

ORIGINAL

DOT 797

REPORT NO. TRC-85-N03

NEW CAR ASSESSMENT PROGRAM (NCAP)  
FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN OF AMERICA, INC.

1985 JETTA  
4-DOOR SEDAN  
NHTSA NO. CF5802  
TRCO TEST NO. 850129

THE TRANSPORTATION RESEARCH CENTER OF OHIO  
ST. RT. 33, LOGAN COUNTY  
EAST LIBERTY, OHIO 43319



MARCH 1985  
FINAL REPORT

PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF MARKET INCENTIVES  
400 SEVENTH STREET, S.W.  
ROOM NO. 5313 (NRM-22)  
WASHINGTON, DC 20590

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APR 3 1985

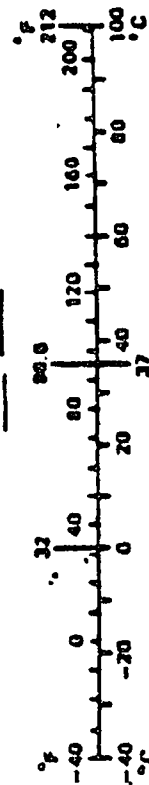
Date of Report Acceptance

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          |                                                                                                                                                                                                                 |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
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| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |                                                                                                                                                                                                                 |           |
| 16. Abstract<br><br>A 35 mph frontal barrier impact test using a load cell barrier was conducted on a 1985 Volkswagen Jetta 4-door Sedan at the Transportation Research Center of Ohio in East Liberty, Ohio on January 29, 1985.<br><br>The barrier impact velocity was 34.8 mph, and the ambient temperature at the barrier face at the time of impact was 70°F. The post-test vehicle crush maximum was 22.7 inches and intrusion of the firewall into the compartment was 5.5 inches.<br><br>The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standards:<br><br>1. FMVSS No. 212, "Windshield Mounting"<br>2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion"<br>3. FMVSS No. 301-75, "Fuel System Integrity"<br><br>Driver HIC: 897.54<br>Passenger HIC: 1007.69 |                                                          |                                                                                                                                                                                                                 |           |
| 17. Key Words<br>35 mph Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>FMVSS 212 Indicant Testing<br>FMVSS 219 (Partial) Indicant Testing<br>FMVSS 301-75 Indicant Testing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | 18. Distribution Statement Available from:<br>Technical Reference Division, National<br>Highway Traffic Safety Administration<br>Nassif Building, Room 5108<br>400 Seventh Street, S.W.<br>Washington, DC 20590 |           |
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# METRIC CONVERSION FACTORS

| Approximate Conversions to Metric Measures |                           |                                               |
|--------------------------------------------|---------------------------|-----------------------------------------------|
| Symbol                                     | When You Know Multiply by | To Find Symbol                                |
| LENGTH                                     |                           |                                               |
| in                                         | 2.5                       | centimeters cm                                |
| ft                                         | 30                        | centimeters cm                                |
| yd                                         | 0.9                       | meters m                                      |
| mi                                         | 1.6                       | kilometers km                                 |
| AREA                                       |                           |                                               |
| in <sup>2</sup>                            | 6.5                       | square centimeters cm <sup>2</sup>            |
| ft <sup>2</sup>                            | 0.09                      | square meters m <sup>2</sup>                  |
| yd <sup>2</sup>                            | 0.8                       | square meters m <sup>2</sup>                  |
| mi <sup>2</sup>                            | 2.6                       | square kilometers km <sup>2</sup>             |
| acres                                      | 0.4                       | hectares ha                                   |
| MASS (weight)                              |                           |                                               |
| oz                                         | 28                        | grams g                                       |
| lb                                         | 0.45                      | kilograms kg                                  |
| short tons                                 | 0.9                       | metric ton t                                  |
| (2000 lb)                                  |                           |                                               |
| VOLUME                                     |                           |                                               |
| tsp                                        | 5                         | milliliters ml.                               |
| Tbsp                                       | 15                        | milliliters ml.                               |
| in <sup>3</sup>                            | 16                        | milliliters ml.                               |
| fl oz                                      | 30                        | milliliters ml.                               |
| c                                          | 0.24                      | liters L                                      |
| pt                                         | 0.47                      | liters L                                      |
| qt                                         | 0.95                      | liters L                                      |
| gal                                        | 3.8                       | liters L                                      |
| ft <sup>3</sup>                            | 0.03                      | cubic meters m <sup>3</sup>                   |
| yd <sup>3</sup>                            | 0.76                      | cubic meters m <sup>3</sup>                   |
| TEMPERATURE (exact)                        |                           |                                               |
| °F                                         | degrees Fahrenheit        | 5/9 (after subtracting 32) degrees Celsius °C |

| Approximate Conversions from Metric Measures |                           |                                         |
|----------------------------------------------|---------------------------|-----------------------------------------|
| Symbol                                       | When You Know Multiply by | To Find Symbol                          |
| LENGTH                                       |                           |                                         |
| mm                                           | 0.04                      | inches in                               |
| cm                                           | 0.4                       | inches in                               |
| m                                            | 3.3                       | feet ft                                 |
| m                                            | 1.1                       | yards yd                                |
| km                                           | 0.6                       | miles mi                                |
| AREA                                         |                           |                                         |
| cm <sup>2</sup>                              | 0.16                      | square inches in <sup>2</sup>           |
| m <sup>2</sup>                               | 1.2                       | square yards yd <sup>2</sup>            |
| km <sup>2</sup>                              | 0.4                       | square miles mi <sup>2</sup>            |
| ha                                           | 2.5                       | acres                                   |
| (10 000 m <sup>2</sup> )                     |                           |                                         |
| MASS (weight)                                |                           |                                         |
| g                                            | 0.035                     | ounces oz                               |
| kg                                           | 2.2                       | pounds lb                               |
| metric ton                                   | 1.1                       | short tons                              |
| (1000 kg)                                    |                           |                                         |
| VOLUME                                       |                           |                                         |
| ml                                           | 0.03                      | fluid ounces fl oz                      |
| ml                                           | 0.06                      | cubic inches in <sup>3</sup>            |
| L                                            | 2.1                       | pints pt                                |
| L                                            | 1.06                      | quarts qt                               |
| L                                            | 0.26                      | gallons gal                             |
| m <sup>3</sup>                               | 35                        | cubic feet ft <sup>3</sup>              |
| m <sup>3</sup>                               | 1.3                       | cubic yards yd <sup>3</sup>             |
| TEMPERATURE (exact)                          |                           |                                         |
| °C                                           | degrees Celsius           | 9/5 (then degrees Fahrenheit add 32) °F |



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SECTION 1.0  
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY'85 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-84-D-11149. 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 FMVSS 212/219/301-75 requirements.

The 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure. Standards Enforcement Indicant Test Program data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 301-75, "Fuel System Integrity", as well as occupant performance data are provided herein.

SECTION 2.0  
SUMMARY OF TEST NUMBER CF5802

A load cell barrier consisting of 36 load cells was impacted by a 1985 Volkswagen Jetta 4-door Sedan at a velocity of 34.8 mph. The test was performed at the Transportation Research Center of Ohio on January 29, 1985. Pre- and post-test photographs of the vehicle and occupants can be found in Appendix A.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger designated seating positions, according to dummy placement procedures specified in Laboratory Indicant Test Procedure dated September 1, 1984.

Both ATDs were instrumented with head and chest triaxial accelerometers and right/left femur load cells. In addition, load cells were placed on the driver's and passenger's lap and shoulder belts to measure dummy upper torso and pelvic section loading. A summary of dummy calibration test data can be found in Appendix C.

The crash event was recorded by one real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information are found in Section 4 of this report.

The 67 channels of data were recorded on two 14 track tape drives. Appendix B contains the vehicle, load cell barrier and dummy response data plots.

CRASH TEST SUMMARY

TEST NO. 850129

PROJECT: CF5802

DATE: January 29, 1985

TIME: 14:15

TEMP: 70°F

VEHICLE: Volkswagen Jetta 4-Door Sedan

TEST WEIGHT (LBS): 2844

IMPACT ANGLE (DEG)\*: 0

IMPACT VELOCITY (MPH)\*\*: 34.8

MAX CRUSH (IN) STATIC: 22.7

DUMMIES

TYPE: Part 572

Part 572

LOCATION: Front Left

Front Right

RESTRAINT: 3-pt. Production Seat Belt

3-pt. Production Seat Belt

NUMBER OF DATA CHANNELS: 67

NUMBER OF HIGH SPEED CAMERAS: 16 and 1 real-time camera

\*With respect to tow track centerline.

\*\*Speed trap measurement ( $\pm$  .05% accuracy).



## GENERAL COMMENTS

The 1985 Volkswagen Jetta 4-door sedan was equipped with a 1786 cubic centimeter, 4-cylinder transverse engine and automatic transmission. The total test weight with two 50th percentile male dummies, instrumentation and two on-board cameras was 2844 pounds.

The test vehicle impacted the frontal load cell barrier at a velocity of 34.8 mph and appeared to comply with FMVSS Nos. 212, "Windshield Mounting" and 301-75, "Fuel System Integrity". There was 91.44 percent windshield retention and no fuel leakage after impact or any phase of the rollover test.

The vehicle sustained 22.7 inches of static crush. Maximum load cell barrier force measured by the 36 load cells was 101,178 pounds at 34.00 milliseconds.

The driver's "Head Injury Criteria" was 897.54. The maximum chest deceleration over 3 milliseconds was 49.7 g's, and right and left femur loads were 396 and 362 pounds respectively.

The right-front passenger's HIC was 1007.69, the maximum chest deceleration over 3 milliseconds was 51.1 g's, and the right and left femur loads were 516 and 711 pounds respectively.

The belt-related data for each occupant are presented in Section 4.0 of this report.

#### TEST ANOMALIES

The cables to the accelerometers mounted on the top of the engine block, ENGXG1, and on the right brake caliper, BCRXG1, were severed during the test. Data from these channels should be disregarded.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Volkswagen of America

MAKE/MODEL: Volkswagen Jetta

VIN: WVVCA0164FW090627

BODY STYLE: 4-door

MODEL YEAR: 1985

NHTSA NO.: CF5802

COLOR: Grey Clearcoat Metallic

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT: 1786 cc

  X   GAS,        DIESEL,        TURBOCHARGE

TRANSMISSION DATA:        SPEED,        MANUAL,   X   AUTOMATIC

DATE VEHICLE RECEIVED: 11/28/84

ODOMETER READING: 903

DEALER'S NAME AND ADDRESS: Volkswagen of America  
1840 MacKenzie Drive  
Columbus, Ohio 43220

ACCESSORIES:

|                |     |                            |     |
|----------------|-----|----------------------------|-----|
| POWER STEERING | Yes | AUTOMATIC TRANSMISSION     | Yes |
| POWER BRAKES   | Yes | AUTOMATIC SPEED CONTROL    | No  |
| POWER SEATS    | No  | TILTING STEERING WHEEL     | No  |
| POWER WINDOWS  | No  | TELESCOPING STEERING WHEEL | No  |
| TINTED GLASS   | Yes | AIR CONDITIONING           | No  |
| RADIO          | No  | ANTI-SKID BRAKE            | No  |
| CLOCK          | Yes | REAR WINDOW DEFROSTER      | Yes |
| OTHER          |     |                            |     |

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Volkswagen of America

DATE OF MANUFACTURE: 9/84

GVWR: 3252 LBS.,

GAWR: FRONT 1808 LBS., REAR 1609 LBS.

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 31 psi; REAR 37 psi

RECOMMENDED TIRE SIZE: 175/70SR13 LOAD RANGE X B, C, D

TIRES ON VEHICLE (MFG., LINE, SIZE): Continental Contact 175/70R13

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS Front - Bucket  
Rear - Bench

TYPE OF FRONT SEAT BACKS Adjustable reclining

NUMBER OF OCCUPANTS 2 FRONT 3 REAR 5 TOTAL

CARGO LOAD 117 LBS. TOTAL 867 LBS.

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

RIGHT FRONT 683 LBS. RIGHT REAR 465 LBS.

LEFT FRONT 702 LBS. LEFT REAR 466 LBS.

TOTAL FRONT WEIGHT 1385 LBS. (59.8 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 931 LBS. (40.2 % OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2316 LBS.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2316 LBS)

VCW = VEHICLE CAPACITY WEIGHT (867 LBS)

DSC = DESIGNATED SEATING CAPACITY (5)

RCLW = VCW - 150 (DCS) =

= 867 - 750 = 117 LBS

TARGET TEST WEIGHT = UDW + RCLW + (2 DUMMIES X 164 LBS/DUMMY)

= 2316 + 117 + 328 LBS

TARGET TEST WEIGHT = 2761 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 117 LBS. CARGO:

|                    |      |      |                                       |     |      |
|--------------------|------|------|---------------------------------------|-----|------|
| RIGHT FRONT        | 670  | LBS. | RIGHT REAR                            | 725 | LBS. |
| LEFT FRONT         | 659  | LBS. | LEFT REAR                             | 790 | LBS. |
| TOTAL FRONT WEIGHT | 1329 |      | LBS. (46.7 % OF TOTAL VEHICLE WEIGHT) |     |      |
| TOTAL REAR WEIGHT  | 1515 |      | LBS. (53.3 % OF TOTAL VEHICLE WEIGHT) |     |      |
| TOTAL TEST WEIGHT  | 2844 |      | LBS. (3.0 % OVER TARGET WEIGHT)       |     |      |

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

|                     |            |             |             |             |
|---------------------|------------|-------------|-------------|-------------|
| DELIVERED ATTITUDE: | RF 25 7/16 | ;LF 25 1/16 | ;RR 24 9/16 | ;LR 24 7/16 |
| PRE-TEST ATTITUDE:  | RF 24 3/4  | ;LF 24 3/8  | ;RR 23 1/16 | ;LR 23      |
| POST-TEST ATTITUDE: | RF 27 1/8  | ;LF 29 3/16 | ;RR 22 1/2  | ;LR 22 7/8  |
| WHEELBASE:          | 97.4       | INCHES      |             |             |

CG = 45.5 INCHES REARWARD OF FRONT WHEEL CENTERLINE

TEST CONDITIONS

TEST NUMBER: 850129

DATE OF TEST: January 29, 1985

TIME OF TEST: 14:15

TYPE OF TEST: Frontal Load Cell Barrier Impact

IMPACT ANGLE: 0 °

AMBIENT TEMPERATURE AT IMPACT AREA: 70°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 70°F

IMPACT VELOCITY: PRIMARY = 34.8 MPH

(SPECIFIED RANGE = 34.5 TO 35.5 MPH)

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES)

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: R 169 3/4 ;C 172 ;L 169 3/4

POST-TEST: R 149 7/8 ;C 150 3/4 ;L 150

TOTAL CRUSH: R 19 7/8 ;C 21 1/4 ;L 19 3/4

FOR FRONTAL IMPACTS, DISTANCE FROM FRONT OF TEST VEHICLE TO BARRIER AFTER IMPACT: R: 20 9/16 ;C: 20 9/16 ;L: 21 1/2

VISIBLE DUMMY CONTACT POINTS:

|            | DRIVER 826                           | PASSENGER A09                 |
|------------|--------------------------------------|-------------------------------|
| Head       | <u>Steering Wheel, Rim &amp; Hub</u> | <u>Upper Instrument Panel</u> |
| Chest      | <u>None</u>                          | <u>None</u>                   |
| Abdomen    | <u>None</u>                          | <u>None</u>                   |
| Left Knee  | <u>Lower Instrument Panel</u>        | <u>Lower Instrument Panel</u> |
| Right Knee | <u>Lower Instrument Panel</u>        | <u>Lower Instrument Panel</u> |

DOOR OPENING:

|       | LEFT                  | RIGHT                 |
|-------|-----------------------|-----------------------|
| Front | <u>Tools Required</u> | <u>Tools Required</u> |
| Rear  | <u>DNA</u>            | <u>DNA</u>            |

SEAT MOVEMENT:

|       | SEAT BACK FAILURE          | SEAT SHIFT             |
|-------|----------------------------|------------------------|
| Front | <u>No Apparent Failure</u> | <u>Shifted Forward</u> |
| Rear  | <u>DNA</u>                 | <u>DNA</u>             |

GLAZING DAMAGE:

Lower windshield crushed.

Cracks were numerous over entire surface of windshield.

\_\_\_\_\_

\_\_\_\_\_

OTHER NOTABLE IMPACT EFFECTS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SECTION 3.0

SUMMARY OF RESULTS FOR - - -

FMVSS 212, "Windshield Mounting"

FMVSS 219 (Partial), "Windshield Zone Intrusion"

FMVSS 301-75, "Fuel System Integrity"

SUMMARY OF FMVSS 212 AND 301 DATA

PRE-IMPACT DATA

MAKE/MODEL: Volkswagen Jetta

BODY STYLE: 4-door Sedan

MODEL YEAR: 1985

NHTSA NO.: CF5802

COLOR: Grey Clearcoat  
Metallic

DATA FROM CERTIFICATION LABEL

VEHICLE MANUFACTURER: Volkswagen of America

DATE OF MANUFACTURE: 9/84

VIN: WVVCA0164FW090627

GVWR: 3252 LBS., GAWR: FRONT 1808 LBS., REAR 1609 LBS.

POST-IMPACT DATA

TYPE OF TEST: Frontal Load Cell Barrier Impact

DATE OF TEST: 1/29/85 TIME: 14:15 TEMP: 70°F

REQUIRED IMPACT VELOCITY RANGE: 34.5 MPH TO 35.5 MPH

IMPACT VELOCITY: PRIMARY = 34.8 MPH

TEST WEIGHT = 2844 LBS., STATIC CRUSH MAX. = 22.7 IN., REBOUND = 21.5 IN.

FUEL SYSTEM DATA

TEST FLUID TYPE: RED STODDARD SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY\*: 14.5 GALLONS (FURNISHED BY CTM)

TEST VOLUME: 13.5 GALLONS (92-94% OF USEABLE)

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 15.5 GALLONS

DETAILS OF FUEL SYSTEM: \_\_\_\_\_

ELECTRIC FUEL PUMP: Yes

FUEL INJECTION: Yes

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? Yes

\*WITH ENTIRE FUEL SYSTEM FILLED FROM FUEL TANK THROUGH CARBURETOR BOWL.

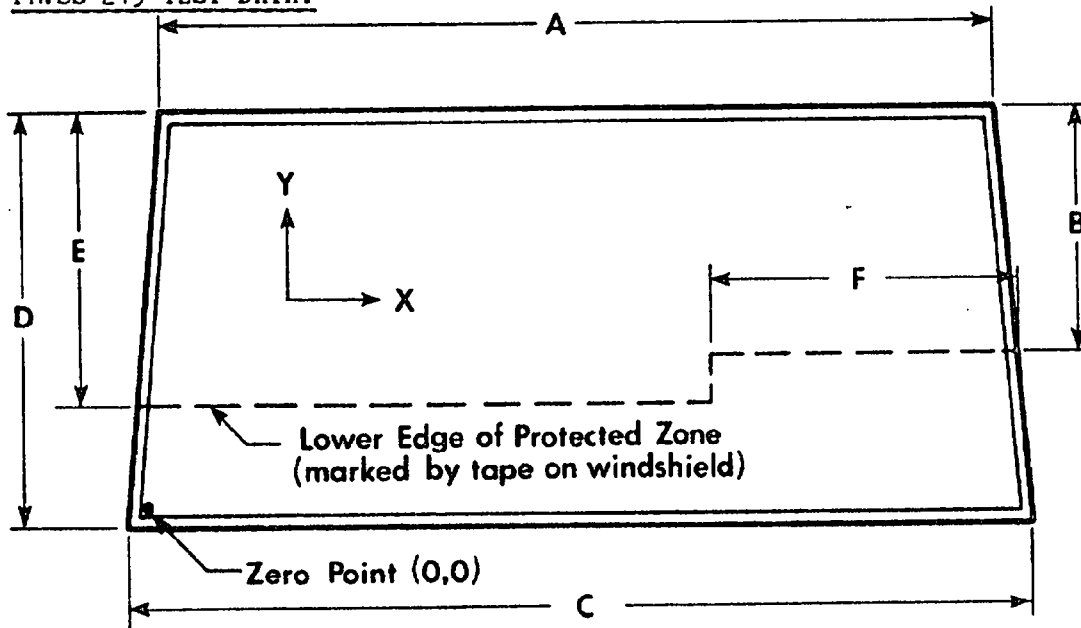


# FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

## PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

## FMVSS 219 TEST DATA:



## **FRONT VIEW**

A = 40.5

C = 54.0

E = 16.3

B = 14.1

D = 23.4

F = 33.0

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":  
(Show location of penetration on above sketch)

## COORDINATES

|    | X | Y |
|----|---|---|
| 1. |   |   |
| 2. |   |   |
| 3. |   |   |
| 4. |   |   |

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

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

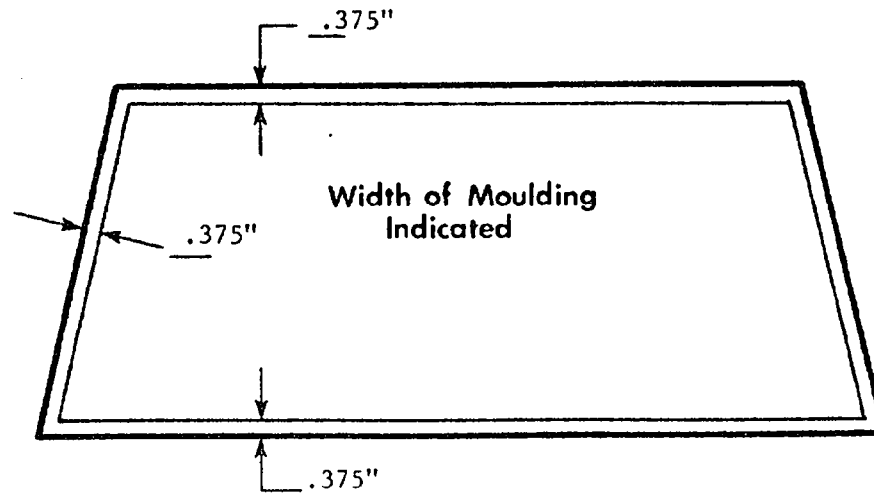
FMVSS 212 REQUIREMENTS: The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

WINDSHIELD PERIPHERY

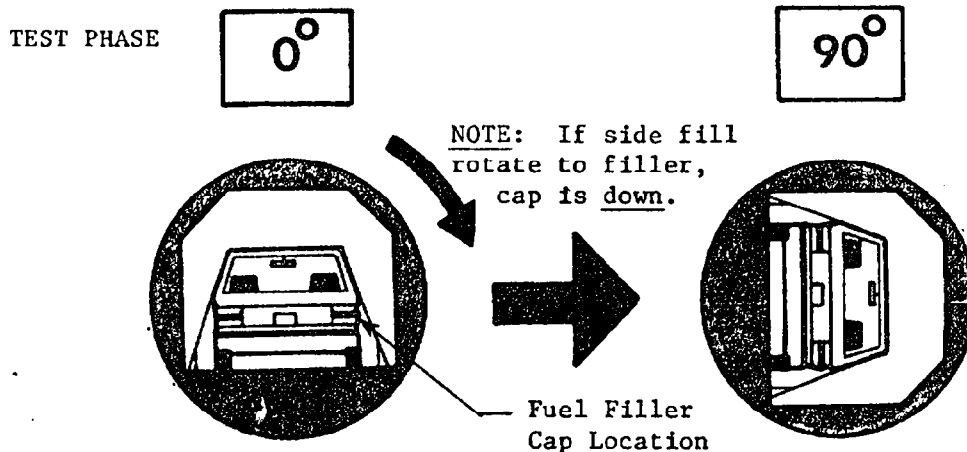
|            | PRE-TEST (in.) | POST-TEST (in.) | PERCENT RETENTION |
|------------|----------------|-----------------|-------------------|
| RIGHT SIDE | 70.65          | 67.60           | 95.68 %           |
| LEFT SIDE  | 70.65          | 61.60           | 87.19 %           |
| TOTAL      | 141.30         | 129.20          | 91.44 %           |

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

# FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET



## STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

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

TOTAL - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - = 7:00 minutes

## FMVSS 301-75 REQUIREMENTS

|                                        | First 5 Minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum Allowable Solvent Spillage - - | 5 oz.                                     | 1 oz.         | 1 oz.         |
| 0 to 90° (filler cap down) - - - - -   | 0                                         | 0             | 0             |

## SOLVENT SPILLAGE LOCATION(S)

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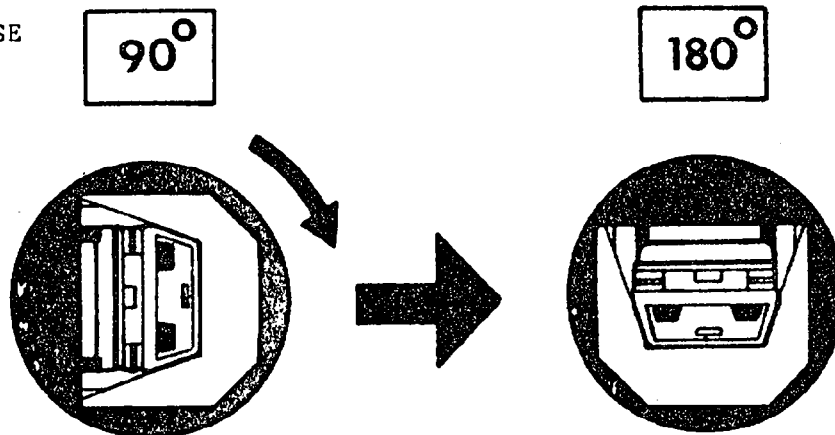
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# FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



## STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

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

TOTAL - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - = 14:00 minutes

## FMVSS 301-75 REQUIREMENTS

|                                      | First 5 Minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|--------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum Allowable Solvent Spillage - | 5 oz.                                     | 1 oz.         | 1 oz.         |
| 90° to 180° (filler cap down) - - -  | 0                                         | 0             | 0             |

## SOLVENT SPILLAGE LOCATION(S)

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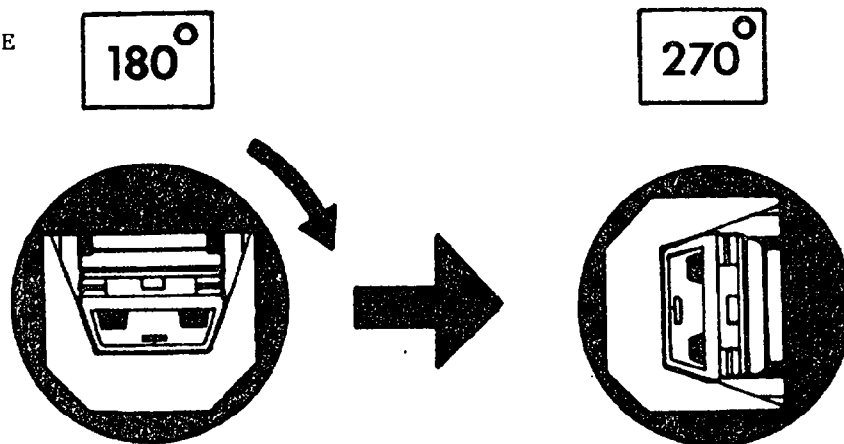
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# FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



## STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds  
 FMVSS 301-75 Position Hold Time = 5 minutes, 00 seconds  
 TOTAL - - - - - = 7 minutes, 00 seconds  
 Next Whole Minute Interval - - - - = 21:00 minutes

## FMVSS 301-75 REQUIREMENTS

|                                        | First 5 Minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum Allowable Solvent Spillage - - | 5 oz.                                     | 1 oz.         | 1 oz.         |
| 180° to 270° (filler cap down) - - -   | 0                                         | 0             | 0             |

## SOLVENT SPILLAGE LOCATION(S)

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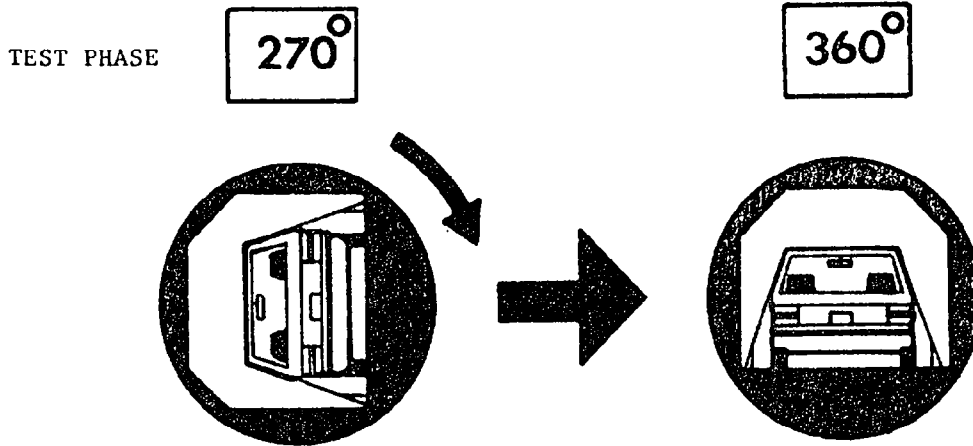


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# FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET



## STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range = 1 to 3 min.)

Time req. for machine to rotate 90° = 2 minutes, 00 seconds

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

TOTAL - - - - - = 7 minutes, 00 seconds

Next Whole Minute Interval - - - - = 28:00 minutes

## FMVSS 301-75 REQUIREMENTS

|                                        | First 5 Minutes<br>FROM ONSET OF ROTATION | 6th<br>Minute | 7th<br>Minute |
|----------------------------------------|-------------------------------------------|---------------|---------------|
| Maximum Allowable Solvent Spillage - - | 5 oz.                                     | 1 oz.         | 1 oz.         |
| 270° to 360° (filler cap down) - - -   | 0                                         | 0             | 0             |

## SOLVENT SPILLAGE LOCATION(S)

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VEHICLE STATIC ROLLOVER DATA SUMMARY:

| <u>MAXIMUM ALLOWABLE SOLVENT SPILLAGE</u> | <u>FIRST 5 MINUTES<br/>FROM ONSET OF ROTATION<br/>5 OZ</u> | <u>6TH<br/>MIN.<br/>1 OZ</u> | <u>7TH<br/>MIN.<br/>1 OZ</u> |
|-------------------------------------------|------------------------------------------------------------|------------------------------|------------------------------|
| 0 TO 90° (FILLER CAP DOWN) - - - - -      | 0                                                          | 0                            | 0                            |
| 90 TO 180° - - - - -                      | 0                                                          | 0                            | 0                            |
| 180 to 270° - - - - -                     | 0                                                          | 0                            | 0                            |
| 270 to 360° - - - - -                     | 0                                                          | 0                            | 0                            |

SECTION 4.0

OCCUPANT, VEHICLE AND LOAD CELL BARRIER INFORMATION



# DUMMY INJURY CRITERIA

|           | MAXIMUM ACCELERATION ('G') |        |        |        |        |        |        |       |
|-----------|----------------------------|--------|--------|--------|--------|--------|--------|-------|
|           | HEAD                       |        |        |        | CHEST  |        |        |       |
|           | X                          | Y      | Z      | R      | X      | Y      | Z      | R*    |
| DRIVER    | -98.87                     | -30.53 | -49.15 | 103.29 | -50.38 | -27.96 | -15.30 | 49.72 |
| PASSENGER | -83.58                     | 55.56  | -91.46 | 134.47 | -46.93 | 64.79  | 29.35  | 51.05 |

|           | MAXIMUM FORCE-FEMUR LOAD (LBS) |            |
|-----------|--------------------------------|------------|
|           | RIGHT FEMUR                    | LEFT FEMUR |
| DRIVER    | 396.25                         | 361.77     |
| PASSENGER | 516.28                         | 711.45     |

|           | MAXIMUM FORCE-SEAT BELT LOADS (LBS) |                              |                             |
|-----------|-------------------------------------|------------------------------|-----------------------------|
|           | SHOULDER STRAP<br>UPPER BELT LOAD   | LAP STRAP<br>RIGHT BELT LOAD | LAP STRAP<br>LEFT BELT LOAD |
| DRIVER    | 1637.07                             | ---                          | 1606.74                     |
| PASSENGER | 1784.01                             | 1942.48                      | ---                         |

|           | HEAD INJURY CRITERIA** |                      |                      |
|-----------|------------------------|----------------------|----------------------|
|           | HIC                    | t <sub>1</sub> (SEC) | t <sub>2</sub> (SEC) |
| DRIVER    | 897.54                 | 66.25                | 99.63                |
| PASSENGER | 1007.69                | 57.88                | 112.00               |

\*Defined as exceeding 0.003 sec. duration

\*\*As defined in FMVSS No. 208

## DUMMY KINEMATIC SUMMARY

### DRIVER

During impact, the driver moved forward in the seat, striking both knees into the lower instrument panel. As the driver continued forward movement, the driver's forehead contacted the upper rim of the steering wheel while the mouth and chin area hit the hub of the steering wheel. Rebounding from the wheel, the dummy rotated back into the seat, striking the back of the head on the headrest. Rotating forward once again, the driver finally came to rest in an upright position.

