

REPORT NO. NCAP-MGA-2000-001  
NEW CAR ASSESSMENT PROGRAM (NCAP)  
FRONTAL BARRIER IMPACT TEST

Hyundai Motor Corporation  
2000 Hyundai Elantra Sedan  
NHTSA No. MY0500

MGA PROVING GROUNDS  
5000 WARREN ROAD  
BURLINGTON, WI 53105



Test Date: November 17, 1999

Report Date: November 19, 1999

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
SAFETY PERFORMANCE STANDARDS  
OFFICE OF CRASHWORTHINESS STANDARDS  
MAIL CODE NPS-10  
400 SEVENTH STREET, SW, ROOM 5313  
WASHINGTON, D.C. 20590

# TECHNICAL REPORT STANDARD TITLE PAGE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                                                                                |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1. Report No.<br>NCAP-MGA-2000-001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2. Government Accession No.                             | 3. Recipient's Catalog No.                                                                                                                                                                     |           |
| 4. Title and Subtitle<br>NHTSA New Car Assessment Program (NCAP) Testing<br>of a 2000 Hyundai Elantra Sedan<br>NHTSA No.: MY0500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         | 5. Report Date<br>November 19, 1999                                                                                                                                                            |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         | 6. Performing Organization Code<br>MGA                                                                                                                                                         |           |
| 7. Author(s)<br>Gary Strassburg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         | 8. Performing Organization Report No.<br>MGA-DOT-NCAP-001                                                                                                                                      |           |
| 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>DTNH22-96-D-12010                                                                                                                                                 |           |
| 12. Sponsoring Agency Name and Address<br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards (Mail Code: NPS-10)<br>400 Seventh St., S.W., Room 5313<br>Washington, D.C. 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         | 13. Type of Report and Period Covered<br>Final Report<br>November 19 to December 1, 1999                                                                                                       |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         | 14. Sponsoring Agency Code                                                                                                                                                                     |           |
| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                                                                                |           |
| 16. Abstract<br>A 56 kph (35 mph) frontal barrier impact using a rigid barrier was conducted on a 2000 Hyundai Elantra Sedan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure No. TP- NCAP090196 for the determination of vehicle crashworthiness on November 17, 1999.<br>The barrier impact velocity was 56.5 kph (35.1 mph), and the ambient temperature at the time of impact was 21 °C. The post-test maximum static crush was 414 mm.<br>The test vehicle appeared to comply with the requirements of the following Federal Motor Vehicle Safety Standards:<br><ol style="list-style-type: none"> <li>1. FMVSS 212, "Windshield Mounting"</li> <li>2. FMVSS 219 (partial), "Windshield Zone Intrusion"</li> <li>3. FMVSS 301, "Fuel System Integrity"</li> </ol> With regard to "Occupant Crash Protection" injury criteria, the driver's HIC was 357 and the 3 msec. Clip (Chest g's) was 43.5 g's. The left and right femur loads for the driver were 2802 and 5882 Newtons, respectively. The passenger's HIC was 573 and the 3 msec Clip was 52.6 g's. The left and right femur maximum loads were 2578 and 4017 Newtons respectively. |                                                         |                                                                                                                                                                                                |           |
| 17. Key Words<br>35 mph Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>FMVSS 212 Indicant Testing<br>FMVSS 219 (partial) Indicant Testing<br>FMVSS 301 Indicant Testing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         | 18. Distribution Statement<br>Copies of this report are available from:<br>Technical Ref. Division, NHTSA,<br>NASSIF Building, Room 5108<br>400 Seventh Street, S.W.<br>Washington, D.C. 20590 |           |
| 19. Security Classif.<br>(of this report)<br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 20. Security Classif.<br>(of this page)<br>Unclassified | 21. No. of Pages<br>278                                                                                                                                                                        | 22. Price |

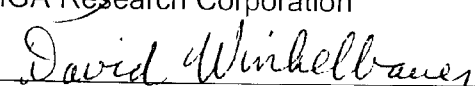
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-96-D-12010. This document is disseminated under the sponsorship of the U.S. Dept. of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

PREPARED BY:

  
Gary Strassburg, Project Engineer  
MGA Research Corporation

APPROVED BY:

  
Dave Winkelbauer, Facility Director  
MGA Research Corporation

APPROVAL DATE:

12/17/99

TEST TECHNICIANS:

Al Chalmers  
Wayne Dahlke  
Chris Novak  
Todd Stevenson  
John Wistert  
Erik Nelson  
Tim Michnay  
Todd Stevenson  
Chris Kulis  
Erika Miller  
Donna Janovicz

CALIBRATION/INSTRUMENTATION:

PHOTOGRAPHIC:

SECRETARY:

FINAL REPORT ACCEPTED BY:

\_\_\_\_\_  
Manager, New Car Assess. Program (NCAP)

\_\_\_\_\_  
Date of Report Acceptance

\_\_\_\_\_  
Contracting Officer's Tech. Rep. (COTR)

\_\_\_\_\_  
Date of Report Acceptance

TABLE OF CONTENTS

| <u>SECTION</u> | <u>DESCRIPTION</u>                                        | <u>PAGE NO.</u> |
|----------------|-----------------------------------------------------------|-----------------|
| 1              | Purpose and Summary of NCAP Test                          | 1-1             |
| 2              | Occupant and Vehicle Information/Data Sheets              | 2-1             |
| APPENDIX A     | Photographs                                               |                 |
| APPENDIX B     | Vehicle and Dummy Response Data                           |                 |
| APPENDIX C     | Dummy Configuration & Performance Verification Data       |                 |
| APPENDIX D     | Test Equipment and Instrumentation Calibration            |                 |
| APPENDIX E     | Vehicle Owner's Occupant Restraint<br>System Instructions |                 |

DATA SHEET LISTING

| <u>DATA SHEET NO.</u> | <u>DESCRIPTION</u>                              | <u>PAGE NO.</u> |
|-----------------------|-------------------------------------------------|-----------------|
| 1                     | Crash Test Summary                              | 2-1             |
| 2                     | General Test and Vehicle Parameter Data         | 2-2             |
| 3                     | Post Impact Data                                | 2-5             |
| 4                     | Test Vehicle Information                        | 2-6             |
| 5                     | Summary of FMVSS 212 Data                       | 2-7             |
| 6                     | Windshield Zone Intrusion FMVSS 219 Data        | 2-8             |
| 7                     | FMVSS 301 Fuel System Integrity Data            | 2-9             |
| 8                     | FMVSS 301 Rollover Data                         | 2-10            |
| 9                     | Dummy Injury Criteria Values                    | 2-14            |
| 10                    | Dummy Positioning in Vehicle                    | 2-17            |
| 11                    | Seat Belt Positioning Data                      | 2-20            |
| 12                    | Seat Belt Performance Data                      | 2-21            |
| 13                    | Camera Data                                     | 2-22            |
| 14                    | Vehicle Target Locations                        | 2-24            |
| 15                    | Vehicle Accelerometer Location and Data Summary | 2-25            |
| 16                    | Post Test Air Bag Data                          | 2-26            |
| 17                    | Test Vehicle Measurements                       | 2-27            |
| 18                    | Accident Investigation Division Data            | 2-34            |

## SECTION 1

### PURPOSE AND SUMMARY OF NCAP TEST

This 35 mph frontal barrier impact test is part of the Composite FY'2000 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-96-D-12010. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48 kph (30 mph) FMVSS 208/212/219/301-75 requirements.

The 56 kph (35 mph) frontal barrier impact test was conducted in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Test Procedure for New Car Assessment Program (NCAP) dated September 1996. Data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

A flat concrete barrier covered with 3/4" plywood was impacted by a 2000 Hyundai Elantra Sedan at a velocity of 56.5 kph (35.1 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on November 17, 1999. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were instrumented with head and chest primary and redundant triaxial accelerometers, pelvis triaxial accelerometers, a chest displacement transducer, a six axis neck load cell, right/left femur load cells, right/left lower leg sensors, and right/left foot accelerometers. Seat belt load cells were also on the driver and passenger shoulder and lap

belts to measure dummy torso and pelvic section loading. Calibrated ATDs, driver (Serial No. 065), and the right front passenger (Serial No. 066), were used for this test. Certification details, along with instrumentation calibration data, are found in Appendices C and D.

The one hundred thirteen (113) channels of data were recorded on 10 computers. Appendix B contains the vehicle and dummy response data traces.

The driver's head struck the inflated airbag. The driver HIC was 357 and the maximum chest (CLIP) deceleration over 3 milliseconds was 43.5 g's. The maximum chest compression was 31 mm. The left and right femur loads were 2802 and 5882 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 573 and maximum chest (CLIP) deceleration over 3 milliseconds was 52.6 g's. The maximum chest compression was 31mm. The left and right femur loads were 2578 and 4017 Newtons respectively.

SECTION 2  
OCCUPANT AND VEHICLE  
INFORMATION/DATA SHEETS

DATA SHEET NO. 1  
CRASH TEST SUMMARYVehicle Yr/Make/Model/Body Style: 2000 Hyundai Elantra SedanNHTSA No.: MY0500 VIN.: KMHJF35F0YV920387Vehicle Test Weight: 1430.3 kgs.Impact Velocity: 56.5 kphMaximum Static Crush: 414 mmVehicle Rebound: 415 mm

## DUMMIES:

## DRIVER

## PASSENGER

Serial Number: 065066Restraint System: 3 Point Belts with pretensioners  
and frontal airbag3 Point Belts with pretensioners  
and frontal airbagNo. Data Channels: 4141Number of Cameras: 1 Real Time  
16 High SpeedDoor Opening Data: LF Yes RF Yes LR Yes RR Yes  
(without use of tools)

## FRONT SEAT(S) DATA

## DRIVER

## FRONT PASSENGER

Seat Shift: 0 mm forward110 mm forwardSeat Back Movement: NoneNone

## VISIBLE DUMMY

## CONTACT POINTS:

## DRIVER

## PASSENGER

Head AirbagAirbagChest AirbagAirbagLeft Knee Instrument PanelGlove BoxRight Knee Instrument PanelGlove Box

## DATA SHEET NO. 2

## GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

Vehicle Yr/Make/Model/Body Style: 2000 Hyundai Elantra SedanNHTSA No.: MY0500VIN.: KMHJF35F0YV920387Body color: RedDate of Manufacture: 9/2/99

Engine: 4 Cylinders;     C.I.D.; 2.0 Liters;  
  X   Gas;     Diesel;     Turbocharged  
    Longitudinal;   X   Transverse

Transmission: 4 Speed;     Manual;   X   Automatic;   X   OverdriveFinal Drive:   X   Front Wheel;     Rear Wheel;     Four WheelOdometer Reading: 55 miles

Major Option:

  X   A/C;   X   P/S;   X   P/B;   X   P/wdo;  
  X   P/locks;   X   Tilt Wheel;   X   Cruise Control;     ABS  
Other: \_\_\_\_\_

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 207 kPa (30 psi) Rear 207 kPa (30 psi)Recommended Tire Size: 195/65/R14Recommended Cold Tire Pressure: Front 207 kPa (30 psi) Rear 207 kPa (30 psi)Tires on Vehicle: 195/65/R14 Manufacturer: MichelinNumber of Occupants: 2 Front; 3 Rear;     3rd Seat; 5 TOTALType of Front Seats:   X   Bucket;     Bench;     Split BenchType of Front Seat Back:     Fixed;   X   Adj. With;     Power;   X   LeverVehicle Capacity Weight (VCW) = 385.6 kg. (A)No. of Occupants x 68.0 kg. = 340.0 kg. (B)Rated Cargo Weight (RCW) A-B = 45.6 kg.GVWR 1676.1 kg. GAWR: Front 899.9 kg.; Rear 785.2 kg.

## GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS) = UDW:

|                                         |                 |                     |                 |
|-----------------------------------------|-----------------|---------------------|-----------------|
| Right Front =                           | <u>384.7</u> kg | Right Rear =        | <u>223.6</u> kg |
| Left Front =                            | <u>384.7</u> kg | Left Rear =         | <u>237.2</u> kg |
| TOTAL FRONT =                           | <u>769.4</u> kg | TOTAL REAR =        | <u>460.8</u> kg |
| % of Total Weight =                     | <u>62.5</u> %   | % of Total Weight = | <u>37.5</u> %   |
| TOTAL UNLOADED DELIVERED WEIGHT (UDW) = |                 | <u>1230</u> kg      |                 |

CALCULATION FOR TARGET TEST WEIGHT:

|                                                              |                  |
|--------------------------------------------------------------|------------------|
| UDW = Unloaded Delivered Weight                              | <u>1230.2</u> kg |
| VCW = Vehicle Capacity Weight                                | <u>385.6</u> kg  |
| DSC = Designated Seating Capacity                            | <u>5</u>         |
| RCW = VCW - 68 (DSC) =                                       | <u>45.6</u> kg*  |
| Target Test Weight = UDW + RCW + (2 dummies x 78.0 kg/dummy) |                  |
| Target Test Weight =                                         | <u>1431.8</u> kg |

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

|                                 |                 |                     |                 |
|---------------------------------|-----------------|---------------------|-----------------|
| Right Front =                   | <u>427.3</u> kg | Right Rear =        | <u>284.0</u> kg |
| Left Front =                    | <u>424.6</u> kg | Left Rear =         | <u>294.4</u> kg |
| TOTAL FRONT =                   | <u>851.9</u> kg | TOTAL REAR =        | <u>578.4</u> kg |
| % of Total Weight =             | <u>59.6</u> %   | % of Total Weight = | <u>40.4</u> %   |
| TOTAL WEIGHT = <u>1430.3</u> kg |                 |                     |                 |

Weight of ballast secured in vehicle trunk area = 0 kg

Vehicle components removed to meet target weight: Spare tire and jack, rear bumper, rear seats and interior, rear side windows, muffler, tail lights

VEHICLE ATTITUDE (all dimensions in mm):

|                     |               |               |               |               |
|---------------------|---------------|---------------|---------------|---------------|
| Delivered Attitude: | RF <u>637</u> | LF <u>638</u> | RR <u>643</u> | LR <u>638</u> |
| Test Attitude:      | RF <u>619</u> | LF <u>624</u> | RR <u>611</u> | LR <u>609</u> |
| Post Test:          | RF <u>707</u> | LF <u>669</u> | RR <u>618</u> | LR <u>587</u> |

Wheel Base: 2554 mm; C.G. = 1033 mm rearward of front wheel C/L

Remarks: \_\_\_\_\_

\* light trucks and MPVs RCW is 136 kgs or manufacturer's value, whichever is less

## GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

FUEL SYSTEM DATA:Fuel System Capacity From Owner's Manual = 55 litersUsable Capacity Figure Furnished by COTR = 54.9 litersTest Volume Range (92 to 94% of Usable Capacity) = 50.5 to 51.6 litersACTUAL TEST VOLUME = 51.0 litersTest Fluid Type: Stoddard Solvent; Spec. Grav. = 0.77Kinematic Viscosity = 1.788 centistrokes; Color = PurpleType of Fuel Pump; Electric X; Mechanical     

Does Electric Pump operate with ignition switch "ON" &amp; engine "Off"?

Yes X No

DATA SHEET NO. 3  
POST-IMPACT DATA

Vehicle Yr/Make/Model/Body Style: 2000 Hyundai Elantra Sedan  
NHTSA No.: MY0500 VIN.: KMHJF35F0YV920387

Type of Test: 35 mph Frontal Impact Impact Angle: 0°  
Date of Test: November 17, 1999 Time of Test: 1:48 p.m.

Ambient Temperature: 21.1 °C (21°F) (Spec. Range = 18.8 to 25.6°C)

Temperature in Occupant Compartment: 21.1 °C (70°F)

Windshield Molding Temperature: 21.1 °C (70°F)

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.5 kph; secondary = NA kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1300 mm

Exiting Speed Trap: 300 mm

VEHICLE REBOUND AND CRUSH (mm):

|                 |           |         |             |     |             |      |             |
|-----------------|-----------|---------|-------------|-----|-------------|------|-------------|
| Vehicle Length: | Pre-test  | = Right | <u>3991</u> | C/L | <u>4194</u> | Left | <u>3985</u> |
|                 | Post-test | = Right | <u>3760</u> | C/L | <u>3780</u> | Left | <u>3695</u> |
|                 | Crush     | = Right | <u>231</u>  | C/L | <u>414</u>  | Left | <u>290</u>  |

Distance from front of test vehicle to point of impact (rebound):

Right 382 mm C/L 371 mm Left 491 mm

Average = 415 mm

DATA SHEET NO. 4  
TEST VEHICLE INFORMATION

|                               | <u>Front</u> |              | <u>Rear</u> |              |
|-------------------------------|--------------|--------------|-------------|--------------|
| <u>Post-Test Door Opening</u> | <u>Left</u>  | <u>Right</u> | <u>Left</u> | <u>Right</u> |
| (without use of tools)        | <u>Yes</u>   | <u>Yes</u>   | <u>Yes</u>  | <u>Yes</u>   |

|                      | <u>Front</u>        |                       | <u>Rear</u> |              |
|----------------------|---------------------|-----------------------|-------------|--------------|
| <u>Seat Movement</u> | <u>Left</u>         | <u>Right</u>          | <u>Left</u> | <u>Right</u> |
| Seat Back Movement   | <u>none</u>         | <u>none</u>           | <u>N/A</u>  | <u>N/A</u>   |
| Seat Shift (mm)      | <u>0 mm forward</u> | <u>110 mm forward</u> | <u>N/A</u>  | <u>N/A</u>   |

Glazing Damage

Backlight/Windshield Windshield cracked

Other Notable Impact Effects: None

## DATA SHEET 5

## FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

Details of windshield mounting such as retention method, trim type, etc.:

Windshield set in rubber molding with glue

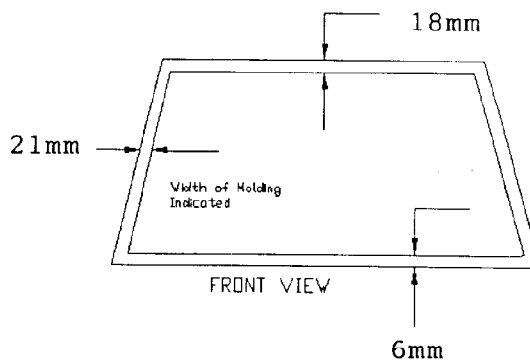
FMVSS 212 Requirements: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

|            | WINDSHIELD PERIPHERY |                | PERCENT RETENTION |
|------------|----------------------|----------------|-------------------|
|            | PRE-TEST (mm)        | POST-TEST (mm) |                   |
| RIGHT SIDE | 2079                 | 2079           | 100%              |
| LEFT SIDE  | 2079                 | 2079           | 100%              |
| TOTAL      | 4158                 | 4158           | 100%              |

AREA OF RETENTION FAILURE: None

FAILURE DETAILS:



## DATA SHEET 6

## FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the surface of the instrument panel, including padding, and drawing the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contact points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and  $\frac{1}{2}$ " distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:

A= 1090 mm

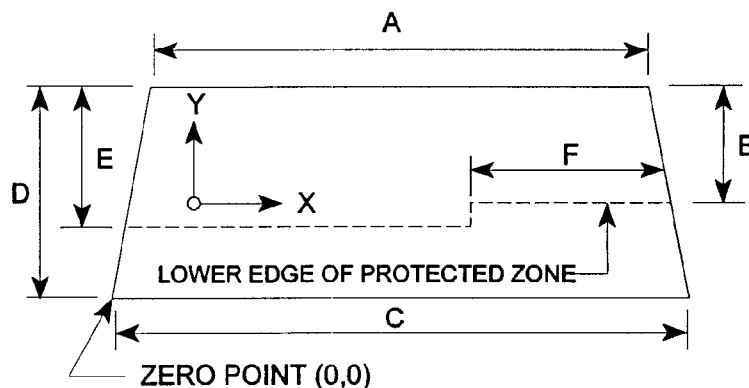
B= 540 mm

C= 1436 mm

D= 816 mm

E= 565 mm

F= 640 mm

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":

(Show location of penetration)

## DATA SHEET 7

## FMVSS NO. 301-75, FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

Test Vehicle NHTSA No.: MY0500      Test Date: November 17, 1999

Vehicle Mfg./Make/Model: 2000 Hyundai Elantra Sedan

Usable Capacity of Vehicle's Fuel Tank: 54.9 Liters  
(figure furnished by vehicle manufacturer)

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.

AMOUNT OF STODDARD SOLVENT ADDED TO VEHICLE'S FUEL TANK:

51.0 Liters which is 92.9 % of the stated USABLE CAPACITY.

TEST VEHICLE IMPACT TYPE: X Frontal (35 mph)

\_\_\_ Oblique (30 mph) with \_\_\_° barrier face first  
contacting (driver/passenger) side

\_\_\_ Rear Moving Barrier (30 mph)

\_\_\_\_ Side Impact MDB (33.2 mph)

FUEL SPILLAGE MEASUREMENT:

1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

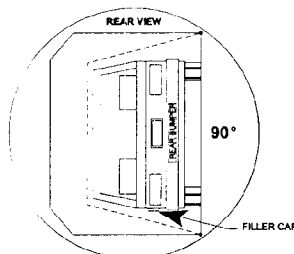
| ACTUAL | MAX ALLOWED |
|--------|-------------|
| 0 oz.  | 1 OZ        |
| 0 oz.  | 5 OZ        |
| 0 oz.  | 1 oz./1 MIN |

SOLVENT SPILLAGE DETAILS: None

DATA SHEET 8  
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90°

Vehicle NHTSA No.: MY0500

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time      2 minutes 50 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +      5 minutes 0 secondsTOTAL      7 minutes 50 secondsNext whole minute interval      8 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                   |
|------------------------------------|----------|----------|-------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|------------------------------------|----------|----------|-------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

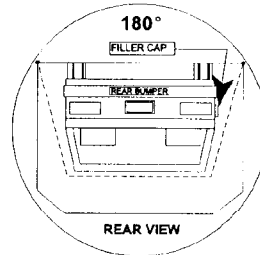
Note: Record spillage for whole minute  
intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

## DATA SHEET 8

## FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

TEST PHASE: 90° - 180°

Vehicle NHTSA No.: MY0500I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 29 seconds  
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 29 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                   |
|------------------------------------|----------|----------|-------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|------------------------------------|----------|----------|-------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

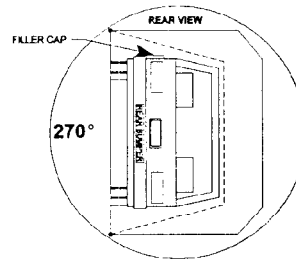
IV. SOLVENT SPILLAGE LOCATIONS(S): None

## DATA SHEET 8

## FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

TEST PHASE: 180° - 270°

Vehicle NHTSA No.: MY0500

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time      2 minutes 13 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +      5 minutes 0 secondsTOTAL      7 minutes 13 secondsNext whole minute interval      8 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

|                                    |          |          |                   |
|------------------------------------|----------|----------|-------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|------------------------------------|----------|----------|-------------------|

(2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

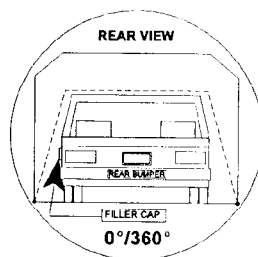
IV. SOLVENT SPILLAGE LOCATIONS(S): None

## DATA SHEET 8

## FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

TEST PHASE: 270° - 360°

Vehicle NHTSA No.: MY0500

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time      2 minutes 38 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +      5 minutes 0 secondsTOTAL      7 minutes 38 secondsNext whole minute interval      8 minutesII. FMVSS 301 REQUIREMENTS:

## (1) Time Period

|                                    |          |          |                   |
|------------------------------------|----------|----------|-------------------|
| First 5 min FROM onset of rotation | 6th min. | 7th min. | 8th min. if reqd. |
|------------------------------------|----------|----------|-------------------|

## (2) Maximum Allowable Solvent Spillage

|          |         |         |         |
|----------|---------|---------|---------|
| 5 ounces | 1 ounce | 1 ounce | 1 ounce |
|----------|---------|---------|---------|

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

|   |   |   |   |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

## DATA SHEET 9

## DUMMY INJURY CRITERIA VALUES DATA SHEET

Vehicle Year/Make/Model/Body Style: 2000 Hyundai Elantra SedanVehicle NHTSA No.: MY0500 Test Date: November 17, 1999

| DESCRIPTION               | UNIT | MAXIMUM VALUE |       |       |       |
|---------------------------|------|---------------|-------|-------|-------|
|                           |      | pos.          | msec. | neg.  | msec. |
| Pos. 1 Head X             | G    | 1.3           | 22    | -48.2 | 70    |
| Pos. 1 Head Y             | G    | 2.8           | 52    | -8.4  | 79    |
| Pos. 1 Head Z             | G    | 19.5          | 56    | -1.2  | 20    |
| Pos. 1 Head Resultant     | G    | 49.5          | 70    | --    | --    |
| Pos. 2 Head X             | G    | 9.2           | 47    | -62.6 | 84    |
| Pos. 2 Head Y             | G    | 7.5           | 71    | -10.2 | 48    |
| Pos. 2 Head Z             | G    | 30.8          | 47    | -2.9  | 132   |
| Pos. 2 Head Resultant     | G    | 63.9          | 84    | --    | --    |
| Pos. 1 Chest X            | G    | 1.6           | 169   | -45.0 | 69    |
| Pos. 1 Chest Y            | G    | 7.3           | 83    | -9.5  | 52    |
| Pos. 1 Chest Z            | G    | 7.3           | 58    | -8.7  | 82    |
| Pos. 1 Chest Resultant    | G    | 45.0          | 69    | --    | --    |
| Pos. 1 Chest Displacement | mm   | -1.5          | 15    | 31.7  | 58    |
| Pos. 2 Chest X            | G    | 1.6           | 136   | -53.0 | 78    |
| Pos. 2 Chest Y            | G    | 3.5           | 54    | -3.8  | 92    |
| Pos. 2 Chest Z            | G    | 12.4          | 50    | -11.1 | 76    |
| Pos. 2 Chest Resultant    | G    | 54.1          | 78    | --    | --    |
| Pos. 2 Chest Displacement | mm   | -.7           | -7    | 30.6  | 87    |
| Pos. 1 Left Femur         | N    | 969           | 50    | -2802 | 63    |
| Pos. 1 Right Femur        | N    | 450           | 116   | -5882 | 50    |
| Pos. 2 Left Femur         | N    | 902           | 48    | -2578 | 38    |
| Pos. 2 Right Femur        | N    | 626           | 49    | -4017 | 58    |

DATA SHEET 9  
DUMMY INJURY CRITERIA VALUES DATA SHEET (Cont'd)

| DESCRIPTION                 | UNIT | MAXIMUM VALUE |       |       |       |
|-----------------------------|------|---------------|-------|-------|-------|
|                             |      | pos.          | msec. | neg.  | msec. |
| Pos. 1 Lap Belt Load        | N    | 6647          | 59    | --    | --    |
| Pos. 1 Torso Belt Load      | N    | 5387          | 54    | --    | --    |
| Pos. 2 Lap Belt Load        | N    | NA            | NA    | --    | --    |
| Pos. 2 Torso Belt Load      | N    | 4772          | 54    | --    | --    |
| Pos. 1 Upper Neck Fx        | N    | 391           | 71    | -448  | 57    |
| Pos. 1 Upper Neck Fy        | N    | **            | **    | **    | **    |
| Pos. 1 Upper Neck Fz        | N    | 1479          | 62    | -161  | 15    |
| Pos. 1 Neck Force Resultant | N    | **            | **    | --    | --    |
| Pos. 1 Upper Neck Mx        | N•m  | 8.1           | 139   | -16.4 | 103   |
| Pos. 1 Upper Neck My        | N•m  | 28.1          | 141   | -48.1 | 91    |
| Pos. 1 Upper Neck Mz        | N•m  | 10.2          | 116   | -3.0  | 161   |
| Pos. 1 Neck Moment Result   | N•m  | 49.2          | 91    | --    | --    |
| Pos. 2 Upper Neck Fx        | N    | 325           | 76    | -499  | 114   |
| Pos. 2 Upper Neck Fy        | N    | 174           | 40    | -162  | 127   |
| Pos. 2 Upper Neck Fz        | N    | 1778          | 63    | -224  | 134   |
| Pos. 2 Neck Force Result    | N    | 1082          | 63    | --    | --    |
| Pos. 2 Upper Neck Mx        | N•m  | 4.8           | 60    | -7.9  | 131   |
| Pos. 2 Upper Neck My        | N•m  | 41.3          | 129   | -27.5 | 56    |
| Pos. 2 Upper Neck Mz        | N•m  | 3.7           | 107   | -3.5  | 69    |
| Pos. 2 Neck Moment Result   | N•m  | 42.0          | 129   | --    | --    |
| Pos. 1 Pelvic (X)           | G    | 2.2           | 180   | -49.6 | 57    |
| Pos. 1 Pelvic (Y)           | G    | 10.0          | 77    | 11.3  | 39    |
| Pos. 1 Pelvic (Z)           | G    | 2.8           | 127   | -30.5 | 72    |
| Pos. 1 Pelvic Resultant     | G    | 53.7          | 61    | --    | --    |

\*\* No valid data recorded

## DATA SHEET 9

## DUMMY INJURY CRITERIA VALUES DATA SHEET (Cont'd)

| DESCRIPTION                 | UNIT | MAXIMUM VALUE |       |        |       |
|-----------------------------|------|---------------|-------|--------|-------|
|                             |      | pos.          | msec. | neg.   | msec. |
| Pos. 2 Pelvic (X)           | G    | 4.5           | 163   | -62.0  | 58    |
| Pos. 2 Pelvic (Y)           | G    | 5.4           | 54    | -6.5   | 58    |
| Pos. 2 Pelvic (Z)           | G    | 34.5          | 73    | -3.8   | 40    |
| Pos. 2 Pelvic Resultant     | G    | 64.5          | 58    | --     | --    |
| Pos. 1 Left Upper Tibia Mx  | N•m  | 12.2          | 189   | -55.3  | 61    |
| Pos. 1 Left Upper Tibia My  | N•m  | 14.9          | 150   | -94.8  | 53    |
| Pos. 1 Left Upper Tibia Fz  | N    | 2325          | 36    | -103   | 149   |
| Pos. 1 Left Lower Tibia Mx  | N•m  | 59.1          | 61    | -13.1  | 21    |
| Pos. 1 Left Lower Tibia My  | N•m  | 4.7           | 84    | -48.4  | 58    |
| Pos. 1 Left Lower Tibia Fz  | N    | 2830          | 37    | -139   | 149   |
| Pos. 1 Right Upper Tibia Mx | N•m  | 97.7          | 51    | -37.2  | 74    |
| Pos. 1 Right Upper Tibia My | N•m  | **            | **    | **     | **    |
| Pos. 1 Right Upper Tibia Fz | N    | 7216          | 43    | -88    | 183   |
| Pos. 1 Right Lower Tibia Mx | N•m  | 37.9          | 38    | -120.7 | 50    |
| Pos. 1 Right Lower Tibia My | N•m  | 69.8          | 43    | -122.1 | 51    |
| Pos. 1 Right Lower Tibia Fz | N    | 7684          | 43    | -72    | 182   |
| Pos. 2 Left Upper Tibia Mx  | N•m  | 72.3          | 42    | -35.0  | 44    |
| Pos. 2 Left Upper Tibia My  | N•m  | 198.6         | 56    | -205.2 | 44    |
| Pos. 2 Left Lower Tibia Fz  | N    | 6177          | 40    | -677   | 86    |
| Pos. 2 Left Lower Tibia Mx  | N•m  | 49.5          | 40    | 125.9  | 44    |
| Pos. 2 Left Lower Tibia My  | N•m  | 77.8          | 52    | -60.2  | 44    |
| Pos. 2 Left Lower Tibia Fz  | N    | 7799          | 40    | -521   | 86    |
| Pos. 2 Right Upper Tibia Mx | N•m  | 64.7          | 55    | -38.5  | 40    |
| Pos. 2 Right Upper Tibia My | N•m  | 82.2          | 56    | -167.5 | 45    |
| Pos. 2 Right Upper Tibia Fz | N    | 3651          | 41    | -92.2  | 138   |
| Pos. 2 Right Lower Tibia Mx | N•m  | 43.7          | 48    | -30.8  | 59    |
| Pos. 2 Right Lower Tibia My | N•m  | 45.8          | 44    | -45.3  | 93    |
| Pos. 2 Right Lower Tibia Fz | N    | **            | **    | **     | **    |

# DATA SHEET 10 DUMMY POSITIONING IN VEHICLE

Vehicle NHTSA No.: MY0500 Vehicle: 2000 Hyundai Elantra

## SEAT TYPE:

     Bench  
X Bucket  
     Split Bench

## ADJUSTER TYPE:

Driver: X Manual  
     Power  
Passenger: X Manual  
     Power

## BUCKET SEAT BACK TYPE:

     Fixed  
X Adjustable Reclining  
     Fixed  
X Adjustable Reclining

## DRIVER SEAT POSITION

9<sup>th</sup> detent of 16 detents

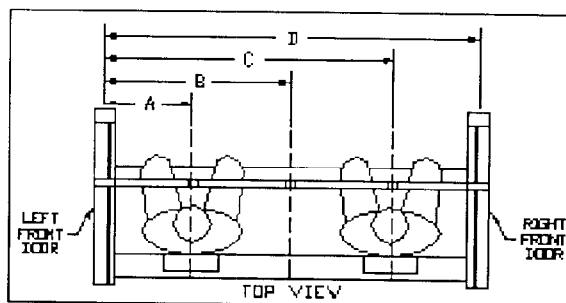
Seat back angle 9.2 ° (ref. sill)\*  
Set eight positions back from  
the first locking position

## PASSENGER SEAT POSITION

9<sup>th</sup> detent of 16 detents

Seat back angle 9.6 ° (ref. sill)\*  
Set eight positions back from  
the first locking position

Steering column set to mid position. Steering column angle 24.2 °  
Adjustable D-ring was set in the 3<sup>rd</sup> position up from the lowest position out of 5 possible positions.



065 DUMMY ID 066

|                                              |                |
|----------------------------------------------|----------------|
| A = Left Door to Driver Centerline           | <u>386</u> mm  |
| B = Left Door to Center Passenger Centerline | <u>737</u> mm  |
| C = Left Door to Right Passenger Centerline  | <u>1078</u> mm |
| D = Left Door to Right Door                  | <u>1474</u> mm |

DATA SHEET 10  
DUMMY POSITIONING IN VEHICLE (Cont'd)

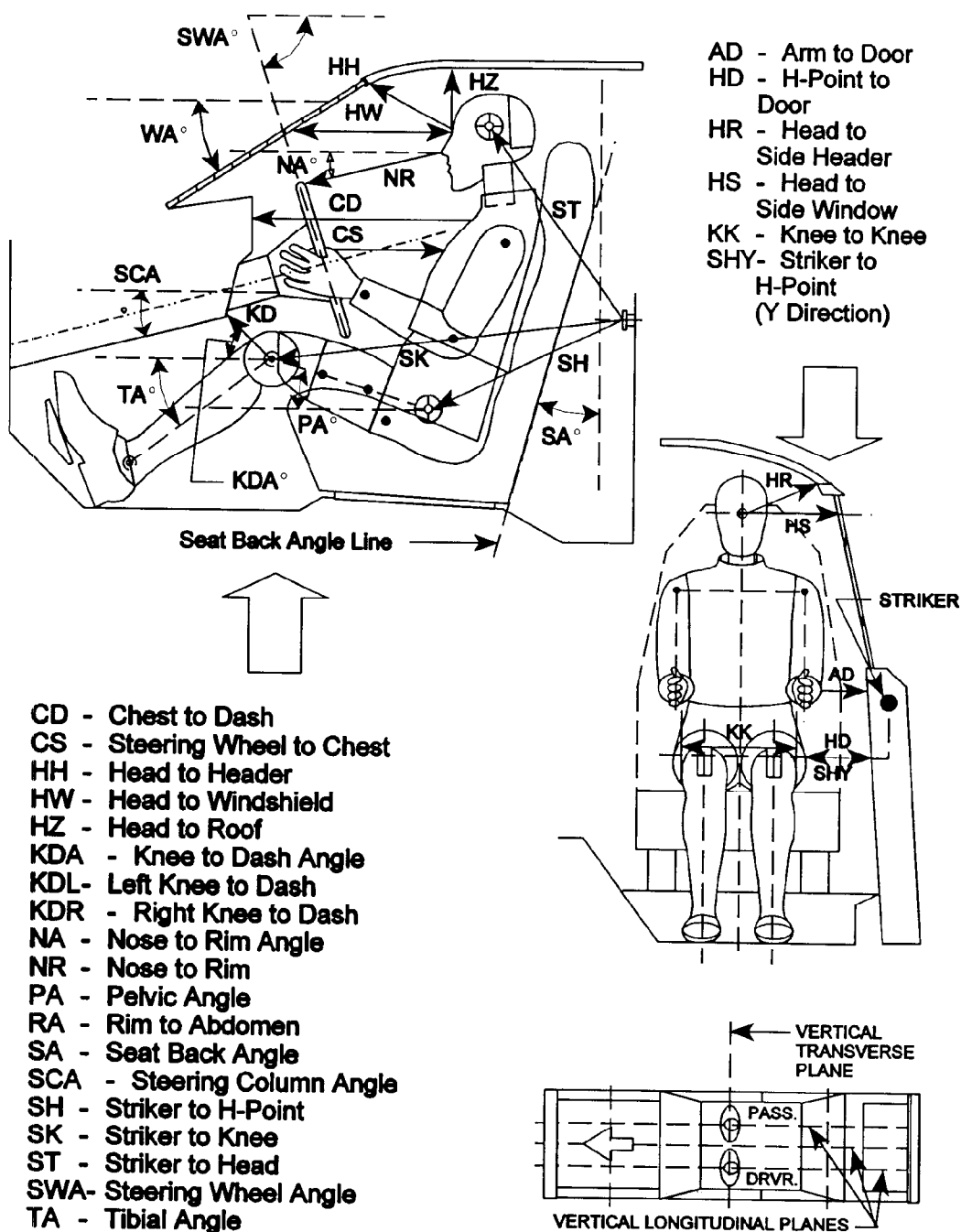
Units (mm)

|      | DRIVER (Serial #065)   | PASSENGER (Serial #066) |
|------|------------------------|-------------------------|
| WA°  | 29.2°                  |                         |
| SWA° | 65.8°                  | N/A                     |
| SCA° | 24.8°                  | N/A                     |
| SA°  | 9.2°                   | 9.6°                    |
| HZ   | 140                    | 133                     |
| HH   | 317                    | 293                     |
| HW   | 518                    | 512                     |
| HR   | 219                    | 218                     |
| NR   | 441 Angle 10.5 °       | N/A                     |
| CD   | 546                    | 603                     |
| CS   | 346                    | N/A                     |
| RA   | 210                    | N/A                     |
| KDL  | 195 Angle (KDA) 21.0 ° | 162                     |
| KDR  | 155                    | 192 Angle 20.1 °        |
| PA°  | 24.8°                  | 24.8°                   |
| TA°  | 45.9°                  | 44.2°                   |
| KK   | 290                    | 252                     |
| ST*  | 526 Angle 5.3 °        | 522 Angle 4.8 °         |
| SK*  | 604 Angle 90.2°        | 581 Angle 90.4°         |
| SH*  | 240 Angle 117.3°       | 222 Angle 123.3°        |
| SHY  | 217                    | 228                     |
| HS   | 277                    | 286                     |
| HD   | 152                    | 152                     |
| AD   | 120                    | 105                     |

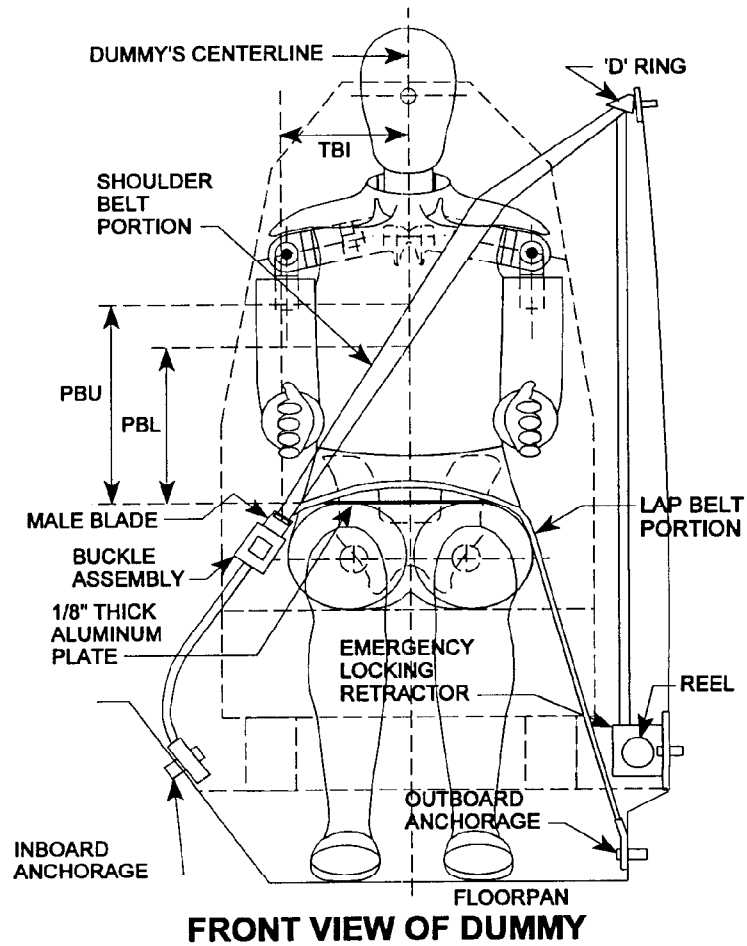
N/A = Not Applicable

\* angle measured with respect to vertical

## FRONT SEAT MEASUREMENTS



# DATA SHEET 11 SEAT BELT POSITIONING DATA



(illustration)

|                                                      | Dimension = mm |                 |
|------------------------------------------------------|----------------|-----------------|
|                                                      | DRIVER DUMMY   | PASSENGER DUMMY |
| PBU – Top surface of alum. plate to upper edge       | 324            | 342             |
| PBL -- Top surface of alum. plate to belt lower edge | 240            | 255             |

DATA SHEET 12  
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:

|                                                                         | <u>Driver</u> | <u>Passenger</u> |
|-------------------------------------------------------------------------|---------------|------------------|
| Length from trim above retractor reel to "D" ring as measured on dummy. | <u>615 mm</u> | <u>610 mm</u>    |
| Shoulder belt length as measured on Part 572 Dummy.                     | <u>890 mm</u> | <u>885 mm</u>    |
| Lap belt length as measured on Part 572 Dummy.                          | <u>825 mm</u> | <u>857 mm</u>    |

SHOULDER BELT SPOOL-OFF DATA:

|                                         |               |               |
|-----------------------------------------|---------------|---------------|
| As determined by film analysis          | <u>140 mm</u> | <u>165 mm</u> |
| As determined mechanically at Retractor | <u>NA mm</u>  | <u>NA mm</u>  |
| As determined mechanically at D-Ring    | <u>172 mm</u> | <u>182 mm</u> |

BELT STRETCH DATA:

|                                                                           |                     |                     |
|---------------------------------------------------------------------------|---------------------|---------------------|
| Measured electronically between shoulder belt load cell and the "D" ring. | <u>Not Recorded</u> | <u>Not Recorded</u> |
| Measured mechanically                                                     | <u>Not Recorded</u> | <u>Not Recorded</u> |

RETRACTOR LOCK-UP TIME:

|                                                                       |                 |                 |
|-----------------------------------------------------------------------|-----------------|-----------------|
| As determined by shoulder belt spool-off observed in on-board cameras | <u>76 msec.</u> | <u>77 msec.</u> |
|-----------------------------------------------------------------------|-----------------|-----------------|

DATA SHEET 13  
CAMERA LOCATIONS

Veh. NHTSA No.: MY0500 Test Date: November 17, 1999

VehicleYear/Make/Model/Body Style: 2000 Hyundai Elantra Sedan

| CAMERA<br>POSITION<br>NO. | VIEW                     | CAMERA POSITIONS<br>(mm.)* |       |      | LENS<br>(mm) | SPEED<br>(fps) |
|---------------------------|--------------------------|----------------------------|-------|------|--------------|----------------|
|                           |                          | X                          | Y     | Z    |              |                |
| 1                         | Real-Time Left Side View | -                          | -     | -    | 18           | 32             |
| 2                         | Left Front View          | 640                        | -7430 | 1550 | 25           | 1020           |
| 3                         | Steering Column Top      | 1560                       | -733  | 1550 | 25           | 1005           |
| 4                         | Steering Column Bottom   | 1560                       | -733  | 1040 | 25           | 1020           |
| 5                         | Driver Close-up          | 1000                       | -9800 | 1410 | 75           | 893            |
| 6                         | Driver Angle             | 5000                       | -5000 | 1980 | 50           | 985            |
| 7                         | Onboard Driver           |                            |       |      | 35           | 800            |
| 8                         | Onboard Passenger        |                            |       |      | 35           | 1000           |
| 9                         | Right Overall            | 2000                       | 6660  | 1250 | 13           | 408            |
| 10                        | Right Passenger Half     | 770                        | 7360  | 1310 | 25           | 1005           |
| 11                        | Right Close-up           | 1300                       | 10400 | 1340 | 75           | 1176           |
| 12                        | Right Angle              | 4860                       | 5300  | 2070 | 50           | 1010           |
| 13                        | Windshield               | -330                       | 0     | 2470 | 13           | 1064           |
| 14                        | Top Driver               | 100                        | -450  | 1600 | 13           | 885            |
| 15                        | Top Passenger            | 100                        | 490   | 1600 | 13           | 833            |
| 16                        | Pit Front                | 1140                       | 0     | 3170 | 13           | 1020           |
| 17                        | Pit Rear                 | 2700                       | 0     | 3210 | 13           | 1015           |

\* COORDINATES:

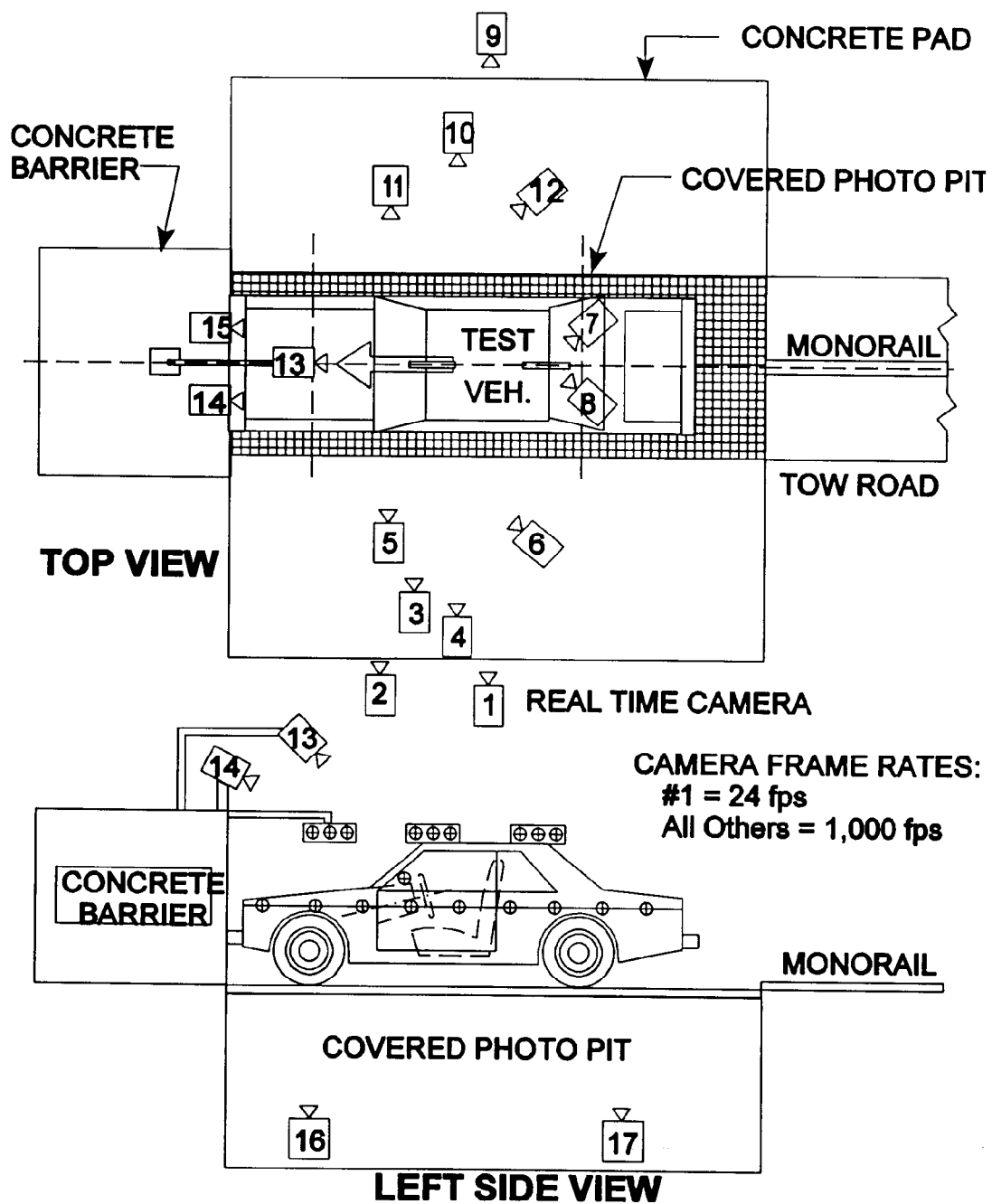
+X = film plane rearward of barrier

+Y = film plane to right of monorail centerline

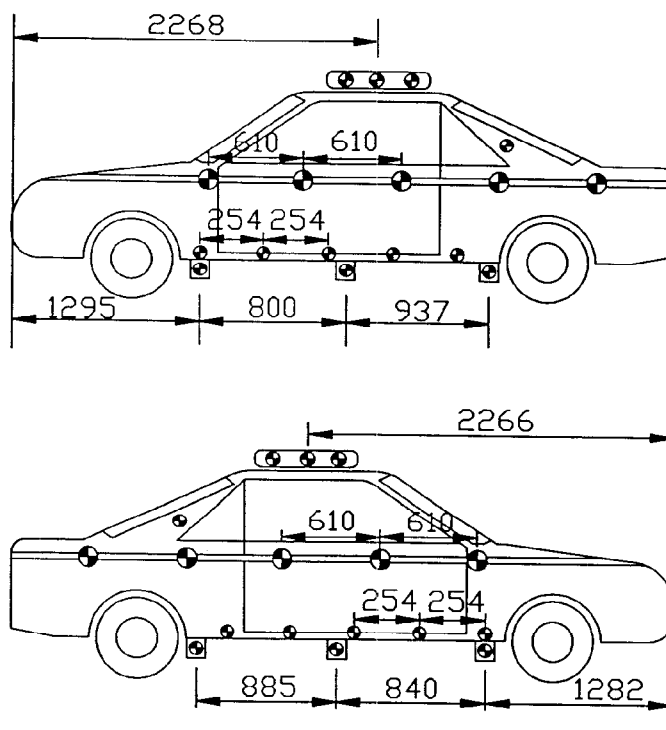
+Z = film plane to above ground level

ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

## CAMERA LOCATIONS (Cont'd)

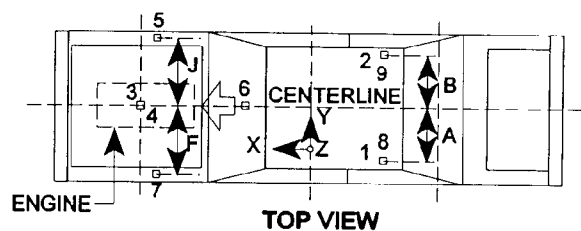
**CAMERA POSITIONS FOR FRONTAL IMPACTS**

DATA SHEET 14  
VEHICLE TARGET LOCATIONS

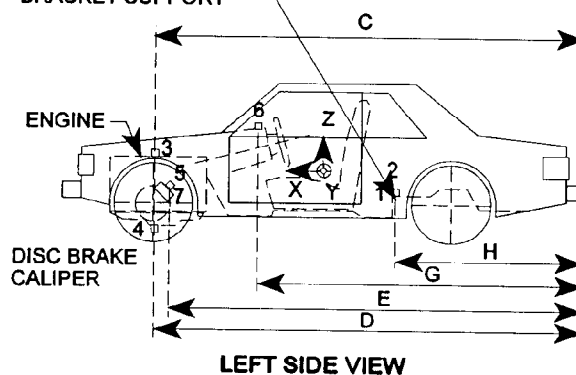


(DIMENSIONS IN MM)

# DATA SHEET 15 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION  
ASSY. FRONT ATTACHMENT  
BRACKET SUPPORT



Units: (mm)

| Dimension | Length |
|-----------|--------|
| A         | 415    |
| B         | 415    |
| C         | 3995   |
| D         | 3494   |
| E         | 3418   |
| F         | 650    |
| G         | 2791   |
| H         | 1421   |
| J         | 650    |

| ACCEL. NO. | ACCELEROMETER               | DIRECTION |
|------------|-----------------------------|-----------|
| 1 and 8    | Left Rear Seat Crossmember  | X         |
| 2 and 9    | Right Rear Seat Crossmember | X         |
| 3          | Top of Engine               | X         |
| 4          | Bottom of Engine            | X         |
| 5          | Right Side Brake Caliper    | X         |
| 6          | Instrument Panel            | X         |
| 7          | Left Side Brake Caliper     | X         |

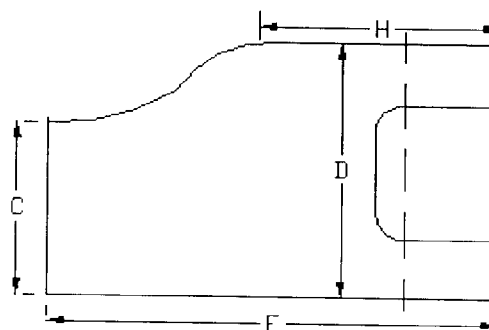
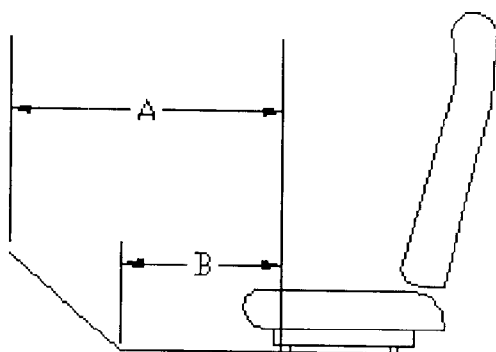
DATA SHEET 16  
POST TEST AIRBAG DATA

- A. Number of Vent Holes: Driver 2 Passenger 2
- B. Size of Vent Holes: Driver 35 mm dia Passenger 50 mm dia
- C. Total Vent Area; Driver 19.2 cm<sup>2</sup> Passenger 39 cm<sup>2</sup>
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter  
Driver; Length 356 mm, Width 610 mm, Diameter \_\_\_\_\_ mm  
Passenger; Length 760 mm, Width 430 mm, Diameter \_\_\_\_\_ mm
- E. Is the Airbag Tethered?  
Driver; X Yes; \_\_\_ No; If yes, record length of tether 250 mm  
Passenger; \_\_\_ Yes; X No, If yes, record length of tether \_\_\_\_\_ mm

DATA SHEET 17  
TEST VEHICLE MEASUREMENTS

STATIC FOOTWELL DEFORMATION

Driver's Side



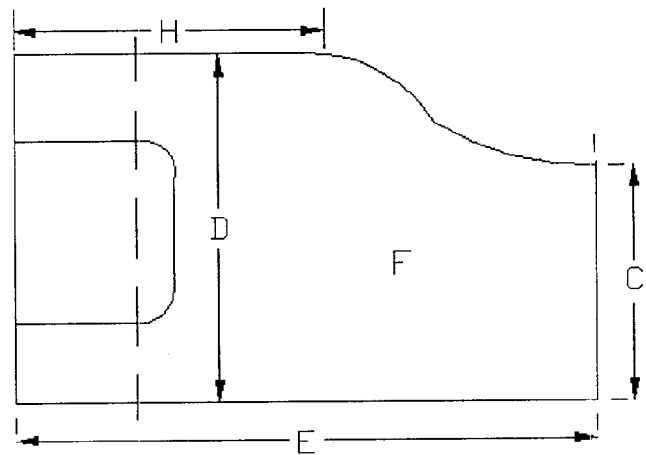
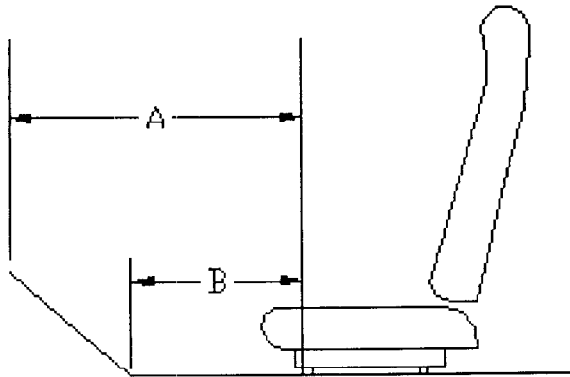
Units = mm

| MEASUREMENT | PRE TEST | POST TEST | DIFFERENCE |
|-------------|----------|-----------|------------|
| A           | 790      | 586       | 204        |
| B           | 550      | 441       | 109        |
| C           | 331      | 422       | -91        |
| D           | 463      | 465       | -2         |
| E           | 1840     | 1747      | 93         |
| H           | 1782     | 1794      | -12        |

DATA SHEET 17  
TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC FOOTWELL DEFORMATION

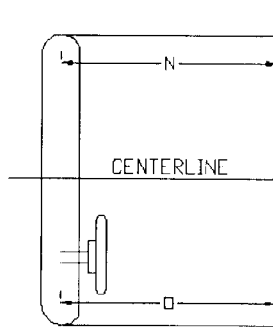
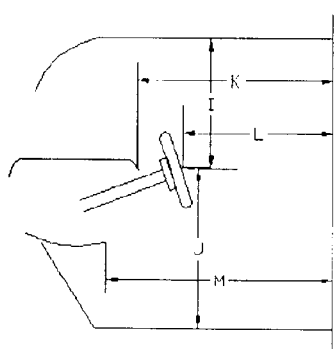
Passenger's Side



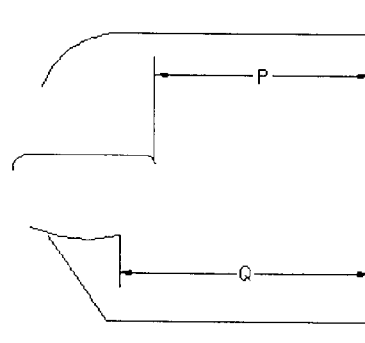
Units = mm

| MEASUREMENT | PRE TEST | POST TEST | DIFFERENCE |
|-------------|----------|-----------|------------|
| A           | 776      | 612       | 164        |
| B           | 537      | 463       | 74         |
| C           | 382      | NA        | NA         |
| D           | 460      | 469       | -9         |
| E           | 1842     | NA        | NA         |
| H           | 1773     | NA        | NA         |

DATA SHEET 17  
 TEST VEHICLE MEASUREMENTS (Cont'd)  
 STATIC PASSENGER COMPARTMENT INTRUSION



MEASUREMENTS  
 FROM C-PILLAR  
 BELT ANCHORAGE



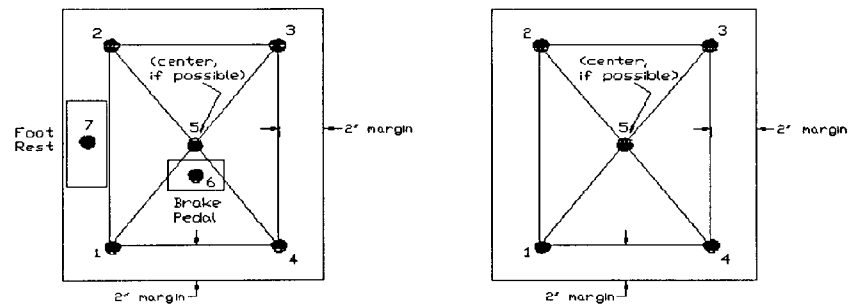
Units = mm

| MEASUREMENT | PRE TEST | POST TEST | DIFFERENCE |
|-------------|----------|-----------|------------|
| I           | 450      | 442       | 8          |
| J           | 590      | 637       | -47        |
| K           | 1534     | 1509      | 25         |
| L           | 1360     | 1351      | 9          |
| M           | 1770     | 1714      | 56         |
| N           | 1818     | 1810      | 8          |
| O           | 1809     | 1806      | 3          |
| P           | 1594     | 1581      | 13         |
| Q           | 1752     | 1720      | 32         |

## DATA SHEET 17

## TEST VEHICLE MEASUREMENTS (Cont'd)

## TOE PAN MEASUREMENTS



DRIVER

PASSENGER

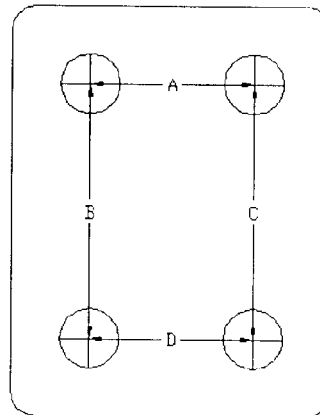
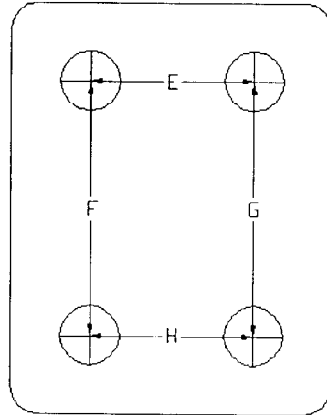
| Driver    |          |           |      |          |           |      |
|-----------|----------|-----------|------|----------|-----------|------|
| Location  | X        |           |      | Z        |           |      |
|           | Pre-Test | Post-Test | Def. | Pre-Test | Post-Test | Def. |
| 1         | 535      | 486       | 49   | -69      | -30       | -39  |
| 2         | 738      | 571       | 167  | 92       | 185       | -93  |
| 3         | 724      | 563       | 161  | 61       | 125       | -64  |
| 4         | 532      | 443       | 89   | -87      | -45       | -42  |
| 5         | 663      | 505       | 158  | -6       | 92        | -98  |
| 6         | 572      | 485       | 87   | 108      | 190       | -82  |
| 7         | 568      | NA        | NA   | 52       | NA        | NA   |
| Passenger |          |           |      |          |           |      |
| Location  | X        |           |      | Z        |           |      |
|           | Pre-Test | Post-Test | Def. | Pre-Test | Post-Test | Def. |
| 1         | 542      | NA        | NA   | -78      | NA        | NA   |
| 2         | 742      | NA        | NA   | 62       | NA        | NA   |
| 3         | 747      | NA        | NA   | 104      | NA        | NA   |
| 4         | 474      | NA        | NA   | 83       | NA        | NA   |
| 5         | 652      | 540       | 112  | -10      | 96        | -106 |

DATA SHEET 17  
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

PASSENGER'S SIDE

DRIVER'S SIDE

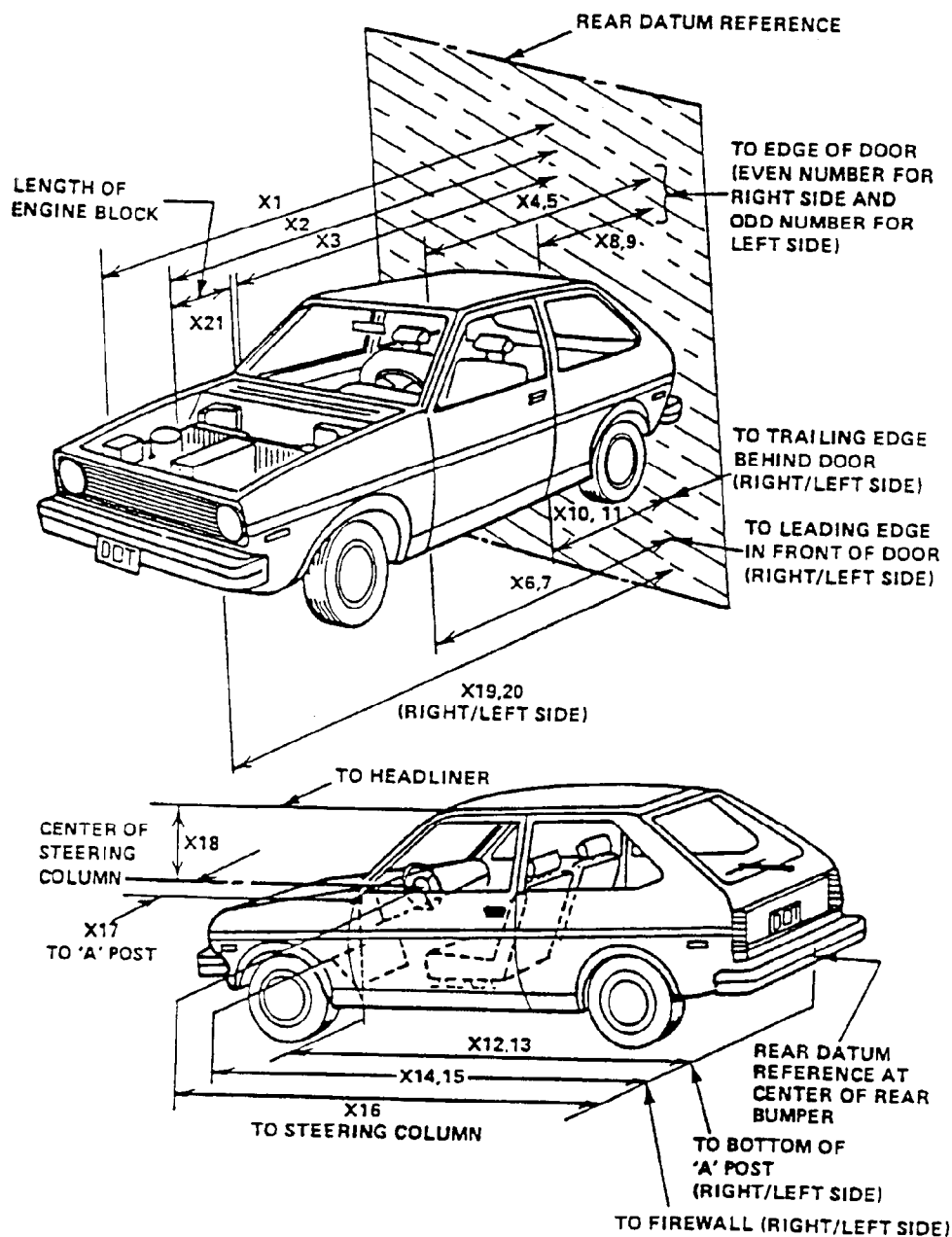


| MEASUREMENT | PRE TEST | POST TEST | DIFFERENCE |
|-------------|----------|-----------|------------|
| A           | 304      | 271       | 33         |
| B           | 377      | 274       | 103        |
| C           | 391      | 230       | 161        |
| D           | 411      | 402       | 9          |
| E           | 318      | 308       | 10         |
| F           | 370      | 302       | 68         |
| G           | 392      | 259       | 133        |
| H           | 418      | 405       | 13         |

DATA SHEET 17  
TEST VEHICLE MEASUREMENTS (Cont'd)

| No. | MEASUREMENT DESCRIPTION:                        | Pre-Test<br>(mm) | Post-Test<br>(mm) | Diff.<br>(mm) |
|-----|-------------------------------------------------|------------------|-------------------|---------------|
| X1  | Total Length of Test Vehicle at Centerline      | 4194             | 3780              | 414           |
| X2  | Rear Surface of Vehicle to Front of Engine      | 3605             | 3370              | 235           |
| X3  | Rear Surface of Vehicle to Firewall             | 3139             | 2964              | 175           |
| X4  | Rear Surface to Upr. Leading Edge of Rt. Door   | 2809             | 2810              | -1            |
| X5  | Rear Surface to Upr. Leading Edge of Left Door  | 2812             | 2806              | 6             |
| X6  | Rear Surface to Lwr. Leading Edge of Rt. Door   | 2821             | 2815              | 6             |
| X7  | Rear Surface to Lwr. Leading Edge of Left Door  | 2819             | 2816              | 3             |
| X8  | Rear Surface to Upr. Trailing Edge of Rt. Door  | 1772             | 1775              | -3            |
| X9  | Rear Surface to Upr. Trailing Edge of Left Door | 1771             | 1766              | 5             |
| X10 | Rear Surface to Lwr. Trailing Edge of Rt. Door  | 1797             | 1791              | 6             |
| X11 | Rear Surface to Lwr. Trailing Edge of Left Door | 1795             | 1790              | 5             |
| X12 | Rear Surface to Bottom of A-Post on Rt. Side    | 2821             | 2819              | 2             |
| X13 | Rear Surface to Bottom of A-Post on Left Side   | 2819             | 2822              | -3            |
| X14 | Rear Surface to Firewall on Right Side          | 3099             | 3037              | 62            |
| X15 | Rear Surface to Firewall on Left Side           | 3094             | 3025              | 69            |
| X16 | Rear Surface to Steering Column                 | 2365             | 2413              | -48           |
| X17 | Center of Steering Column to A-Post             | 384              | 355               | 29            |
| X18 | Center of Steering Column to Headlining         | 450              | 442               | 8             |
| X19 | Rear Surface to Right Side of Front Bumper      | 3991             | 3760              | 231           |
| X20 | Rear Surface to Left Side of Front Bumper       | 3985             | 3695              | 290           |
| X21 | Length of Engine Block                          | 460              | 460               | 0             |

DATA SHEET 17  
TEST VEHICLE MEASUREMENTS (Cont'd)



DATA SHEET 18  
ACCIDENT INVESTIGATION DIVISION DATA  
FOR 35 MPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 2000 Hyundai Elantra Sedan

VIN: KMHJF35F0YV920387

Model Year: 2000 ; Build Date: 9/99 ; Test Date: November 17, 1999

Veh. Size Category: Compact ; TEST WEIGHT: 1430.3 kg

Veh. Wheelbase: 2554 mm ; Front Overhang: 872 mm ; Overall Width: 1700 mm

ACCELEROMETER DATA:

Location: As per measurements on pages 2-25

Calibration Procedure: As per MGA Calibration Procedure

Linearity: >99.9% ; Integration Algorithm: Trapezoidal

Veh: Impact Speed: 56.5 kph ; Time Of Separation: 160 msec

Velocity Change: 65.1 kph

Collision Deformation Classification (CDC) Code: F (Frontal)

Crush Depth C1 = 290 mm

Dimensions\*: C2 = 375 mm

C3 = 381 mm

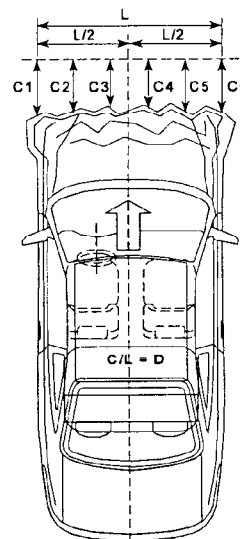
C4 = 351 mm

C5 = 304 mm

C6 = 231 mm

Midpoint Of Damage: D = Vehicle Centerline (Longitudinal)

Length Of Damaged Region: L = 1574 mm



APPENDIX A  
PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS

|                                                                             | <u>Page No.</u> |
|-----------------------------------------------------------------------------|-----------------|
| Photo No. A-1 - Pre-Test Front View of Test Vehicle                         | A-1             |
| Photo No. A-2 - Post-Test Front View of Test Vehicle                        | A-2             |
| Photo No. A-3 - Pre-Test Rear View of Test Vehicle                          | A-3             |
| Photo No. A-4 - Post-Test Rear View of Test Vehicle                         | A-4             |
| Photo No. A-5 - Pre-Test Left Side View of Test Vehicle                     | A-5             |
| Photo No. A-6 - Post-Test Left Side View of Test Vehicle                    | A-6             |
| Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle       | A-7             |
| Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle      | A-8             |
| Photo No. A-9 - Pre-Test Right Side View of Test Vehicle                    | A-9             |
| Photo No. A-10 - Post-Test Right Side View of Test Vehicle                  | A-10            |
| Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle    | A-11            |
| Photo No. A-12 - Post-Test Right Front Three-Quarter View of Test Vehicle   | A-12            |
| Photo No. A-13 - Pre-Test Fuel Filler Cap View                              | A-13            |
| Photo No. A-14 - Pre-Test Engine Compartment View                           | A-14            |
| Photo No. A-15 - Post-Test Engine Compartment View                          | A-15            |
| Photo No. A-16 - Pre-Test Front Underbody View                              | A-16            |
| Photo No. A-17 - Post-Test Front Underbody View                             | A-17            |
| Photo No. A-18 - Pre-Test Rear Underbody View                               | A-18            |
| Photo No. A-19 - Post-Test Rear Underbody View                              | A-19            |
| Photo No. A-20 - Pre-Test Windshield View                                   | A-20            |
| Photo No. A-21 - Post-Test Windshield View                                  | A-21            |
| Photo No. A-22 - Pre-Test Driver Dummy Position Left Side View              | A-22            |
| Photo No. A-23 - Post-Test Driver Dummy Position Left Side View             | A-23            |
| Photo No. A-24 - Pre-Test Driver Dummy Position Left Side View (Door Open)  | A-24            |
| Photo No. A-25 - Post-Test Driver Dummy Position Left Side View (Door Open) | A-25            |
| Photo No. A-26 - Pre-Test Driver Seat Position View                         | A-26            |
| Photo No. A-27 - Post-Test Driver Seat Position View                        | A-27            |
| Photo No. A-28 - Pre-Test Driver Dummy Knee Position                        | A-28            |
| Photo No. A-29 - Post-Test Driver Dummy Knee Position                       | A-29            |

# TABLE OF PHOTOGRAPHS (Cont'd)

|                                                                             | <u>Page No.</u> |
|-----------------------------------------------------------------------------|-----------------|
| Photo No. A-30 - Post-Test Driver Airbag Contact                            | A-30            |
| Photo No. A-31 - Post-Test Driver Knee Contact View                         | A-31            |
| Photo No. A-32 - Pre-Test Driver Windshield View                            | A-32            |
| Photo No. A-33 - Post-Test Driver Windshield View                           | A-33            |
| Photo No. A-34 - Pre-Test Passenger Dummy Position Right Side View          | A-34            |
| Photo No. A-35 - Post-Test Passenger Dummy Position Right Side View         | A-35            |
| Photo No. A-36 - Pre-Test Pass. Dummy Position Right Side View (Door Open)  | A-36            |
| Photo No. A-37 - Post-Test Pass. Dummy Position Right Side View (Door Open) | A-37            |
| Photo No. A-38 - Pre-Test Passenger Seat Position View                      | A-38            |
| Photo No. A-39 - Post-Test Passenger Seat Position View                     | A-39            |
| Photo No. A-40 - Pre-Test Passenger Dummy Knee Position                     | A-40            |
| Photo No. A-41 - Post-Test Passenger Dummy Knee Position                    | A-41            |
| Photo No. A-42 - Post-Test Passenger Airbag Contact                         | A-42            |
| Photo No. A-43 - Post-Test Passenger Knee Contact View                      | A-43            |
| Photo No. A-44 - Pre-Test Passenger Windshield View                         | A-44            |
| Photo No. A-45 - Post-Test Passenger Windshield View                        | A-45            |
| Photo No. A-46 - Vehicle Certification Label                                | A-46            |
| Photo No. A-47 - Tire Placard                                               | A-47            |
| Photo No. A-48 - Vehicle Impact                                             | A-48            |
| Photo No. A-49 - Rollover 90°                                               | A-49            |
| Photo No. A-50 - Rollover 180°                                              | A-50            |
| Photo No. A-51 - Rollover 270°                                              | A-51            |
| Photo No. A-52 - Rollover 360°                                              | A-52            |

