

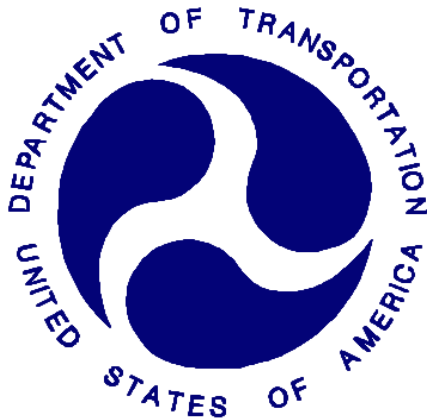
**REPORT NUMBER TR-P23001-23-NC**

**NEW CAR ASSESSMENT PROGRAM  
FRONTAL BARRIER IMPACT TEST**

**DAIMLER CHRYSLER CORPORATION  
2004 JEEP LIBERTY 4WD  
SUV**

**NHTSA NUMBER: M40300**

**PREPARED BY:  
KARCO ENGINEERING, LLC  
9270 HOLLY ROAD  
ADELANTO, CALIFORNIA 92301**



**11/18/03**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
RULEMAKING  
OFFICE OF CRASHWORTHINESS STANDARDS  
MAIL CODE: NVS-111  
400 SEVENTH STREET, SW, ROOM 5311  
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-02005.

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Date: November 23, 2003

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

# Technical Report Documentation Page

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                |                  |                                                                                                                                                                                                                           |                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
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| <b>4. Title and Subtitle</b><br>Final Report of New Car Assessment Program Testing of a<br>2004 Jeep Liberty 4WD SUV<br>NHTSA No. M40300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                |                  | <b>5. Report Date</b>                                                                                                                                                                                                     |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                |                  | <b>6. Performing Organization Code</b>                                                                                                                                                                                    |                      |
| <b>7. Authors</b><br>Mr. James E. Gorth, Project Engineer, Karco<br>Mr. Frank Richardson, Program Manager, Karco                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                |                  | <b>8. Performing Organization Report No.</b><br>TR-P23001-23-NC                                                                                                                                                           |                      |
| <b>9. Performing Organization Name and Address</b><br>Karco Engineering, LLC<br>9270 Holly Rd.<br>Adelanto, CA, 92301                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                                                |                  | <b>10. Work Unit No.</b>                                                                                                                                                                                                  |                      |
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| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                                                                |                  |                                                                                                                                                                                                                           |                      |
| <b>16. Abstract</b><br><br>A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2004 Jeep Liberty 4WD SUV at Karco Engineering, LLC on 11/18/03. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 55.98 km/h. The ambient temperature at the barrier face at the time of impact is 17.2 degrees Celcius. The vehicle's maximum post test static crush is 389 mm to the left of the vehicle centerline. The test vehicle is equipped with a 3-point continuous belt system and second generation supplemental airbags in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows: |  |                                                                |                  |                                                                                                                                                                                                                           |                      |
| <b>Measurement Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | <b>Units</b>                                                   | <b>Threshold</b> | <b>Driver ATD</b>                                                                                                                                                                                                         | <b>Passenger ATD</b> |
| Head Injury Criteria (HIC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | N/A                                                            | 1000             | 481.8                                                                                                                                                                                                                     | 778.4                |
| Max. Chest Accel. (3 msec Clip)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | G's                                                            | 60               | 37.9                                                                                                                                                                                                                      | 49.5                 |
| Left Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | Newtons                                                        | 10008            | -4040.8                                                                                                                                                                                                                   | -3172.0              |
| Right Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | Newtons                                                        | 10008            | -1717.9                                                                                                                                                                                                                   | -3729.9              |
| <b>17. Key Words</b><br>56.3 km/h NCAP Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>2004 Jeep Liberty 4WD SUV<br>NHTSA No. M40300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                |                  | <b>18. Distribution of Statement</b><br>Copies of this report available from:<br>NHTSA Technical Reference Division<br>National Highway Traffic Safety Admin.<br>400 Seventh St., SW, Room 5108<br>Washington, D.C. 20590 |                      |
| <b>19. Security Classification (this report)</b><br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | <b>20. Security Classification (this page)</b><br>Unclassified |                  | <b>21. No. of Pages</b><br>490                                                                                                                                                                                            | <b>22. Price</b>     |

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## **SECTION 1**

### **PURPOSE AND SUMMARY OF TEST M40300**

#### **1.1 PURPOSE**

This 35 mph (56.3 km/h) frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-02005. 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 30 mph (48.3 km/h) requirements.

The 35 mph (56.3 km/h) frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Test Procedure.

#### **1.2 SUMMARY**

A load cell barrier consisting of 36 load cells was impacted by a 2004 Jeep Liberty 4WD SUV at a velocity of 55.98 km/h. The test was performed at Karco Engineering, LLC on November 18, 2003.

One real-time and 20 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50<sup>th</sup> 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 fully instrumented head (primary and redundant), chest (primary and redundant) and pelvis triaxial accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also placed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 34) and the right-front passenger (position 2) ATD (Serial No. 35) were calibrated one test prior to this test.

Ninety seven (97) channels of data were recorded using an on-board data acquisition system. Appendix A contains Pre and Post-Test Photographs, Appendix B contains the vehicle and dummy response data traces. Appendix C contains Load Cell Barrier information. Appendix D contains the Instrumentation Data Channel assignments. Appendix E contains the Dummy Calibration data and Appendix F contains the Child Restraint System (CRS).

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the impact event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 389 mm and both the driver and the passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD head and chest contacted the airbag. Both knees contacted the knee bolster.

The passenger's visible contact points were as follows: The passenger ATD head and chest contacted the airbag. Both knees contacted the glove box.

Occupant injury data is contained in table below.

**OCCUPANT DATA SUMMARY**

| ATD Position | HIC   | Clip (g) | Chest<br>Disp.<br>(mm) | Left<br>Femur<br>(N) | Right<br>Femur<br>(N) | Belt<br>Spool<br>(mm) |
|--------------|-------|----------|------------------------|----------------------|-----------------------|-----------------------|
| Driver       | 481.8 | 37.9     | -24.3                  | -4040.8              | -1717.9               | 131.2                 |
| Passenger    | 778.4 | 49.5     | -29.6                  | -3172.0              | -3729.9               | 207.6                 |

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**CONVERSION FACTORS USED IN THIS REPORT\***

| Quantity           | Typical Application | Std Units           | Metric Unit | Multiply By   |
|--------------------|---------------------|---------------------|-------------|---------------|
| Mass               | Vehicle Weight      | lb                  | kg          | 0.4536        |
| Linear Velocity    | Impact Velocity     | mile/h              | km/h        | 1.609         |
| Length or Distance | Measurements        | in                  | mm          | 25.4          |
| Volume             | Fuel Systems        | gal                 | liter       | 3.785         |
| Volume             | Small Fluids        | oz                  | mL          | 29.573        |
| Pressure           | Tire Pressures      | lbf/in <sup>2</sup> | kPa         | 7.0           |
| Volume             | Liquid              | gal                 | liter       | 3.785         |
| Temperature        | General Use         | °F                  | °C          | =(tf -32)/1.8 |
| Force              | Dynamic Forces      | lbf                 | N           | 4.448         |
| Moment             | Torque              | lbf/ft              | Nm          | 1.355         |

\* Based on the Recommended Practice in SAE J916, May 85

**DATA SHEET NO. 1**  
**CRASH TEST SUMMARY**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**PRIMARY IMPACT DATA**

| Measured Parameter   | Units   | Value |
|----------------------|---------|-------|
| Velocity at Impact   | km/h    | 55.98 |
| Test Weight          | kg      | 2165  |
| Impact Angle         | degrees | 0     |
| Average Rebound      | mm      | 704   |
| Maximum Static Crush | mm      | 389   |

**DOOR OPENING AND SEAT TRACK INFORMATION**

| Description           | Driver                            | Passenger                         |
|-----------------------|-----------------------------------|-----------------------------------|
| Front Door opening    | Remained closed, opened w/o tools | Remained closed, opened w/o tools |
| Rear Door Opening     | Remained closed, opened w/o tools | Remained closed, opened w/o tools |
| Seat Track Shift (mm) | None                              | None                              |
| Seat Back Failure     | None                              | None                              |

**TEST DUMMY INFORMATION**

| Description            | Driver                     | Passenger                  |
|------------------------|----------------------------|----------------------------|
| Dummy Type/ Serial No. | 50% Male Hybrid III No. 34 | 50% Male Hybrid III No. 35 |
| Head Contact           | Airbag                     | Airbag                     |
| Chest Contact          | Airbag                     | Airbag                     |
| Abdomen Contact        | None                       | None                       |
| Left Knee Contact      | Knee Bolster               | Glovebox                   |
| Right Knee Contact     | Knee Bolster               | Glovebox                   |

**16mm MOVIE COVERAGE**

|            |    |
|------------|----|
| High Speed | 20 |
| Real Time  | 1  |
| Total      | 21 |

**DATA CHANNELS**

|                                  |     |
|----------------------------------|-----|
| Driver ATD Sensors               | 40  |
| Passenger ATD Sensors            | 40  |
| Belt Assessment Sensors          | 8   |
| Vehicle Structure Accelerometers | 9   |
| Rigid Barrier Load Cells         | 36  |
| Total                            | 133 |

**DATA SHEET NO. 2**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**TEST VEHICLE INFORMATION AND OPTIONS**

|                  |                     |                       |      |
|------------------|---------------------|-----------------------|------|
| NHTSA No.        | M40300              | Anti-Lock Brakes      | Yes  |
| Make             | Jeep                | All Wheel Drive       | No   |
| Model            | Liberty             | Power Steering        | Yes  |
| Body Style       | 4-Door SUV          | Driver Front Airbag   | Yes  |
| Vin No.          | 1J4GL48K34W105261   | Driver Side Airbag    | No   |
| Color            | Blue                | Driver Head Airbag    | No   |
| Delivery Date    | 11/7/2003           | Driver Curtain Airbag | No   |
| Odometer         | 72                  | Pass. Airbag          | Yes  |
| Dealer           | Ontario Auto Center | Pass. Side Airbag     | No   |
| Transmission     | 3 Speed Automatic   | Pass. Head Airbag     | No   |
| Final Drive      | Rear                | Pass. Curtain Airbag  | No   |
| Type/No. Cyl.    | V-6                 | Pre-Tensioners        | Yes  |
| Engine Disp. (L) | 3.7                 | Load Limiters         | Yes  |
| Engine Placement | Longitudinal        | Bucket Seats          | Yes  |
| Roof Rack        | Yes                 | Air. Cond.            | Yes  |
| Sunroof/T-Top    | No                  | AM/FM Cassette        | Yes  |
| Tinted Glass     | Yes                 | Tilt Steering         | Yes  |
| Traction Control | No                  | Power Door Locks      | Yes  |
| Power Brakes     | Yes                 | Power Windows         | Yes  |
| Front Disc       | Yes                 | Power Seats           | No   |
| Rear Disc        | Yes                 | Other                 | None |

**DATA FROM CERTIFICATION LABEL**

|                     |                              |                 |      |
|---------------------|------------------------------|-----------------|------|
| Manufactured By     | Daimler Chrysler Corporation | GWR (kg)        | 2541 |
| Date of Manufacture | Jul-03                       | GAWR Front (kg) | 1248 |
|                     |                              | GAWR Rear (kg)  | 1429 |

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

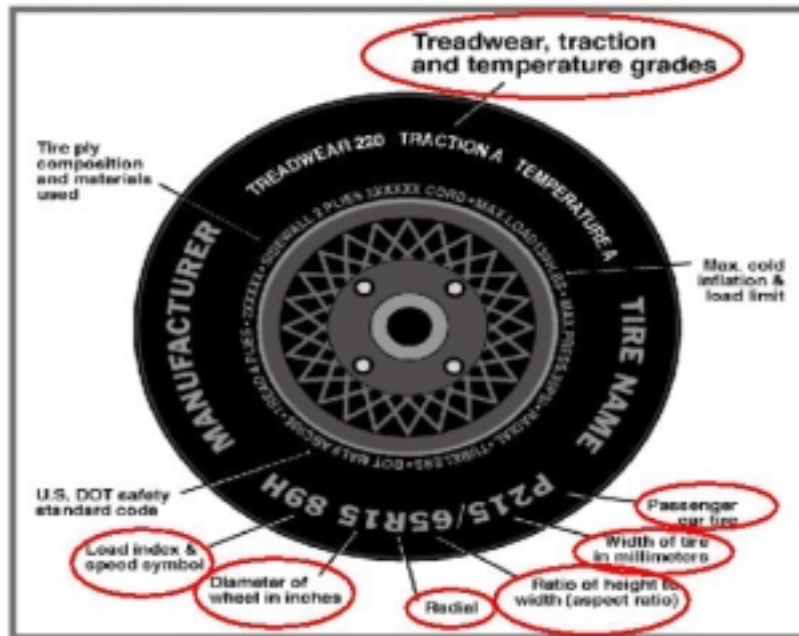
| Measured Parameter         | Front  | Rear  | Third | Total |
|----------------------------|--------|-------|-------|-------|
| Type of Seats              | Bucket | Bench | None  |       |
| Number of Occupants        | 2      | 3     | 0     | 5     |
| Capacity Weight (VCW) (kg) |        |       |       | 522   |
| Cargo Weight (RCLW) (kg)   |        |       |       | 136   |

**DATA SHEET NO. 2.....(CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



**TIRE INFORMATION**

| Measured Parameter       | Front           | Rear            |
|--------------------------|-----------------|-----------------|
| Max. Tire Pressure (kpa) | 308             | 308             |
| Cold Pressure (kpa)      | 231             | 231             |
| Recommended Tire Size    | P215/75R16      | P215/75R16      |
| Tire Size on Vehicle     | P215/75R16      | P215/75R16      |
| Tire Manufacturer        | Goodyear        | Goodyear        |
| Treadwear                | 340             | 340             |
| Traction                 | A               | A               |
| Temperature Grades       | B               | B               |
| Tire Plies Sidewall      | 2               | 2               |
| Tire Plies Body          | 2               | 2               |
| Load Index/Speed Symbol  | 101 S           | 101 S           |
| Tire Material            | Polyester/Steel | Polyester/Steel |
| DOT Safety Code Right    | MGY4 EYER 2903  | MGY4 EYER 2903  |
| DOT Safety Code Left     | MGY4 EYER 2903  | MGY4 EYER 2903  |

**DATA SHEET NO. 2.....(CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered Weights (UVW) |           |       | As Tested Weights (ATW) |           |       |
|--------|-------|----------------------------|-----------|-------|-------------------------|-----------|-------|
|        |       | Front Axle                 | Rear Axle | Total | Front Axle              | Rear Axle | Total |
| Left   | kg    | 515                        | 447       |       | 538                     | 553       |       |
| Right  | kg    | 495                        | 427       |       | 527                     | 547       |       |
| Ratio  | %     | 53.6                       | 46.4      |       | 49.2                    | 50.8      |       |
| Totals | kg    | 1010                       | 874       | 1884  | 1065                    | 1100      | 2165  |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                   | Units | Value |
|--------------------------------------|-------|-------|
| Total Delivered Weight (UVW)         | kg    | 1884  |
| Weight of 2 P572 ATD's               | kg    | 152   |
| Rated Cargo/Luggage Wt. (RCLW)       | kg    | 136   |
| Calculated Vehicle Target Wt. (TVTW) | kg    | 2172  |

**TEST VEHICLE ATTITUDE AND CG**

|              | Units | LF  | RF  | LR  | RR  | CG (aft of front axle) |
|--------------|-------|-----|-----|-----|-----|------------------------|
| As Delivered | mm    | 808 | 809 | 822 | 830 | 1229                   |
| As Tested    | mm    | 797 | 796 | 775 | 780 | 1347                   |

Vehicle Wheel Base (mm) 2650

Weight of Ballast Secured in cargo area (kg) 91

Vehicle Components Removed Rear windows, door panels and bumper.

\* Ballast weight does not include cameras, instrumentation and brake abort system.

**FUEL SYSTEM DATA**

Fuel System Capacity From Owners Manual (L) 73.82

Usable Capacity Furnished by COTR (L) 73.82

Actual Test Volume with entire fuel System Filled (L) 68.63

1/3 of Usable Capacity (L) 24.6

Test Fluid Type: Stoddard Solvent

Kinematic Viscosity: as per ASTM Standard D484-71 Purple

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "On" & engine "OFF" Yes

Fuel System Particulars: \_\_\_\_\_  
 \_\_\_\_\_

**DATA SHEET NO. 3**  
**POST TEST IMPACT DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**SPEED TRAP DATA**

| Measured Parameter           | Units | Requirement    | Value |
|------------------------------|-------|----------------|-------|
| Trap No.1 Velocity (Primary) | km/h  | 55.51 to 57.12 | 55.98 |
| Trap No. 1 Entry Distance    | mm    | <1524          | 1524  |
| Trap No.1 Exit Distance      | mm    | <1524          | 305   |
| Trap No.2 Velocity (Redun.)  | km/h  | 55.51 to 57.12 | 56.00 |
| Trap No.2 Entry Distance     | mm    | <1524          | 1524  |
| Trap No.2 Exit Distance      | mm    | <1524          | 305   |

**VEHICLE STATIC CRUSH**

| Measured Parameter | Units | Pre-Test | Post-Test | Difference |
|--------------------|-------|----------|-----------|------------|
| Left Side          | mm    | 4091     | 3864      | -227       |
| Center             | mm    | 4219     | 3836      | -383       |
| Right Side         | mm    | 4085     | 3796      | -289       |

**VEHICLE REBOUND FROM BARRIER**

| Measured Parameter | Units | Value |
|--------------------|-------|-------|
| Left Side          | mm    | 715   |
| Center             | mm    | 695   |
| Right Side         | mm    | 703   |
| Average            | mm    | 704   |



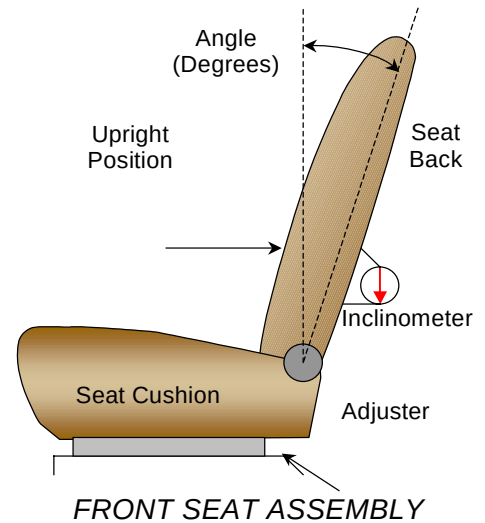
## DATA SHEET NO. 4 TEST VEHICLE INFORMATION

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

### NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows: A special application tool with pointed probes is inserted through the fabric to make contact with the rigid portion of the lower seat frame assembly, approximately 13 inches above the pivot point of the seat back. An inclinometer is placed against the flat surface of the tool and the seat back angle is measured directly from the dial face.



### SEAT BACK ANGLES

|                          | Deg. |
|--------------------------|------|
| Driver w/seated dummy    | 23.5 |
| Passenger w/seated Dummy | 23.5 |

### SEAT FORE/AFT POSITIONS

The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for both the driver and passenger.

### SEAT FORE/AFT POSITIONING

|                | Total Fore/Aft Travel | Placed in Position # |
|----------------|-----------------------|----------------------|
| Driver Seat    | 19                    | 10                   |
| Passenger Seat | 19                    | 10                   |

### SEAT BELT UPPER ANCHORAGE

Position number one (1) is the uppermost position.

### SEAT BELT UPPER ANCHORAGE

|                | Total # of Positions | Placed in Position # |
|----------------|----------------------|----------------------|
| Driver Seat    | 4                    | 2                    |
| Passenger Seat | 4                    | 2                    |

**DATA SHEET NO. 4.....(CONTINUED)****TEST VEHICLE INFORMATION**

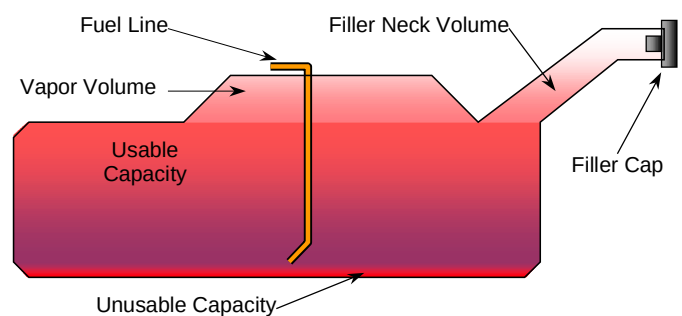
Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**FUEL TANK CAPACITY**

|                                    | Liters         |
|------------------------------------|----------------|
| Usable Capacity of "Standard Tank" | 73.8           |
| Usable Capacity of "Optional" Tank | N/A            |
| Usable Capacity used for FMVSS 301 | 67.91 to 69.39 |
| Actual Amount of Solvent used      | 68.6           |
| 1/3 of Usable Capacity             | 24.6           |

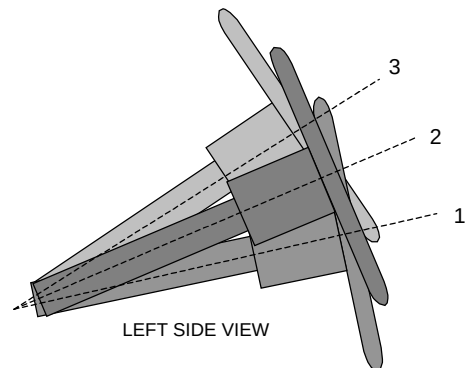
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



VEHICLE FUEL TANK ASSEMBLY

**STEERING COLUMN ADJUSTMENT**

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

**STEERING COLUMN POSITIONS**

|                                 | Degrees |
|---------------------------------|---------|
| Lowermost position No. 1        | 22.0    |
| Geometric center position No. 2 | 27.0    |
| Uppermost position No. 3        | 28.0    |

## DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

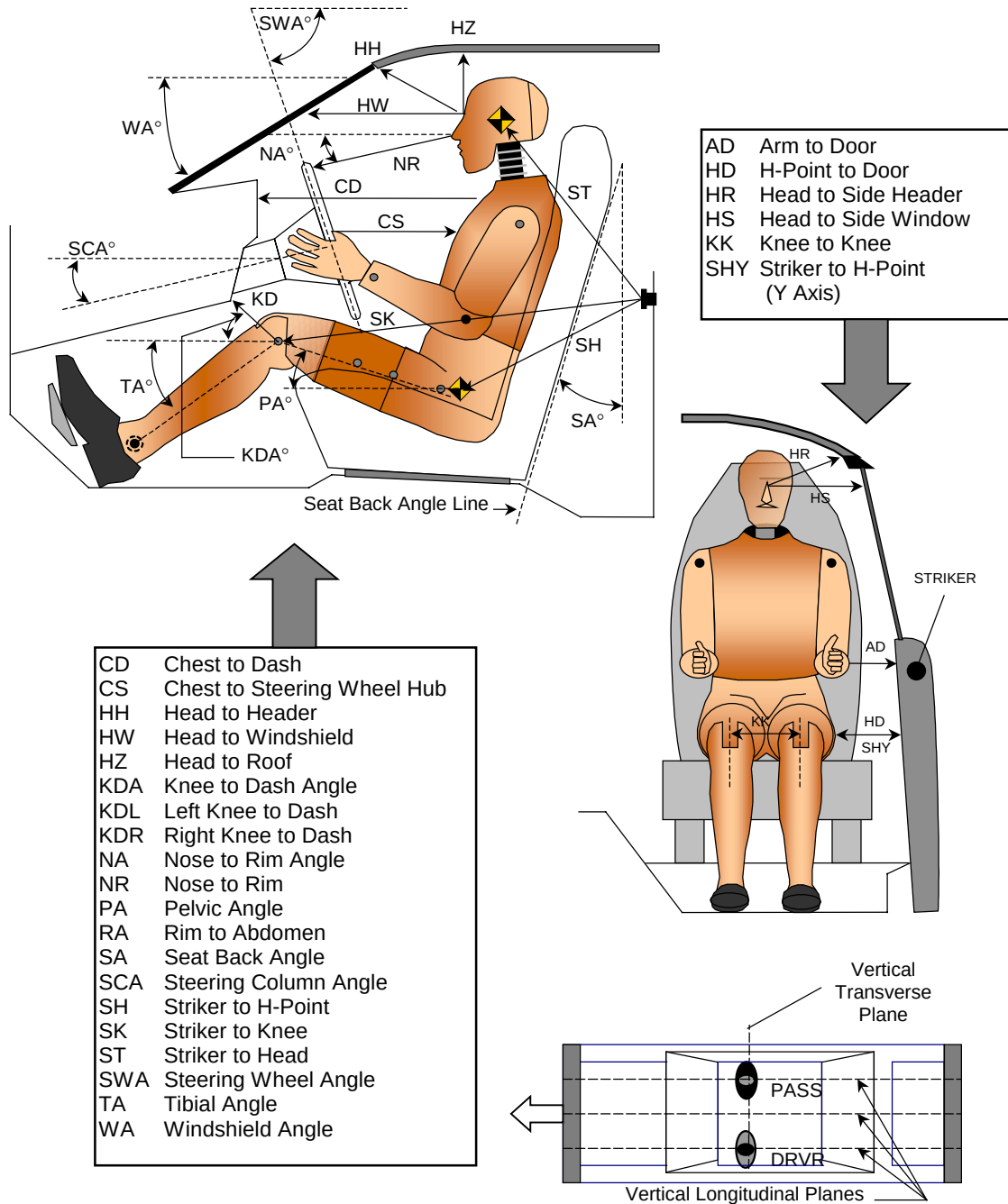
### TEST DUMMY POSITION MEASUREMENTS

| Code | Measurement Description | Driver      |             | Passenger   |             |
|------|-------------------------|-------------|-------------|-------------|-------------|
|      |                         | Length (mm) | Angle (deg) | Length (mm) | Angle (deg) |
| WA   | Windshield Angle        |             | 42          |             |             |
| SWA  | Steering Wheel Angle    |             | 65.5        |             |             |
| SCA  | Steering Column Angle   |             | 27.0        |             |             |
| SA   | Seat Back Angle         |             | 23.5        |             | 23.5        |
| HZ   | Head to Roof (Z)        | 232         | 90          | 210         | 90          |
| HH   | Head to Header          | 412         |             | 430         |             |
| HW   | Head to Windshield      | 597         |             | 560         |             |
| HR   | Head to Side Header (Y) | 270         |             | 265         |             |
| NR   | Nose to Rim             | 397         | 16          |             |             |
| CD   | Chest to Dash           | 510         |             | 585         |             |
| CS   | Chest to Steering Hub   | 285         |             |             |             |
| RA   | Rim to Abdomen          | 178         |             |             |             |
| KDL  | Left Knee to Dash       | 123         | 9           | 167         |             |
| KDR  | Right Knee to Dash      | 138         |             | 150         | 20          |
| PA   | Pelvic Angle            |             | 20          |             | 23          |
| TA   | Tibia Angle             |             | 50          |             | 50          |
| KK   | Knee to Knee (Y)        | 295         |             | 272         |             |
| SK   | Striker to Knee         | 605         | 11          | 640         | 10          |
| ST   | Striker to Head         | 625         | 87          | 595         | 86          |
| SH   | Striker to H-Point      | 218         |             | 195         |             |
| SHY  | Striker to H-Point (Y)  | 185         |             | 190         |             |
| HS   | Head to Side Window     | 312         |             | 310         |             |
| HD   | H-Point to Door (Y)     | 183         |             | 193         |             |
| AD   | Arm to Door (Y)         | 95          |             | 80          |             |

# **DATA SHEET NO. 5...(CONTINUED)** **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

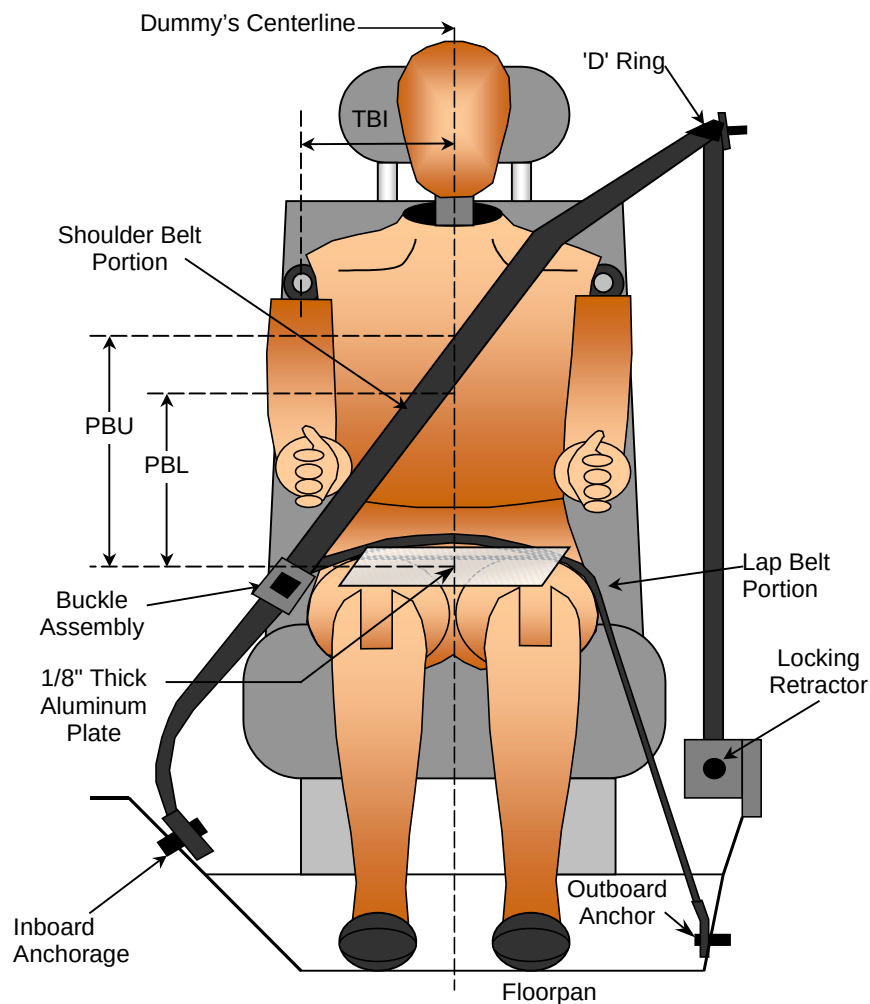


## **DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS**

# **DATA SHEET NO. 6** **SEAT BELT POSITIONING DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03



## **SEAT BELT POSITIONING MEASUREMENTS**

| Measured Parameter                                | Units    | Driver    | Passenger |
|---------------------------------------------------|----------|-----------|-----------|
| TBI -Dummy C/L to Lap/Shoulder Belt Intersect     | mm       | 255       | 255       |
| PBU - Top Surface of reference to belt upper edge | mm       | 345       | 310       |
| PBL - Top Surface of reference to belt lower edge | mm       | 250       | 235       |
| Lap Belt Tension                                  | Newton's | 10        | 10        |
| Shoulder Belt Tension                             | N/A      | Retractor | Retractor |

# DATA SHEET NO. 7 - VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

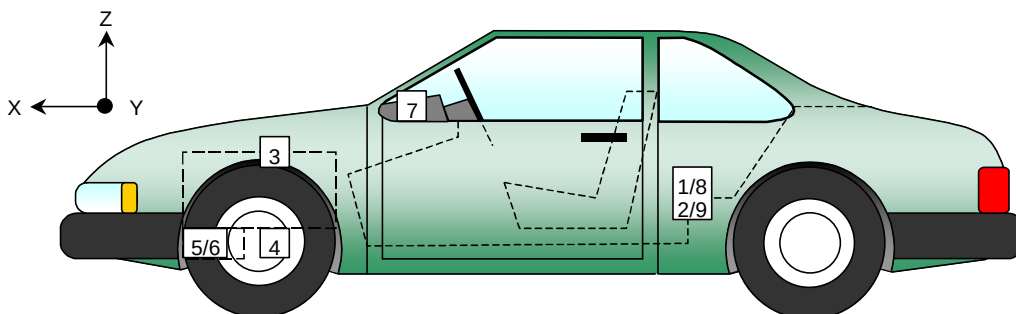
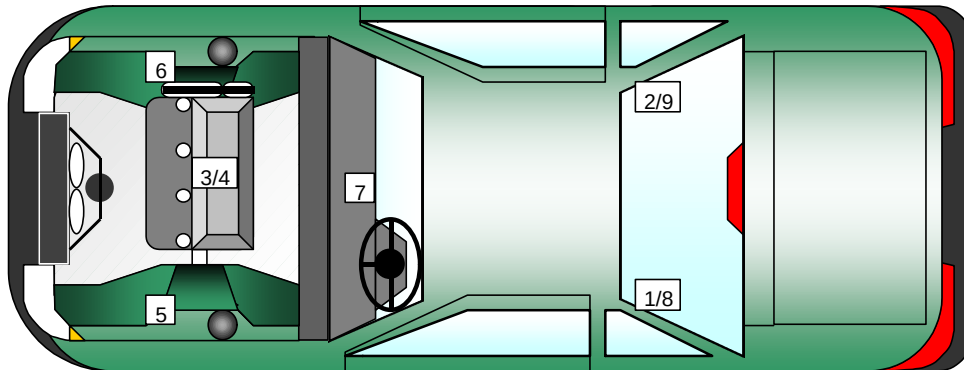
Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

| No. | Accelerometer Location       | Measurements (mm) |      |      | Peak Values |      |       |        |      |
|-----|------------------------------|-------------------|------|------|-------------|------|-------|--------|------|
|     |                              | X                 | Y    | Z    | Units       | Max  | Time  | Min    | Time |
| 1   | Left Rear X-Member           | 1730              | -620 | 410  | G's         | 1.3  | 136.9 | -40.8  | 34.2 |
| 2   | Right Rear X-Member          | 1730              | 610  | 410  | G's         | 1.3  | 119.6 | -42.4  | 35.4 |
| 3   | Engine Top                   | 3570              | -250 | 890  | G's         | 29.4 | 52.6  | -88.2  | 39.9 |
| 4   | Engine Bottom                | 2920              | 100  | 250  | G's         | 9.4  | 57.7  | -64.3  | 41.6 |
| 5   | Left Brake Caliper           | 3400              | -740 | 290  | G's         | 82.2 | 56.0  | -109.7 | 42.3 |
| 6   | Right Brake Caliper          | 3400              | 740  | 290  | G's         | 48.3 | 53.8  | -145.0 | 35.1 |
| 7   | Instrument Panel             | 2770              | 10   | 1240 | G's         | 31.0 | 82.2  | -73.3  | 45.1 |
| 8   | Left Rear X-Member (Z-Axis)  | 1650              | -620 | 410  | G's         | 8.1  | 81.6  | -8.0   | 22.8 |
| 9   | Right Rear X-Member (Z-Axis) | 1650              | 610  | 410  | G's         | 8.9  | 70.8  | -6.9   | 12.0 |

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane



# DATA SHEET NO. 8 - HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## HEAD PRIMARY PEAK ACCELERATIONS

| Location          | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|-------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                   |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Head CG           | X    | G's   | 4.9    | 239.7 | -56.6 | 75.5 | 6.7       | 242.0 | -50.7 | 70.2  |
| Head CG           | Y    | G's   | 14.3   | 81.8  | -6.1  | 17.8 | 2.4       | 36.6  | -32.6 | 92.9  |
| Head CG           | Z    | G's   | 20.5   | 44.2  | -16.3 | 94.4 | 38.8      | 73.6  | -9.9  | 104.5 |
| Head CG Resultant | N/A  | G's   | 57.8   | 75.5  |       |      | 62.6      | 73.6  |       |       |

## CHEST PRIMARY PEAK ACCELERATIONS

| Location           | Axis | Units | Driver |       |       |      | Passenger |       |       |      |
|--------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|------|
|                    |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time |
| Chest CG           | X    | G's   | 2.1    | 135.8 | -38.3 | 54.4 | 2.5       | 299.9 | -49.5 | 63.8 |
| Chest CG           | Y    | G's   | 3.5    | 78.7  | -4.9  | 21.9 | 5.2       | 69.9  | -8.1  | 75.0 |
| Chest CG           | Z    | G's   | 8.3    | 60.1  | -14.7 | 97.5 | 16.8      | 76.8  | -16.3 | 63.1 |
| Chest CG Resultant | N/A  | G's   | 38.8   | 54.4  |       |      | 52.0      | 63.4  |       |      |

## FEMUR PEAK FORCES

| Location    | Axis | Units   | Driver |       |         |      | Passenger |      |         |      |
|-------------|------|---------|--------|-------|---------|------|-----------|------|---------|------|
|             |      |         | Max    | Time  | Min     | Time | Max       | Time | Min     | Time |
| Left Femur  | Z    | Newtons | 200.4  | 151.7 | -4040.8 | 47.1 | 527.0     | 30.3 | -3172.0 | 55.5 |
| Right Femur | Z    | Newtons | 313.4  | 23.4  | -1717.9 | 35.6 | 433.9     | 25.9 | -3729.9 | 40.9 |

## SEAT BELT SENSOR PEAK VALUES

| Location              | Axis | Units   | Driver |      |       |       | Passenger |      |       |       |
|-----------------------|------|---------|--------|------|-------|-------|-----------|------|-------|-------|
|                       |      |         | Max    | Time | Min   | Time  | Max       | Time | Min   | Time  |
| Shoulder Belt Pullout | N/A  | MM      | 131.2  | 80.4 | -3.2  | 44.0  | 207.6     | 91.8 | -0.1  | 6.0   |
| Shoulder Belt Stretch | N/A  | MM/CM   | 0.00   | 0.0  | 0.00  | 0.0   | 0.00      | 0.0  | 0.00  | 0.0   |
| Lap Belt Force        | N/A  | Newtons | 5424.7 | 46.4 | -45.6 | 9.0   | 5933.2    | 45.9 | 1.8   | 0.0   |
| Shoulder Belt Force   | N/A  | Newtons | 4927.0 | 44.6 | -28.3 | 143.6 | 4271.7    | 61.6 | -54.1 | 192.1 |

1.) Not used with pre-tensioners

| Location        | Driver |                |                |       | Passenger |                |                |       |
|-----------------|--------|----------------|----------------|-------|-----------|----------------|----------------|-------|
|                 | HIC    | T <sup>1</sup> | T <sup>2</sup> | Avg G | HIC       | T <sup>1</sup> | T <sup>2</sup> | Avg G |
| Head CG Primary | 481.8  | 52.7           | 88.6           | 44.7  | 778.4     | 65.1           | 101.0          | 54.2  |

## PRIMARY CHEST CLIP (3MSEC)

| Location         | Driver |                |                | Passenger |                |                |
|------------------|--------|----------------|----------------|-----------|----------------|----------------|
|                  | CLIP   | T <sup>1</sup> | T <sup>2</sup> | CLIP      | T <sup>1</sup> | T <sup>2</sup> |
| Chest CG Primary | 37.9   | 70.9           | 73.9           | 49.5      | 61.6           | 64.6           |

# DATA SHEET NO. 8...(continued)

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## PELVIC PEAK ACCELERATIONS

| Location         | Axis | Units | Driver |       |       |      | Passenger |       |       |      |
|------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|------|
|                  |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time |
| Pelvis           | X    | G's   | 8.0    | 89.2  | -47.1 | 47.2 | 9.7       | 111.3 | -57.4 | 52.4 |
| Pelvis           | Y    | G's   | 3.1    | 92.6  | -6.0  | 51.1 | 4.9       | 20.4  | -7.3  | 65.8 |
| Pelvis           | Z    | G's   | 3.1    | 161.0 | -18.2 | 85.8 | 5.1       | 230.1 | -32.5 | 64.2 |
| Pelvis Resultant | N/A  | G's   | 48.8   | 50.5  |       |      | 59.7      | 52.4  |       |      |

## UPPER NECK PEAK FORCES AND MOMENTS

| Location              | Axis | Units   | Driver |       |        |       | Passenger |      |         |       |
|-----------------------|------|---------|--------|-------|--------|-------|-----------|------|---------|-------|
|                       |      |         | Max    | Time  | Min    | Time  | Max       | Time | Min     | Time  |
| Neck Force            | X    | Newtons | 436.6  | 63.3  | -365.2 | 134.7 | 345.3     | 82.3 | -1188.4 | 67.2  |
| Neck Force            | Y    | Newtons | 160.0  | 126.8 | -158.4 | 49.9  | 172.0     | 68.7 | -166.8  | 104.9 |
| Neck Force            | Z    | Newtons | 1558.5 | 56.9  | -484.6 | 97.6  | 2226.8    | 73.3 | -360.9  | 100.8 |
| Neck Force Resultant  | N/A  | Newtons | 1607.0 | 56.9  |        |       | 2314.3    | 74.0 |         |       |
| Neck Moment           | X    | N•m     | 13.5   | 75.3  | -4.6   | 101.1 | 14.6      | 89.9 | -14.0   | 125.4 |
| Neck Moment           | Y    | N•m     | 31.0   | 59.6  | -24.9  | 44.8  | 55.4      | 82.3 | -87.3   | 66.6  |
| Neck Moment           | Z    | N•m     | 9.1    | 144.9 | -17.4  | 97.8  | 34.6      | 98.4 | -7.1    | 149.7 |
| Neck Moment Resultant | N/A  | N•m     | 31.5   | 59.6  |        |       | 87.8      | 66.7 |         |       |

## FOOT PEAK ACCELERATIONS

| Location        | Axis | Units | Driver |       |        |      | Passenger |      |        |      |
|-----------------|------|-------|--------|-------|--------|------|-----------|------|--------|------|
|                 |      |       | Max    | Time  | Min    | Time | Max       | Time | Min    | Time |
| Left Foot Aft   | X    | G's   | 19.6   | 83.3  | -59.7  | 46.4 | 129.4     | 70.2 | -152.9 | 44.9 |
| Left Foot Aft   | Z    | G's   | 2.1    | 135.0 | -37.0  | 47.8 | 40.3      | 71.3 | -39.0  | 44.8 |
| Left Foot Fore  | Z    | G's   | 0.0    | 0.0   | 0.0    | 0.0  | 58.4      | 71.4 | -61.3  | 41.1 |
| Right Foot Aft  | X    | G's   | 18.2   | 81.9  | -89.3  | 29.4 | 31.5      | 75.6 | -172.0 | 39.3 |
| Right Foot Aft  | Z    | G's   | 3.3    | 232.7 | -46.3  | 36.7 | 44.0      | 76.2 | -50.6  | 39.2 |
| Right Foot Fore | Z    | G's   | 33.7   | 43.3  | -126.4 | 36.5 | 42.1      | 39.1 | -61.4  | 46.5 |

1.) Driver channel failed, no data

## UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

| Location           | Axis | Units   | Driver |      |         |       | Passenger |       |         |       |
|--------------------|------|---------|--------|------|---------|-------|-----------|-------|---------|-------|
|                    |      |         | Max    | Time | Min     | Time  | Max       | Time  | Min     | Time  |
| Left Upper Moment  | X    | N•m     | 25.7   | 28.7 | -43.3   | 89.5  | 22.5      | 72.5  | -50.4   | 67.9  |
| Left Upper Moment  | Y    | N•m     | 194.7  | 30.5 | -4.4    | 281.8 | 112.0     | 44.5  | -11.0   | 67.7  |
| Right Upper Moment | X    | N•m     | 21.1   | 29.3 | -4.0    | 87.3  | 45.1      | 37.8  | -13.6   | 142.6 |
| Right Upper Moment | Y    | N•m     | 144.1  | 35.4 | -12.4   | 299.4 | 159.5     | 41.2  | -4.1    | 298.4 |
| Left Lower Moment  | X    | N•m     | 22.7   | 50.1 | -9.5    | 94.1  | 10.3      | 114.3 | -39.8   | 74.3  |
| Left Lower Moment  | Y    | N•m     | 46.5   | 31.0 | -8.7    | 281.0 | 110.8     | 71.7  | -43.4   | 36.6  |
| Left Lower Force   | Z    | Newtons | 451.5  | 34.8 | -1570.1 | 81.0  | 63.8      | 58.2  | -3499.7 | 70.5  |
| Right Lower Moment | X    | N•m     | 11.8   | 79.4 | -5.2    | 37.2  | 5.3       | 93.9  | -26.8   | 36.9  |
| Right Lower Moment | Y    | N•m     | 34.1   | 79.0 | -25.8   | 30.2  | 57.2      | 76.4  | -52.5   | 38.8  |
| Right Lower Force  | Z    | Newtons | 218.9  | 35.1 | -1672.1 | 78.2  | 477.9     | 34.5  | -2606.3 | 77.0  |



# DATA SHEET NO. 8...(continued)

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## CHEST PEAK DISPLACEMENTS

| Location | Axis | Units | Driver |      |       |      | Passenger |      |       |      |
|----------|------|-------|--------|------|-------|------|-----------|------|-------|------|
|          |      |       | Max    | Time | Min   | Time | Max       | Time | Min   | Time |
| Chest CG | X    | MM    | 0.1    | 7.9  | -24.3 | 64.8 | 0.3       | 12.7 | -29.6 | 70.8 |

## HEAD REDUNDANT PEAK ACCELERATIONS

| Location          | Axis | Units | Driver |       |       |      | Passenger |       |       |       |
|-------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|-------|
|                   |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time  |
| Head CG           | X    | G's   | 4.7    | 239.1 | -56.1 | 74.7 | 5.5       | 250.2 | -50.4 | 70.1  |
| Head CG           | Y    | G's   | 14.2   | 80.4  | -4.8  | 17.8 | 4.1       | 41.9  | -33.0 | 91.4  |
| Head CG           | Z    | G's   | 20.6   | 44.4  | -16.5 | 94.1 | 38.2      | 73.6  | -10.0 | 104.3 |
| Head CG Resultant | N/A  | G's   | 57.5   | 75.0  |       |      | 62.1      | 73.6  |       |       |

## CHEST REDUNDANT PEAK ACCELERATIONS

| Location           | Axis | Units | Driver |       |       |      | Passenger |       |       |      |
|--------------------|------|-------|--------|-------|-------|------|-----------|-------|-------|------|
|                    |      |       | Max    | Time  | Min   | Time | Max       | Time  | Min   | Time |
| Chest CG           | X    | G's   | 2.1    | 134.4 | -38.7 | 54.5 | 2.6       | 299.2 | -48.9 | 63.9 |
| Chest CG           | Y    | G's   | 3.1    | 79.0  | -4.8  | 21.9 | 5.9       | 70.0  | -7.7  | 75.2 |
| Chest CG           | Z    | G's   | 8.2    | 43.1  | -14.6 | 97.4 | 16.9      | 68.9  | -16.8 | 63.2 |
| Chest CG Resultant | N/A  | G's   | 39.1   | 54.5  |       |      | 51.7      | 63.2  |       |      |

## REDUNDANT HEAD INJURY CRITERIA (HIC)

| Location          | Driver |                |                |       | Passenger |                |                |       |
|-------------------|--------|----------------|----------------|-------|-----------|----------------|----------------|-------|
|                   | HIC    | T <sup>1</sup> | T <sup>2</sup> | Avg G | HIC       | T <sup>1</sup> | T <sup>2</sup> | Avg G |
| Head CG Redundant | 485.3  | 52.8           | 88.7           | 44.9  | 782.0     | 65.3           | 101.2          | 54.3  |

## REDUNDANT CHEST CLIP (3MSEC)

| Location           | Driver |                |                | Passenger |                |                |
|--------------------|--------|----------------|----------------|-----------|----------------|----------------|
|                    | CLIP   | T <sup>1</sup> | T <sup>2</sup> | CLIP      | T <sup>1</sup> | T <sup>2</sup> |
| Chest CG Redundant | 37.8   | 71.0           | 74.0           | 49.3      | 61.7           | 64.7           |

**DATA SHEET NO. 9**  
**SEATBELT ASSESSMENT TEST DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**SEAT BELT POSITIONING MEASUREMENTS**

| Measurement Description                           | Units    | Driver    | Passenger |
|---------------------------------------------------|----------|-----------|-----------|
| TBI -Dummy C/L to Lap/Shoulder Belt Intersect     | mm       | 255       | 255       |
| PBU - Top Surface of reference to belt upper edge | mm       | 345       | 310       |
| PBL - Top Surface of reference to belt lower edge | mm       | 250       | 235       |
| Lap Belt Tension                                  | Newton's | 10        | 10        |
| Shoulder Belt Tension                             | N/A      | Retractor | Retractor |

**SEAT BELT POSITIONING MEASUREMENTS**

| Measurement Description                          | Units | Driver | Passenger |
|--------------------------------------------------|-------|--------|-----------|
| Retractor Reel to "D" ring                       | mm    | 645    | 645       |
| Shoulder Belt length as measured on ATD          | mm    | 825    | 815       |
| Lap Belt length as measured on ATD               | mm    | 720    | 710       |
| Remainder of belt on reel                        | mm    | 865    | 845       |
| Total belt length for continuous webbing systems | mm    | 3055   | 3015      |

**SHOULDER BELT SPOOL-OFF DATA**

| Measurement Description      | Units | Driver | Passenger |
|------------------------------|-------|--------|-----------|
| As determined mechanically   | mm    | 65.0   | 130.0     |
| As determined electronically | mm    | 131.2  | 207.6     |

**BELT STRETCH DATA**

| Measurement Description                            | Units | Driver | Passenger |
|----------------------------------------------------|-------|--------|-----------|
| Electronically between belt load cell and "D" ring | mm/cm | *      | *         |
| Mechanically                                       | mm/cm | N/A    | N/A       |

\* Not used with shoulder belt pre-tensioner systems

**DATA SHEET NO. 10**  
**SUMMARY OF FMVSS 212 DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

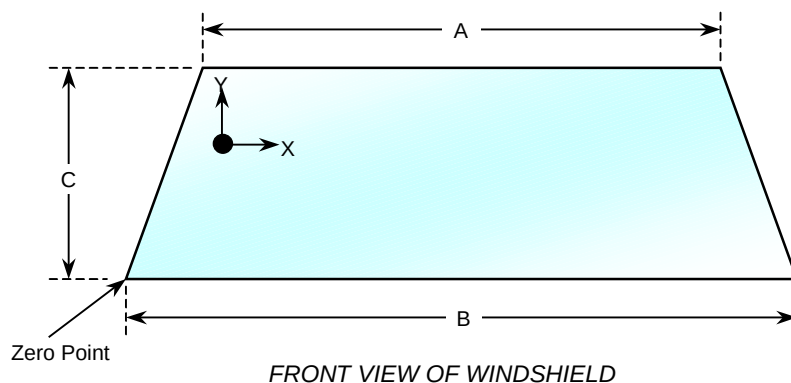
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the posttest retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles that are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.1 °C

**WINDSHIELD PERIPHERY MEASUREMENTS**

| Measurement | Pre-Test(mm) | Post-Test(mm) | % of Retention |
|-------------|--------------|---------------|----------------|
| Left Side   | 1970.5       | 1970.5        | 100.0          |
| Right Side  | 1970.5       | 1970.5        | 100.0          |
| Total       | 3941.0       | 3941.0        | 100.0          |



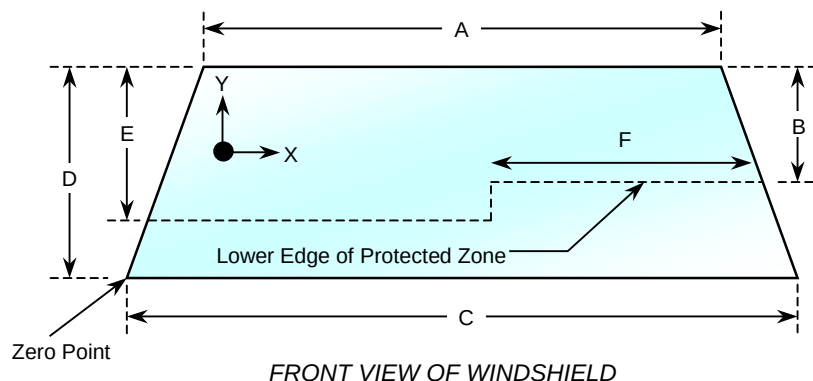
**WINDSHIELD DIMENSIONS**

| Item    | Units | Segment Length | Molding Width |
|---------|-------|----------------|---------------|
| A       | mm    | 1200.0         | N/A           |
| B       | mm    | 1497.0         | 11.0          |
| C-Left  | mm    | 622.0          | 20.0          |
| C-Right | mm    | 622.0          | 20.0          |

**DATA SHEET NO. 11**  
**WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03



**WINDSHIELD AND  
PROTECTED ZONE**

| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 1200  |
| B    | mm    | 406   |
| C    | mm    | 1497  |
| D    | mm    | 622   |
| E    | mm    | 434   |
| F    | mm    | 487   |

**AREA OF PROTECTED ZONE FAILURES**

- A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one that is normally in contact with the windshield.

| X   | Y   |
|-----|-----|
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |

- B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

| X   | Y   |
|-----|-----|
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |
| N/A | N/A |

**DATA SHEET NO. 12**  
**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV NHTSA No.: M40300  
Test Program: 2004 NHTSA 35mph NCAP Test Date: 11/18/03

Test Time: 2:54 PM Temperature: 17.2 Deg. C.

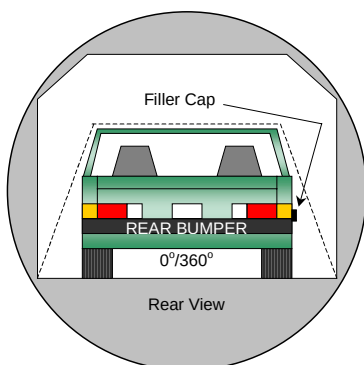
**STODDARD SOLVENT SPILLAGE MEASUREMENTS**

- A. From impact until vehicle motion ceases: 0.0 oz.  
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0.0 oz.  
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0.0 oz.  
(Maximum Allowable = 1 oz./minute)
- D. Spillage Location Details: No leakage occurred

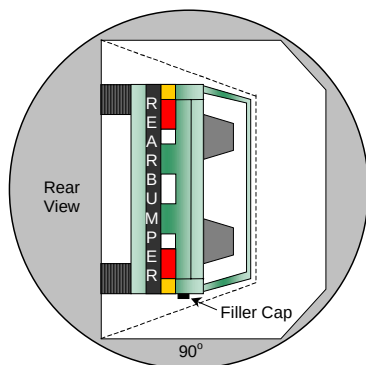
**DATA SHEET NO. 13**  
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

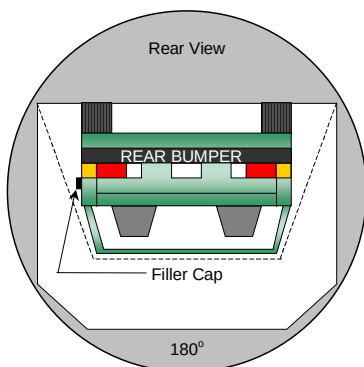
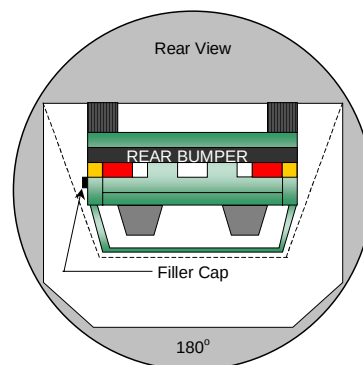
NHTSA No.: M40300  
Test Date: 11/18/03



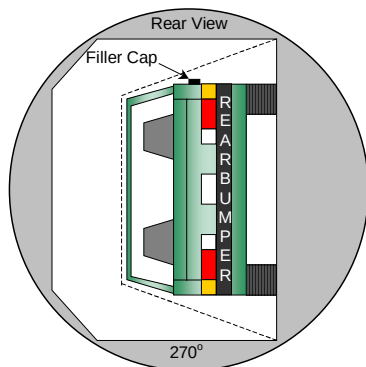
**0° to 90°**



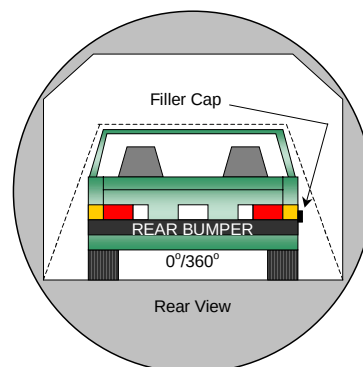
**90° to 180°**



**180° to 270°**



**270° to 360°**



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

**DATA SHEET NO. 13....(CONTINUED)**  
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° to 90°    | 81            | 300       | 381        |
| 90° to 180°  | 81            | 300       | 381        |
| 180° to 270° | 78            | 300       | 378        |
| 270° to 360° | 77            | 300       | 377        |

**FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)**

|                 |     |
|-----------------|-----|
| First 5 Minutes | 5.0 |
| Sixth Minute    | 1.0 |
| Seventh Minute  | 1.0 |
| Eighth Minute   | 1.0 |

**ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)**

| Test Phase   | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|--------------|-----------------|--------------|----------------|---------------|
| 0° to 90°    | 0               | 0            | 0              | 0             |
| 90° to 180°  | 0               | 0            | 0              | 0             |
| 180° to 270° | 0               | 0            | 0              | 0             |
| 270° to 360° | 0               | 0            | 0              | 0             |

**SOLVENT SPILLAGE LOCATION TABLE**

| Test Phase   | Spillage Location |
|--------------|-------------------|
| 0° to 90°    | None              |
| 90° to 180°  | None              |
| 180° to 270° | None              |
| 270° to 360° | None              |

**DATA SHEET NO. 14**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**VEHICLE MEASUREMENT TABLE**

| No. | Measurement Description                      | Units | Pre-Test | Post-Test | Diff. |
|-----|----------------------------------------------|-------|----------|-----------|-------|
| 1   | Total length of vehicle at centerline        | mm    | 4219     | 3836      | -383  |
| 2   | RSOV to front of engine                      | mm    | 3665     | 3518      | -147  |
| 3   | RSOV to firewall centerline                  | mm    | 3129     | 3101      | -28   |
| 4   | RSOV to leading edge of right door           | mm    | 2874     | 2875      | 1     |
| 5   | RSOV to leading edge of left door            | mm    | 2874     | 2874      | 0     |
| 6   | RSOV to lower leading edge of right door     | mm    | 2842     | 2811      | -31   |
| 7   | RSOV to lower leading edge of left door      | mm    | 2850     | 2816      | -34   |
| 8   | RSOV to upper trailing edge of right door    | mm    | 1837     | 1829      | -8    |
| 9   | RSOV to upper trailing edge of left door     | mm    | 1835     | 1835      | 0     |
| 10  | RSOV to lower trailing edge of right door    | mm    | 1849     | 1826      | -23   |
| 11  | RSOV to lower trailing edge of left door     | mm    | 1858     | 1825      | -33   |
| 12  | RSOV to bottom of right 'A' pillar           | mm    | 2827     | 2816      | -11   |
| 13  | RSOV to bottom of left 'A' pillar            | mm    | 2828     | 2817      | -11   |
| 14  | RSOV to firewall on right side               | mm    | 3161     | 3144      | -17   |
| 15  | RSOV to firewall on left side                | mm    | 3184     | 3159      | -25   |
| 16  | RSOV to steering column                      | mm    | 2402     | 2429      | 27    |
| 17  | Center of steering column to left 'A' pillar | mm    | 311      | 372       | 61    |
| 18  | Center of steering column to headlining      | mm    | 482      | 470       | -12   |
| 19  | RSOV to right side of front bumper           | mm    | 4085     | 3796      | -289  |
| 20  | RSOV to left side of front bumper            | mm    | 4091     | 3864      | -227  |
| 21  | Length of engine block                       | mm    | 589      | 589       | 0     |
| RD  | RSOV to right side of dash panel             | mm    | 2644     | 2646      | 2     |
| CD  | RSOV to center of dash panel                 | mm    | 2551     | 2646      | 95    |
| LD  | RSOV to left side of dash panel              | mm    | 2642     | 2647      | 5     |

All measurements in millimeters



**DATA SHEET NO. 14.....(CONTINUED)**  
**VEHICLE STRUCTURAL MEASUREMENTS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**VEHICLE STRUCTURAL MEASUREMENT TABLE**

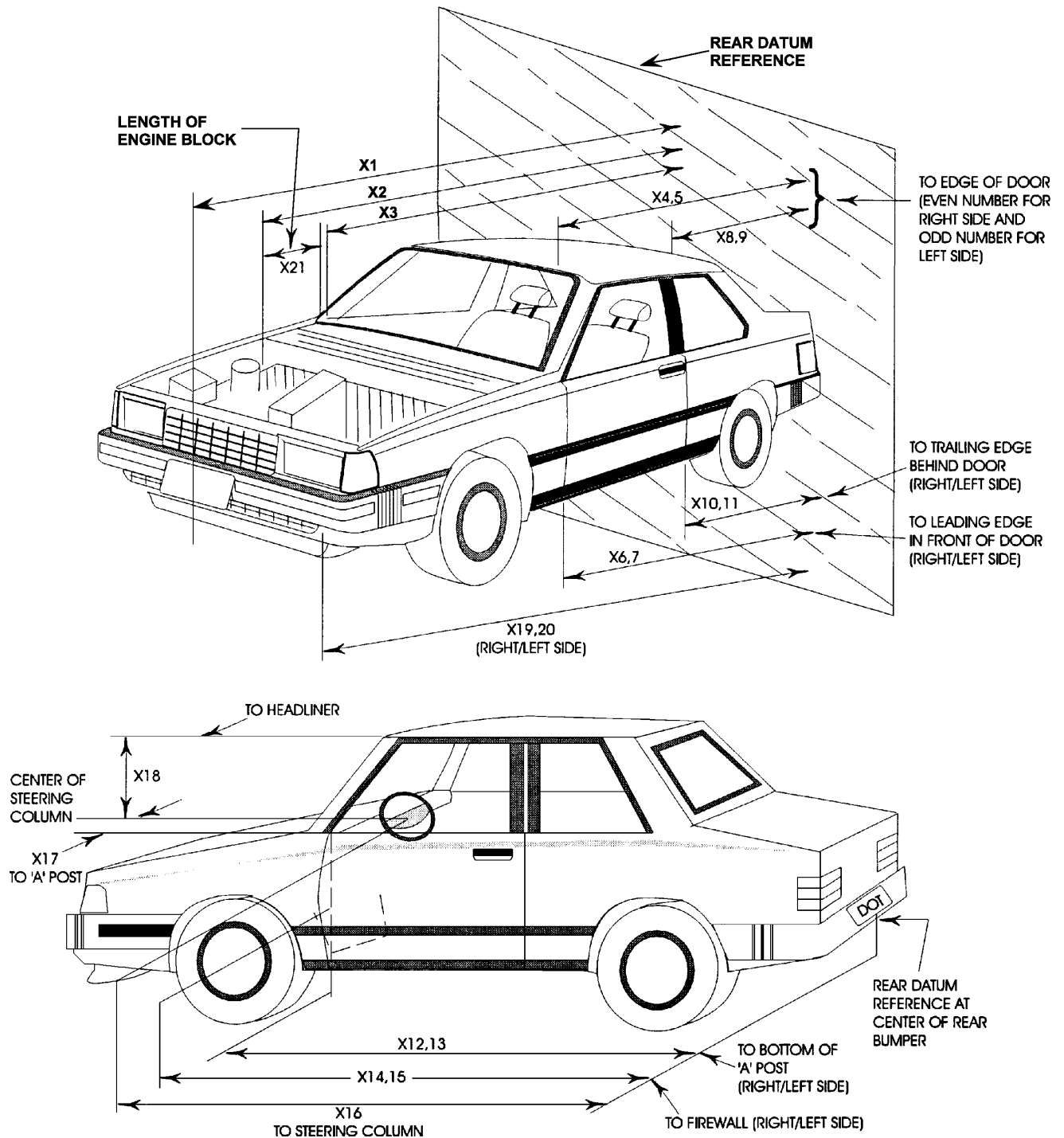
| No. | Measurement Description               | Units | Pre-Test | Post-Test | Diff. |
|-----|---------------------------------------|-------|----------|-----------|-------|
| 1   | Total length                          | mm    | 4219     | 3836      | -383  |
| 2   | Total width                           | mm    | 1805     | 1805      | 0     |
| 3   | Bumper top height                     | mm    | 715      | 734       | 19    |
| 4   | Bumper bottom height                  | mm    | 348      | 380       | 32    |
| 5   | Longitudinal member top height        | mm    | 571      | 696       | 125   |
| 6   | Longitudinal member bottom height     | mm    | 461      | 397       | -64   |
| 7   | Distance between longitudinal members | mm    | 584      | 700       | 116   |
| 8   | Longitudinal member width             | mm    | 68       | 85        | 17    |
| 9   | Engine top height                     | mm    | 910      | 910       | 0     |
| 10  | Engine bottom height                  | mm    | 243      | 226       | -17   |
| 11  | Engine and gear box width             | mm    | 634      | 634       | 0     |
| 12  | Front bumper to engine distance       | mm    | 536      | 322       | -214  |
| 13  | Front shock absorber fixing width     | mm    | 707      | 736       | 29    |
| 14  | Bonnet leading edge height            | mm    | 927      | 1030      | 103   |
| 15  | Front shock absorber fixing width     | mm    | 896      | 816       | -80   |
| 16  | Front bumper to front axle distance   | mm    | 722      | 481       | -241  |
| 17  | Front axle to 'A' pillar distance     | mm    | 600      | 580       | -20   |
| 18  | 'A' pillar to 'B' pillar distance     | mm    | 1040     | 1036      | -4    |
| 19  | 'B' pillar to rear axle distance      | mm    | 1000     | 1005      | 5     |
| 20  | 'B' pillar to 'C' pillar distance     | mm    | 886      | 889       | 3     |
| 21  | Roof sill bottom height               | mm    | 1685     | 1503      | -182  |
| 22  | Roof sill top height                  | mm    | 1595     | 1674      | 79    |
| 23  | Floor sill bottom height              | mm    | 361      | 284       | -77   |
| 24  | Floor sill top height                 | mm    | 461      | 447       | -14   |

All measurements in millimeters

**DATA SHEET NO. 14...(CONTINUED)**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03



**DATA SHEET NO. 15**  
**CAMERA LOCATIONS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**VEHICLE CAMERA MEASUREMENT TABLE**

| No. | Camera View          | Location (mm) |        |       | Angle (deg.) | Film Plane to Head | Lens (mm) | Speed (fps) |
|-----|----------------------|---------------|--------|-------|--------------|--------------------|-----------|-------------|
|     |                      | X             | Y      | Z     |              |                    |           |             |
| 1   | Real Time            | 18288         | -22860 | 2540  | 10           | N/A                | 17-70     | 24          |
| 2   | Driver Overall       | 1930          | 8357   | 1321  | 4            | 7827               | 13        | 1010        |
| 2B  | Driver Overall       | 1626          | 8230   | 1092  | 4            | 7721               | 17        | NTM         |
| 3   | Driver Close-up      | 1626          | 8230   | 1600  | 4            | 7715               | 35        | 1020        |
| 3B  | Driver Close-up      | 1930          | 8230   | 1600  | 4            | 7701               | 35        | 1000        |
| 4   | 3/4 Driver           | 6477          | 10185  | 4648  | 13           | 11057              | 35-85     | 1000        |
| 5   | Steering Column      | 1524          | 8230   | 3404  | 20           | 7965               | 19        | 960         |
| 6   | Steering Column      | 1524          | 8230   | 2997  | 16           | 7874               | 19        | 1000        |
| 7   | Driver Side Child    | 2845          | -813   | 1575  | 20           | 1364               | 13        | 1000        |
| 7B  | Driver Side Child    | 2489          | 8230   | 2388  | 20           | 7815               | 50        | 1010        |
| 8   | Passenger Overall    | 2289          | -8230  | 1524  | 6            | 7698               | 13        | 1020        |
| 9   | Passenger Close-up   | 1219          | -6096  | 1524  | 4            | 5638               | 35        | 1000        |
| 10  | 3/4 Passenger        | 8026          | -8941  | 2997  | 9            | 10383              | 80        | 950         |
| 11  | Passenger Door       | 1626          | -8836  | 1702  | 4            | 8322               | 50        | 910         |
| 12  | Passenger Side Child | 2845          | 813    | 1575  | 20           | 1364               | 13        | 1000        |
| 12B | Passenger Side Child | 3048          | -8839  | 2032  | 20           | 8359               | 35-85     | 1010        |
| 13  | Overhead             | 610           | 0      | 6172  | 90           | N/A                | 13        | 1110        |
| 14  | Driver Front         | -610          | 406    | 2743  | 40           | N/A                | 13        | NTM         |
| 15  | Passenger Front      | -610          | 406    | 2743  | 40           | N/A                | 13        | NTM         |
| 16  | Pit Engine           | 762           | 0      | -1499 | 90           | N/A                | 9         | 1040        |
| 17  | Pit Fuel Tank        | 3658          | 0      | -1499 | 90           | N/A                | 6         | 900         |

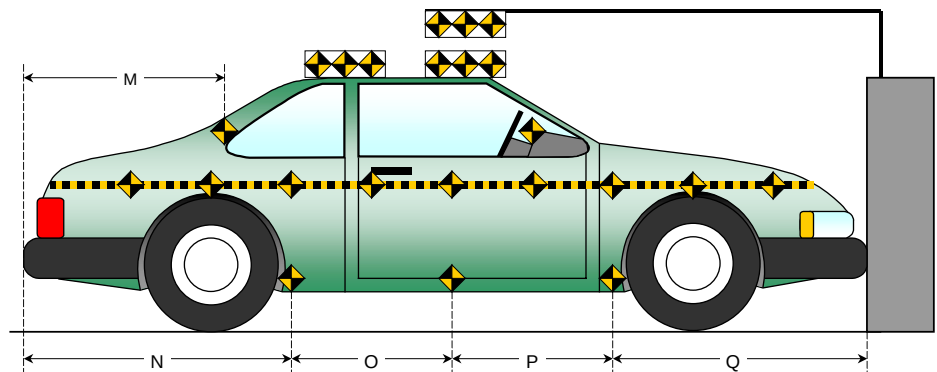
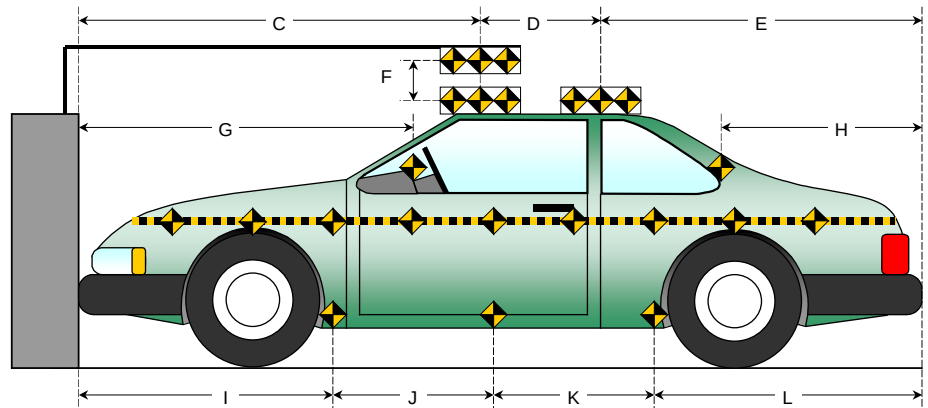
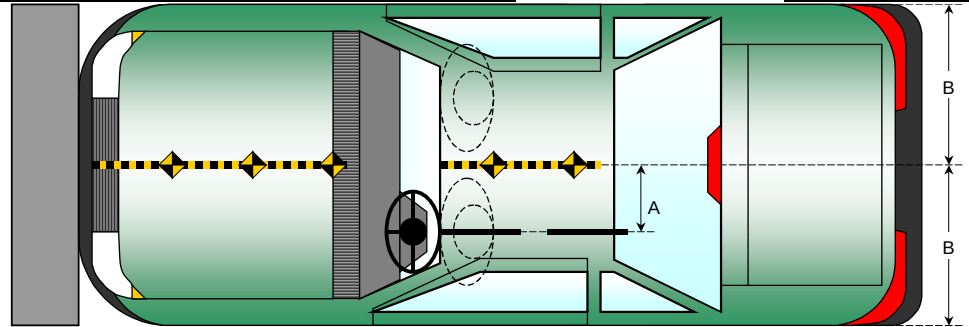
X = Barrier Face    Y = Monorail Centerline    Z = Ground

# **DATA SHEET NO. 16** **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

| All Dimensions in (mm) |       |
|------------------------|-------|
| Item                   | Value |
| A                      | 342   |
| B                      | 902   |
| C                      | 2111  |
| D                      | 612   |
| E                      | 1596  |
| F                      | 155   |
| G                      | 1620  |
| H                      | 1015  |
| I                      | 385   |
| J                      | 724   |
| K                      | 726   |
| L                      | 1398  |
| M                      | 1015  |
| N                      | 1394  |
| O                      | 720   |
| P                      | 724   |
| Q                      | 1375  |



**DATA SHEET NO. 17**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

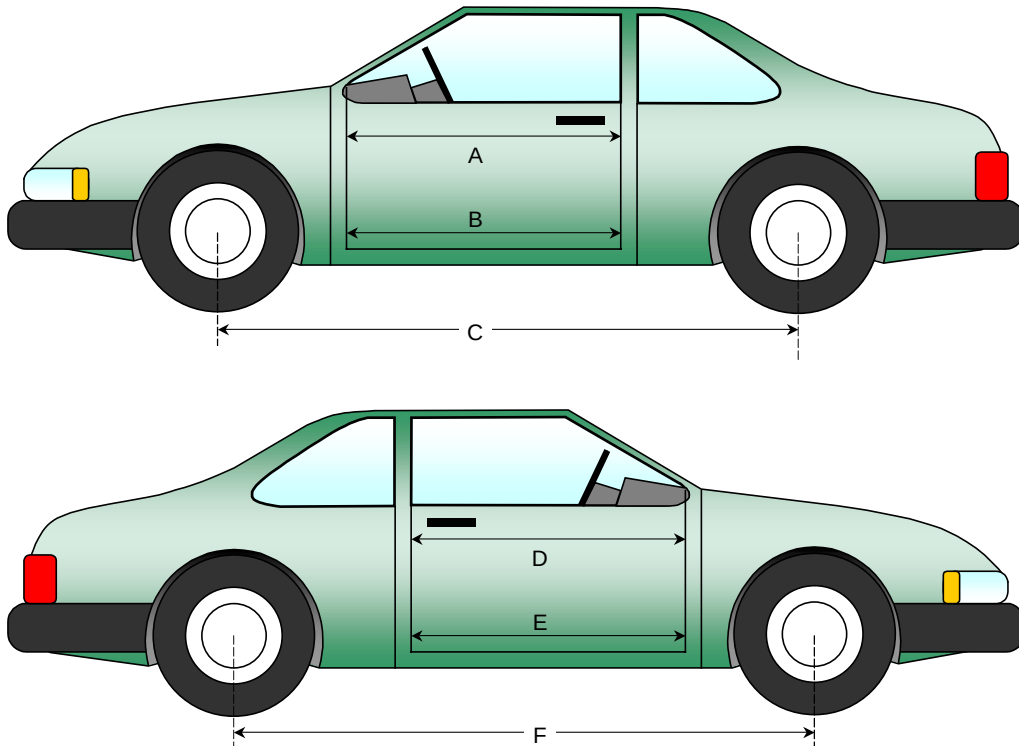
NHTSA No.: M40300  
Test Date: 11/18/03

**DOOR OPENING WIDTH TABLE**

| Item | Description      | Units | Pre-Test | Post-Test | Diff. |
|------|------------------|-------|----------|-----------|-------|
| A    | Left Side Upper  | mm    | 930      | 929       | -1    |
| B    | Left Side Lower  | mm    | 899      | 896       | -3    |
| D    | Right Side Upper | mm    | 926      | 922       | -4    |
| E    | Right Side Lower | mm    | 931      | 906       | -25   |

**WHEELBASE MEASUREMENT TABLE**

| Item | Description           | Units | Pre-Test | Post-Test | Diff. |
|------|-----------------------|-------|----------|-----------|-------|
| C    | Left Side Wheel Base  | mm    | 2650     | 2590      | -60   |
| F    | Right Side Wheel Base | mm    | 2650     | 2566      | -84   |



**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

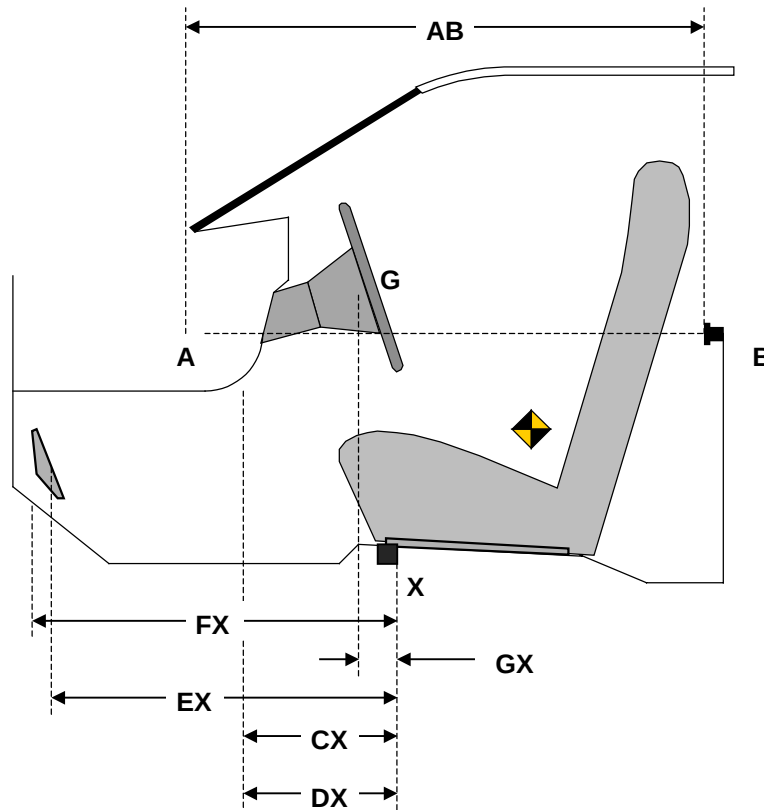
Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

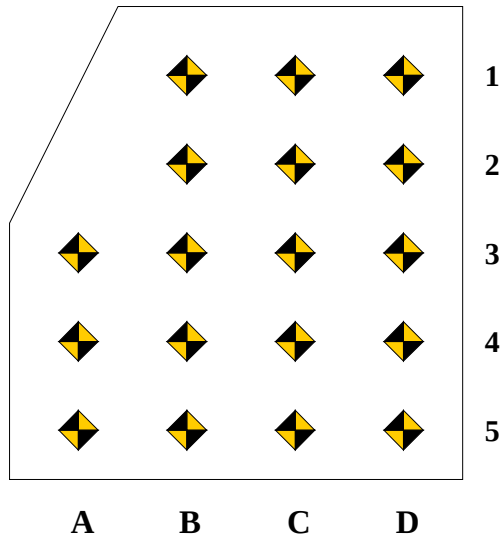
**DRIVER COMPARTMENT INTRUSION TABLE**

| Item | Description                       | Units | Pre-Test | Post-Test | Diff. |
|------|-----------------------------------|-------|----------|-----------|-------|
| AB   | Door Opening (Inside window jam)  | mm    | 930      | 929       | -1    |
| CX   | Left Knee Bolster to X            | mm    | 244      | 251       | 7     |
| DX   | Right Knee Bolster to X           | mm    | 285      | 285       | 0     |
| EX   | Brake Pedal to X                  | mm    | 501      | 502       | 1     |
| FX   | Foot Rest to X                    | mm    | 601      | 616       | 15    |
| GX   | Center of Steering Wheel Hub to X | mm    | 50       | 65        | 15    |

X = Left Front Seat Outboard Anchor Bolt Head



**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**



Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Program: 2004 NHTSA 35mph NCAP

Measurement reference point for X and Z-axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4 and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.

**DRIVER FLOOR PAN X-AXIS**

|   | Pre-Test |     |     |     | Post-Test |     |     |     | Difference |     |     |     |
|---|----------|-----|-----|-----|-----------|-----|-----|-----|------------|-----|-----|-----|
|   | A        | B   | C   | D   | A         | B   | C   | D   | A          | B   | C   | D   |
| 1 |          | 626 | 630 | 613 |           | 619 | 613 | 602 |            | -7  | -17 | -11 |
| 2 |          | 533 | 537 | 526 |           | 524 | 510 | 514 |            | -9  | -27 | -12 |
| 3 | 447      | 443 | 447 | 432 | 432       | 434 | 429 | 412 | -15        | -9  | -18 | -20 |
| 4 | 347      | 343 | 337 | 332 | 331       | 330 | 320 | 320 | -16        | -13 | -17 | -12 |
| 5 | 242      | 242 | 237 | 232 | 231       | 230 | 226 | 220 | -11        | -12 | -11 | -12 |

**DRIVER FLOOR PAN Z-AXIS**

|   | Pre-Test |      |      |      | Post-Test |      |      |      | Difference |    |     |     |
|---|----------|------|------|------|-----------|------|------|------|------------|----|-----|-----|
|   | A        | B    | C    | D    | A         | B    | C    | D    | A          | B  | C   | D   |
| 1 |          | -136 | -135 | -125 |           | -127 | -137 | -135 |            | 9  | -2  | -10 |
| 2 |          | -168 | -165 | -170 |           | -172 | -179 | -172 |            | -4 | -14 | -2  |
| 3 | -180     | -178 | -175 | -167 | -179      | -175 | -175 | -165 | 1          | 3  | 0   | 2   |
| 4 | -177     | -177 | -174 | -165 | -171      | -170 | -173 | -157 | 6          | 7  | 1   | 8   |
| 5 | -177     | -177 | -177 | -138 | -175      | -175 | -175 | -130 | 2          | 2  | 2   | 8   |

**DATA SHEET NO. 17...(CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: \_\_\_\_\_

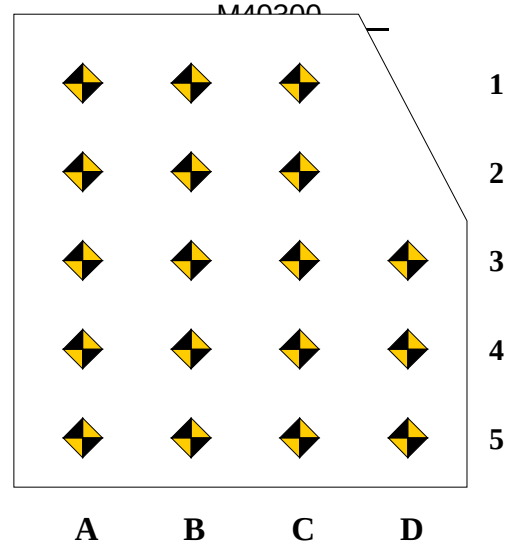
Test Program: 2004 NHTSA 35mph NCAP

Test Date: \_\_\_\_\_

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4, and 5 are located on the most level portion of the floor pan.



Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.

**PASSENGER FLOOR PAN Z-AXIS**

|   | Pre-Test |     |     |     | Post-Test |     |     |     | Difference |    |    |    |
|---|----------|-----|-----|-----|-----------|-----|-----|-----|------------|----|----|----|
|   | A        | B   | C   | D   | A         | B   | C   | D   | A          | B  | C  | D  |
| 1 | 662      | 671 | 685 |     | 678       | 687 | 699 |     | 16         | 16 | 14 |    |
| 2 | 592      | 593 | 610 |     | 602       | 605 | 607 |     | 10         | 12 | -3 |    |
| 3 | 479      | 488 | 499 | 504 | 494       | 497 | 505 | 508 | 15         | 9  | 6  | 4  |
| 4 | 382      | 391 | 405 | 410 | 397       | 400 | 415 | 416 | 15         | 9  | 10 | 6  |
| 5 | 276      | 283 | 290 | 289 | 297       | 298 | 305 | 308 | 21         | 15 | 15 | 19 |

**PASSENGER FLOOR PAN Z-AXIS**

|   | Pre-Test |      |      |      | Post-Test |      |      |      | Difference |     |     |     |
|---|----------|------|------|------|-----------|------|------|------|------------|-----|-----|-----|
|   | A        | B    | C    | D    | A         | B    | C    | D    | A          | B   | C   | D   |
| 1 | -101     | -94  | -97  |      | -107      | -105 | -102 |      | -6         | -11 | -5  |     |
| 2 | -151     | -142 | -152 |      | -159      | -155 | -157 |      | -8         | -13 | -5  |     |
| 3 | -172     | -166 | -170 | -170 | -177      | -180 | -180 | -180 | -5         | -14 | -10 | -10 |
| 4 | -165     | -171 | -169 | -170 | -177      | -175 | -175 | -175 | -12        | -4  | -6  | -5  |
| 5 | -173     | -173 | -172 | -179 | -188      | -178 | -174 | -165 | -15        | -5  | -2  | 14  |

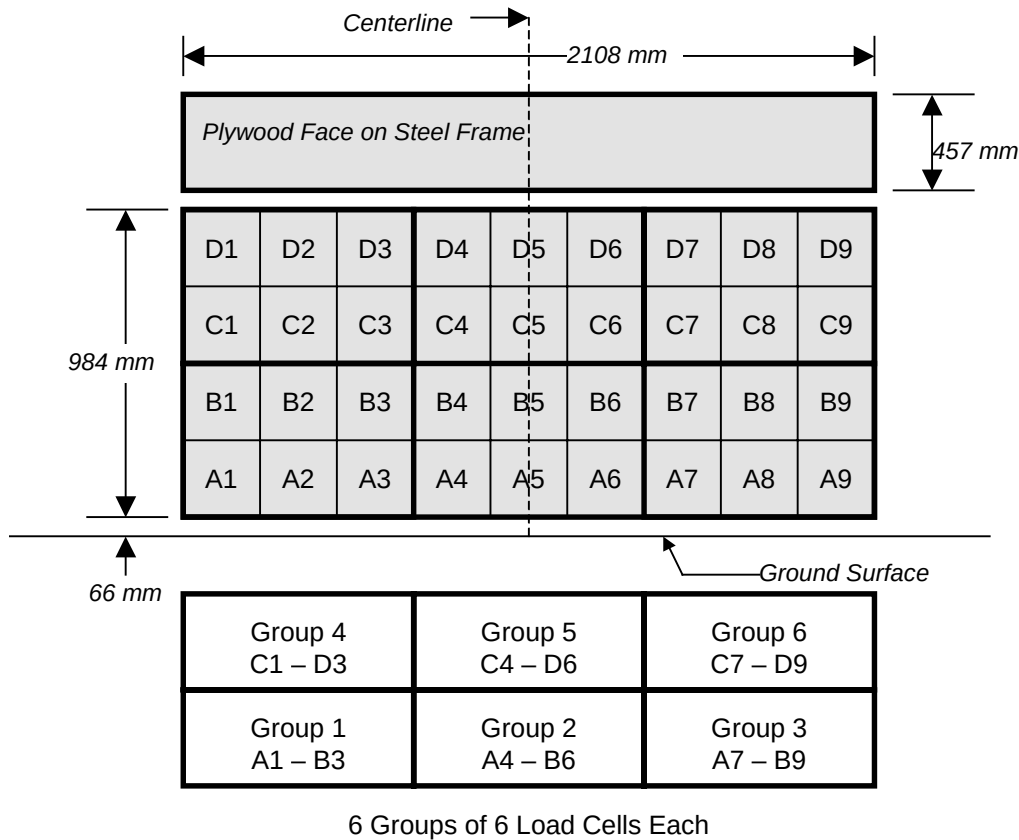


**DATA SHEET NO. 18**  
**FIXED BARRIER LOAD CELL LOCATIONS**

Test Vehicle: 2004 Jeep Liberty 4WD SUV  
 Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
 Test Date: 11/18/03

**36 Load Cell Rigid Barrier (NHTSA Standard)**  
**Load Cell Locations on Fixed Barrier**



The Data is presented in Appendix C with the following requirements:

- 1.) Data from 36 individual load cells
- 2.) Sum data from 6 groupings shown above (6 cells/group)
- 3.) Total or sum of all 36 individual load cells
- 4.) Sum of all 36 individual load cells vs. vehicle dynamic crush

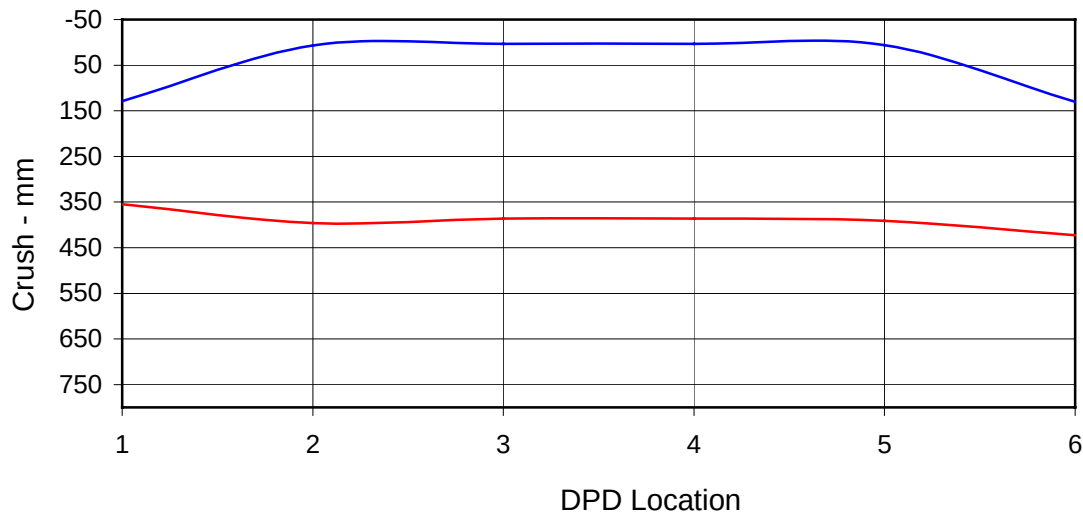
**DATA SHEET NO. 19**  
**ACCIDENT INVESTIGATION DIVISION DATA**

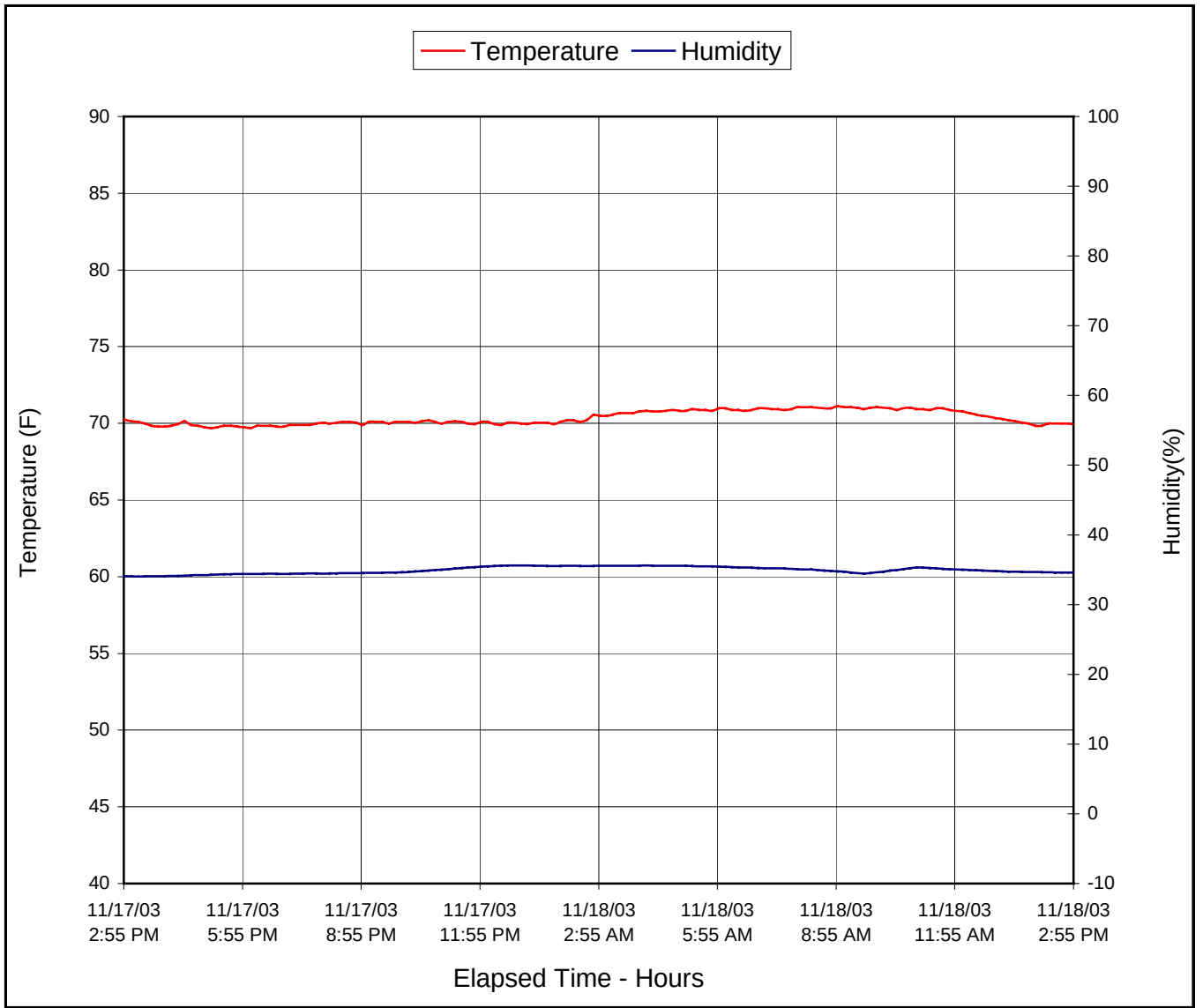
Test Vehicle: 2004 Jeep Liberty 4WD SUV  
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300  
Test Date: 11/18/03

**VEHICLE INFORMATION**VIN: 1J4GL48K34W105261Vehicle Size Category: 4-Door SUVWheel base (mm): 2650Test Weight (kg): 2165**ACCELEROMETER DATA**Accelerometer Location: Left rear floor panCal. Procedure/Interval: 6 months / drop testIntegration Algorithm: NHTSA StandardLinearity: GoodImpact Velocity (km/h): 55.98Velocity Change (km/h): 61.22Time of Separation (msec): 72.5**CRUSH PROFILE**Collision Deformation Classification: 12FDEW6Midpoint of Damage: Vehicle CenterlineDamage Region Length (mm): 1370Impact Mode: Full Frontal

| No. | Measurement Description    | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------|-------|----------|-----------|------------|
| C1  | Crush zone 1 at left side  | mm    | 129      | 355       | -226       |
| C2  | Crush zone 2 on left side  | mm    | 7        | 396       | -389       |
| C3  | Crush zone 3 on left side  | mm    | 3        | 386       | -383       |
| C4  | Crush zone 4 on right side | mm    | 3        | 386       | -383       |
| C5  | Crush zone 5 on right side | mm    | 6        | 391       | -385       |
| C6  | Crush zone 6 at right side | mm    | 130      | 423       | -293       |

**DATA SHEET NO. 20****DUMMY/VEHICLE TEMPERATURE STABILIZATION**Test Vehicle: 2004 Jeep Liberty 4WD SUVNHTSA No.: M40300Test Program: 2004 NHTSA 35mph NCAPTest Date: 11/18/03



**APPENDIX A**  
**PHOTOGRAPHS**

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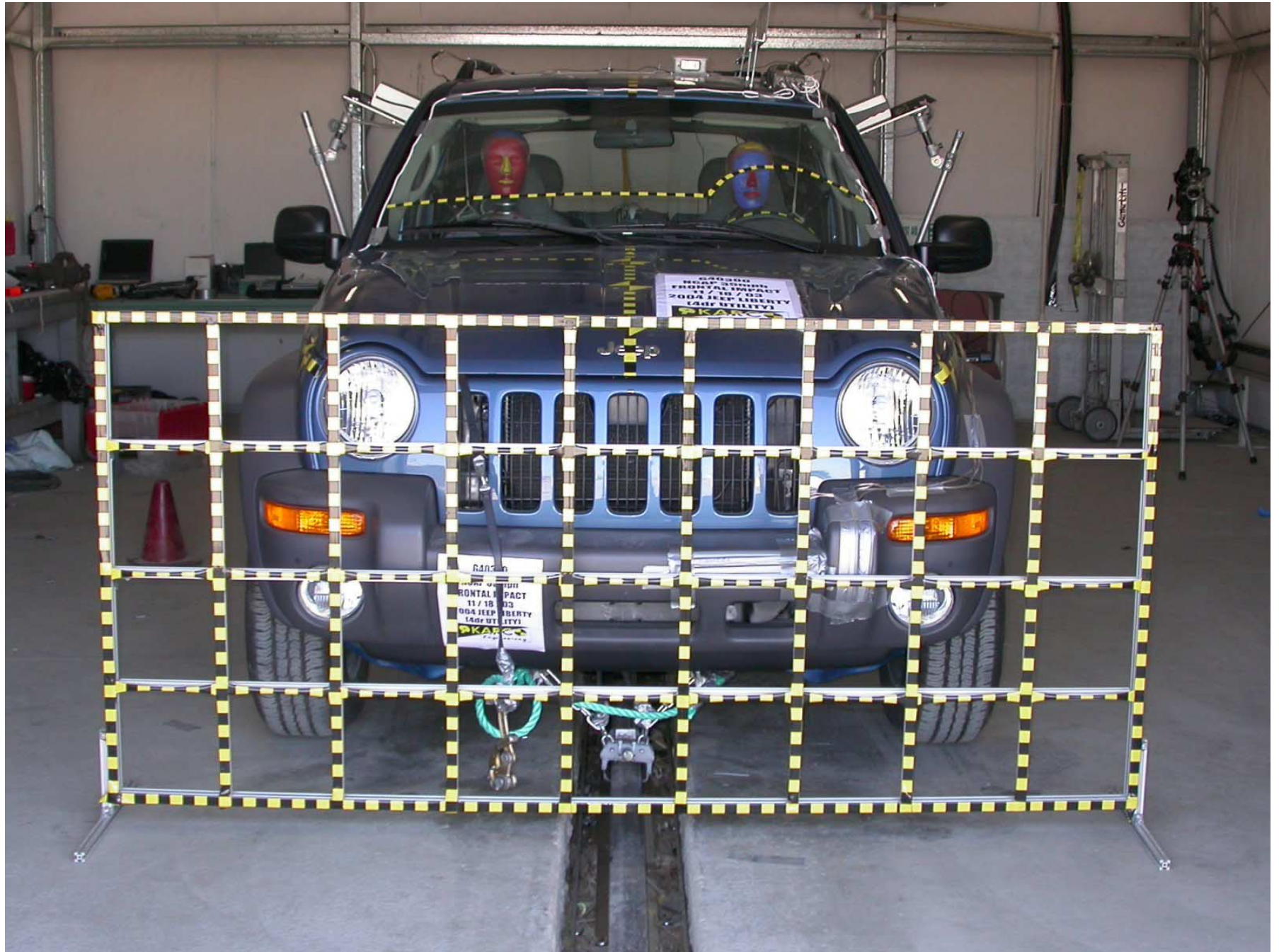


Figure A-1: Load Cell Location (Correct NHTSA # is M40300)

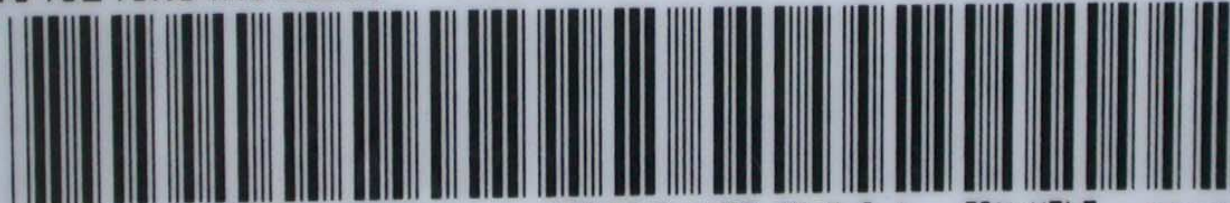


MFD BY DAIMLERCHRYSLER CORPORATION DATE OF MFR 7-03 GVWR 2541 KG(05600 LB)

|                  |            |         |                 |
|------------------|------------|---------|-----------------|
| GAWR FRONT       | WITH TIRES | RIMS AT | COLD            |
| 1248 KG(2750 LB) | P215/75R16 | 16X7    | 227 KPA(33 PSI) |
| GAWR REAR        | WITH TIRES | RIMS AT | COLD            |
| 1429 KG(3150 LB) | P215/75R16 | 16X7    | 227 KPA(33 PSI) |

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

VIN: 1J4GL48K34W105261 TYPE: MPV SINGLE X DUAL



MDH: 073111 080AA PNT:PBJ VEHICLE MADE IN U.S.A. TRM:M5L5 4648503

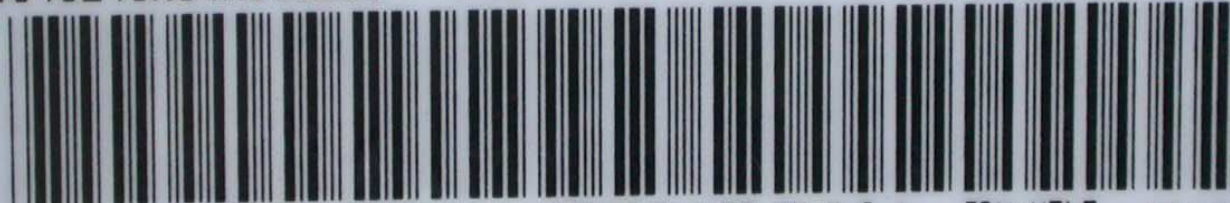
Figure A-2: Vehicle Certification Label

MFD BY DAIMLERCHRYSLER CORPORATION DATE OF MFR 7-03 GVWR 2541 KG(05600 LB)

|                  |            |         |                 |
|------------------|------------|---------|-----------------|
| GAWR FRONT       | WITH TIRES | RIMS AT | COLD            |
| 1248 KG(2750 LB) | P215/75R16 | 16X7    | 227 KPA(33 PSI) |
| GAWR REAR        | WITH TIRES | RIMS AT | COLD            |
| 1429 KG(3150 LB) | P215/75R16 | 16X7    | 227 KPA(33 PSI) |

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

VIN: 1J4GL48K34W105261 TYPE: MPV SINGLE X DUAL



MDH: 073111 080AA PNT:PBJ VEHICLE MADE IN U.S.A. TRM:M5L5 4648503

Figure A-3: Vehicle Tire Label





Figure A-4: Right Front  $\frac{3}{4}$  View, As Received





Figure A-5: Left Rear  $\frac{3}{4}$  View, as Received





Figure A-6: Pre-Test Front View (Correct NHTSA # is M40300)





Figure A-7: Post-Test Front View (Vehicle Moved) (Correct NHTSA # is M40300)





Figure A-8: Pre-Test Left Side View (Correct NHTSA # is M40300)





Figure A-9: Post-Test Left Side View (Correct NHTSA # is M40300)





Figure A-10: Pre-Test Right Side View (Correct NHTSA # is M40300)



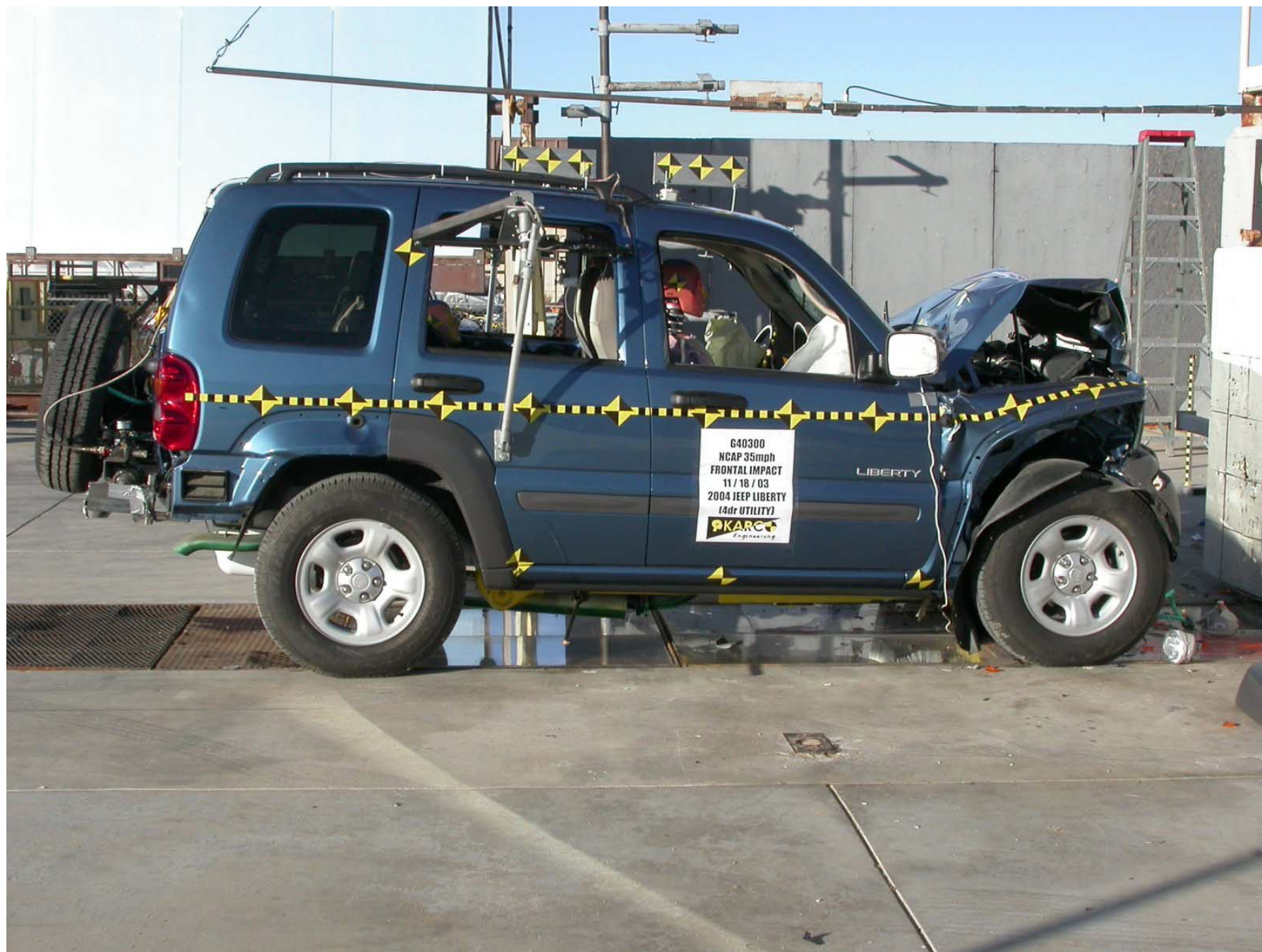


Figure A-11: Post-Test Right Side View (Correct NHTSA # is M40300)





Figure A-12: Pre-Test Right Front  $\frac{3}{4}$  View (Correct NHTSA # is M40300)





Figure A-13: Post-Test Right Front  $\frac{3}{4}$  View (Correct NHTSA # is M40300)





Figure A-14: Pre-Test Left Rear  $\frac{3}{4}$  View (Correct NHTSA # is M40300)





Figure A-15: Post-Test Left Rear  $\frac{3}{4}$  View (Correct NHTSA # is M40300)





Figure A-16: Left Rear  $\frac{3}{4}$  View of Doors After Impact (Correct NHTSA # is M40300)





Figure A-17: Right Rear  $\frac{3}{4}$  View of Doors After Impact (Correct NHTSA # is M40300)



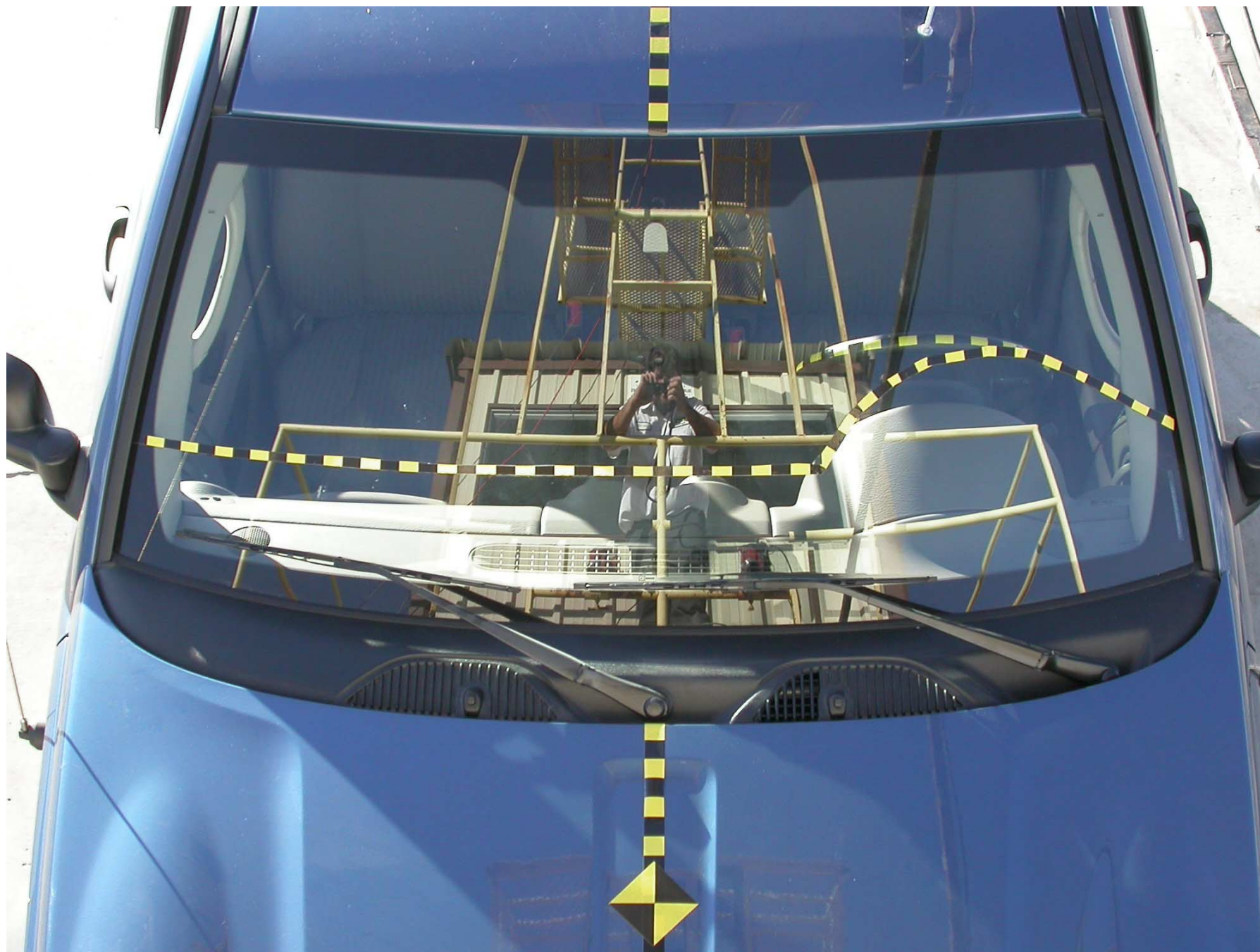


Figure A-18: Pre-Test Windshield View





Figure A-19: Post-Test Windshield View (Correct NHTSA # is M40300)





Figure A-20: Pre-Test Engine Compartment





Figure A-21: Post-Test Engine Compartment (Vehicle Moved)





Figure A-22: Pre-Test Fuel Cap





Figure A-23: Post-Test Fuel Cap



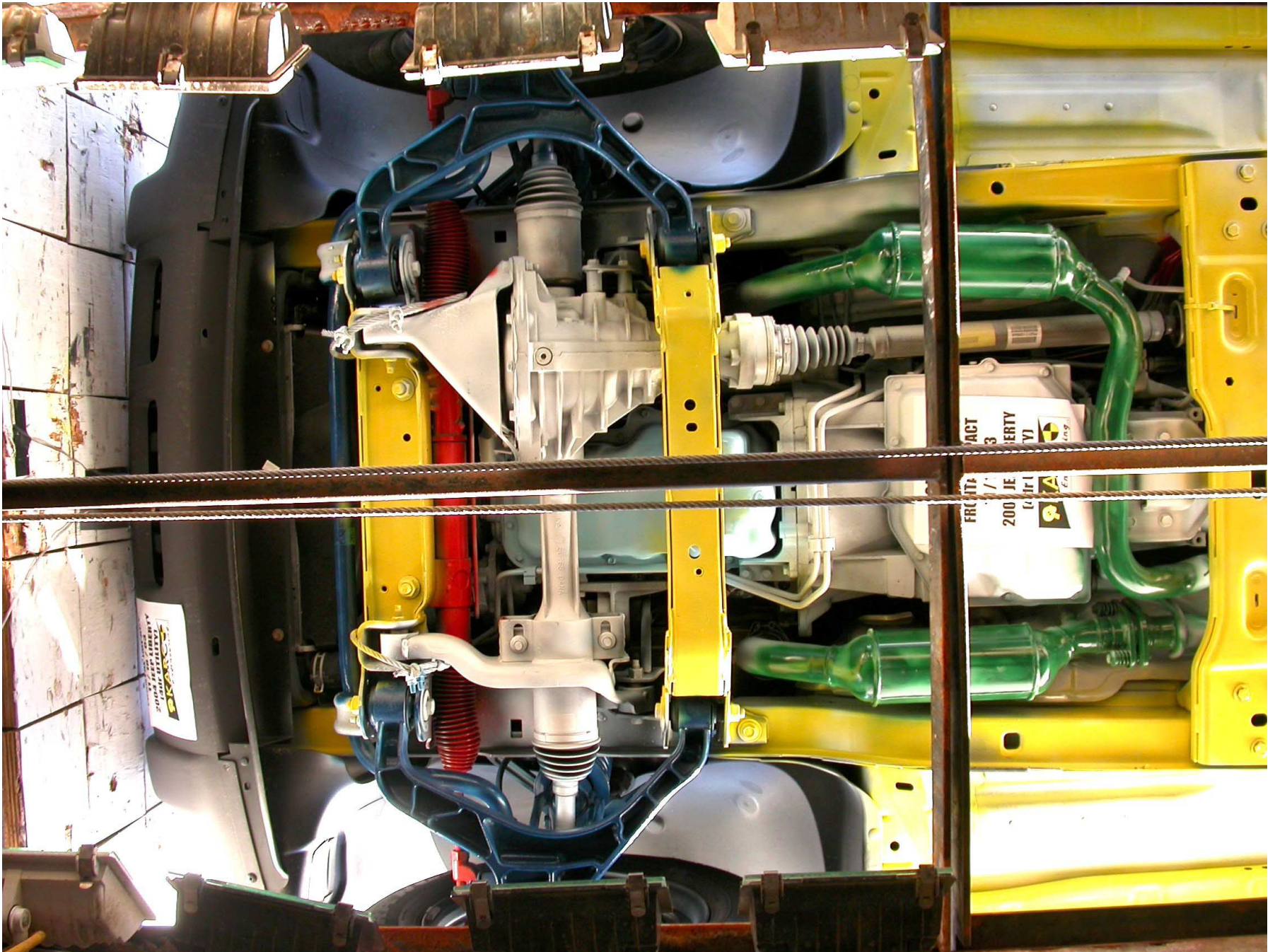


Figure A-24: Pre-Test Front Underbody View (Correct NHTSA # is M40300)



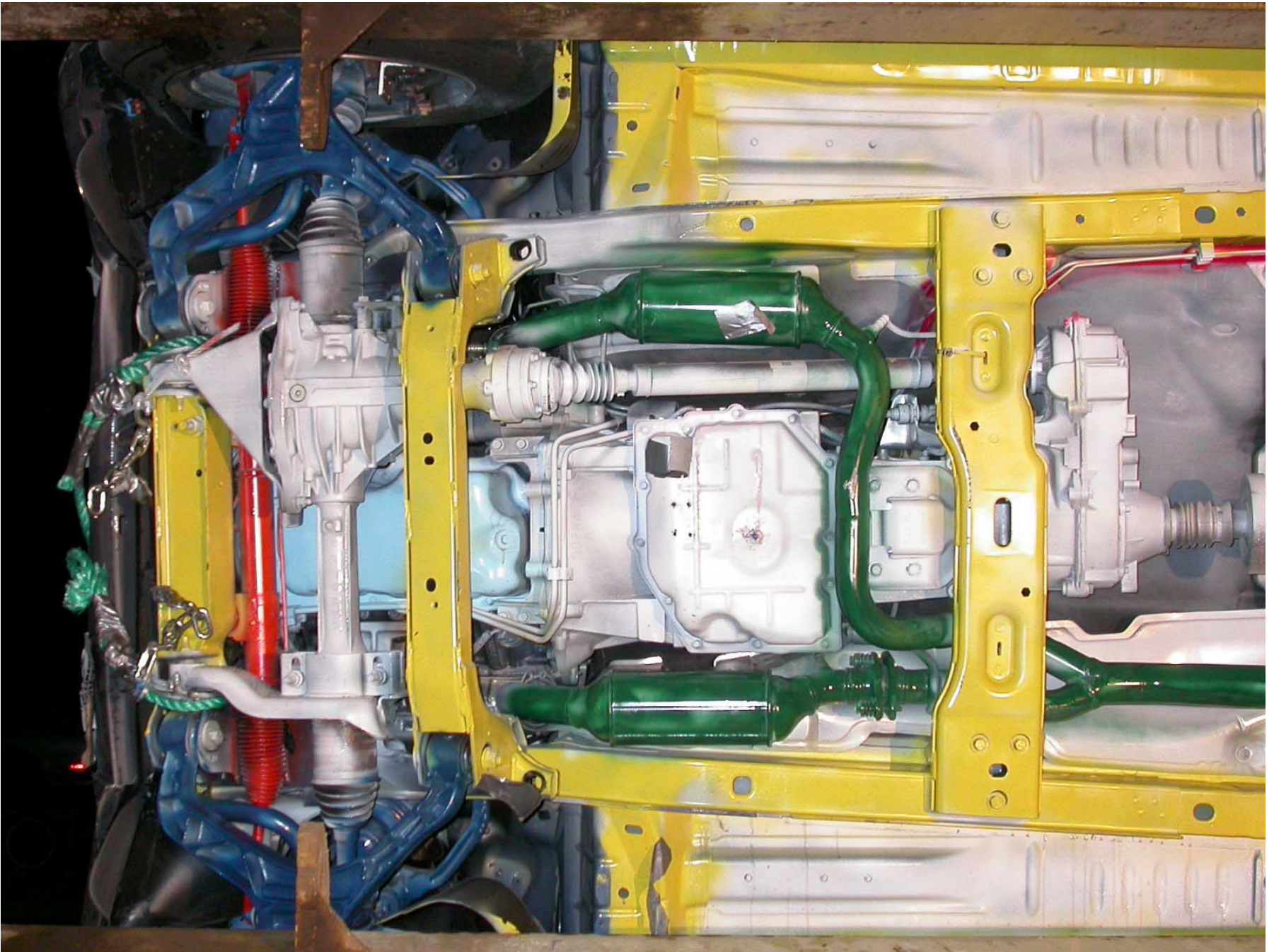


Figure A-25: Post-Test Front Underbody View (Correct NHTSA # is M40300)



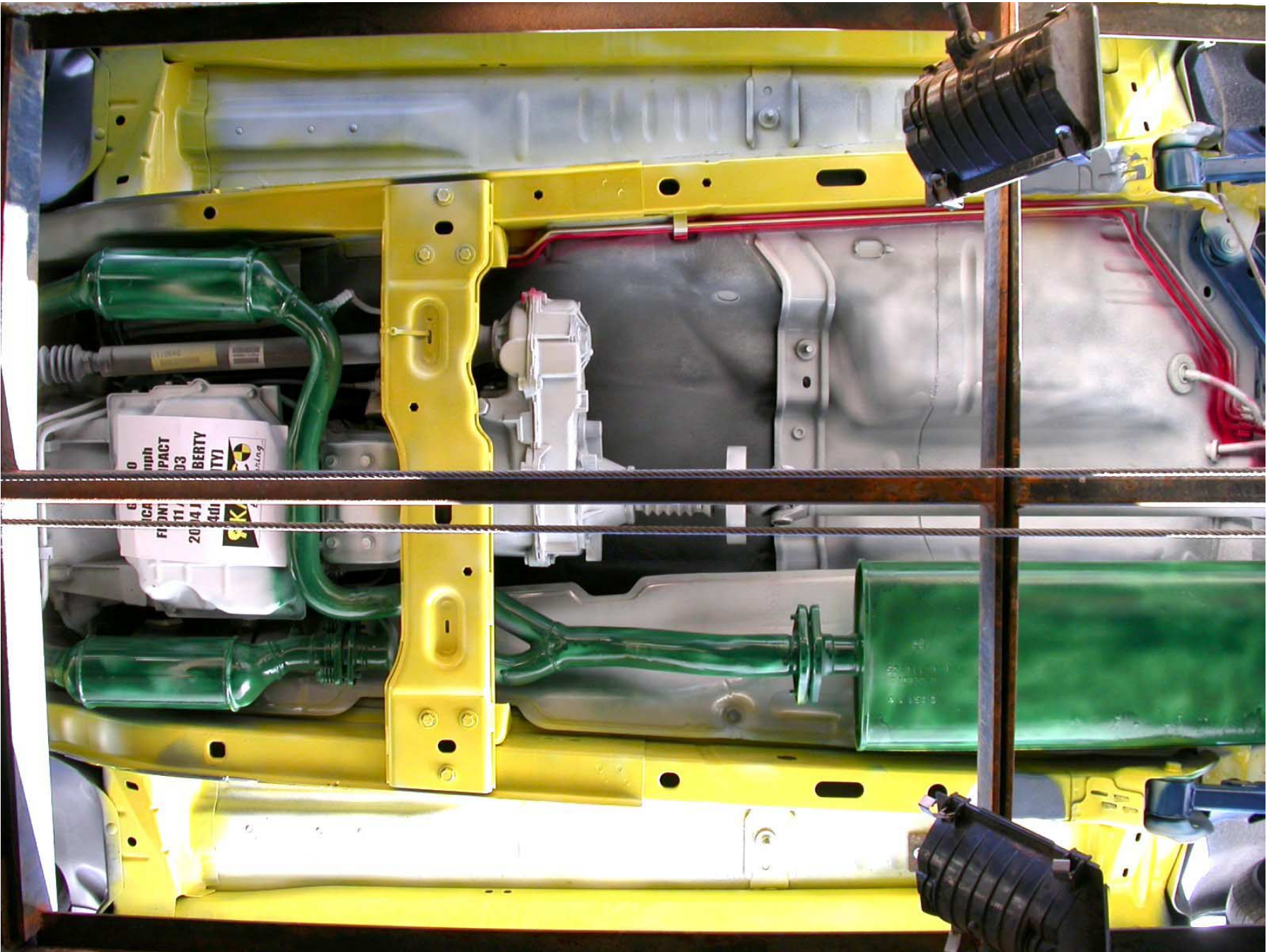


Figure A-26: Pre-Test Mid Underbody View (Correct NHTSA # is M40300)



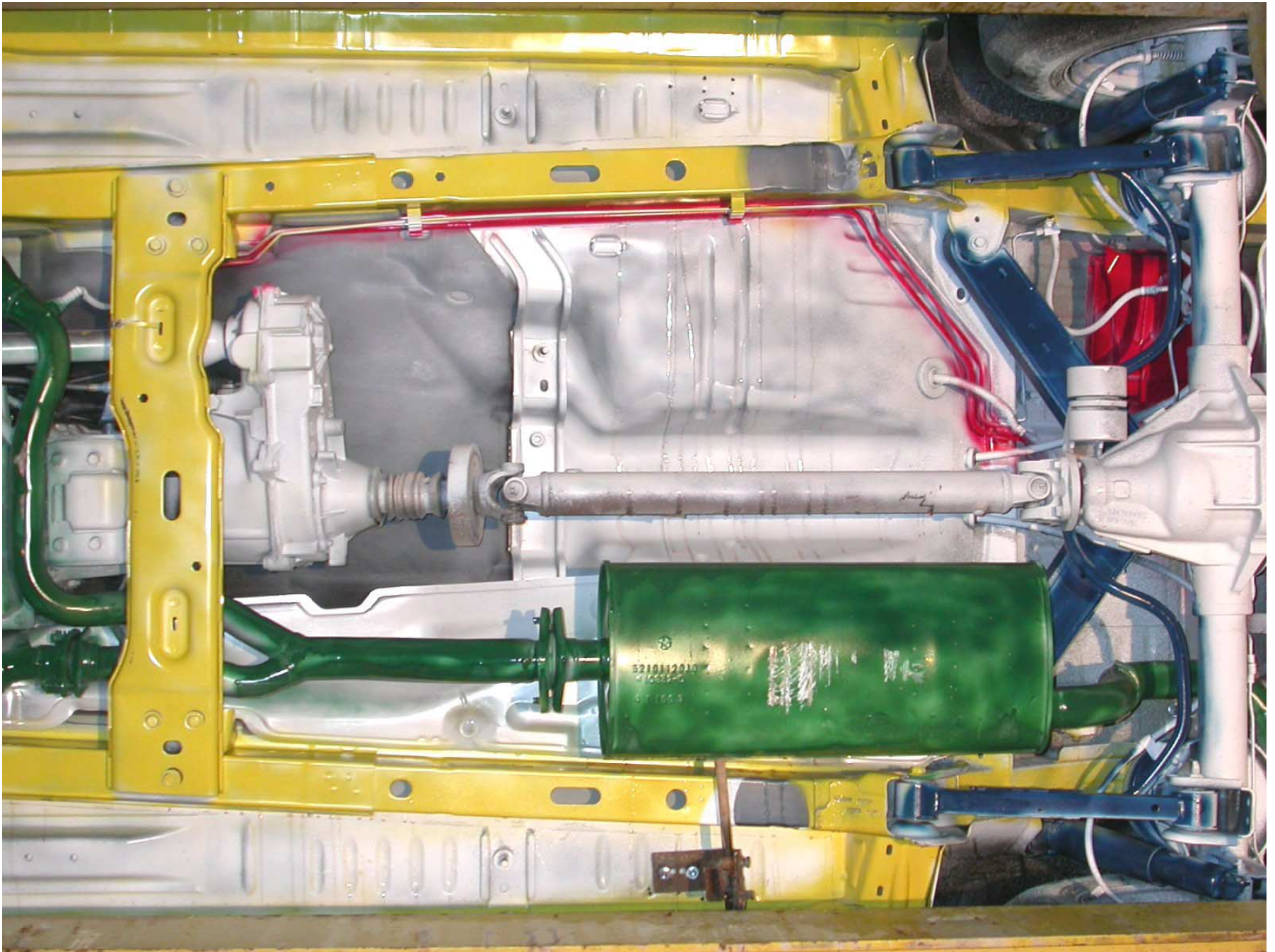


Figure A-27: Post-Test Mid Underbody View (Correct NHTSA # is M40300)



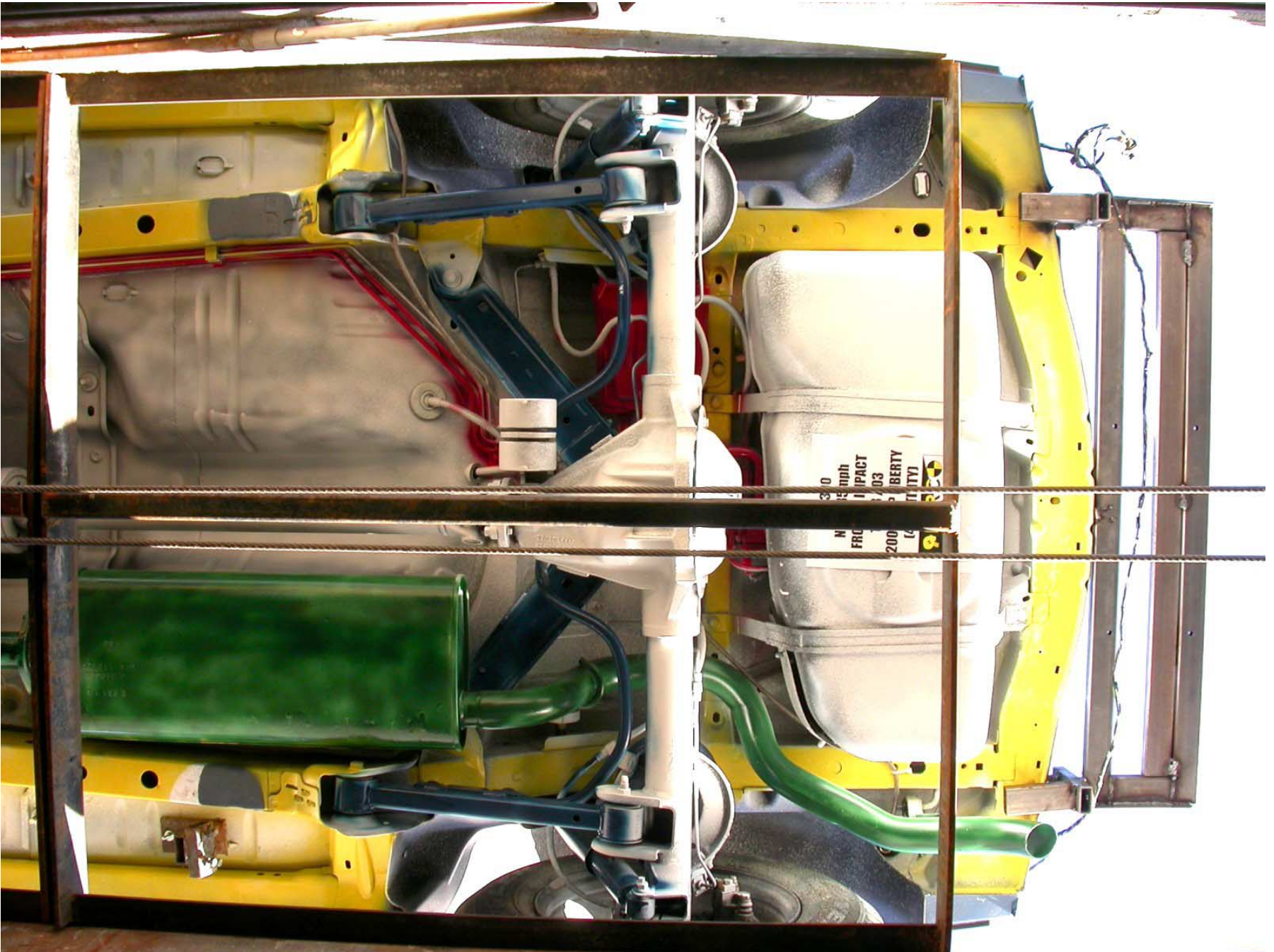


Figure A-28: Pre-Test Rear Underbody View (Correct NHTSA # is M40300)



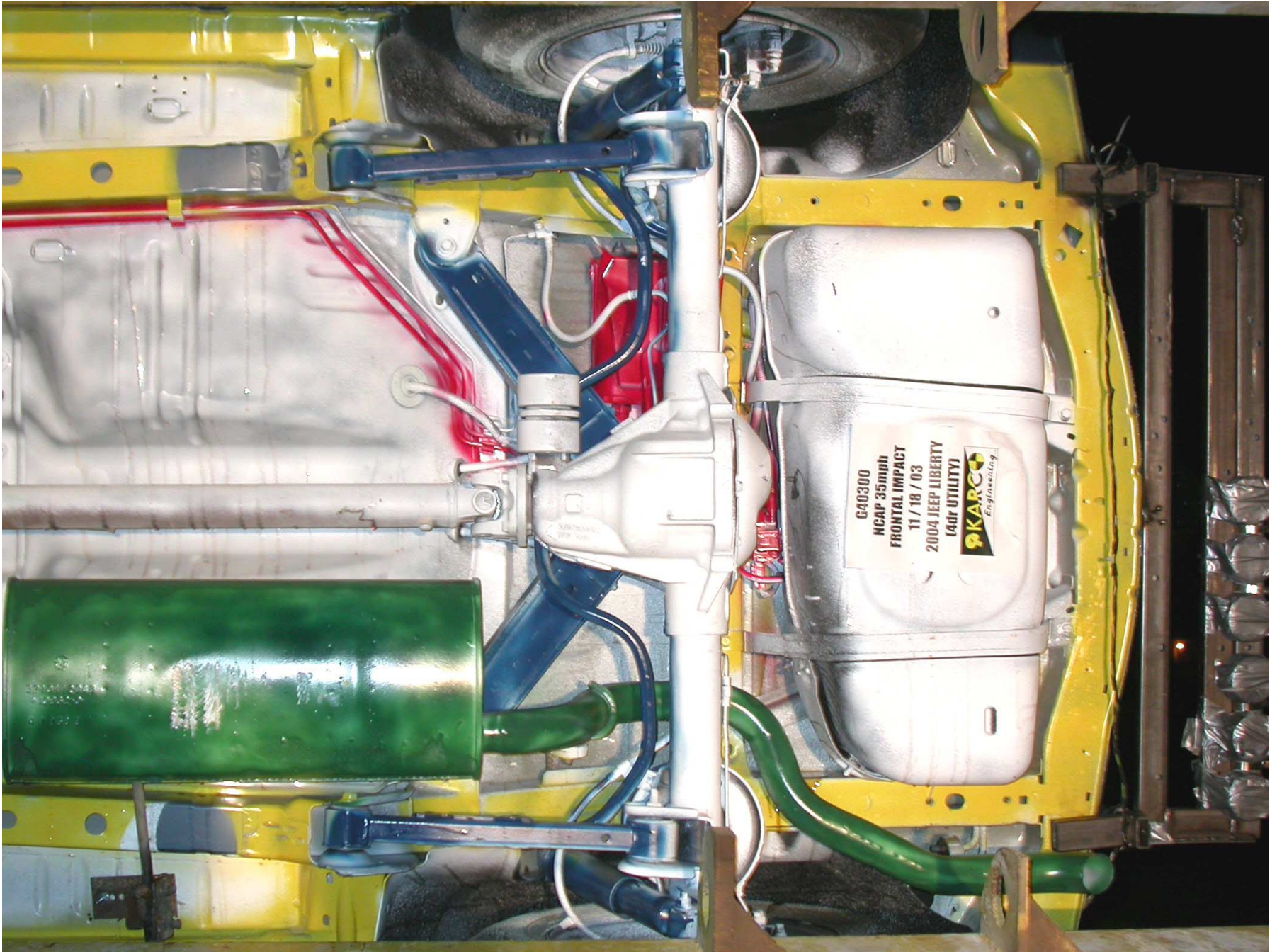


Figure A-29: Post-Test Rear Underbody View (Correct NHTSA # is M40300)





Figure A-30: Pre-Test Driver Dummy Front View (Head Position)





Figure A-31: Post-Test Driver Dummy Front View (Head Position)





Figure A-32: Pre-Test Driver Dummy Front Through Window





Figure A-33: Post-Test Driver Dummy Front Through Window





Figure A-34: Pre-Test Driver Dummy (Door Open)





Figure A-35: Post-Test Driver Dummy (Door Open)





Figure A-36: Pre-Test Driver Dummy Feet





Figure A-37: Post-Test Driver Dummy Feet





Figure A-38: Pre-Test Driver Side Knee Bolster



Figure A-39: Post-Test Driver Side Knee Bolster





Figure A-40: Pre-Test Driver Side Floor Pan





Figure A-41: Post-Test Driver Side Floor Pan





Figure A-42: Post-Test Driver Dummy Head





Figure A-43: Post-Test Driver Dummy Contact to Air Bag





Figure A-44: Pre-Test Passenger Dummy Front View (Head Position)





Figure A-45: Post-Test Passenger Dummy Front View (Head Position)





Figure A-46: Pre-Test Passenger Dummy Front Through Window (Door Open)





Figure A-47: Post-Test Passenger Dummy Front Through Window





Figure A-48: Pre-Test Passenger Dummy (Door Open)





Figure A-49: Post-Test Passenger Dummy (Door Open)





Figure A-50: Pre-Test Passenger Dummy Feet



Figure A-51: Post-Test Passenger Dummy Feet





Figure A-52: Pre-Test Passenger Side Knee Bolster



Figure A-53: Post-Test Passenger Side Knee Bolster





Figure A-54: Pre-Test Passenger Side Floor Pan





Figure A-55: Post-Test Passenger Side Floor Pan





Figure A-56: Post-Test Passenger Dummy Head





Figure A-57: Post-Test Passenger Dummy Contact to Air Bag





Figure A-58: Vehicle on Rollover Device (Correct NHTSA # is M40300)



Figure A-59: Vehicle on Rollover Device (Correct NHTSA # is M40300)





Figure A-60: Vehicle on Rollover Device (Correct NHTSA # is M40300)



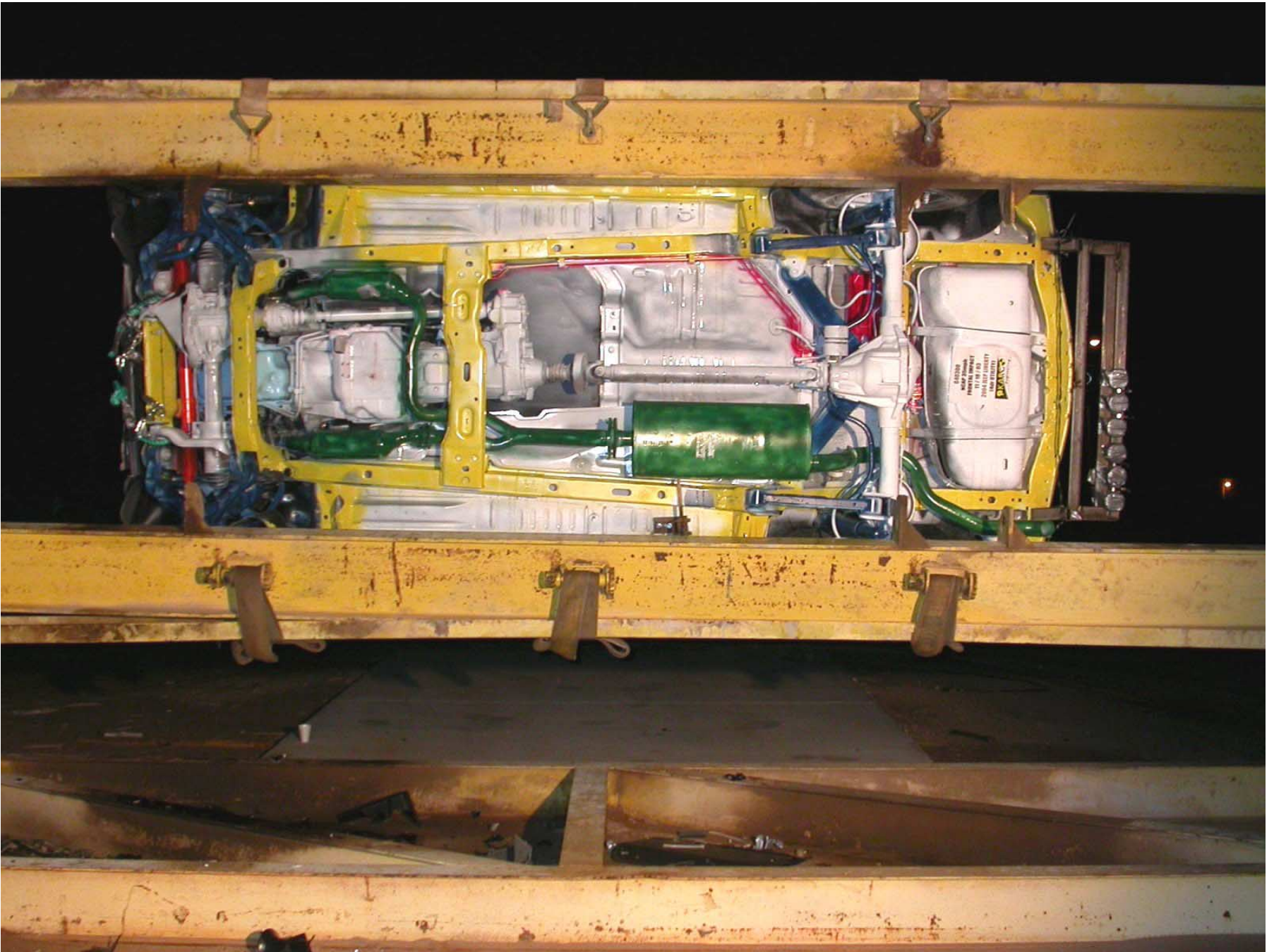


Figure A-61: Vehicle on Rollover Device (Correct NHTSA # is M40300)





Figure A-62: Vehicle During Impact (Correct NHTSA # is M40300)

## **APPENDIX B**

### **DATA PLOTS**



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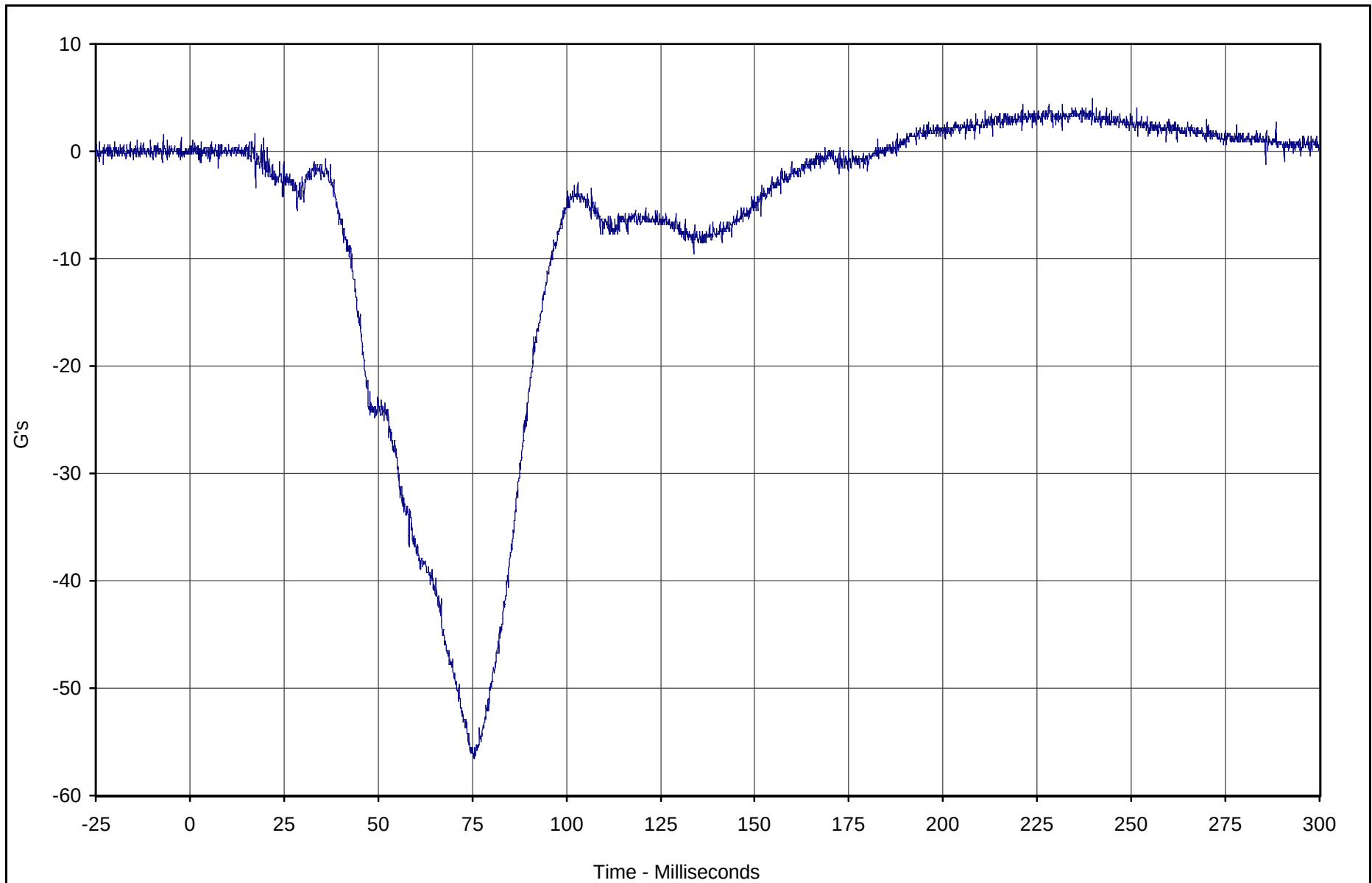
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| Curve Description     | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Head Primary X | 001   | FIL  | G's   | 4.9 | 239.7 | -56.6 | 75.5 | 1000      |



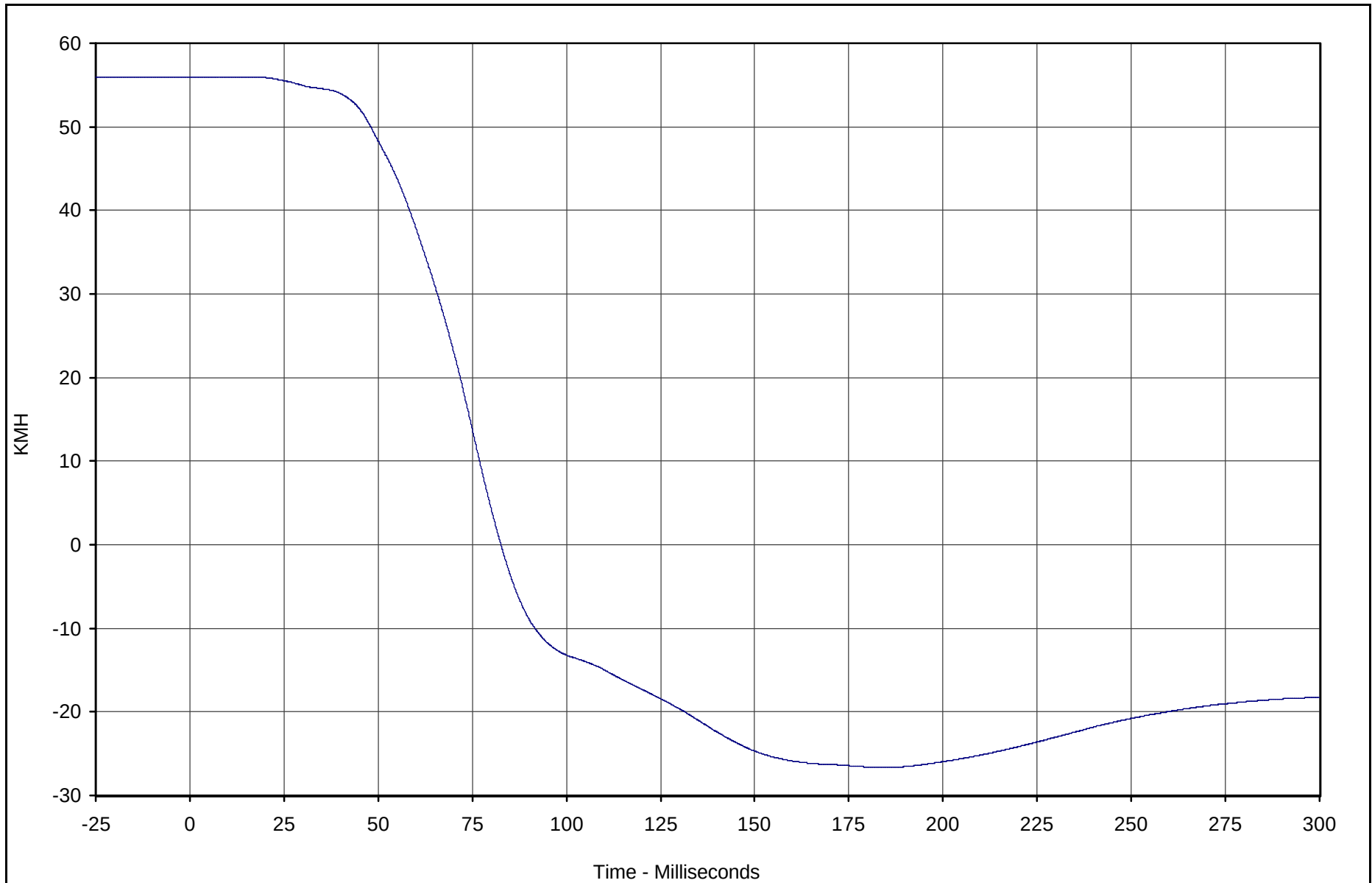
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description              | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Head Primary X Velocity | 001   | IN1  | KMH   | 56.0 | 1.9  | -26.6 | 183.1 | 180       |

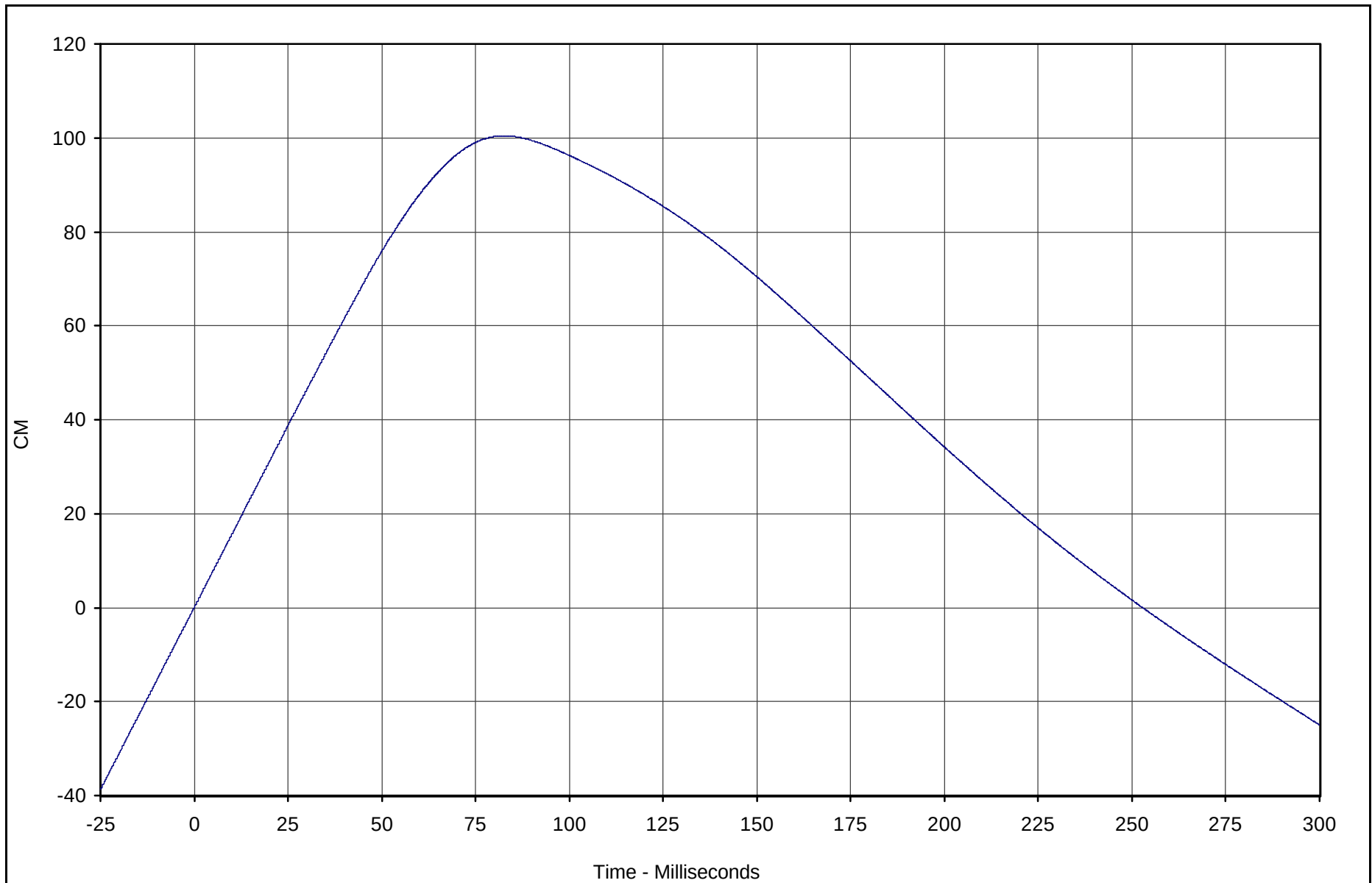


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Driver Head Primary X Displ. | 001   | IN2  | CM    | 100.4 | 82.6 | -24.9 | 299.9 | 180       |



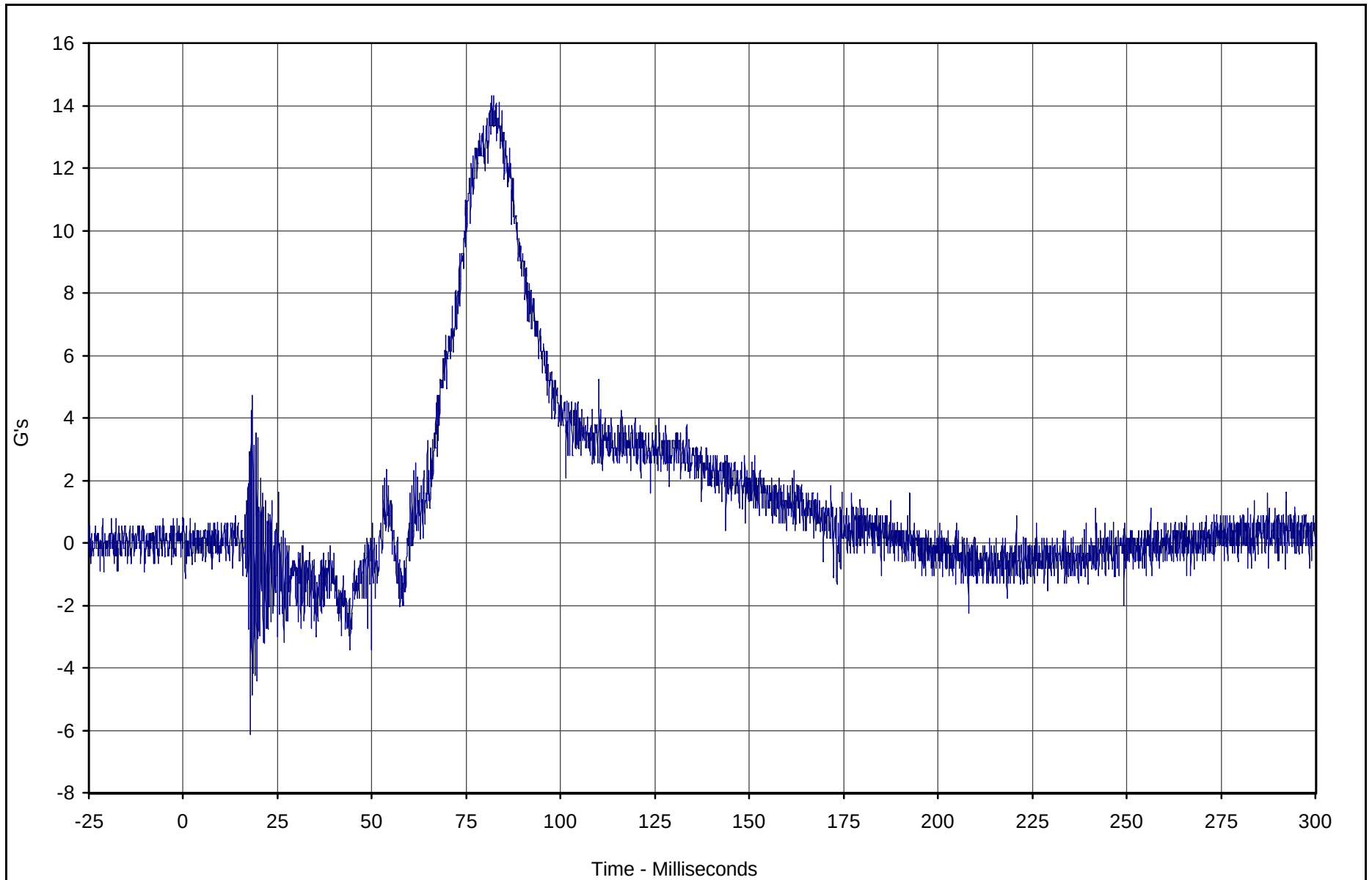
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description     | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Head Primary Y | 002   | FIL  | G's   | 14.3 | 81.8 | -6.1 | 17.8 | 1000      |

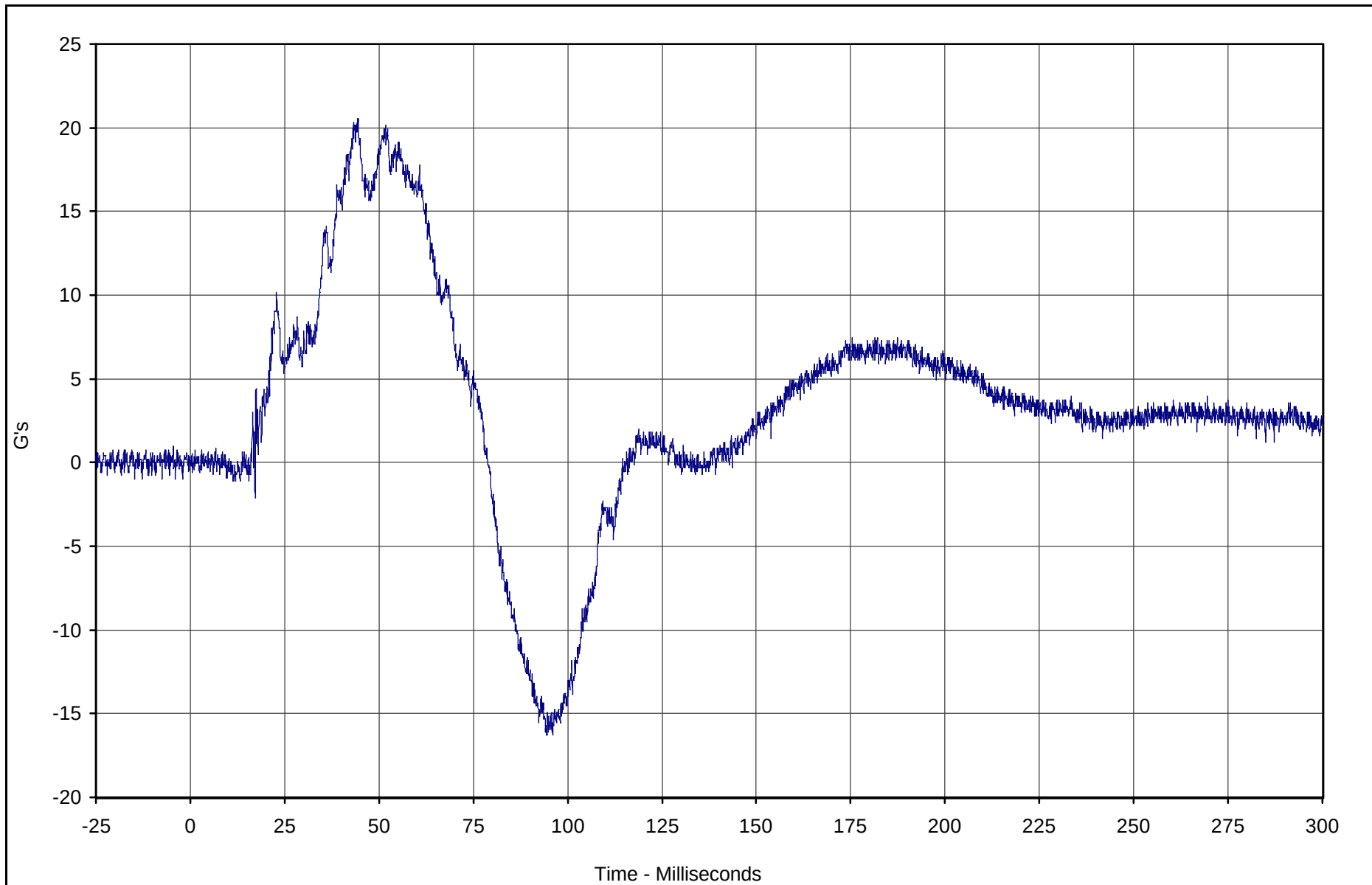


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description     | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Head Primary Z | 003   | FIL  | G's   | 20.5 | 44.2 | -16.3 | 94.4 | 1000      |



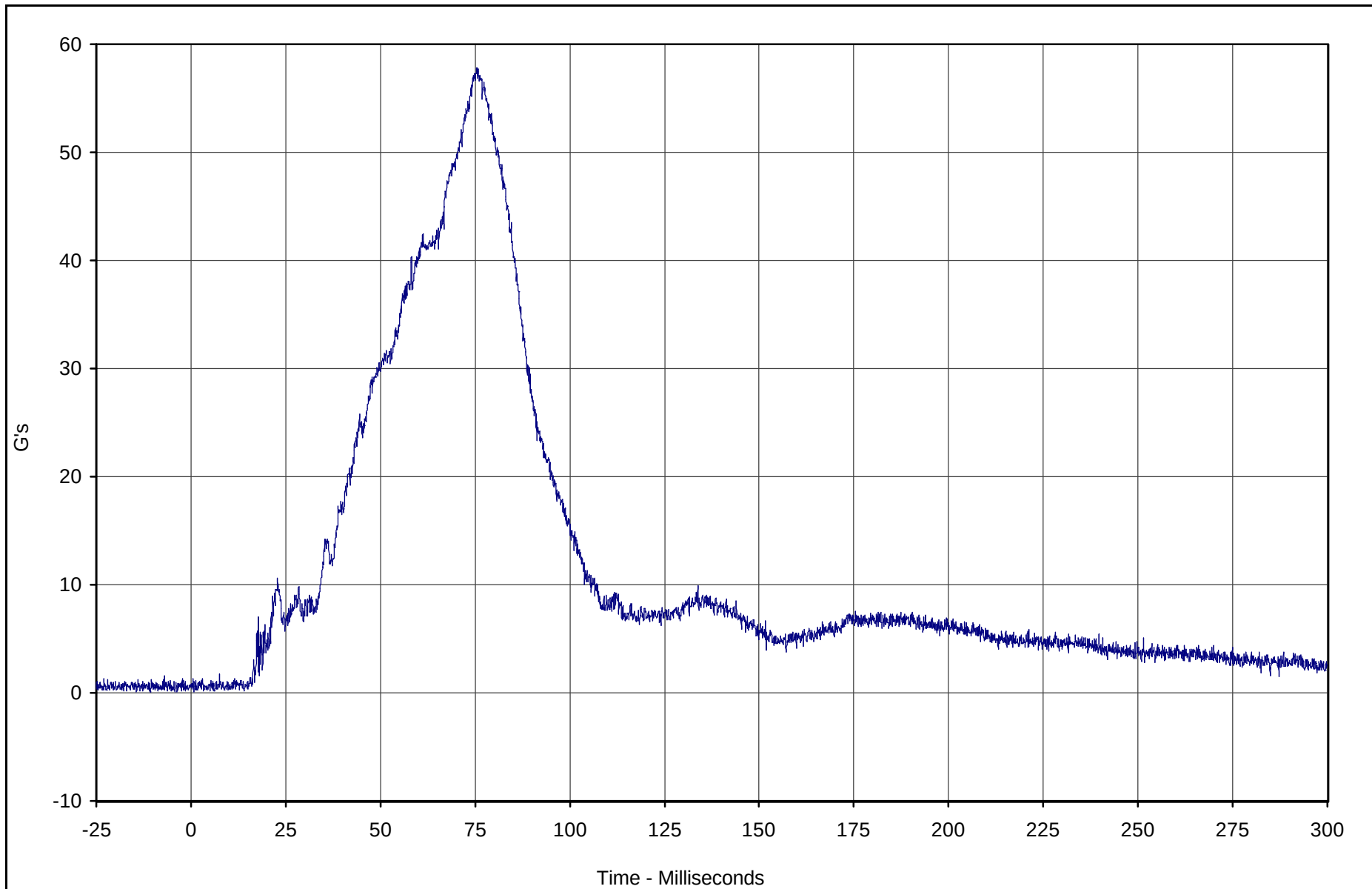
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description             | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Head Resultant Primary | 001   | RES  | G's   | 57.8 | 75.5 | 0.1 | 0.7  | 1000      |

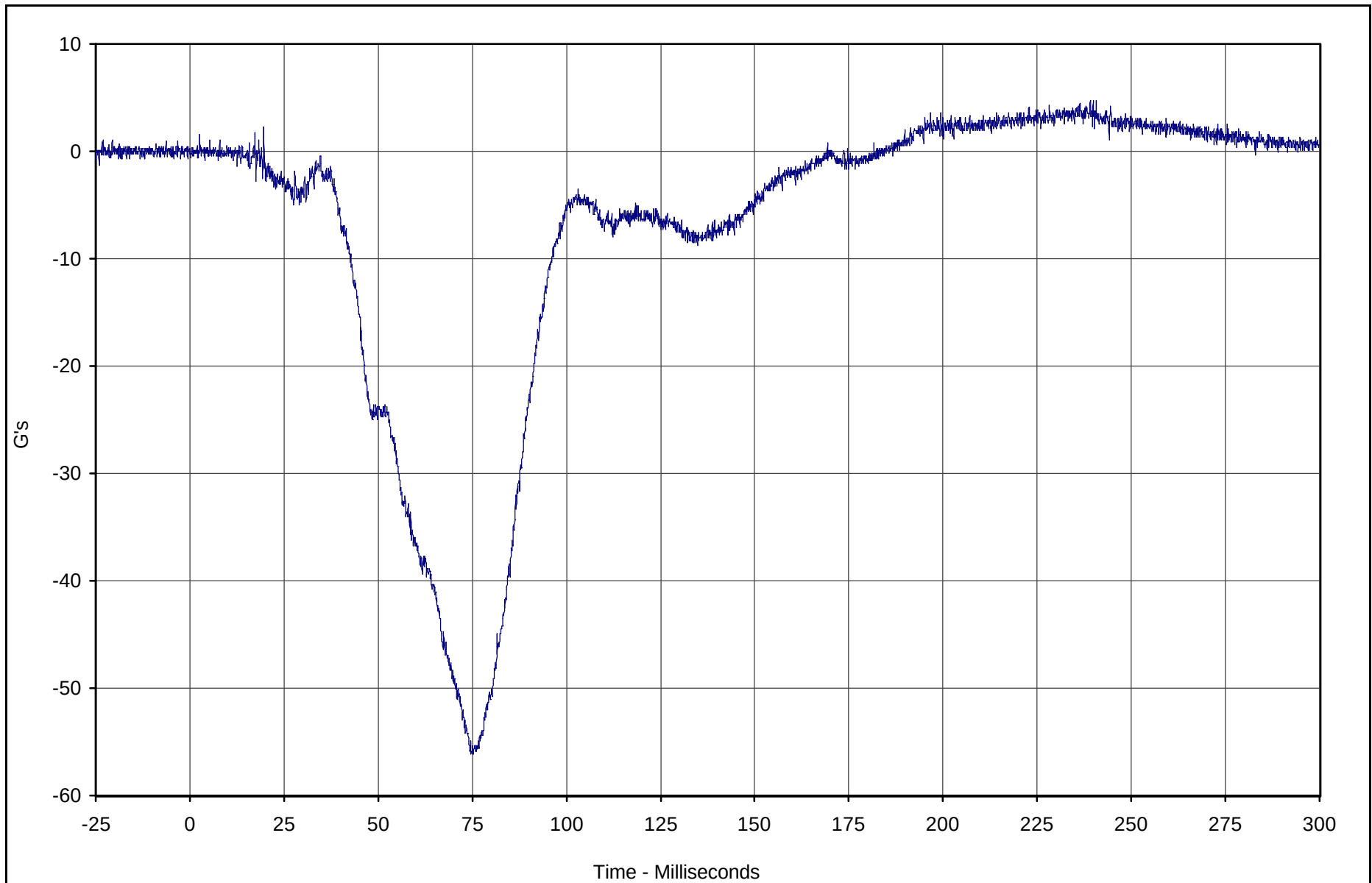


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Head Redundant X | 004   | FIL  | G's   | 4.7 | 239.1 | -56.1 | 74.7 | 1000      |

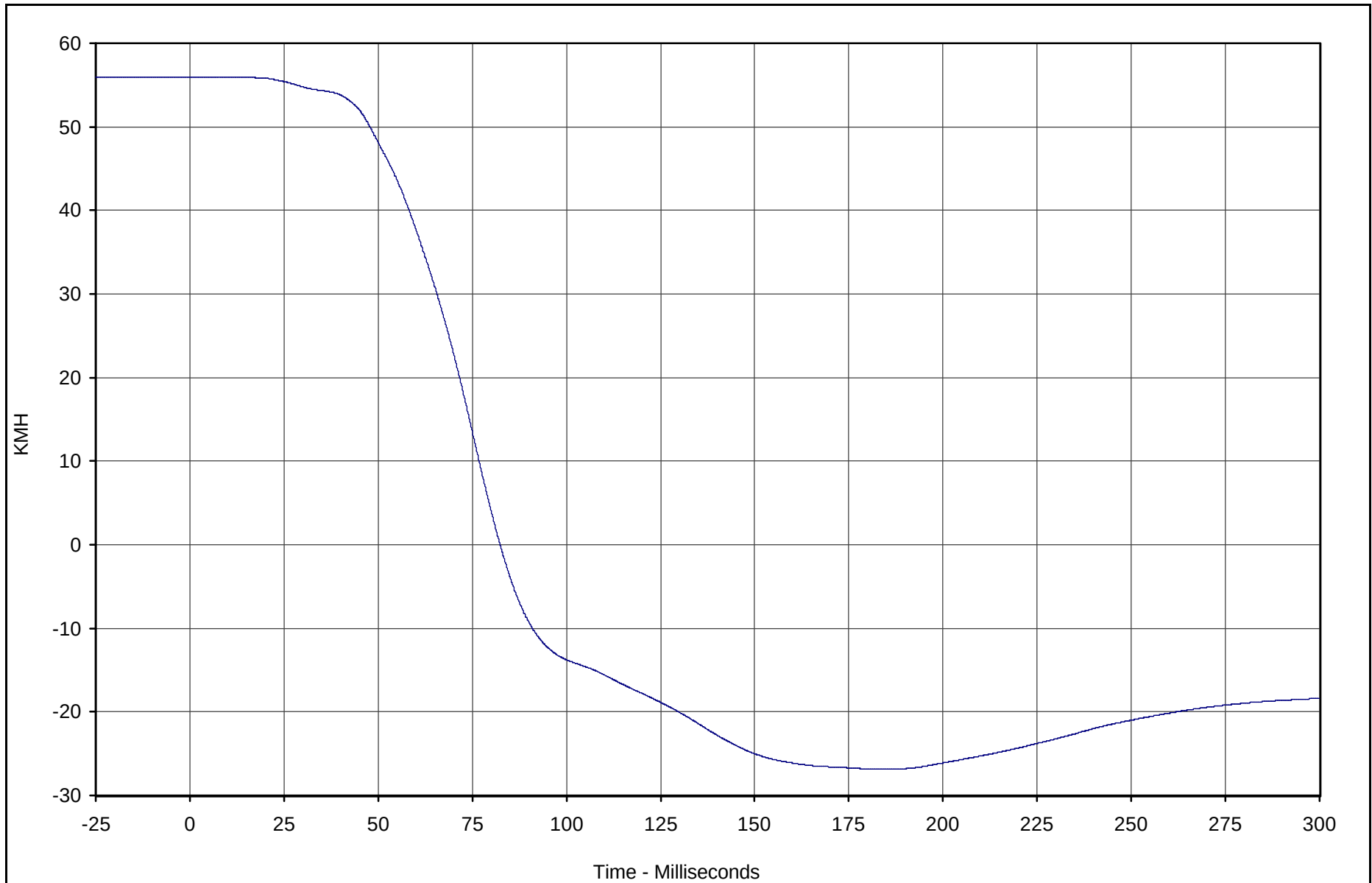


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Head Redundant X Velocity | 004   | IN1  | KMH   | 56.0 | 0.0  | -26.9 | 184.0 | 180       |



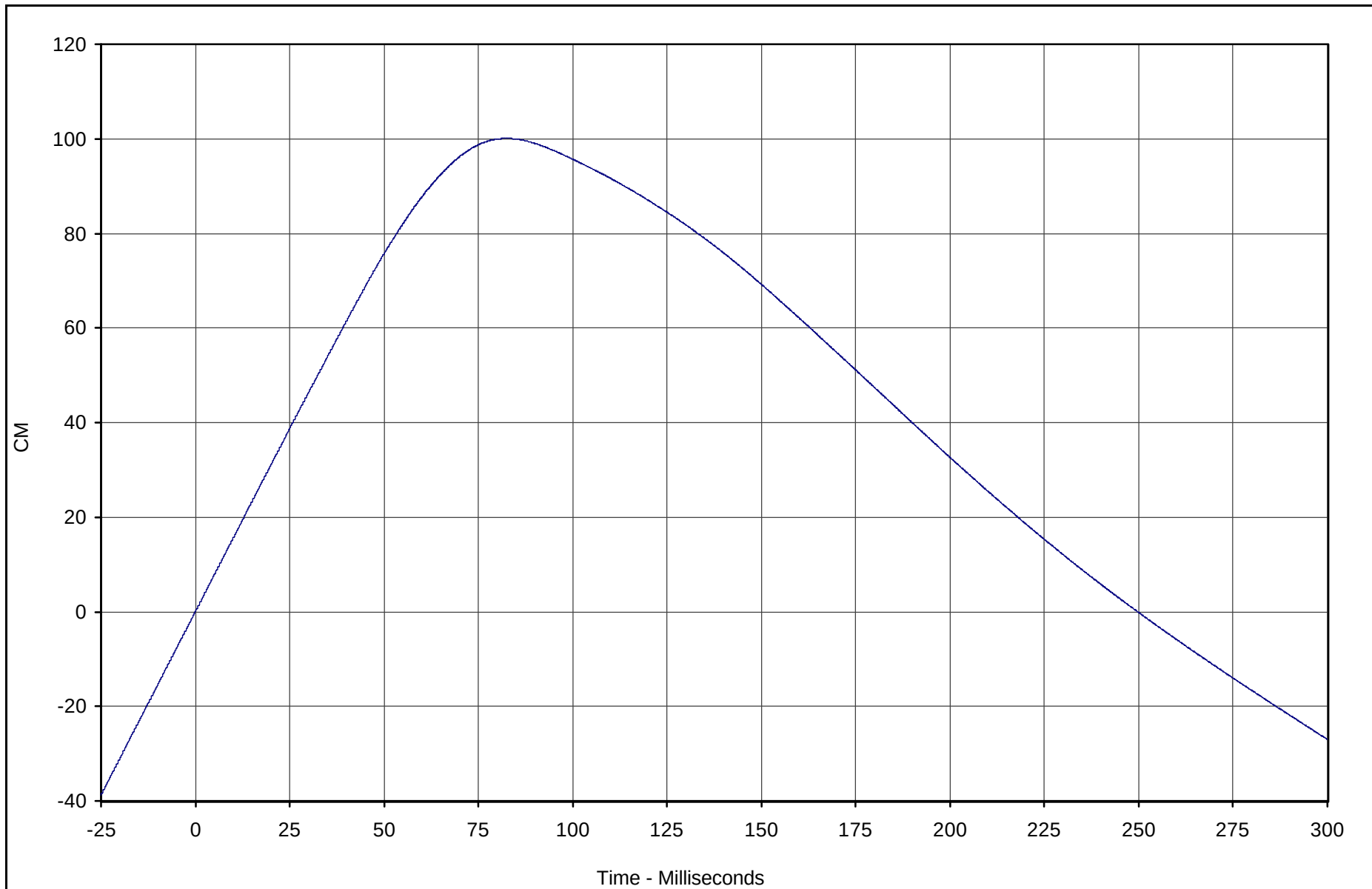
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description              | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|--------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Driver Head Redundant X Displ. | 004   | IN2  | CM    | 100.1 | 82.4 | -26.9 | 299.9 | 180       |

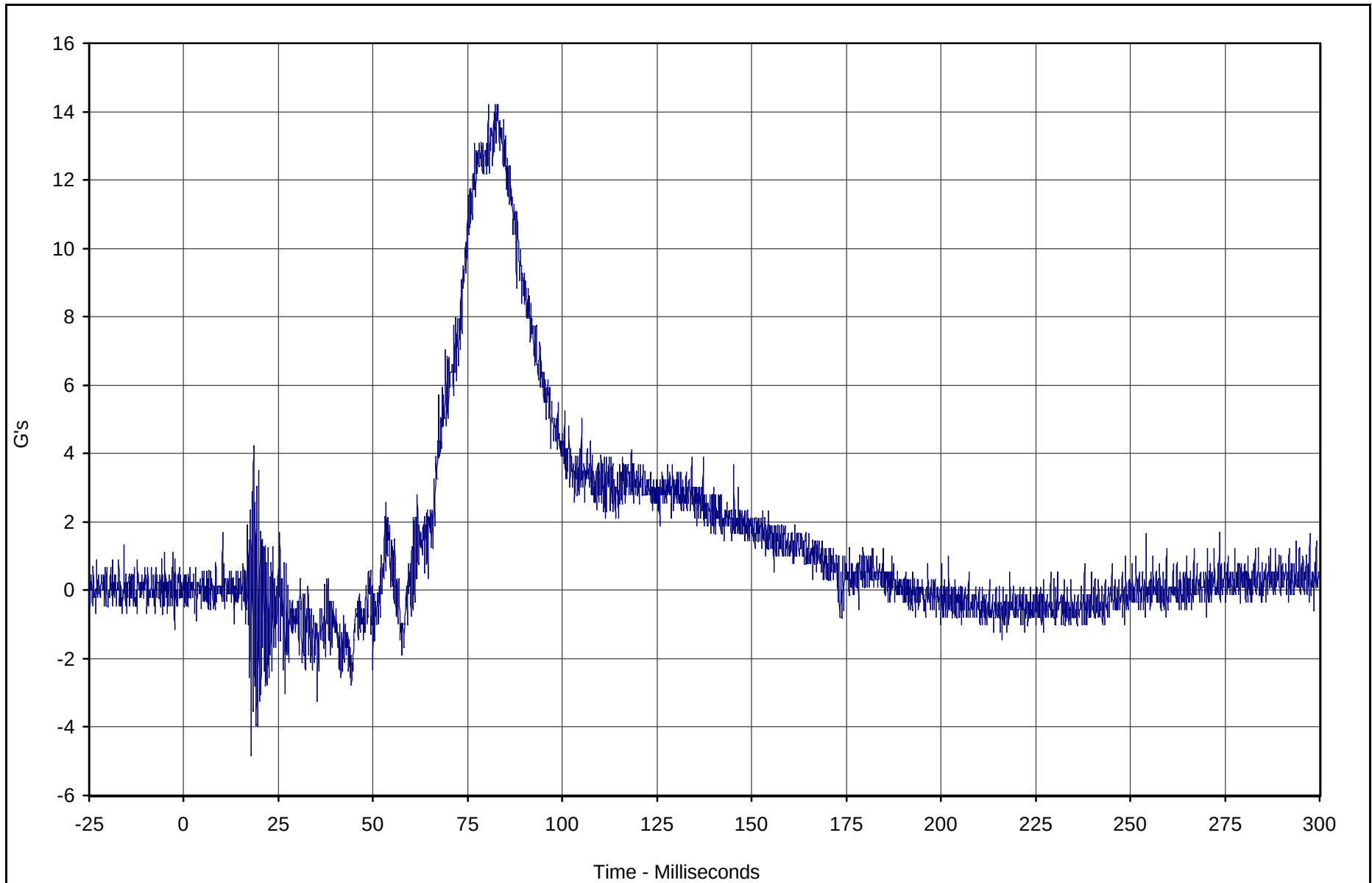


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Head Redundant Y | 005   | FIL  | G's   | 14.2 | 80.4 | -4.8 | 17.8 | 1000      |

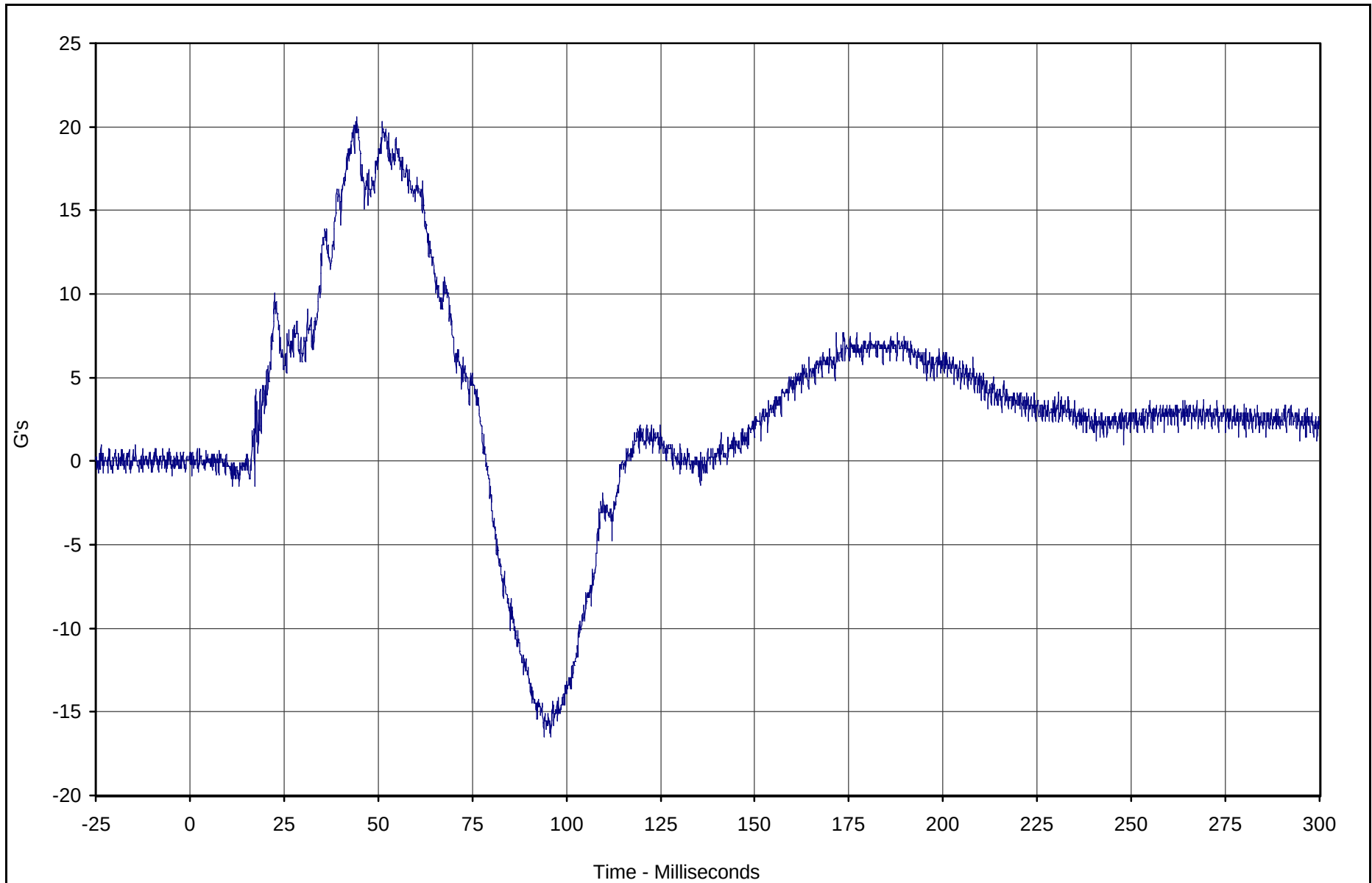


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Head Redundant Z | 006   | FIL  | G's   | 20.6 | 44.4 | -16.5 | 94.1 | 1000      |



