DOT/600

R2150-0010

REPORT NO. 212-MSE-83-0010

301-MSE-83-0010

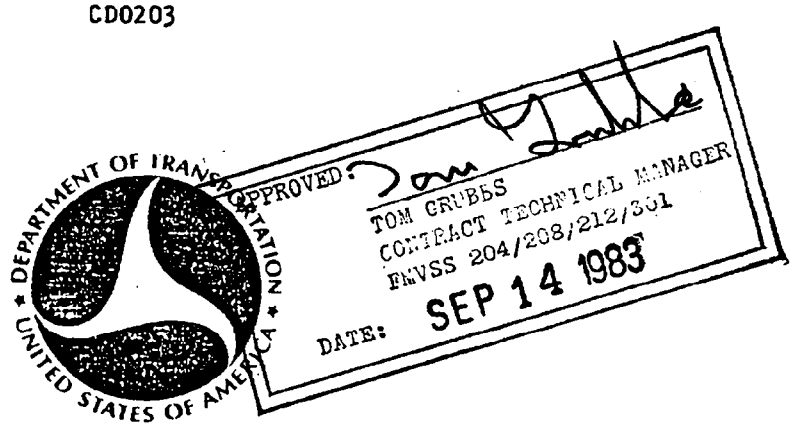
# NHTSA NEW VEHICLE ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING FMVSS 212, & 301

FORD MOTOR COMPANY

1983 FORD LTD

4 DOOR SEDAN

CD0203




AUGUST 1983

FINAL REPORT

Prepared Under Contract No. DTNH22-82-D-21140

For

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
Office of Vehicle Safety Compliance
400 Seventh Street, S.W.
Washington, D.C. 20590

By

MOBILITY SYSTEMS AND EQUIPMENT COMPANY
6151 West Century Boulevard, Suite 912
Los Angeles, California 90045

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Prepared by M. Poindexter

Approved By Floyd E Gaskins

Date 08/25/83

Report Accepted by:

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Contract Technical Manager
Office of Vehicle Safety Compliance

SEP 14 1983

Date

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**16. Abstract**

A 35 mph frontal barrier impact assessment test was performed on the vehicle listed below at the Mobility Systems And Equipment Co. Automotive Research Center in Mira Loma, California. This crash test was performed as part of the New Vehicle Assessment and Standards Enforcement Indicant Testing of

FMVSS No. 212, "Windshield Mounting"

FMVSS No. 301, "Fuel System Integrity"

for the Office of Vehicle Safety Compliance, Office of Market Incentives, Office of Vehicle Research, and National Center for Statistics and Analysis.

Veh. Yr./Make/Model- 1983 Ford LTD — Impact Speed- 35.20 mph

Veh. Body Style- 4 Door Sedan — Test Date- 08/11/83

Veh. NHTSA I.D. No.- CD0203 — Ambient Temp.- 99 °F

The test vehicle appeared to comply with the following performance standards:

FMVSS 212

FMVSS 301

The following FMVSS No. 208 Head Injury Data was generated during the crash:

Driver Dummy HIC = 609

Passenger Dummy HIC = 957

| 17. Key Words | 18. Distribution Statement |
|---|---|
| New Vehicle Assessment<br>Stds. Enforcement Indicant Testing<br>35 mph Frontal Impact Testing | Copies Available From—<br>Technical Reference Division, NHTSA<br>400 Seventh Street, S.W., Rm 5108<br>Washington, D.C. 20590<br>Attn: Bob Hornickle (202) 426-2987<br>Mail Code: NAD-52 |

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TABLE 2 SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

| Loc. No. | Location | Field of View | Lens Size | Frame Rate | Timing Speed | Mfg/ Serial Number | Impact Dist-X | Center-line Dist-Y | Camera Height | Film Quality |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Overhead (Barrier) | Windshield stryofoam up to barrier-vehicle contact if possible | 16 mm | 981 fps | None | HIMAC 135 | 43 | - 11 | 119 1/2 | Good |
| 2 | Ground Based (Right) | Windshield | 20 mm | 929 fps | .010 sec | HIMAC 138 | 31 | -110 | 55 | Good |
| 3 | Pit | Engine underside and fuel pump | 13 mm | - - | - - | PHOTO-SONICS 45 | 65 3/4 | 0 | -56 1/2 | Did Not Run |
| 4 | Ground Based (Left) | Views entire left side of vehicle | 50 mm | 620 fps | .010 sec | FASTAX 1258 | 16 | 1186 | 62 | Good |
| 5 | Ground Based | Documentary | Zoom | 24 fps | None | ARIFLEX NR6837 | 542 | 980 | 57 | Good |
| 6 | Ground Based | Driver dummy closeup | 25 mm | 389 fps | .010 sec | MILLIKEN 7410-2 | 107 | 187 1/2 | 68 | Good |
| 7 | Ground Based | Passenger dummy closeup | 25 mm | 333 fps | .010 sec | MILLIKEN 6784 | 86 1/2 | -154 | 65 1/4 | Good |
| 8 | Pit | Fuel tank | 13 mm | - - | - - | PHOTO-SONICS 573 | 178 1/2 | 3 | -53 | Did Not Run |
| 9 | Gound Based | Same view as Camera No. 6 | 25 mm | 465 fps | None | FAIR-CHILD 276 | 112 1/2 | 172 | 60 | Good |
| 10 | Ground Based (Right) | Same view as Camera No. 7 | 25 mm | 1033 fps | None | HIMAC 143 | 106 | -163 | 62 | Good |
| 11 | Ground Based (Left) | Windshield | 25 mm | 774 fps | None | FAIR-CHILD 383 | 108 | 173 3/4 | 61 | Good |
| 12 | Above (Barrier) | Left windshield | 25 mm | 620 fps | None | FASTAX 3 | 19 | 15 3/4 | 114 1/2 | Good |
| 13 | Above (Barrier) | Right windshield | 25 mm | 465 fps | None | FASTAX 1 | 19 | - 23 | 114 1/2 | Good |

## SECTION 1
## INTRODUCTION

The test was conducted as part of the 1983 Composite Test Program being conducted for the National Highway Traffic Safety Administration (NHTSA) by Mobility Systems and Equipment Company (MSE) under Contract DTNH22-82-D-21140. The composite tests provide data for evaluation of FMVSS 212, 301-75; occupant response; and vehicle acceleration environment, at impact speeds in excess of those specified in the current FMVSS requirements. The test was conducted in accordance with the NHTSA test procedures TP-219-02 and IP-212-02.

## SECTION 2
## SUMMARY OF TEST CONDITIONS

A composite test was conducted on a 1983 Ford LTD, NHTSA No. CD0203 on 08/11/83. The vehicle was impacted into a load cell barrier. The general test and vehicle descriptive information are presented in Table 1. The camera location data are presented in Table 2 and Figure 1. The list of measurements recorded during the test is presented in Table 3. Pretest and posttest photographs of the vehicle and occupants are presented in Appendix A.

Two certified (see Appendix B) fully instrumented part 572, 50th percentile male anthropomorphic test dummies (ATD's) were installed in the driver and right front passenger designated seating position (DSP's). The ATD's were restrained with the standard production 3 point lap and shoulder belt system.

The test event was photographed with one real-time camera and fifteen high-speed cameras. Two high-speed cameras were located on-board to view the belt pullout. The two pit cameras did not run for this test. All other cameras functioned properly.

Sixty-four channels of data were recorded on six FM tape recorders. Time history plots of all recorded channels and appropriate resultants and HIC and chest peak acceleration values are presented in Appendix C. Twelve data channels from the load cell barrier were lost during the test.

TABLE 1 - CRASH TEST SUMMARY

PROJECT: FY-83 Composite Test Program TEST NO. N02103

DATE: 08/11/83 TIME: 1:44 P.M. TEMP. 99°F

| | |
|---|---|
| VEHICLE | Ford LTD |
| TEST WEIGHT (lbs) | 3,563 |
| IMPACT ANGLE (deg) | 0 |
| IMPACT VELOCITY (mph) | 35.20 |
| MAX. CRUSH (in) | 26 3/8 |

ATD'S

| | | |
|---|---|---|
| TYPE | Part 572<br>50th Percentile Male | Part 572<br>50th Percentile Male |
| LOCATION | Front Right | Front Left |
| RESTRAINT | Production<br>3-point restraint | Production<br>3-point restraint |

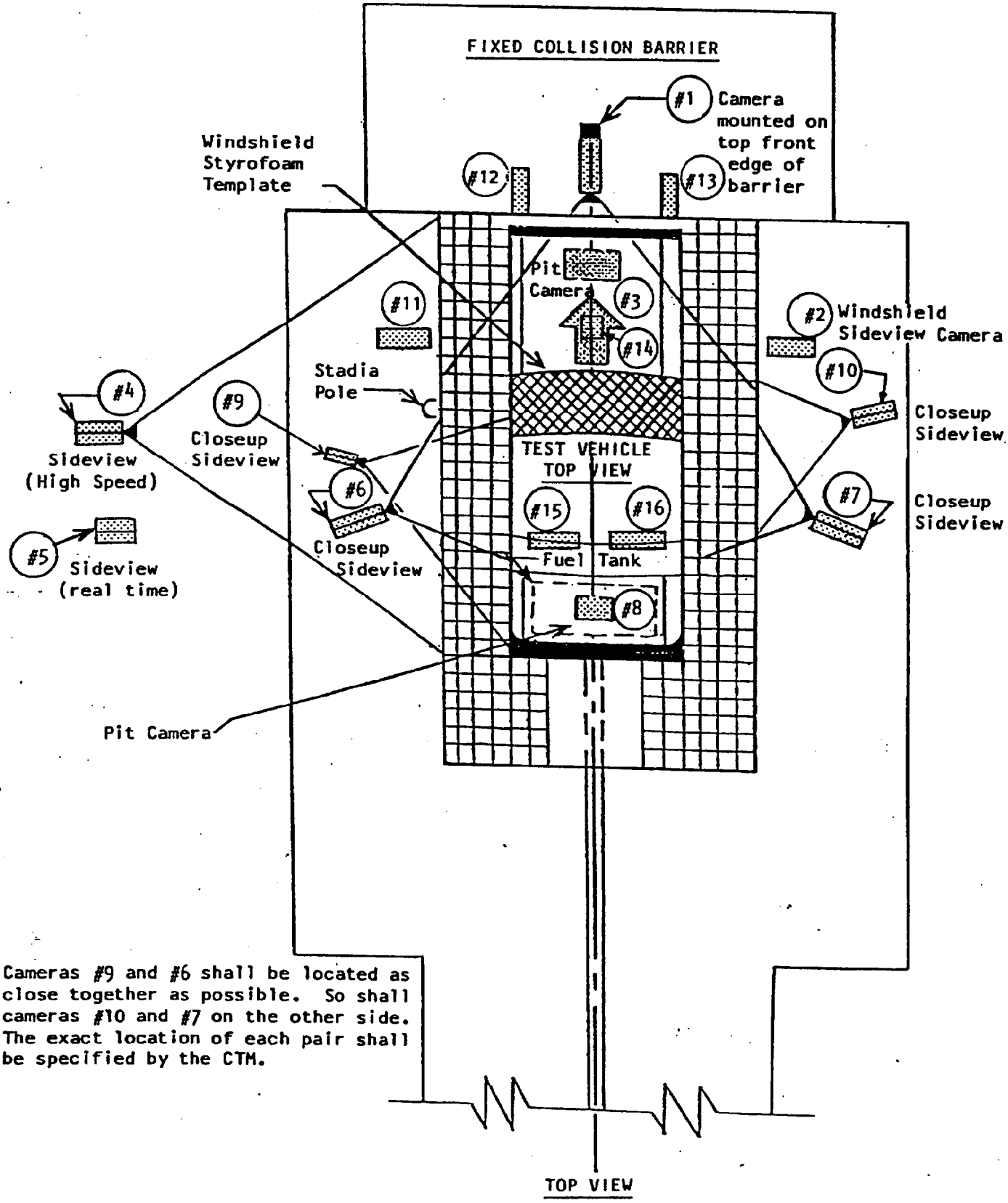
NUMBER OF DATA CHANNELS 64

NUMBER OF HIGH SPEED CAMERAS 15

BARRIER Load Cell

TABLE 2 SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS - (CONT'D)

| Loc. No. | Location | Field of View | Lens Size | Frame Rate | Timing Speed | Mfg/ Serial Number | Impact Dist-X | Center-line Dist-Y | Camera Height | Film Quality |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Over Hood | Windshield | 13 mm | 500 fps | .010 sec | FAIR-CHILD 306 | 38 | 0 | 112 | Good |
| 15 | On board | Passenger belt retractor | 13 mm | 550 fps | None | FAIR-CHILD 305 | Variable | 13 | 18 | Good |
| 16 | On board | Driver belt retractor | 13 mm | 1000 fps | None | FAIR-CHILD 141 | Variable | -13 | 17 | Good |




Cameras #9 and #6 shall be located as close together as possible. So shall cameras #10 and #7 on the other side. The exact location of each pair shall be specified by the CTM.

FIGURE 1 CAMERA LOCATIONS

TABLE 3 MEASUREMENT SYSTEM CHANNEL DESIGNATION

| DIGITAL TAPE CHANNEL NO. | SENSOR | CHANNEL DESCRIPTION | DATA QUALITY |
|---|---|---|---|
| 01 | AC | DR HED X | Good |
| 02 | AC | DR HED Y | Good |
| 03 | AC | DR HED Z | Good |
| 04 | AC | DR CST X | Good |
| 05 | AC | DR CST Y | Good |
| 06 | AC | DR CST Z | Good |
| 07 | AC | PA HED X | Good |
| 08 | AC | PA HED Y | Good |
| 09 | AC | PA HED Z | Good |
| 10 | AC | PA CST X | Good |
| 11 | AC | PA CST Y | Good |
| 12 | AC | PA CST Z | Good |
| 13 | LC | DR FEMUR L | Good |
| 14 | LC | DR FEMUR R | Good |
| 15 | LC | PA FEMUR L | Good |
| 16 | LC | PA FEMUR R | Good |
| 17 | AC | VEH. RFF X | Good |
| 18 | AC | VEH. LRF X | Good |
| 19 | AC | VEH. ENG TOP X | Good |
| 20 | AC | VEH. ENG. BOT. X | Good |
| 21 | AC | VEH. BCR X | Good |
| 22 | AC | VEH. BCL X | Good |
| 23 | LC | DR LBO | Good |
| 24 | LC | DR SHB | Good |
| 25 | LC | PA LBO | Good |
| 26 | LC | PA SHB | Good |
| 27 | DT | DR SHB | Good |
| 28 | DT | PA SHB | Good |
| *29-64 | LC | BA | Good |

* Data from channels 41-52 were lost.

## 2.1 GENERAL COMMENTS

The 1983 Ford LTD 4-door sedan was equipped with a 3.3 liter 6-cylinder engine, three speed automatic transmission, power steering, air conditioning, and power windows. The rear bumper was removed from the car to reduce its weight. The total test weight of the LTD with two 50th percentile male ATD's, instrumentation and cameras was 3,563 pounds.

The Ford LTD was involved in a frontal load cell barrier crash at a velocity of 35.20 mph.

The vehicle appears to comply with FMVSS 212 - Windshield Mounting; and FMVSS 301-75 - Fuel System Integrity. There was 96.5% windshield retention, and no fuel leakage after impact or during the subsequent rollover test. The maximum static crush of the vehicle was 27 1/8 inches.

After impact both the driver's door and passenger's door required tools to be opened. The windshield was cracked. All other vehicle glazing remained intact.

The driver ATD's chin hit the steering wheel rim, and his forehead hit the top of the dash panel. His chest hit the lower steering wheel rim. His knees hit the dash panel; and his left knee also hit the side of the steering column. The driver's maximum chest acceleration (resultant clipped) of 69 g's exceeds the FMVSS 208 requirements. His Head Injury Criteria value of 609 and maximum femur loads of 168 and 58 pounds satisfy the FMVSS 208 requirements.

The passenger ATD's head hit the dash panel below his nose and his knees pushed in the glove compartment door. The passenger ATD met all FMVSS 208 Injury Criteria with a HIC of 957, a maximum chest acceleration (resultant clipped) of 54 g's, and maximum femur loads of 110 and 158 pounds.

Seat belt pullout as measured by film analysis was 2 3/4 inches for both the driver's belt and the passenger's belt.

## SECTION 3
## COMPLIANCE DATA
## FMVSS 212, 301-75

Compliance data for FMVSS 212 and 301-75 were acquired during the test. The results are presented in Tables 4 and 5.

TABLE 4 SUMMARY OF FMVSS 212 DATA

TEST VEHICLE NHTSA NO. CD0203 TEST DATE: 08/11/83

VEH. MFR/MAKE/MODEL Ford LTD

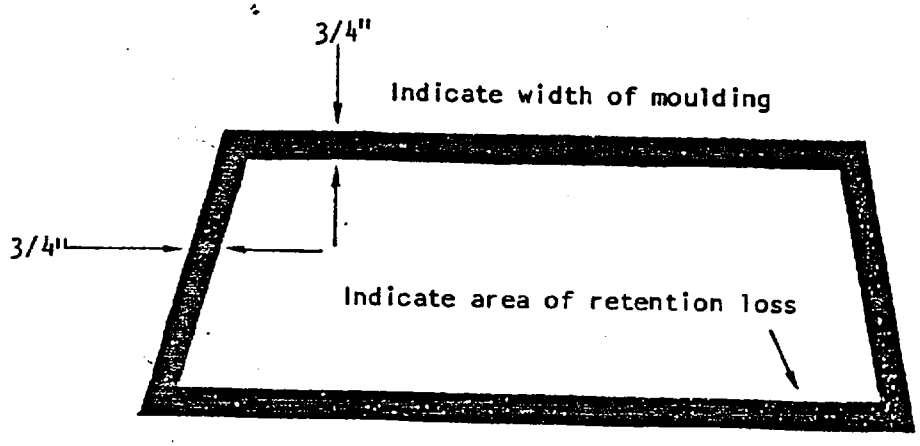
Details of windshield mounting (method of retention, type of trim, etc.)

The windshield is bonded to a rubber perimeter moulding with adhesive. A chrome moulding surrounds the outside edges of the windshield, and is held in place by clips.

| | WINDSHIELD PERIPHERY | |
|---|---|---|
| | PRETEST | POSTTEST |
| RIGHT SIDE | 76 3/4 | 76 3/4 |
| LEFT SIDE | 75 1/2 | 70 3/8 |
| TOTAL | 152 1/4 | 147 1/8 |

The standard requires that POSTTEST 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 which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE:




FRONT VIEW 5 inches

TABLE 5 FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST VEHICLE NHTSA NO. CD0203 TEST DATE 08/11/83

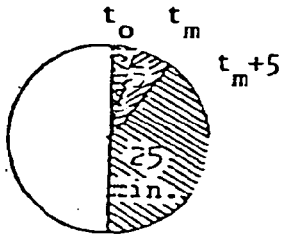
VEH. MFR/MAKE/MODEL Ford LTD

Test vehicle fuel tank filled to 90-91% of capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation. Part 572 test dummies located at each front designated seating position.

A. TEST VEHICLE IMPACT TYPE

- [X] Frontal (35 mph)
- [ ] Oblique (35 mph) with ° barrier face first contacting (driver/passenger) side
- [ ] Rear Moving Barrier (35 mph)
- [ ] Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT - - -




| | ACTUAL | MAX. ALLOW. |
|---|---|---|
| 1. From impact until vehicle motion ceases - - - - - - | 0 | 1 oz |
| 2. For 5 minute period after veh. motion ceases - - - | 0 | 5 oz |
| 3. For next 25 minutes - - - | 0 | 1 oz/1 min. |

B. TEST VEHICLE STATIC ROLLOVER

DETAIL TEST RESULTS ARE RECORDED ON THE FOLLOWING DATA SHEETS:

(1) Rollover data for 0° to 90° test phase.
(2) Rollover data for 90° to 180° test phase.
(3) Rollover data for 180° to 270° test phase.
(4) Rollover data for 270° to 360° test phase.

C. SOLVENT SPILLAGE DETAILS

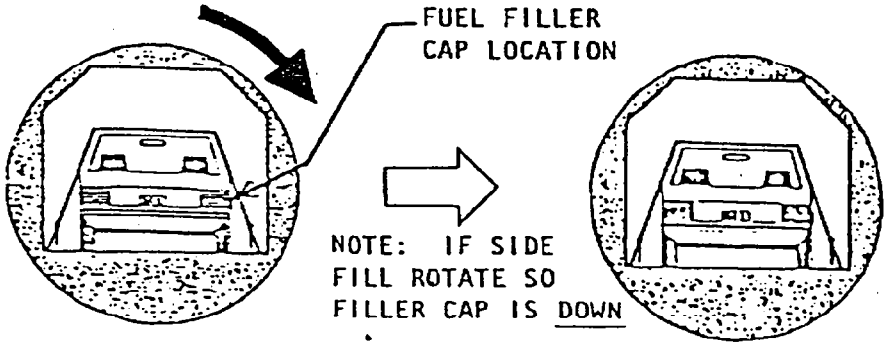
No solvent spillage was observed.

TABLE 5 FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET (CONT)

TEST VEHICLE NHTSA NO. CD0203 TEST DATE 08/11/83

VEH. MFR/MAKE/MODEL Ford LTD

TEST PHASE: 0° 90°




I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

| | | | | |
|---|---|---|---|---|
| Rollover Fixture 90° Rotation Time - - (Spec. Range = 1 to 3 minutes) | = | 1 | minutes | 38 seconds |
| FMVSS 301-75 Position Hold Time - - - | + = | 5 | minutes | 00 seconds |
| TOTAL- - - - - - - - - - - - - - - - - - | = | 6 | minutes | 38 seconds |
| Next Whole Minute Interval - - - - - - - | = | 7 | minutes | |

II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period--

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

(2) Maximum Allowable Solvent Spillage--

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

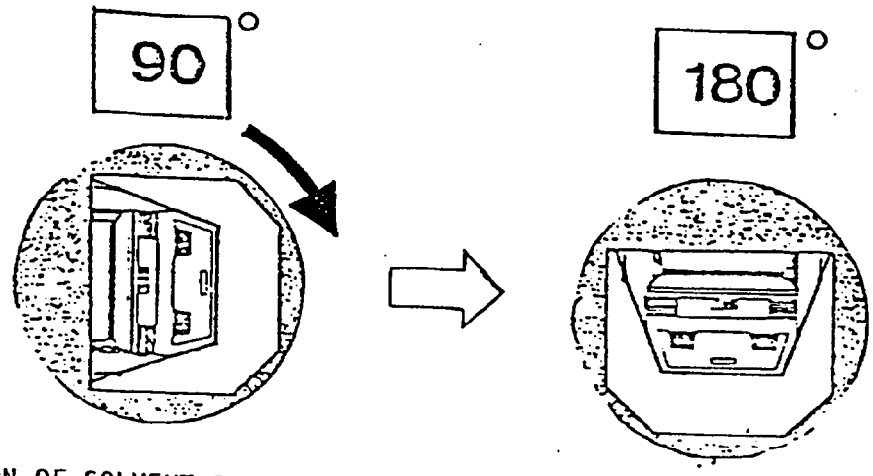
None.

TABLE 5 FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET (CONT)

TEST VEHICLE NHTSA NO. CD0203 TEST DATE 08/11/83

VEH. MFR/MAKE/MODEL Ford LTD

TEST PHASE




I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

| | | | | |
|---|---|---|---|---|
| Rollover Fixture 90° Rotation Time - - = (Spec. Range - 1 to 3 minutes) | 1 | minutes | 41 | seconds |
| FMVSS 301-75 Position Hold Time - - - = | + 5 | minutes | 00 | seconds |
| TOTAL - - - - - - - - - - - - - - - - - - = | 6 | minutes | 41 | seconds |
| Next Whole Minute Interval - - - - - - - = | 7 | minutes | | |

II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period --

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

(2) Maximum Allowable Solvent Spillage --

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

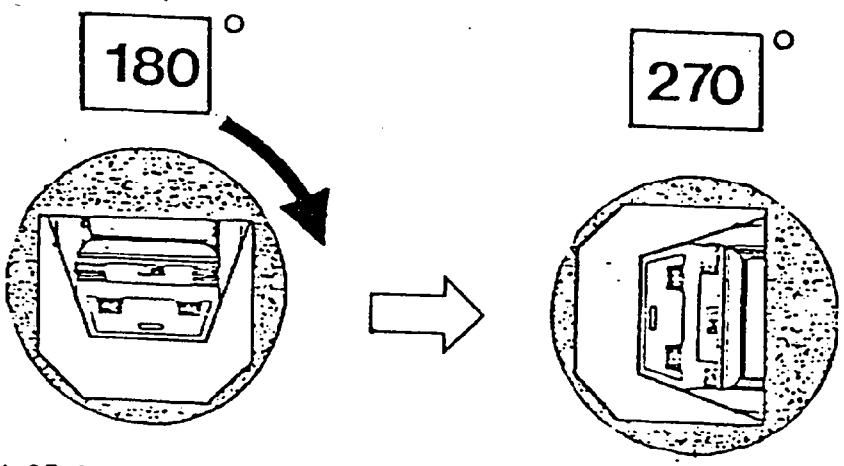
None.

TABLE 5 FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET (CONT)

TEST VEHICLE NHTSA NO. CD0203 TEST DATE 08/11/83

VEH. MFR/MAKE/MODEL Ford LTD

TEST PHASE




I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

| | | | | |
|---|---|---|---|---|
| Rollover Fixture 90° Rotation Time - - = (Spec. Range - 1 to 3 minutes) | 1 | minutes | 1 1 | seconds |
| FMVSS 301-75 Position Hold Time - - - = | 5 | minutes | 0 0 | seconds |
| TOTAL - - - - - - - - - - - - - - - - - = | 6 | minutes | 1 1 | seconds |
| Next Whole Minute Interval - - - - - - = | 7 | minutes | | |

II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period --

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

(2) Maximum Allowable Solvent Spillage --

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

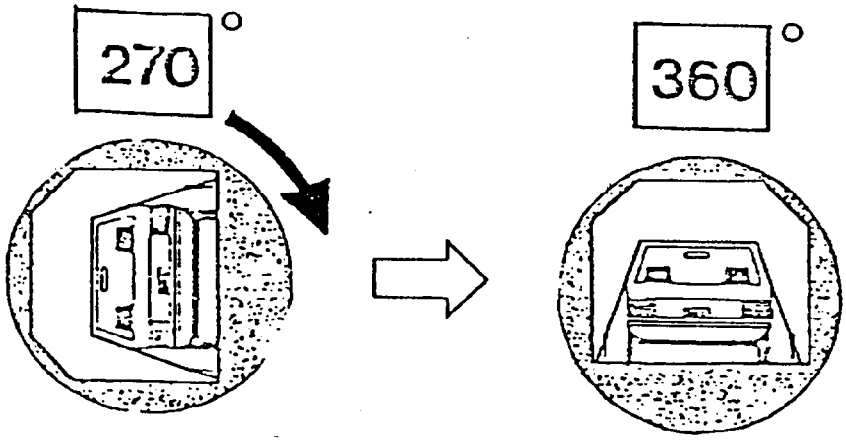
IV. SOLVENT SPILLAGE LOCATION(S):

None.

TABLE 5 FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET (CONT)

TEST VEHICLE NHTSA NO. CD0203 TEST DATE 08/11/83

VEH. MFR/MAKE/MODEL Ford LTD




I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time - - = 1 minutes 24 seconds
(Spec. Range - 1 to 3 minutes)

FMVSS 301-75 Position Hold Time - - - = + 5 minutes 00 seconds

TOTAL - - - - - - - - - - - - - - - - - - = 6 minutes 24 seconds

Next Whole Minute Interval - - - - - - - = 7 minutes

II. FMVSS 301-75 REQUIREMENTS:

(1) Time Period --

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

(2) Maximum Allowable Solvent Spillage --

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

None.

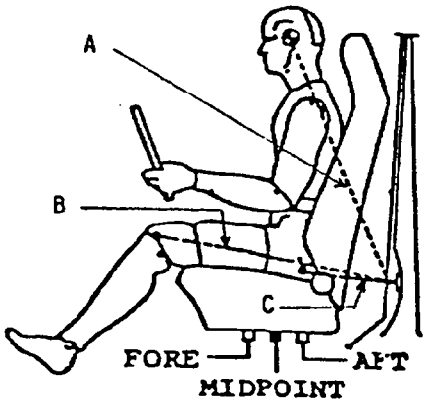
## SECTION 4
## OCCUPANT DATA

Two Part 572 50th percentile male ATD's were installed in the test vehicle. One was positioned in the driver's DSP, and one in the right front passenger's DSP. Both ATD's were fully instrumented with three accelerometers mounted in the head and chest, and load cells mounted in each femur.

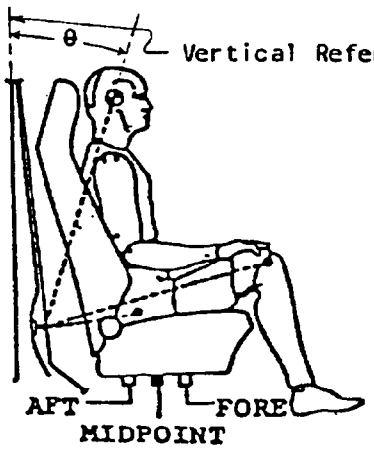
The pretest position of each ATD is shown in Tables 6 and 7. A summary of the recorded ATD data is shown in Table 8. A description of the posttest ATD positions is presented in Table 9.

TABLE 6 - DUMMY IN-VEHICLE POSITION RECORDING

DRIVER ATD



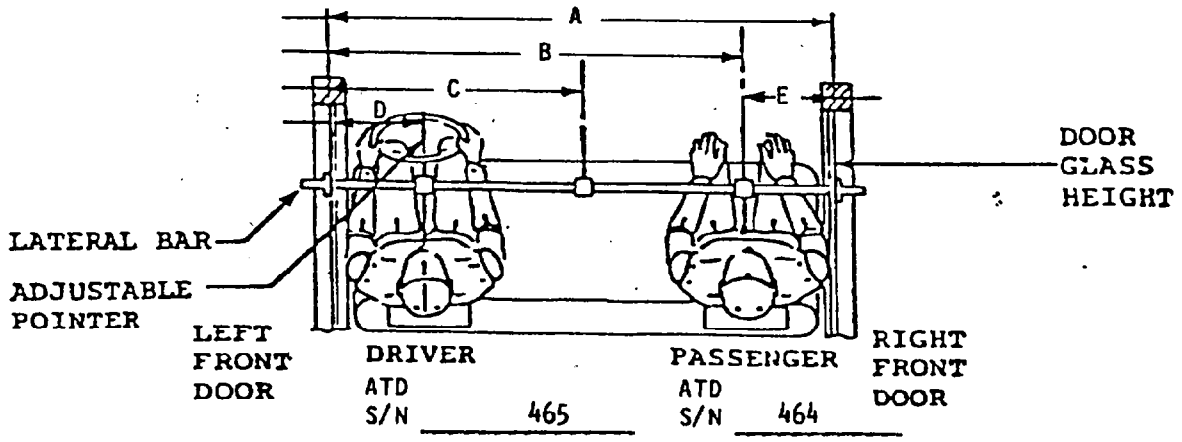

PASSENGER ATD




| Dimension | (in.) | (θ°) |
|---|---|---|
| A | 22 1/8 | 16° |
| B | 23 1/8 | 95° |
| C | 9 1/2 | 123° |
| Torso Angle = -10° | | |
| Seat Back Angle = -12° | | |

| Dimension | (in.) | (θ°) |
|---|---|---|
| A | 22 1/2 | 16° |
| B | 23 3/4 | 93° |
| C | 10 1/4 | 123° |
| Torso Angle = -10° | | |
| Seat Back Angle = -11° | | |

All angles are relative to the vertical plane.

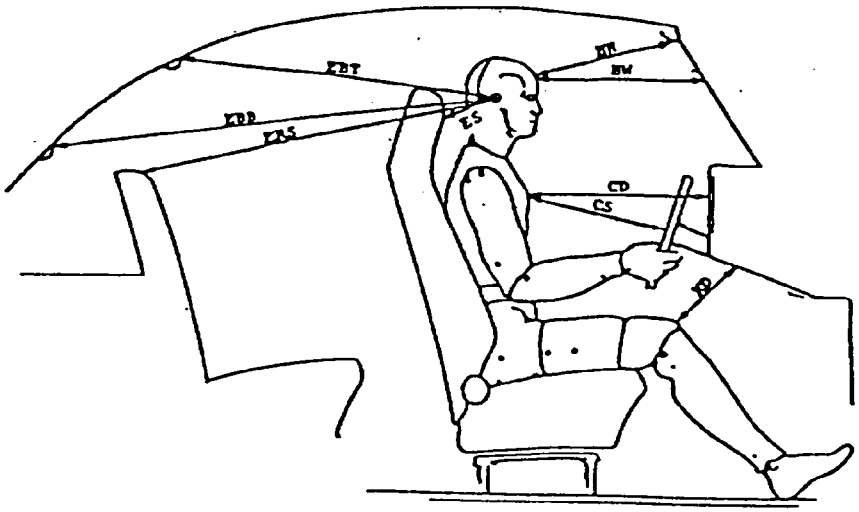



A = 52 1/2 D = 12 3/4

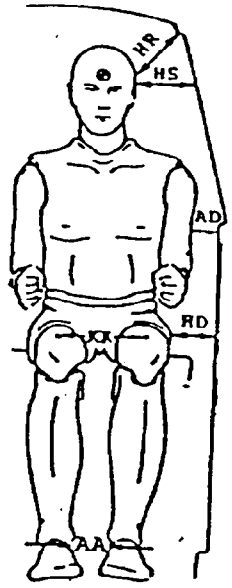
B = 39 E = 13 1/2

C = 26 1/4

TABLE 7 PART 572 ATD IN-VEHICLE POSITION




| | DRIVER | PASSENGER |
|---|---|---|
| HH | 8 7/8 | 10 1/8 |
| HW | 14 1/4 | 14 3/4 |
| CD | 18 | 18 1/4 |
| CS | 10 3/8 | - - |
| KD L | 6 7/8 | 6 1/2 |
| KD R | 7 1/8 | 6 5/8 |




| | DRIVER | PASSENGER |
|---|---|---|
| HR | 6 5/8 | 8 7/8 |
| HS | 8 5/8 | 10 3/4 |
| AD | 3 3/4 | 5 1/8 |
| HD | 4 3/8 | 4 3/8 |
| KK | 14 1/2 | 11 1/8 |
| AA | 11 3/8 | 9 |

HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knees to Dash
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle

TABLE 8 PART 572 ATD DATA SUMMARY

| Test Vehicle: 1983 Ford LTD | Driver ATD | | | | Passenger ATD | | | |
|---|---|---|---|---|---|---|---|---|
| | Positive Direction* | | Negative Direction** | | Positive Direction* | | Negative Direction** | |
| | Peak (G) | Time (msec) | Peak (G) | Time (msec) | Peak (G) | Time (msec) | Peak (G) | Time (msec) |
| Head Acceleration Longitudinal | 17 | 287 | 52 | 85 | 10 | 287 | 142 | 88 |
| Lateral | 5 | 190 | 19 | 108 | 27 | 92 | 8 | 112 |
| Vertical | 68 | 85 | 6 | 156 | 64 | 98 | 5 | 183 |
| Resultant | 86 | 85 | -- | -- | 145 | 88 | -- | -- |
| HIC | 609 btwn 72 and 114 msec | | | | 957 btwn 74 and 109 msec | | | |
| Chest Acceleration Longitudinal | 7 | 230 | 75 | 77 | 5 | 215 | 38 | 102 |
| Lateral | 7 | 143 | 17 | 80 | 42 | 100 | 8 | 69 |
| Vertical | 19 | 72 | 7 | 150 | 25 | 74 | 19 | 110 |
| Resultant (Max) | 76 | 77 | -- | --- | 56 | 100 | -- | --- |
| Resultant (clip) | 69 | --- | -- | --- | 54 | --- | -- | --- |
| | Peak (lb) | Time (msec) | Peak (lb) | Time (msec) | Peak (lb) | Time (msec) | Peak (lb) | Time (msec) |
| Femur Loads Left | 1017 | 76 | 168 | 57 | 1669 | 73 | 110 | 55 |
| Right | 763 | 75 | 58 | 60 | 648 | 84 | 158 | 56 |
| Belt Loads Lap | 1342 | 74 | -- | -- | 1509 | 75 | -- | -- |
| Torso | 1300 | 76 | -- | -- | 1669 | 76 | -- | -- |
| | Peak (in.) | Time (msec) | | | Peak (in.) | Time (msec) | | |
| Belt Spoolout: Potentiometer | 2.45 | -- | -- | -- | 1.95 | -- | -- | -- |
| Film Data | 2 3/4 | -- | -- | -- | 2 3/4 | -- | -- | -- |
| Vehicle Impact Speed (mph): 35.20 | | | | | | | | |

* Longitudinal: Forward
Lateral: Rightward
Vertical: Downward

** Longitudinal: Rearward
Lateral: Leftward
Vertical: Upward

TABLE 9 GENERAL ATD POSTTEST DESCRIPTIONS

ATD Positions

Driver: Slouched with arms spread outward.

Passenger: Slid toward the center of car. Left hand under knee, and right hand by door.

Visible ATD Contact Areas

| Component | Driver | Passenger |
|---|---|---|
| Head | Steering rim<br>Dash panel | Dash panel |
| Chest | Steering column | - - - |
| Abdomen | Steering rim | - - - |
| Left Knee | Dash panel<br>Steering column | Glove compartment |
| Right Knee | Dash panel | Glove compartment |

## SECTION 5
## VEHICLE DATA

The test vehicle is a 1983 Ford LTD. General vehicle descriptive information is presented in Table 10.

The pretest and posttest vehicle dimensional data are presented in Table 11.

The accelerometer placement locations, and a summary of the measured peak amplitudes are presented in Table 12.

TABLE 10 TEST VEHICLE INFORMATION

Vehicle Manufacturer: Ford Motor Company

Make/Model: Ford LTD

Body Style: 4-Door Sedan Model Year: 1983

VIN: 1FABP39X7DG122542 Build Date: 11/82

NHTSA No.: CD0203 Color: Grey

Engine Data: 6 Cylinders: 3,300 cc Displacement

Transmission Data: 3 Speed ( ) Manual/ (X ) Automatic

Date Vehicle Received by Laboratory: January 13, 1983

Dealer's Name & Address: Midway Ford, Los Angeles, California

DATA FROM CERTIFICATION LABEL ON LEFT DOOR REAR FACE OR 'B' POST

Vehicle Manufactured By: Ford Motor Company

Date of Manufacturer: 11/82 VIN: 1FABP39X7DG122542

GVWR: 4,300 lbs. GAWR: Front = 2,099 lbs. Rear = 2,293 lbs.

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVE BOX, ETC.

Vehicle Load: FRONT REAR
Up to Capacity [3][0] psi [3][5] psi

| RECOMMENDED TIRE SIZE: | LOAD RANGE: |
|---|---|
| P185/75 R14 | (B) C D |

Vehicle Capacity:
Type of seats [X] Bench
[ ] Bucket
[ ] Split Bench

CARGO LOAD = [1][0][0] lbs

TOTAL = [8][5][0] lbs.

| RECOMMENDED COLD TIRE PRESSURE | F 30 : R 35 |
|---|---|

Number of Occupants = [2] Front
(Designated Seating [3] Rear
Capacity) [5] Total

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with max. fluids): UDW 3,110

Right Front = [8][6][8] lbs
Left Front = [8][6][5] lbs
TOTAL FRONT WEIGHT = [1][7][3][3] lbs
TOTAL REAR WEIGHT = [1][3][7][7] lbs.
TOTAL DELV. WEIGHT = [3][1][1][0] lbs

Right Rear = [6][9][8] lbs
Left Rear = [6][7][9] lbs
( 55.4 % of Total Vehicle Weight)
( 44.6 % of Total Vehicle Weight)

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight ( 3,100 lbs)

VCW = Vehicle Capacity Weight ( 850 lbs)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 150 (DSC) = 100 lbs

Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs/dummy)

Target Test Weight = 3,528 lbs

TABLE 10 TEST VEHICLE INFORMATION (CONT'D)

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 100 lbs CARGO: 3,563 lbs.

Right Front = 974 lbs
Left Front = 967 lbs
TOTAL FRONT WEIGHT = 1941 lbs
TOTAL REAR WEIGHT = 1622 lbs
TOTAL TEST WEIGHT = 3563 lbs

Right Rear = 806 lbs
Left Rear = 816 lbs
( 54.5 % of Total Vehicle Weight)
( 45.5 % of Total Vehicle Weight)

Weight of ballast secured in vehicle trunk area = 0 lbs

VEHICLE ATTITUDE: (all dimensions in inches)

Delivered Attitude: RF 25 1/4 LF 25 3/8 RR 23 1/2 LR 23 7/8
Test Attitude: RF 24 13/16 LF 25 RR 23 LR 23 9/16
Wheelbase: 106 5/8 ; Distance from c.g. to front axle: 48.4

TEST FLUID DATA:

Test Fluid Type: Red Stoddard Solvent Spec. Grav.: 0.764
Viscosity: 0.96 Centistokes
Fuel System Capacity (data from NHTSA): 16.0 gal.
Fuel System Capacity (data from Owners Manual): 16.0 gal.
Test Volume: 15.0 Gallons (92 to 94% of NHTSA capacity)

Electric Fuel Pump: ___ Yes: X No; Fuel Injection: ___ Yes X No

Does electric fuel pump operate with ignition switch "on" and the engine not operating: ___ Yes ___ No N/A

Details of Fuel System: The fuel tank is located beneath the trunk, and to the rear of the rear axle. The filler tube is on the right side of the tank. Two rubber fuel lines leave the top of the tank. One is connected to a metal line which follows the right frame rail to the B pillar, and then goes along the left side of the floor pan, and up the firewall behind the left front tire to the fuel pump attached to the left side of the engine block. A metal fuel line runs from the pump around the front of the engine block to the carburetor on the right side of the engine. The other fuel line runs from the tank along the right side of the floor pan to a cannister in the engine compartment.

TABLE 10 TEST VEHICLE INFORMATION (CONT'D)

TEST CONDITIONS:

Date of Test: 08/11/83 Time of Test: 1:44 am/(pm)

Ambient Temperature: 99 °F at impact area

Temp. In Occ. Compart.: 75 °F: W/Shld. Mldg. Temp.: 73 °F

IMPACT VELOCITY:

Trap No. 1 = 35.20 mph; Trap No. 2 = 35.20 mph

Distance from the vehicle's front bumper to the barrier face entering the vehicle velocity measurement device = 60 inches

Exiting the vehicle velocity measurement device = 12 inches

VEHICLE REBOUND

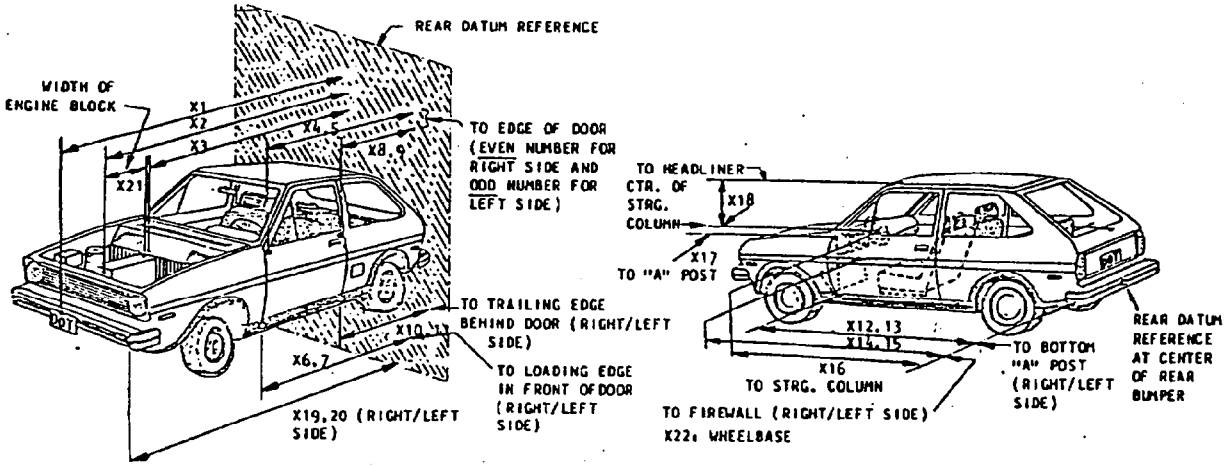
Distance from front of test vehicle to the barrier after impact: Ave. = 10 7/8 ; R = 11 1/8 ; L = 10 5/8

VEHICLE MAXIMUM CRUSH:

Left Side : 26 3/8 inches Ave.: 26 1/16

Right Side: 25 3/4 inches Max.: 26 3/8

TABLE 11 PRE-/POST-TEST STATIC MEASUREMENT DATA

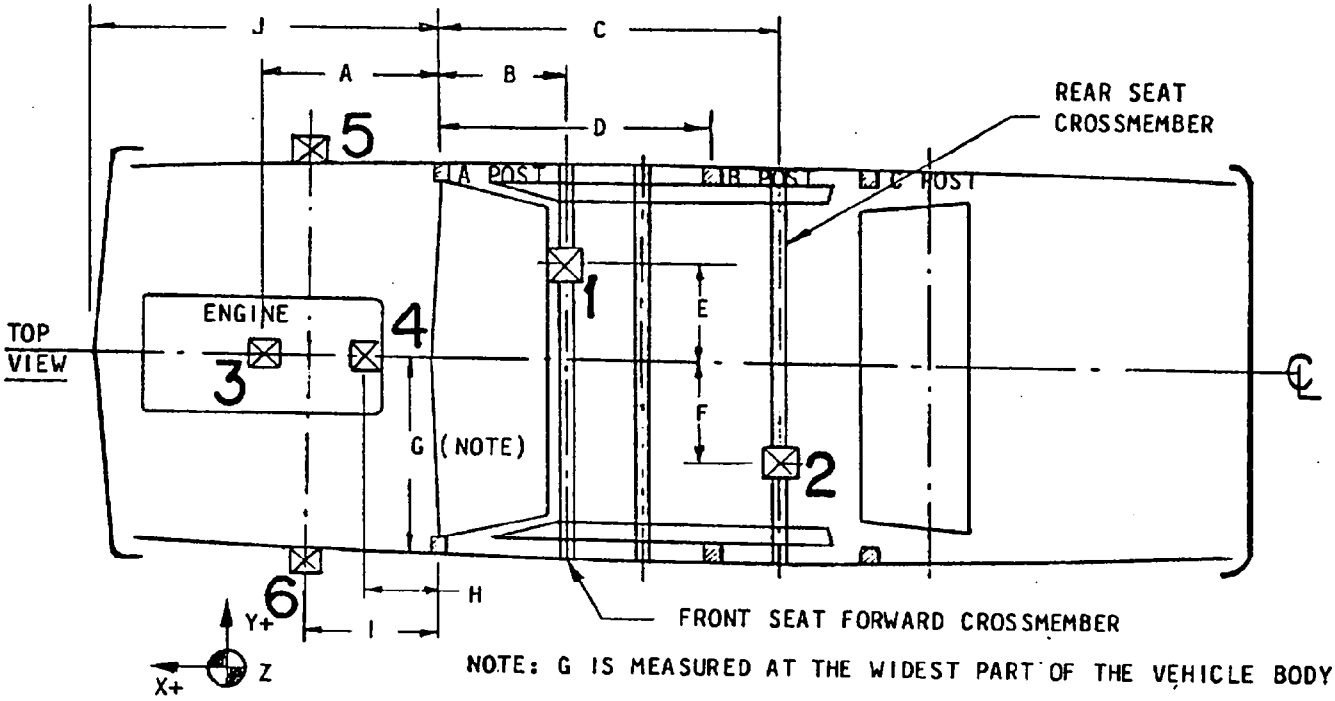



VEHICLE: Ford LTD NHTSA NO.: CD0203

TEST DATE: 08/04/83

| REFERENCE DIMENSION | PRE-TEST MEASUREMENT | POST-TEST MEASUREMENT | CHANGE |
|---|---|---|---|
| X1 | 192 3/4 | 167 7/8 | -24 7/8 |
| X2 | 172 1/2 | 160 1/2 | -12 |
| X3 | 144 1/2 | 140 | - 4 1/2 |
| X4 | 130 | 129 1/4 | - 3/4 |
| X5 | 130 7/8 | 130 1/2 | - 3/8 |
| X6 | 132 | 132 1/4 | + 1/4 |
| X7 | 132 | 132 7/8 | + 7/8 |
| X8 | 92 3/8 | 92 5/8 | + 1/4 |
| X9 | 92 1/2 | 92 1/2 | 0 |
| X10 | 89 7/8 | 88 7/8 | 0 |
| X11 | 89 5/8 | 89 1/8 | - 1/2 |
| X12 | 131 1/4 | 130 1/4 | - 1 |
| X13 | 131 3/8 | 130 1/2 | - 7/8 |
| X14 | 139 | 138 7/8 | - 1 1/8 |
| X15 | 138 7/8 | 139 3/8 | + 1/2 |
| X16 | 115 | 114 7/8 | - 1/8 |
| X17 | 17 | 17 3/8 | + 3/8 |
| X18 | 17 1/4 | 21 1/4 | + 4 |
| X19 | 192 3/8 | 166 5/8 | -25 3/4 |
| X20 | 192 3/8 | 166 | -26 3/8 |
| X21 | 28 | 27 1/2 | - 1/2 |
| X22 | 106 5/8 | 100 7/8 | - 5 3/4 |

TABLE 12 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



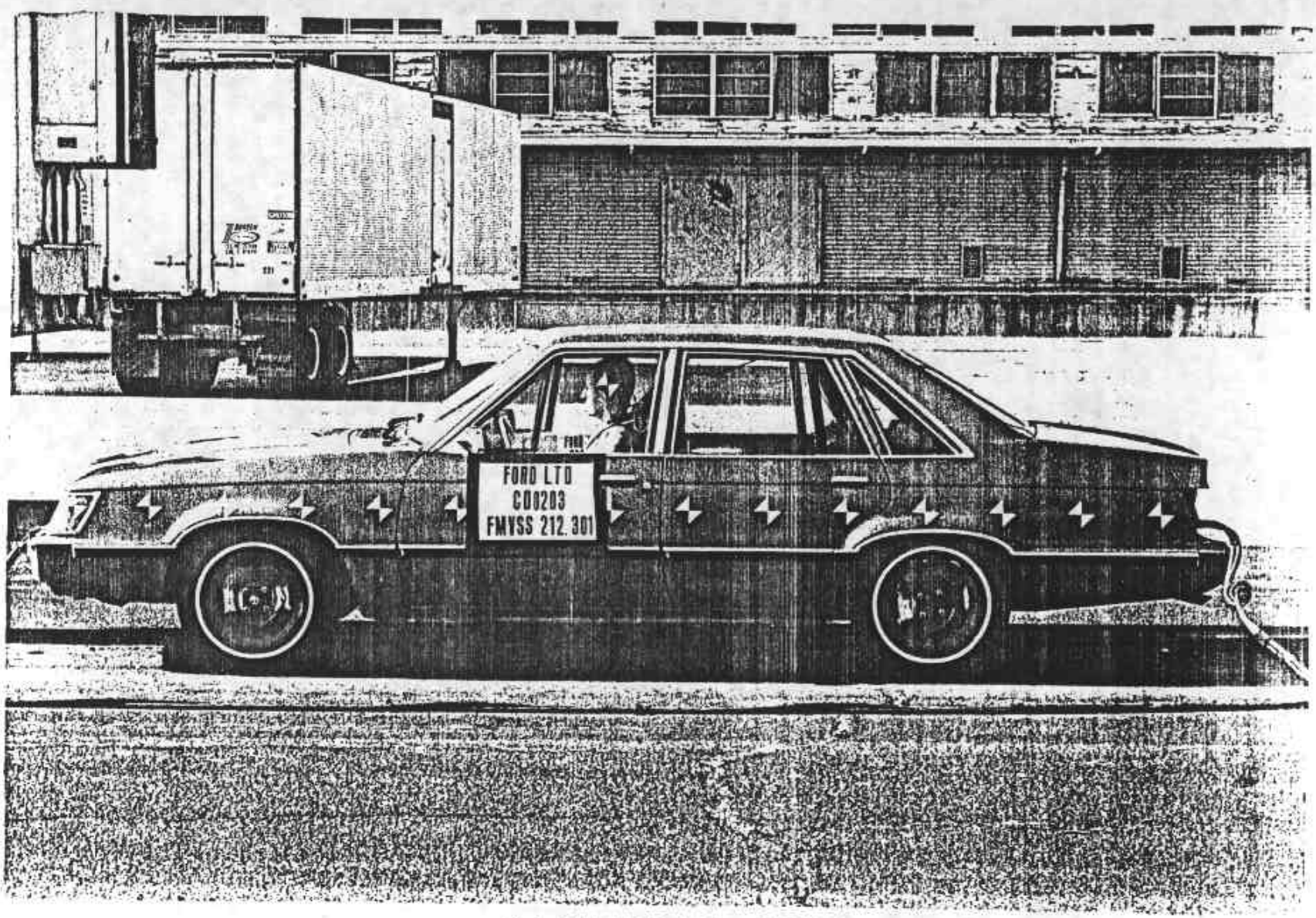

NOTE: G IS MEASURED AT THE WIDEST PART OF THE VEHICLE BODY.