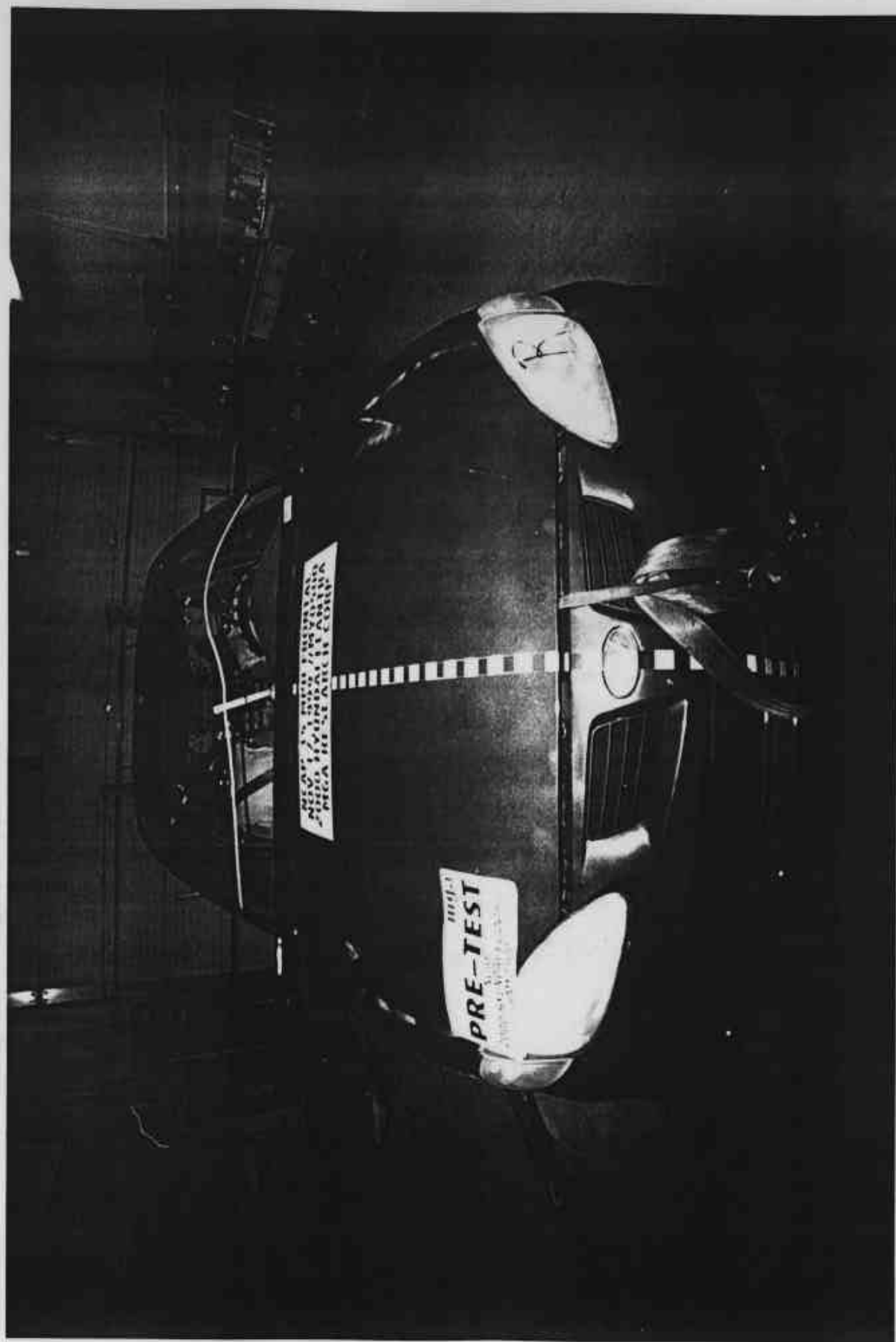


Photo No. A-1 - Pre-Test Front View of Test Vehicle

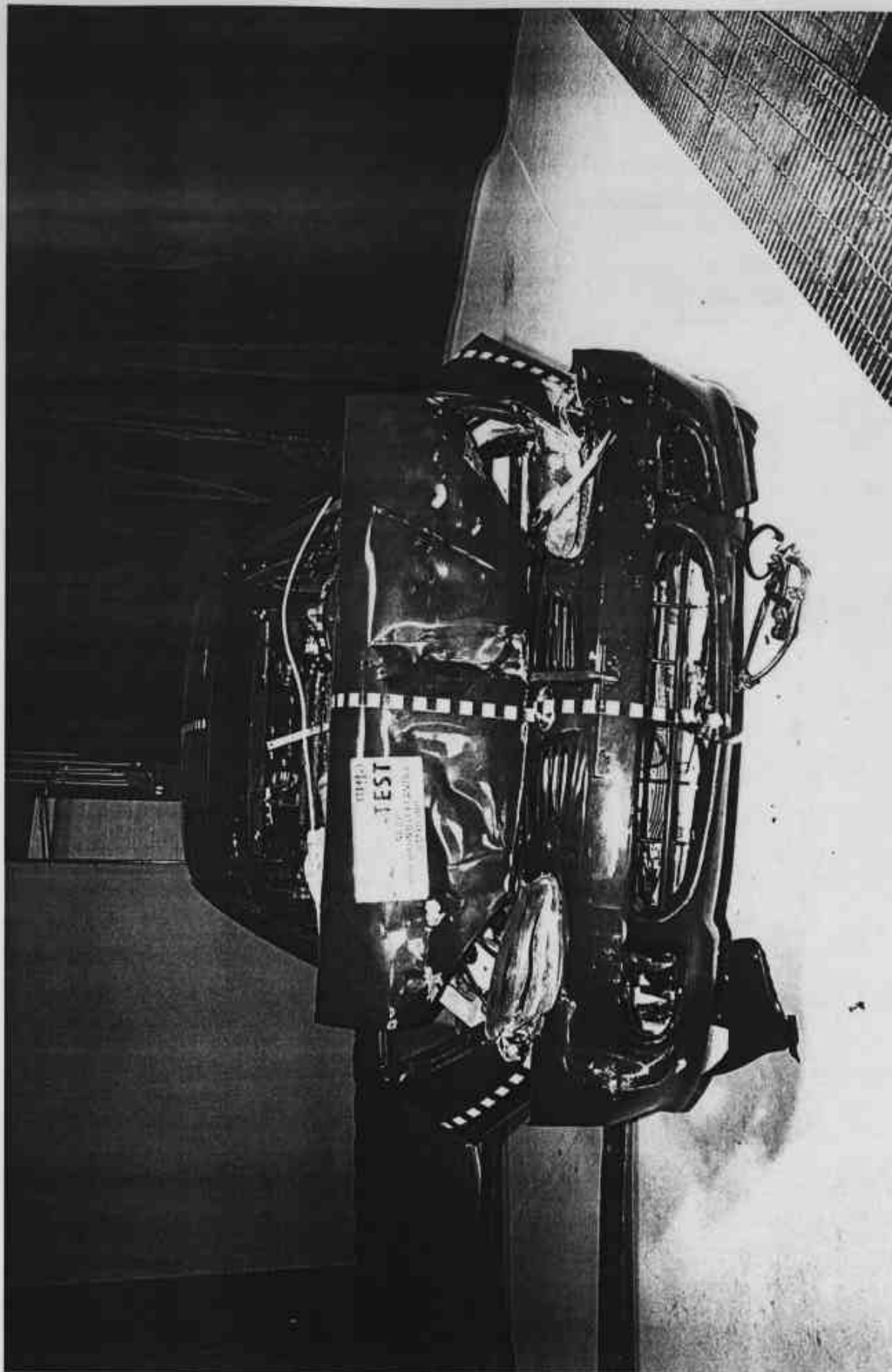


Photo No. A-2 - Post-Test Front View of Test Vehicle

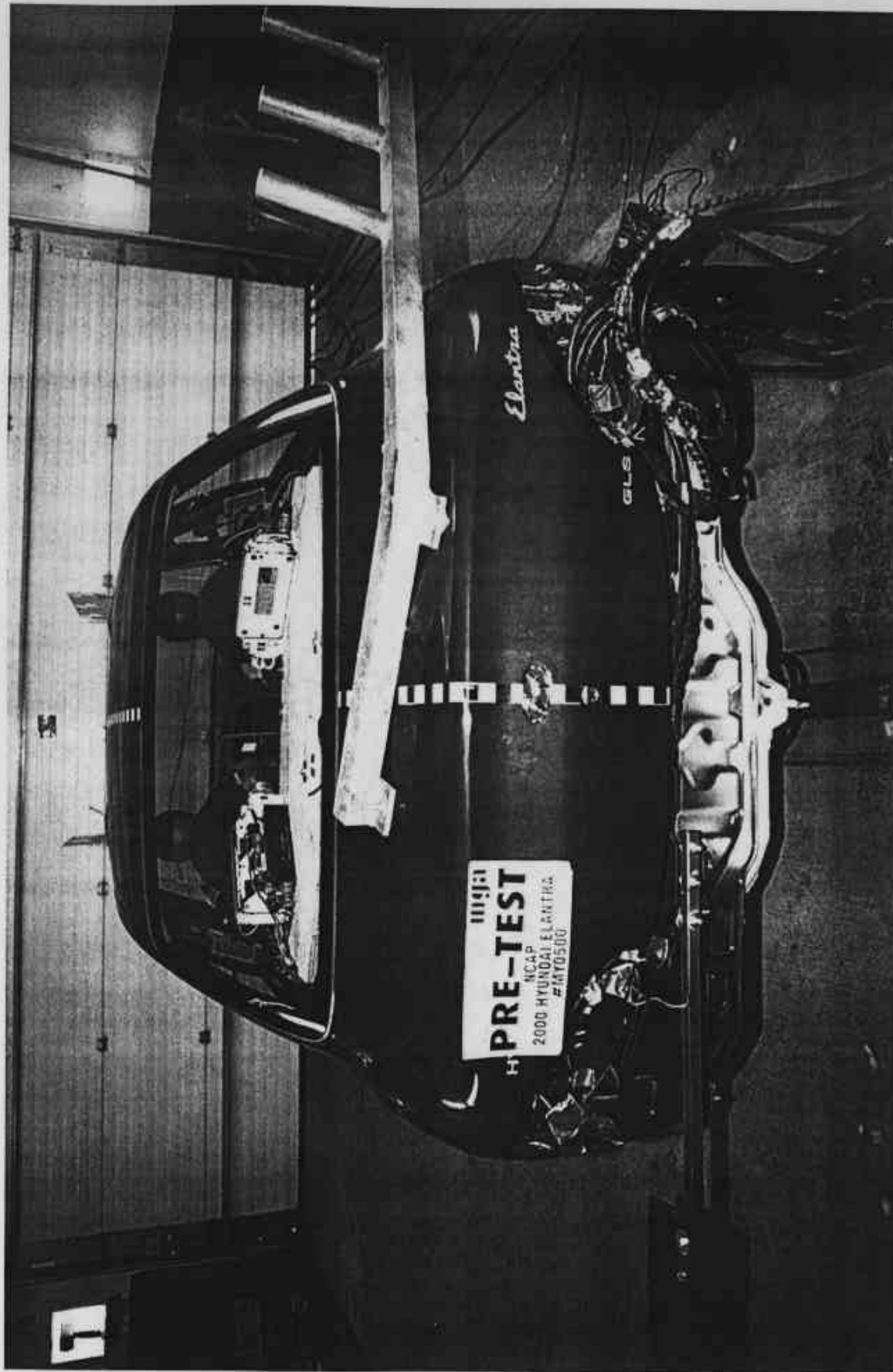


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

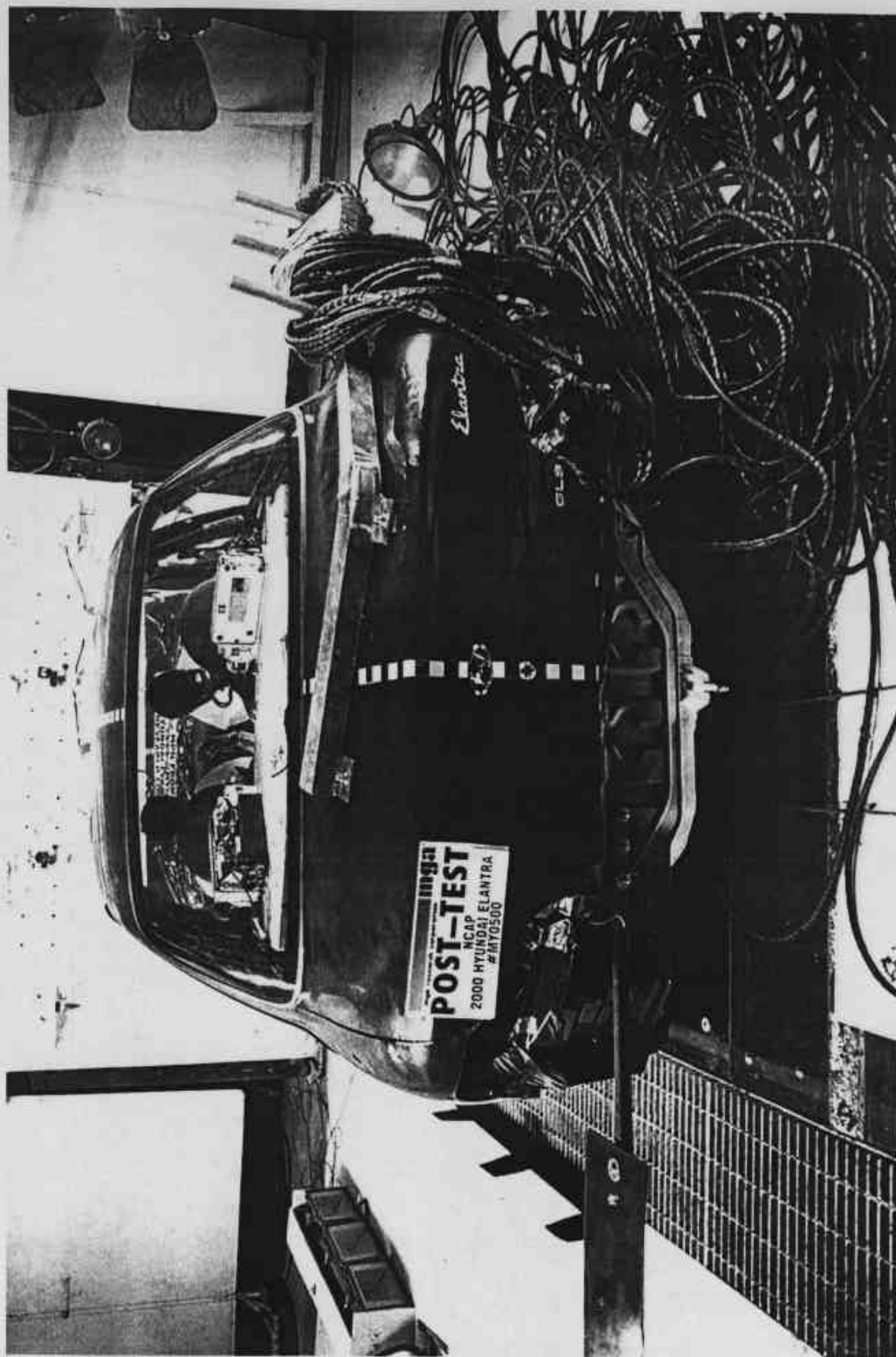


Photo No. A-4 - Post-Test Rear View of Test Vehicle

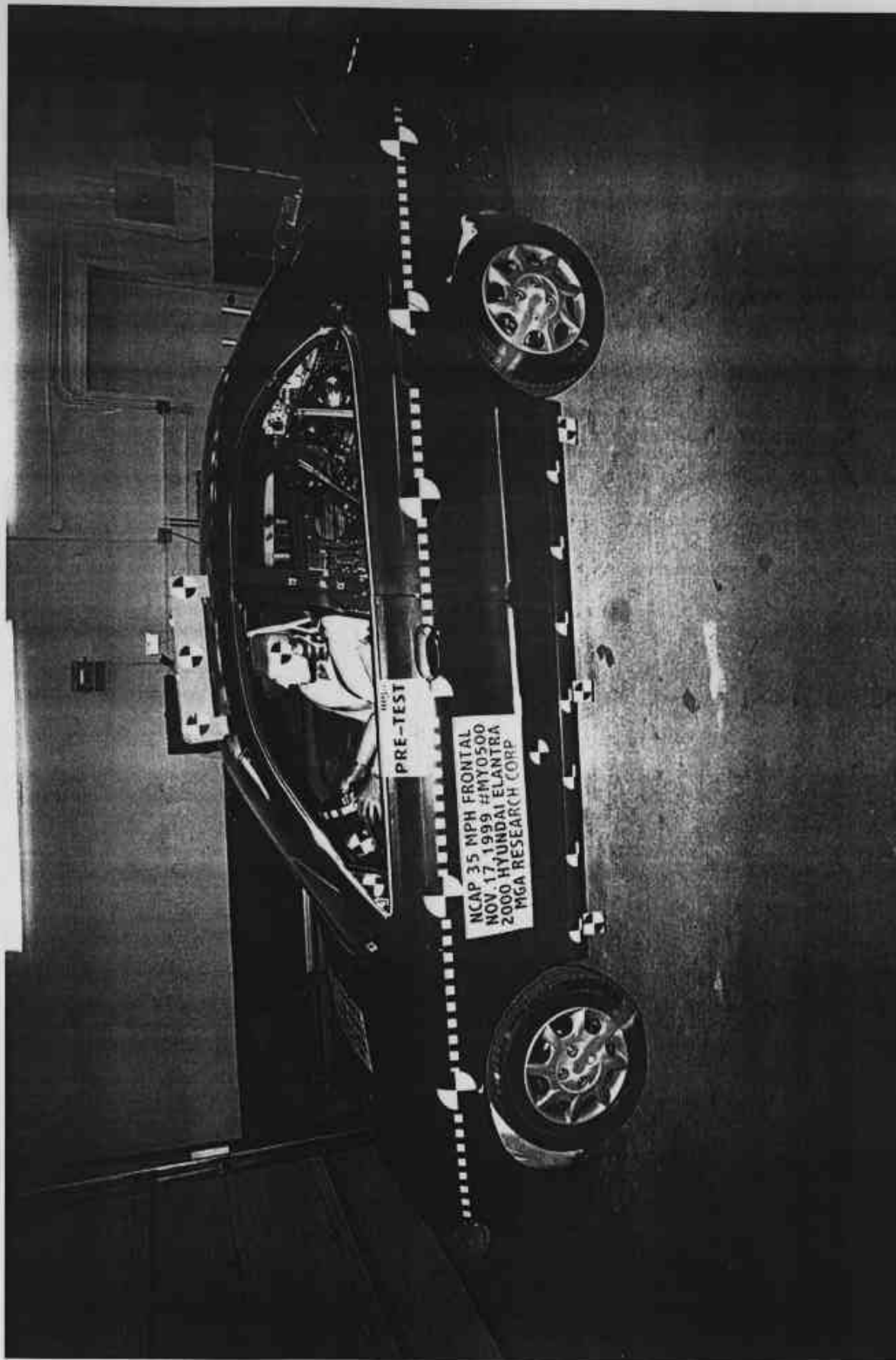


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

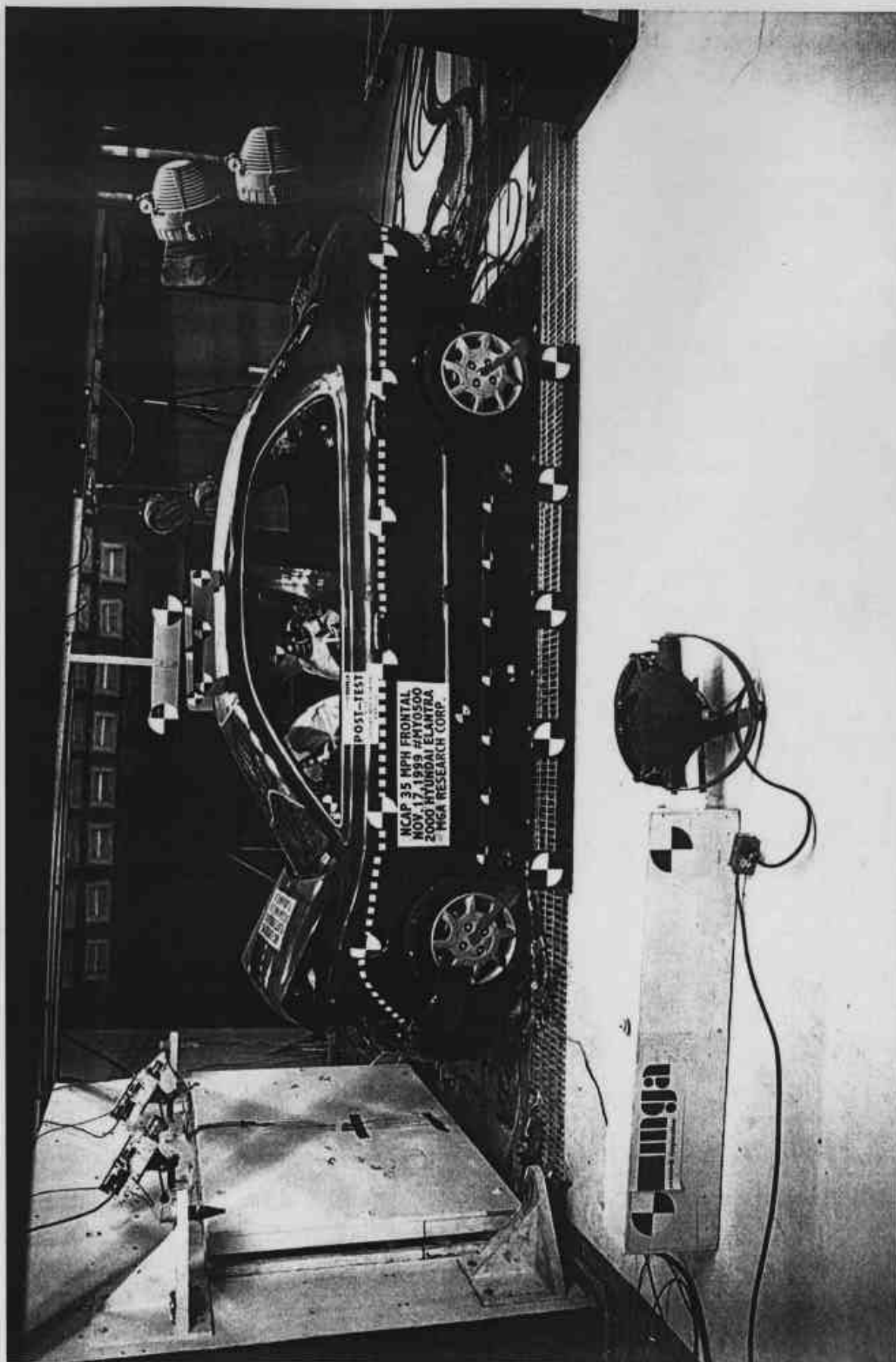


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

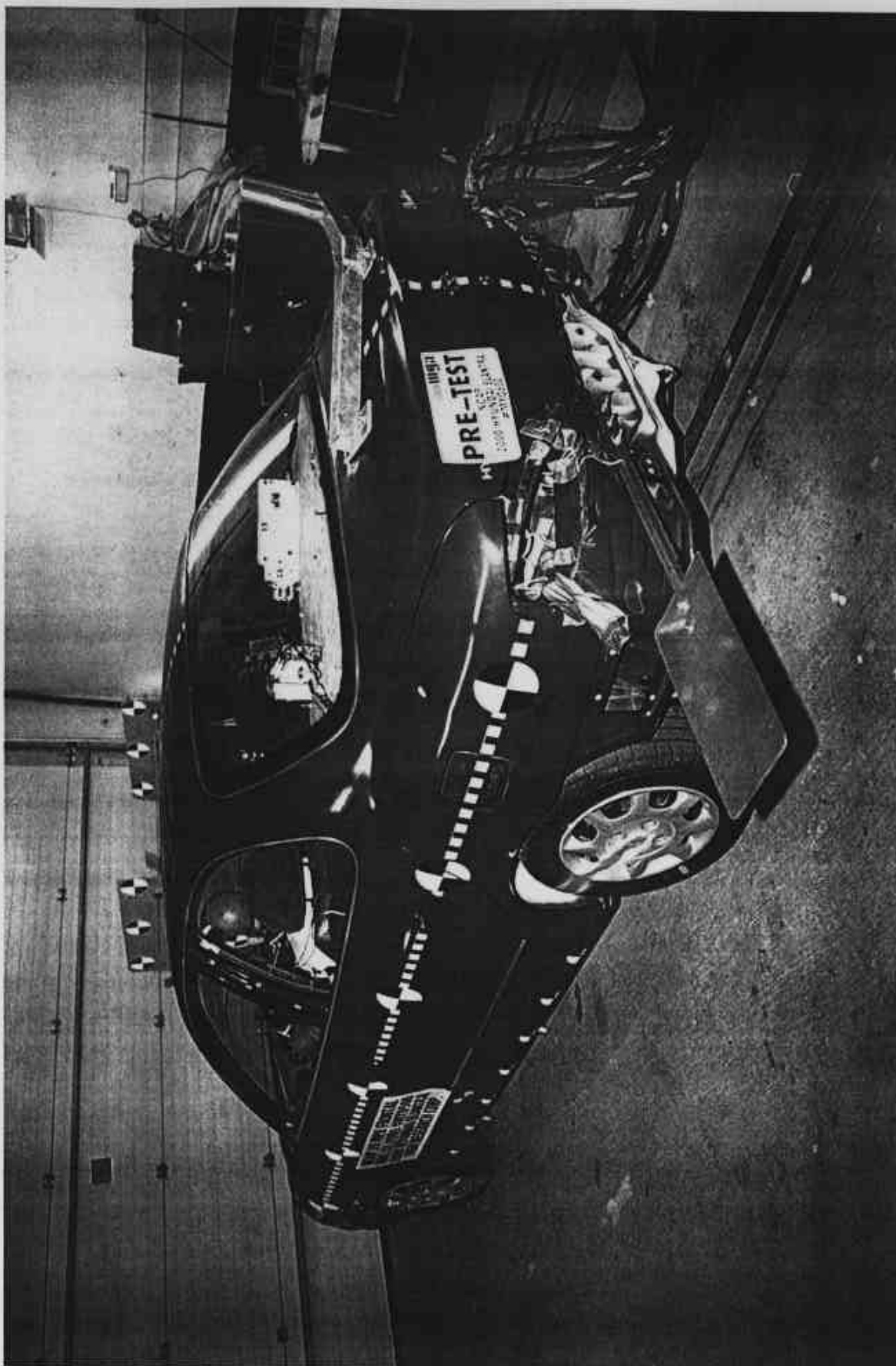


Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

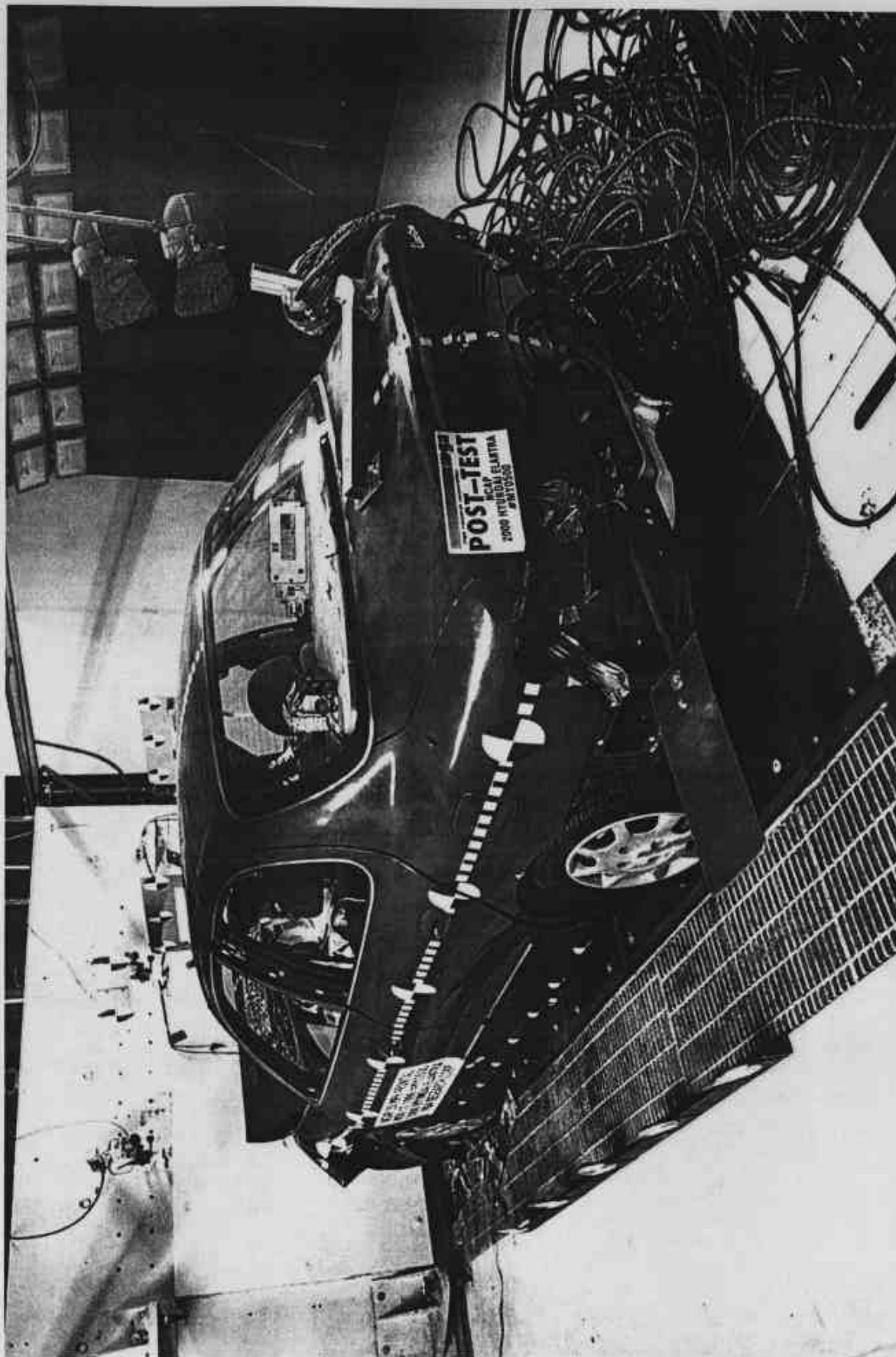


Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

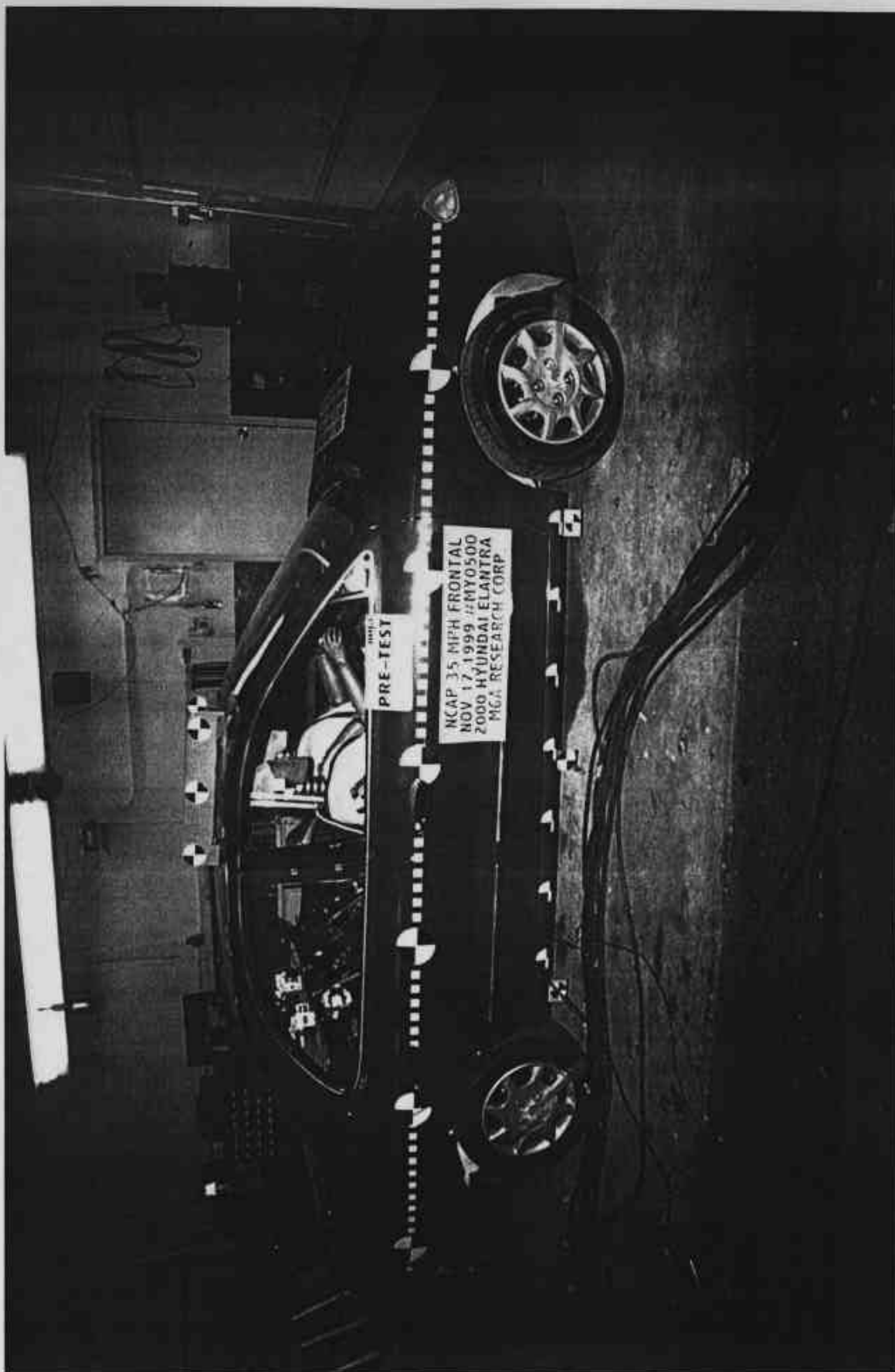


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

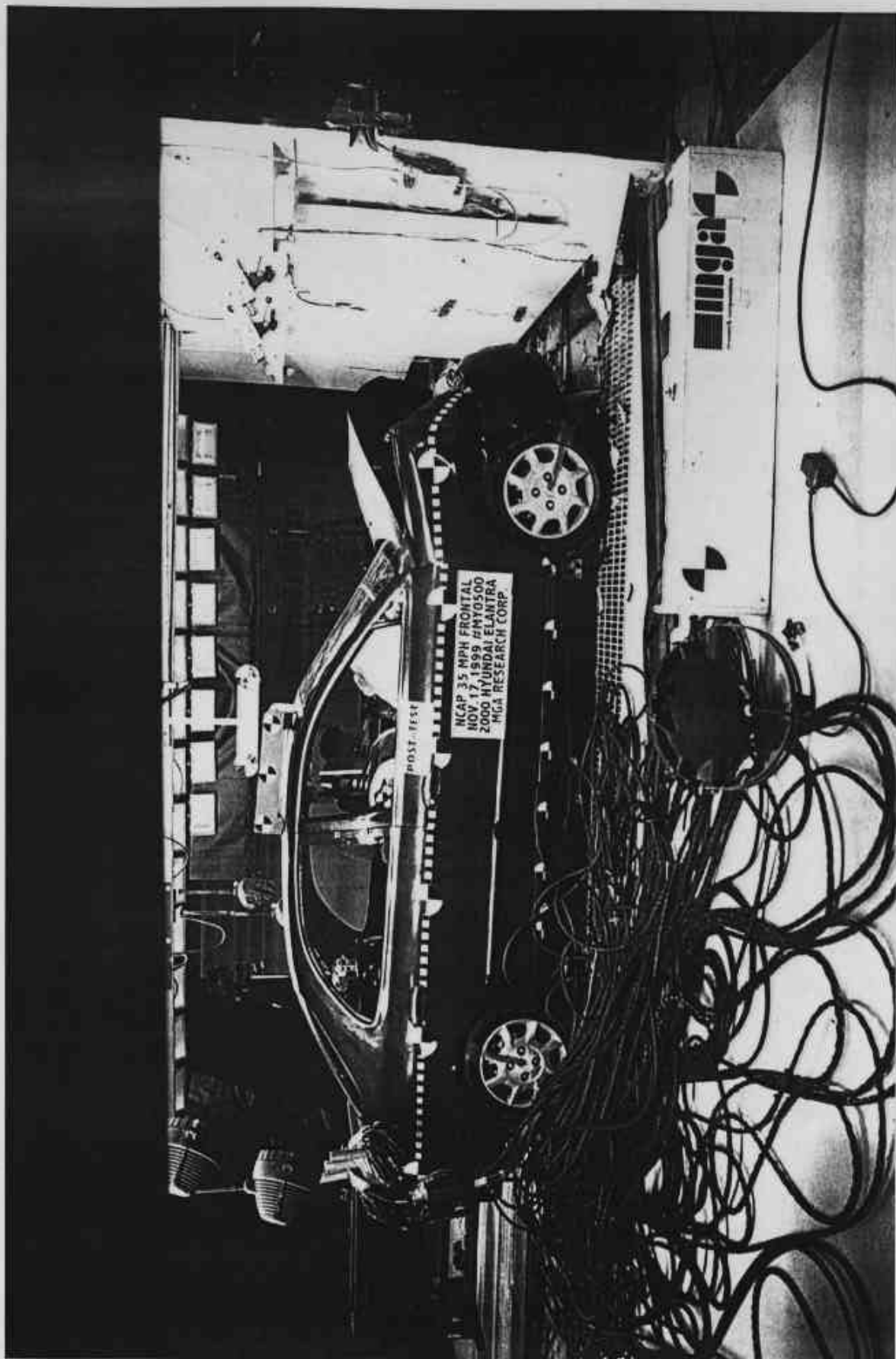


Photo No. A-10 - Post-Test Right Side View of Test Vehicle

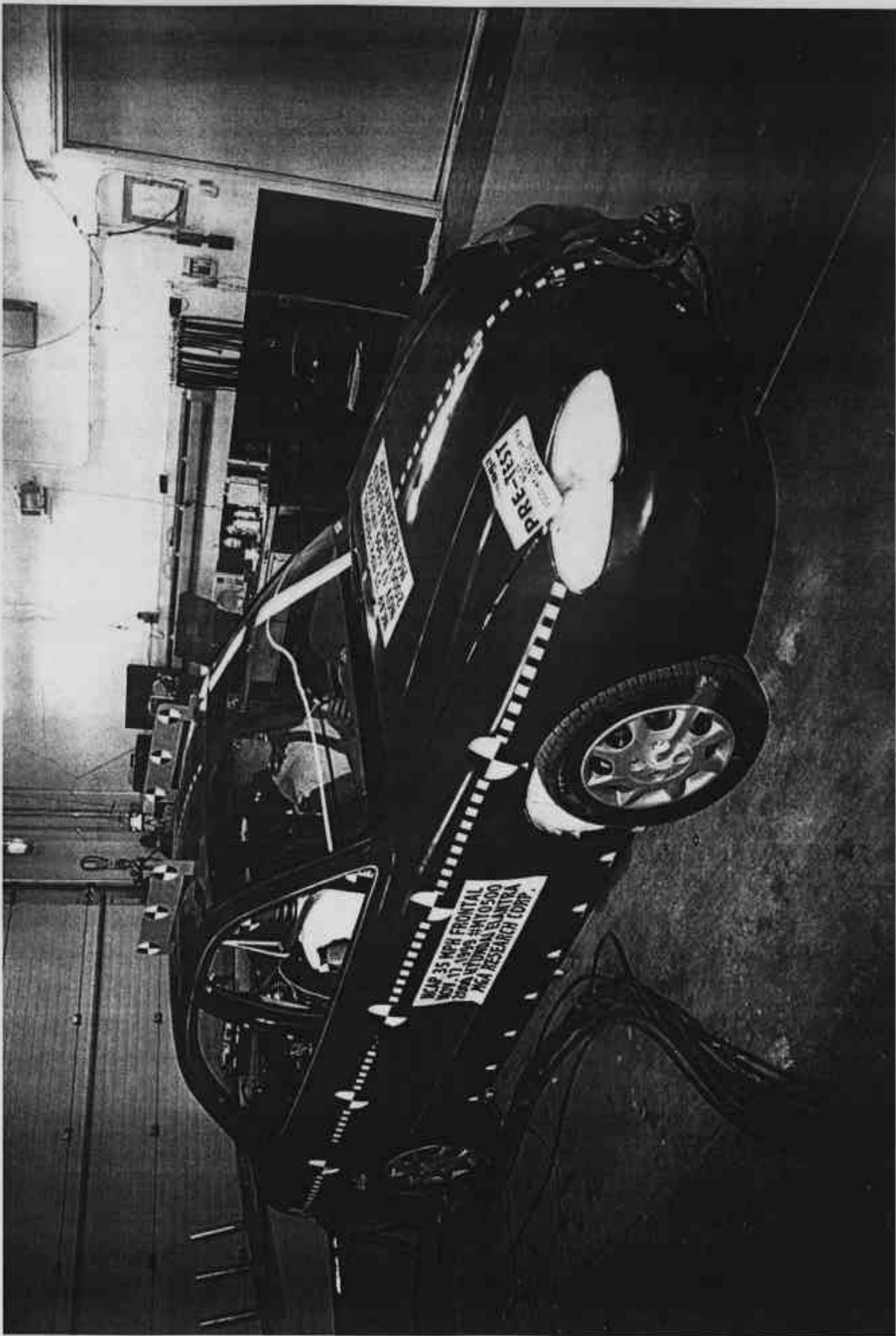
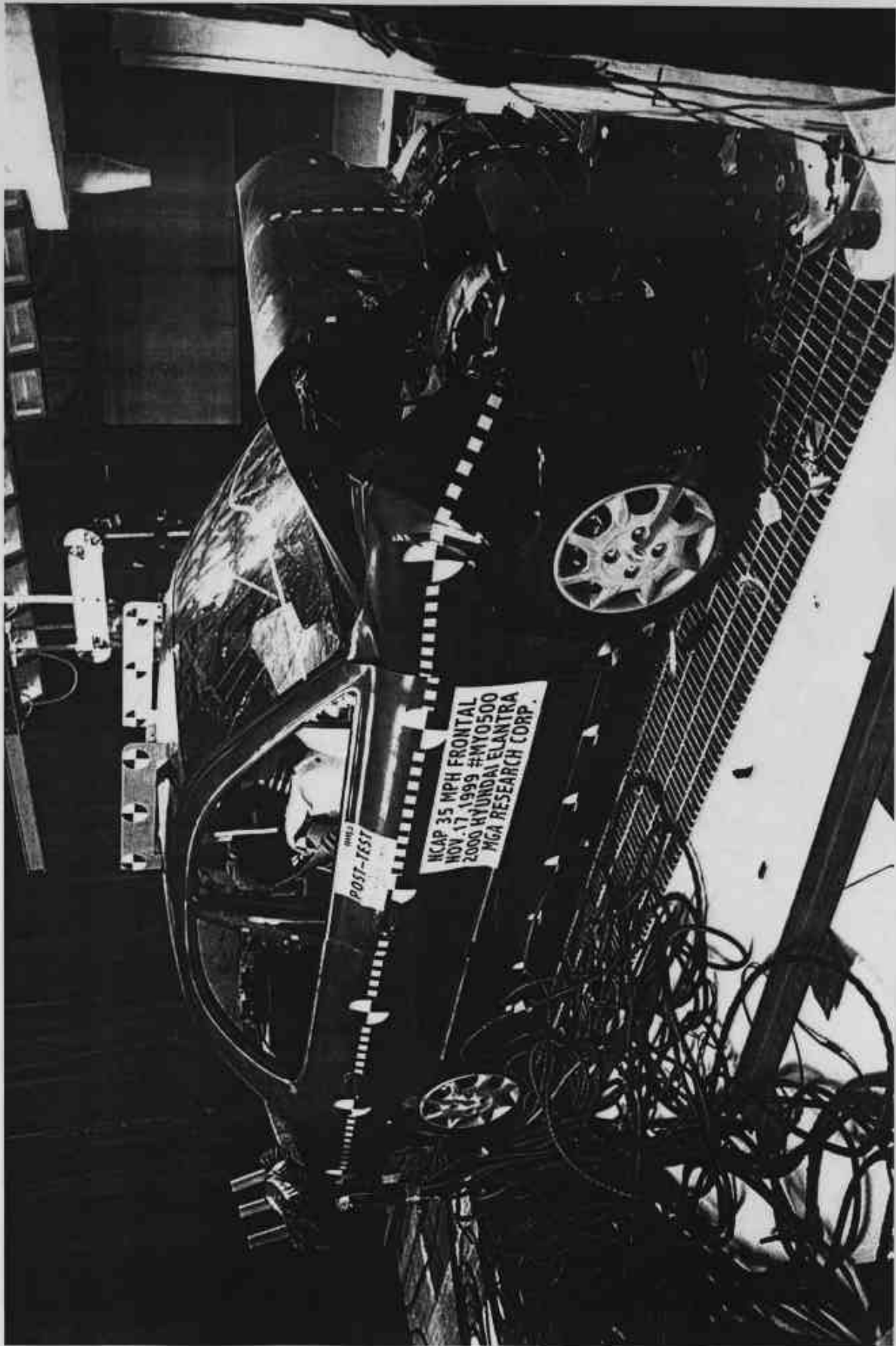


Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle



A-12

Photo No. A-12 - Post-Test Right Front Three-Quarter View of Test Vehicle



Photo No. A-13 - Pre-Test Fuel Filler Cap View

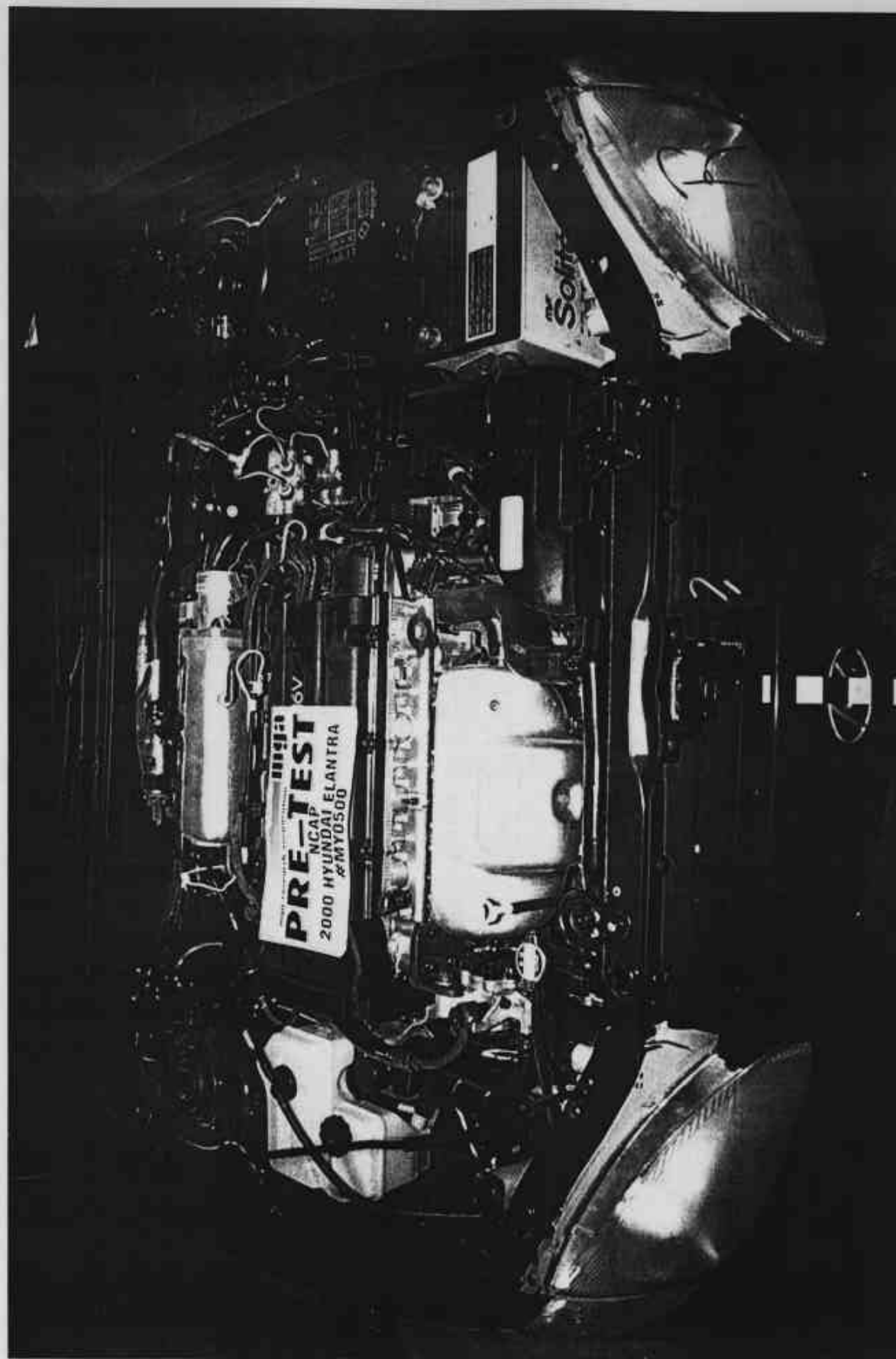


Photo No. A-14 - Pre-Test Engine Compartment View

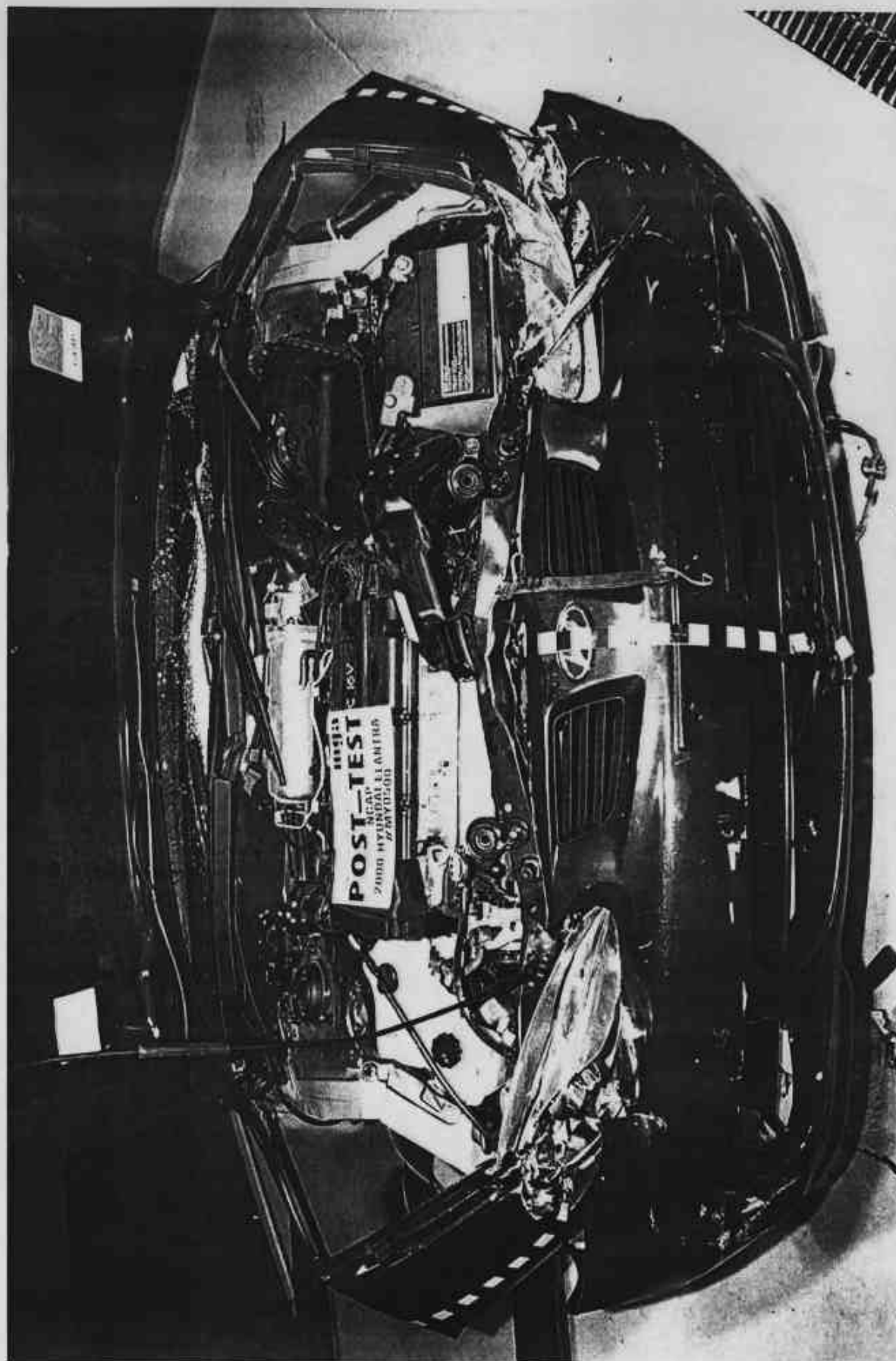


Photo No. A-15 - Post-Test Engine Compartment View

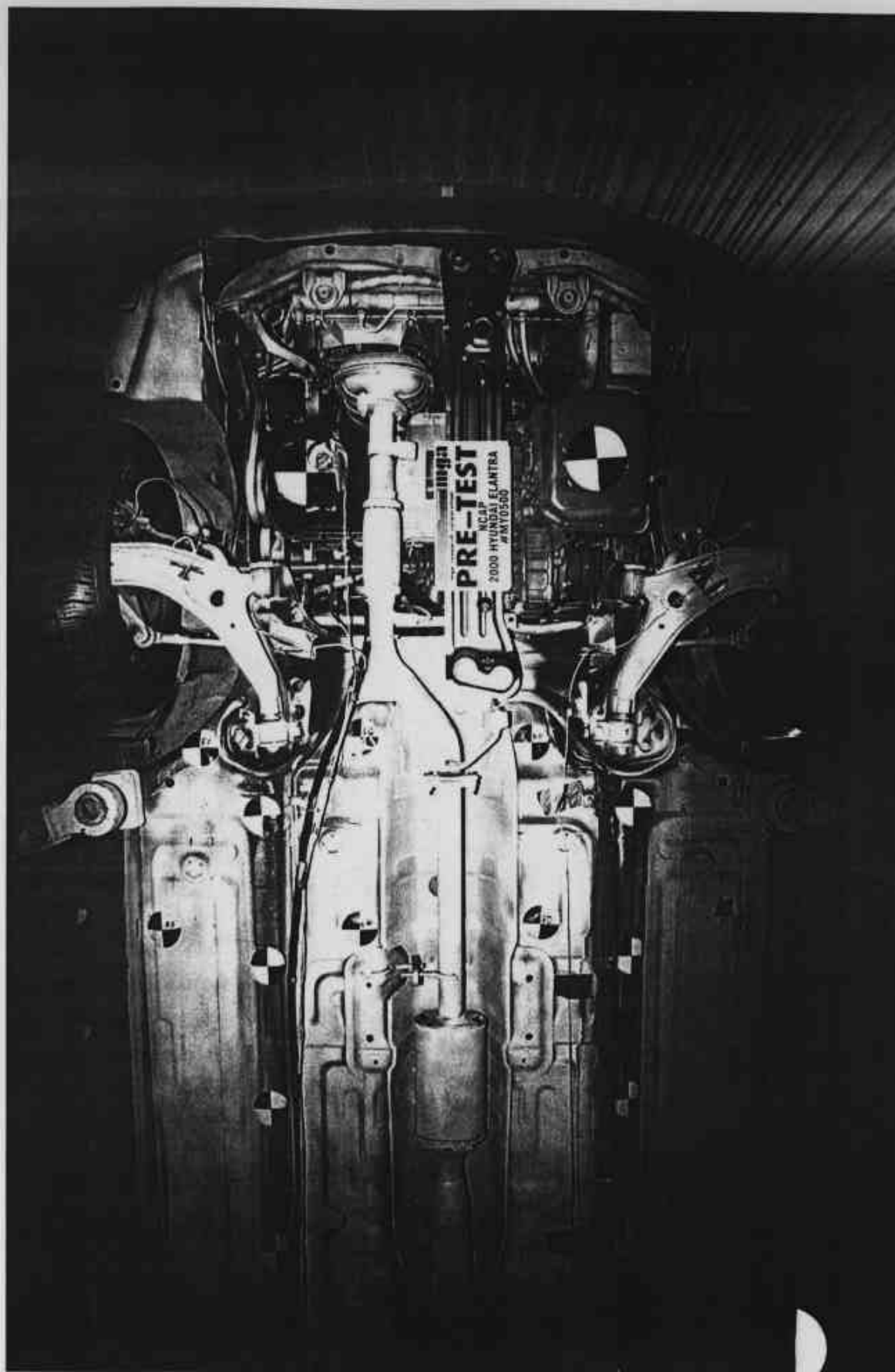


Photo No. A-16 - Pre-Test Front Underbody View

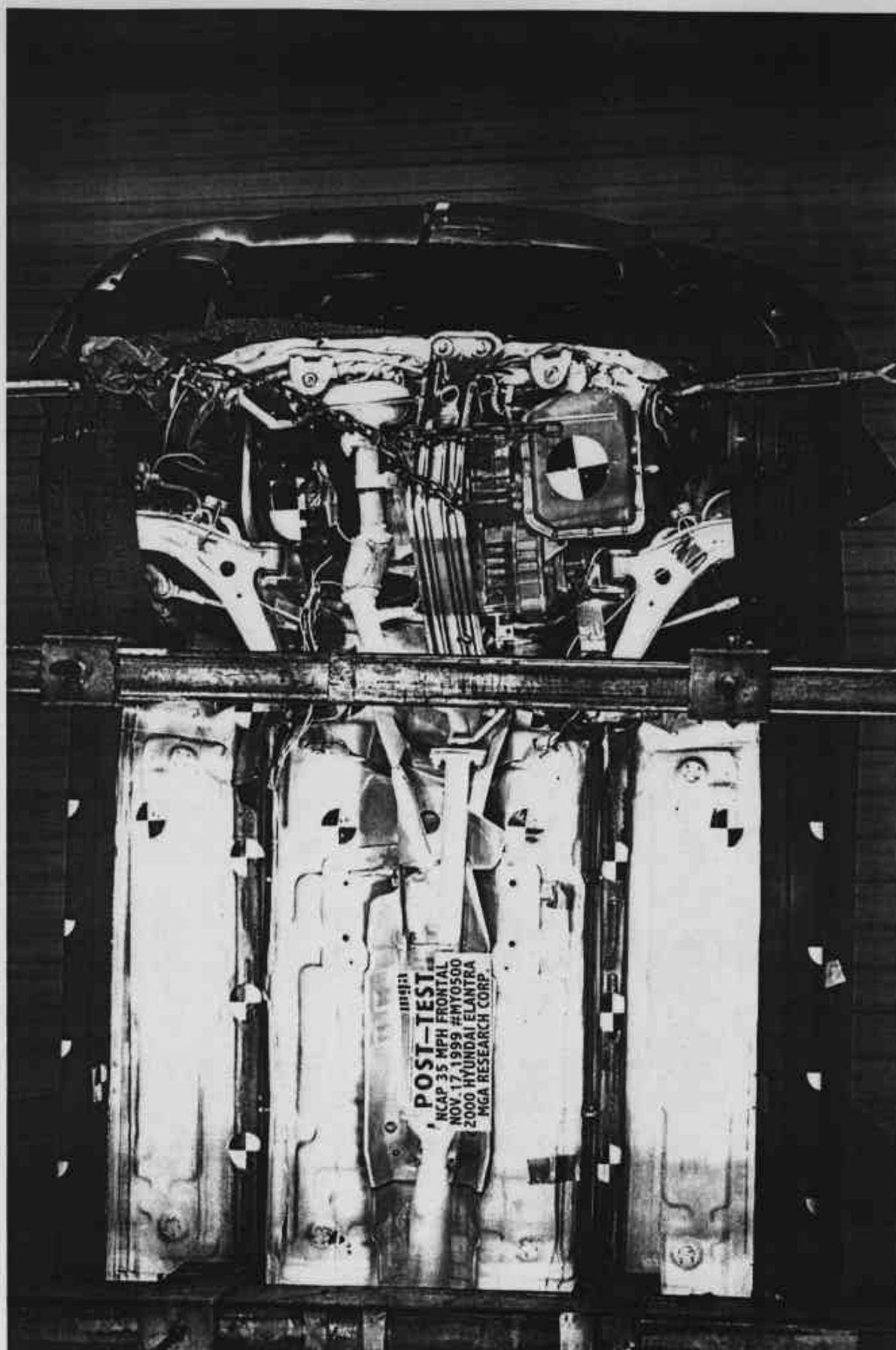


Photo No. A-17 - Post-Test Front Underbody View

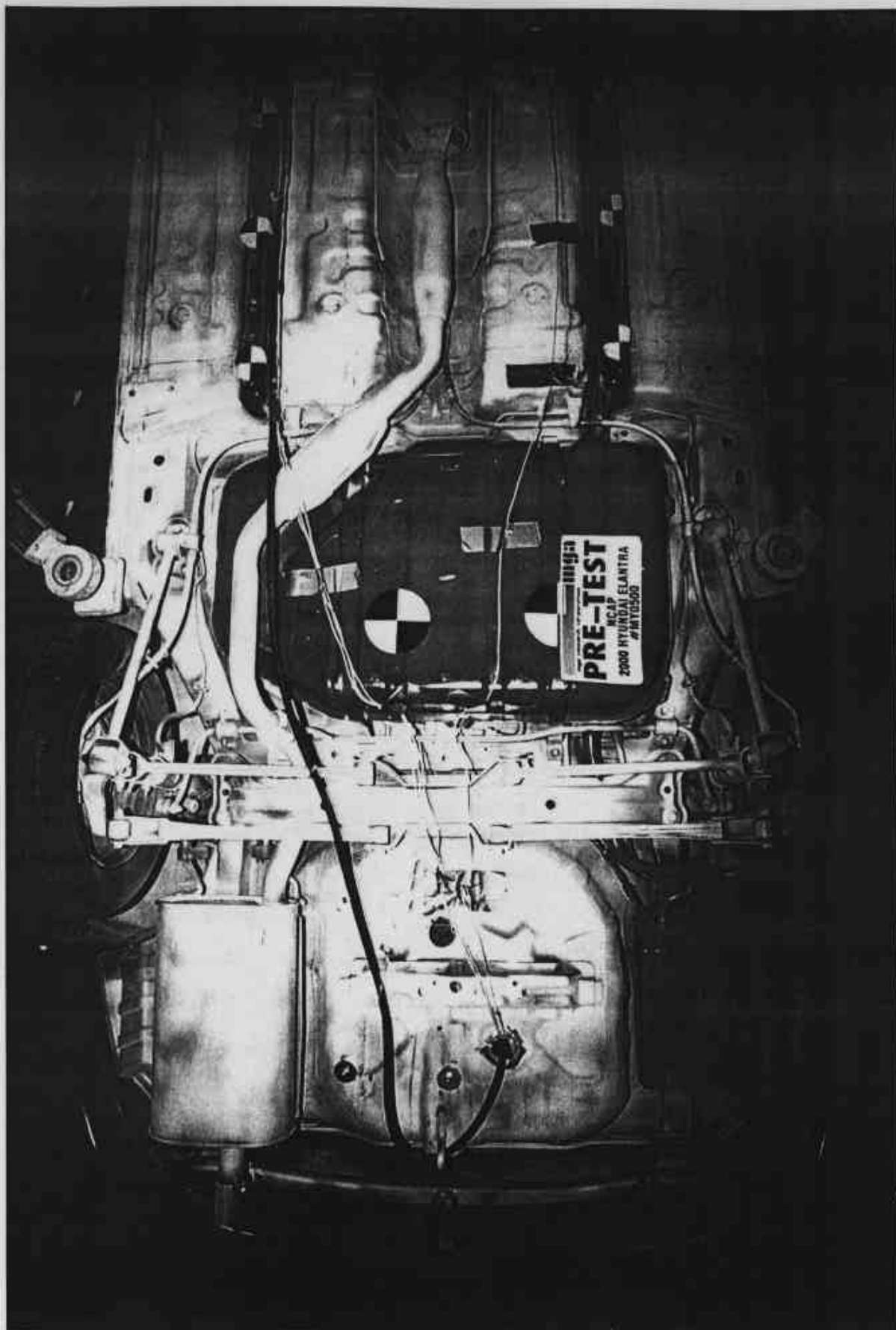


Photo No. A-18 - Pre-Test Rear Underbody View

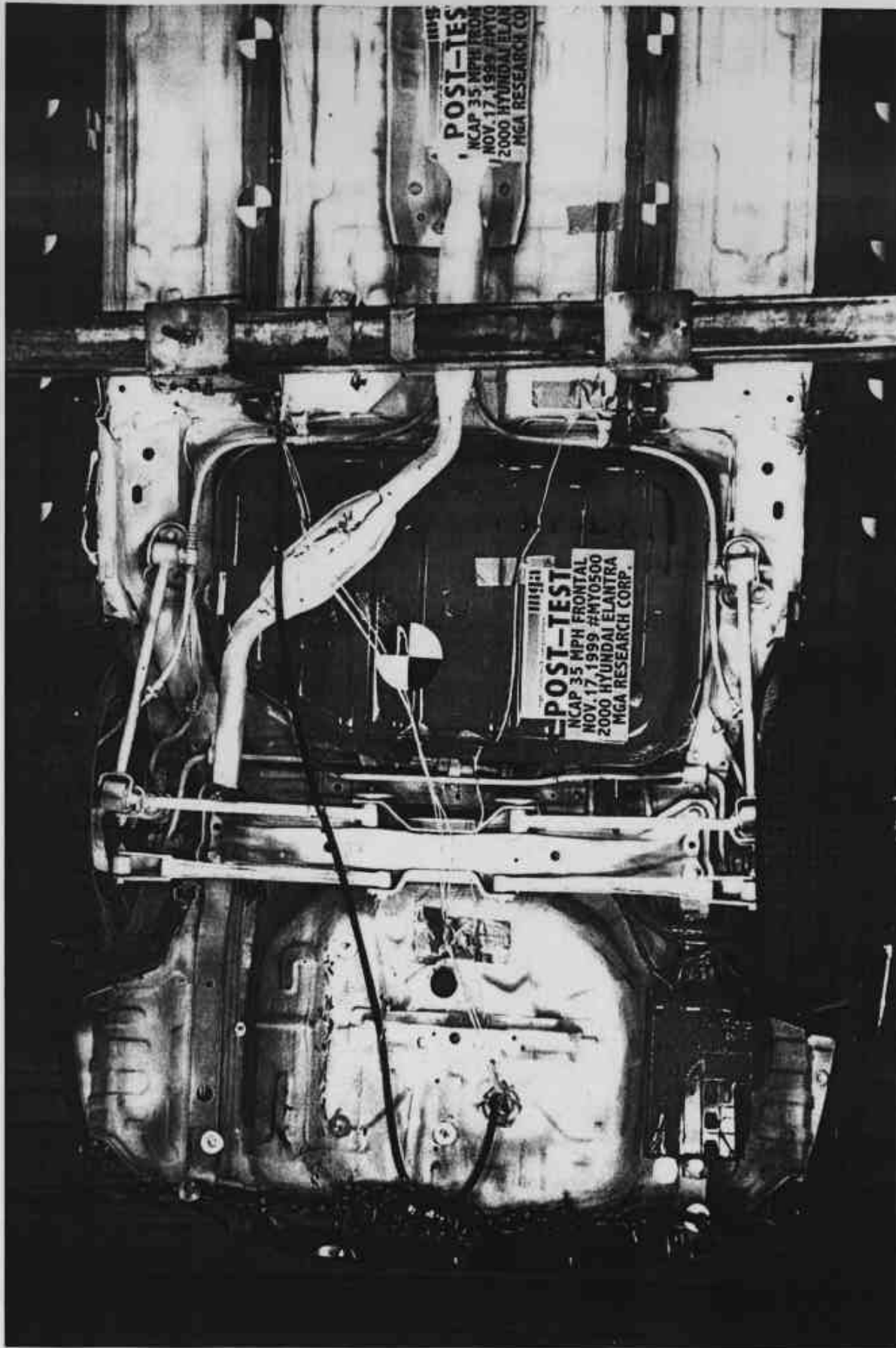


Photo No. A-19 - Post-Test Rear Underbody View

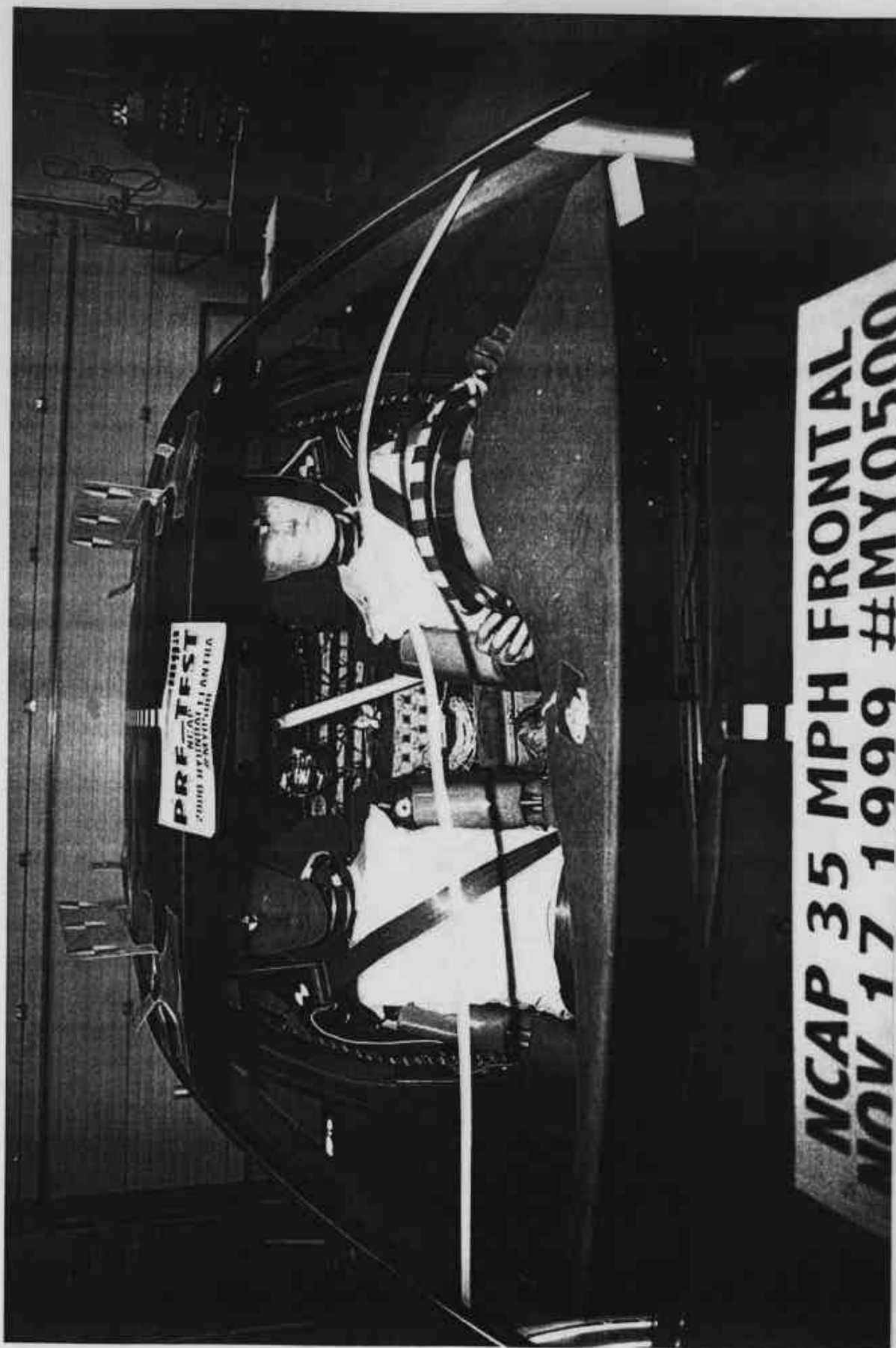


Photo No. A-20 - Pre-Test Windshield View

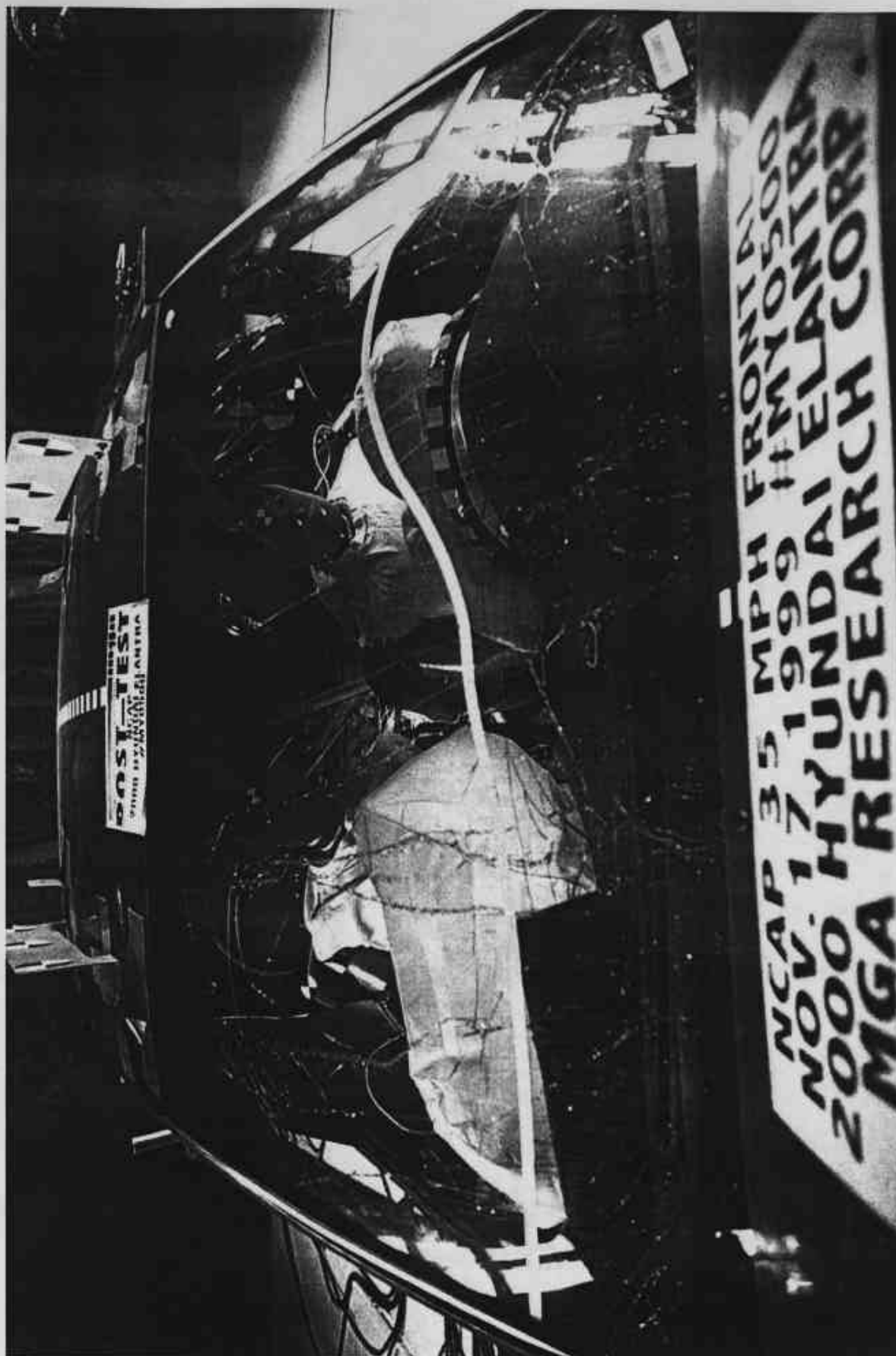


Photo No. A-21 - Post-Test Windshield View

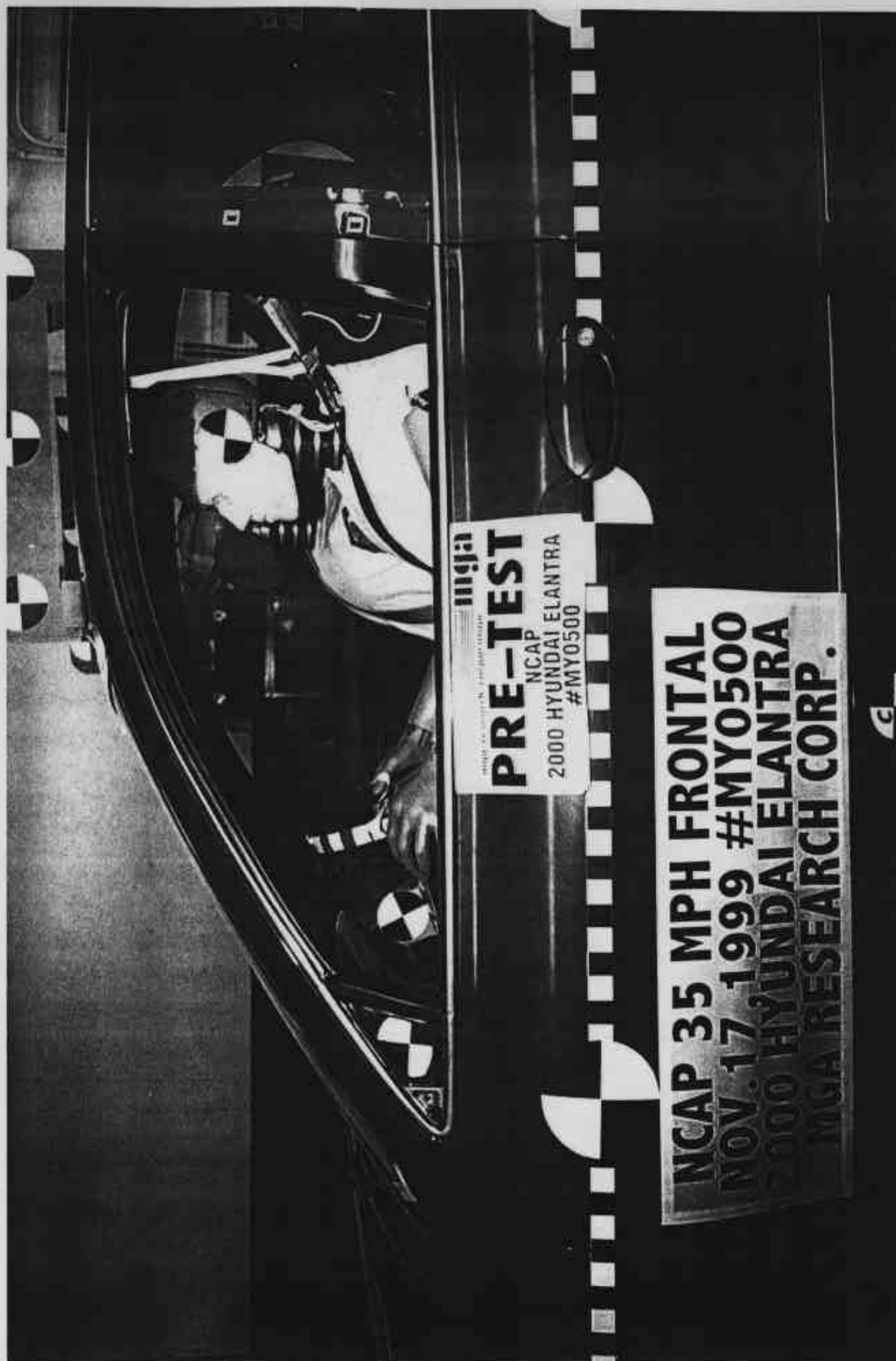
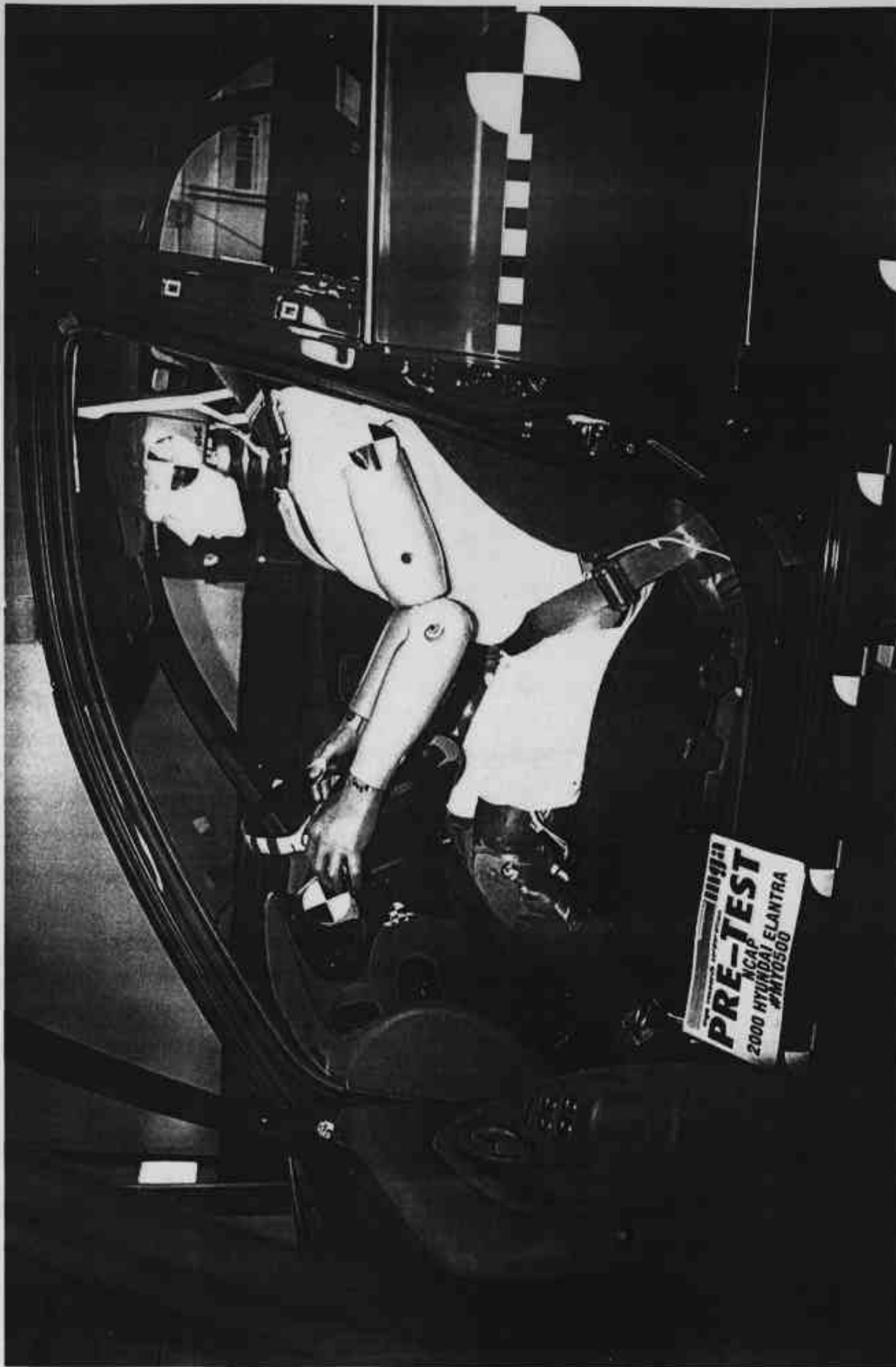


Photo No. A-22 - Pre-Test Driver Dummy Position Left Side View



Photo A-23 - Post-Test Driver Dummy Position Left Side View



A-24

Photo No. A-24 - Pre-Test Driver Dummy Position Left Side View (Door Open)

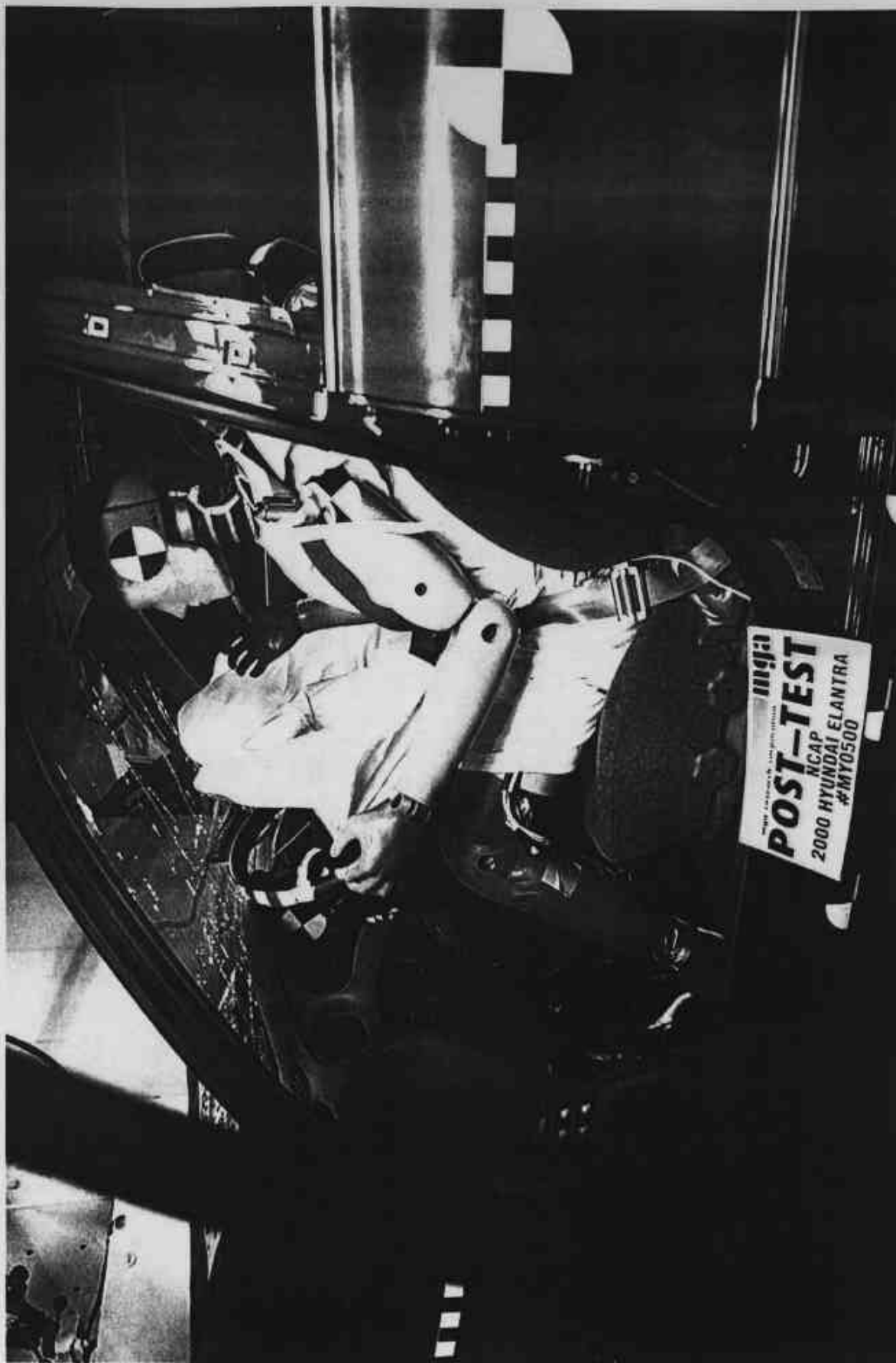


Photo No. A-25 - Post-Test Driver Dummy Position Left Side View (Door Open)



Photo No. A-26 - Pre-Test Driver Seat Position View



Photo No. A-27 - Post-Test Driver Seat Position View



Photo No. A-28 - Pre-Test Driver Dummy Knee Position

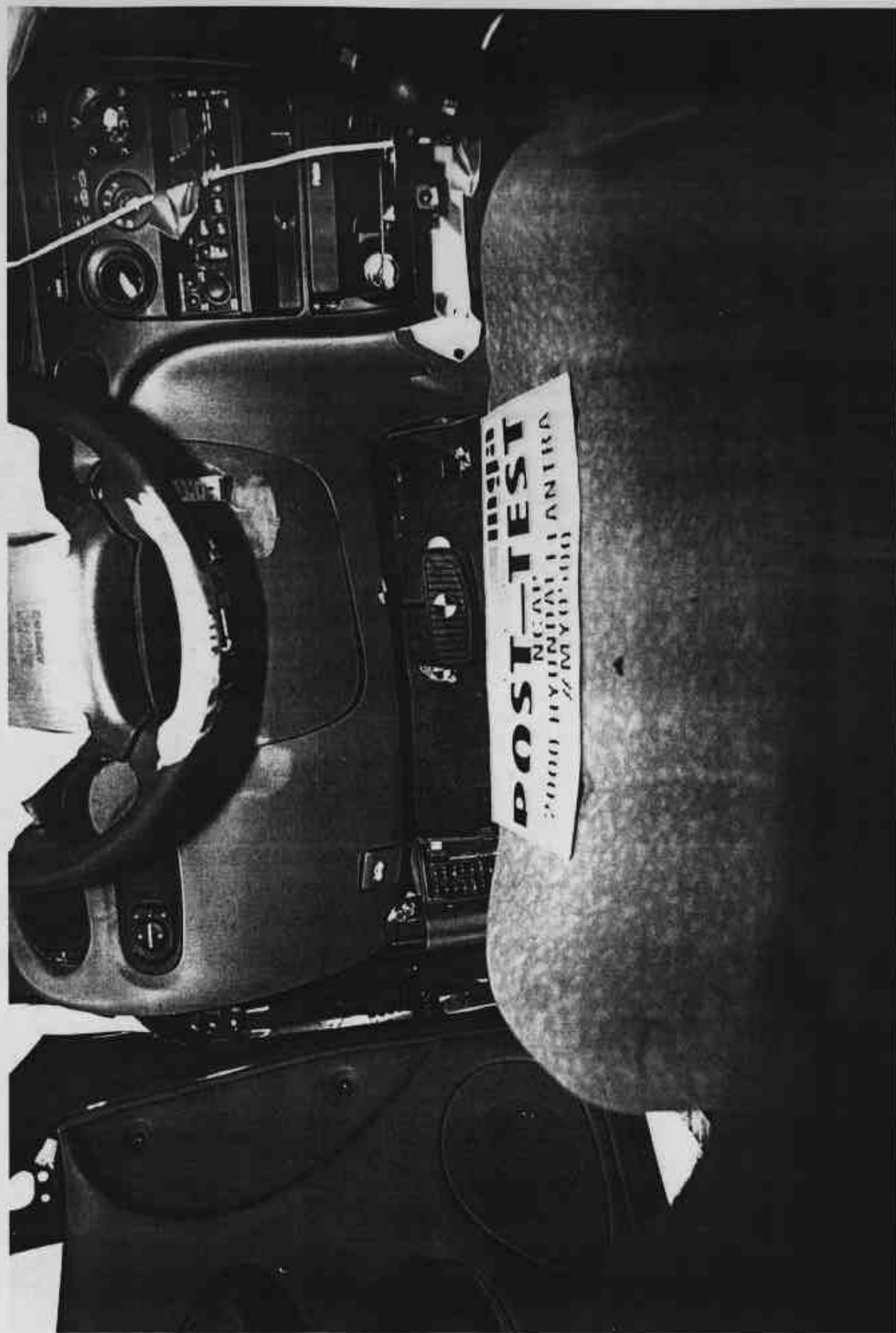


Photo No. A-29 - Post-Test Driver Dummy Knee Position



A-30

Photo No. A-30 - Post-Test Driver Airbag Contact



A-31

Photo No. A-31 - Post-Test Driver Knee Contact View

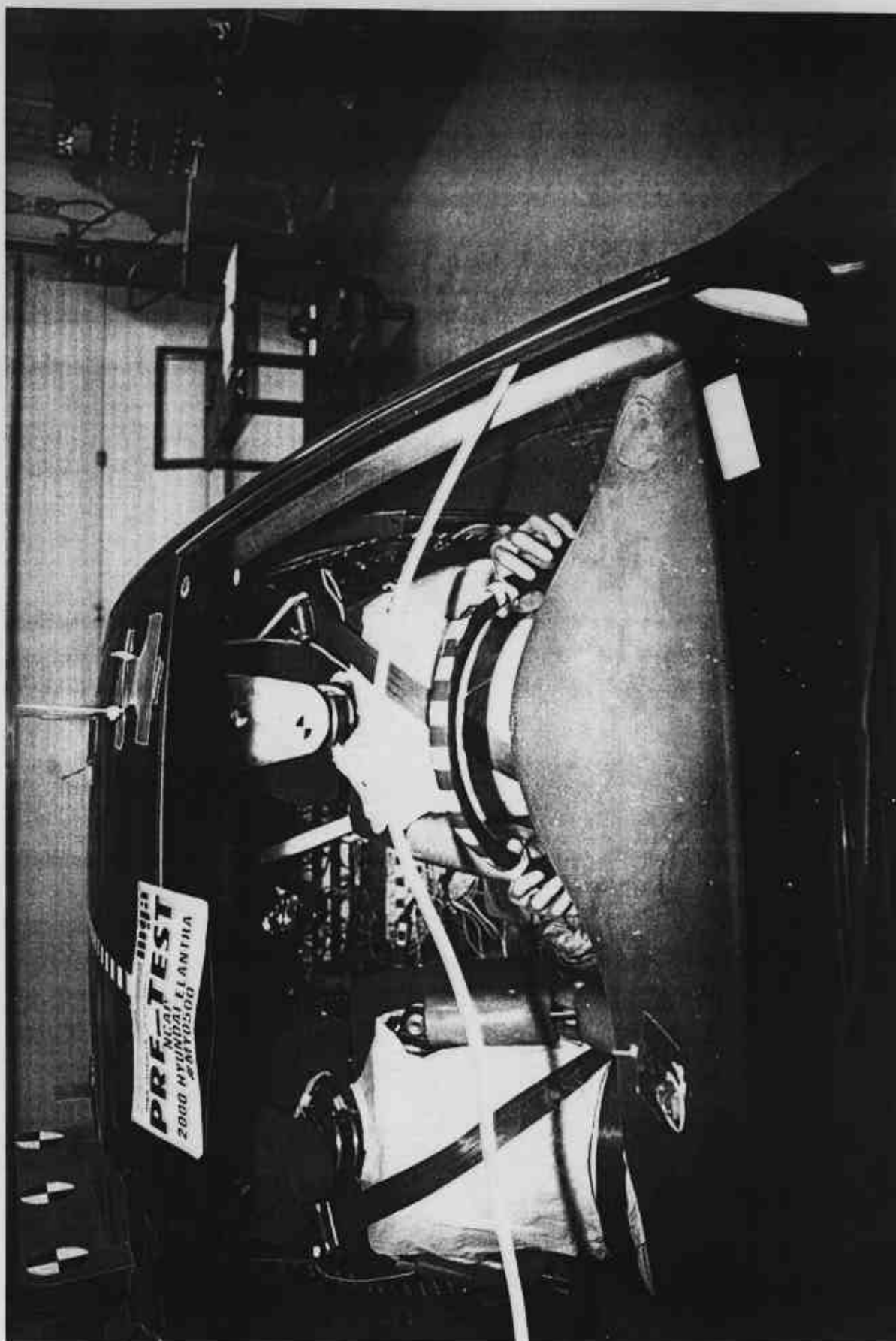


Photo No. A-32 - Pre-Test Driver Windshield View

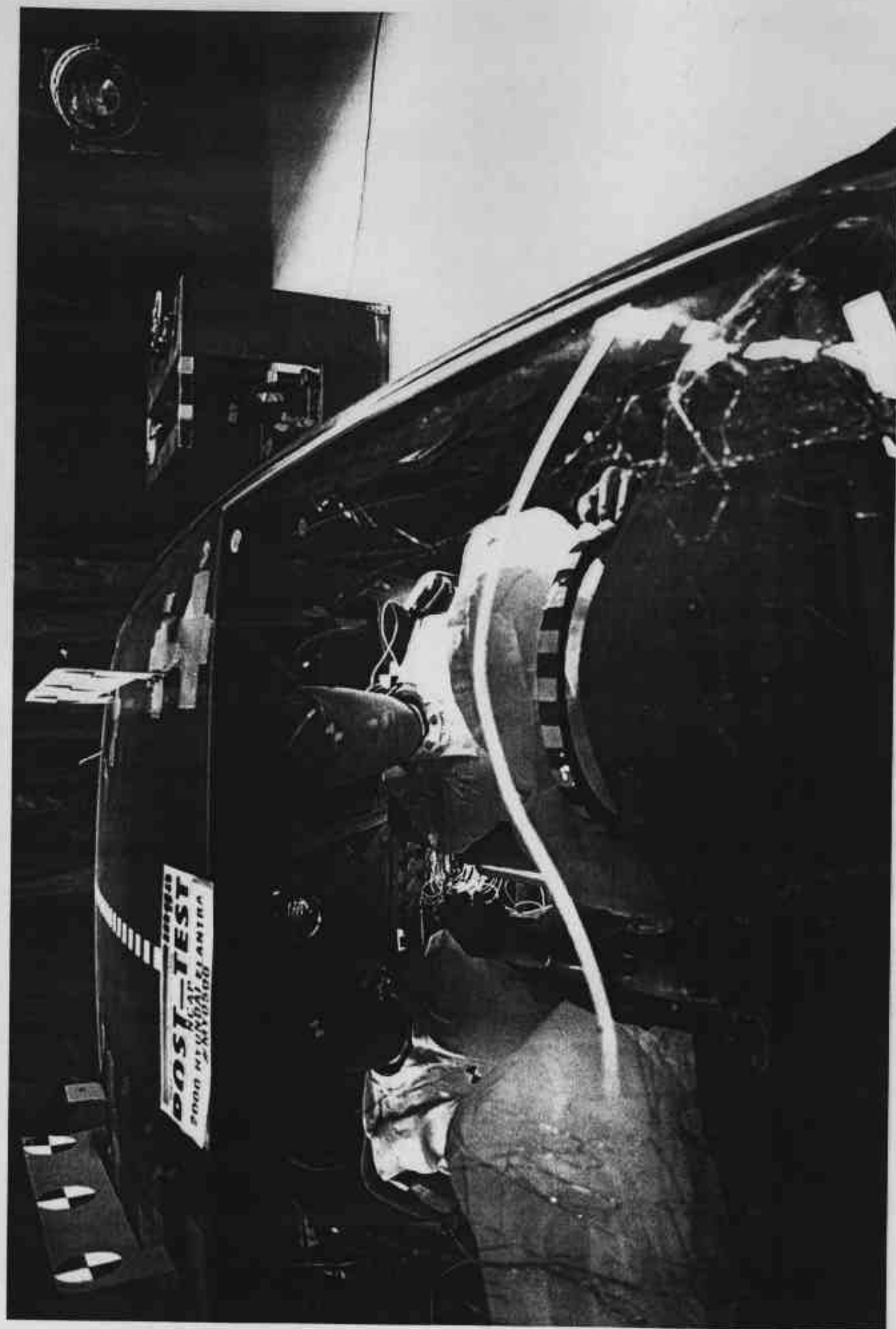


Photo No. A-33 - Post-Test Driver Windshield View



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



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



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



Photo No. A-37 - Post-Test Passenger Dummy Position Right Side View (Door Open)



Photo No. A-38 - Pre-Test Passenger Seat Position View



Photo No. A-39 - Post-Test Passenger Seat Position View



Photo No. A-40 - Pre-Test Passenger Dummy Knee Position

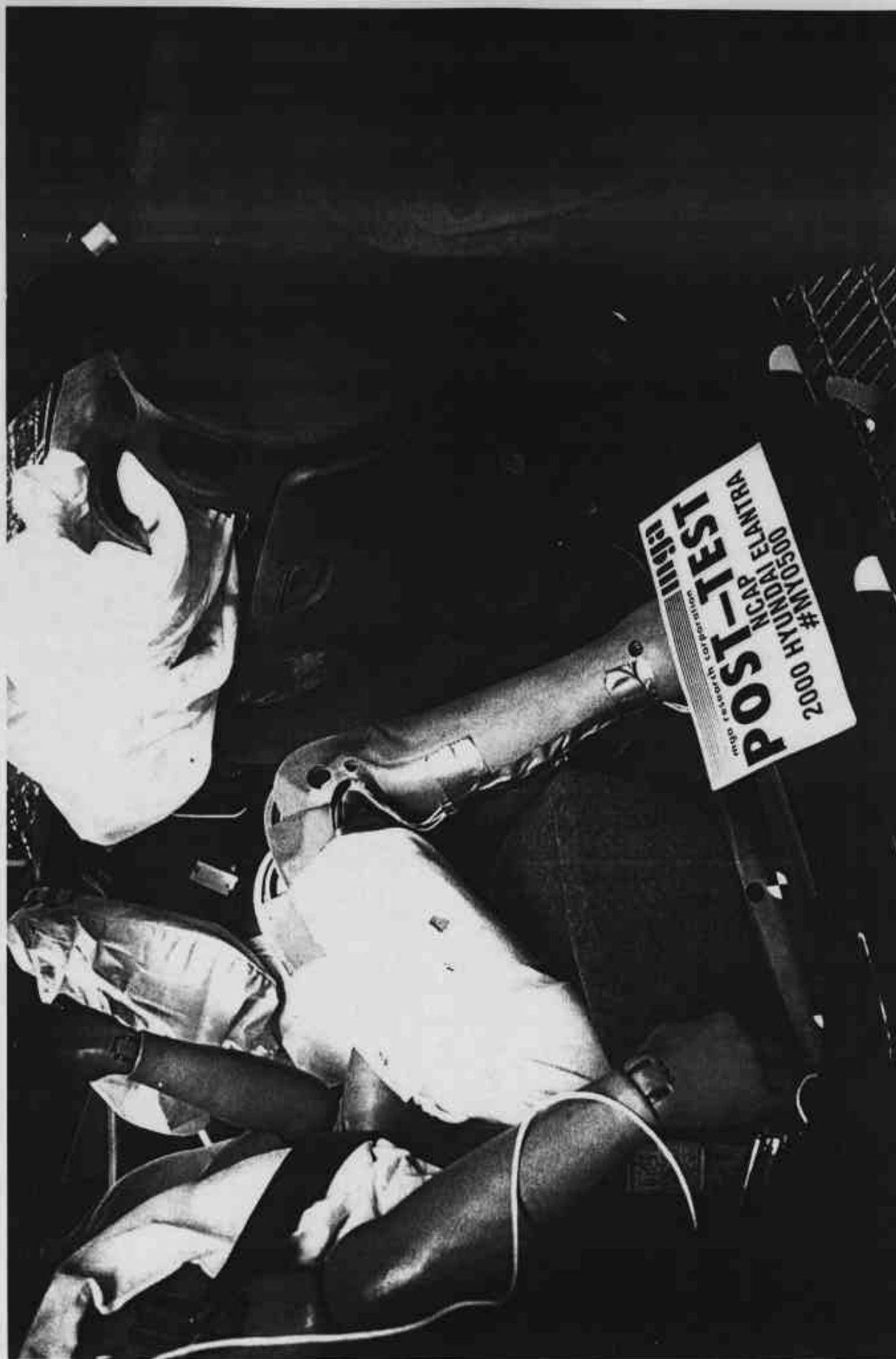


Photo A-41 - Post-Test Passenger Dummy Knee Position



Photo A-42 - Post-Test Passenger Airbag Contact

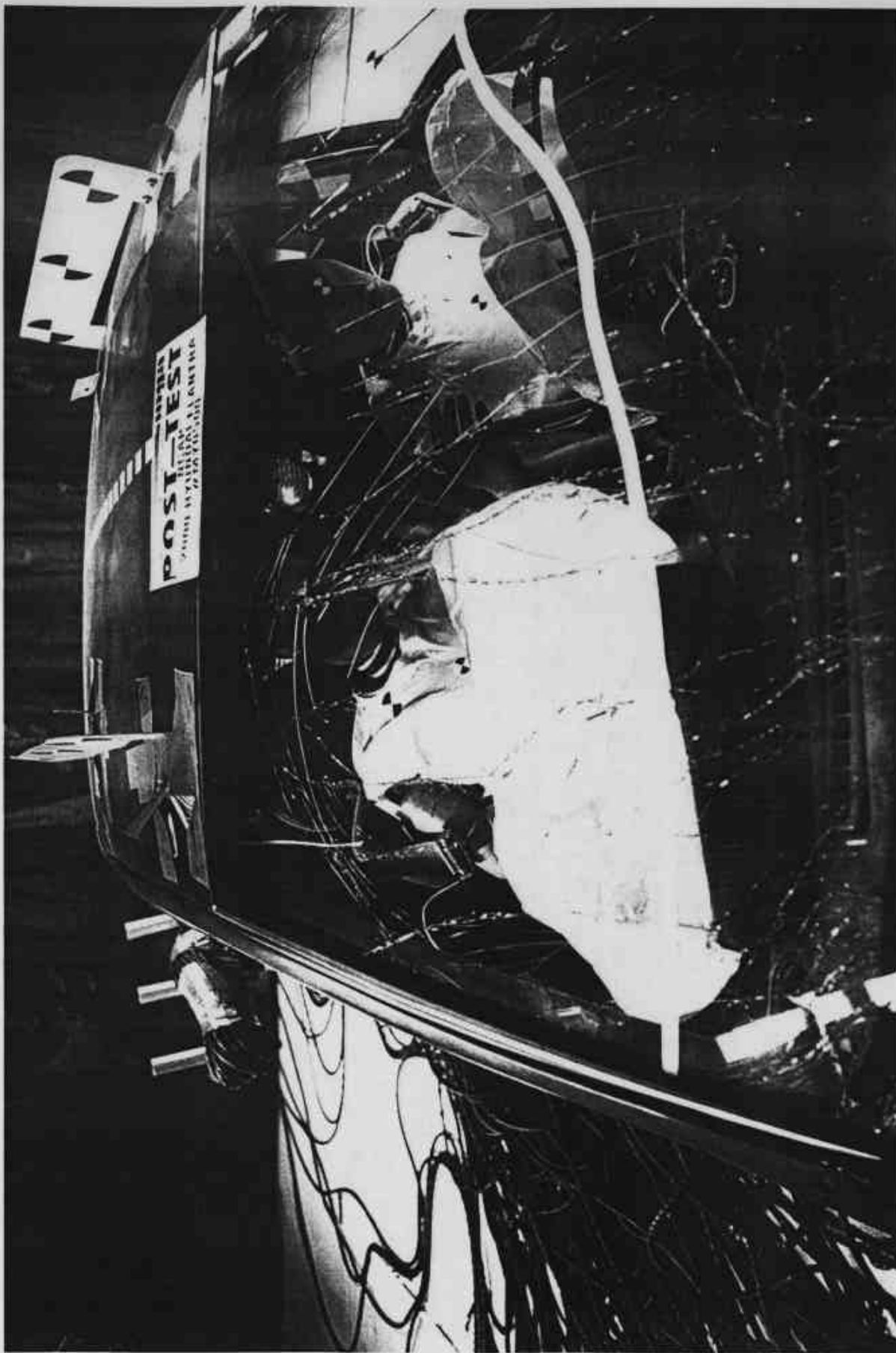


A-43

Photo A-43 - Post-Test Passenger Knee Contact View



Photo A-44 - Pre-Test Passenger Windshield View



A-45

Photo A-45 - Post-Test Passenger Windshield View



A-46

Photo A-46 - Vehicle Certification Label

1 TIRE INFLATION SYSTEM

VEHICLE CAPACITY WEIGHT 1000 LBS  
SEATING CAPACITY TOTAL 1000 LBS

TIRE PRESSURES COLD (PSI)

| TIRE SIZE   | LOAD 1000 LBS<br>2 PERSONS | LOAD 1500 LBS<br>3 PERSONS |
|-------------|----------------------------|----------------------------|
| 185-50 R14  | 210/200                    | 210/210                    |
| P185-50 R14 | 210/200                    | 210/210                    |
| 112-70 015  | 200/200                    | 200/200                    |

Photo A-47 - Tire Placard

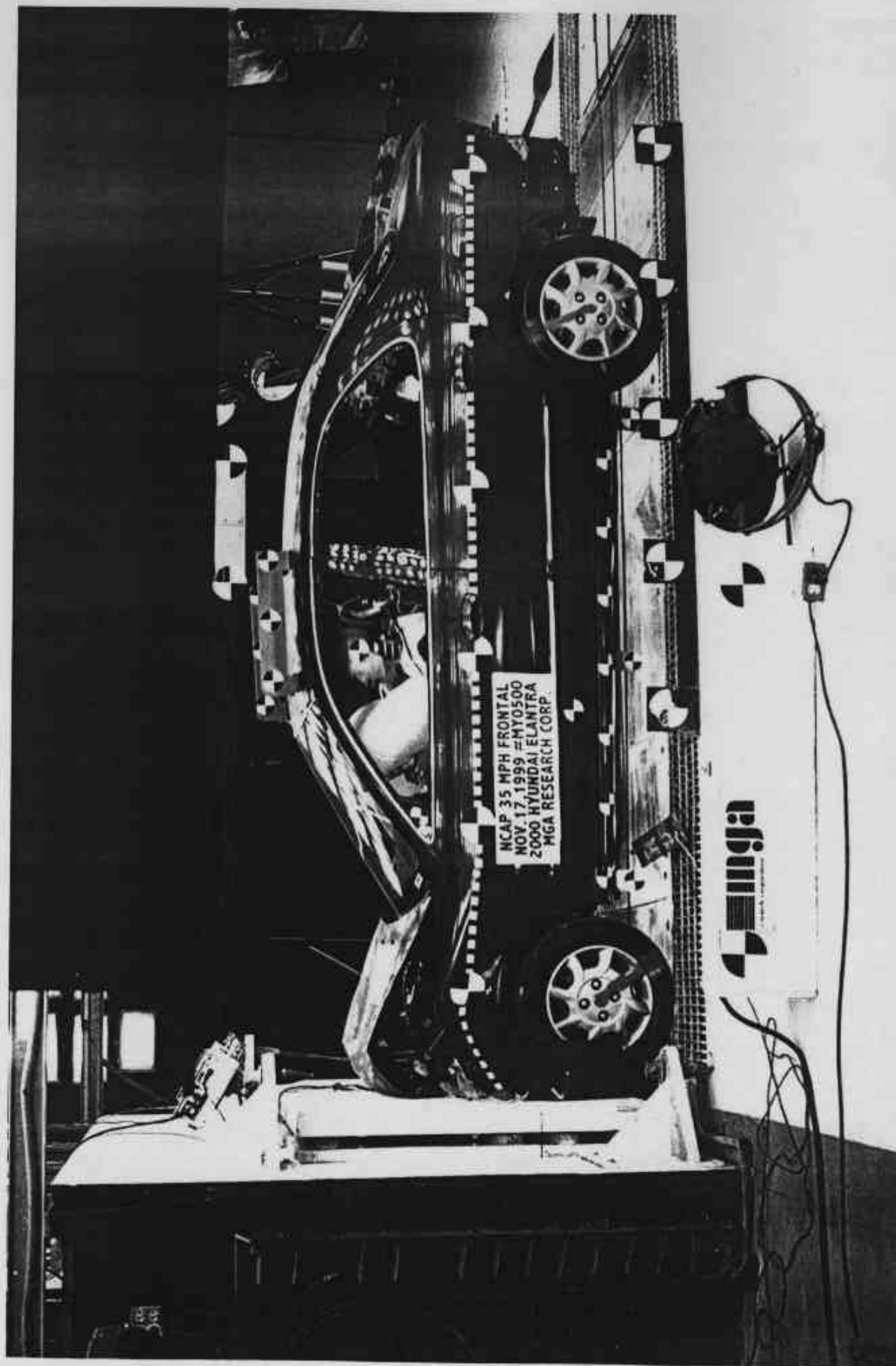
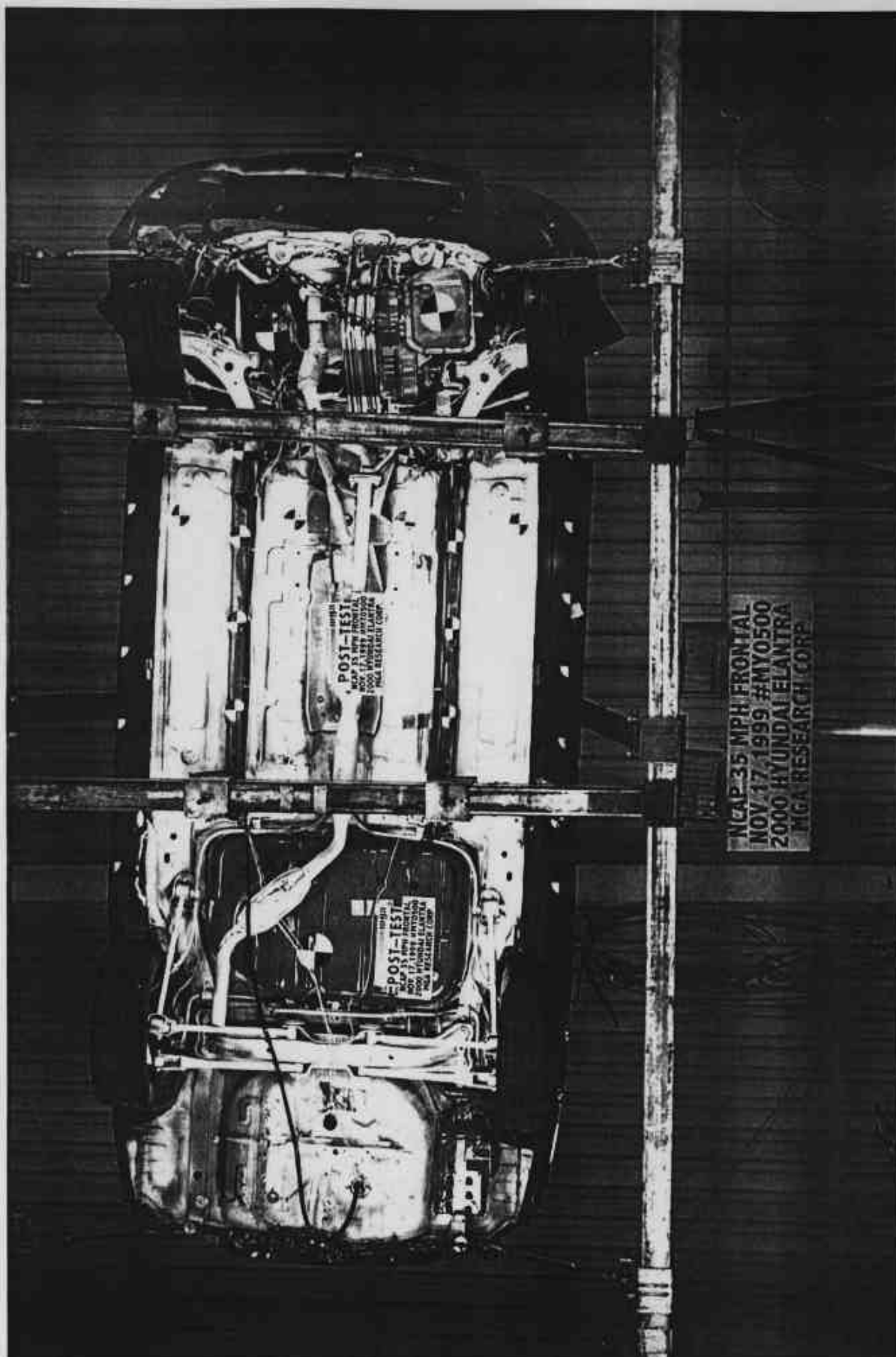


Photo A-48 - Vehicle Impact



A-49

Photo A-49 - Rollover 90°

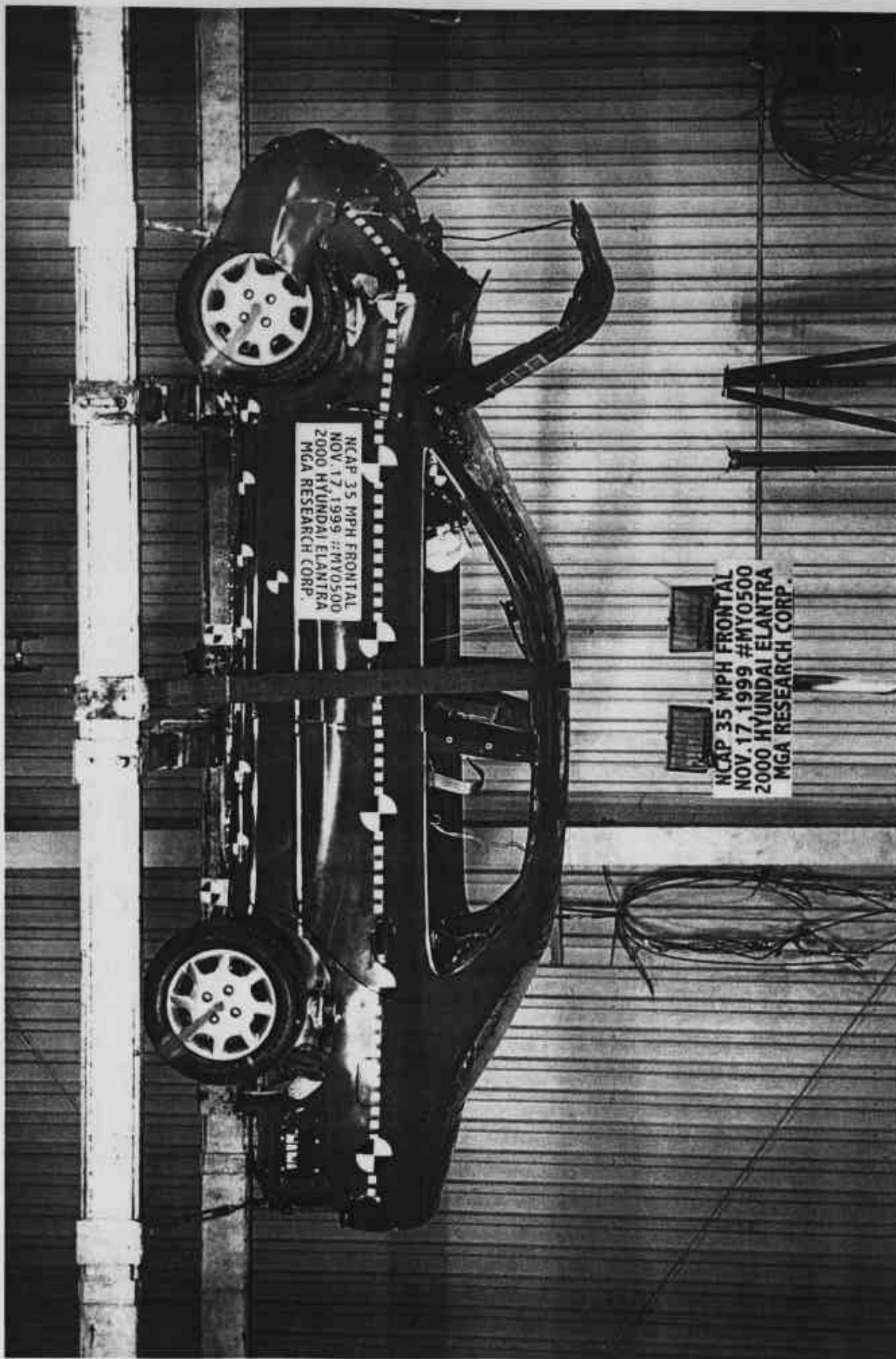
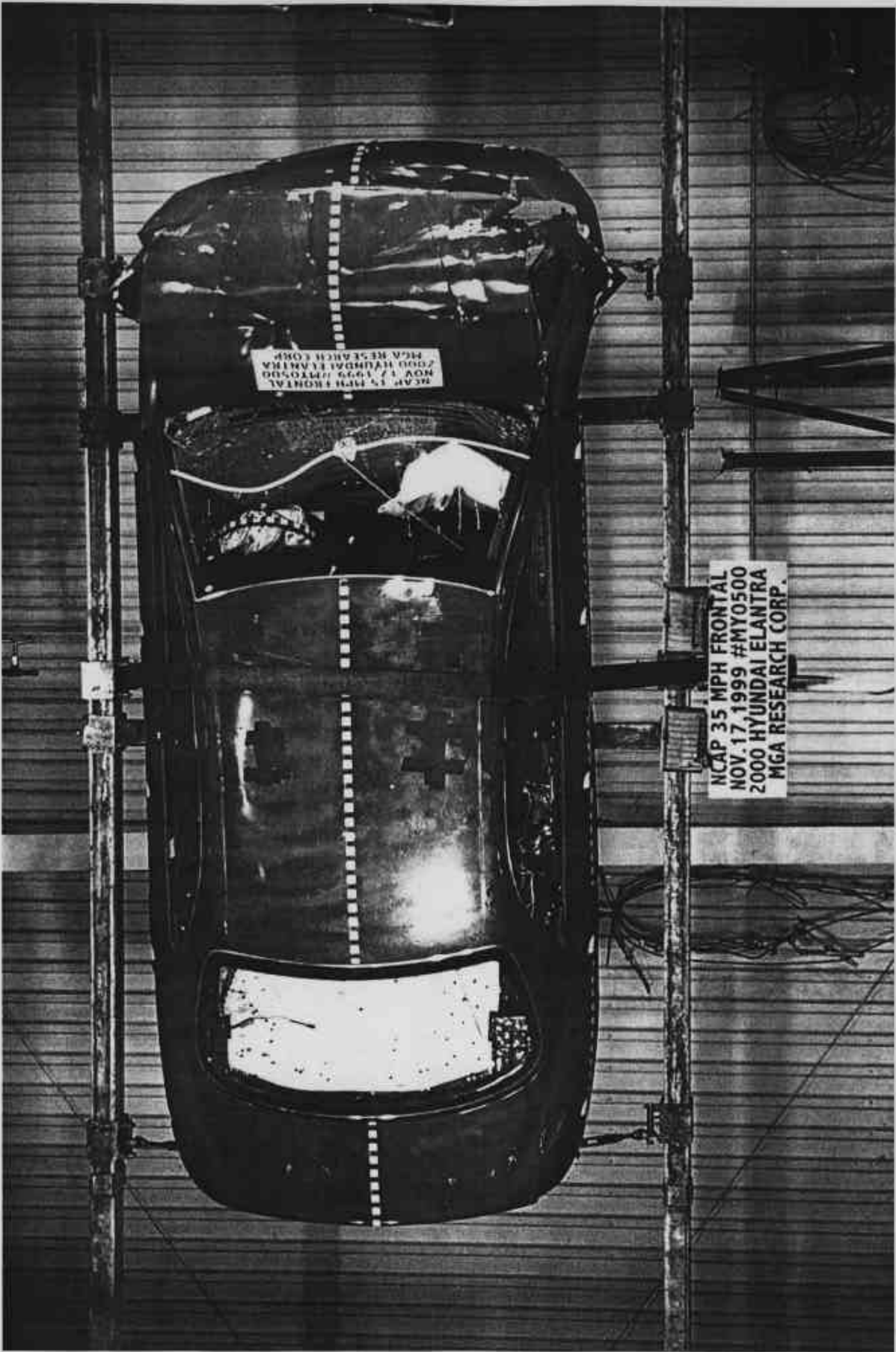