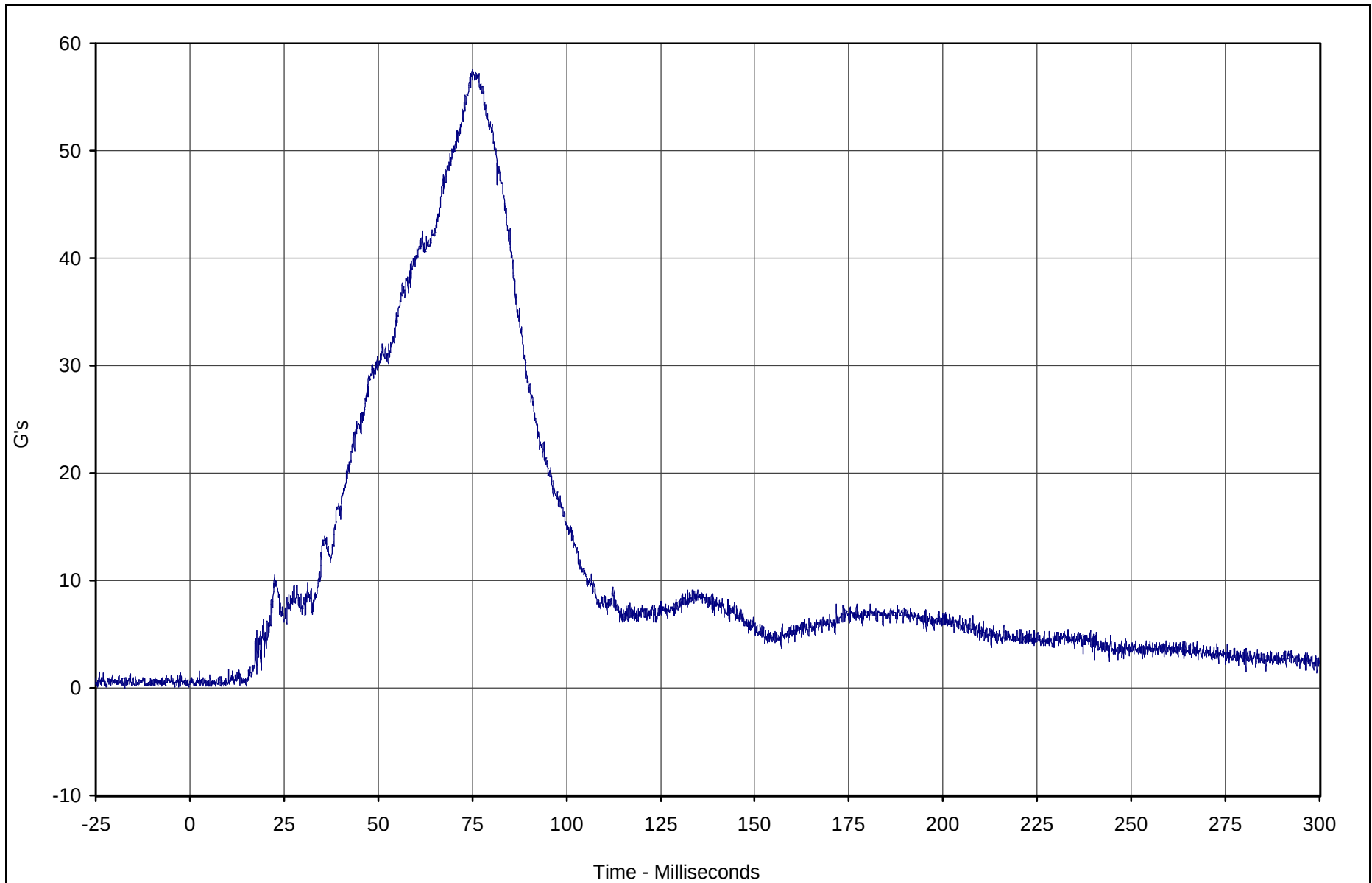
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Head Resultant Redundant | 004   | RES  | G's   | 57.5 | 75.0 | 0.2 | 4.2  | 1000      |

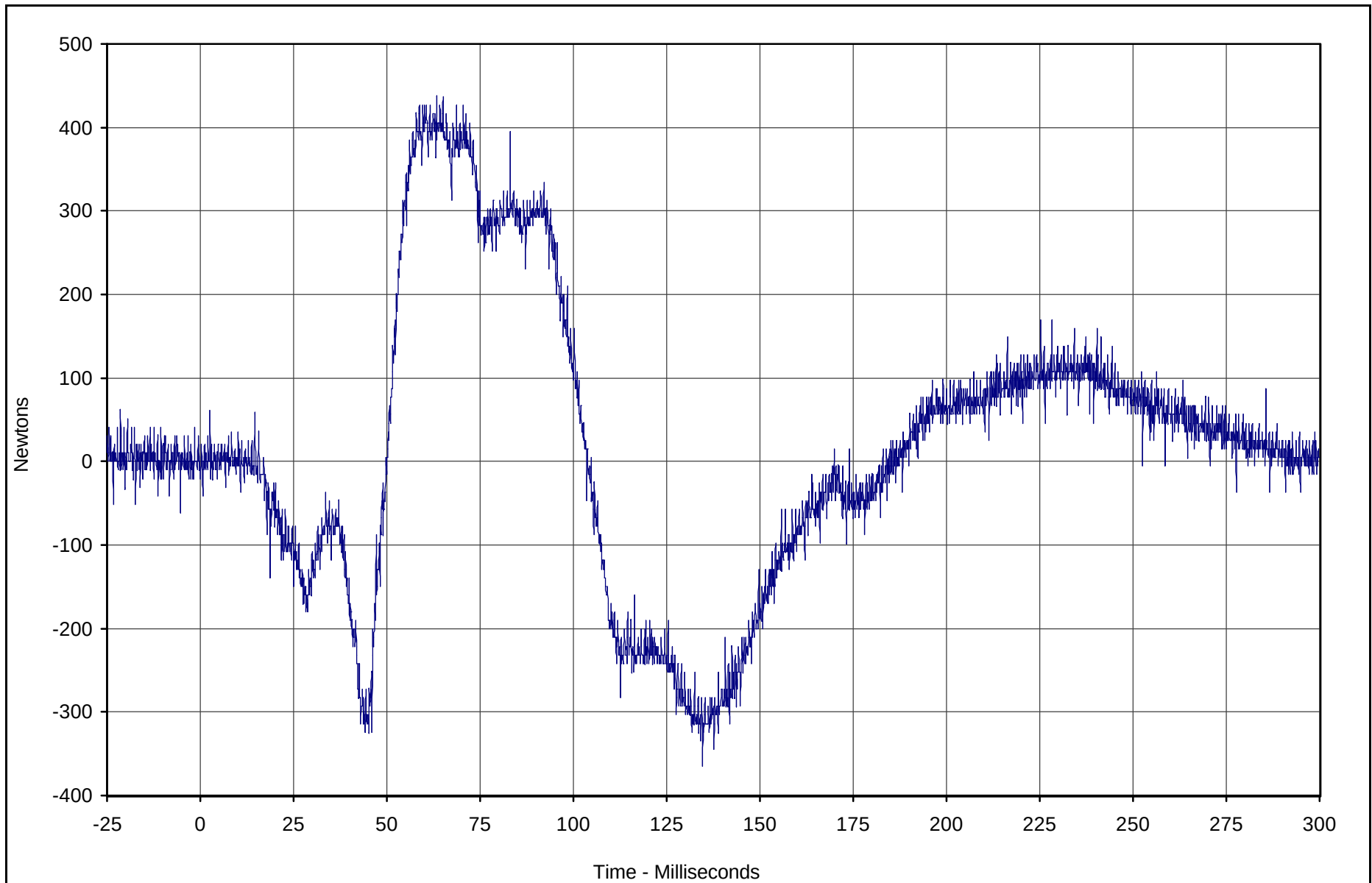


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description   | CURNO | Type | Units   | Max   | Time | Min    | Time  | SAE Class |
|---------------------|-------|------|---------|-------|------|--------|-------|-----------|
| Driver Neck Force X | 007   | FIL  | Newtons | 436.6 | 63.3 | -365.2 | 134.7 | 1000      |

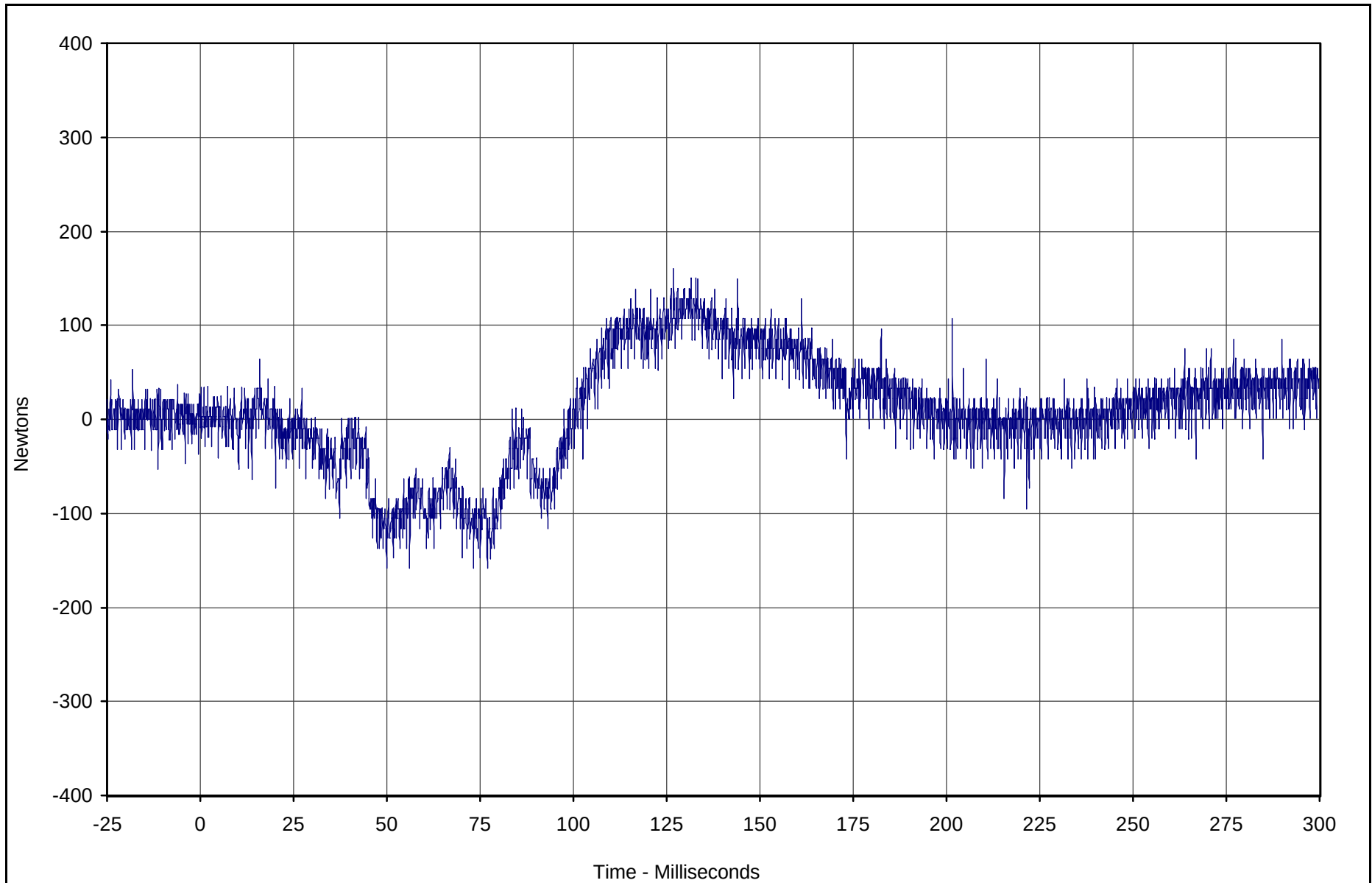


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description   | CURNO | Type | Units   | Max   | Time  | Min    | Time | SAE Class |
|---------------------|-------|------|---------|-------|-------|--------|------|-----------|
| Driver Neck Force Y | 008   | FIL  | Newtons | 160.0 | 126.8 | -158.4 | 49.9 | 1000      |



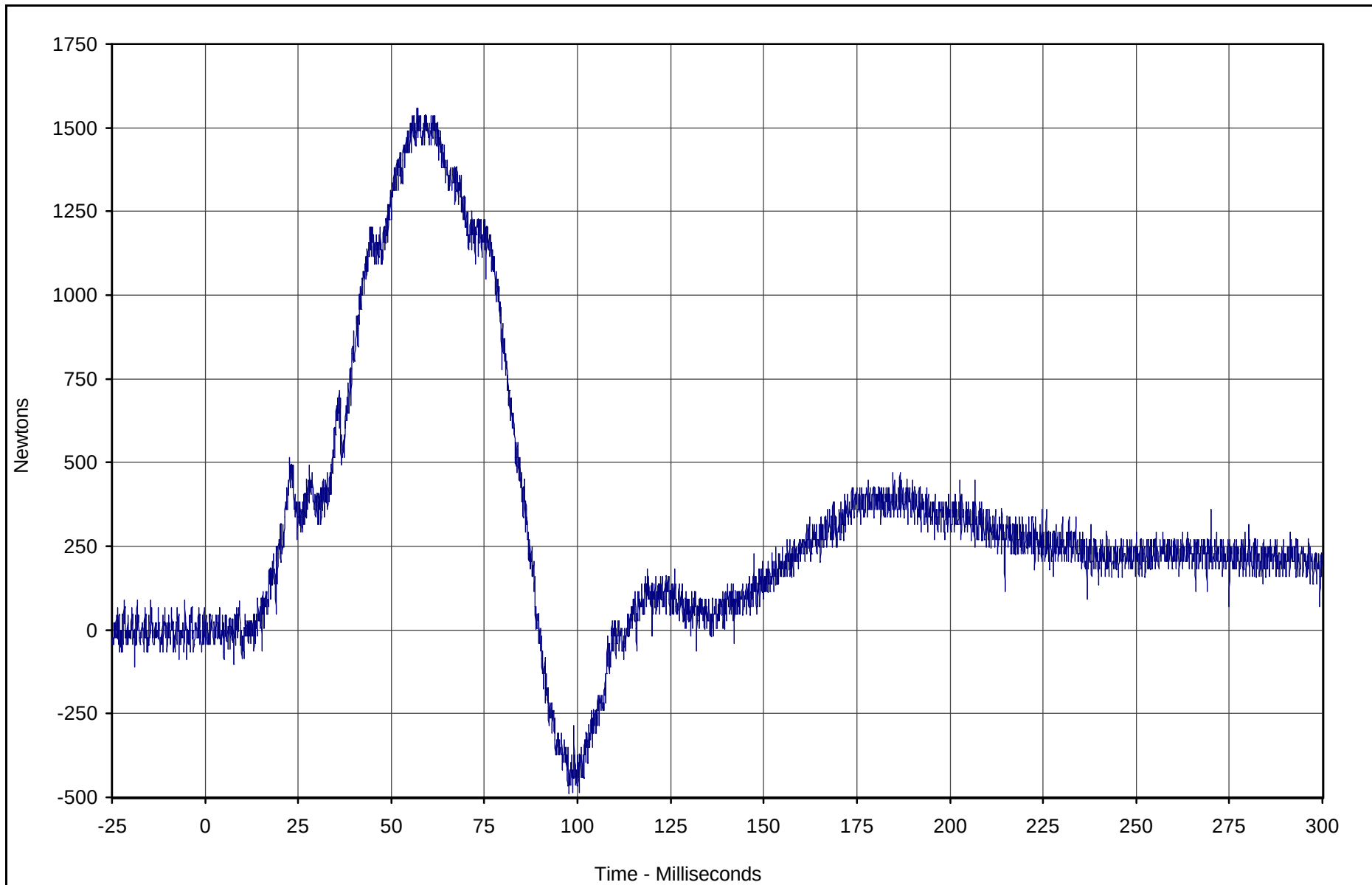
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description   | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|---------------------|-------|------|---------|--------|------|--------|------|-----------|
| Driver Neck Force Z | 009   | FIL  | Newtons | 1558.5 | 56.9 | -484.6 | 97.6 | 1000      |

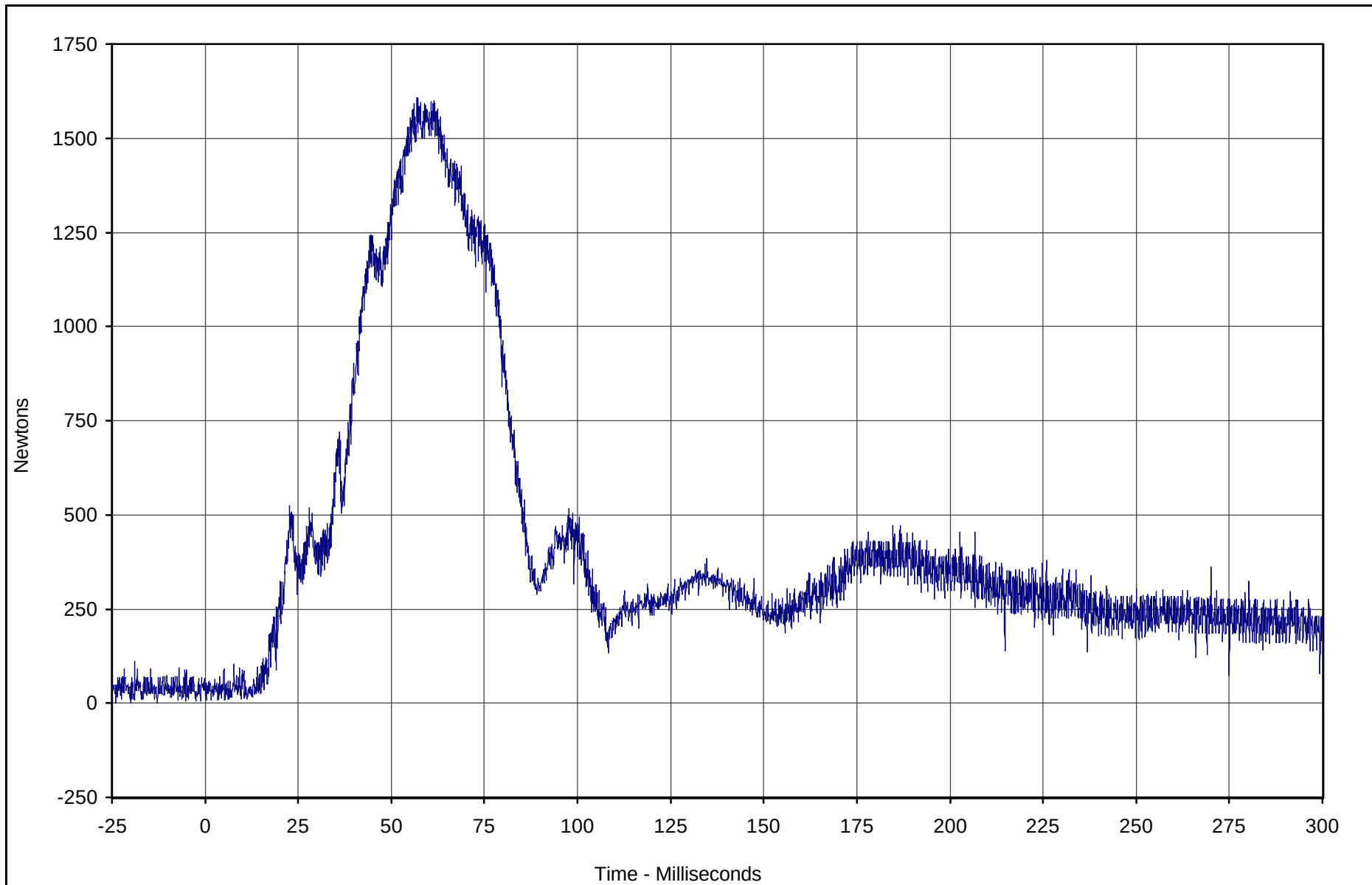


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|-----------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Driver Neck Force Resultant | 007   | RES  | Newtons | 1607.0 | 56.9 | 8.0 | 0.4  | 1000      |

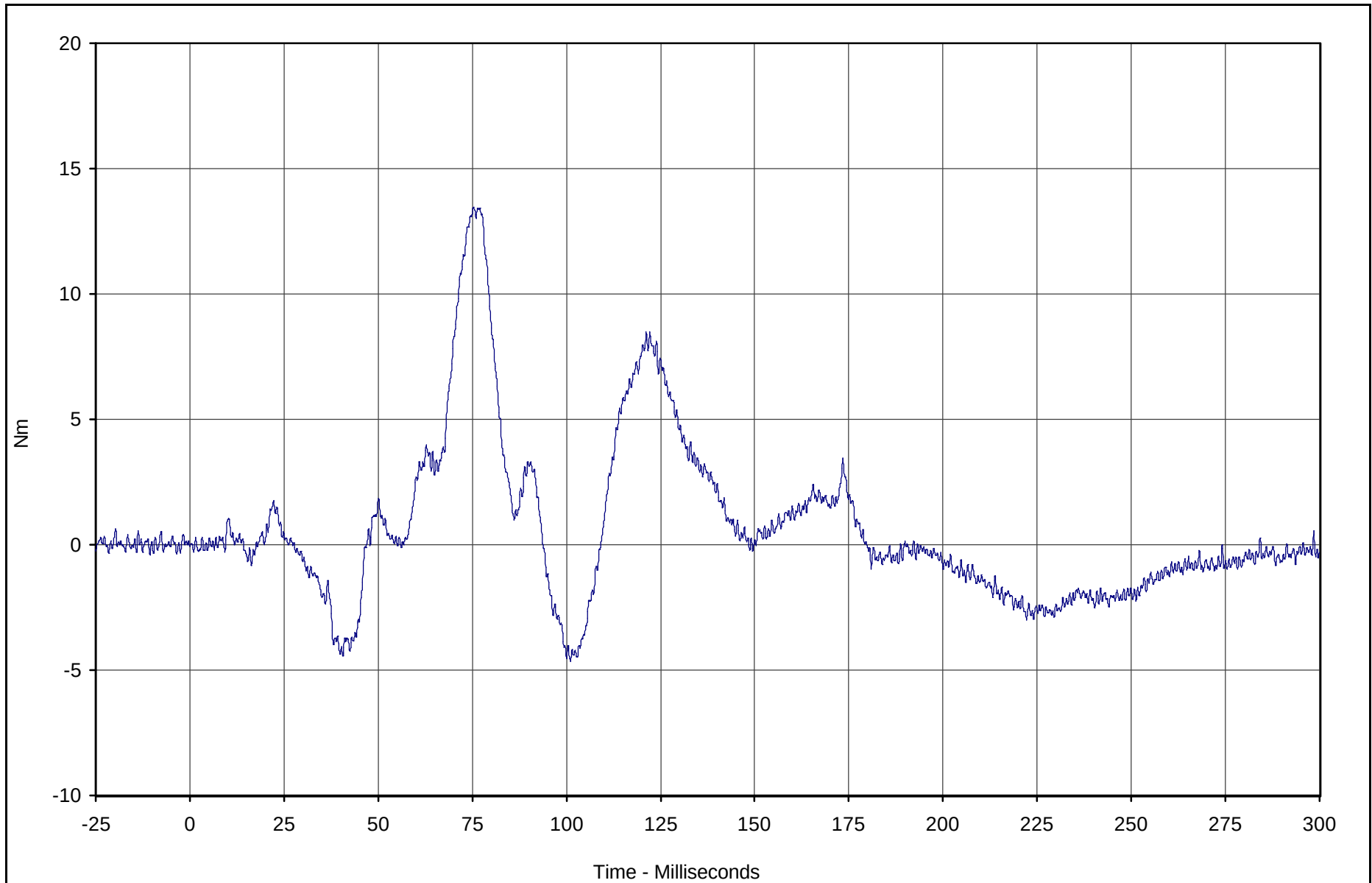


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description    | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|----------------------|-------|------|-------|------|------|------|-------|-----------|
| Driver Neck Moment X | 010   | FIL  | Nm    | 13.5 | 75.3 | -4.6 | 101.1 | 600       |



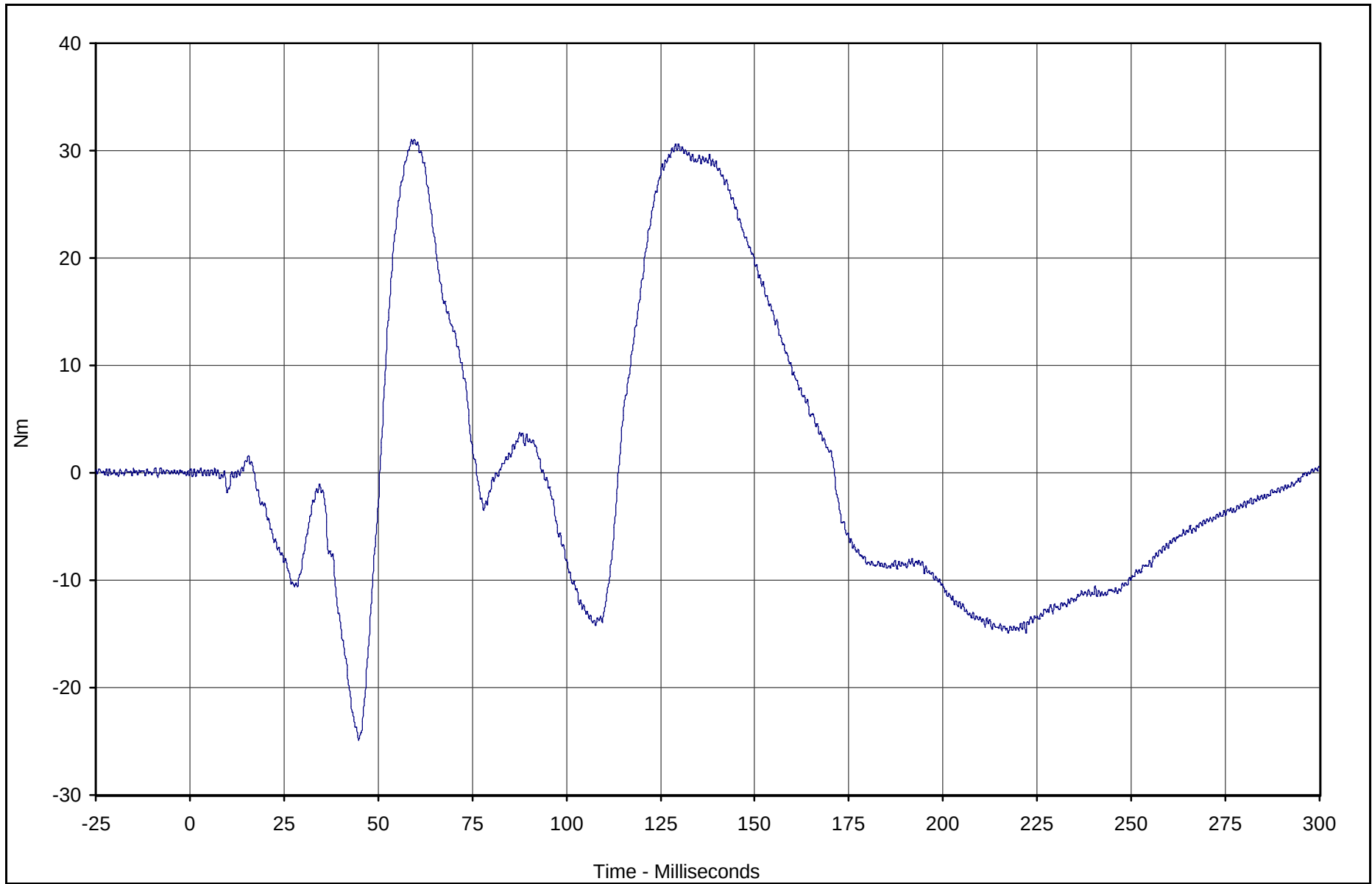
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description    | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Neck Moment Y | 011   | FIL  | Nm    | 31.0 | 59.6 | -24.9 | 44.8 | 600       |

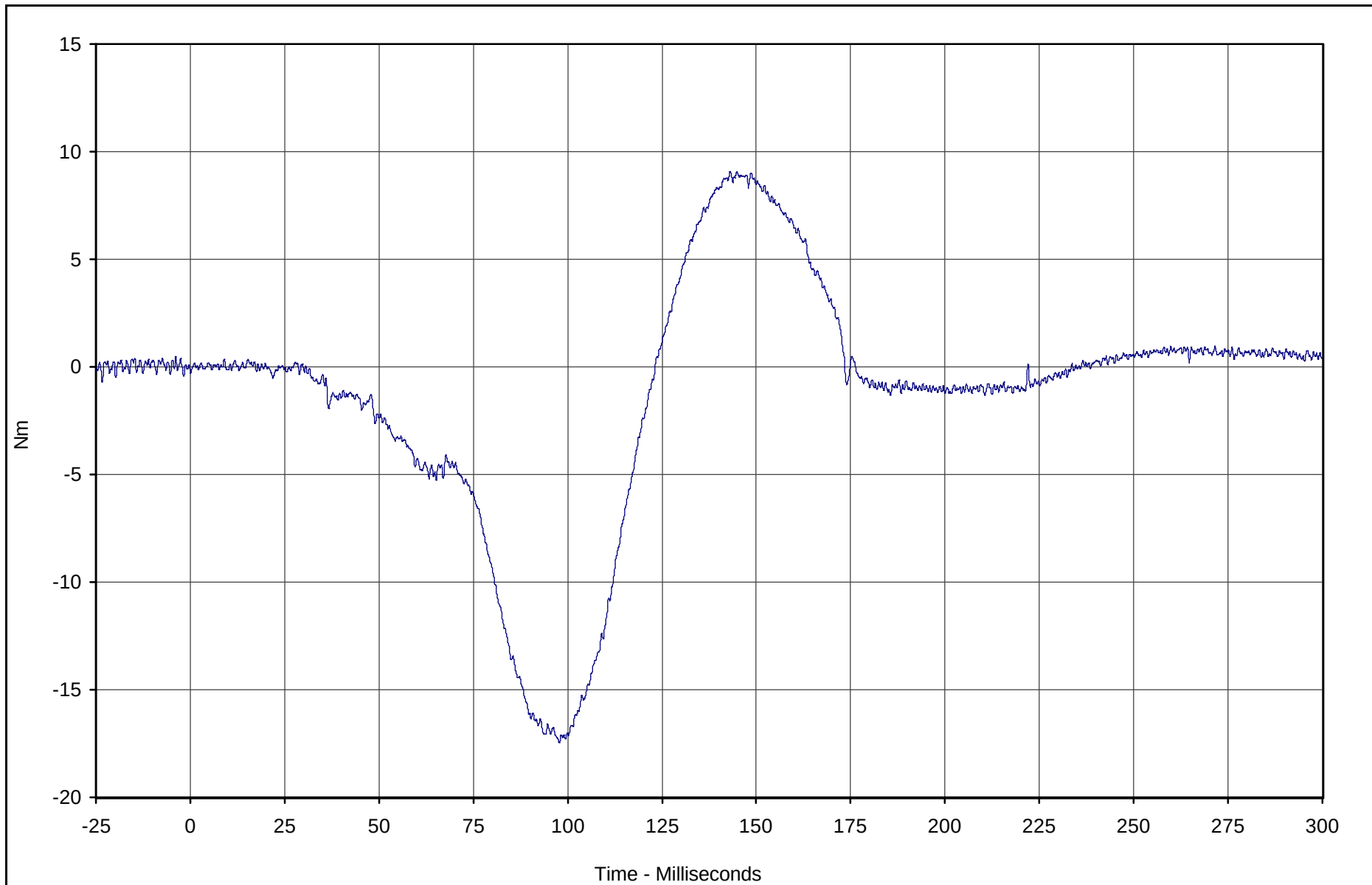


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description    | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Neck Moment Z | 012   | FIL  | Nm    | 9.1 | 144.9 | -17.4 | 97.8 | 600       |

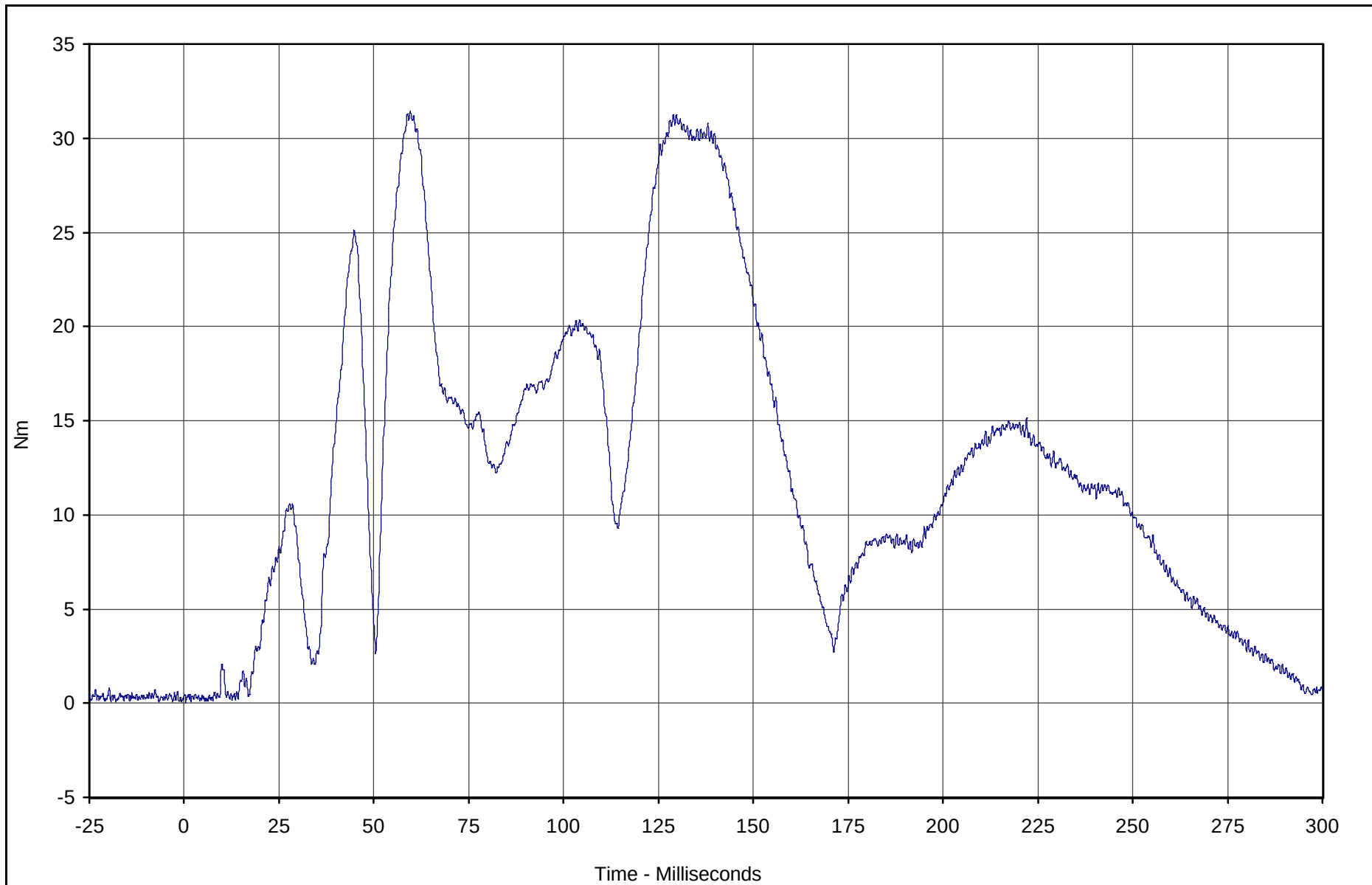


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Neck Moment Resultant | 010   | RES  | Nm    | 31.5 | 59.6 | 0.0 | 0.5  | 600       |



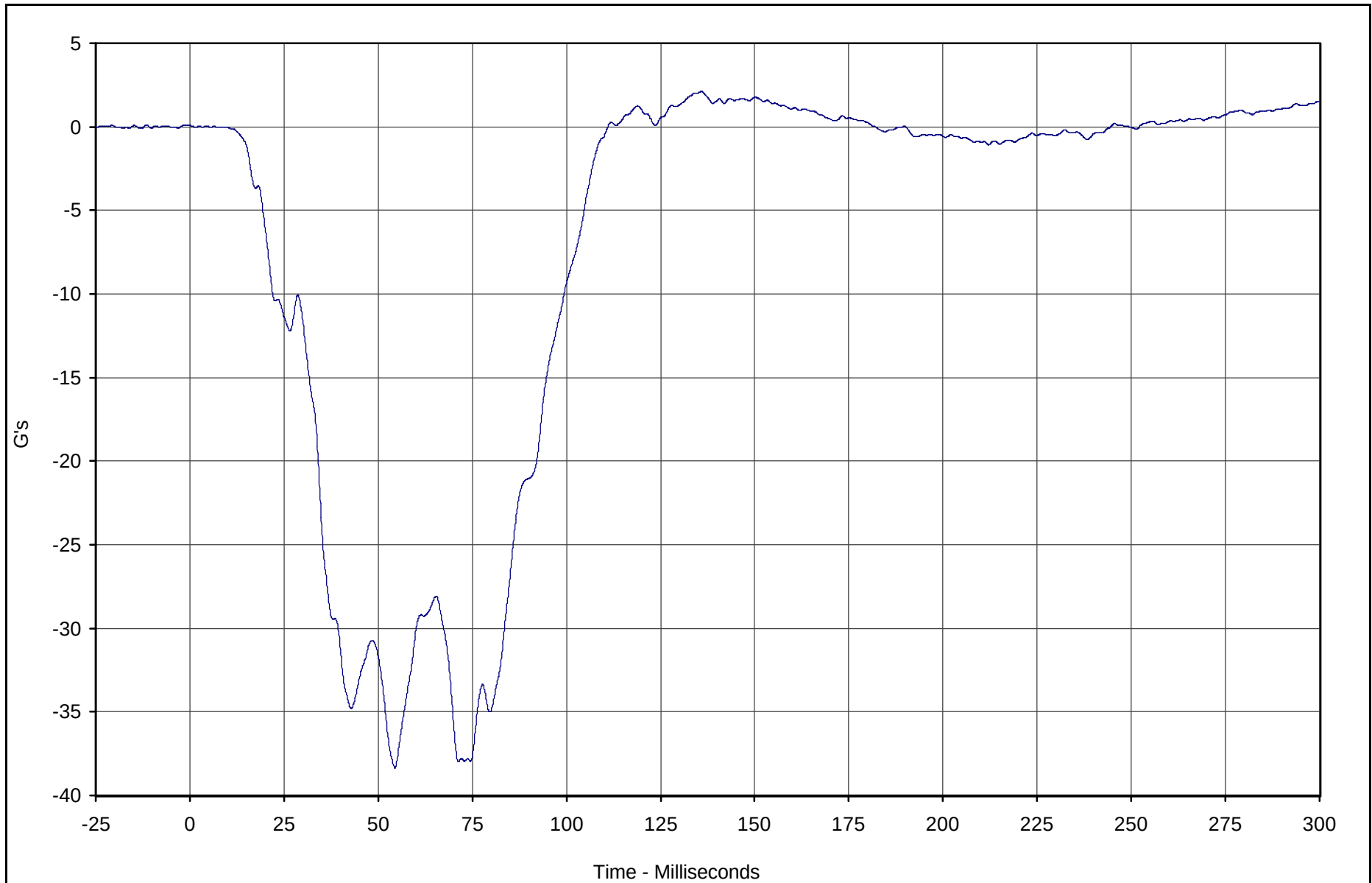
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description      | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Chest Primary X | 013   | FIL  | G's   | 2.1 | 135.8 | -38.3 | 54.4 | 180       |

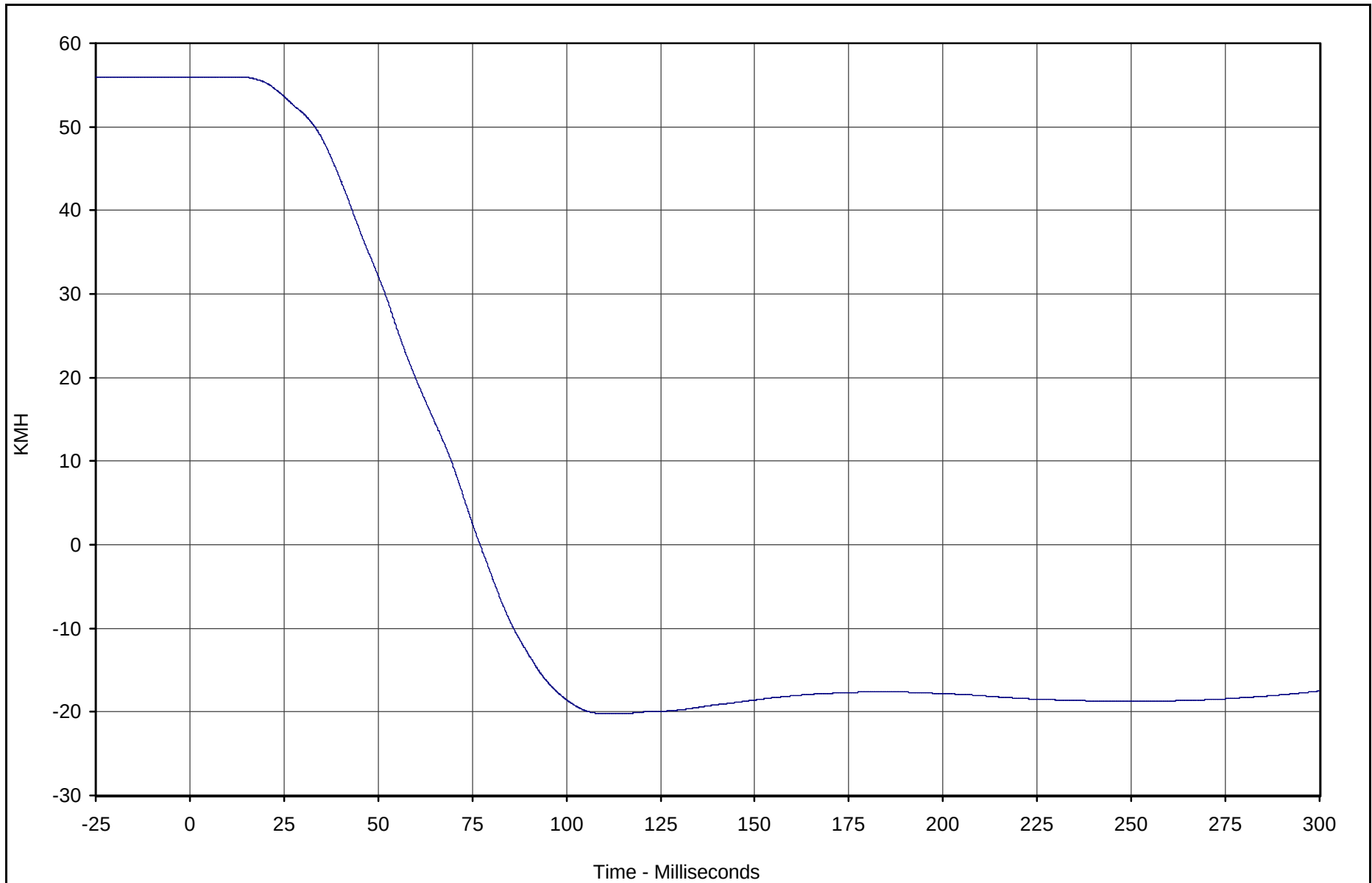


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|---------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Primary X Velocity | 013   | IN1  | KMH   | 56.0 | 5.0  | -20.2 | 111.0 | 180       |

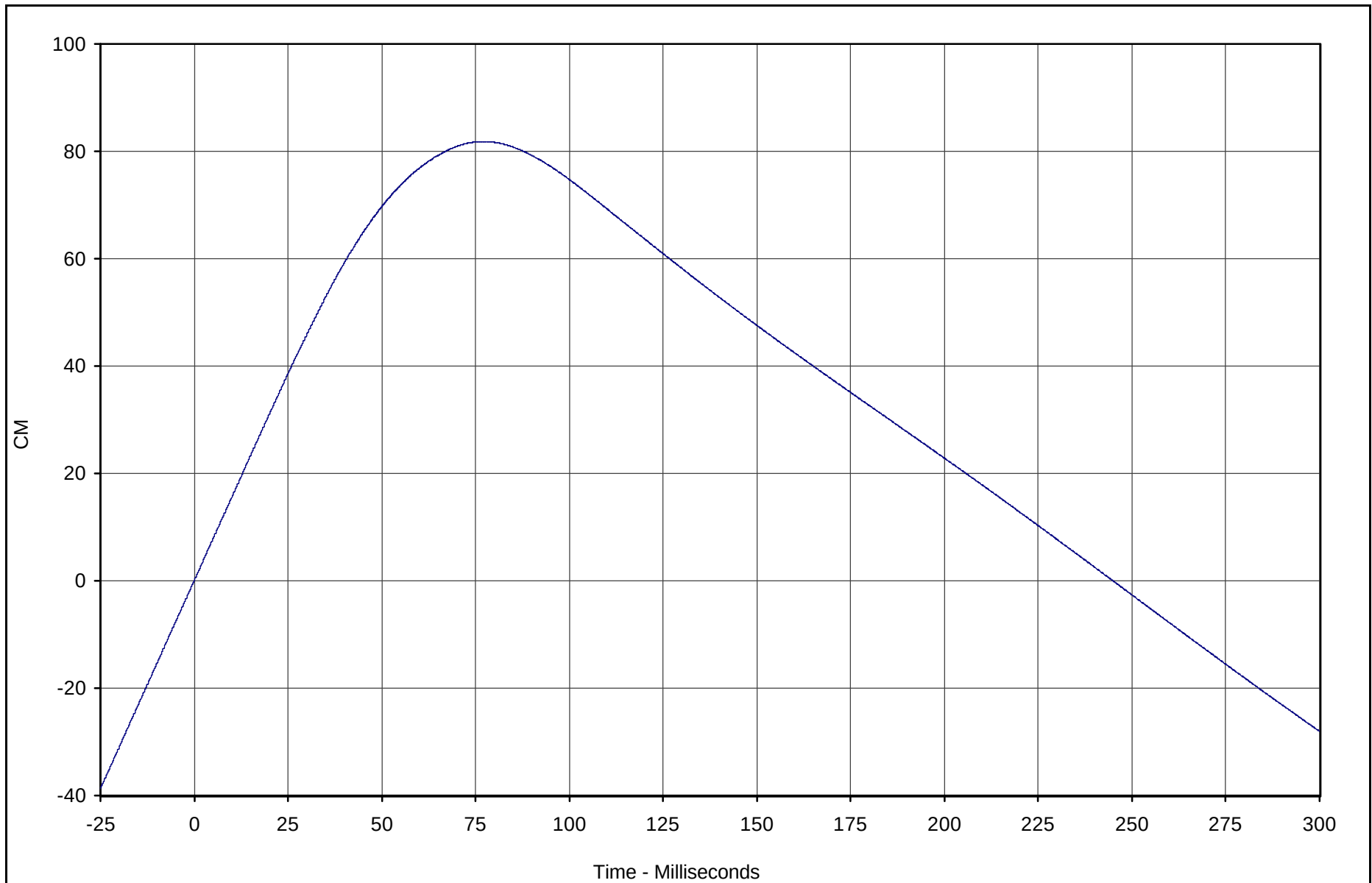


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description             | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Primary X Displ. | 013   | IN2  | CM    | 81.8 | 77.1 | -28.0 | 299.9 | 180       |



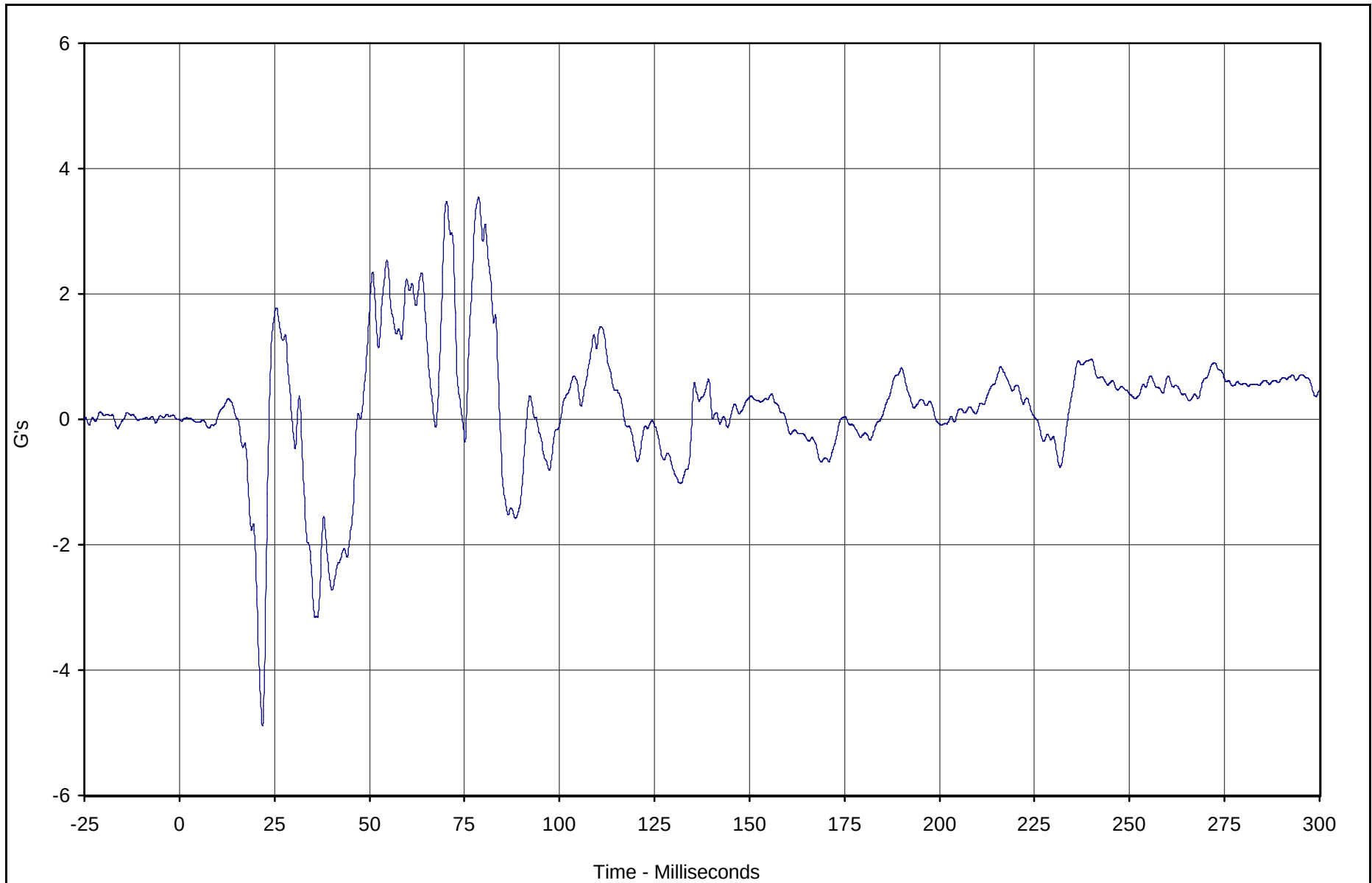
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description      | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|------------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Chest Primary Y | 014   | FIL  | G's   | 3.5 | 78.7 | -4.9 | 21.9 | 180       |

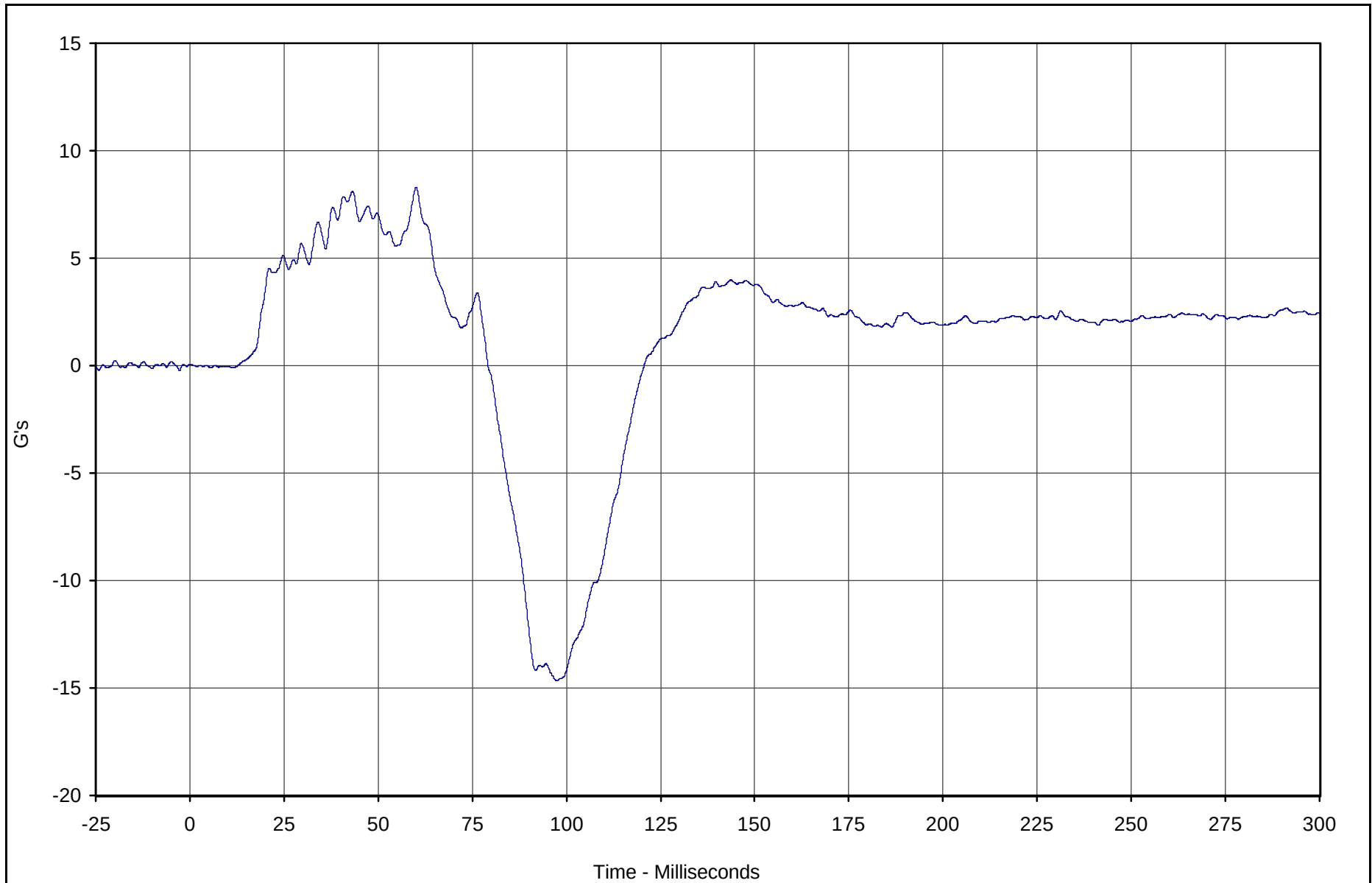


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description      | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Primary Z | 015   | FIL  | G's   | 8.3 | 60.1 | -14.7 | 97.5 | 180       |

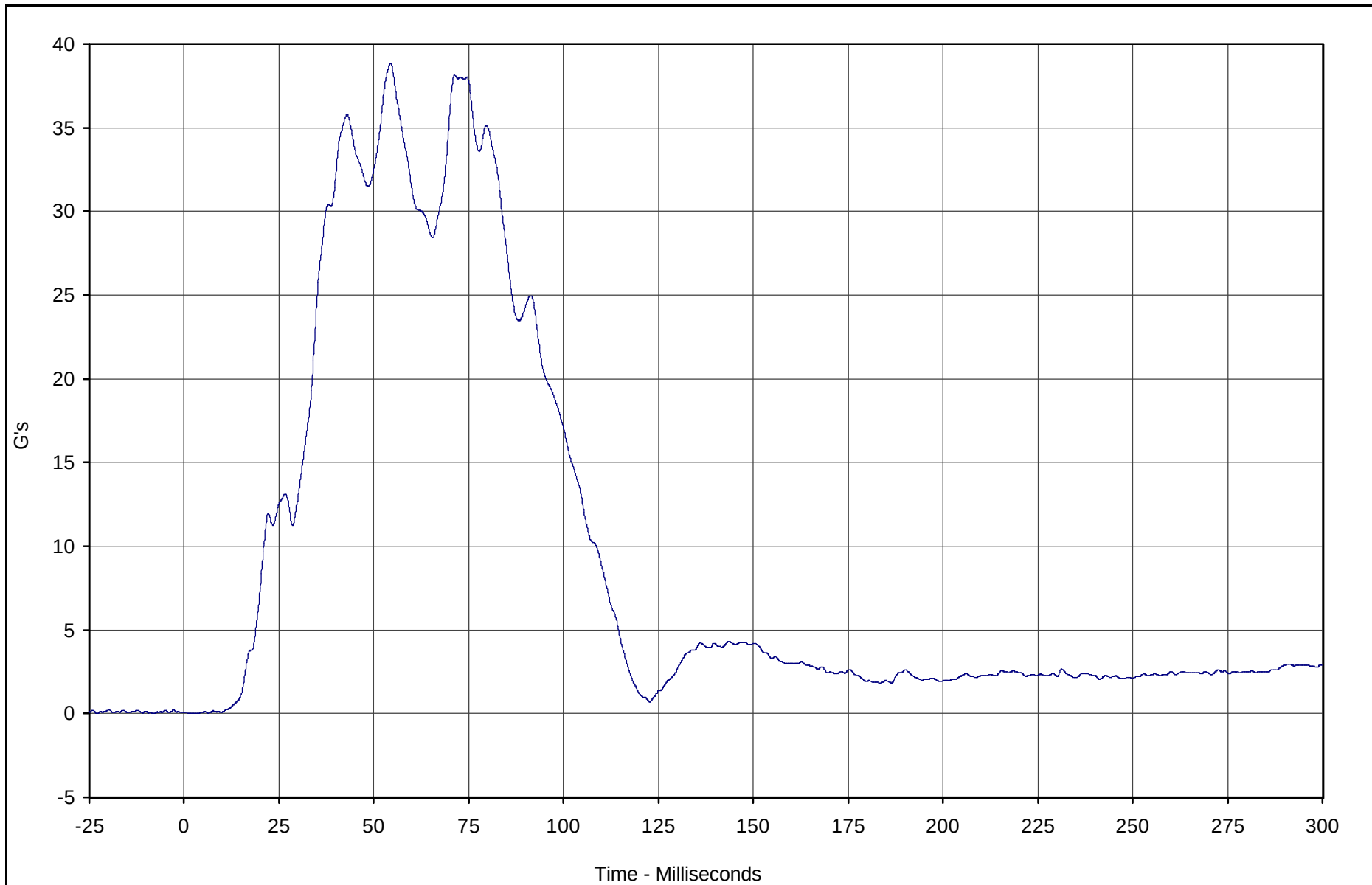


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description              | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|--------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Chest Resultant Primary | 013   | RES  | G's   | 38.8 | 54.4 | 0.0 | 1.1  | 180       |



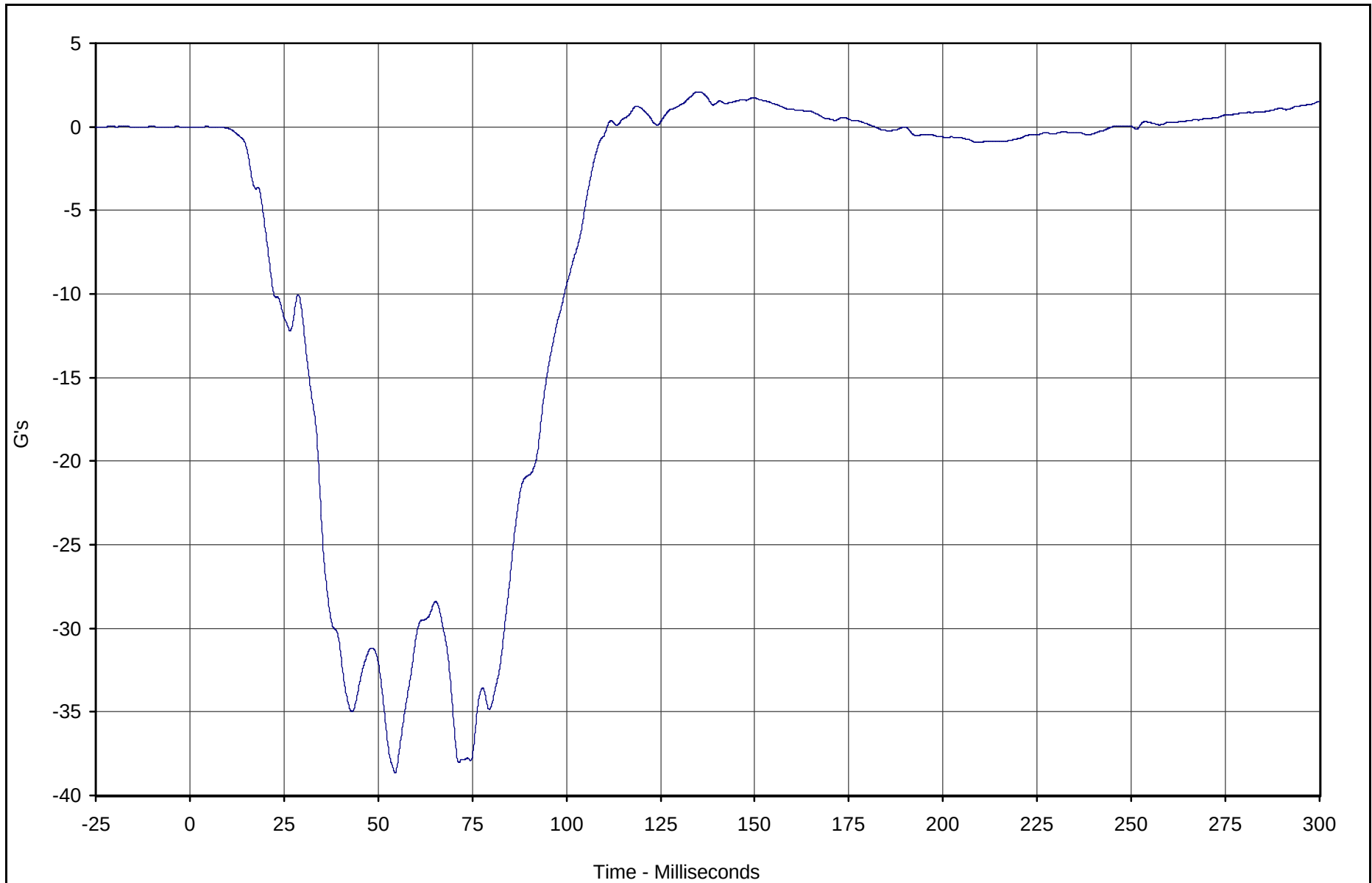
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description        | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Chest Redundant X | 016   | FIL  | G's   | 2.1 | 134.4 | -38.7 | 54.5 | 180       |

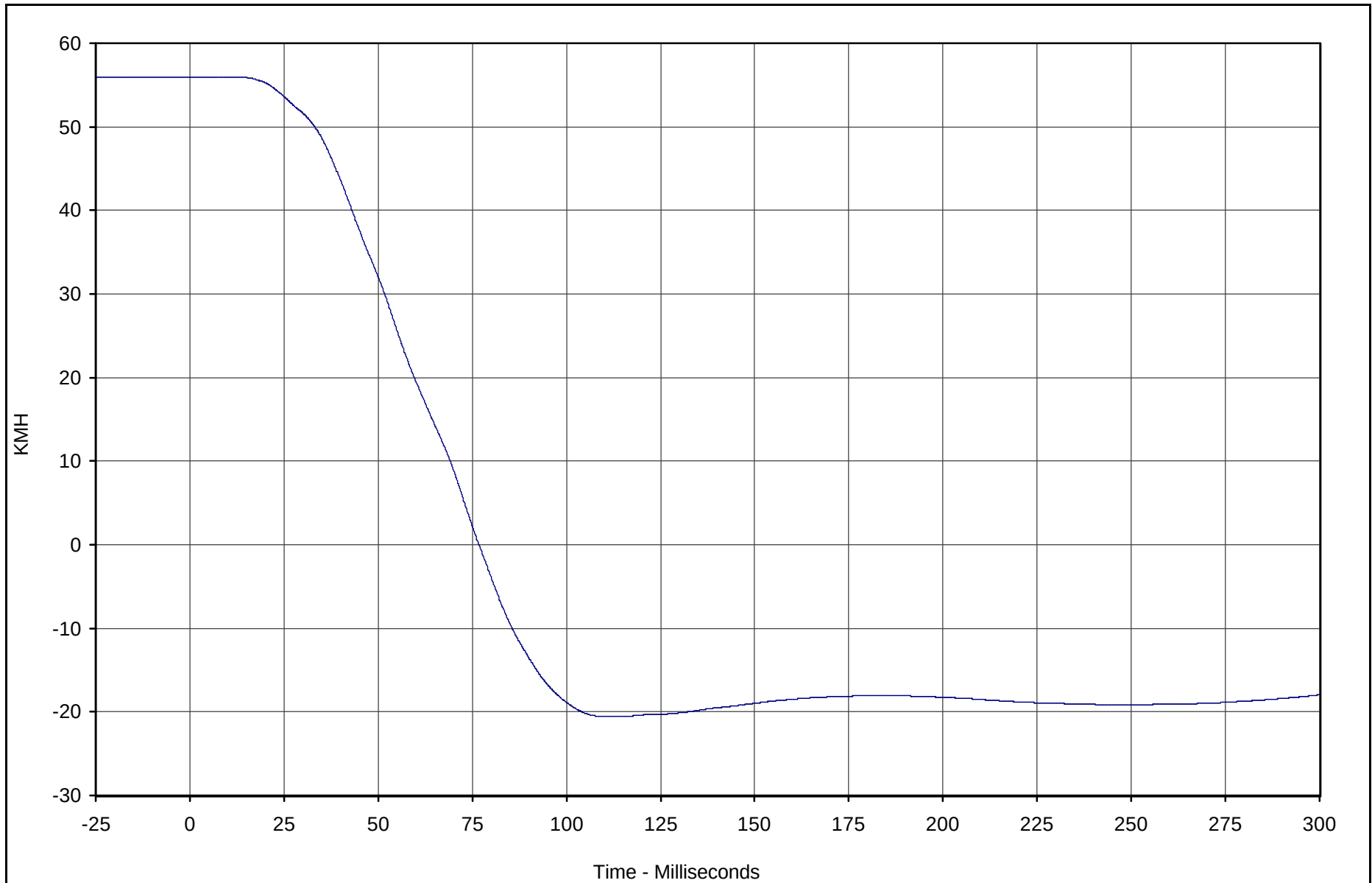


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Redundant X Velocity | 016   | IN1  | KMH   | 56.0 | 0.0  | -20.6 | 110.9 | 180       |

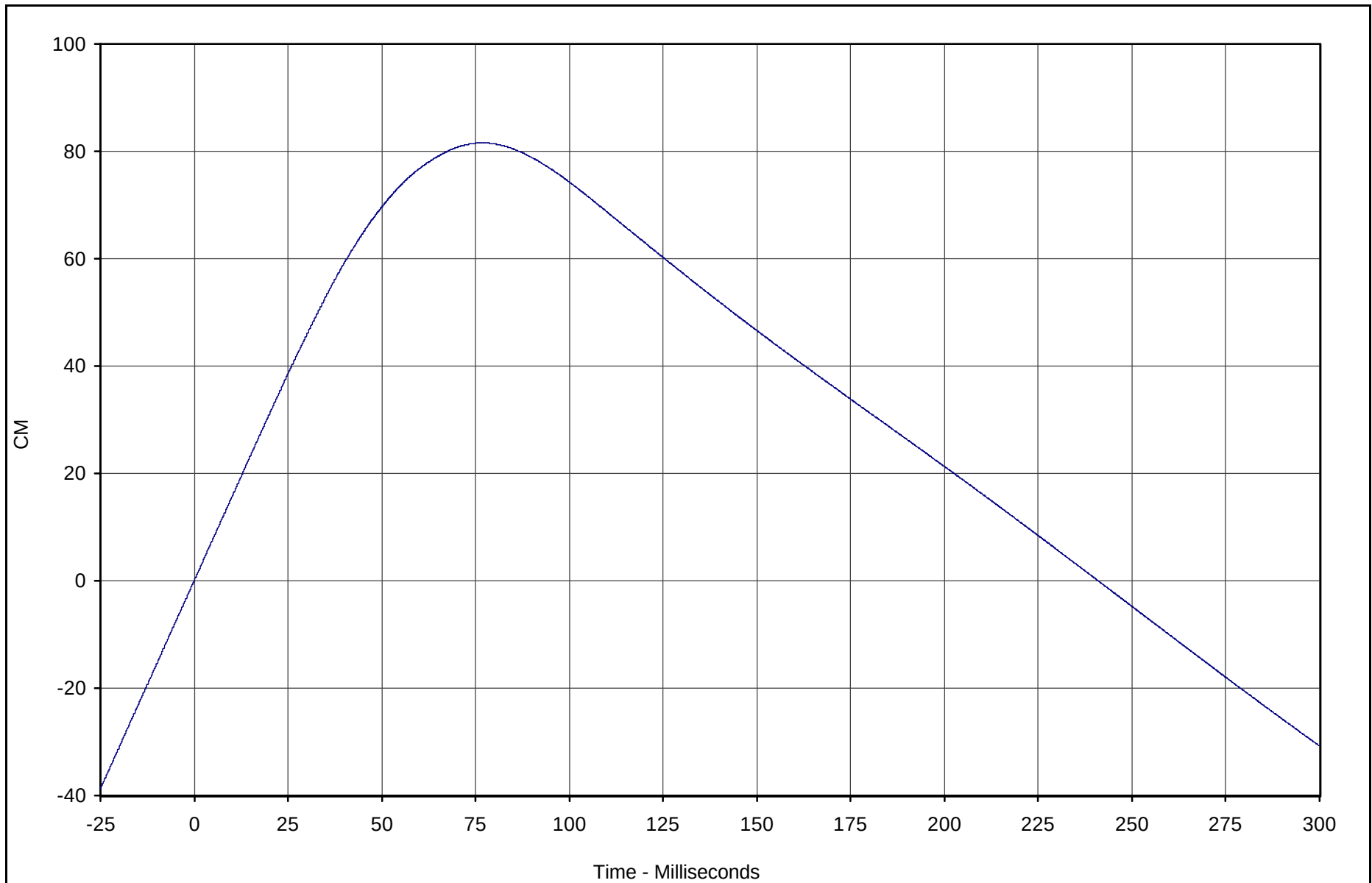


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|---------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Driver Chest Redundant X Displ. | 016   | IN2  | CM    | 81.6 | 76.8 | -30.7 | 299.9 | 180       |



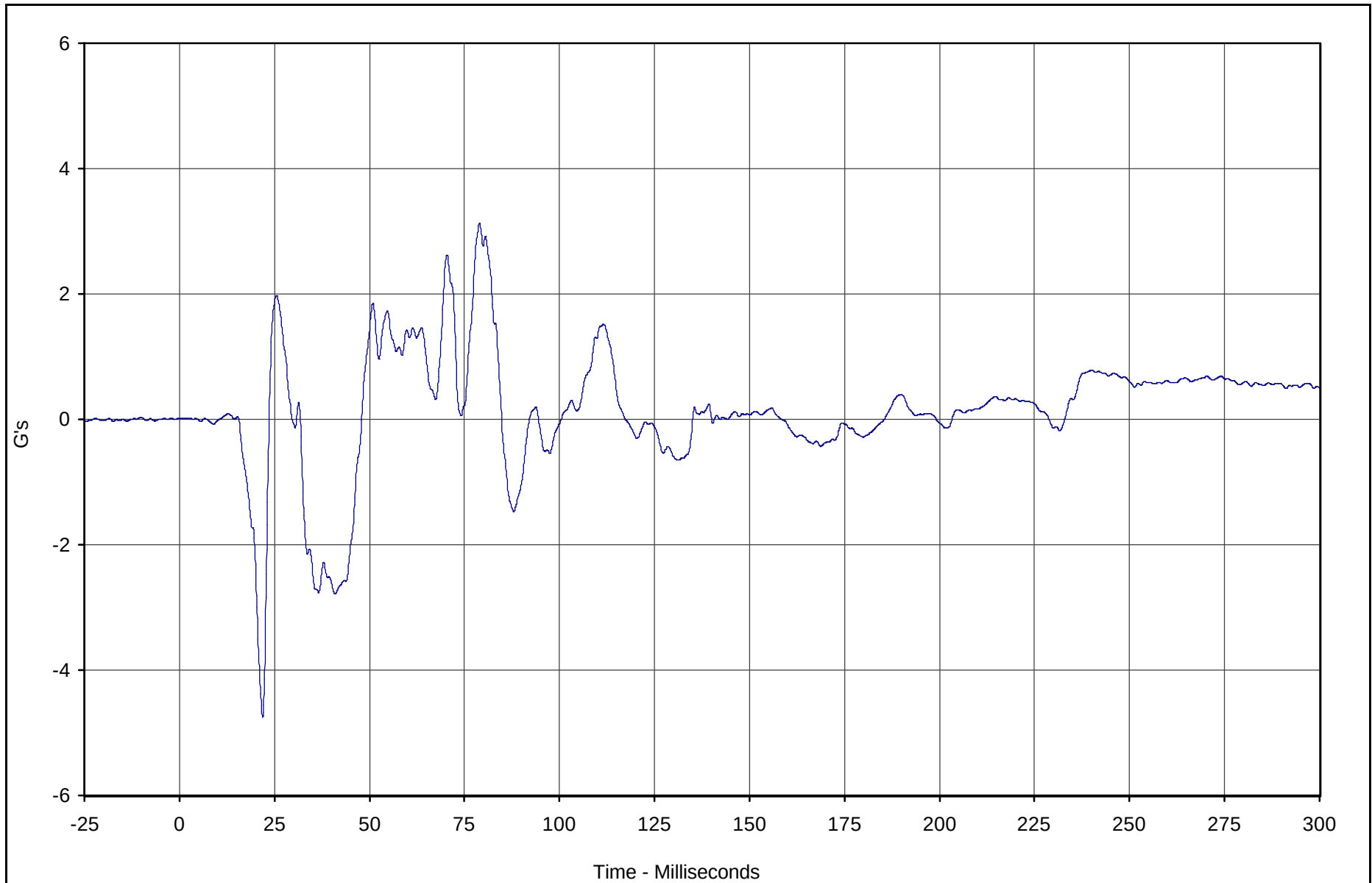
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description        | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Chest Redundant Y | 017   | FIL  | G's   | 3.1 | 79.0 | -4.8 | 21.9 | 180       |

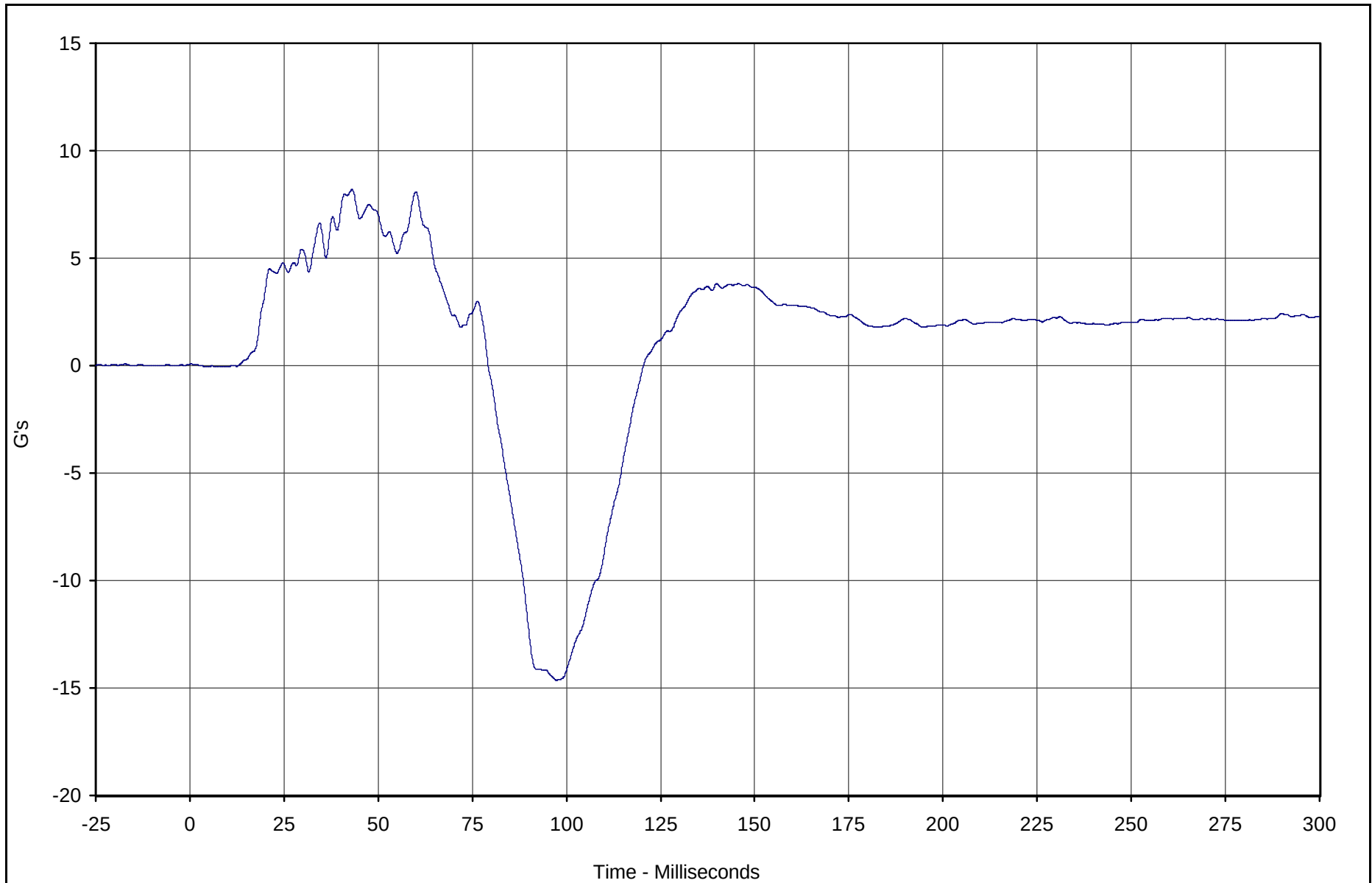


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Redundant Z | 018   | FIL  | G's   | 8.2 | 43.1 | -14.6 | 97.4 | 180       |

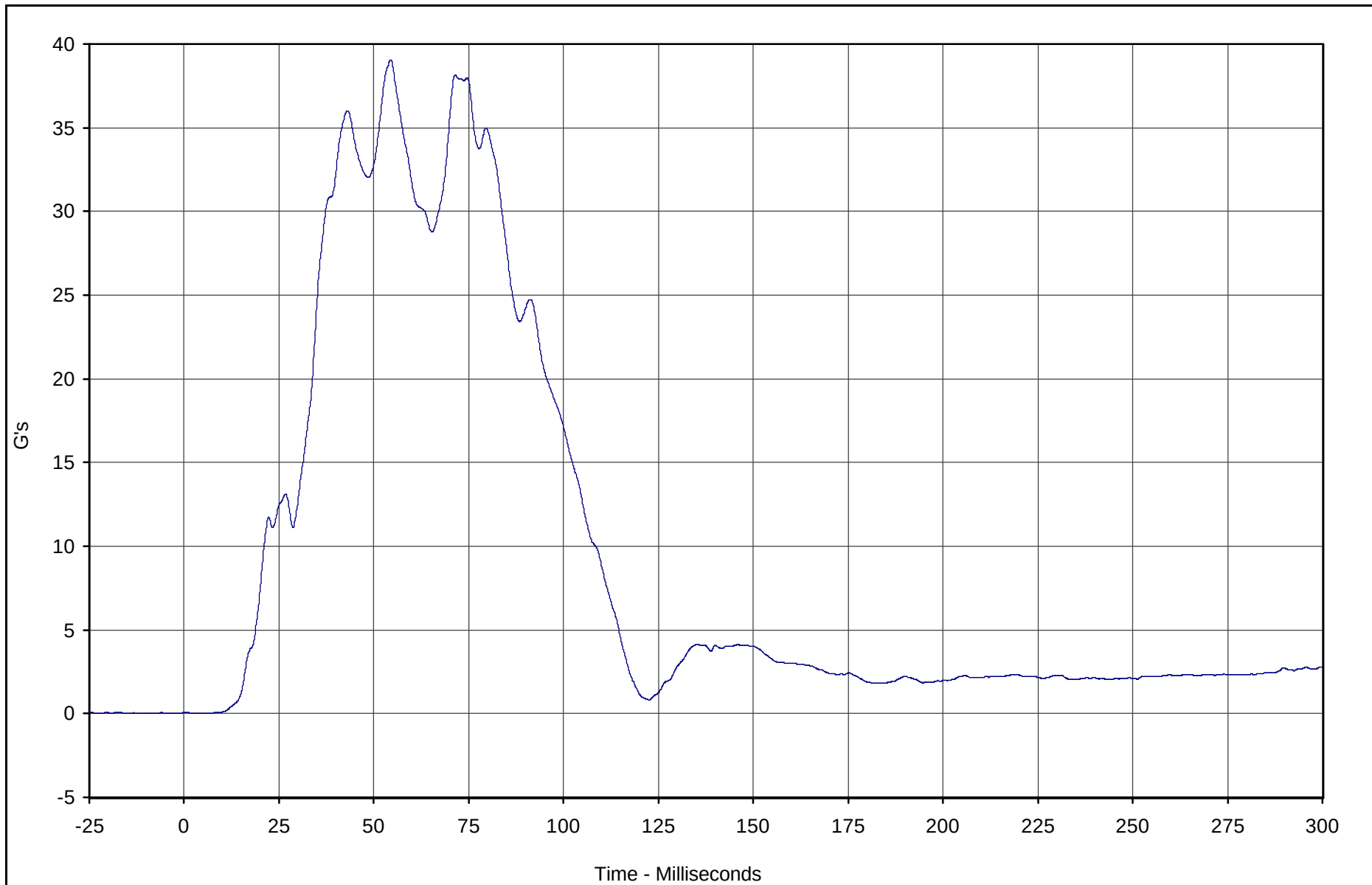


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Chest Resultant Redundant | 016   | RES  | G's   | 39.1 | 54.5 | 0.0 | 3.0  | 180       |



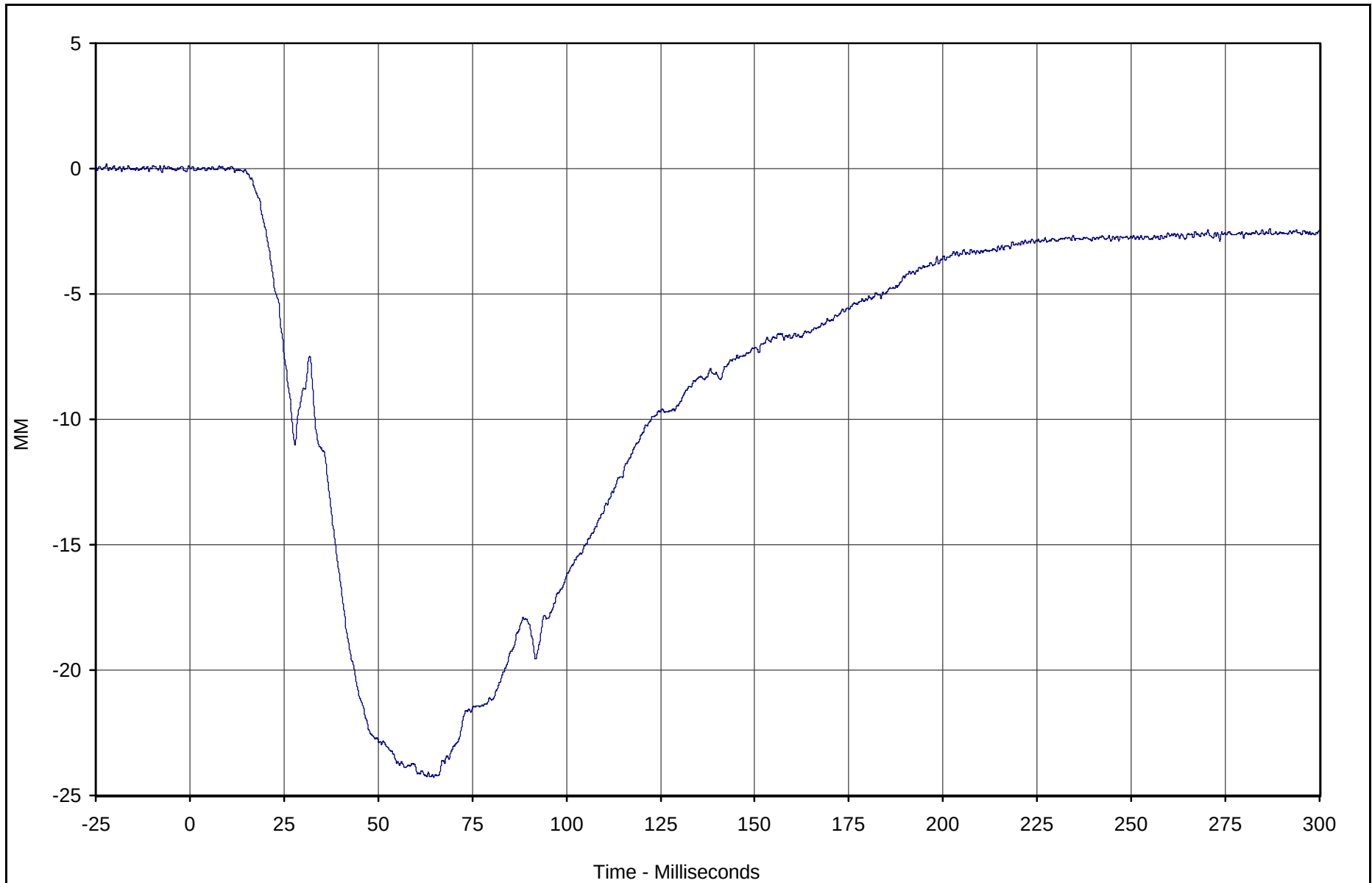
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description           | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Chest Displacement X | 019   | FIL  | MM    | 0.1 | 7.9  | -24.3 | 64.8 | 600       |

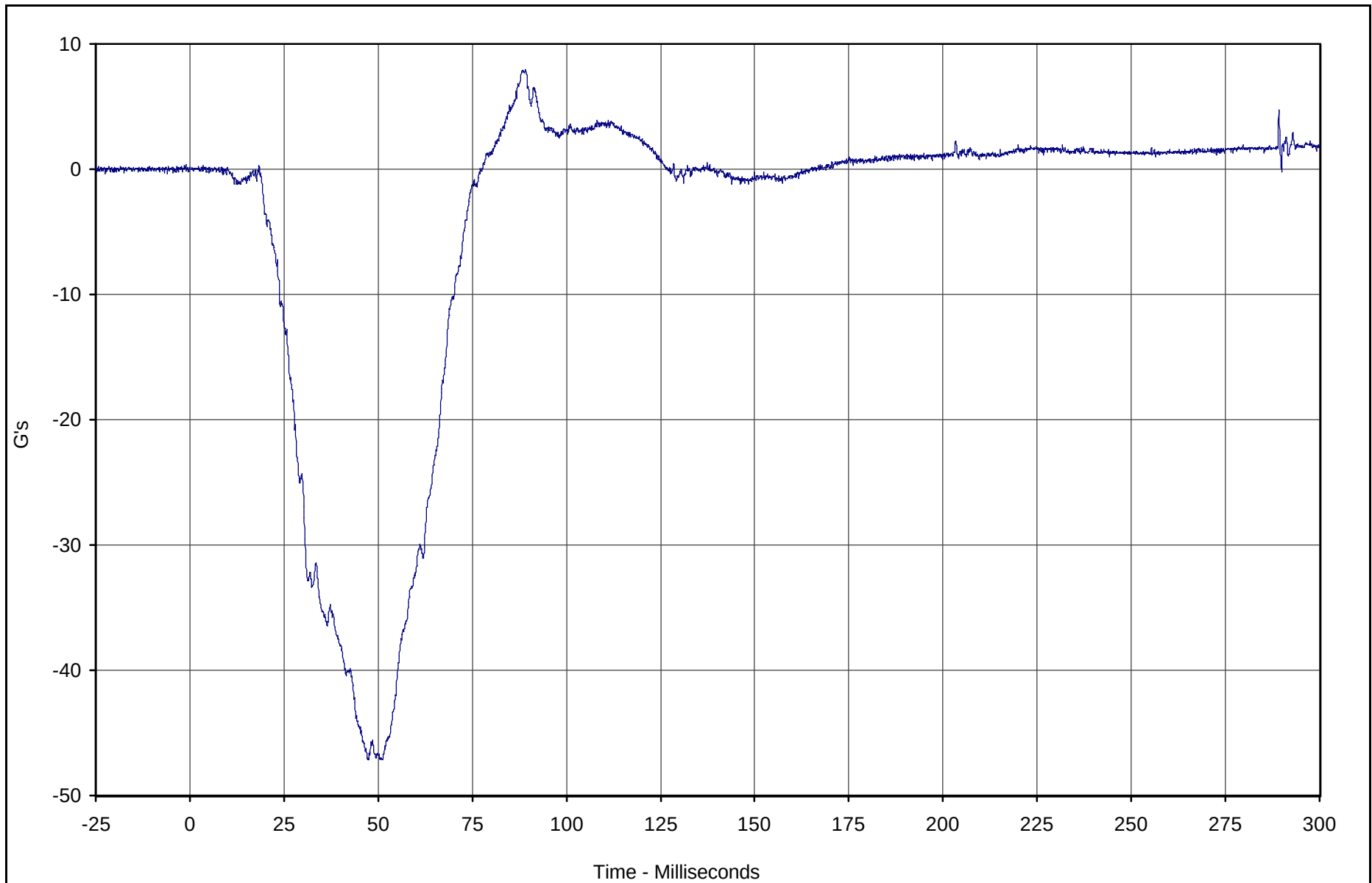


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-------------------|-------|------|-------|-----|------|-------|------|-----------|
| Driver Pelvis X   | 020   | FIL  | G's   | 8.0 | 89.2 | -47.1 | 47.2 | 1000      |

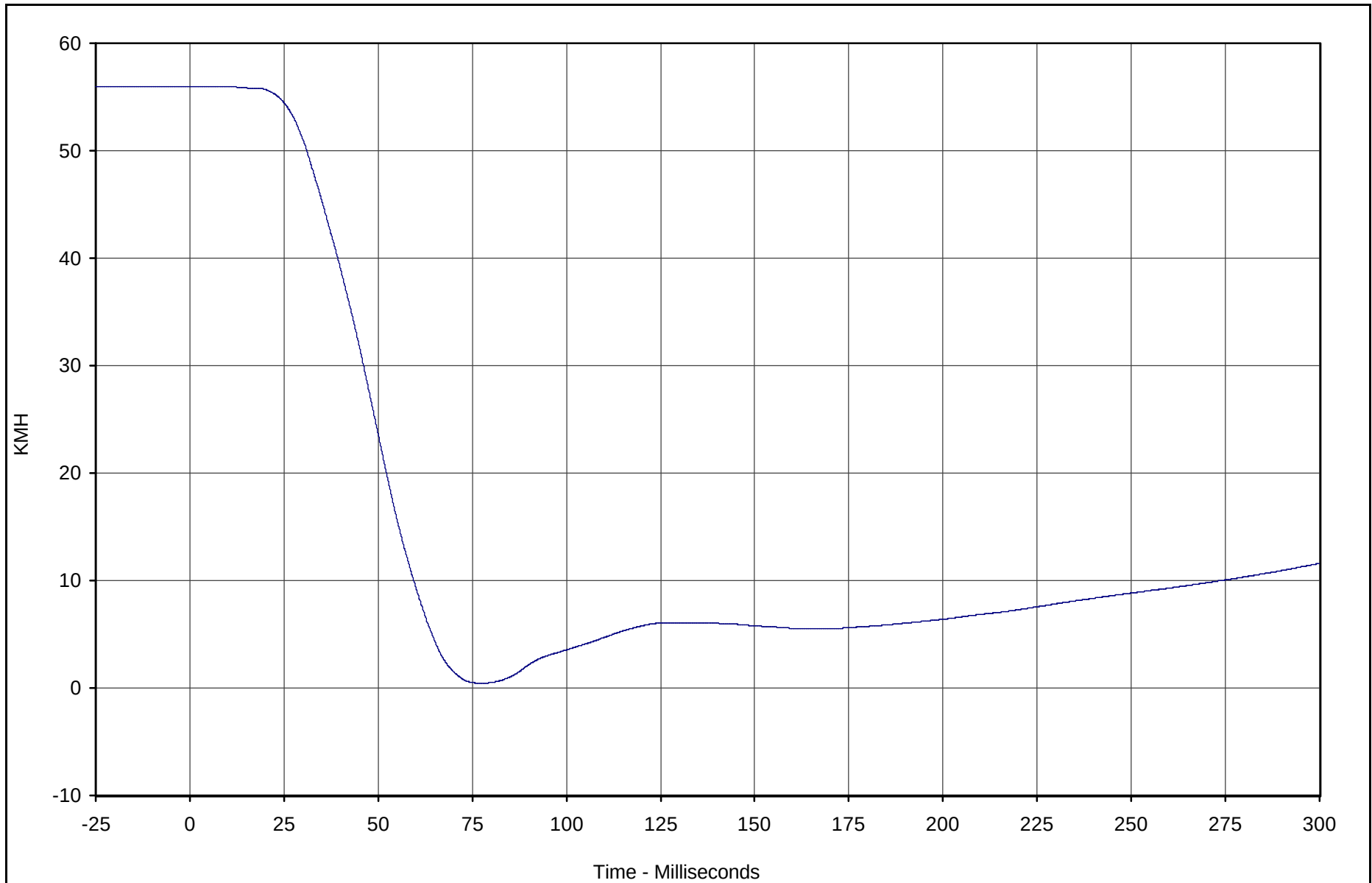


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Pelvis X Velocity | 020   | IN1  | KMH   | 56.0 | 4.0  | 0.4 | 77.5 | 180       |



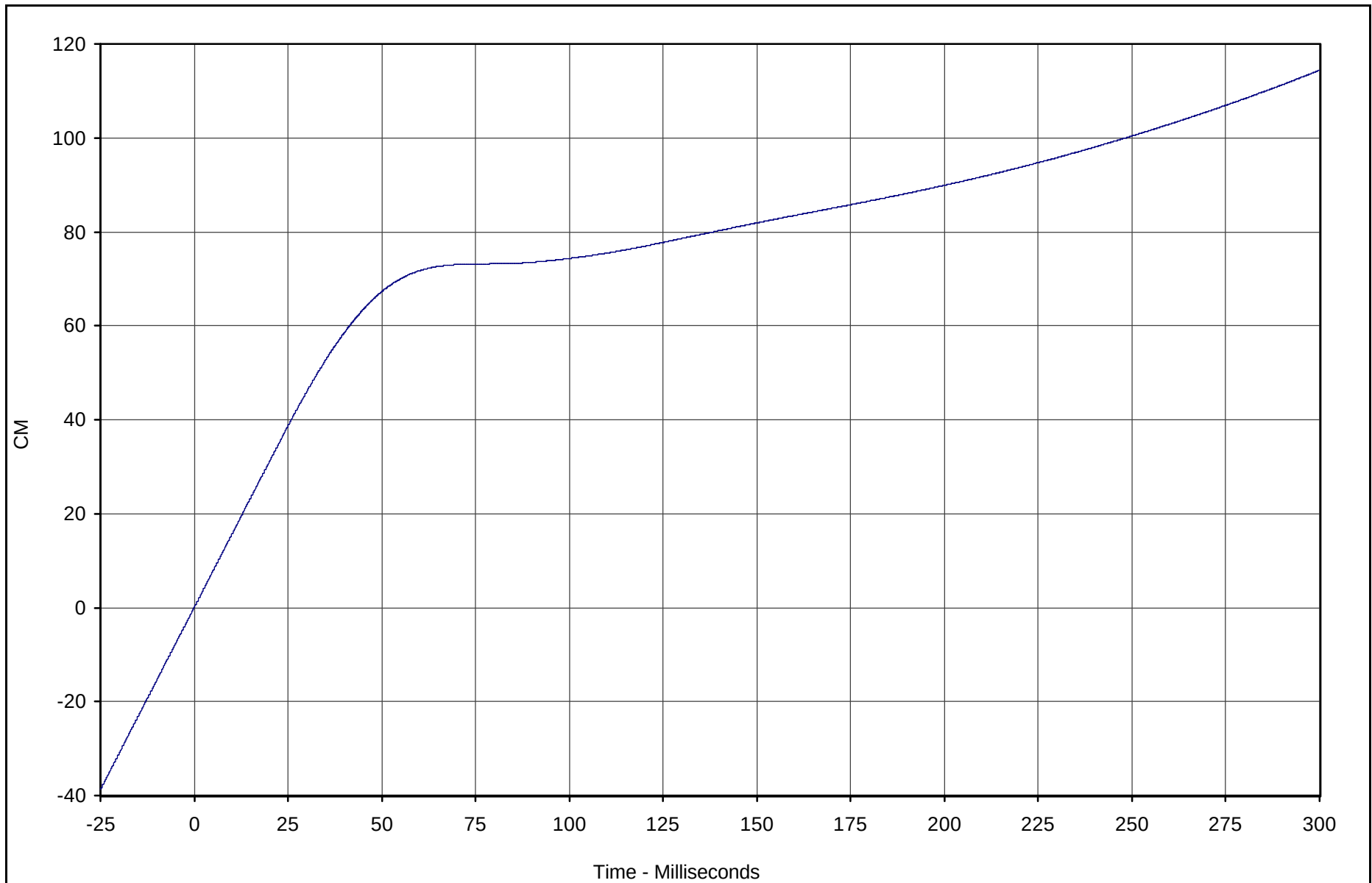
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description      | CURNO | Type | Units | Max   | Time  | Min | Time | SAE Class |
|------------------------|-------|------|-------|-------|-------|-----|------|-----------|
| Driver Pelvis X Displ. | 020   | IN2  | CM    | 114.4 | 299.9 | 0.0 | 0.0  | 180       |

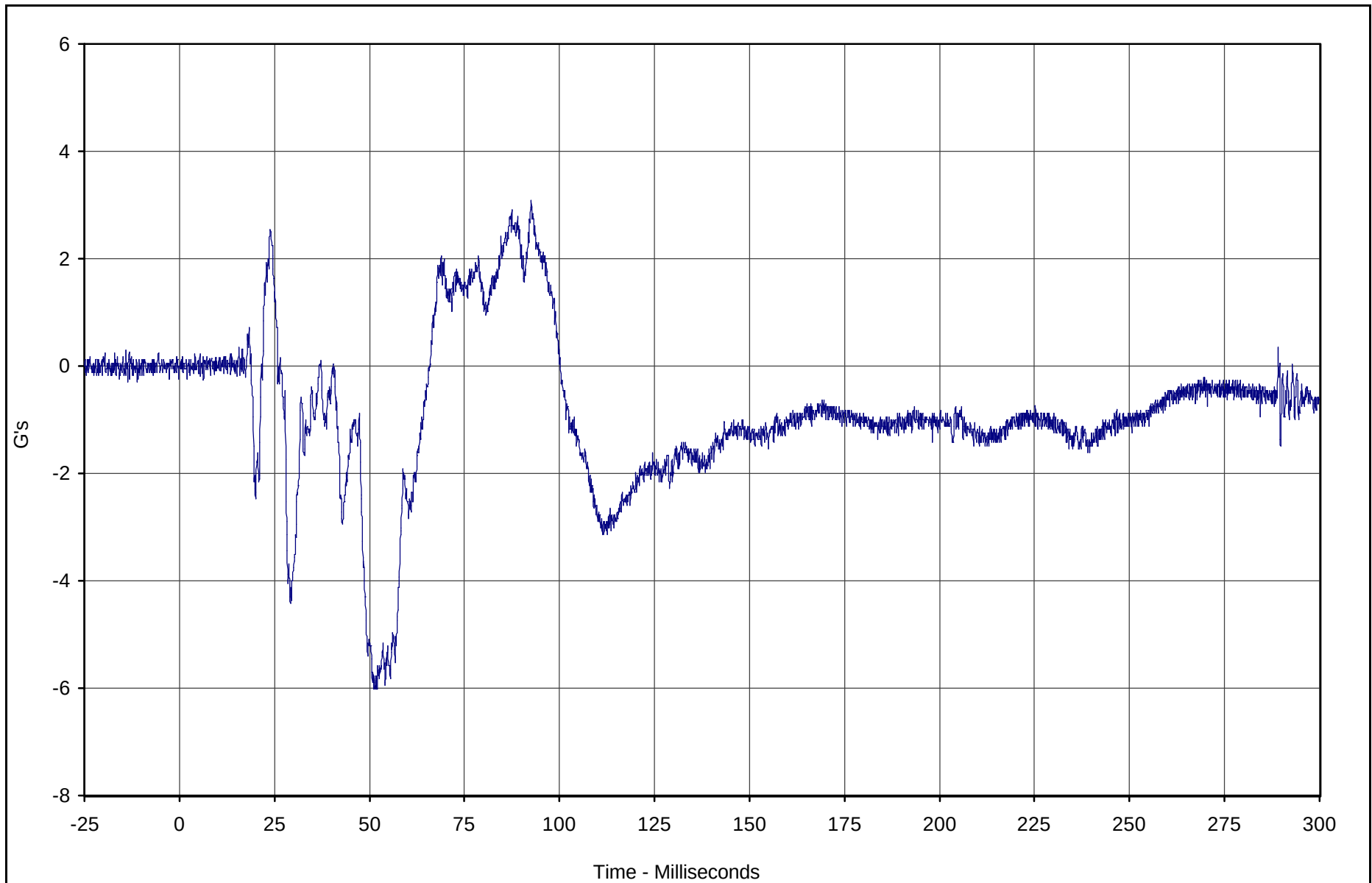


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-------------------|-------|------|-------|-----|------|------|------|-----------|
| Driver Pelvis Y   | 021   | FIL  | G's   | 3.1 | 92.6 | -6.0 | 51.1 | 1000      |

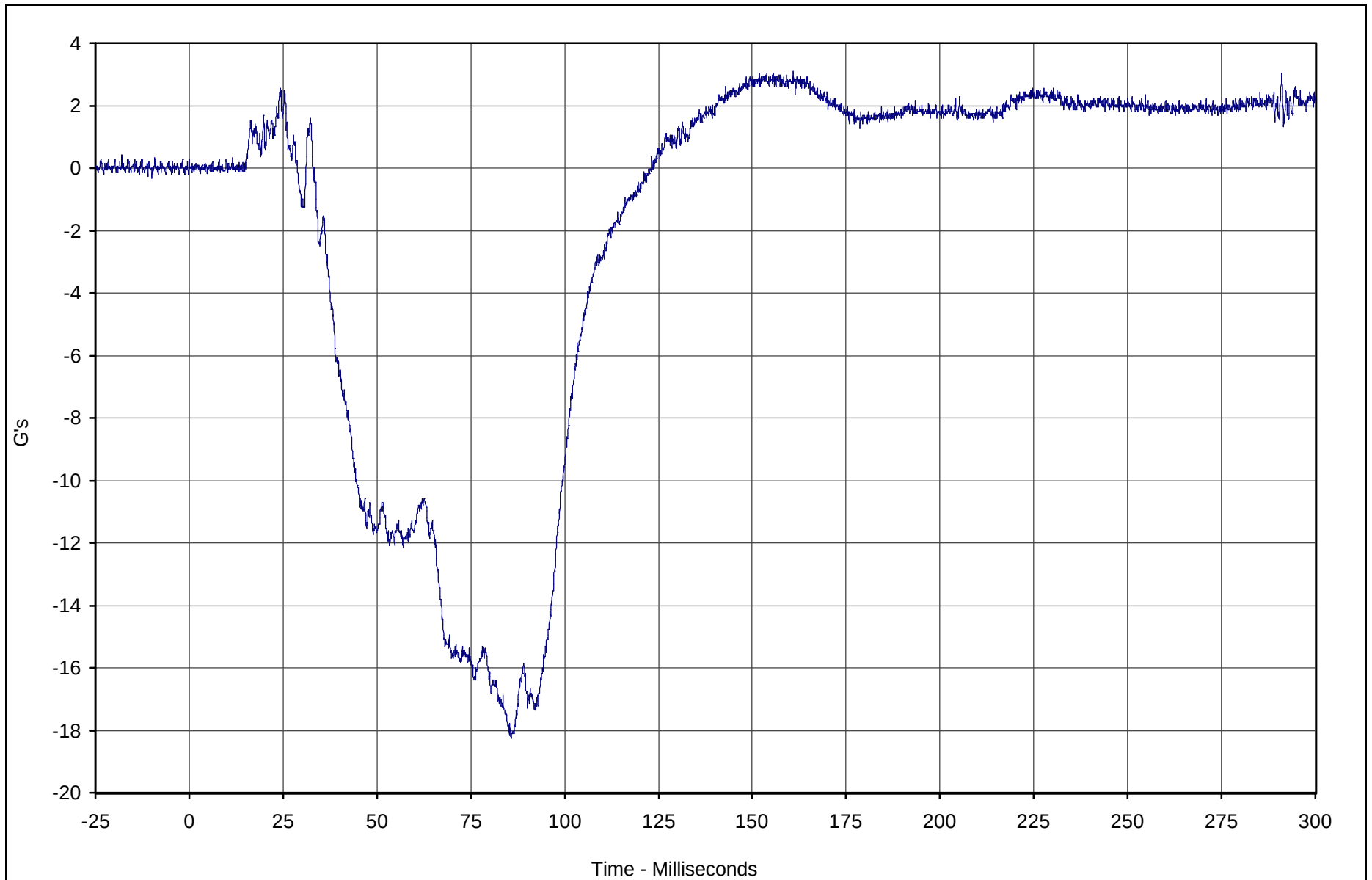


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Pelvis Z   | 022   | FIL  | G's   | 3.1 | 161.0 | -18.2 | 85.8 | 1000      |



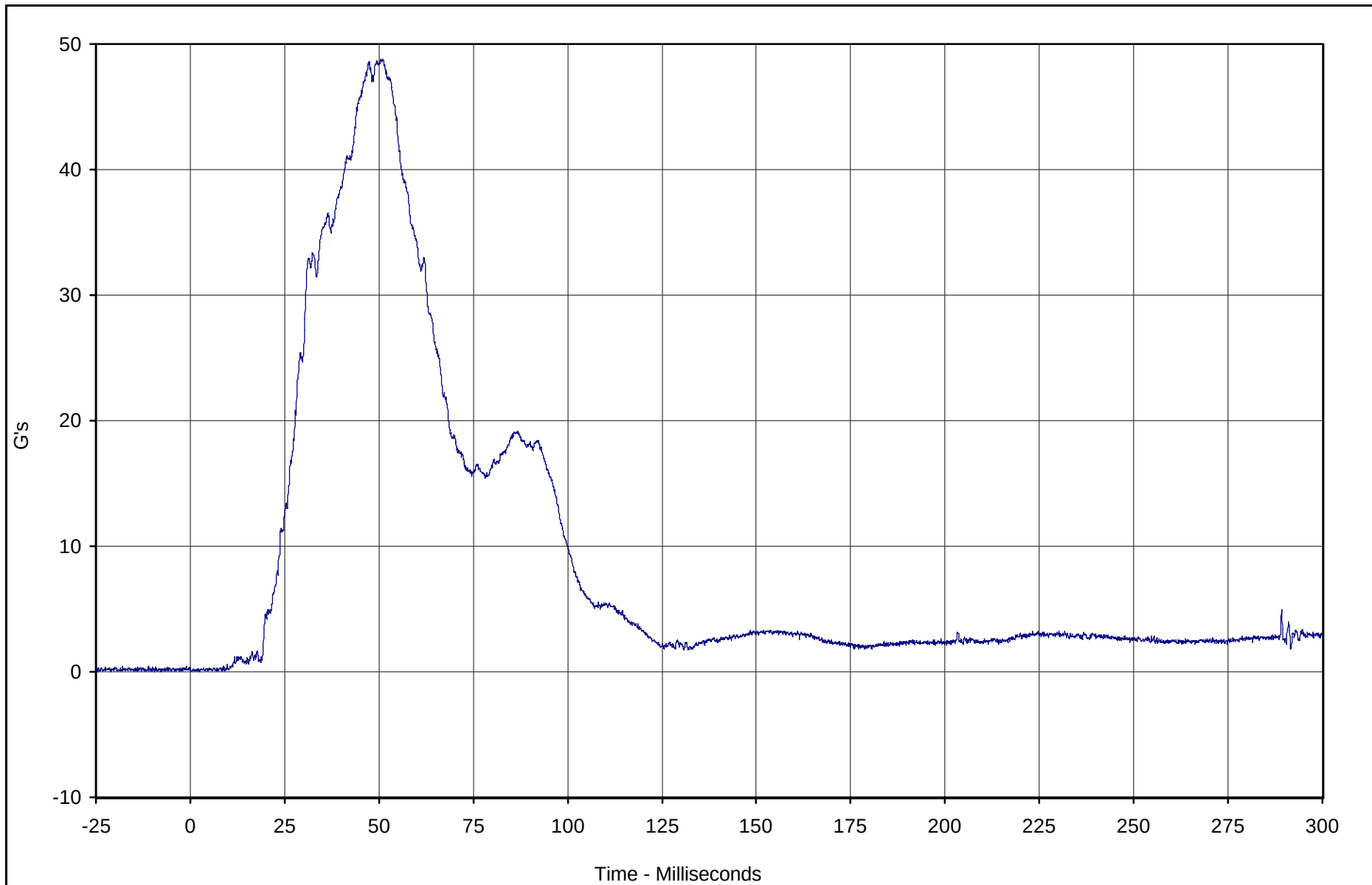
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description       | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-----|------|-----------|
| Driver Pelvis Resultant | 023   | RES  | G's   | 48.8 | 50.5 | 0.0 | 2.4  | 1000      |

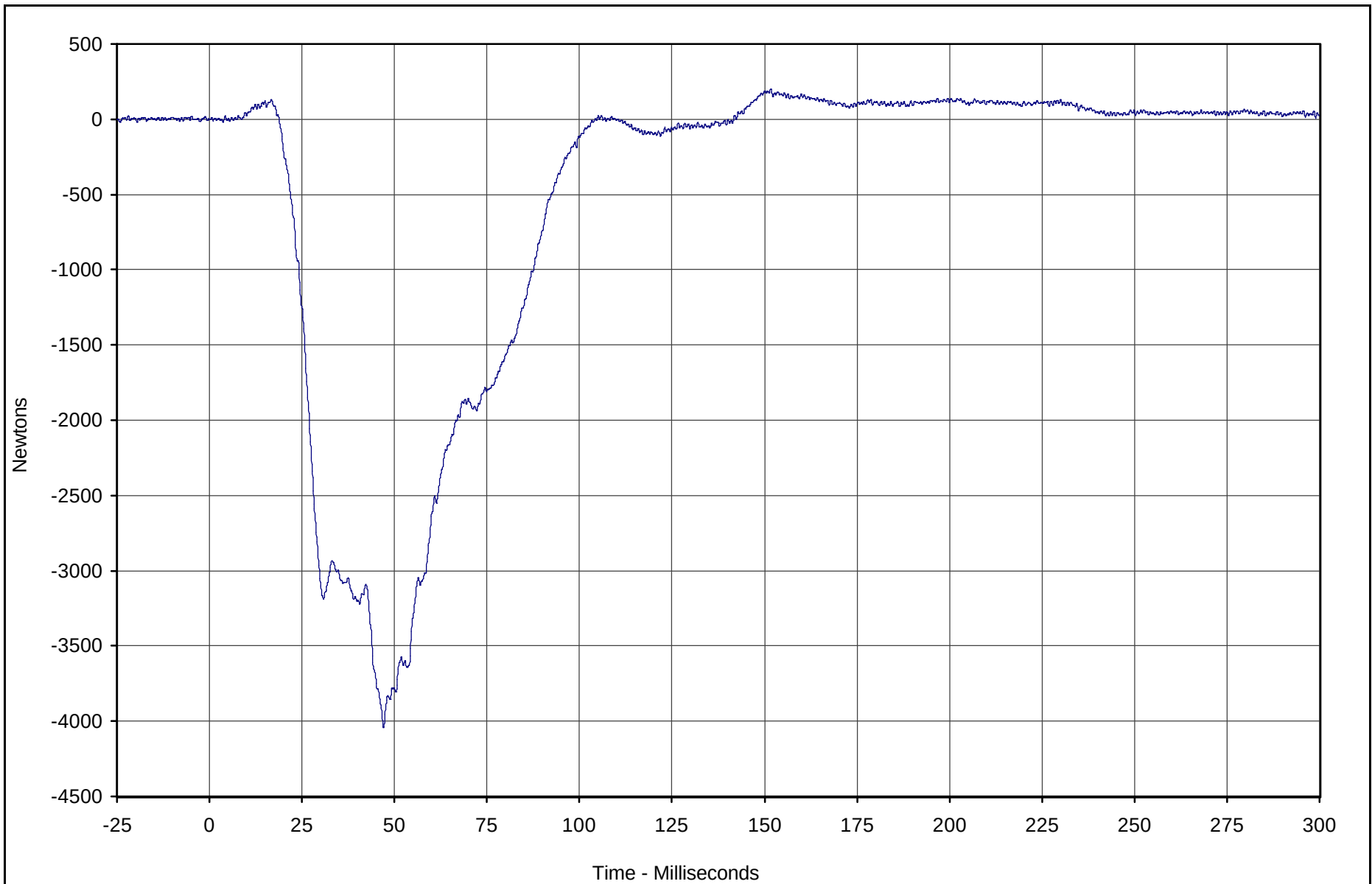


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units   | Max   | Time  | Min     | Time | SAE Class |
|-------------------------|-------|------|---------|-------|-------|---------|------|-----------|
| Driver Left Femur Force | 023   | FIL  | Newtons | 200.4 | 151.7 | -4040.8 | 47.1 | 600       |

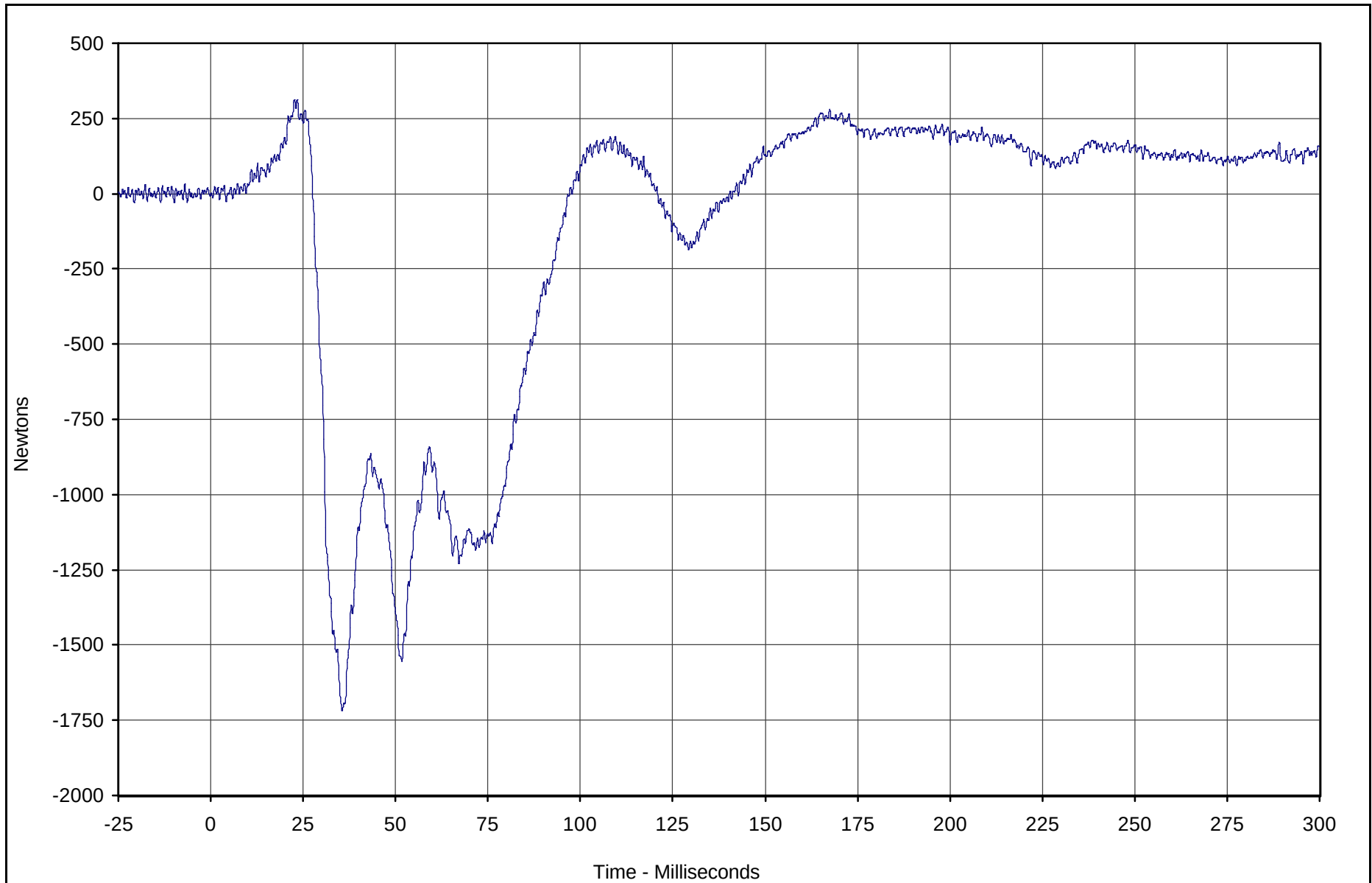


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|--------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Driver Right Femur Force | 024   | FIL  | Newtons | 313.4 | 23.4 | -1717.9 | 35.6 | 600       |



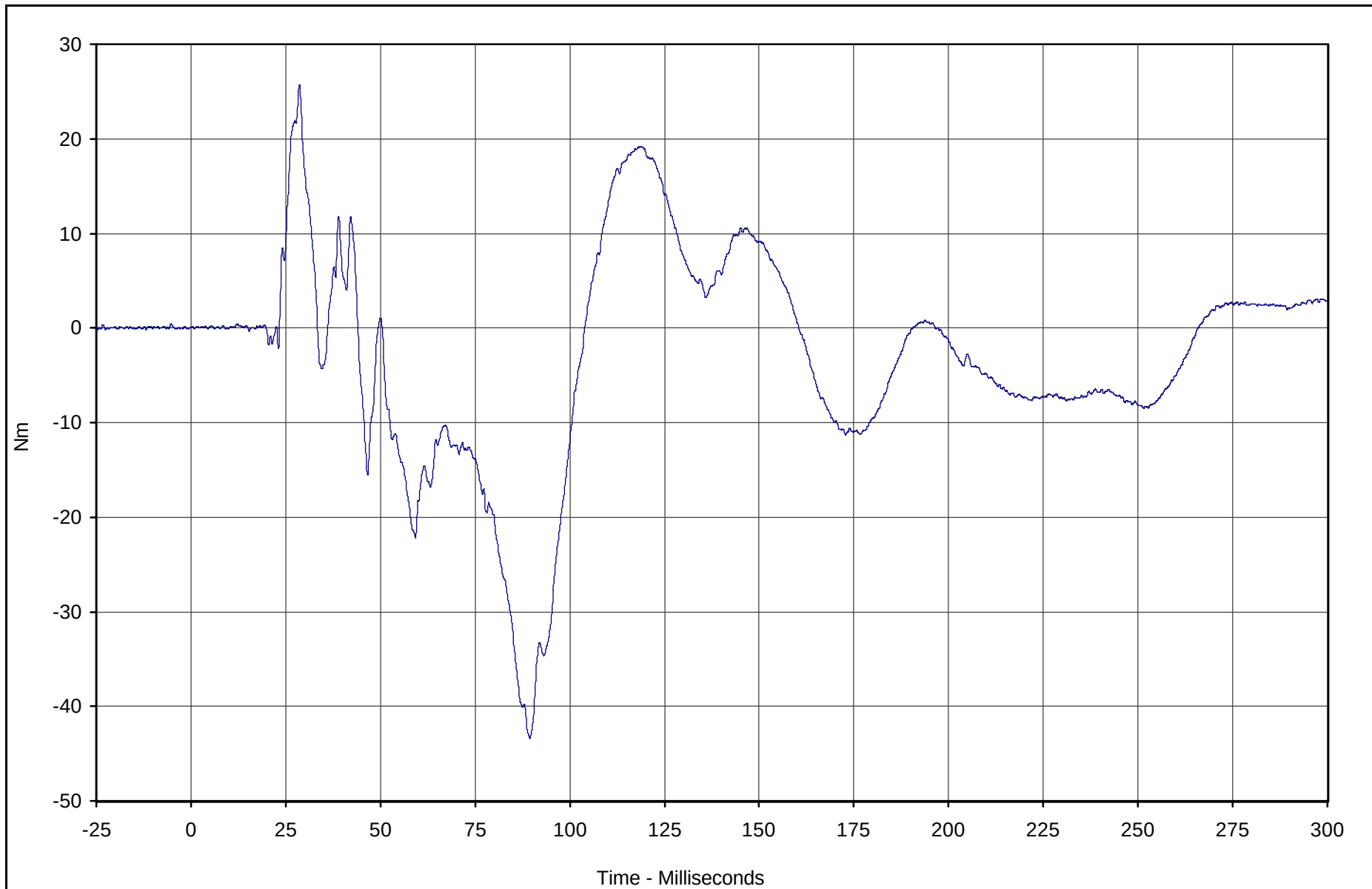
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Left Upper Tibia Moment X | 025   | FIL  | Nm    | 25.7 | 28.7 | -43.3 | 89.5 | 600       |

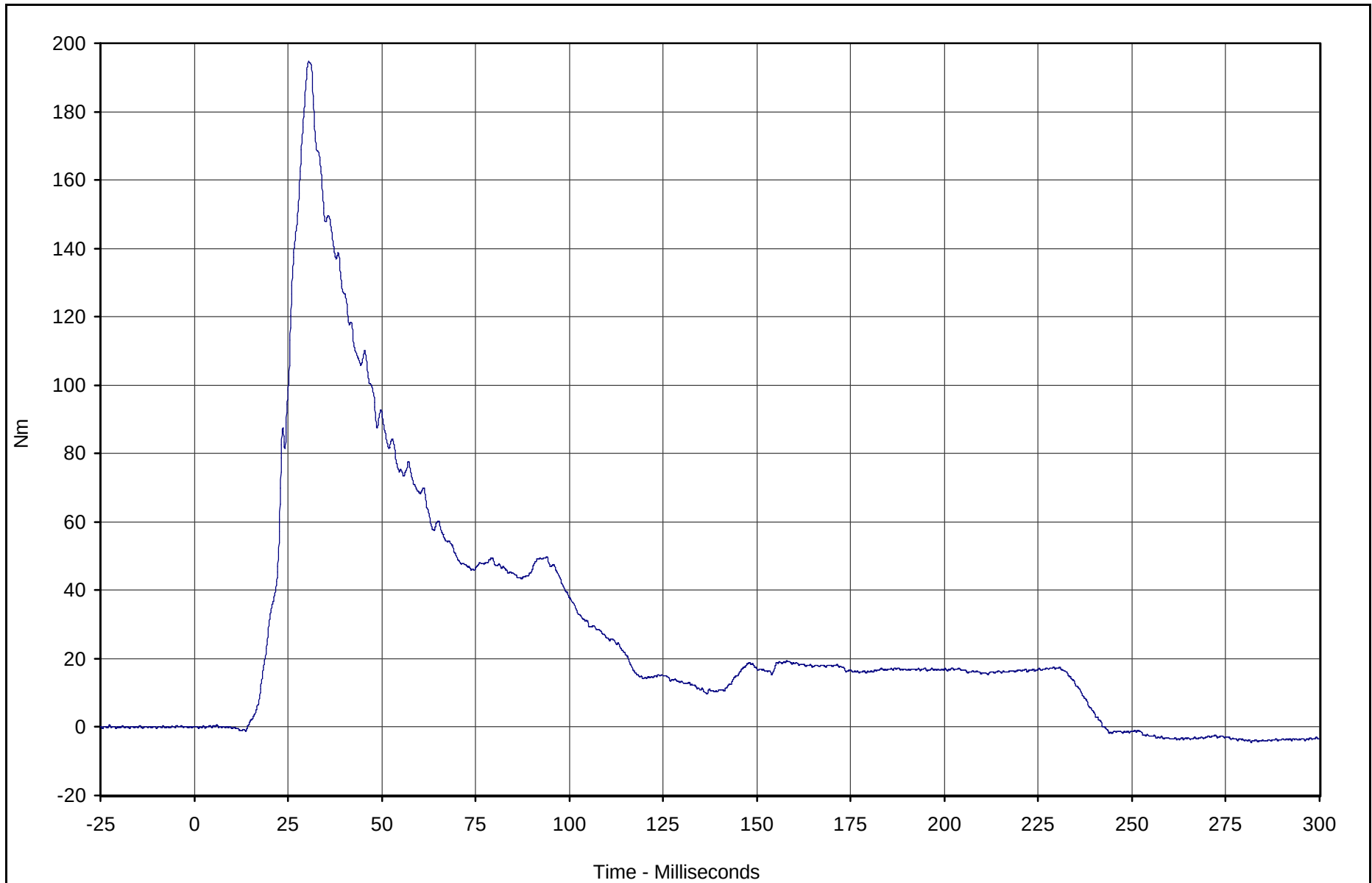


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max   | Time | Min  | Time  | SAE Class |
|----------------------------------|-------|------|-------|-------|------|------|-------|-----------|
| Driver Left Upper Tibia Moment Y | 026   | FIL  | Nm    | 194.7 | 30.5 | -4.4 | 281.8 | 600       |

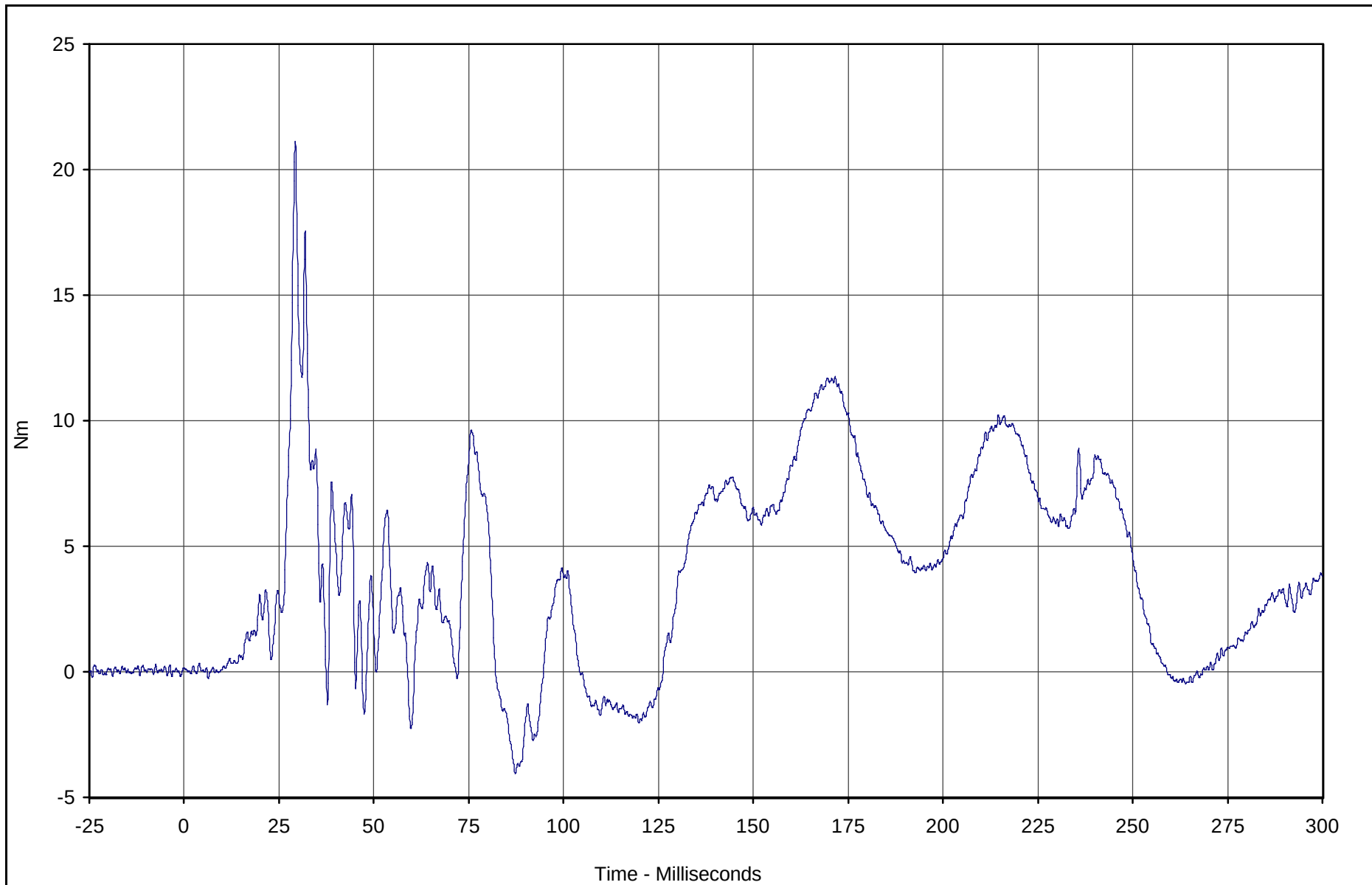


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Right Upper Tibia Moment X | 027   | FIL  | Nm    | 21.1 | 29.3 | -4.0 | 87.3 | 600       |



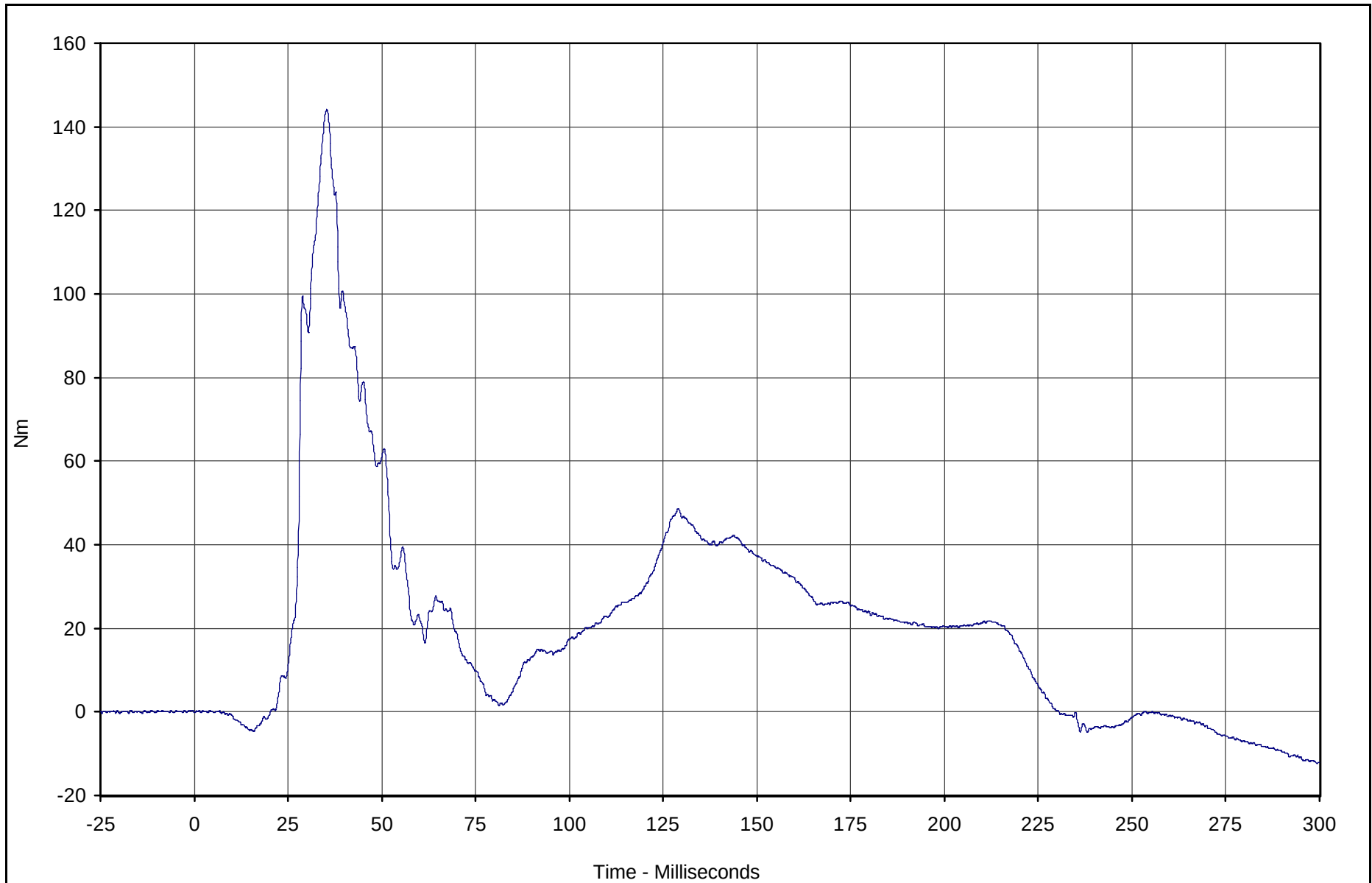
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                 | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Driver Right Upper Tibia Moment Y | 028   | FIL  | Nm    | 144.1 | 35.4 | -12.4 | 299.4 | 600       |

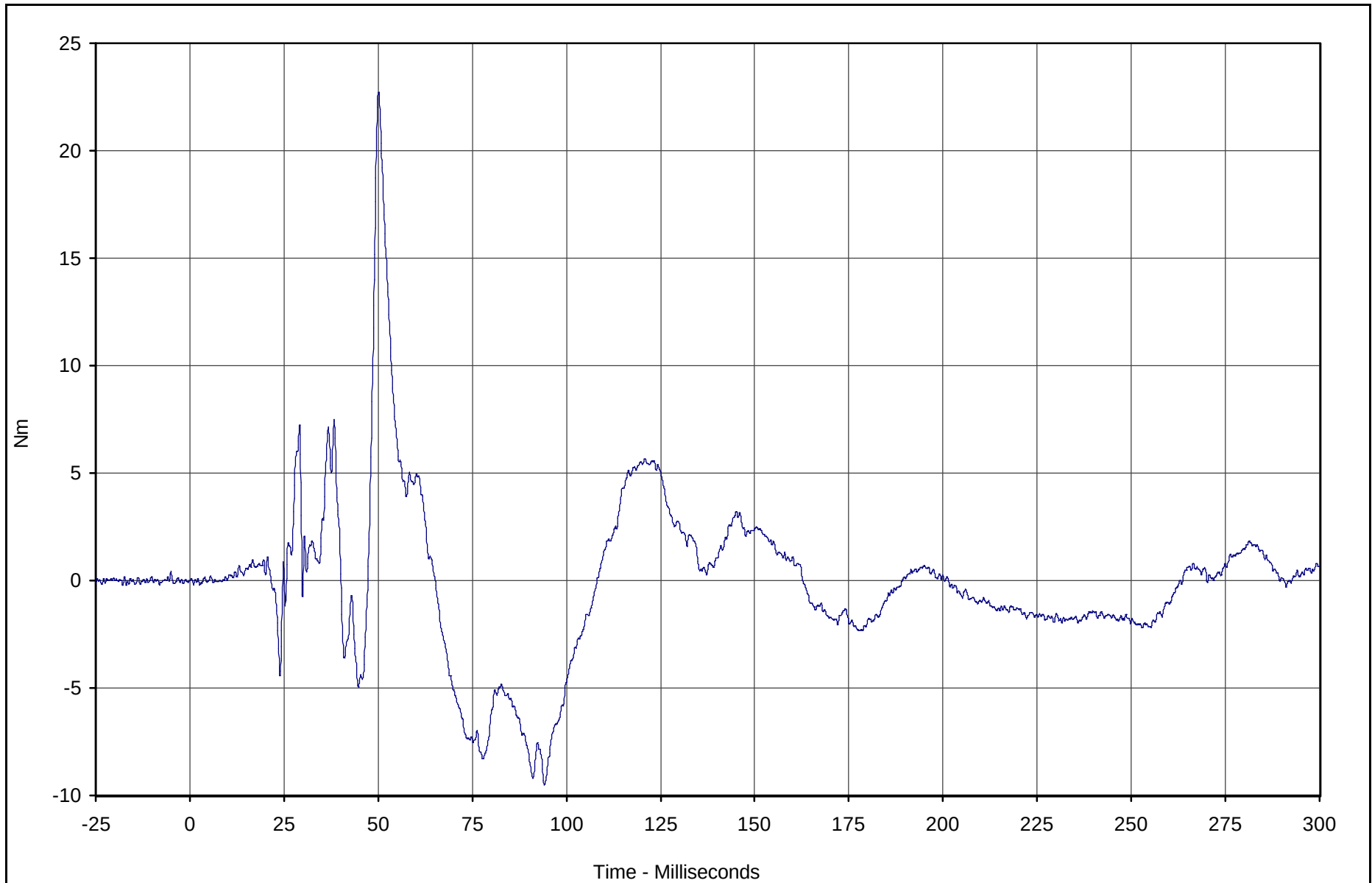


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Left Lower Tibia Moment X | 029   | FIL  | Nm    | 22.7 | 50.1 | -9.5 | 94.1 | 600       |

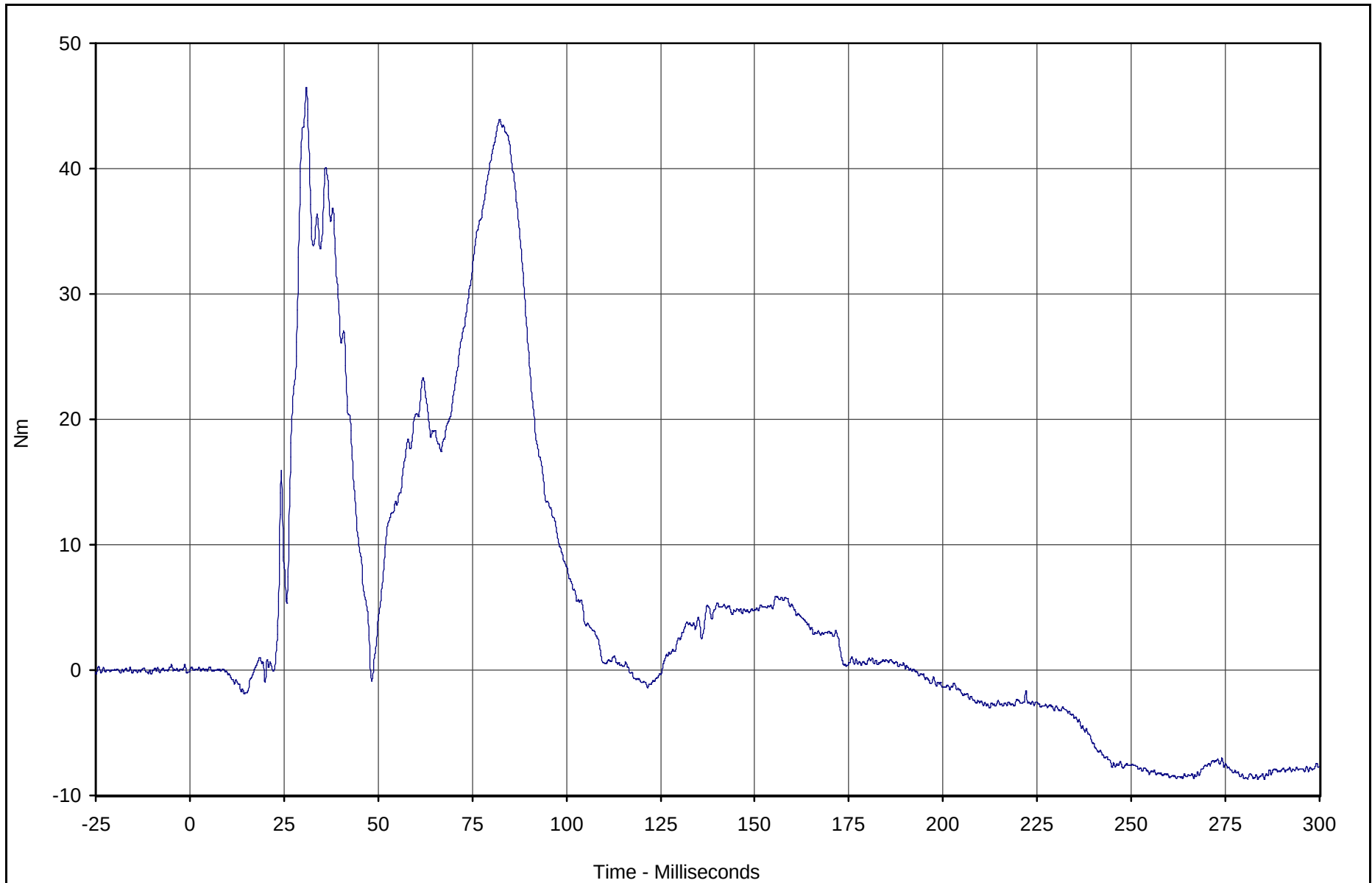


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|----------------------------------|-------|------|-------|------|------|------|-------|-----------|
| Driver Left Lower Tibia Moment Y | 030   | FIL  | Nm    | 46.5 | 31.0 | -8.7 | 281.0 | 600       |



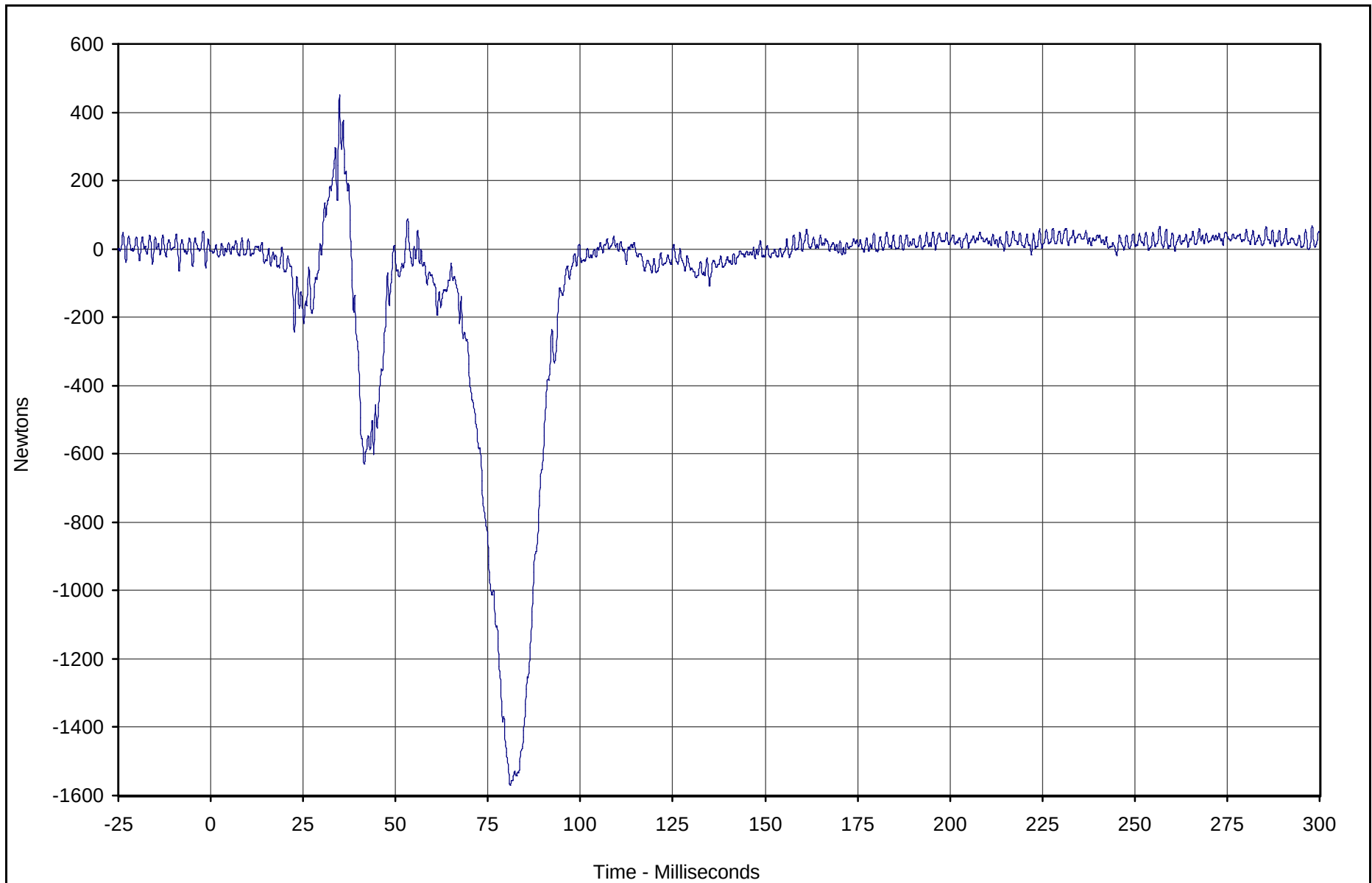
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description               | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|---------------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Driver Left Lower Tibia Force Z | 031   | FIL  | Newtons | 451.5 | 34.8 | -1570.1 | 81.0 | 600       |

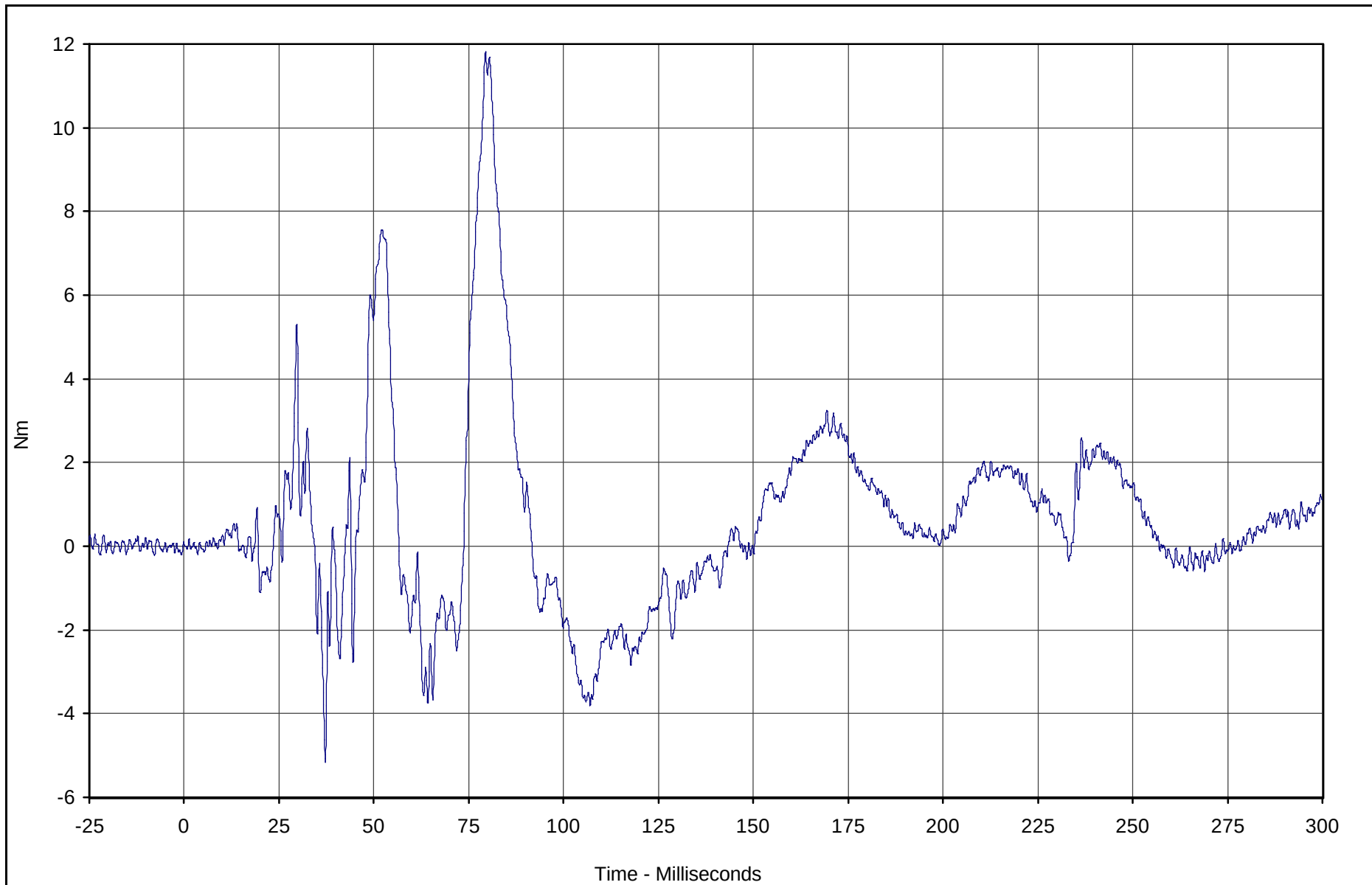


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Right Lower Tibia Moment X | 032   | FIL  | Nm    | 11.8 | 79.4 | -5.2 | 37.2 | 600       |

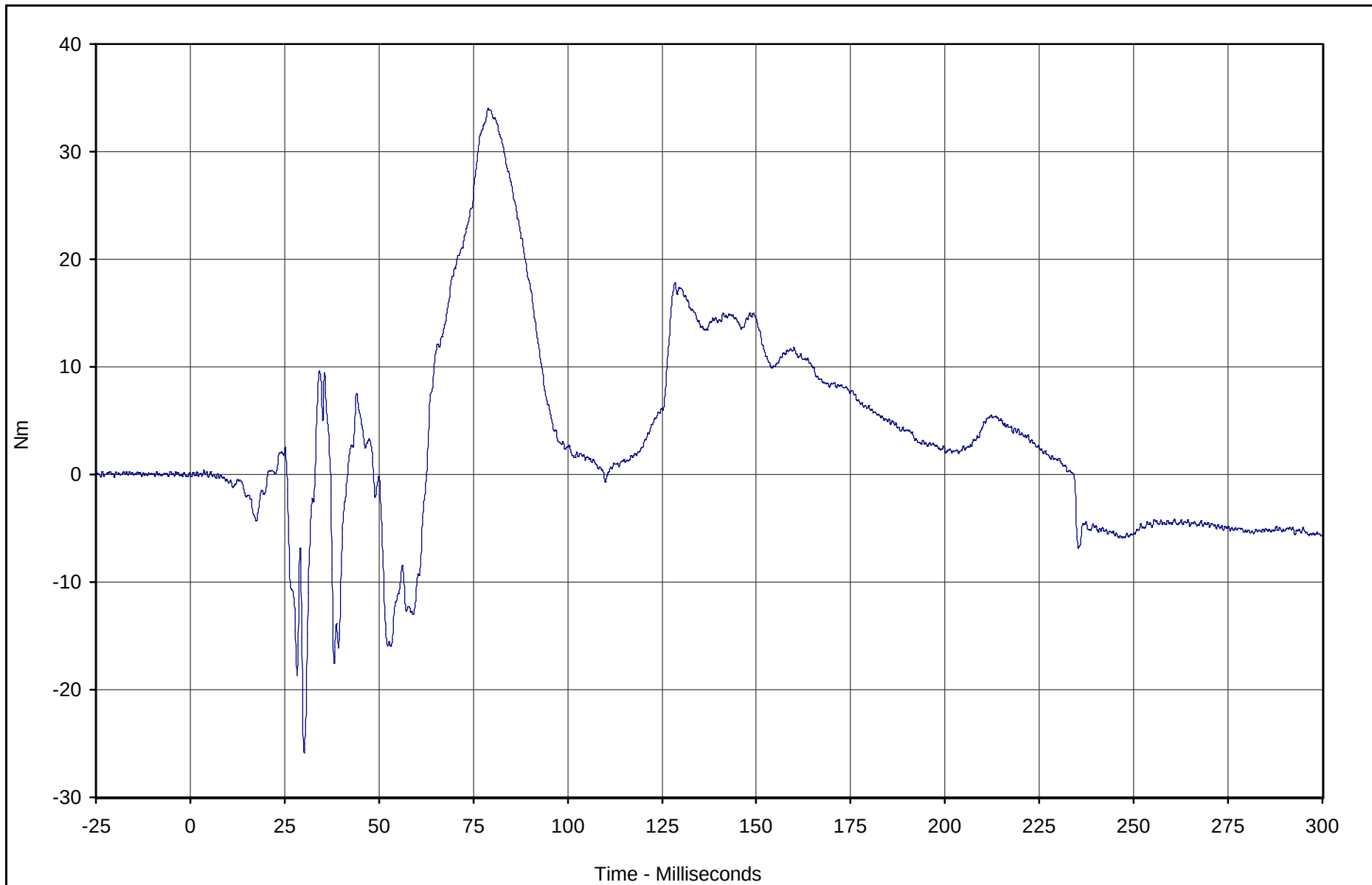


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Right Lower Tibia Moment Y | 033   | FIL  | Nm    | 34.1 | 79.0 | -25.8 | 30.2 | 600       |



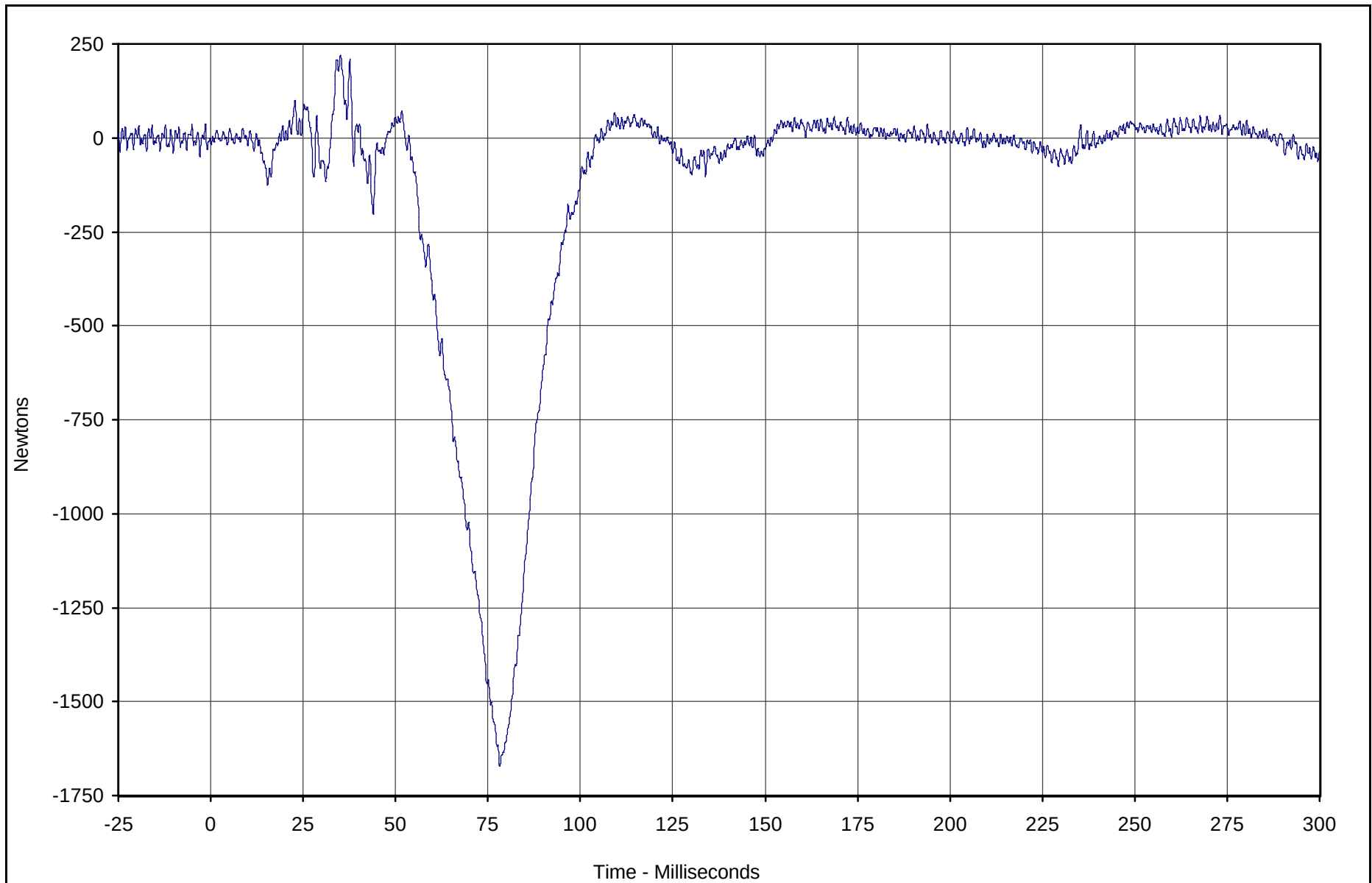
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|----------------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Driver Right Lower Tibia Force Z | 034   | FIL  | Newtons | 218.9 | 35.1 | -1672.1 | 78.2 | 600       |

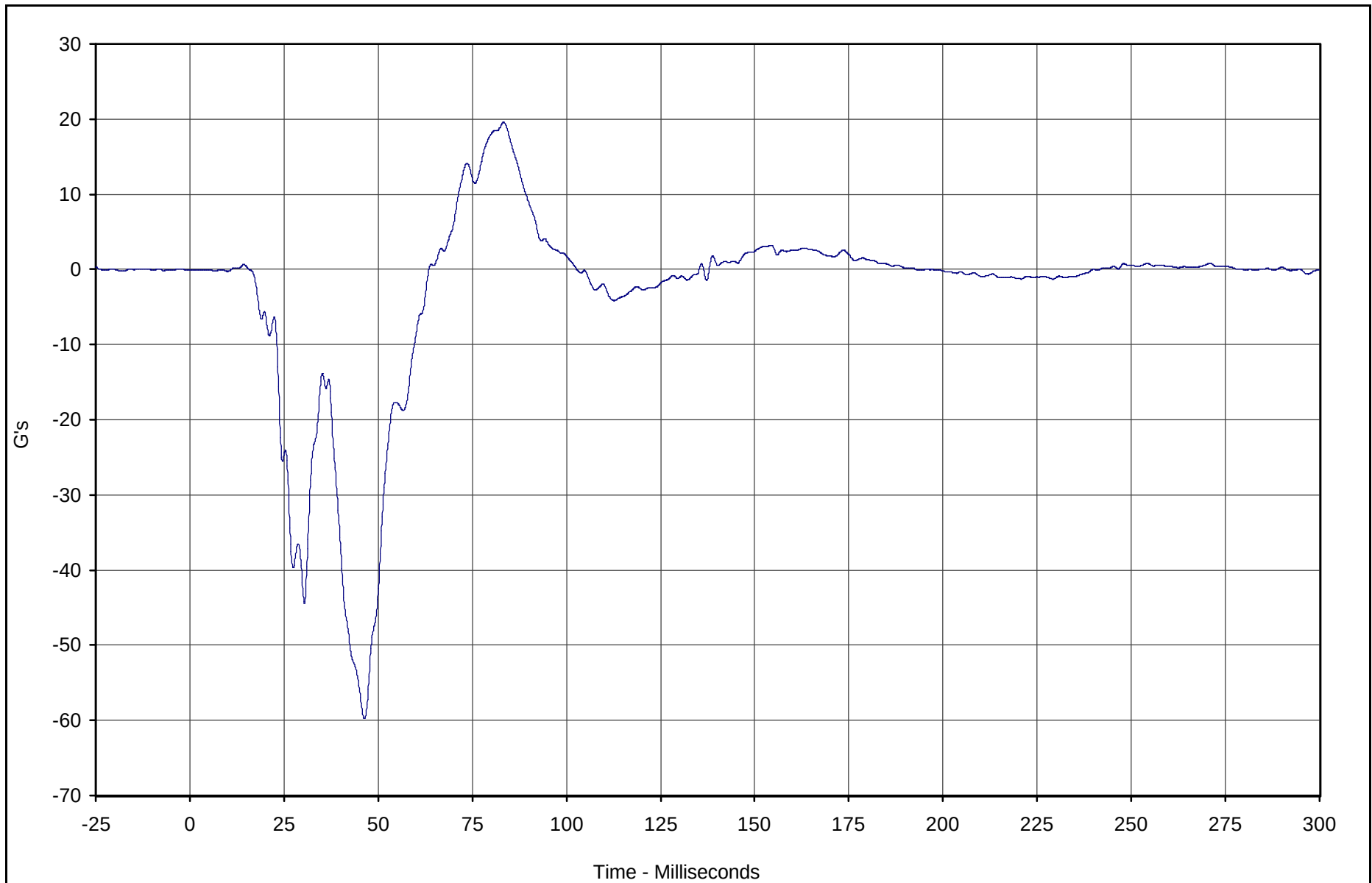


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description      | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Left Foot Aft X | 035   | FIL  | G's   | 19.6 | 83.3 | -59.7 | 46.4 | 180       |

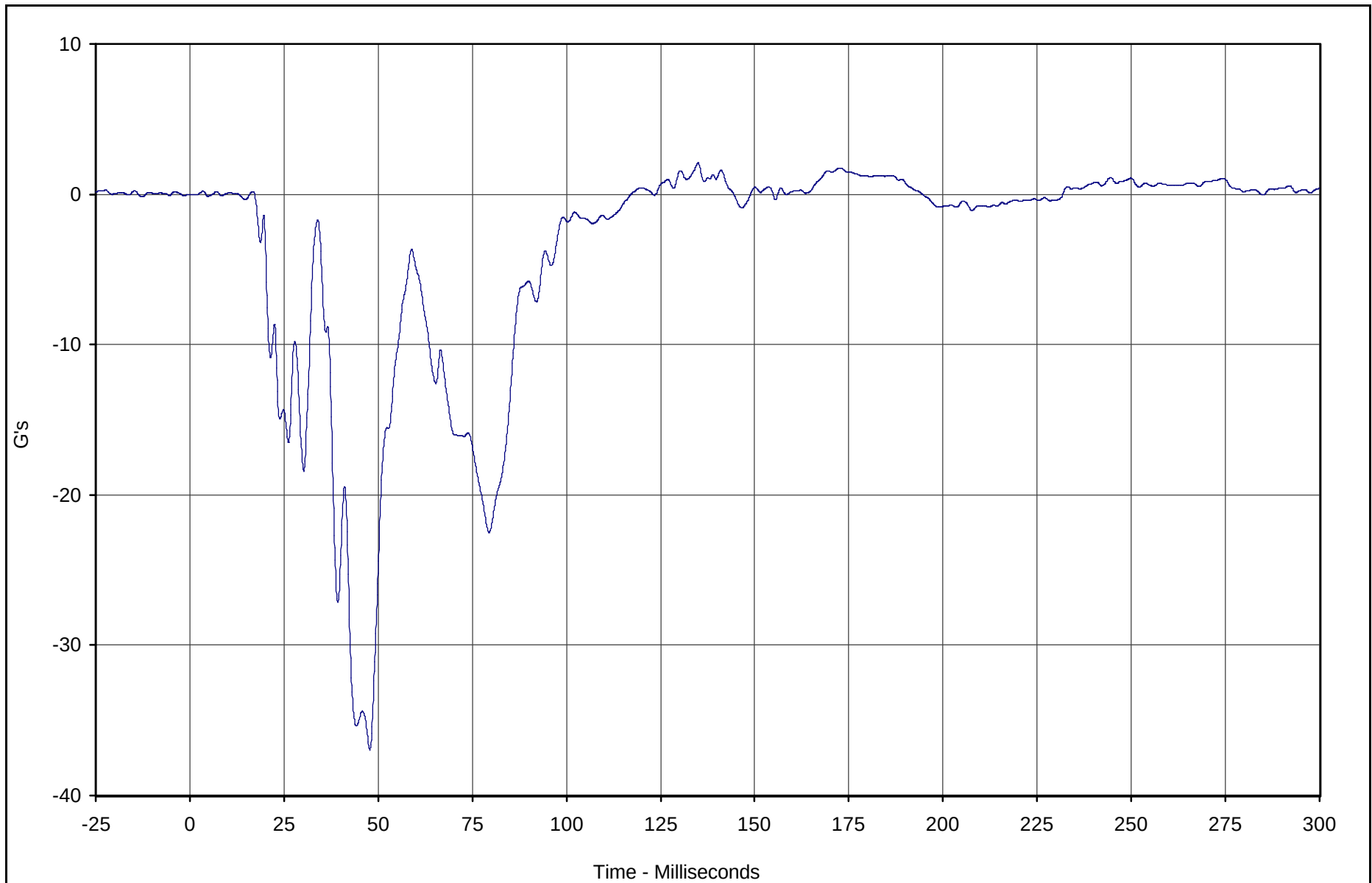


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description      | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Left Foot Aft Z | 036   | FIL  | G's   | 2.1 | 135.0 | -37.0 | 47.8 | 180       |



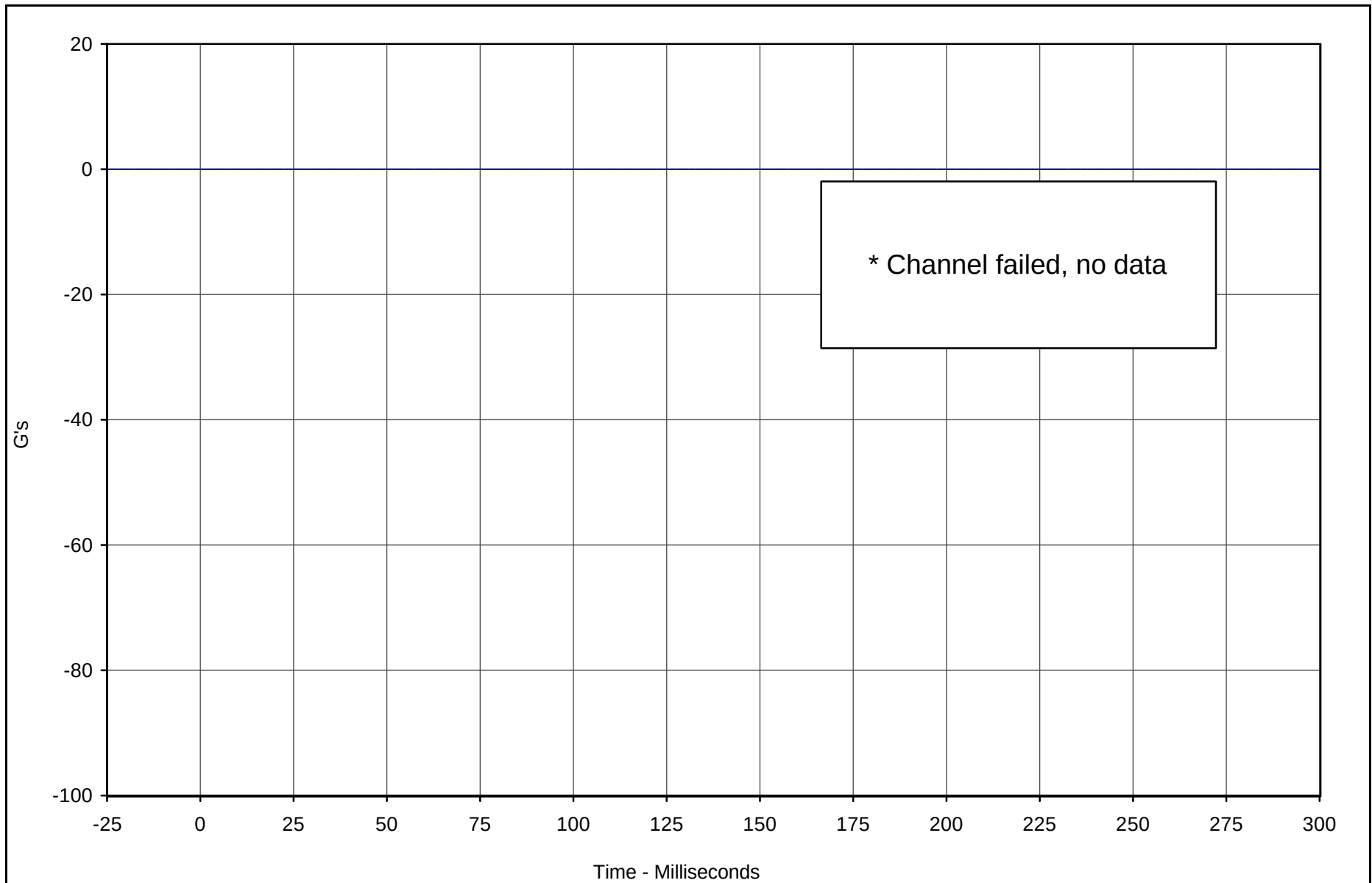
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





\* Channel failed, no data

| Curve Description       | CURNO | Type | Units | Max | Time | Min | Time | SAE Class |
|-------------------------|-------|------|-------|-----|------|-----|------|-----------|
| Driver Left Foot Fore Z | 037   | FIL  | G's   | 0.0 | 0.0  | 0.0 | 0.0  | 180       |

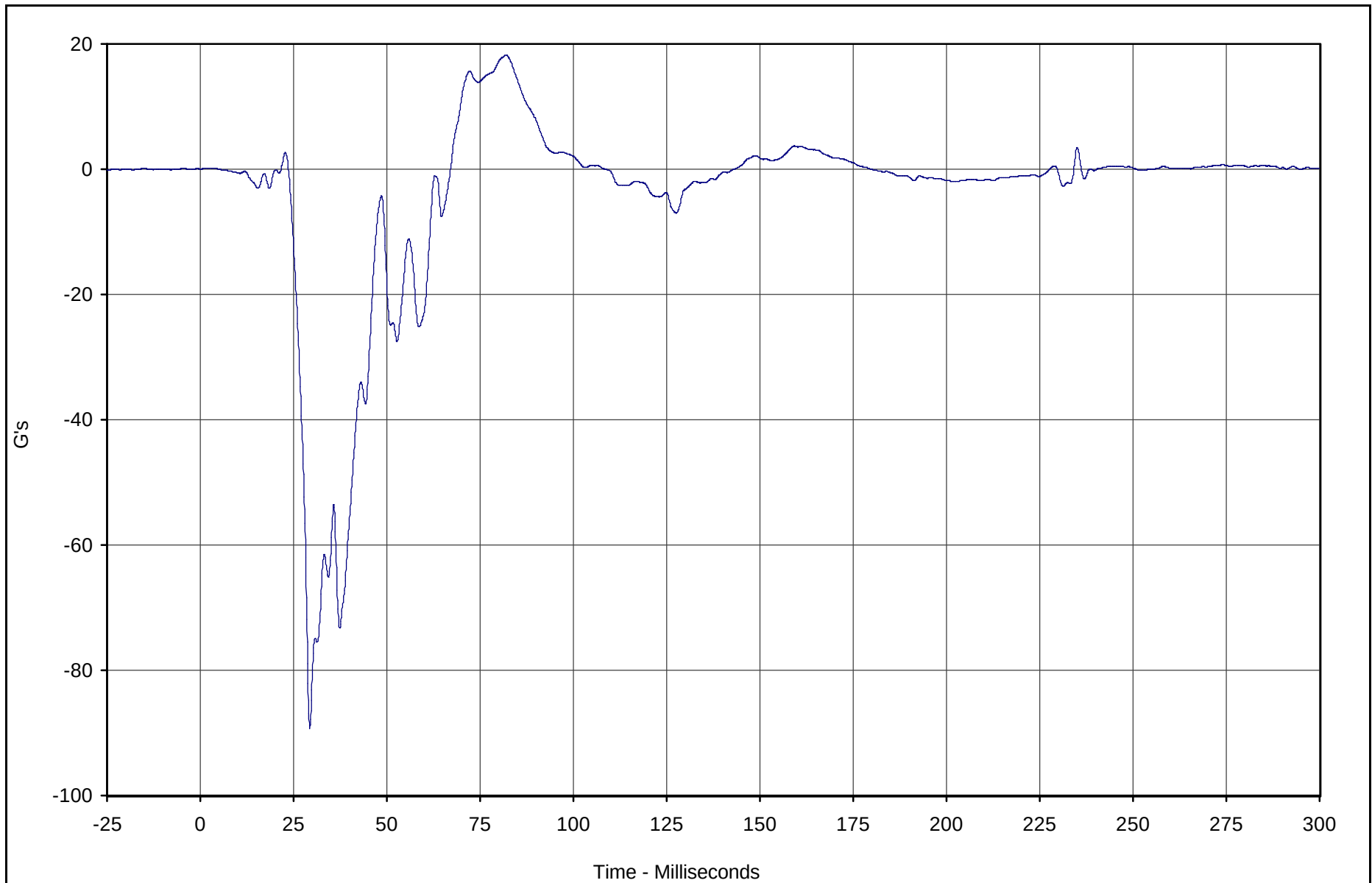


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-------|------|-----------|
| Driver Right Foot Aft X | 038   | FIL  | G's   | 18.2 | 81.9 | -89.3 | 29.4 | 180       |

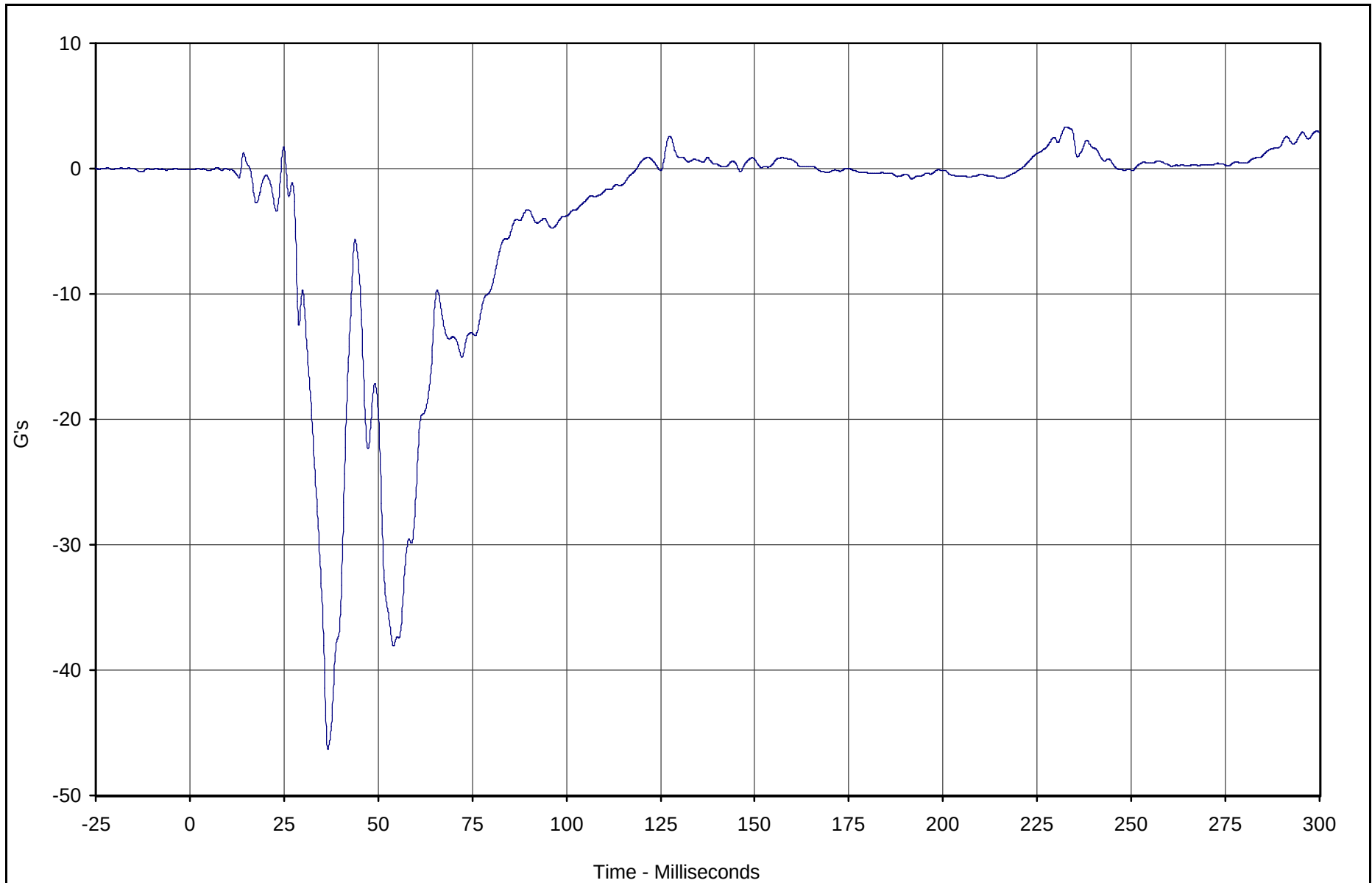


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Driver Right Foot Aft Z | 039   | FIL  | G's   | 3.3 | 232.7 | -46.3 | 36.7 | 180       |

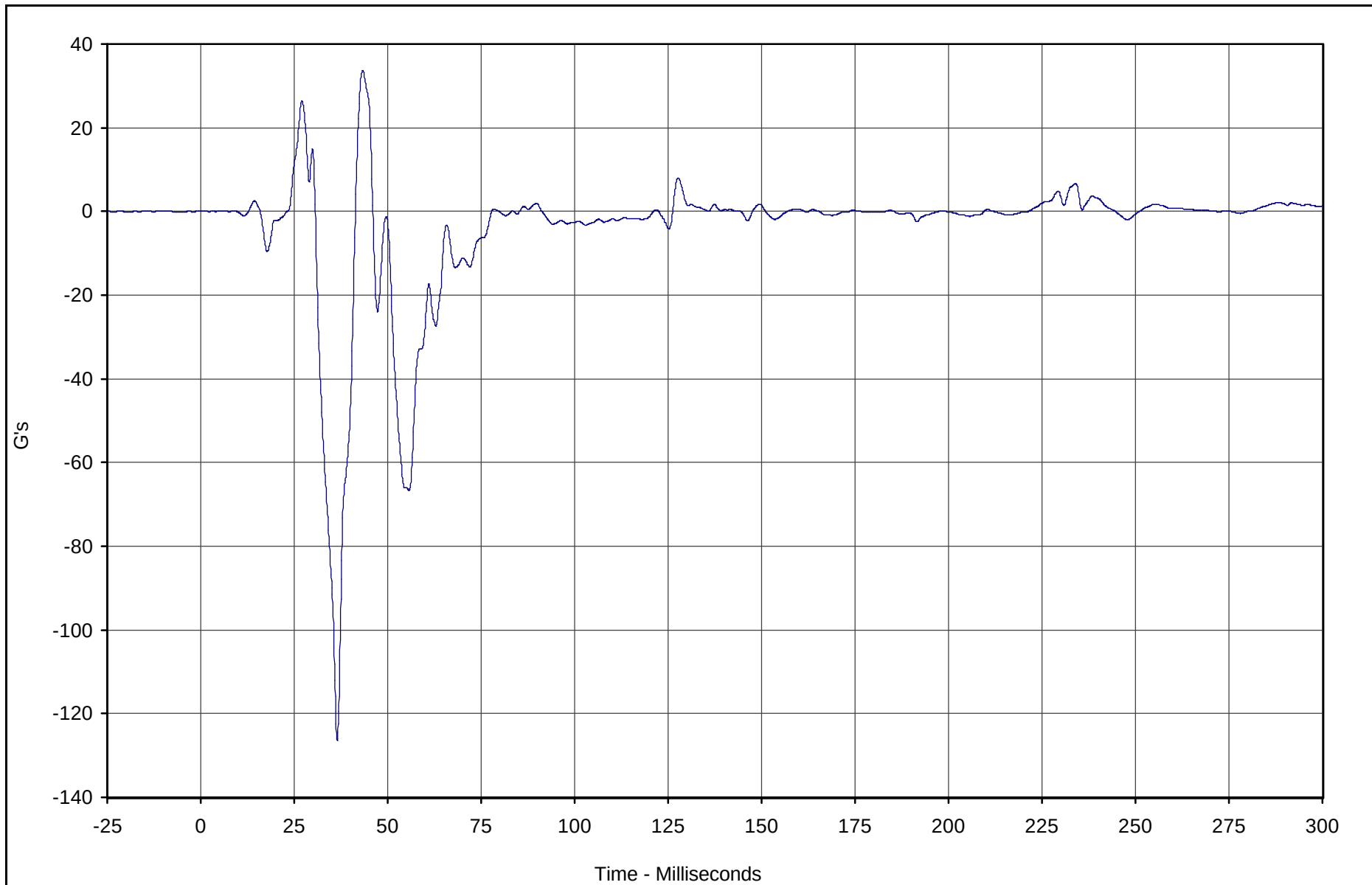


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|--------|------|-----------|
| Driver Right Foot Fore Z | 040   | FIL  | G's   | 33.7 | 43.3 | -126.4 | 36.5 | 180       |



