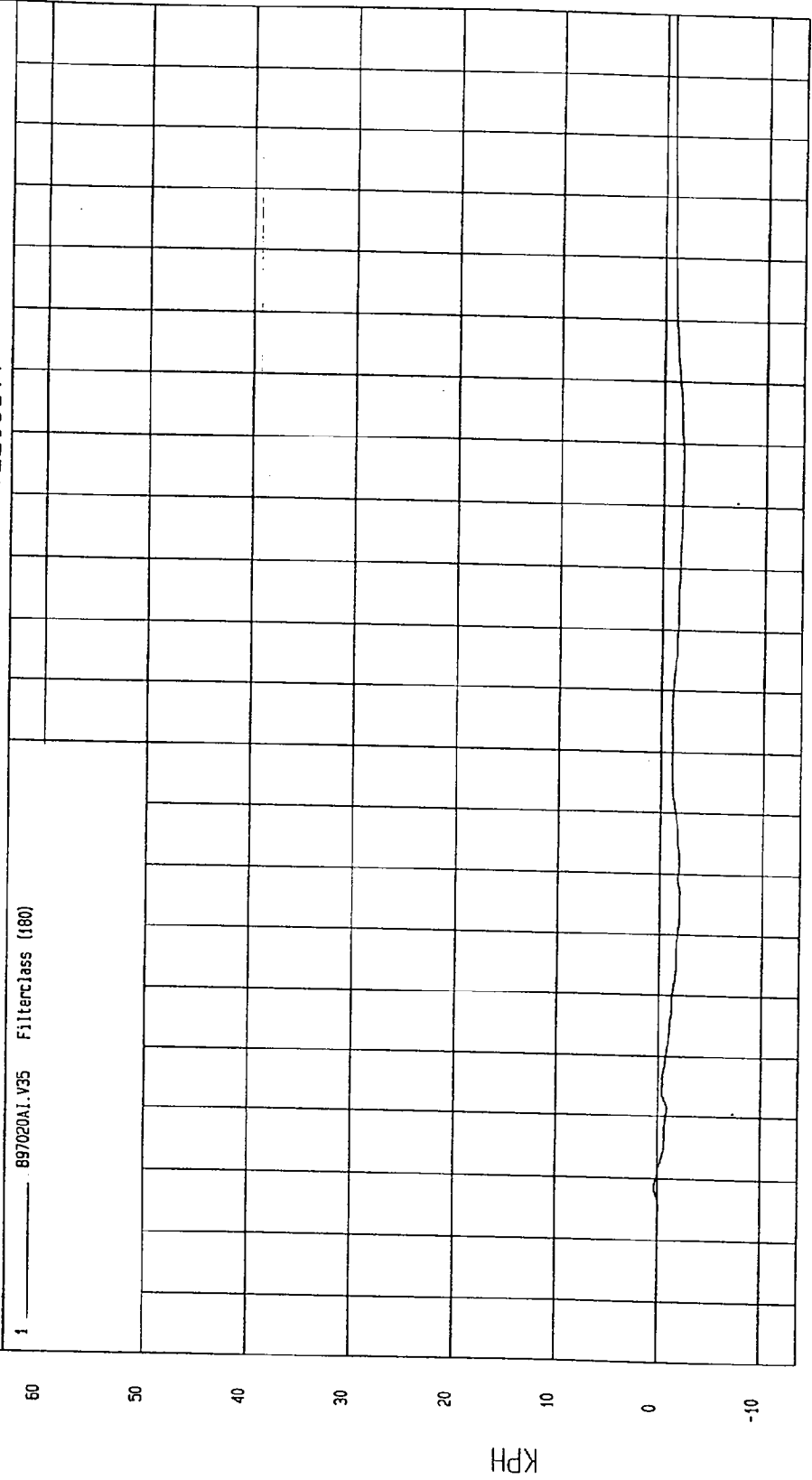
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.97 KPH at 57 msec

Maximum = .29 KPH at 9 msec

RIGHT SIDE SILL AT REAR SEAT X VELOCITY

1 \_\_\_\_\_ B97020A1.V35 FilterClass (180)



MCA Research  
02-06-1997 11:22

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -1.99 G'S at 171 msec

Maximum = 20.85 G'S at 19 msec

RIGHT SIDE SILL AT REAR SEAT Y ACCELERATION

1 ——— 897020AF.A35 Filterclass (50)

20

18

16

14

12

10

8

6

4

2

0

-2

G'S

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

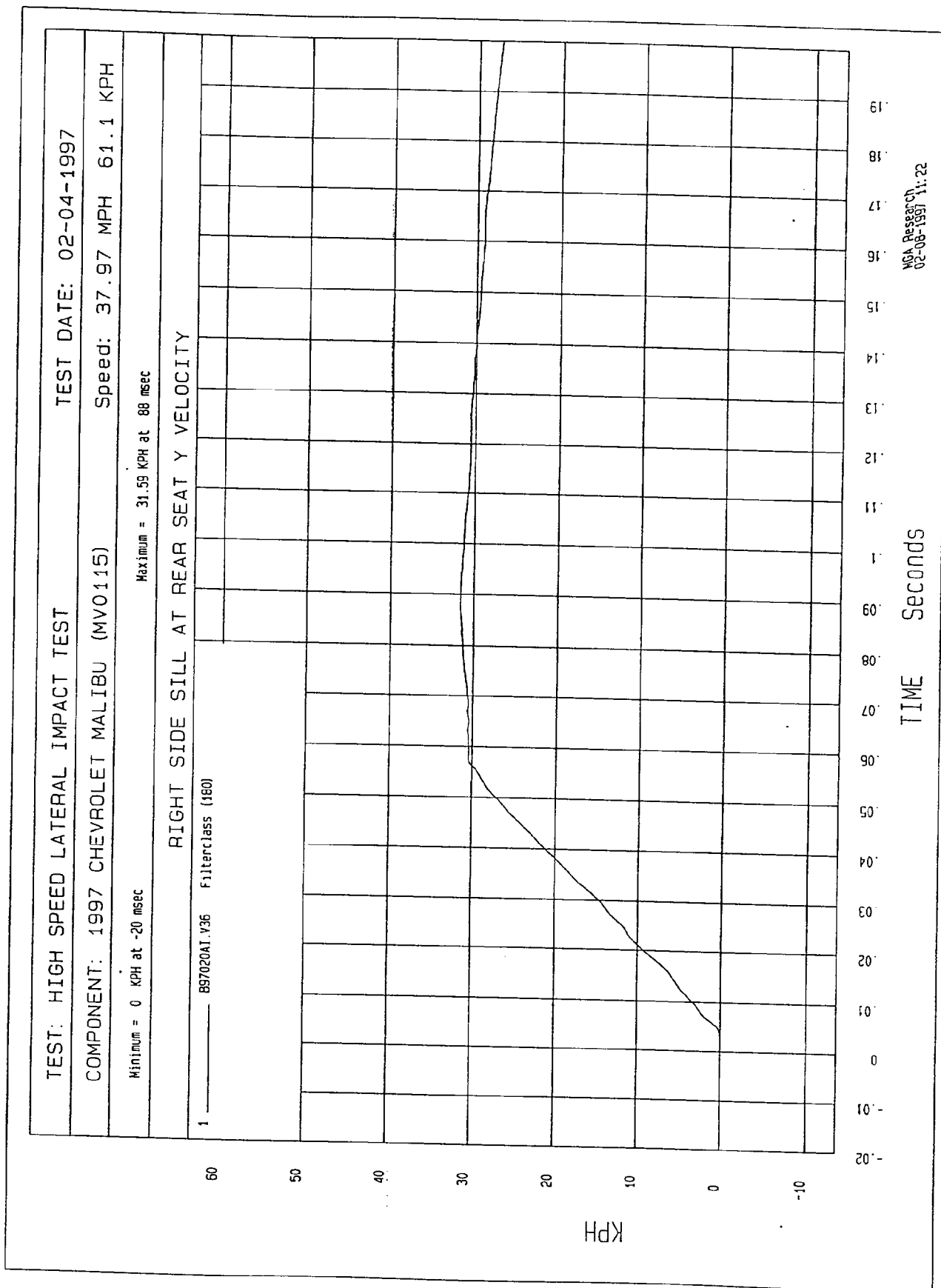
0.18

0.19

TIME (SECONDS)

MCA Research  
02-08-1997 11:21





TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

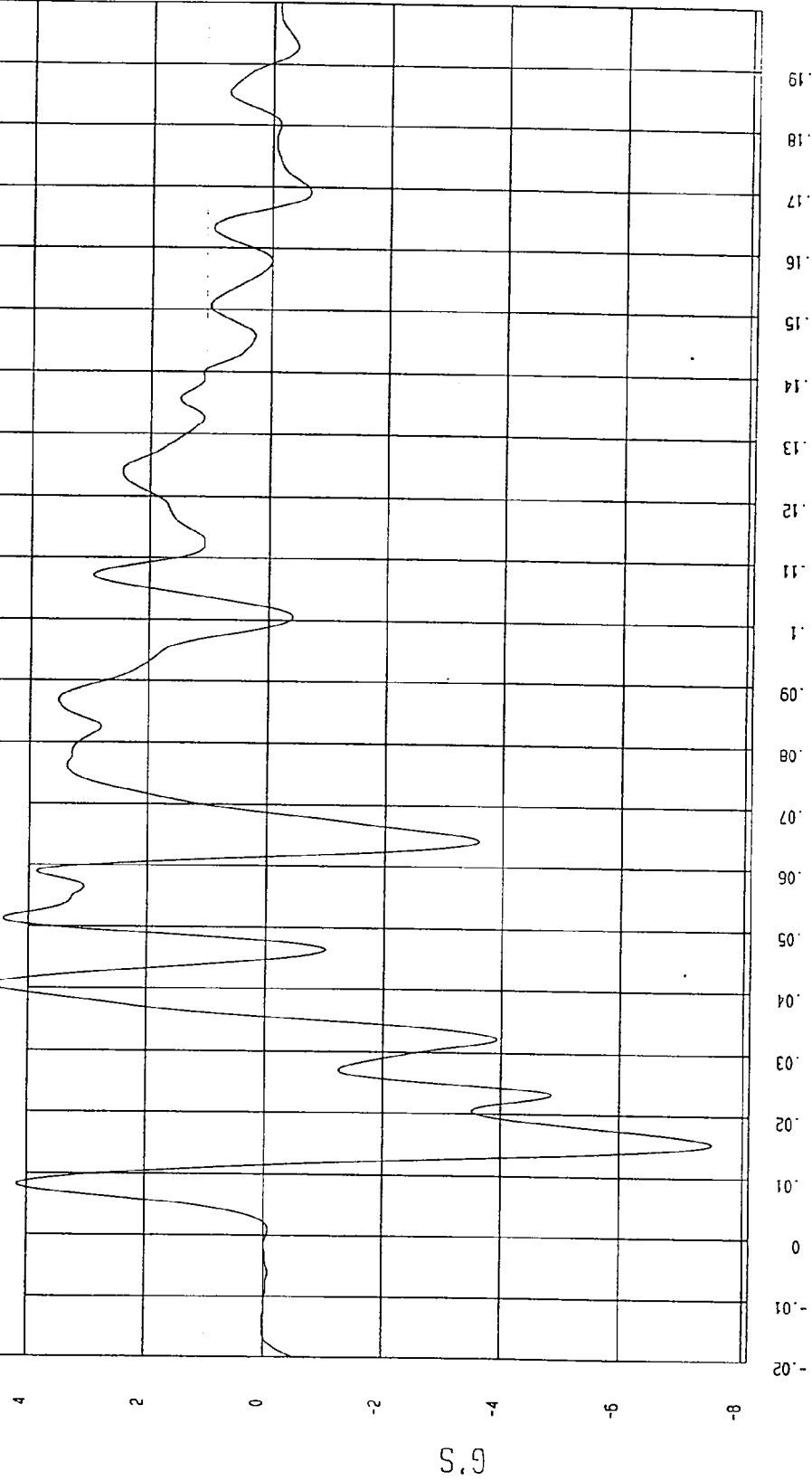
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -7.49 G'S at 15 msec

Maximum = 4.61 G'S at 40 msec

RIGHT SIDE SILL AT REAR SEAT Z ACCELERATION

1 ——— B97020AF.A37 Filterclass (50)



MGA Research  
02-08-1997 11:27

TIME (SECONDS)

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

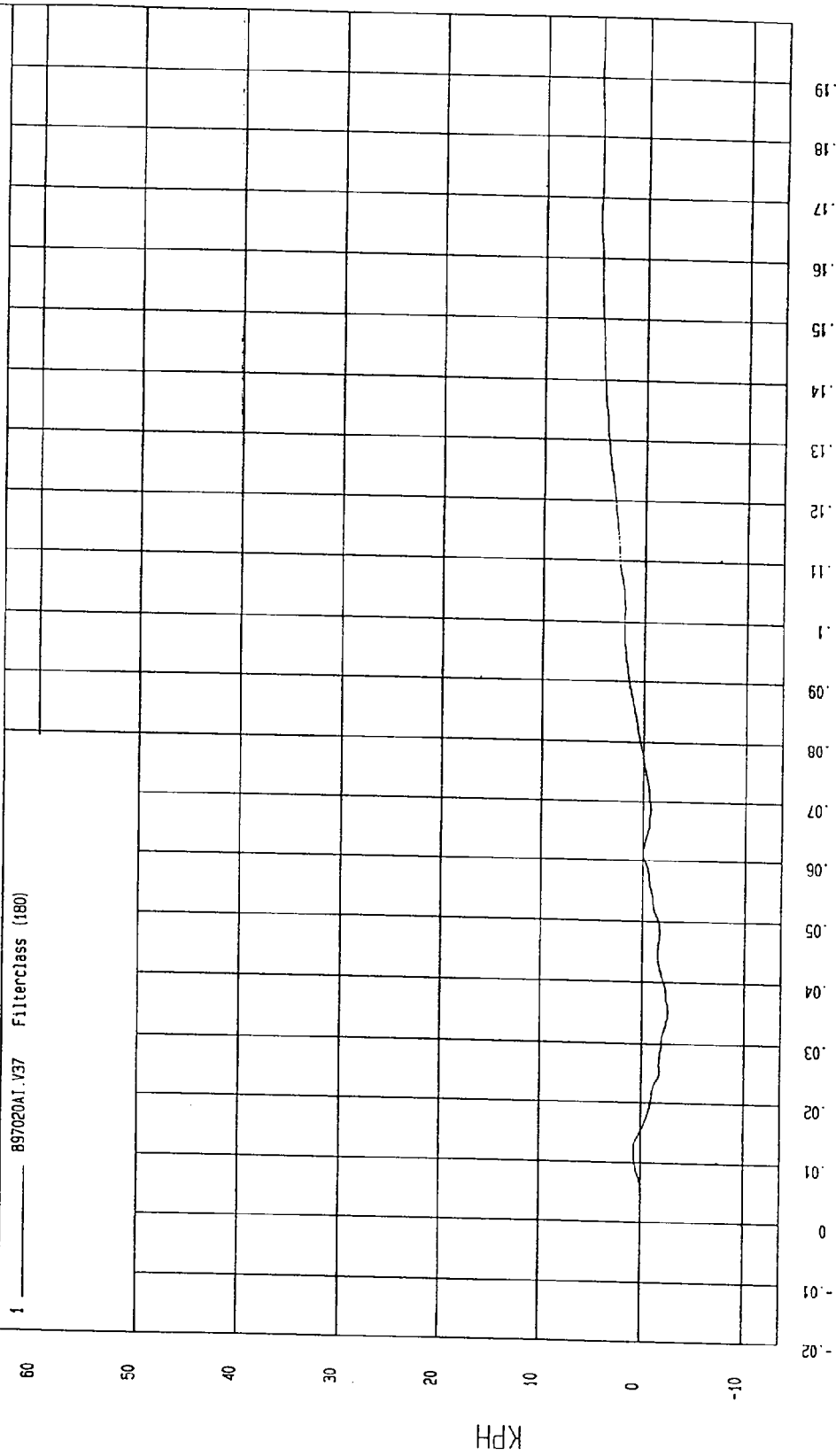
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -2.52 KPH at 35 msec

Maximum = 4.67 KPH at 166 msec

RIGHT SIDE SILL AT REAR SEAT Z VELOCITY

1 — B97020A1.V37 Filterclass (180)



MCA Research  
02-08-1997 11:22

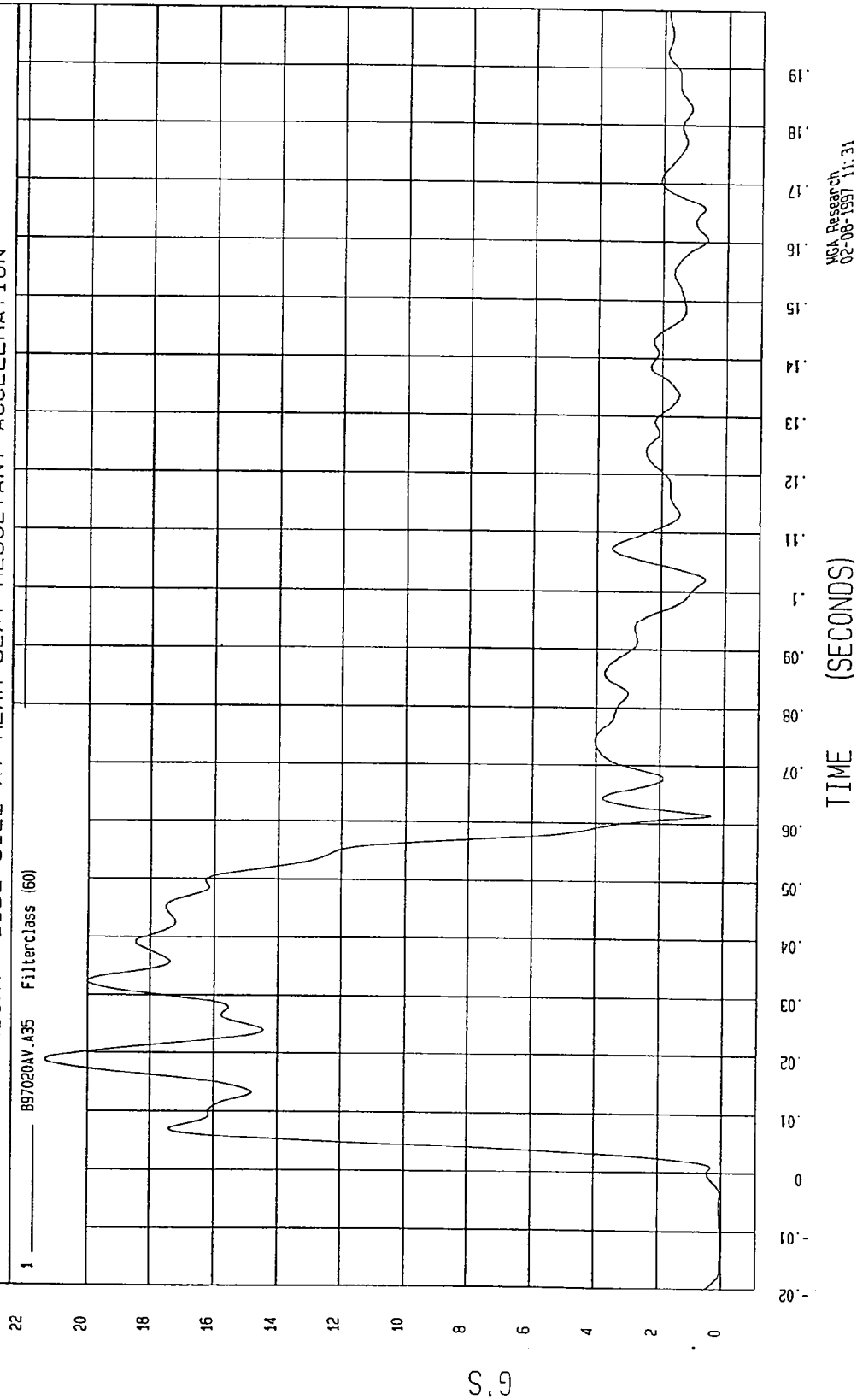
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 1.27E-02 G'S at -13 msec

Maximum = 21.32 G'S at 19 msec

RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION



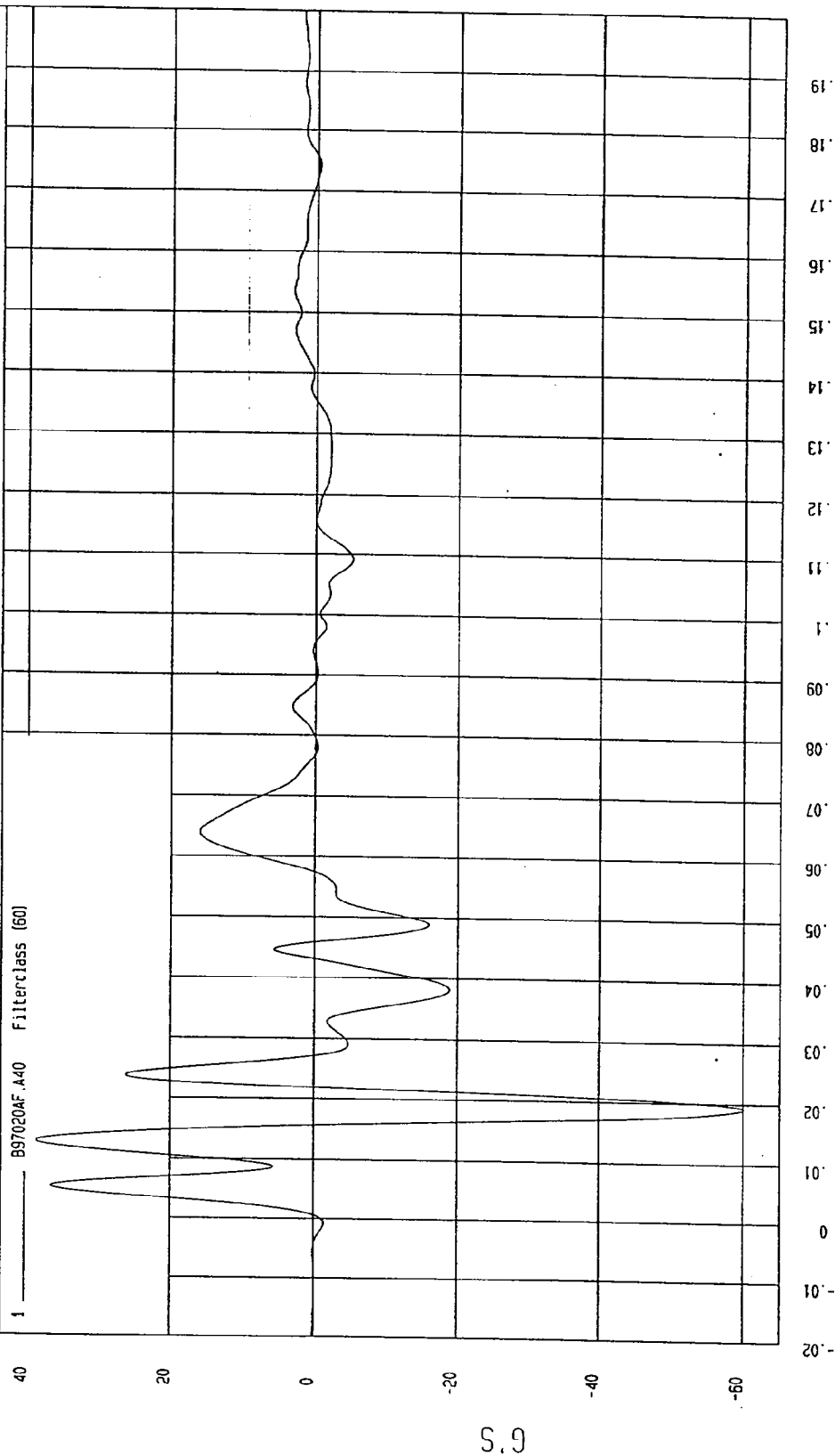
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -60.12 G'S at 19 msec Maximum = 38.73 G'S at 13 msec

DRIVER SEAT TRACK Y ACCELERATION

1 B97020AF.A40 Filterclass (60)



NCA Research  
02-08-1997 11:37

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

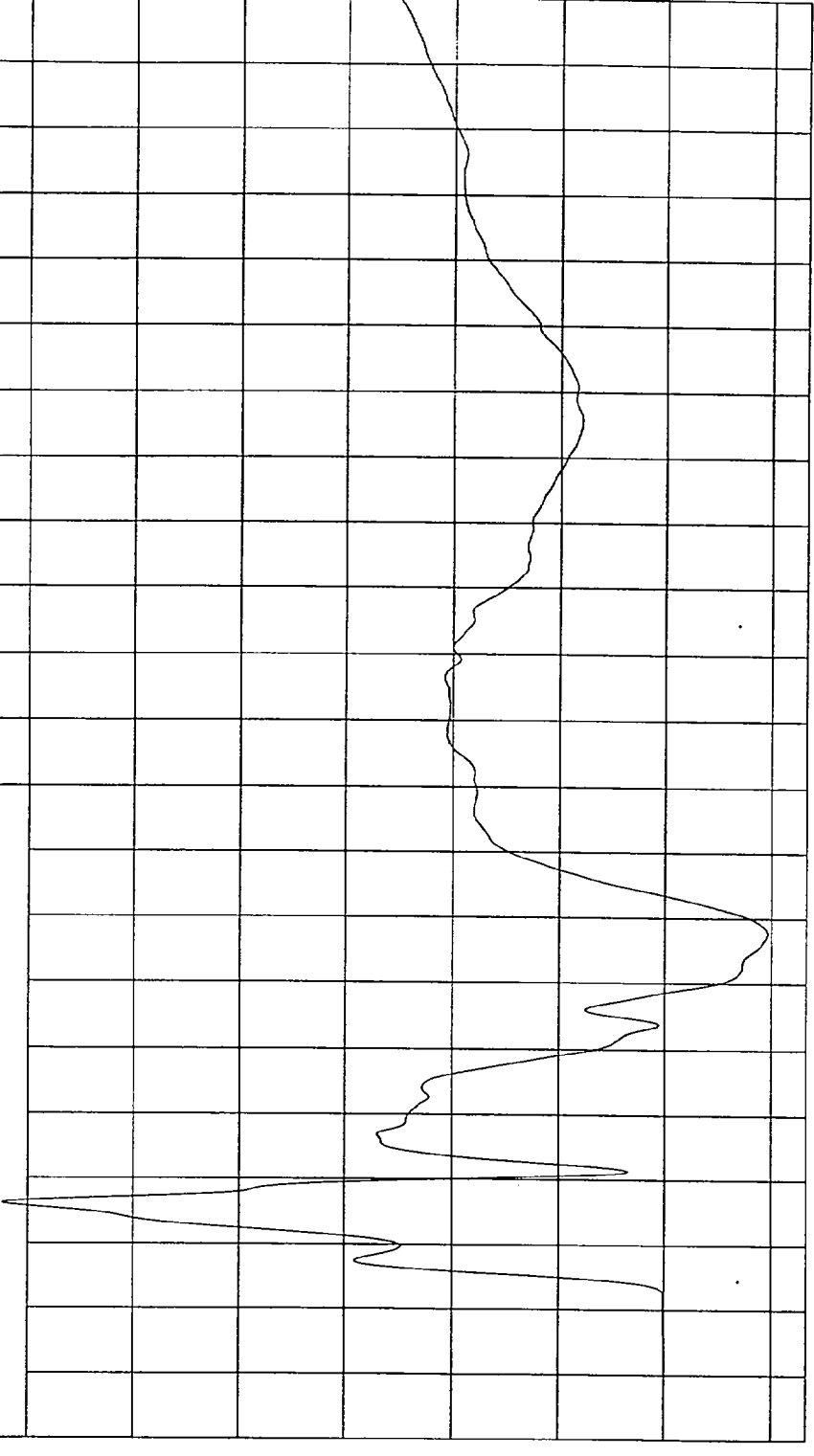
Minimum = -1.92 KPH at 58 msec  
Maximum = 12.47 KPH at 16 msec

DRIVER SEAT TRACK Y VELOCITY

1 ——— 897020A1.V40 Filterclass (180)

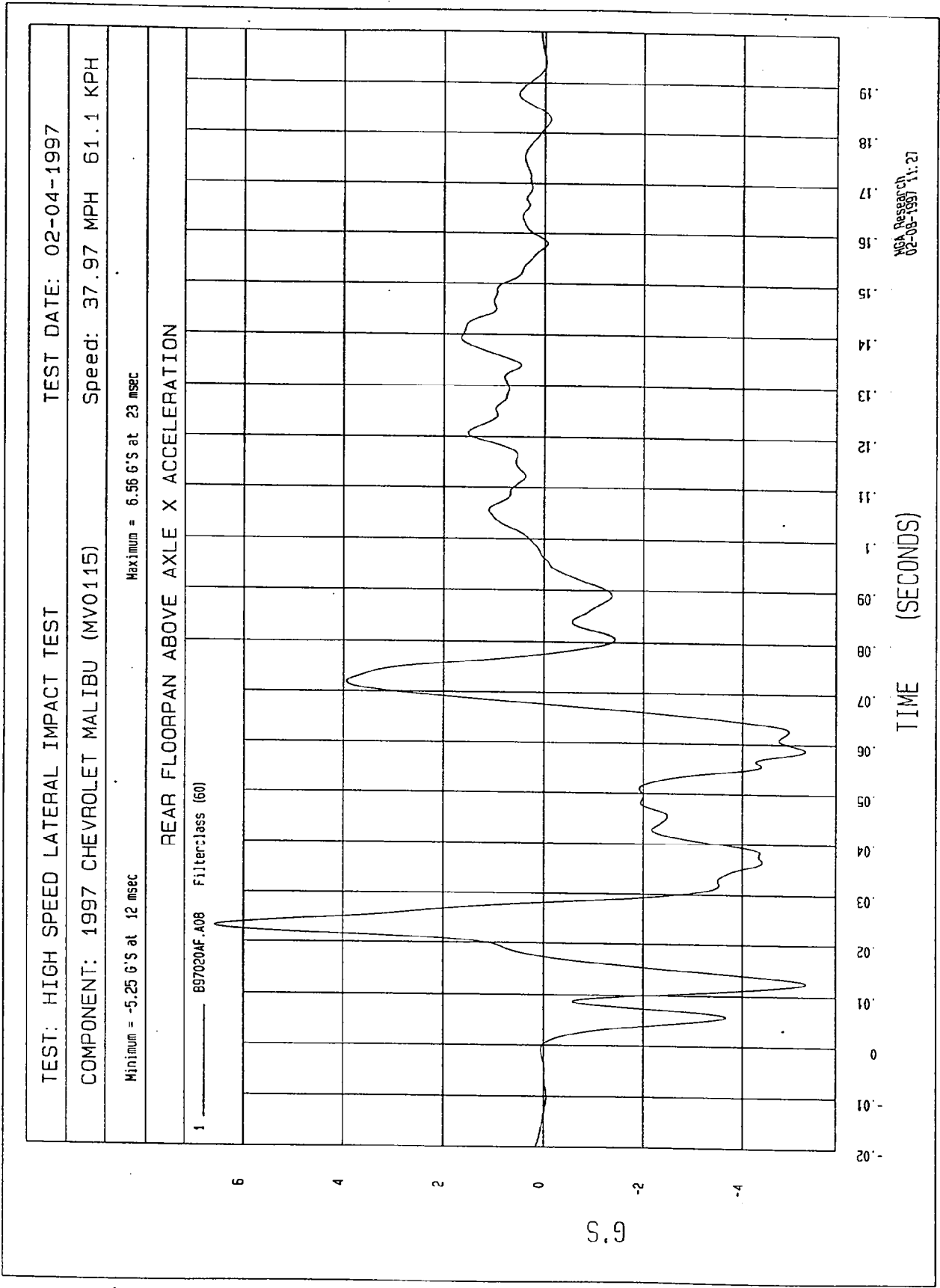
KPH

12  
10  
8  
6  
4  
2  
0  
-2



VGA Research  
02-08-1997 11:37

TIME Seconds



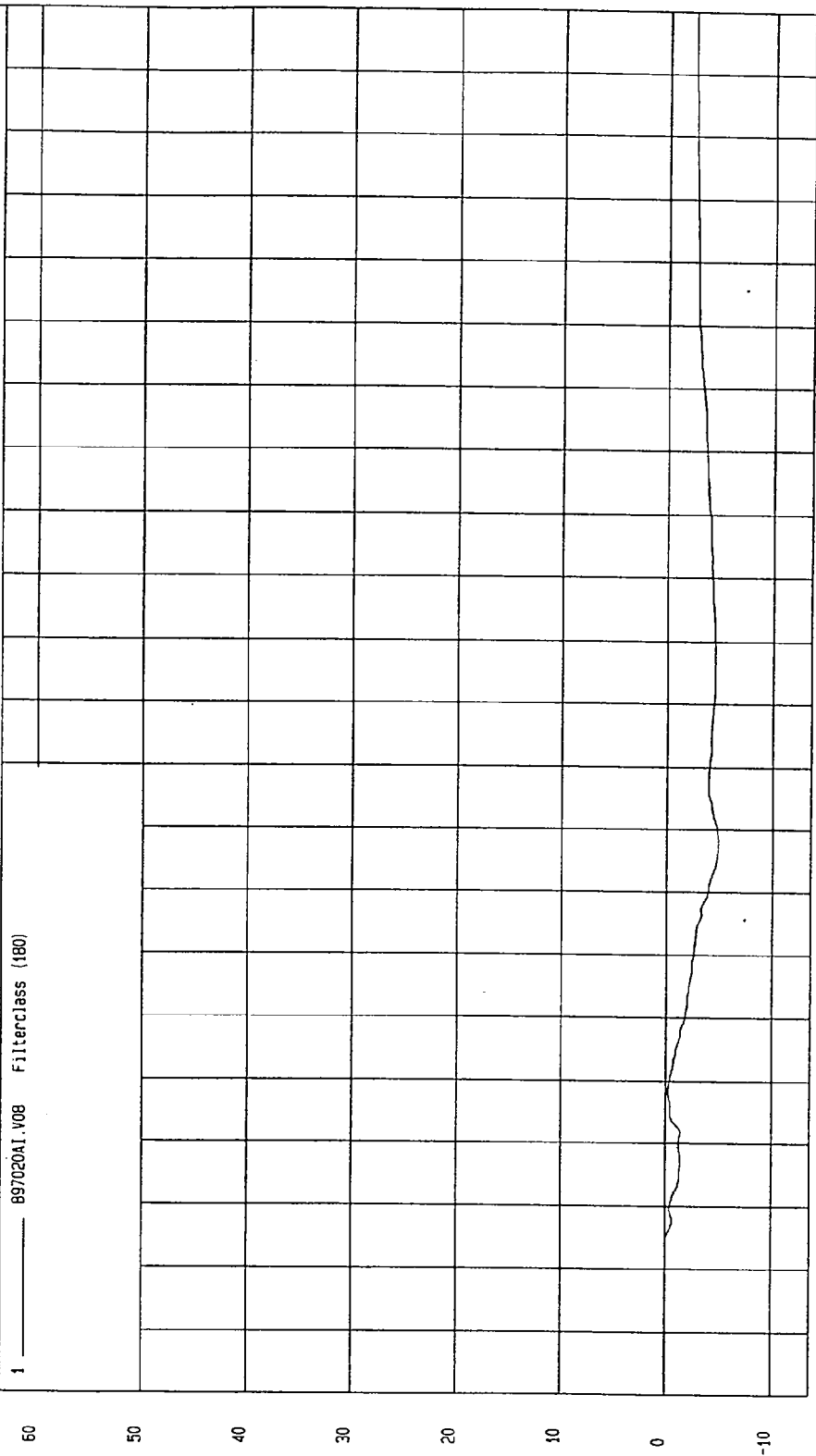
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -4.83 KPH at 68 msec Maximum = 1.65E-02 KPH at -12 msec

REAR FLOORPAN ABOVE AXLE X VELOCITY

1 897020A1.V08 Filterclass (180)



MGA Research  
02-08-1997 11:22



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

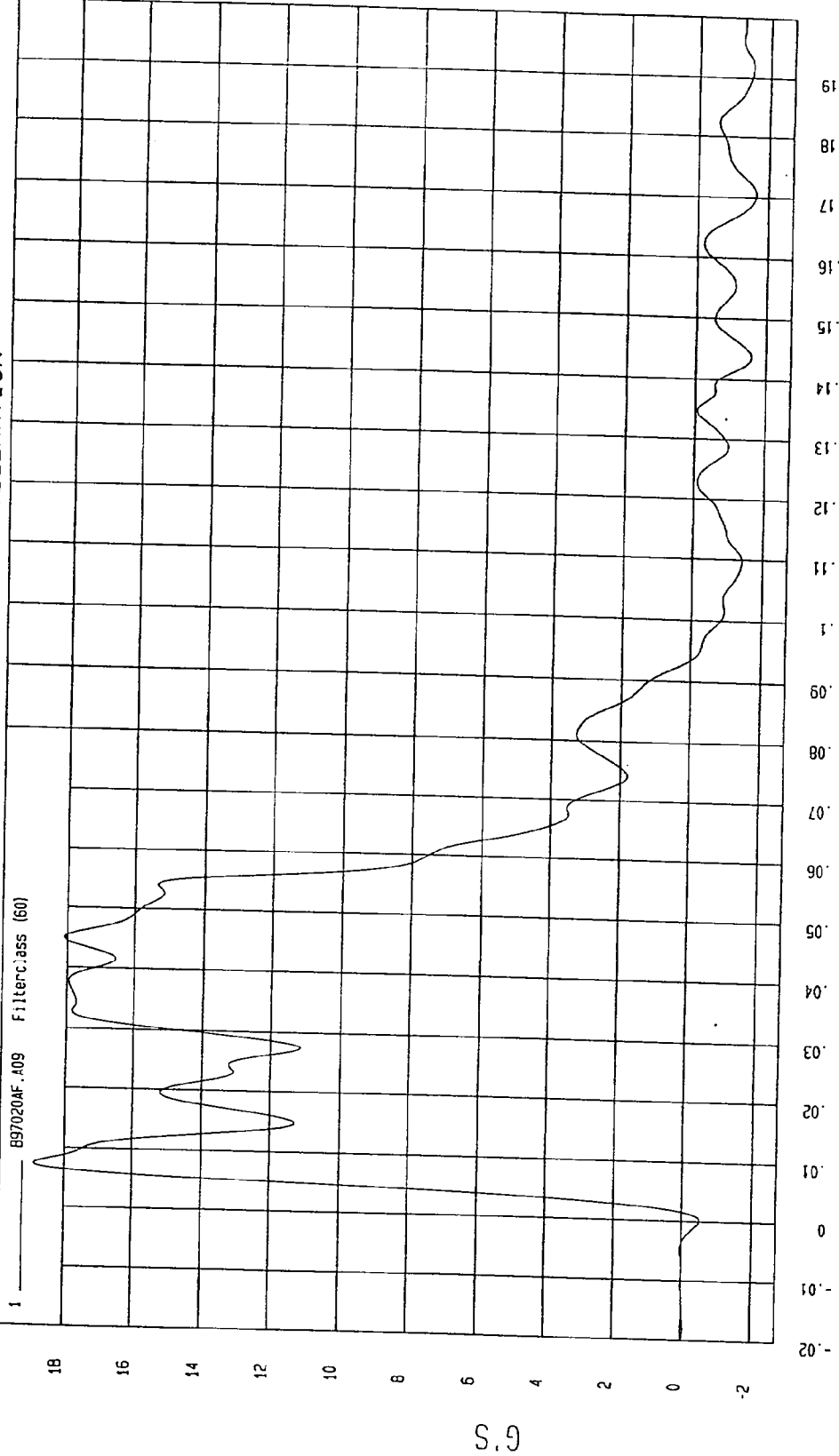
Speed: 37.97 MPH 61.1 KPH

Minimum = -1.65 G'S at 170 msec

Maximum = 18.87 G'S at 7 msec

REAR FLOORPAN ABOVE AXLE Y ACCELERATION

1 897020MF.A09 Filter: class (60)



MCA Research  
02-08-1997 11:28

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

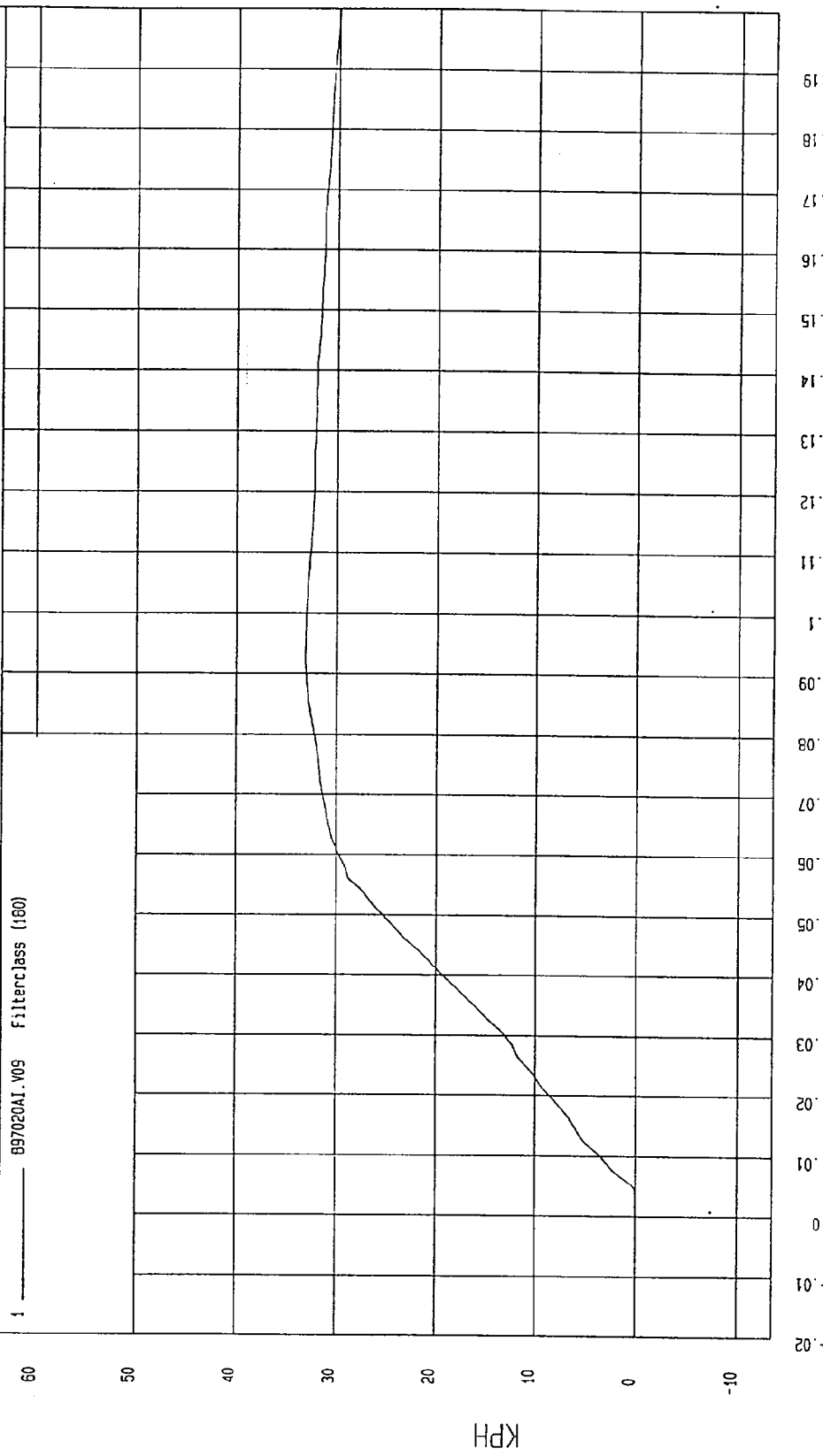
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 33.24 KPH at 93 msec

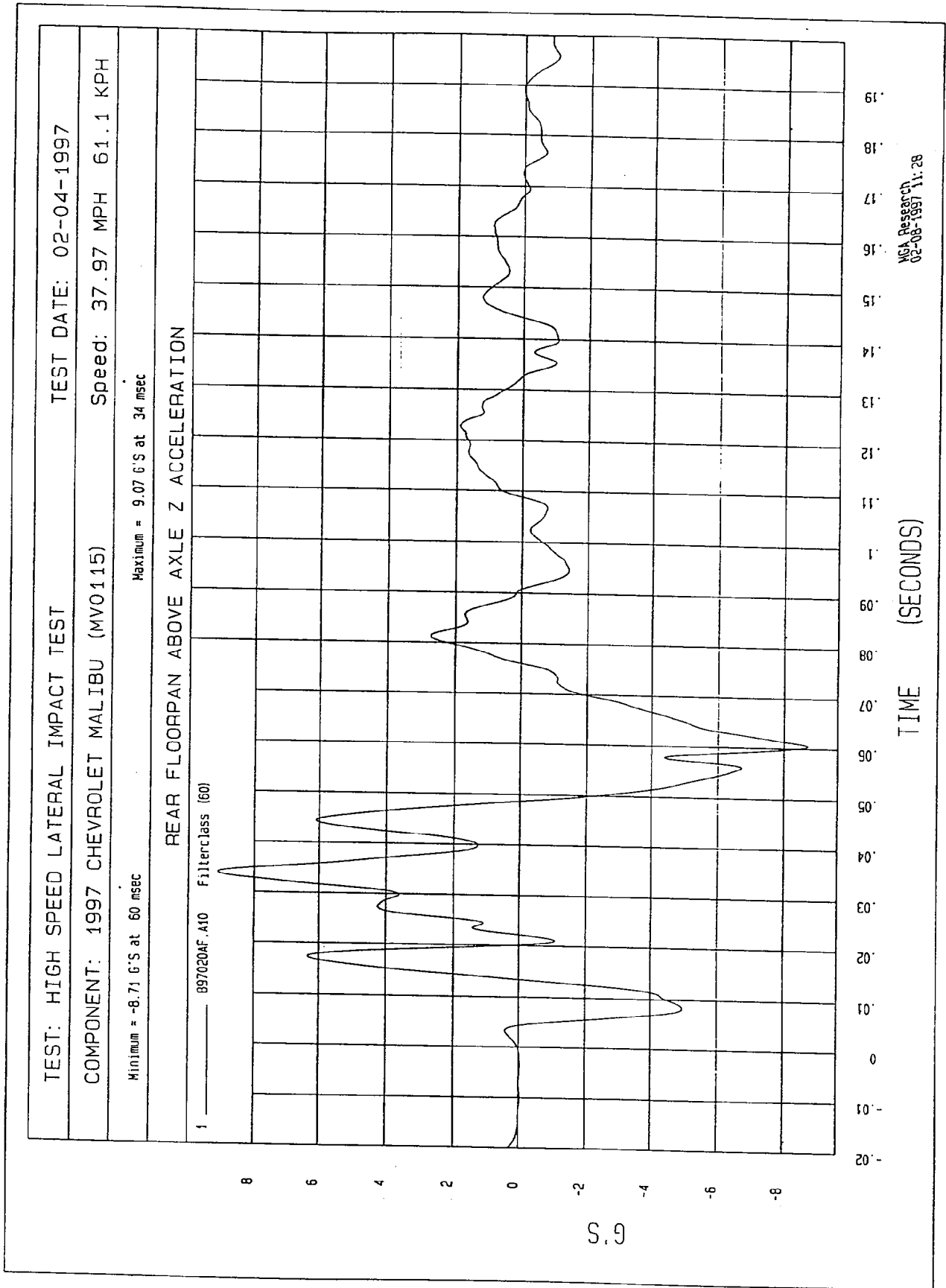
Minimum = -1.05E-02 KPH at -12 msec

REAR FLOORPAN ABOVE AXLE Y VELOCITY

1 — 897020AI.V09 Filterclass (180)



WCA Research  
02-08-1997 11:22



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.11 KPH at 13 msec  
Maximum = 3.61 KPH at 49 msec

REAR FLOORPAN ABOVE AXLE Z VELOCITY

1 B97020A1.V10 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

MCA Research  
02-08-1997 11:22

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 1.08E-02 G'S at -13 msec Maximum = 20.25 G'S at 34 msec

REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION

1 897020AV.A08 FilterClass (60)

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

2

0

-2

-4

G.S

TIME (SECONDS)