| LOCATION NO. AND DESCRIPTION | LOCATION DIMENSION (IN.) | AXIS | PEAK (G'S) | | TIME TO PEAK(MSEC) | |
|---|---|---|---|---|---|---|
| | | | POSITIVE | NEGATIVE | POSITIVE | NEGATIVE |
| 1 - Below Front Seat Area | E - 17 3/4<br>B - 23 1/8 | X | 3 | 39 | 130 | 53 |
| 2 - Below Rear Seat Area | F - 19 1/4<br>C - 52 3/8 | X | 2 | 48 | 128 | 53 |
| 3 - Top of Engine at Carb. Mount | A - 30 1/4 | X | 50 | 116 | 50 | 40 |
| 4 - Bottom of Engine at Oil Pan | H - 19 3/4 | X | 58 | 130 | 49 | 41 |
| 5 - Right Front Brake Caliper | I - 17 1/2 | X | 55 | 77 | 86 | 69 |
| 6 - Left Front Brake Caliper | I - 17 1/2 | X | 67 | 45 | 89 | 108 |
| - Vehicle Half Width | G - 36 1/2 | NOTE: NEGATIVE ACCELERATION IS REARWARD | | | | |
| - Forward Most Point At ℄ to A Post | J - 64 3/4 | | | | | |
| - Distance from 'A' post to 'B' post | D - 40 | | | | | |