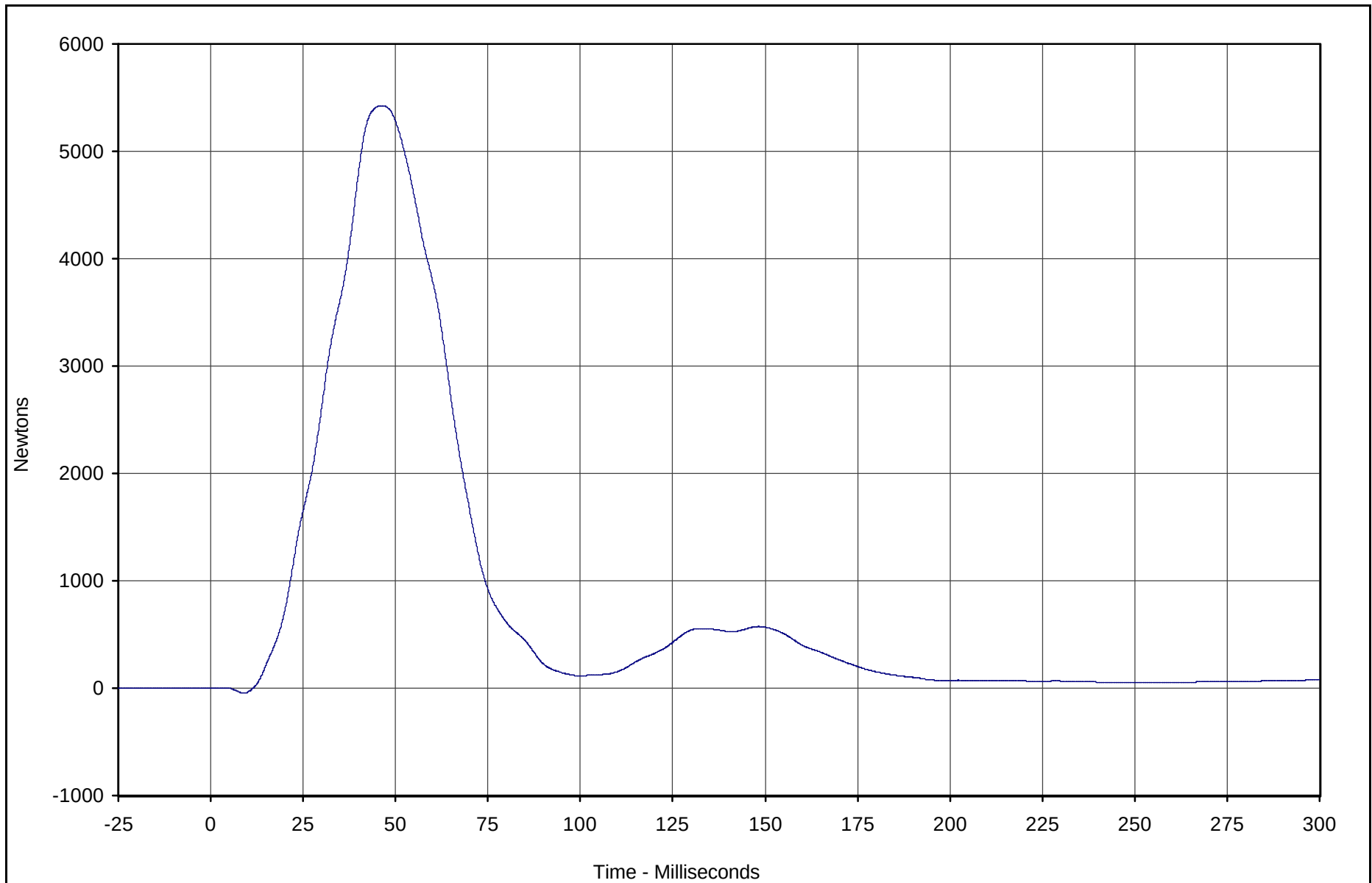
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description     | CURNO | Type | Units   | Max    | Time | Min   | Time | SAE Class |
|-----------------------|-------|------|---------|--------|------|-------|------|-----------|
| Driver Lap Belt Force | 041   | FIL  | Newtons | 5424.7 | 46.4 | -45.6 | 9.0  | 60        |

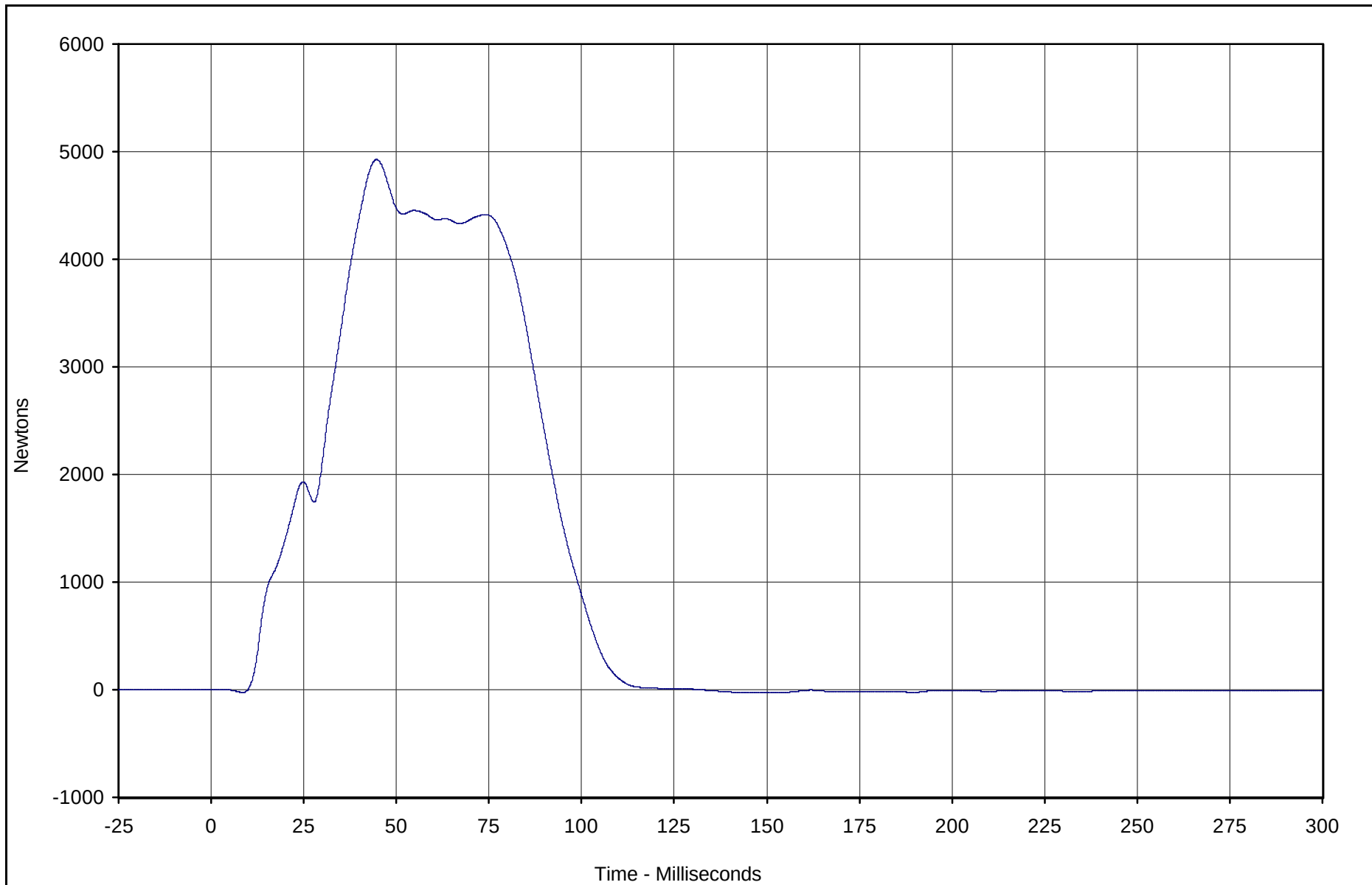


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units   | Max    | Time | Min   | Time  | SAE Class |
|----------------------------|-------|------|---------|--------|------|-------|-------|-----------|
| Driver Shoulder Belt Force | 042   | FIL  | Newtons | 4927.0 | 44.6 | -28.3 | 143.6 | 60        |

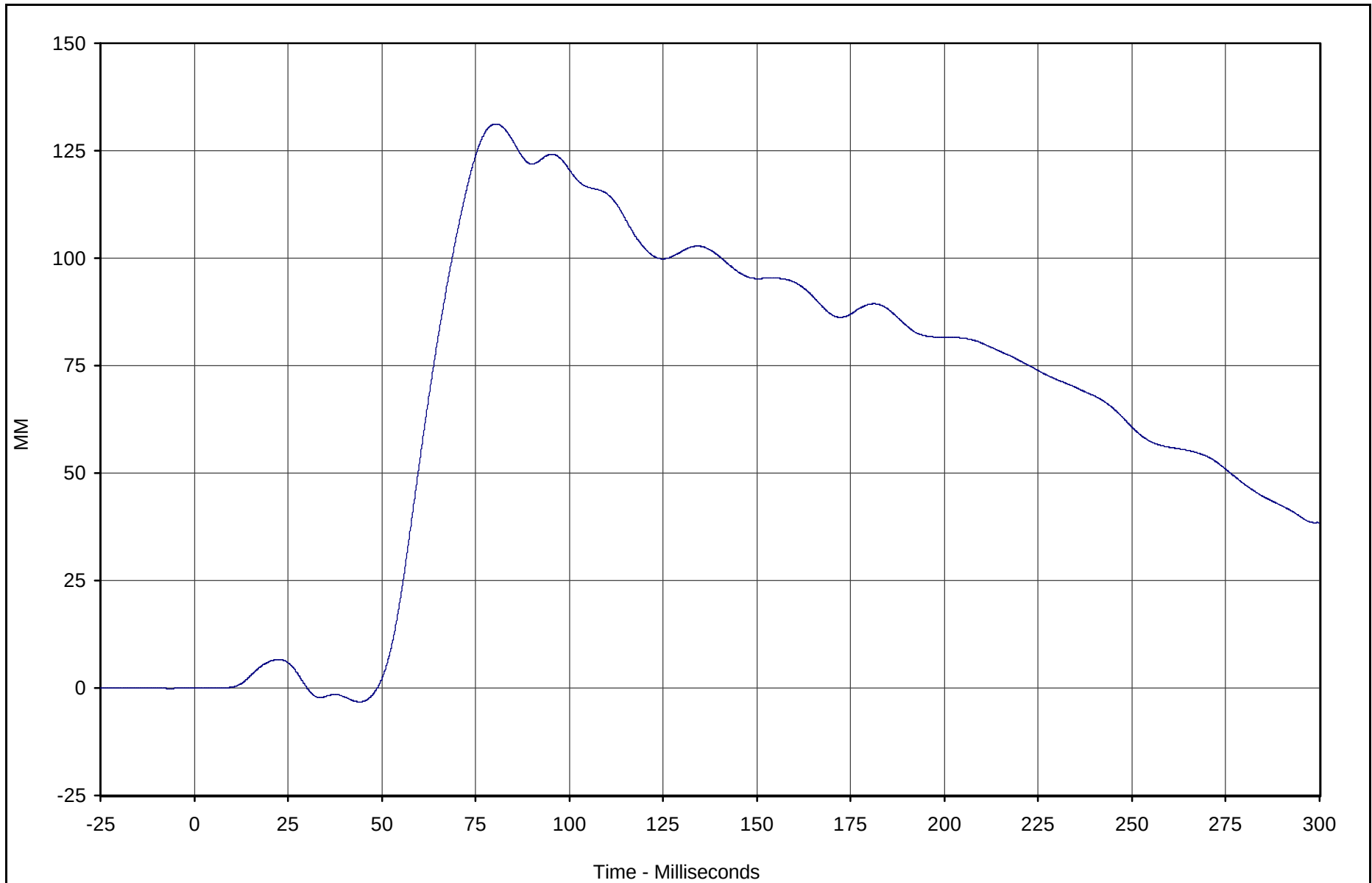


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max   | Time | Min  | Time | SAE Class |
|------------------------------|-------|------|-------|-------|------|------|------|-----------|
| Driver Shoulder Belt Pullout | 043   | FIL  | MM    | 131.2 | 80.4 | -3.2 | 44.0 | 60        |

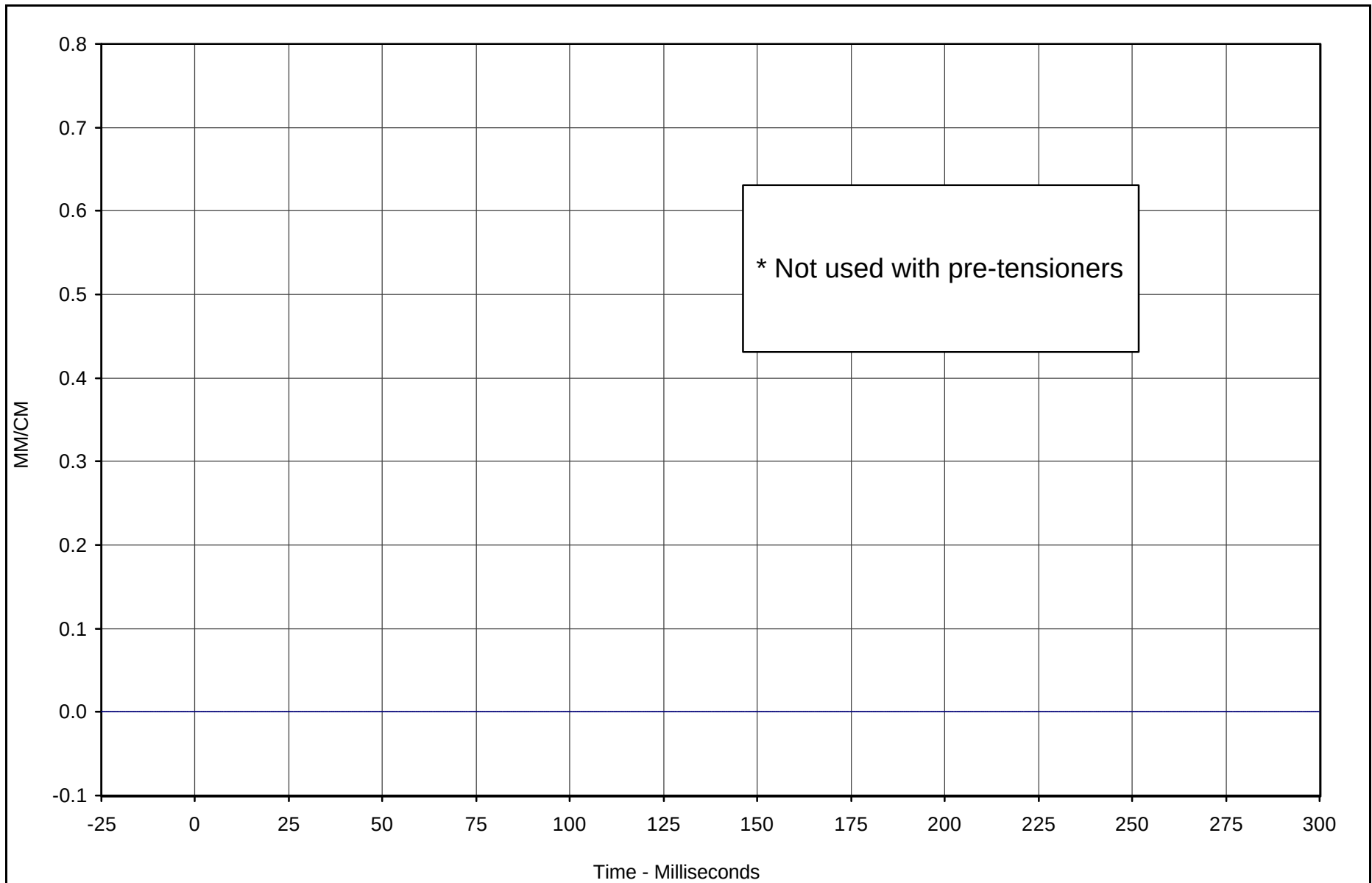


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|------|------|-----------|
| Driver Shoulder Belt Elongation | 044   | FIL  | MM/CM | 0.00 | 0.0  | 0.00 | 0.0  | 60        |



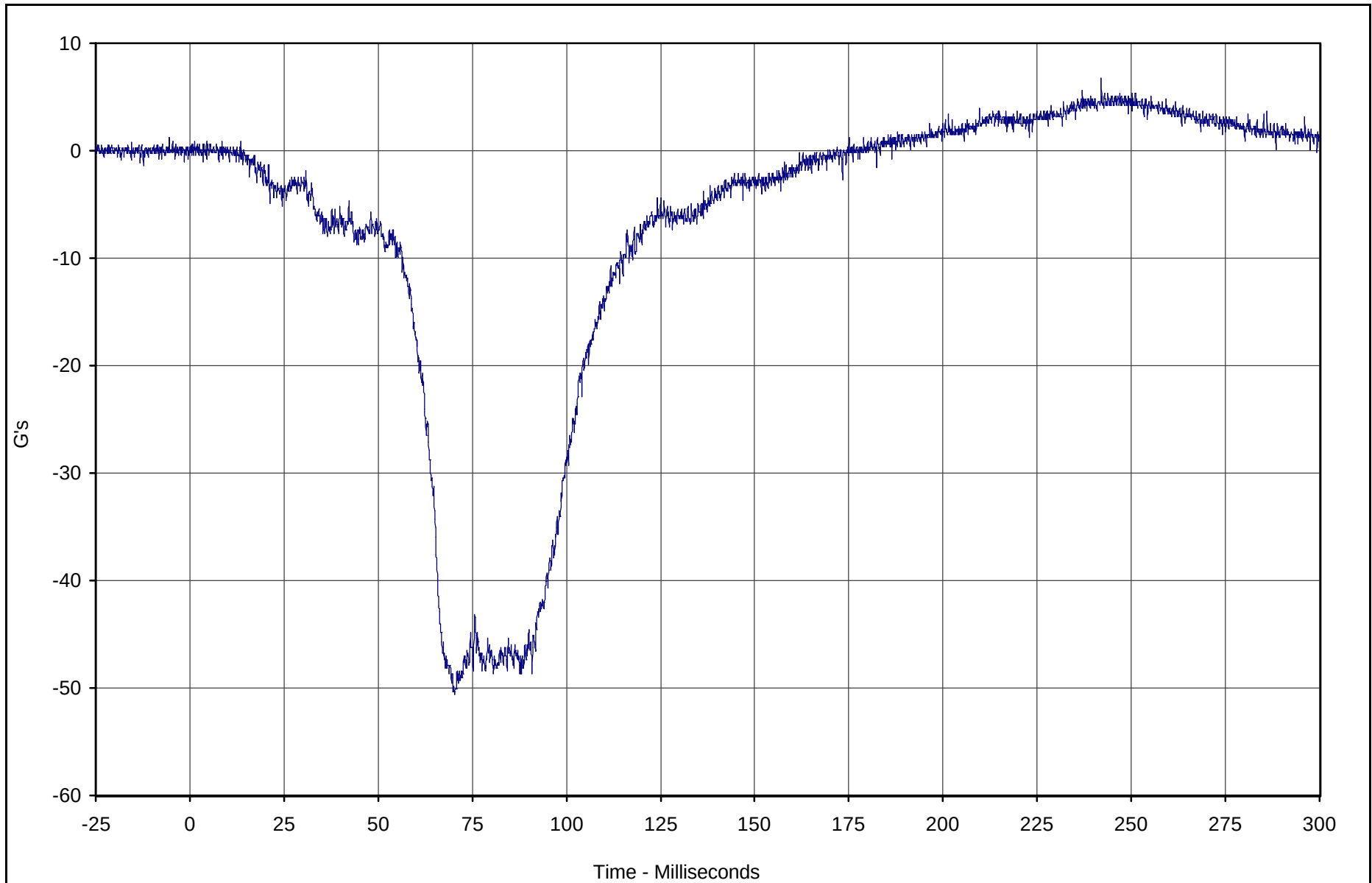
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description        | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Primary X | 045   | FIL  | G's   | 6.7 | 242.0 | -50.7 | 70.2 | 1000      |

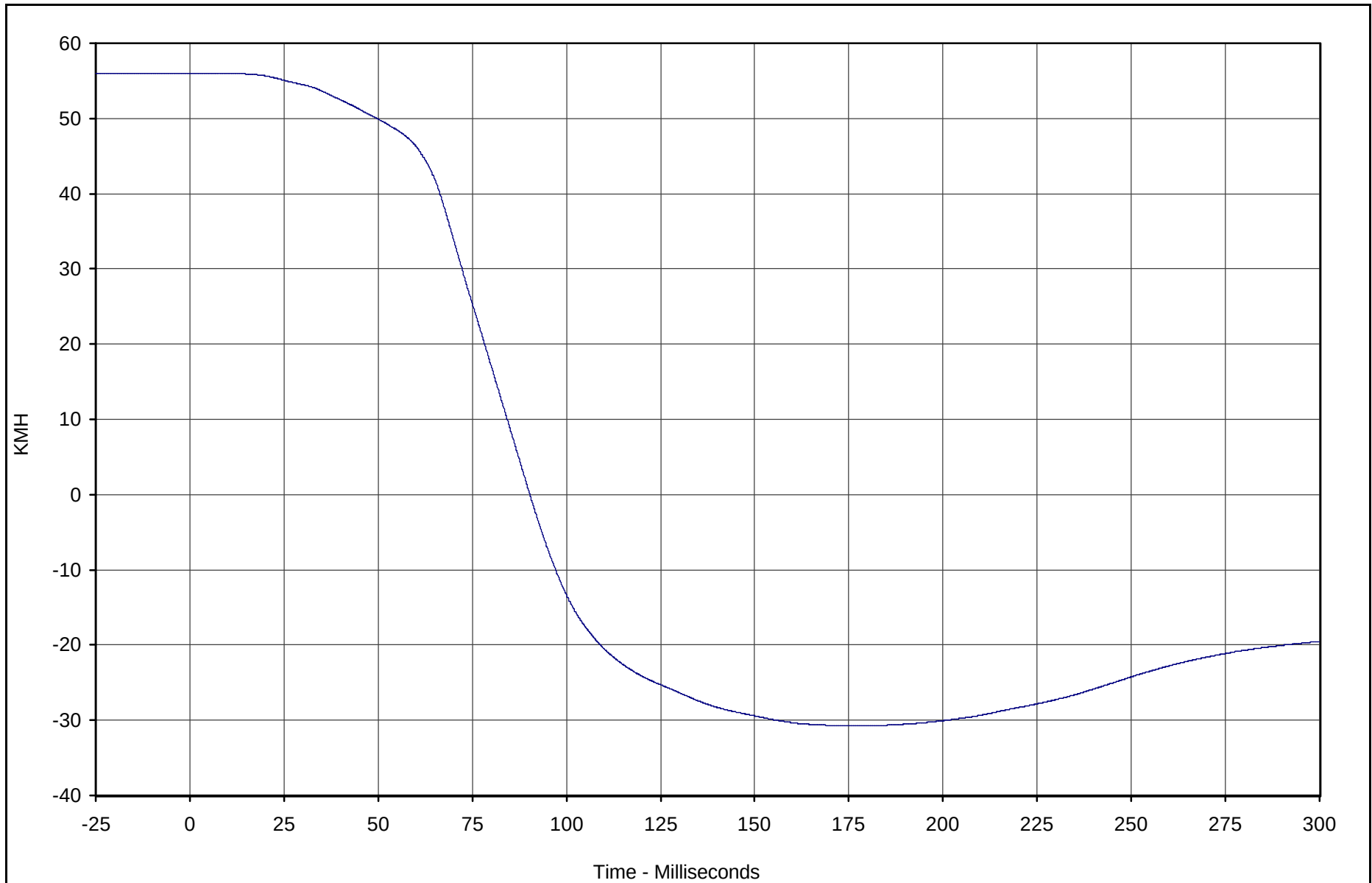


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Primary X Velocity | 045   | IN1  | KMH   | 56.0 | 6.8  | -30.8 | 178.2 | 180       |

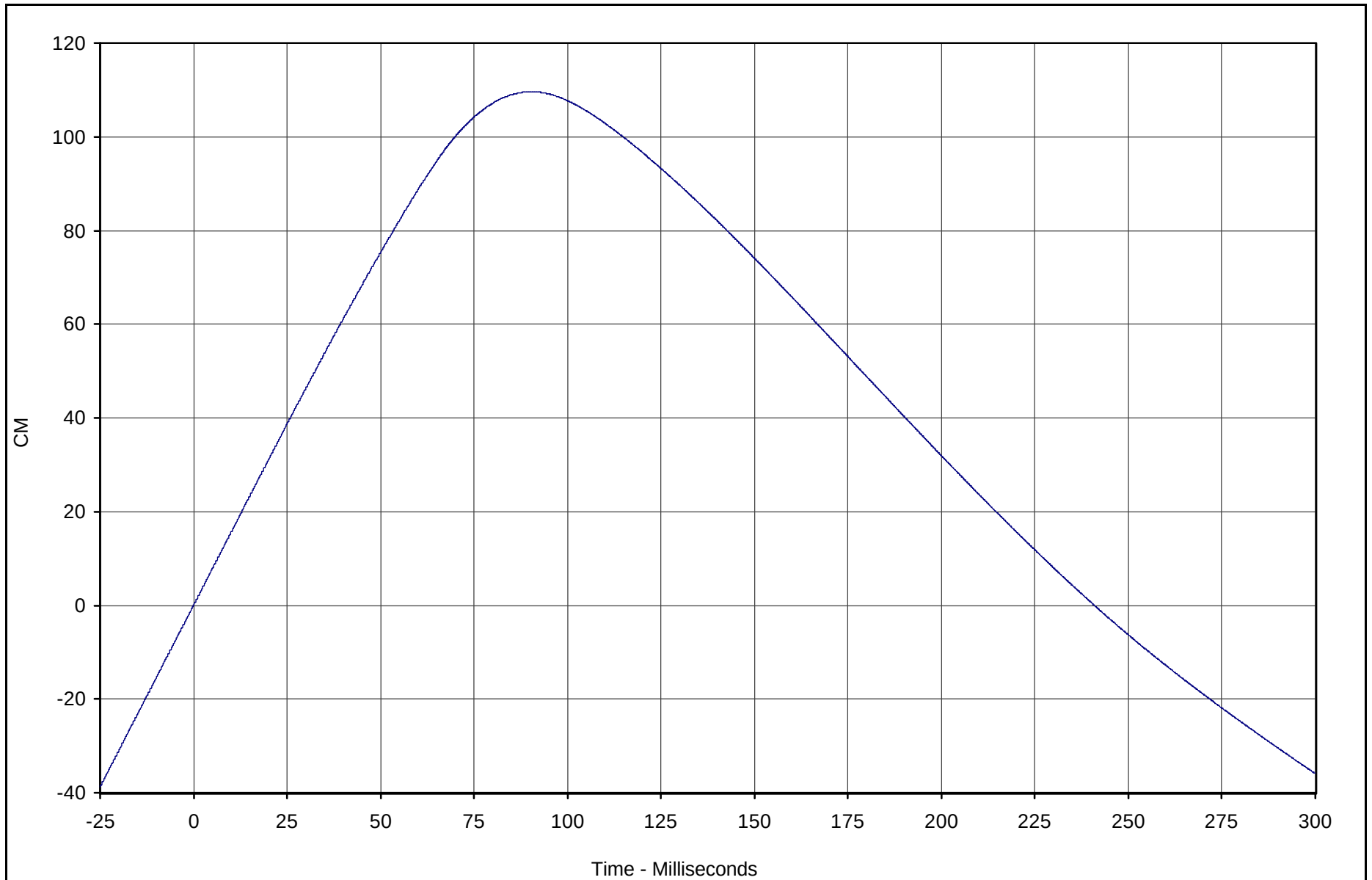


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|---------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Passenger Head Primary X Displ. | 045   | IN2  | CM    | 109.6 | 90.3 | -35.9 | 299.9 | 180       |

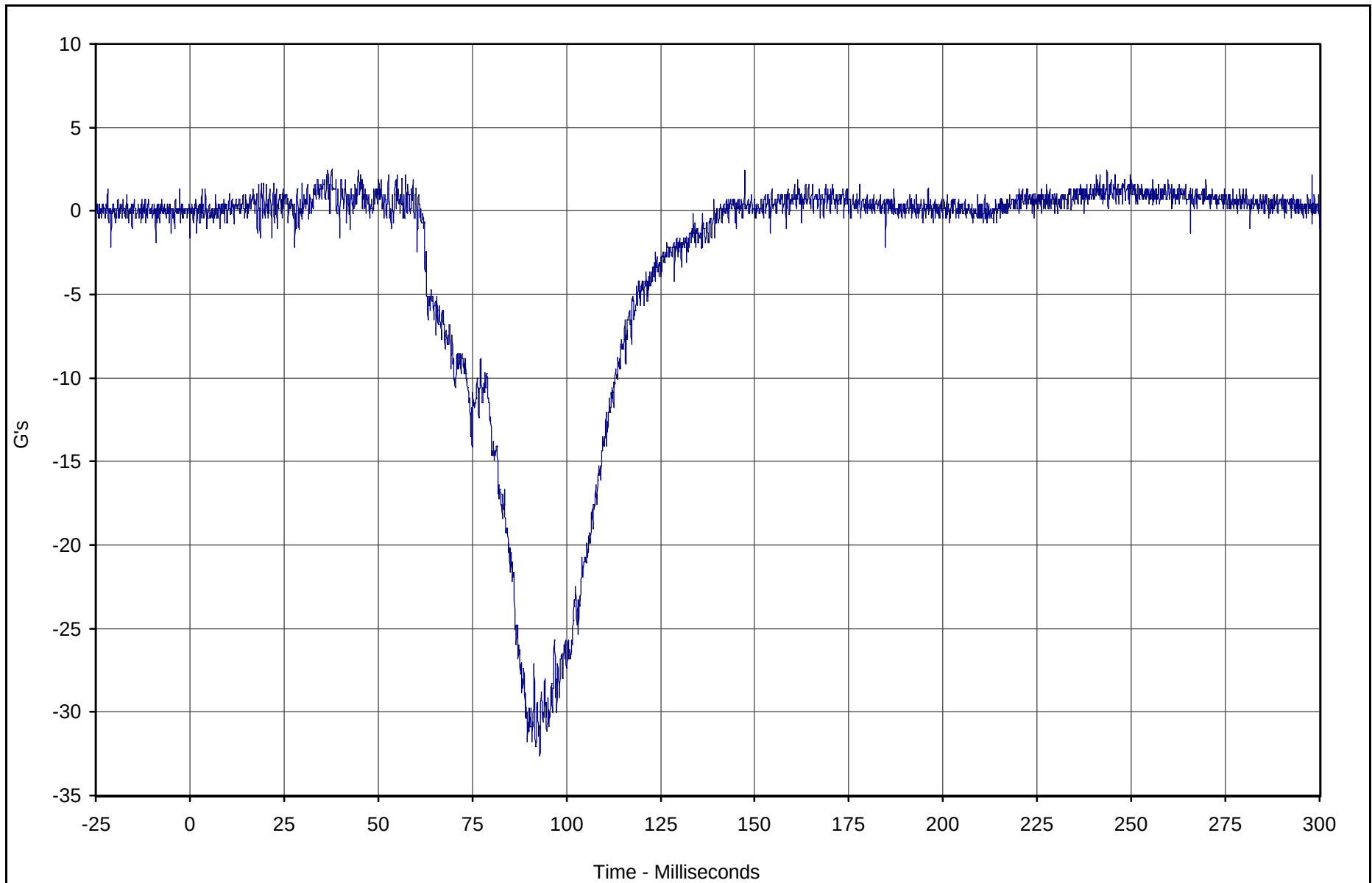


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Head Primary Y | 046   | FIL  | G's   | 2.4 | 36.6 | -32.6 | 92.9 | 1000      |



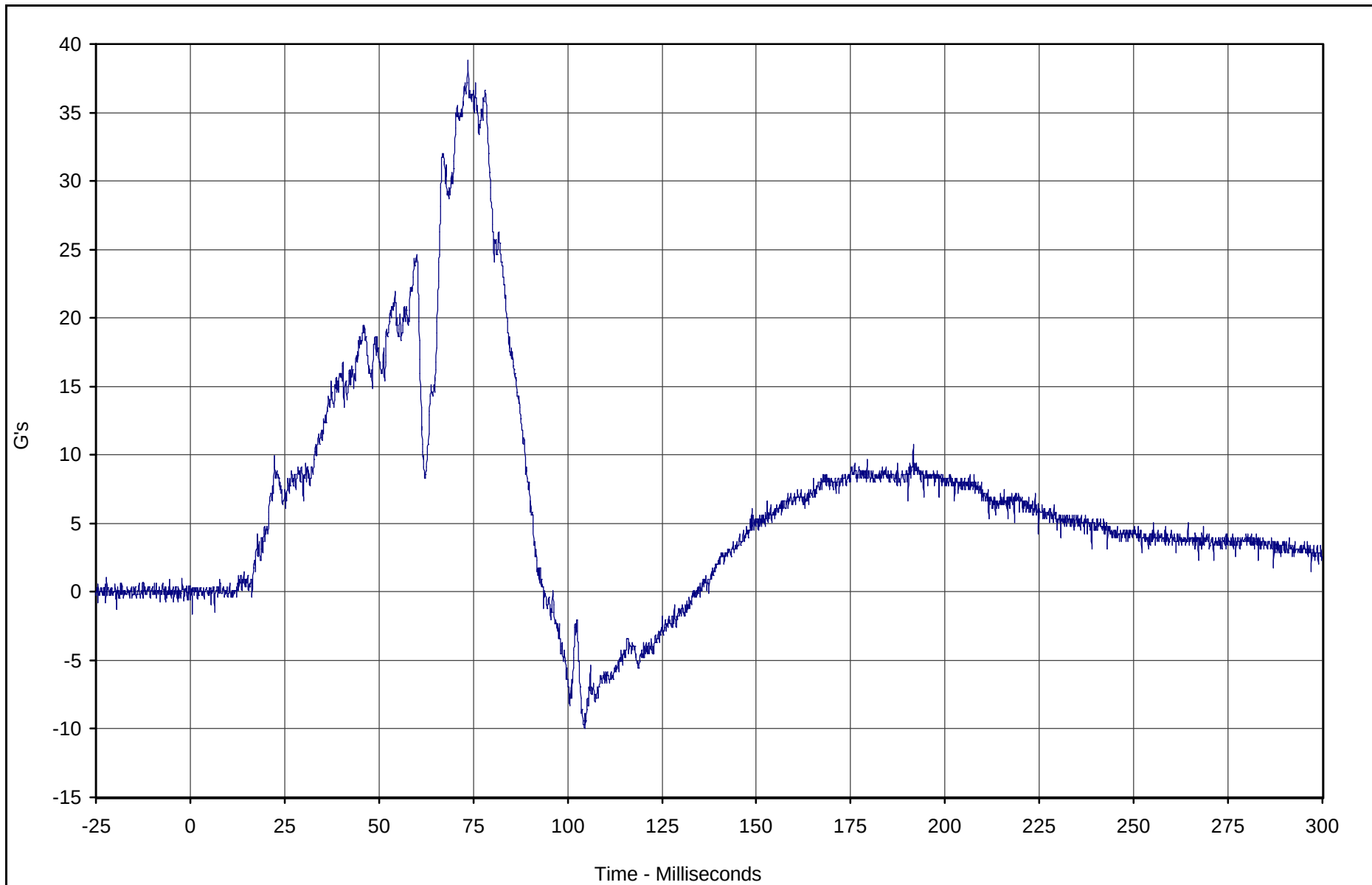
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description        | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|--------------------------|-------|------|-------|------|------|------|-------|-----------|
| Passenger Head Primary Z | 047   | FIL  | G's   | 38.8 | 73.6 | -9.9 | 104.5 | 1000      |

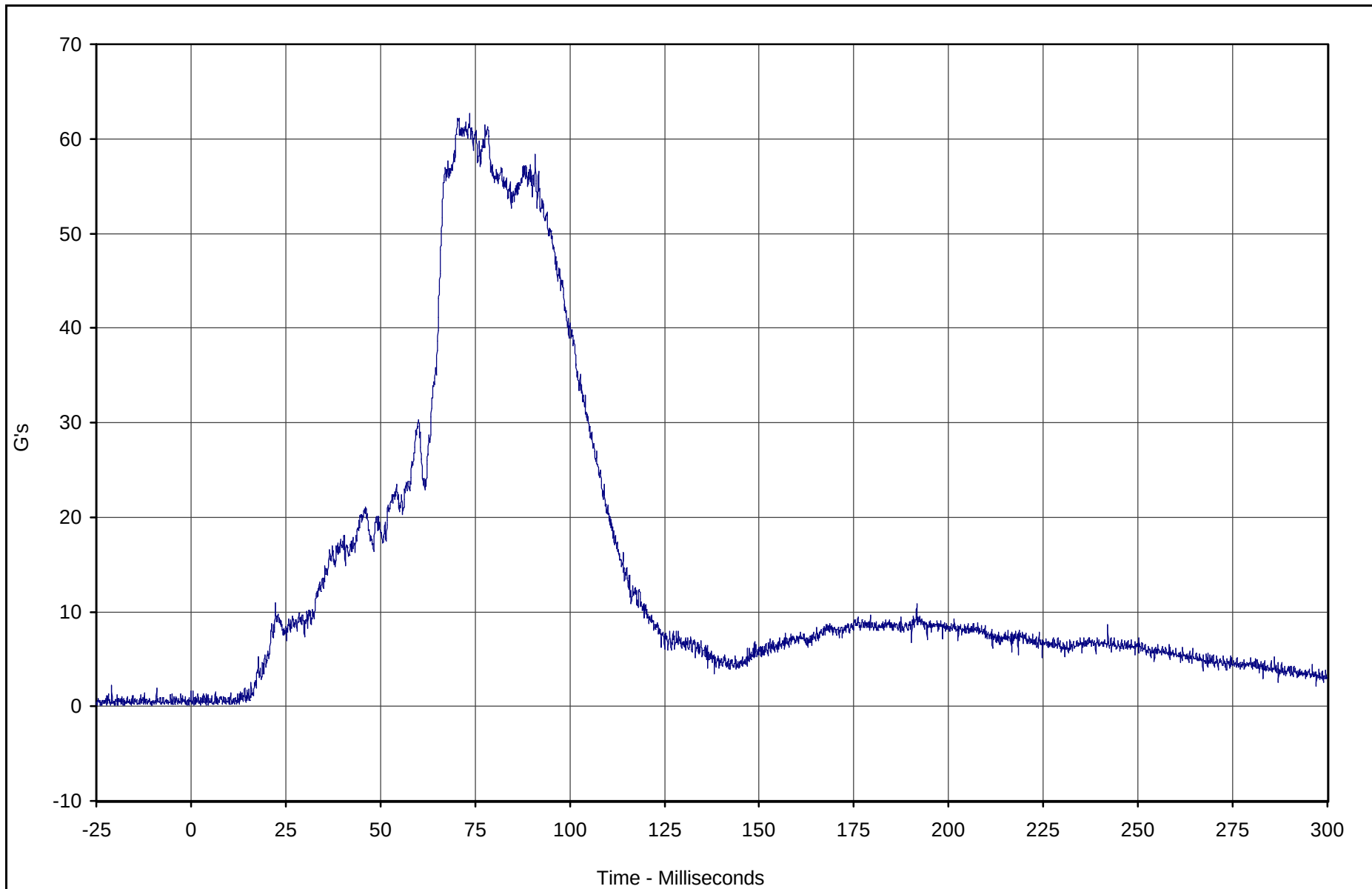


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Head Resultant Primary | 045   | RES  | G's   | 62.6 | 73.6 | 0.2 | 0.7  | 1000      |

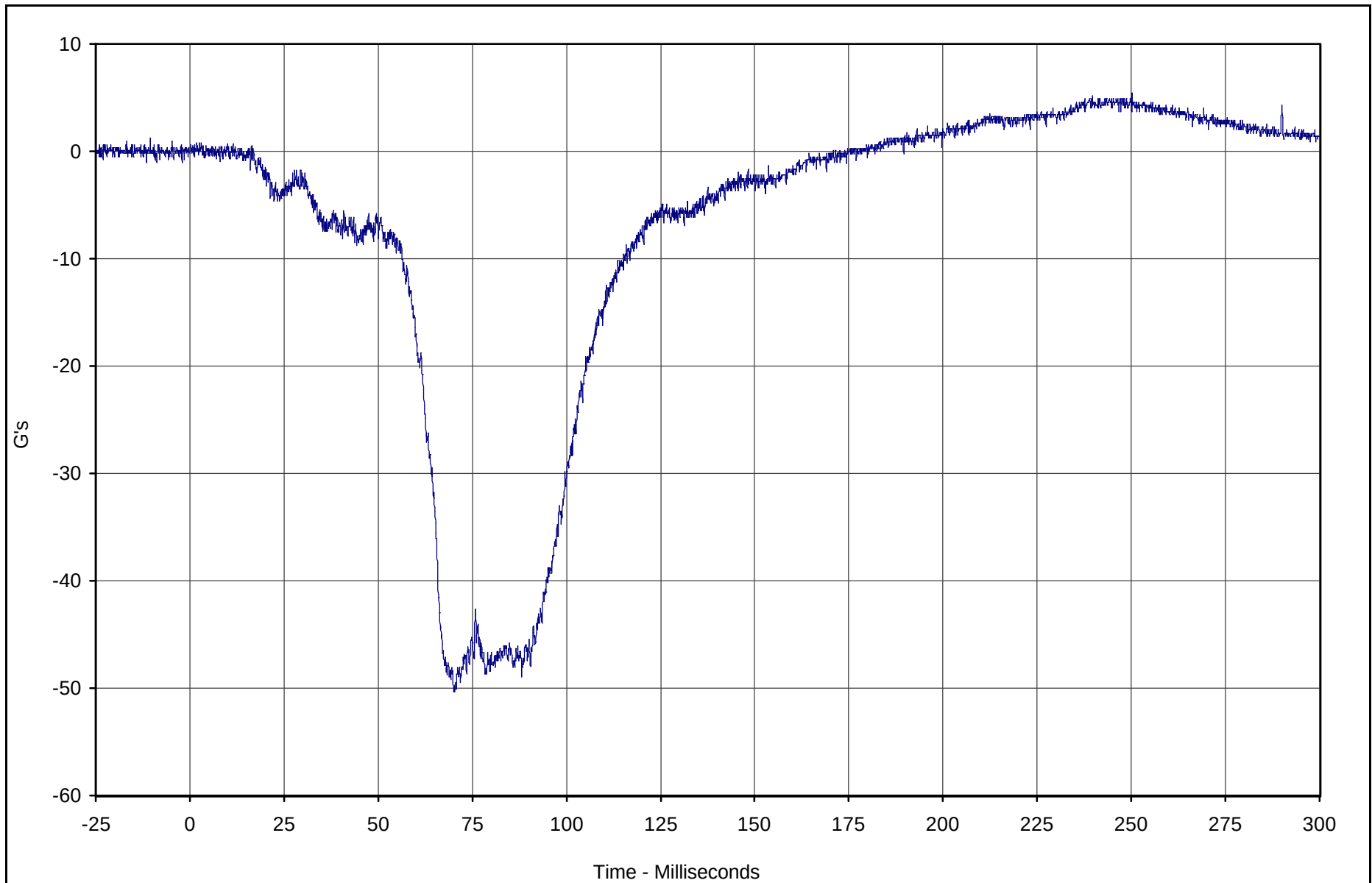


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Head Redundant X | 048   | FIL  | G's   | 5.5 | 250.2 | -50.4 | 70.1 | 1000      |

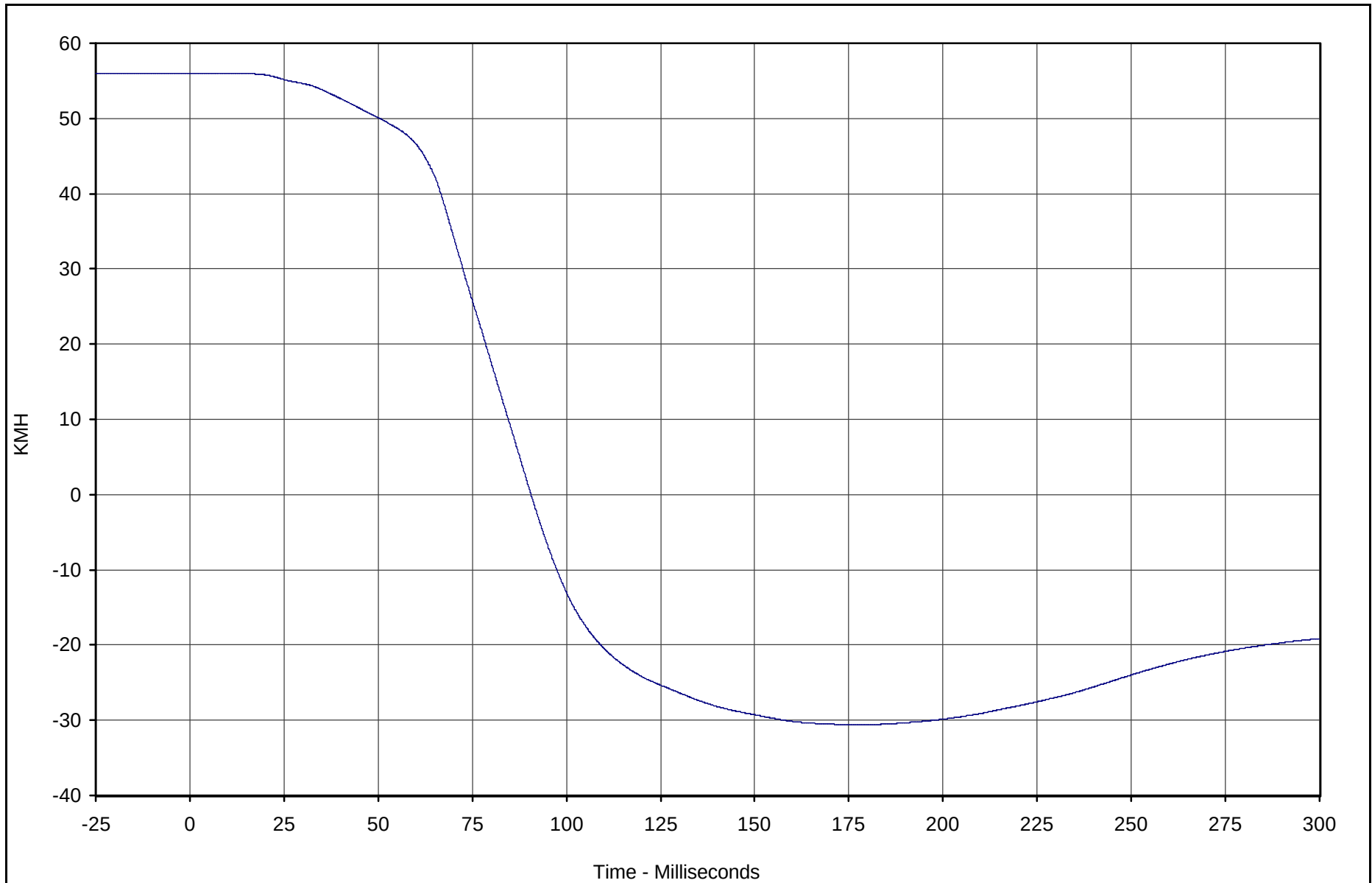


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Redundant X Velocity | 048   | IN1  | KMH   | 56.0 | 3.6  | -30.6 | 175.5 | 180       |



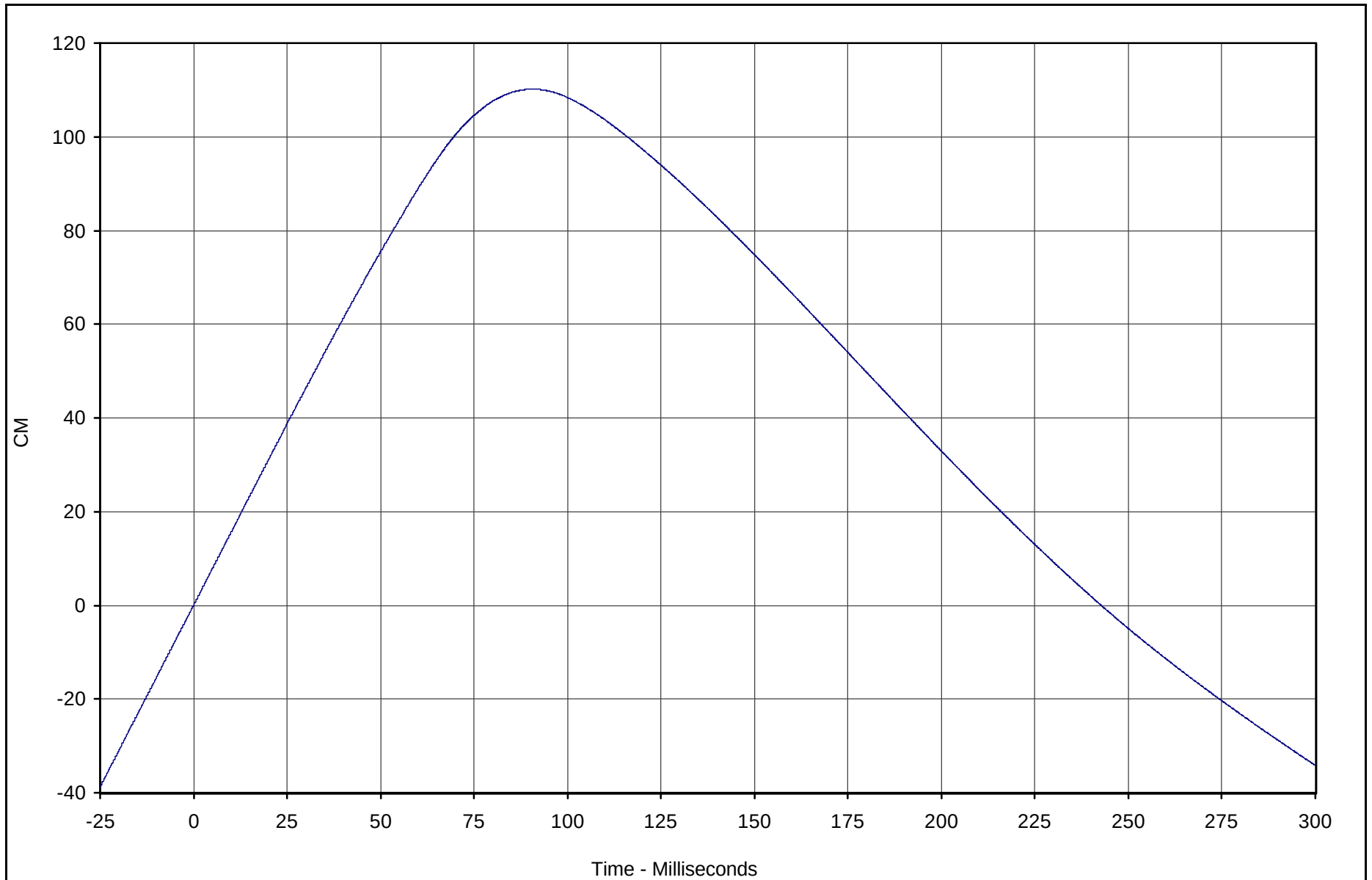
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                 | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|-----------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Passenger Head Redundant X Displ. | 048   | IN2  | CM    | 110.2 | 90.6 | -34.1 | 299.9 | 180       |

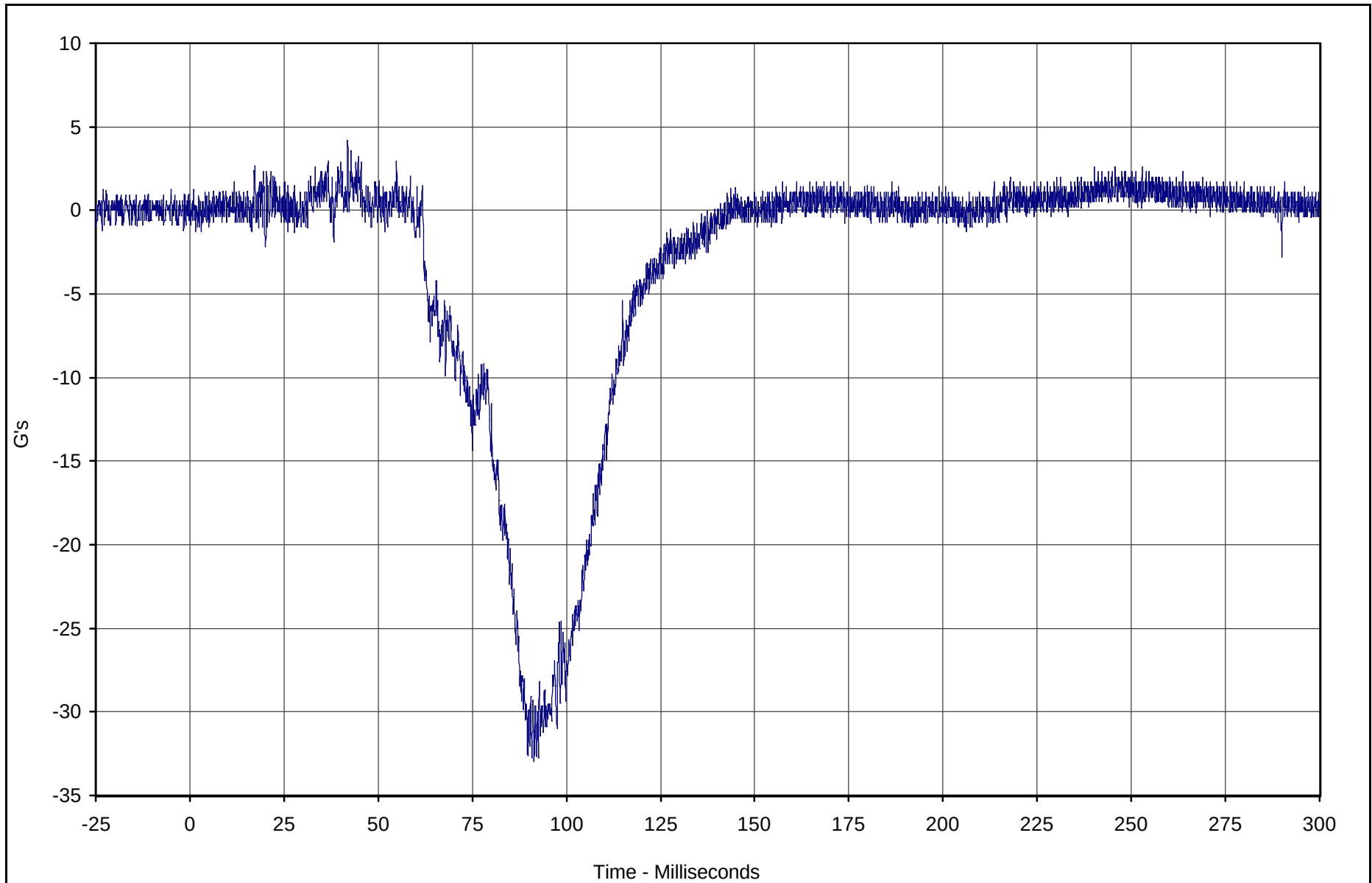


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Head Redundant Y | 049   | FIL  | G's   | 4.1 | 41.9 | -33.0 | 91.4 | 1000      |

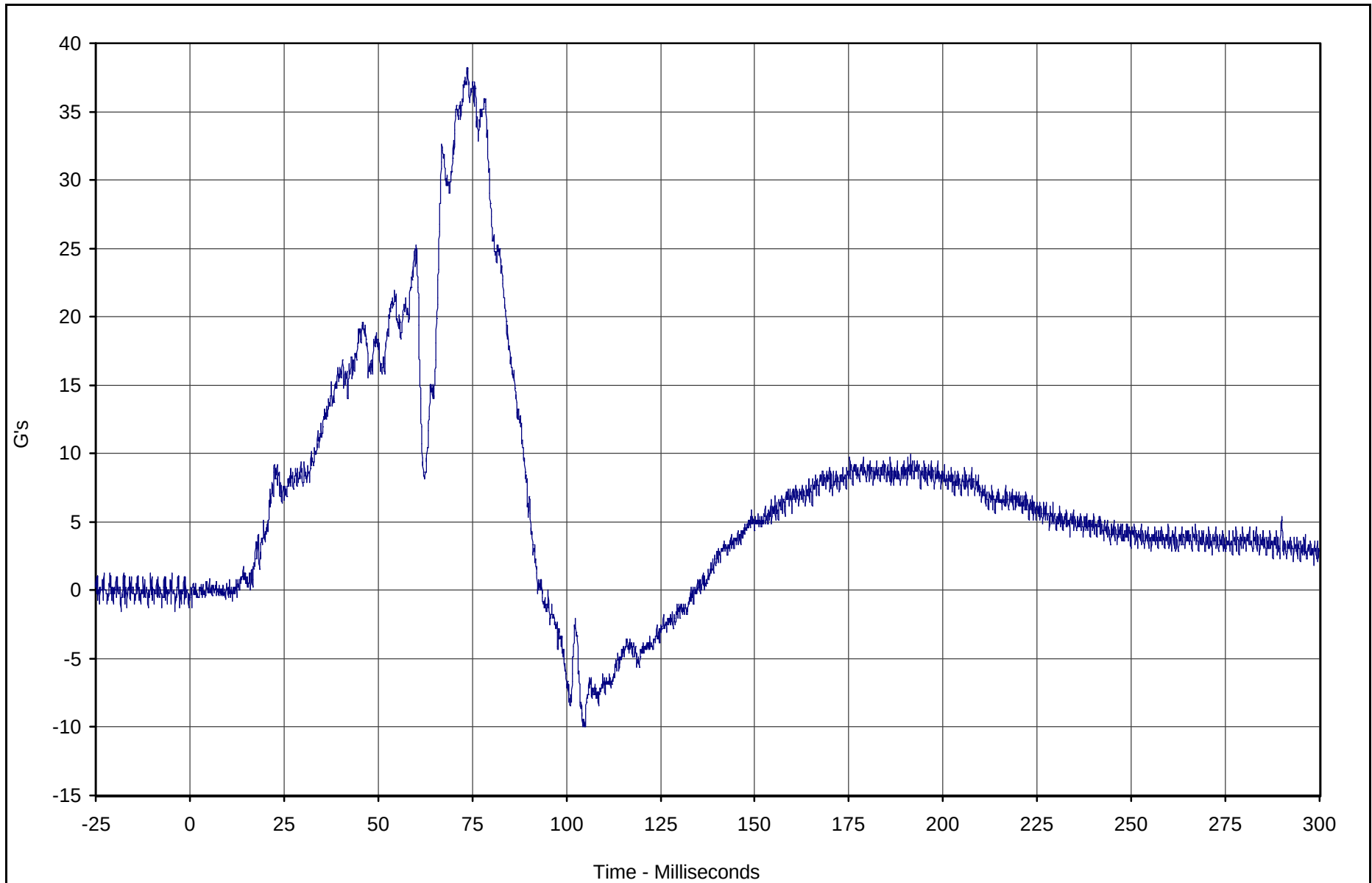


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Head Redundant Z | 050   | FIL  | G's   | 38.2 | 73.6 | -10.0 | 104.3 | 1000      |

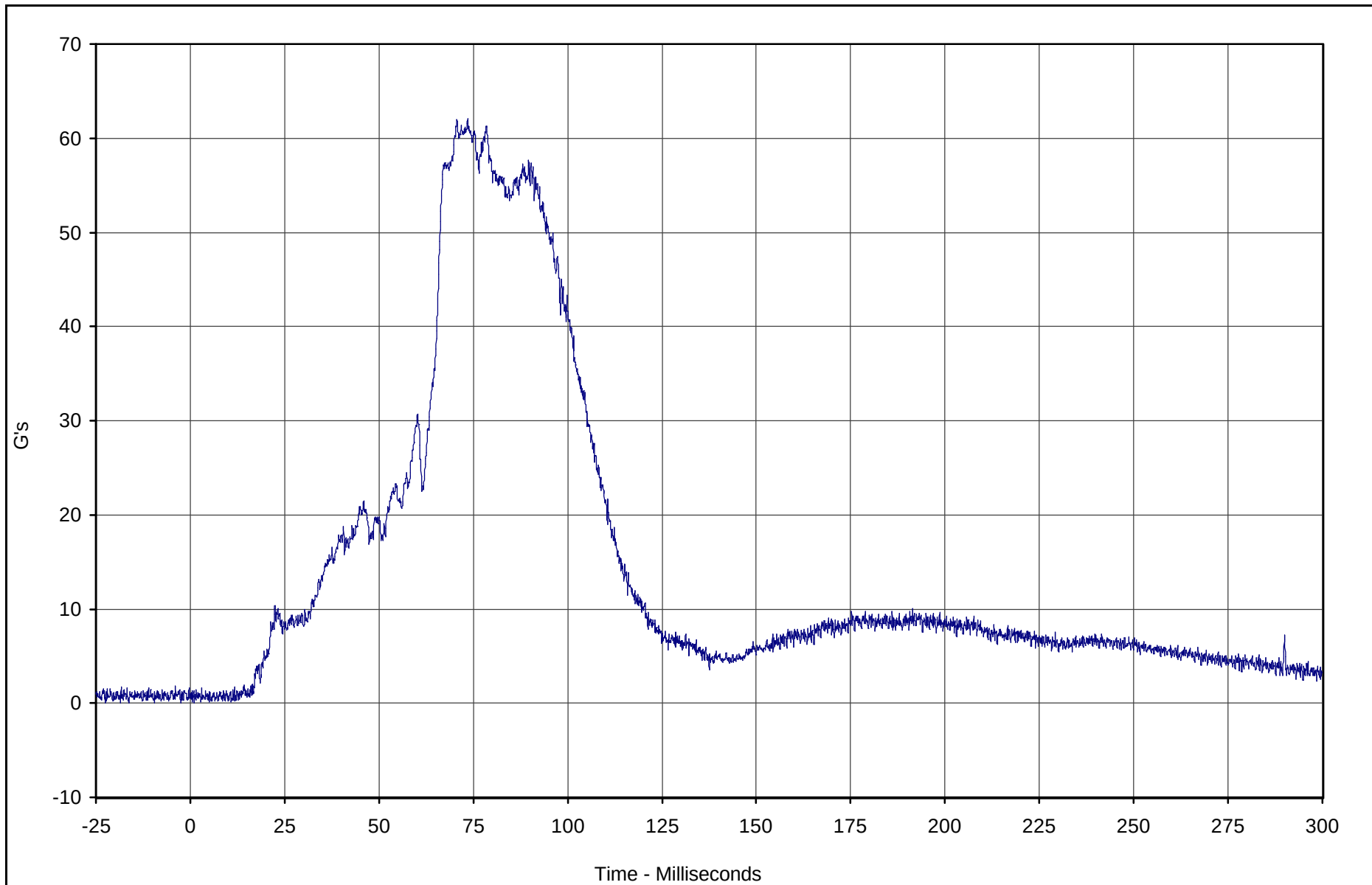


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Head Resultant Redundant | 048   | RES  | G's   | 62.1 | 73.6 | 0.0 | 1.1  | 1000      |



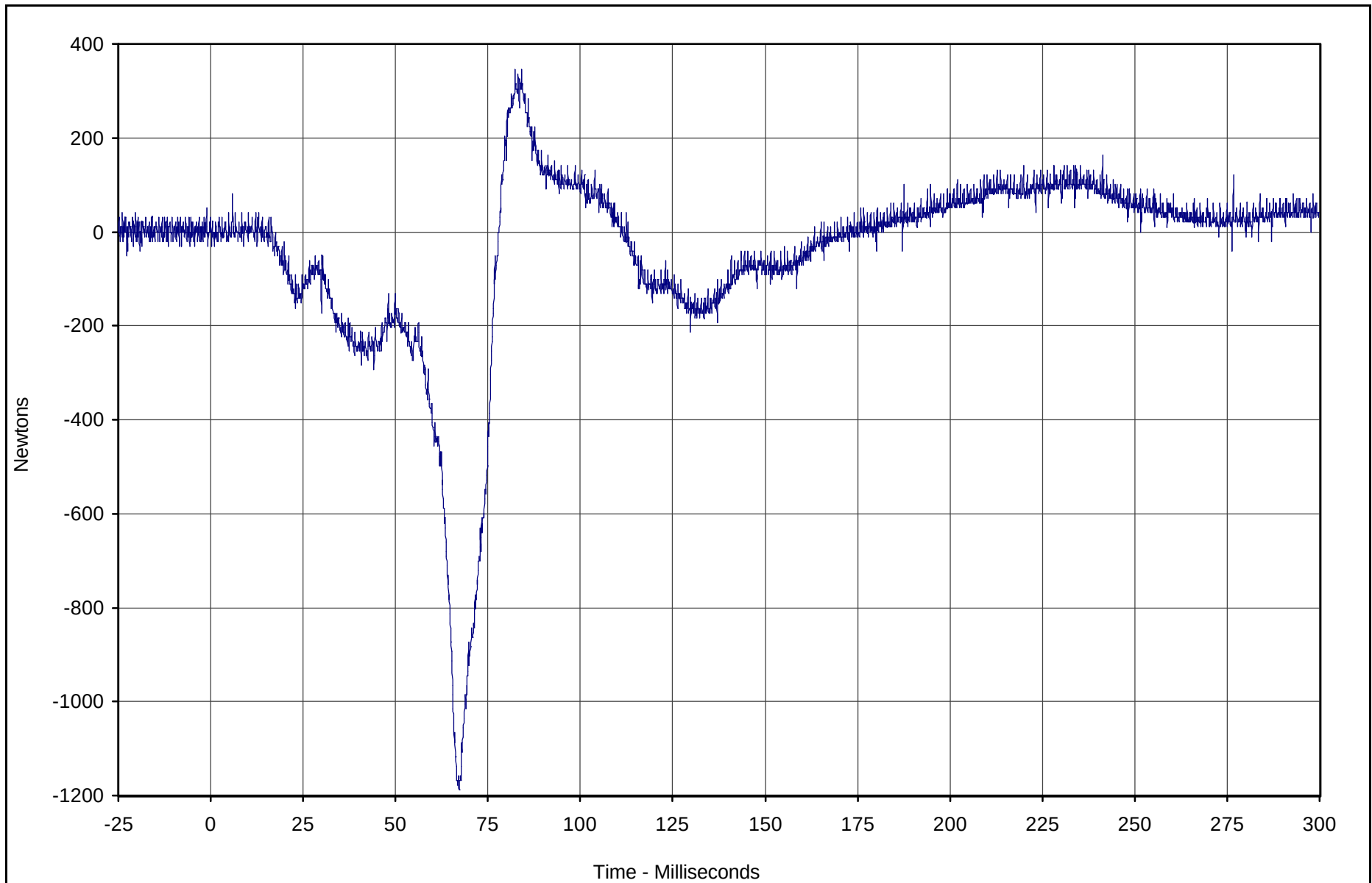
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description      | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Passenger Neck Force X | 051   | FIL  | Newtons | 345.3 | 82.3 | -1188.4 | 67.2 | 1000      |

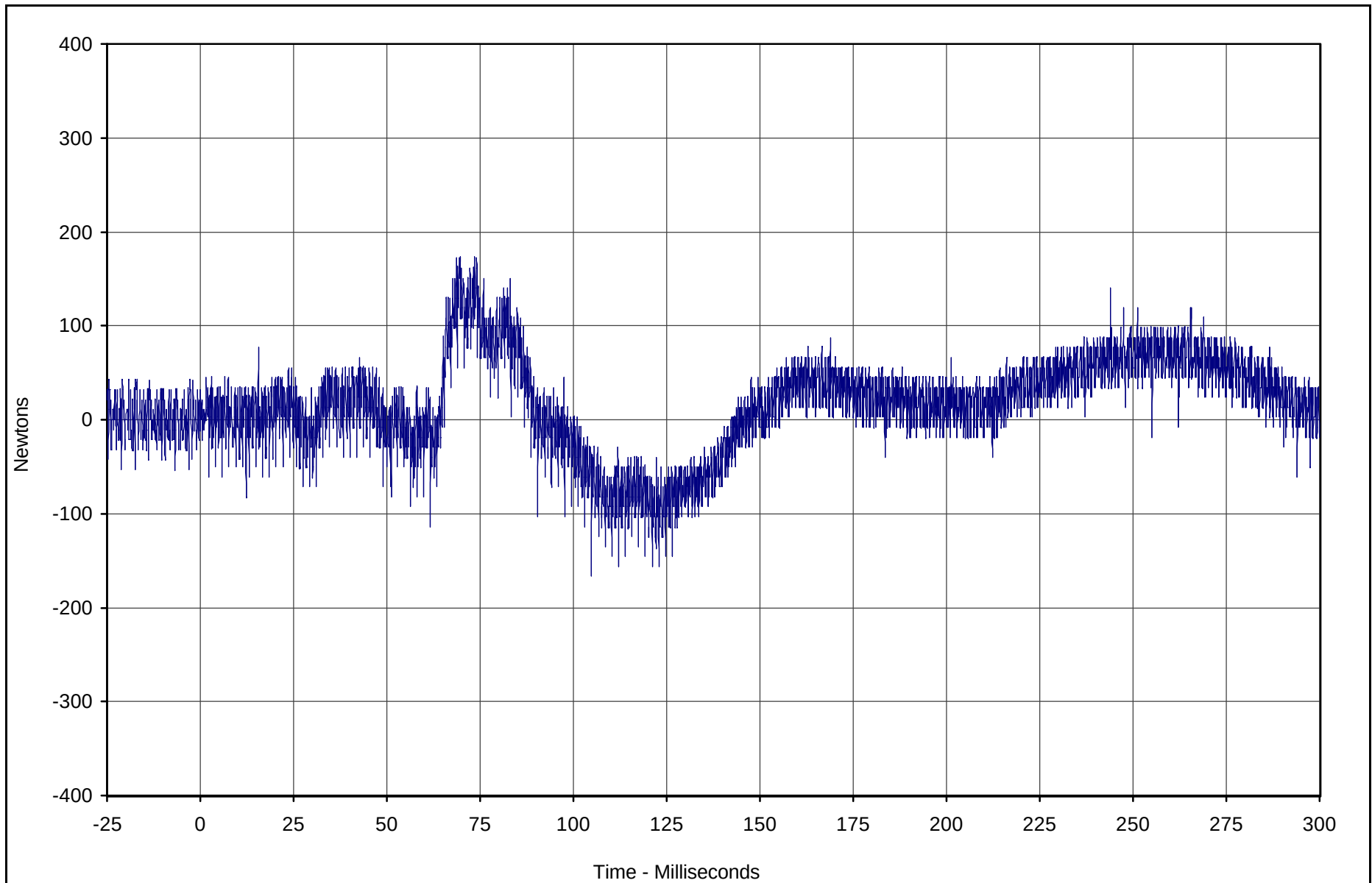


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description      | CURNO | Type | Units   | Max   | Time | Min    | Time  | SAE Class |
|------------------------|-------|------|---------|-------|------|--------|-------|-----------|
| Passenger Neck Force Y | 052   | FIL  | Newtons | 172.0 | 68.7 | -166.8 | 104.9 | 1000      |

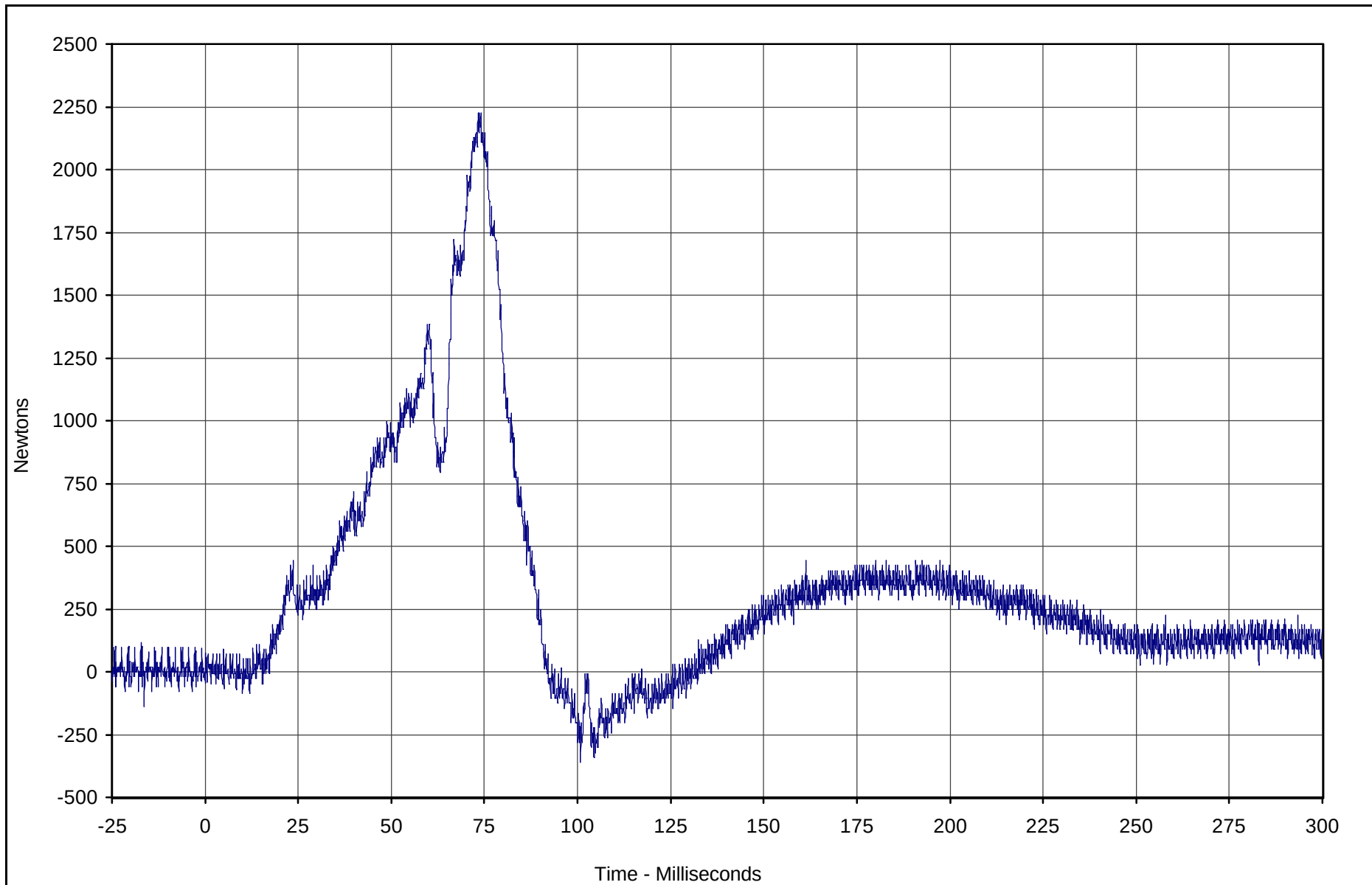


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description      | CURNO | Type | Units   | Max    | Time | Min    | Time  | SAE Class |
|------------------------|-------|------|---------|--------|------|--------|-------|-----------|
| Passenger Neck Force Z | 053   | FIL  | Newtons | 2226.8 | 73.3 | -360.9 | 100.8 | 1000      |

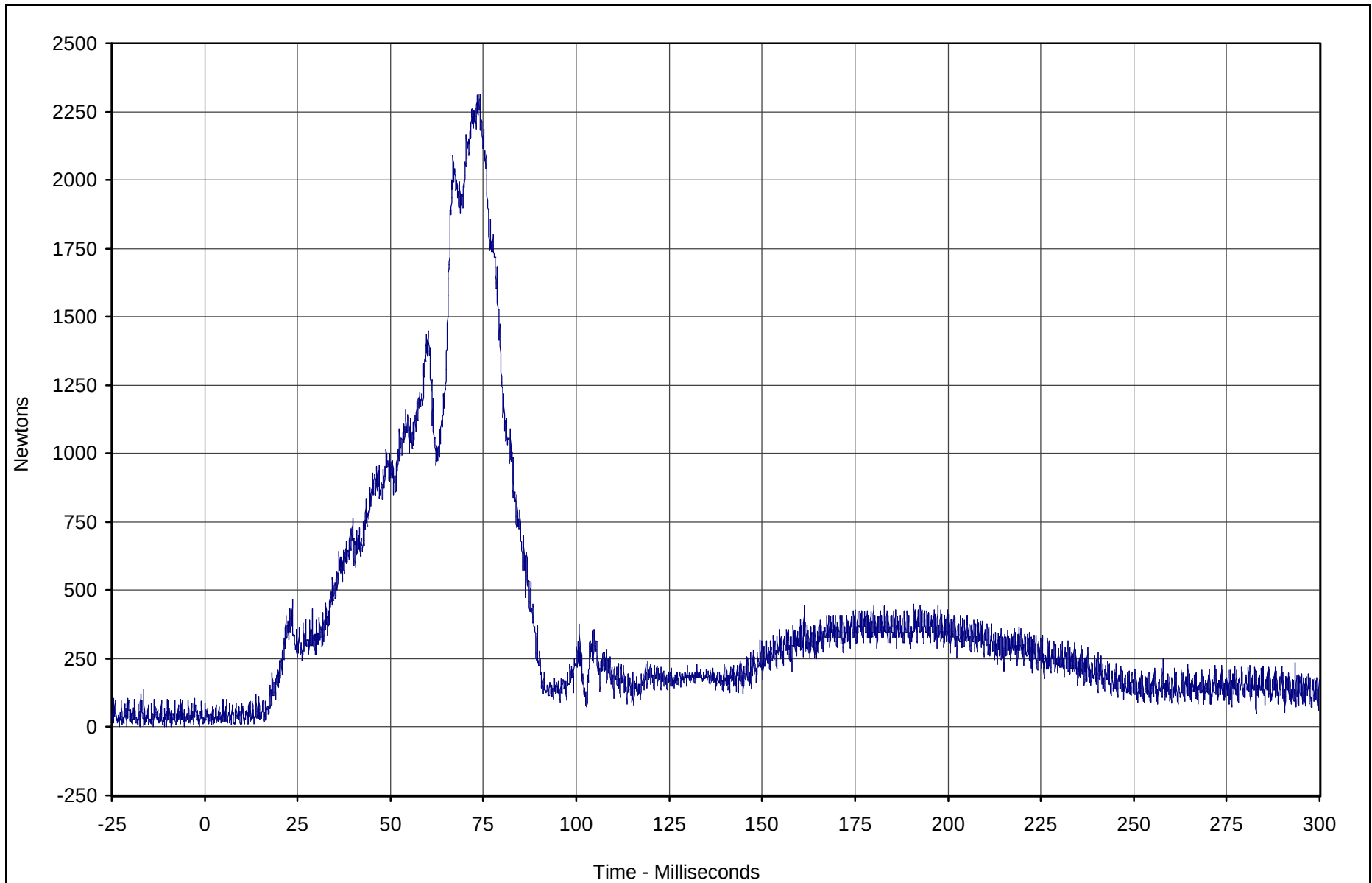


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description              | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|--------------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Passenger Neck Force Resultant | 051   | RES  | Newtons | 2314.3 | 74.0 | 8.4 | 1.9  | 1000      |



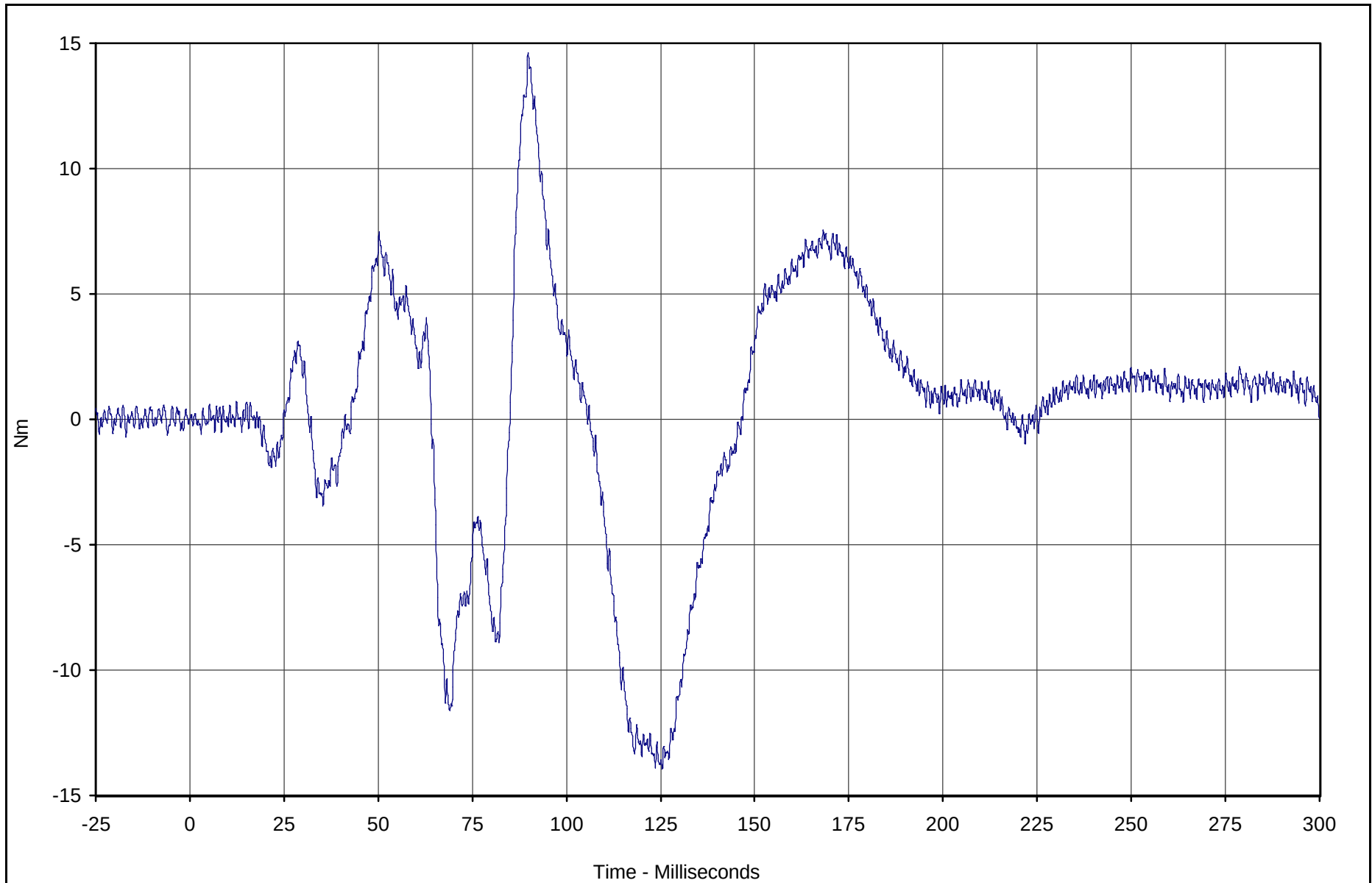
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description       | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Neck Moment X | 054   | FIL  | Nm    | 14.6 | 89.9 | -14.0 | 125.4 | 600       |

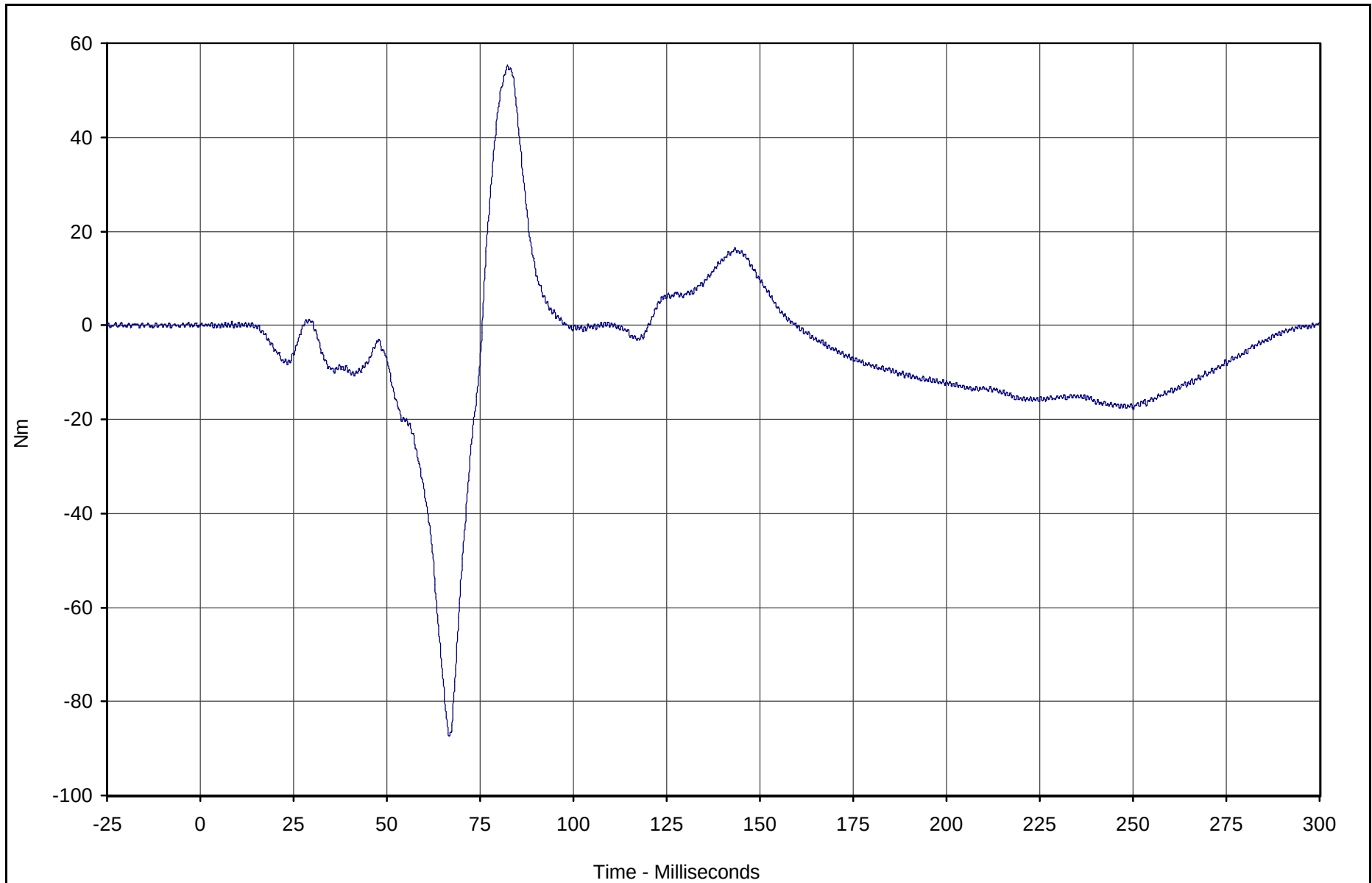


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Neck Moment Y | 055   | FIL  | Nm    | 55.4 | 82.3 | -87.3 | 66.6 | 600       |

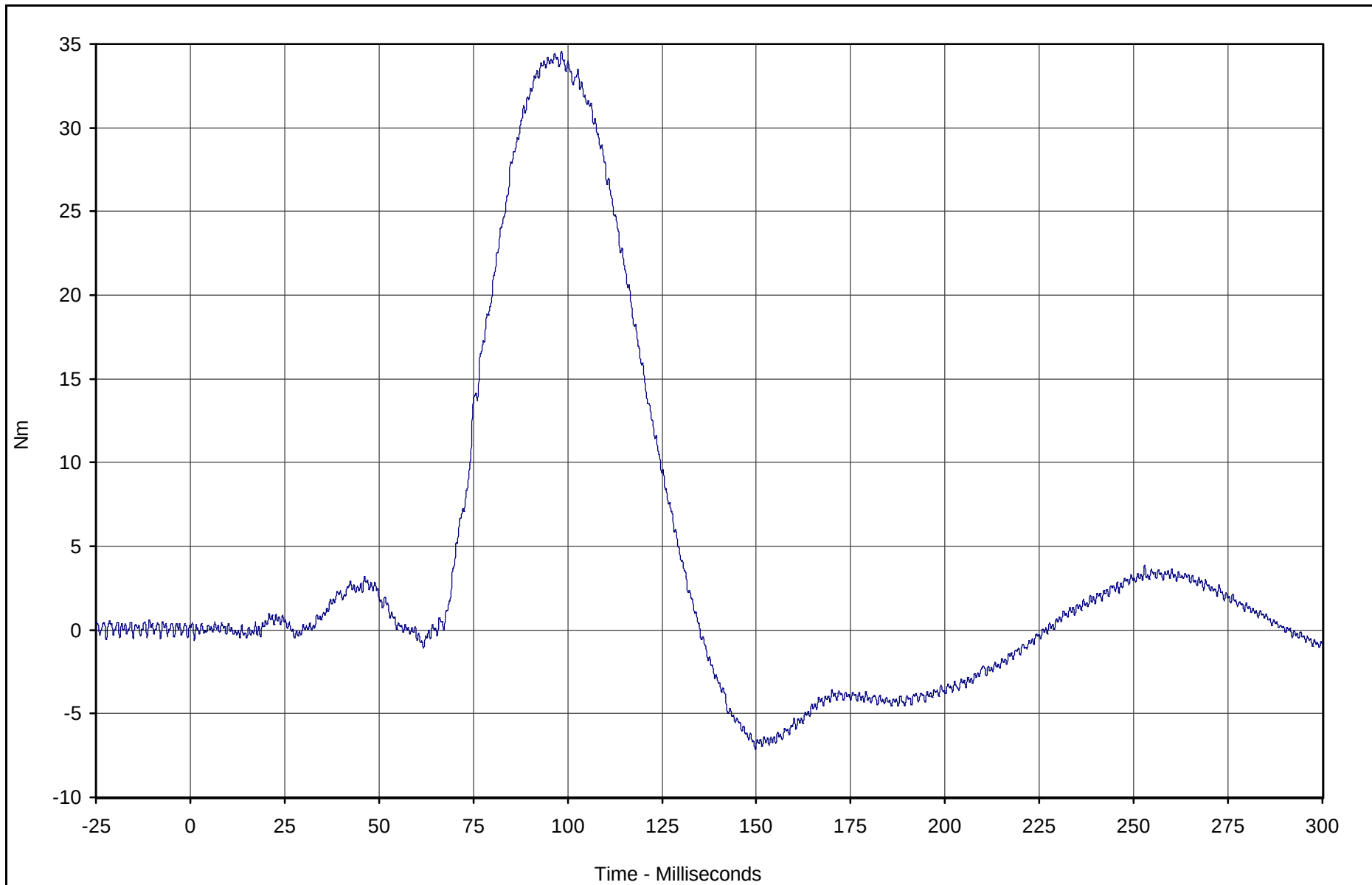


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|-------------------------|-------|------|-------|------|------|------|-------|-----------|
| Passenger Neck Moment Z | 056   | FIL  | Nm    | 34.6 | 98.4 | -7.1 | 149.7 | 600       |

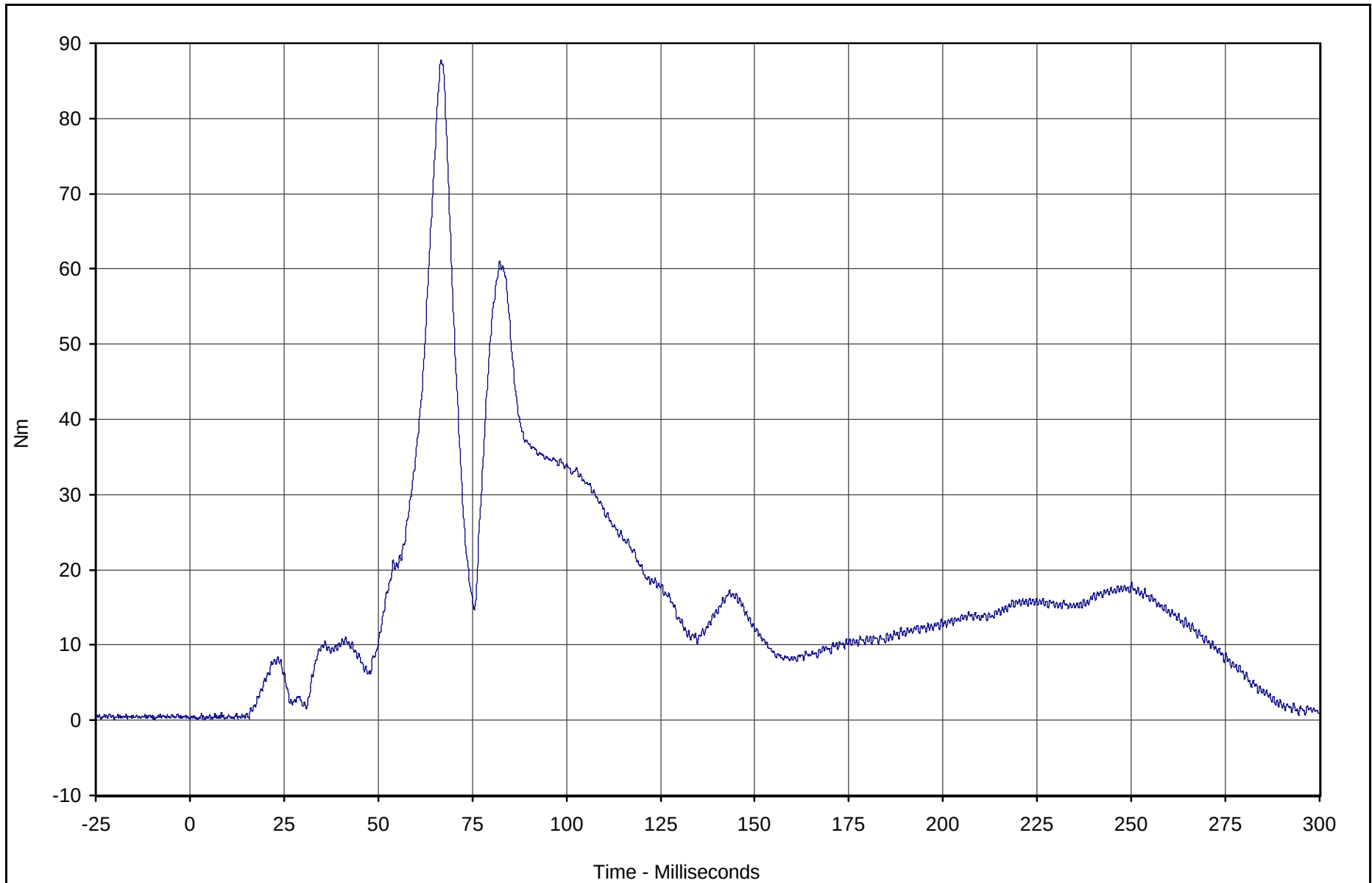


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Neck Moment Resultant | 054   | RES  | Nm    | 87.8 | 66.7 | 0.1 | 3.8  | 600       |



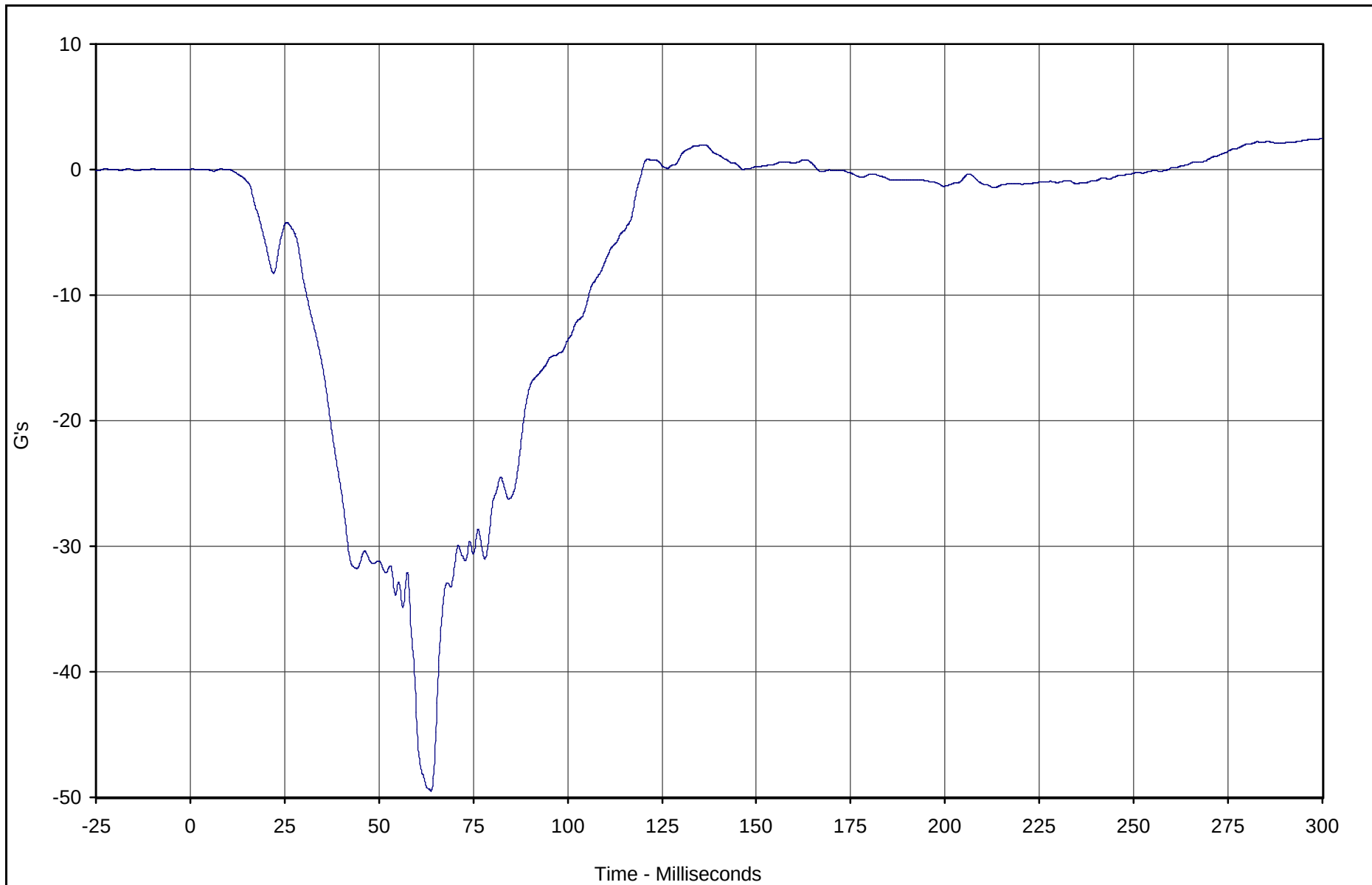
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description         | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Chest Primary X | 057   | FIL  | G's   | 2.5 | 299.9 | -49.5 | 63.8 | 180       |

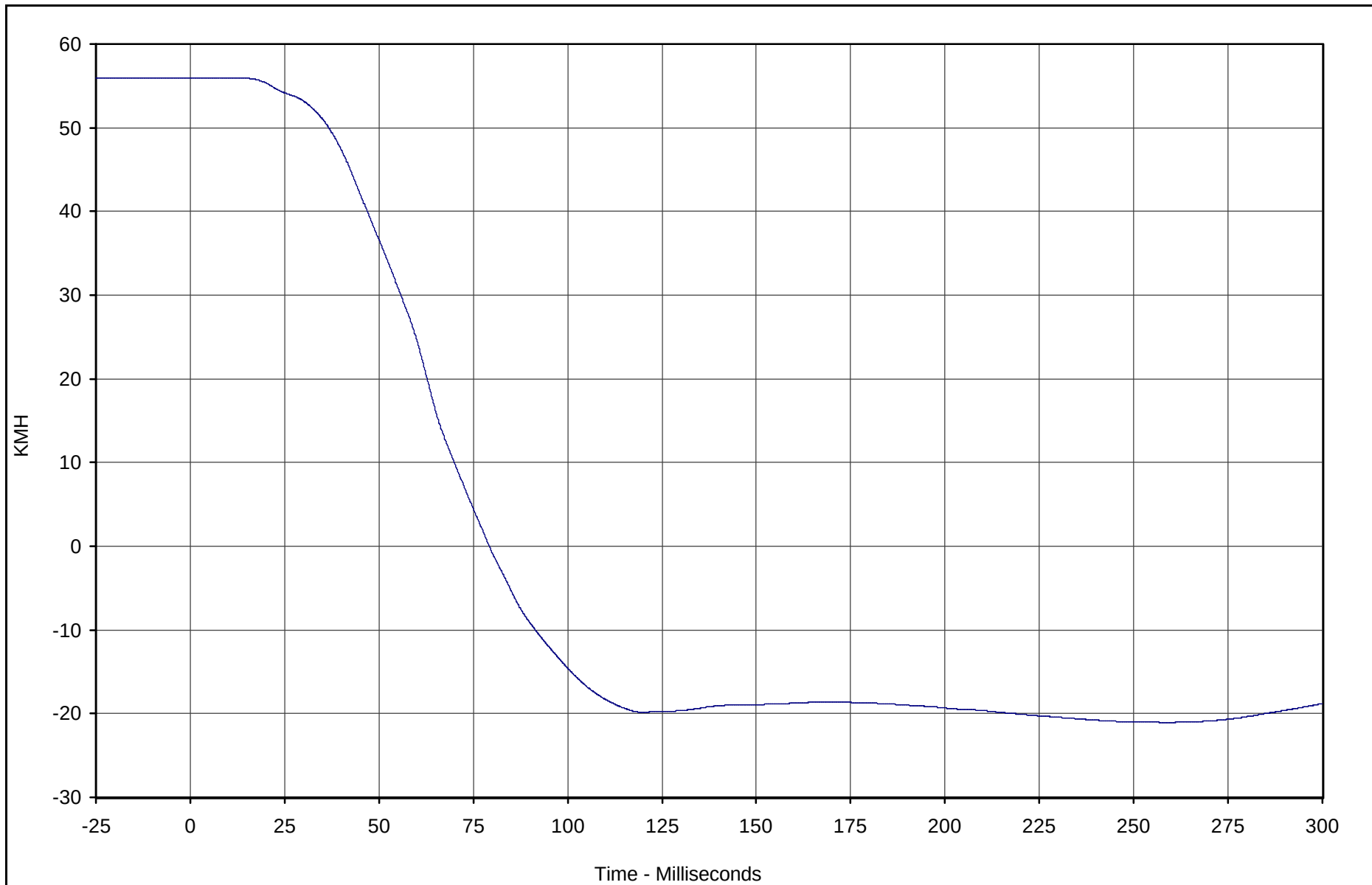


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Primary X Velocity | 057   | IN1  | KMH   | 56.0 | 4.6  | -21.0 | 259.2 | 180       |

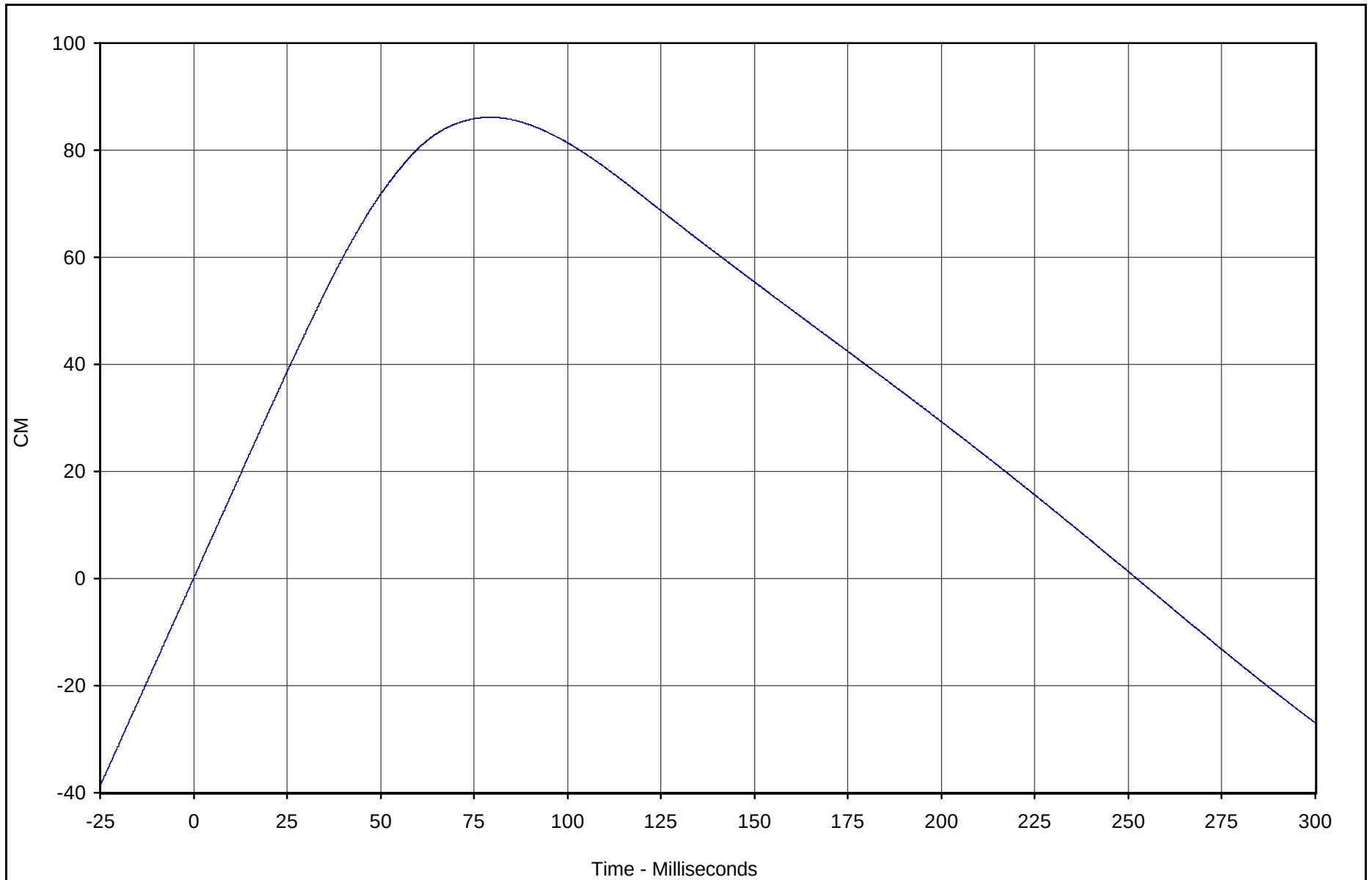


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|----------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Primary X Displ. | 057   | IN2  | CM    | 86.1 | 79.3 | -26.9 | 299.9 | 180       |

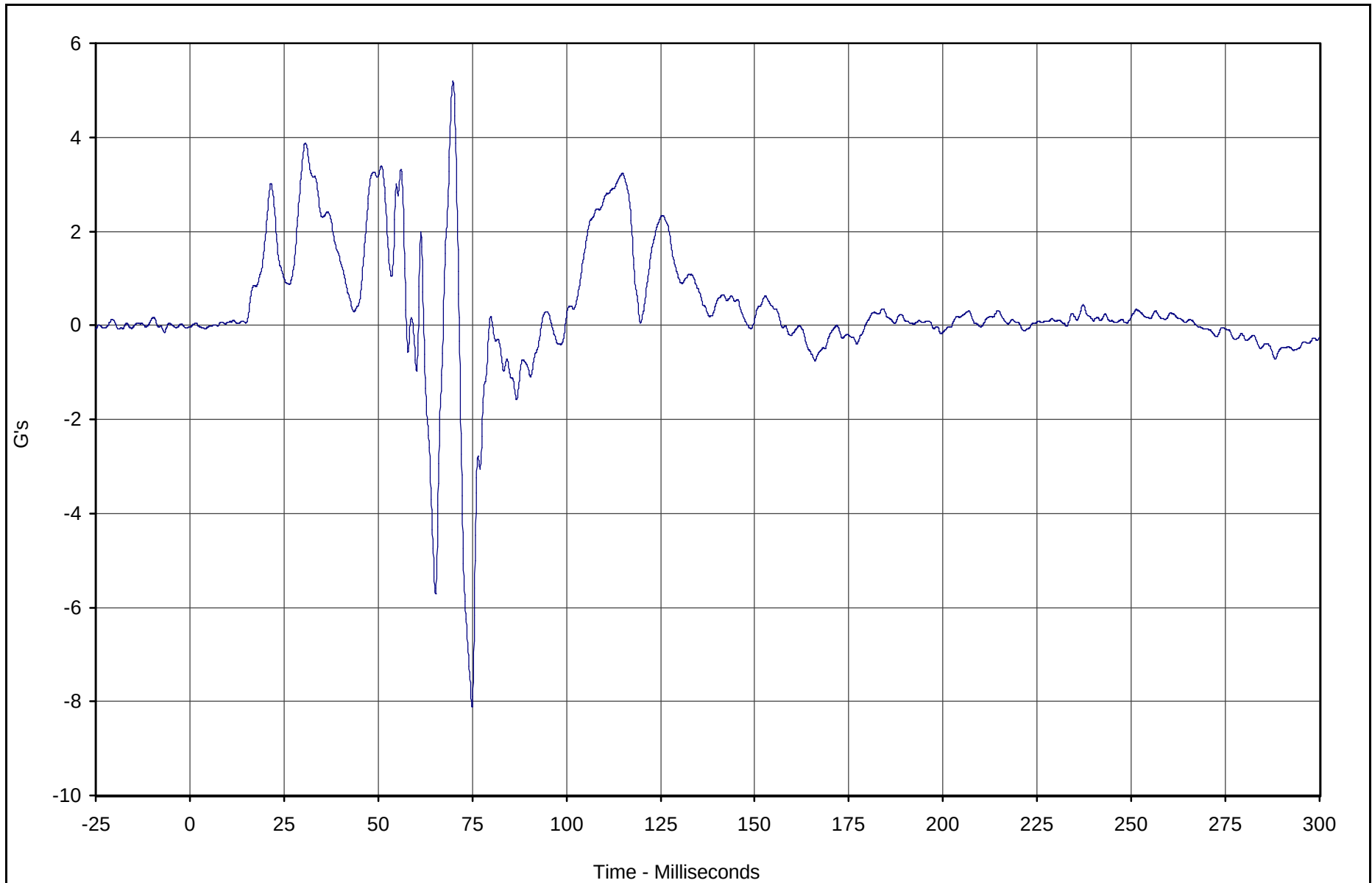


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|---------------------------|-------|------|-------|-----|------|------|------|-----------|
| Passenger Chest Primary Y | 058   | FIL  | G's   | 5.2 | 69.9 | -8.1 | 75.0 | 180       |



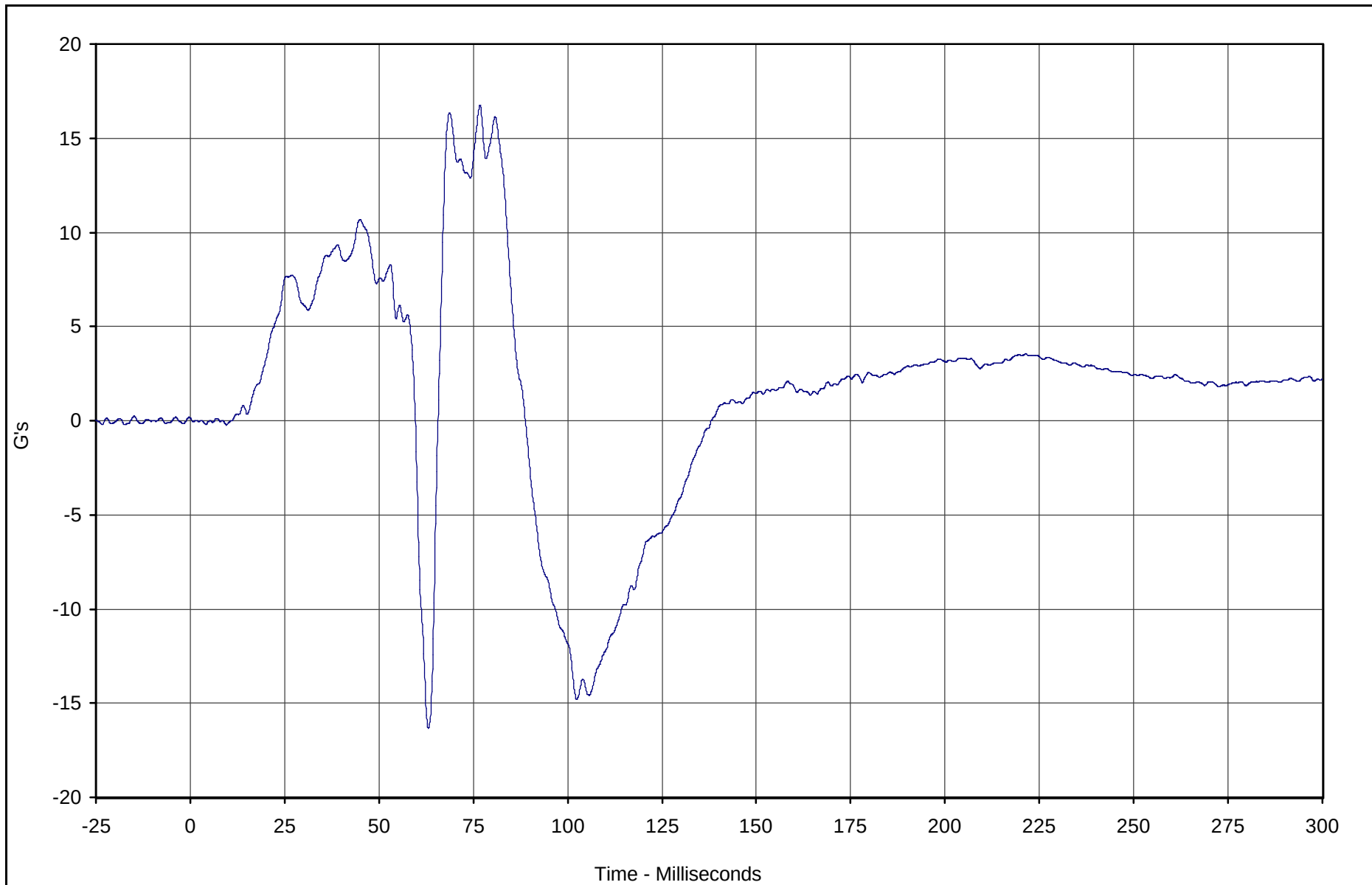
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description         | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Chest Primary Z | 059   | FIL  | G's   | 16.8 | 76.8 | -16.3 | 63.1 | 180       |

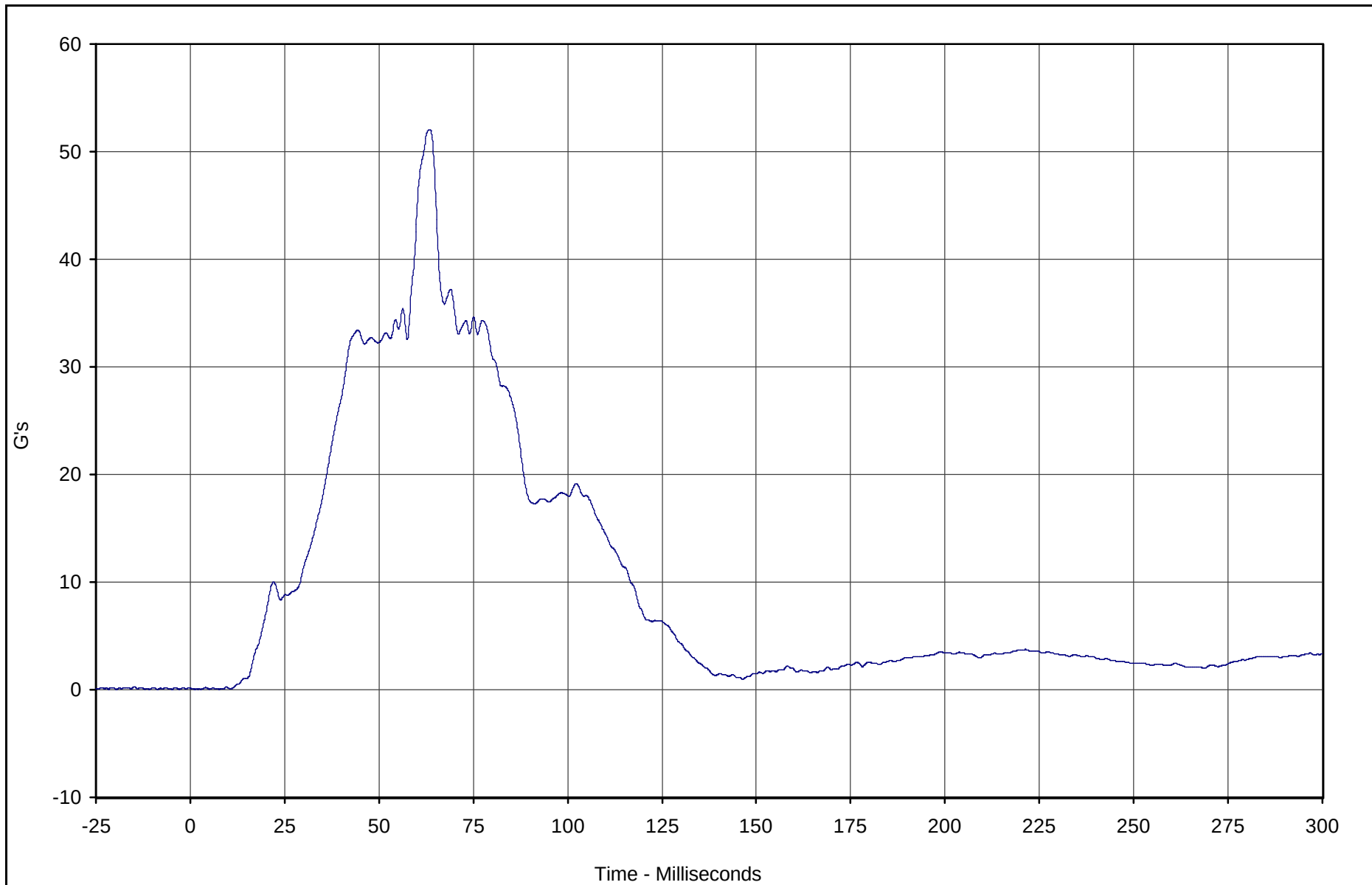


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Chest Resultant Primary | 057   | RES  | G's   | 52.0 | 63.4 | 0.0 | 7.6  | 180       |

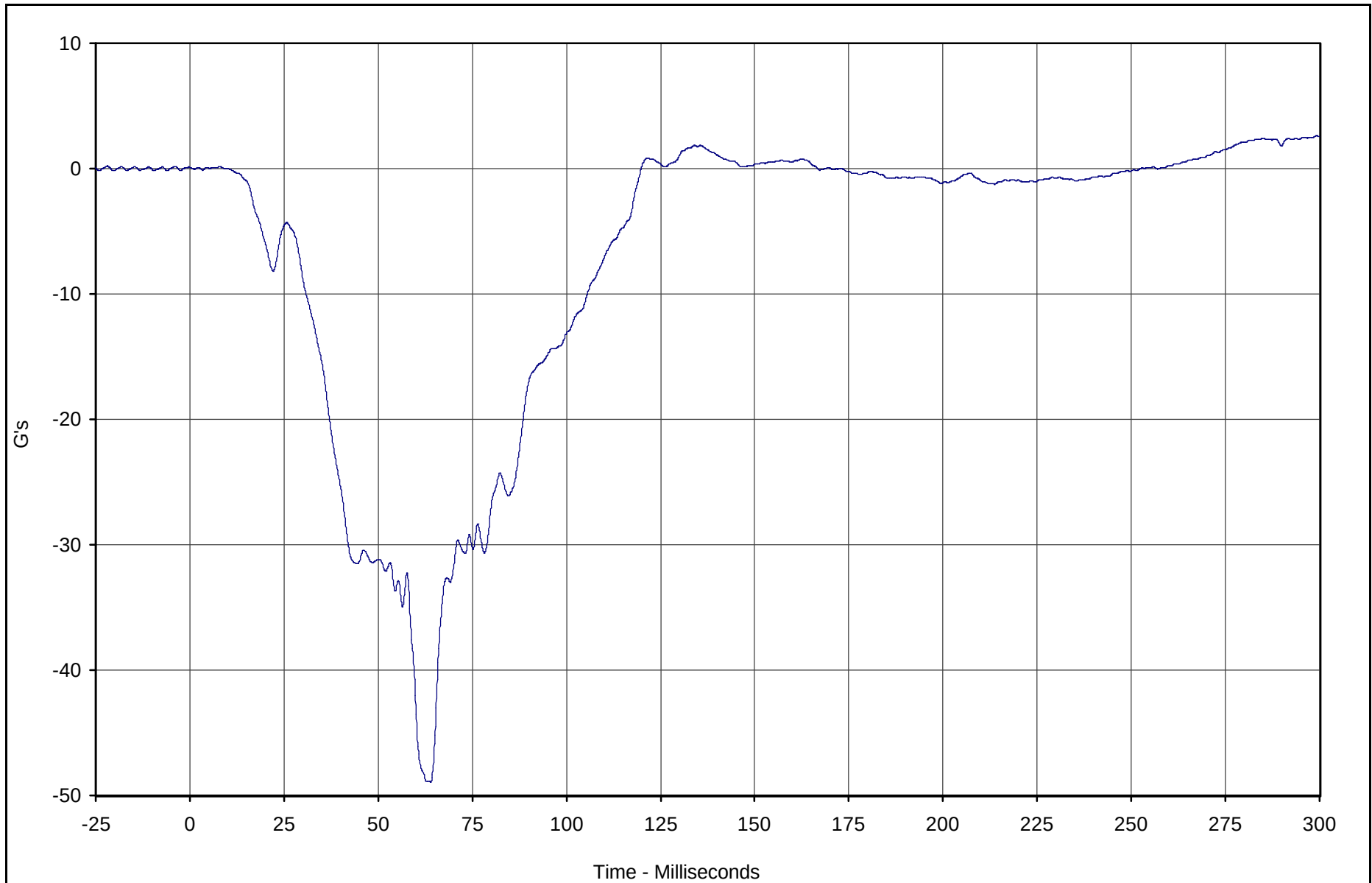


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Chest Redundant X | 060   | FIL  | G's   | 2.6 | 299.2 | -48.9 | 63.9 | 180       |

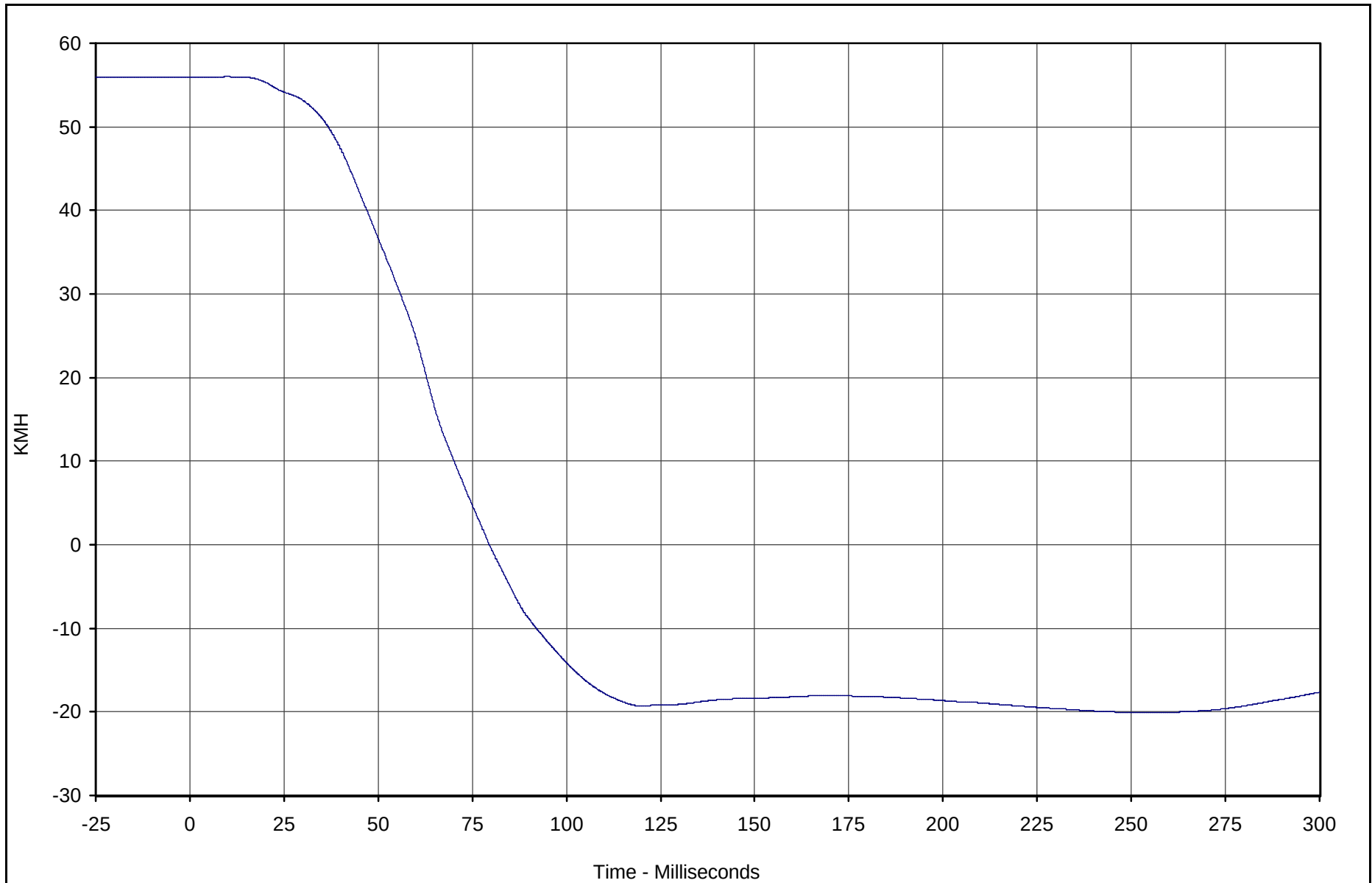


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Redundant X Velocity | 060   | IN1  | KMH   | 56.0 | 10.1 | -20.1 | 252.3 | 180       |



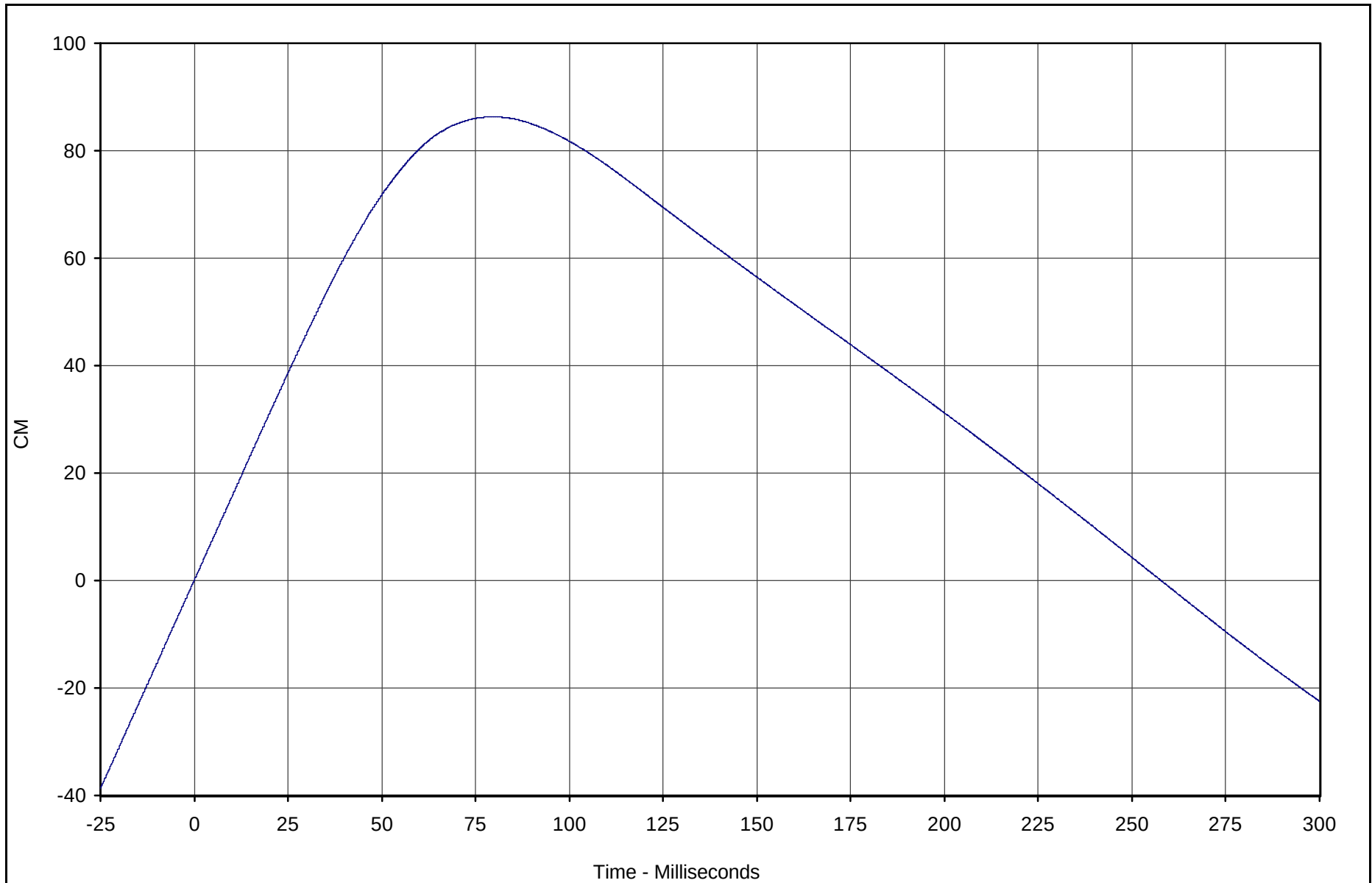
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                  | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Chest Redundant X Displ. | 060   | IN2  | CM    | 86.3 | 79.5 | -22.4 | 299.9 | 180       |

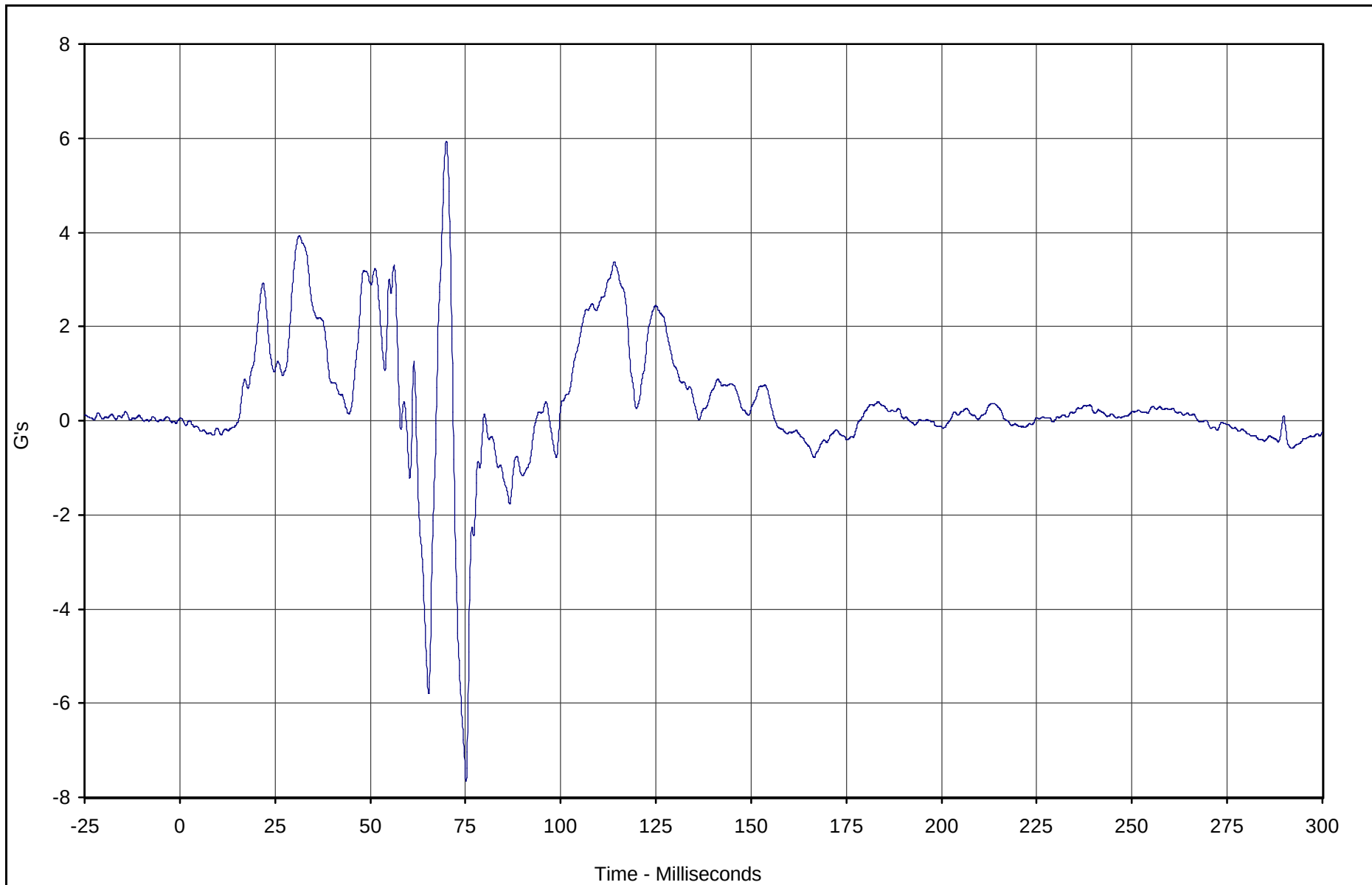


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|------|------|------|-----------|
| Passenger Chest Redundant Y | 061   | FIL  | G's   | 5.9 | 70.0 | -7.7 | 75.2 | 180       |

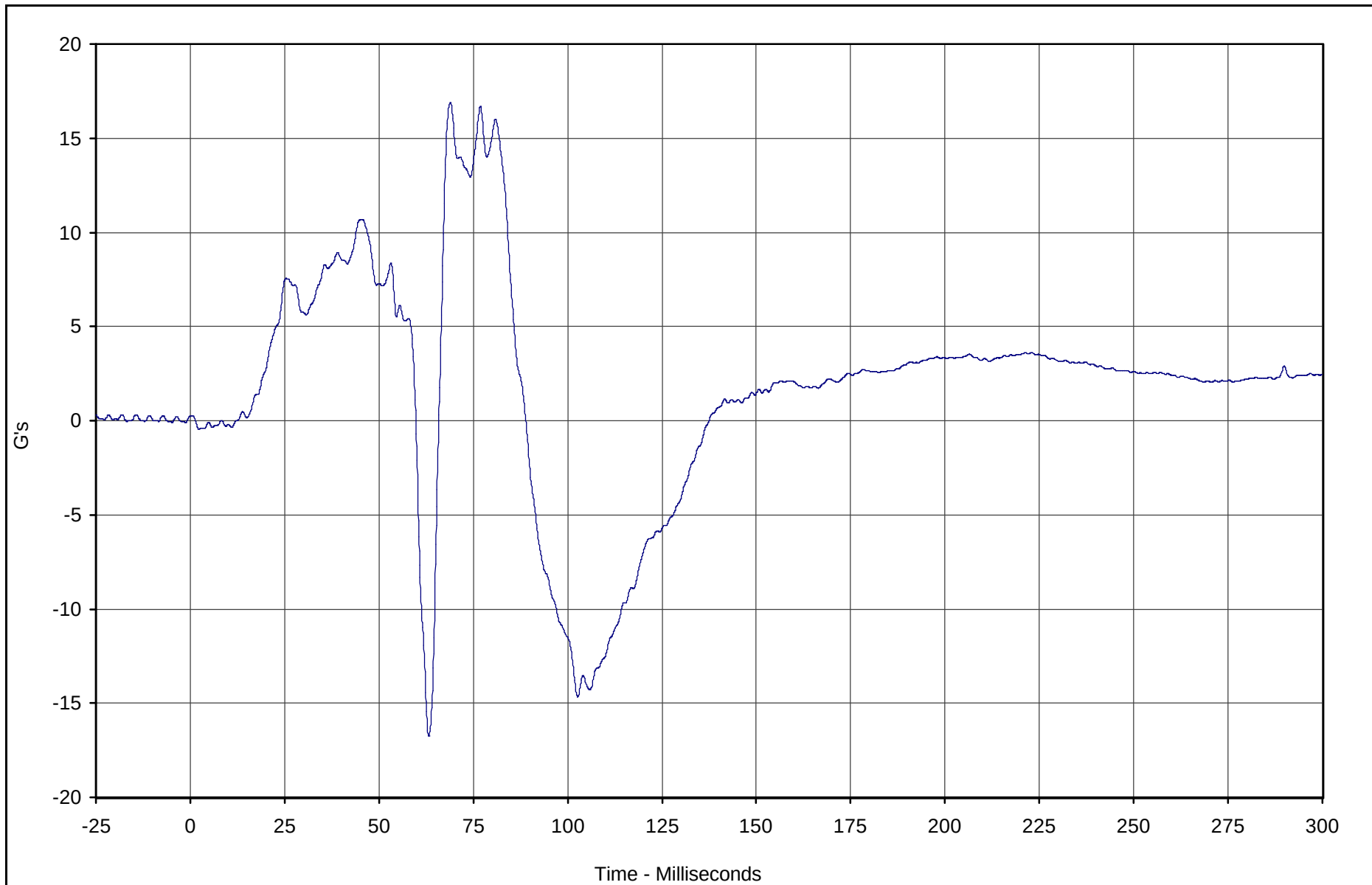


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Chest Redundant Z | 062   | FIL  | G's   | 16.9 | 68.9 | -16.8 | 63.2 | 180       |

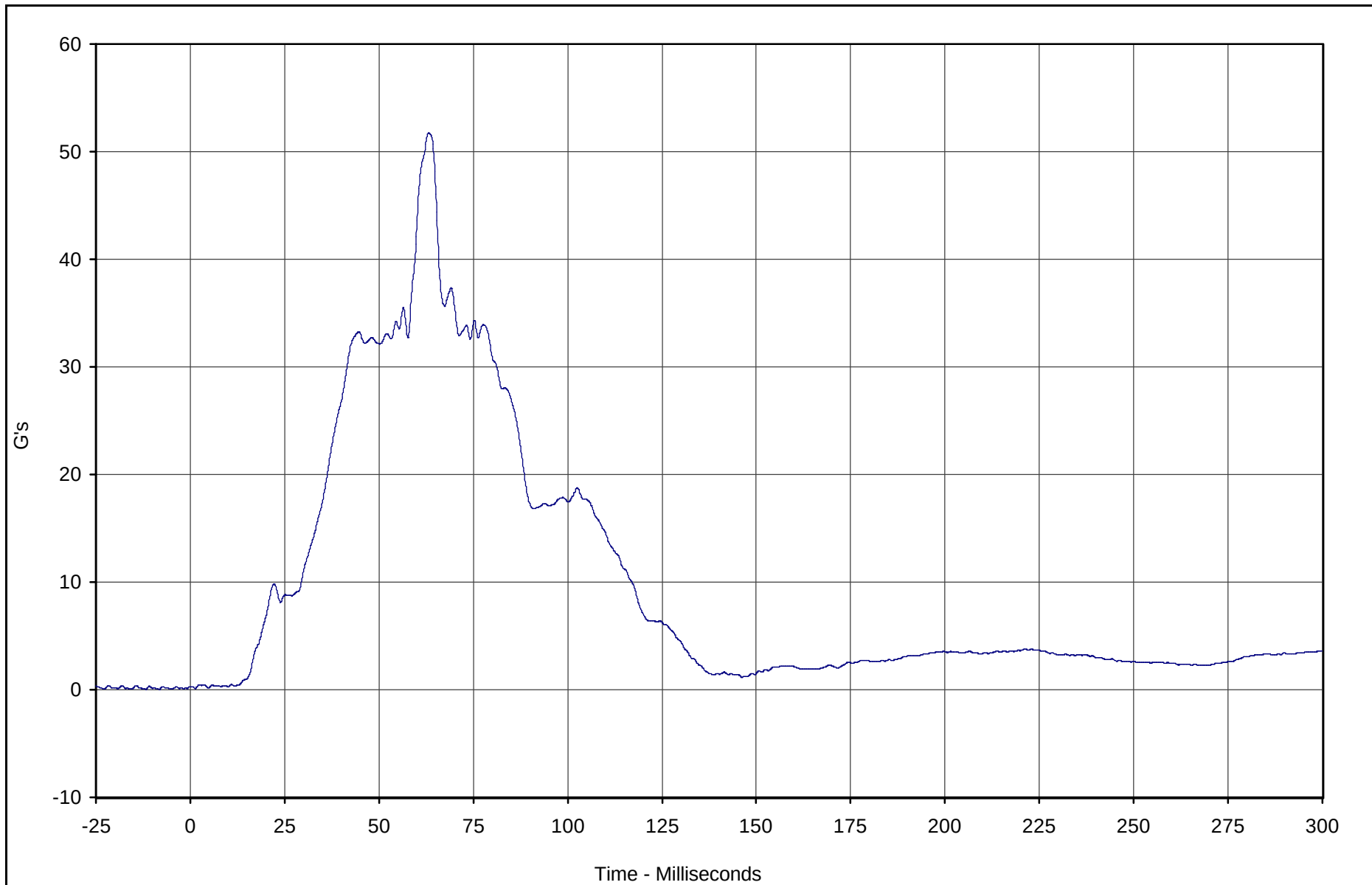


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Chest Resultant Redundant | 060   | RES  | G's   | 51.7 | 63.2 | 0.1 | 1.3  | 180       |



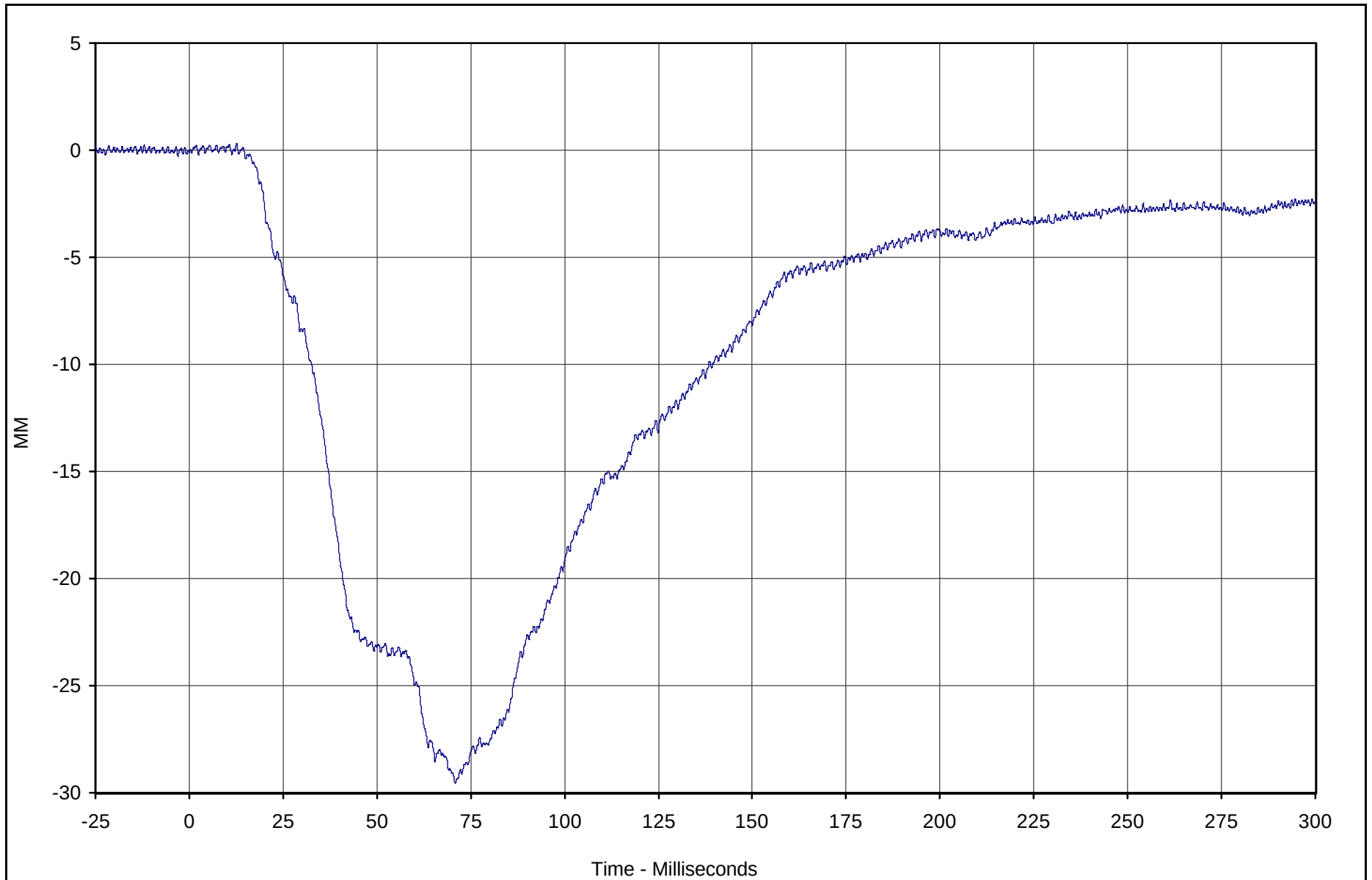
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description              | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Chest Displacement X | 063   | FIL  | MM    | 0.3 | 12.7 | -29.6 | 70.8 | 600       |

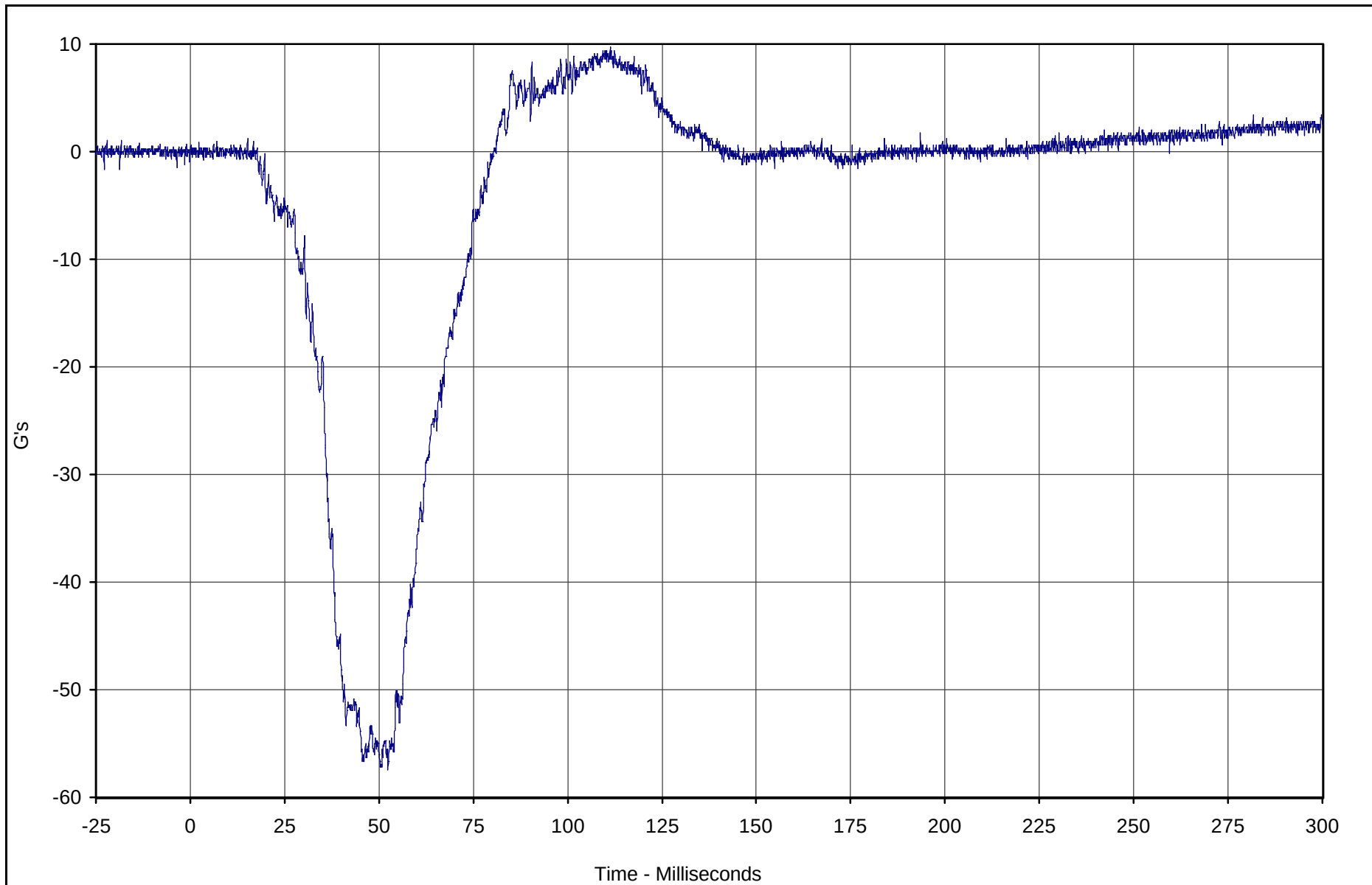


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description  | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Pelvis X | 064   | FIL  | G's   | 9.7 | 111.3 | -57.4 | 52.4 | 1000      |

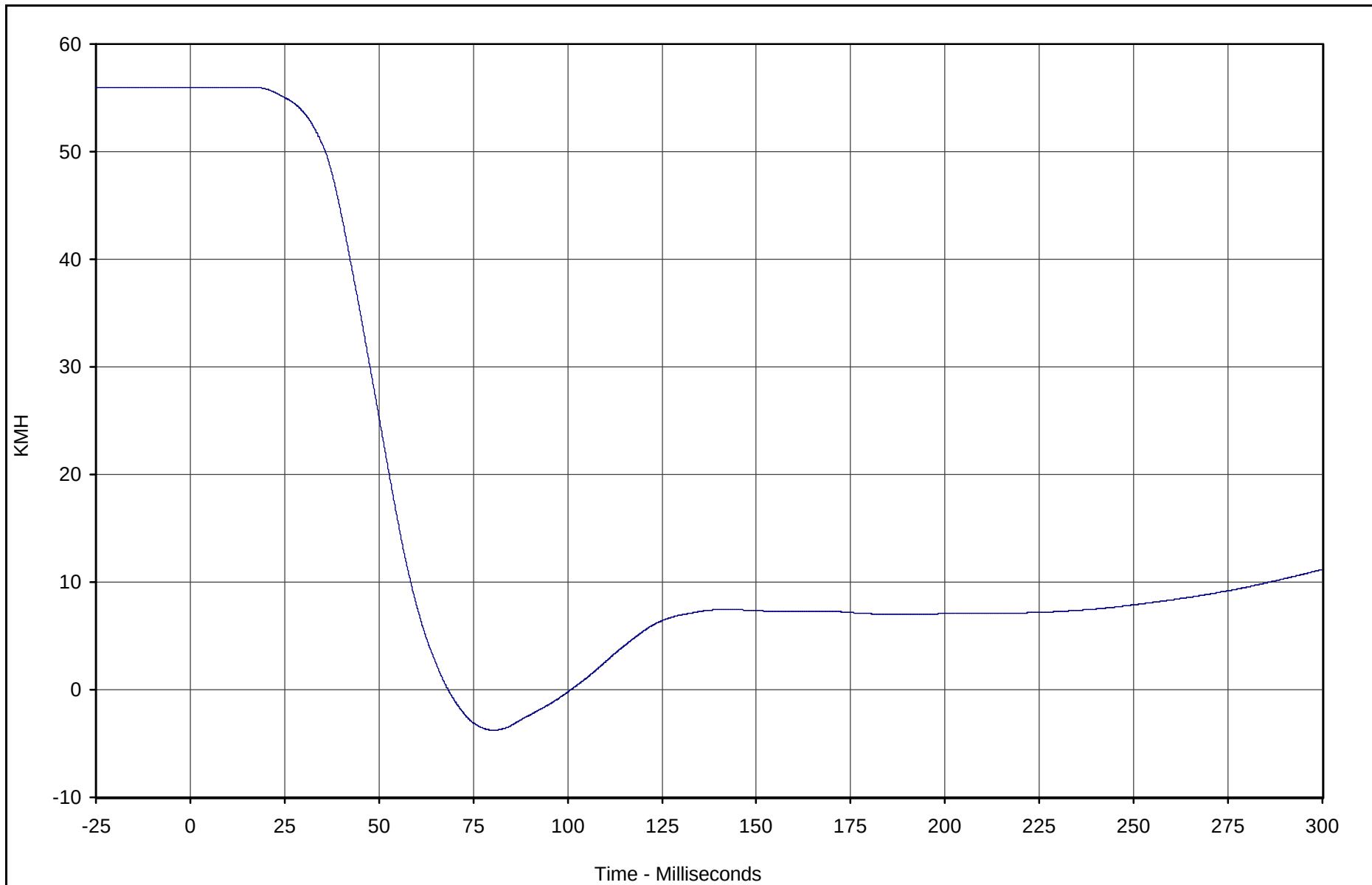


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Pelvis X Velocity | 064   | IN1  | KMH   | 56.0 | 12.5 | -3.8 | 80.5 | 180       |

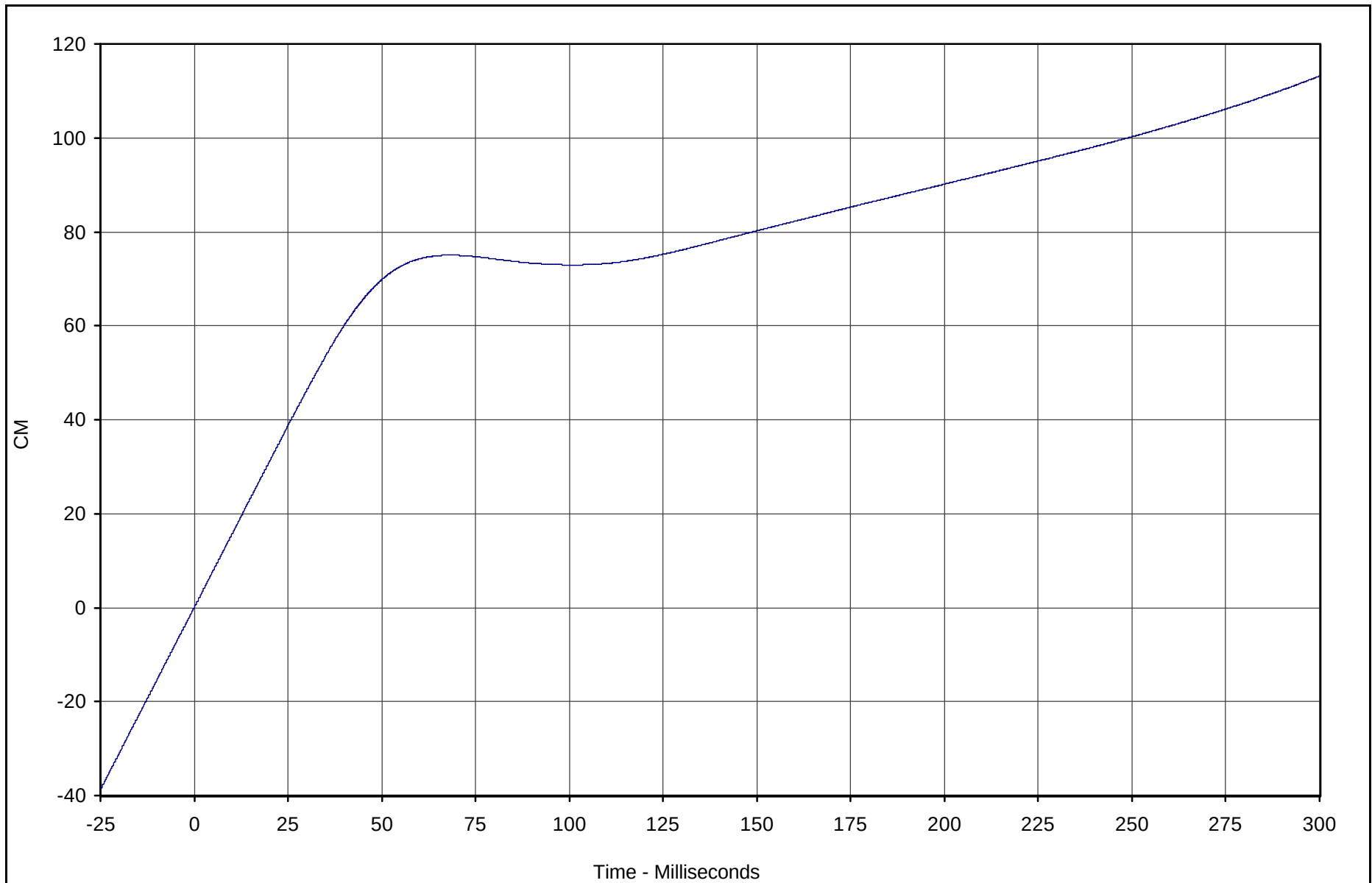


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max   | Time  | Min | Time | SAE Class |
|---------------------------|-------|------|-------|-------|-------|-----|------|-----------|
| Passenger Pelvis X Displ. | 064   | IN2  | CM    | 113.1 | 299.9 | 0.0 | 0.0  | 180       |



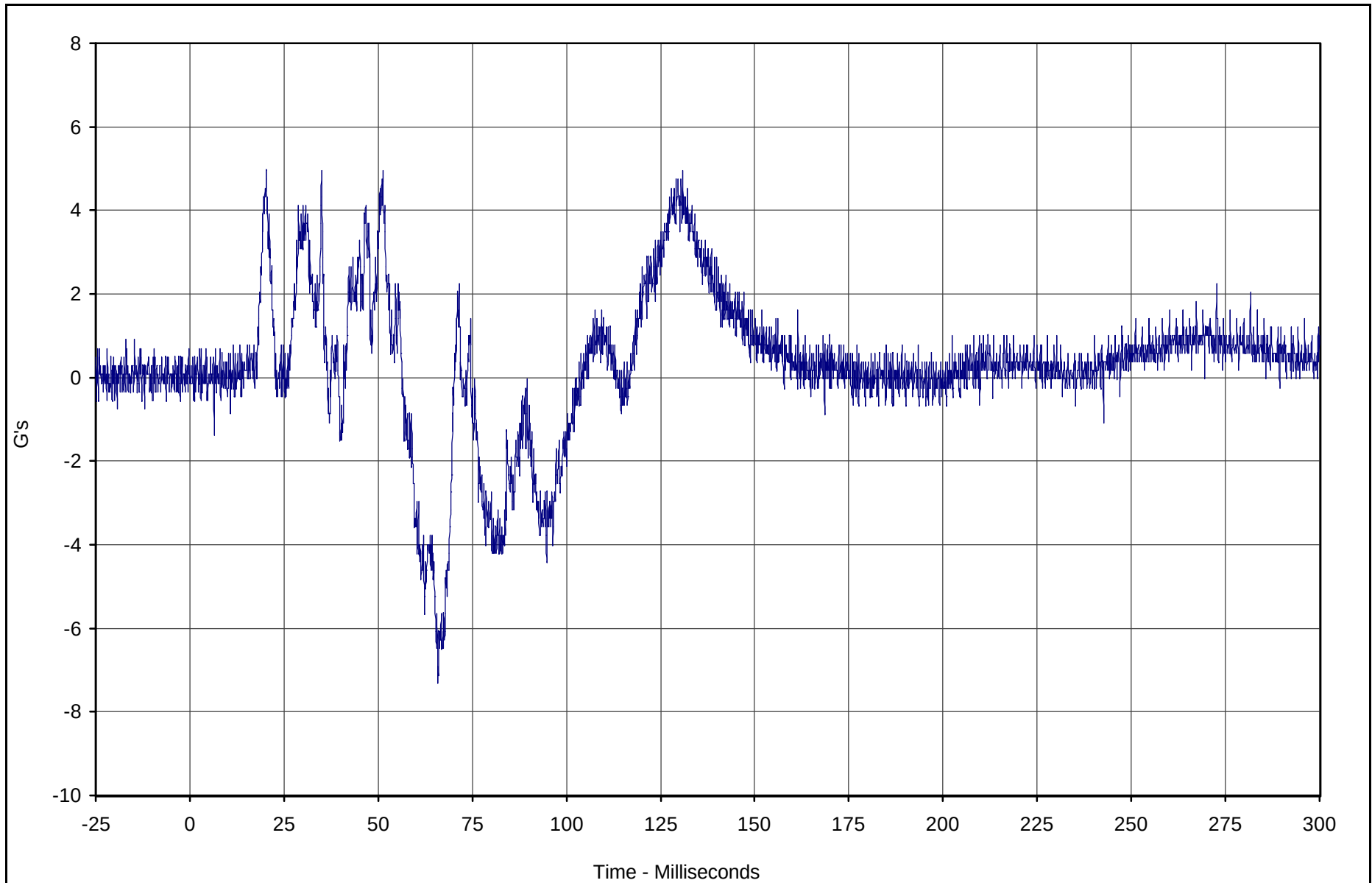
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description  | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|--------------------|-------|------|-------|-----|------|------|------|-----------|
| Passenger Pelvis Y | 065   | FIL  | G's   | 4.9 | 20.4 | -7.3 | 65.8 | 1000      |

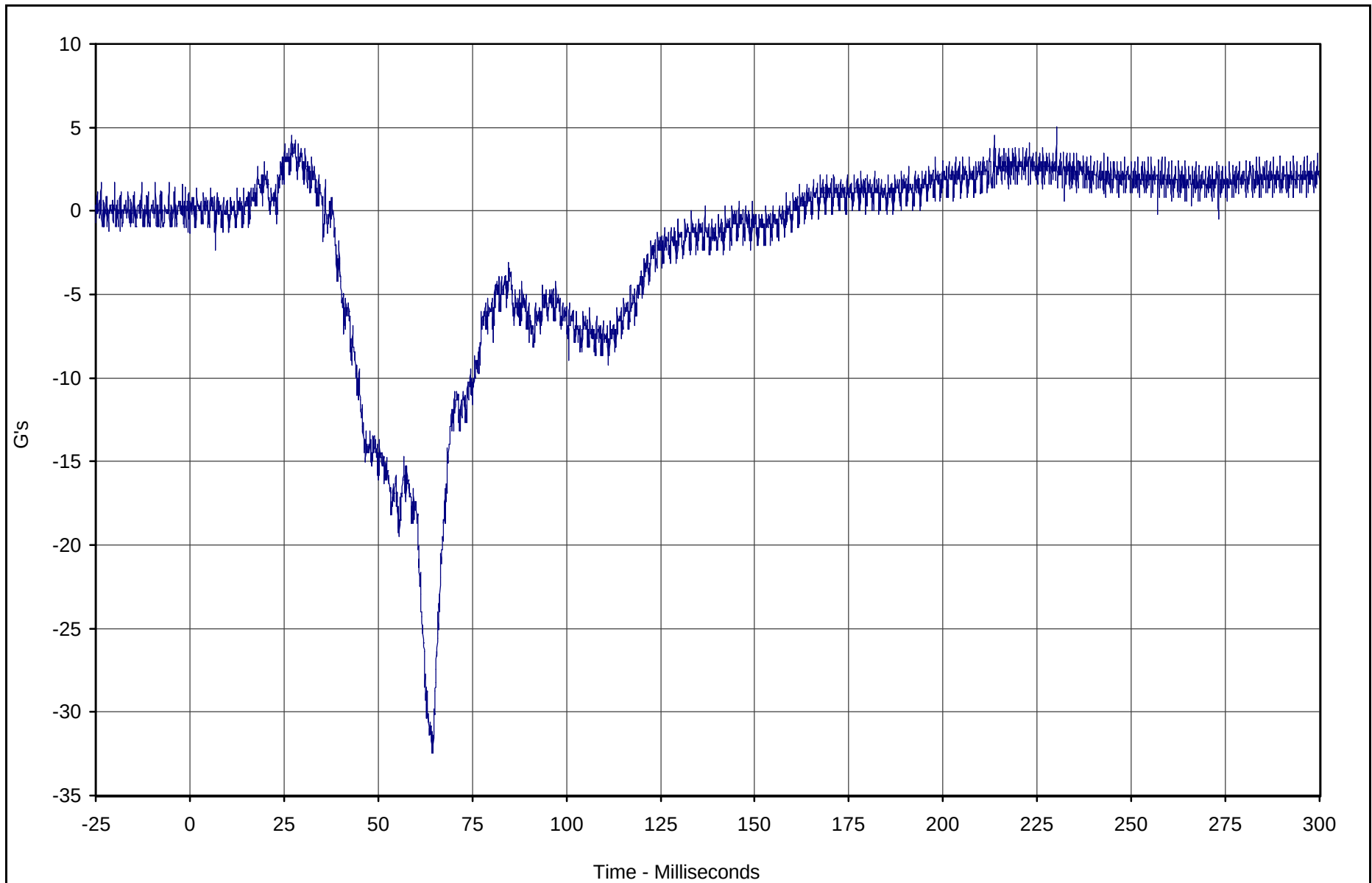


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description  | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|--------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Passenger Pelvis Z | 066   | FIL  | G's   | 5.1 | 230.1 | -32.5 | 64.2 | 1000      |

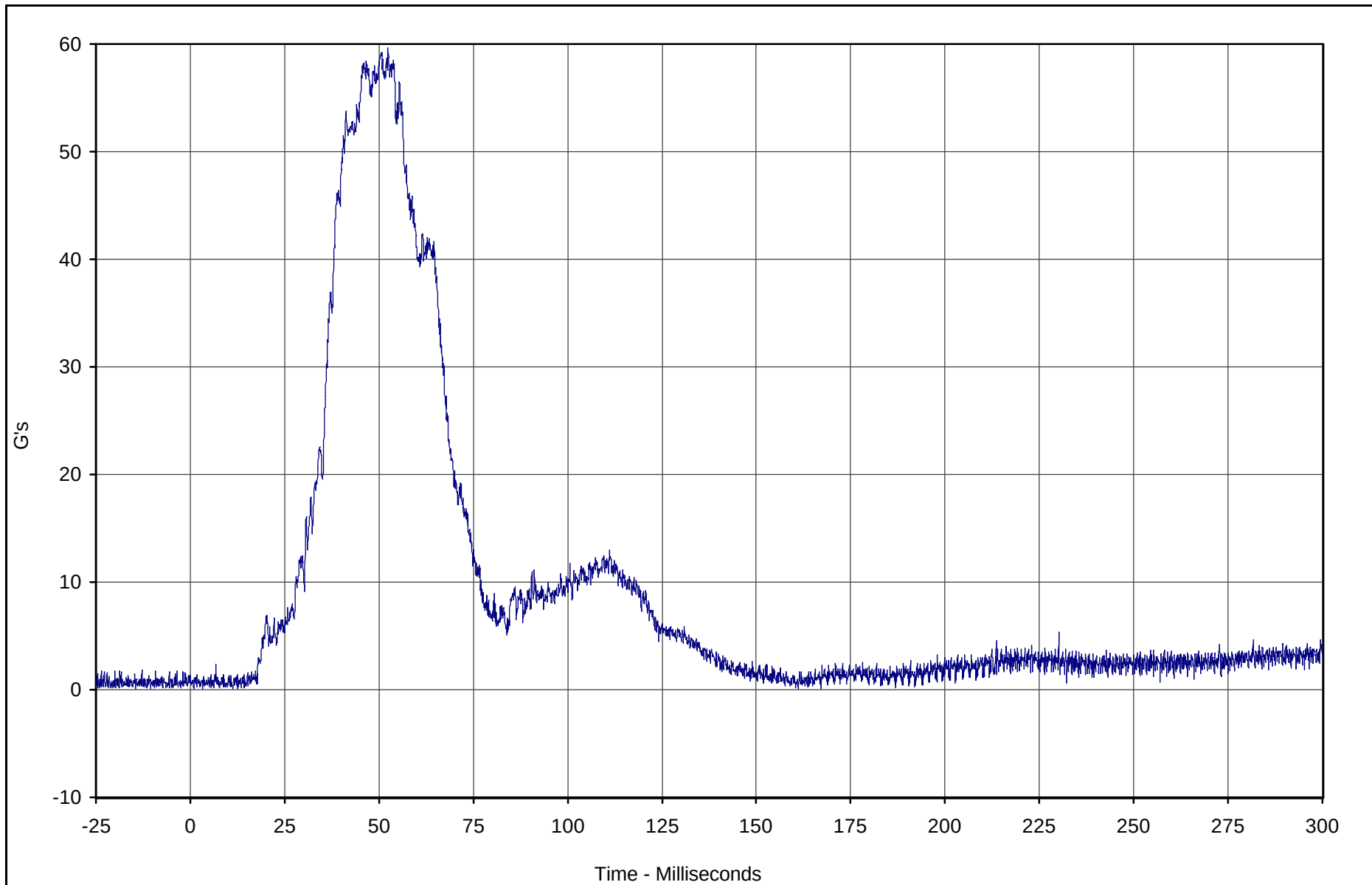


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Passenger Pelvis Resultant | 066   | RES  | G's   | 59.7 | 52.4 | 0.1 | 0.9  | 1000      |

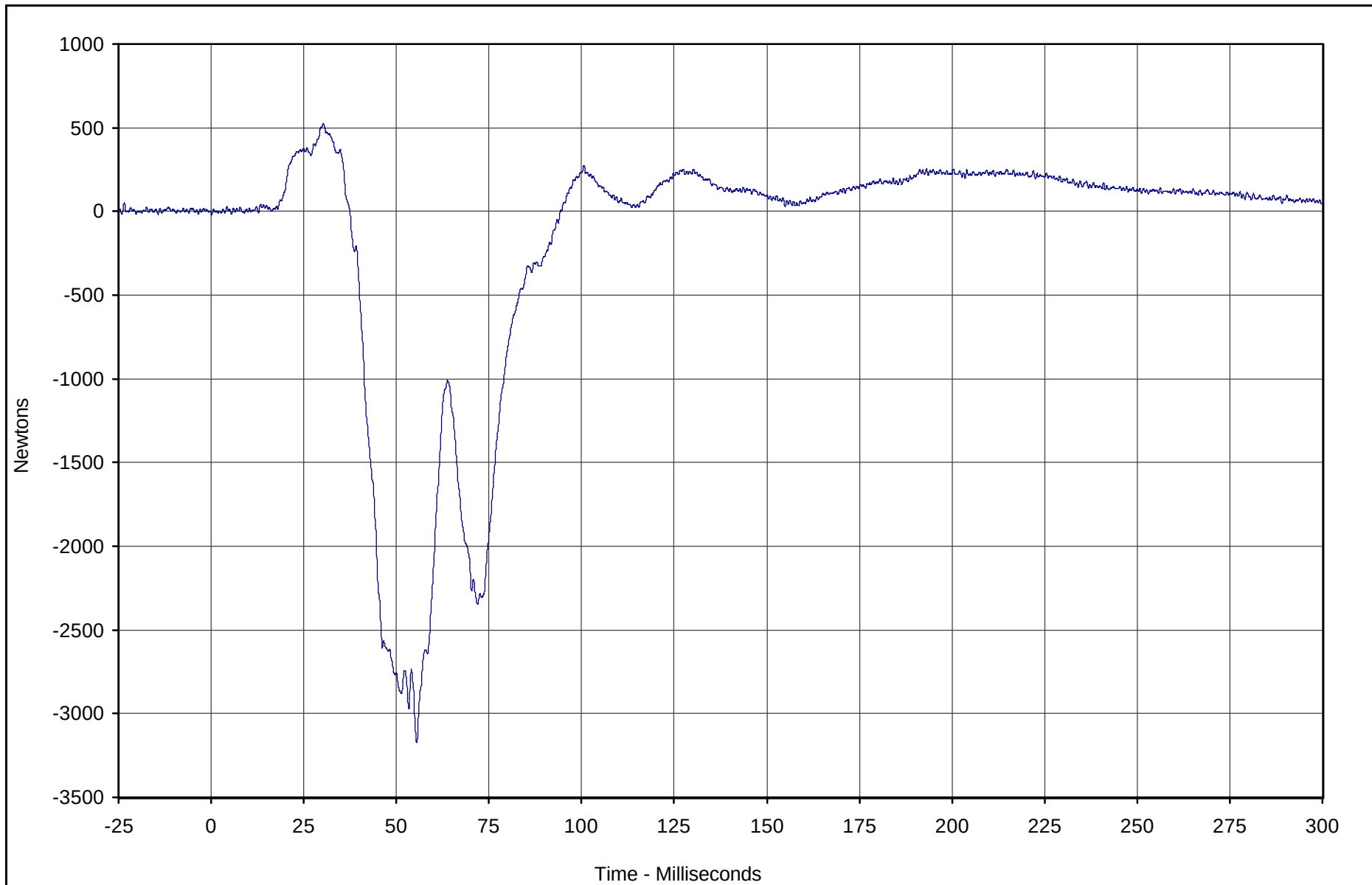


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|----------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Passenger Left Femur Force | 067   | FIL  | Newtons | 527.0 | 30.3 | -3172.0 | 55.5 | 600       |



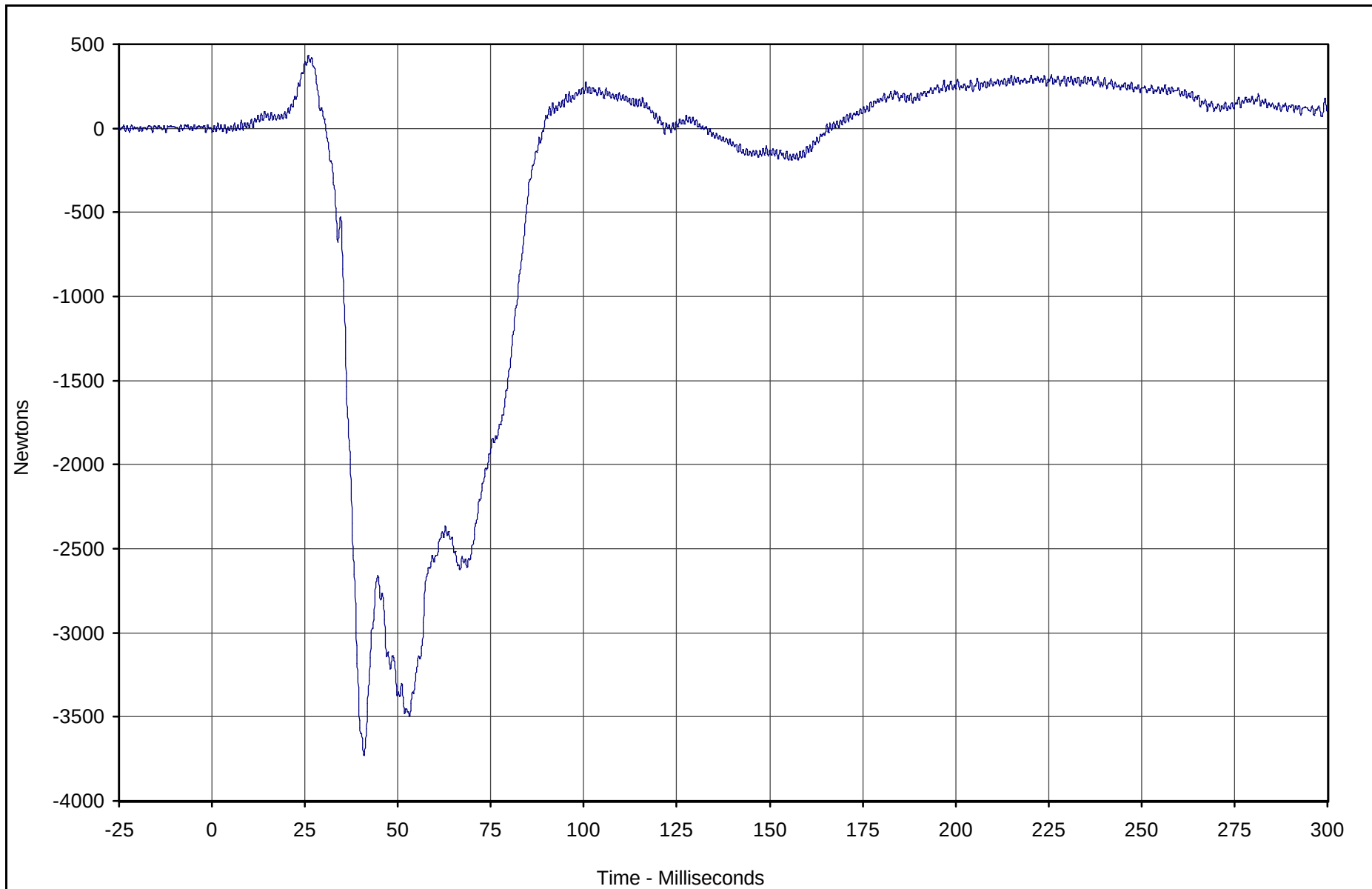
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description           | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|-----------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Passenger Right Femur Force | 068   | FIL  | Newtons | 433.9 | 25.9 | -3729.9 | 40.9 | 600       |

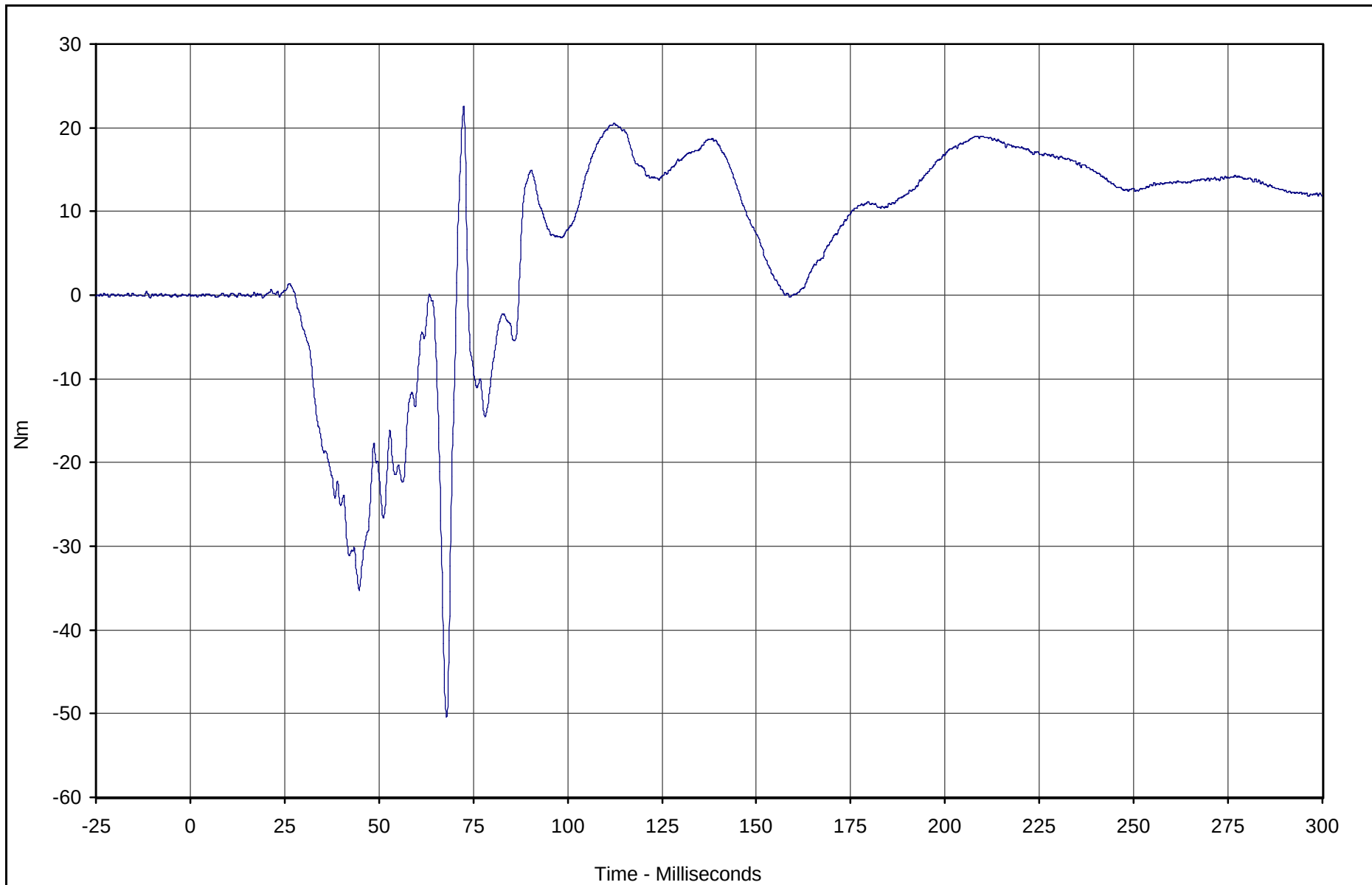


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Left Upper Tibia Moment X | 069   | FIL  | Nm    | 22.5 | 72.5 | -50.4 | 67.9 | 600       |

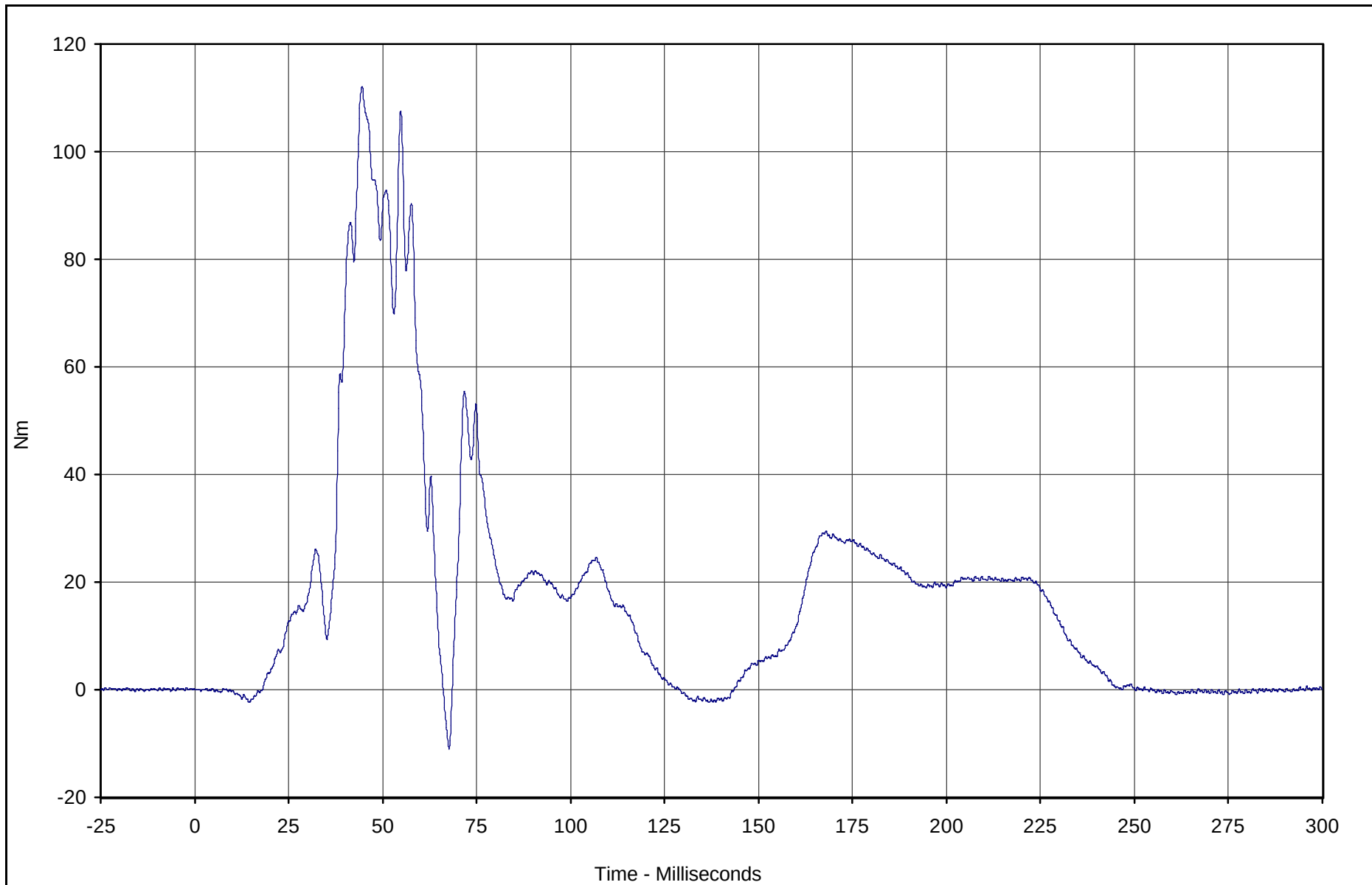


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max   | Time | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|-------|------|-------|------|-----------|
| Passenger Left Upper Tibia Moment Y | 070   | FIL  | Nm    | 112.0 | 44.5 | -11.0 | 67.7 | 600       |