Photo A-50 - Rollover 180°



A-51

Photo A-51 - Rollover 270°

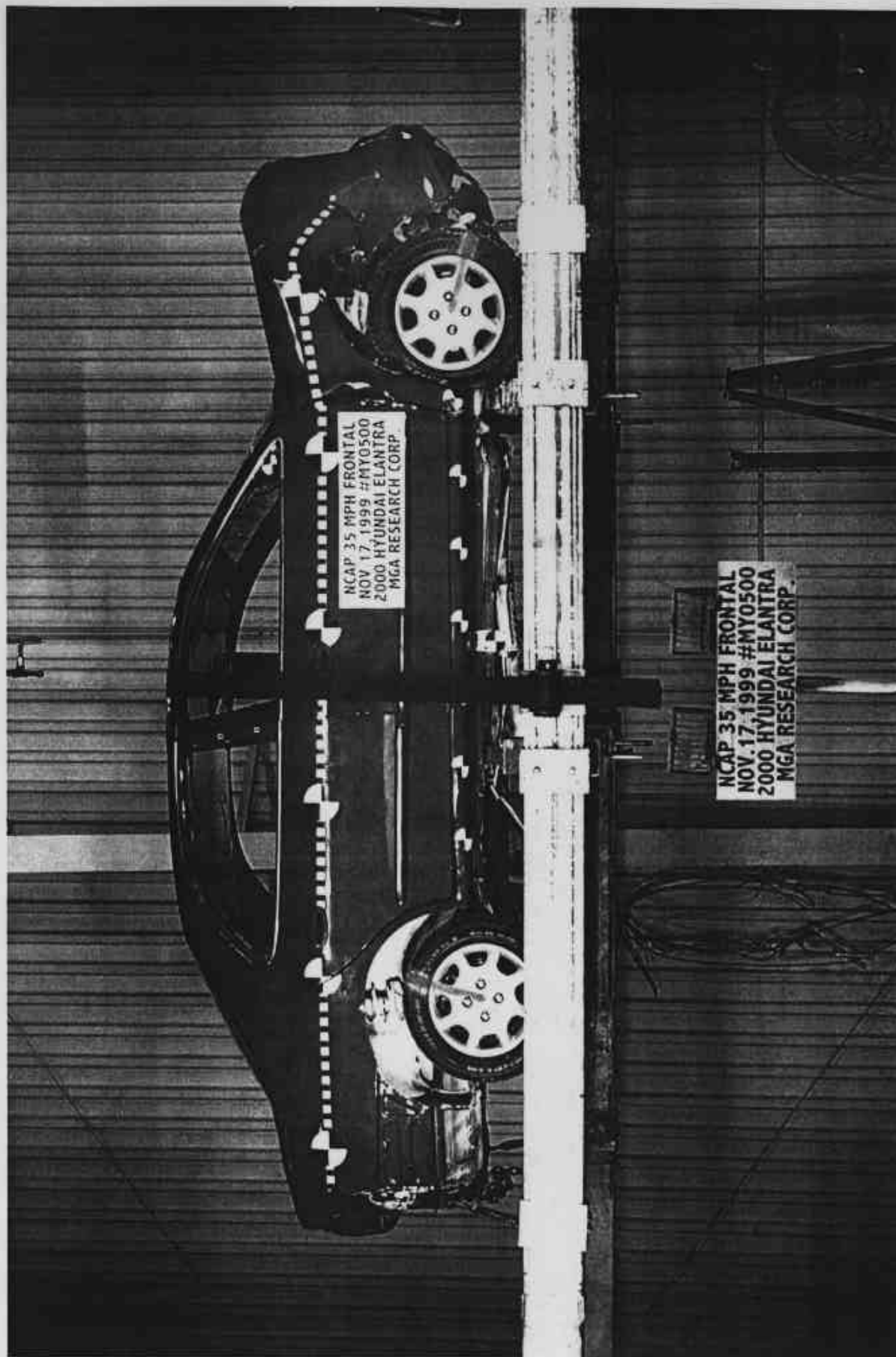


Photo A-52 - Rollover 360°

APPENDIX B  
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

2000 Hyundai Elantra

VEHICLE DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

Chest Accelerations 180 (300 Hz)

Vehicle Accelerations 60 (100 Hz)

Barrier Load Cells 60 (100 Hz)

Femur Load Cells 600 (1000 Hz)

Lap and Torso Belts 60 (100 Hz)

Occupant Data

Page No.

|                                                                    |      |
|--------------------------------------------------------------------|------|
| Figure B-1 - Driver Head X Acceleration vs. Time                   | B-1  |
| Figure B-2 - Driver Head Y Acceleration vs. Time                   | B-2  |
| Figure B-3 - Driver Head Z Acceleration vs. Time                   | B-3  |
| Figure B-4 - Driver Head Resultant Acceleration vs. Time           | B-4  |
| Figure B-5 - Driver Head X Velocity vs. Time                       | B-5  |
| Figure B-6 - Driver Head Redundant X Acceleration vs. Time         | B-6  |
| Figure B-7 - Driver Head Redundant Y Acceleration vs. Time         | B-7  |
| Figure B-8 - Driver Head Redundant Z Acceleration vs. Time         | B-8  |
| Figure B-9 - Driver Head Redundant Resultant Acceleration vs. Time | B-9  |
| Figure B-10 - Driver Head Redundant X Velocity vs. Time            | B-10 |
| Figure B-11 - Driver Neck Force X vs. Time                         | B-11 |
| Figure B-12 - Driver Neck Force Y vs. Time*                        | B-12 |
| Figure B-13 - Driver Neck Force Z vs. Time                         | B-13 |
| Figure B-14 - Driver Neck Force Resultant vs. Time*                | B-14 |
| Figure B-15 - Driver Neck Moment X vs. Time                        | B-15 |
| Figure B-16 - Driver Neck Moment Y vs. Time                        | B-16 |
| Figure B-17 - Driver Neck Moment Z vs. Time                        | B-17 |
| Figure B-18 - Driver Neck Moment Resultant vs. Time                | B-18 |
| Figure B-19 - Driver Chest X Acceleration vs. Time                 | B-19 |
| Figure B-20 - Driver Chest Y Acceleration vs. Time                 | B-20 |
| Figure B-21 - Driver Chest Z Acceleration vs. Time                 | B-21 |
| Figure B-22 - Driver Chest Resultant Acceleration vs. Time         | B-22 |

\* No Valid Data Collected

Occupant Data: (Cont'd)

Page No.

|                                                                      |      |
|----------------------------------------------------------------------|------|
| Figure B-23 - Driver Chest X Velocity vs. Time                       | B-23 |
| Figure B-24 - Driver Chest Redundant X Acceleration vs. Time         | B-24 |
| Figure B-25 - Driver Chest Redundant Y Acceleration vs. Time         | B-25 |
| Figure B-26 - Driver Chest Redundant Z Acceleration vs. Time         | B-26 |
| Figure B-27 - Driver Chest Redundant Resultant Acceleration vs. Time | B-27 |
| Figure B-28 - Driver Chest Redundant X Velocity vs. Time             | B-28 |
| Figure B-29 - Driver Chest Compression vs. Time                      | B-29 |
| Figure B-30 - Driver Pelvis X Acceleration vs. Time                  | B-30 |
| Figure B-31 - Driver Pelvis Y Acceleration vs. Time                  | B-31 |
| Figure B-32 - Driver Pelvis Z Acceleration vs. Time                  | B-32 |
| Figure B-33 - Driver Pelvis Resultant Acceleration vs. Time          | B-33 |
| Figure B-34 - Driver Pelvis X Velocity vs. Time                      | B-34 |
| Figure B-35 - Driver Left Femur Force vs. Time                       | B-35 |
| Figure B-36 - Driver Right Femur Force vs. Time                      | B-36 |
| Figure B-37 - Driver Left Upper Tibia Moment X vs. Time              | B-37 |
| Figure B-38 - Driver Left Upper Tibia Moment Y vs. Time              | B-38 |
| Figure B-39 - Driver Left Upper Tibia Force Z vs. Time               | B-39 |
| Figure B-40 - Driver Left Lower Tibia Moment X vs. Time              | B-40 |
| Figure B-41 - Driver Left Lower Tibia Moment Y vs. Time              | B-41 |
| Figure B-42 - Driver Left Lower Tibia Force Z vs. Time               | B-42 |
| Figure B-43 - Driver Right Upper Tibia Moment X vs. Time             | B-43 |
| Figure B-44 - Driver Right Upper Tibia Moment Y vs. Time*            | B-44 |
| Figure B-45 - Driver Right Upper Tibia Force Z vs. Time              | B-45 |
| Figure B-46 - Driver Right Lower Tibia Moment X vs. Time             | B-46 |
| Figure B-47 - Driver Right Lower Tibia Moment Y vs. Time             | B-47 |
| Figure B-48 - Driver Right Lower Tibia Force Z vs. Time              | B-48 |
| Figure B-49 - Driver Left Foot Ball Z Acceleration vs. Time          | B-49 |
| Figure B-50 - Driver Left Heel X Acceleration vs. Time               | B-50 |
| Figure B-51 - Driver Left Heel Z Acceleration vs. Time               | B-51 |
| Figure B-52 - Driver Right Foot Ball Z Acceleration vs. Time         | B-52 |
| Figure B-53 - Driver Right Heel X Acceleration vs. Time              | B-53 |
| Figure B-54 - Driver Right Heel Z Acceleration vs. Time              | B-54 |

\* No Valid Data Collected

Occupant Data: (Cont'd)

Page No.

|                                                                         |      |
|-------------------------------------------------------------------------|------|
| Figure B-55 - Driver Shoulder Belt Force vs. Time                       | B-55 |
| Figure B-56 - Driver Lap Belt Force vs. Time                            | B-56 |
| Figure B-57 - Passenger Head X Acceleration vs. Time                    | B-57 |
| Figure B-58 - Passenger Head Y Acceleration vs. Time                    | B-58 |
| Figure B-59 - Passenger Head Z Acceleration vs. Time                    | B-59 |
| Figure B-60 - Passenger Head Resultant Acceleration vs. Time            | B-60 |
| Figure B-61 - Passenger Head X Velocity vs. Time                        | B-61 |
| Figure B-62 - Passenger Head Redundant X Acceleration vs. Time          | B-62 |
| Figure B-63 - Passenger Head Redundant Y Acceleration vs. Time          | B-63 |
| Figure B-64 - Passenger Head Redundant Z Acceleration vs. Time          | B-64 |
| Figure B-65 - Passenger Head Redundant Resultant Acceleration vs. Time  | B-65 |
| Figure B-66 - Passenger Head Redundant X Velocity vs. Time              | B-66 |
| Figure B-67 - Passenger Neck Force X vs. Time                           | B-67 |
| Figure B-68 - Passenger Neck Force Y vs. Time                           | B-68 |
| Figure B-69 - Passenger Neck Force Z vs. Time                           | B-69 |
| Figure B-70 - Passenger Neck Force Resultant vs. Time                   | B-70 |
| Figure B-71 - Passenger Neck Moment X vs. Time                          | B-71 |
| Figure B-72 - Passenger Neck Moment Y vs. Time                          | B-72 |
| Figure B-73 - Passenger Neck Moment Z vs. Time                          | B-73 |
| Figure B-74 - Passenger Neck Moment Resultant vs. Time                  | B-74 |
| Figure B-75 - Passenger Chest X Acceleration vs. Time                   | B-75 |
| Figure B-76 - Passenger Chest Y Acceleration vs. Time                   | B-76 |
| Figure B-77 - Passenger Chest Z Acceleration vs. Time                   | B-77 |
| Figure B-78 - Passenger Chest Resultant Acceleration vs. Time           | B-78 |
| Figure B-79 - Passenger Chest X Velocity vs. Time                       | B-79 |
| Figure B-80 - Passenger Chest Redundant X Acceleration vs. Time         | B-80 |
| Figure B-81 - Passenger Chest Redundant Y Acceleration vs. Time         | B-81 |
| Figure B-82 - Passenger Chest Redundant Z Acceleration vs. Time         | B-82 |
| Figure B-83 - Passenger Chest Redundant Resultant Acceleration vs. Time | B-83 |
| Figure B-84 - Passenger Chest Redundant X Velocity vs. Time             | B-84 |
| Figure B-85 - Passenger Chest Compression vs. Time                      | B-85 |
| Figure B-86 - Passenger Pelvis X Acceleration vs. Time                  | B-86 |
| Figure B-87 - Passenger Pelvis Y Acceleration vs. Time                  | B-87 |
| Figure B-88 - Passenger Pelvis Z Acceleration vs. Time                  | B-88 |

Occupant Data: (Cont'd)

Page No.

|                                                                  |       |
|------------------------------------------------------------------|-------|
| Figure B-89 - Passenger Pelvis Resultant Acceleration vs. Time   | B-89  |
| Figure B-90 - Passenger Pelvis X Velocity vs. Time               | B-90  |
| Figure B-91 - Passenger Left Femur Force vs. Time                | B-91  |
| Figure B-92 - Passenger Right Femur Force vs. Time               | B-92  |
| Figure B-93 - Passenger Left Upper Tibia Moment X vs. Time       | B-93  |
| Figure B-94 - Passenger Left Upper Tibia Moment Y vs. Time       | B-94  |
| Figure B-95 - Passenger Left Upper Tibia Force Z vs. Time        | B-95  |
| Figure B-96 - Passenger Left Lower Tibia Moment X vs. Time       | B-96  |
| Figure B-97 - Passenger Left Lower Tibia Moment Y vs. Time       | B-97  |
| Figure B-98 - Passenger Left Lower Tibia Force Z vs. Time        | B-98  |
| Figure B-99 - Passenger Right Upper Tibia Moment X vs. Time      | B-99  |
| Figure B-100 - Passenger Right Upper Tibia Moment Y vs. Time     | B-100 |
| Figure B-101 - Passenger Right Upper Tibia Force Z vs. Time      | B-101 |
| Figure B-102 - Passenger Right Lower Tibia Moment X vs. Time     | B-102 |
| Figure B-103 - Passenger Right Lower Tibia Moment Y vs. Time     | B-103 |
| Figure B-104 - Passenger Right Lower Tibia Force Z vs. Time*     | B-104 |
| Figure B-105 - Passenger Left Foot Ball Z Acceleration vs. Time  | B-105 |
| Figure B-106 - Passenger Left Heel X Acceleration vs. Time       | B-106 |
| Figure B-107 - Passenger Left Heel Z Acceleration vs. Time       | B-107 |
| Figure B-108 - Passenger Right Foot Ball Z Acceleration vs. Time | B-108 |
| Figure B-109 - Passenger Right Heel X Acceleration vs. Time      | B-109 |
| Figure B-110 - Passenger Right Heel Z Acceleration vs. Time      | B-110 |
| Figure B-111 - Passenger Shoulder Belt Force vs. Time            | B-111 |
| Figure B-112 - Passenger Lap Belt Force vs. Time**               | B-112 |

Vehicle and Barrier Data:

|                                                                    |       |
|--------------------------------------------------------------------|-------|
| Figure B-113- Left Rear Seat Crossmember X Acceleration vs. Time   | B-113 |
| Figure B-114 - Left Rear Seat Crossmember X Velocity vs. Time      | B-114 |
| Figure B-115 - Left Rear Seat Crossmember X Displacement vs. Time  | B-115 |
| Figure B-116 - Right Rear Seat Crossmember X Acceleration vs. Time | B-116 |
| Figure B-117- Right Rear Seat Crossmember X Velocity vs. Time      | B-117 |

\* No Valid Data Collected

\*\* No Valid Data Collected After .06 seconds

Vehicle and Barrier Data:

Page No.

|                                                                              |       |
|------------------------------------------------------------------------------|-------|
| Figure B-118 - Right Rear Seat Crossmember X Displacement vs. Time           | B-118 |
| Figure B-119 - Top of Engine Block X Acceleration vs. Time                   | B-119 |
| Figure B-120 - Top of Engine Block X Velocity vs. Time                       | B-120 |
| Figure B-121 - Top of Engine Block X Displacement vs. Time                   | B-121 |
| Figure B-122 - Bottom of Engine X Acceleration vs. Time                      | B-122 |
| Figure B-123 - Bottom of Engine X Velocity vs. Time                          | B-123 |
| Figure B-124 - Bottom of Engine X Displacement vs. Time                      | B-124 |
| Figure B-125 - Left Front Brake Caliper X Acceleration vs. Time              | B-125 |
| Figure B-126 - Left Front Brake Caliper X Velocity vs. Time                  | B-126 |
| Figure B-127 - Left Front Brake Caliper X Displacement vs. Time              | B-127 |
| Figure B-128 - Right Front Brake Caliper X Acceleration vs. Time             | B-128 |
| Figure B-129 - Right Front Brake Caliper X Velocity vs. Time                 | B-129 |
| Figure B-130 - Right Front Brake Caliper X Displacement vs. Time             | B-130 |
| Figure B-131 - Instrument Panel X Acceleration vs. Time                      | B-131 |
| Figure B-132 - Instrument Panel X Velocity vs. Time                          | B-132 |
| Figure B-133 - Instrument Panel X Displacement vs. Time                      | B-133 |
| Figure B-134 - Left Rear Seat Crossmember Redundant X Acceleration vs. Time  | B-134 |
| Figure B-135 - Left Rear Seat Crossmember Redundant X Velocity vs. Time      | B-135 |
| Figure B-136 - Left Rear Seat Crossmember Redundant X Displacement vs. Time  | B-136 |
| Figure B-137 - Right Rear Seat Crossmember Redundant X Acceleration vs. Time | B-137 |
| Figure B-138 - Right Rear Seat Crossmember Redundant X Velocity vs. Time     | B-138 |
| Figure B-139 - Right Rear Seat Crossmember Redundant X Displacement vs. Time | B-139 |
| Figure B-140 - Upper Left Barrier Force vs. Time                             | B-140 |
| Figure B-141 - Upper Center Barrier Force vs. Time                           | B-141 |
| Figure B-142 - Upper Right Barrier Force vs. Time                            | B-142 |
| Figure B-143 - Lower Left Barrier Force vs. Time                             | B-143 |
| Figure B-144 - Lower Center Barrier Force vs. Time                           | B-144 |
| Figure B-145 - Lower Right Barrier Force vs. Time                            | B-145 |
| Figure B-146 - Sum of Left Barrier Forces vs. Time                           | B-146 |
| Figure B-147 - Sum of Center Barrier Forces vs. Time                         | B-147 |
| Figure B-148 - Sum of Right Barrier Forces vs. Time                          | B-148 |
| Figure B-149 - Sum of Barrier Forces vs. Time                                | B-149 |

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

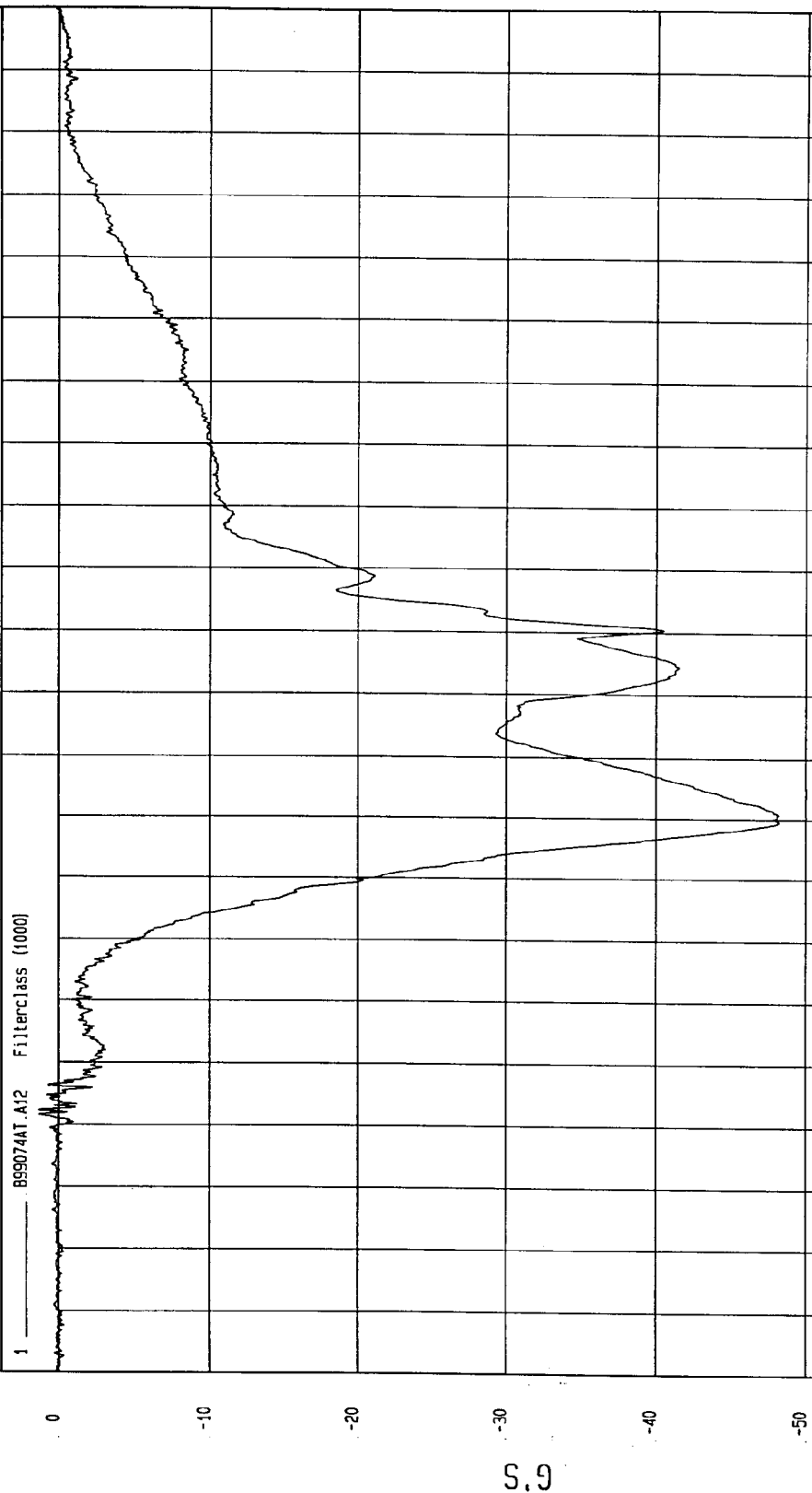
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -48.19 G'S at 69 msec

Maximum = 1.3 G'S at 22 msec

DRIVER HEAD X ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

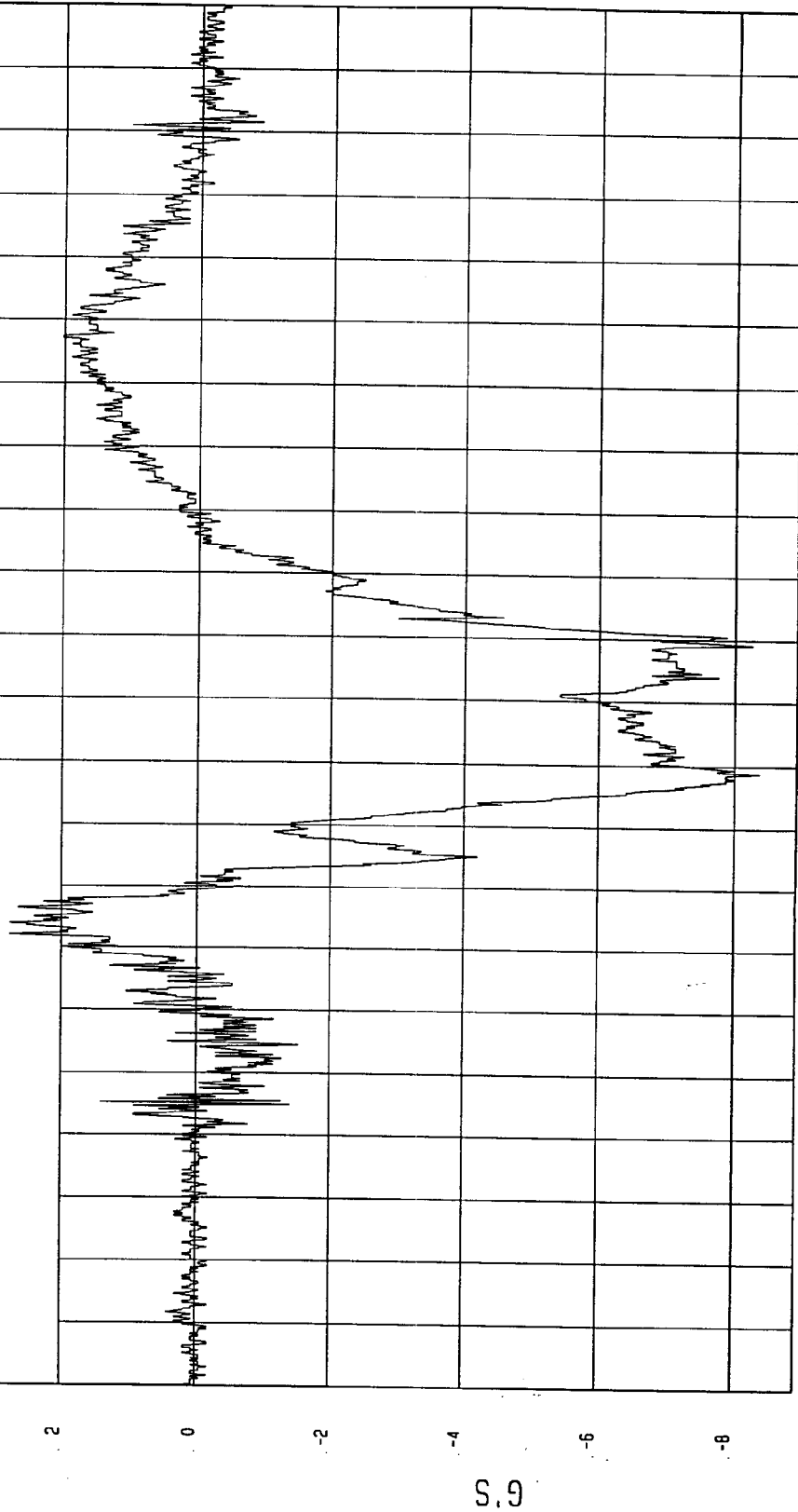
Speed: 35.1 MPH 56.5 KPH

Minimum = -8.37 G'S at 79 msec

Maximum = 2.75 G'S at 52 msec

DRIVER HEAD Y ACCELERATION

1 899074AT.A13 Filterclass (1000)



MGA Research  
08-17-2000 09:08

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

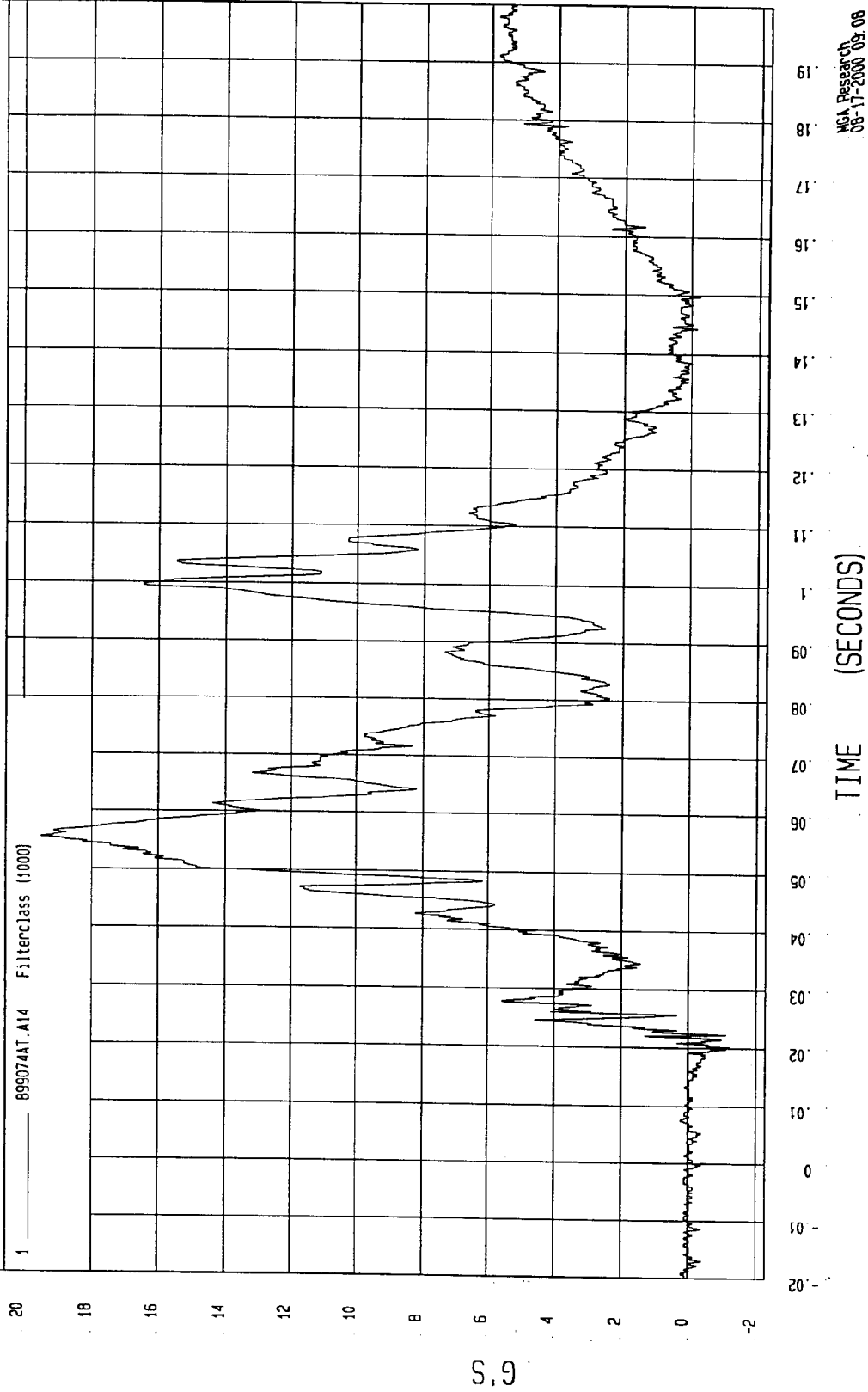
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -1.24 G'S at 20 msec

Maximum = 19.49 G'S at 55 msec

DRIVER HEAD Z ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

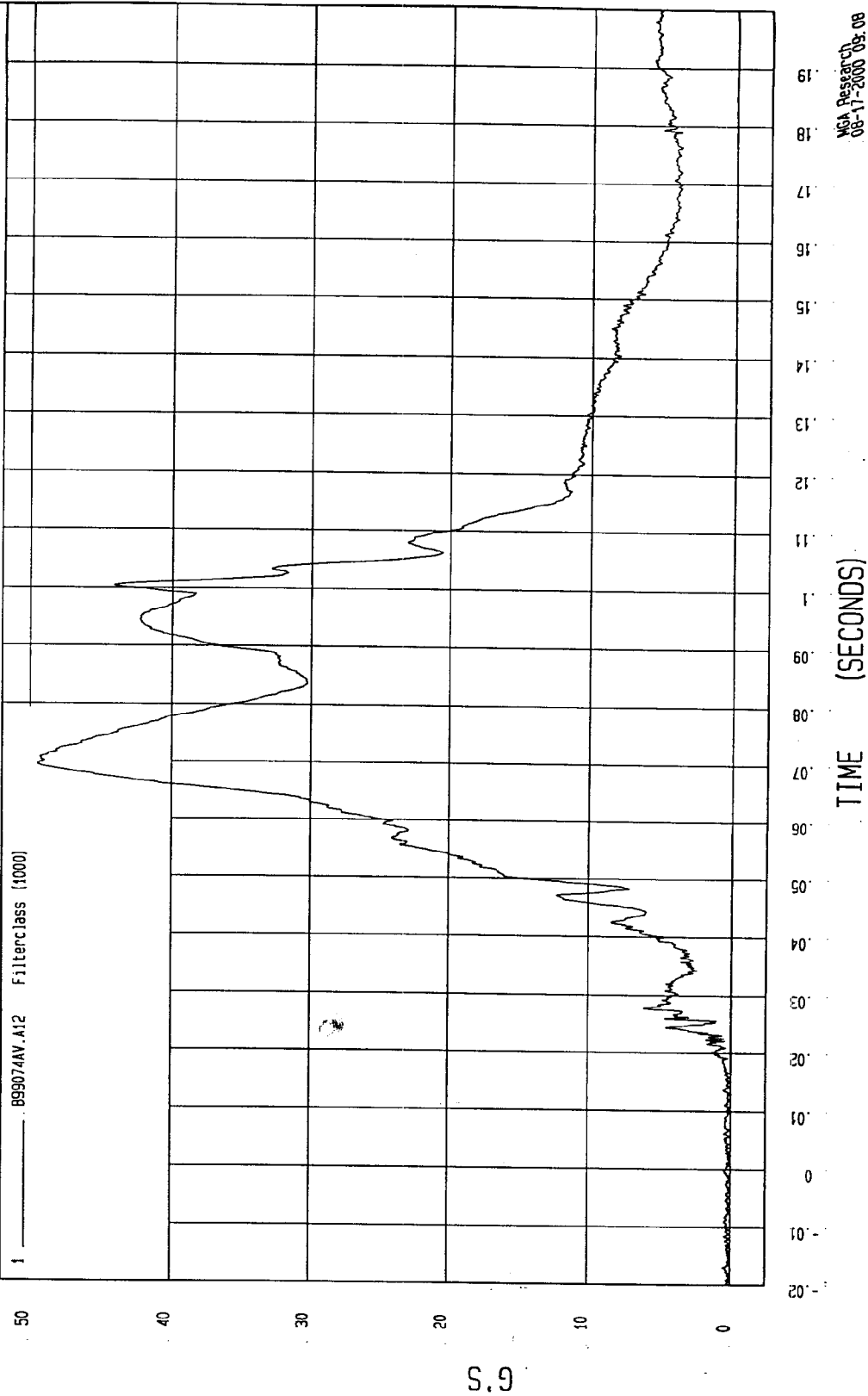
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = 7.51E-02 G's at -16 msec

Maximum = 49.49 G's at 69 msec

DRIVER HEAD RESULTANT ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

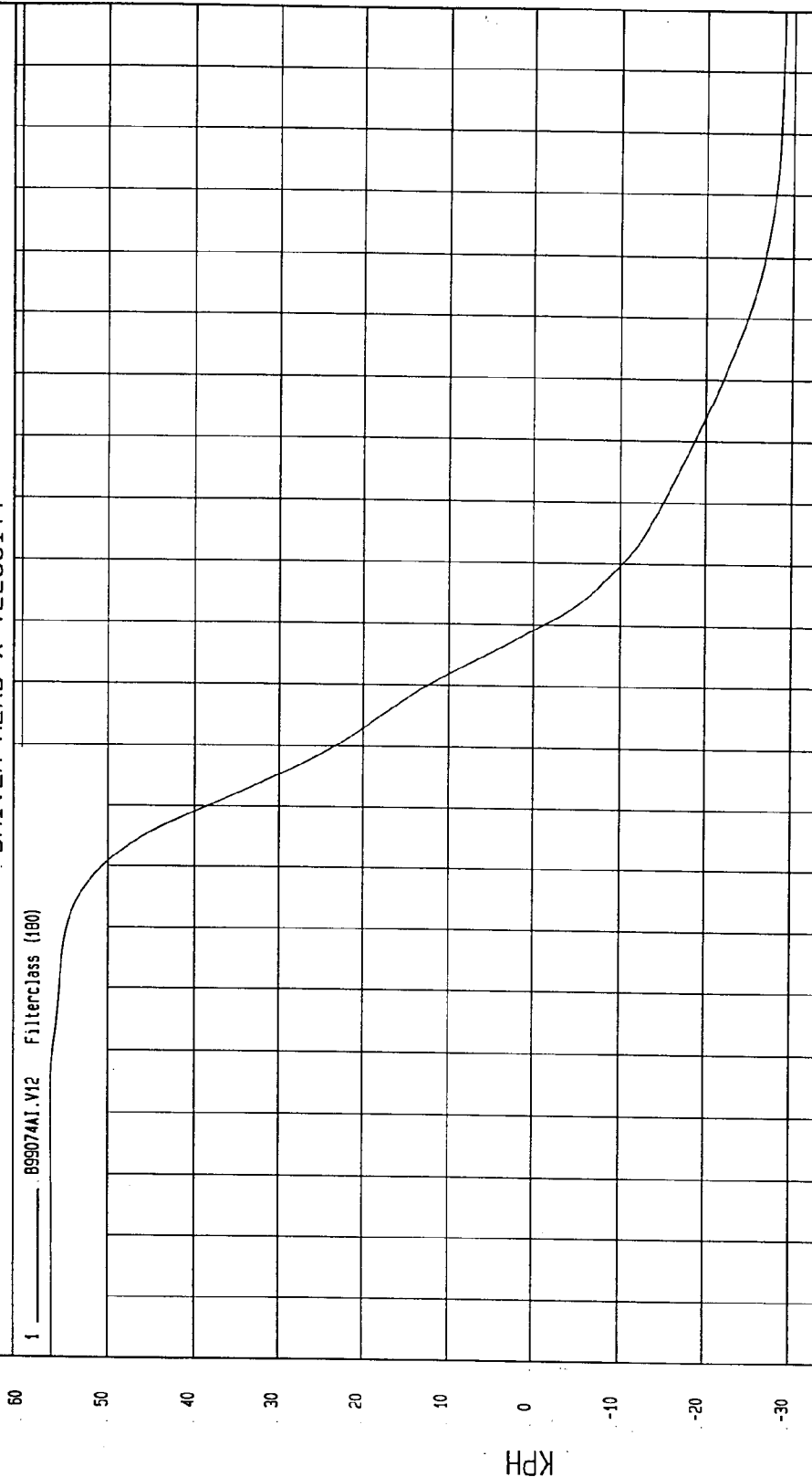
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 56.69 KPH at 22 msec

Minimum = -28.88 KPH at 200 msec

DRIVER HEAD X VELOCITY

1 ——— B99074A1.V12 Filterclass (180)



WCA Research  
08-17-2000 11:03

TIME Seconds

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

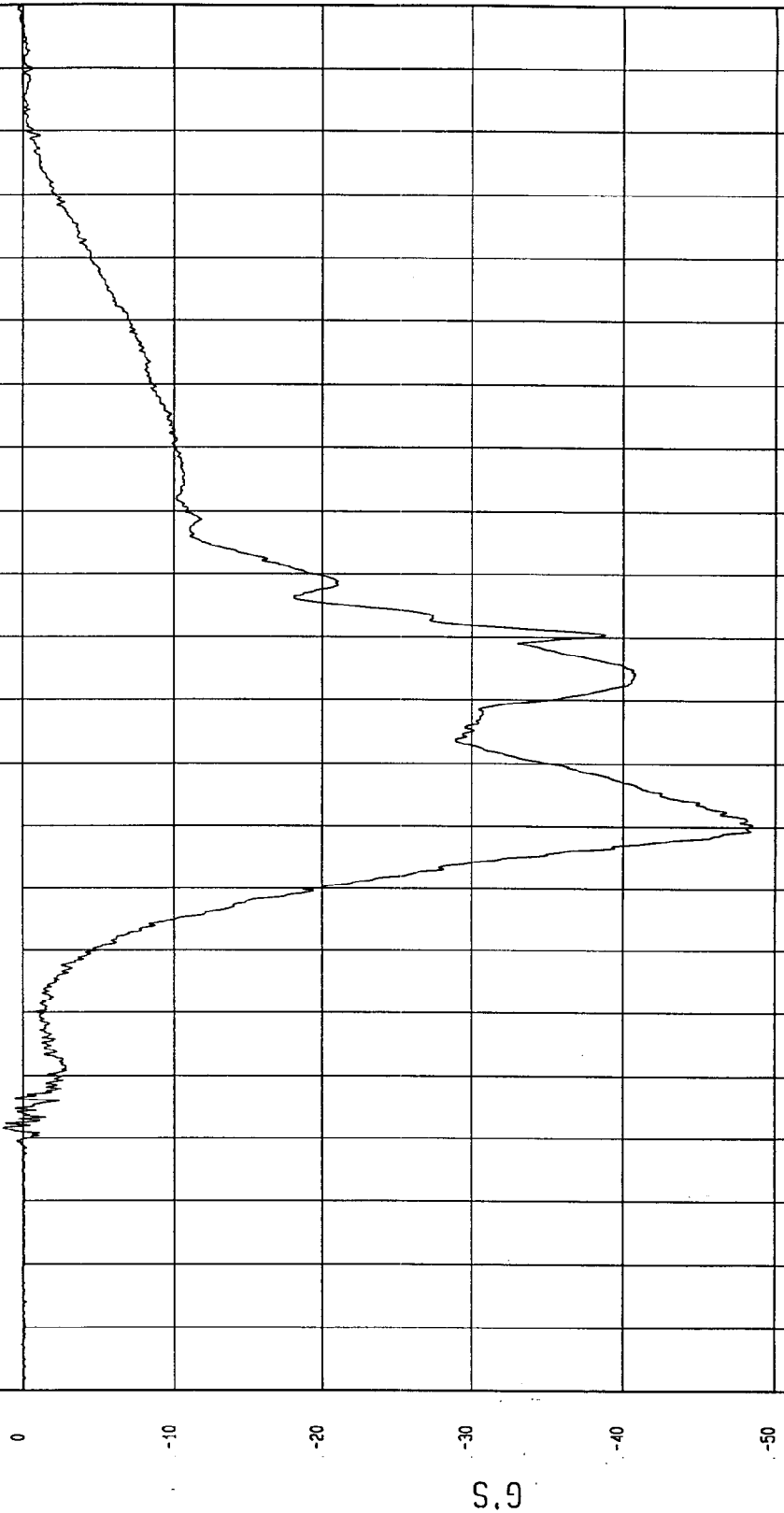
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 1.28 G'S at 22 msec

Minimum = -48.53 G'S at 70 msec

DRIVER HEAD REDUNDANT X ACCELERATION

1 B99074AT.A32 FilterClass (1000)



MGA Research  
08-11-2000 09:28

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

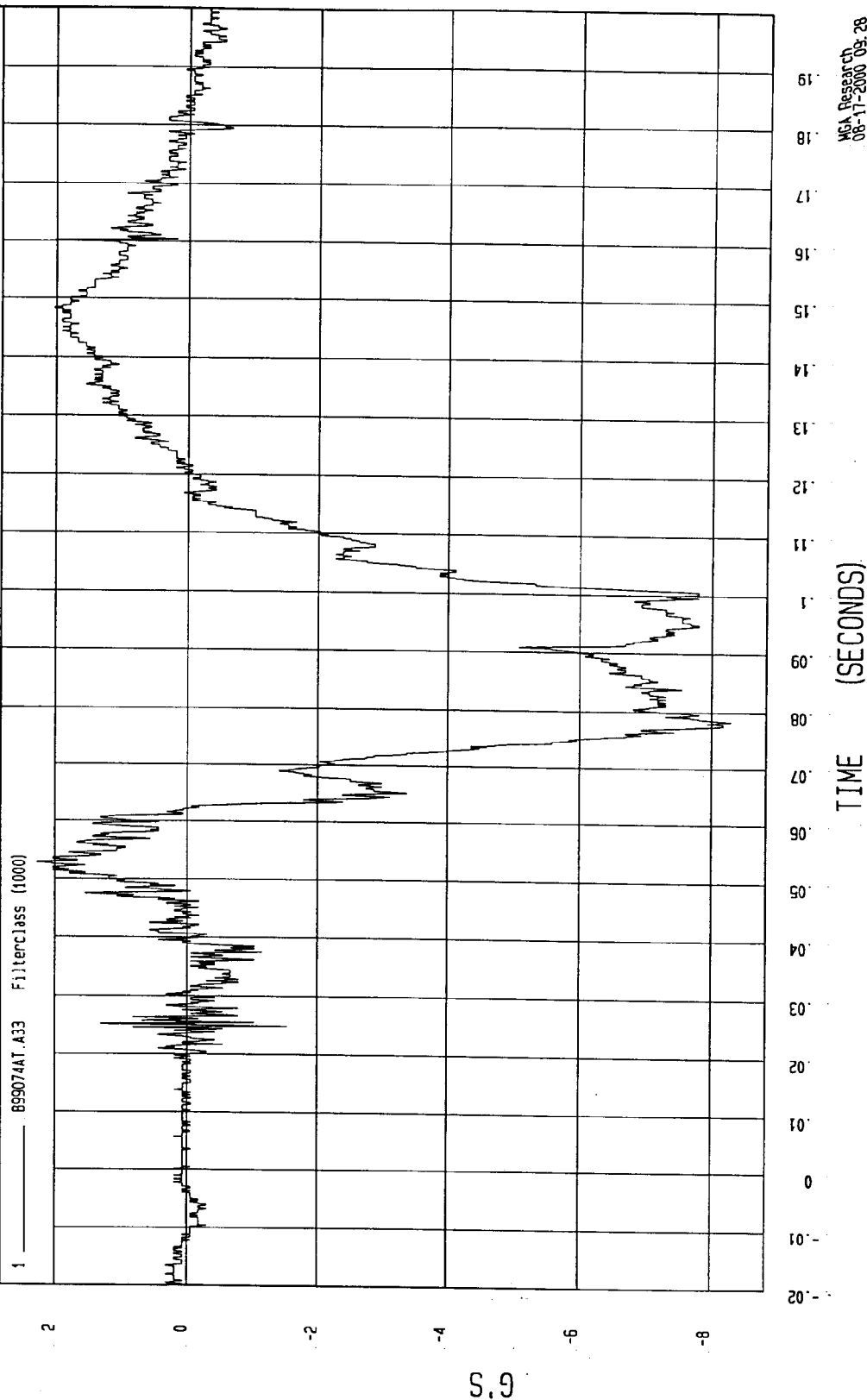
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -8.29 G'S at 78 msec

Maximum = 2.28 G'S at 53 msec

DRIVER HEAD REDUNDANT Y ACCELERATION

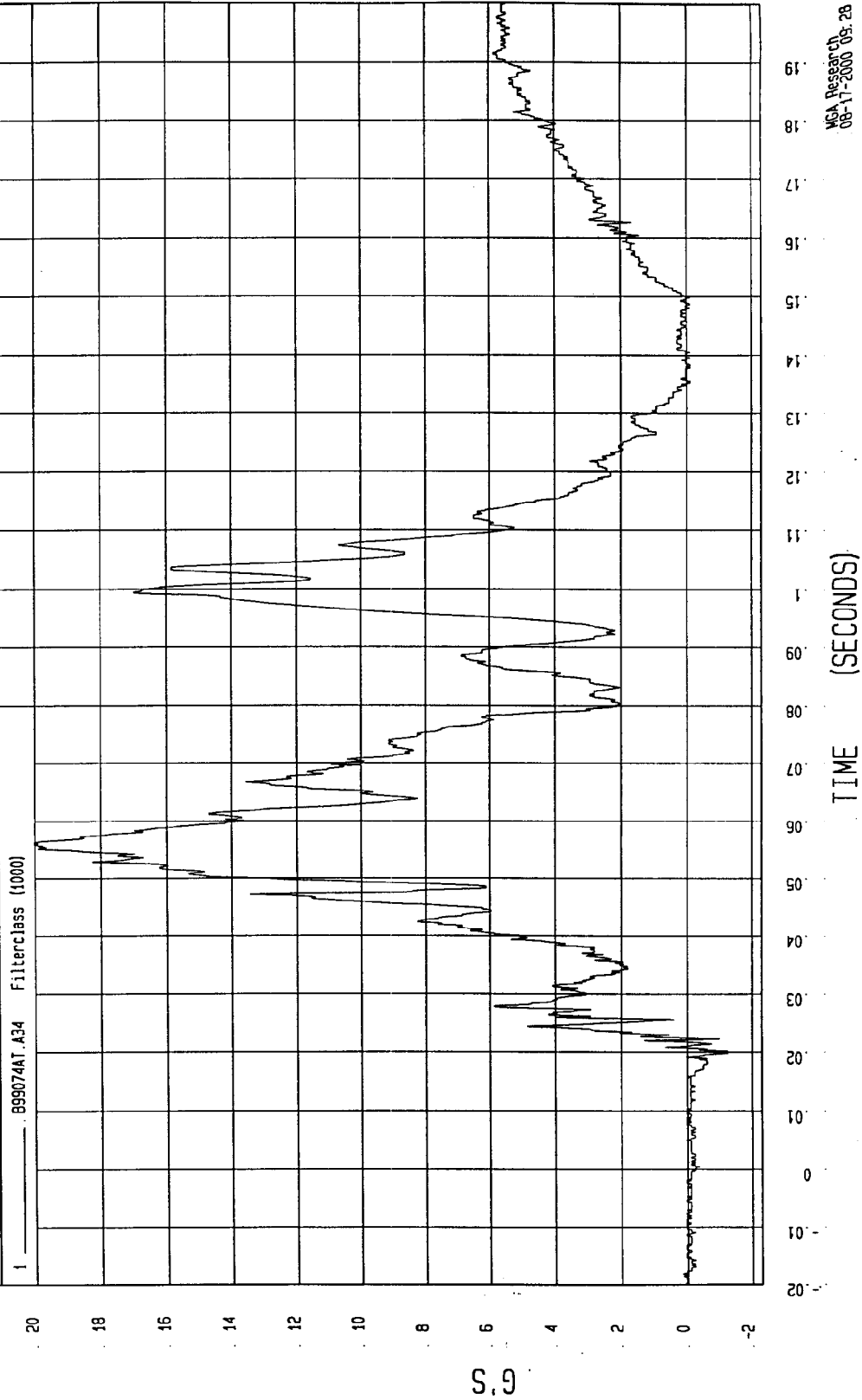


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH    56.5 KPH

Minimum = -1.23 G's at 20 msec      Maximum = 20.03 G's at 56 msec

DRIVER HEAD REDUNDANT Z ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

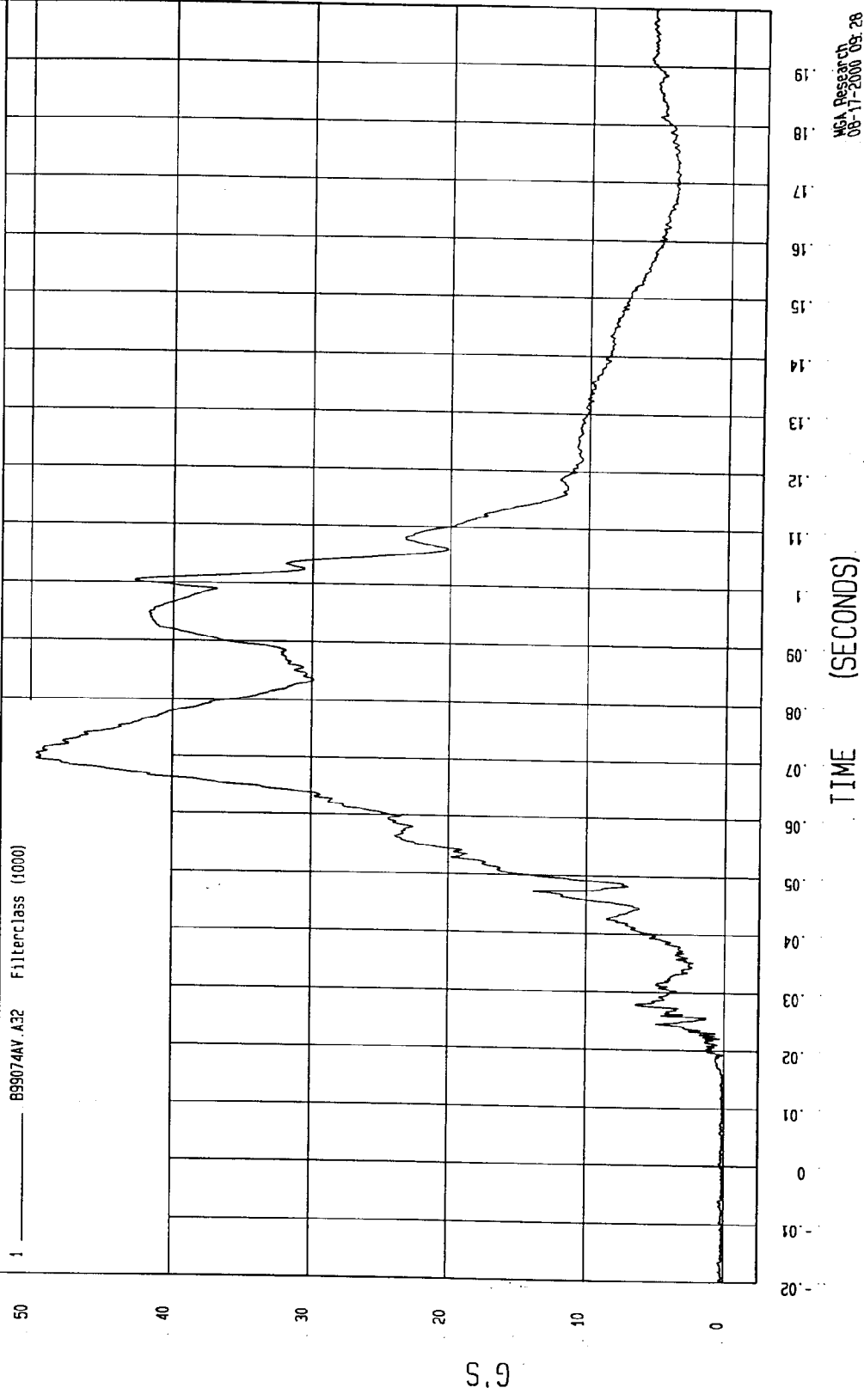
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = 7.30E-02 G'S at -11 msec

Maximum = 49.57 G'S at 70 msec

DRIVER HEAD REDUNDANT RESULTANT ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

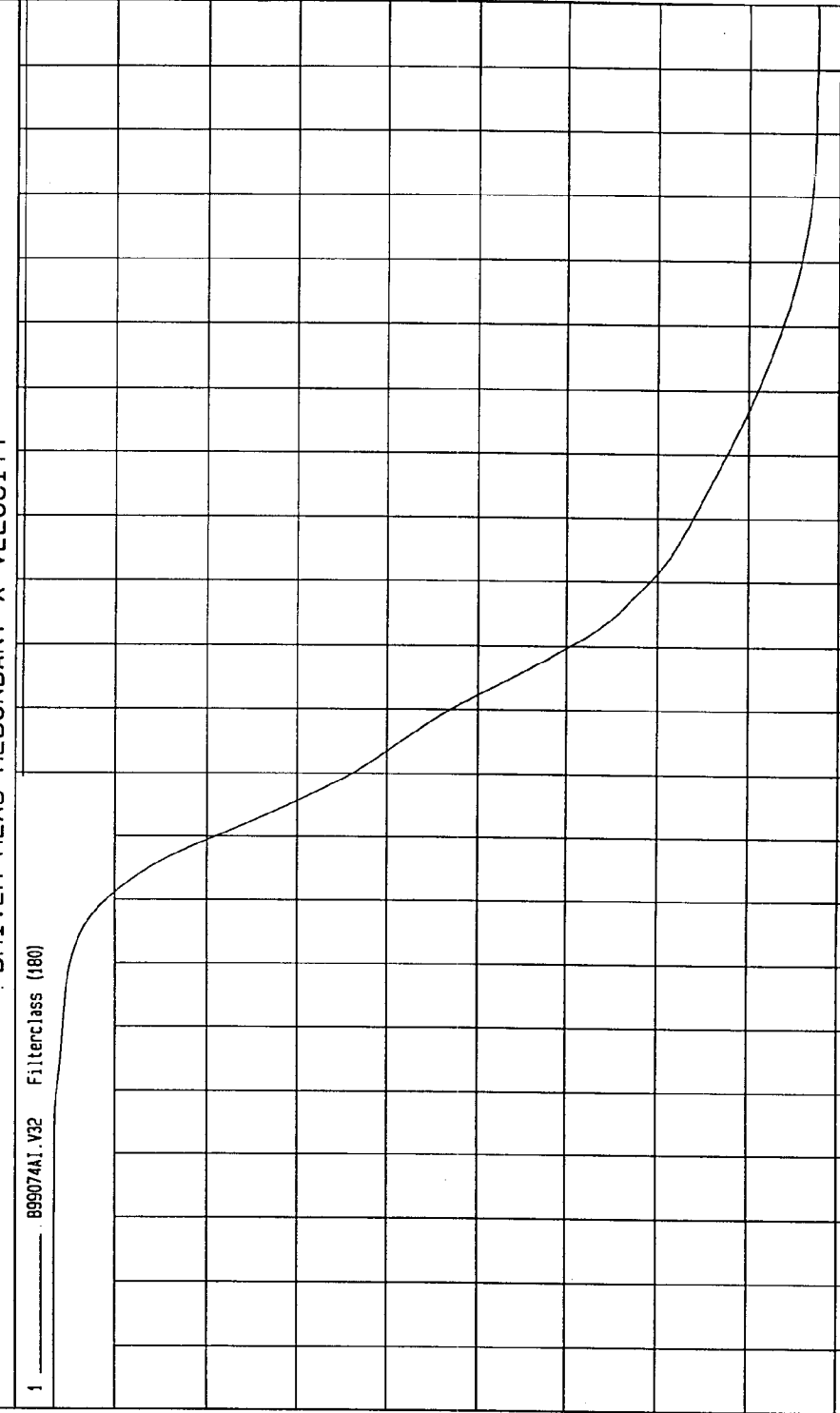
Minimum = -27.56 KPH at .197 msec

Maximum = 56.6 KPH at -.12 msec

DRIVER HEAD REDUNDANT X VELOCITY

1 \_\_\_\_\_ 899074A1.V32 Filterclass (180)

KPH



TIME Seconds

MCA Research  
08-11-2000 11:03

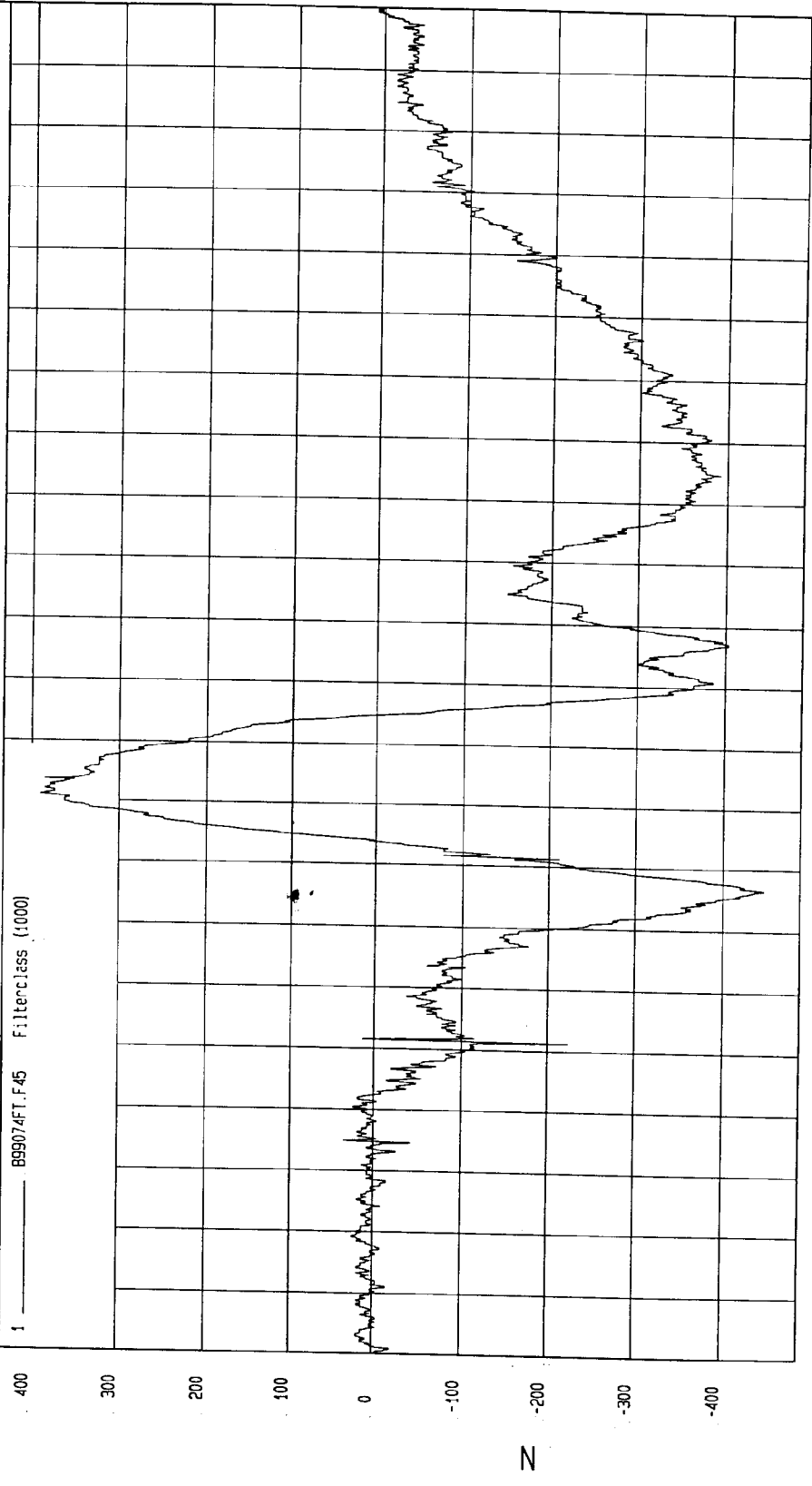
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -448.04 N at 56 msec      Maximum = 390.62 N at 71 msec

DRIVER NECK FORCE X

1 ——— B99074FT.F45 Filterclass (0000)



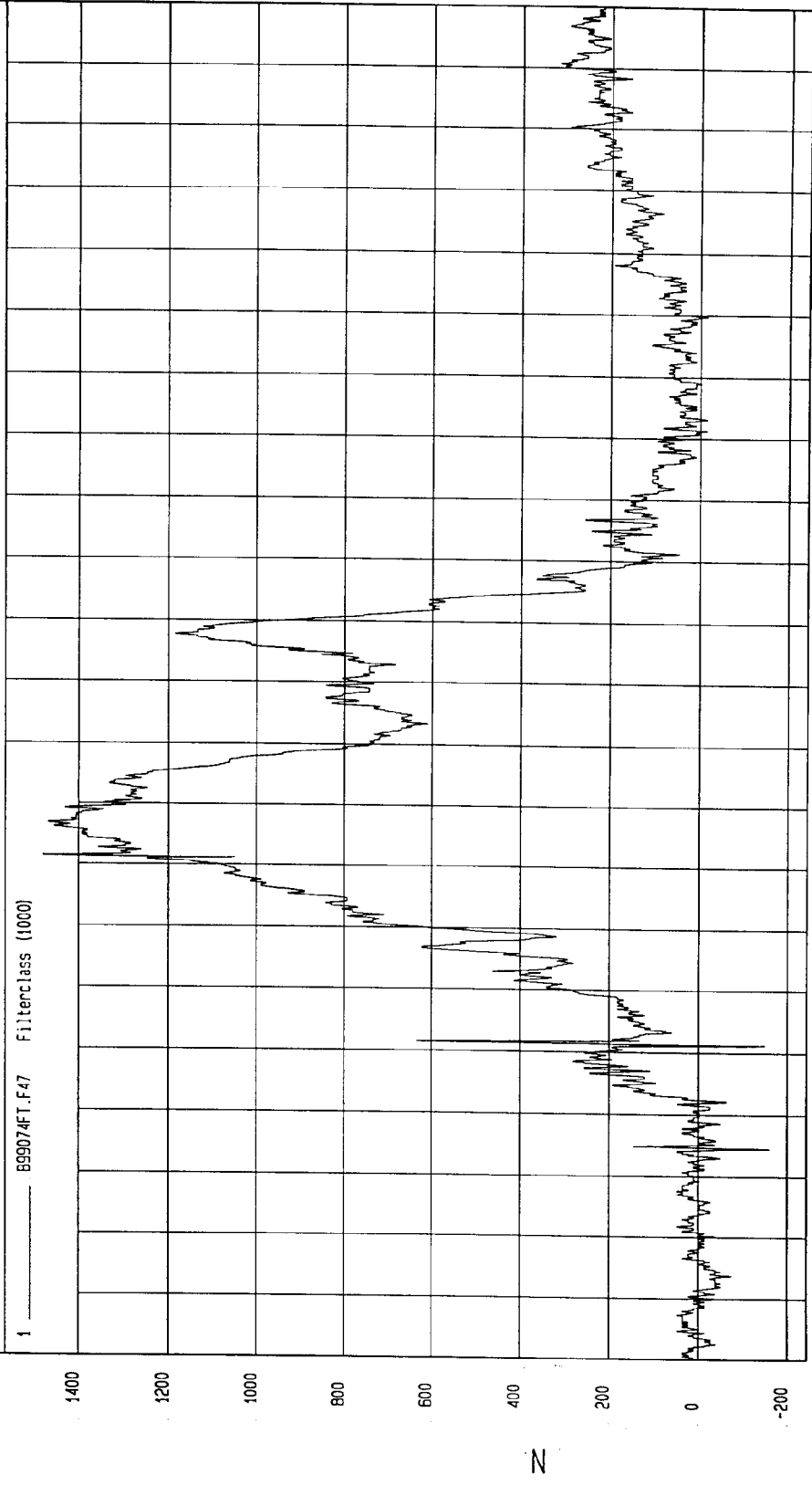
Driver Neck Force Y vs. Time  
No Valid Data Collected

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -161.44 N at 14 msec      Maximum = 1478.74 N at 62 msec

DRIVER NECK FORCE Z



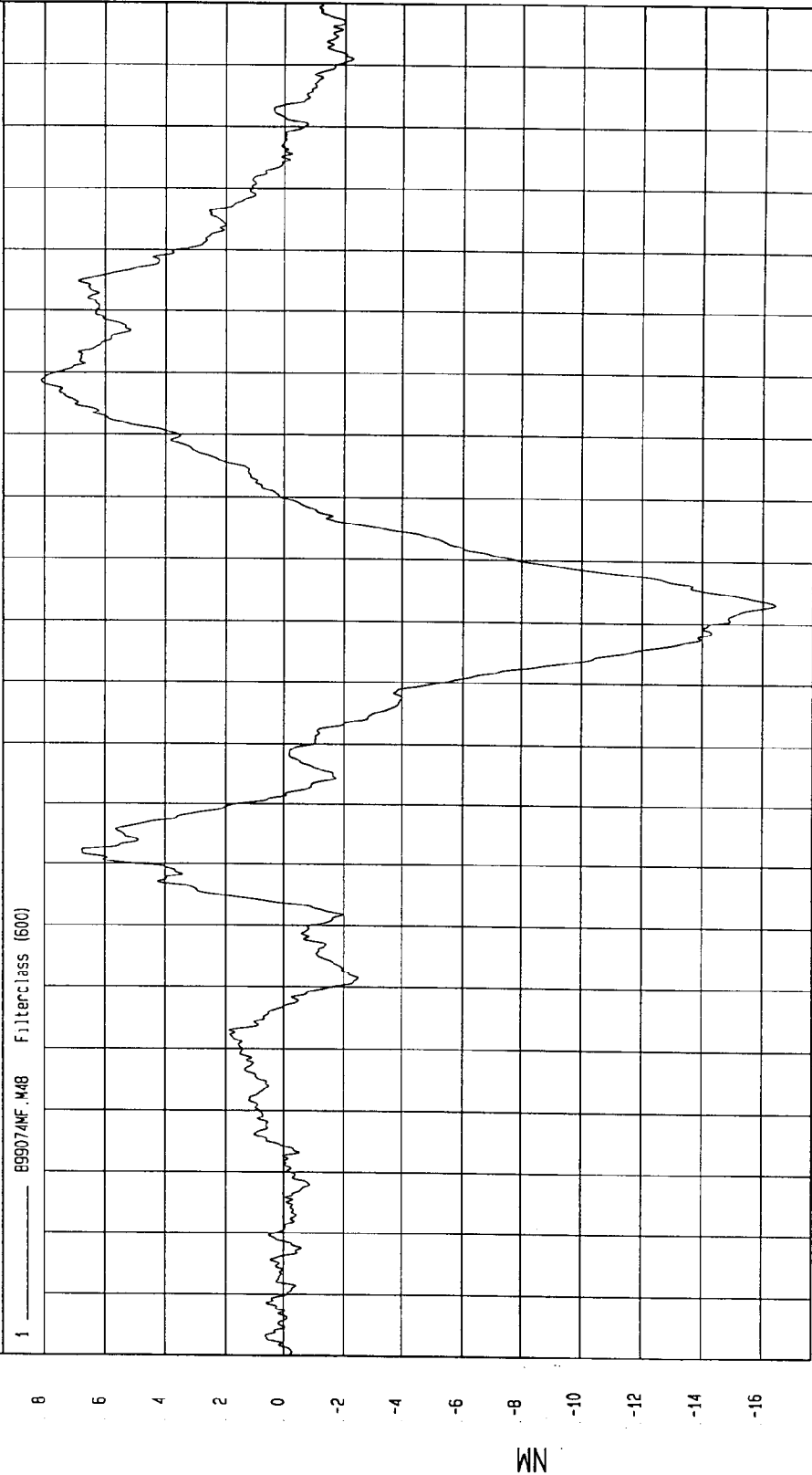
Driver Neck Force Resultant vs. Time  
No Valid Data Collected

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -16.41 NM at 103 msec      Maximum = 8.13 NM at 139 msec

DRIVER NECK MOMENT X



TIME (SECONDS)

WGA Research  
08-17-2000 08:45

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

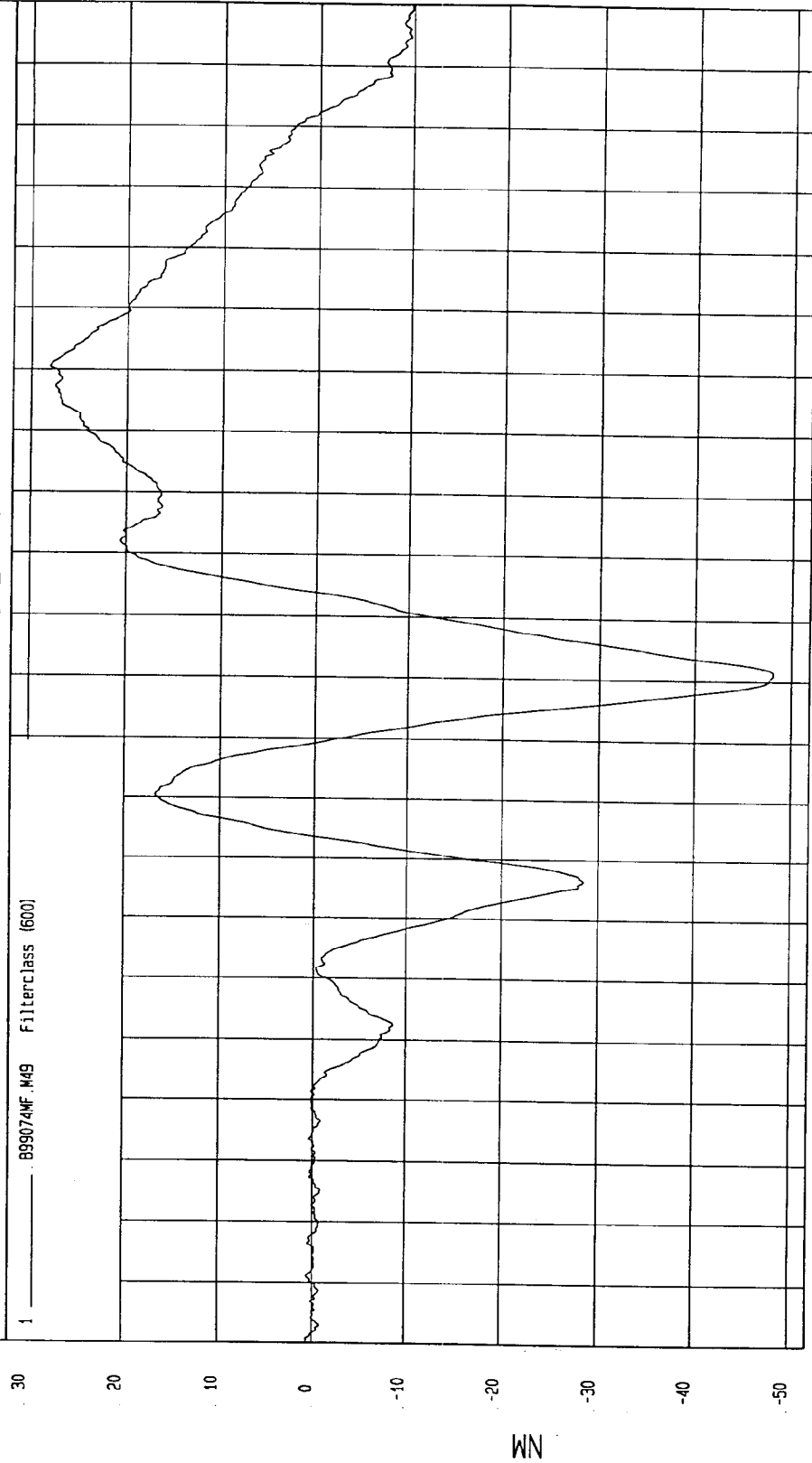
Speed: 35.1 MPH 56.5 KPH

Minimum = -48.07 NM at 91 msec

Maximum = 28.05 NM at 140 msec

DRIVER NECK MOMENT Y

1 B99074MF.M49 Filterclass (600)



MCA Research  
08-17-2000 08:45

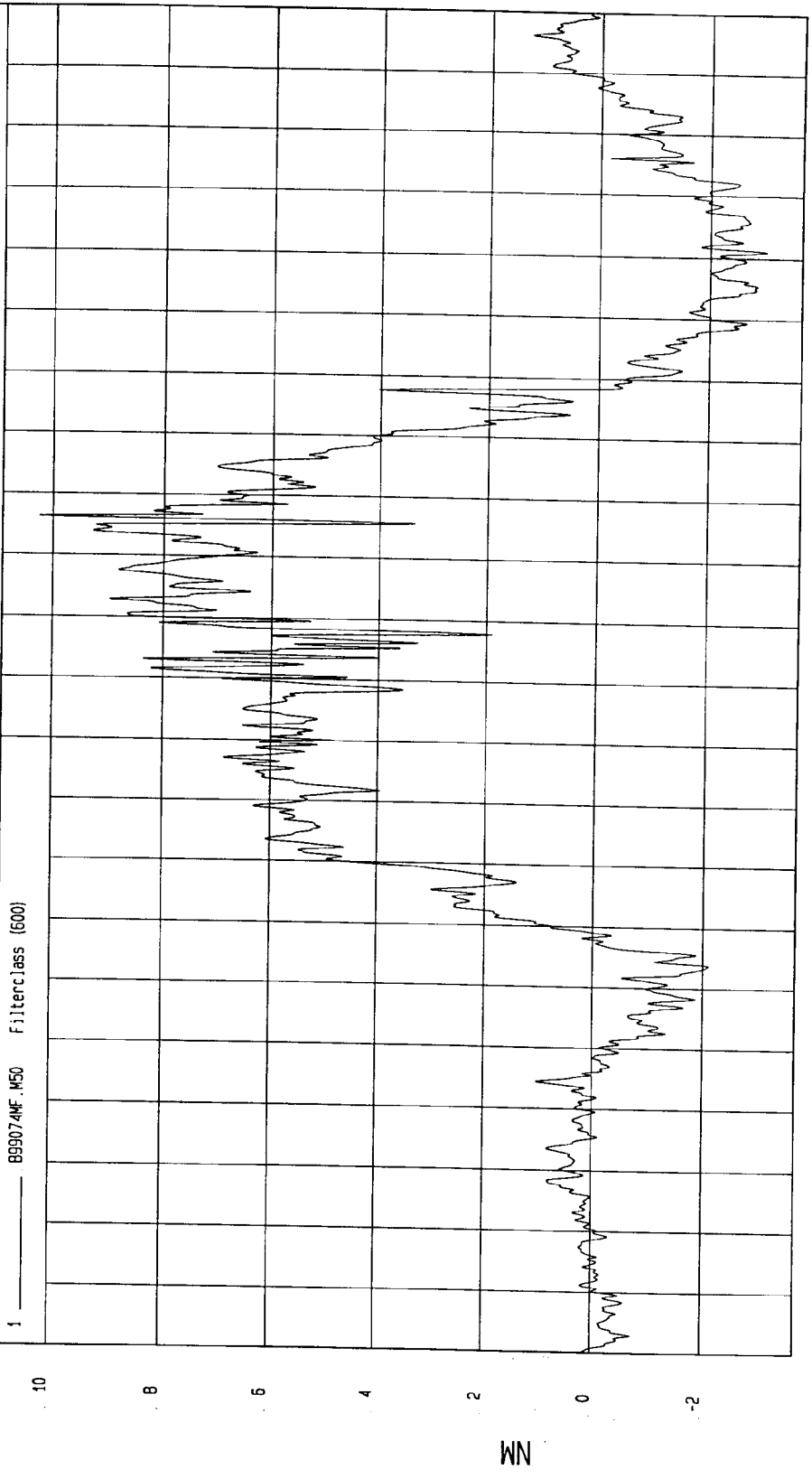
TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -3.03 NM at 161 msec      Maximum = 10.24 NM at 116 msec

DRIVER NECK MOMENT Z



10  
8  
6  
4  
2  
0  
-2

NM

TIME (SECONDS)

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

MCA Research  
08-17-2000 08:45

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

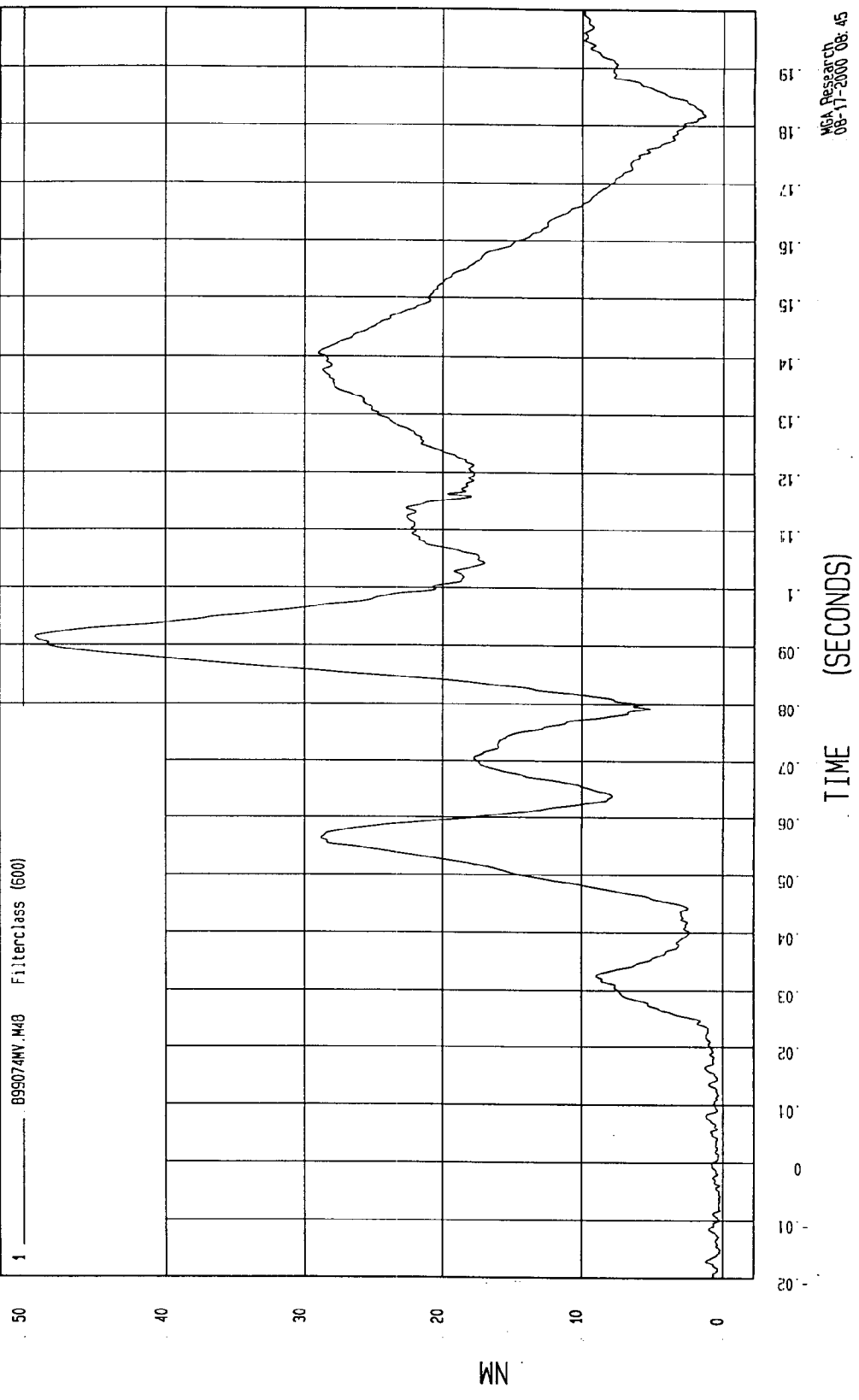
Speed: 35.1 MPH 56.5 KPH

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 49.2 NM at 91 msec

Minimum = .17 NM at -6 msec

DRIVER NECK MOMENT RESULTANT



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

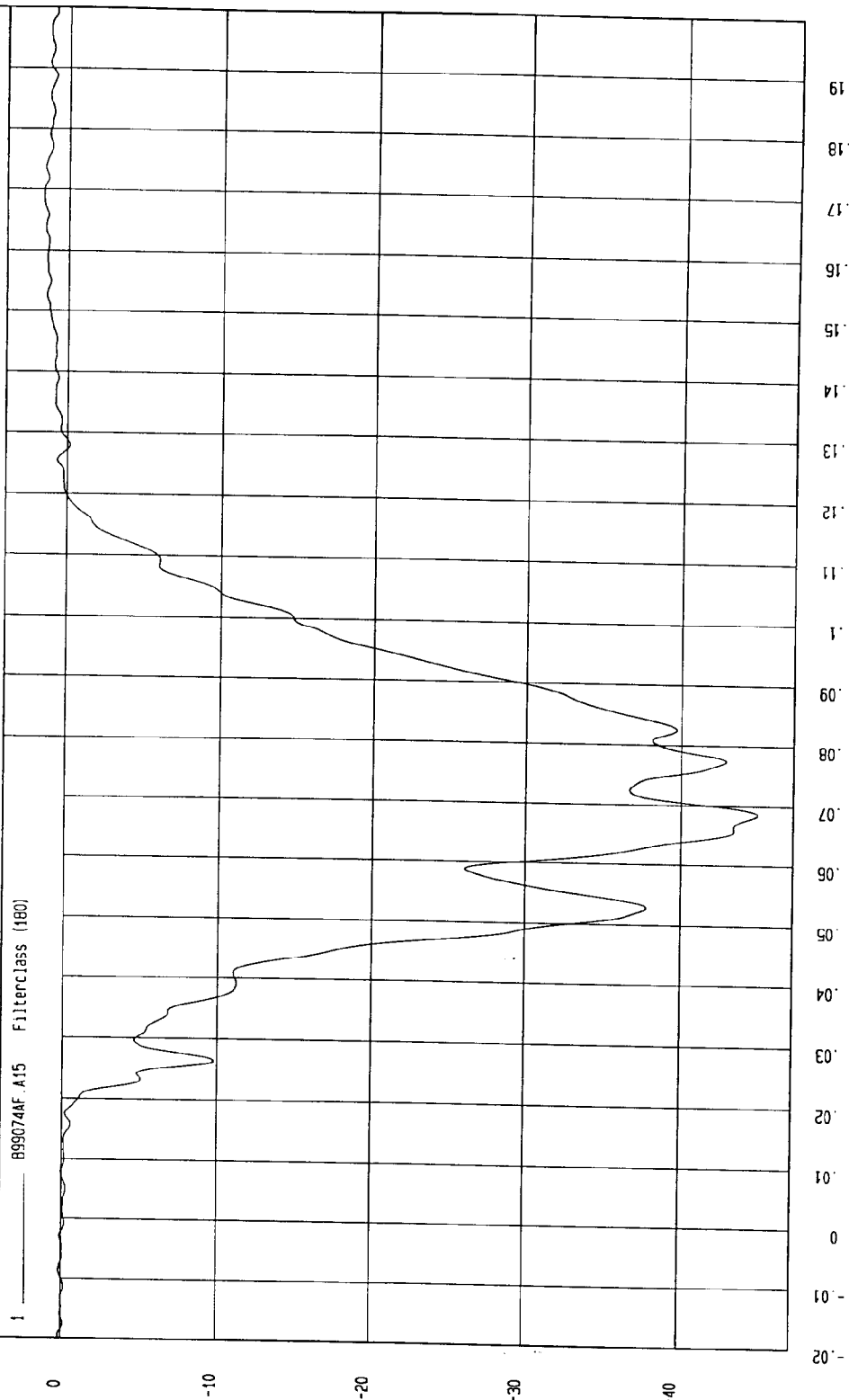
Speed: 35.1 MPH 56.5 KPH

Minimum = -44.97 G'S at 68 msec

Maximum = 1.6 G'S at 169 msec

DRIVER CHEST X ACCELERATION

1 B99074AF A15 Filterclass (180)

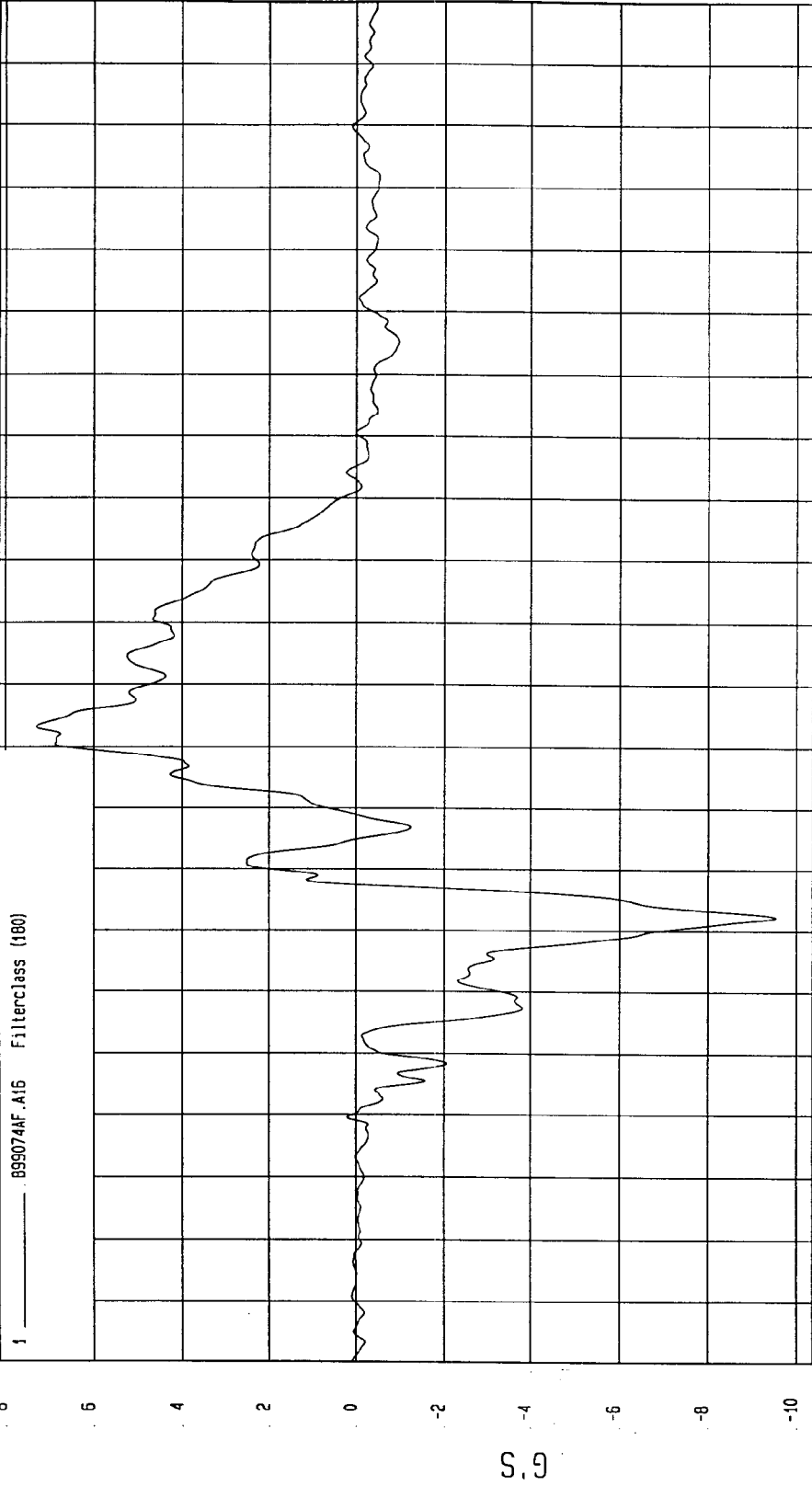


TIME (SECONDS)

WGA Research  
08-17-2000 09:08

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH  
Minimum = -9.53 G'S at 52 msec      Maximum = 7.3 G'S at 83 msec

DRIVER CHEST Y ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

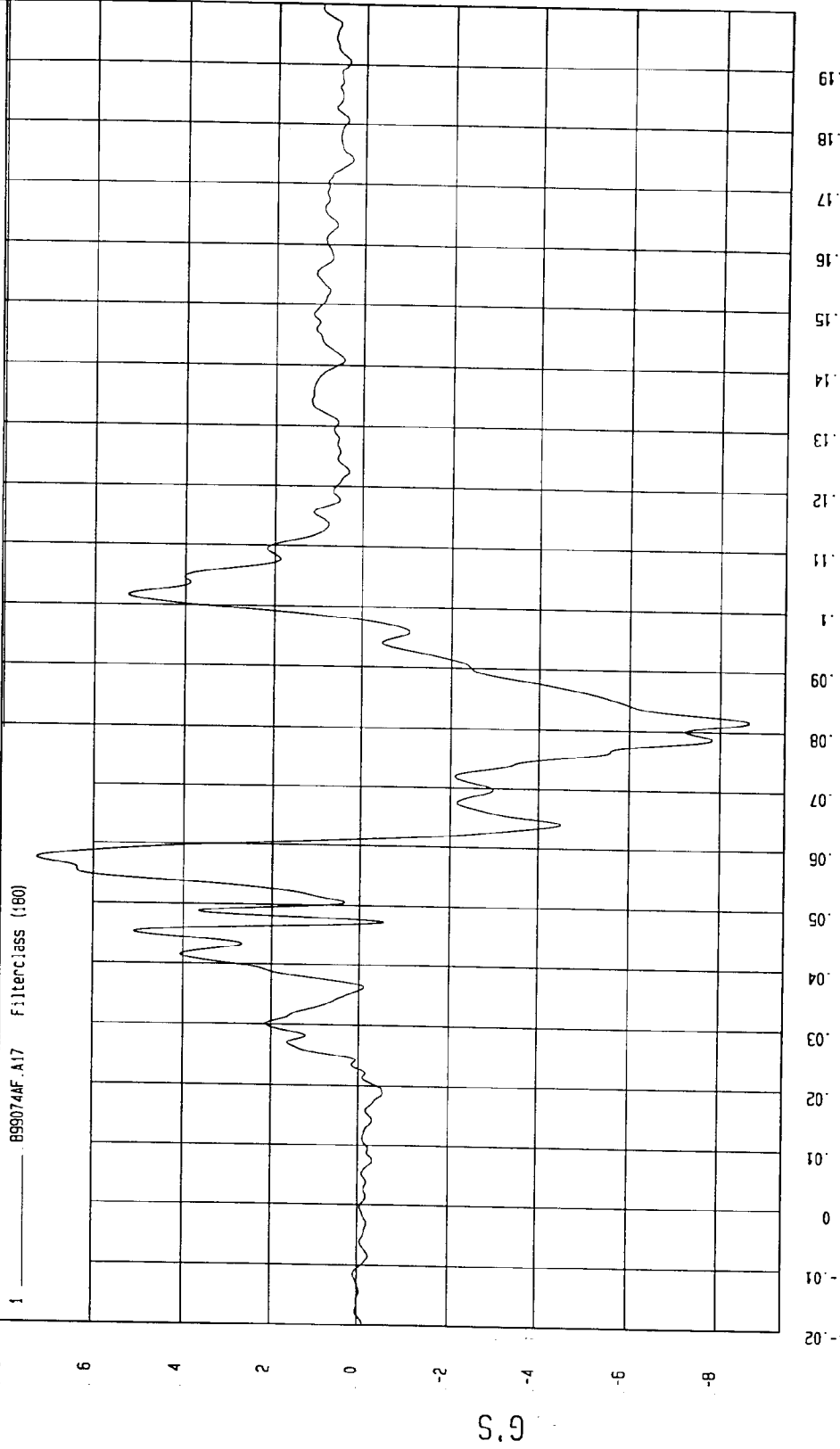
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -8.67 G'S at 82 msec

Maximum = 7.27 G'S at 58 msec

DRIVER CHEST Z ACCELERATION



TIME (SECONDS)

MCA Research  
08-17-2000 09:09

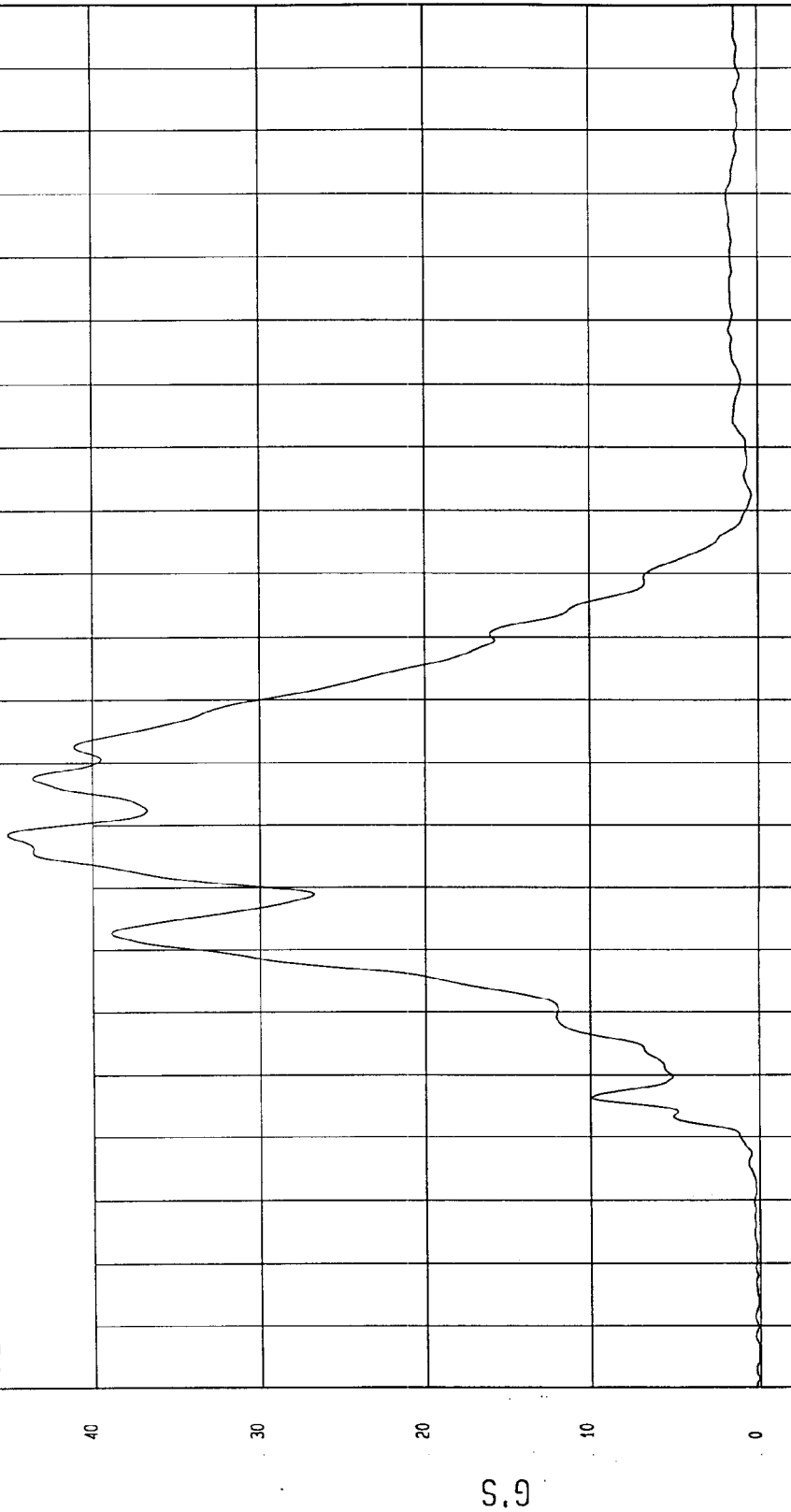
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = 2.34E-02 G'S at -16 msec      Maximum = 45.04 G'S at 68 msec

DRIVER CHEST RESULTANT ACCELERATION

1 \_\_\_\_\_ B99074AV.A15 Filterclass (180)



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

TIME (SECONDS)

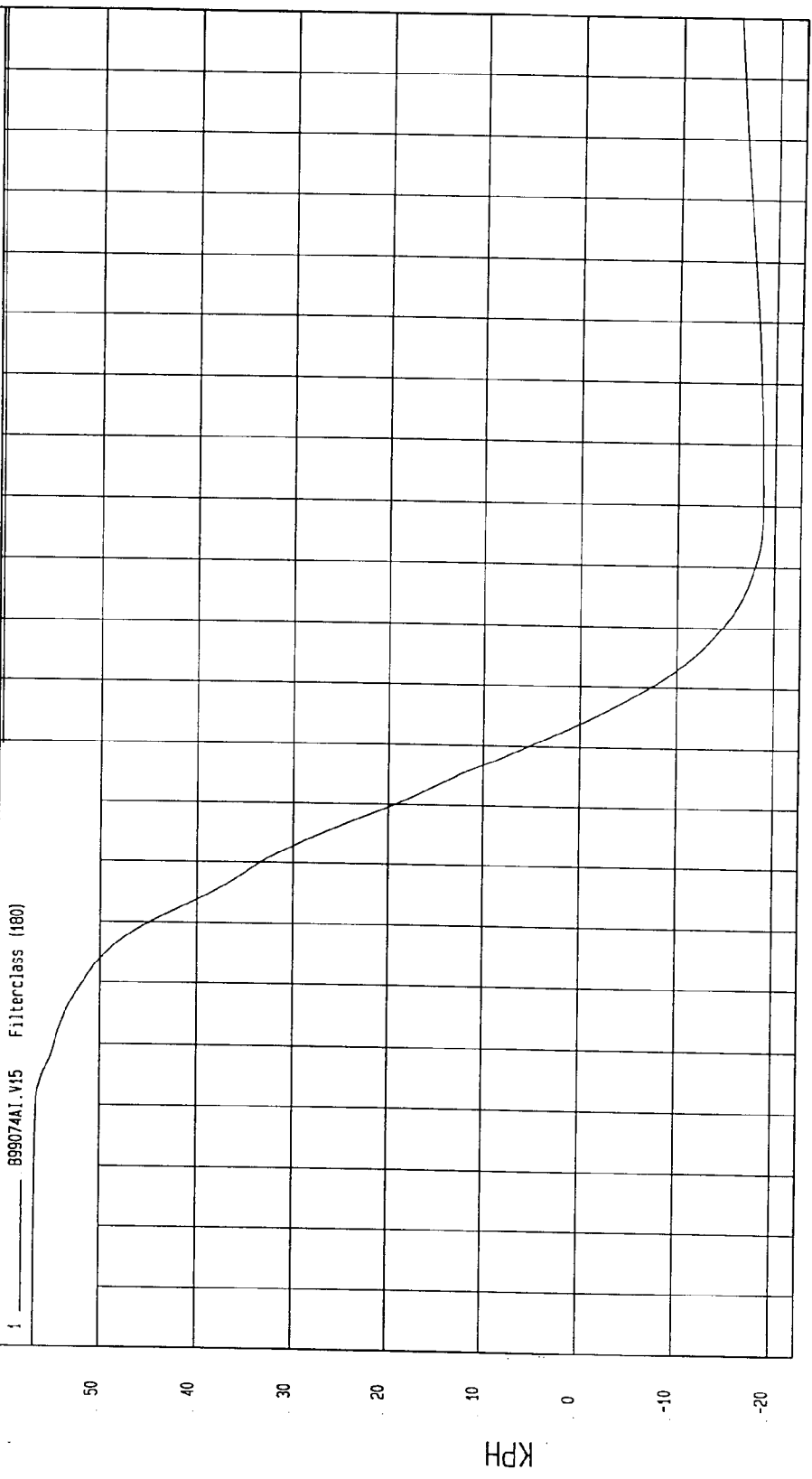
MCA Research  
08-17-2000 03:09

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -18.8 KPH at 120 msec      Maximum = 56.61 KPH at -18 msec