MGA Research  
02-08-1997 11:31

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

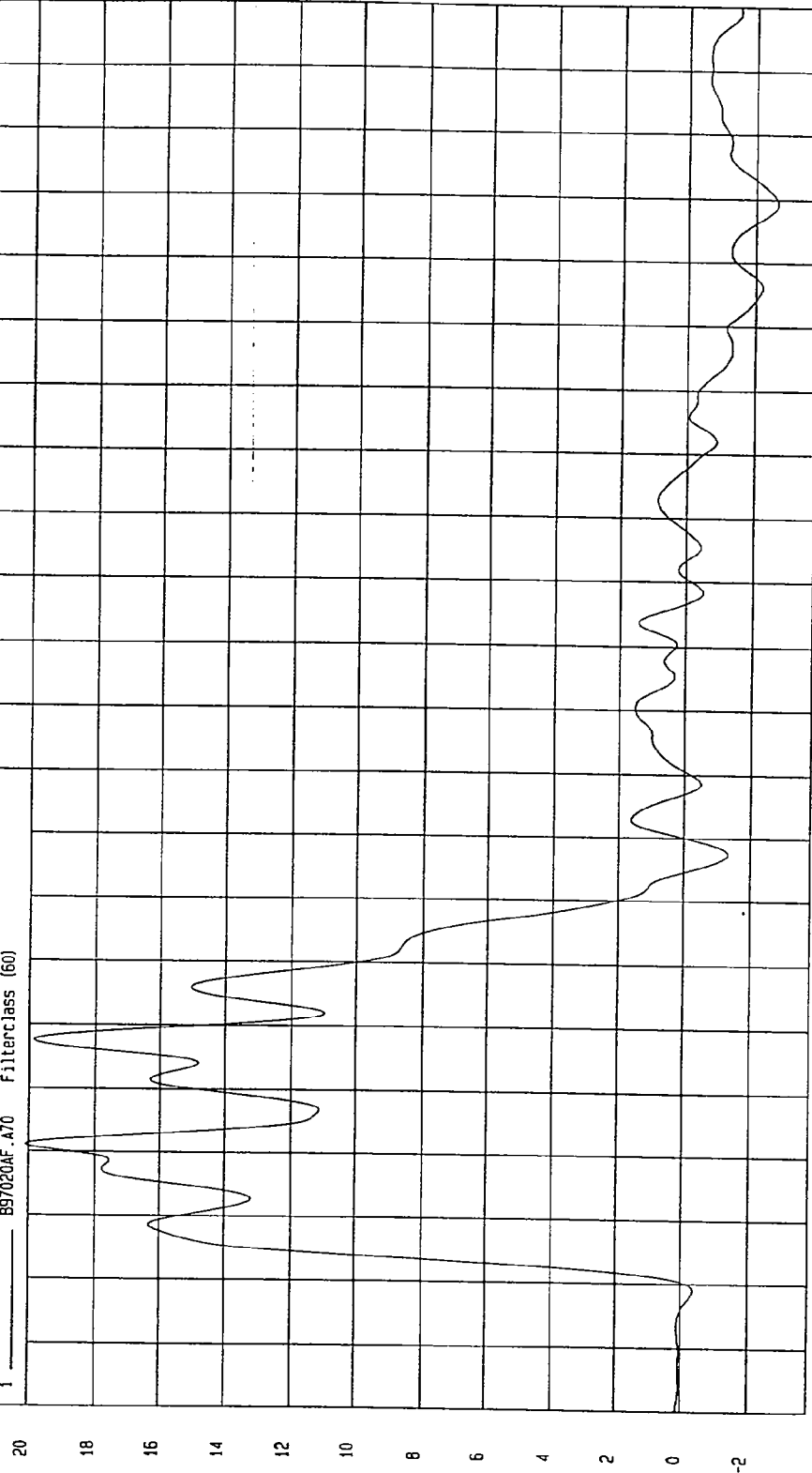
Speed: 37.97 MPH 61.1 KPH

Minimum = -2.66 G'S at 169 msec

Maximum = 20.09 G'S at 21 msec

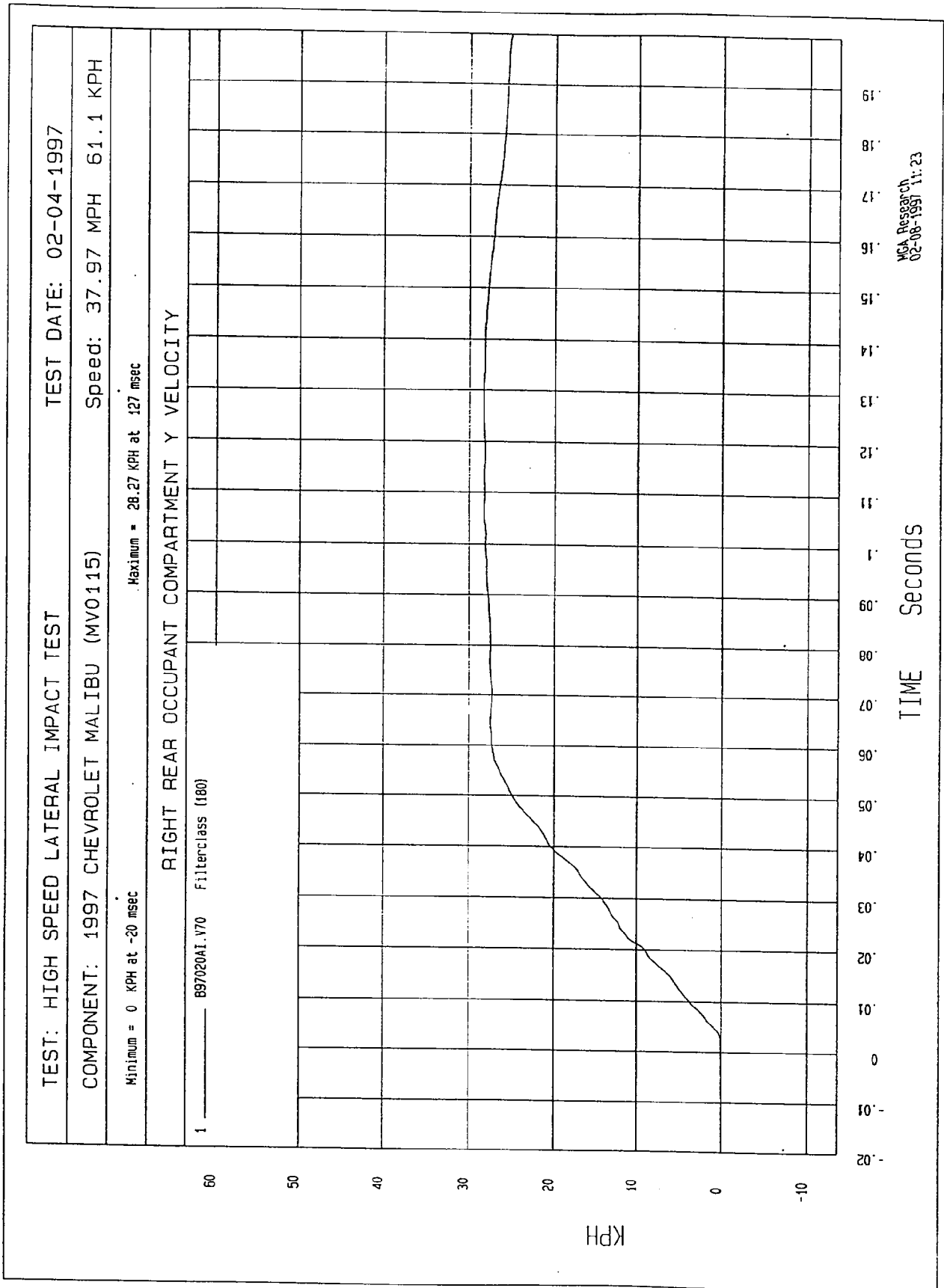
RIGHT REAR OCCUPANT COMPARTMENT Y ACCELERATION

1 ——— B97020AF.A70 Filterclass (60)



MGA Research  
02-08-1997 11:28

TIME (SECONDS)



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 58.13 G'S at 3 msec

Minimum = -21.22 G'S at 21 msec

LEFT LOWER A-POST Y ACCELERATION

1 B97020AF.A20 Filterclass (60)

60

50

40

30

20

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

MCA Research  
02-08-1997 11:37

TIME (SECONDS)



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -10 KPH at 1 msec

Maximum = 14.43 KPH at 19 msec

LEFT LOWER A-POST Y VELOCITY

1 ——— B97020AI.Y20 Filterclass (180)

60

50

40

30

20

10

0

-10

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

MGA Research  
02-08-1997 11:22

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -3.19 G'S at 6 msec Maximum = 33.36 G'S at 3 msec

LEFT MID A-POST Y ACCELERATION

1 8970204F.A19 Filterclass (60)

30

20

10

0

G.S

-02

0

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

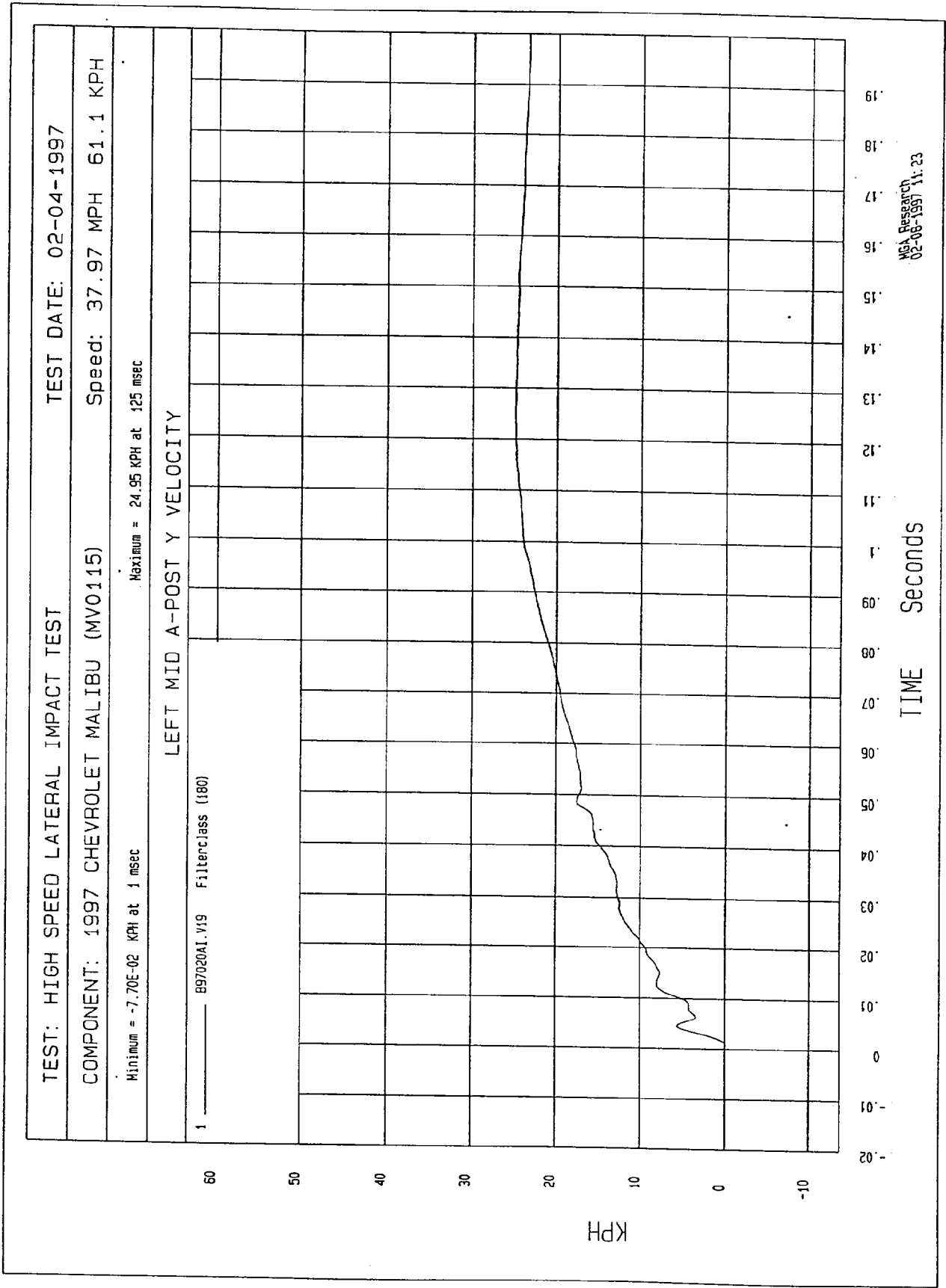
17

18

19

TIME (SECONDS)

NCA Research  
02-08-1997 11:39



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

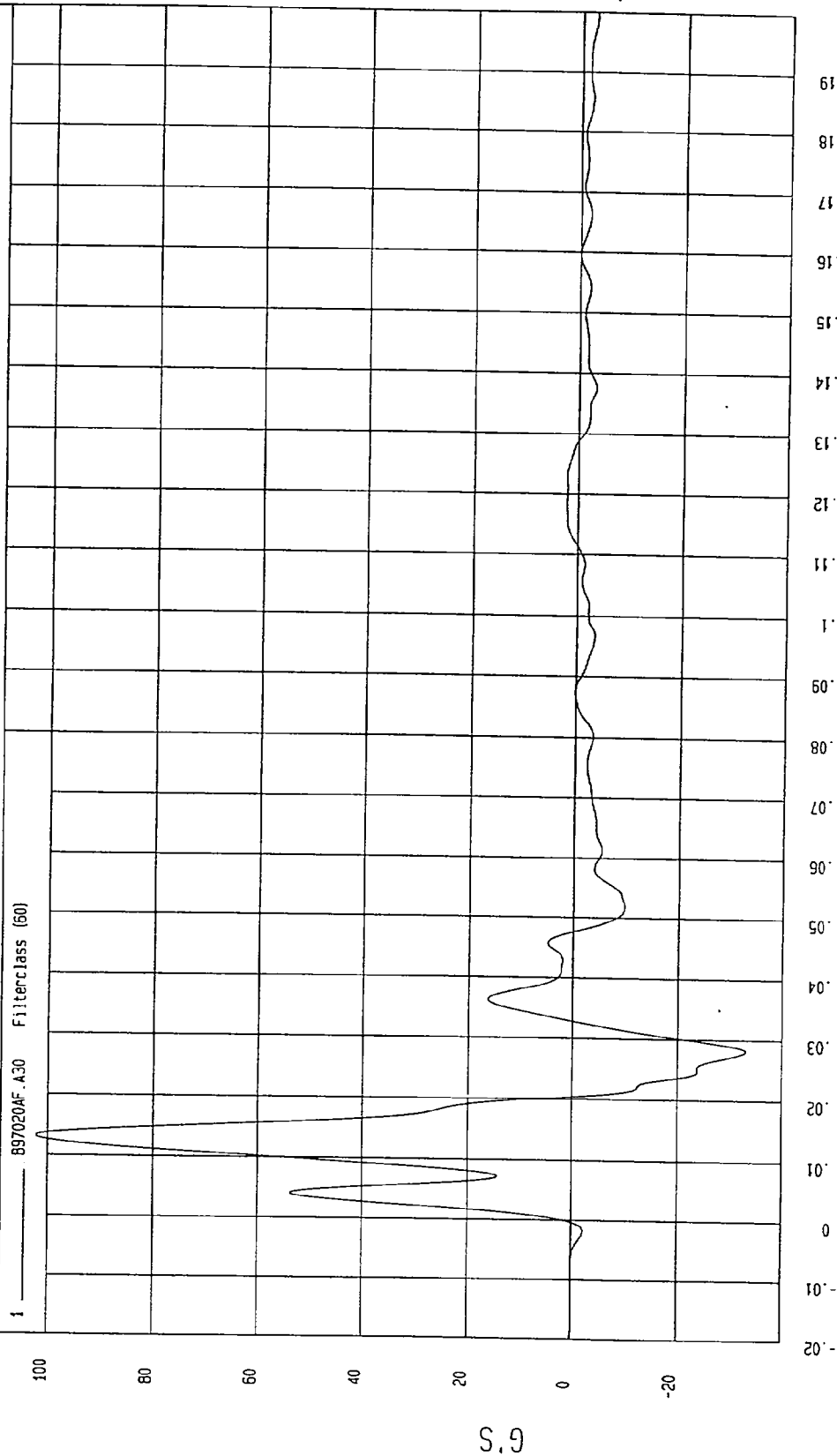
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 102.22 G'S at 13 msec

Minimum = -32.85 G'S at 28 msec

LEFT LOWER B-POST Y ACCELERATION

1 — 897020AF.A30 Filterclass (50)



NCA Research  
02-06-1997 11:37

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

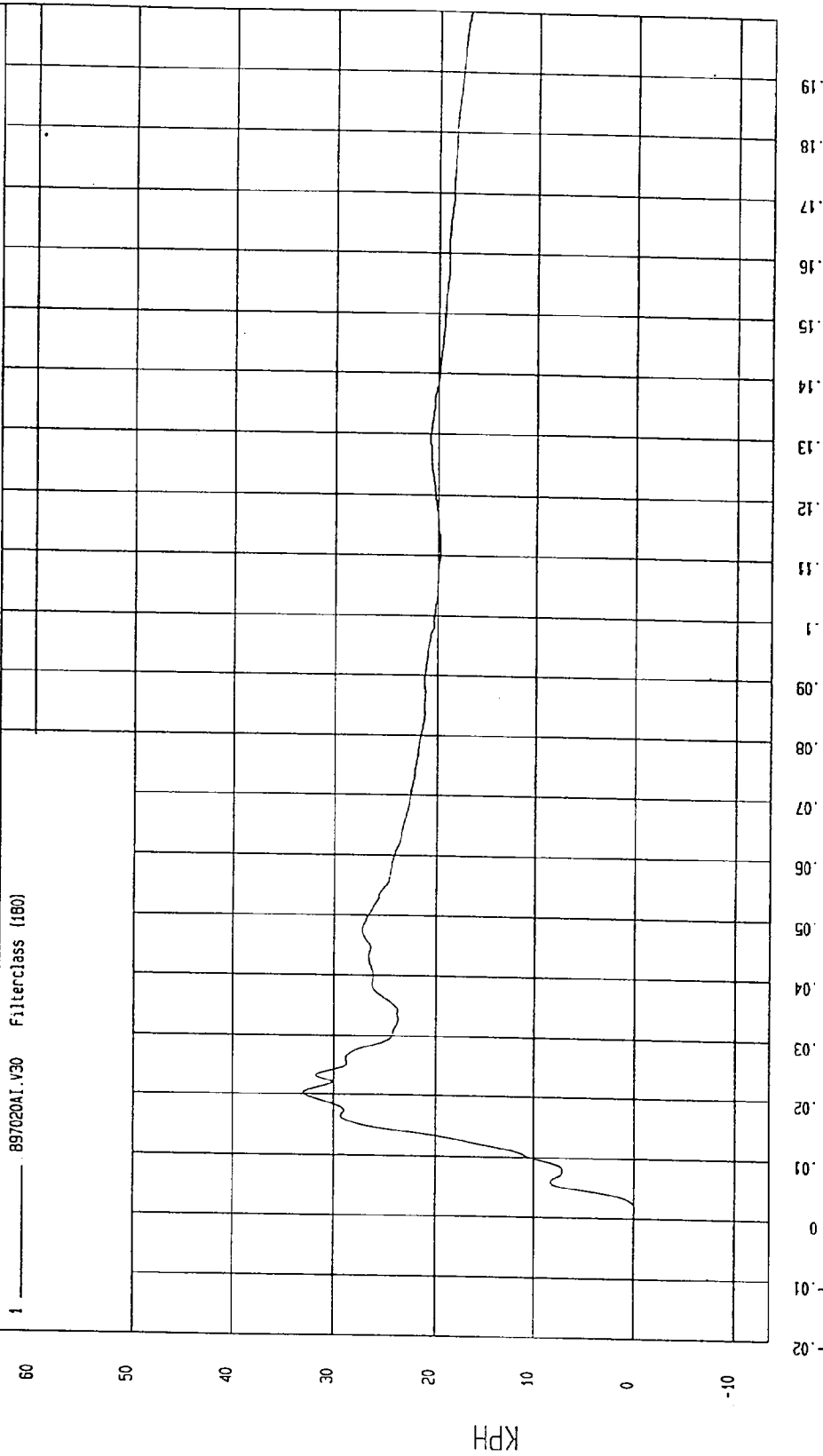
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -6.40E-02 KPH at 2 msec

Maximum = 33.14 KPH at 20 msec

LEFT LOWER B-POST Y VELOCITY

1 — 897020A1.V30 Filterclass (180)



MGA Research  
02-08-1997 11:23

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

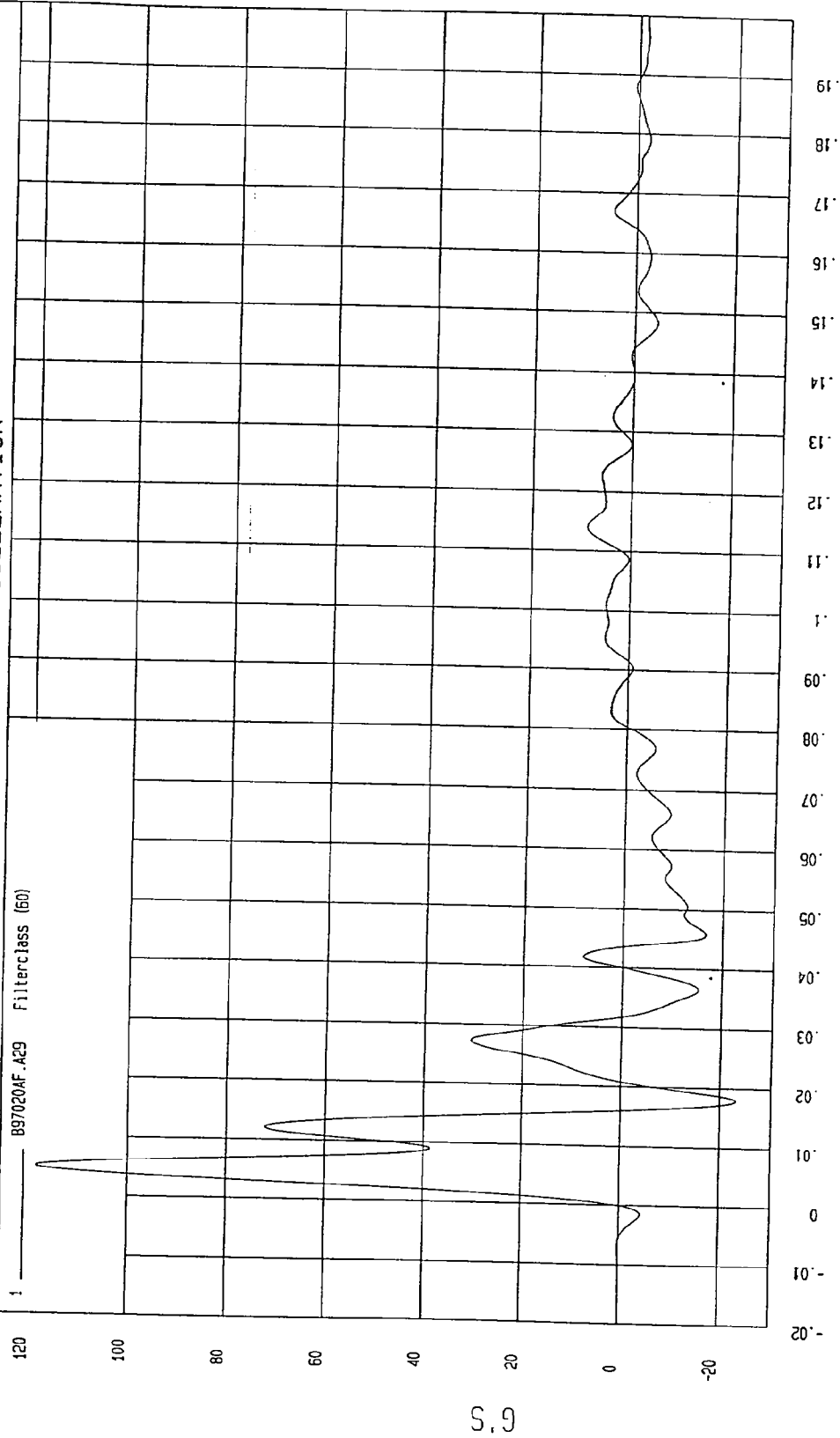
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -23.24 G's at 18 msec

Maximum = 118.68 G's at 5 msec

LEFT MID B-POST Y ACCELERATION

1 ——— B97020AF.A29 Filterclass (50)



NGA Research  
02-08-1997 11:38

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -.15 KPH at 2 msec

Maximum = 37.23 KPH at 31 msec

LEFT MID B-POST Y VELOCITY

1 897020A1.V29 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

NCA Research  
02-08-1997 11:23

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

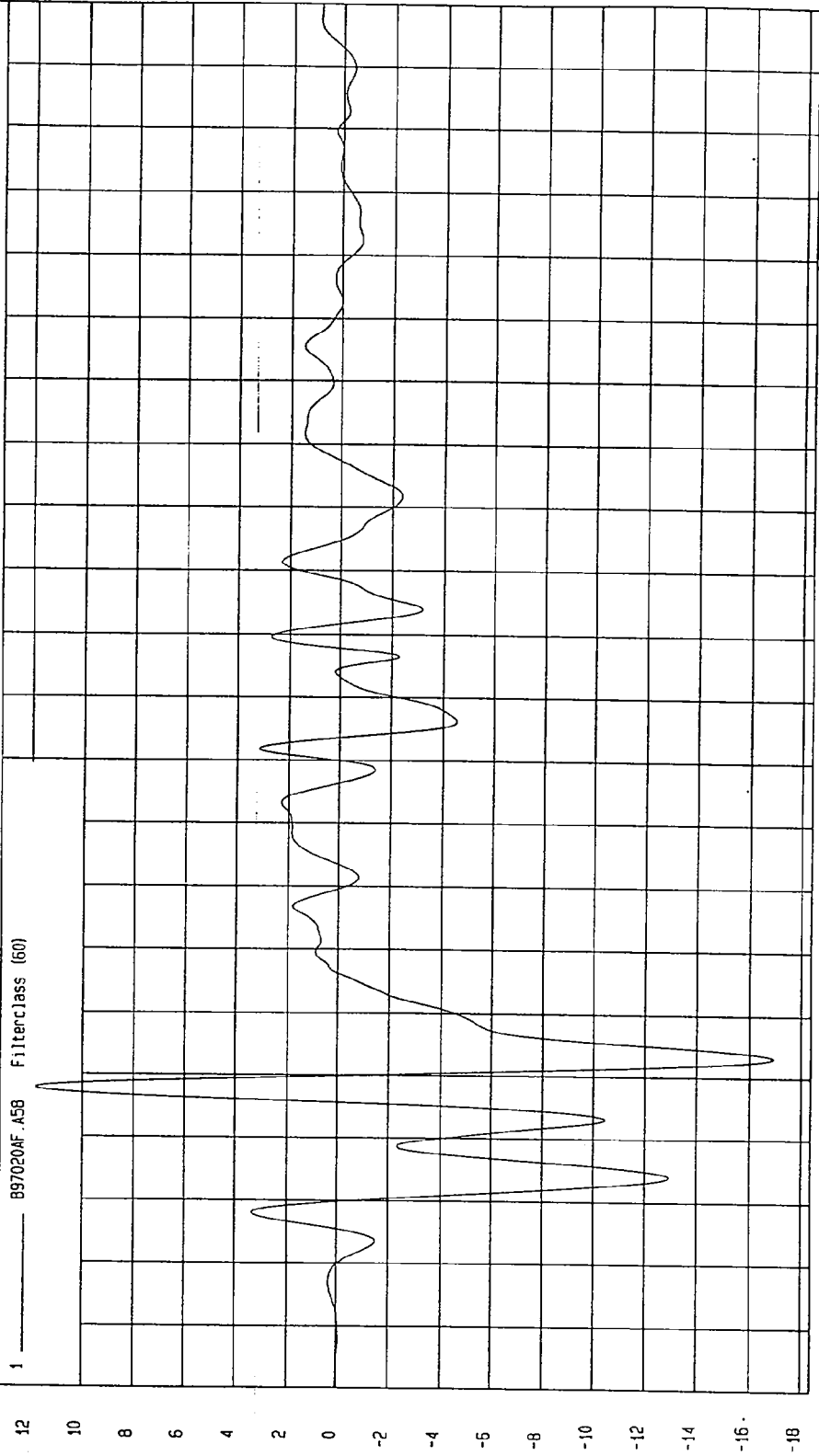
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -16.92 G'S at 33 msec

Maximum = 11.60 G'S at 28 msec

VEHICLE CG X ACCELERATION

1 ——— B97020AF.A58 Filterclass (60)



MCA Research  
02-06-1997 11:26

TIME (SECONDS)



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -6.79 KPH at 128 msec

Maximum = .31 KPH at 10 msec

VEHICLE CG X VELOCITY

1 ——— B97020A1.V58 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

NCA Research  
02-08-1997 11:23

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -13.35 G'S at 28 msec Maximum = 78.77 G'S at 23 msec

VEHICLE CG Y ACCELERATION

1 ——— B97020AF.A59 Filterclass (60)

80

60

40

20

0

G.S

-20

-10

0

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

180

190

TIME (SECONDS)

MGA Research  
02-08-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

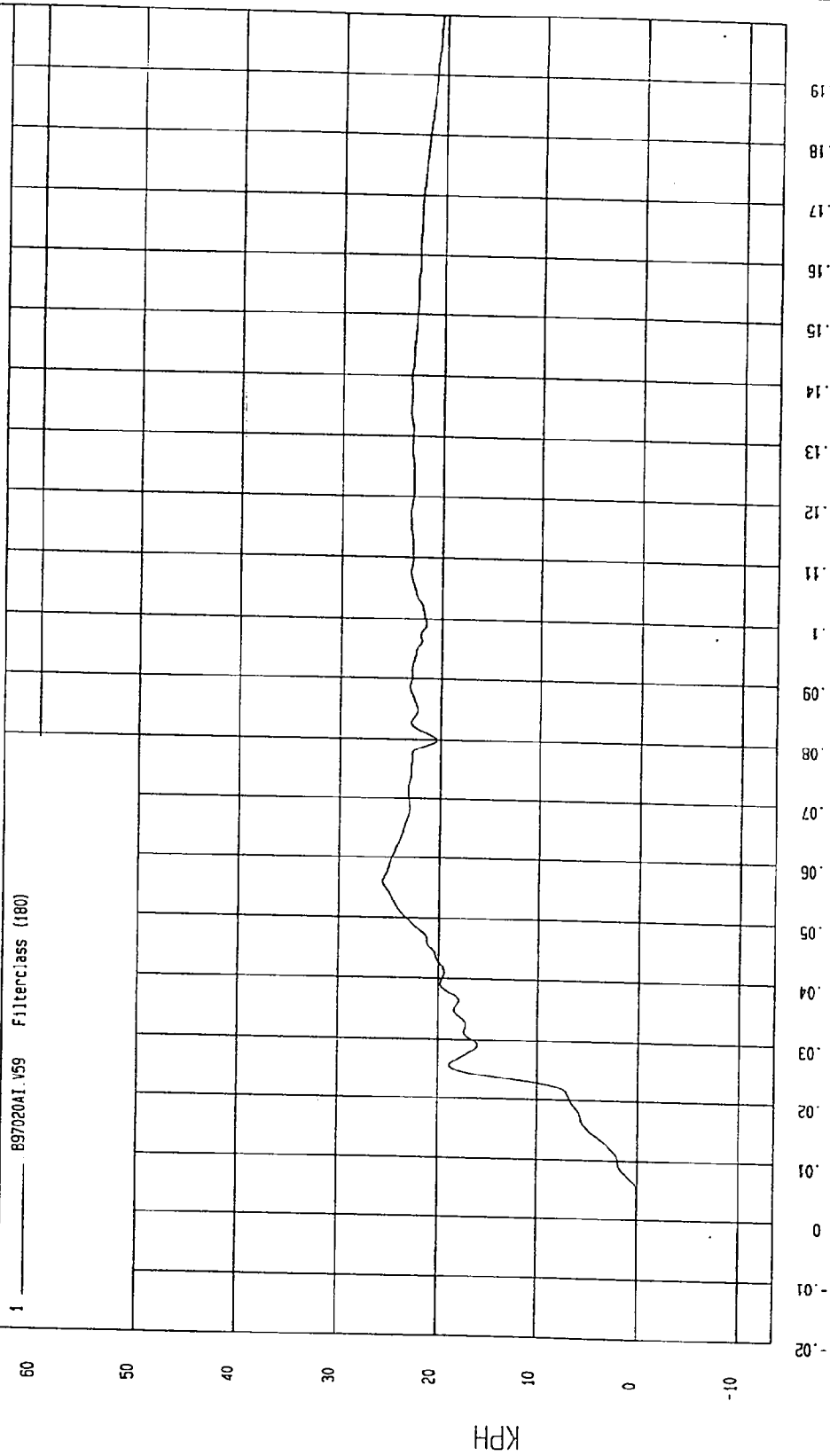
Speed: 37.97 MPH 61.1 KPH

Minimum = 0 KPH at -20 msec

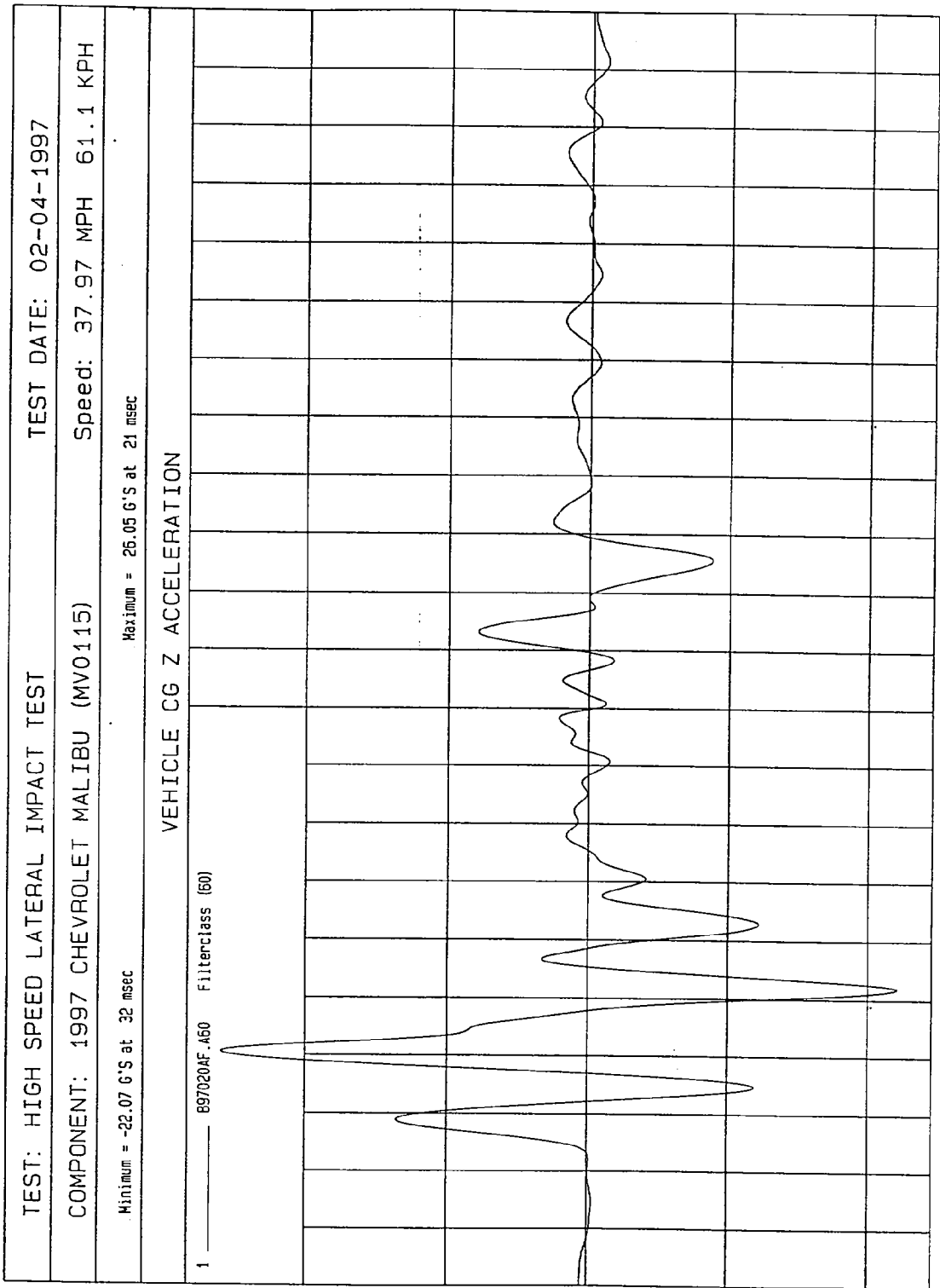
Maximum = 25.58 KPH at 56 msec

VEHICLE CG Y VELOCITY

1 ——— B970204I.V59 Filterclass (180)



MCA Research  
02-08-1997 11:23



TIME (SECONDS)

MSA Research  
02-08-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 0 KPH at -20 msec

Maximum = 6.01 KPH at 30 msec

VEHICLE CG Z VELOCITY

1 \_\_\_\_\_ B97020A1.V60 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

MSA Research  
02-08-1997 11:23

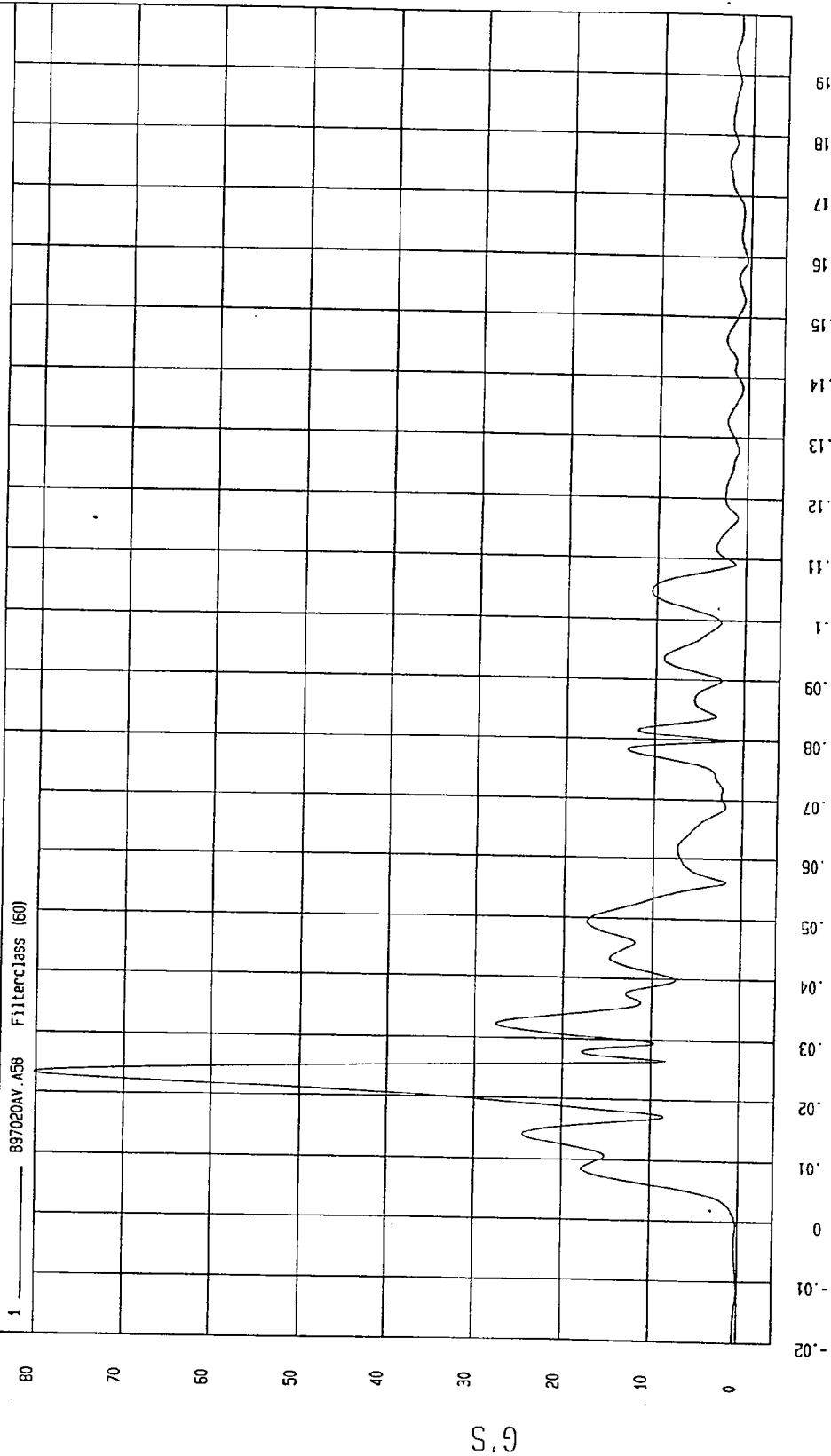
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 6.48E-02 G's at -12 msec Maximum = 80.22 G's at 23 msec

VEHICLE CG RESULTANT ACCELERATION

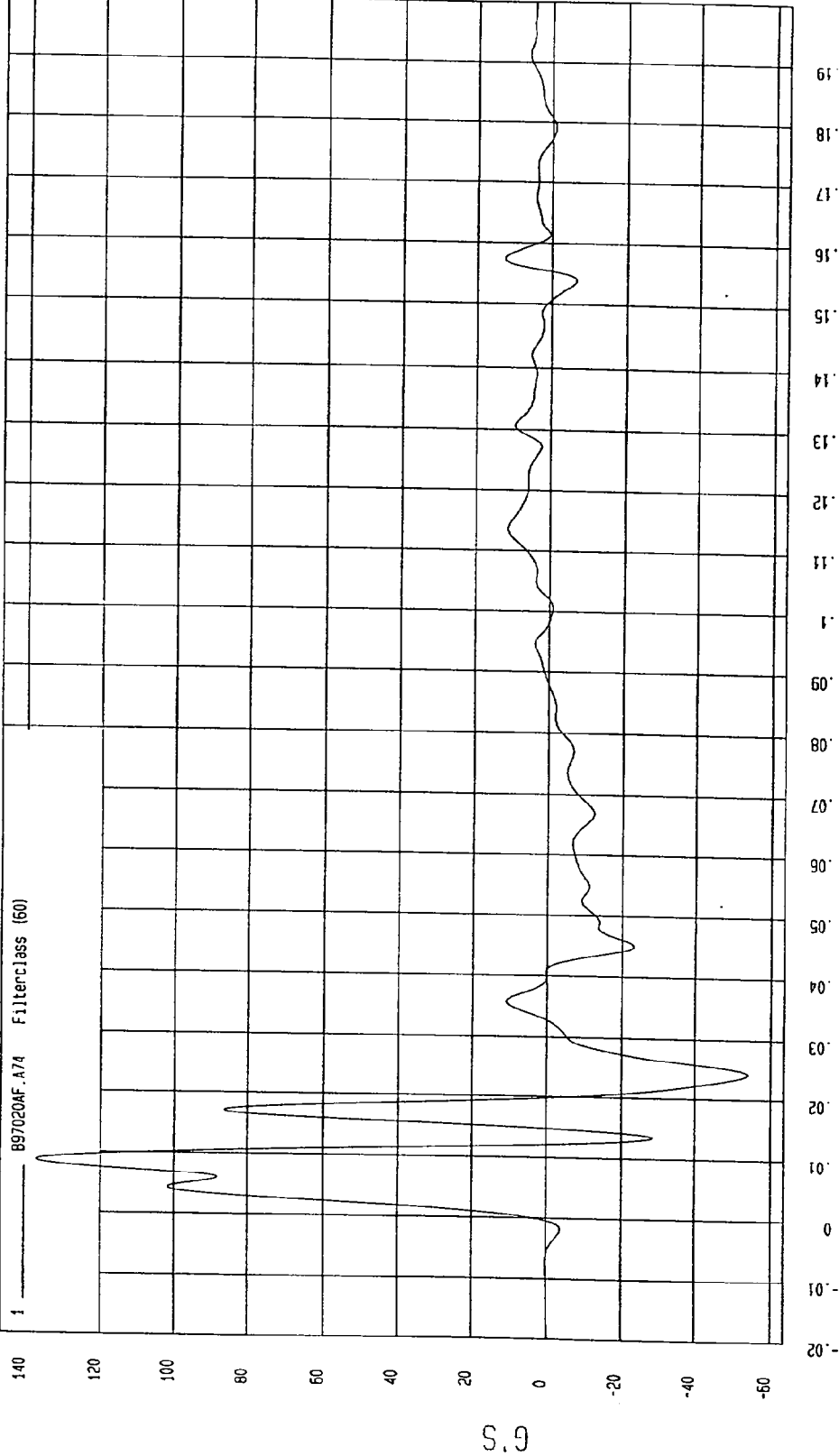
1 ——— B97020AV A58 Filterclass (60)



NSA Research  
02-08-1997 11:31

TEST: HIGH SPEED LATERAL IMPACT TEST      TEST DATE: 02-04-1997  
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)      Speed: 37.97 MPH 61.1 KPH  
Minimum = -53.90 G'S at: 24 msec      Maximum = 137.23 G'S at: 9 msec

LEFT FRONT DOOR MIDREAR Y ACCELERATION



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02-08-1997 11:30

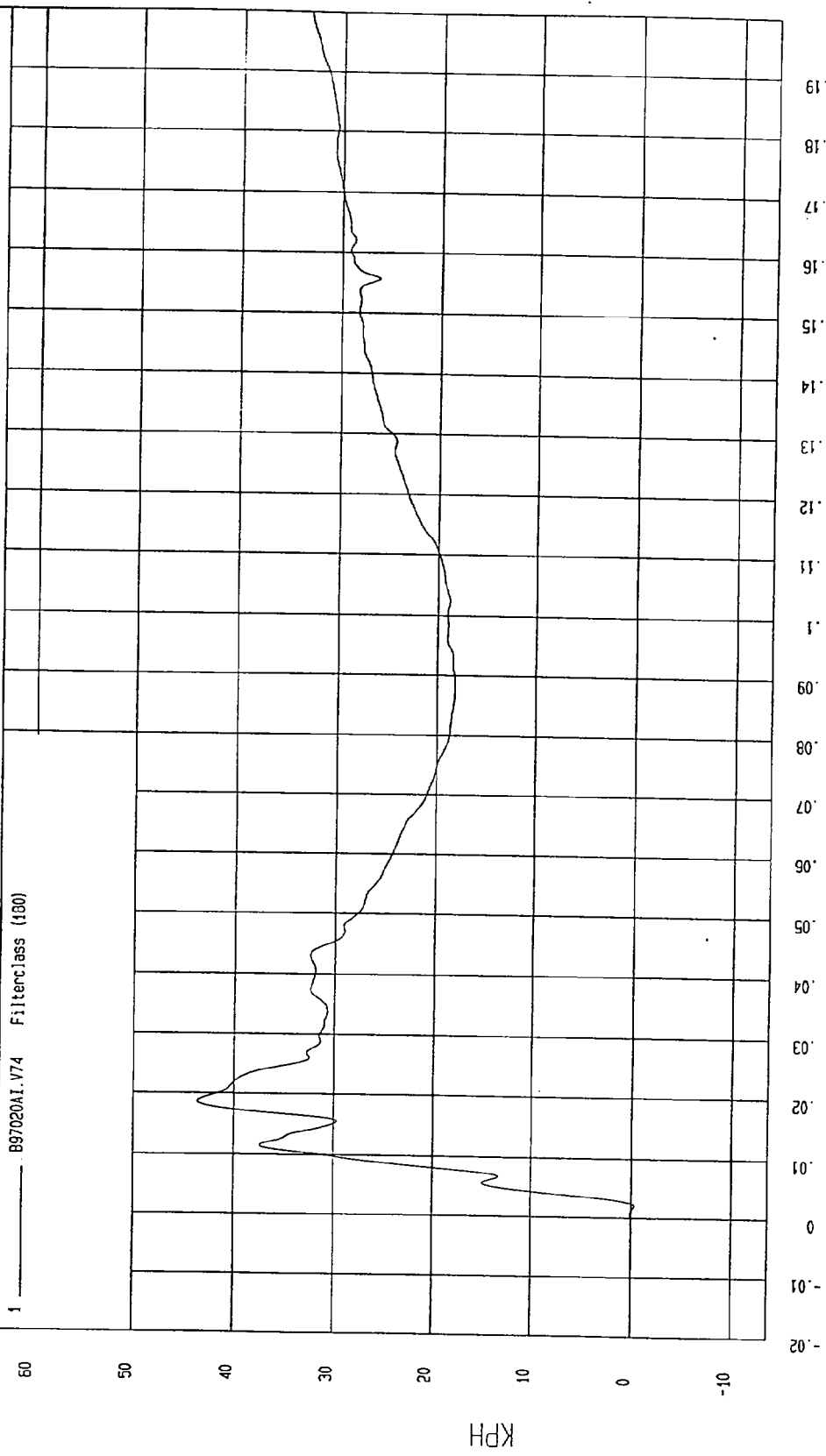
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -.31 KPH at 2 msec  
Maximum = 43.74 KPH at 19 msec

LEFT FRONT DOOR MIDREAR Y VELOCITY

1 B97020A1.V74 Filterclass (100)



MCA Research  
02-06-1997 11:24



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

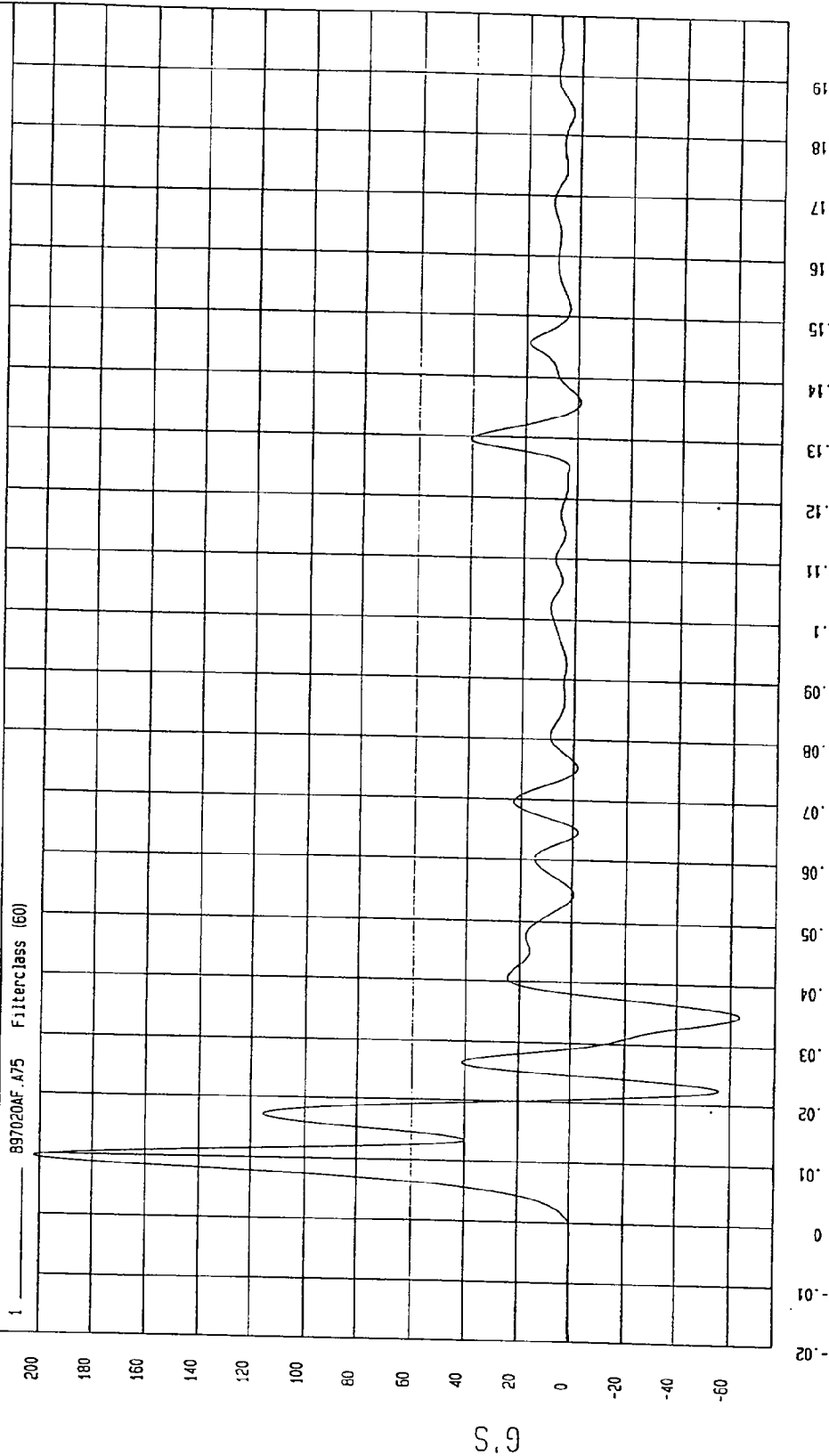
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -63.27 G'S at 35 msec