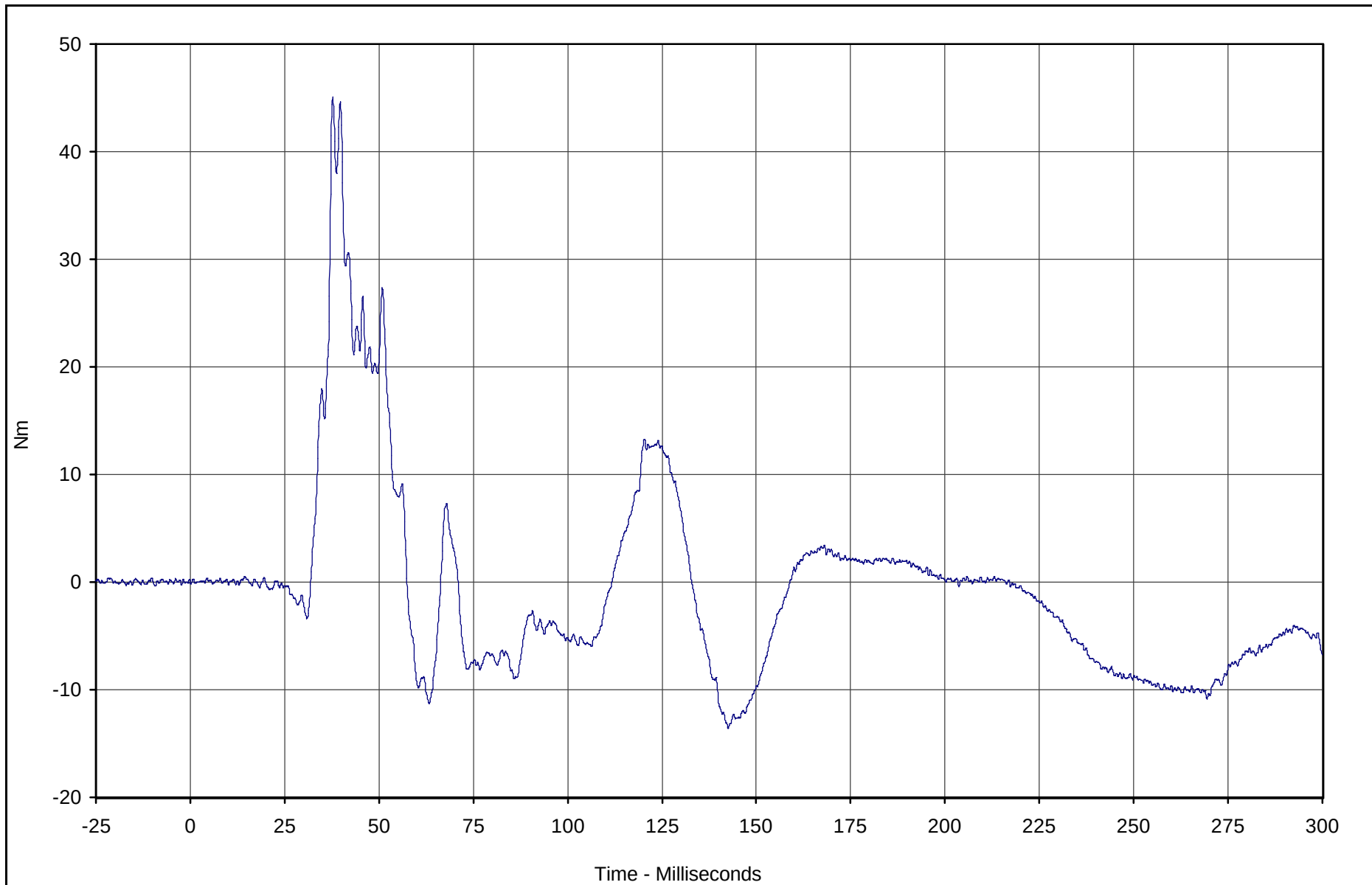


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|--------------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Passenger Right Upper Tibia Moment X | 071   | FIL  | Nm    | 45.1 | 37.8 | -13.6 | 142.6 | 600       |



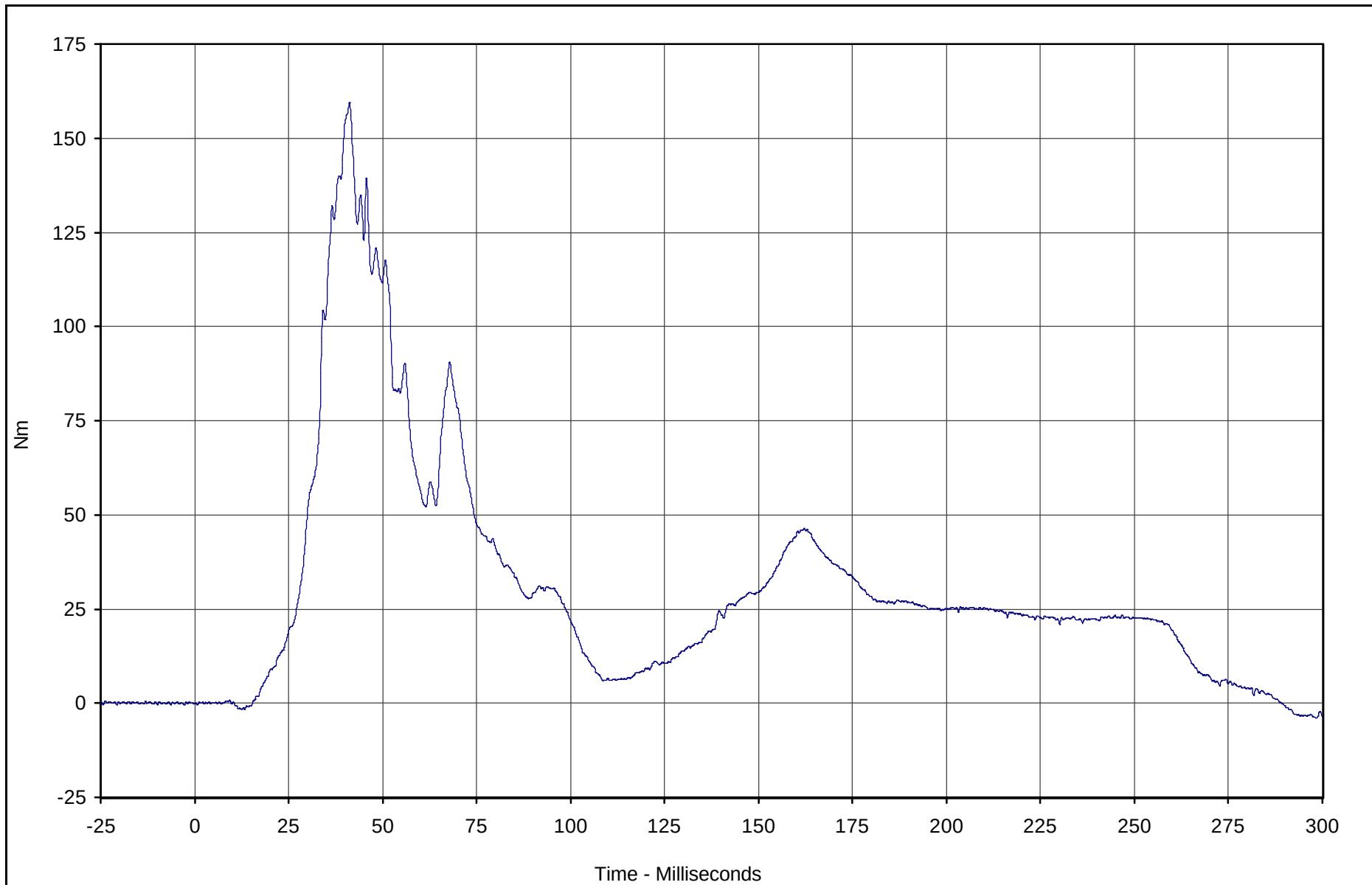
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                    | CURNO | Type | Units | Max   | Time | Min  | Time  | SAE Class |
|--------------------------------------|-------|------|-------|-------|------|------|-------|-----------|
| Passenger Right Upper Tibia Moment Y | 072   | FIL  | Nm    | 159.5 | 41.2 | -4.1 | 298.4 | 600       |

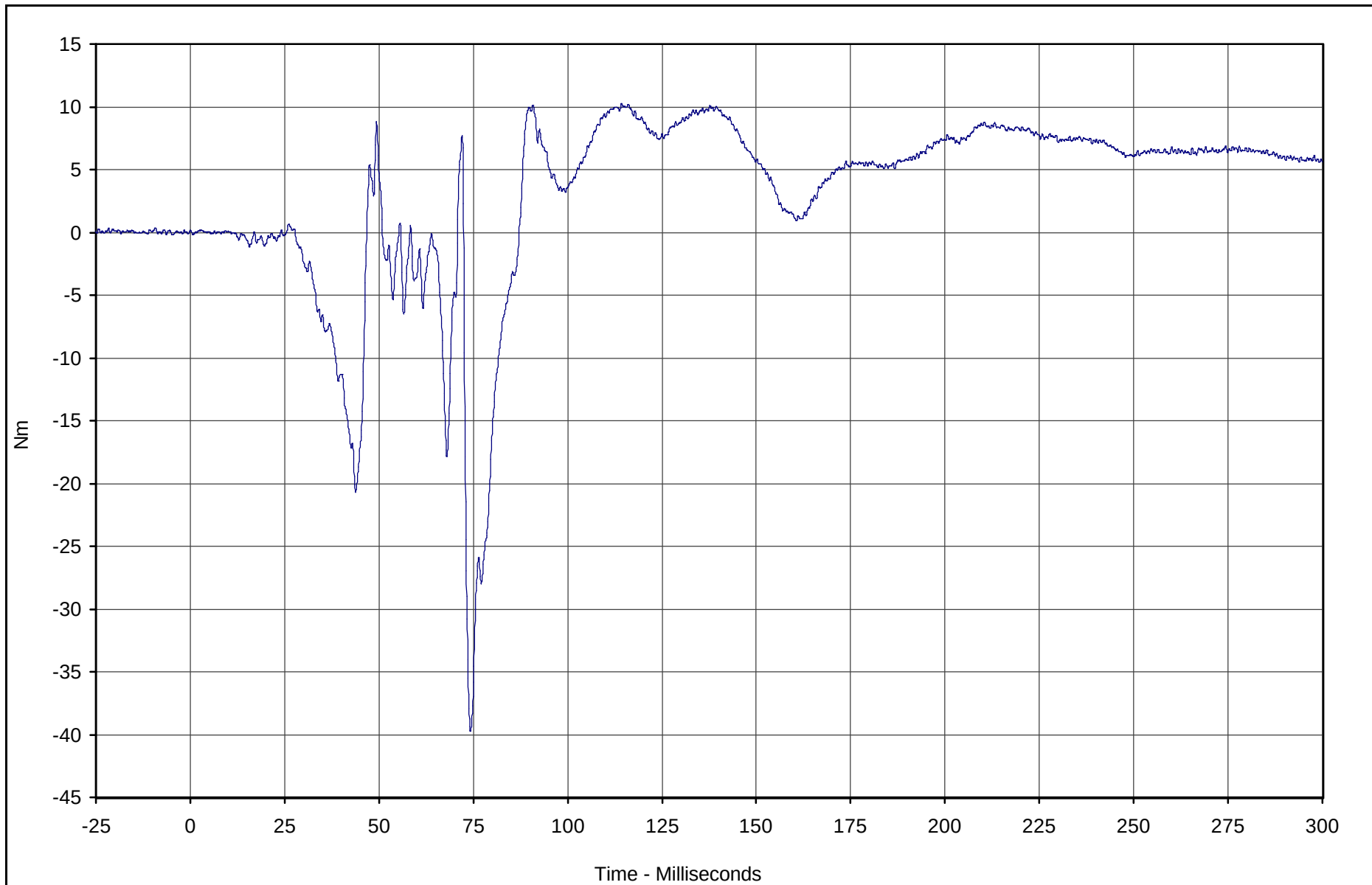


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Passenger Left Lower Tibia Moment X | 073   | FIL  | Nm    | 10.3 | 114.3 | -39.8 | 74.3 | 600       |

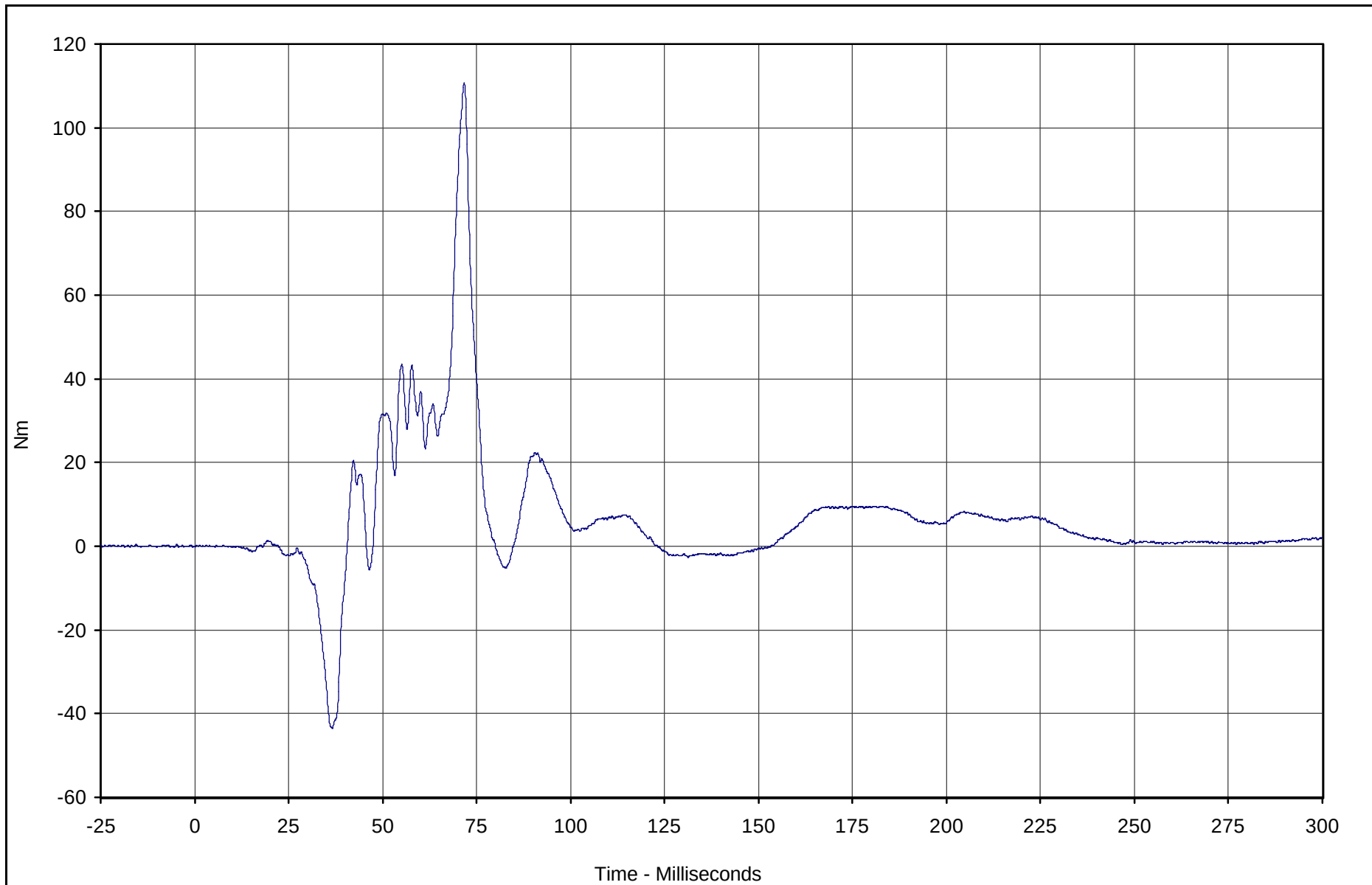


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max   | Time | Min   | Time | SAE Class |
|-------------------------------------|-------|------|-------|-------|------|-------|------|-----------|
| Passenger Left Lower Tibia Moment Y | 074   | FIL  | Nm    | 110.8 | 71.7 | -43.4 | 36.6 | 600       |

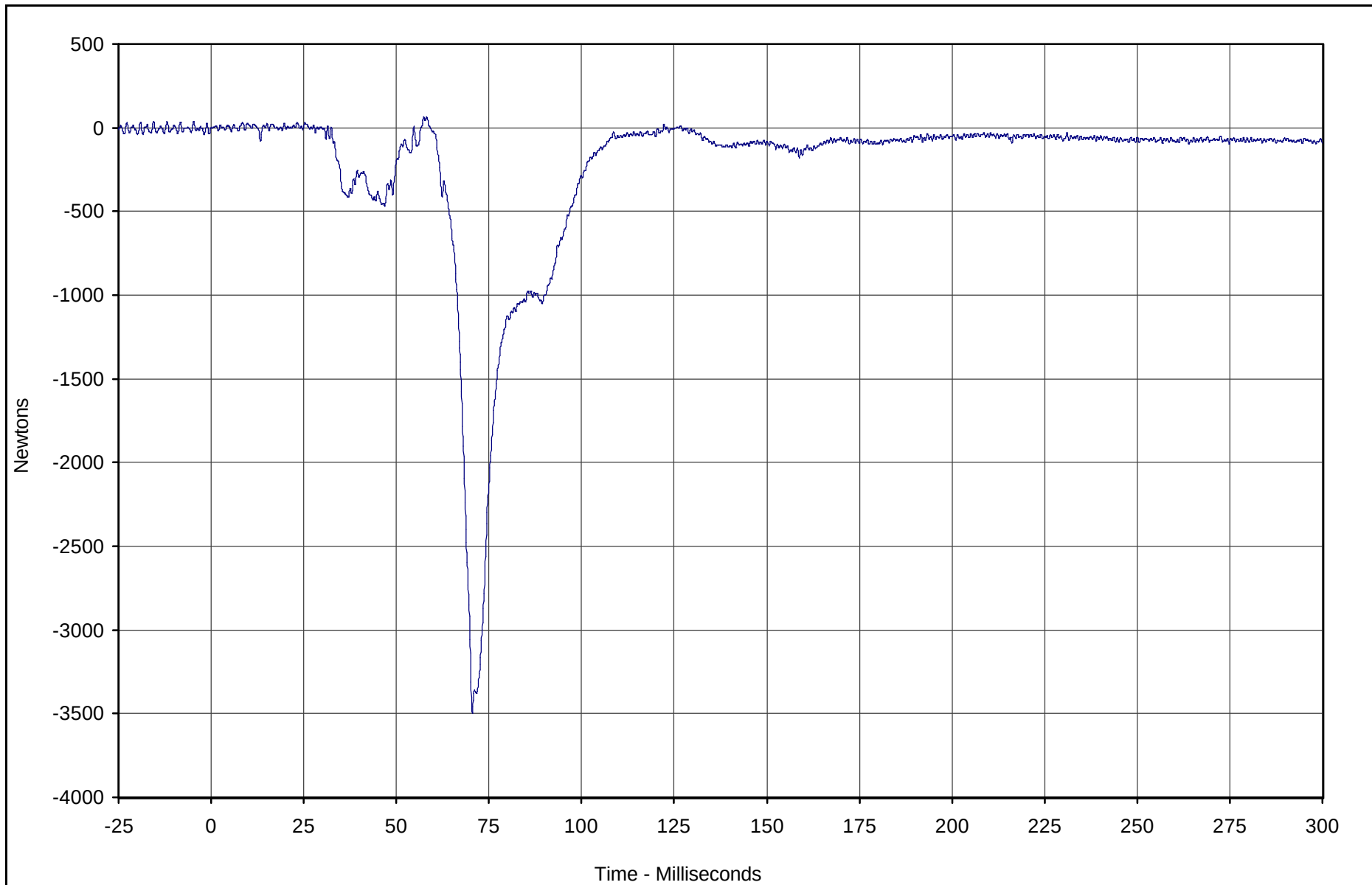


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units   | Max  | Time | Min     | Time | SAE Class |
|------------------------------------|-------|------|---------|------|------|---------|------|-----------|
| Passenger Left Lower Tibia Force Z | 075   | FIL  | Newtons | 63.8 | 58.2 | -3499.7 | 70.5 | 600       |



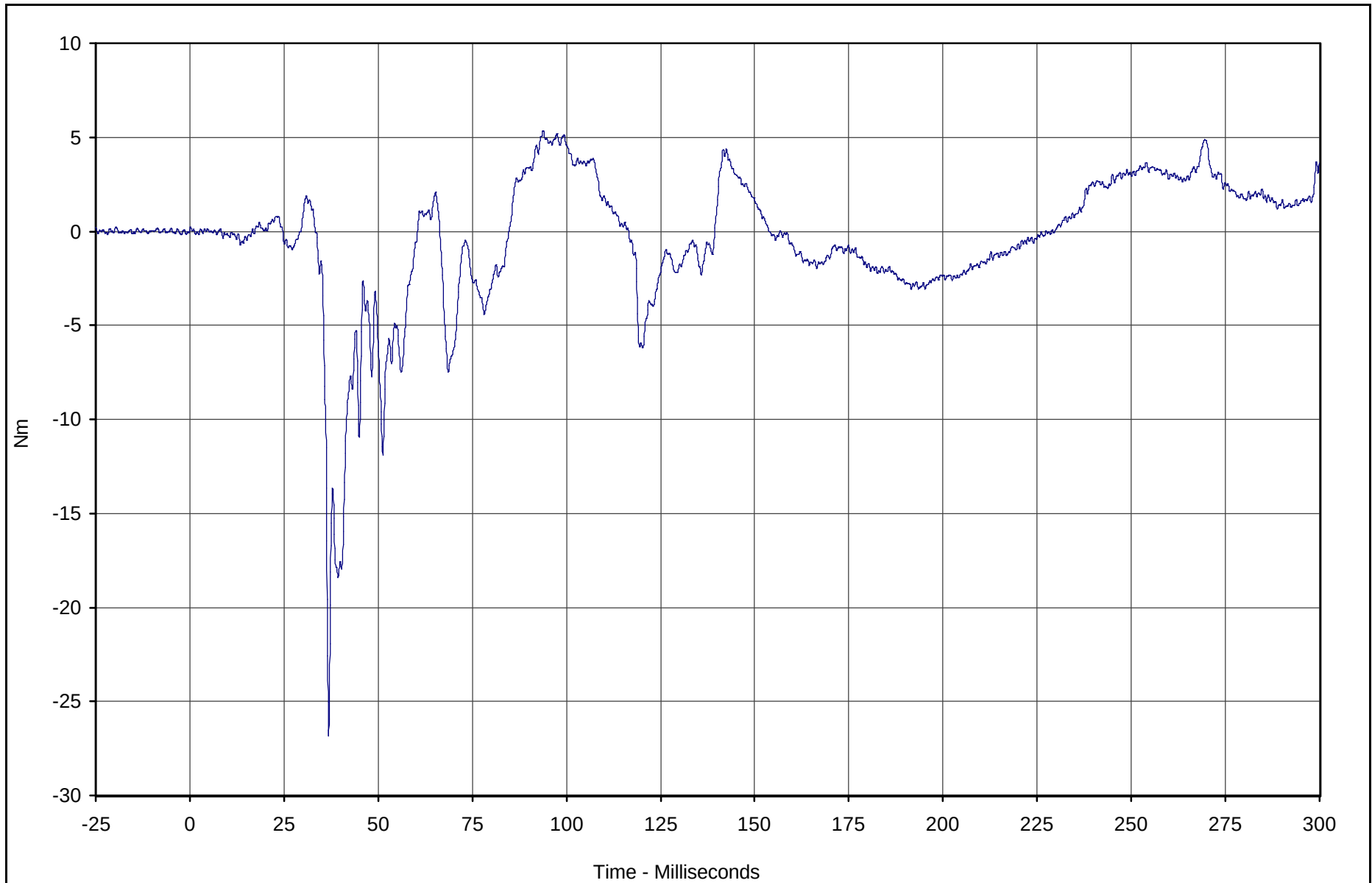
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                    | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Passenger Right Lower Tibia Moment X | 076   | FIL  | Nm    | 5.3 | 93.9 | -26.8 | 36.9 | 600       |

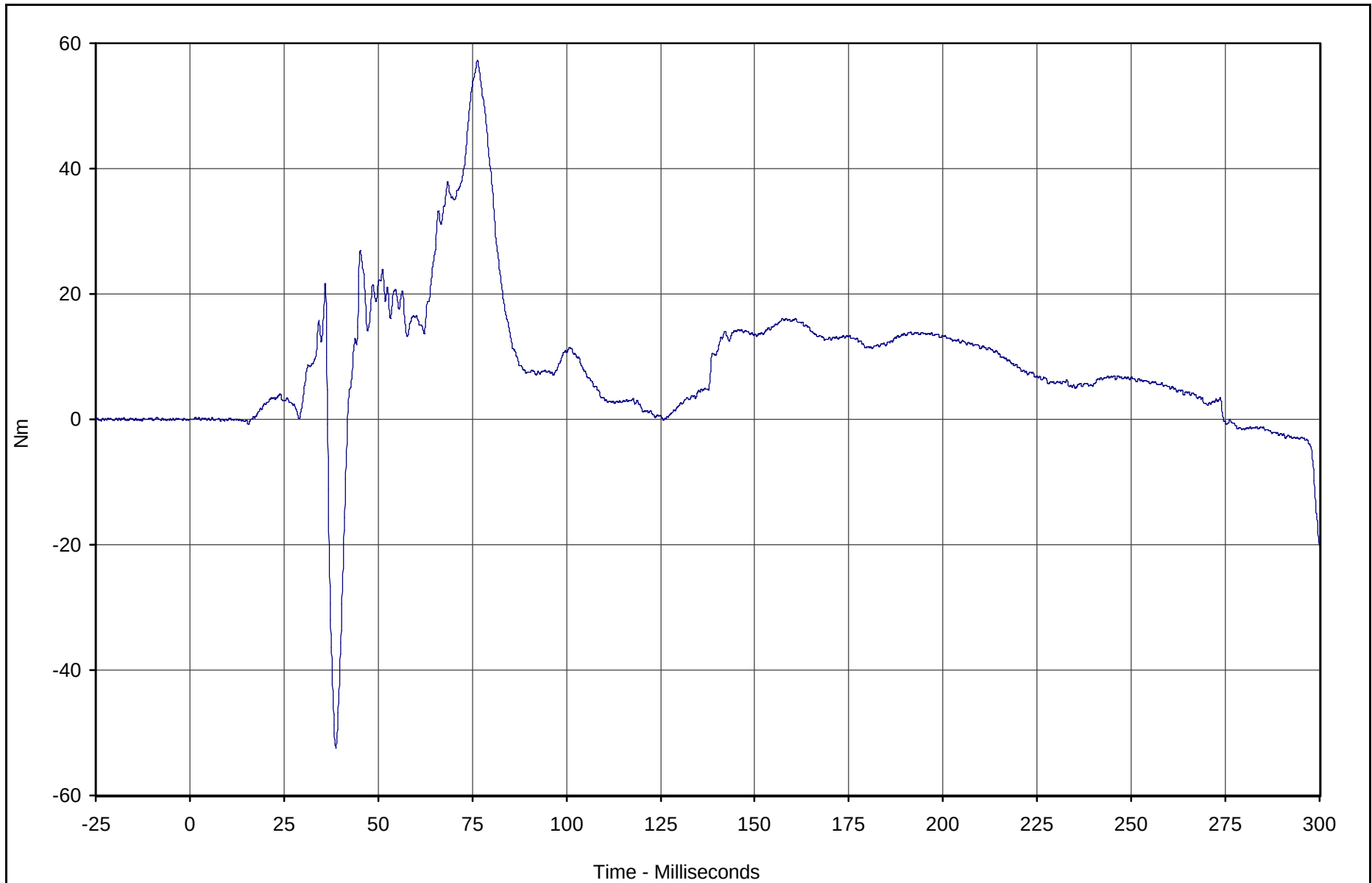


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Right Lower Tibia Moment Y | 077   | FIL  | Nm    | 57.2 | 76.4 | -52.5 | 38.8 | 600       |

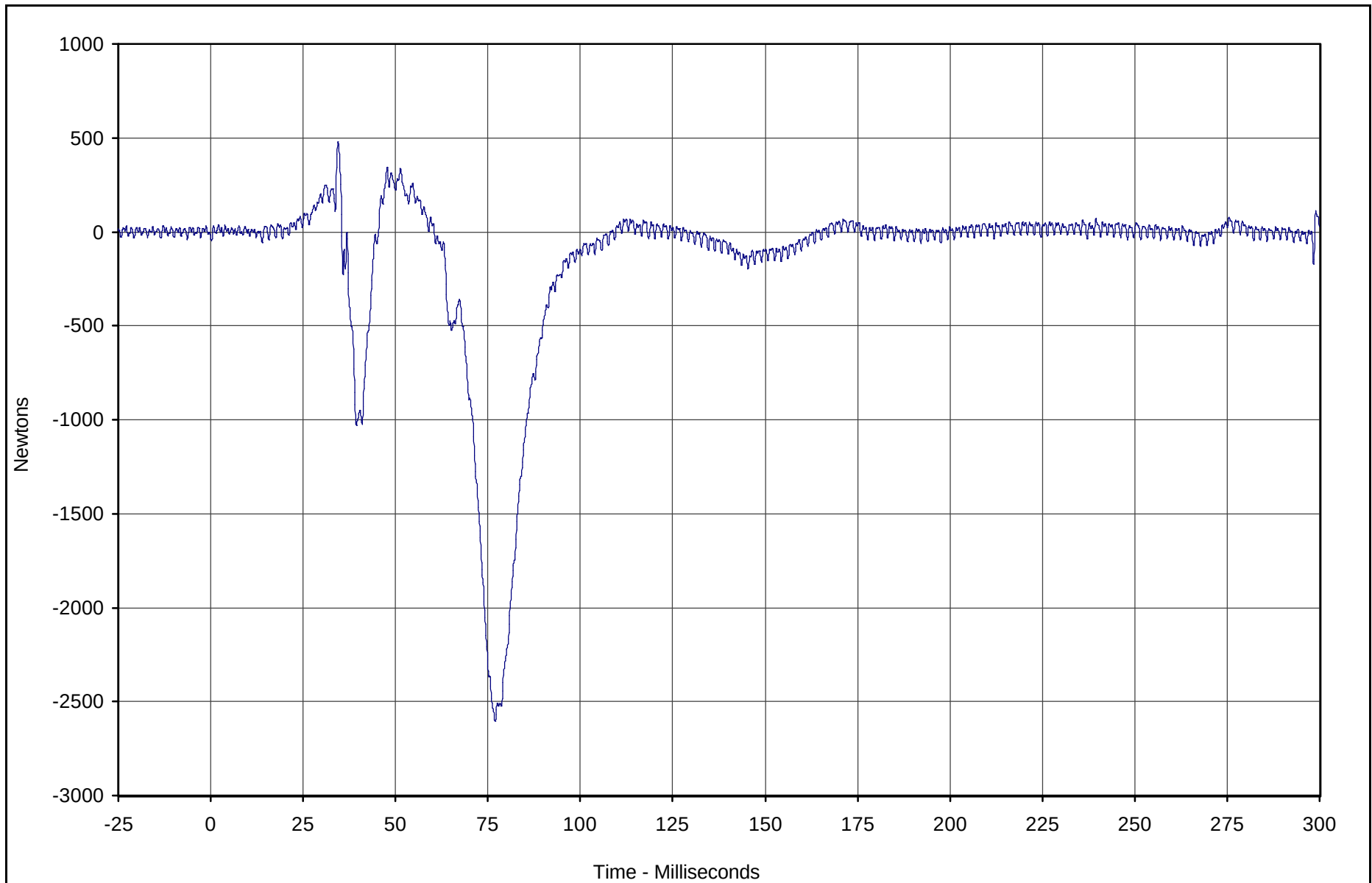


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|-------------------------------------|-------|------|---------|-------|------|---------|------|-----------|
| Passenger Right lower Tibia Force Z | 078   | FIL  | Newtons | 477.9 | 34.5 | -2606.3 | 77.0 | 600       |

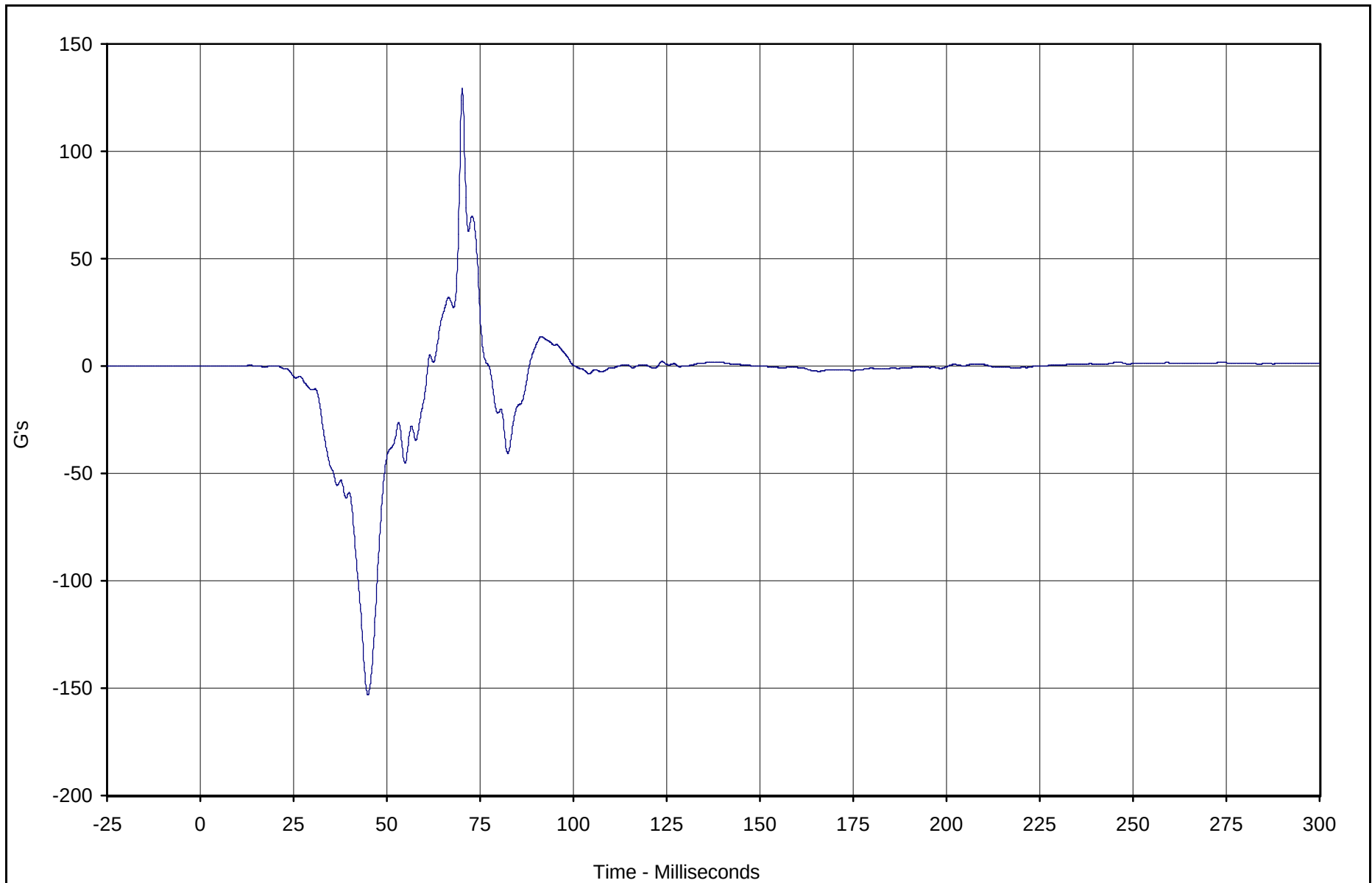


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max   | Time | Min    | Time | SAE Class |
|---------------------------|-------|------|-------|-------|------|--------|------|-----------|
| Passenger Left Foot Aft X | 079   | FIL  | G's   | 129.4 | 70.2 | -152.9 | 44.9 | 180       |

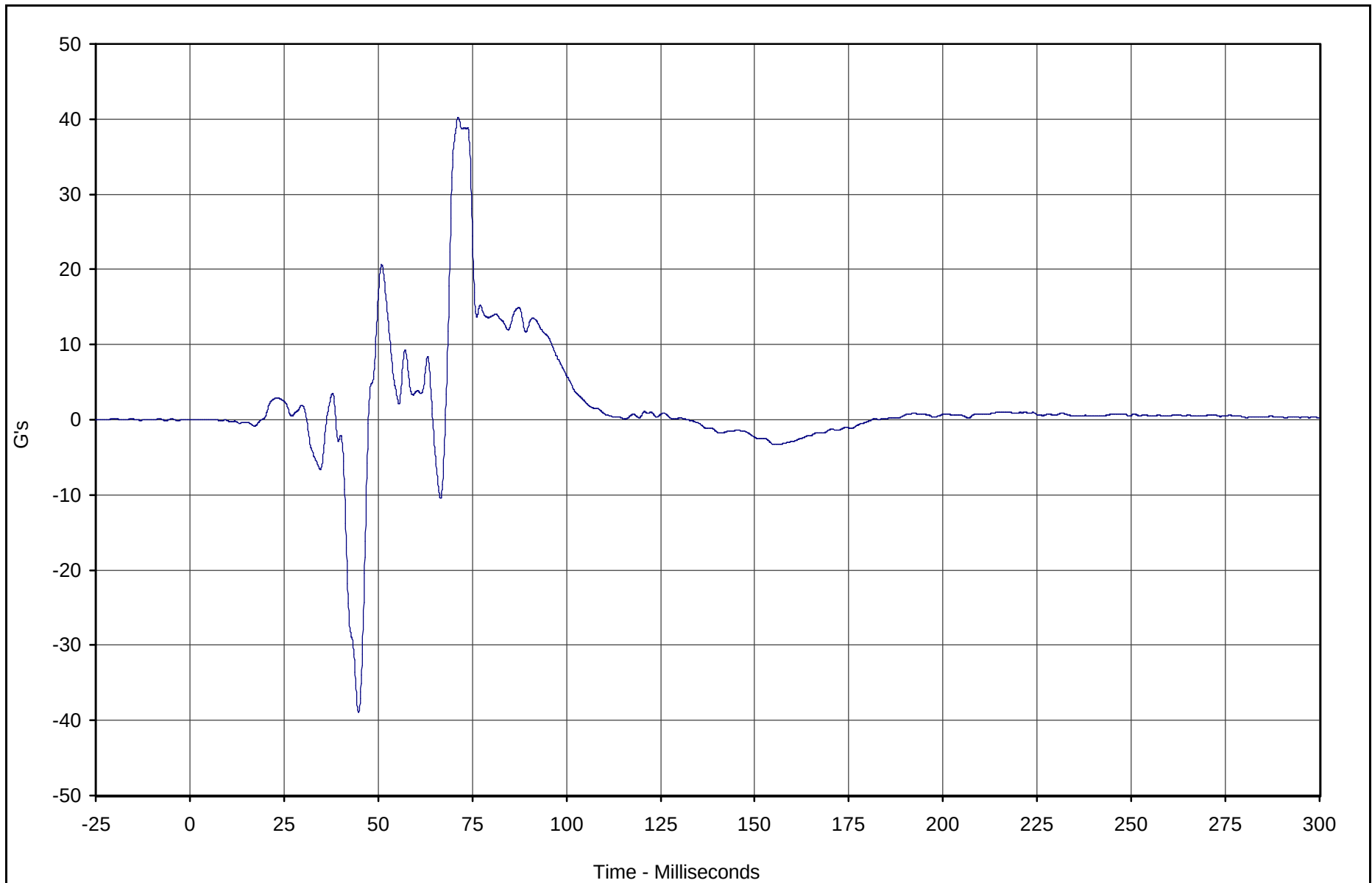


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Left Foot Aft Z | 080   | FIL  | G's   | 40.3 | 71.3 | -39.0 | 44.8 | 180       |



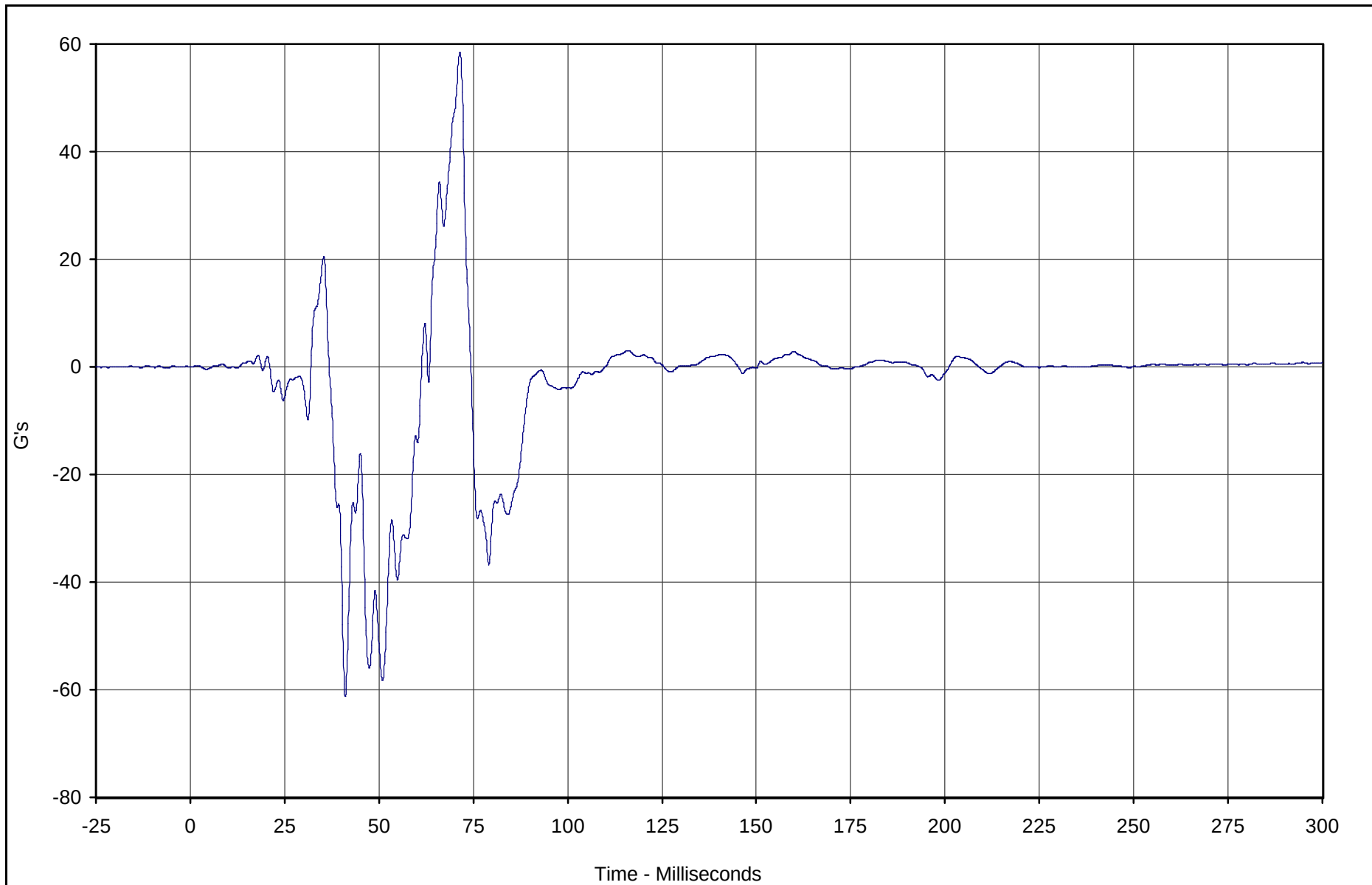
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description          | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Left Foot Fore Z | 081   | FIL  | G's   | 58.4 | 71.4 | -61.3 | 41.1 | 180       |

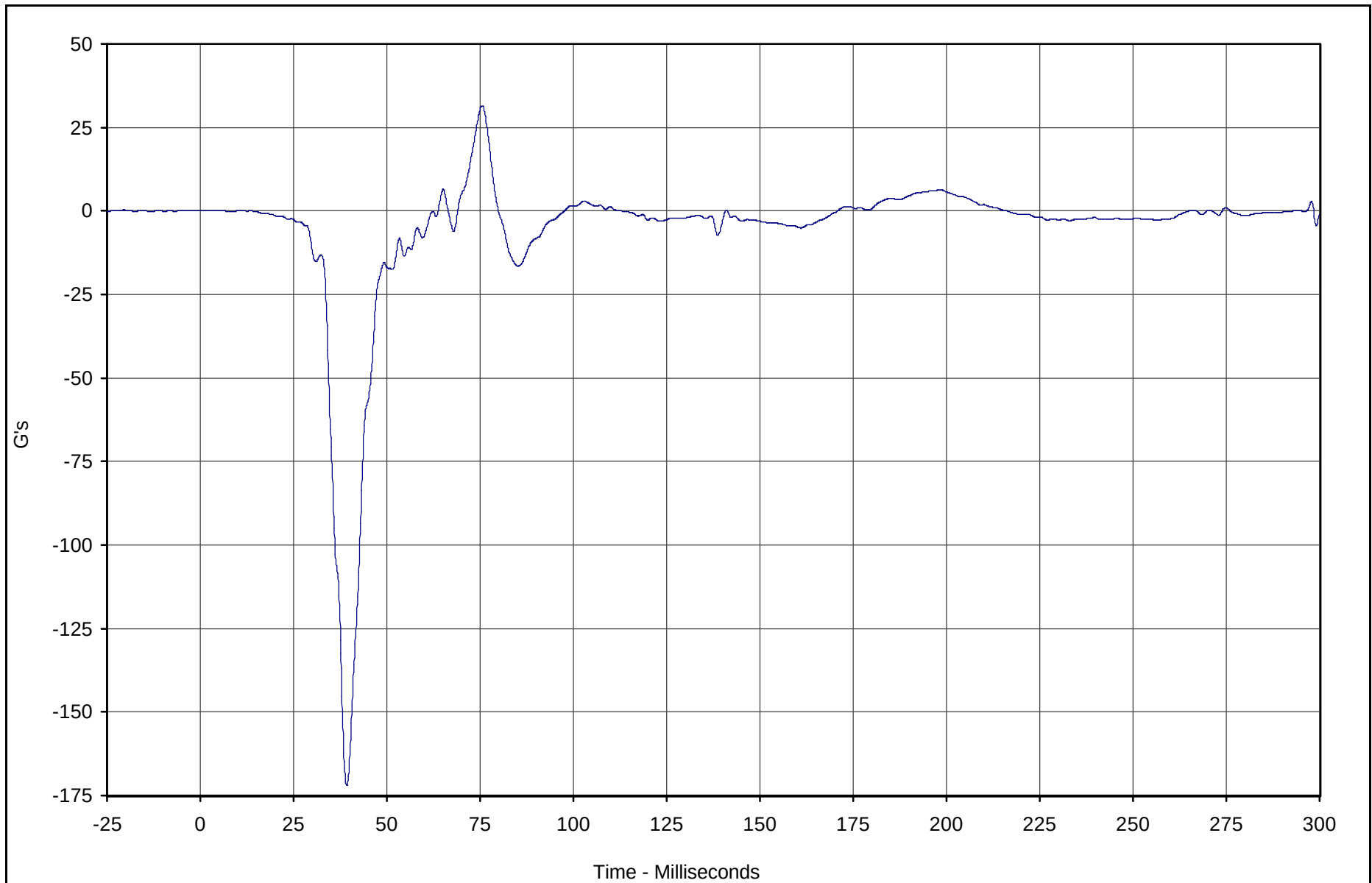


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|--------|------|-----------|
| Passenger Right Foot Aft X | 082   | FIL  | G's   | 31.5 | 75.6 | -172.0 | 39.3 | 180       |

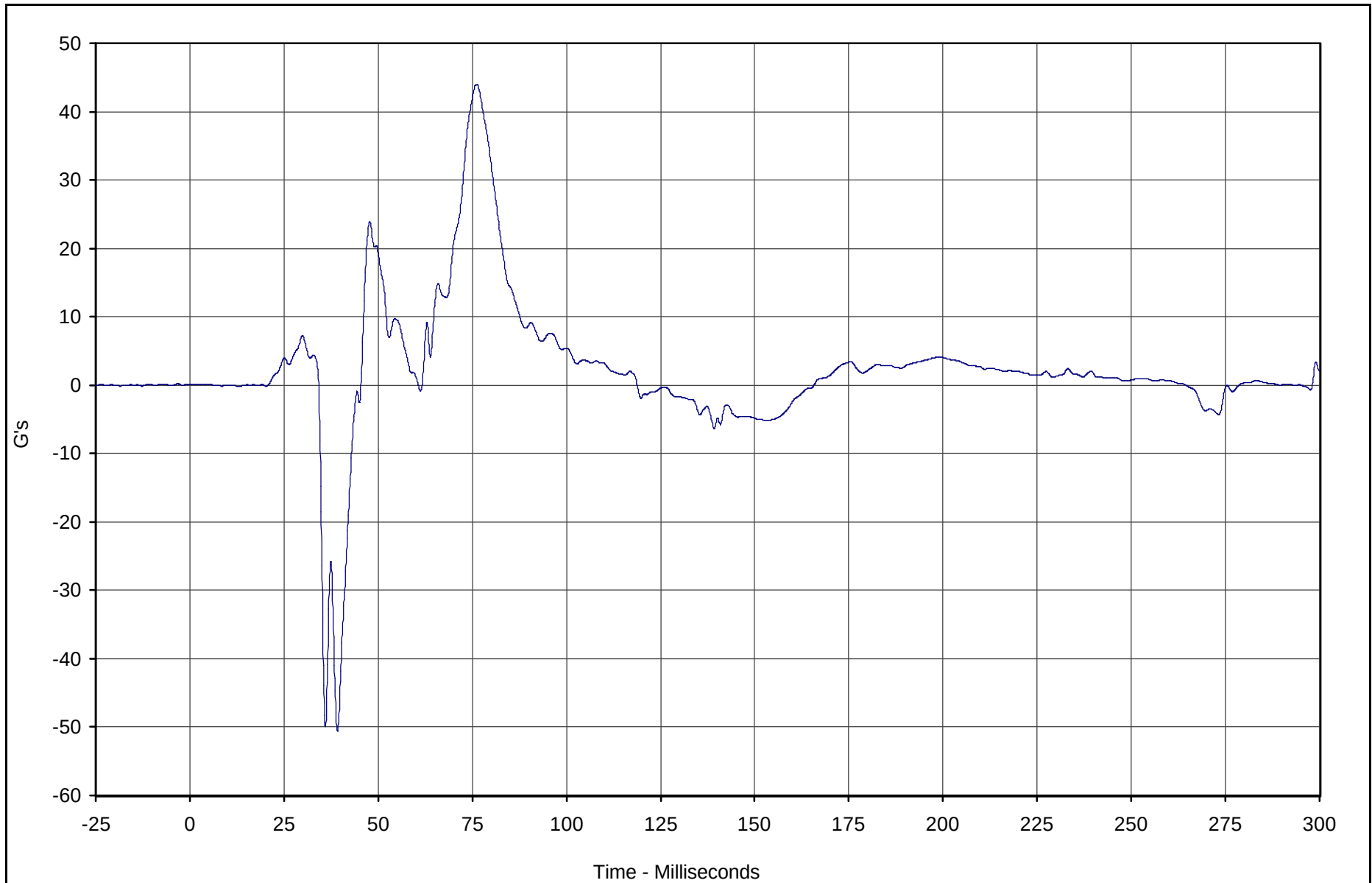


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Right Foot Aft Z | 083   | FIL  | G's   | 44.0 | 76.2 | -50.6 | 39.2 | 180       |

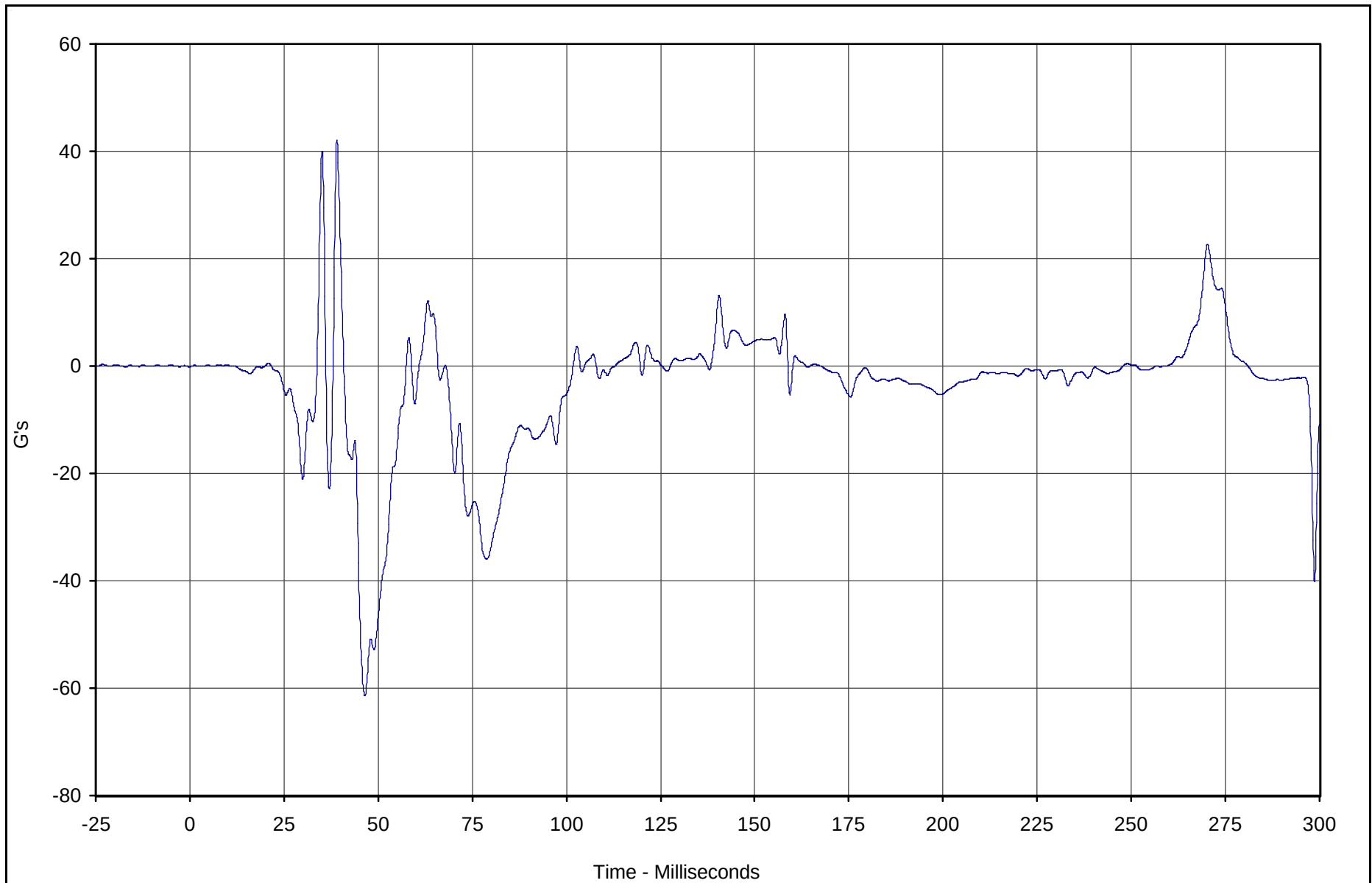


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|-------|------|-----------|
| Passenger Right Foot Fore Z | 084   | FIL  | G's   | 42.1 | 39.1 | -61.4 | 46.5 | 180       |

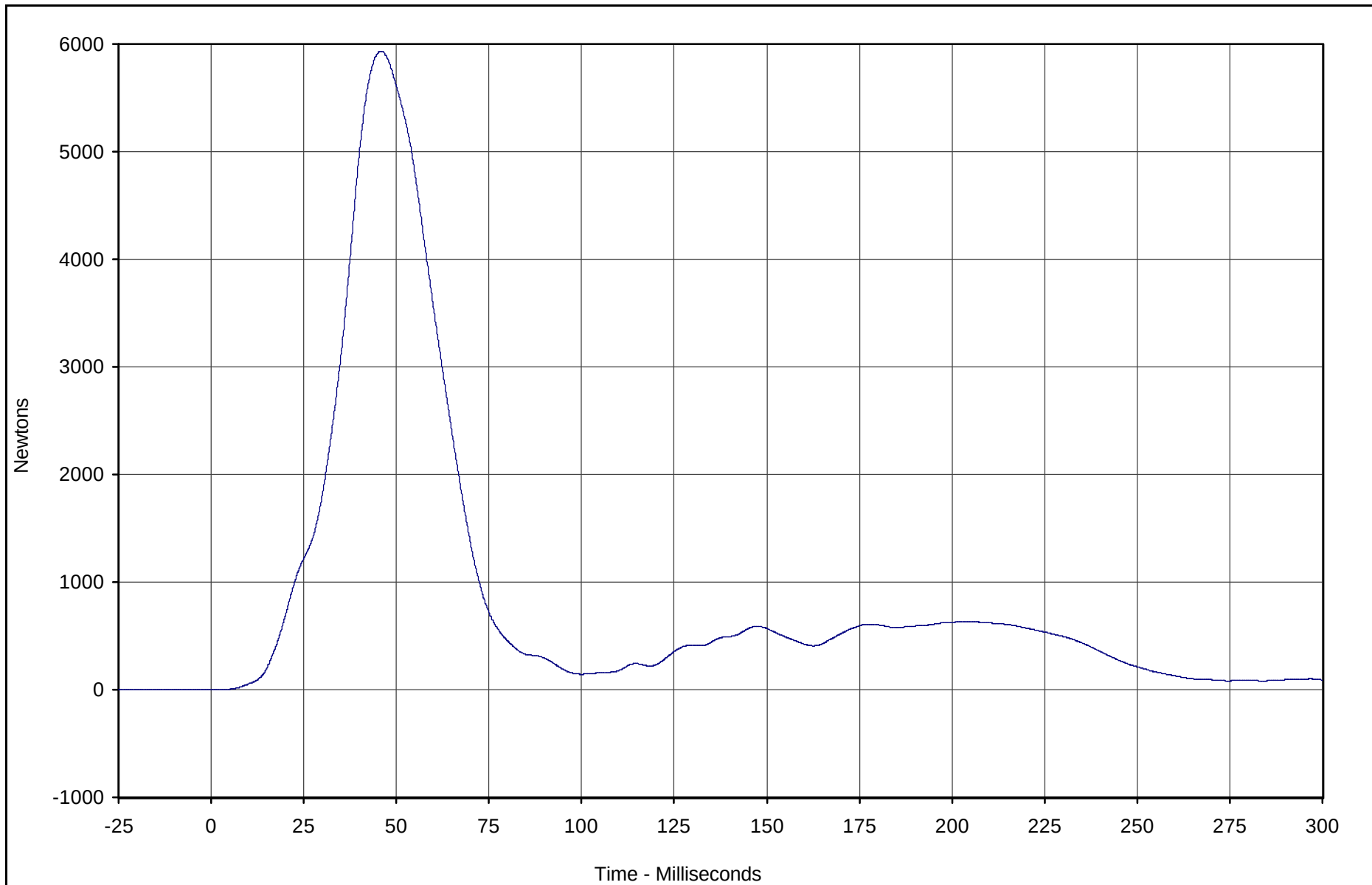


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|--------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Passenger Lap Belt Force | 085   | FIL  | Newtons | 5933.2 | 45.9 | 1.8 | 0.0  | 60        |



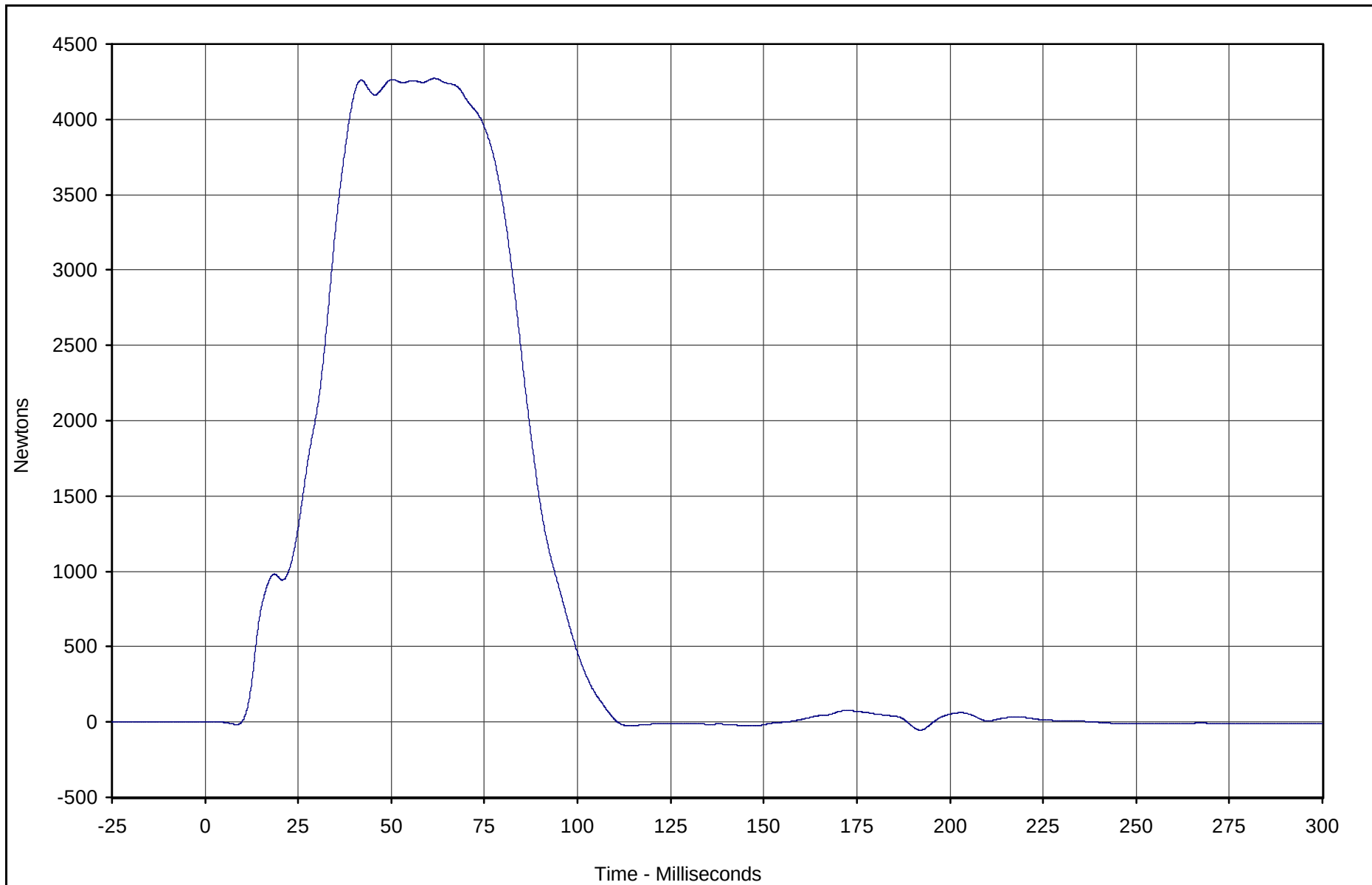
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description             | CURNO | Type | Units   | Max    | Time | Min   | Time  | SAE Class |
|-------------------------------|-------|------|---------|--------|------|-------|-------|-----------|
| Passenger Shoulder Belt Force | 086   | FIL  | Newtons | 4271.7 | 61.6 | -54.1 | 192.1 | 60        |

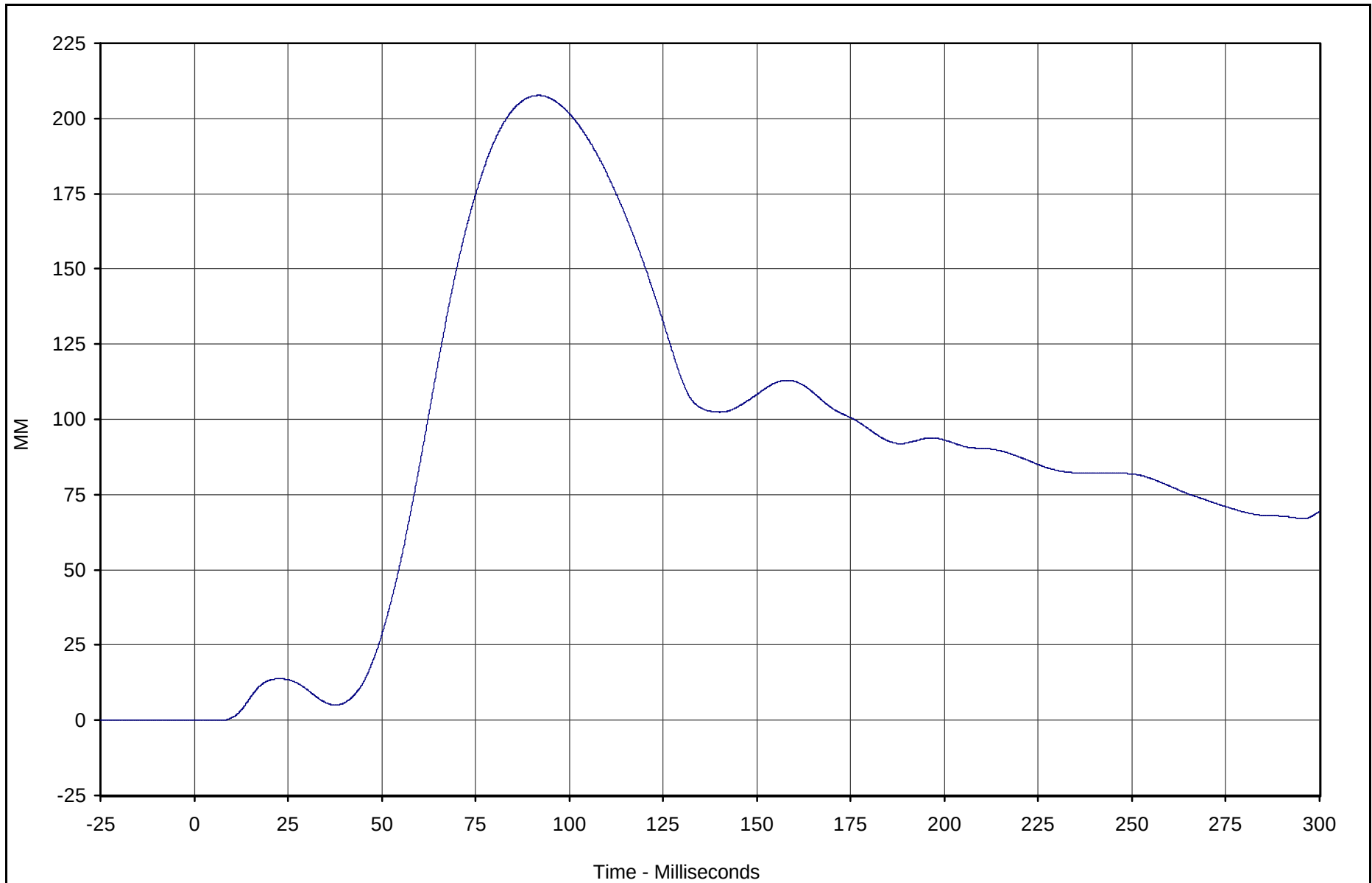


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max   | Time | Min  | Time | SAE Class |
|---------------------------------|-------|------|-------|-------|------|------|------|-----------|
| Passenger Shoulder Belt Pullout | 087   | FIL  | MM    | 207.6 | 91.8 | -0.1 | 6.0  | 60        |

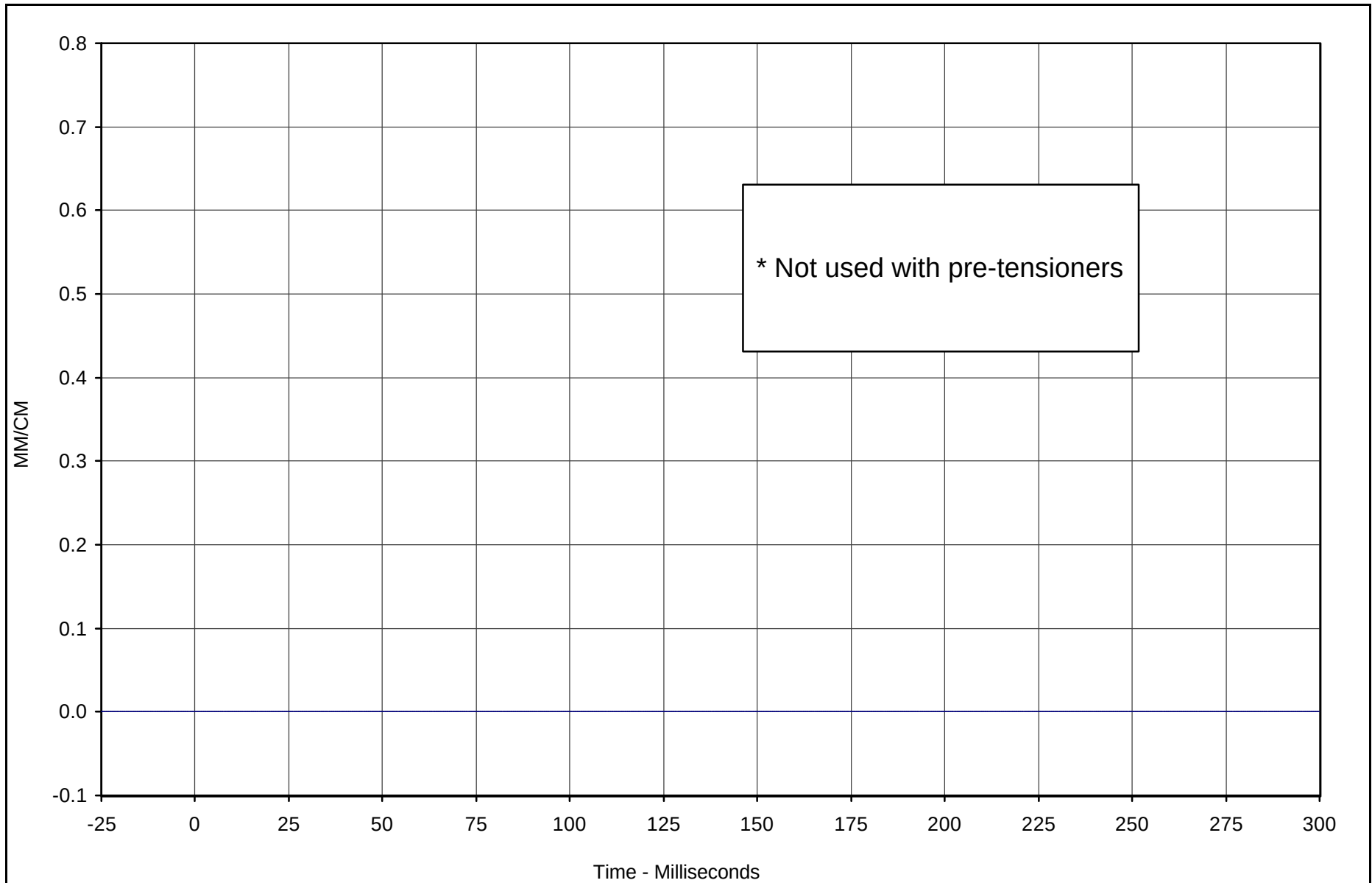


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Passenger Shoulder Belt Elongation | 088   | FIL  | MM/CM | 0.00 | 0.0  | 0.00 | 0.0  | 60        |

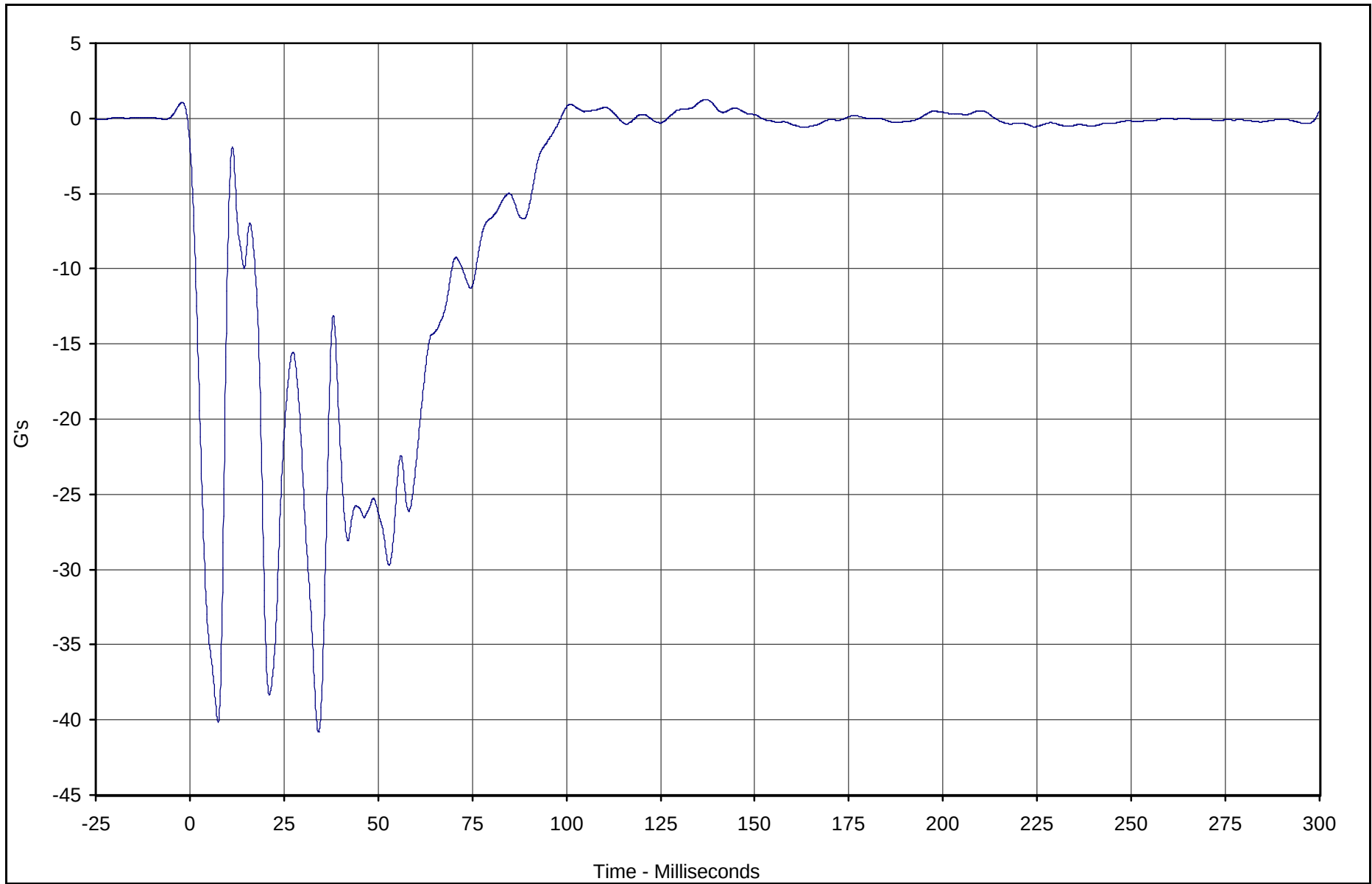


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description   | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|---------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Vehicle Left Rear X | 089   | FIL  | G's   | 1.3 | 136.9 | -40.8 | 34.2 | 60        |

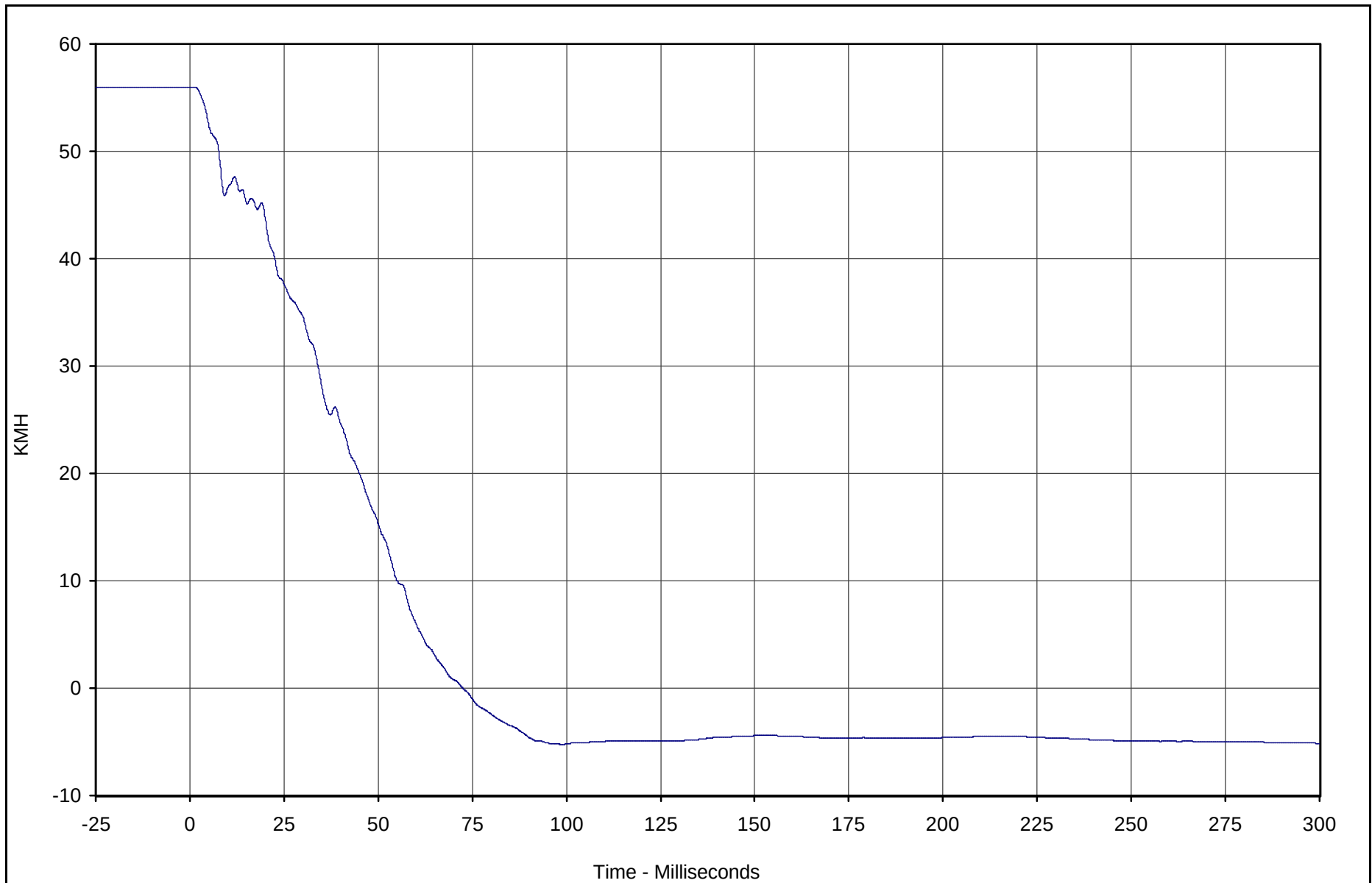


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Left Rear X Velocity | 089   | IN1  | KMH   | 56.0 | 1.0  | -5.2 | 99.1 | 180       |



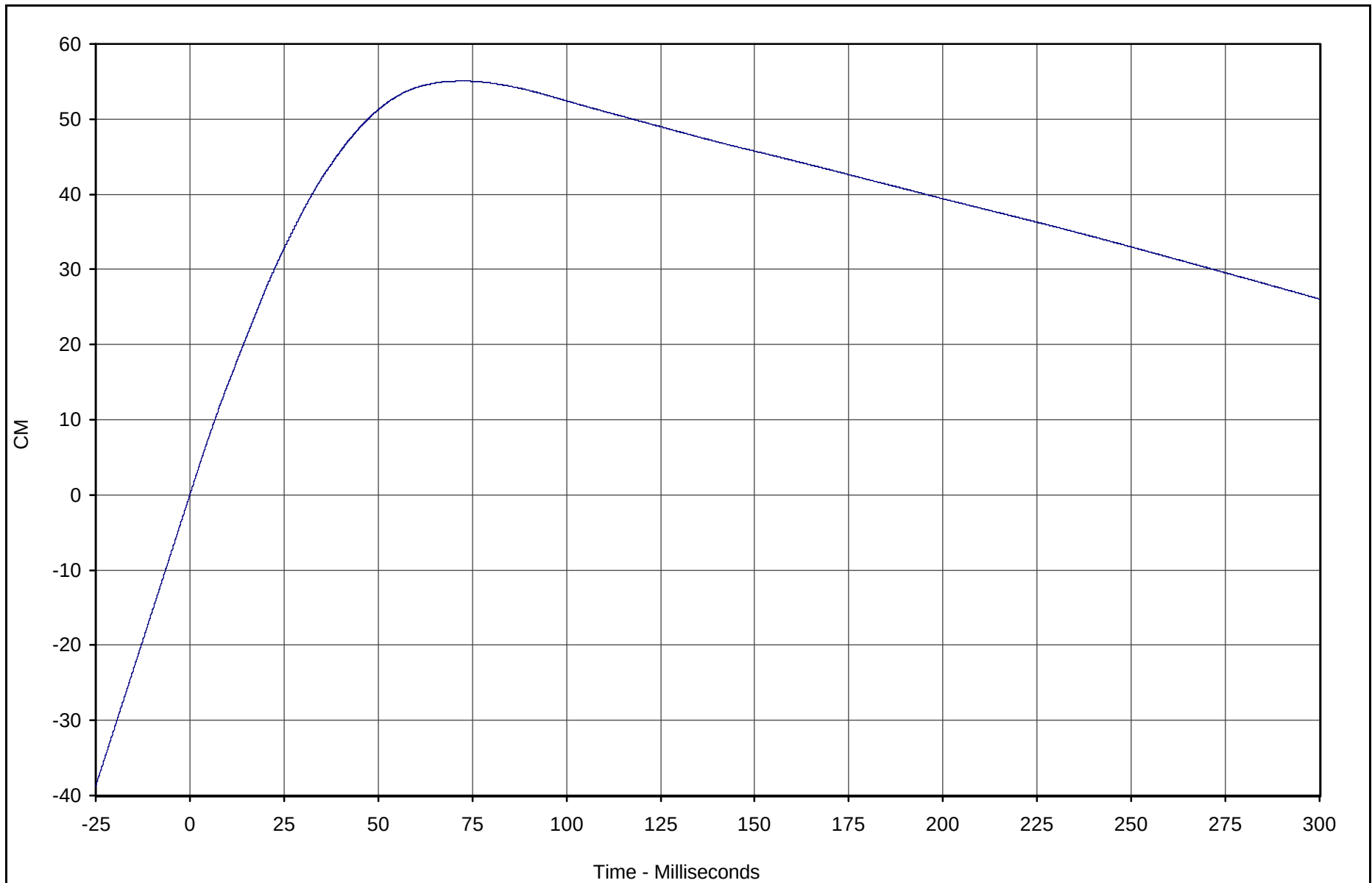
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description          | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Left Rear X Displ. | 089   | IN2  | CM    | 55.1 | 72.4 | 0.0 | 0.0  | 180       |

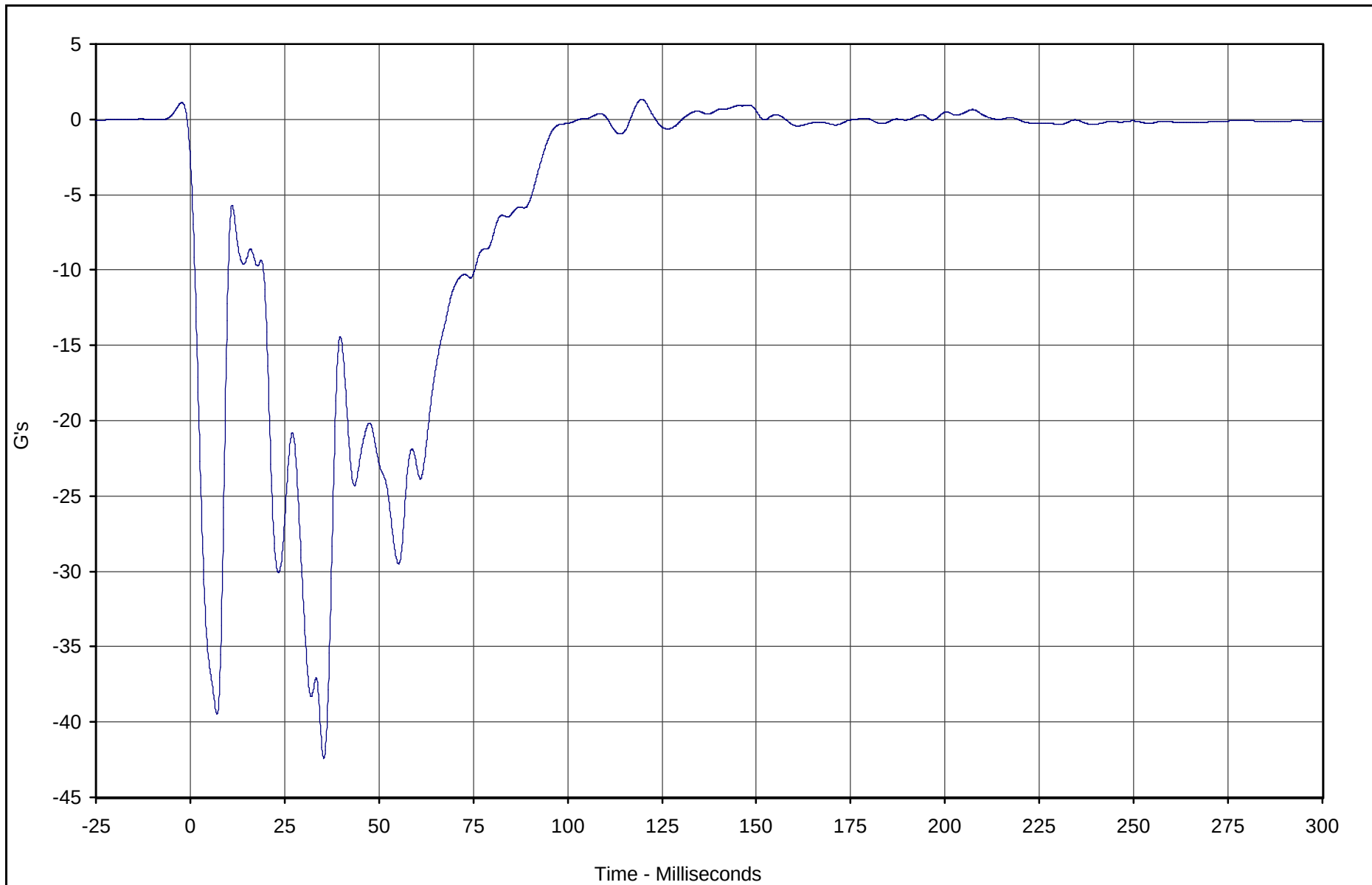


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description    | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Vehicle Right Rear X | 090   | FIL  | G's   | 1.3 | 119.6 | -42.4 | 35.4 | 60        |

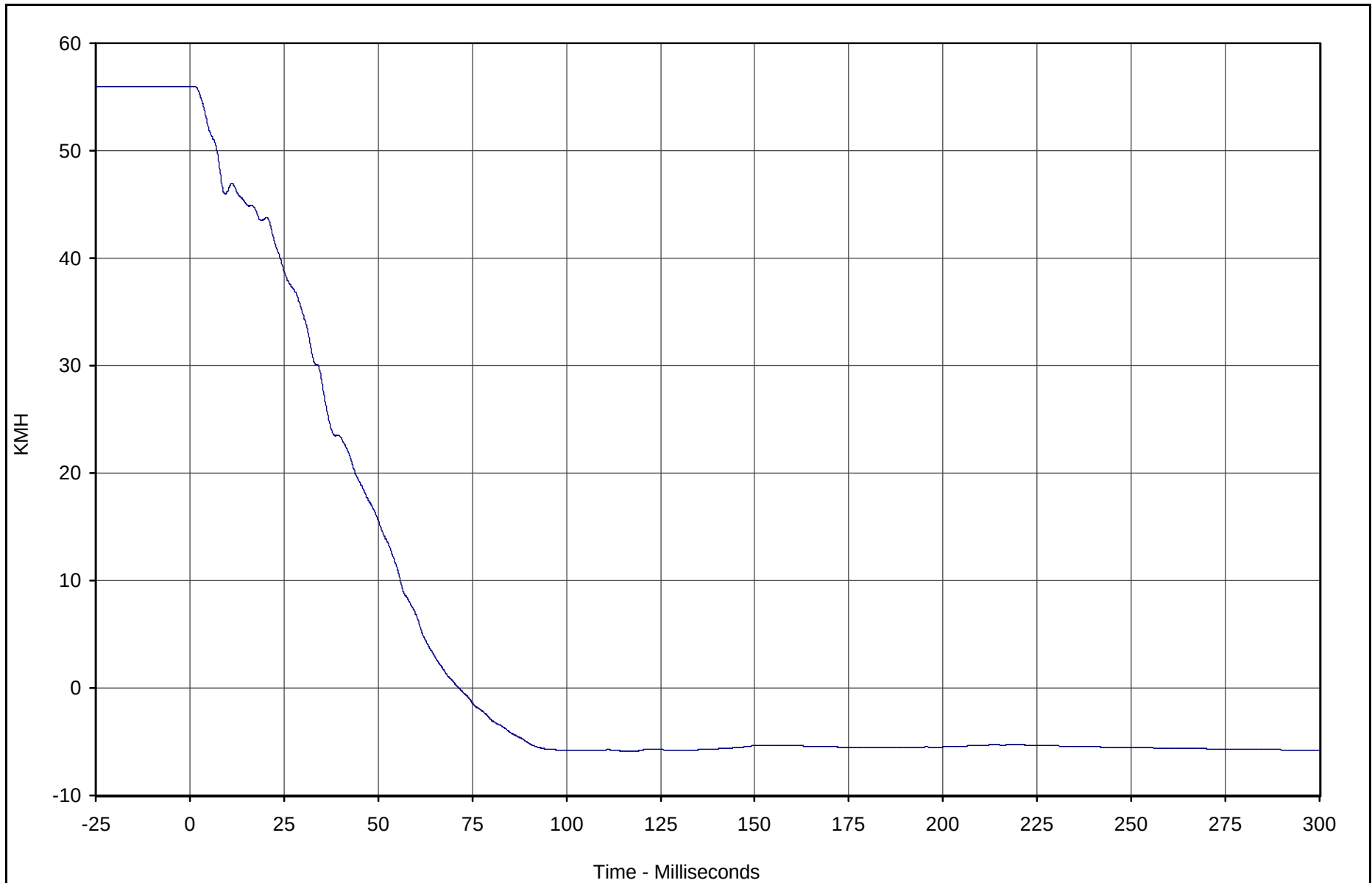


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description             | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|-------------------------------|-------|------|-------|------|------|------|-------|-----------|
| Vehicle Right Rear X Velocity | 090   | IN1  | KMH   | 56.0 | 0.9  | -5.9 | 116.8 | 180       |

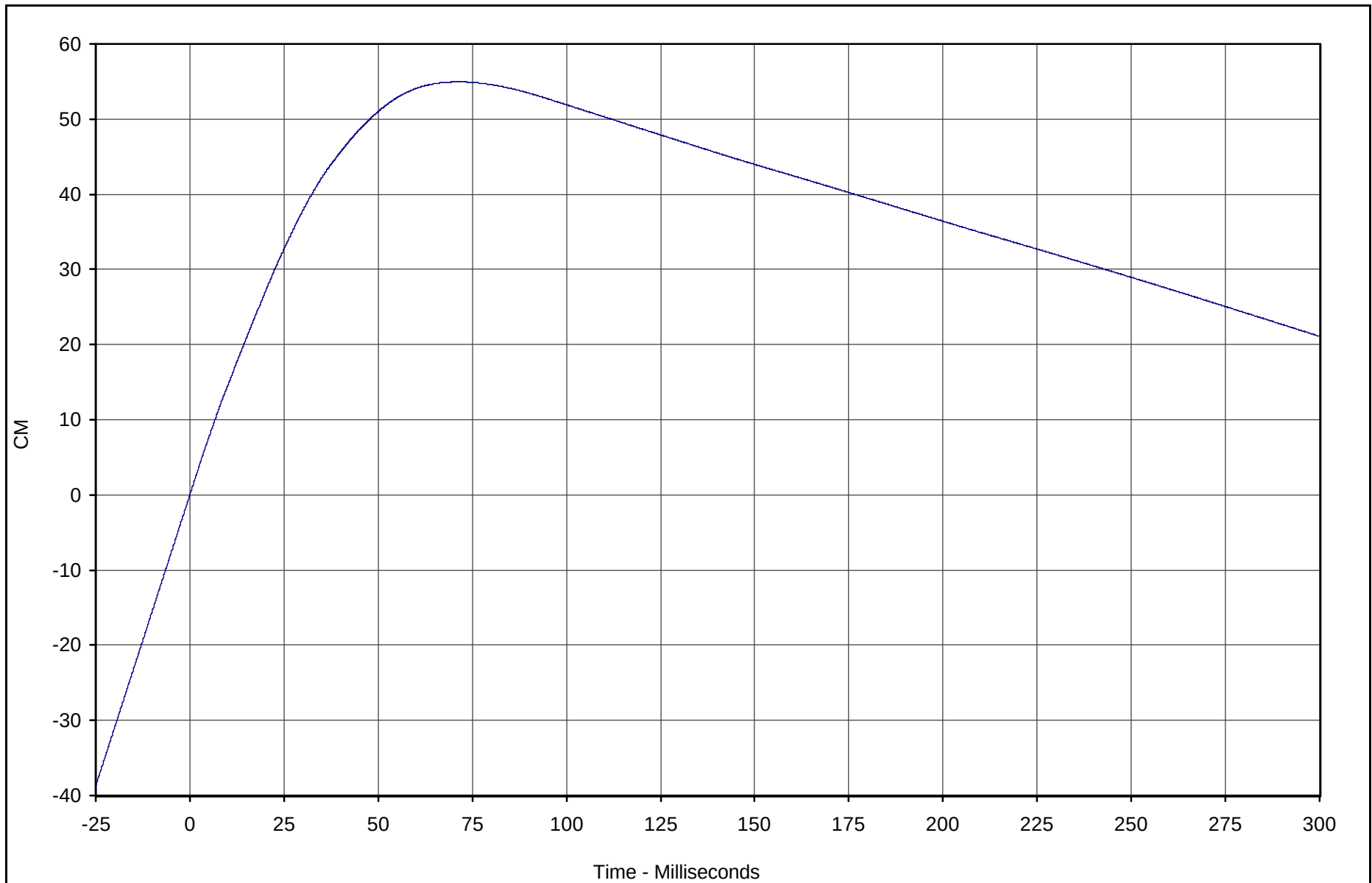


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Right Rear X Displ. | 090   | IN2  | CM    | 54.9 | 71.4 | 0.0 | 0.0  | 180       |

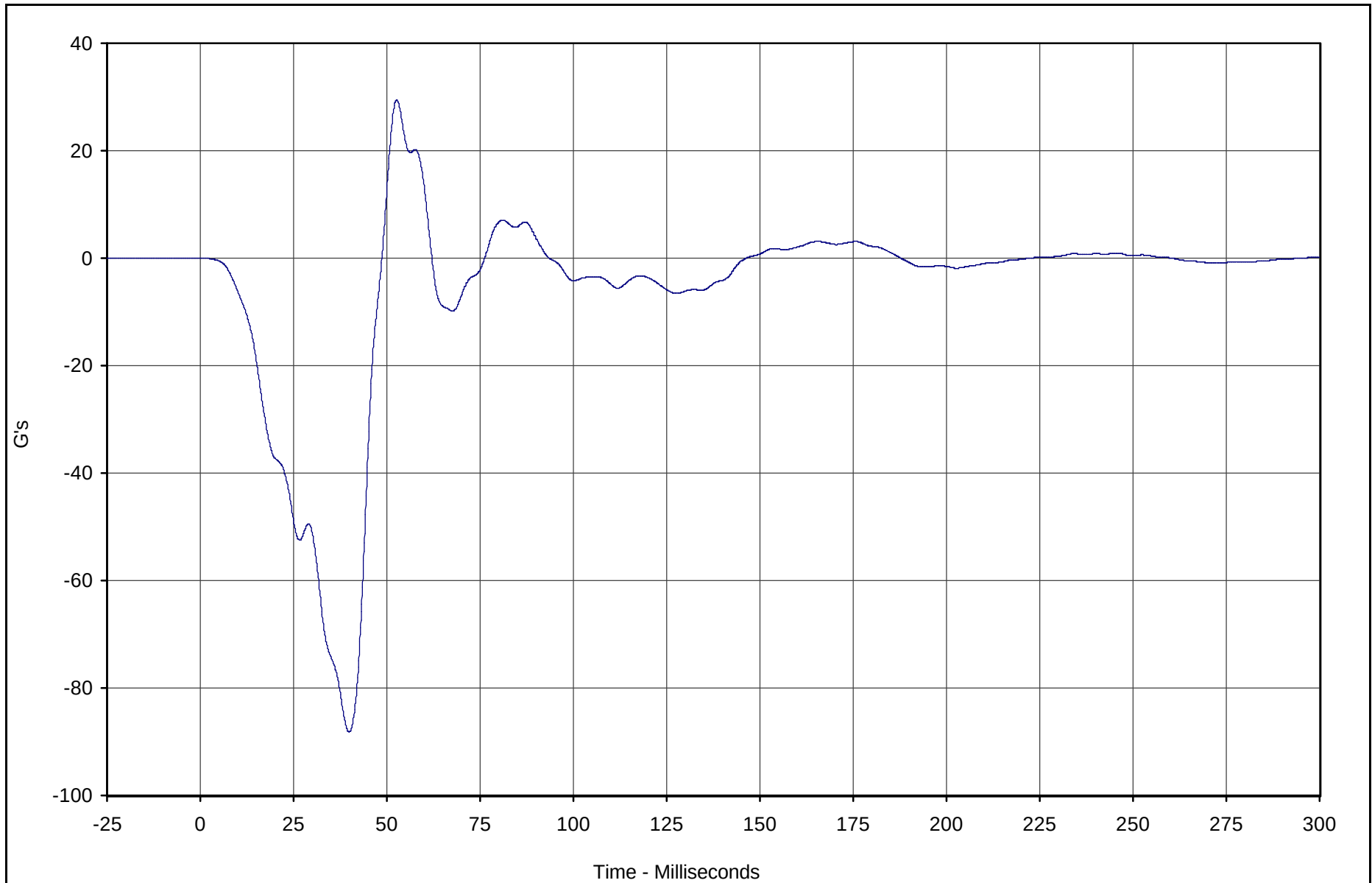


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description  | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|--------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Engine Top | 091   | FIL  | G's   | 29.4 | 52.6 | -88.2 | 39.9 | 60        |



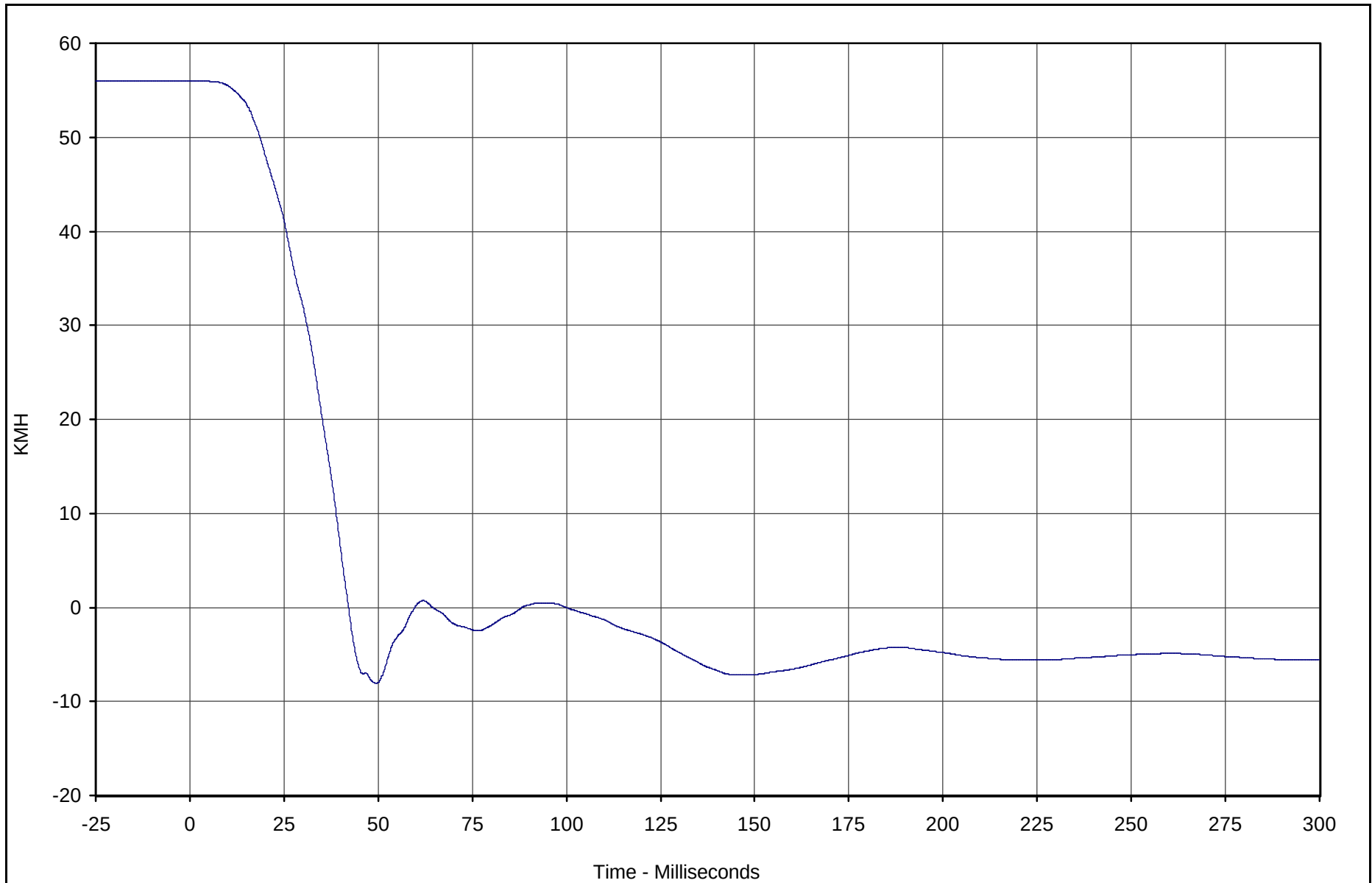
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description           | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Engine Top Velocity | 091   | IN1  | KMH   | 56.0 | 0.4  | -8.1 | 49.6 | 180       |

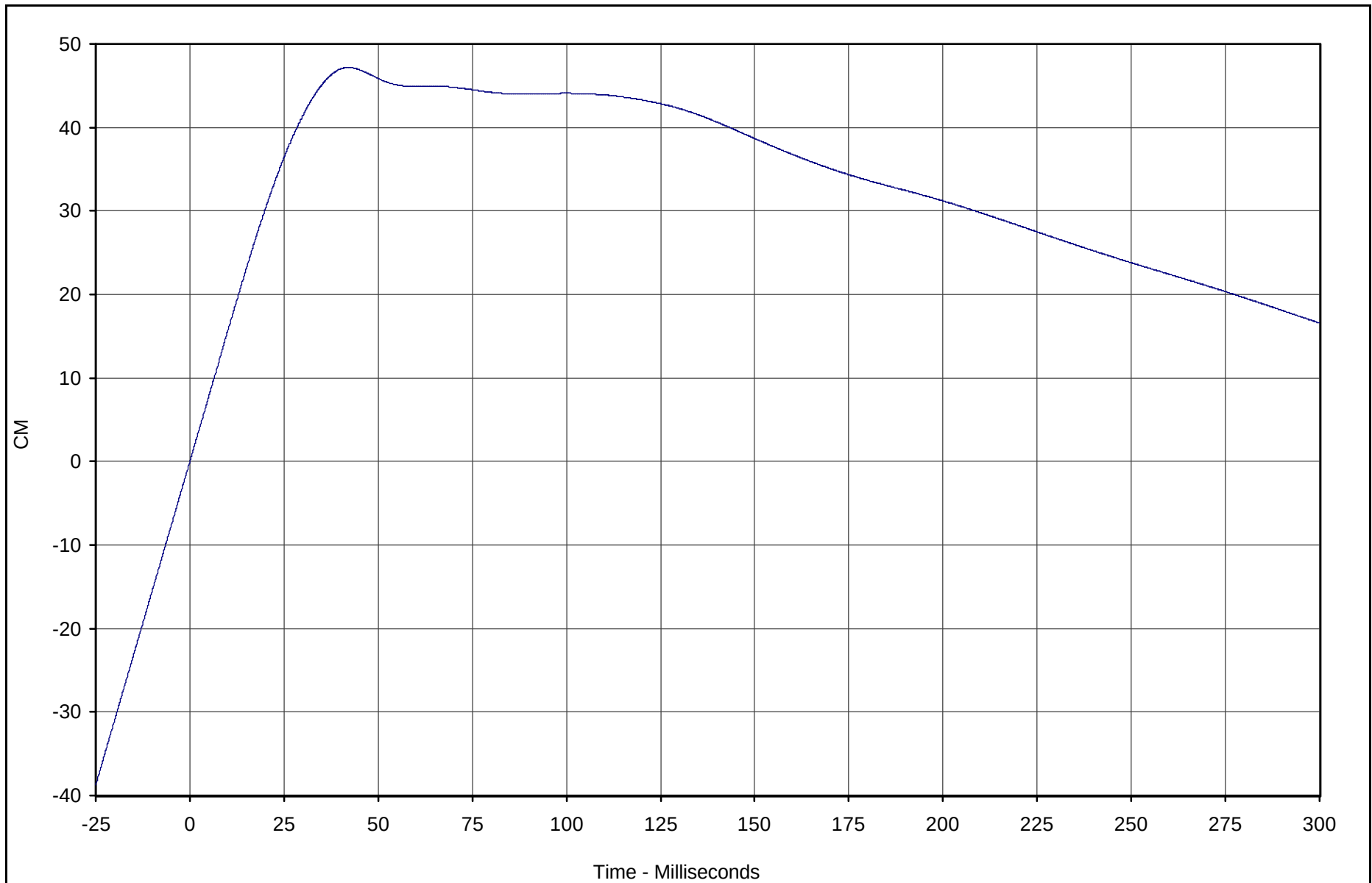


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description               | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Engine Top Displacement | 091   | IN2  | CM    | 47.2 | 42.1 | 0.0 | 0.0  | 180       |

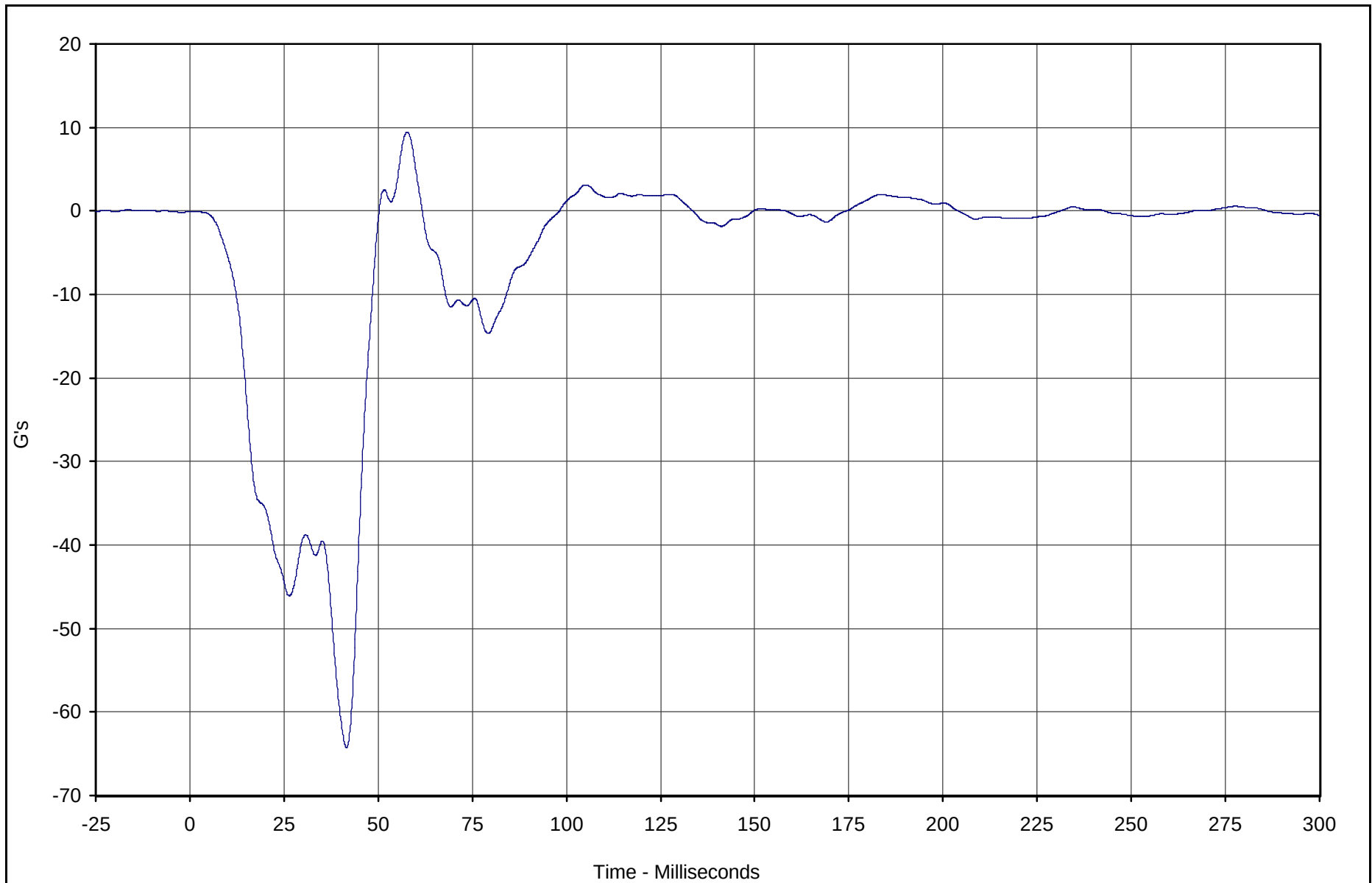


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description     | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|-----------------------|-------|------|-------|-----|------|-------|------|-----------|
| Vehicle Engine Bottom | 092   | FIL  | G's   | 9.4 | 57.7 | -64.3 | 41.6 | 60        |

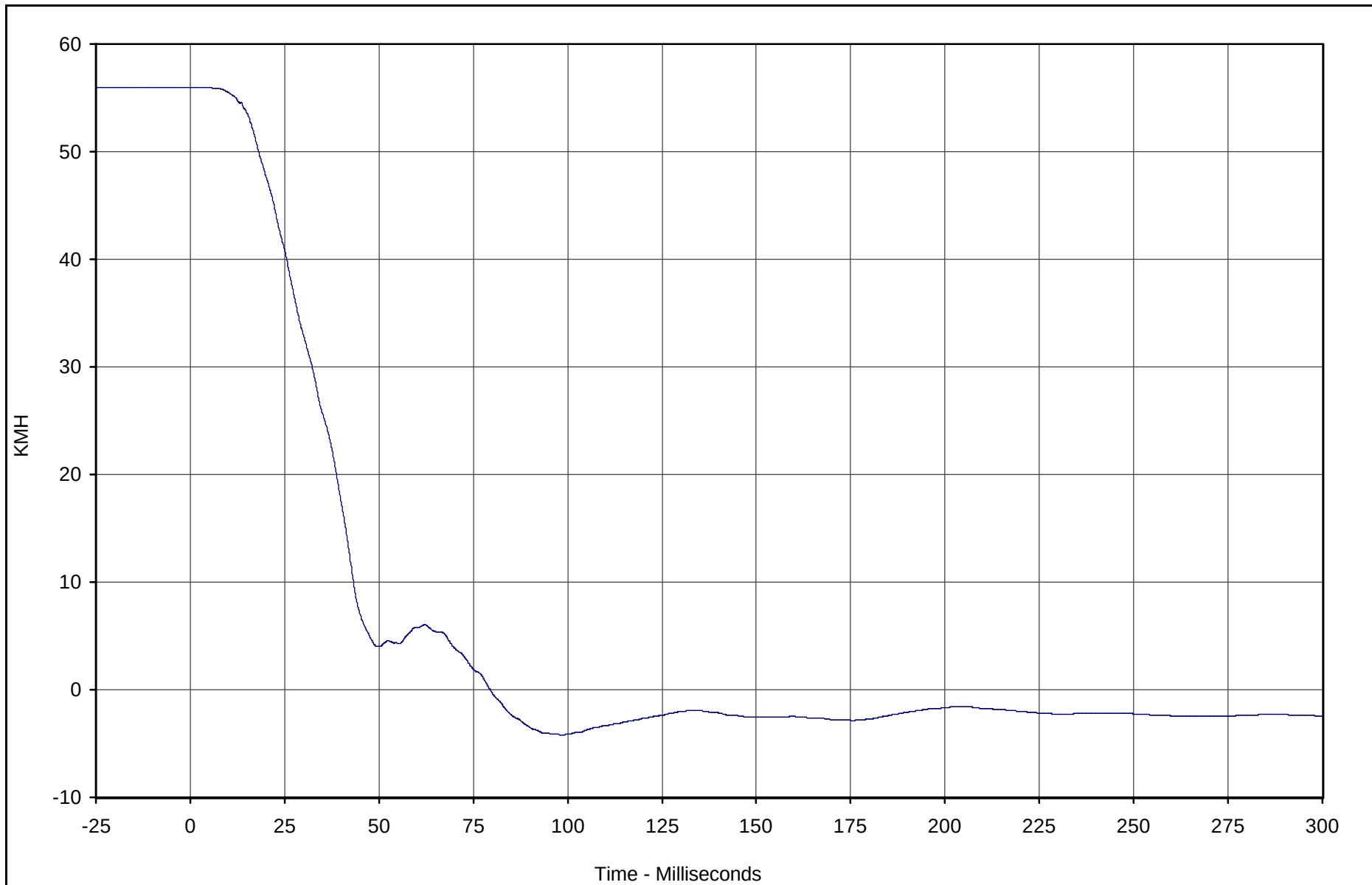


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description              | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|--------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Engine Bottom Velocity | 092   | IN1  | KMH   | 56.0 | 0.0  | -4.2 | 98.6 | 180       |

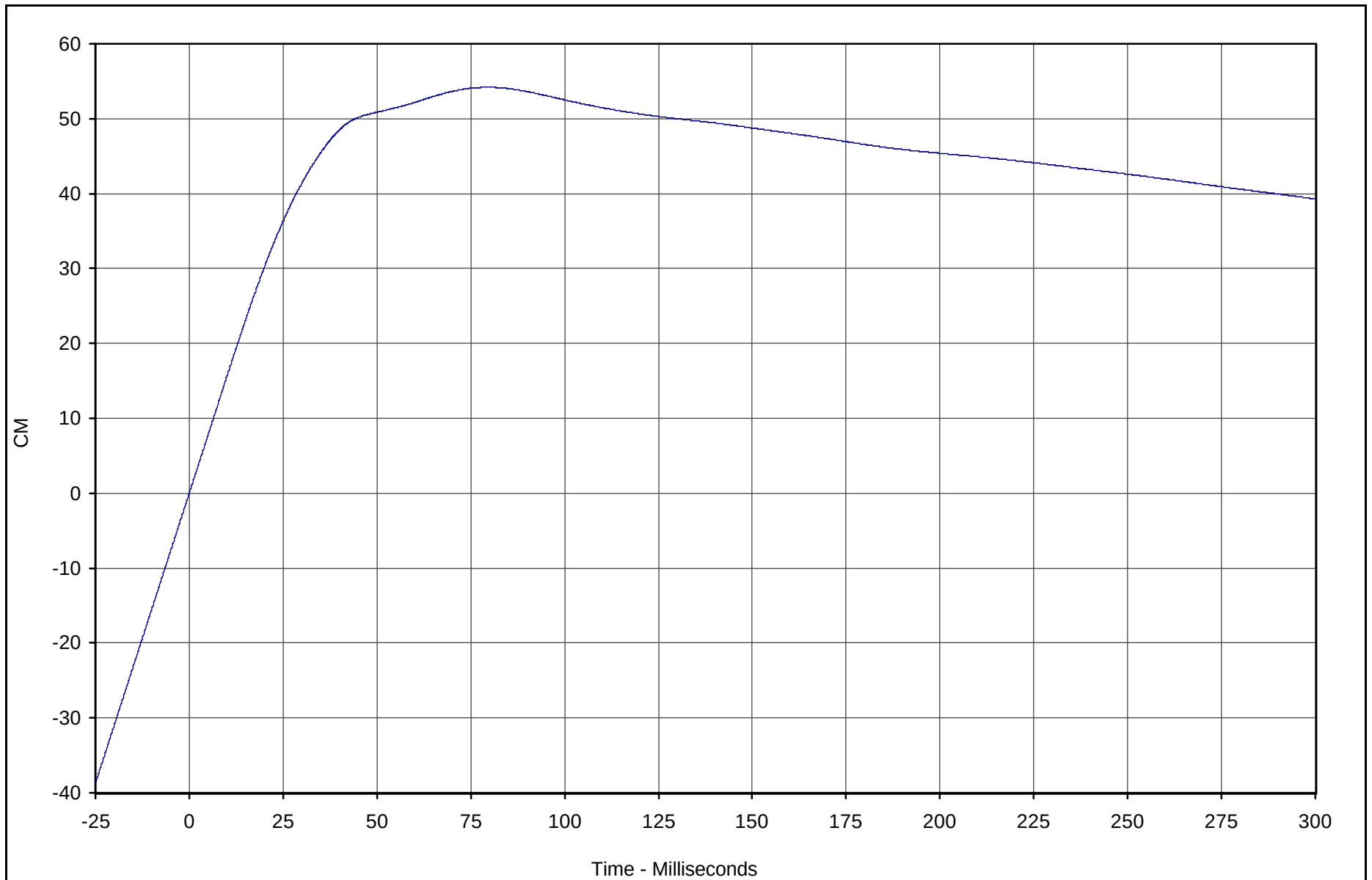


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Vehicle Engine Bottom Displacement | 092   | IN2  | CM    | 54.2 | 79.5 | 0.0 | 0.0  | 180       |



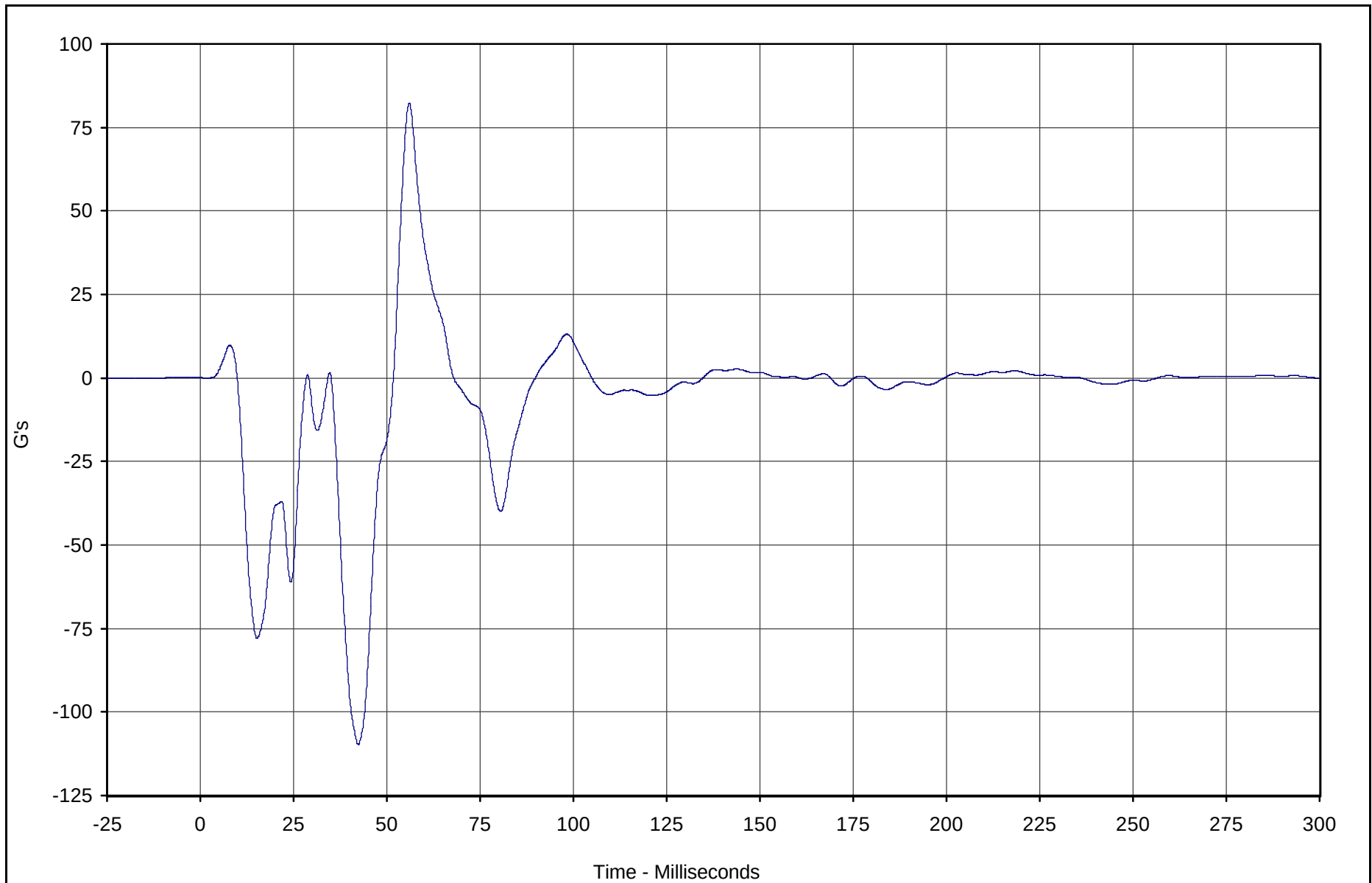
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description          | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|----------------------------|-------|------|-------|------|------|--------|------|-----------|
| Vehicle Left Brake Caliper | 093   | FIL  | G's   | 82.2 | 56.0 | -109.7 | 42.3 | 60        |

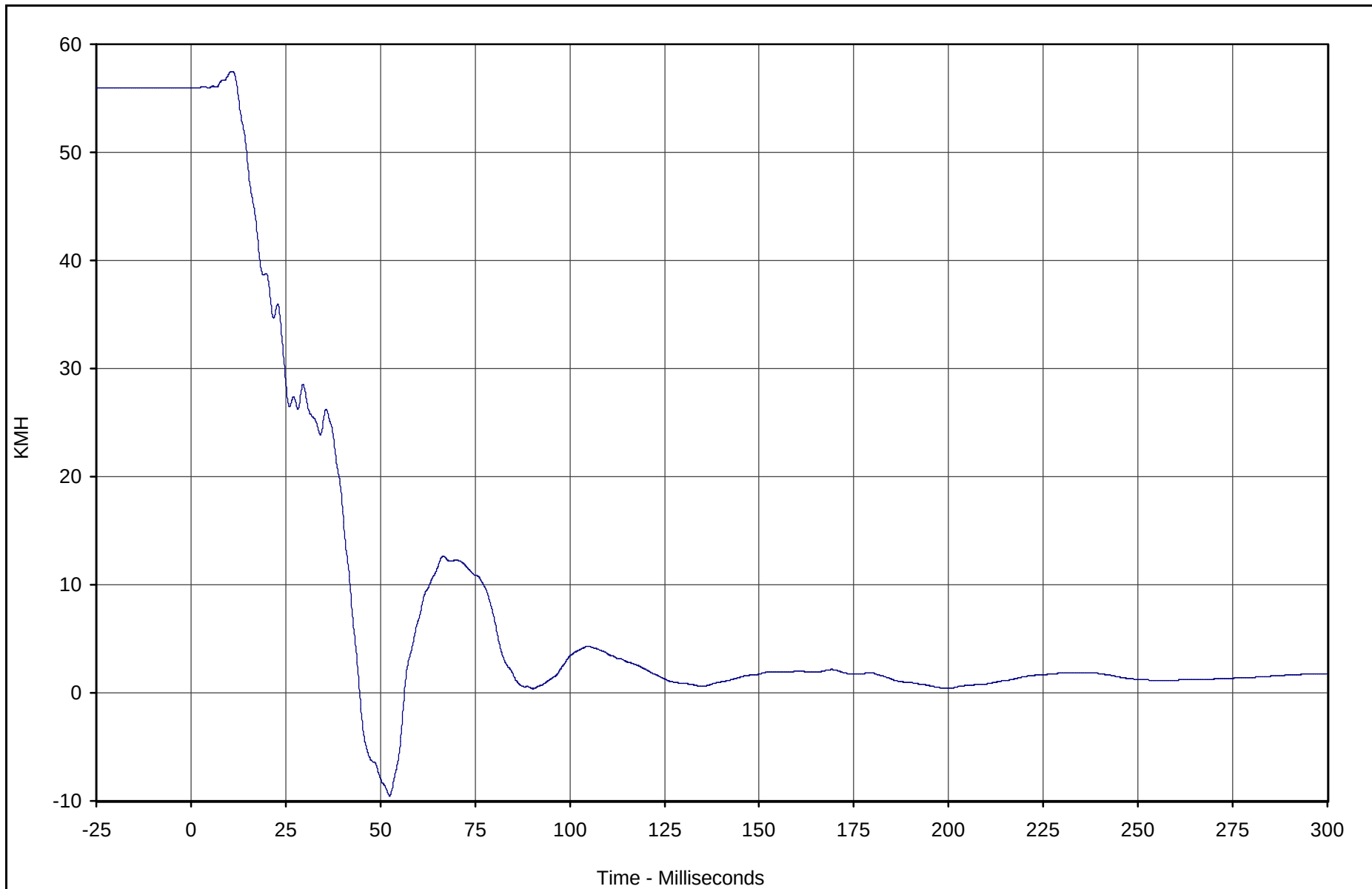


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Left Brake Caliper Velocity | 093   | IN1  | KMH   | 57.5 | 10.9 | -9.5 | 52.4 | 180       |

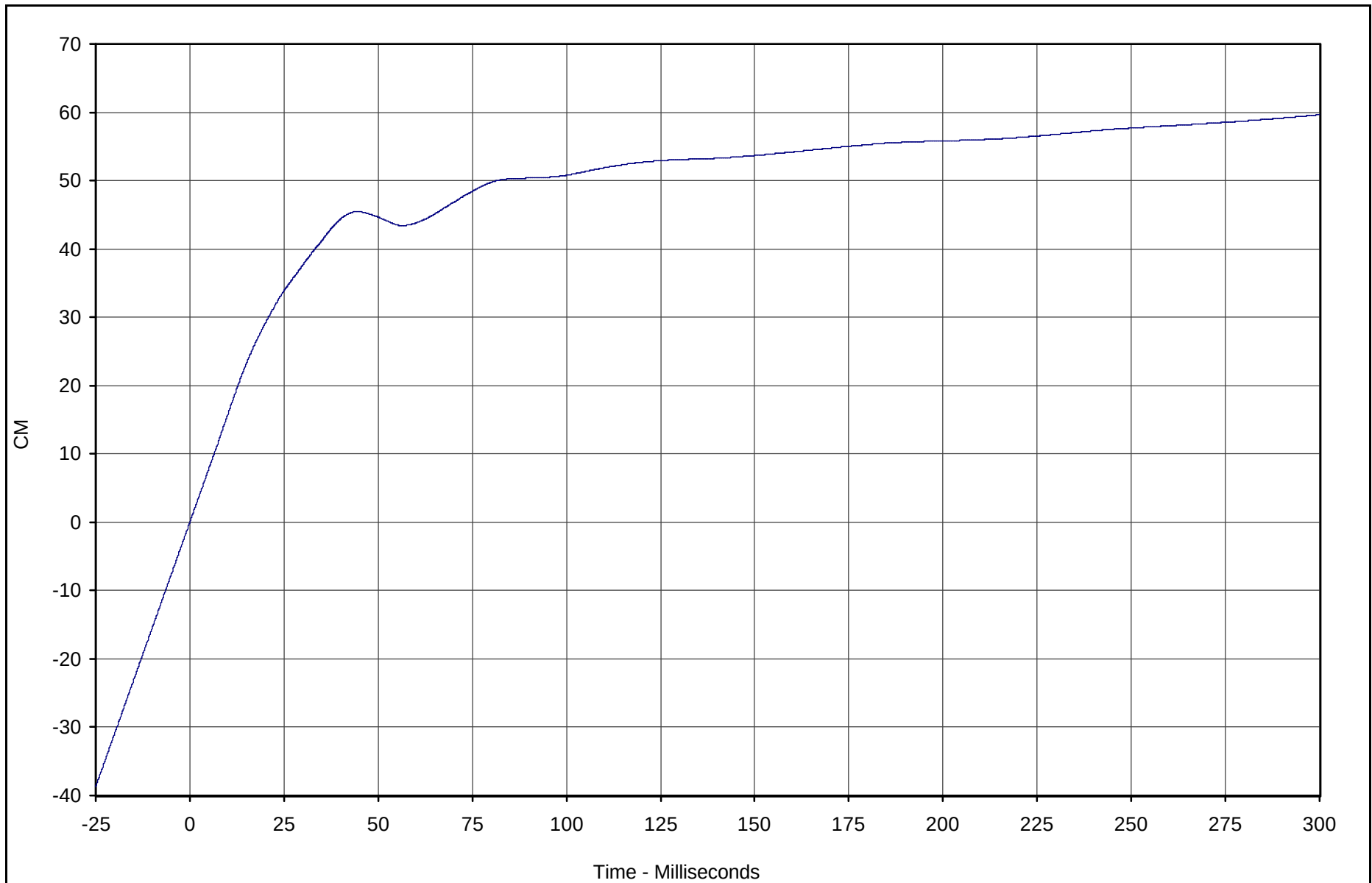


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Vehicle Left Brake Caliper Displ. | 093   | IN2  | CM    | 59.6 | 299.9 | 0.0 | 0.0  | 180       |

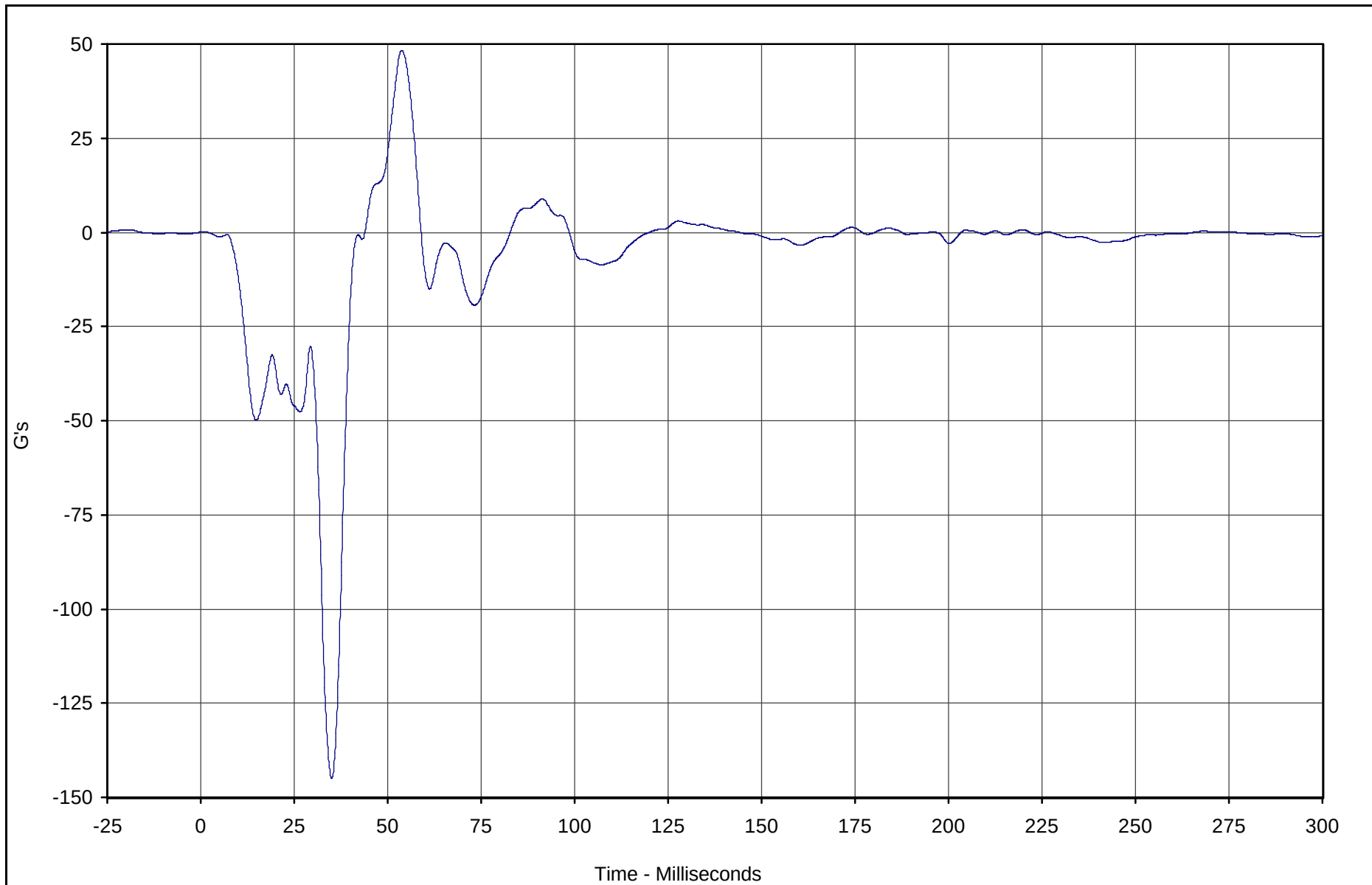


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time | Min    | Time | SAE Class |
|-----------------------------|-------|------|-------|------|------|--------|------|-----------|
| Vehicle Right Brake Caliper | 094   | FIL  | G's   | 48.3 | 53.8 | -145.0 | 35.1 | 60        |

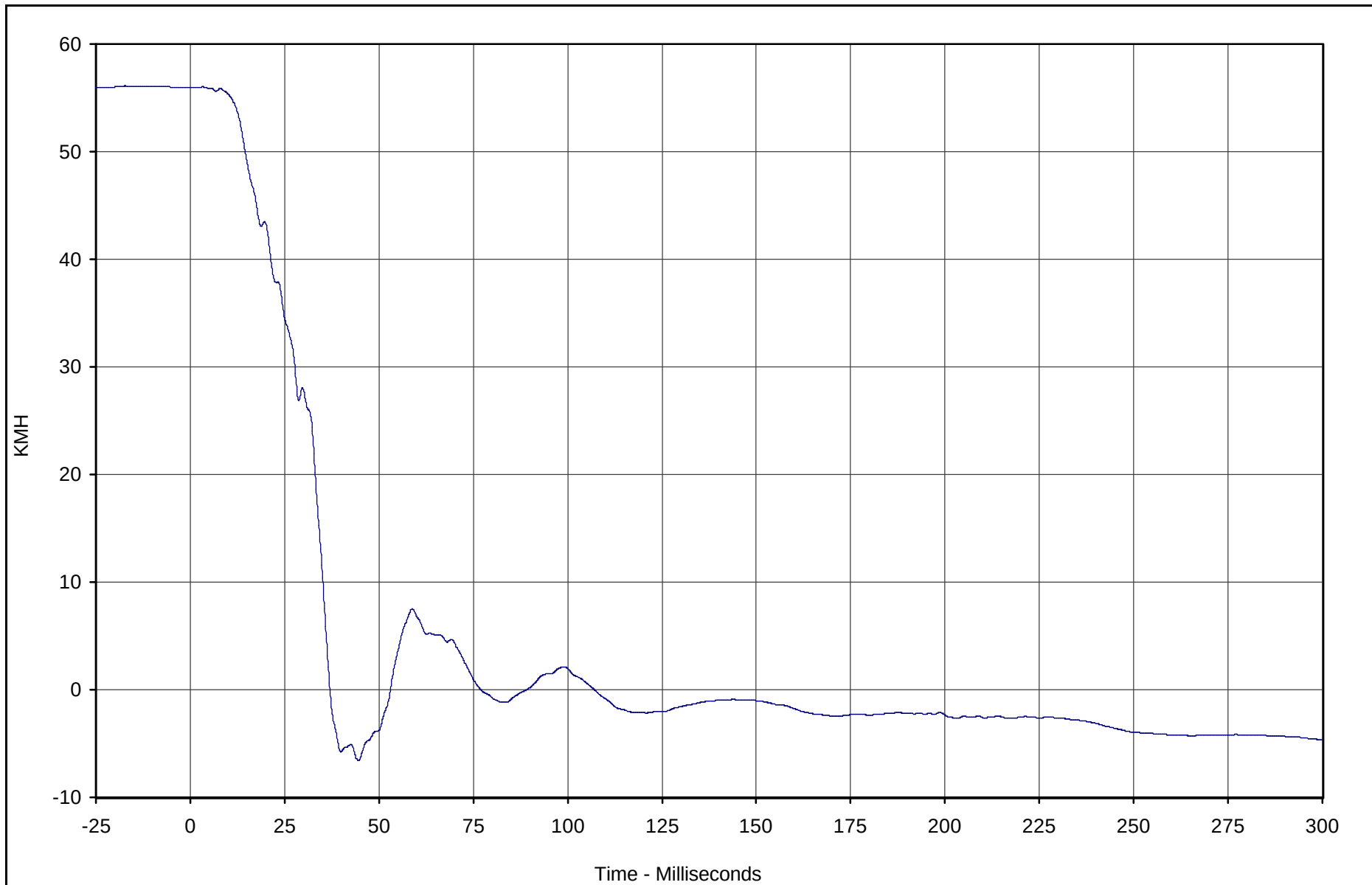


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Right Brake Caliper Velocity | 094   | IN1  | KMH   | 56.0 | 3.3  | -6.6 | 44.5 | 180       |



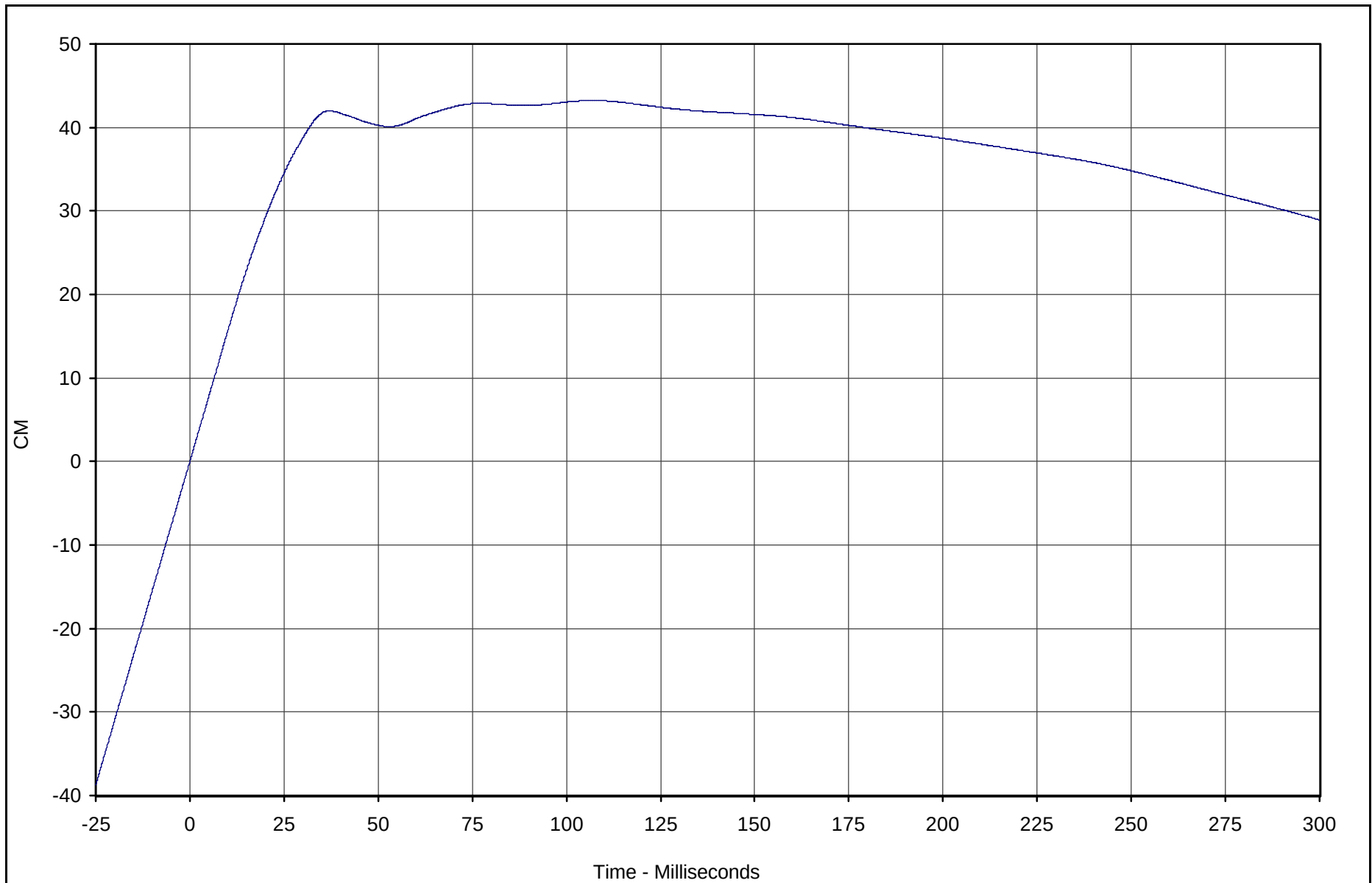
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                  | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Vehicle Right Brake Caliper Displ. | 094   | IN2  | CM    | 43.2 | 107.1 | 0.0 | 0.0  | 180       |

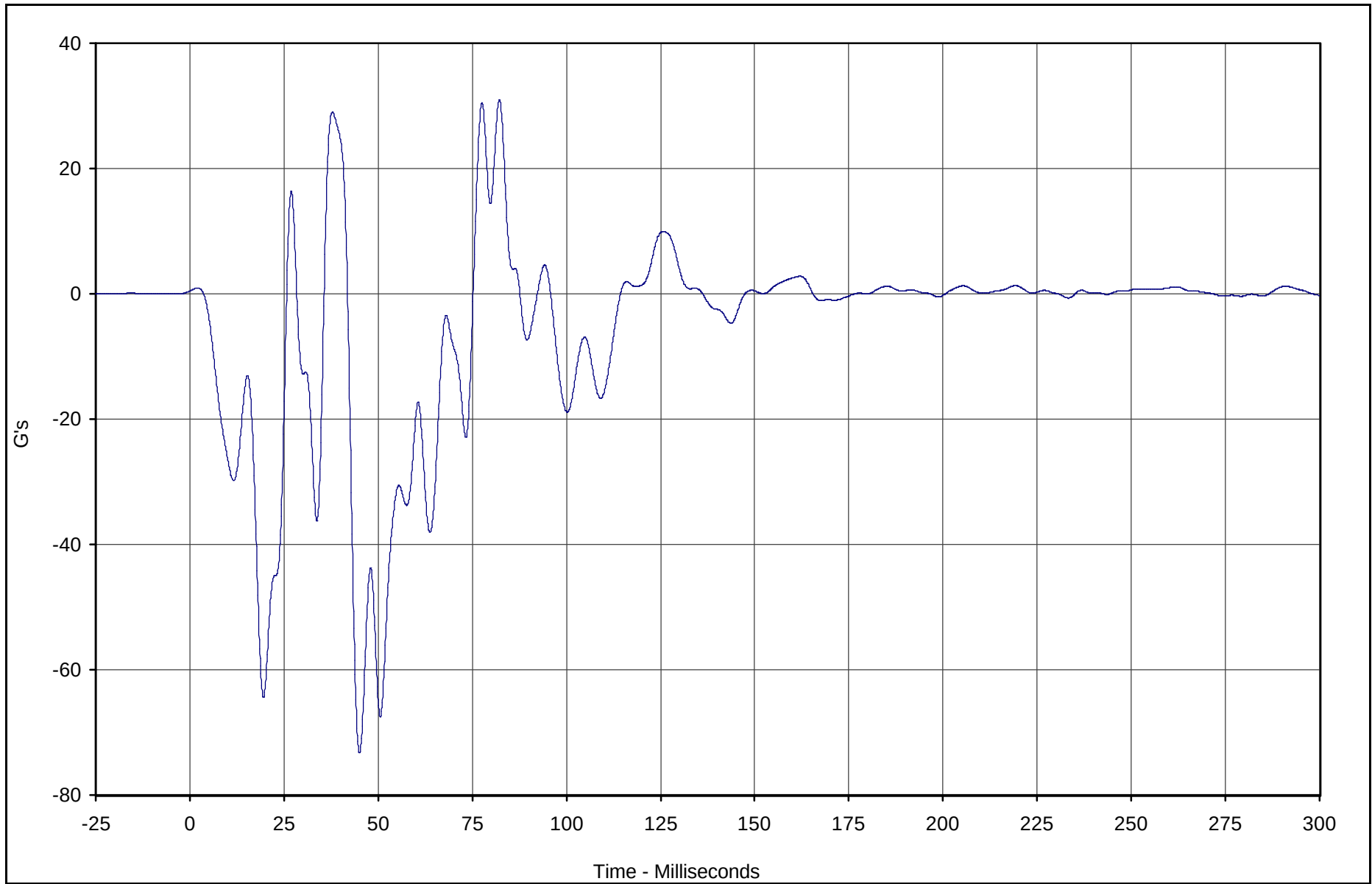


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|-------|------|-----------|
| Vehicle Instrument Panel | 095   | FIL  | G's   | 31.0 | 82.2 | -73.3 | 45.1 | 60        |

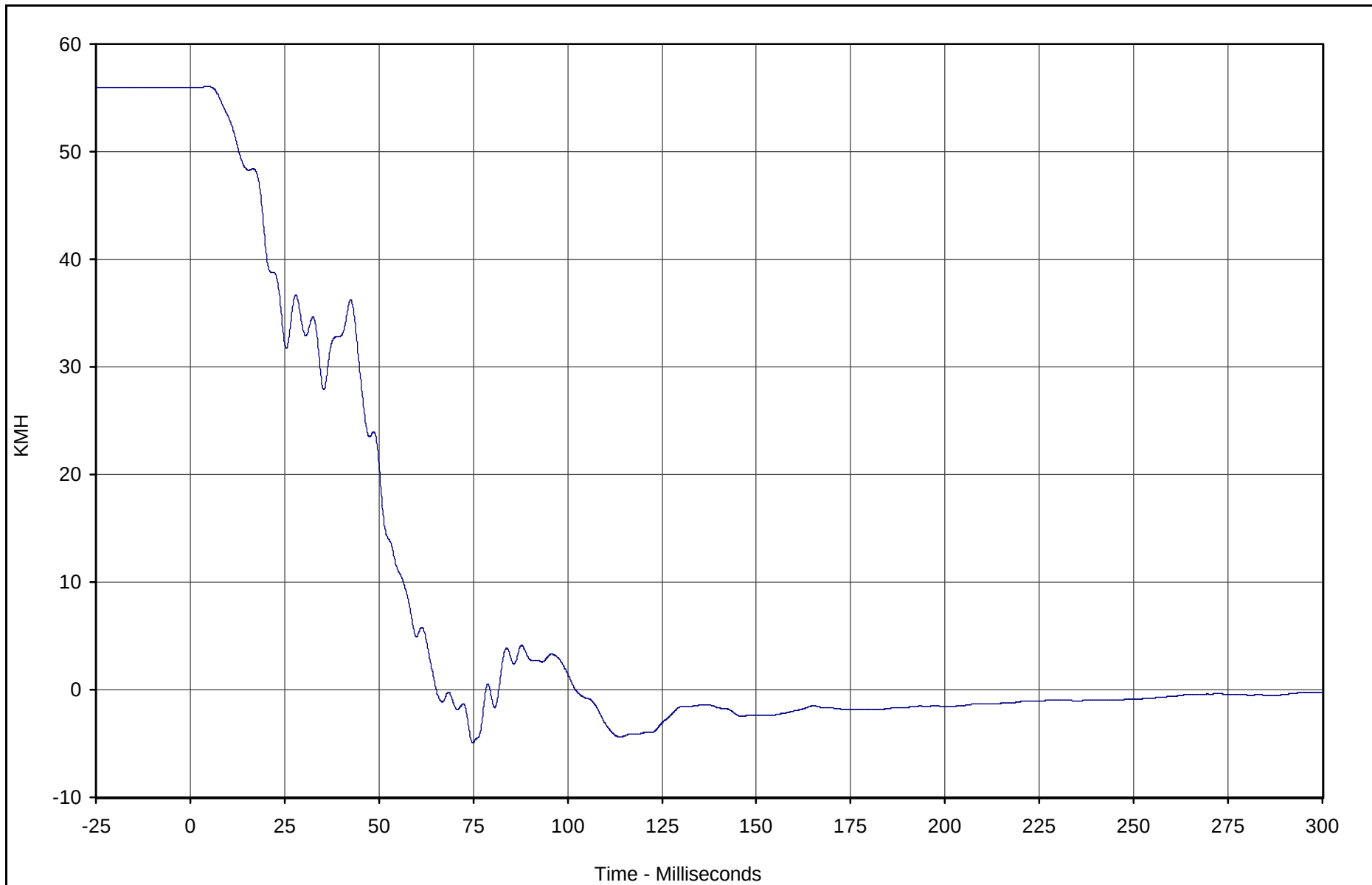


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|------|------|-----------|
| Vehicle Instrument Panel Velocity | 095   | IN1  | KMH   | 56.0 | 4.8  | -4.9 | 74.9 | 180       |

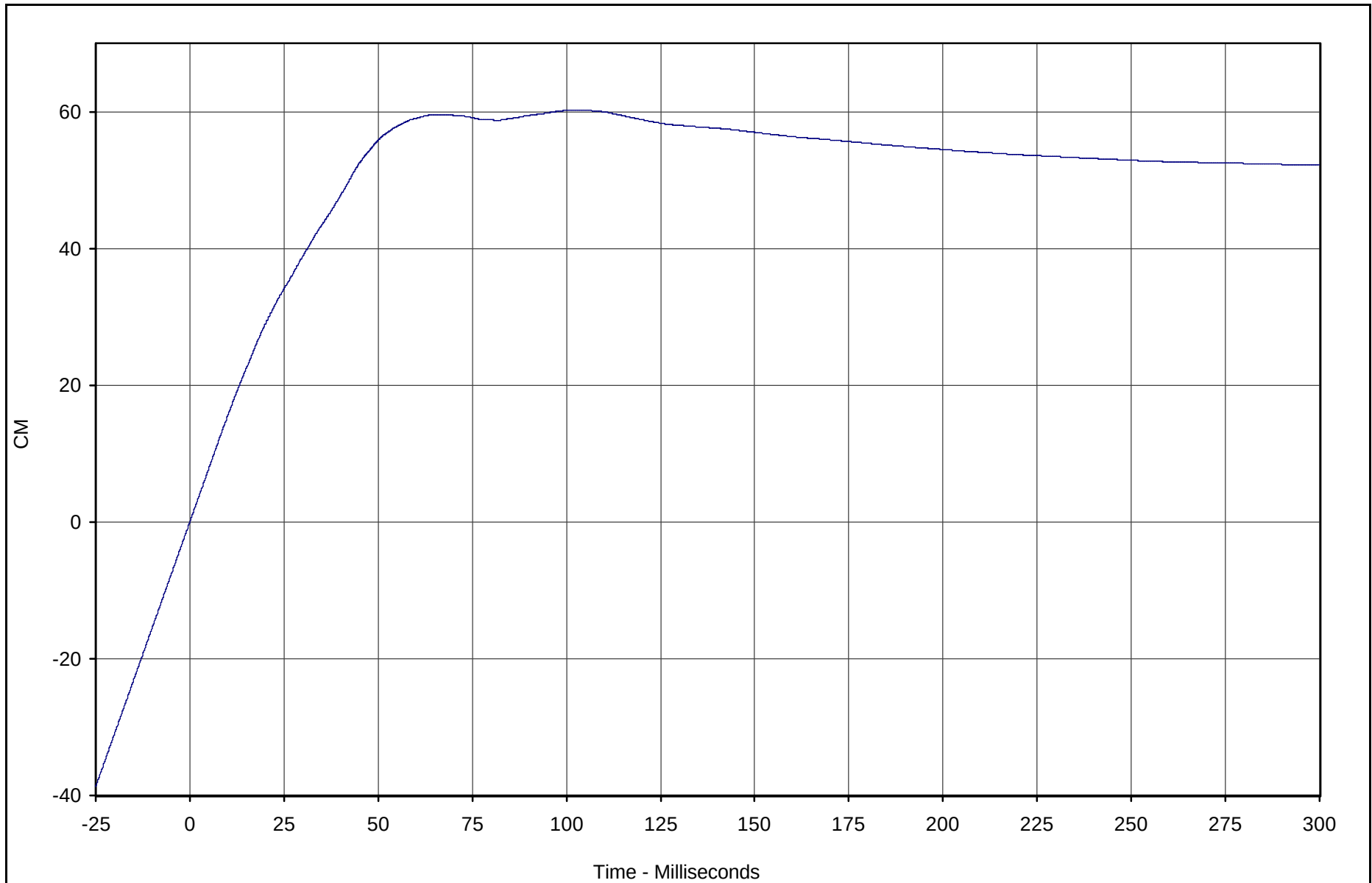


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|---------------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Vehicle Instrument Panel Displacement | 095   | IN2  | CM    | 60.2 | 102.1 | 0.0 | 0.0  | 180       |

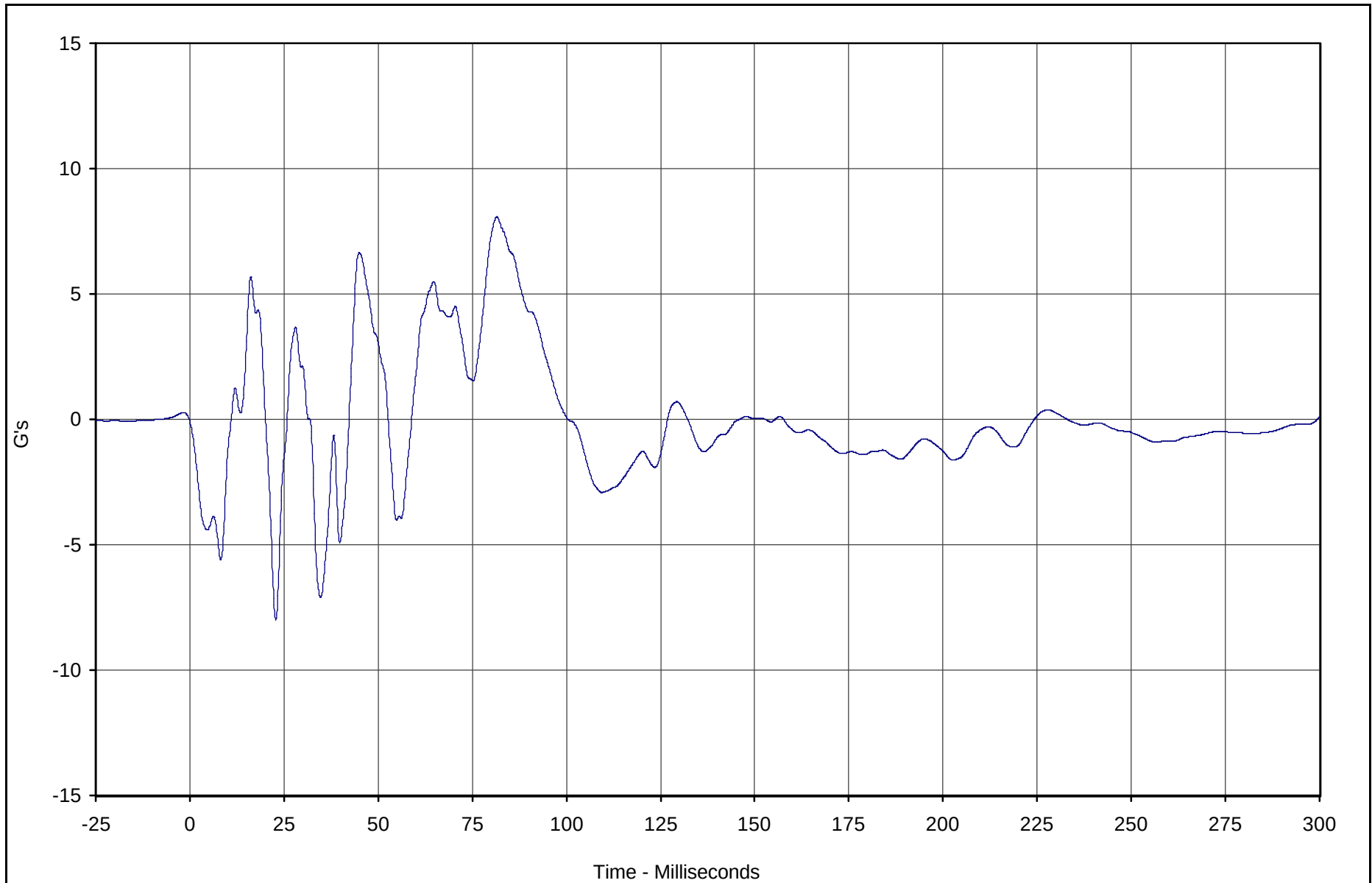


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description   | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|---------------------|-------|------|-------|-----|------|------|------|-----------|
| Vehicle Left Rear Z | 096   | FIL  | G's   | 8.1 | 81.6 | -8.0 | 22.8 | 60        |



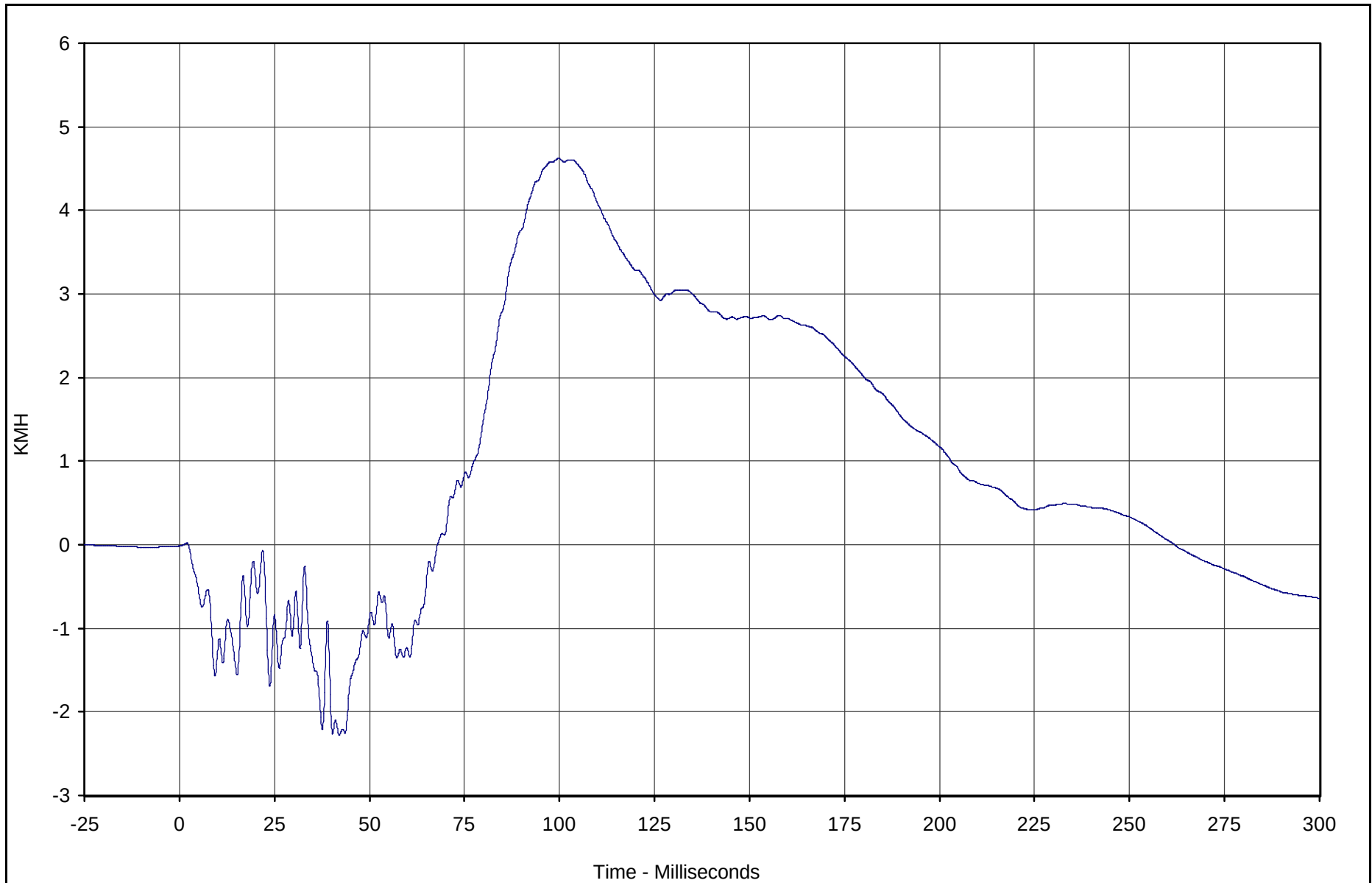
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description            | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|------------------------------|-------|------|-------|-----|------|------|------|-----------|
| Vehicle Left Rear Z Velocity | 096   | IN1  | KMH   | 4.6 | 99.8 | -2.3 | 42.1 | 180       |

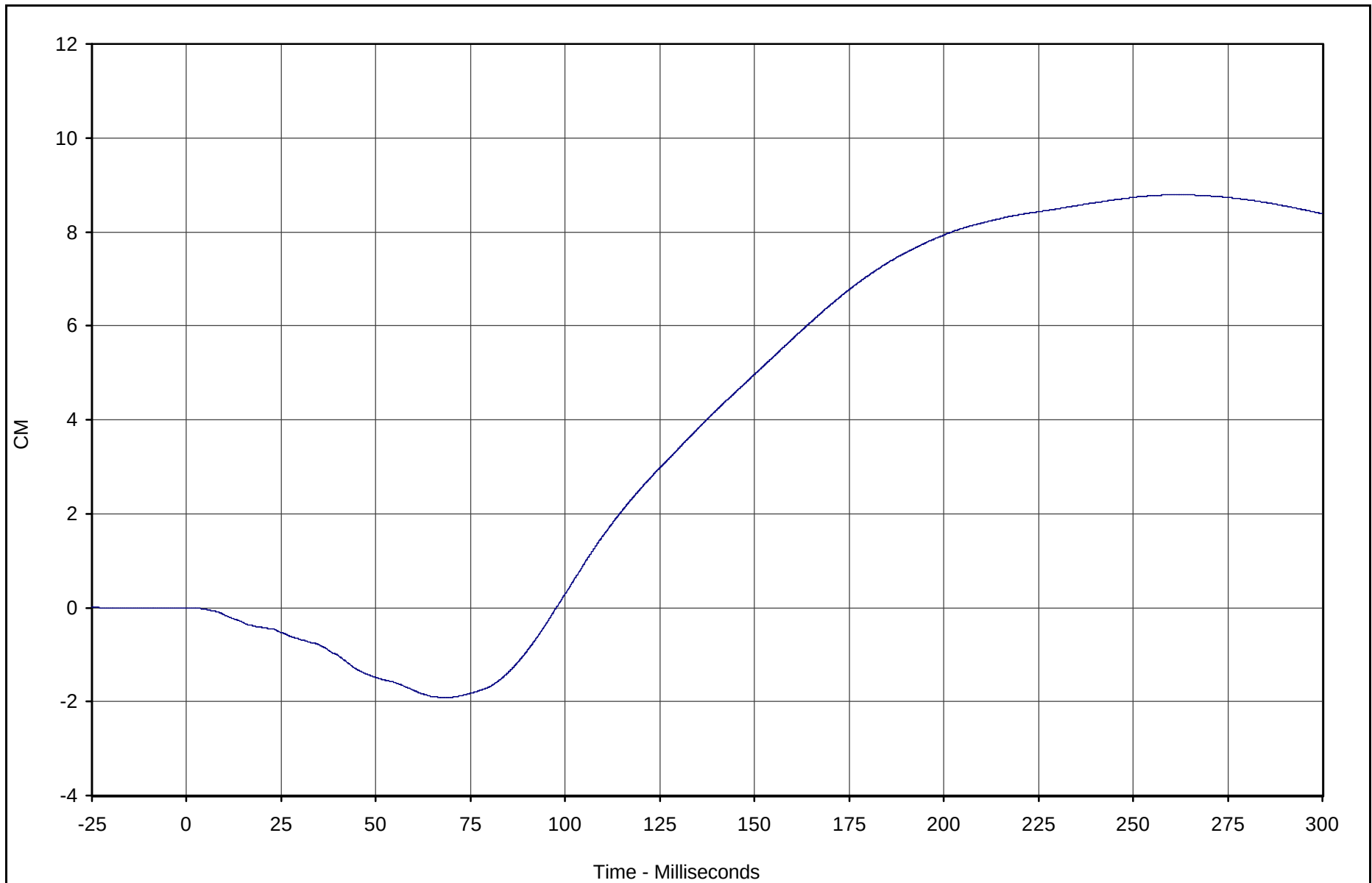


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time  | Min  | Time | SAE Class |
|----------------------------|-------|------|-------|-----|-------|------|------|-----------|
| Vehicle Left Rear Z Displ. | 096   | IN2  | CM    | 8.8 | 261.8 | -1.9 | 67.9 | 180       |

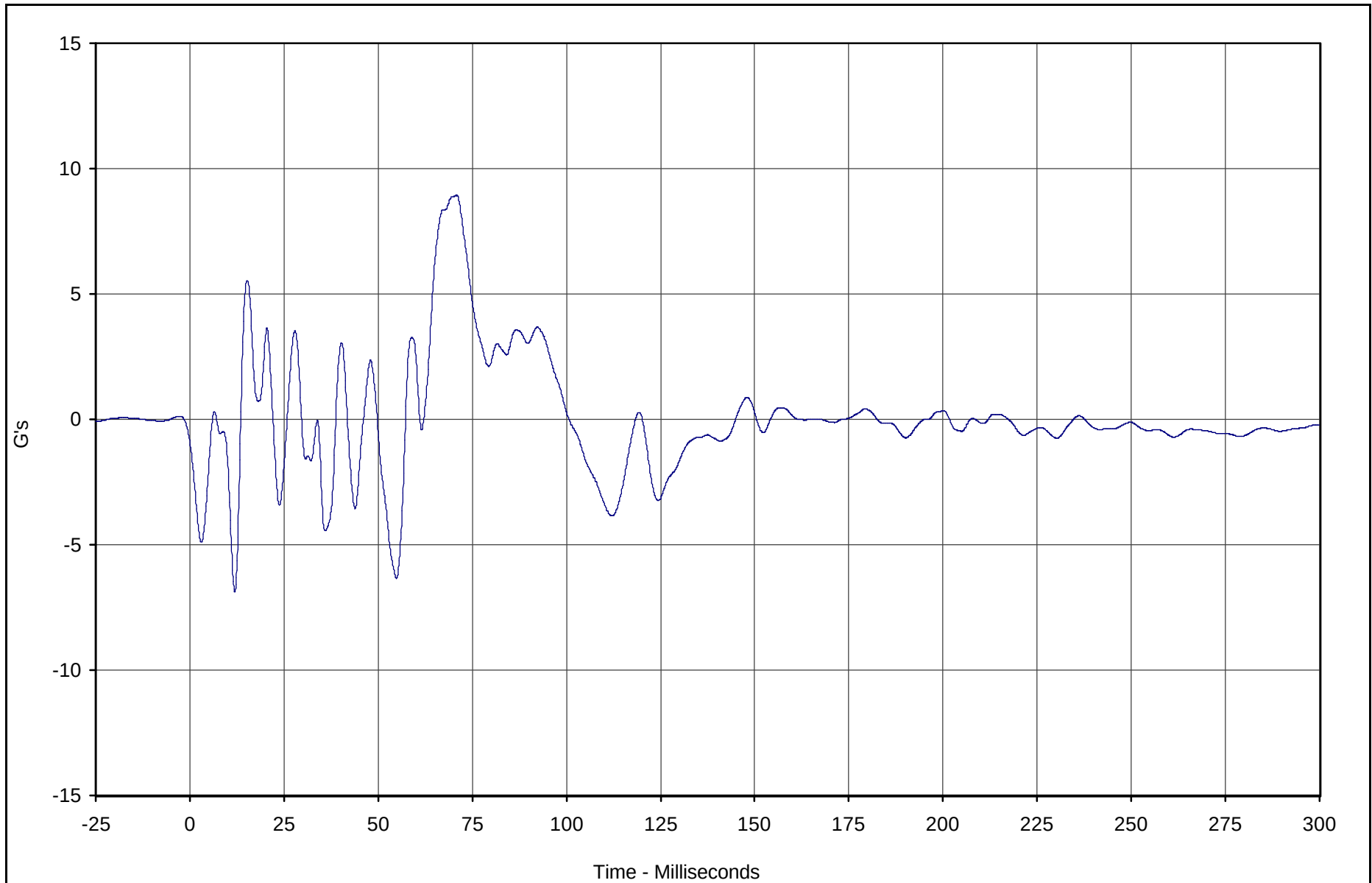


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description    | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|----------------------|-------|------|-------|-----|------|------|------|-----------|
| Vehicle Right Rear Z | 097   | FIL  | G's   | 8.9 | 70.8 | -6.9 | 12.0 | 60        |

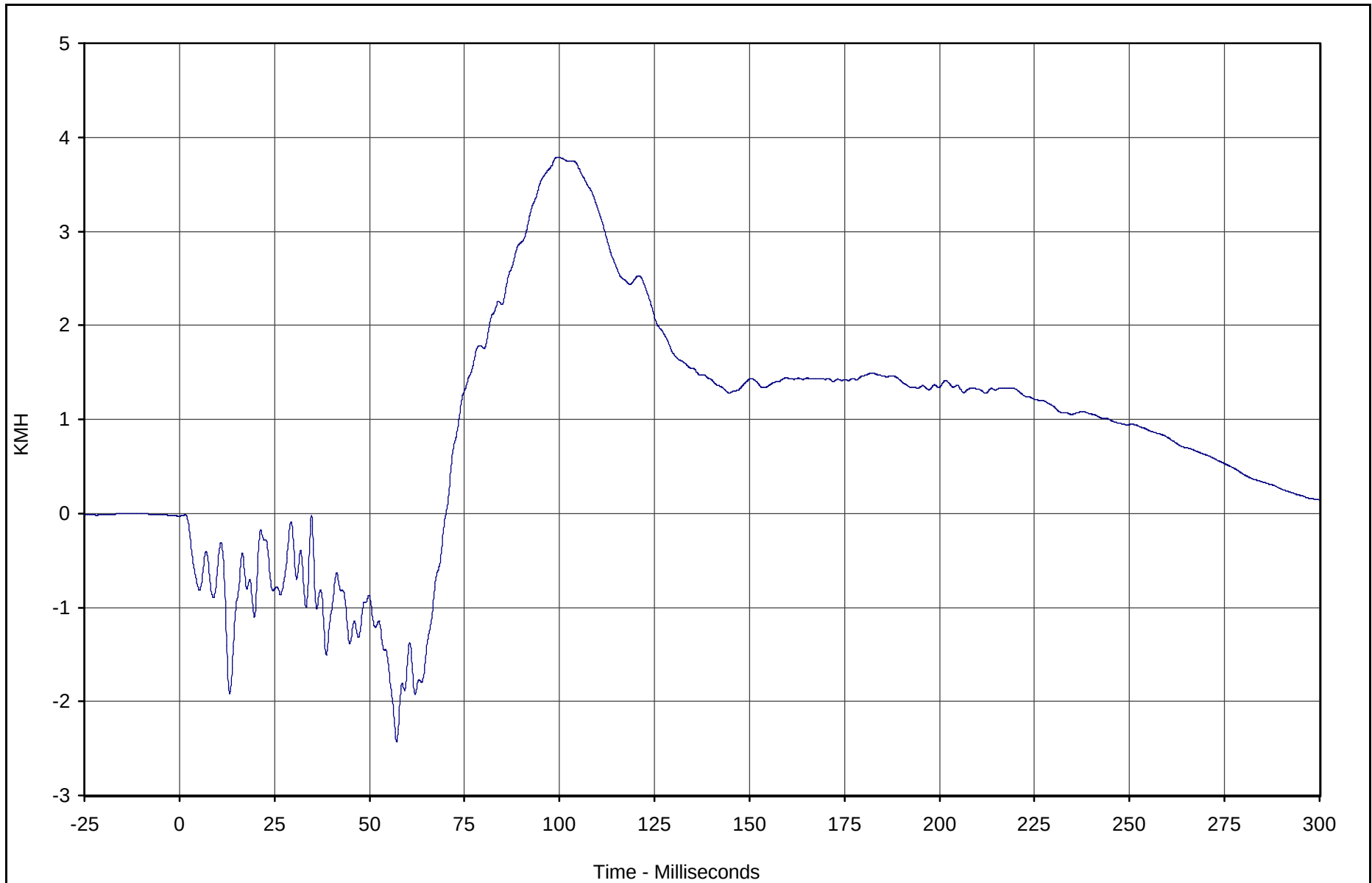


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description             | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|-------------------------------|-------|------|-------|-----|------|------|------|-----------|
| Vehicle Right Rear Z Velocity | 097   | IN1  | KMH   | 3.8 | 99.6 | -2.4 | 57.2 | 180       |

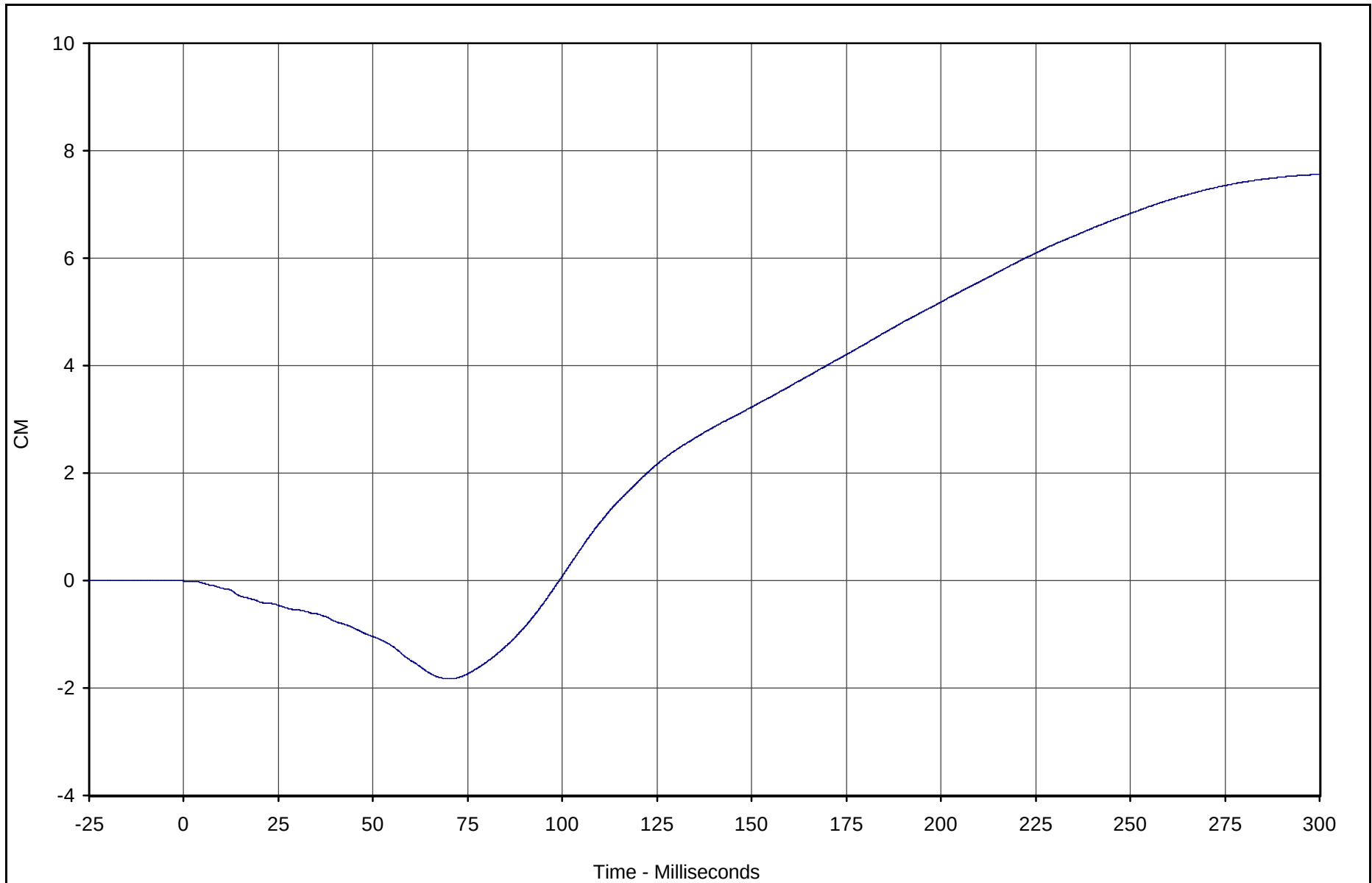


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max | Time  | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|-------|------|------|-----------|
| Vehicle Right Rear Z Displ. | 097   | IN2  | CM    | 7.6 | 299.9 | -1.8 | 70.1 | 180       |



Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

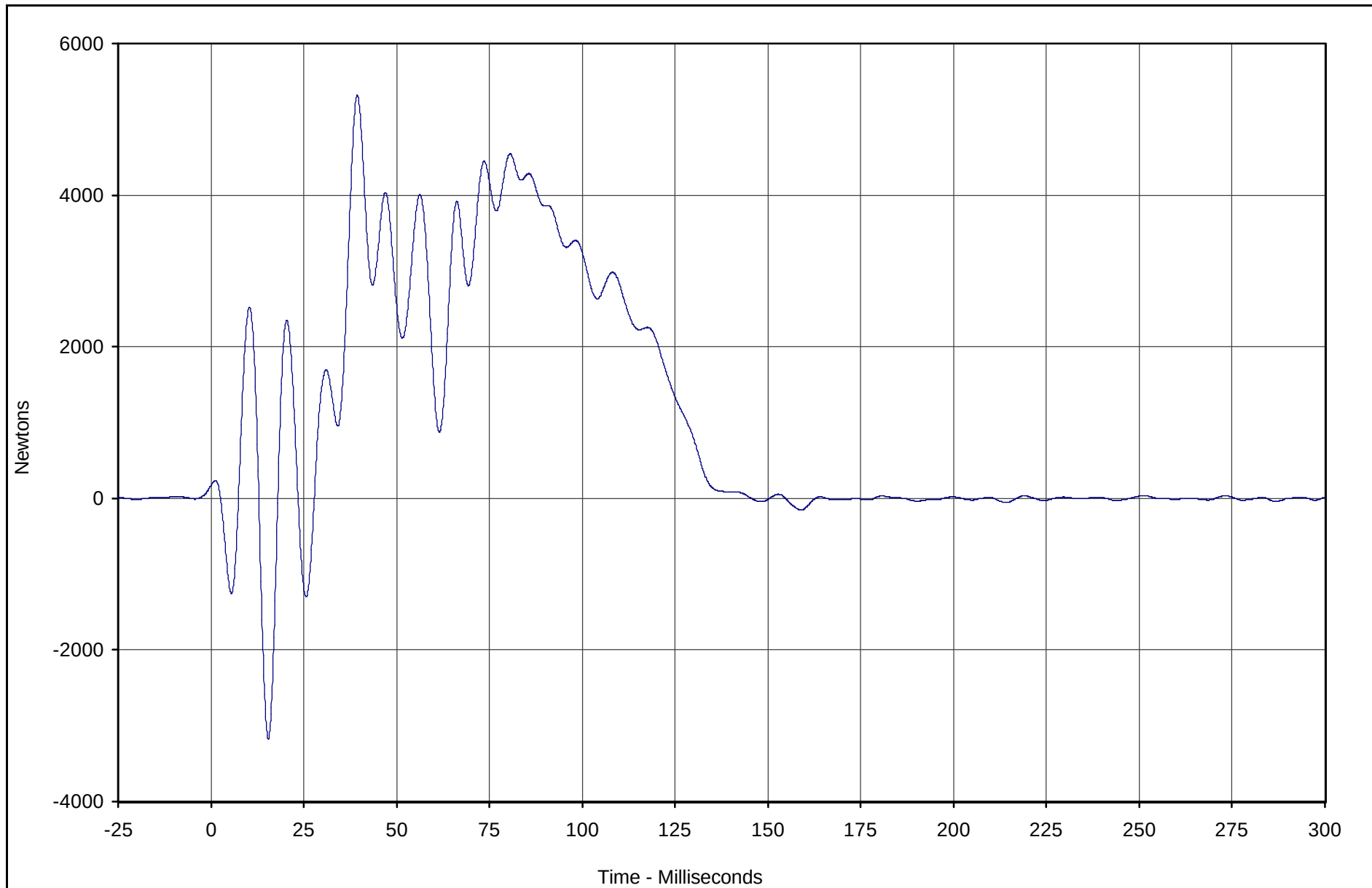
NHTSA No.: M40300



## **APPENDIX C**

### **LOAD CELL BARRIER DATA PLOTS**

C-1



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A1  | 098   | FIL  | Newtons | 5318.9 | 39.4 | -3174.9 | 15.5 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