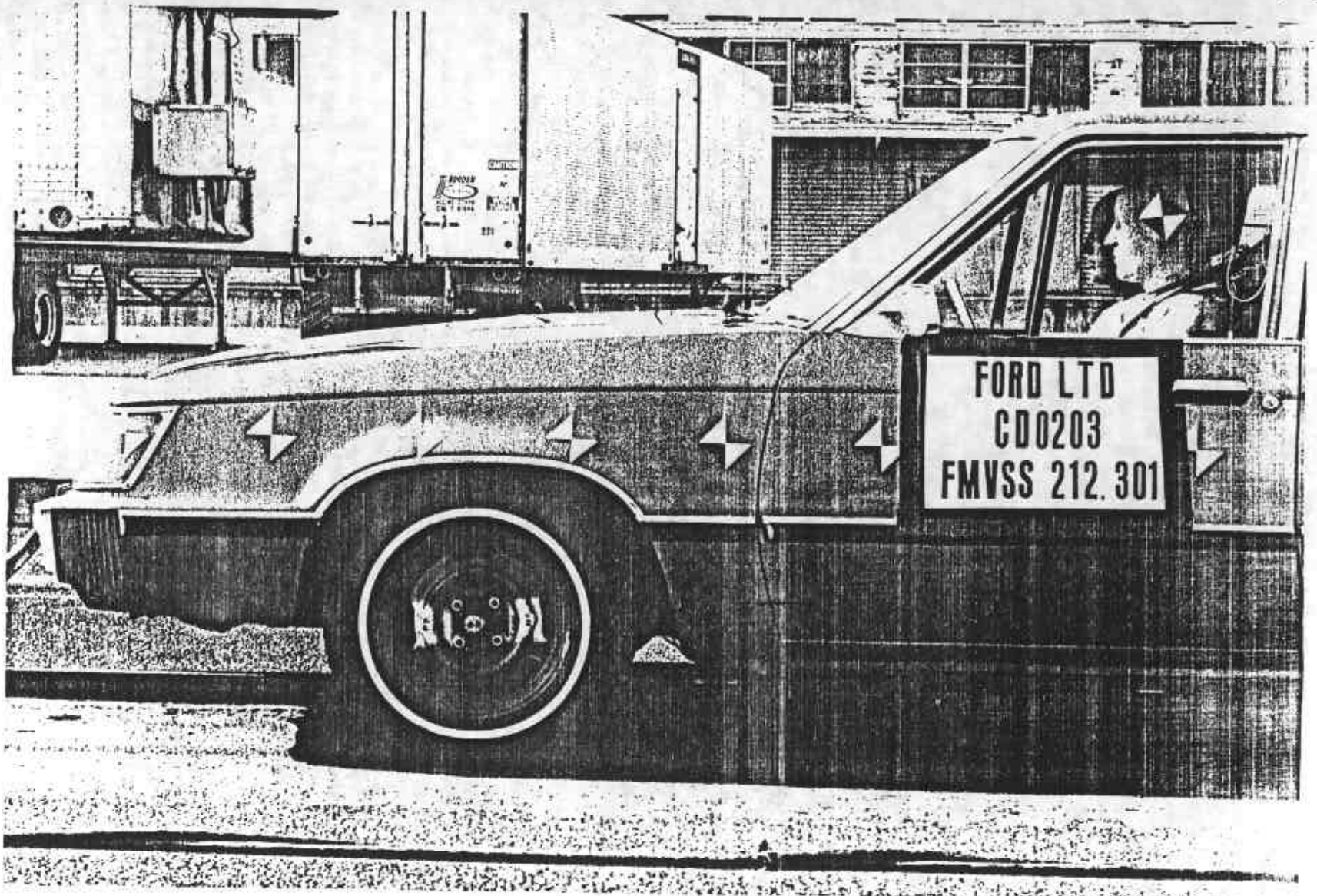
# APPENDIX

# A

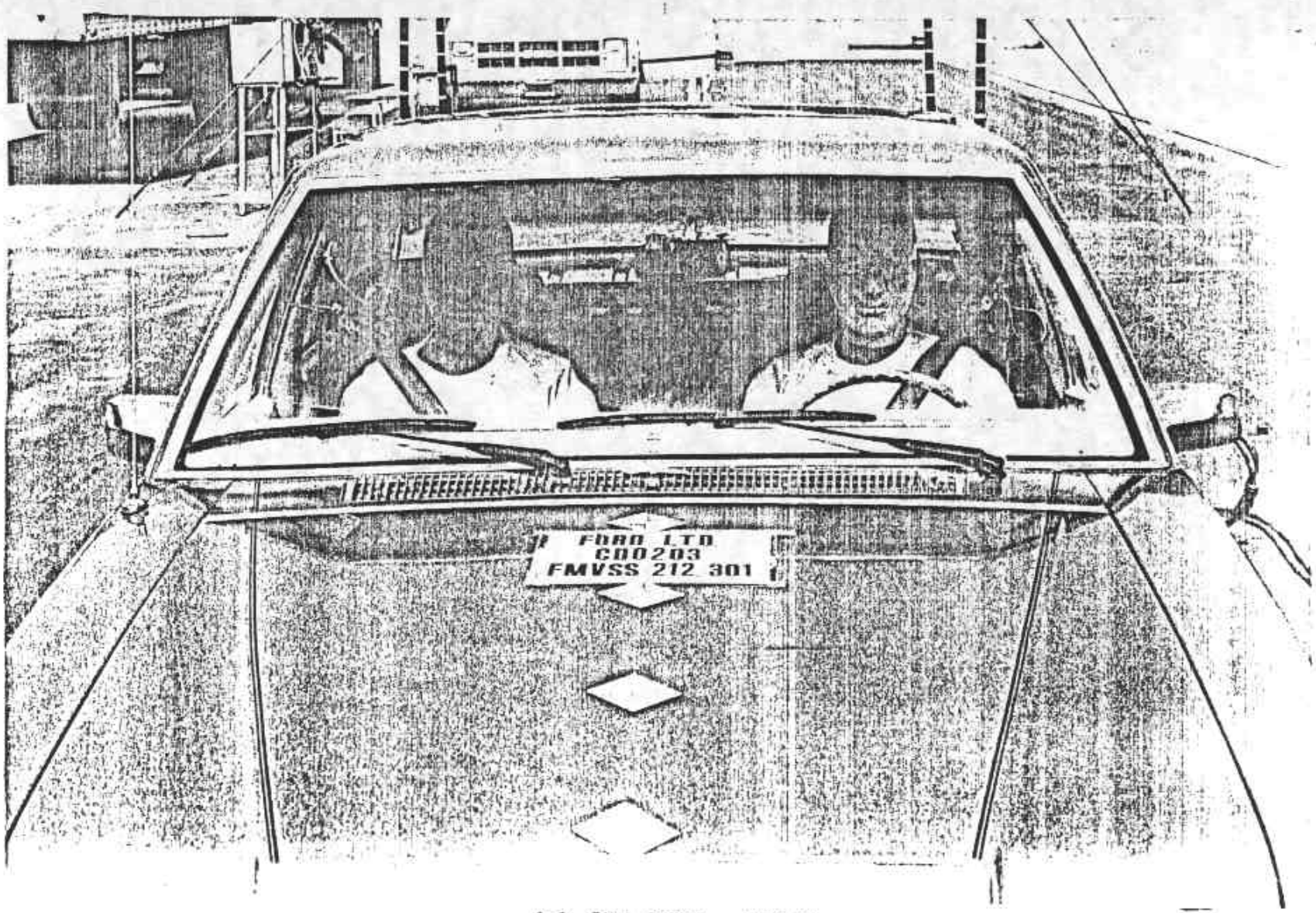
# PHOTOGRAPHIC COVERAGE



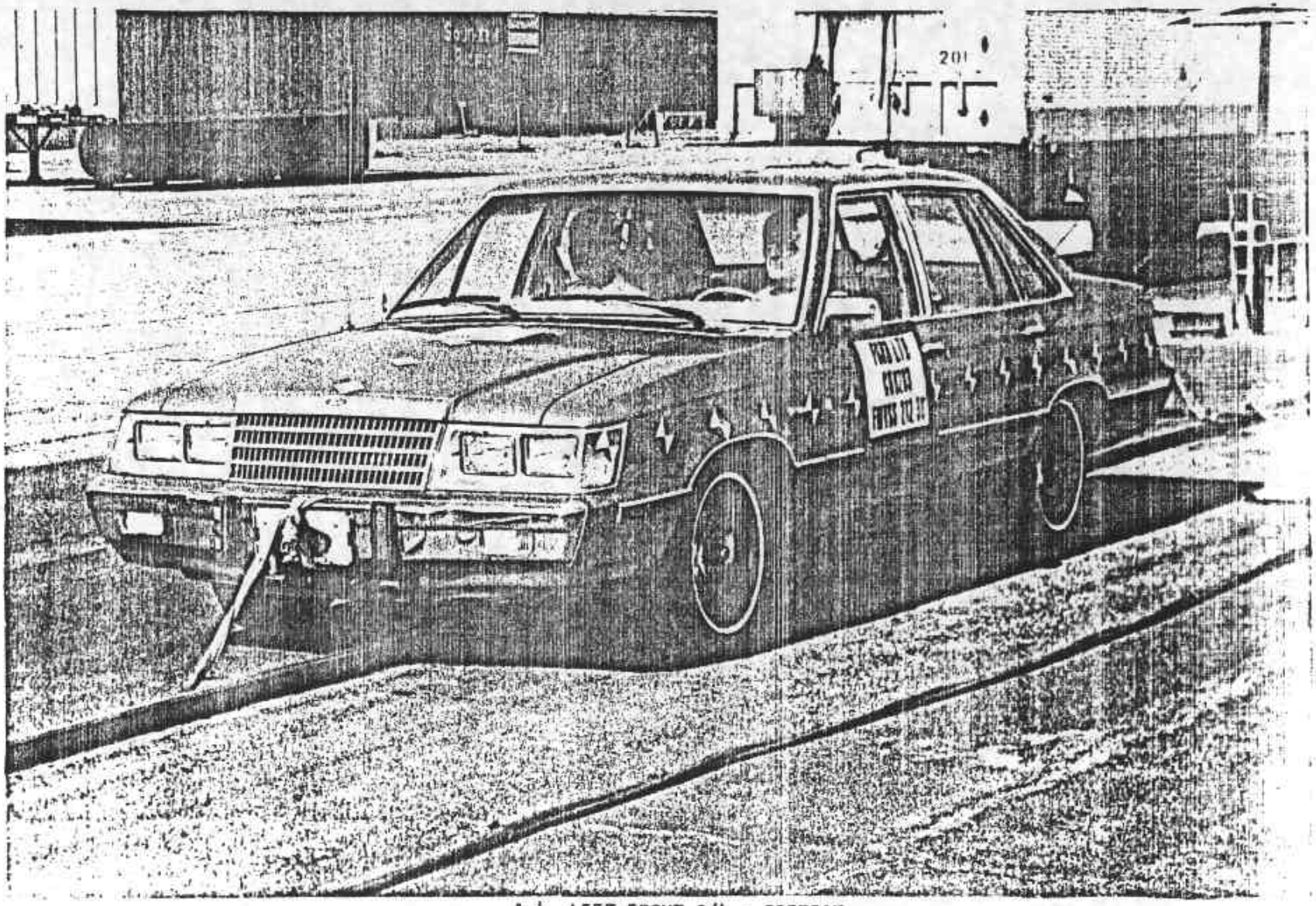

A-1 FULL LEFT SIDE — PRETEST



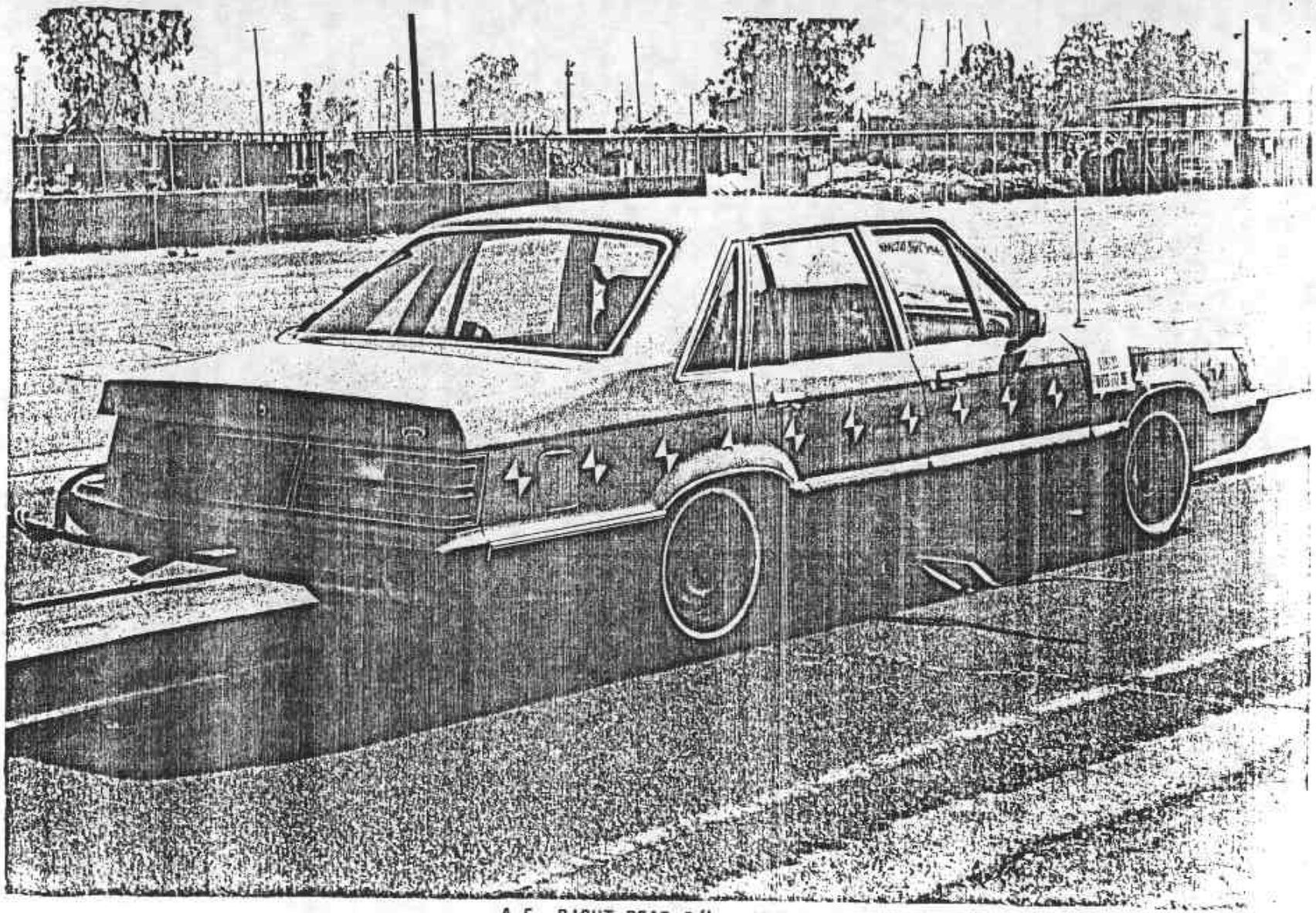

A-2 HALF LEFT SIDE – PRETEST



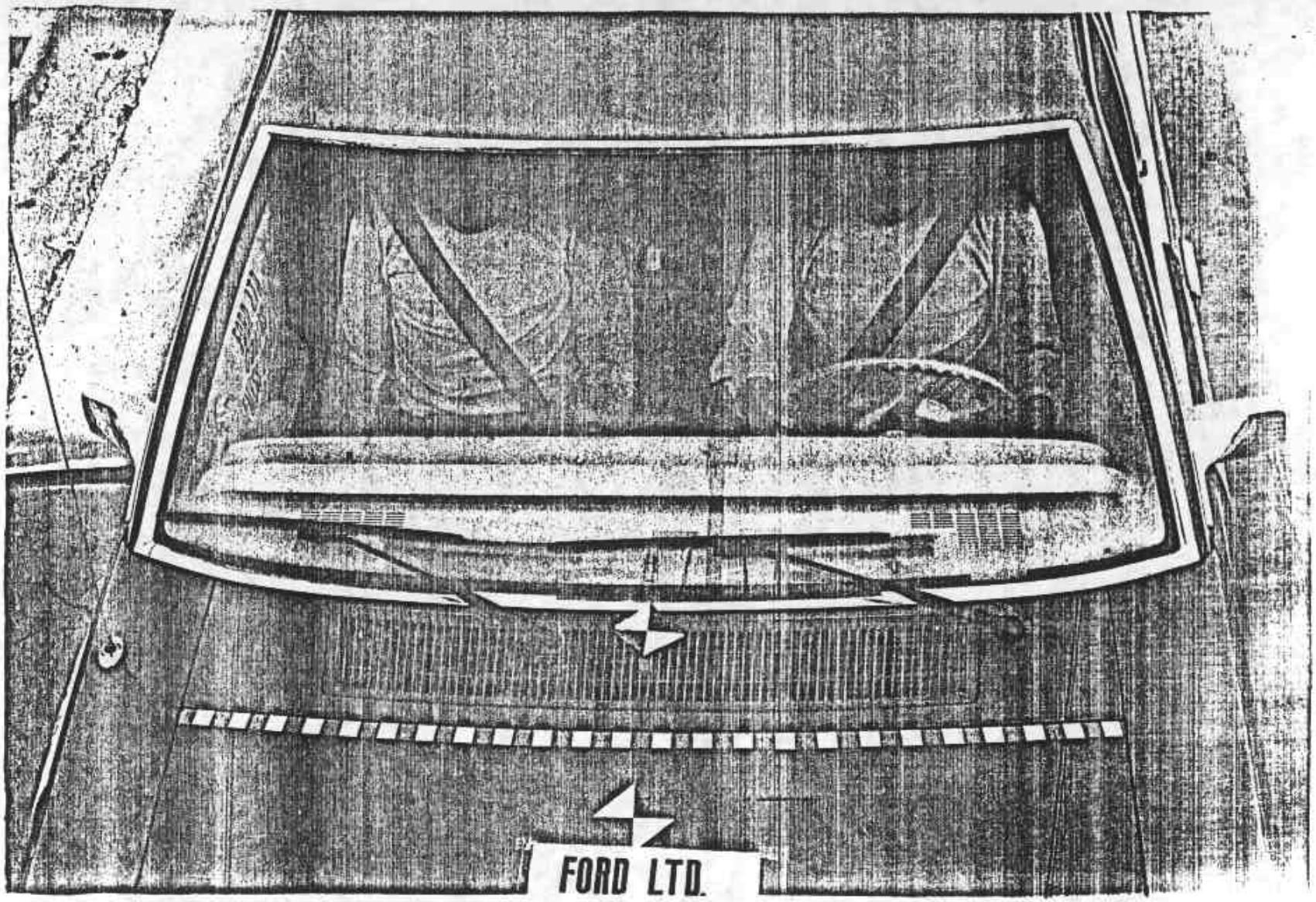

A-3 FULL FRONT - PRETEST



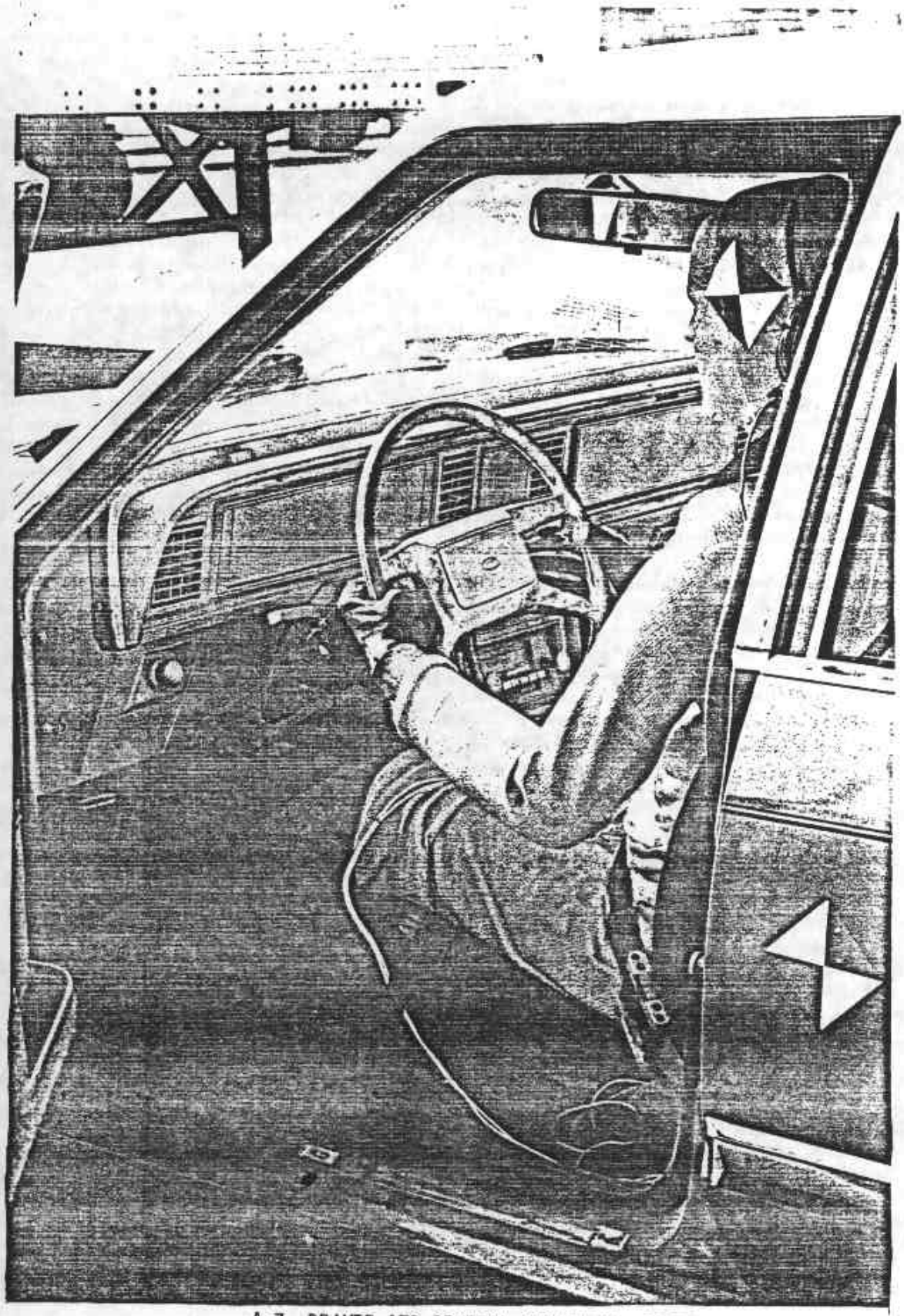
A–4 LEFT FRONT 3/4 – PRETEST



A-5 RIGHT REAR 3/4 – PRETEST

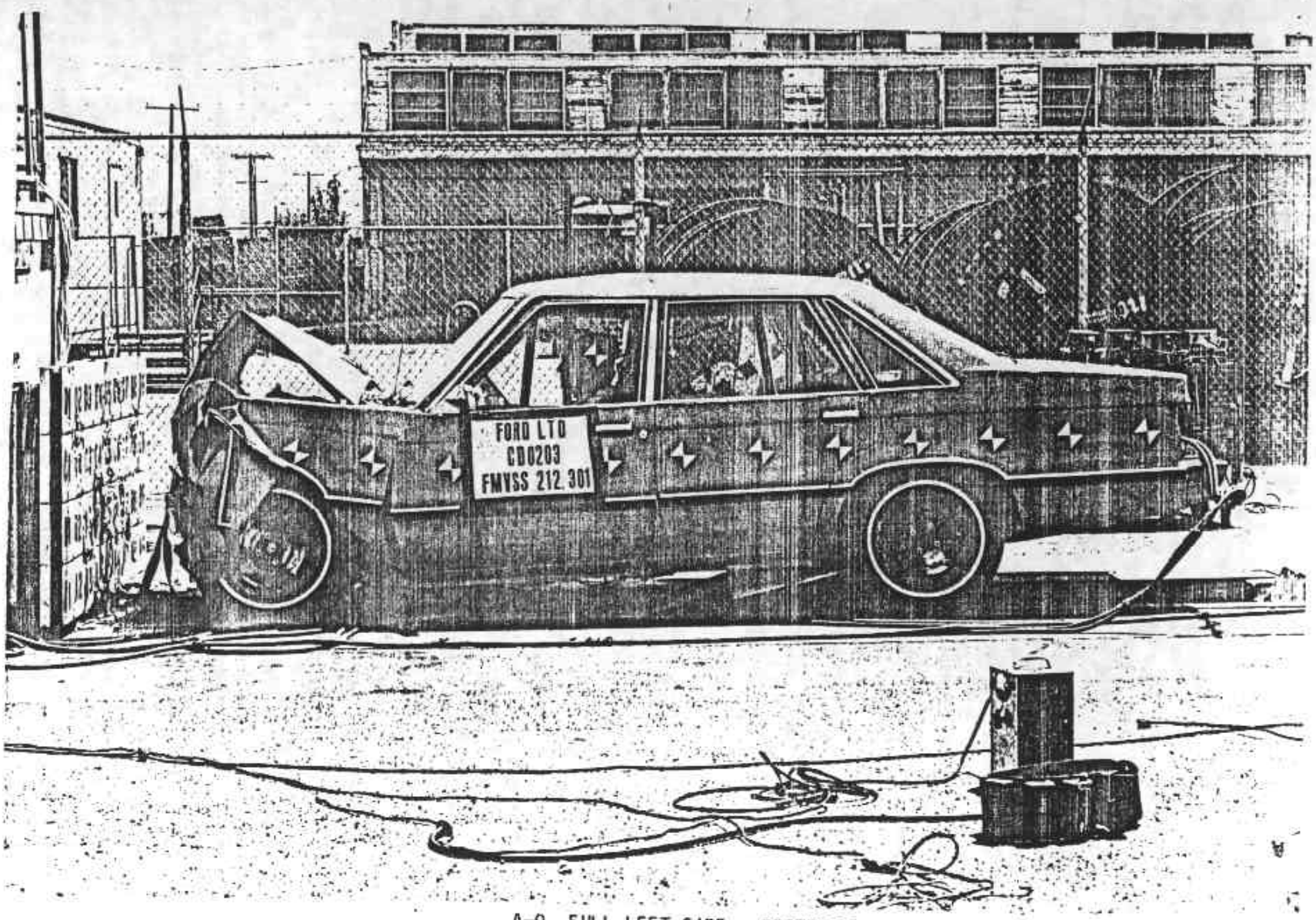



A-6 FULL FRONT WINDSHIELD – PRETEST

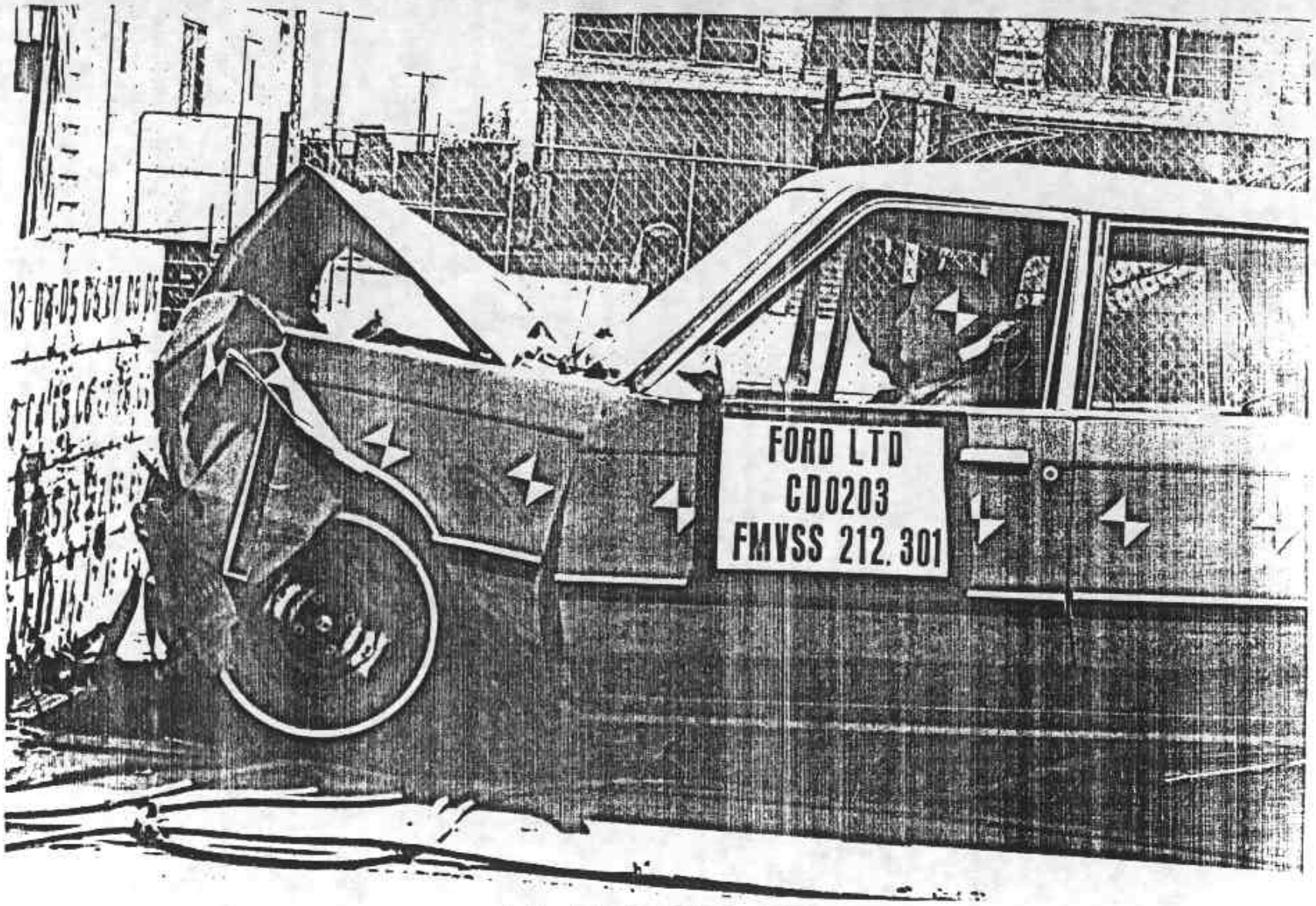


A-7 DRIVER ATD GENERAL POSITION - PRETEST

A-8 PASSENGER ATD GENERAL POSITION – PRETEST

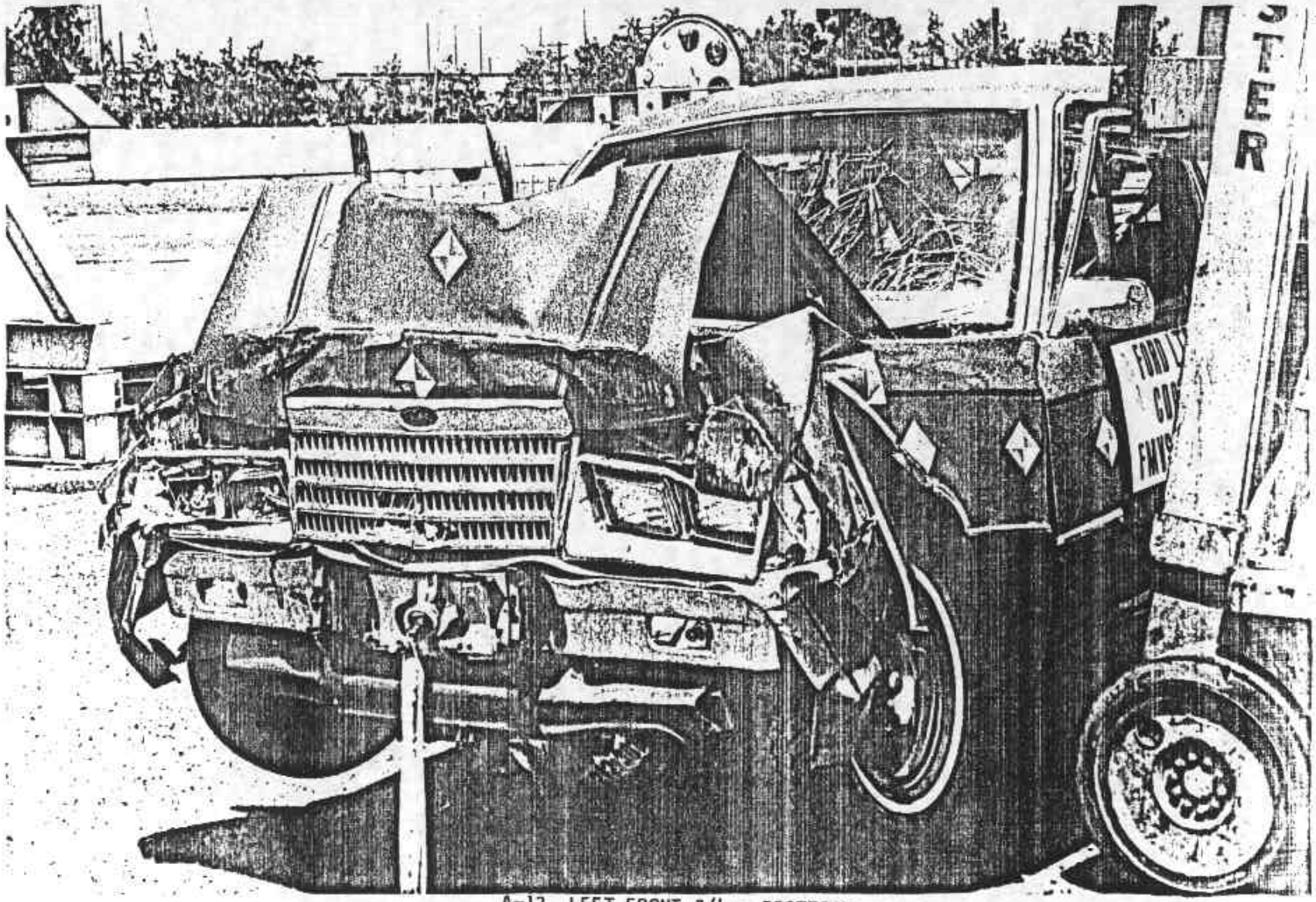



A-9 FULL LEFT SIDE – POSTTEST

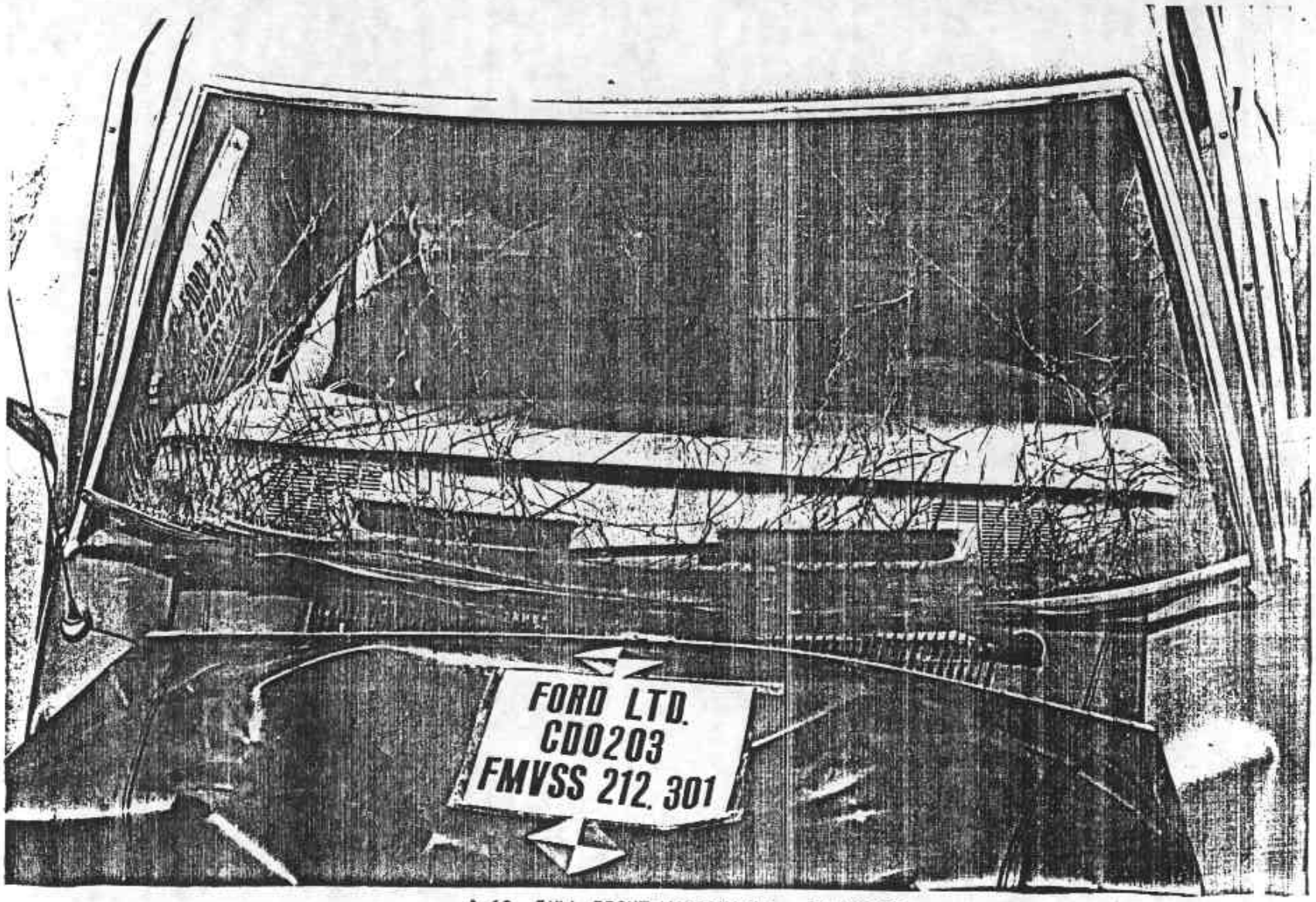



A-10 HALF LEFT SIDE - POSTTEST

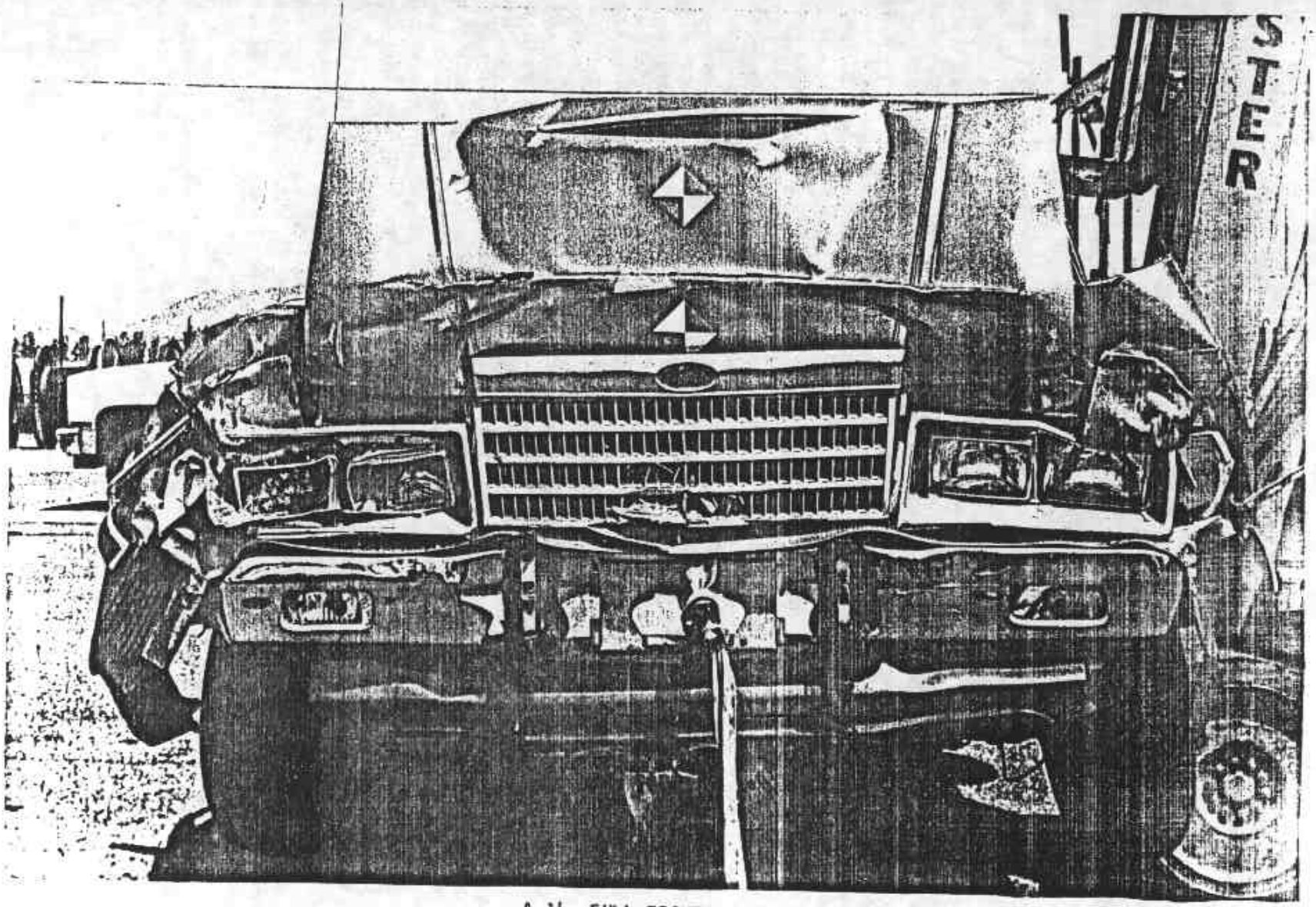

A-11 HALF RIGHT SIDE – POSTTEST



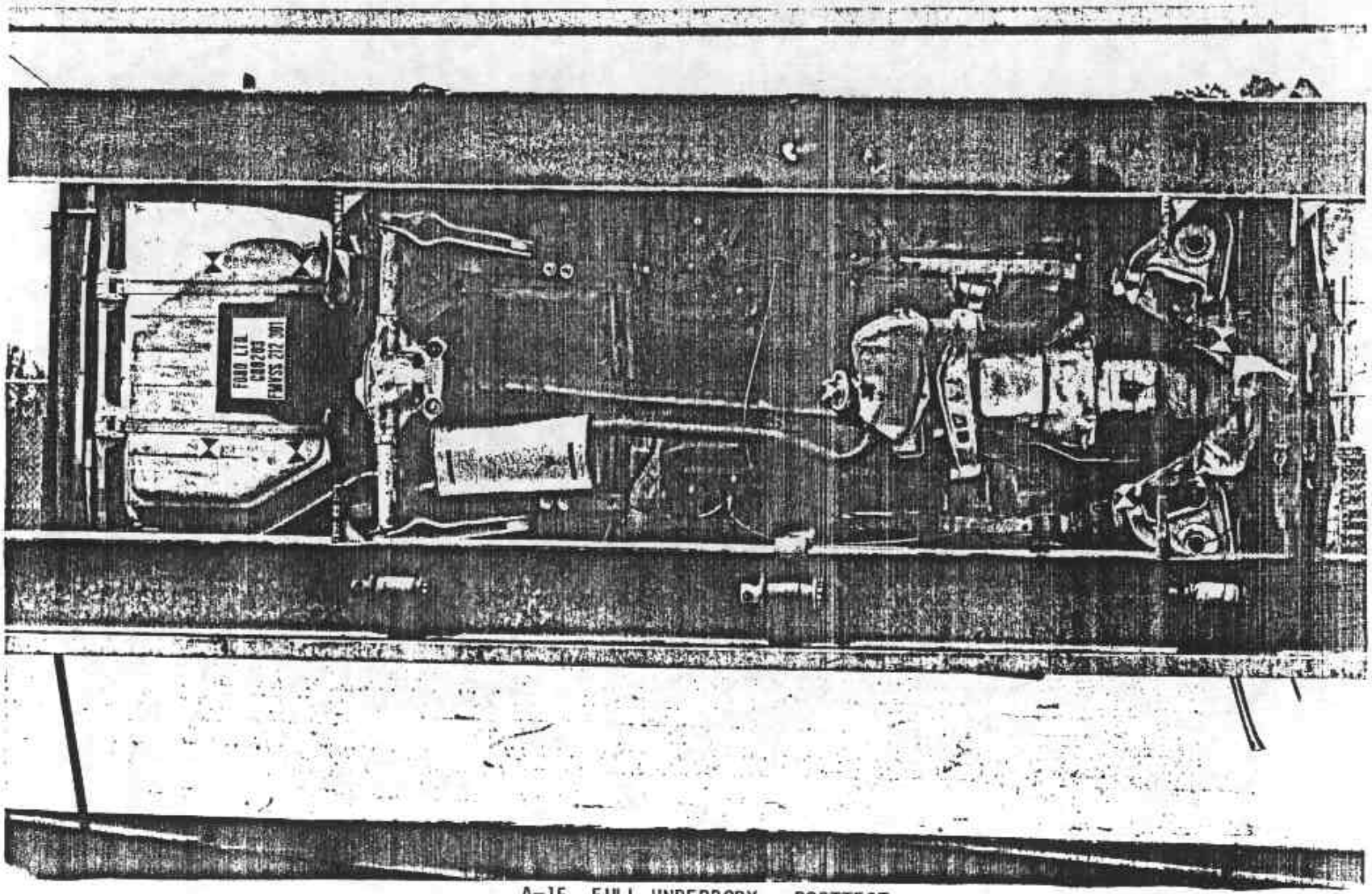
A–12 LEFT FRONT 3/4 – POSTTEST



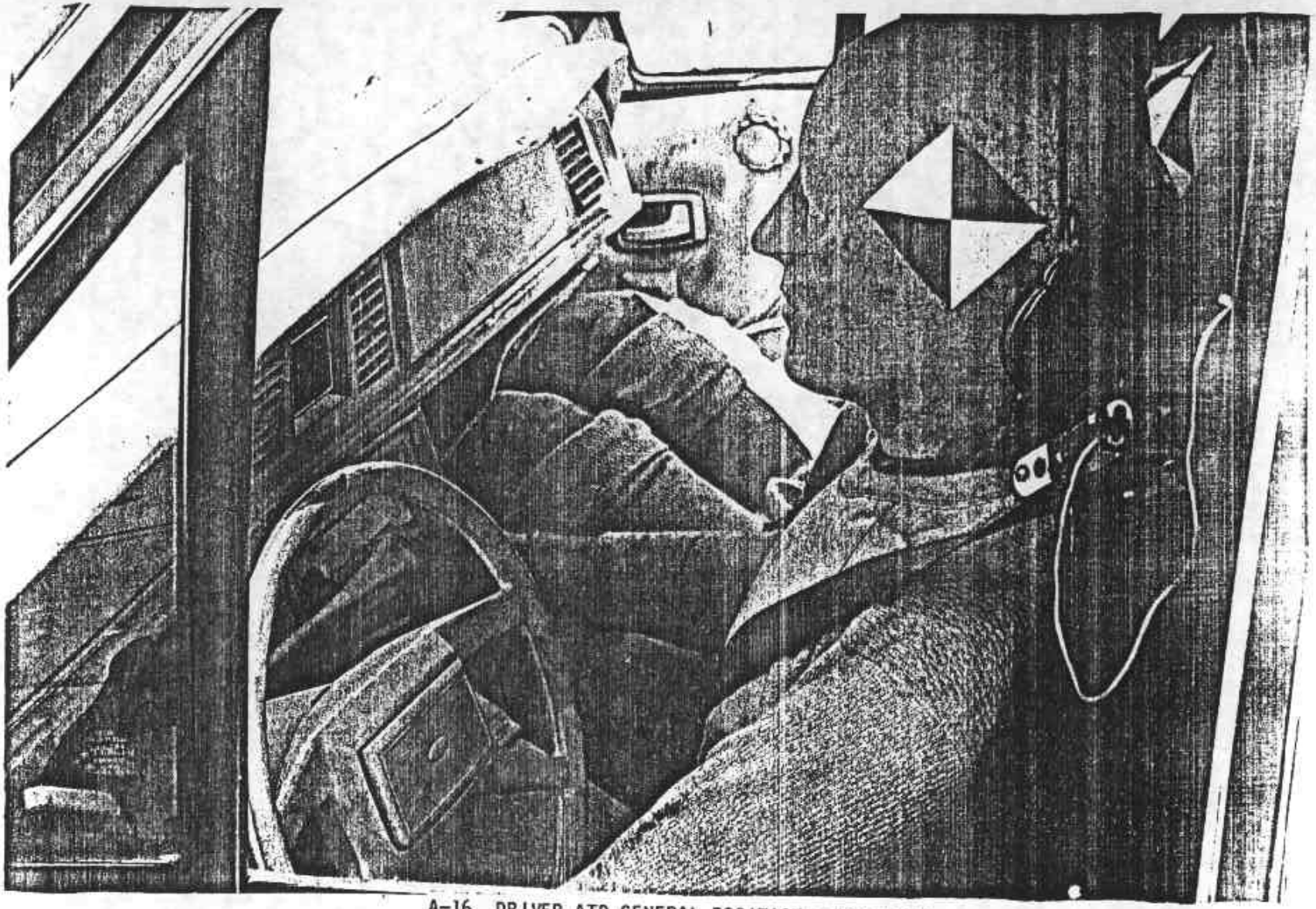

A-13 FULL FRONT WINDSHIELD – POSTTEST




A-14 FULL FRONT - POSTTEST

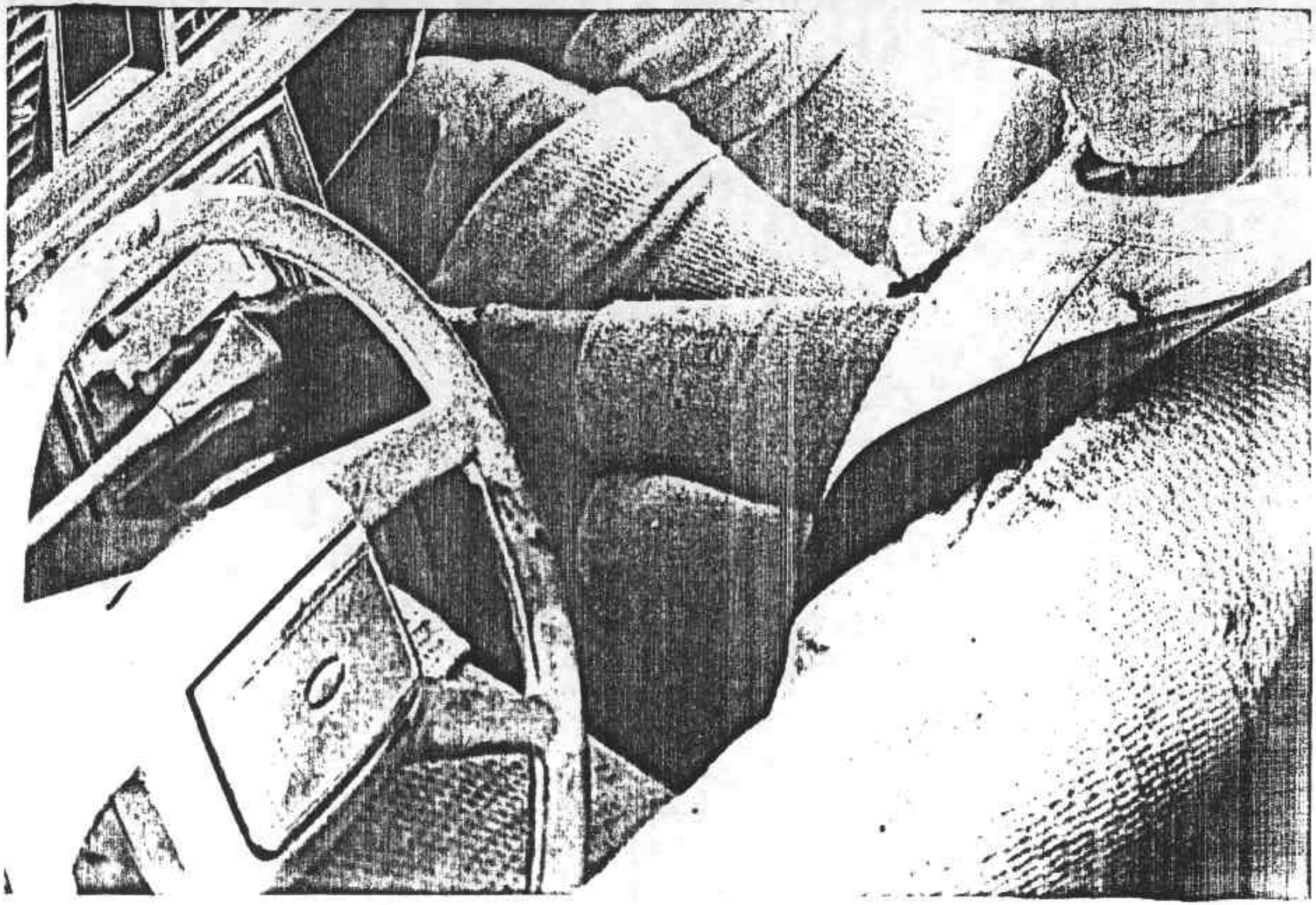



A-15 FULL UNDERBODY - POSTTEST

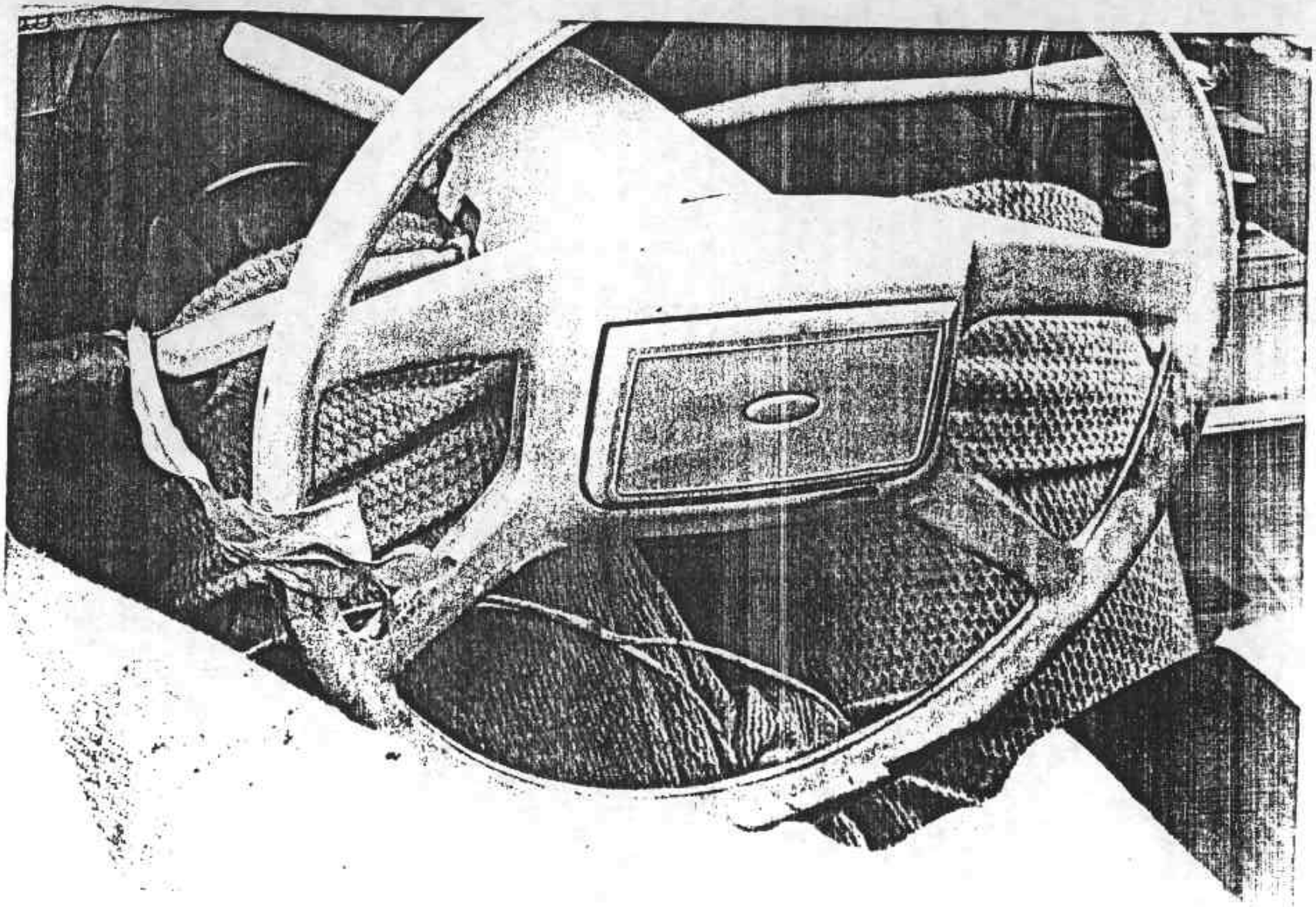


A-16 DRIVER ATD GENERAL POSITION – POSTTEST

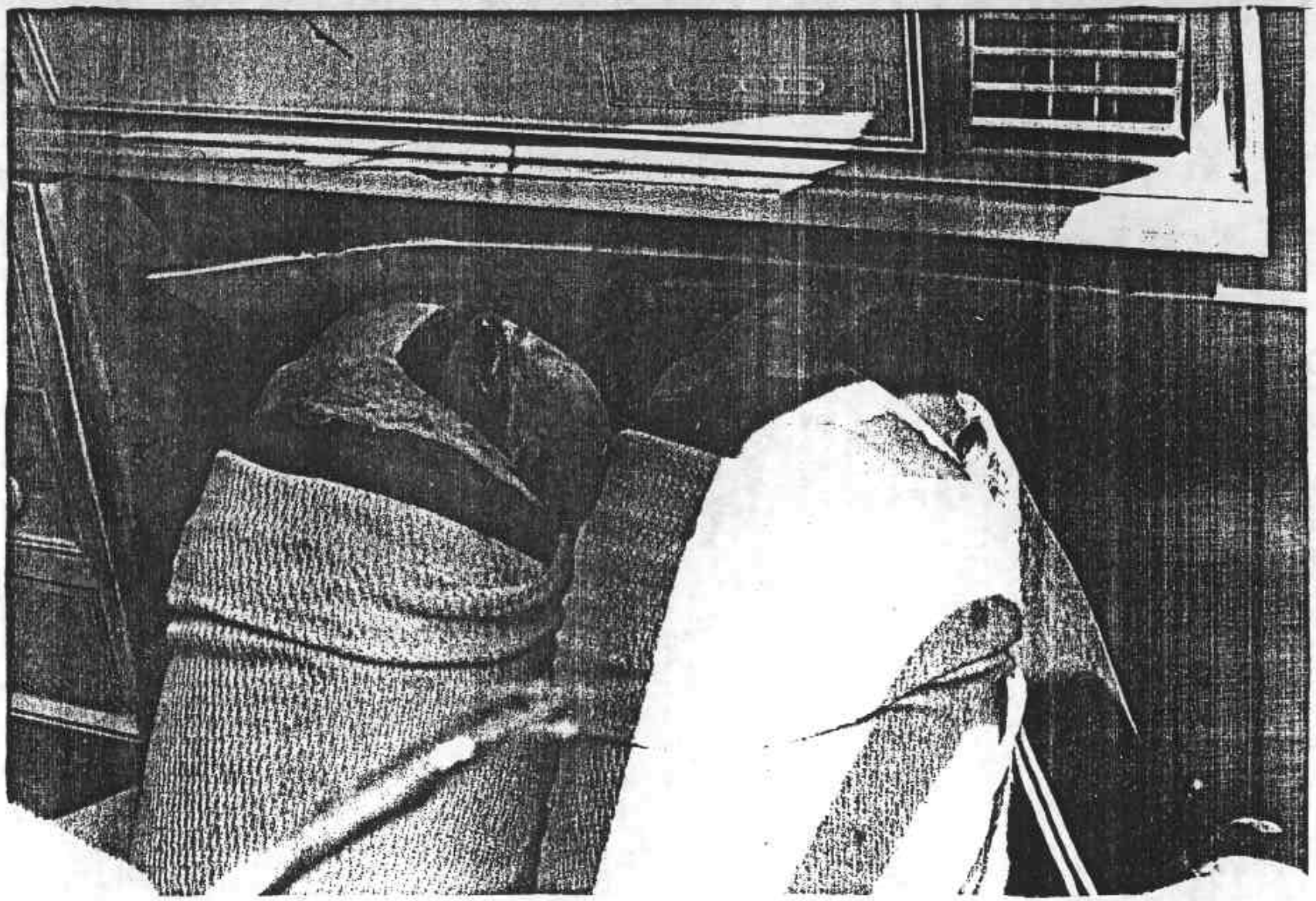
A-17 PASSENGER ATD GENERAL POSITION – POSTTEST



A–18 DRIVER ATD STEERING WHEEL – POSTTEST



A-19 DRIVER ATD KNEES – POSTTEST



A–20 PASSENGER ATD KNEES – POSTTEST

APPENDIX B

SUMMARY OF RESULTS OF

CERTIFICATION TESTS ON

PART 572 ANTHROPOMORPHIC TEST DEVICES

HUMANOID MODEL 572

SERIAL NO'S. 464 & 465

TABLE B-1- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY

NHTSA ATD I.D. NO.: 464

LABORATORY TECHNICIAN: M. Poindexter

| Sheet 1 of 3 | | | Pre-Test Calibration | Post-Test Calibration |
|---|---|---|---|---|
| Date of ATD Calibration - - - - - - - - - - - - | | | 08/01-08/02/83 | 08/15-08/18/83 |
| Calibration Sequential Number For Dummy - - - | | | 4 | 5 |
| Temperature in Lab. (Spec. = 66 to 78° F) - - | | | 72 - 78°F | 75 - 78°F |
| Relative Humidity in Lab. (Spec. = 10 to 70%) | | | 51 - 60% | 52 - 70% |
| TEST PARAMETER | | SPECIFICATION | | |
| 1. HEAD DROP TEST: | | | | |
| a. Peak Resultant Accel. - | | 210 to 260G | 245 | 212 |
| b. Peak Lateral Accel. - - | | ≤10G | 5 | 9 |
| c. Time above 100G - - - - | | 0.9 to 1.5 ms | 1.1 | 1.4 |
| 2. NECK BENDING TEST: | | | | |
| a. Pendulum Speed - - - - | | 21.5 to 25.5 fps | 21.5 | 21.5 |
| b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - - | | 20 to 24G | 23.5 | 24 |
| c. Peak Resultant Head Acceleration - - - - - | | 26G maximum | 23.5 | 25.5 |
| d. Pendulum Decel. ($t_2$-$t_1$) | | ≤3 ms | 0.6 | 1.4 |
| e. Pendulum Decel. ($t_3$-$t_2$) | | 25 to 30 ms | 29 | 28 |
| f. Pendulum Decel. ($t_4$-$t_3$) | | ≤ 10 ms | 8 | 7 |
| g. Pendulum Direction Reversal Time - - - - - | | ≥123 ms | N/A | N/A |
| h. Max. Head Rotation - - | | 63 to 73° | 68 | 69 |
| i. Chordal Displacement: Head Rotation Angle - - | | | | |
| 0° | Time | -2 to 2 ms | 0 | 0 |
| | Displ. | -.5 to .5 in. | 0 | 0 |
| 30° | Time | 25.6 to 34.4 ms | 33.2 | 30.9 |
| | Displ. | 2.1 to 3.1 in. | 2.4 | 3.1 |
| 60° | Time | 40.3 to 51.7 ms | 51.7 | 46.0 |
| | Displ. | 4.3 to 5.3 in. | 5.1 | 5.2 |
| Maximum (69°) | Time | 53.2 to 66.8 ms | 63.8 | 57.7 |
| | Displ. | 5.0 to 6.0 in. | 5.7 | 5.8 |

TABLE B-1- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY (CONT'D)

NHTSA ATD I.D. NO.: 464

| Sheet 2 of 3 | | | | |
|---|---|---|---|---|
| TEST PARAMETER | | | SPECIFICATION | Pre-Test Calibration | Post-Test Calibration |
| 2. NECK BENDING TEST Continued: | | | | | |
| i. Chordal Displacement: | | | | | |
| Head Rotation Angle - | | | | | |
| | 60° | Time | 67.0 to 83.0 ms | 76.2 | 70.2 |
| | | Disp. | 4.3 to 5.3 in. | 5.2 | 5.1 |
| | 30° | Time | 85.4 to 104.6 ms | 93.2 | 87.1 |
| | | Displ. | 2.1 to 3.1 in. | 2.6 | 2.3 |
| | 0° | Time | 101.0 to 123.0 ms | 104 | 101 |
| | | Displ. | -.5 to 0.5 in. | 0.4 | 0.5 |
| 3. ABDOMINAL COMPRESSION TEST: | | | | | |
| (Preload = 10 pounds) | | | | | |
| a. Force @ .5" - - - - - | | | 23 - 36 lbs. | 24 | 25 |
| b. Force @ .75" - - - - | | | 36 - 50 lbs. | 37 | 38 |
| c. Force @ 1.0" - - - - | | | 50 - 63 lbs. | 51 | 52 |
| d. Force @ 1.3" - - - - | | | 73 - 88 lbs. | 73 | 81 |
| 4. LUMBAR FLEXION TEST: | | | | | |
| a. Force @ 20° - - - - - | | | 22 to 34 lbs. | 29 | 31 |
| b. Force @ 30° - - - - - | | | 34 to 46 lbs. | 38 | 40 |
| d. Force @ 40° - - - - - | | | 46 to 58 lbs. | 50 | 55 |
| e. Return Angle - - - - | | | 12° maximum | 9 | 8 |
| 5. CHEST IMPACT TESTS: | | | | | |
| a. High Speed | | | | | |
| (1) Probe Speed - - - | | | 21.78-22.22 fps | 22.18 | 22.07 |
| (2) Peak Deflection - | | | 1.7" maximum | 1.67 | 1.70 |
| (3) Peak Resistive Force - - - - - - | | | 2250 lbs. maximum | 1906 | 1947 |
| (4) Internal Hysteresis - - - | | | 50 to 70% | 51 | 65 |

TABLE B-1- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY (CONT'D)

NHTSA ATD I.D. NO.: 464

| Sheet 3 of 3<br>TEST PARAMETER | SPECIFICATION | Pre-Test Calibration | Post-Test Calibration |
|---|---|---|---|
| 5. CHEST IMPACT TESTS: Continued: | | | |
| b. Low Speed | | | |
| (1) Probe Speed - - - | 13.86-14.14 fps | 13.89 | 13.88 |
| (2) Peak Deflection - | 1.1" maximum | .96 | 1.08 |
| (3) Peak Resistive Force - - - - - - | 1450 lbs. maximum | 1128 | 1164 |
| (4) Internal Hysteresis - - - | 50 to 70% | 51 | 60 |
| 6. KNEE IMPACT TESTS: | | | |
| a. Right Side | | | |
| (1) Probe Speed - - - | 6.76 to 7.04 fps | 6.98 | 6.93 |
| (2) Maximum Force - - | 1850 to 2500 lbs. | 1870 | 2330 |
| (3) Time Above 1000#- | 1.7 ms minimum | 1.9 | 1.7 |
| b. Left Side | | | |
| (1) Probe Speed - - - | 6.76 to 7.04 fps | 7.03 | 7.02 |
| (2) Maximum Force - - | 1850 to 2500 lbs. | 1955 | 2405 |
| (3) Time Above 1000#- | 1.7 ms, minimum | 1.8 | 1.8 |

TABLE B-2- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY

NHTSA ATD I.D. NO.: 465

LABORATORY TECHNICIAN: M. Poindexter

| Sheet 1 of 3 | | | Pre-Test Calibration | Post-Test Calibration |
|---|---|---|---|---|
| Date of ATD Calibration - - - - - - - - - - - - | | | 07/08-07/09/83 | 08/15-08/17/83 |