Maximum = 202.03 G'S at 10 msec

LEFT FRONT DOOR CENTERLINE Y ACCELERATION

1 — 897020AF.A75 Filterclass (60)



NCA Research  
02-06-1997 11:30

TIME (SECONDS)

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

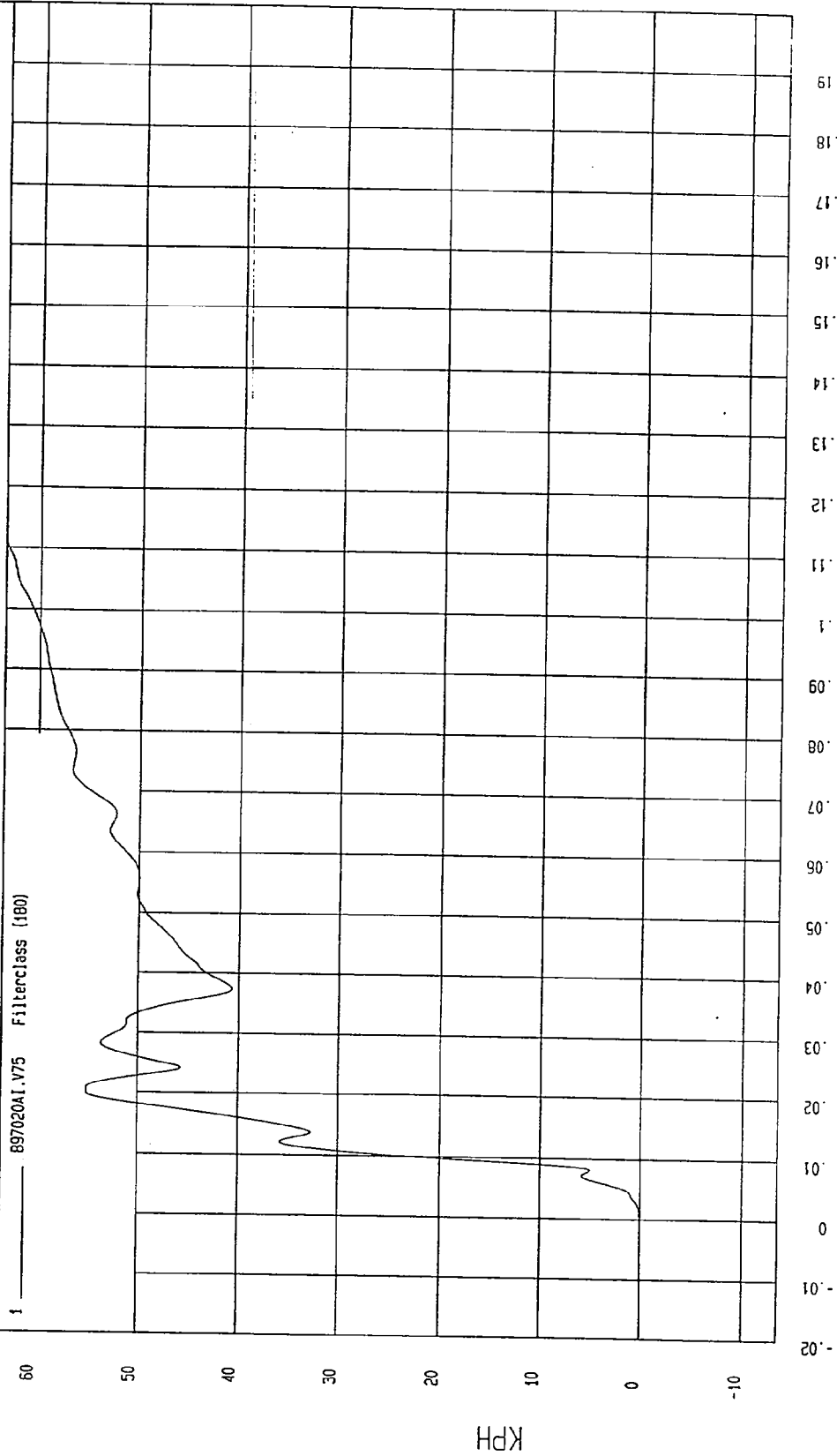
Speed: 37.97 MPH 61.1 KPH

Minimum = -2.63E-02 KPH at -14 msec

Maximum = 88.74 KPH at 200 msec

LEFT FRONT DOOR CENTERLINE Y VELOCITY

1 — 897020A1.V75 Filterclass (180)



MGA Research  
02-08-1997 11:24

TIME Seconds

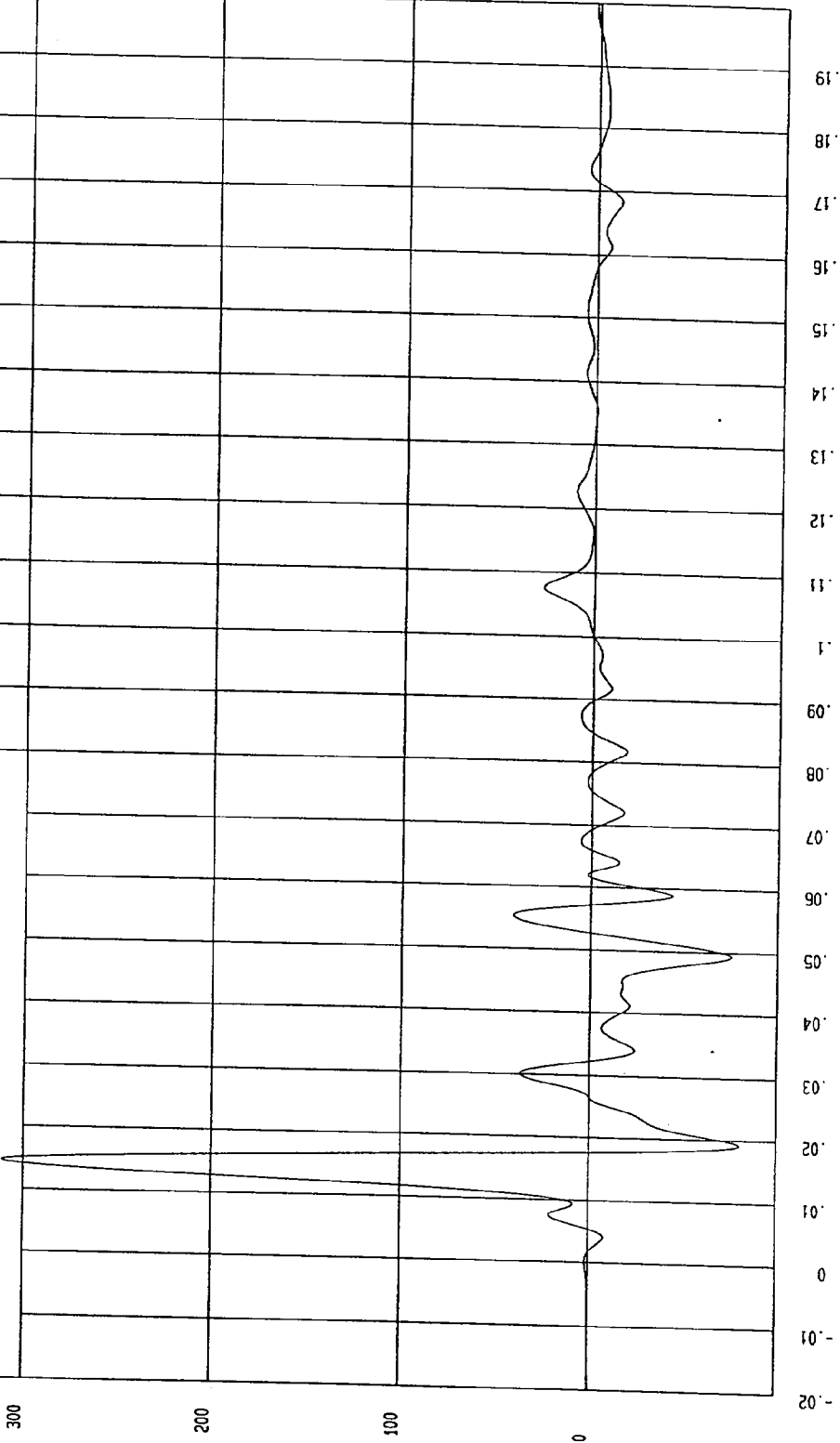
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -79.52 G'S at 19 msec Maximum = 311.41 G'S at 15 msec

LEFT FRONT DOOR UPPER CENTERLINE Y ACCELERATION

1 B97020AF.A76 Filterclass (50)



MCA Research  
02-04-1997 11:30

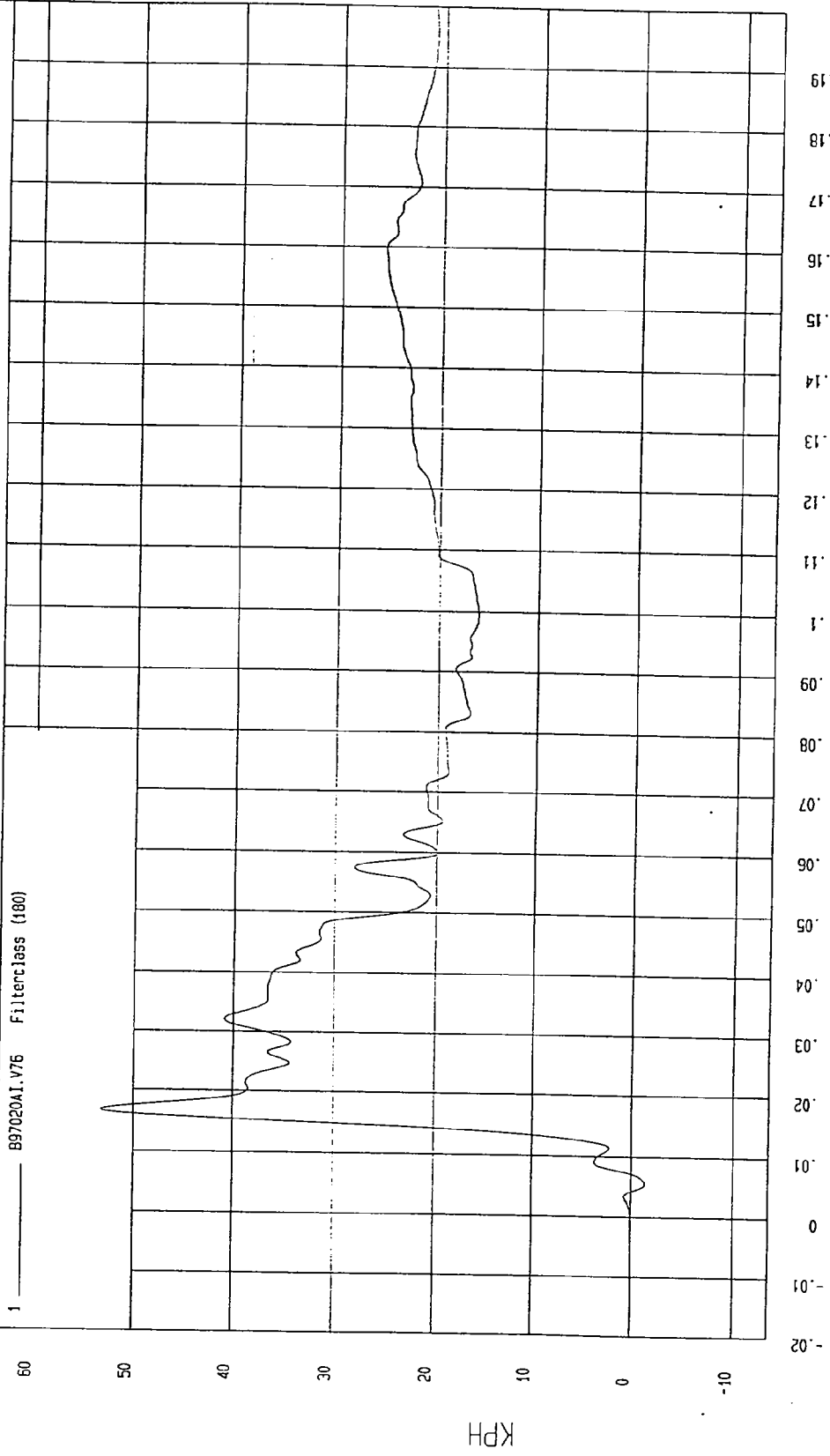
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.37 KPH at 6 msec Maximum = 53.32 KPH at 17 msec

LEFT FRONT DOOR UPPER CENTERLINE Y VELOCITY

1 ——— B97020A1.V76 Filterclass (180)



NCA Research  
02-06-1997 11:24

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

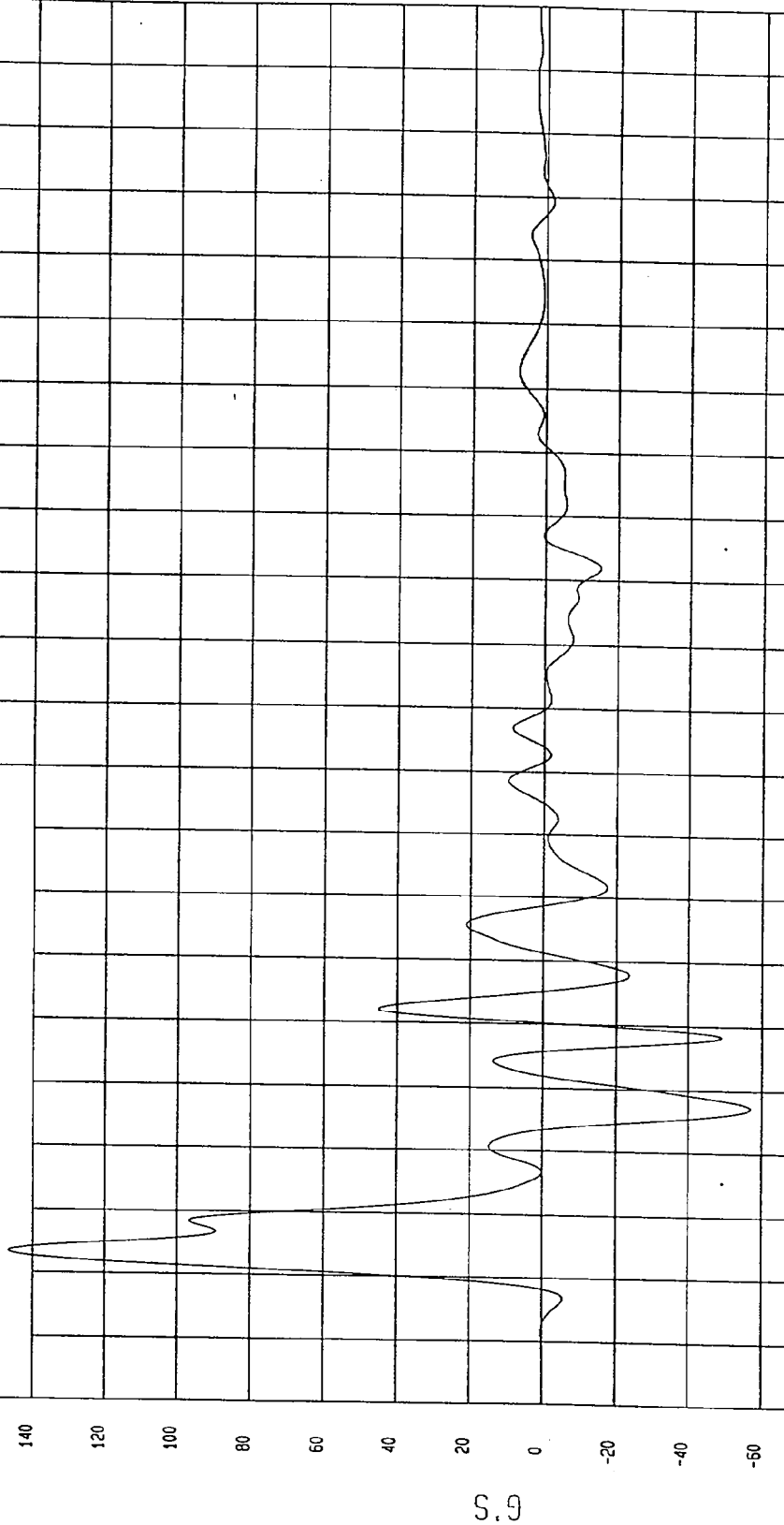
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 146.66 G'S at 3 msec

Minimum = -57.04 G'S at 27 msec

LEFT REAR DOOR MIDREAR Y ACCELERATION

1 897020AF.A77 Filterclass (60)



MSA Research  
02-08-1997 11:30

TIME (SECONDS)

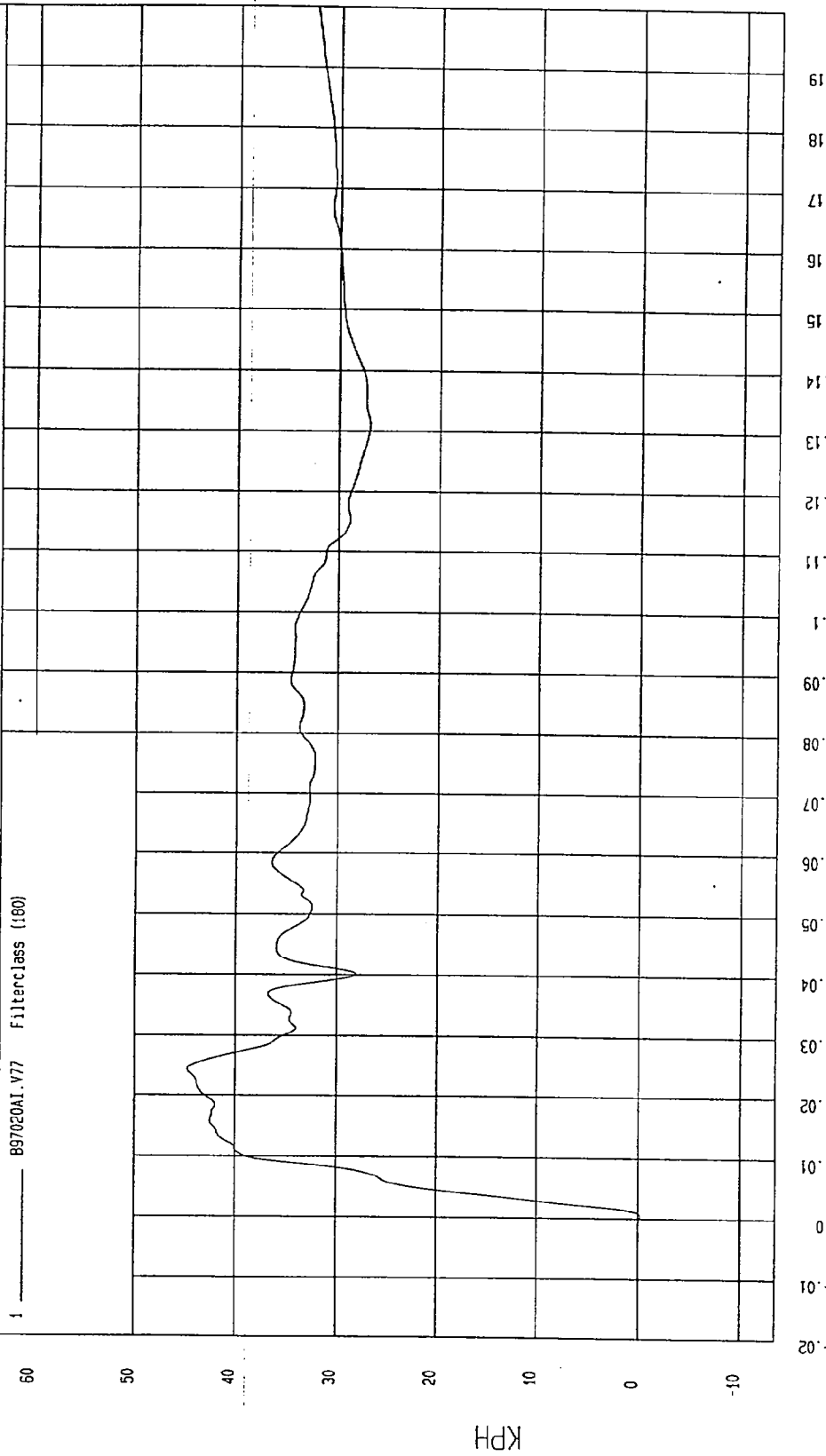
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MVO1115) Speed: 37.97 MPH 61.1 KPH

Minimum = -.23 KPH at 0 msec Maximum = 44.80 KPH at 24 msec

LEFT REAR DOOR MIDREAR Y VELOCITY

1 ——— B97020A1.V77 Filterclass (180)



NSA Research  
02-08-1997 11:24

TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

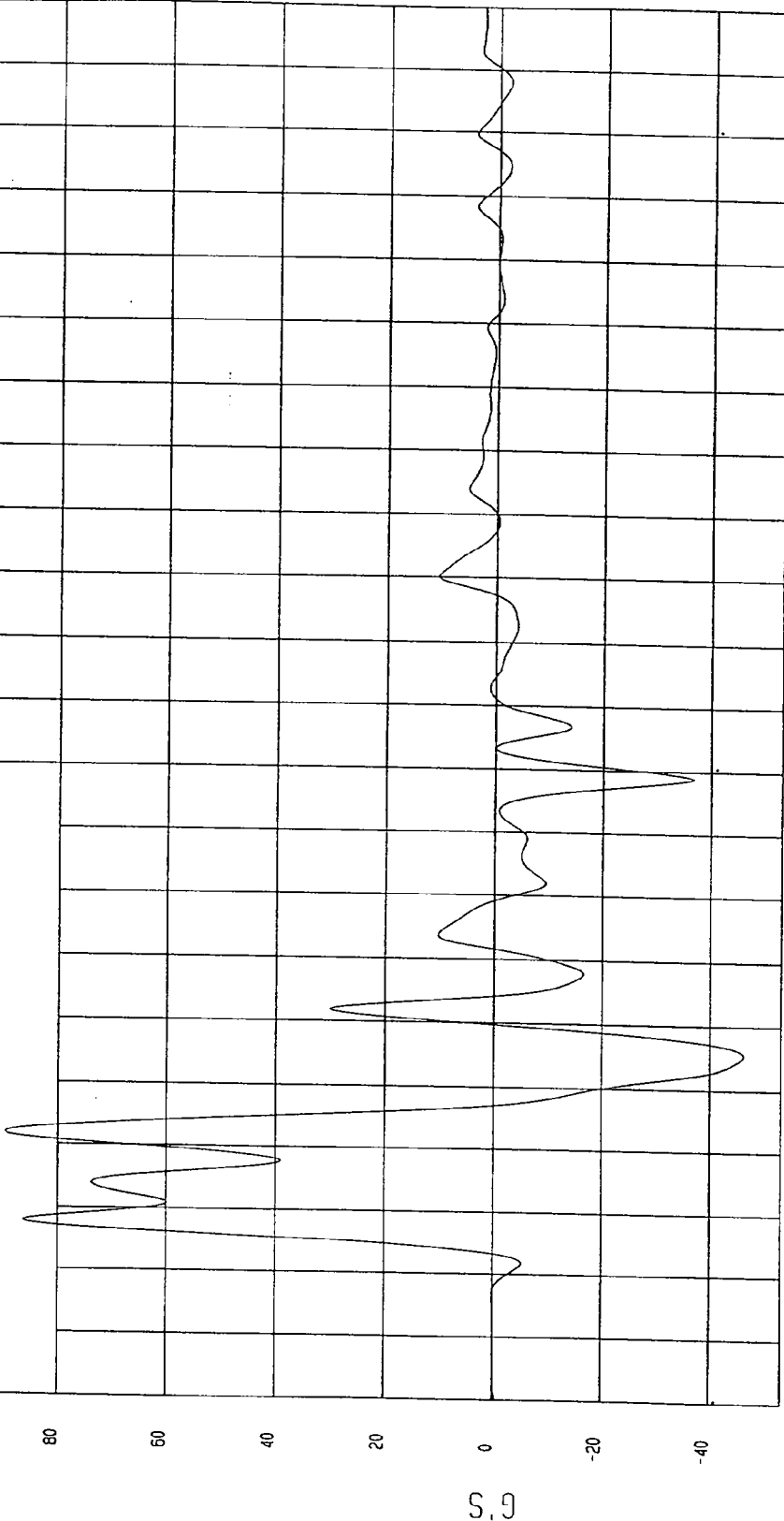
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -46.15 G'S at 35 msec

Maximum = 89.65 G'S at 22 msec

LEFT REAR DOOR UPPER CENTERLINE Y ACCELERATION

1 897020AF.A78 Filterclass (60)



WGA Research  
02-08-1997 11:30

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

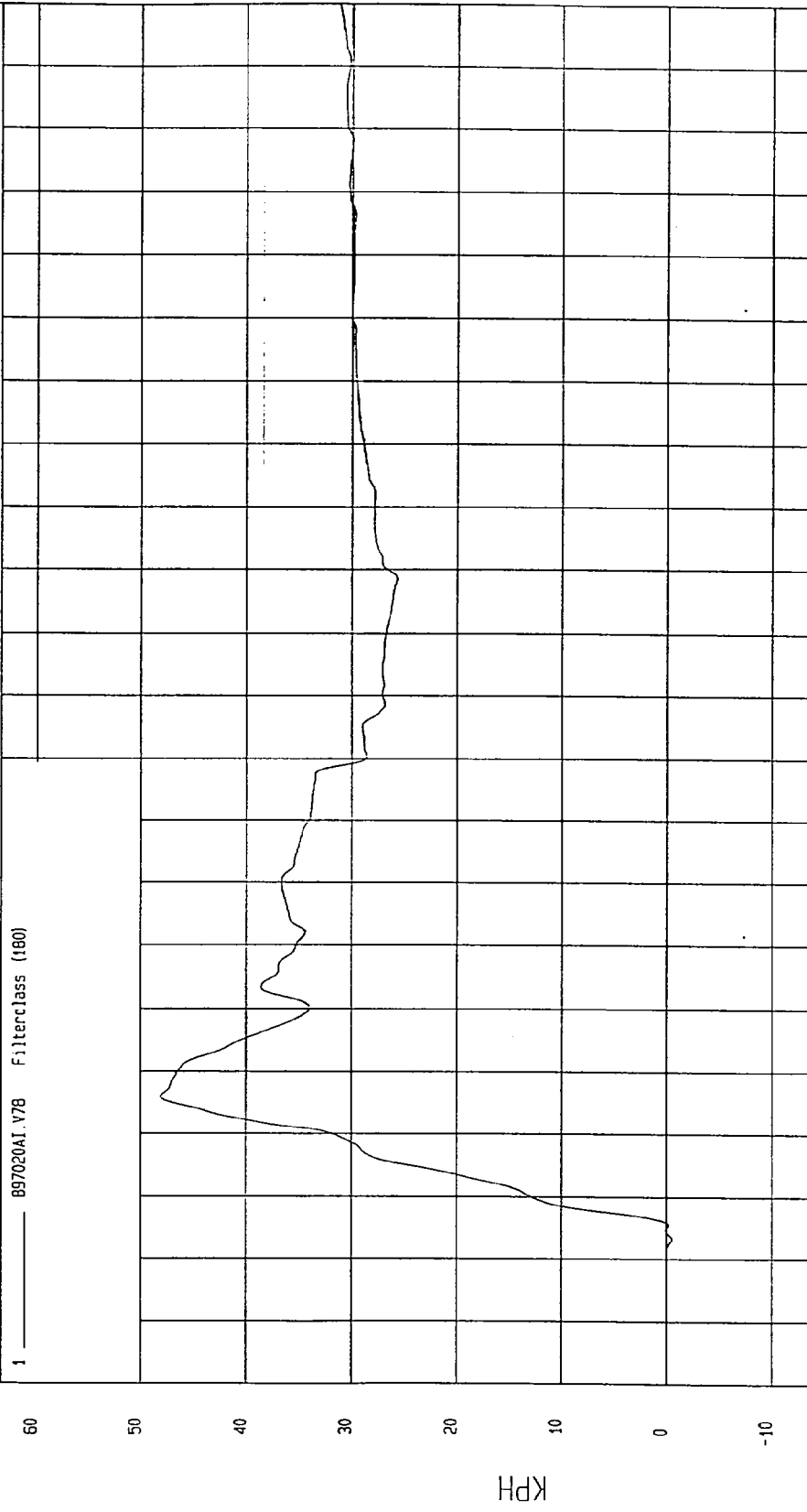
COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Maximum = 48.08 KPH at .26 msec

Minimum = -.50 KPH at .3 msec

LEFT REAR DOOR UPPER CENTERLINE Y VELOCITY

1 \_\_\_\_\_ 897020AI.V78 Filterclass (180)



MGA Research  
02-08-1997 11:24

TIME Seconds



TEST: HIGH SPEED LATERAL IMPACT TEST

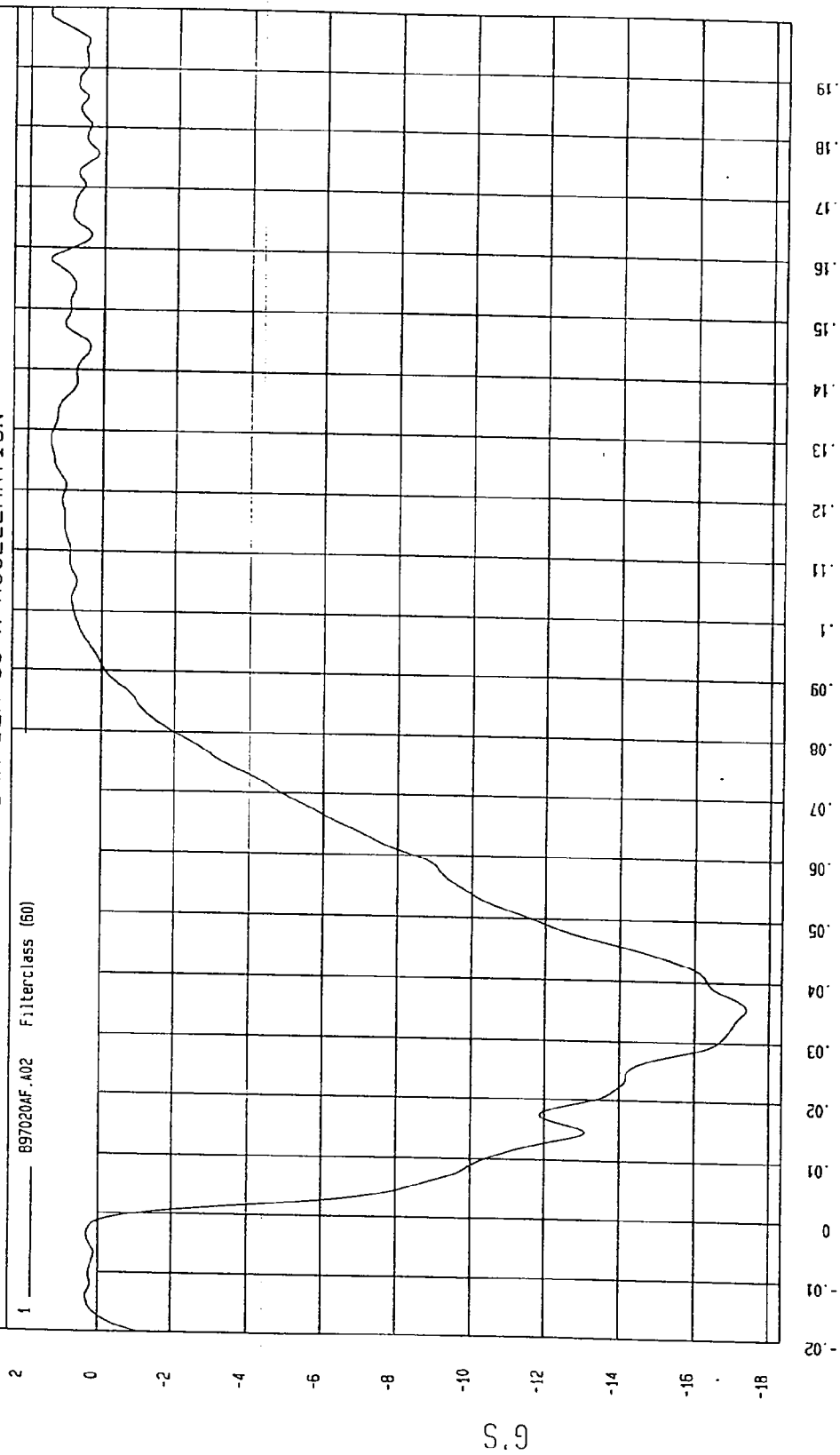
TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -17.38 G'S at 36 msec Maximum = 1.46 G'S at 199 msec

MOVING BARRIER CG X ACCELERATION

1 ——— 897020AF.A02 Filterclass (60)



W&A Research  
02-06-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

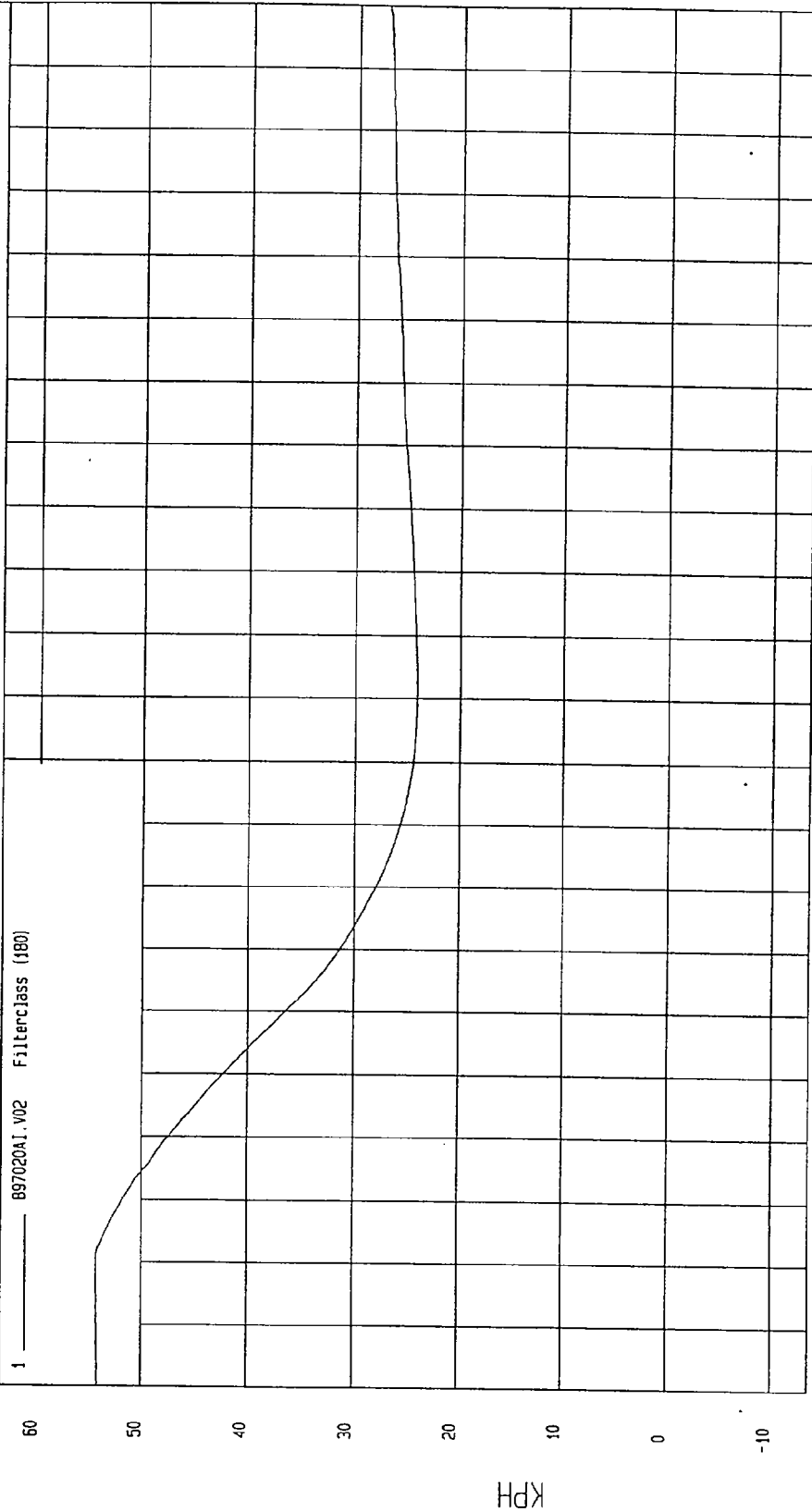
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 24.04 KPH at 91 msec

Maximum = 54.44 KPH at -3 msec

MOVING BARRIER CG X VELOCITY

1 ——— B97020A1.V02 Filterclass (180)



61  
18  
17  
16  
15  
14  
13  
12  
11  
1  
09  
08  
07  
06  
05  
04  
03  
02  
01  
0  
-01  
-02

TIME Seconds

MGA Research  
02-08-1997 11:23

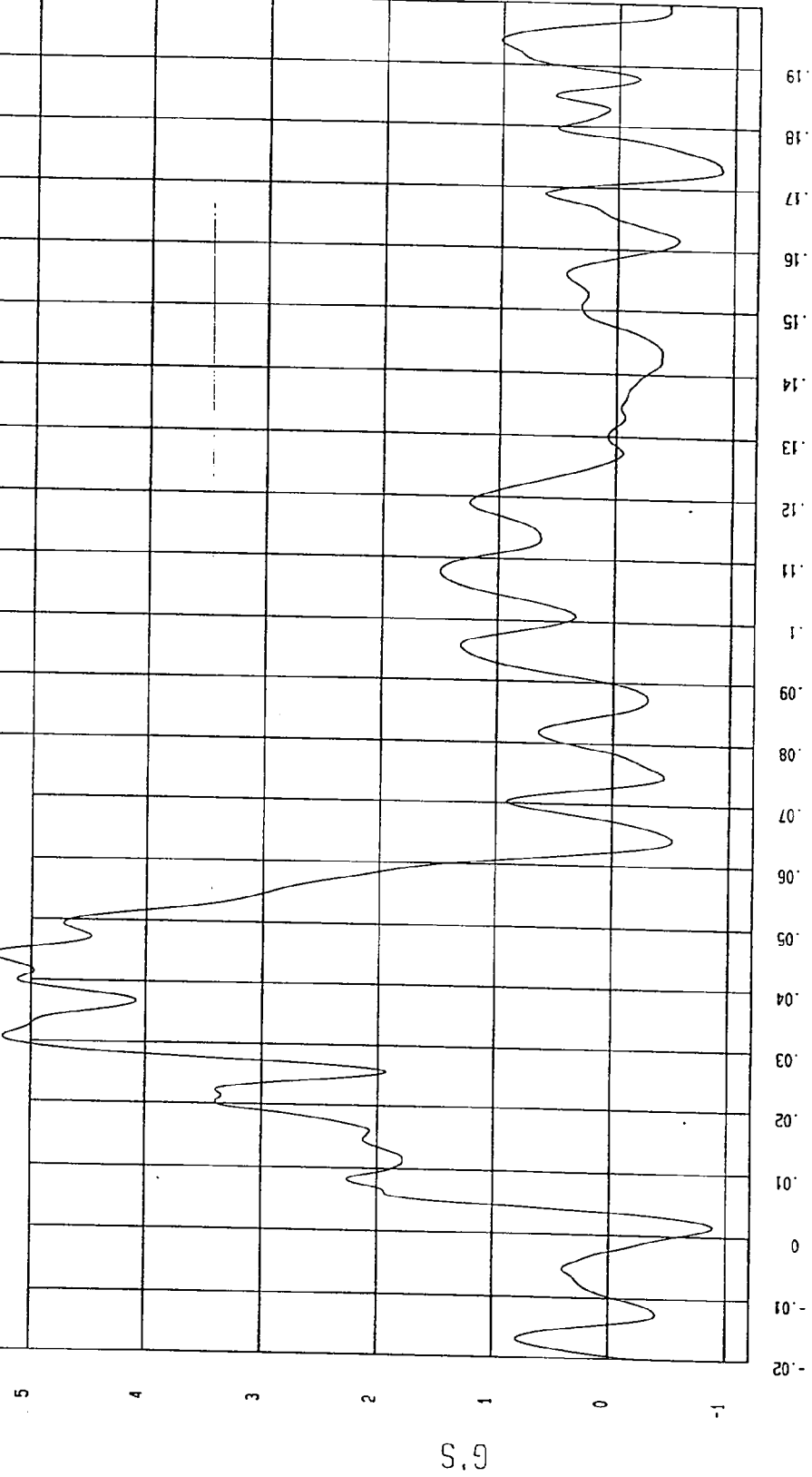
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -.89 G'S at 2 msec Maximum = 5.35 G'S at 44 msec

MOVING BARRIER CG Y ACCELERATION

1 B97020AF.A03 Filterclass (60)



NCA Research  
02-08-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

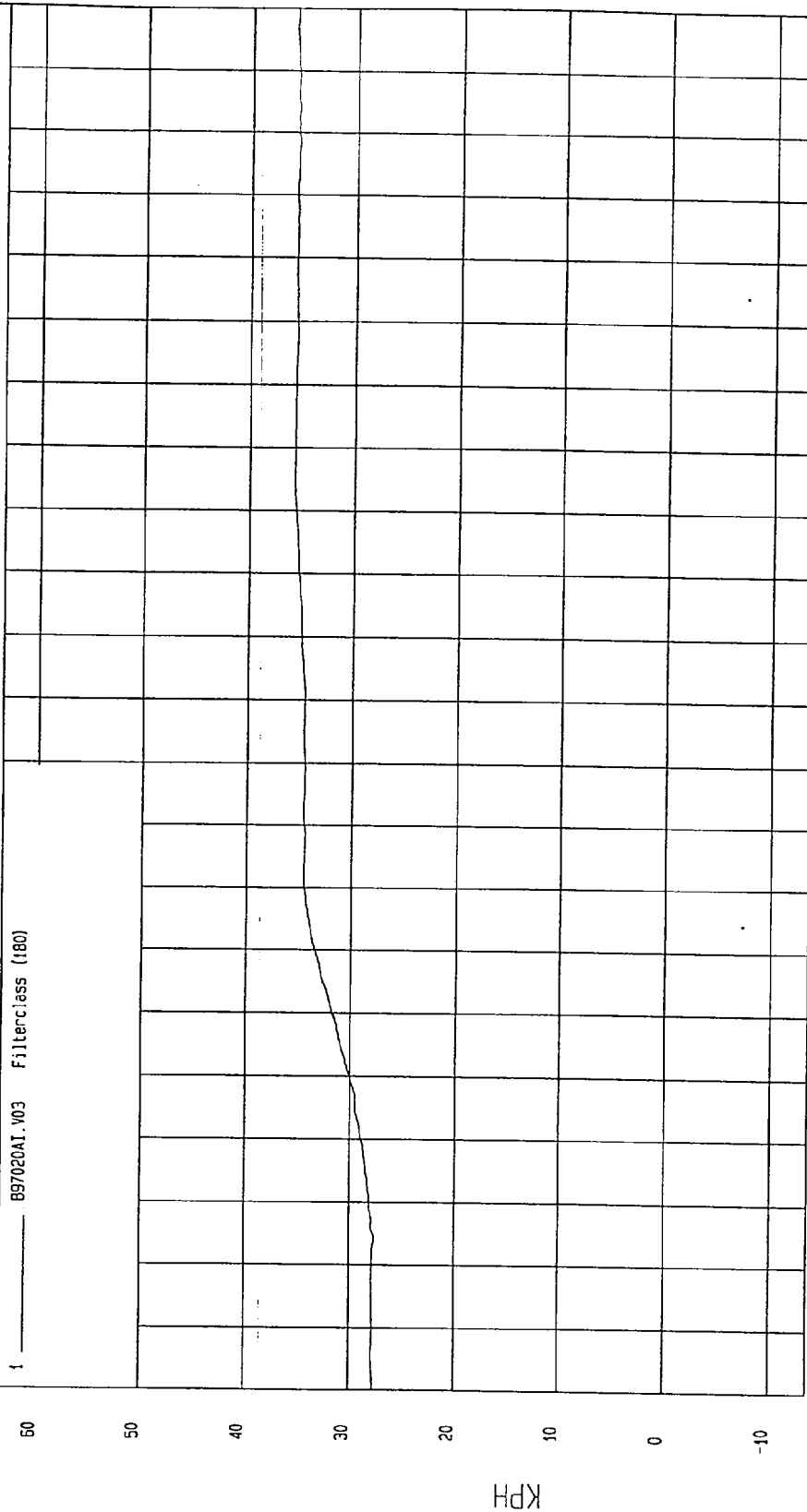
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 27.61 KPH at 4 msec

Maximum = 35.85 KPH at 197 msec

MOVING BARRIER CG Y VELOCITY

1 ——— 897020AI.V03 Filterclass (180)



MCA Research  
02-08-1997 11:23

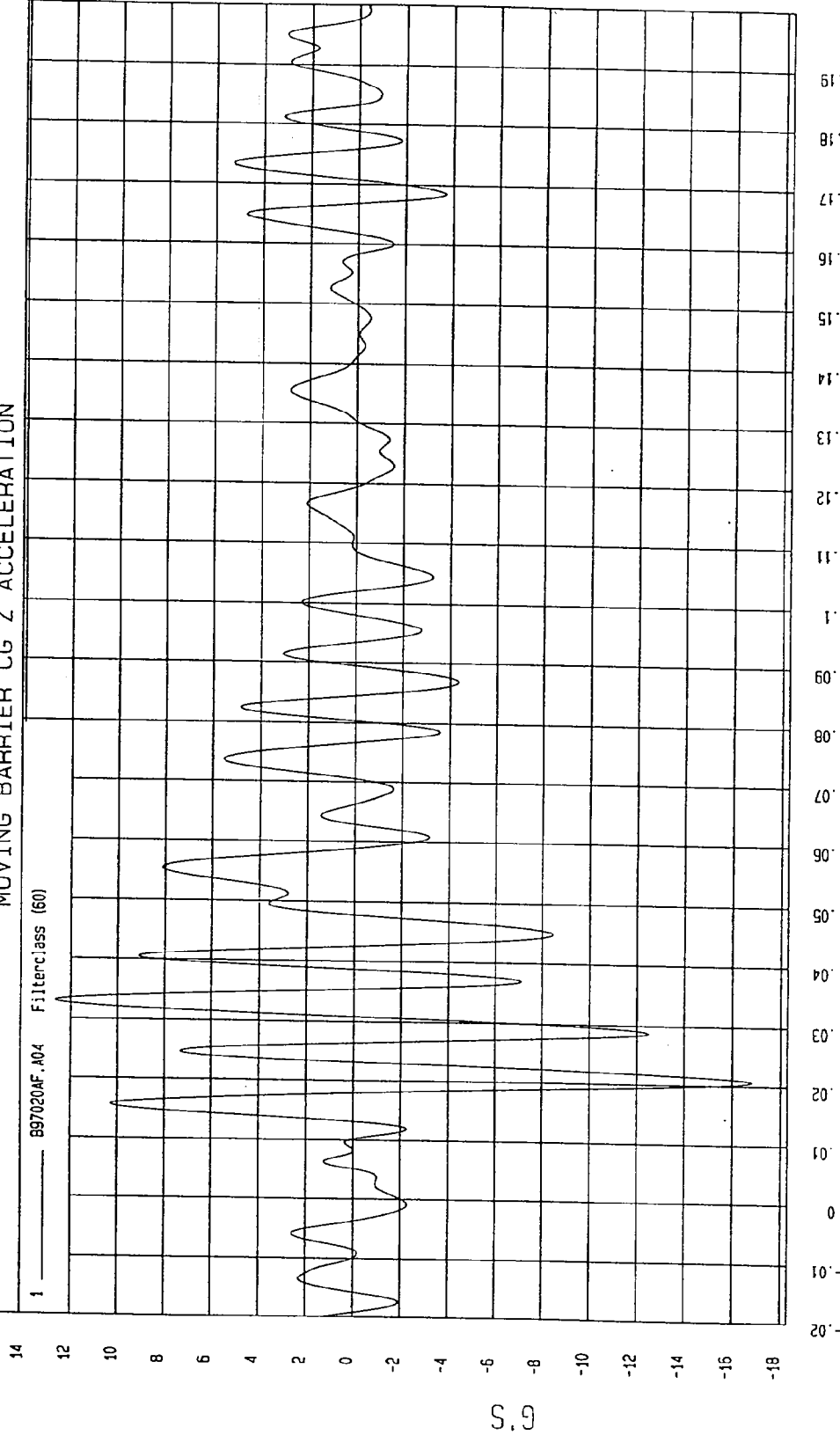
TEST: HIGH SPEED LATERAL IMPACT TEST      TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)      Speed: 37.97 MPH 61.1 KPH

Minimum = -16.81 G'S at 21 msec      Maximum = 12.67 G'S at 33 msec

MOVING BARRIER CG Z ACCELERATION

1 — 897020AF.A04 Filterclass (60)



WCA Research  
02-08-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -2.04 KPH at 31 msec Maximum = 2.60 KPH at 196 msec