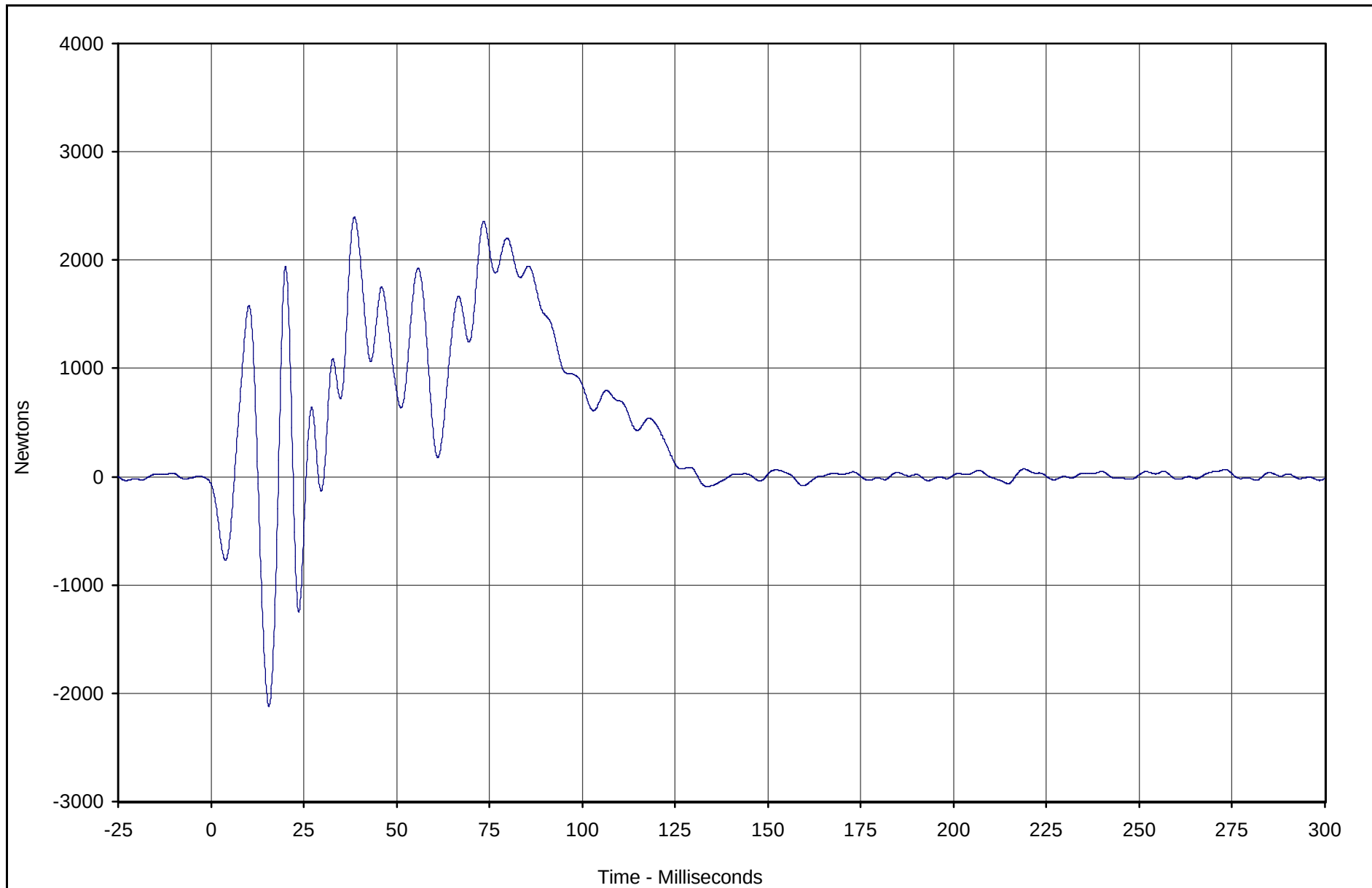
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



TR-P23001-23-NC



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A2  | 099   | FIL  | Newtons | 2394.4 | 38.7 | -2118.7 | 15.7 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

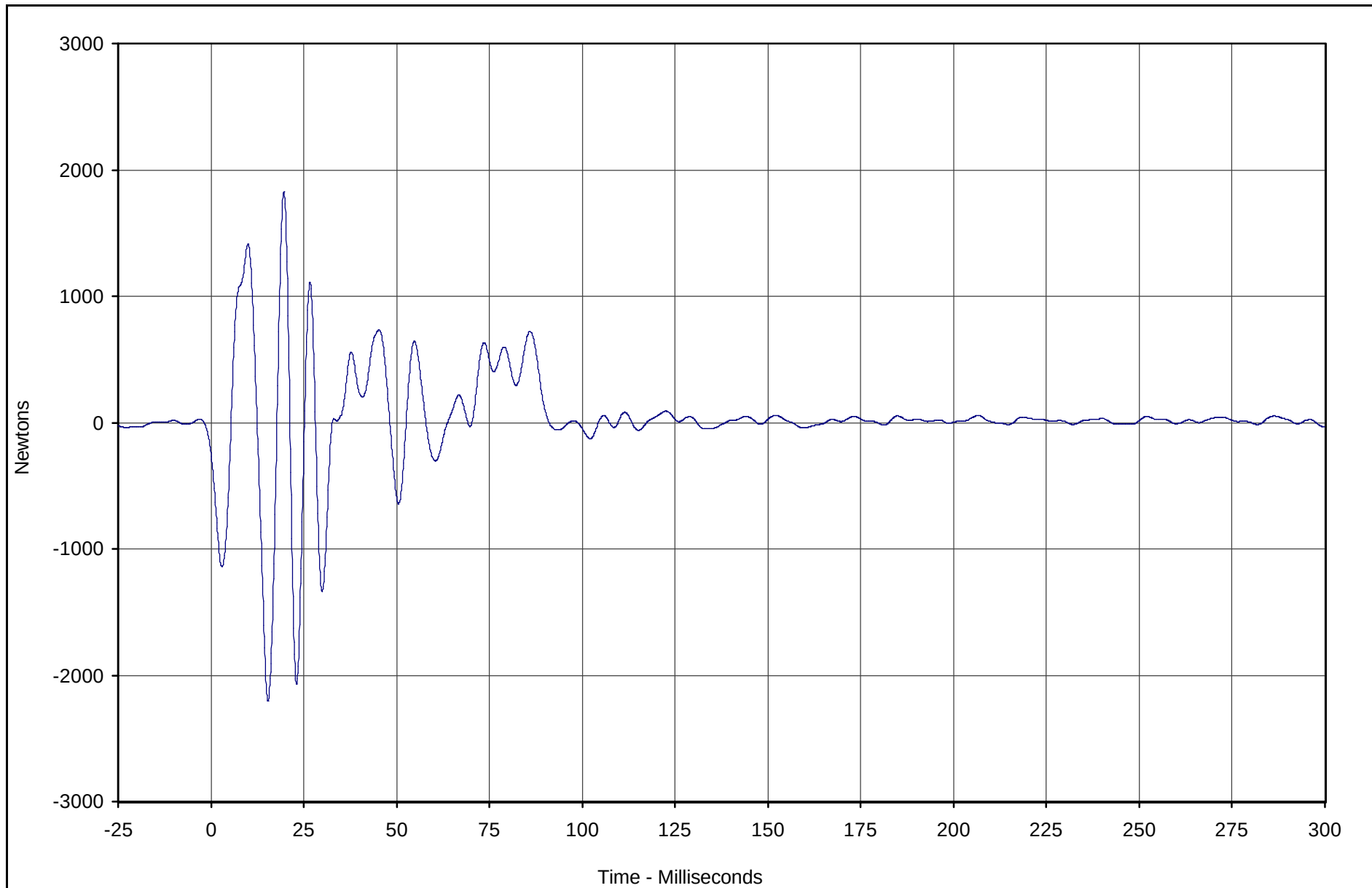
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A3  | 100   | FIL  | Newtons | 1827.3 | 19.6 | -2206.0 | 15.4 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

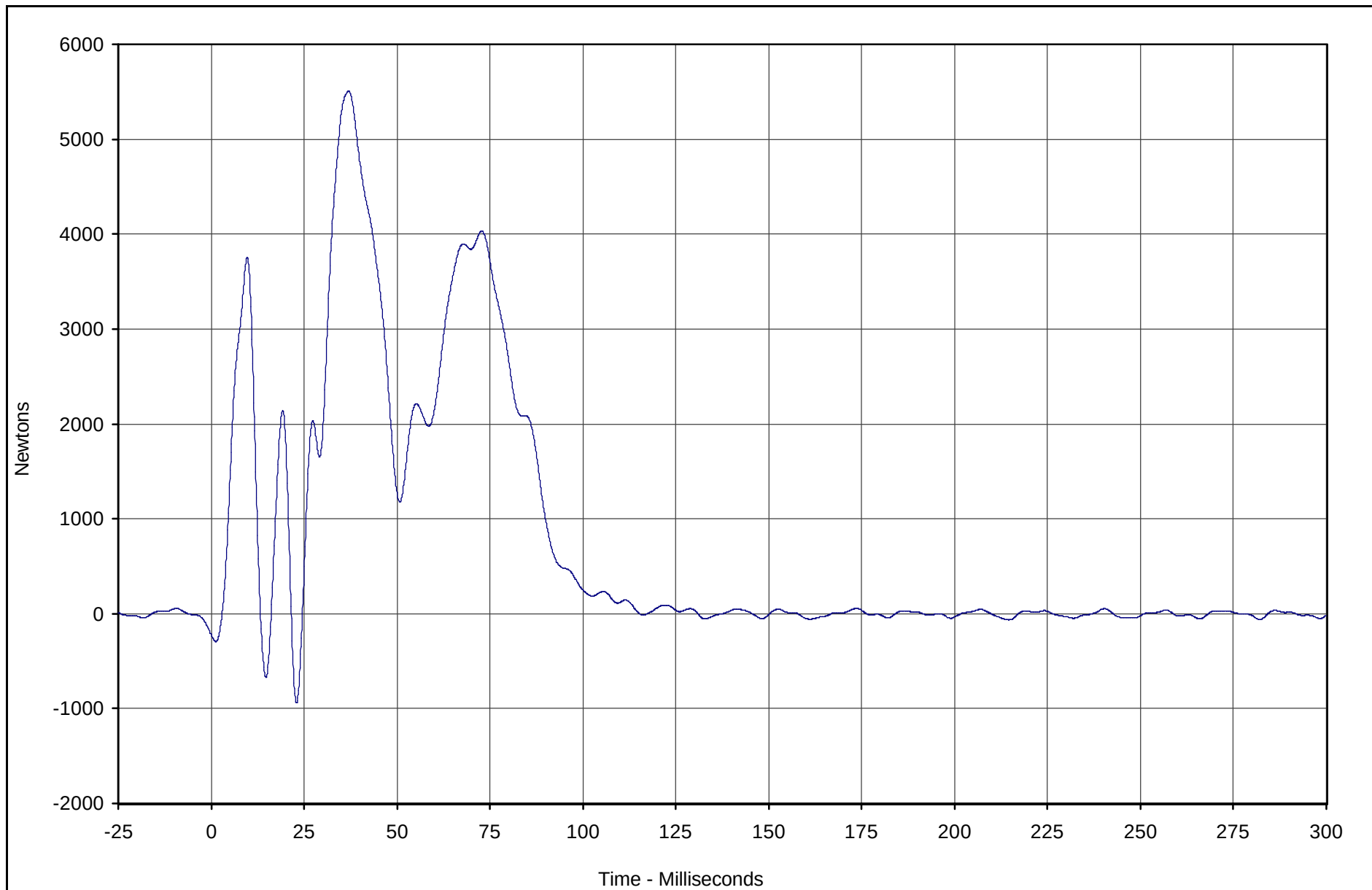
Test Date: 11/18/03

Test Program: NHTSA 35mph NCAP

NHTSA No.: M40300



TR-P23001-23-NC



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force A4  | 101   | FIL  | Newtons | 5505.7 | 37.0 | -942.0 | 23.0 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

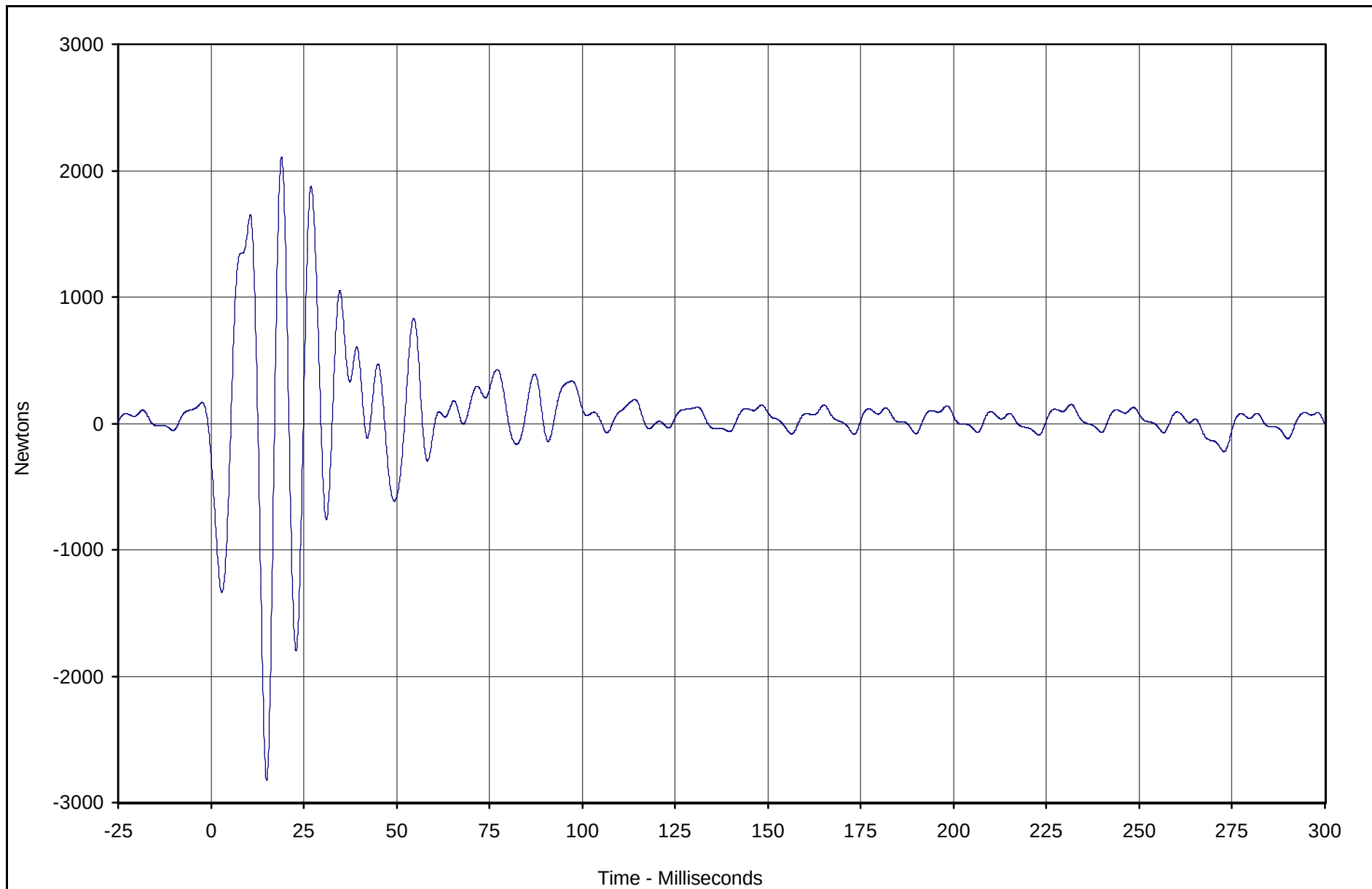
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300







| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A5  | 102   | FIL  | Newtons | 2106.7 | 19.0 | -2825.6 | 15.0 | 60        |

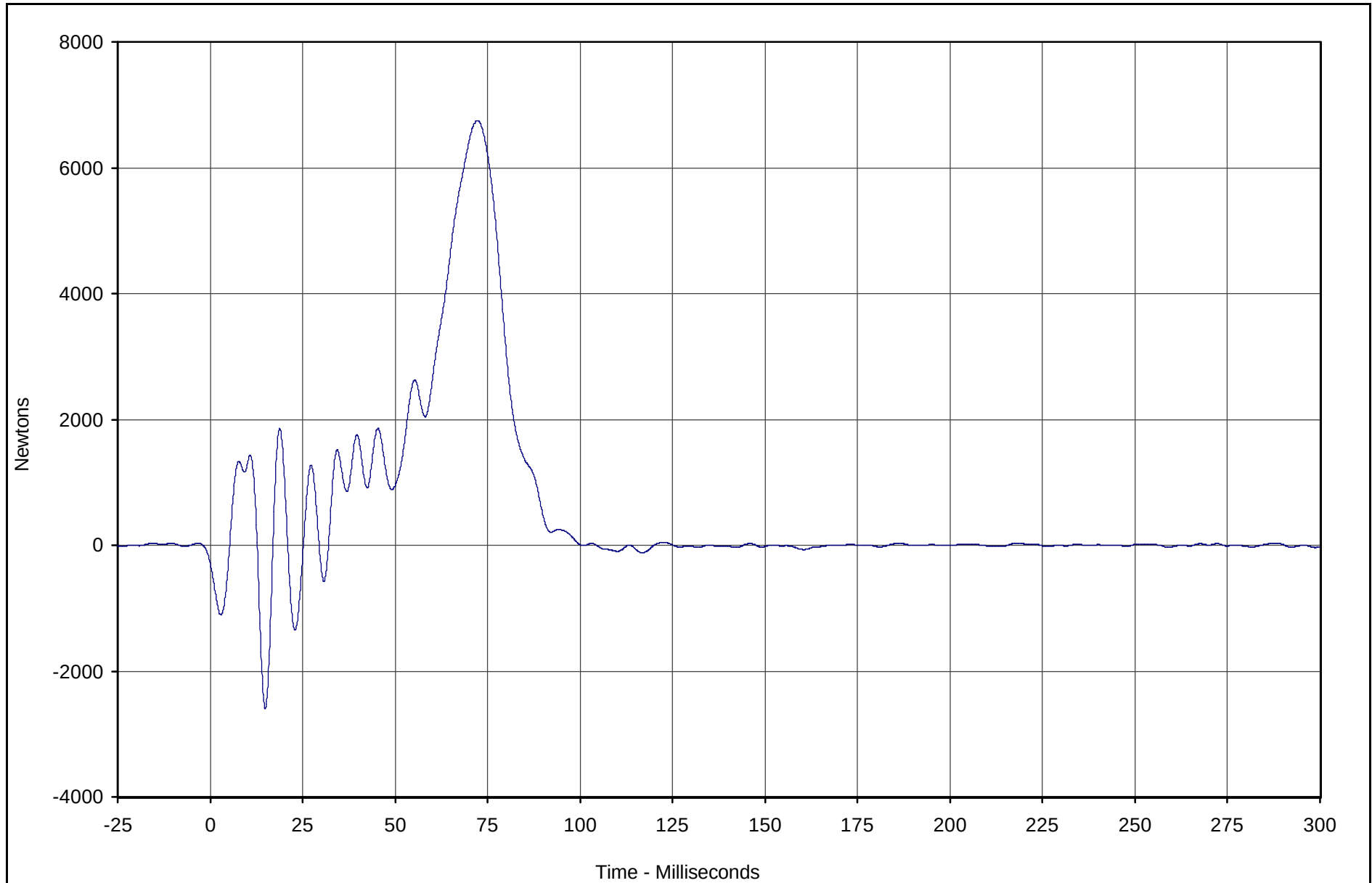


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A6  | 103   | FIL  | Newtons | 6748.5 | 72.3 | -2590.5 | 14.9 | 60        |

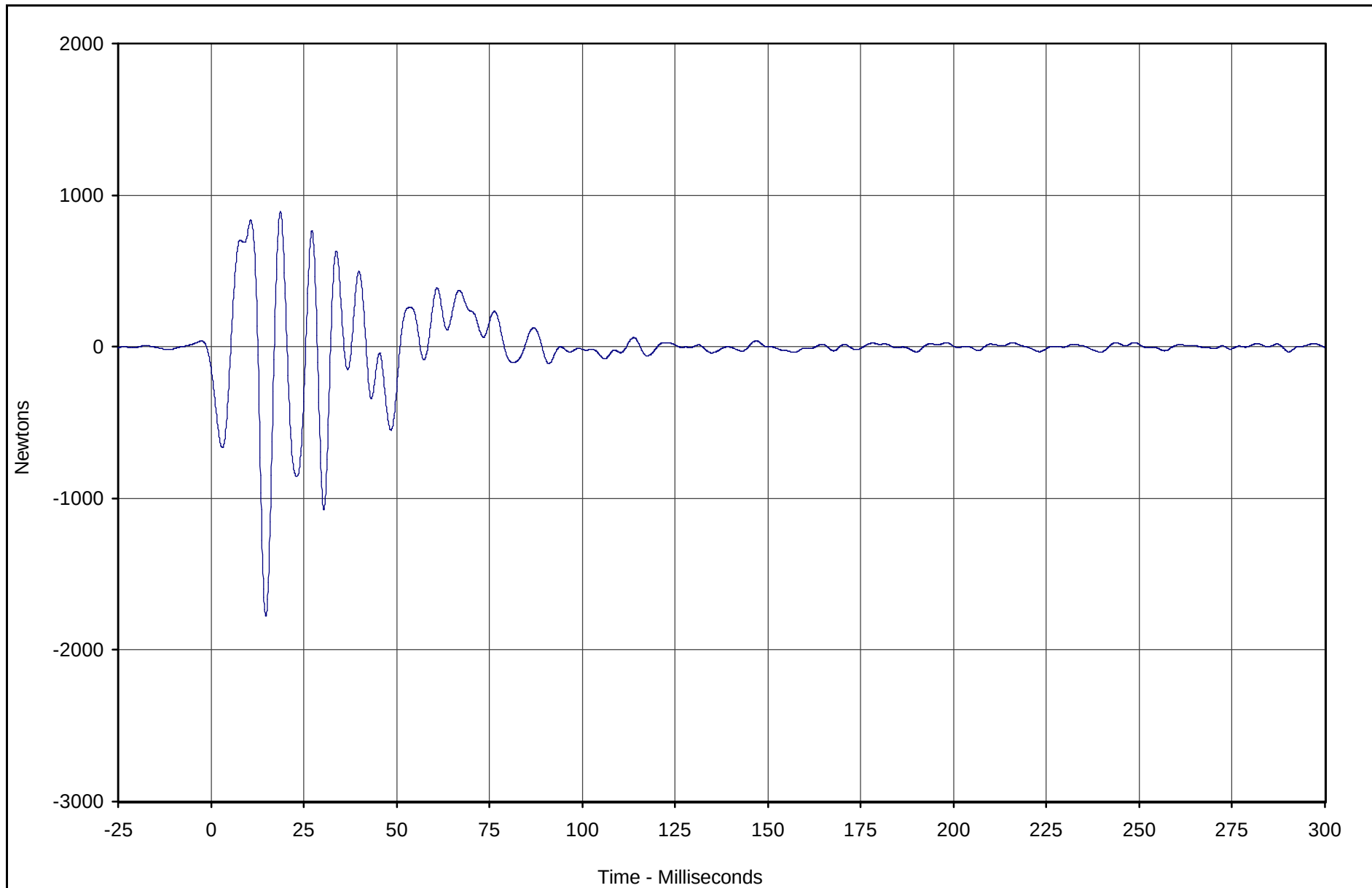


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max   | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|-------|------|---------|------|-----------|
| Barrier Force A7  | 104   | FIL  | Newtons | 890.4 | 18.7 | -1778.6 | 14.8 | 60        |

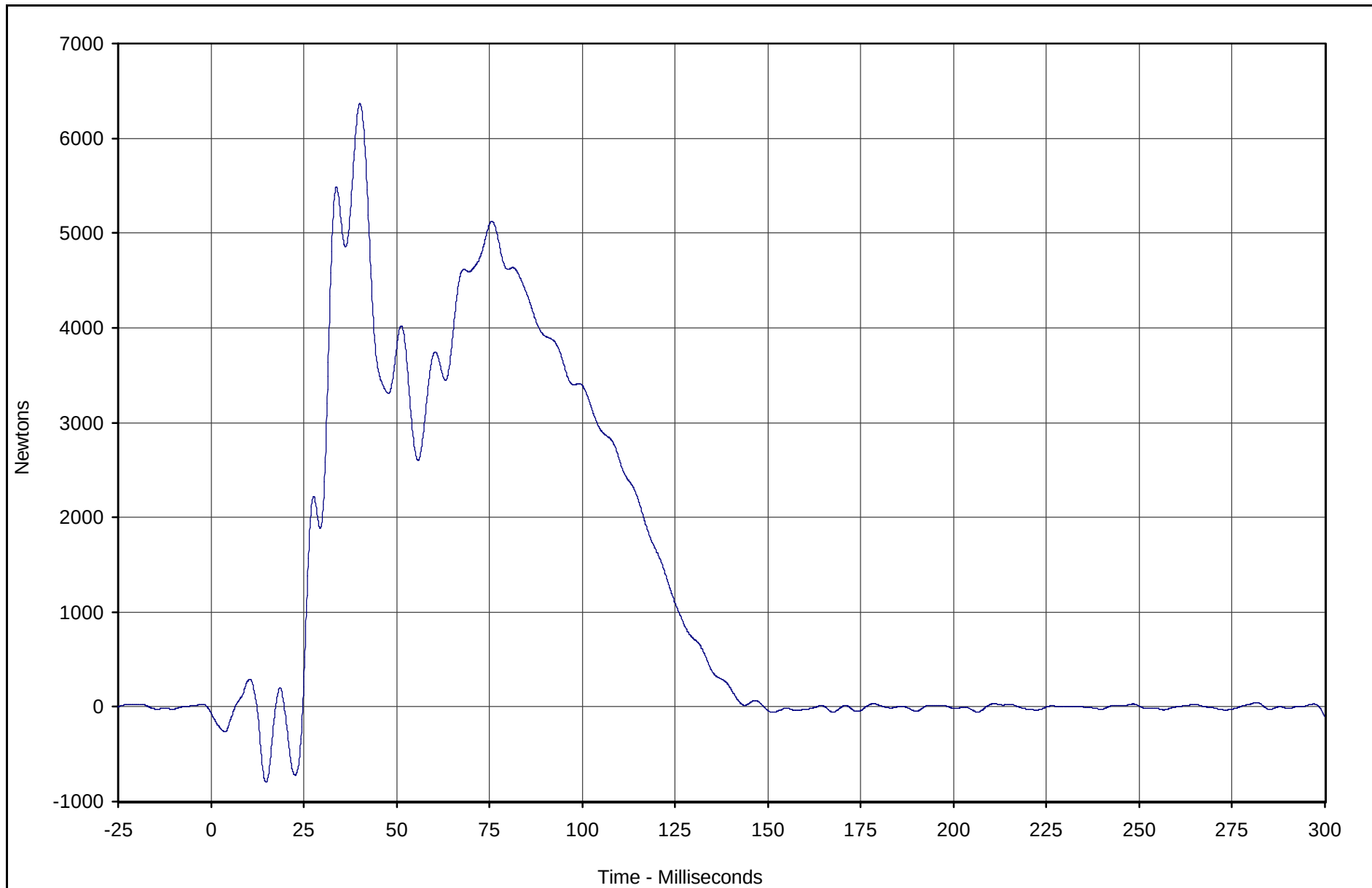


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force A8  | 105   | FIL  | Newtons | 6365.7 | 40.1 | -797.3 | 14.9 | 60        |

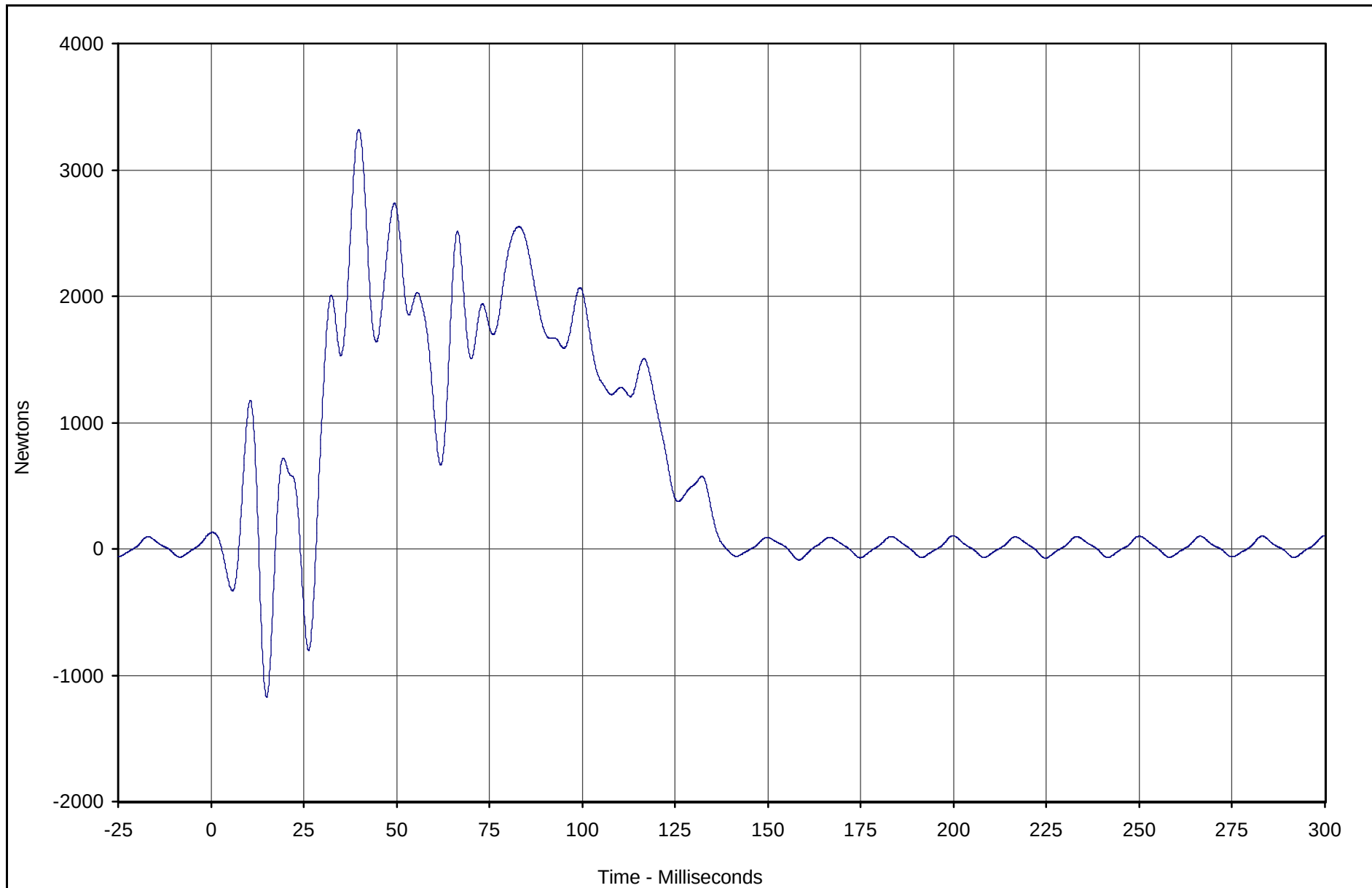


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force A9  | 106   | FIL  | Newtons | 3320.2 | 39.8 | -1173.8 | 15.0 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

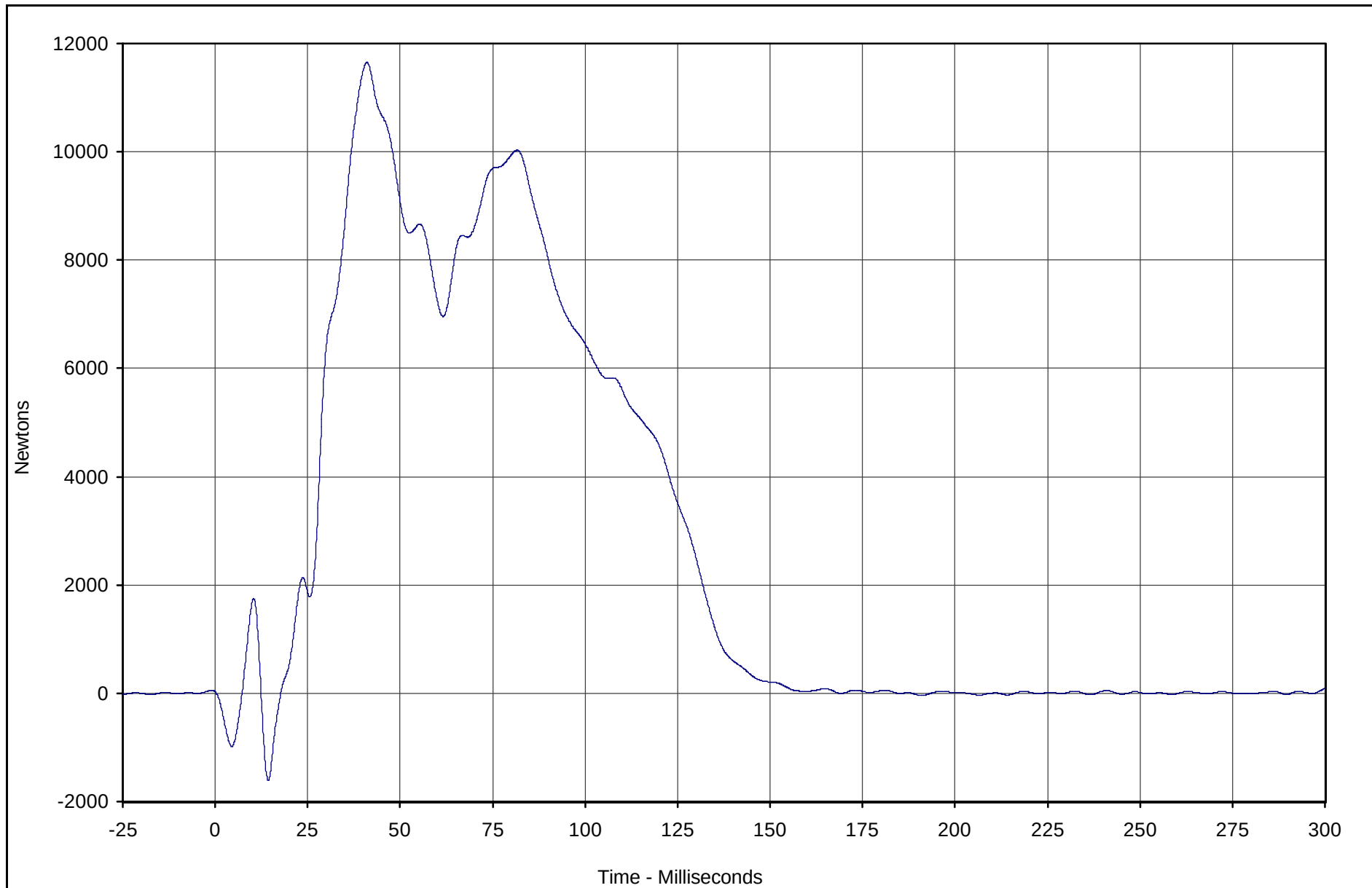
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300







| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force B1  | 107   | FIL  | Newtons | 11650.6 | 41.0 | -1612.3 | 14.4 | 60        |

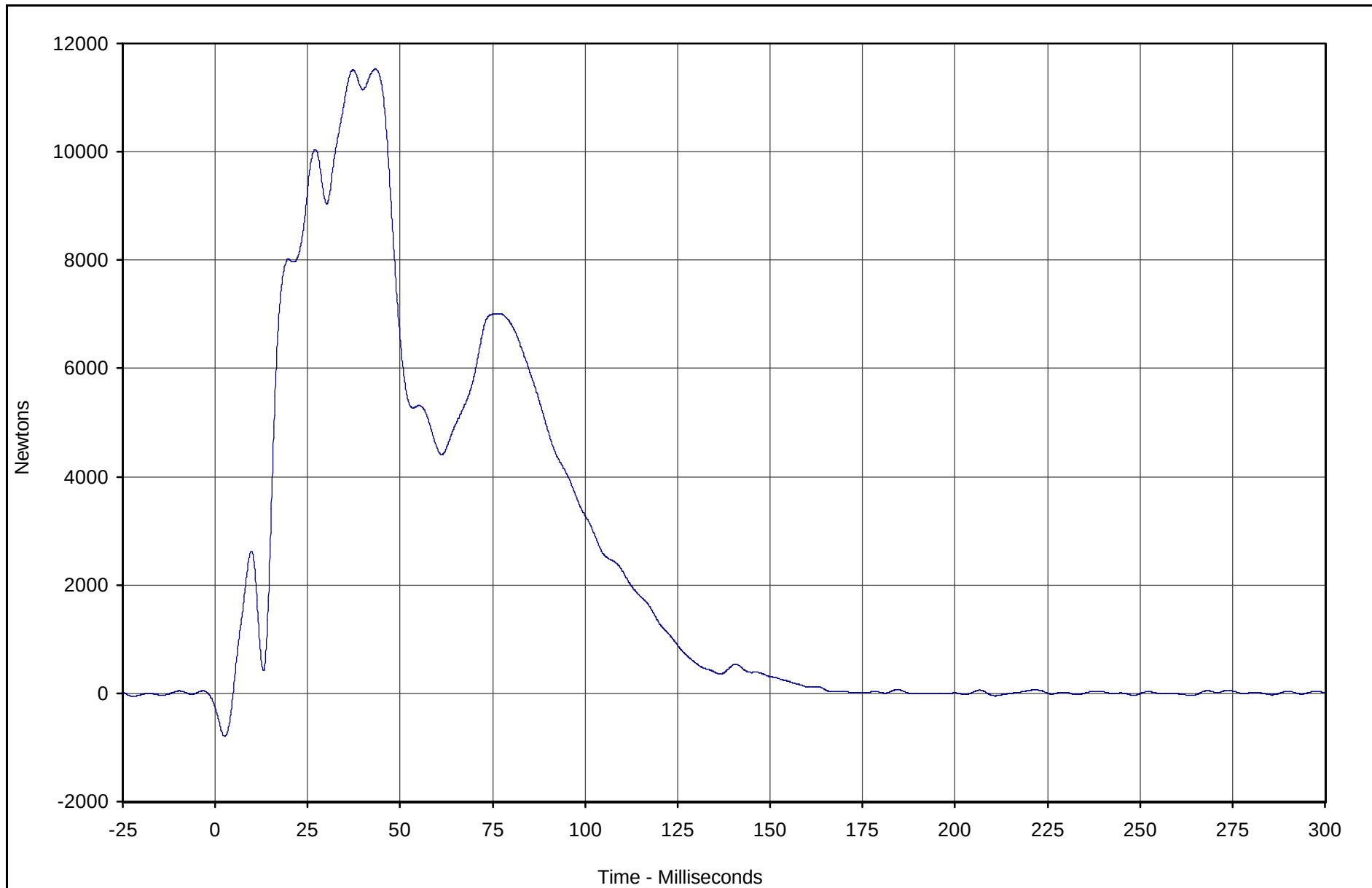


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force B2  | 108   | FIL  | Newtons | 11527.5 | 43.3 | -789.8 | 2.6  | 60        |

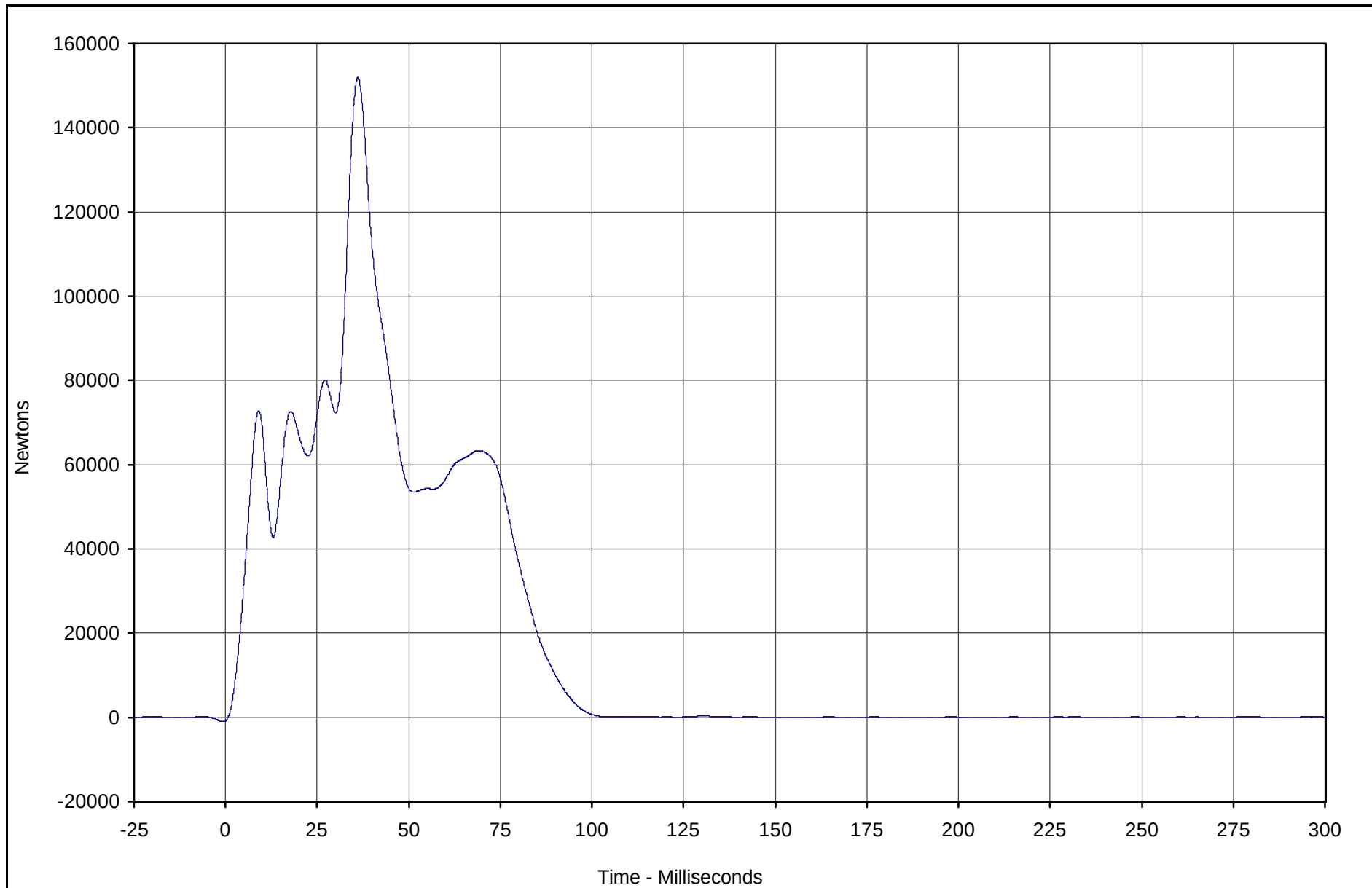


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max      | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|----------|------|--------|------|-----------|
| Barrier Force B3  | 109   | FIL  | Newtons | 151979.3 | 36.1 | -849.8 | 0.0  | 60        |

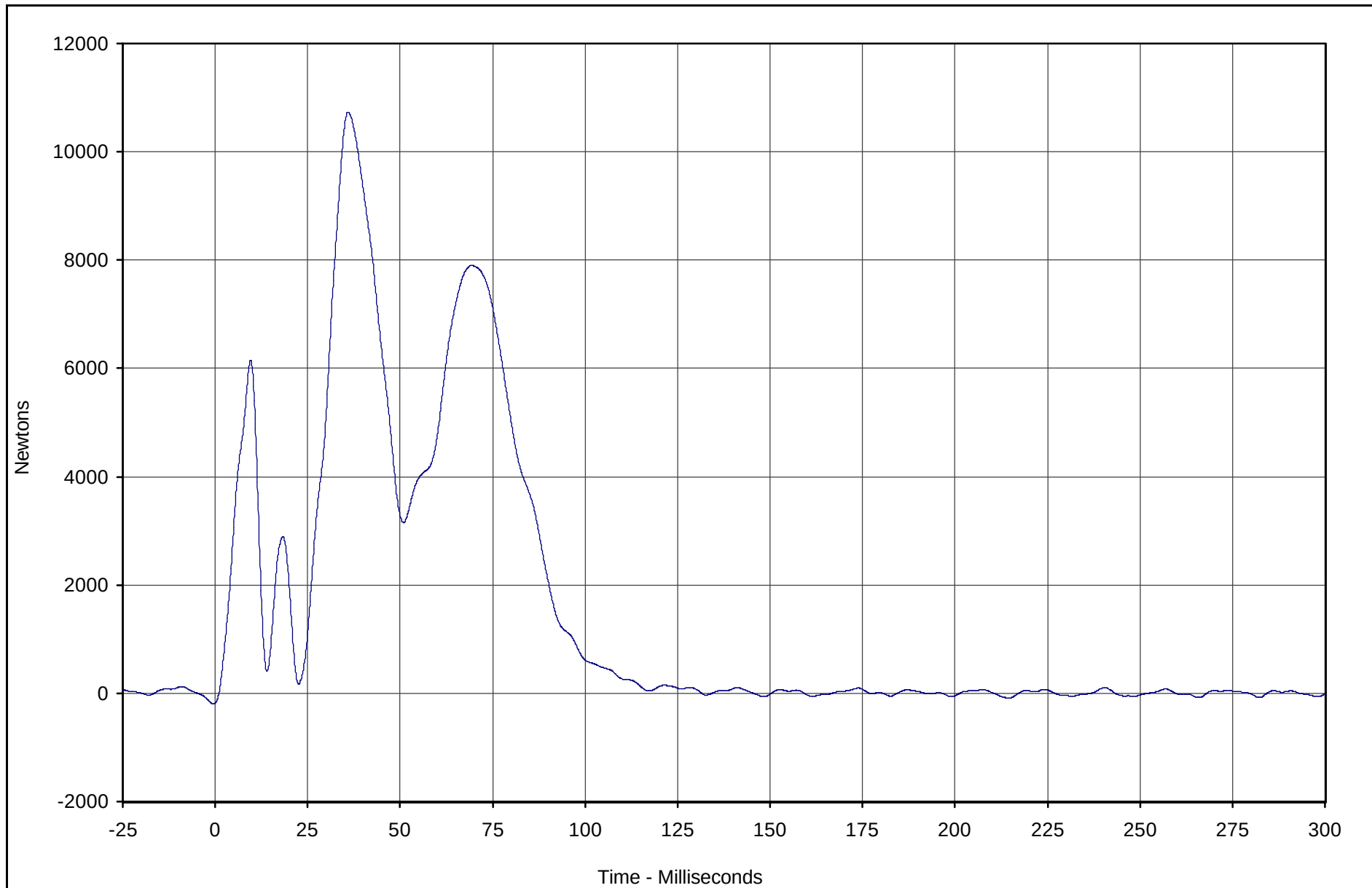


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force B4  | 110   | FIL  | Newtons | 10733.6 | 35.9 | -178.6 | 0.0  | 60        |

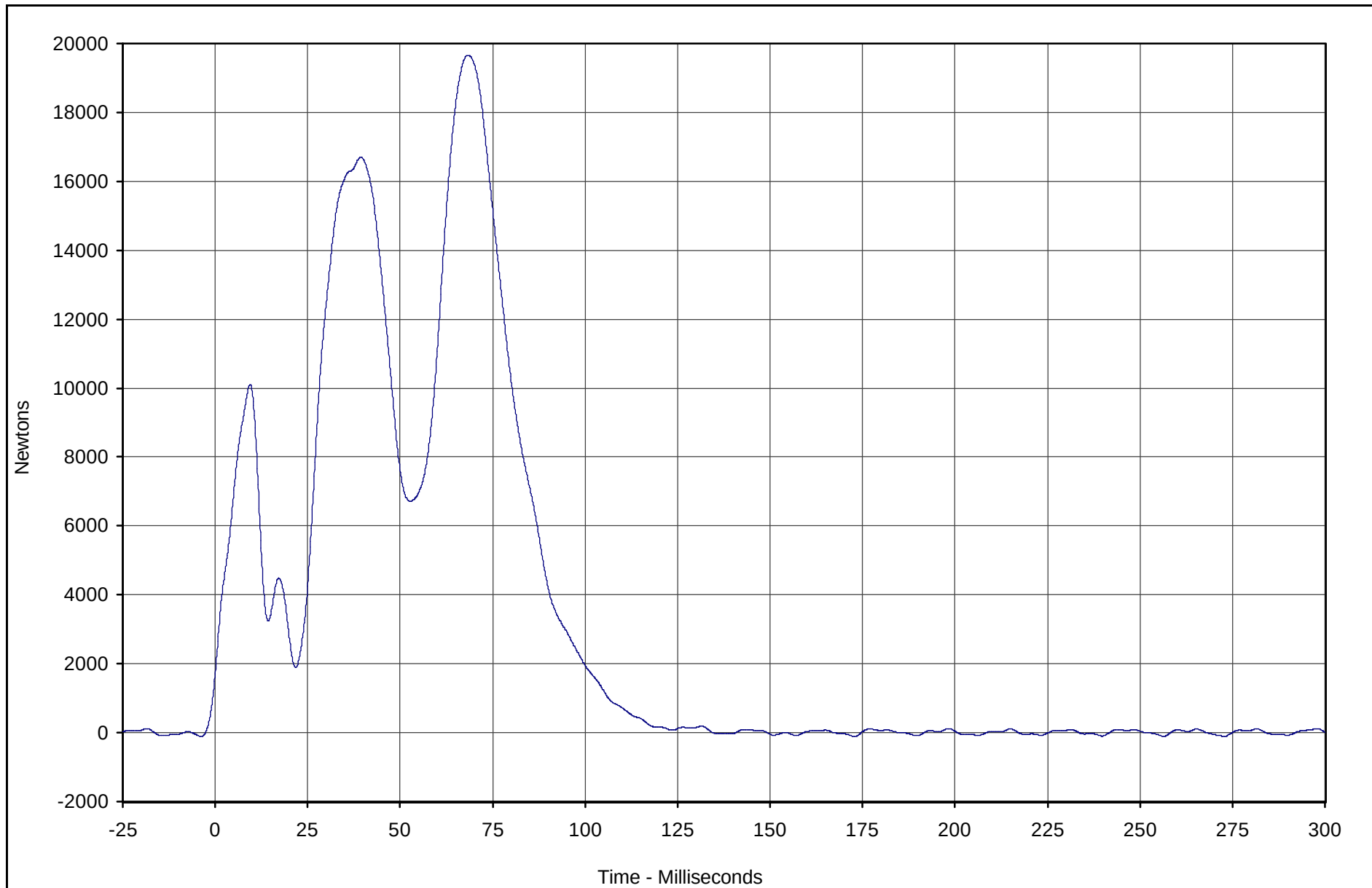


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force B5  | 111   | FIL  | Newtons | 19656.5 | 68.4 | -107.0 | 172.9 | 60        |



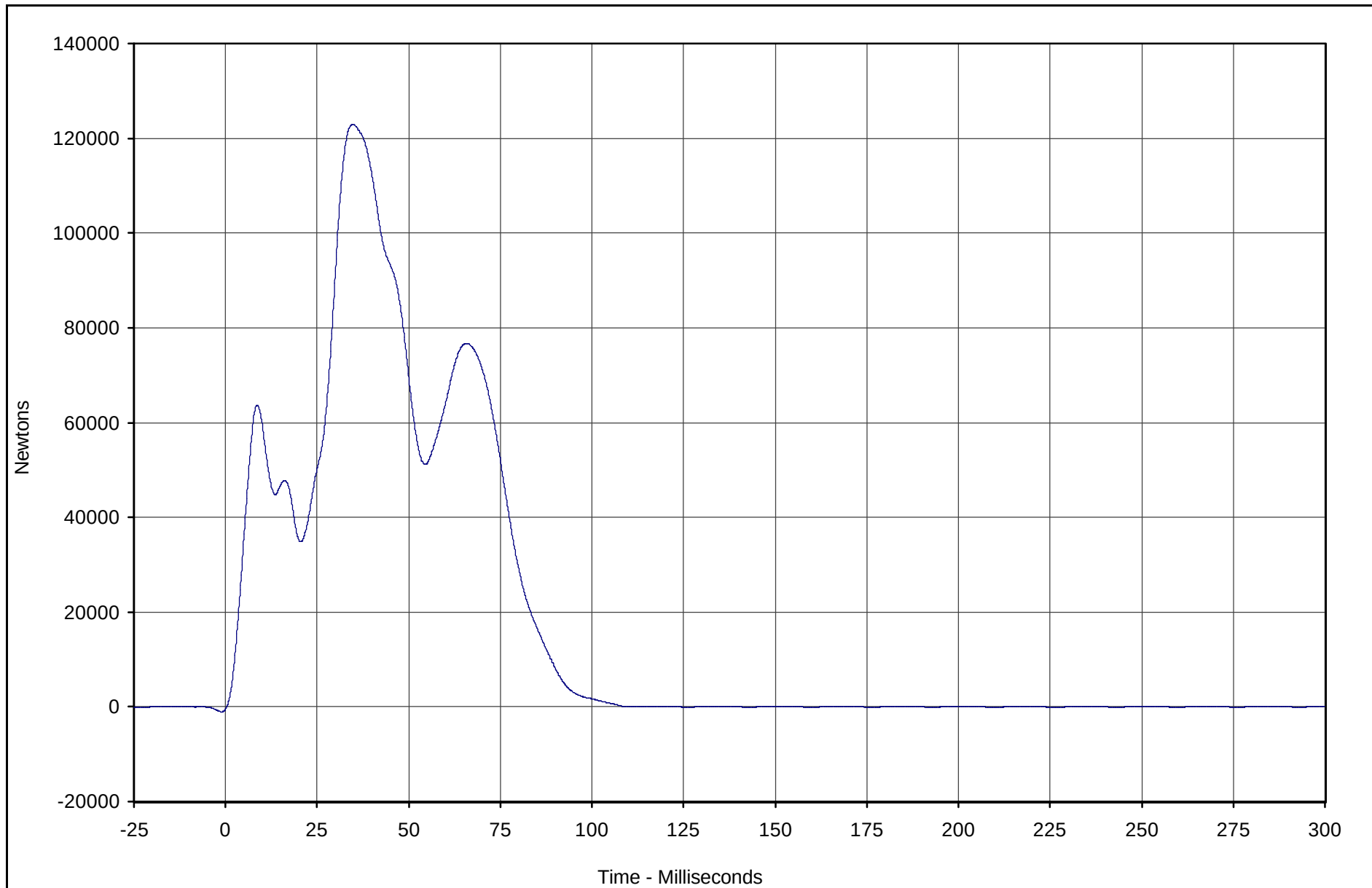
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description | CURNO | Type | Units   | Max      | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|----------|------|--------|------|-----------|
| Barrier Force B6  | 112   | FIL  | Newtons | 122904.7 | 34.7 | -518.3 | 0.0  | 60        |

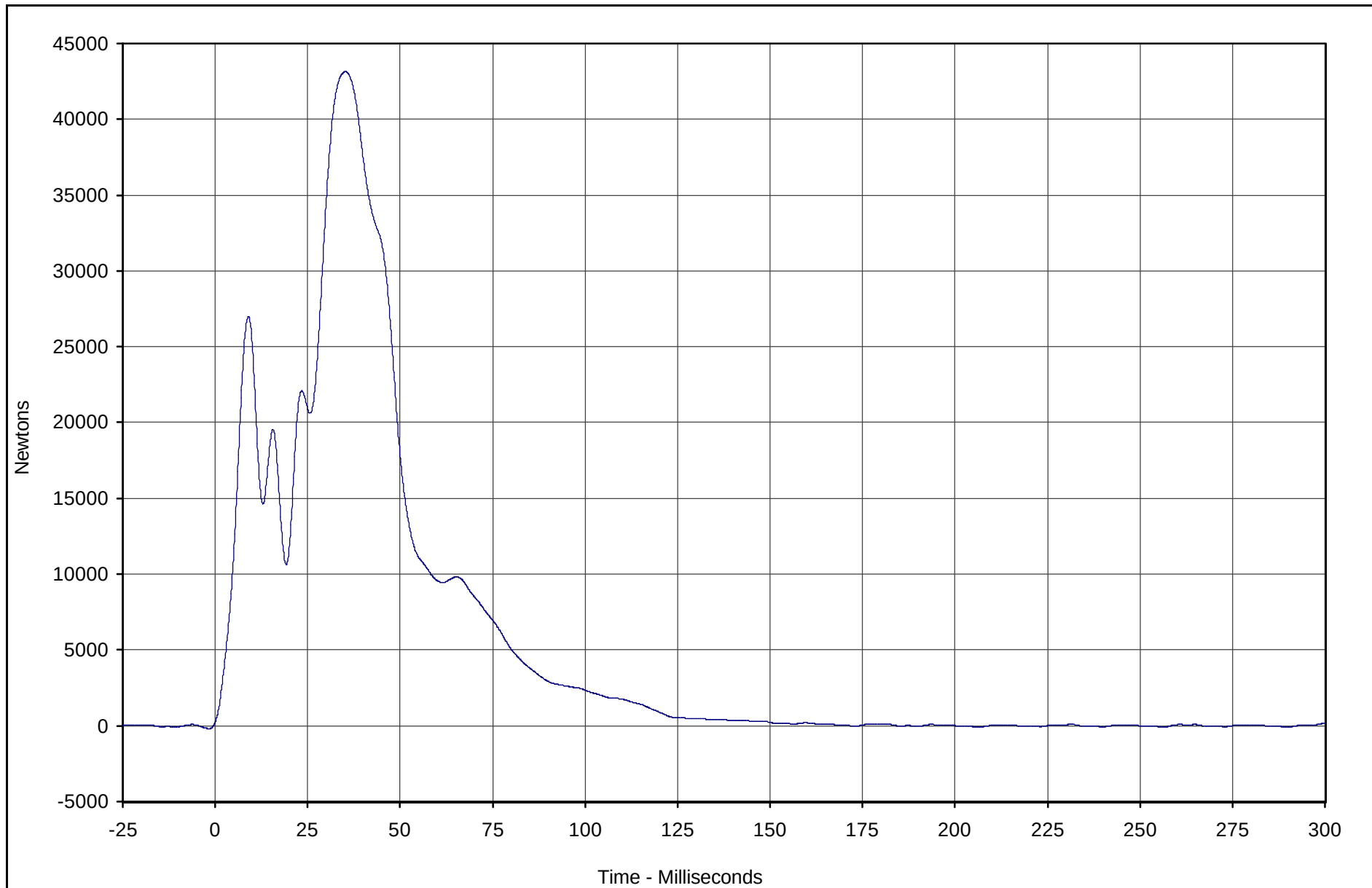


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|-------|-----------|
| Barrier Force B7  | 113   | FIL  | Newtons | 43139.1 | 35.2 | -87.2 | 289.8 | 60        |

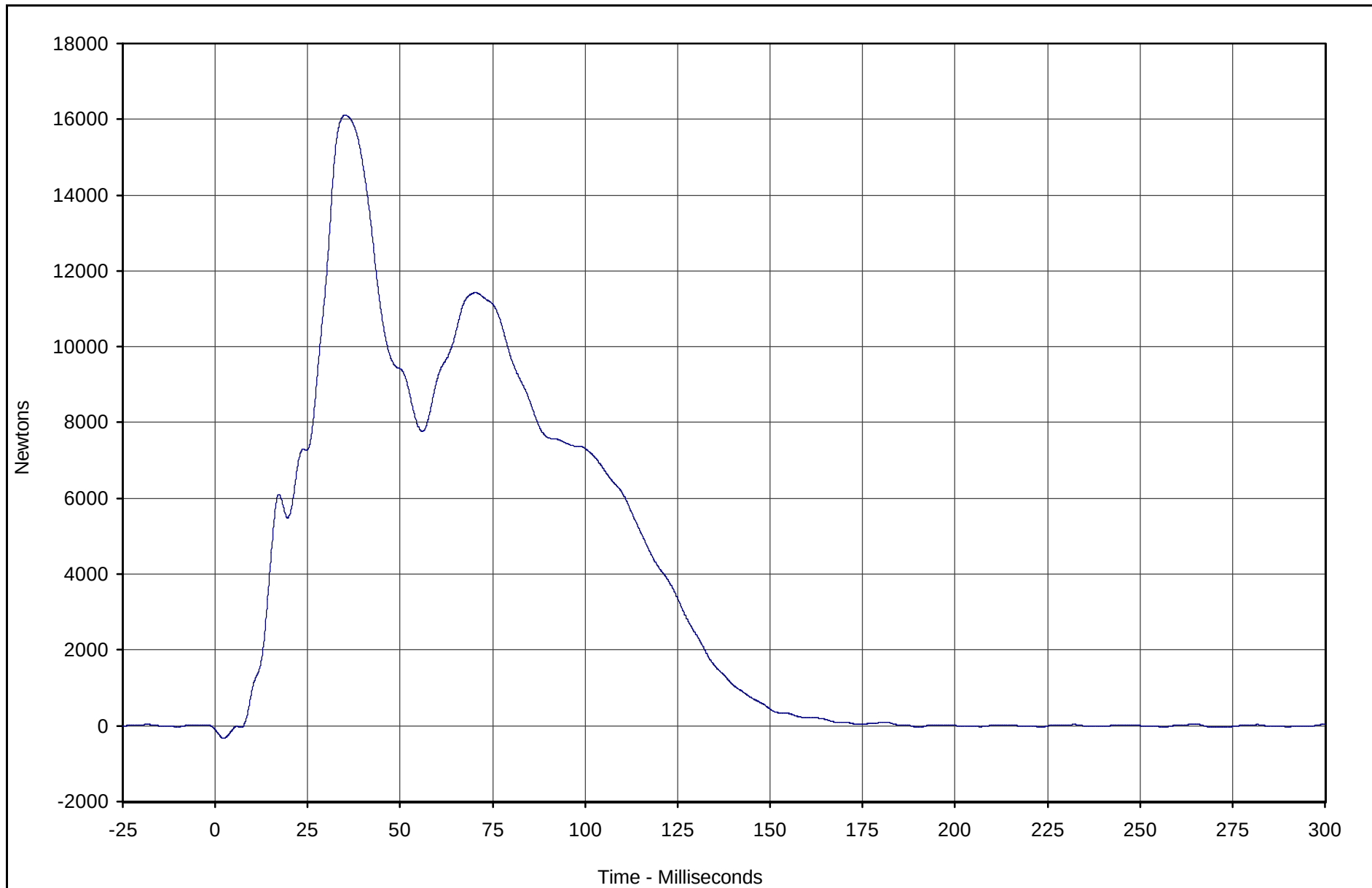


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force B8  | 114   | FIL  | Newtons | 16108.9 | 35.1 | -329.5 | 2.2  | 60        |

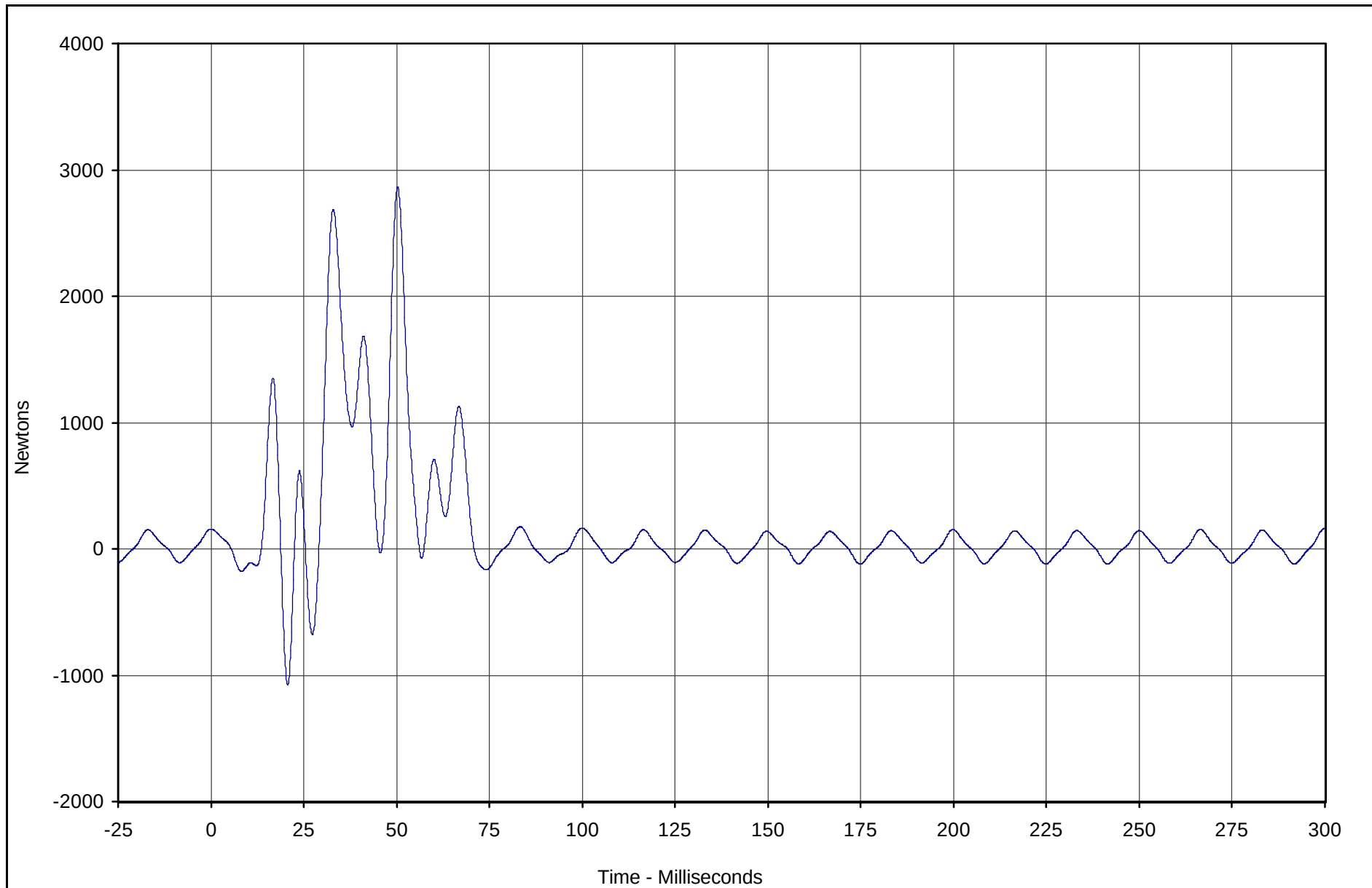


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force B9  | 115   | FIL  | Newtons | 2865.8 | 50.3 | -1079.3 | 20.7 | 60        |

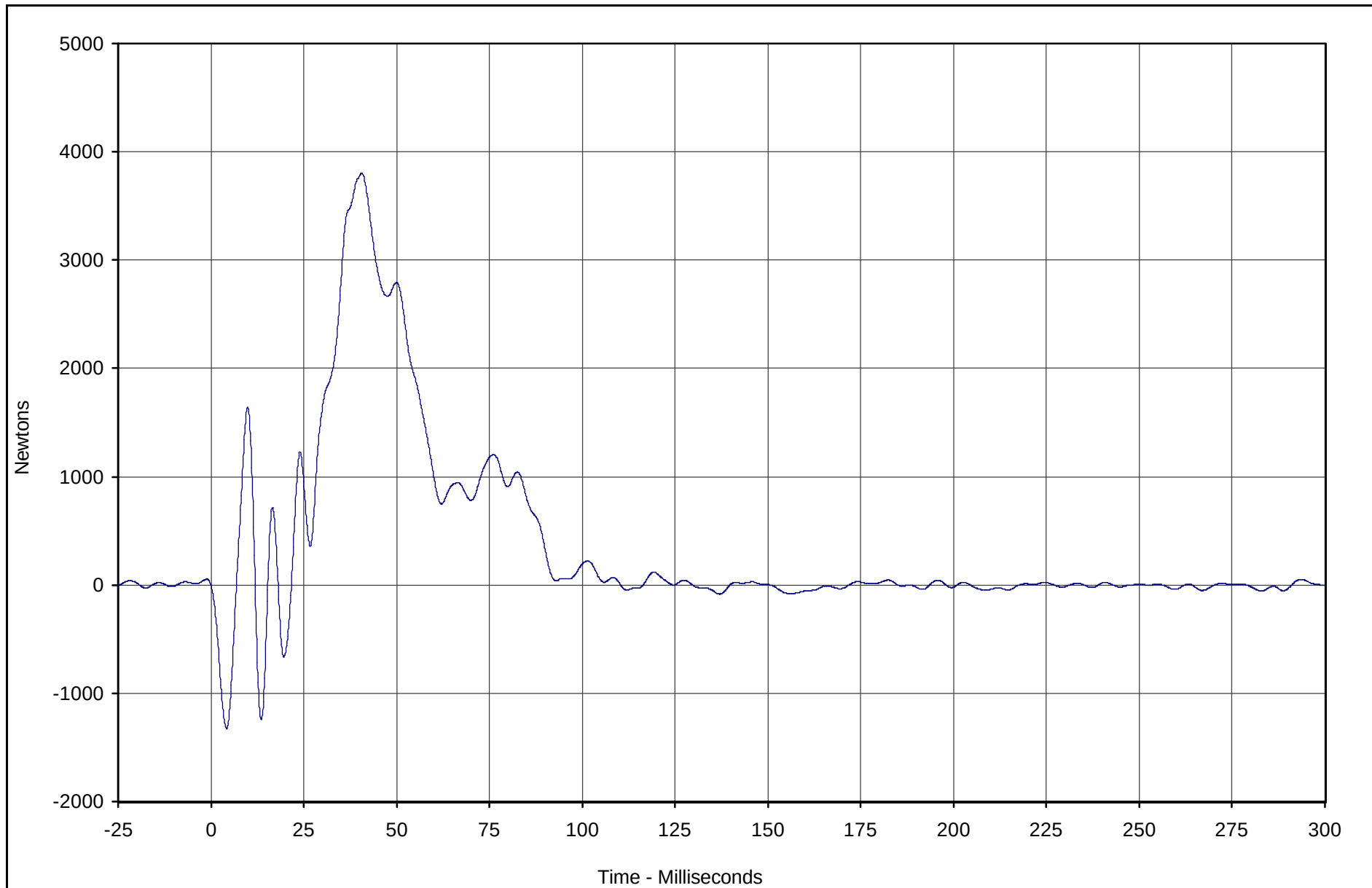
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force C1  | 116   | FIL  | Newtons | 3802.4 | 40.6 | -1328.4 | 4.2  | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

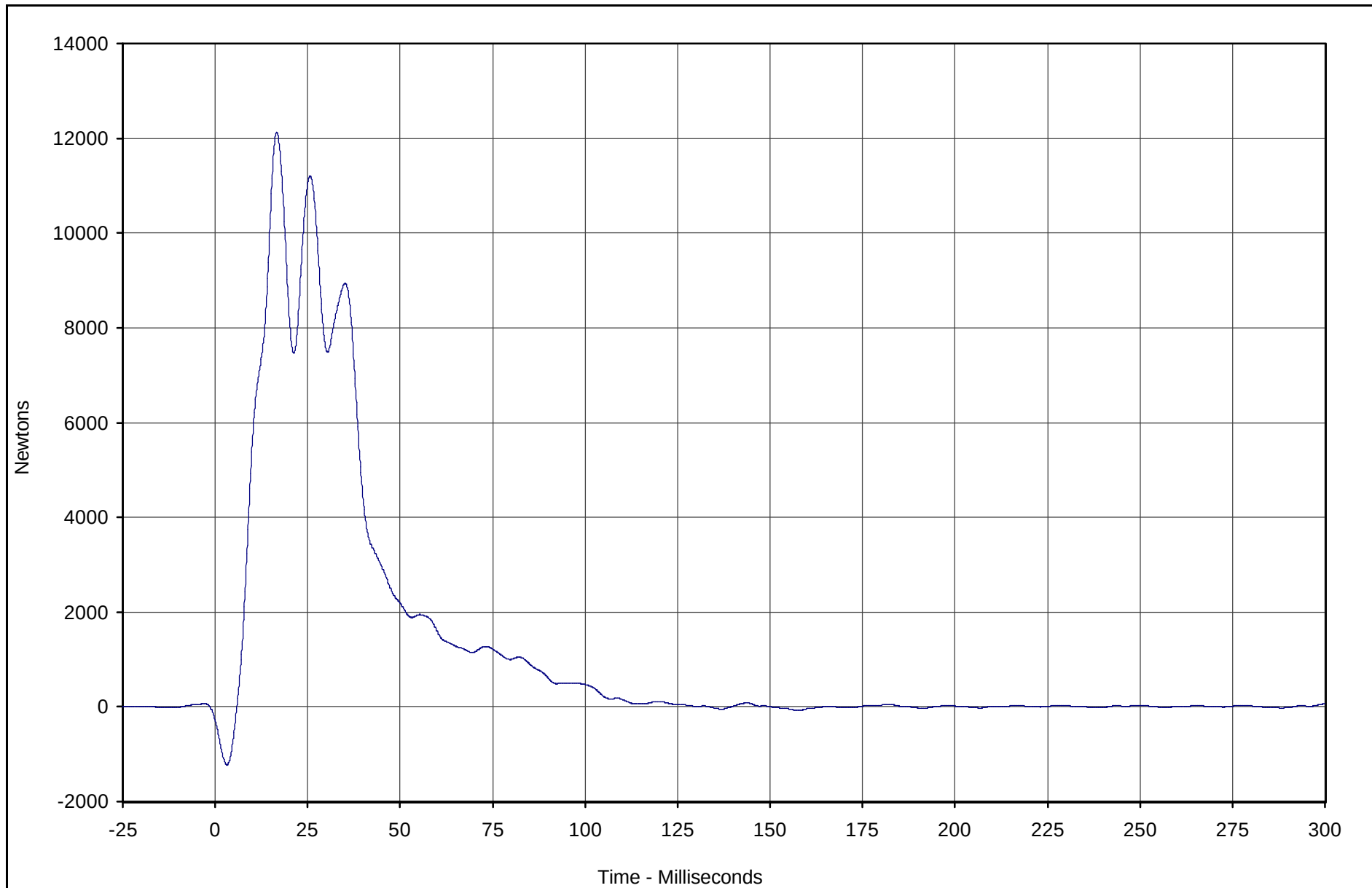
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





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| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force C2  | 117   | FIL  | Newtons | 12122.9 | 16.6 | -1225.8 | 3.2  | 60        |



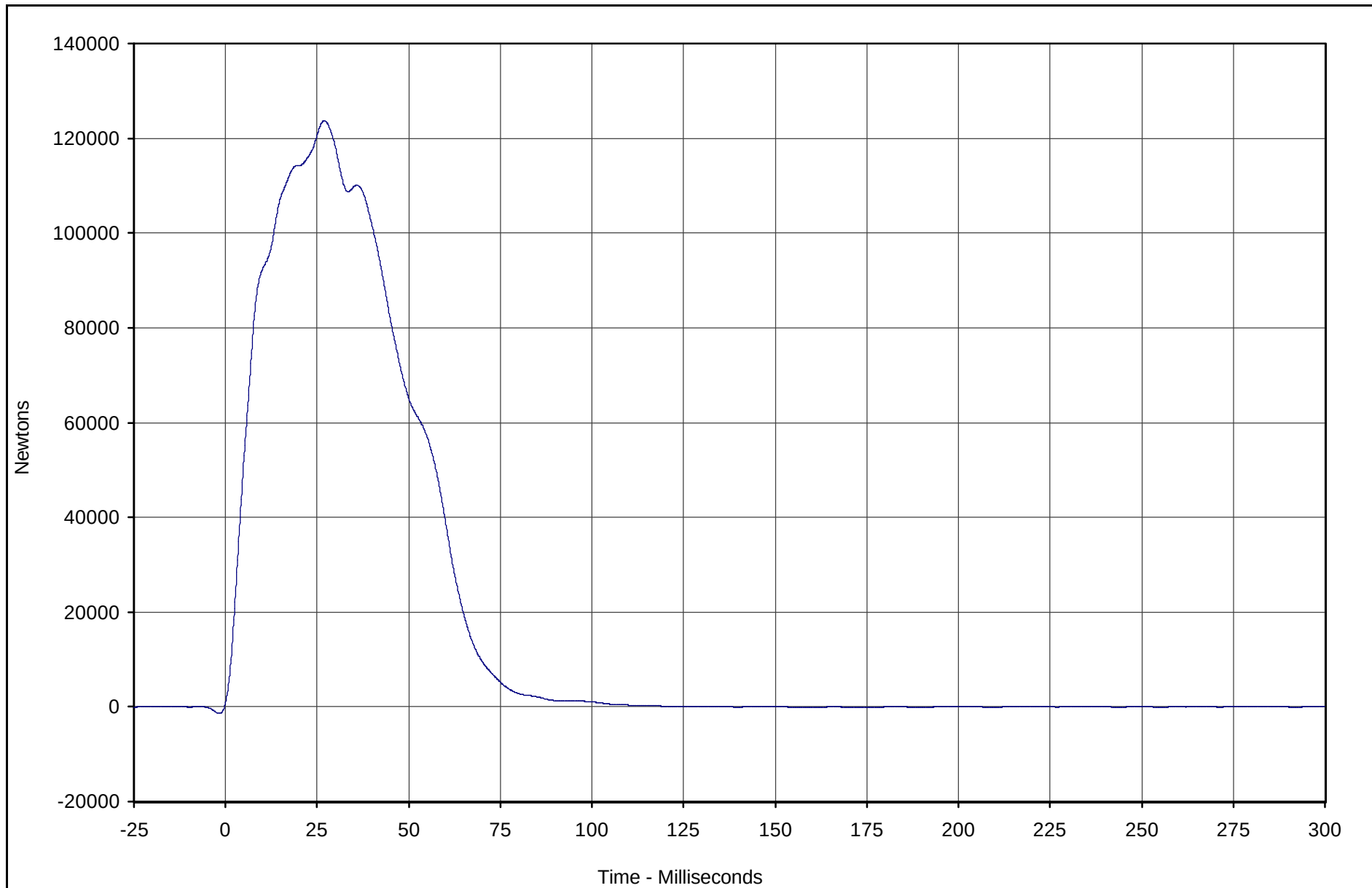
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

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| Curve Description | CURNO | Type | Units   | Max      | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|----------|------|-------|-------|-----------|
| Barrier Force C3  | 118   | FIL  | Newtons | 123710.9 | 27.0 | -90.0 | 157.9 | 60        |



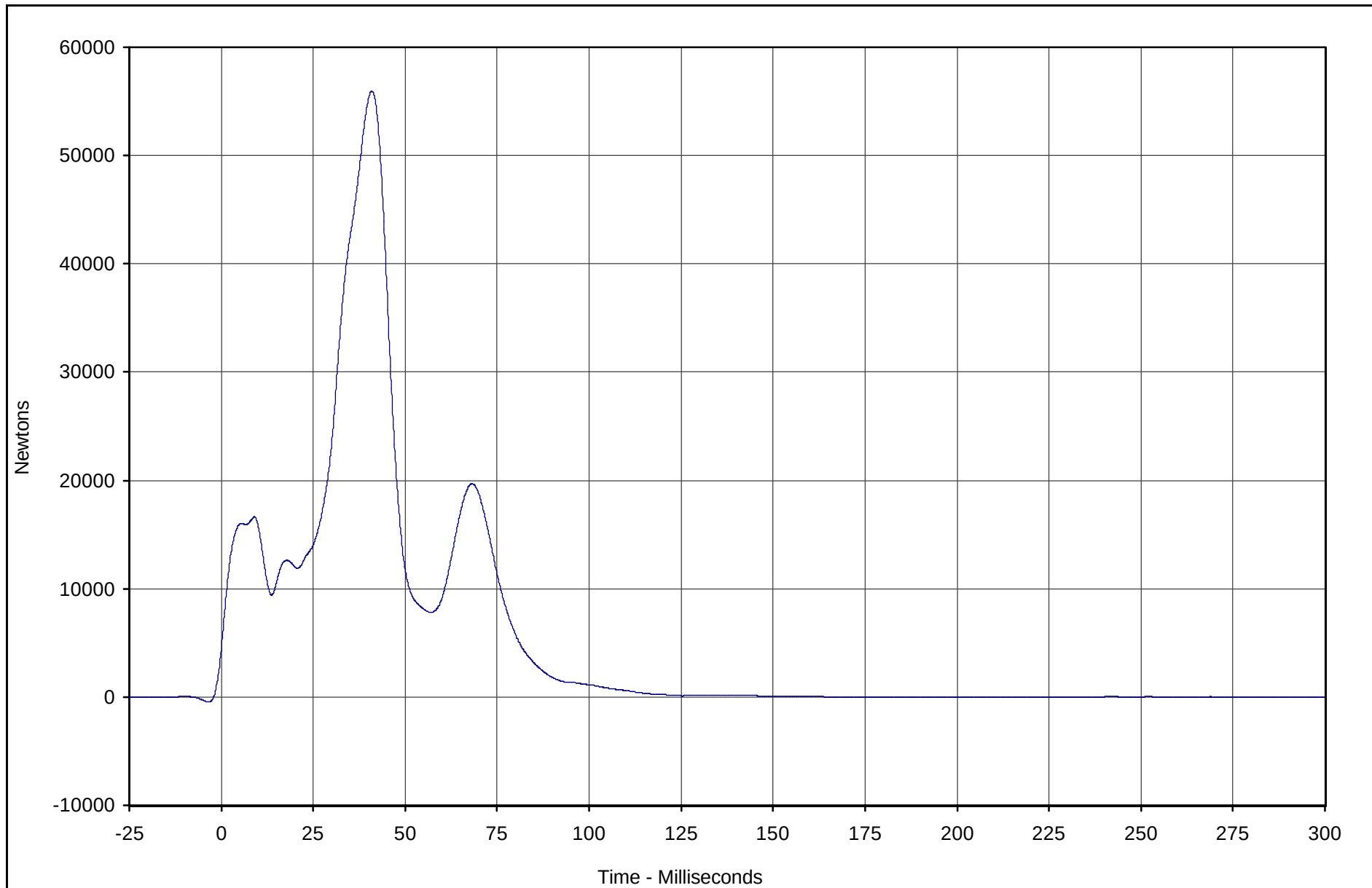
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

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| Curve Description | CURNO | Type | Units   | Max     | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|-------|-------|-----------|
| Barrier Force C4  | 119   | FIL  | Newtons | 55927.2 | 40.9 | -27.6 | 236.9 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

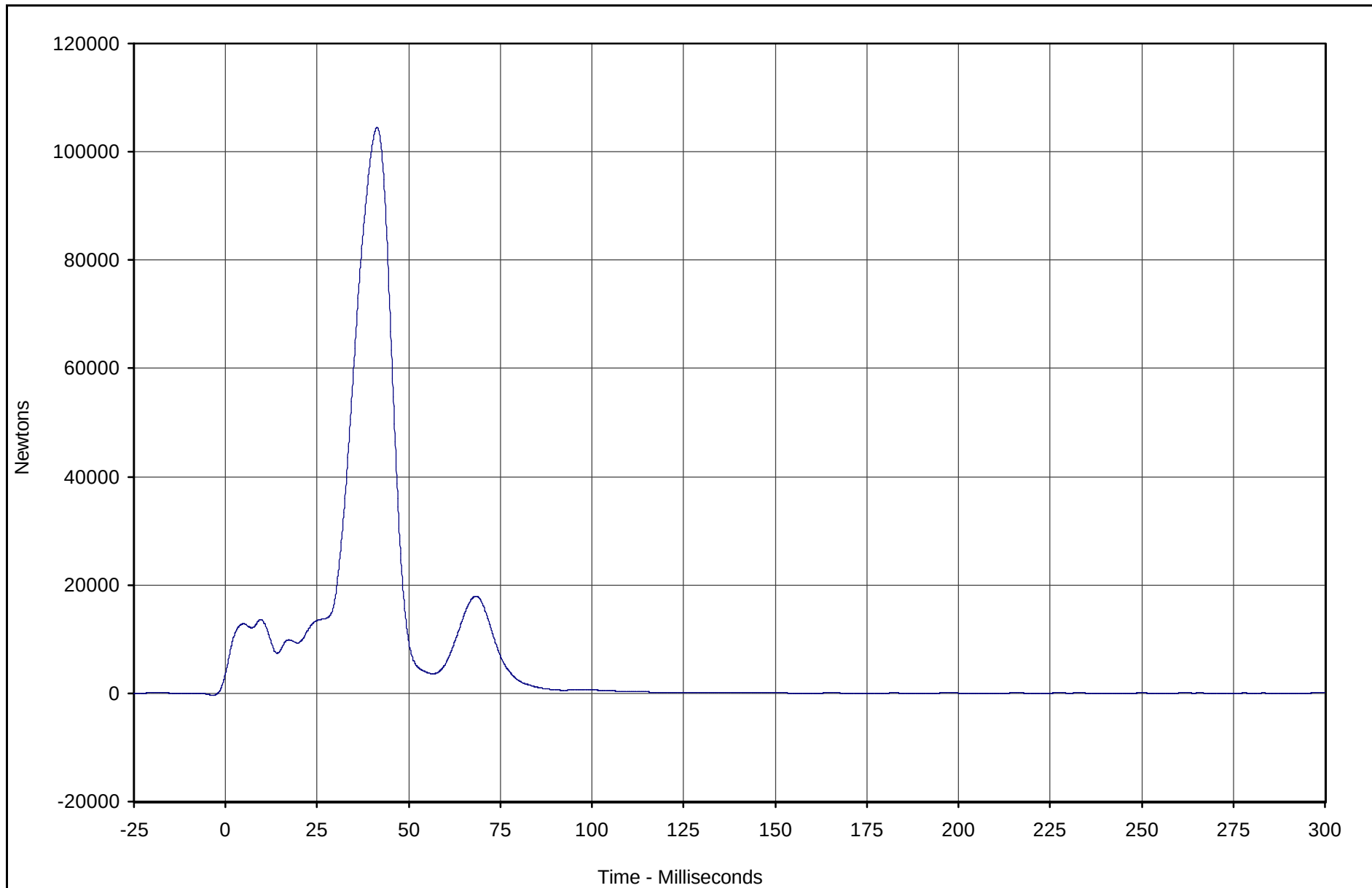
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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C-23



| Curve Description | CURNO | Type | Units   | Max      | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|----------|------|-------|-------|-----------|
| Barrier Force C5  | 120   | FIL  | Newtons | 104523.7 | 41.3 | -72.3 | 173.8 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

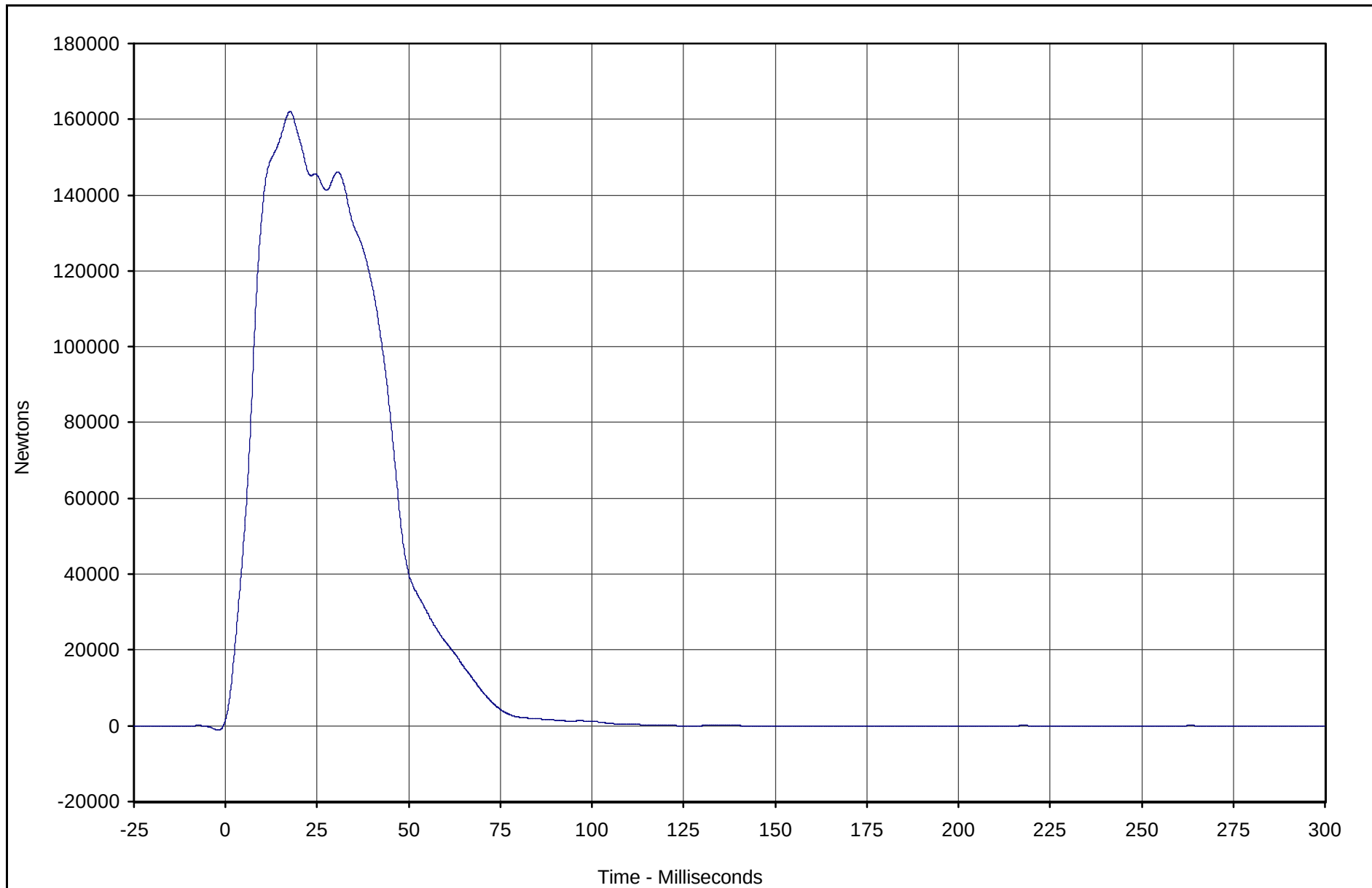
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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| Curve Description | CURNO | Type | Units   | Max      | Time | Min   | Time  | SAE Class |
|-------------------|-------|------|---------|----------|------|-------|-------|-----------|
| Barrier Force C6  | 121   | FIL  | Newtons | 162004.4 | 17.6 | -69.9 | 174.4 | 60        |

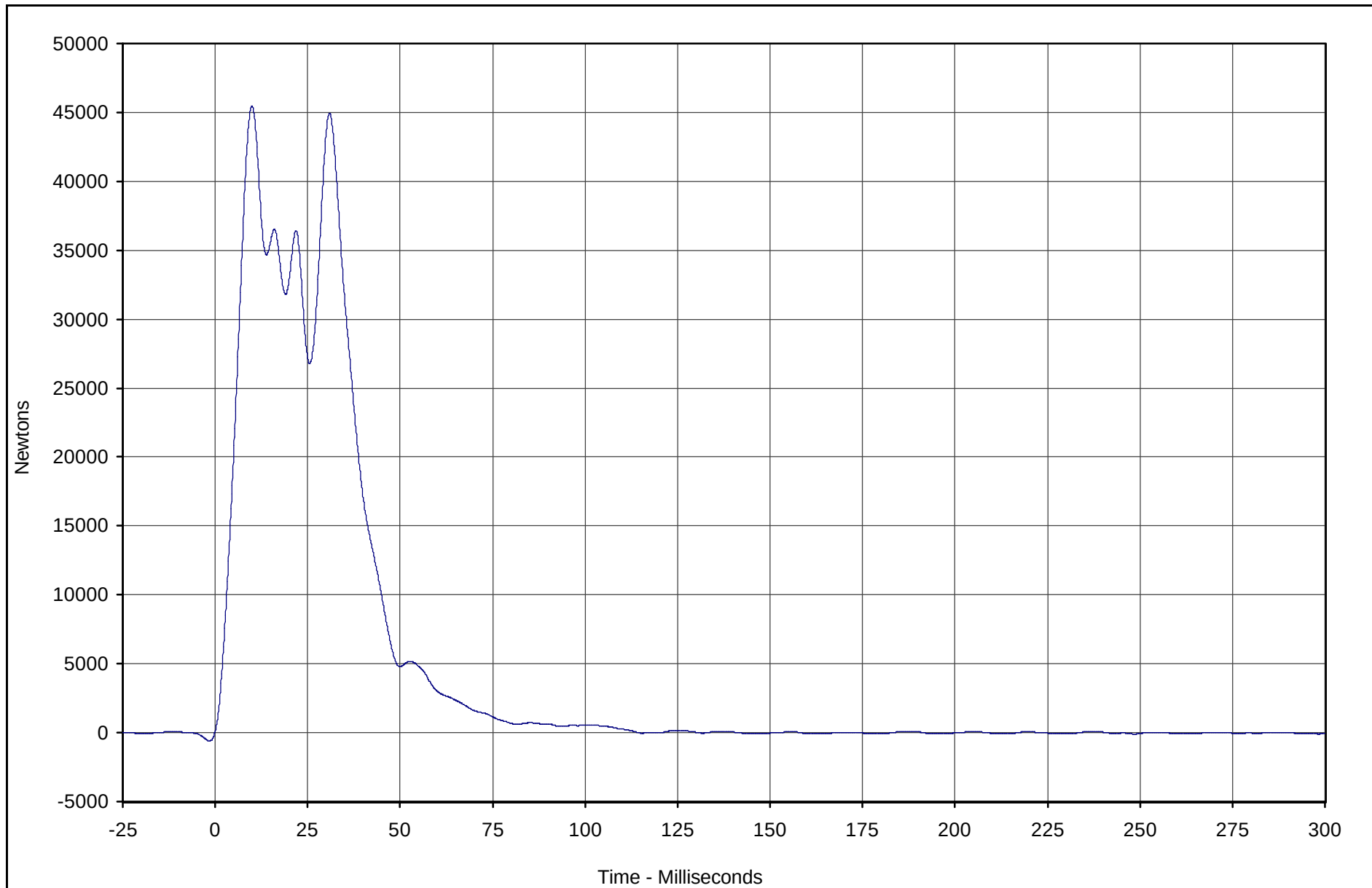


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force C7  | 122   | FIL  | Newtons | 45463.8 | 9.9  | -104.8 | 248.5 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

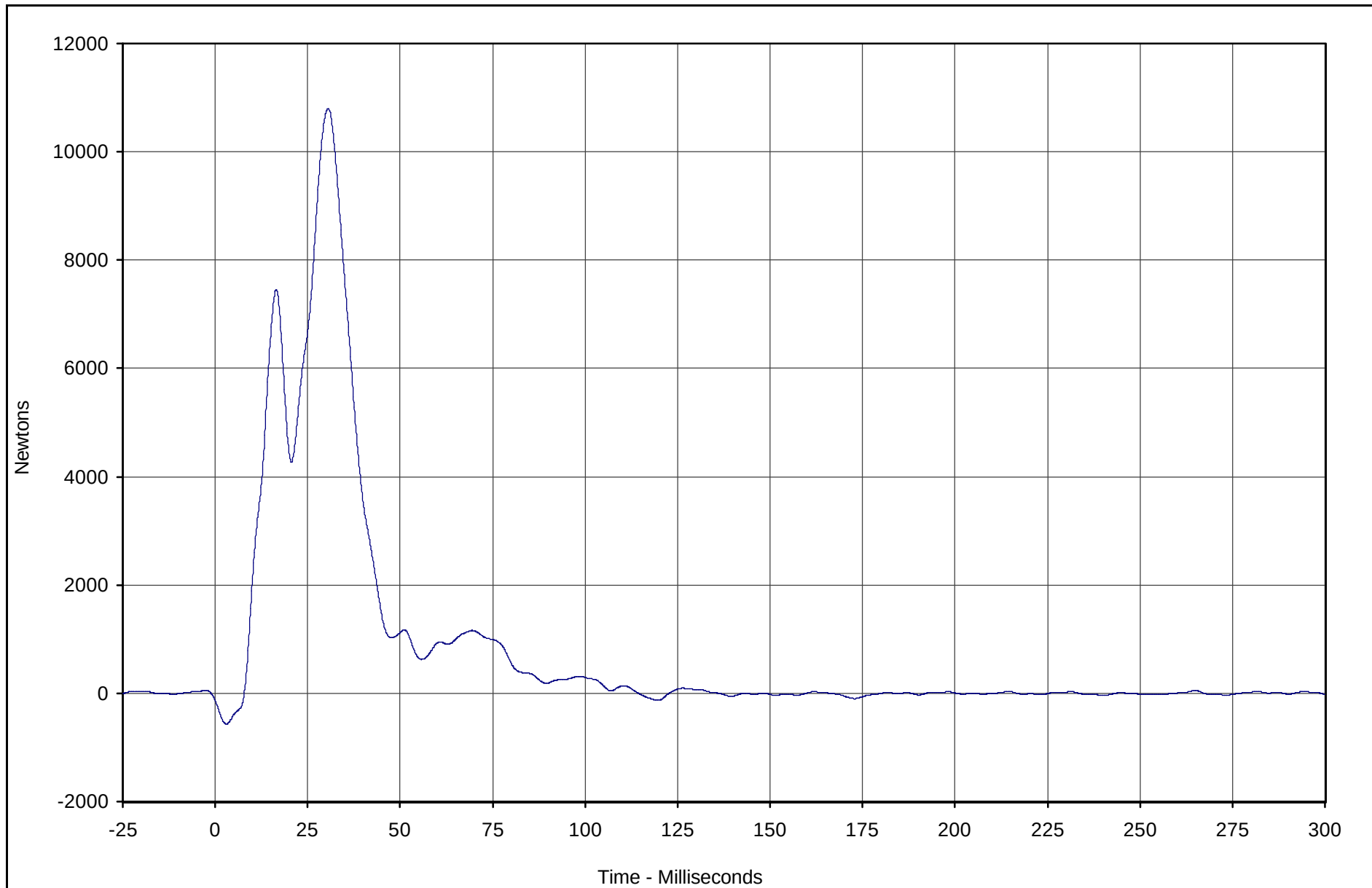
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300







| Curve Description | CURNO | Type | Units   | Max     | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|--------|------|-----------|
| Barrier Force C8  | 123   | FIL  | Newtons | 10792.0 | 30.6 | -568.4 | 3.0  | 60        |

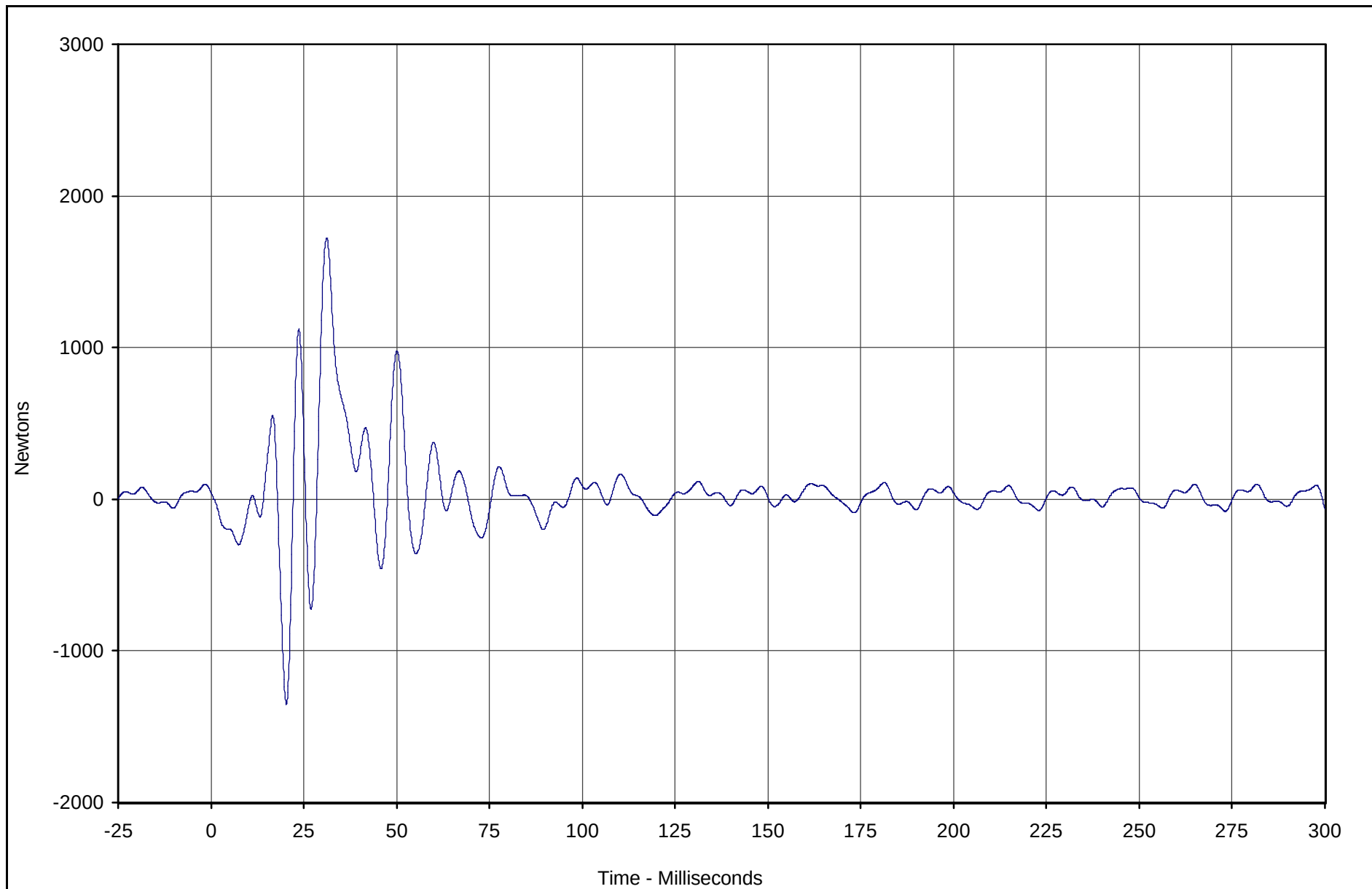
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force C9  | 124   | FIL  | Newtons | 1722.5 | 31.2 | -1352.1 | 20.3 | 60        |

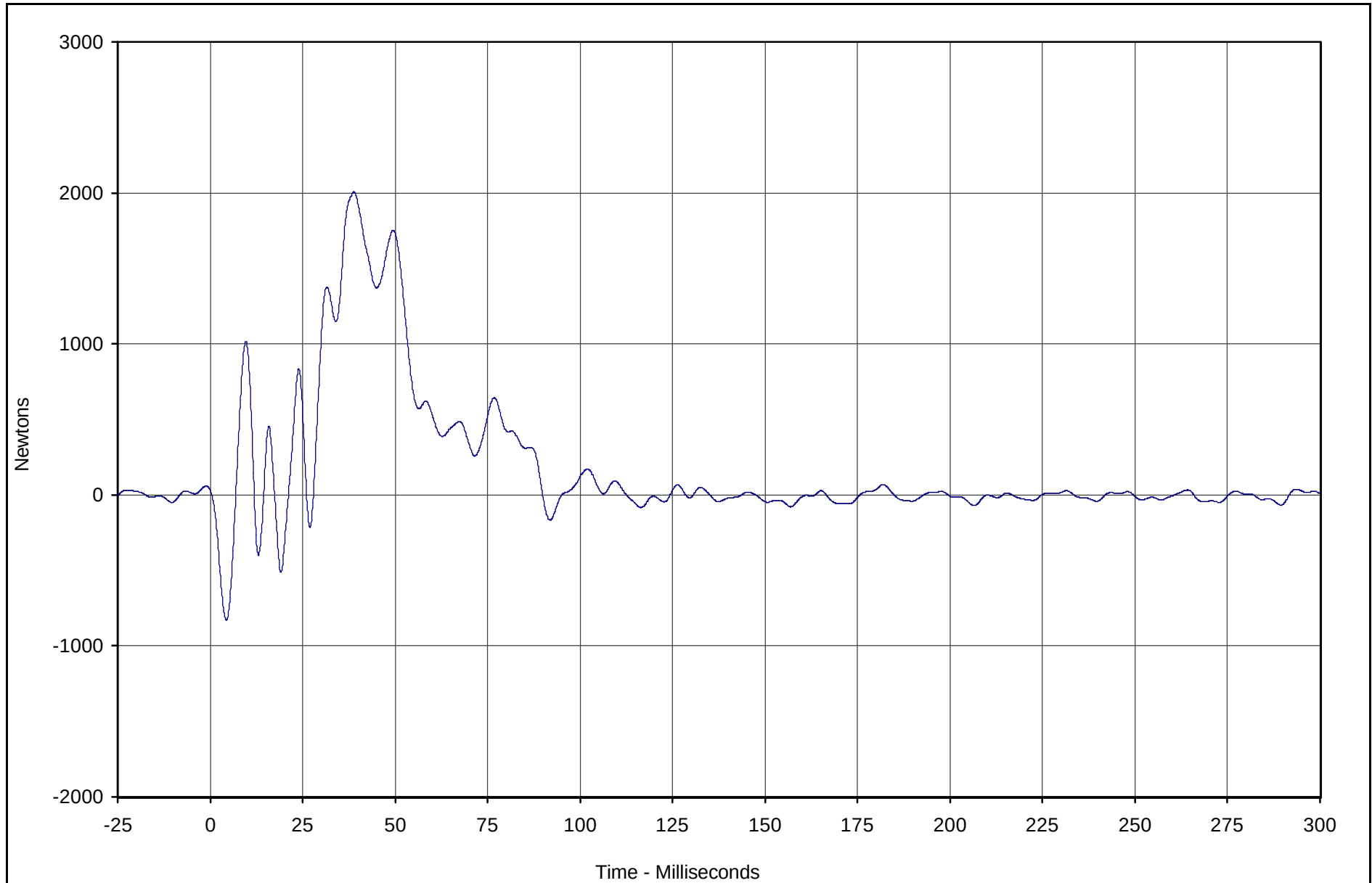


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force D1  | 125   | FIL  | Newtons | 2007.3 | 38.9 | -829.4 | 4.4  | 60        |

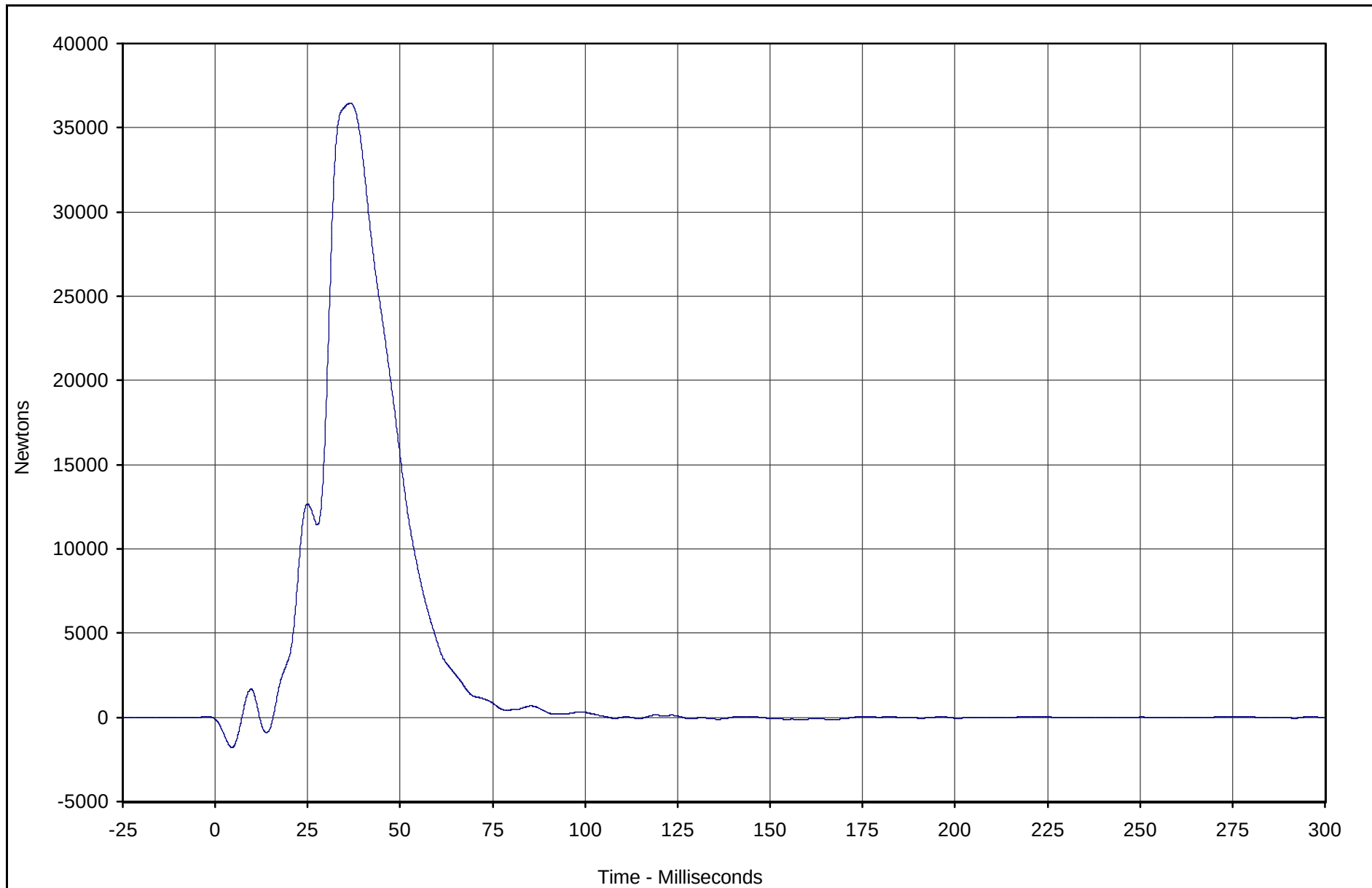


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force D2  | 126   | FIL  | Newtons | 36450.6 | 36.4 | -1792.4 | 4.5  | 60        |

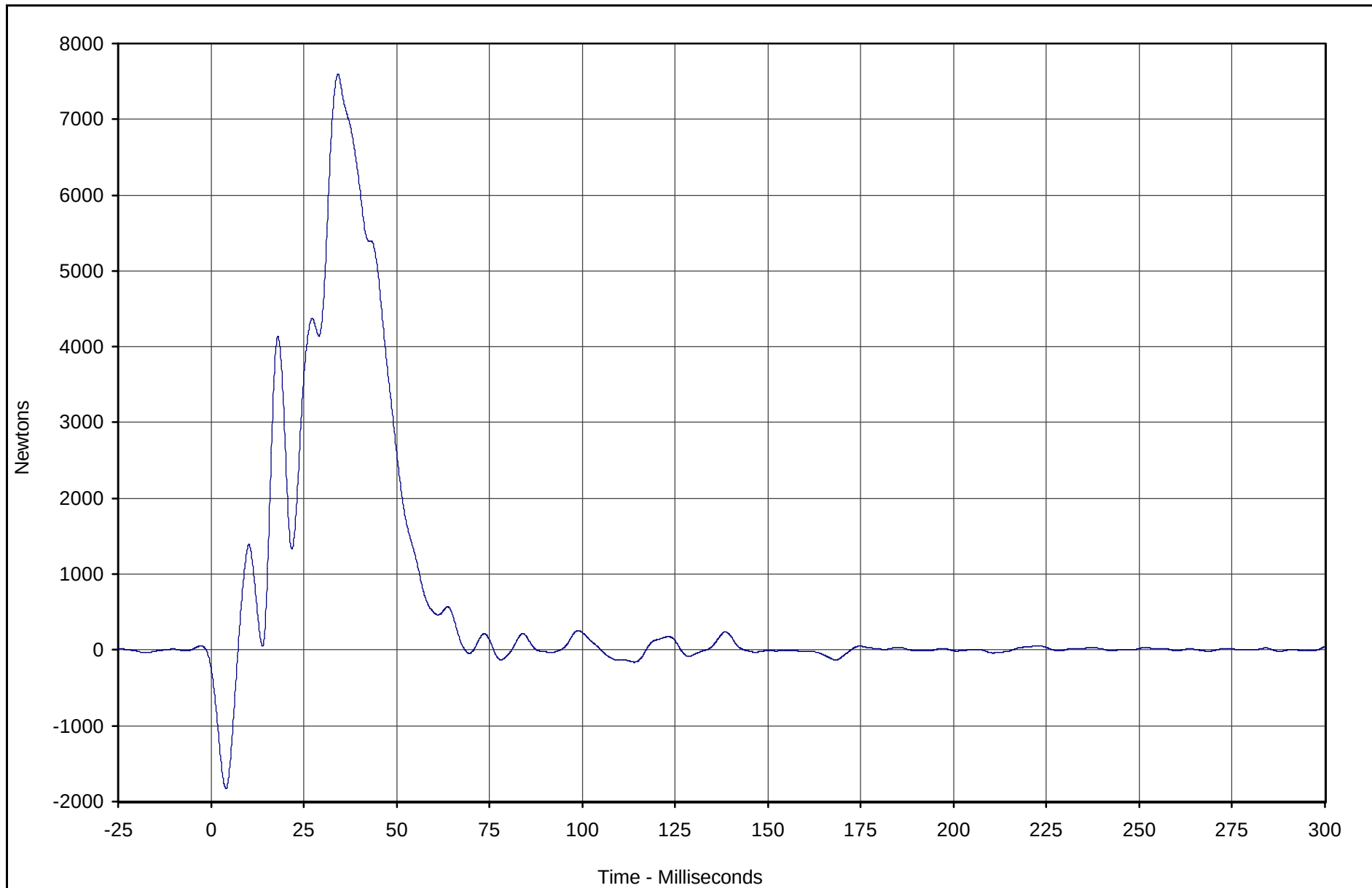
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force D3  | 127   | FIL  | Newtons | 7595.7 | 34.2 | -1826.4 | 4.1  | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

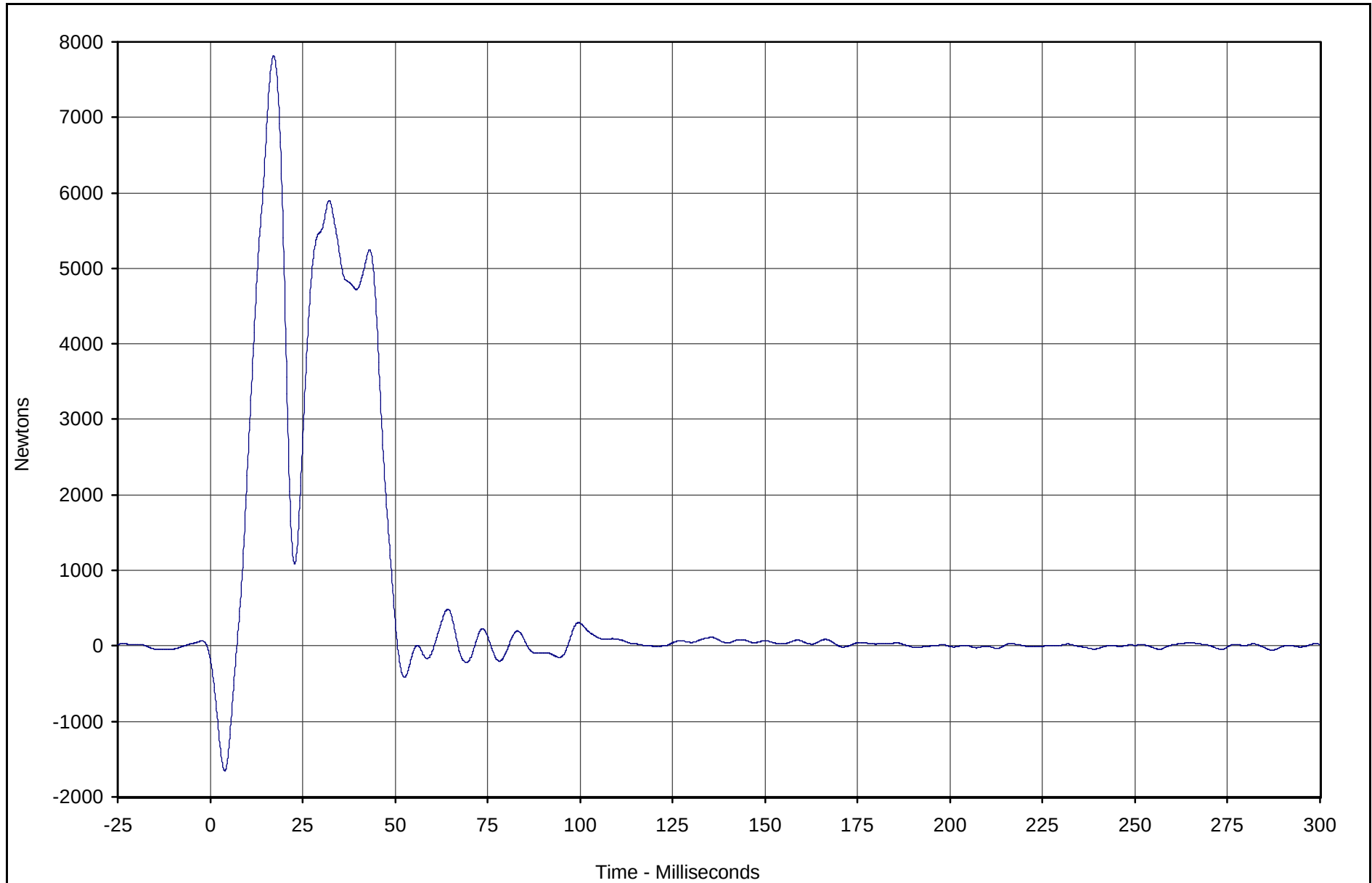
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force D4  | 128   | FIL  | Newtons | 7813.3 | 17.2 | -1657.7 | 4.0  | 60        |



Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

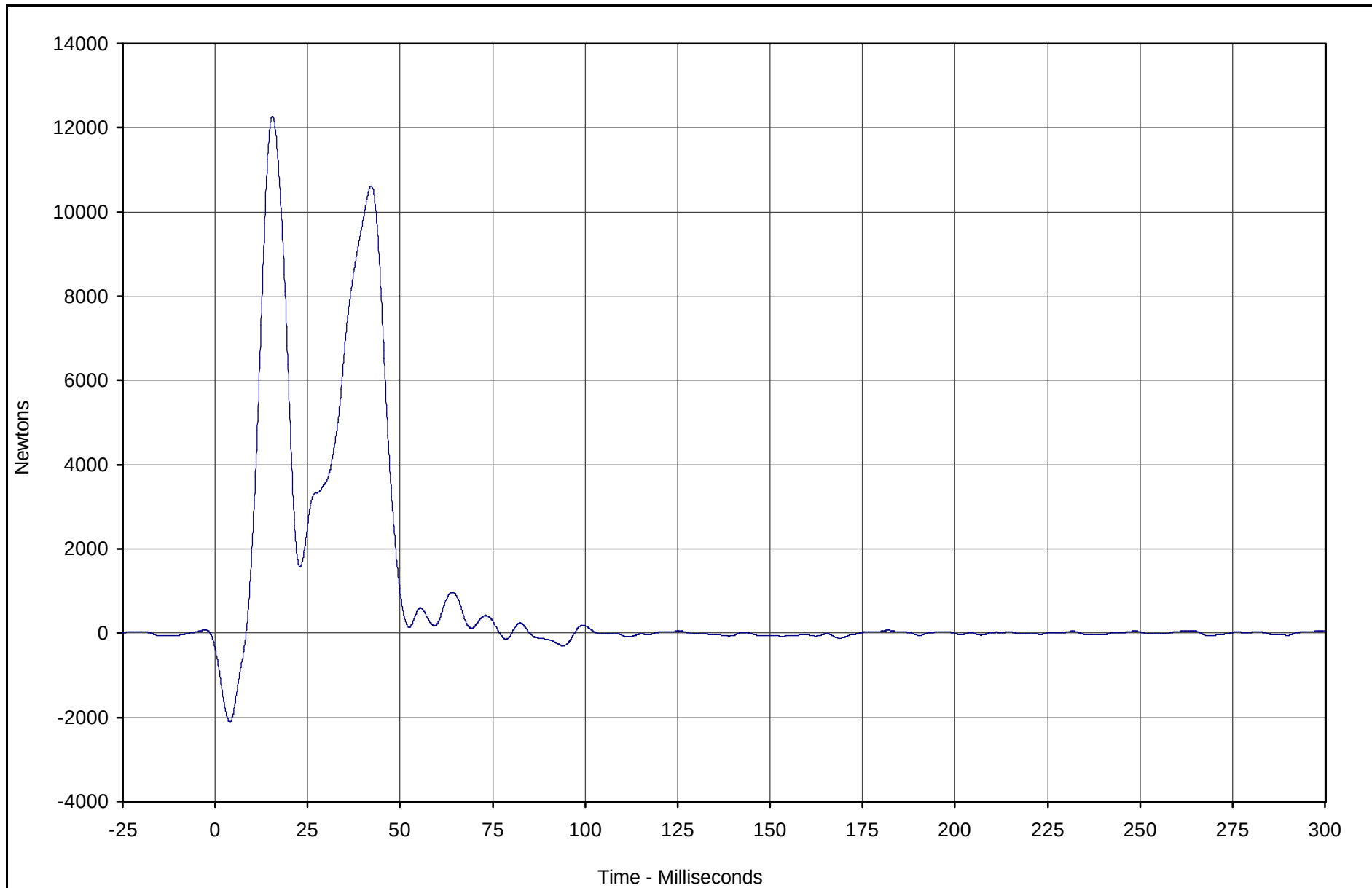
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

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C-32



| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force D5  | 129   | FIL  | Newtons | 12276.3 | 15.5 | -2110.9 | 4.0  | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

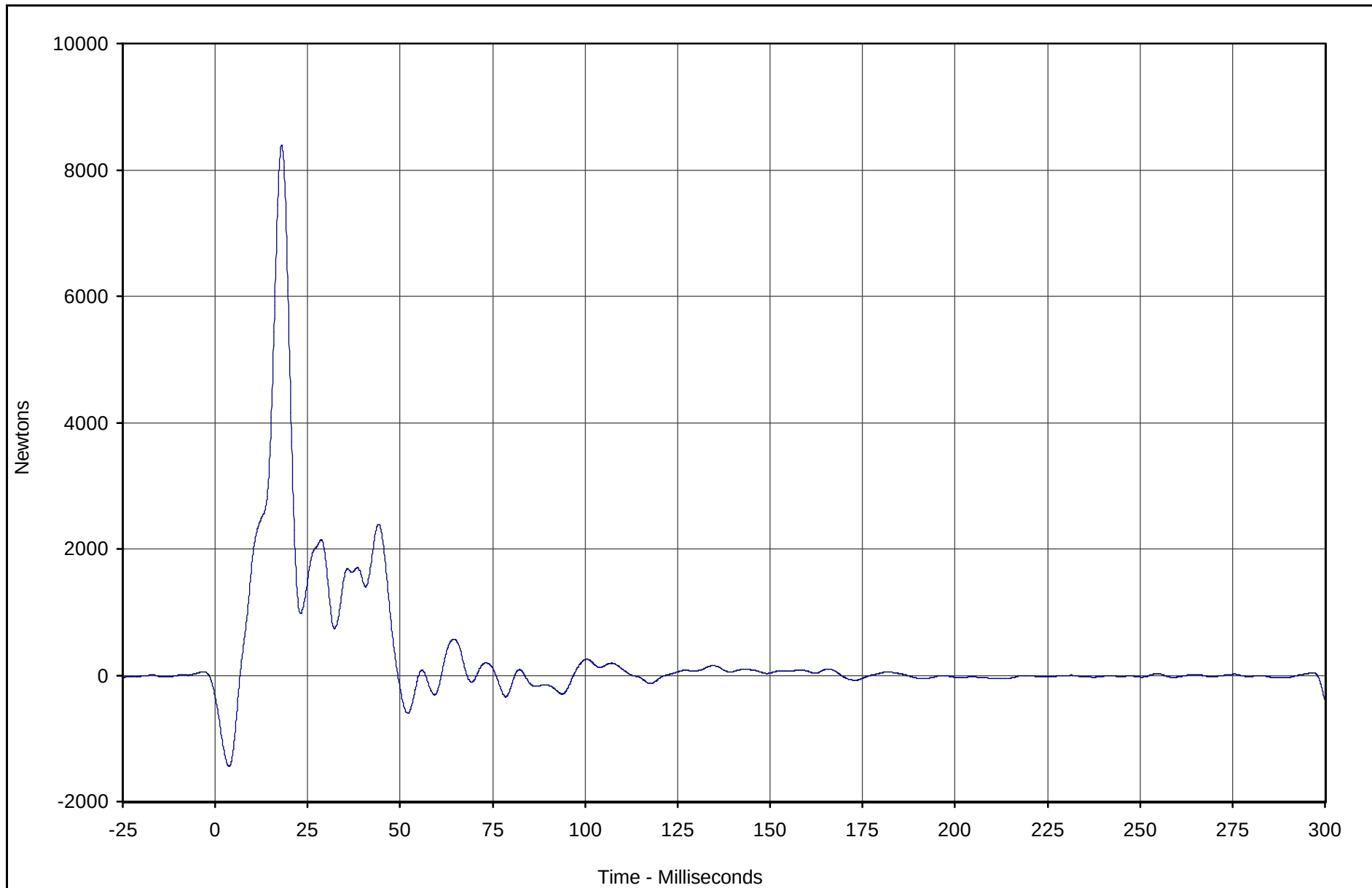
Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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C-33



| Curve Description | CURNO | Type | Units   | Max    | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|---------|------|-----------|
| Barrier Force D6  | 130   | FIL  | Newtons | 8396.1 | 18.0 | -1439.7 | 3.8  | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

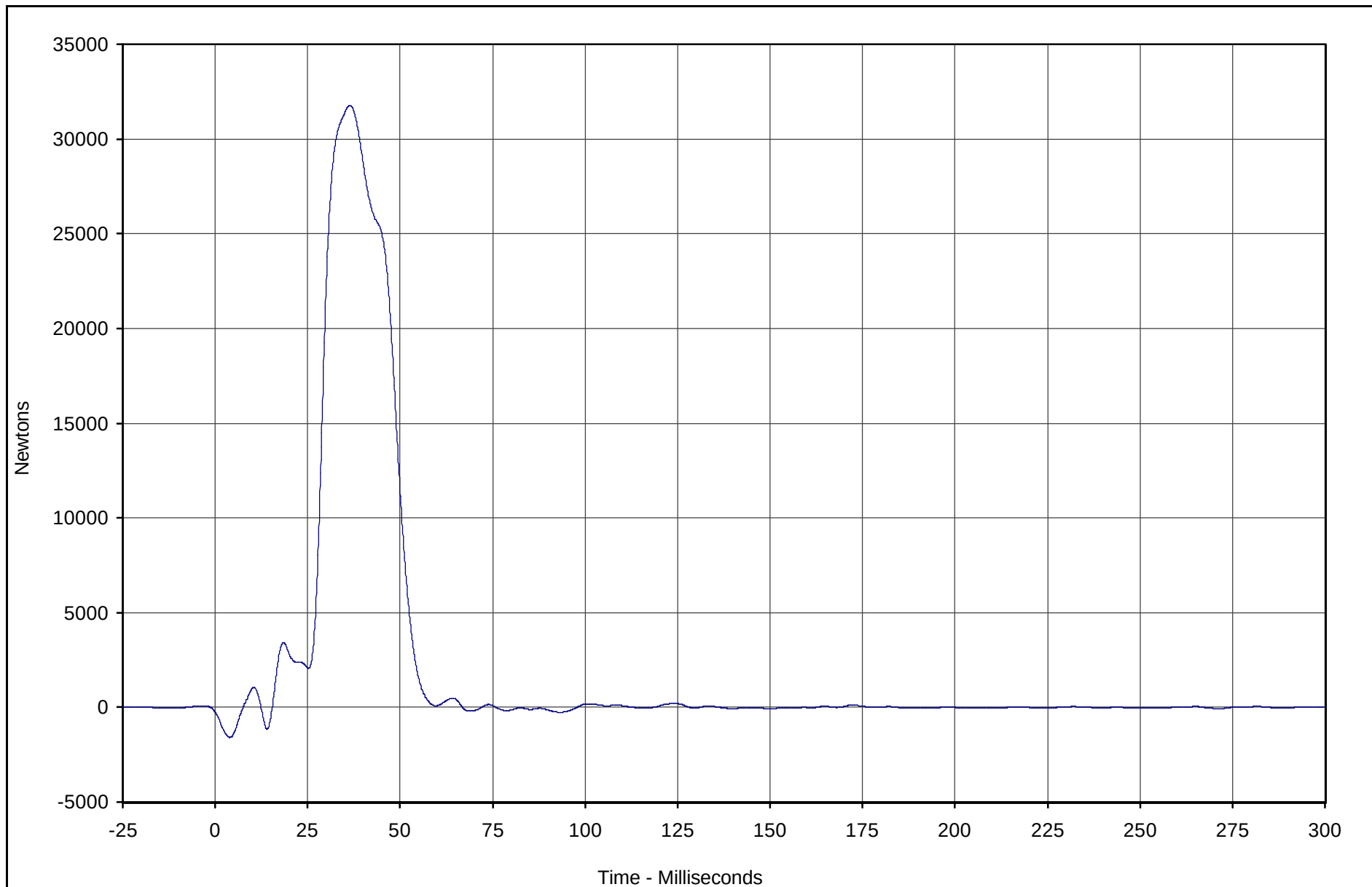
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



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| Curve Description | CURNO | Type | Units   | Max     | Time | Min     | Time | SAE Class |
|-------------------|-------|------|---------|---------|------|---------|------|-----------|
| Barrier Force D7  | 131   | FIL  | Newtons | 31772.5 | 36.4 | -1586.9 | 4.0  | 60        |

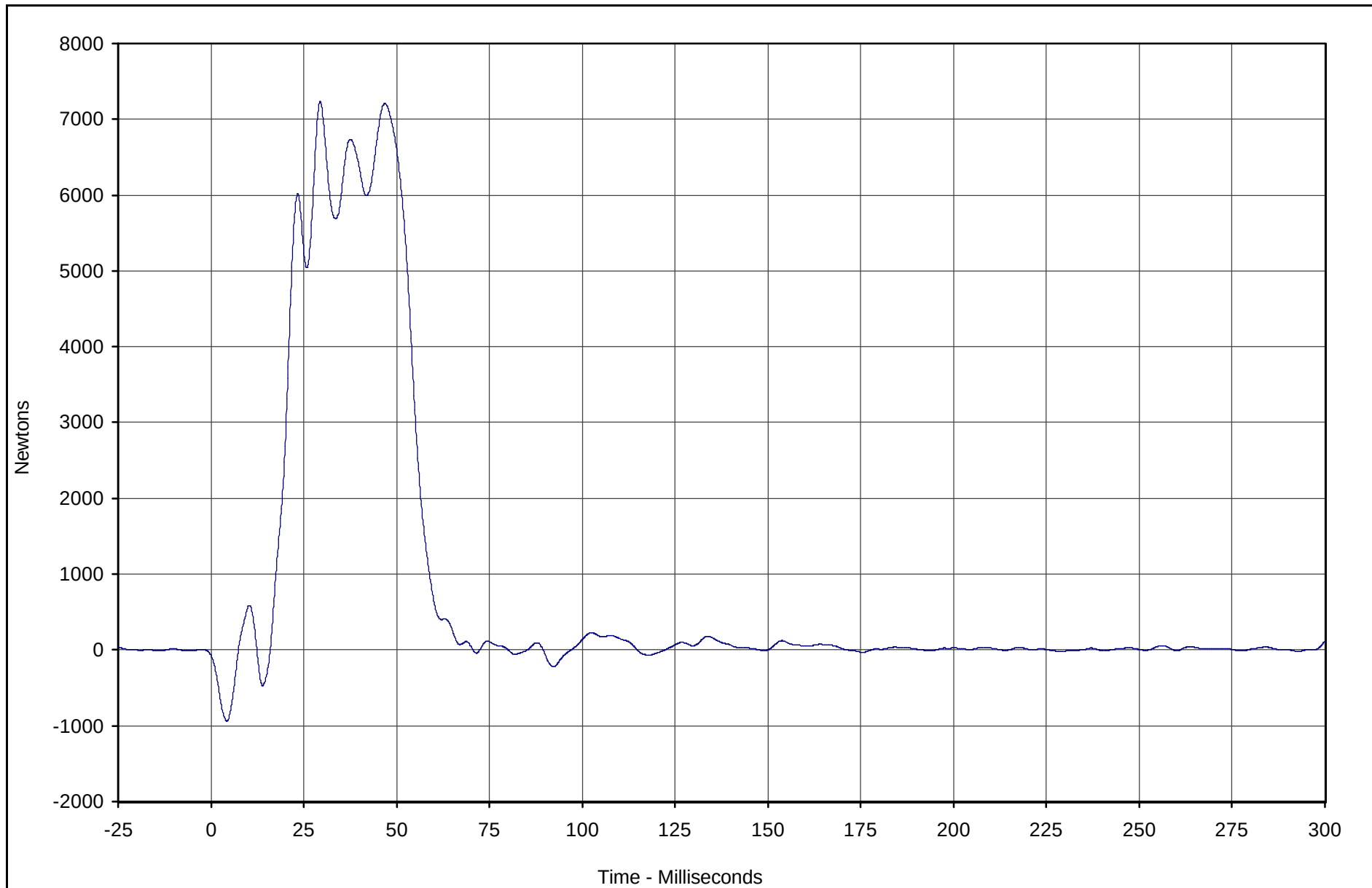


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|--------|------|--------|------|-----------|
| Barrier Force D8  | 132   | FIL  | Newtons | 7232.2 | 29.4 | -937.1 | 4.3  | 60        |

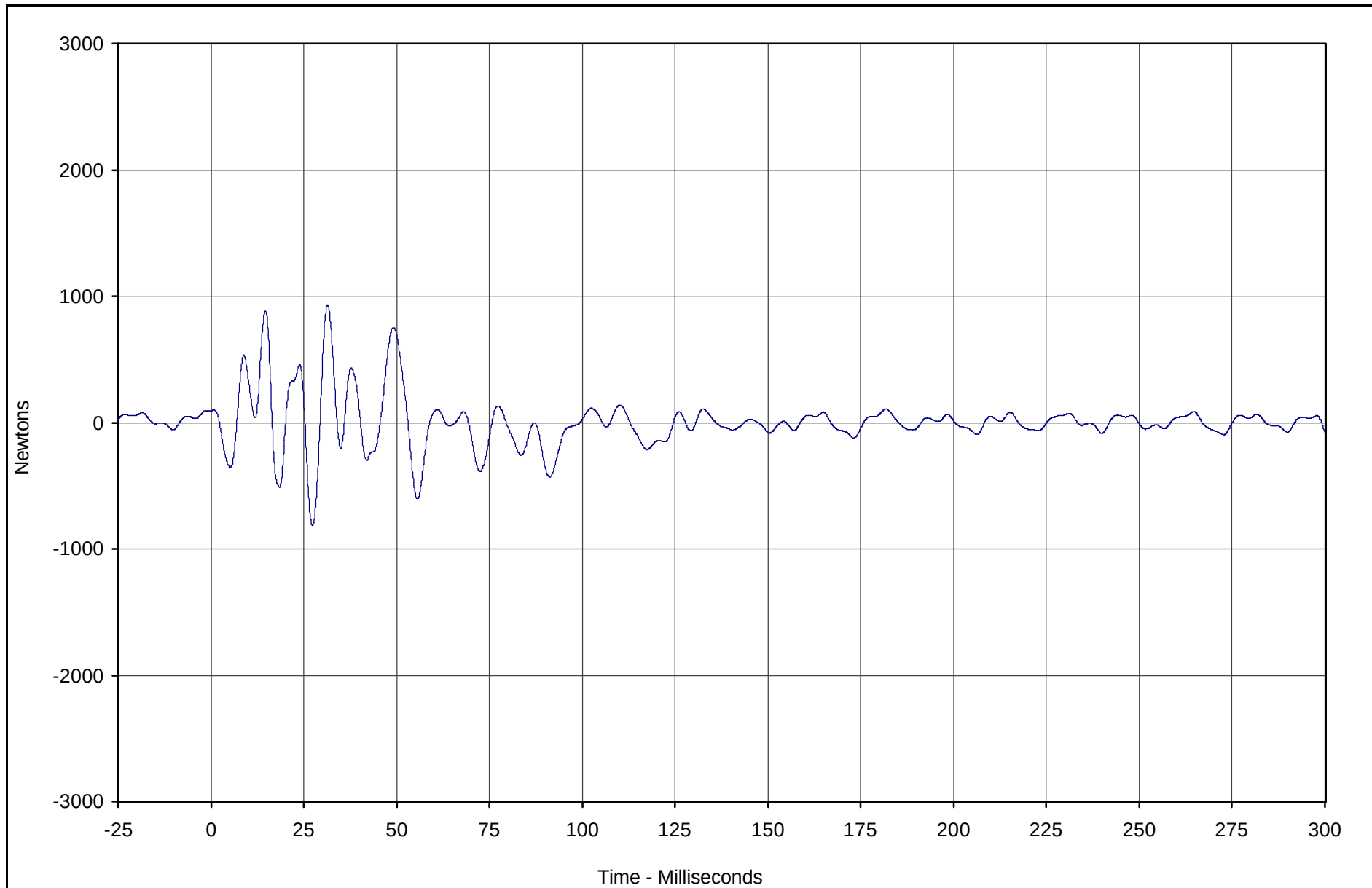


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|-------------------|-------|------|---------|-------|------|--------|------|-----------|
| Barrier Force D9  | 133   | FIL  | Newtons | 928.8 | 31.4 | -814.8 | 27.4 | 60        |

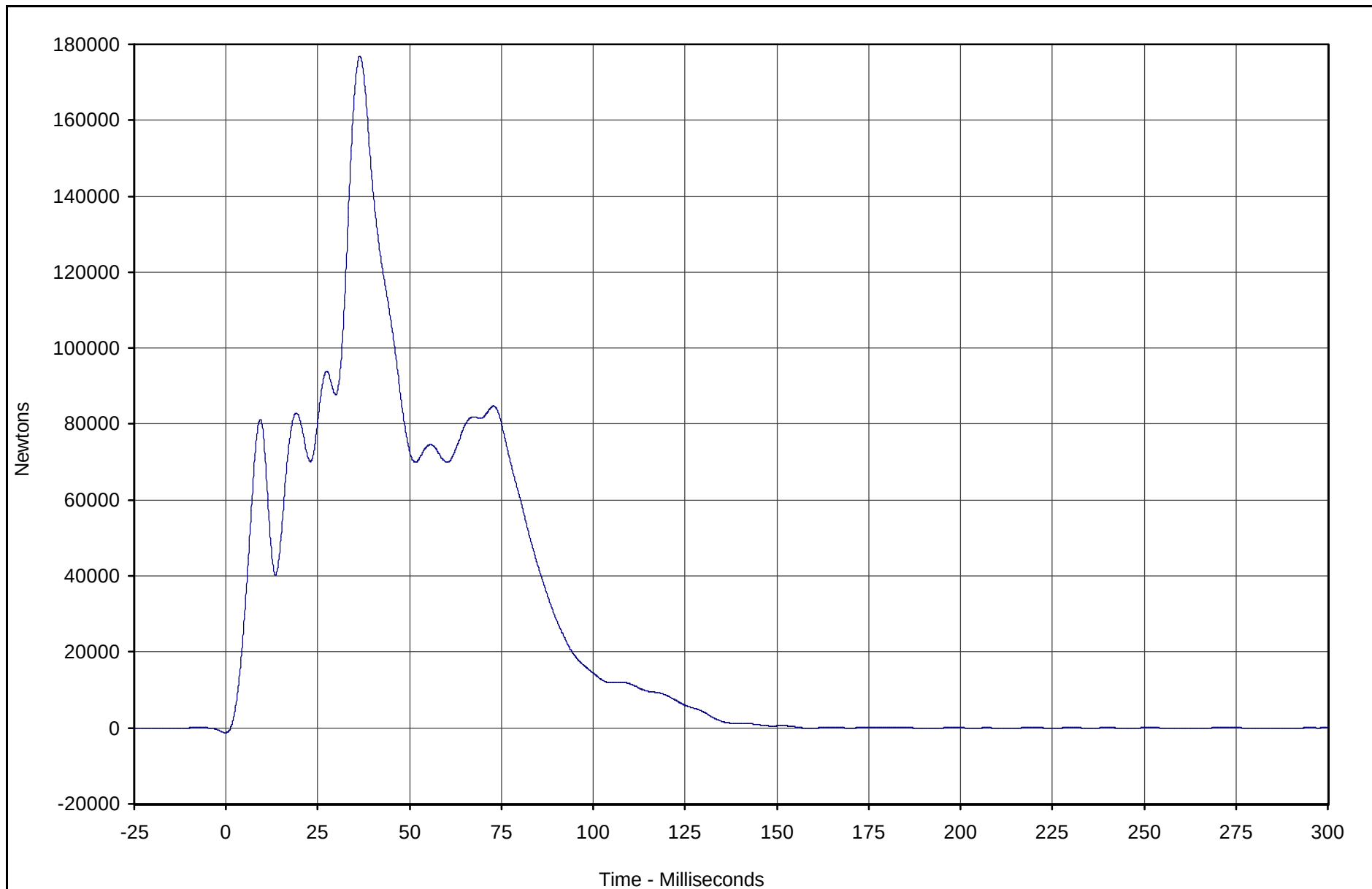


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units   | Max      | Time | Min     | Time | SAE Class |
|---------------------------|-------|------|---------|----------|------|---------|------|-----------|
| Barrier Force Sum Group 1 | 001   | SUM  | Newtons | 176772.9 | 36.4 | -1229.9 | 0.0  | 60        |



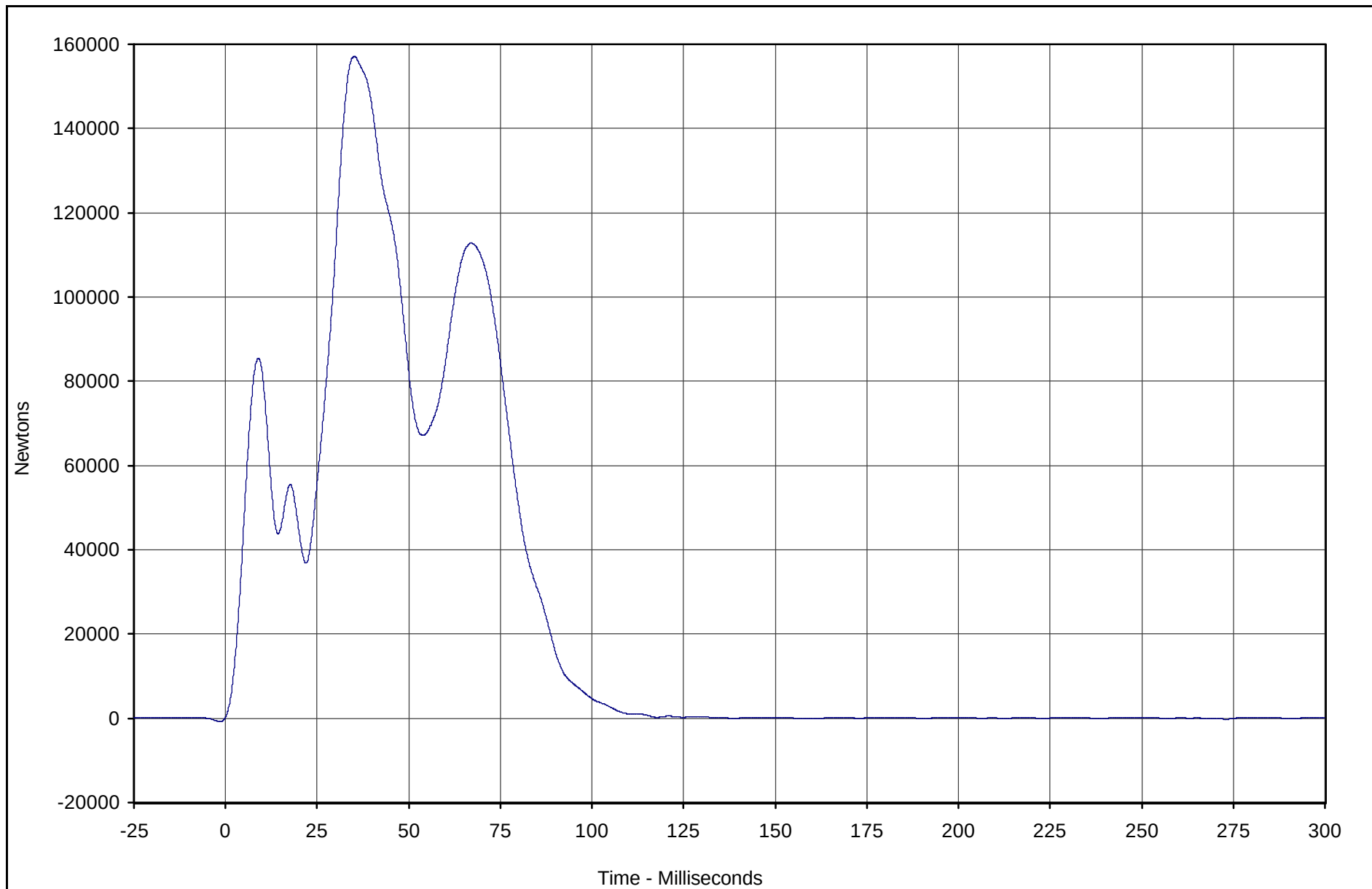
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description         | CURNO | Type | Units   | Max      | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|----------|------|--------|-------|-----------|
| Barrier Force Sum Group 2 | 002   | SUM  | Newtons | 157116.9 | 35.1 | -221.2 | 273.1 | 60        |

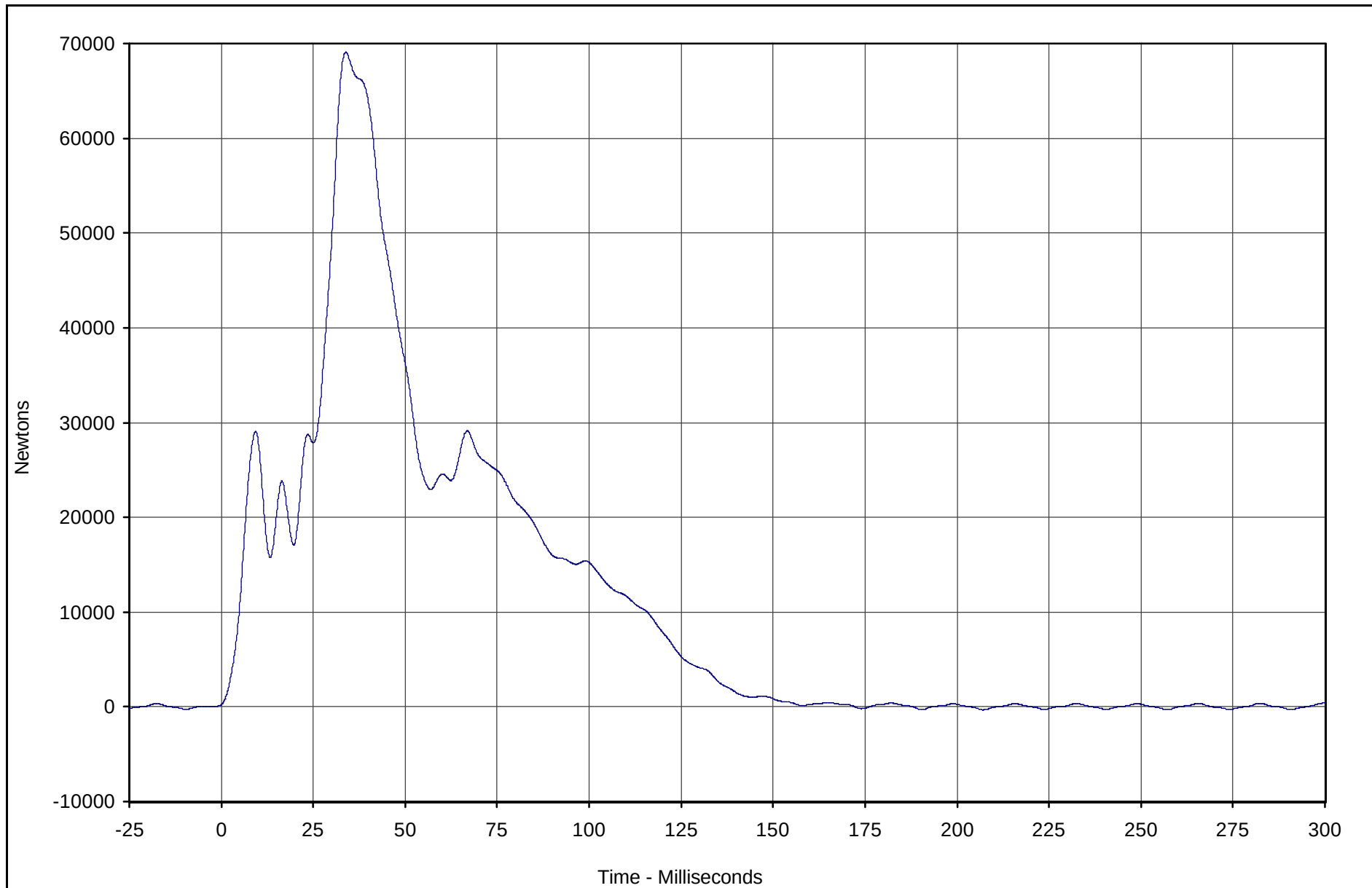


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force Sum Group 3 | 003   | SUM  | Newtons | 69070.2 | 33.8 | -311.0 | 207.1 | 60        |

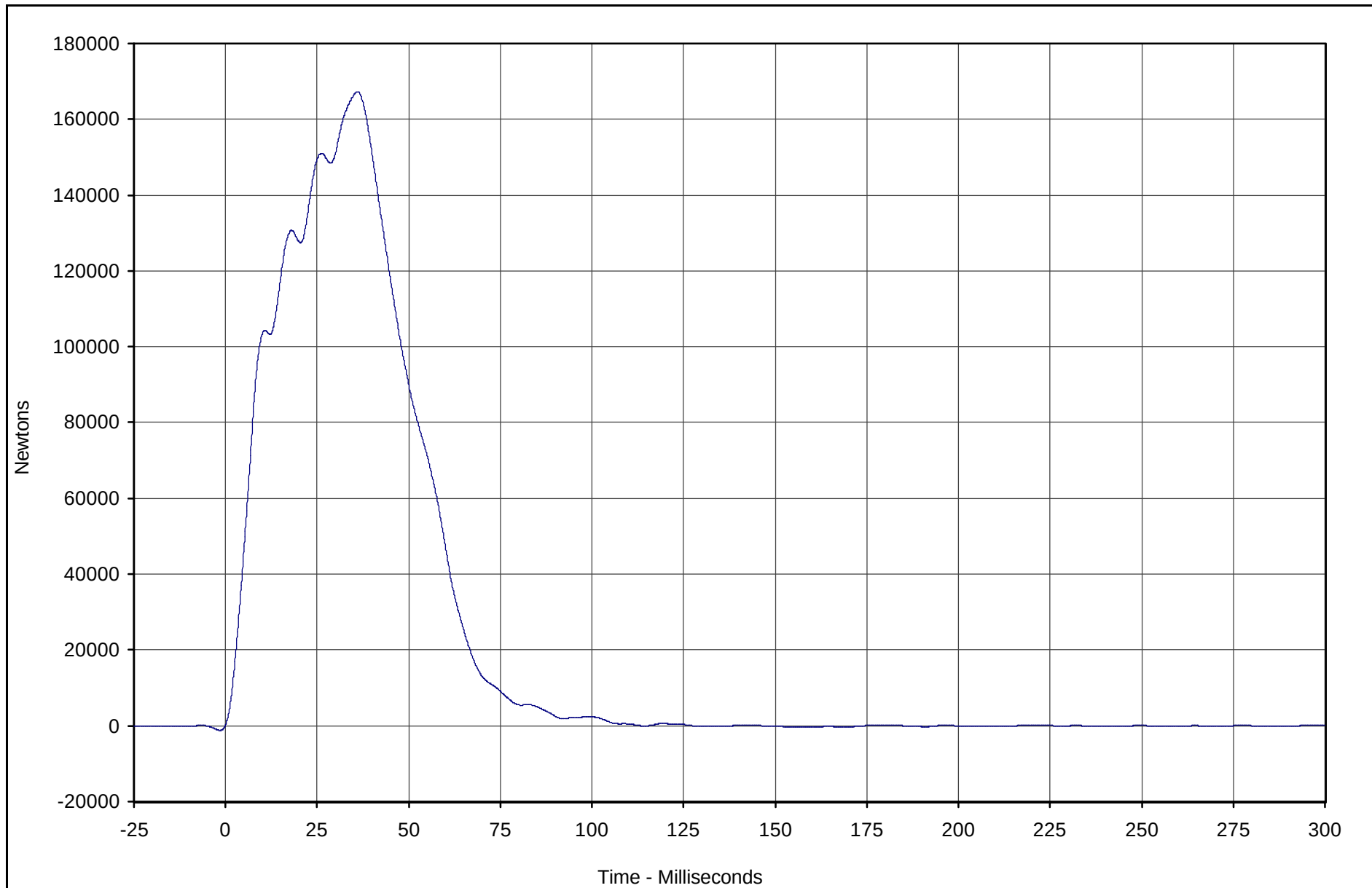


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units   | Max      | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|----------|------|--------|-------|-----------|
| Barrier Force Sum Group 4 | 004   | SUM  | Newtons | 167308.3 | 36.0 | -435.7 | 157.5 | 60        |



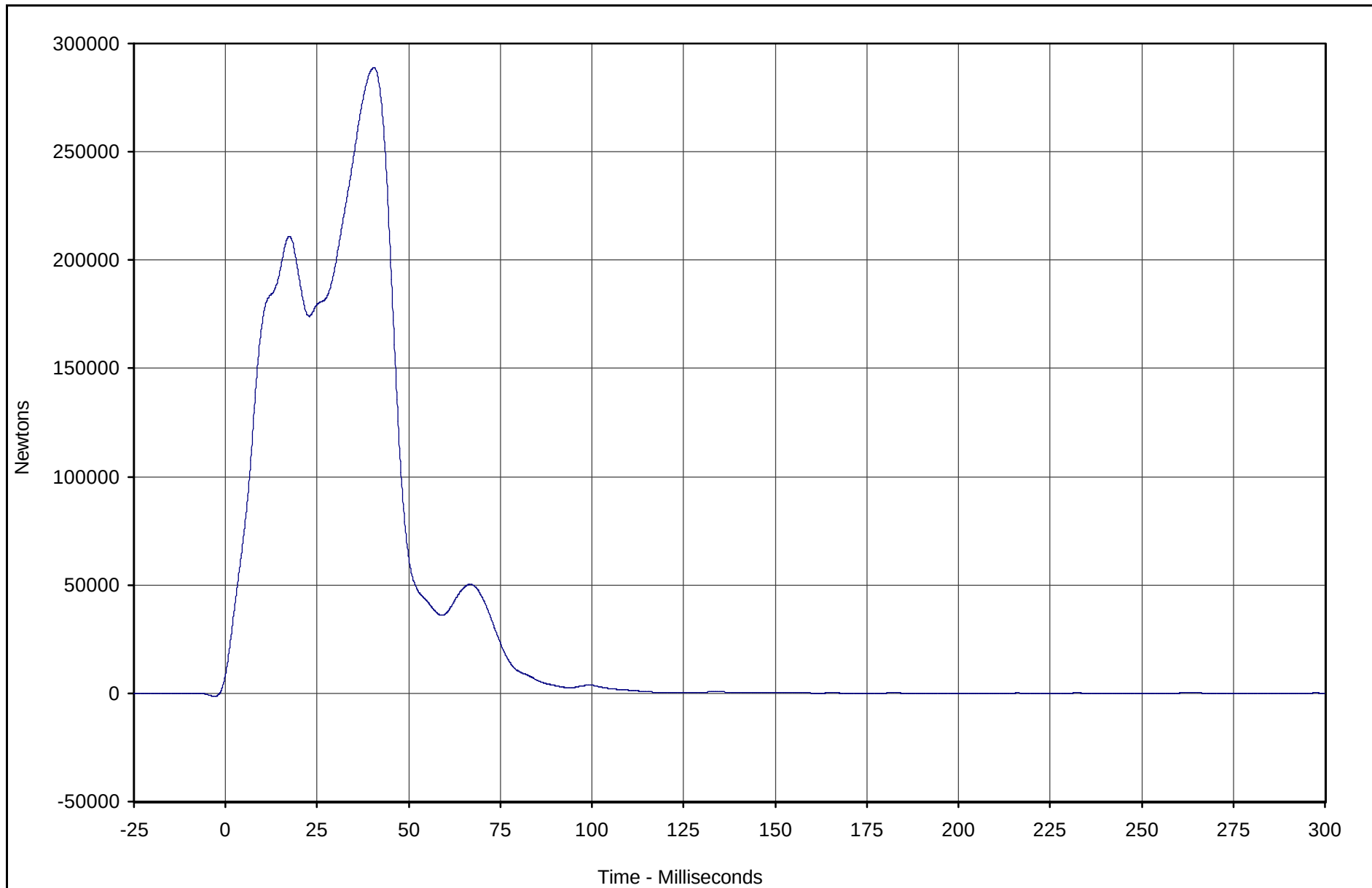
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

C-41



| Curve Description         | CURNO | Type | Units   | Max      | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|----------|------|--------|-------|-----------|
| Barrier Force Sum Group 5 | 005   | SUM  | Newtons | 288822.6 | 40.4 | -237.5 | 299.9 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

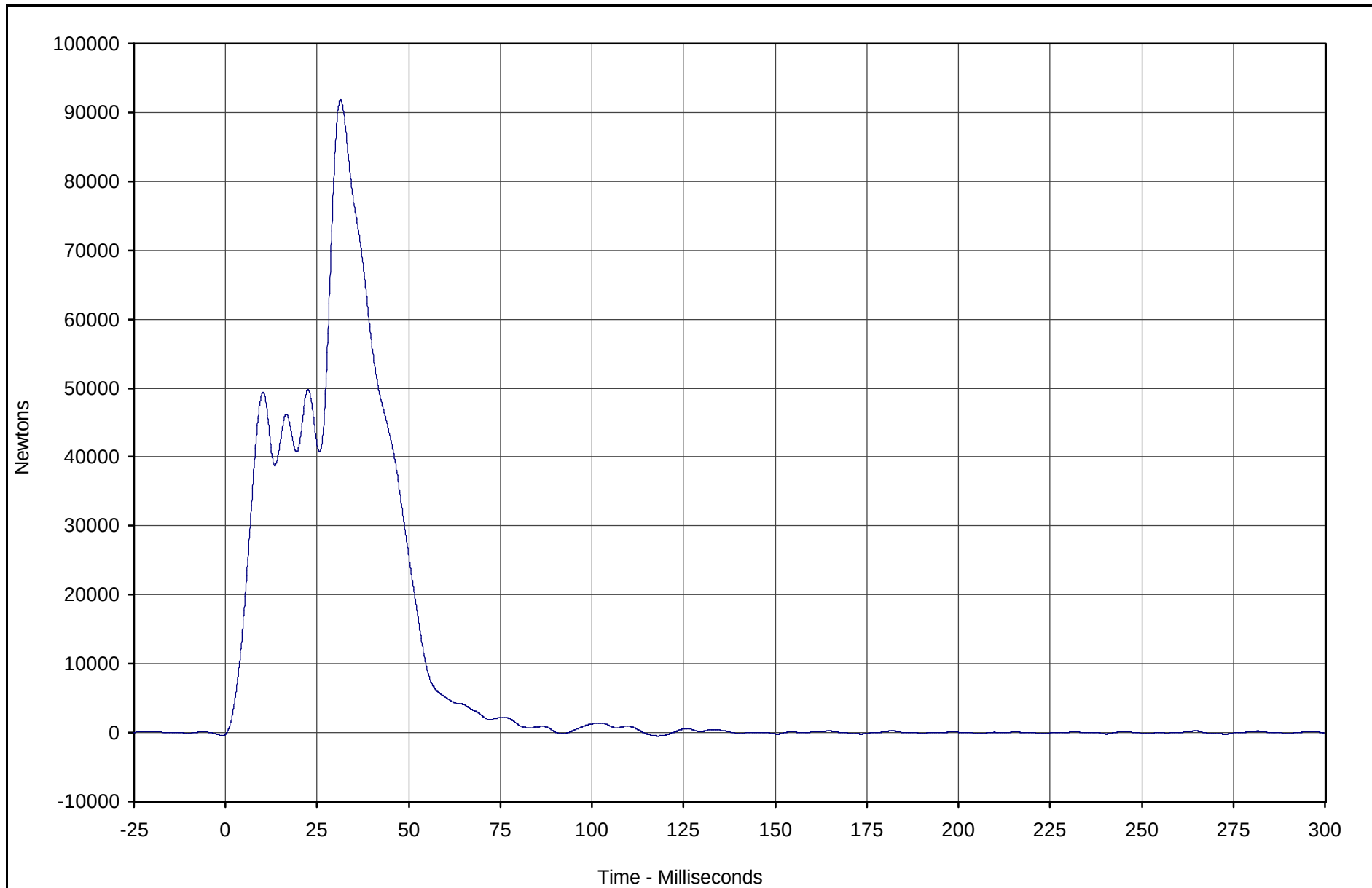
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



TR-P23001-23-NC



| Curve Description         | CURNO | Type | Units   | Max     | Time | Min    | Time  | SAE Class |
|---------------------------|-------|------|---------|---------|------|--------|-------|-----------|
| Barrier Force Sum Group 6 | 006   | SUM  | Newtons | 91814.3 | 31.4 | -464.5 | 117.9 | 60        |

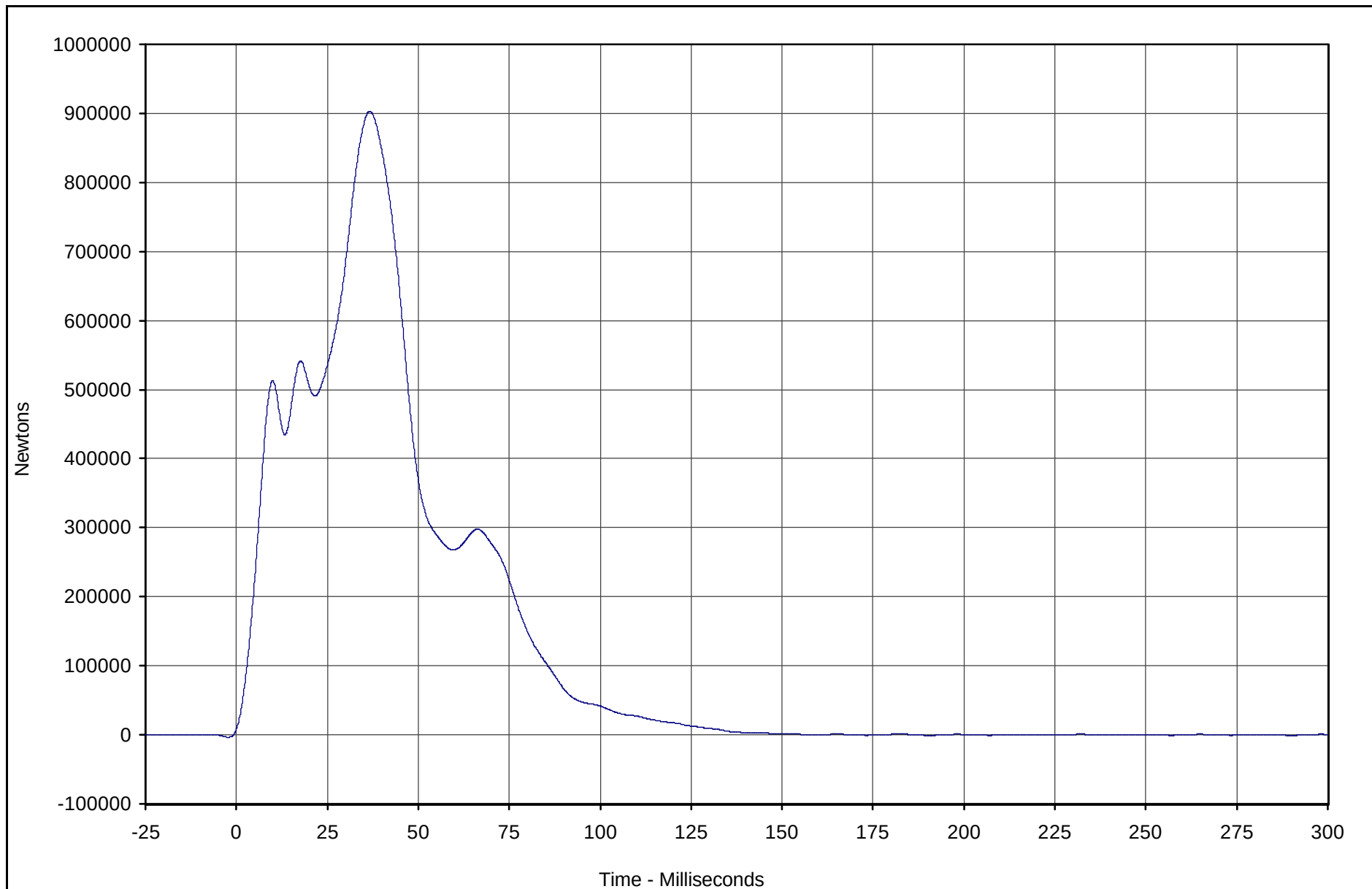


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description       | CURNO | Type | Units   | Max    | Time | Min     | Time  | SAE Class |
|-------------------------|-------|------|---------|--------|------|---------|-------|-----------|
| Barrier Force Total Sum | 007   | SUM  | Newtons | 902995 | 36.7 | -1065.5 | 190.4 | 60        |

Test Vehicle: 2004 Jeep Liberty 4WD SUV

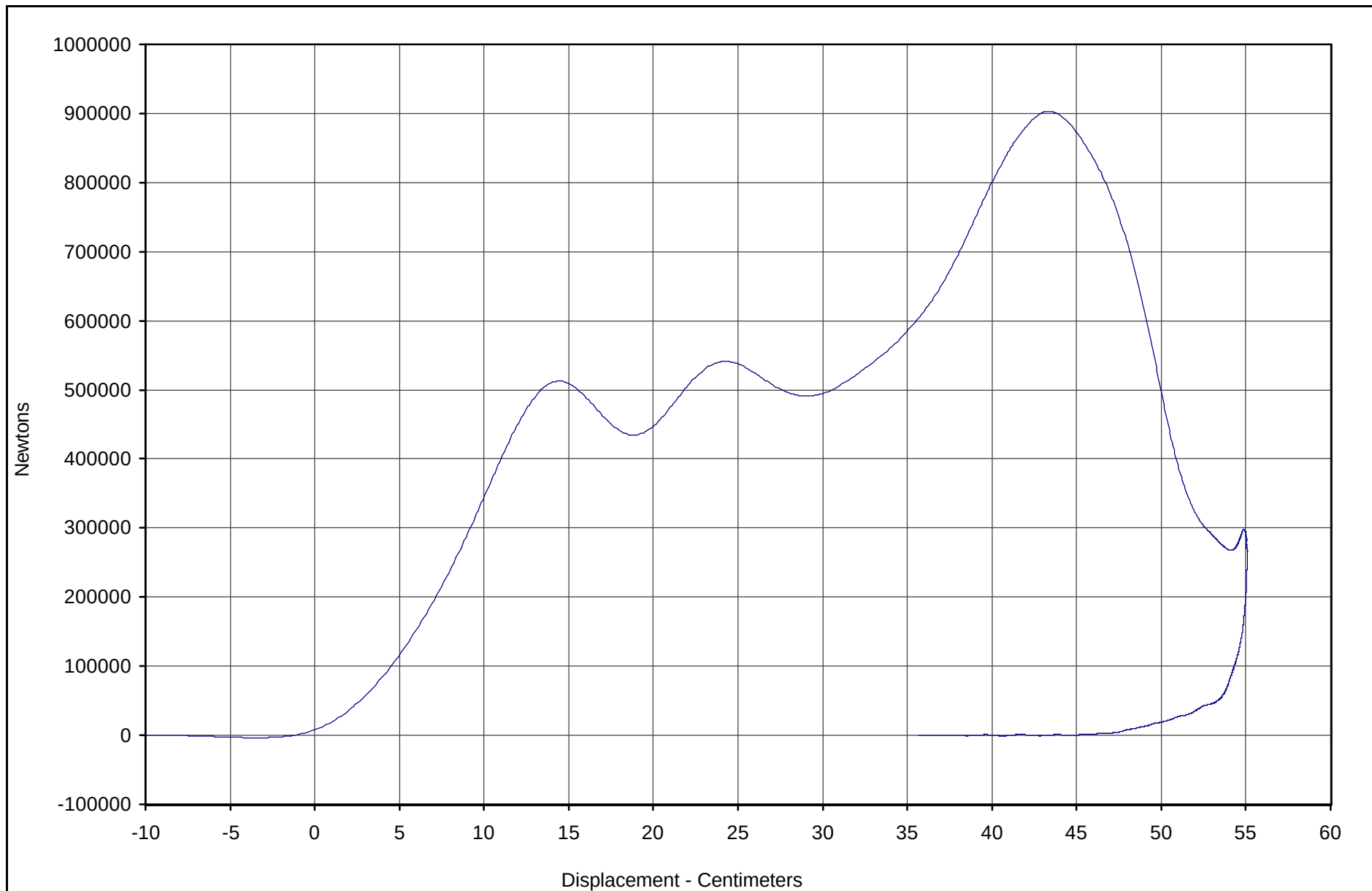
Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300







| Curve Description                  | CURNO | Type | Units   | Max    | CM   | Energy (Joules) | SAE Class |
|------------------------------------|-------|------|---------|--------|------|-----------------|-----------|
| Barrier Force Total Sum vs. Displ. | 001   | XVY  | Newtons | 902995 | 43.4 | 264582          | 60        |



Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

# BARRIER LOAD CELL SUMMARY DATA

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

| Location                  | Units   | Max      | Time | Min     | Time  |
|---------------------------|---------|----------|------|---------|-------|
| Barrier Force A1          | Newtons | 5318.9   | 39.4 | -3174.9 | 15.5  |
| Barrier Force A2          | Newtons | 2394.4   | 38.7 | -2118.7 | 15.7  |
| Barrier Force A3          | Newtons | 1827.3   | 19.6 | -2206.0 | 15.4  |
| Barrier Force A4          | Newtons | 5505.7   | 37.0 | -942.0  | 23.0  |
| Barrier Force A5          | Newtons | 2106.7   | 19.0 | -2825.6 | 15.0  |
| Barrier Force A6          | Newtons | 6748.5   | 72.3 | -2590.5 | 14.9  |
| Barrier Force A7          | Newtons | 890.4    | 18.7 | -1778.6 | 14.8  |
| Barrier Force A8          | Newtons | 6365.7   | 40.1 | -797.3  | 14.9  |
| Barrier Force A9          | Newtons | 3320.2   | 39.8 | -1173.8 | 15.0  |
| Barrier Force B1          | Newtons | 11650.6  | 41.0 | -1612.3 | 14.4  |
| Barrier Force B2          | Newtons | 11527.5  | 43.3 | -789.8  | 2.6   |
| Barrier Force B3          | Newtons | 151979.3 | 36.1 | -849.8  | 0.0   |
| Barrier Force B4          | Newtons | 10733.6  | 35.9 | -178.6  | 0.0   |
| Barrier Force B5          | Newtons | 19656.5  | 68.4 | -107.0  | 172.9 |
| Barrier Force B6          | Newtons | 122904.7 | 34.7 | -518.3  | 0.0   |
| Barrier Force B7          | Newtons | 43139.1  | 35.2 | -87.2   | 289.8 |
| Barrier Force B8          | Newtons | 16108.9  | 35.1 | -329.5  | 2.2   |
| Barrier Force B9          | Newtons | 2865.8   | 50.3 | -1079.3 | 20.7  |
| Barrier Force C1          | Newtons | 3802.4   | 40.6 | -1328.4 | 4.2   |
| Barrier Force C2          | Newtons | 12122.9  | 16.6 | -1225.8 | 3.2   |
| Barrier Force C3          | Newtons | 123710.9 | 27.0 | -90.0   | 157.9 |
| Barrier Force C4          | Newtons | 55927.2  | 40.9 | -27.6   | 236.9 |
| Barrier Force C5          | Newtons | 104523.7 | 41.3 | -72.3   | 173.8 |
| Barrier Force C6          | Newtons | 162004.4 | 17.6 | -69.9   | 174.4 |
| Barrier Force C7          | Newtons | 45463.8  | 9.9  | -104.8  | 248.5 |
| Barrier Force C8          | Newtons | 10792.0  | 30.6 | -568.4  | 3.0   |
| Barrier Force C9          | Newtons | 1722.5   | 31.2 | -1352.1 | 20.3  |
| Barrier Force D1          | Newtons | 2007.3   | 38.9 | -829.4  | 4.4   |
| Barrier Force D2          | Newtons | 36450.6  | 36.4 | -1792.4 | 4.5   |
| Barrier Force D3          | Newtons | 7595.7   | 34.2 | -1826.4 | 4.1   |
| Barrier Force D4          | Newtons | 7813.3   | 17.2 | -1657.7 | 4.0   |
| Barrier Force D5          | Newtons | 12276.3  | 15.5 | -2110.9 | 4.0   |
| Barrier Force D6          | Newtons | 8396.1   | 18.0 | -1439.7 | 3.8   |
| Barrier Force D7          | Newtons | 31772.5  | 36.4 | -1586.9 | 4.0   |
| Barrier Force D8          | Newtons | 7232.2   | 29.4 | -937.1  | 4.3   |
| Barrier Force D9          | Newtons | 928.8    | 31.4 | -814.8  | 27.4  |
| Barrier Force Sum Group 1 | Newtons | 176772.9 | 36.4 | -1229.9 | 0.0   |
| Barrier Force Sum Group 2 | Newtons | 157116.9 | 35.1 | -221.2  | 273.1 |
| Barrier Force Sum Group 3 | Newtons | 69070.2  | 33.8 | -311.0  | 207.1 |
| Barrier Force Sum Group 4 | Newtons | 167308.3 | 36.0 | -435.7  | 157.5 |
| Barrier Force Sum Group 5 | Newtons | 288822.6 | 40.4 | -237.5  | 299.9 |
| Barrier Force Sum Group 6 | Newtons | 91814.3  | 31.4 | -464.5  | 117.9 |
| Barrier Force Total Sum   | Newtons | 902994.8 | 36.7 | -1065.5 | 190.4 |

## **APPENDIX D**

### **INSTRUMENTATION DATA CHANNEL ASSIGNMENTS**

**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Driver A.T.D. Serial Number 34**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 1   | HEAD, PRIMARY      | X    | KEAC039    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 2   | HEAD, PRIMARY      | Y    | KEAC038    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 3   | HEAD, PRIMARY      | Z    | KEAC027    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 4   | HEAD, REDUNDANT    | X    | KEAC031    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 5   | HEAD, REDUNDANT    | Y    | KEAC032    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 6   | HEAD, REDUNDANT    | Z    | KEAC026    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 7   | NECK FORCE         | X    | GPUN02FX   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 8   | NECK FORCE         | Y    | GPUN02FY   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 9   | NECK FORCE         | Z    | GPUN02FZ   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 10  | NECK MOMENT        | X    | GPUN02MX   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 11  | NECK MOMENT        | Y    | GPUN02MY   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 12  | NECK MOMENT        | Z    | GPUN02MZ   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 13  | CHEST , PRIMARY    | X    | GPAC031    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 14  | CHEST , PRIMARY    | Y    | GPAC024    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 15  | CHEST , PRIMARY    | Z    | GPAC029    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 16  | CHEST , REDUNDANT  | X    | KEAC023    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 17  | CHEST , REDUNDANT  | Y    | KEAC022    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 18  | CHEST , REDUNDANT  | Z    | KEAC024    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 19  | CHEST DISPLACEMENT | X    | GPCP001    | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 20  | PELVIS, PRIMARY    | X    | KEAC019    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 21  | PELVIS, PRIMARY    | Y    | KEAC020    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 22  | PELVIS, PRIMARY    | Z    | KEAC021    | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 23  | LEFT FEMUR FORCE   | Z    | KEFF001    | Load cell, Femur         | R.A. Denton  | 2121      | N     |
| 24  | RIGHT FEMUR FORCE  | Z    | KEFF002    | Load cell, Femur         | R.A. Denton  | 2121      | N     |

**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Driver A.T.D. Serial Number 34**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION               | AXIS | IDENT. NO. | DESCRIPTION               | MFR          | MODEL       | UNITS |
|-----|------------------------|------|------------|---------------------------|--------------|-------------|-------|
| 25  | UP. TIBIA LEFT MOM.    | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 26  | UP. TIBIA LEFT MOM.    | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 27  | UP. TIBIA RIGHT MOM.   | X    | GPUT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 28  | UP. TIBIA RIGHT MOM.   | Y    | GPUT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 29  | LWR. TIBIA LEFT MOM.   | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 30  | LWR. TIBIA LEFT MOM.   | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 31  | LWR. TIBIA LEFT FORCE  | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 32  | LWR. TIBIA RIGHT MOM.  | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 33  | LWR. TIBIA RIGHT MOM.  | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 34  | LWR. TIBIA RIGHT FORCE | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 35  | FOOT LEFT, AFT         | X    | KEIC003X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 36  | FOOT LEFT, AFT         | Z    | KEIC003Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 37  | FOOT LEFT, FORE        | Z    | KEIC003Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 38  | FOOT RIGHT, AFT        | X    | KEIC004X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 39  | FOOT RIGHT, AFT        | Z    | KEIC004Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 40  | FOOT RIGHT, FORE       | Z    | KEIC004Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 41  | LAP BELT FORCE         | X    | KELC001    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 42  | SHOULDER BELT FORCE    | X    | KELC002    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 43  | SHOULDER BELT SPOOL    | X    | KEPP001    | Pullout pot               | Celesco      | PTX101-0030 | MM    |
| 44  | SHOULDER BELT ELONG.   | X    | KEEP001    | Linear pot., belt stretch | E.T.I.       | LCP8-10 10K | MM/CM |

**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Passenger A.T.D. Serial Number 35**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 45  | HEAD, PRIMARY      | X    | GPAC027    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 46  | HEAD, PRIMARY      | Y    | GPAC002    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 47  | HEAD, PRIMARY      | Z    | GPAC003    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 48  | HEAD, REDUNDANT    | X    | GPAC032    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 49  | HEAD, REDUNDANT    | Y    | GPAC021    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 50  | HEAD, REDUNDANT    | Z    | GPAC026    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 51  | NECK FORCE         | X    | GPUN01FX   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 52  | NECK FORCE         | Y    | GPUN01FY   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 53  | NECK FORCE         | Z    | GPUN01FZ   | Load cell, six axis neck | R. A. Denton | 1716A     | N     |
| 54  | NECK MOMENT        | X    | GPUN01MX   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 55  | NECK MOMENT        | Y    | GPUN01MY   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 56  | NECK MOMENT        | Z    | GPUN01MZ   | Load cell, six axis neck | R. A. Denton | 1716A     | Nm    |
| 57  | CHEST , PRIMARY    | X    | GPAC005    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 58  | CHEST , PRIMARY    | Y    | GPAC011    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 59  | CHEST , PRIMARY    | Z    | GPAC010    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 60  | CHEST , REDUNDANT  | X    | GPAC034    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 61  | CHEST , REDUNDANT  | Y    | GPAC023    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 62  | CHEST , REDUNDANT  | Z    | GPAC020    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 63  | CHEST DISPLACEMENT | X    | GPCP002    | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 64  | PELVIS, PRIMARY    | X    | GPAC025    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 65  | PELVIS, PRIMARY    | Y    | GPAC022    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 66  | PELVIS, PRIMARY    | Z    | GPAC019    | Accel., 1/2 bridge       | Endevco      | 7264-2000 | G     |
| 67  | LEFT FEMUR FORCE   | Z    | KEFF003    | Load cell, Femur         | R.A. Denton  | 2121      | N     |
| 68  | RIGHT FEMUR FORCE  | Z    | KEFF004    | Load cell, Femur         | R.A. Denton  | 2121      | N     |



**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Passenger A.T.D. Serial Number 35**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION               | AXIS | IDENT. NO. | DESCRIPTION               | MFR          | MODEL       | UNITS |
|-----|------------------------|------|------------|---------------------------|--------------|-------------|-------|
| 69  | UP. TIBIA LEFT MOM.    | X    | GPOT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 70  | UP. TIBIA LEFT MOM.    | Y    | GPOT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 71  | UP. TIBIA RIGHT MOM.   | X    | GPOT09MX   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 72  | UP. TIBIA RIGHT MOM.   | Y    | GPOT09MY   | 2 ch., Upper tibia gage   | R. A. Denton | 1583        | Nm    |
| 73  | LWR. TIBIA LEFT MOM.   | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 74  | LWR. TIBIA LEFT MOM.   | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 75  | LWR. TIBIA LEFT FORCE  | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 76  | LWR. TIBIA RIGHT MOM.  | X    | GPLT09MX   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 77  | LWR. TIBIA RIGHT MOM.  | Y    | GPLT09MY   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | Nm    |
| 78  | LWR. TIBIA RIGHT FORCE | Z    | GPLT09FZ   | 3 ch., lower tibia gage   | R. A. Denton | 3093        | N     |
| 79  | FOOT LEFT, AFT         | X    | KEIC002X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 80  | FOOT LEFT, AFT         | Z    | KEIC002Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 81  | FOOT LEFT, FORE        | Z    | KEIC002Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 82  | FOOT RIGHT, AFT        | X    | KEIC001X   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 83  | FOOT RIGHT, AFT        | Z    | KEIC001Y   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 84  | FOOT RIGHT, FORE       | Z    | KEIC001Z   | Accel., Foot Triax        | I.C. Sensor  | 3031-500    | G     |
| 85  | LAP BELT FORCE         | X    | KELC003    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 86  | SHOULDER BELT FORCE    | X    | KELC004    | Load cell, Seat belt      | Lebow        | 3371        | N     |
| 87  | SHOULDER BELT SPOOL    | X    | KEPP001    | Pullout pot               | Celesco      | PTX101-0030 | MM    |
| 88  | SHOULDER BELT ELONG.   | X    | KEEP001    | Linear pot., belt stretch | E.T.I.       | LCP8-10 10K | MM/CM |