### PASSENGER

During impact, the passenger moved forward in the seat, striking both knees into the lower instrument panel. As the passenger continued forward movement, the passenger's upper torso rotated toward the door of the vehicle. The left side of the head impacted the upper instrument panel. The dummy then rotated back into the seat, striking the back of the head on the headrest. The passenger finally came to rest in an upright position.

# DUMMY IN-VEHICLE POSITION RECORDING SHEET

VEHICLE NHTSA NO. CF5802

MFR./MAKE/MODEL: Volkswagen Jetta

SEAT TYPE: Bench  
X Bucket  
Split Bench

ADJUSTER TYPE: X Manual  
Power

## TECHNICIANS:

BUCKET SEAT BACK TYPE: Fixed  
X Adjustable Reclining

1. D. LeVally

2. B. Miller

3. R. Benavides

POSITIONING DATE: 1/29/85

4.

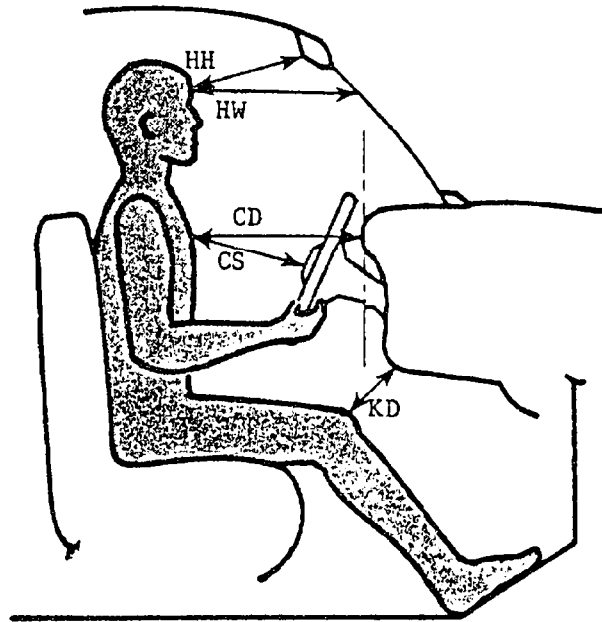
AMBIENT TEMP.: 70° F. TIME: 8:30

|                                                                                                                                                                                                                    |                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DRIVER DUMMY # <u>826</u> TYPE <u>P572</u></p> <p>Head <u>17 1/2"</u></p> <p>Target <u>3</u> °</p> <p>Knee <u>24 5/8"</u></p> <p>Joint <u>105</u> °</p> <p>Approx. "H" <u>12"</u></p> <p>Point <u>130</u> °</p> | <p>PASSENGER DUMMY # <u>A09</u> TYPE <u>P572</u></p> <p>Head <u>18"</u></p> <p>Target <u>3</u> °</p> <p>Knee <u>25 1/4"</u></p> <p>Joint <u>102</u> °</p> <p>Approx. "H" <u>11 1/4"</u></p> <p>Point <u>130</u> °</p> |
|                                                                                                                                                                                                                    |                                                                                                                                                                                                                       |
| <p>A = <u>48</u> "</p> <p>B = <u>38</u> "</p> <p>C = <u>10</u> "</p> <p>D = <u>10</u> "</p>                                                                                                                        |                                                                                                                                                                                                                       |

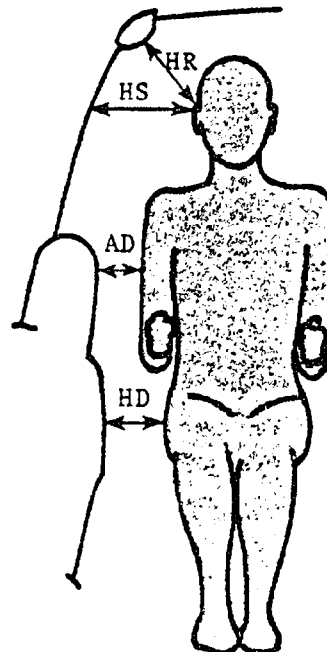
\* Door glass height is equal on the right and left side of vehicle.

# DUMMY IN-VEHICLE POSITION RECORDING SHEET

|     | DRIVER<br>826 | PASSENGER<br>A09 |
|-----|---------------|------------------|
| HH  | 15 3/4        | 15 13/16         |
| HW  | 20 3/4        | 20 3/16          |
| CD  | 22 7/16       | 22 7/16          |
| CS  | 13 11/16      | DNA              |
| KDL | 5 7/16        | 7 7/16           |
| KDR | 6 1/4         | 7 5/8            |

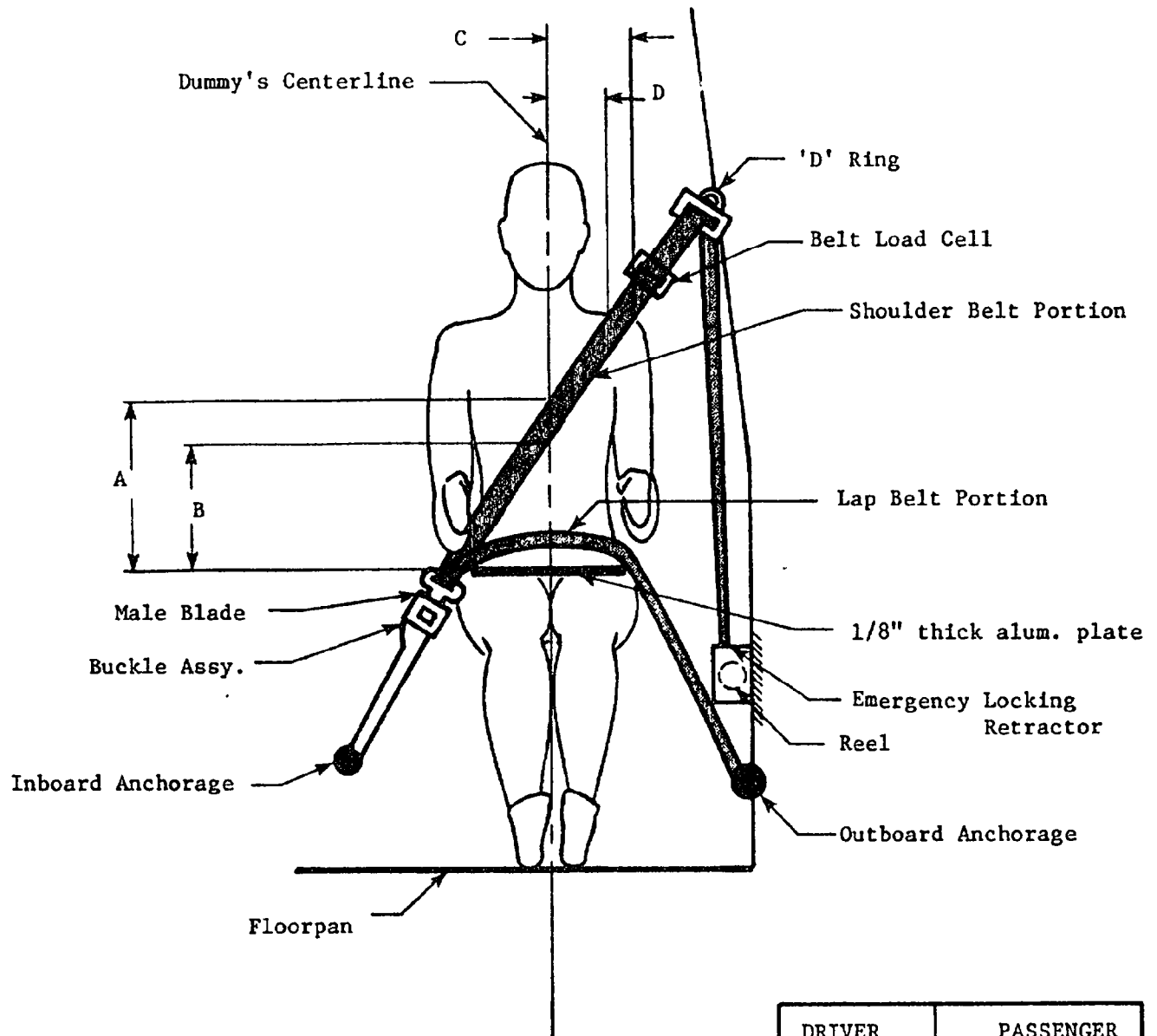


|    | DRIVER<br>826 | PASSENGER<br>A09 |
|----|---------------|------------------|
| HR | 5 3/16        | 5                |
| HS | 7 1/2         | 7                |
| AD | 3 9/16        | 3 3/4            |
| HD | 5 5/8         | 5 1/16           |



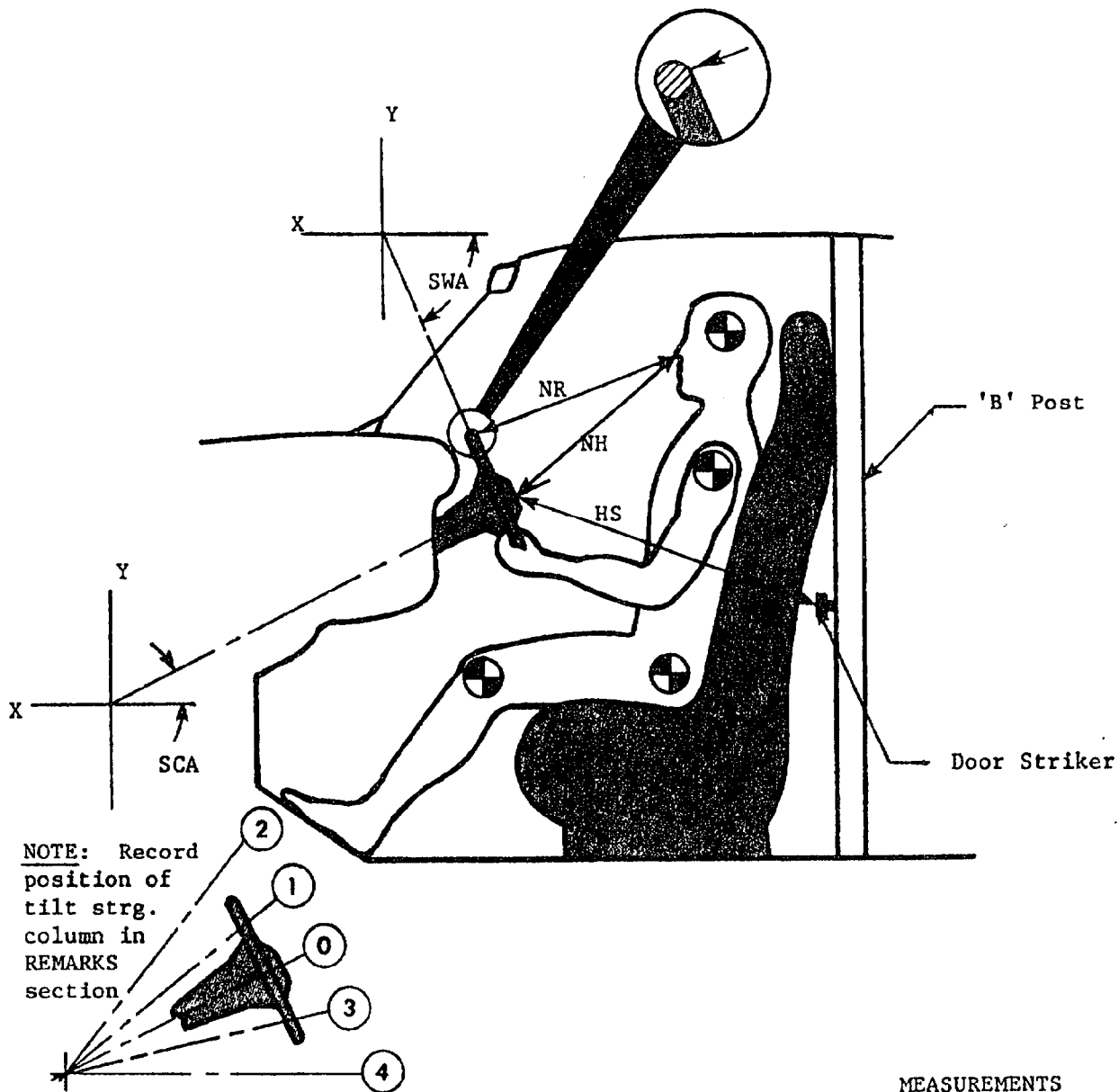
ALL MEASUREMENT IN INCHES

# SEAT BELT POSITIONING DATA



|                                                                       | DRIVER<br>DUMMY | PASSENGER<br>DUMMY |
|-----------------------------------------------------------------------|-----------------|--------------------|
| A - Top surface of alum. plate to belt upper edge (in)                | 14 1/2          | 14 1/2             |
| B - Top surface of alum. plate to belt lower edge (in)                | 11 1/2          | 11 1/2             |
| C - Dummy centerline to outer edge of belt at chest<br>flesh top (in) | 6               | 6                  |
| D - Dummy centerline to inner edge of belt at chest<br>flesh top (in) | 4               | 4                  |
| LAP BELT TENSION (lbs)                                                | 4               | 3                  |
| SHOULDER BELT TENSION (lbs)                                           | 1               | 1                  |

# DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



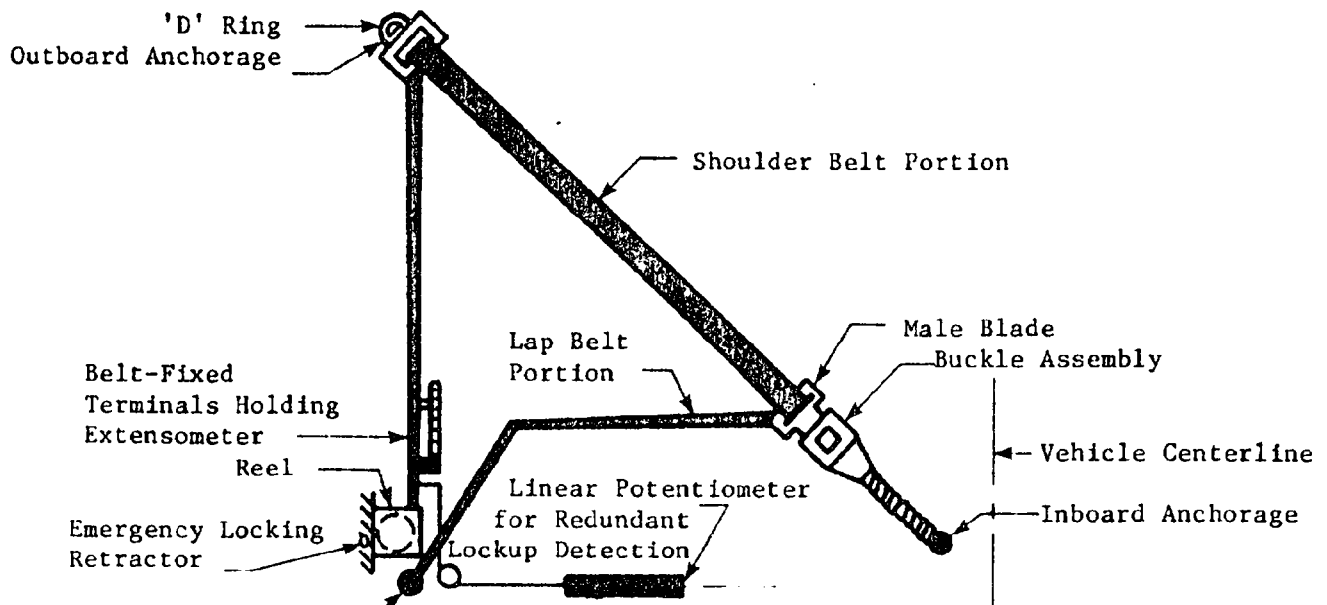
## MEASUREMENTS

|                                                                                                       |          |
|-------------------------------------------------------------------------------------------------------|----------|
| NR - Distance from tip of dummy's nose to top rear surface of steering wheel rim.                     | 18 1/8"  |
| NH - Distance from tip of dummy's nose to center of steering column hub.                              | 19 1/2"  |
| HS - Distance from center of steering column hub to the forward surface of the door lock striker pin. | 27 1/16" |
| SCA - Angle of steering column relative to the horizontal X axis.                                     | 28°      |
| SWA - Angle of steering wheel relative to the horizontal X axis.                                      | 25°      |

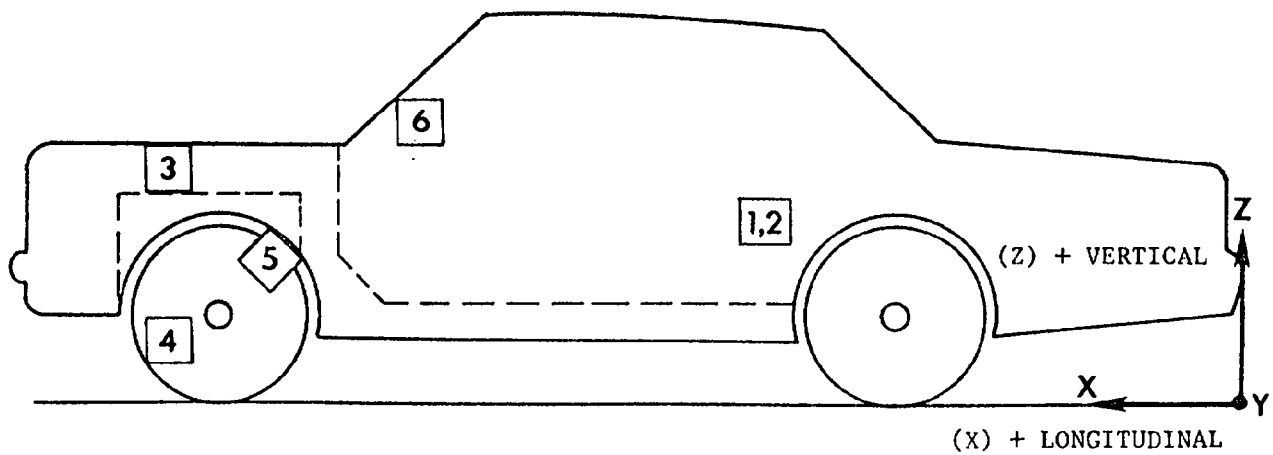
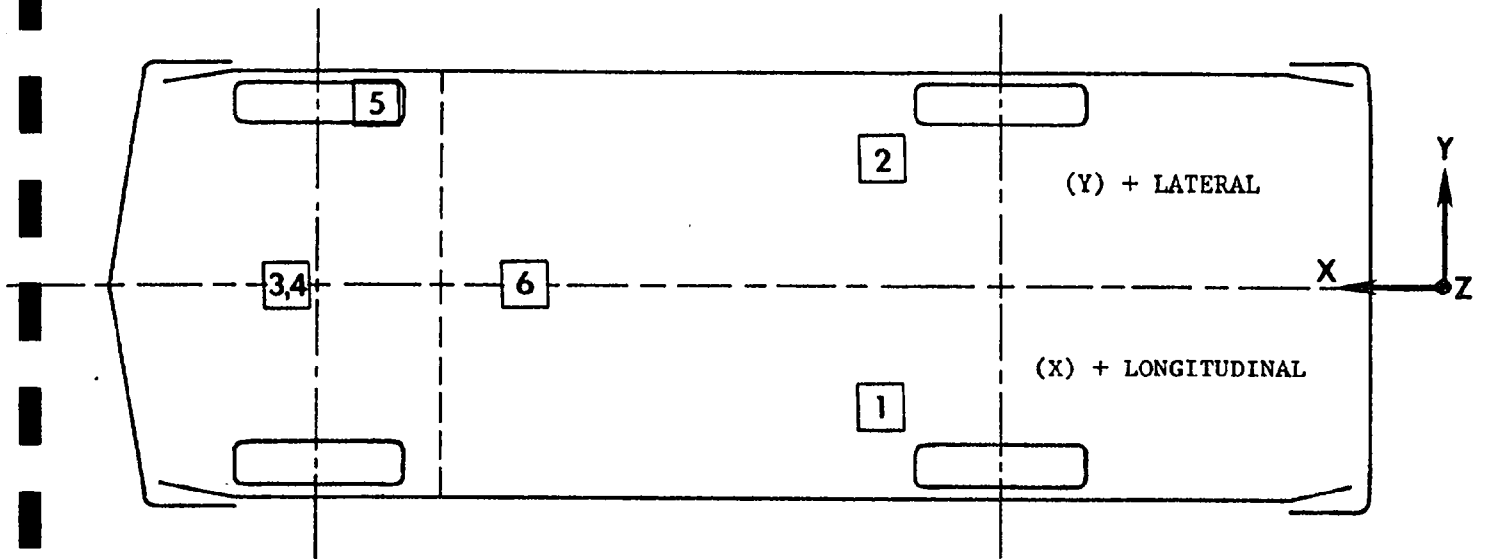
# SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

## BELT LENGTH DATA:

|                                                                                                 | DRIVER SIDE |           | PASSENGER SIDE |           |
|-------------------------------------------------------------------------------------------------|-------------|-----------|----------------|-----------|
|                                                                                                 | PRE-TEST    | POST-TEST | PRE-TEST       | POST-TEST |
| Total belt length from retractor reel to bolt hole anchor point for continuous webbing systems. | 124         | NA        | 124            | NA        |
| Retractor reel to 'D' ring as measured on Part 572 dummy.                                       | 18          | NA        | 18 3/8         | NA        |
| Shoulder belt length as measured on Part 572 dummy.                                             | 38          | NA        | 37 1/2         | NA        |
| Lap belt length as measured on Part 572 dummy.                                                  | 40          | NA        | 40             | NA        |
| Remainder of belt webbing left on retractor reel.                                               | 28          | NA        | 28 1/8         | NA        |
| <u>BELT SPOOL-OFF DATA:</u>                                                                     |             |           |                |           |
| As determined by film analysis                                                                  | DNA         | 2 3/16    | DNA            | 1 13/16   |
| As determined electronically                                                                    | DNA         | 2 5/8     | DNA            | 2 1/2     |
| <u>BELT STRAIN DATA:</u>                                                                        |             |           |                |           |
| Measured between marks placed on shoulder belt between 'D' ring and male blade.                 | 24.0"       | 24.5"     | 24.0"          | 24.1"     |



# VEHICLE ACCELEROMETER LOCATIONS





# VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

| NO. | LOCATION                                            | X*    | Y*    | Z*   | POSITIVE<br>DIRECTION** |                | NEGATIVE<br>DIRECTION** |                |
|-----|-----------------------------------------------------|-------|-------|------|-------------------------|----------------|-------------------------|----------------|
|     |                                                     |       |       |      | MAX<br>(g)              | TIME<br>(msec) | MAX<br>(g)              | TIME<br>(msec) |
| 1   | REAR SEAT X-MEMBER<br>AT LEFT SIDE<br>LONGITUDINAL  | 71.8  | 25.5  | 13.0 | 2.68                    | 140.38         | 38.88                   | 37.00          |
| 2   | REAR SEAT X-MEMBER<br>AT RIGHT SIDE<br>LONGITUDINAL | 71.5  | -25.5 | 72.9 | 2.24                    | 133.25         | 39.41                   | 36.63          |
| 3   | TOP OF ENGINE<br>BLOCK<br>LONGITUDINAL              | 155.6 | 0.0   | 30.0 | ---                     | --- Y          | ---                     | ---Y           |
| 4   | BOTTOM OF ENGINE<br>BLOCK<br>LONGITUDINAL           | 149.5 | -2.8  | 16.7 | 88.80                   | 36.25          | 94.25                   | 30.63          |
| 5   | BRAKE CALIPER AT<br>RIGHT SIDE<br>LONGITUDINAL      | 143.6 | -23.9 | 10.6 | ---                     | --- Y          | ---                     | ---Y           |
| 6   | DASH PANEL<br>LONGITUDINAL                          | 114.8 | 0.0   | 39.3 | 59.40                   | 33.88          | 64.24                   | 69.13          |