MOVING BARRIER CG Z VELOCITY

1 ——— BS7020AL.V04 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

MCA Research  
02-06-1997 11:23

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

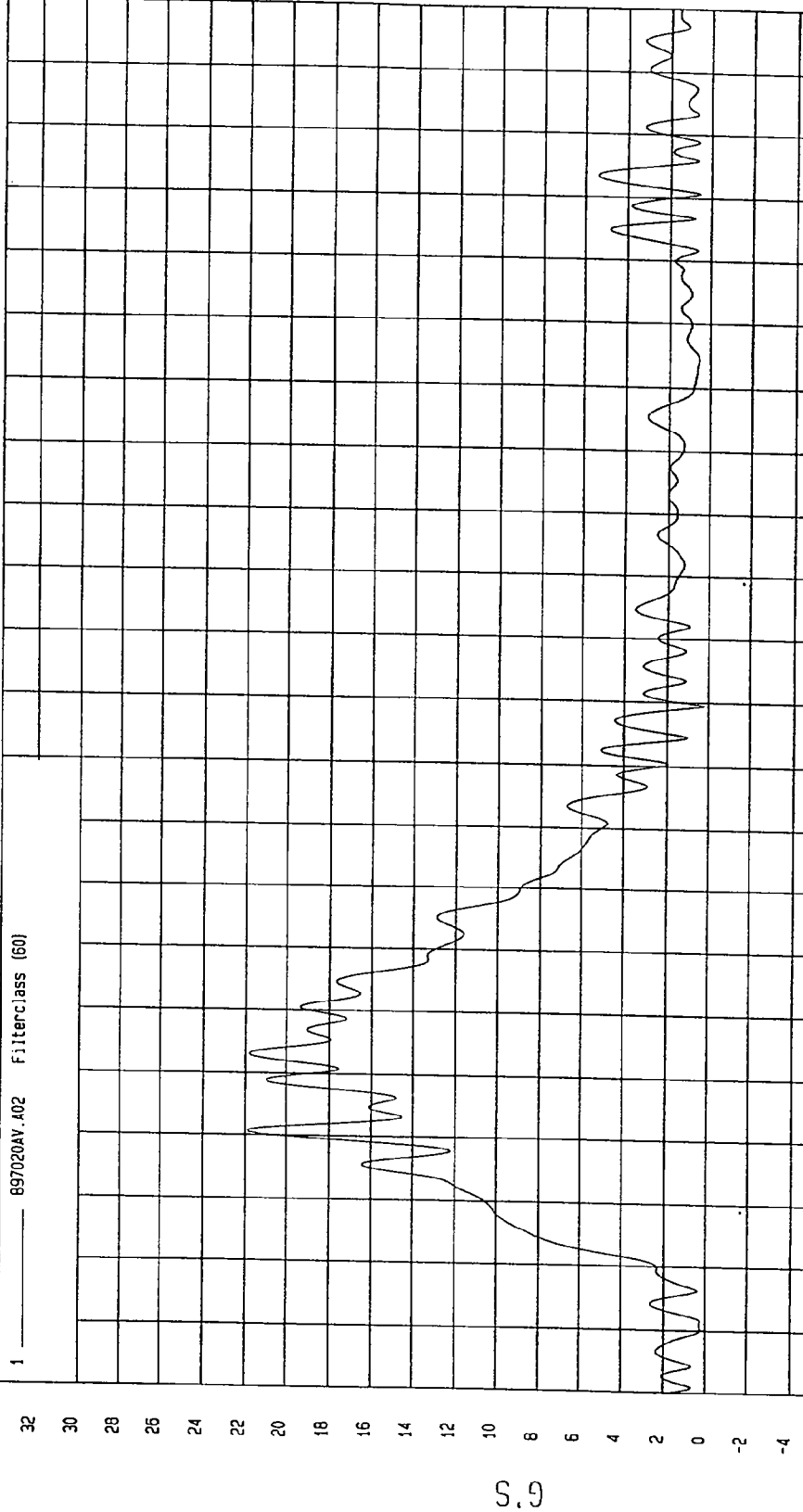
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = .18 G'S at 90 msec

Maximum = 21.89 G'S at 21 msec

MOVING BARRIER CG RESULTANT ACCELERATION

1 897020AV.A02 Filterclass (60)



MCA Research  
02-08-1997 11:31

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

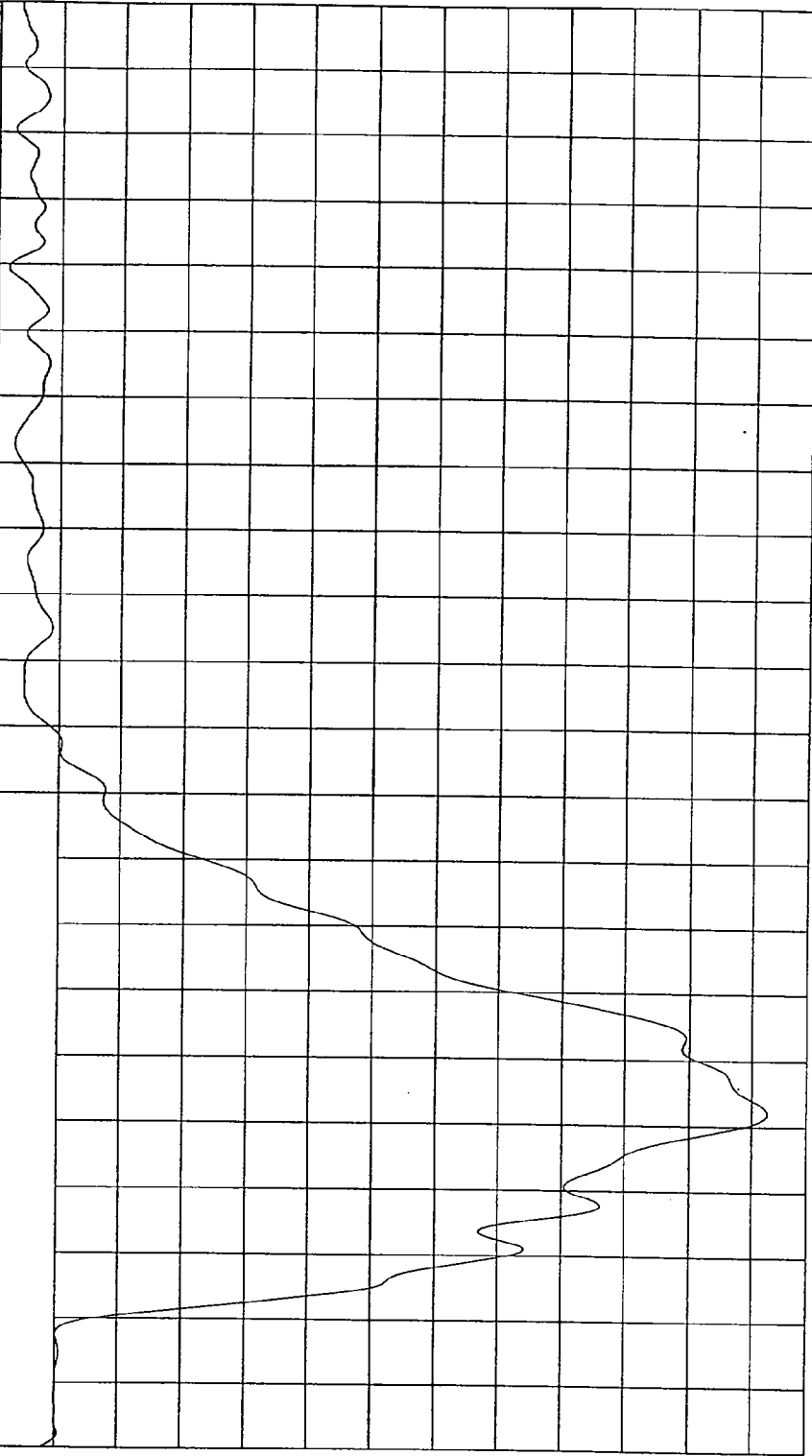
Minimum = -22.48 G'S at 32 msec

Maximum = 1.67 G'S at 160 msec

MOVING BARRIER REAR AXLE X ACCELERATION

1 B97020AF.A05 Filterclass (60)

2



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

MCA Research  
02-06-1997 11:29



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 17.74 KPH at 89 msec

Maximum = 54.35 KPH at -20 msec

MOVING BARRIER REAR AXLE X VELOCITY

1 B97020A1.V05 Filterclass (180)

60

50

40

30

20

10

0

-10

KPH

TIME Seconds

MOA Research  
02-08-1997 11:23

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Minimum = -.55 G'S at 162 msec

Maximum = 3.71 G'S at 22 msec

MOVING BARRIER REAR AXLE Y ACCELERATION

1 ——— B97020AF.A06 Filterclass (60)

3

2

1

0

G'S

-0.02

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.10

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME (SECONDS)

MGA Research  
02-08-1997 11:29

TEST: HIGH SPEED LATERAL IMPACT TEST

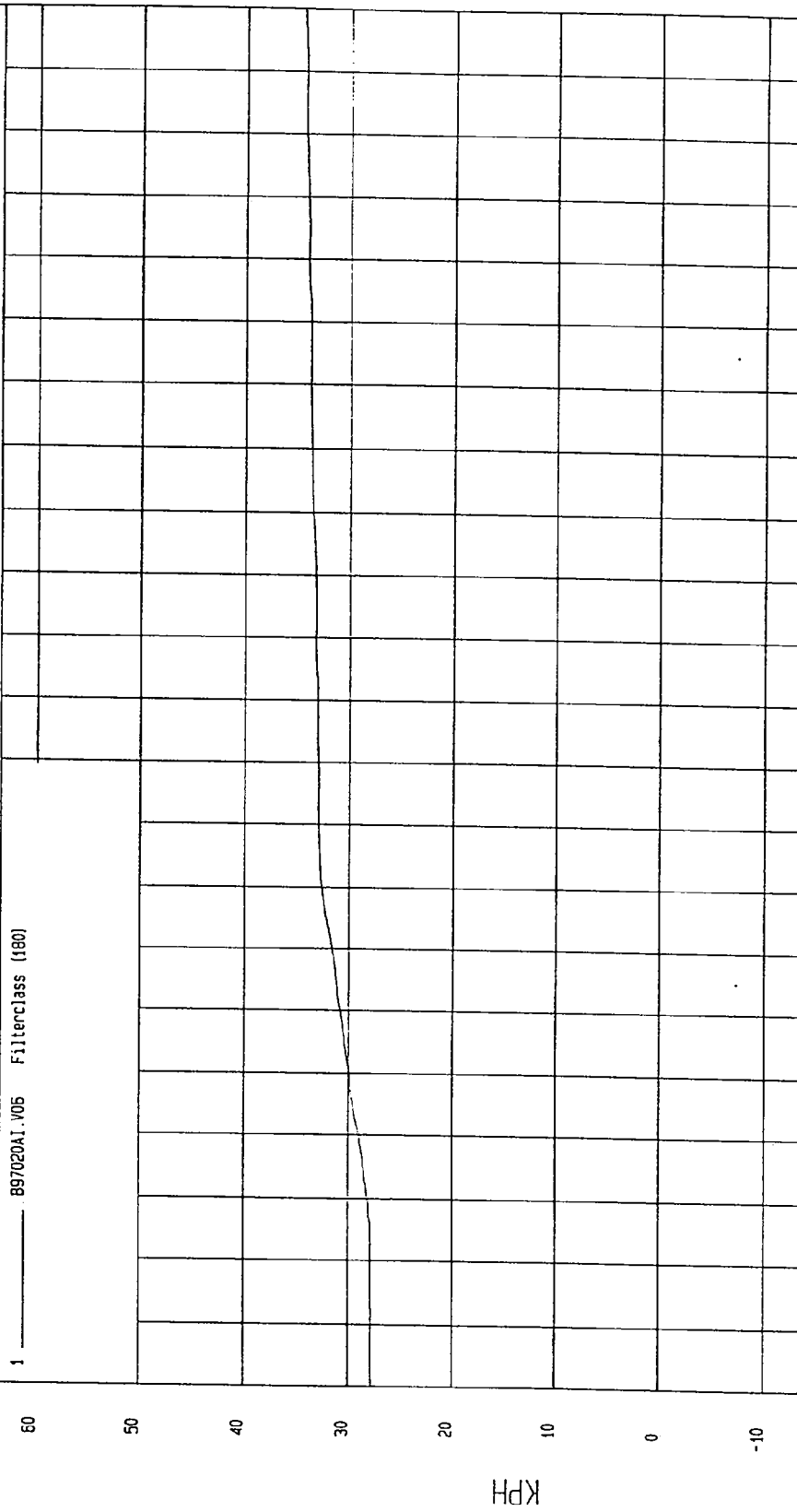
TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = 27.69 KPH at -20 msec Maximum = 34.61 KPH at 200 msec

MOVING BARRIER REAR AXLE Y VELOCITY

1 ——— B97020A1.V05 Filterclass (180)



TIME Seconds

MSA Research  
02-08-1997 11:24

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

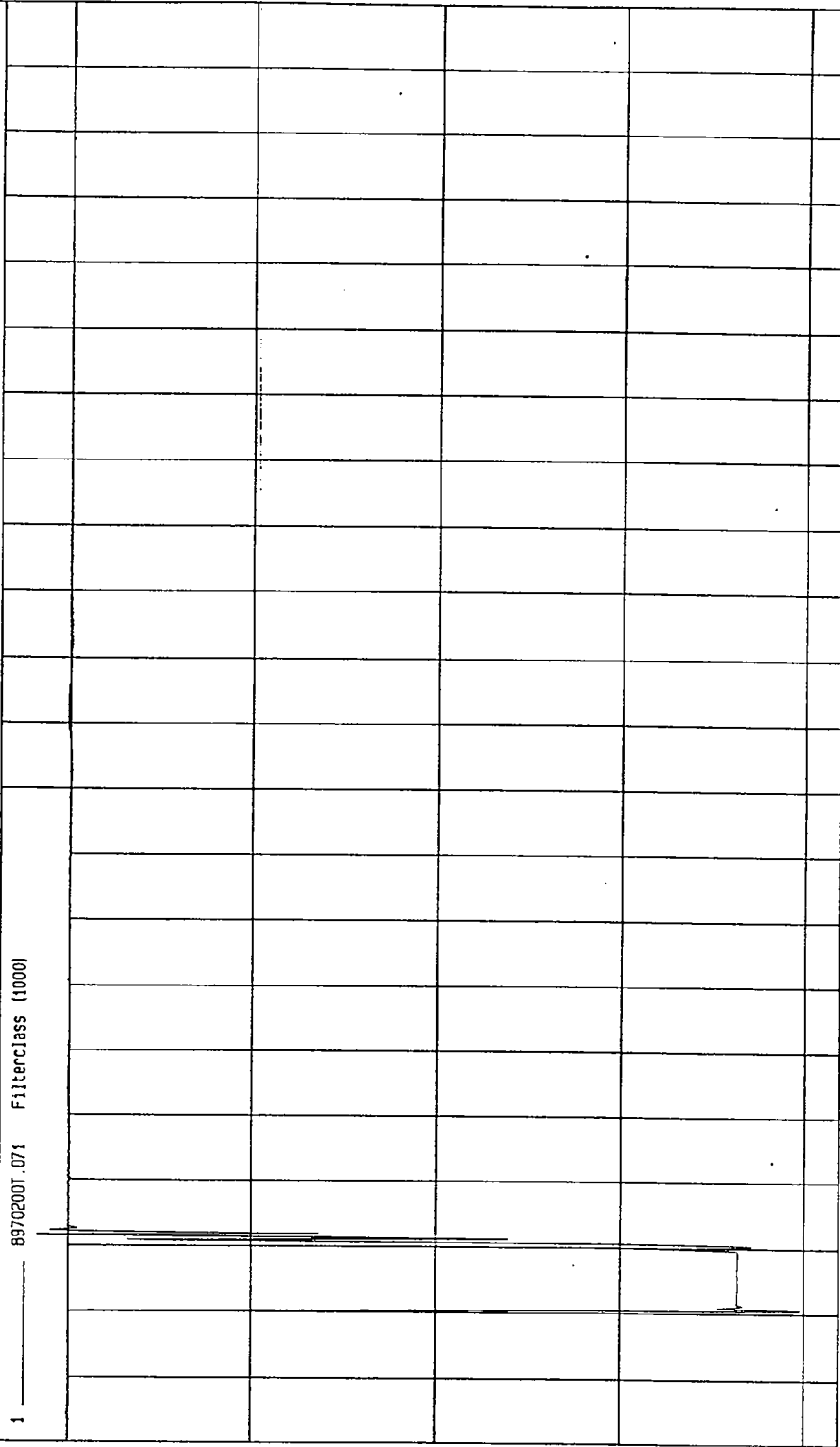
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -3.97 VOLTS at 1 msec

Maximum = .17 VOLTS at 12 msec

LEFT BARRIER CONTACT

1 8970200T.071 Filterclass (1000)



WCA Research  
02-06-1997 11:30

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -4.04 VOLTS at 2 msec

Maximum = .18 VOLTS at 51 msec

RIGHT BARRIER CONTACT

1 ——— B970200T.072 Filterclass (1000)

0

-1

-2

-3

-4

VOLTS

TIME (SECONDS)

NCA Research  
02-06-1997 11:30

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

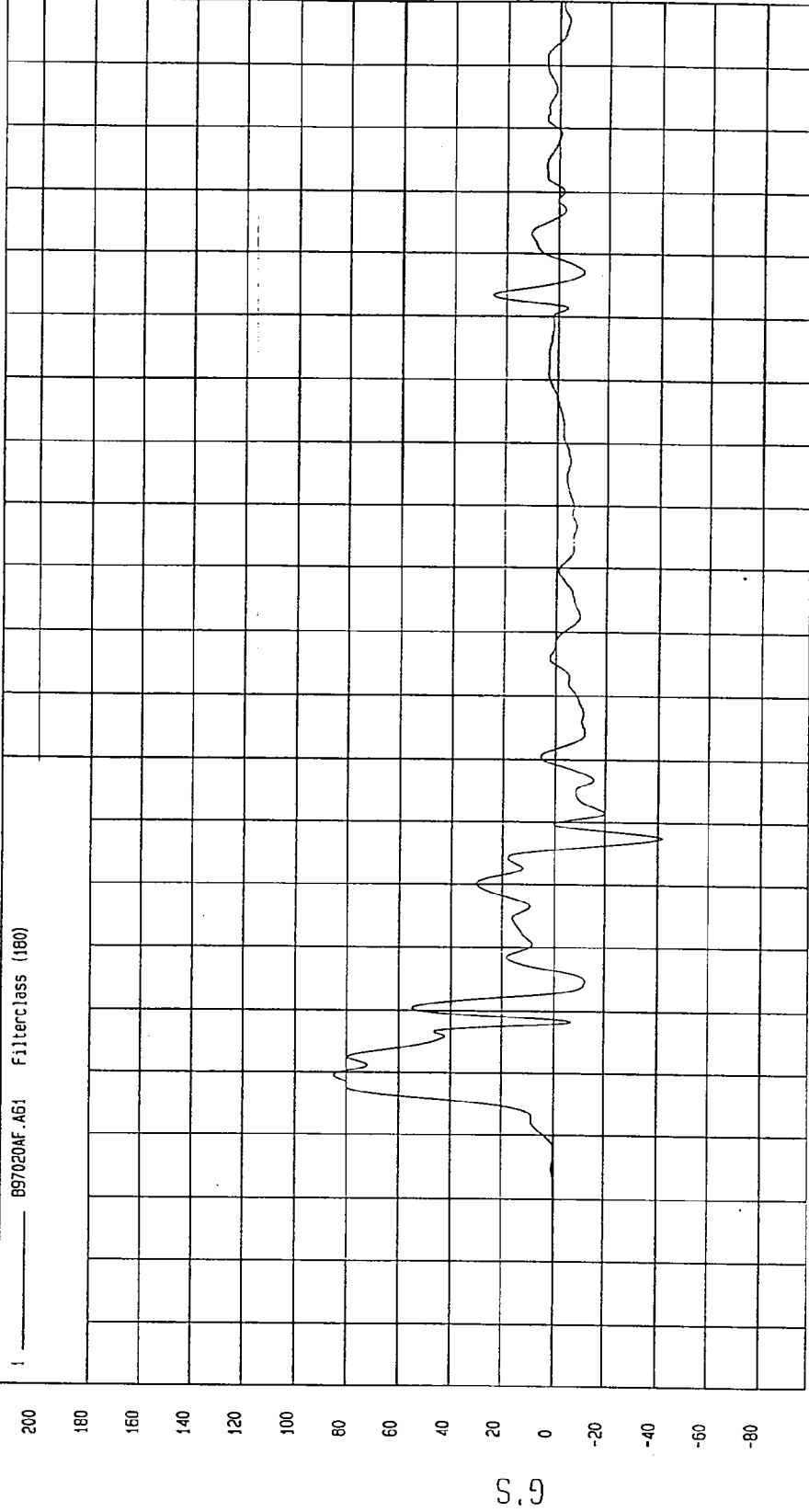
Speed: 37.97 MPH 61.1 KPH

Minimum = -41.55 G'S at 68 msec

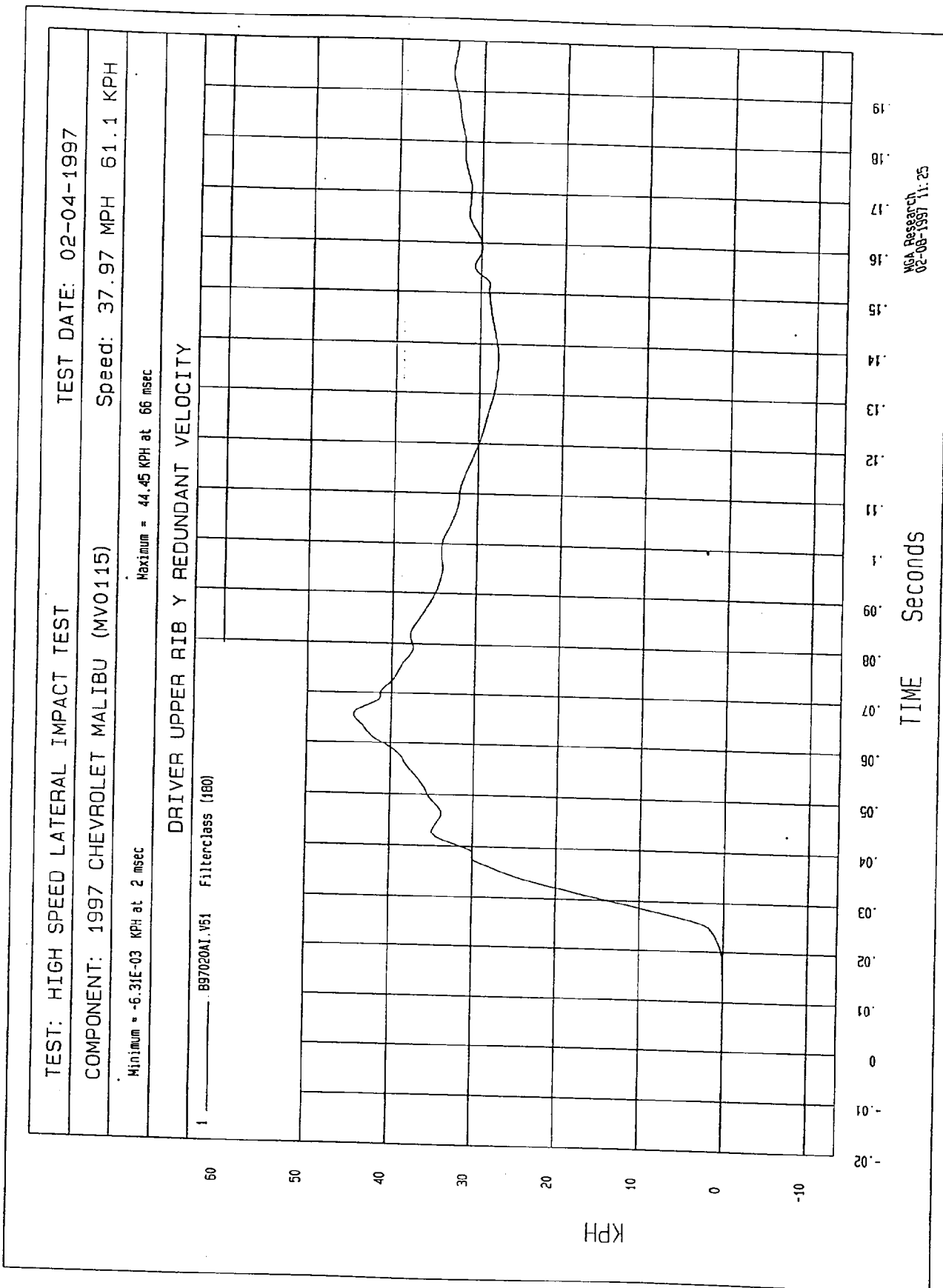
Maximum = 85.14 G'S at 30 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

1 B97020AF.A61 Filterclass (180)



NCA Research  
02-08-1997 11.32



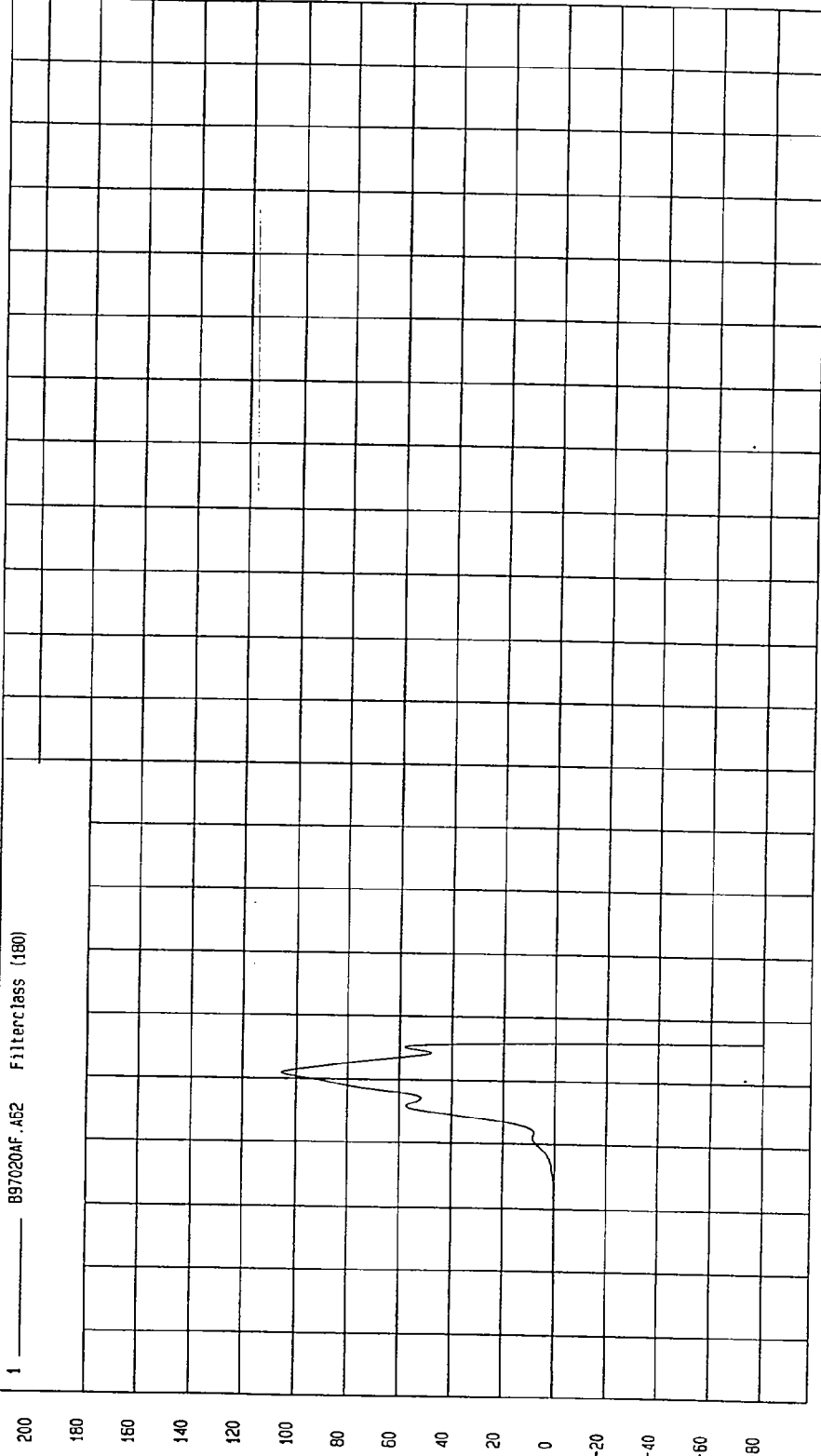
TEST: HIGH SPEED LATERAL IMPACT TEST      TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)      Speed: 37.97 MPH 61.1 KPH

Minimum = -372.40 G'S at 38 msec      Maximum = 105.52 G'S at 31 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION

1 ——— B97020AF.452 Filterclass (180)



TIME (SECONDS)

MSA Research  
02-08-1997 11:32



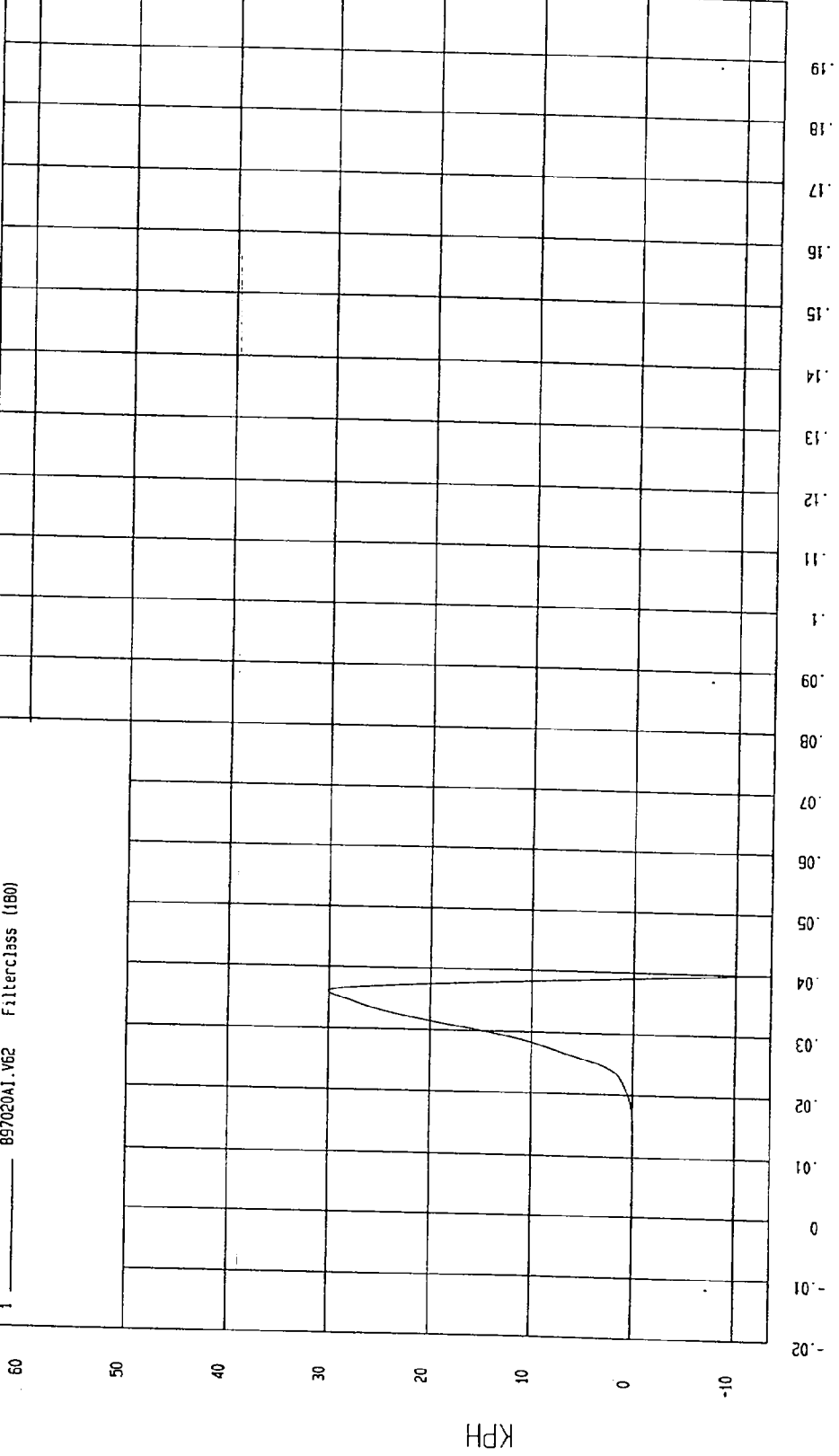
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -2040.84 KPH at 200 msec  
Maximum = 30.08 KPH at 36 msec

DRIVER LOWER RIB Y REDUNDANT VELOCITY

1 ——— 897020A1.V62 Filterclass (180)



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02-08-1997 11:25

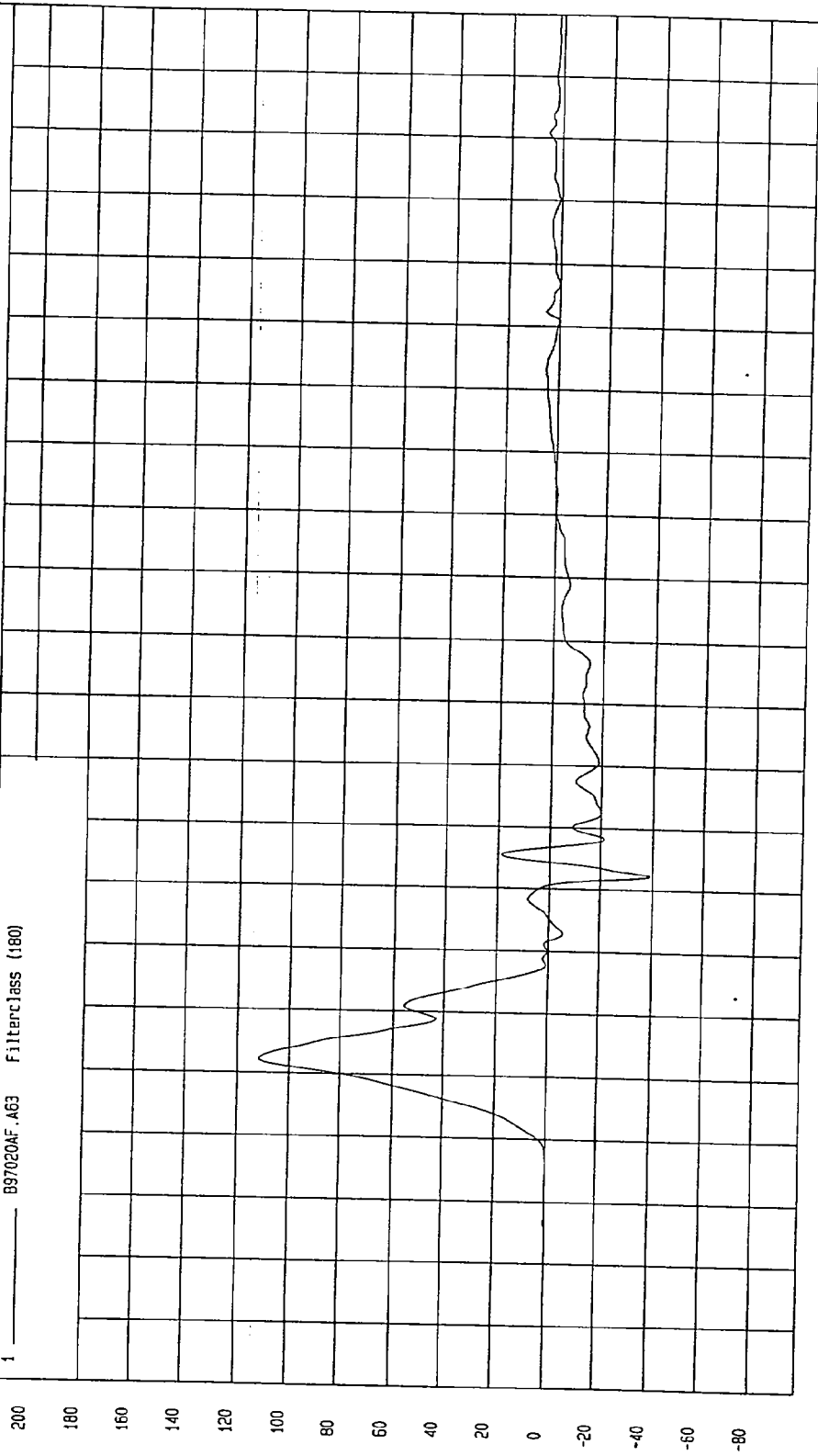
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -38.84 G's at 62 msec Maximum = 111.90 G's at 32 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 B97020AF.A63 FilterClass (180)



NGA Research  
02-06-1997 11:32

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

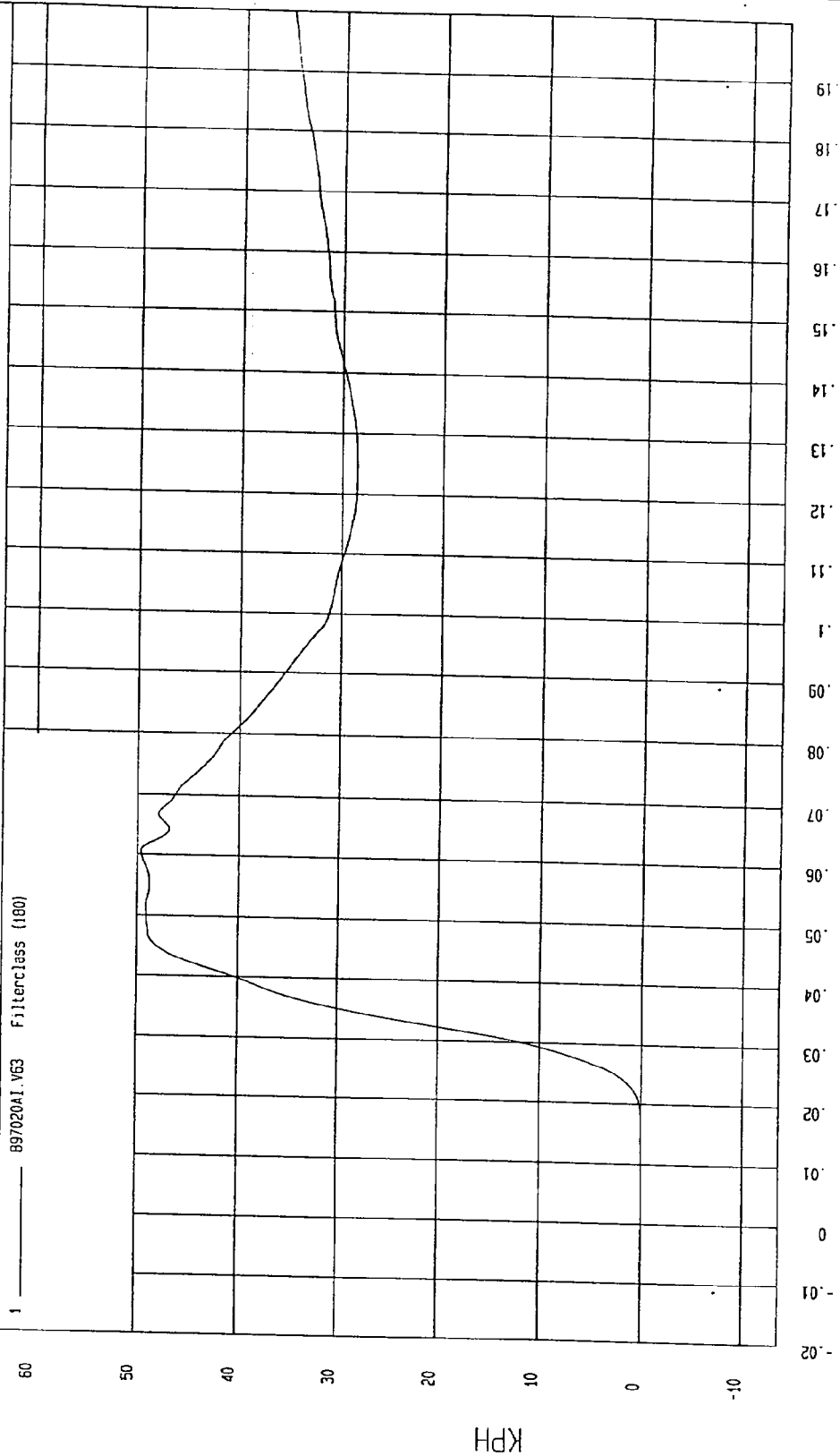
Speed: 37.97 MPH 61.1 KPH

Minimum = -3.24E-03 KPH at -17 msec

Maximum = 49.63 KPH at 61 msec

DRIVER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— 897020A1.V63 Filterclass (180)



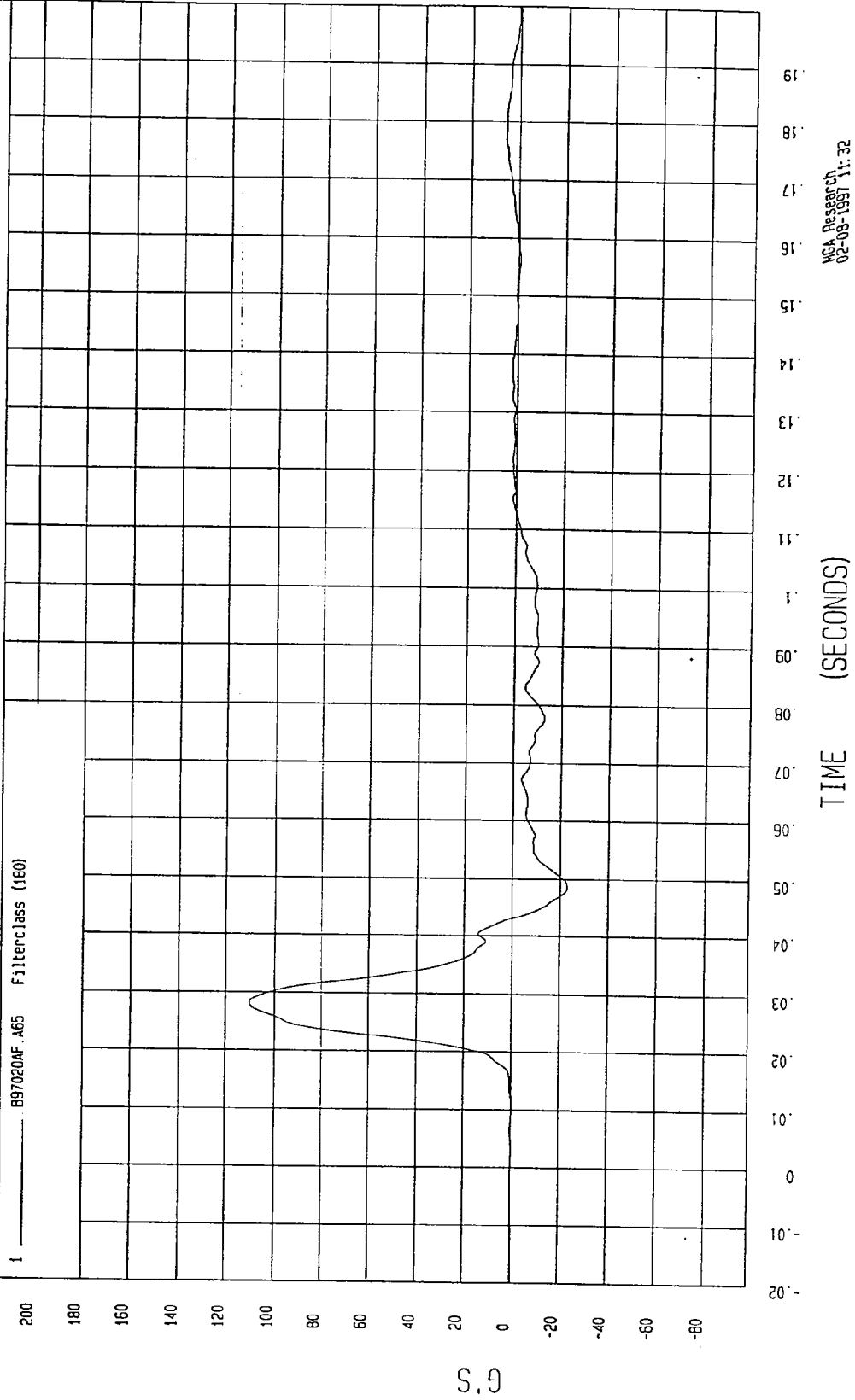
MGA Research  
02-08-1997 11:26

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -22.93 G'S at 49 msec Maximum = 110.22 G'S at 28 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

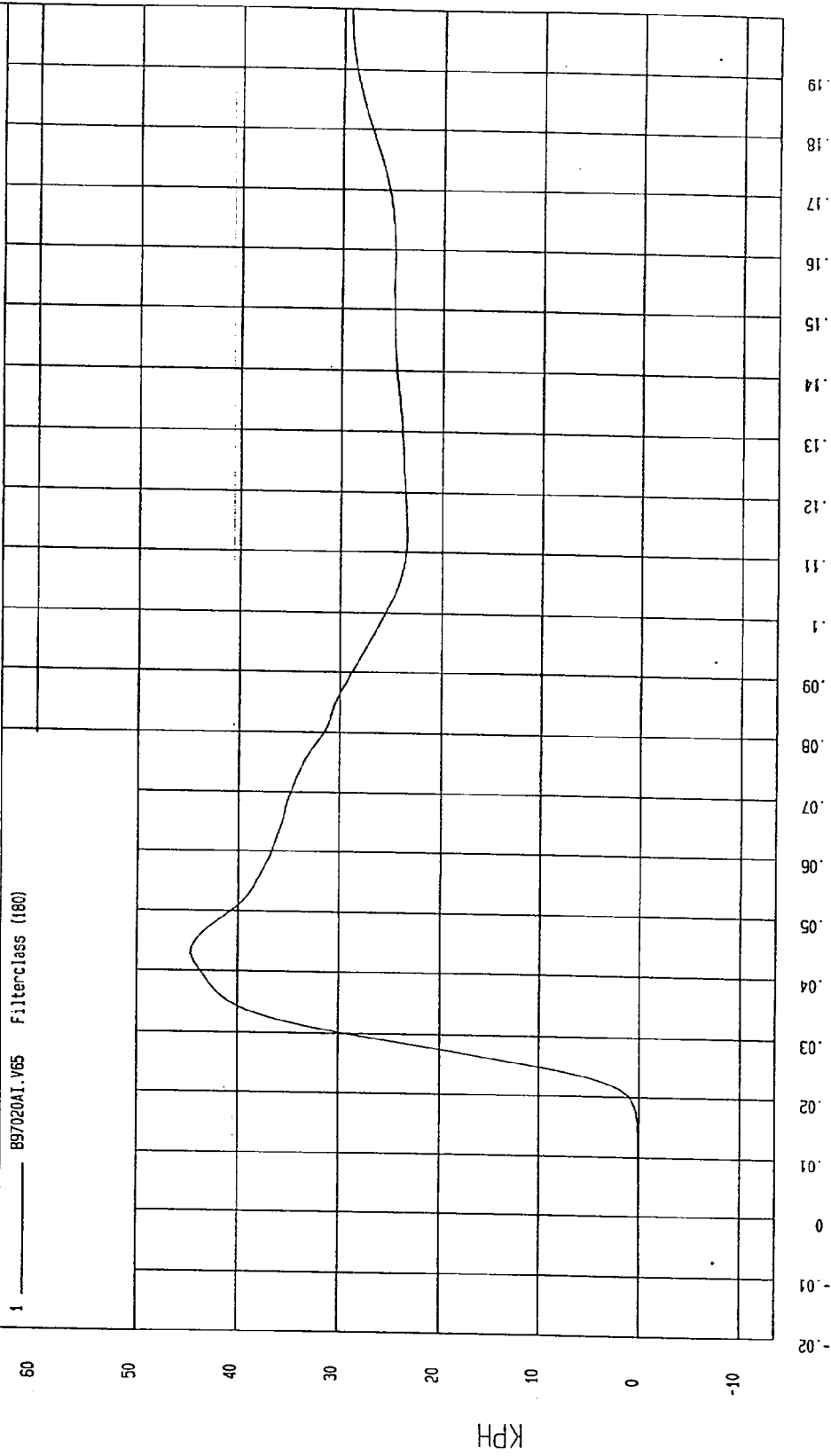


TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -5.24E-02 KPH at -9 msec Maximum = 44.63 KPH at 43 msec

DRIVER PELVIS Y REDUNDANT VELOCITY



NCA Research  
02-08-1997 11:26

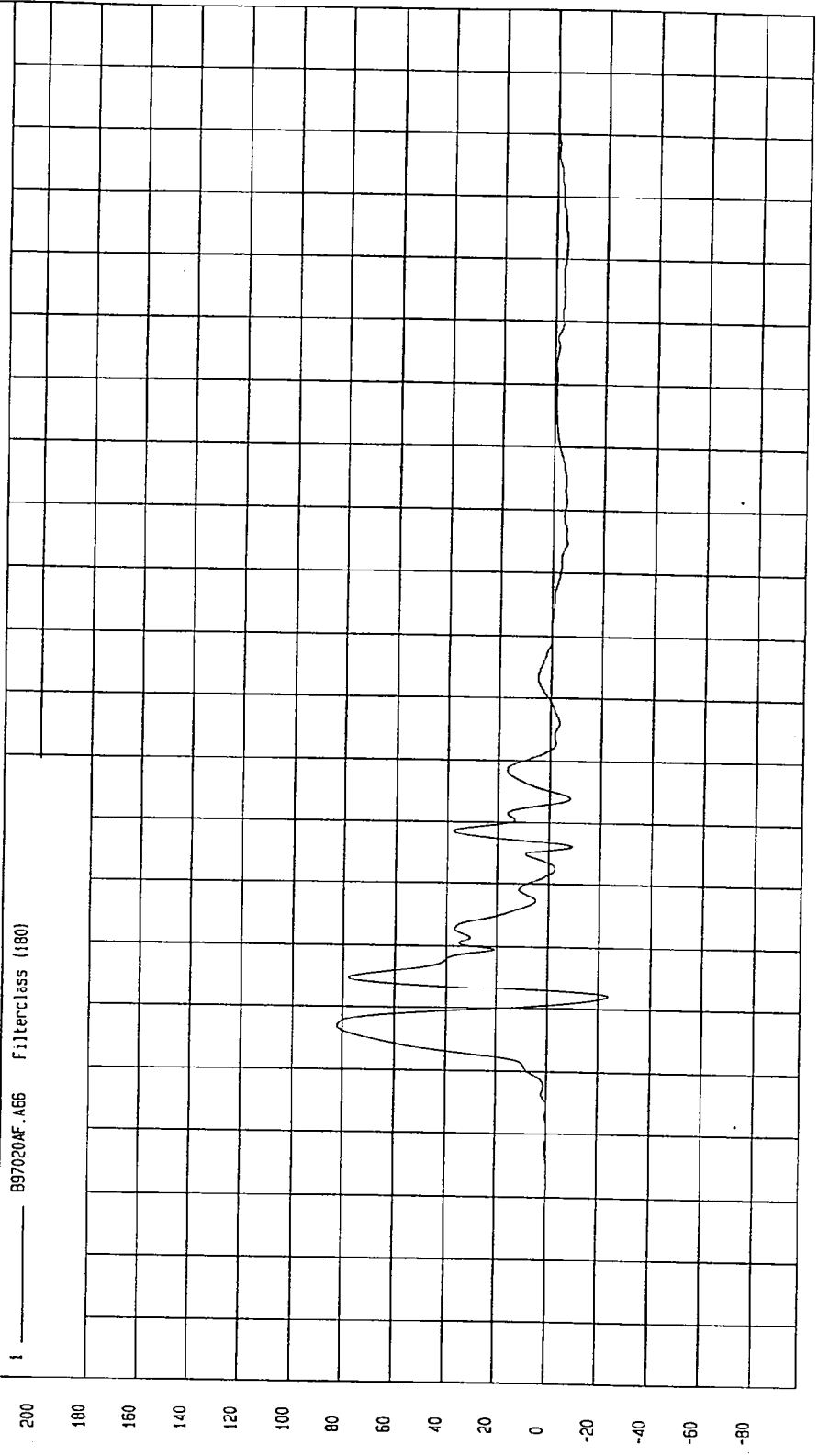
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -23.84 G'S at 42 msec Maximum = 82.45 G'S at 37 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 B97020AF.A66 Filterclass (180)