**2004 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Vehicle Accelerometers  
11/18/03  
2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION            | AXIS | IDENT. NO. | DESCRIPTION           | MFR         | MODEL    | UNITS |
|-----|---------------------|------|------------|-----------------------|-------------|----------|-------|
| 89  | Left Rear           | X    | KEVA002    | Accel., Pre-Amp       | I.C.S/Karco | 3031-500 | G     |
| 90  | Right Rear          | X    | KEVA006    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |
| 91  | Engine Top          | X    | KEVA009    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 92  | Engine Bottom       | X    | KEVA007    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 93  | Left Brake Caliper  | X    | KEVA008    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 94  | Right Brake Caliper | X    | KEVA012    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 95  | Instrument Panel    | X    | KEVA011    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |
| 96  | Left Rear           | Z    | KEVA001    | Accel., Vehicle block | I.C. Sensor | 3031-500 | G     |
| 97  | Right Rear          | Z    | KEVA010    | Accel., Vehicle block | I.C. Sensor | 3031-200 | G     |

**2004 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Rigid Load Cell Barrier  
11/18/03  
2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION         | AXIS | IDENT. NO. | DESCRIPTION    | MFR       | MODEL   | UNITS |
|-----|------------------|------|------------|----------------|-----------|---------|-------|
| 98  | BARRIER FORCE A1 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 99  | BARRIER FORCE A2 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 100 | BARRIER FORCE A3 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 101 | BARRIER FORCE A4 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 102 | BARRIER FORCE A5 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 103 | BARRIER FORCE A6 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 104 | BARRIER FORCE A7 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 105 | BARRIER FORCE A8 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 106 | BARRIER FORCE A9 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 107 | BARRIER FORCE B1 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 108 | BARRIER FORCE B2 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 109 | BARRIER FORCE B3 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 110 | BARRIER FORCE B4 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 111 | BARRIER FORCE B5 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 112 | BARRIER FORCE B6 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 113 | BARRIER FORCE B7 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 114 | BARRIER FORCE B8 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 115 | BARRIER FORCE B9 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |

**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Rigid Load Cell Barrier**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION         | AXIS | IDENT. NO. | DESCRIPTION    | MFR       | MODEL   | UNITS |
|-----|------------------|------|------------|----------------|-----------|---------|-------|
| 116 | BARRIER FORCE C1 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 117 | BARRIER FORCE C2 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 118 | BARRIER FORCE C3 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 119 | BARRIER FORCE C4 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 120 | BARRIER FORCE C5 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 121 | BARRIER FORCE C6 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 122 | BARRIER FORCE C7 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 123 | BARRIER FORCE C8 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 124 | BARRIER FORCE C9 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 125 | BARRIER FORCE D1 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 126 | BARRIER FORCE D2 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 127 | BARRIER FORCE D3 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 128 | BARRIER FORCE D4 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 129 | BARRIER FORCE D5 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 130 | BARRIER FORCE D6 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 131 | BARRIER FORCE D7 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 132 | BARRIER FORCE D8 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |
| 133 | BARRIER FORCE D9 | X    | BARRIER    | Load Cell, LCB | Interface | 1220-FS | N     |

## **APPENDIX E**

### **DUMMY CALIBRATION DATA**



# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Impact Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: LK08E

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.6  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.08   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5714   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

ATD Serial No.: 034

Location: Right Knee

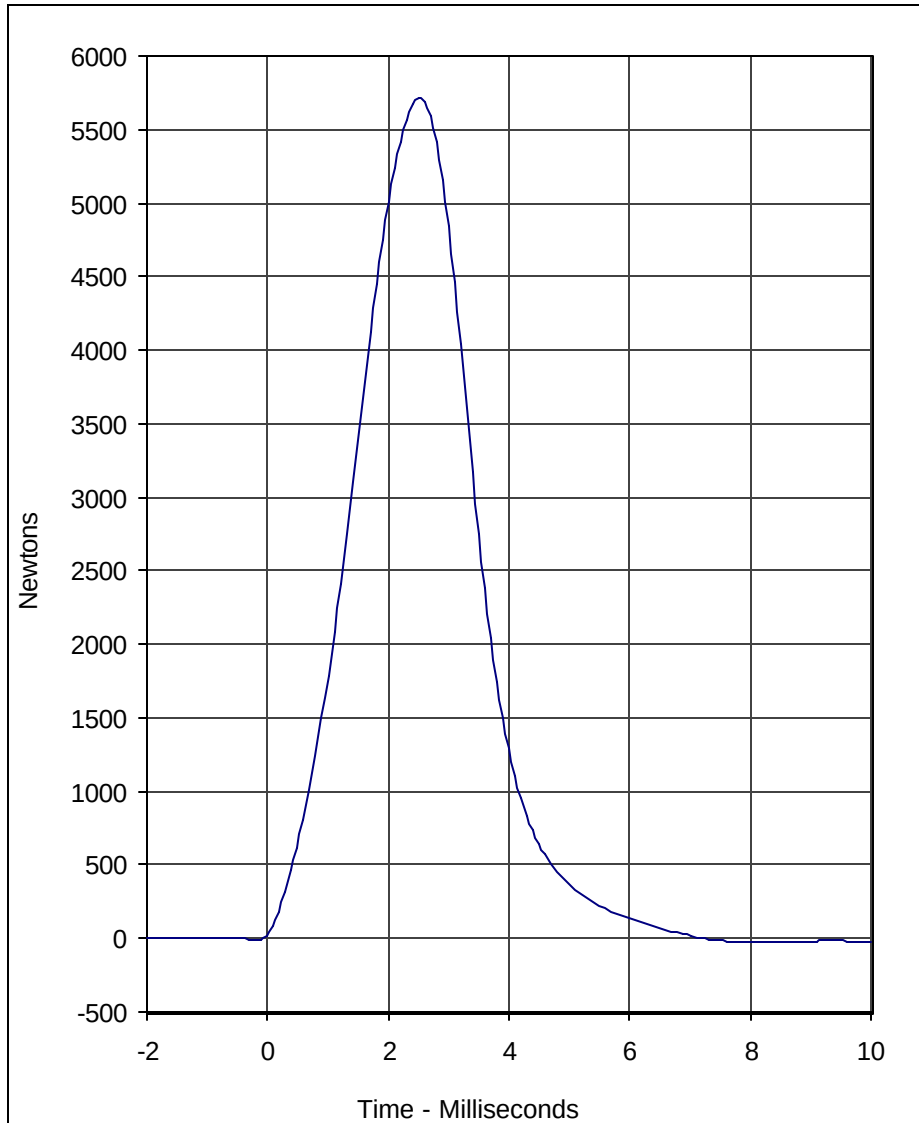
Test I.D.: RK08E

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.6  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.12   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5257   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

Laboratory Technician

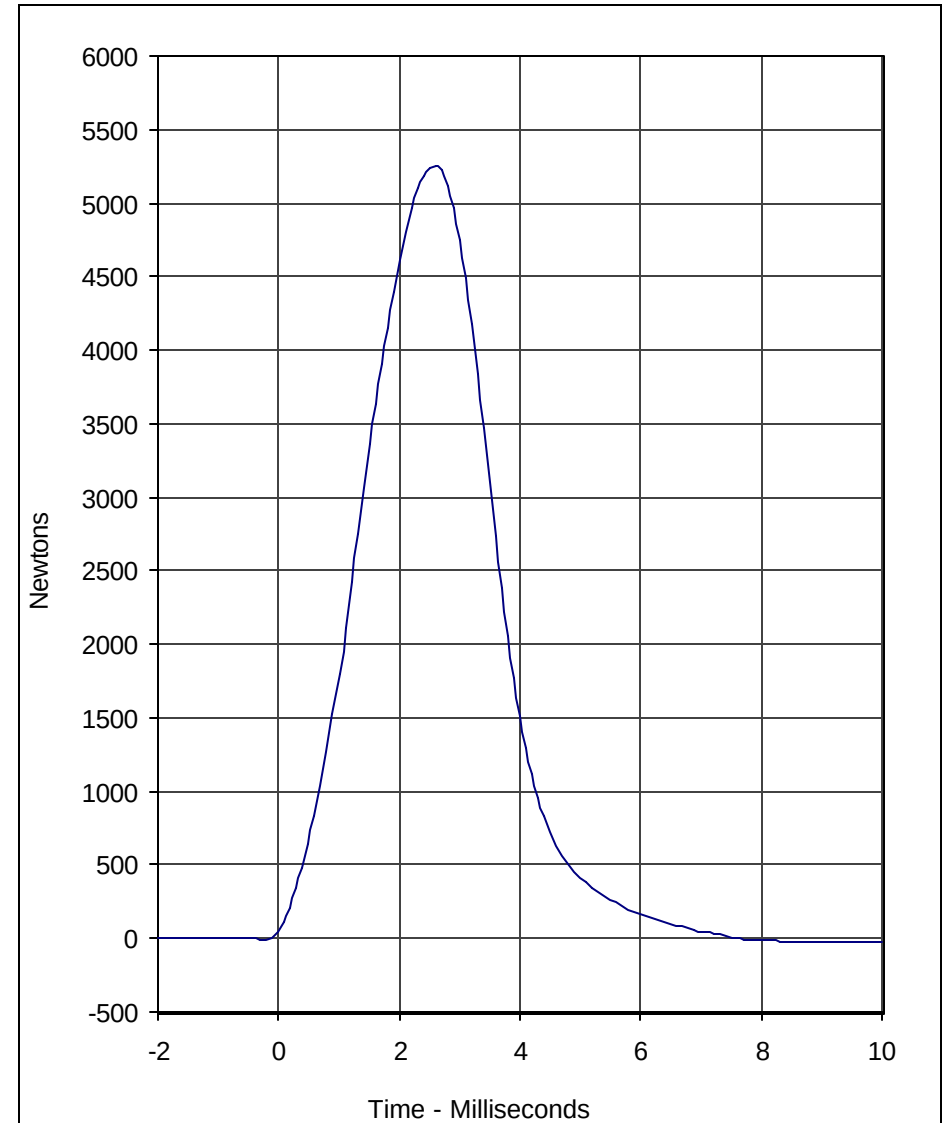
November 13, 2003  
Test Date





| Curve Description |        | Location  | Test I.D. | CURNO | Type      |
|-------------------|--------|-----------|-----------|-------|-----------|
| Probe Force       |        | Left Knee | LK08E     | 001   | FIL       |
| Units             | Max    | Time      | Min       | Time  | SAE Class |
| Newtons           | 5714.0 | 2.5       | -23.8     | 7.9   | 600       |

Test Program: Hybrid III 50th Percentile Male Knee Impact Test  
 Test Date: 11/13/03



| Curve Description |        | Location   | Test I.D. | CURNO | Type      |
|-------------------|--------|------------|-----------|-------|-----------|
| Probe Force       |        | Right Knee | RK08E     | 002   | FIL       |
| Units             | Max    | Time       | Min       | Time  | SAE Class |
| Newtons           | 5256.6 | 2.6        | -29.7     | 9.9   | 600       |

A.T.D. Serial No.: 034





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Head Drop Test

ATD Serial No.: 034

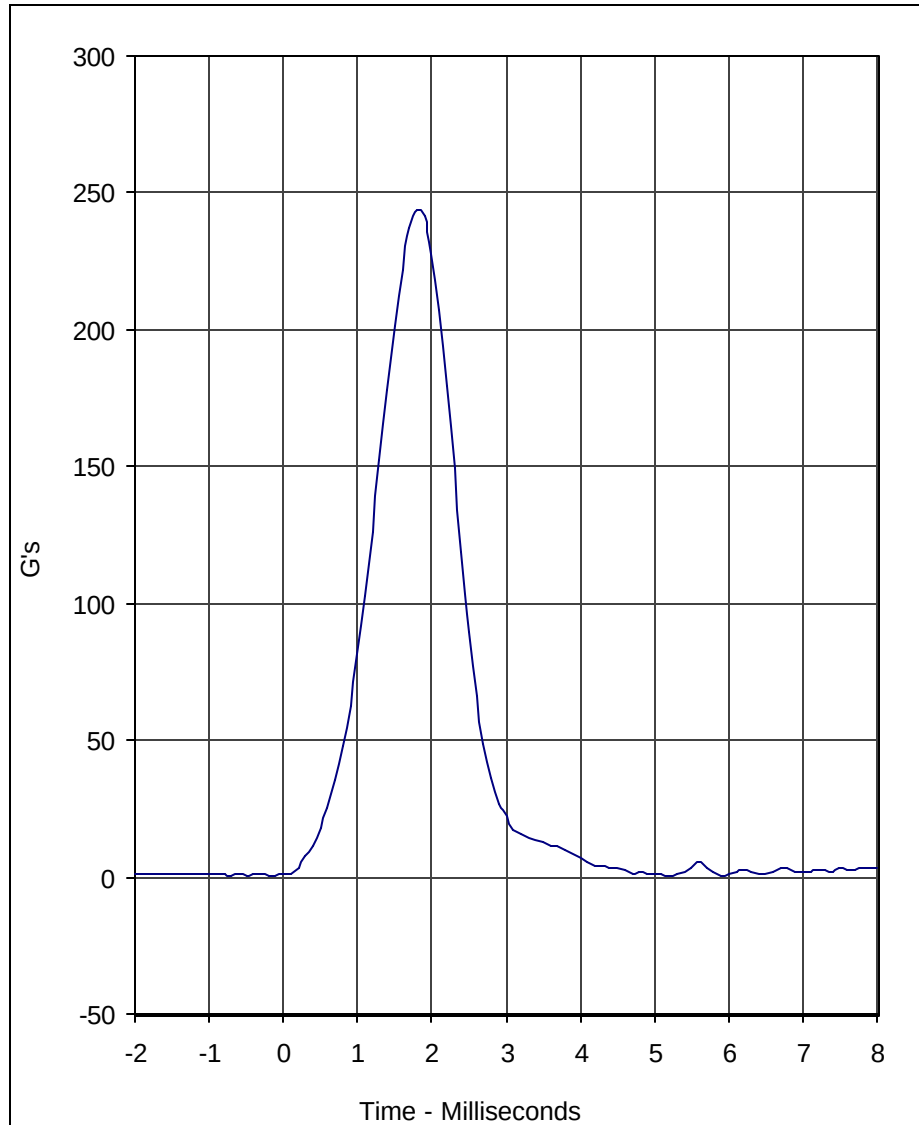
Test I.D.: HD11B

| Tested Parameter             | Units  | Specification  | Result | Pass/Fail |
|------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature       | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration  | G's    | 225.0 to 275.0 | 243.6  | Pass      |
| Peak Lateral Acceleration    | G's    | ≤15.0          | 7.4    | Pass      |
| Is Acceleration Unimodal?    | Yes/No | Yes            | Yes    | Pass      |
| Overall Test Results         |        |                |        | Pass      |

Laboratory Technician

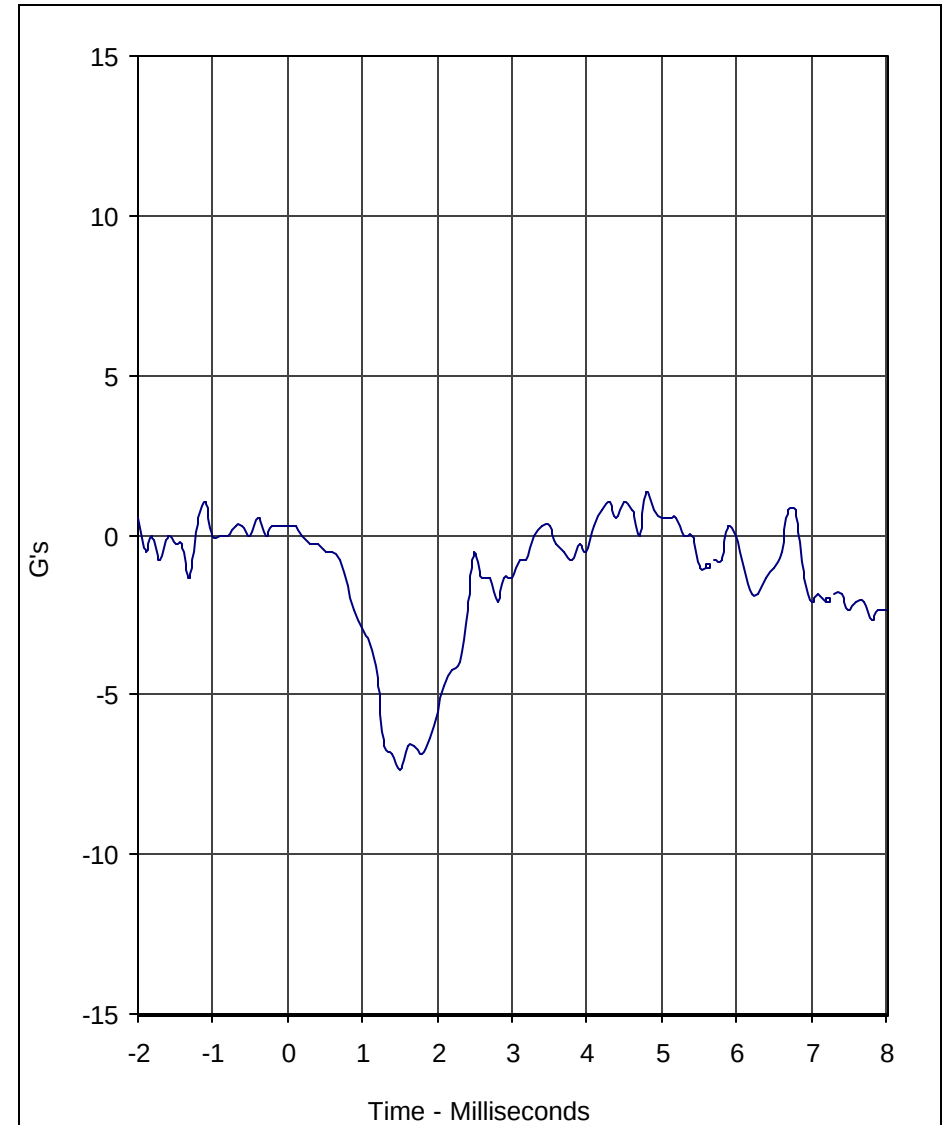
November 13, 2003

Test Date



|                   |       |      |     |       |           |
|-------------------|-------|------|-----|-------|-----------|
| Curve Description |       |      |     | CURNO | Type      |
| Head Resultant    |       |      |     | 001   | RES       |
| Units             | Max   | Time | Min | Time  | SAE Class |
| G's               | 243.6 | 1.8  | 0.5 | -0.7  | 1000      |

Test Program: Hybrid III 50th Percentile Male Head Drop Test  
 Test Date: 11/13/03



|                   |     |      |      |       |           |
|-------------------|-----|------|------|-------|-----------|
| Curve Description |     |      |      | CURNO | Type      |
| Head Y            |     |      |      | 002   | FIL       |
| Units             | Max | Time | Min  | Time  | SAE Class |
| G's               | 1.3 | 4.8  | -7.4 | 1.5   | 1000      |

A.T.D. Serial No.: 034  
 Test I.D.: HD11B





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Thorax Impact Test

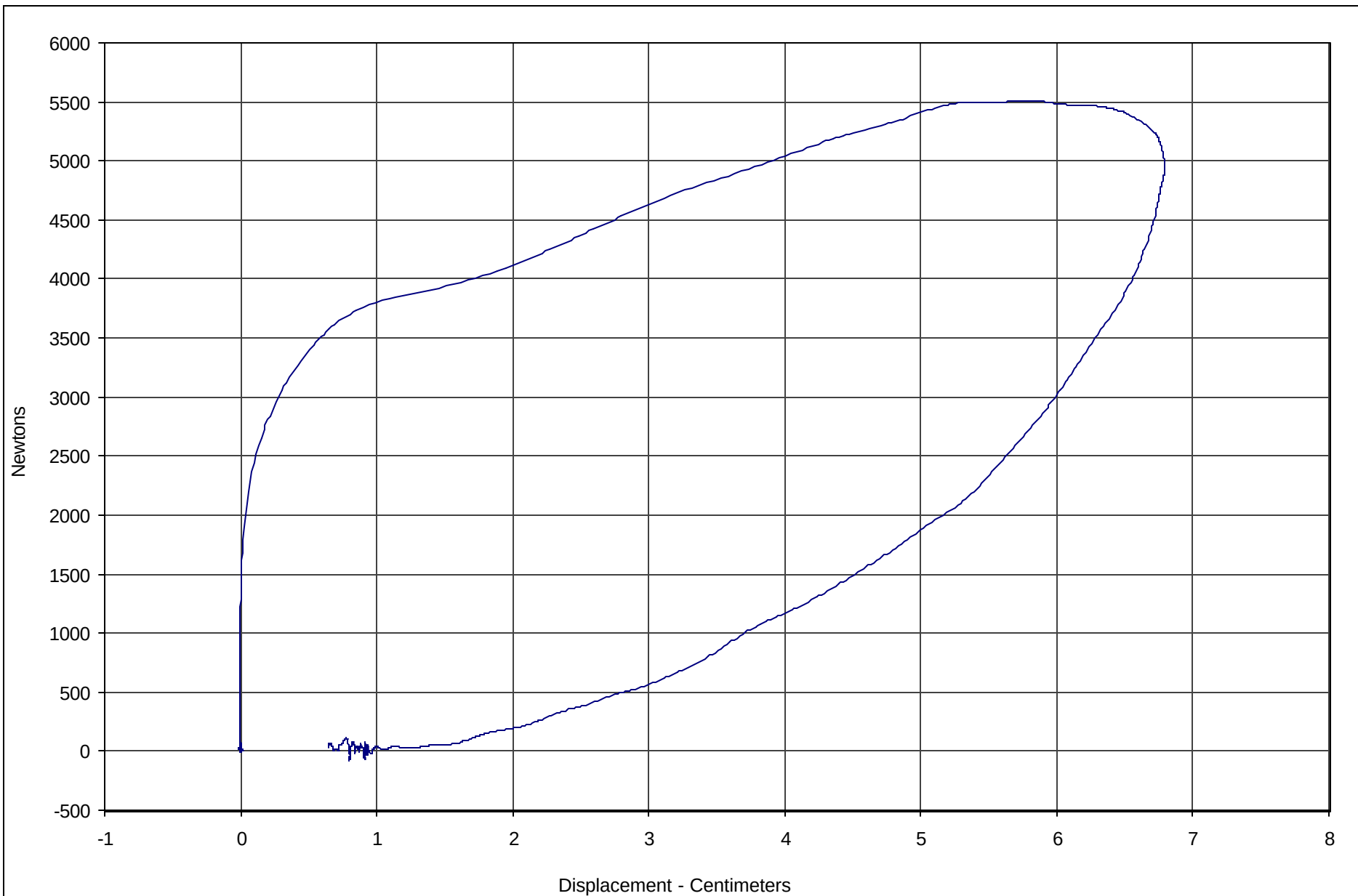
ATD Serial No.: 034

Test I.D.: CH10C

| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity               | m/s     | 6.58 to 6.82  | 6.64   | Pass      |
| Peak Probe Force             | Newtons | 5159 to 5893  | 5510   | Pass      |
| Peak Sternum Displacement    | CM      | 6.35 to 7.26  | 6.79   | Pass      |
| Internal Hysteresis          | %       | 69 to 85      | 73.9   | Pass      |
| Overall Test Results         |         |               |        | Pass      |

Laboratory Technician

November 14, 2003  
Test Date



| Curve Description                  | CURNO | Type | Hysteresis | Peak Chest Displ. | Peak Probe Force | SAE Class |
|------------------------------------|-------|------|------------|-------------------|------------------|-----------|
| Probe Force vs. Chest Displacement | 001   | FIL  | 73.9       | 6.79              | 5510.2           | 180       |



Test Program: Hybrid III 50th Percentile Male Thorax Impact

A.T.D. Serial No.: 034

Test Date: 11/14/03

Test I.D.: CH10C



# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Neck Flexion Test

ATD Serial No.: 034

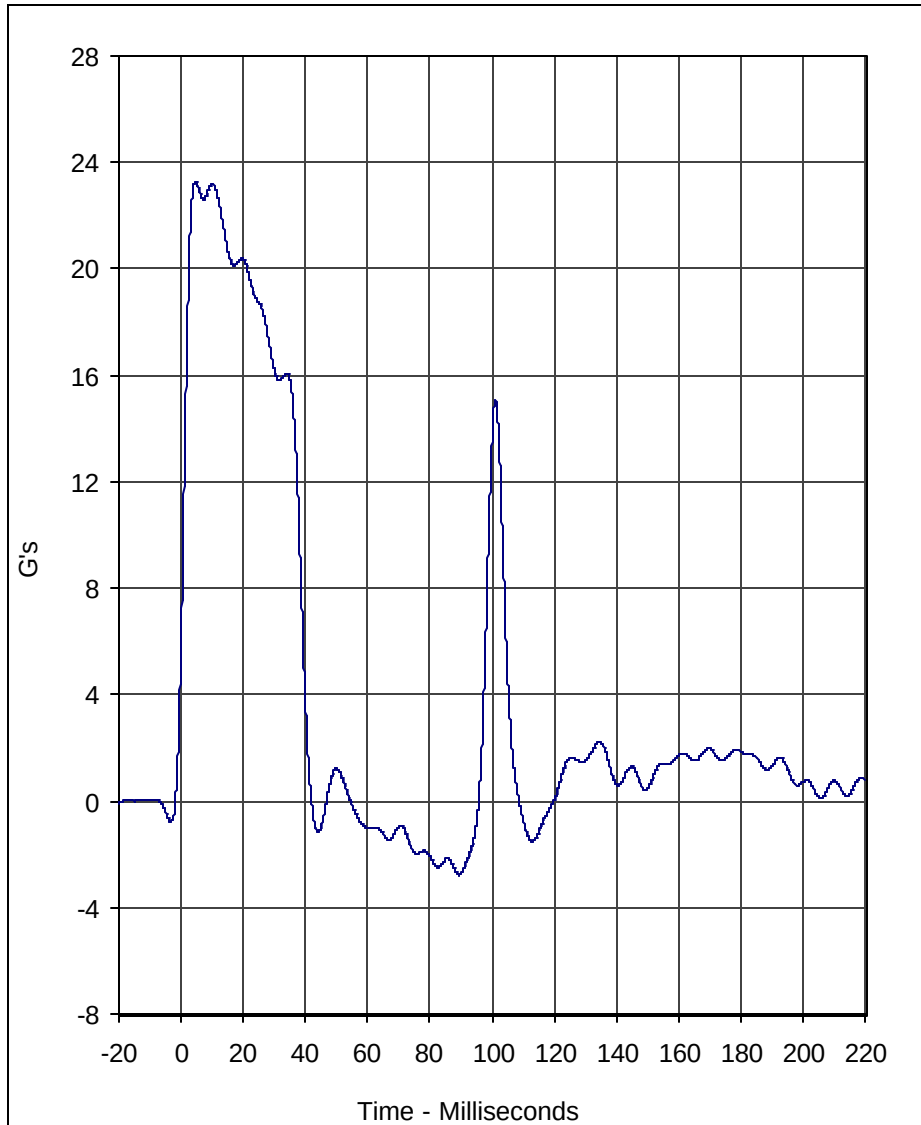
Test I.D.: NF11A

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 7.10   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 23.2   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 20.4   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 16.2   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 16.2   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 39.6   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 64.0 to 78.0   | 65.0   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 60.8   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 125.7  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | Nm      | 84.1 to 108.5  | 86.1   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 56.6   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 102.5  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

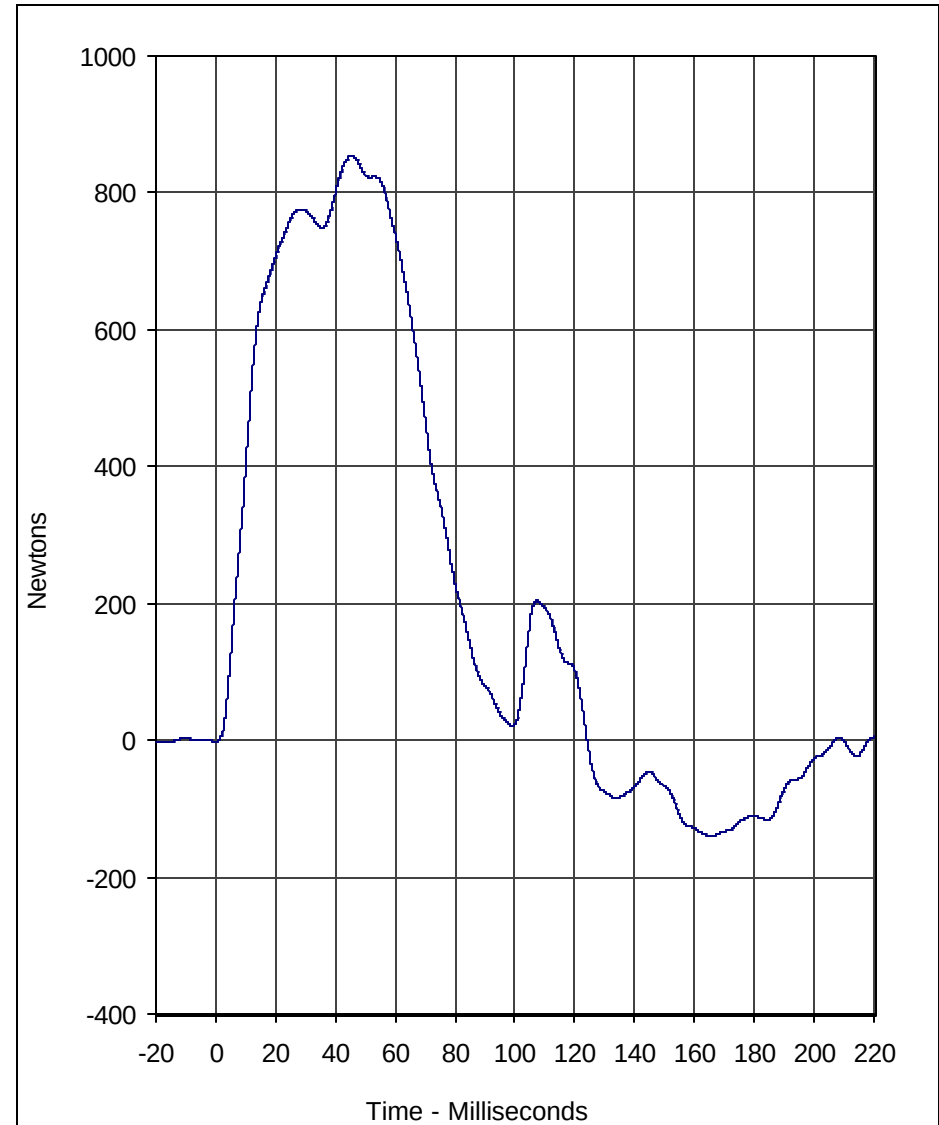
November 13, 2003  
\_\_\_\_\_  
Test Date





| Curve Description     |      |      |      | CURNO | Type      |
|-----------------------|------|------|------|-------|-----------|
| Pendulum Deceleration |      |      |      | 001   | FIL       |
| Units                 | Max  | Time | Min  | Time  | SAE Class |
| G's                   | 23.3 | 4.6  | -2.8 | 89.5  | 60        |

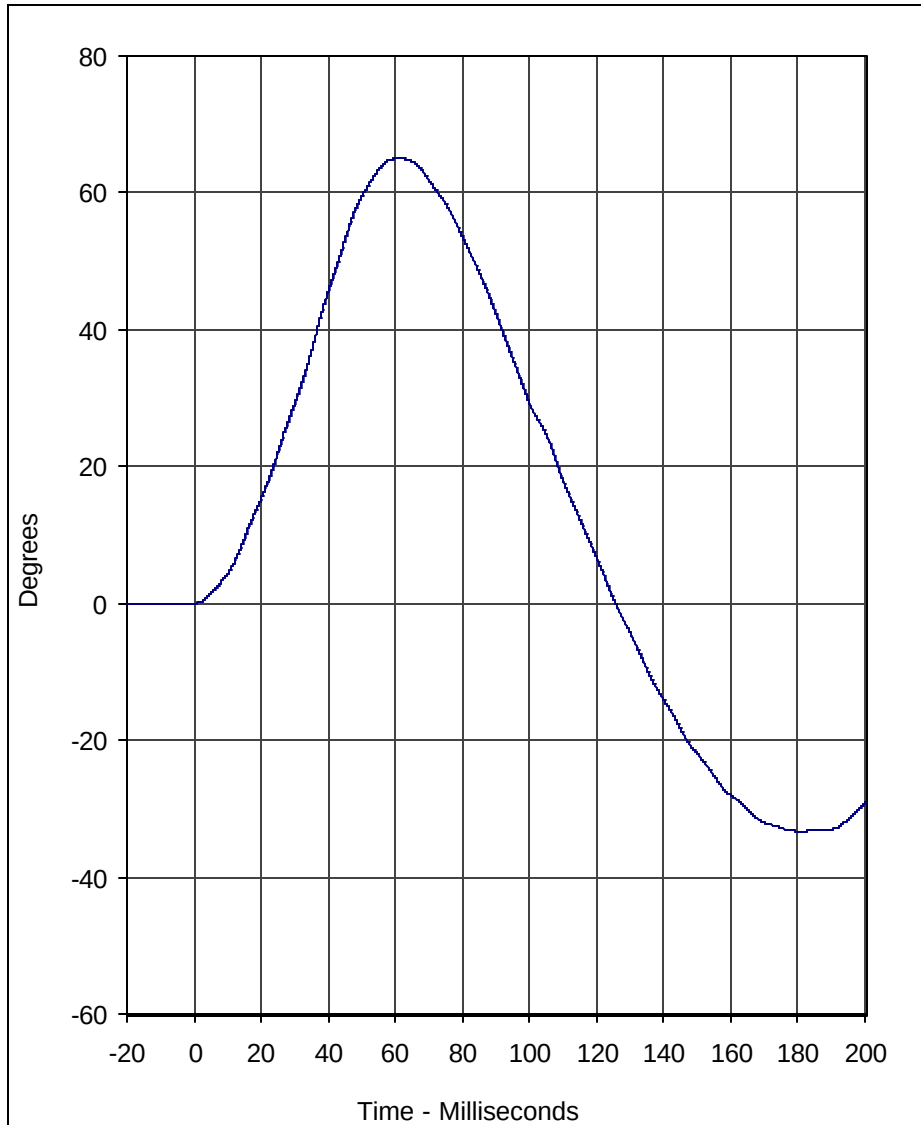
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 Test Date: 11/13/03



| Curve Description |       |      |        | CURNO | Type      |
|-------------------|-------|------|--------|-------|-----------|
| Neck Force X      |       |      |        | 002   | FIL       |
| Units             | Max   | Time | Min    | Time  | SAE Class |
| Newtons           | 854.8 | 45.6 | -140.6 | 165.5 | 60        |

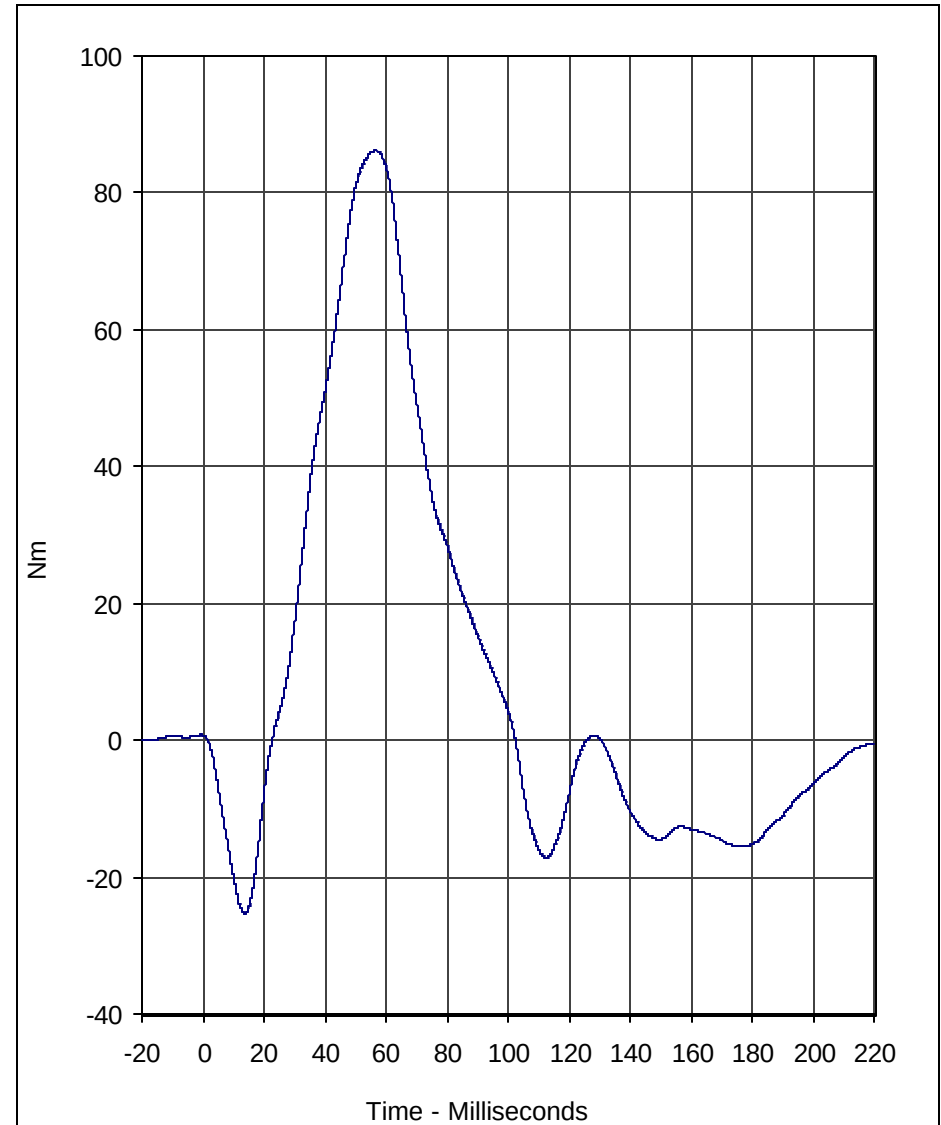
A.T.D. Serial No.: 034  
 Test I.D.: NF11A





| Curve Description  |      |      |       | CURNO | Type      |
|--------------------|------|------|-------|-------|-----------|
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 65.0 | 60.8 | -33.3 | 180.9 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 Test Date: 11/13/03



| Curve Description              |      |      |       | CURNO | Type      |
|--------------------------------|------|------|-------|-------|-----------|
| Moment About Occipital Condyle |      |      |       | 004   | FIL       |
| Units                          | Max  | Time | Min   | Time  | SAE Class |
| Nm                             | 86.1 | 56.6 | -25.3 | 13.7  | 60        |

A.T.D. Serial No.: 034  
 Test I.D.: NF11A





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Neck Extension Test

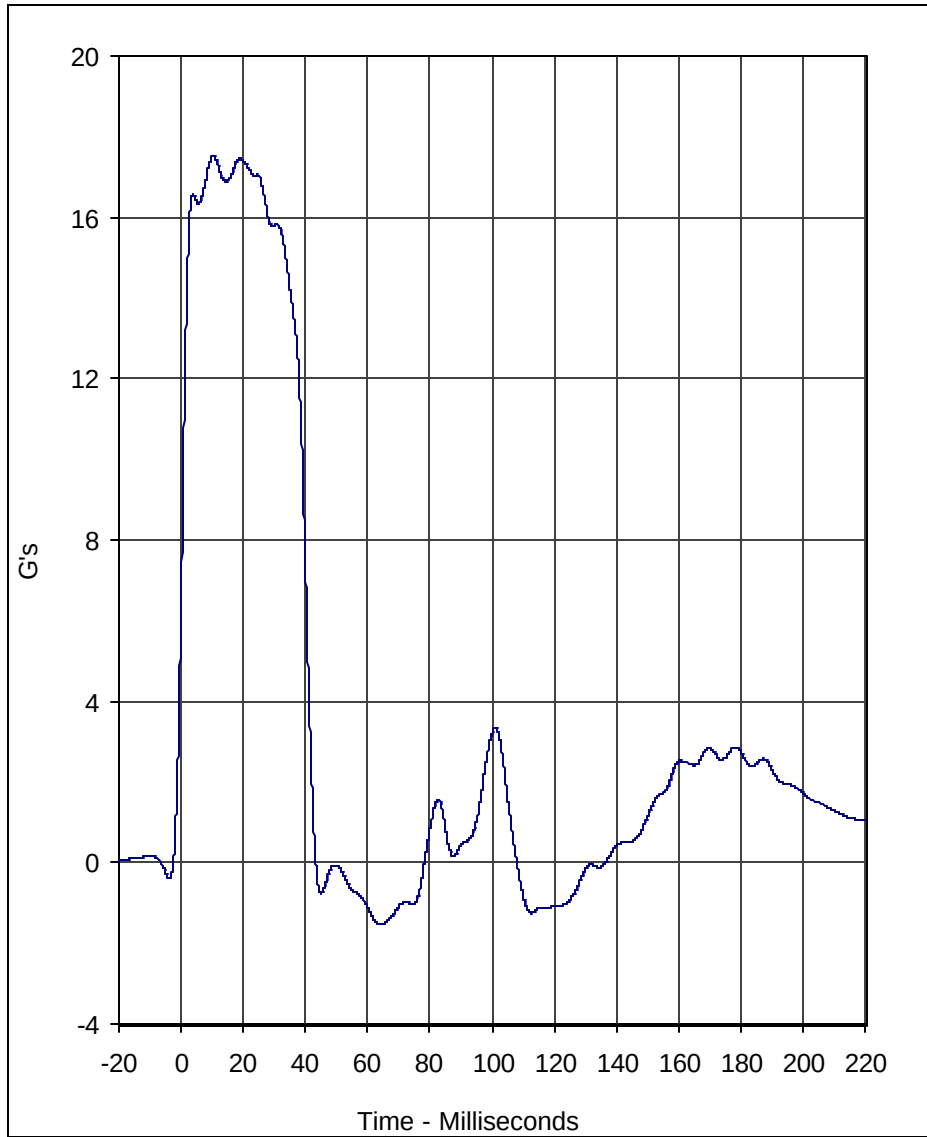
ATD Serial No.: 034

Test I.D.: NE11N

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.94 to 6.19   | 6.01   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 17.5   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 17.4   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 15.8   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 15.8   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 40.9   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 81.0 to 106.0  | 97.2   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 76.7   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 151.8  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | Nm      | -52.9 to- 79.9 | -69.0  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 68.7   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 138.0  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

Laboratory Technician

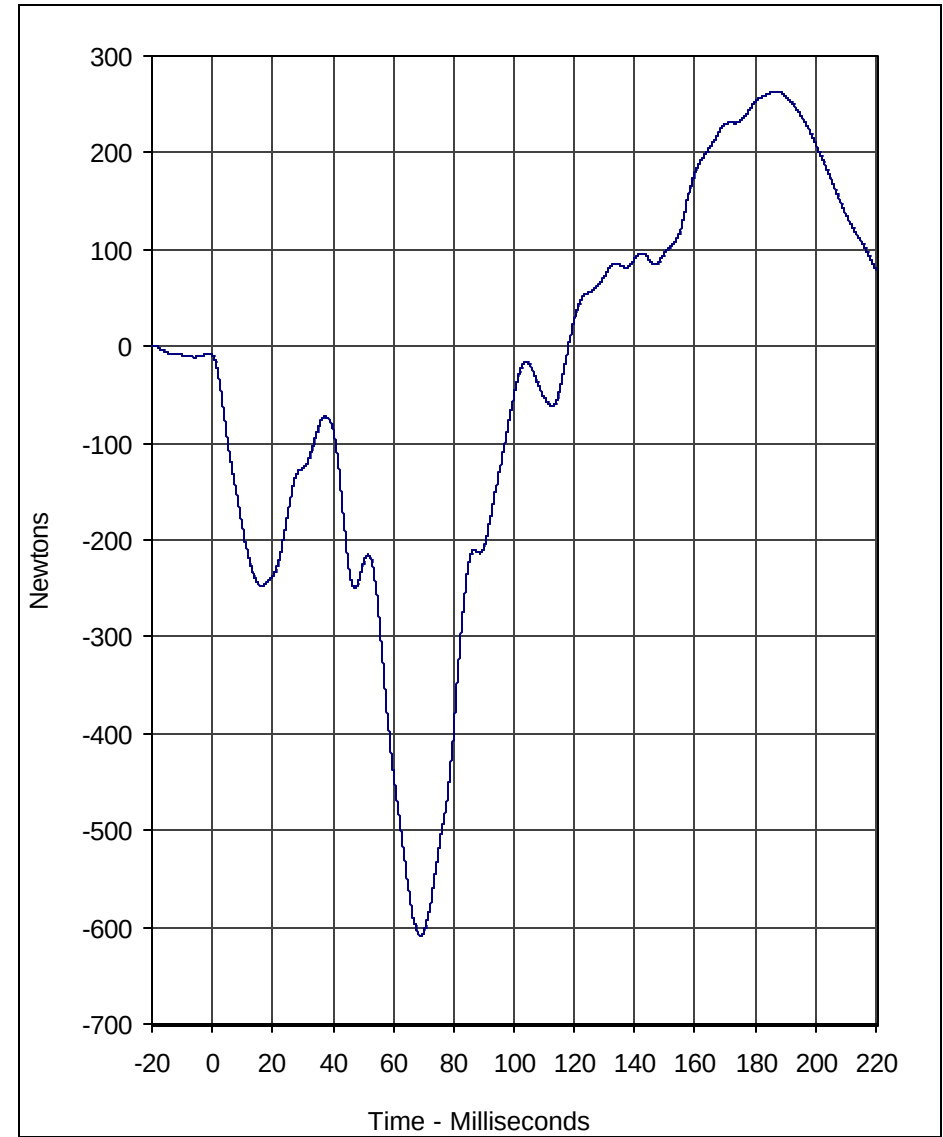
November 13, 2003  
Test Date



| Curve Description     |  |  |  | CURNO | Type |
|-----------------------|--|--|--|-------|------|
| Pendulum Deceleration |  |  |  | 001   | FIL  |

| Units | Max  | Time | Min  | Time | SAE Class |
|-------|------|------|------|------|-----------|
| G's   | 17.5 | 10.4 | -1.5 | 64.1 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Extension Test  
 Test Date: 11/13/03

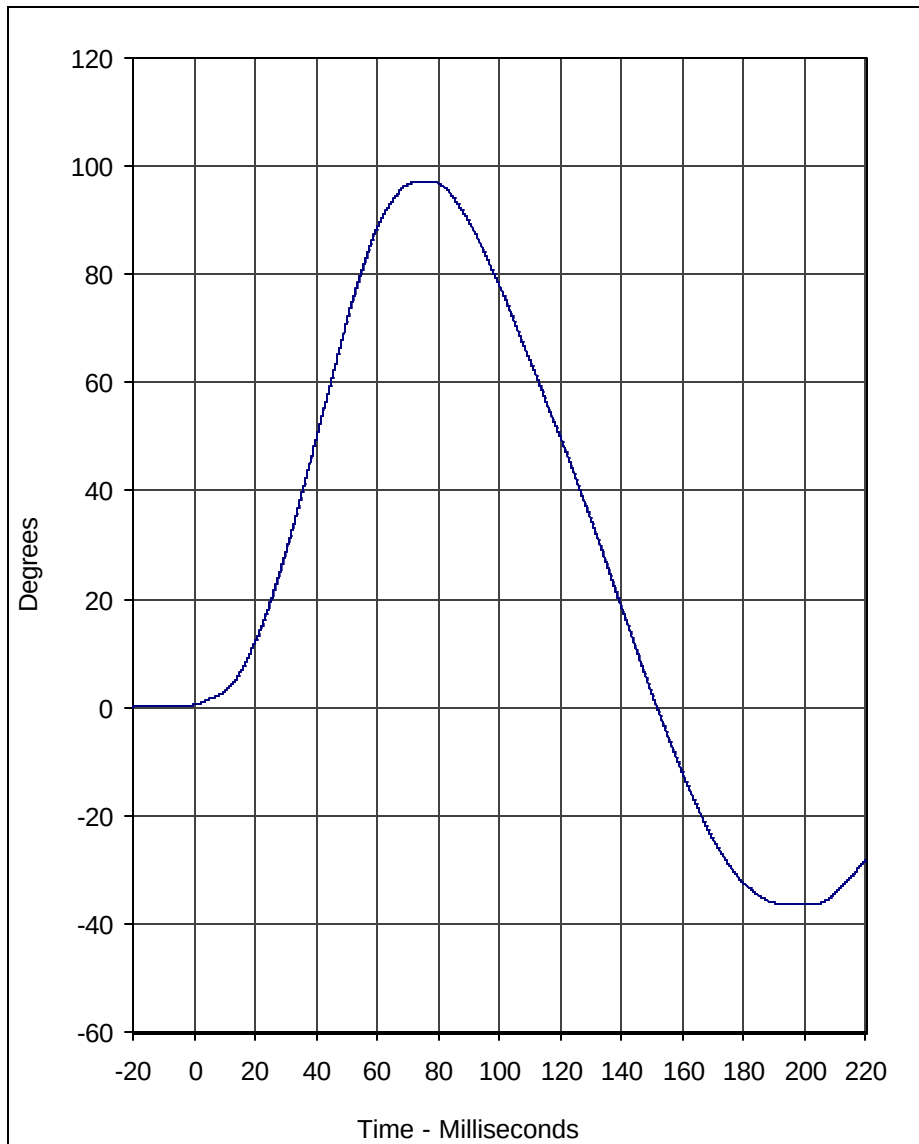


| Curve Description |  |  |  | CURNO | Type |
|-------------------|--|--|--|-------|------|
| Neck Force X      |  |  |  | 002   | FIL  |

| Units   | Max   | Time  | Min    | Time | SAE Class |
|---------|-------|-------|--------|------|-----------|
| Newtons | 263.7 | 186.9 | -608.9 | 69.1 | 60        |

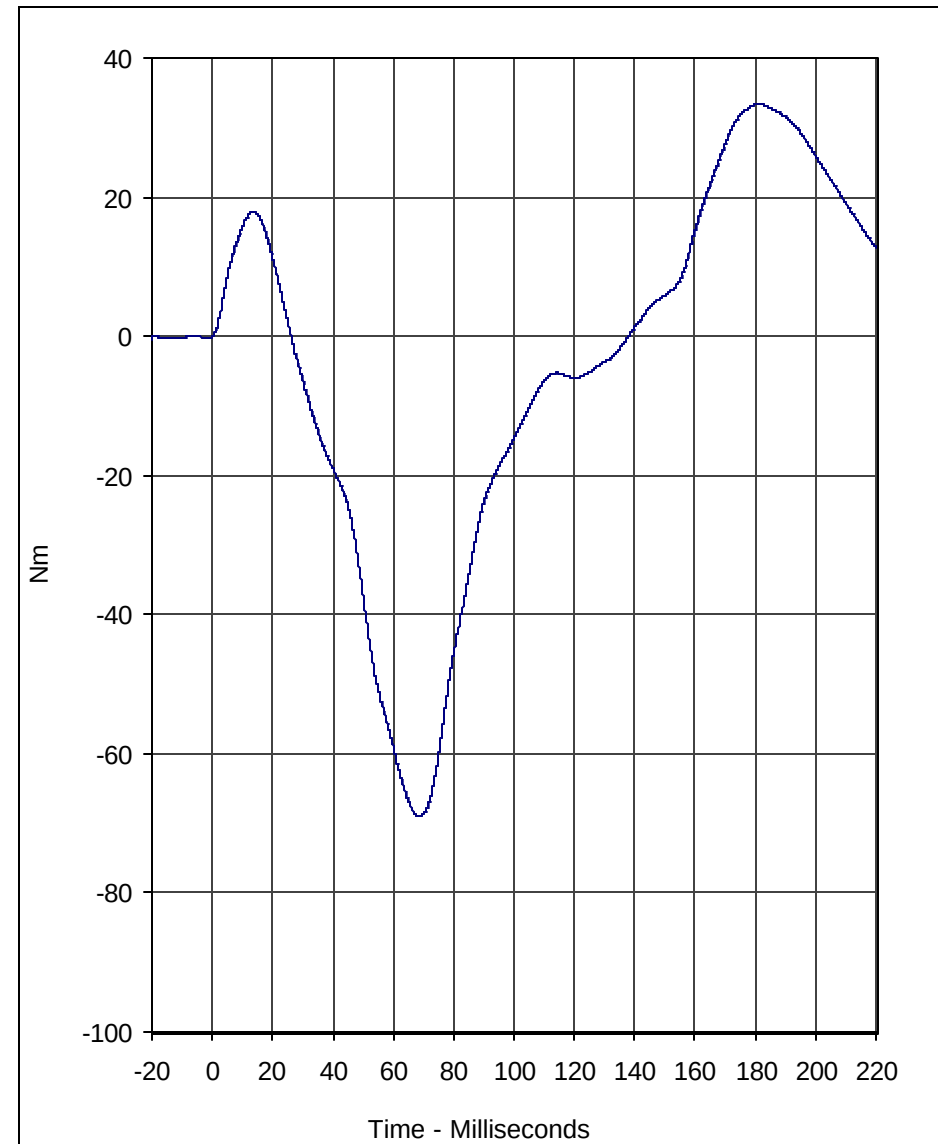
A.T.D. Serial No.: 034  
 Test I.D.: NE11N





|                    |      |      |       |       |           |
|--------------------|------|------|-------|-------|-----------|
| Curve Description  |      |      |       | CURNO | Type      |
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 97.2 | 76.7 | -36.5 | 201.5 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Extension Test  
 Test Date: 11/13/03



|                                |      |       |       |       |           |
|--------------------------------|------|-------|-------|-------|-----------|
| Curve Description              |      |       |       | CURNO | Type      |
| Moment About Occipital Condyle |      |       |       | 004   | FIL       |
| Units                          | Max  | Time  | Min   | Time  | SAE Class |
| Nm                             | 33.4 | 181.2 | -69.0 | 68.7  | 60        |

A.T.D. Serial No.: 034  
 Test I.D.: NE11N





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### External Measurements

ATD Serial No.: 034

| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
|---------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity          | %     | 10 to 70      | 30     | Pass      |
| A - Total sitting height              | mm    | 879 to 889    | 880    | Pass      |
| B - Shoulder pivot height             | mm    | 505 to 521    | 515    | Pass      |
| C - "H" point height                  | mm    | 84 to 89      | 85     | Pass      |
| D - "H" point from seat back          | mm    | 135 to 140    | 135    | Pass      |
| E - Shoulder pivot from back          | mm    | 84 to 94      | 90     | Pass      |
| F - Thigh clearance                   | mm    | 140 to 155    | 145    | Pass      |
| G - Elbow back to wrist pivot         | mm    | 290 to 305    | 295    | Pass      |
| H - Skull cap to back line            | mm    | 41 to 46      | 45     | Pass      |
| I - Shoulder to elbow length          | mm    | 330 to 345    | 335    | Pass      |
| J - Elbow rest height                 | mm    | 190 to 211    | 210    | Pass      |
| K - Buttock to knee length            | mm    | 579 to 604    | 600    | Pass      |
| L - Popliteal length                  | mm    | 429 to 455    | 435    | Pass      |
| M - Knee pivot height                 | mm    | 485 to 500    | 490    | Pass      |
| N - Buttock popliteal length          | mm    | 452 to 477    | 460    | Pass      |
| O - Chest depth                       | mm    | 213 to 229    | 220    | Pass      |
| P - Foot length                       | mm    | 251 to 267    | 260    | Pass      |
| V - Shoulder breadth                  | mm    | 422 to 437    | 425    | Pass      |
| W - Foot breadth                      | mm    | 91 to 107     | 100    | Pass      |
| Y - Chest circumference               | mm    | 970 to 1001   | 995    | Pass      |
| Z - Waist circumference               | mm    | 836 to 866    | 850    | Pass      |
| AA - Location for chest circumference | mm    | 429 to 434    | 430    | Pass      |
| BB - Location for waist circumference | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                  |       |               |        | Pass      |

Laboratory Technician

November 14, 2003

Test Date





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Knee Impact Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: LK08F

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.6  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.08   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5780   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

ATD Serial No.: 035

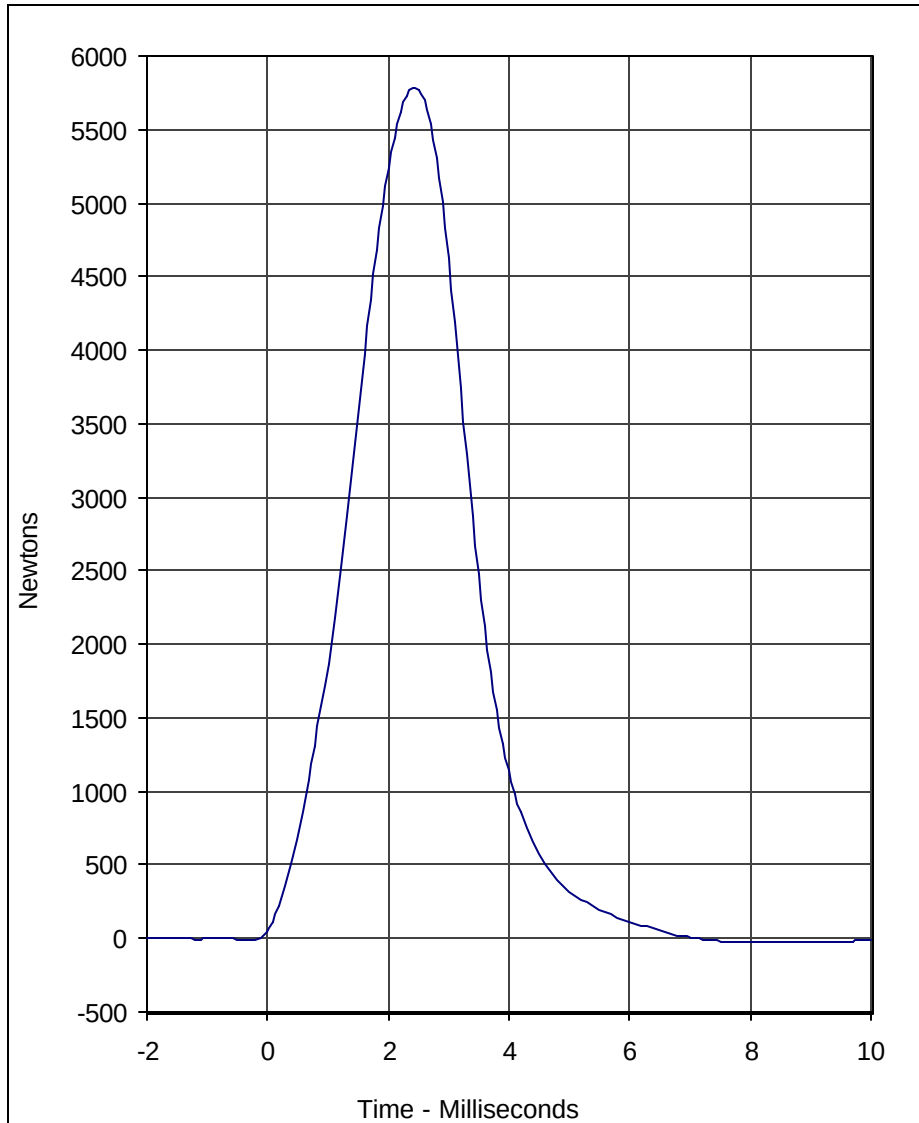
Location: Right Knee

Test I.D.: RK08F

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 18.9 to 25.6  | 21.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 30     | Pass      |
| Pendulum Velocity at T=0     | m/sec | 2.07 to 2.13  | 2.12   | Pass      |
| Peak Probe Force             | N     | 4715 to 5782  | 5474   | Pass      |
| Overall Test Results         |       |               |        | Pass      |

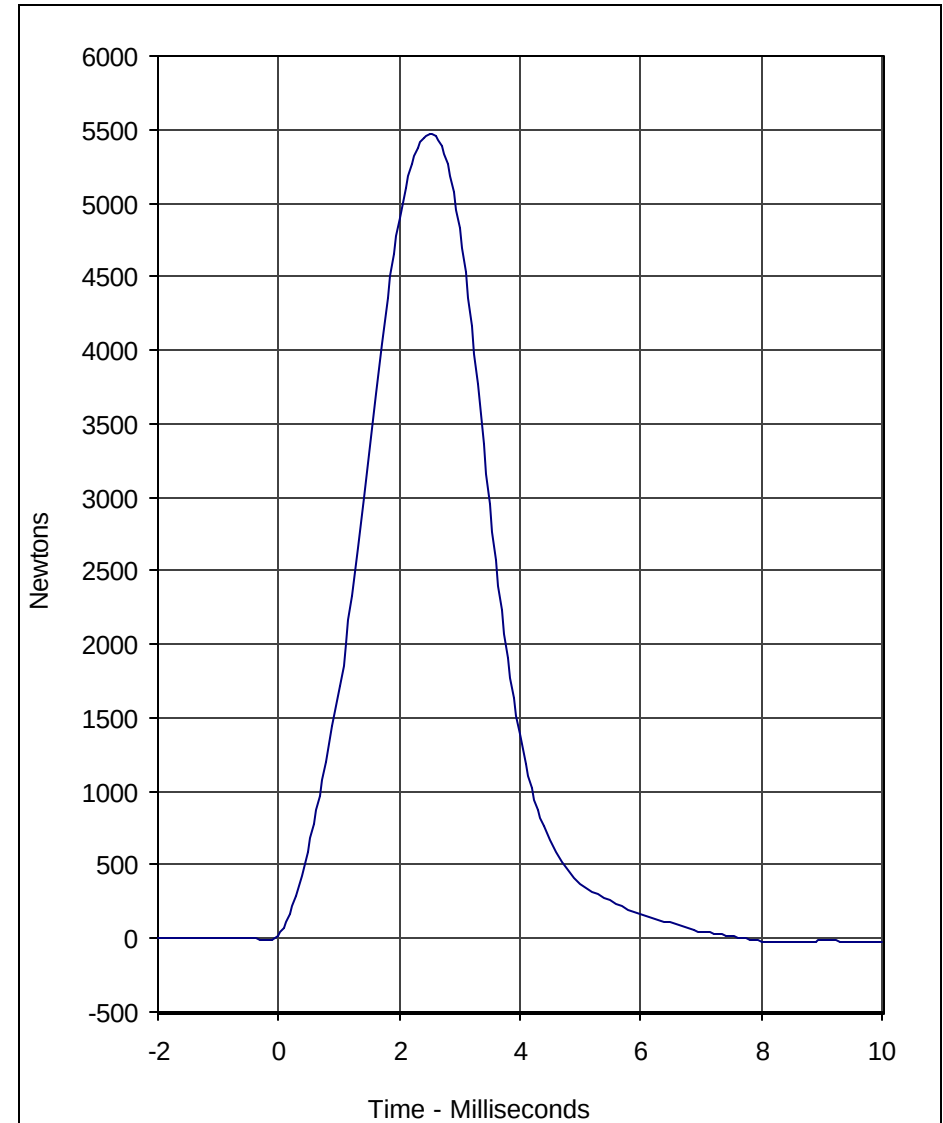
Laboratory Technician

November 13, 2003  
Test Date



|                   |        |           |           |       |           |
|-------------------|--------|-----------|-----------|-------|-----------|
| Curve Description |        | Location  | Test I.D. | CURNO | Type      |
| Probe Force       |        | Left Knee | LK08F     | 001   | FIL       |
| Units             | Max    | Time      | Min       | Time  | SAE Class |
| Newtons           | 5780.2 | 2.4       | -28.8     | 8.7   | 600       |

Test Program: Hybrid III 50th Percentile Male Knee Impact Test  
 Test Date: 11/13/03



|                   |        |            |           |       |           |
|-------------------|--------|------------|-----------|-------|-----------|
| Curve Description |        | Location   | Test I.D. | CURNO | Type      |
| Probe Force       |        | Right Knee | RK08F     | 002   | FIL       |
| Units             | Max    | Time       | Min       | Time  | SAE Class |
| Newtons           | 5474.3 | 2.5        | -24.7     | 9.6   | 600       |

A.T.D. Serial No.: 035





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Head Drop Test

ATD Serial No.: 035

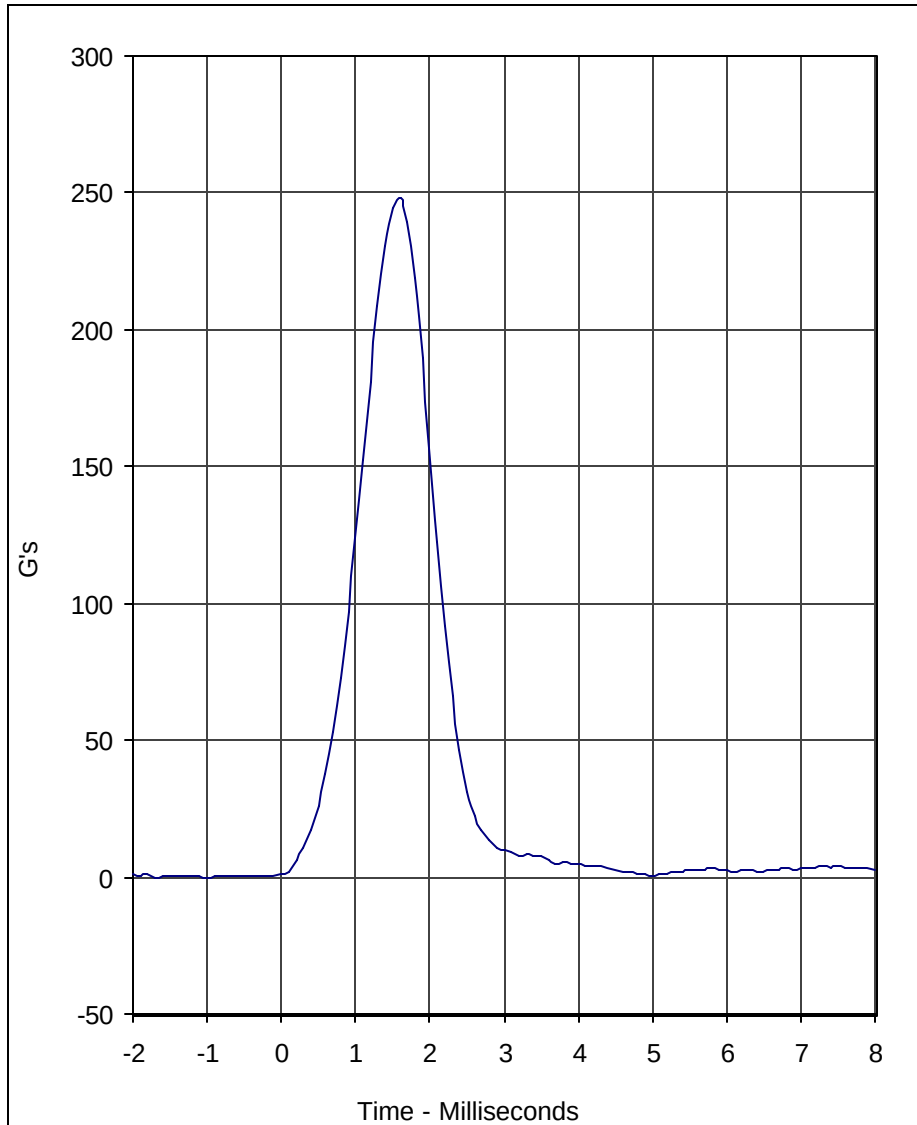
Test I.D.: HD11A

| Tested Parameter             | Units  | Specification  | Result | Pass/Fail |
|------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature       | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration  | G's    | 225.0 to 275.0 | 247.8  | Pass      |
| Peak Lateral Acceleration    | G's    | ≤15.0          | 12.2   | Pass      |
| Is Acceleration Unimodal?    | Yes/No | Yes            | Yes    | Pass      |
| Overall Test Results         |        |                |        | Pass      |

Laboratory Technician

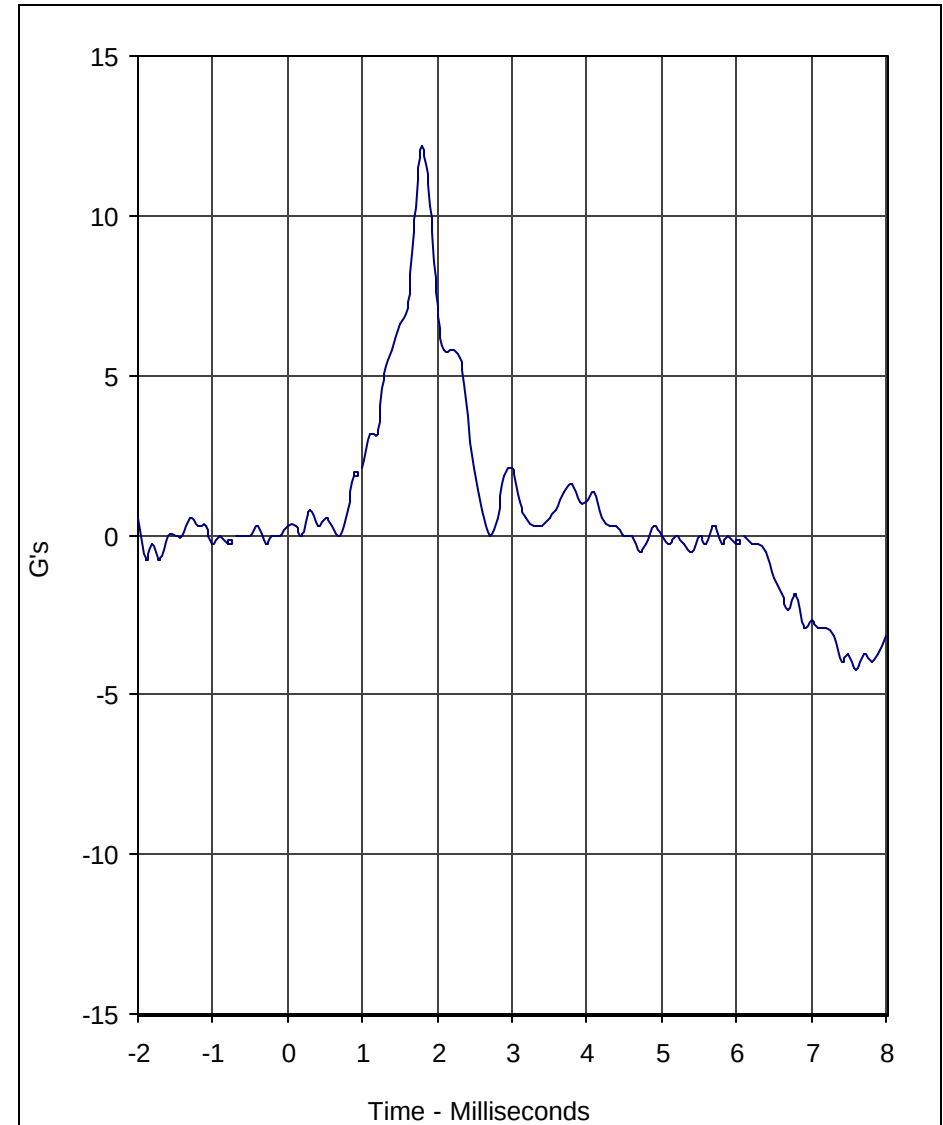
November 13, 2003

Test Date



| Curve Description |       |      |     | CURNO | Type      |
|-------------------|-------|------|-----|-------|-----------|
| Head Resultant    |       |      |     | 001   | RES       |
| Units             | Max   | Time | Min | Time  | SAE Class |
| G's               | 247.8 | 1.6  | 0.0 | -1.7  | 1000      |

Test Program: Hybrid III 50th Percentile Male Head Drop Test  
 Test Date: 11/13/03



| Curve Description |      |      |      | CURNO | Type      |
|-------------------|------|------|------|-------|-----------|
| Head Y            |      |      |      | 002   | FIL       |
| Units             | Max  | Time | Min  | Time  | SAE Class |
| G's               | 12.2 | 1.8  | -0.8 | -1.9  | 1000      |

A.T.D. Serial No.: 035  
 Test I.D.: HD11A





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Thorax Impact Test

ATD Serial No.: 035

Test I.D.: CH10D

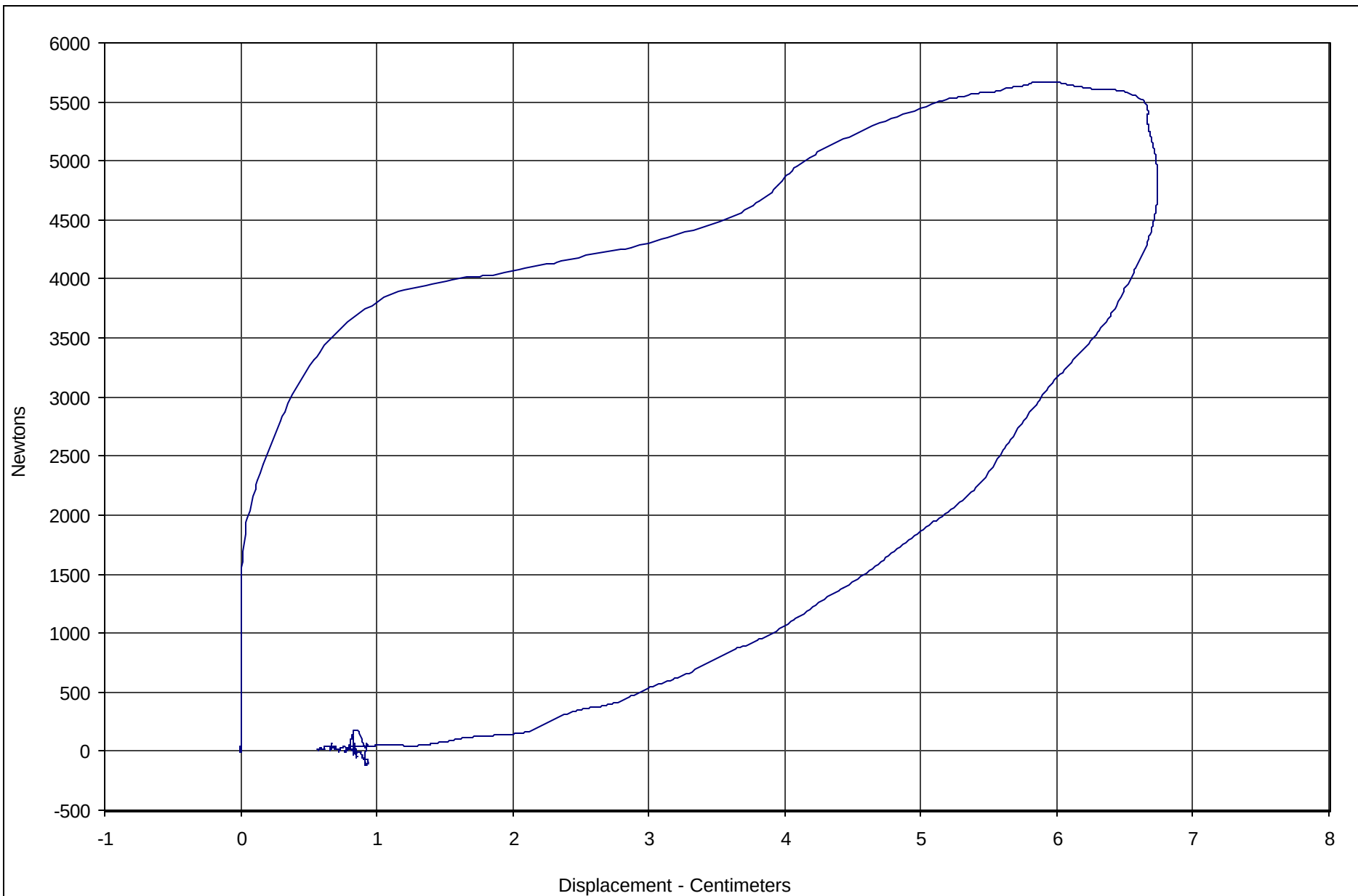
| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity               | m/s     | 6.58 to 6.82  | 6.64   | Pass      |
| Peak Probe Force             | Newtons | 5159 to 5893  | 5670   | Pass      |
| Peak Sternum Displacement    | CM      | 6.35 to 7.26  | 6.74   | Pass      |
| Internal Hysteresis          | %       | 69 to 85      | 74.3   | Pass      |
| Overall Test Results         |         |               |        | Pass      |

E-18

TR-P23001-23-NC

\_\_\_\_\_  
Laboratory Technician

November 14, 2003  
\_\_\_\_\_  
Test Date



| Curve Description                  | CURNO | Type | Hysteresis | Peak Chest Displ. | Peak Probe Force | SAE Class |
|------------------------------------|-------|------|------------|-------------------|------------------|-----------|
| Probe Force vs. Chest Displacement | 001   | FIL  | 74.3       | 6.74              | 5670.4           | 180       |



Test Program: Hybrid III 50th Percentile Male Thorax Impact

A.T.D. Serial No.: 035

Test Date: 11/14/03

Test I.D.: CH10D





# Calibration Data Sheet Hybrid III 50th Percentile Male Neck Flexion Test

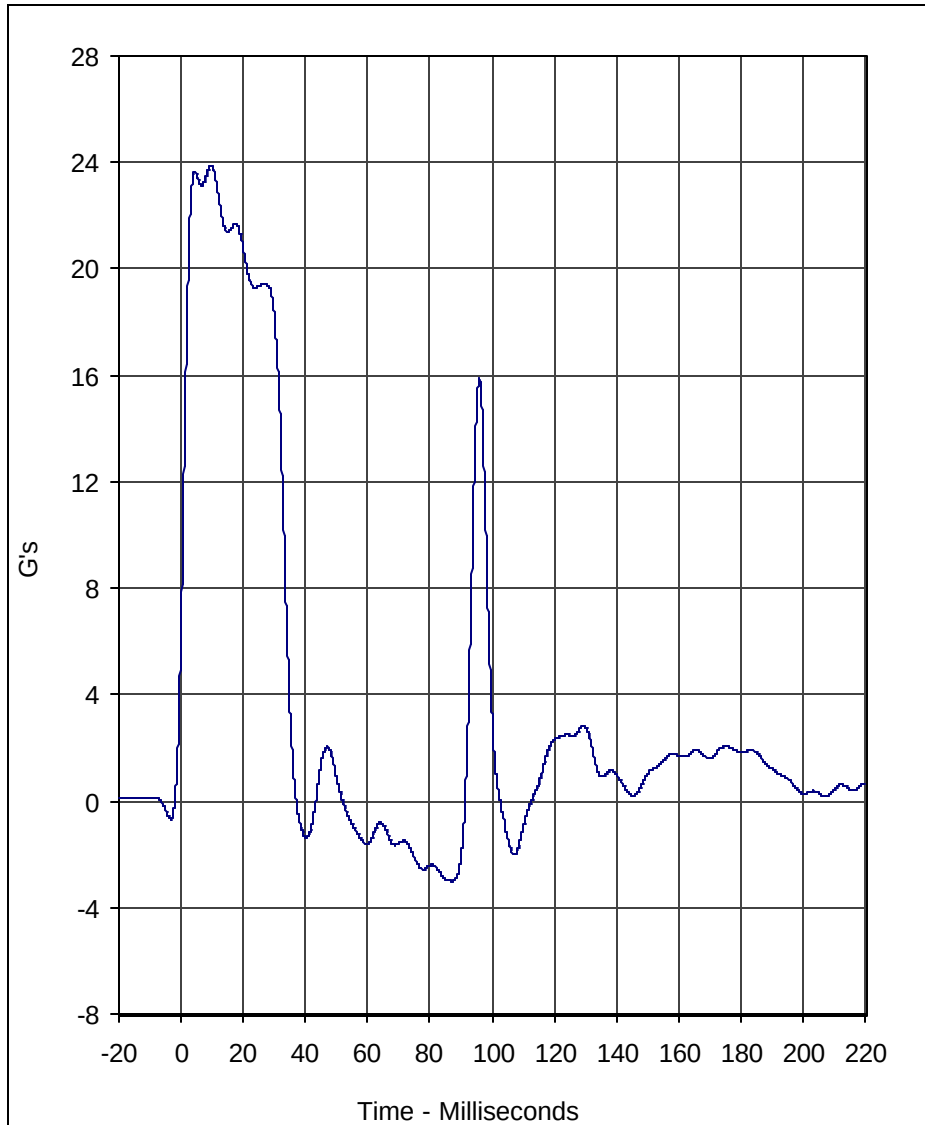
ATD Serial No.: 035

Test I.D.: NF11B

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 7.10   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 23.8   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 20.8   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 18.2   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 18.2   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 34.5   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 64.0 to 78.0   | 66.8   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 59.2   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 113.1  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | Nm      | 84.1 to 108.5  | 91.2   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 47.1   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 97.2   | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

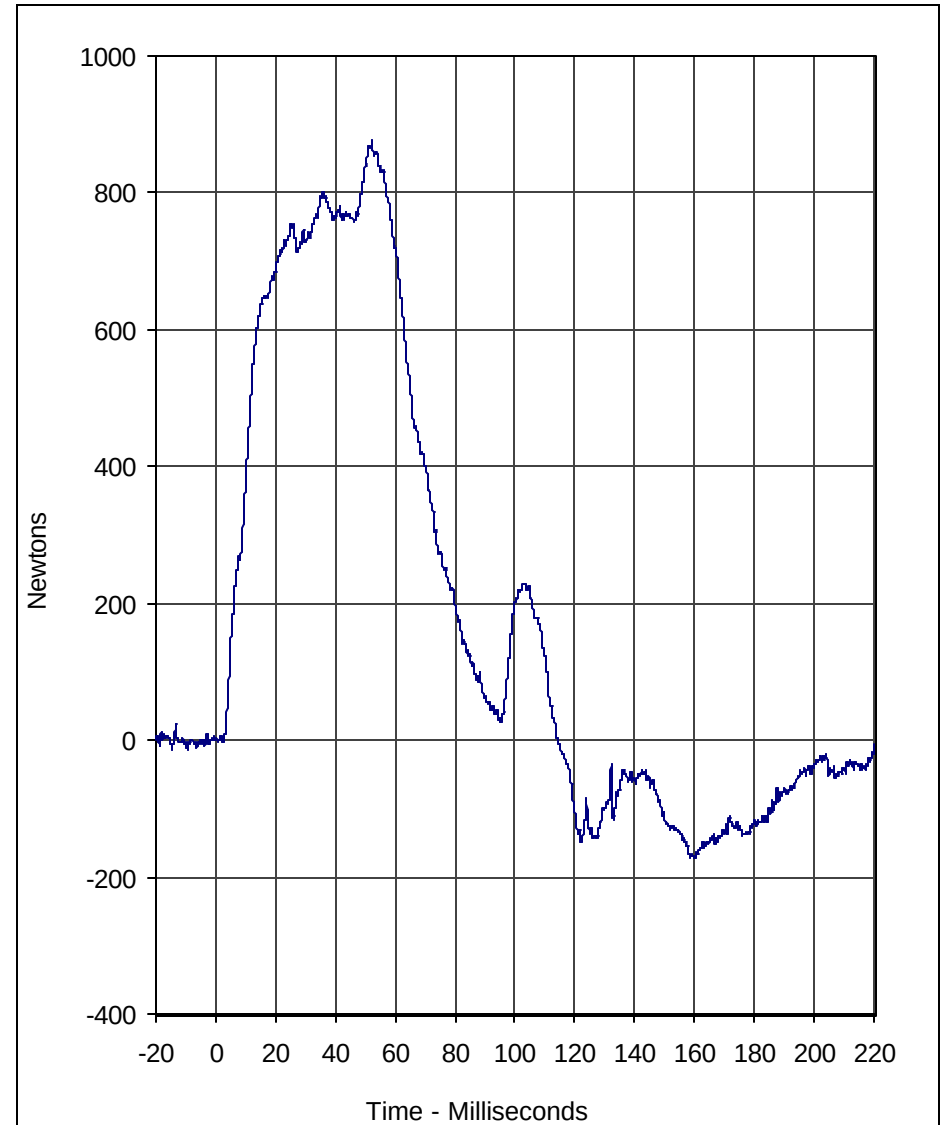
Laboratory Technician

November 13, 2003  
Test Date



| Curve Description     |      |      |      | CURNO | Type      |
|-----------------------|------|------|------|-------|-----------|
| Pendulum Deceleration |      |      |      | 001   | FIL       |
| Units                 | Max  | Time | Min  | Time  | SAE Class |
| G's                   | 23.9 | 9.6  | -3.0 | 87.2  | 60        |

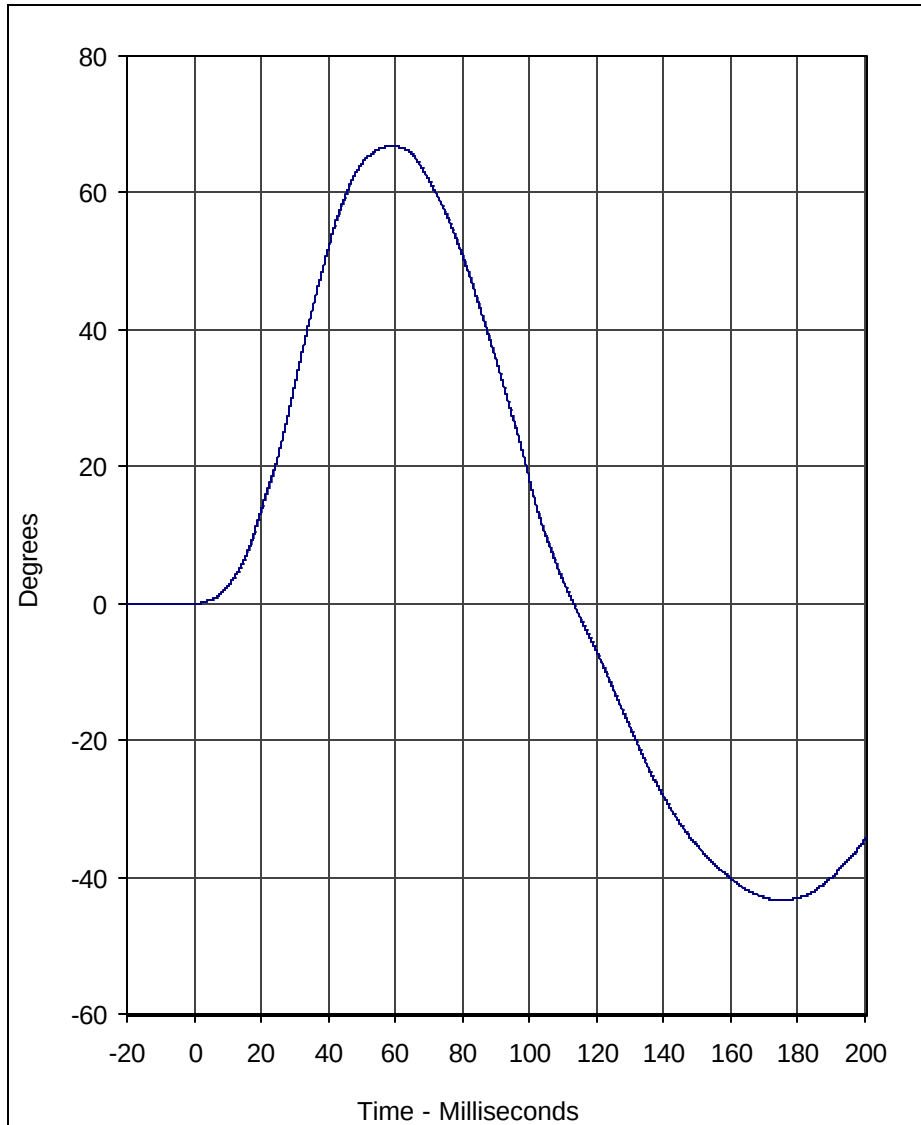
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 Test Date: 11/13/03



| Curve Description |       |      |        | CURNO | Type      |
|-------------------|-------|------|--------|-------|-----------|
| Neck Force X      |       |      |        | 002   | FIL       |
| Units             | Max   | Time | Min    | Time  | SAE Class |
| Newtons           | 876.0 | 52.2 | -171.9 | 160.2 | 600       |

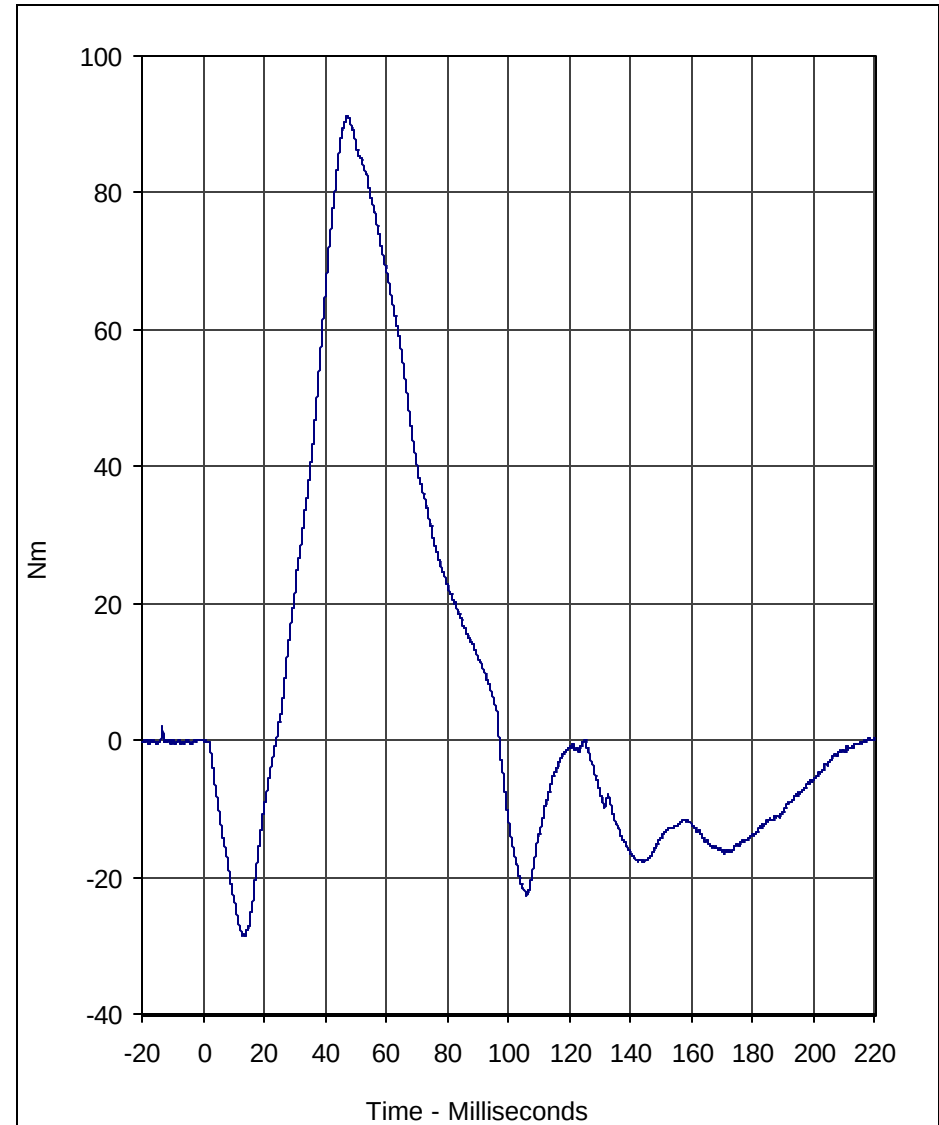
A.T.D. Serial No.: 035  
 Test I.D.: NF11B





| Curve Description  |      |      |       | CURNO | Type      |
|--------------------|------|------|-------|-------|-----------|
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 66.8 | 59.2 | -43.3 | 174.1 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 Test Date: 11/13/03



| Curve Description              |      |      |       | CURNO | Type      |
|--------------------------------|------|------|-------|-------|-----------|
| Moment About Occipital Condyle |      |      |       | 004   | FIL       |
| Units                          | Max  | Time | Min   | Time  | SAE Class |
| Nm                             | 91.2 | 47.1 | -28.5 | 13.0  | 600       |

A.T.D. Serial No.: 035  
 Test I.D.: NF11B





# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### Neck Extension Test

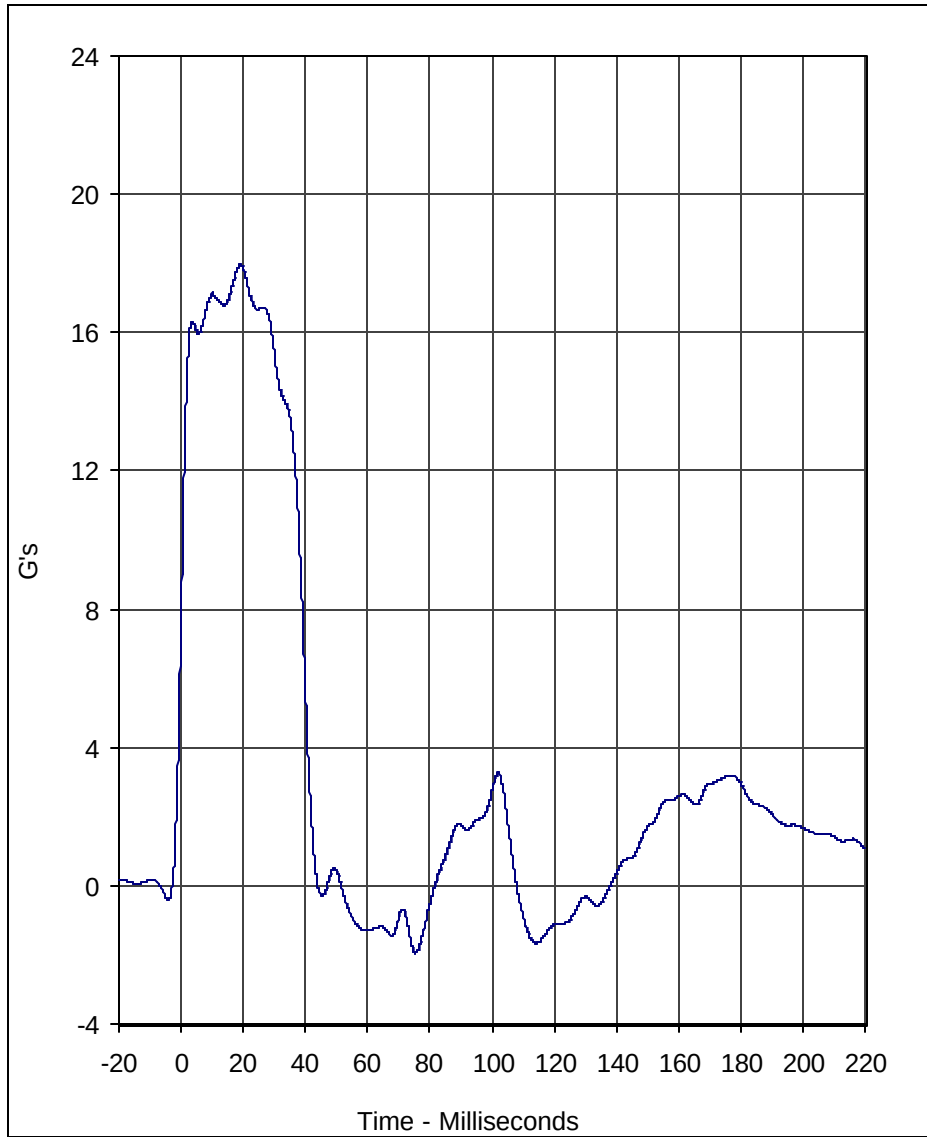
ATD Serial No.: 035

Test I.D.: NE08F

| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature                          |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity                    |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.94 to 6.19   | 6.01   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 17.2   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 17.9   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 15.4   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 15.4   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 40.3   | Pass      |
| Maximum "D" Plane Rotation                      | Maximum  | Degrees | 81.0 to 106.0  | 94.9   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 79.3   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 151.3  | Pass      |
| Moment About Occipital Condyle                  | Maximum  | Nm      | -52.9 to- 79.9 | -75.5  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 68.4   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 135.9  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |

\_\_\_\_\_  
Laboratory Technician

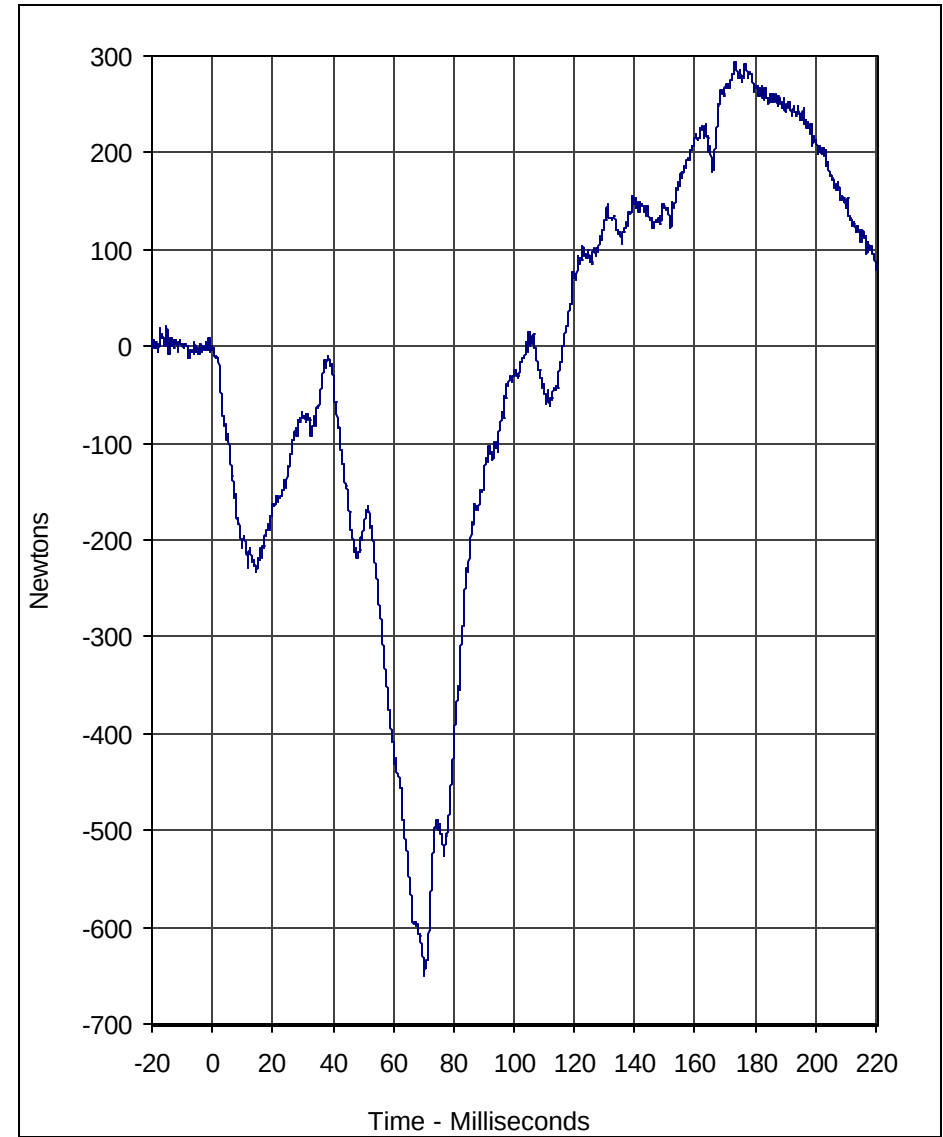
November 13, 2003  
\_\_\_\_\_  
Test Date



| Curve Description     |  |  |  | CURNO | Type |
|-----------------------|--|--|--|-------|------|
| Pendulum Deceleration |  |  |  | 001   | FIL  |

| Units | Max  | Time | Min  | Time | SAE Class |
|-------|------|------|------|------|-----------|
| G's   | 18.0 | 19.1 | -2.0 | 75.4 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Extension Test  
 Test Date: 11/13/03

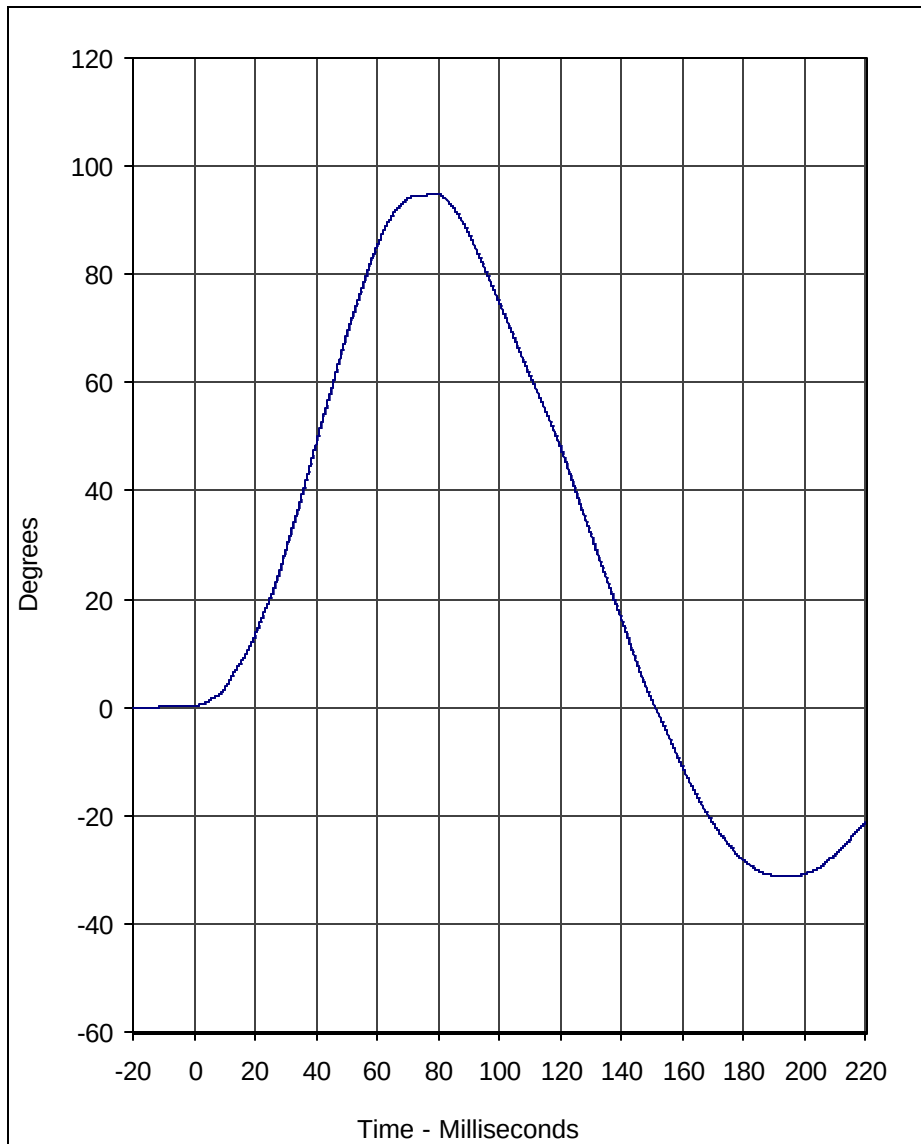


| Curve Description |  |  |  | CURNO | Type |
|-------------------|--|--|--|-------|------|
| Neck Force X      |  |  |  | 002   | FIL  |

| Units   | Max   | Time  | Min    | Time | SAE Class |
|---------|-------|-------|--------|------|-----------|
| Newtons | 293.3 | 173.4 | -650.1 | 70.3 | 600       |

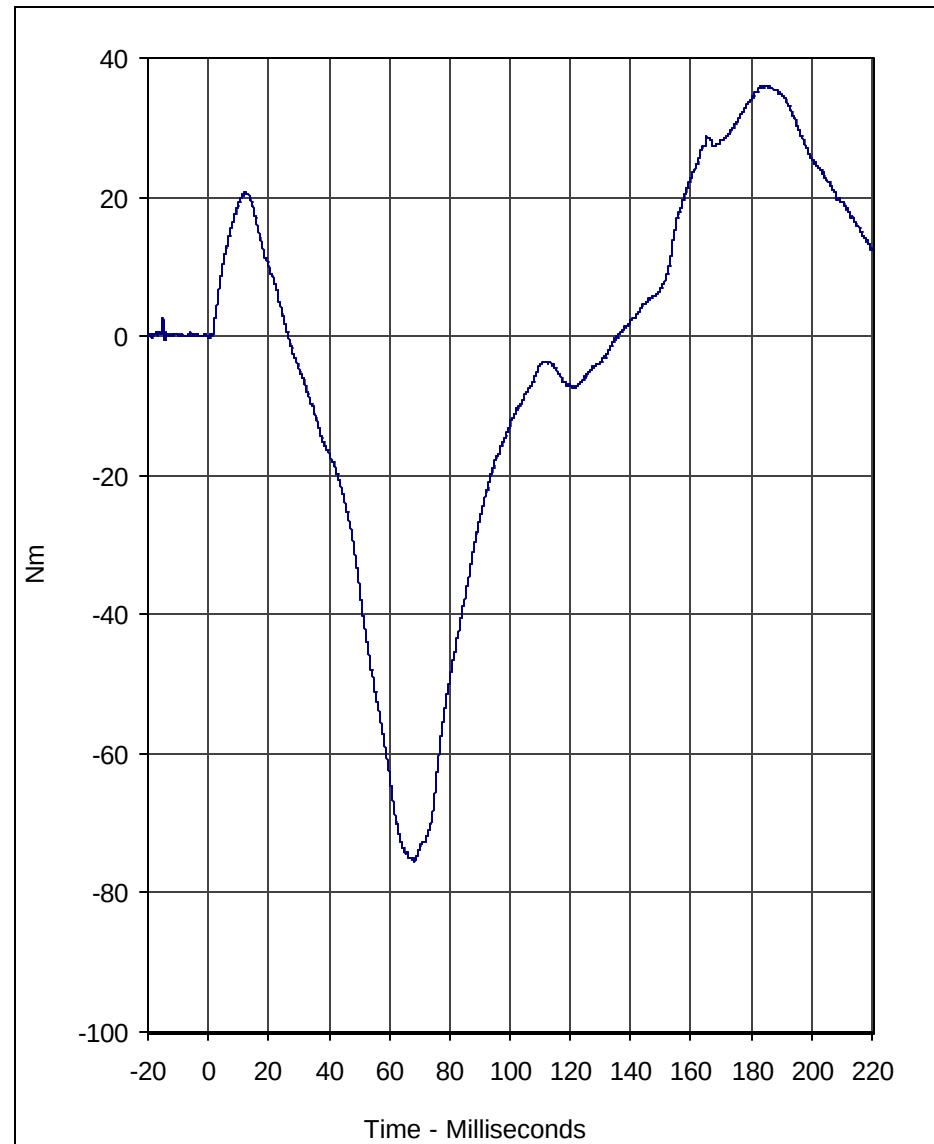
A.T.D. Serial No.: 035  
 Test I.D.: NE08F





|                    |      |      |       |       |           |
|--------------------|------|------|-------|-------|-----------|
| Curve Description  |      |      |       | CURNO | Type      |
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 94.9 | 79.3 | -31.3 | 194.0 | 60        |

Test Program: Hybrid III 50th Percentile Male Neck Extension Test  
 Test Date: 11/13/03



|                                |      |       |       |       |           |
|--------------------------------|------|-------|-------|-------|-----------|
| Curve Description              |      |       |       | CURNO | Type      |
| Moment About Occipital Condyle |      |       |       | 004   | FIL       |
| Units                          | Max  | Time  | Min   | Time  | SAE Class |
| Nm                             | 36.1 | 184.8 | -75.5 | 68.4  | 600       |

A.T.D. Serial No.: 035  
 Test I.D.: NE08F







# Calibration Data Sheet

## Hybrid III 50th Percentile Male

### External Measurements

ATD Serial No.: 035

| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
|---------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity          | %     | 10 to 70      | 30     | Pass      |
| A - Total sitting height              | mm    | 879 to 889    | 880    | Pass      |
| B - Shoulder pivot height             | mm    | 505 to 521    | 515    | Pass      |
| C - "H" point height                  | mm    | 84 to 89      | 85     | Pass      |
| D - "H" point from seat back          | mm    | 135 to 140    | 135    | Pass      |
| E - Shoulder pivot from back          | mm    | 84 to 94      | 90     | Pass      |
| F - Thigh clearance                   | mm    | 140 to 155    | 150    | Pass      |
| G - Elbow back to wrist pivot         | mm    | 290 to 305    | 300    | Pass      |
| H - Skull cap to back line            | mm    | 41 to 46      | 45     | Pass      |
| I - Shoulder to elbow length          | mm    | 330 to 345    | 340    | Pass      |
| J - Elbow rest height                 | mm    | 190 to 211    | 200    | Pass      |
| K - Buttock to knee length            | mm    | 579 to 604    | 600    | Pass      |
| L - Popliteal length                  | mm    | 429 to 455    | 450    | Pass      |
| M - Knee pivot height                 | mm    | 485 to 500    | 490    | Pass      |
| N - Buttock popliteal length          | mm    | 452 to 477    | 475    | Pass      |
| O - Chest depth                       | mm    | 213 to 229    | 220    | Pass      |
| P - Foot length                       | mm    | 251 to 267    | 260    | Pass      |
| V - Shoulder breadth                  | mm    | 422 to 437    | 425    | Pass      |
| W - Foot breadth                      | mm    | 91 to 107     | 100    | Pass      |
| Y - Chest circumference               | mm    | 970 to 1001   | 995    | Pass      |
| Z - Waist circumference               | mm    | 836 to 866    | 855    | Pass      |
| AA - Location for chest circumference | mm    | 429 to 434    | 430    | Pass      |
| BB - Location for waist circumference | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                  |       |               | Pass   |           |

Laboratory Technician

November 14, 2003  
Test Date

## **APPENDIX F**

### **CHILD RESTRAINT SYSTEM**

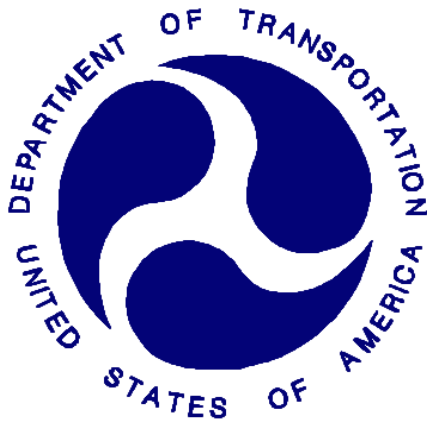
**REPORT NUMBER TR-P23001-23-NC**

**NEW CAR ASSESSMENT PROGRAM  
FRONTAL BARRIER IMPACT TEST**

**DAIMLER CHRYSLER CORPORATION  
2004 JEEP LIBERTY 4WD  
SUV**

**NHTSA NUMBER: M40300**

**PREPARED BY:  
KARCO ENGINEERING, LLC  
9270 HOLLY ROAD  
ADELANTO, CALIFORNIA 92301**



**NOVEMBER 18, 2003**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
RULEMAKING  
OFFICE OF CRASHWORTHINESS STANDARDS  
MAIL CODE: NVS-111  
400 SEVENTH STREET, SW, ROOM 5311  
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-02005.

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Prepared by: \_\_\_\_\_  
Mr. James E. Gorth, Project Engineer  
KARCO Engineering, LLC

Date: November 23, 2003

Reviewed by: \_\_\_\_\_  
Mr. Jerry L. Kratzke, Director of Operations  
KARCO Engineering, LLC

Date: November 23, 2003

Approved by: \_\_\_\_\_  
Mr. Frank D. Richardson, Program Manager  
KARCO Engineering, LLC

Date: November 23, 2003

FINAL REPORT ACCEPTED BY:

\_\_\_\_\_  
Manager, New Car Assessment Program

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

\_\_\_\_\_  
COTR, NCAP Frontal Impact Program

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

### Technical Report Documentation Page

|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  |                                                                                                                                                                                                                           |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>1. Report No.</b><br>TR-P23001-23-NC                                                                                                                                                                                                                                                                                                                                                                                   |  | <b>2. Government Accession No.</b>                             |  | <b>3. Recipients Catalog No.</b>                                                                                                                                                                                          |                   |
| <b>4. Title and Subtitle</b><br>Final Report of a Century 1500STE Convertible<br>Final Report of a Evenflo Vanguard 5 Convertible<br>NHTSA No. M40300                                                                                                                                                                                                                                                                     |  |                                                                |  | <b>5. Report Date</b>                                                                                                                                                                                                     |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  | <b>6. Performing Organization Code</b>                                                                                                                                                                                    |                   |
| <b>7. Authors</b><br>Mr. James E. Gorth, Project Engineer, Karco<br>Mr. Frank Richardson, Program Manager, Karco                                                                                                                                                                                                                                                                                                          |  |                                                                |  | <b>8. Performing Organization Report No.</b><br>TR-P23001-23-NC                                                                                                                                                           |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  |                                                                                                                                                                                                                           |                   |
| <b>9. Performing Organization Name and Address</b><br>Karco Engineering, LLC<br>9270 Holly Rd.<br>Adelanto, CA, 92301                                                                                                                                                                                                                                                                                                     |  |                                                                |  | <b>10. Work Unit No.</b>                                                                                                                                                                                                  |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  | <b>11. Contract or Grant No.</b><br>DTNH22-01-D-02005                                                                                                                                                                     |                   |
| <b>12. Sponsoring Agency Name and Address</b><br>U. S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Rulemaking<br>Office of Crashworthiness Standards<br>Mail Code NPS-111<br>400 Seventh Street, SW, Room 5311<br>Washington, D.C 20590                                                                                                                                             |  |                                                                |  | <b>13. Type of Report and Period Covered</b><br>Final Test Report<br>Option Year 2                                                                                                                                        |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  | <b>14. Sponsoring Agency Code</b><br>DOT/NHTSA/NRM/OCS                                                                                                                                                                    |                   |
| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                |  |                                                                                                                                                                                                                           |                   |
| <b>16. Abstract</b><br><br>A frontal test was conducted on the subject CRS's Century 1500 STE and an Evenflo Vanguard 5 in conjunction with frontal NCAP testing on a 2004 Jeep Liberty 4WD SUV and in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted at Karco Engineering, LLC on November 18, 2003. |  |                                                                |  |                                                                                                                                                                                                                           |                   |
| <b>Measurement Description</b>                                                                                                                                                                                                                                                                                                                                                                                            |  | <b>Units</b>                                                   |  | <b>Left Rear</b>                                                                                                                                                                                                          | <b>Right Rear</b> |
| Head Injury Criteria (HIC) 36                                                                                                                                                                                                                                                                                                                                                                                             |  | N/A                                                            |  | 666.3                                                                                                                                                                                                                     | 818.9             |
| Head Injury Criteria (HIC) 15                                                                                                                                                                                                                                                                                                                                                                                             |  | N/A                                                            |  | 328.3                                                                                                                                                                                                                     | 378.9             |
| 3 msec. Chest Clip                                                                                                                                                                                                                                                                                                                                                                                                        |  | G's                                                            |  | 43.3                                                                                                                                                                                                                      | 42.0              |
| Peak Chest Displacement                                                                                                                                                                                                                                                                                                                                                                                                   |  | mm                                                             |  | -23.2                                                                                                                                                                                                                     | -14.0             |
| <b>17. Key Words</b><br>56.3 km/h NCAP Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>Final Report of a Evenflo Vanguard 5 Convertible<br>Final Report of a Evenflo Vanguard 5 Convertible<br>NHTSA No. M40300                                                                                                                                                                                       |  |                                                                |  | <b>18. Distribution of Statement</b><br>Copies of this report available from:<br>NHTSA Technical Reference Division<br>National Highway Traffic Safety Admin.<br>400 Seventh St., SW, Room 5108<br>Washington, D.C. 20590 |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  |                                                                                                                                                                                                                           |                   |
| <b>19. Security Classification (this report)</b><br>Unclassified                                                                                                                                                                                                                                                                                                                                                          |  | <b>20. Security Classification (this page)</b><br>Unclassified |  | <b>21. No. of Pages</b><br>148                                                                                                                                                                                            |                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                |  | <b>22. Price</b>                                                                                                                                                                                                          |                   |

Form DOT F1700.7 (8-72)

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## SECTION F-1

### PURPOSE AND SUMMARY OF TEST M40300

The purpose of this test is to obtain CRS performance data during an NCAP (35mph) frontal impact test.

The 55.98 km/h NCAP frontal impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

### SUMMARY

Two three year old child dummies were instrumented with head, chest, and pelvic triaxial accelerometers. In addition chest displacement and upper and lower six axial neck force and moment load cell sensors were utilized. Triaxial accelerometers were installed on the CRS.

The right rear (Position 3) child dummy (Serial No. 139) and the left rear (Position 4) child dummy (Serial No. 082) were calibrated one test prior to this test. Child dummy certification information is found in Section F-5.

#### CHILD DUMMY VALUES

| Location         | HIC 36<br>Values | HIC 15<br>Values | 3 Msec.<br>Chest Clip | Peak Chest<br>Disp. |
|------------------|------------------|------------------|-----------------------|---------------------|
| Right Rear Child | 818.9            | 378.9            | 42.0                  | -14.0               |
| Left Rear Child  | 666.3            | 328.3            | 43.3                  | -23.2               |

**SECTION F-1****DATA SHEET NO.1.....CRASH TEST SUMMARY**Test Vehicle: 2004 Jeep Liberty 4WD SUVNHTSA No.: M40300Test Program: 2004 NHTSA 35mph NCAPTest Date: 11/18/03**CRS TEST INFORMATION**

| Description      | Position # 3 CRS | Position #4 CRS |
|------------------|------------------|-----------------|
| Manufacturer     | Evenflo          | Century         |
| Model Name       | Vanguard 5       | 1500 STE        |
| Serial No.       | 3691331P1        | 44164ELM        |
| Type             | Convertible      | Convertible     |
| Forward/Rearward | Forward          | Forward         |

**VISIBLE DUMMY CONTACT POINTS**

| Description        | Position #3 CRS        | Position #4 CRS        |
|--------------------|------------------------|------------------------|
| Head Contact       | Chin to Retaining Clip | Chin to Retaining Clip |
| Chest Contact      | None                   | None                   |
| Abdomen Contact    | None                   | None                   |
| Left Knee Contact  | None                   | None                   |
| Right Knee Contact | None                   | None                   |
| Left Toe Contact   | Seatback               | Seatback               |
| Right Toe Contact  | Seatback               | Seatback               |

**POST TEST DOOR OPENINGS**

| Description      | Position #3 CRS                           | Position #4 CRS                           |
|------------------|-------------------------------------------|-------------------------------------------|
| Left Side Doors  | Remained closed/latched, opened w/o tools | Remained closed/latched, opened w/o tools |
| Right Side Doors | Remained closed/latched, opened w/o tools | Remained closed/latched, opened w/o tools |
| Hatch/Other Door | None                                      | None                                      |

**POST TEST SEAT DATA**

| Location    | Seat Movement (mm) | Seat Back Failure |
|-------------|--------------------|-------------------|
| Left Front  | None               | None              |
| Right Front | None               | None              |
| Left Rear   | None               | None              |
| Right Rear  | None               | None              |

**CAMERA COVERAGE**

|            |   |
|------------|---|
| High Speed | 2 |
| Real Time  | 2 |
| Total      | 4 |

**DATA CHANNELS**

**SECTION F-1****DATA SHEET NO.2.....CRS PARAMETER DATA**Test Vehicle: 2004 Jeep Liberty 4WD SUVNHTSA No.: M40300Test Program: 2004 NHTSA 35mph NCAPTest Date: 11/18/03**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered Weights (UVW) |           |       | As Tested Weights (ATW) |           |       |
|--------|-------|----------------------------|-----------|-------|-------------------------|-----------|-------|
|        |       | Front Axle                 | Rear Axle | Total | Front Axle              | Rear Axle | Total |
| Left   | kg    | 515                        | 447       |       | 538                     | 553       |       |
| Right  | kg    | 495                        | 427       |       | 527                     | 547       |       |
| Ratio  | %     | 53.6                       | 46.4      |       | 49.2                    | 50.8      |       |
| Totals | kg    | 1010                       | 874       | 1884  | 1065                    | 1100      | 2165  |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                   | Units | Value |
|--------------------------------------|-------|-------|
| Total Delivered Weight (UVW)         | kg    | 1884  |
| Weight of 2 P572 ATD's               | kg    | 152   |
| Rated Cargo/Luggage Wt. (RCLW)       | kg    | 136   |
| Calculated Vehicle Target Wt. (TVTW) | kg    | 2172  |

## SECTION F-1

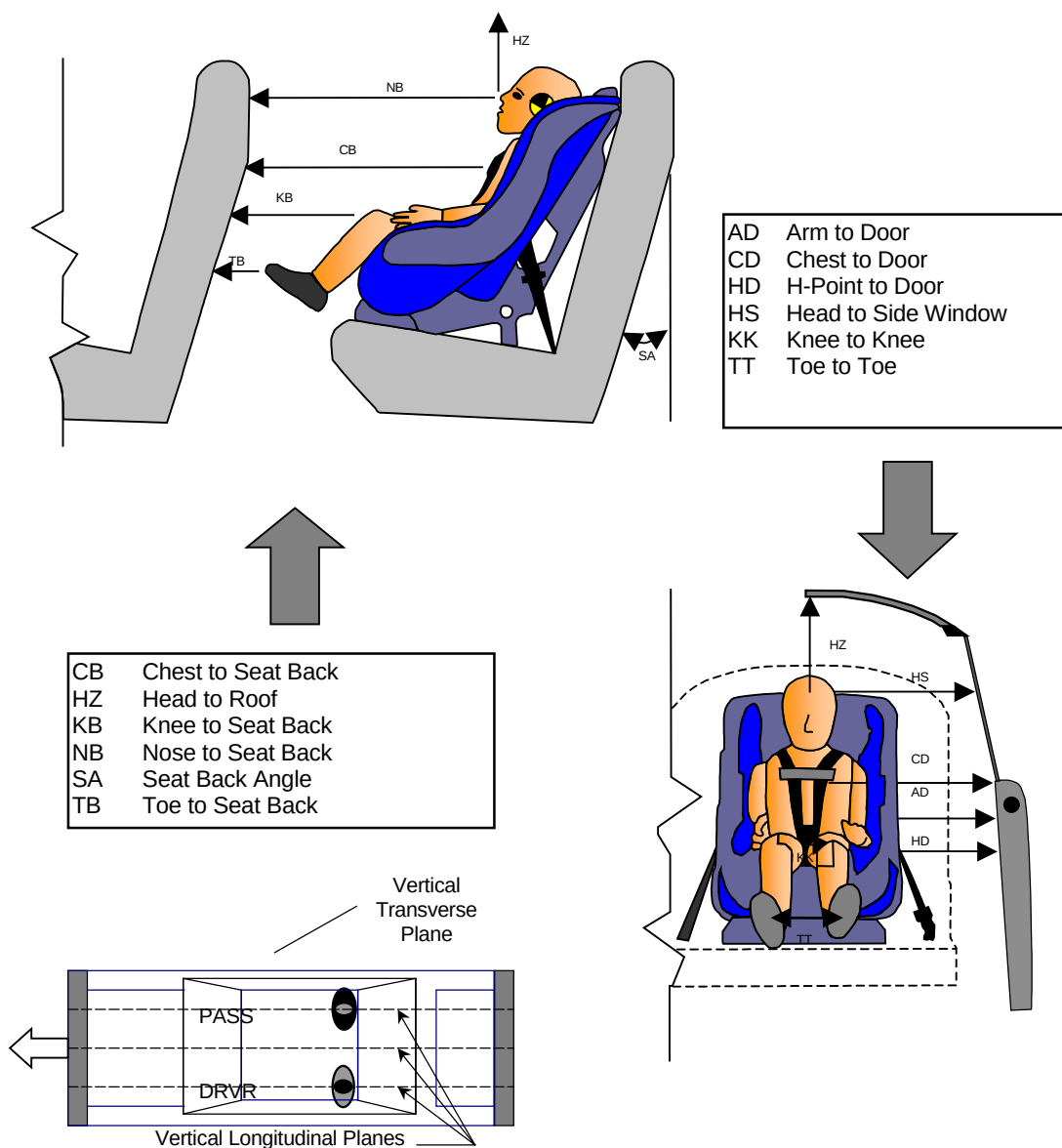
### DATA SHEET NO.3.....CHILD DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03



### DUMMY MEASUREMENTS FOR REAR SEAT OCCUPANTS

## SECTION F-1

### DATA SHEET NO.3.....CHILD DUMMY POSITIONING IN VEHICLE...(continued)

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

#### CHILD DUMMY POSITION MEASUREMENTS

| Code     | Measurement         | Units | P3 CRS Serial No. 139 |           |       | P4 CRS Serial No. 082 |           |       |
|----------|---------------------|-------|-----------------------|-----------|-------|-----------------------|-----------|-------|
|          |                     |       | Pre-Test              | Post-Test | Diff. | Pre-Test              | Post-Test | Diff. |
| SA       | Seat Back Angle     | deg.  | 20                    | 20        | 0     | 20                    | 20        | 0     |
| HZ       | Head to Roof (Z)    | mm    | 400                   | 405       | 5     | 425                   | 430       | 5     |
| CD       | Chest to Dash       | mm    | 385                   | 365       | -20   | 400                   | 395       | -5    |
| KK       | Knee to Knee (Y)    | mm    | 265                   | 235       | -30   | 245                   | 255       | 10    |
| HS       | Head to Side Window | mm    | 315                   | 290       | -25   | 290                   | 320       | 30    |
| HD       | H-Point to Door (Y) | mm    | 480                   | 460       | -20   | 510                   | 510       | 0     |
| AD       | Arm to Door         | mm    | 480                   | 475       | -5    | 465                   | 480       | 15    |
| NB       | Nose to Seat Back   | mm    | 510                   | 490       | -20   | 495                   | 500       | 5     |
| CB       | Chest to Seat Back  | mm    | 173                   | 222       | 49    | 177                   | 155       | -22   |
| FF       | Foot to Foot        | mm    | 120                   | 280       | 160   | 185                   | 155       | -30   |
| KB-Left  | Knee to Seat Back   | mm    | 275                   | 285       | 10    | 300                   | 290       | -10   |
| KB-Right | Knee to Seat Back   | mm    | 280                   | 300       | 20    | 290                   | 285       | -5    |
| TB-Left  | Toe to Seat Back    | mm    | 85                    | 60        | -25   | 35                    | 40        | 5     |
| TB-Right | Toe to Seat Back    | mm    | 90                    | 22        | -68   | 25                    | 0         | -25   |

# DATA SHEET NO. 8 - 3 YEAR OLD HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## HEAD PRIMARY PEAK ACCELERATIONS

| Location          | Axis | Units | Left Rear (3 Yr.) |       |       |       | Right Rear (3 Yr.) |       |       |       |
|-------------------|------|-------|-------------------|-------|-------|-------|--------------------|-------|-------|-------|
|                   |      |       | Max               | Time  | Min   | Time  | Max                | Time  | Min   | Time  |
| Head CG           | X    | G's   | 52.6              | 175.7 | -46.3 | 91.9  | 62.6               | 201.0 | -43.9 | 97.6  |
| Head CG           | Y    | G's   | 11.2              | 91.9  | -4.1  | 99.2  | 19.1               | 97.2  | -3.6  | 243.8 |
| Head CG           | Z    | G's   | 50.4              | 68.1  | -6.9  | 208.9 | 55.5               | 78.7  | -7.8  | 35.5  |
| Head CG Resultant | N/A  | G's   | 60.2              | 175.8 |       |       | 72.7               | 201.0 |       |       |

## PRIMARY HEAD INJURY CRITERAS (HIC)

| Location                | Left Rear (3 Yr.) |                |                |       | Right Rear (3 Yr.) |                |                |       |
|-------------------------|-------------------|----------------|----------------|-------|--------------------|----------------|----------------|-------|
|                         | HIC               | T <sup>1</sup> | T <sup>2</sup> | Avg G | HIC                | T <sup>1</sup> | T <sup>2</sup> | Avg G |
| Head CG Primary (HIC36) | 666.3             | 58.5           | 94.5           | 50.9  | 818.9              | 66.5           | 102.5          | 55.3  |
| Head CG Primary (HIC15) | 328.3             | 64.3           | 79.3           | 54.4  | 378.9              | 70.2           | 85.2           | 57.7  |

## CHEST PRIMARY PEAK ACCELERATIONS

| Location           | Axis | Units | Left Rear (3 Yr.) |       |       |      | Right Rear (3 Yr.) |       |       |       |
|--------------------|------|-------|-------------------|-------|-------|------|--------------------|-------|-------|-------|
|                    |      |       | Max               | Time  | Min   | Time | Max                | Time  | Min   | Time  |
| Chest CG           | X    | G's   | 17.7              | 205.3 | -39.1 | 69.8 | 12.0               | 207.6 | -33.1 | 62.9  |
| Chest CG           | Y    | G's   | 6.1               | 63.2  | -2.6  | 44.8 | 6.2                | 68.9  | -3.3  | 229.5 |
| Chest CG           | Z    | G's   | 14.6              | 179.9 | -34.0 | 52.1 | 12.8               | 203.1 | -28.4 | 54.6  |
| Chest CG Resultant | N/A  | G's   | 44.2              | 52.2  |       |      | 42.6               | 54.4  |       |       |

## PRIMARY CHEST CLIP (3MSEC)

| Location         | Left Rear (3 Yr.) |                |                | Right Rear (3 Yr.) |                |                |
|------------------|-------------------|----------------|----------------|--------------------|----------------|----------------|
|                  | CLIP              | T <sup>1</sup> | T <sup>2</sup> | CLIP               | T <sup>1</sup> | T <sup>2</sup> |
| Chest CG Primary | 43.3              | 20.3           | 50.3           | 42.0               | 23.3           | 53.3           |

## CHEST PEAK DISPLACEMENTS

| Location | Axis | Units | Left Rear (3 Yr.) |      |       |      | Right Rear (3 Yr.) |      |       |       |
|----------|------|-------|-------------------|------|-------|------|--------------------|------|-------|-------|
|          |      |       | Max               | Time | Min   | Time | Max                | Time | Min   | Time  |
| Chest CG | X    | MM    | 0.0               | 7.5  | -23.2 | 99.0 | 0.0                | 0.5  | -14.0 | 101.8 |

## PELVIC PEAK ACCELERATIONS

| Location         | Axis | Units | Left Rear (3 Yr.) |       |       |      | Right Rear (3 Yr.) |       |       |      |
|------------------|------|-------|-------------------|-------|-------|------|--------------------|-------|-------|------|
|                  |      |       | Max               | Time  | Min   | Time | Max                | Time  | Min   | Time |
| Pelvis           | X    | G's   | 8.9               | 103.4 | -52.5 | 61.4 | 4.7                | 249.6 | -40.7 | 50.4 |
| Pelvis           | Y    | G's   | 3.4               | 56.1  | -6.2  | 38.1 | 1.9                | 211.4 | -8.3  | 71.7 |
| Pelvis           | Z    | G's   | 16.3              | 179.4 | -33.7 | 50.2 | 11.7               | 202.9 | -31.8 | 56.6 |
| Pelvis Resultant | N/A  | G's   | 58.9              | 60.7  |       |      | 50.4               | 52.9  |       |      |



# DATA SHEET NO. 8...(continued)

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

## UPPER NECK PEAK FORCES AND MOMENTS

| Location              | Axis | Units   | Left Rear (3 Yr.) |       |        |       | Right Rear (3 Yr.) |       |         |       |
|-----------------------|------|---------|-------------------|-------|--------|-------|--------------------|-------|---------|-------|
|                       |      |         | Max               | Time  | Min    | Time  | Max                | Time  | Min     | Time  |
| Neck Force            | X    | Newtons | 194.7             | 209.1 | -857.9 | 96.4  | 41.0               | 236.6 | -1040.5 | 102.7 |
| Neck Force            | Y    | Newtons | 53.5              | 66.4  | -81.6  | 92.9  | 96.0               | 72.6  | -93.5   | 204.6 |
| Neck Force            | Z    | Newtons | 1710.1            | 71.2  | -239.8 | 215.1 | 1669.9             | 98.6  | -202.8  | 213.0 |
| Neck Force Resultant  | N/A  | Newtons | 1823.7            | 71.3  |        |       | 1926.2             | 99.1  |         |       |
| Neck Moment           | X    | Nm      | 3.5               | 180.5 | -3.7   | 203.9 | 6.1                | 79.2  | -2.5    | 250.0 |
| Neck Moment           | Y    | Nm      | 0.0               | 0.0   | 0.0    | 0.0   | 3.1                | 299.9 | -18.9   | 207.3 |
| Neck Moment           | Z    | Nm      | 4.2               | 207.6 | -3.0   | 254.0 | 3.5                | 104.6 | -6.7    | 241.5 |
| Neck Moment Resultant | N/A  | Nm      | 5.3               | 204.8 |        |       | 19.4               | 207.2 |         |       |

1.) Left rear pass. channel failed, no data

## LOWER NECK PEAK FORCES AND MOMENTS

| Location              | Axis | Units   | Left Rear (3 Yr.) |       |         |       | Right Rear (3 Yr.) |       |        |       |
|-----------------------|------|---------|-------------------|-------|---------|-------|--------------------|-------|--------|-------|
|                       |      |         | Max               | Time  | Min     | Time  | Max                | Time  | Min    | Time  |
| Neck Force            | X    | Newtons | 319.3             | 208.7 | -1006.9 | 90.8  | 180.3              | 193.3 | -884.4 | 99.0  |
| Neck Force            | Y    | Newtons | 195.0             | 78.6  | -24.6   | 245.8 | 52.3               | 171.0 | -192.6 | 79.3  |
| Neck Force            | Z    | Newtons | 913.2             | 73.2  | -250.0  | 36.6  | 1456.1             | 71.6  | -380.6 | 42.7  |
| Neck Force Resultant  | N/A  | Newtons | 1271.0            | 76.8  |         |       | 1489.7             | 71.6  |        |       |
| Neck Moment           | X    | Nm      | 7.7               | 70.6  | -6.9    | 96.2  | 17.2               | 84.8  | -8.1   | 249.3 |
| Neck Moment           | Y    | Nm      | 111.7             | 91.7  | -15.6   | 208.7 | 134.6              | 99.6  | -13.6  | 193.5 |
| Neck Moment           | Z    | Nm      | 7.5               | 68.4  | -2.7    | 262.0 | 6.7                | 80.3  | -6.6   | 234.8 |
| Neck Moment Resultant | N/A  | Nm      | 111.7             | 91.7  |         |       | 134.9              | 99.5  |        |       |

## CHILD SEAT TETHER BELT SENSOR PEAK VALUES

| Location          | Axis | Units   | Left Rear (3 Yr.) |       |       |      | Right Rear (3 Yr.) |       |      |      |
|-------------------|------|---------|-------------------|-------|-------|------|--------------------|-------|------|------|
|                   |      |         | Max               | Time  | Min   | Time | Max                | Time  | Min  | Time |
| Tether Belt Force | N/A  | Newtons | 53.2              | 197.8 | -73.1 | 66.3 | 263.7              | 105.4 | -2.8 | 13.0 |

## CHILD SEAT ACCELEROMETER PEAK VALUES

| Location             | Axis | Units | Left Rear (3 Yr.) |       |       |      | Right Rear (3 Yr.) |       |       |       |
|----------------------|------|-------|-------------------|-------|-------|------|--------------------|-------|-------|-------|
|                      |      |       | Max               | Time  | Min   | Time | Max                | Time  | Min   | Time  |
| Child Seat           | X    | G's   | 14.7              | 195.1 | -52.0 | 57.3 | 8.4                | 172.2 | -46.4 | 48.8  |
| Child Seat           | Y    | G's   | 24.7              | 48.9  | -30.2 | 55.3 | 4.8                | 137.3 | -7.7  | 76.9  |
| Child Seat           | Z    | G's   | 19.4              | 180.3 | -47.0 | 54.5 | 17.4               | 70.9  | -12.6 | 208.4 |
| Child Seat Resultant | N/A  | G's   | 71.9              | 55.1  |       |      | 46.9               | 48.8  |       |       |

## SECTION F-1

### DATA SHEET NO.5 .....CRS PERFORMANCE DATA

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

| Location                    | P3 CRS Serial No. 139 |           | P4 CRS Serial No. 082 |           |
|-----------------------------|-----------------------|-----------|-----------------------|-----------|
|                             | Damage                | Post-Test | Damage                | Post-Test |
| Upper Tether Strap          | No                    | None      | No                    | None      |
| Upper Tether Buckle         | No                    | None      | No                    | None      |
| Upper Tether Hook           | No                    | None      | No                    | None      |
| Veh. Upper Tether Anchor    | No                    | None      | No                    | None      |
| Lower Anchor Strap          | No                    | None      | No                    | None      |
| Lower Anchor Buckle         | No                    | None      | No                    | None      |
| Lower Anchor Hooks          | No                    | None      | No                    | None      |
| Veh. Lower CRS Anchors      | No                    | None      | No                    | None      |
| 5 Point Harness Connections | No                    | None      | No                    | None      |
| Cracks on CRS               | No                    | None      | No                    | None      |
| Fabric Tears on CRS         | No                    | None      | No                    | None      |
| Vehicle Seat Structure      | No                    | None      | No                    | None      |
| Vehicle Seat Fabric Tears   | No                    | None      | No                    | None      |

## SECTION F-1

### DATA SHEET NO.6 .....CRS CAMERA DATA

Test Vehicle: 2004 Jeep Liberty 4WD SUV

NHTSA No.: M40300

Test Program: 2004 NHTSA 35mph NCAP

Test Date: 11/18/03

#### CAMERA LOCATIONS

| No. | Camera View                | Location(mm) |       |      | Angle<br>(Deg.) | Film<br>Plane to<br>Head | Lens<br>(mm) | Speed<br>(fps) |
|-----|----------------------------|--------------|-------|------|-----------------|--------------------------|--------------|----------------|
|     |                            | X            | Y     | Z    |                 |                          |              |                |
| 1   | Driver Side Child Dummy    | 2845         | -813  | 1575 | 20              | 1364                     | 13           | 1000           |
| 2   | Driver Side Child Dummy    | 2489         | 8230  | 2388 | 20              | 7815                     | 50           | 1010           |
| 3   | Passenger Side Child Dummy | 2845         | -8836 | 1575 | 20              | 1364                     | 13           | 1000           |
| 4   | Passenger Side Child Dummy | 3048         | 813   | 2032 | 20              | 8359                     | 35-85        | 1010           |

X = Barrier Face    Y = Monorail Centerline    Z = Ground    DNR = Did Not Run

**SECTION F-2**

**PHOTOGRAPHS**

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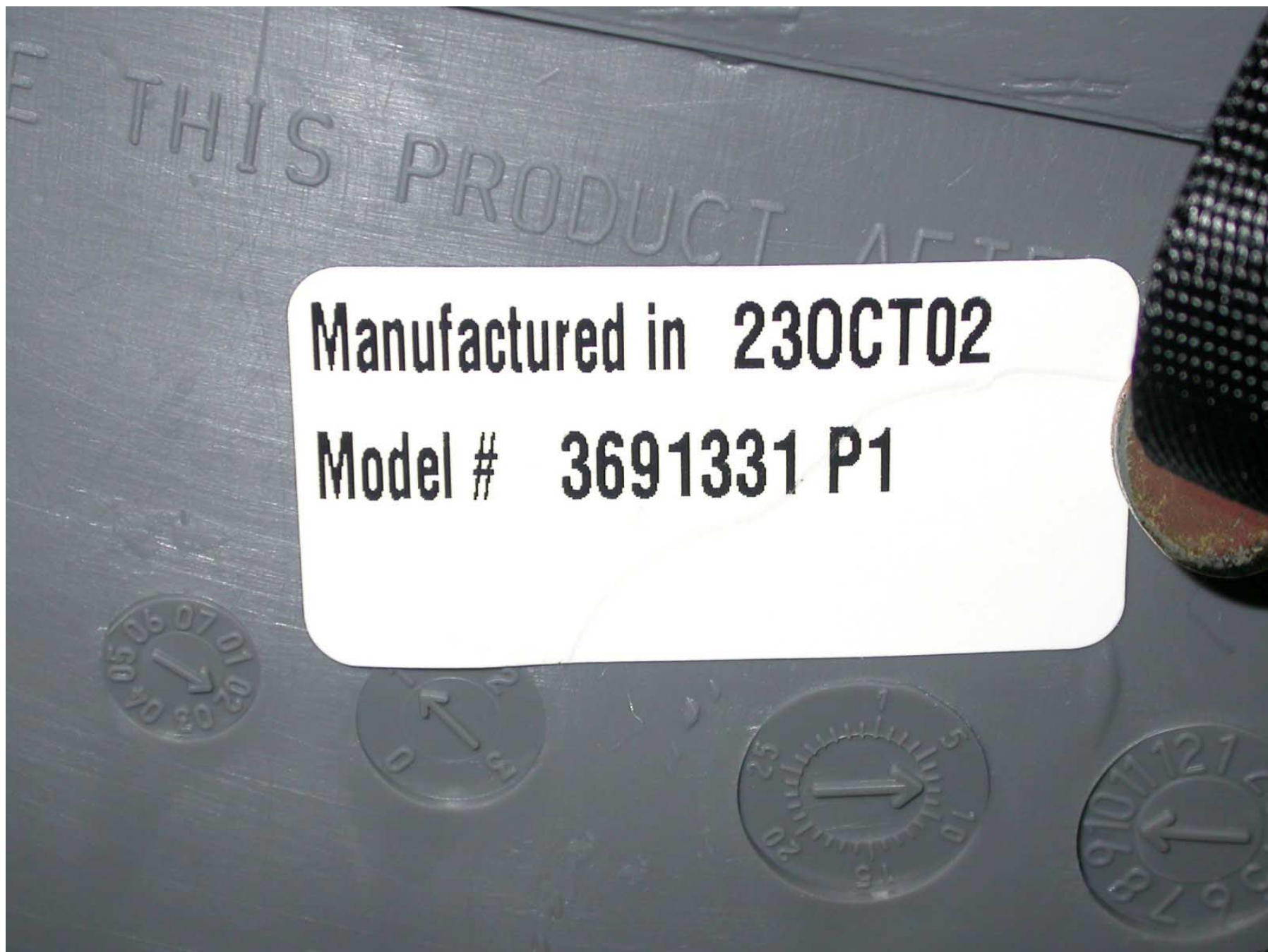


Figure F2-1: Close-up View Position 3 CRS Label





Figure F2-2: Pre-Test Frontal View of Position 3 CRS





Figure F2-3: Post-Test Frontal View of Position 3 CRS





Figure F2-4: Pre-Test Rear View of Position 3 CRS



Figure F2-5: Post-Test Rear View of Position 3 CRS





Figure F2-6: Pre-Test Left Side View of Position 3 CRS



Figure F2-7: Post-Test Left Side View of Position 3 CRS





Figure F2-8: Pre-Test Right Side View of Position 3 CRS





Figure F2-9: Post-Test Right Side View of Position 3 CRS





Figure F2-10: Pre-Test Position 3 Front View





Figure F2-11: Post-Test Position 3 Front View





Figure F2-12: Pre-Test Position 3 Left Side View





Figure F2-13: Post-Test Position 3 Left Side View





Figure F2-14: Pre-Test Position 3 Right Side View





Figure F2-15: Post-Test Position 3 Right Side View





Figure F2-16: Post-Test Position 3 Contact Point (Back of Right Front Seat)

...g... around the car seat!  
Properly securing your child in the car seat.

Manufactured by: Graco Children's Products, Inc.  
Cincinnati, Ohio USA 44056

number

Manufactured in:

**44164ELM**  
**1000 STE MG**

**2002 07 25 M**  
**YEAR—MONTH—DAY**  
**ANNEE—MOIS—JOUR**

PB-28230-A PM282300

Figure F2-17: Close-up View Position 4 CRS Label





Figure F2-18: Pre-Test Frontal View of Position 4 CRS



Figure F2-19: Post-Test Front View of Position 4 CRS





Figure F2-20: Pre-Test Rear View of Position 4 CRS





Figure F2-21: Post-Test Rear View of Position 4 CRS





Figure F2-22: Pre-Test Left Side View of Position 4 CRS





Figure F2-23: Post-Test Left Side View of Position 4 CRS



Figure F2-24: Pre-Test Right Side View of Position 4 CRS





Figure F2-25: Post-Test Right Side View of Position 4 CRS



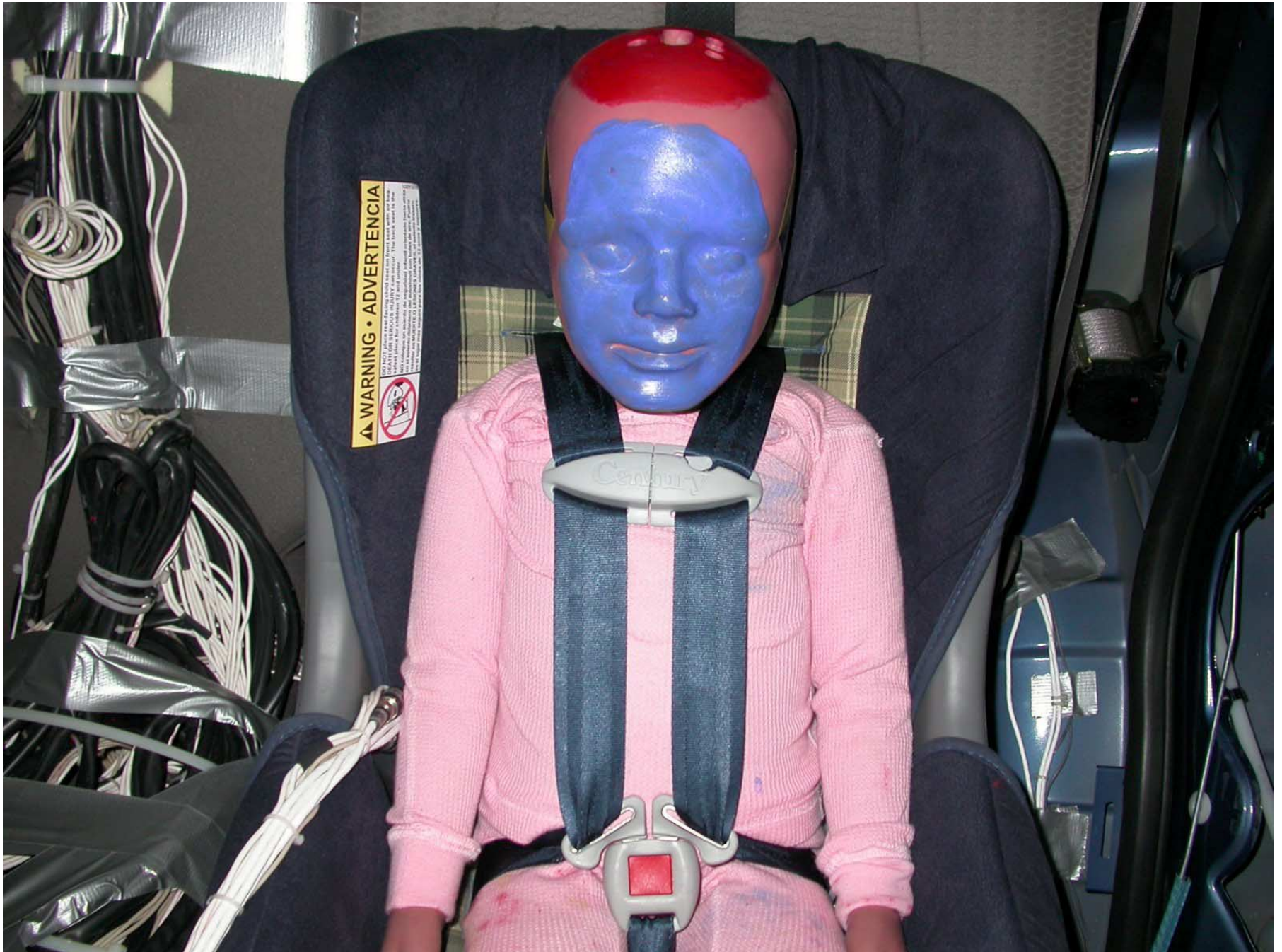


Figure F2-26: Pre-Test Position 4 Front View



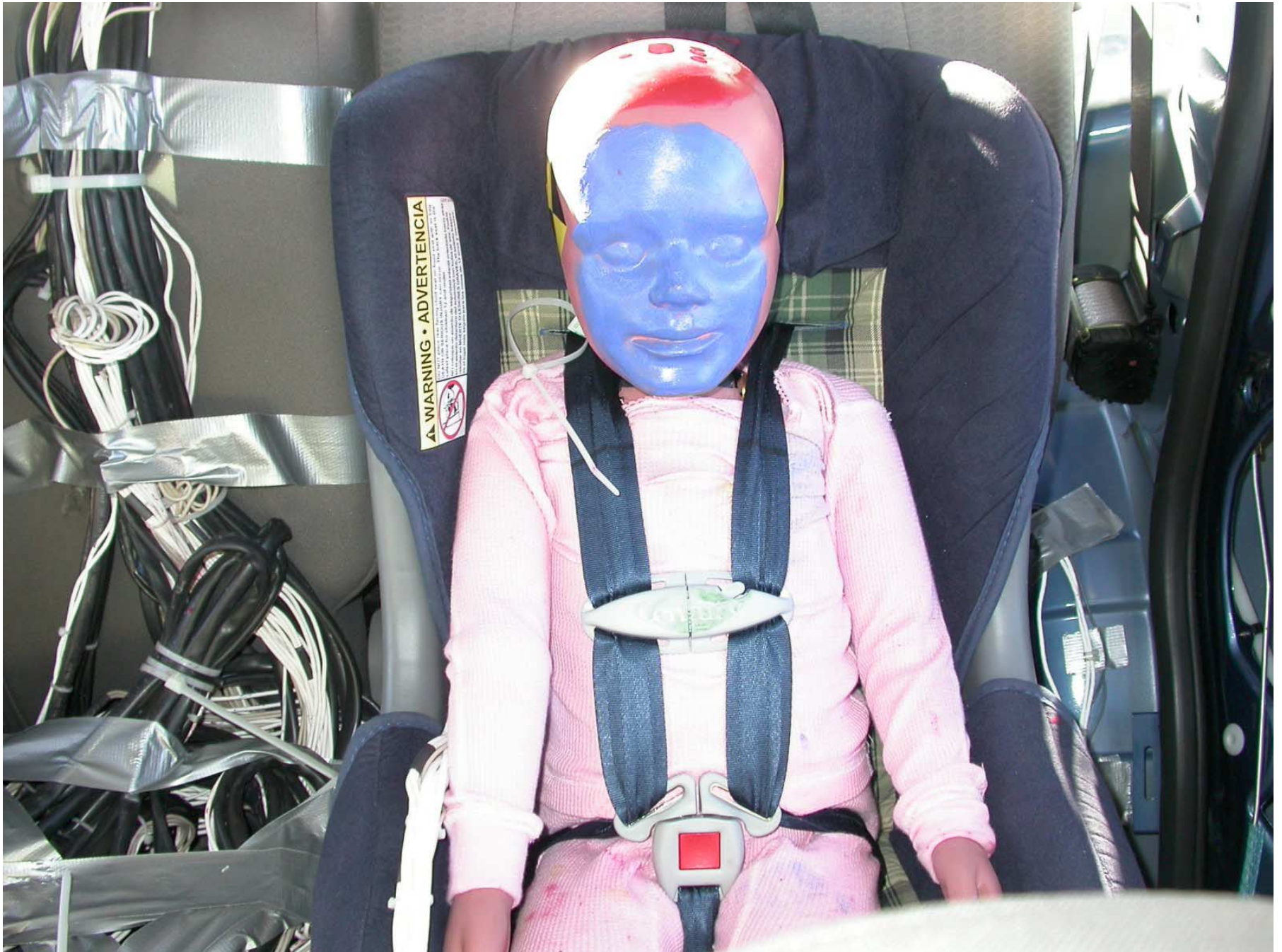


Figure F2-27: Post-Test Position 4 Front View





Figure F2-28: Pre-Test Position 4 Left Side View





Figure F2-29: Post-Test Position 4 Left Side View





Figure F2-30: Pre-Test Position 4 Right Side View





Figure F2-31: Post-Test Position 4 Right Side View





Figure F2-32: Post-Test Position 4 Contact Point (Back of Left Front Seat)



## **SECTION F-3**

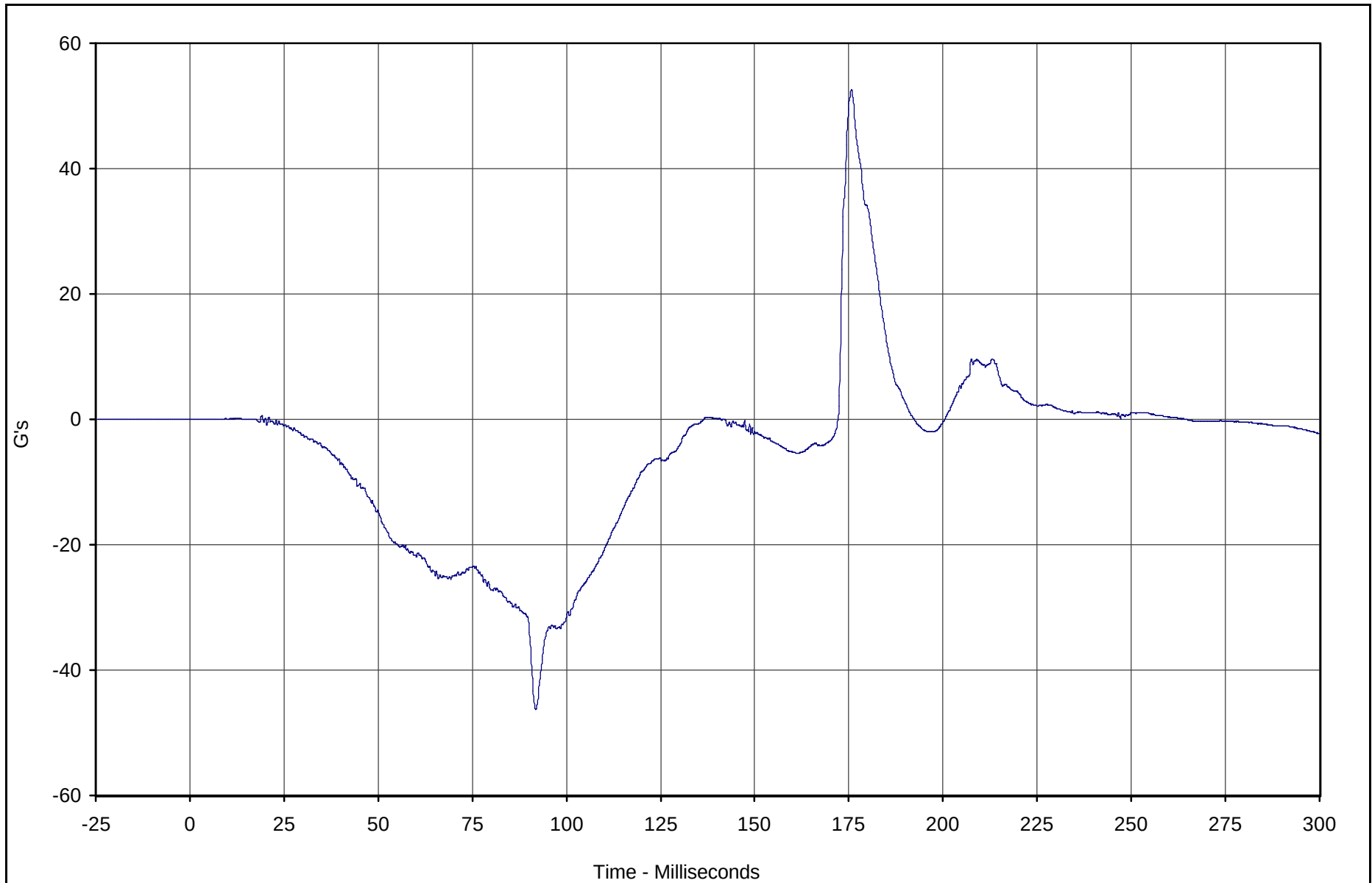
### **CHILD DUMMY RESPONSE AND CRS DATA TRACES**

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| Curve Description        | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|--------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Head X | 134   | FIL  | G's   | 52.6 | 175.7 | -46.3 | 91.9 | 1000      |

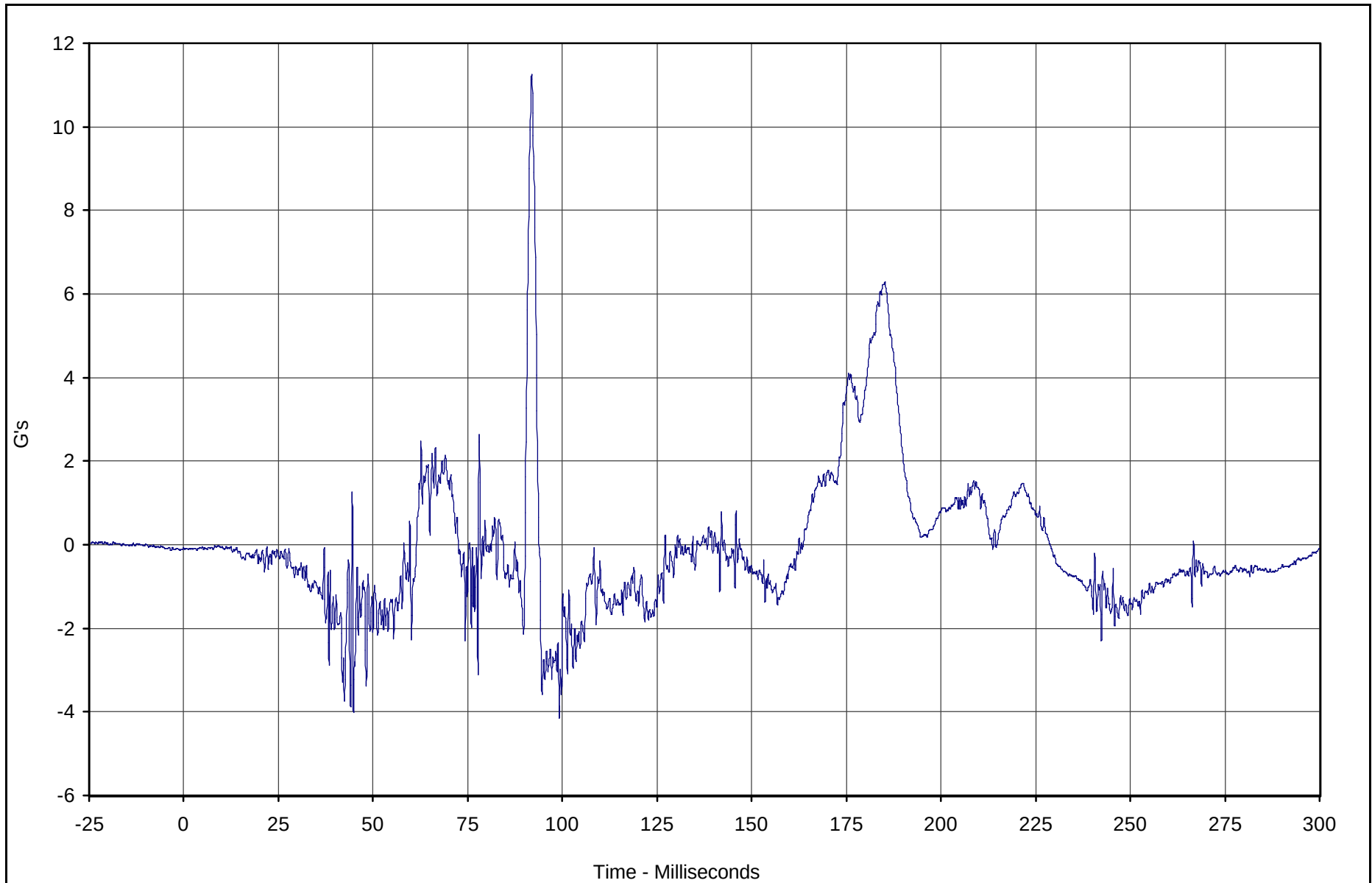


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description        | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|--------------------------|-------|------|-------|------|------|------|------|-----------|
| Left Rear (3 Yr.) Head Y | 135   | FIL  | G's   | 11.2 | 91.9 | -4.1 | 99.2 | 1000      |



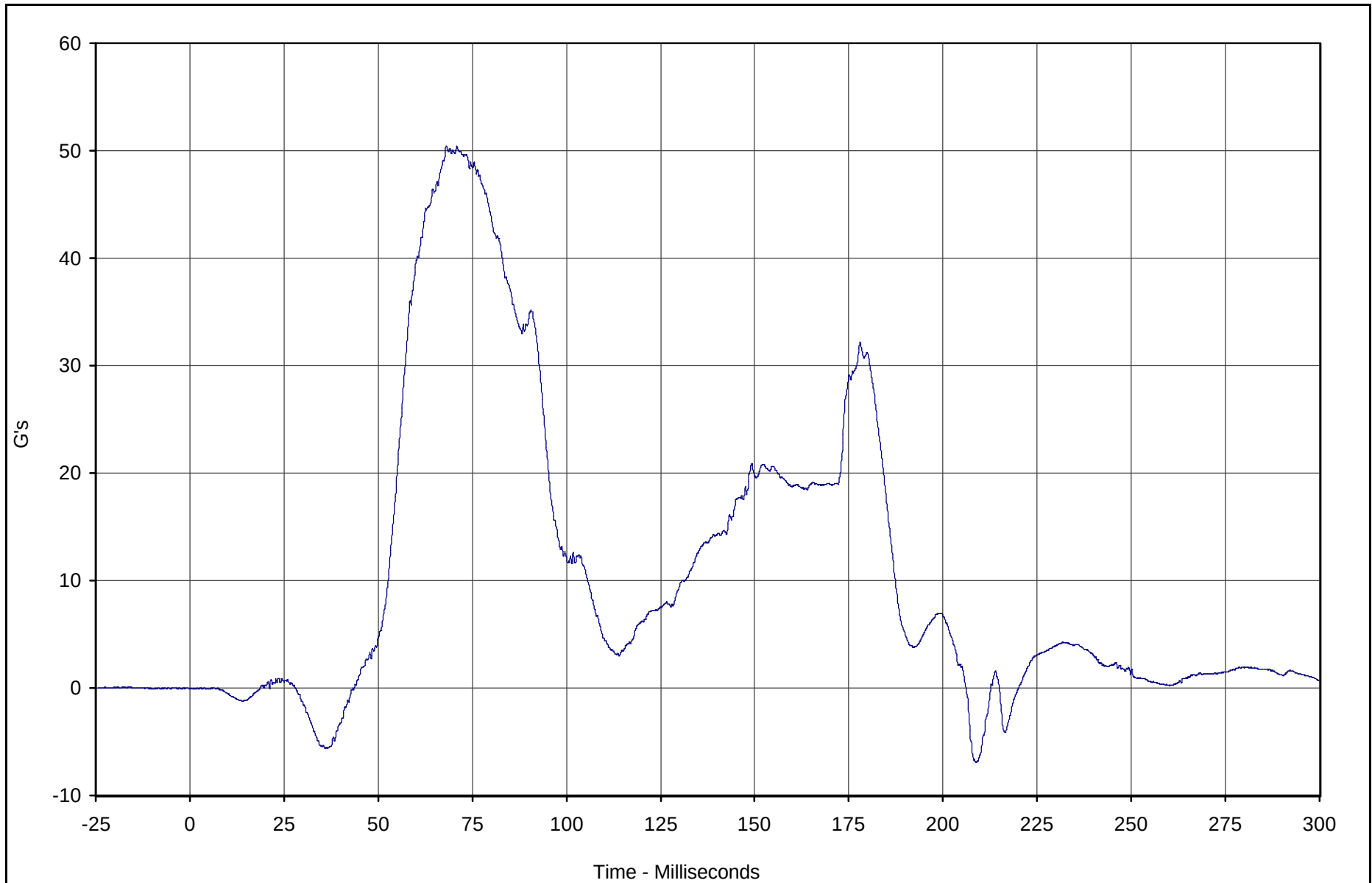
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description        | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|--------------------------|-------|------|-------|------|------|------|-------|-----------|
| Left Rear (3 Yr.) Head Z | 136   | FIL  | G's   | 50.4 | 68.1 | -6.9 | 208.9 | 1000      |

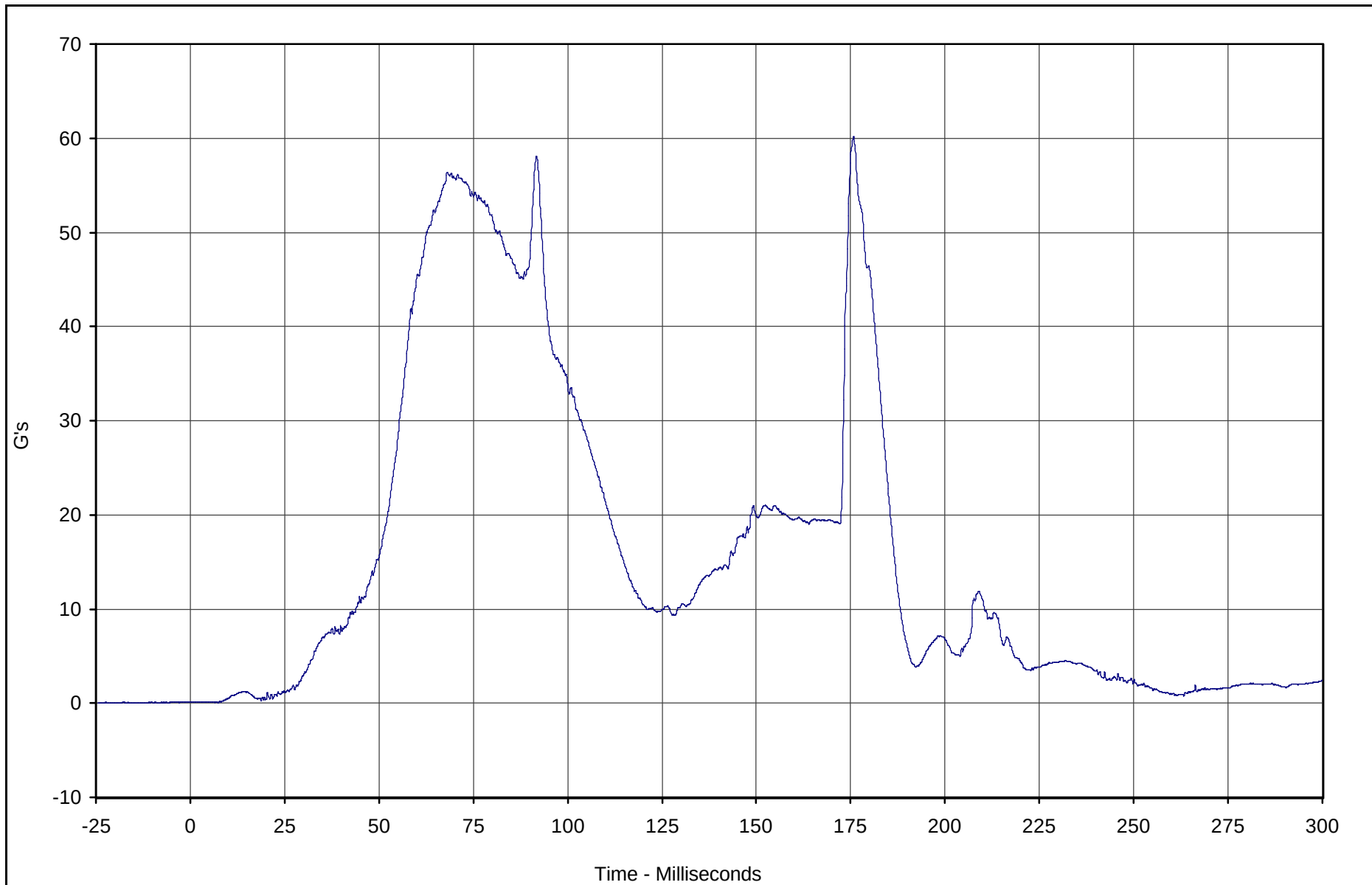


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|----------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Left Rear (3 Yr.) Head Resultant | 134   | RES  | G's   | 60.2 | 175.8 | 0.1 | 6.6  | 1000      |

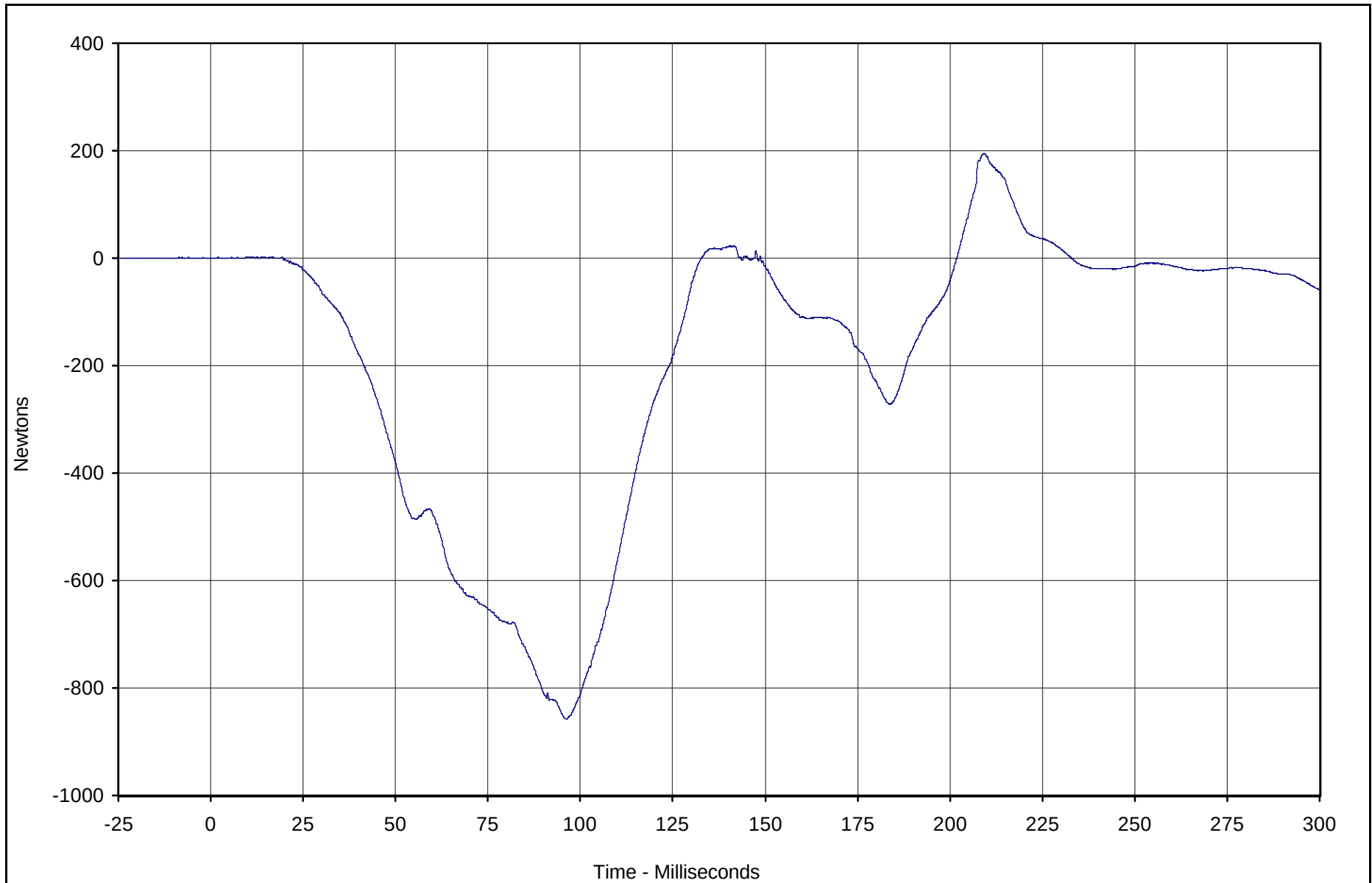


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units   | Max   | Time  | Min    | Time | SAE Class |
|--------------------------------------|-------|------|---------|-------|-------|--------|------|-----------|
| Left Rear (3 Yr.) Upper Neck Force X | 137   | FIL  | Newtons | 194.7 | 209.1 | -857.9 | 96.4 | 1000      |

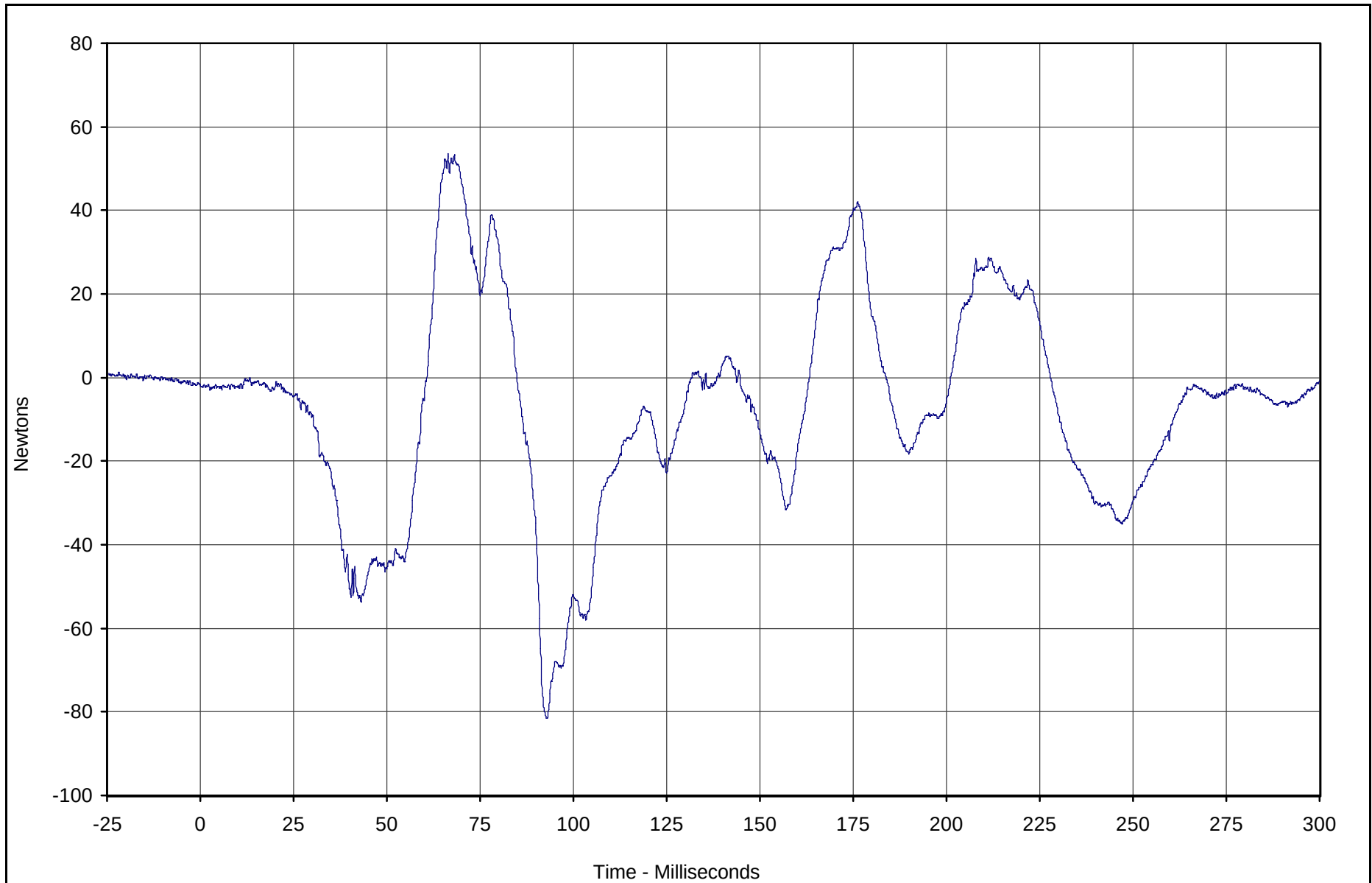


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units   | Max  | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|---------|------|------|-------|------|-----------|
| Left Rear (3 Yr.) Upper Neck Force Y | 138   | FIL  | Newtons | 53.5 | 66.4 | -81.6 | 92.9 | 1000      |

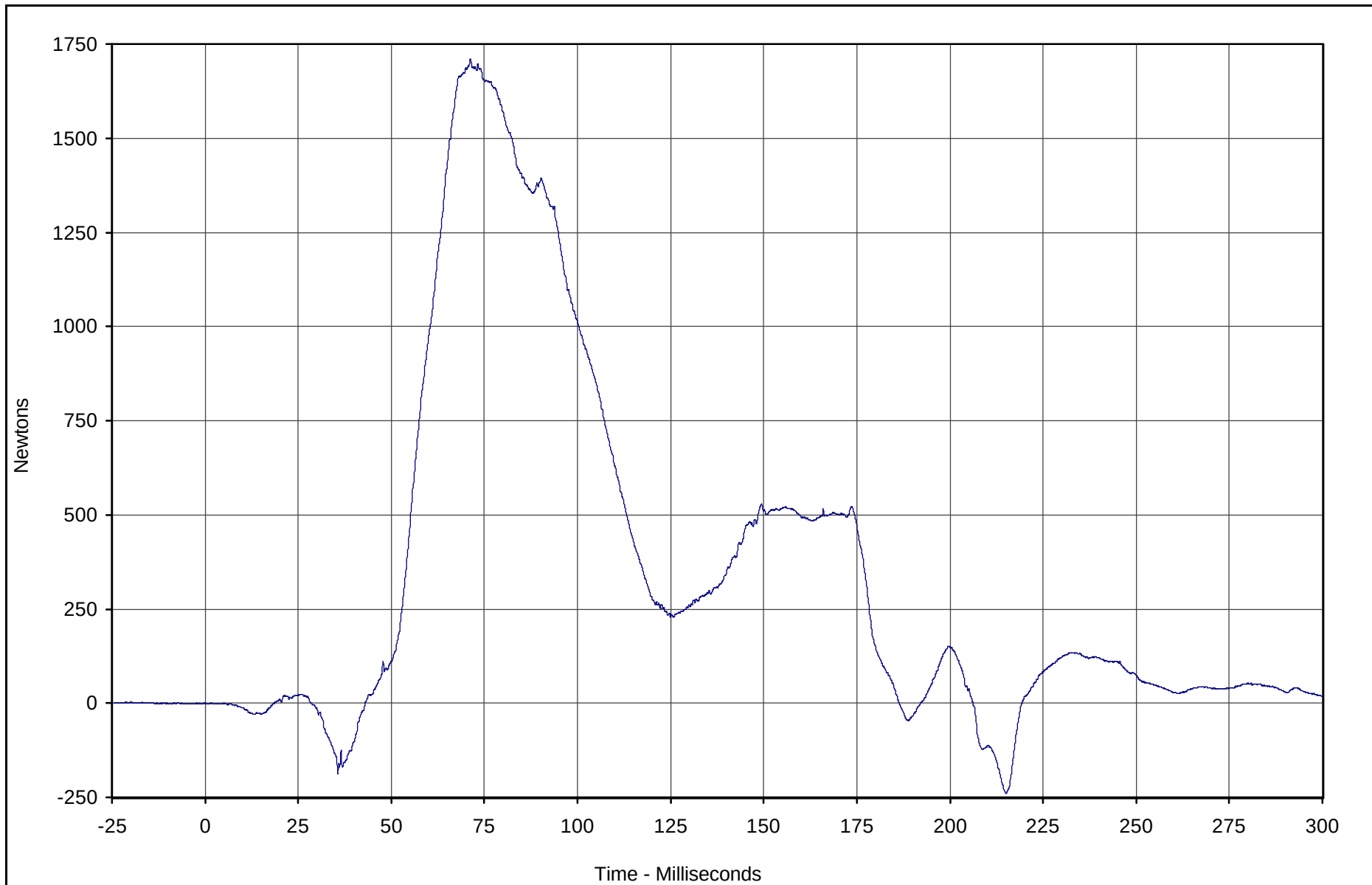


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units   | Max    | Time | Min    | Time  | SAE Class |
|--------------------------------------|-------|------|---------|--------|------|--------|-------|-----------|
| Left Rear (3 Yr.) Upper Neck Force Z | 139   | FIL  | Newtons | 1710.1 | 71.2 | -239.8 | 215.1 | 1000      |



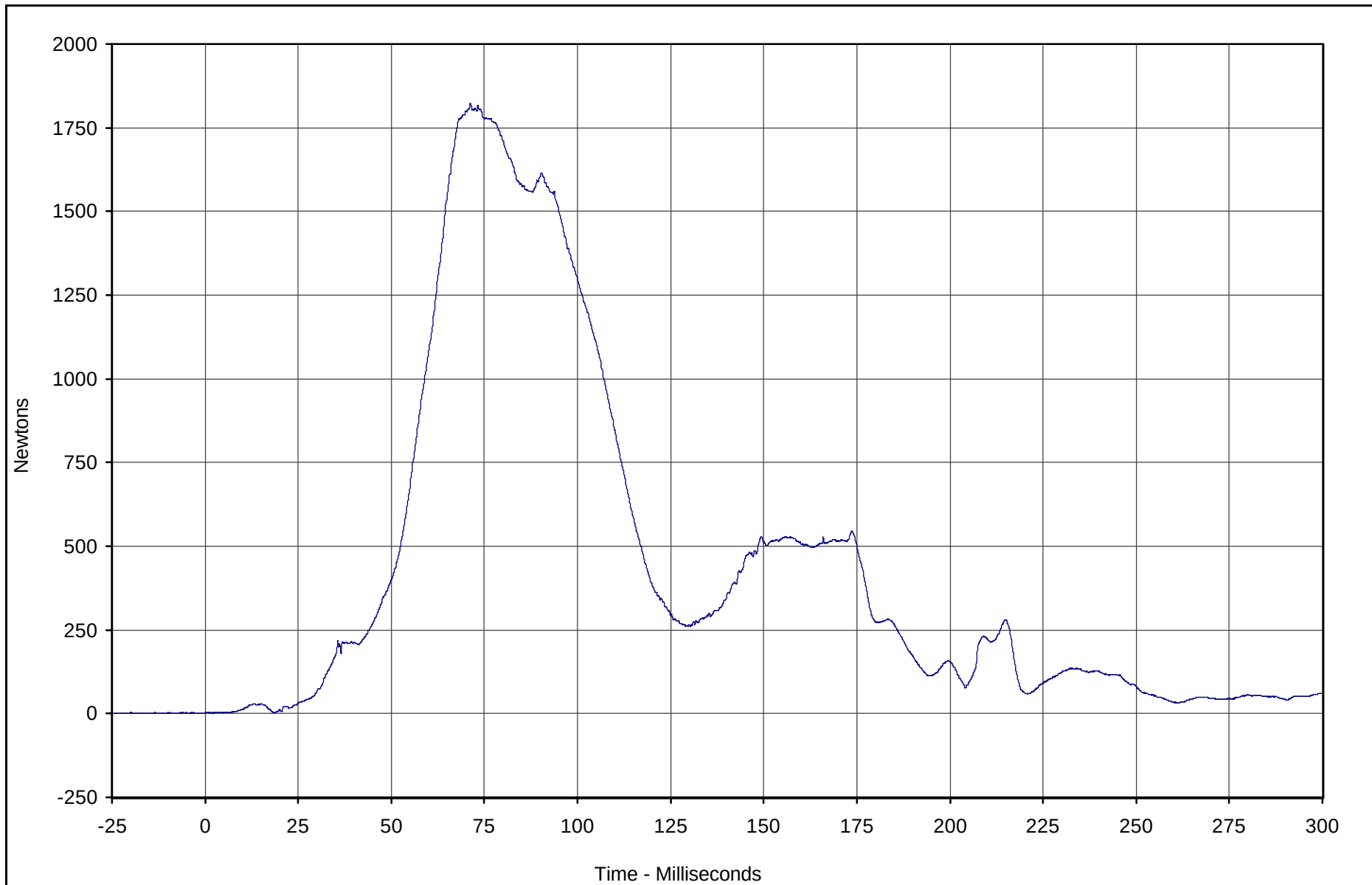
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                       | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|-----------------------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Left Rear (3 Yr.) Upper Neck Force Res. | 137   | RES  | Newtons | 1823.7 | 71.3 | 1.9 | 0.0  | 1000      |