| Calibration Sequential Number For Dummy - - - | | | 3 | 4 |
| Temperature in Lab. (Spec. = 66 to 78° F) - - | | | 72 - 78°F | 72 - 78°F |
| Relative Humidity in Lab. (Spec. = 10 to 70%) | | | 38 - 56% | 52 - 56% |
| TEST PARAMETER | | SPECIFICATION | | |
| 1. HEAD DROP TEST: | | | | |
| a. Peak Resultant Accel. - | | 210 to 260G | 250 | 241 |
| b. Peak Lateral Accel. - - | | ≤10G | 5.2 | 7.5 |
| c. Time above 100G - - - - | | 0.9 to 1.5 ms | 0.9 | 1.3 |
| 2. NECK BENDING TEST: | | | | |
| a. Pendulum Speed - - - - | | 21.5 to 25.5 fps | 21.5 | 21.5 |
| b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - - | | 20 to 24G | 24 | 24 |
| c. Peak Resultant Head Acceleration - - - - - | | 26G maximum | 26 | 26 |
| d. Pendulum Decel. ($t_2$-$t_1$) | | ≤3 ms | 1.4 | 0.4 |
| e. Pendulum Decel. ($t_3$-$t_2$) | | 25 to 30 ms | 26.6 | 28.4 |
| f. Pendulum Decel. ($t_4$-$t_3$) | | ≤ 10 ms | 10 | 7.2 |
| g. Pendulum Direction Reversal Time - - - - - | | ≥123 ms | N/A | N/A |
| h. Max. Head Rotation - - | | 63 to 73° | 66 | 64 |
| i. Chordal Displacement: Head Rotation Angle - - | | | | |
| 0° | Time | -2 to 2 ms | 0 | 0 |
| | Displ. | -.5 to .5 in. | 0 | 0 |
| 30° | Time | 25.6 to 34.4 ms | 26.6 | 31.8 |
| | Displ. | 2.1 to 3.1 in. | 2.8 | 3.0 |
| 60° | Time | 40.3 to 51.7 ms | 42.8 | 47.4 |
| | Displ. | 4.3 to 5.3 in. | 5.0 | 4.9 |
| Maximum (64 °) | Time | 53.2 to 66.8 ms | 55.2 | 53.8 |
| | Displ. | 5.0 to 6.0 in. | 5.5 | 5.3 |

TABLE B-2- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY (CONT'D)

NHTSA ATD I.D. NO.: 465

| Sheet 2 of 3 | | | Pre-Test Calibration | Post-Test Calibration |
|---|---|---|---|---|
| TEST PARAMETER | | SPECIFICATION | | |
| 2. NECK BENDING TEST Continued: | | | | |
| i. Chordal Displacement: | | | | |
| Head Rotation Angle - | | | | |
| 60° | Time | 67.0 to 83.0 ms | 67 | 68.2 |
| | Disp. | 4.3 to 5.3 in. | 4.9 | 4.9 |
| 30° | Time | 85.4 to 104.6 ms | 86 | 85.8 |
| | Displ. | 2.1 to 3.1 in. | 2.2 | 2.2 |
| 0° | Time | 101.0 to 123.0 ms | 101 | 101 |
| | Displ. | -.5 to 0.5 in. | 0.3 | -0.5 |
| 3. ABDOMINAL COMPRESSION TEST: | | | | |
| (Preload = 10 pounds) | | | | |
| a. Force @ .5" - - - - - | | 23 - 36 lbs. | 26 | 24 |
| b. Force @ .75" - - - - | | 36 - 50 lbs. | 41 | 36 |
| c. Force @ 1.0" - - - - | | 50 - 63 lbs. | 57 | 50 |
| d. Force @ 1.3" - - - - | | 73 - 88 lbs. | 88 | 73 |
| 4. LUMBAR FLEXION TEST: | | | | |
| a. Force @ 20° - - - - - | | 22 to 34 lbs. | 32 | 27 |
| b. Force @ 30° - - - - - | | 34 to 46 lbs. | 40 | 38 |
| d. Force @ 40° - - - - - | | 46 to 58 lbs. | 52 | 53 |
| e. Return Angle - - - - | | 12° maximum | 12 | 11 |
| 5. CHEST IMPACT TESTS: | | | | |
| a. High Speed | | | | |
| (1) Probe Speed - - - | | 21.78-22.22 fps | 21.9 | 21.94 |
| (2) Peak Deflection - | | 1.7" maximum | 1.57 | 1.70 |
| (3) Peak Resistive Force - - - - - - | | 2250 lbs. maximum | 2215 | 1802 |
| (4) Internal Hysteresis - - - | | 50 to 70% | 59 | 58 |

TABLE B-2- PART 572 ATD CERTIFICATION TEST DATA, SUMMARY (CONT'D)

NHTSA ATD I.D. NO.: 465

| Sheet 3 of 3<br>TEST PARAMETER | SPECIFICATION | Pre-Test Calibration | Post-Test Calibration |
|---|---|---|---|
| 5. CHEST IMPACT TESTS: Continued: | | | |
| b. Low Speed | | | |
| (1) Probe Speed - - - | 13.86-14.14 fps | 13.87 | 13.83 |
| (2) Peak Deflection - | 1.1" maximum | 1.0 | .89 |
| (3) Peak Resistive Force - - - - - - | 1450 lbs. maximum | 1153 | 1148 |
| (4) Internal Hysteresis - - - | 50 to 70% | 57 | 53 |
| 6. KNEE IMPACT TESTS: | | | |
| a. Right Side | | | |
| (1) Probe Speed - - - | 6.76 to 7.04 fps | 6.78 | 7.02 |
| (2) Maximum Force - - | 1850 to 2500 lbs. | 2390 | 2410 |
| (3) Time Above 1000#- | 1.7 ms minimum | 2.0 | 1.9 |
| b. Left Side | | | |
| (1) Probe Speed - - - | 6.76 to 7.04 fps | 6.76 | 7.02 |
| (2) Maximum Force - - | 1850 to 2500 lbs. | 2070 | 2430 |
| (3) Time Above 1000#- | 1.7 ms. minimum | 1.8 | 1.7 |

# APPENDIX
# C

# TEST DATA PLOTS

OCCUPANT RESPONSE COMPARISON 08/11/83
TO FMVSS REQUIREMENTS

HIC

| VEHICLE | OCCUPANT | HIC | T1 | T2 | T2-T1 | *COMP. MARG. |
|---|---|---|---|---|---|---|
| 1983 FORD LTD | DRIVER | 608.65 | 72.12 | 113.50 | 41.38 | .61 |
| 1983 FORD LTD | PASSENGER | 957.38 | 73.87 | 109.12 | 35.25 | .96 |

* VALUES GREATER THAN 1 REPRESENT NON-COMPLIANCE

OCCUPANT RESPONSE COMPARISON 08/11/83
TO FMVSS REQUIREMENTS

CHEST 3 MSEC CLIPPED PEAK

| VEHICLE | | REQUIREMENT | RESPONSE | * COMP. MARG. |
|---|---|---|---|---|
| 1983 FORD LTD | DRIVER | 60.00 | 69.10 | 1.22 |
| 1983 FORD LTD | PASSENGER | 60.00 | 54.10 | .91 |

* ABS(VALUES) GREATER THAN 1 REPRESENT NON-COMPLIANCE

# PRINTOUT OF HEADER DATA FOR DIGITAL TAPE

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210207836-ILF3.300LITERS AR4D3563106.6196.873.048.4SOTHP
35.2  0  012FDAM8999 61.025.826.227.126.825.526.400.027.1
3LCB 0.0 0 0.0   0R9 0.0 0 0
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502AC011HED 2800 1600   .72860 360   125G'SY 0.0GOOD
503AC011HED 6000 1600   .72860 360   125G'SZ 0.0GOOD
X04AC011CST 6000 1600   .72860 360   125G'SX35.2GOOD
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516LC012RFM 9999 1000999.92860 360   125LBSO    GOOD
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525LC012LBO 9999  100999.92860 360   125LBSO    GOOD
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528DT012SHB 9999  100999.92860 360   125INCO    GOOD
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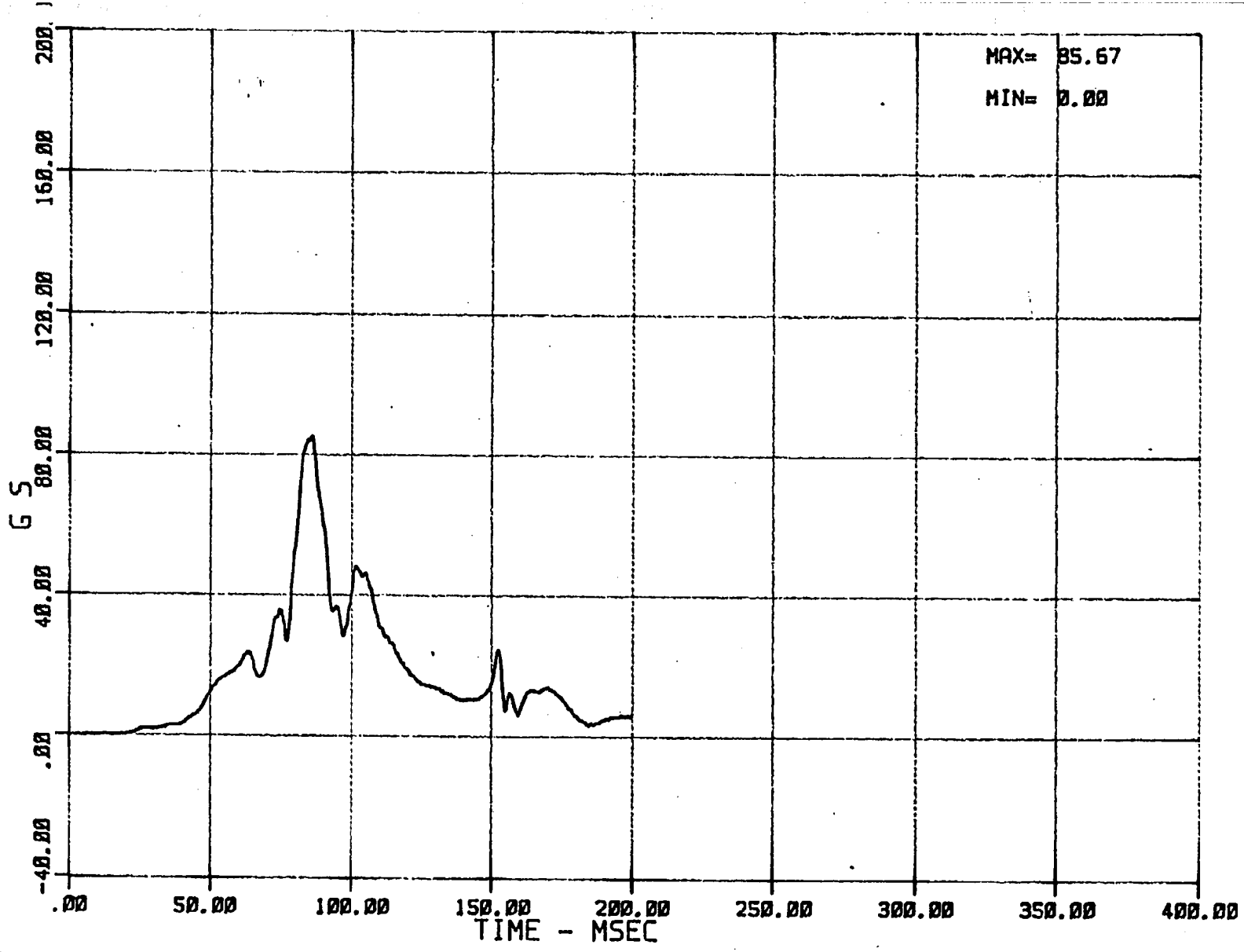
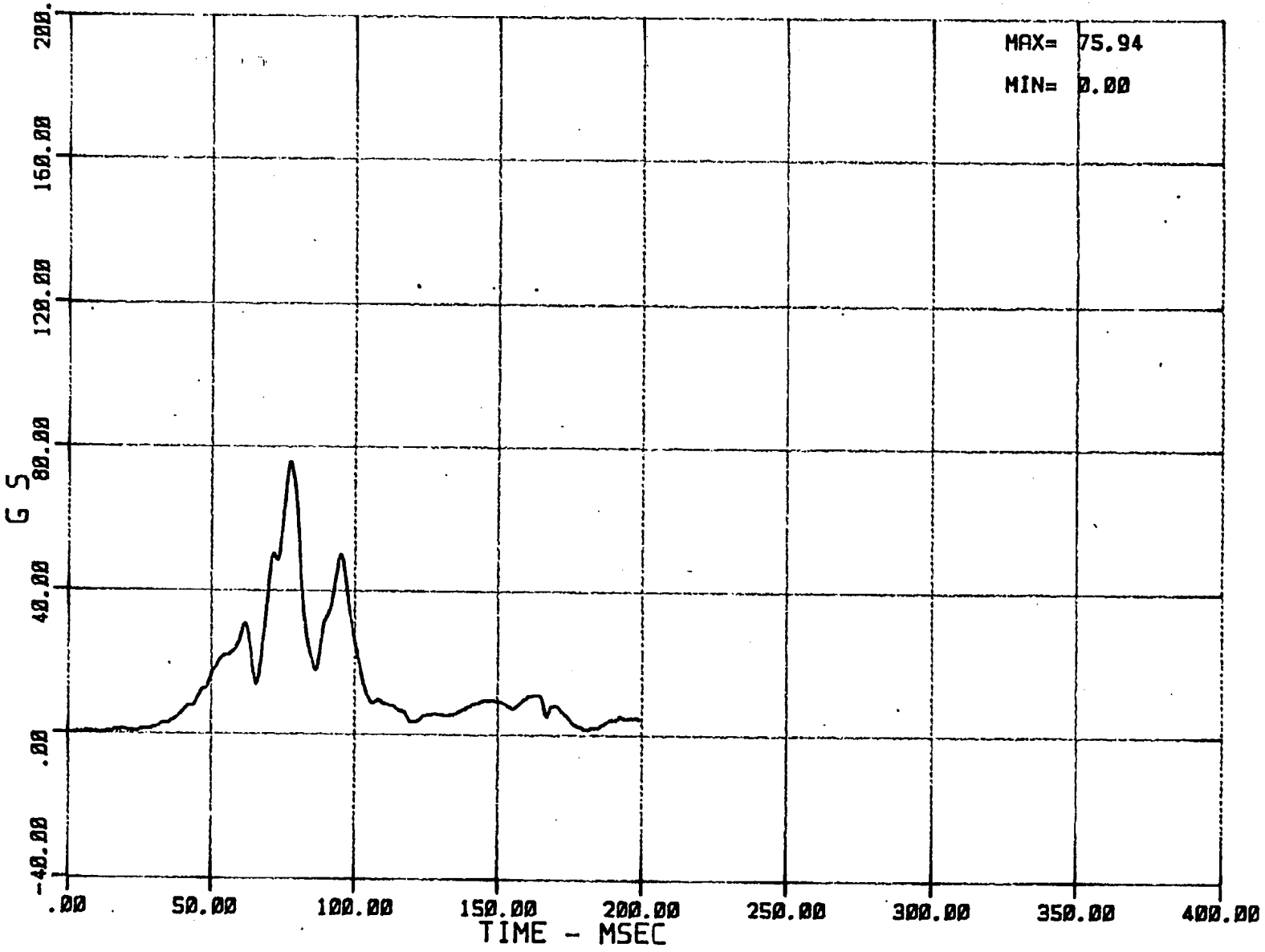


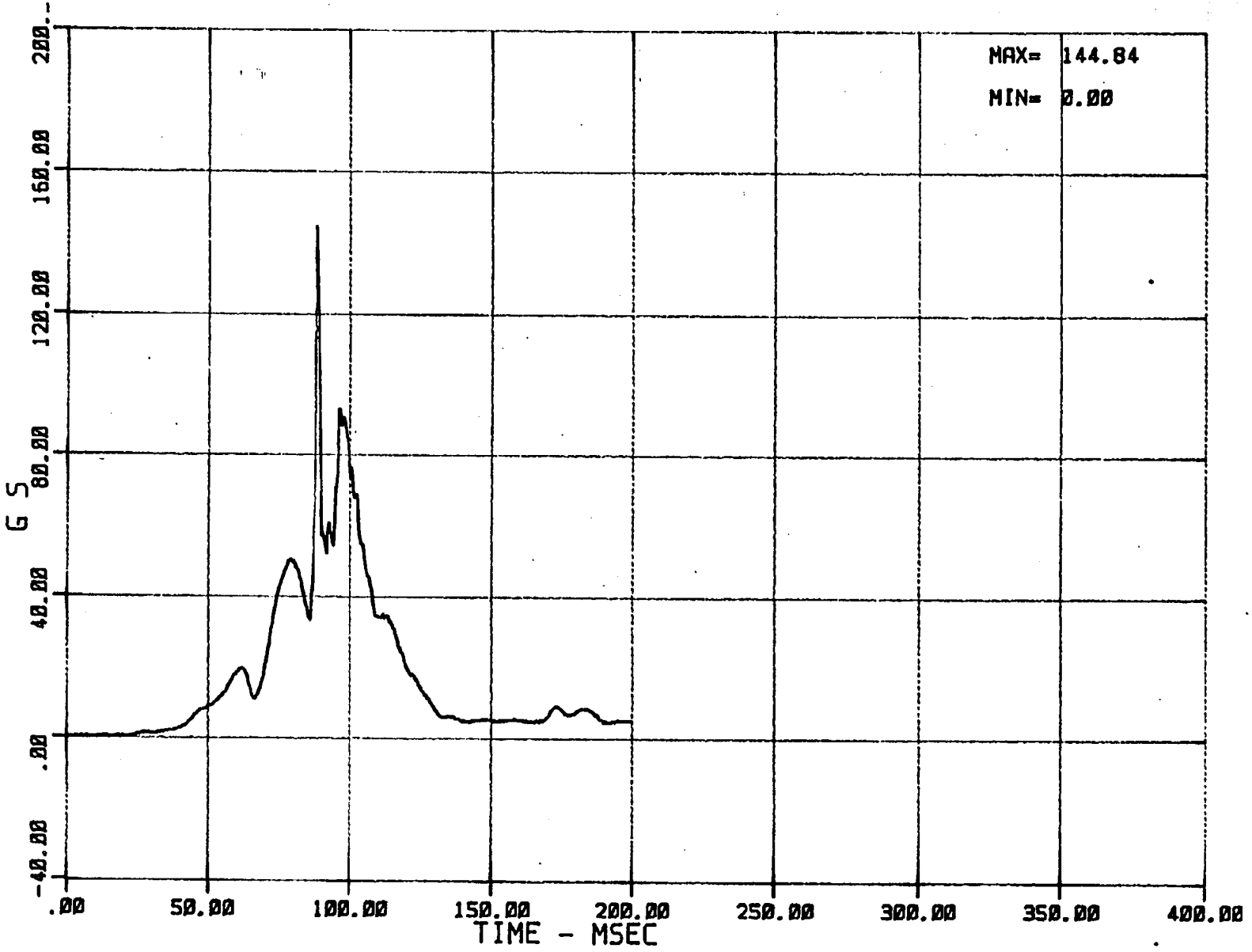

DRIVERS HEAD RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83



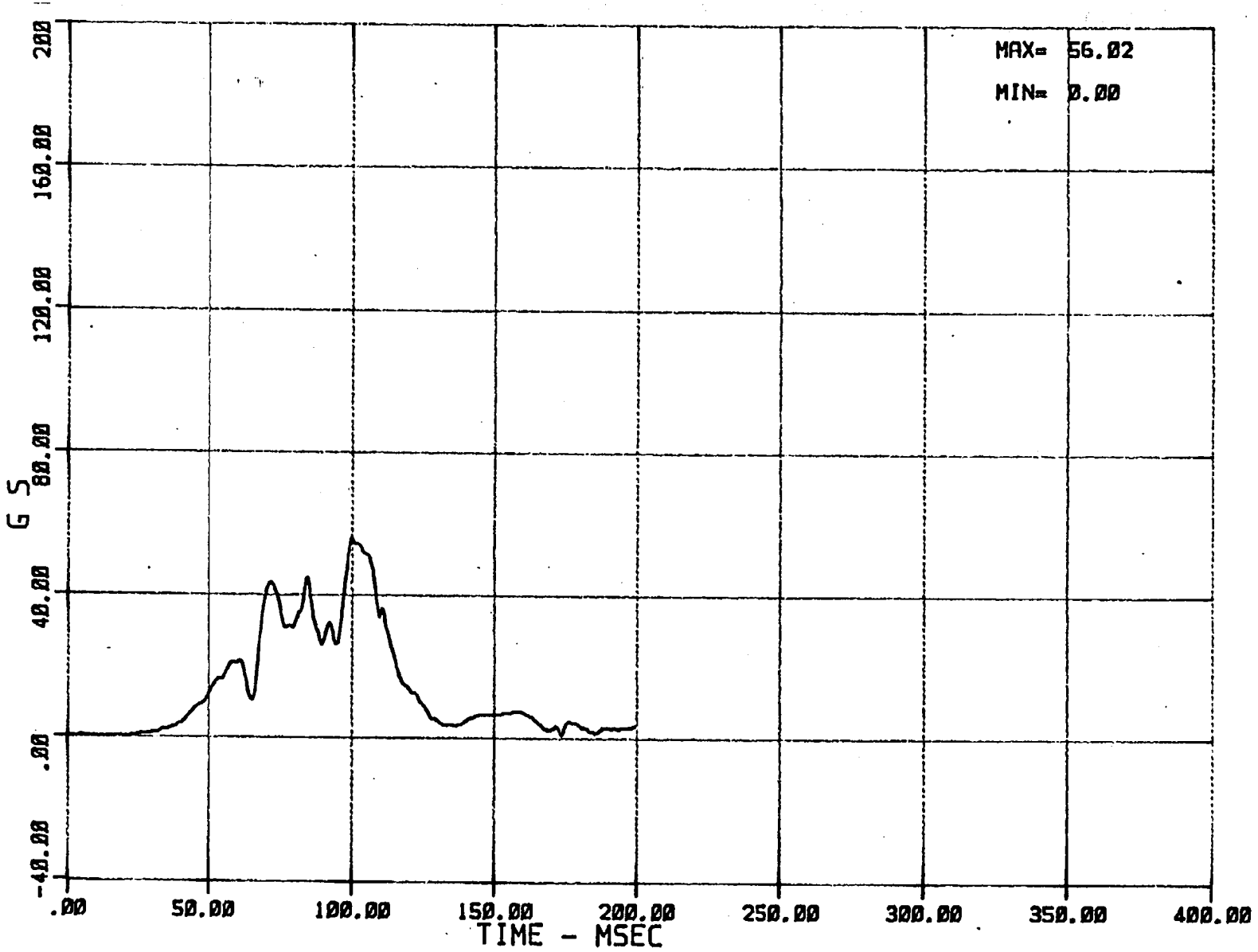

DRIVERS CHEST RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83



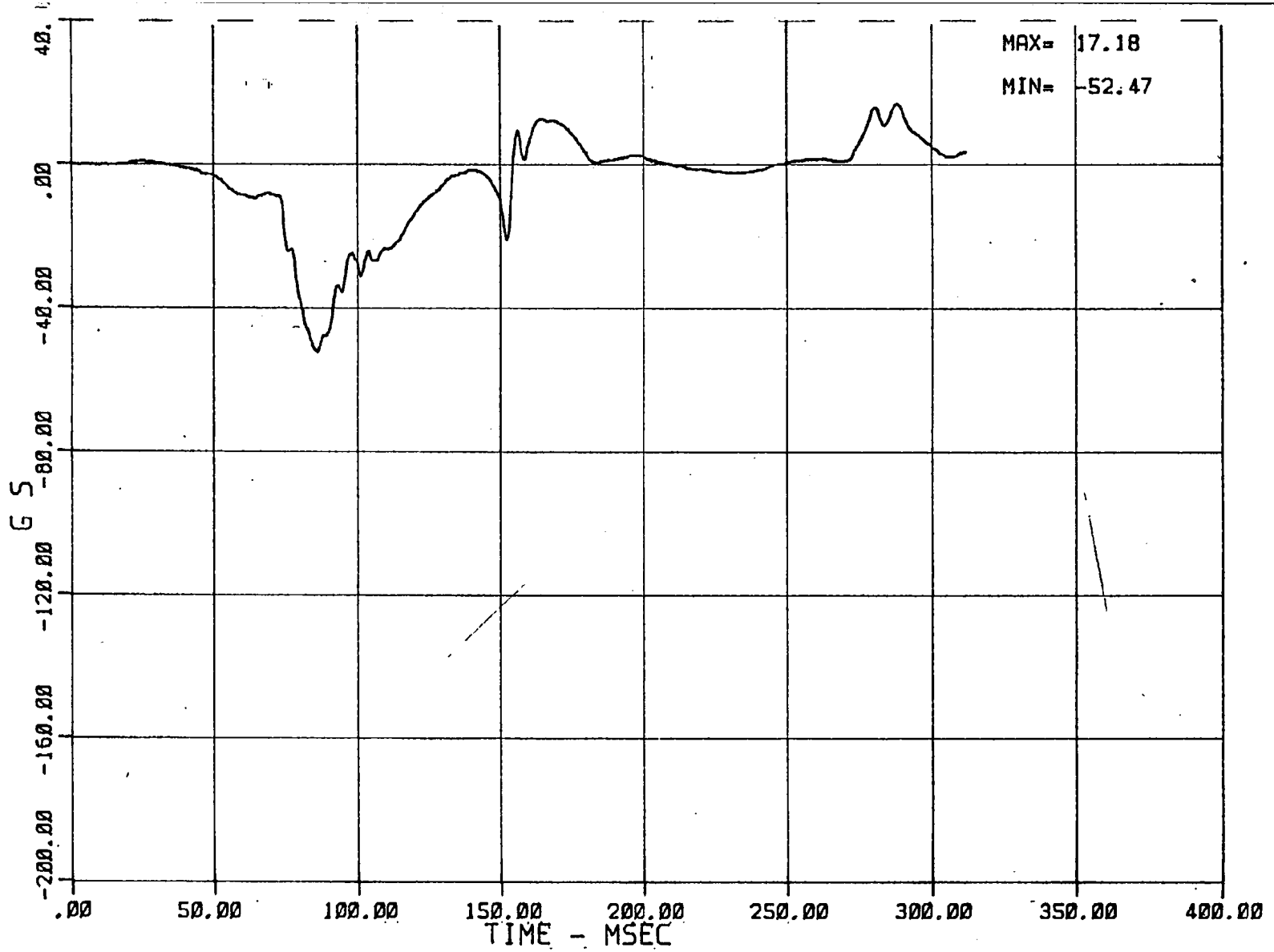

PASSENGERS HEAD RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83



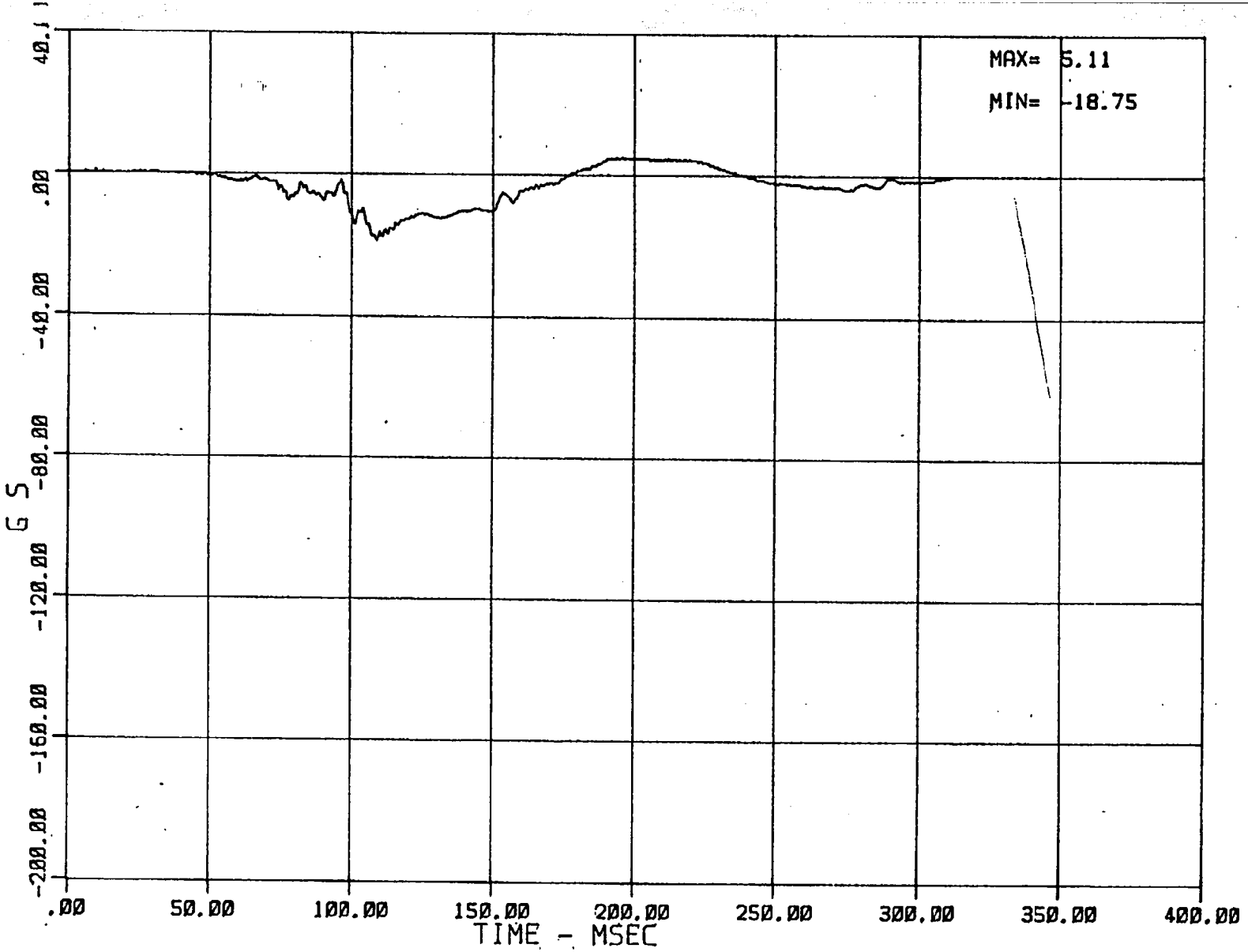

PASSENGERS CHEST RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83




Ø1 AC Ø1 1 HED X (DRIVERS HEAD ACCEL. -- X AXIS)

MSE N02103 1983 FORD LTD 08/11/83

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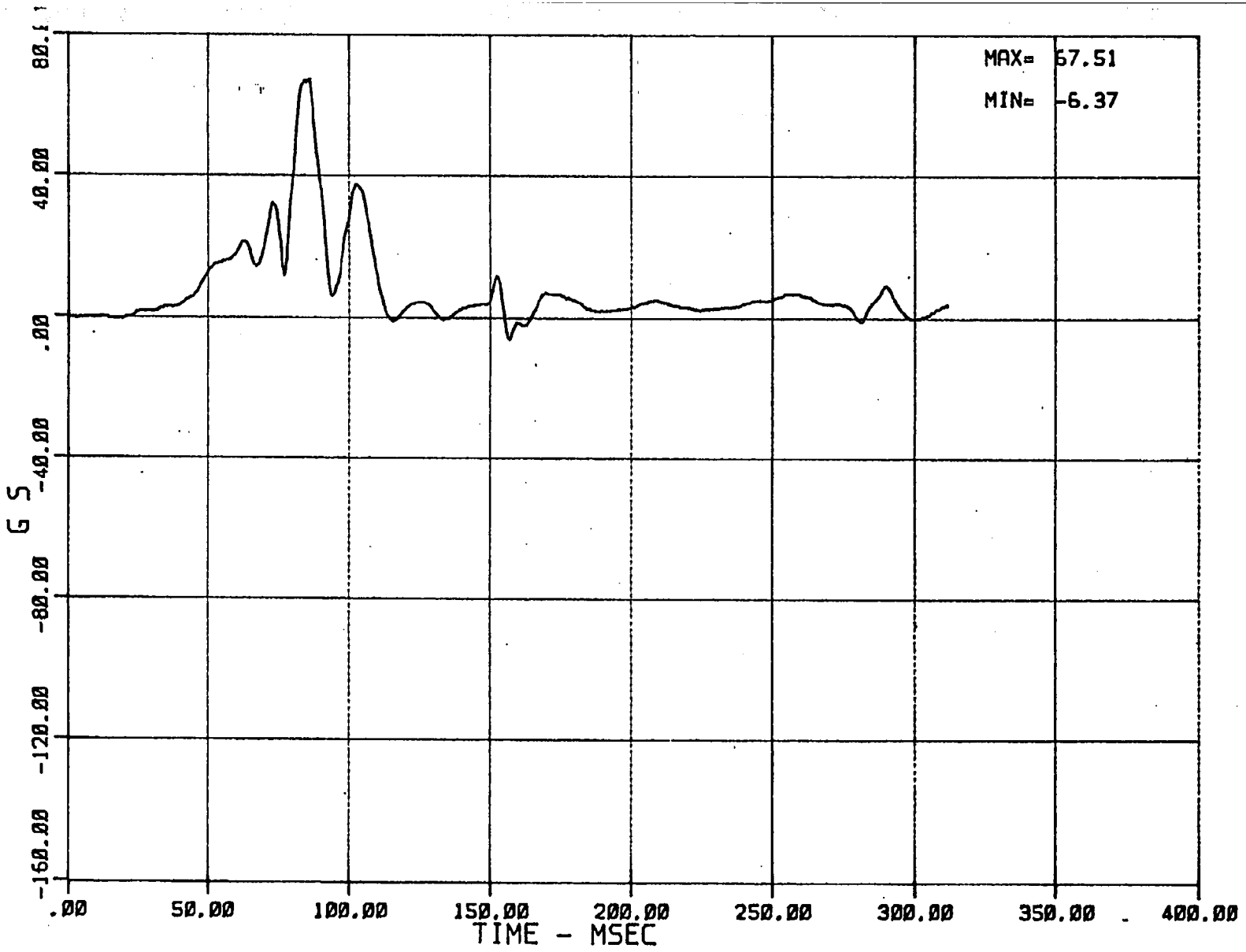
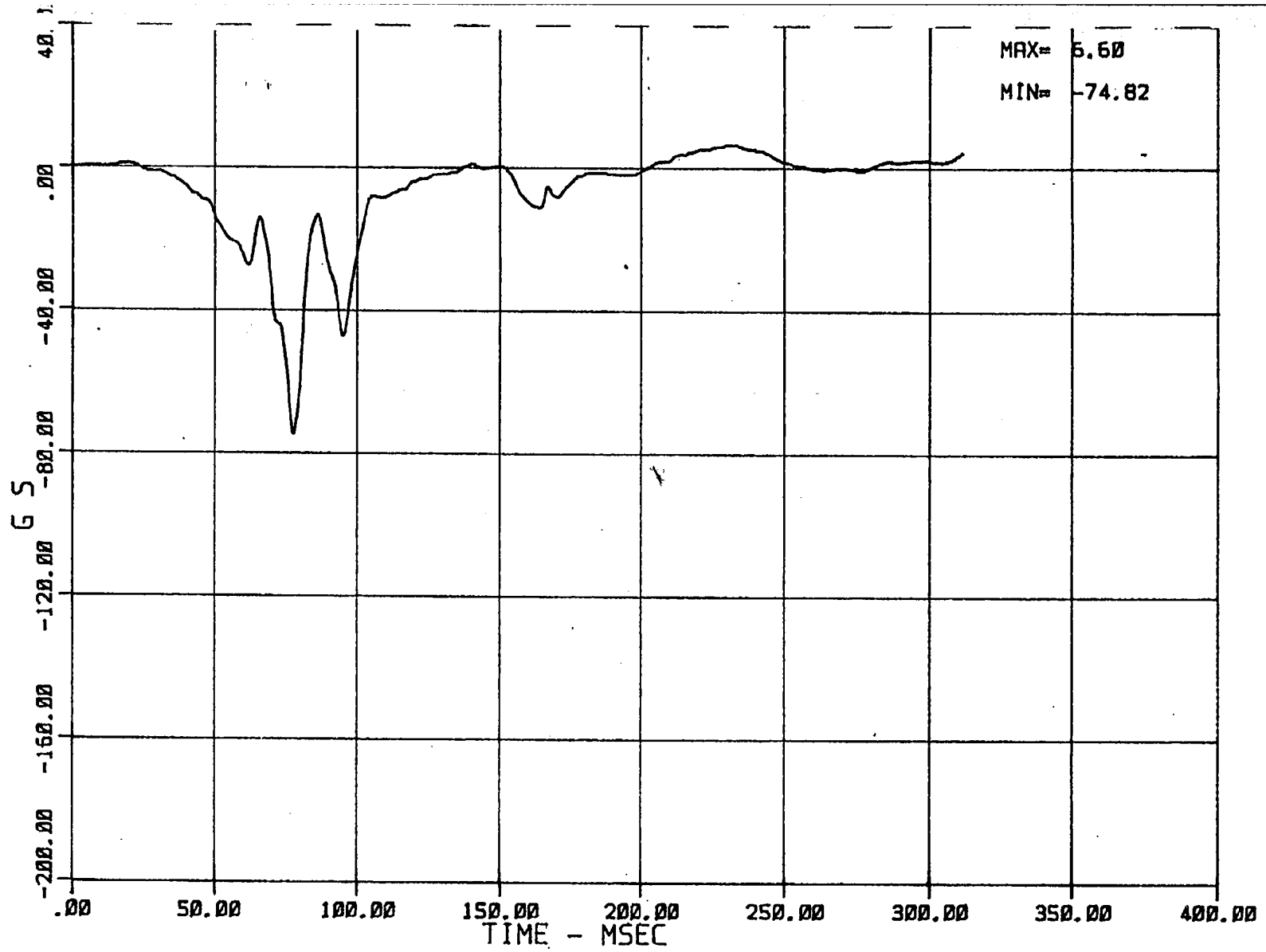
MSE NØ2103 1983 FORD LTD