DRIVER CHEST X VELOCITY



TIME Seconds

WSA Research  
08-17-2000 11:03

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

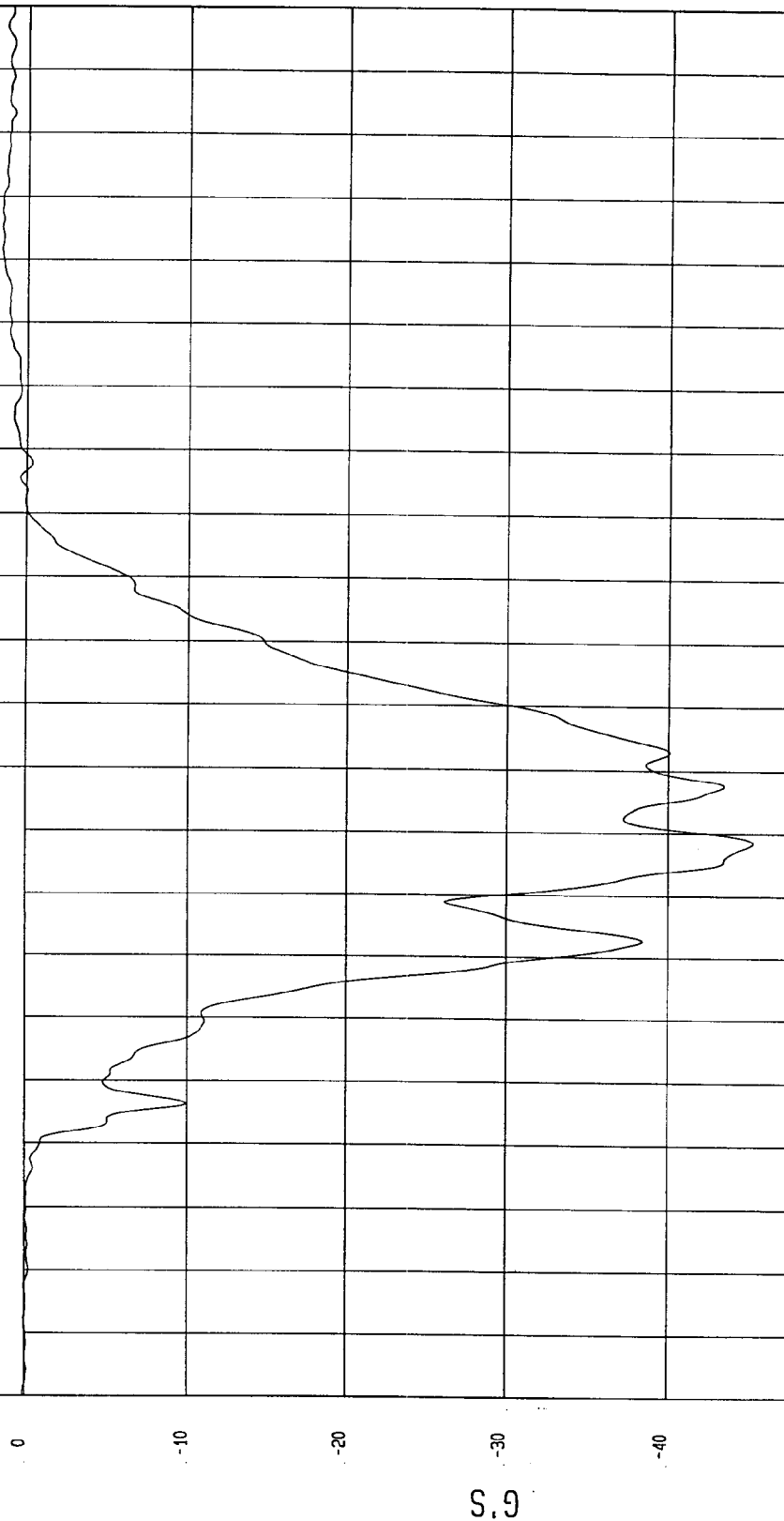
Speed: 35.1 MPH 56.5 KPH

Minimum = -45.21 G'S at 68 msec

Maximum = 1.58 G'S at 182 msec

DRIVER CHEST REDUNDANT X ACCELERATION

1 899074AF.A35 Filter: class (180)



MGA Research  
08-17-2000 09:28

TIME (SECONDS)

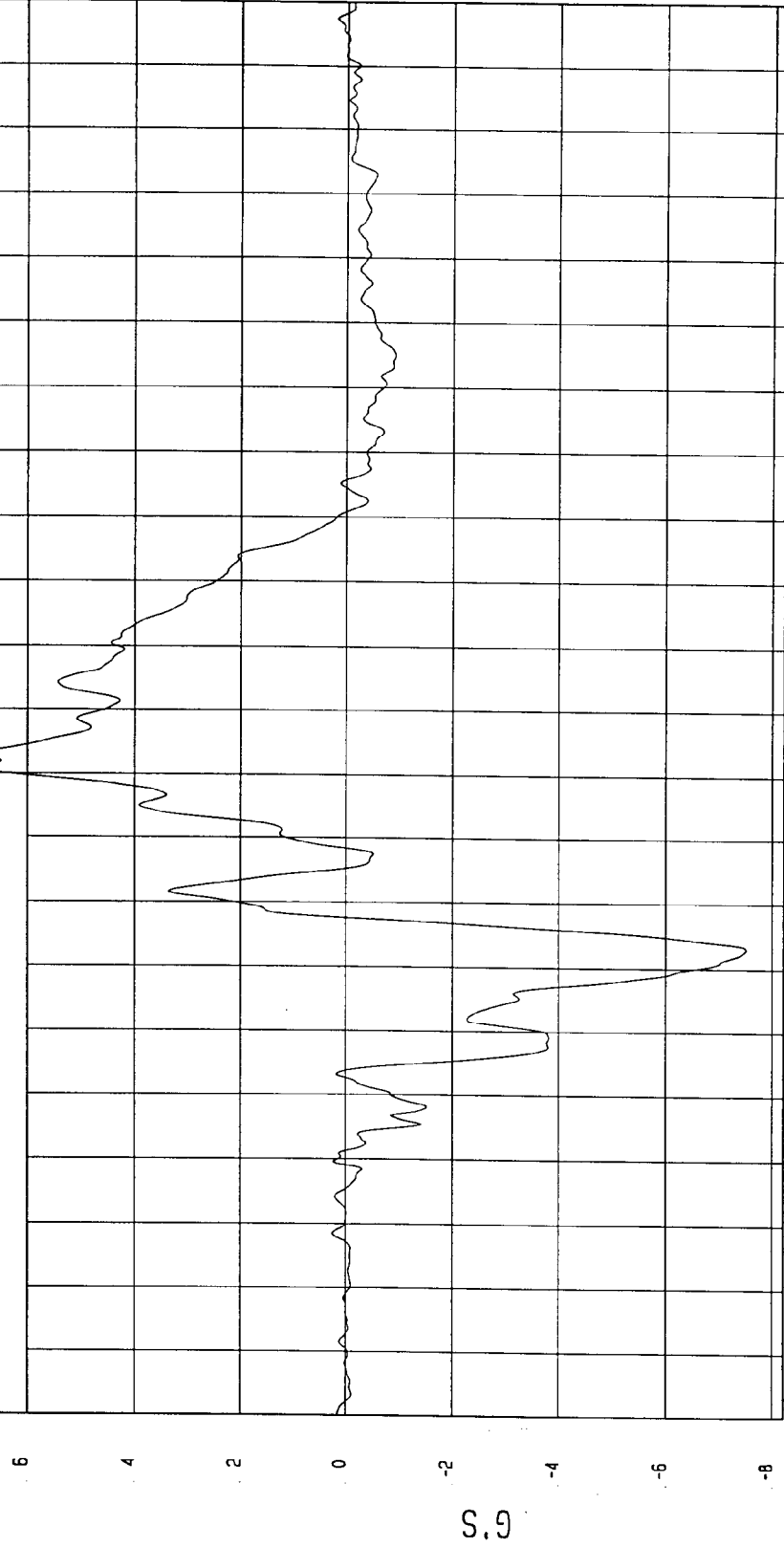
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -7.5 G'S at 53 msec      Maximum = 6.86 G'S at 83 msec

DRIVER CHEST REDUNDANT Y ACCELERATION

1 ——— 899074AF.A36 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

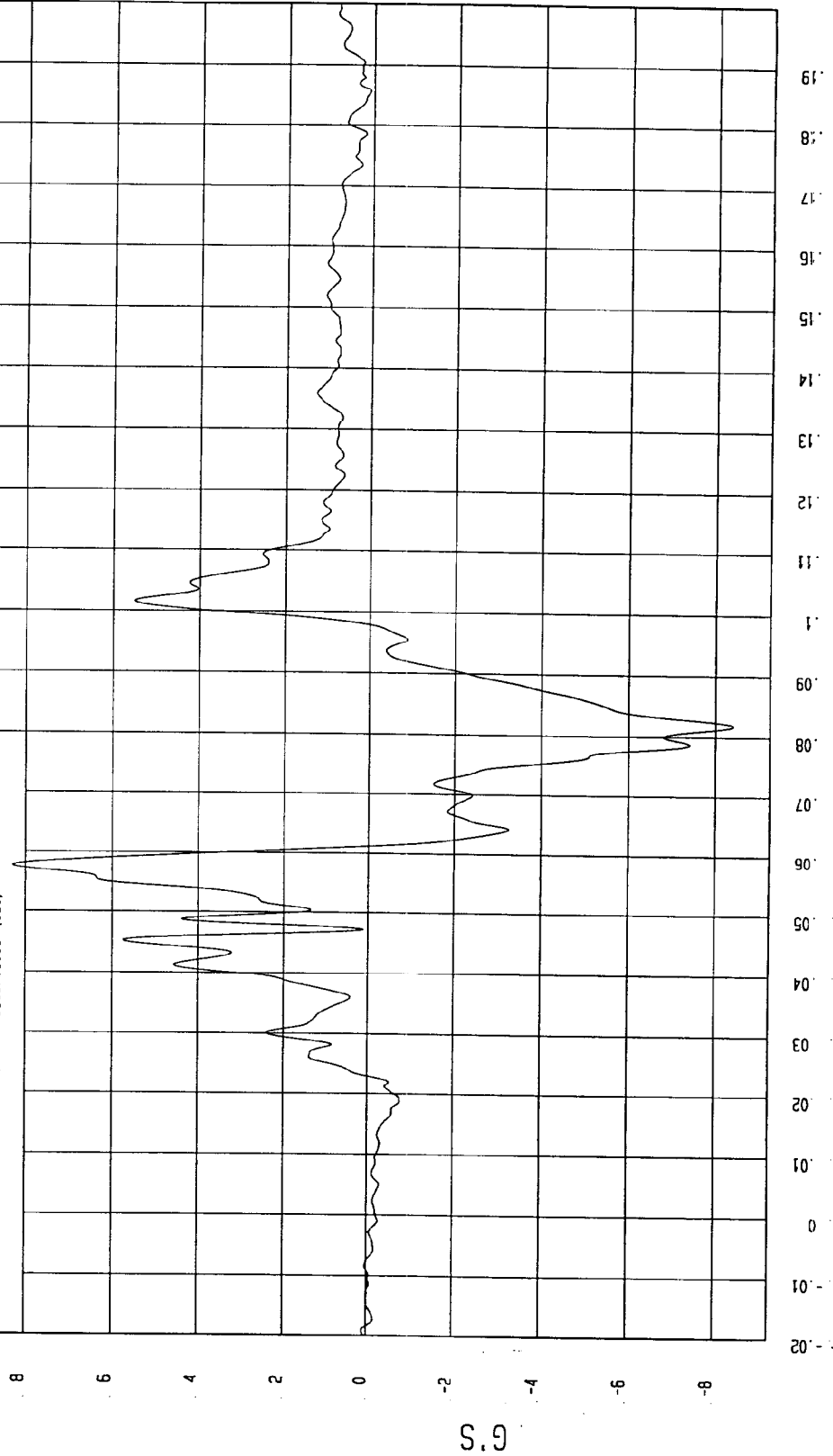
Speed: 35.1 MPH 56.5 KPH

Minimum = -8.42 G'S at 82 msec

Maximum = 8.29 G'S at 58 msec

DRIVER CHEST REDUNDANT Z ACCELERATION

1 B99074AF.A37 Filterclass (180)



TIME (SECONDS)

NSA Research  
08-17-2000 09:28

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

SPEED: 35.1 MPH 56.5 KPH

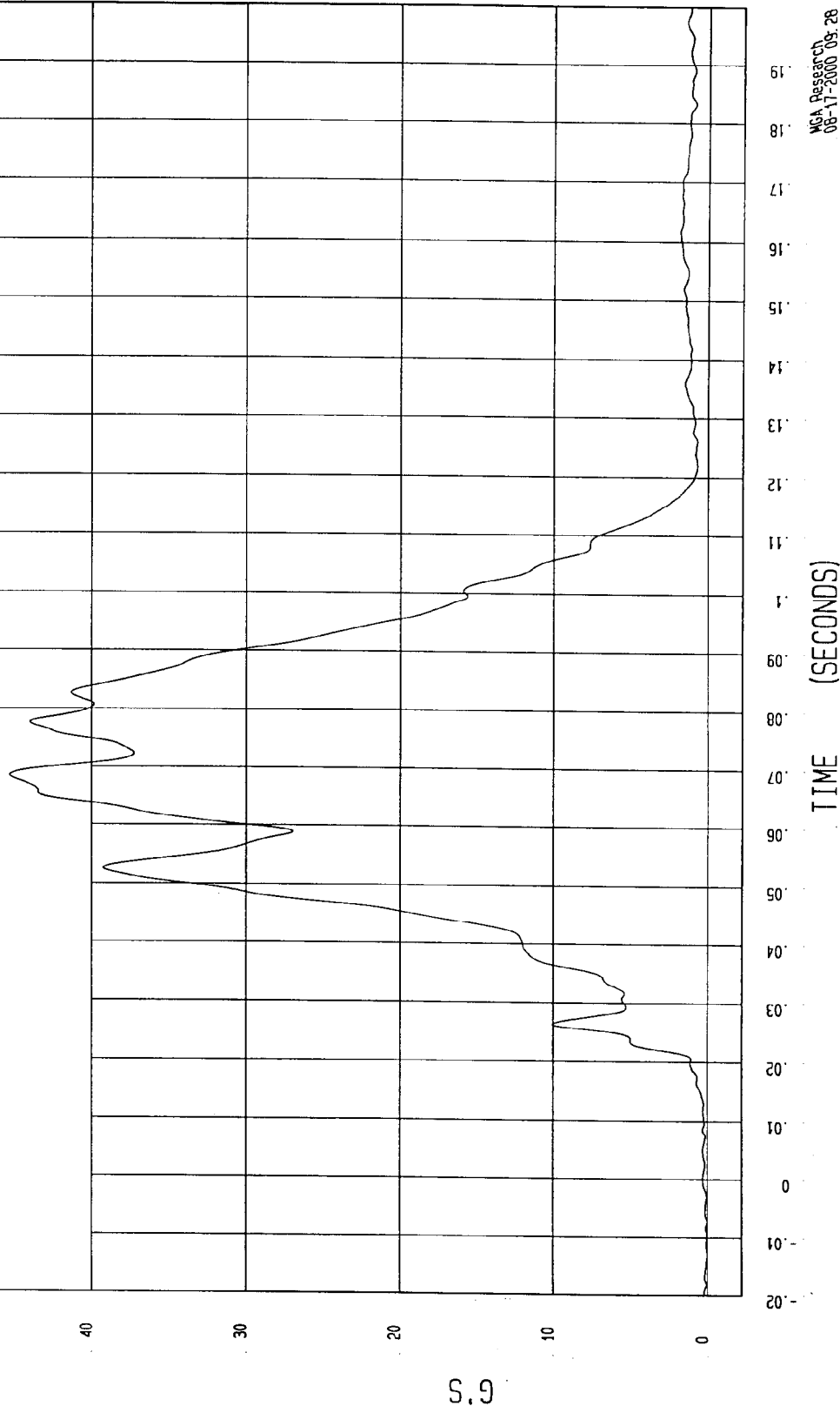
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 45.26 G'S at 68 msec

Minimum = 3.00E-02 G'S at -7 msec

DRIVER CHEST REDUNDANT RESULTANT ACCELERATION

1 899074AV.A35 FilterClass (180)



MCA Research  
08-17-2000 09:28

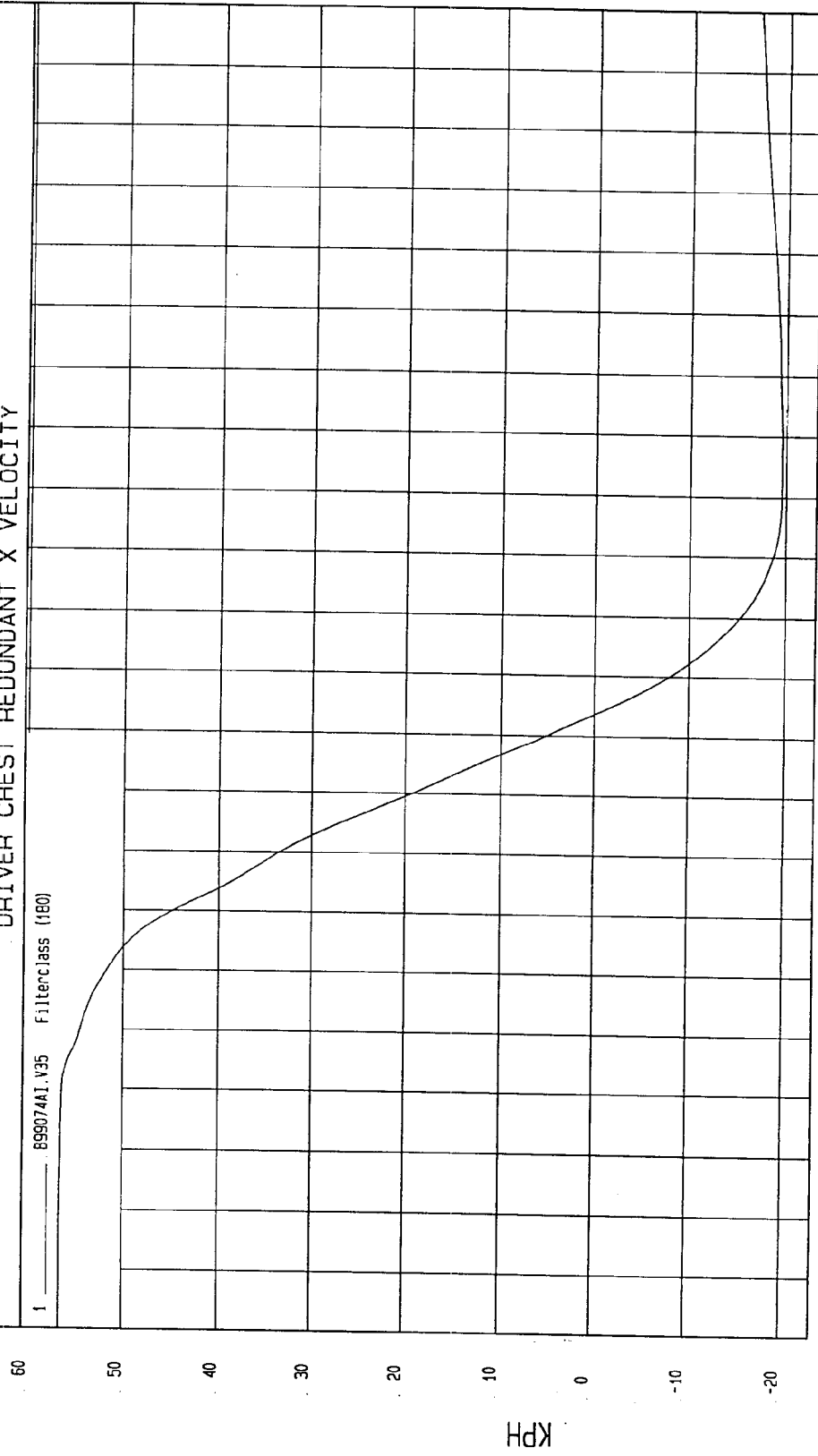
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -19.52 KPH at 121 msec      Maximum = 56.61 KPH at -18 msec

DRIVER CHEST REDUNDANT X VELOCITY

1 899074A1 V35 Filterclass (100)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

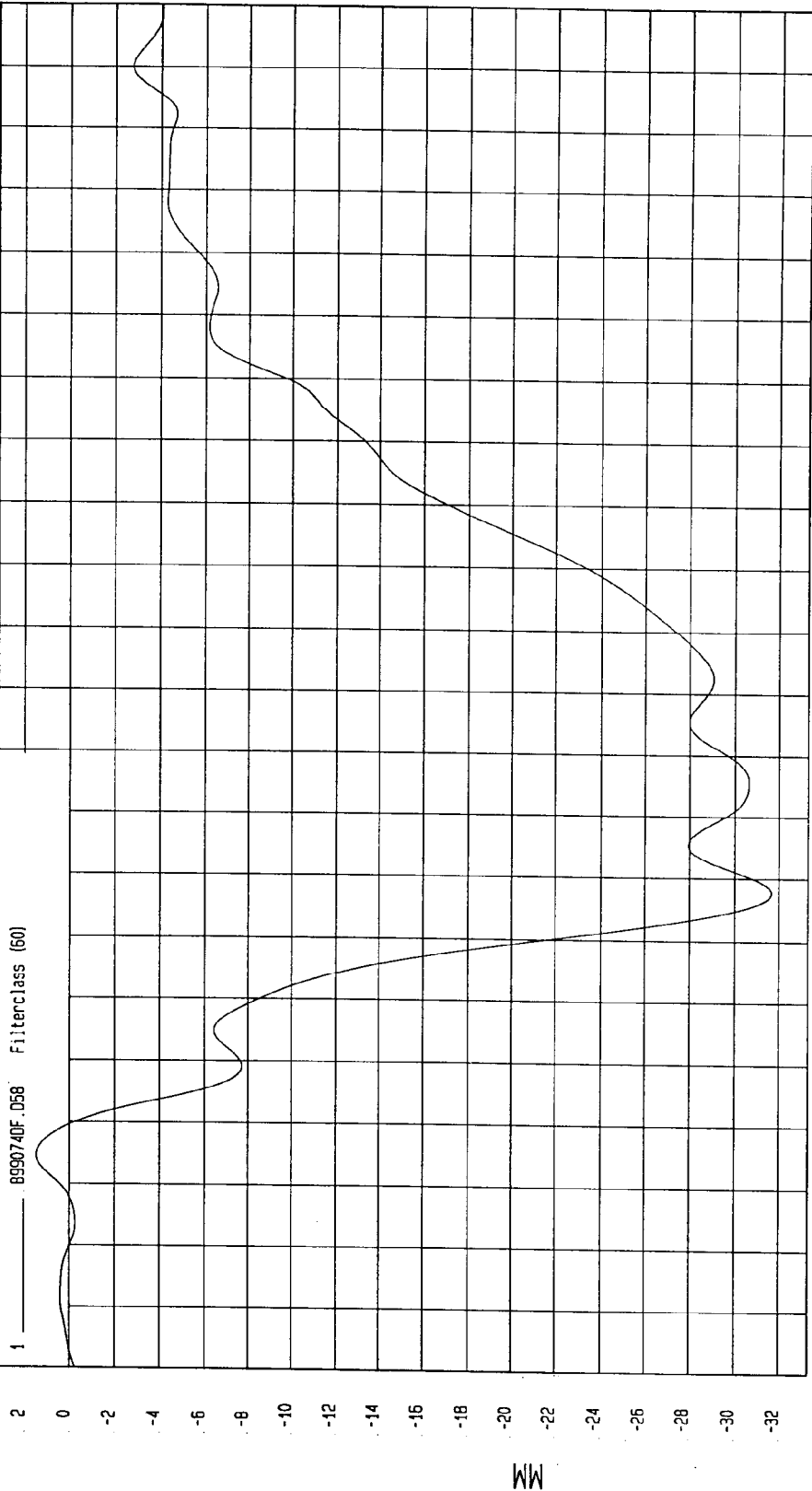
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 1.48 MM at 15 msec

Minimum = -31.66 MM at 58 msec

DRIVER CHEST COMPRESSION

1 ——— 8990740F.D58 Filterclass (60)

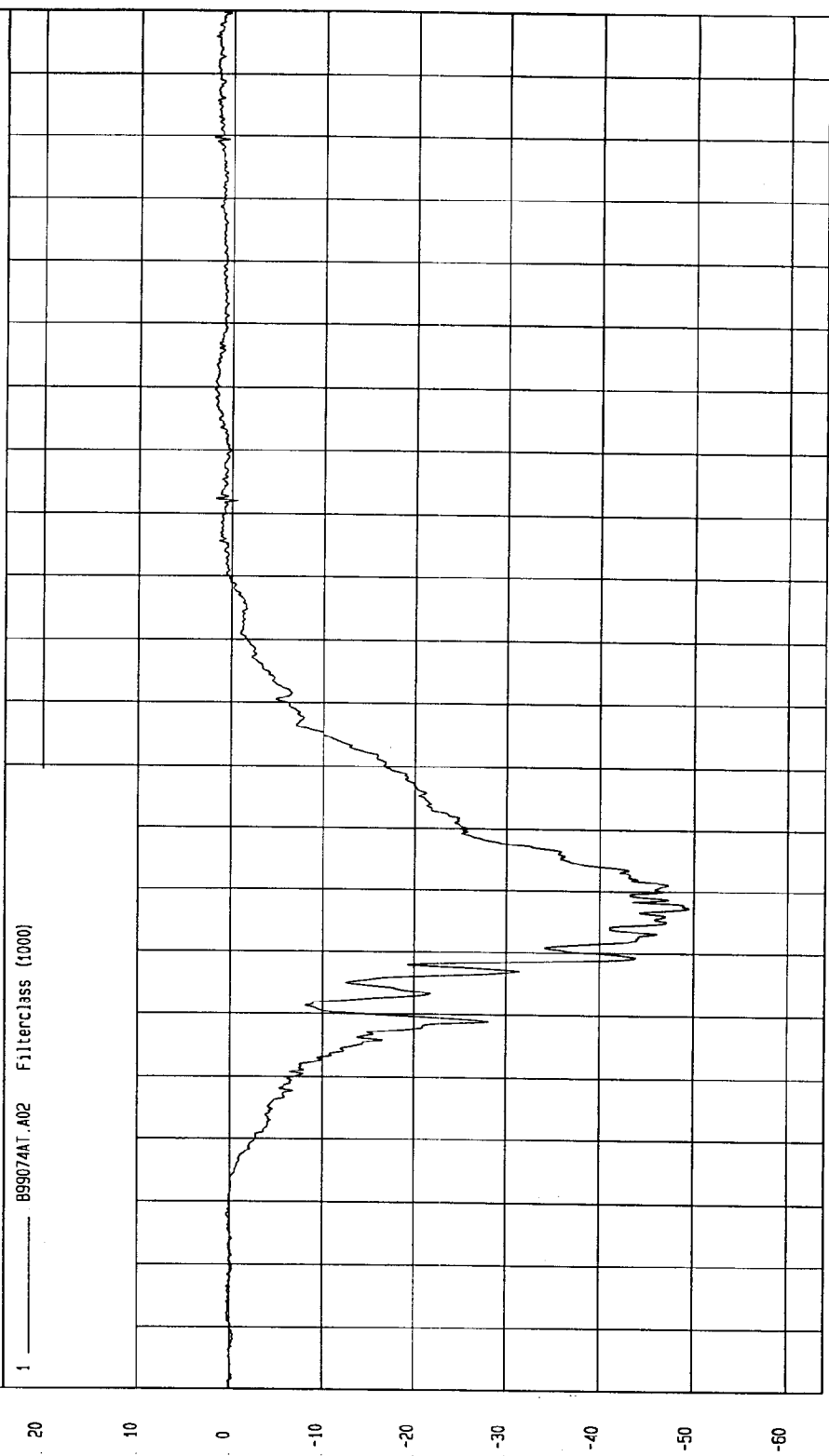


TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -49.57 G'S at 57 msec  
Maximum = 2.22 G'S at 180 msec

DRIVER PELVIS X ACCELERATION



TIME (SECONDS)

MCA Research  
08-11-2000 09:28

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

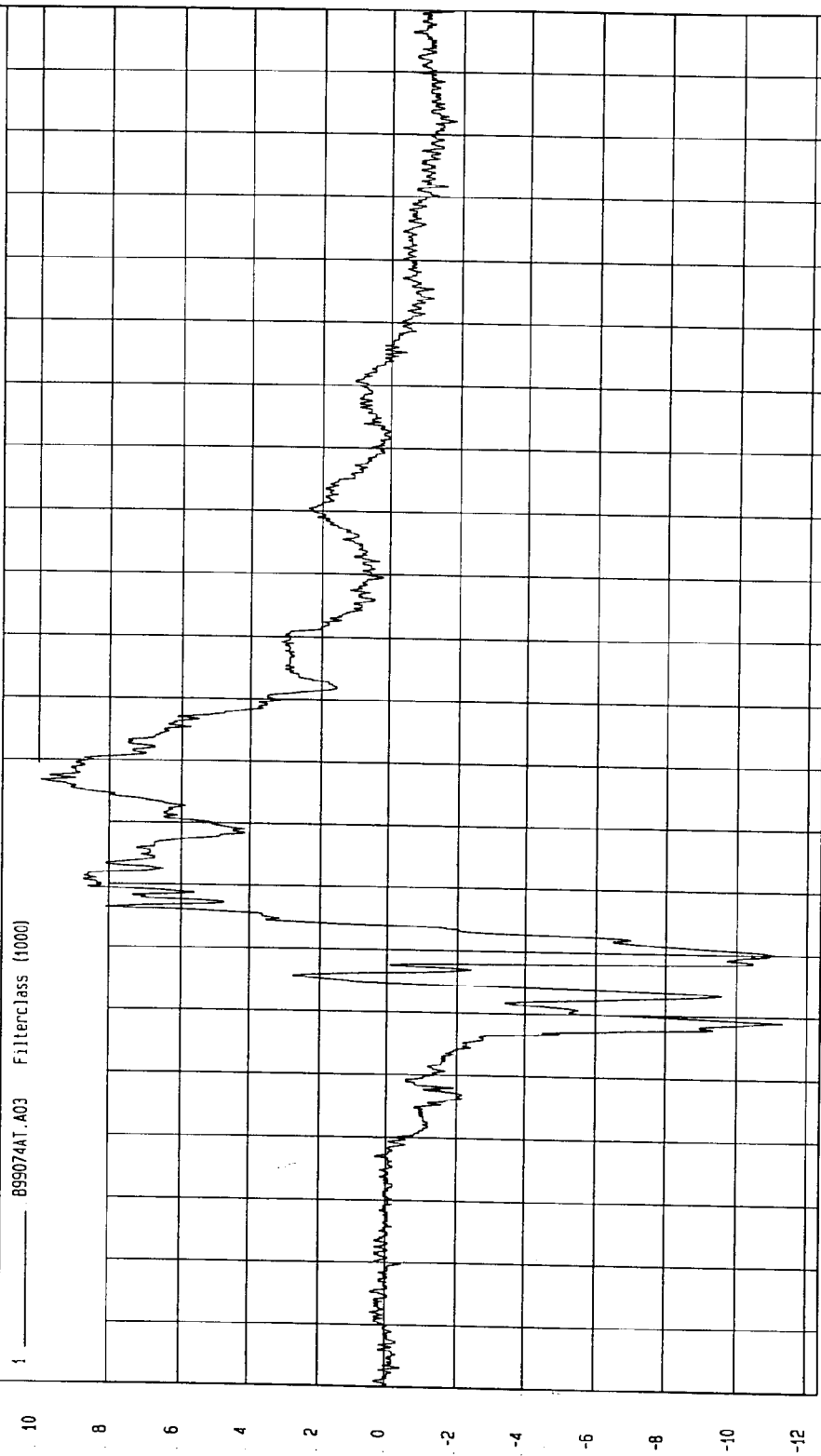
Speed: 35.1 MPH 56.5 KPH

Minimum = -11.31 G'S at 39 msec

Maximum = 9.95 G'S at 77 msec

DRIVER PELVIS Y ACCELERATION

1 ——— B99074AT.A03 Filterclass (1000)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

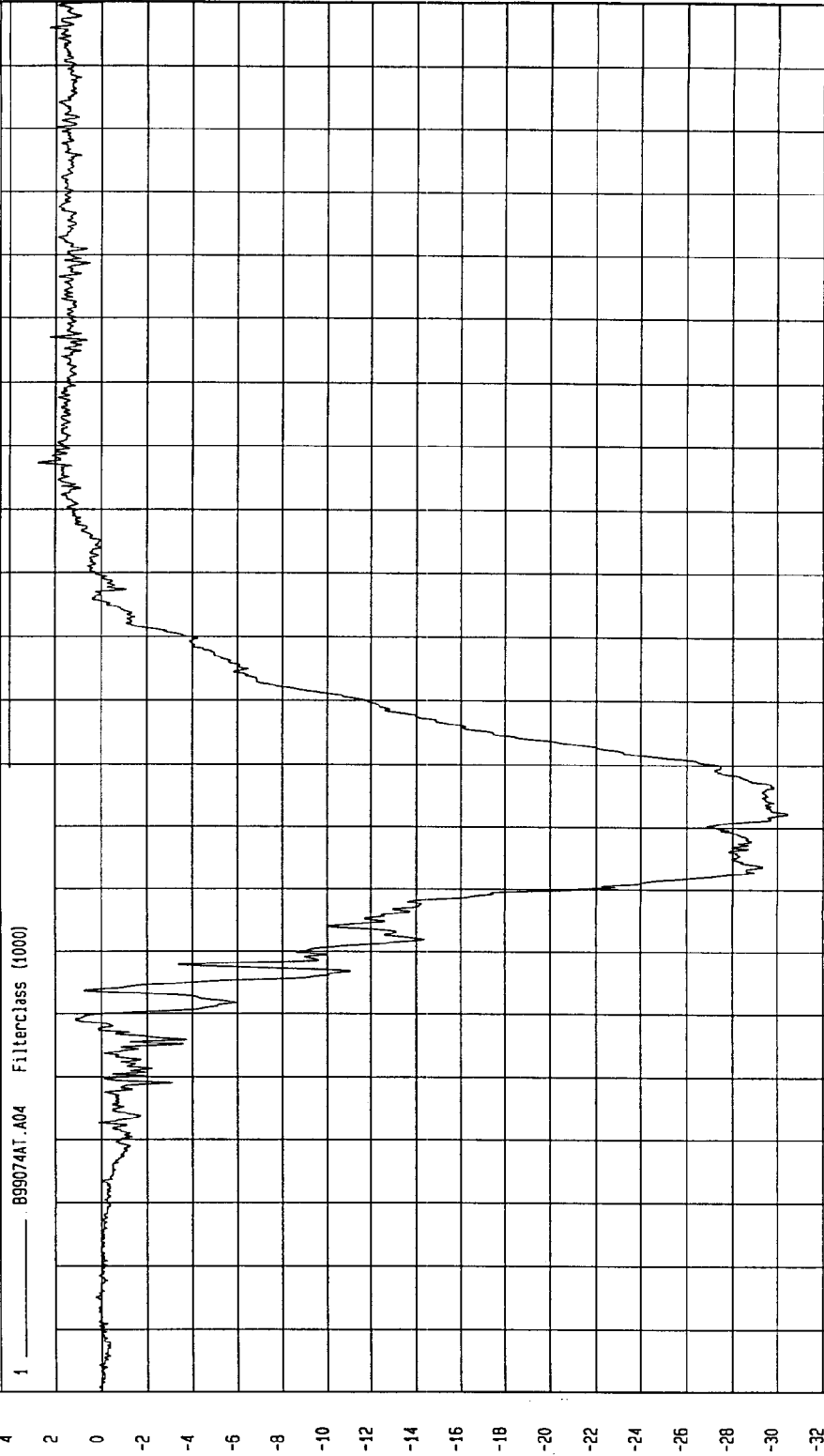
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -30.47 G'S at 72 msec

Maximum = 2.77 G'S at 127 msec

DRIVER PELVIS Z ACCELERATION

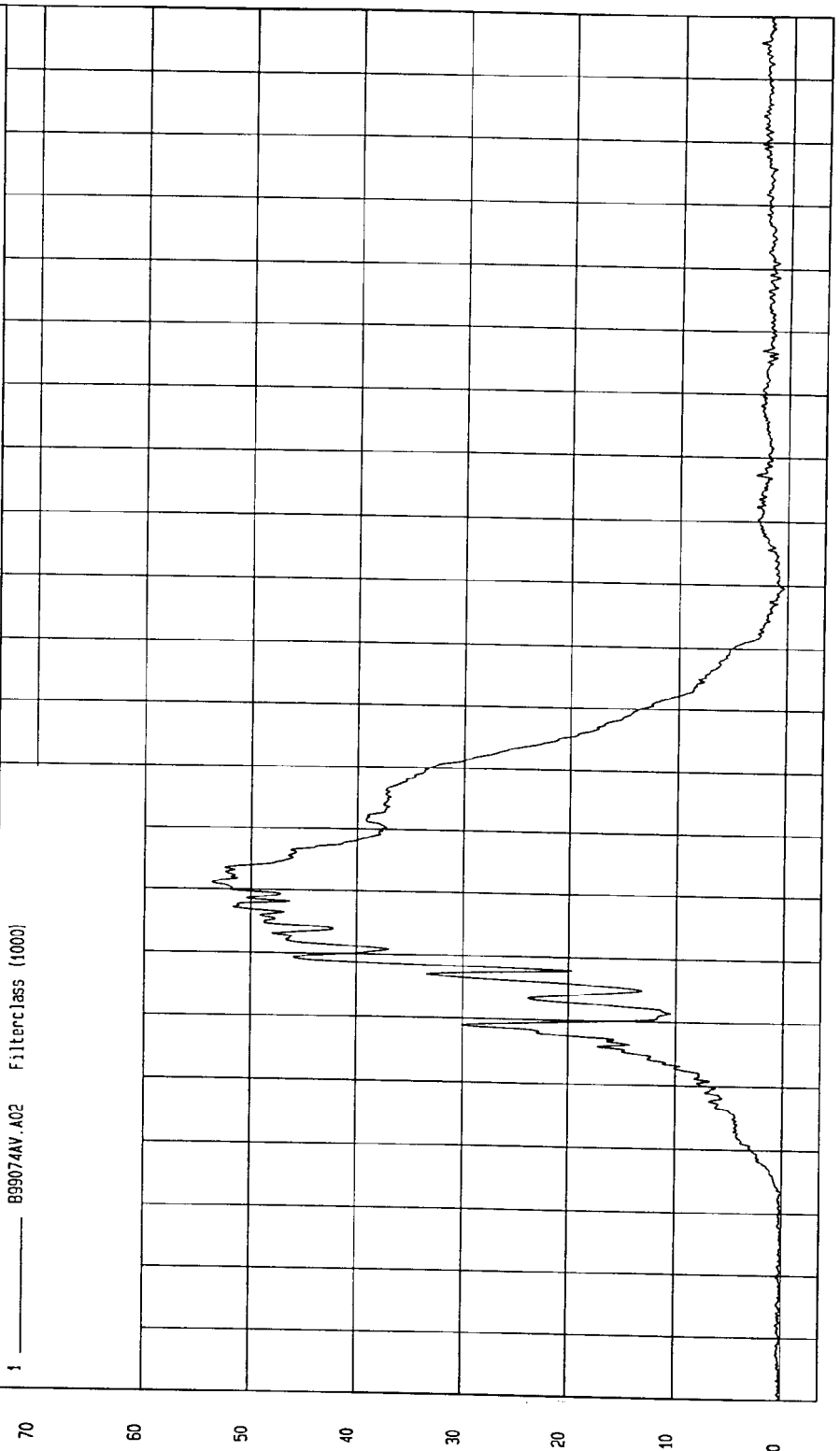


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = 6.45E-02 G'S at -20 msec      Maximum = 53.74 G'S at 61 msec

DRIVER PELVIS RESULTANT ACCELERATION



TIME (SECONDS)

MCA Research  
08-11-2000 09:28

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

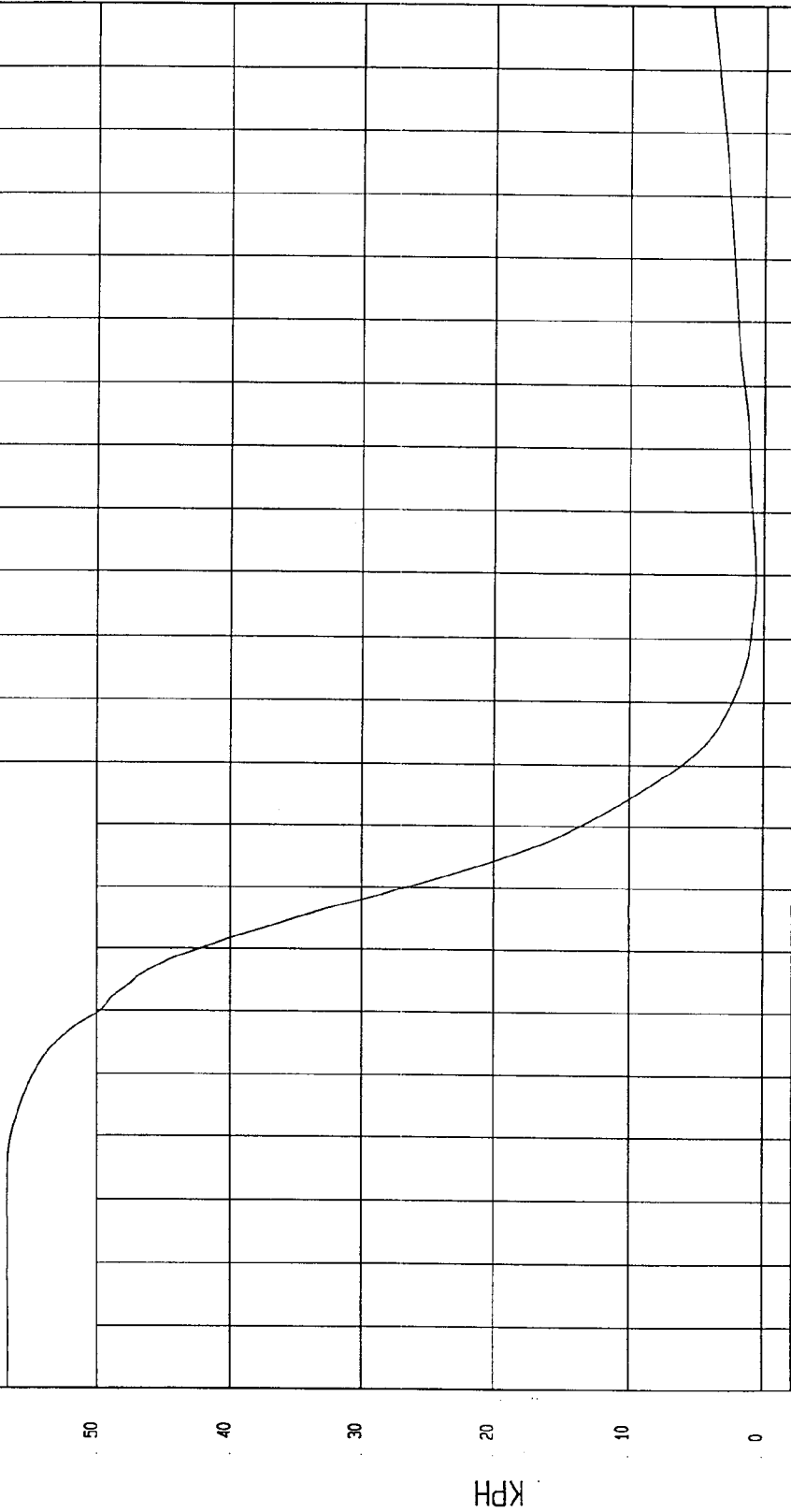
Speed: 35.1 MPH 56.5 KPH

Minimum = .6 KPH at 109 msec

Maximum = 56.61 KPH at 11 msec

DRIVER PELVIS X VELOCITY

1 ——— B99074AI.V02 Filterclass (180)



TIME Seconds

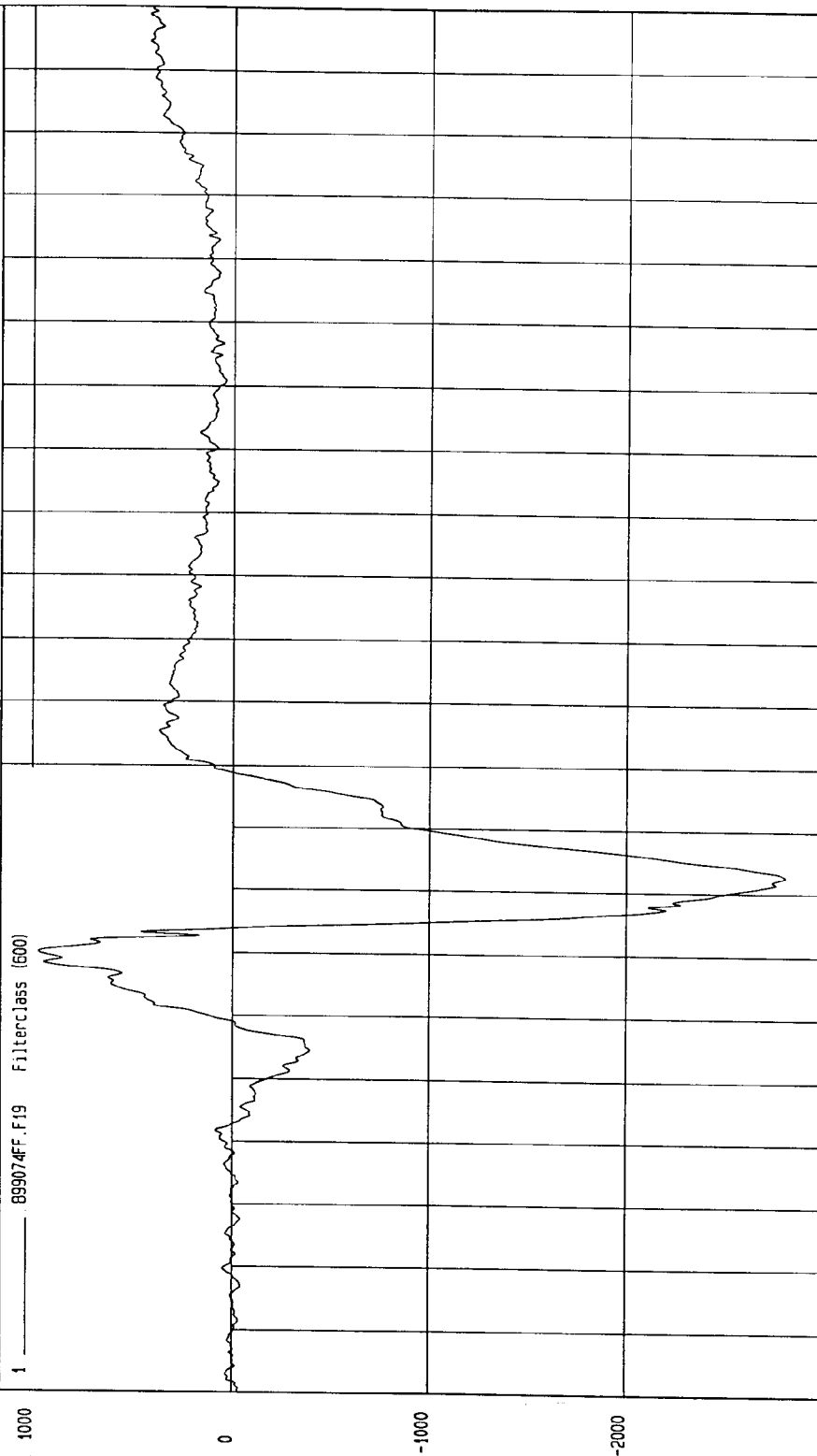
NCA Research  
08-17-2000 11.03

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -2802.4 N at 63 msec Maximum = 968.82 N at 50 msec

DRIVER LEFT FEMUR FORCE



TIME (SECONDS)

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

1000 0 -1000 -2000

N

MCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

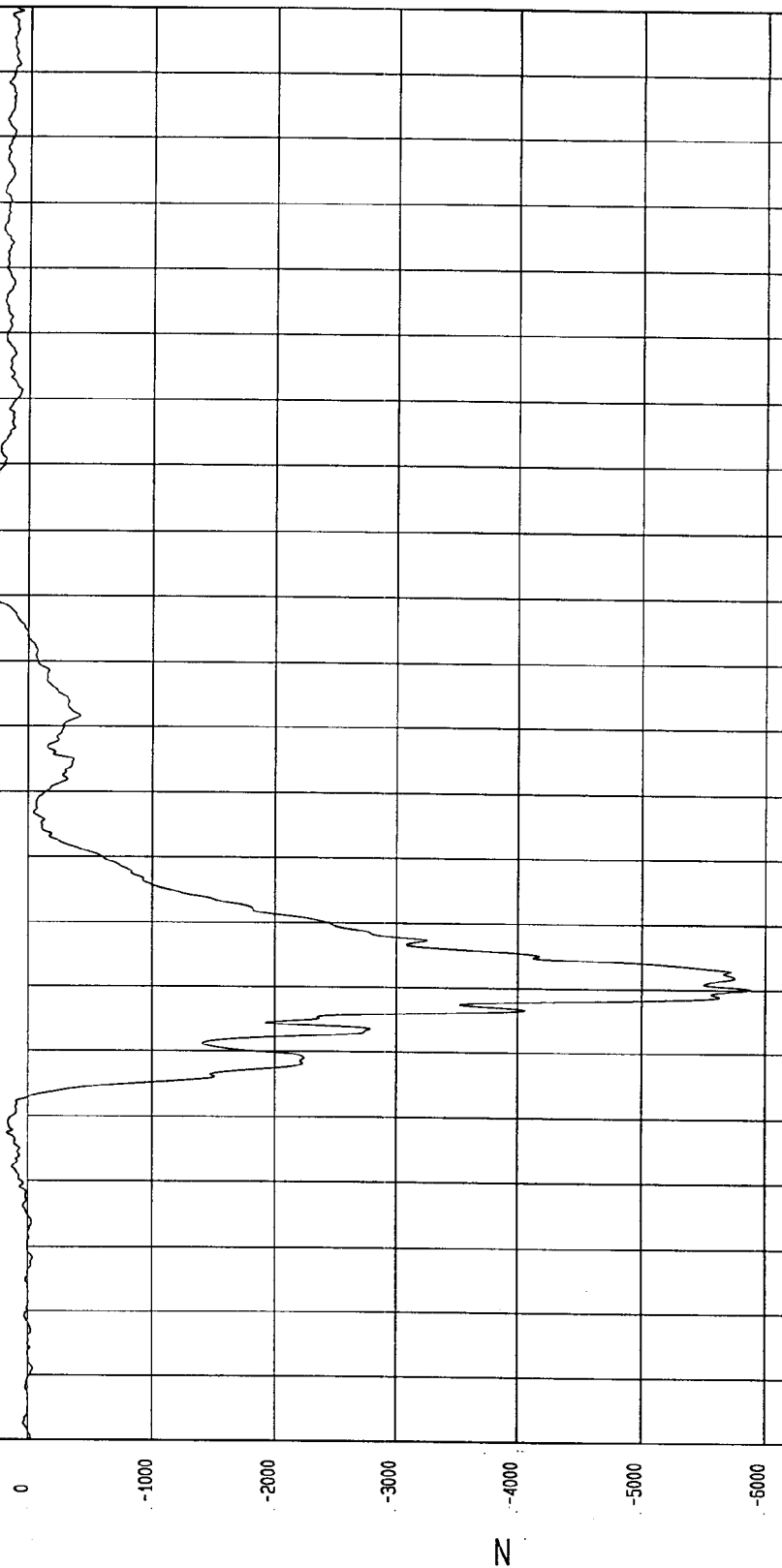
Speed: 35.1 MPH 56.5 KPH

Minimum = -5881.68 N at 50 msec

Maximum = 450.11 N at 116 msec

DRIVER RIGHT FEMUR FORCE

1 ——— B99074FF.F18 Filterclass (600)



TIME (SECONDS)

NCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

SPEED: 35.1 MPH 56.5 KPH

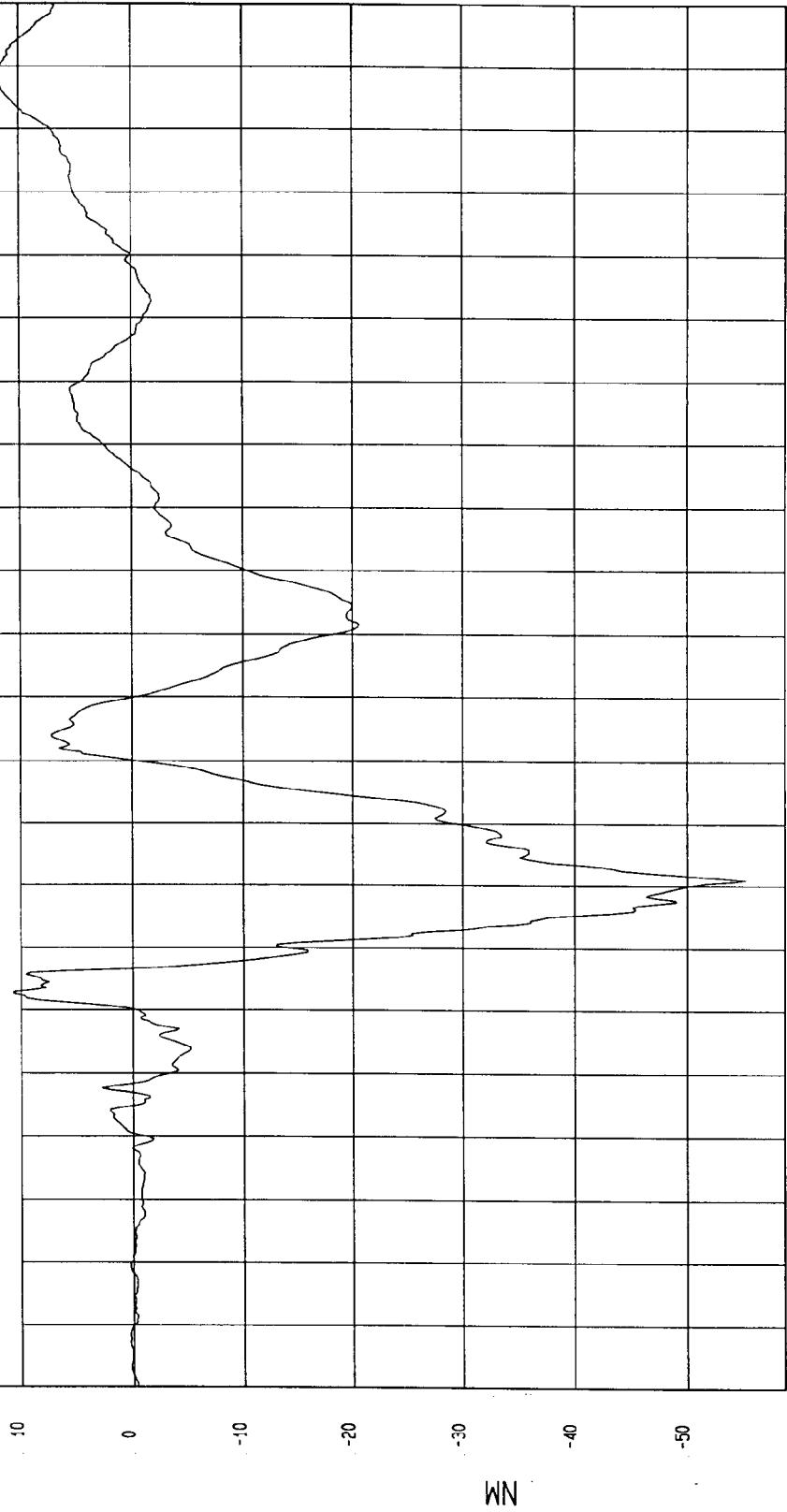
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 12.15 NM at 189 msec

Minimum = -55.34 NM at 61 msec

DRIVER LEFT UPPER TIBIA MOMENT X

1 B95074NF.M60 Filterclass (600)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

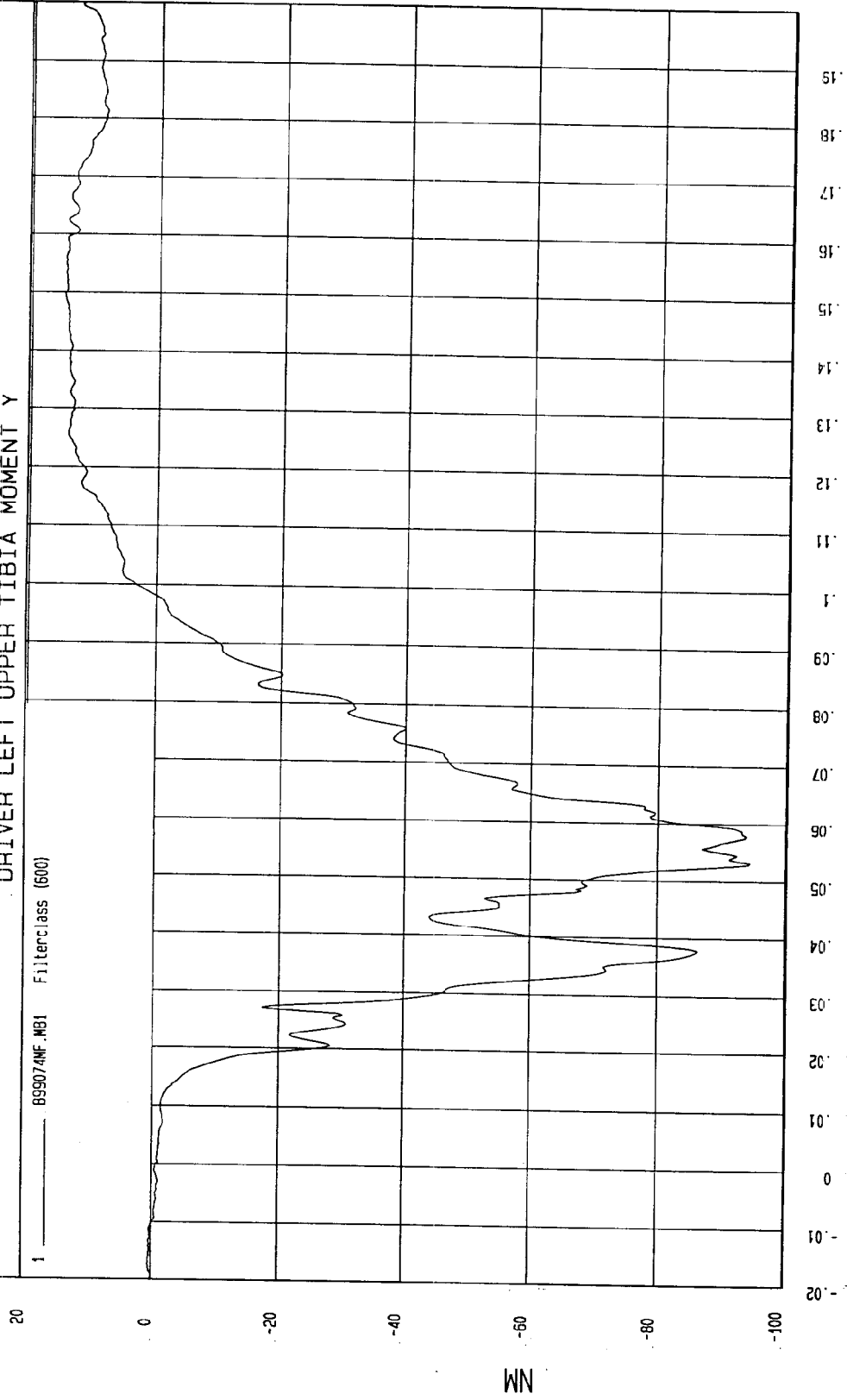
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -94.76 NM at 53 msec

Maximum = 14.93 NM at 150 msec

DRIVER LEFT UPPER TIBIA MOMENT Y



MCA Research  
08-17-2000 09:28

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

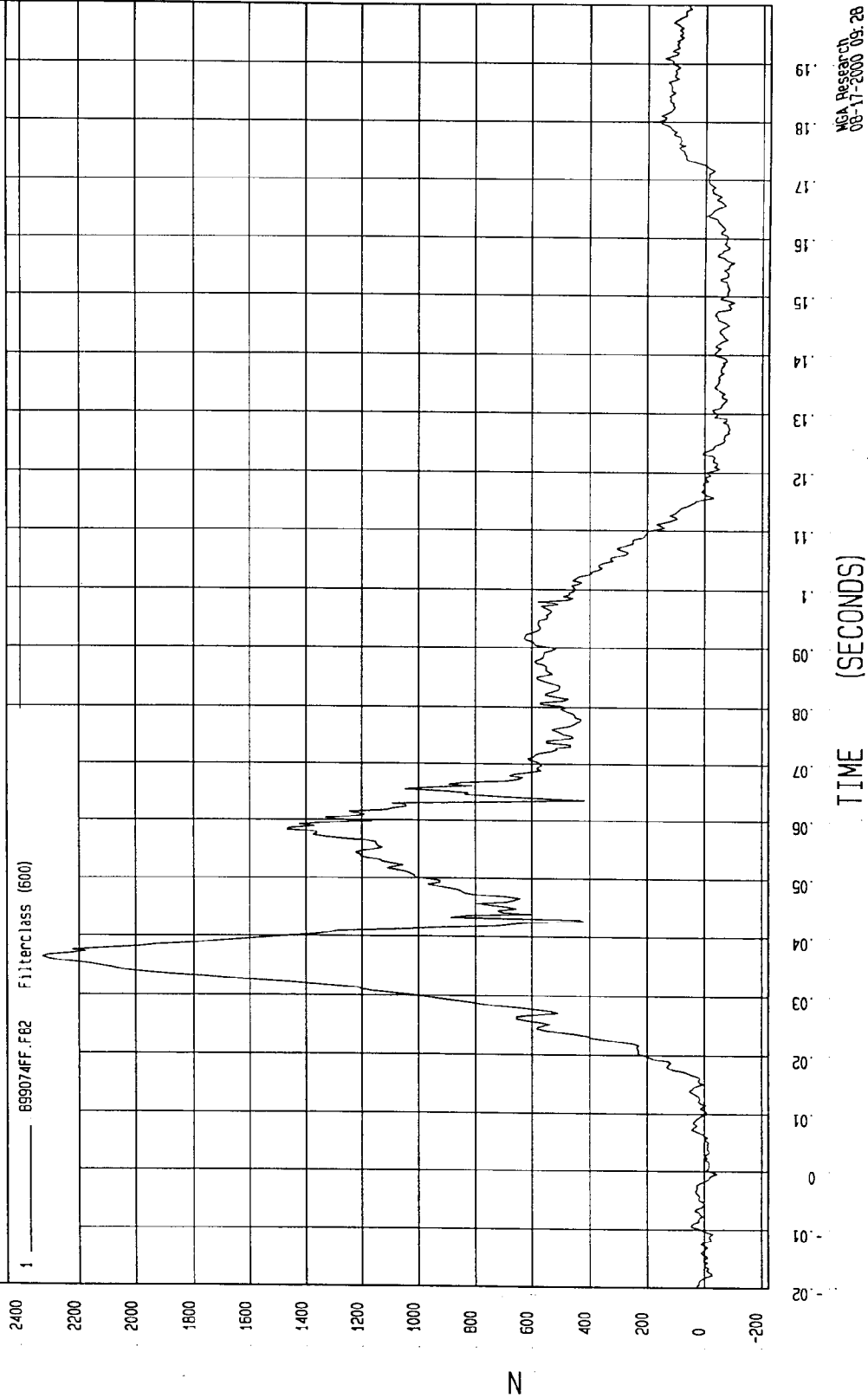
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -102.77 N at 149 msec

Maximum = 2325.01 N at 36 msec

DRIVER LEFT UPPER TIBIA FORCE Z



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

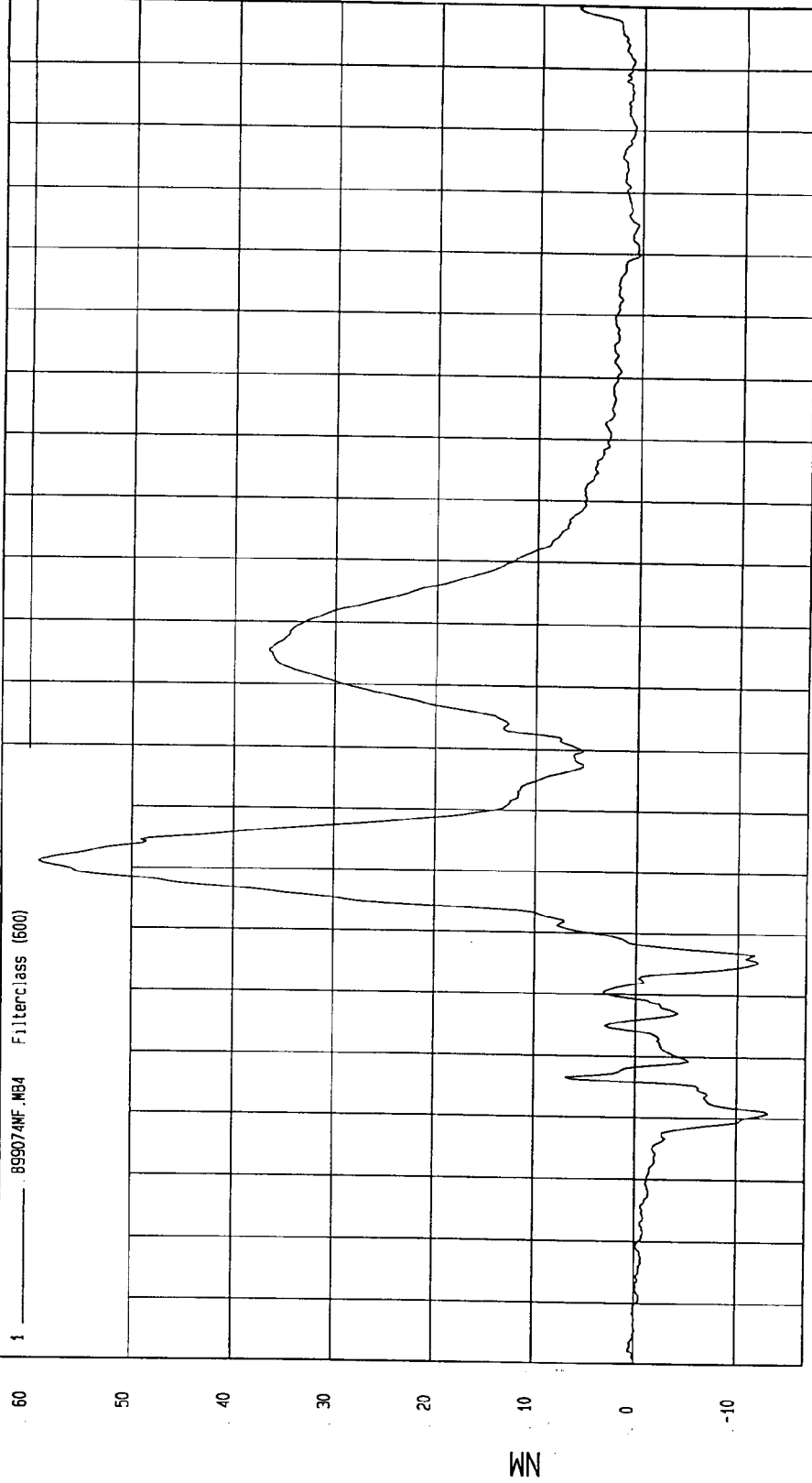
Speed: 35.1 MPH 56.5 KPH

Minimum = -13.11 NM at 21 msec

Maximum = 59.1 NM at 61 msec

DRIVER LEFT LOWER TIBIA MOMENT X

1 899074NF.MB4 Filterclass (500)



TIME (SECONDS)

MGA Research  
08-17-2000 09:28

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

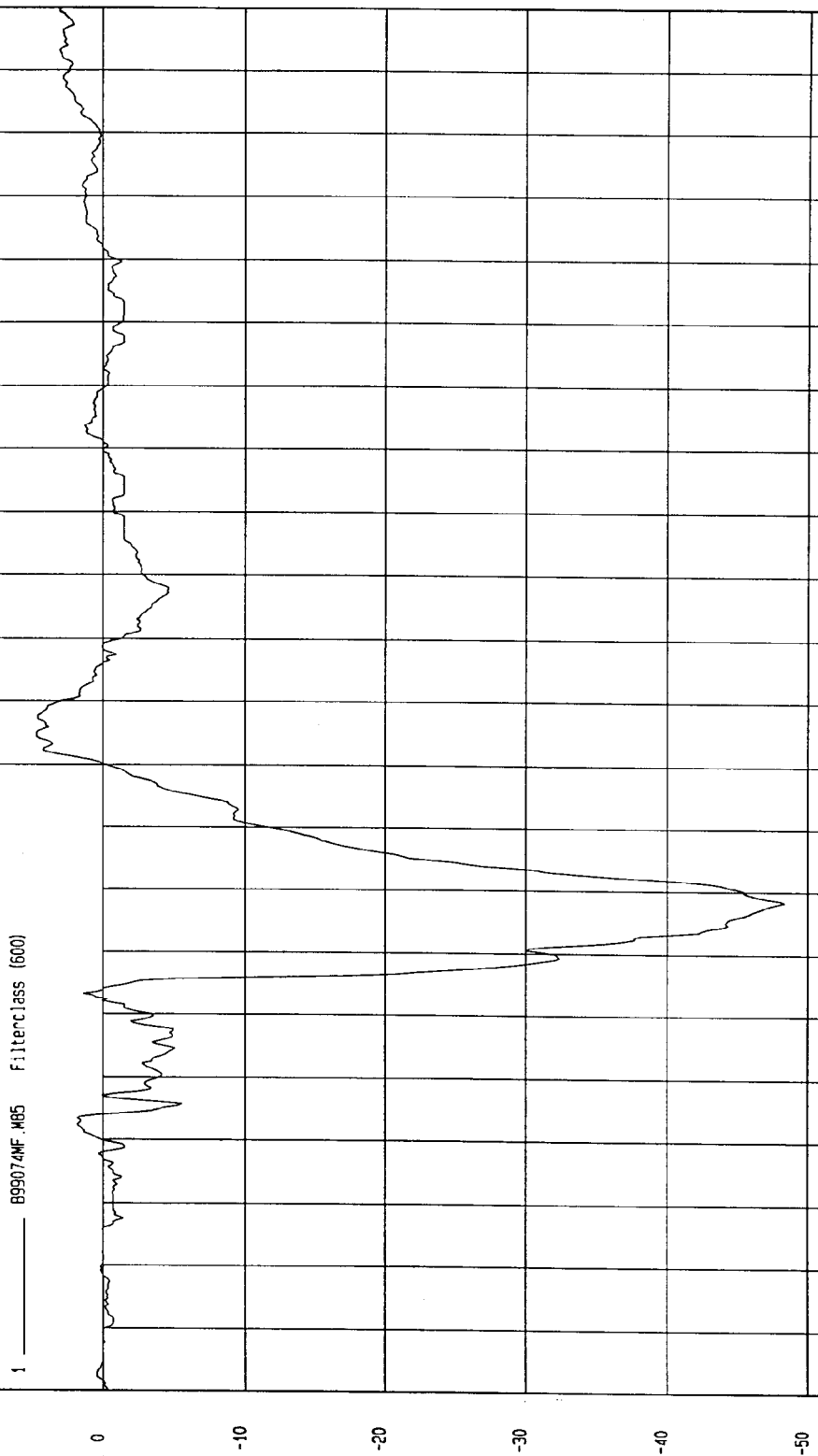
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 4.67 NM at 84 msec

Minimum = -48.35 NM at 58 msec

DRIVER LEFT LOWER TIBIA MOMENT Y

1 ——— B99074NF.M05 FilterClass (600)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

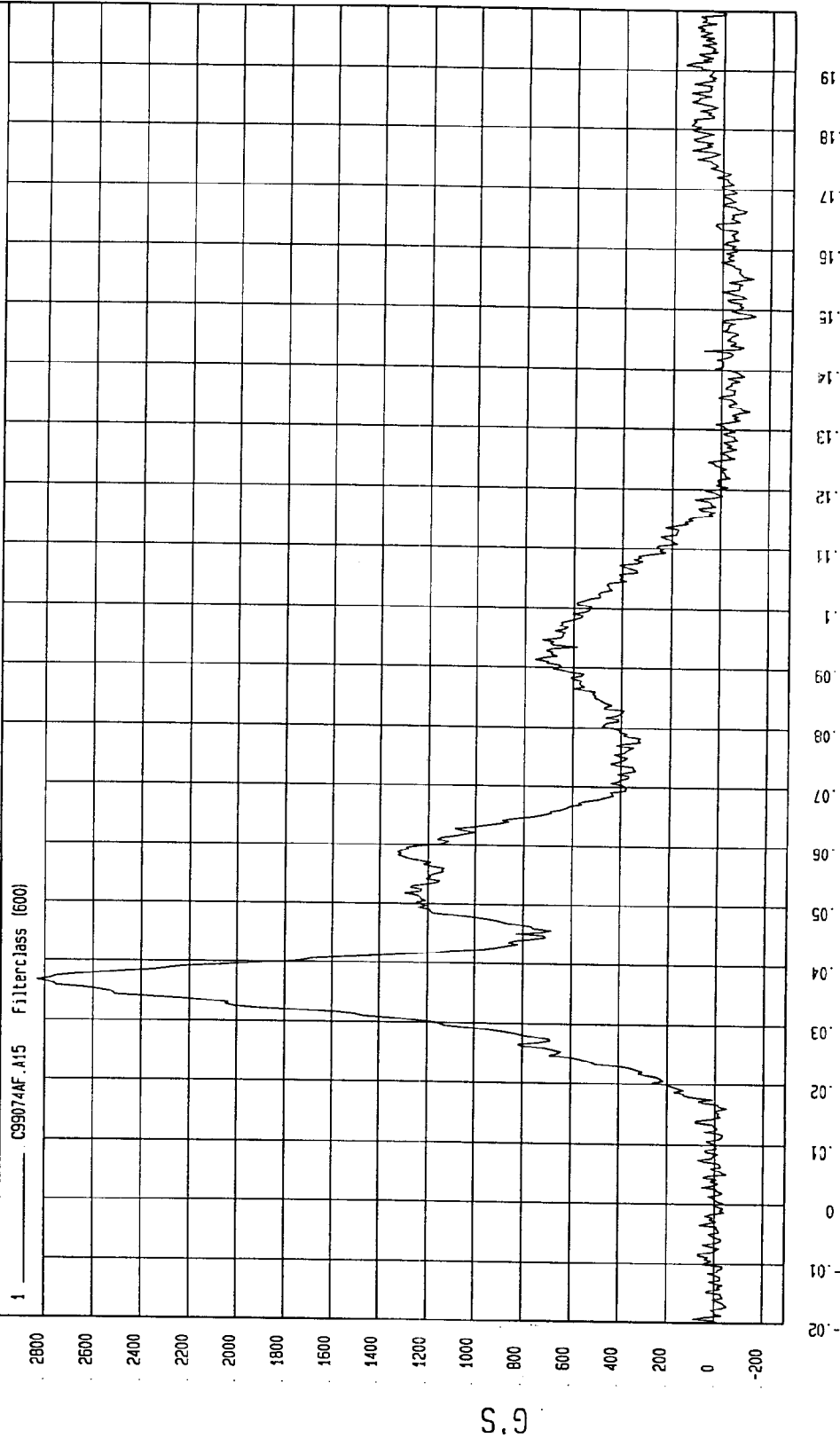
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -139.47 G'S at 149 msec

Maximum = 2830.1 G'S at 37 msec

DRIVER LEFT LOWER TIBIA FORCE Z



NSA Research  
08-18-2000 04:39

TIME (seconds)

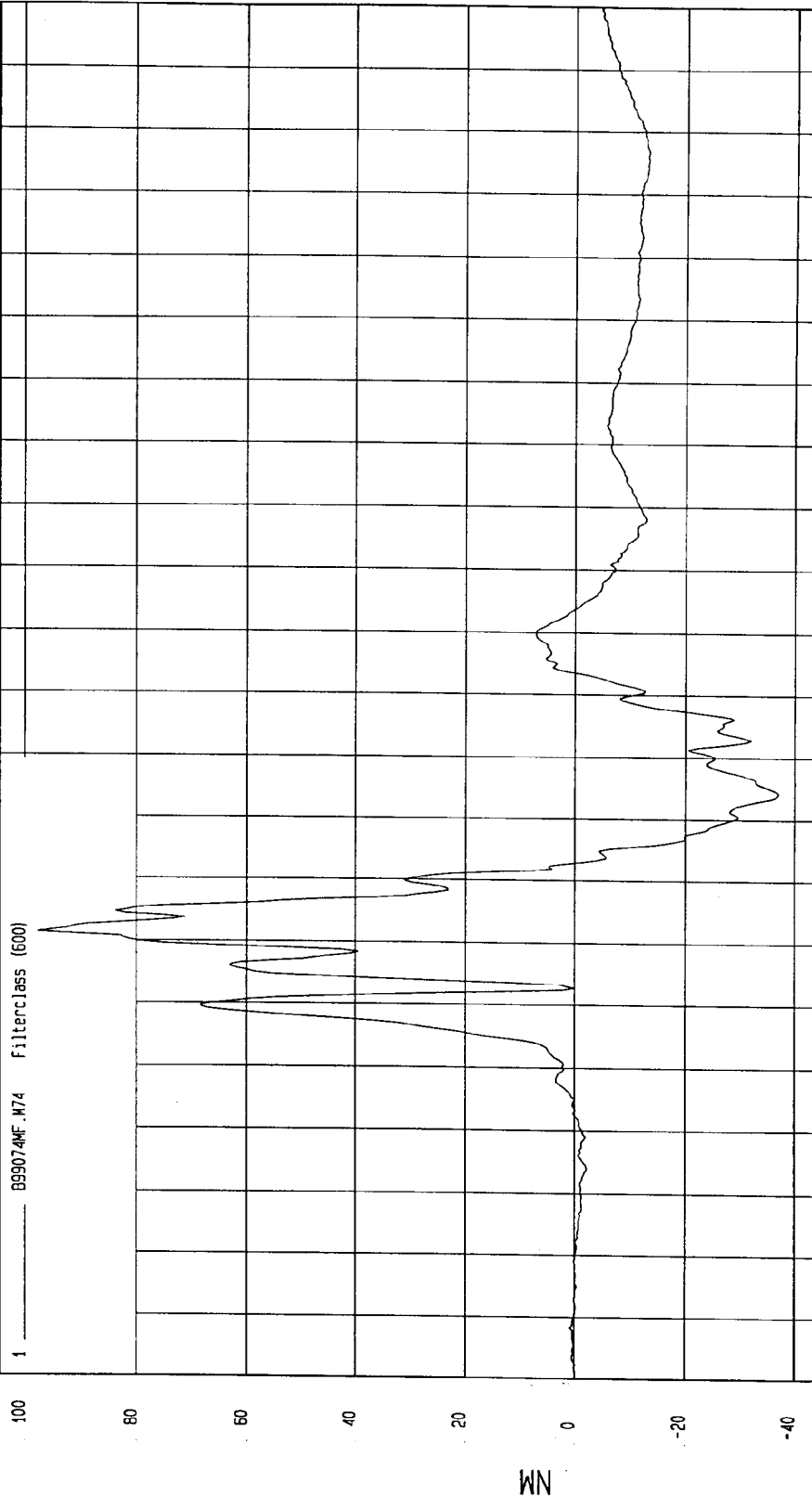
B-42

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -37.18 NM at 74 msec Maximum = 97.74 NM at 51 msec

DRIVER RIGHT UPPER TIBIA MOMENT X



Driver Right Upper Tibia Moment Y vs. Time  
No Valid Data Collected

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 7216.46 N at 43 msec

Minimum = -88.42 N at 183 msec

DRIVER RIGHT UPPER TIBIA FORCE Z

1 B99074MF.M77 Filterclass (600)



MGA Research  
08-19-2000 06:35

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

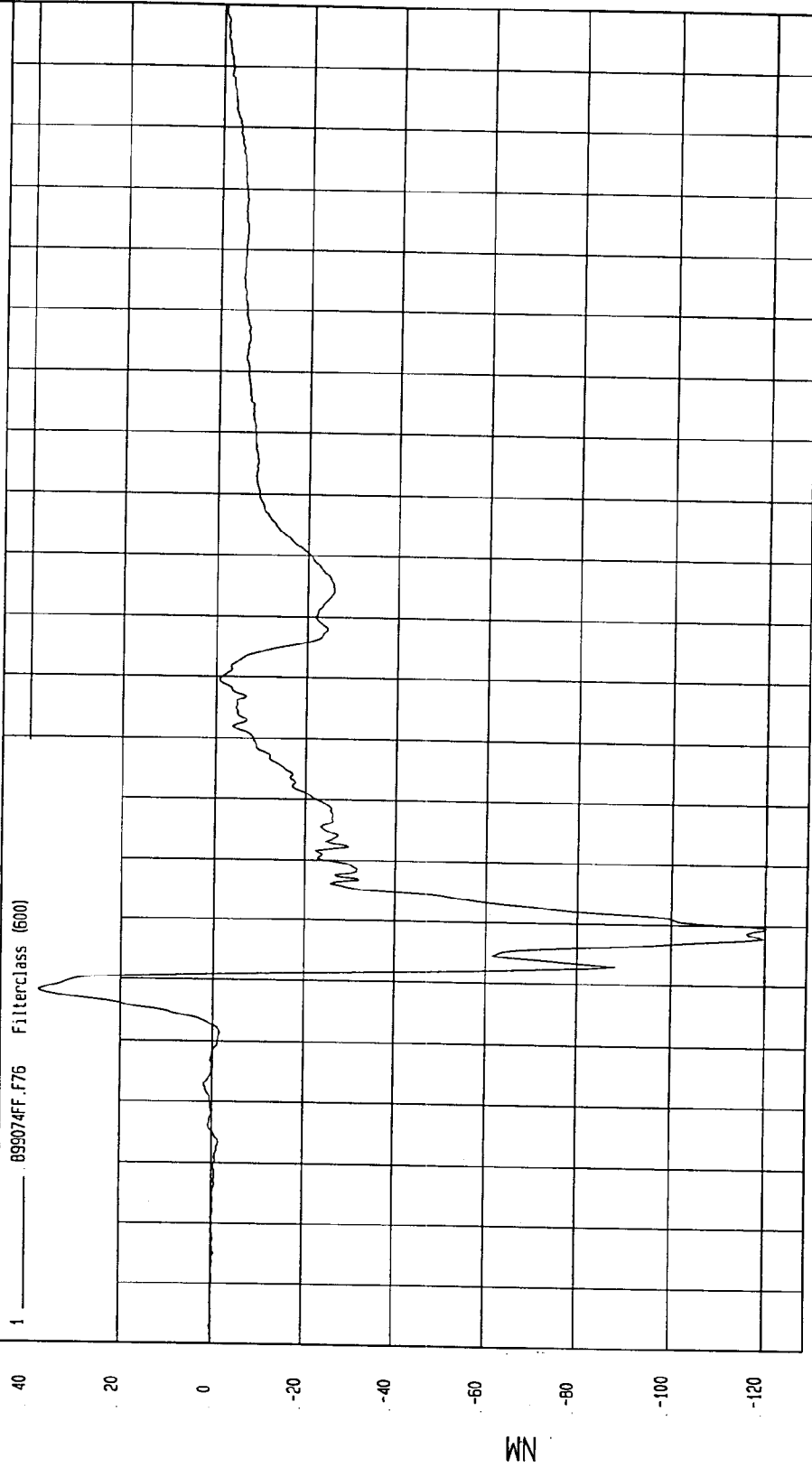
Speed: 35.1 MPH 56.5 KPH

Minimum = -120.7 NM at 50 msec

Maximum = 37.89 NM at 38 msec

DRIVER RIGHT LOWER TIBIA MOMENT X

1 ——— 895074FF.F76 FilterClass (600)



TIME (SECONDS)

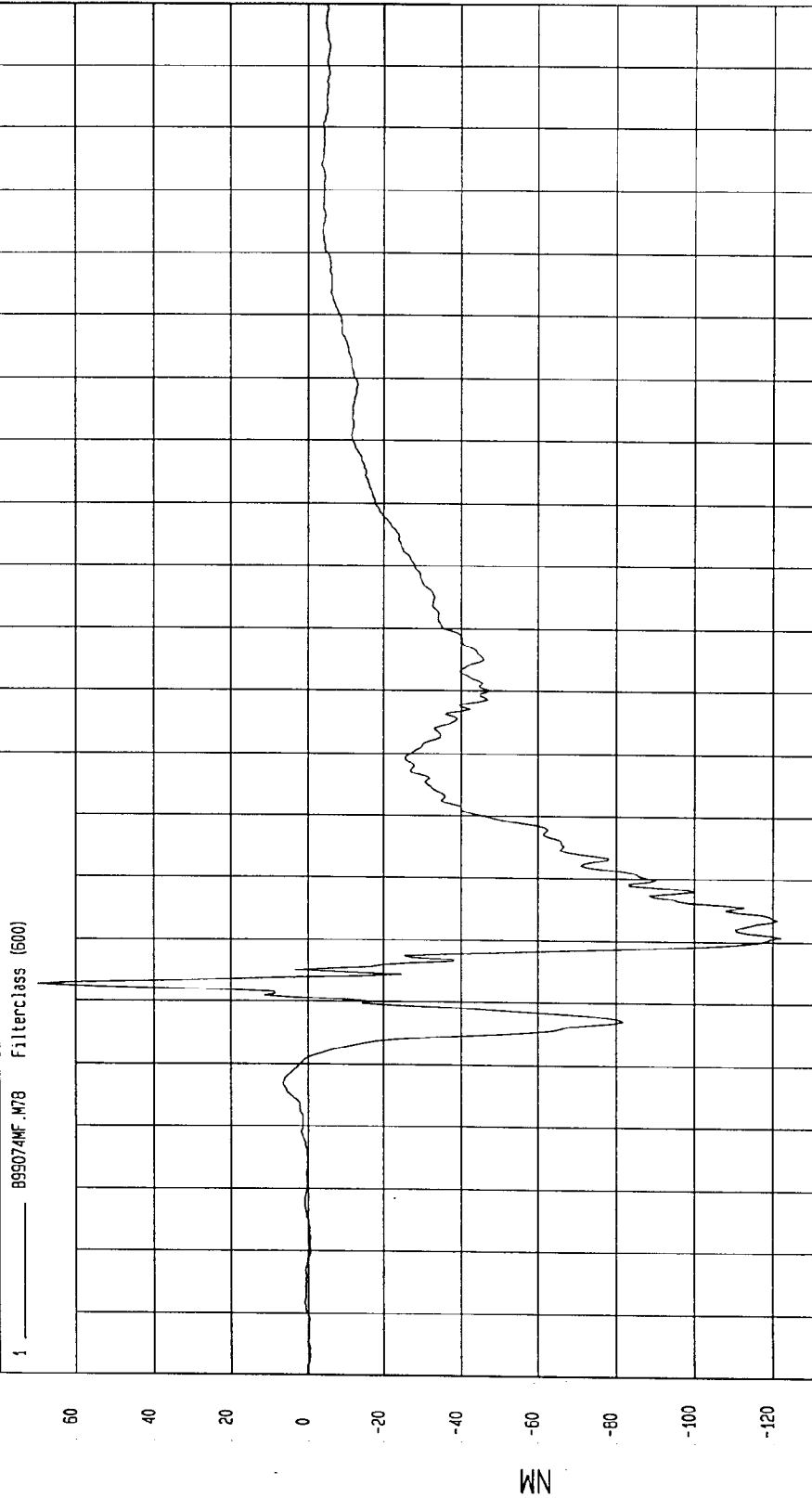
MGA Research  
08-19-2000 06:35

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -122.08 NM at 51 msec      Maximum = 69.83 NM at 43 msec

DRIVER RIGHT LOWER TIBIA MOMENT Y



TIME (SECONDS)

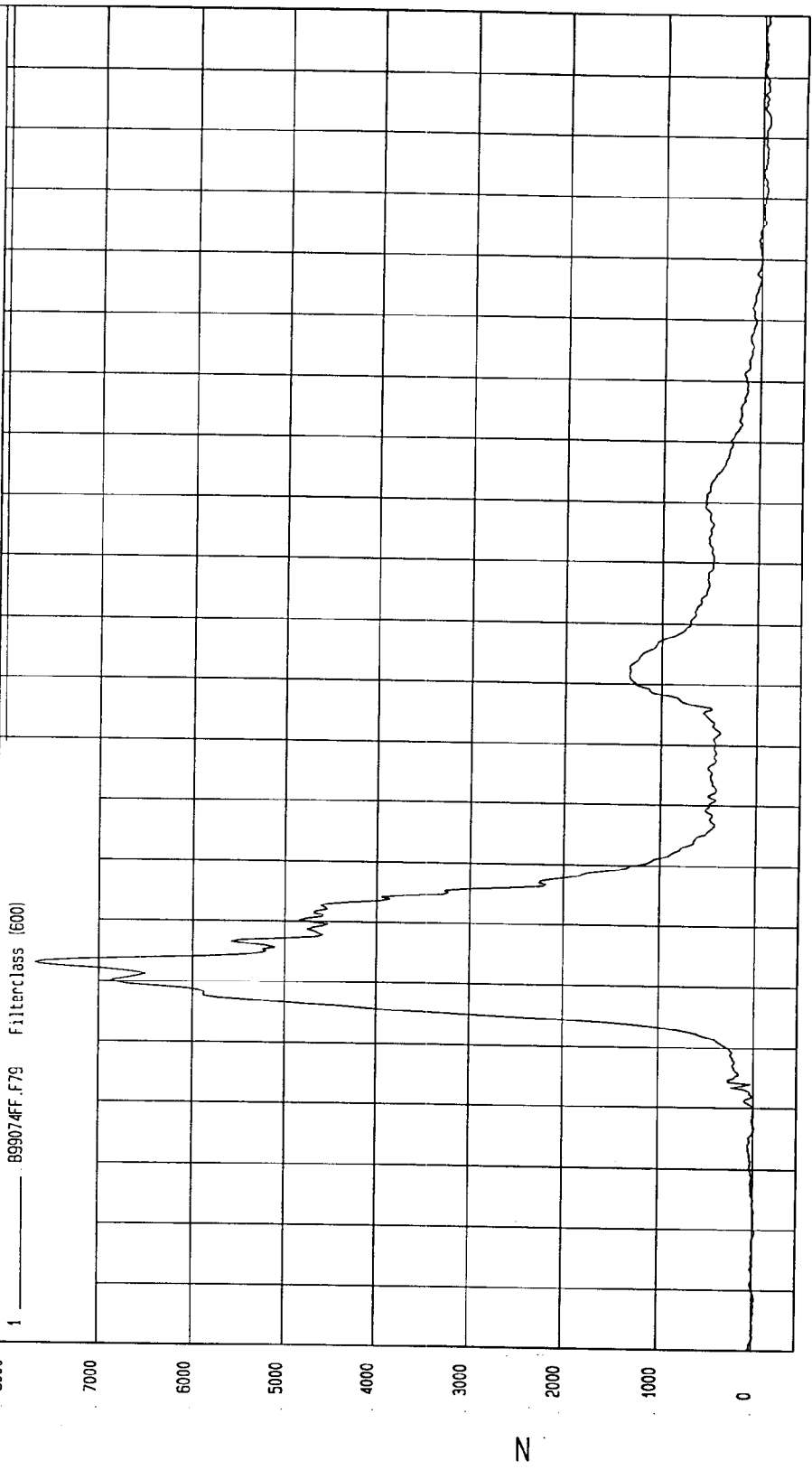
WCA Research  
08-17-2000 09:28

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

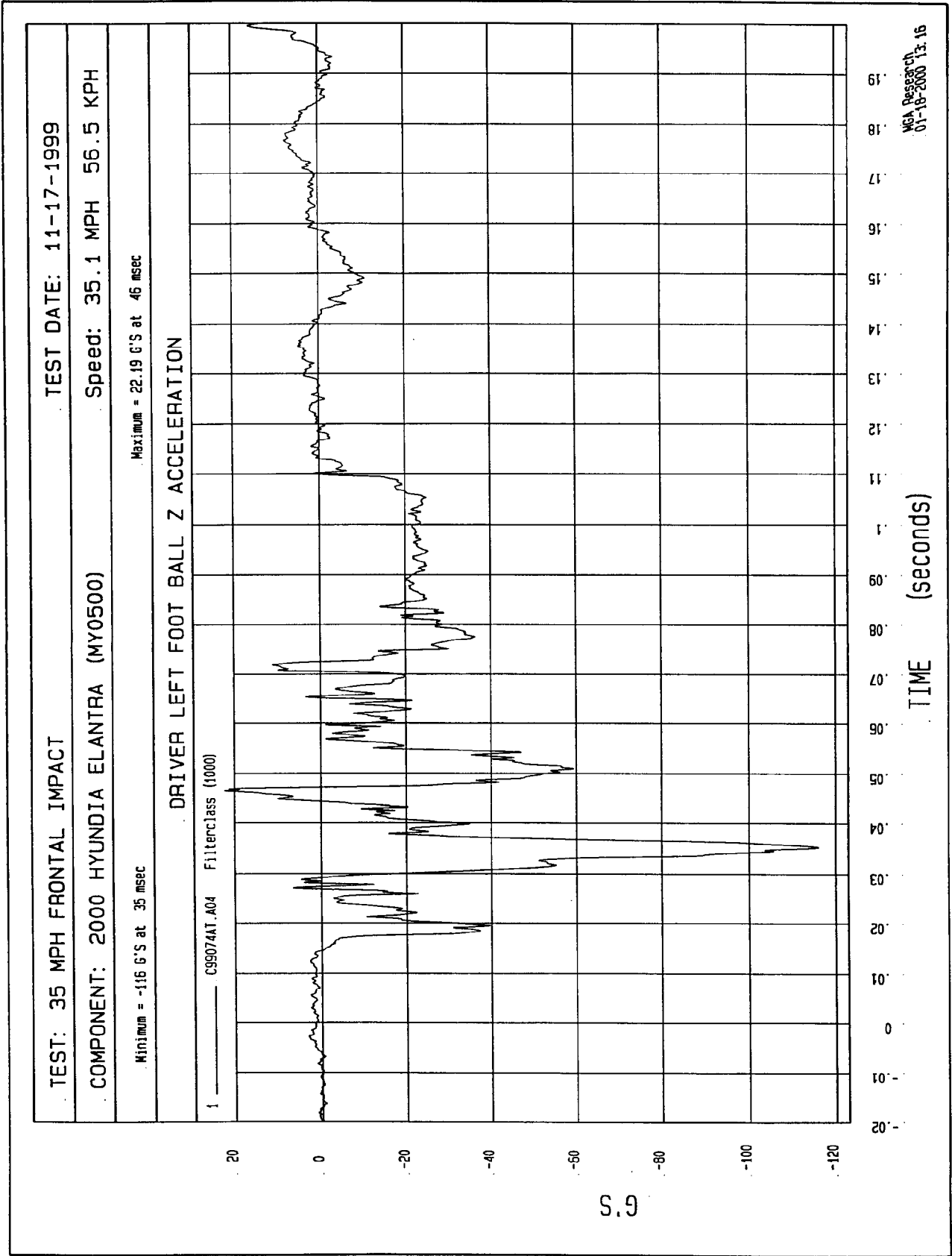
Minimum = -72.02 N at 182 msec      Maximum = 7684.33 N at 43 msec

DRIVER RIGHT LOWER TIBIA FORCE Z



TIME (SECONDS)

MCA Research  
08-17-2000 09:28



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

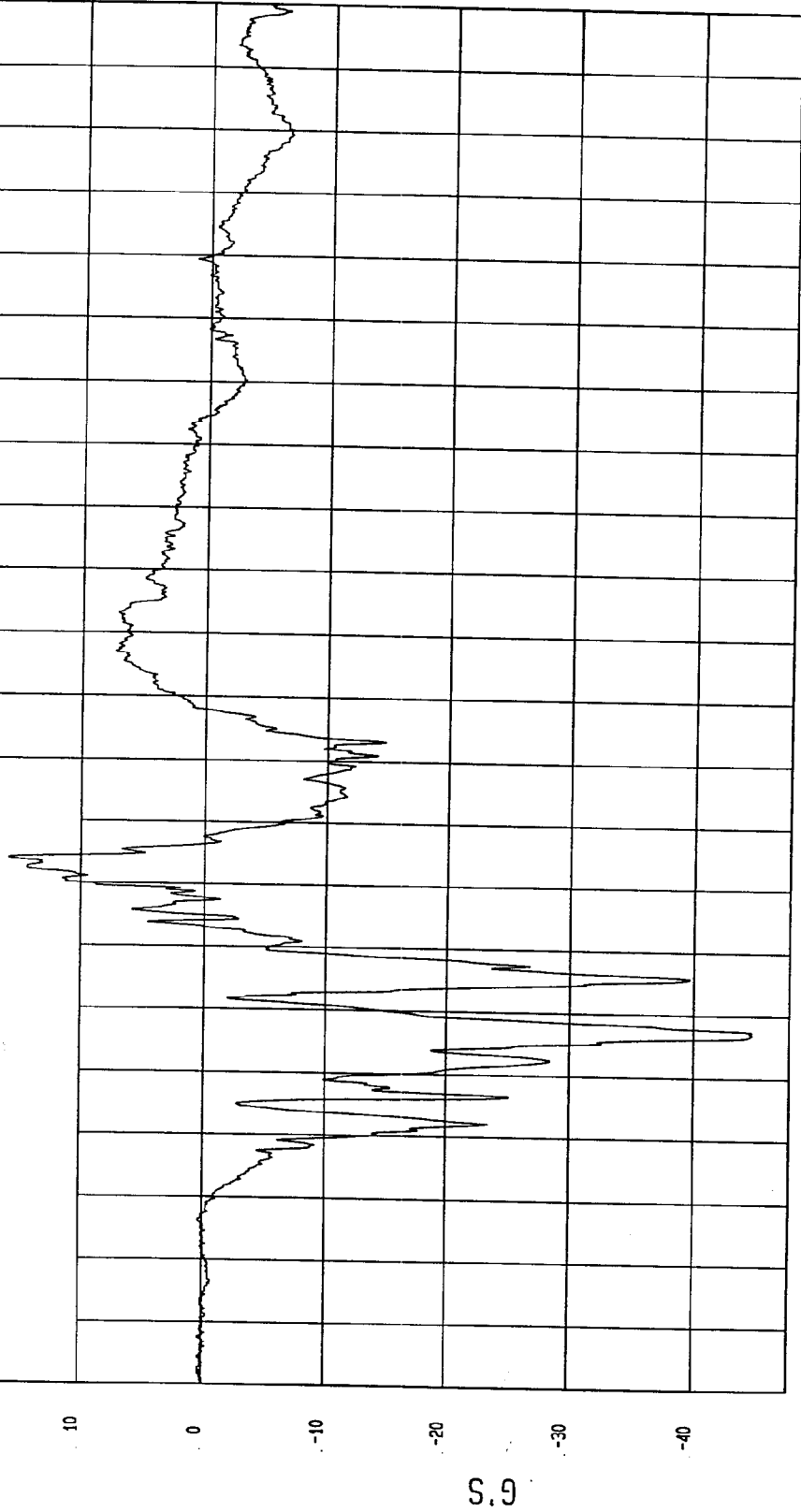
Speed: 35.1 MPH 56.5 KPH

Minimum = -44.59 G'S at 37 msec

Maximum = 15.85 G'S at 64 msec

DRIVER LEFT HEEL X ACCELERATION

1 C99074AT.A05 Filterclass (1000)



MGA Research  
01-18-2000 13:15

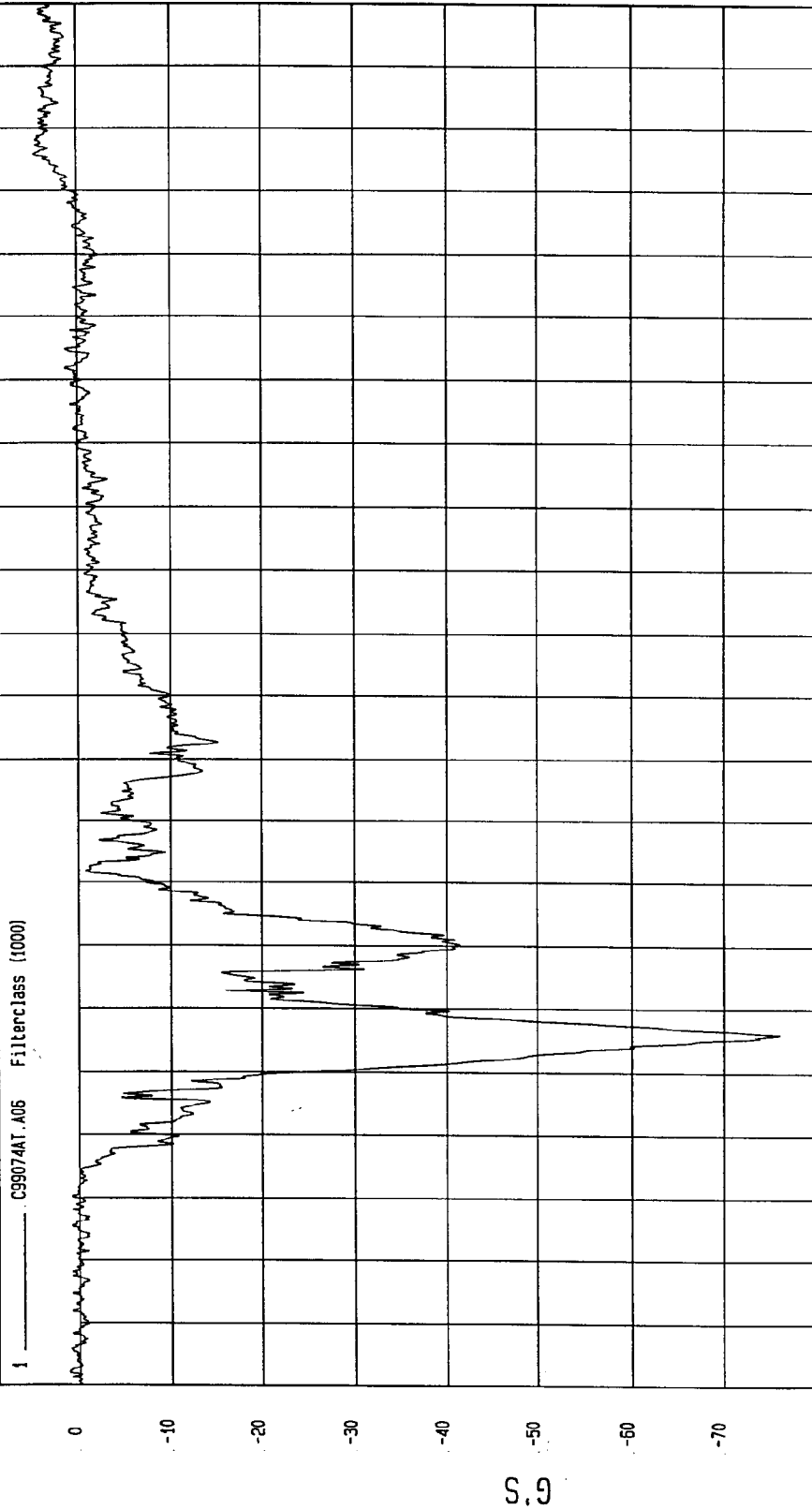
TIME (seconds)