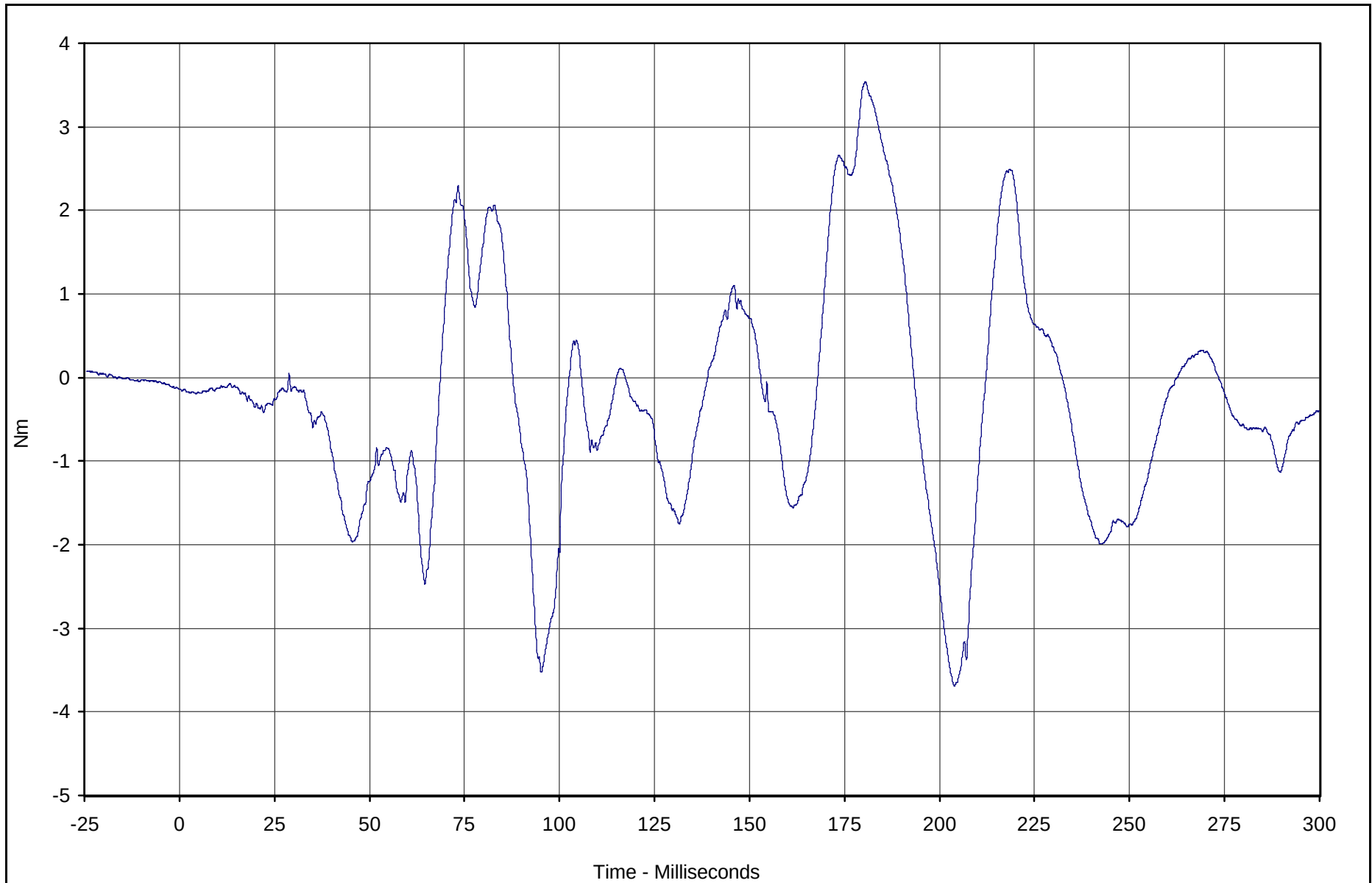


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max | Time  | Min  | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-----|-------|------|-------|-----------|
| Left Rear (3 Yr.) Upper Neck Moment X | 140   | FIL  | Nm    | 3.5 | 180.5 | -3.7 | 203.9 | 600       |

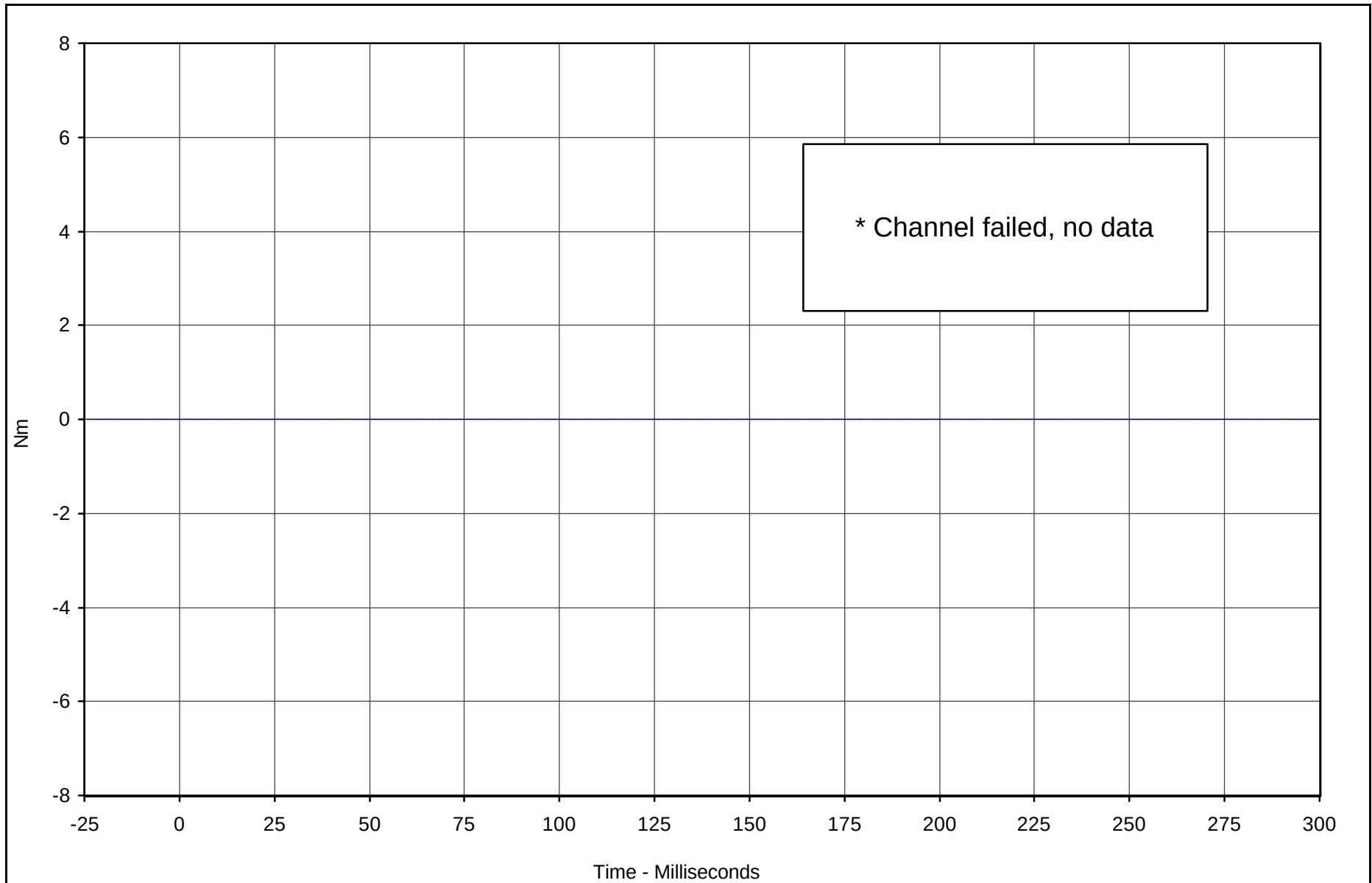


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



\* Channel failed, no data

| Curve Description                     | CURNO | Type | Units | Max | Time | Min | Time | SAE Class |
|---------------------------------------|-------|------|-------|-----|------|-----|------|-----------|
| Left Rear (3 Yr.) Upper Neck Moment Y | 141   | FIL  | Nm    | 0.0 | 0.0  | 0.0 | 0.0  | 600       |

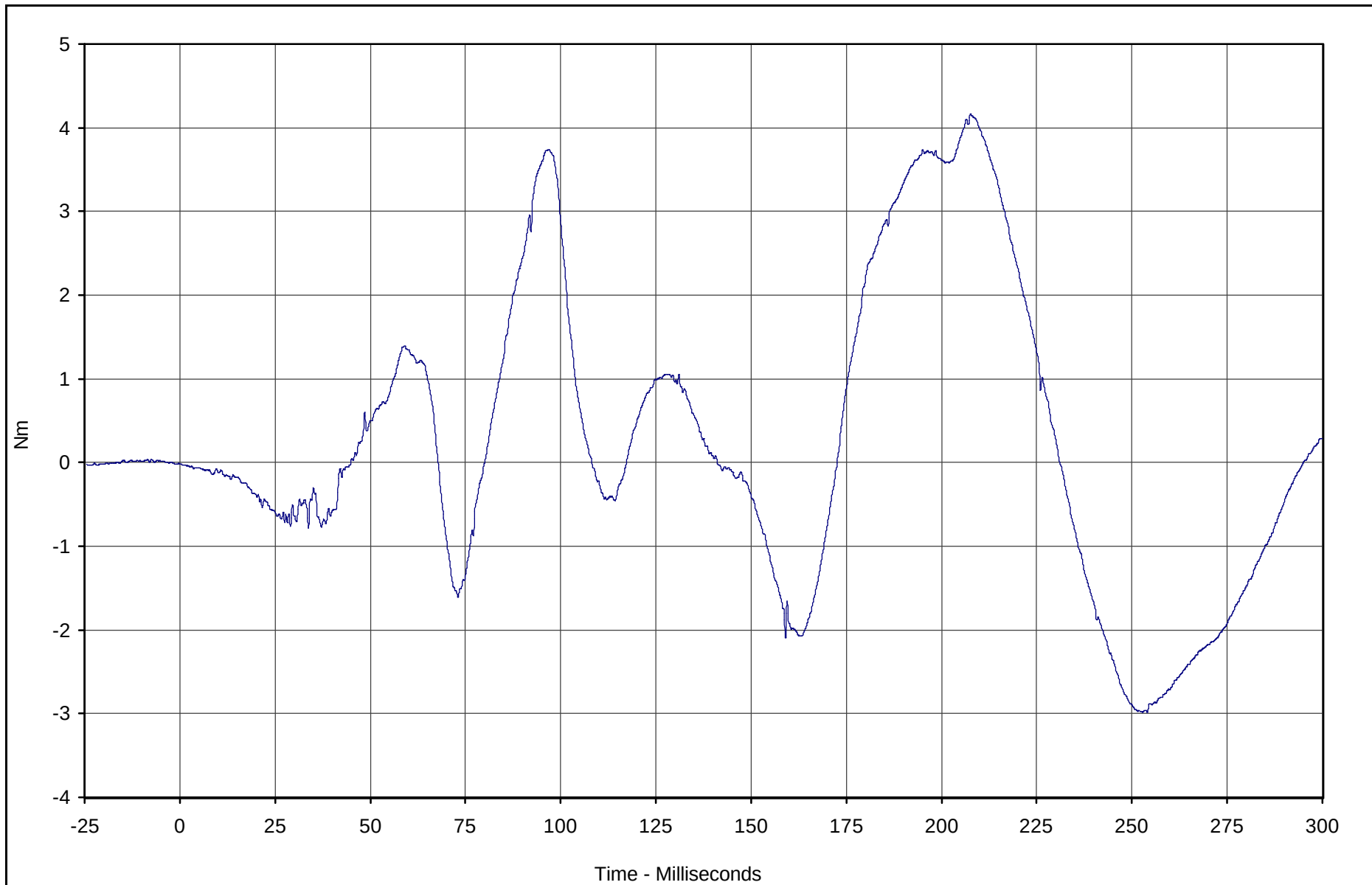


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max | Time  | Min  | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-----|-------|------|-------|-----------|
| Left Rear (3 Yr.) Upper Neck Moment Z | 142   | FIL  | Nm    | 4.2 | 207.6 | -3.0 | 254.0 | 600       |

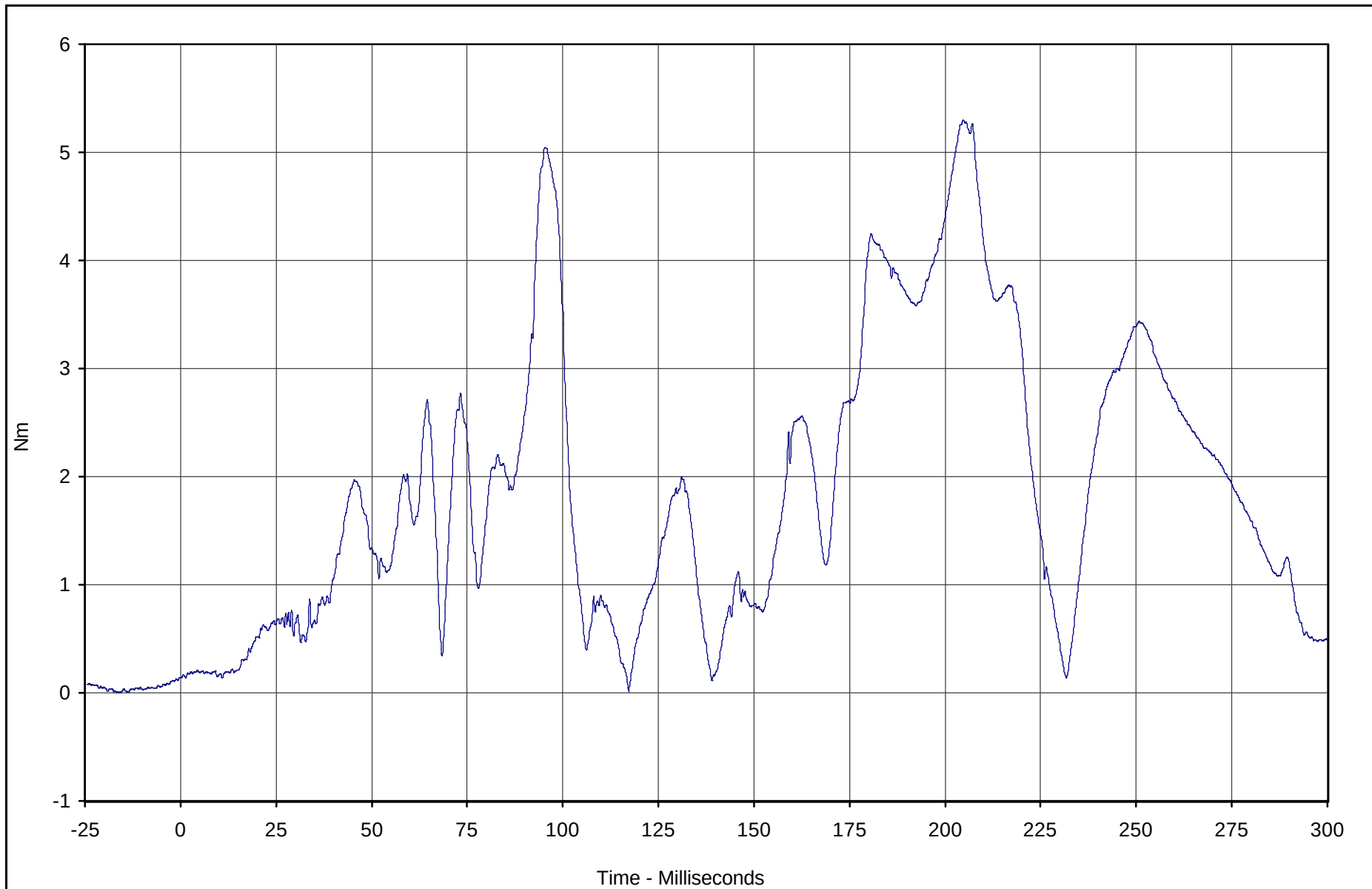


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max | Time  | Min | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-----|-------|-----|-------|-----------|
| Left Rear (3 Yr.) Upper Neck Mom Res. | 140   | RES  | Nm    | 5.3 | 204.8 | 0.0 | 117.3 | 600       |



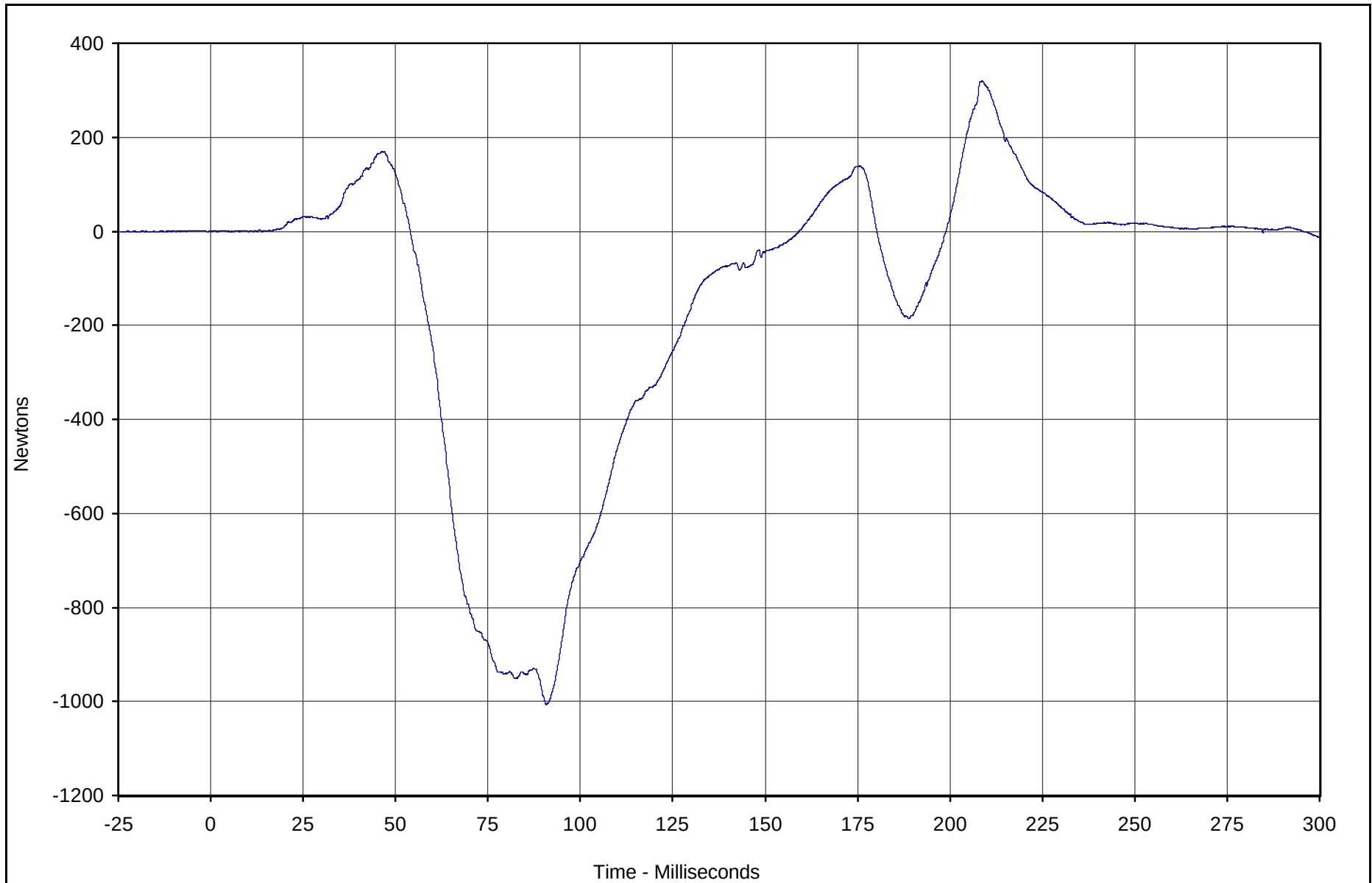
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                    | CURNO | Type | Units   | Max   | Time  | Min     | Time | SAE Class |
|--------------------------------------|-------|------|---------|-------|-------|---------|------|-----------|
| Left Rear (3 Yr.) Lower Neck Force X | 143   | FIL  | Newtons | 319.3 | 208.7 | -1006.9 | 90.8 | 1000      |

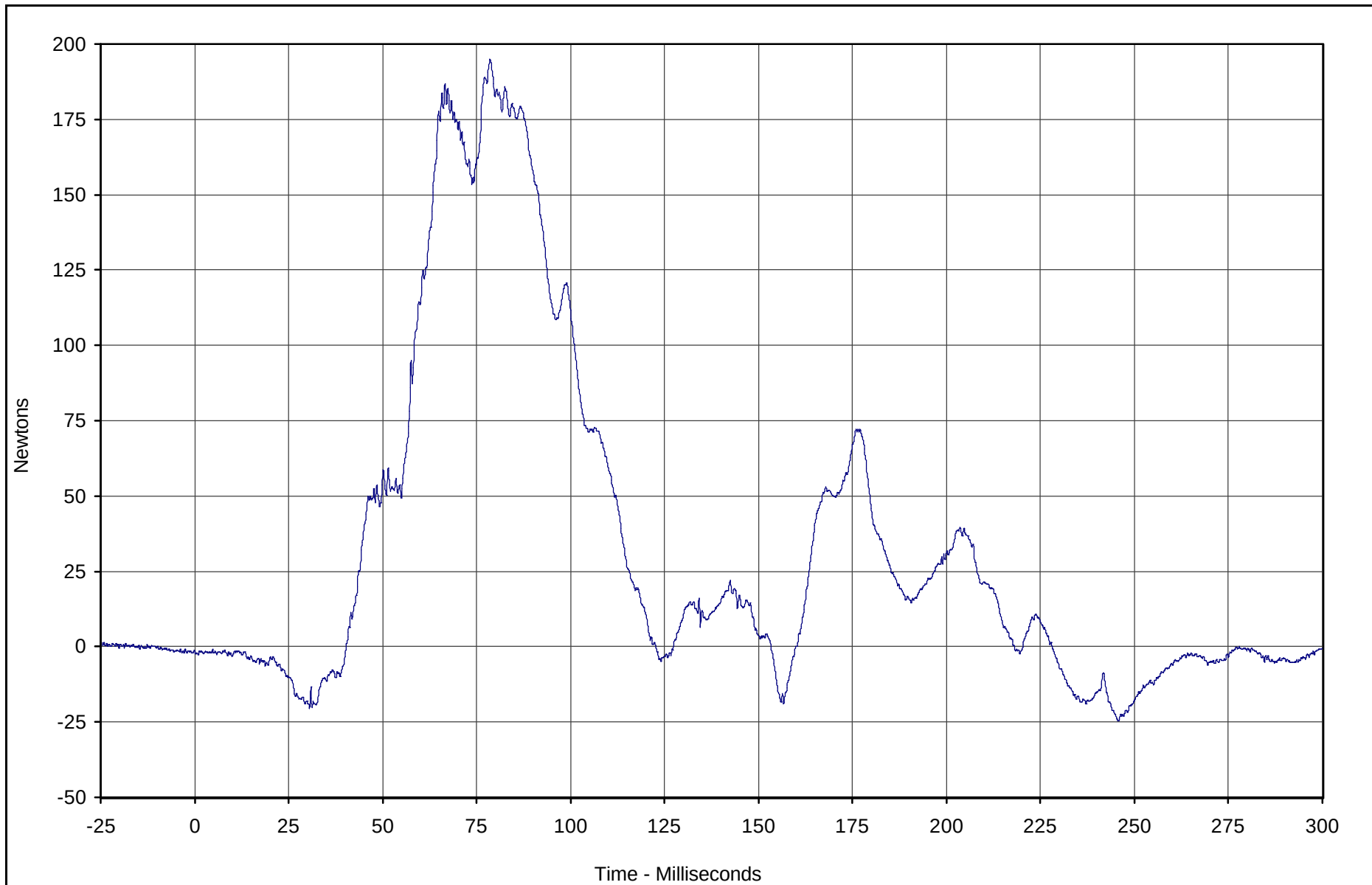


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units   | Max   | Time | Min   | Time  | SAE Class |
|--------------------------------------|-------|------|---------|-------|------|-------|-------|-----------|
| Left Rear (3 Yr.) Lower Neck Force Y | 144   | FIL  | Newtons | 195.0 | 78.6 | -24.6 | 245.8 | 1000      |

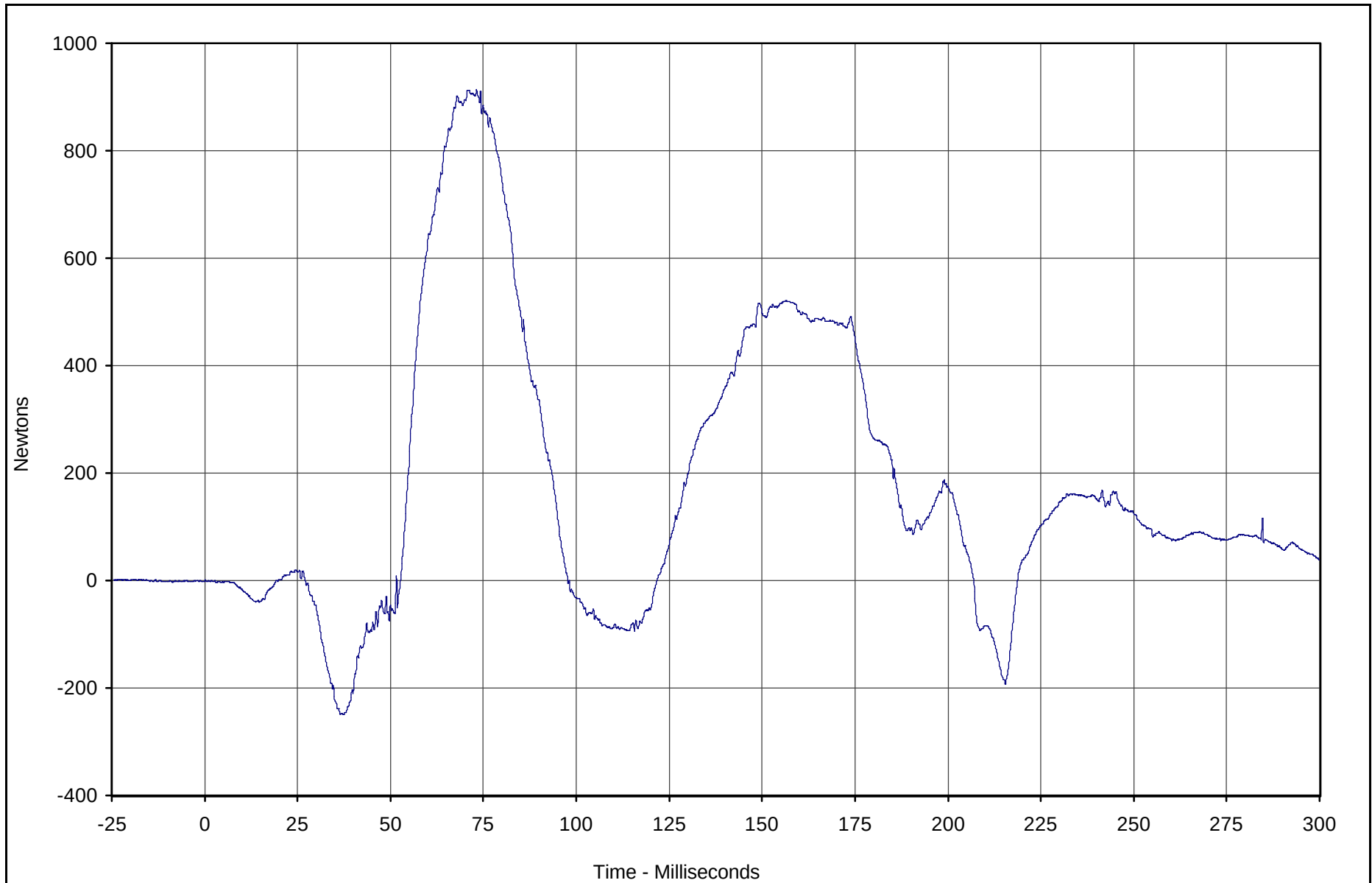


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units   | Max   | Time | Min    | Time | SAE Class |
|--------------------------------------|-------|------|---------|-------|------|--------|------|-----------|
| Left Rear (3 Yr.) Lower Neck Force Z | 145   | FIL  | Newtons | 913.2 | 73.2 | -250.0 | 36.6 | 1000      |

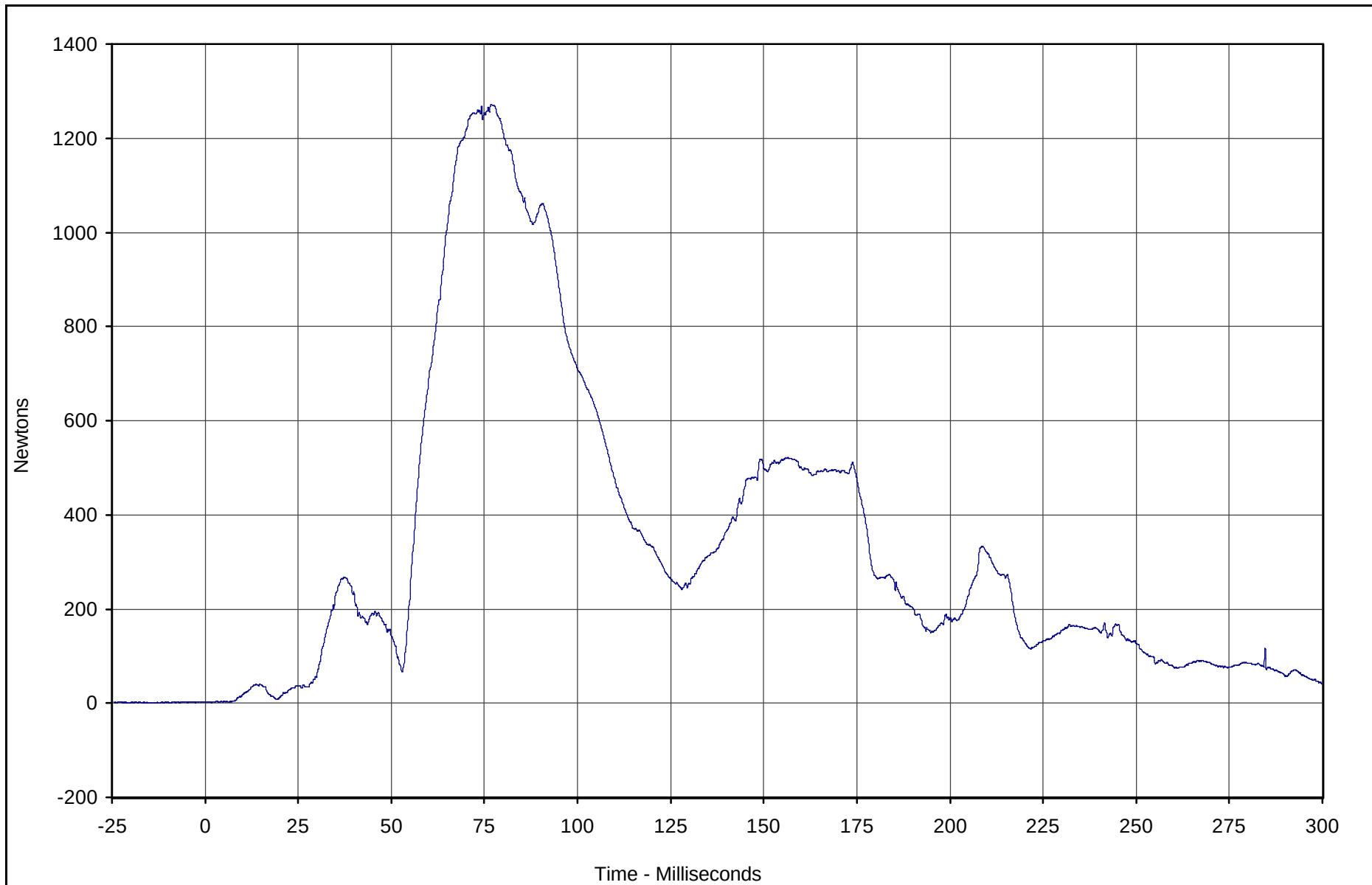


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                       | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|-----------------------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Left Rear (3 Yr.) Lower Neck Force Res. | 143   | RES  | Newtons | 1271.0 | 76.8 | 1.5 | 1.8  | 1000      |

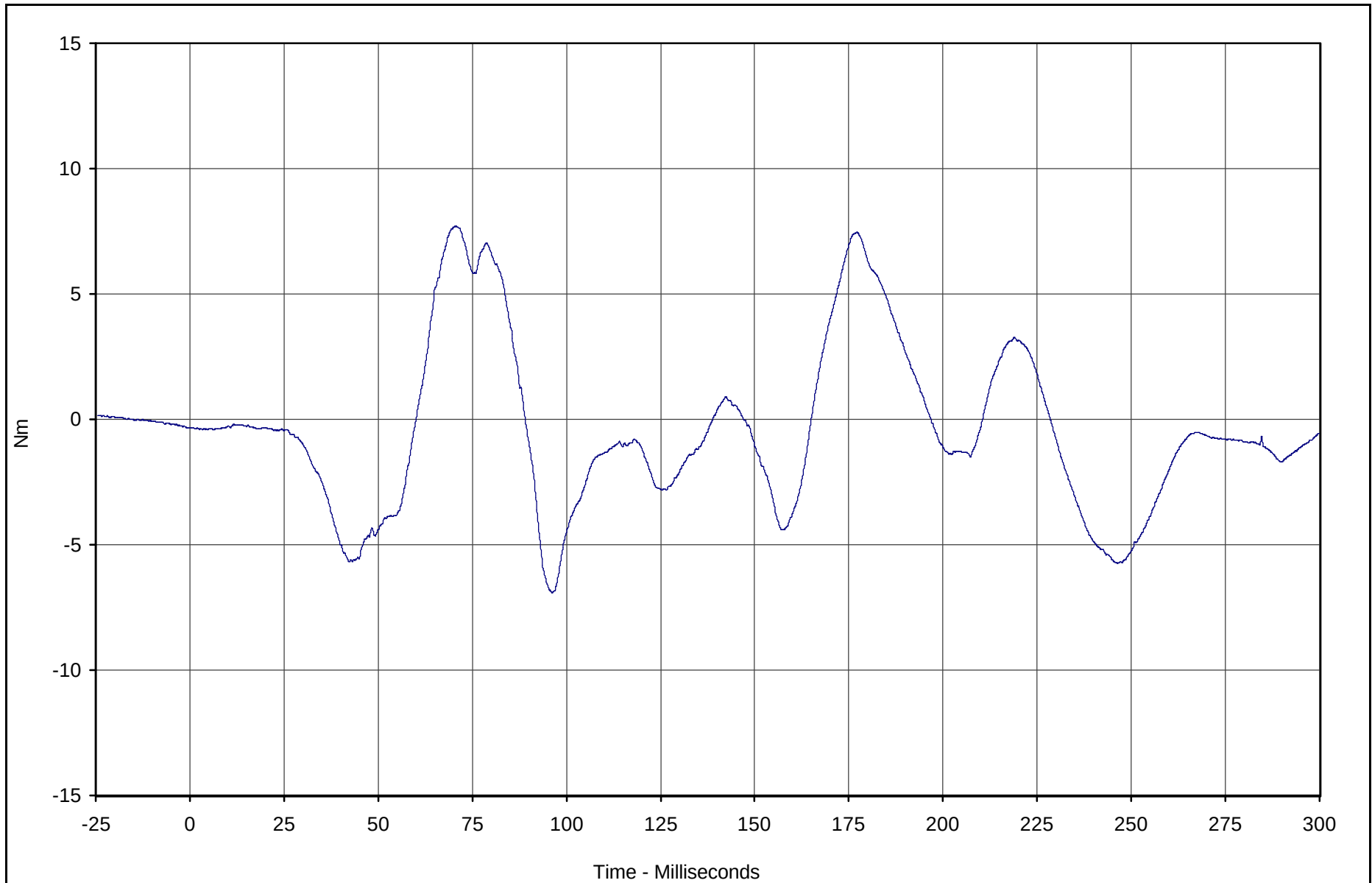


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|---------------------------------------|-------|------|-------|-----|------|------|------|-----------|
| Left Rear (3 Yr.) Lower Neck Moment X | 146   | FIL  | Nm    | 7.7 | 70.6 | -6.9 | 96.2 | 600       |



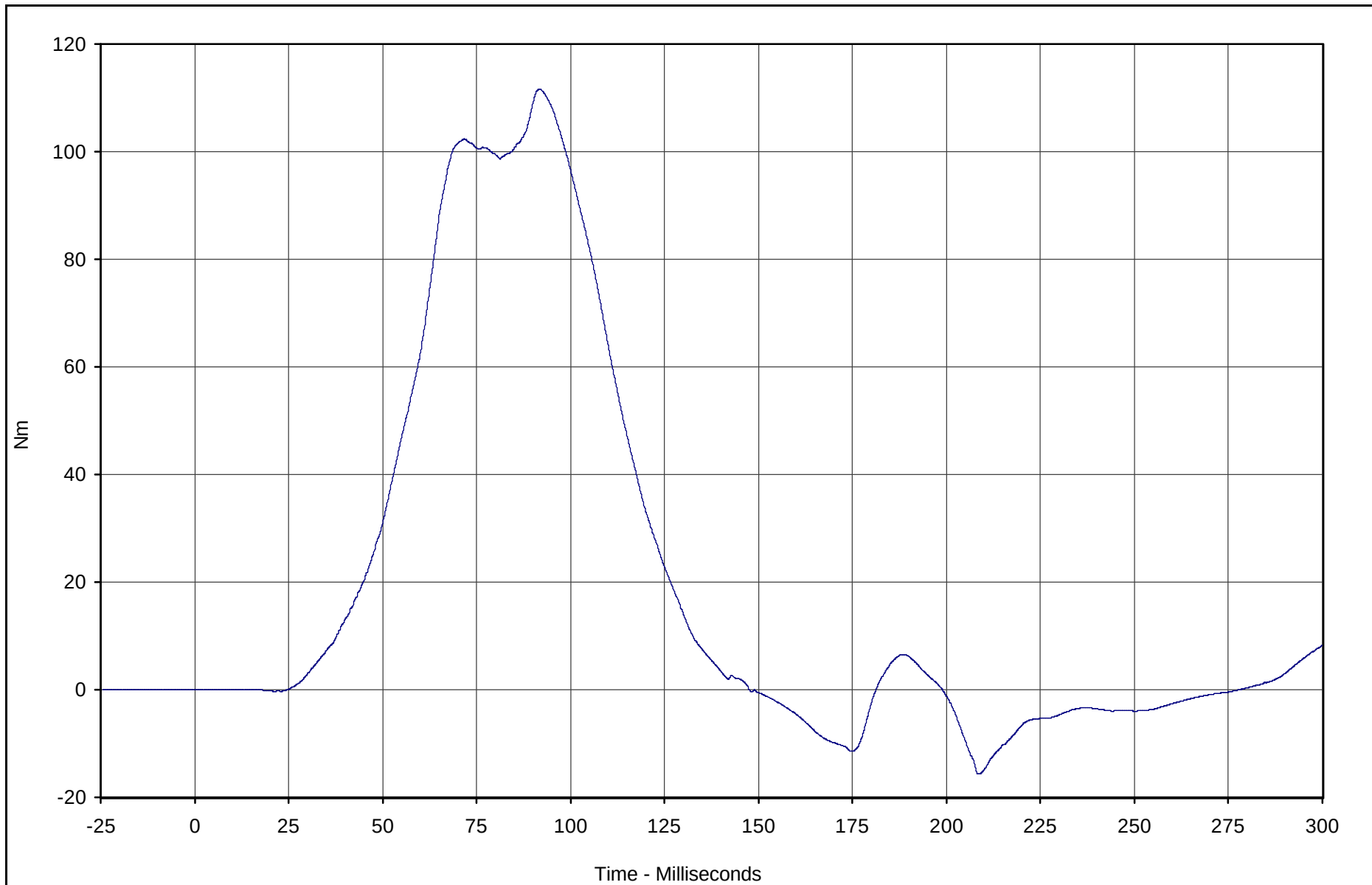
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                     | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Left Rear (3 Yr.) Lower Neck Moment Y | 147   | FIL  | Nm    | 111.7 | 91.7 | -15.6 | 208.7 | 600       |

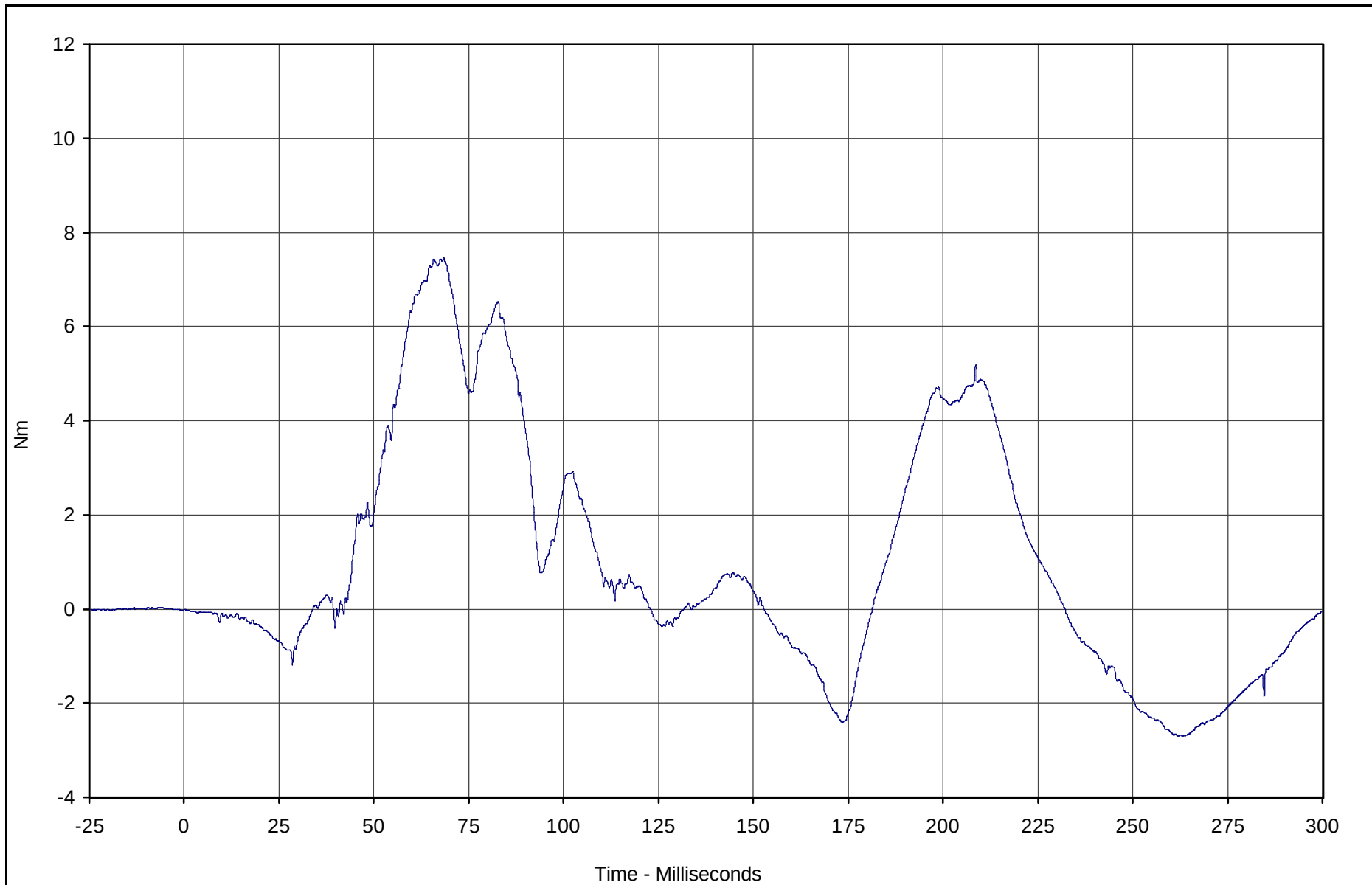


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Left Rear (3 Yr.) Lower Neck Moment Z | 148   | FIL  | Nm    | 7.5 | 68.4 | -2.7 | 262.0 | 600       |

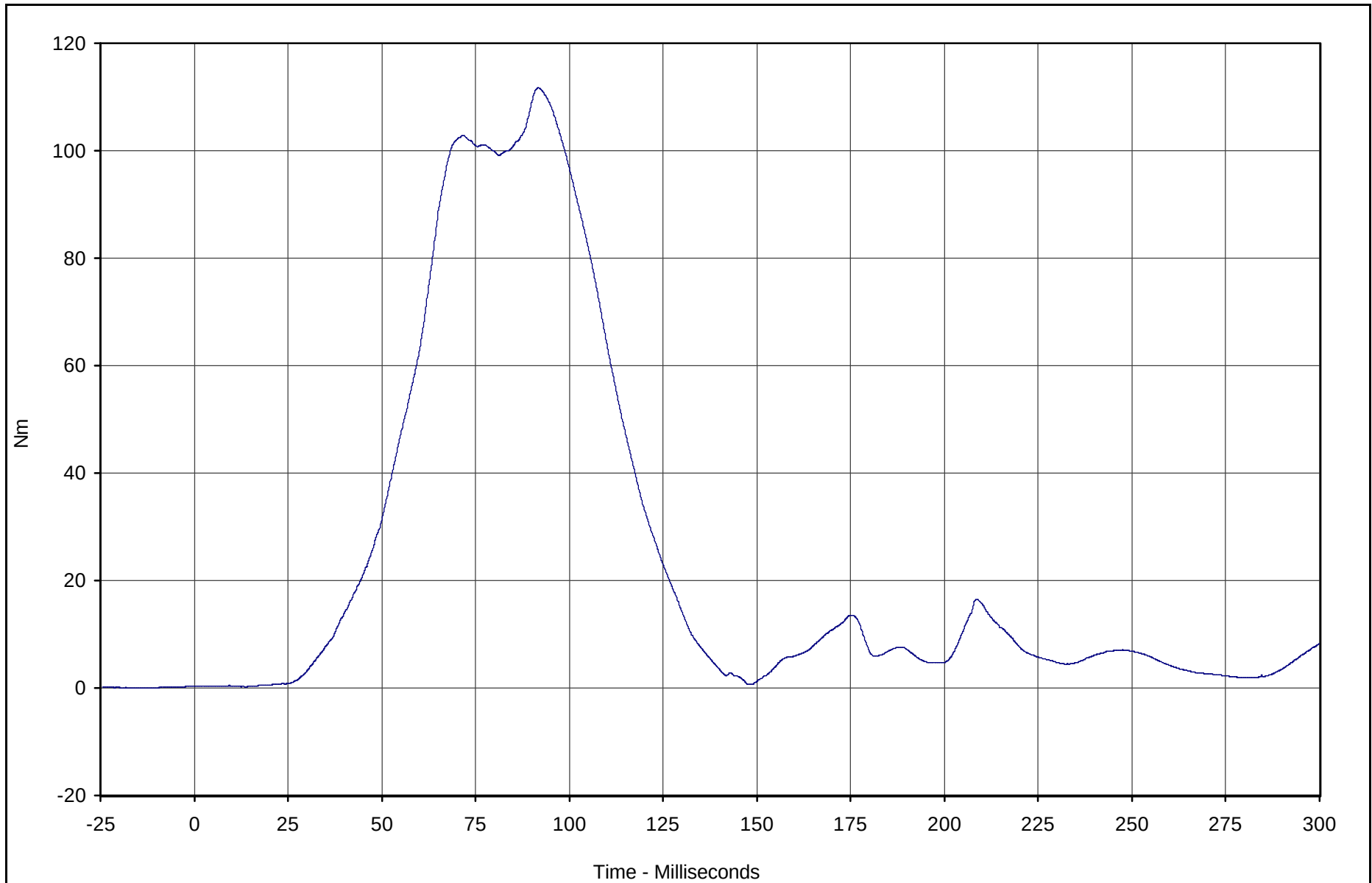


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max   | Time | Min | Time | SAE Class |
|---------------------------------------|-------|------|-------|-------|------|-----|------|-----------|
| Left Rear (3 Yr.) Lower Neck Mom Res. | 146   | RES  | Nm    | 111.7 | 91.7 | 0.2 | 13.9 | 600       |

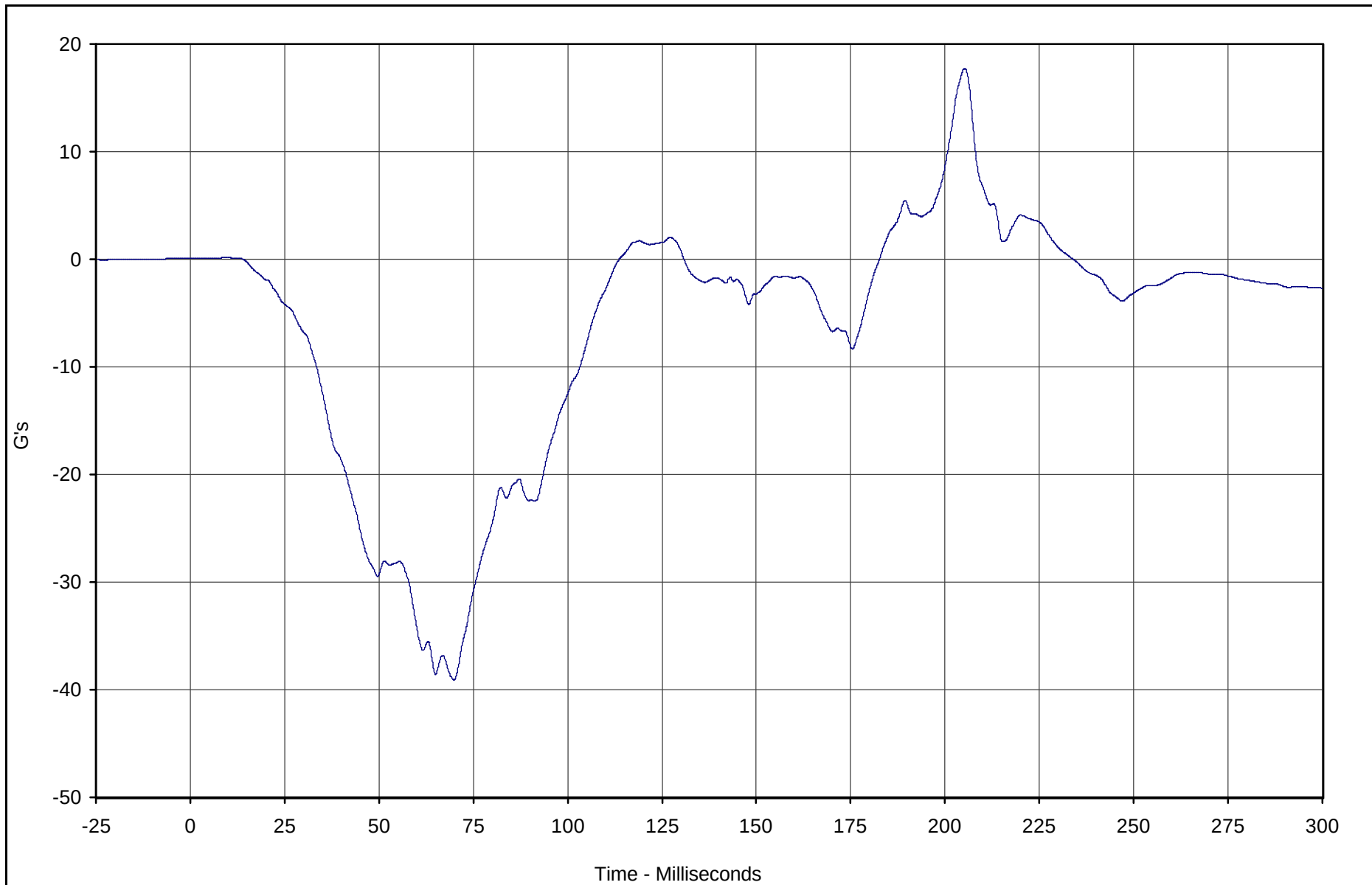


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Chest X | 149   | FIL  | G's   | 17.7 | 205.3 | -39.1 | 69.8 | 180       |

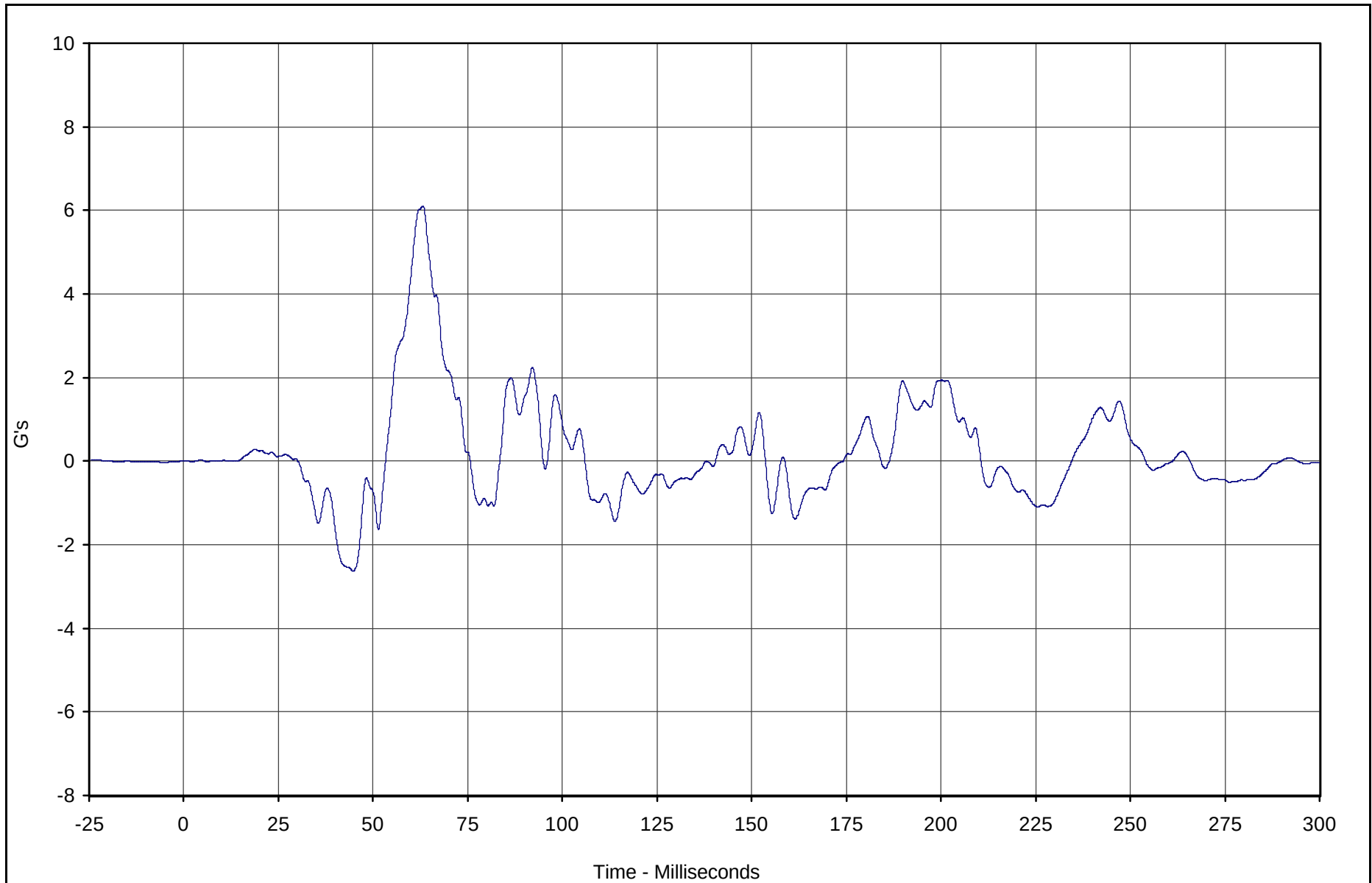


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|---------------------------|-------|------|-------|-----|------|------|------|-----------|
| Left Rear (3 Yr.) Chest Y | 150   | FIL  | G's   | 6.1 | 63.2 | -2.6 | 44.8 | 180       |



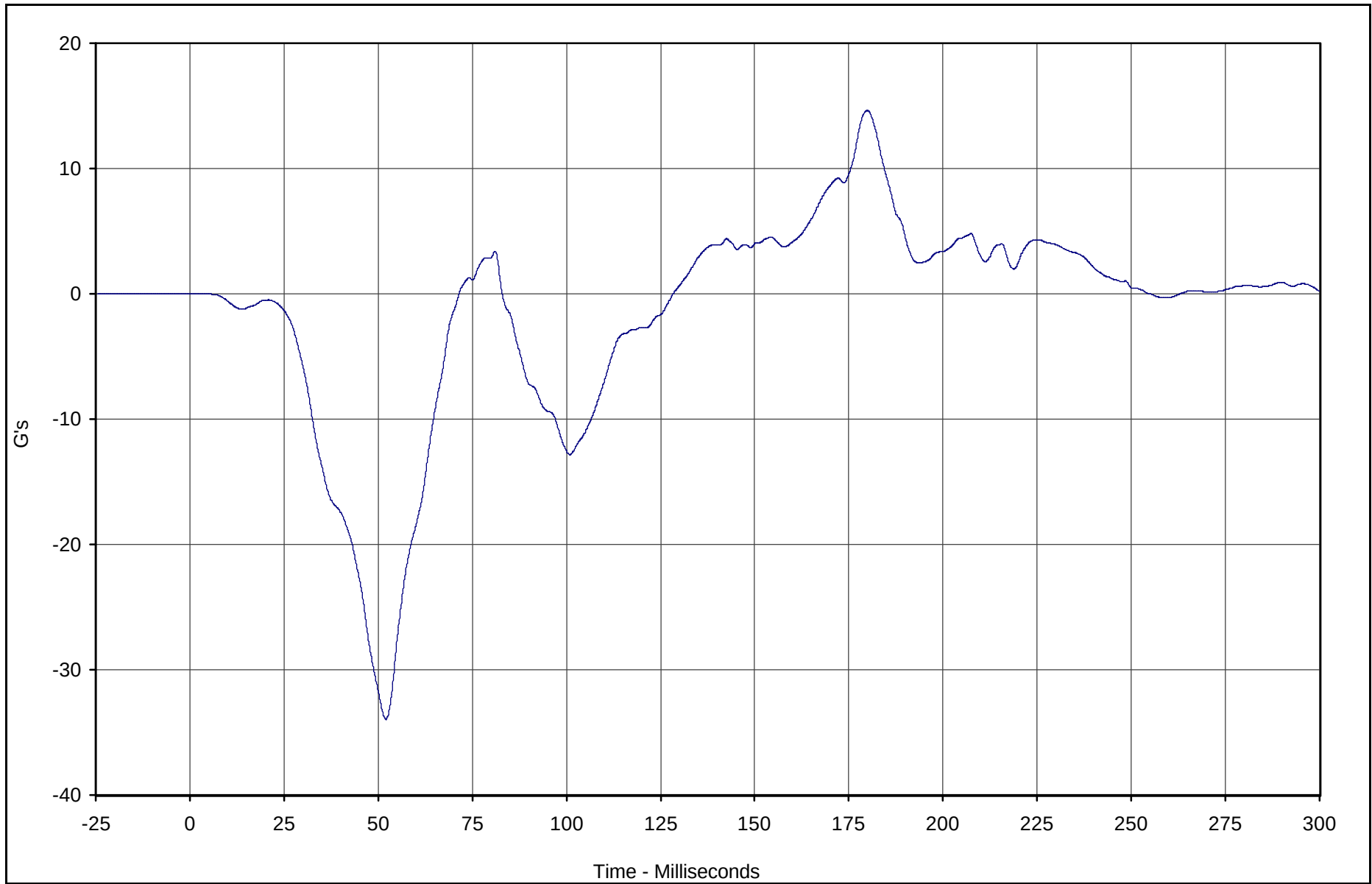
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description         | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Chest Z | 151   | FIL  | G's   | 14.6 | 179.9 | -34.0 | 52.1 | 180       |

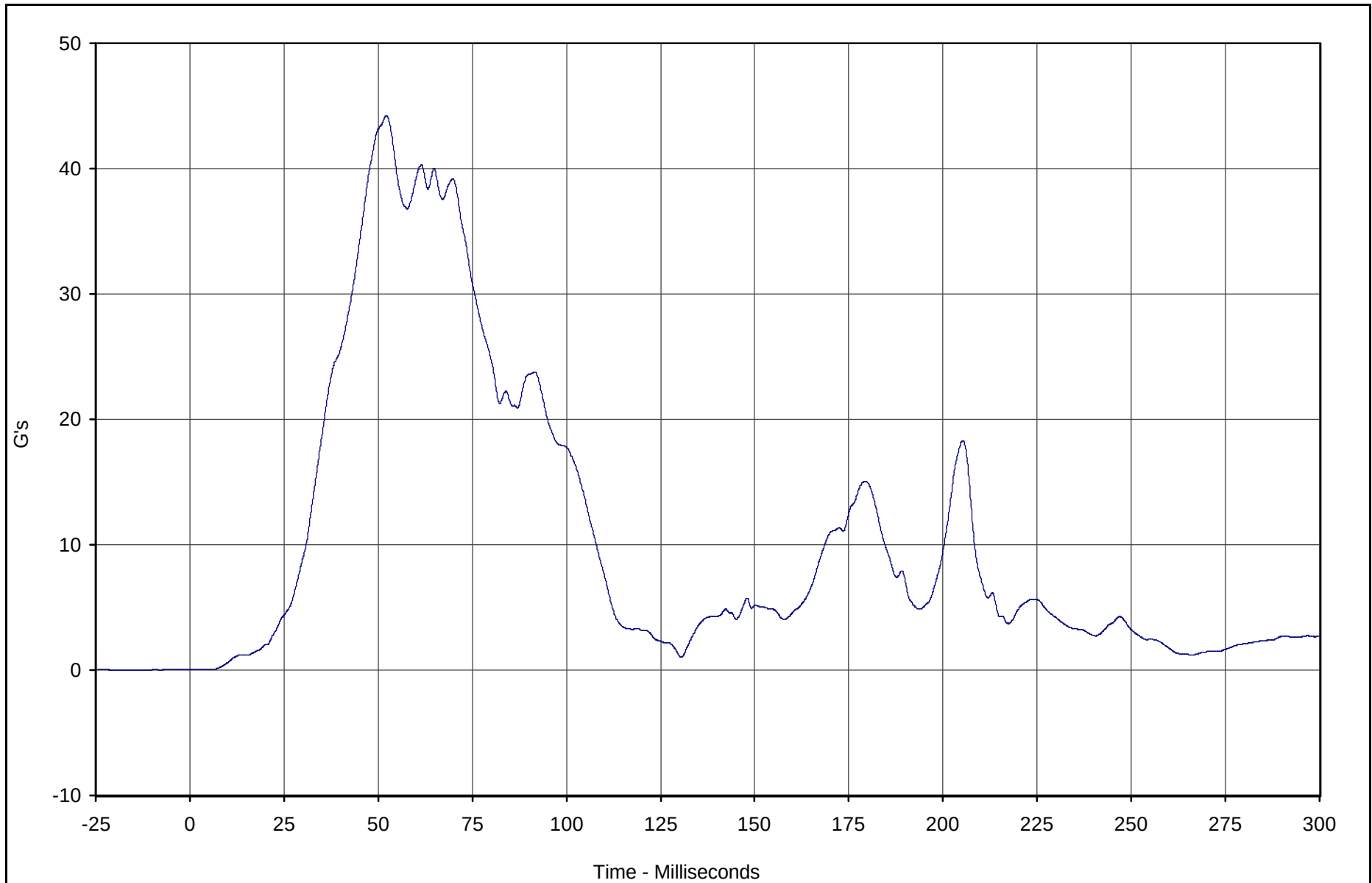


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Left Rear (3 Yr.) Chest Resultant | 149   | RES  | G's   | 44.2 | 52.2 | 0.1 | 1.3  | 180       |

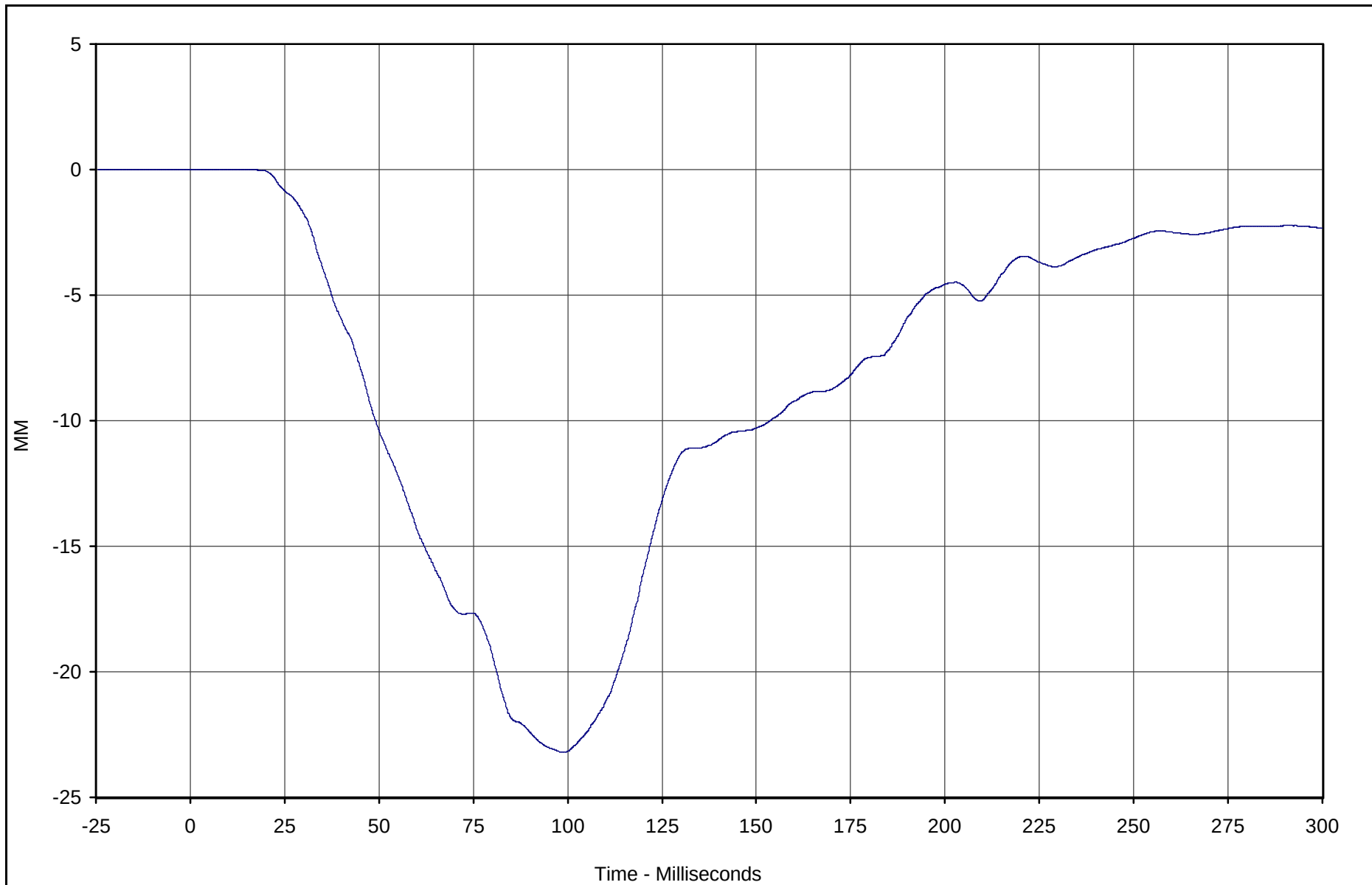


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max | Time | Min   | Time | SAE Class |
|--------------------------------------|-------|------|-------|-----|------|-------|------|-----------|
| Left Rear (3 Yr.) Chest Displacement | 152   | FIL  | MM    | 0.0 | 7.5  | -23.2 | 99.0 | 600       |

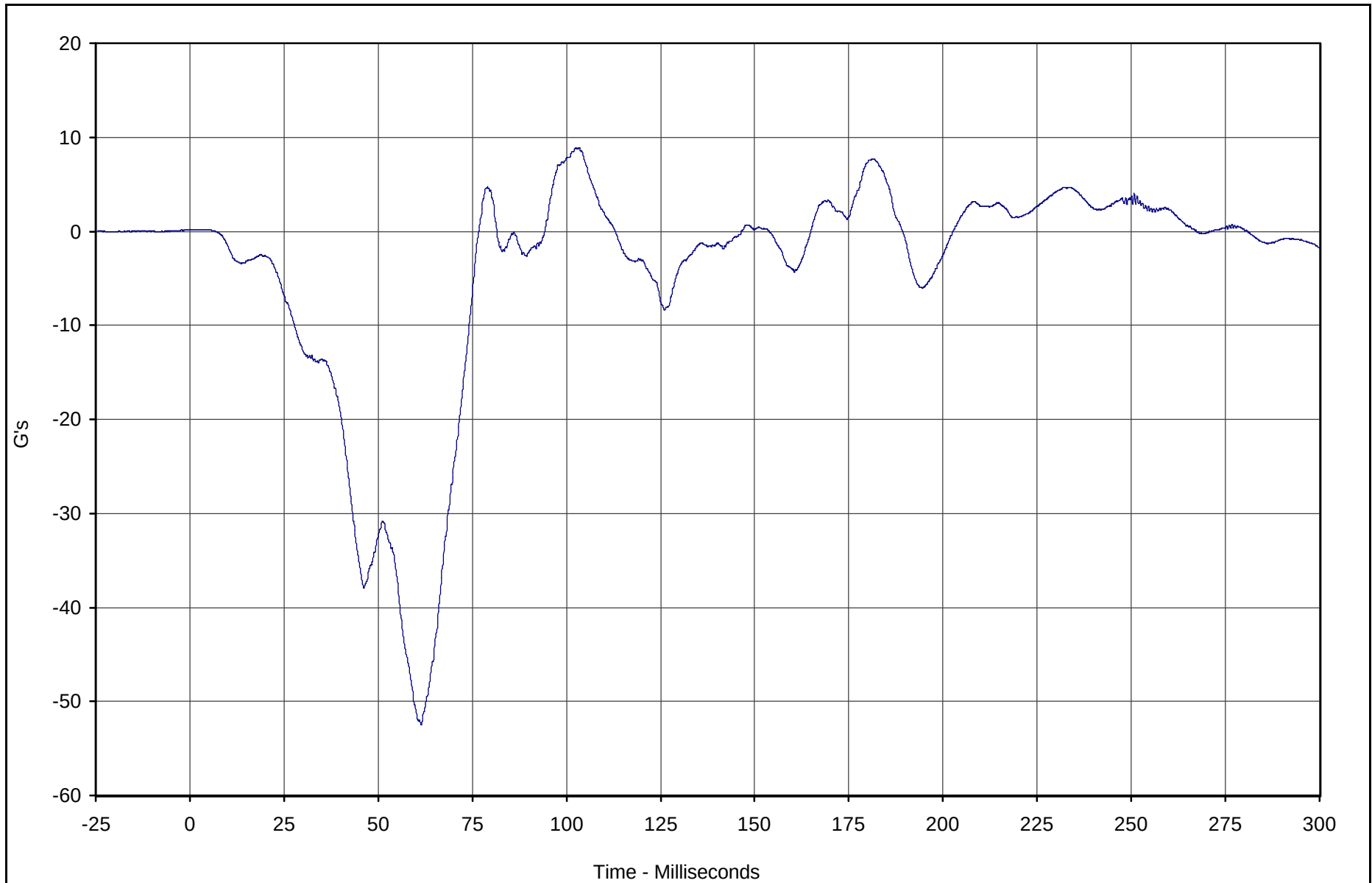


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Left Rear (3 Yr.) Pelvis X | 153   | FIL  | G's   | 8.9 | 103.4 | -52.5 | 61.4 | 1000      |

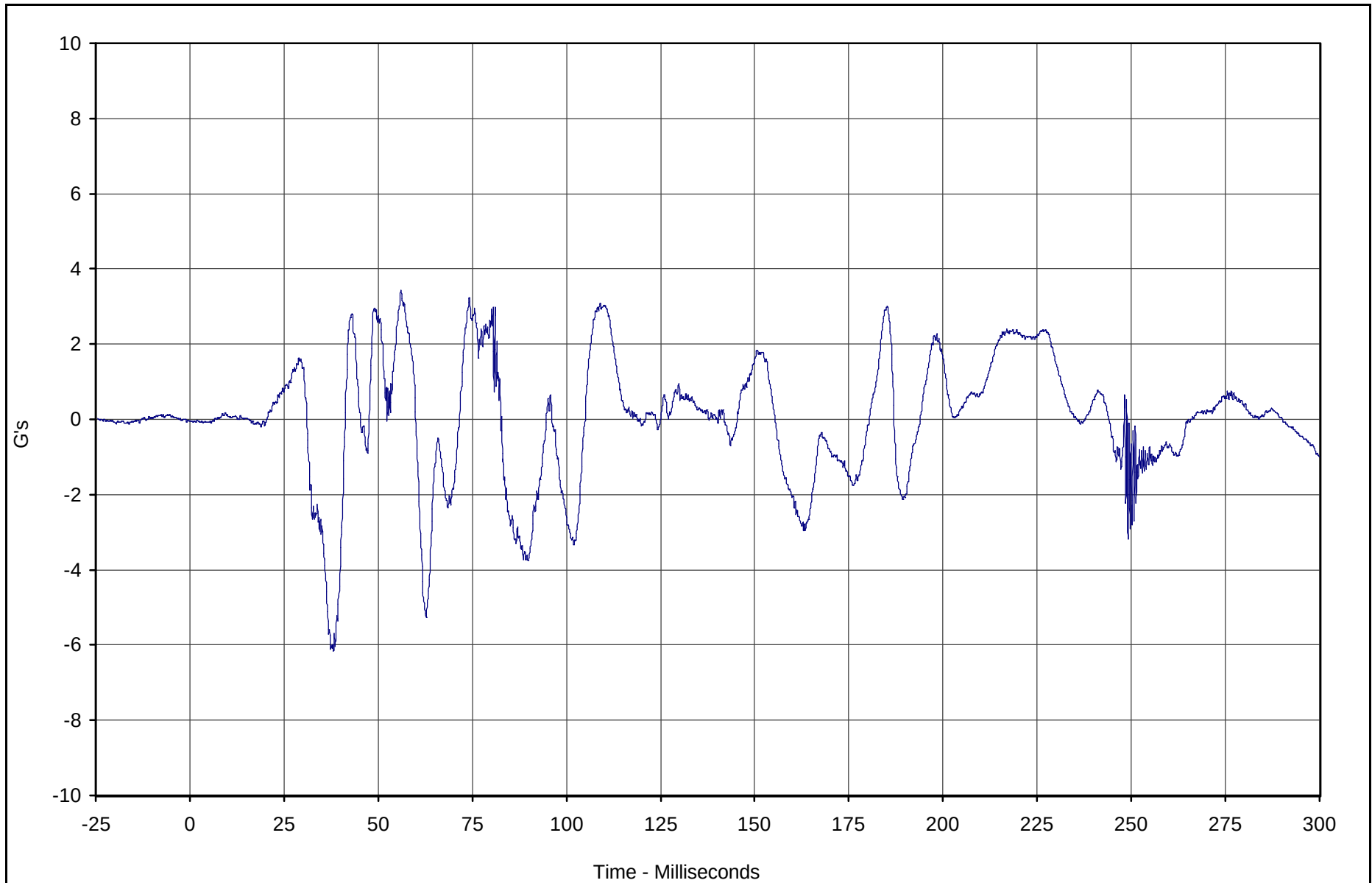


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time | Min  | Time | SAE Class |
|----------------------------|-------|------|-------|-----|------|------|------|-----------|
| Left Rear (3 Yr.) Pelvis Y | 154   | FIL  | G's   | 3.4 | 56.1 | -6.2 | 38.1 | 1000      |

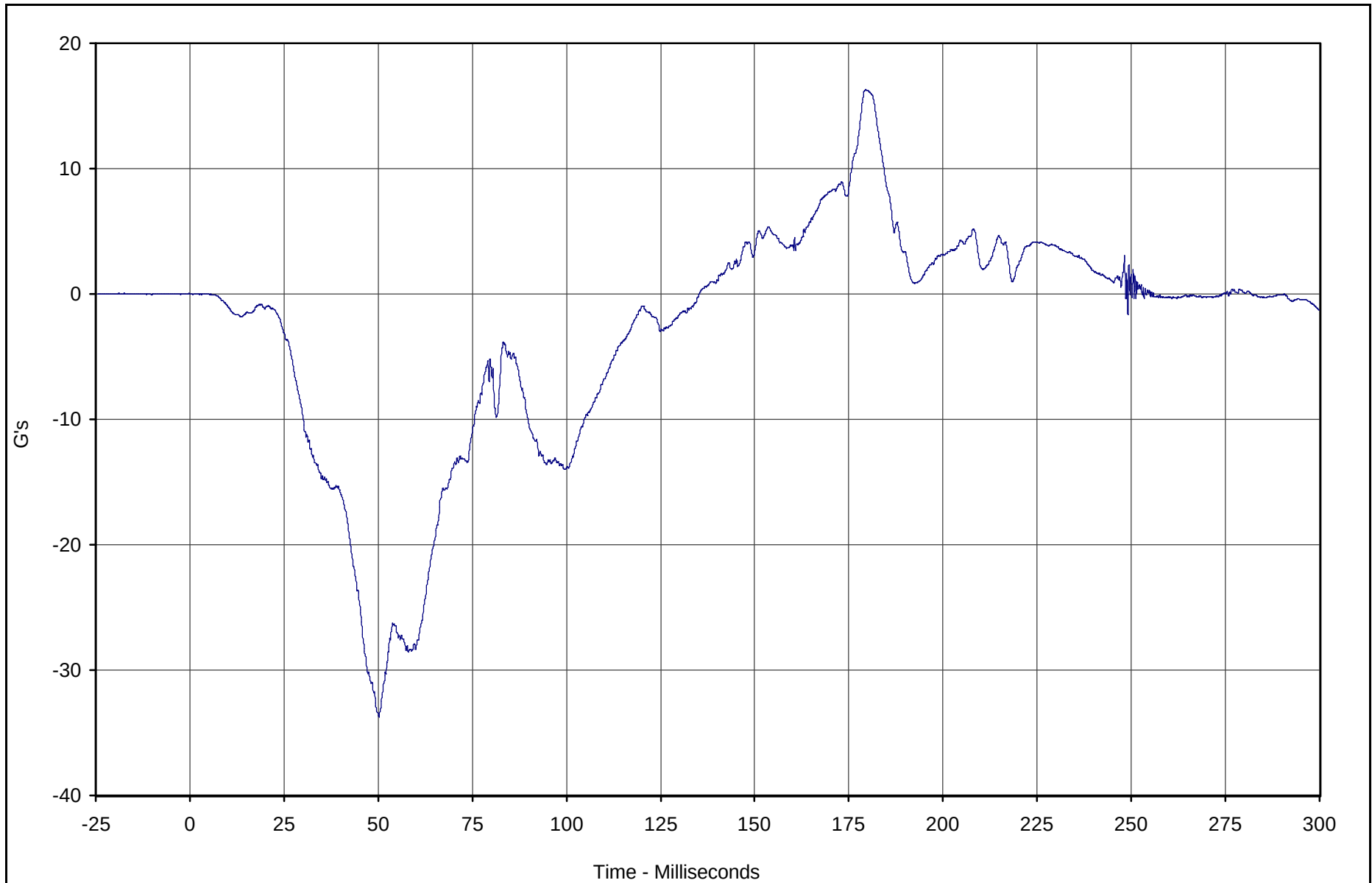


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Pelvis Z | 155   | FIL  | G's   | 16.3 | 179.4 | -33.7 | 50.2 | 1000      |



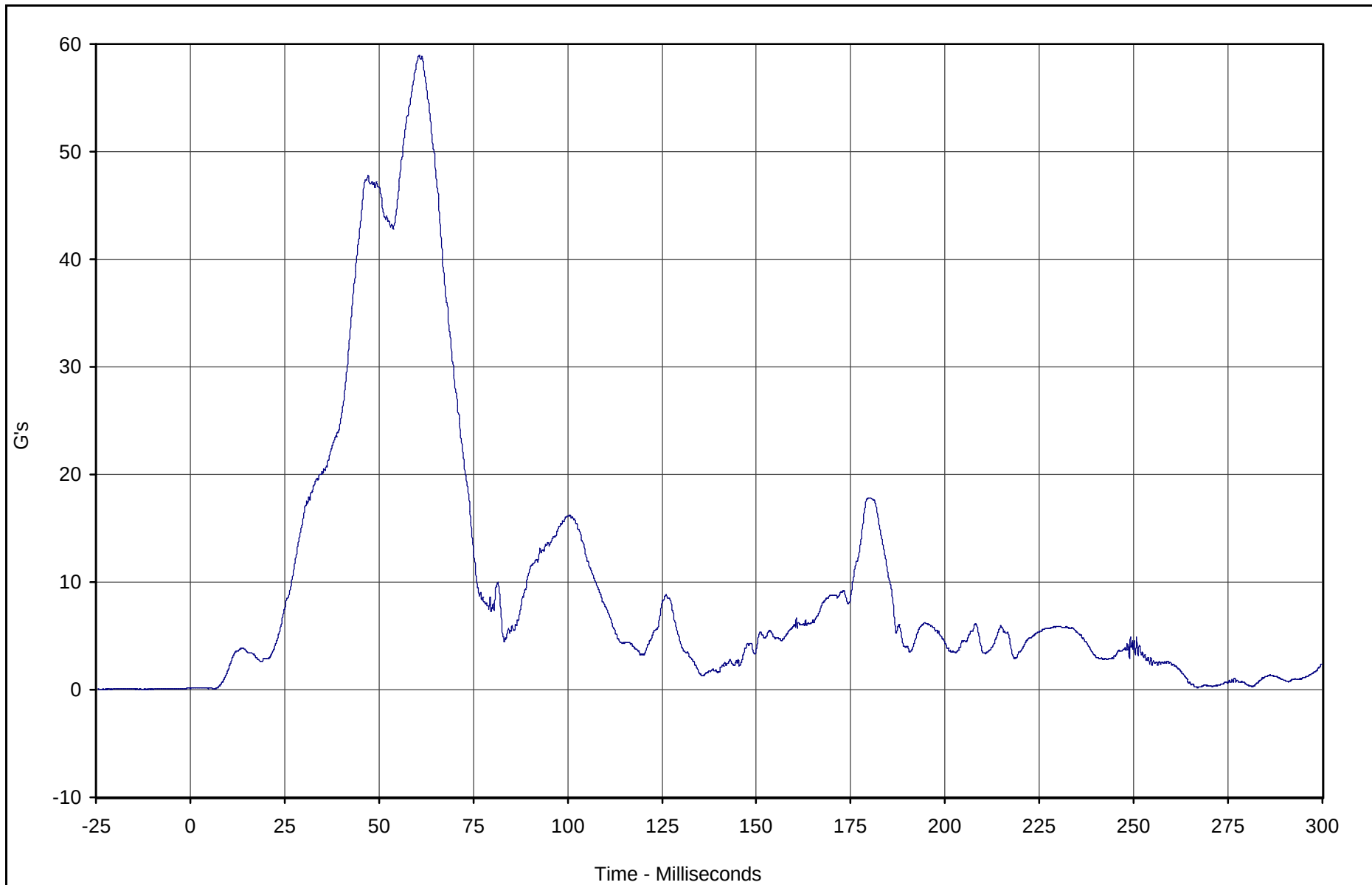
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Left Rear (3 Yr.) Pelvis Resultant | 153   | RES  | G's   | 58.9 | 60.7 | 0.1 | 6.6  | 1000      |

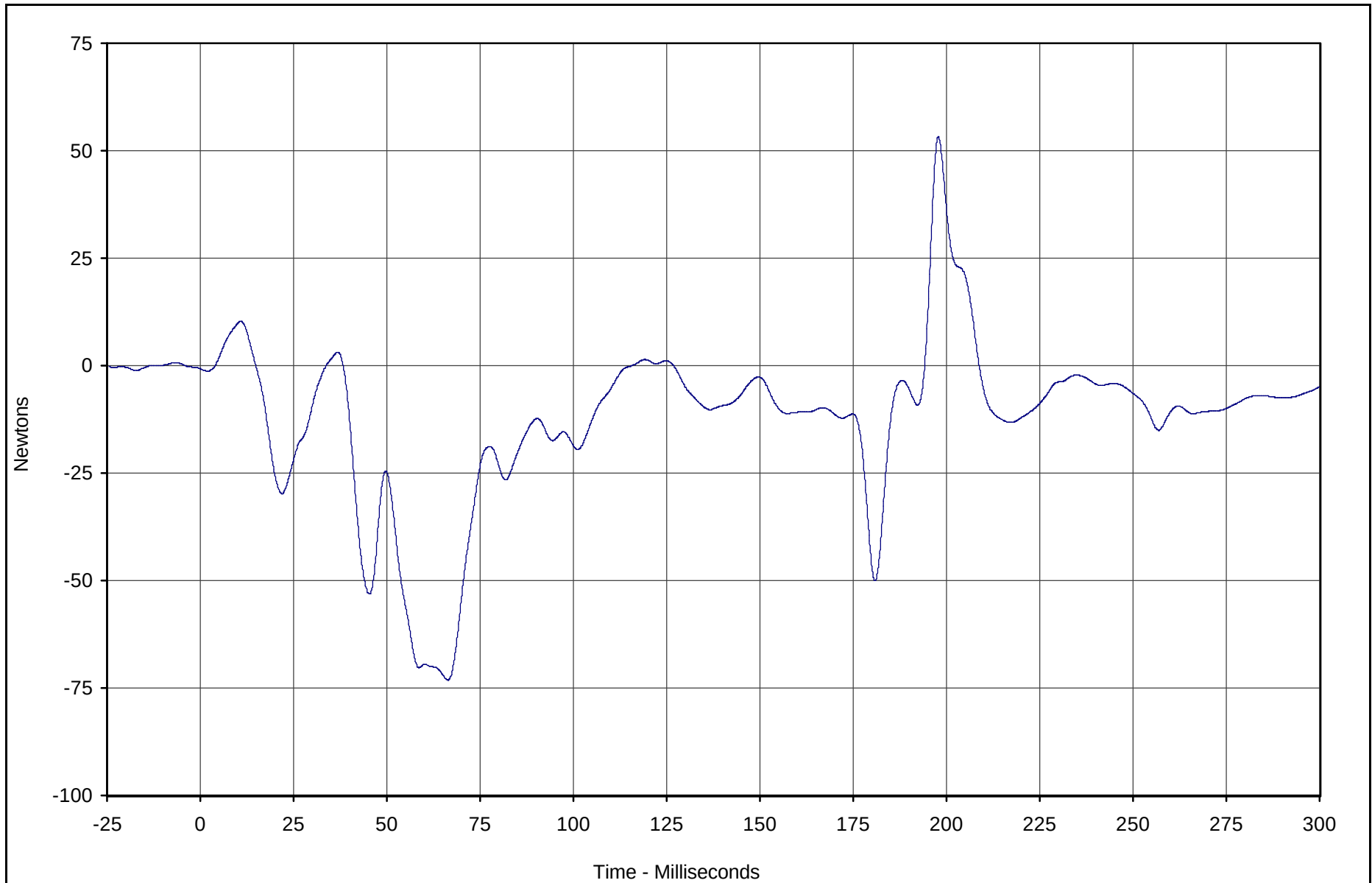


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units   | Max  | Time  | Min   | Time | SAE Class |
|----------------------------------------|-------|------|---------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Car Seat Tether Load | 156   | FIL  | Newtons | 53.2 | 197.8 | -73.1 | 66.3 | 60        |

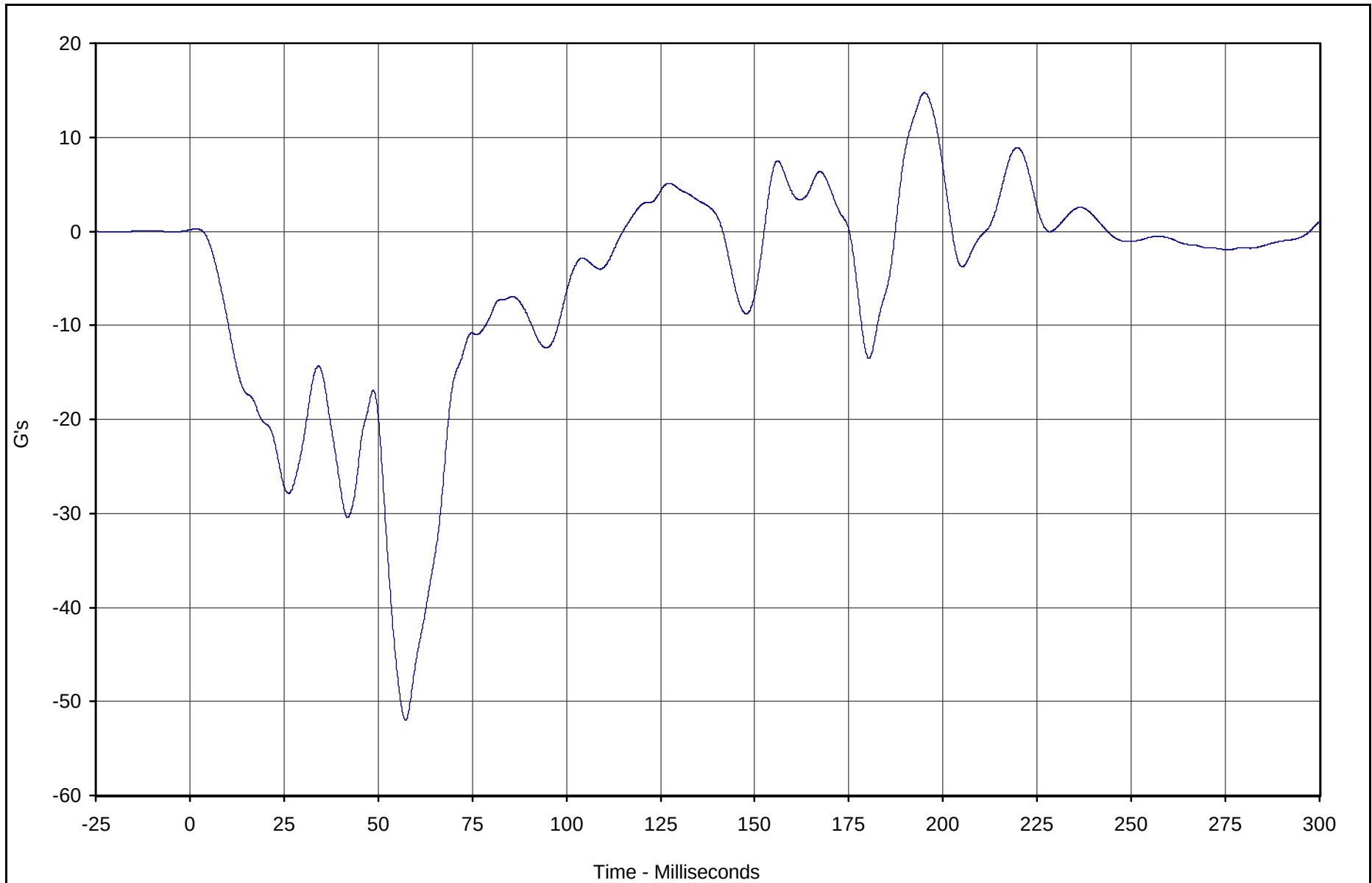


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Car Seat X | 157   | FIL  | G's   | 14.7 | 195.1 | -52.0 | 57.3 | 60        |

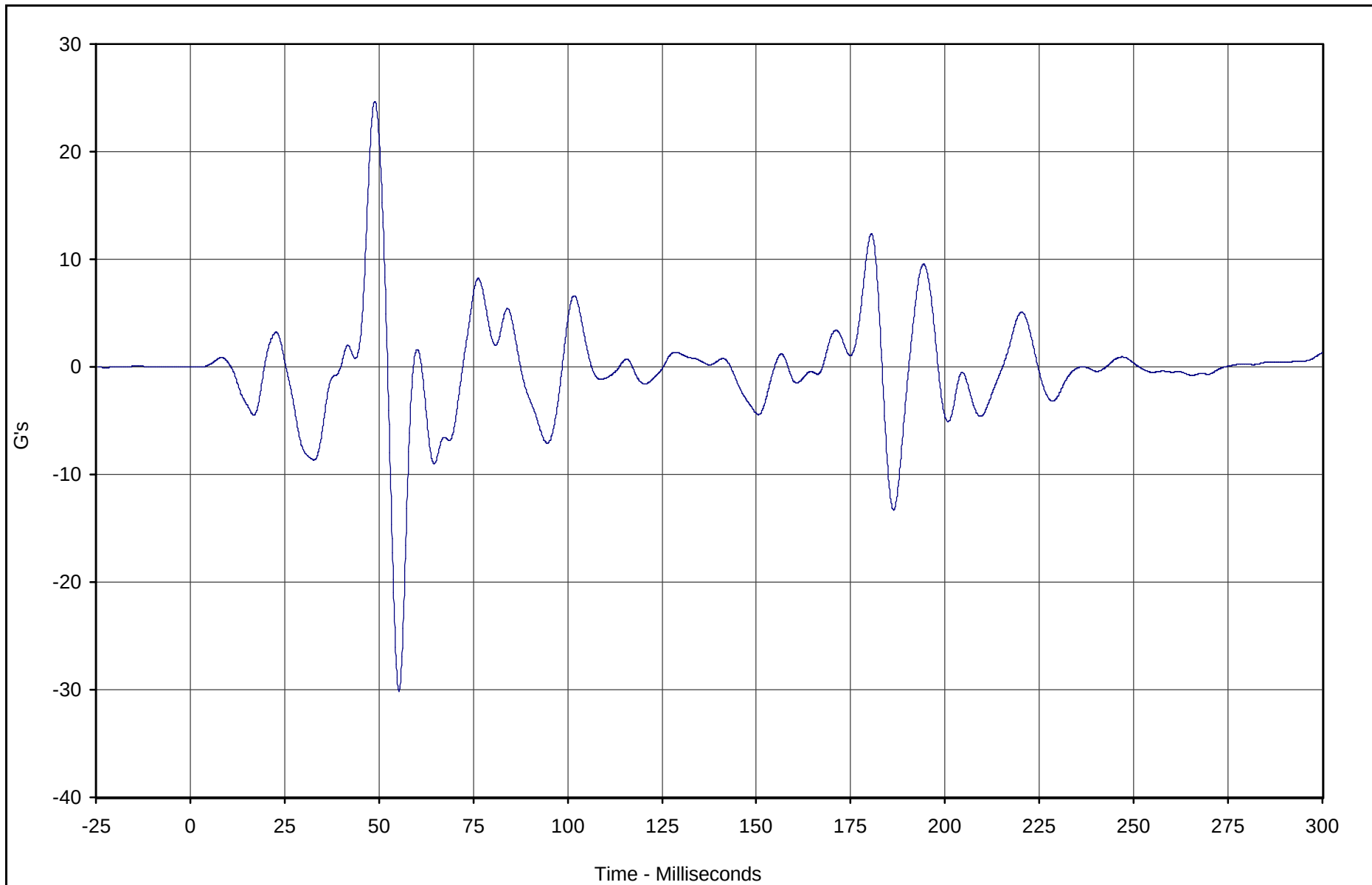


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max  | Time | Min   | Time | SAE Class |
|------------------------------|-------|------|-------|------|------|-------|------|-----------|
| Left Rear (3 Yr.) Car Seat Y | 158   | FIL  | G's   | 24.7 | 48.9 | -30.2 | 55.3 | 60        |

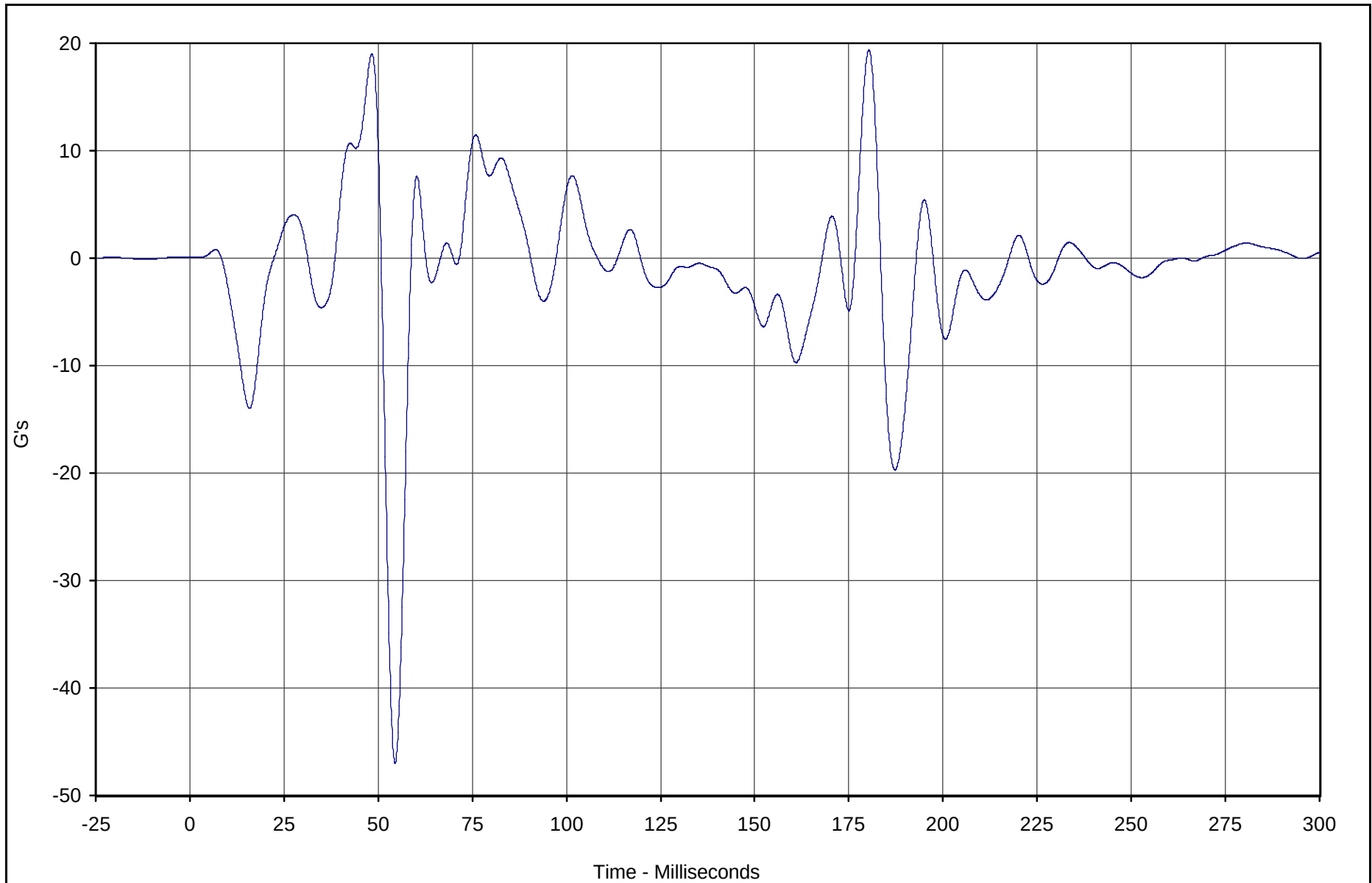


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description            | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|------------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Left Rear (3 Yr.) Car Seat Z | 159   | FIL  | G's   | 19.4 | 180.3 | -47.0 | 54.5 | 60        |

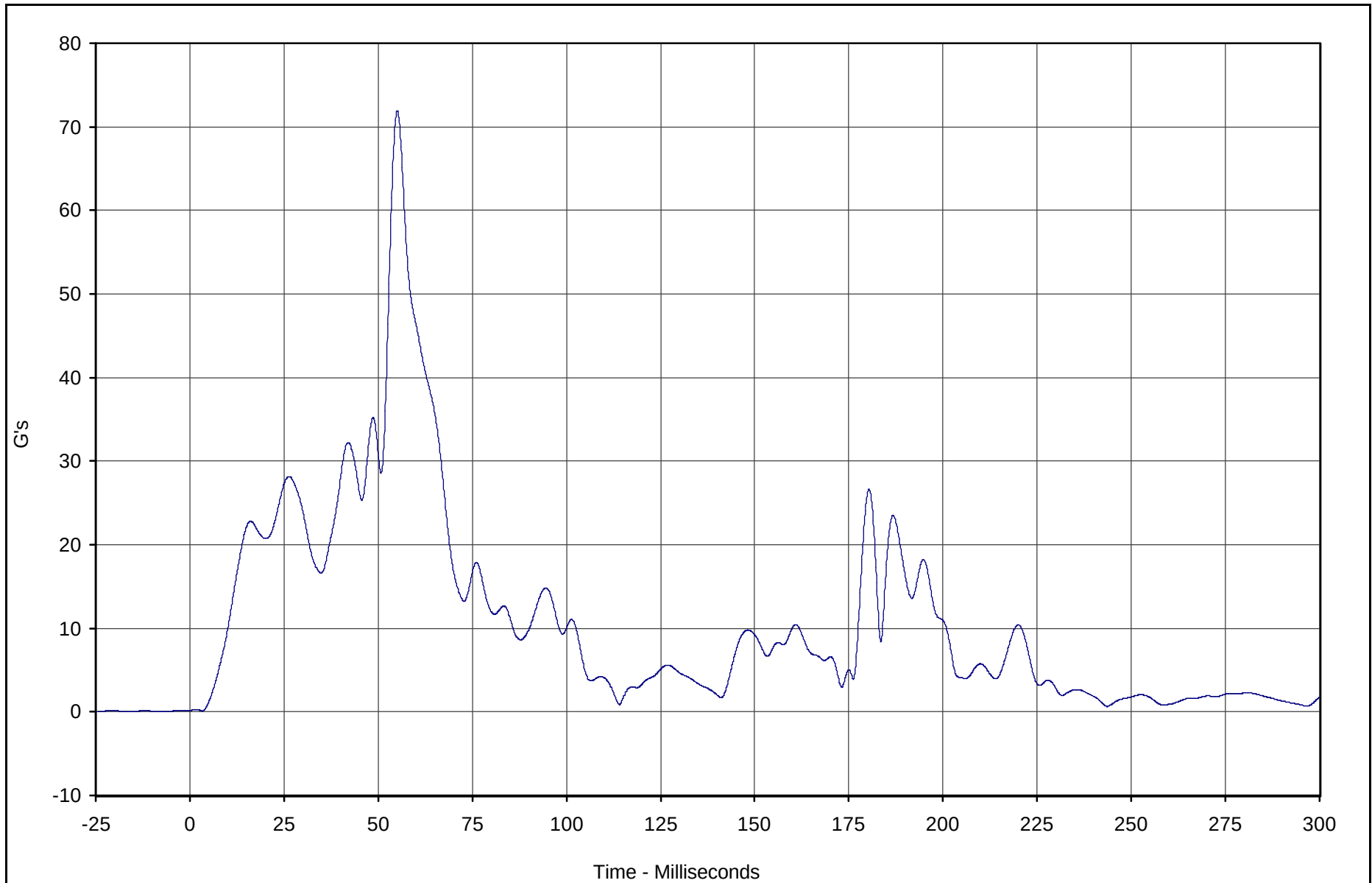


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                    | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|--------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Left Rear (3 Yr.) Car Seat Resultant | 157   | RES  | G's   | 71.9 | 55.1 | 0.1 | 3.3  | 60        |



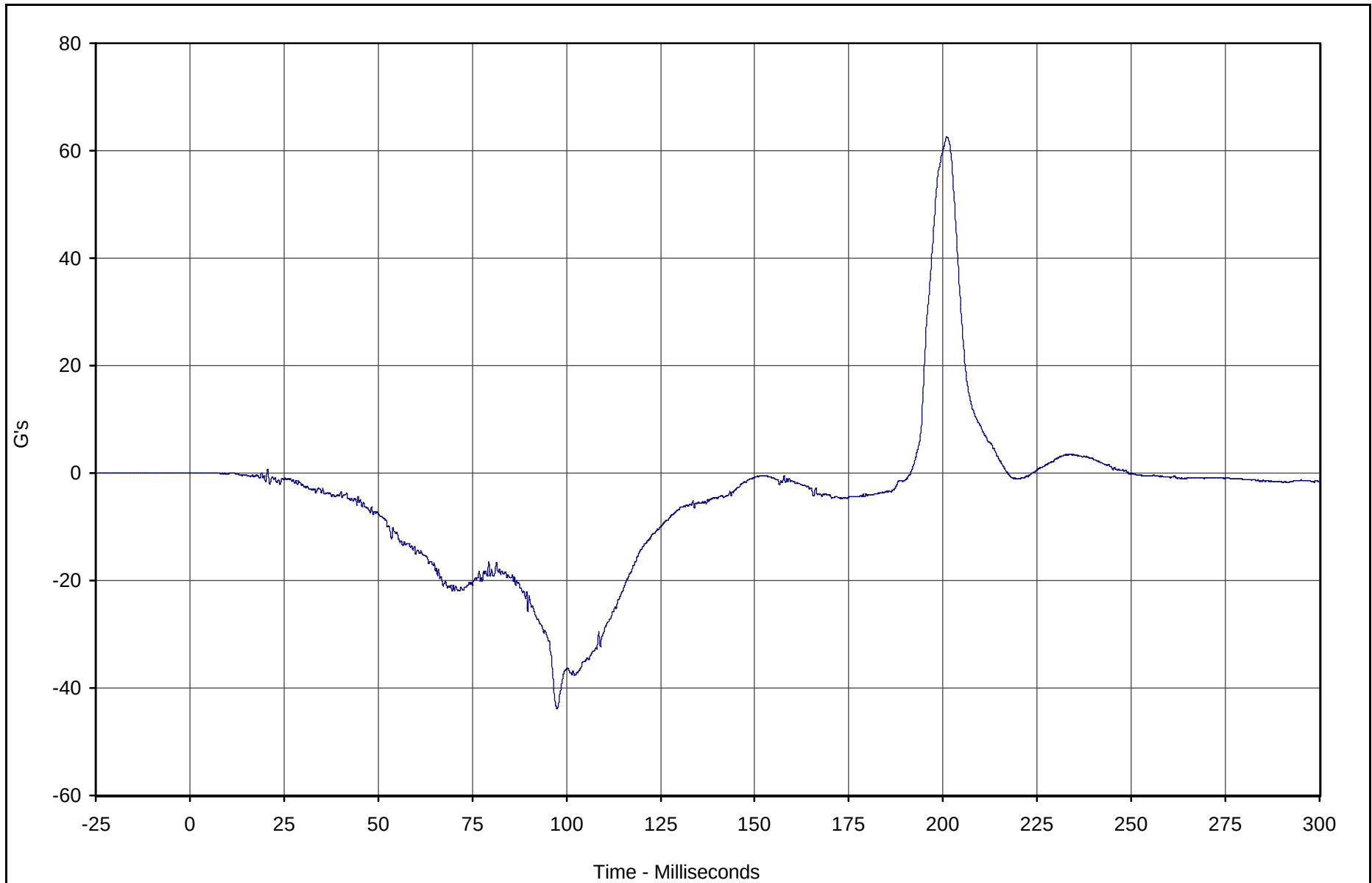
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description         | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|---------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Right Rear (3 Yr.) Head X | 160   | FIL  | G's   | 62.6 | 201.0 | -43.9 | 97.6 | 1000      |

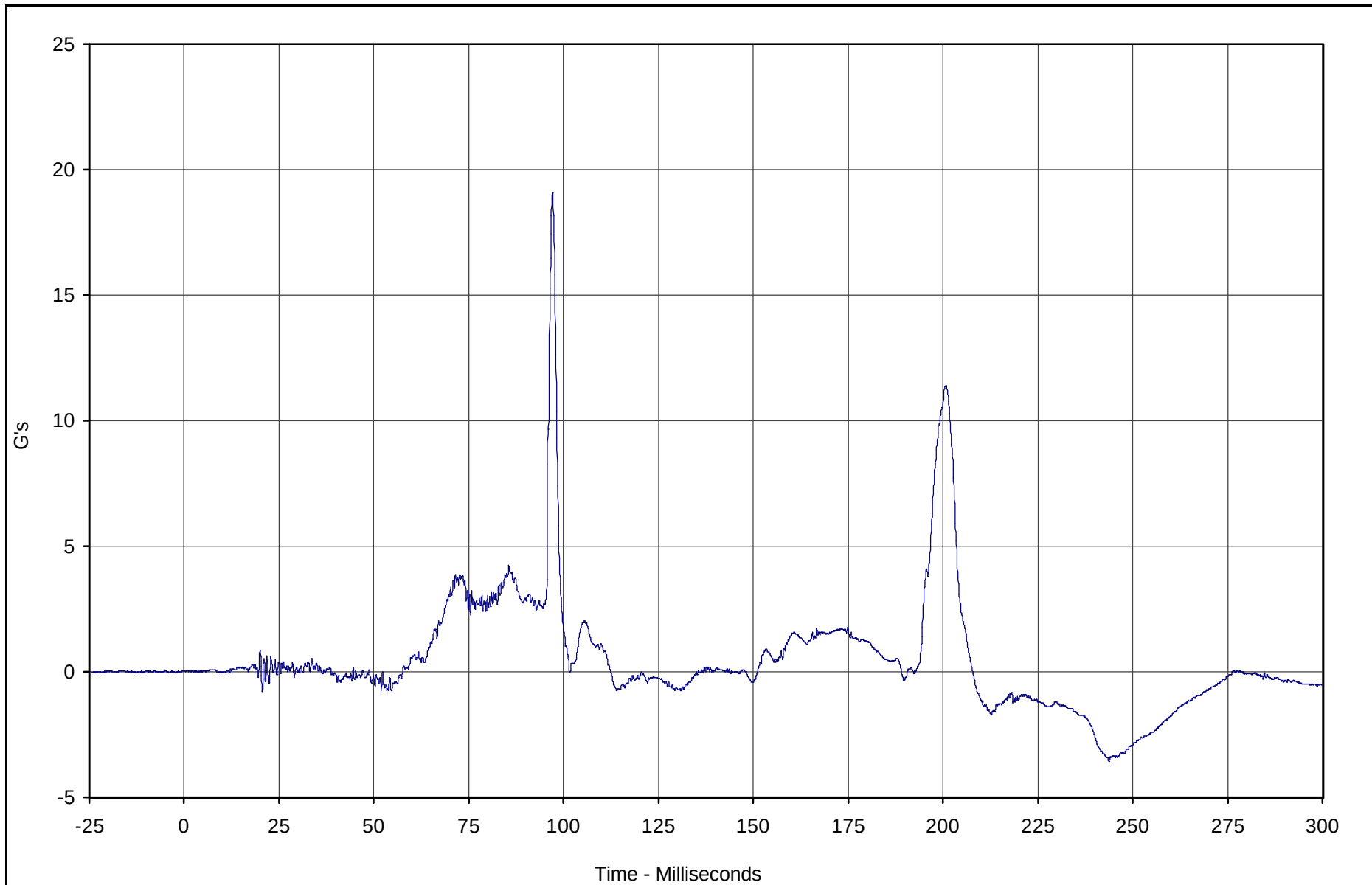


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|---------------------------|-------|------|-------|------|------|------|-------|-----------|
| Right Rear (3 Yr.) Head Y | 161   | FIL  | G's   | 19.1 | 97.2 | -3.6 | 243.8 | 1000      |

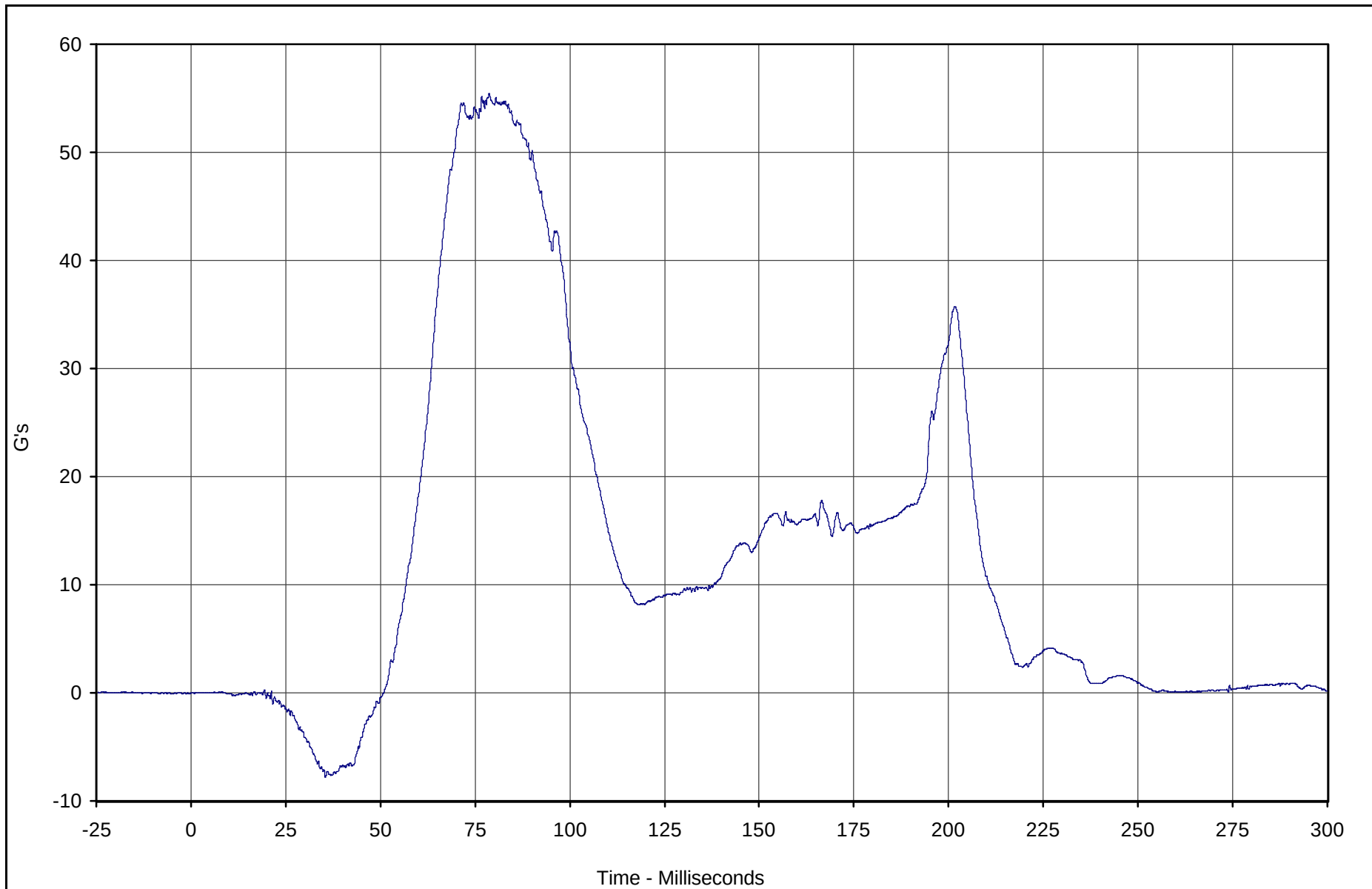


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description         | CURNO | Type | Units | Max  | Time | Min  | Time | SAE Class |
|---------------------------|-------|------|-------|------|------|------|------|-----------|
| Right Rear (3 Yr.) Head Z | 162   | FIL  | G's   | 55.5 | 78.7 | -7.8 | 35.5 | 1000      |

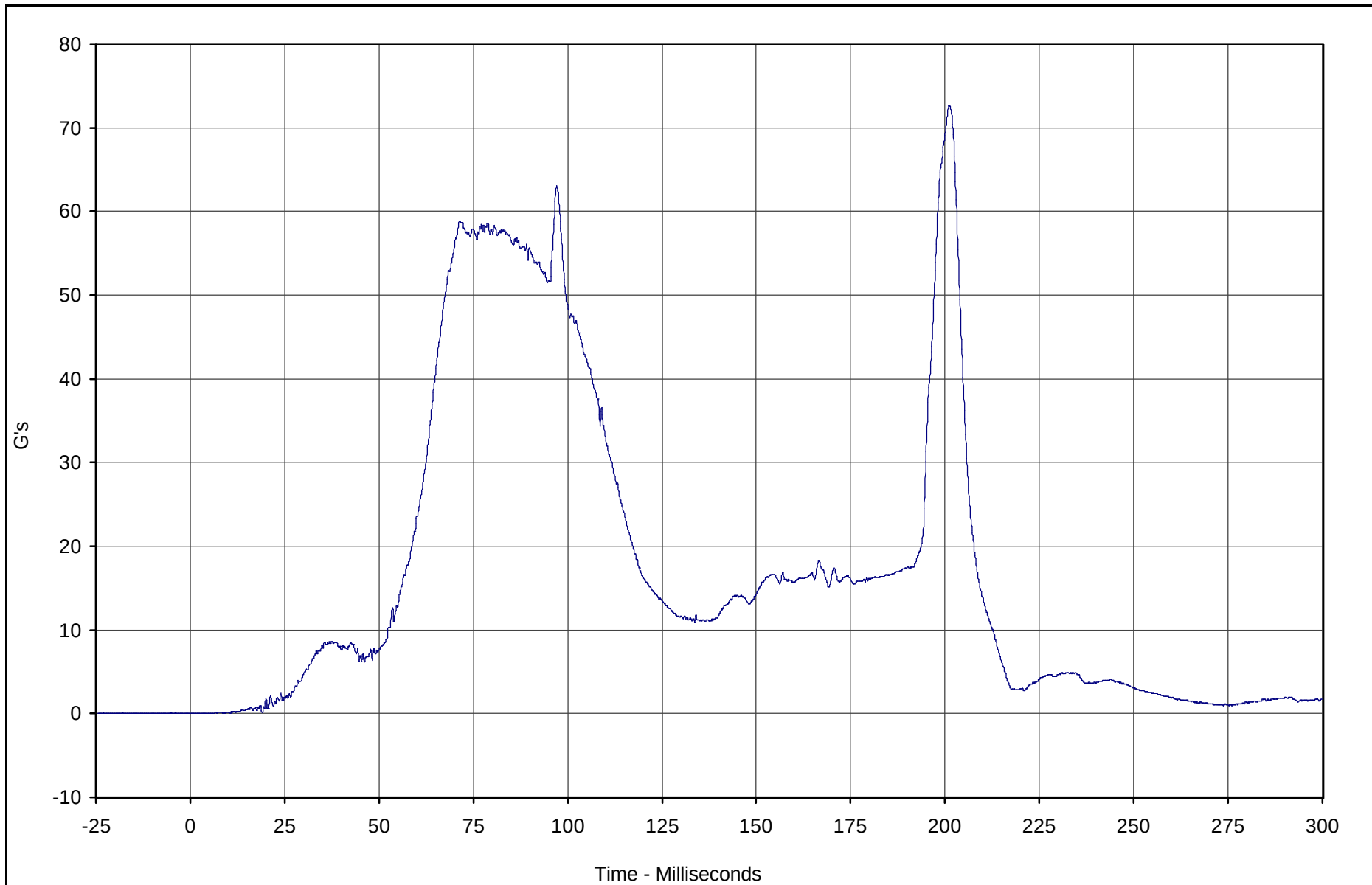


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                 | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|-----------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Right Rear (3 Yr.) Head Resultant | 160   | RES  | G's   | 72.7 | 201.0 | 0.0 | 4.0  | 1000      |

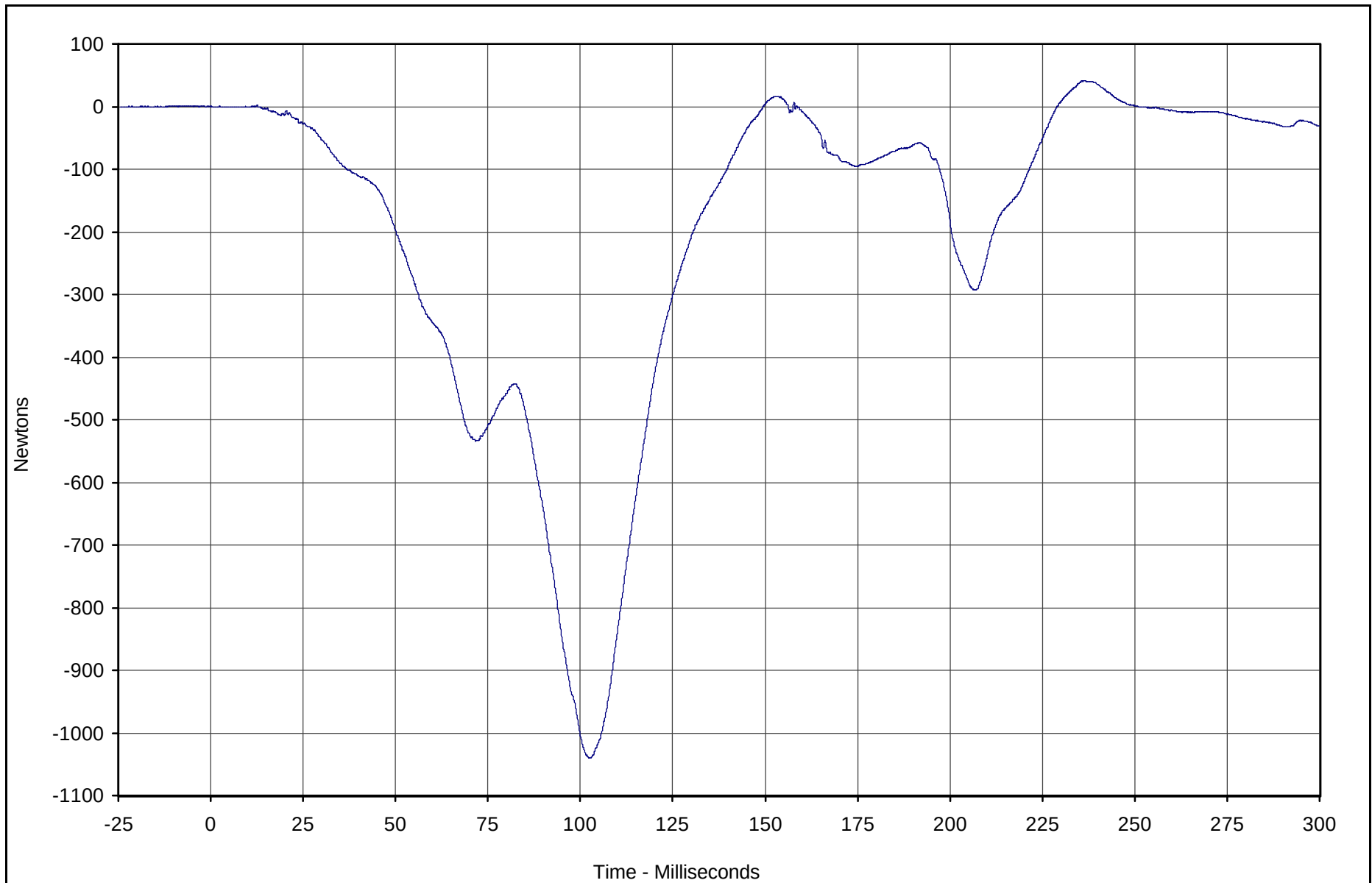


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units   | Max  | Time  | Min     | Time  | SAE Class |
|---------------------------------------|-------|------|---------|------|-------|---------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Force X | 163   | FIL  | Newtons | 41.0 | 236.6 | -1040.5 | 102.7 | 1000      |

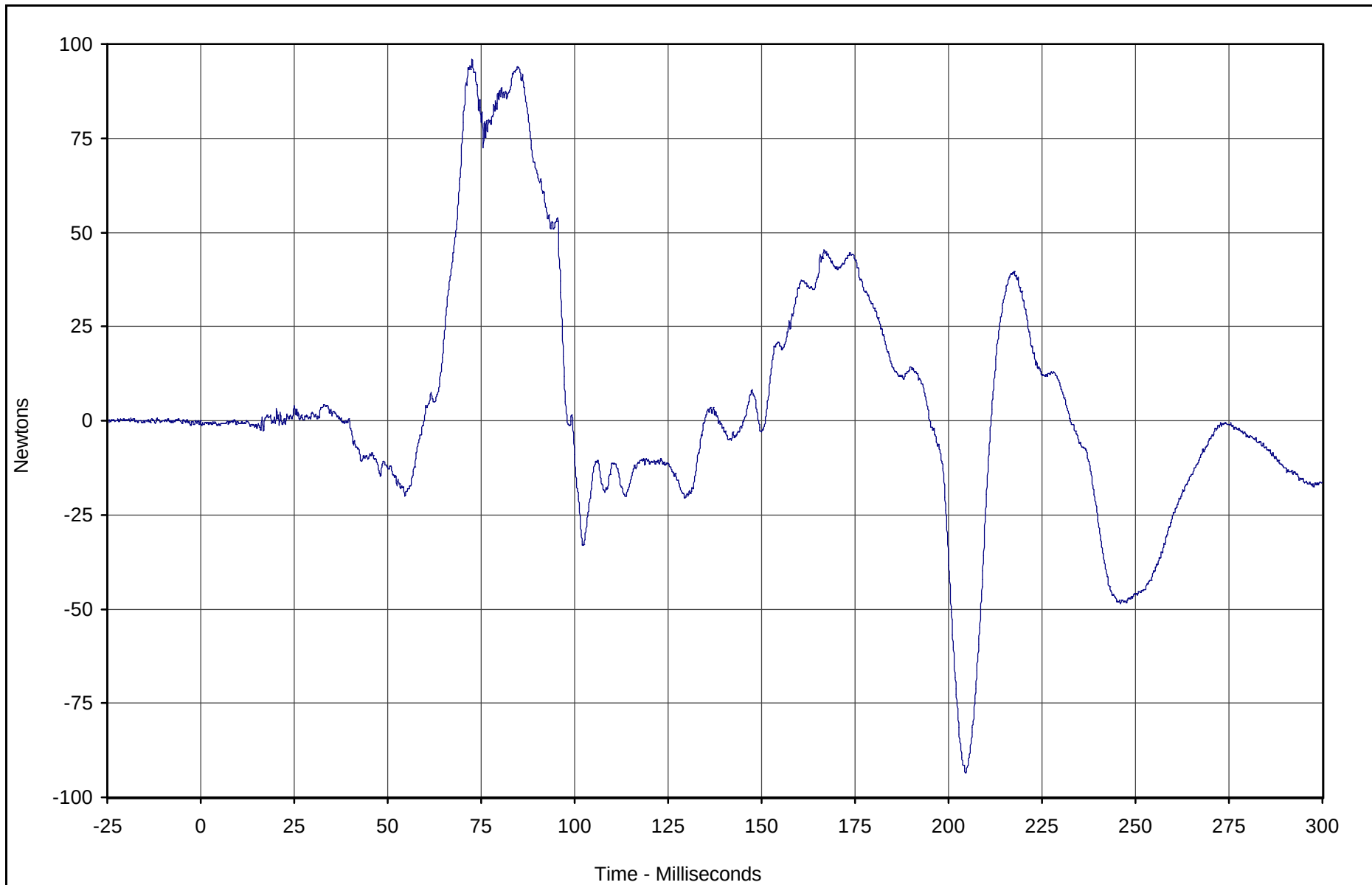


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units   | Max  | Time | Min   | Time  | SAE Class |
|---------------------------------------|-------|------|---------|------|------|-------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Force Y | 164   | FIL  | Newtons | 96.0 | 72.6 | -93.5 | 204.6 | 1000      |



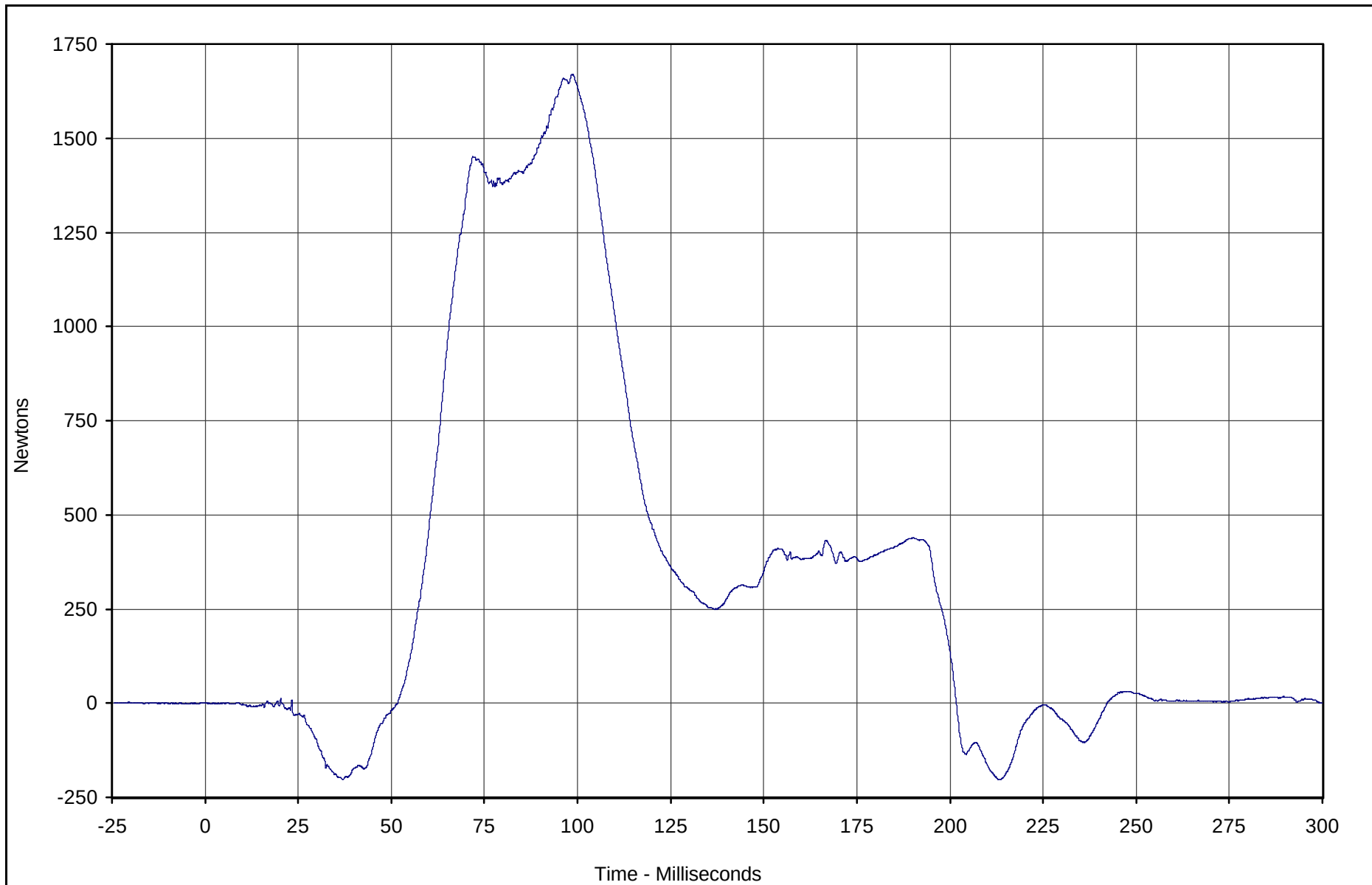
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                     | CURNO | Type | Units   | Max    | Time | Min    | Time  | SAE Class |
|---------------------------------------|-------|------|---------|--------|------|--------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Force Z | 165   | FIL  | Newtons | 1669.9 | 98.6 | -202.8 | 213.0 | 1000      |

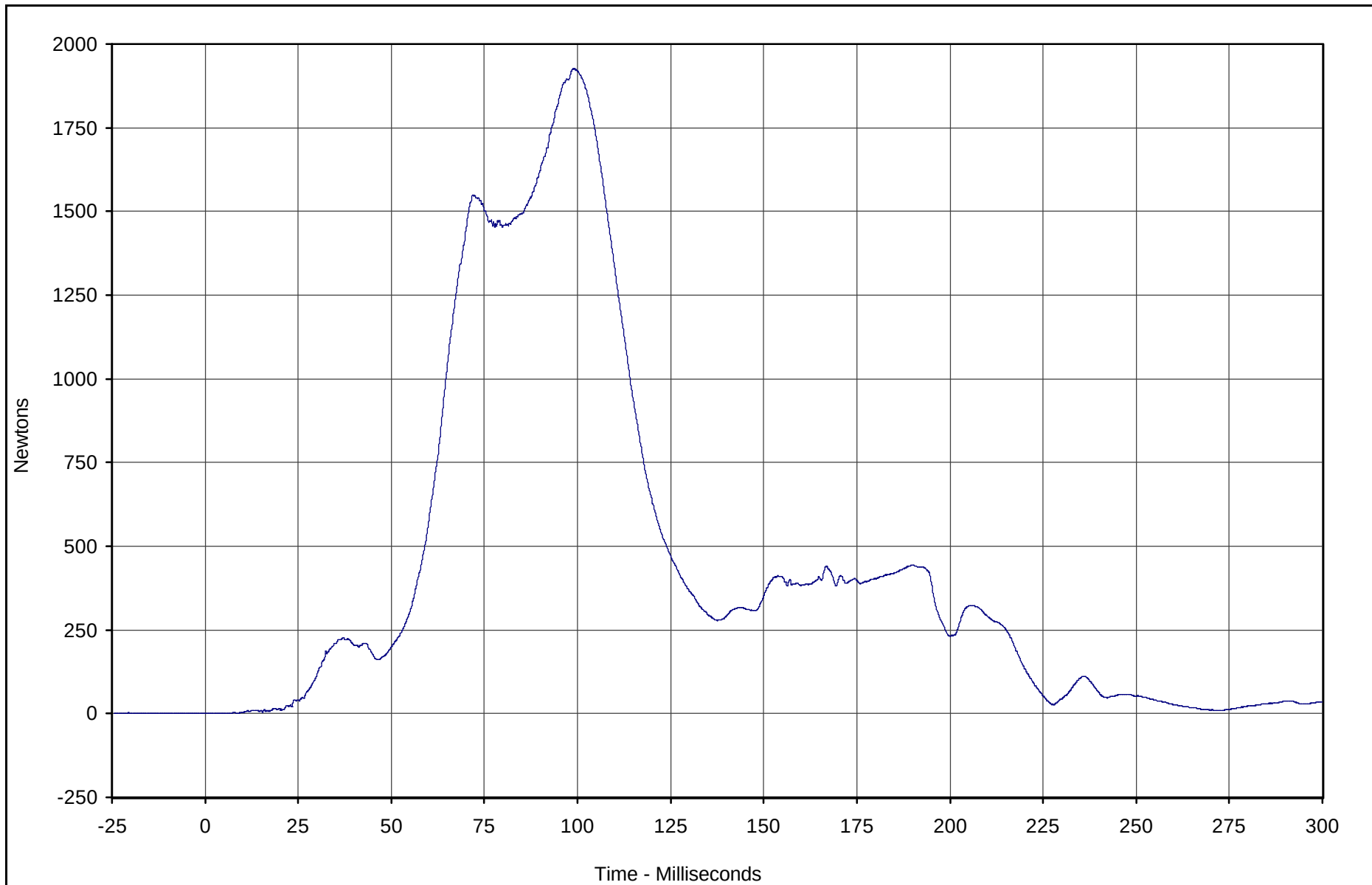


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                        | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|------------------------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Right Rear (3 Yr.) Upper Neck Force Res. | 163   | RES  | Newtons | 1926.2 | 99.1 | 0.4 | 2.4  | 1000      |

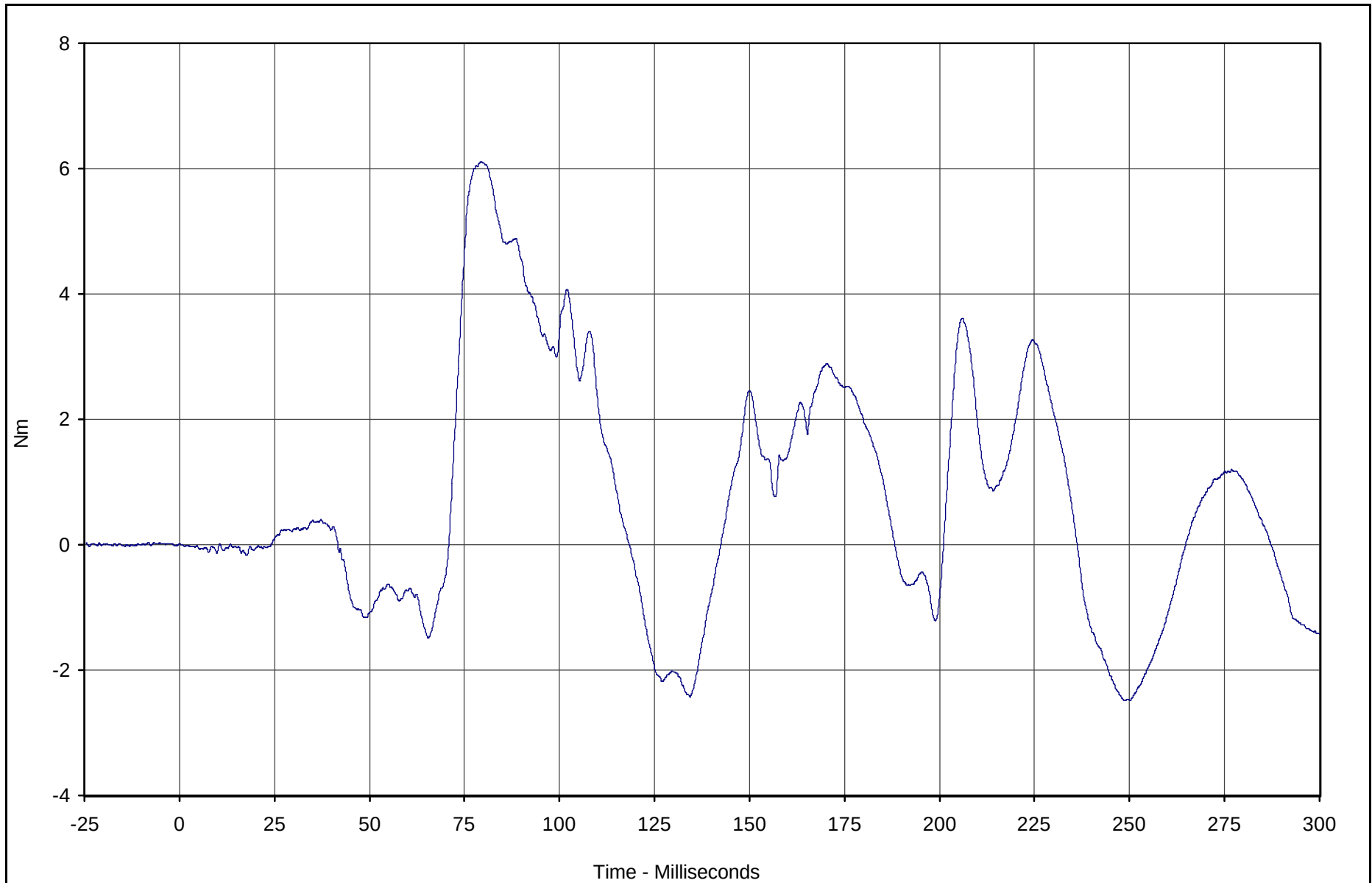


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|----------------------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Moment X | 166   | FIL  | Nm    | 6.1 | 79.2 | -2.5 | 250.0 | 600       |

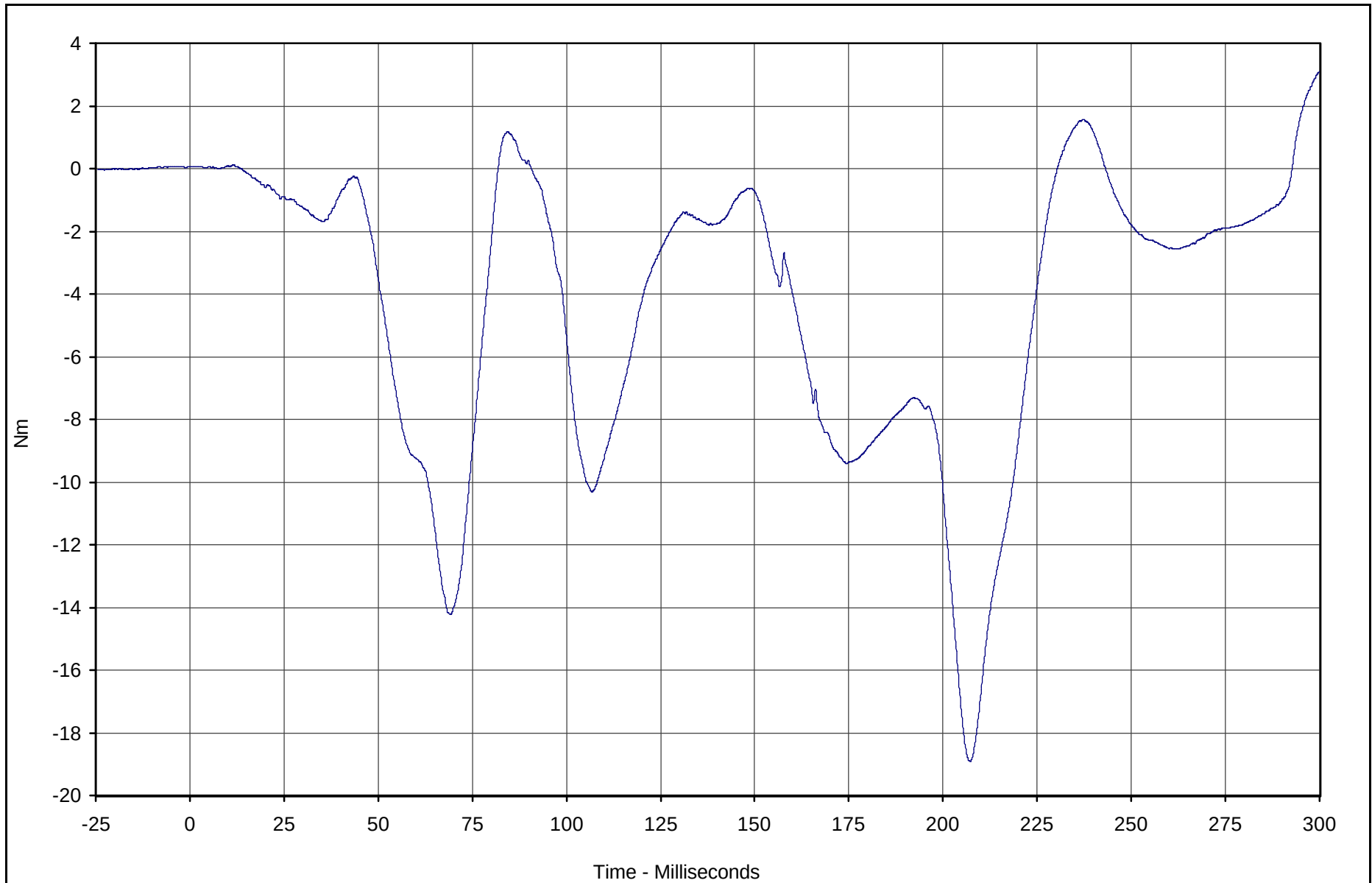


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max | Time  | Min   | Time  | SAE Class |
|----------------------------------------|-------|------|-------|-----|-------|-------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Moment Y | 167   | FIL  | Nm    | 3.1 | 299.9 | -18.9 | 207.3 | 600       |

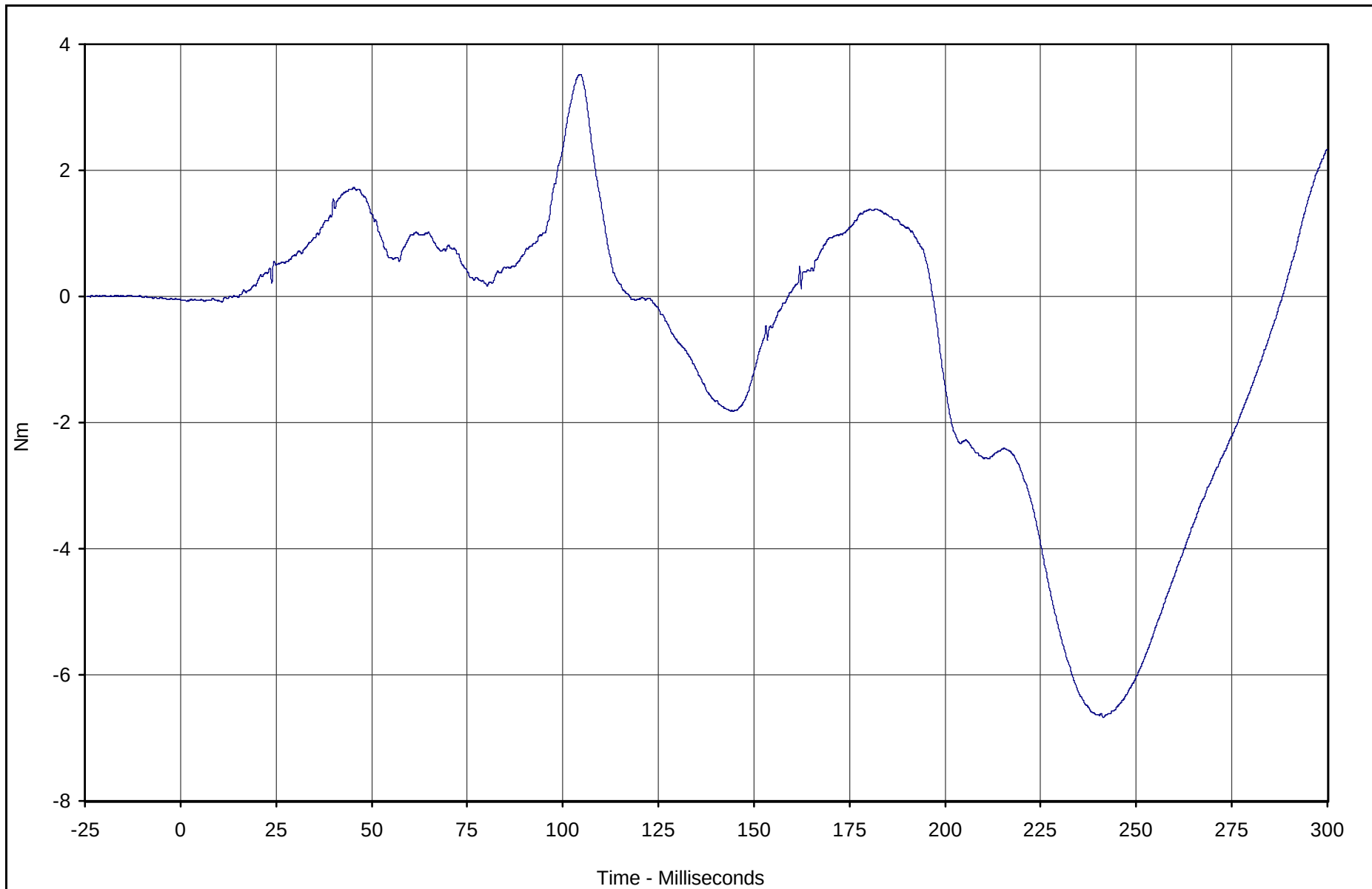


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max | Time  | Min  | Time  | SAE Class |
|----------------------------------------|-------|------|-------|-----|-------|------|-------|-----------|
| Right Rear (3 Yr.) Upper Neck Moment Z | 168   | FIL  | Nm    | 3.5 | 104.6 | -6.7 | 241.5 | 600       |

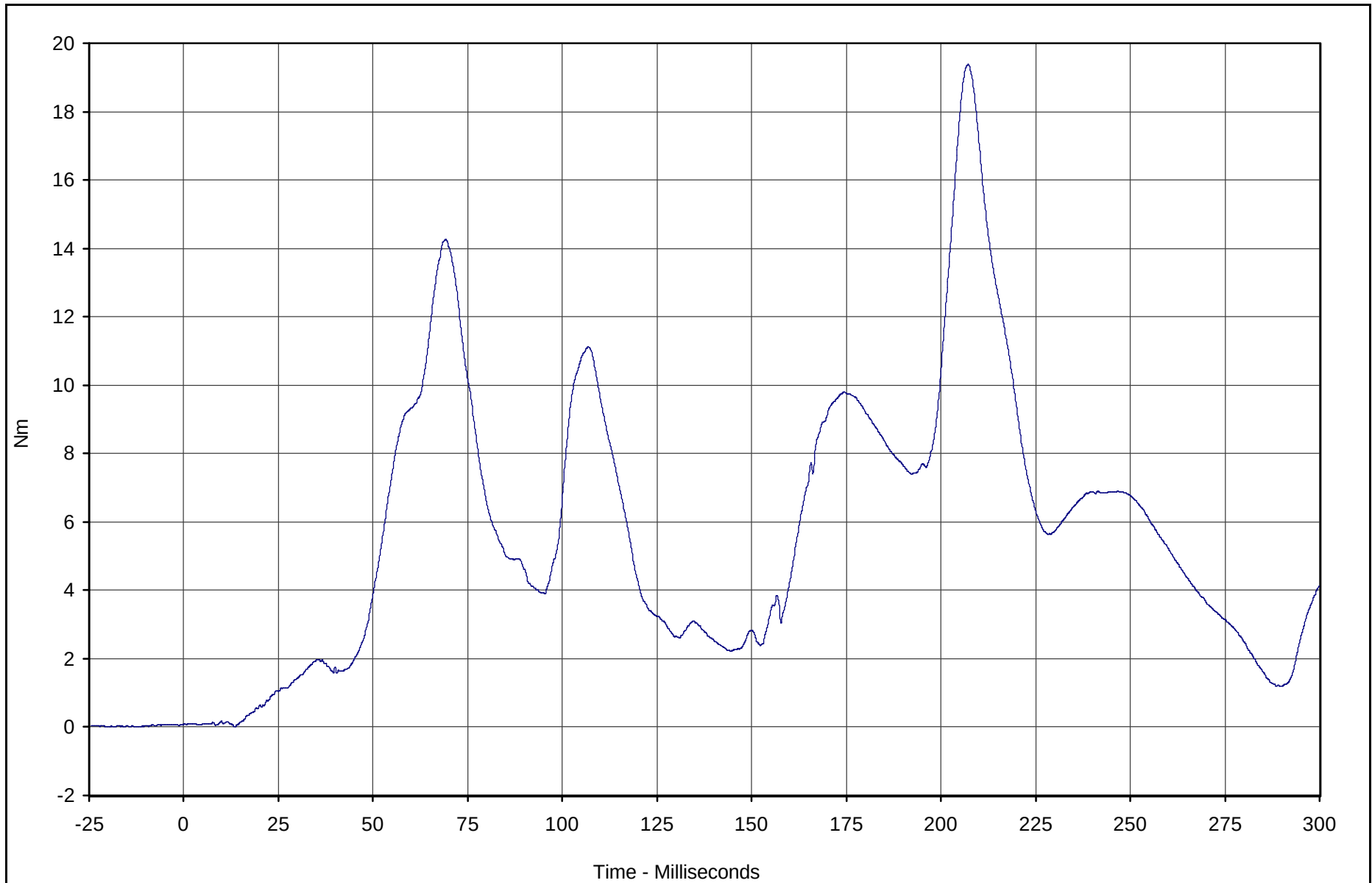


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max  | Time  | Min | Time | SAE Class |
|----------------------------------------|-------|------|-------|------|-------|-----|------|-----------|
| Right Rear (3 Yr.) Upper Neck Mom Res. | 166   | RES  | Nm    | 19.4 | 207.2 | 0.0 | 13.6 | 600       |



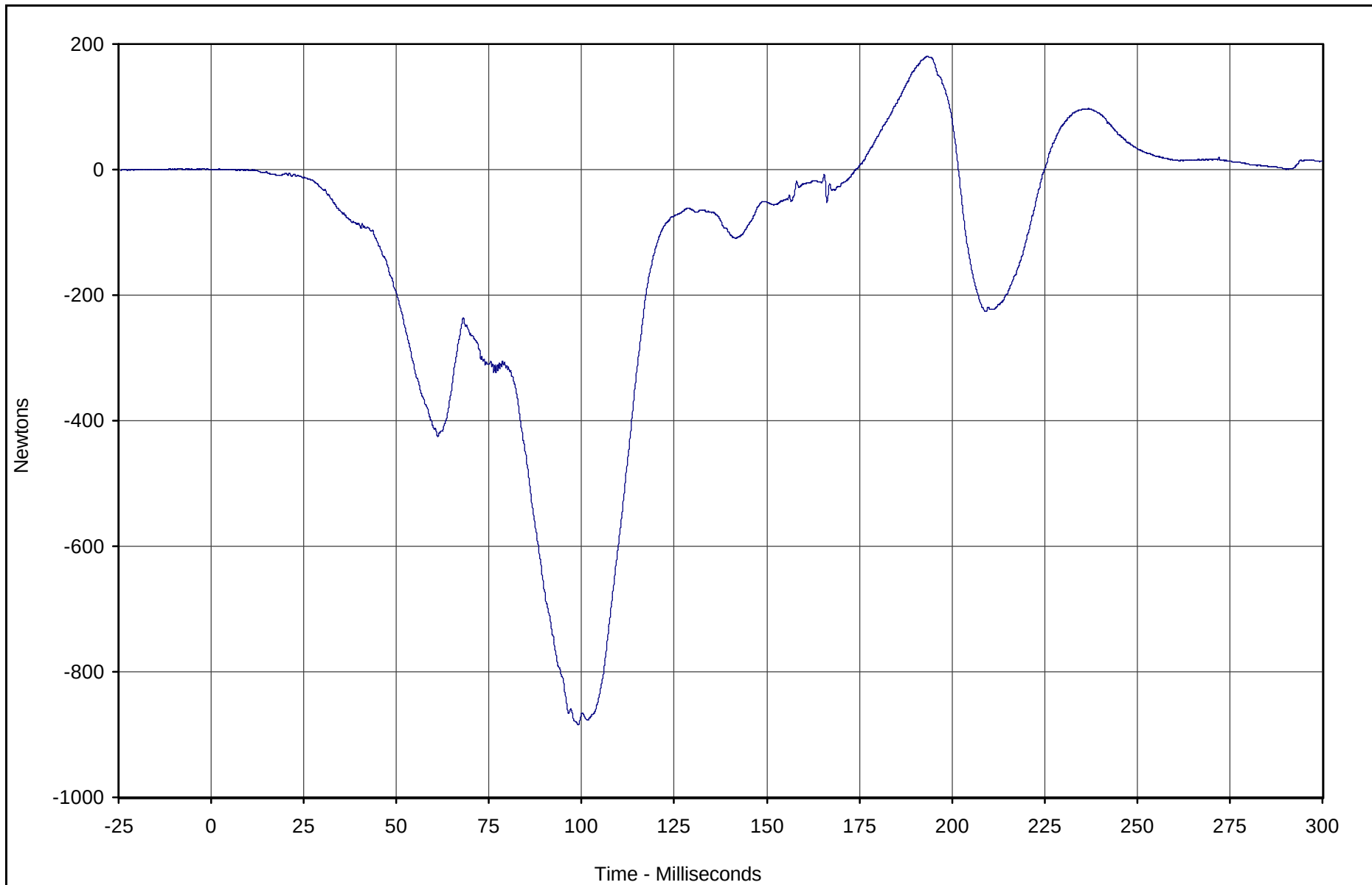
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                     | CURNO | Type | Units   | Max   | Time  | Min    | Time | SAE Class |
|---------------------------------------|-------|------|---------|-------|-------|--------|------|-----------|
| Right Rear (3 Yr.) Lower Neck Force X | 169   | FIL  | Newtons | 180.3 | 193.3 | -884.4 | 99.0 | 1000      |

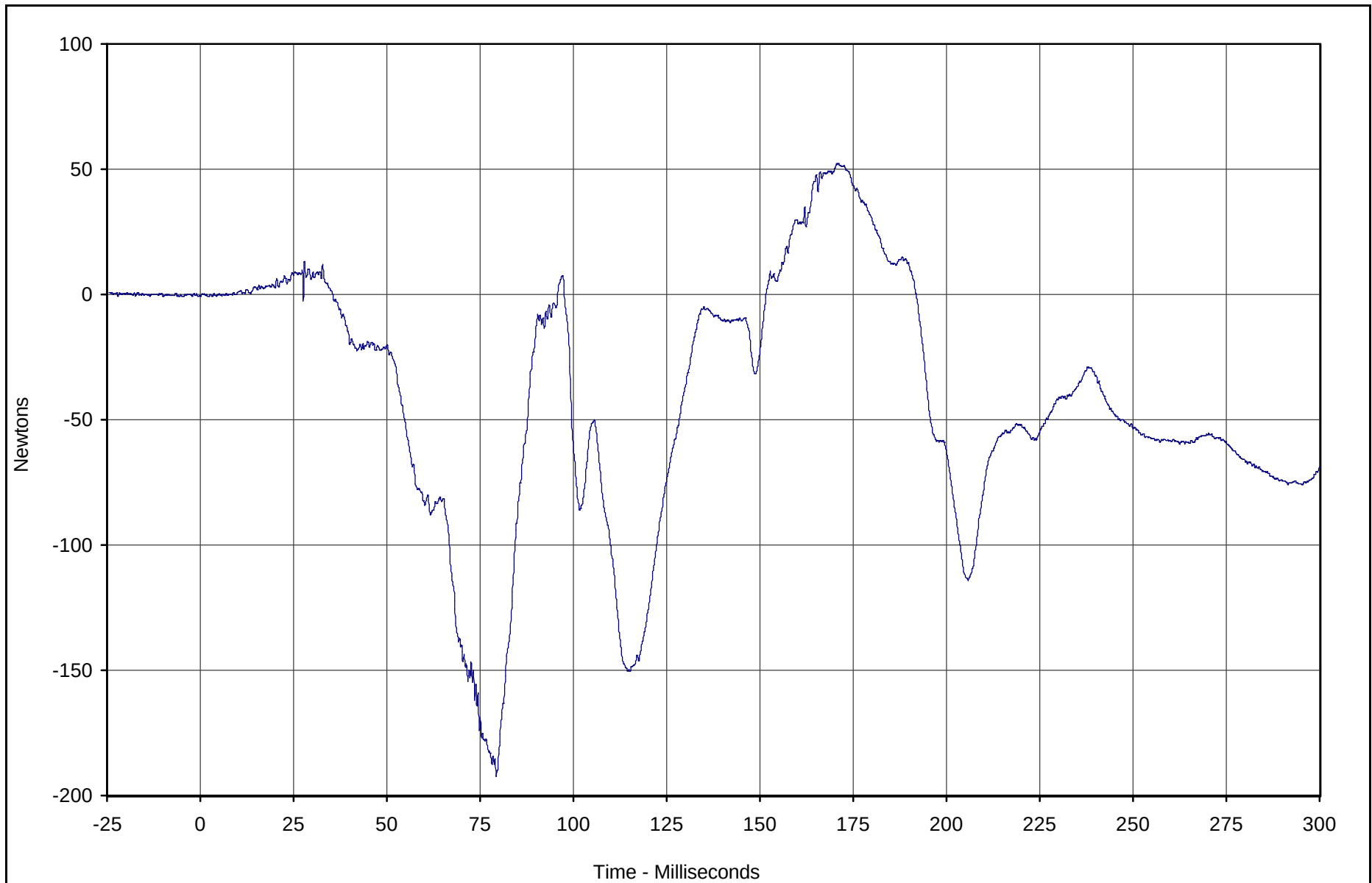


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units   | Max  | Time  | Min    | Time | SAE Class |
|---------------------------------------|-------|------|---------|------|-------|--------|------|-----------|
| Right Rear (3 Yr.) Lower Neck Force Y | 170   | FIL  | Newtons | 52.3 | 171.0 | -192.6 | 79.3 | 1000      |

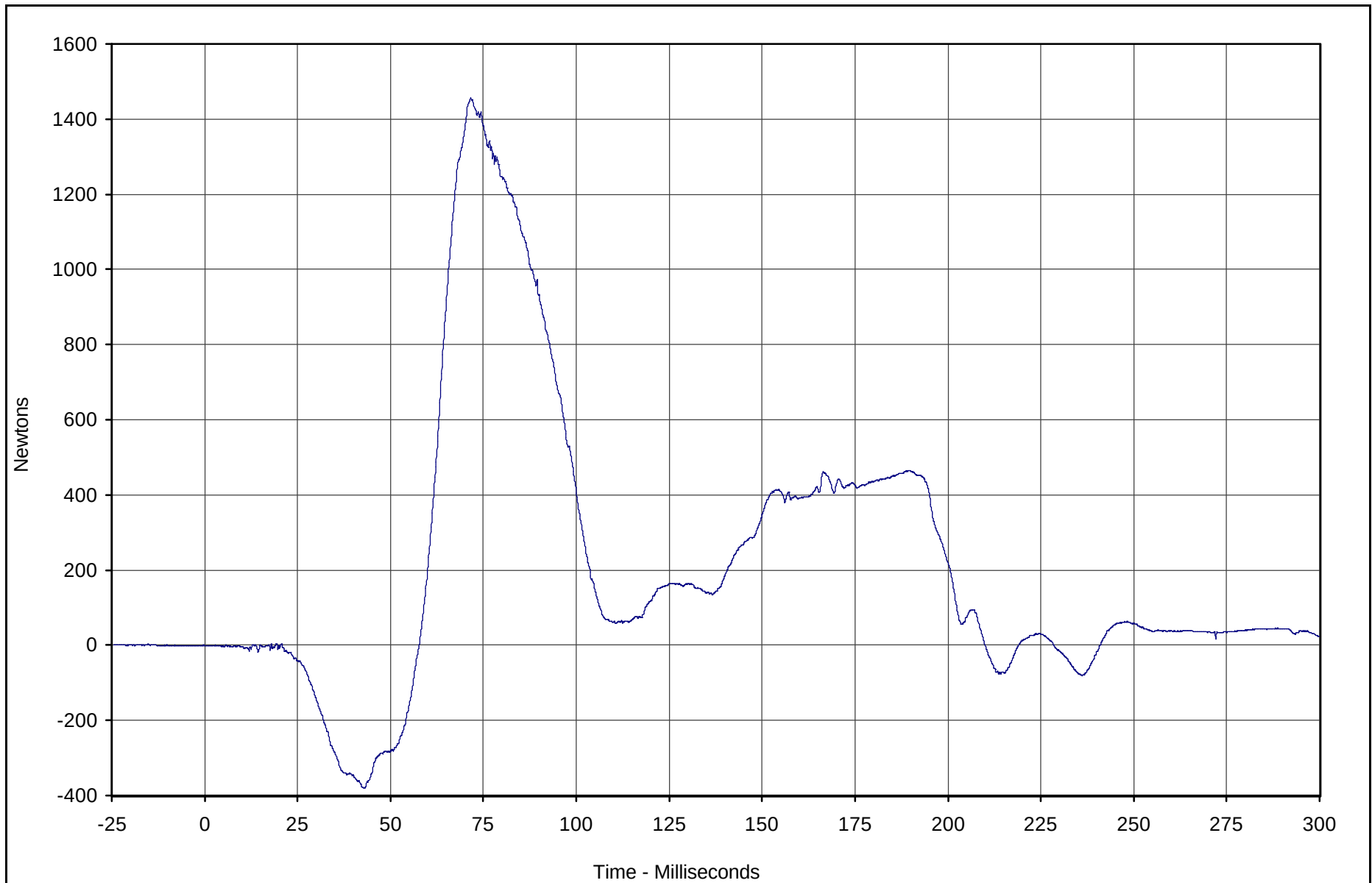


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units   | Max    | Time | Min    | Time | SAE Class |
|---------------------------------------|-------|------|---------|--------|------|--------|------|-----------|
| Right Rear (3 Yr.) Lower Neck Force Z | 171   | FIL  | Newtons | 1456.1 | 71.6 | -380.6 | 42.7 | 1000      |

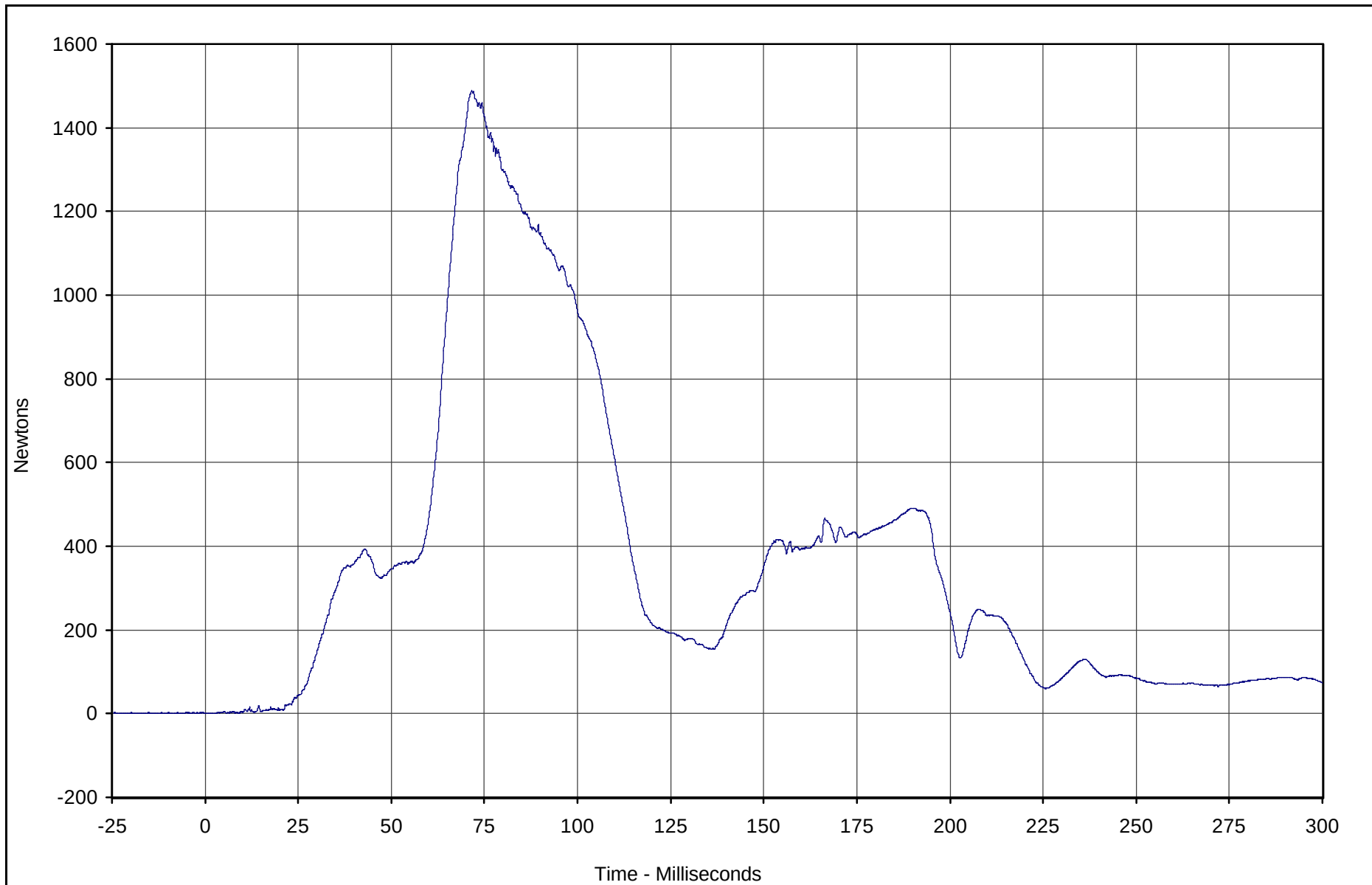


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                        | CURNO | Type | Units   | Max    | Time | Min | Time | SAE Class |
|------------------------------------------|-------|------|---------|--------|------|-----|------|-----------|
| Right Rear (3 Yr.) Lower Neck Force Res. | 169   | RES  | Newtons | 1489.7 | 71.6 | 0.3 | 2.9  | 1000      |

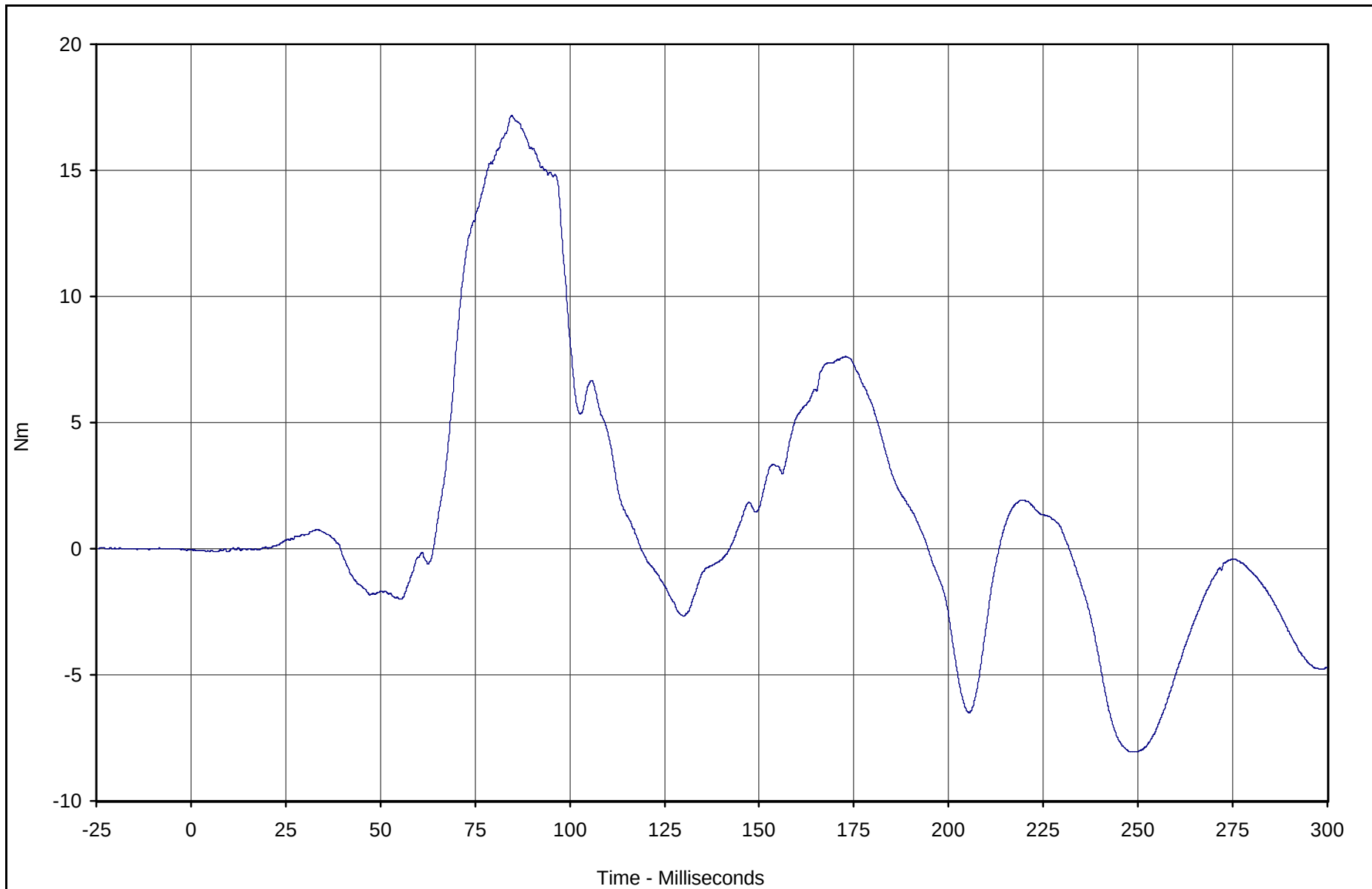


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max  | Time | Min  | Time  | SAE Class |
|----------------------------------------|-------|------|-------|------|------|------|-------|-----------|
| Right Rear (3 Yr.) Lower Neck Moment X | 172   | FIL  | Nm    | 17.2 | 84.8 | -8.1 | 249.3 | 600       |

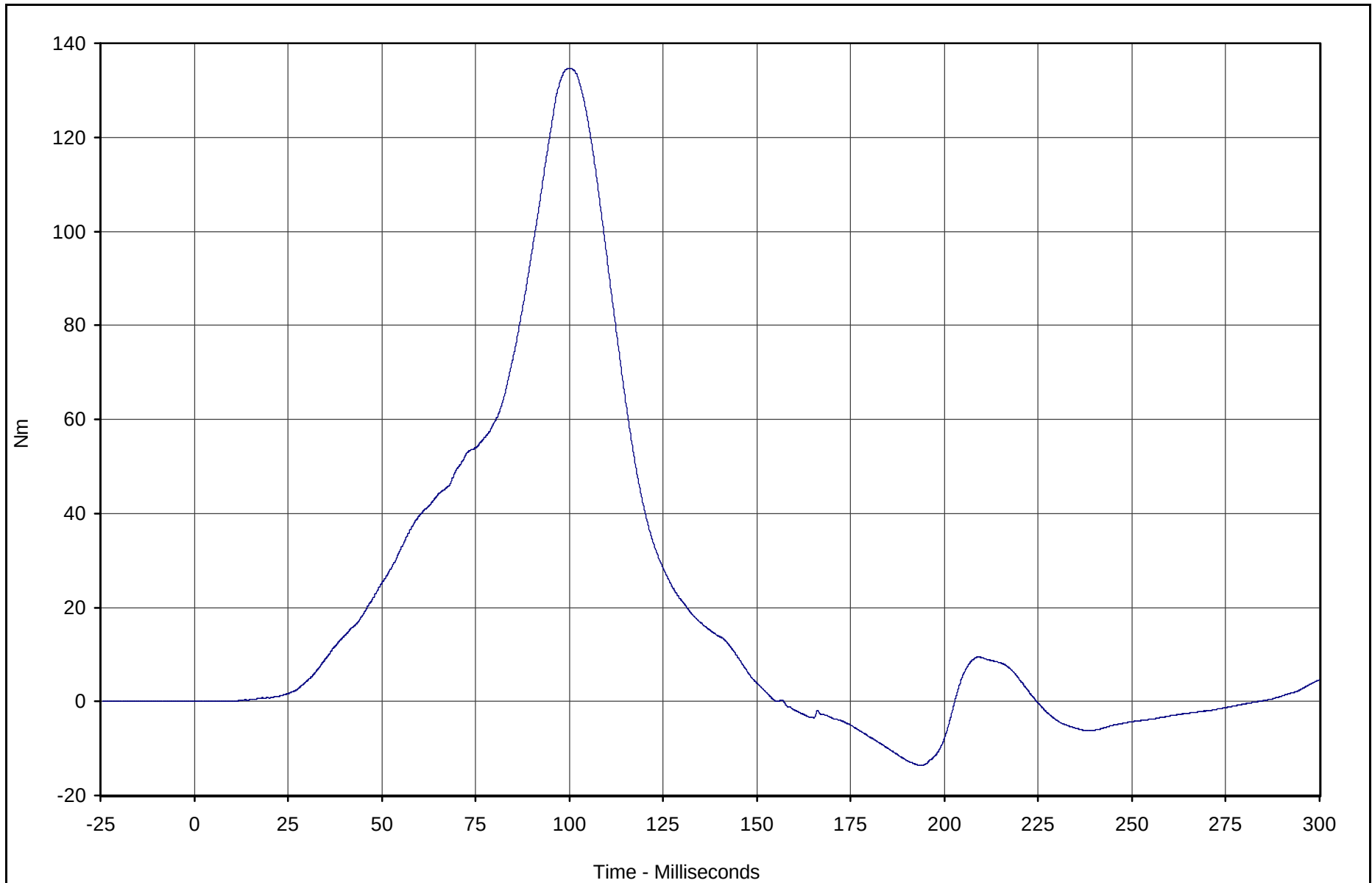


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max   | Time | Min   | Time  | SAE Class |
|----------------------------------------|-------|------|-------|-------|------|-------|-------|-----------|
| Right Rear (3 Yr.) Lower Neck Moment Y | 173   | FIL  | Nm    | 134.6 | 99.6 | -13.6 | 193.5 | 600       |



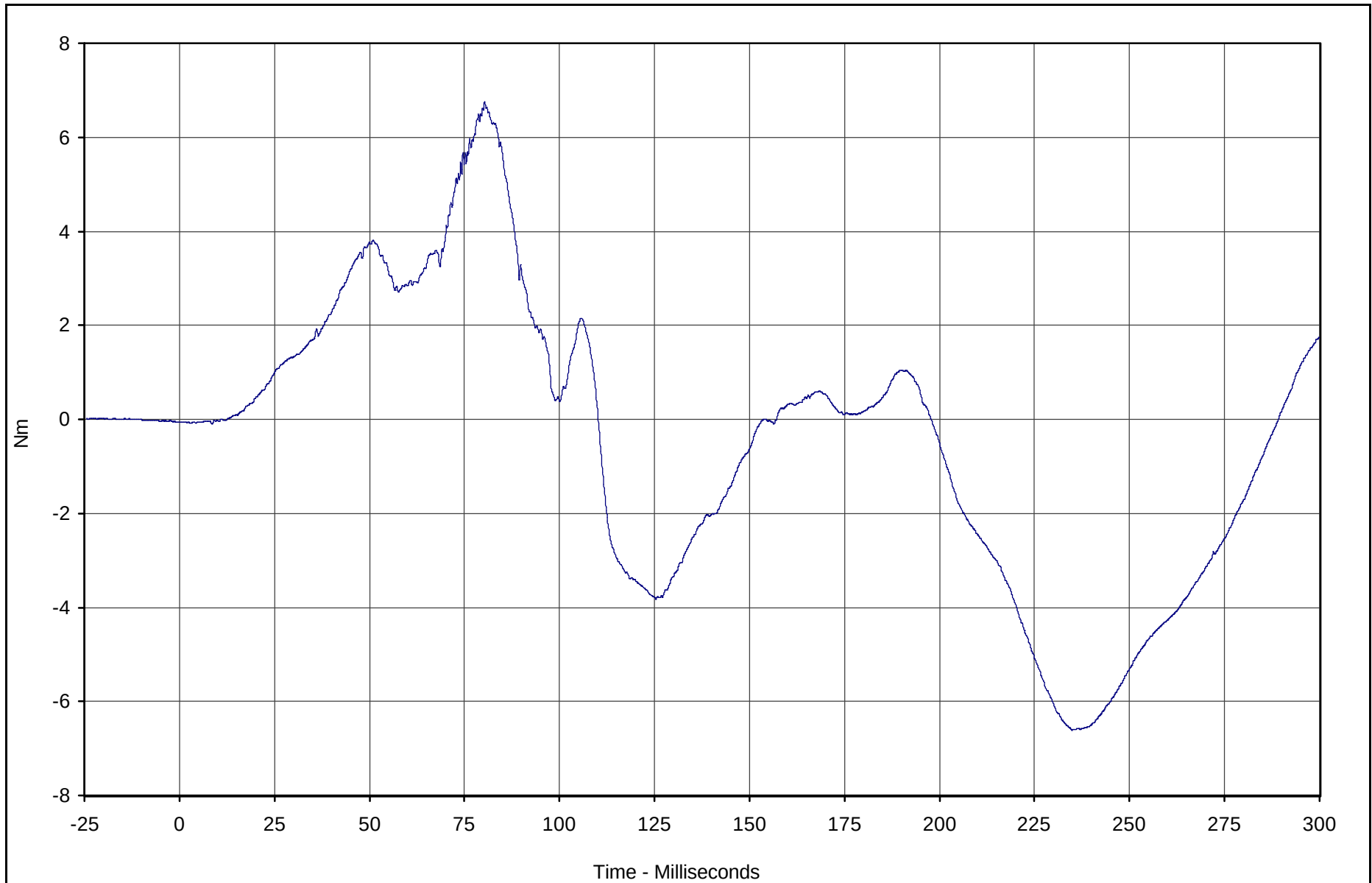
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                      | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|----------------------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Right Rear (3 Yr.) Lower Neck Moment Z | 174   | FIL  | Nm    | 6.7 | 80.3 | -6.6 | 234.8 | 600       |