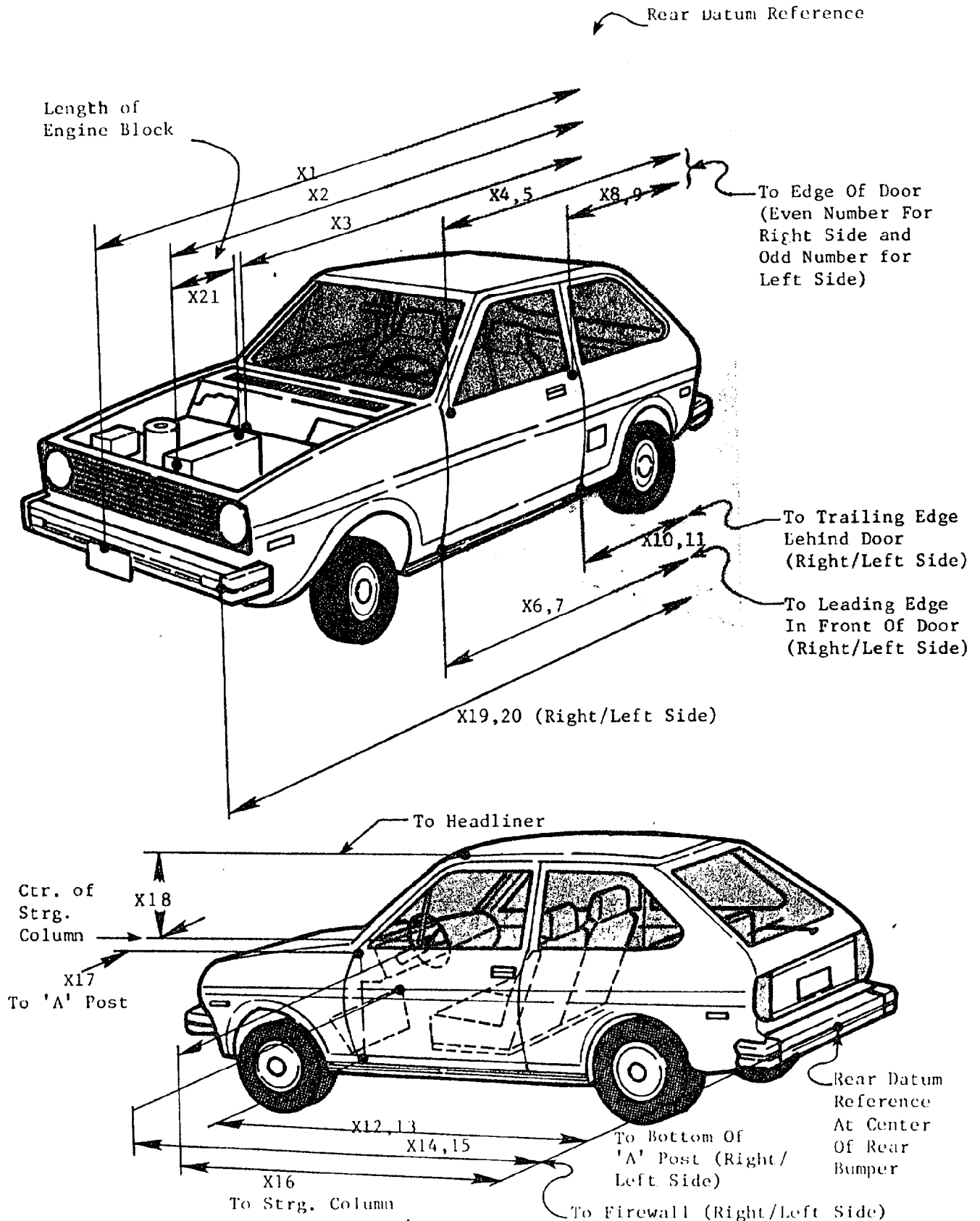
\* X + Forward from rear bumper  
Y + Left vehicle centerline  
Z + Up from ground level

\*\* LONGITUDINAL: FORWARD  
LATERAL: LEFTWARD  
VERTICAL: UPWARD

MEASUREMENTS IN INCHES

Y See TEST ANOMALIES (page 2-4)

# PRE-TEST AND POST-TEST MEASUREMENT POINTS



## IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL Volkswagen Jetta

TEST NUMBER 850129

DIMENSIONS IN INCHES

| NO. | TYPE OF MEASUREMENT                                          | PRE-TEST | POST-TEST | DIFF. |
|-----|--------------------------------------------------------------|----------|-----------|-------|
| X 1 | TOTAL LENGTH OF VEHICLE AT CENTERLINE                        | 172.0    | 150.8     | 21.2  |
| X 2 | REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK             | 146.4    | 140.8     | 5.6   |
| X 3 | REAR SURFACE OF VEHICLE TO FIREWALL                          | 130.8    | 137.3     | -6.5* |
| X 4 | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR  | 120.6    | 119.5     | 1.1   |
| X 5 | REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR   | 120.6    | 120.0     | 0.6   |
| X 6 | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR  | 121.6    | 120.4     | 1.2   |
| X 7 | REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR   | 121.5    | 120.8     | 0.7   |
| X 8 | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR | 82.1     | 81.0      | 1.1   |
| X 9 | REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR  | 82.1     | 81.5      | 0.6   |
| X10 | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR | 83.1     | 81.9      | 1.2   |
| X11 | REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE ON LEFT DOOR  | 83.3     | 82.4      | 0.9   |
| X12 | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE  | 120.8    | 119.1     | 1.7   |
| X13 | REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE   | 119.8    | 119.3     | 0.5   |
| X14 | REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE             | 134.5    | 129.0     | 5.5   |
| X15 | REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE              | 134.6    | 132.0     | 2.6   |
| X16 | REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER             | 105.5    | 102.0     | 3.5   |
| X17 | CENTER OF STEERING COLUMN TO "A" POST                        | 15.3     | 17.3      | -2.0  |

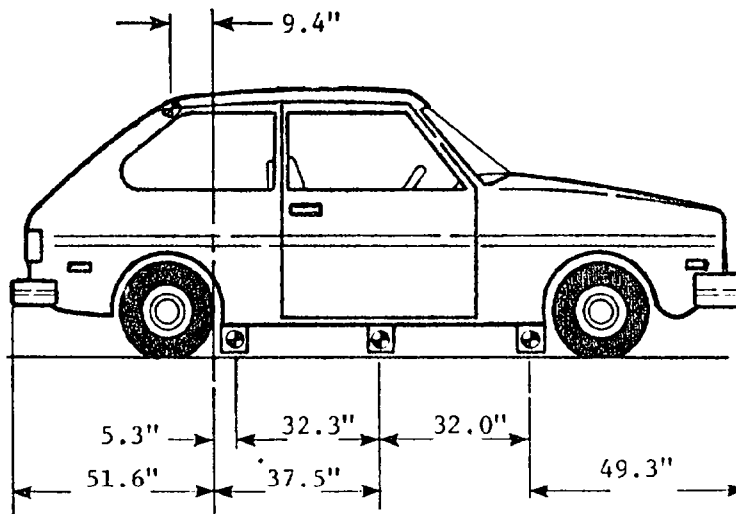
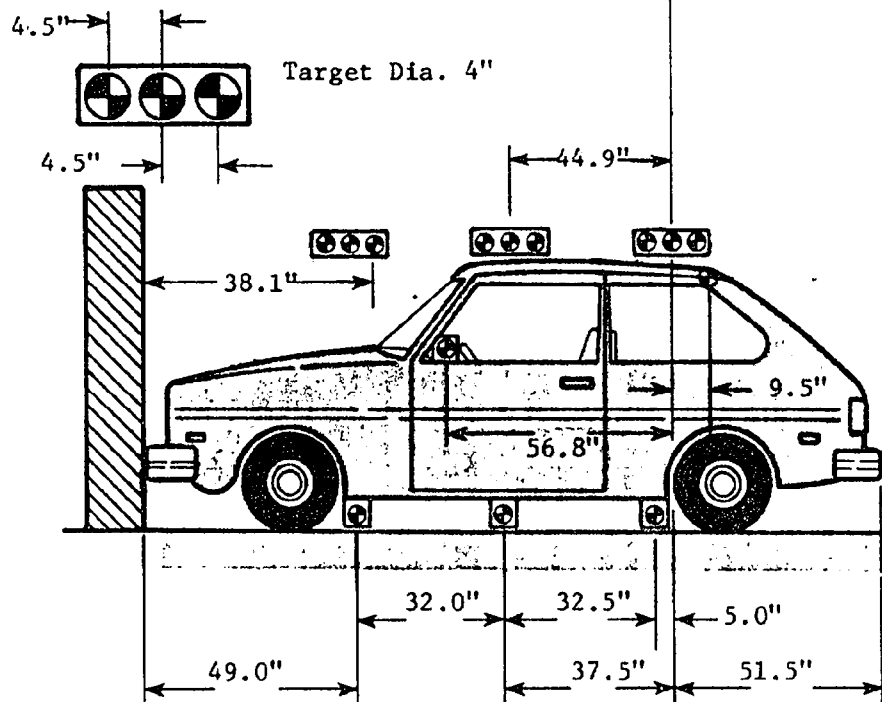
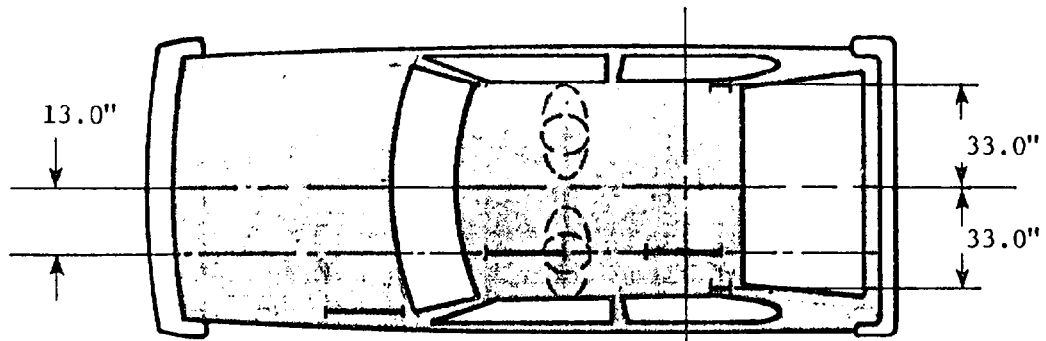
\*Created by Major Sheet Metal Deformation.

## IMPACTED VEHICLE MEASUREMENTS CONTD

VEHICLE MAKE/MODEL Volkswagen Jetta TEST NUMBER 850129

| NO. | TYPE OF MEASUREMENT                                   | DIMENSIONS IN INCHES |           |       |
|-----|-------------------------------------------------------|----------------------|-----------|-------|
|     |                                                       | PRE-TEST             | POST-TEST | DIFF. |
| X18 | CENTER OF STEERING COLUMN TO HEADLINING               | 17.5                 | 17.6      | 0.1   |
| X19 | REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER | 169.8                | 149.9     | 19.9  |
| X20 | REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER  | 169.8                | 150.0     | 19.8  |
| X21 | LENGTH OF ENGINE BLOCK                                | 10.0                 | 10.0      | 0     |

# VEHICLE TARGET LOCATIONS



ACCIDENT INVESTIGATION DIVISION DATA  
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Volkswagen Jetta 4-Door Sedan  
 VEH. NHTSA NO.: CF5802; VIN: WVWCA0164FW090627  
 MODEL YEAR: 1985; BUILD DATE: 9/84; TEST DATE 1/29/85  
 VEH. SIZE CATEGORY: Mid-Size; TEST WEIGHT: 2844  
 VEH. WHEELBASE: 97.4

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

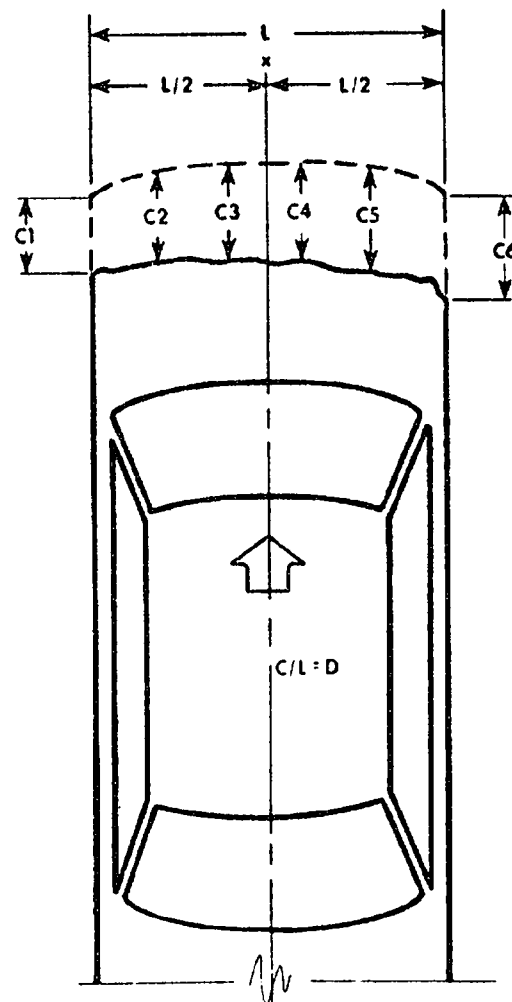
F (Frontal)

CRUSH DEPTH DIMENSIONS:

|      |             |        |
|------|-------------|--------|
| C1 = | <u>20.8</u> | inches |
| C2 = | <u>22.3</u> | inches |
| C3 = | <u>22.7</u> | inches |
| C4 = | <u>22.4</u> | inches |
| C5 = | <u>21.7</u> | inches |
| C6 = | <u>20.4</u> | inches |

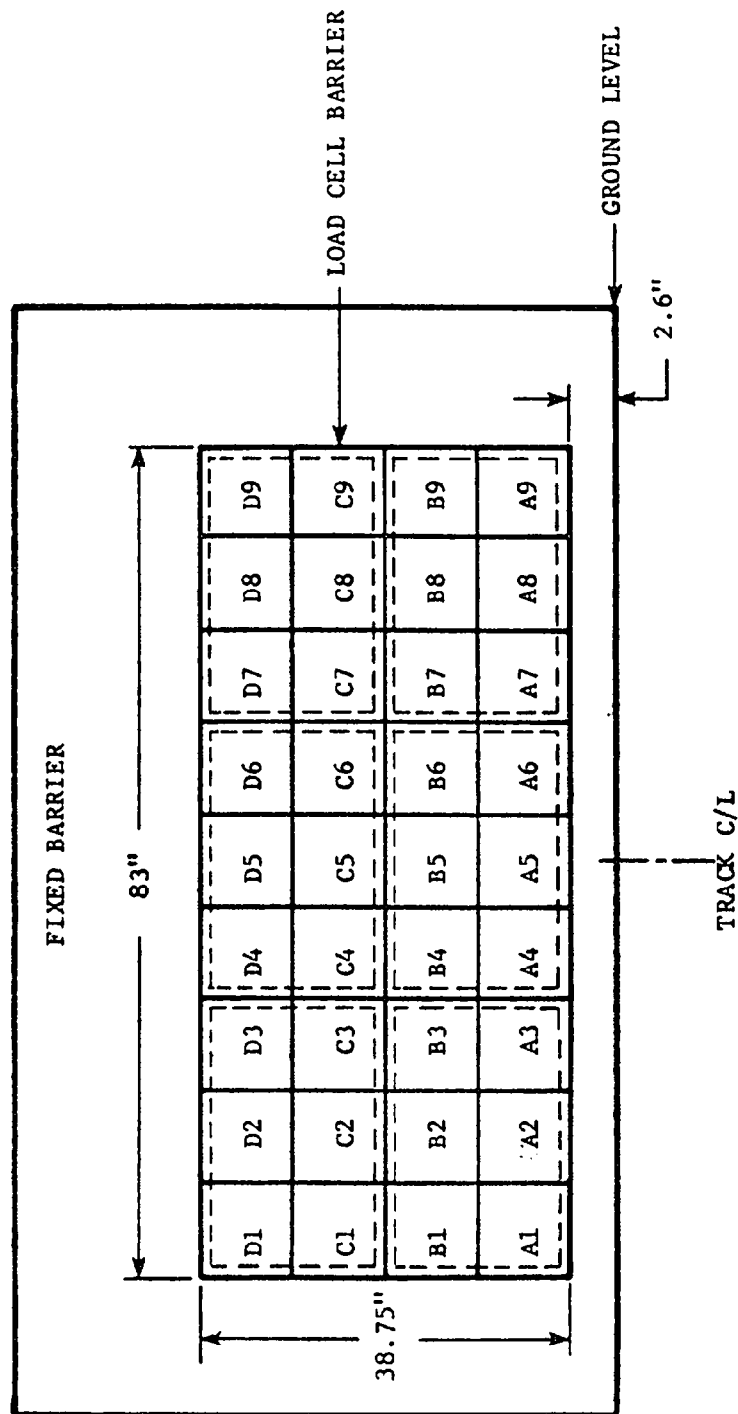
MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitudinal)

LENGTH OF DAMAGED REGION: L = 55.4 inches



36 LOAD CELLS  
4 ROWS  
9 COLUMNS

FRONT VIEW



# BARRIER LOAD CELL CONFIGURATION

- GROUP 1: D1 thru C3
- GROUP 2: D4 thru C6
- GROUP 3: D7 thru C9
- GROUP 4: B1 thru A3
- GROUP 5: B4 thru A6
- GROUP 6: B7 thru A9

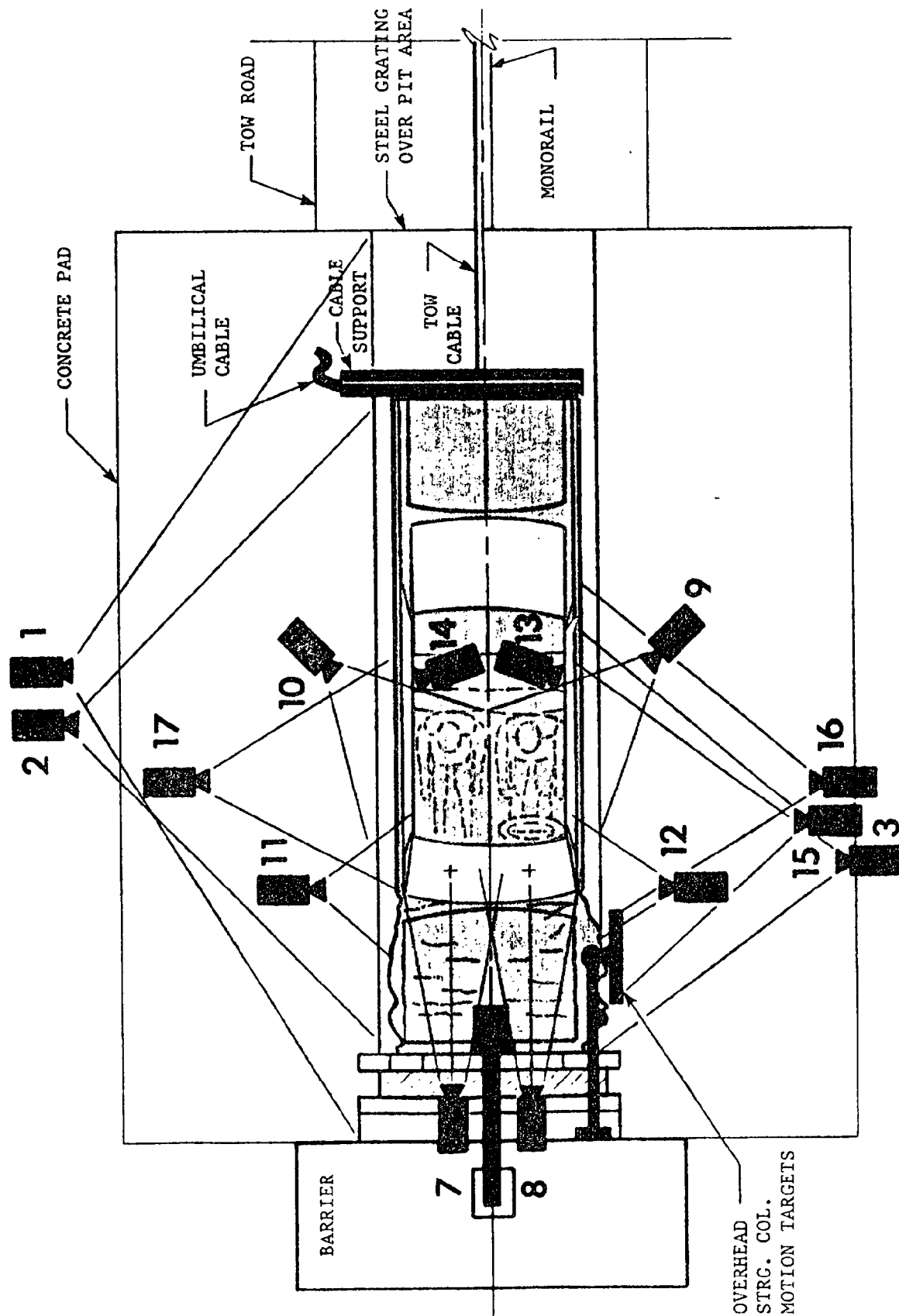
# LOAD CELL BARRIER SUMMARY

| POSITION              | POSITIVE DIRECTION* |                | NEGATIVE DIRECTION* |                |
|-----------------------|---------------------|----------------|---------------------|----------------|
|                       | MAX<br>(lb)         | TIME<br>(msec) | MIN<br>(lb)         | TIME<br>(msec) |
| TOTAL GROUP 1         | 8340.45             | 18.13          | 183.42              | 246.25         |
| TOTAL GROUP 2         | 7094.26             | 52.63          | 176.94              | 6.13           |
| TOTAL GROUP 3         | 7918.56             | 18.00          | 105.97              | 184.25         |
| TOTAL GROUP 4         | 26447.27            | 17.63          | 160.43              | 3.75           |
| TOTAL GROUP 5         | 52343.88            | 34.38          | ---                 | --- E          |
| TOTAL GROUP 6         | 21912.75            | 17.00          | ---                 | --- E          |
| TOTAL LOAD CELL FORCE | 101178.21           | 34.00          | ---                 | --- E          |

\*REFERENCE: COMPRESSION IS POSITIVE  
TENSION IS NEGATIVE

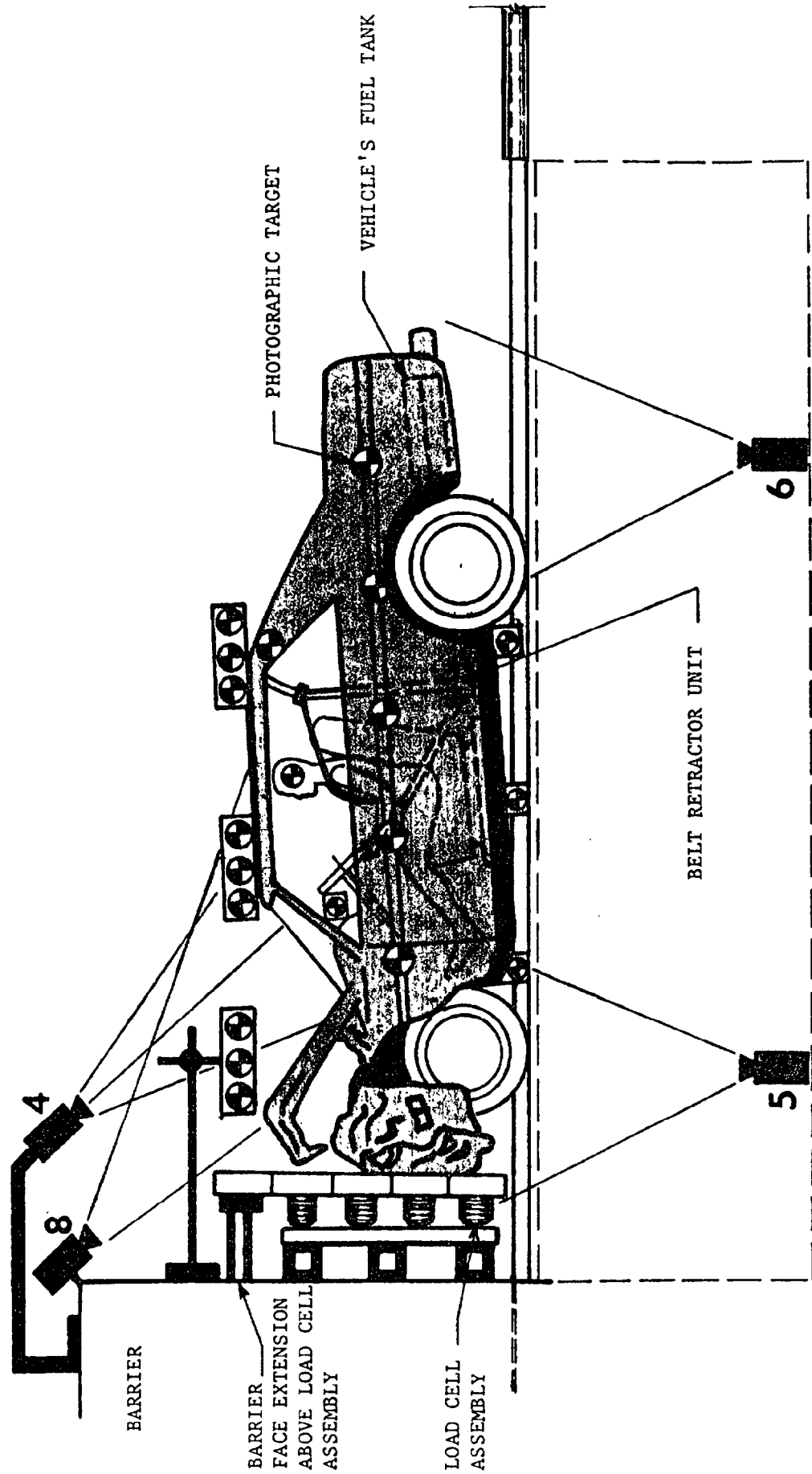
E There were no negative values in the time interval of interest.





CAMERA POSITIONS

# CAMERA POSITIONS



# HIGH SPEED CAMERA LOCATIONS

TEST NO.: 850129 VEHICLE: Volkswagen Jetta

| CAMERA NO. | VIEW                        | CAMERA POSITIONS (IN)* |        |       | ANGLE ** (DEG) | FILM PLANE TO HEAD TARGET | LENS (MM) | SPEED (FPS) |
|------------|-----------------------------|------------------------|--------|-------|----------------|---------------------------|-----------|-------------|
|            |                             | X                      | Y      | Z     |                |                           |           |             |
| 1          | Real-time Panning           | -142                   | 504    | 61    | NA             | NA                        | 16        | 24          |
| 2          | Vehicle Crush               | -81.3                  | 266.4  | 37.1  | 0              | NA                        | 13        | 500         |
| 3          | Dummy Kinematics            | -41.5                  | -295   | 44    | -3             | 275 1/4"                  | 25        | 507         |
| 4          | Windshield Damage           | -36.4                  | 0      | 120   | -85            | NA                        | 13        | 525         |
| 5          | Crush & Fluid Spillage      | -50.5                  | 0      | -92.4 | 90             | NA                        | 13        | 500         |
| 6          | Fluid Spillage              | -99.3                  | 0      | -99   | 90             | NA                        | 13        | 498         |
| 7          | Passenger Kinematics        | 4.5                    | 13.8   | 115   | -55            | NA                        | 17        | 562         |
| 8          | Driver Kinematics           | 6.8                    | -14.5  | 113.3 | -55            | NA                        | 17        | 475         |
| 9          | Driver Kinematics           | -157.3                 | -166.9 | 74.1  | -13            | 161"                      | 25        | 493         |
| 10         | Passenger Kinematics        | -152.1                 | 167.9  | 76    | -15            | 160 3/8"                  | 25        | 502         |
| 11         | Windshield Intrusion        | -53.9                  | 306.1  | 44    | 0              | NA                        | 50        | 498         |
| 12         | Windshield Intrusion        | -53                    | -309.4 | 42.3  | 0              | NA                        | 50        | 502         |
| 13         | Driver Seatbelt Movement    | NA                     | NA     | NA    | NA             | NA                        | 13        | 500         |
| 14         | Passenger Seatbelt Movement | NA                     | NA     | NA    | NA             | NA                        | 13        | 502         |
| 15         | Column Movement             | -98                    | -286   | 100   | -15            | NA                        | 25        | 505         |
| 16         | Column Movement             | -98                    | -286   | 72.5  | -10            | NA                        | 25        | 495         |
| 17         | Passenger Kinematics        | -38.8                  | 210.8  | 45.3  | 5              | 197 7/16"                 | 13        | 505         |

\* X = Film plane to monorail centerline  
Y = Film plane to impact location  
Z = Film plane to ground  
\*\* Referenced to horizontal plane

APPENDIX A  
PHOTOGRAPHS

1. PRE-TEST FRONT VIEW
2. PRE-TEST LEFT SIDE VIEW
3. PRE-TEST RIGHT SIDE VIEW
4. POST-TEST RIGHT SIDE VIEW
5. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW
6. POST-TEST RIGHT FRONT THREE-QUARTER VIEW
7. PRE-TEST LEFT REAR THREE-QUARTER VIEW
8. POST-TEST LEFT REAR THREE-QUARTER VIEW
9. POST-TEST TOP VIEW (VEHICLE ON ROLLOVER MACHINE)
10. PRE-TEST ENGINE COMPARTMENT VIEW
11. POST-TEST FUEL FILLER CAP VIEW
12. PRE-TEST FRONT UNDERBODY VIEW
13. POST-TEST FRONT UNDERBODY VIEW
14. PRE-TEST REAR UNDERBODY VIEW
15. POST-TEST REAR UNDERBODY VIEW
16. PRE-TEST DRIVER DUMMY POSITION VIEW
17. PRE-TEST PASSENGER DUMMY POSITION VIEW
18. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
19. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
20. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
21. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)
22. POST-TEST DRIVER DUMMY HEAD CONTACT AREA
23. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT