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -75.9 G'S at 36 msec      Maximum = 4.57 G'S at 176 msec

DRIVER LEFT HEEL Z ACCELERATION



NCA Research  
01-18-2000 13.16

TIME (seconds)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

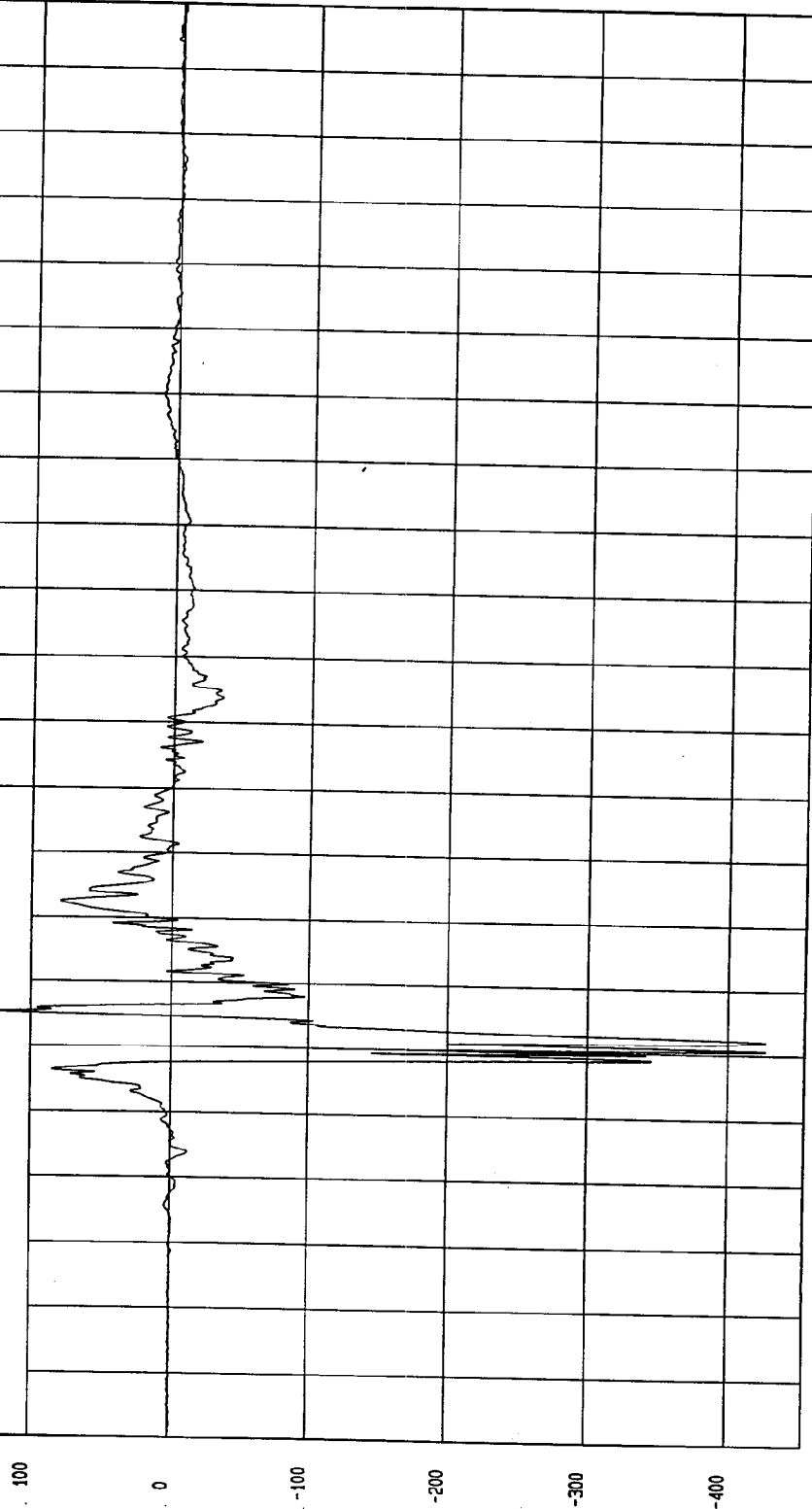
Speed: 35.1 MPH 56.5 KPH

Minimum = -426.64 G'S at 41 msec

Maximum = 125.47 G'S at 45 msec

DRIVER RIGHT FOOT BALL Z ACCELERATION

1 C99074AT.A01 Filterclass (1000)



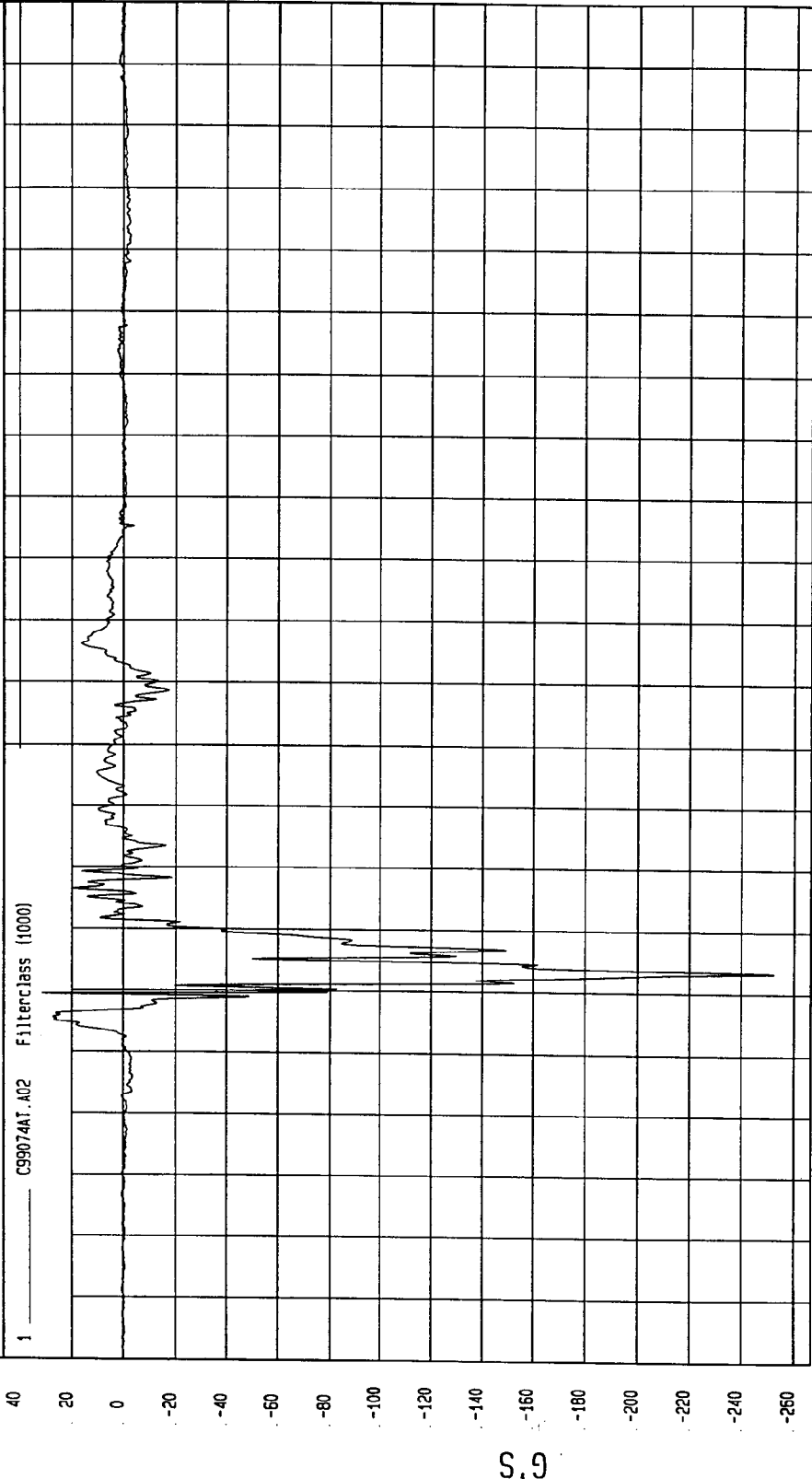
WSA Research  
01-18-2000 13:15

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -252.39 G'S at 43 msec Maximum = 31.55 G'S at 39 msec

DRIVER RIGHT HEEL X ACCELERATION



TIME (seconds)

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

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

G's

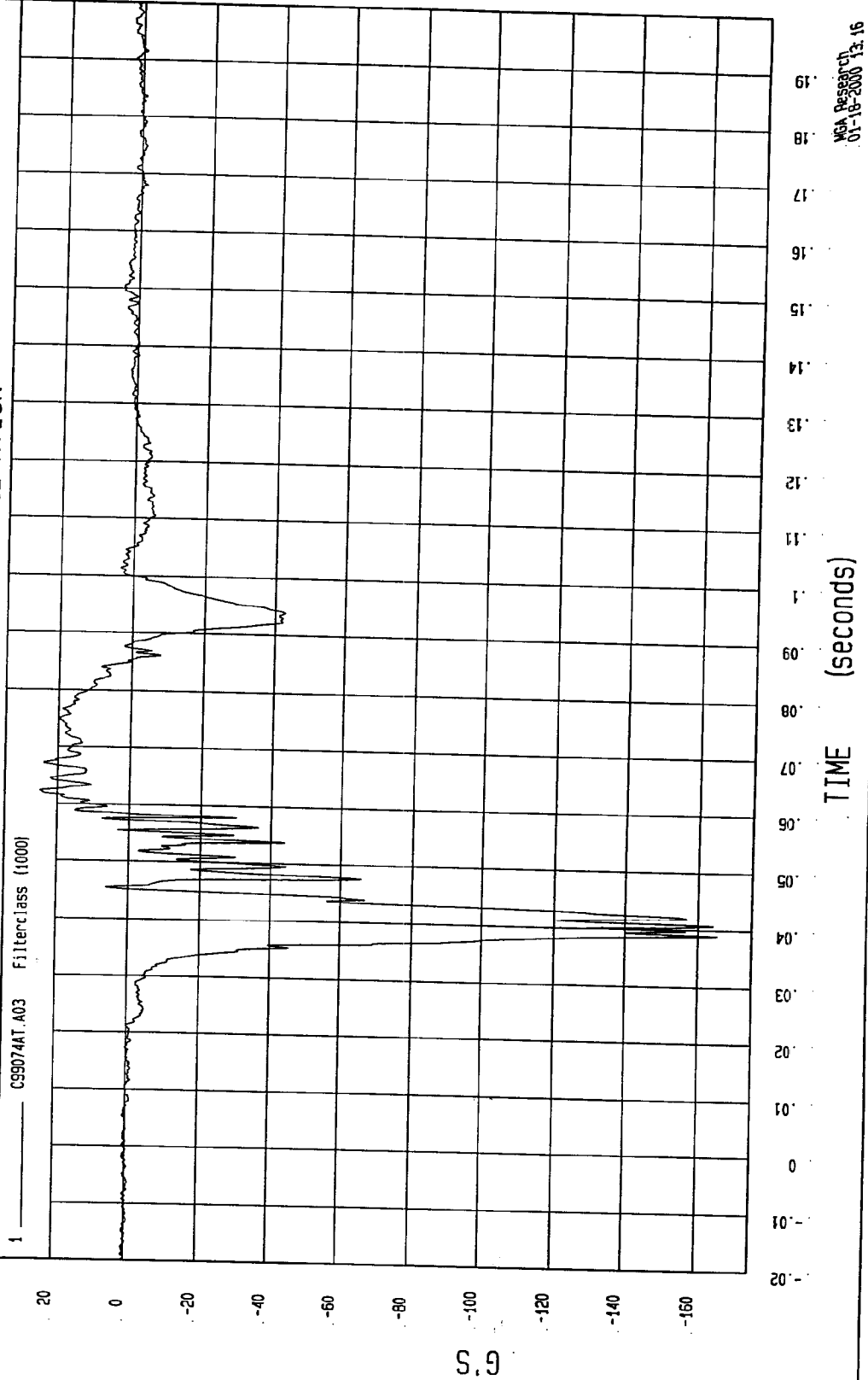
NCA Research  
01-18-2000 13:15

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -165.24 G'S at 39 msec Maximum = 24.82 G'S at 62 msec

DRIVER RIGHT HEEL Z ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

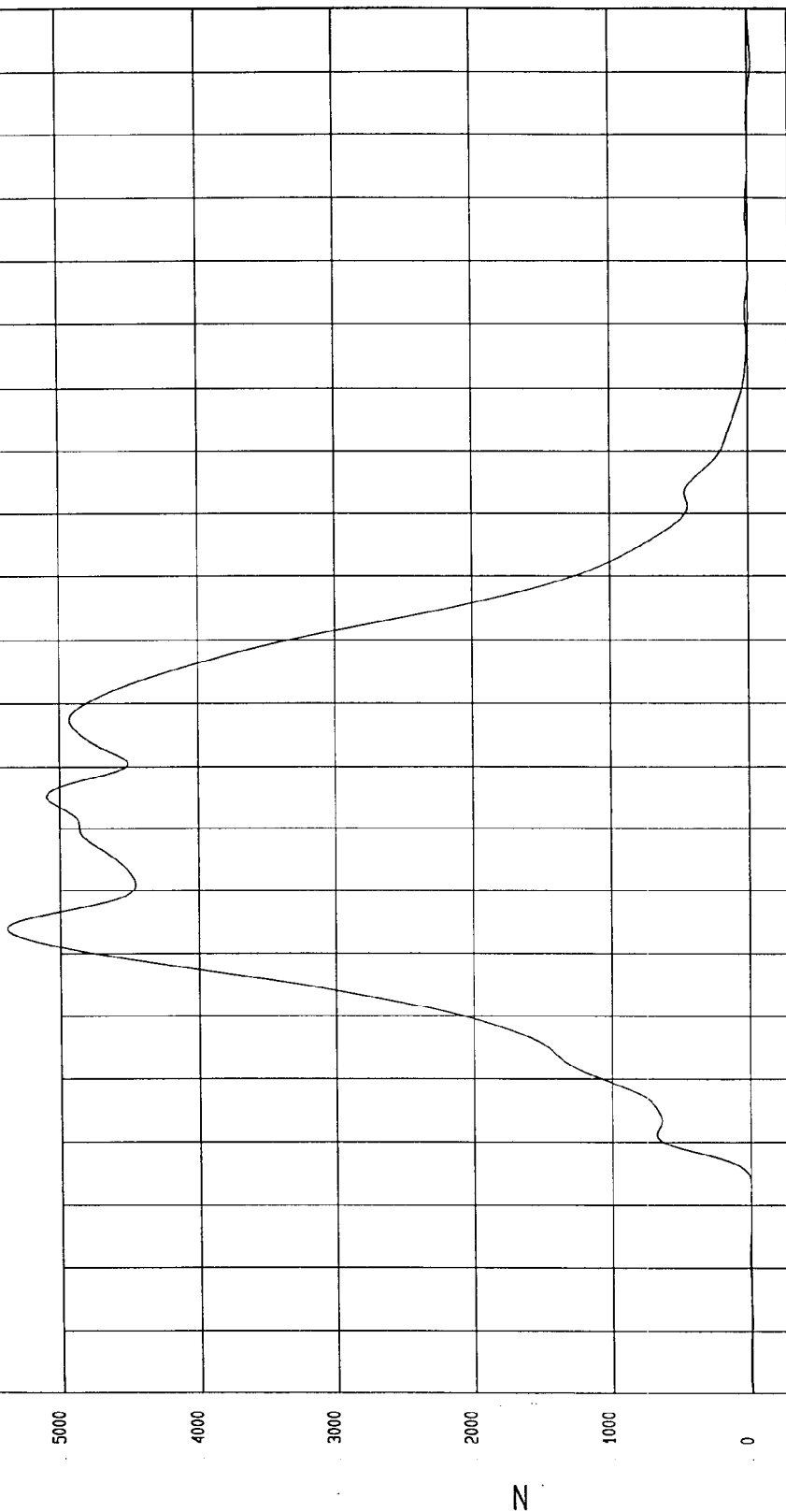
Speed: 35.1 MPH 56.5 KPH

Minimum = -25.41 N at .191 msec

Maximum = 5386.5 N at .54 msec

DRIVER SHOULDER BELT FORCE

1 ——— B99074FF.F60 Filterclass (60)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

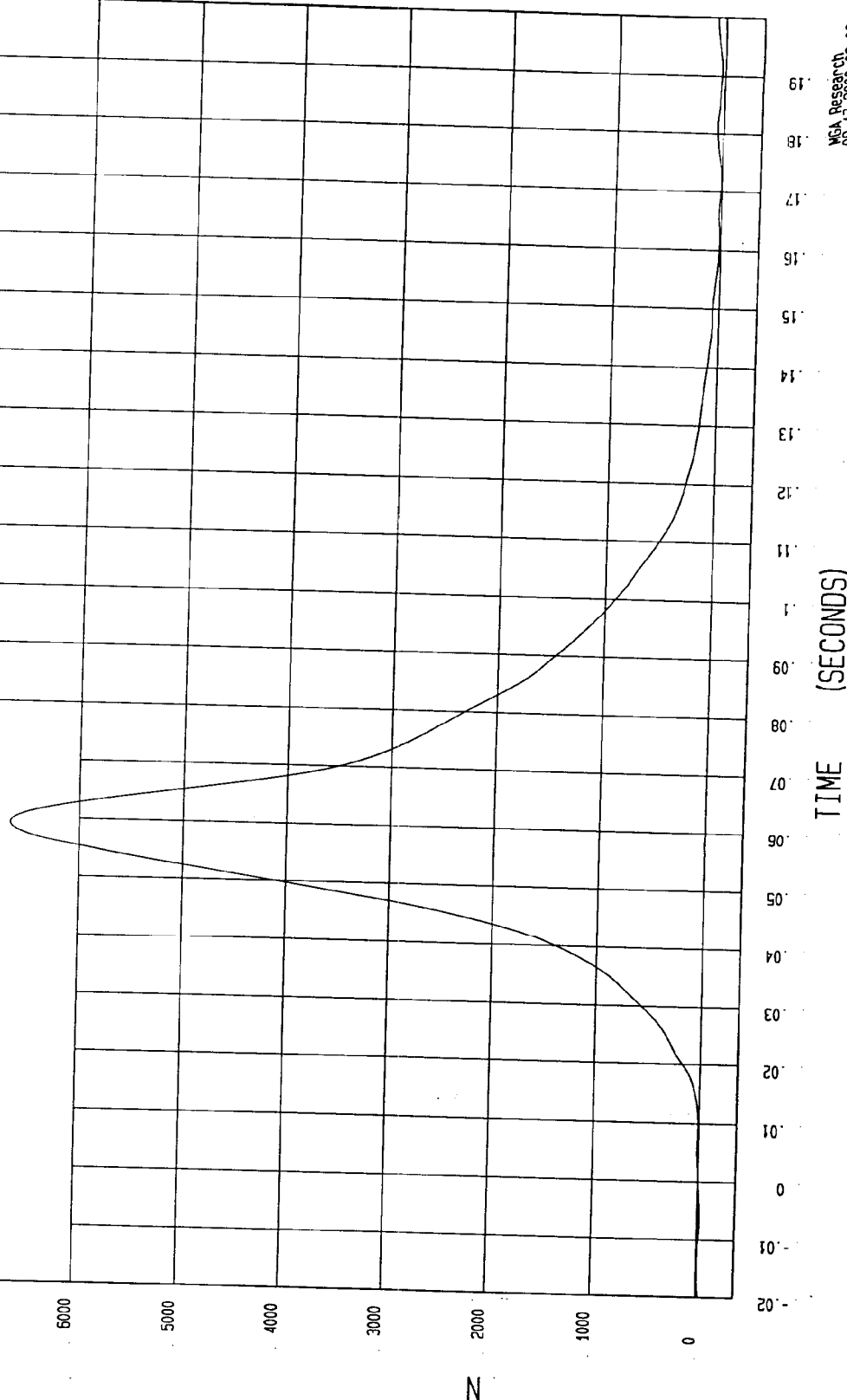
Speed: 35.1 MPH 56.5 KPH

Minimum = -19.89 N at -20 msec

Maximum = 6646.93 N at 59 msec

DRIVER LAP BELT FORCE

1 899074FF.F61 Filterclass (60)



MCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

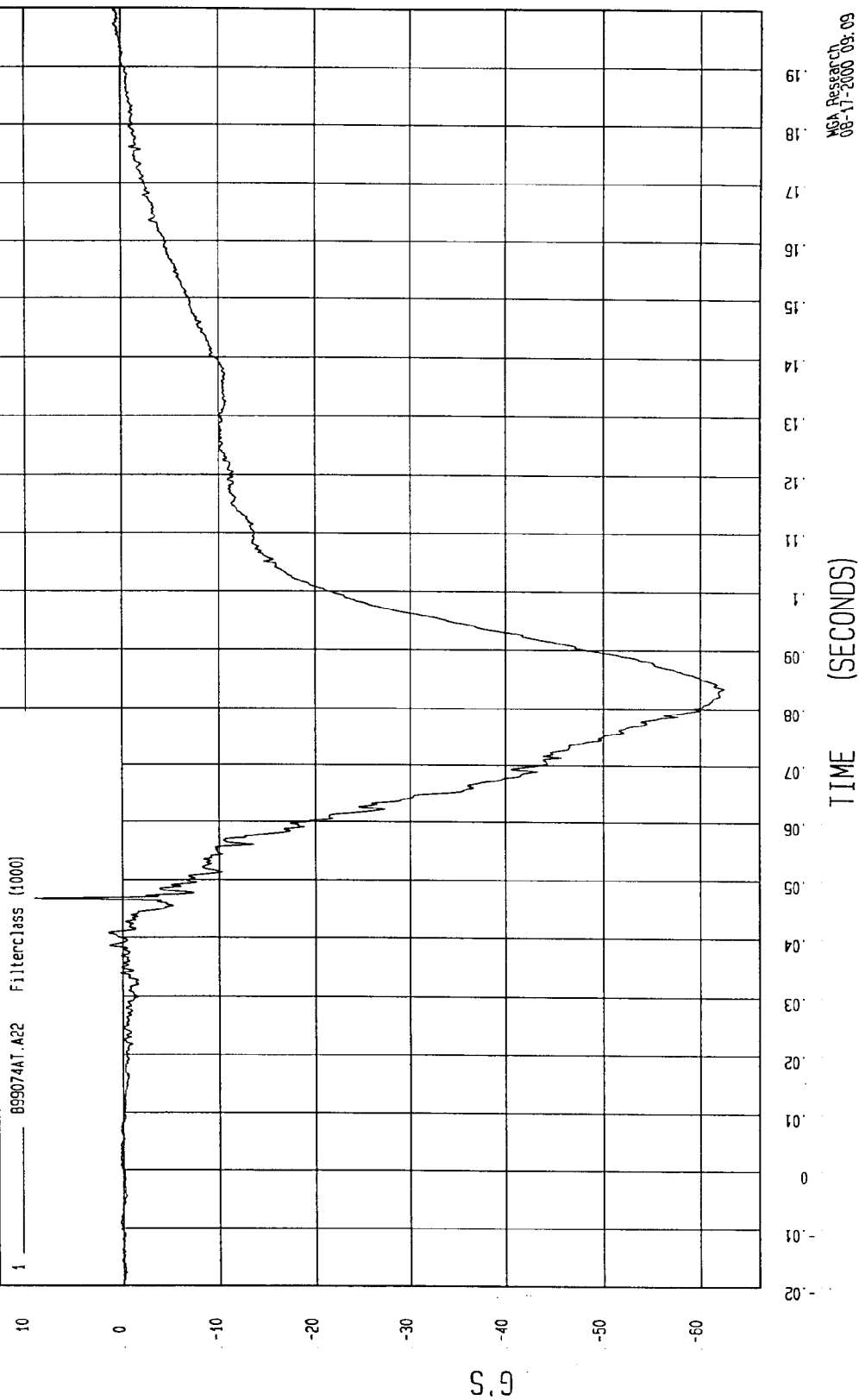
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -62.55 G'S at 84 msec

Maximum = 9.19 G'S at 47 msec

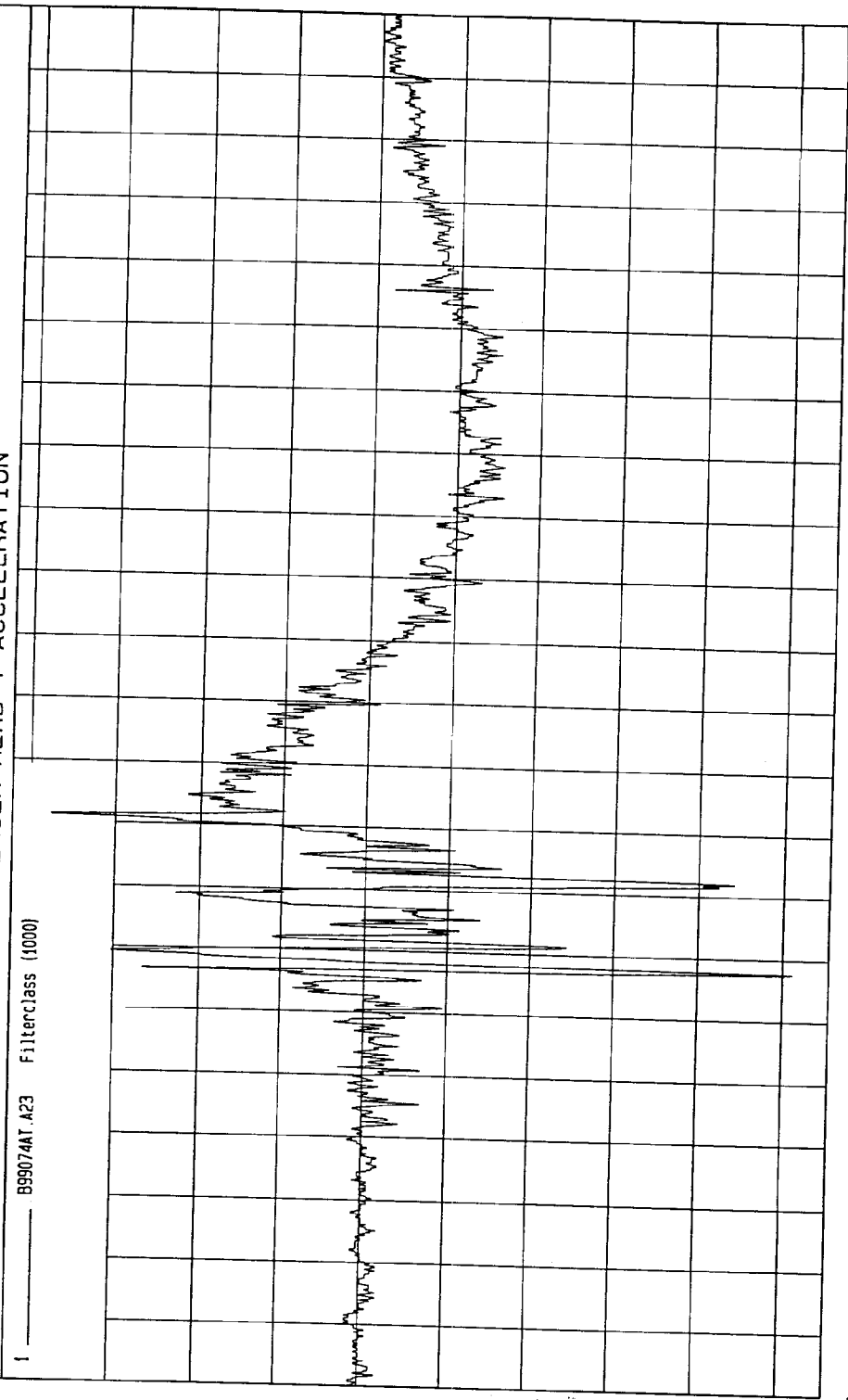
PASSENGER HEAD X ACCELERATION



TEST: 35 MPH FRONTAL IMPACT  
TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)  
Speed: 35.1 MPH 56.5 KPH  
Minimum = -10.22 G'S at 48 msec  
Maximum = 7.53 G'S at 71 msec

PASSENGER HEAD Y ACCELERATION

1 B99074AT.A23 Filterclass (1000)



MSC Research  
08-11-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

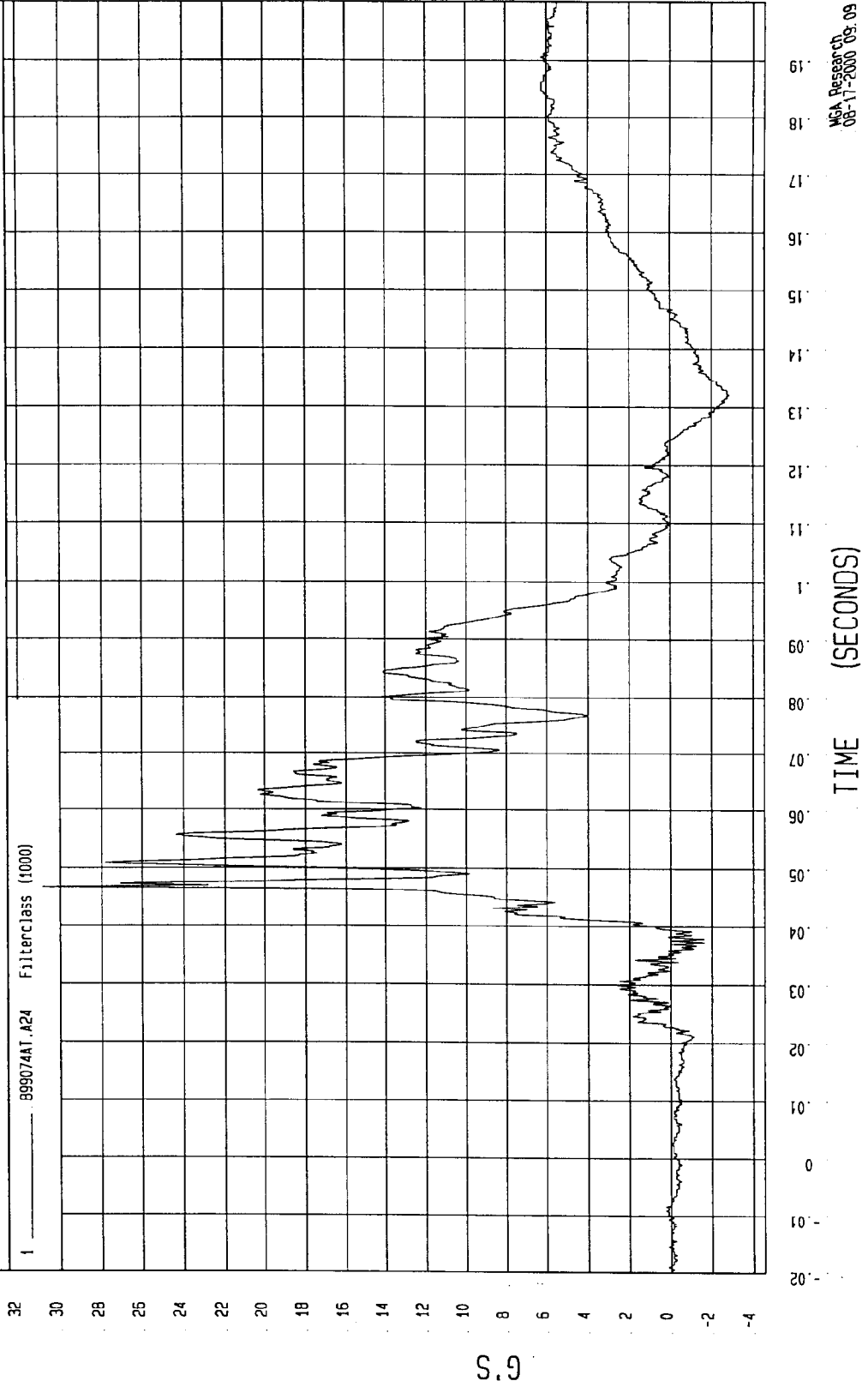
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -2.88 G'S at 132 msec

Maximum = 30.83 G'S at 47 msec

PASSENGER HEAD Z ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

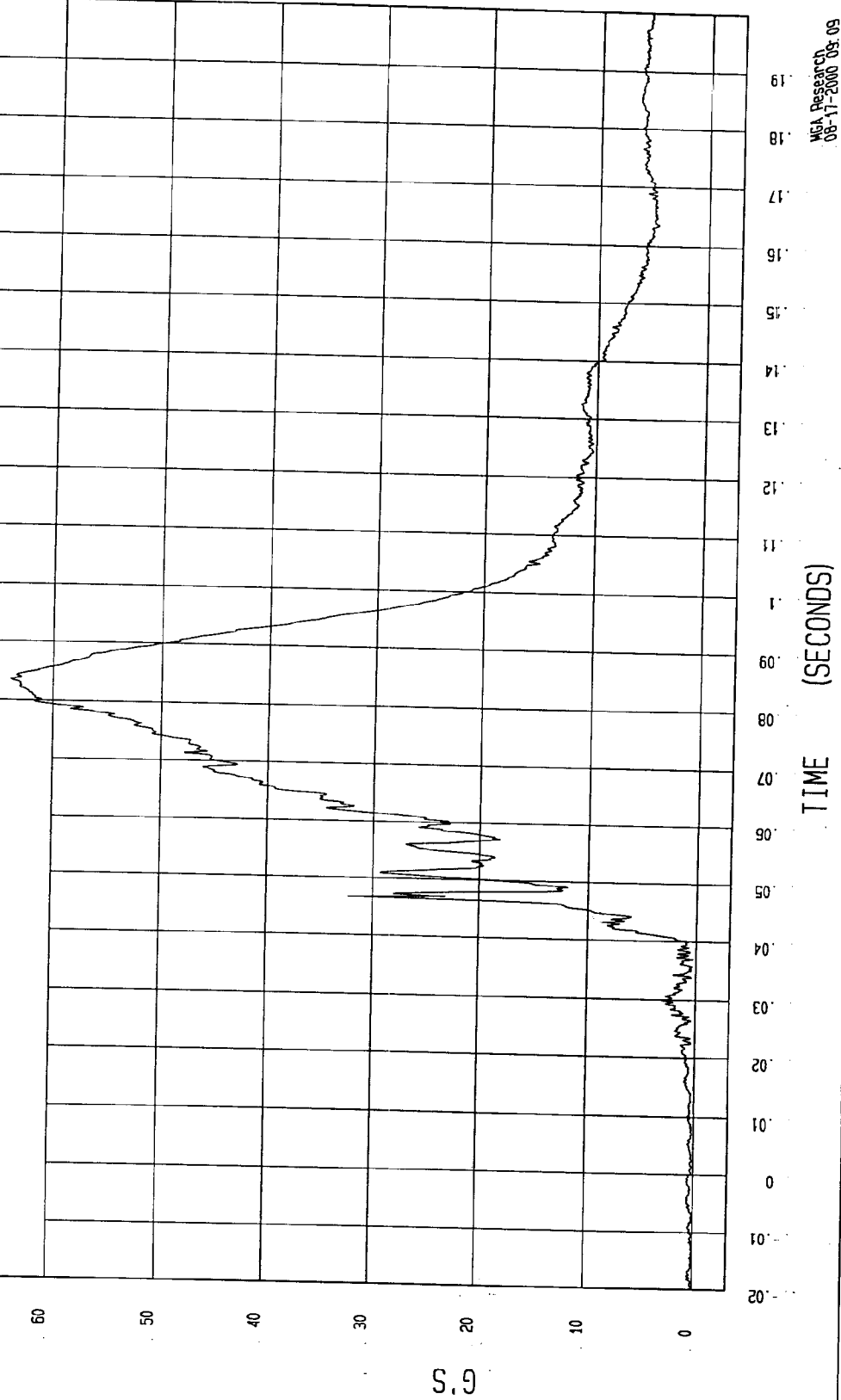
Speed: 35.1 MPH 56.5 KPH

Minimum = .04 G'S at .16 msec

Maximum = 63.88 G'S at .84 msec

PASSENGER HEAD RESULTANT ACCELERATION

1 ——— 899074AV.A22 Filterclass (1000)



MCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

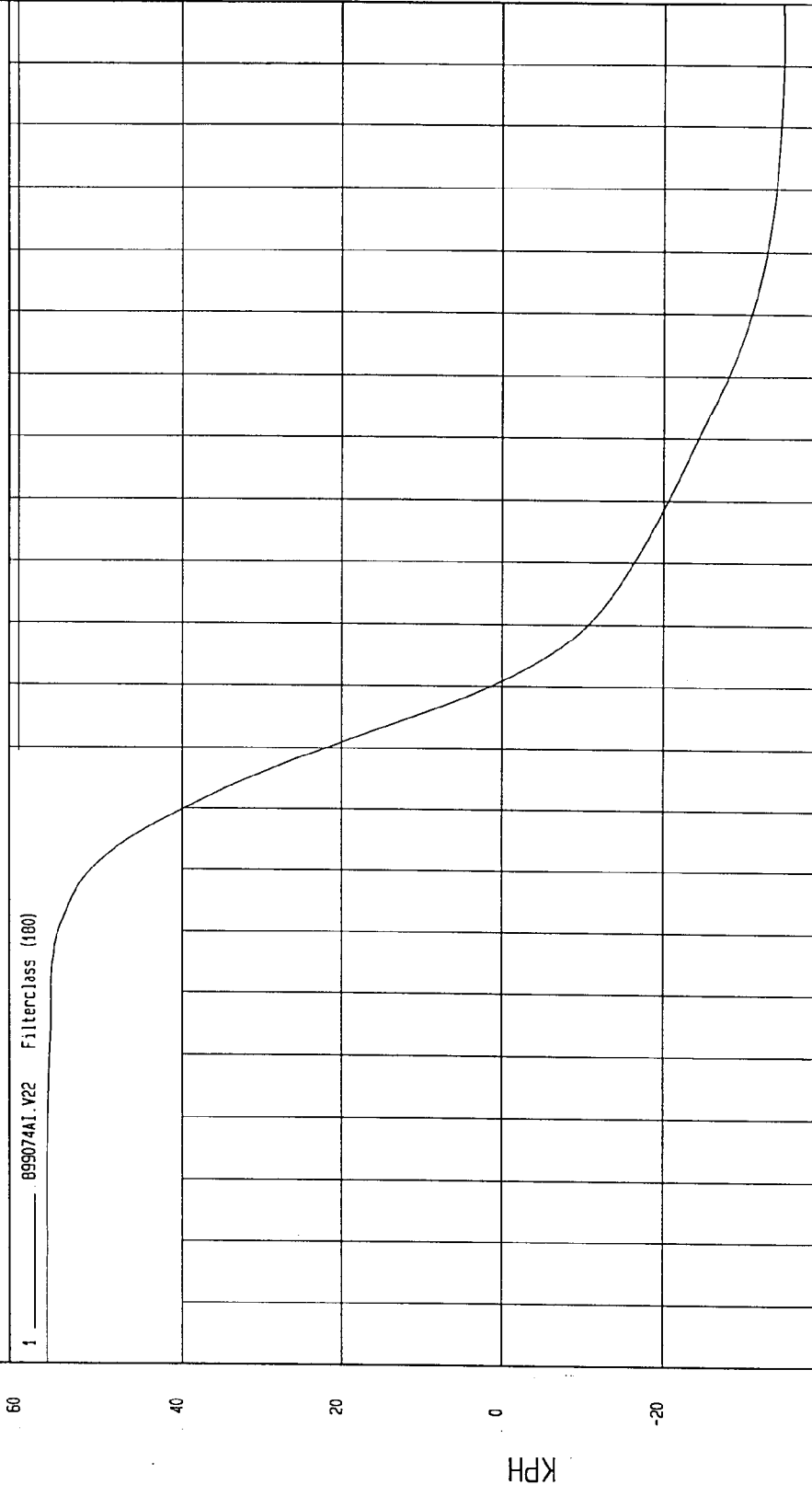
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -34.69 KPH at 193 msec

Maximum = 56.6 KPH at -20 msec

PASSENGER HEAD X VELOCITY



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

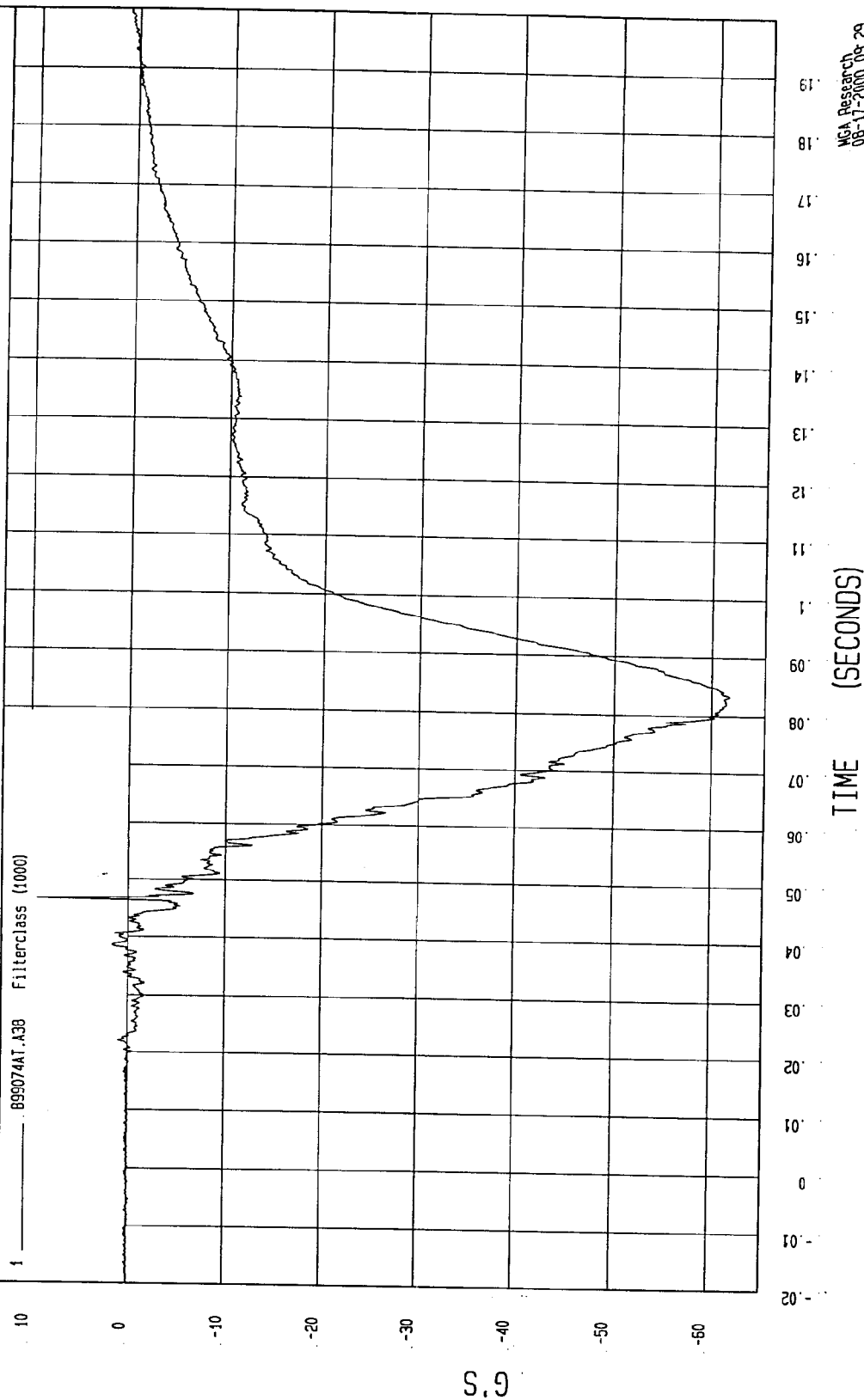
Speed: 35.1 MPH 56.5 KPH

Minimum = -61.84 G'S at 63 msec

Maximum = 9.35 G'S at 47 msec

PASSENGER HEAD REDUNDANT X ACCELERATION

1 ——— B99074AT.A38 Filterclass (1000)

WCA Research  
08-17-2000 09:29

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

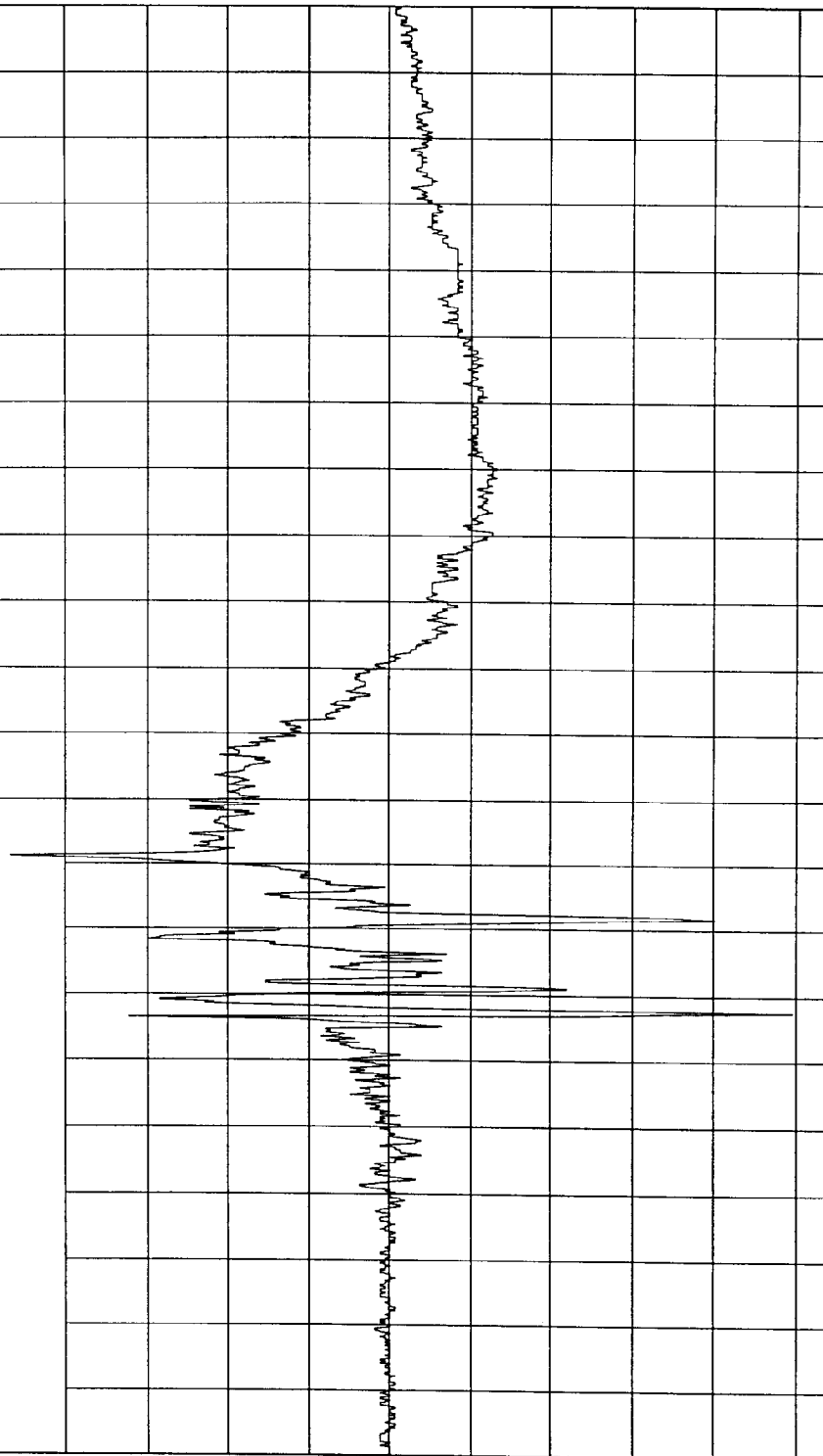
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -9.91 G'S at 48 msec Maximum = 9.34 G'S at 71 msec

PASSENGER HEAD REDUNDANT Y ACCELERATION

1 B99074AT.A39 Filterclass (1000)

G.S



TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -3.17 G'S at 131 msec

Maximum = 30.52 G'S at 47 msec

PASSENGER HEAD REDUNDANT Z ACCELERATION

1 B99074AT.A40 Filterclass (1000)

32

30

28

26

24

22

20

18

16

14

12

10

8

6

4

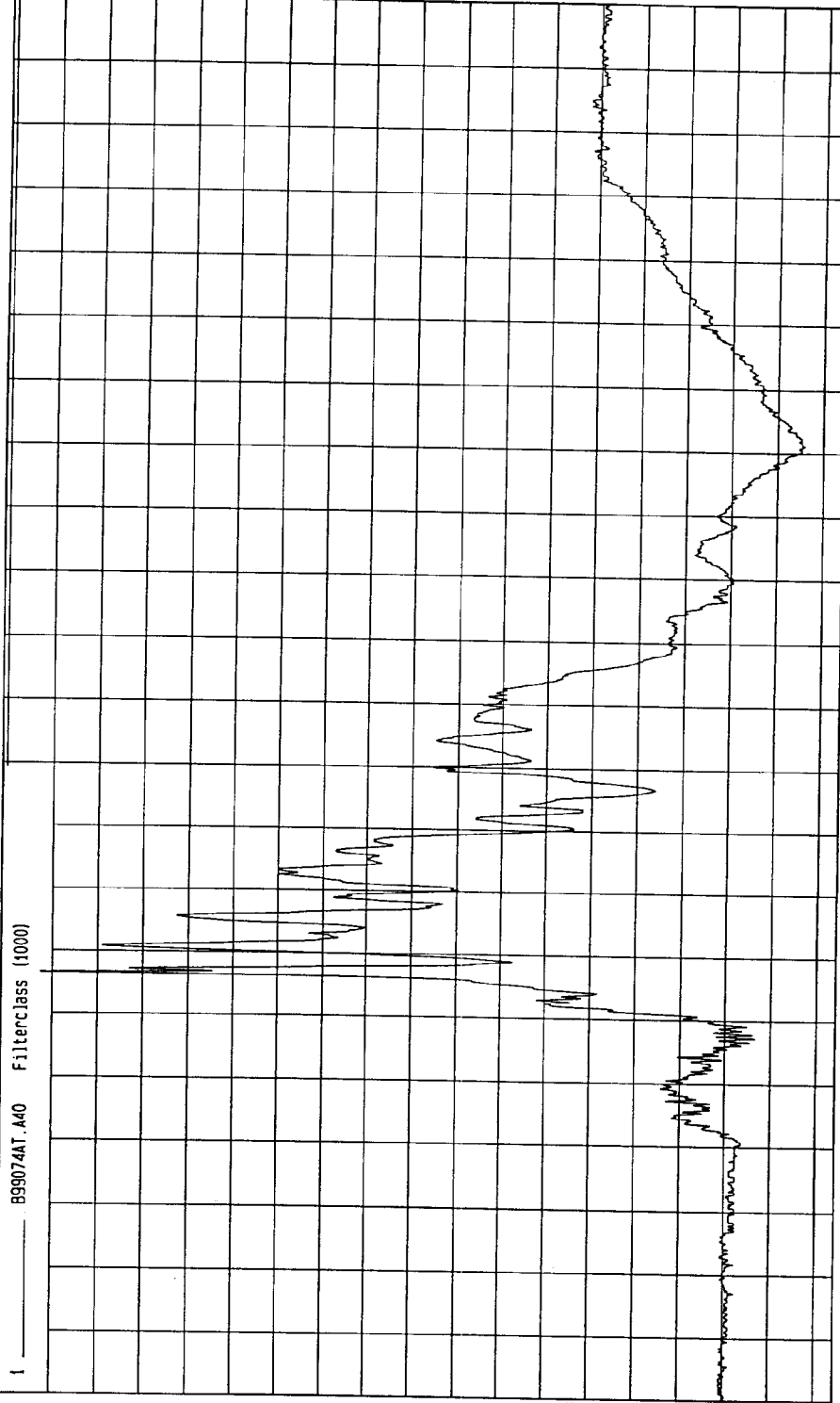
2

0

-2

-4

G.S



TIME (SECONDS)

MGA Research  
08-17-2000 09:29

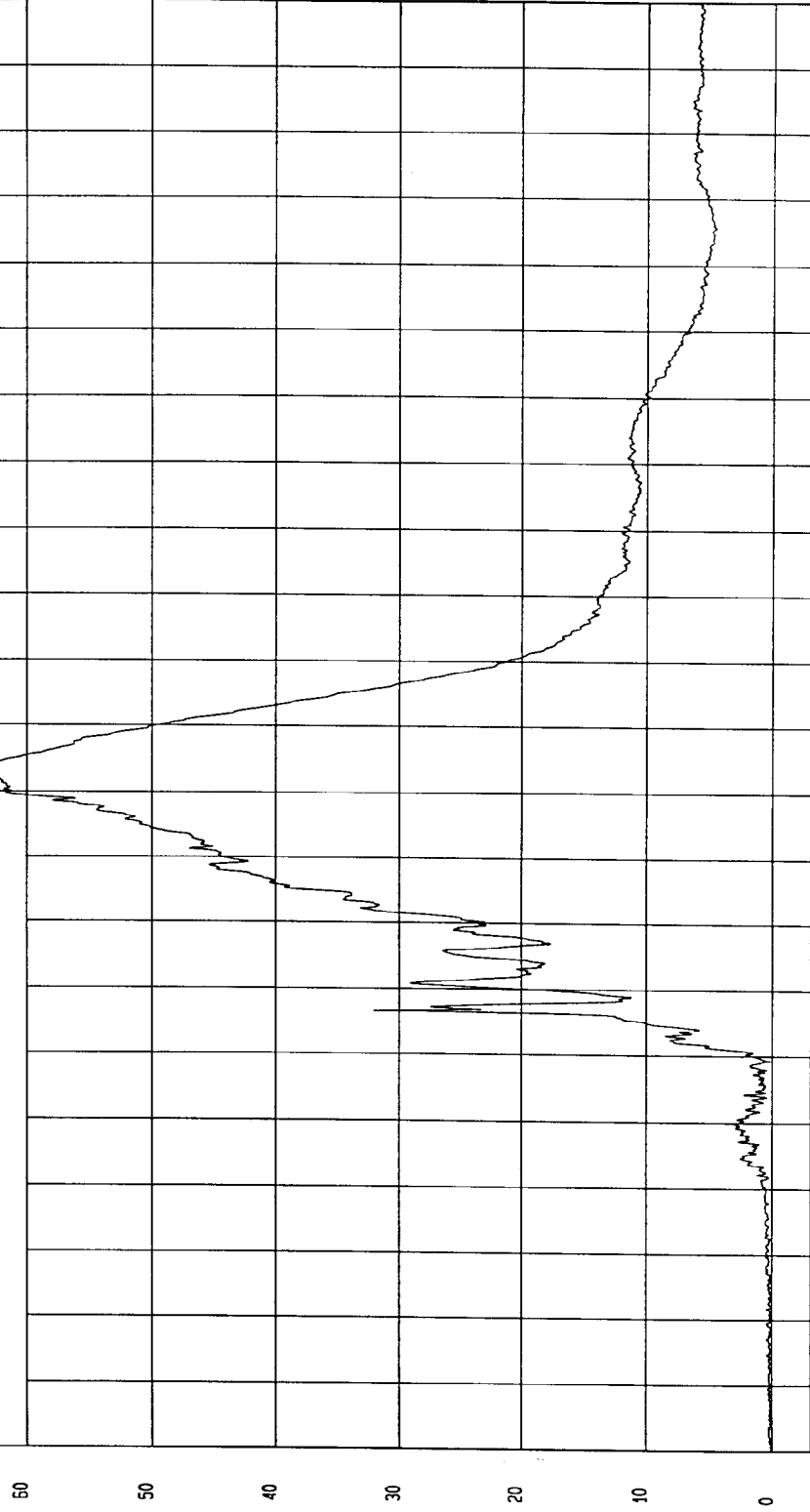
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = 6.12E-02 G'S at -20 msec  
Maximum = 63.03 G'S at 83 msec

PASSENGER HEAD REDUNDANT RESULTANT ACCELERATION

1 B99074AV A38 Filterclass (1000)



NCA Research  
08-17-2000 09:23

TIME (SECONDS)

G'S

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -33.8 KPH at 192 msec

Maximum = 56.67 KPH at 23 msec

PASSENGER HEAD REDUNDANT X VELOCITY

1 899074A1.V38 Filterclass (180)

60

50

40

30

20

10

0

-10

-20

-30

KPH

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME Seconds

MCA Research  
08-17-2000 11:03

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

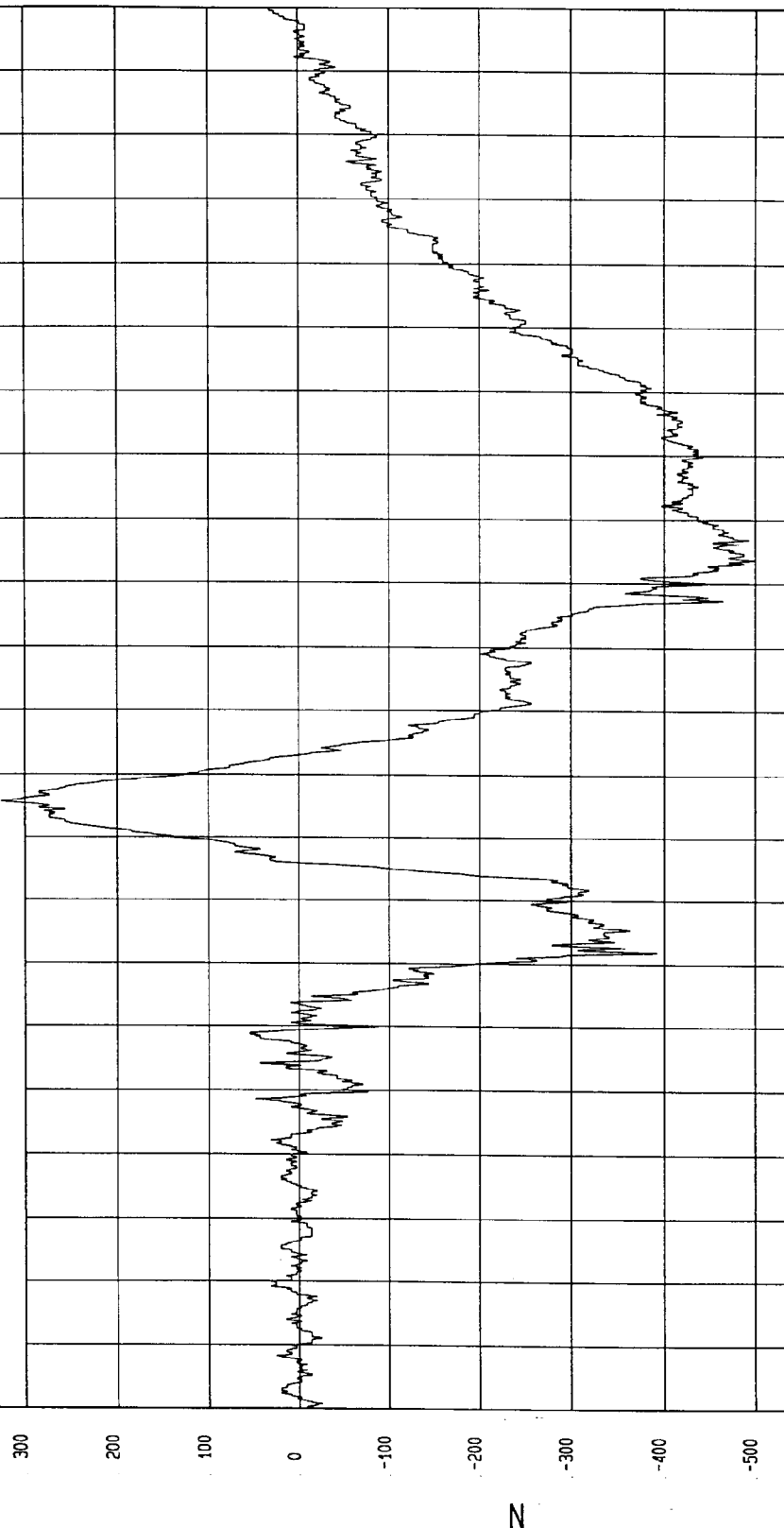
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 324.97 N at 76 msec

Minimum = -499.02 N at 114 msec

PASSENGER NECK FORCE X

1 899074FT.F51 Filterclass (1000)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

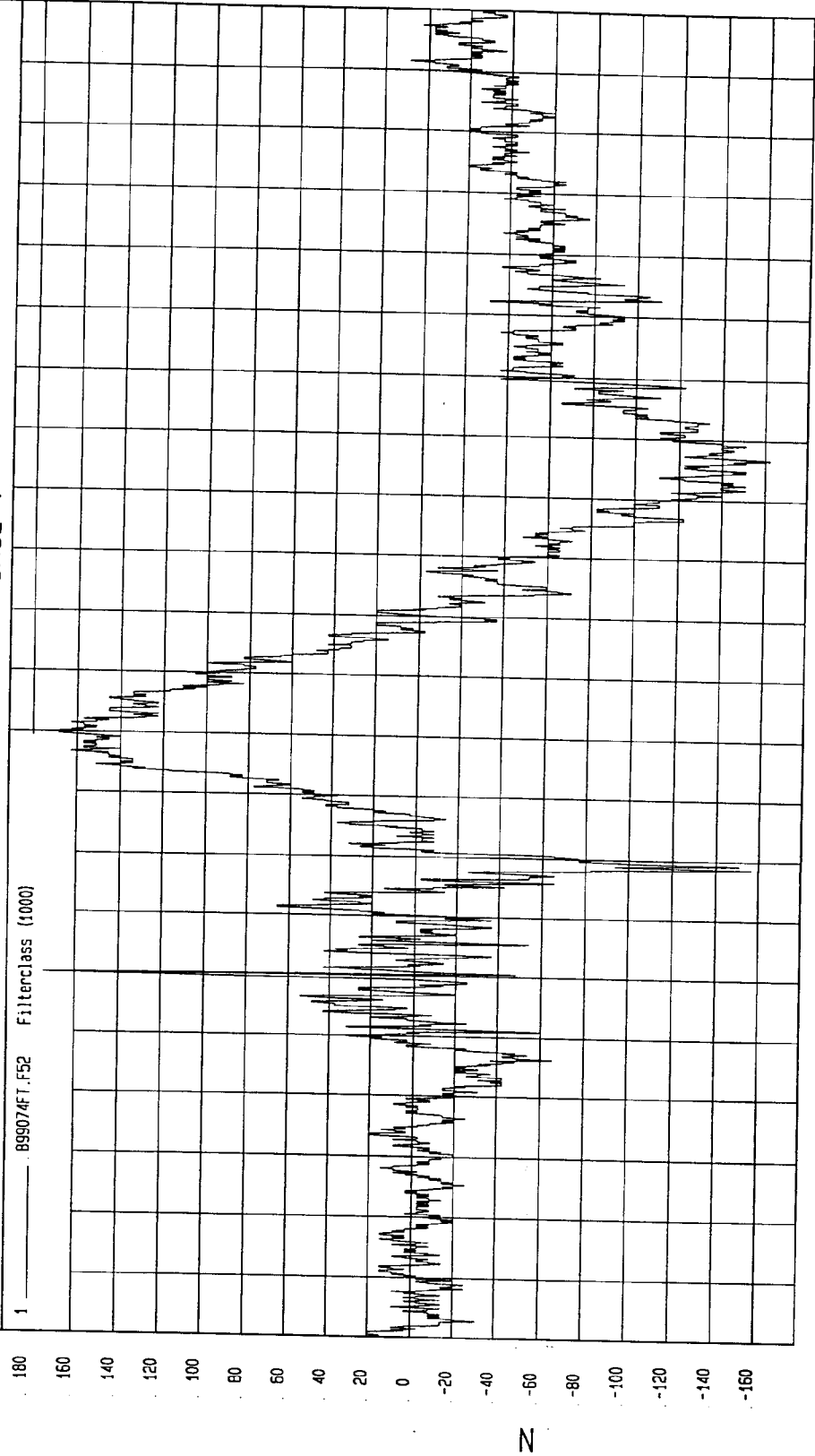
Speed: 35.1 MPH 56.5 KPH

Minimum = -152.29 N at 127 msec

Maximum = 174.16 N at 40 msec

PASSENGER NECK FORCE Y

1 8950747.F52 Filterclass (1000)



WCA Research  
08-17-2000 08:46

TIME (SECONDS)

B-68

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

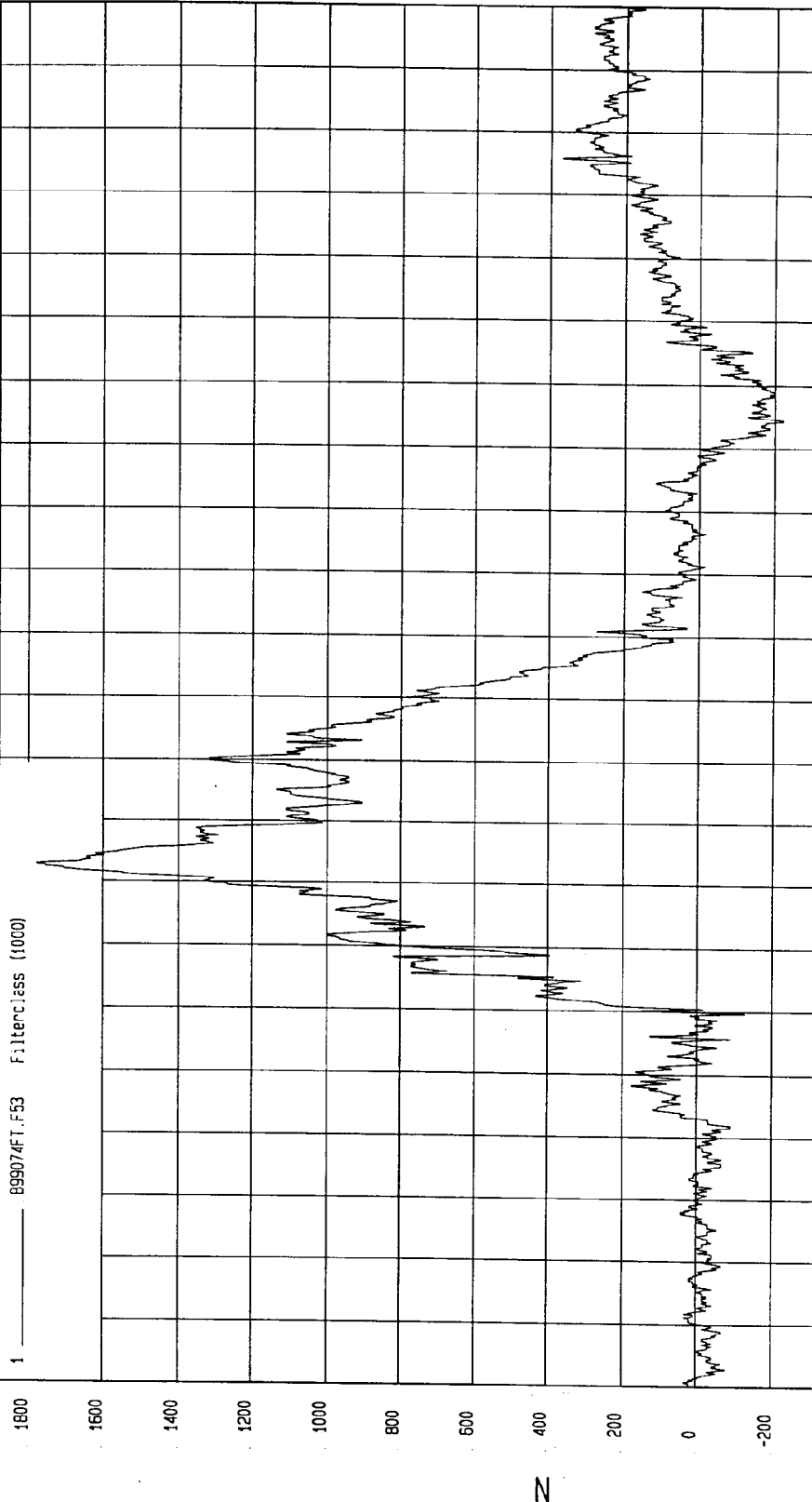
Speed: 35.1 MPH 56.5 KPH

Minimum = -223.51 N at 134 msec

Maximum = 1777.95 N at 63 msec

PASSENGER NECK FORCE Z

1 — 899074FT.F53 Filterclass (1000)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

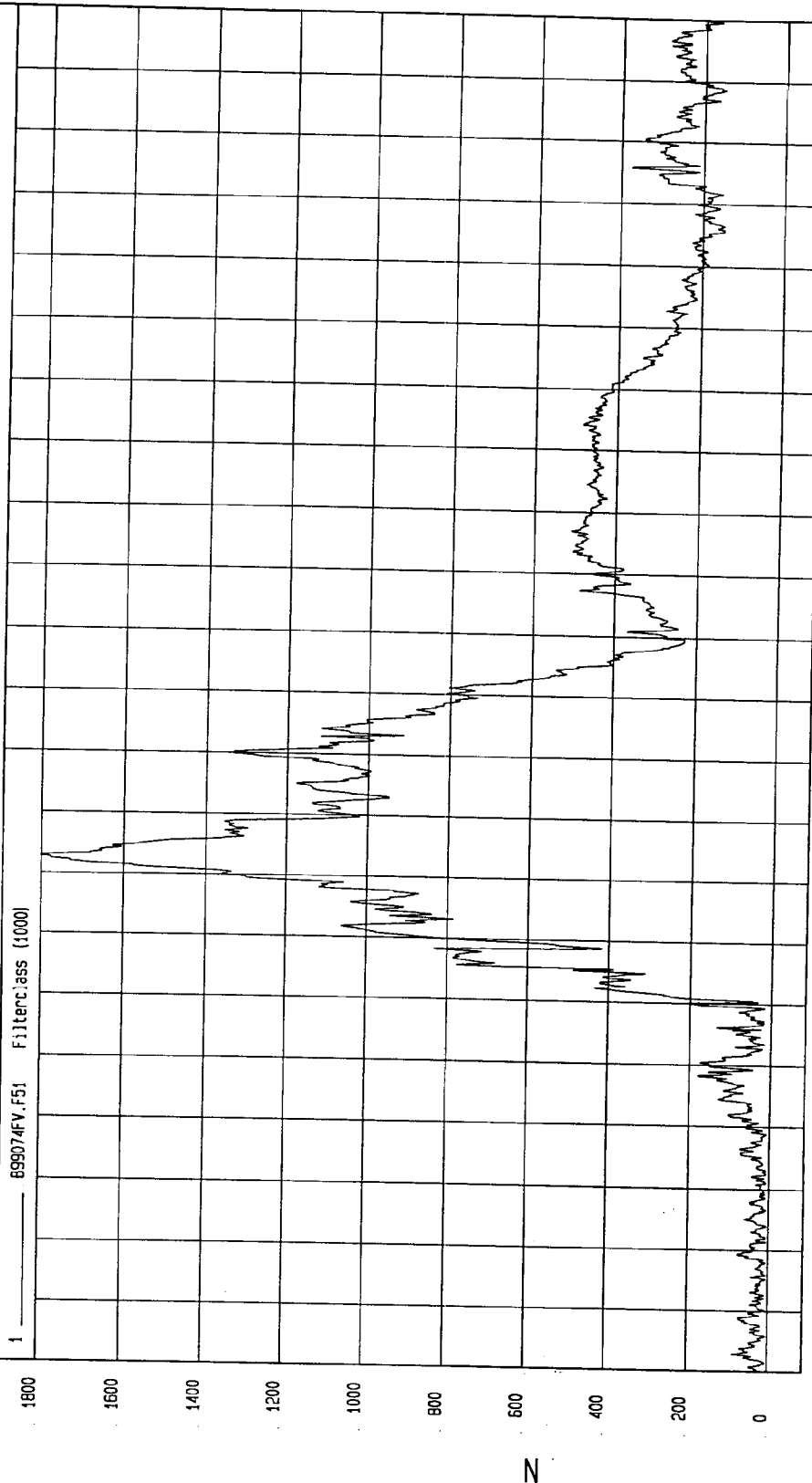
Speed: 35.1 MPH 56.5 KPH

Minimum = 6.26 N at -19 msec

Maximum = 1802.4 N at 63 msec

PASSENGER NECK FORCE RESULTANT

1 — 899074FV.F51 Filterclass (1000)



WGA Research  
08-11-2000 08:46

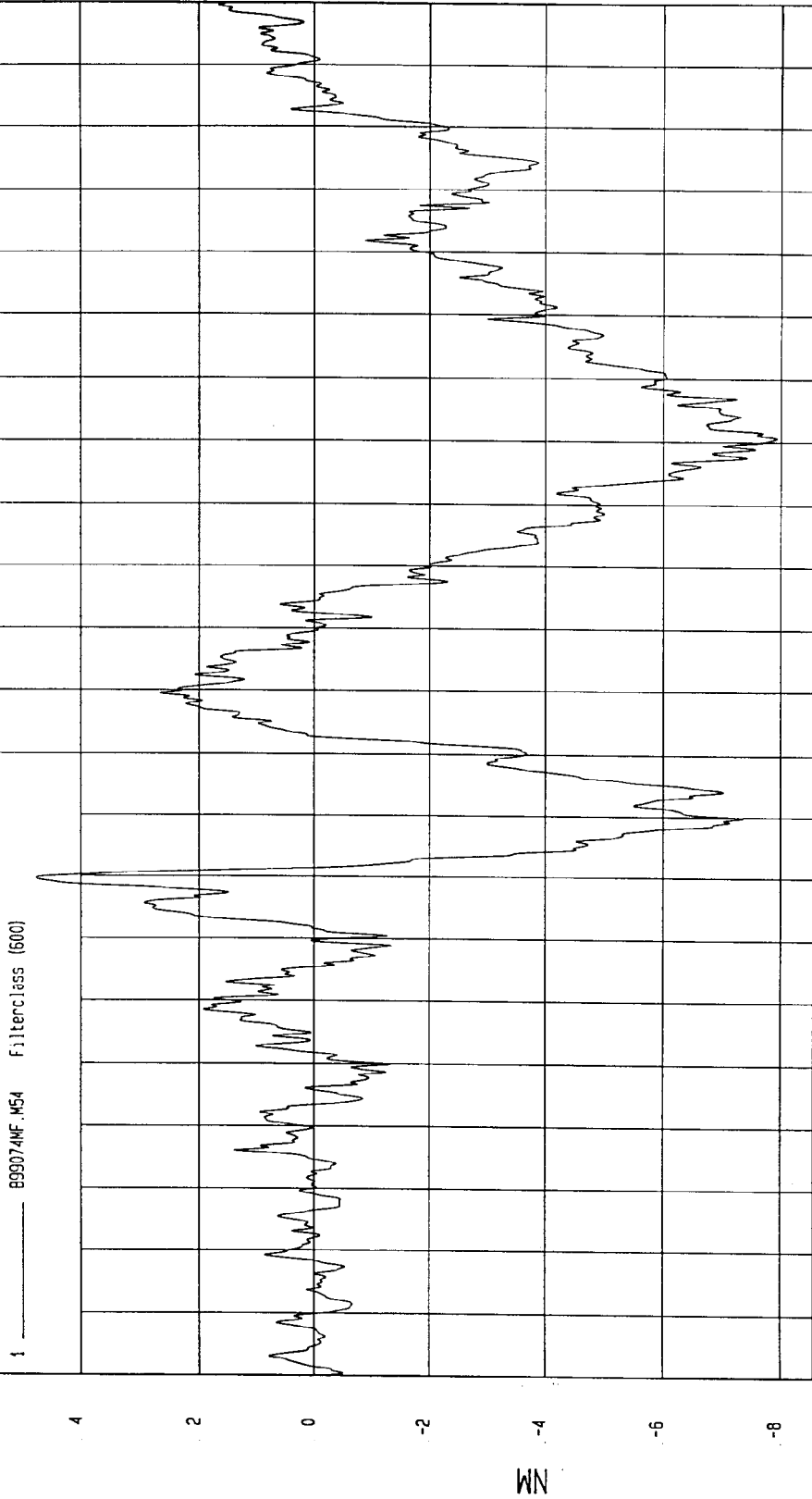
TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -7.93 NM at 131 msec      Maximum = 4.77 NM at 60 msec

PASSENGER NECK MOMENT X

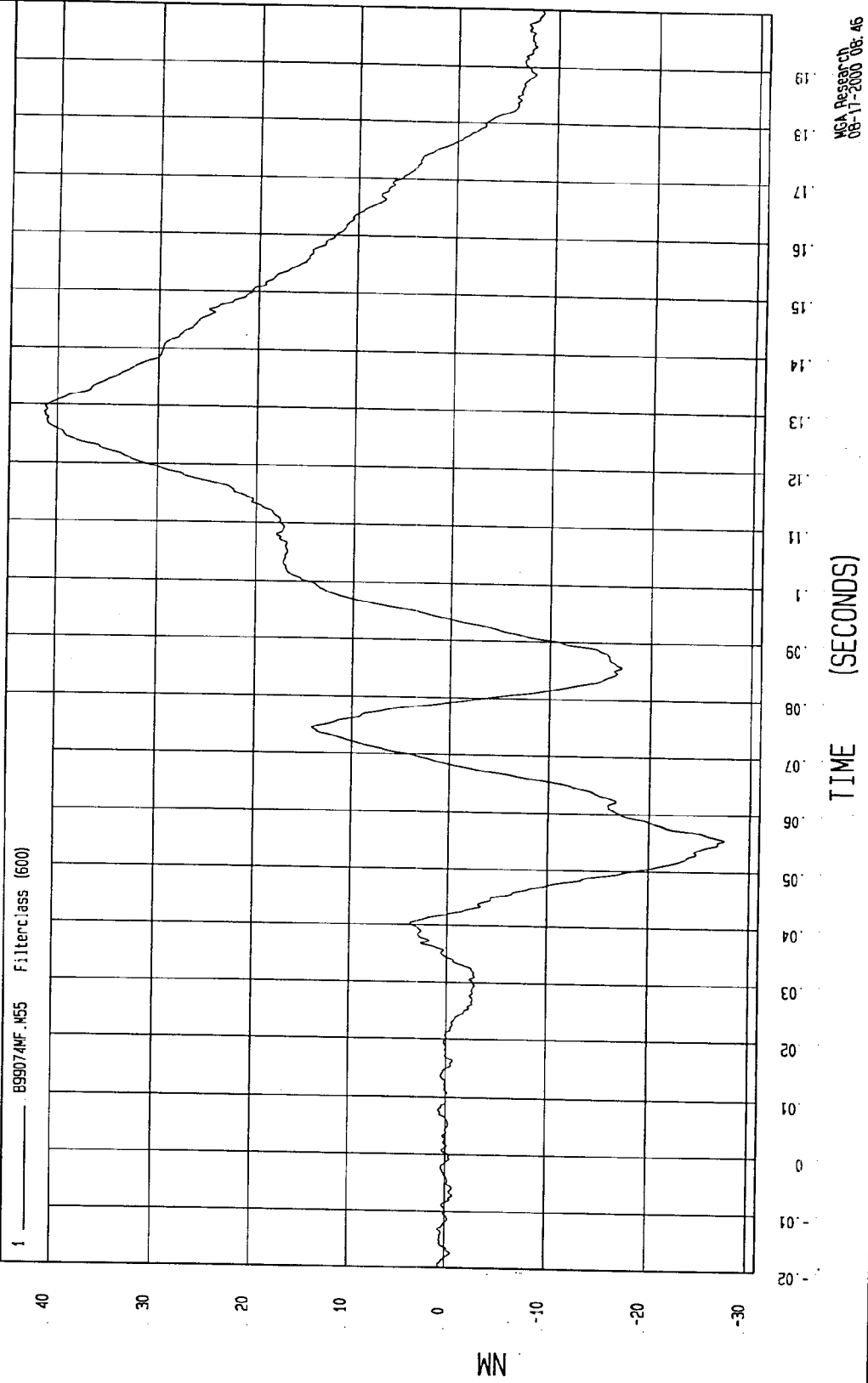


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -27.51 NM at 56 msec      Maximum = 41.28 NM at 129 msec

PASSENGER NECK MOMENT Y



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

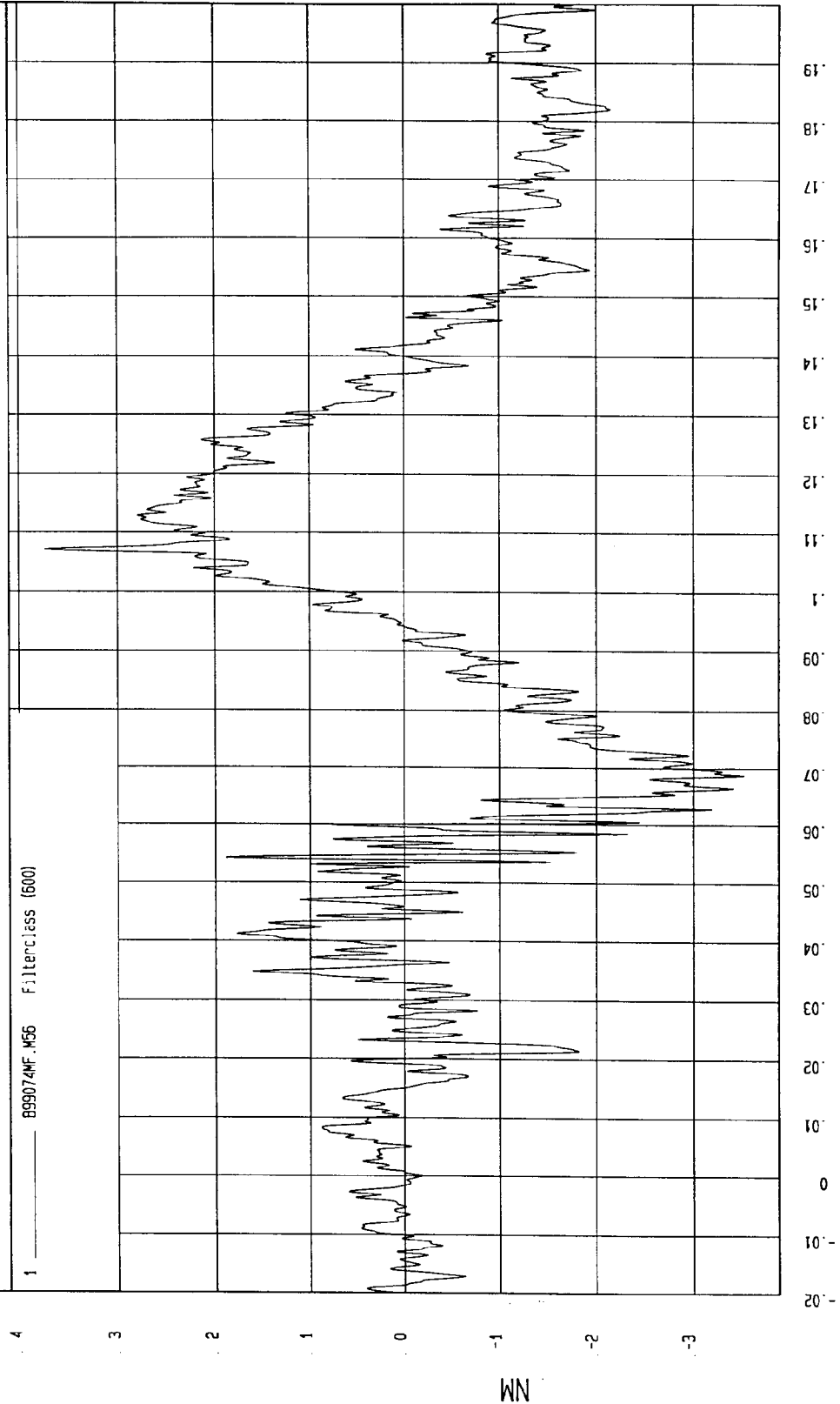
Speed: 35.1 MPH 56.5 KPH

Minimum = -3.51 NM at 69 msec

Maximum = 3.74 NM at 107 msec

PASSENGER NECK MOMENT Z

1 899074MF.M56 Filterclass (500)



NGA Research  
08-17-2000 08:46

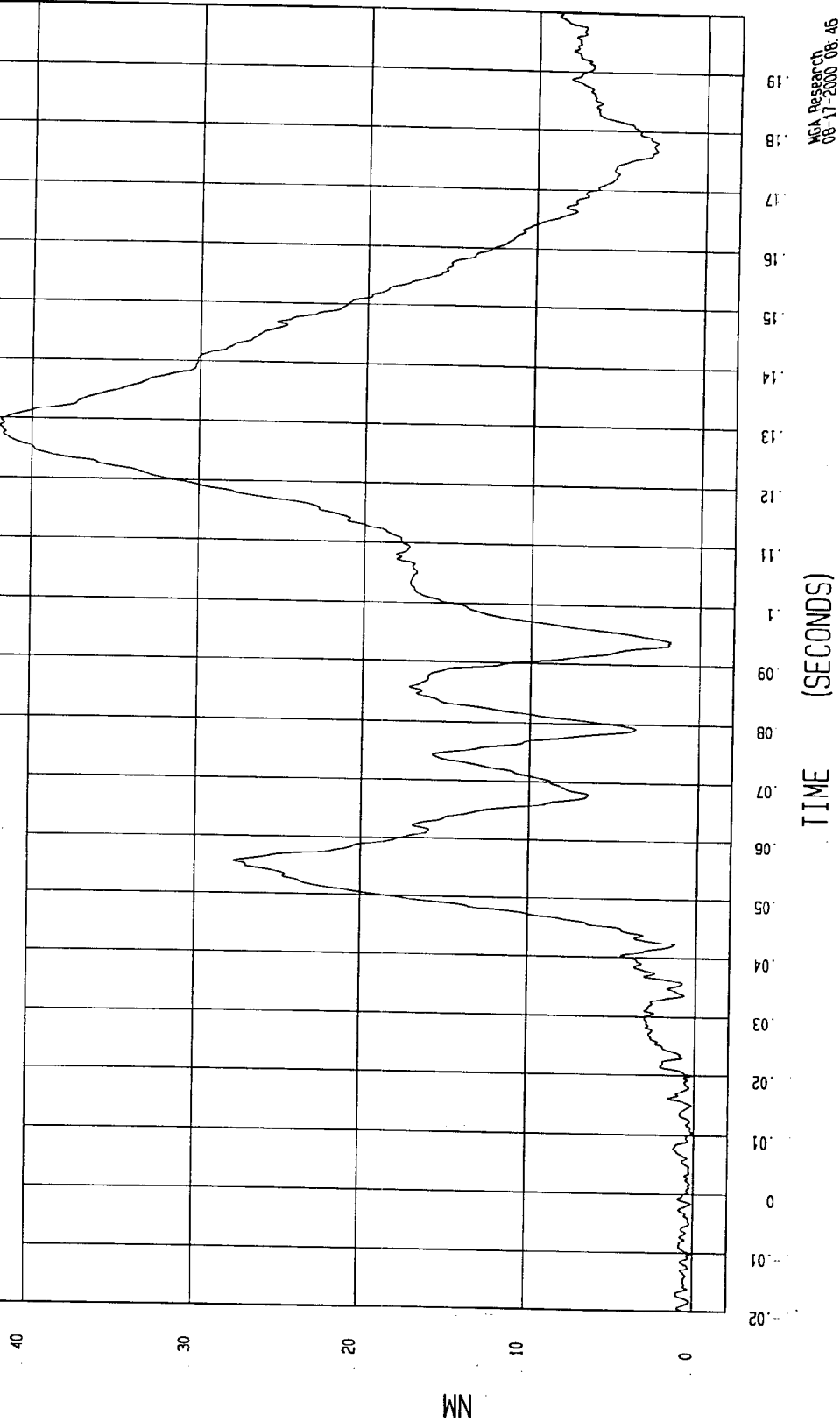
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = .06 NM at 10 msec Maximum = 41.95 NM at 129 msec

PASSENGER NECK MOMENT RESULTANT

1 B99074NV M54 Filterclass (600)



MGA Research  
08-17-2000 08:46

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -53.03 G'S at 78 msec

Maximum = 1.61 G'S at 136 msec

PASSENGER CHEST X ACCELERATION

1 — 899074F.A25 Filterclass (180)



WCA Research  
08-17-2000 09:09

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

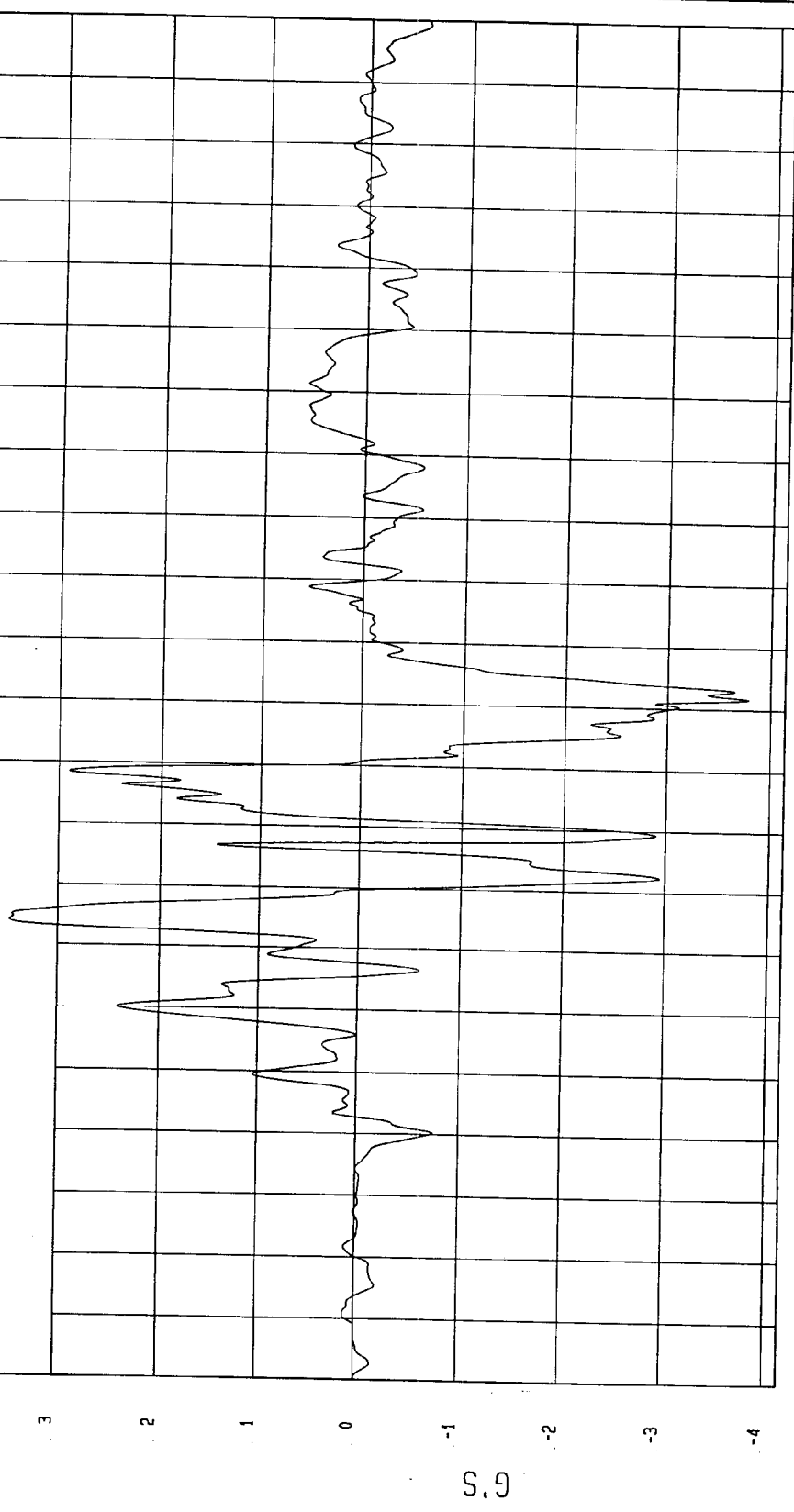
Speed: 35.1 MPH 56.5 KPH

Minimum = -3.78 G'S at 92 msec

Maximum = 3.47 G'S at 54 msec

PASSENGER CHEST Y ACCELERATION

1 — B99074AF.A26 Filterclass (180)



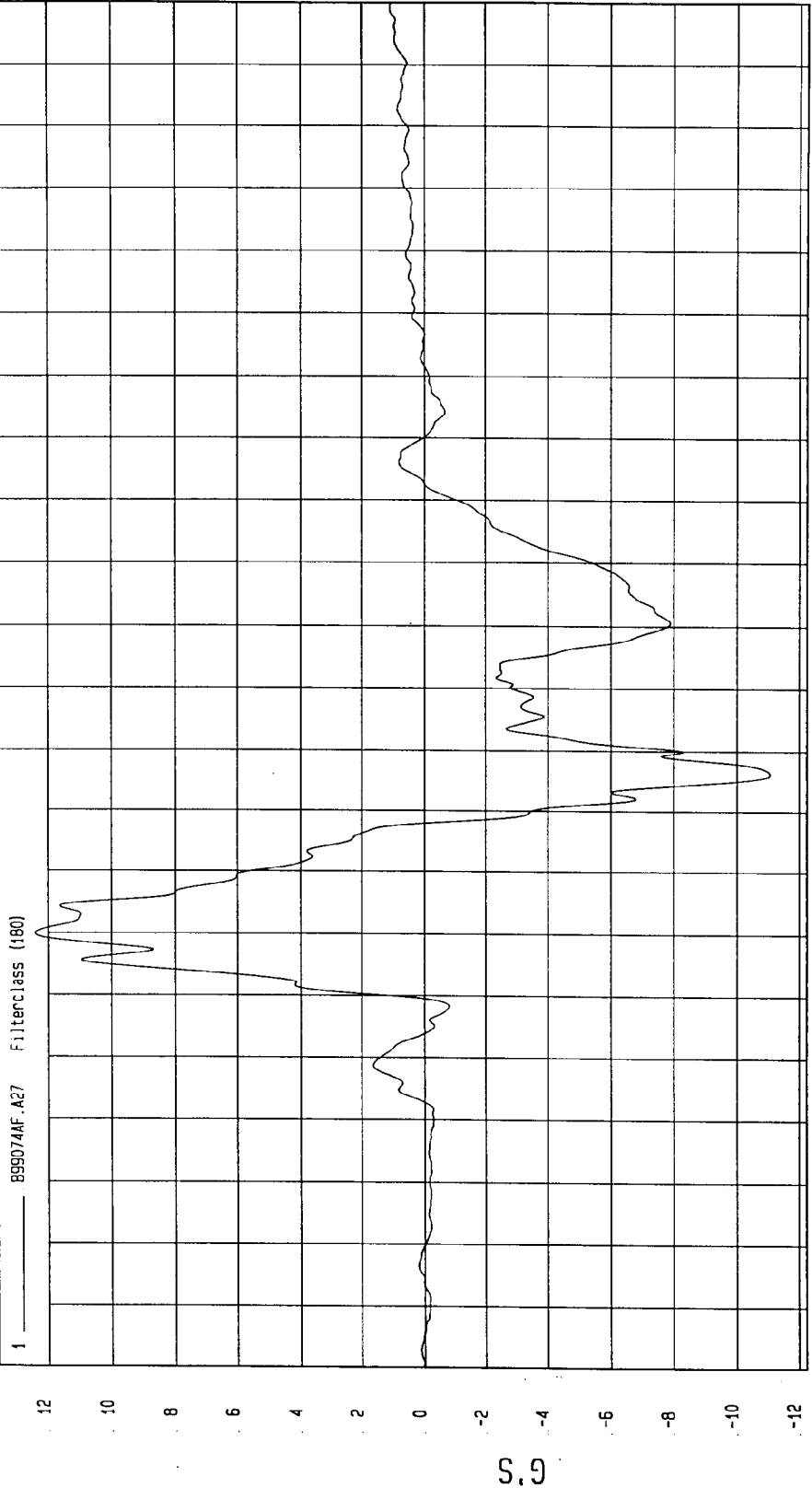
MGA Research  
08-17-2000 09.09

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -11.06 G'S at 76 msec      Maximum = 12.41 G'S at 50 msec

PASSENGER CHEST Z ACCELERATION



TIME (SECONDS)