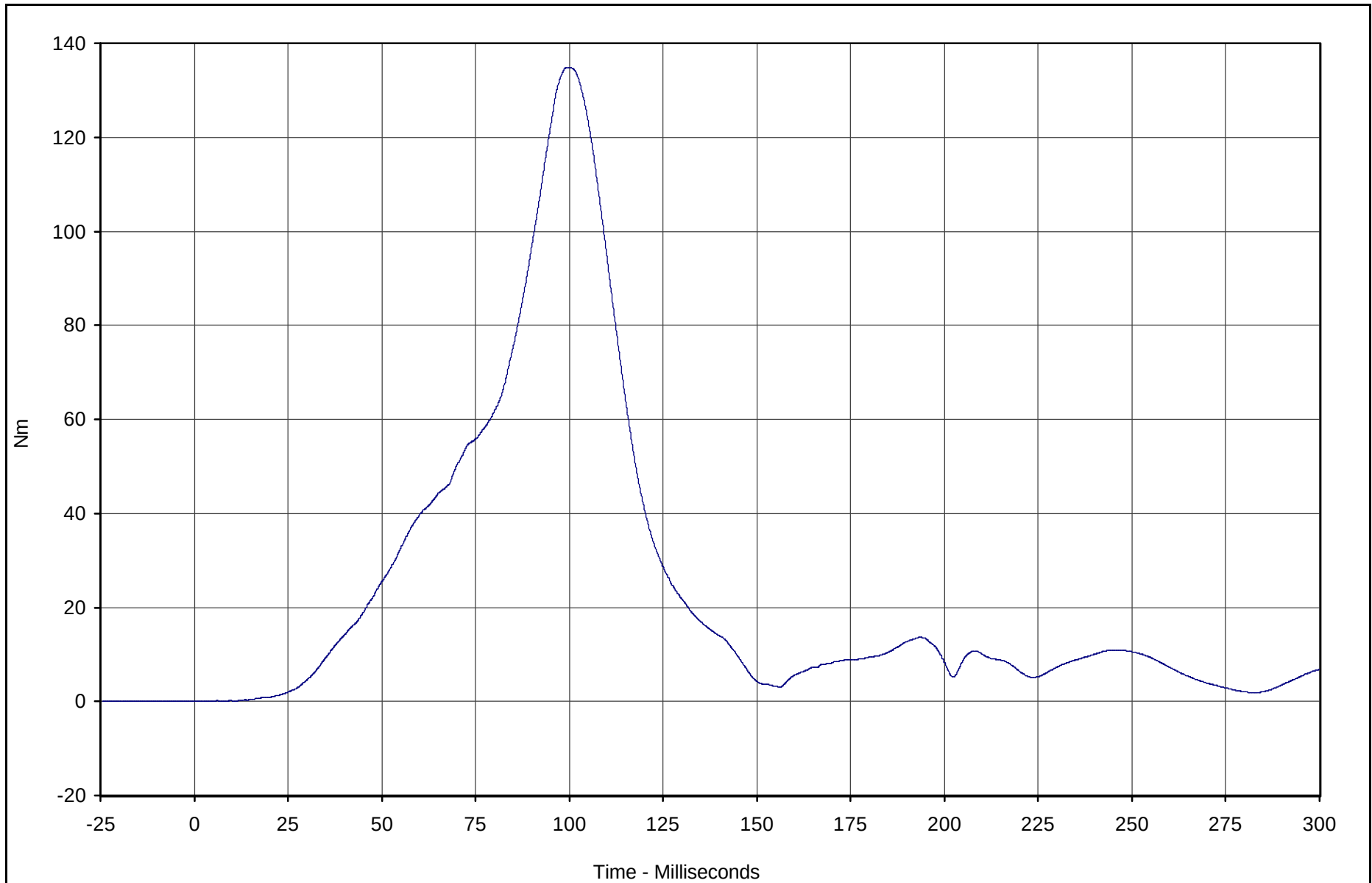


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                      | CURNO | Type | Units | Max   | Time | Min | Time | SAE Class |
|----------------------------------------|-------|------|-------|-------|------|-----|------|-----------|
| Right Rear (3 Yr.) Lower Neck Mom Res. | 172   | RES  | Nm    | 134.9 | 99.5 | 0.1 | 0.7  | 600       |

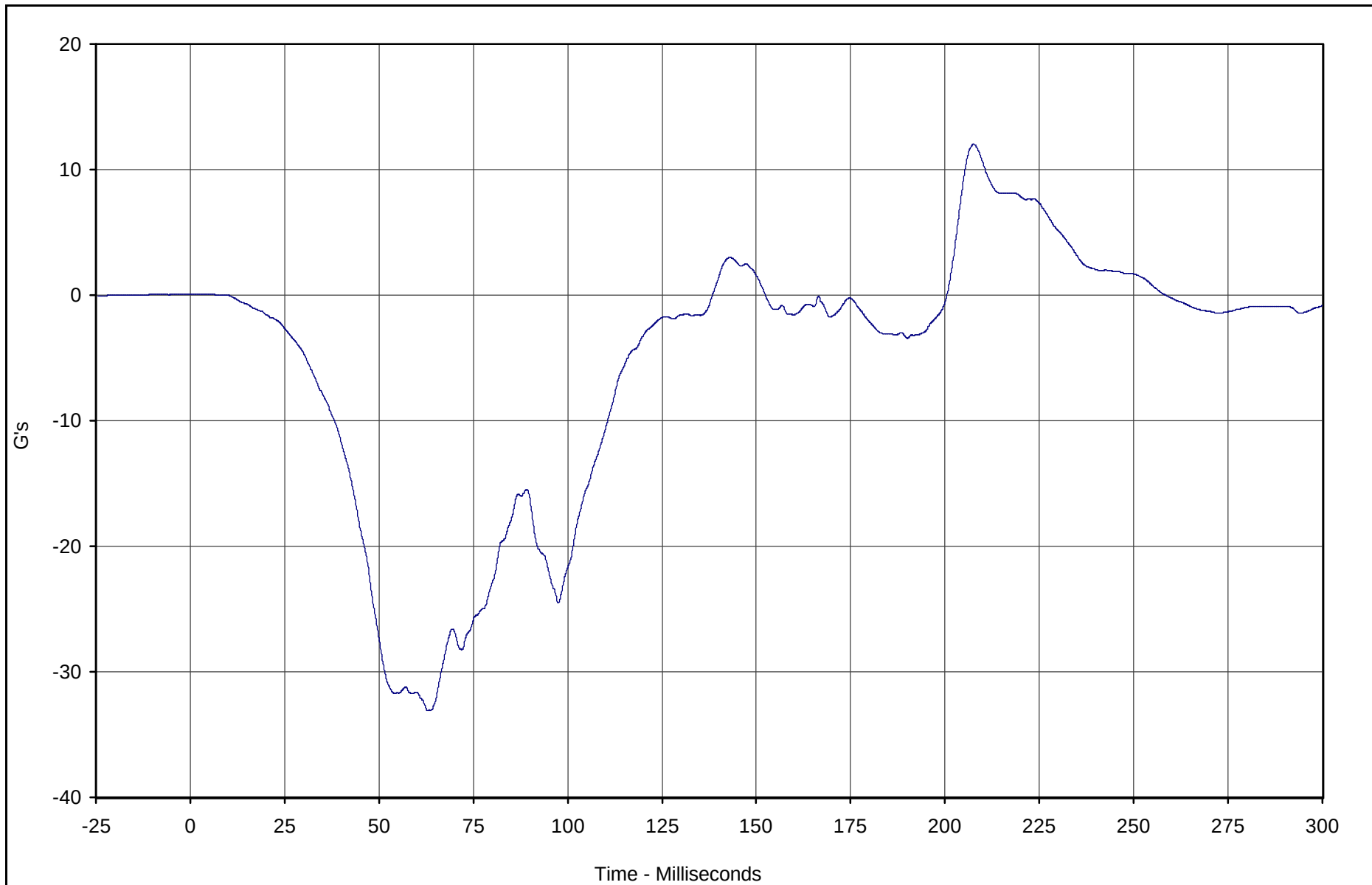


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Right Rear (3 Yr.) Chest X | 175   | FIL  | G's   | 12.0 | 207.6 | -33.1 | 62.9 | 180       |

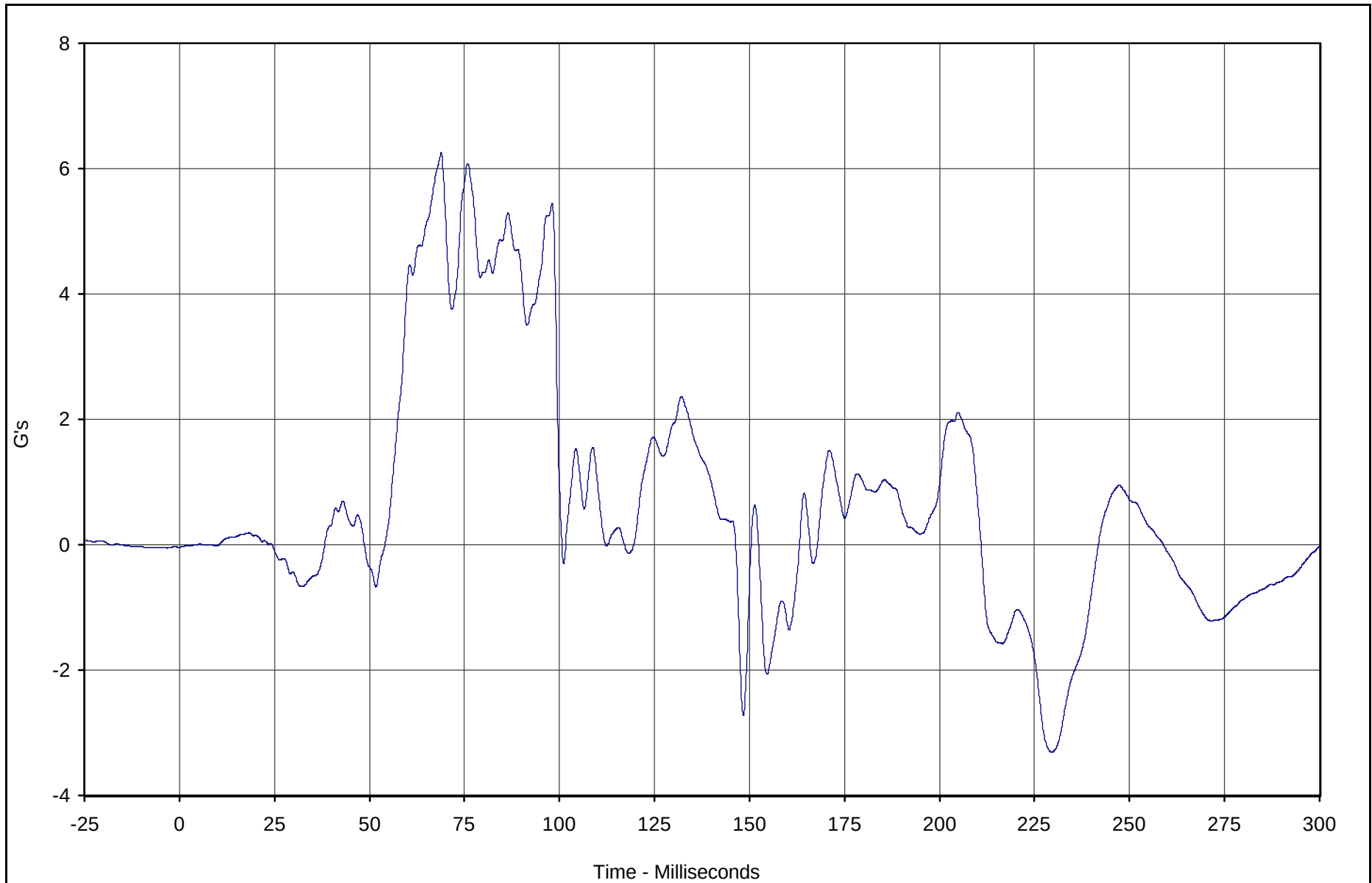


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max | Time | Min  | Time  | SAE Class |
|----------------------------|-------|------|-------|-----|------|------|-------|-----------|
| Right Rear (3 Yr.) Chest Y | 176   | FIL  | G's   | 6.2 | 68.9 | -3.3 | 229.5 | 180       |

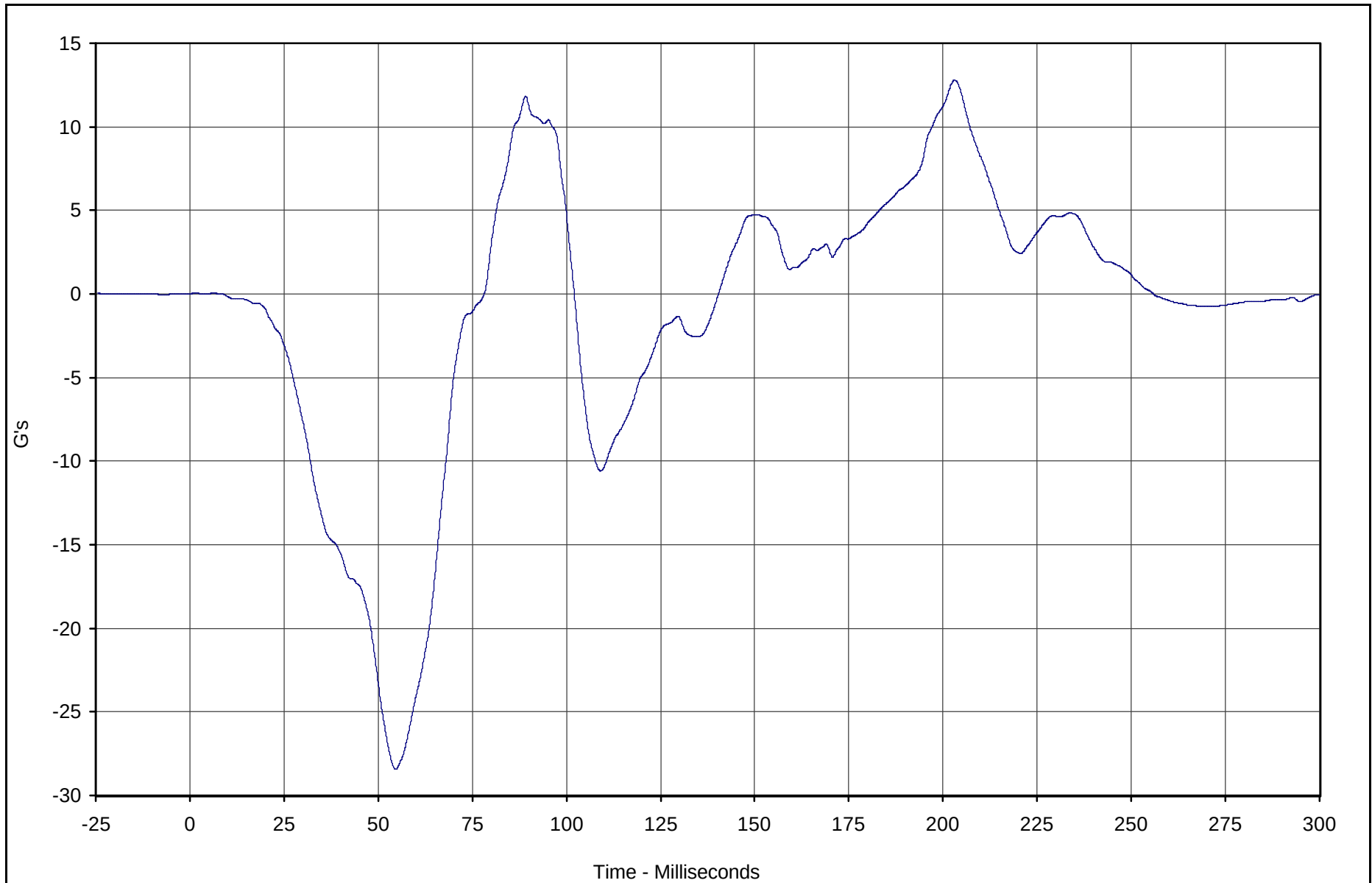


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description          | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|----------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Right Rear (3 Yr.) Chest Z | 177   | FIL  | G's   | 12.8 | 203.1 | -28.4 | 54.6 | 180       |

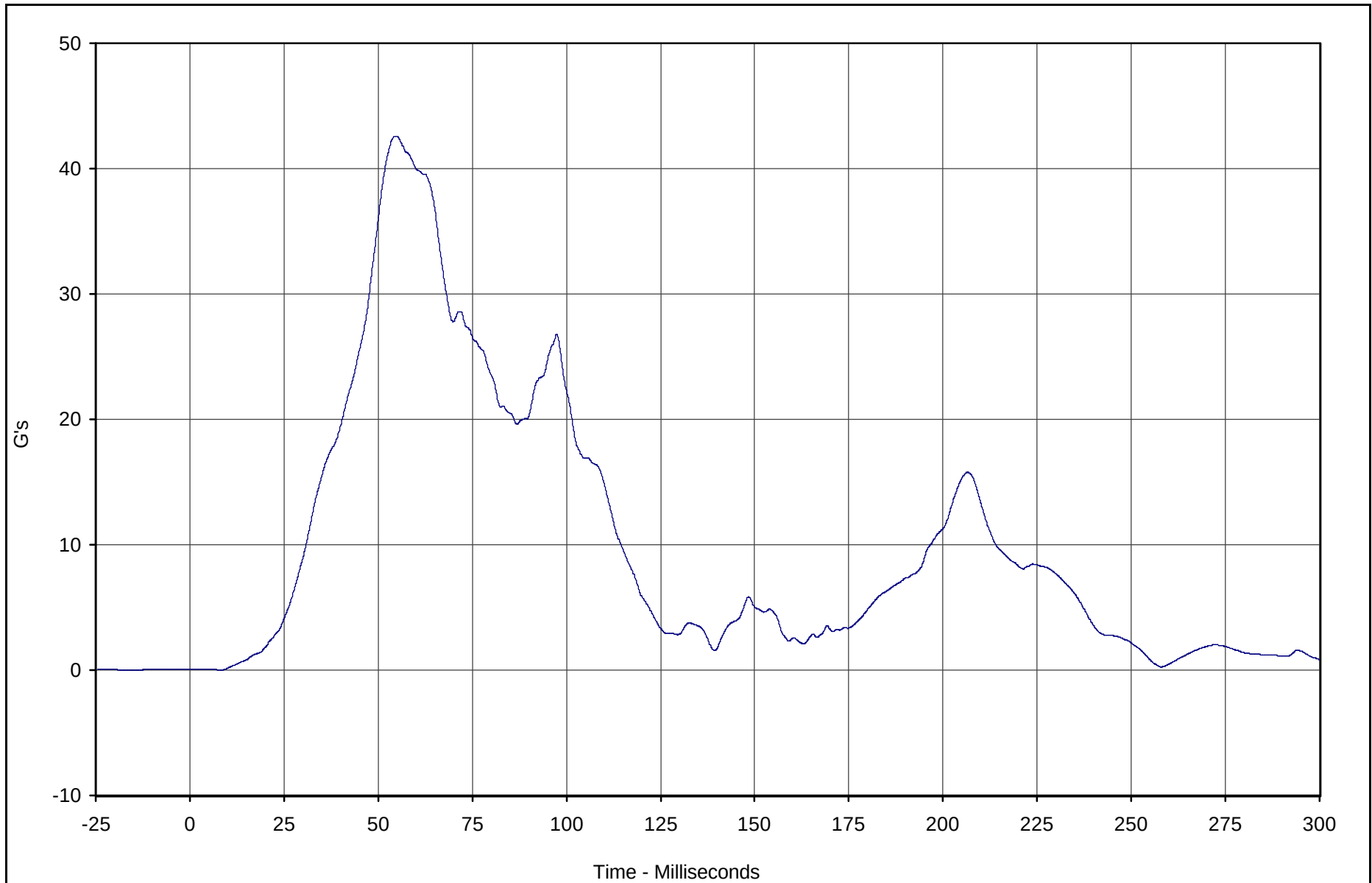


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                  | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Right Rear (3 Yr.) Chest Resultant | 177   | RES  | G's   | 42.6 | 54.4 | 0.0 | 8.5  | 180       |



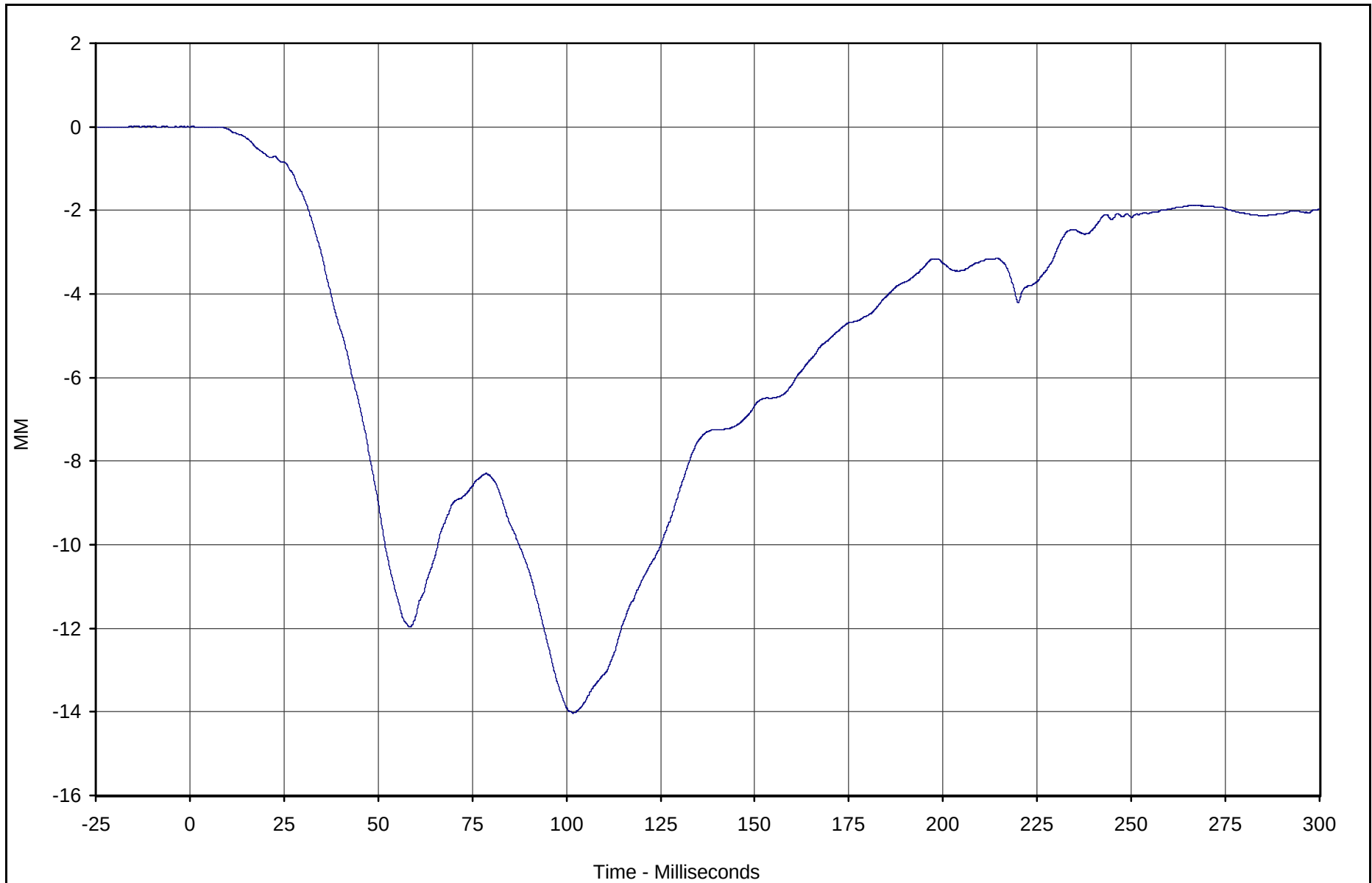
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description                     | CURNO | Type | Units | Max | Time | Min   | Time  | SAE Class |
|---------------------------------------|-------|------|-------|-----|------|-------|-------|-----------|
| Right Rear (3 Yr.) Chest Displacement | 178   | FIL  | MM    | 0.0 | 0.5  | -14.0 | 101.8 | 600       |

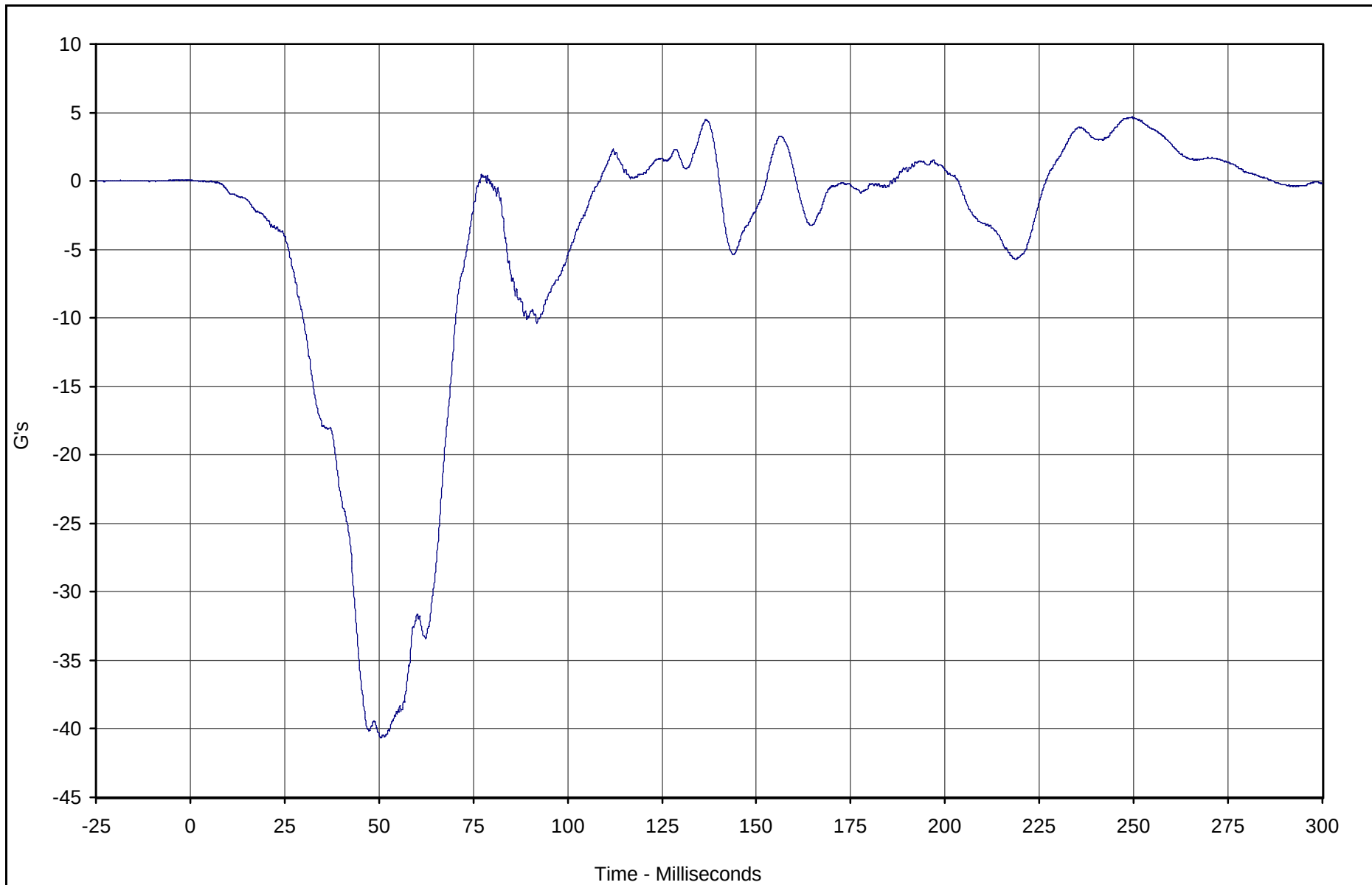


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Right Rear (3 Yr.) Pelvis X | 179   | FIL  | G's   | 4.7 | 249.6 | -40.7 | 50.4 | 1000      |

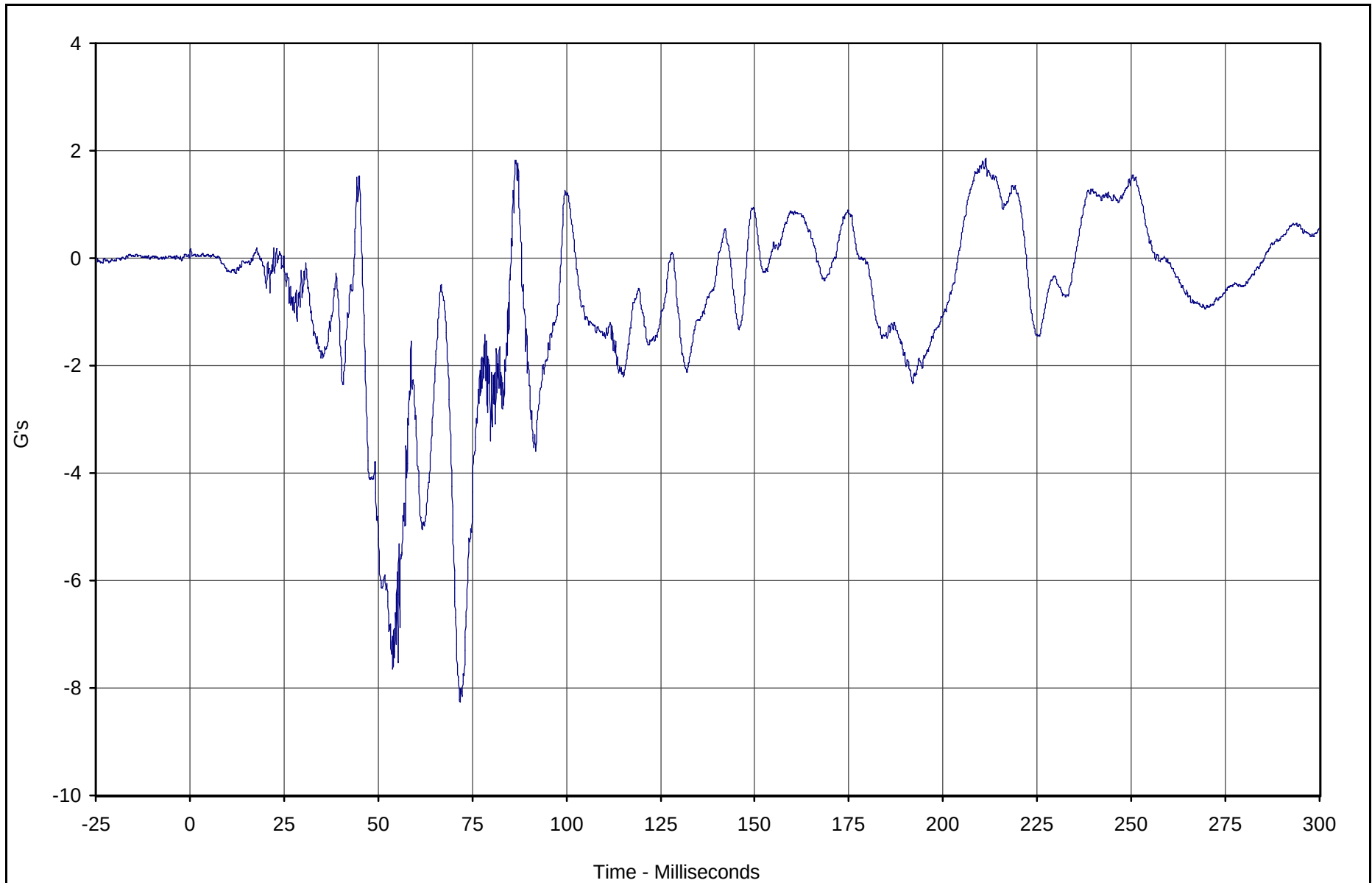


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max | Time  | Min  | Time | SAE Class |
|-----------------------------|-------|------|-------|-----|-------|------|------|-----------|
| Right Rear (3 Yr.) Pelvis Y | 180   | FIL  | G's   | 1.9 | 211.4 | -8.3 | 71.7 | 1000      |

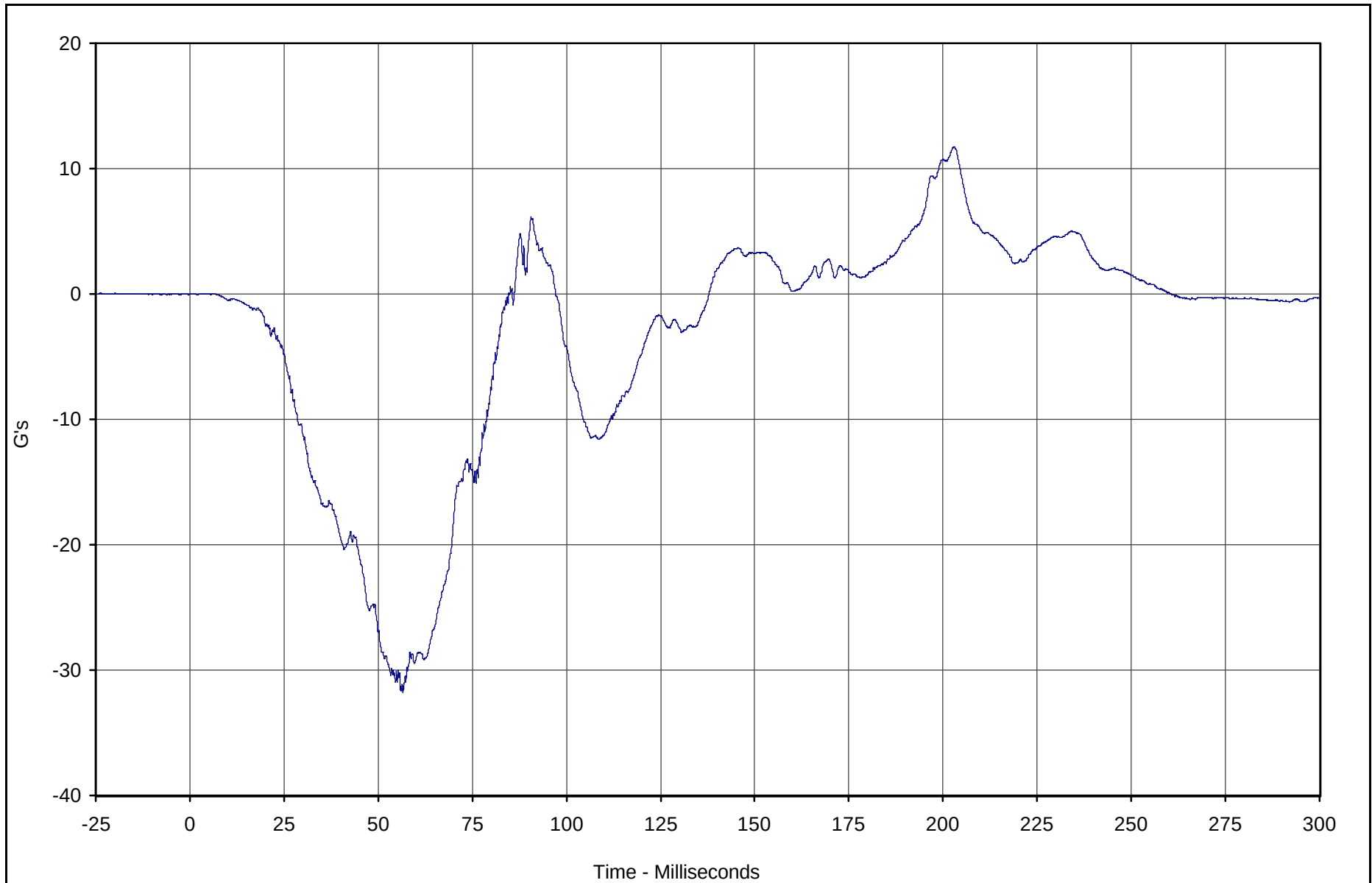


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description           | CURNO | Type | Units | Max  | Time  | Min   | Time | SAE Class |
|-----------------------------|-------|------|-------|------|-------|-------|------|-----------|
| Right Rear (3 Yr.) Pelvis Z | 181   | FIL  | G's   | 11.7 | 202.9 | -31.8 | 56.6 | 1000      |

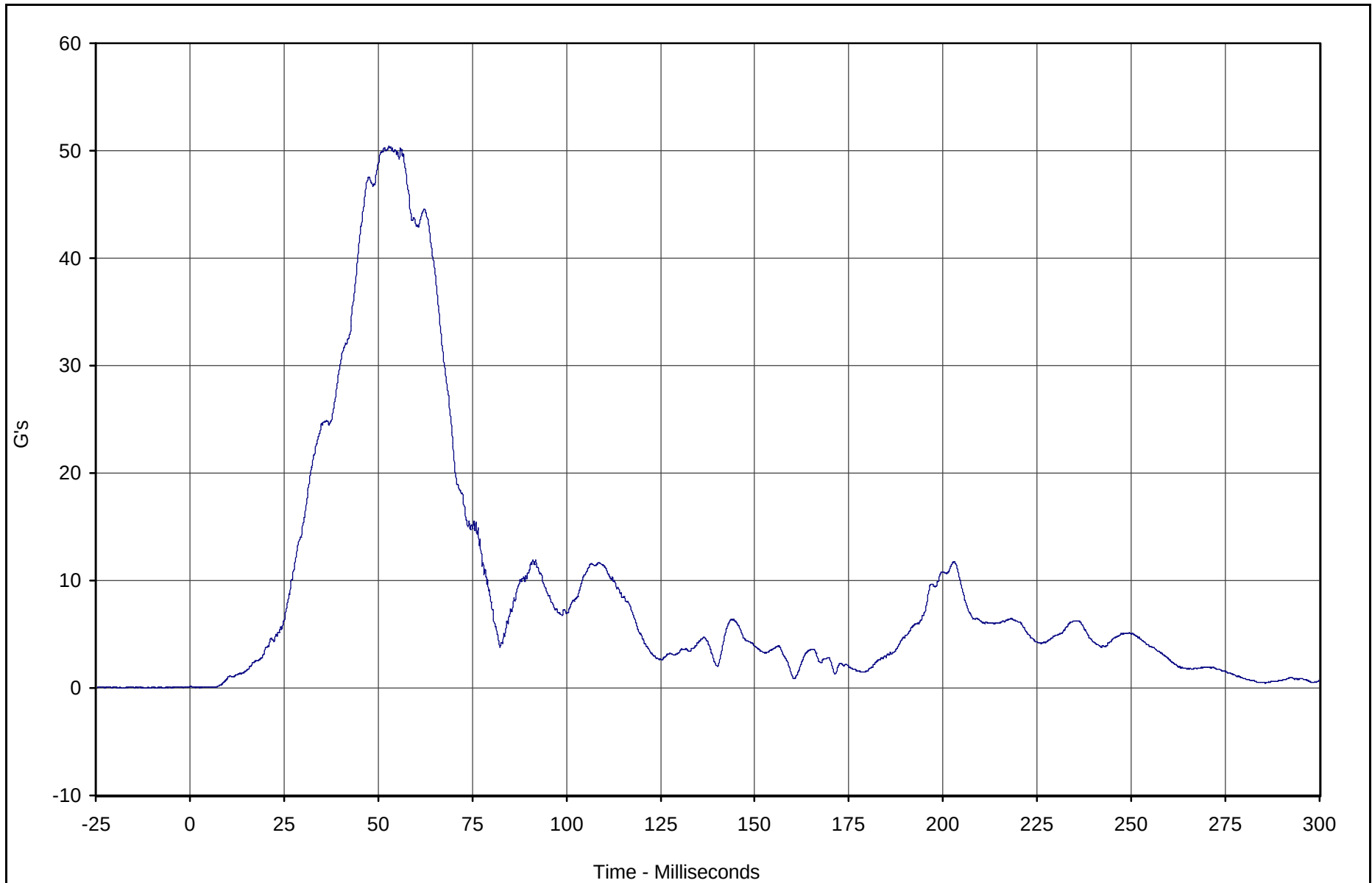


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                   | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|-------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Right Rear (3 Yr.) Pelvis Resultant | 179   | RES  | G's   | 50.4 | 52.9 | 0.0 | 2.6  | 1000      |

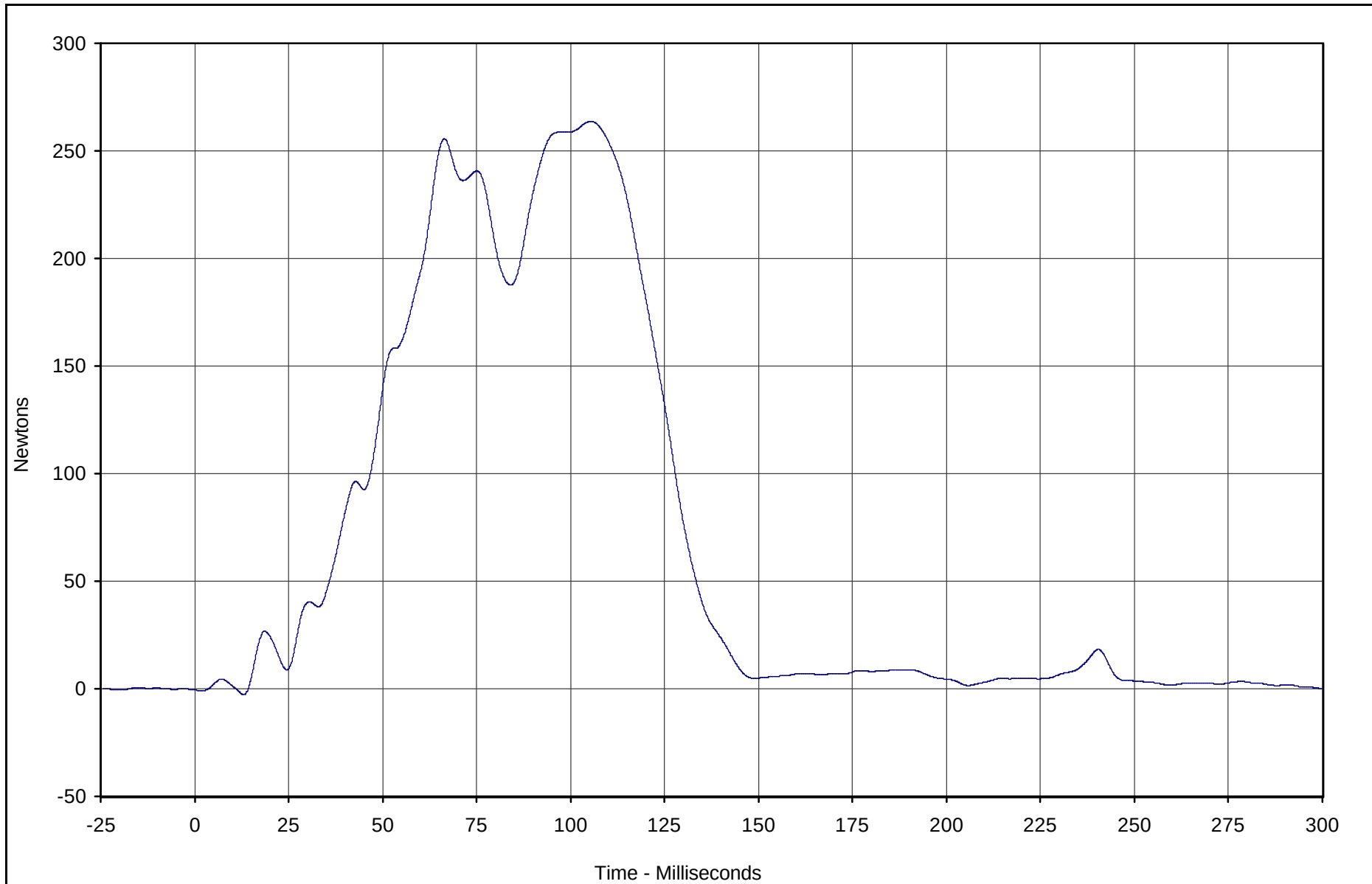


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                       | CURNO | Type | Units   | Max   | Time  | Min  | Time | SAE Class |
|-----------------------------------------|-------|------|---------|-------|-------|------|------|-----------|
| Right Rear (3 Yr.) Car Seat Tether Load | 182   | FIL  | Newtons | 263.7 | 105.4 | -2.8 | 13.0 | 60        |



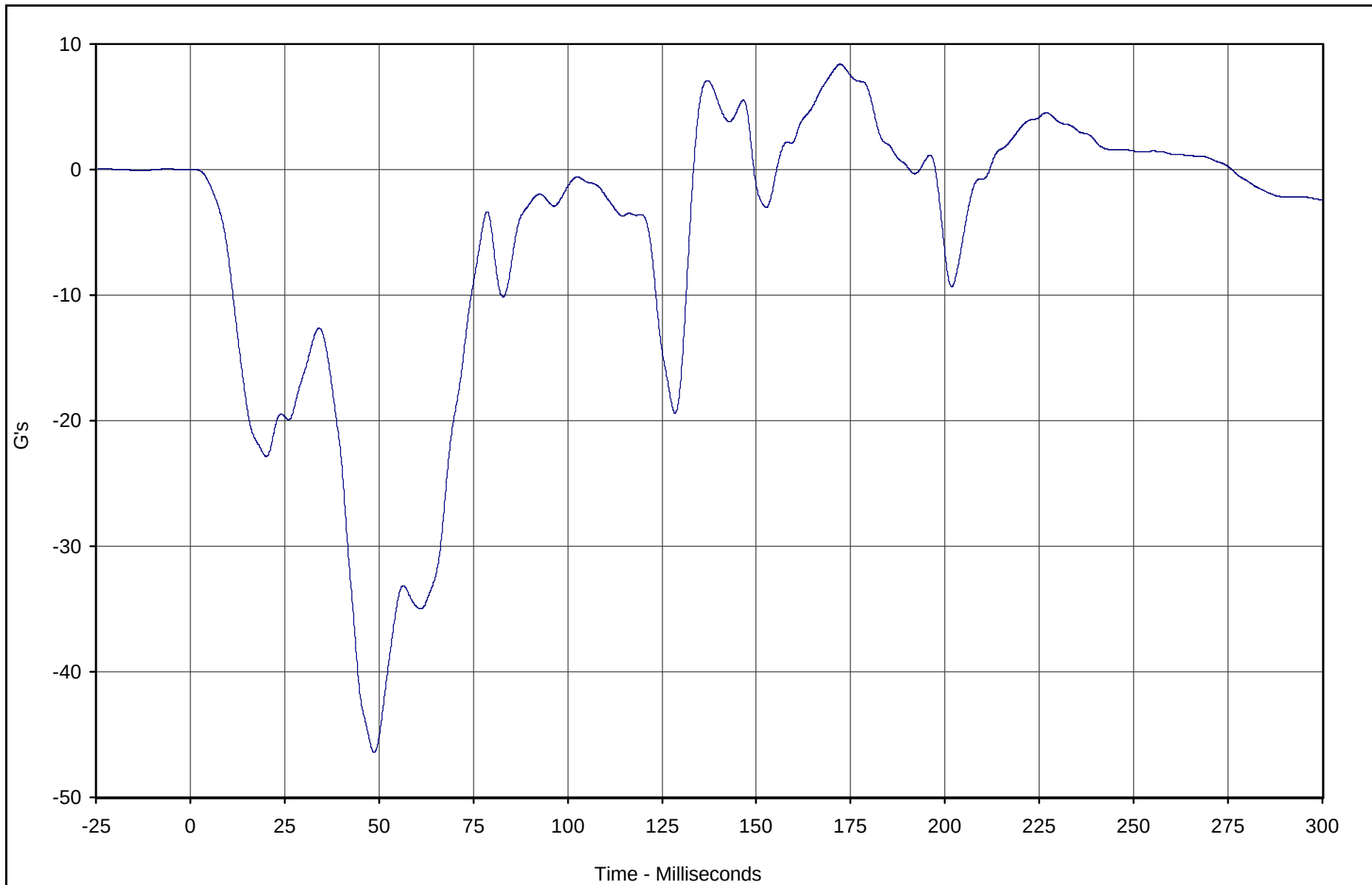
Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300





| Curve Description             | CURNO | Type | Units | Max | Time  | Min   | Time | SAE Class |
|-------------------------------|-------|------|-------|-----|-------|-------|------|-----------|
| Right Rear (3 Yr.) Car Seat X | 183   | FIL  | G's   | 8.4 | 172.2 | -46.4 | 48.8 | 60        |

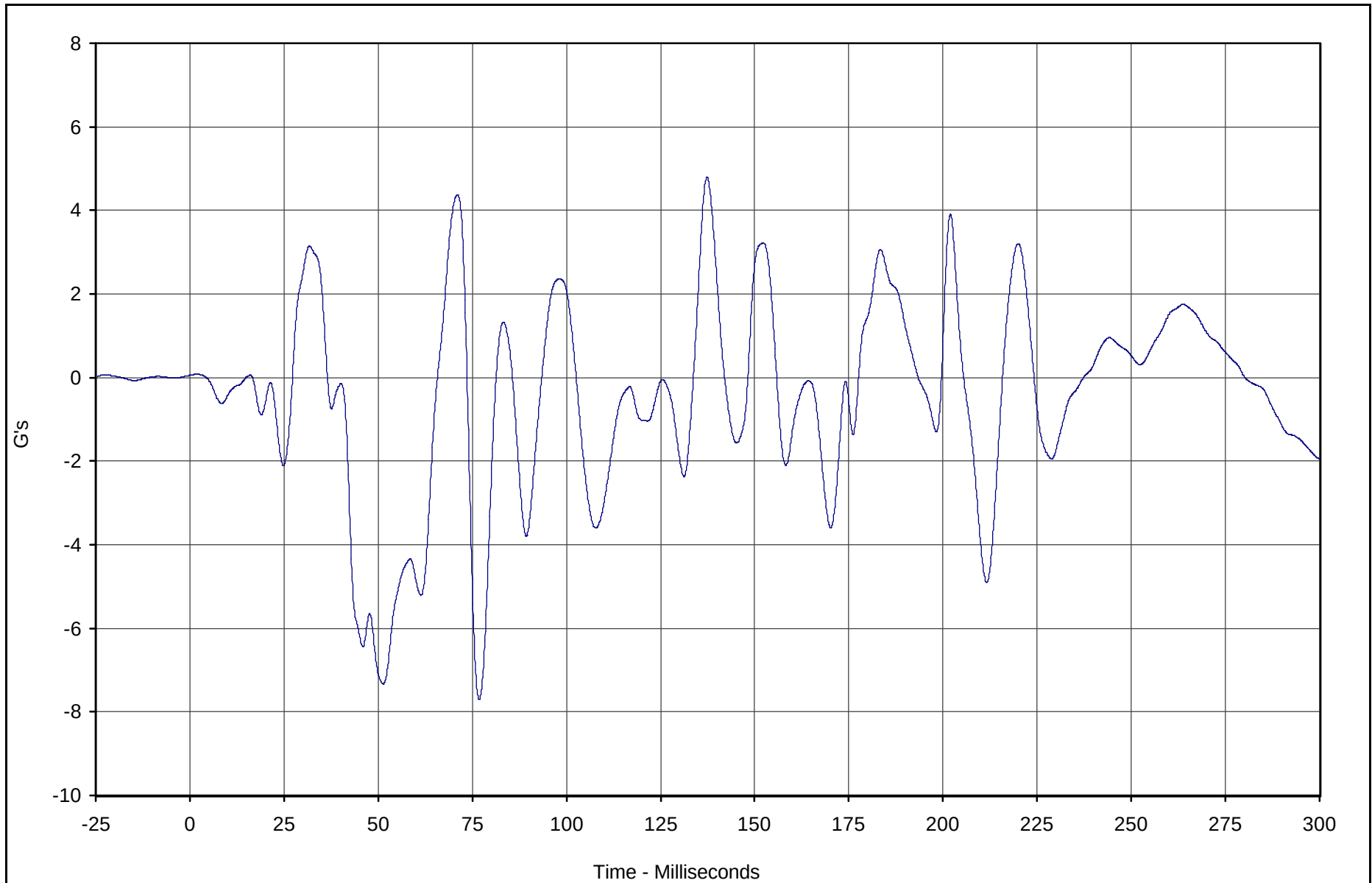


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description             | CURNO | Type | Units | Max | Time  | Min  | Time | SAE Class |
|-------------------------------|-------|------|-------|-----|-------|------|------|-----------|
| Right Rear (3 Yr.) Car Seat Y | 184   | FIL  | G's   | 4.8 | 137.3 | -7.7 | 76.9 | 60        |

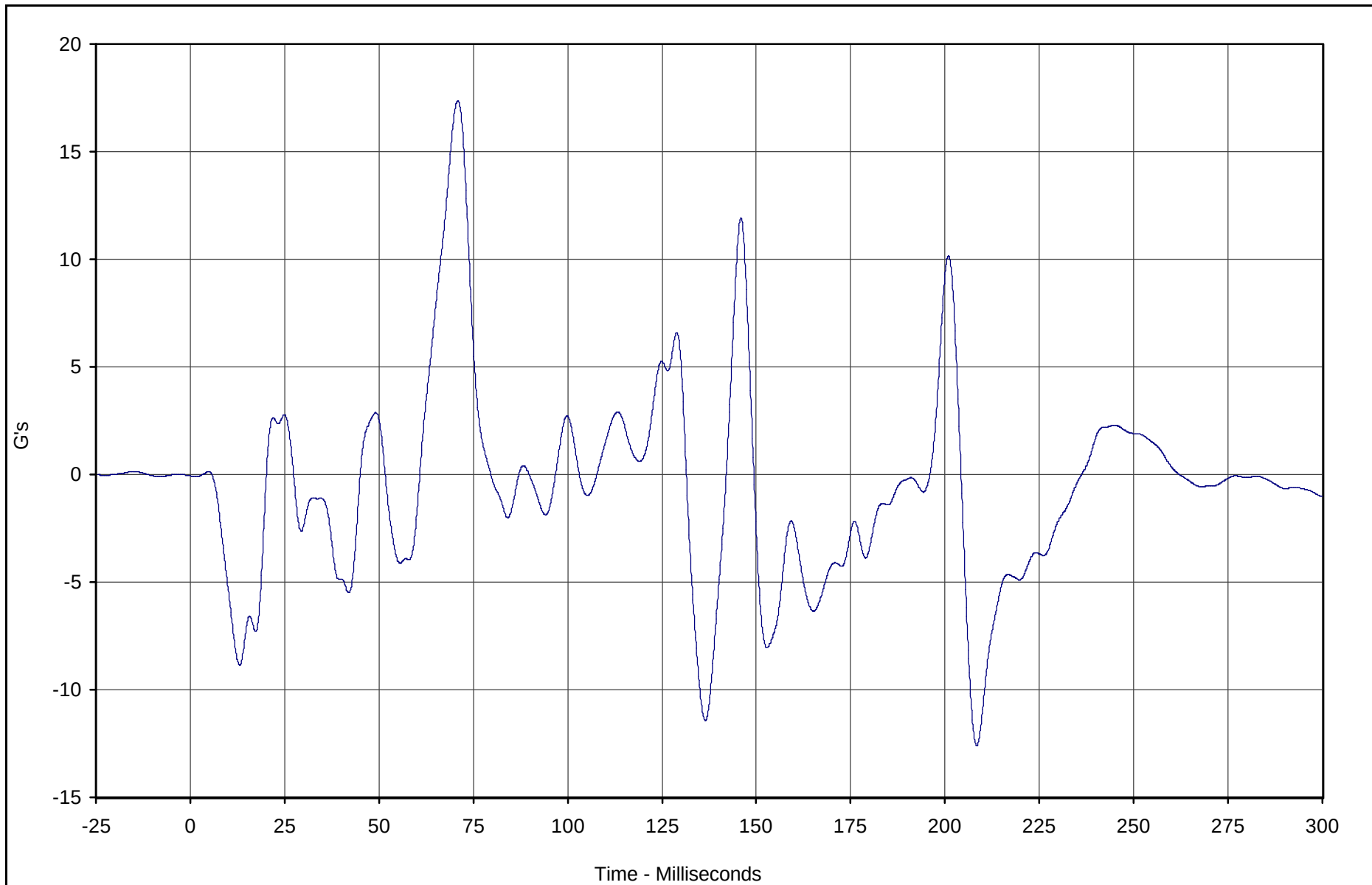


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description             | CURNO | Type | Units | Max  | Time | Min   | Time  | SAE Class |
|-------------------------------|-------|------|-------|------|------|-------|-------|-----------|
| Right Rear (3 Yr.) Car Seat Z | 185   | FIL  | G's   | 17.4 | 70.9 | -12.6 | 208.4 | 60        |

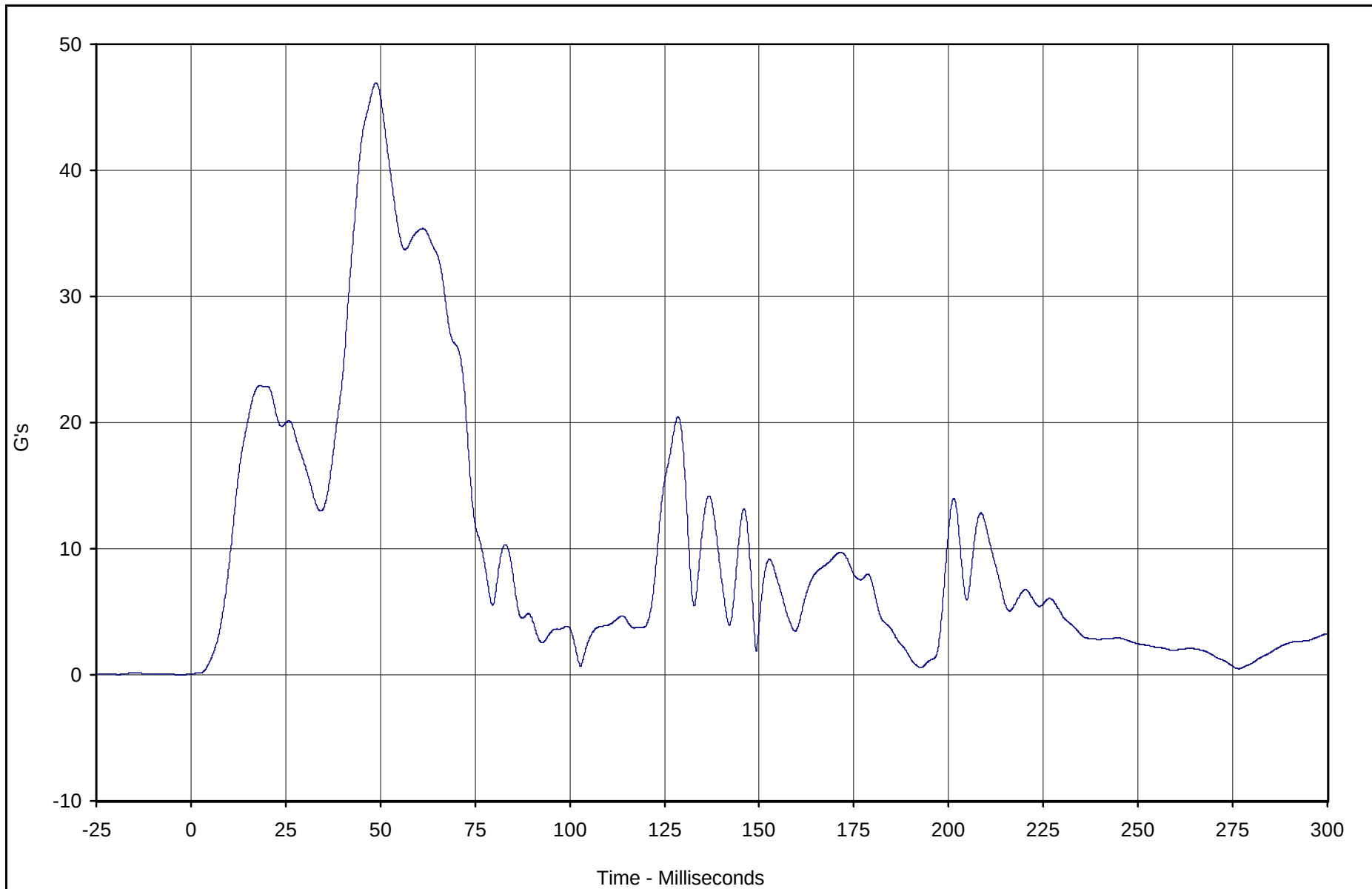


Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300



| Curve Description                     | CURNO | Type | Units | Max  | Time | Min | Time | SAE Class |
|---------------------------------------|-------|------|-------|------|------|-----|------|-----------|
| Right Rear (3 Yr.) Car Seat Resultant | 183   | RES  | G's   | 46.9 | 48.8 | 0.1 | 0.0  | 60        |



Test Vehicle: 2004 Jeep Liberty 4WD SUV

Test Date: 11/18/03

Test Program: 2004 NHTSA 35mph NCAP

NHTSA No.: M40300

## **SECTION F-4**

### **CHILD DUMMY INSTRUMENTATION INFORMATION**

**2004 NHTSA 35mph NCAP**  
**Instrumentation Data Channel Assignments**  
**Left Rear Child A.T.D. Serial Number 082**  
**11/18/03**  
**2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 134 | HEAD, PRIMARY      | X    | GPAC050    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 135 | HEAD, PRIMARY      | Y    | GPAC051    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 136 | HEAD, PRIMARY      | Z    | GPAC052    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 137 | UPPER NECK FORCE   | X    | 082UNFX    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 138 | UPPER NECK FORCE   | Y    | 082UNFY    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 139 | UPPER NECK FORCE   | Z    | 082UNFZ    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 140 | UPPER NECK MOMENT  | X    | 082UNMX    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 141 | UPPER NECK MOMENT  | Y    | 082UNMY    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 142 | UPPER NECK MOMENT  | Z    | 082UNMZ    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 143 | LOWER NECK FORCE   | X    | 082LNFX    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 144 | LOWER NECK FORCE   | Y    | 082LNFY    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 145 | LOWER NECK FORCE   | Z    | 082LNFZ    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 146 | LOWER NECK MOMENT  | X    | 082LNMX    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 147 | LOWER NECK MOMENT  | Y    | 082LNMY    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 148 | LOWER NECK MOMENT  | Z    | 082LNMZ    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 149 | CHEST , PRIMARY    | X    | 2116-A11   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 150 | CHEST , PRIMARY    | Y    | 2116-A14   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 151 | CHEST , PRIMARY    | Z    | 2116-A23   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 152 | CHEST DISPLACEMENT | X    | 082CP      | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 153 | PELVIS, PRIMARY    | X    | 2116-A12   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 154 | PELVIS, PRIMARY    | Y    | 2116-A19   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 155 | PELVIS, PRIMARY    | Z    | 2116-A17   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 156 | CAR SEAT TETHER    | X    | BL112      | Load cell, Seat belt     | FGP          | FN4060    | N     |
| 157 | CAR SEAT           | X    | KETX1A     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 158 | CAR SEAT           | Y    | KETX1B     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 159 | CAR SEAT           | Z    | KETX1C     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |



**2004 NHTSA 35mph NCAP  
Instrumentation Data Channel Assignments  
Right Rear Child A.T.D. Serial Number 139  
11/18/03  
2004 Jeep Liberty 4WD SUV**

| CH. | LOCATION           | AXIS | IDENT. NO. | DESCRIPTION              | MFR          | MODEL     | UNITS |
|-----|--------------------|------|------------|--------------------------|--------------|-----------|-------|
| 160 | HEAD, PRIMARY      | X    | GPAC047    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 161 | HEAD, PRIMARY      | Y    | GPAC048    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 162 | HEAD, PRIMARY      | Z    | GPAC049    | Accel.,1/2 bridge        | Endevco      | 7264-2000 | G     |
| 163 | UPPER NECK FORCE   | X    | 139UNFX    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 164 | UPPER NECK FORCE   | Y    | 139UNFY    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 165 | UPPER NECK FORCE   | Z    | 139UNFZ    | Load cell, six axis neck | R. A. Denton | IF-234    | N     |
| 166 | UPPER NECK MOMENT  | X    | 139UNMX    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 167 | UPPER NECK MOMENT  | Y    | 139UNMY    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 168 | UPPER NECK MOMENT  | Z    | 139UNMZ    | Load cell, six axis neck | R. A. Denton | IF-234    | Nm    |
| 169 | LOWER NECK FORCE   | X    | 139LNFX    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 170 | LOWER NECK FORCE   | Y    | 139LNFY    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 171 | LOWER NECK FORCE   | Z    | 139LNFZ    | Load cell, six axis neck | R. A. Denton | 3303      | N     |
| 172 | LOWER NECK MOMENT  | X    | 139LNMX    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 173 | LOWER NECK MOMENT  | Y    | 139LNMY    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 174 | LOWER NECK MOMENT  | Z    | 139LNMZ    | Load cell, six axis neck | R. A. Denton | 3303      | Nm    |
| 175 | CHEST , PRIMARY    | X    | 2116-A01   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 176 | CHEST , PRIMARY    | Y    | 2116-A06   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 177 | CHEST , PRIMARY    | Z    | 2116-A07   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 178 | CHEST DISPLACEMENT | X    | 139CP      | Rotary Pot Chest         | Servo        | 14CBI     | MM    |
| 179 | PELVIS, PRIMARY    | X    | 2116-N07   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 180 | PELVIS, PRIMARY    | Y    | 2116-A03   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 181 | PELVIS, PRIMARY    | Z    | 2116-A17   | Accel., Full Bridge      | Entran       | 2000JF    | G     |
| 182 | CAR SEAT TETHER    | X    | BL113      | Load cell, Seat belt     | FGP          | FN4060    | N     |
| 183 | CAR SEAT           | X    | KETX4A     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 184 | CAR SEAT           | Y    | KETX4B     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |
| 185 | CAR SEAT           | Z    | KETX4C     | Accel.,1/2 bridge        | Endevco      | 7264-200  | G     |

## **SECTION F-5**

### **CHILD DUMMY CALIBRATION INFORMATION**



# Calibration Data Sheet Hybrid III 3 Year Old Head Drop Test

ATD Serial No.: 082

Test I.D.: HD11D

| Tested Parameter              | Units  | Specification  | Result | Pass/Fail |
|-------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration   | G's    | 250.0 to 280.0 | 270.4  | Pass      |
| Peak Lateral Acceleration     | G's    | ≤15.0          | 1.3    | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes            | Yes    | Pass      |
| Oscillations After Main Pulse | %      | <10            | 3.6    | Pass      |
| Overall Test Results          |        |                |        | Pass      |

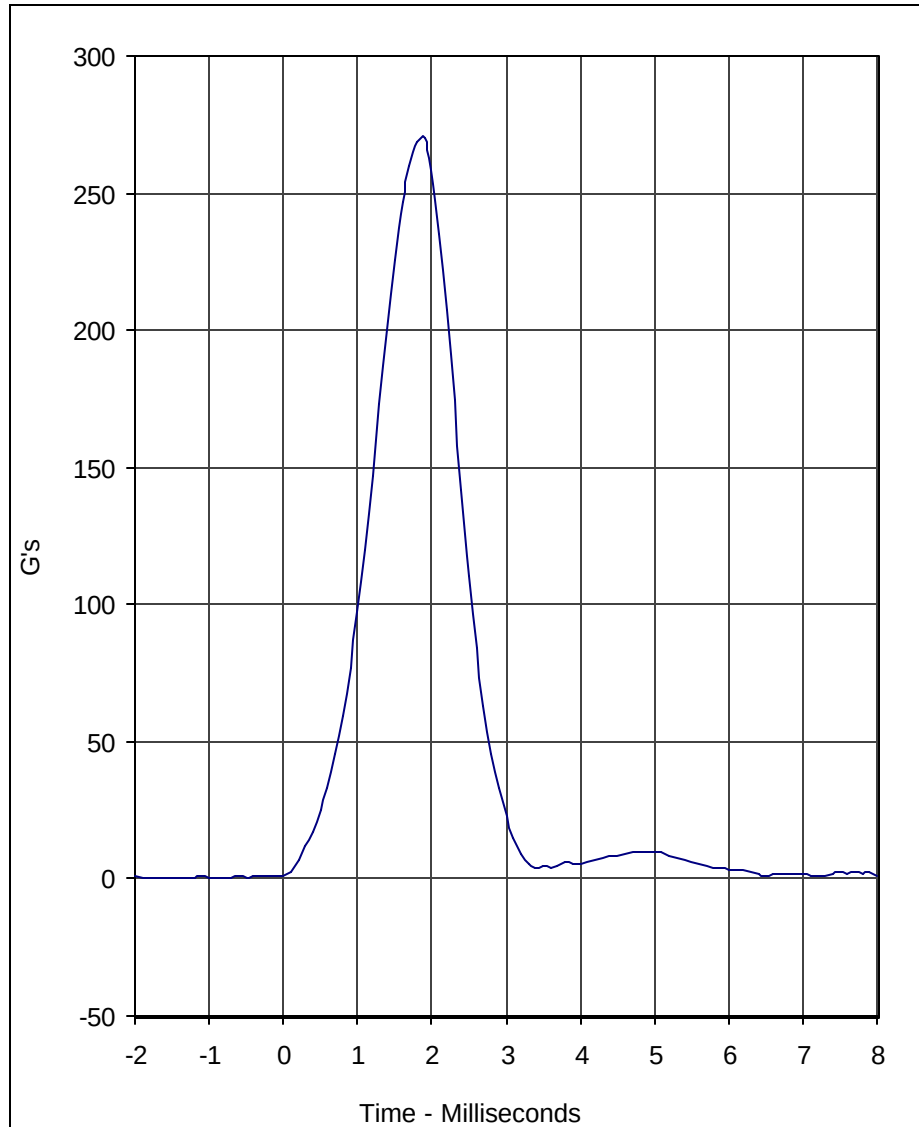
F5-1

TR-P23001-23-NC

Laboratory Technician

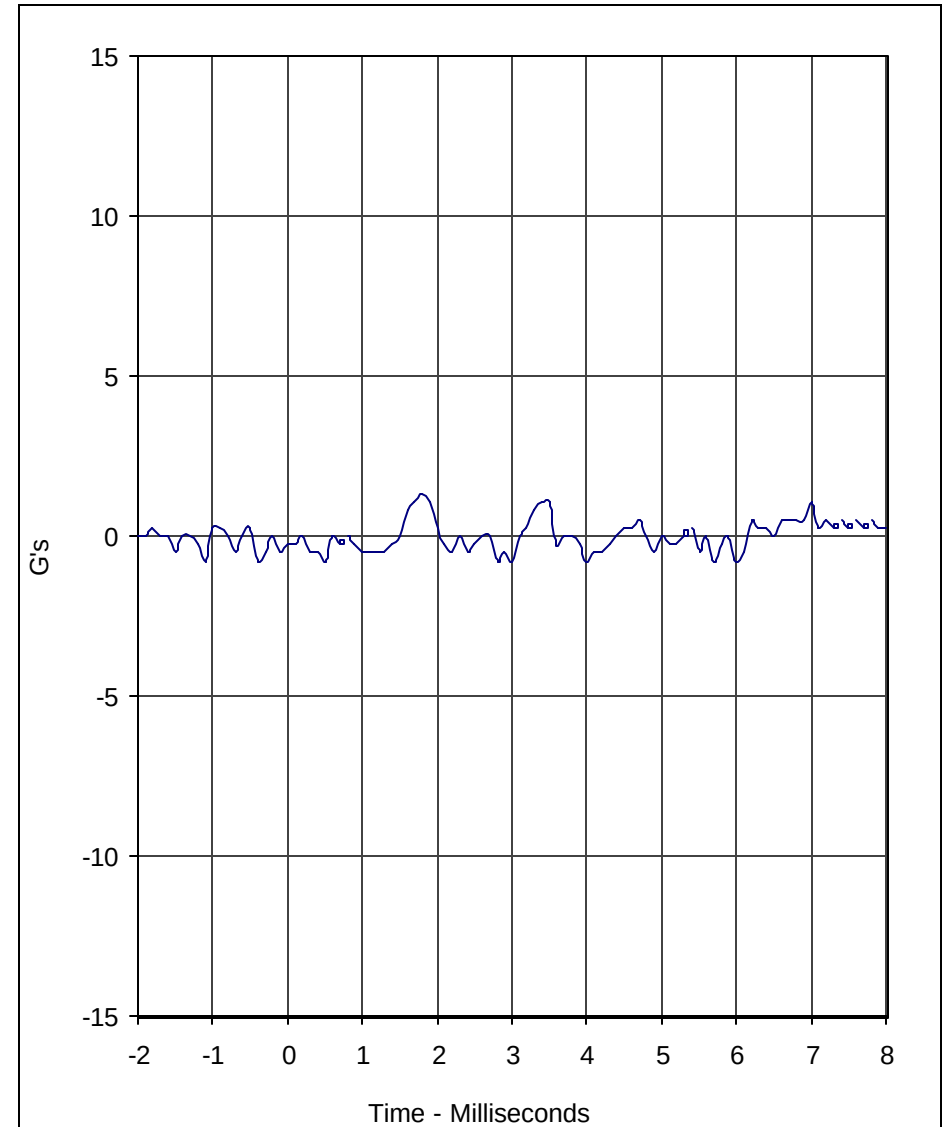
November 11, 2003

Test Date



| Curve Description |       |      |     | CURNO | Type      |
|-------------------|-------|------|-----|-------|-----------|
| Head Resultant    |       |      |     | 001   | RES       |
| Units             | Max   | Time | Min | Time  | SAE Class |
| G's               | 270.4 | 1.9  | 0.0 | -1.7  | 1000      |

Test Program: Hybrid III 3 Year Old Head Drop Test  
 Test Date: 11/11/03



| Curve Description |     |      |      | CURNO | Type      |
|-------------------|-----|------|------|-------|-----------|
| Head Y            |     |      |      | 002   | FIL       |
| Units             | Max | Time | Min  | Time  | SAE Class |
| G's               | 1.3 | 1.8  | -0.8 | -1.1  | 1000      |

A.T.D. Serial No.: 082  
 Test I.D.: HD11D





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Thorax Impact Test

ATD Serial No.: 082

Test I.D.: CH11A

| Tested Parameter                        | Units   | Specification | Result | Pass/Fail |
|-----------------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature                  | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity            | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity                          | m/s     | 5.9 to 6.1    | 5.96   | Pass      |
| Peak Chest Compression                  | MM      | 32 to 38      | 36.0   | Pass      |
| Peak Probe Force Between 32 and 38 MM   | Newtons | 680 to 810    | 759.7  | Pass      |
| Peak Probe Force Between 12.5 and 32 MM | Newtons | ≤860          | 742.0  | Pass      |
| Internal Hysteresis                     | %       | 65 to 85      | 68.8   | Pass      |
| Overall Test Results                    |         |               |        | Pass      |

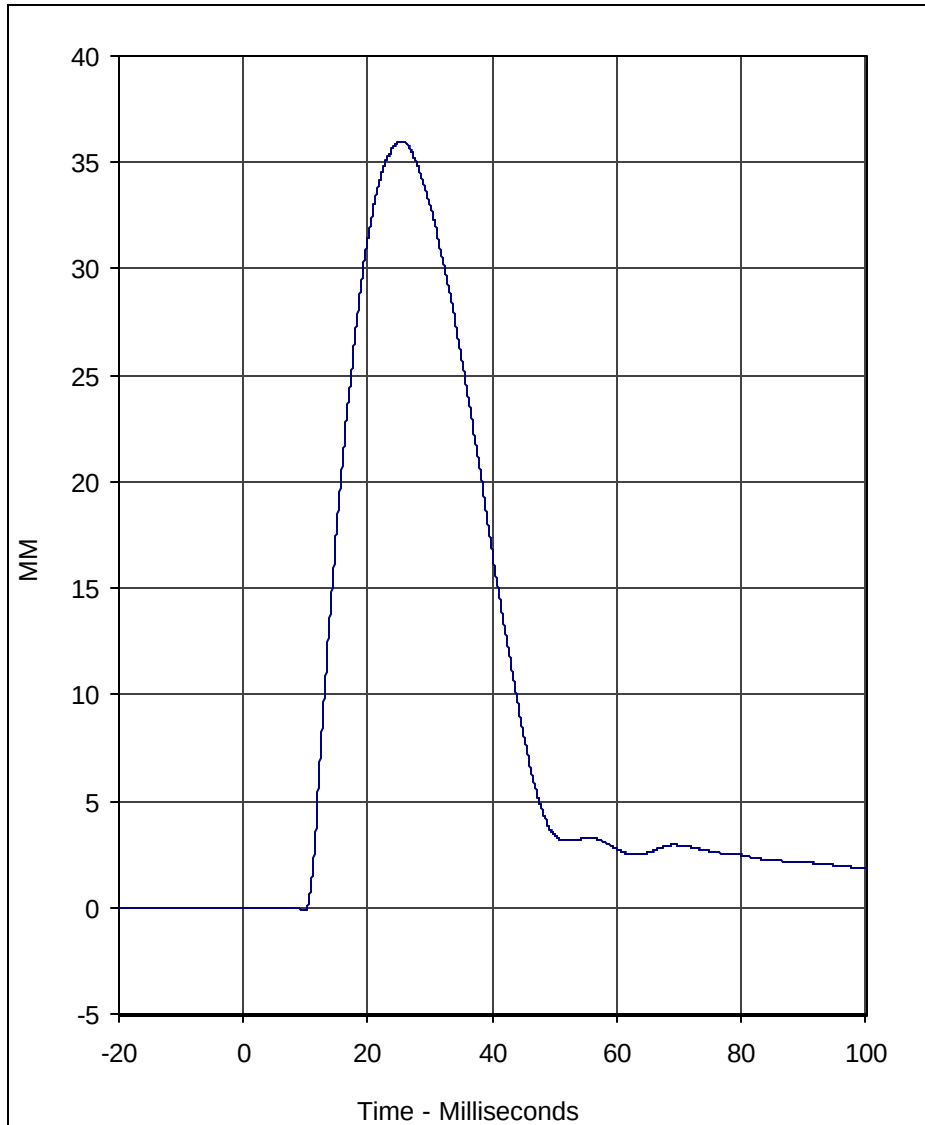
F5-3

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Laboratory Technician

November 12, 2003

Test Date

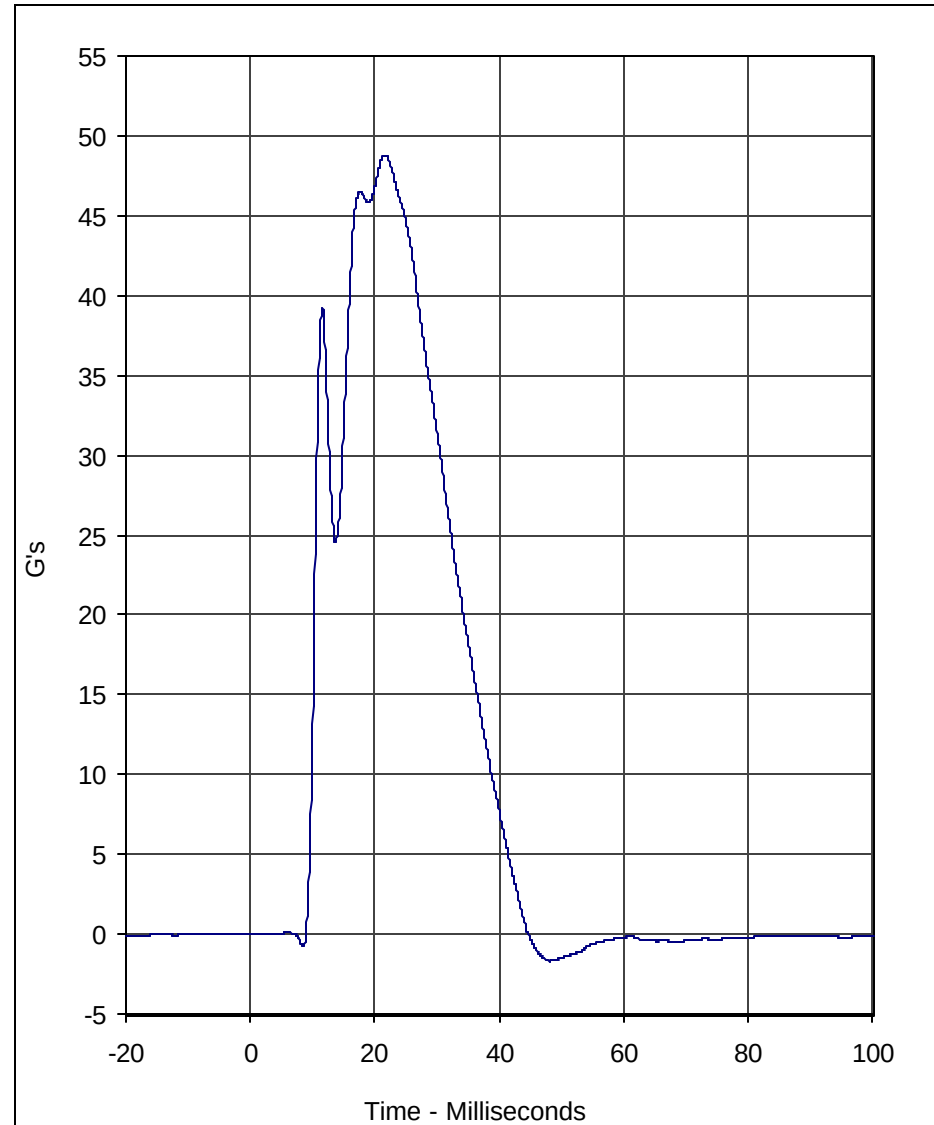


|                   |  |  |  |       |      |
|-------------------|--|--|--|-------|------|
| Curve Description |  |  |  | CURNO | Type |
| Chest Compression |  |  |  | 001   | FIL  |

| Units | Max  | Time | Min  | Time | SAE Class |
|-------|------|------|------|------|-----------|
| MM    | 36.0 | 25.5 | -0.1 | 9.8  | 600       |

Test Program: Hybrid III 3 Year Old Thorax Impact

Test Date: 11/12/03



|                    |  |  |  |       |      |
|--------------------|--|--|--|-------|------|
| Curve Description  |  |  |  | CURNO | Type |
| Probe Acceleration |  |  |  | 002   | FIL  |

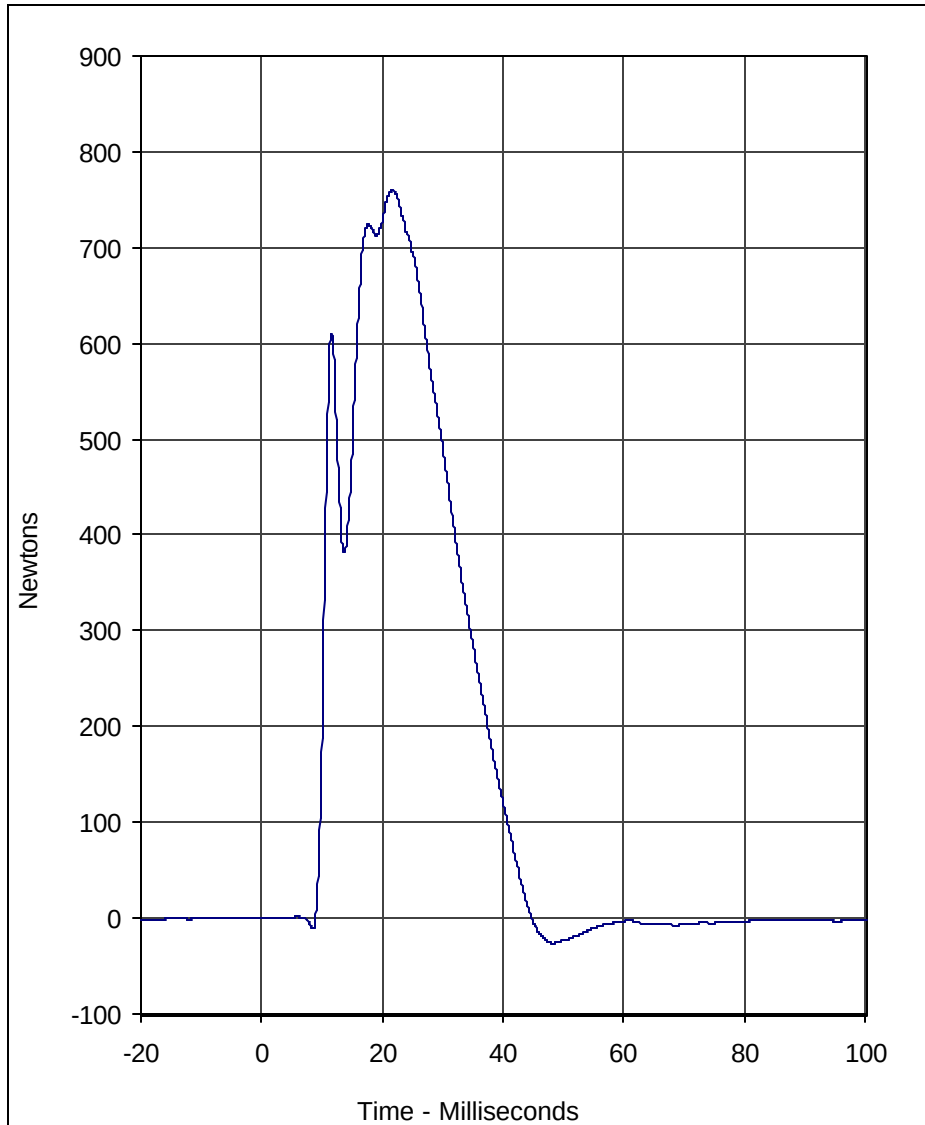
| Units | Max  | Time | Min  | Time | SAE Class |
|-------|------|------|------|------|-----------|
| G's   | 48.8 | 21.7 | -1.7 | 48.2 | 180       |

A.T.D. Serial No.: 082

Test I.D.: CH11A



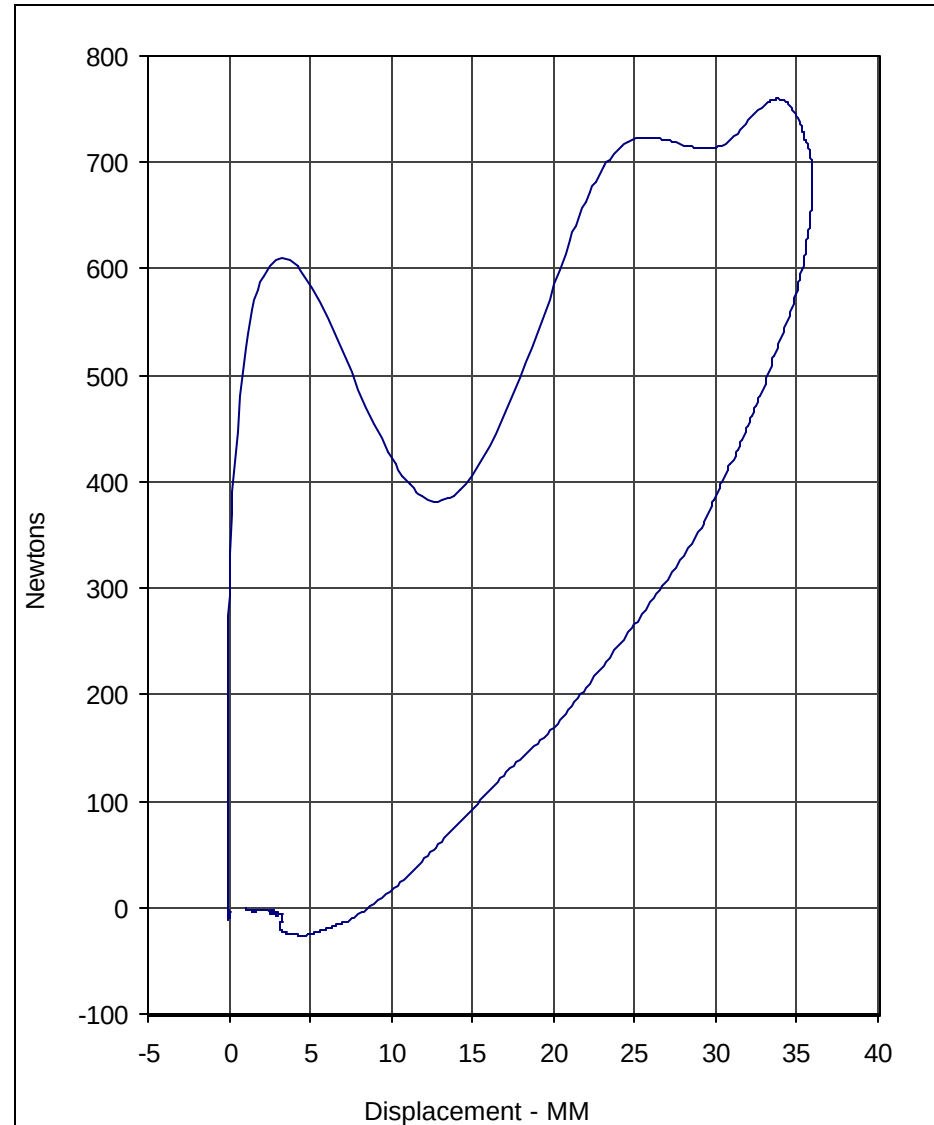




| Curve Description |       |      |       | CURNO | Type      |
|-------------------|-------|------|-------|-------|-----------|
| Probe Force       |       |      |       | 003   | FIL       |
| Units             | Max   | Time | Min   | Time  | SAE Class |
| Newtons           | 759.7 | 21.7 | -26.2 | 48.2  | 180       |

Test Program: Hybrid III 3 Year Old Thorax Impact

Test Date: 11/12/03



| Curve Description                 |            |           | CURNO | Type |
|-----------------------------------|------------|-----------|-------|------|
| Probe Force vs. Chest Compression |            |           | 004   | FIL  |
| Units                             | Hysteresis | SAE Class |       |      |
| %                                 | 68.8       | 180/600   |       |      |

A.T.D. Serial No.: 082

Test I.D.: CH11A





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Neck Flexion Test

ATD Serial No.: 082

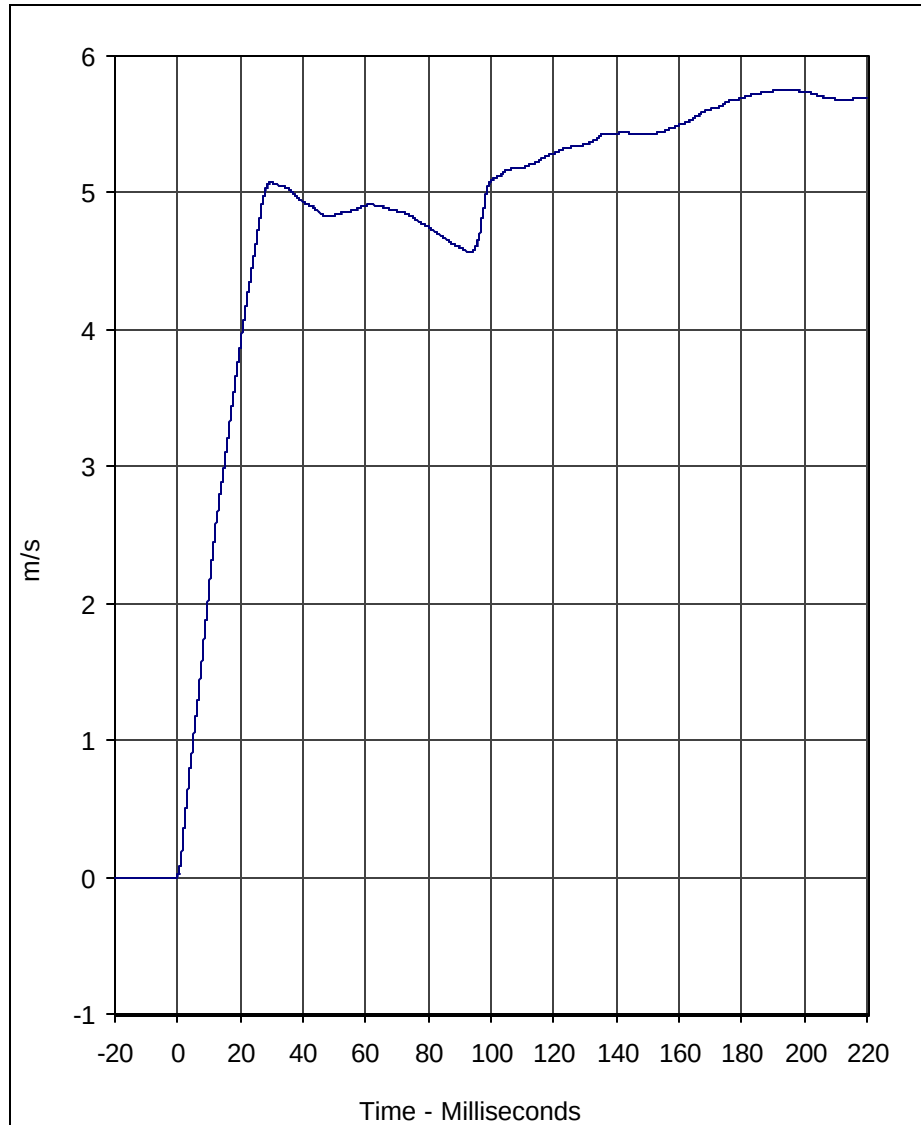
Test I.D.: NF11F

| Tested Parameter                    |          | Units   | Specification | Result | Pass/Fail |
|-------------------------------------|----------|---------|---------------|--------|-----------|
| Laboratory Temperature              |          | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity        |          | %       | 10 to 70      | 30     | Pass      |
| Pendulum Velocity                   |          | m/s     | 5.40 to 5.60  | 5.49   | Pass      |
| Pendulum Deceleration               | 10 Msec. | m/s     | 2.0 to 2.7    | 2.1    | Pass      |
|                                     | 20 Msec. | m/s     | 3.0 to 4.0    | 3.9    | Pass      |
|                                     | 30 Msec. | m/s     | 4.0 to 5.1    | 5.1    | Pass      |
| "D" Plane Rotation                  | Maximum  | Degrees | 70.0 to 82.0  | 74.3   | Pass      |
| Peak Moment in Rotation             | Maximum  | Nm      | 42.0 to 53.0  | 48.0   | Pass      |
| Positive Moment Decay, Time to 10Nm |          | Msec.   | 60.0 to 80.0  | 73.0   | Pass      |
| Overall Test Results                |          |         |               |        | Pass      |

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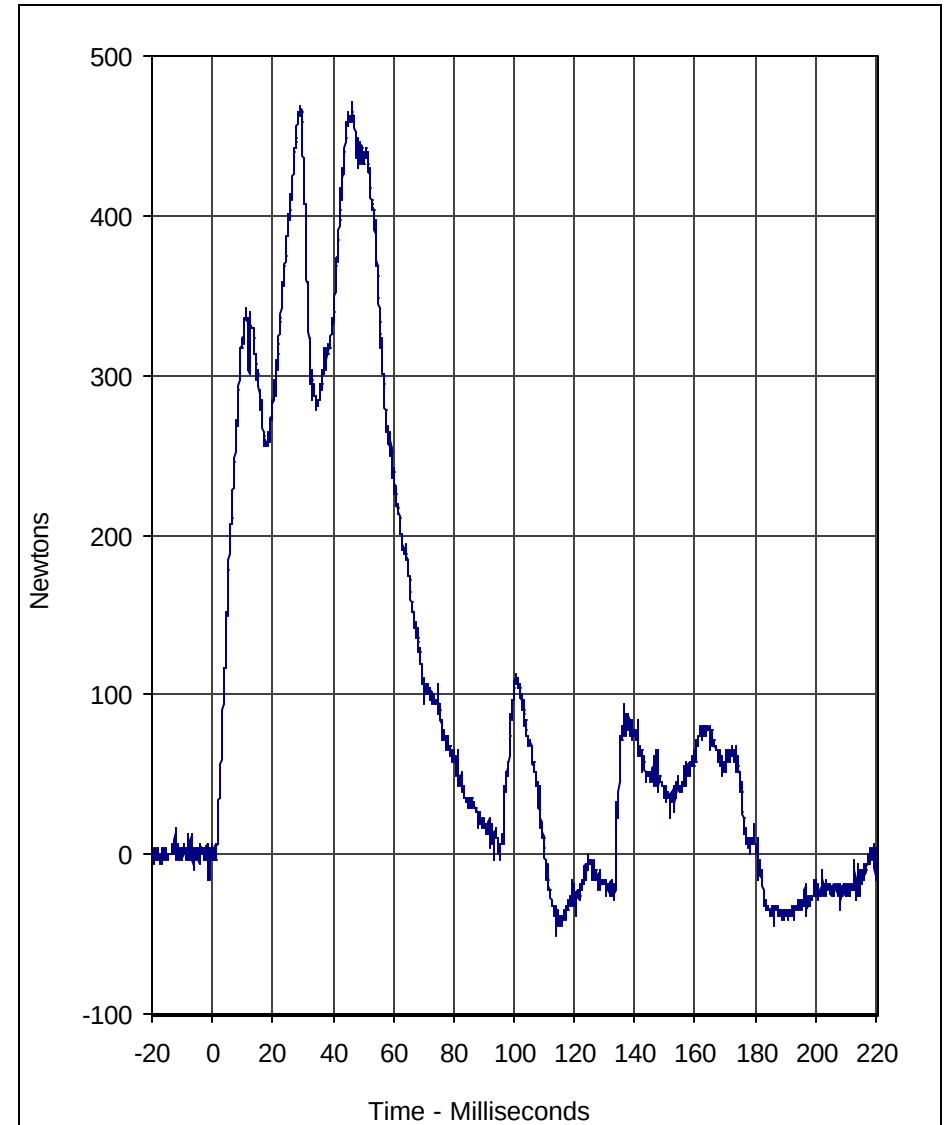
Test Date



| Curve Description |     |       |     | CURNO | Type      |
|-------------------|-----|-------|-----|-------|-----------|
| Pendulum Velocity |     |       |     | 001   | FIL       |
| Units             | Max | Time  | Min | Time  | SAE Class |
| m/s               | 5.8 | 194.1 | 0.0 | -20.0 | 180       |

Test Program: 3 Year Old Hybrid III Neck Flexion Test

Test Date: 11/12/03

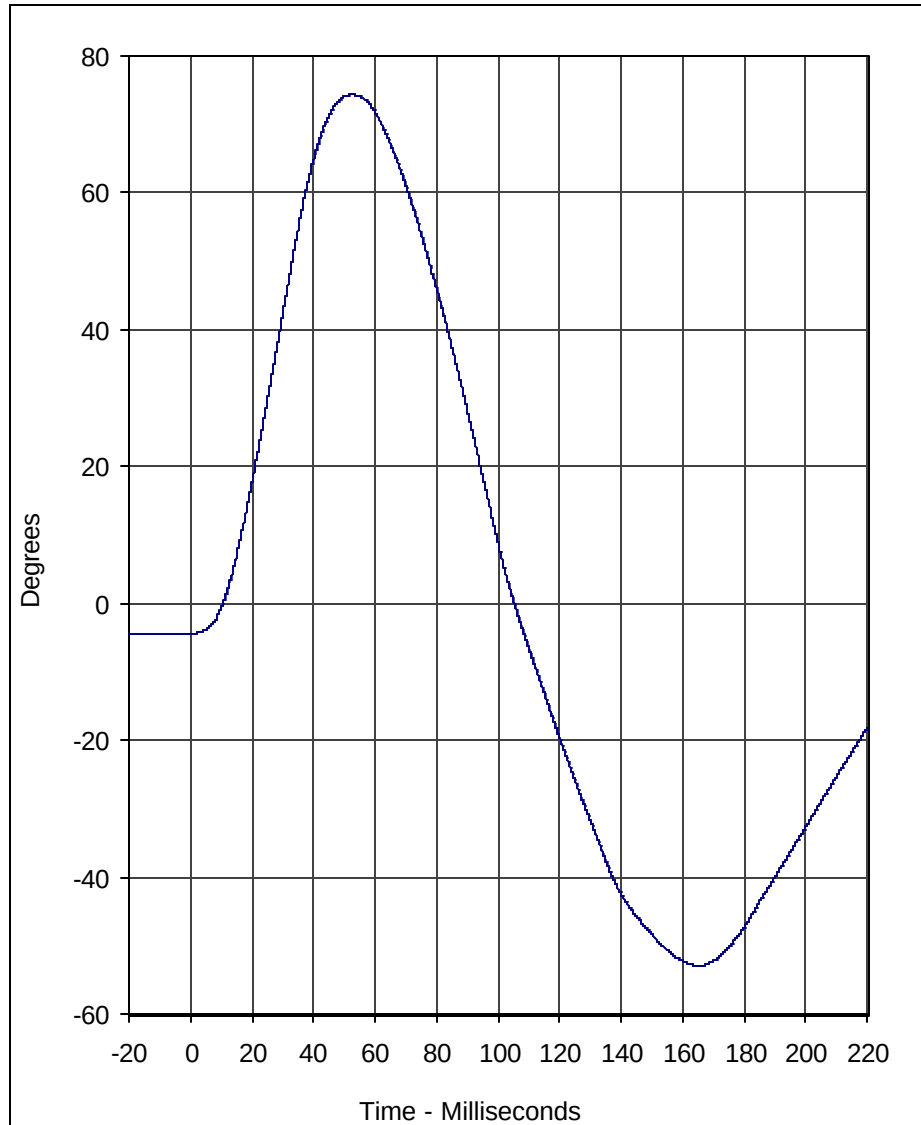


| Curve Description |       |      |       | CURNO | Type      |
|-------------------|-------|------|-------|-------|-----------|
| Neck Force X      |       |      |       | 002   | FIL       |
| Units             | Max   | Time | Min   | Time  | SAE Class |
| Newtons           | 471.7 | 46.1 | -51.4 | 114.0 | 1000      |

A.T.D. Serial No.: 082

Test I.D.: NF11F

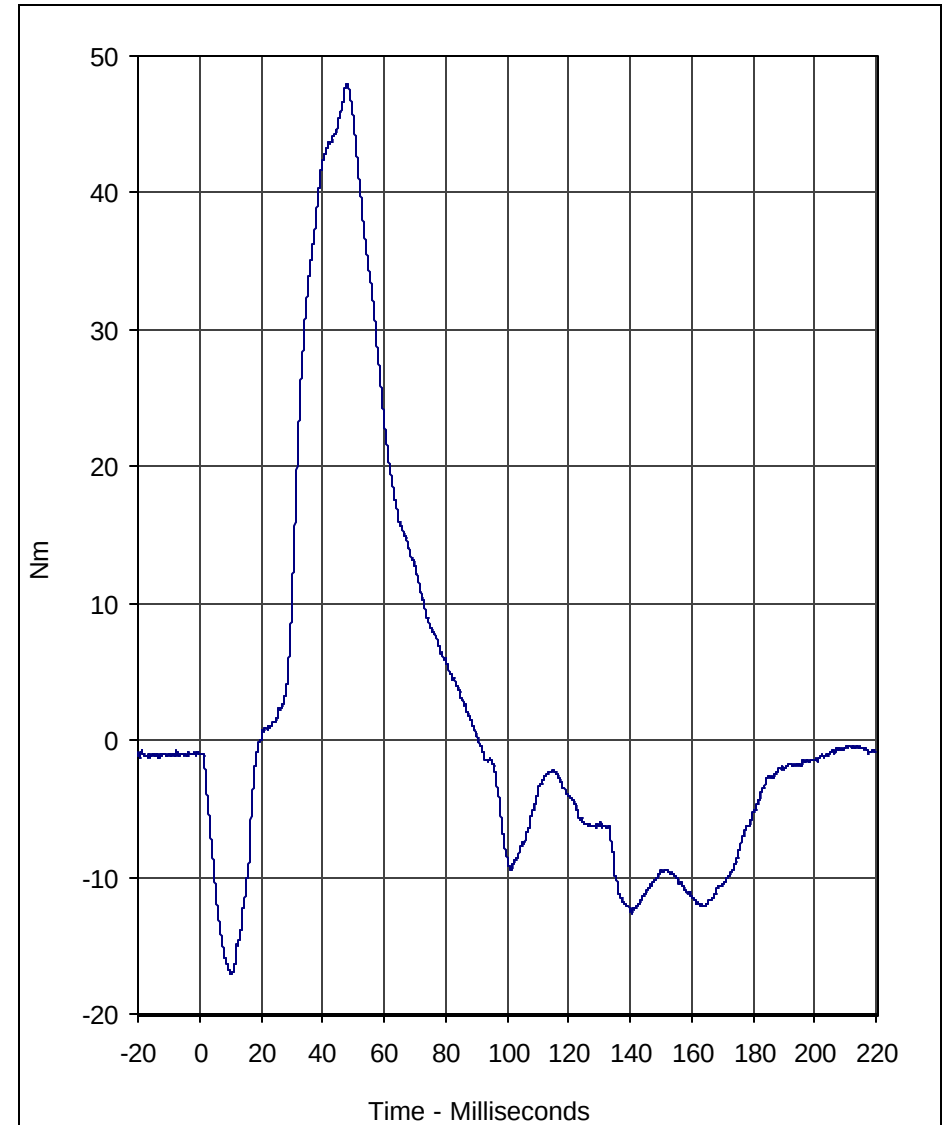




| Curve Description  |      |      |       | CURNO | Type      |
|--------------------|------|------|-------|-------|-----------|
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 74.3 | 52.5 | -52.9 | 165.4 | 60        |

Test Program: 3 Year Old Hybrid III Neck Flexion Test

Test Date: 11/12/03



| Curve Description |      |      |       | CURNO | Type      |
|-------------------|------|------|-------|-------|-----------|
| Neck Moment Y     |      |      |       | 002   | FIL       |
| Units             | Max  | Time | Min   | Time  | SAE Class |
| Nm                | 48.0 | 48.1 | -17.1 | 10.3  | 600       |

A.T.D. Serial No.: 082

Test I.D.: NF11F





# Calibration Data Sheet

## Hybrid III 3 Year Old

## Neck Extension Test

ATD Serial No.: 082

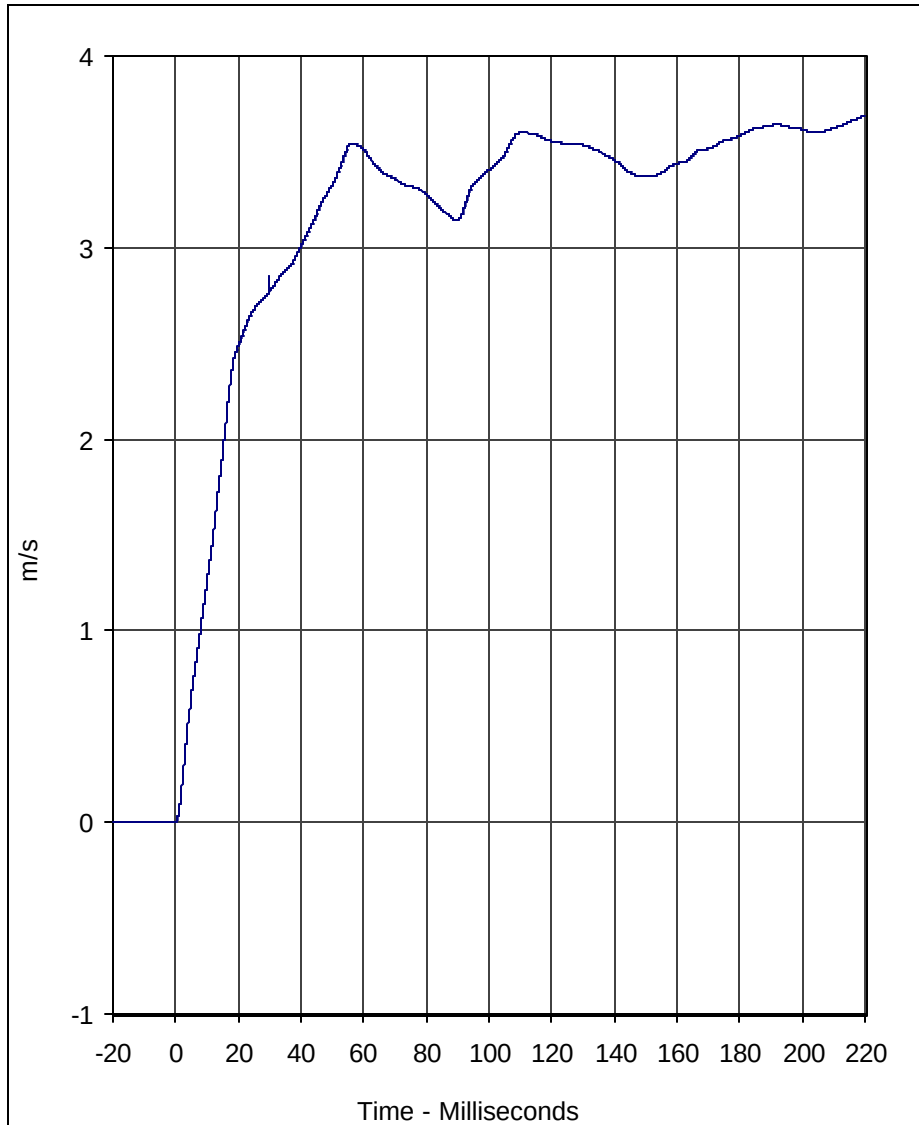
Test I.D.: NE11G

| Tested Parameter                    |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature              |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity        |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                   |          | m/s     | 3.55 to 3.75   | 3.60   | Pass      |
| Pendulum Deceleration               | 10 Msec. | m/s     | 1.0 to 1.4     | 1.3    | Pass      |
|                                     | 20 Msec. | m/s     | 1.9 to 2.5     | 2.5    | Pass      |
|                                     | 30 Msec. | m/s     | 2.8 to 3.5     | 2.8    | Pass      |
| "D" Plane Rotation                  | Maximum  | Degrees | 83.0 to 93.0   | 86.5   | Pass      |
| Peak Moment in Rotation             | Maximum  | Nm      | -43.7 to -53.3 | -47.6  | Pass      |
| Positive Moment Decay, Time to 10Nm |          | Msec.   | 60.0 to 80.0   | 68.4   | Pass      |
| Overall Test Results                |          |         |                |        | Pass      |

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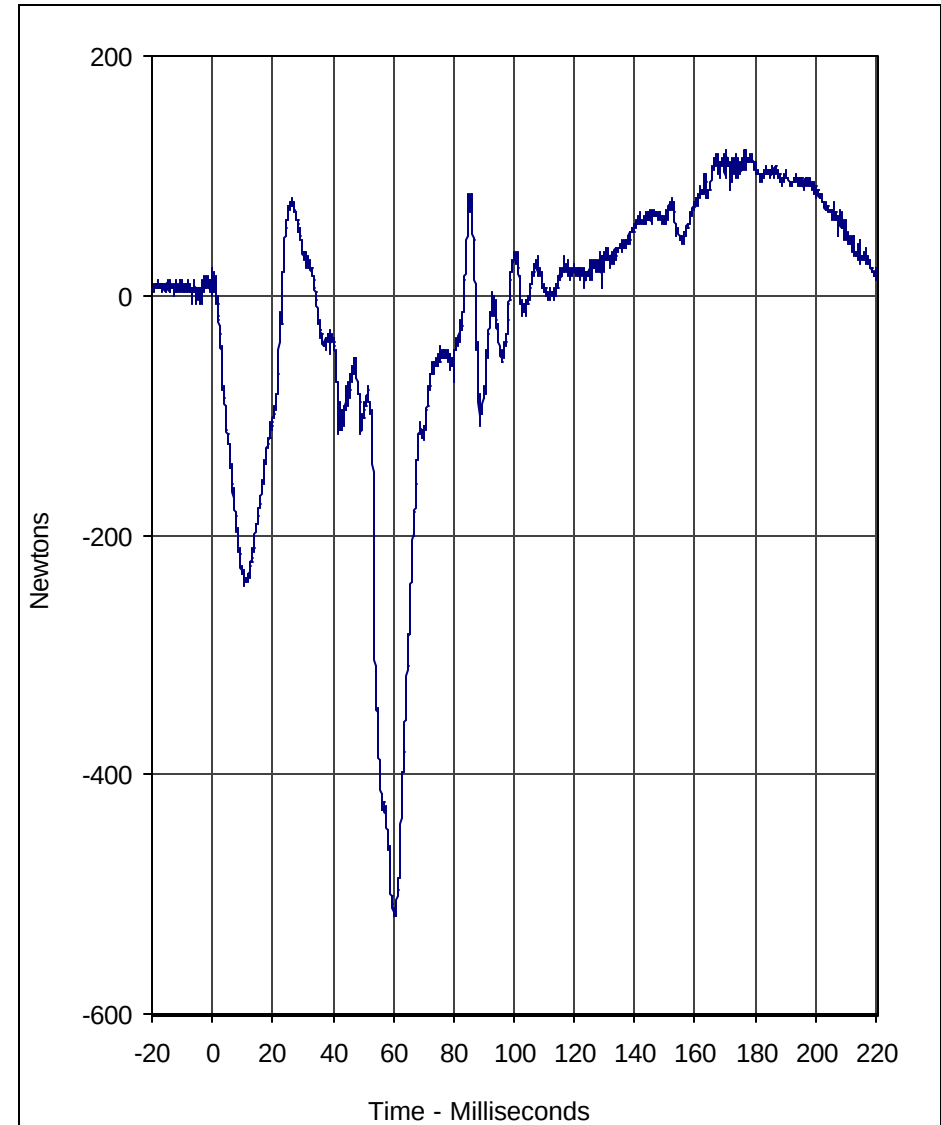
Test Date



| Curve Description |     |       |     | CURNO | Type      |
|-------------------|-----|-------|-----|-------|-----------|
| Pendulum Velocity |     |       |     | 001   | FIL       |
| Units             | Max | Time  | Min | Time  | SAE Class |
| m/s               | 3.7 | 220.0 | 0.0 | -0.6  | 180       |

Test Program: 3 Year Old Hybrid III Neck Extension Test

Test Date: 11/12/03



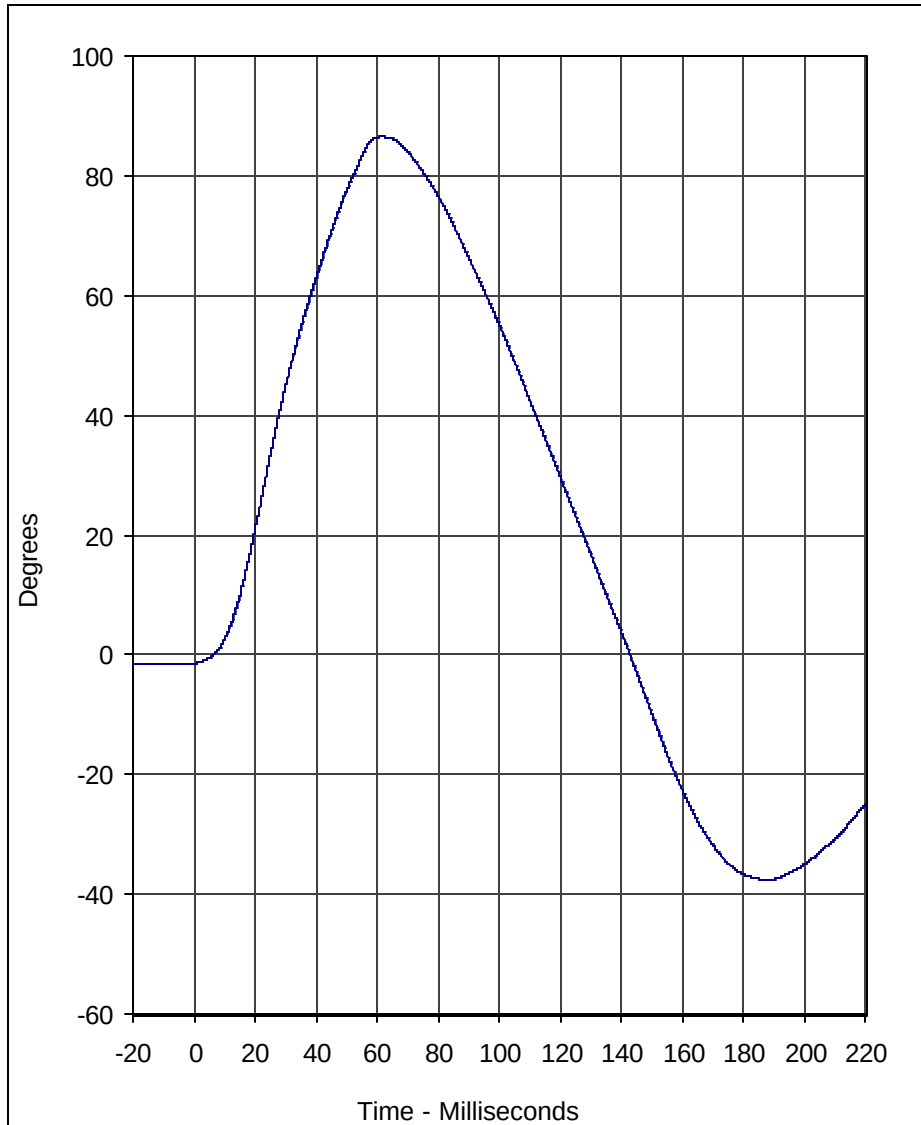
| Curve Description |       |       |        | CURNO | Type      |
|-------------------|-------|-------|--------|-------|-----------|
| Neck Force X      |       |       |        | 002   | FIL       |
| Units             | Max   | Time  | Min    | Time  | SAE Class |
| Newtons           | 121.5 | 170.6 | -518.7 | 60.0  | 1000      |

A.T.D. Serial No.: 082

Test I.D.: NE11G



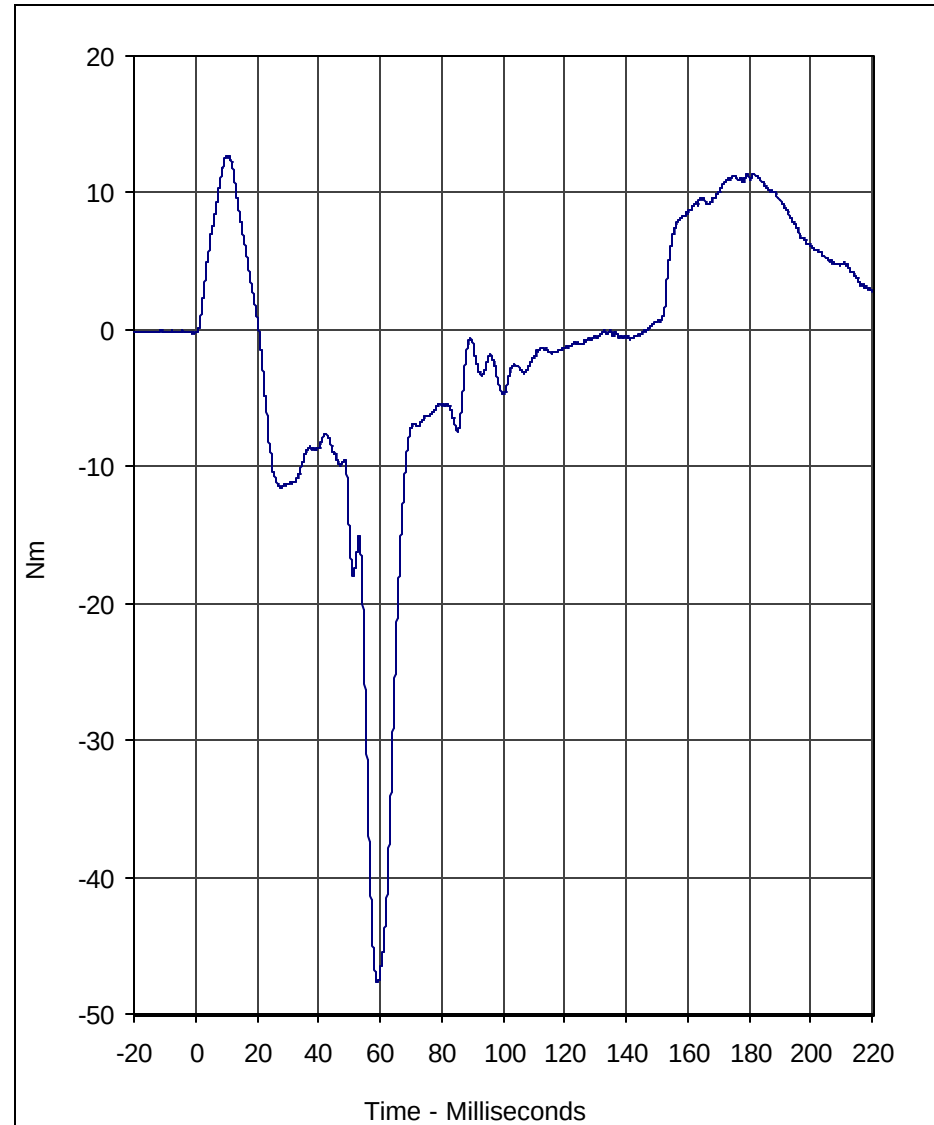




| Curve Description  |      |      |       | CURNO | Type      |
|--------------------|------|------|-------|-------|-----------|
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 86.5 | 61.7 | -37.7 | 187.9 | 60        |

Test Program: 3 Year Old Hybrid III Neck Extension Test

Test Date: 11/12/03



| Curve Description |      |      |       | CURNO | Type      |
|-------------------|------|------|-------|-------|-----------|
| Neck Moment Y     |      |      |       | 002   | FIL       |
| Units             | Max  | Time | Min   | Time  | SAE Class |
| Nm                | 12.7 | 10.3 | -47.6 | 59.1  | 600       |

A.T.D. Serial No.: 082

Test I.D.: NE11G





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Torso Flexion Test

ATD Serial No.: 082

Test I.D.: LF11S

| Tested Parameter                | Units   | Specification  | Result | Pass/Fail |
|---------------------------------|---------|----------------|--------|-----------|
| Laboratory Temperature          | °C      | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity    | %       | 10 to 70       | 30     | Pass      |
| Initial reference plane angle   | Degrees | ≤15.0          | 3.1    | Pass      |
| Peak Force at 45 +/-0.5 degrees | Newtons | 130.0 to 180.0 | 155.6  | Pass      |
| Torso rotation rate             | deg/sec | 0.5 to 1.5     | 1.1    | Pass      |
| Final reference plane angle     | Degrees | +/-10          | 4.6    | Pass      |
| Overall Test Results            |         |                |        | Pass      |

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# Calibration Data Sheet Hybrid III 3 Year Old External Measurements

ATD Serial No.: 082

| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
|---------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity          | %     | 10 to 70      | 30     | Pass      |
| A - Total sitting height              | mm    | 539 to 554    | 550    | Pass      |
| B - Shoulder pivot height             | mm    | 307 to 323    | 310    | Pass      |
| C - "H" point height                  | mm    | 34 to 45      | 40     | Pass      |
| D - "H" point from backline           | mm    | 57 to 67      | 65     | Pass      |
| E - Shoulder pivot from back          | mm    | 61 to 71      | 70     | Pass      |
| F - Thigh clearance                   | mm    | 81 to 91      | 90     | Pass      |
| G - Elbow back to wrist pivot         | mm    | 247 to 263    | 260    | Pass      |
| H - Skull cap to back line            | mm    | 48 to 58      | 50     | Pass      |
| I - Shoulder to elbow length          | mm    | 185 to 201    | 200    | Pass      |
| J - Elbow rest height                 | mm    | 134 to 149    | 145    | Pass      |
| K - Buttock to knee length            | mm    | 285 to 300    | 290    | Pass      |
| L - Popliteal length                  | mm    | 219 to 234    | 220    | Pass      |
| M - Knee pivot height                 | mm    | 242 to 257    | 255    | Pass      |
| N - Buttock popliteal length          | mm    | 218 to 233    | 230    | Pass      |
| O - Chest depth with jacket           | mm    | 139 to 154    | 145    | Pass      |
| P - Foot length                       | mm    | 138 to 148    | 140    | Pass      |
| R - Buttock to knee pivot length      | mm    | 251 to 262    | 260    | Pass      |
| S - Head Breadth                      | mm    | 128 to 144    | 135    | Pass      |
| T - Head Depth                        | mm    | 167 to 183    | 170    | Pass      |
| U - Hip breadth                       | mm    | 201 to 216    | 205    | Pass      |
| V - Shoulder breadth                  | mm    | 237 to 252    | 250    | Pass      |
| W - Foot breadth                      | mm    | 54 to 64      | 60     | Pass      |
| X - Head circumference                | mm    | 500 to 516    | 505    | Pass      |
| Y - Chest circumference with jacket   | mm    | 527 to 553    | 550    | Pass      |
| Z - Waist circumference               | mm    | 527 to 553    | 545    | Pass      |
| AA - Location for chest circumference | mm    | 249 to 259    | 255    | Pass      |
| BB - Location for waist circumference | mm    | 160 to 170    | 165    | Pass      |
| Overall Test Results                  |       |               |        | Pass      |

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# Calibration Data Sheet Hybrid III 3 Year Old Head Drop Test

ATD Serial No.: 139

Test I.D.: HD11E

| Tested Parameter              | Units  | Specification  | Result | Pass/Fail |
|-------------------------------|--------|----------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70       | 30     | Pass      |
| Peak Resultant Acceleration   | G's    | 250.0 to 280.0 | 272.5  | Pass      |
| Peak Lateral Acceleration     | G's    | ≤15.0          | 10.3   | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes            | Yes    | Pass      |
| Oscillations After Main Pulse | %      | <10            | 3.9    | Pass      |
| Overall Test Results          |        |                |        | Pass      |

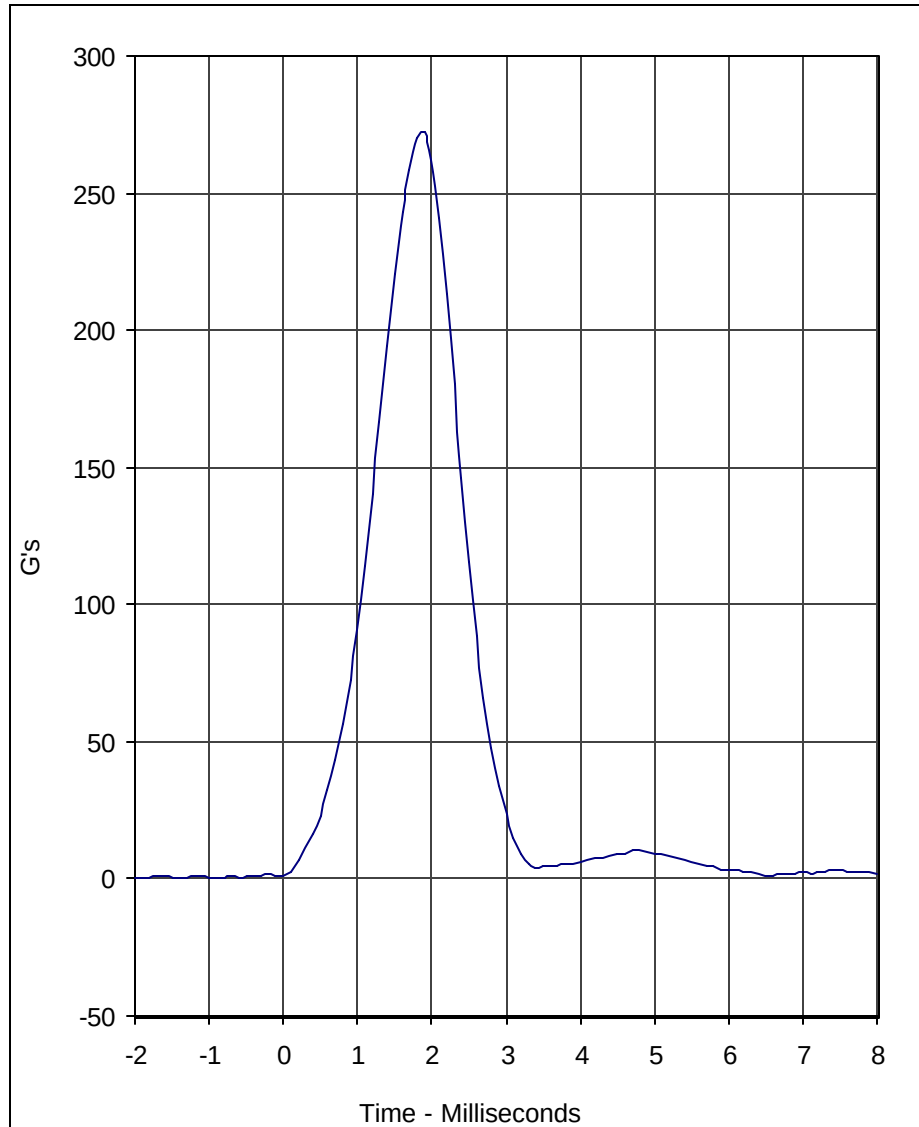
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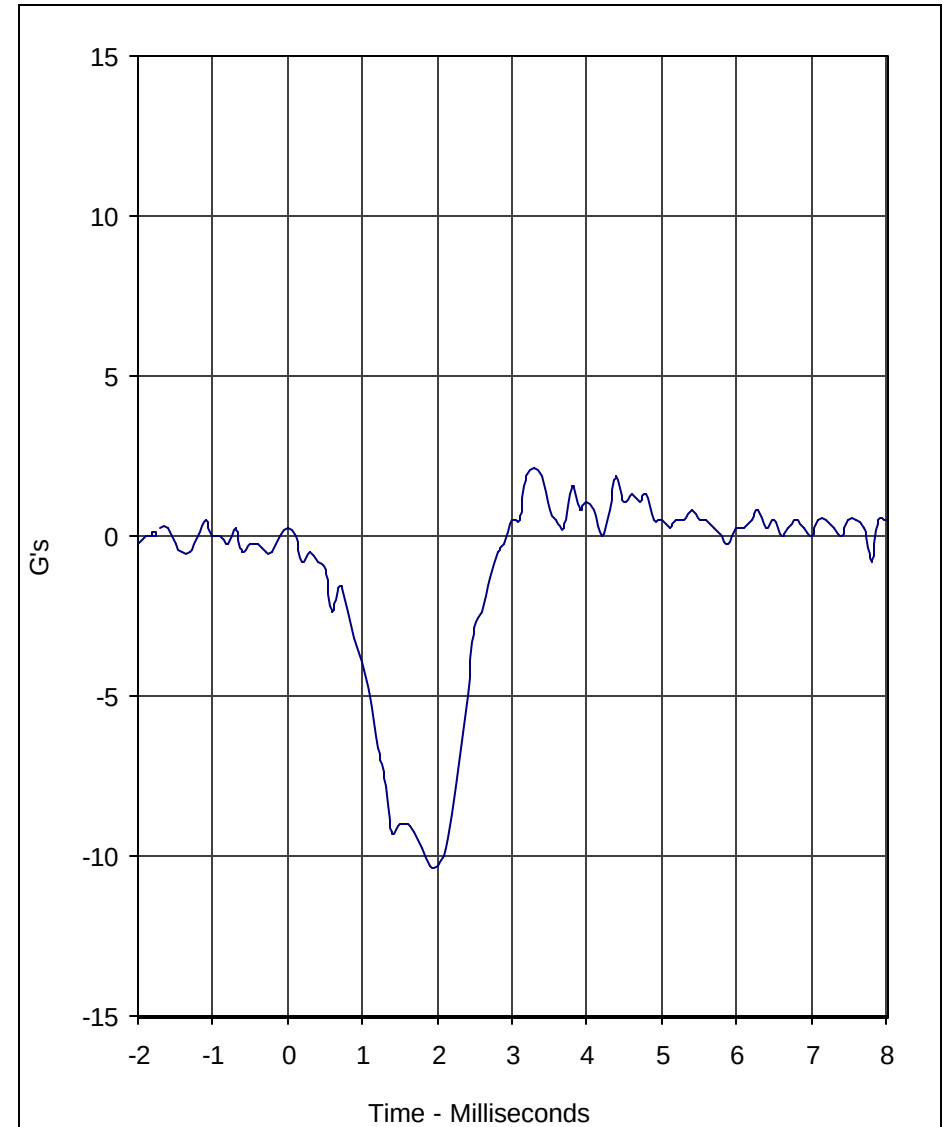
Laboratory Technician

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Test Date



| Curve Description |       |      |     | CURNO | Type      |
|-------------------|-------|------|-----|-------|-----------|
| Head Resultant    |       |      |     | 001   | RES       |
| Units             | Max   | Time | Min | Time  | SAE Class |
| G's               | 272.5 | 1.9  | 0.3 | -1.8  | 1000      |



| Curve Description |     |      |       | CURNO | Type      |
|-------------------|-----|------|-------|-------|-----------|
| Head Y            |     |      |       | 002   | FIL       |
| Units             | Max | Time | Min   | Time  | SAE Class |
| G's               | 2.1 | 3.3  | -10.3 | 1.9   | 1000      |

Test Program: Hybrid III 3 Year Old Head Drop Test  
 Test Date: 11/11/03

A.T.D. Serial No.: 139  
 Test I.D.: HD11E





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Thorax Impact Test

ATD Serial No.: 139

Test I.D.: CH11D

| Tested Parameter                        | Units   | Specification | Result | Pass/Fail |
|-----------------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature                  | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity            | %       | 10 to 70      | 30     | Pass      |
| Probe Velocity                          | m/s     | 5.9 to 6.1    | 5.96   | Pass      |
| Peak Chest Compression                  | MM      | 32 to 38      | 37.3   | Pass      |
| Peak Probe Force Between 32 and 38 MM   | Newtons | 680 to 810    | 788.7  | Pass      |
| Peak Probe Force Between 12.5 and 32 MM | Newtons | ≤860          | 758.6  | Pass      |
| Internal Hysteresis                     | %       | 65 to 85      | 69.2   | Pass      |
| Overall Test Results                    |         |               |        | Pass      |

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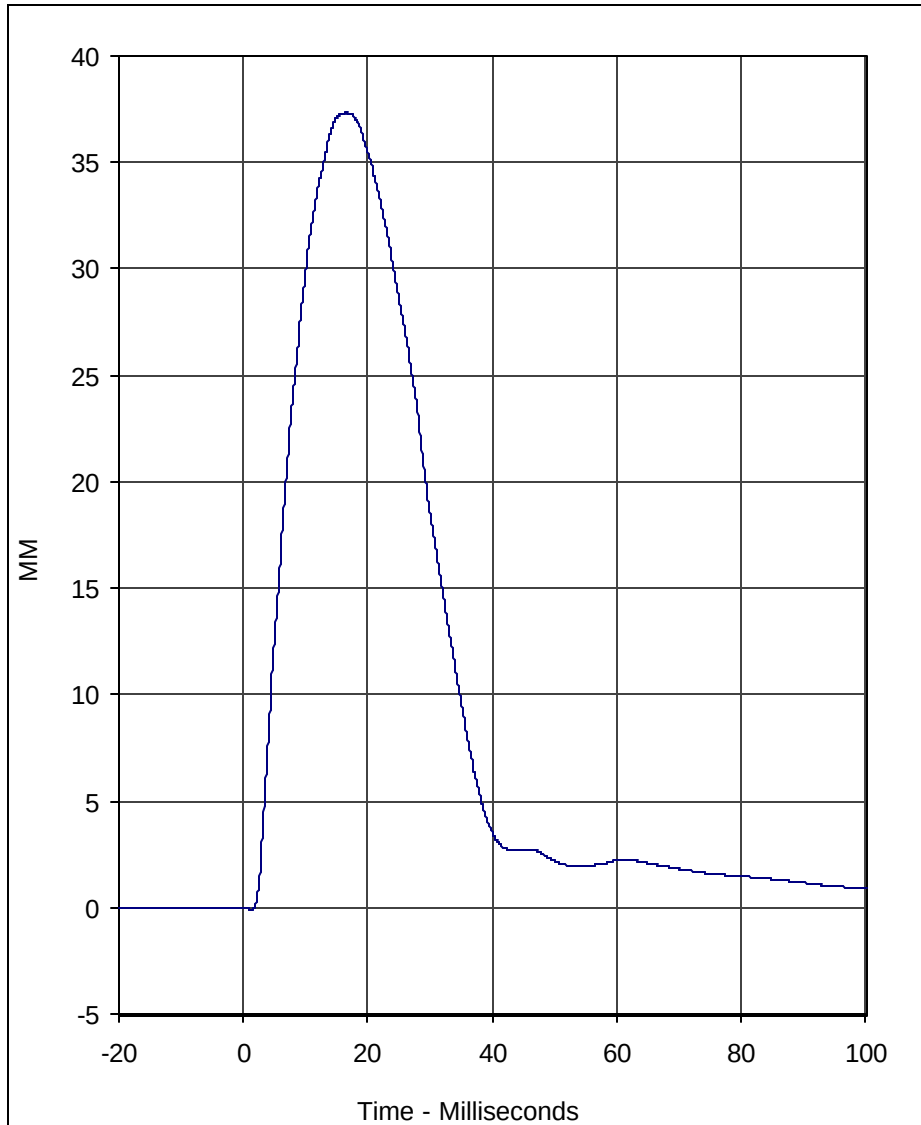
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Laboratory Technician

November 12, 2003

Test Date

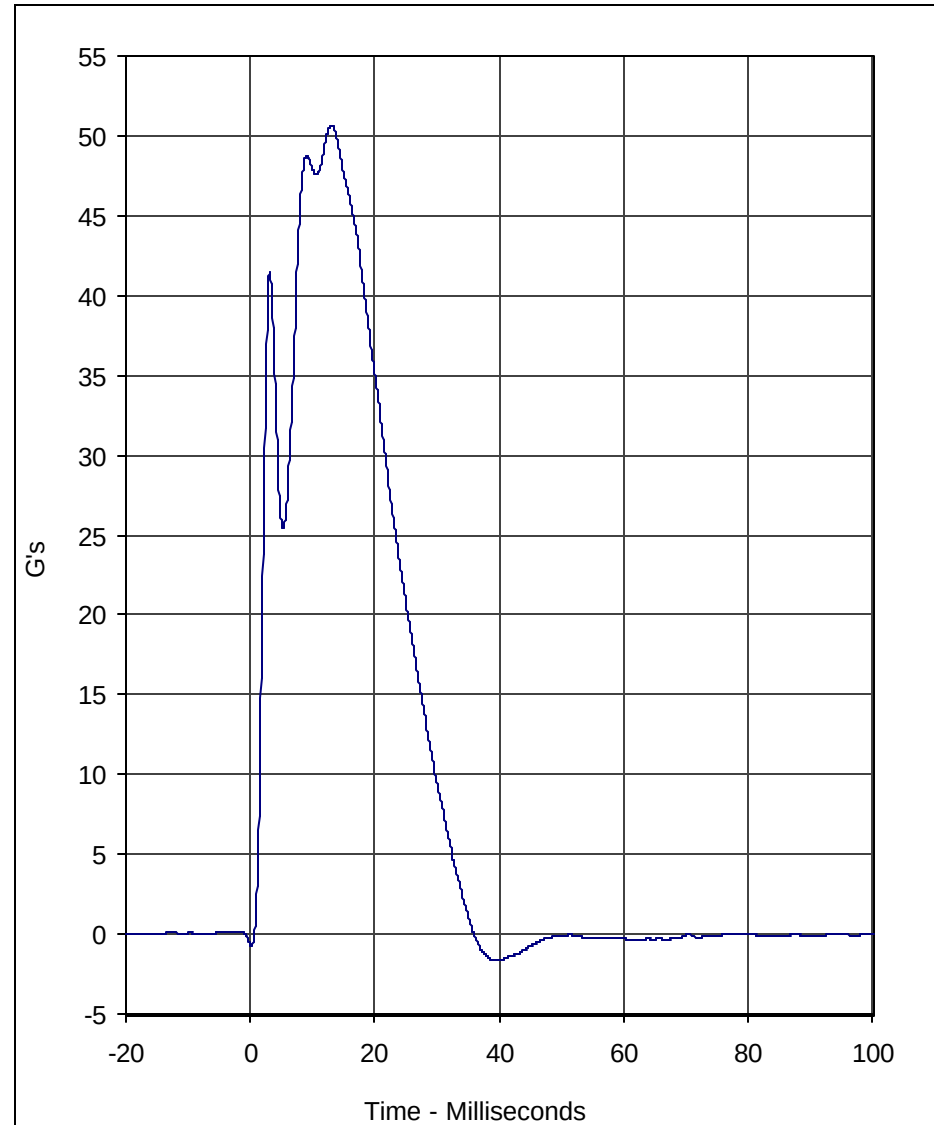




| Curve Description |      |      |      | CURNO | Type      |
|-------------------|------|------|------|-------|-----------|
| Chest Compression |      |      |      | 001   | FIL       |
| Units             | Max  | Time | Min  | Time  | SAE Class |
| MM                | 37.3 | 16.5 | -0.1 | 1.4   | 600       |

Test Program: Hybrid III 3 Year Old Thorax Impact

Test Date: 11/12/03

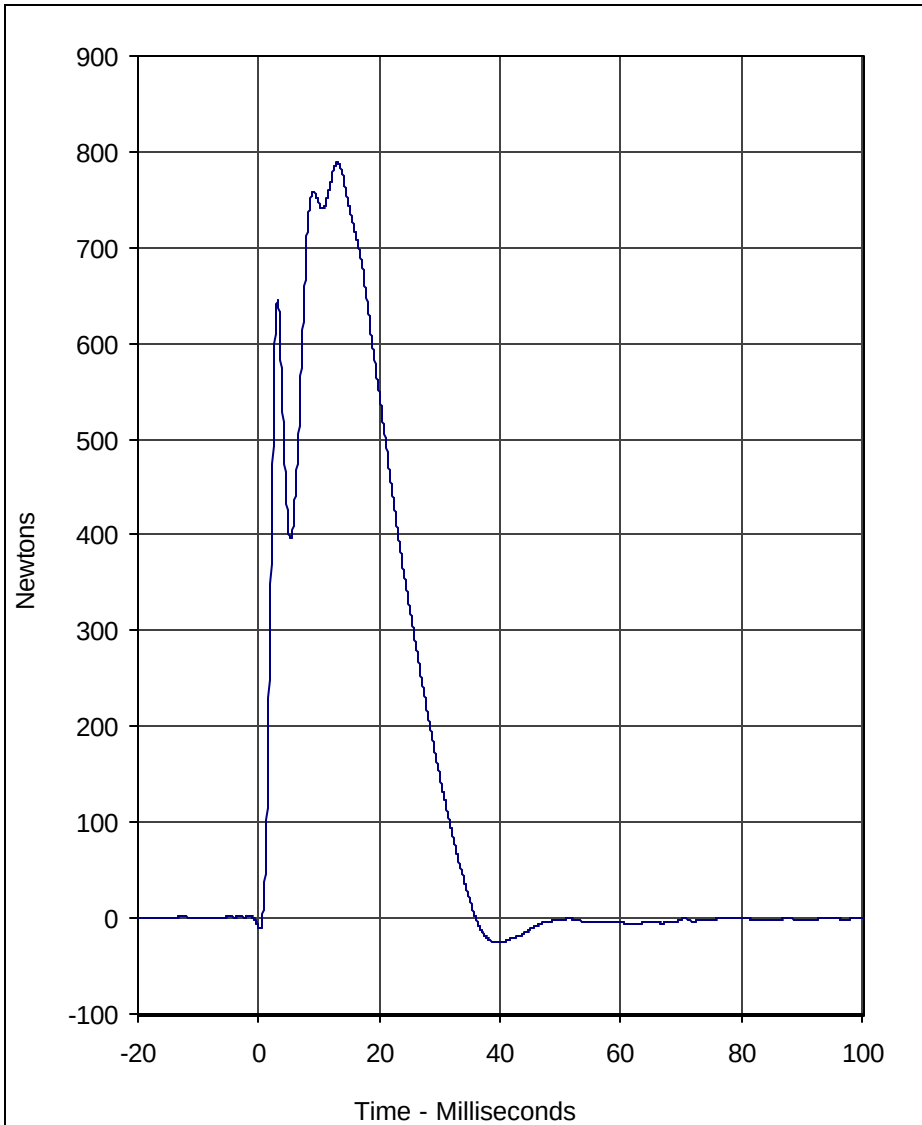


| Curve Description  |      |      |      | CURNO | Type      |
|--------------------|------|------|------|-------|-----------|
| Probe Acceleration |      |      |      | 002   | FIL       |
| Units              | Max  | Time | Min  | Time  | SAE Class |
| G's                | 50.7 | 13.1 | -1.6 | 39.7  | 180       |

A.T.D. Serial No.: 139

Test I.D.: CH11D

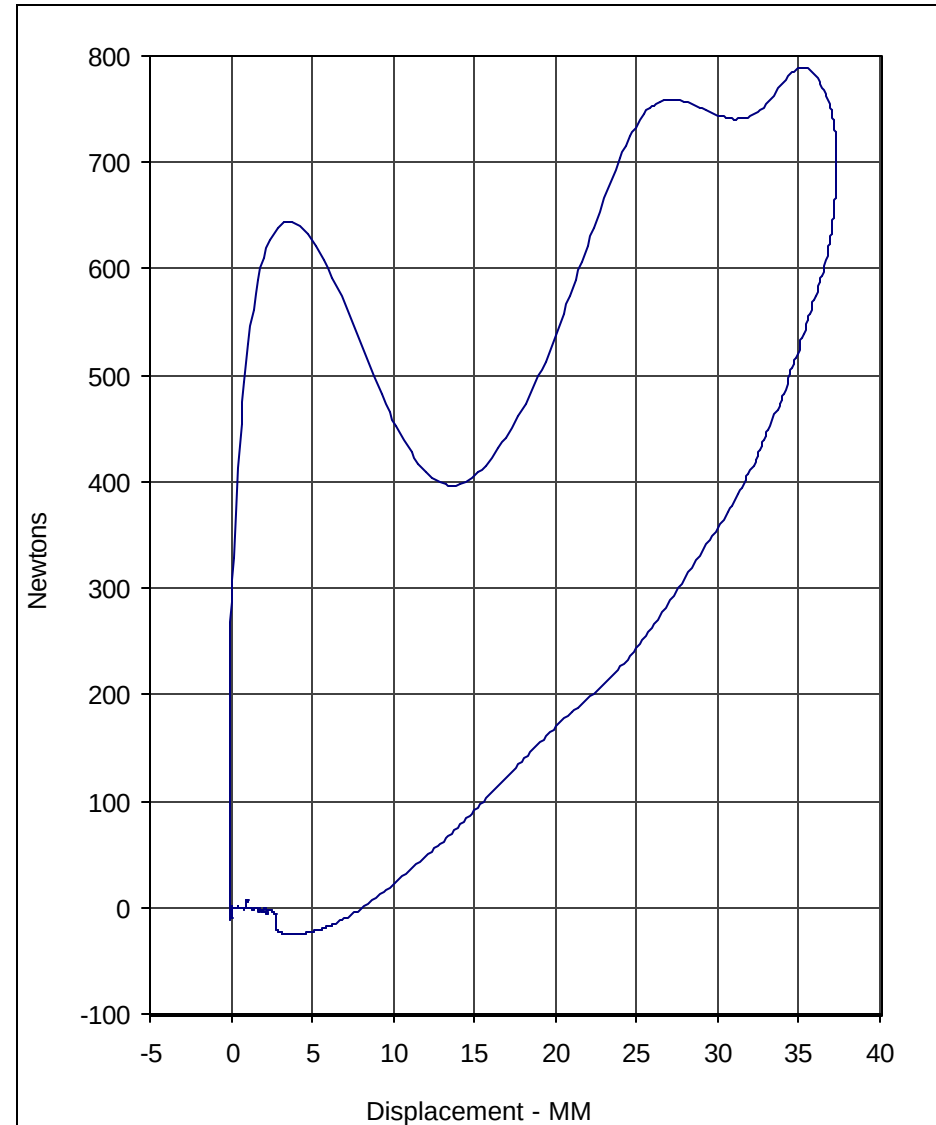




| Curve Description |       |      |       | CURNO | Type      |
|-------------------|-------|------|-------|-------|-----------|
| Probe Force       |       |      |       | 003   | FIL       |
| Units             | Max   | Time | Min   | Time  | SAE Class |
| Newtons           | 788.7 | 13.1 | -25.5 | 39.7  | 180       |

Test Program: Hybrid III 3 Year Old Thorax Impact

Test Date: 11/12/03



| Curve Description                 |            |           | CURNO | Type |
|-----------------------------------|------------|-----------|-------|------|
| Probe Force vs. Chest Compression |            |           | 004   | FIL  |
| Units                             | Hysteresis | SAE Class |       |      |
| %                                 | 69.2       | 180/600   |       |      |

A.T.D. Serial No.: 139

Test I.D.: CH11D





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Neck Flexion Test

ATD Serial No.: 139

Test I.D.: NF11G

| Tested Parameter                    |          | Units   | Specification | Result | Pass/Fail |
|-------------------------------------|----------|---------|---------------|--------|-----------|
| Laboratory Temperature              |          | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity        |          | %       | 10 to 70      | 30     | Pass      |
| Pendulum Velocity                   |          | m/s     | 5.40 to 5.60  | 5.49   | Pass      |
| Pendulum Deceleration               | 10 Msec. | m/s     | 2.0 to 2.7    | 2.0    | Pass      |
|                                     | 20 Msec. | m/s     | 3.0 to 4.0    | 3.8    | Pass      |
|                                     | 30 Msec. | m/s     | 4.0 to 5.1    | 5.0    | Pass      |
| "D" Plane Rotation                  | Maximum  | Degrees | 70.0 to 82.0  | 74.6   | Pass      |
| Peak Moment in Rotation             | Maximum  | Nm      | 42.0 to 53.0  | 48.3   | Pass      |
| Positive Moment Decay, Time to 10Nm |          | Msec.   | 60.0 to 80.0  | 77.1   | Pass      |
| Overall Test Results                |          |         |               |        | Pass      |

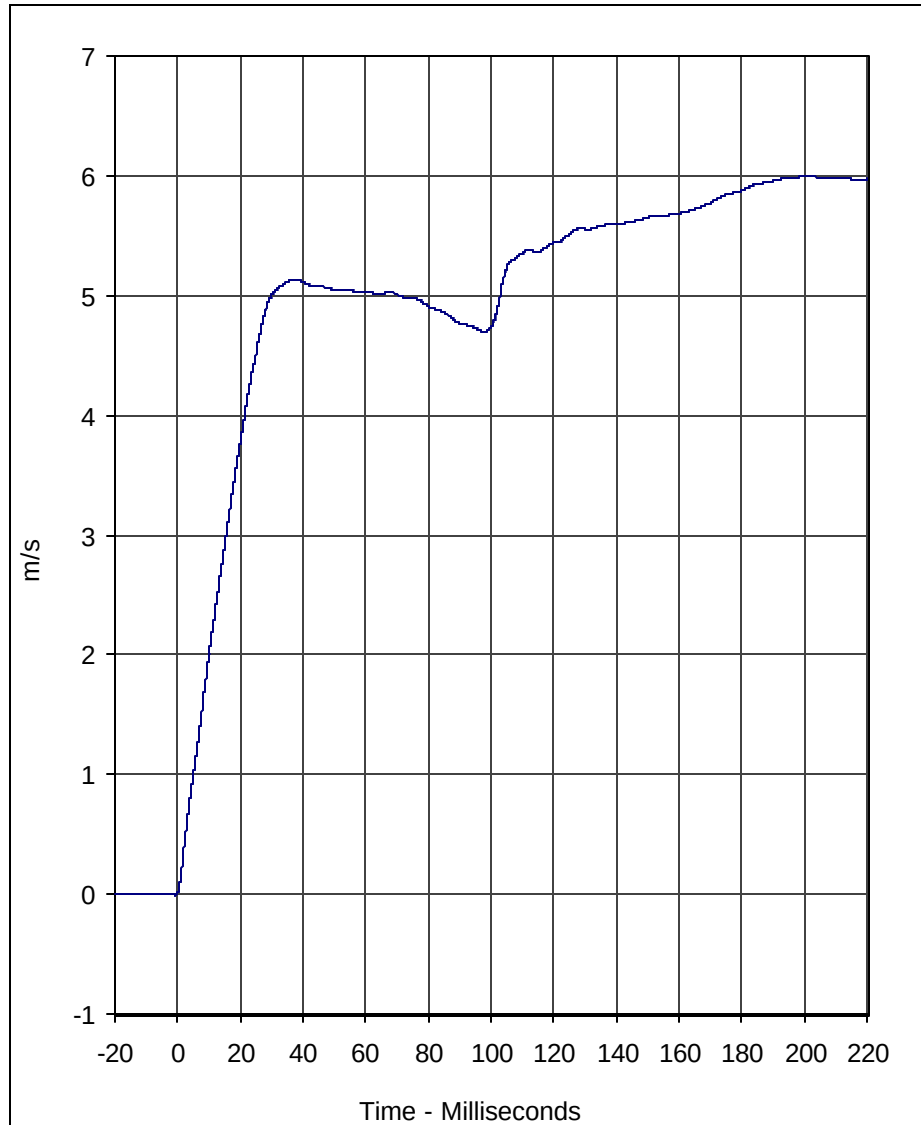
Laboratory Technician

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Test Date

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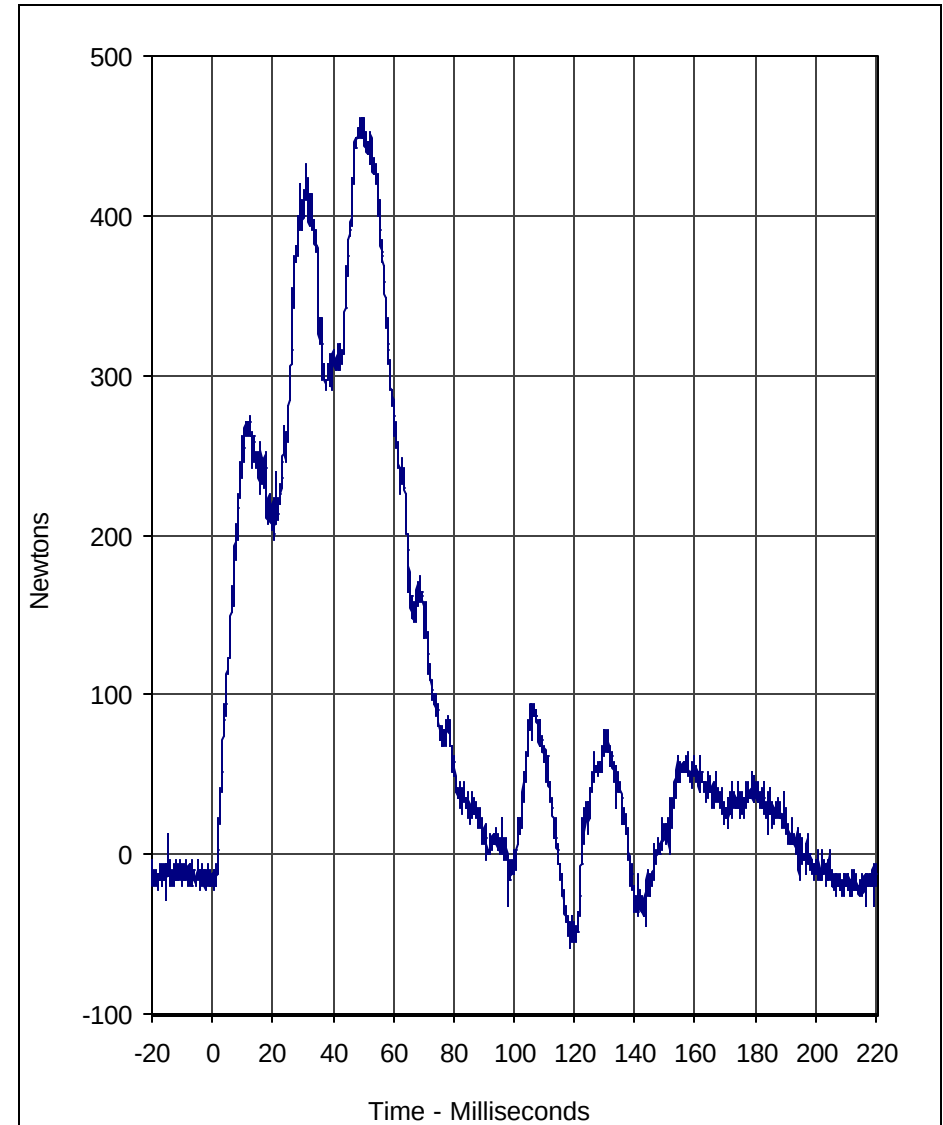
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| Curve Description |     |       |     | CURNO | Type      |
|-------------------|-----|-------|-----|-------|-----------|
| Pendulum Velocity |     |       |     | 001   | FIL       |
| Units             | Max | Time  | Min | Time  | SAE Class |
| m/s               | 6.0 | 200.8 | 0.0 | -0.6  | 180       |

Test Program: 3 Year Old Hybrid III Neck Flexion Test

Test Date: 11/12/03

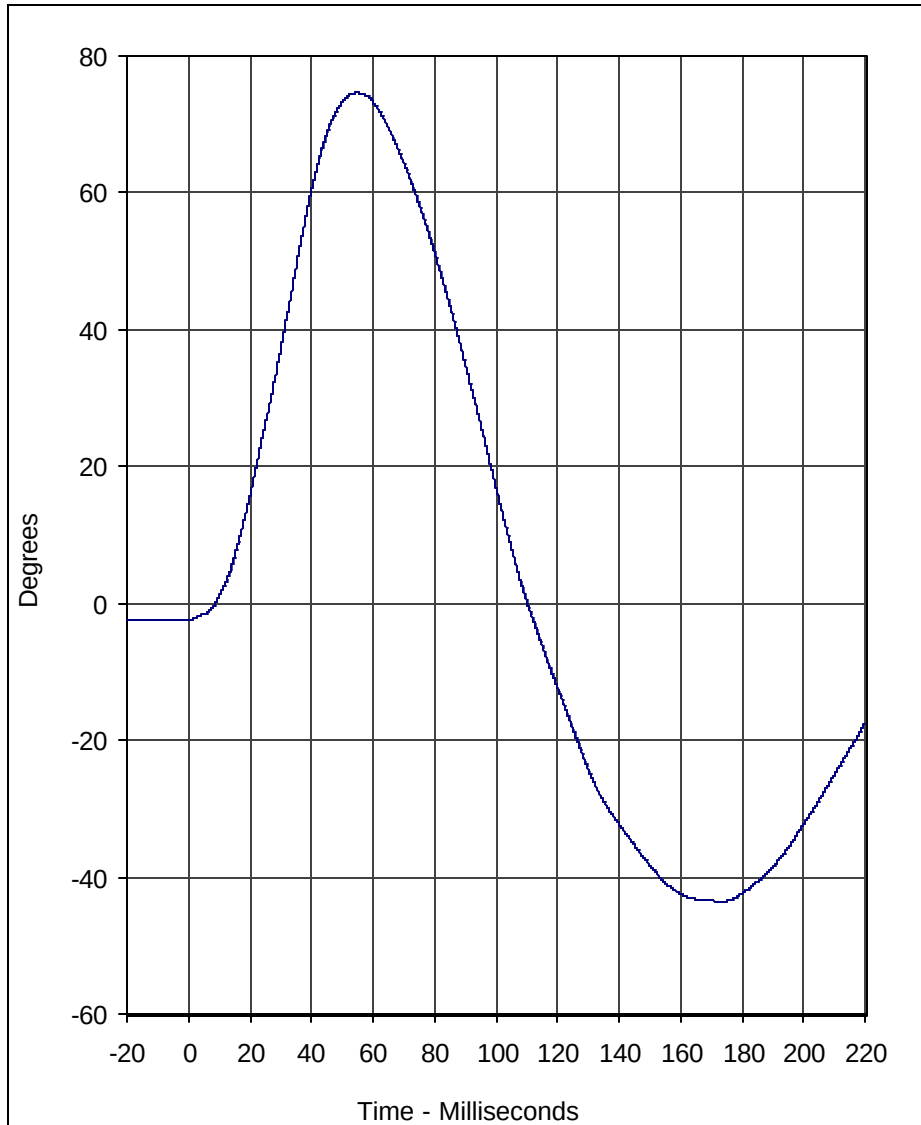


| Curve Description |       |      |       | CURNO | Type      |
|-------------------|-------|------|-------|-------|-----------|
| Neck Force X      |       |      |       | 002   | FIL       |
| Units             | Max   | Time | Min   | Time  | SAE Class |
| Newtons           | 461.8 | 49.0 | -58.1 | 118.5 | 1000      |

A.T.D. Serial No.: 139

Test I.D.: NF11G

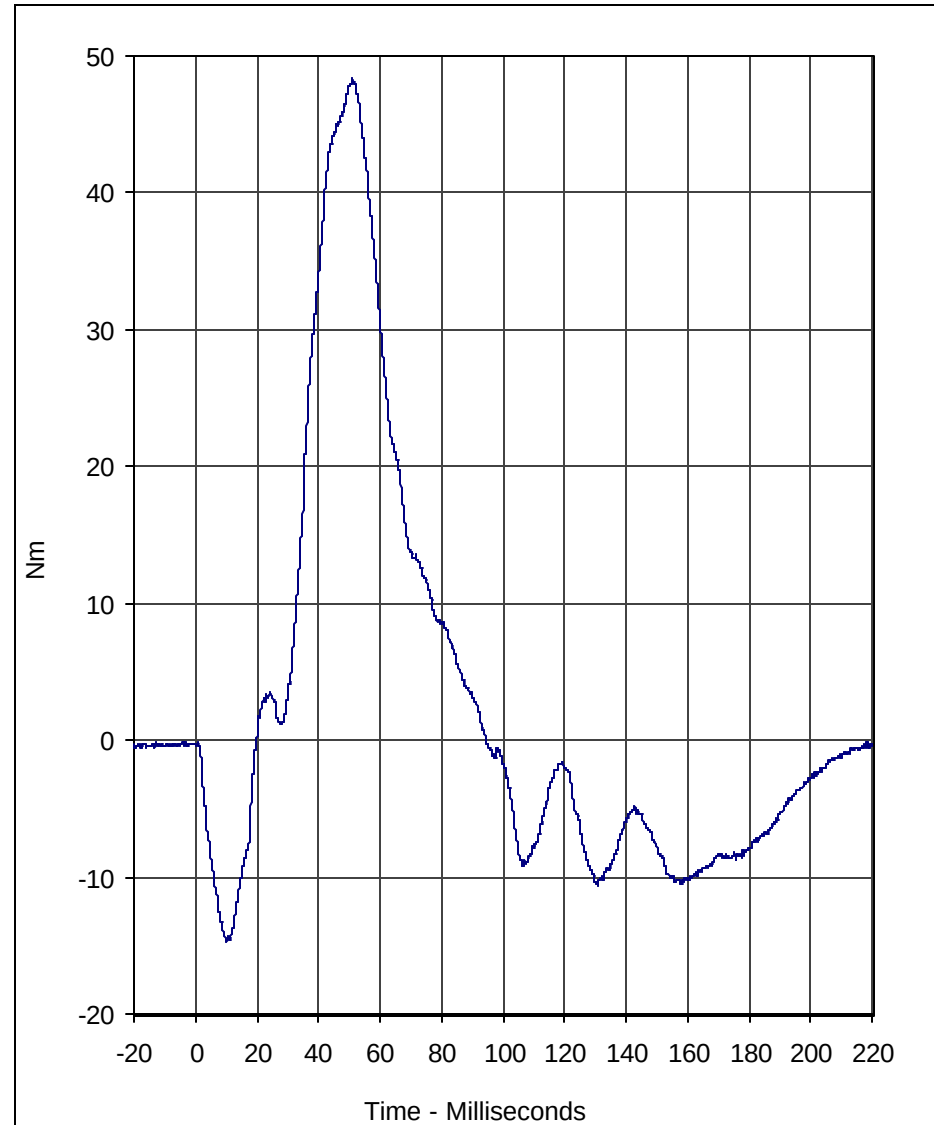




| Curve Description  |      |      |       | CURNO | Type      |
|--------------------|------|------|-------|-------|-----------|
| "D" Plane Rotation |      |      |       | 003   | FIL       |
| Units              | Max  | Time | Min   | Time  | SAE Class |
| Degrees            | 74.6 | 55.0 | -43.6 | 173.4 | 60        |

Test Program: 3 Year Old Hybrid III Neck Flexion Test

Test Date: 11/12/03



| Curve Description |      |      |       | CURNO | Type      |
|-------------------|------|------|-------|-------|-----------|
| Neck Moment Y     |      |      |       | 002   | FIL       |
| Units             | Max  | Time | Min   | Time  | SAE Class |
| Nm                | 48.3 | 51.0 | -14.8 | 10.1  | 600       |

A.T.D. Serial No.: 139

Test I.D.: NF11G





# Calibration Data Sheet

## Hybrid III 3 Year Old

## Neck Extension Test

ATD Serial No.: 139

Test I.D.: NE11H

| Tested Parameter                    |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------|----------|---------|----------------|--------|-----------|
| Laboratory Temperature              |          | °C      | 20.6 to 22.2   | 21.1   | Pass      |
| Laboratory Relative Humidity        |          | %       | 10 to 70       | 30     | Pass      |
| Pendulum Velocity                   |          | m/s     | 3.55 to 3.75   | 3.60   | Pass      |
| Pendulum Deceleration               | 10 Msec. | m/s     | 1.0 to 1.4     | 1.3    | Pass      |
|                                     | 20 Msec. | m/s     | 1.9 to 2.5     | 2.5    | Pass      |
|                                     | 30 Msec. | m/s     | 2.8 to 3.5     | 2.8    | Pass      |
| "D" Plane Rotation                  | Maximum  | Degrees | 83.0 to 93.0   | 87.2   | Pass      |
| Peak Moment in Rotation             | Maximum  | Nm      | -43.7 to -53.3 | -47.7  | Pass      |
| Positive Moment Decay, Time to 10Nm |          | Msec.   | 60.0 to 80.0   | 66.7   | Pass      |
| Overall Test Results                |          |         |                |        | Pass      |

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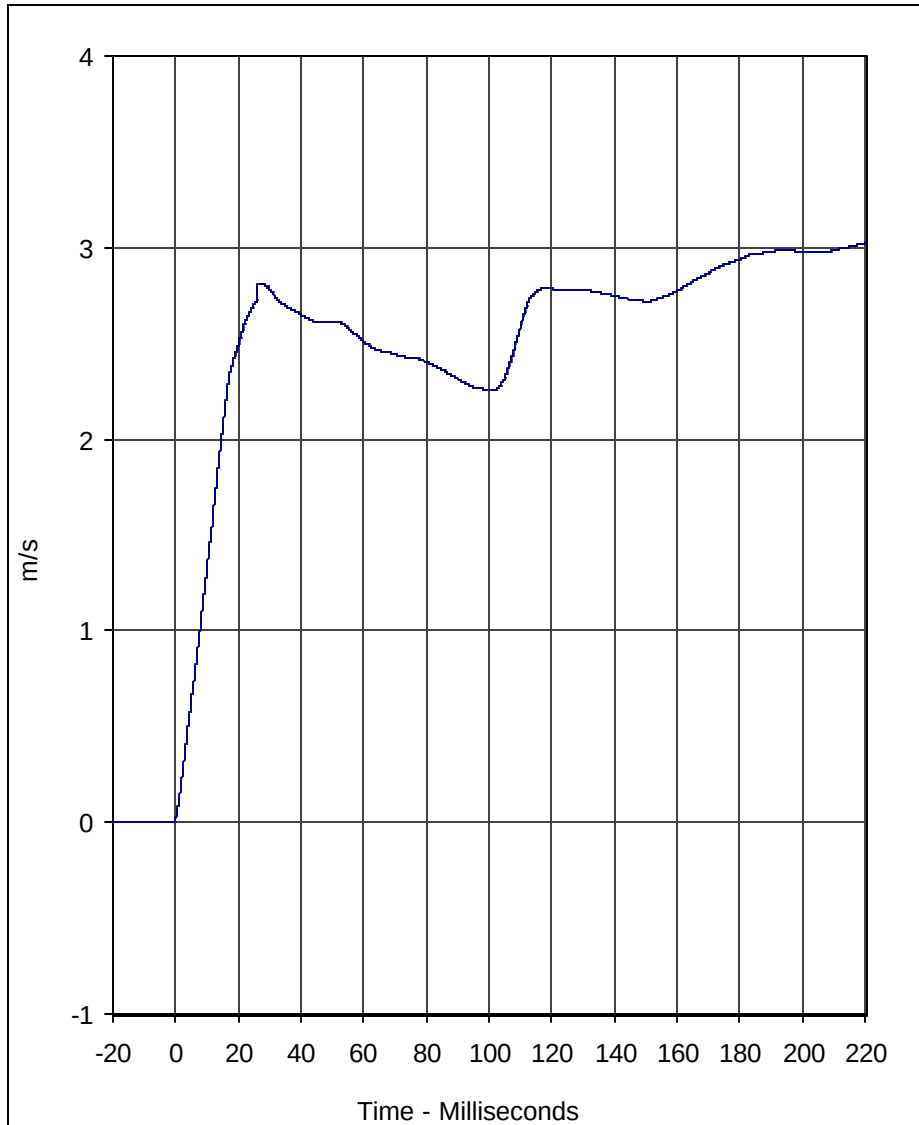
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Test Date

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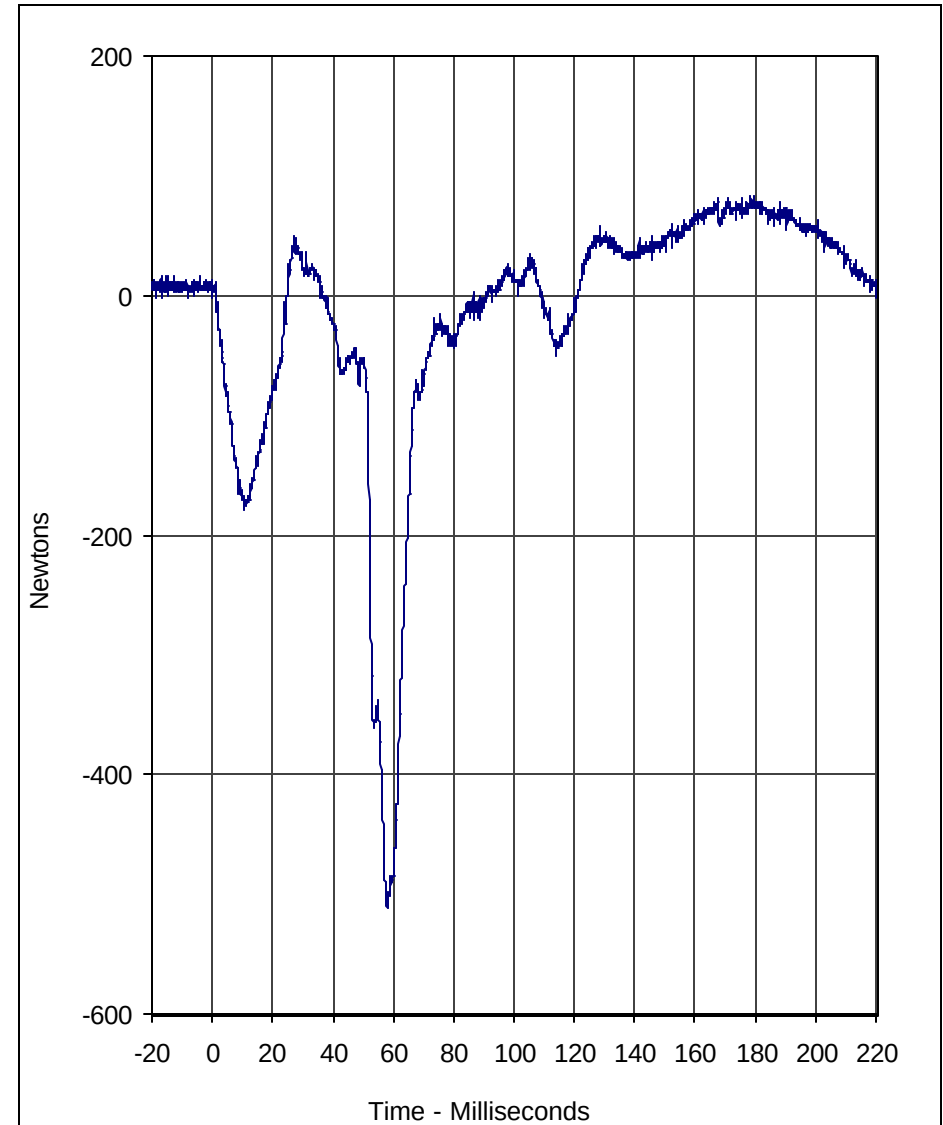




| Curve Description |     |       |     | CURNO | Type      |
|-------------------|-----|-------|-----|-------|-----------|
| Pendulum Velocity |     |       |     | 001   | FIL       |
| Units             | Max | Time  | Min | Time  | SAE Class |
| m/s               | 3.0 | 220.0 | 0.0 | -1.1  | 180       |

Test Program: 3 Year Old Hybrid III Neck Extension Test

Test Date: 11/12/03

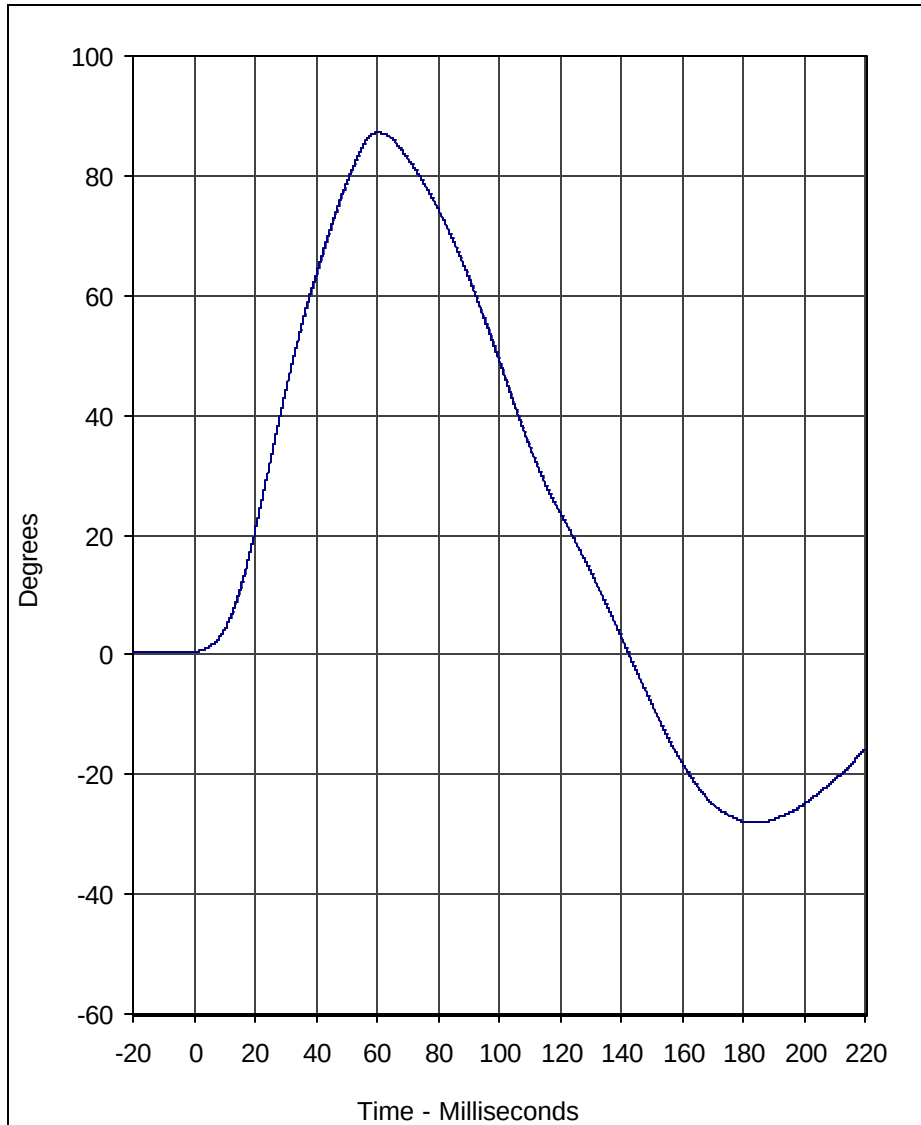


| Curve Description |      |       |        | CURNO | Type      |
|-------------------|------|-------|--------|-------|-----------|
| Neck Force X      |      |       |        | 002   | FIL       |
| Units             | Max  | Time  | Min    | Time  | SAE Class |
| Newtons           | 83.9 | 178.5 | -511.3 | 58.0  | 1000      |

A.T.D. Serial No.: 139

Test I.D.: NE11H



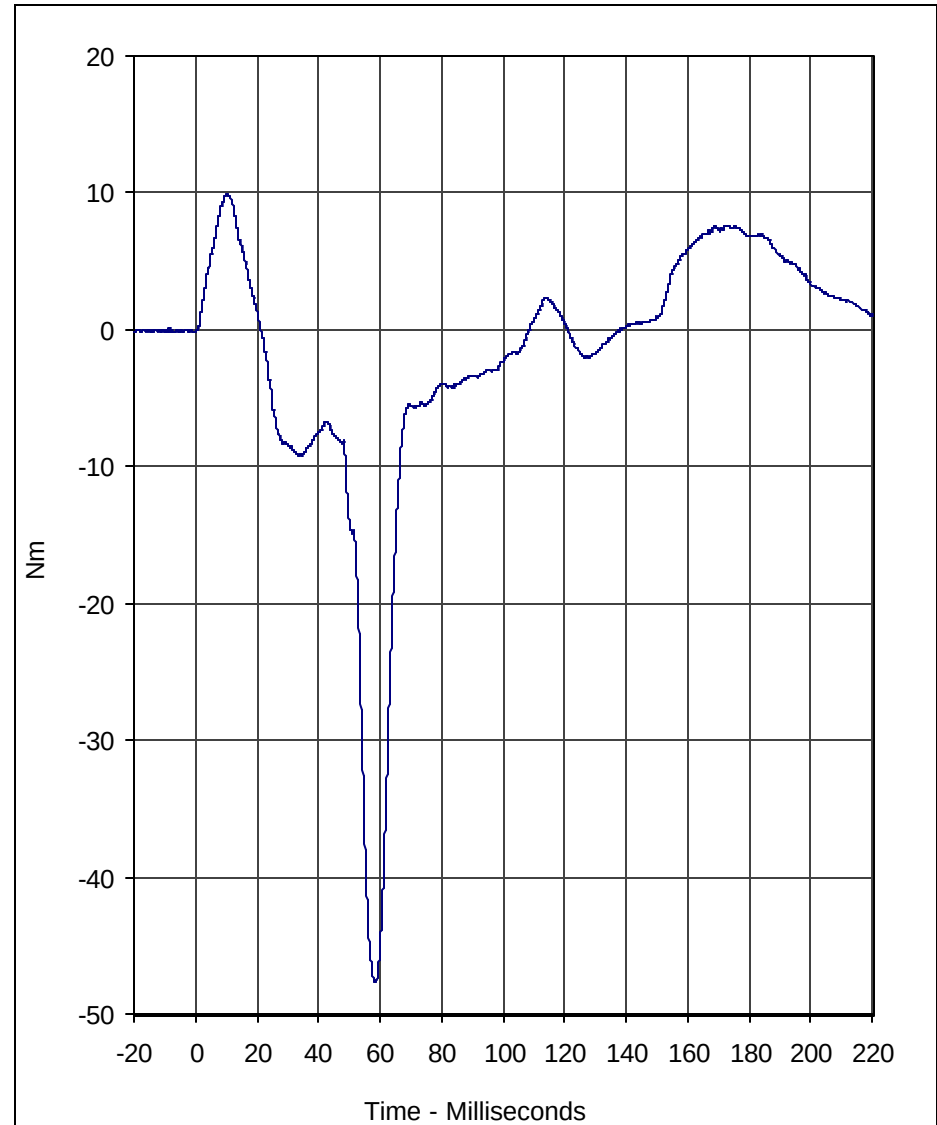


|                    |  |  |  |       |      |
|--------------------|--|--|--|-------|------|
| Curve Description  |  |  |  | CURNO | Type |
| "D" Plane Rotation |  |  |  | 003   | FIL  |

| Units   | Max  | Time | Min   | Time  | SAE Class |
|---------|------|------|-------|-------|-----------|
| Degrees | 87.2 | 60.5 | -28.0 | 184.1 | 60        |

Test Program: 3 Year Old Hybrid III Neck Extension Test

Test Date: 11/12/03



|                   |  |  |  |       |      |
|-------------------|--|--|--|-------|------|
| Curve Description |  |  |  | CURNO | Type |
| Neck Moment Y     |  |  |  | 002   | FIL  |

| Units | Max | Time | Min   | Time | SAE Class |
|-------|-----|------|-------|------|-----------|
| Nm    | 9.9 | 10.3 | -47.7 | 58.4 | 600       |

A.T.D. Serial No.: 139

Test I.D.: NE11H





# Calibration Data Sheet

## Hybrid III 3 Year Old

### Torso Flexion Test

ATD Serial No.: 139

Test I.D.: LF11T

| Tested Parameter                | Units   | Specification  | Result | Pass/Fail |
|---------------------------------|---------|----------------|--------|-----------|
| Laboratory Temperature          | °C      | 18.9 to 25.6   | 21.1   | Pass      |
| Laboratory Relative Humidity    | %       | 10 to 70       | 30     | Pass      |
| Initial reference plane angle   | Degrees | ≤15.0          | 2.5    | Pass      |
| Peak Force at 45 +/-0.5 degrees | Newtons | 130.0 to 180.0 | 146.5  | Pass      |
| Torso rotation rate             | deg/sec | 0.5 to 1.5     | 0.8    | Pass      |
| Final reference plane angle     | Degrees | +/-10          | 3.4    | Pass      |
| Overall Test Results            |         |                |        | Pass      |

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# Calibration Data Sheet Hybrid III 3 Year Old External Measurements

ATD Serial No.: 139

| Tested Parameter                      | Units | Specification | Result | Pass/Fail |
|---------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity          | %     | 10 to 70      | 30     | Pass      |
| A - Total sitting height              | mm    | 539 to 554    | 550    | Pass      |
| B - Shoulder pivot height             | mm    | 307 to 323    | 310    | Pass      |
| C - "H" point height                  | mm    | 34 to 45      | 40     | Pass      |
| D - "H" point from backline           | mm    | 57 to 67      | 65     | Pass      |
| E - Shoulder pivot from back          | mm    | 61 to 71      | 70     | Pass      |
| F - Thigh clearance                   | mm    | 81 to 91      | 90     | Pass      |
| G - Elbow back to wrist pivot         | mm    | 247 to 263    | 255    | Pass      |
| H - Skull cap to back line            | mm    | 48 to 58      | 50     | Pass      |
| I - Shoulder to elbow length          | mm    | 185 to 201    | 200    | Pass      |
| J - Elbow rest height                 | mm    | 134 to 149    | 145    | Pass      |
| K - Buttock to knee length            | mm    | 285 to 300    | 290    | Pass      |
| L - Popliteal length                  | mm    | 219 to 234    | 225    | Pass      |
| M - Knee pivot height                 | mm    | 242 to 257    | 255    | Pass      |
| N - Buttock popliteal length          | mm    | 218 to 233    | 225    | Pass      |
| O - Chest depth with jacket           | mm    | 139 to 154    | 150    | Pass      |
| P - Foot length                       | mm    | 138 to 148    | 145    | Pass      |
| R - Buttock to knee pivot length      | mm    | 251 to 262    | 260    | Pass      |
| S - Head Breadth                      | mm    | 128 to 144    | 135    | Pass      |
| T - Head Depth                        | mm    | 167 to 183    | 175    | Pass      |
| U - Hip breadth                       | mm    | 201 to 216    | 210    | Pass      |
| V - Shoulder breadth                  | mm    | 237 to 252    | 250    | Pass      |
| W - Foot breadth                      | mm    | 54 to 64      | 60     | Pass      |
| X - Head circumference                | mm    | 500 to 516    | 515    | Pass      |
| Y - Chest circumference with jacket   | mm    | 527 to 553    | 550    | Pass      |
| Z - Waist circumference               | mm    | 527 to 553    | 535    | Pass      |
| AA - Location for chest circumference | mm    | 249 to 259    | 255    | Pass      |
| BB - Location for waist circumference | mm    | 160 to 170    | 165    | Pass      |
| Overall Test Results                  |       |               |        | Pass      |

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