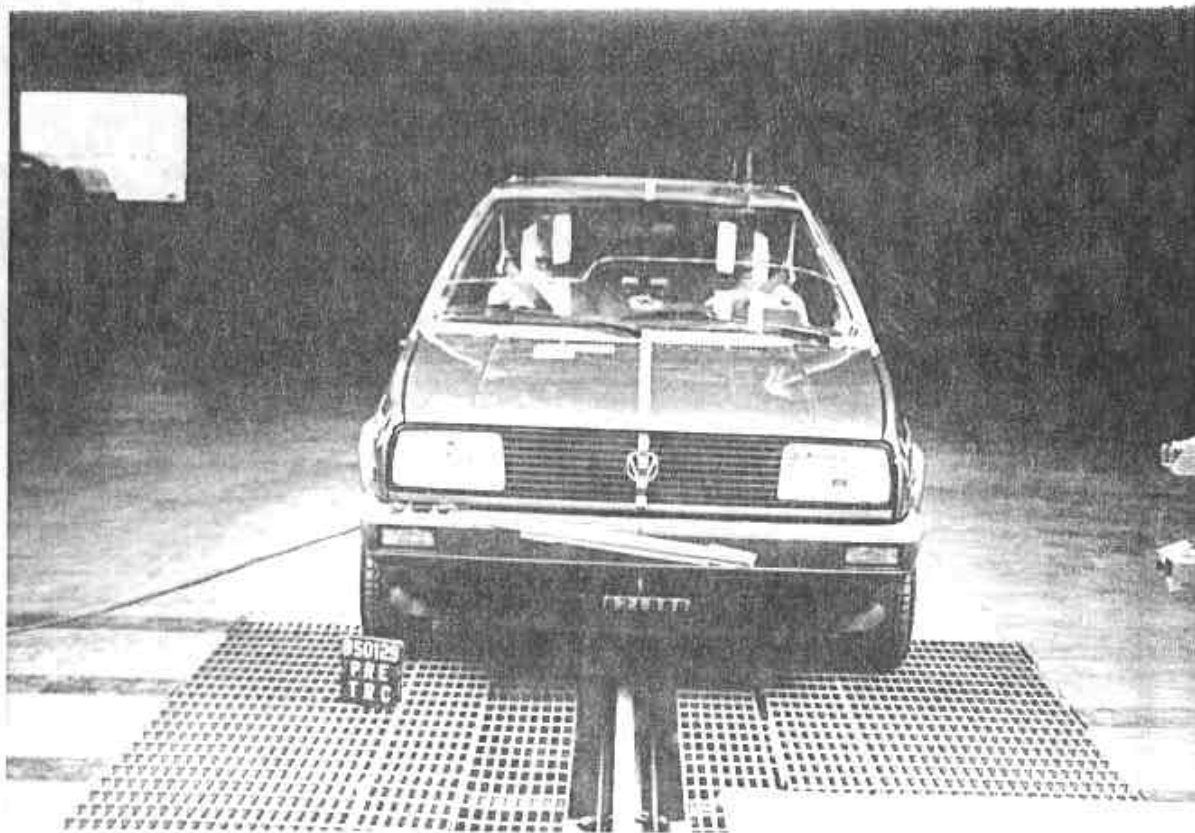


Figure 1. PRE-TEST FRONT VIEW

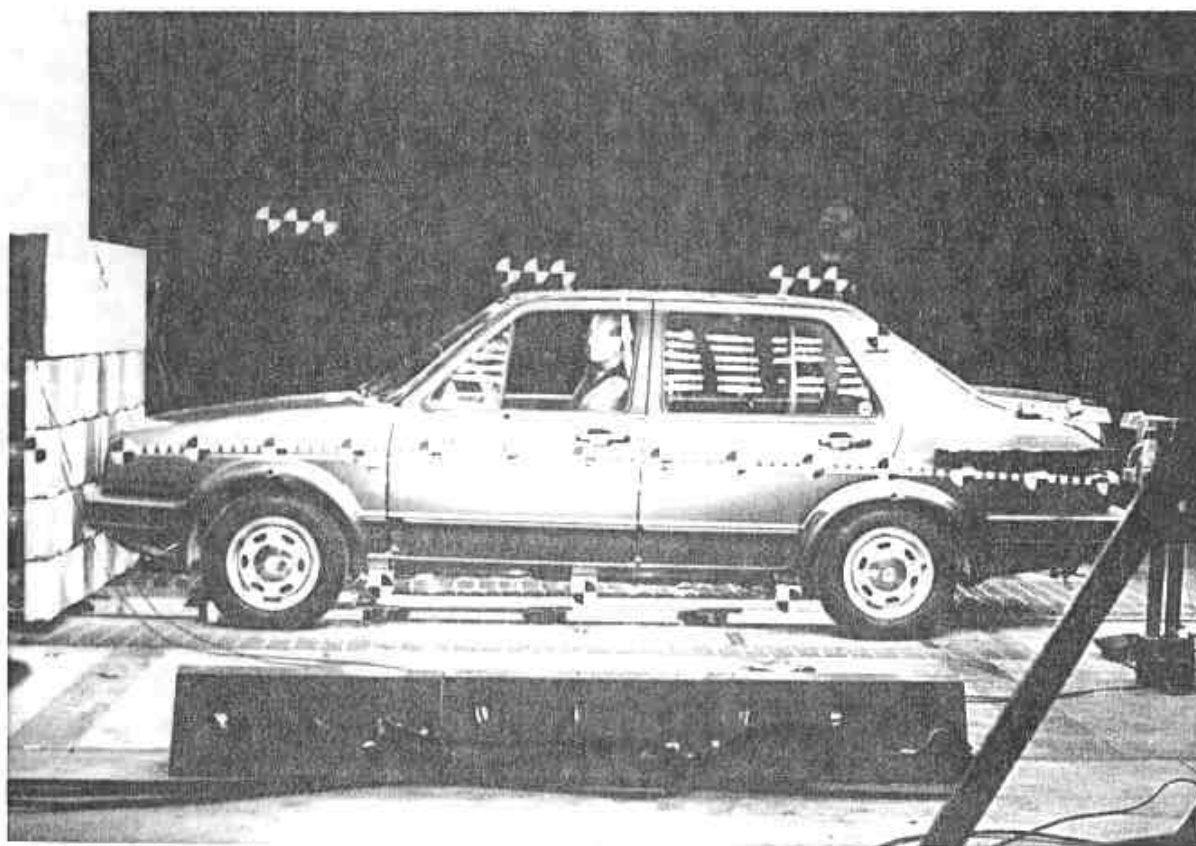


Figure 2. PRE-TEST LEFT SIDE VIEW  
A-2

850129



Figure 3. PRE-TEST RIGHT SIDE VIEW

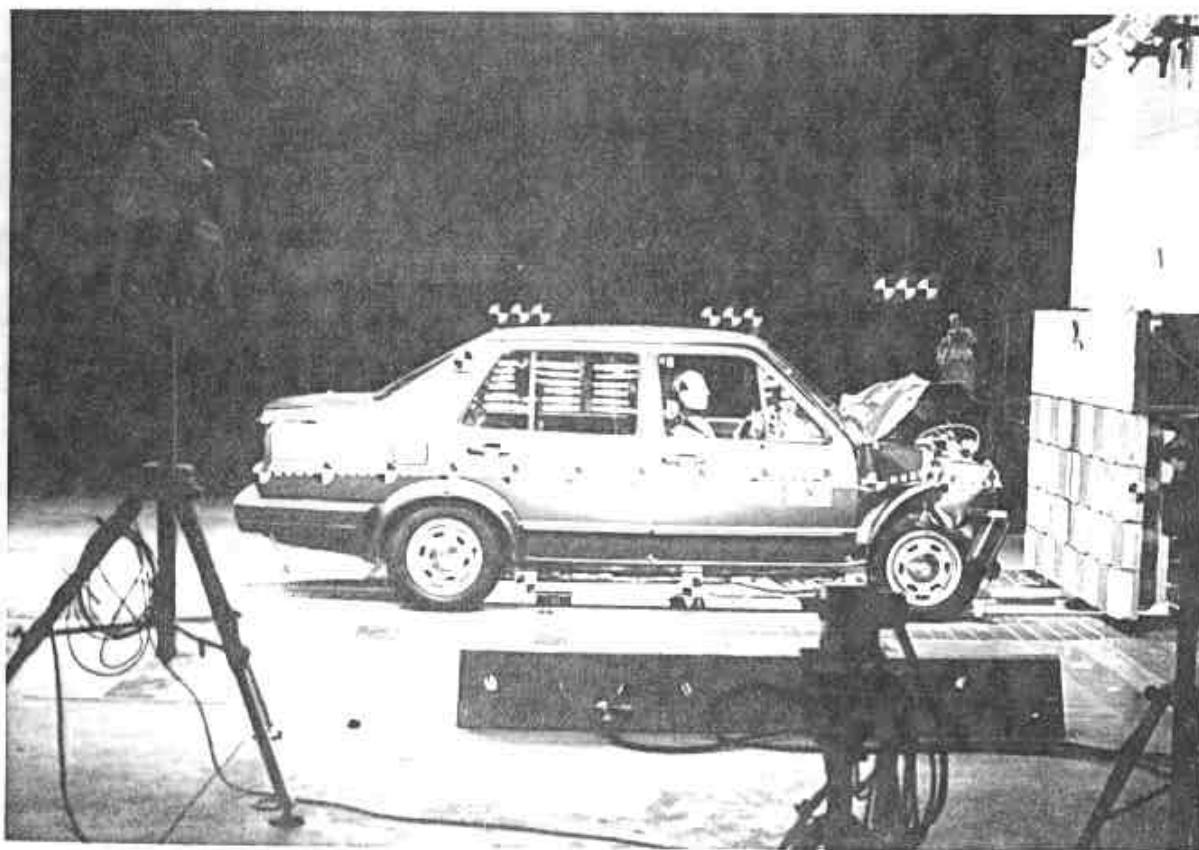


Figure 4. POST-TEST RIGHT SIDE VIEW  
A-3

850129



Figure 5. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

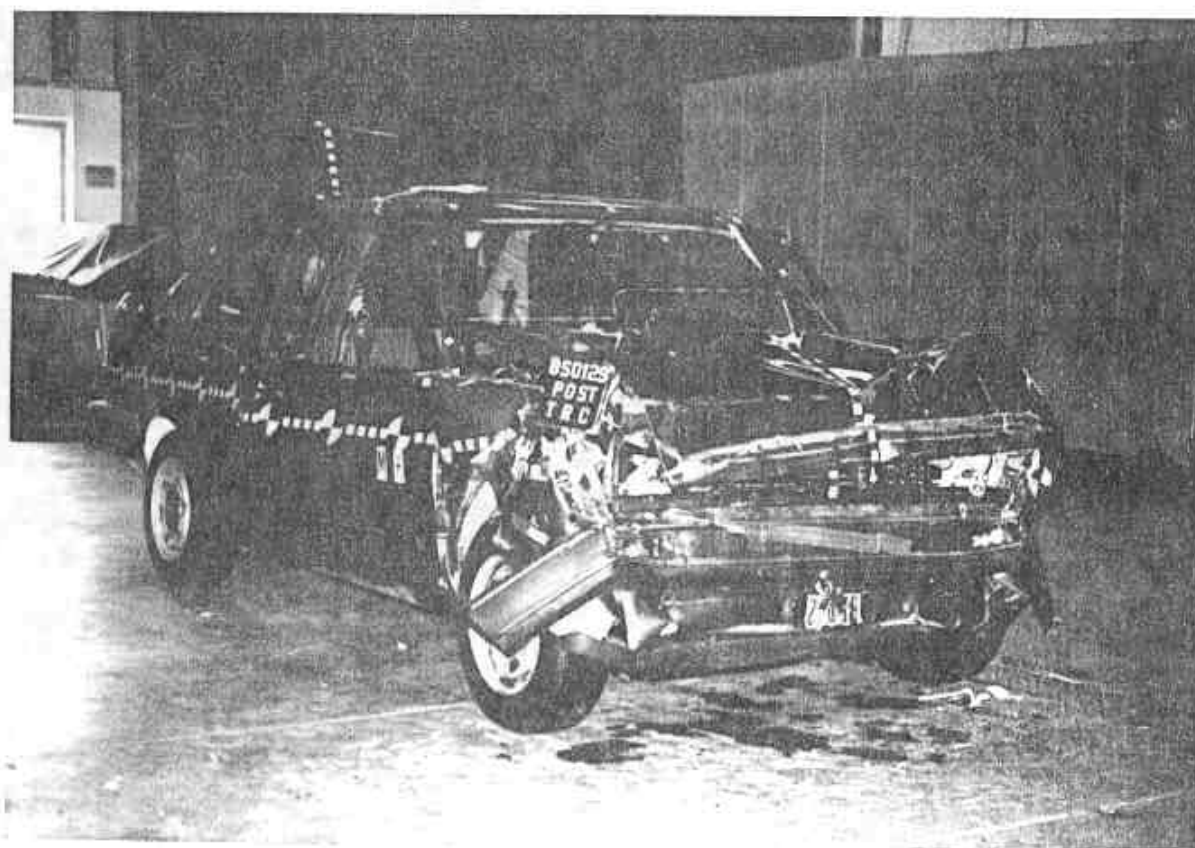


Figure 6. POST-TEST RIGHT FRONT THREE-QUARTER VIEW





Figure 7. PRE-TEST LEFT REAR THREE-QUARTER VIEW

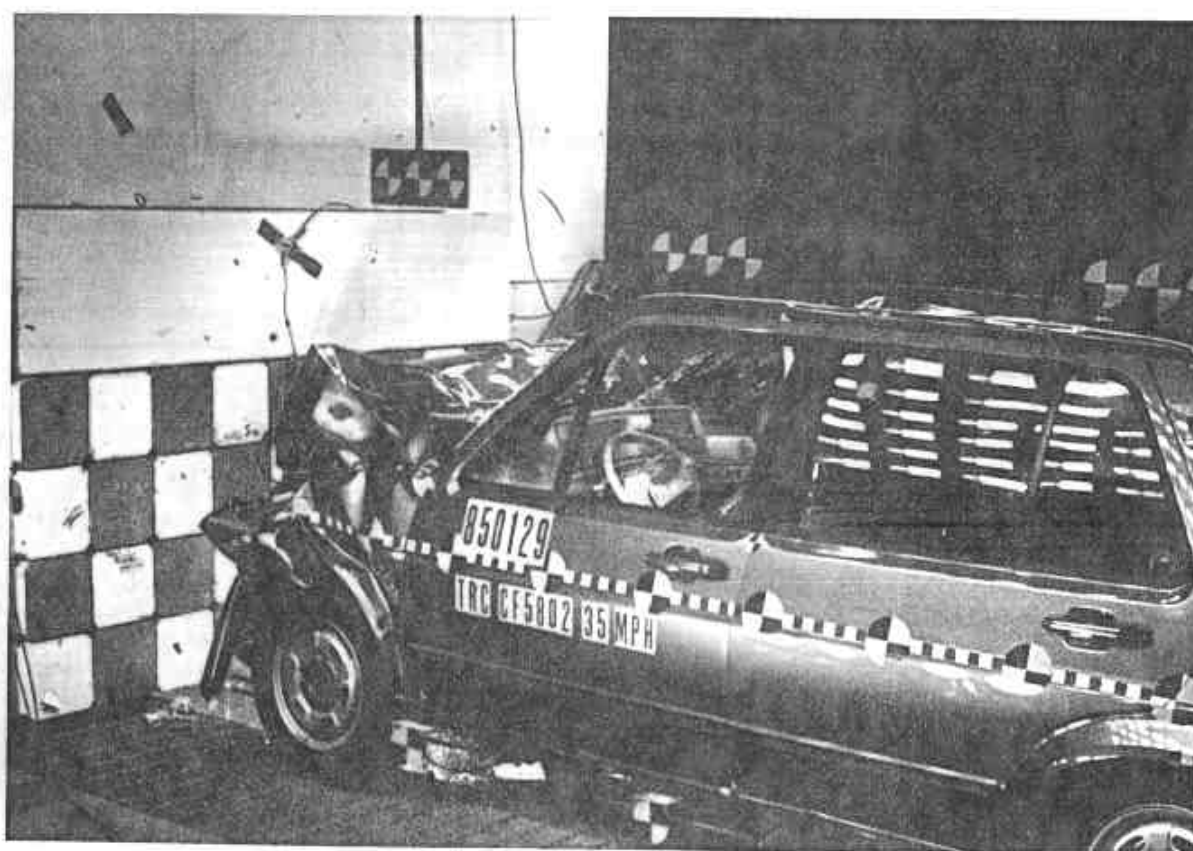


Figure 8. POST-TEST LEFT REAR THREE-QUARTER VIEW

A-5

850129



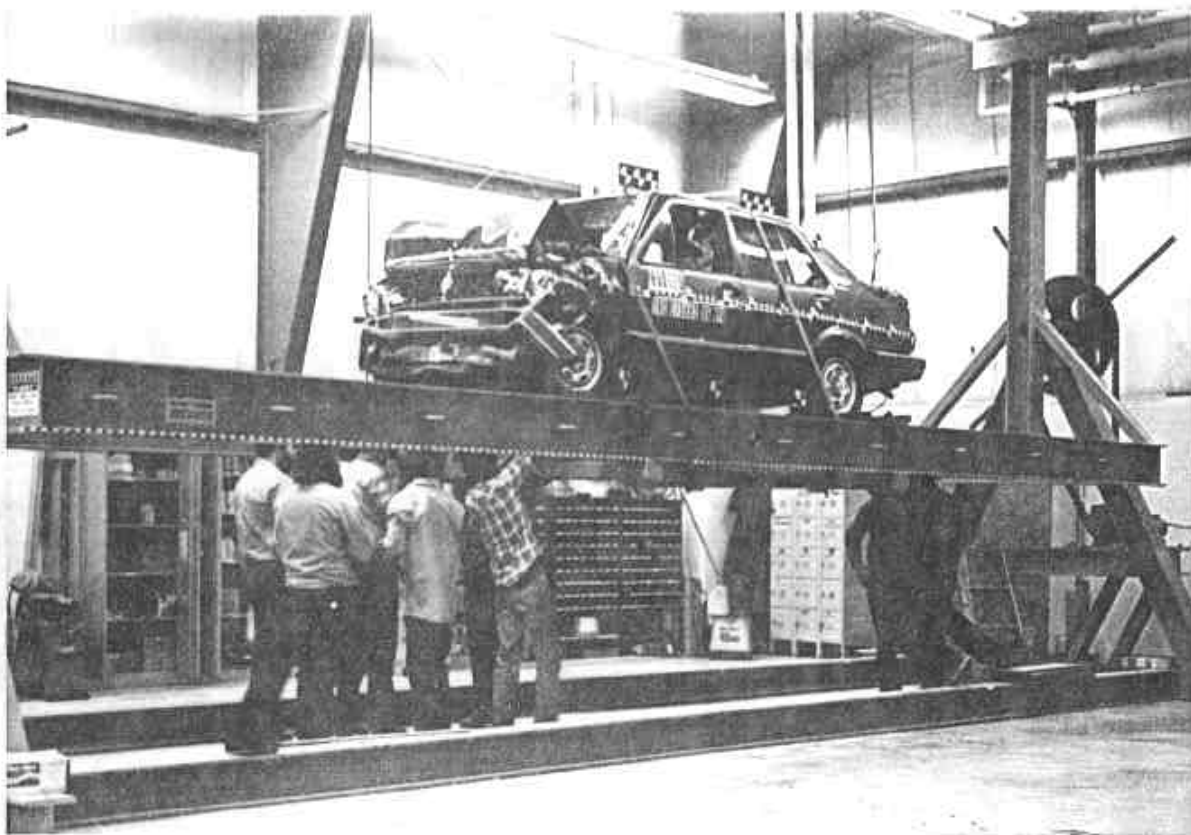


Figure 9. POST-TEST TOP VIEW (VEHICLE ON ROLLOVER MACHINE)