NSA Research  
08-17-2000 09:09

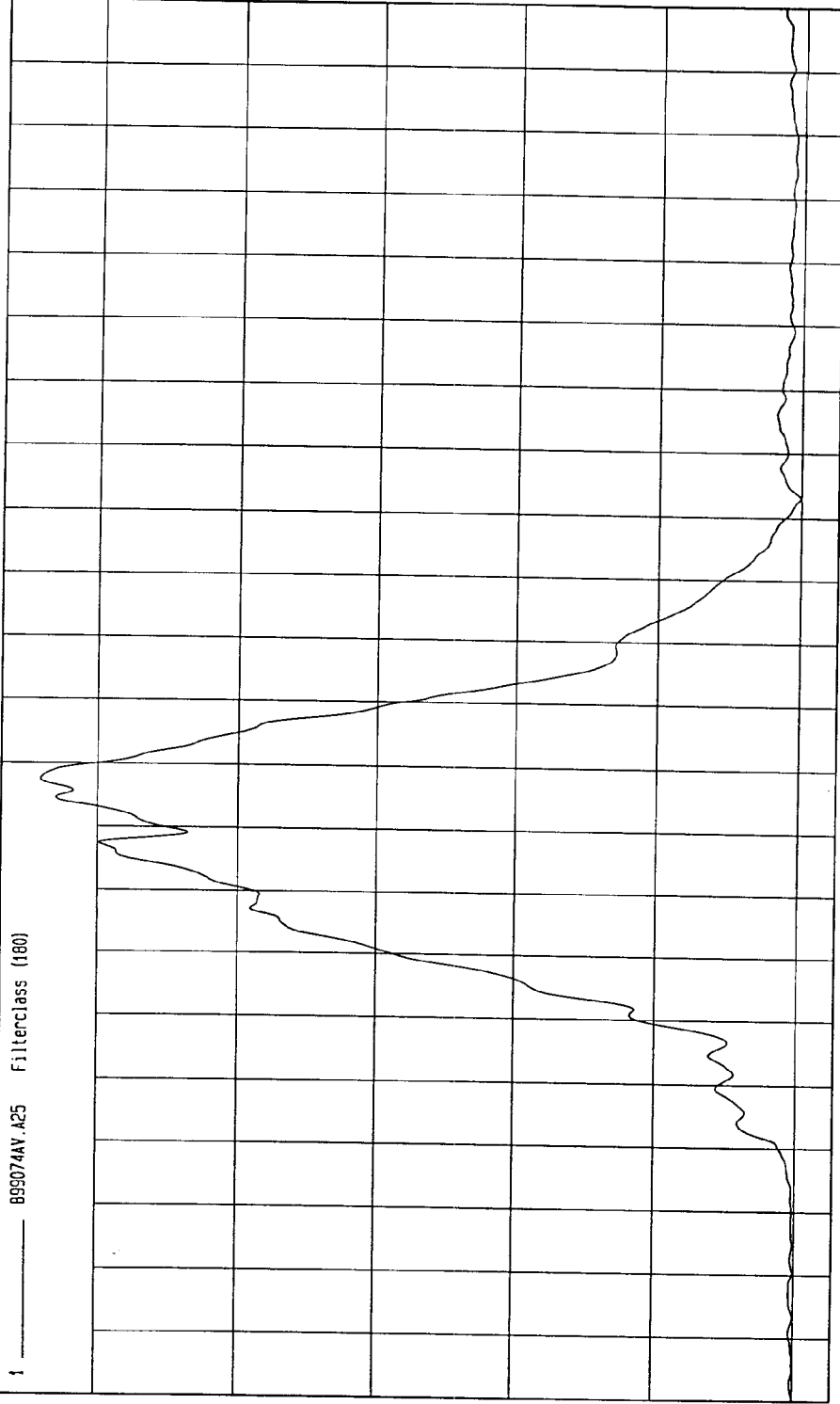
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

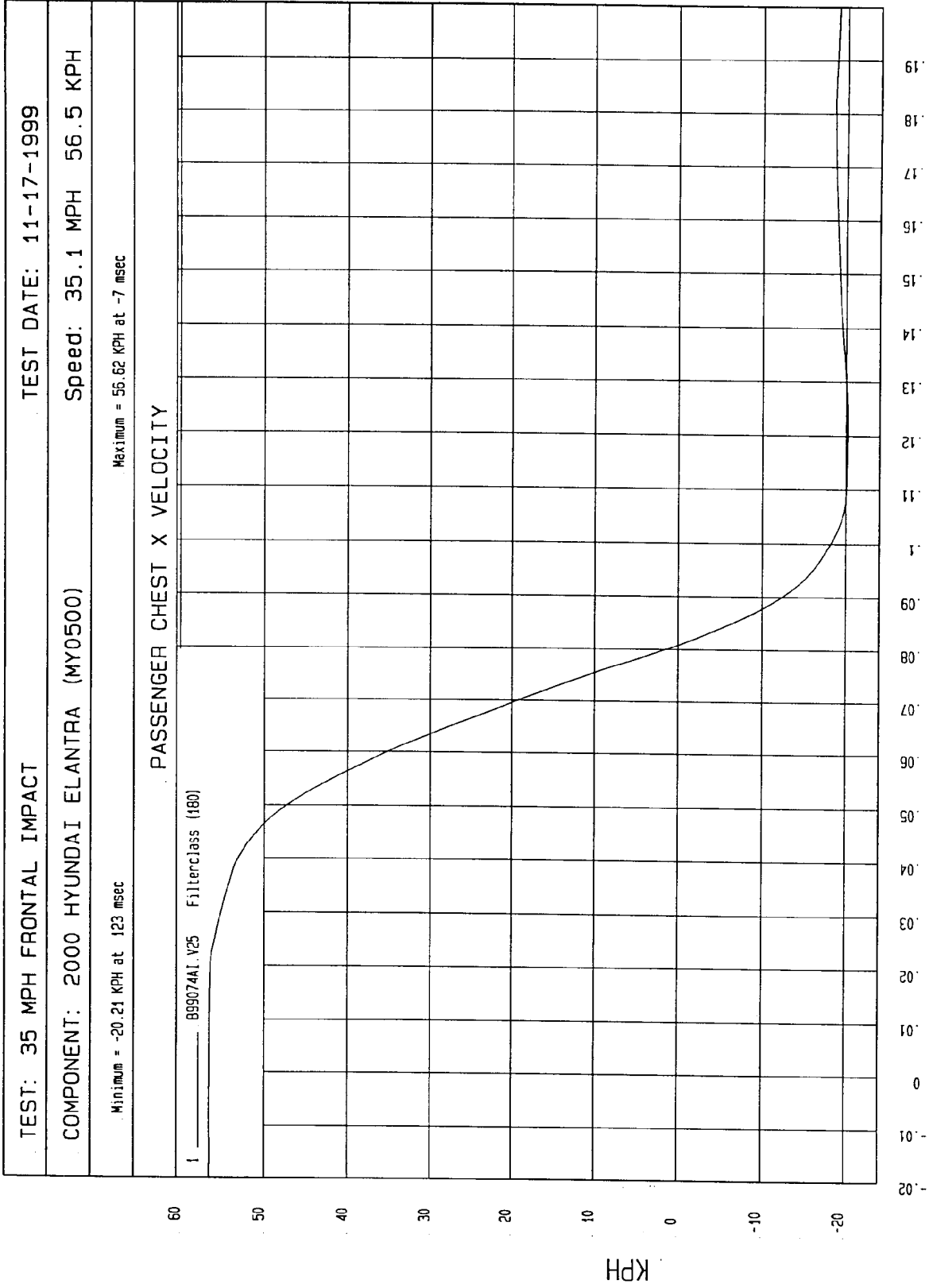
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = .03 G'S at -13 msec Maximum = 54.08 G'S at 78 msec

PASSENGER CHEST RESULTANT ACCELERATION

1 ——— B99074AV.A25 Filterclass (180)





MGA Research  
08-11-2000 11:03

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

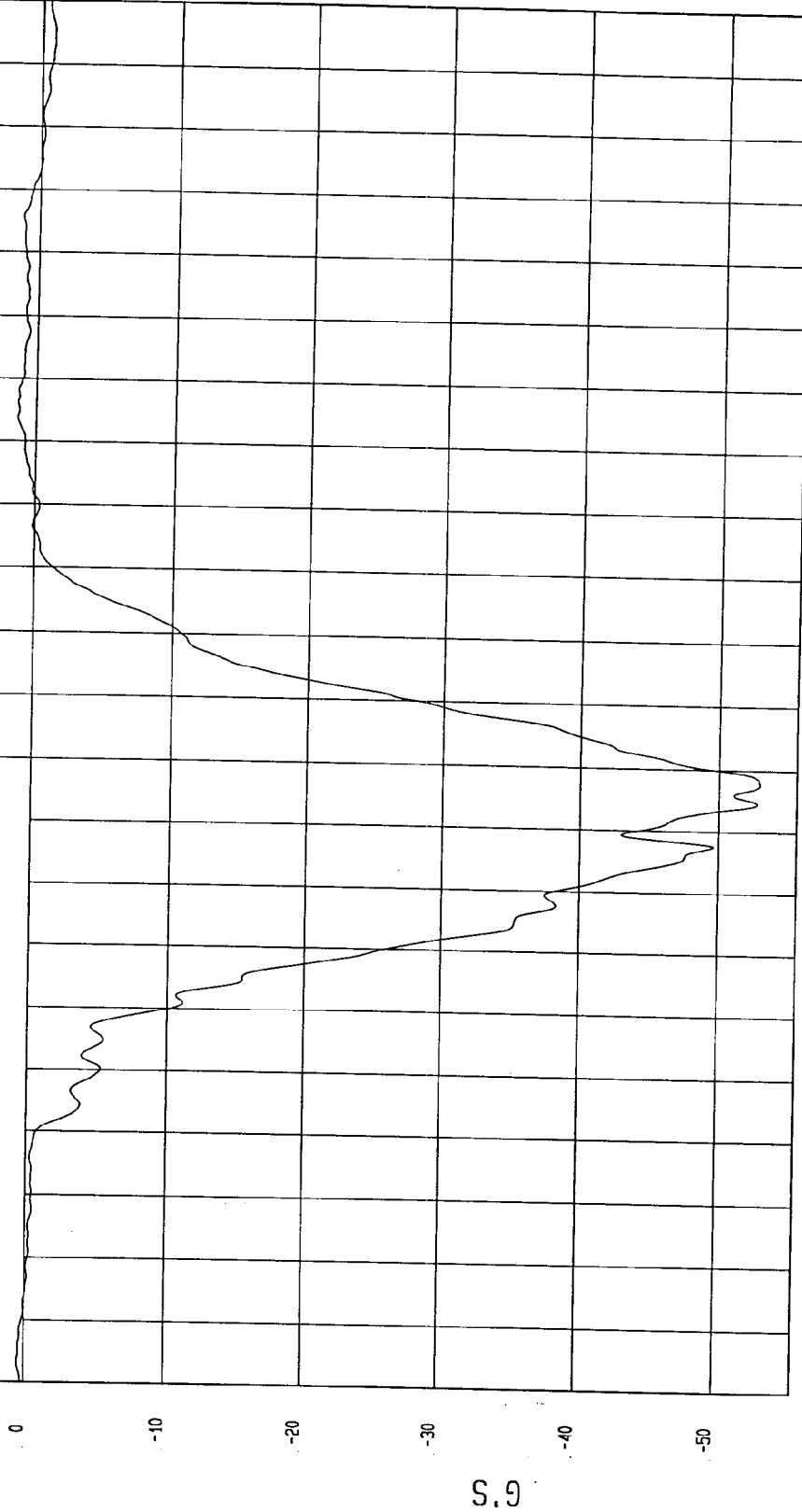
Speed: 35.1 MPH 56.5 KPH

Minimum = -52.97 G'S at 78 msec

Maximum = 1.34 G'S at 134 msec

PASSENGER CHEST REDUNDANT X ACCELERATION

1 — B99074AF.A42 Filterclass (180)



MSA Research  
08-11-2000 09:29

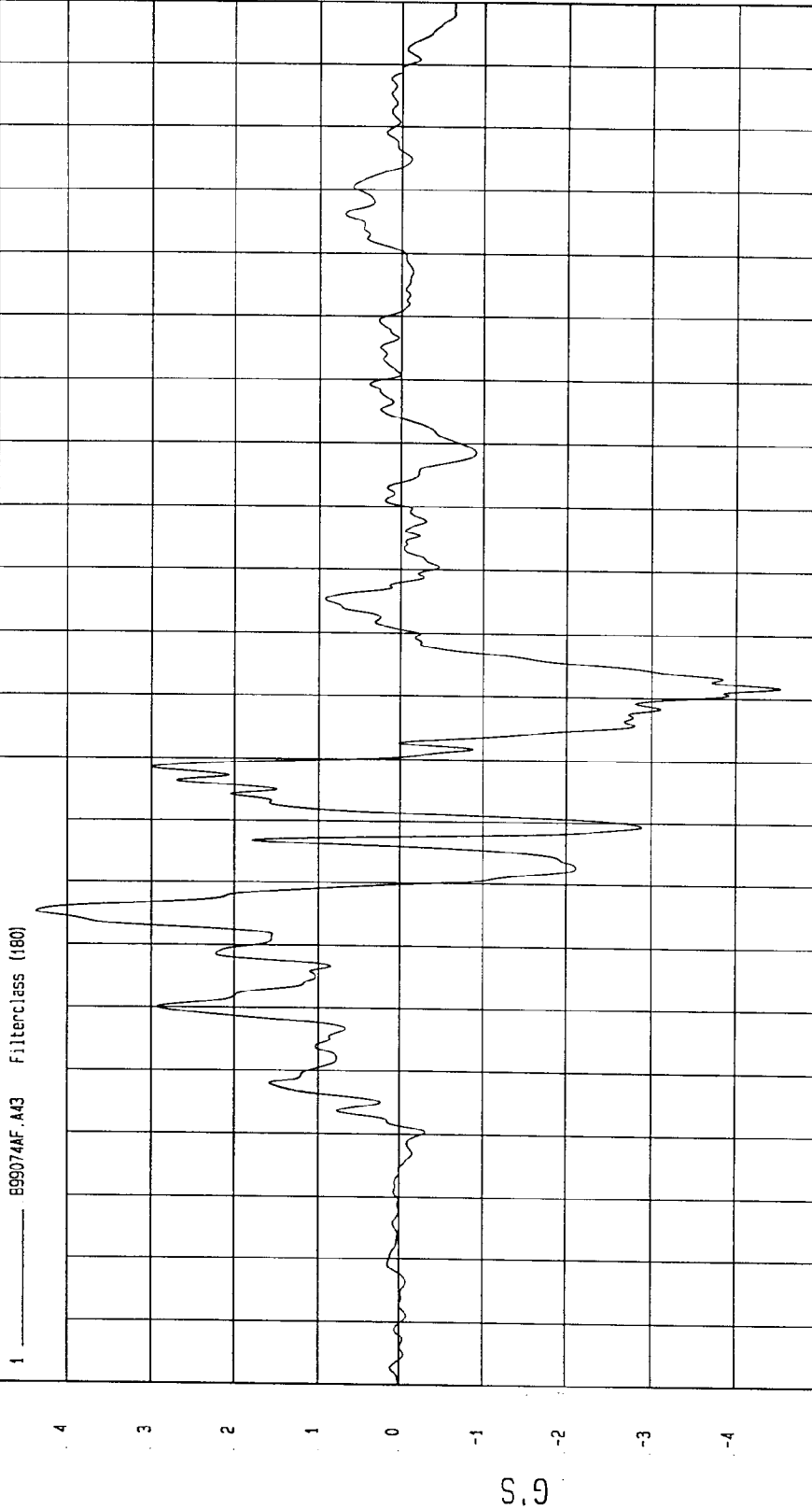
B-80

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -4.53 G'S at 92 msec  
Maximum = 4.37 G'S at 55 msec

PASSENGER CHEST REDUNDANT Y ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

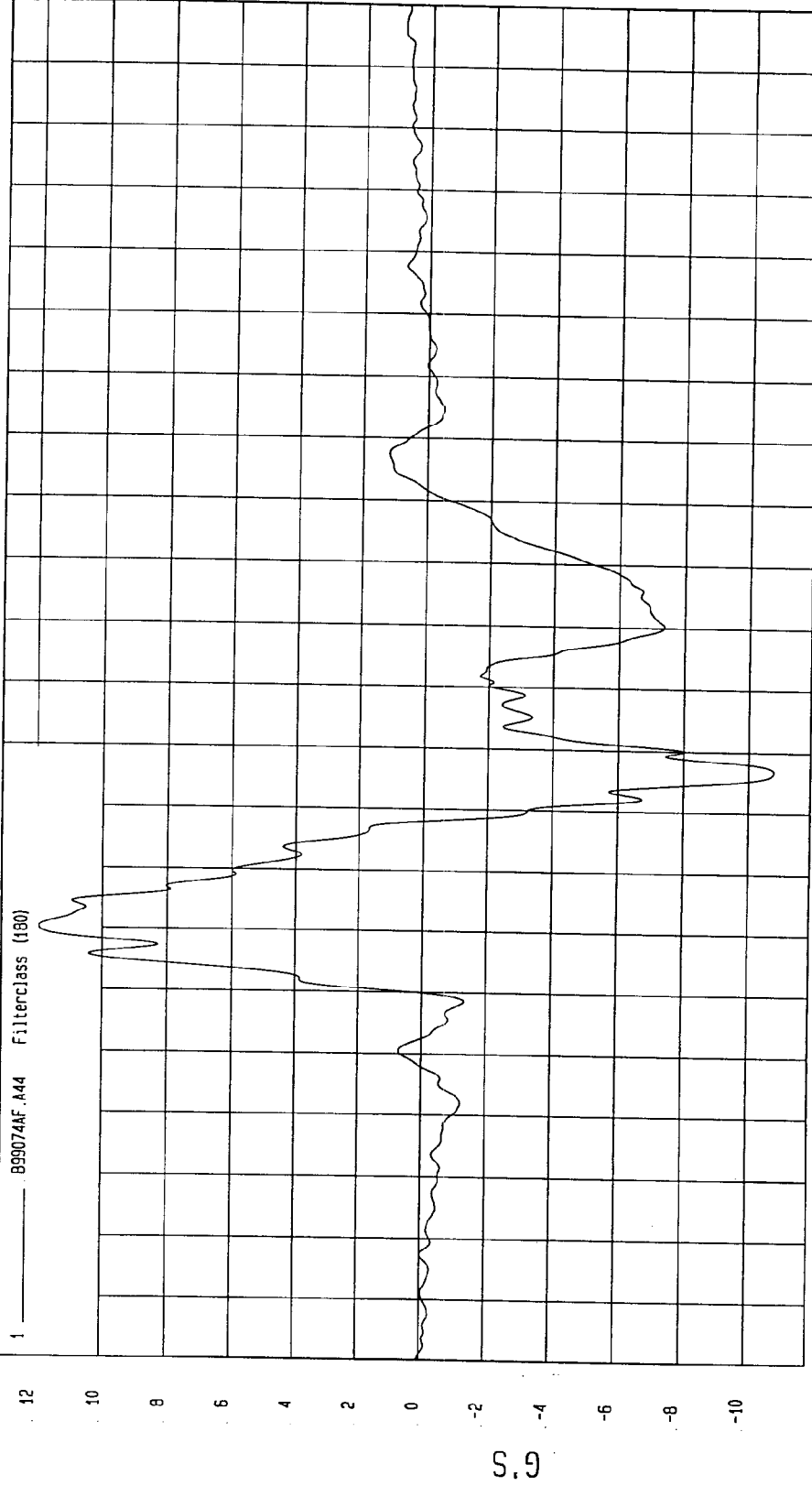
Speed: 35.1 MPH 56.5 KPH

Minimum = -10.76 G'S at 77 msec

Maximum = 11.92 G'S at 50 msec

PASSENGER CHEST REDUNDANT Z ACCELERATION

1 ——— B99074AF.A44 Filterclass (180)



TIME (SECONDS)

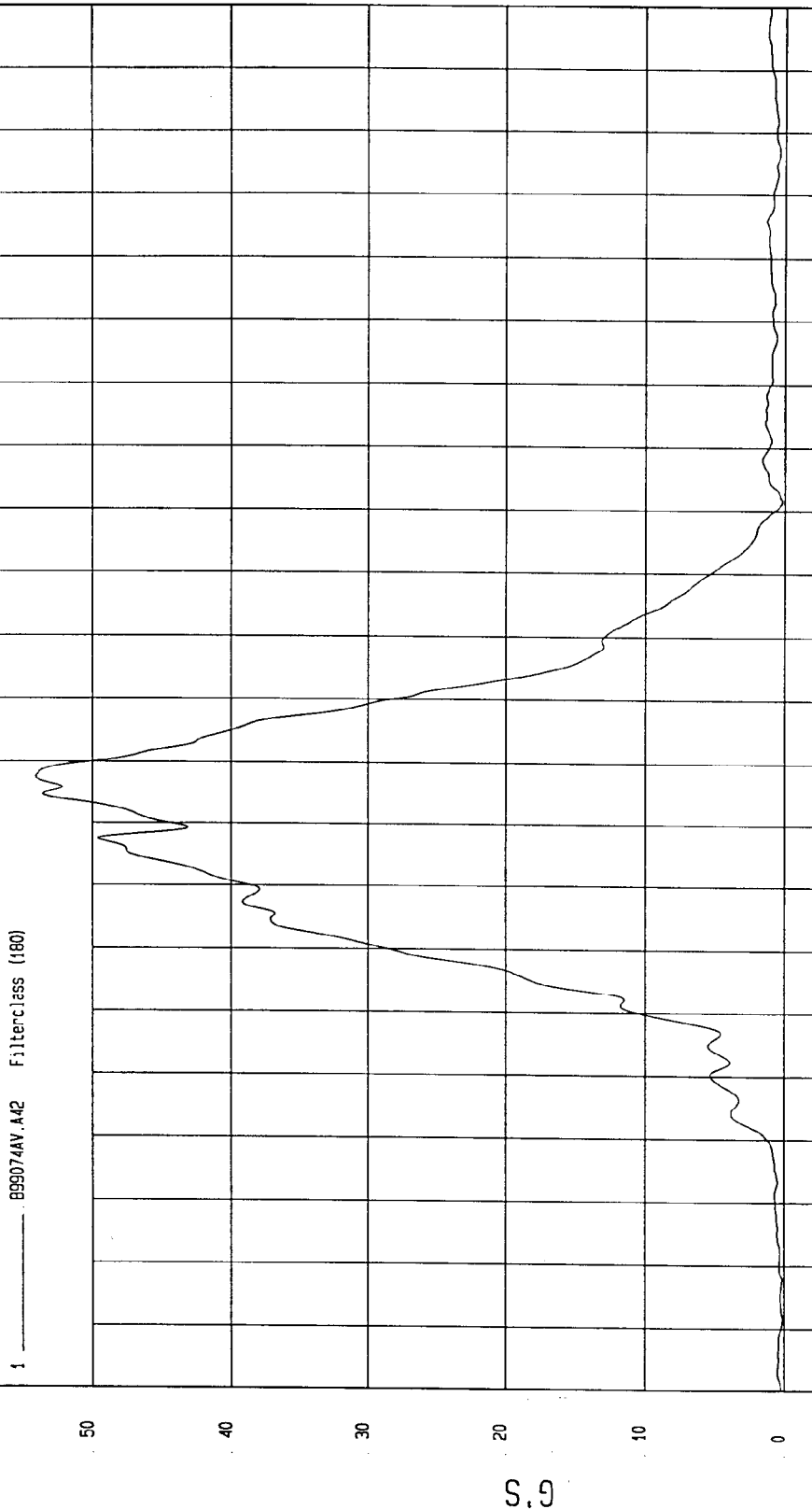
MSA Research  
08-17-2000 09:29

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = .11 G'S at -8 msec Maximum = 54.03 G'S at 78 msec

PASSENGER CHEST REDUNDANT RESULTANT ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -20.02 KPH at 121 msec

Maximum = 56.74 KPH at -6 msec

PASSENGER CHEST REDUNDANT X VELOCITY

1 89907441.V42 Filterclass (180)

60

50

40

30

20

10

0

-10

-20

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

MCA Research  
08-17-2000 11:03

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

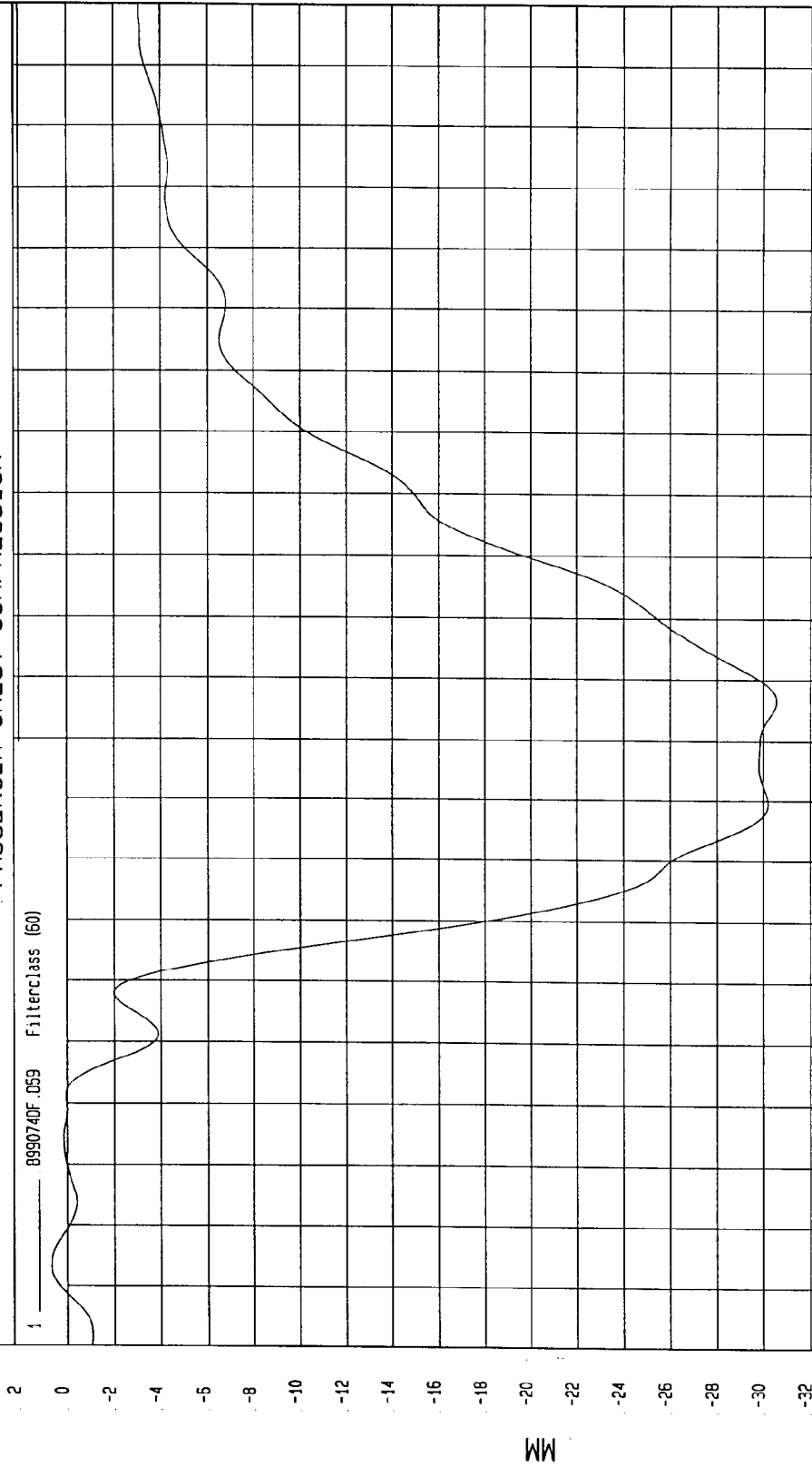
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -30.56 MM at 86 msec

Maximum = .65 MM at -7 msec

PASSENGER CHEST COMPRESSION



TIME SECONDS

WCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

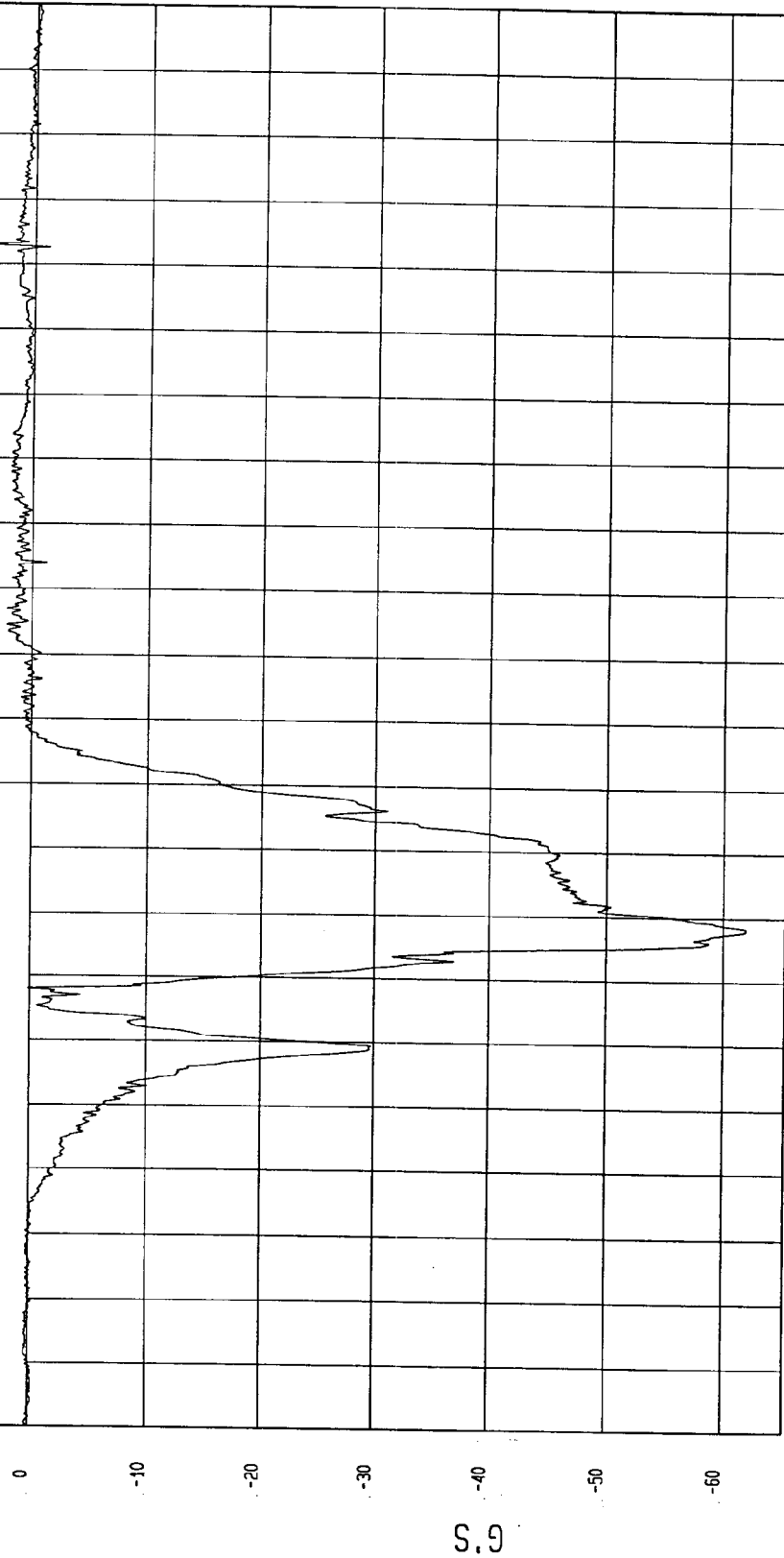
Speed: 35.1 MPH 56.5 KPH

Minimum = -61.95 G'S at 58 msec

Maximum = 4.5 G'S at 163 msec

PASSENGER PELVIS X ACCELERATION

1 899074AT.A05 Filterclass (1000)



WCA Research  
08-17-2000 09:28

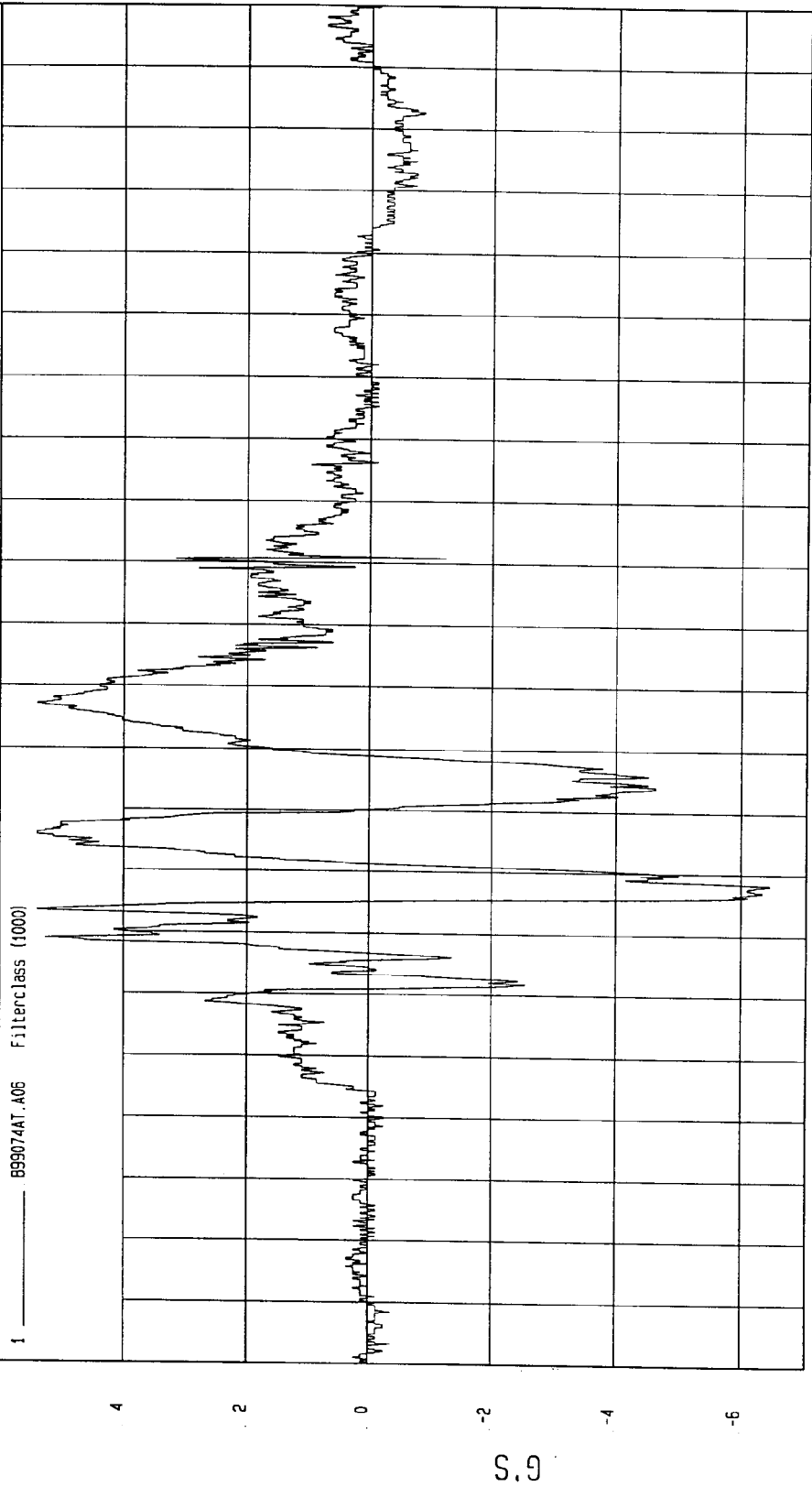
TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -6.47 G'S at 58 msec      Maximum = 5.37 G'S at 54 msec

PASSENGER PELVIS Y ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

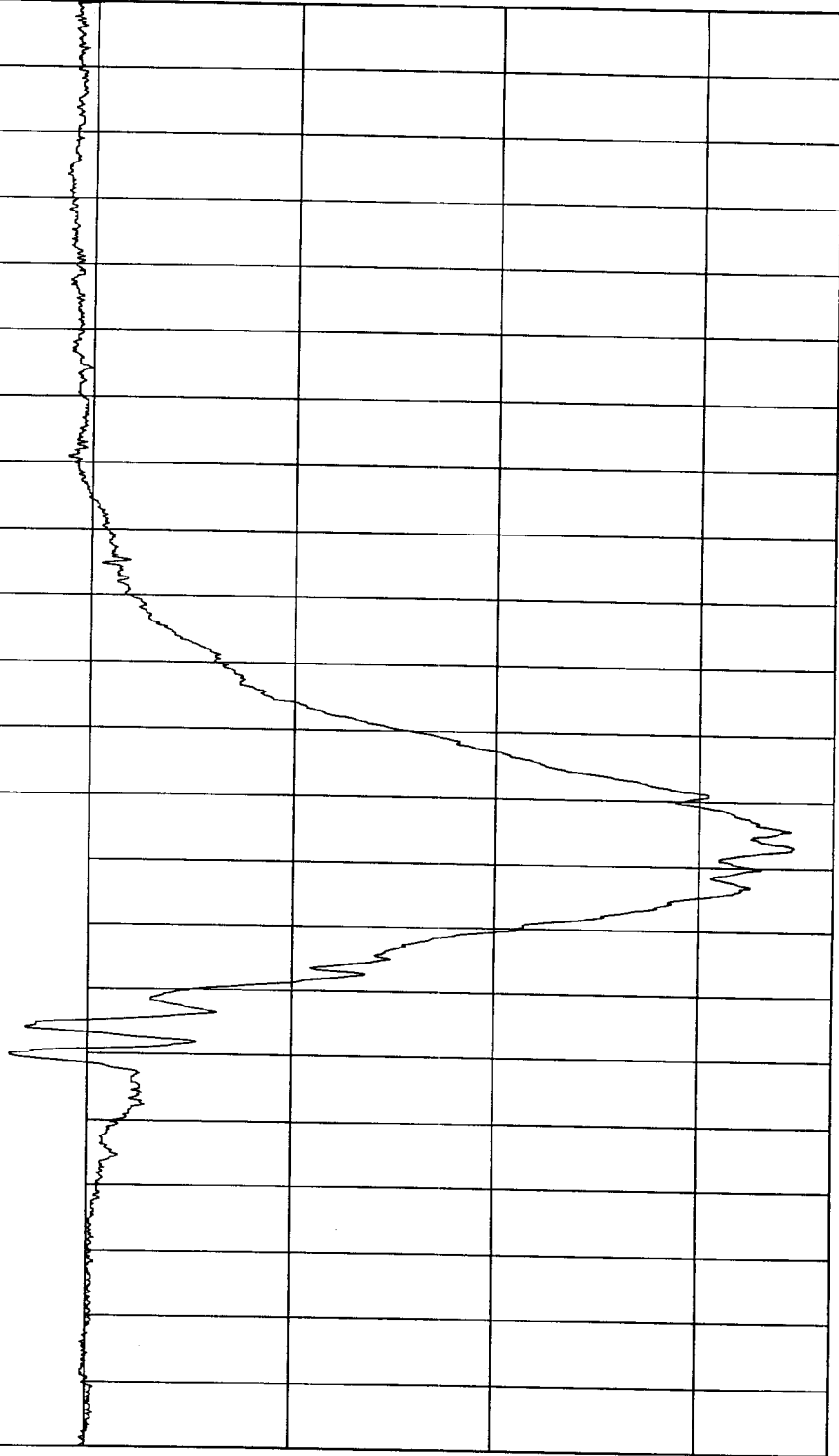
Speed: 35.1 MPH 56.5 KPH

Minimum = -34.47 G'S at 73 msec

Maximum = 3.8 G'S at 40 msec

PASSENGER PELVIS Z ACCELERATION

1 ——— B99074AT.A07 Filterclass (1000)



MGA Research  
12-06-1999 11:07

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

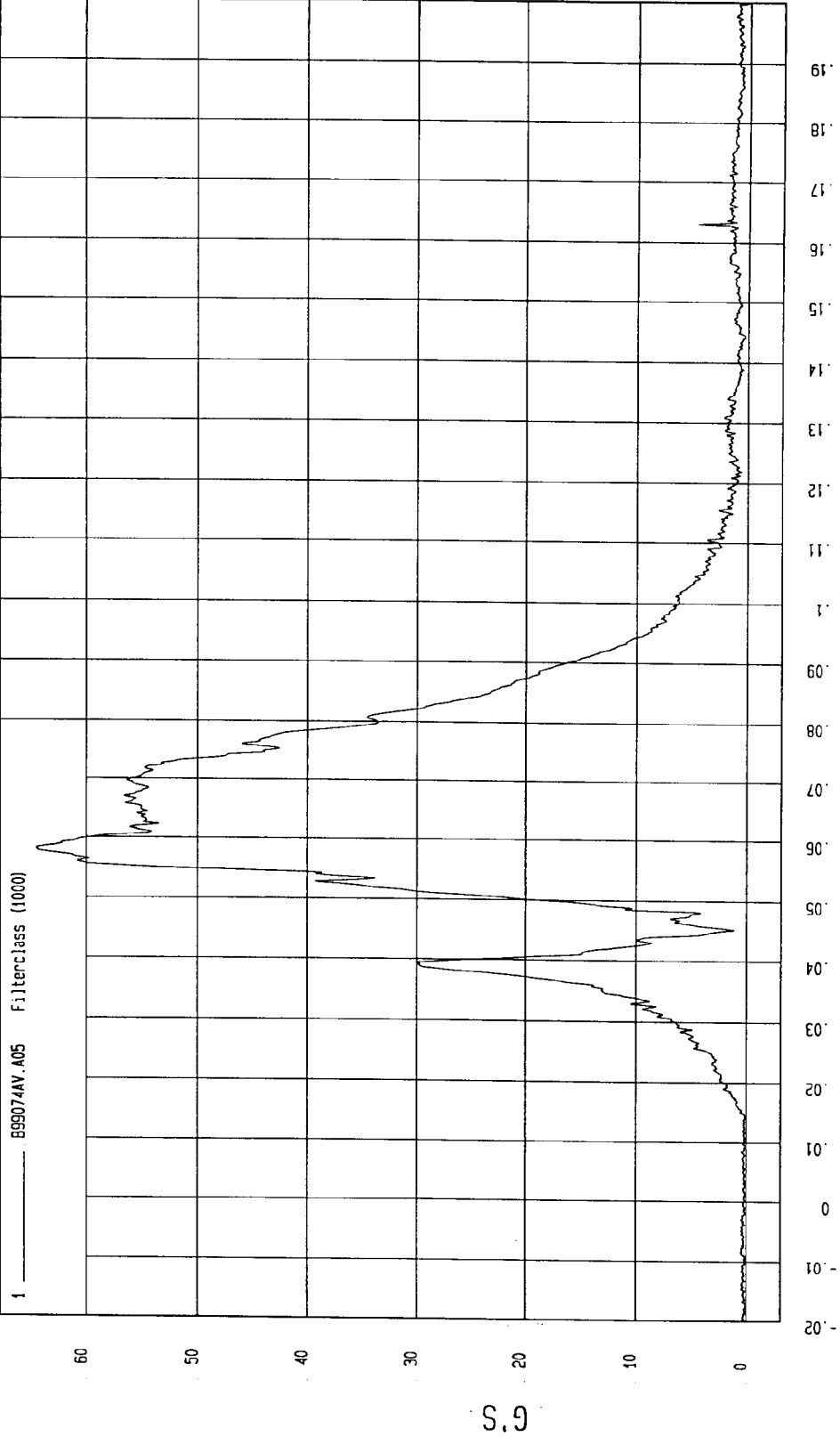
Speed: 35.1 MPH 56.5 KPH

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 64.55 G'S at 58 msec

Minimum = 6.74E-02 G'S at -18 msec

PASSENGER PELVIS RESULTANT ACCELERATION



MCA Research  
08-17-2000 09:29

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

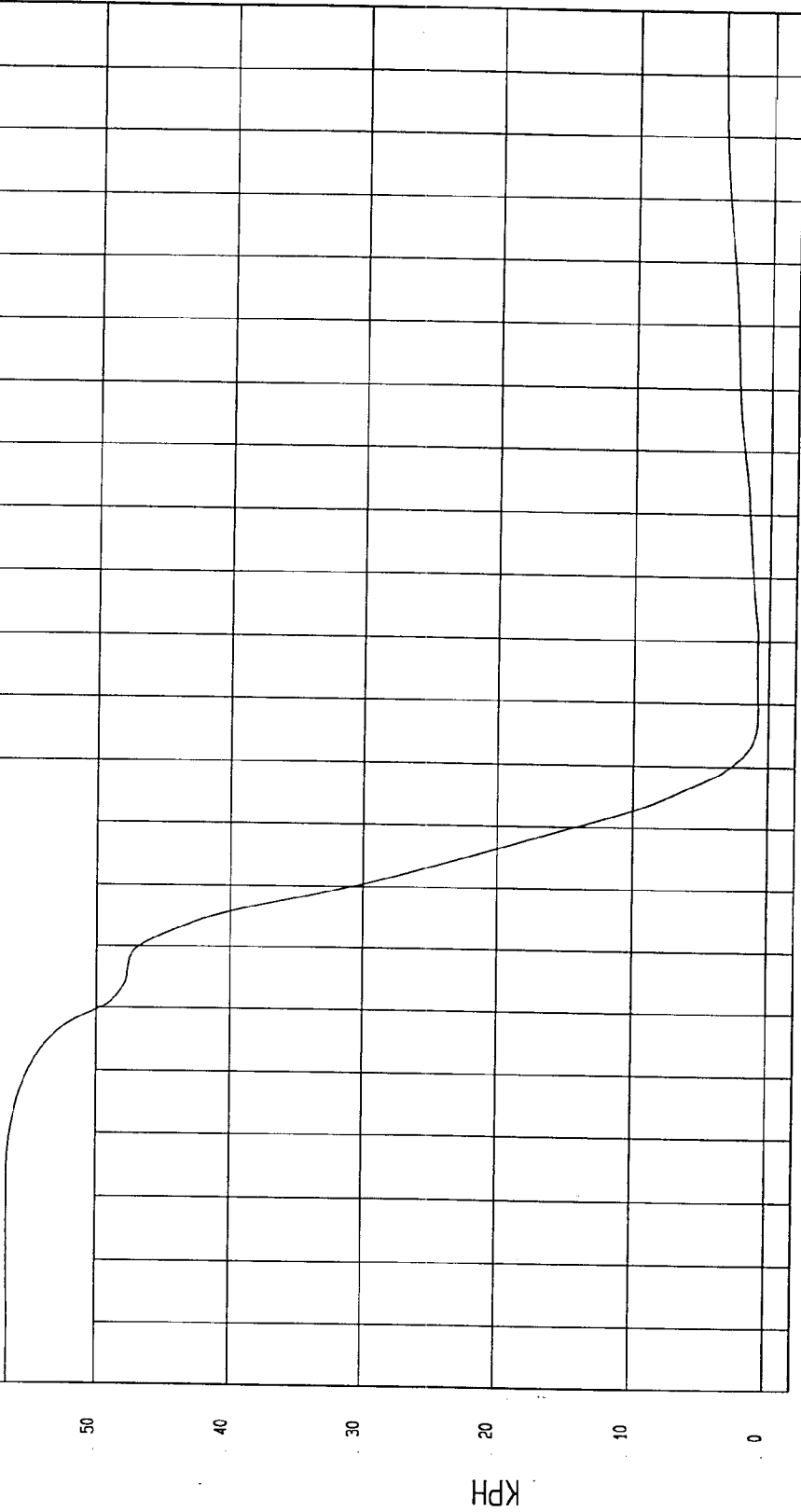
Speed: 35.1 MPH 56.5 KPH

Minimum = .78 KPH at 88 msec

Maximum = 56.66 KPH at 11 msec

PASSENGER PELVIS X VELOCITY

1 899074AI.V05 FilterClass (180)



MCA Research  
08-17-2000 11:03

TIME Seconds

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

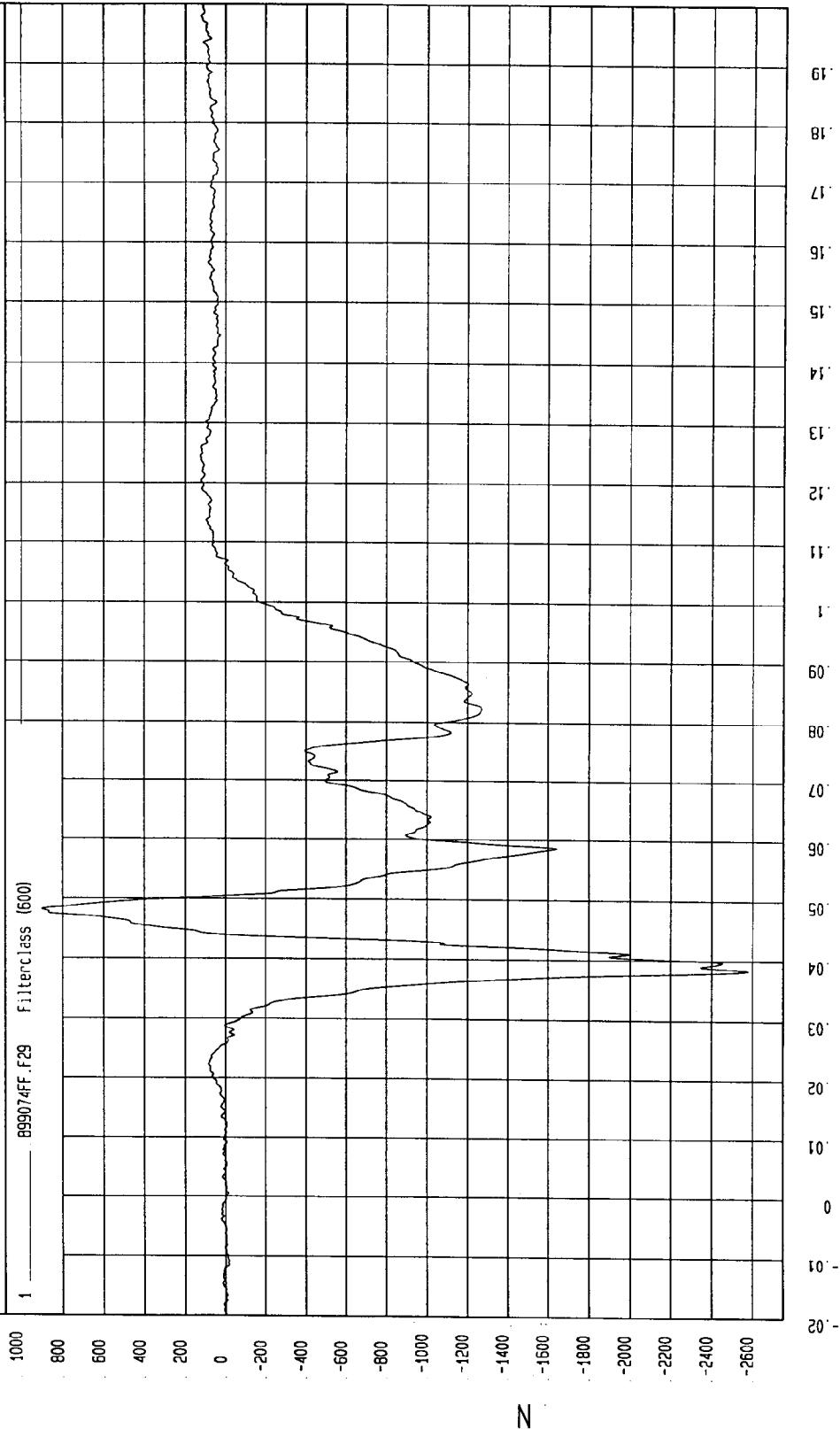
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -2577.87 N at 38 msec

Maximum = 901.71 N at 48 msec

PASSENGER LEFT FEMUR FORCE



MSA Research  
08-17-2000 09:09

TIME (SECONDS)

B-91

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

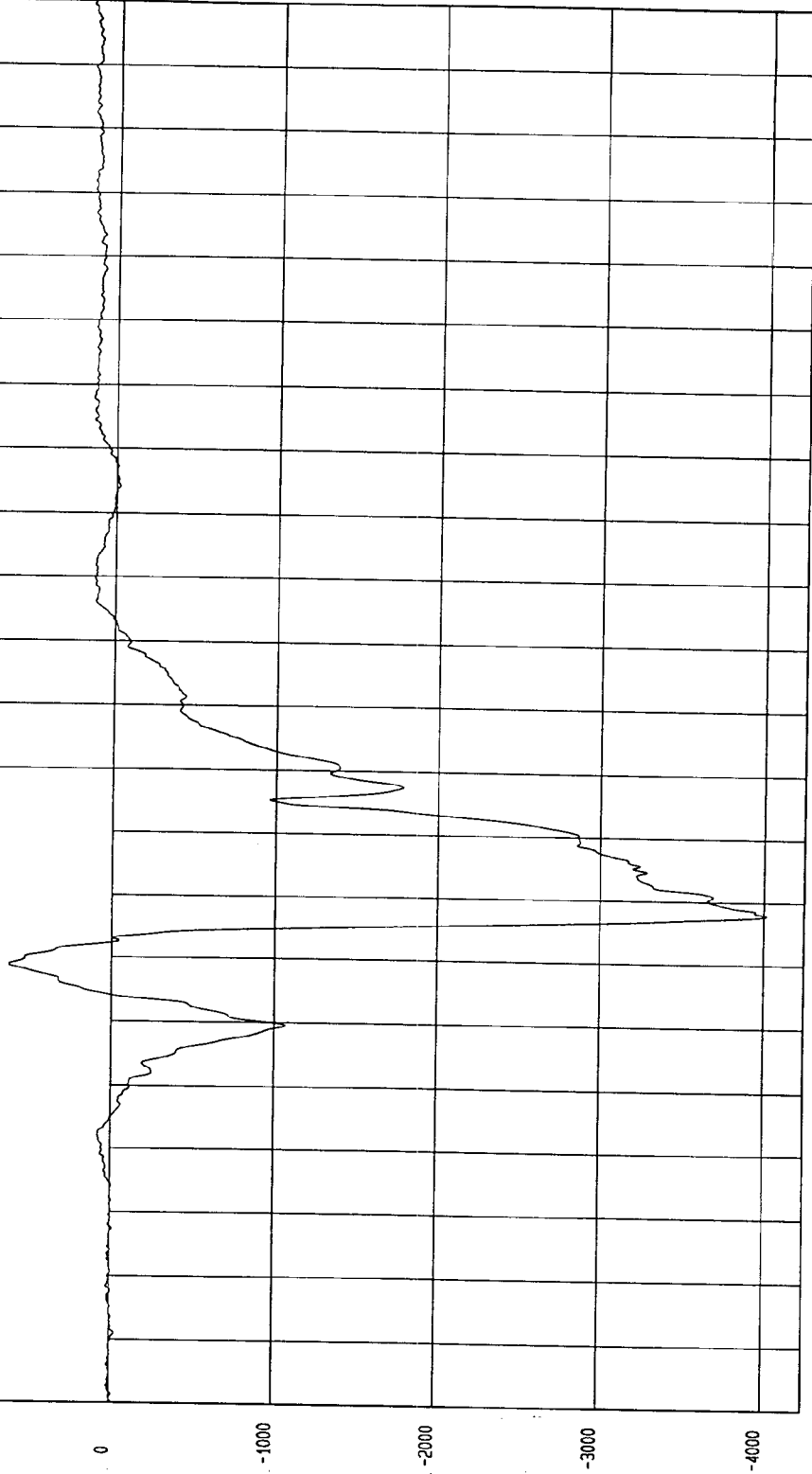
Speed: 35.1 MPH 56.5 KPH

Minimum = -4017.17 N at 58 msec

Maximum = 626.49 N at 49 msec

PASSENGER RIGHT FEMUR FORCE

1 ——— 895074FF.F28 Filterclass (500)



TIME (SECONDS)

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

WCA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

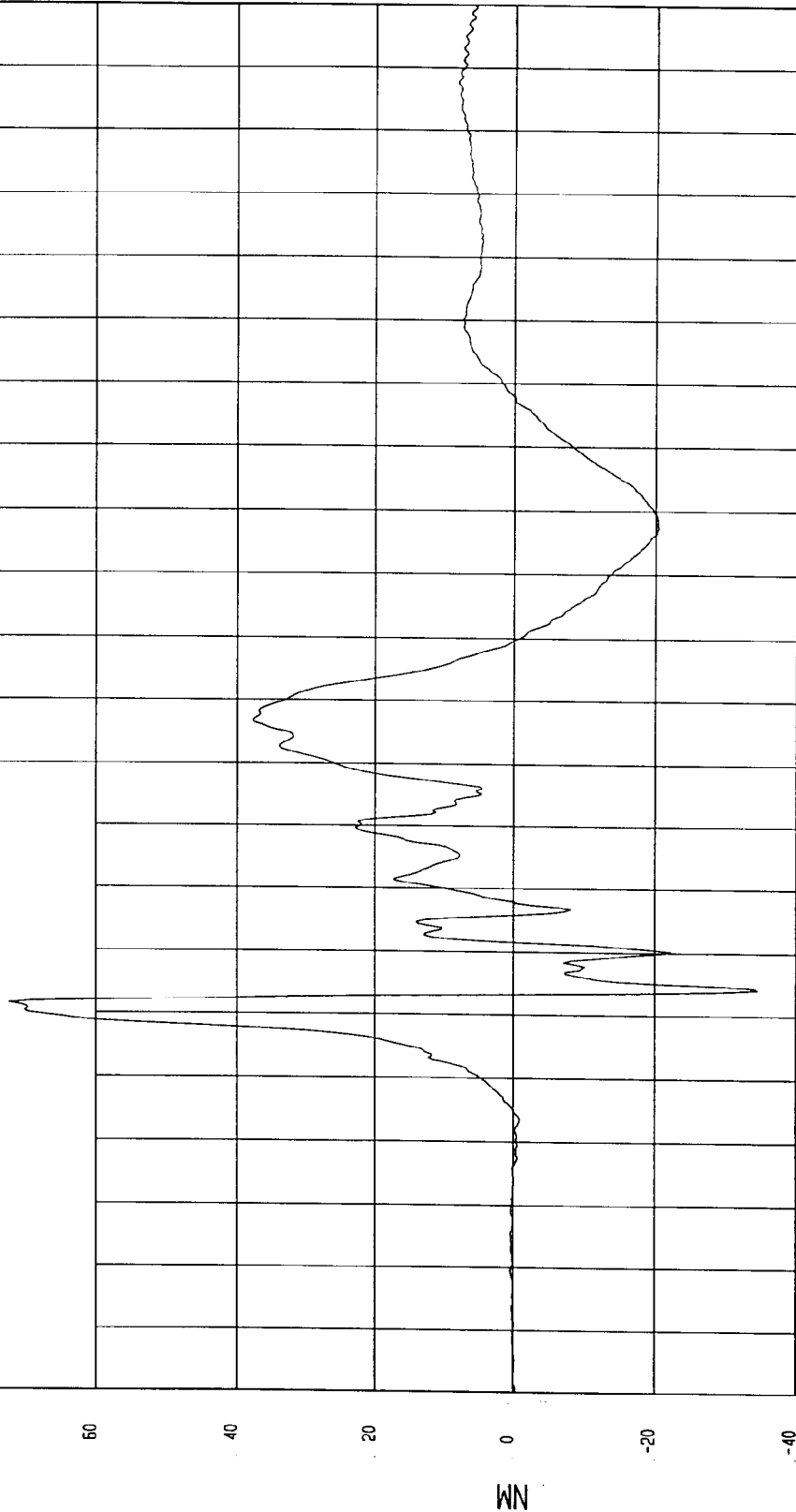
Speed: 35.1 MPH 56.5 KPH

Minimum = -34.95 NM at 44 msec

Maximum = 72.28 NM at 42 msec

PASSENGER LEFT UPPER TIBIA MOMENT X

1 ——— 899074MF.M94 Filterclass (600)



MCA Research  
08-17-2000 09:29

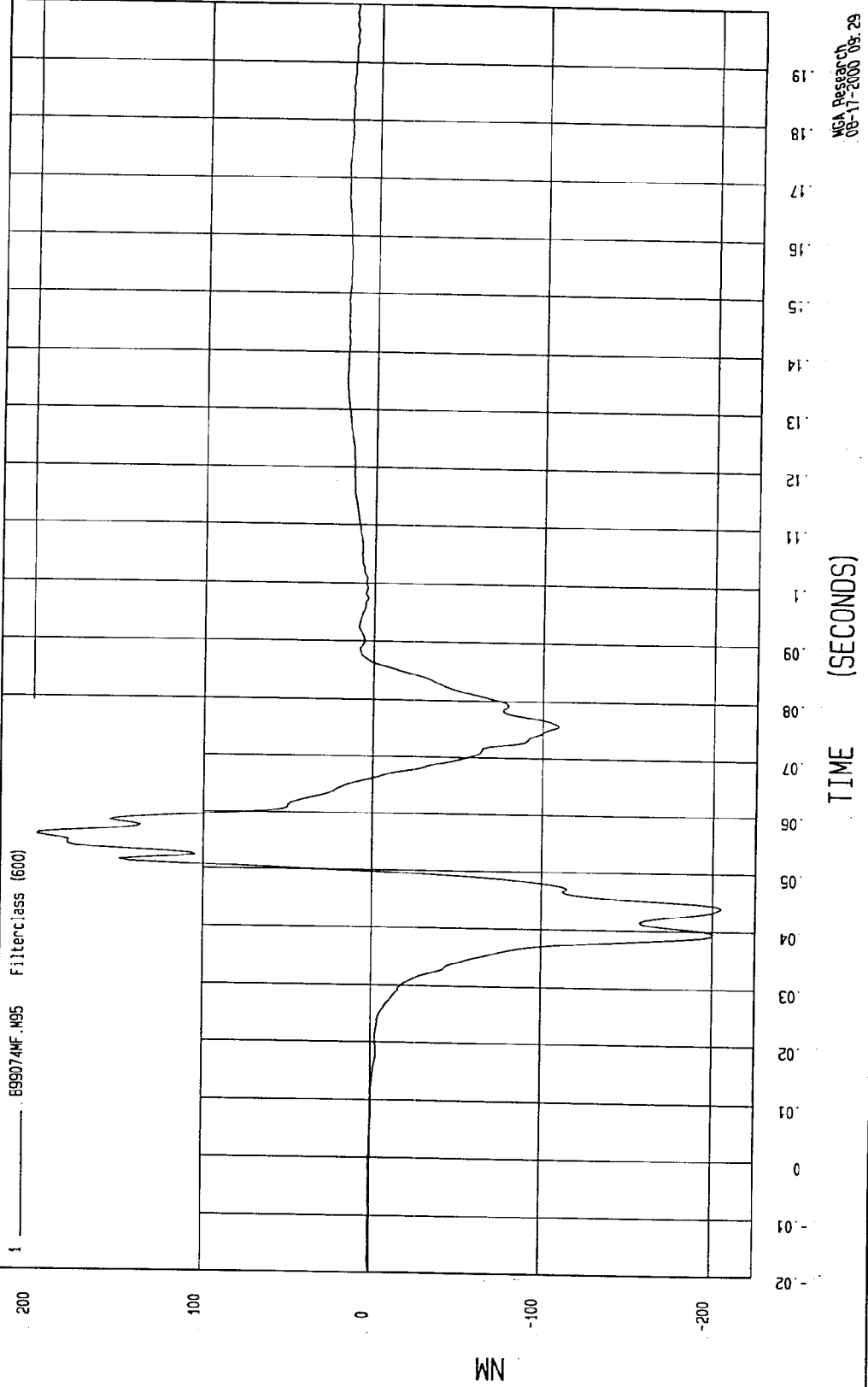
TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -205.22 NM at 44 msec      Maximum = 198.57 NM at 56 msec

PASSENGER LEFT UPPER TIBIA MOMENT Y



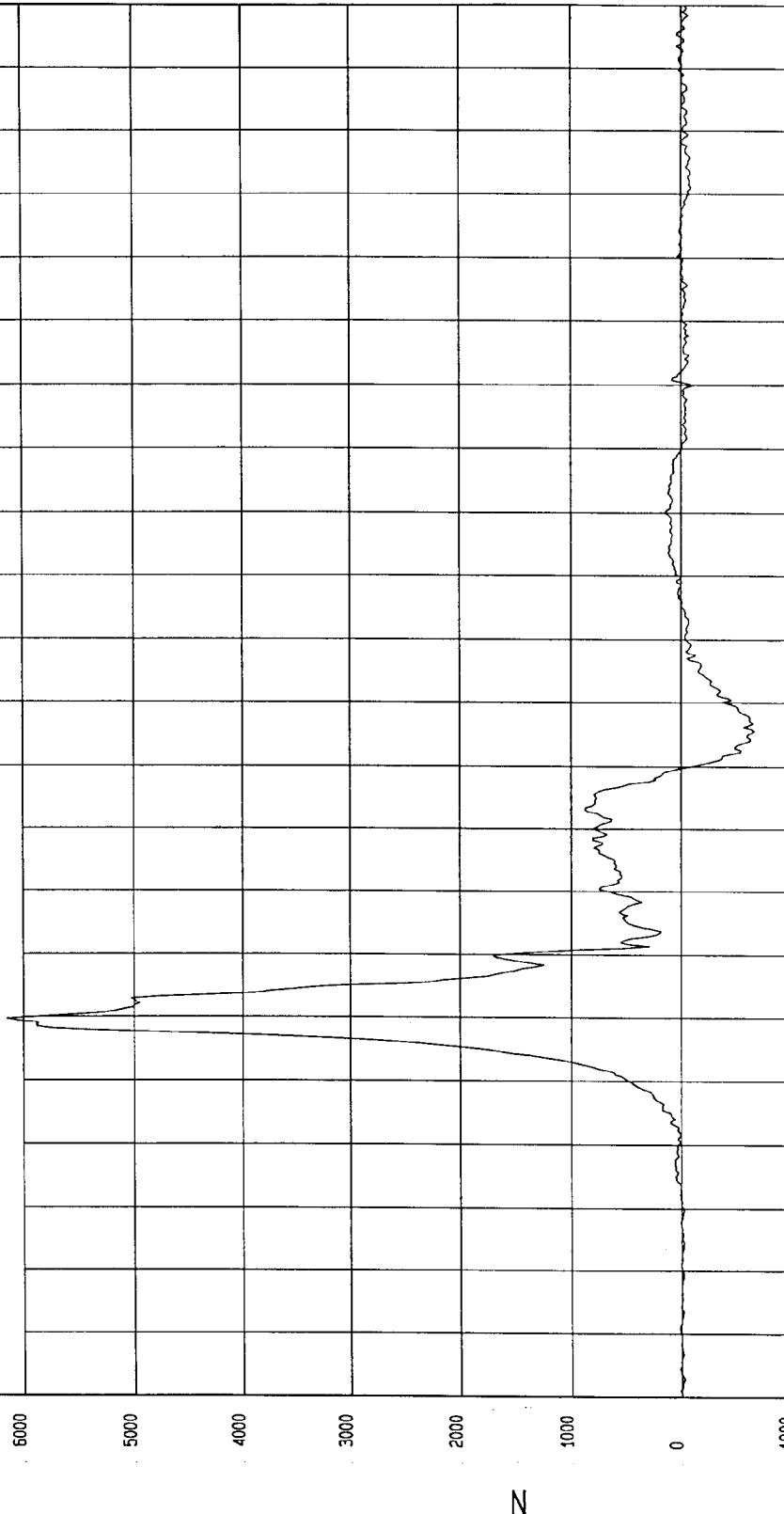
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -676.5 N at 66 msec Maximum = 6176.96 N at 40 msec

PASSENGER LEFT UPPER TIBIA FORCE Z

1 B99074FF.F96 Filterclass (600)



MSA Research  
08-17-2000 09:29

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

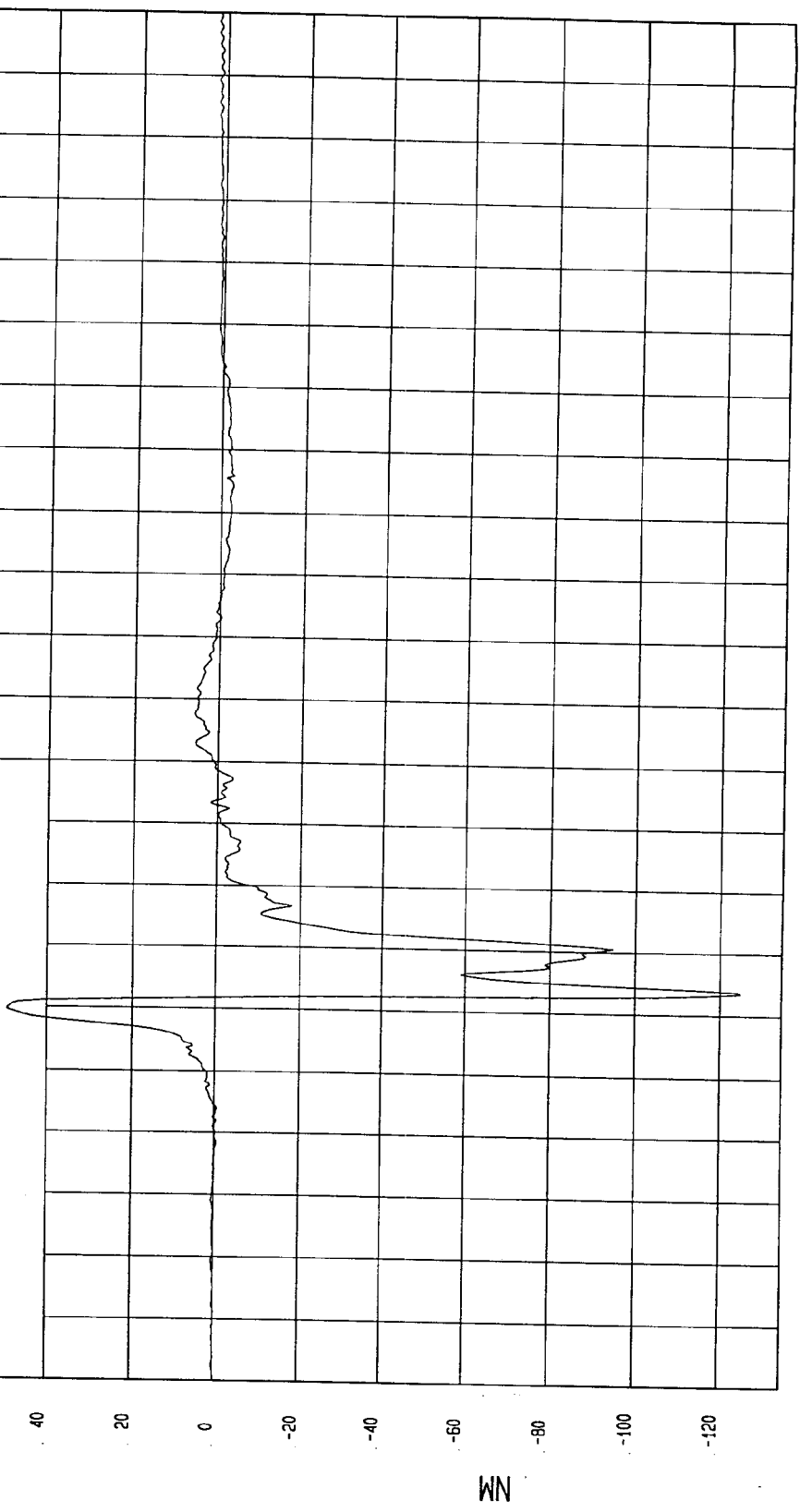
Speed: 35.1 MPH 56.5 KPH

Minimum = -125.91 NM at 44 msec

Maximum = 49.54 NM at 40 msec

PASSENGER LEFT LOWER TIBIA MOMENT X

1 ——— B99074NF.M97 Filterclass (500)

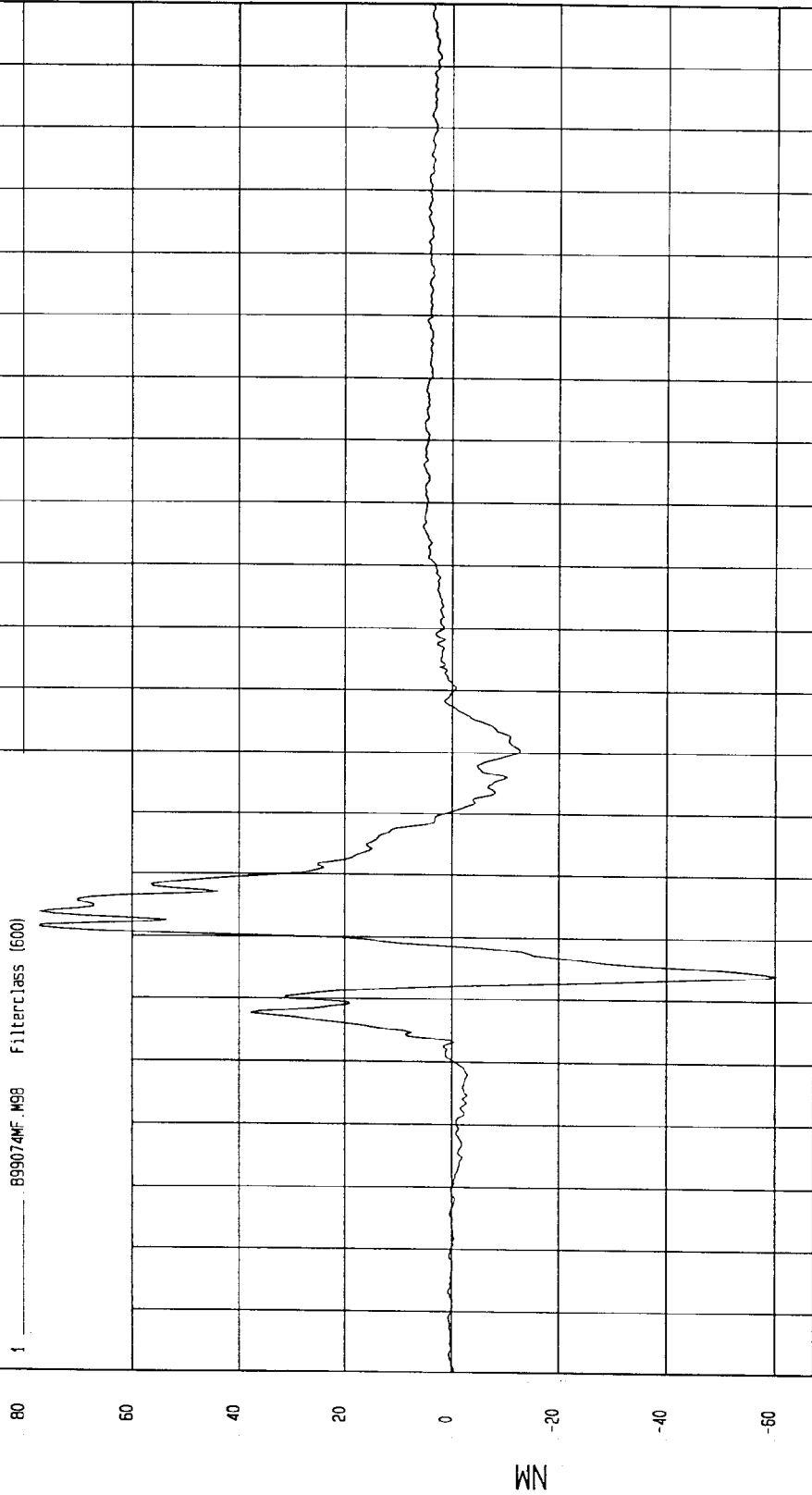


TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -60.18 NM at 44 msec Maximum = 77.75 NM at 52 msec

PASSENGER LEFT LOWER TIBIA MOMENT Y



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

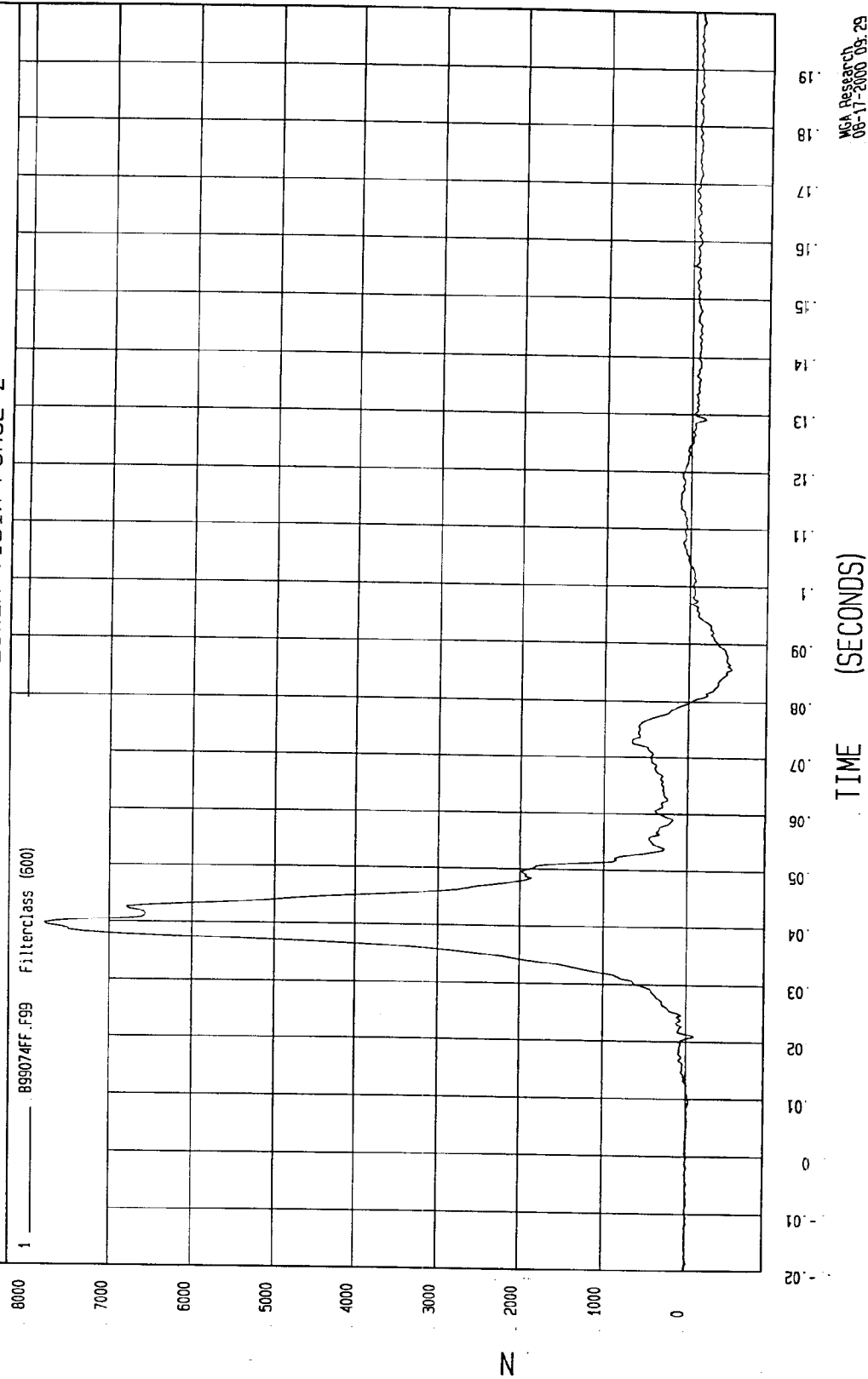
Speed: 35.1 MPH 56.5 KPH

Minimum = -520.94 N at 86 msec

Maximum = 7799.23 N at 40 msec

PASSENGER LEFT LOWER TIBIA FORCE Z

1 ——— B99074FF.F99 Filterclass (600)



WCA Research  
08-17-2000 09:29

B-98

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

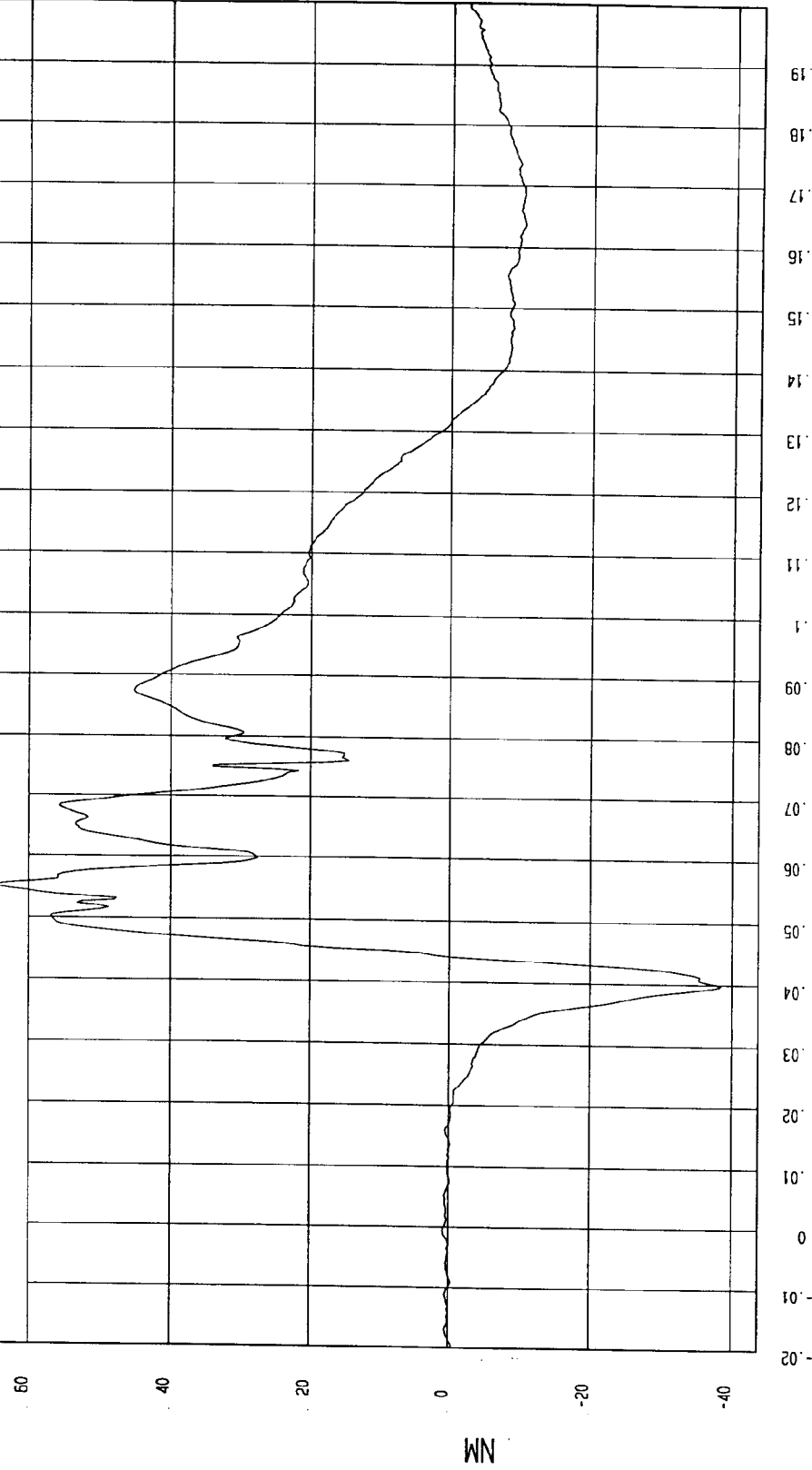
Speed: 35.1 MPH 56.5 KPH

Minimum = -38.49 NM at 40 msec

Maximum = 64.71 NM at 55 msec

PASSENGER RIGHT UPPER TIBIA MOMENT X

1 899074NF.M87 Filterclass (600)



MCA Research  
08-17-2000 09:29

TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

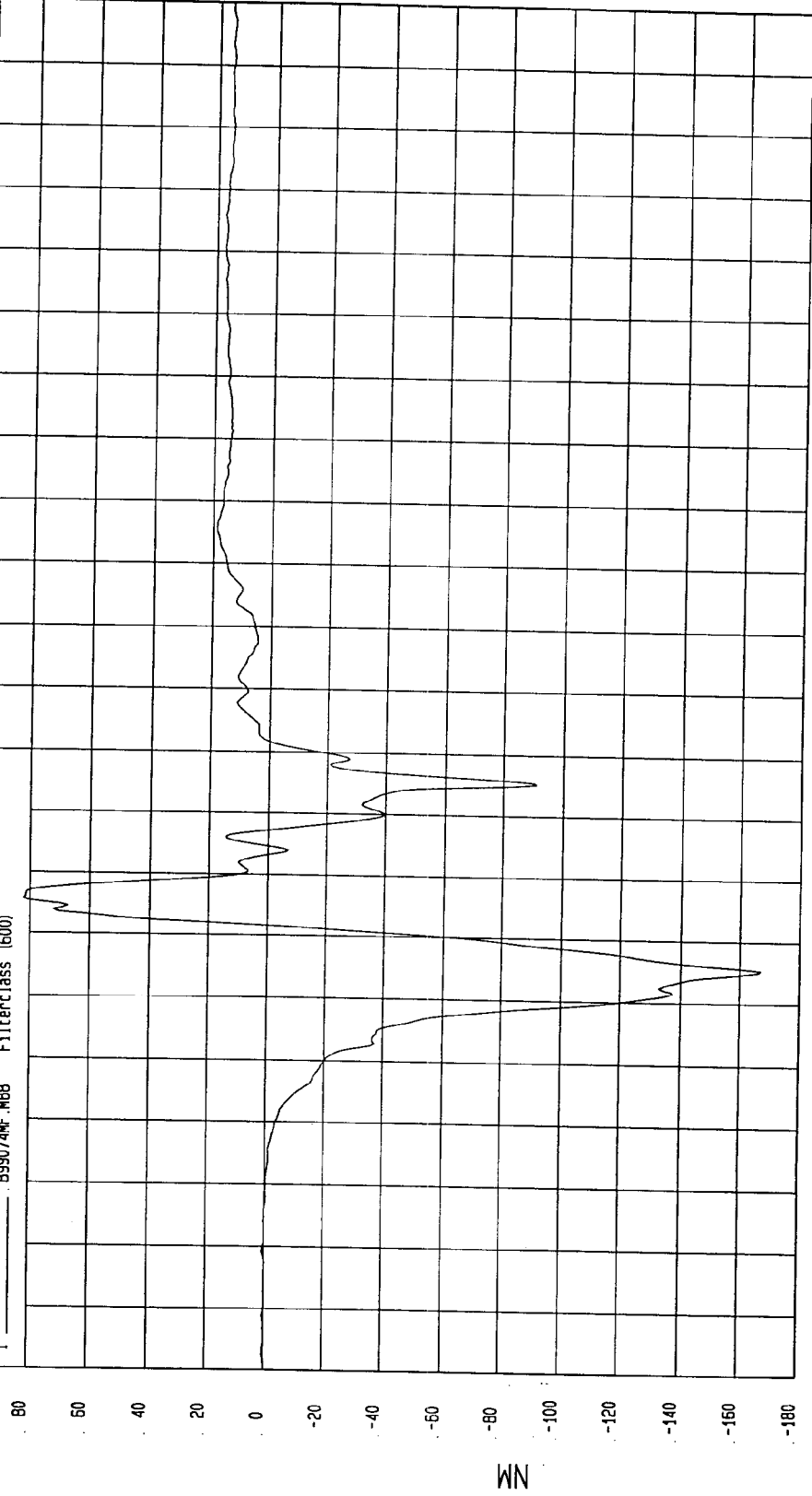
Speed: 35.1 MPH 56.5 KPH

Minimum = -167.53 NM at 45 msec

Maximum = 82.2 NM at 56 msec

PASSENGER RIGHT UPPER TIBIA MOMENT Y

1 .B99074NF.M88 Filterclass (600)



B-100

MGA Research  
08-17-2000 09:29

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -92.18 N at 138 msec

Maximum = 3651.07 N at 41 msec

PASSENGER RIGHT UPPER TIBIA FORCE Z

1 099074FF.F89 Filterclass (600)

3000

2000

1000

0

N

-02

0

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

McA Research  
08-17-2000 09:29

B-101

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

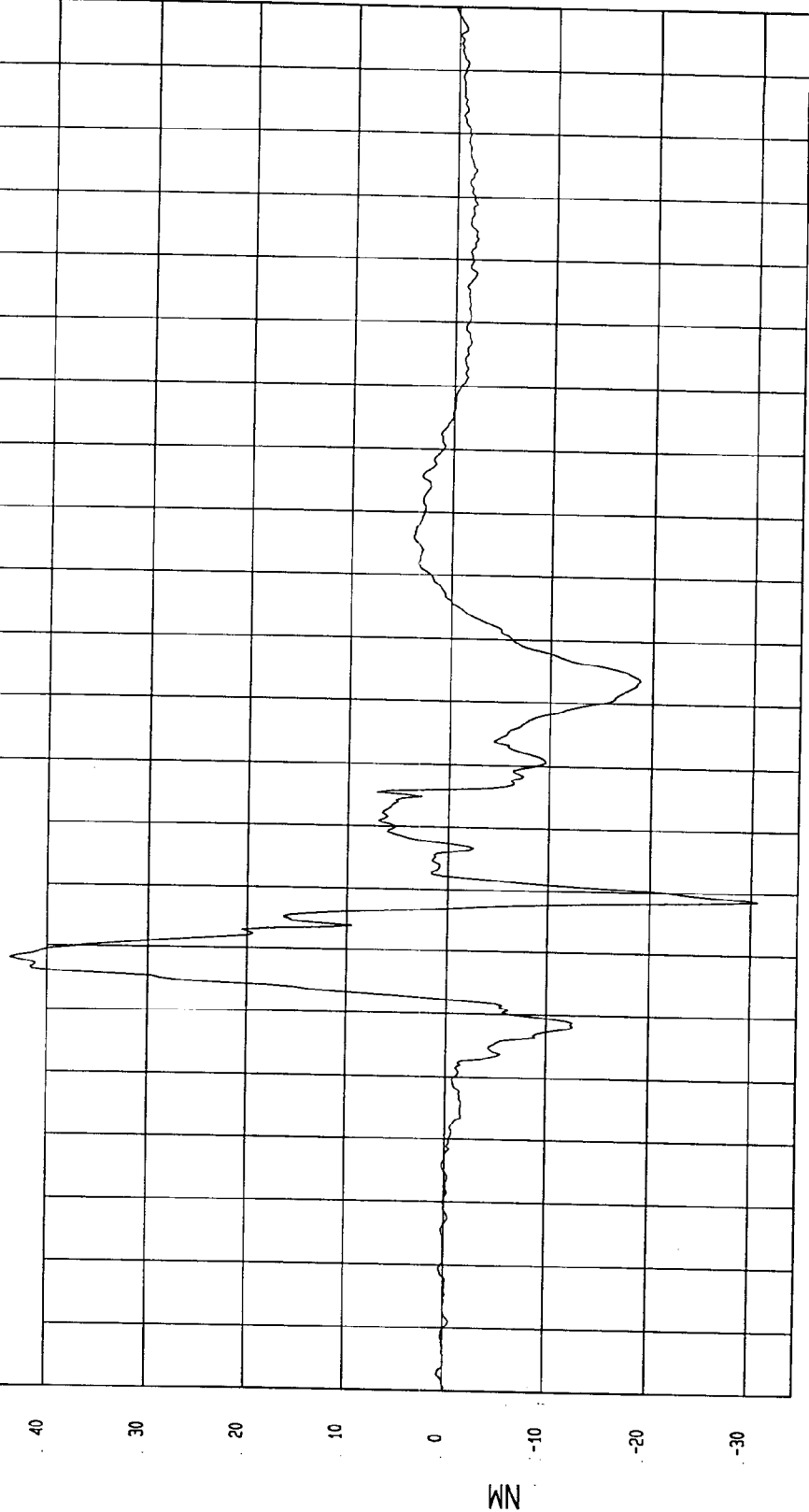
Speed: 35.1 MPH 56.5 KPH

Minimum = -30.77 NM at 59 msec

Maximum = 43.69 NM at 48 msec

PASSENGER RIGHT LOWER TIBIA MOMENT X

1 ——— B93074MF.M90 Filter(class 600)



TIME (SECONDS)

MGA Research  
08-17-2000 09:29

B-102

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

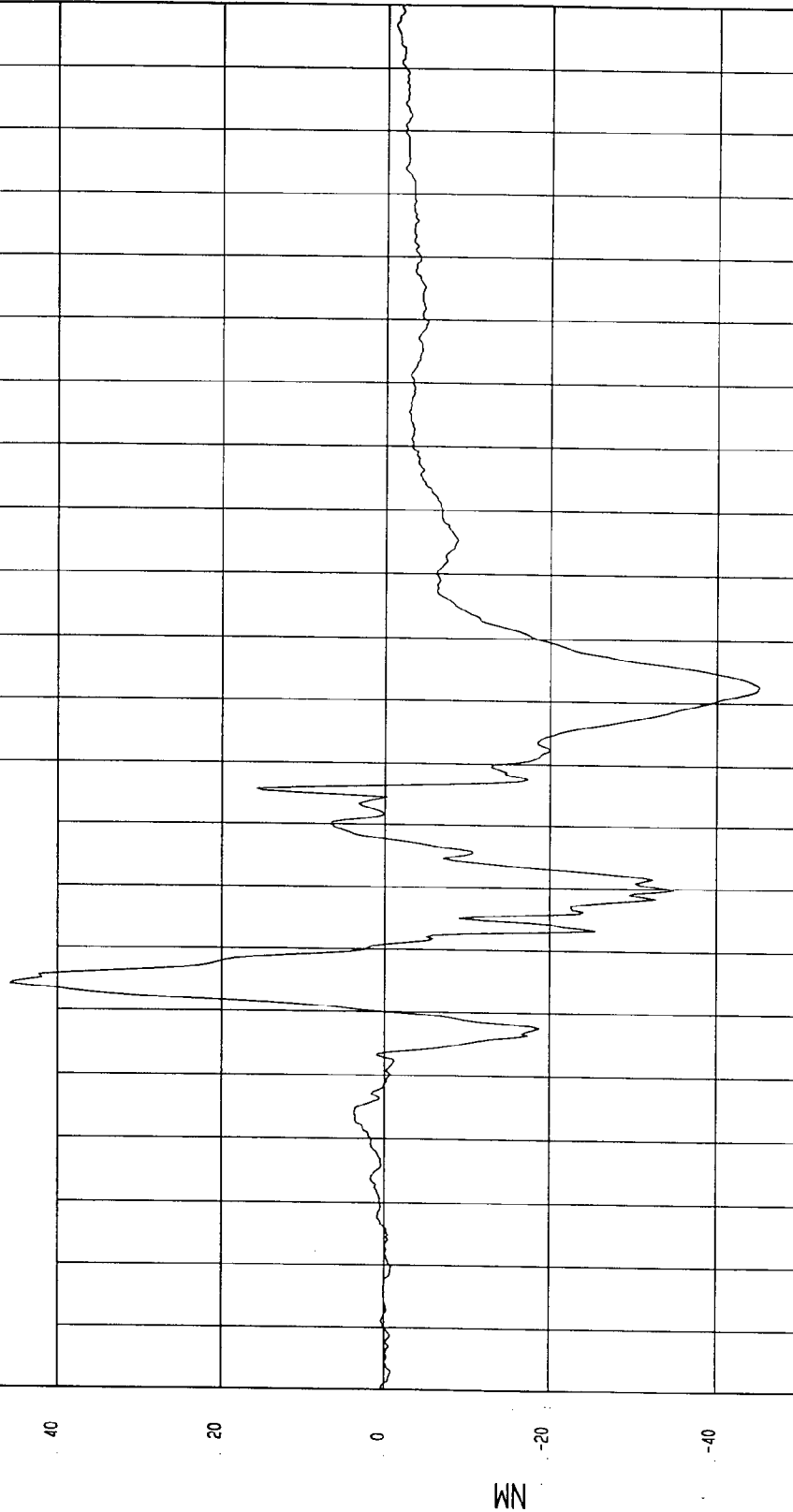
Speed: 35.1 MPH 56.5 KPH

Minimum = -45.32 NM at 93 msec

Maximum = 45.77 NM at 44 msec

PASSENGER RIGHT LOWER TIBIA MOMENT Y

1 ——— B99074NF.M91 Filterclass (600)



TIME (SECONDS)

MGA Research  
08-17-2000 09:29

B-103

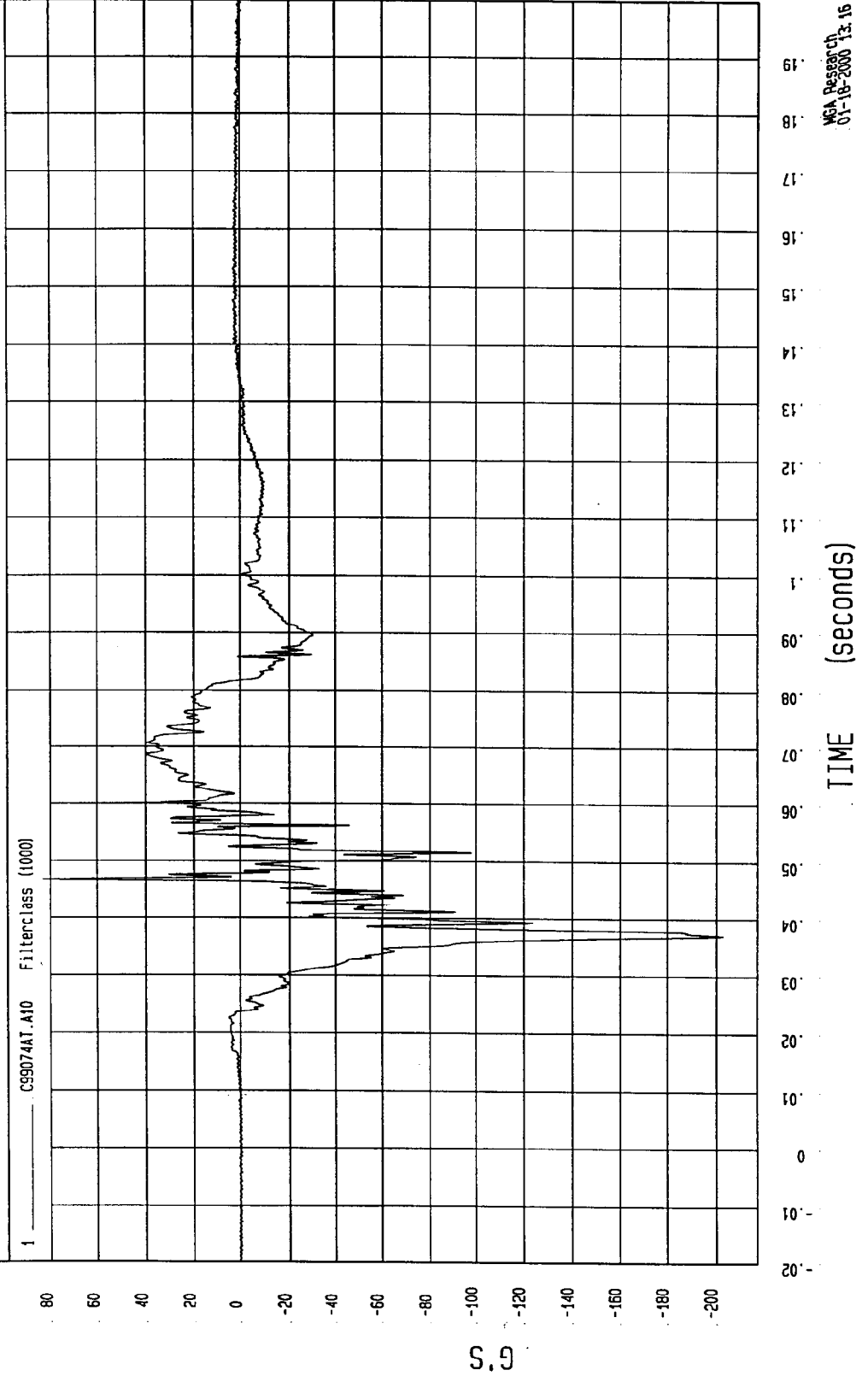
Passenger Right Lower Tibia Force Z vs. Time  
No Valid Data Collected

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -202.76 G'S at 37 msec      Maximum = 83.17 G'S at 47 msec