TIME (SECONDS)

MSA Research  
02-08-1997 11:33

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

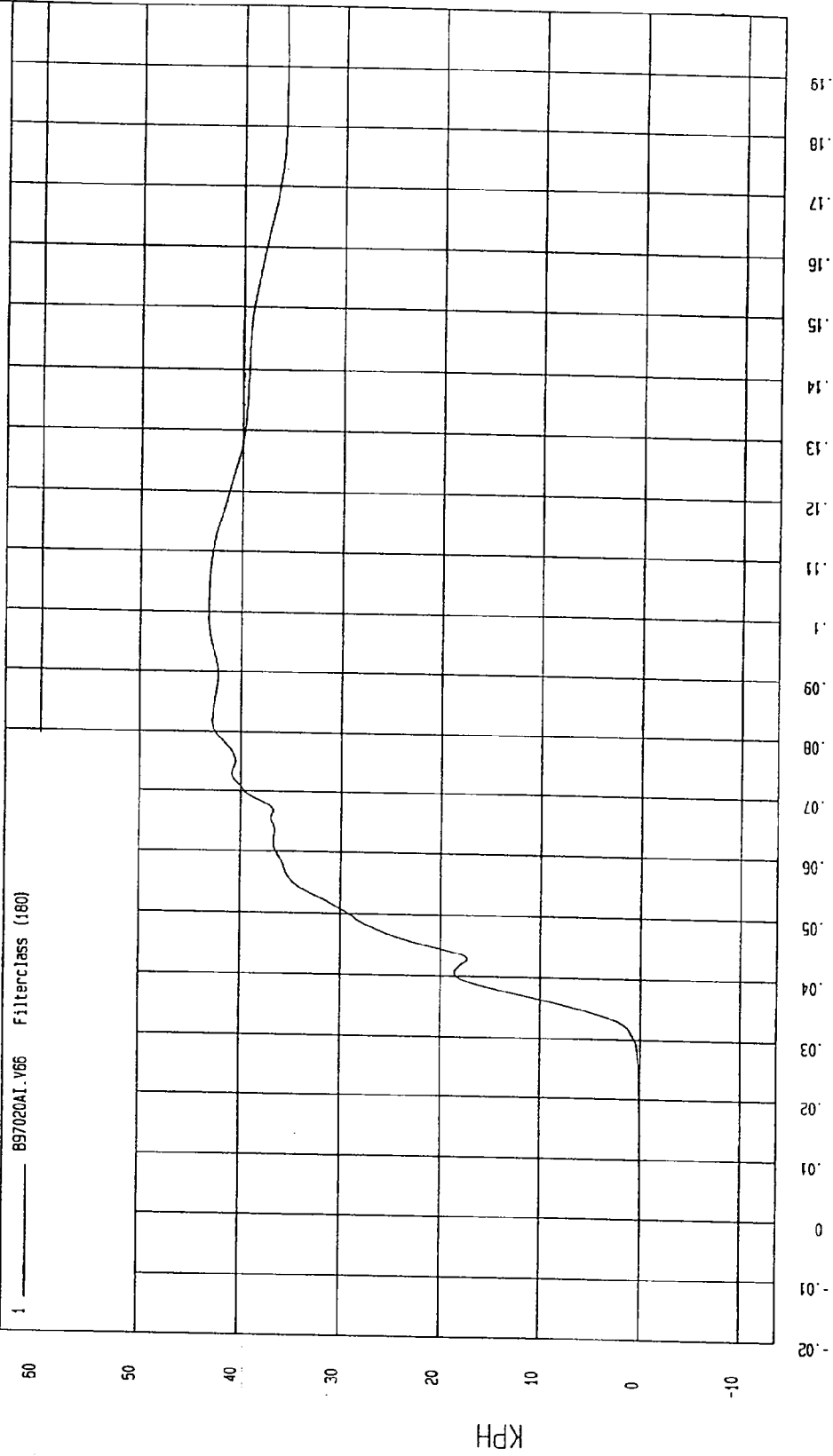
Speed: 37.97 MPH 61.1 KPH

Minimum = -5.83E-02 KPH at 1 msec

Maximum = 43.29 KPH at 102 msec

REAR PASSENGER UPPER RIB Y REDUNDANT VELOCITY

1 — B97020A1.V66 FilterClass (180)



NGA Research  
02-08-1997 11:26

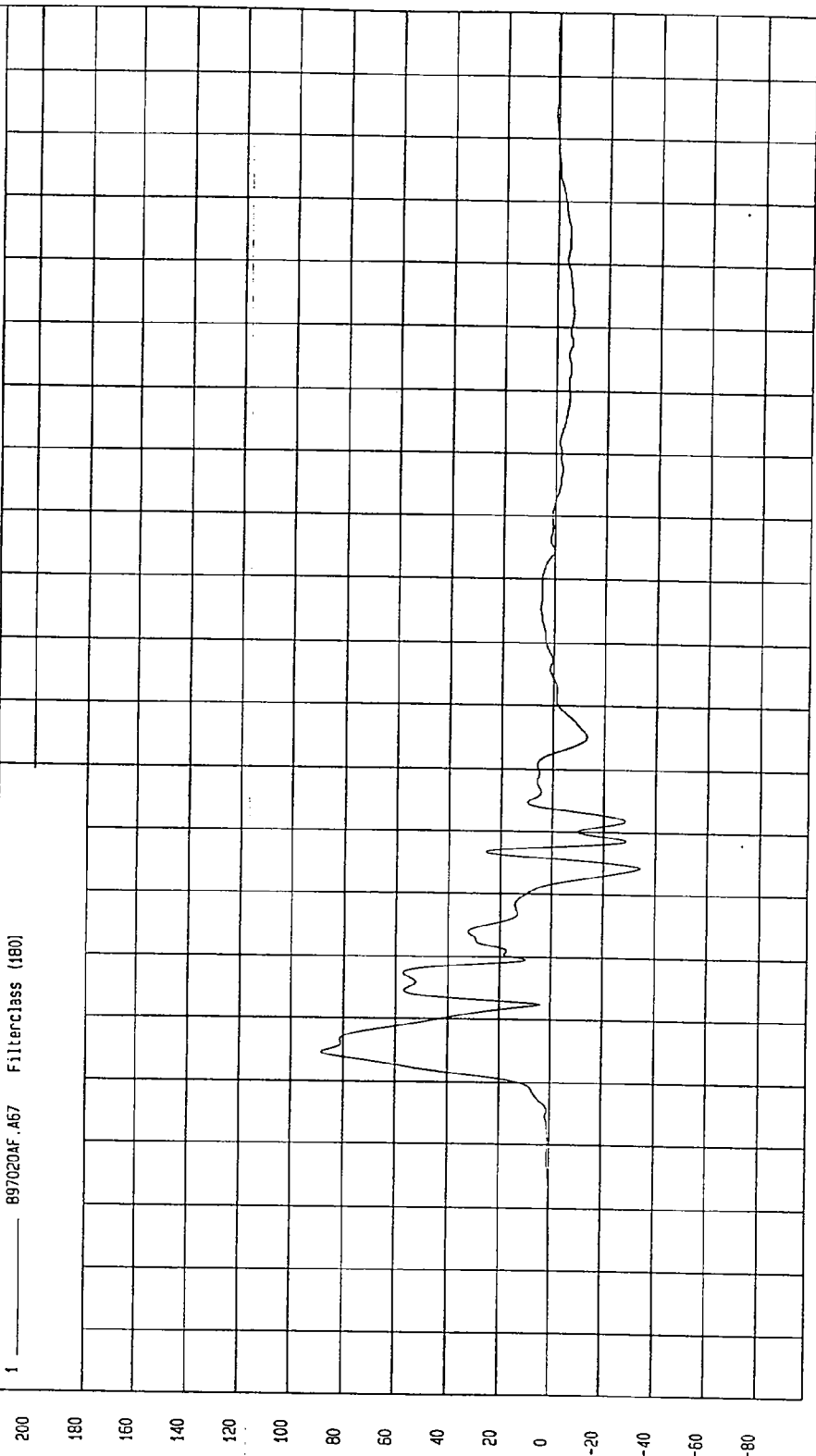
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -34.09 G'S at 64 msec Maximum = 88.39 G'S at 34 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

1 8970204F.A57 Filterclass (180)



MSA Research  
02-08-1997 11:33



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

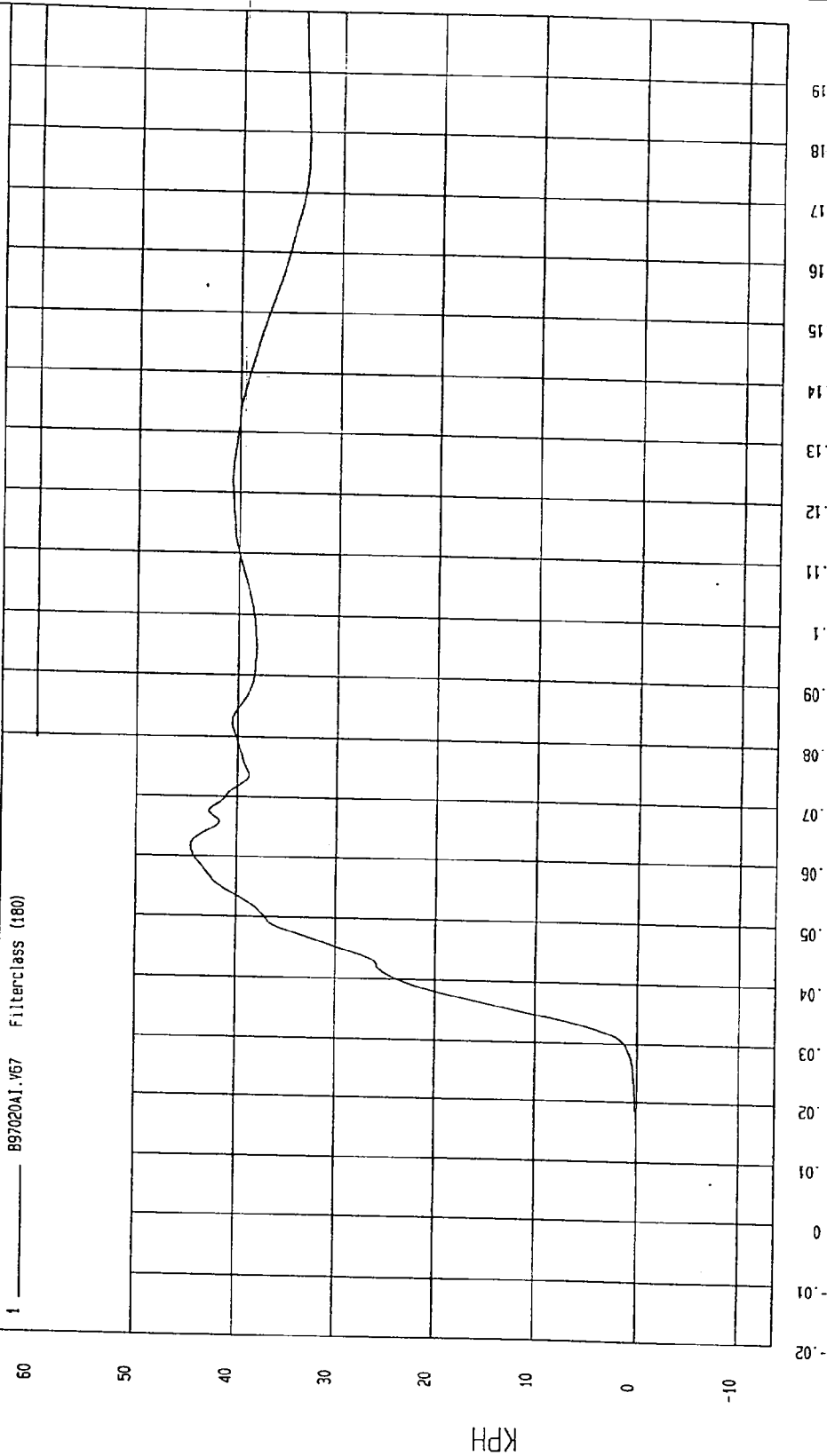
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -1.05E-02 KPH at 2 msec

Maximum = 44.57 KPH at 62 msec

REAR PASSENGER LOWER RIB Y REDUNDANT VELOCITY

1 ——— B97020A1.V67 Filterclass (180)



MCA Research  
02-06-1997 11:26

TIME Seconds

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

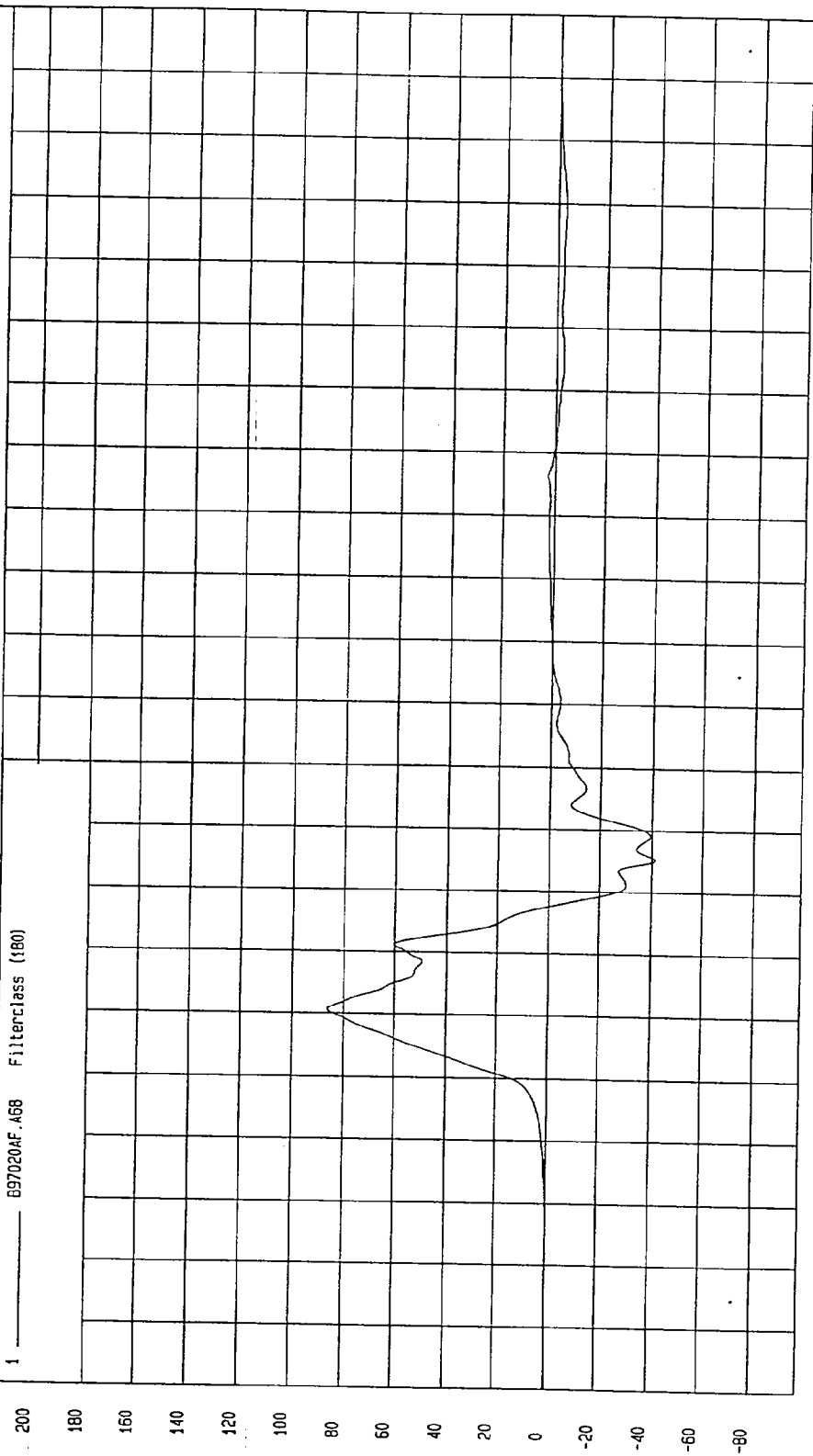
Speed: 37.97 MPH 61.1 KPH

Minimum = -41.22 G'S at 65 msec

Maximum = 86.27 G'S at 41 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 ——— B97020AF.A68 Filterclass (180)



MCA Research  
02-08-1997 11:33

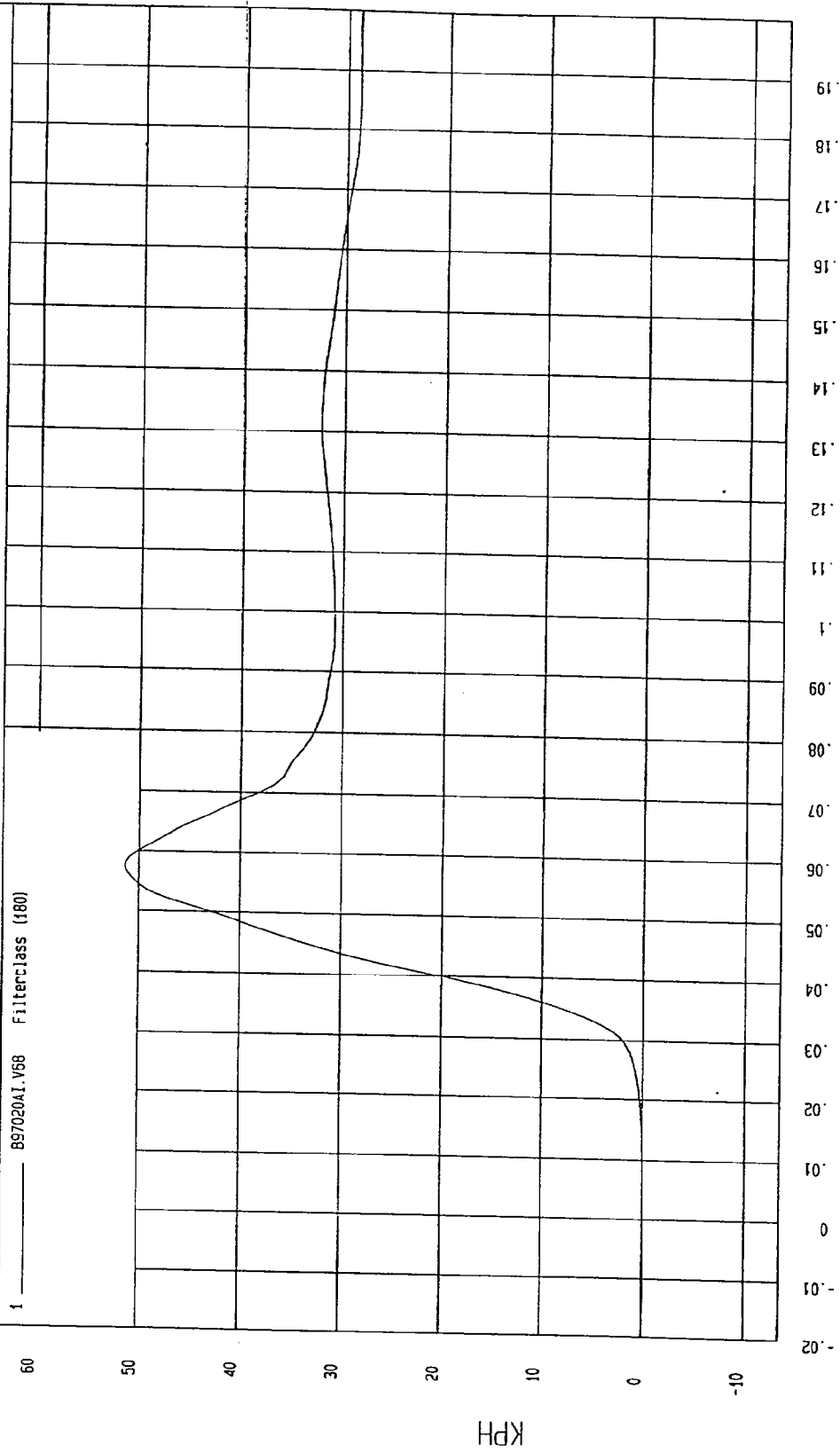
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -8.88E-02 KPH at -12 msec Maximum = 51.39 KPH at 58 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT VELOCITY

1 ——— 897020A1.V58 Filterclass (180)



NSA Research  
02-06-1997 11:26

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -17.16 G's at 78 msec

Maximum = 82.69 G's at 31 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 — 897020AF.A69 Filterclass (180)

200

180

160

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G's

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

MGA Research  
02-08-1997 11:33

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

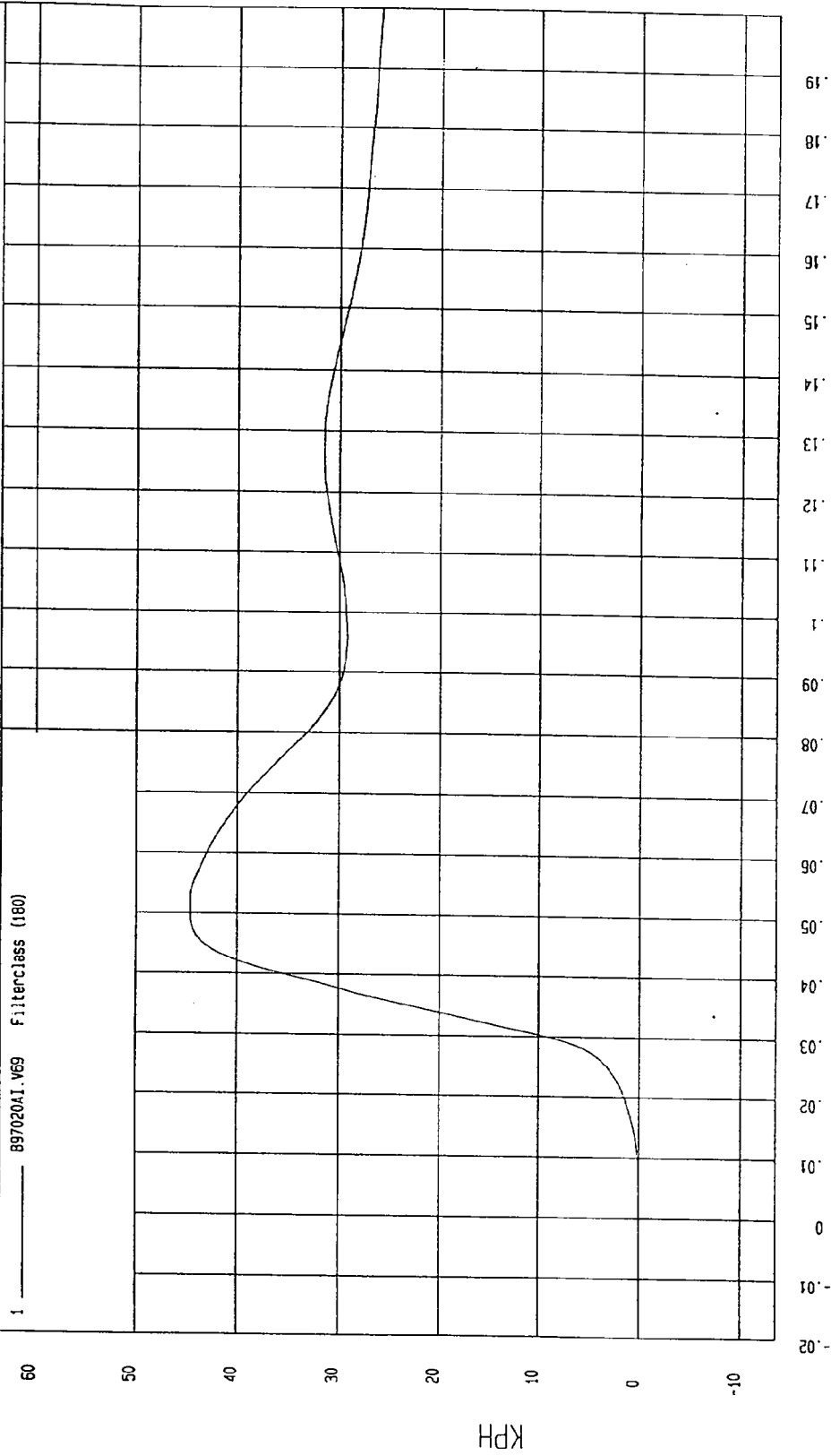
COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -2.58E-03 KPH at -5 msec

Maximum = 44.71 KPH at 52 msec

REAR PASSENGER PELVIS Y REDUNDANT VELOCITY

1 897020A1.V69 Filterclass (180)



MCA Research  
02-08-1997 11:26

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MVO115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -25.49 G'S at 58 msec

Maximum = 82.94 G'S at 30 msec

DRIVER UPPER RIB Y ACCELERATION

1 B97020FI.R15 Filterclass (FIR Filtered)

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

G.S

TIME (SECONDS)

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

NSA Research  
02-06-1997 11:18

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -23.21 G'S at 68 msec

Maximum = 83.85 G'S at 30 msec

DRIVER UPPER RIB Y REDUNDANT ACCELERATION

1 897020F1.R61 Filterclass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17

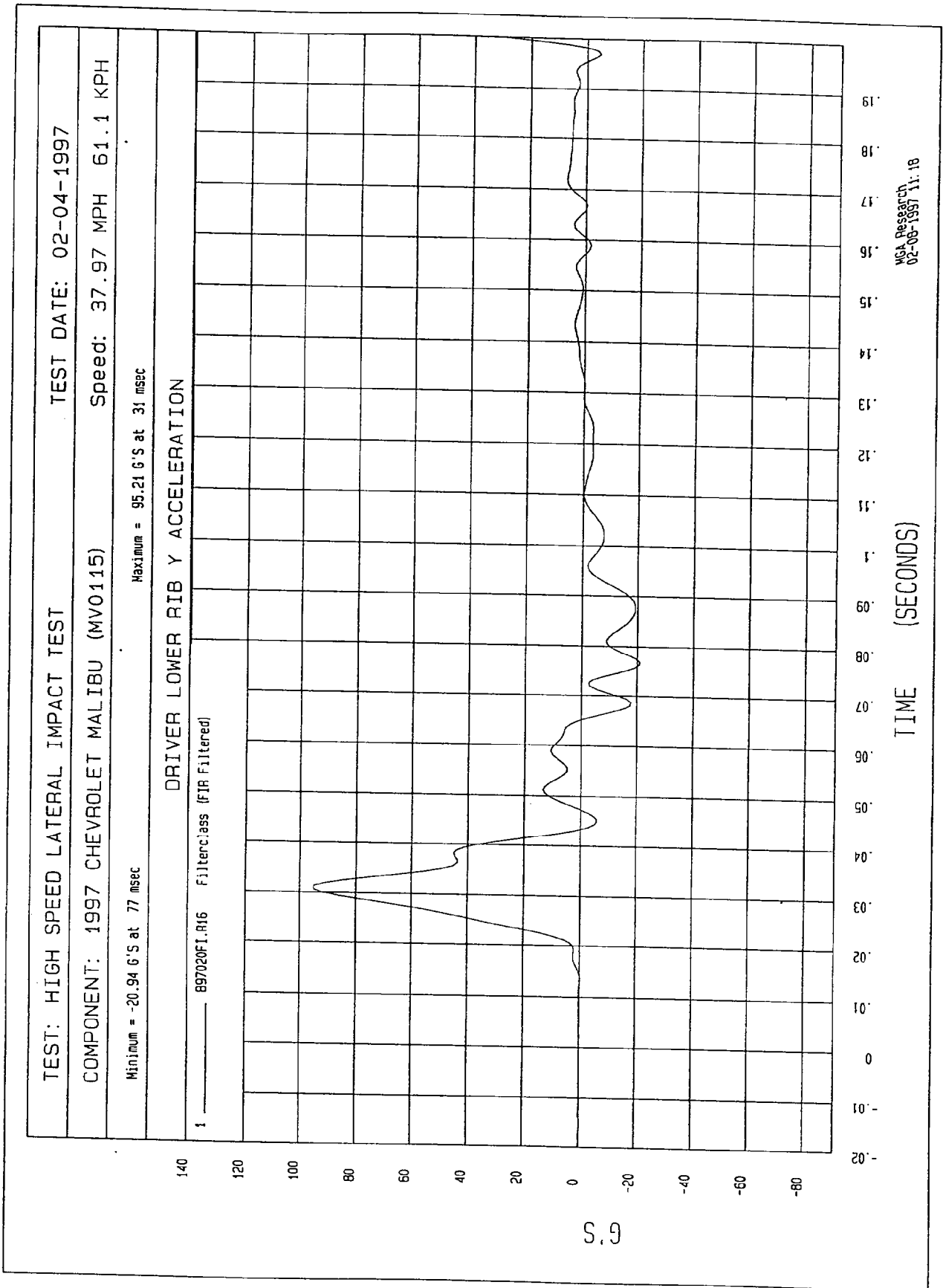
18

19

TIME (SECONDS)

NSA Research  
02-08-1997 11:18





TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -395.29 G'S at 197 msec

Maximum = 107.67 G'S at 33 msec

DRIVER LOWER RIB Y REDUNDANT ACCELERATION

1 B97020FLR62 Filterclass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G.S

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

MGA Research  
02-08-1997 11:18

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -21.30 G'S at 62 msec

Maximum = 105.57 G'S at 32 msec

DRIVER LOWER SPINE Y ACCELERATION

1 897020F1.R17 FilterClass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G.S

-02

-01

0

10

20

30

40

50

60

70

80

90

100

110

120

130

140

150

160

170

180

190

TIME (SECONDS)

HGA Research  
02-08-1997 11:18

TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -19.80 G'S at 62 msec

Maximum = 108.95 G'S at 33 msec

DRIVER LOWER SPINE Y REDUNDANT ACCELERATION

1 ——— B97020FL.R63 Filterclass (FIR Filtered)

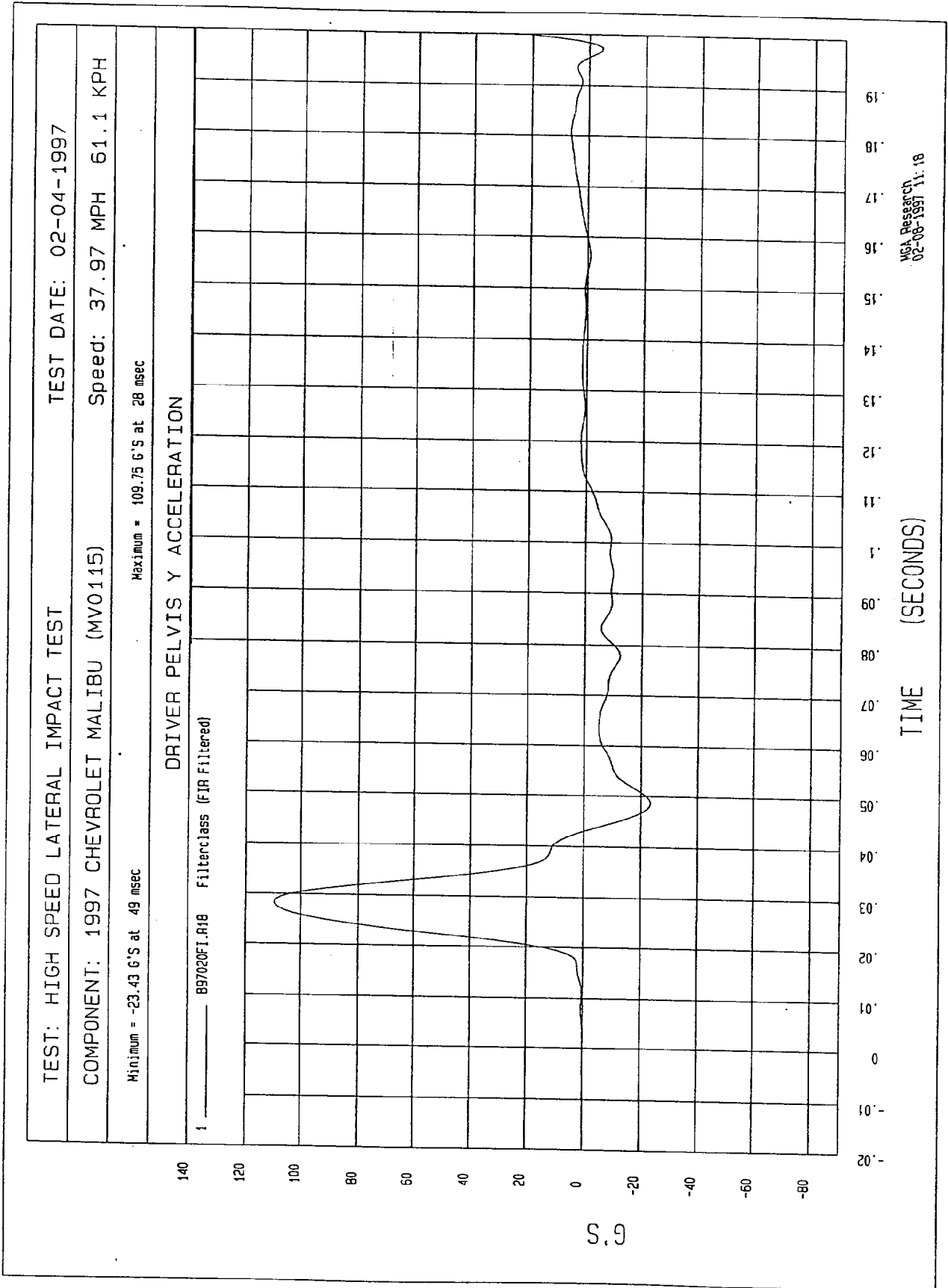
G.S

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

MECA Research  
02-06-1997 11:18

TIME (SECONDS)

-.02  
-.01  
0  
.01  
.02  
.03  
.04  
.05  
.06  
.07  
.08  
.09  
.1  
.11  
.12  
.13  
.14  
.15  
.16  
.17  
.18  
.19



TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MVO115) Speed: 37.97 MPH 61.1 KPH

Minimum = -22.55 G'S at .49 msec

Maximum = 110.42 G'S at .28 msec

DRIVER PELVIS Y REDUNDANT ACCELERATION

1 — 897020F1.P65 Filterclass (FIR Filtered)

G.S.

140

120

100

80

60

40

20

0

-20

-40

-60

-80

-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

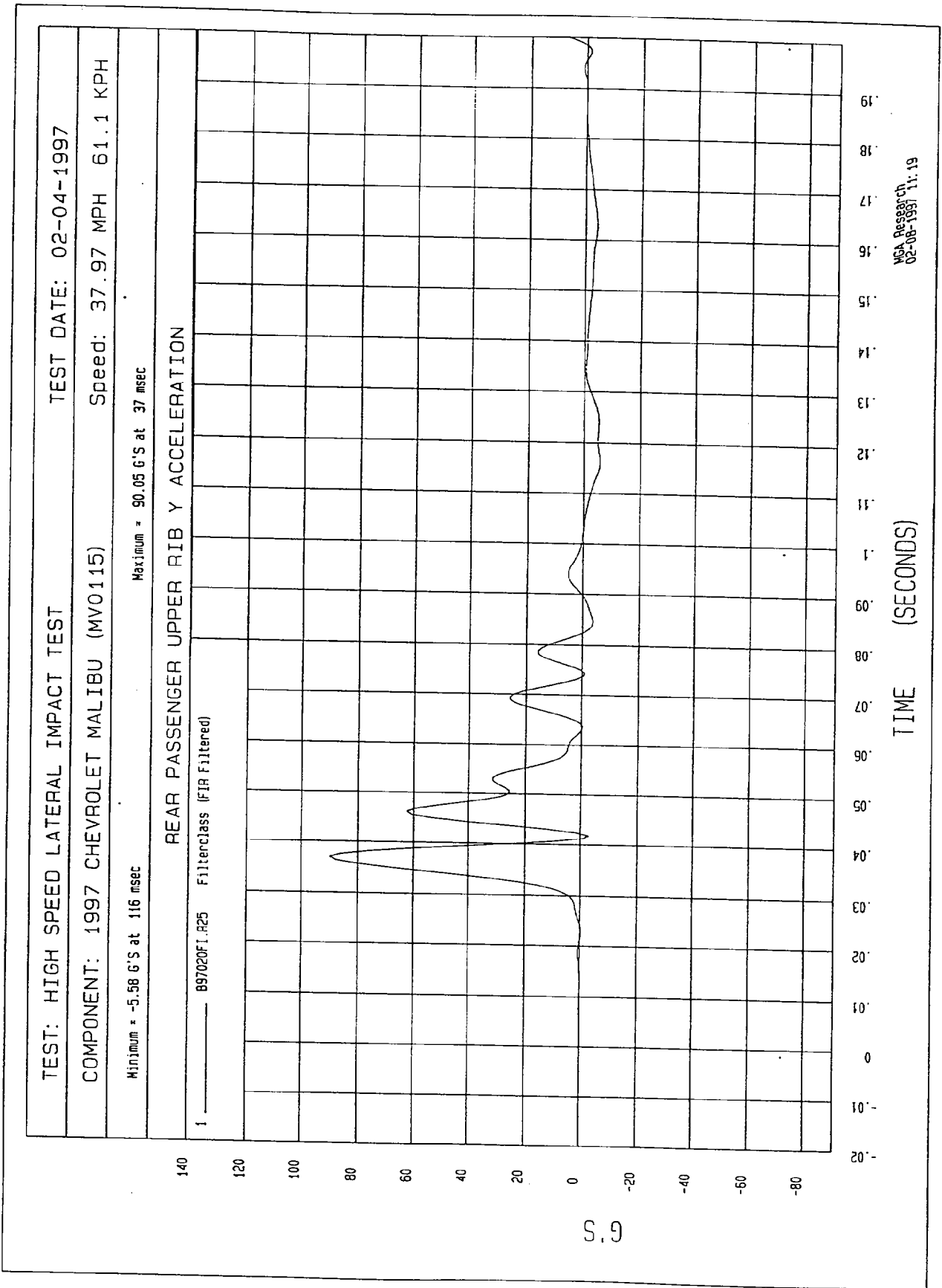
0.17

0.18

0.19

TIME (SECONDS)

HSA Research  
02-08-1997 11:18



MCA Research  
02-08-1997 11:19

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Speed: 37.97 MPH 61.1 KPH

Minimum = -5.37 G'S at 116 msec

Maximum = 88.19 G'S at 37 msec

REAR PASSENGER UPPER RIB Y REDUNDANT ACCELERATION

1 897020F1.R66 Filterclass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

WCA Research  
02-08-1997 11:19



TIME (SECONDS)

TEST: HIGH SPEED LATERAL IMPACT TEST

TEST DATE: 02-04-1997

Speed: 37.97 MPH 61.1 KPH

COMPONENT: 1997 CHEVROLET MALIBU (MV0115)

Minimum = -22.94 G'S at 71 msec

Maximum = 88.09 G'S at 36 msec

REAR PASSENGER LOWER RIB Y REDUNDANT ACCELERATION

897020F1.R67 Filterclass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

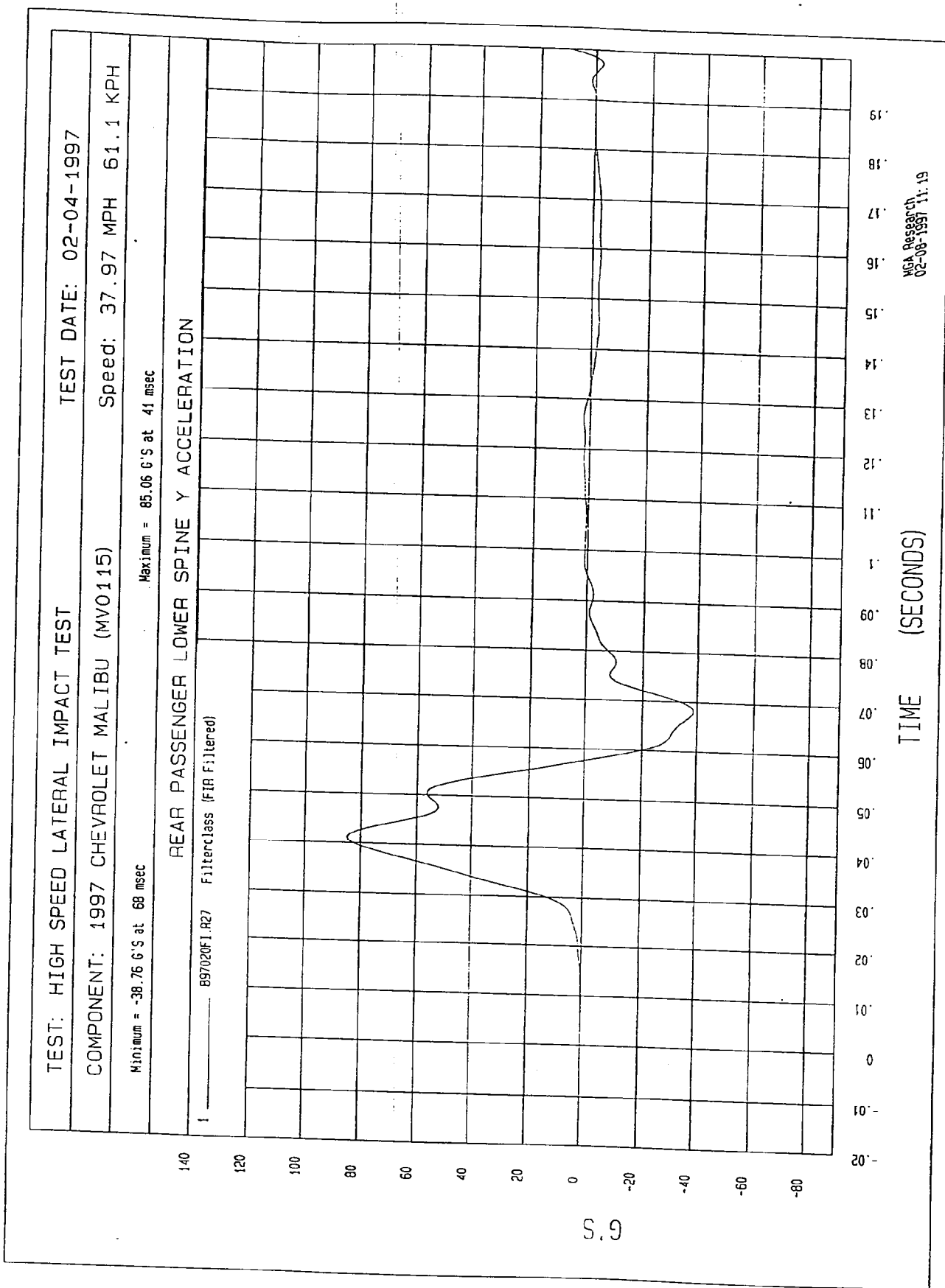
17

18

19

TIME (SECONDS)

MGA Research  
02-08-1997 11:19



TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -39.34 G's at 68 msec

Maximum = 83.86 G's at 41 msec

REAR PASSENGER LOWER SPINE Y REDUNDANT ACCELERATION

1 897020F1.068 Filterclass (FIR Filtered)

140

120

100

80

60

40

20

0

-20

-40

-60

-80

G's

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

MOA Research  
02-08-1997 11:19

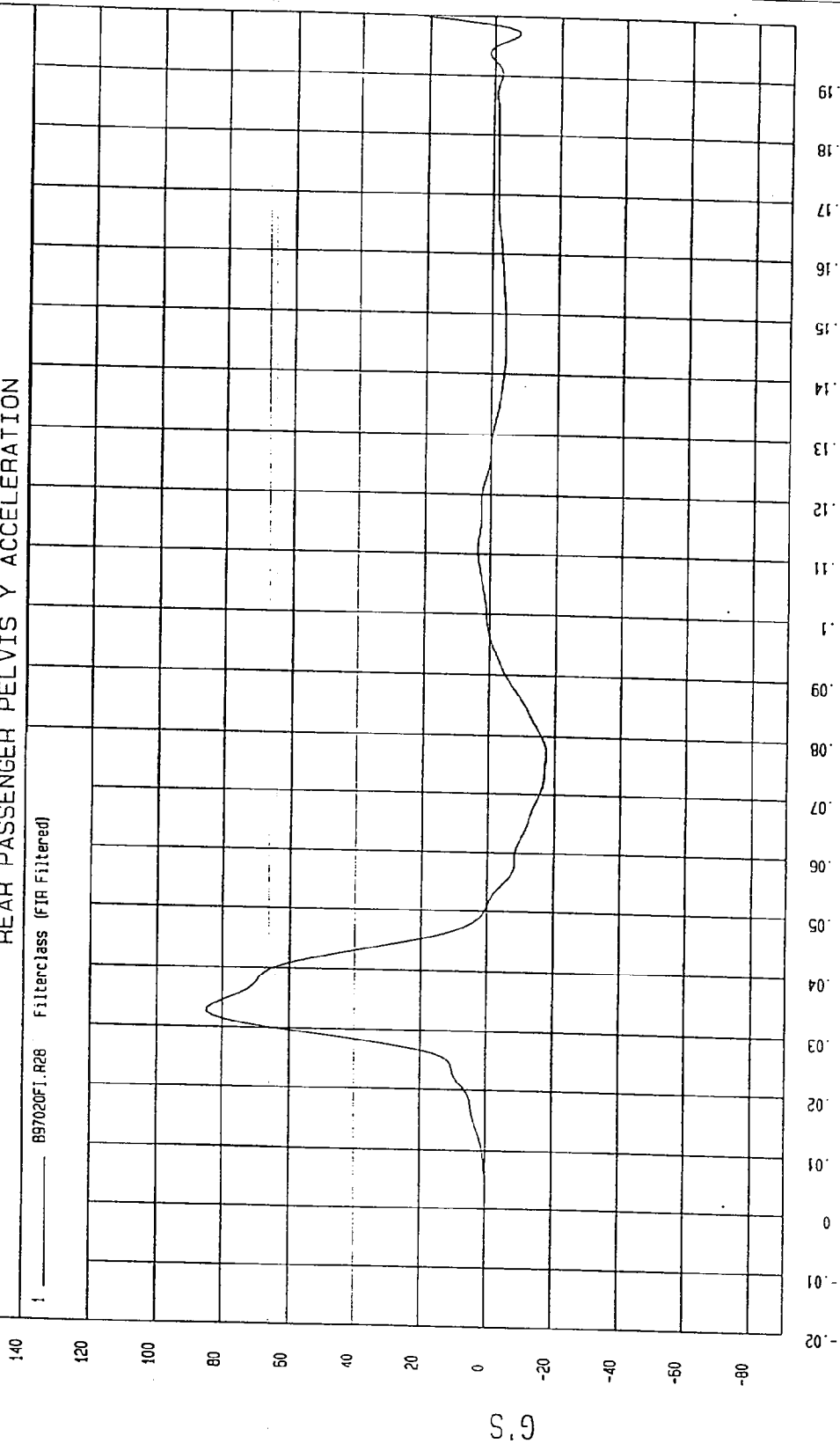
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MVO115) Speed: 37.97 MPH 61.1 KPH

Minimum = -17.39 G'S at 77 msec Maximum = 84.90 G'S at 32 msec

REAR PASSENGER PELVIS Y ACCELERATION

1 897020F1.R28 Filterclass (FIR Filtered)