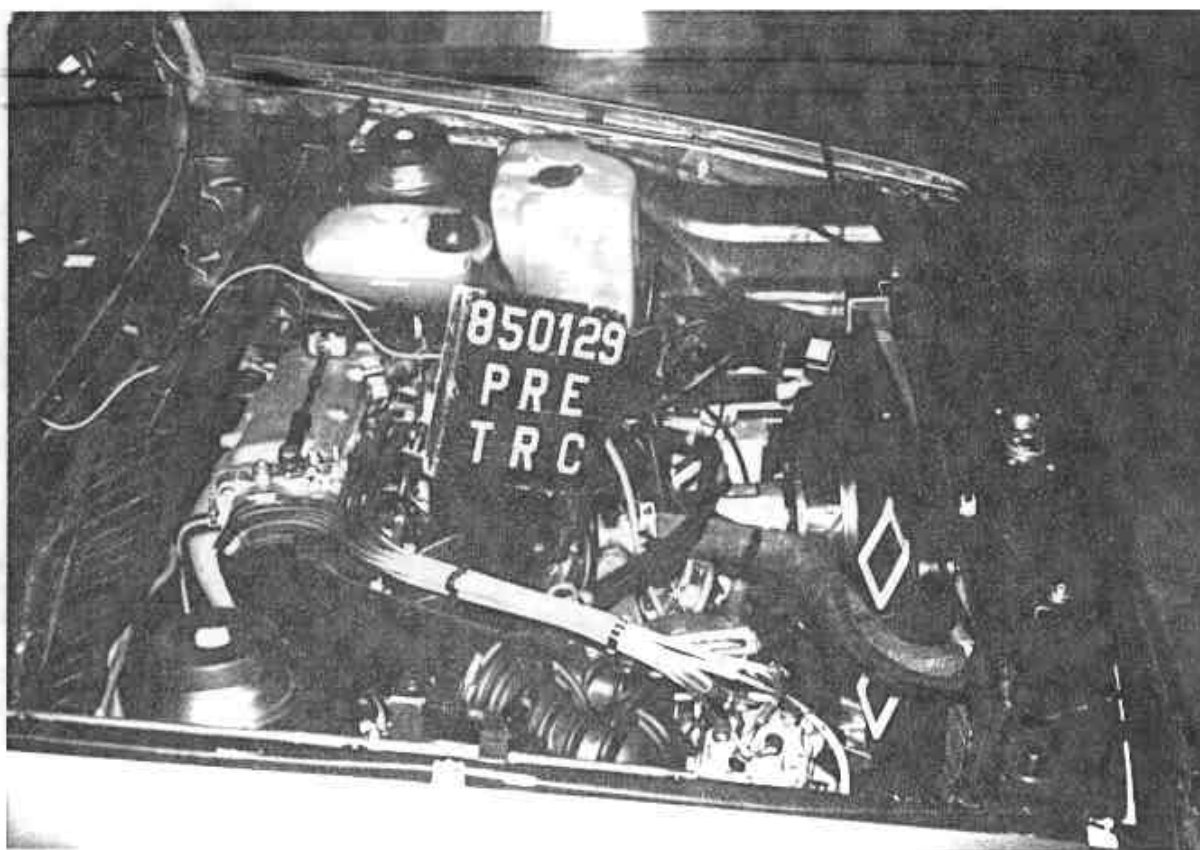


Figure 10. PRE-TEST ENGINE COMPARTMENT VIEW  
A-6

850129



Figure 11. POST-TEST FUEL FILLER CAP VIEW

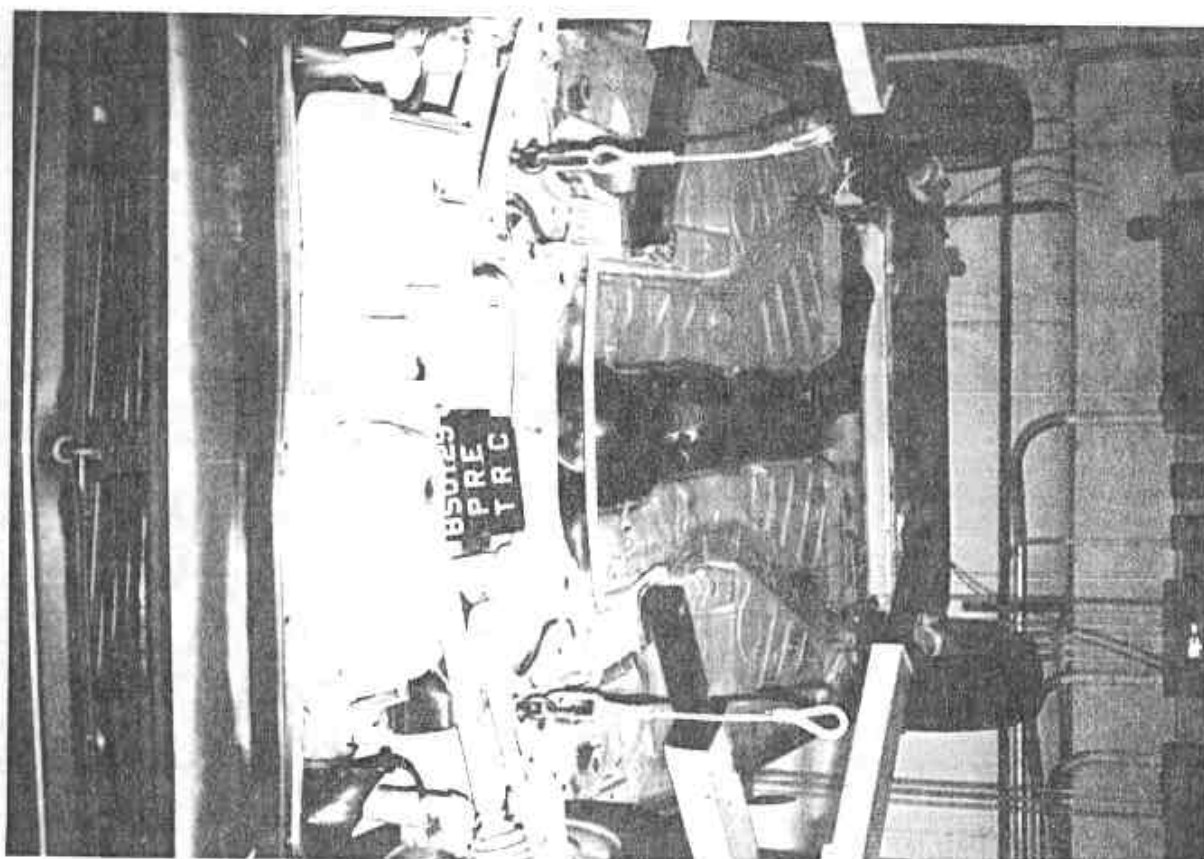


Figure 12. PRE-TEST FRONT UNDERBODY VIEW

A-7

850129

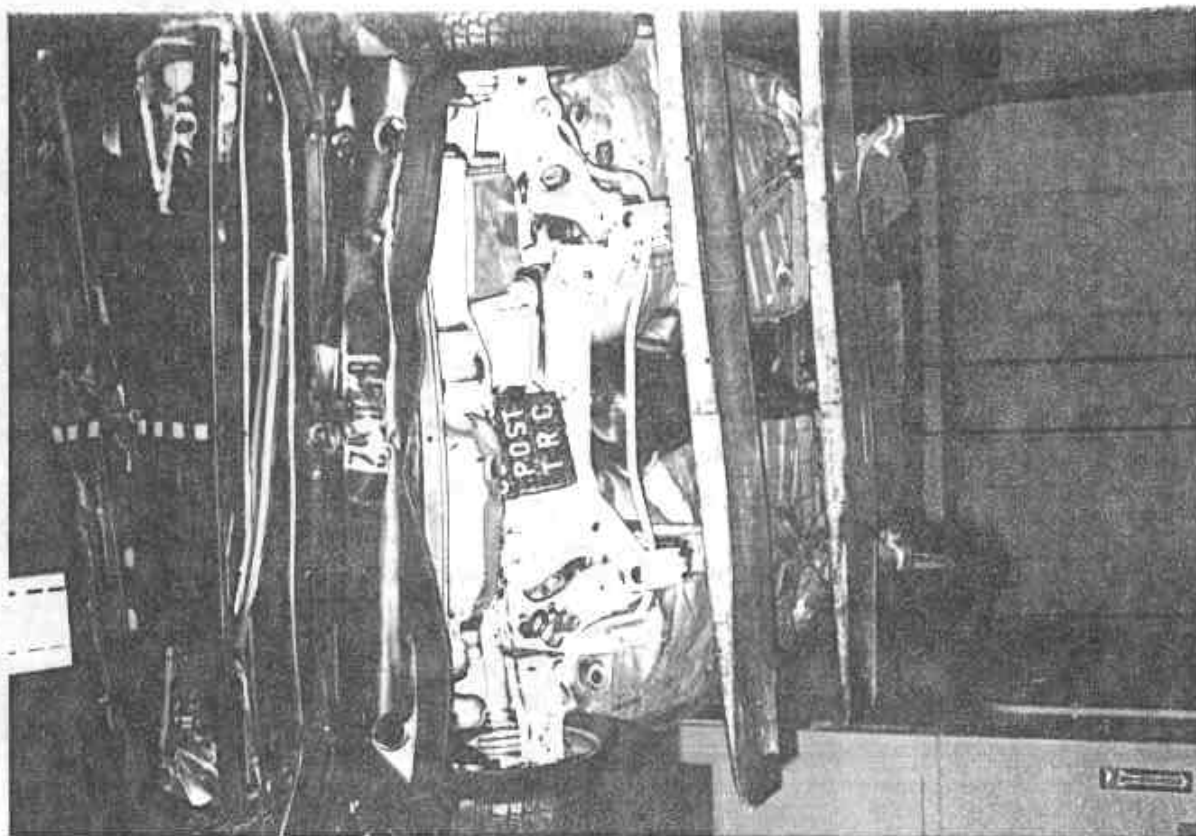


Figure 13. POST-TEST FRONT UNDERBODY VIEW

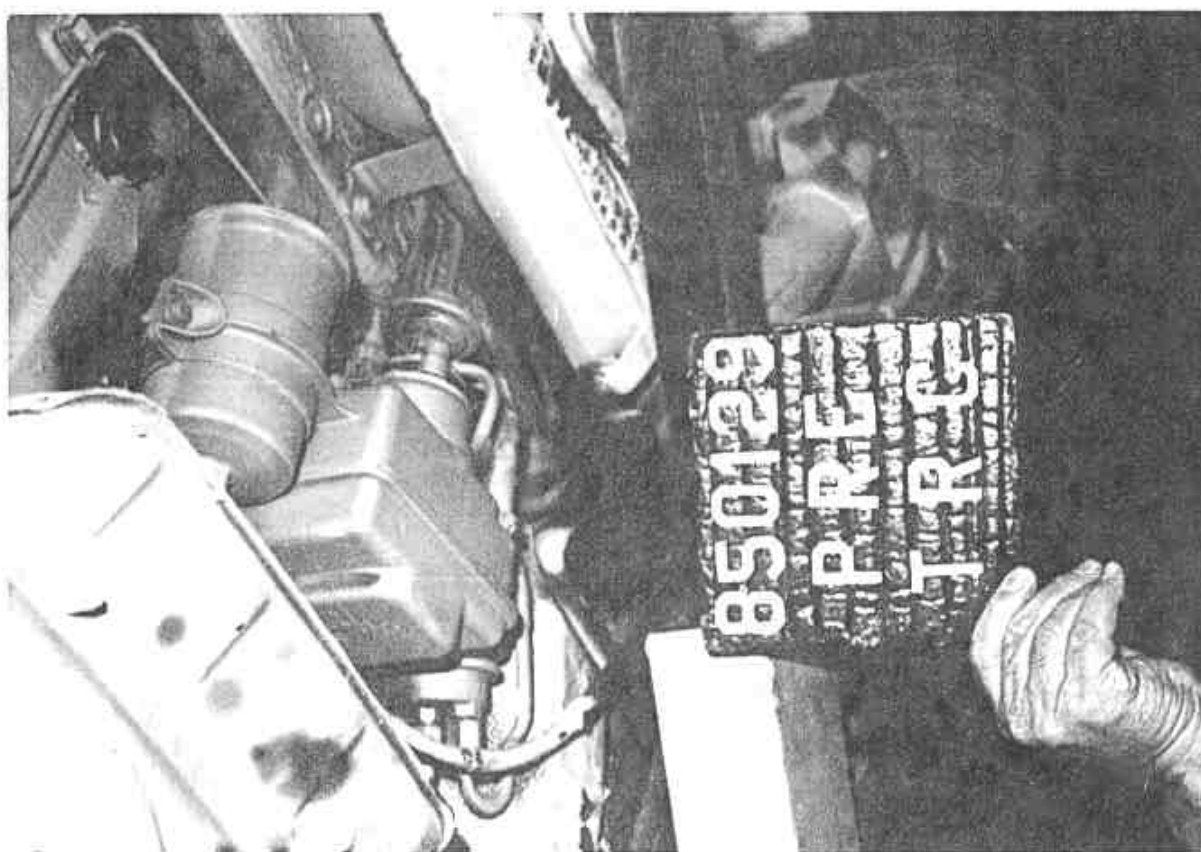


Figure 14. PRE-TEST REAR UNDERBODY VIEW



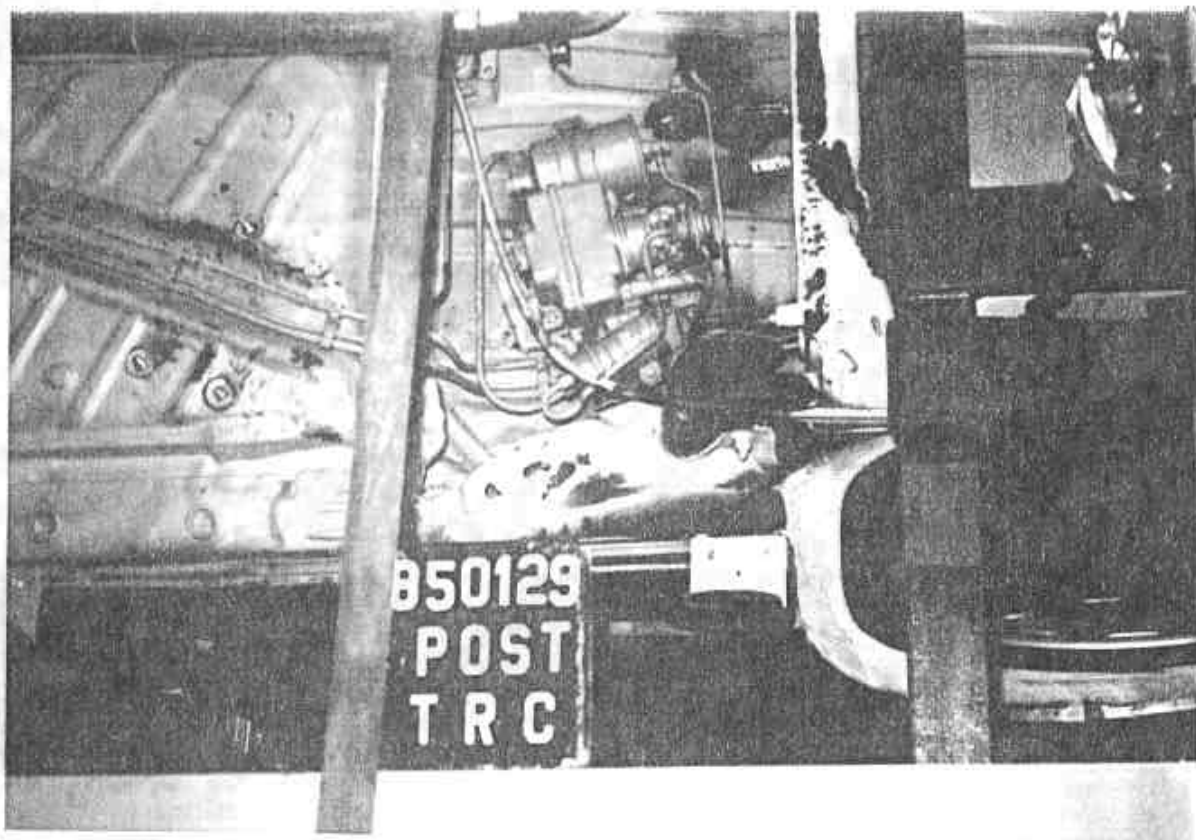


Figure 15. POST-TEST REAR UNDERBODY VIEW

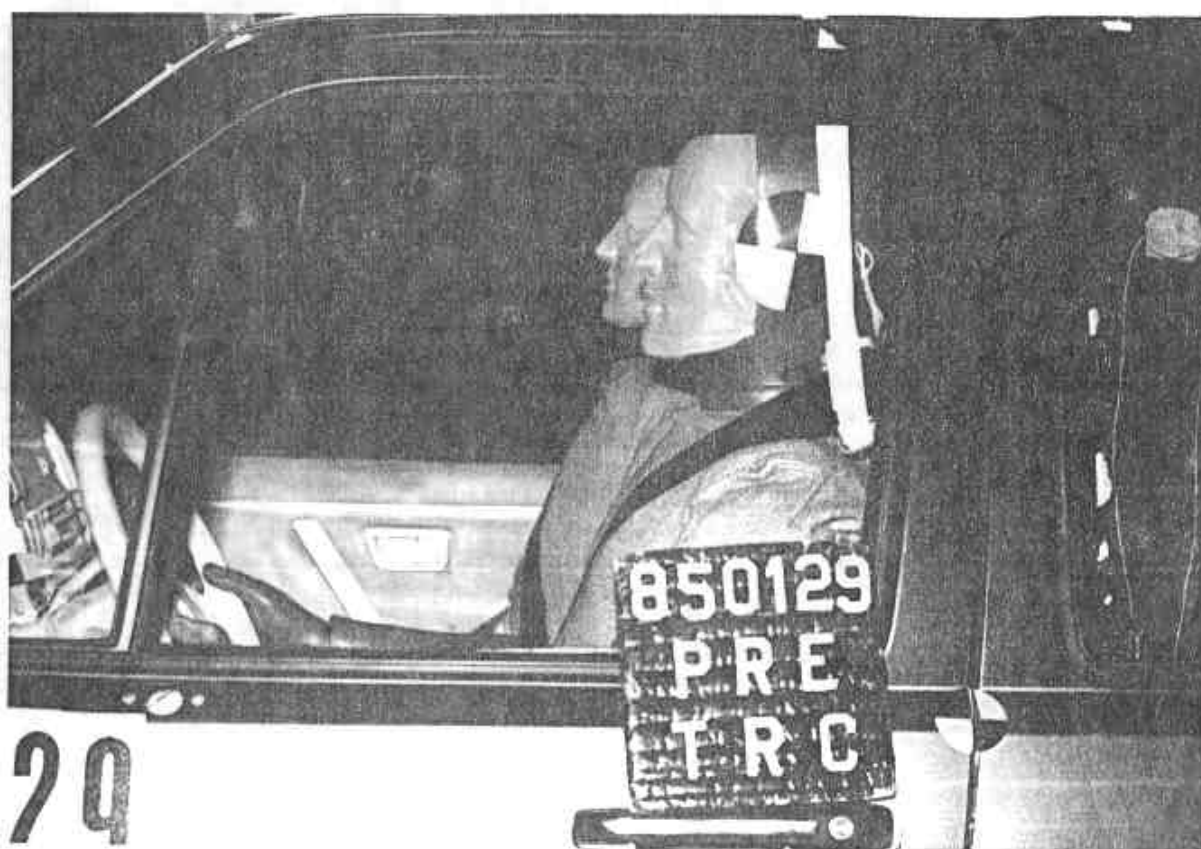


Figure 16. PRE-TEST DRIVER DUMMY POSITION VIEW  
A-9

850129



Figure 17. PRE-TEST PASSENGER DUMMY POSITION VIEW

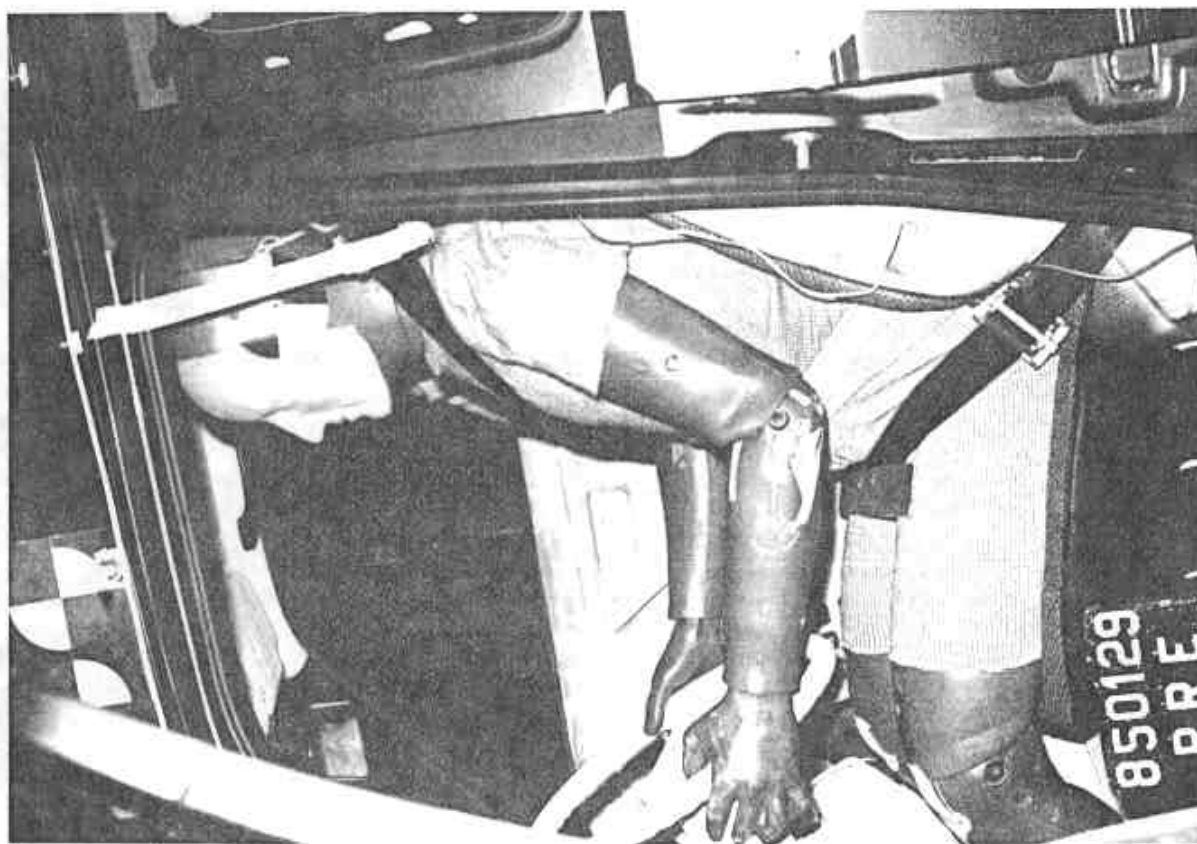


Figure 18. PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

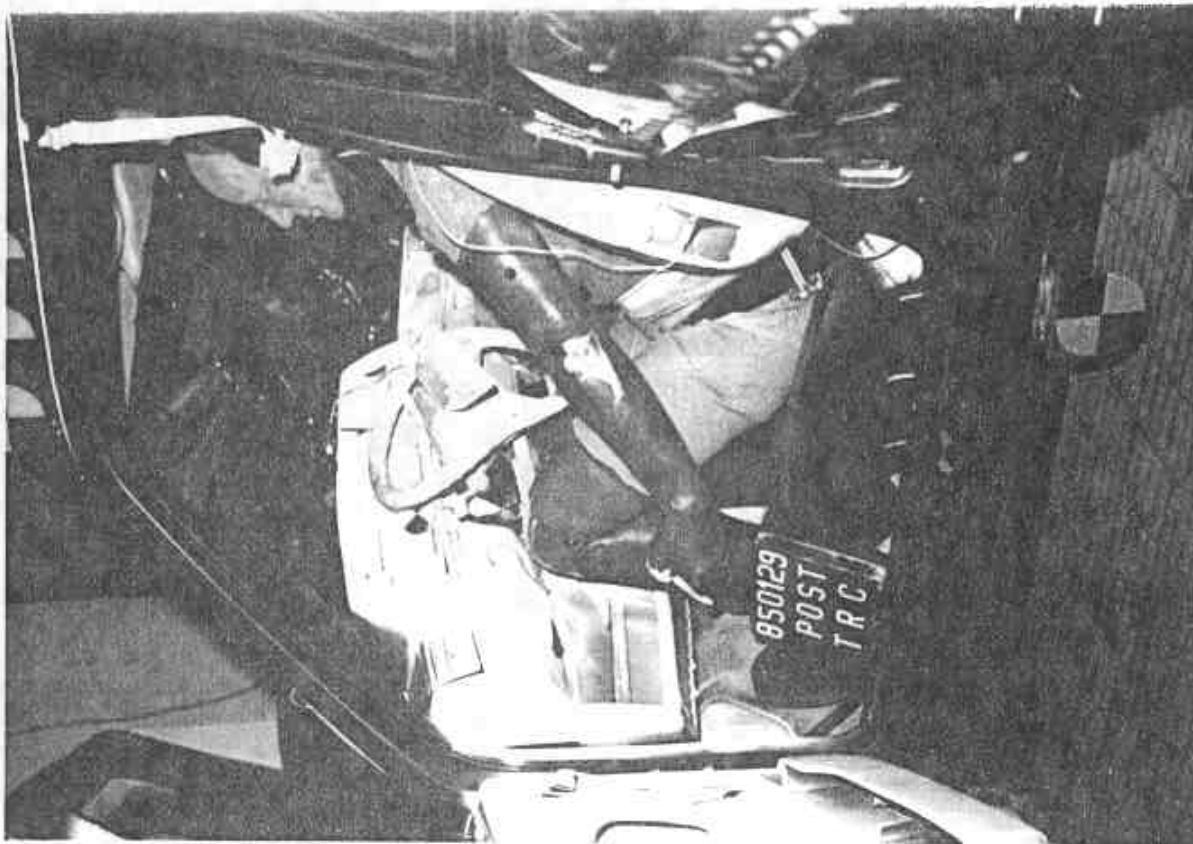


Figure 19. POST-TEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)

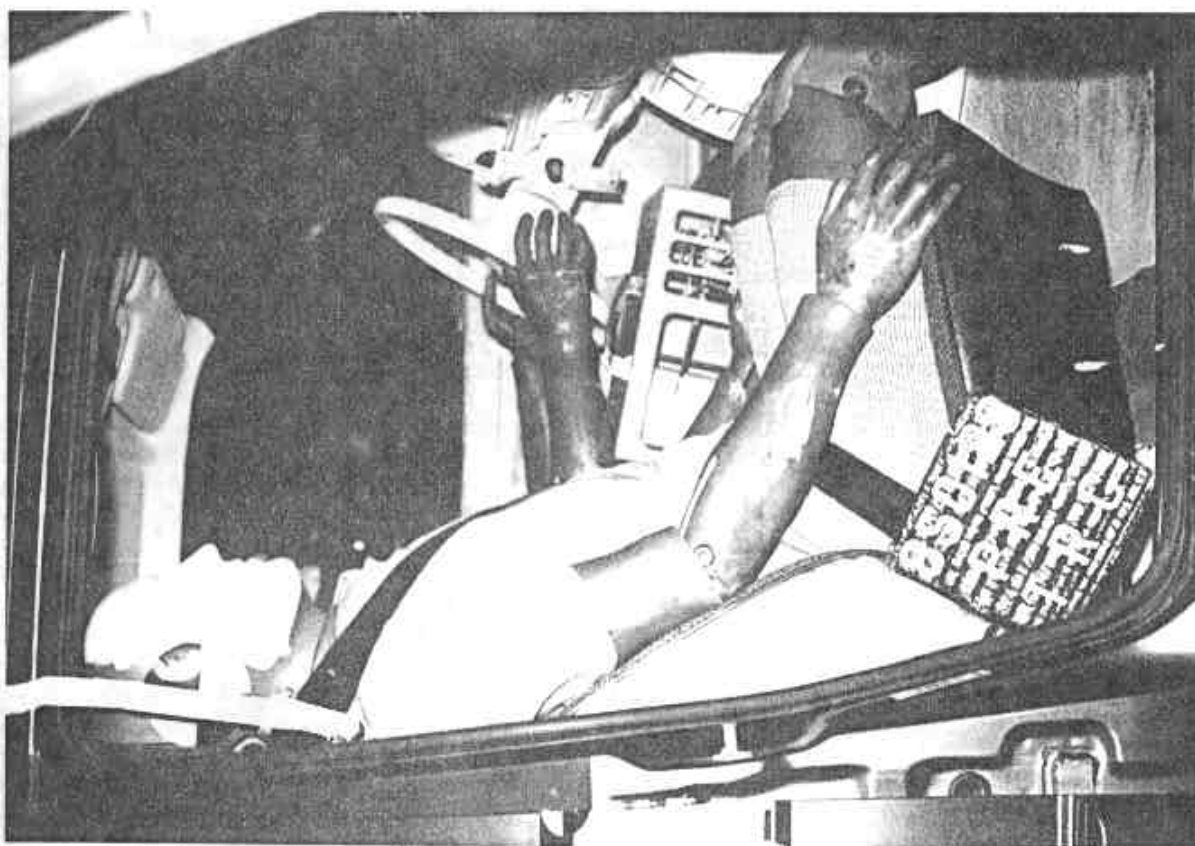


Figure 20. PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (DOOR OPEN)





Figure 21. POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR (DOOR OPEN)



Figure 22. POST-TEST DRIVER DUMMY HEAD CONTACT AREA

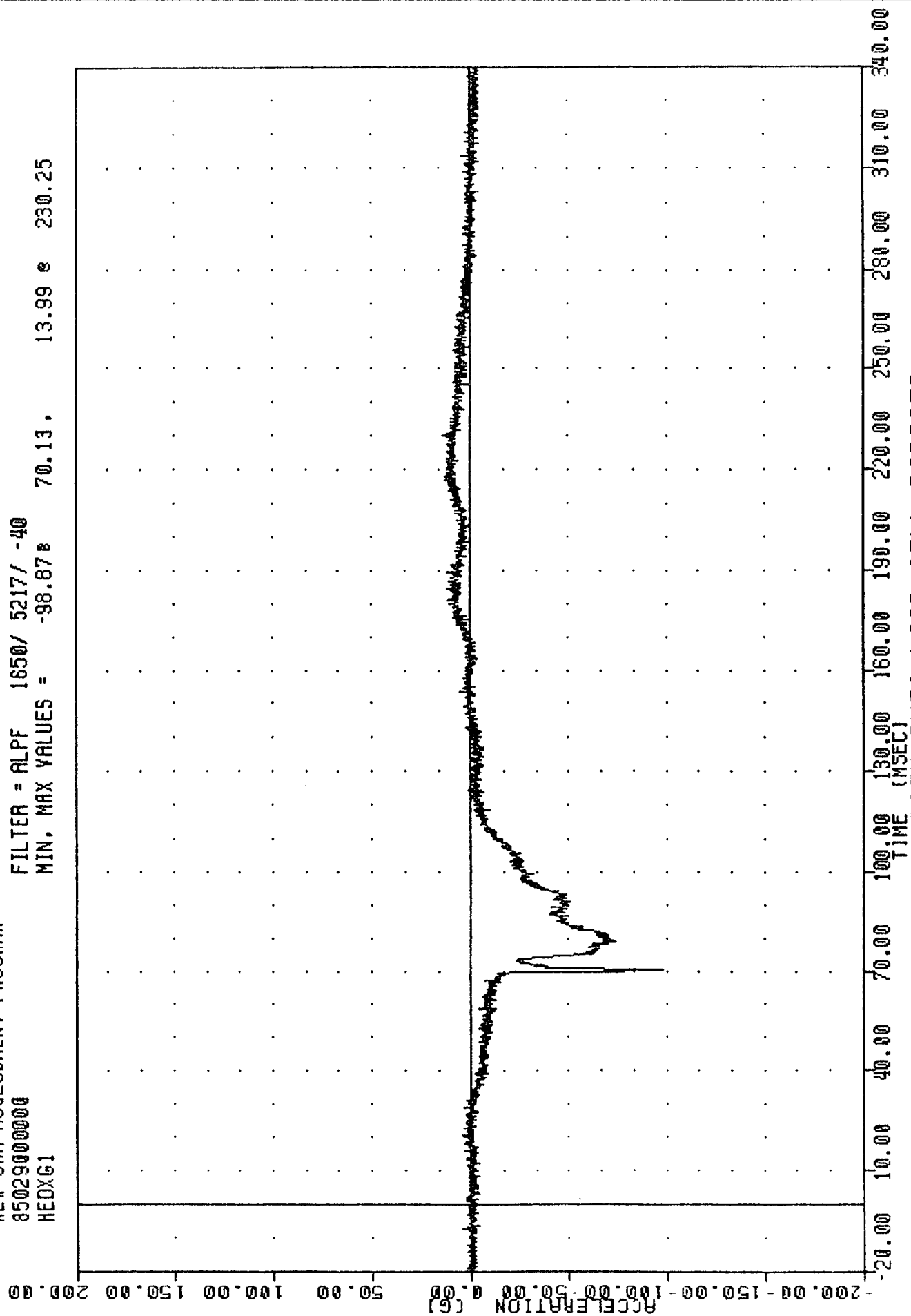


Figure 23. POST-TEST PASSENGER DUMMY HEAD/KNEE CONTACT



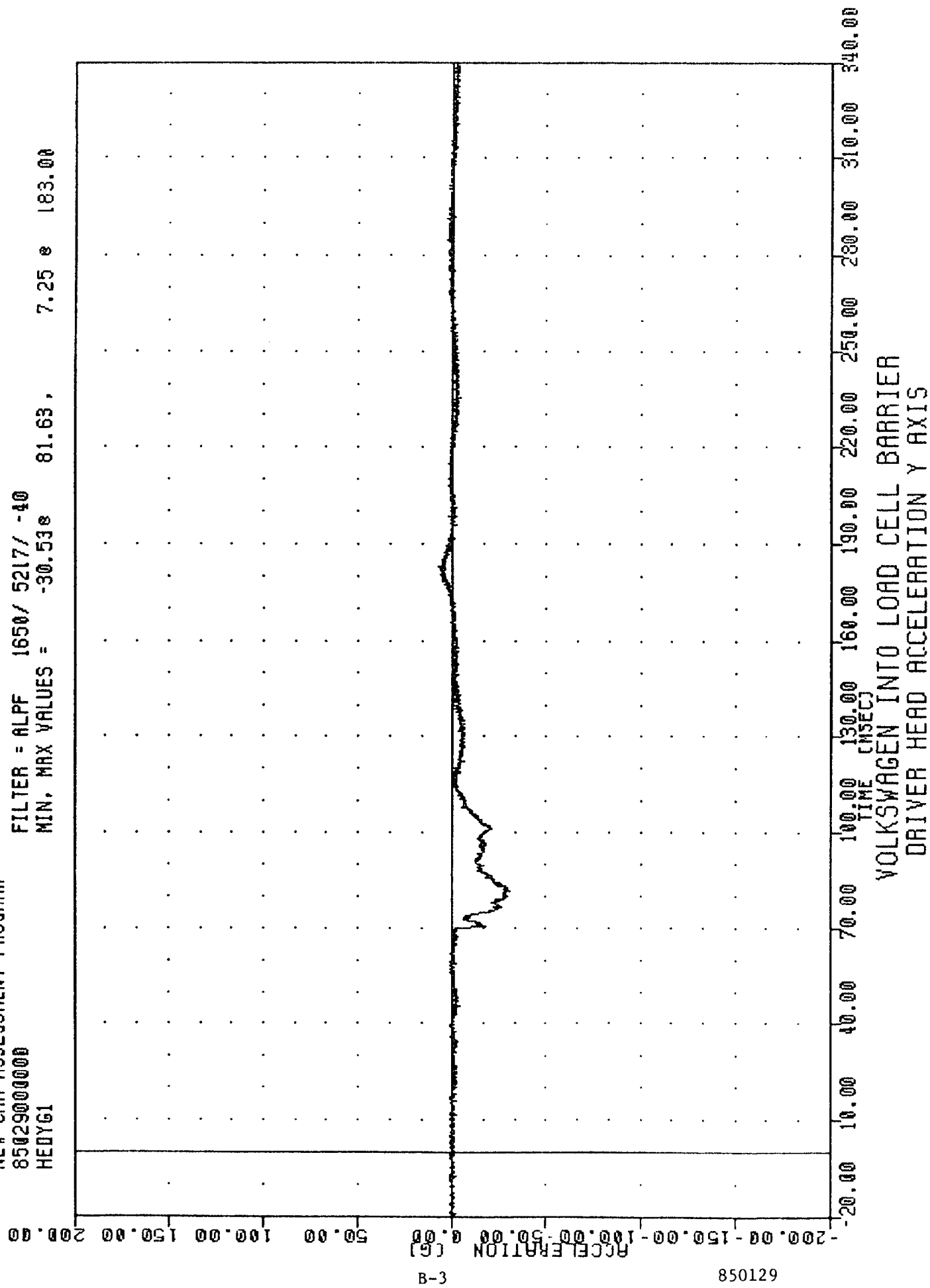
APPENDIX B  
DATA PLOTS

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 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 HEDXG1  
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 MIN, MAX VALUES = -98.87 70.13, 13.99 230.25  
 DATE FEB 05 12:02:00

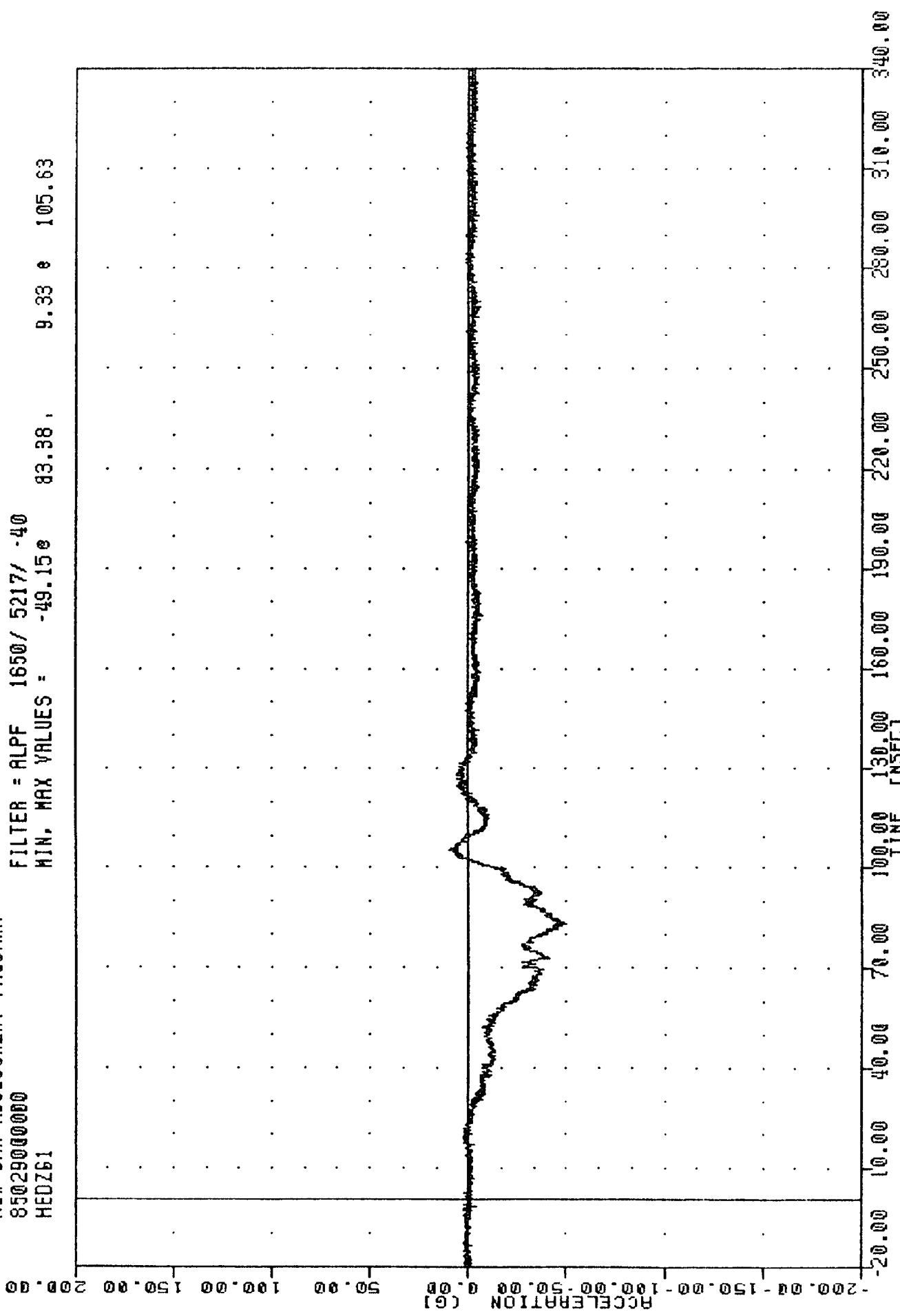


VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER HEAD ACCELERATION X AXIS