PASSENGER LEFT FOOT BALL Z ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

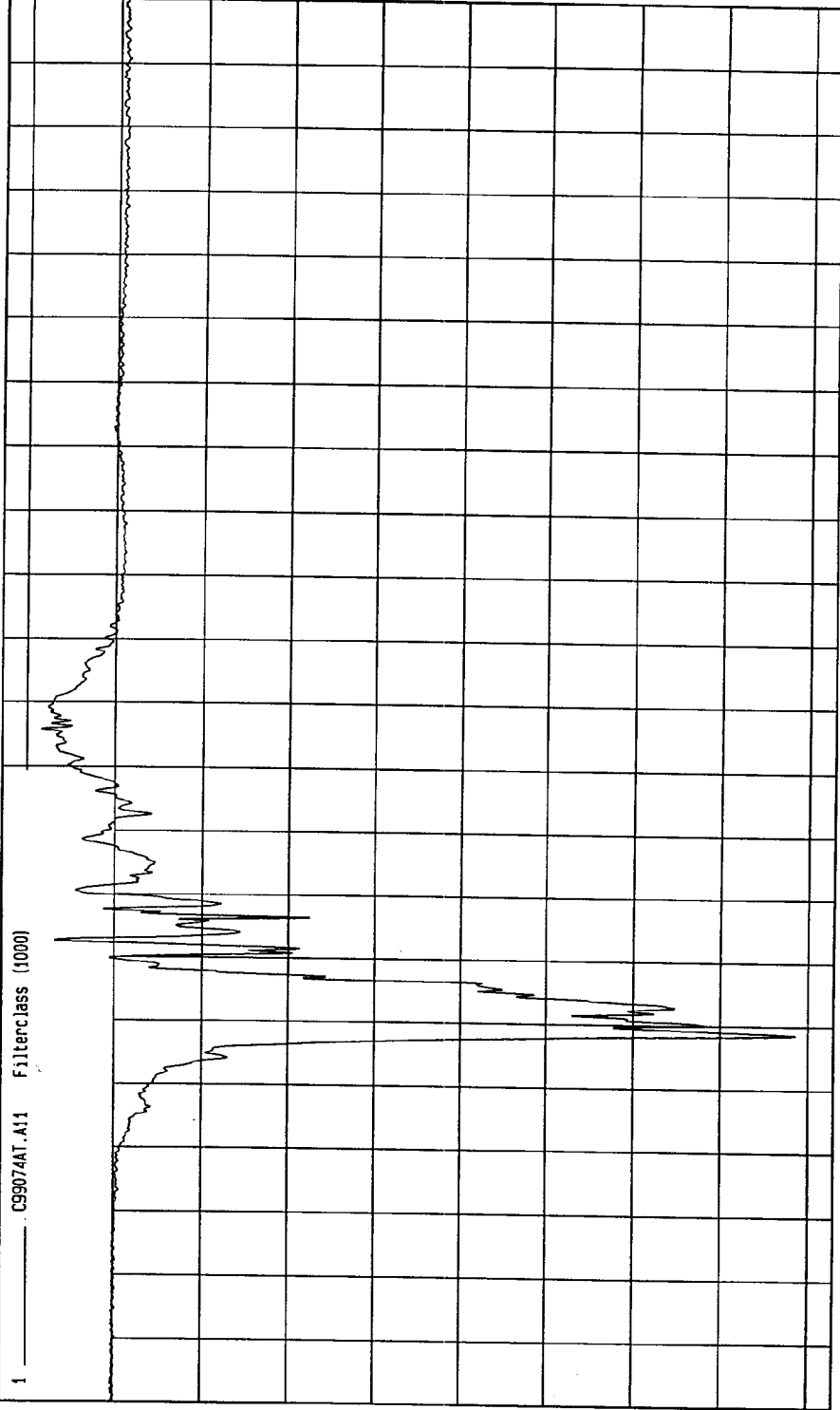
COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

Maximum = 15.89 G'S at 86 msec

Minimum = -157.15 G'S at 39 msec

PASSENGER LEFT HEEL X ACCELERATION

1 C99074AT.A11 Filterclass (1000)



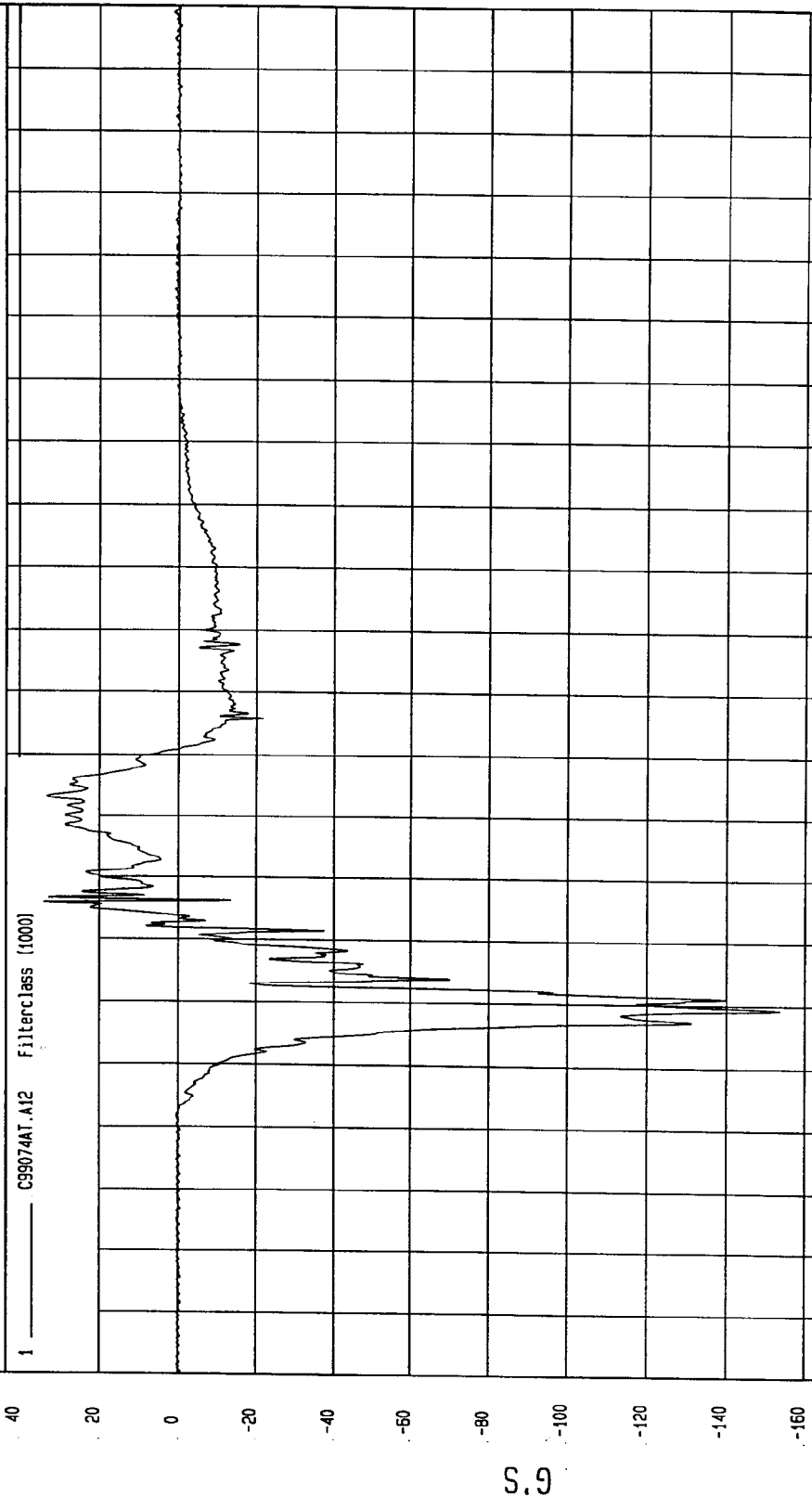
WCA Research  
01-16-2000 12:16

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -153.65 G'S at 39 msec      Maximum = 33.82 G'S at 56 msec

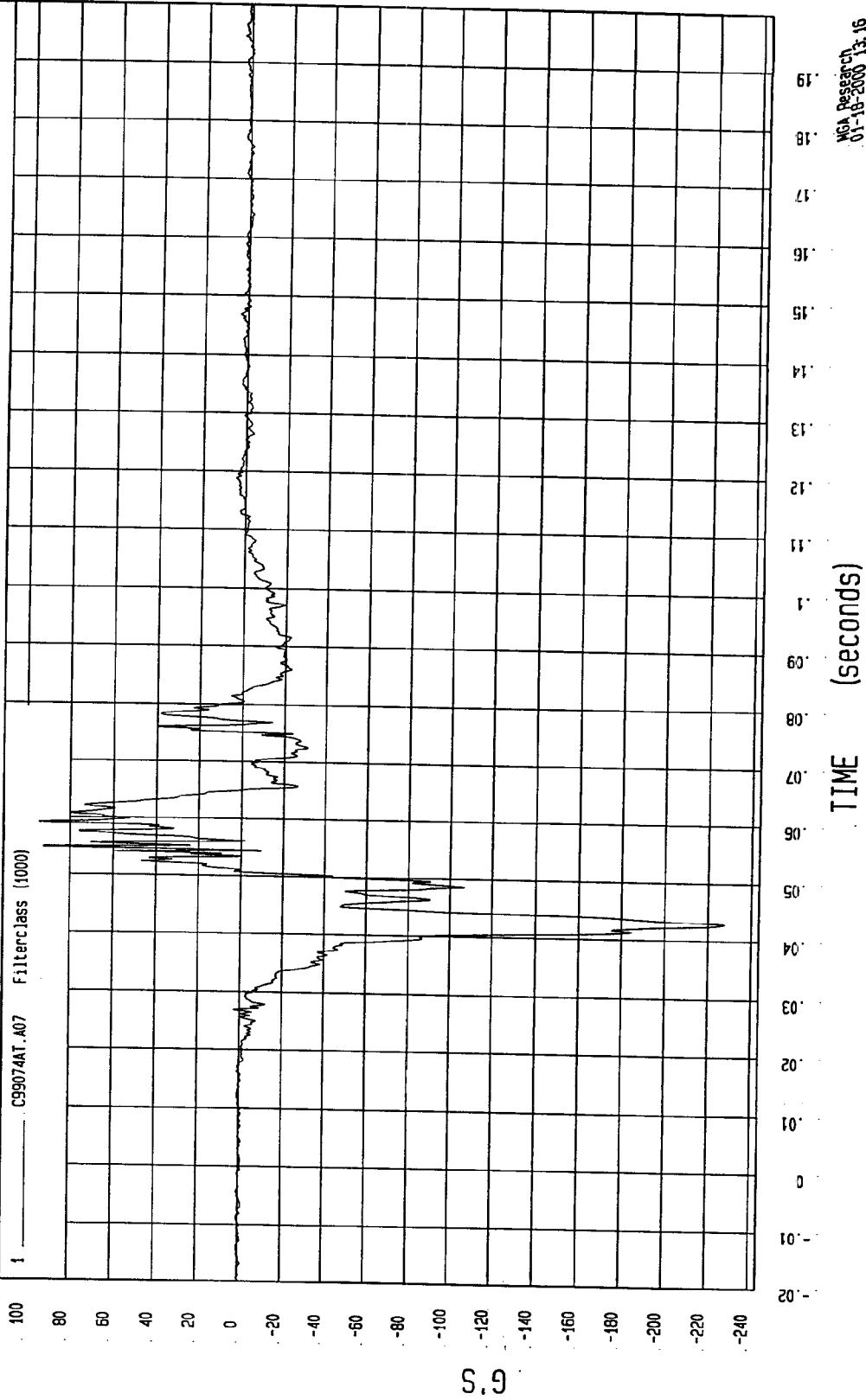
PASSENGER LEFT HEEL Z ACCELERATION



WCA Research  
01-18-2000 13:16

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDA ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH  
Minimum = -227.49 G's at 43 msec      Maximum = 94.4 G's at 59 msec

PASSENGER RIGHT FOOT BALL Z ACCELERATION

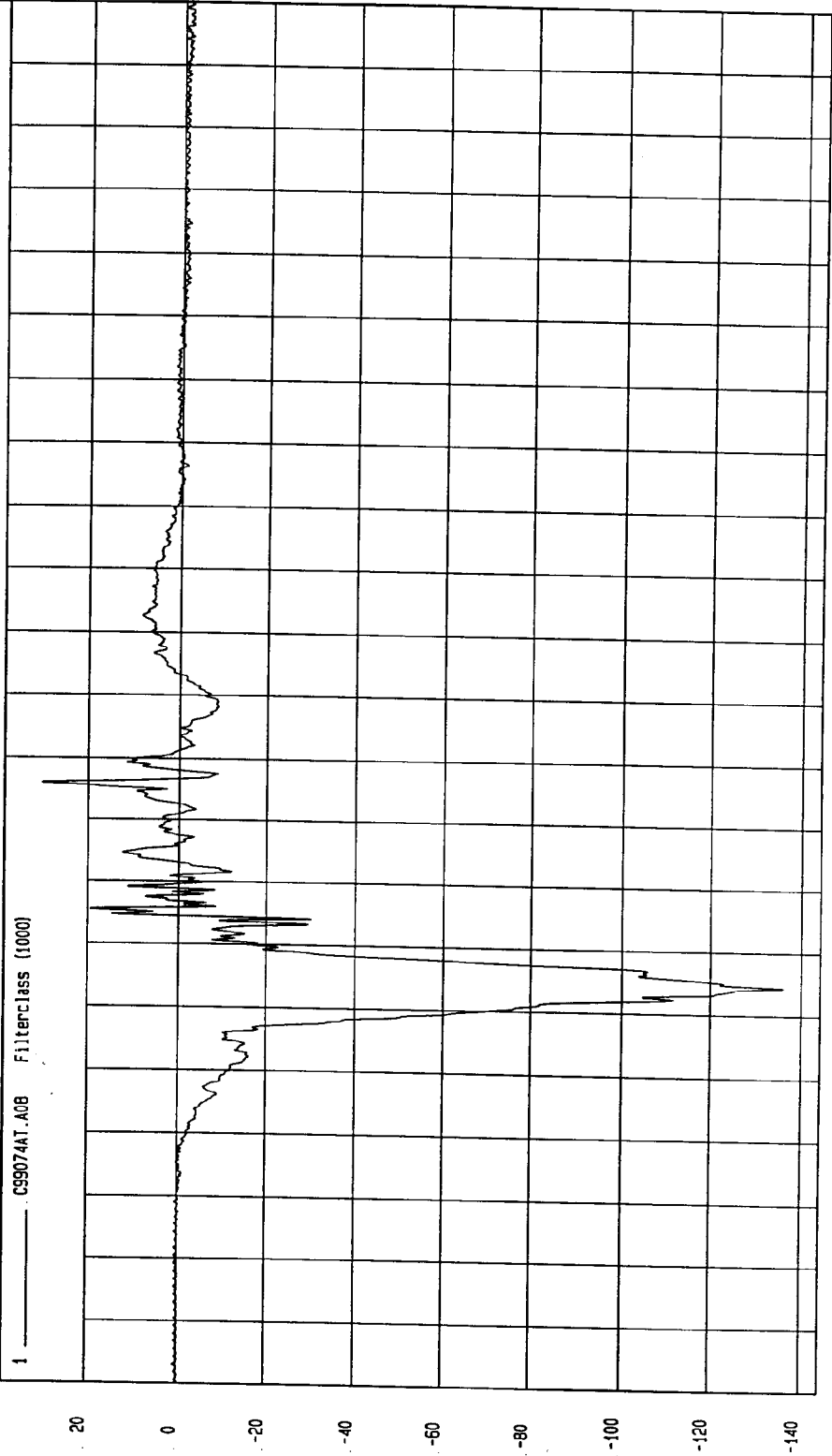


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -135.96 G'S at 44 msec      Maximum = 30.32 G'S at 76 msec

PASSENGER RIGHT HEEL X ACCELERATION



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

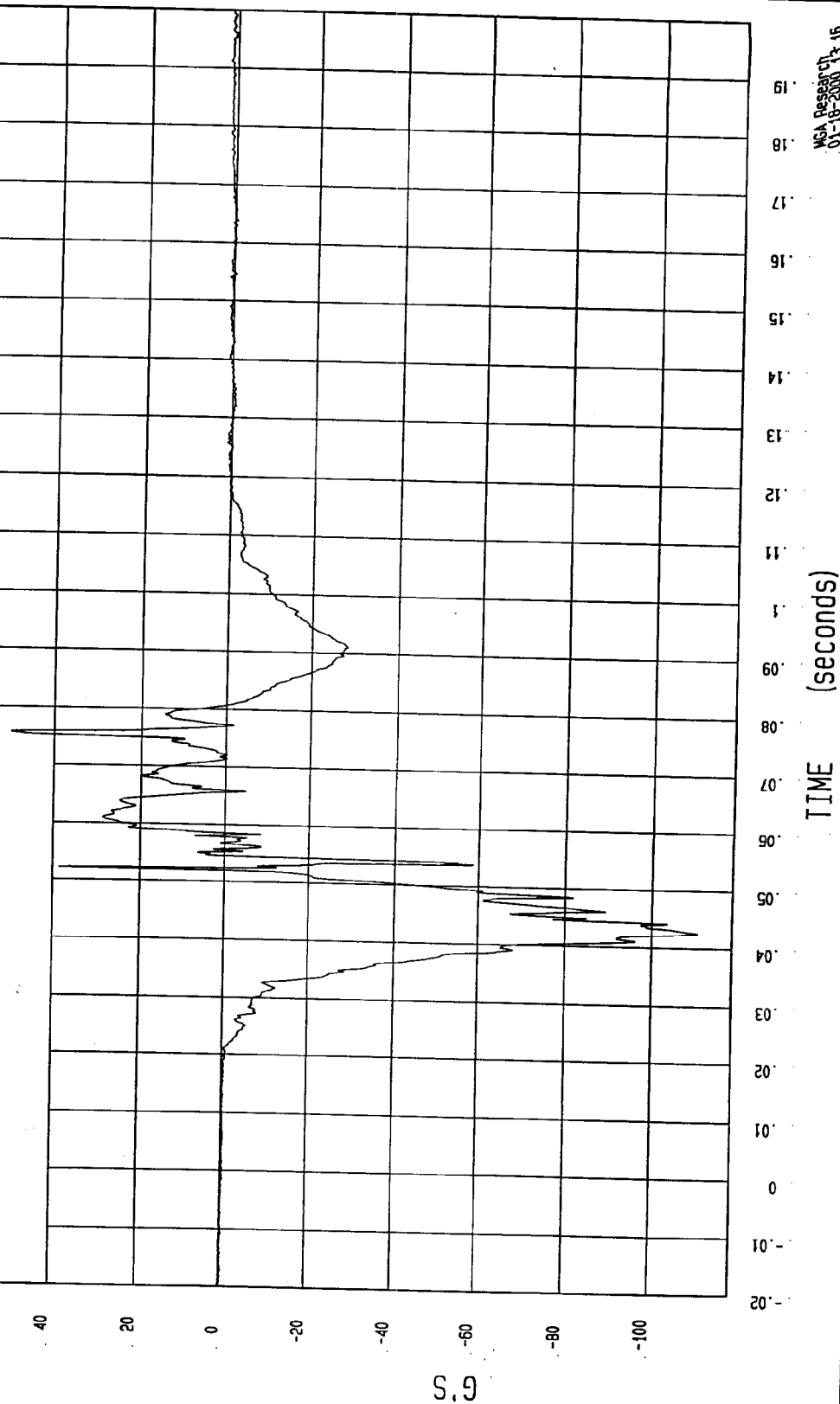
Speed: 35.1 MPH 56.5 KPH

Minimum = -110.59 G'S at 43 msec

Maximum = 50.03 G'S at 76 msec

PASSENGER RIGHT HEEL Z ACCELERATION

1 C99074AT.A09 Filterclass (1000)

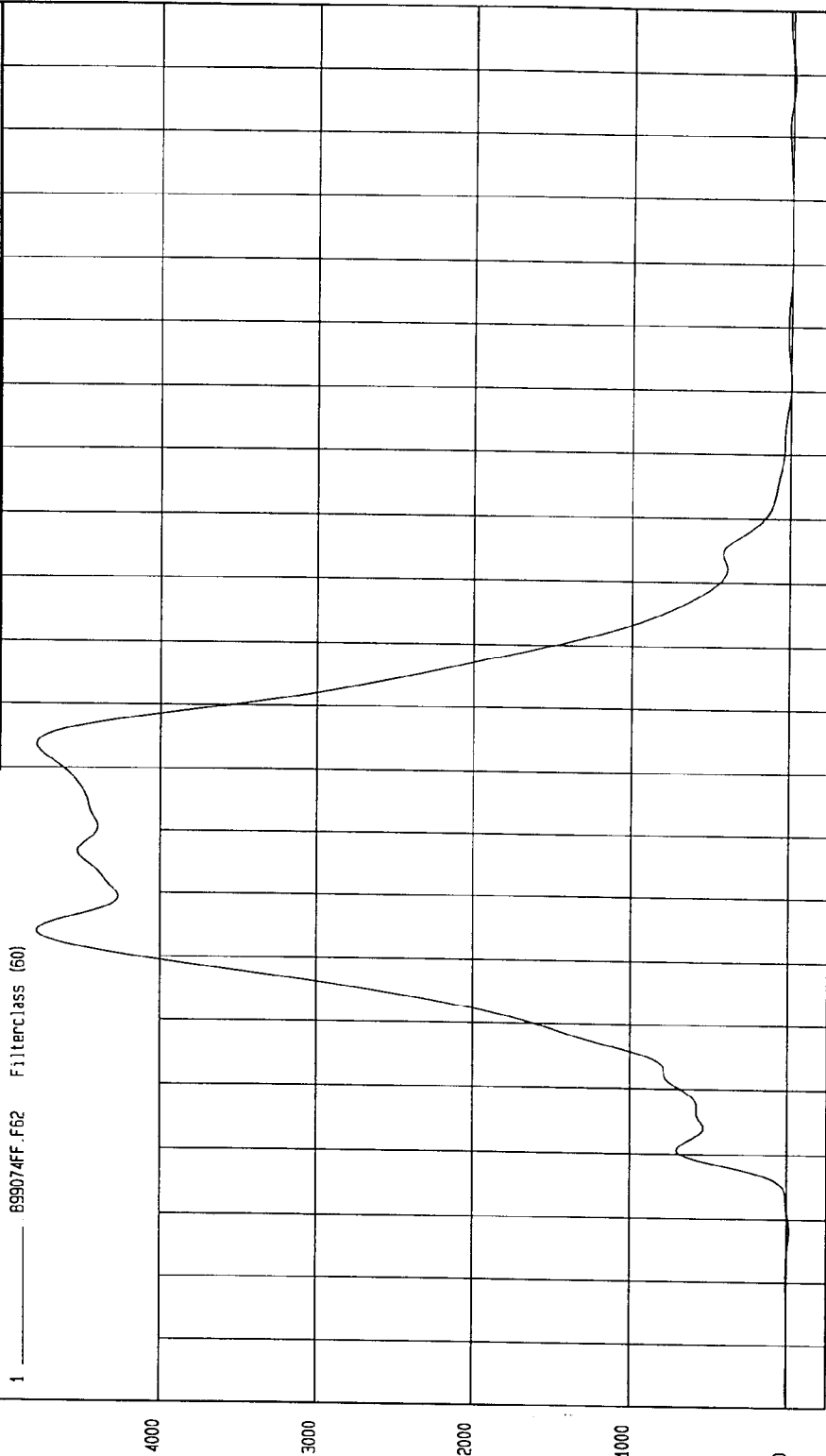
NSA Research  
01-16-2000 13:15

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -15.38 N at 8 msec      Maximum = 4772.3 N at 54 msec

PASSENGER SHOULDER BELT FORCE



TIME (SECONDS)

MSA Research  
08-17-2000 09:09

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -14.81 N at -20 msec

Maximum = 7419.08 N at 60 msec

PASSENGER LAP BELT FORCE

1 — 899074FF.F63 Filterclass (60)

7000

6000

5000

4000

3000

2000

1000

0

N

No Valid Data  
After .06 seconds

TIME (SECONDS)

MCA Research  
12-06-1999 11:07

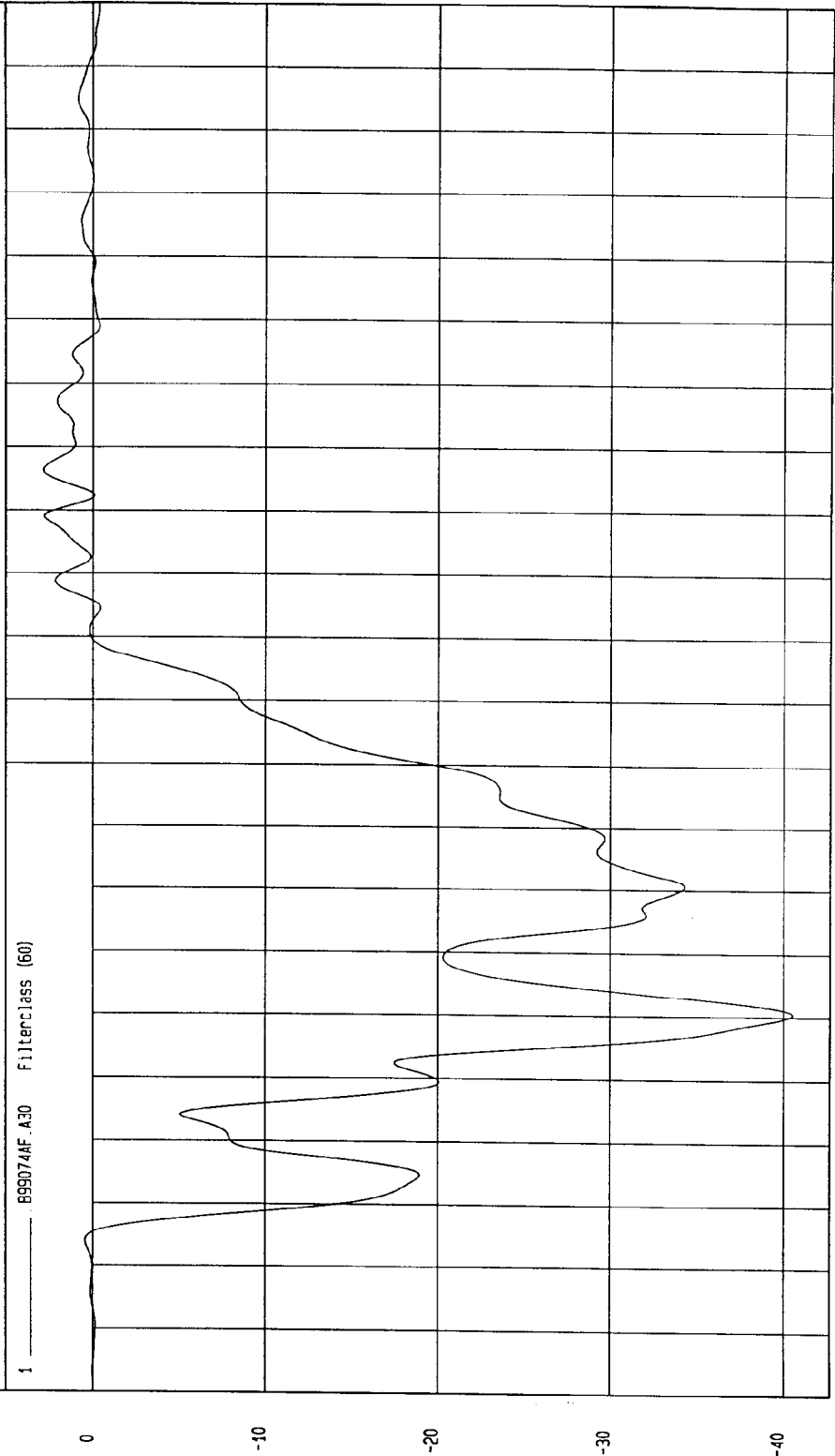
-.02 -.01 0 .01 .02 .03 .04 .05 .06 .07 .08 .09 .1 .11 .12 .13 .14 .15 .16 .17 .18 .19

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -40.53 G'S at 40 msec      Maximum = 2.82 G'S at 126 msec

LEFT REAR SEAT CROSSMEMBER X ACCELERATION



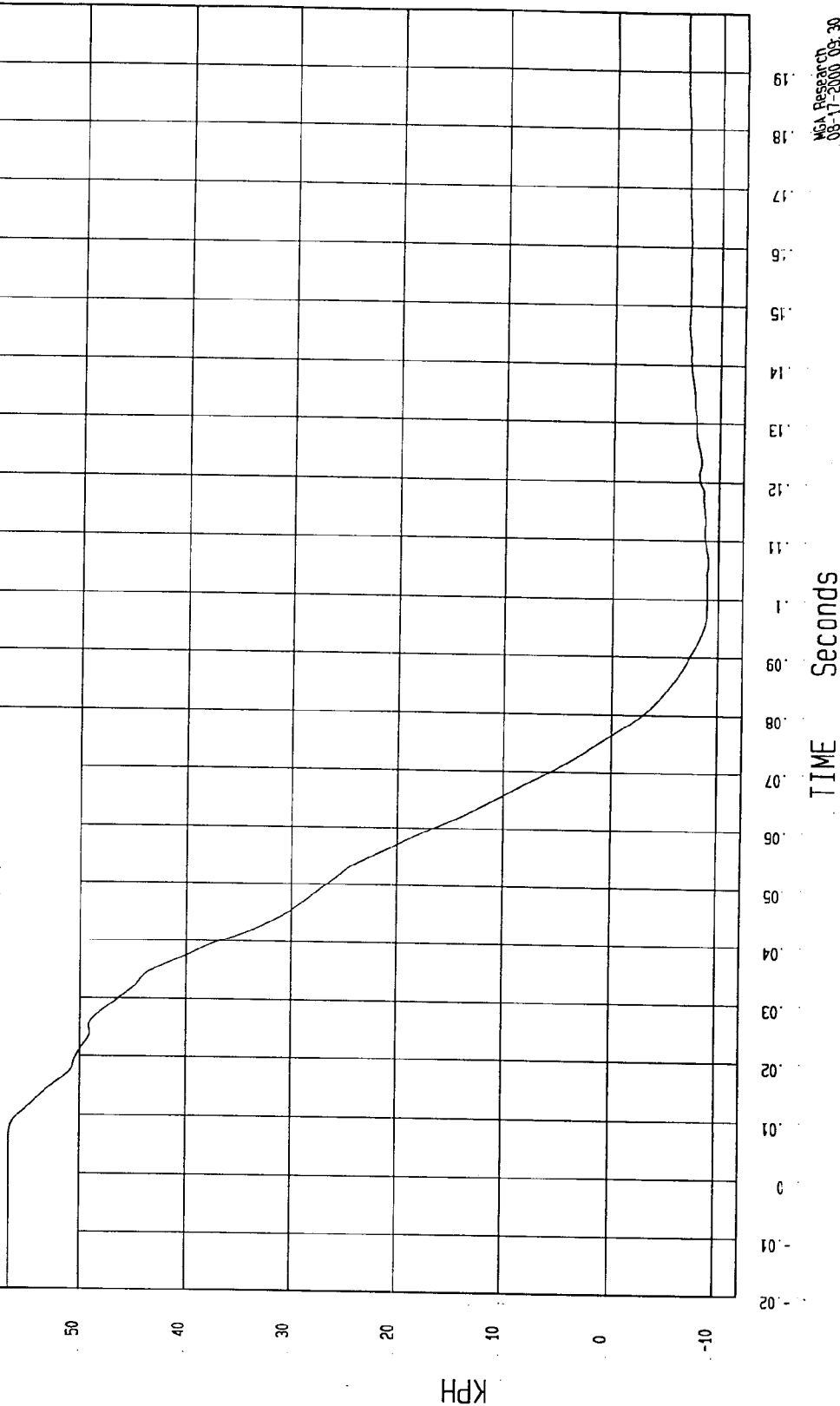
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -9.04 KPH at 106 msec      Maximum = 56.6 KPH at -15 msec

## LEFT REAR SEAT CROSSMEMBER X VELOCITY

1 ——— B99074A1.V30 Filterclass (180)

MCA Research  
08-17-2000 09:30

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

Speed: 35.1 MPH 56.5 KPH

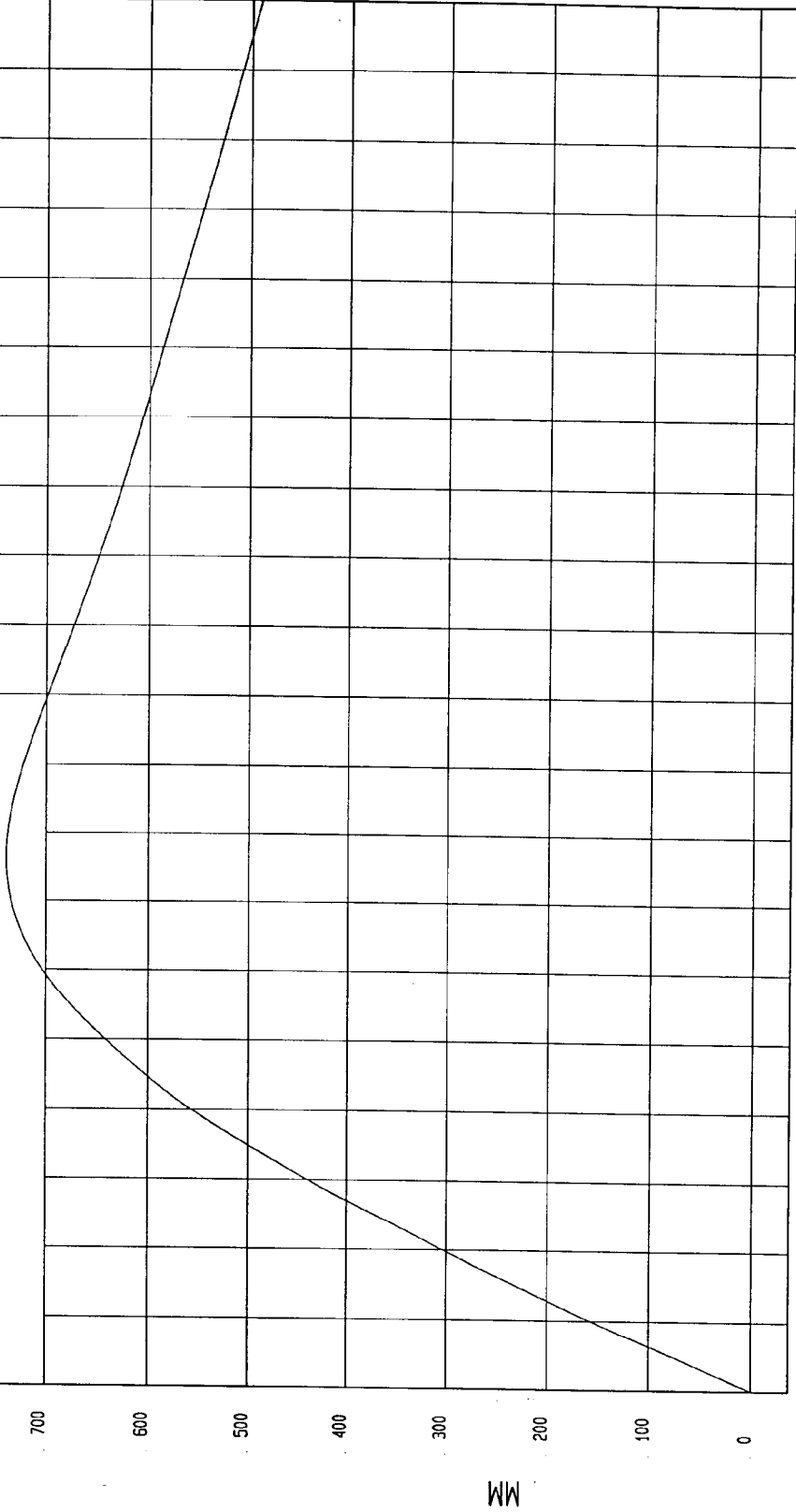
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 739.65 MM at 76 msec

Minimum = 0 MM at 0 msec

LEFT REAR SEAT CROSSMEMBER X DISPLACEMENT

1 ——— 899074A1.D30 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -43.29 G'S at 39 msec

Maximum = 3.54 G'S at 121 msec

RIGHT REAR SEAT CROSSMEMBER X ACCELERATION

1 ——— B99074F.A20 Filterclass (60)



MCA Research  
08-17-2000 09:30

TIME (SECONDS)

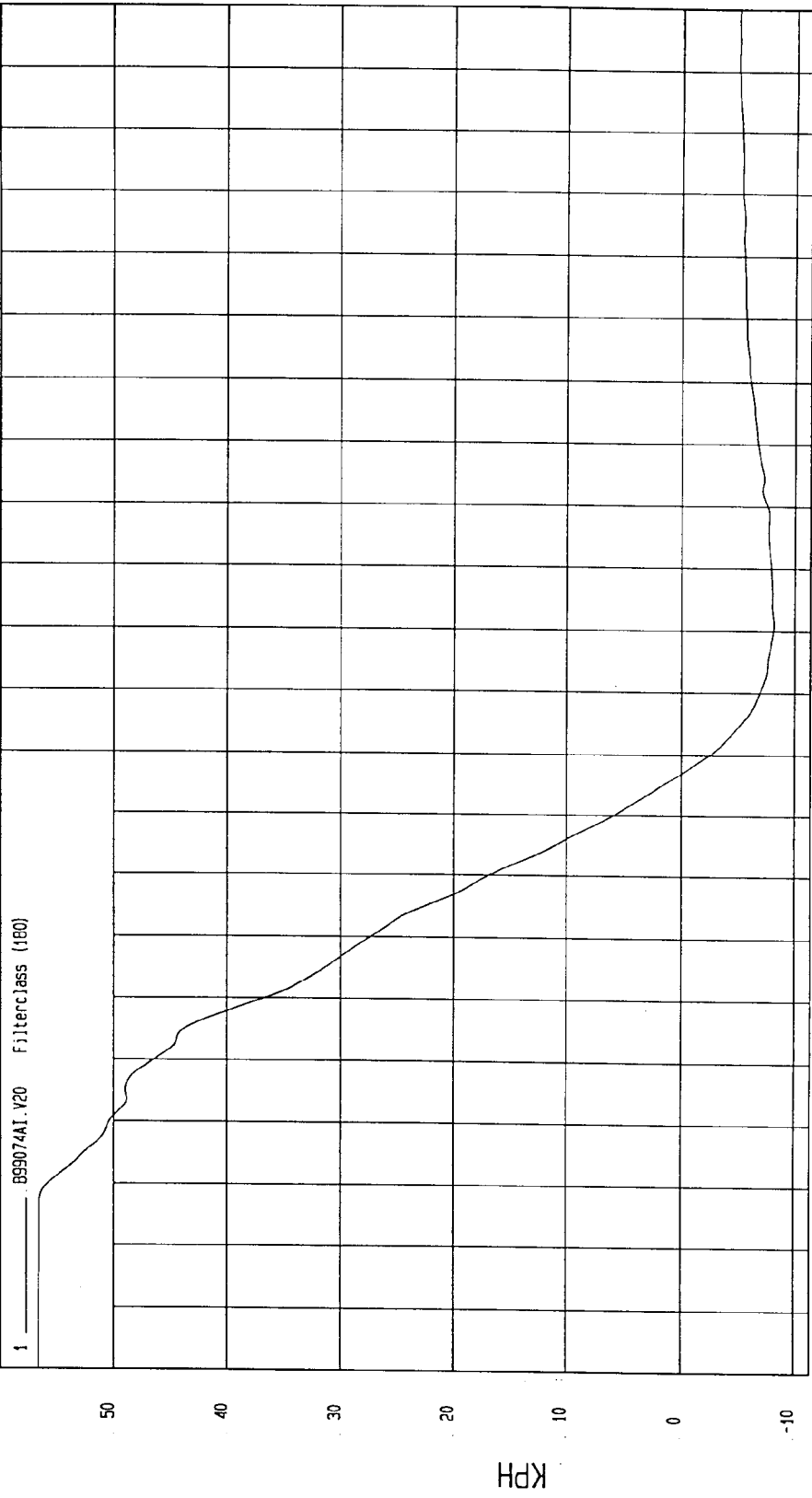
B-116

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -8.15 KPH at 101 msec      Maximum = 56.6 KPH at -16 msec

RIGHT REAR SEAT CROSSMEMBER X VELOCITY



TIME Seconds

MEV Research  
08-17-2000 09:30

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

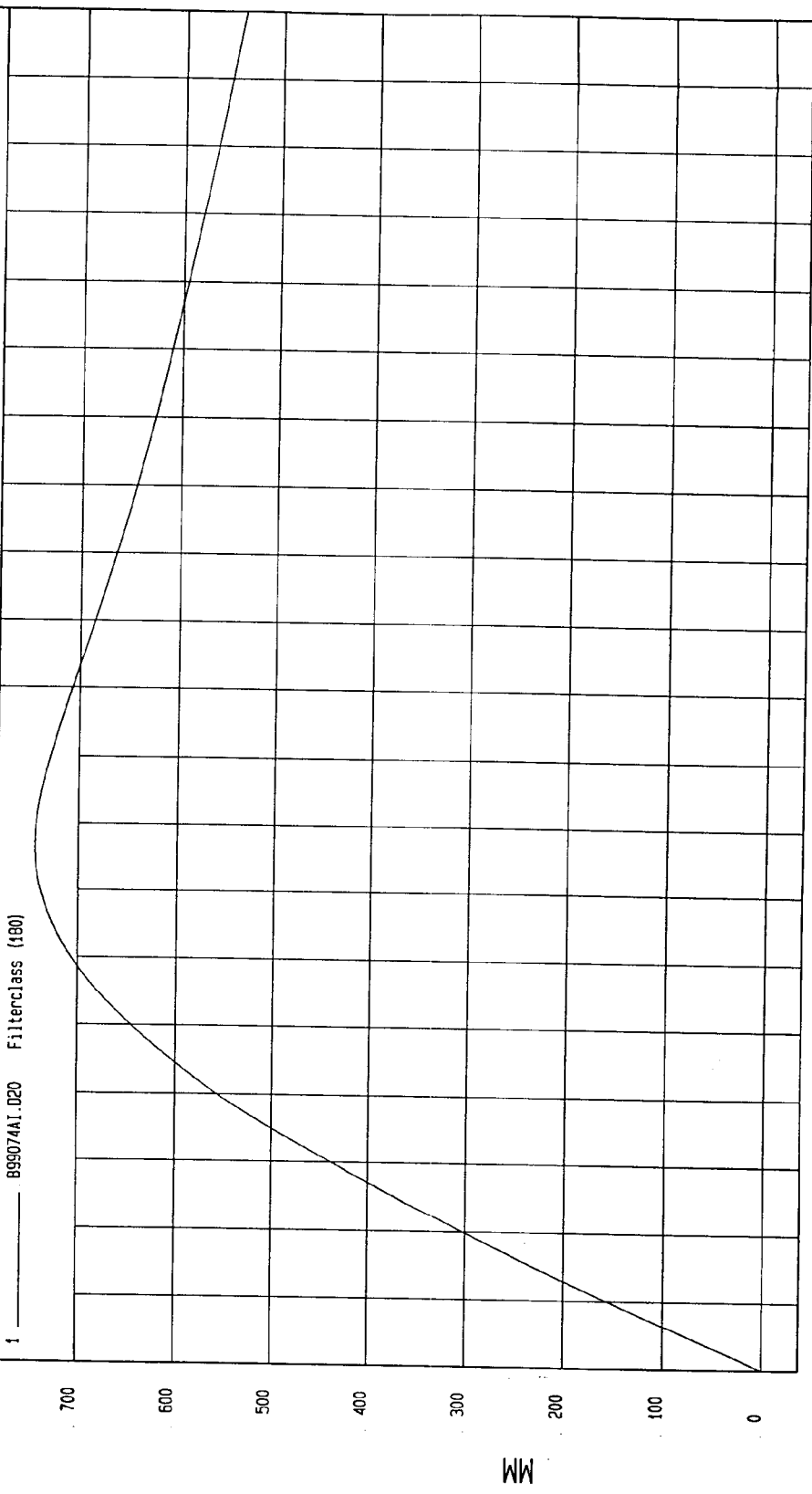
Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 743.48 MM at 77 msec

RIGHT REAR SEAT CROSSMEMBER X DISPLACEMENT

1 ——— B99074A1.020 Filterclass (180)



TIME Seconds

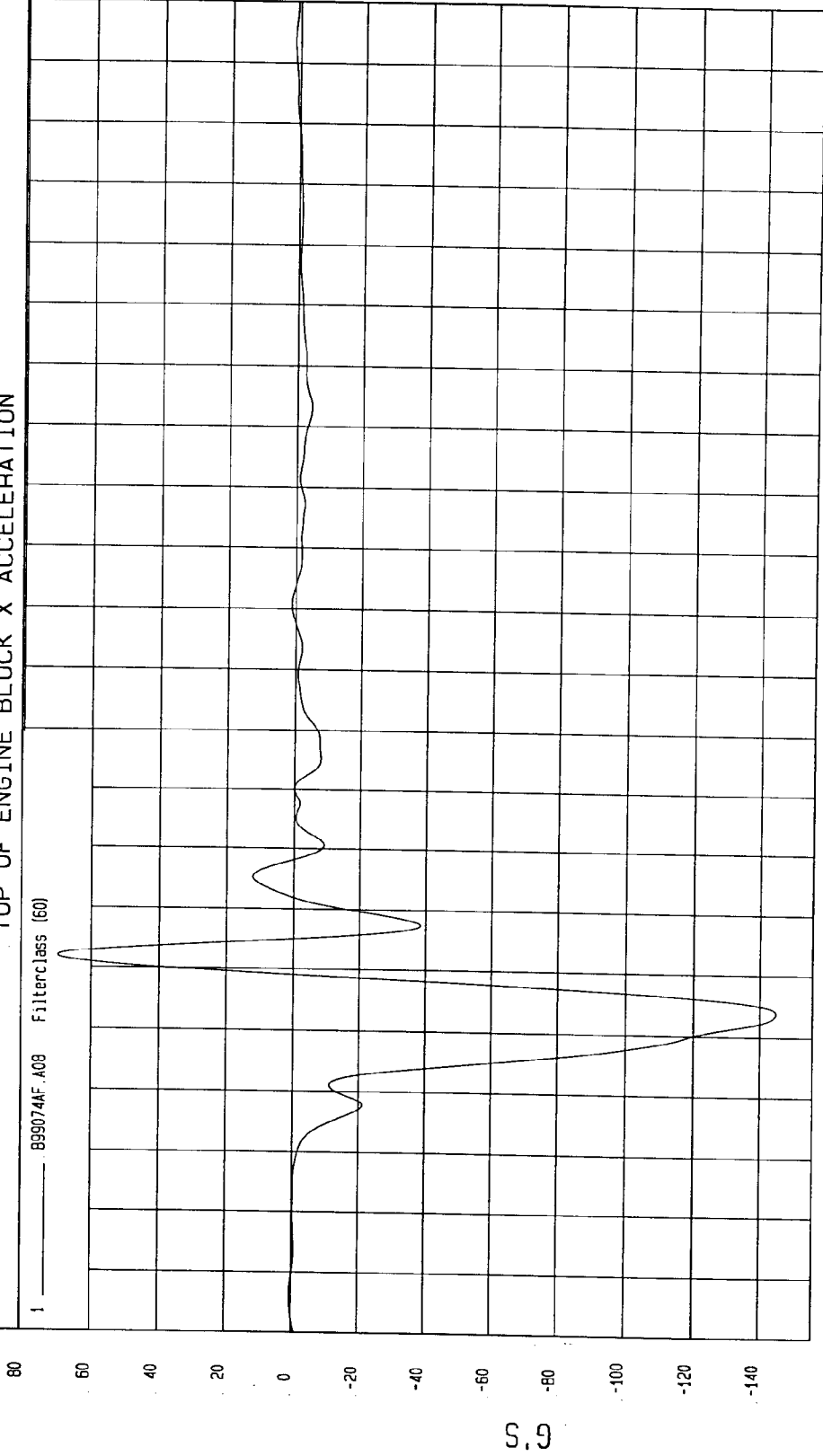
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -144.91 G'S at 34 msec  
Maximum = 69.91 G'S at 42 msec

TOP OF ENGINE BLOCK X ACCELERATION

1 899074AF.A08 Filterclass (60)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

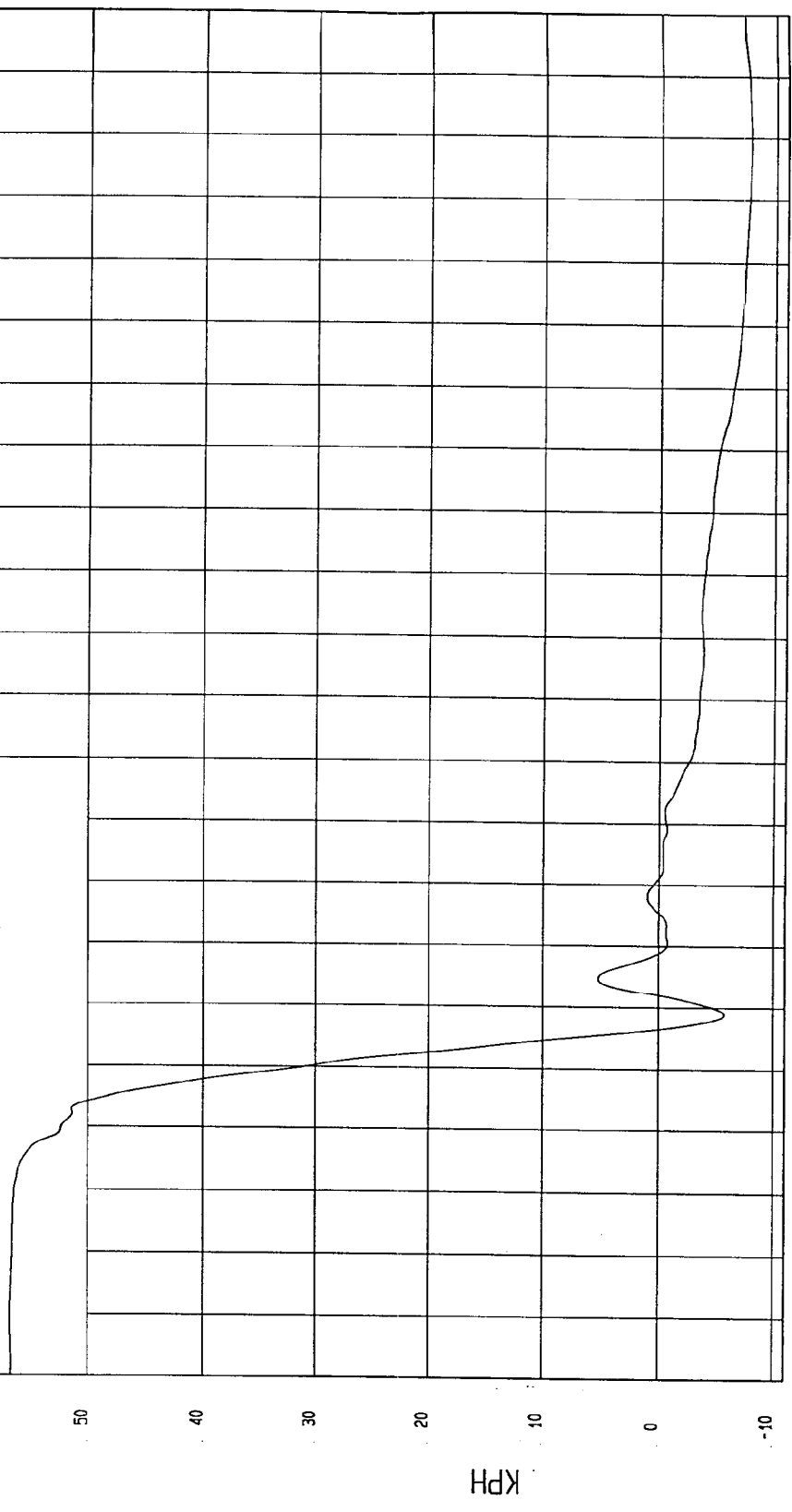
Speed: 35.1 MPH 56.5 KPH

Minimum = -7.79 KPH at 180 msec

Maximum = 56.68 KPH at -10 msec

TOP OF ENGINE BLOCK X VELOCITY

1 899074AI.V08 Filterclass (180)

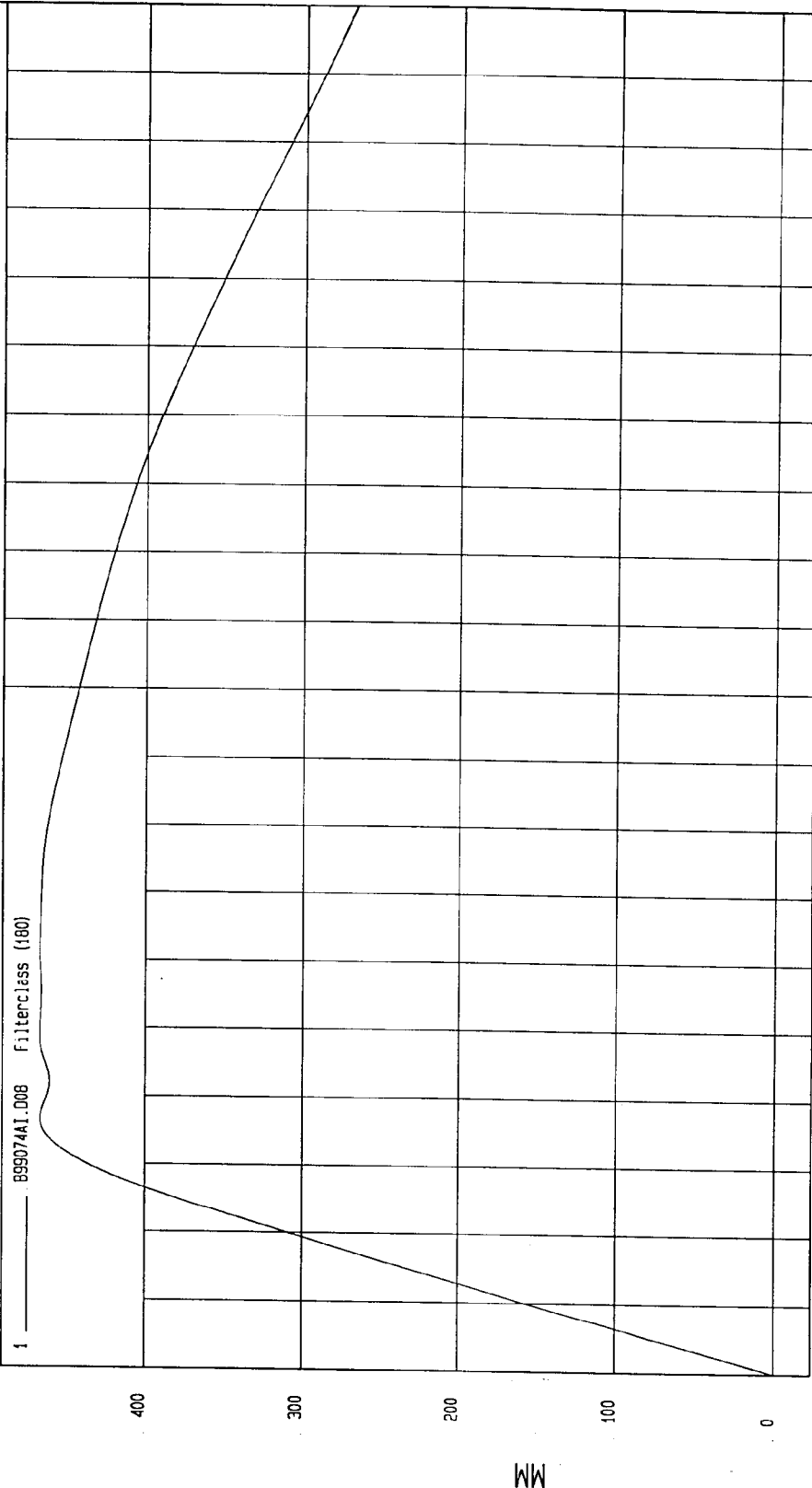


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec      Maximum = 466.21 MM at 61 msec

TOP OF ENGINE BLOCK X DISPLACEMENT



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

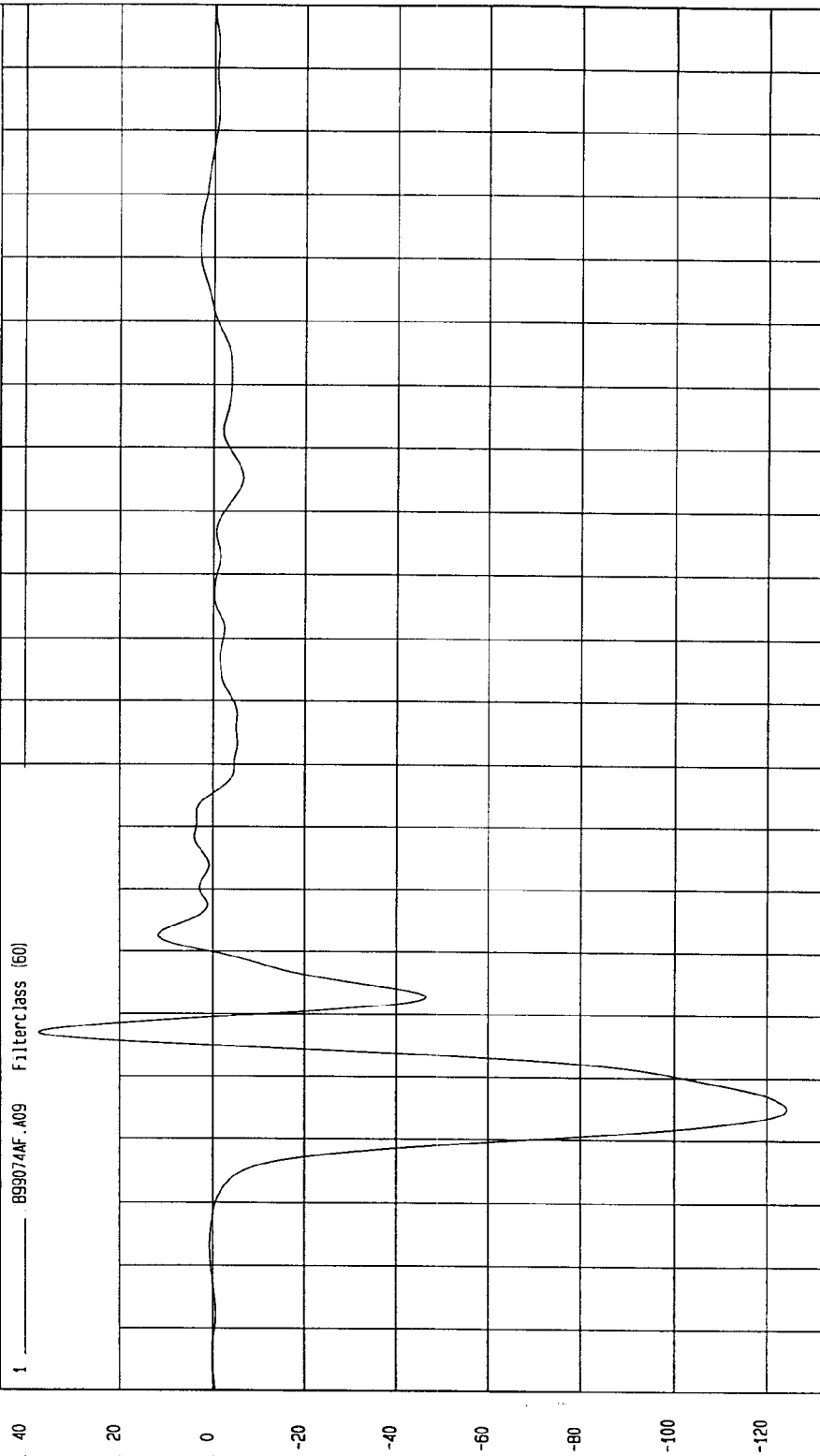
Speed: 35.1 MPH 56.5 KPH

Minimum = -124.15 G'S at 25 msec

Maximum = 37.24 G'S at 37 msec

BOTTOM OF ENGINE X ACCELERATION

1 ——— BS9074AF.A09 Filterclass (60)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -9.45 KPH at 152 msec

Maximum = 56.69 KPH at 8 msec

BOTTOM OF ENGINE X VELOCITY

1 ——— 899074A1.V09 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

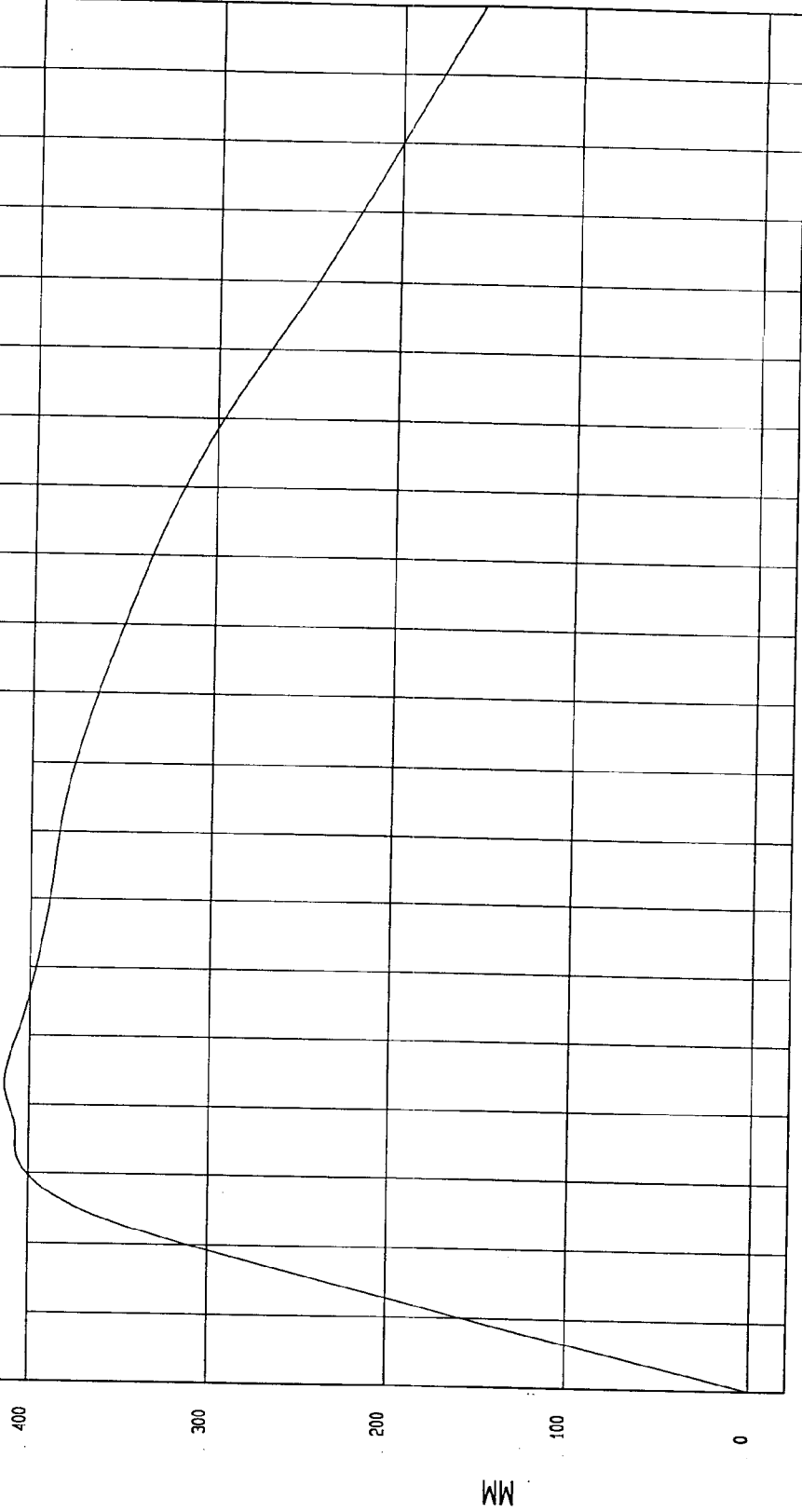
Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 413.4 MM at 43 msec

BOTTOM OF ENGINE X DISPLACEMENT

1 ——— 895074A1.009 Filterclass (180)



TIME Seconds

MCA Research  
08-17-2000 11:03

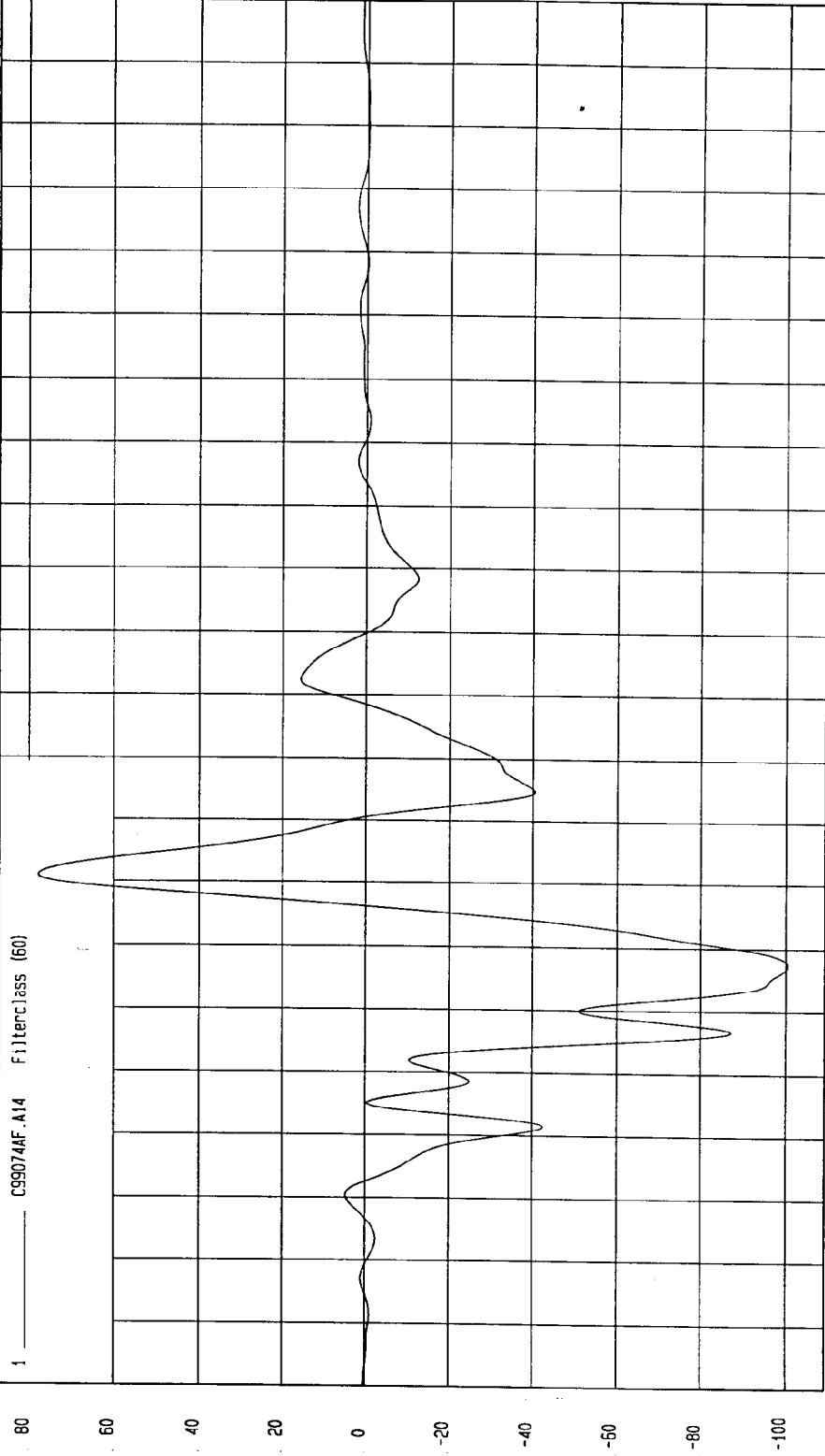
B-124

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999  
 COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -100.51 G'S at 47 msec Maximum = 77.85 G'S at 61 msec

LEFT FRONT BRAKE CALIPER X ACCELERATION

1 C99074AF.A14 Filterclass (60)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

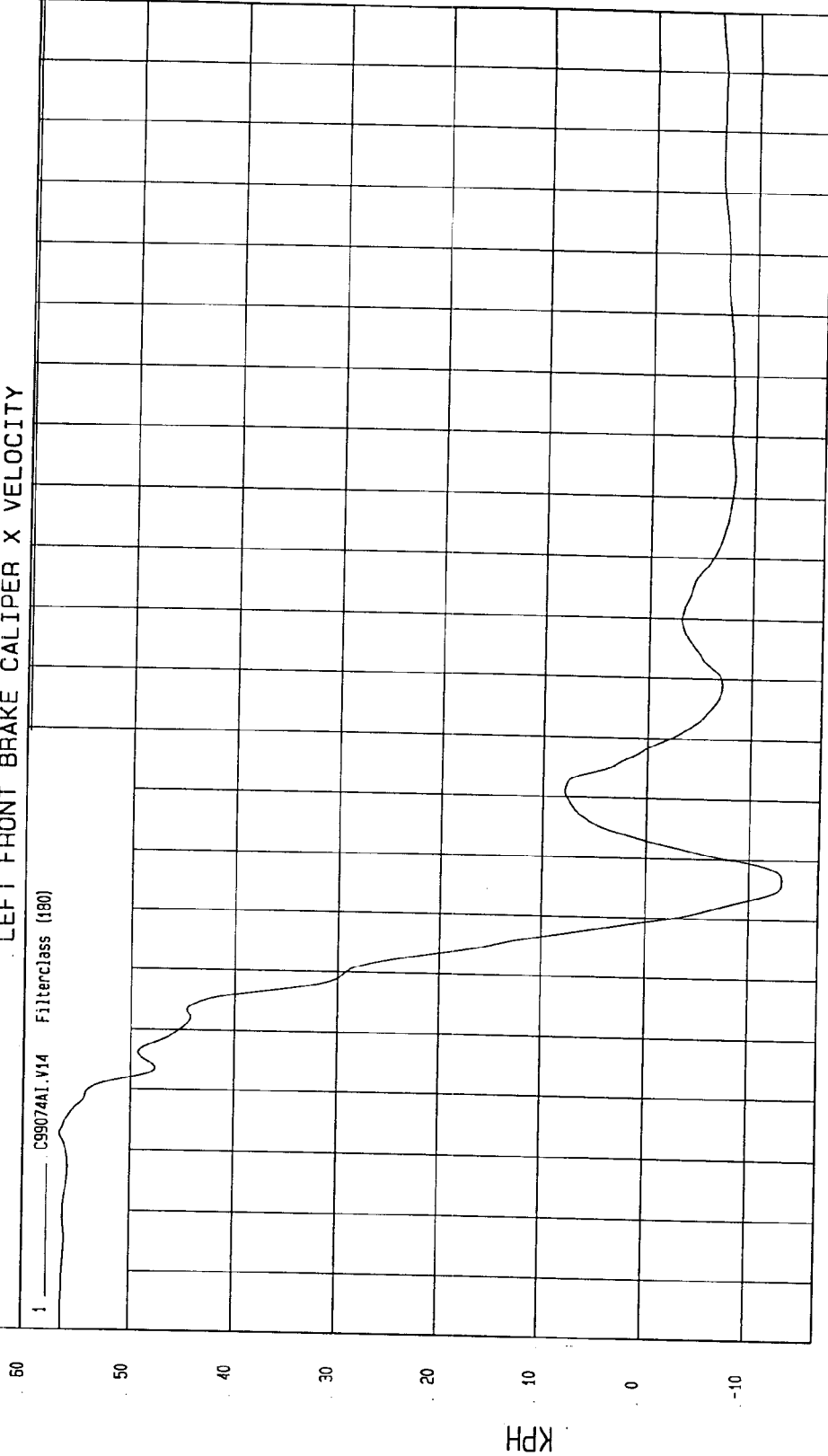
Speed: 35.1 MPH 56.5 KPH

Minimum = -13.25 KPH at 57 msec

Maximum = 56.81 KPH at 12 msec

LEFT FRONT BRAKE CALIPER X VELOCITY

1 C99074A1.V14 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

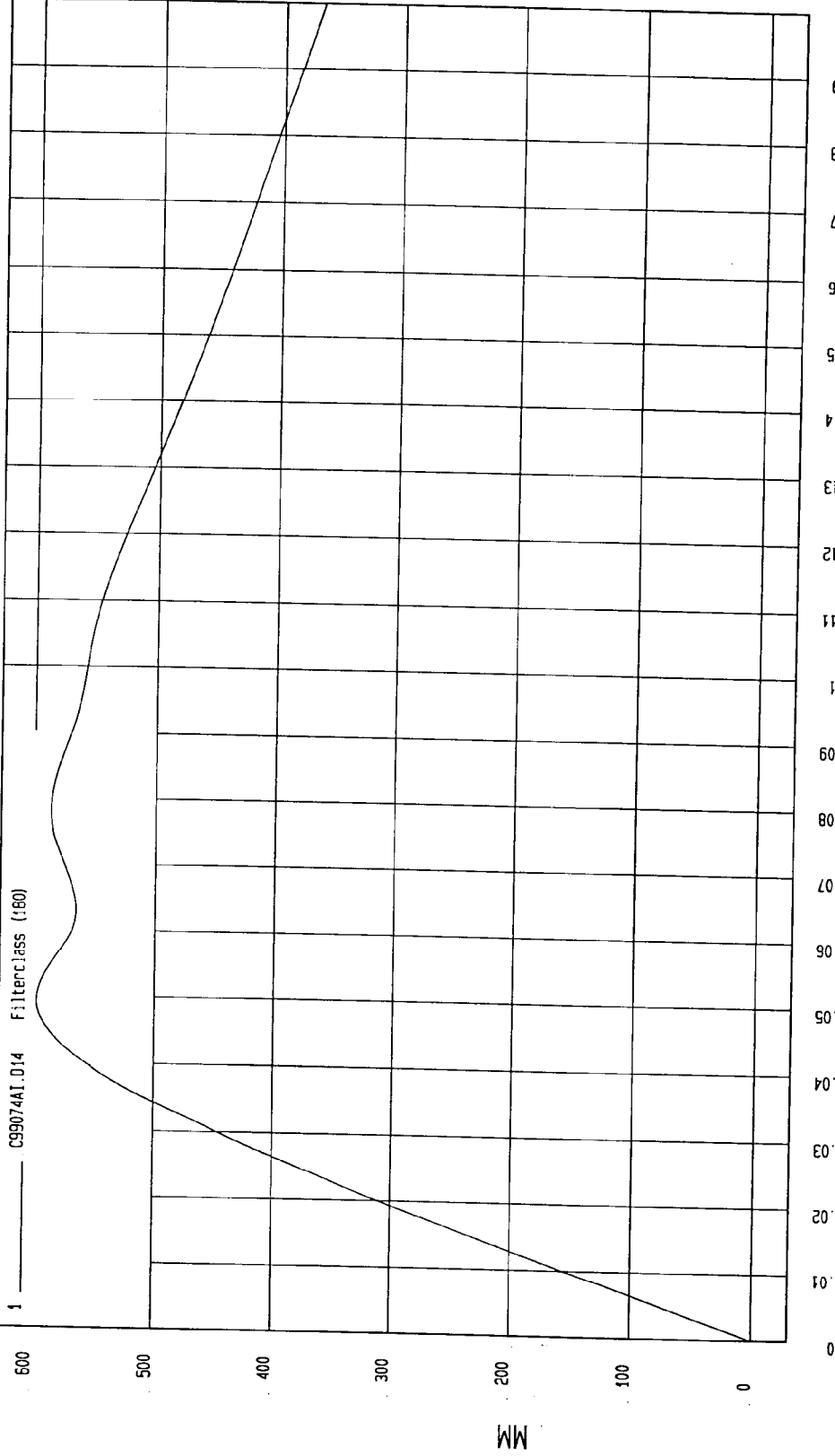
Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 597.45 MM at 49 msec

LEFT FRONT BRAKE CALIPER X DISPLACEMENT

1 — C99074A1.014 Filterclass (180)



TIME Seconds

MCA Research  
08-18-2000 03:34

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

SPEED: 35.1 MPH 56.5 KPH

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Maximum = 51.36 G'S at 62 msec

Minimum = -136.59 G'S at 44 msec

RIGHT FRONT BRAKE CALIPER X ACCELERATION

1 C99074AF.A13 Filterclass (60)

60

40

20

0

-20

-40

-60

-80

-100

-120

-140

G'S

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

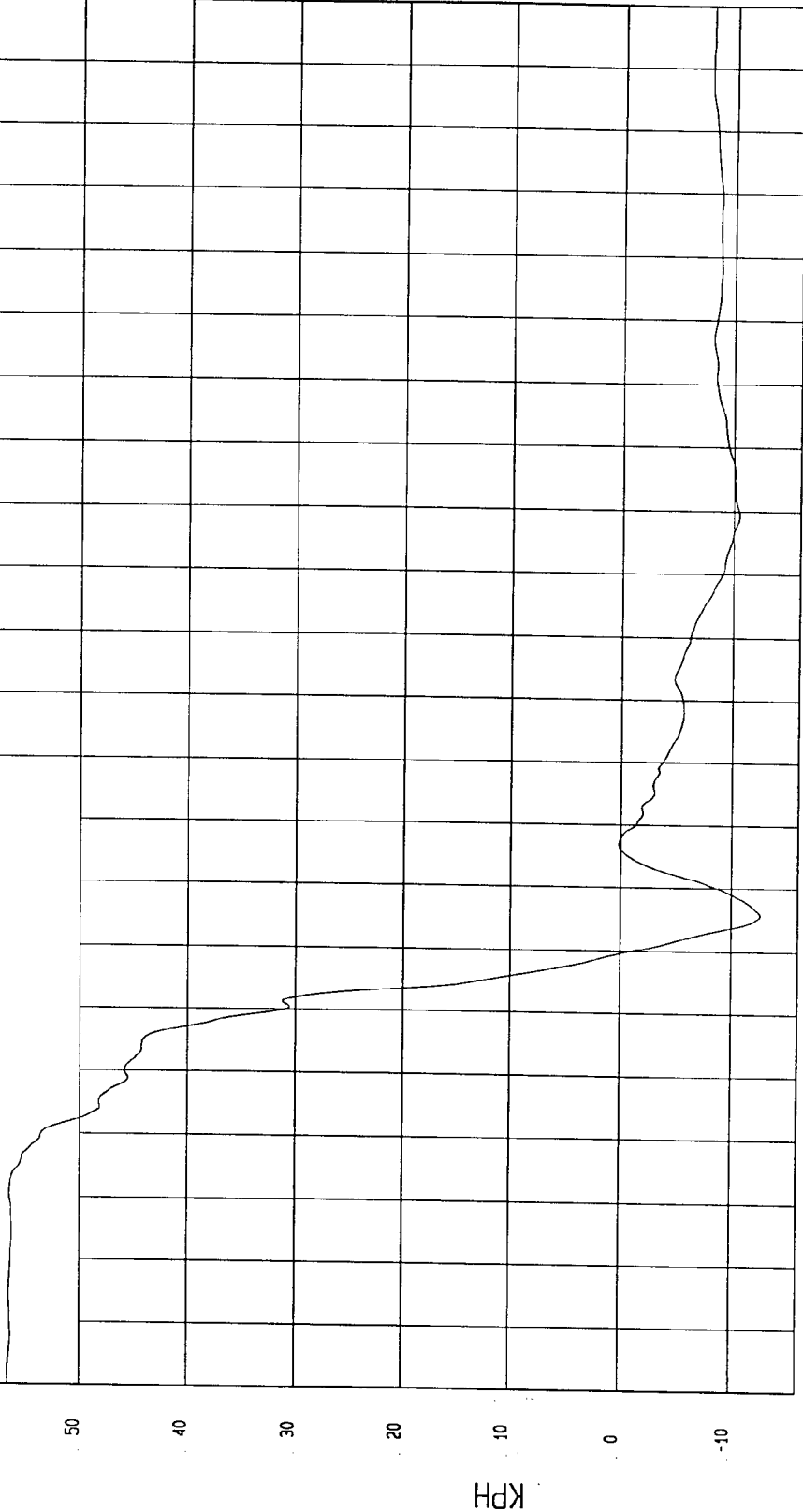
TIME (seconds)

MCA Research  
08-18-2000 03:27

TEST: 35 MPH FRONTAL IMPACT  
TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)  
Speed: 35.1 MPH 56.5 KPH  
Minimum = -12.75 KPH at 55 msec  
Maximum = 56.52 KPH at -18 msec

RIGHT FRONT BRAKE CALIPER X VELOCITY

1 C99074A1.V13 Filtenclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

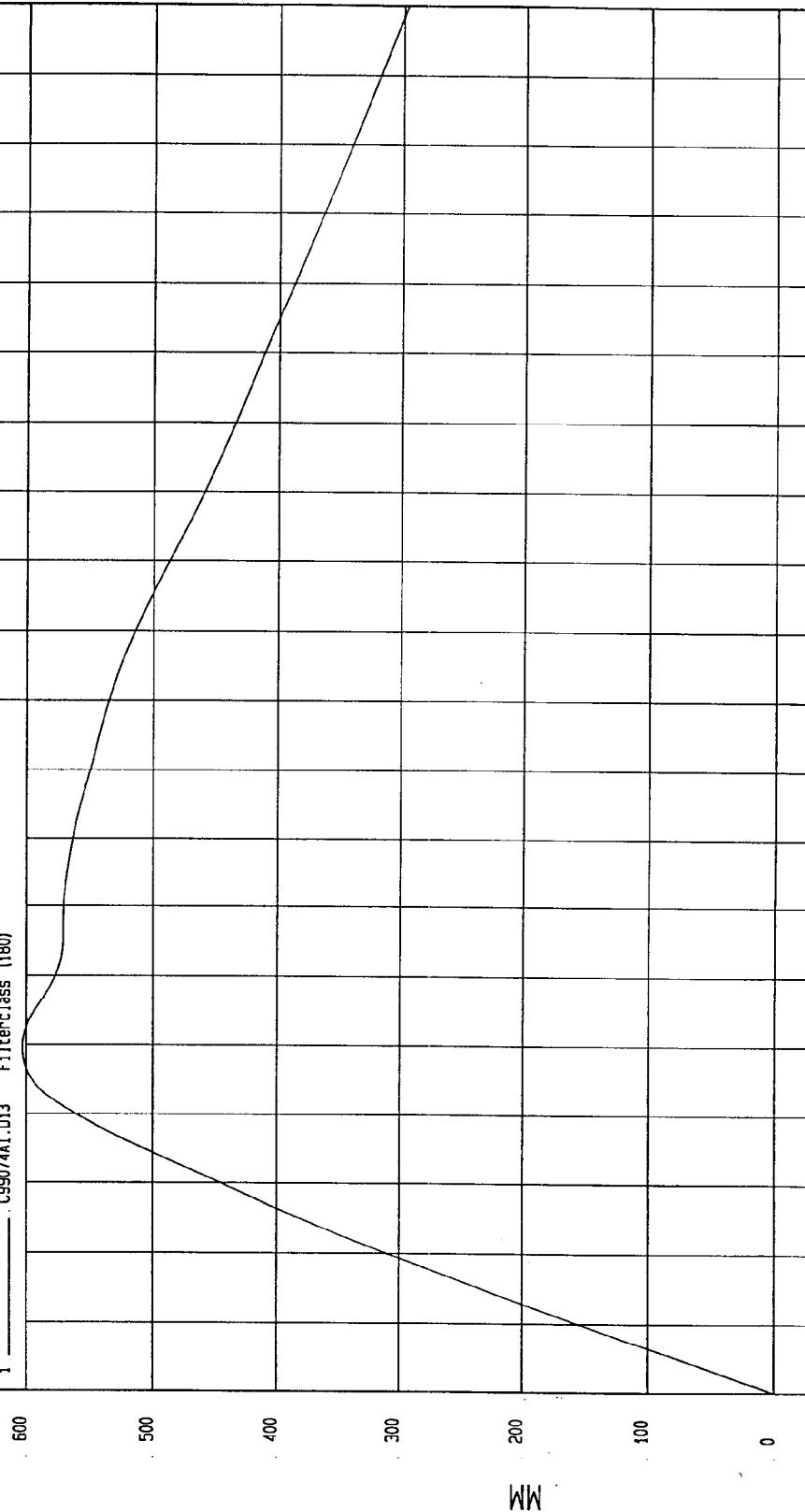
Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 603.21 MM at 50 msec

RIGHT FRONT BRAKE CALIPER X DISPLACEMENT

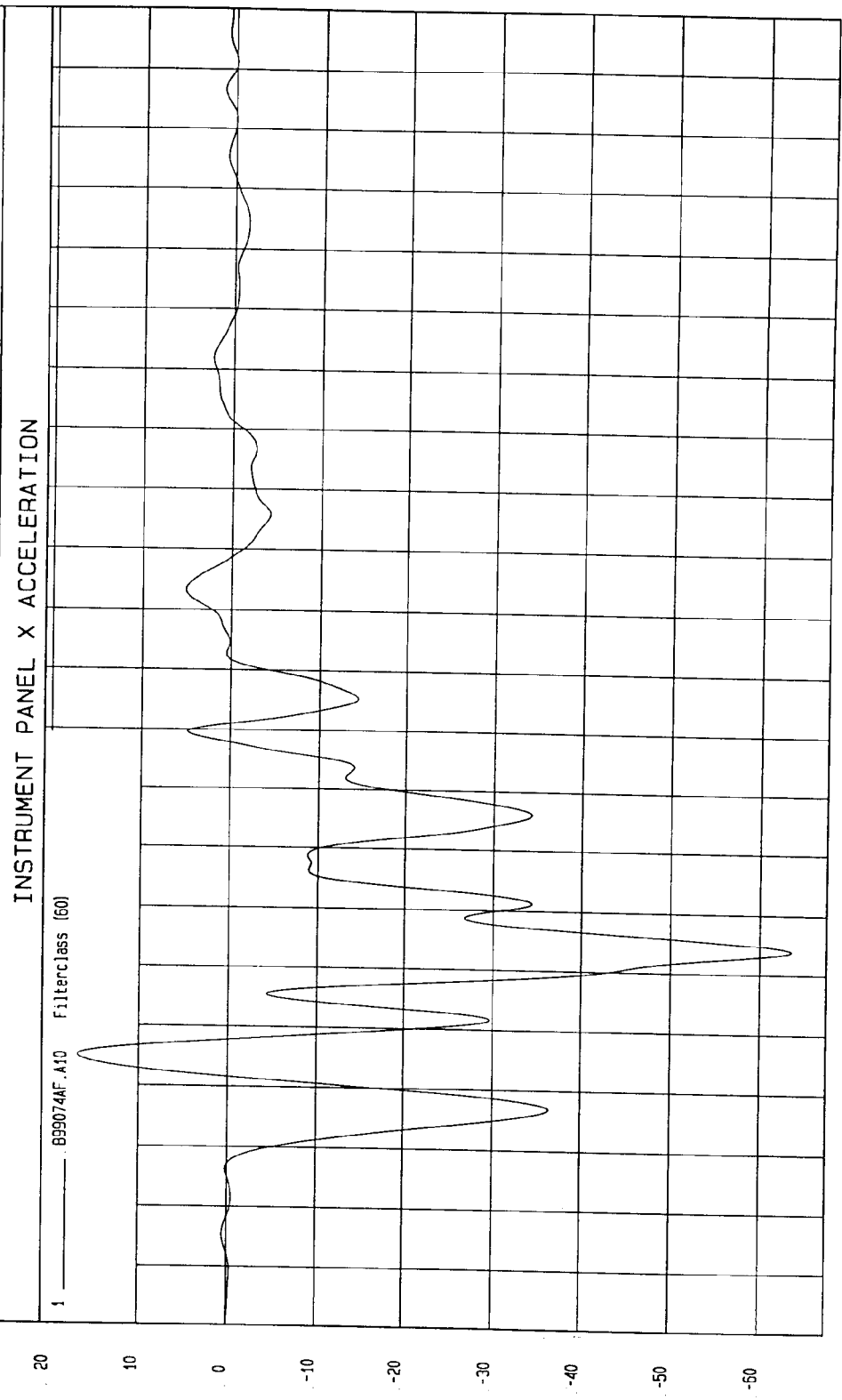
1 — C99074A1.D13 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -63.57 G'S at 44 msec      Maximum = 16.83 G'S at 25 msec



TIME (SECONDS)

19  
18  
17  
16  
15  
14  
13  
12  
11  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1  
0  
-1  
-2  
-3  
-4  
-5  
-6  
-7  
-8  
-9  
-10  
-11  
-12  
-13  
-14  
-15  
-16  
-17  
-18  
-19  
-20  
-21  
-22  
-23  
-24  
-25  
-26  
-27  
-28  
-29  
-30  
-31  
-32  
-33  
-34  
-35  
-36  
-37  
-38  
-39  
-40  
-41  
-42  
-43  
-44  
-45  
-46  
-47  
-48  
-49  
-50  
-51  
-52  
-53  
-54  
-55  
-56  
-57  
-58  
-59  
-60

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

MGA Research  
08-17-2000 09:46

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

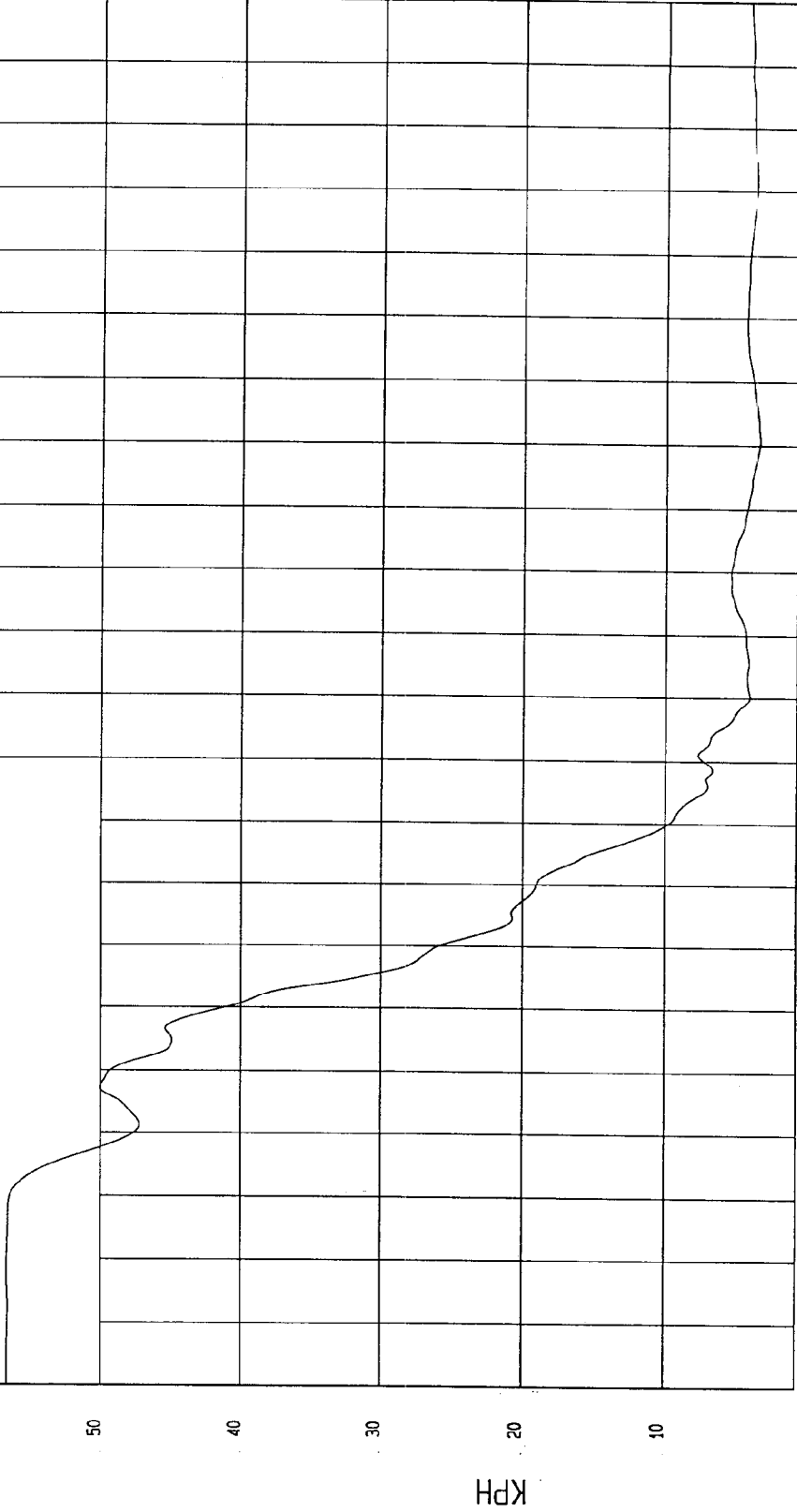
Speed: 35.1 MPH 56.5 KPH

Minimum = 3.35 KPH at 131 msec

Maximum = 56.6 KPH at -18 msec

INSTRUMENT PANEL X VELOCITY

1 B99074A1.V10 Filterclass (180)



MCA Research  
08-17-2000 09:46

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 918.96 MM at 200 msec

INSTRUMENT PANEL X DISPLACEMENT

1 ——— B99074A1.D10 Filterclass (180)

800

600

400

200

0

MM

0

.01

.02

.03

.04

.05

.06

.07

.08

.09

.1

.11

.12

.13

.14

.15

.16

.17

.18

.19

TIME Seconds

MCA Research  
08-17-2000 11:03

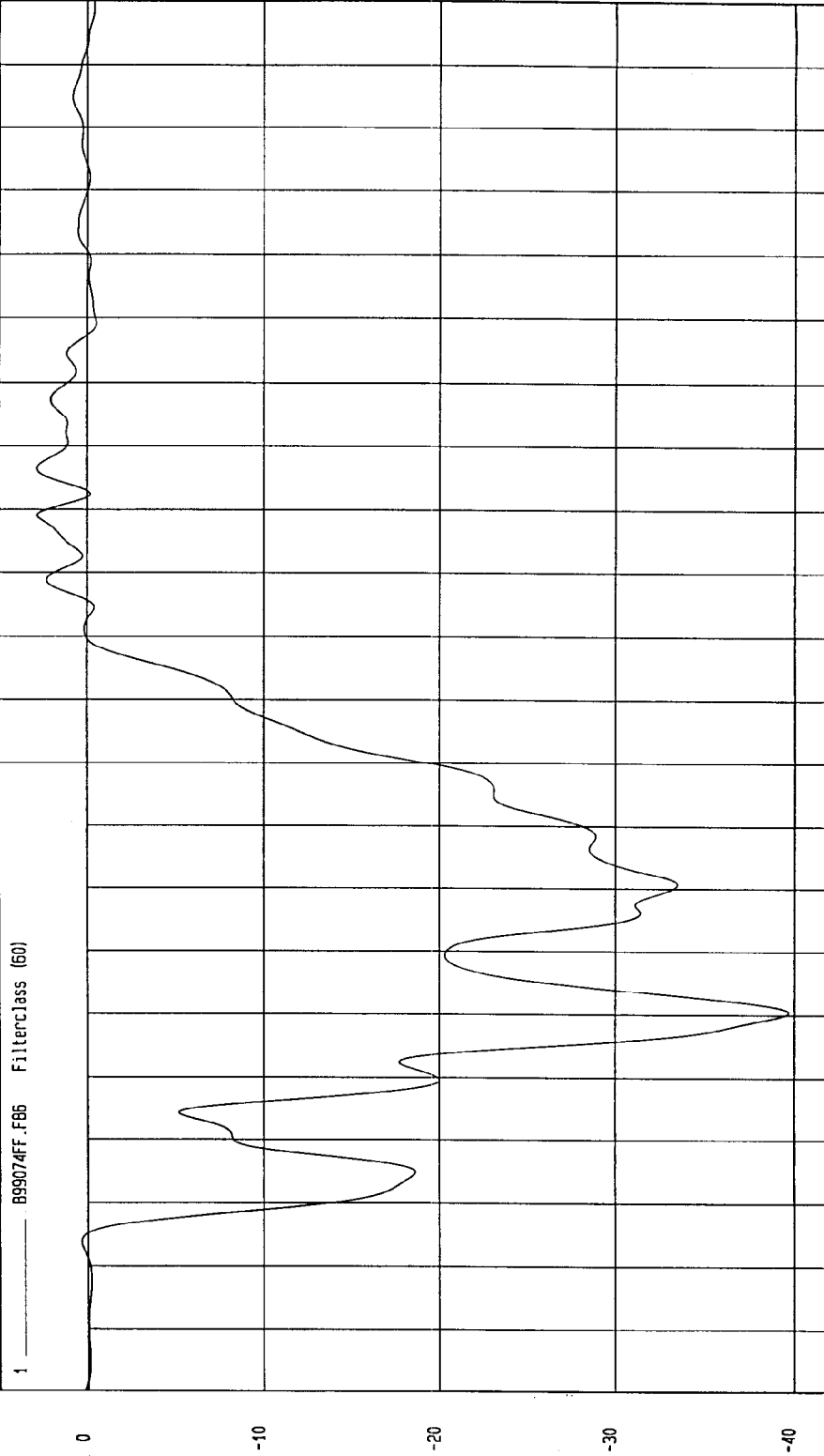
B-133

TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -39.68 N at 40 msec Maximum = 2.77 N at 126 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

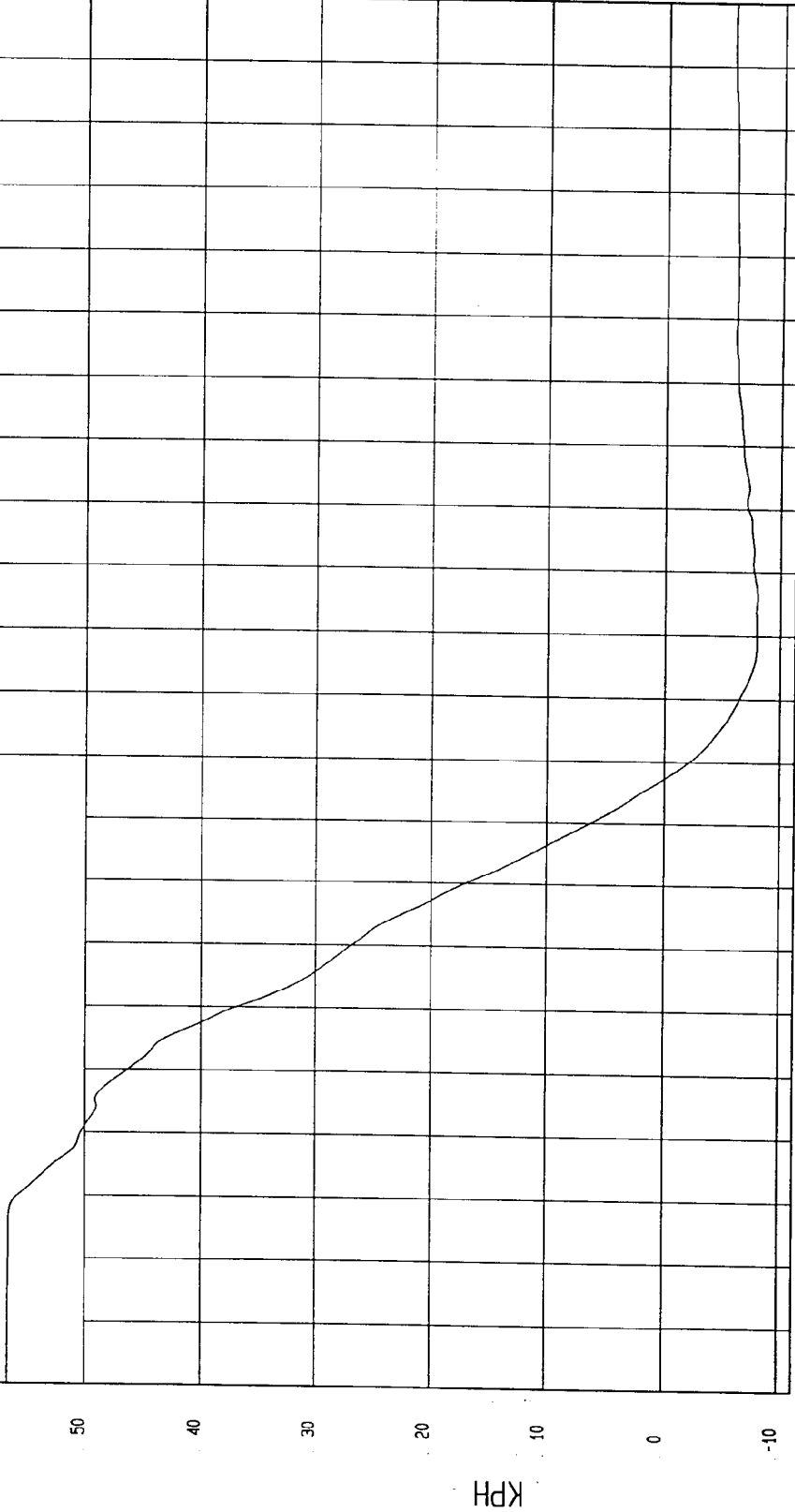


TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999  
 COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -8.03 KPH at 106 msec Maximum = 56.6 KPH at -19 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