MCA Research  
02-06-1997 11:19

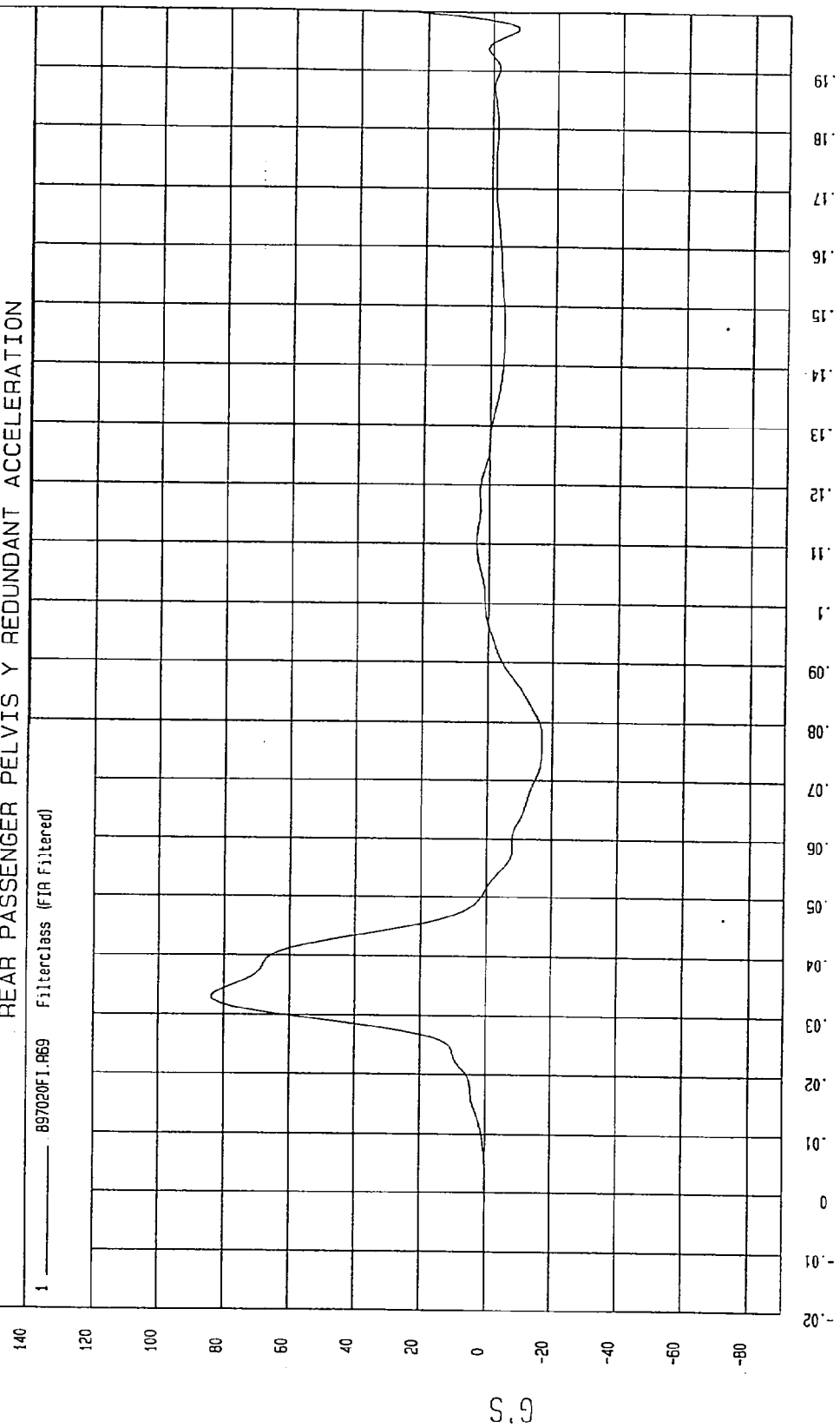
TEST: HIGH SPEED LATERAL IMPACT TEST TEST DATE: 02-04-1997

COMPONENT: 1997 CHEVROLET MALIBU (MV0115) Speed: 37.97 MPH 61.1 KPH

Minimum = -16.90 G'S at 78 msec Maximum = 83.86 G'S at 33 msec

REAR PASSENGER PELVIS Y REDUNDANT ACCELERATION

1 — 897020F1.R69 FilterClass (FIR Filtered)



MCA Research  
02-08-1997 11:19

APPENDIX C  
SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-97-DC15

DUMMY PERFORMANCE CALIBRATIONS

NEW CAR ASSESSMENT PROGRAM  
SIDE IMPACT TEST

1997 CHEVROLET MALIBU  
NHTSA NO. MV0115

MGA PROVING GROUNDS  
5000 WARREN ROAD  
BURLINGTON, WI 53105



Test Date: February 4, 1997

Report Date: February 18, 1997

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
ROOM 5313, NPS-10  
400 SEVENTH STREET, S.W.  
Washington, D.C. 20590



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| DUMMY S/N: 274 | PRE-TEST CERTIFICATION DATA    | 2-1             |
| DUMMY S/N: 275 | POST-TEST CERTIFICATION DATA   | 3-1             |
| DUMMY S/N: 274 | POST-TEST CERTIFICATION DATA   | 4-1             |
| DUMMY S/N: 275 | POST-TEST INSPECTION CHECKLIST | 5-1             |
| DUMMY S/N: 274 | POST-TEST INSPECTION CHECKLIST | 6-1             |
|                | 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: February 3, 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 McLean

APPROVED BY: Gene Koschke

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 3, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97342

| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 19%          |
| PROBE SPEED       | 13.8 - 14.2 fps | 14.2         |
| UPPER RIB         | 37 - 46 g's     | 39           |
| LOWER RIB         | 37 - 46 g's     | 38           |
| LOWER SPINE       | 15 - 22 g's     | 18           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim White

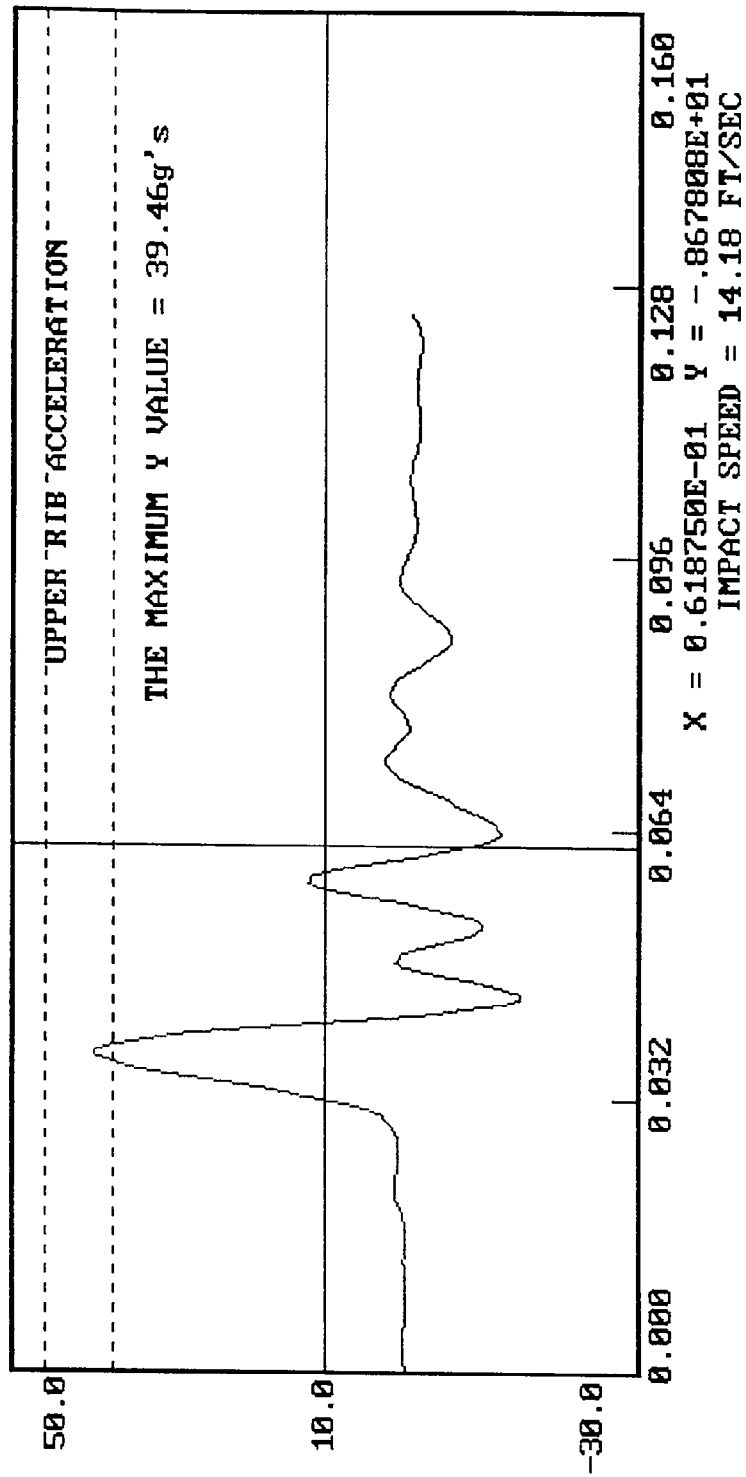
APPROVED BY Rene Koebcke

02-03-1997 15:03

DUMMY CALIBRATION - THORAX IMPACT

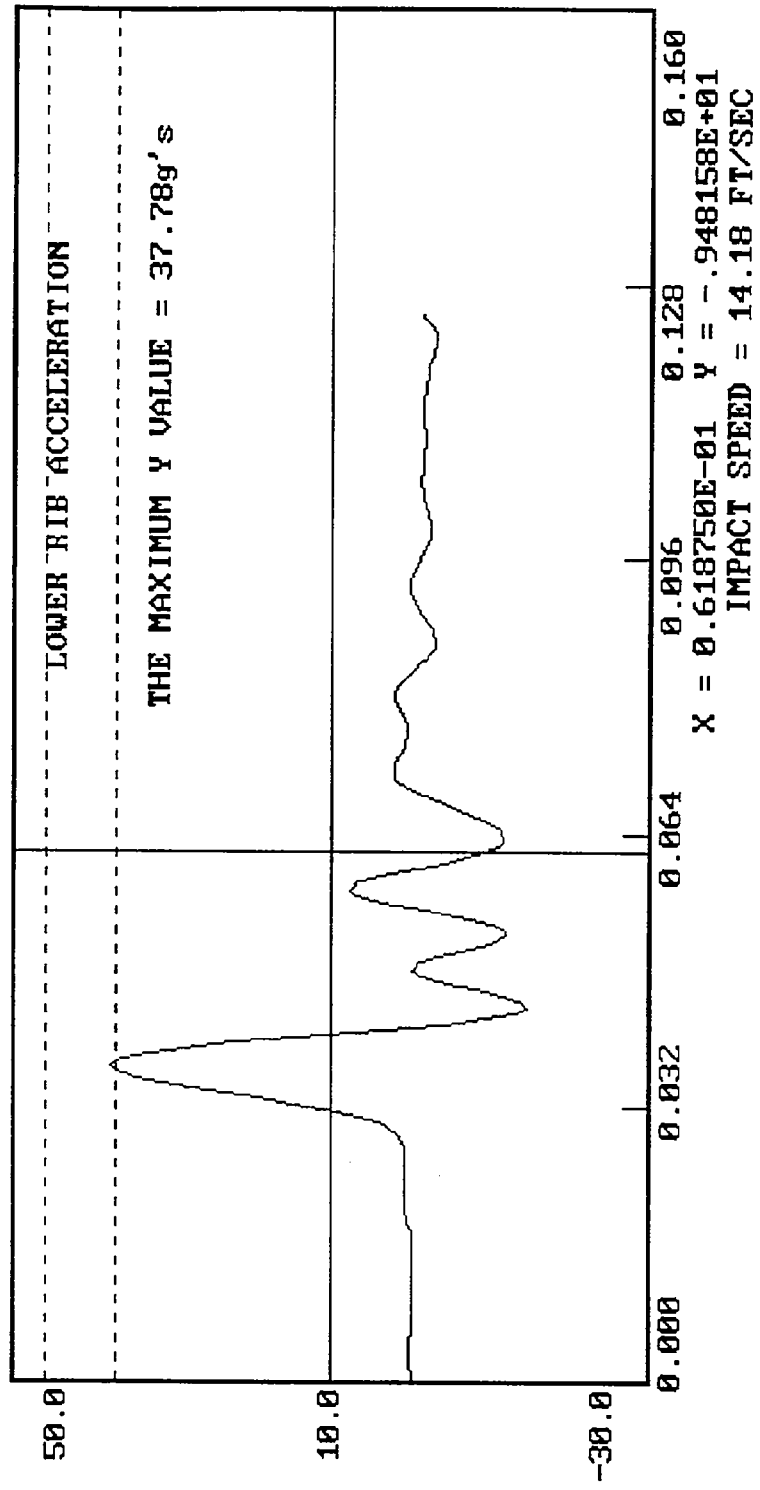
DUMMY # 275

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



02-03-1997 15:03

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

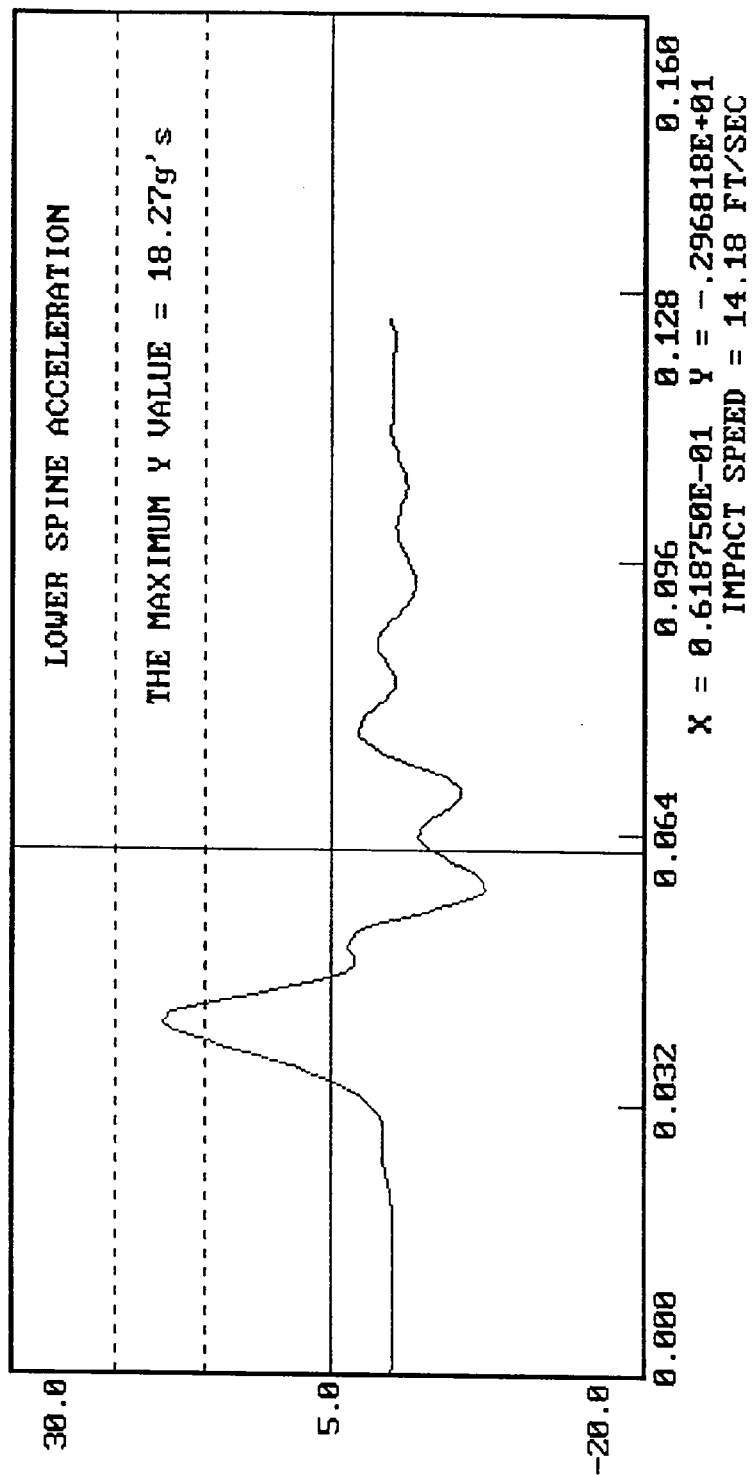


02-03-1997 15:04

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 275

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





MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 3, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97343

| TEST PARAMETER      | SPECIFICATION   | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE         | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY   | 10 - 70%        | 19%          |
| PROBE SPEED         | 13.8 - 14.2 f/s | 14.2         |
| PELVIS ACCELERATION | 40 - 60 g's     | 48           |

TEST MEETS SPECIFICATIONS

TECHNICIAN

Jim Klabacke

APPROVED BY

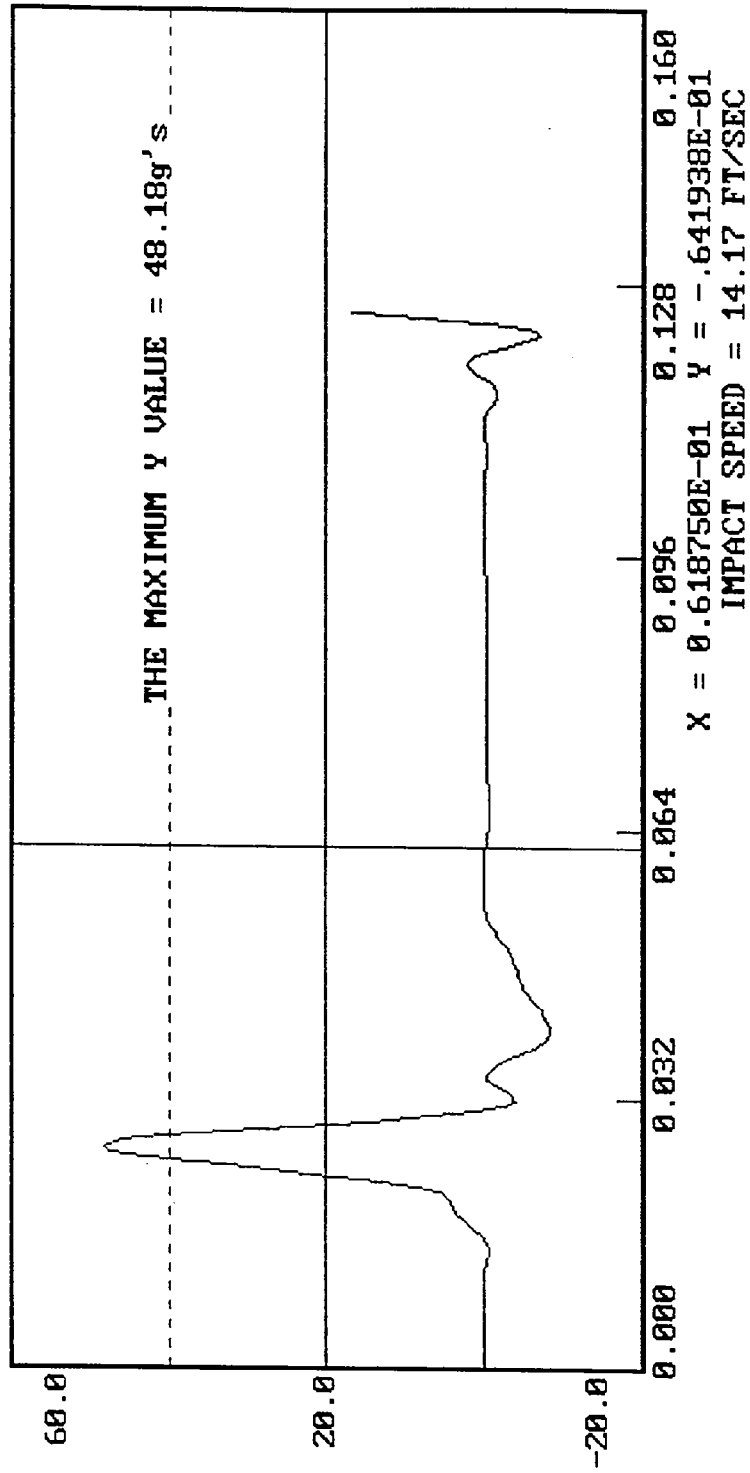
Paul Klabacke

02-03-1997 15:27

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 31, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97344

| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 16%          |
| FORCE @ 0.5 in    | 23.3 - 36.5 lbs | 29.9         |
| FORCE @ 0.75 in   | 36.7 - 49.8 lbs | 41.7         |
| FORCE @ 1.0 in    | 50 - 63 lbs     | 56           |
| FORCE @ 1.3 in    | 73 - 88 lbs     | 77           |

TEST MEETS SPECIFICATIONS

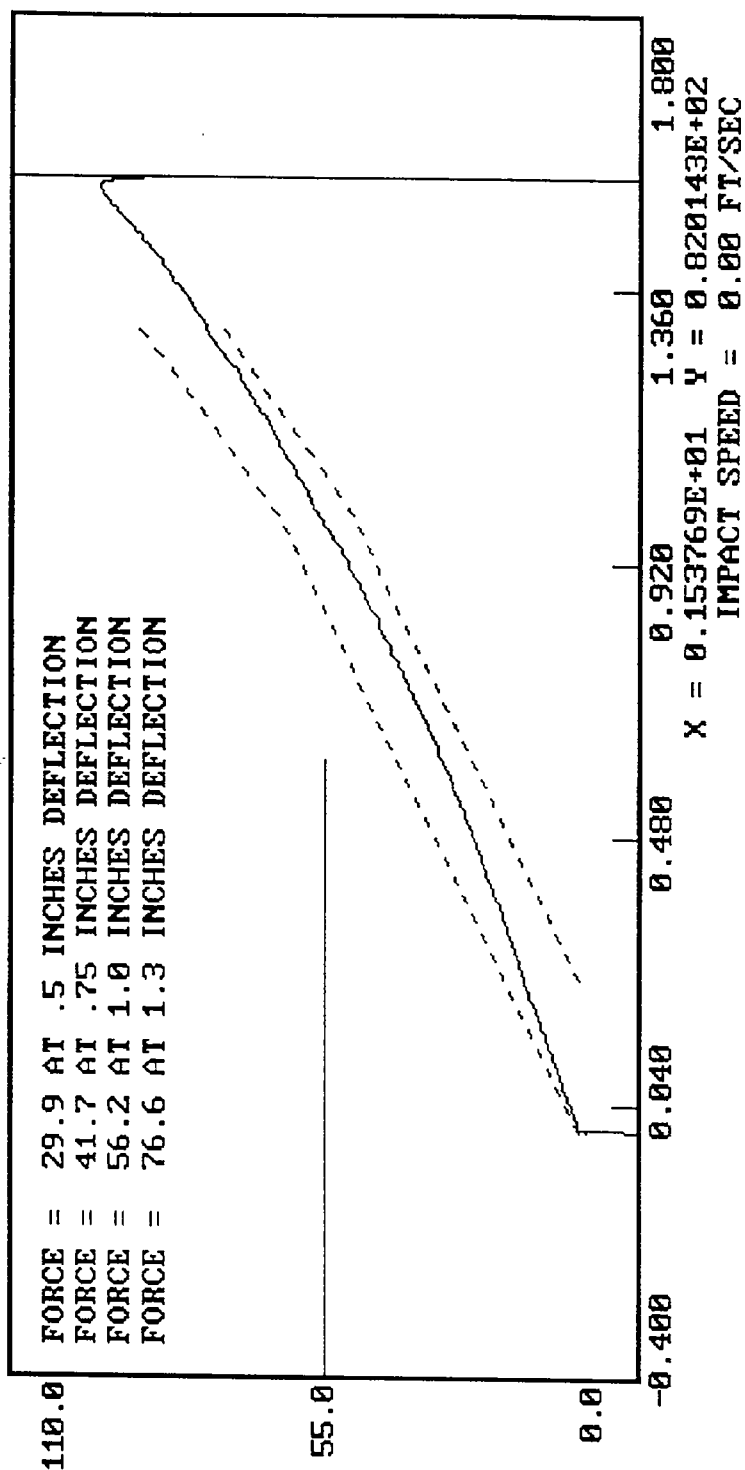
TECHNICIAN

Tim M. L.

APPROVED BY

Paul Kuchuk

DUMMY CALIBRATION - ABDOMEN COMPRESSION  
 DUMMY # 275  
 01-31-1997 12:44  
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 31, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97345

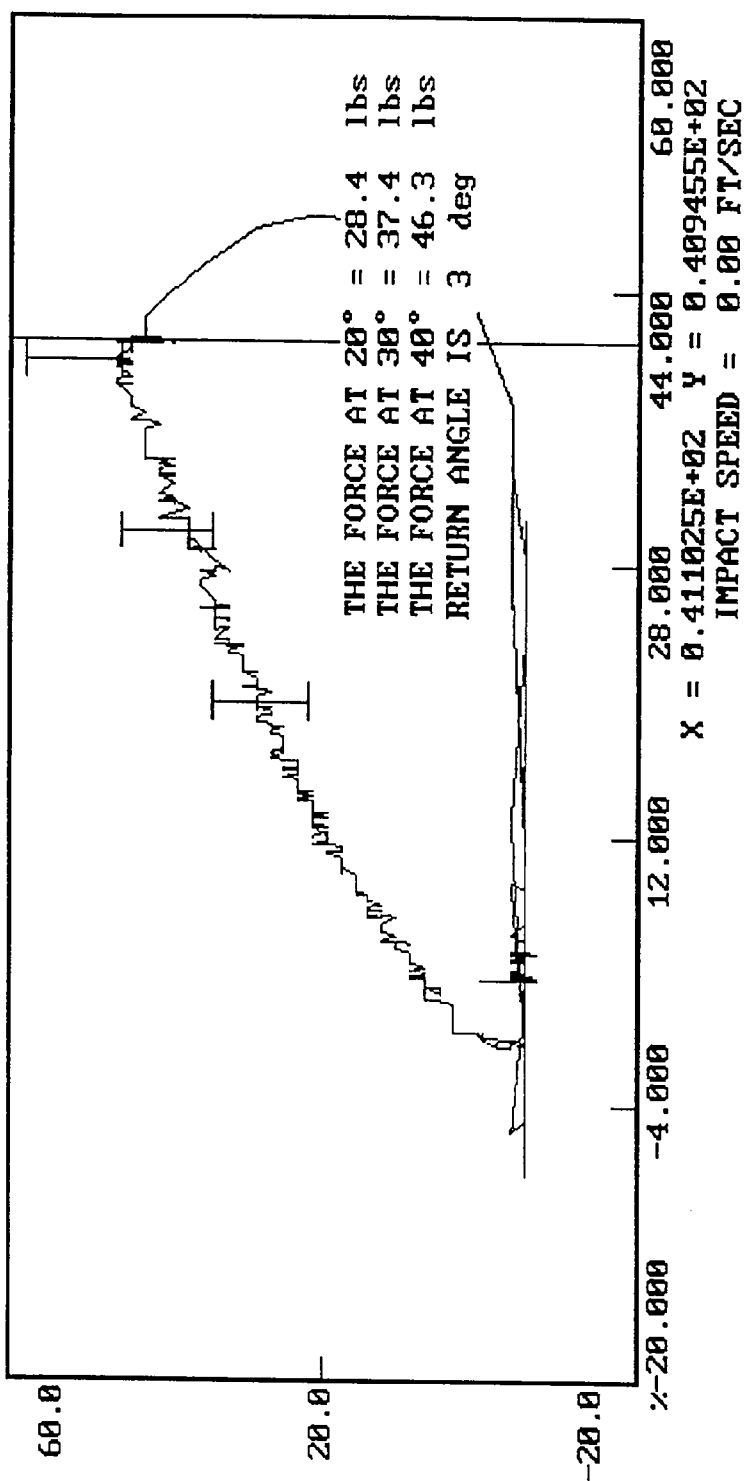
| TEST PARAMETER    | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE       | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY | 10 - 70%      | 19%          |
| FORCE @ 0°        | 0 - 6 lbs     | 0            |
| FORCE @ 20°       | 22 - 34 lbs   | 28           |
| FORCE @ 30°       | 34 - 46 lbs   | 37           |
| FORCE @ 40°       | 46 - 58 lbs   | 46           |
| RETURN ANGLE      | 12° maximum   | 3°           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim Welch

APPROVED BY Dave Kraboske

DUMMY CALIBRATION - LUMBAR FLEXION  
 DUMMY # 275  
 01-31-1997 16:53  
 FORCE (LBS) VS. TORSO ROTATION (DEGREES)



PRE-TEST CERTIFICATION DATA

Rear Dummy Serial Number: 274

Calibration Test Results Summary

Dummy 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: February 3, 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 White

APPROVED BY: Rene Kabeke

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 3, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97332

| 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     | 41           |
| LOWER RIB         | 37 - 46 g's     | 38           |
| LOWER SPINE       | 15 - 22 g's     | 20           |

TEST MEETS SPECIFICATIONS

TECHNICIAN

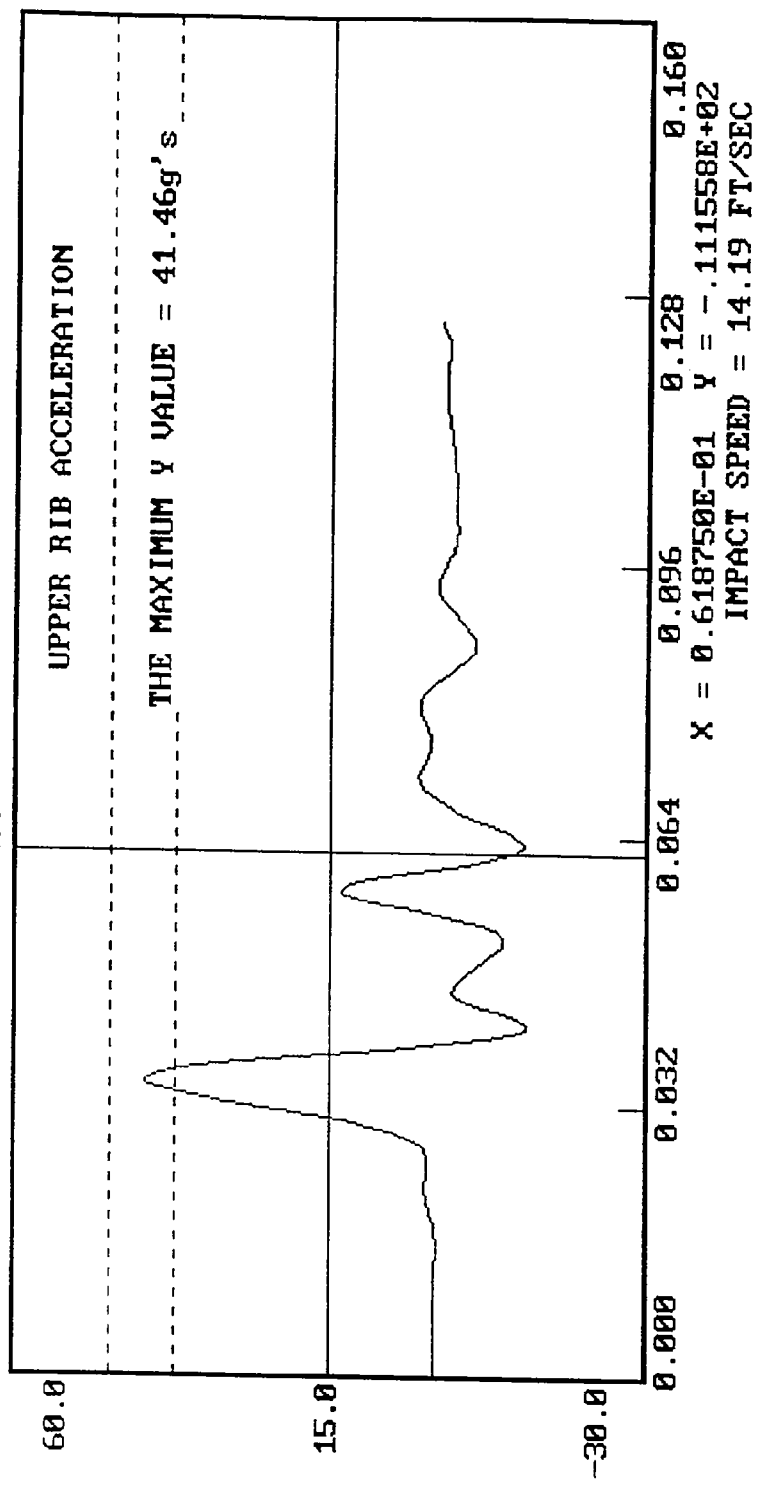
Jim M. Lich

APPROVED BY

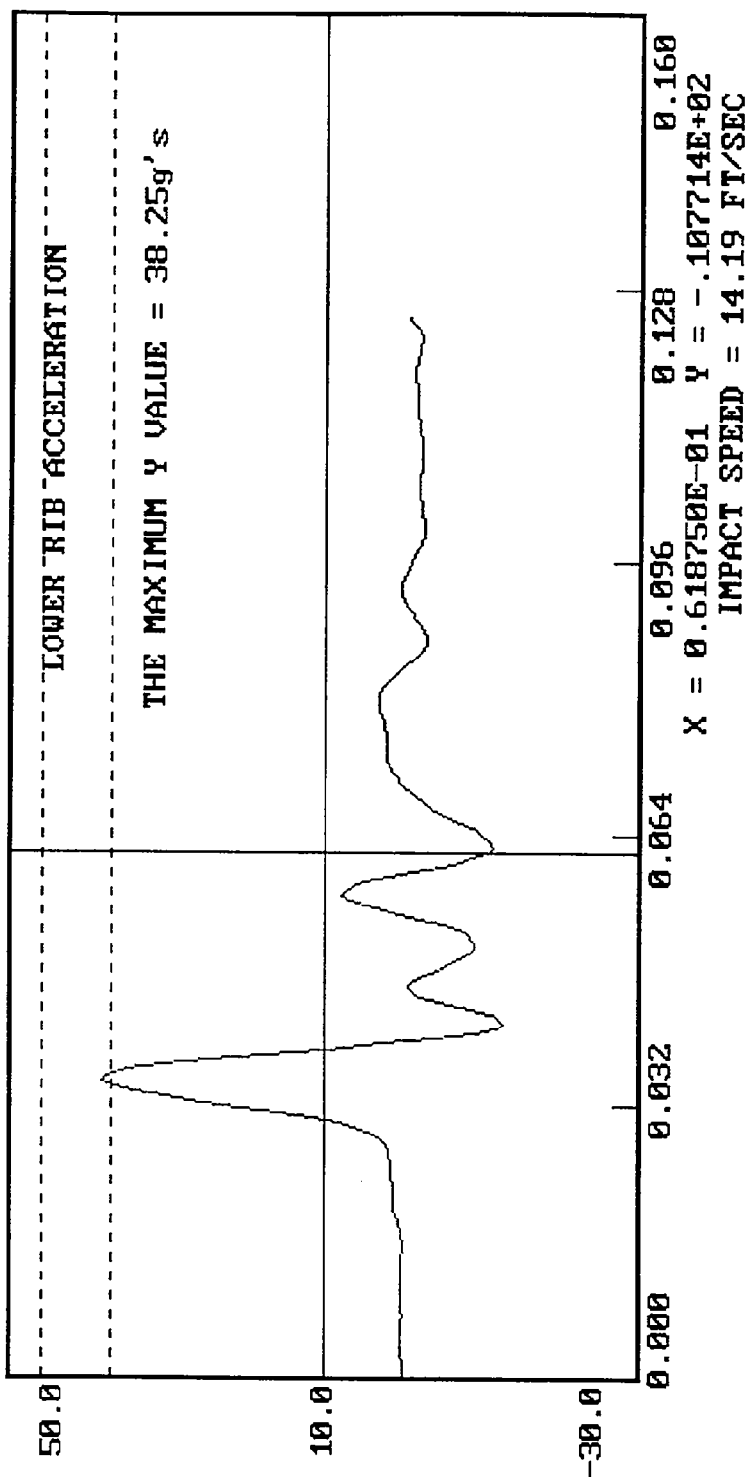
Paul Koschake

DUMMY CALIBRATION - THORAX IMPACT  
 DUMMY # 274  
 02-03-1997 13:42

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



DUMMY CALIBRATION - THORAX IMPACT  
 DUMMY # 274  
 02-03-1997 13:42  
 ACCELERATION (G'S) VS. TIME ((SECONDS))

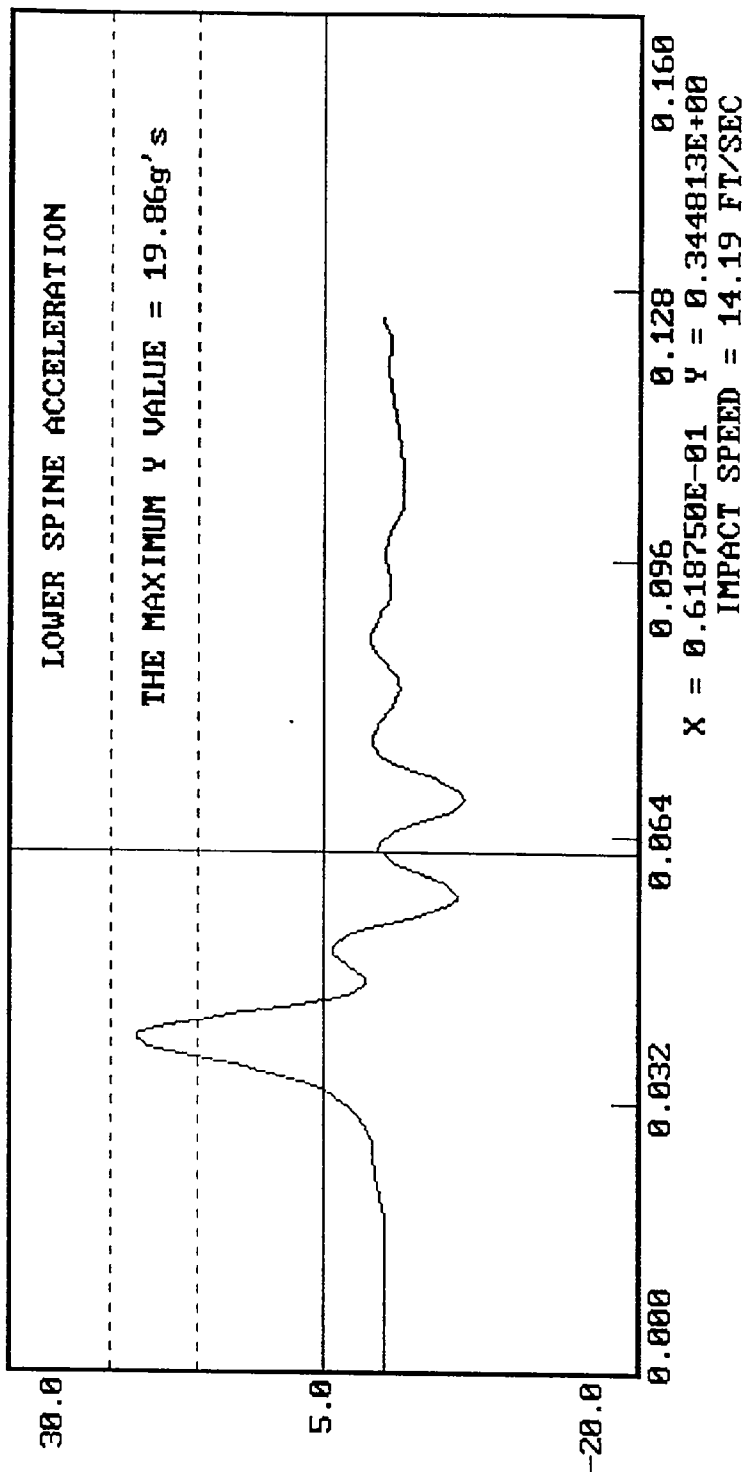


02-03-1997 13:44

DUMMY CALIBRATION - THORAX IMPACT

DUMMY # 274

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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 3, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97333

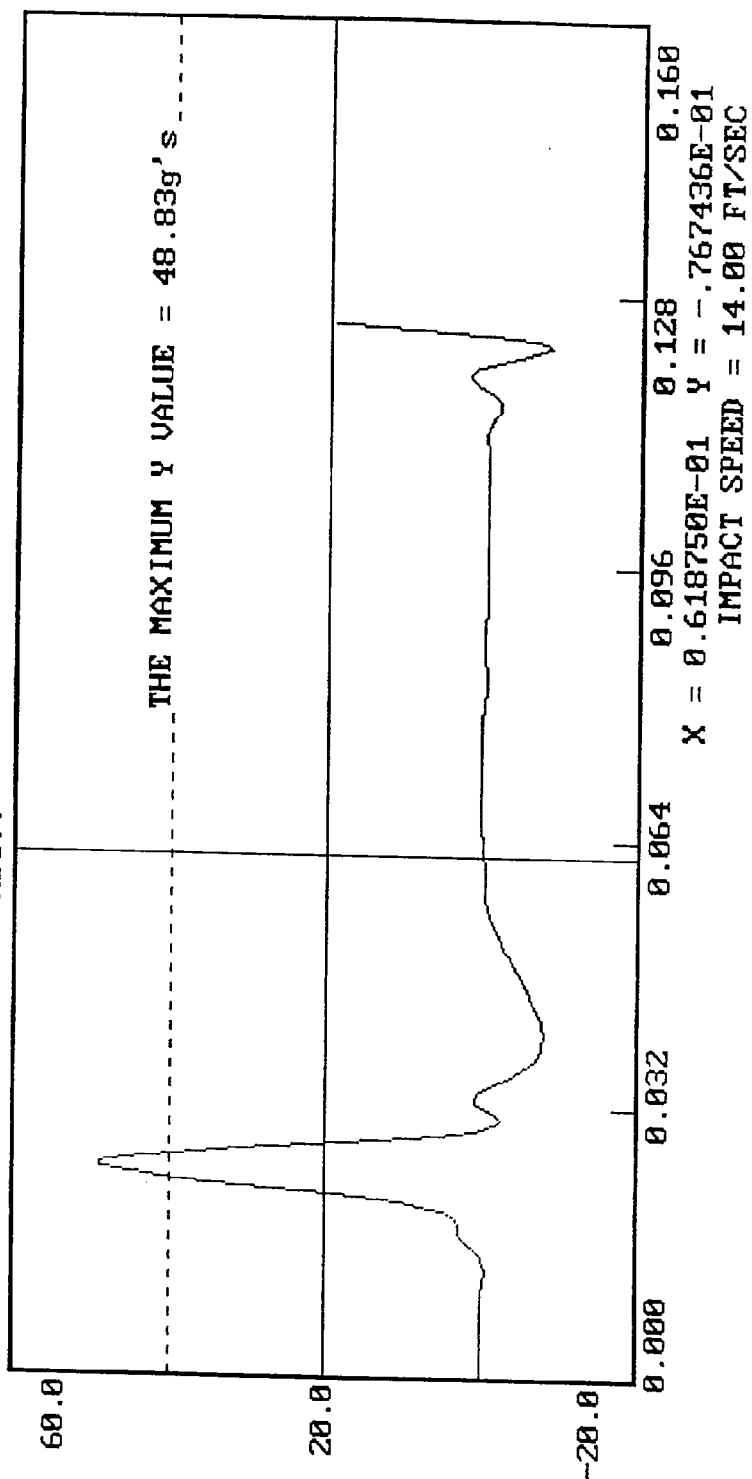
| TEST PARAMETER      | SPECIFICATION   | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE         | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY   | 10 - 70%        | 18%          |
| PROBE SPEED         | 13.8 - 14.2 f/s | 14.0         |
| PELVIS ACCELERATION | 40 - 60 g's     | 49           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim White

APPROVED BY Paul Kosloske

DUMMY CALIBRATION - PELVIS IMPACT  
 DUMMY # 274  
 02-03-1997 13:50  
 ACCELERATION (G'S) VS. TIME ((SECONDS))



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

DATE: January 31, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97334

| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 16%          |
| FORCE @ 0.5 in    | 23.3 - 36.5 lbs | 30.4         |
| FORCE @ 0.75 in   | 36.7 - 49.8 lbs | 42.0         |
| FORCE @ 1.0 in    | 50 - 63 lbs     | 56           |
| FORCE @ 1.3 in    | 73 - 88 lbs     | 75           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim H. H.

APPROVED BY Rene K. K.

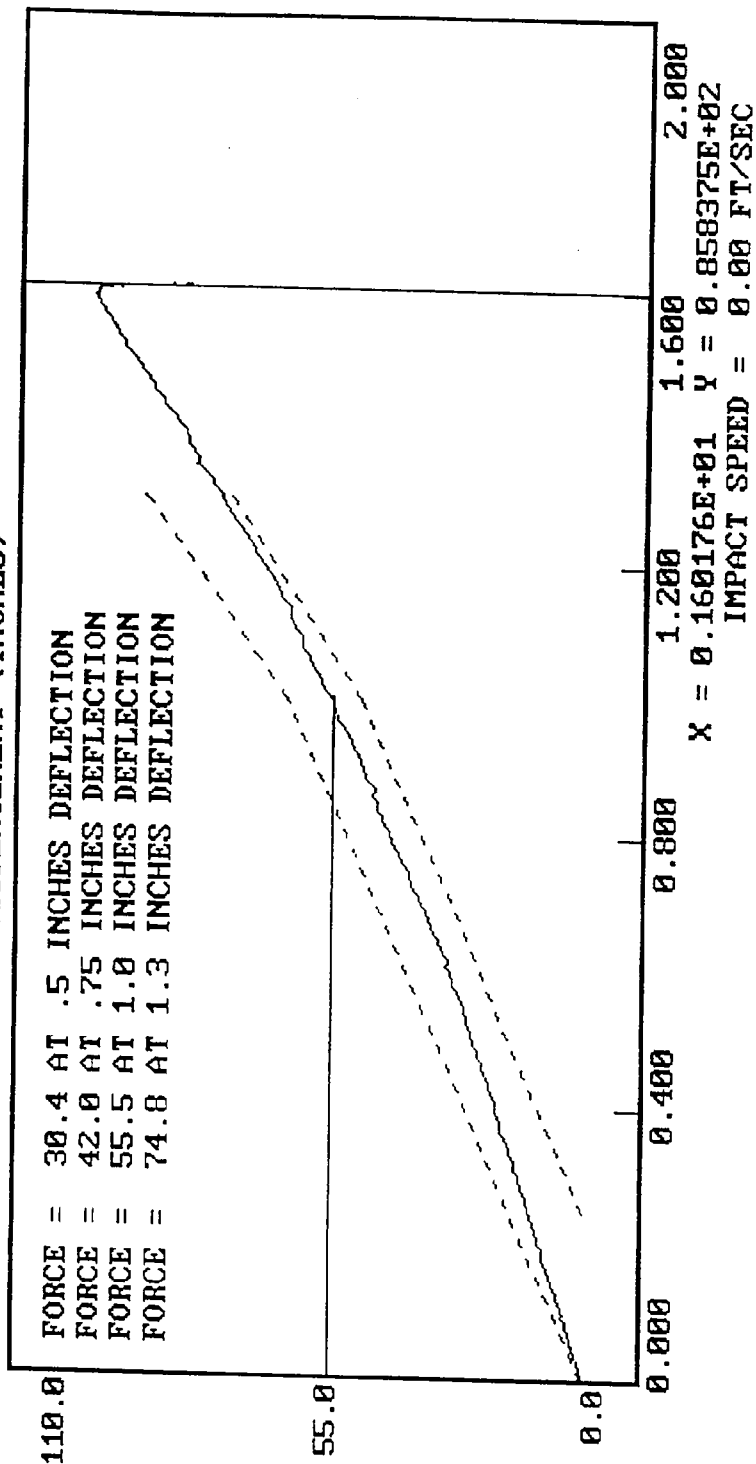


# DUMMY CALIBRATION - ABDOMEN COMPRESSION

DUMMY # 274

01-31-1997 12:40

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



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: January 31, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97335

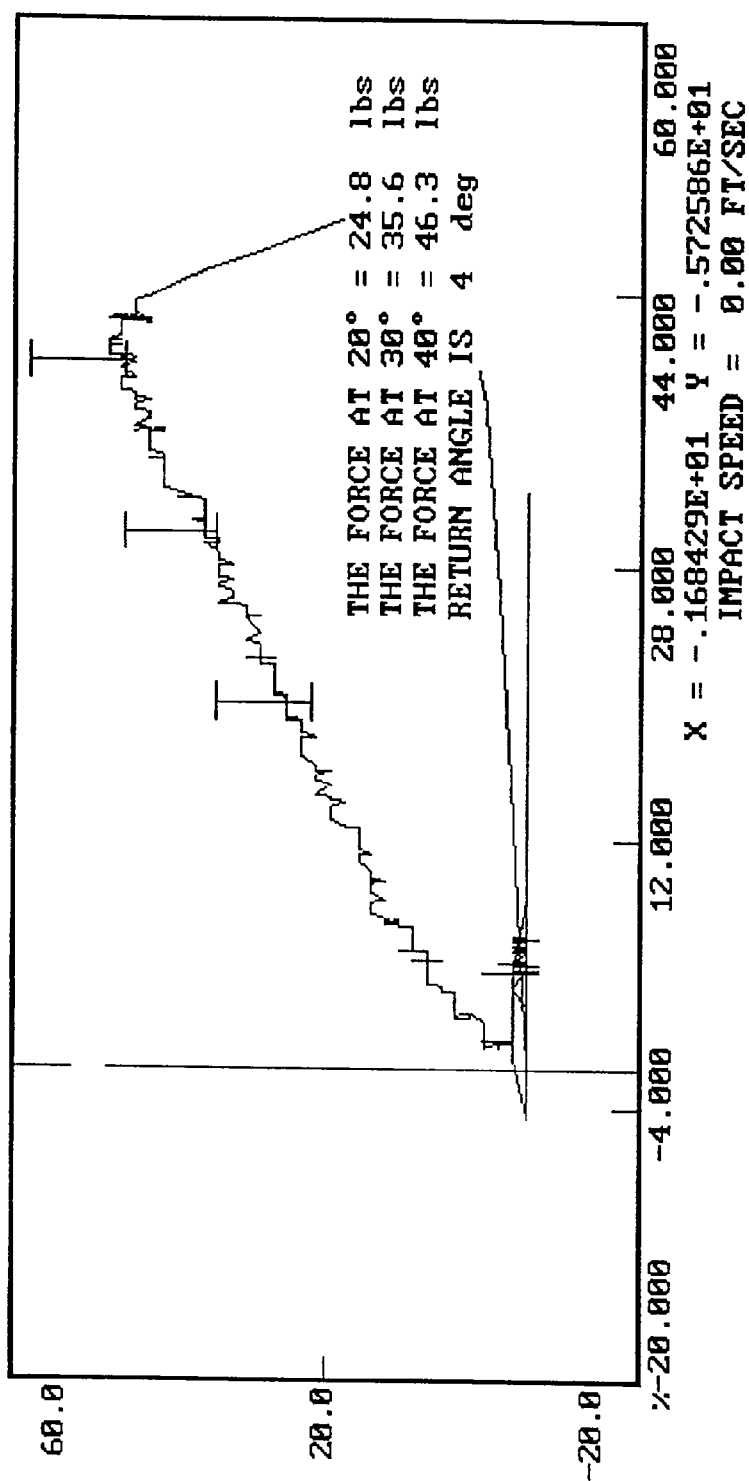
| TEST PARAMETER    | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE       | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY | 10 - 70%      | 19%          |
| FORCE @ 0°        | 0 - 6 lbs     | 0            |
| FORCE @ 20°       | 22 - 34 lbs   | 25           |
| FORCE @ 30°       | 34 - 46 lbs   | 36           |
| FORCE @ 40°       | 46 - 58 lbs   | 46           |
| RETURN ANGLE      | 12° maximum   | 4°           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Melich

APPROVED BY Don Korbak

DUMMY CALIBRATION - LUMBAR FLEXION  
 DUMMY # 274  
 01-31-1997 16:21  
 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: February 17, 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: Jim White