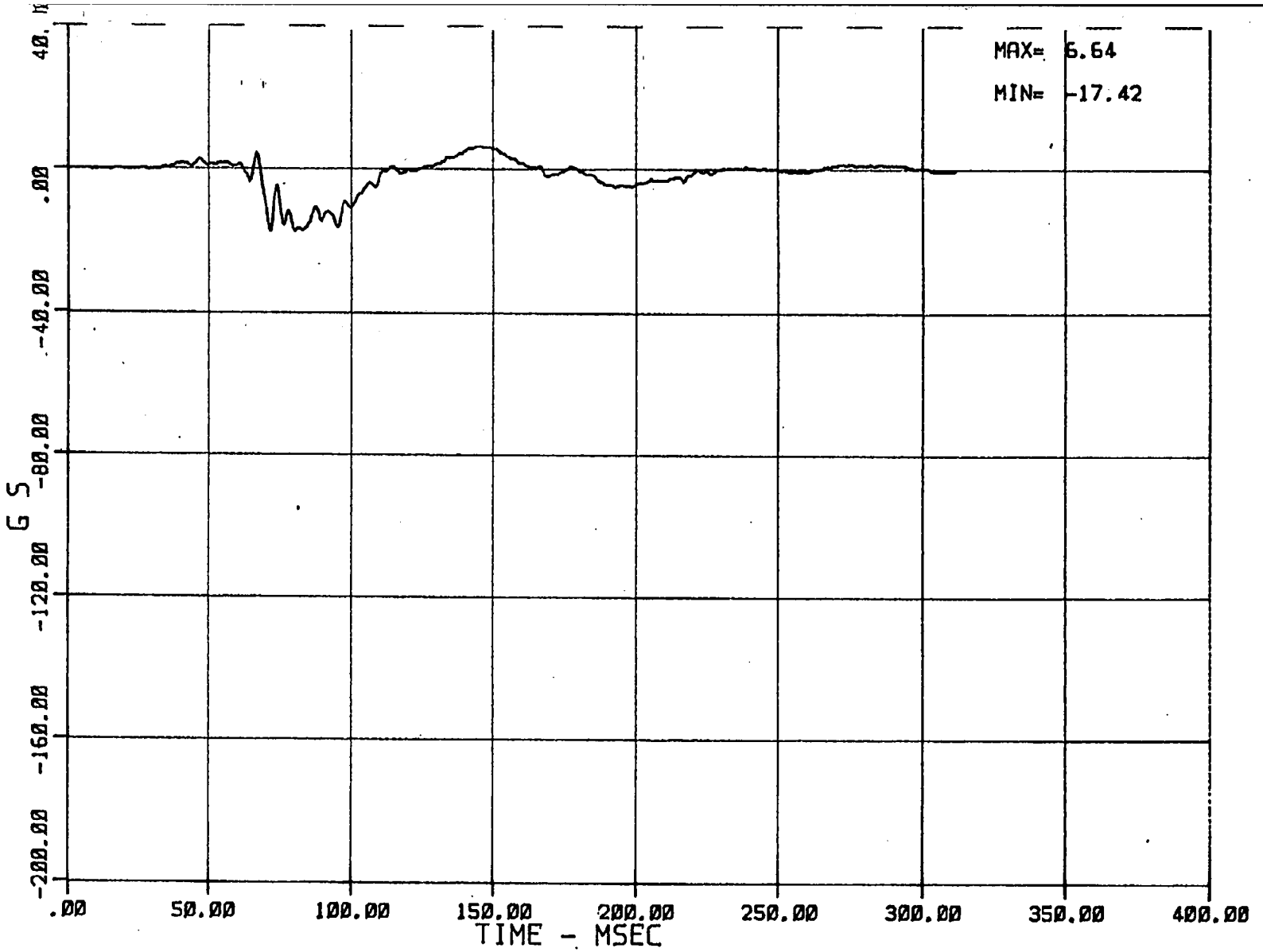
Ø8/11/83




03 AC 01 1 HED Z (DRIVERS HEAD ACCEL. - Z AXIS)
MSE N02103 1983 FORD LTD 08/11/83




Ø4 AC Ø1 1 CST X (DRIVERS CHEST ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83




05 AC 01 1 CST Y (DRIVERS CHEST ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83

DOT#600

OCCUPANT RESPONSE COMPARISON 08/11/83
TO FMVSS REQUIREMENTS

HIC

| VEHICLE | OCCUPANT | HIC | T1 | T2 | T2-T1 | *COMP. MARG. |
|---|---|---|---|---|---|---|
| 1983 FORD LTD | DRIVER | 608.65 | 72.12 | 113.50 | 41.38 | .61 |
| 1983 FORD LTD | PASSENGER | 957.38 | 73.87 | 109.12 | 35.25 | .96 |

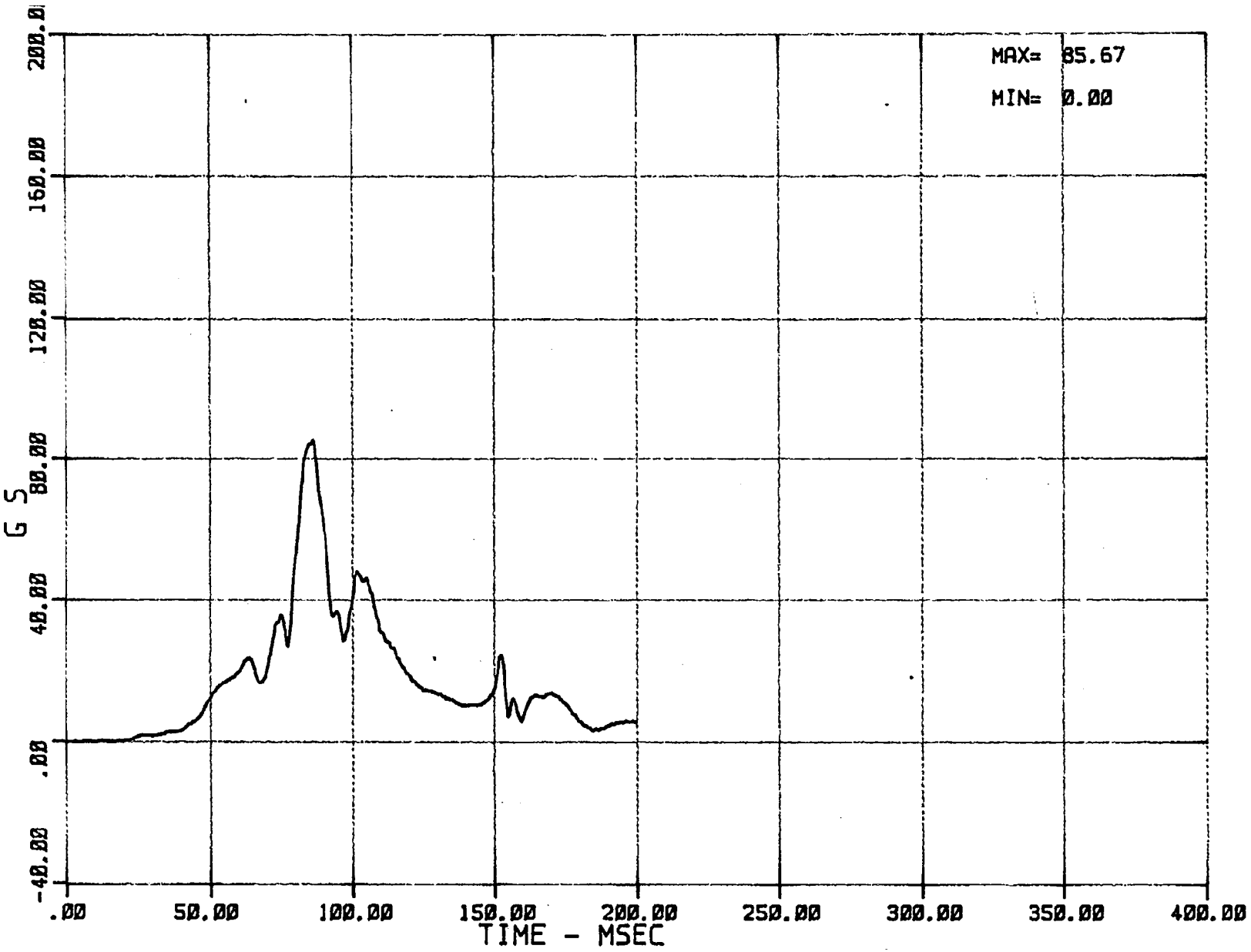
* VALUES GREATER THAN 1 REPRESENT NON-COMPLIANCE

OCCUPANT RESPONSE COMPARISON 08/11/83
TO FMVSS REQUIREMENTS

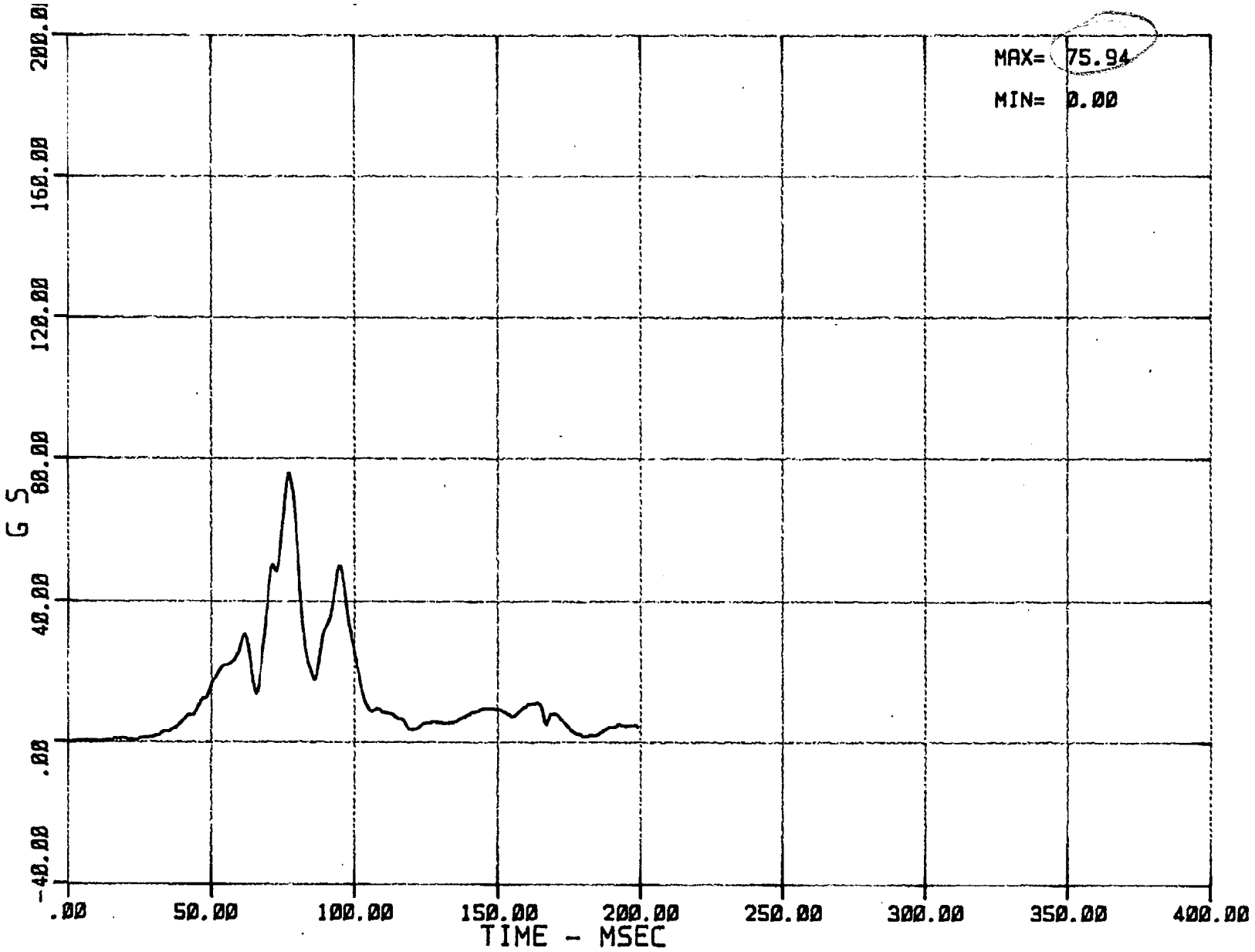
TEST: N02103

| CHAN. | VEHICLE | | REQUIREMENT | RESPONSE | * COMP. MARG. |
|---|---|---|---|---|---|
| RES | 1983 FORD LTD | DRIVER | 60.00 | 73.44 | 1.22 |
| RES | 1983 FORD LTD | PASSENGER | 60.00 | 54.85 | .91 |

* ABS(VALUES) GREATER THAN 1 REPRESENT NON-COMPLIANCE

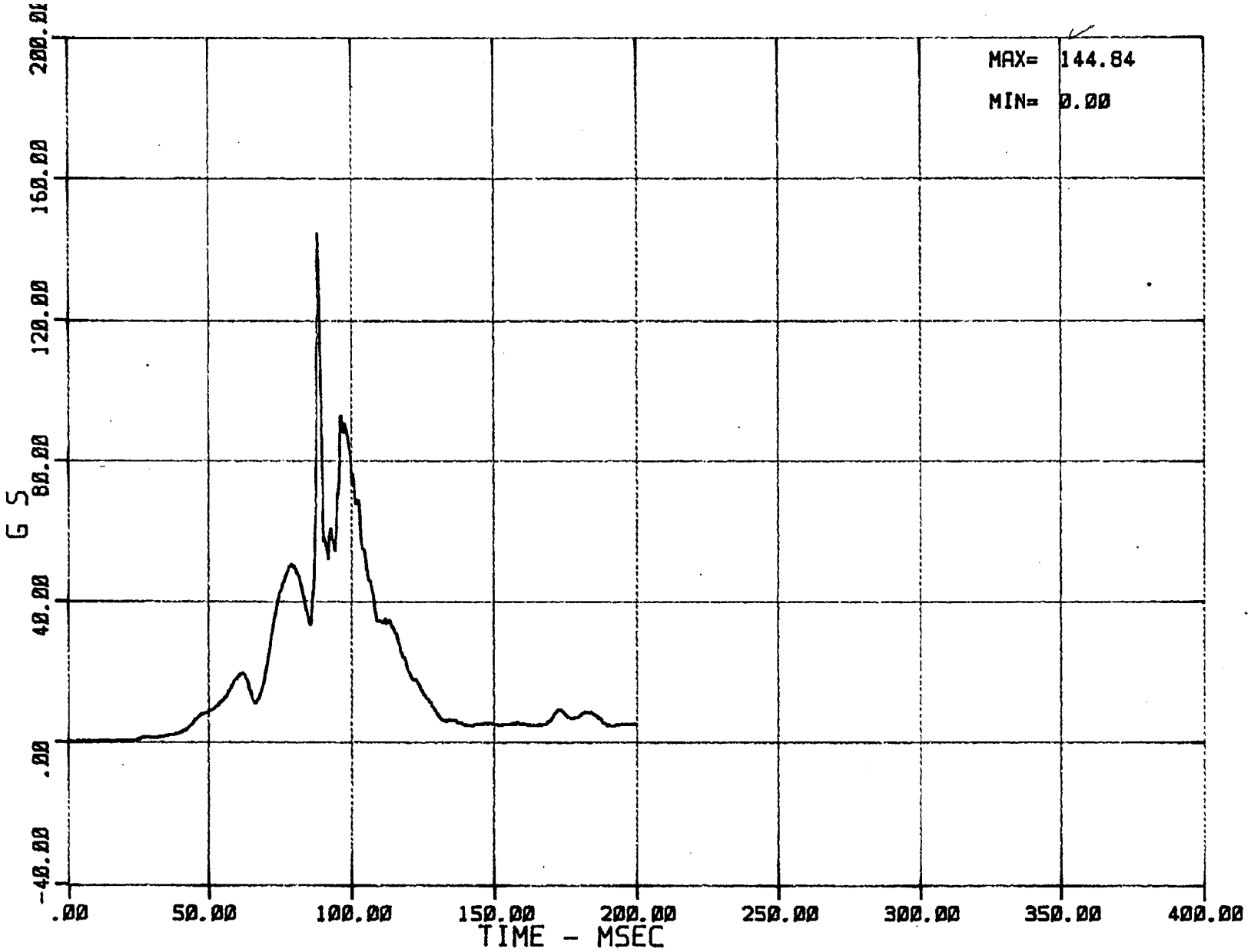



DRIVERS HEAD RESULTANT ACCEL.
MSE N02103 1983 FORD LTD 08/11/83

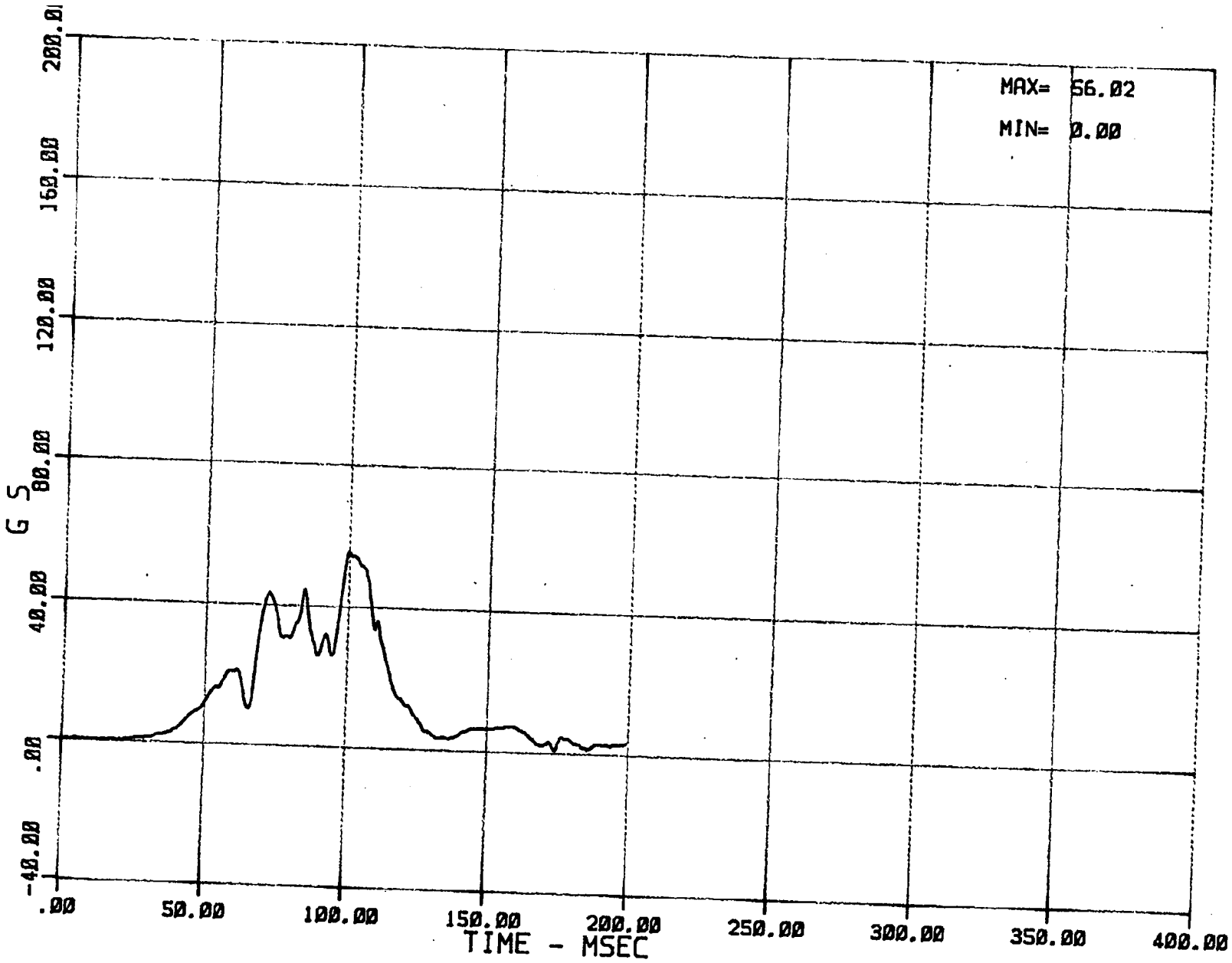



DRIVERS CHEST RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83

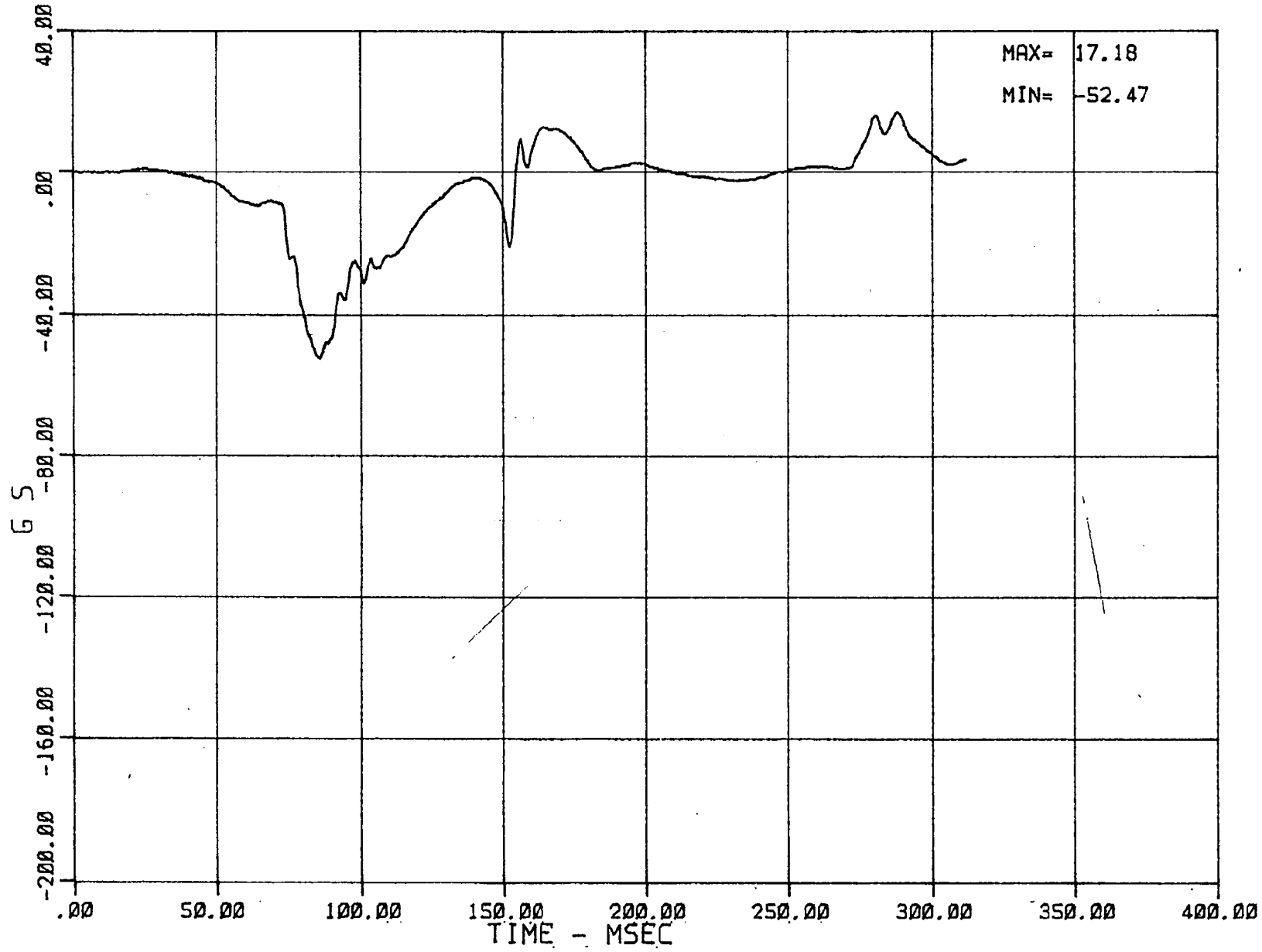



PASSENGERS HEAD RESULTANT ACCEL.
MSE N02103 1983 FORD LTD 08/11/83

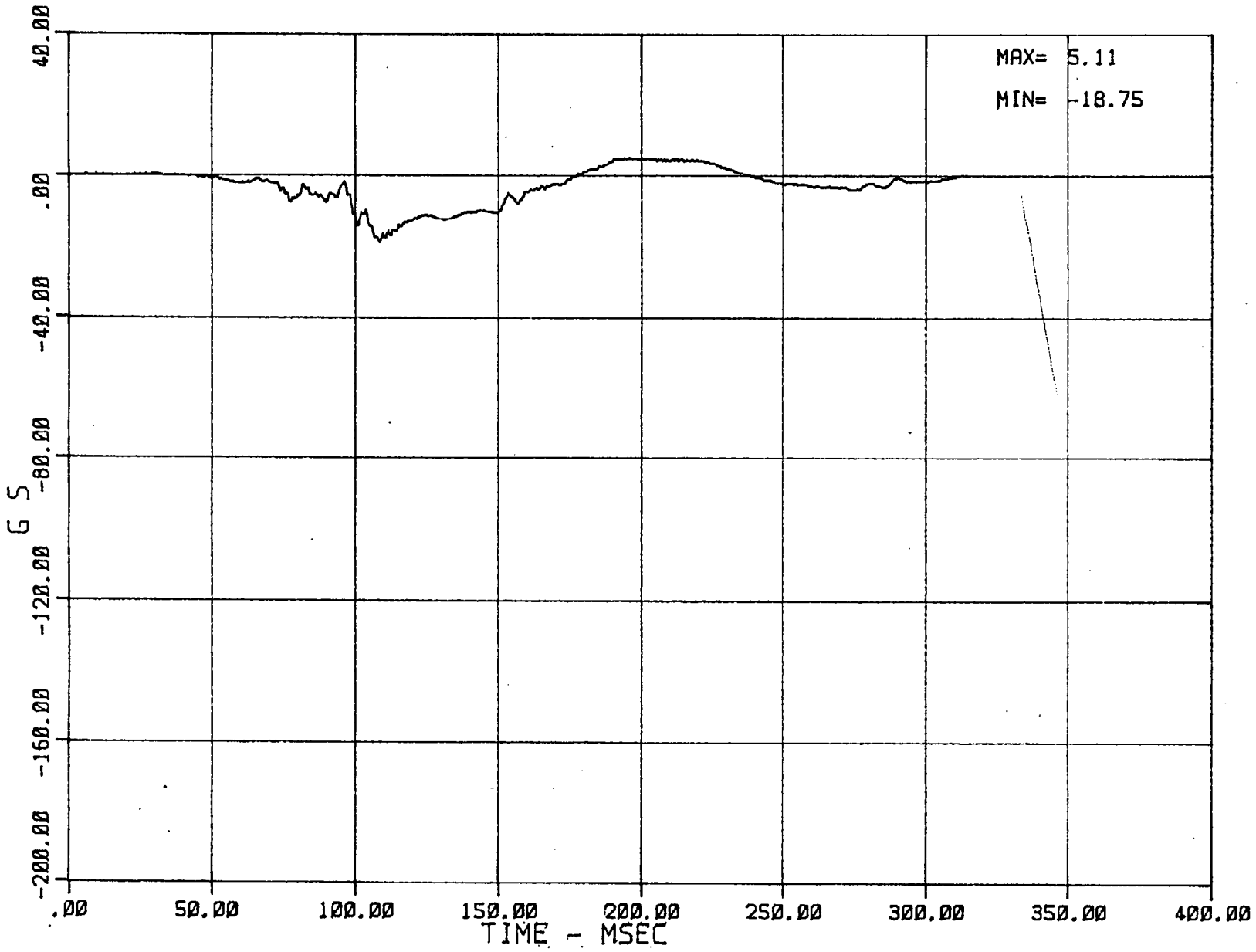



PASSENGERS CHEST RESULTANT ACCEL.
MSE N02103 1983 FORD LTD

08/11/83

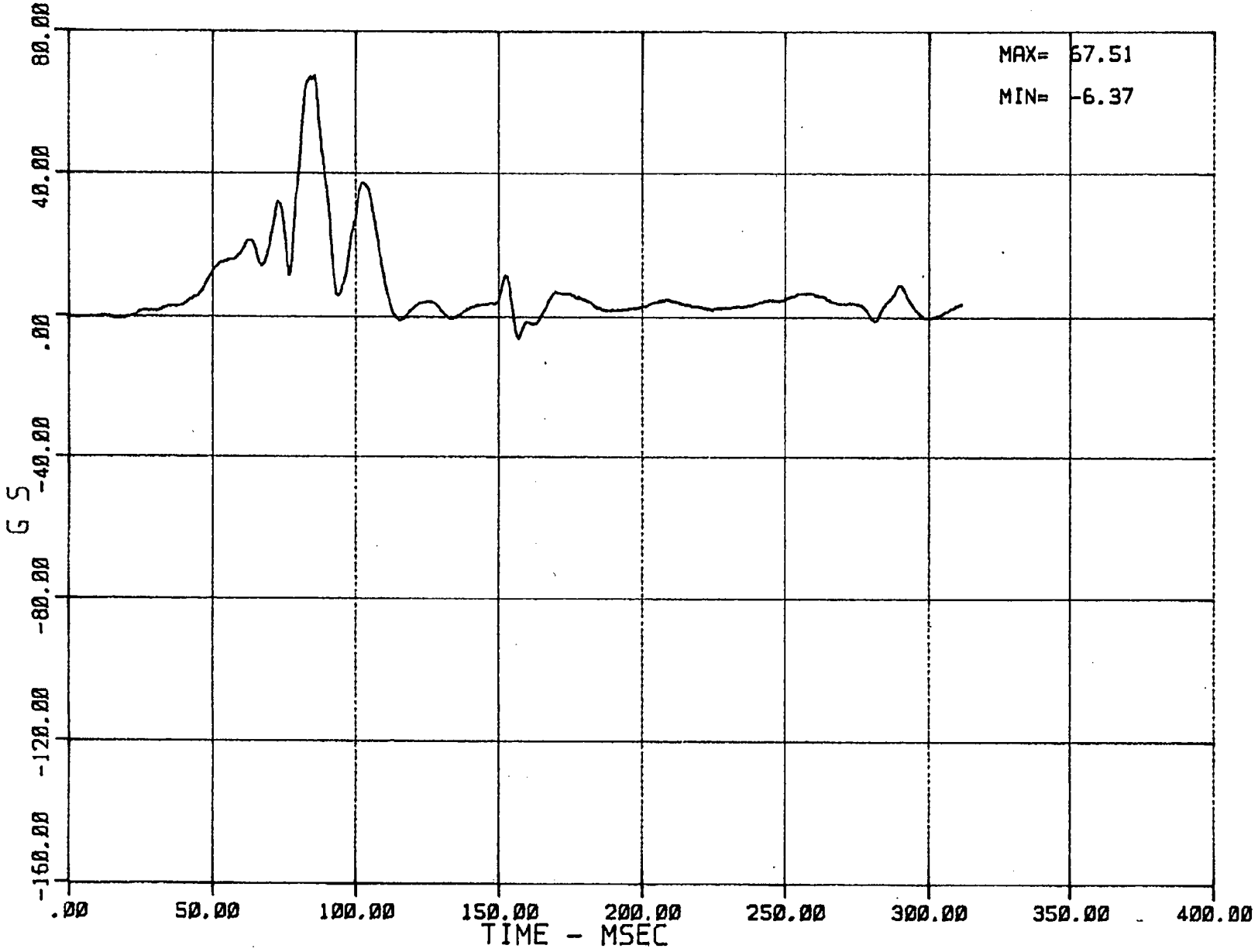



01 AC 01 1 HED X (DRIVERS HEAD ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83



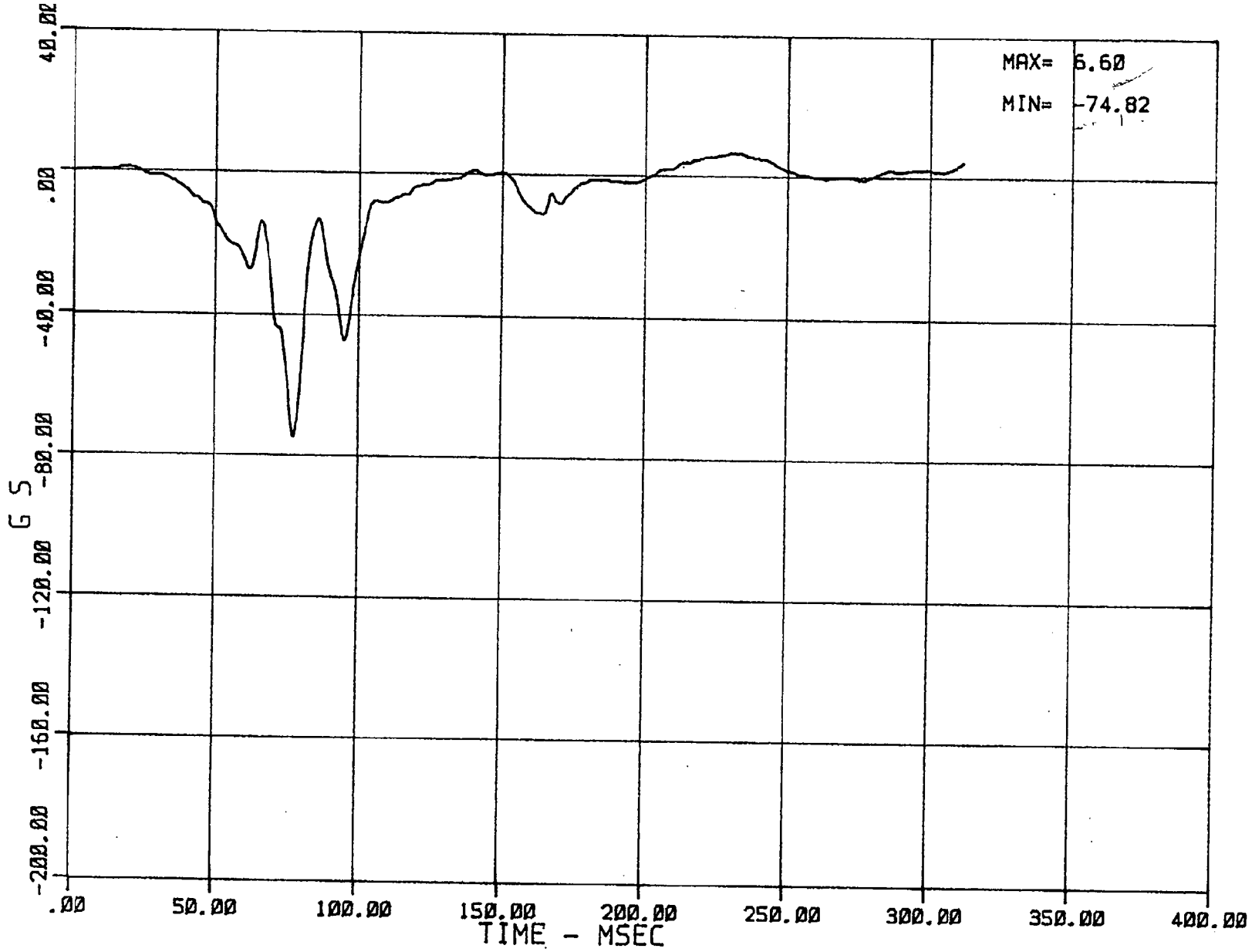

Ø2 AC Ø1 I HED Y (DRIVERS HEAD ACCEL. -- Y AXIS)

MSE N02103 1983 FORD LTD 08/11/83



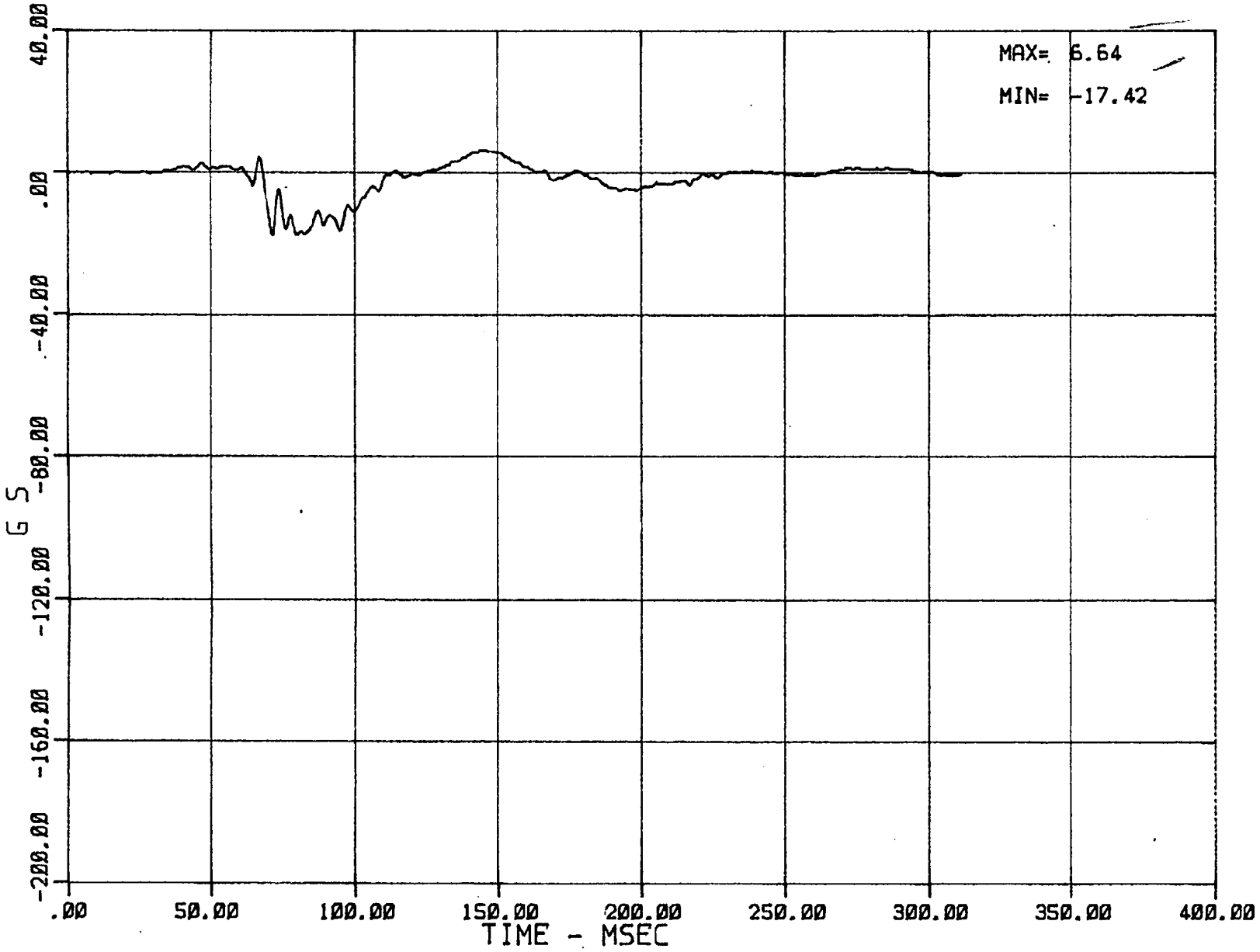

Ø3 AC Ø1 1 HED Z (DRIVERS HEAD ACCEL. - Z AXIS)

MSE N02103 1983 FORD LTD 08/11/83

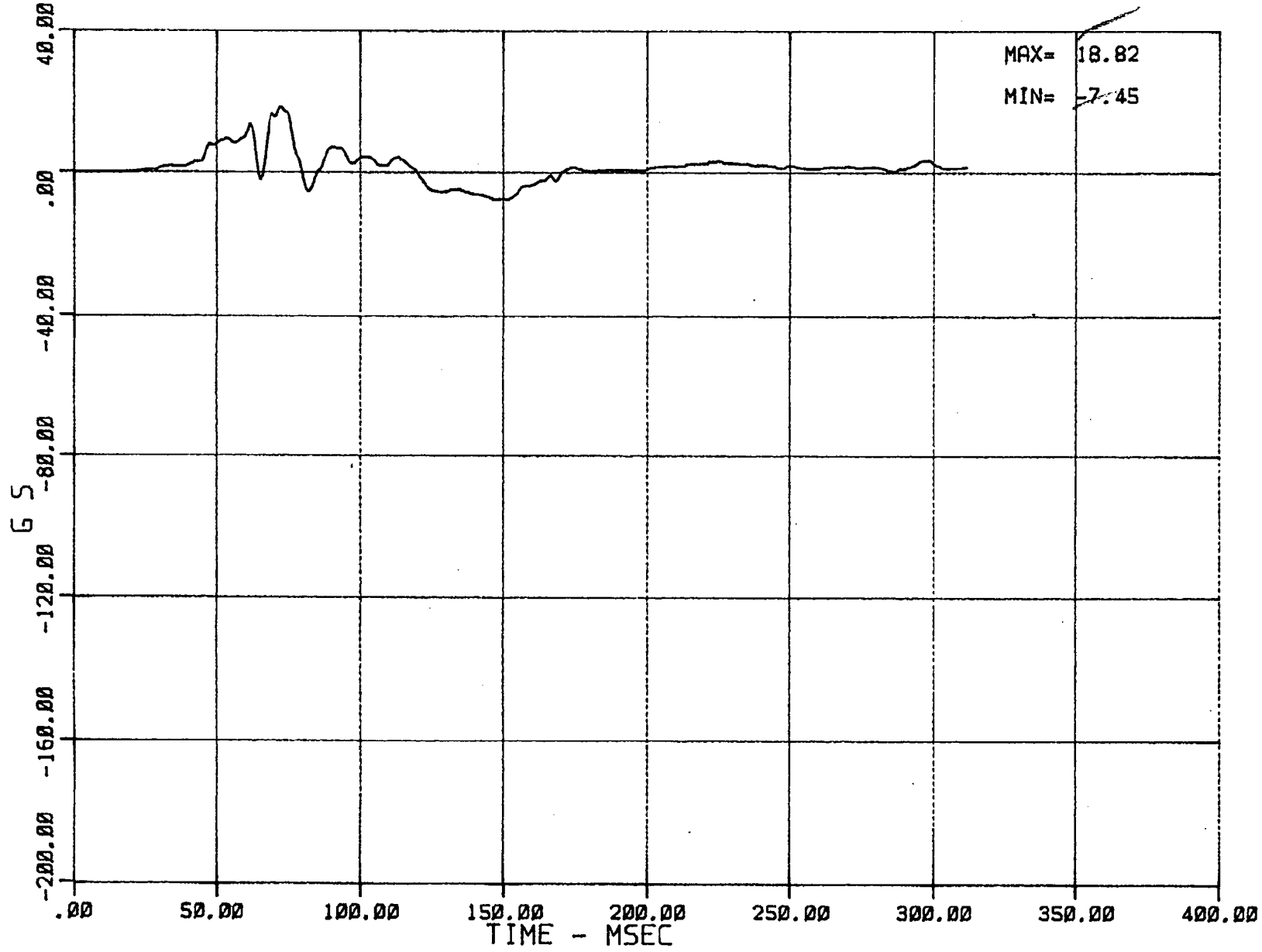



04 AC 01 1 CST X (DRIVERS CHEST ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD

08/11/83




05 AC 01 1 CST Y (DRIVERS CHEST ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83




06 AC 01 1 CST Z (DRIVERS CHEST ACCEL. -- Z AXIS)
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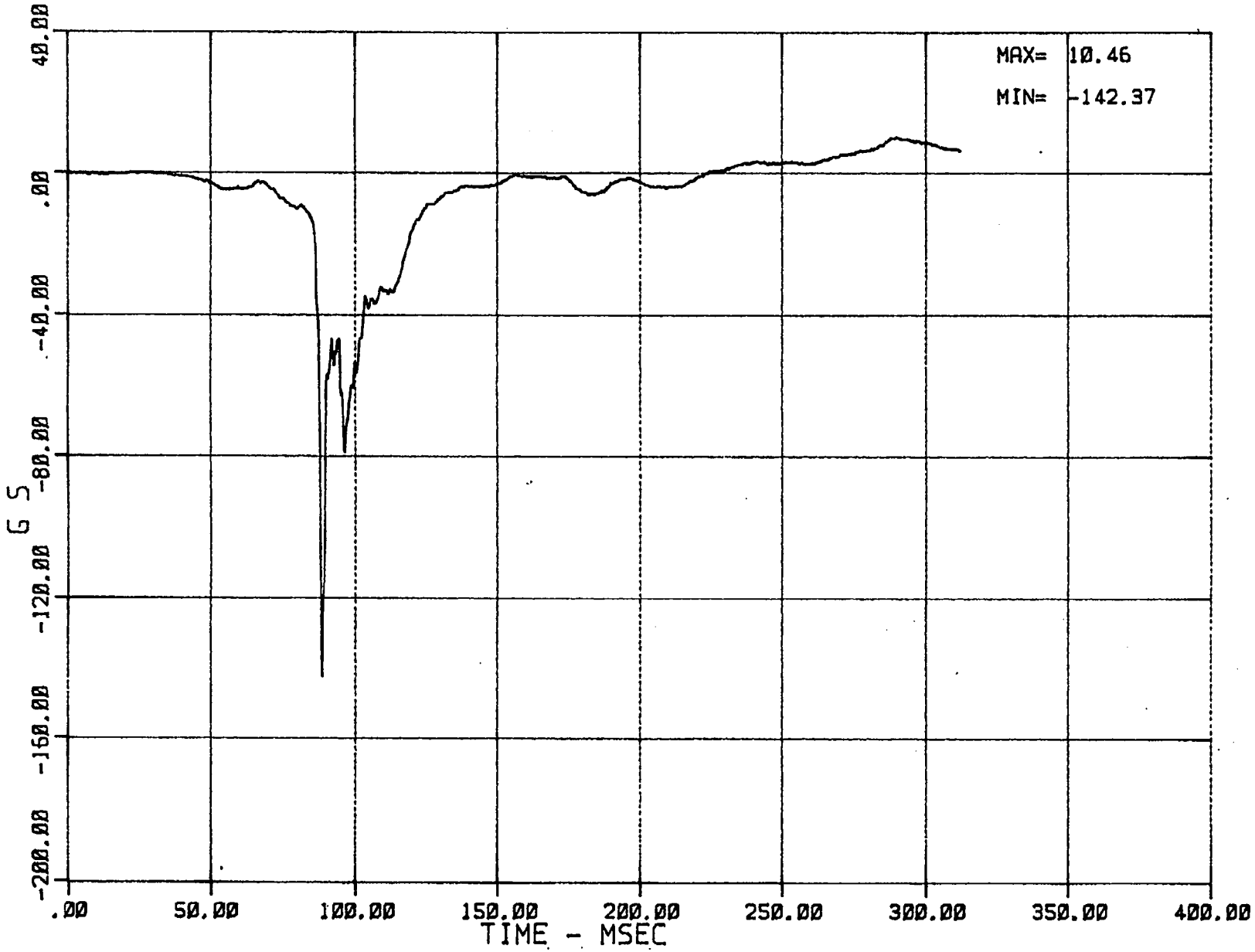
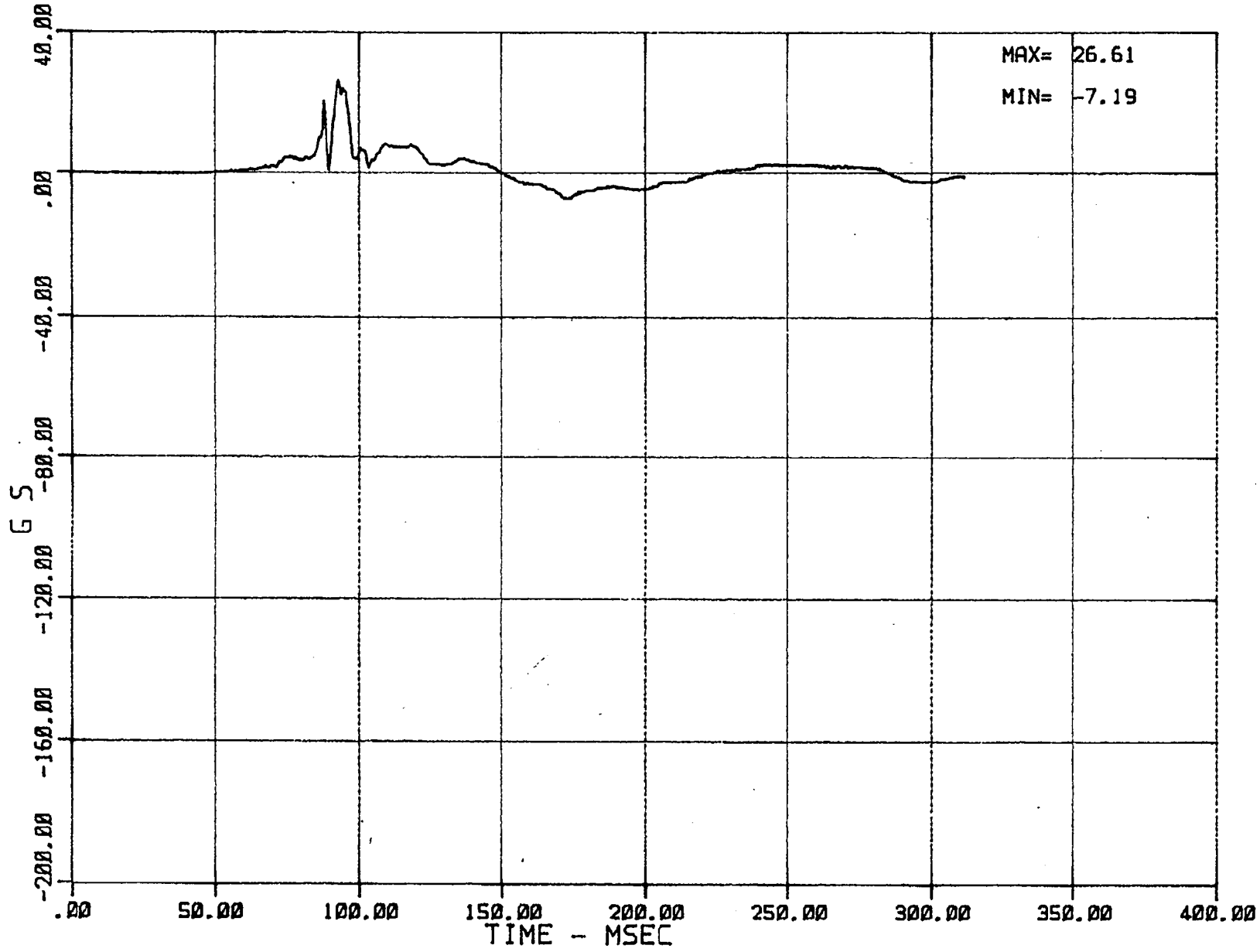
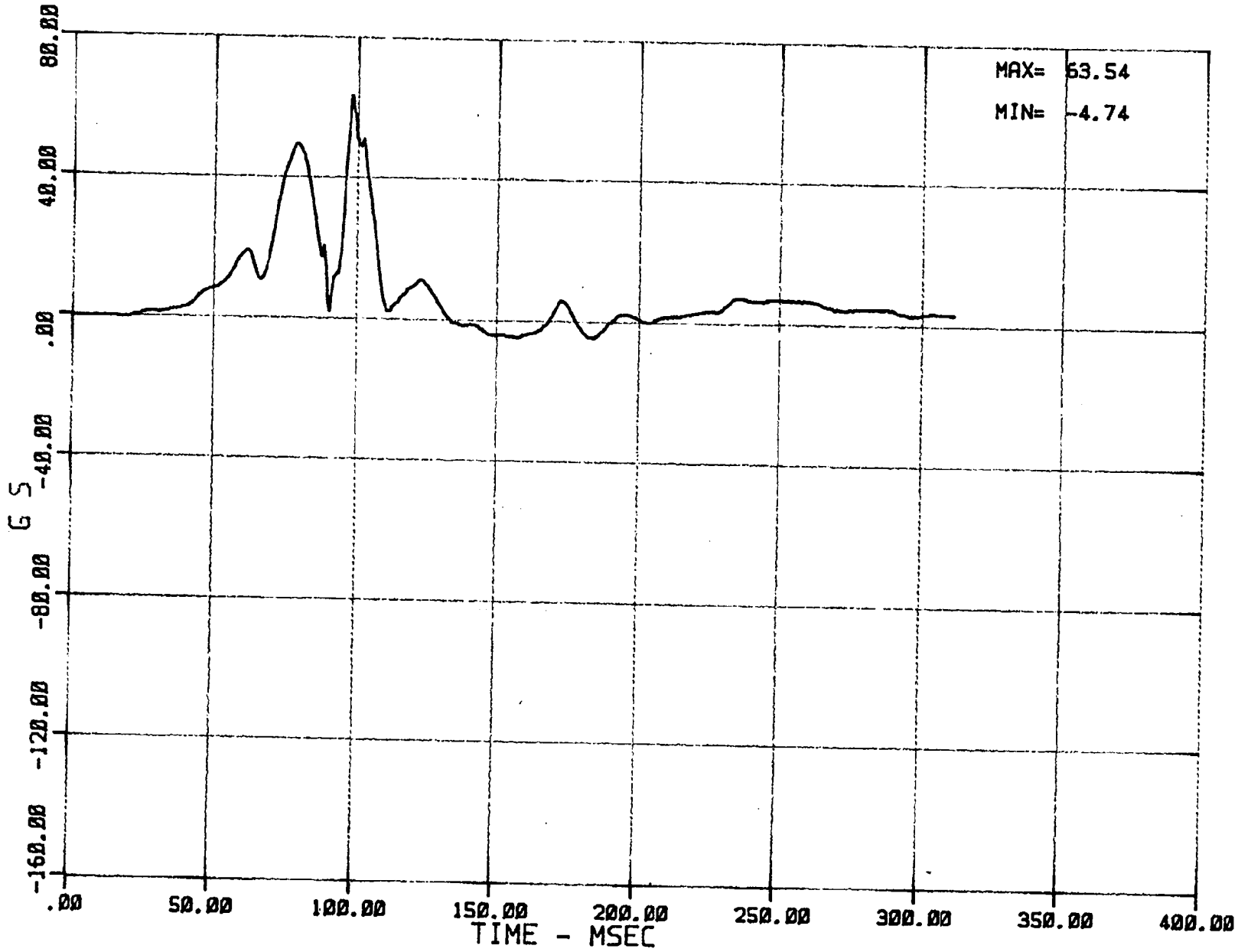