THU 7:00129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 HEDYG1  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN, MAX VALUES = -30.538 81.63, 7.25 e 183.00  
 13:02:03

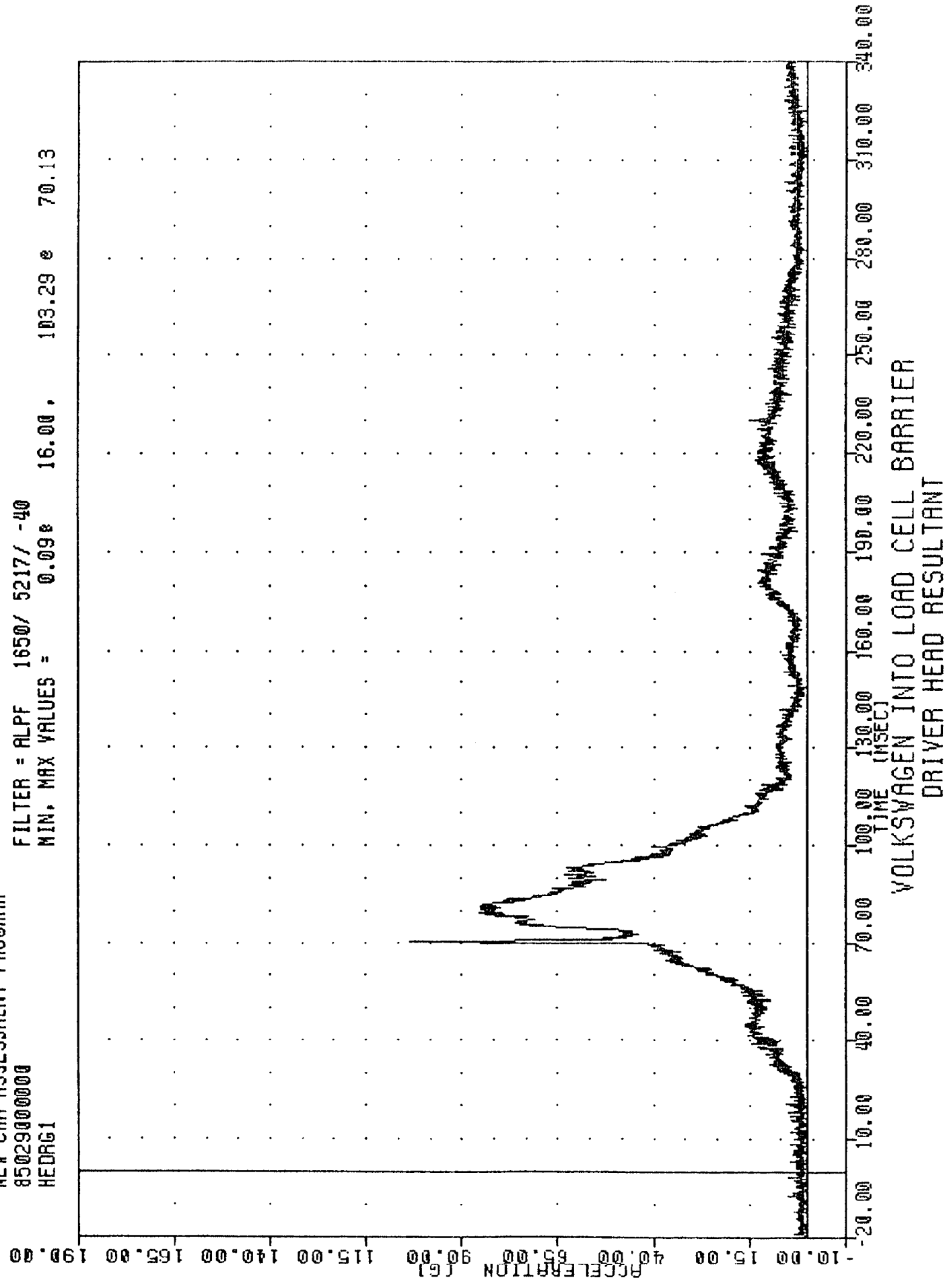


TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 HEDZ61  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN, MAX VALUES = -49.15e 83.38, 9.33 e 105.63  
 4 FEB 83 13:02:09



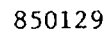
VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER HEAD ACCELERATION Z AXIS

NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 HEDRG1  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN. MAX VALUES = 0.098 16.00, 103.29 e 70.13  
 FEB 02:00



012

MIN, MAX VALUES = -50.38 80.13, 6.51 225.13



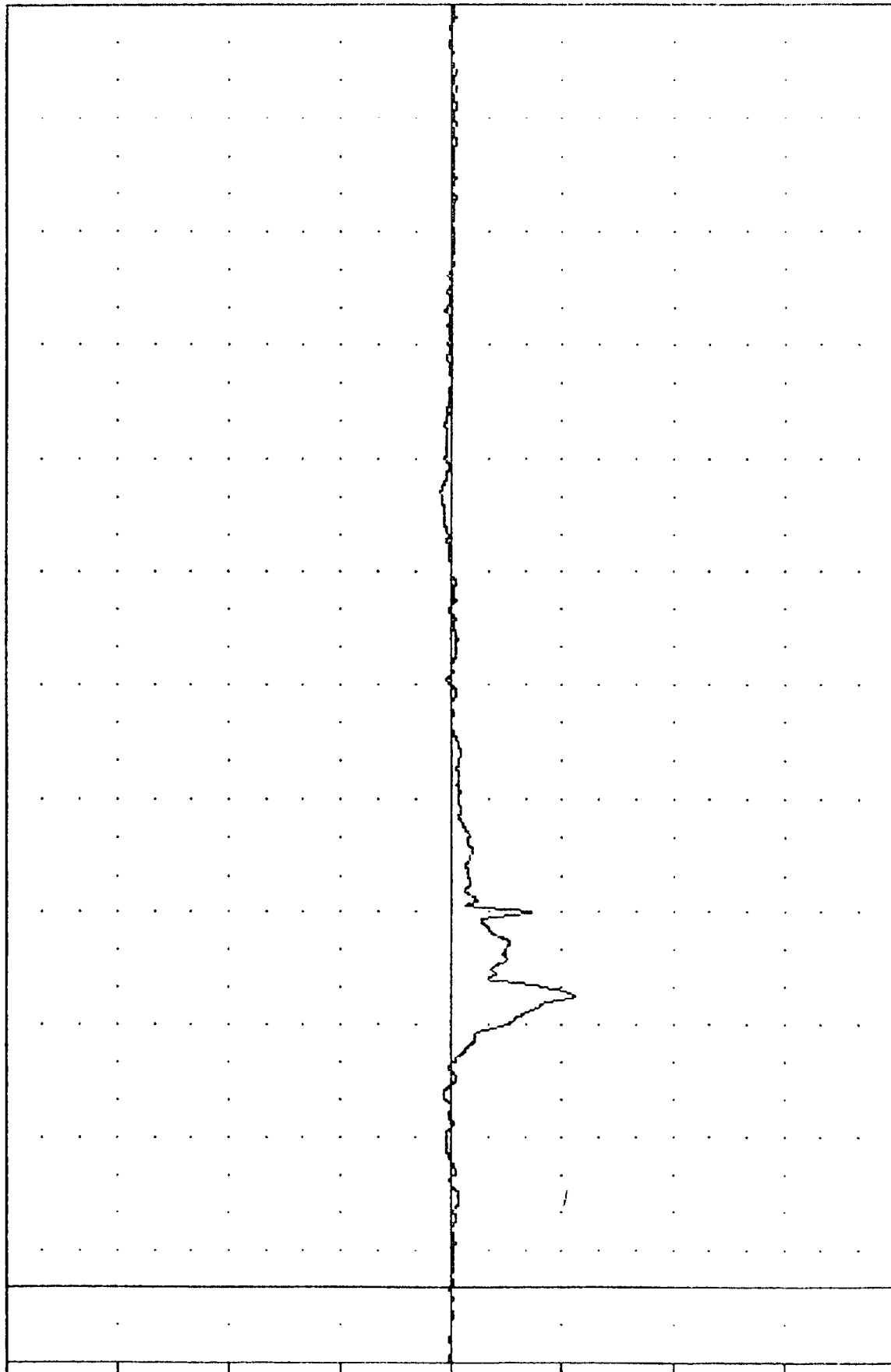
THC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 CSTY61

PLUT DATE 4-FEB-85 13:02:09

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -27.96e 77.50, 2.64 e 211.00

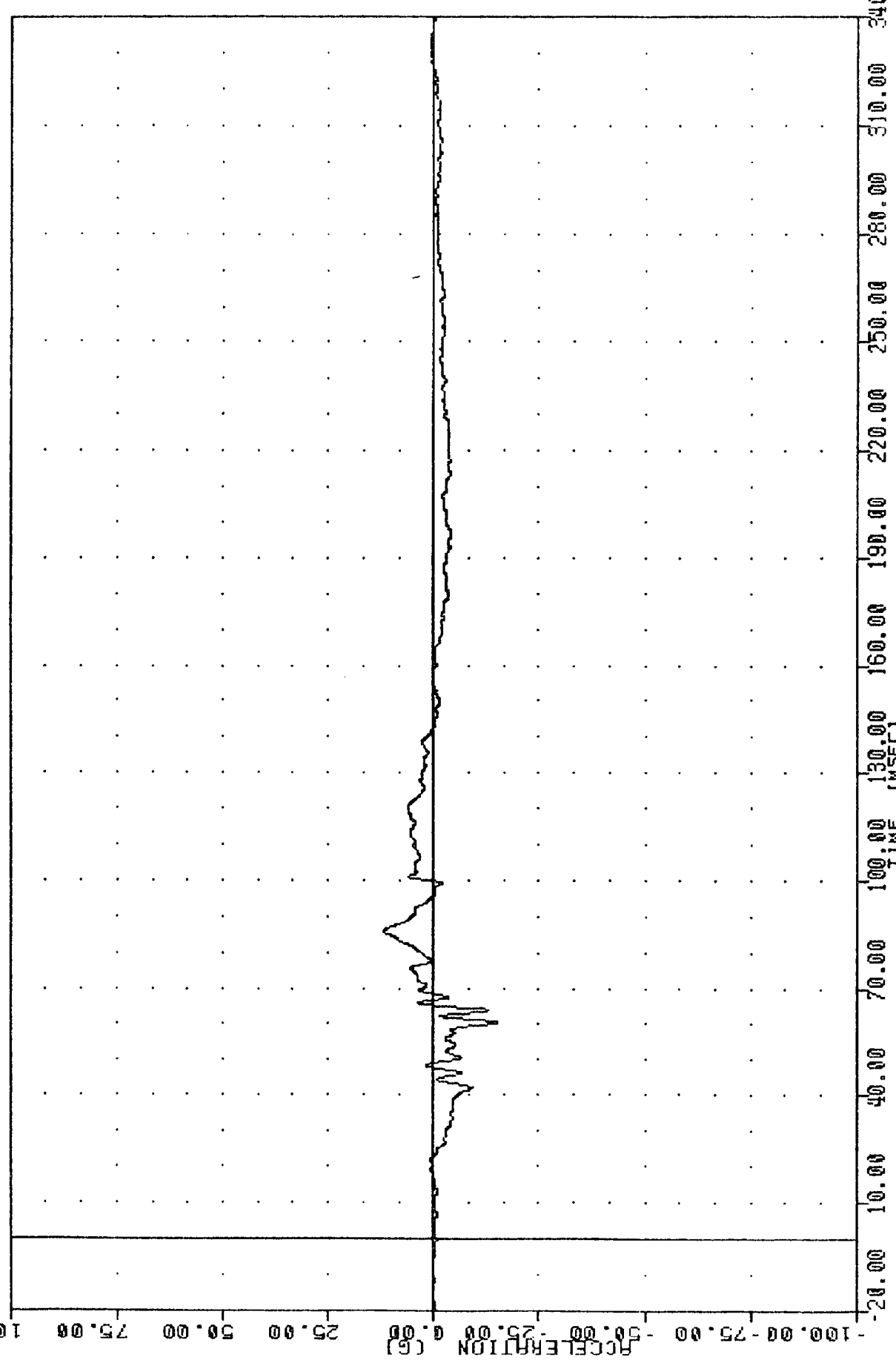
ACCELERATION (G)



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER CHEST ACCELERATION Y AXIS

TRC 850129 4-FEB-83 13:02:09  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 CSTZG1  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -15.30e 60.38, 11.84 e 85.75

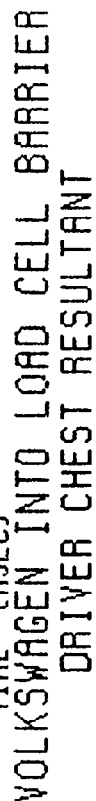


VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER CHEST ACCELERATION Z AXIS

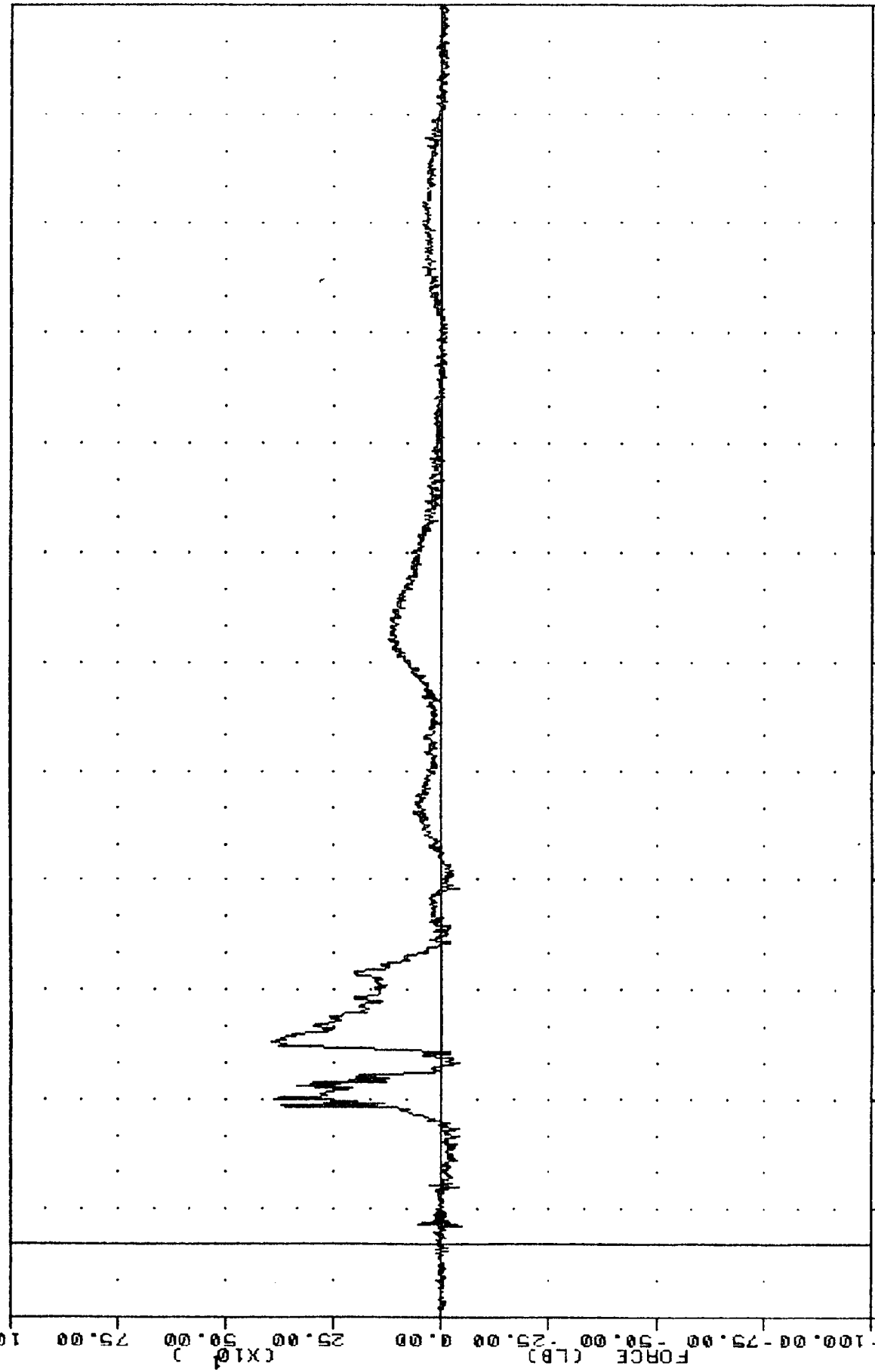


1

|                   |       |         |         |       |
|-------------------|-------|---------|---------|-------|
| MIN. MAX VALUES = | 0.03% | -16.25, | 54.89 % | 79.75 |
|-------------------|-------|---------|---------|-------|

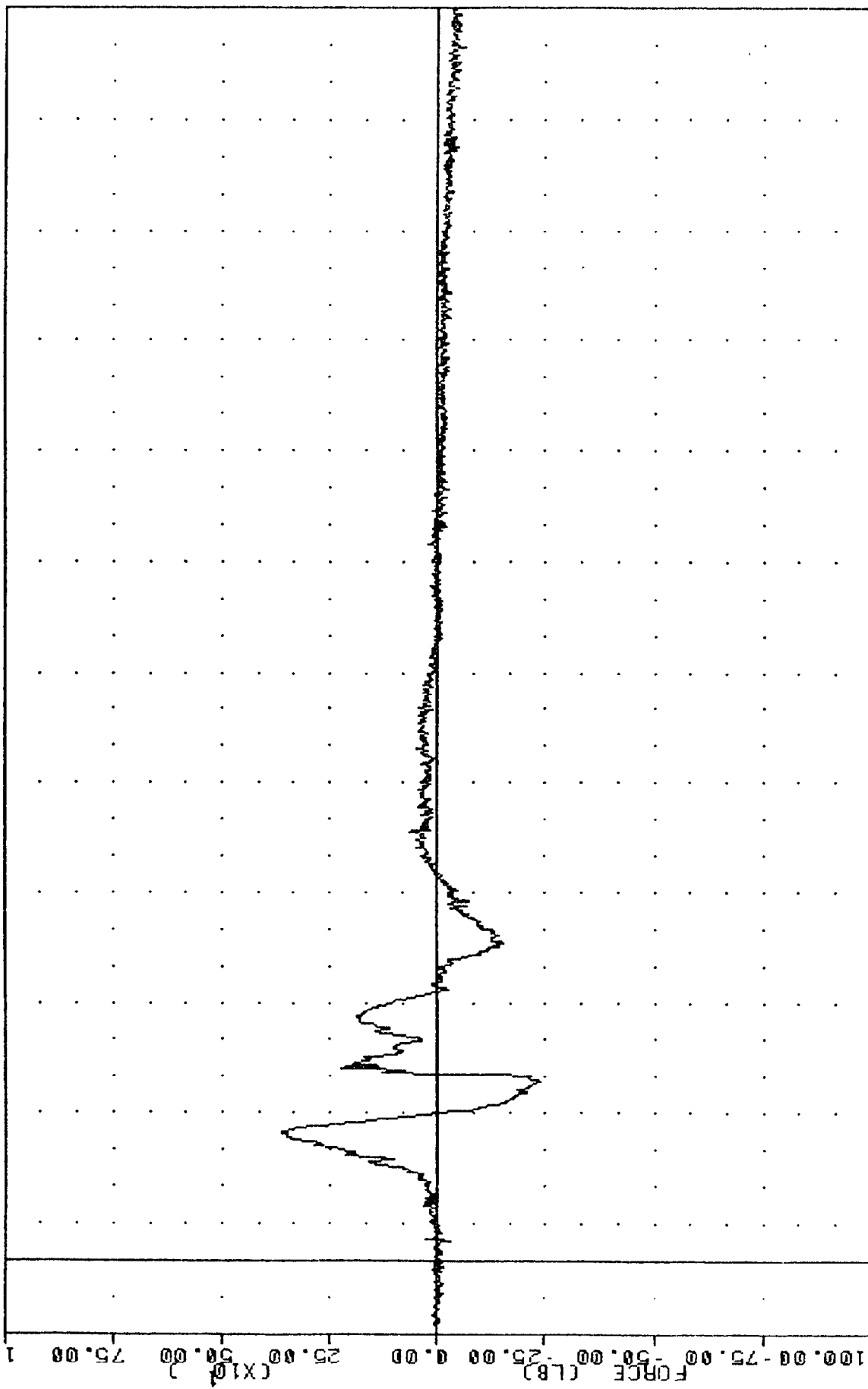


THE [REDACTED] 030123 [REDACTED] [REDACTED] FEB-83 13:02:09 [REDACTED]  
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 RFMF1  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN, MAX VALUES = -43.898 5.13, 396.25 55.75



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER RIGHT FEMUR FORCE LBS

NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 LFMF1  
 FILTER = BLPF 1000/ 3162/ -40  
 MIN, MAX VALUES = -239.11e 48.50, 361.77 e 34.38

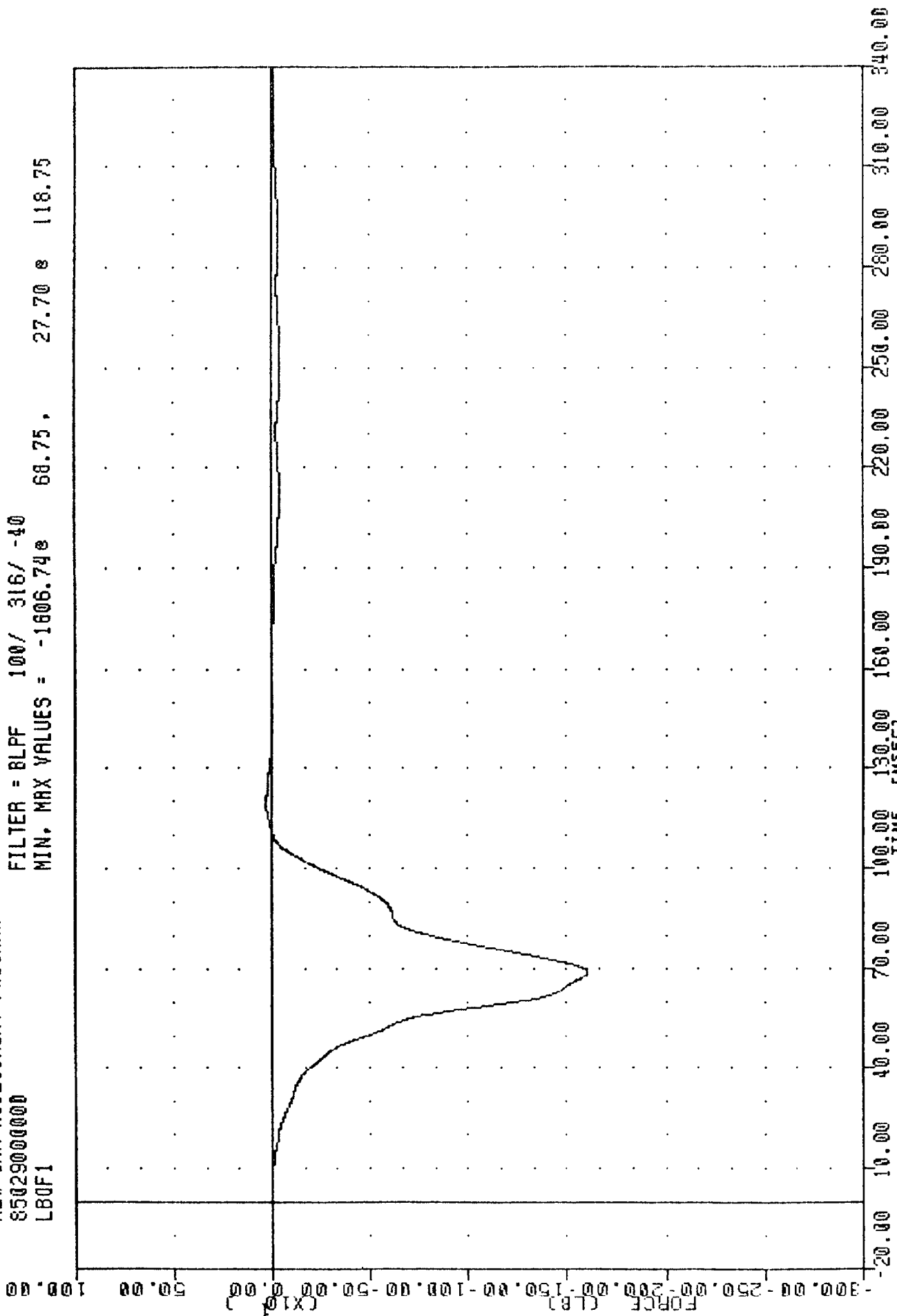


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 DRIVER LEFT FEMUR FORCE LBS

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 LB0F1

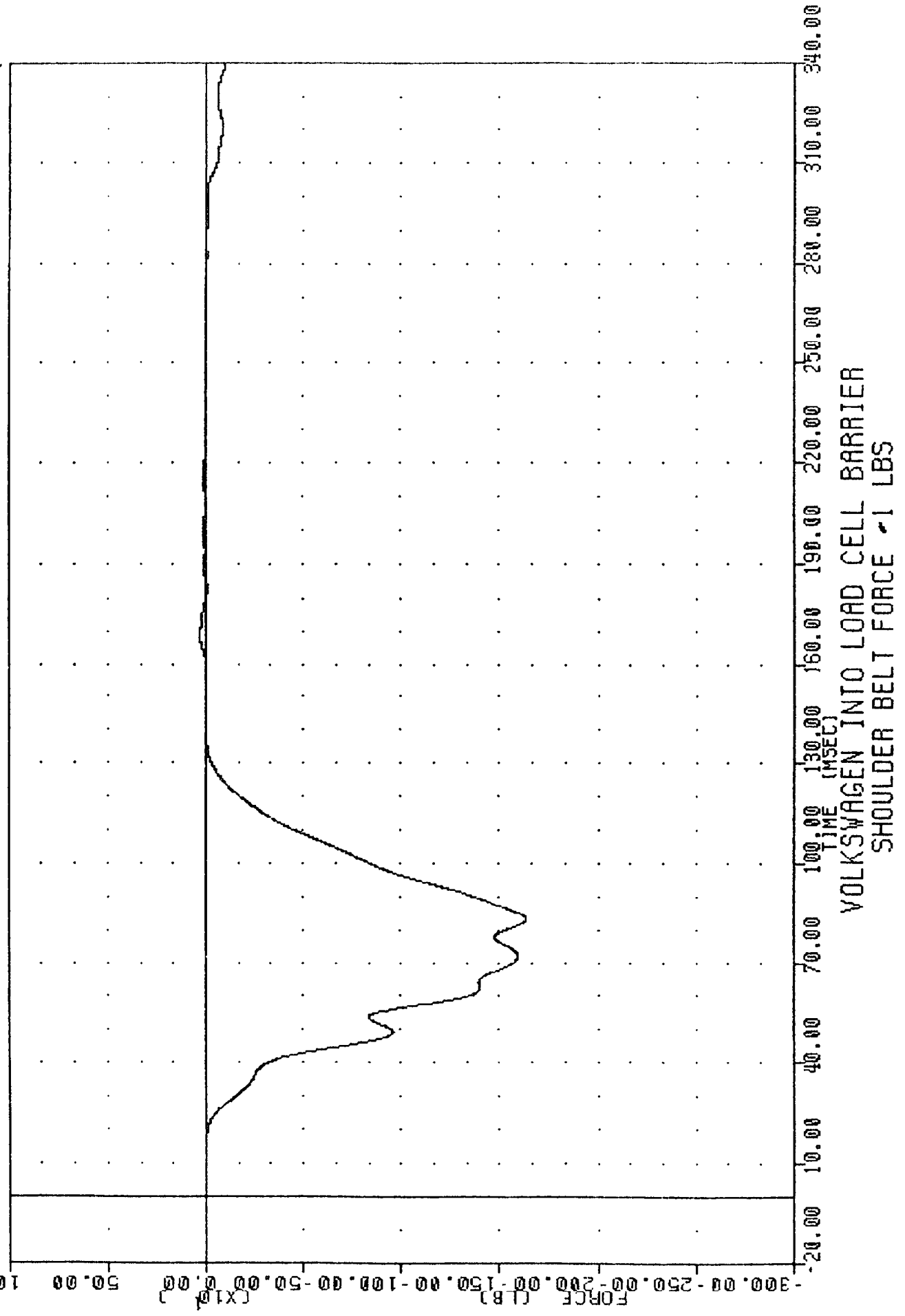
PLUT DATE 4-FEB-85 13:02:09

FILTER = 8LPF 100/ 316/ -40  
 MIN. MAX VALUES = -1606.74e 68.75e 27.70 e 118.75



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LAP BELT OUTBOARD FORCE ~1 LBS