APPROVED BY: Rene Korbake

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

DATE: February 11, 1997

DUMMY NUMBER: 275

TEST NUMBER: D9744678

| TEST PARAMETER      |                    | SPECIFICATION | TEST RESULTS |
|---------------------|--------------------|---------------|--------------|
| TEMPERATURE         |                    | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY   |                    | 10 - 70%      | 15%          |
| VELOCITY<br>10 ft/s | FORCE (lb.)        | 188 - 253     | 204          |
|                     | DISPLACEMENT (in.) | 1.18 - 1.38   | 1.34         |
| VELOCITY<br>14 ft/s | FORCE (lb.)        | 389 - 472     | 429          |
|                     | DISPLACEMENT (in.) | 1.26 - 1.47   | 1.46         |
| VELOCITY<br>20 ft/s | FORCE (lb.)        | 841 - 1000    | 858          |
|                     | DISPLACEMENT (in.) | 1.30 - 1.57   | 1.51         |

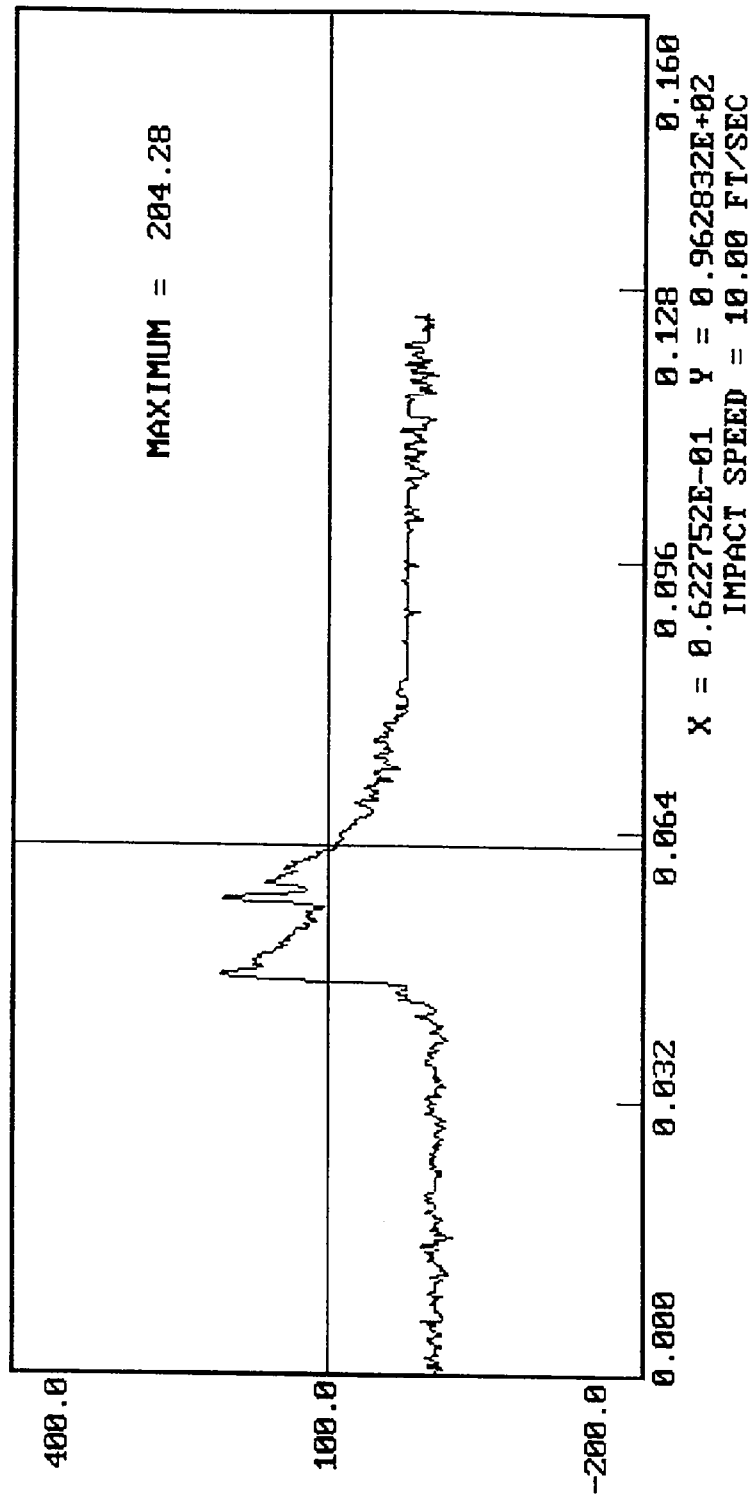
TEST MEETS SPECIFICATIONS

TECHNICIAN Jim Miller

APPROVED BY Rene Korbache

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

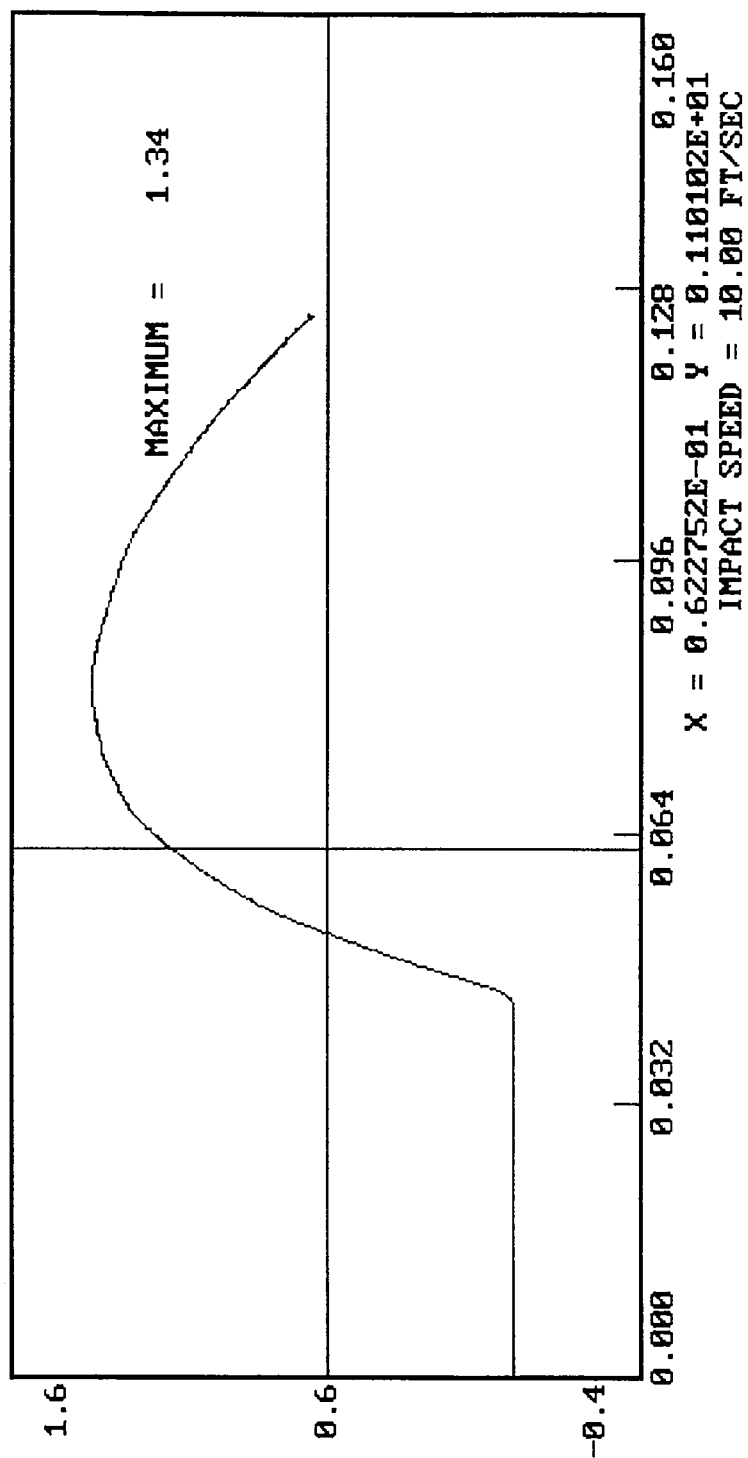
02-11-1997 13:53





02-11-1997 13:53

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

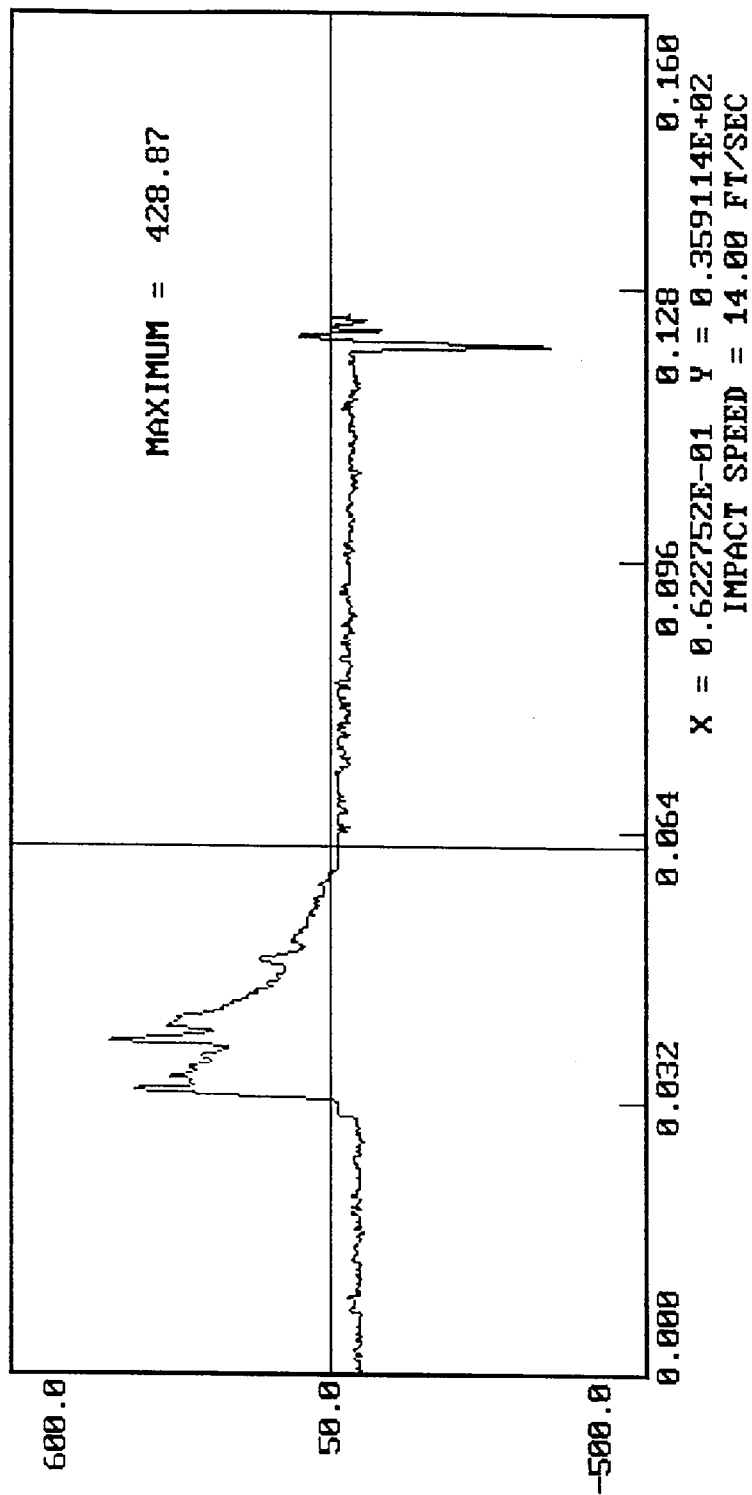


02-11-1997 14:01

DUMMY CALIBRATION - DAMPENER BENCH TEST

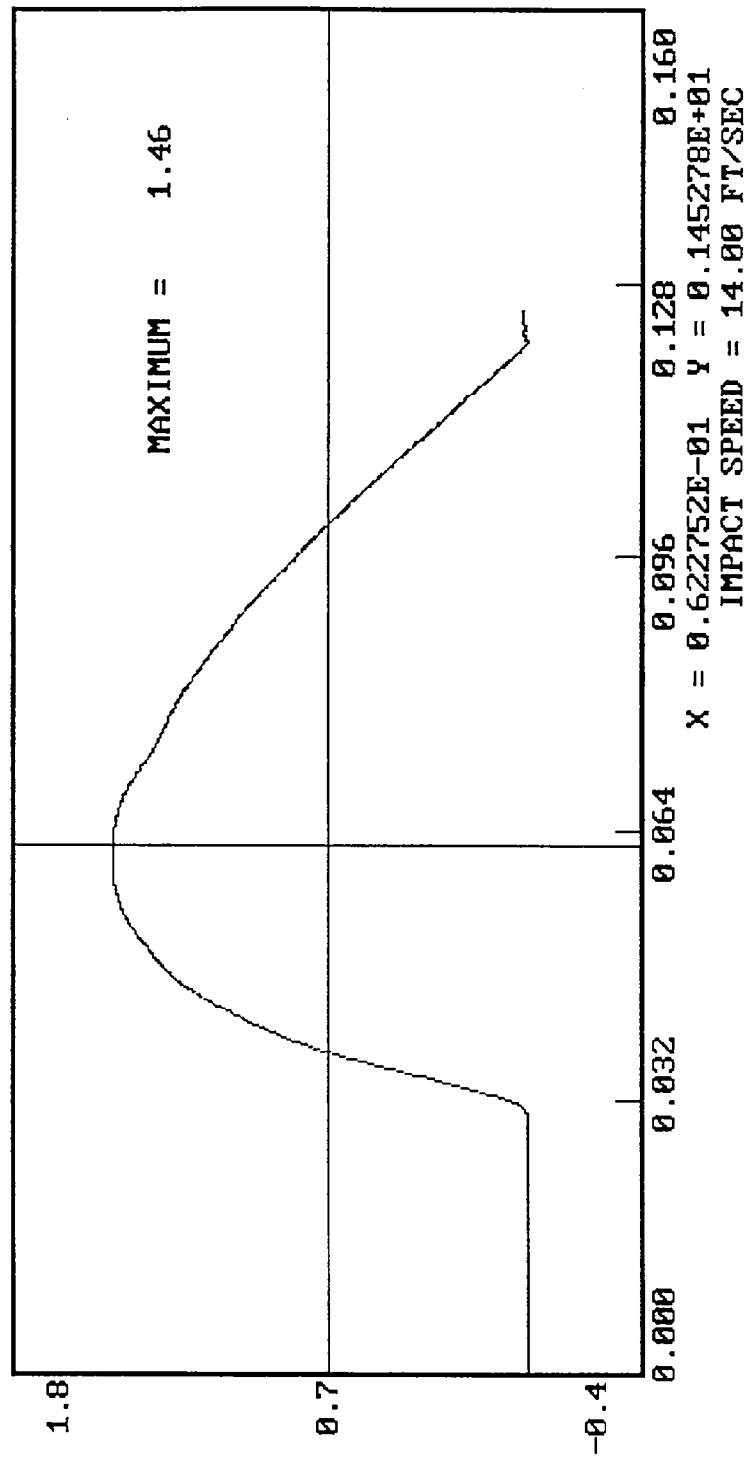
DUMMY # 275

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



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

02-11-1997 14:01

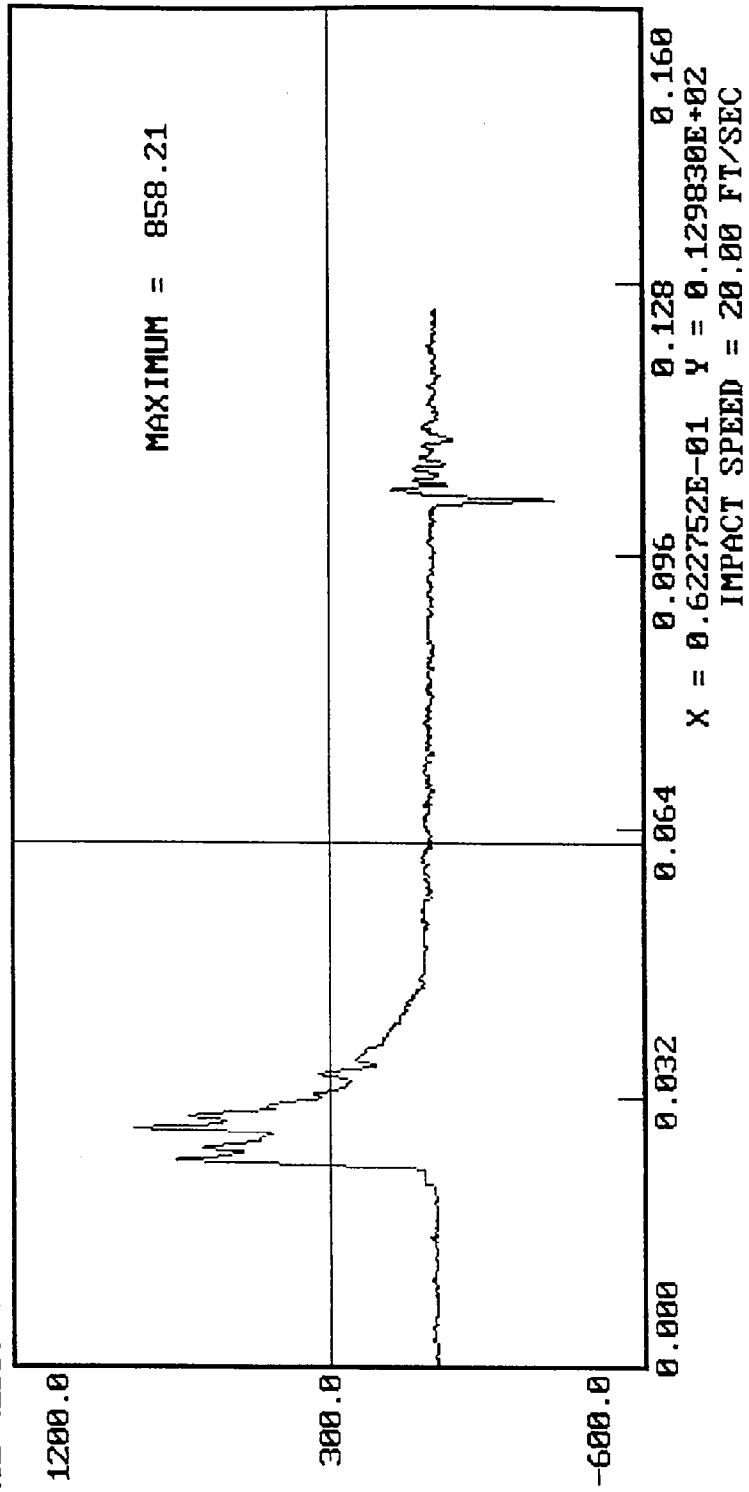


02-11-1997 14:20

DUMMY CALIBRATION - DAMPENER BENCH TEST

DUMMY # 275

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

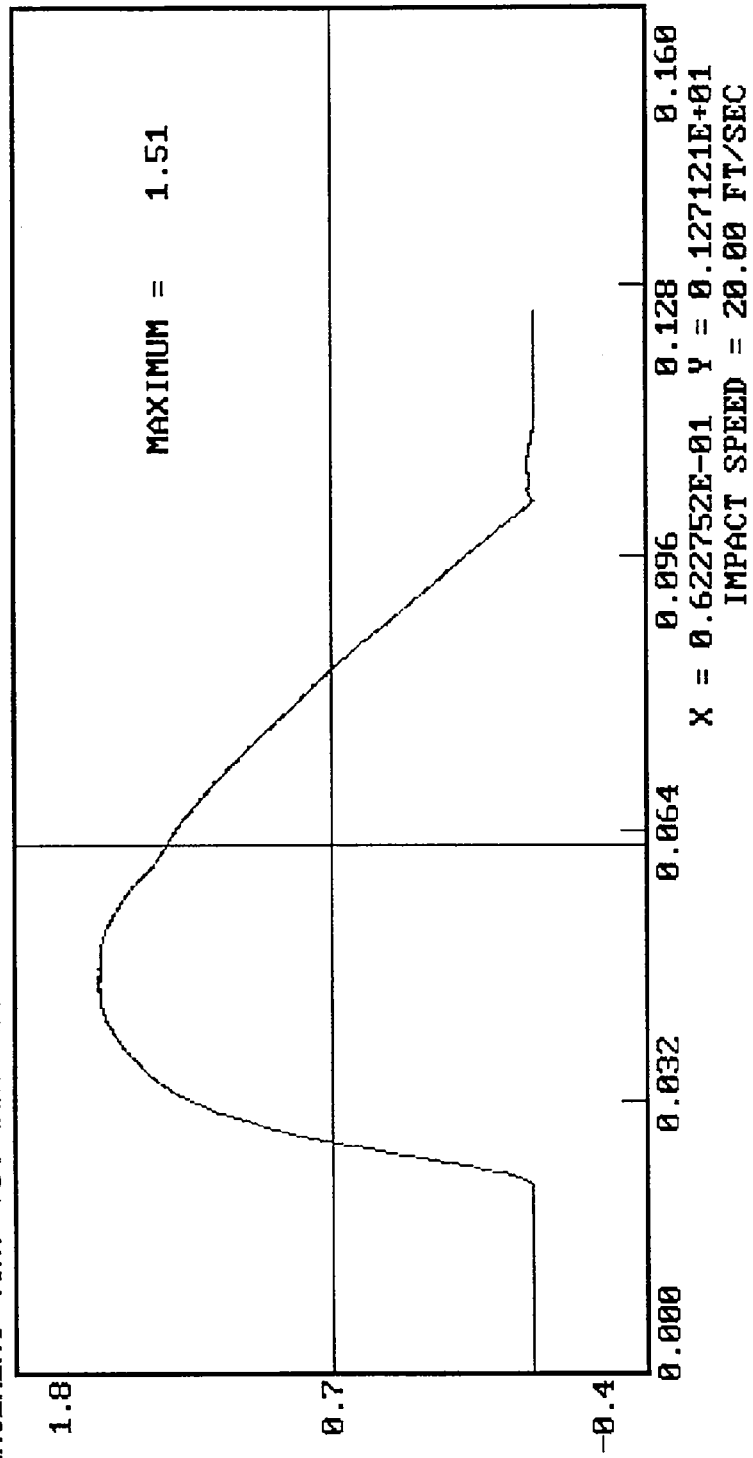


02-11-1997 14:20

DUMMY CALIBRATION - DAMPENER BENCH TEST

DUMMY # 275

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



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 17, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97442

| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 11%          |
| 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     | 17           |

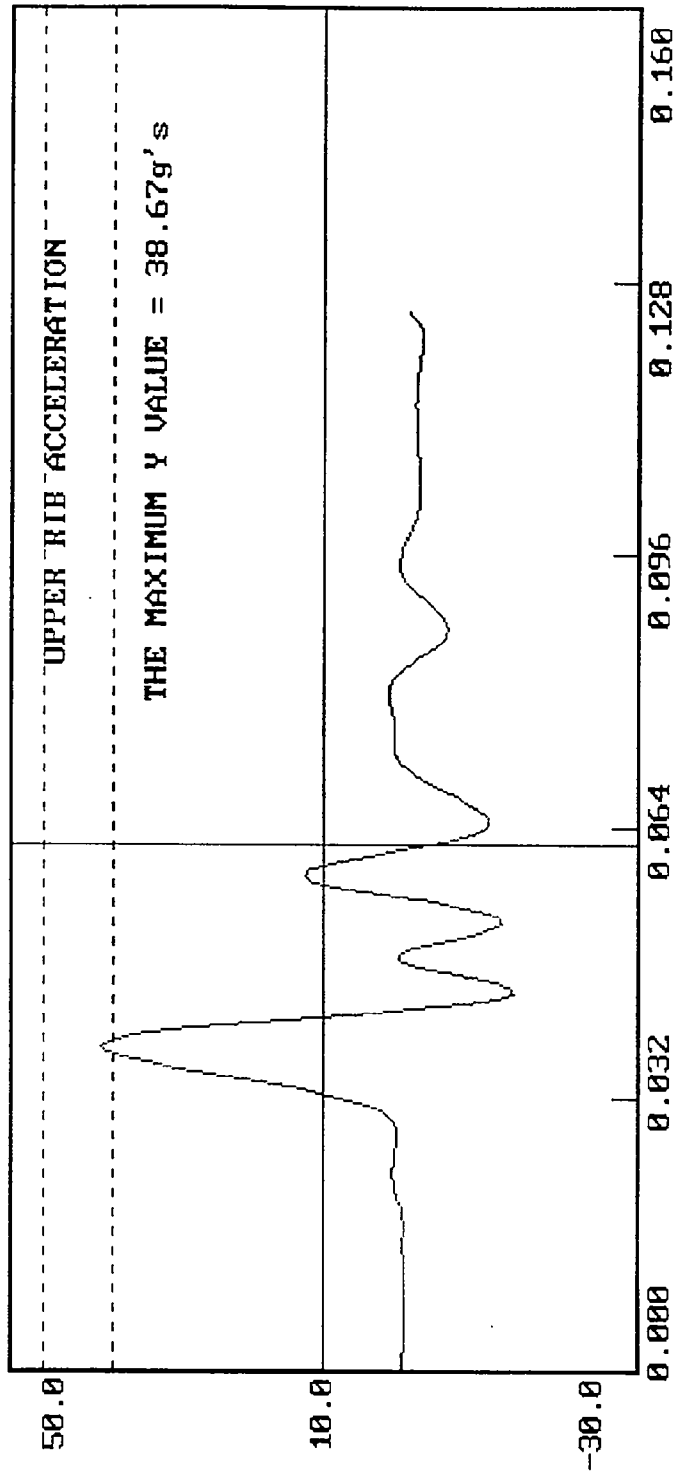
TEST MEETS SPECIFICATIONS

TECHNICIAN Jim M. L.

APPROVED BY Paul Korbake

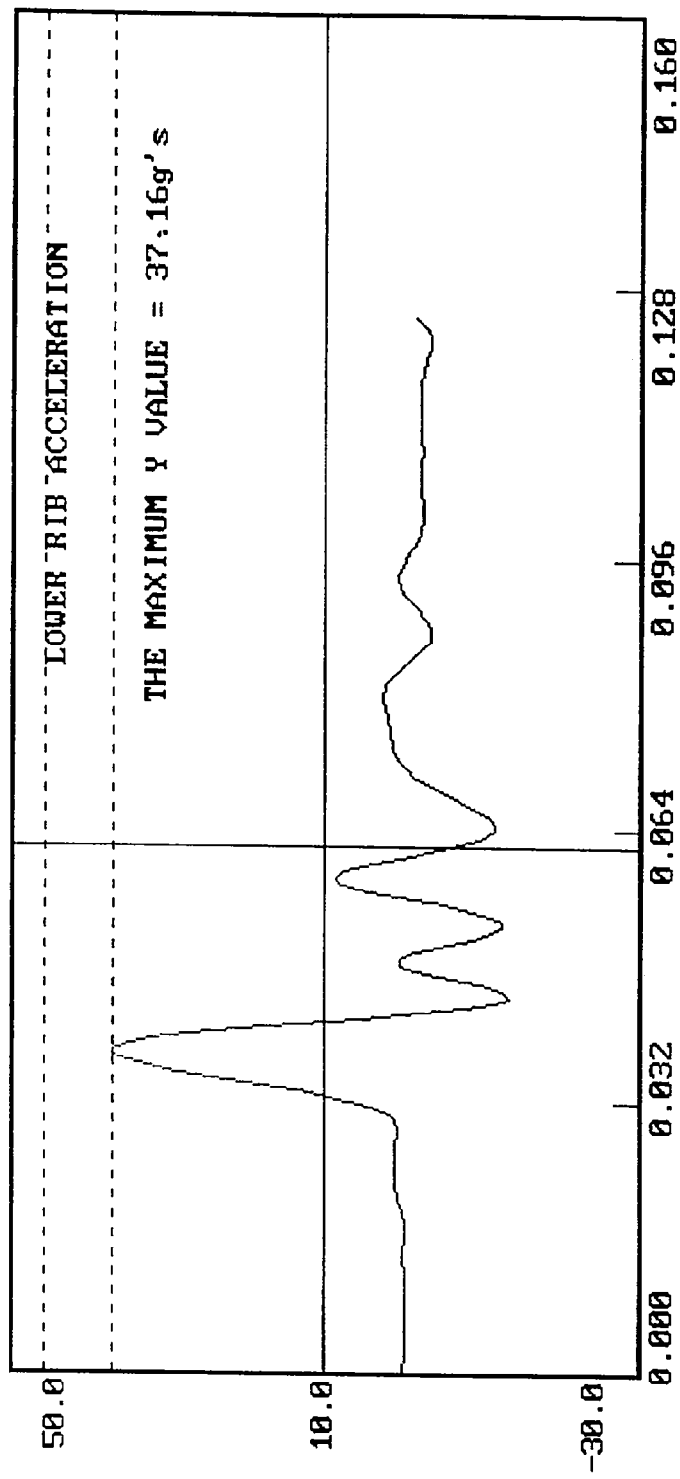
02-17-1997 09:36

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



IMPACT SPEED = 14.16 FT/SEC

DUMMY CALIBRATION - THORAX IMPACT  
DUMMY # 275  
02-17-1997 09:36  
ACCELERATION (G'S) VS. TIME ((SECONDS))



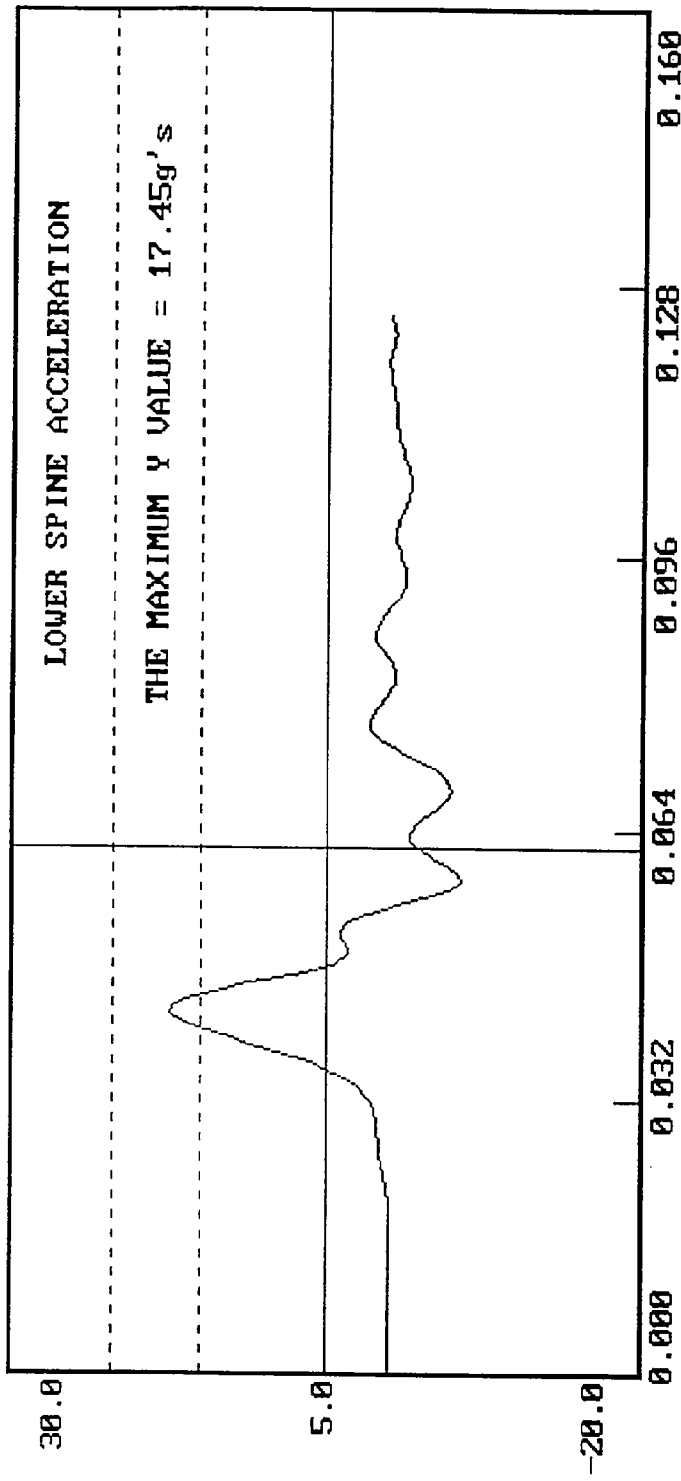
IMPACT SPEED = 14.16 FT/SEC



02-17-1997 09:37

DUMMY CALIBRATION - THORAX IMPACT  
DUMMY # 275

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



IMPACT SPEED = 14.16 FT/SEC

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 17, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97443

| TEST PARAMETER      | SPECIFICATION   | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE         | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY   | 10 - 70%        | 11%          |
| PROBE SPEED         | 13.8 - 14.2 f/s | 14.1         |
| PELVIS ACCELERATION | 40 - 60 g's     | 50           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim White

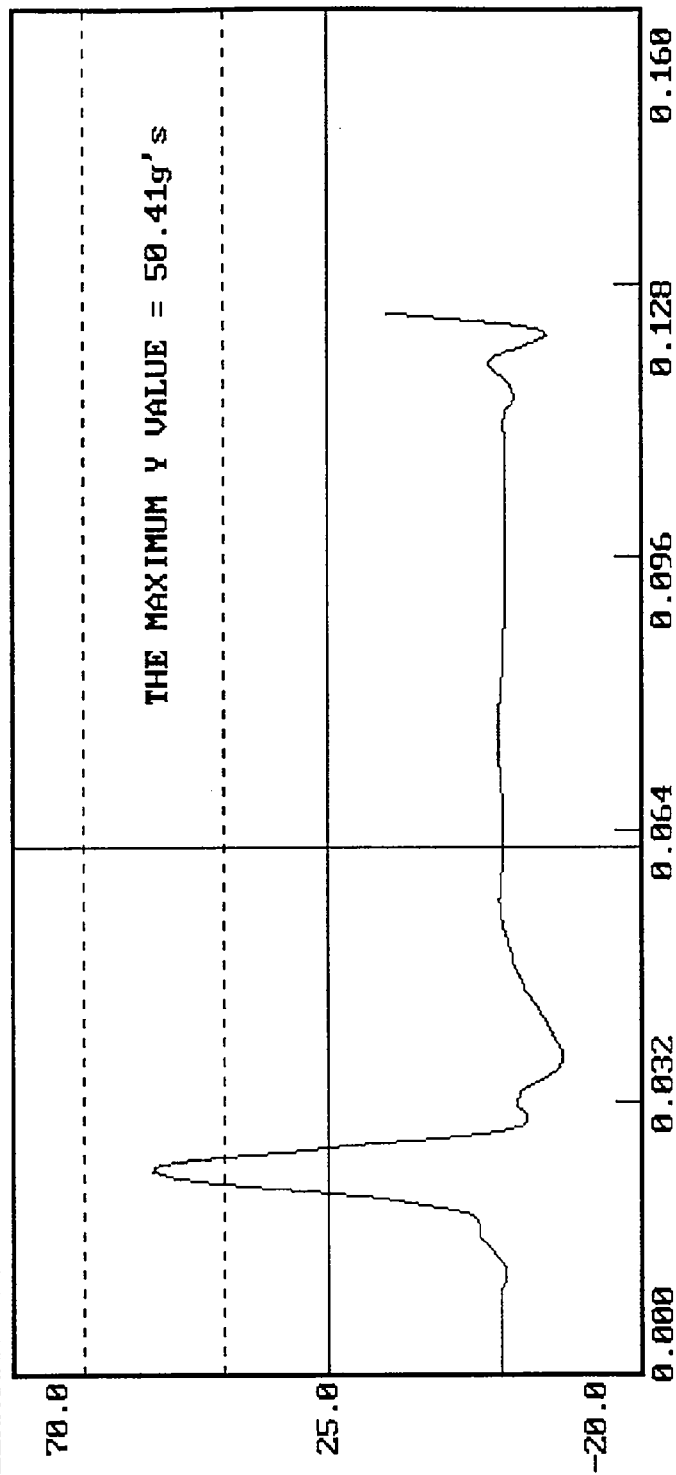
APPROVED BY Gene Krasinski

02-17-1997 10:04

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: February 14, 1997

DUMMY NUMBER: 275

TEST NUMBER: D97444

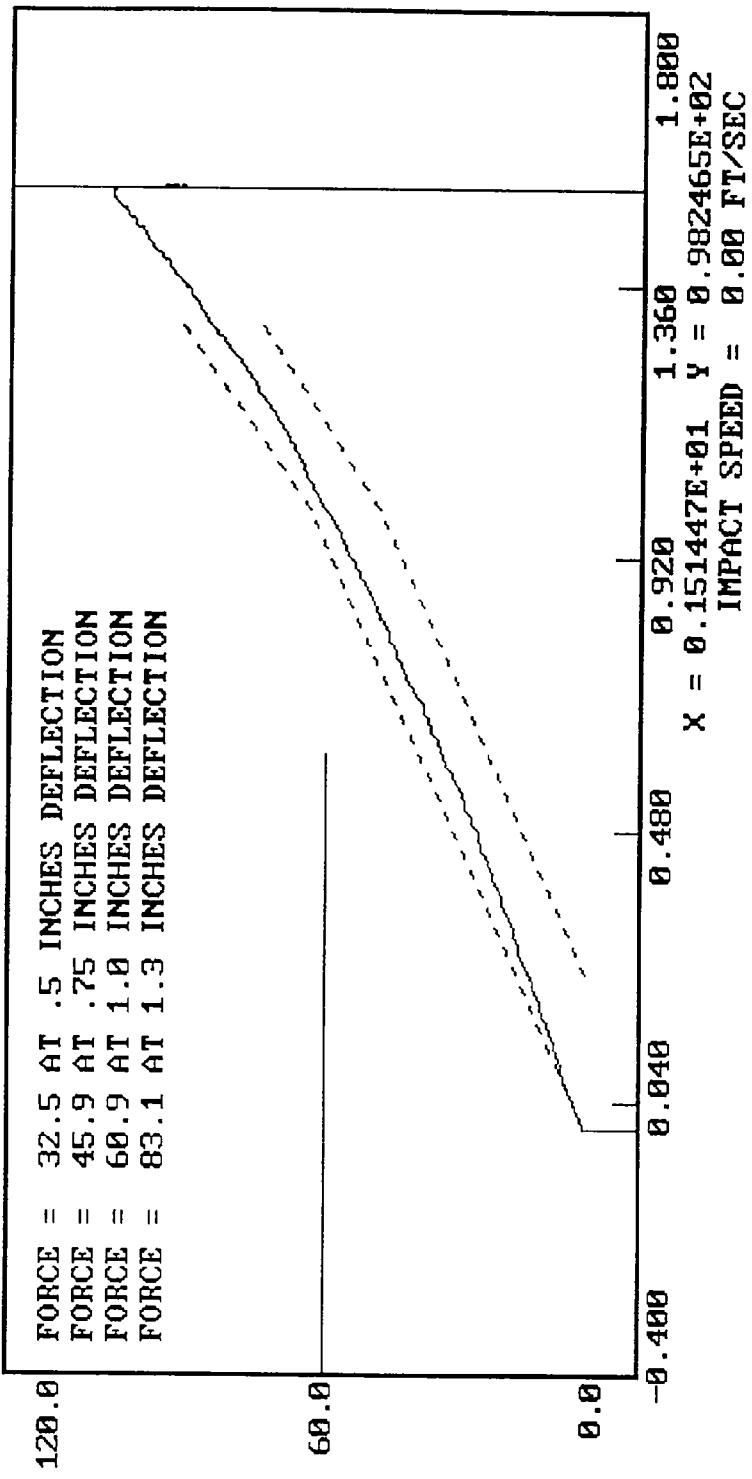
| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 15%          |
| FORCE @ 0.5 in    | 23.3 - 36.5 lbs | 32.5         |
| FORCE @ 0.75 in   | 36.7 - 49.8 lbs | 45.9         |
| FORCE @ 1.0 in    | 50 - 63 lbs     | 61           |
| FORCE @ 1.3 in    | 73 - 88 lbs     | 83           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim M. L. [Signature]

APPROVED BY Steve Koebke [Signature]

DUMMY CALIBRATION - ABDOMEN COMPRESSION  
 DUMMY # 275  
 02-14-1997 10:23  
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: February 14, 1997

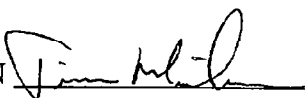
DUMMY NUMBER: 275

TEST NUMBER: D97445

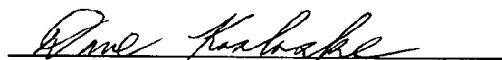
| TEST PARAMETER    | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE       | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY | 10 - 70%      | 15%          |
| FORCE @ 0°        | 0 - 6 lbs     | 0            |
| FORCE @ 20°       | 22 - 34 lbs   | 30           |
| FORCE @ 30°       | 34 - 46 lbs   | 43           |
| FORCE @ 40°       | 46 - 58 lbs   | 53           |
| RETURN ANGLE      | 12° maximum   | 1°           |

TEST MEETS SPECIFICATIONS

TECHNICIAN

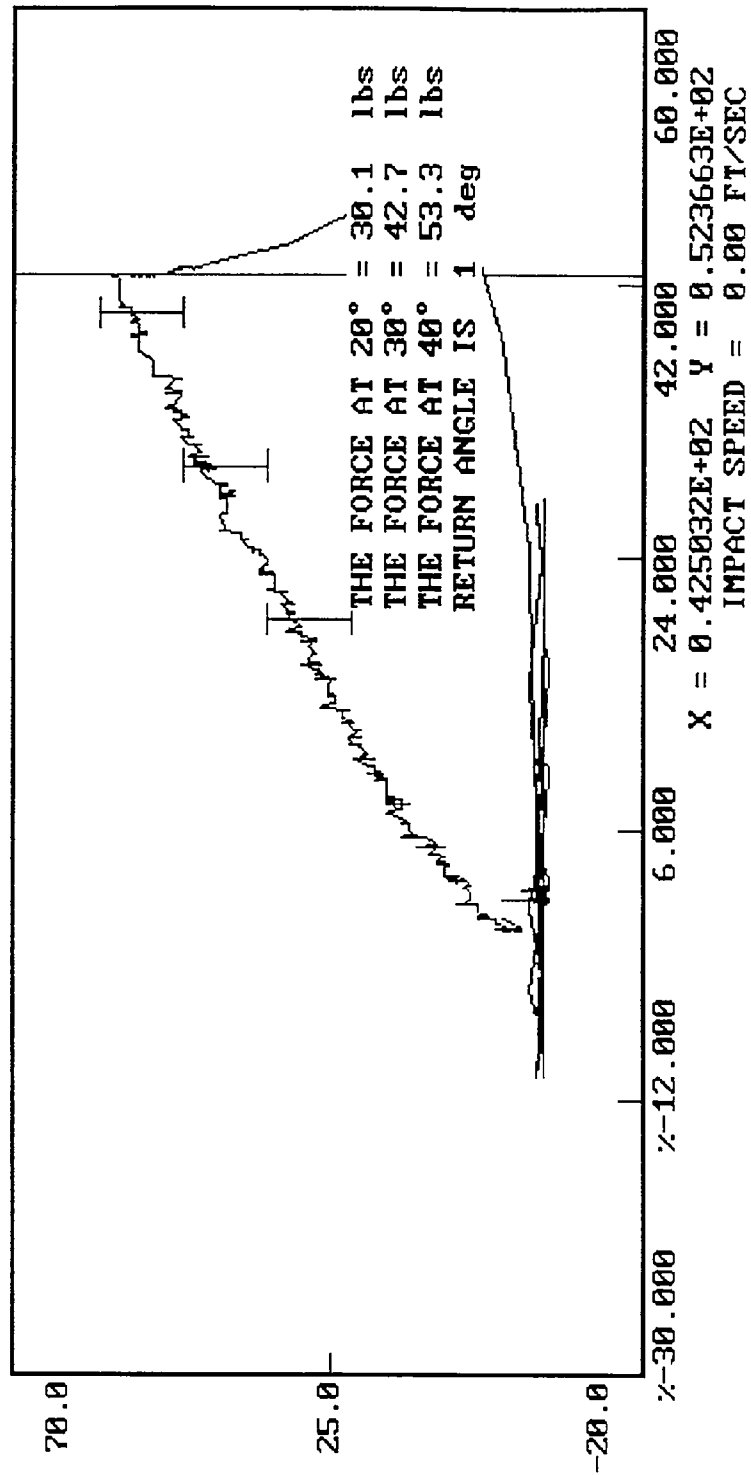


APPROVED BY



02-14-1997 12:42

DUMMY CALIBRATION - LUMBAR FLEXION  
DUMMY # 275  
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: February 14, 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:

Tim M. L.

APPROVED BY:

Alan K. K.