07 AC 01 2 HED X (PASSENGER HEAD ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

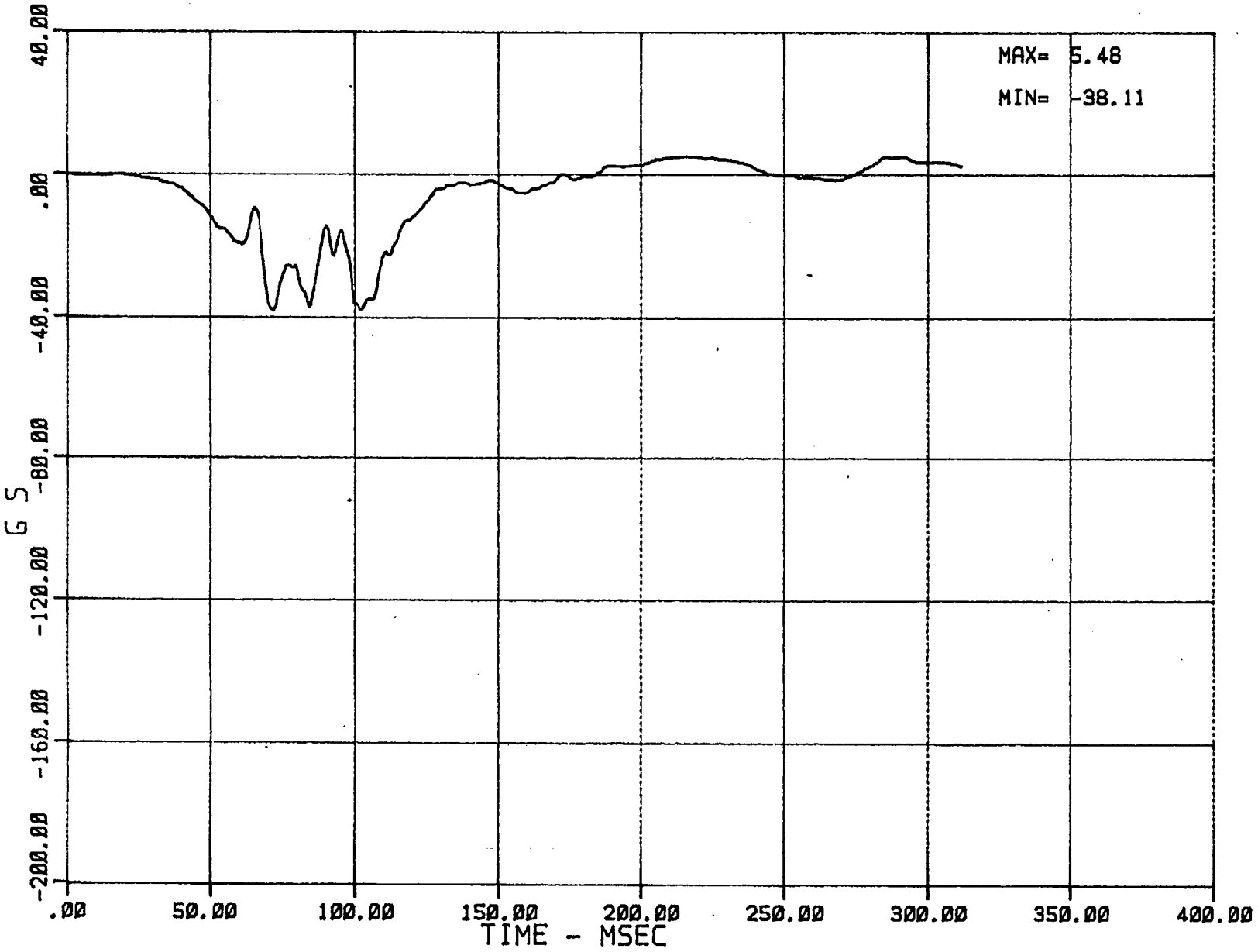



08 AC 01 2 HED Y (PASSENGER HEAD ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83

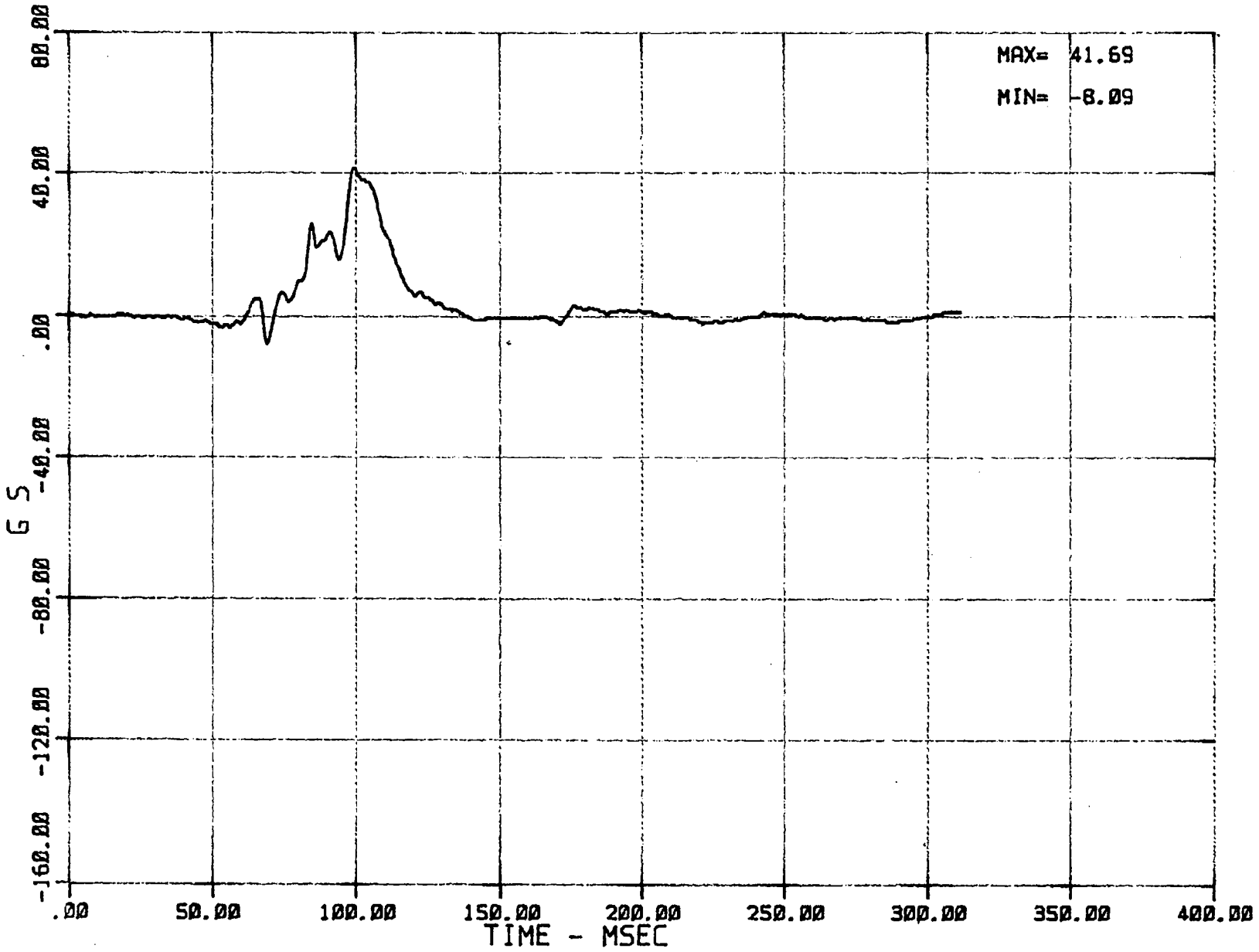



09 AC 01 2 HED Z (PASSENGER HEAD ACCEL. -- Z AXIS)
MSE N02103 1983 FORD LTD

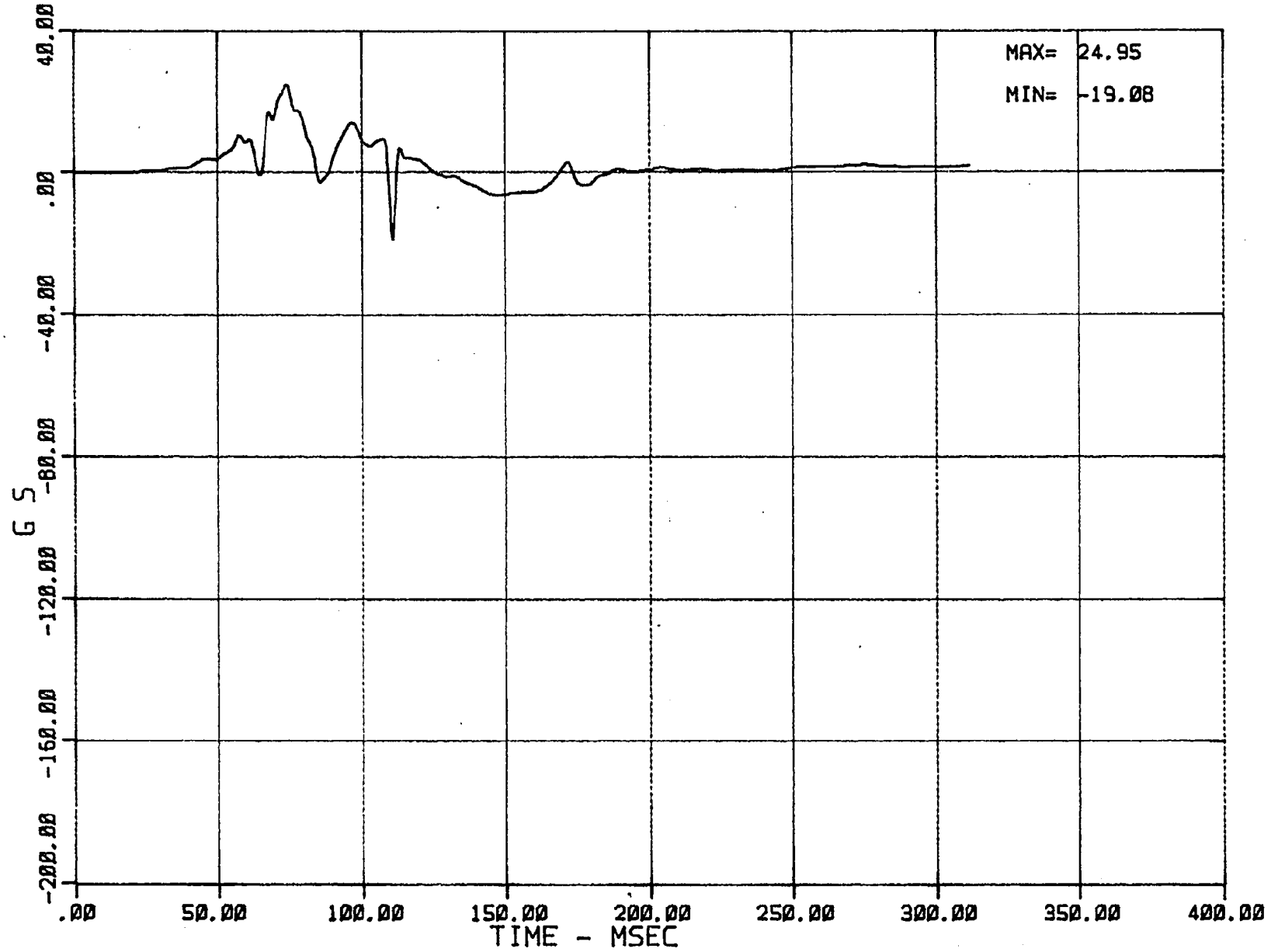
08/11/83




10 AC 01 2 CST X (PASSENGER CHEST ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

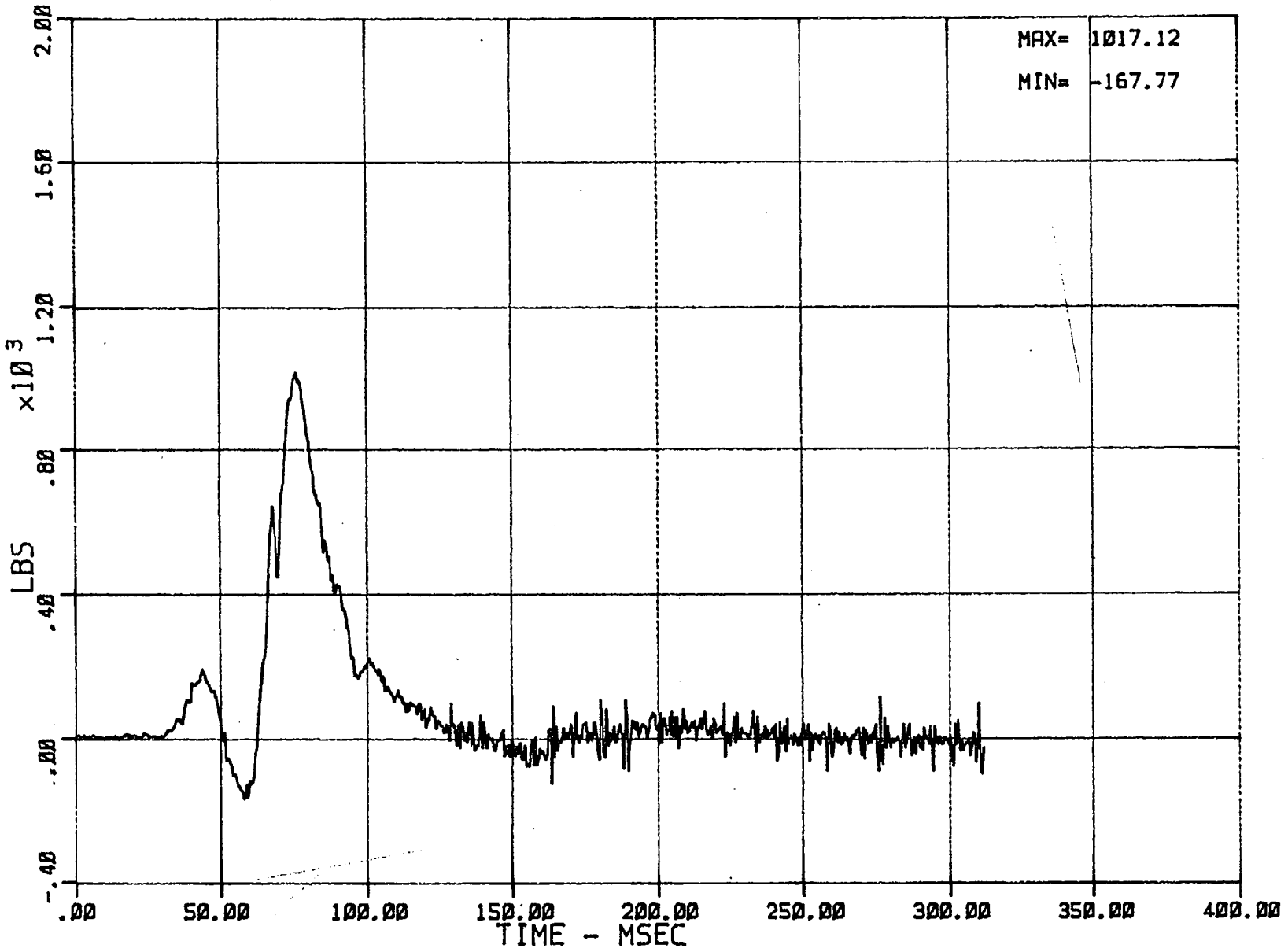



11 AC 01 2 CST Y (PASSENGER CHEST ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83.

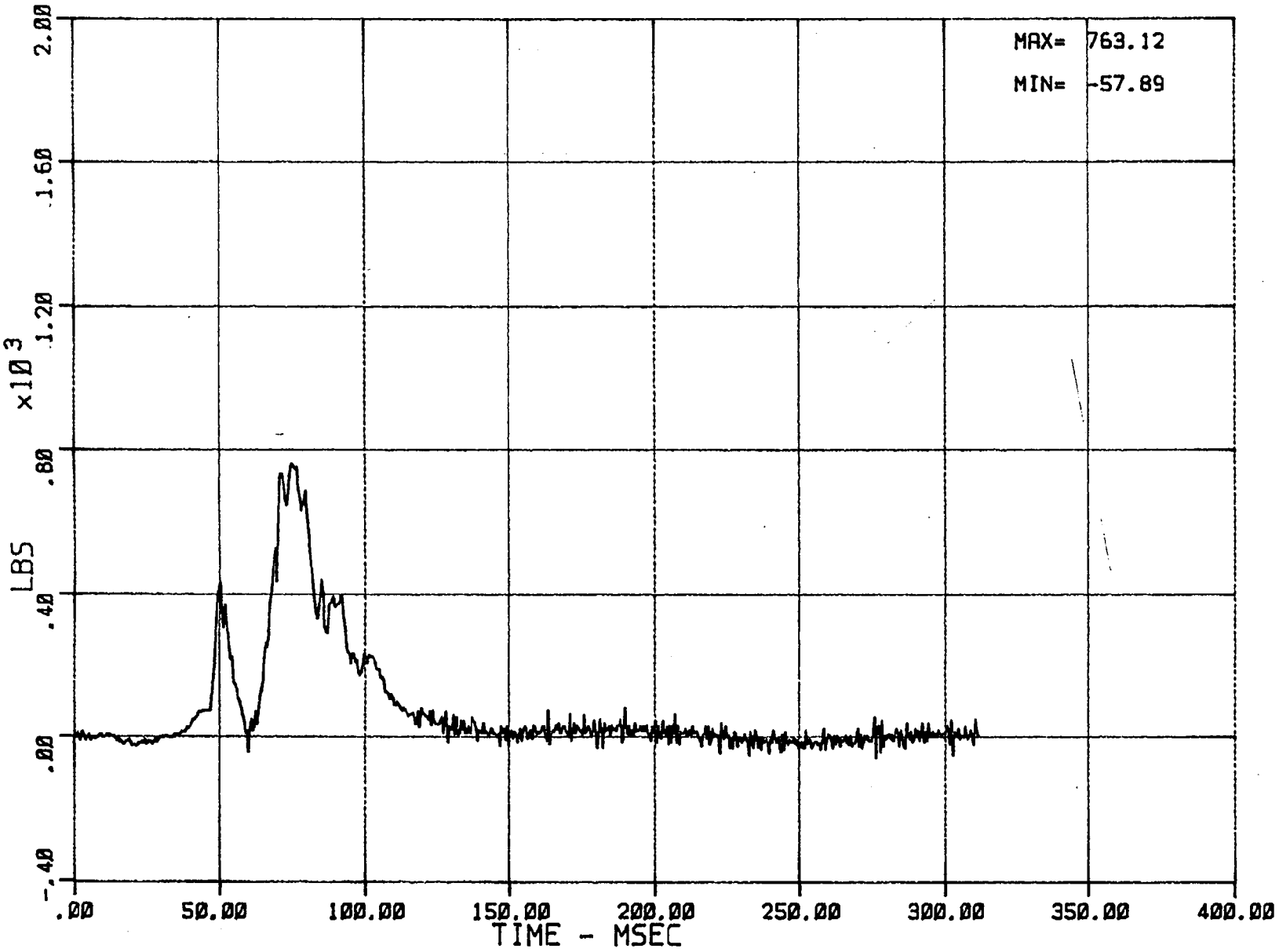



12 AC 01 2 CST Z (PASSENGER CHEST ACCEL. -- Z AXIS)

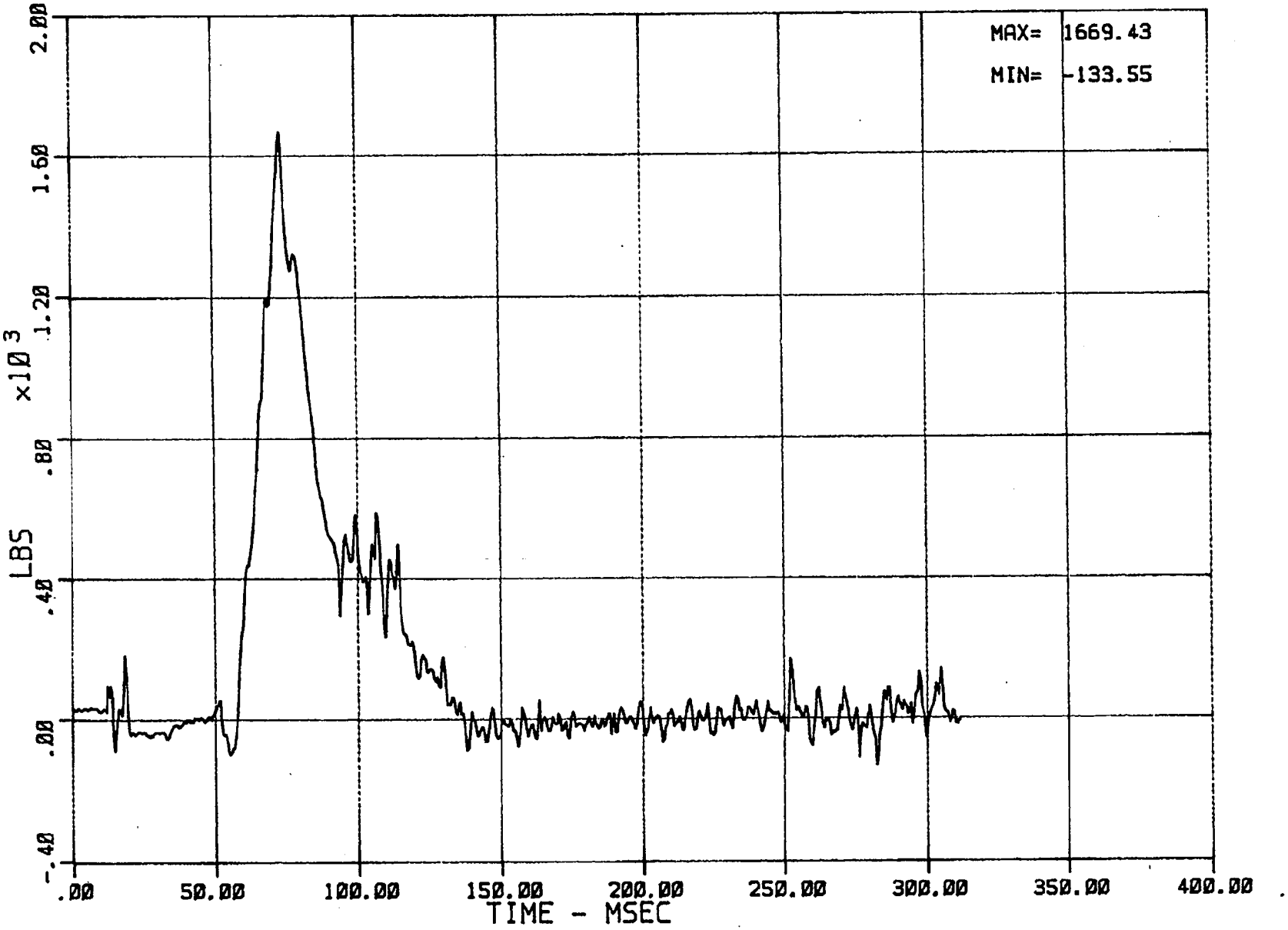
MSE N02103 1983 FORD LTD 08/11/83



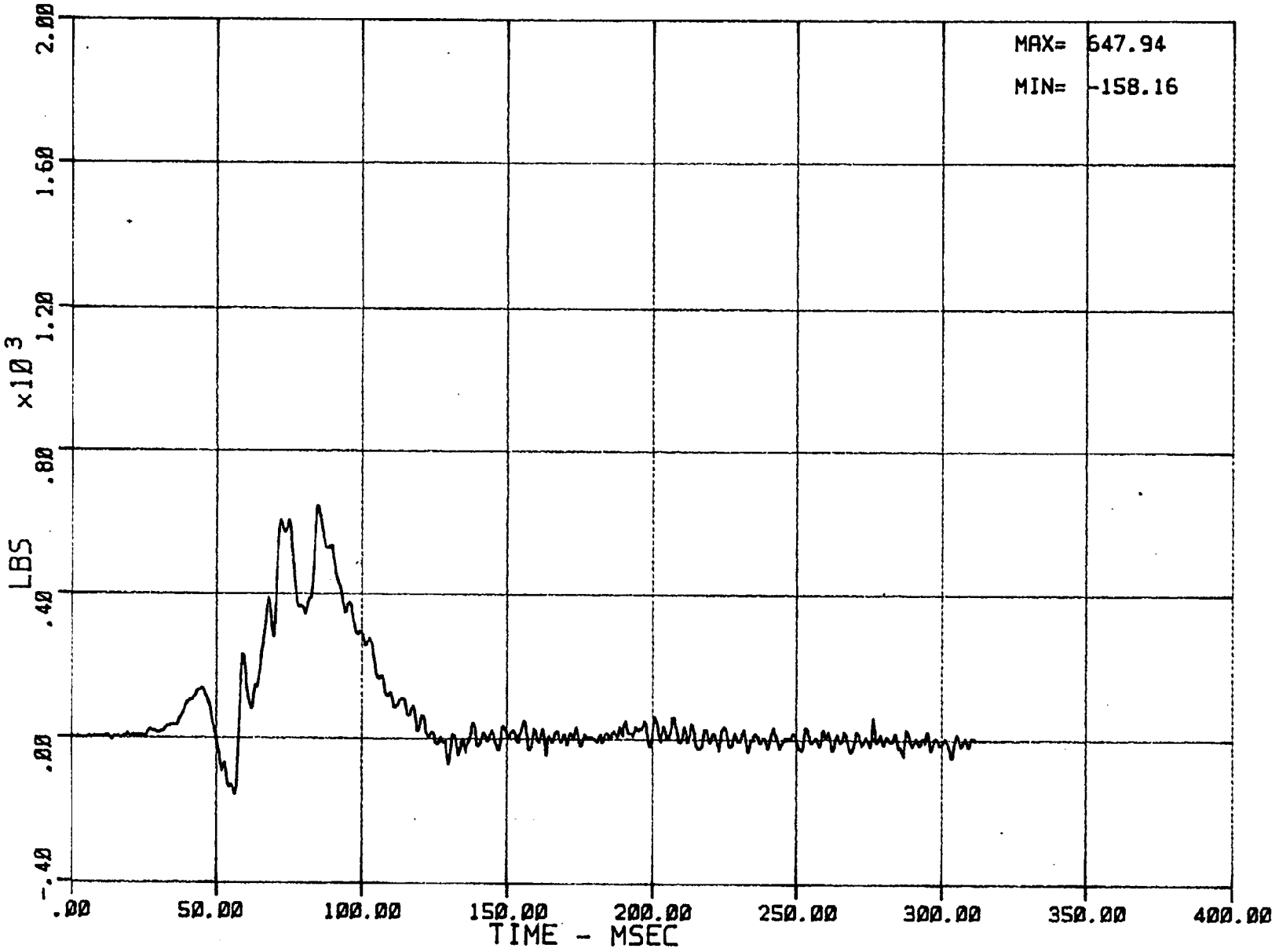

13 LC 01 1 LFM 0 (DRIVERS LEFT FEMUR FORCE)
MSE N02103 1983 FORD LTD 08/11/83



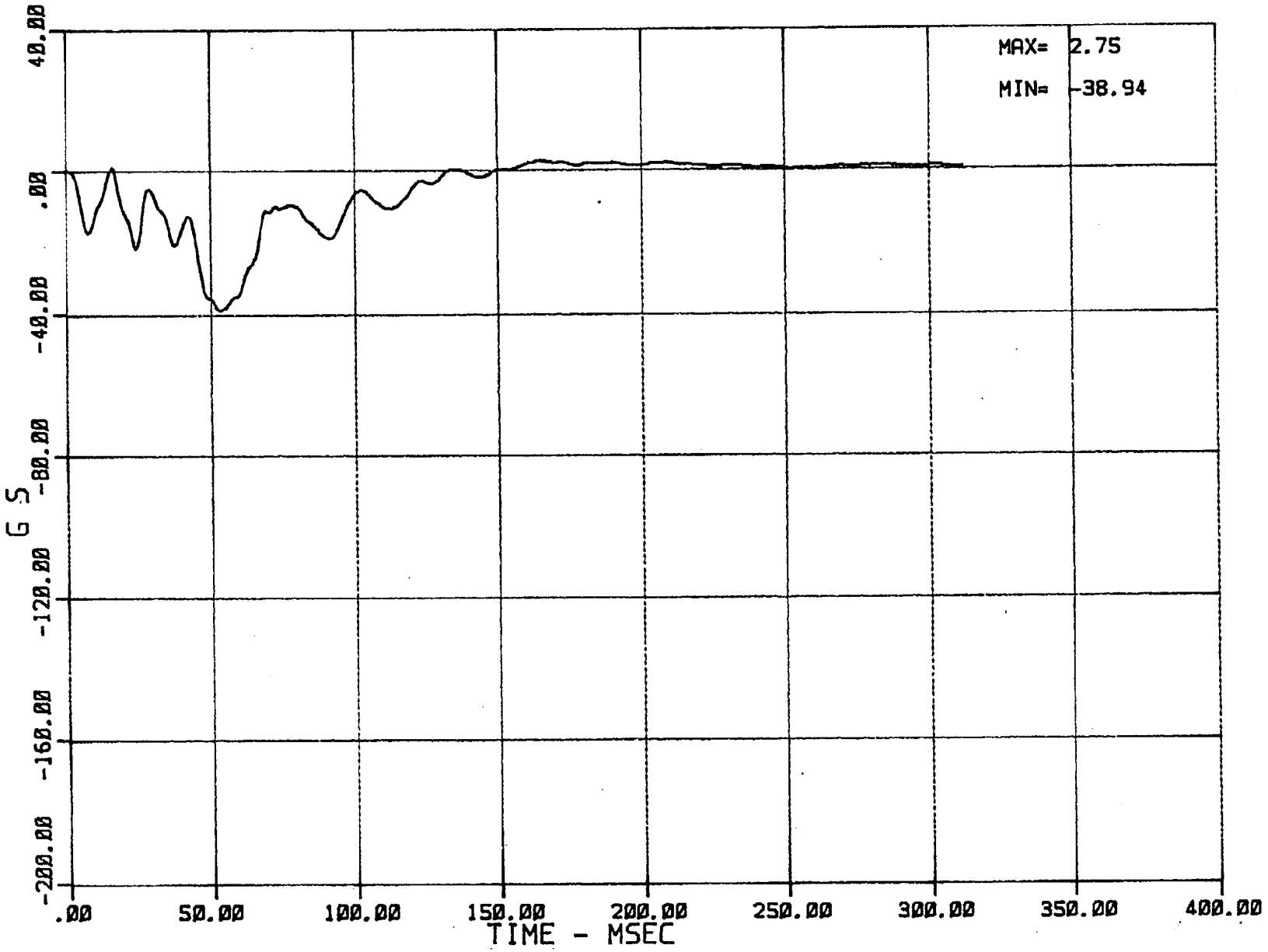

14 LC 01 1 RFM 0 (DRIVERS RIGHT FEMUR FORCE)
MSE N02103 1983 FORD LTD 08/11/83




15 LC 01 2 LFM 0 (PASSENGERS LEFT FEMUR FORCE)
MSE N02103 1983 FORD LTD 08/11/83

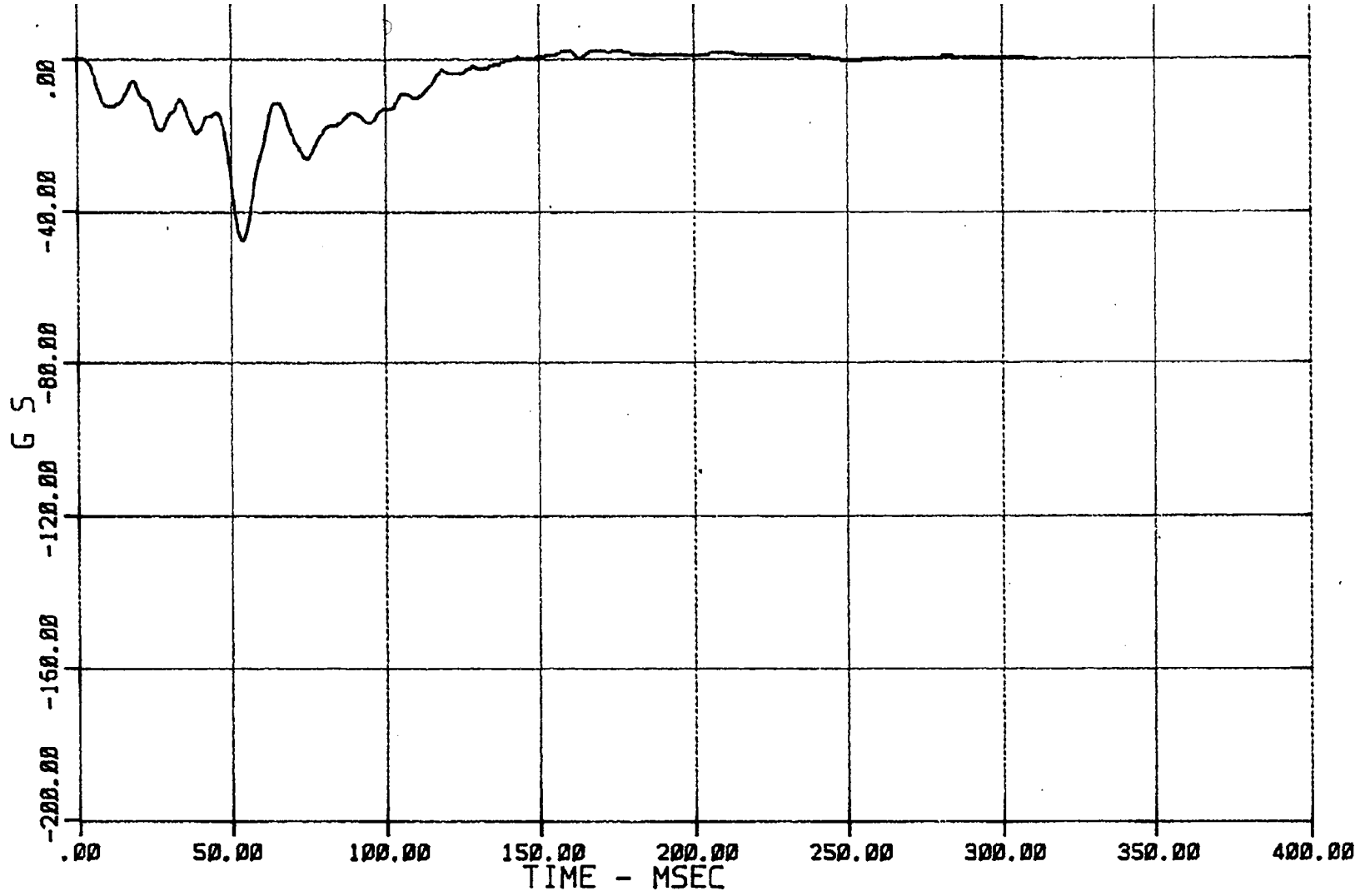



16 LC 01 2 RFM 0 (PASSENGERS RIGHT FEMUR FORCE)
MSE N02103 1983 FORD LTD 08/11/83

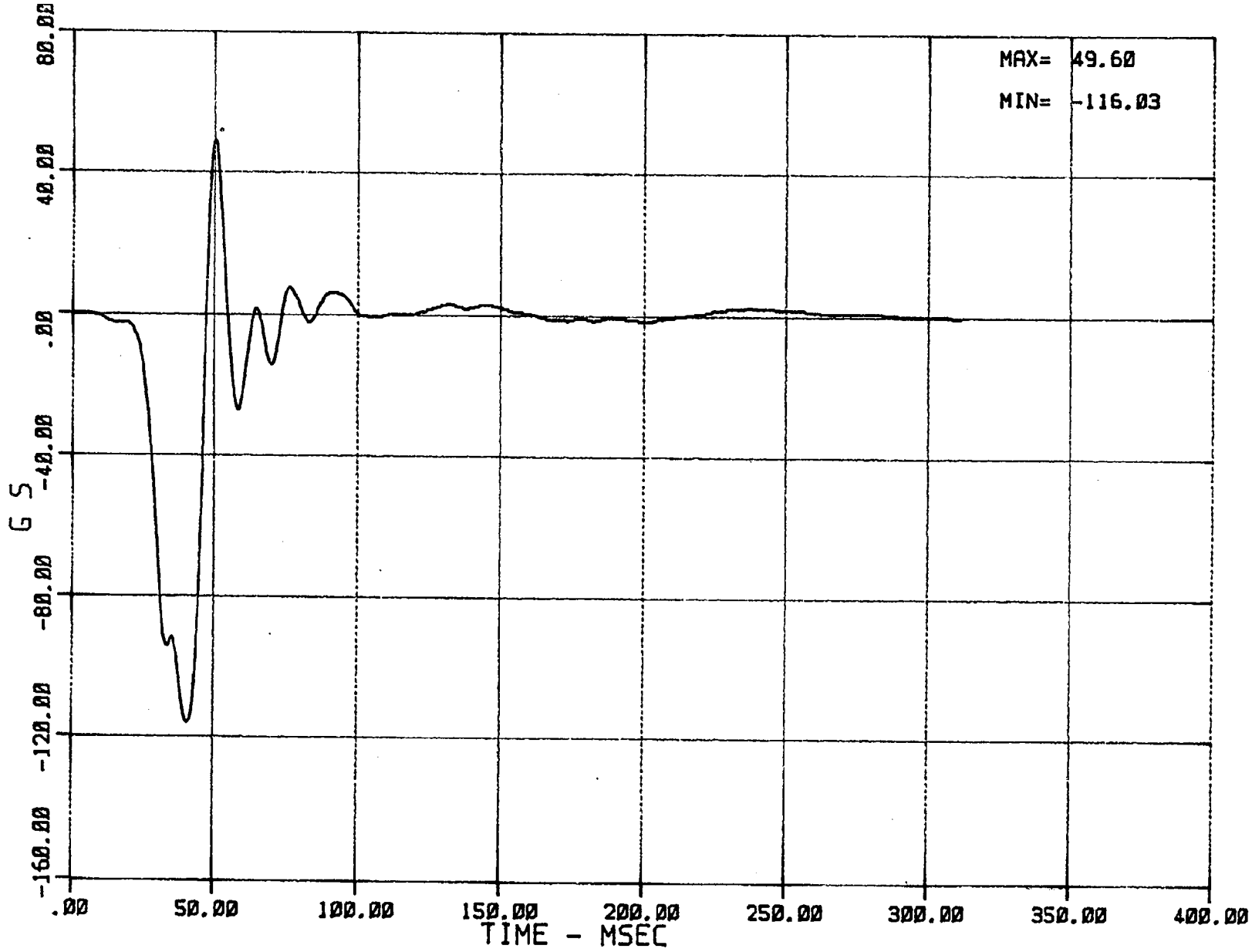



17 AC 01 N RFF X (RIGHT FRONT FLOOR ACCEL.)

MSE N02103 1983 FORD LTD 08/11/83

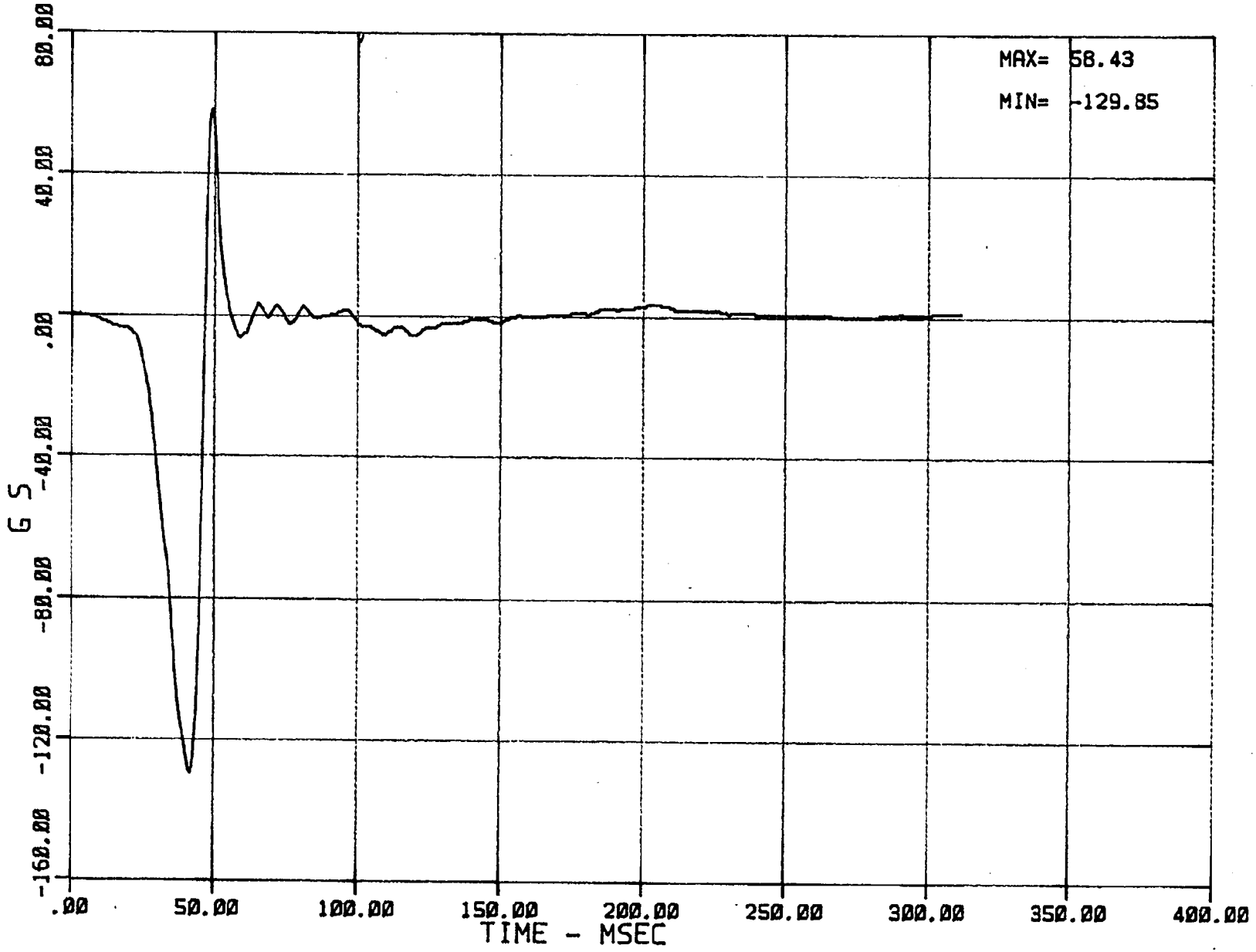



18 AC 01 N LRF X (LEFT REAR FLOOR ACCEL.)
MSE N02103 1983 FORD LTD 08/11/83



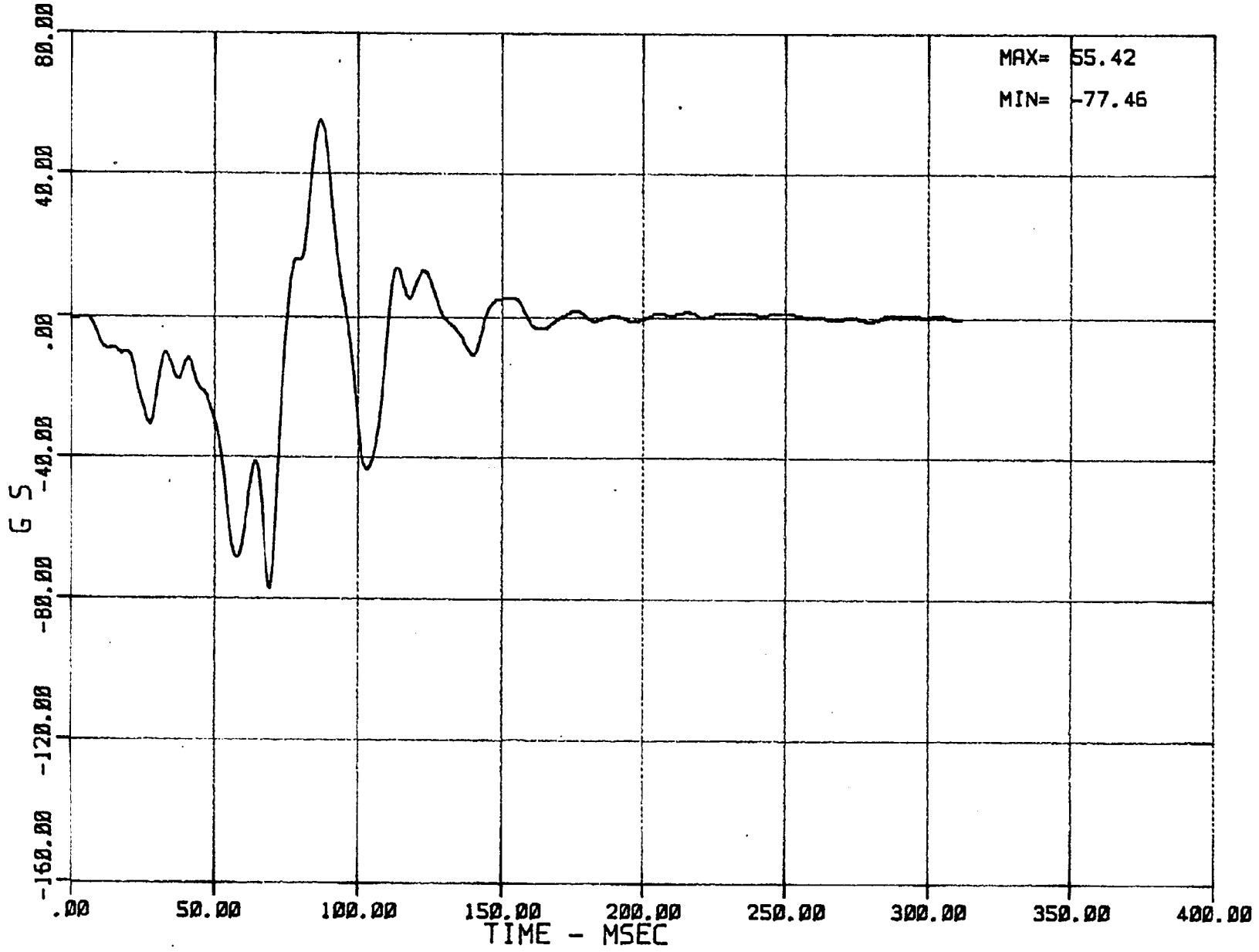

19 AC 01 N ENG X (ENGINE ACCEL. TOP -- X AXIS)
MSE N02103 1983 FORD LTD

08/11/83

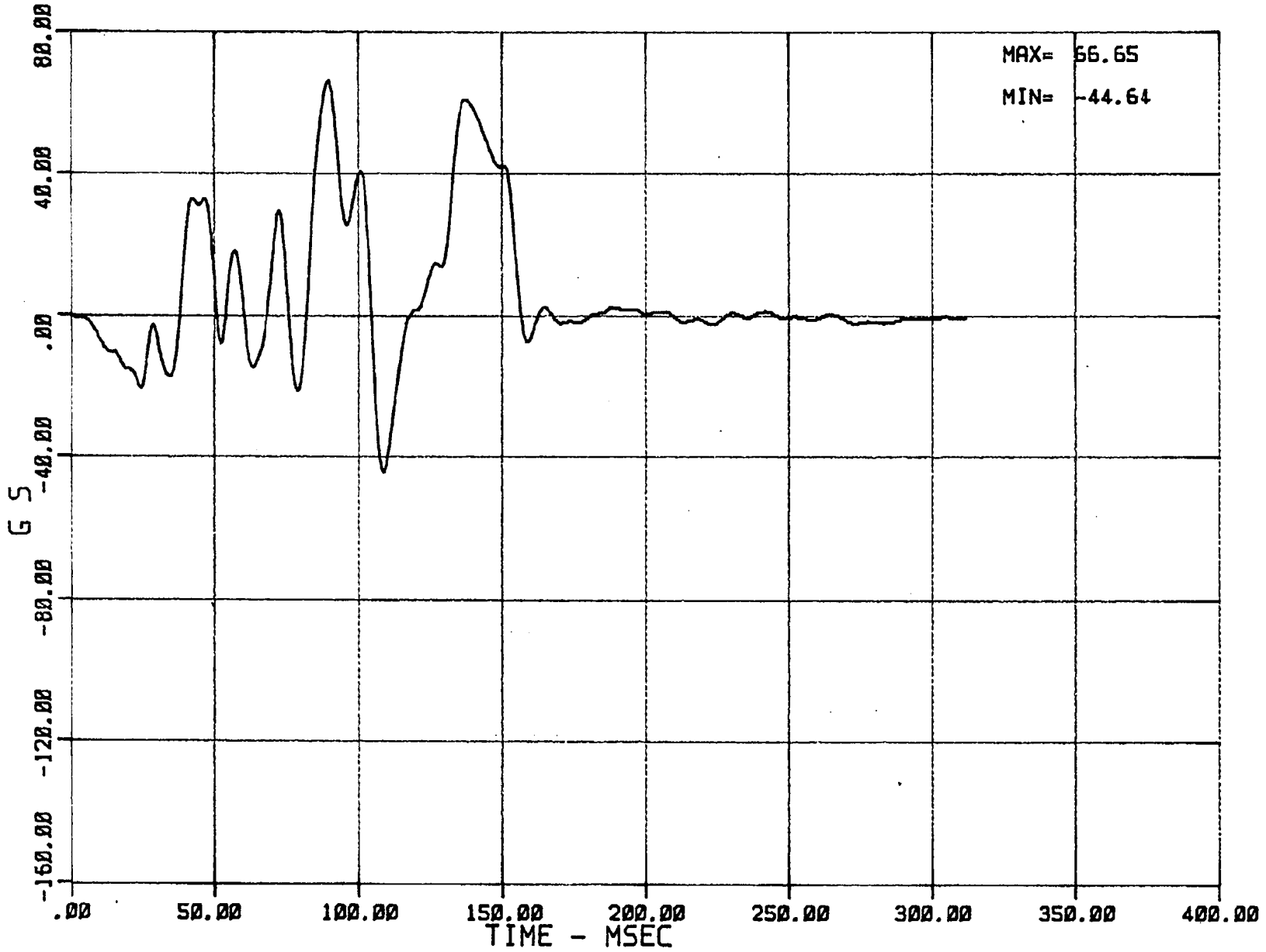



20 AC 01 N ENG X (ENGINE ACCEL. BOTTOM - X AXIS)
MSE N02103 1983 FORD LTD

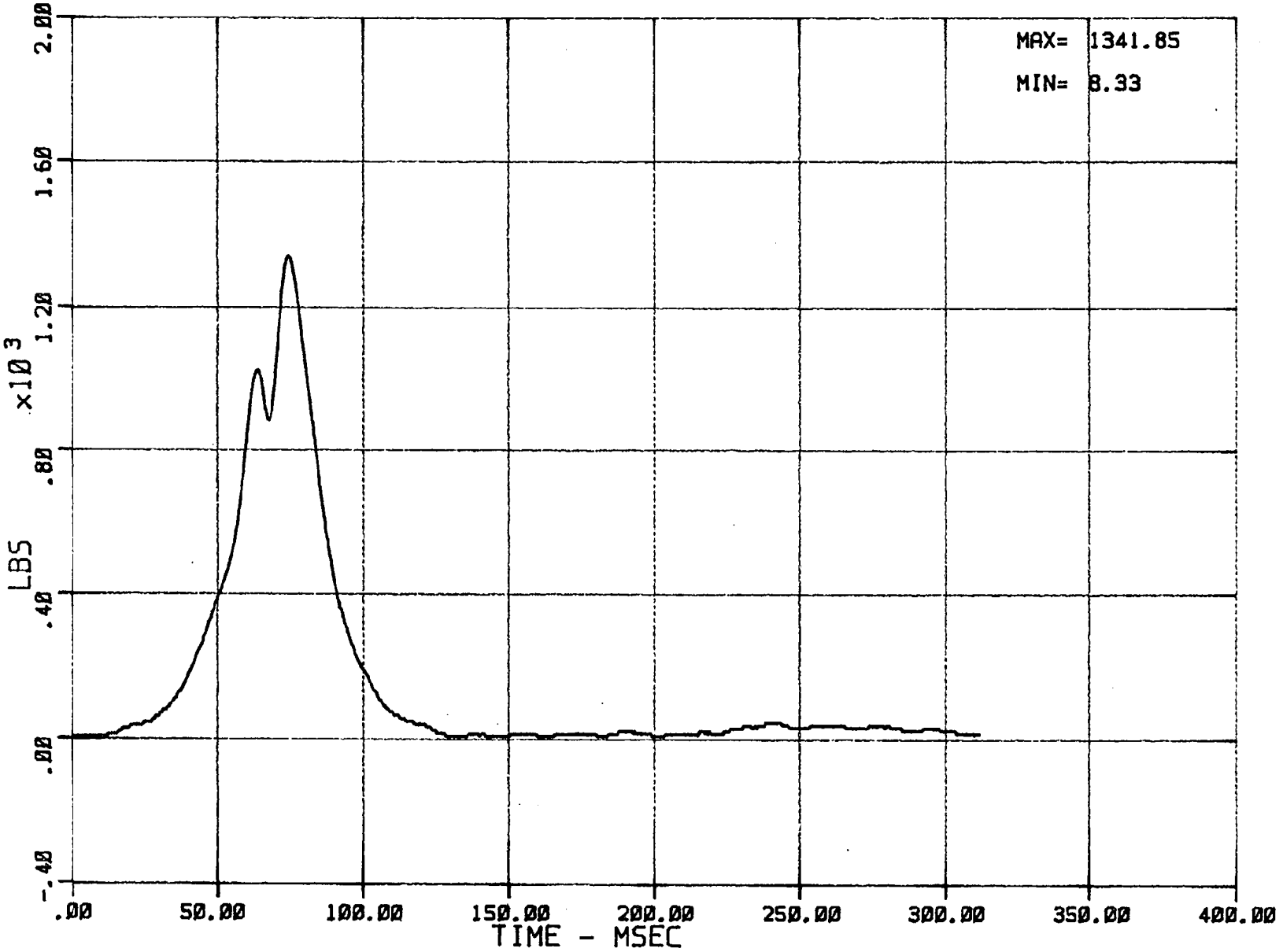
08/11/83



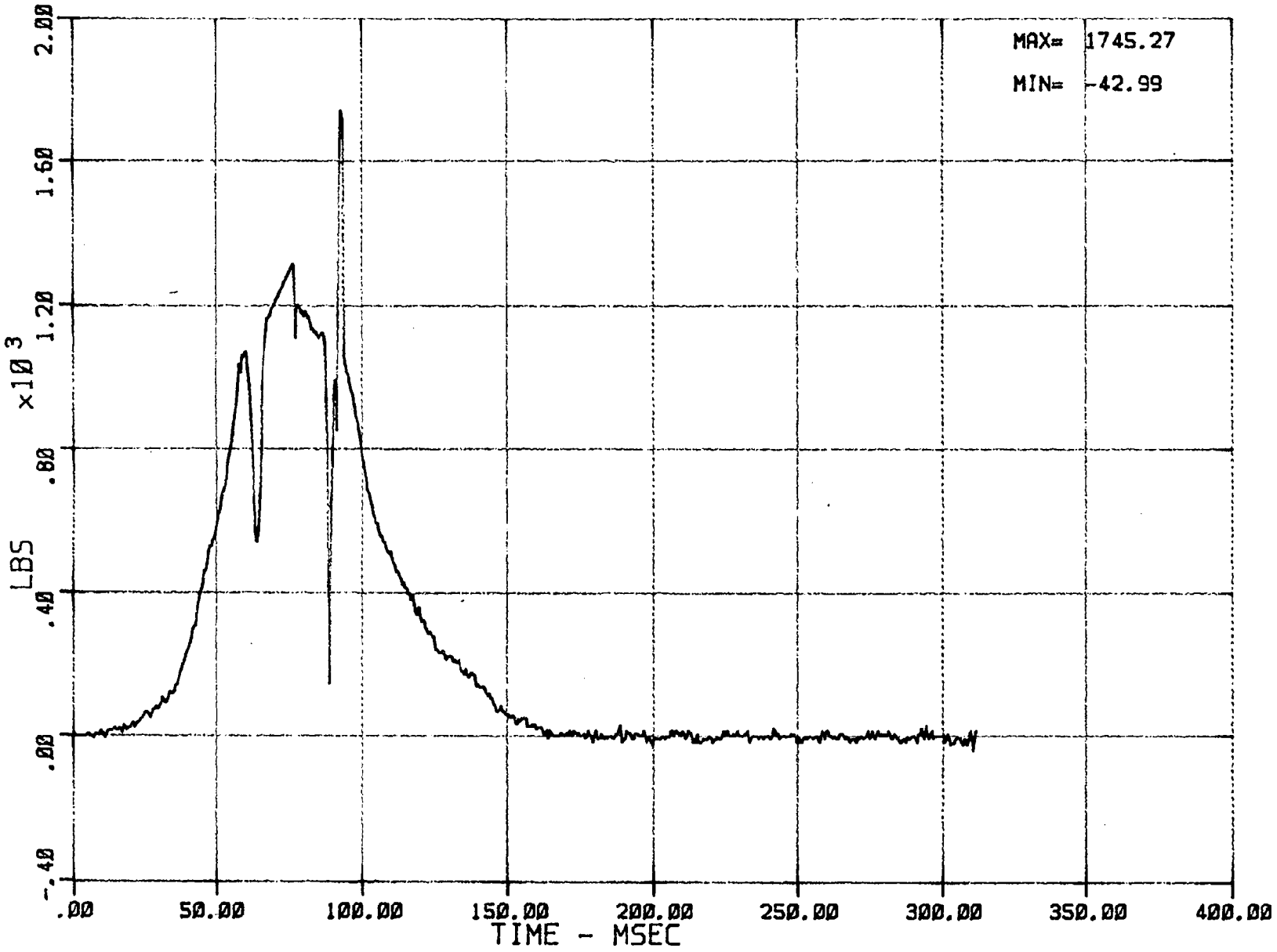

21 AC 01 N BCR X (RIGHT FRONT WHEEL ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83



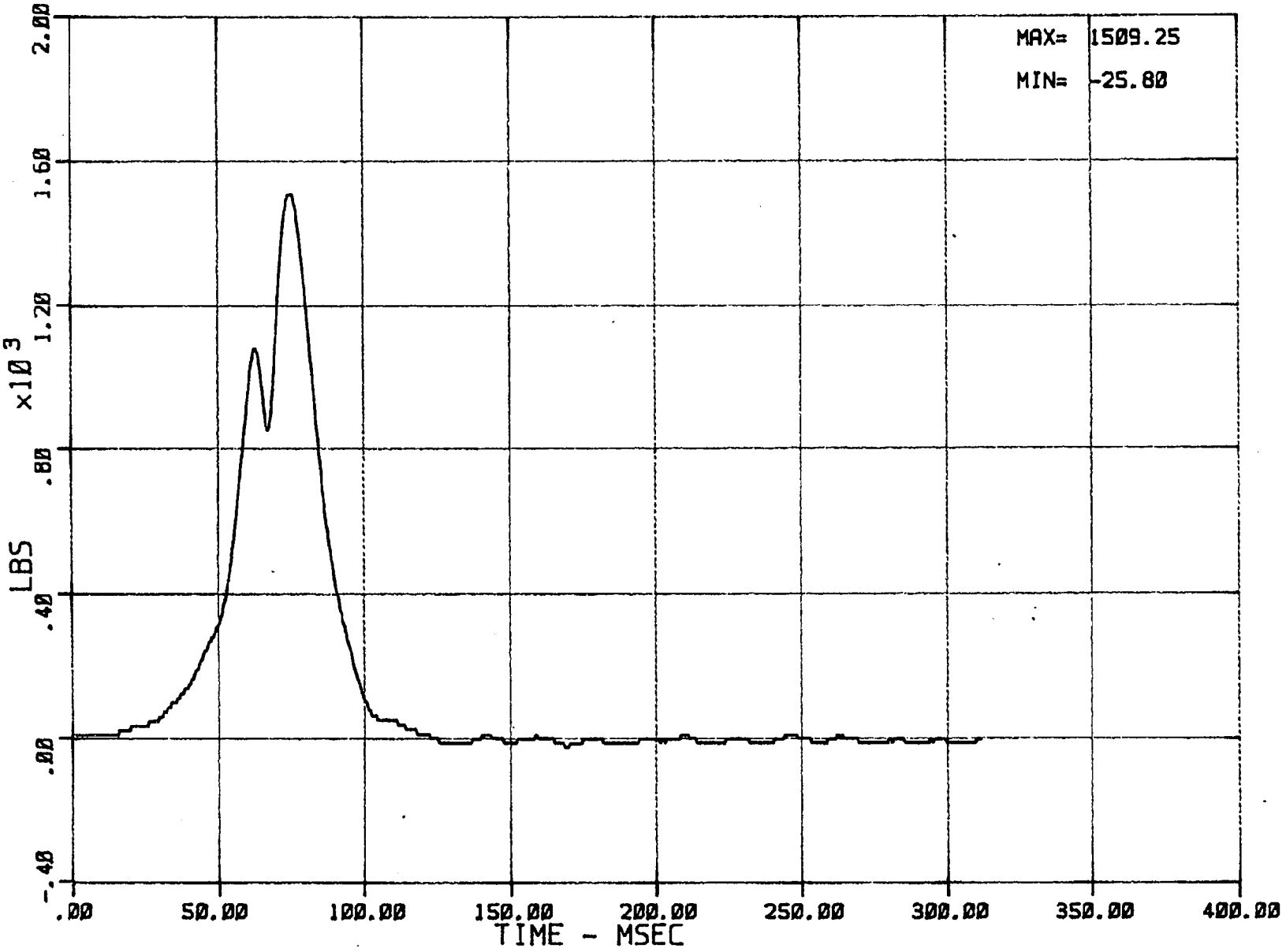

22.AC Ø1 N BCL X (LEFT FRONT WHEEL ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83