1 899074F1.V06 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

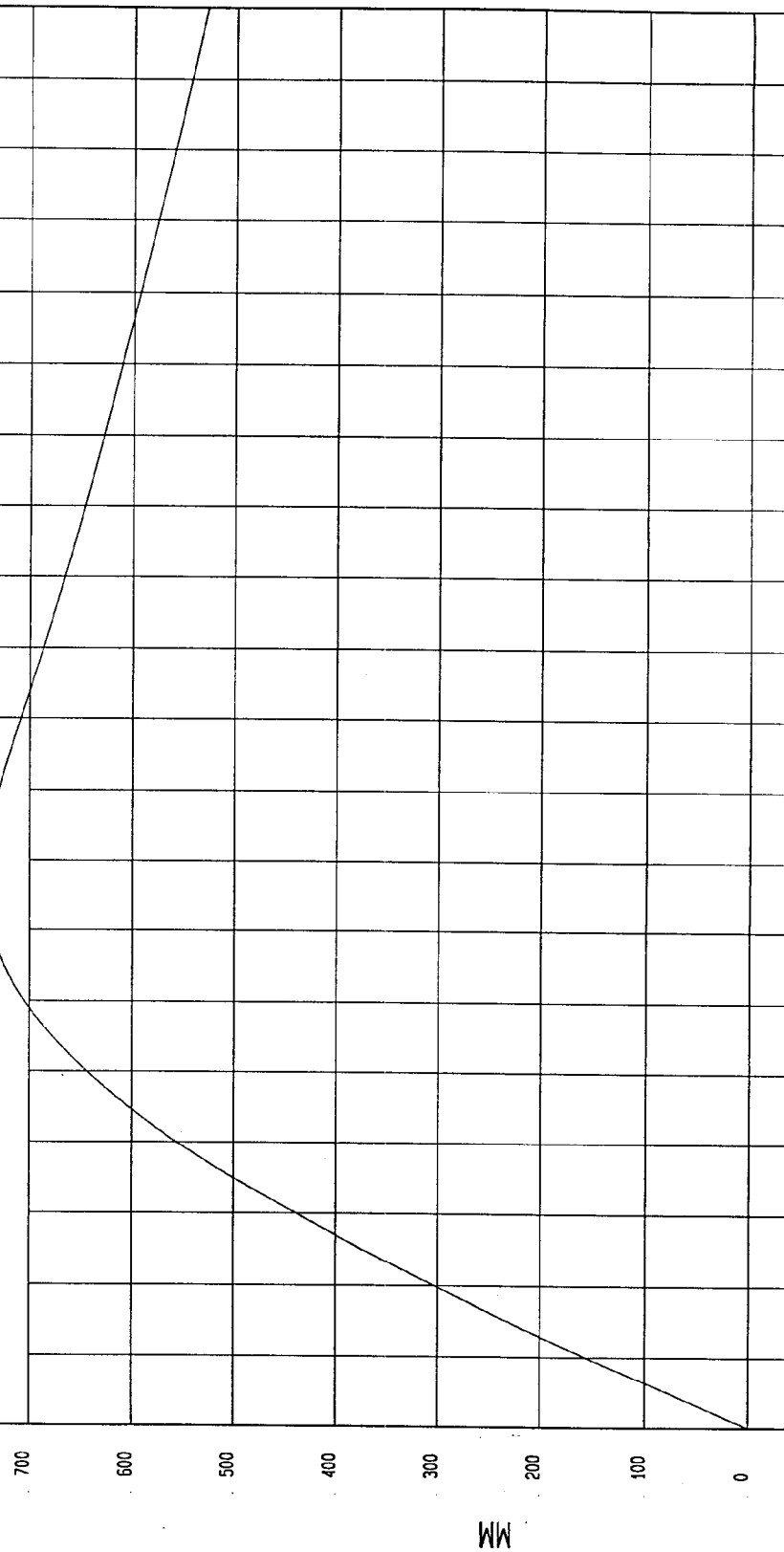
Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec

Maximum = 742.77 MM at 77 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT

1 ——— 899074FI.086 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

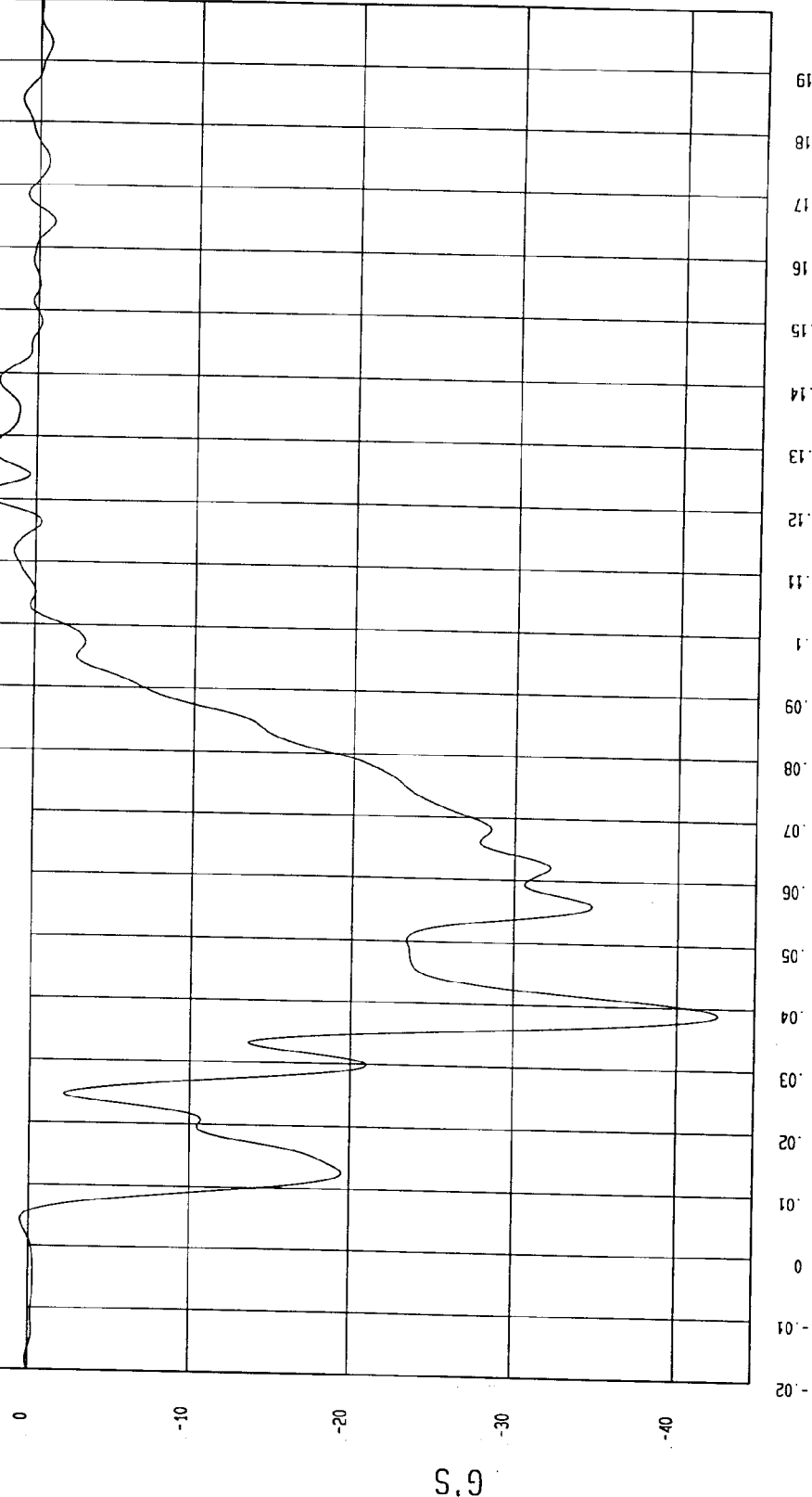
Speed: 35.1 MPH 56.5 KPH

Minimum = -42.52 G'S at 39 msec

Maximum = 3.37 G'S at 121 msec

RIGHT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

1 ——— B99074F.A66 Filterclass (60)



TIME (SECONDS)

MGA Research  
08-17-2000 09:46

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

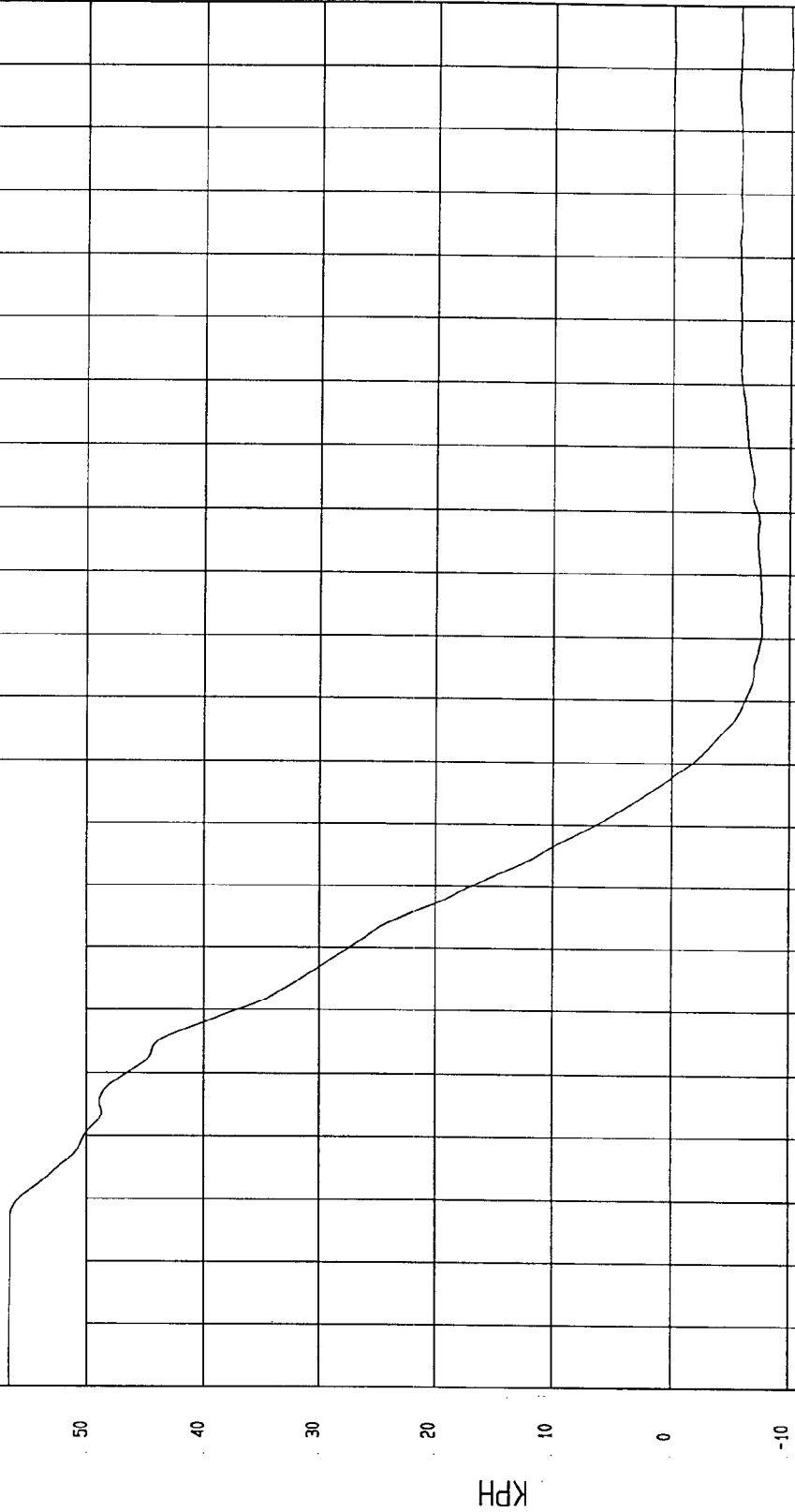
Speed: 35.1 MPH 56.5 KPH

Minimum = -7.63 KPH at 101 msec

Maximum = 56.62 KPH at -17 msec

RIGHT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

1 899074A1.V66 Filterclass (180)



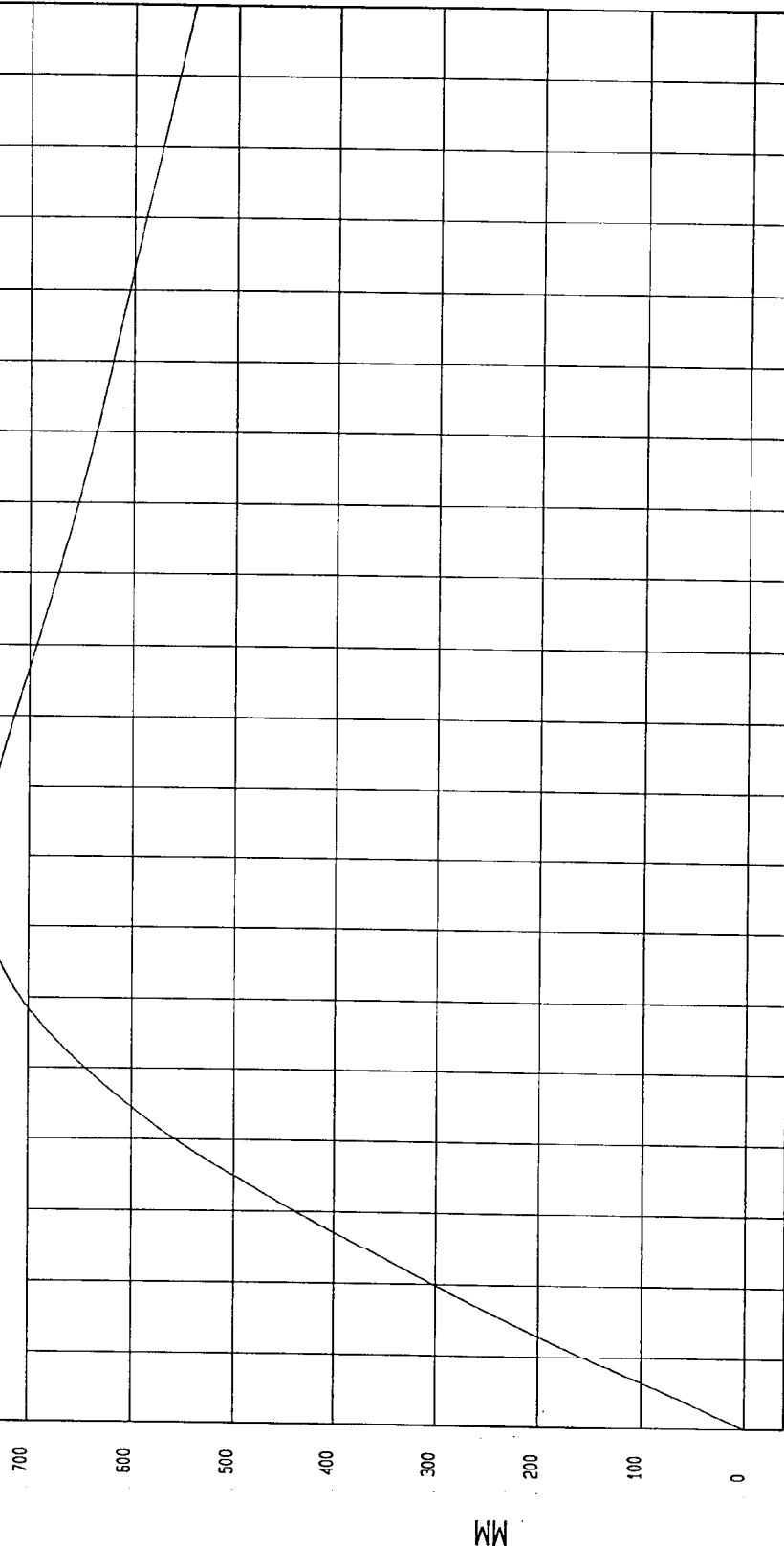
TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = 0 MM at 0 msec Maximum = 746.08 MM at 78 msec

RIGHT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT

1 B99074A1.D66 Filterclass (180)



TEST: 35 MPH FRONTAL IMPACT TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500) Speed: 35.1 MPH 56.5 KPH

Minimum = -2.93 KN at 8 msec Maximum = 36.56 KN at 35 msec

UPPER LEFT BARRIER FORCE

1 A99074FF.F94 Filterclass (60)

240

220

200

180

160

140

120

100

80

60

40

20

0

-20

KN

TIME (SECONDS)

MECA Research  
08-18-2000 05.01

0.02

0.01

0.00

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.10

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

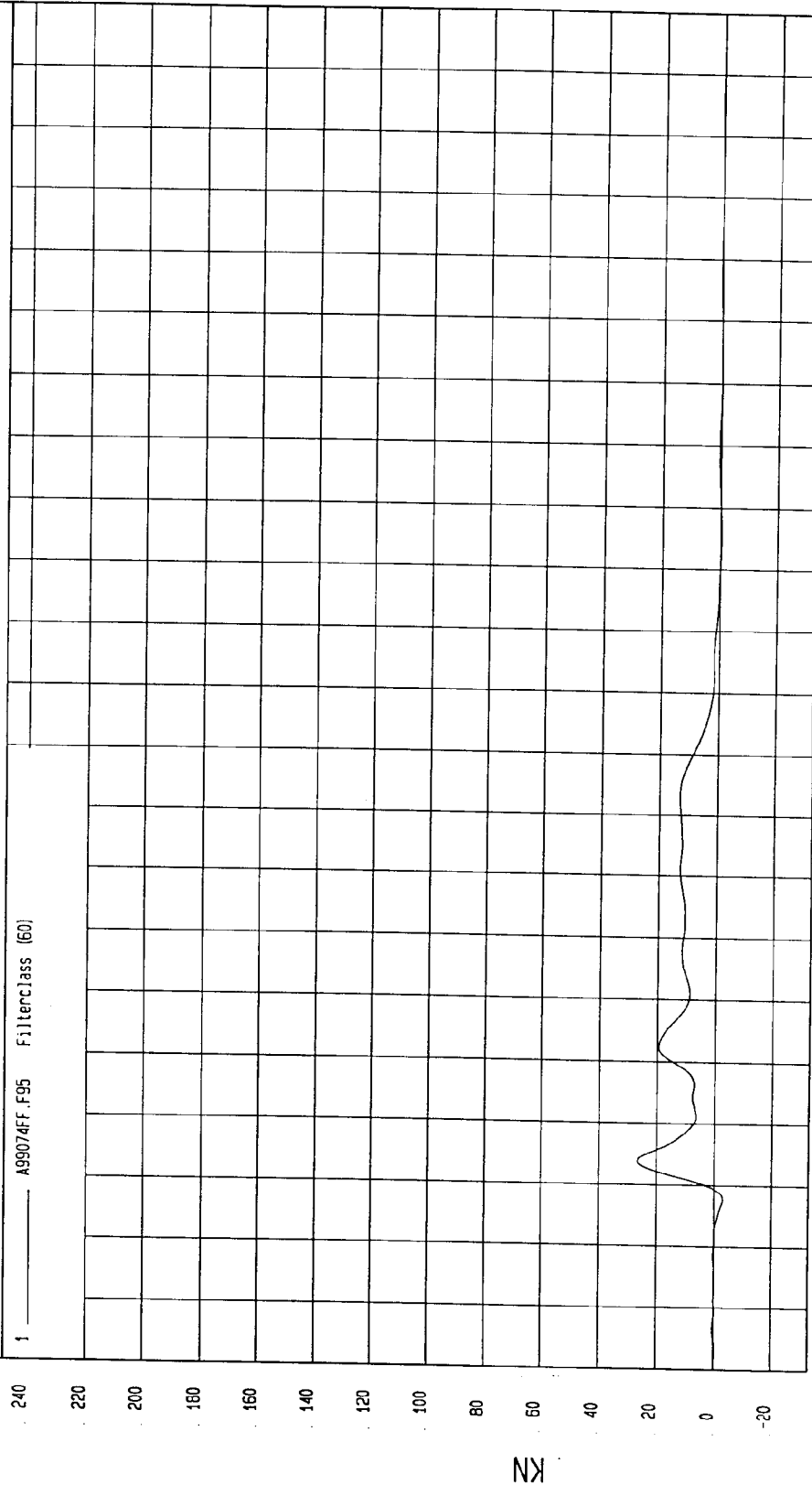
Speed: 35.1 MPH 56.5 KPH

Minimum = -3.04 KN at 8 msec

Maximum = 26.52 KN at 14 msec

UPPER CENTER BARRIER FORCE

1 A99074FF.F95 FilterClass (60)



TIME (SECONDS)

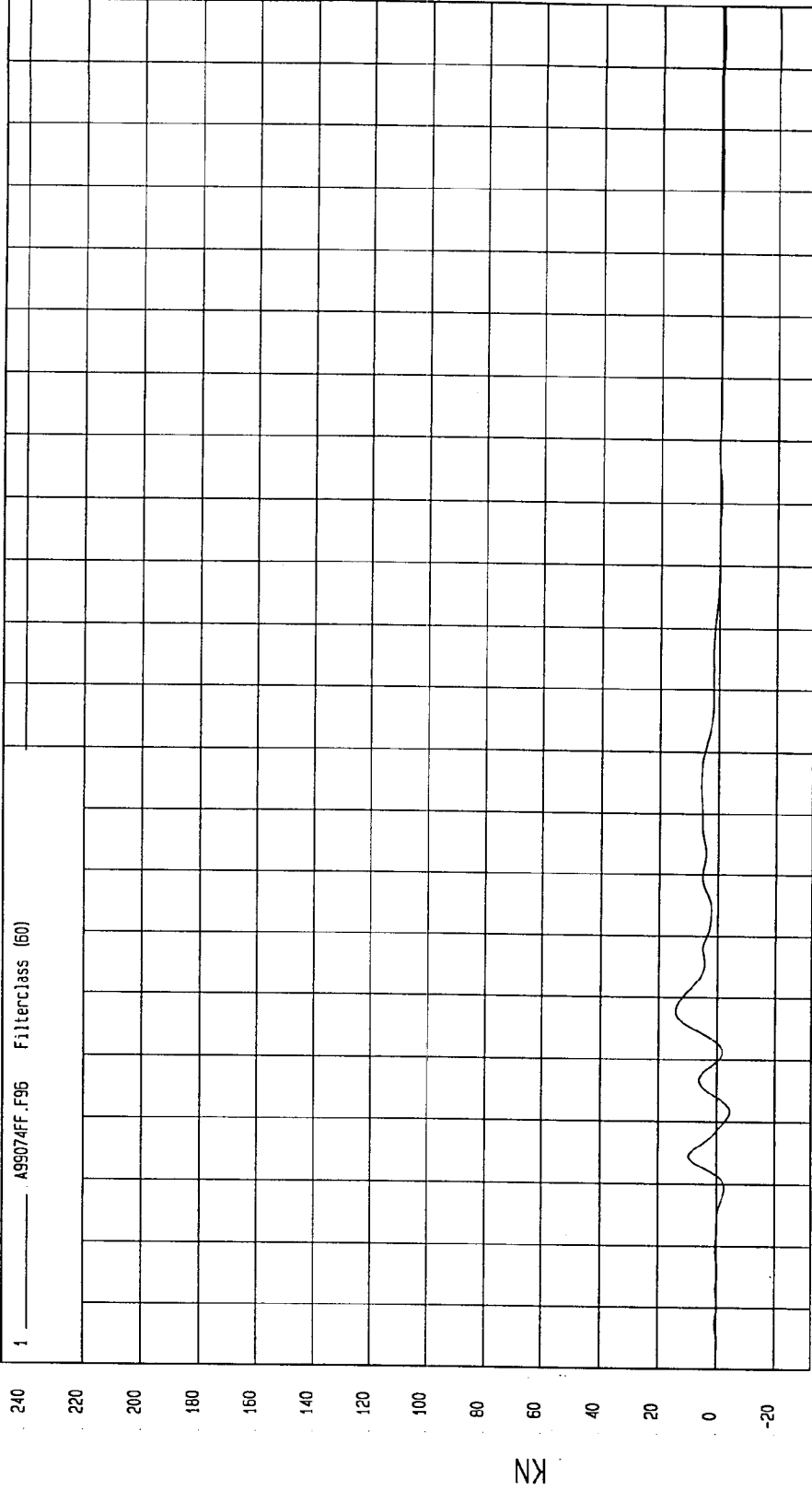
WCA Research  
08-18-2000 05:01

TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -4.43 KN at 22 msec      Maximum = 14.12 KN at 38 msec

UPPER RIGHT BARRIER FORCE

1 ——— A99074FF.F96      Filterclass (60)

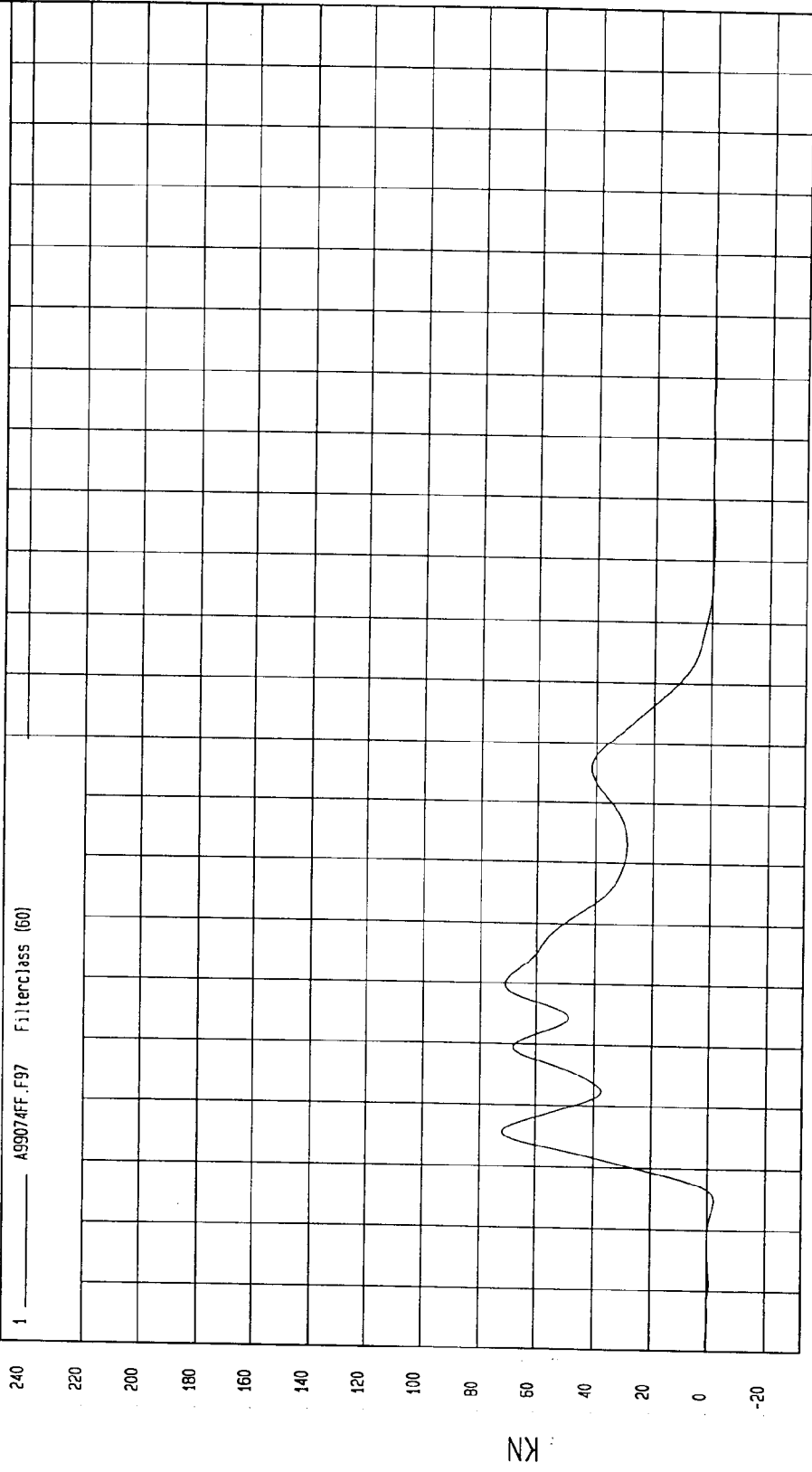


TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)      Speed: 35.1 MPH 56.5 KPH

Minimum = -2.33 KN at 5 msec      Maximum = 71.77 KN at 16 msec

LOWER LEFT BARRIER FORCE

1 — A99074FF.F97 FilterClass (60)



TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

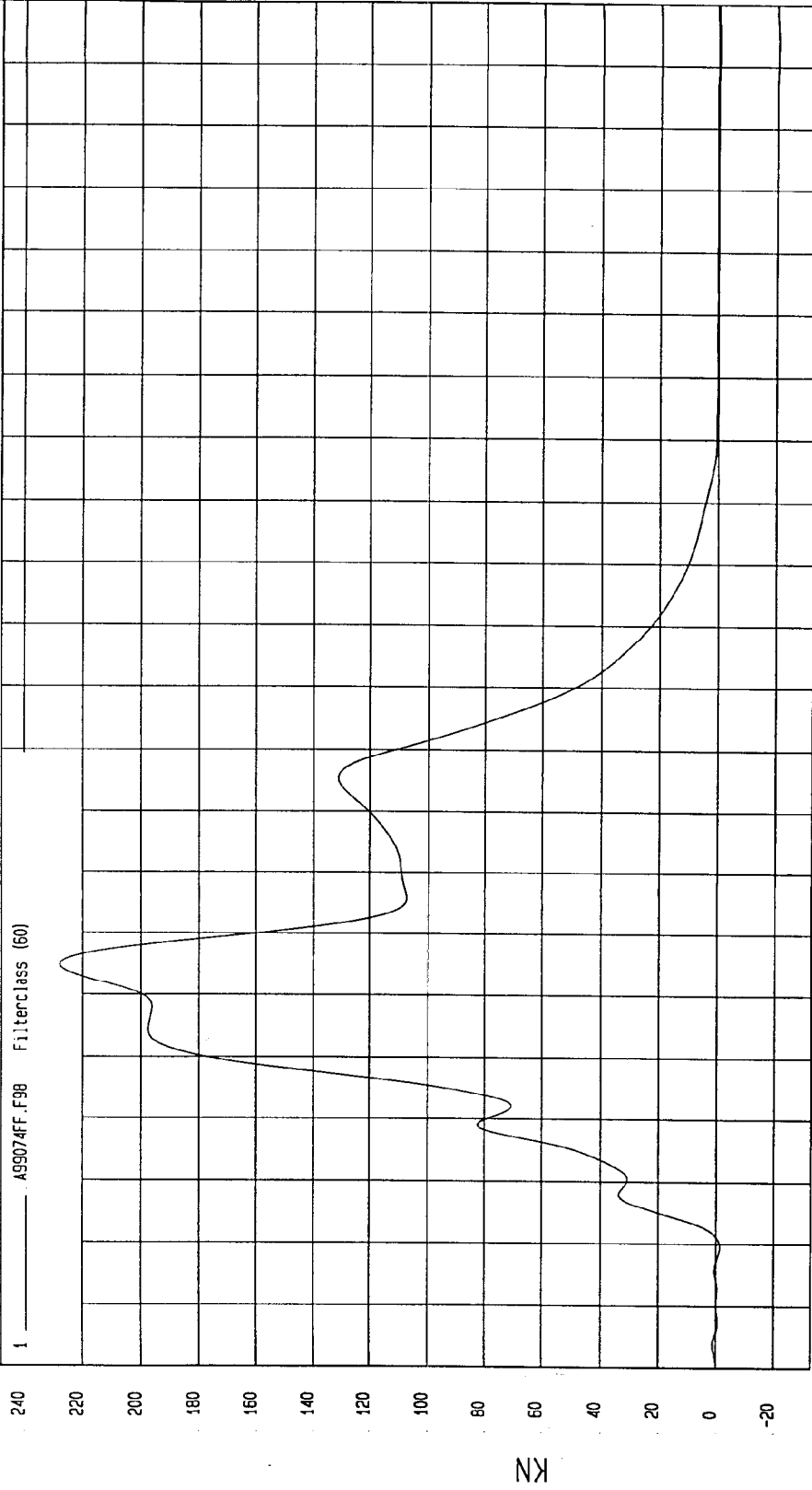
Speed: 35.1 MPH 56.5 KPH

Minimum = -1.31 KN at -1 msec

Maximum = 227.82 KN at 45 msec

LOWER CENTER BARRIER FORCE

1 A99074FF.F98 Filterclass (60)



NSA Research  
08-18-2000 05:01

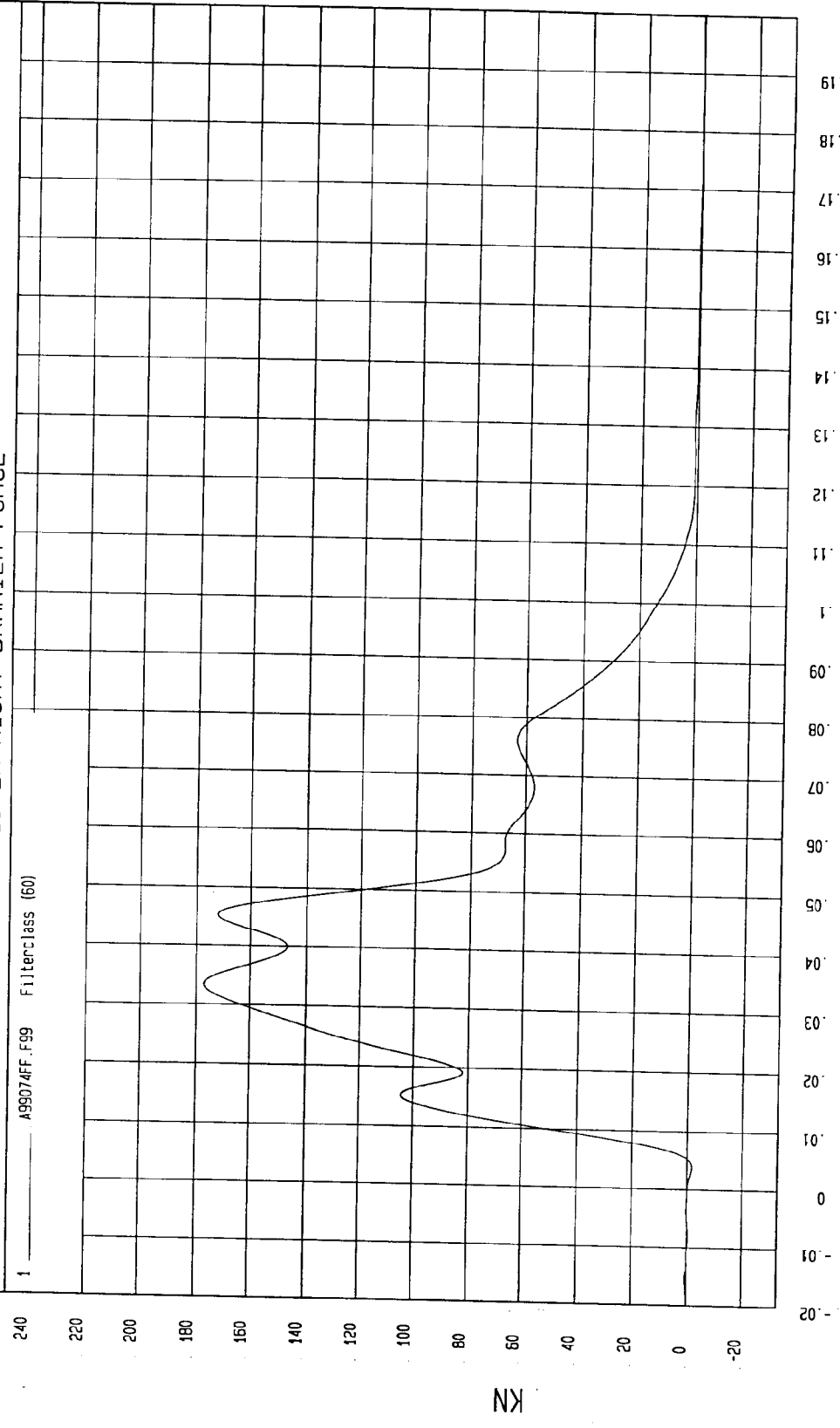
TIME (SECONDS)

B-144

TEST: 35 MPH FRONTAL IMPACT  
TEST DATE: 11-17-1999  
COMPONENT: 2000 HYUNDA ELANTRA (MY0500)  
Speed: 35.1 MPH 56.5 KPH  
Minimum = -1.65 KN at 4 msec  
Maximum = 177.22 KN at 33 msec

LOWER RIGHT BARRIER FORCE

1 A95074FF.F99 Filterclass (60)



TIME (SECONDS)

KN

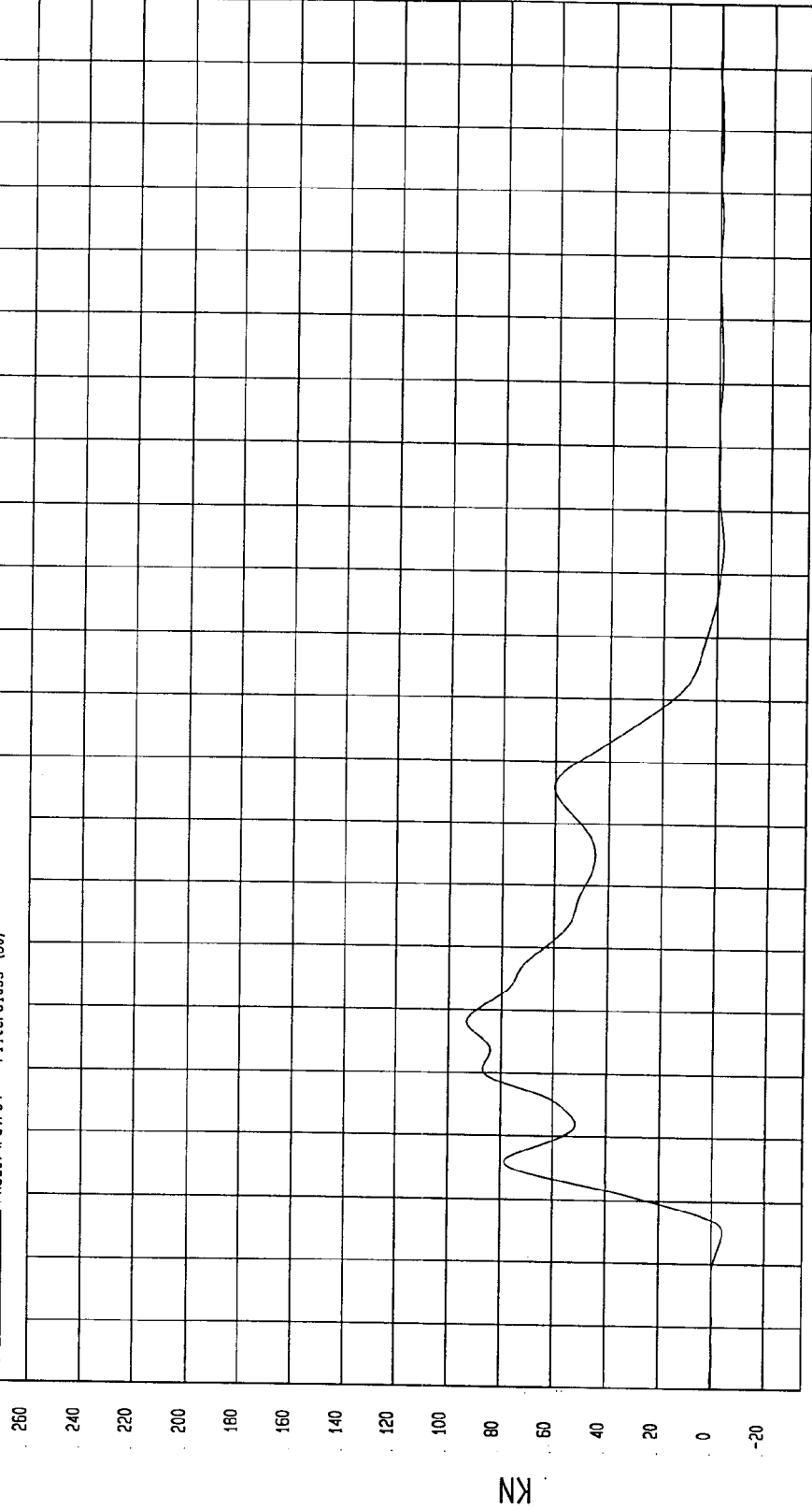
TEST: 35 MPH FRONTAL IMPACT      TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)      Speed: 35.1 MPH    56.5 KPH

Minimum = -4.08 KN at 5 msec      Maximum = 93.15 KN at 38 msec

SUM OF LEFT BARRIER FORCES

1 ——— A99074F0.F94    Filterclass (50)



TIME (SECONDS)

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDAI ELANTRA (MY0500)

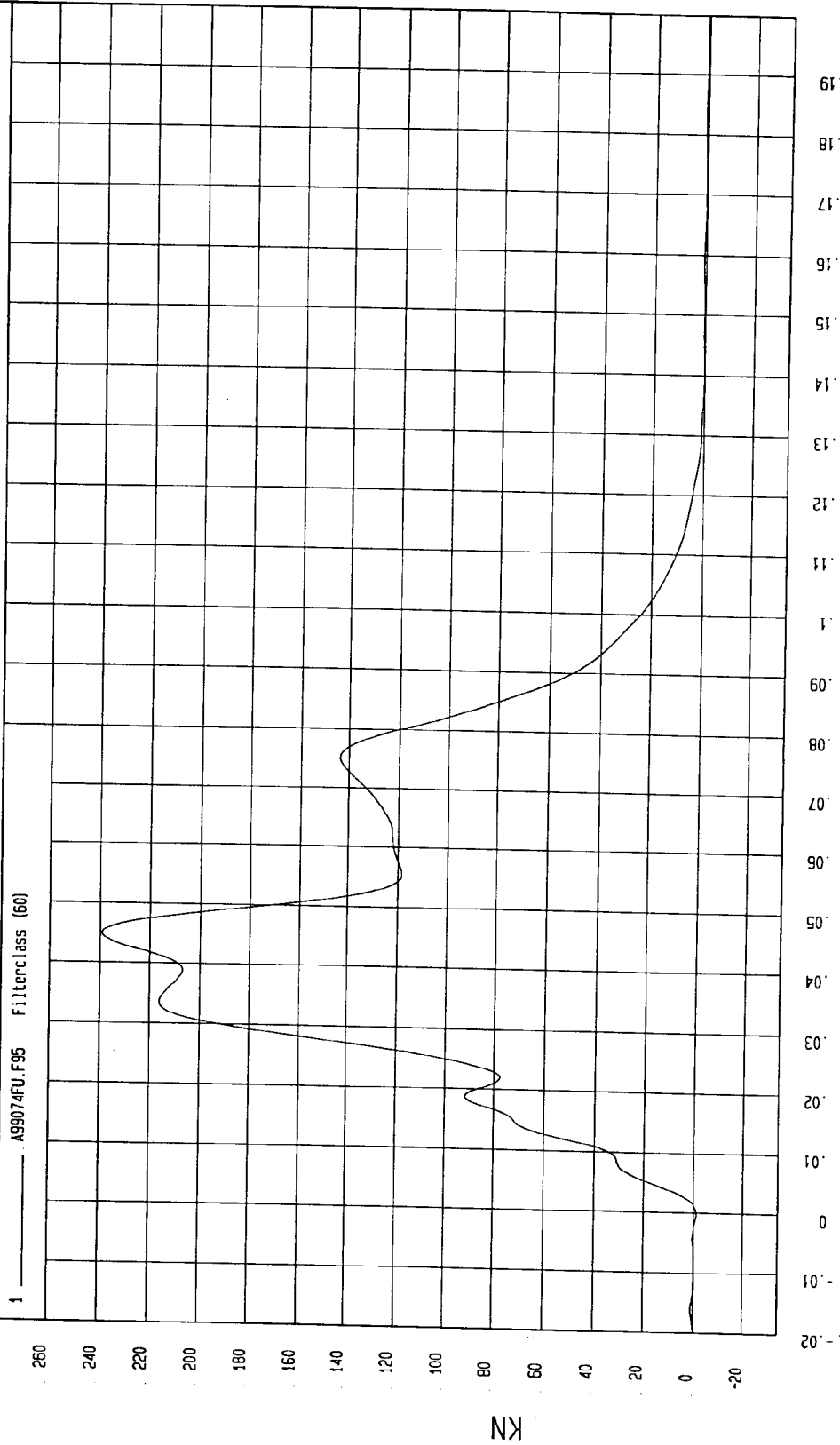
Speed: 35.1 MPH 56.5 KPH

Minimum = -1.21 KN at 0 msec

Maximum = 239.11 KN at 45 msec

SUM OF CENTER BARRIER FORCES

1 — A99074FU.F95 Filterclass (60)



TIME (SECONDS)

WCA Research  
08-18-2000 05:01

B-147

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

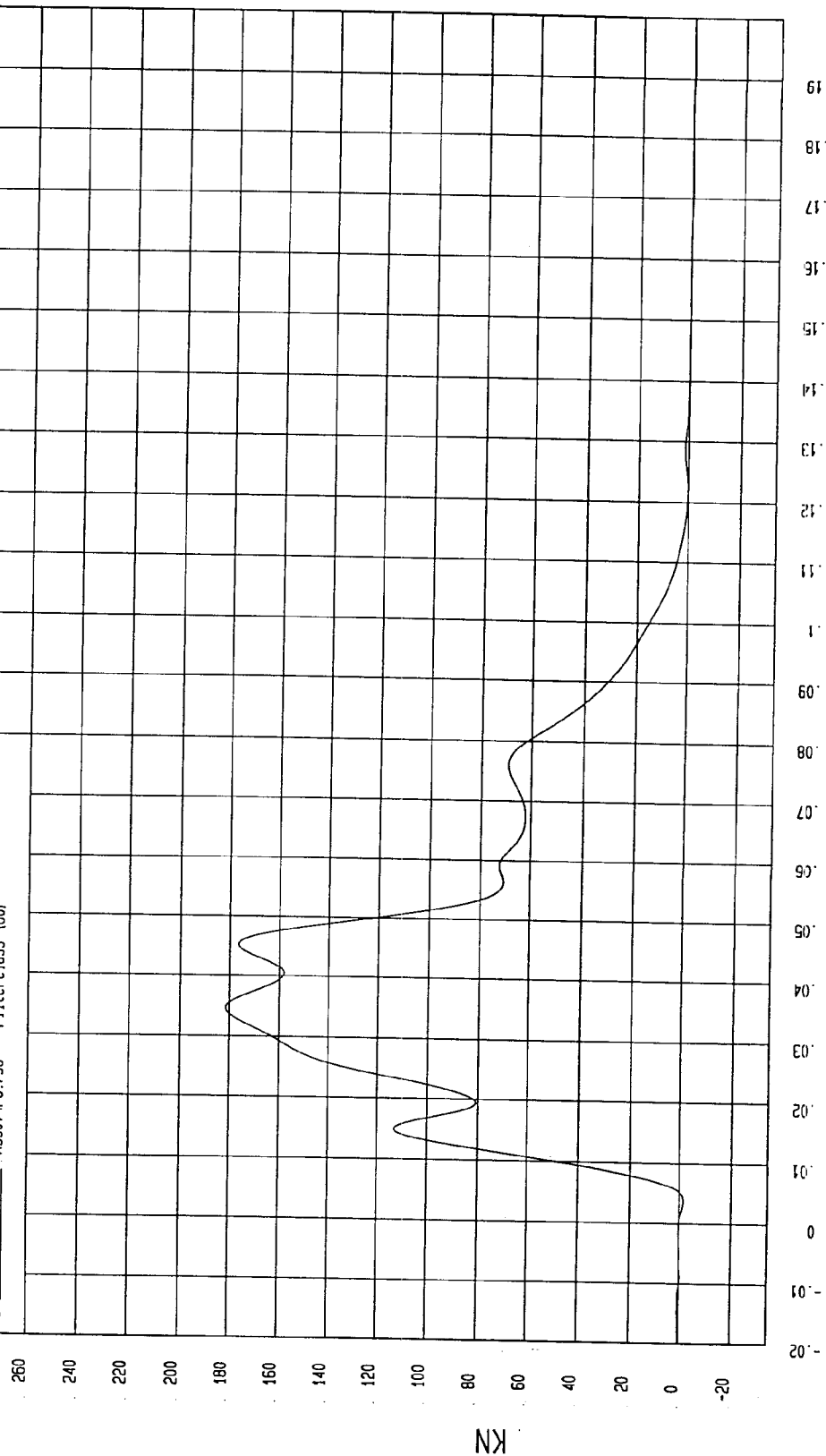
Speed: 35.1 MPH 56.5 KPH

Minimum = -1.66 KN at 4 msec

Maximum = 181.49 KN at 35 msec

SUM OF RIGHT BARRIER FORCES

1 — A99074FU.F96 Filterclass (60)



TIME (SECONDS)

NSA Research  
08-18-2000 05:01

B-148

TEST: 35 MPH FRONTAL IMPACT

TEST DATE: 11-17-1999

COMPONENT: 2000 HYUNDA ELANTRA (MY0500)

Speed: 35.1 MPH 56.5 KPH

Minimum = -1.93 KN at 1 msec

Maximum = 490.13 KN at 45 msec

SUM OF BARRIER FORCES

1 A99074FU.F94 Filterclass (50)

500

400

300

200

100

0

KN

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

MCA Research  
08-18-2000 05:01

APPENDIX C  
DUMMY CONFIGURATION & PERFORMANCE VERIFICATION DATA

## HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 065 DUMMY CALIBRATION BY: Tim Michnay

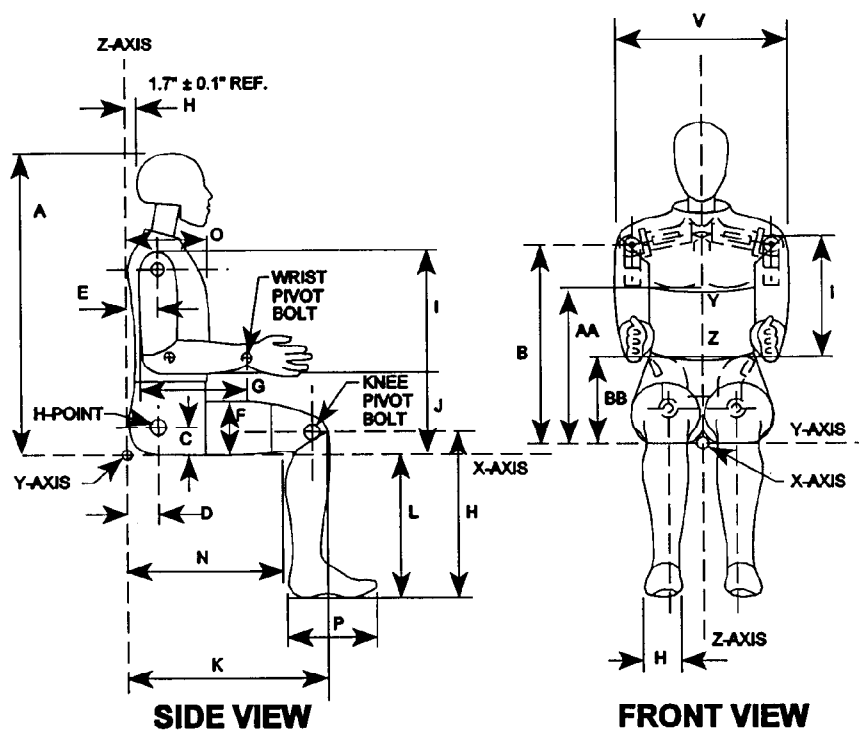
## I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: November 16, 1999

| DESCRIPTION                      | SPECIFICATION<br>(Inches) | ACTUAL<br>MEASUREMENT<br>(inches) |
|----------------------------------|---------------------------|-----------------------------------|
| A - Total Sitting Height         | 34.6 - 35.0               | 34.8                              |
| B - Shoulder Pivot Height        | 19.9 - 20.5               | 20.3                              |
| C - "H" Point Height             | 3.3 - 3.5                 | 3.4                               |
| D - "H" Point from Seat Back     | 5.3 - 5.5                 | 5.4                               |
| E - Shoulder Pivot From Backline | 3.3 - 3.7                 | 3.6                               |
| F - Thigh Clearance              | 5.5 - 6.1                 | 5.9                               |
| G - Back of Elbow to Wrist Pivot | 11.4 - 12.0               | 11.8                              |
| H - Skull Cap Skin to Backline   | 1.6 - 1.8                 | 1.7                               |
| I - Shoulder Elbow Length        | 13.0 - 13.6               | 13.4                              |
| J - Elbow Rest Height            | 7.5 - 8.3                 | 7.8                               |
| K - Buttock Knee Length          | 22.8 - 23.8               | 23.3                              |
| L - Popliteal Height             | 16.9 - 17.9               | 17.2                              |
| M - Knee Pivot Height            | 19.1 - 19.9               | 19.5                              |
| N - Buttock Popliteal Length     | 17.8 - 18.8               | 18.4                              |
| O - Chest Depth at 3rd Rib       | 8.4 - 9.0                 | 8.8                               |
| P - Foot Length                  | 9.9 - 10.5                | 10.3                              |
| V - Shoulder Breadth             | 16.6 - 17.2               | 16.8                              |
| W - Foot Breadth                 | 3.5 - 4.2                 | 3.5                               |
| Y - Chest Circumference          | 38.2 - 39.4               | 38.9                              |
| Z - Waist Circumference          | 32.9 - 34.1               | 33.4                              |

Note: (See next page for external dimensions)

## HYBRID III EXTERNAL DIMENSIONS



Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the hybrid III to be positioned in a perfect erect attitude.

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET

DUMMY NO.: 065 DUMMY CALIBRATION BY: Tim MichnayVERIFICATION DATE: November 15, 1999VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

## 1.0 HEAD DROP TEST

|                                | SPECIFICATION      | MEASUREMENT |
|--------------------------------|--------------------|-------------|
| Peak Resultant Acceleration    | 225 - 275 G        | 259         |
| Peak Lateral Acceleration      | 15 G. MAX          | 8           |
| Is Acceleration Curve Unimodal | within 10% of peak | yes         |

## 2.0 NECK FLEXION TEST

|                                                 |       | SPECIFICATION      | MEASUREMENT |
|-------------------------------------------------|-------|--------------------|-------------|
| Pendulum Speed                                  |       | 22.6 - 23.4 FT/SEC | 22.8        |
| Pendulum Deceleration                           | 10 MS | 22.50 - 27.50 G    | 23.92       |
|                                                 | 20 MS | 17.60 - 22.60 G    | 19.92       |
|                                                 | 30 MS | 12.50 - 18.50 G    | 14.88       |
| Max. Pendulum G Above 30 MS                     |       | 29.0 G MAX         | 14.9        |
| Deceleration - Time Curve Decay Time to 5 G     |       | 34 - 42 MS         | 37          |
| D Plane Rotation                                | MAX   | 64 - 78 DEG.       | 69          |
|                                                 | TIME  | 57 - 64 MS         | 58          |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 113 - 128 MS       | 118         |
| Moment About Occipital Condyle                  | MAX.  | 65 - 80 FT.LBS     | 71          |
|                                                 | TIME  | 47 - 58 MS         | 51          |
| Positive Moment - Time Curve Decay Time to Zero |       | 97 - 107 MS        | 98          |

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

## 3.0 NECK EXTENSION TEST

|                                                 |       | SPECIFICATION      | MEASUREMENT |
|-------------------------------------------------|-------|--------------------|-------------|
| Pendulum Speed                                  |       | 19.50 - 20.30 F/S  | 20.10       |
| Pendulum Deceleration                           | 10 MS | 17.20 - 21.20 G    | 18.65       |
|                                                 | 20 MS | 14.00 - 19.00 G    | 16.58       |
|                                                 | 30 MS | 11.00 - 16.00 G    | 12.44       |
| Max. Pendulum G Above 30 MS                     |       | 22 G Max           | 12          |
| Deceleration - Time Curve Decay Time to 5 G     |       | 38 - 46 MS         | 42          |
| D Plane Rotation                                | MAX   | 81 - 106 DEG.      | 95          |
|                                                 | TIME  | 72 - 82 MS         | 75          |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 147 - 174 MS       | 153         |
| Moment About Occipital Condyle                  | MIN.  | -59.0/-39.0 FT LBS | -41.2       |
|                                                 | TIME  | 65 - 79 MS         | 70          |
| Positive Moment - Time Curve Decay Time to Zero |       | 120 - 148 MS       | 139         |

## 4.0 CHEST IMPACT TESTS

|                      | SPECIFICATION     | MEASUREMENT |
|----------------------|-------------------|-------------|
| Probe Speed          | 21.6 to 22.4 F/S  | 21.9        |
| Peak Deflection      | 2.50 to 2.86 IN.  | 2.78        |
| Peak Resistive Force | 1160 to 1325 LBS. | 1281        |
| Internal Hysteresis  | 69 to 85%         | 74.1        |

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

## 5.0 KNEE IMPACT TESTS

| RIGHT KNEE    | SPECIFICATION    | MEASUREMENT |
|---------------|------------------|-------------|
| Probe Speed   | 6.8 to 7.0 F/S   | 7.0         |
| Maximum Force | 1060 - 1300 LBS. | 1224        |

| LEFT KNEE     | SPECIFICATION    | MEASUREMENT |
|---------------|------------------|-------------|
| Probe Speed   | 6.8 to 7.0 F/S   | 6.8         |
| Maximum Force | 1060 - 1300 LBS. | 1136        |

## 6.0 HIP JOINT-FEMUR FLEXION TEST

| LEFT KNEE               | SPECIFICATION              | MEASUREMENT |       |
|-------------------------|----------------------------|-------------|-------|
|                         |                            | LEFT        | RIGHT |
| Relative Humidity       | 10 - 70%                   | 26%         |       |
| Rotation Rate           | 5-10 DEG/SEC.              | yes         | yes   |
| 30 DEGREE MAX. ROTATION | 70 FT-LBF                  | 48          | 51    |
| 150 FT-LBF              | 40-50 DEGREE MAX. ROTATION | 44°         | 43°   |

## HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 066 DUMMY CALIBRATION BY: Tim Michnay

## I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: November 16, 1999

| DESCRIPTION                      | SPECIFICATION<br>(Inches) | ACTUAL<br>MEASUREMENT<br>(inches) |
|----------------------------------|---------------------------|-----------------------------------|
| A - Total Sitting Height         | 34.6 - 35.0               | 34.7                              |
| B - Shoulder Pivot Height        | 19.9 - 20.5               | 20.2                              |
| C - "H" Point Height             | 3.3 - 3.5                 | 3.4                               |
| D - "H" Point from Seat Back     | 5.3 - 5.5                 | 5.5                               |
| E - Shoulder Pivot From Backline | 3.3 - 3.7                 | 3.5                               |
| F - Thigh Clearance              | 5.5 - 6.1                 | 5.7                               |
| G - Back of Elbow to Wrist Pivot | 11.4 - 12.0               | 11.9                              |
| H - Skull Cap Skin to Backline   | 1.6 - 1.8                 | 1.7                               |
| I - Shoulder Elbow Length        | 13.0 - 13.6               | 13.4                              |
| J - Elbow Rest Height            | 7.5 - 8.3                 | 7.7                               |
| K - Buttock Knee Length          | 22.8 - 23.8               | 23.1                              |
| L - Popliteal Height             | 16.9 - 17.9               | 17.3                              |
| M - Knee Pivot Height            | 19.1 - 19.9               | 19.5                              |
| N - Buttock Popliteal Length     | 17.8 - 18.8               | 18.5                              |
| O - Chest Depth at 3rd Rib       | 8.4 - 9.0                 | 8.7                               |
| P - Foot Length                  | 9.9 - 10.5                | 10.3                              |
| V - Shoulder Breadth             | 16.6 - 17.2               | 16.9                              |
| W - Foot Breadth                 | 3.5 - 4.2                 | 4.0                               |
| Y - Chest Circumference          | 38.2 - 39.4               | 39.2                              |
| Z - Waist Circumference          | 32.9 - 34.1               | 33.2                              |

Note: (See page C-2 for external dimensions)

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

DUMMY NO.: 066 DUMMY CALIBRATION BY: Tim MichnayVERIFICATION DATE: November 15, 1999VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

## 1.0 HEAD DROP TEST

|                                | SPECIFICATION      | MEASUREMENT |
|--------------------------------|--------------------|-------------|
| Peak Resultant Acceleration    | 225 - 275 G        | 232         |
| Peak Lateral Acceleration      | 15 G. MAX          | 10          |
| Is Acceleration Curve Unimodal | within 10% of peak | yes         |

## 2.0 NECK FLEXION TEST

|                                                 |       | SPECIFICATION      | MEASUREMENT |
|-------------------------------------------------|-------|--------------------|-------------|
| Pendulum Speed                                  |       | 22.6 - 23.4 FT/SEC | 23.0        |
| Pendulum Deceleration                           | 10 MS | 22.50 - 27.50 G    | 23.46       |
|                                                 | 20 MS | 17.60 - 22.60 G    | 19.49       |
|                                                 | 30 MS | 12.50 - 18.50 G    | 14.73       |
| Max. Pendulum G Above 30 MS                     |       | 29.0 G MAX         | 14.7        |
| Deceleration - Time Curve Decay Time to 5 G     |       | 34 - 42 MS         | 38          |
| D Plane Rotation                                | MAX   | 64 - 78 DEG.       | 70          |
|                                                 | TIME  | 57 - 64 MS         | 58          |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 113 - 128 MS       | 114         |
| Moment About Occipital Condyle                  | MAX.  | 65 - 80 FT.LBS     | 67          |
|                                                 | TIME  | 47 - 58 MS         | 52          |
| Positive Moment - Time Curve Decay Time to Zero |       | 97 - 107 MS        | 101         |

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

## 3.0 NECK EXTENSION TEST

|                                                 |       | SPECIFICATION      | MEASUREMENT |
|-------------------------------------------------|-------|--------------------|-------------|
| Pendulum Speed                                  |       | 19.50 - 20.30 F/S  | 19.56       |
| Pendulum Deceleration                           | 10 MS | 17.20 - 21.20 G    | 19.46       |
|                                                 | 20 MS | 14.00 - 19.00 G    | 15.99       |
|                                                 | 30 MS | 11.00 - 16.00 G    | 13.37       |
| Max. Pendulum G Above 30 MS                     |       | 22 G Max           | 14          |
| Deceleration - Time Curve Decay Time to 5 G     |       | 38 - 46 MS         | 40          |
| D Plane Rotation                                | MAX   | 81 - 106 DEG.      | 98          |
|                                                 | TIME  | 72 - 82 MS         | 75          |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 147 - 174 MS       | 154         |
| Moment About Occipital Condyle                  | MIN.  | -59.0/-39.0 FT LBS | -48.1       |
|                                                 | TIME  | 65 - 79 MS         | 71          |
| Positive Moment - Time Curve Decay Time to Zero |       | 120 - 148 MS       | 144         |

## 4.0 CHEST IMPACT TESTS

|                      | SPECIFICATION     | MEASUREMENT |
|----------------------|-------------------|-------------|
| Probe Speed          | 21.6 to 22.4 F/S  | 21.9        |
| Peak Deflection      | 2.50 to 2.86 IN.  | 2.80        |
| Peak Resistive Force | 1160 to 1325 LBS. | 1272        |
| Internal Hysteresis  | 69 to 85%         | 71          |

## HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

## 5.0 KNEE IMPACT TESTS

| RIGHT KNEE    | SPECIFICATION    | MEASUREMENT |
|---------------|------------------|-------------|
| Probe Speed   | 6.8 to 7.0 F/S   | 6.8         |
| Maximum Force | 1060 - 1300 LBS. | 1214        |

| LEFT KNEE     | SPECIFICATION    | MEASUREMENT |
|---------------|------------------|-------------|
| Probe Speed   | 6.8 to 7.0 F/S   | 7.0         |
| Maximum Force | 1060 - 1300 LBS. | 1155        |

## 6.0 HIP JOINT-FEMUR FLEXION TEST

| LEFT KNEE          | SPECIFICATION                 | MEASUREMENT |       |
|--------------------|-------------------------------|-------------|-------|
|                    |                               | LEFT        | RIGHT |
| Relative Humidity  | 10 - 70%                      | 26%         |       |
| Rotation Rate      | 5-10 DEG/SEC.                 | yes         | yes   |
| 30 DEGREE ROTATION | 70 FT-LBF                     | 51          | 49    |
| 150 FT-LBF         | 40-50 degree maximum rotation | 44°         | 44°   |

APPENDIX D  
TEST EQUIPMENT & INSTRUMENTATION CALIBRATION

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 065

|                       | DRIVER     |              |                   |
|-----------------------|------------|--------------|-------------------|
|                       | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Head X                | AAMN8      | Endevco      | November 12, 1999 |
| Head Y                | ACC61      | Endevco      | November 12, 1999 |
| Head Z                | ACCW9      | Endevco      | November 12, 1999 |
| Head X Redundant      | AJ621      | Endevco      | November 12, 1999 |
| Head Y Redundant      | AJ619      | Endevco      | November 12, 1999 |
| Head Z Redundant      | AHY54      | Endevco      | November 12, 1999 |
| Chest X               | ACCY1      | Endevco      | November 12, 1999 |
| Chest Y               | ACCC8      | Endevco      | November 12, 1999 |
| Chest Z               | ACCT7      | Endevco      | November 12, 1999 |
| Chest X Redundant     | AJ9D4      | Endevco      | November 12, 1999 |
| Chest Y Redundant     | AJ9F3      | Endevco      | November 12, 1999 |
| Chest Z Redundant     | AJ9D9      | Endevco      | November 12, 1999 |
| Right Femur Load Cell | 259        | Denton       | November 11, 1999 |
| Left Femur Load Cell  | 260        | Denton       | November 11, 1999 |
| Pelvis X              | ANAM1      | Endevco      | November 12, 1999 |
| Pelvis Y              | AJ9Y3      | Endevco      | November 12, 1999 |
| Pelvis Z              | ANAN7      | Endevco      | November 12, 1999 |

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 065

|                         | DRIVER     |              |                   |
|-------------------------|------------|--------------|-------------------|
|                         | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Neck Load Cell X        | 442        | Denton       | August 27, 1999   |
| Neck Load Cell Y        | 442        | Denton       | August 27, 1999   |
| Neck Load Cell Z        | 442        | Denton       | August 27, 1999   |
| Neck Moment X           | 442        | Denton       | August 27, 1999   |
| Neck Moment Y           | 442        | Denton       | August 27, 1999   |
| Neck Moment Z           | 442        | Denton       | August 27, 1999   |
| Chest Deflection Gauge  | 442        | Servo        | November 16, 1999 |
| Lap Belt Load Cell      | B194       | Denton       | May 21, 1999      |
| Shoulder Belt Load Cell | B195       | Denton       | May 21, 1999      |

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 065

|                                | DRIVER     |              |                   |
|--------------------------------|------------|--------------|-------------------|
|                                | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Upper Right Tibia Moment X     | 103        | Denton       | June 16, 1999     |
| Upper Right Tibia Moment Y     | 103        | Denton       | June 16, 1999     |
| Upper Right Tibia Force Z      | 103        | Denton       | June 16, 1999     |
| Lower Right Tibia Moment X     | 133        | Denton       | June 16, 1999     |
| Lower Right Tibia Moment Y     | 133        | Denton       | June 16, 1999     |
| Lower Right Tibia Force Z      | 133        | Denton       | June 16, 1999     |
| Upper Left Tibia Moment X      | 105        | Denton       | June 16, 1999     |
| Upper Left Tibia Moment Y      | 105        | Denton       | June 16, 1999     |
| Upper Left Tibia Force Z       | 105        | Denton       | June 16, 1999     |
| Lower Left Tibia Moment X      | 134        | Denton       | June 16, 1999     |
| Lower Left Tibia Moment Y      | 134        | Denton       | June 16, 1999     |
| Lower Left Tibia Force Z       | 134        | Denton       | June 16, 1999     |
| Left Foot Ball Z Acceleration  | AJ820      | Endevco      | November 12, 1999 |
| Left Heel X Acceleration       | AJ8Y6      | Endevco      | November 12, 1999 |
| Left Heel Z Acceleration       | AGTG8      | Endevco      | November 12, 1999 |
| Right Foot Ball Z Acceleration | AHTB2      | Endevco      | November 12, 1999 |
| Right Heel X Acceleration      | J18953     | Endevco      | November 12, 1999 |
| Right Heel Z Acceleration      | J18843     | Endevco      | November 12, 1999 |

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 066

|                       | PASSENGER  |              |                   |
|-----------------------|------------|--------------|-------------------|
|                       | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Head X                | ACCY6      | Endevco      | November 12, 1999 |
| Head Y                | ACCH1      | Endevco      | November 12, 1999 |
| Head Z                | AAMW5      | Endevco      | November 12, 1999 |
| Head X Redundant      | AJ9D2      | Endevco      | November 12, 1999 |
| Head Y Redundant      | AH1E2      | Endevco      | November 12, 1999 |
| Head Z Redundant      | AJ7K3      | Endevco      | November 12, 1999 |
| Chest X               | ACC78      | Endevco      | November 12, 1999 |
| Chest Y               | ACCE6      | Endevco      | November 12, 1999 |
| Chest Z               | ACCY3      | Endevco      | November 12, 1999 |
| Chest X Redundant     | AJ7A2      | Endevco      | November 12, 1999 |
| Chest Y Redundant     | AJ819      | Endevco      | November 12, 1999 |
| Chest Z Redundant     | AJ9J7      | Endevco      | November 12, 1999 |
| Right Femur Load Cell | 261        | Denton       | November 11, 1999 |
| Left Femur Load Cell  | 262        | Denton       | November 11, 1999 |
| Pelvis X              | J11548     | Endevco      | November 12, 1999 |
| Pelvis Y              | J10866     | Endevco      | November 12, 1999 |
| Pelvis Z              | AP2D6      | Endevco      | November 12, 1999 |

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 066

|                         | PASSENGER  |              |                   |
|-------------------------|------------|--------------|-------------------|
|                         | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Neck Load Cell X        | 443        | Denton       | August 27, 1999   |
| Neck Load Cell Y        | 443        | Denton       | August 27, 1999   |
| Neck Load Cell Z        | 443        | Denton       | August 27, 1999   |
| Neck Moment X           | 443        | Denton       | August 27, 1999   |
| Neck Moment Y           | 443        | Denton       | August 27, 1999   |
| Neck Moment Z           | 443        | Denton       | August 27, 1999   |
| Chest Deflection Gauge  | 66         | Servo        | November 16, 1999 |
| Lap Belt Load Cell      | B198       | Denton       | May 21, 1999      |
| Shoulder Belt Load Cell | B199       | Denton       | May 21, 1999      |

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 066

|                                | PASSENGER  |              |                   |
|--------------------------------|------------|--------------|-------------------|
|                                | SERIAL NO. | MANUFACTURER | CALIBRATION DATE  |
| Upper Right Tibia Moment X     | 106        | Denton       | June 22, 1999     |
| Upper Right Tibia Moment Y     | 106        | Denton       | June 22, 1999     |
| Upper Right Tibia Force Z      | 106        | Denton       | June 22, 1999     |
| Lower Right Tibia Moment X     | 135        | Denton       | June 16, 1999     |
| Lower Right Tibia Moment Y     | 135        | Denton       | June 16, 1999     |
| Lower Right Tibia Force Z      | 135        | Denton       | June 16, 1999     |
| Upper Left Tibia Moment X      | 109        | Denton       | June 16, 1999     |
| Upper Left Tibia Moment Y      | 109        | Denton       | June 16, 1999     |
| Upper Left Tibia Force Z       | 109        | Denton       | June 16, 1999     |
| Lower Left Tibia Moment X      | 138        | Denton       | June 22, 1999     |
| Lower Left Tibia Moment Y      | 138        | Denton       | June 22, 1999     |
| Lower Left Tibia Force Z       | 138        | Denton       | June 22, 1999     |
| Left Foot Ball Z Acceleration  | AHWP2      | Endevco      | November 12, 1999 |
| Left Heel X Acceleration       | AHY98      | Endevco      | November 12, 1999 |
| Left Heel Z Acceleration       | AHTW6      | Endevco      | November 12, 1999 |
| Right Foot Ball Z Acceleration | AMWC8      | Endevco      | November 12, 1999 |
| Right Heel X Acceleration      | AJ436      | Endevco      | November 12, 1999 |
| Right Heel Z Acceleration      | AGT81      | Endevco      | November 12, 1999 |

# DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

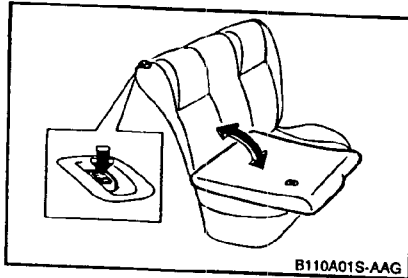
|                                         | VEHICLE ACCELEROMETERS |              |                    |
|-----------------------------------------|------------------------|--------------|--------------------|
|                                         | SERIAL NO.             | MANUFACTURER | CALIBRATION DATE   |
| Left Rear Seat Crossmember X            | I14-D13                | Entran       | August 12, 1999    |
| Right Rear Seat Crossmember X           | C25-A09                | Entran       | August 17, 1999    |
| Top of Engine Block X                   | I26-D04                | Entran       | September 24, 1999 |
| Bottom of Engine X                      | F10-D04                | Entran       | August 16, 1999    |
| Left Brake Caliper X                    | J10-E03                | Entran       | August 17, 1999    |
| Right Brake Caliper X                   | F10-D02                | Entran       | September 24, 1999 |
| Instrument Panel X                      | C25-A09                | Entran       | August 17, 1999    |
| Redundant Left Rear Seat Crossmember X  | G13-B03                | Entran       | August 17, 1999    |
| Redundant Right Rear Seat Crossmember X | I26-D15                | Entran       | August 17, 1999    |

|                                            | LABORATORY INSTRUMENTS |              |                   |
|--------------------------------------------|------------------------|--------------|-------------------|
|                                            | SERIAL NO.             | MANUFACTURER | CALIBRATION DATE  |
| Neck Bending Pendulum Accelerometer        | C12885                 | Endevco      | August 3, 1999    |
| Neck Bending Head Rotary Potentiometer     | 019                    | Spectrol     | November 11, 1999 |
| Neck Bending Pendulum Rotary Potentiometer | 018                    | Spectrol     | November 11, 1999 |
| Chest Probe Accelerometer                  | J13780                 | Endevco      | August 3, 1999    |
| Knee Impact Accelerometer                  | AMHP6                  | Endevco      | August 3, 1999    |

APPENDIX E  
VEHICLE OWNER'S OCCUPANT RESTRAINT  
SYSTEM INSTRUCTIONS

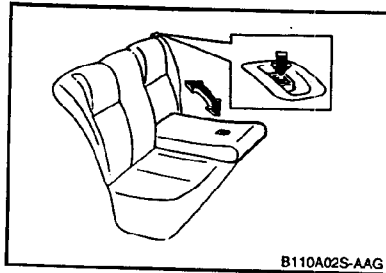
B110A02S-AAT

## FOLDING REAR SEATBACKS (If Installed)



The rear seatbacks may be folded to facilitate carrying long items or to increase the luggage capacity of the vehicle.

- o To unlock the seatback, push the seat-back locking button, then pull forward on the seatback panel.
- o When you return the seatback to its upright position, always be sure it has locked into position by pulling and pushing on the top of the seatback.



### WARNING:

The purpose of the fold-down rear seatbacks is to allow you to carry longer objects than could otherwise be accommodated. Do not allow passengers to sit on top of the folded down seat back while the car is moving as this is not a proper seating position and no seat belts are available for use. This could result in injury in case of an accident or sudden stop. Objects carried on the folded down seatback should not extend higher than the top of the front seats. This could allow cargo to slide forward and

cause injury or damage during sudden stops.

B150A01S-AAT

## SEAT BELT PRECAUTIONS

### WARNING:

All occupants of the vehicle must wear their seat belts at all times. Note that this vehicle is equipped with a Supplemental Restraint (Airbag) System as discussed beginning on page 1-22. The seat belts must be used in conjunction with the supplemental airbag system. State laws may require that some or all occupants of the vehicle use seat belts. The possibility of increased injury or severity of injury in an accident will be increased if this elementary safety precaution is not observed. In addition, the following recommendations are made:

B150B01S-AAT

### Infant or Small Child

All states require small children to use proper restraints. The child restraint seat or infant restraint system should be

1-10

# FEATURES OF YOUR HYUNDAI

placed in the rear seat and used for infants or small children weighing less than 40 pounds. Information about the use of such restraints begins on page 1-18. Such restraints must only be used in the rear seat.

### WARNING:

Every person in your vehicle needs to be buckled up at all times, including infants and children. In a collision, an unrestrained child can become a "missile" inside the car. The force required to hold a child on your lap could be so great that you could not hold the child. Any child riding in the vehicle should always be in a proper restraint in the rear seat of the vehicle.

### NOTE:

Small children are best protected in an accident when properly restrained in the rear seat by a child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards. Before buying any child restraint system, make sure that it

has a label certifying that it meets Motor Vehicle Safety Standard 213. The restraint must be appropriate for your child's height and weight. Check the label on the child restraint for this information. See page 1-18.

B150C01A-AAT

### Larger Children

It is recommended that all children who are too large for child seats occupy the rear seat and use the available lap/shoulder belts. The lap portion should be fastened snug on the hips and as low as possible. Check belt fit periodically. A child's squirming could move the belt out of position. If the larger child (over age 13) is in the front seat, the child should be securely restrained by the seat belt. Under no circumstances should the child be allowed to stand or kneel on the seat. Children are afforded the most safety in the event of an accident when they are restrained by a proper restraint system in the rear seat.

B150D01S-AAT

### Pregnant Women

The use of a seat belt is recommended for pregnant women to lessen the chance of injury in an accident. When a seat belt is used, it should be placed as low and snugly as possible on the hips, not across the abdomen. For specific recommendations, consult a physician.

B150E01A-AAT

### Injured Person

A seat belt should be used when an injured person is being transported. When this is necessary, you should consult a physician for recommendations.

B150F01A-AAT

### One Person Per Belt

Two people (including children) should never attempt to use a single seat belt. This could increase the severity of injuries in case of an accident.

B150G01A-AAT

### Do Not Lie Down

To reduce the chance of injuries in the event of an accident, and to achieve

## FEATURES OF YOUR HYUNDAI

maximum effectiveness of the restraint system, all passengers should be sitting up and the front seats should be in an upright position when the car is moving. A seat belt cannot operate properly if the person is lying down in the rear seat or if the front seat is in a reclined position.

### WARNING:

**Sitting in a reclined position or lying down when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined**

**The shoulder belt can't do its job because it won't be against your body. Instead, it will be in front of you. In a crash you could go into it, receiving serious neck or other injuries.**

**The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones.**

**This could cause serious internal injuries.**

**For proper protection when the vehicle is in motion, have the seatback**

**upright. Then sit well back in the seat and wear your safety belt properly.**

B160A01A-AAT

### CARE OF SEAT BELTS

Seat belt systems should never be disassembled or modified. In addition, care should be taken to assure that seat belts and belt hardware are not damaged by seat hinges, doors or other abuse.

### WARNING:

**When you return the rear seatback to its upright position after the rear seatback was folded down, be careful not to damage the seat belt webbing or buckle. Be sure that the webbing or buckle does not get caught or pinched in the rear seat.**

B160B01A-AAT

### Periodic Inspection

It is recommended that all seat belts be inspected periodically for wear or damage of any kind. Parts of the system that are damaged should be replaced as soon as possible.

B160C01A-AAT

### Keep Belts Clean and Dry

Seat belts should be kept clean and dry. If belts become dirty, they can be cleaned by using a mild soap solution and warm water. Bleach, dye, strong detergents or abrasives should not be used because they may damage and weaken the fabric.

B160D01A-AAT

### When To Replace Seat Belts

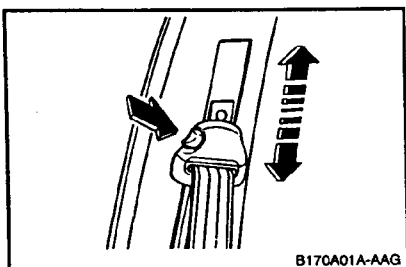
The entire seat belt assembly or assemblies should be replaced if the vehicle has been involved in an accident. This should be done even if no damage is visible. Additional questions concerning seat belt operation should be directed to your Hyundai Dealer.

1-12

## FEATURES OF YOUR HYUNDAI

B170A01A-AAT

### HEIGHT ADJUSTABLE FRONT SEAT SHOULDER BELT (If Installed)



You can adjust the height of the shoulder belt anchor to one of the 4 positions.

If the height of the adjusting seat belt is too near your neck, you will not be getting the most effective protection. The shoulder portion should be adjusted so that it lies across your chest and mid-way over your shoulder nearest the door and not your neck.

To adjust the height of seat belt anchor, lower or raise the height adjuster into

an appropriate position when the height adjuster knob is pulled up.

Release the button to lock the anchor into position. Try sliding the release button to make sure that it has locked into position.

### WARNING:

**The height adjuster must be in the locked position when the vehicle is moving.**

B180A01S-AAT

### SEAT BELT-Driver's 3-Point System with Emergency Locking Retractor

#### To Fasten Your Belt

To fasten your seat belt, pull it out of the retractor and insert the metal tab into the buckle. There will be an audible "click" when the tab locks into the buckle.

The seat belt automatically adjusts to the proper length only after the lap belt portion is adjusted manually so that it fits snugly around your hips. If you lean forward in a slow, easy motion, the belt will extend and let you move around. If

there is a sudden stop or impact, the belt will lock into position. It will also lock if you try to lean forward too quickly. Check to make sure that the belt is properly locked and that the belt is not twisted.

### NOTE:

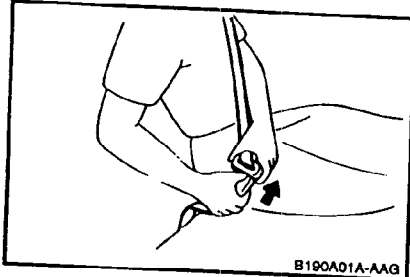
**If the driver's seat belt is not fastened when the Ignition key is in the "ON" position, the seat belt warning light will flash and the warning chime will sound for approximately six seconds.**

1-13

B190A01A-AAT

## SEAT BELTS-Front Passenger and Outboard Rear Seat 3-Point System with Combination Locking Retractor

### To Fasten Your Belt



B190A01A-AAG

Combination retractor type seat belts are installed in the rear seat outboard positions to help accommodate the installation of child restraint systems. Although a combination retractor is also installed in the front passenger seat position, Hyundai strongly recommends that children always be seated in the rear seat. NEVER place any infant restraint system in the front seat of the vehicle.

1-14

This type of seat belt combines the features of both an emergency locking retractor seat belt and an automatic locking retractor seat belt. To fasten your seat belt, pull it out of the retractor and insert the metal tab into the buckle. There will be an audible "click" when the tab locks into the buckle. When not securing a child restraint, the seat belt operates in the same way as the driver's seat belt (Emergency Locking Retractor Type). It automatically adjusts to the proper length only after the lap belt portion of the seat belt is adjusted manually so that it fits snugly around your hips. When the seat belt is fully extended from the retractor to allow the installation of a child restraint system, the seat belt operation changes to allow the belt to retract, but not to extend. (Automatic Locking Retractor Type)

### NOTE:

Although the combination retractor provides the same level of protection for seated passengers in either emergency or automatic locking modes, it is recommended that seated pas-

sengers use the emergency locking feature for improved convenience. The automatic locking function is intended to facilitate child restraint installation. To convert from the automatic locking feature to the emergency locking operation mode, allow the unbuckled seat belt to fully retract.

### WARNING:

- o For maximum restraint system protection, seat belts must always be used whenever the car is moving.
- o Seat belts are most effective when seatbacks are in the upright position.
- o Children must always be seatbelted in the rear seats.
- o The shoulder belt should be positioned midway over the shoulder nearest the door for the most effective protection. Never wear the seat belt under the arm nearest the door.
- o Avoid wearing twisted seat belts. A twisted belt can't do its job as well. In a collision, it could even cut into

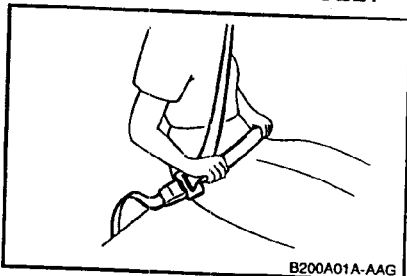
# FEATURES OF YOUR HYUNDAI

you. Be sure the belt is straight and not twisted.

- o Be careful not to damage the belt webbing or hardware.

B200A01A-AAT

## ADJUSTING YOUR SEAT BELT



B200A01A-AAG

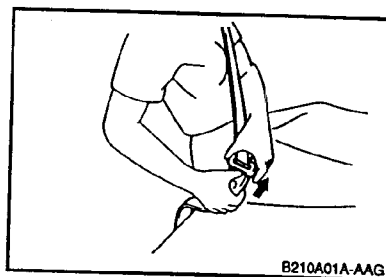
### WARNING:

You should place the lap belt portion as low as possible and snugly across your hips, not on your waist. If the lap belt is located too high on your waist, it may increase the chance of injury in the event of a collision. Both arms should not be under or over the belt. Rather, one should be over

and the other under, as shown in the illustration.

B210A01A-AAT

## To Release the Seat Belt



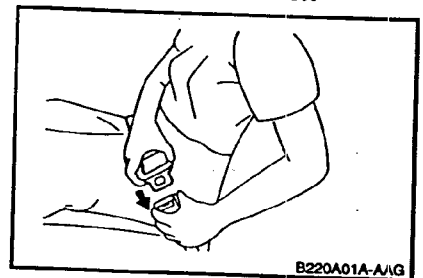
B210A01A-AAG

The seat belt is released by pressing the release button in the locking buckle. When it is released, the belt should automatically draw back into the retractor. If this does not happen, check the belt to be sure it is not twisted, then try again.

B220A01A-AAT

## SEAT BELTS (2-Point Static Type) (Rear Seat Center)

### To Fasten Your Seat Belt



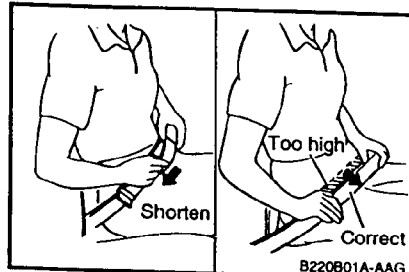
B220A01A-A/G

To fasten a 2-point static type belt, insert the metal tab into the locking buckle. There will be an audible "click" when the tab locks into the buckle. Check to make sure the belt is properly locked and that the belt is not twisted.

## FEATURES OF YOUR HYUNDAI

B220B01A-AAT

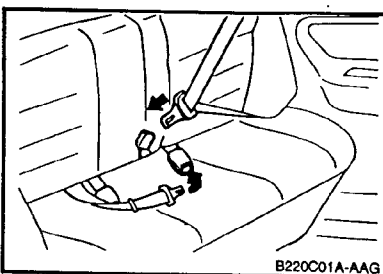
### Adjusting Your Seat Belt



With a 2-point static type seat belt, the length must be adjusted manually so it fits snugly around your body. Fasten the belt and pull on the loose end to tighten. The belt should be placed as low as possible on your hips, not on your waist. If the belt is too high, it could increase the possibility of your being injured in an accident.

B220C01A-AAT

### To Release the Seat Belt



When you want to release the seat belt, press the button in the locking buckle.

#### WARNING:

The center lap belt latching mechanism is different from those for the rear seat shoulder belts. When fastening the rear seat shoulder belts or the center lap belt, make sure they are inserted into the correct buckles to obtain maximum protection from the seat belt system and assure proper operation.

B230A01A-AAT

### CHILD RESTRAINT SYSTEM

Children riding in the car should sit in the rear seat and must always be restrained to minimize the risk of injury in an accident, sudden stop or sudden maneuver. According to accident statistics provided by the National Highway Traffic Safety Administration (NHTSA), children are safer when properly restrained in the rear seats than in the front seat. Larger children should use one of the seat belts provided.

You are required by law to use safety restraints for children. If small children ride in your vehicle (generally children younger than four years and/or weighing less than 40 Lbs.) you must put them in a child restraint system (safety seat). For smaller children, you must use a commercially available child restraint system that meets the requirements of the Federal Motor Vehicle Safety Standards (FMVSS).

Children could be injured in a crash if their restraints are not properly secured. For small children and babies, a child

1-16

## FEATURES OF YOUR HYUNDAI

seat or infant seat must be used. Before buying a particular child restraint system, make sure it fits your car seat and seat belts, and fits your child. Follow all the instructions provided by the manufacturer when installing the child restraint system.

#### WARNING:

- o A child restraint system must be placed in the rear seat. Never install a child or infant seat on the front passenger's seat. Should an accident occur and cause the passenger side supplemental airbag to deploy, it could severely injure or kill an infant or child seated in an infant or child seat. Thus, only use a child restraint in the rear seat of your vehicle.
- o Since a safety belt or child restraint system can become very hot if it is left in a closed vehicle, be sure to check the seat cover and buckles before placing a child there.
- o When the child restraint system is not in use, store it in the trunk or fasten it with a safety belt so that

it will not be thrown forward in the case of a sudden stop or an accident.

- o Children who are too large to be in a child restraint should sit in the rear seat and be restrained with the available lap/shoulder belts.
- o Always make sure that the shoulder belt portion of the outboard lap/shoulder belt is positioned midway over the shoulder, never across the neck. Moving the child closer to the center of the vehicle may help provide a good shoulder belt fit. The lap belt portion of the lap/shoulder belt or the center seat lap belt must always be positioned as low as possible on the child's hips and as snug as possible.
- o If the seat belt will not properly fit the child, we recommend the use of an approved booster seat in the rear seat in order to raise the child's seating height so that the seat belt will properly fit the child. Before purchasing a booster seat, make sure that it meets applicable Federal Motor Vehicle Safety Standards

(FMVSS) and that it is satisfactory for use with this vehicle.

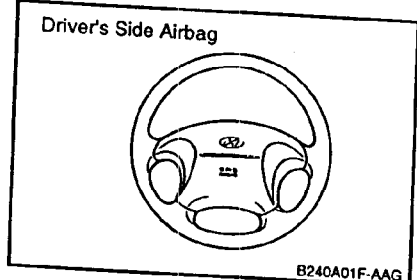
- o Never allow a child to stand up or kneel on the seat.
- o Never use an infant carrier or child safety seat that "hooks" over a seat-back; it may not provide adequate security in an accident.
- o Never allow a child to be held in a person's arms while they are in a moving vehicle, as this could result in serious injury to the child in the event of an accident or a sudden stop. Holding a child in a moving vehicle does not provide the child with any means of protection during an accident, even if the person holding the child is wearing a seat belt.

service or repair the pre-tensioner seat belt assemblies may lead to improper operation or inadvertent activation and serious injury.

- o Always wear the seat belts when driving or riding in a motor vehicle.

B240A01F-AAT

## SUPPLEMENTAL RESTRAINT (AIRBAG) SYSTEM "SRS"



Your Hyundai is equipped with a Supplemental Restraint (Airbag) System. The indications of the system's presence are the letters "SRS AIR BAG" embossed on the airbag pad cover in the steering wheel and the passenger's side front panel pad above the glove box.

1-22

The Hyundai SRS consists of airbags installed under the pad covers in the center of the steering wheel and the passenger's side front panel above the glove box. The purpose of the SRS is to provide the vehicle's driver and the front passenger with additional protection when used together with the seat belt, in case of a frontal impact.

### NOTE:

Be sure to read information about the SRS on the labels provided on the backside of the sun visor and in the glove box.

### WARNING:

- o As its name implies, the SRS is designed to work with, and be supplemental to, the driver's and the passenger's three point seat belt systems and is not a substitute for them. Therefore your seat belts must be worn at all times while the vehicle is in motion. In addition, the airbags deploy only in certain frontal impact conditions severe enough to cause significant injury to the vehicle occupants.

o The SRS is designed to deploy the airbags only when an impact is sufficiently severe and when the impact angle is less than 30° from the forward longitudinal axis of the vehicle and will not deploy in side, rear or rollover impacts. Additionally, the airbags will only deploy once. Thus, seat belts must be worn at all times.

o The driver should sit back as far as possible while still maintaining control of the vehicle. If you are sitting too close to the airbag, it can cause death or serious injury when it inflates.

o No objects should be placed over or near the airbag modules on the steering wheel, instrument panel, and the front passenger's panel above the glove box, because any such object could cause harm if the vehicle is in a crash severe enough to cause the airbags to inflate.

o If the airbags inflate, they must be replaced by an authorized Hyundai dealer.

# FEATURES OF YOUR HYUNDAI

- o Do not tamper with or disconnect SRS wiring, or other components of the SRS system. Doing so could result in injury, due to accidental firing of the airbags or by rendering the SRS inoperative.

o Do not install a child restraint system in the front passenger seat position. A child restraint system must never be placed in the front seat. The infant or child could be severely injured or killed by an airbag deployment in case of an accident.

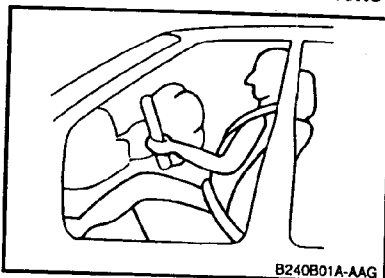
o For maximum safety protection in all types of crashes, all occupants including the driver should always wear their seat belts whether or not an airbag is also provided at their seating position to minimize the risk of severe injury or death in the event of a crash. Do not sit or lean unnecessarily close to the airbag while the vehicle is in motion.

o The SRS airbag system must deploy very rapidly to provide protection in a crash. If an occupant is out

of position because of not wearing a seat belt, the airbag may forcefully contact the occupant causing serious or fatal injuries.

B240B02A-AAT

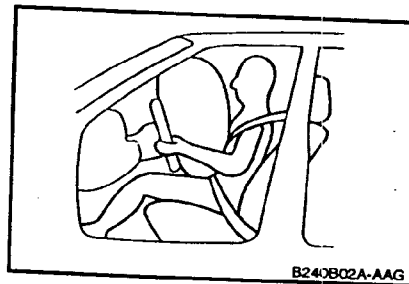
## SRS Components and Functions



The SRS consists of the following components:

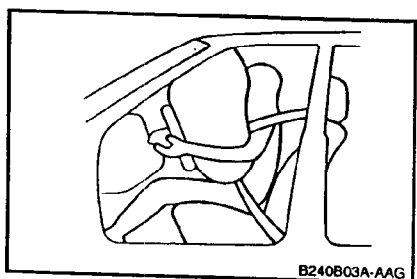
- Driver's Side Airbag Module
- Passenger's Side Airbag Module
- Knee Bolster
- SRS Service Reminder Indicator (SRI)
- SRS Control Module (SRSCM)

The SRSCM continually monitors all elements while the ignition is "ON" to determine if a frontal or near-frontal impact is severe enough to require airbag deployment.

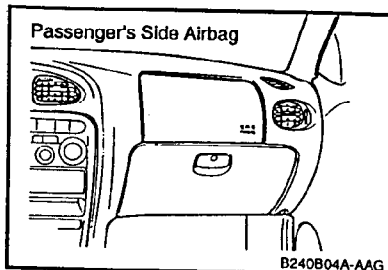


The SRS service reminder indicator (SRI) on the instrument panel will blink for about 6 seconds after the ignition key is turned to the "ON" position or after the engine is started, after which the SRI should go out.

## FEATURES OF YOUR HYUNDAI

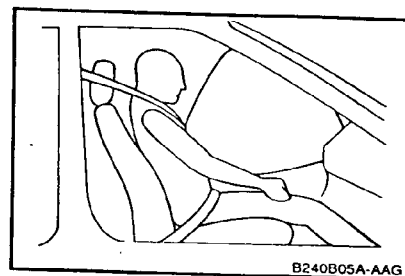


The airbag modules are located both in the center of the steering wheel and in the front passenger's panel above the glove box. When the SRSCM detects a considerable impact to the front of the vehicle, it will automatically deploy the airbags.



Upon deployment, tear seams molded directly into the pad covers will separate under pressure from the expansion of the airbags. Further opening of the covers then allows full inflation of the airbags.

A fully inflated airbag in combination with a properly worn seat belt slows the driver's or the passenger's forward motion, thus reducing the risk of head and chest injury.



After complete inflation, the airbag immediately starts deflating, enabling the driver to maintain forward visibility.

**CAUTION:**

When installing a container of liquid air freshener inside a vehicle, do not place it near the instrument cluster nor on the instrument panel pad surface. If there is any leakage from the air freshener onto these areas (instrument cluster, instrument panel pad or air ventilator), it may damage these parts. If the liquid from the air freshener does leak onto these areas, wash them with water immediately.

1-24

## FEATURES OF YOUR HYUNDAI

**WARNING:**

- o When the SRS is activated, there may be a loud noise and fine dust will be released through out the vehicle. These conditions are normal and are not hazardous. However, the fine dust generated during airbag deployment may cause skin irritation. Be sure to wash your hands and face thoroughly with lukewarm water and a mild soap after an accident in which the airbags were deployed.
- o The SRS can function only when the Ignition key is in the "ON" position. If the SRS SRI does not come on, or continuously remains on, after flashing for about 6 seconds when the Ignition key is turned to the "ON" position, or after the engine is started, or comes on while driving, the SRS is not working properly. If this occurs, have your vehicle immediately inspected by your Hyundai dealer.
- o Before you replace a fuse or disconnect a battery terminal, turn the Ignition key to the "LOCK" position or remove the Ignition key. Never remove or replace the air bag related fuse(s) when the Ignition key is in the "ON" position. Failure to heed this warning will cause the SRS SRI to illuminate.

B240C01A-AAT  
SRS Care

- o The SRS is virtually maintenance free and there are no parts you can safely service by yourself. The entire SRS system must be inspected by an authorized Hyundai dealer 10 years after the date that the vehicle was manufactured.
- o Any work on the SRS system, such as removing, installing, repairing, or any work on the steering wheel must be performed by a qualified Hyundai technician. Improper handling of the airbag system may result in serious personal injury.

**WARNING:**

- o Modification to SRS components or wiring, including the addition of any kind of badges to the pad covers or modifications to the body structure, can adversely affect SRS performance and lead to possible injury.
- o For cleaning the airbag pad covers, use only a soft, dry cloth or one which has been moistened with plain water. Solvents or cleaners could adversely affect the airbag covers and proper deployment of the system.

1-25

## FEATURES OF YOUR HYUNDAI

- o No objects should be placed over or near the airbag modules on the steering wheel, instrument panel, and the front passenger's panel above the glove box, because any such object could cause harm if the vehicle is in a crash severe enough to cause the airbags to inflate.
- o If the airbags inflate, they must be replaced by an authorized Hyundai dealer.
- o Do not tamper with or disconnect SRS wiring, or other components of the SRS system. Doing so could result in injury, due to accidental firing of the airbags or by rendering the SRS inoperative.
- o Do not install a child restraint system in the front passenger seat position. A child restraint system must never be placed in the front seat. The infant or child could be severely injured or killed by an airbag deployment in case of an accident.
- o If components of the airbag system must be discarded, or if the vehicle must be scrapped, certain safety precautions must be observed. Your Hyundai dealer knows these precautions and can give you the necessary information. Failure to follow these precautions and procedures could increase the risk of personal injury.
- o If you sell your vehicle, be sure to inform the new owner of these important points and make certain that this manual is transferred to the new owner.
- o If your car was flooded and has soaked carpeting or water on the floor, you shouldn't try to start the engine; have the car towed to an authorized Hyundai dealer.