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

DATE: February 11, 1997

DUMMY NUMBER: 274

TEST NUMBER: D9743678

| TEST PARAMETER      |                    | SPECIFICATION | TEST RESULTS |
|---------------------|--------------------|---------------|--------------|
| TEMPERATURE         |                    | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY   |                    | 10 - 70%      | 15%          |
| VELOCITY<br>10 ft/s | FORCE (lb.)        | 188 - 253     | 246          |
|                     | DISPLACEMENT (in.) | 1.18 - 1.38   | 1.20         |
| VELOCITY<br>14 ft/s | FORCE (lb.)        | 389 - 472     | 396          |
|                     | DISPLACEMENT (in.) | 1.26 - 1.47   | 1.32         |
| VELOCITY<br>20 ft/s | FORCE (lb.)        | 841 - 1000    | 932          |
|                     | DISPLACEMENT (in.) | 1.30 - 1.57   | 1.35         |

TEST MEETS SPECIFICATIONS

TECHNICIAN

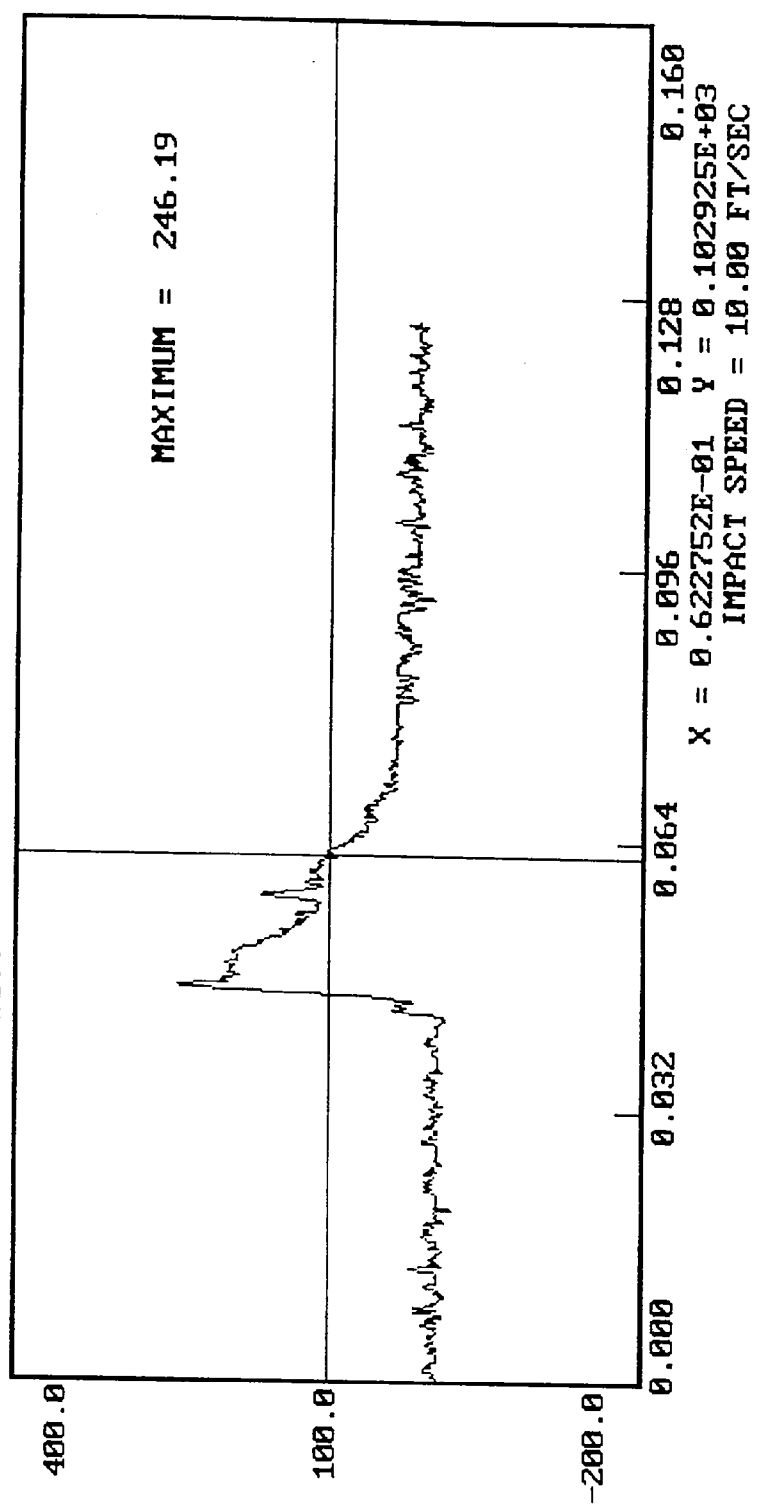
*Tim M. L.*

APPROVED BY

*Dave Kozlowski*

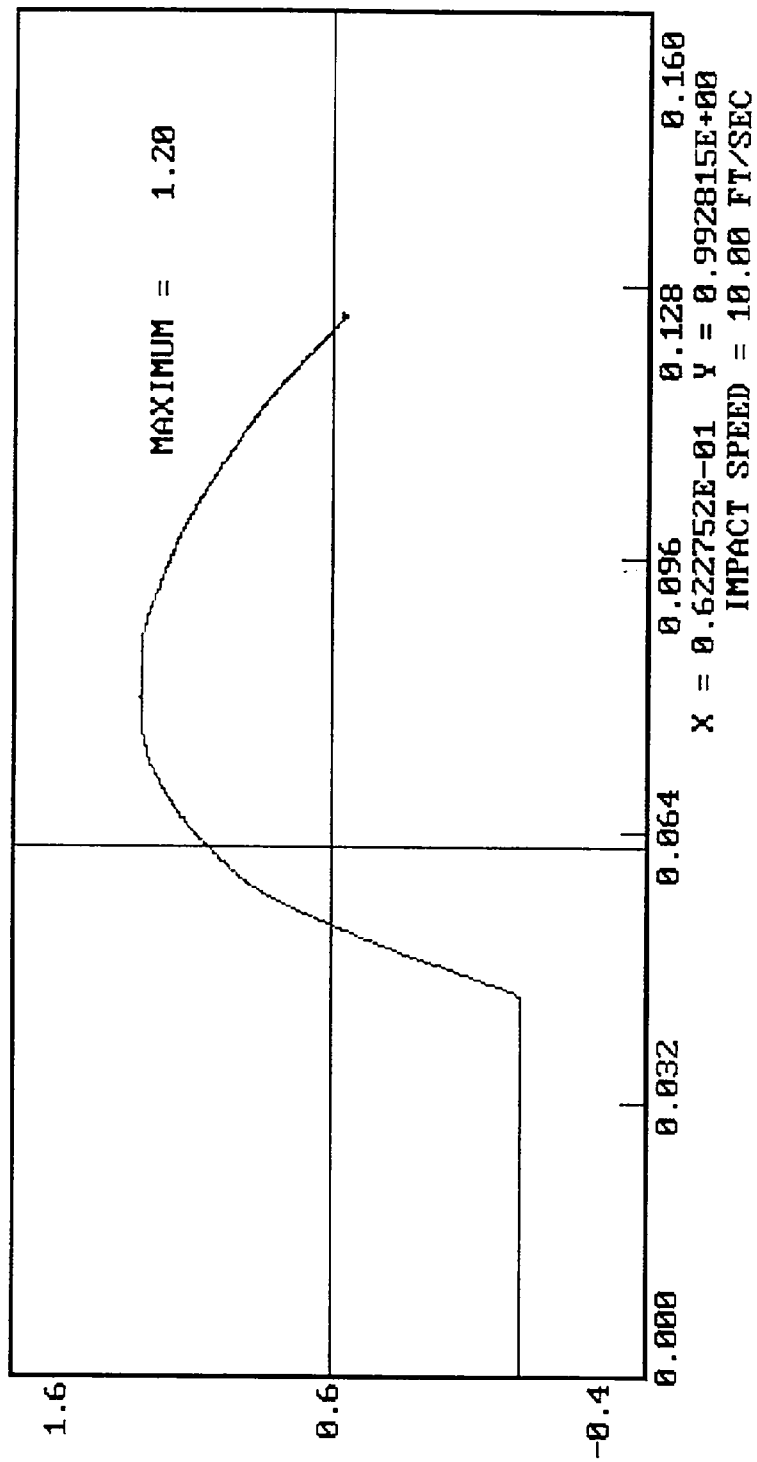
DUMMY CALIBRATION - DAMPENER BENCH TEST  
 DUMMY # 274  
 FORCE (LBS) VS. TIME ((SECONDS))

02-11-1997 11:49



DUMMY CALIBRATION - DAMPENER BENCH TEST  
 DUMMY # 274  
 DISPLACEMENT (IN) VS. TIME ((SECONDS))

02-11-1997 11:49

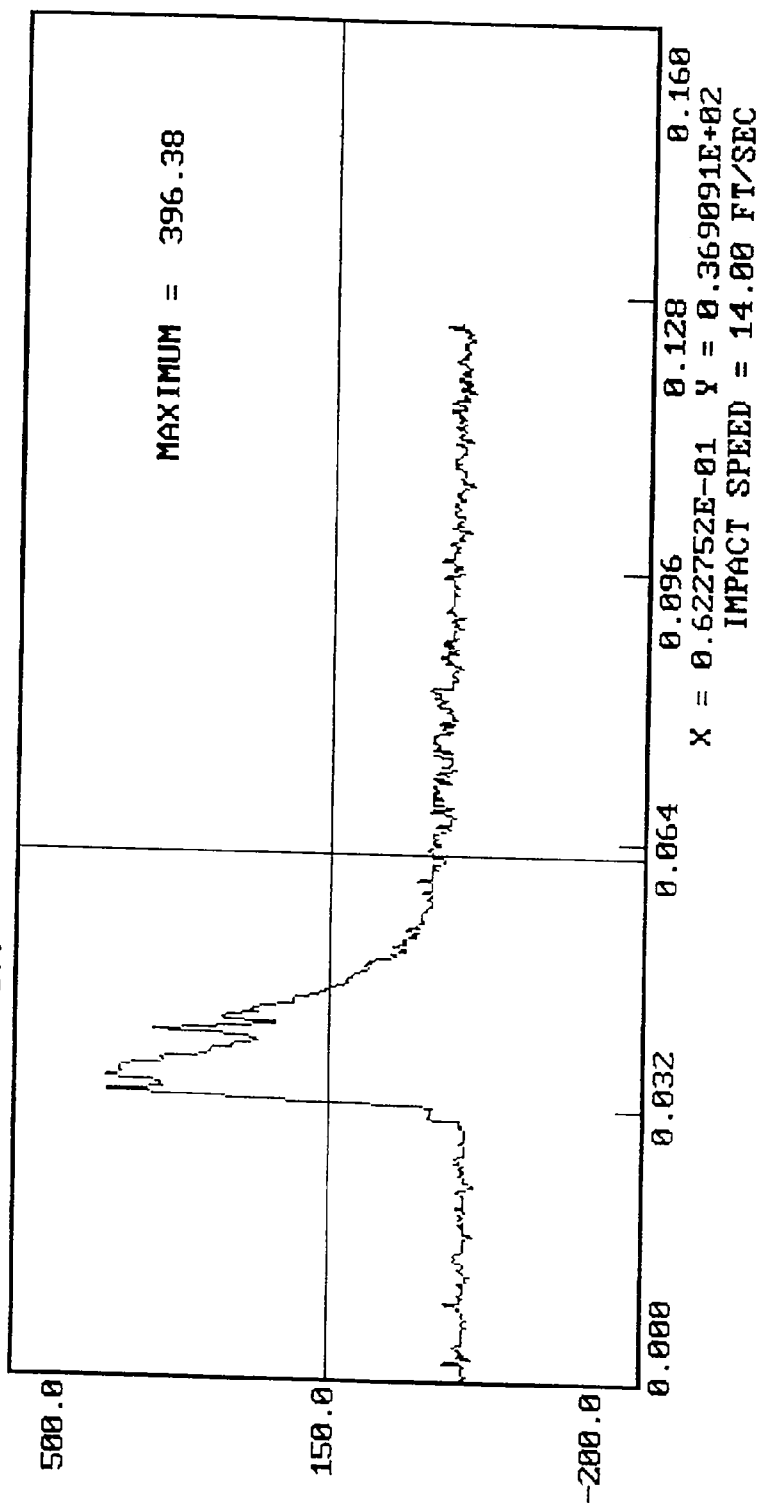


# DUMMY CALIBRATION - DAMPENER BENCH TEST

DUMMY # 274

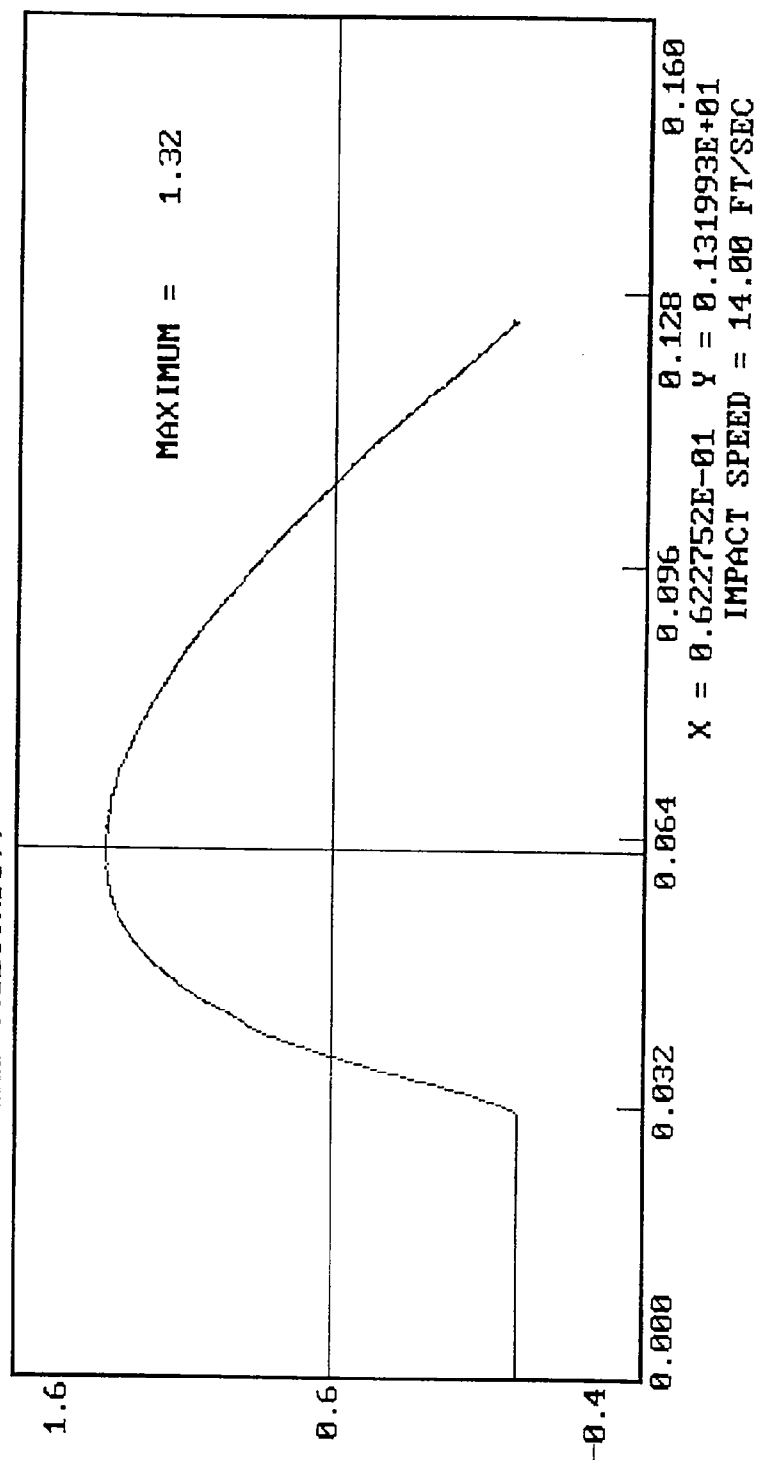
FORCE (LBS) VS. TIME ((SECONDS))

02-11-1997 11:45



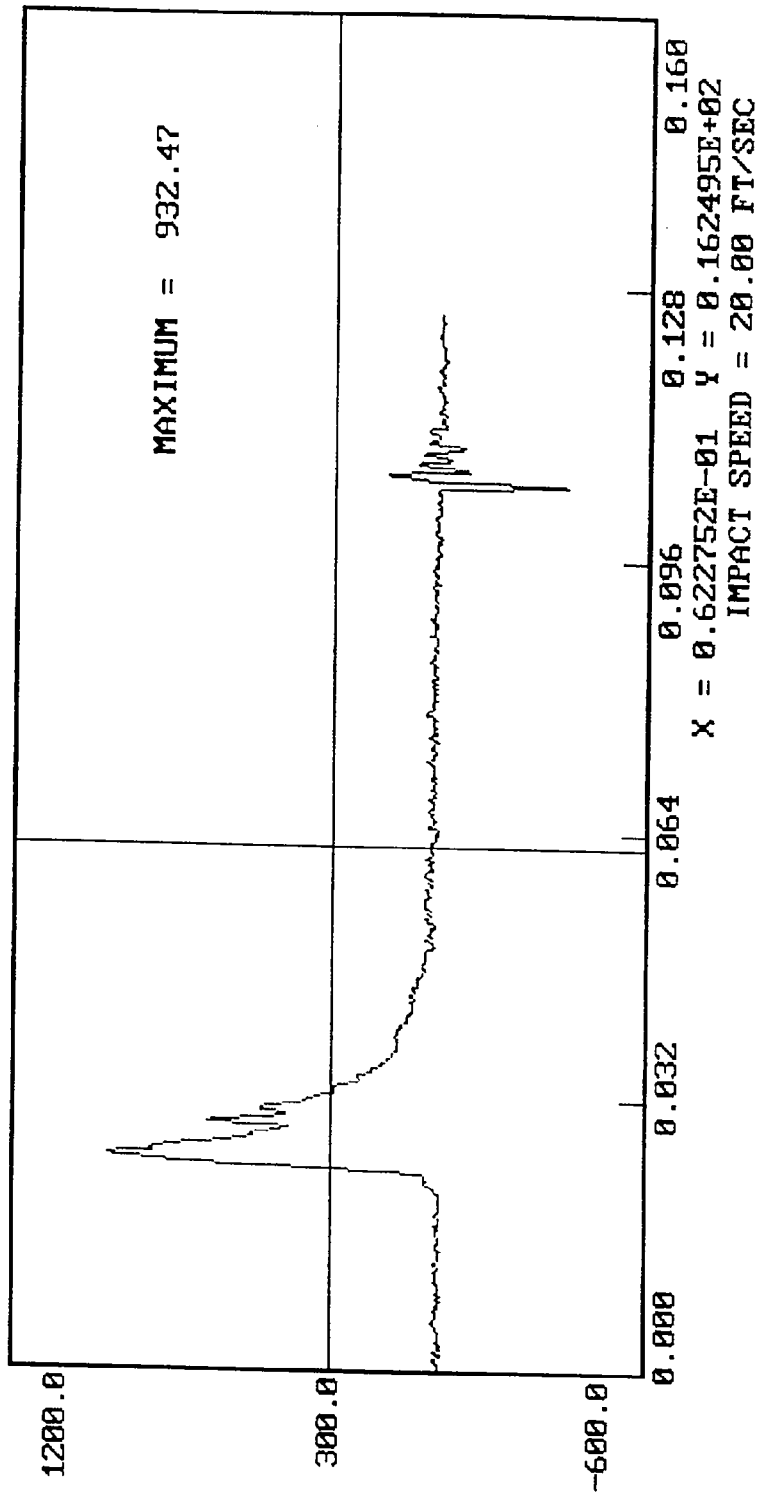
DUMMY CALIBRATION - DAMPENER BENCH TEST  
 DUMMY # 274  
 DISPLACEMENT (IN) VS. TIME ((SECONDS))

02-11-1997 11:45



DUMMY CALIBRATION - DAMPENER BENCH TEST  
 DUMMY # 274  
 FORCE (LBS) VS. TIME ((SECONDS))

02-11-1997 11:42



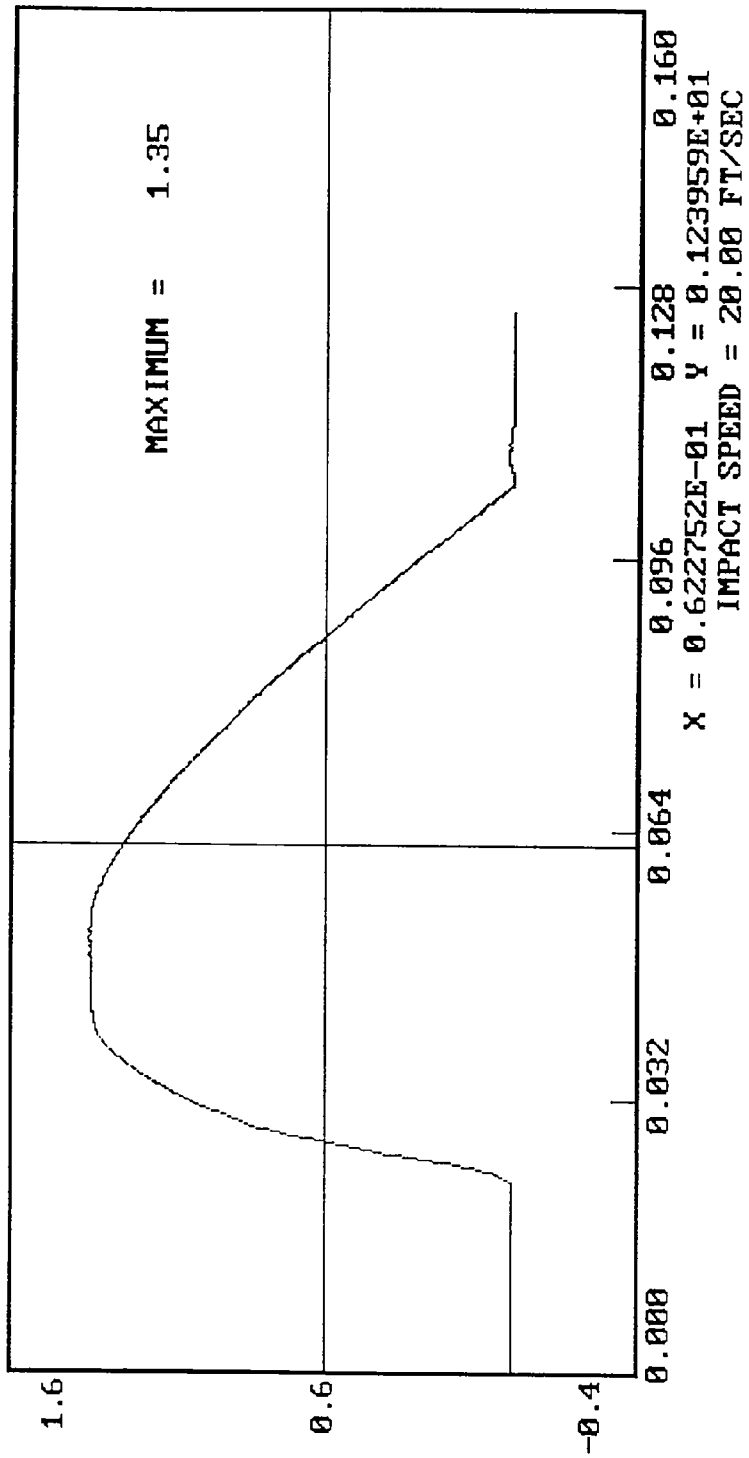


02-11-1997 11:42

DUMMY CALIBRATION - DAMPENER BENCH TEST

DUMMY # 274

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



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 14, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97432

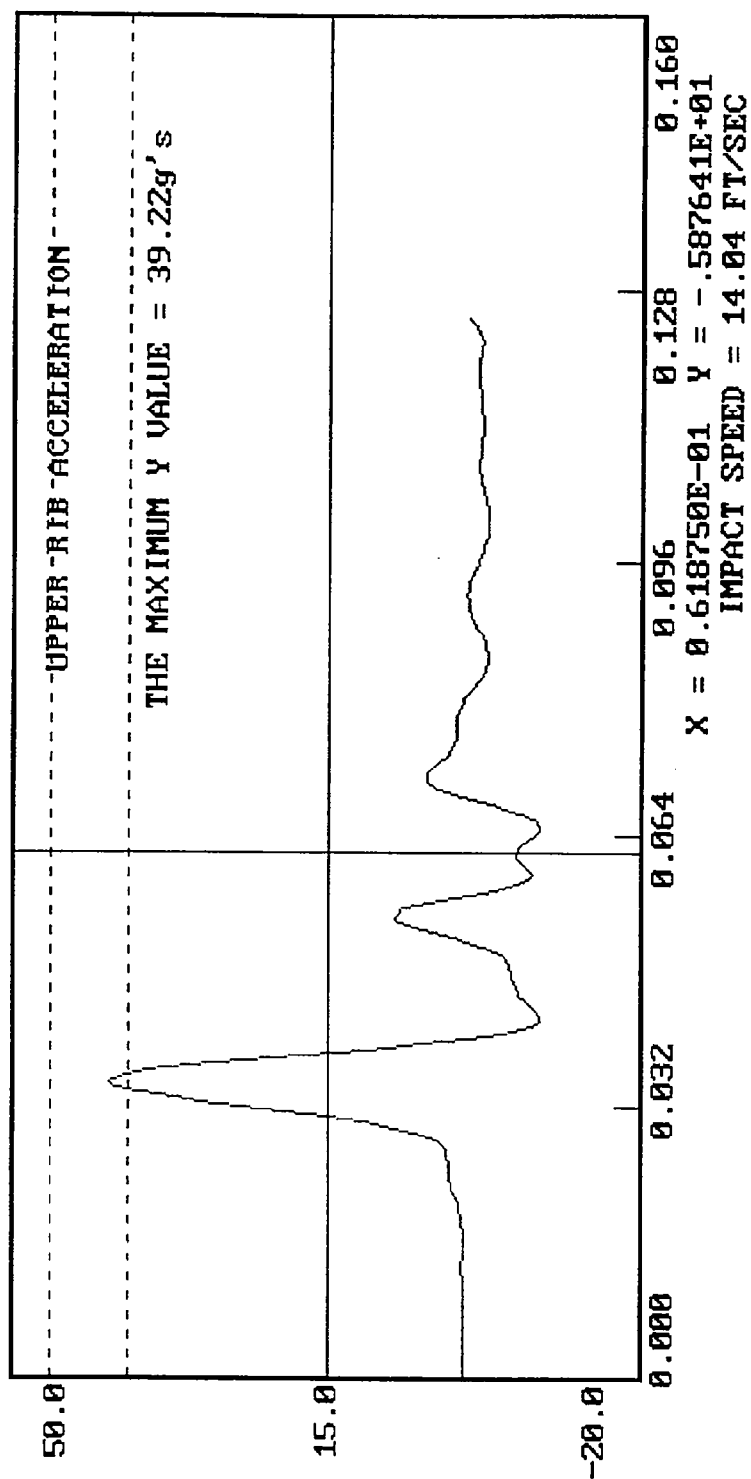
| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 15%          |
| PROBE SPEED       | 13.8 - 14.2 fps | 14.0         |
| UPPER RIB         | 37 - 46 g's     | 39           |
| LOWER RIB         | 37 - 46 g's     | 37           |
| LOWER SPINE       | 15 - 22 g's     | 19           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim M. H. [Signature]

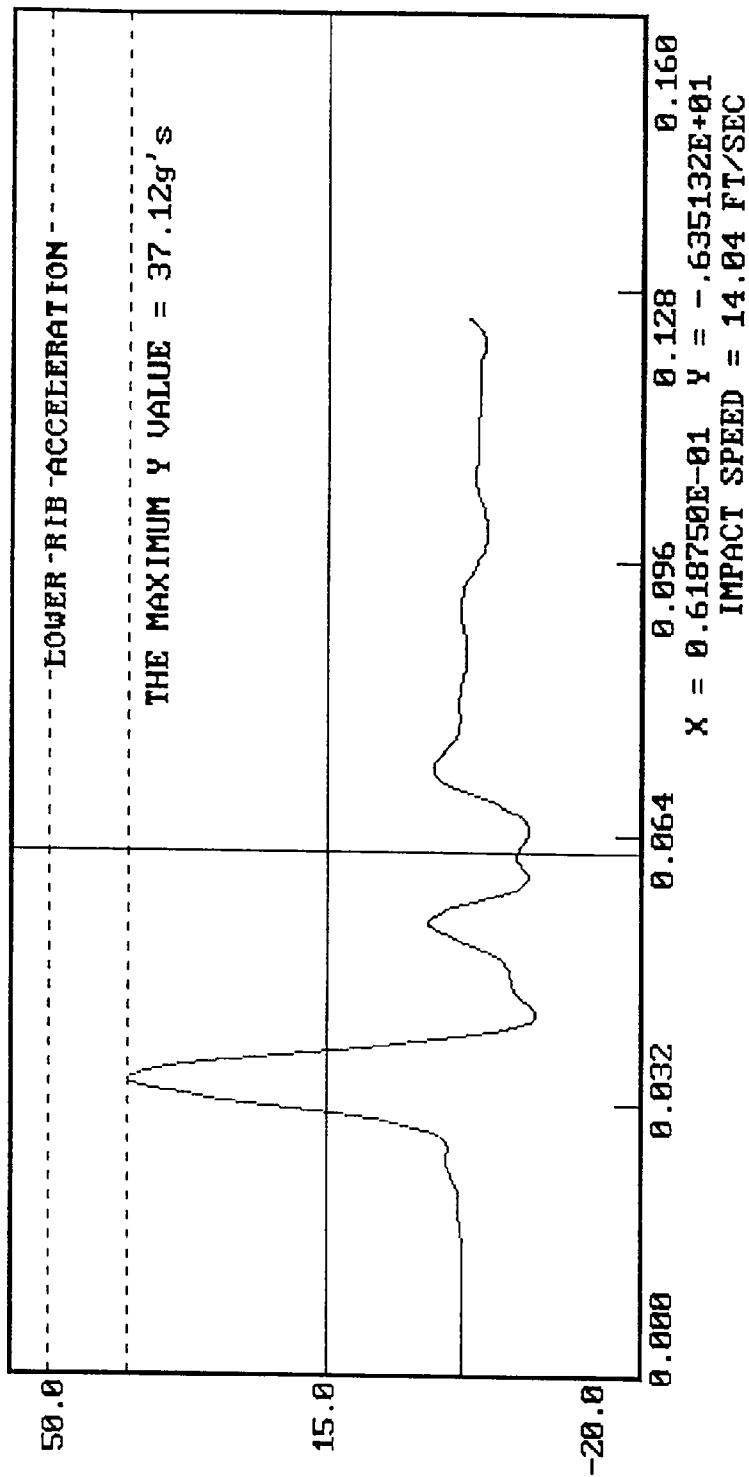
APPROVED BY [Signature]

DUMMY CALIBRATION - THORAX IMPACT  
 DUMMY # 274  
 02-14-1997 15:10  
 ACCELERATION (G'S) VS. TIME ((SECONDS))

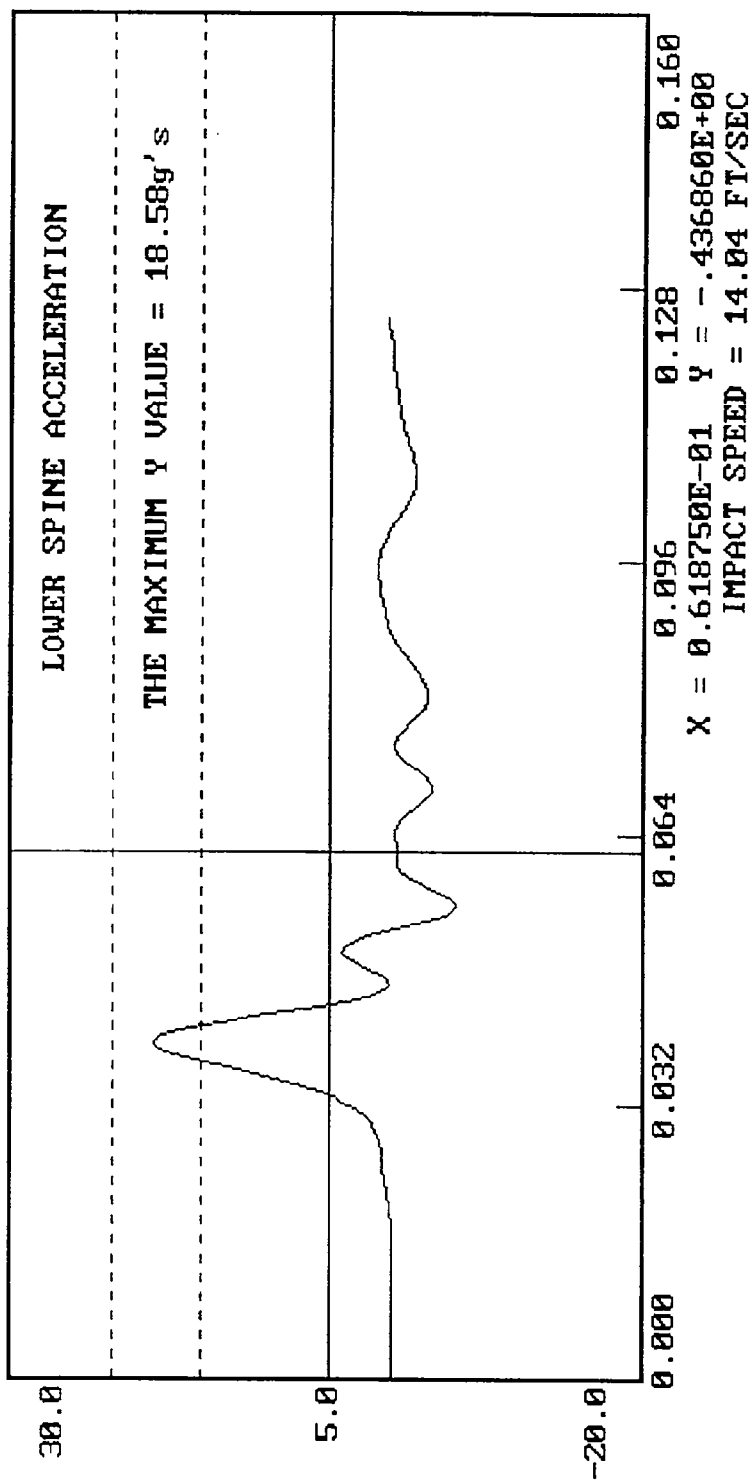


02-14-1997 15:18

DUMMY CALIBRATION - THORAX IMPACT  
DUMMY # 274  
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT  
 DUMMY # 274  
 02-14-1997 15:13  
 ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: February 14, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97433

| TEST PARAMETER      | SPECIFICATION   | TEST RESULTS |
|---------------------|-----------------|--------------|
| TEMPERATURE         | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY   | 10 - 70%        | 15%          |
| PROBE SPEED         | 13.8 - 14.2 f/s | 14.1         |
| PELVIS ACCELERATION | 40 - 60 g's     | 44           |

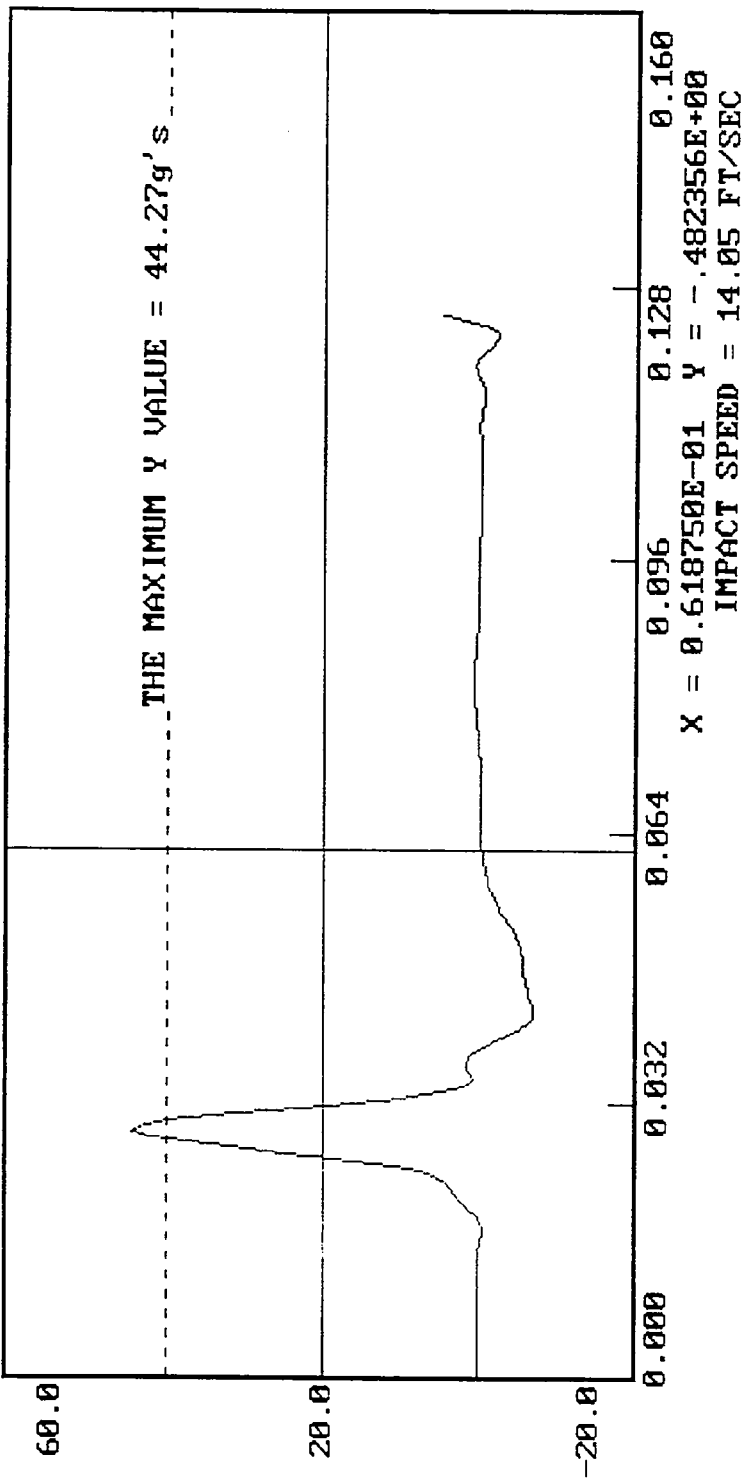
TEST MEETS SPECIFICATIONS

TECHNICIAN Jim White

APPROVED BY Paul Kabeke

02-14-1997 15:27

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: February 14, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97434

| TEST PARAMETER    | SPECIFICATION   | TEST RESULTS |
|-------------------|-----------------|--------------|
| TEMPERATURE       | 66 - 78° F      | 70°          |
| RELATIVE HUMIDITY | 10 - 70%        | 15%          |
| FORCE @ 0.5 in    | 23.3 - 36.5 lbs | 29.8         |
| FORCE @ 0.75 in   | 36.7 - 49.8 lbs | 42.2         |
| FORCE @ 1.0 in    | 50 - 63 lbs     | 57           |
| FORCE @ 1.3 in    | 73 - 88 lbs     | 77           |

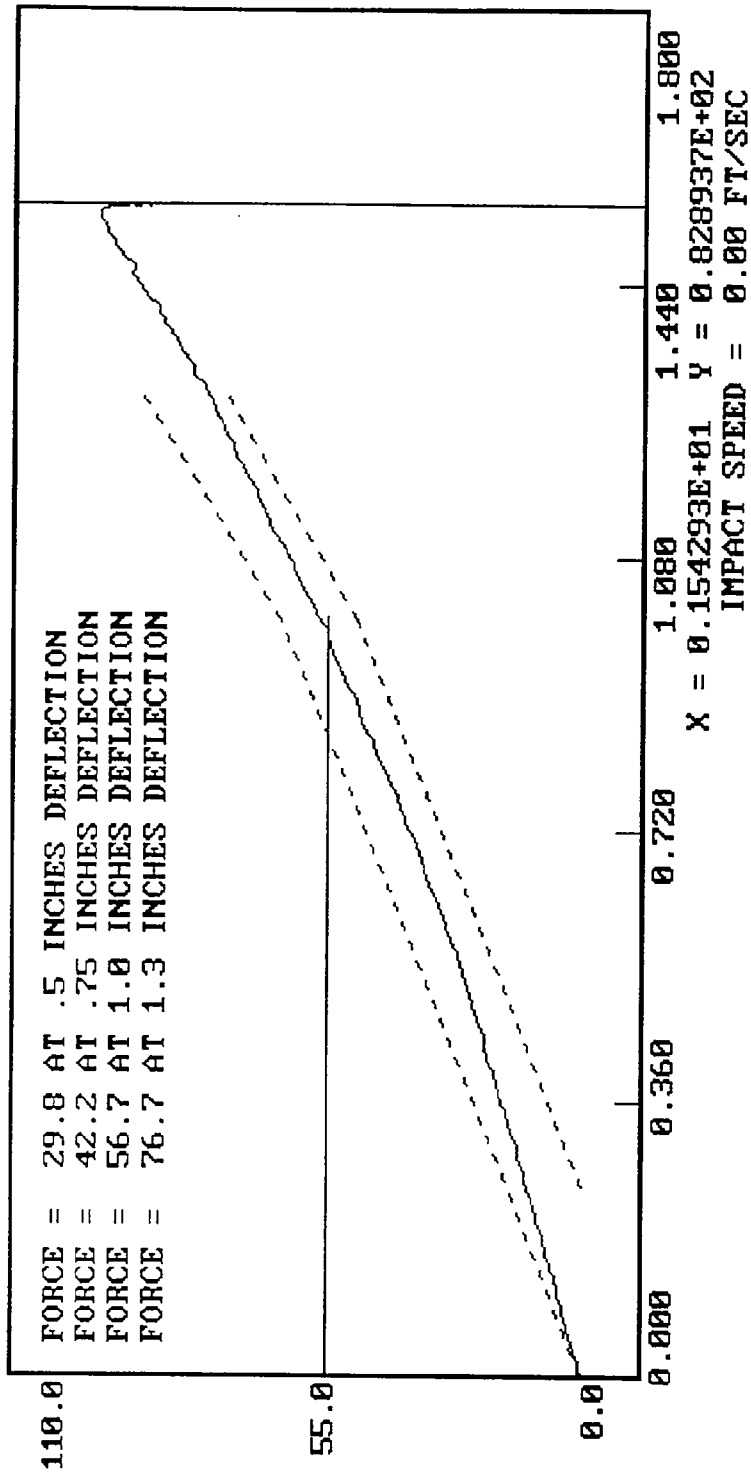
TEST MEETS SPECIFICATIONS

TECHNICIAN Tim M. H.

APPROVED BY Don Koshako



DUMMY CALIBRATION - ABDOMEN COMPRESSION  
 DUMMY # 274  
 02-14-1997 10:07  
 ABDOMEN FORCE (LBS) VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: February 14, 1997

DUMMY NUMBER: 274

TEST NUMBER: D97435

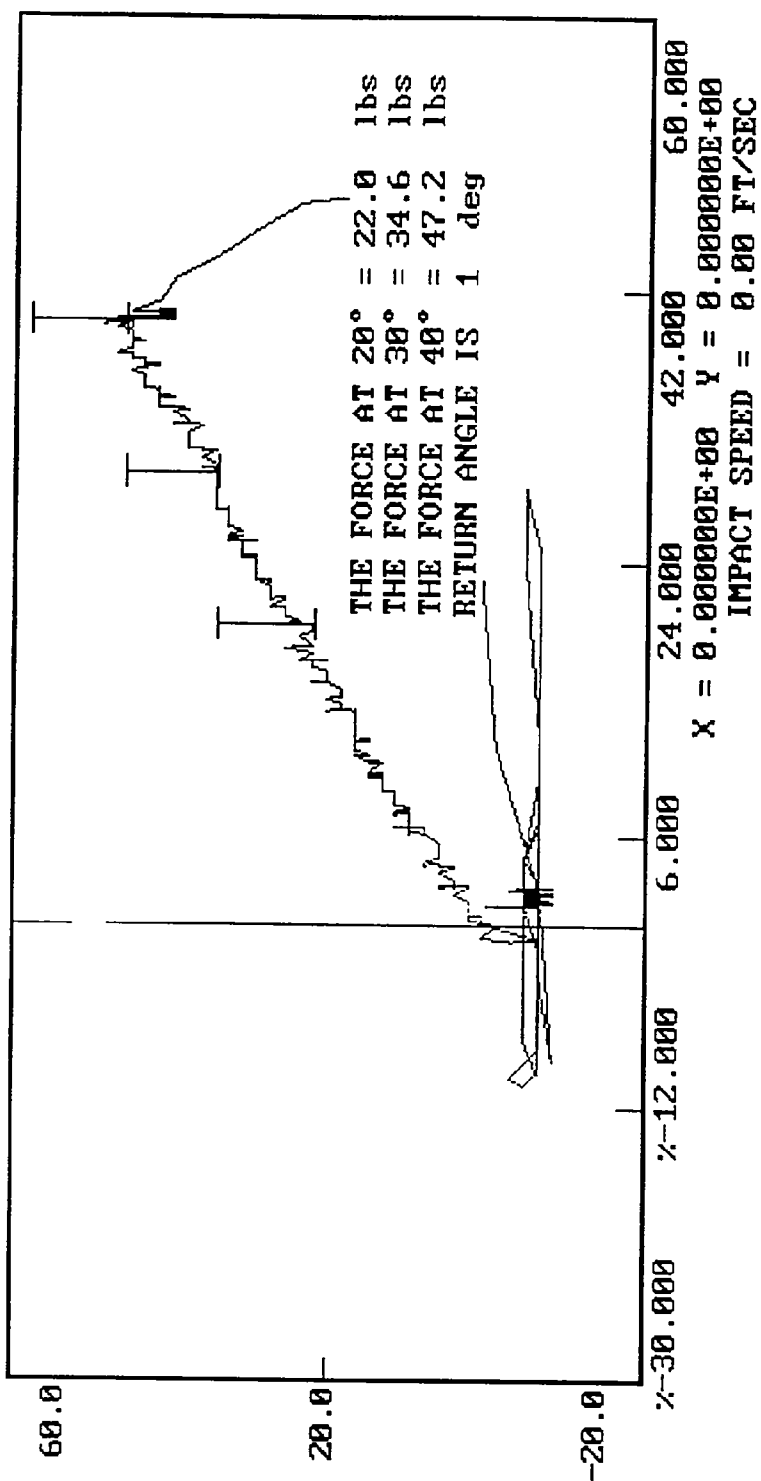
| TEST PARAMETER    | SPECIFICATION | TEST RESULTS |
|-------------------|---------------|--------------|
| TEMPERATURE       | 66 - 78° F    | 70°          |
| RELATIVE HUMIDITY | 10 - 70%      | 15%          |
| FORCE @ 0°        | 0 - 6 lbs     | 0            |
| FORCE @ 20°       | 22 - 34 lbs   | 22           |
| FORCE @ 30°       | 34 - 46 lbs   | 35           |
| FORCE @ 40°       | 46 - 58 lbs   | 47           |
| RETURN ANGLE      | 12° maximum   | 1°           |

TEST MEETS SPECIFICATIONS

TECHNICIAN Tim M. L.

APPROVED BY Dave K. K.

DUMMY CALIBRATION - LUMBAR FLEXION  
 DUMMY # 274  
 02-14-1997 11:06  
 FORCE (LBS) VS. TORSO ROTATION (DEGREES)



## POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 275

Inspected By: Tim Michnay

Date: February 14, 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

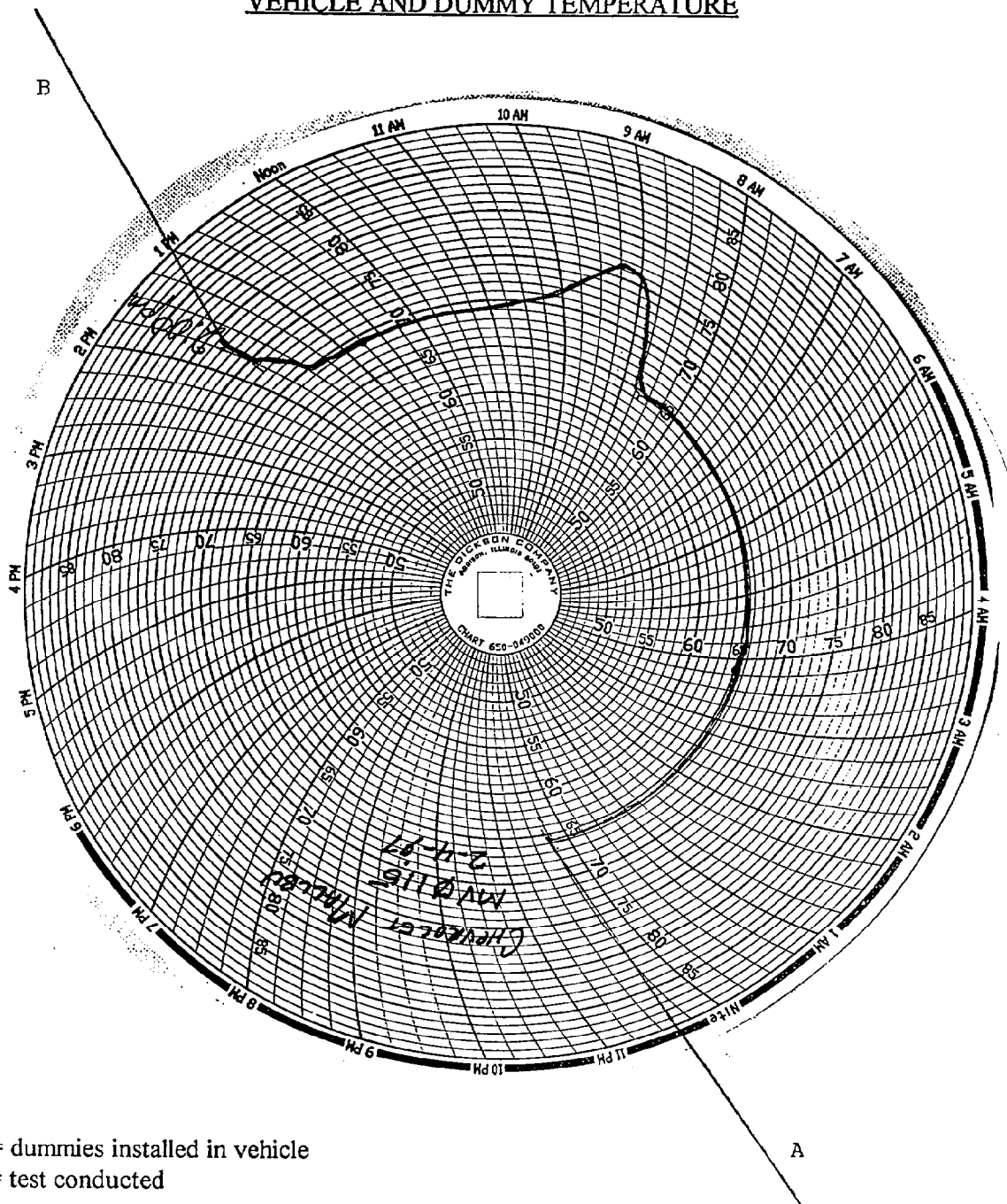
Inspected By: Tim Michnay

Date: February 14, 1997

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

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

# VEHICLE AND DUMMY TEMPERATURE



A = dummies installed in vehicle  
B = test conducted

APPENDIX D  
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA  
INSTRUMENTS FOR DRIVER DUMMY NO. 275

|                         | DRIVER     |              |                  |
|-------------------------|------------|--------------|------------------|
|                         | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y             | AHRP6      | Endevco      | 1/02/97          |
| Lower Rib Y             | AJ8T5      | Endevco      | 1/02/97          |
| Lower Spine Y           | AHT20      | Endevco      | 1/02/97          |
| Pelvis Y                | AJ417      | Endevco      | 1/02/97          |
| Upper Rib Redundant Y   | AJ412      | Endevco      | 1/02/97          |
| Lower Rib Redundant Y   | APYR7      | Endevco      | 1/02/97          |
| Lower Spine Redundant Y | AH0N9      | Endevco      | 1/02/97          |
| Pelvis Redundant Y      | AGP20      | Endevco      | 1/02/97          |



INSTRUMENTS FOR PASSENGER DUMMY NO. 274

|                         | LEFT REAR PASSENGER |              |                  |
|-------------------------|---------------------|--------------|------------------|
|                         | SERIAL NO.          | MANUFACTURER | CALIBRATION DATE |
| Upper Rib Y             | AN8L6               | Endevco      | 1/02/97          |
| Lower Rib Y             | J12465              | Endevco      | 1/02/97          |
| Lower Spine Y           | J12450              | Endevco      | 1/02/97          |
| Pelvis Y                | AGTP7               | Endevco      | 1/02/97          |
| Upper Rib Redundant Y   | APY13               | Endevco      | 1/02/97          |
| Lower Rib Redundant Y   | J11361              | Endevco      | 1/02/97          |
| Lower Spine Redundant Y | J12461              | Endevco      | 1/02/97          |
| Pelvis Redundant Y      | AGT04               | Endevco      | 1/02/97          |

# VEHICLE INSTRUMENT CALIBRATION

|                                 | VEHICLE ACCELEROMETERS |              |                  |
|---------------------------------|------------------------|--------------|------------------|
|                                 | SERIAL NO.             | MANUFACTURER | CALIBRATION DATE |
| Moving Barrier CG X             | C25-A04                | Entran       | 1/06/97          |
| Moving Barrier CG Y             | C25-A06                | Entran       | 1/07/97          |
| Moving Barrier CG Z             | B13-Z02                | Entran       | 7/11/96          |
| Moving Barrier Rear Axle X      | D05-R19                | Entran       | 1/02/97          |
| Moving Barrier Rear Axle Y      | D05-R20                | Entran       | 1/02/97          |
| Left Mid A-Post Y               | B14-R15                | Entran       | 1/03/97          |
| Left Lower A-Post Y             | J10-E14                | Entran       | 1/03/97          |
| Left Mid B-Post Y               | E25-G07                | Entran       | 1/03/97          |
| Left Lower B-Post Y             | F07-A04                | Entran       | 1/07/97          |
| Rear Floorpan Above Axle X      | L18-E02                | Entran       | 1/03/97          |
| Rear Floorpan Above Axle Y      | J10-E03                | Entran       | 1/07/97          |
| Rear Floorpan Above Axle Z      | A09-G05                | Entran       | 12/03/96         |
| Driver Seat Track Y             | J03-A13                | Entran       | 1/06/97          |
| Right Side Sill at Front Seat X | L22-G05                | Entran       | 1/02/97          |
| Right Side Sill at Front Seat Y | B28-B03                | Entran       | 1/02/97          |
| Right Side Sill at Front Seat Z | D05-R05                | Entran       | 1/07/97          |
| Right Side Sill at Rear Seat X  | F10-D04                | Entran       | 1/07/97          |
| Right Side Sill at Rear Seat Y  | L14-D16                | Entran       | 12/03/96         |
| Right Side Sill at Rear Seat Z  | L18-D13                | Entran       | 1/03/97          |
| Left Side Sill at Front Seat Y  | L14-D07                | Entran       | 1/07/97          |

# VEHICLE INSTRUMENT CALIBRATION

|                                   | VEHICLE ACCELEROMETERS |              |                  |
|-----------------------------------|------------------------|--------------|------------------|
|                                   | SERIAL NO              | MANUFACTURER | CALIBRATION DATE |
| Left Side Sill at Rear Seat Y     | J10-E13                | Entran       | 1/07/97          |
| Right Rear Occupant Compartment Y | H07-A25                | Entran       | 1/02/97          |
| Vehicle CG X                      | MGA095                 | Entran       | 1/02/97          |
| Vehicle CG Y                      | D06-A09                | Entran       | 1/02/97          |
| Vehicle CG Z                      | C20-J10                | Entran       | 1/02/97          |

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