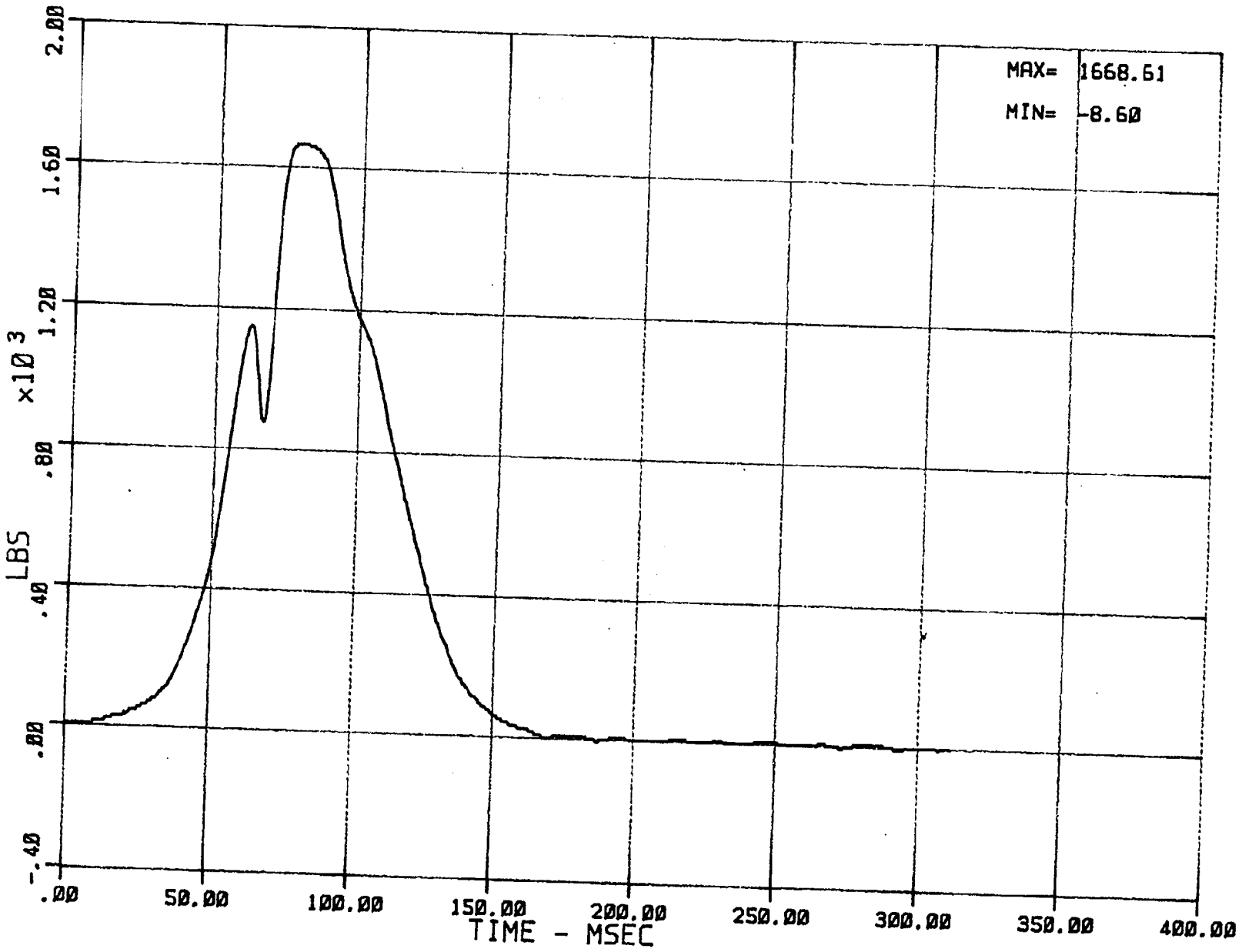

23 LC 01 1 LBO 0 (DRIVERS LAP BELT FORCE)
MSE N02103 1983 FORD LTD 08/11/83




24 LC 01 1 SHB 0 (DRIVERS SHOULDER BELT FORCE)
MSE N02103 1983 FORD LTD 08/11/83

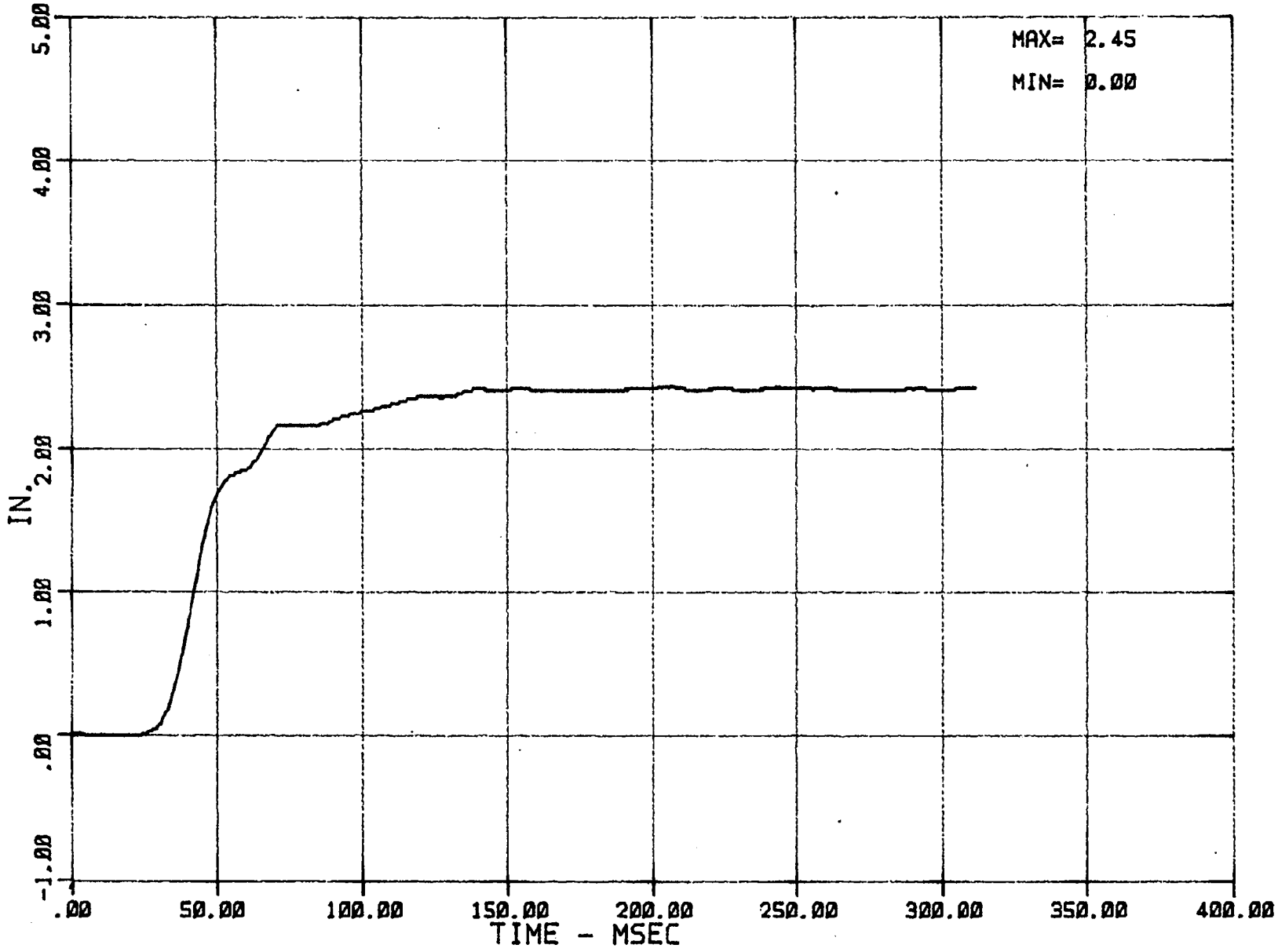



25 LC 01 2 LBO 0 (PASSENGER LAP BELT FORCE)
MSE N02103 1983 FORD LTD 08/11/83

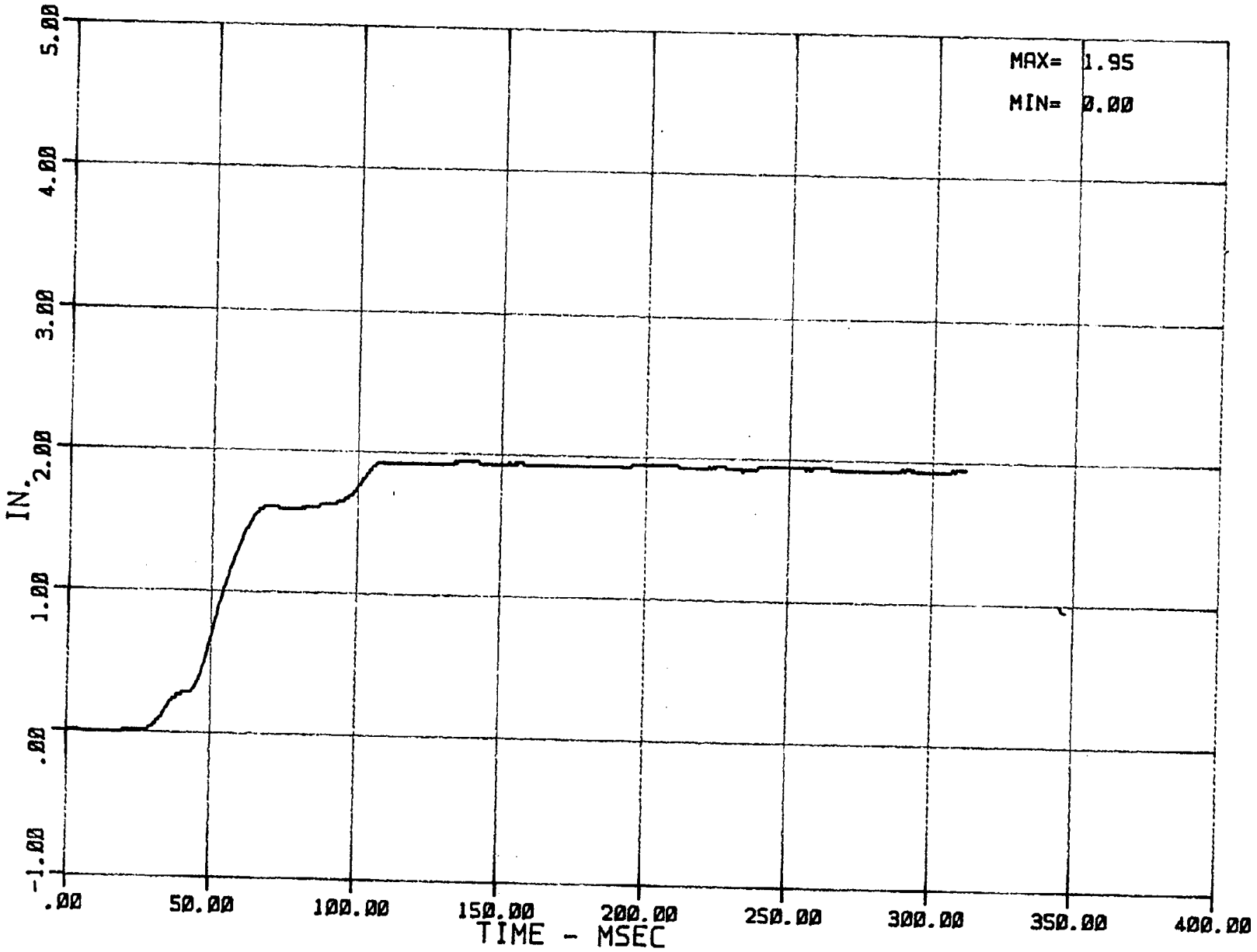



26 LC 01 2 SHB 0 (PASSENGERS SHOULDER BELT FORCE)
MSE N02103 1983 FORD LTD

08/11/83

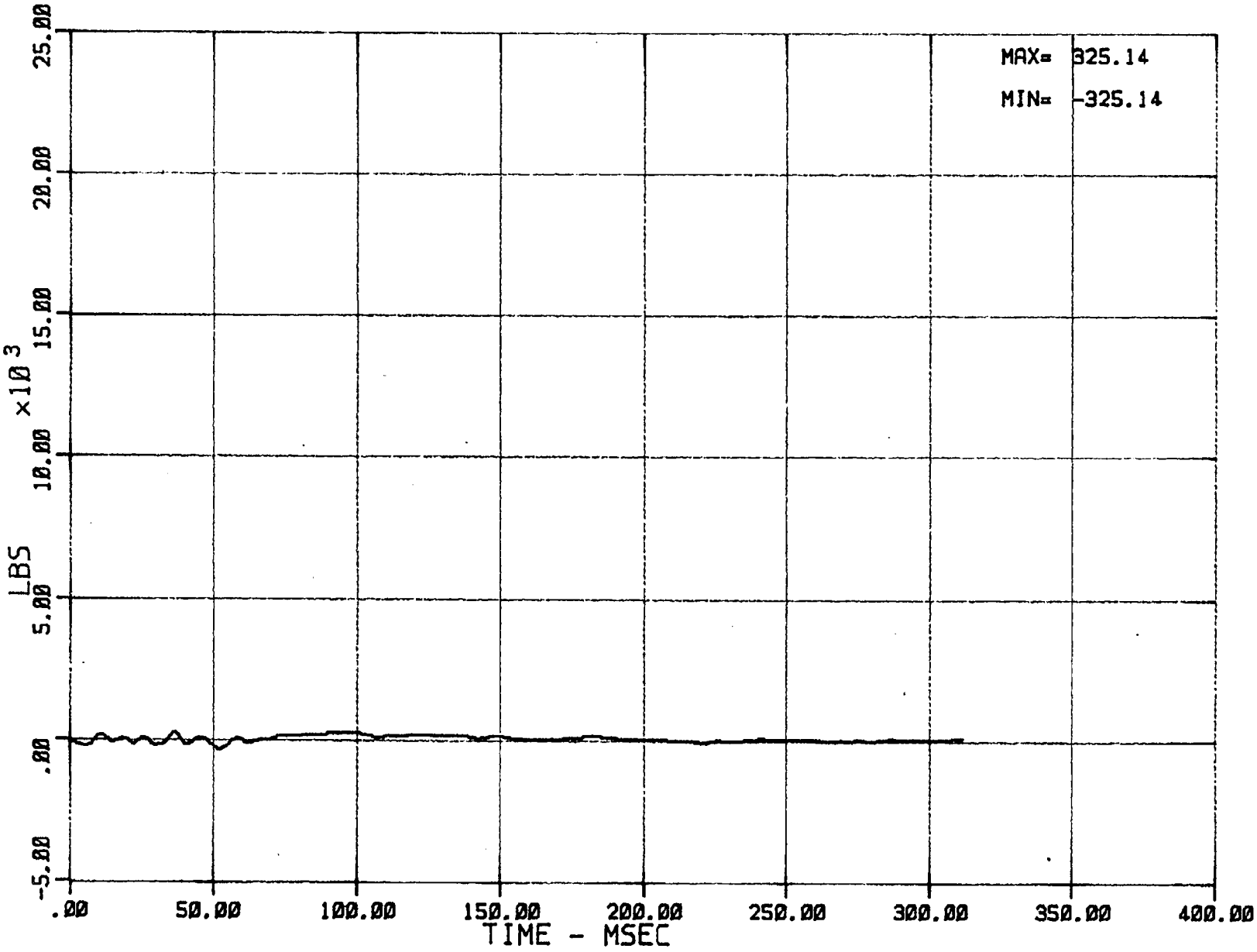



27 DT 01 1 SHB 0 (DRIVER SHOULDER BELT PULLOUT)
MSE N02103 1983 FORD LTD 08/11/83

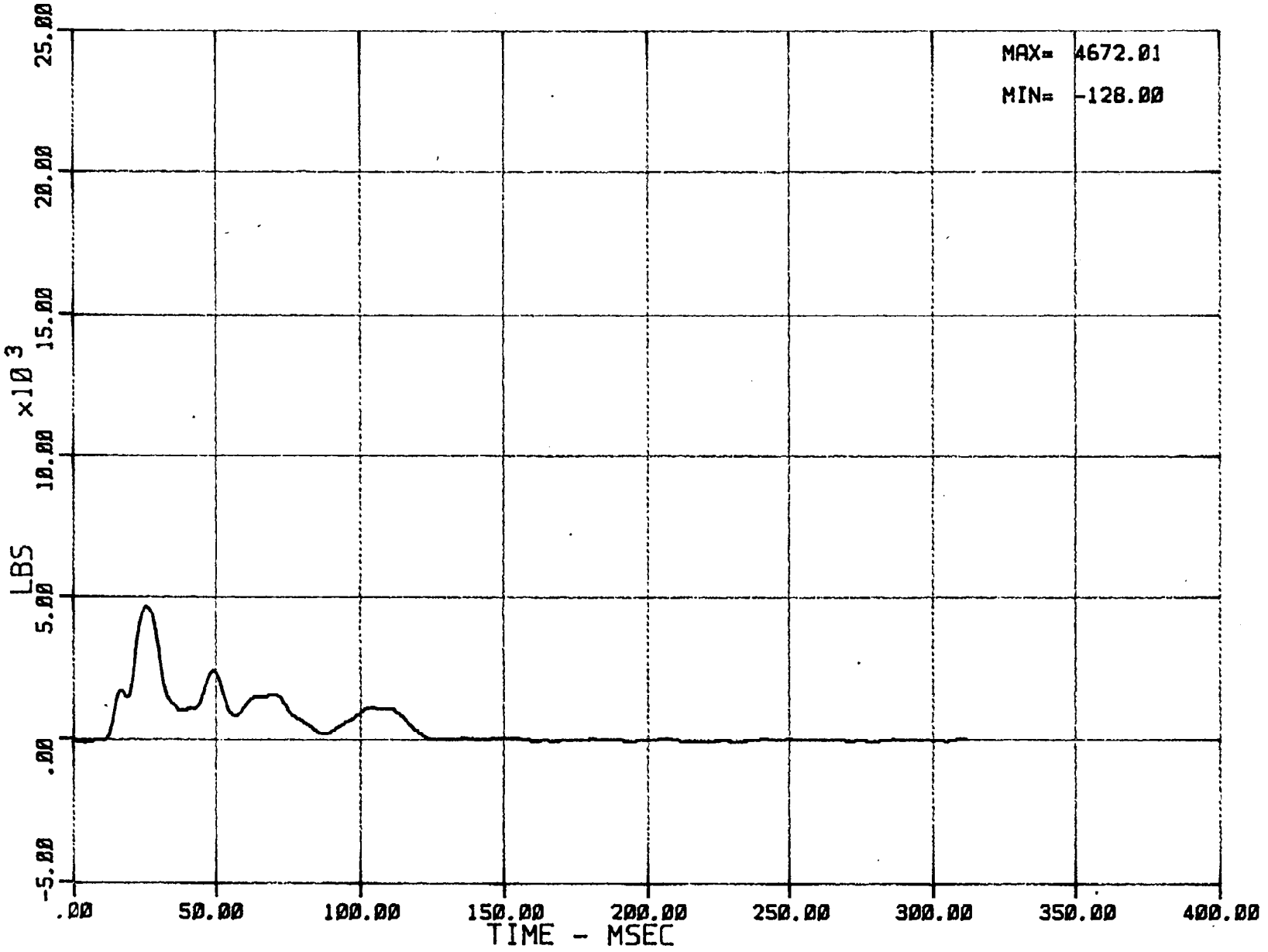



28 DT 01 2 SHB 0 (PASSENGER SHOULDER BELT PULLOUT)
MSE N02103 1983 FORD LTD

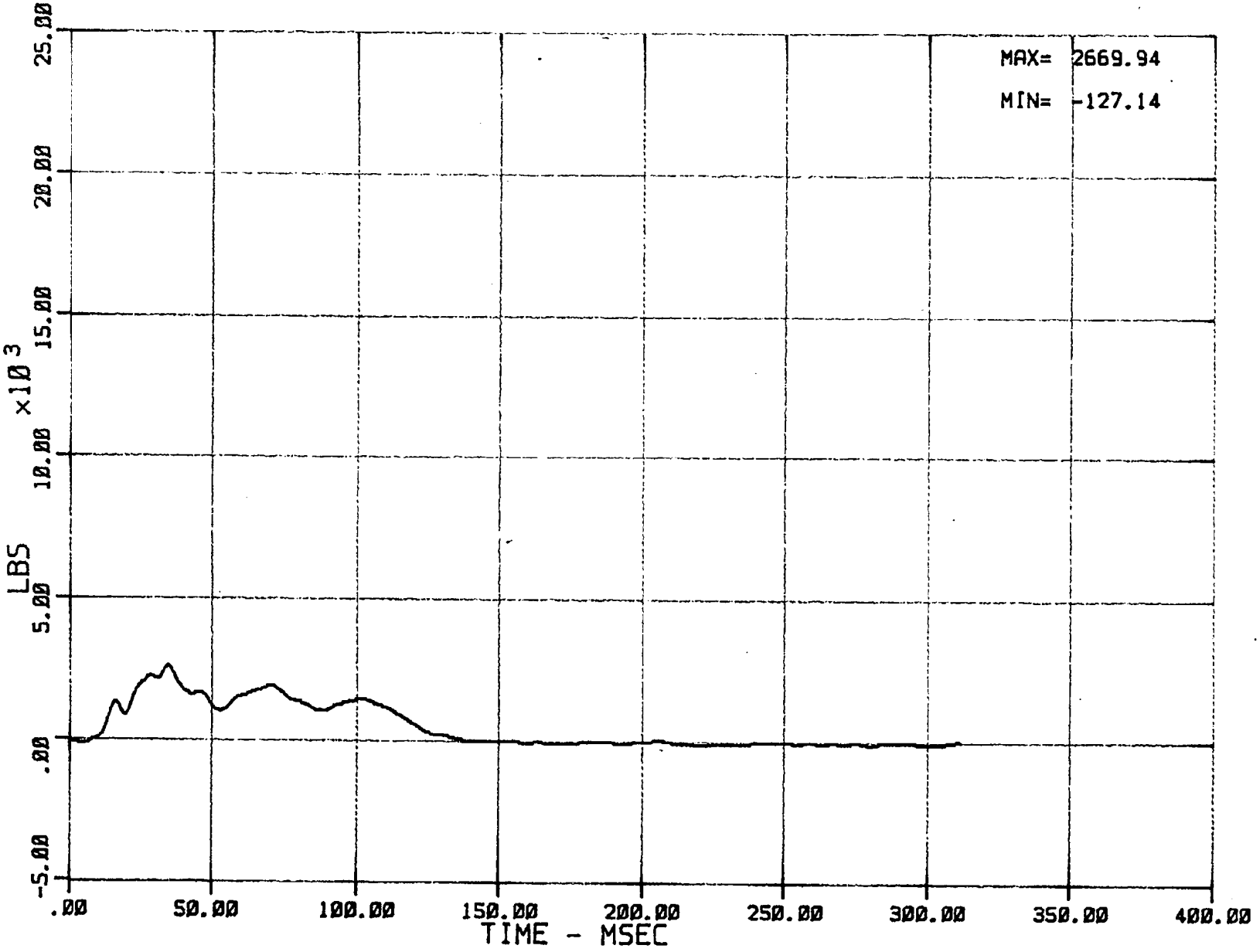
08/11/83




33 LC BA N A5 X (BARRIER LOAD CELL A5)
MSE N02103 1983 FORD LTD 08/11/83

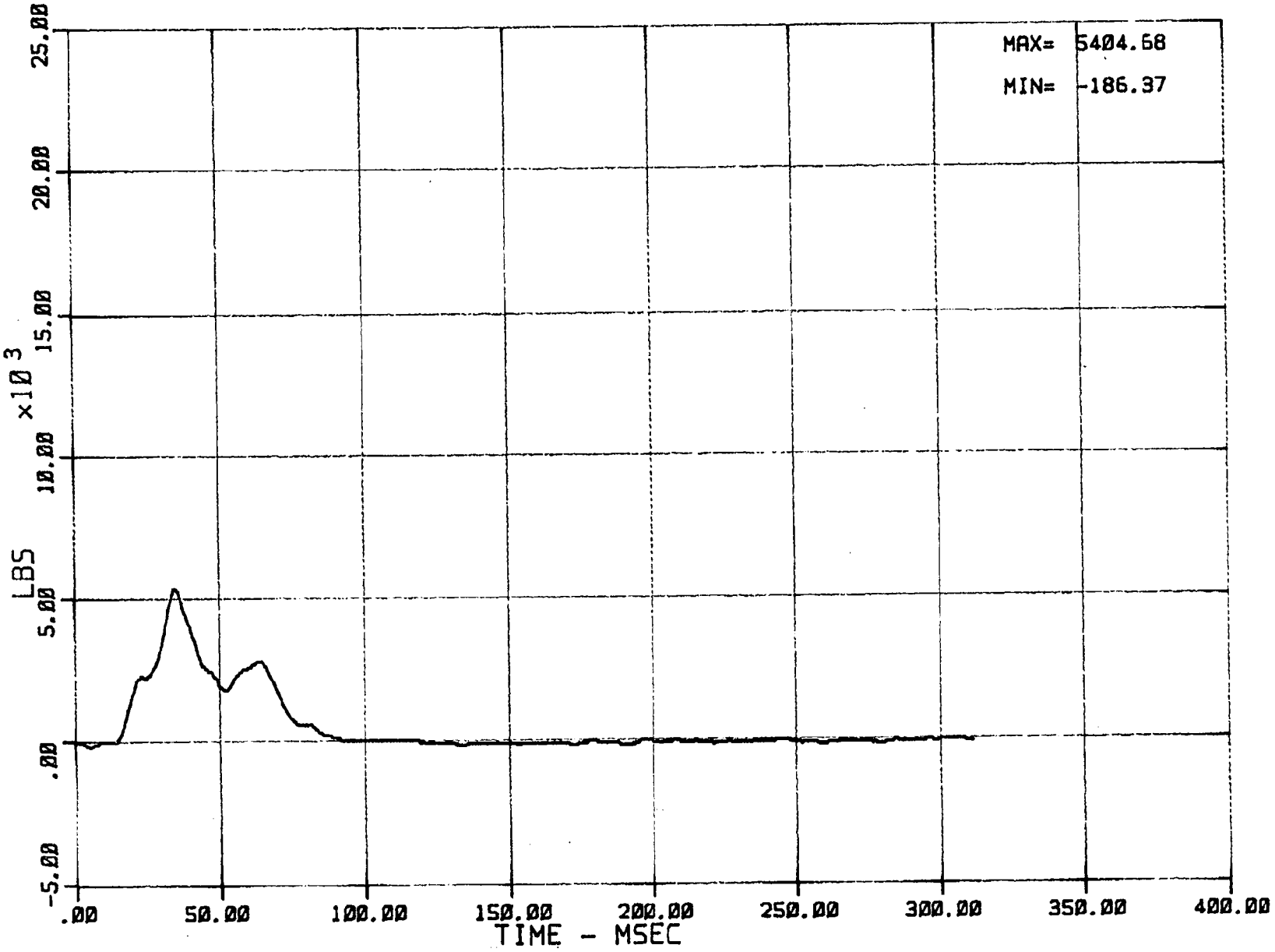



39 LC BA N B2 (BARRIER LOAD CELL B2)
MSE N02103 1983 FORD LTD 08/11/83



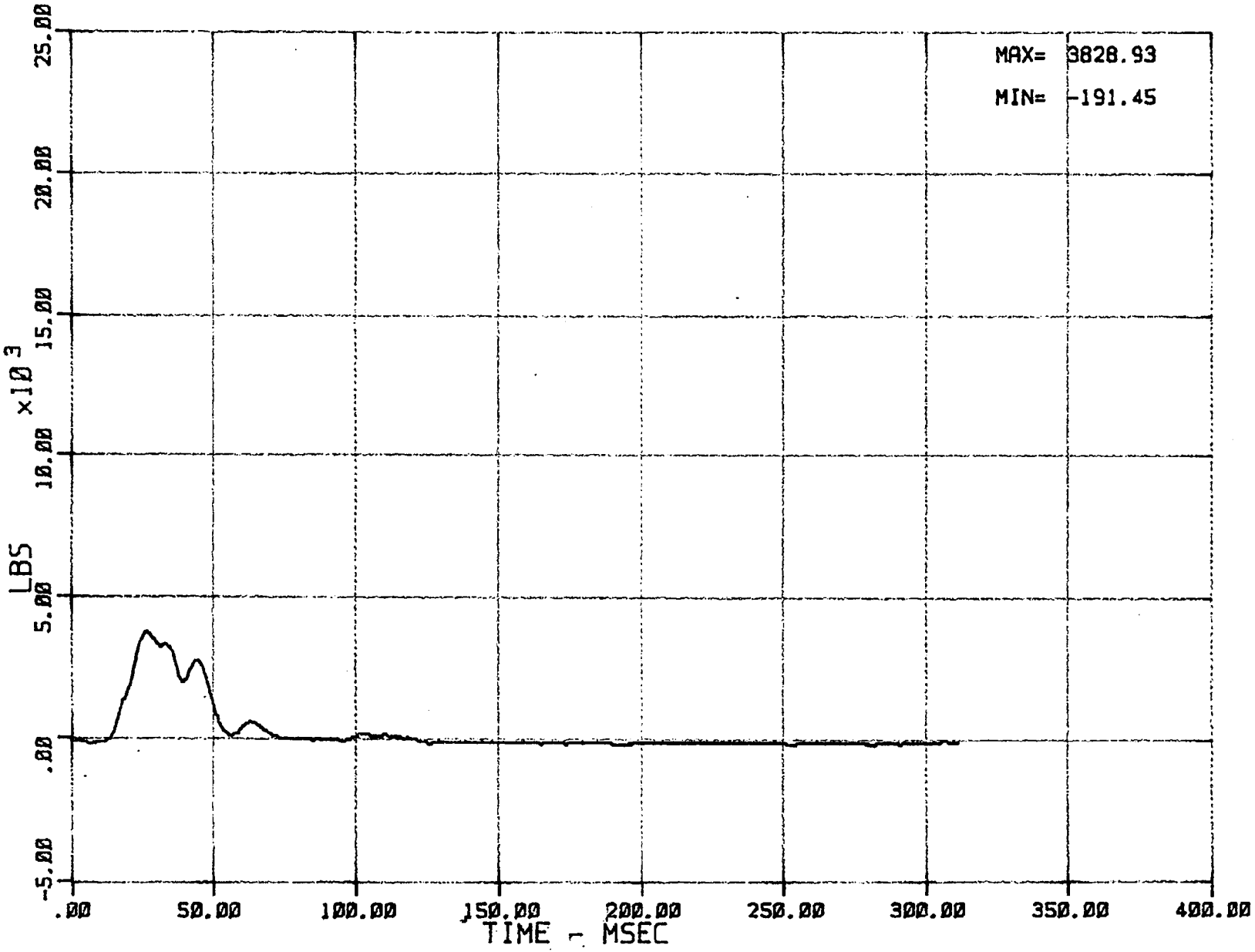

40 LC BA N B3 (BARRIER LOAD CELL B3)
MSE N02103 1983 FORD LTD

08/11/83

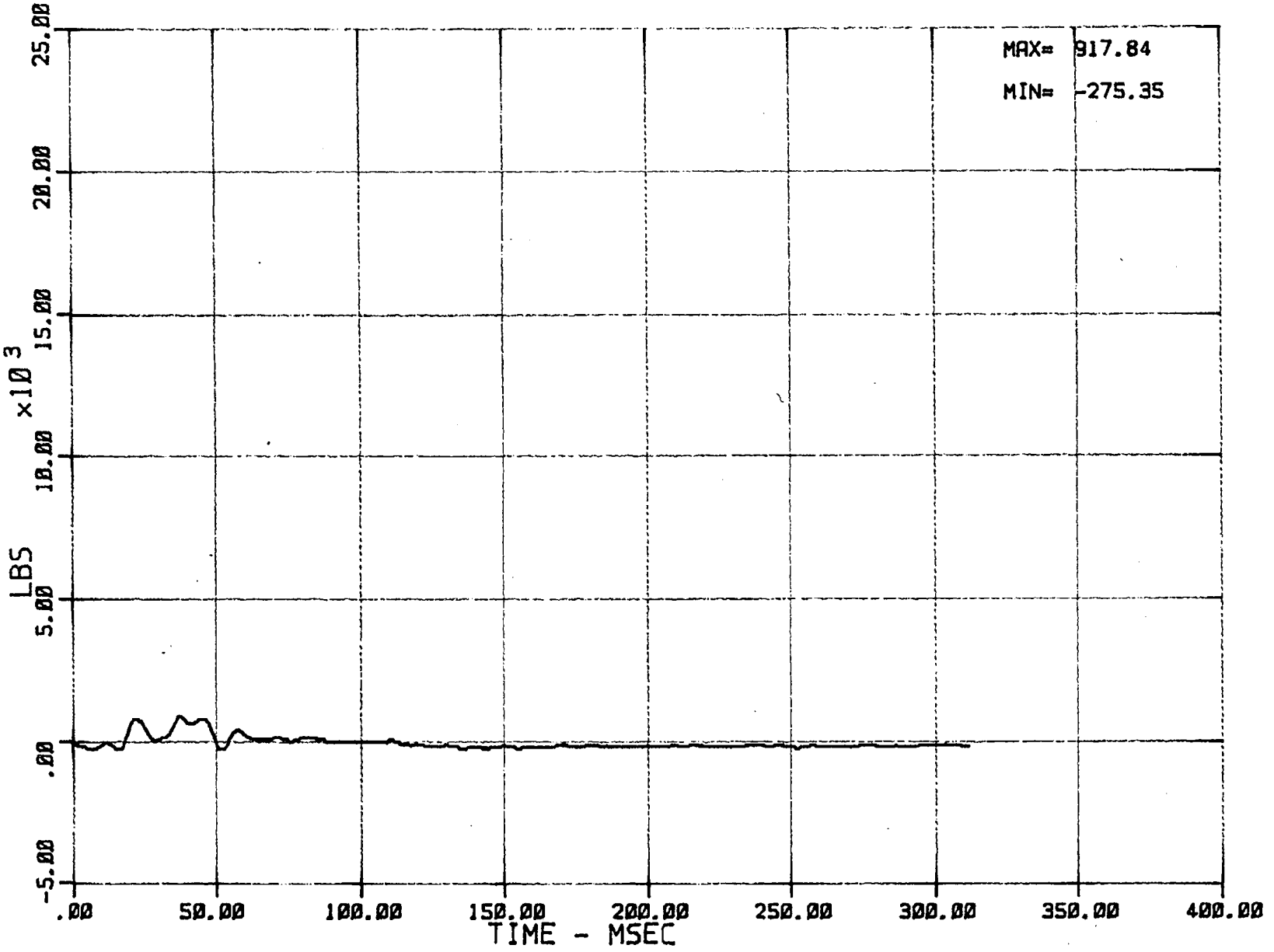



41 LC BA N C7 X (BARRIER LOAD CELL C7)
MSE N02103 1983 FORD LTD

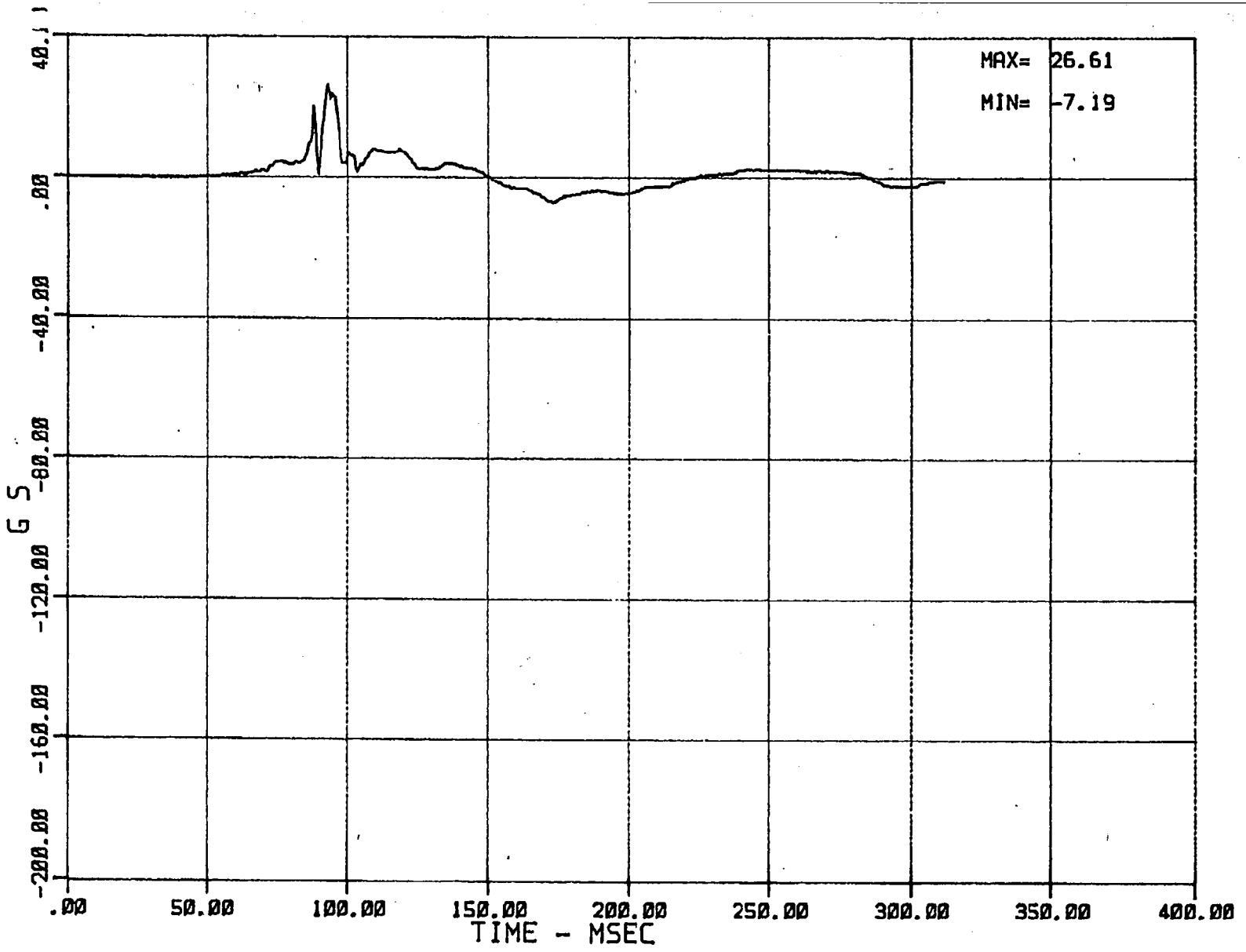
08/11/83



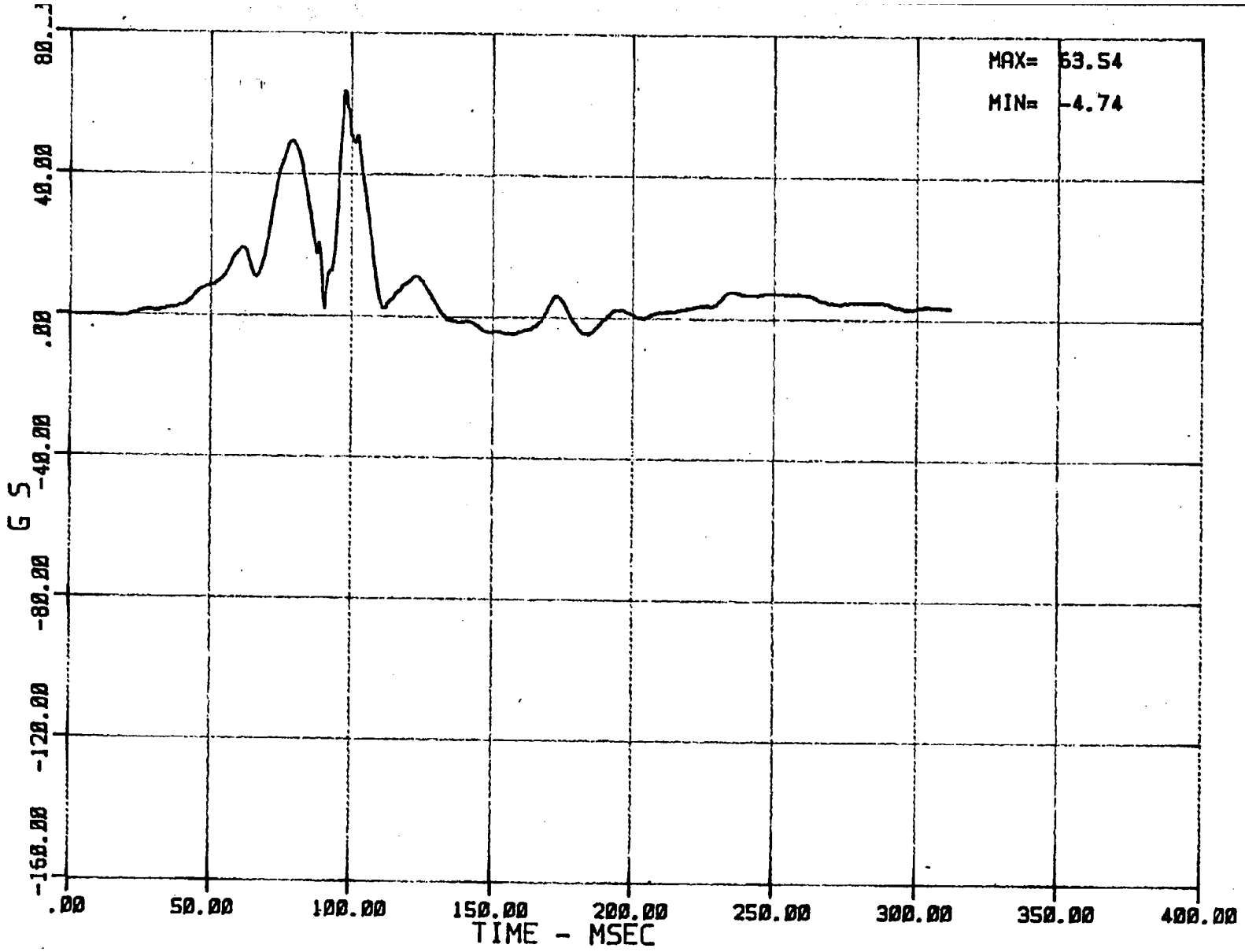

42 LC BA N C8 (BARRIER LOAD CELL C8)
MSE N02103 1983 FORD LTD 08/11/83




48 LC BA N DS X (BARRIER LOAD CELL DS)
MSE N02103 1983 FORD LTD 08/11/83

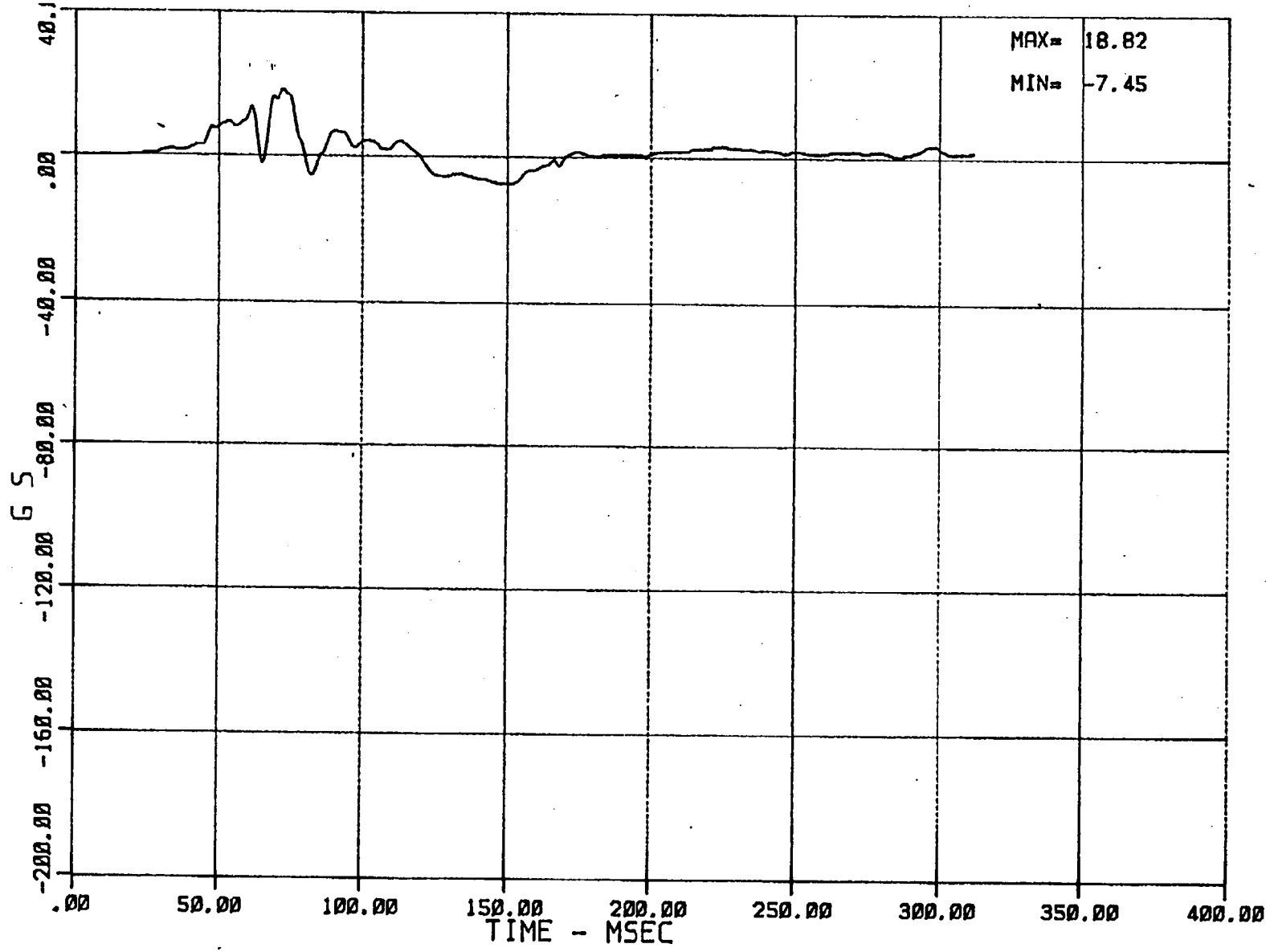



08 AC 01 2 HED Y (PASSENGER HEAD ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83



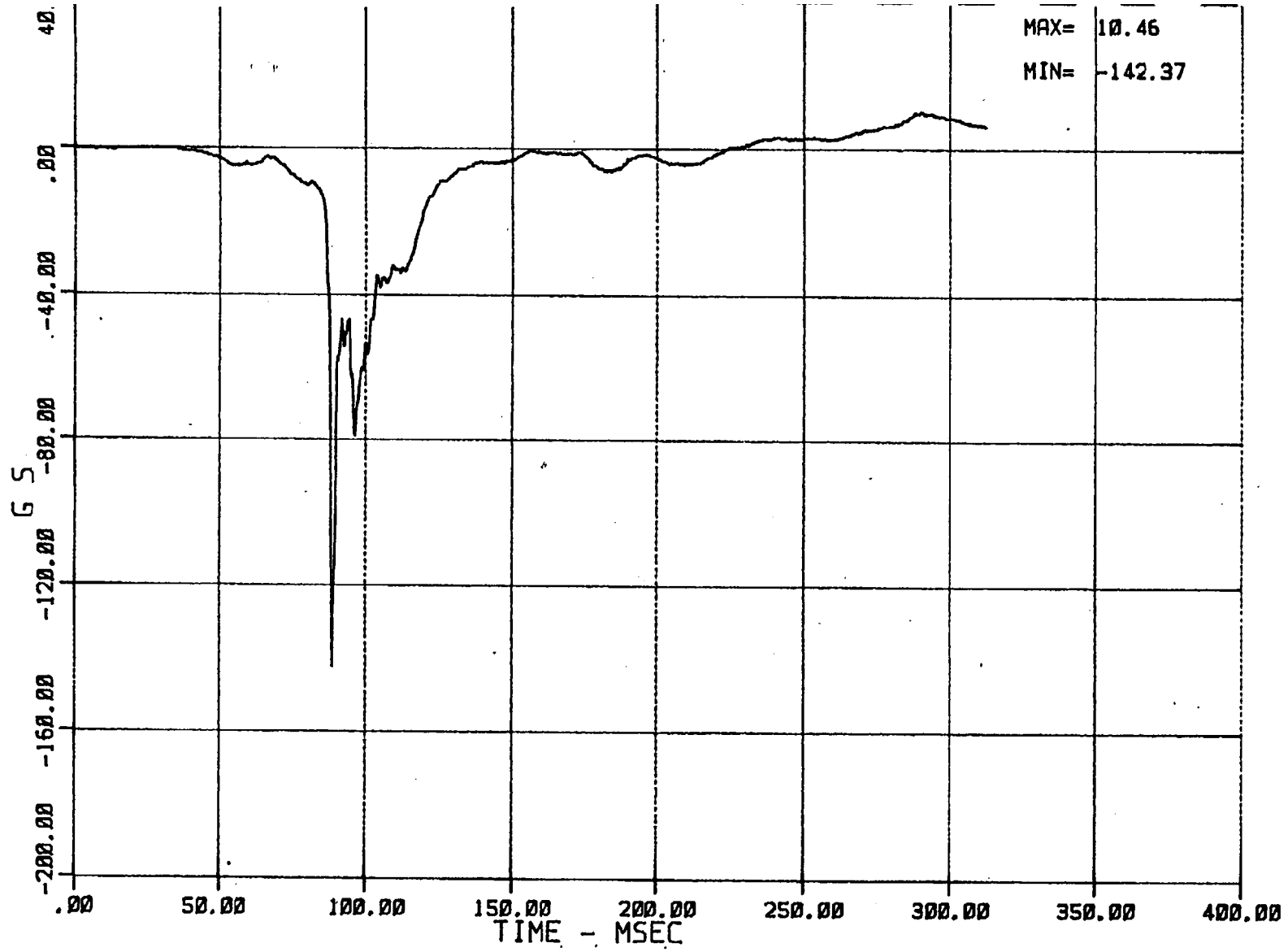

09 AC 01 2 HED Z (PASSENGER HEAD ACCEL. -- Z AXIS)
MSE N02103 1983 FORD LTD

08/11/83

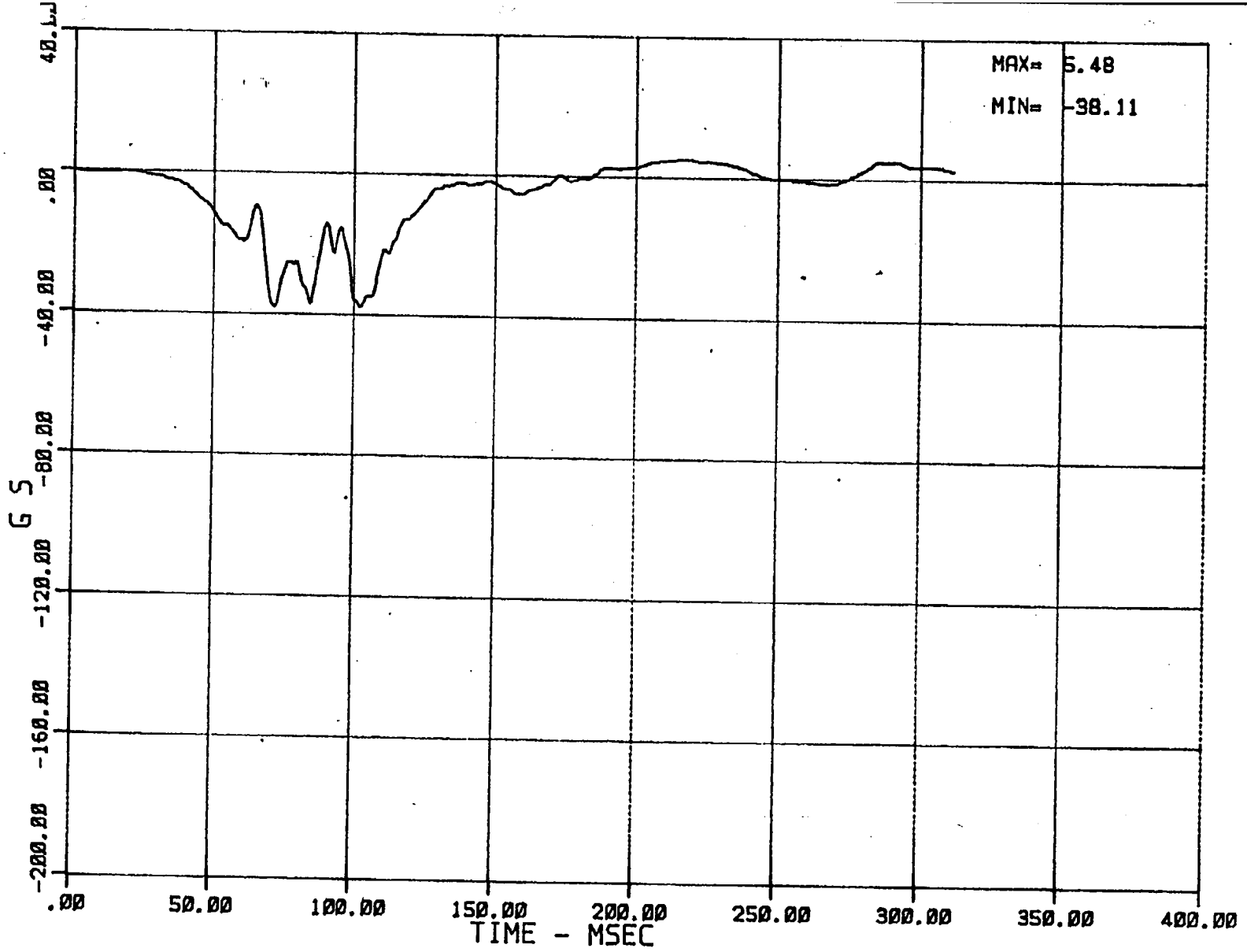



Ø6 AC Ø1 1 CST Z (DRIVERS CHEST ACCEL. -- Z AXIS)
MSE N02103 1983 FORD LTD

Ø8/11/83

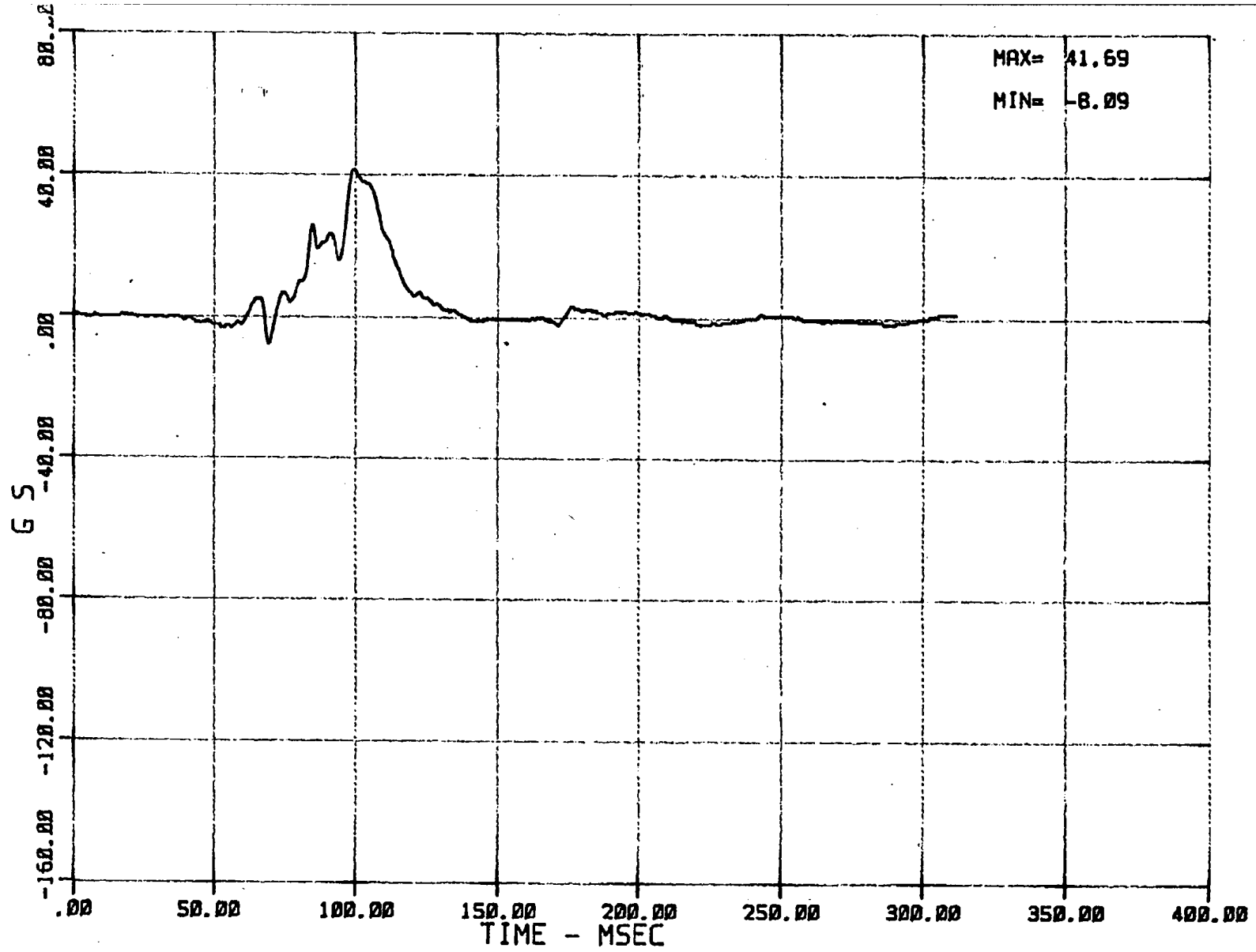



07 AC 01 2 HED X (PASSENGER HEAD ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

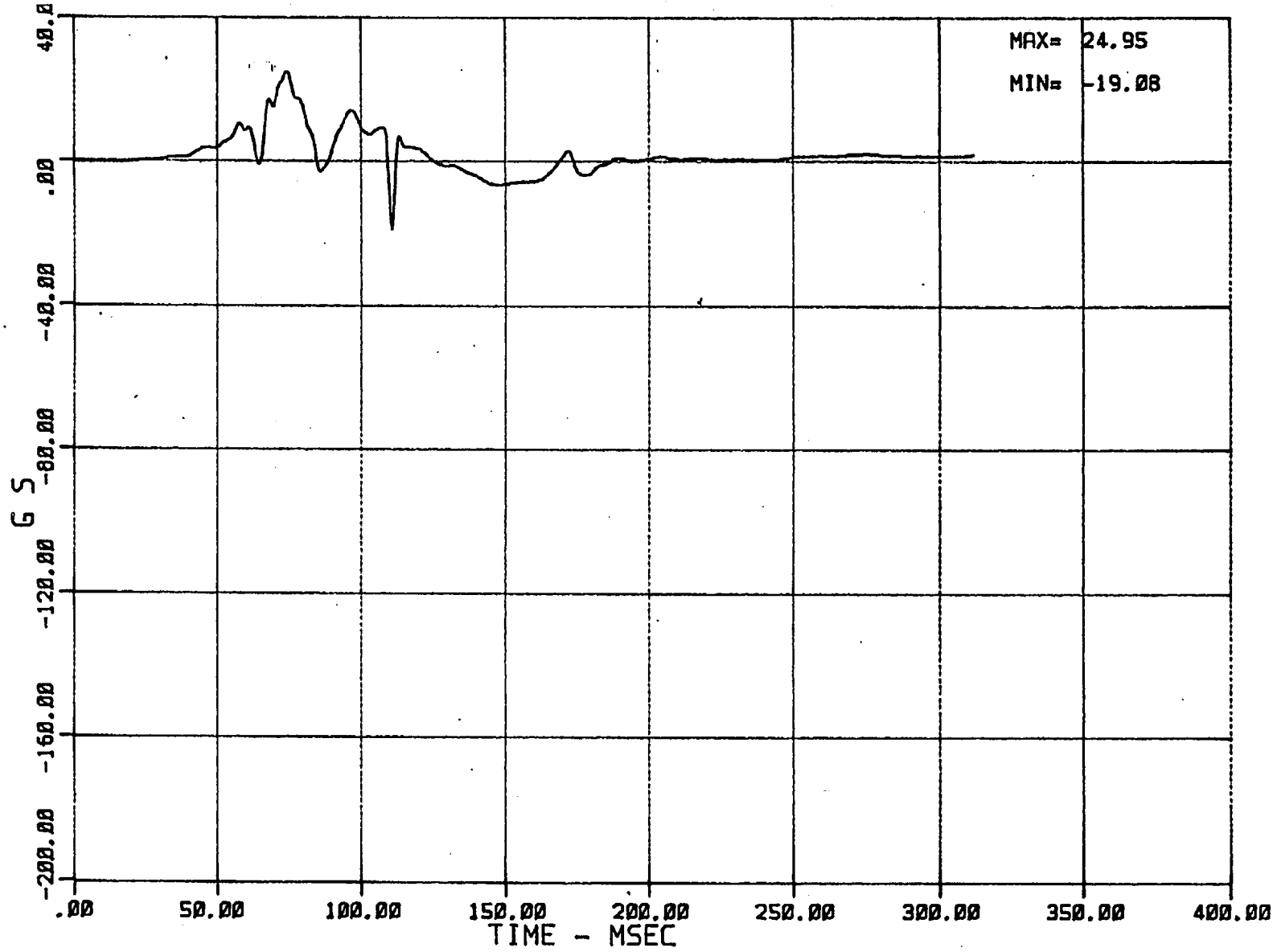



10 AC 01 2 CST X (PASSENGER CHEST ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD

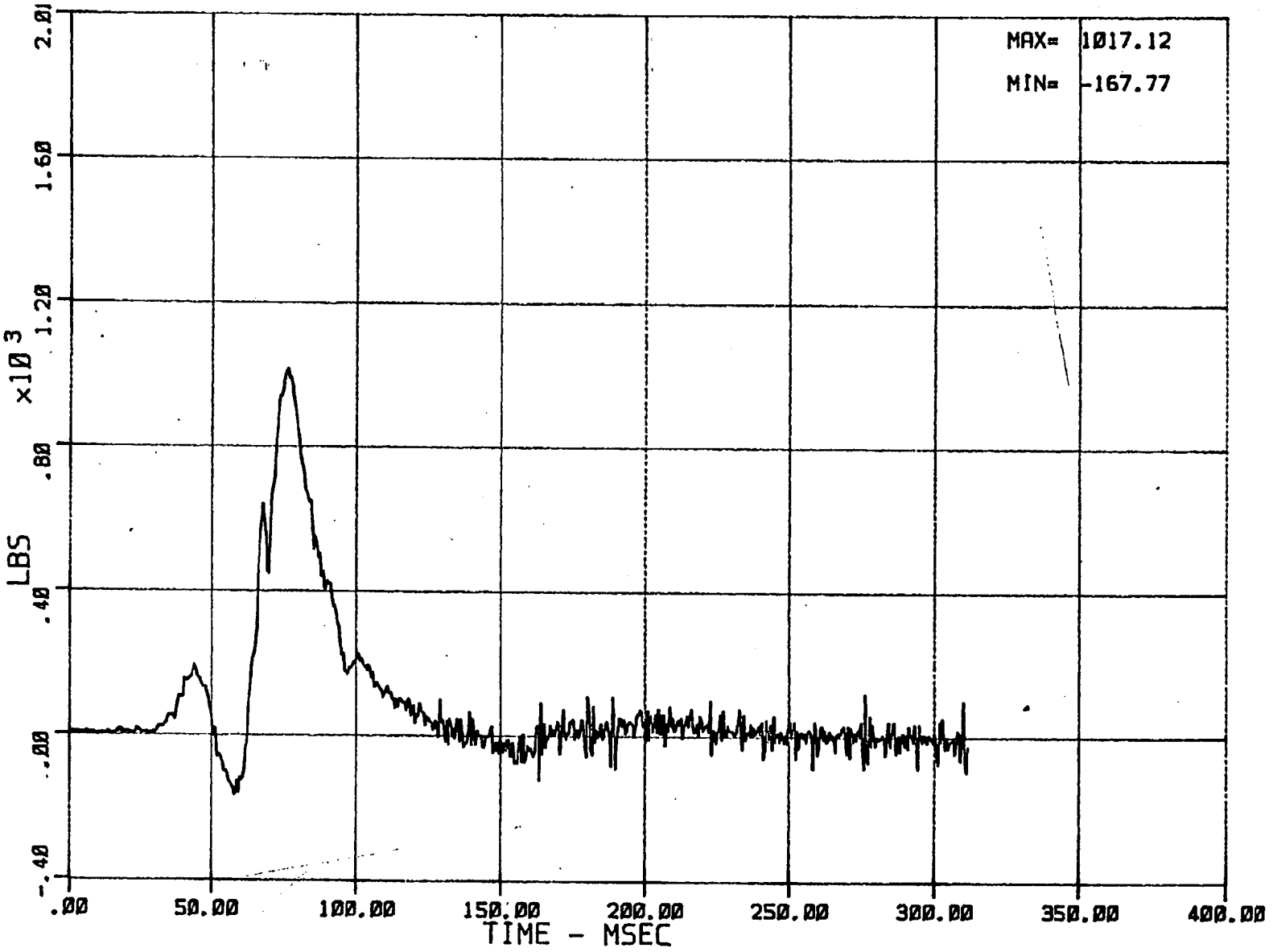
08/11/83




11 AC 01 2 CST Y (PASSENGER CHEST ACCEL. -- Y AXIS)
MSE N02103 1983 FORD LTD 08/11/83.

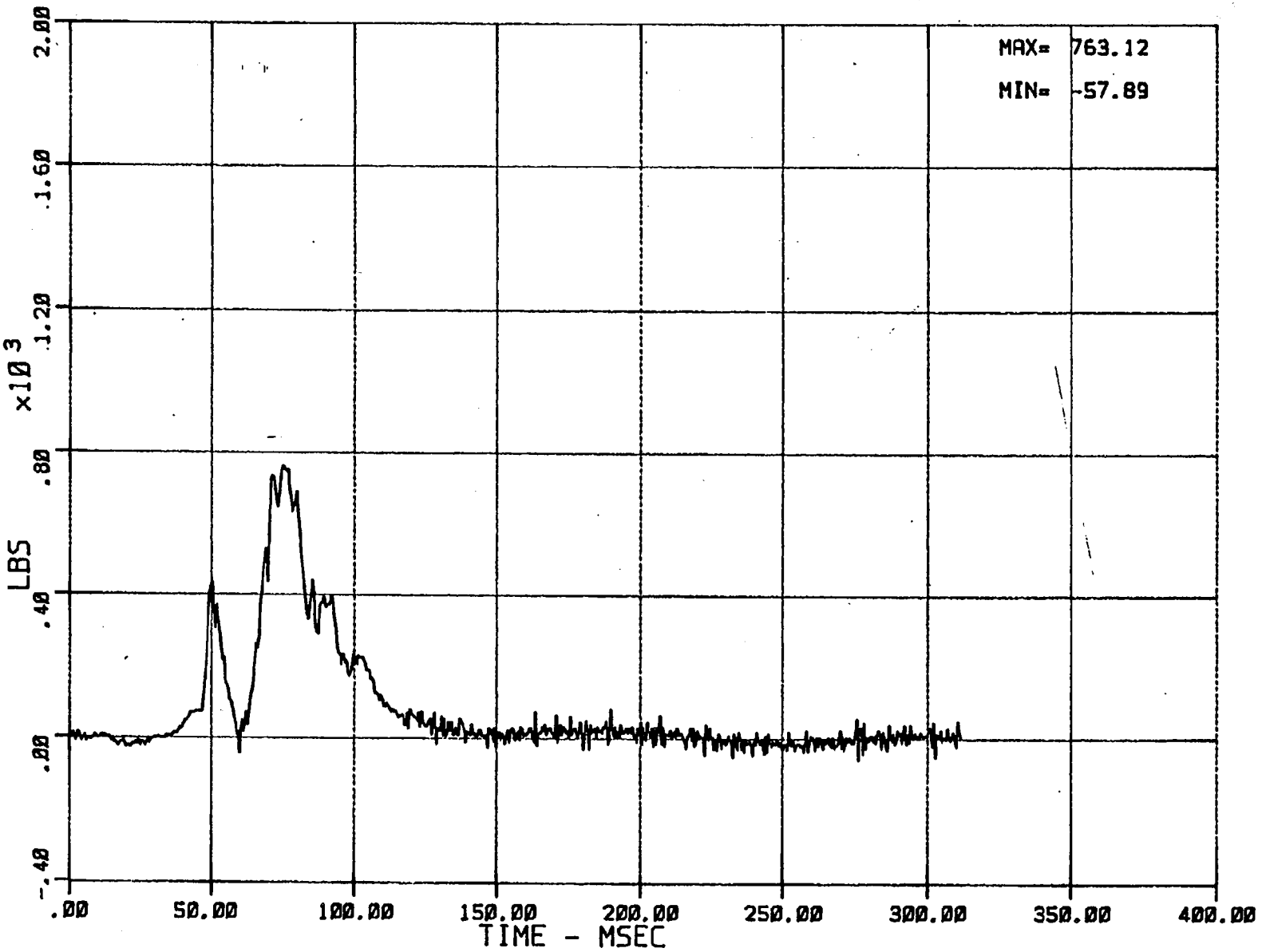



12 AC 01 2 CST Z (PASSENGER CHEST ACCEL. -- Z AXIS)
MSE N02103 1983 FORD LTD 08/11/83



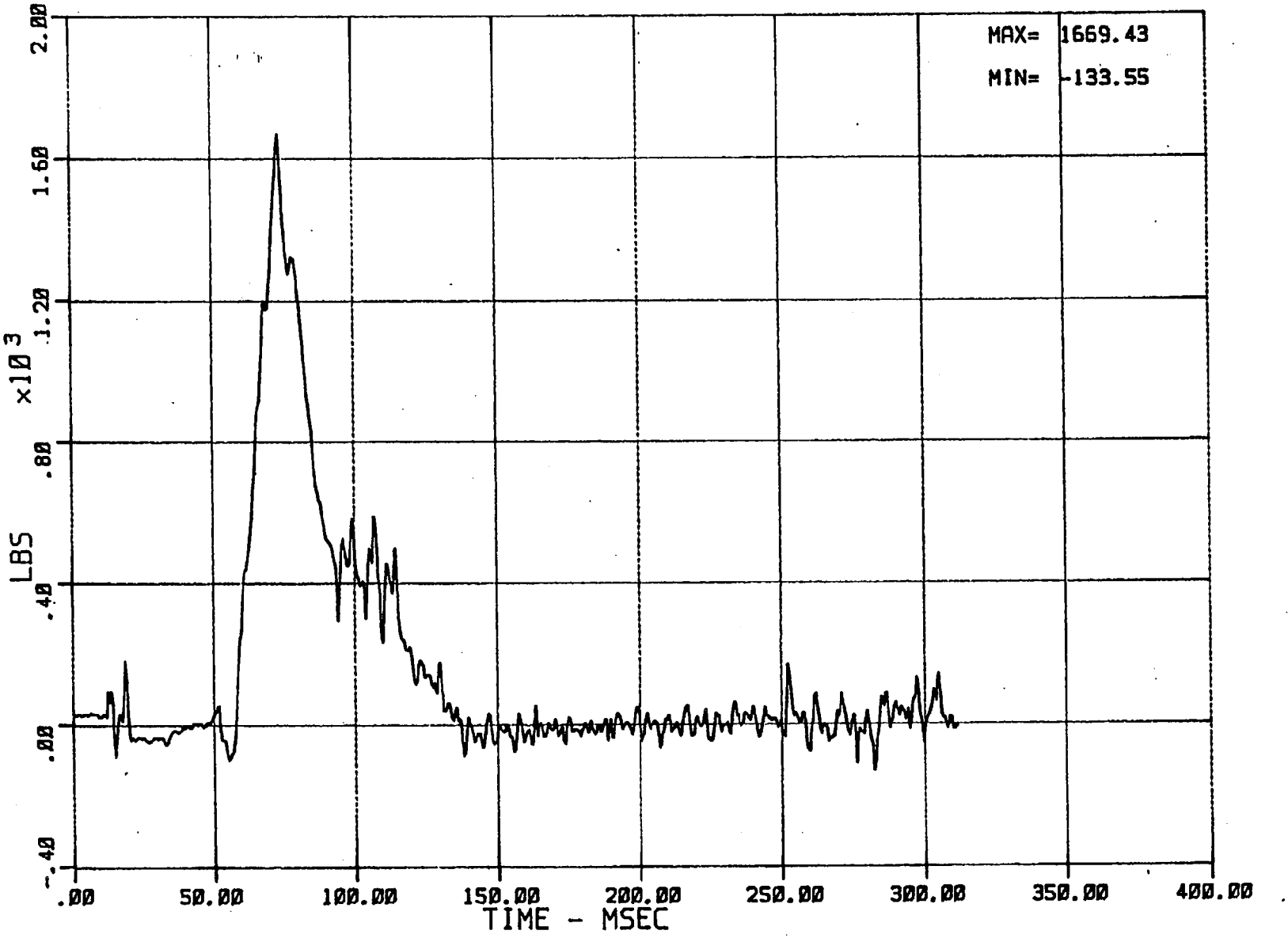

13 LC 01 1 LFM 0 (DRIVERS LEFT FEMUR FORCE)
MSE N02103 1983 FORD LTD

08/11/83

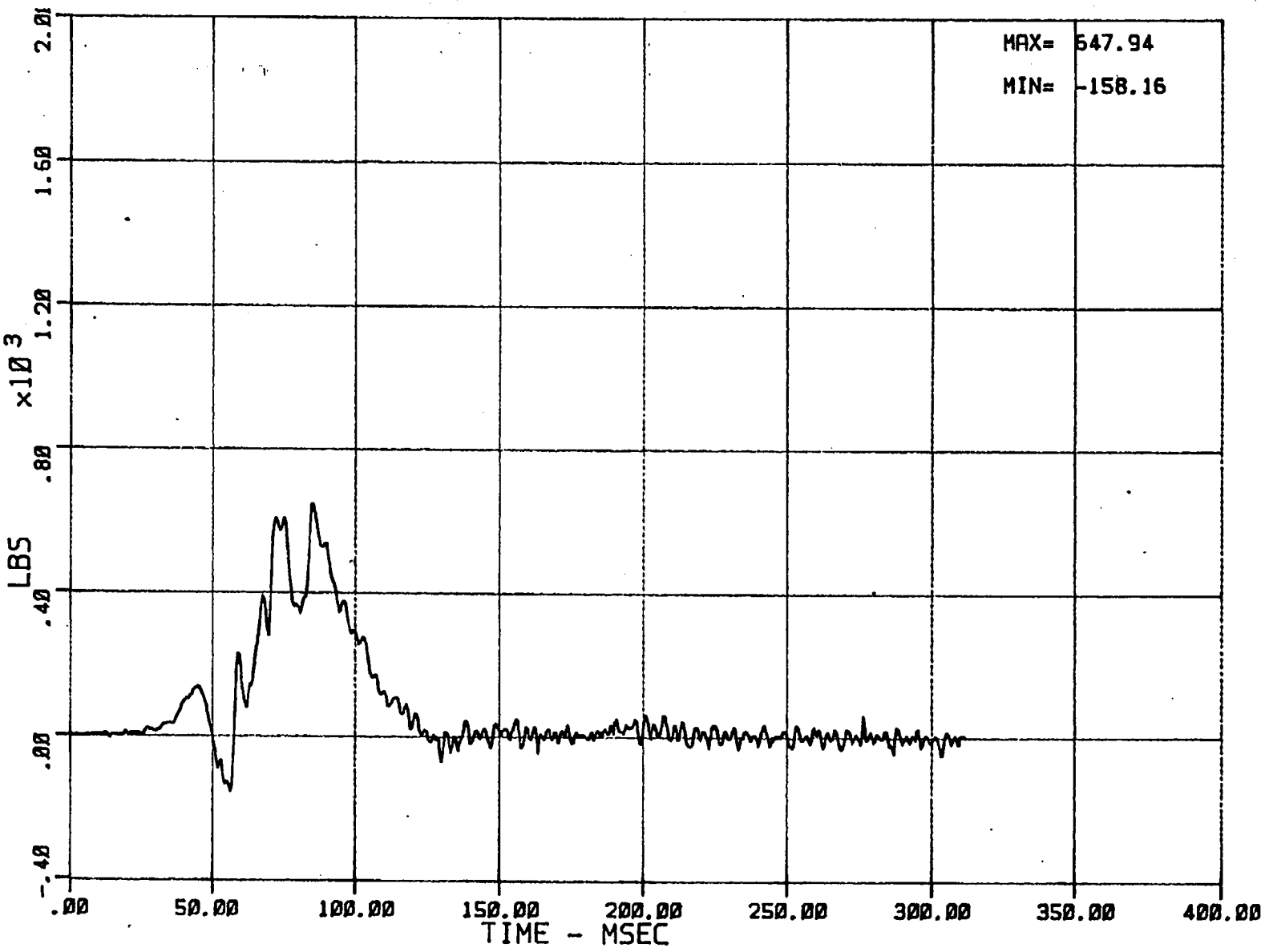