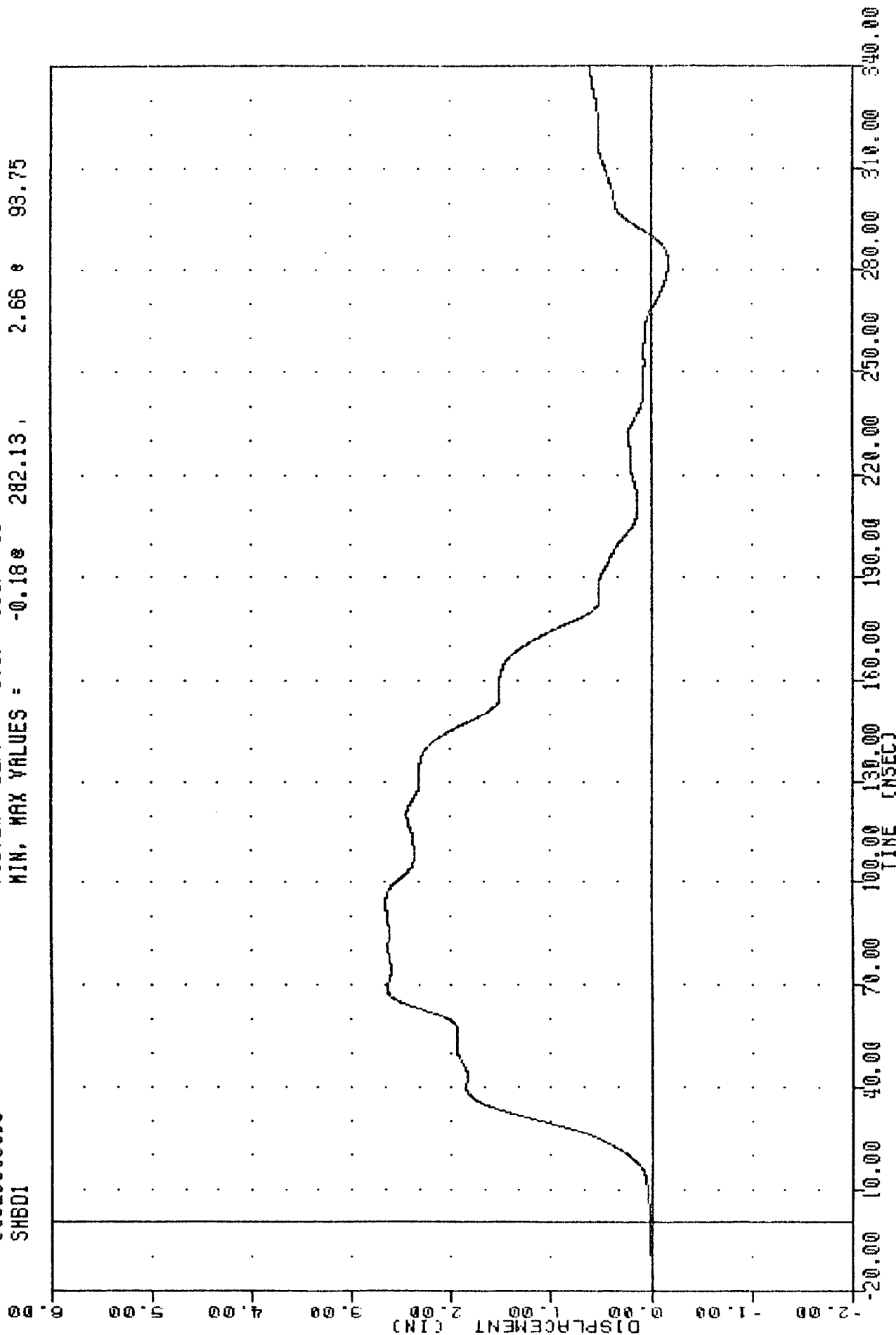
INC 850129 850129 850129 850129 850129 850129 850129 850129 850129 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 SHBF1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -1637.07 83.13, 28.31 8 168.25  
 13:02:09 4 FEB 80



T 012  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 SHBD1

P 02:

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -0.18 282.13, 2.66 93.75

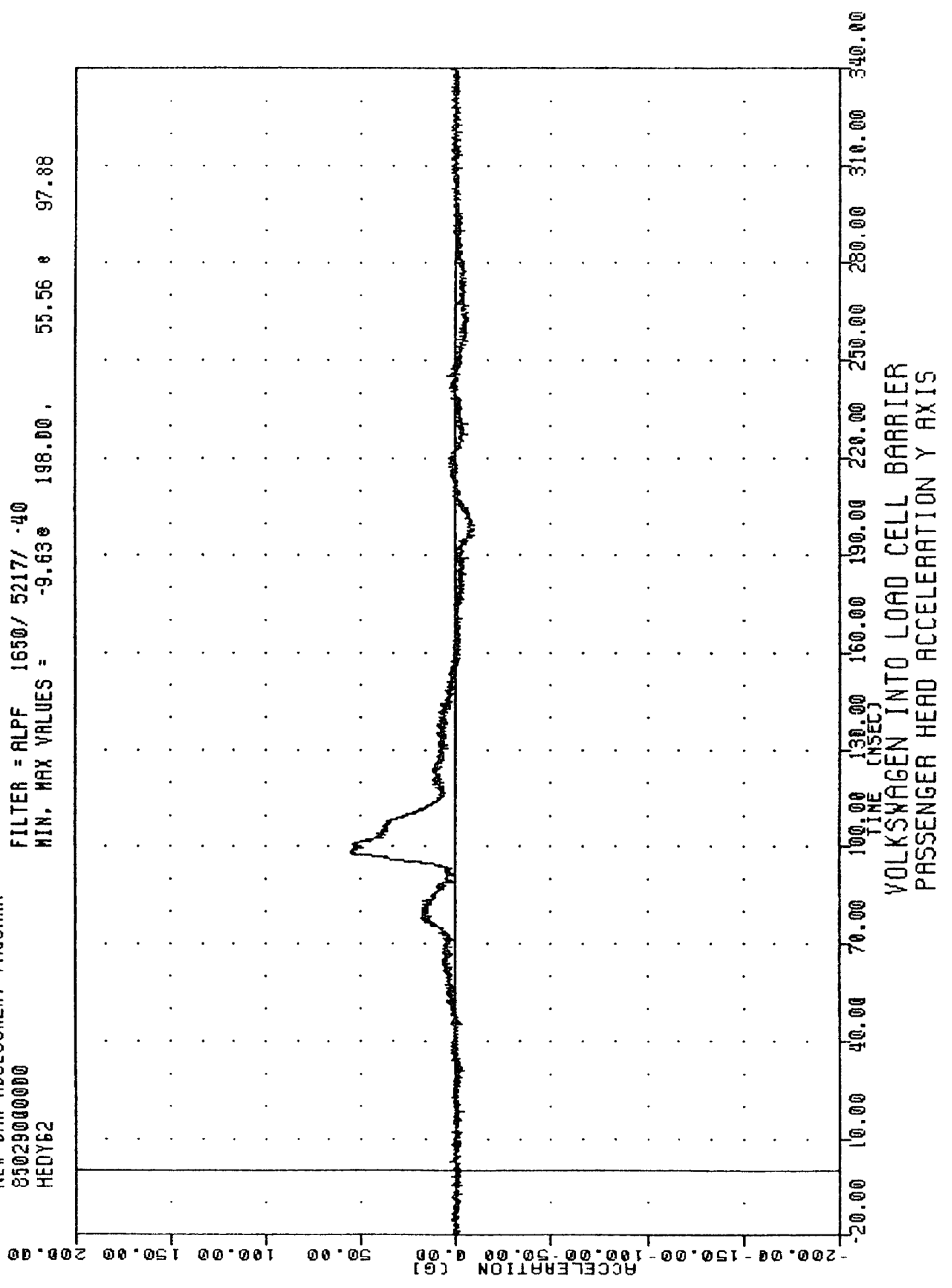


VOLKSWAGEN INTO LOAD CELL BARRIER  
 SHOULDER BELT -1 DISPLACEMENT INCHES

FILTER = ALPF 1650/ 5217/ -40  
MIN, MAX VALUES = -83.58 98.13, 15.12 227.75



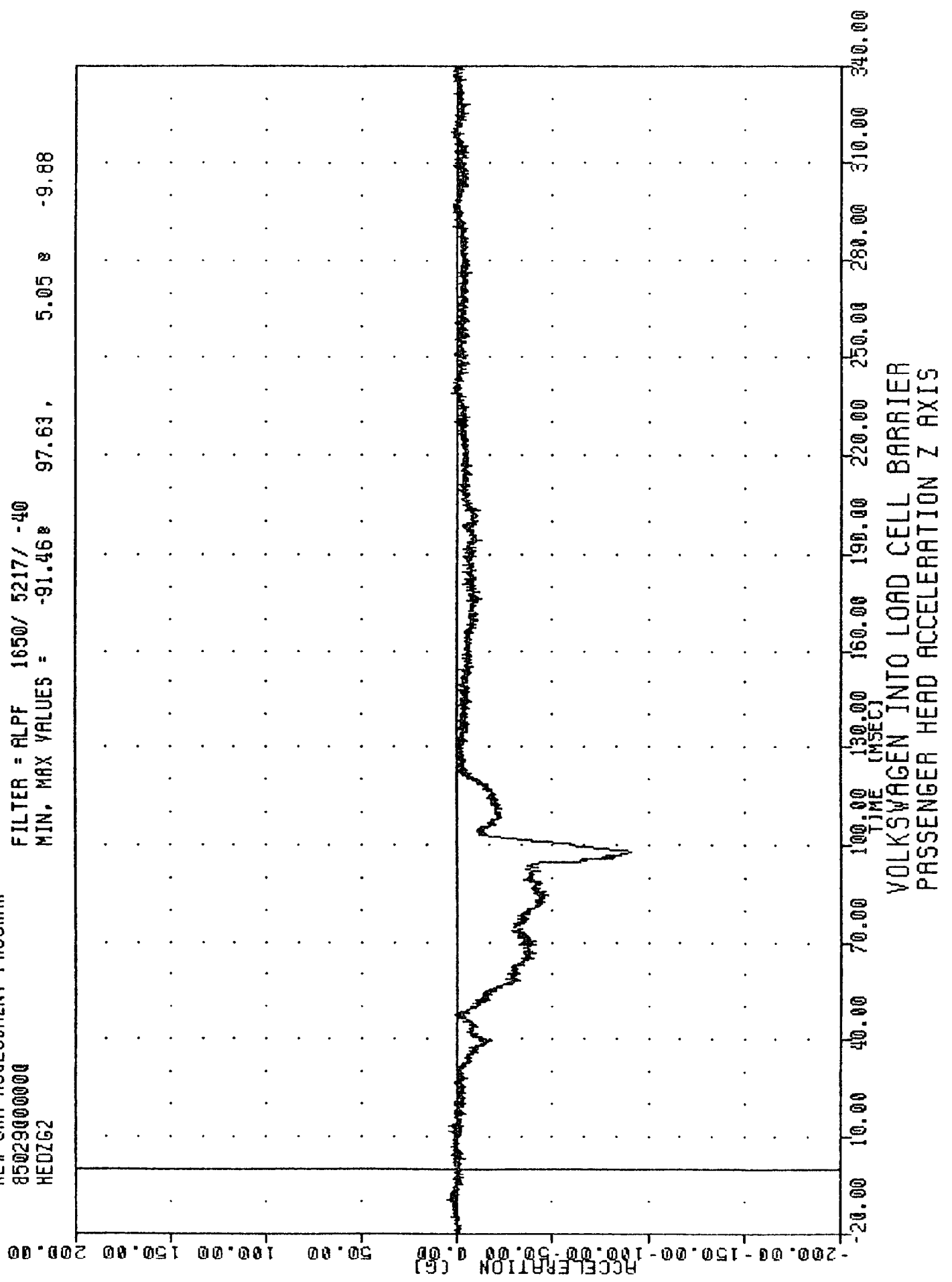
TAG 850129 PLUG DATA FEB-88 12:00  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 HEDY62  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN. MAX VALUES = -9.63e 198.00 . 55.56 e 97.88



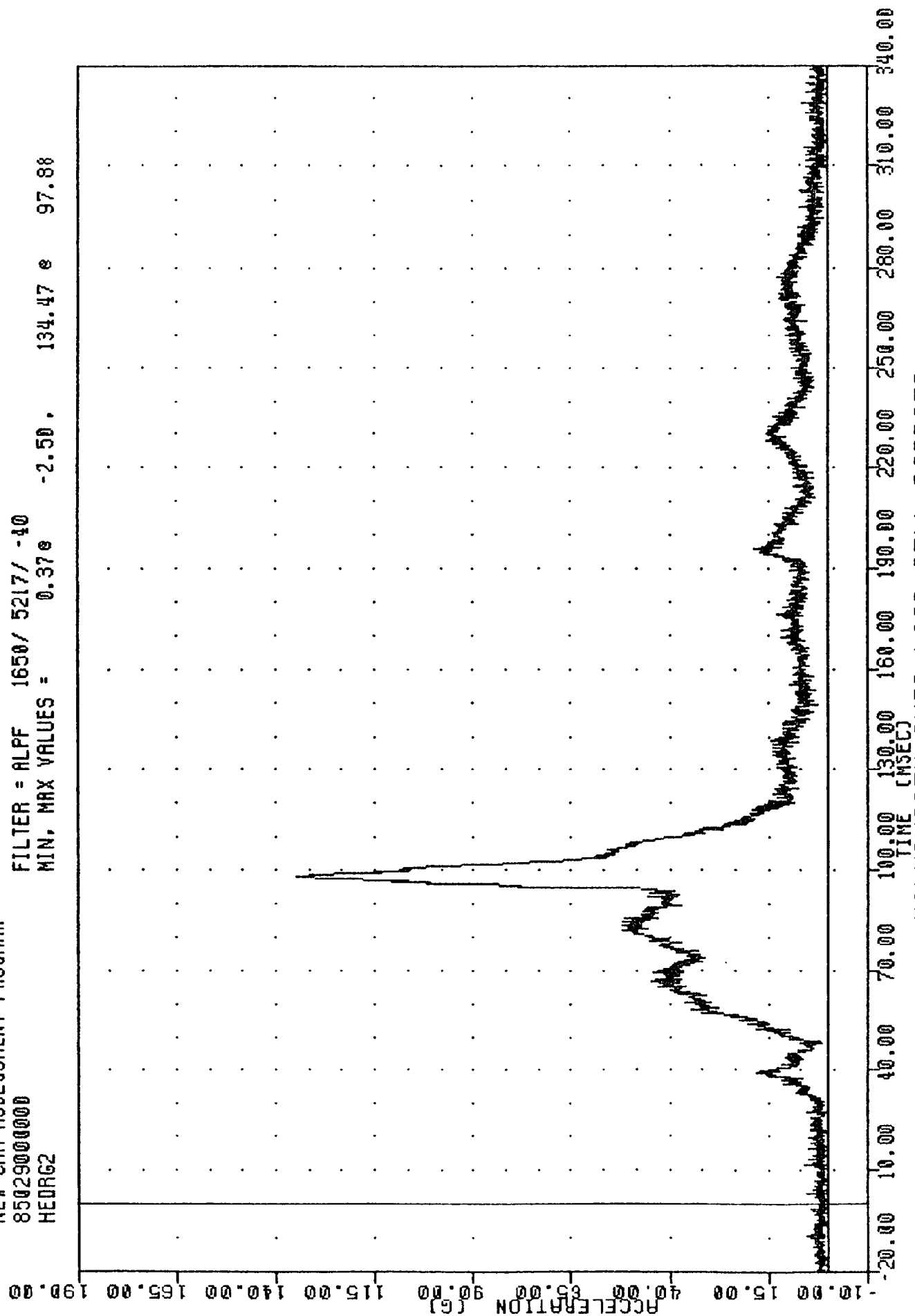
VOLKSWAGEN INTO LOAD CELL BARRIER  
 PASSENGER HEAD ACCELERATION Y AXIS



THE [REDACTED] 850129 [REDACTED] FEB-80 [REDACTED] 02:00  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 HEDZG2  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN. MAX VALUES = -91.46 97.63 5.05 -9.88

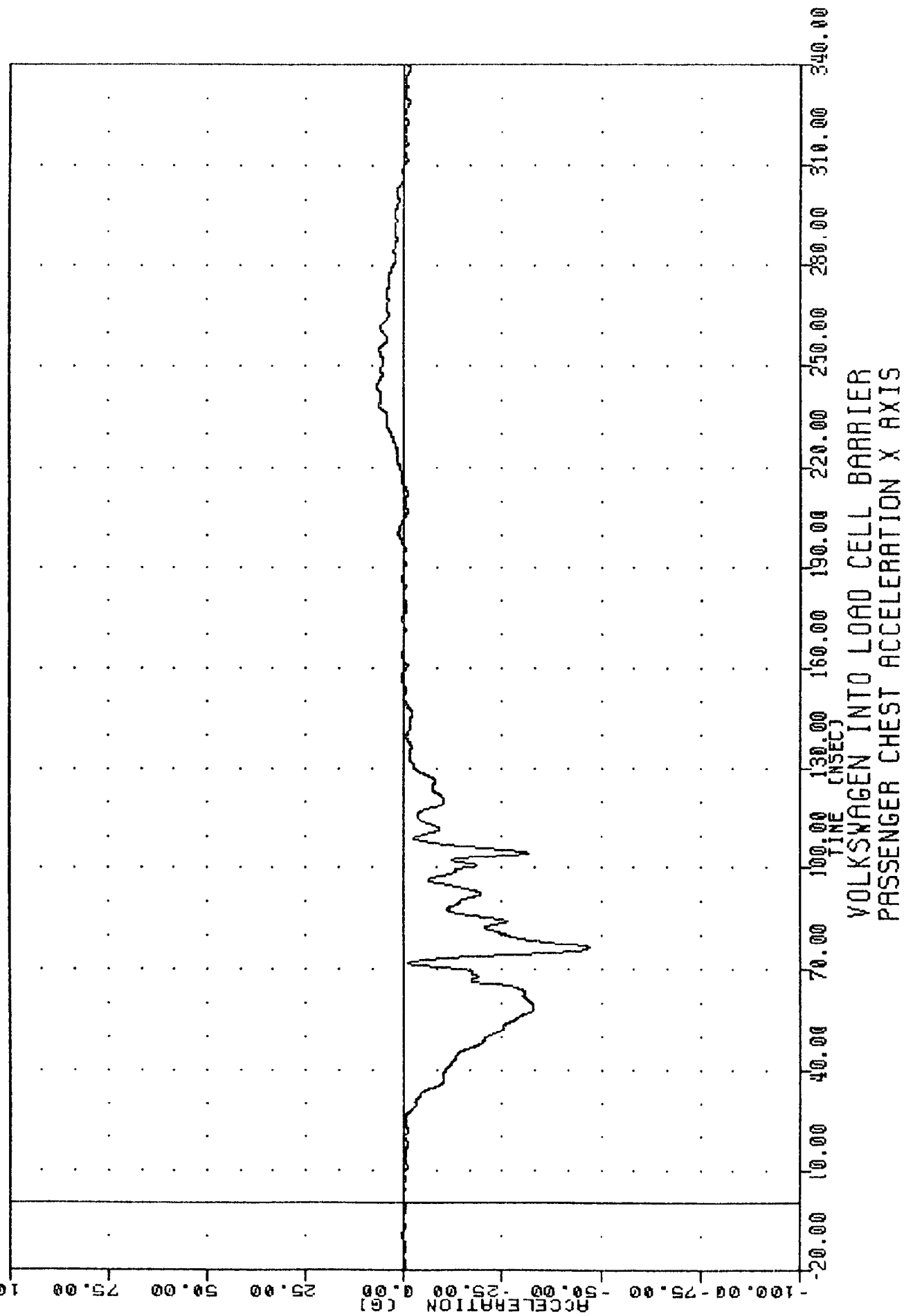


THE 850129 P 02:00  
 NEW CAR ASSESSMENT PROGRAM  
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 HEDRG2  
 FILTER = ALPF 1650/ 5217/ -40  
 MIN, MAX VALUES = 0.370 -2.50 . 134.47 e 97.8%



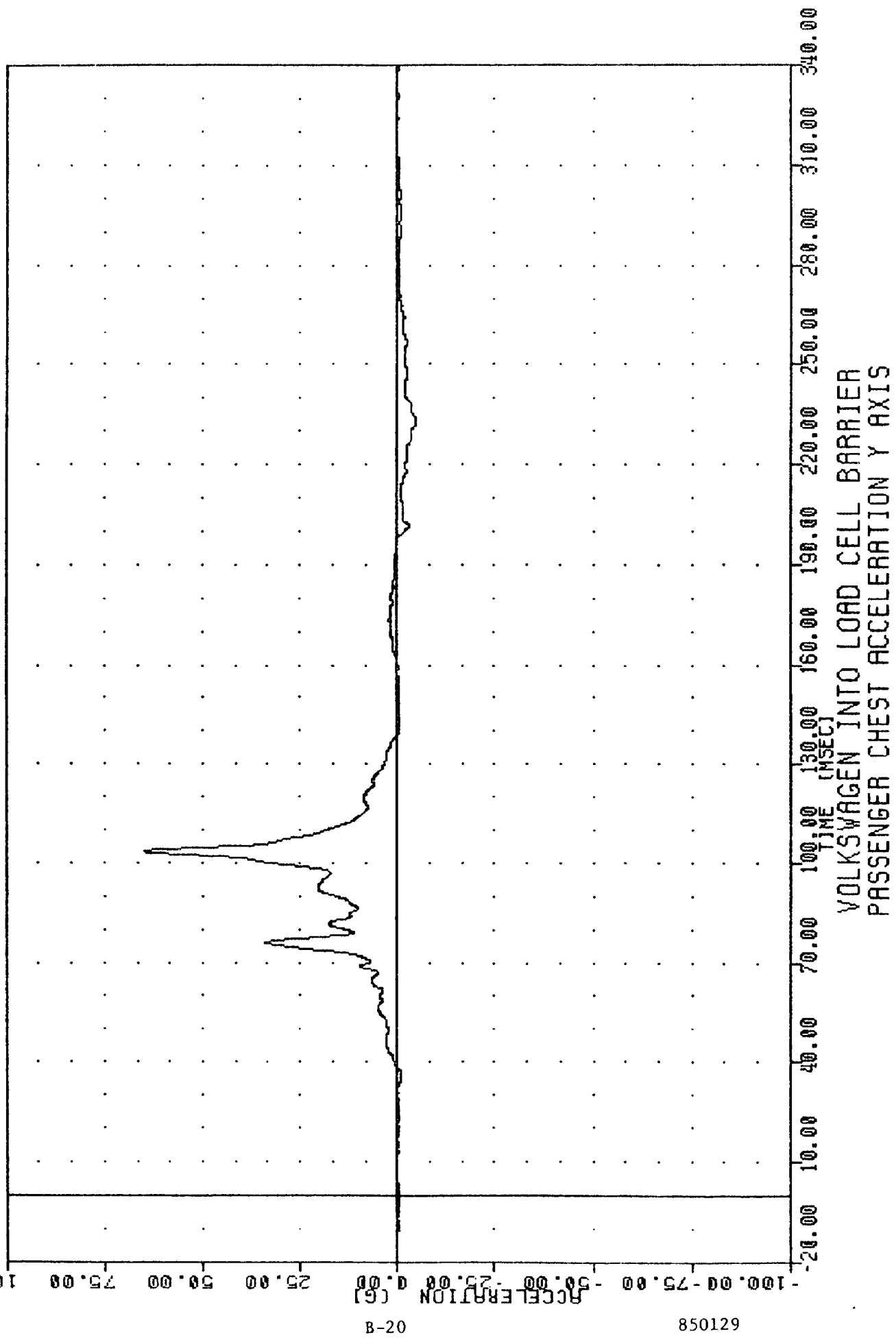
VOLKSWAGEN INTO LOAD CELL BARRIER  
 PASSENGER HEAD RESULTANT

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 CSTX62  
 FILTER = BLPF 300/ 949/ -40  
 MIN. MAX VALUES = -46.93 76.25 7.06 243.63  
 DATE 4 FEB 63 13:02:03

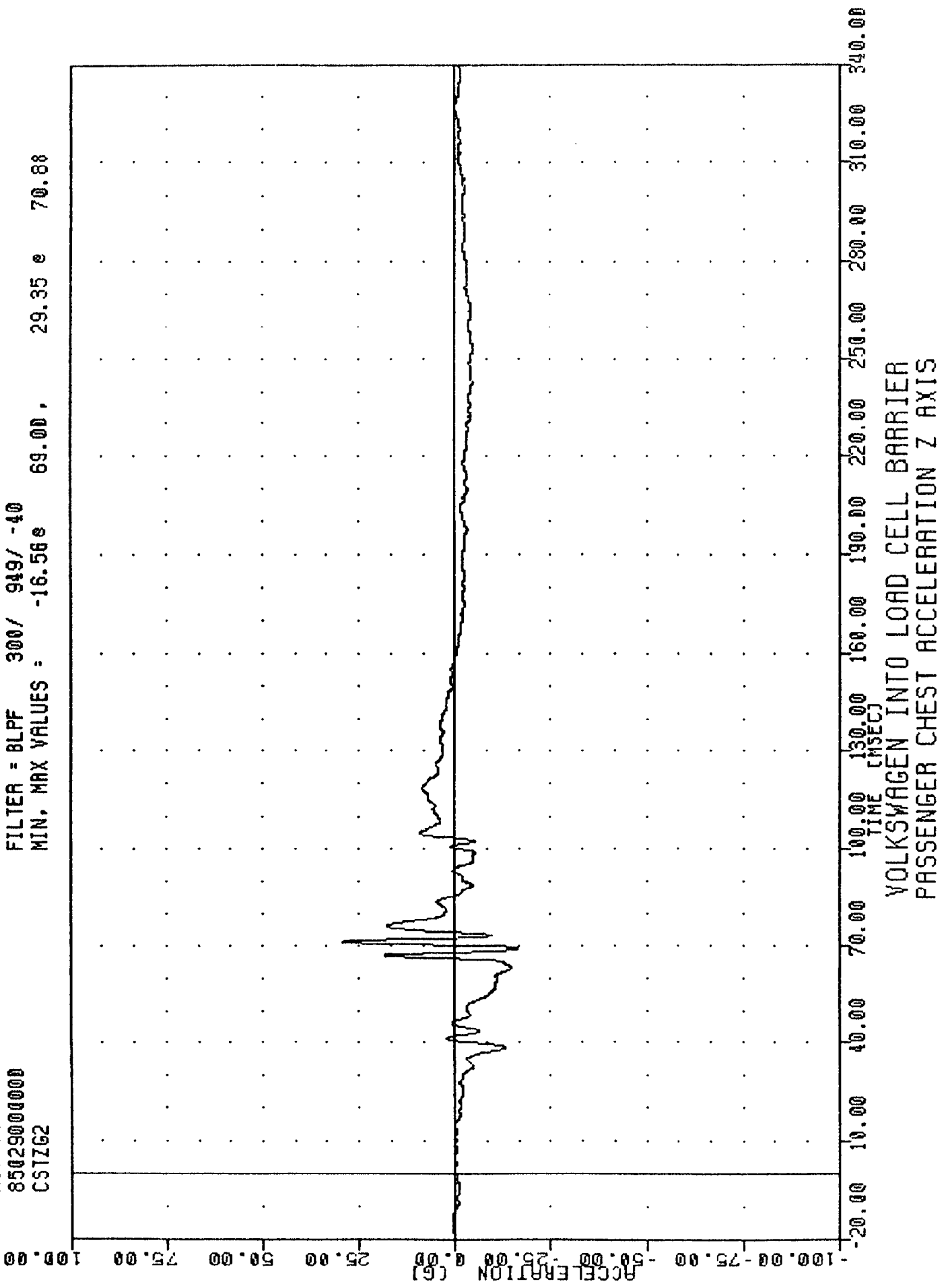


VOLKSWAGEN INTO LOAD CELL BARRIER  
 PASSENGER CHEST ACCELERATION X AXIS

TRC 850129 850129 850129 850129 850129 850129 850129 850129 850129 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 CSTY62  
 FILTER = BLPF 300/ 949/ -40  
 MIN, MAX VALUES = -4.628 232.00, 64.79 8 103.38  
 PEUT DATE 13-02-03



THE 850129 030129 030129 030129 030129 030129 030129 030129 030129 030129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 CSTZG2  
 FILTER = BLPF 300/ 949/ -40  
 MIN, MAX VALUES = -16.56s 69.00, 29.35 s 70.88