14 LC 01 1 RFM 0 (DRIVERS RIGHT FEMUR FORCE)
MSE N02103 1983 FORD LTD

08/11/83

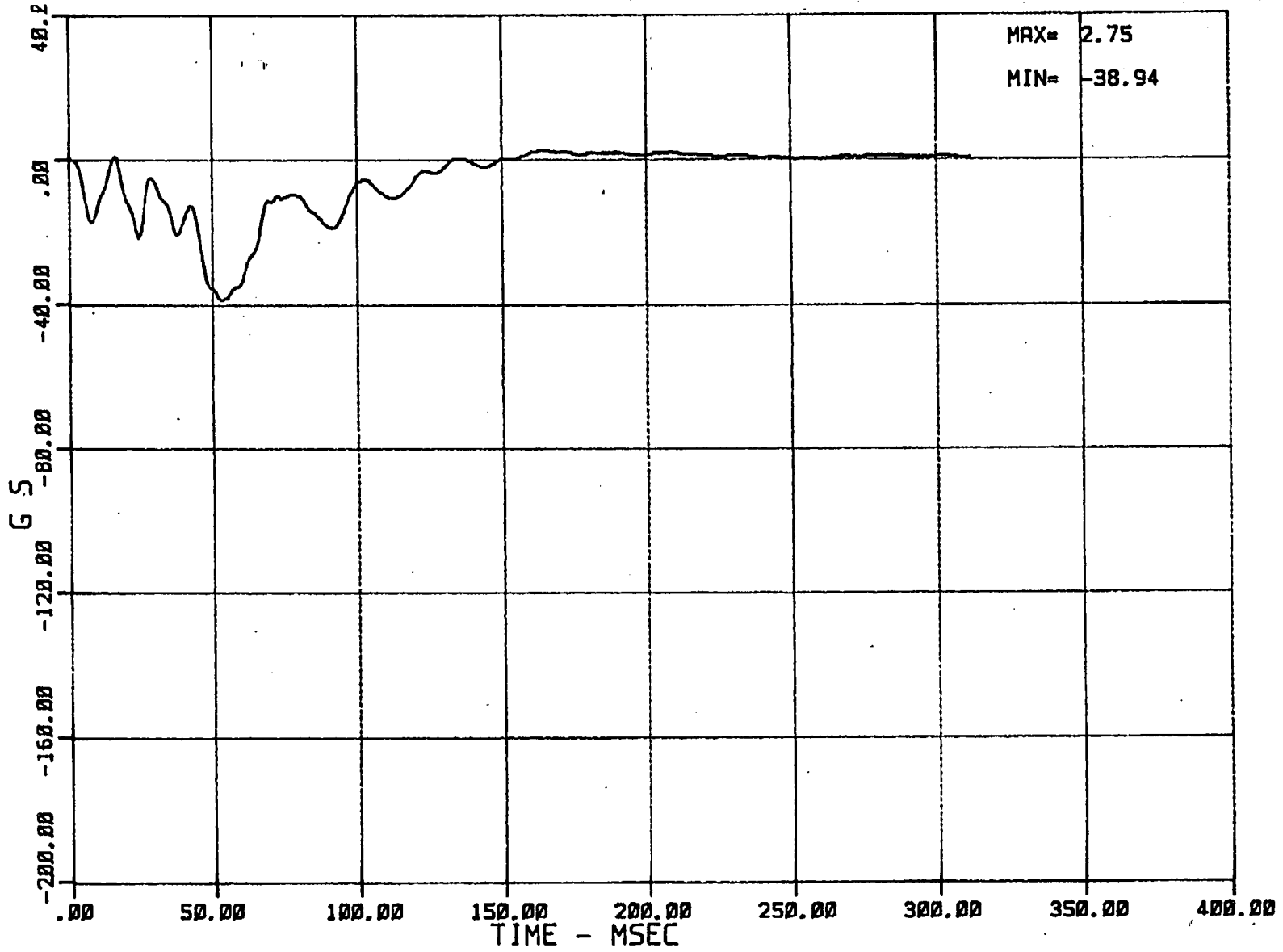



15 LC 01 2 LFM 0 (PASSENGERS LEFT FEMUR FORCE)
MSE N02103 1983 FORD LTD 08/11/83

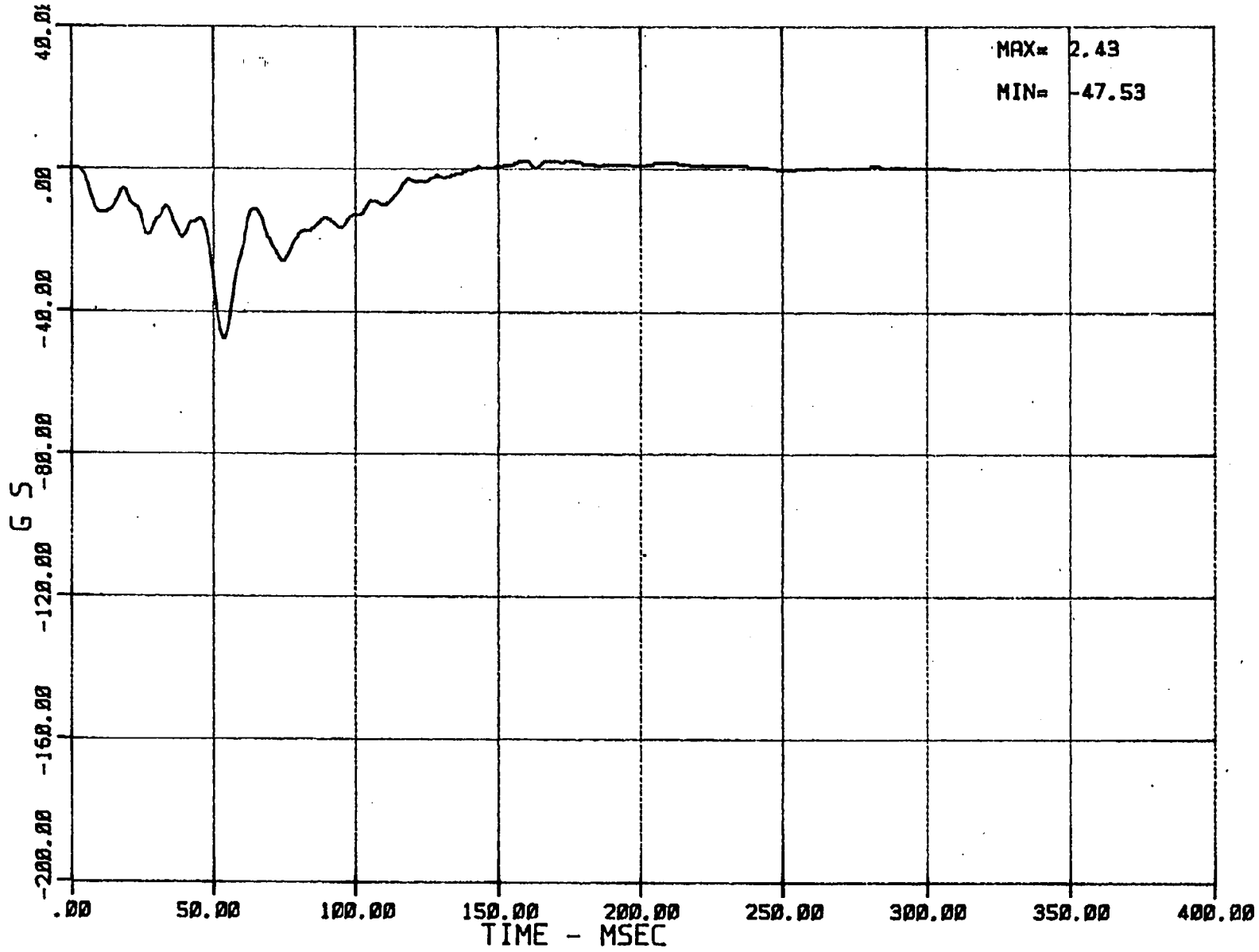



16 LC 01 2 RFM 0 (PASSENGERS RIGHT FEMUR FORCE)
MSE N02103 1983 FORD LTD

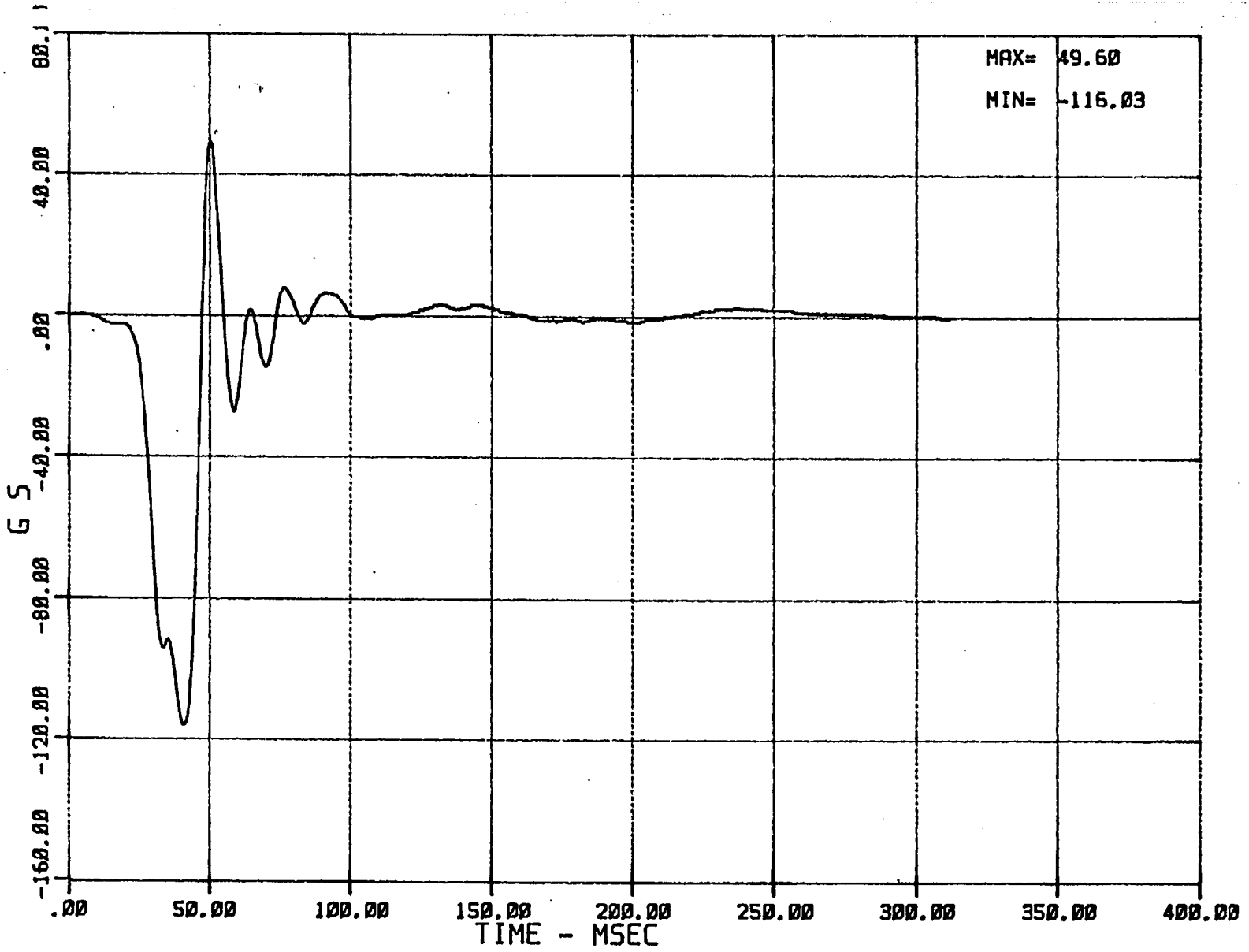
08/11/83



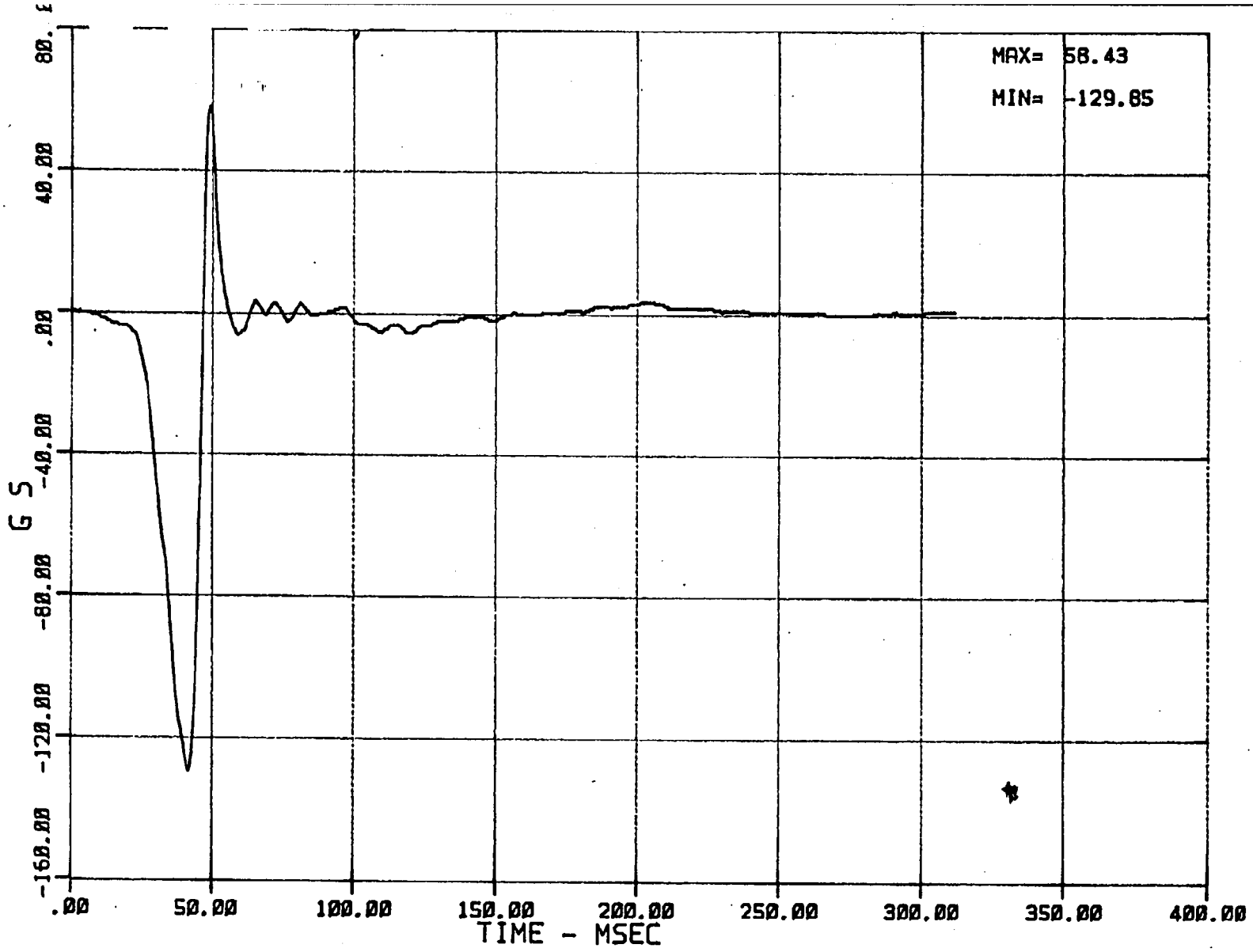

17 AC 01 N RFF X (RIGHT FRONT FLOOR ACCEL.)
MSE N02103 1983 FORD LTD 08/11/83




18 AC 01 N LRF X (LEFT REAR FLOOR ACCEL.)
MSE N02103 1983 FORD LTD 08/11/83

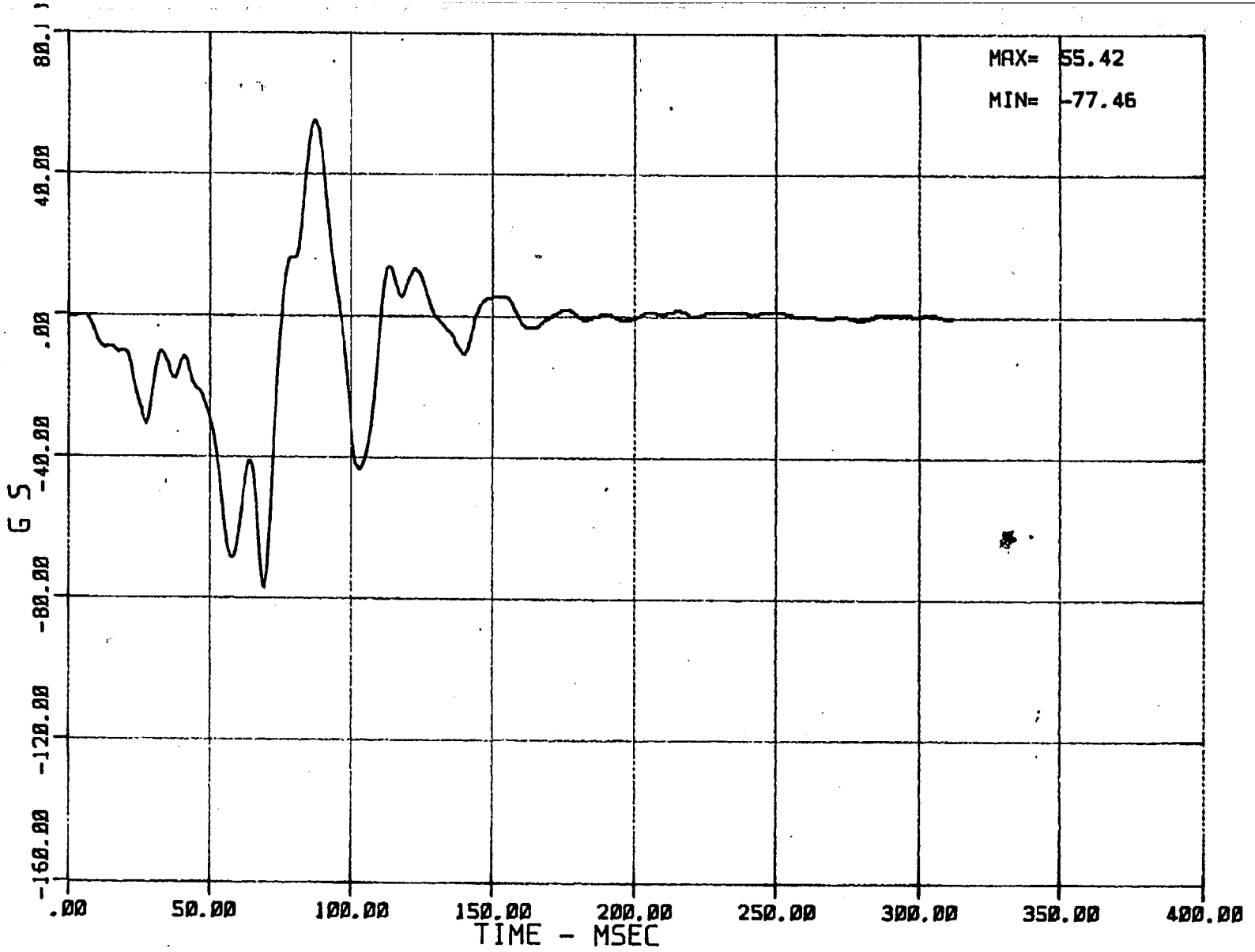



19 AC 01 N ENG X (ENGINE ACCEL. TOP -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

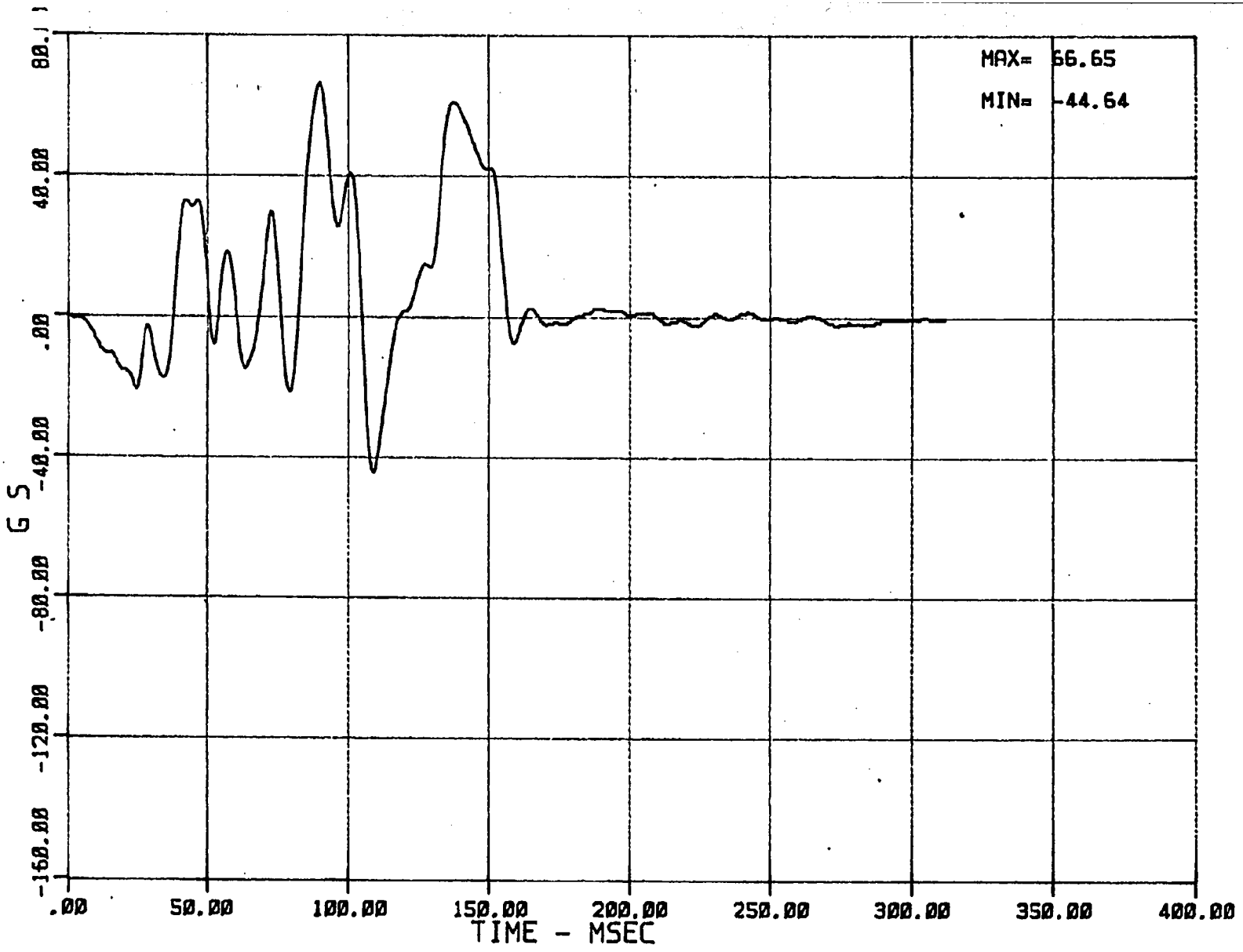



20 AC 01 N ENG X (ENGINE ACCEL. BOTTOM - X AXIS)
MSE N02103 1983 FORD LTD

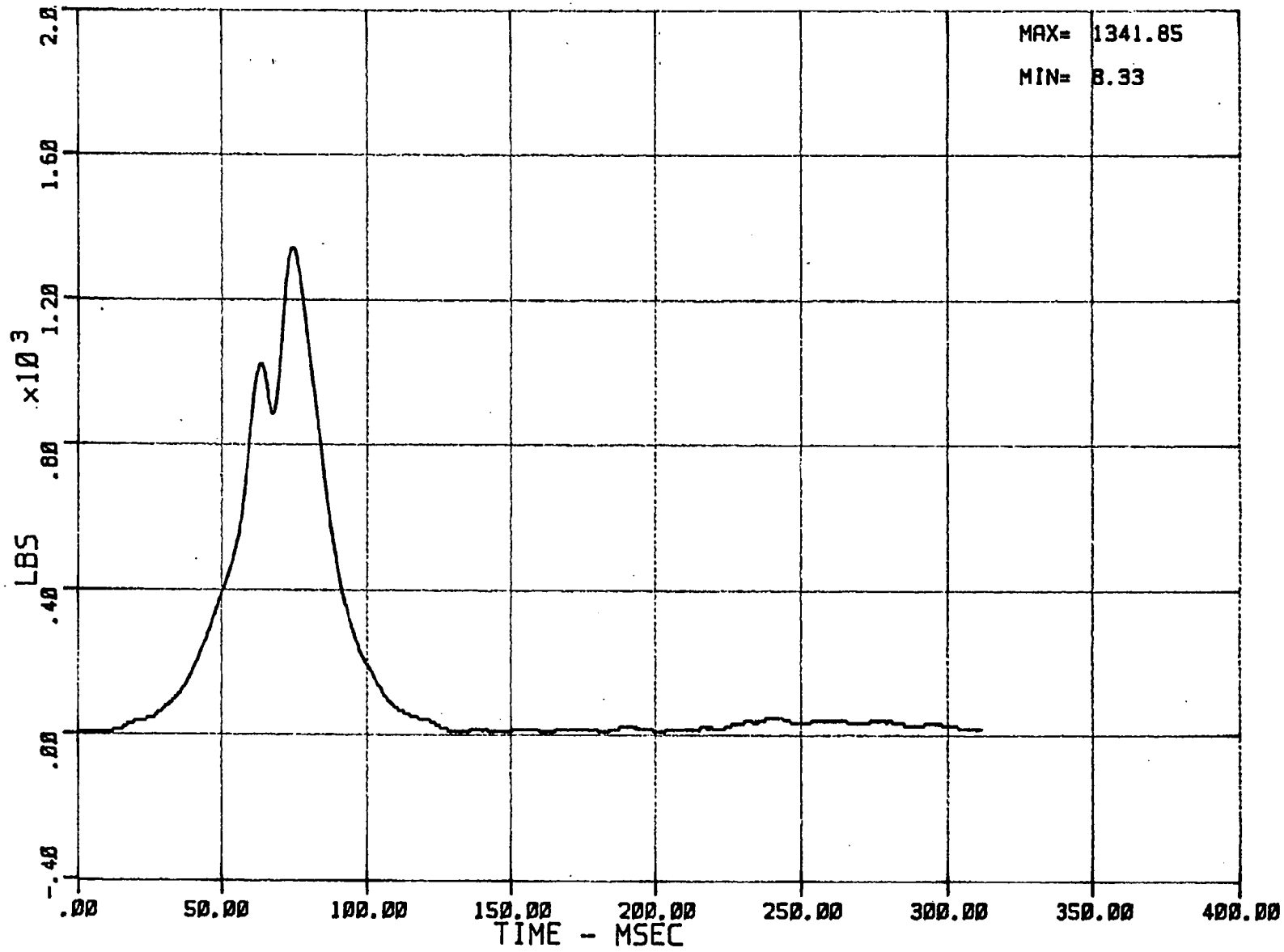
08/11/83




21 AC 01 N BCR X (RIGHT FRONT WHEEL ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

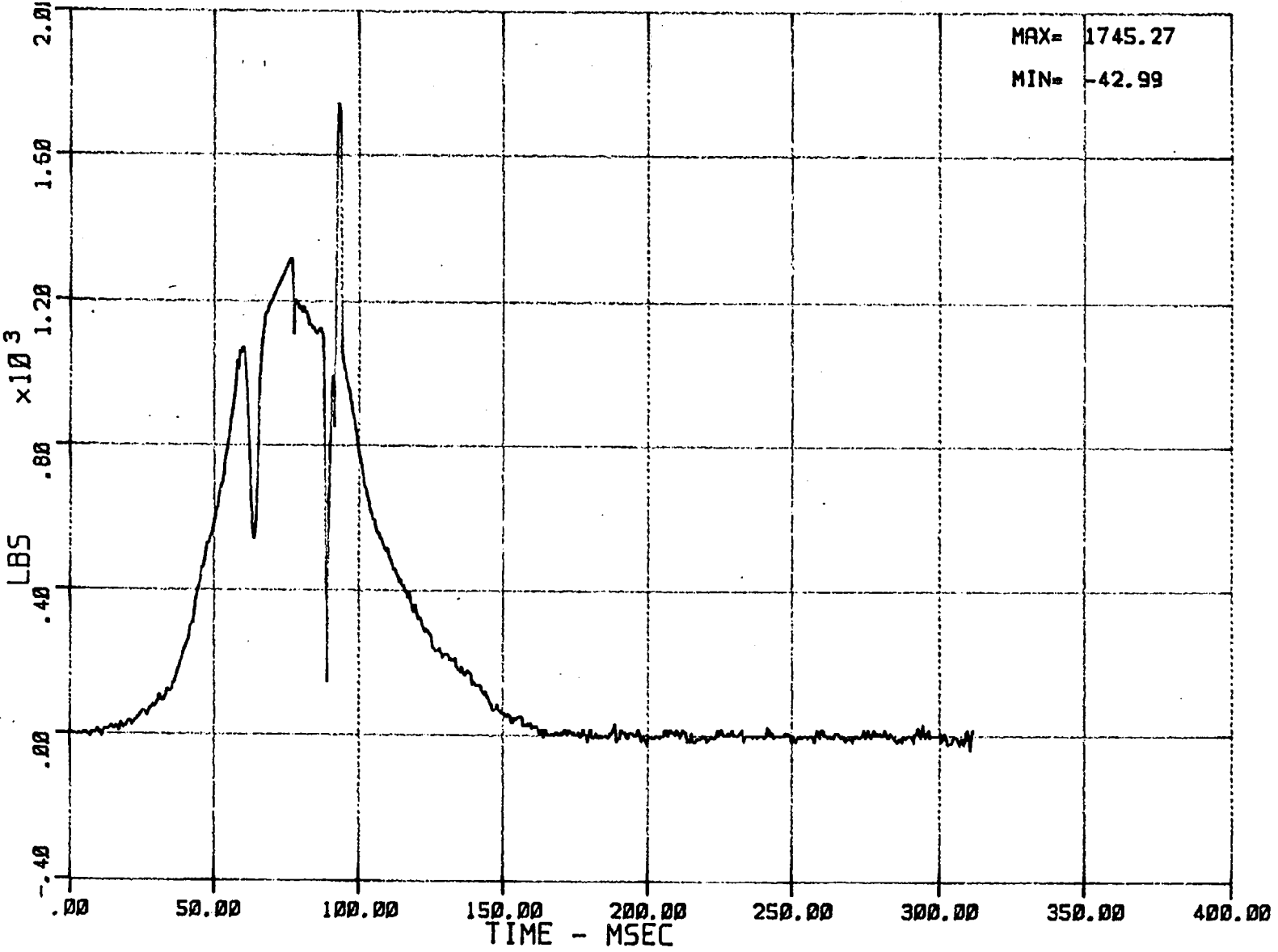



22.AC Ø1 N BCL X (LEFT FRONT WHEEL ACCEL. -- X AXIS)
MSE N02103 1983 FORD LTD 08/11/83

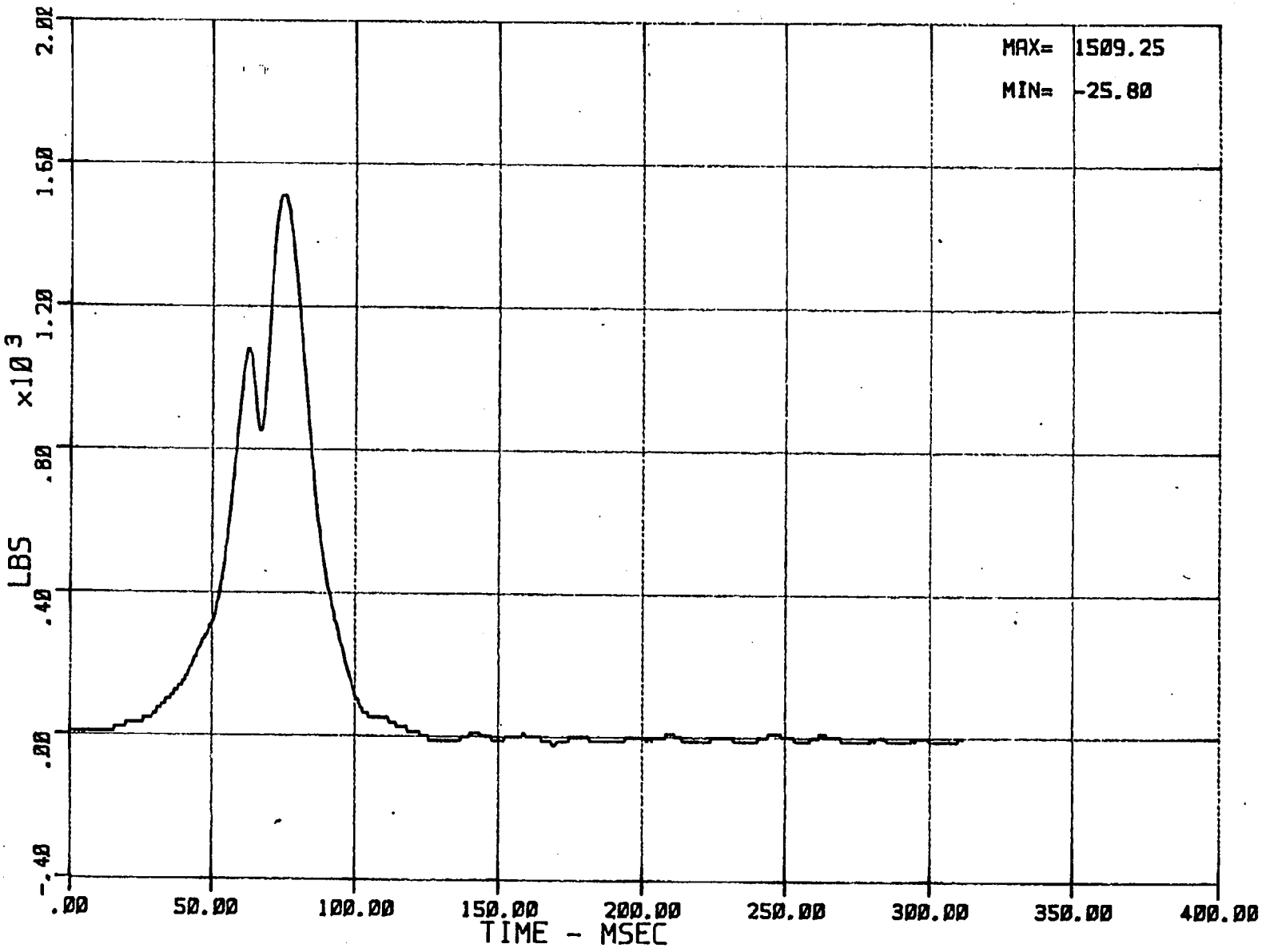



23 LC 01 1 LBO 0 (DRIVERS LAP BELT FORCE)
MSE N02103 1983 FORD LTD

08/11/83

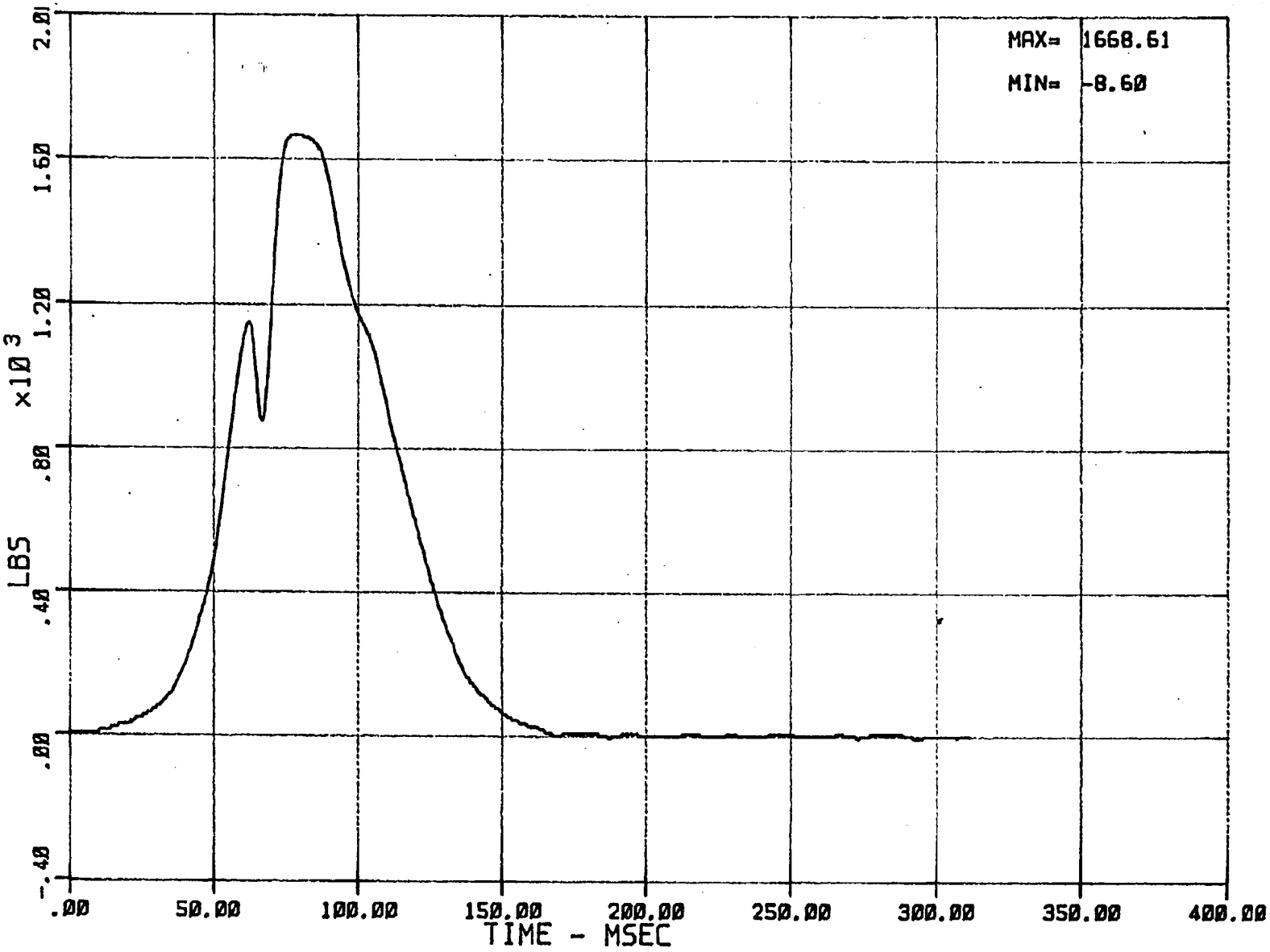



24 LC 01 1 SHB 0 (DRIVERS SHOULDER BELT FORCE)
MSE N02103 1983 FORD LTD 08/11/83

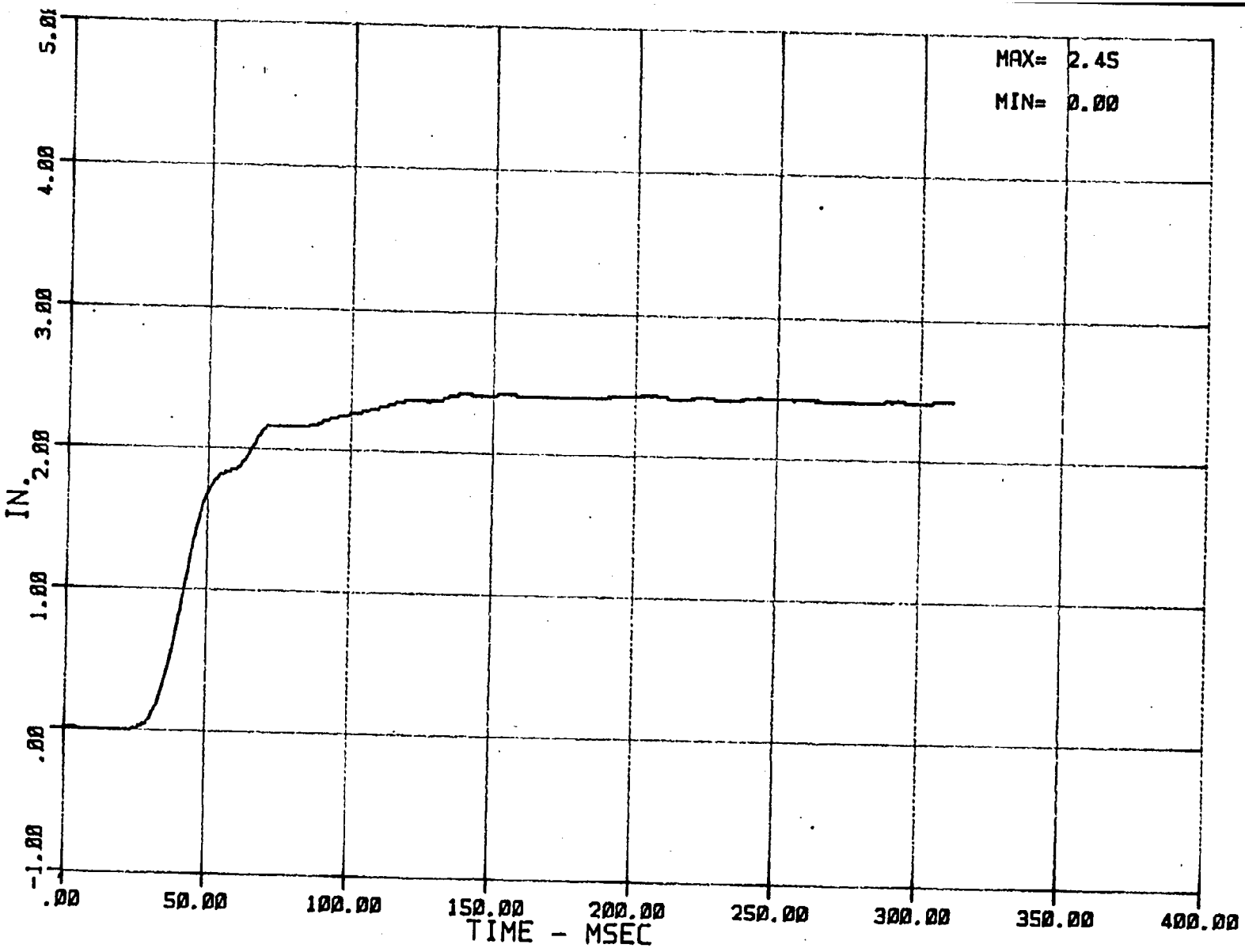



25 LC 01 2 LBO 0 (PASSENGER LAP BELT FORCE)
MSE N02103 1983 FORD LTD

08/11/83

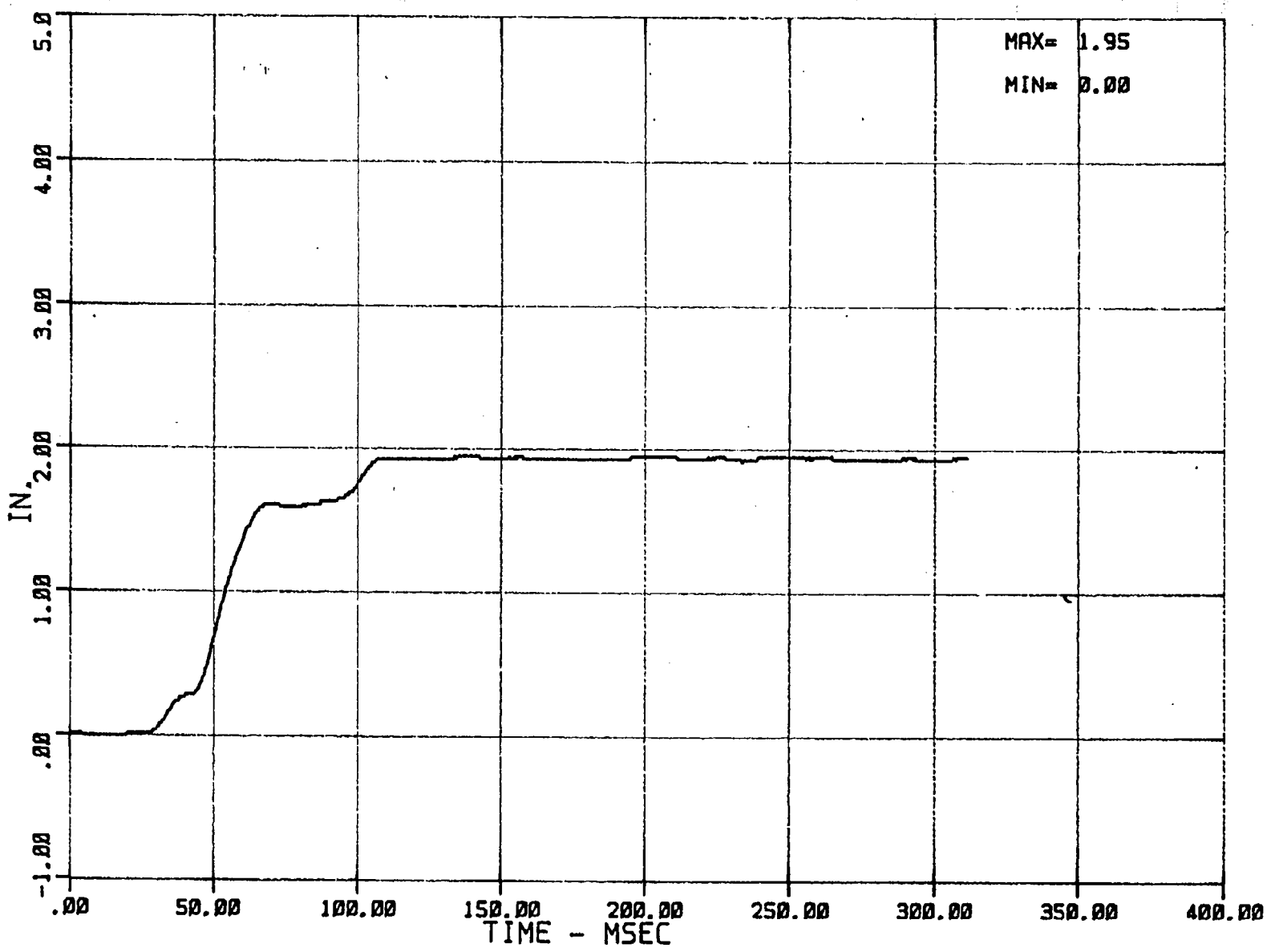



26 LC 01 2 SHB 0 (PASSENGERS SHOULDER BELT FORCE)
MSE N02103 1983 FORD LTD 08/11/83

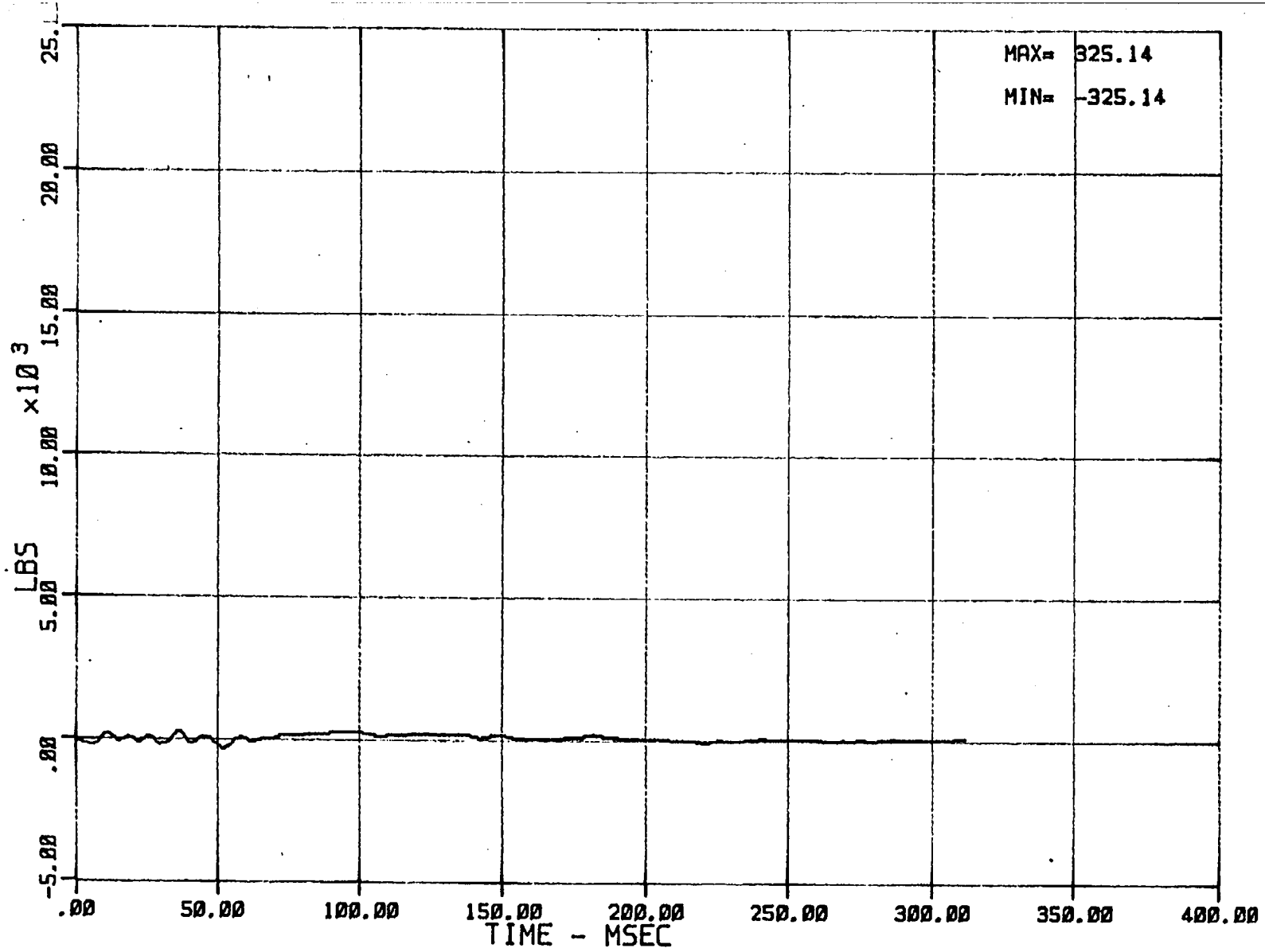



27 DT 01 1 SHB 0 (DRIVER SHOULDER BELT PULLOUT)
MSE N02103 1983 FORD LTD

08/11/83

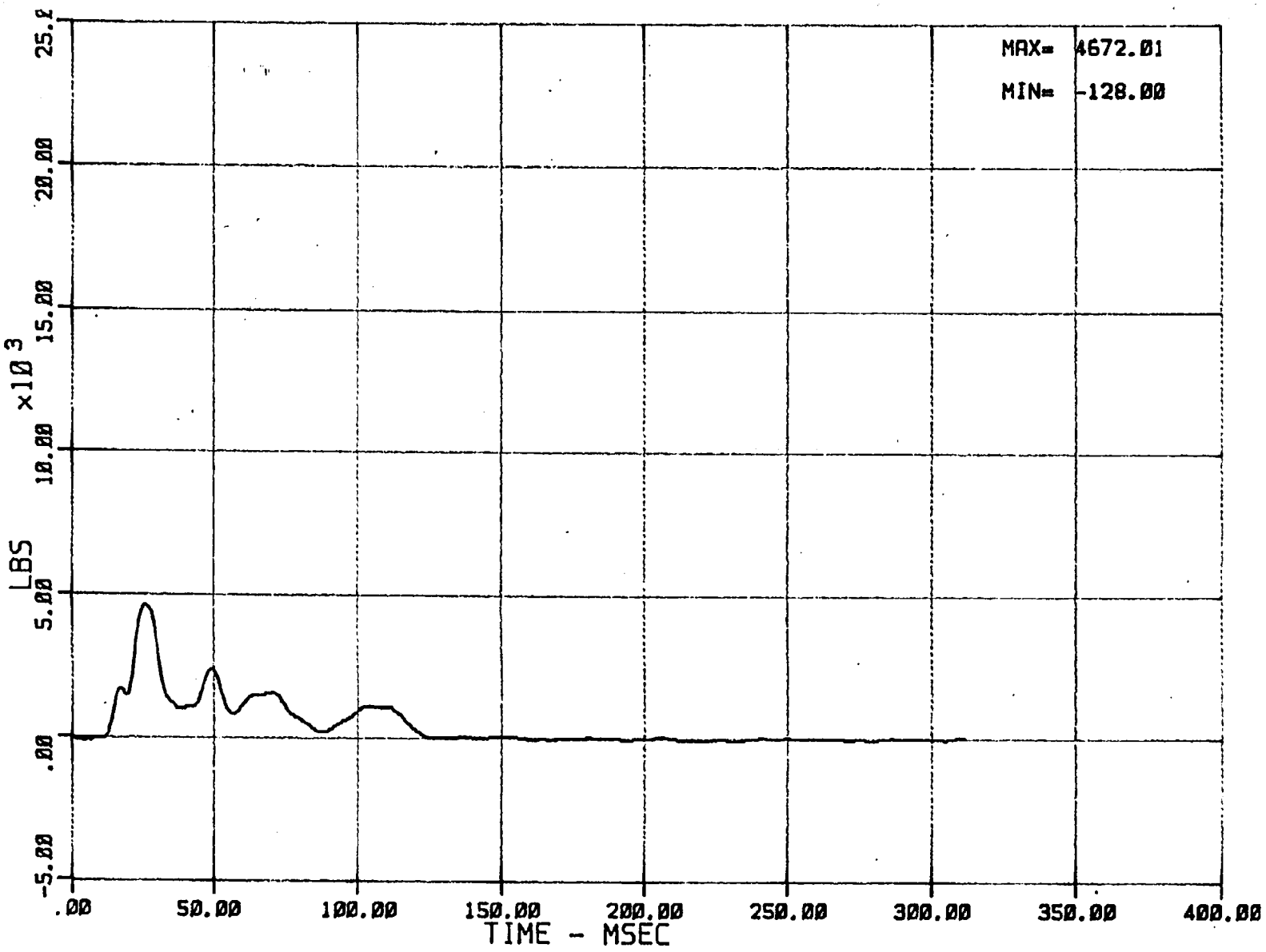



28 DT 01 2 SHB 0 (PASSENGER SHOULDER BELT PULLOUT)
MSE N02103 1983 FORD LTD 08/11/83



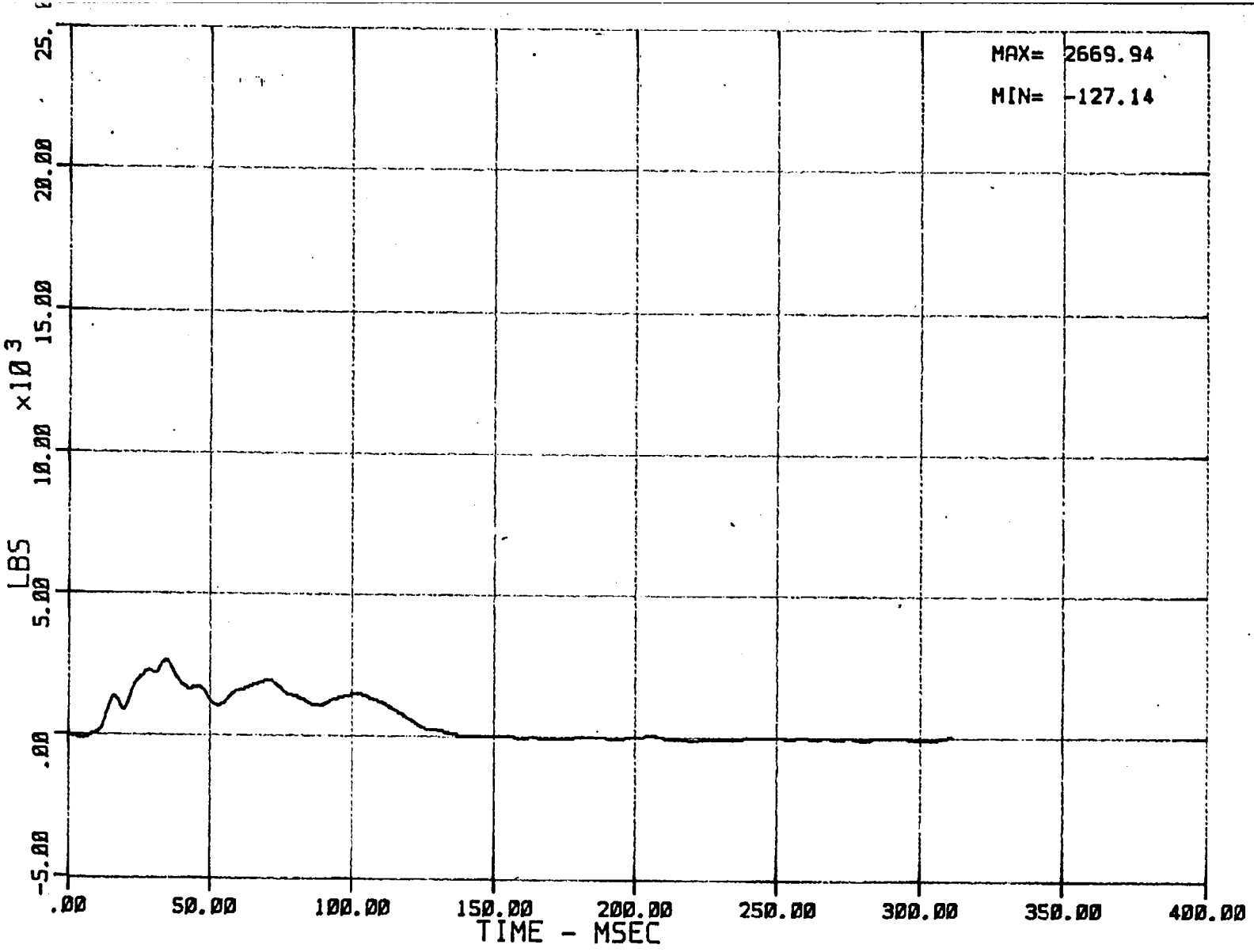

33 LC BA N AS X (BARRIER LOAD CELL AS)
MSE N02103 1983 FORD LTD

08/11/83



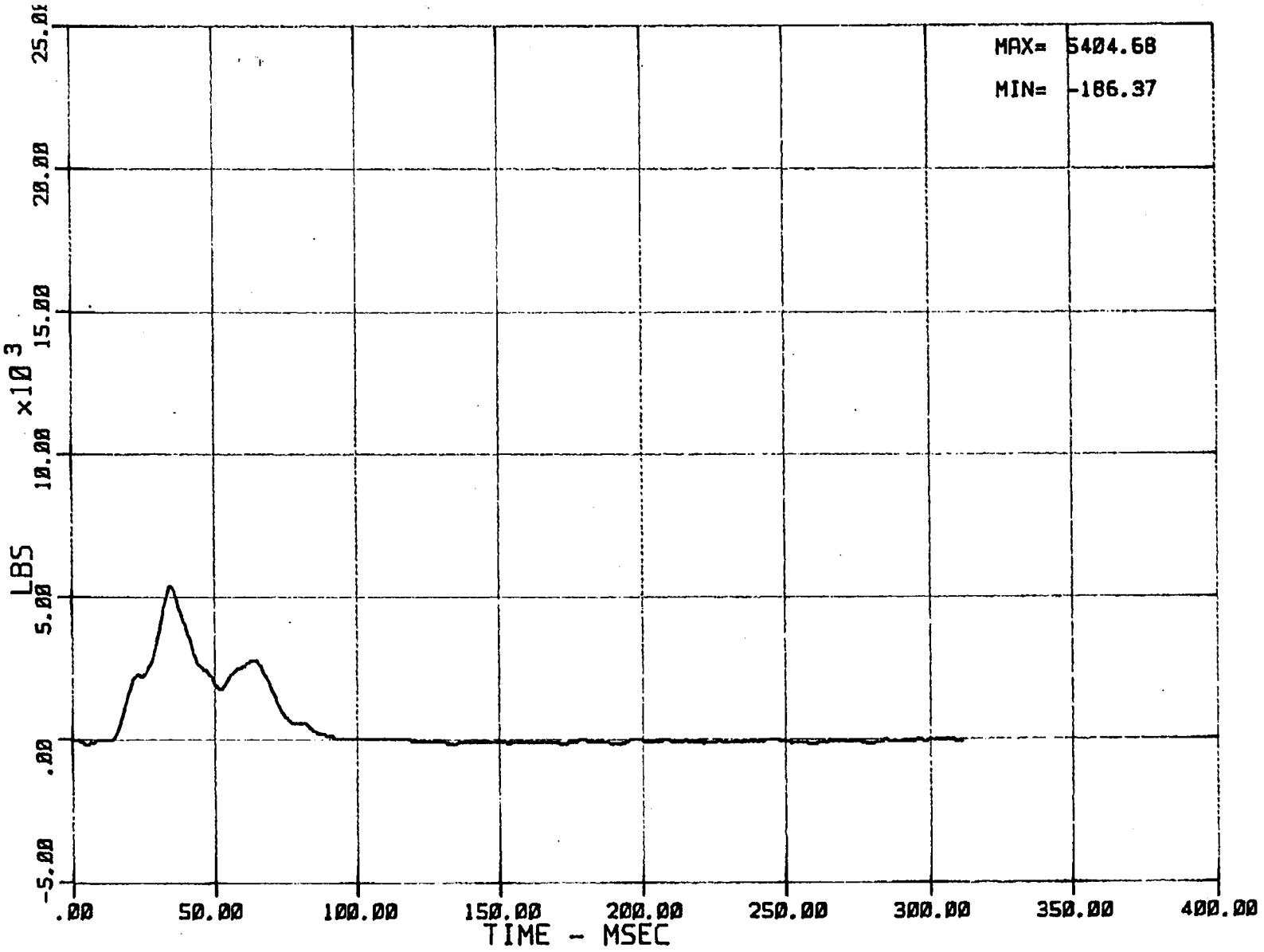

39 LC BA N B2 (BARRIER LOAD CELL B2)
MSE N02103 1983 FORD LTD

08/11/83

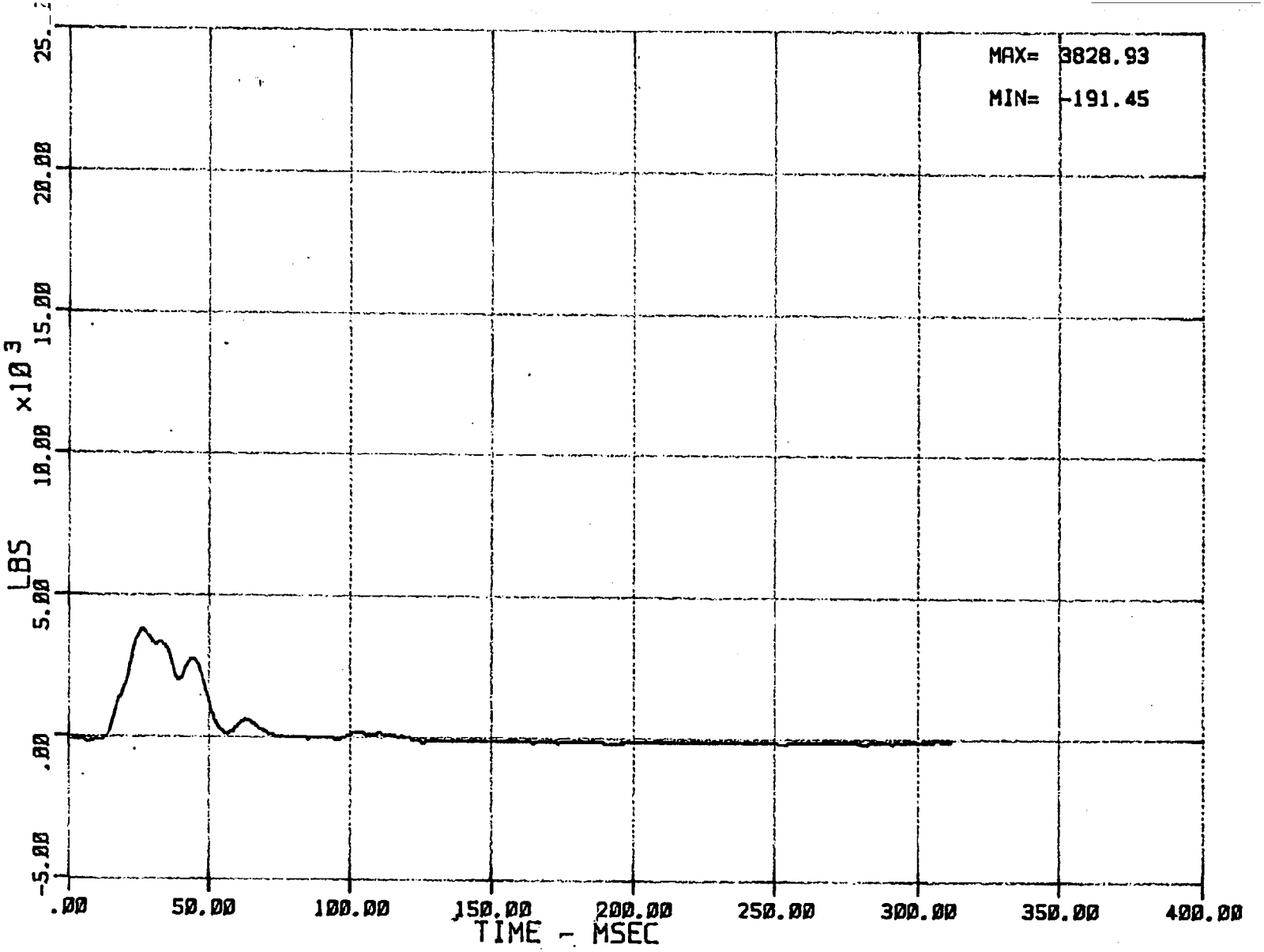



40 LC BA N B3 (BARRIER LOAD CELL B3)
MSE N02103 1983 FORD LTD

08/11/83

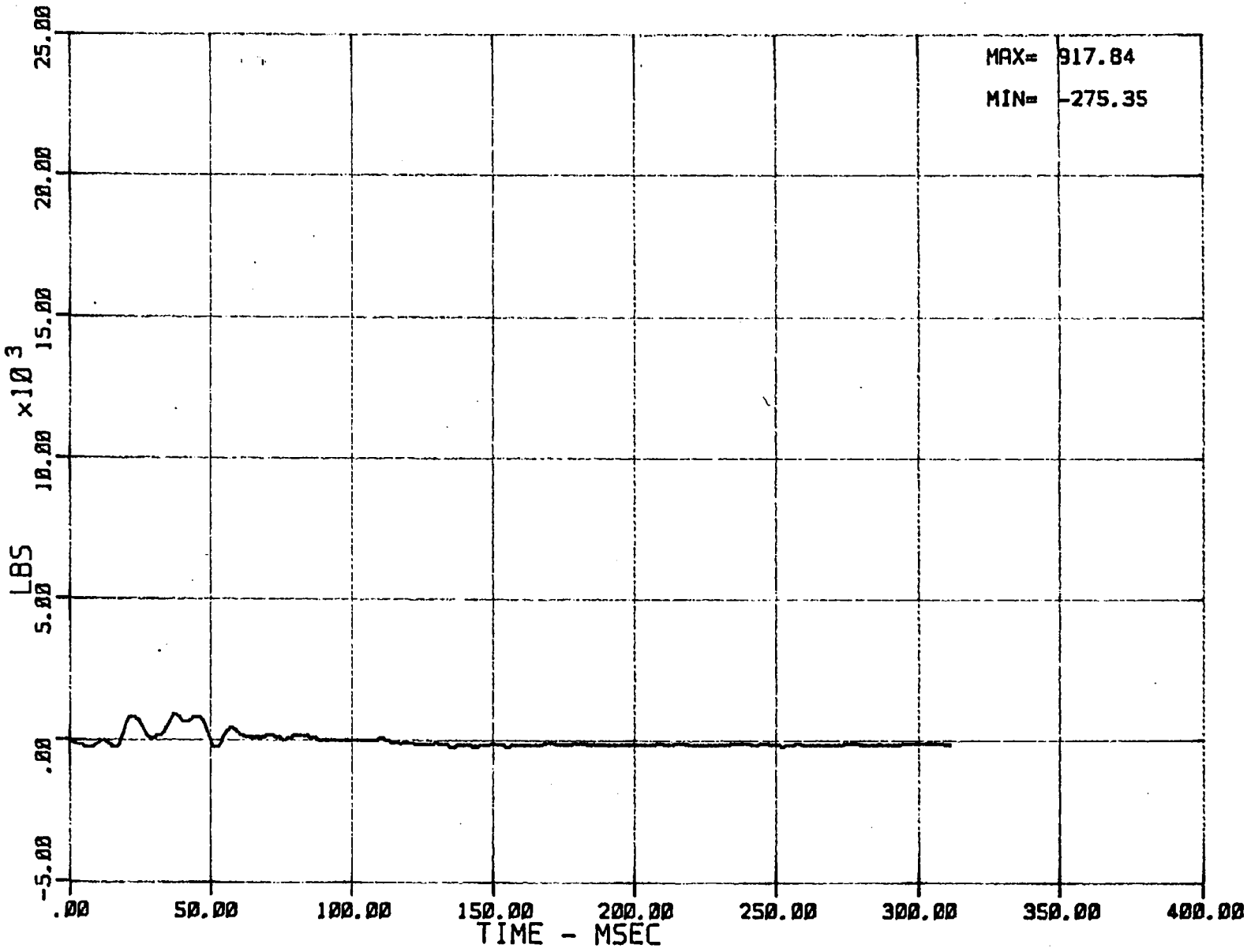



41: LC BA N C7 X (BARRIER LOAD CELL C7)
MSE N02103 1983 FORD LTD 08/11/83




42 LC BA N C8 (BARRIER LOAD CELL C8)
MSE N02103 1983 FORD LTD

08/11/83




48 LC BA N DS X (BARRIER LOAD CELL DS)
MSE N02103 1983 FORD LTD 08/11/83