VOLKSWAGEN INTO LOAD CELL BARRIER  
 PASSENGER CHEST ACCELERATION Z AXIS

THC

850129

NEW CAR ASSESSMENT PROGRAM

85029000000

CSTR62

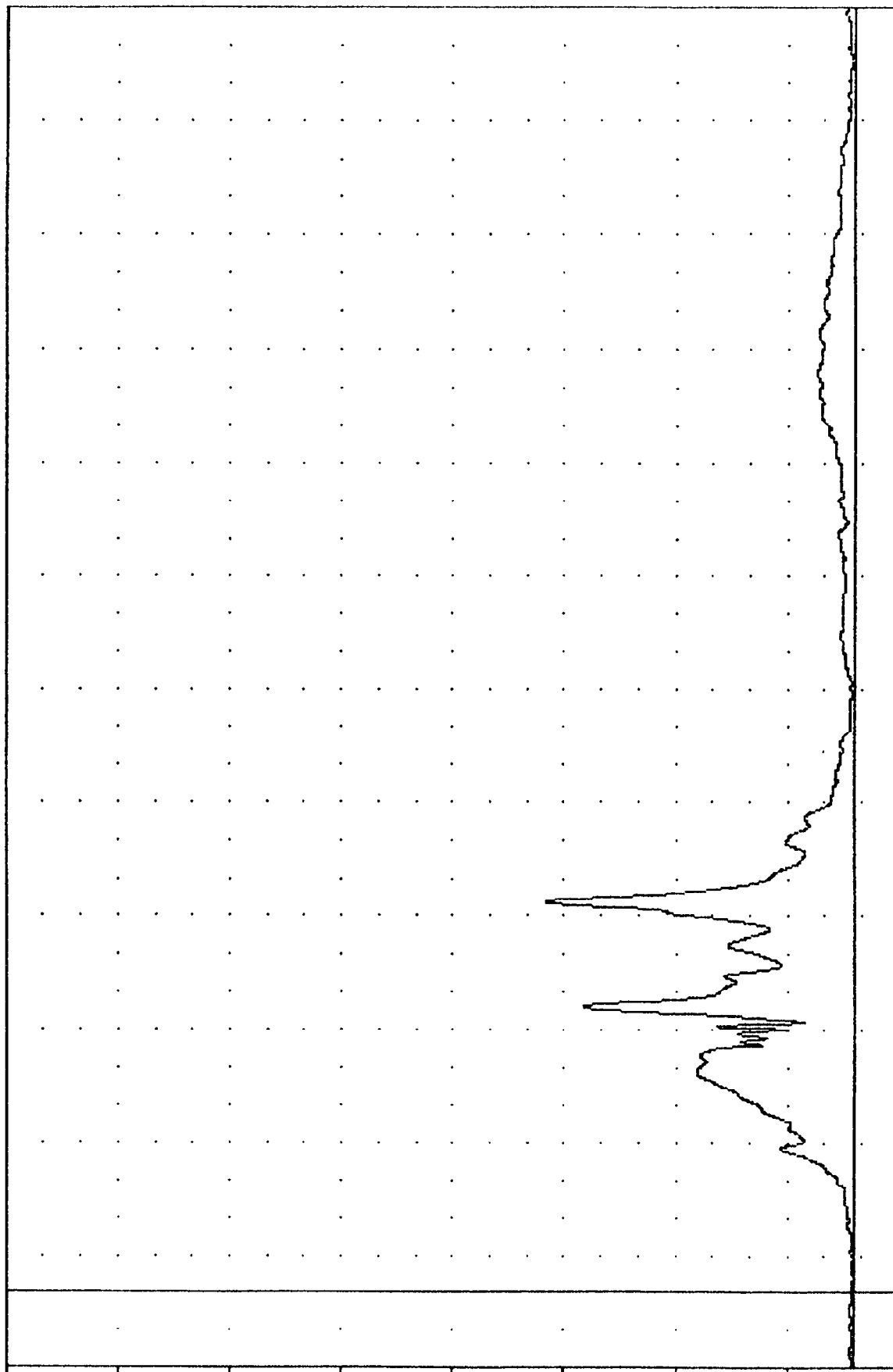
PLUT DATE

4-FEB-85

13:02:09

FILTER = BLPF 300/ 949/ 40  
MIN, MAX VALUES = 0.03e 4.63, 68.95 e 103.63

ACCELERATION (G)



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

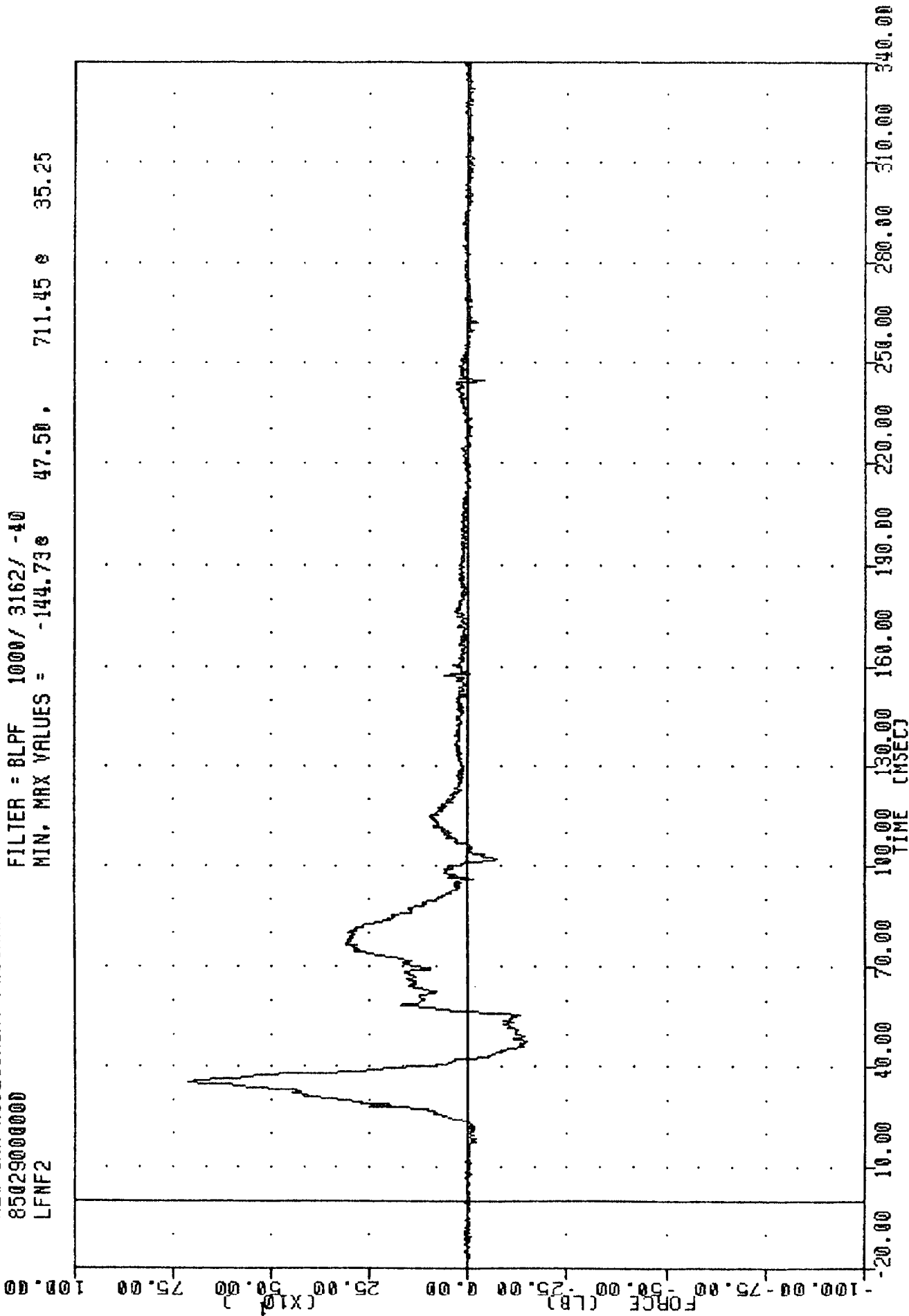
VOLKSWAGEN INTO LOAD CELL BARRIER  
PASSENGER CHEST RESULTANT

100

TRC 850129  
NEW CAR ASSESSMENT PROGRAM  
85029000000  
LFNF2

PLUT DATE 4-FEB-85 13:02:09

FILTER = BLPF 1000/ 3162/ -40  
MIN, MAX VALUES = -144.73e 47.50, 711.45 e 35.25



VOLKSWAGEN INTO LOAD CELL BARRIER  
PASSENGER LEFT FEMUR FORCE LBS



TRC

850129

NEW CAR ASSESSMENT PROGRAM

85029000000

BCBF

BCBF

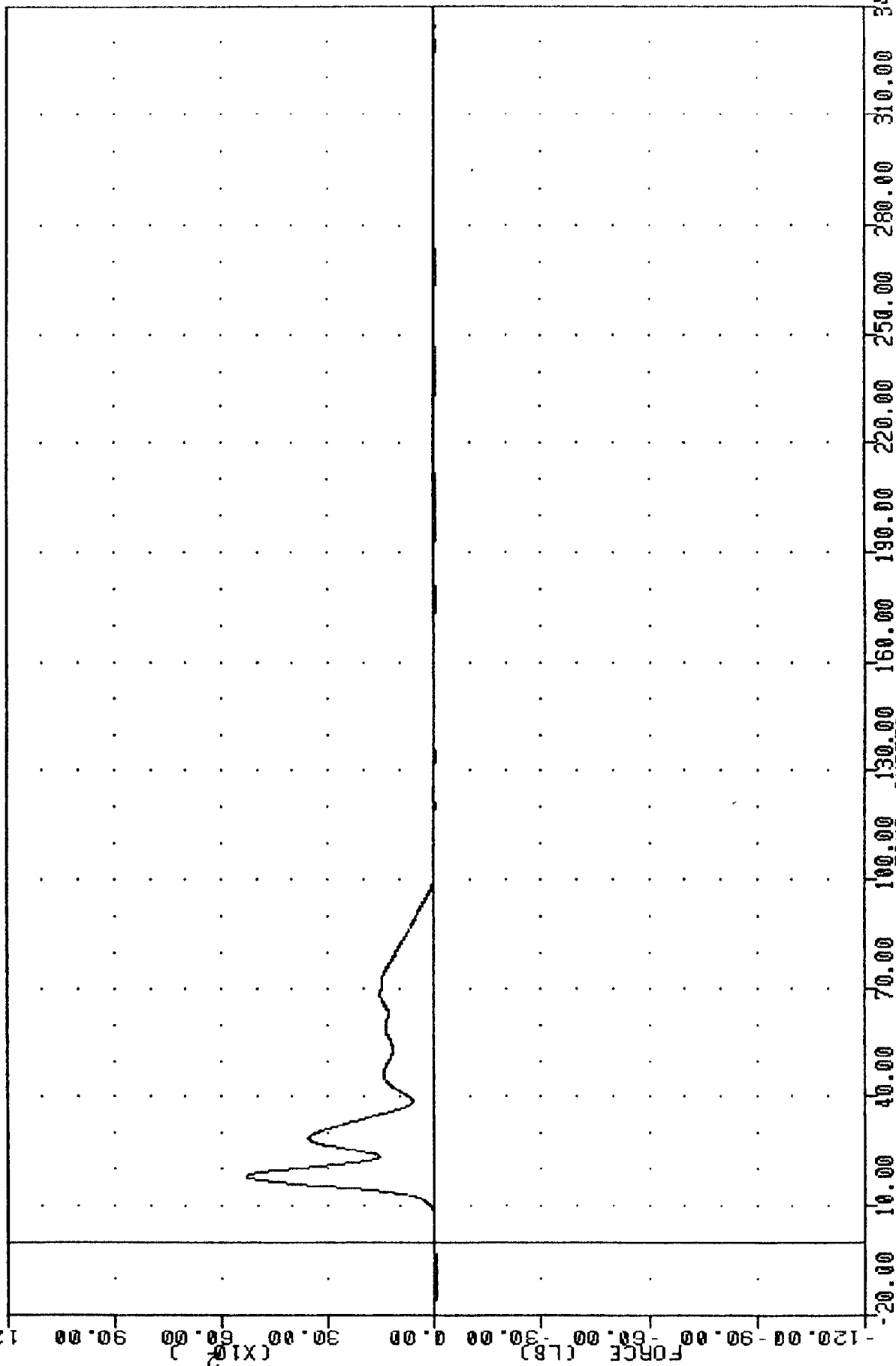
850129

B-52

850129

850129

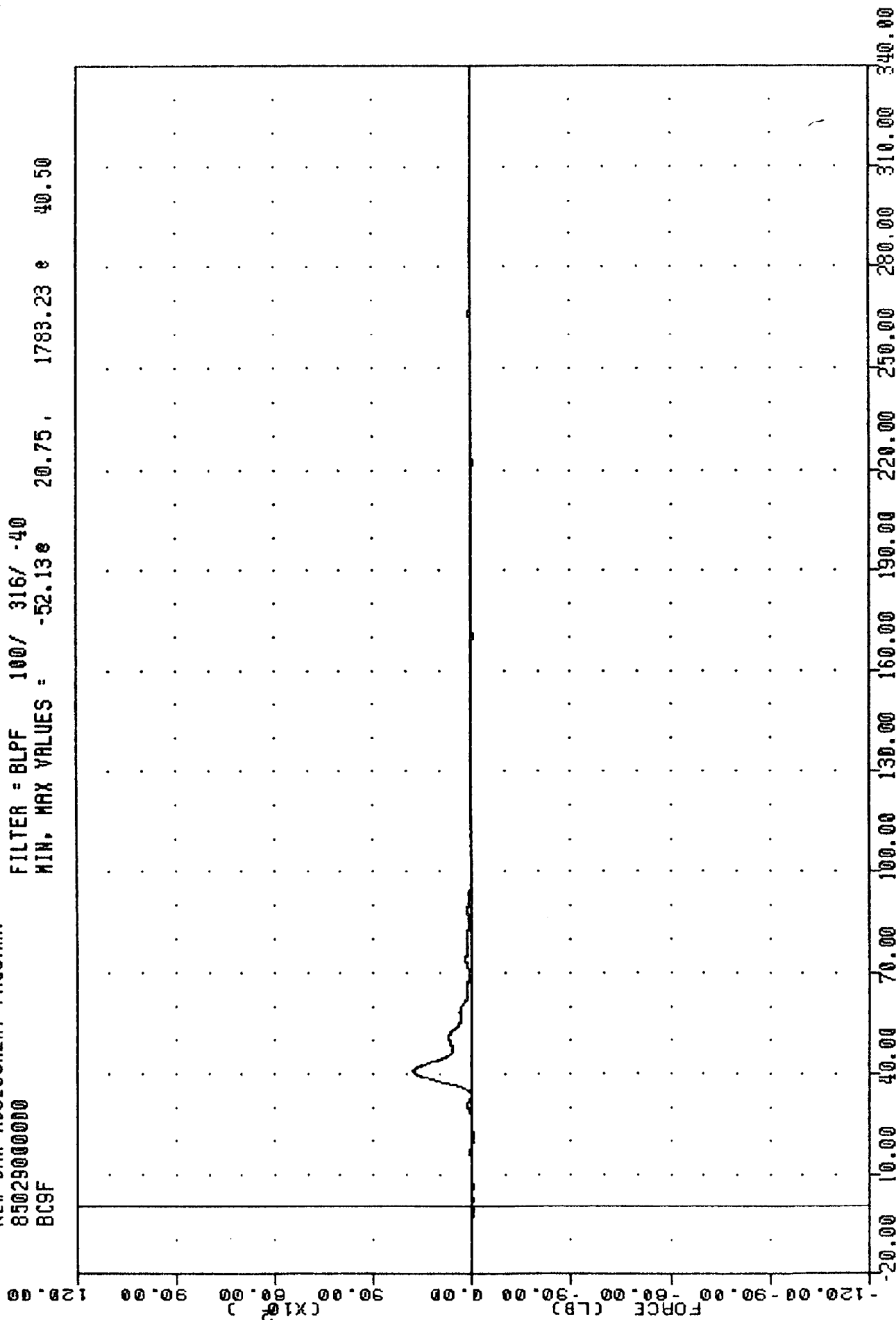
FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -57.398 -11.50. 5327.11 s 17.88



VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C8 LBS

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BC9F

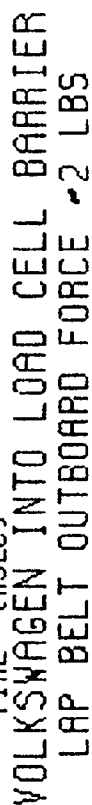
FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -52.13e 20.75, 1783.23 e 40.50



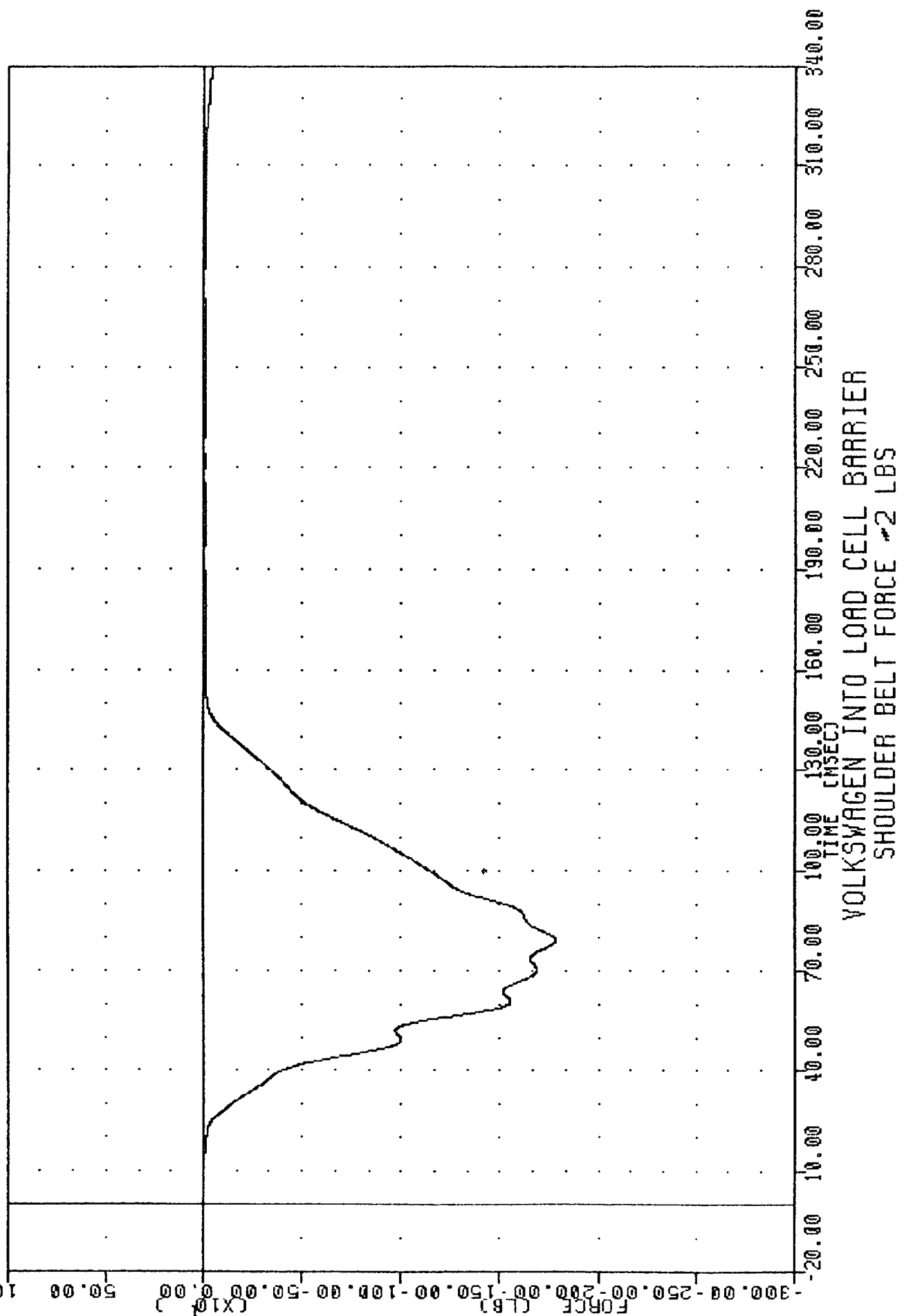
VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C9 LBS

1

| MIN, MAX VALUES = | -1942.48 | 70.38, | 12.01 | 328.38 |
|-------------------|----------|--------|-------|--------|
|-------------------|----------|--------|-------|--------|

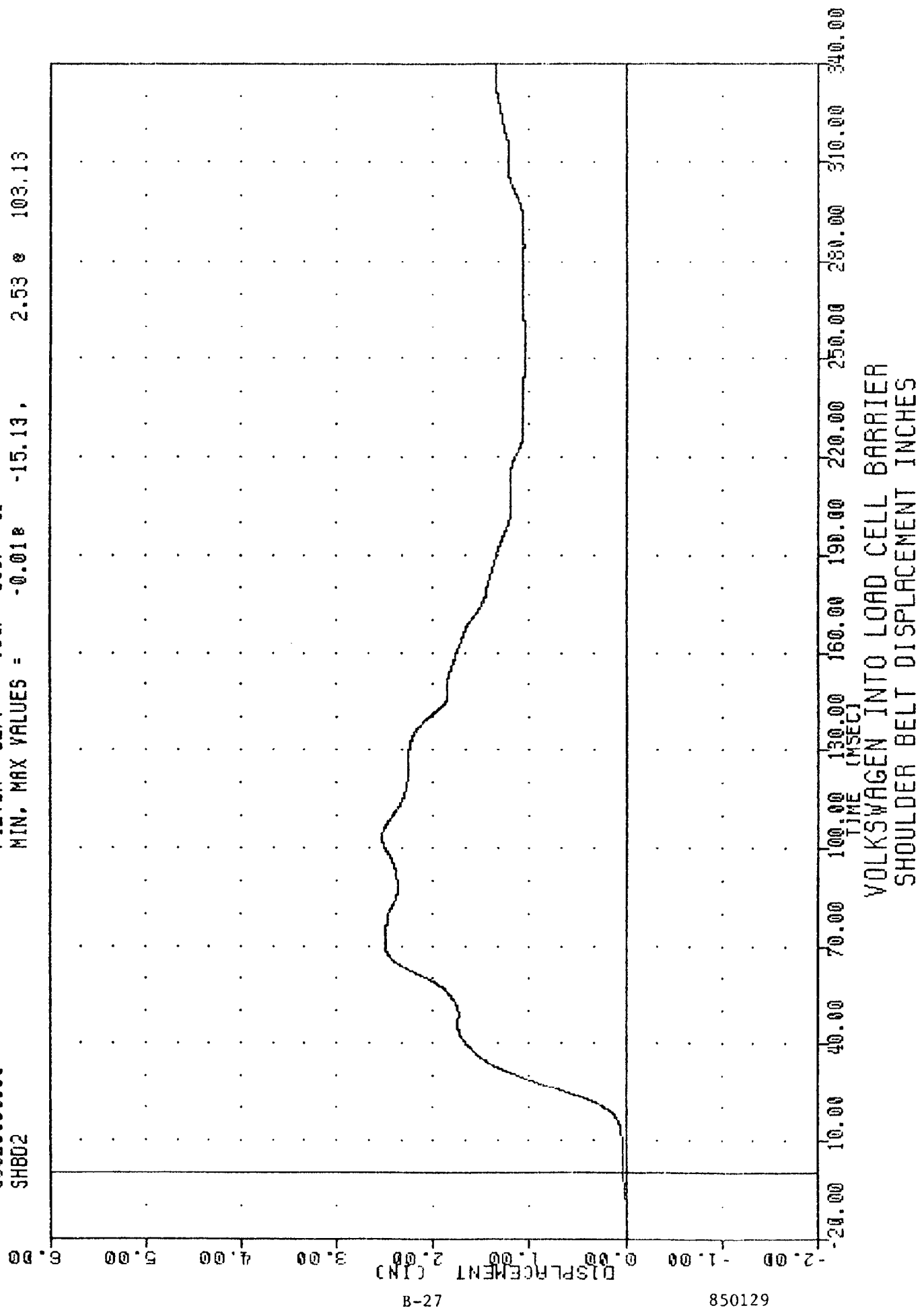


THE NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 SHBF2  
 FILTER = 8LPF 100/ 316/ -40  
 MIN. MAX VALUES = -1784.01e 78.88, 1.07 e -6.88  
 PLOT DATE 13:02:09



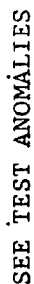
VOLKSWAGEN INTO LOAD CELL BARRIER  
 SHOULDER BELT FORCE #2 LBS

INC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 SHB02  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -0.018 -15.13, 2.53 e 103.13  
 PLOT DATE 4 FEB 83 13:02:03



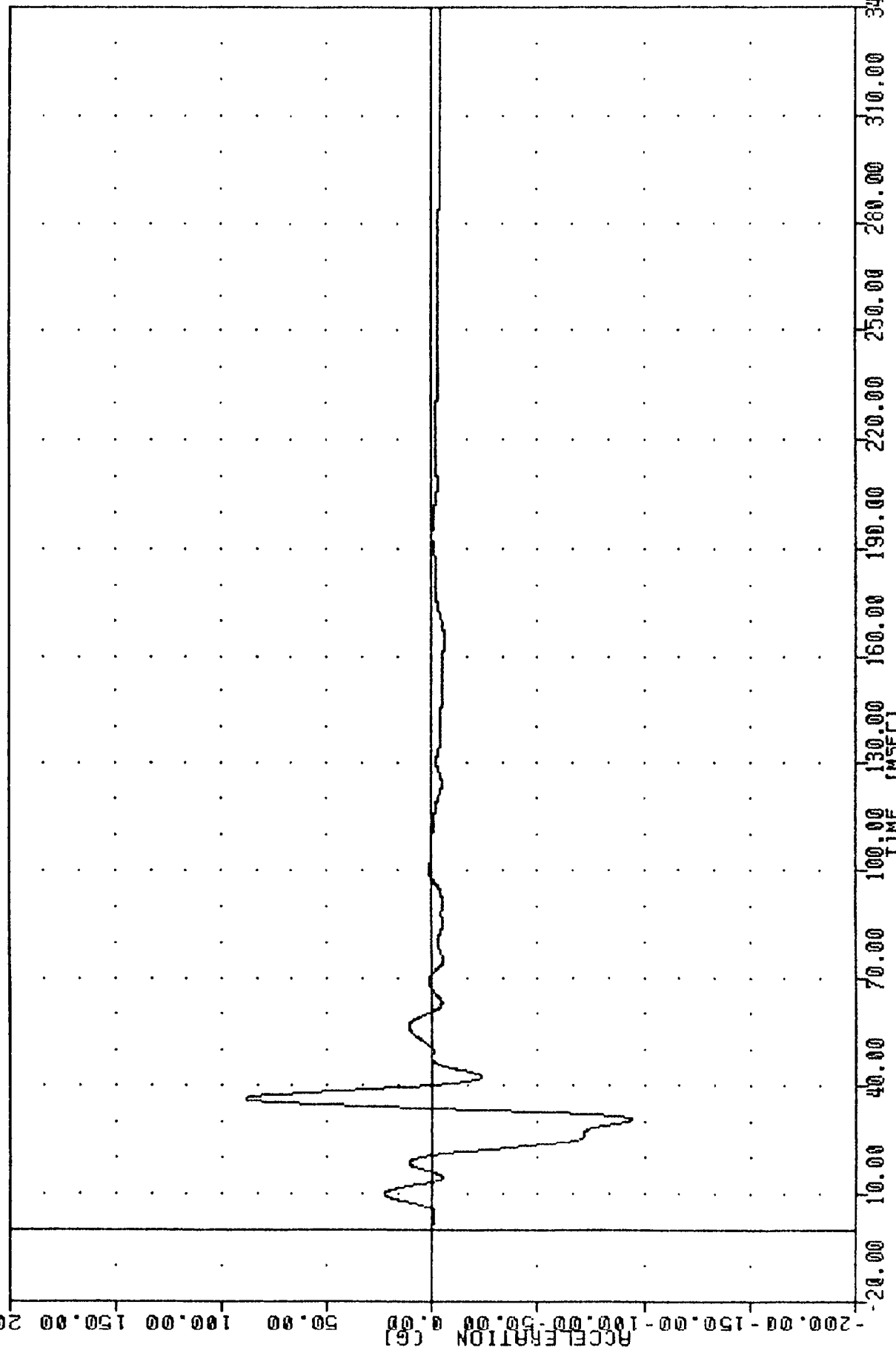
[REDACTED] [REDACTED]

|                   |         |         |        |
|-------------------|---------|---------|--------|
| MIN, MAX VALUES = | -248.63 | 101.75, | 232.09 |
|-------------------|---------|---------|--------|



|        |       |       |       |        |        |        |        |        |        |        |        |        |
|--------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| -20.00 | 10.00 | 40.00 | 70.00 | 100.00 | 130.00 | 160.00 | 190.00 | 220.00 | 250.00 | 280.00 | 310.00 | 340.00 |
|--------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

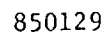
INC 7030123  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 ENGCG2  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -94.25 30.63 88.80 36.25  
 FEB 83 13:02:03



VOLKSWAGEN INTO LOAD CELL BARRIER  
 ENGINE BLOCK ACCELERATION -2 X AXIS

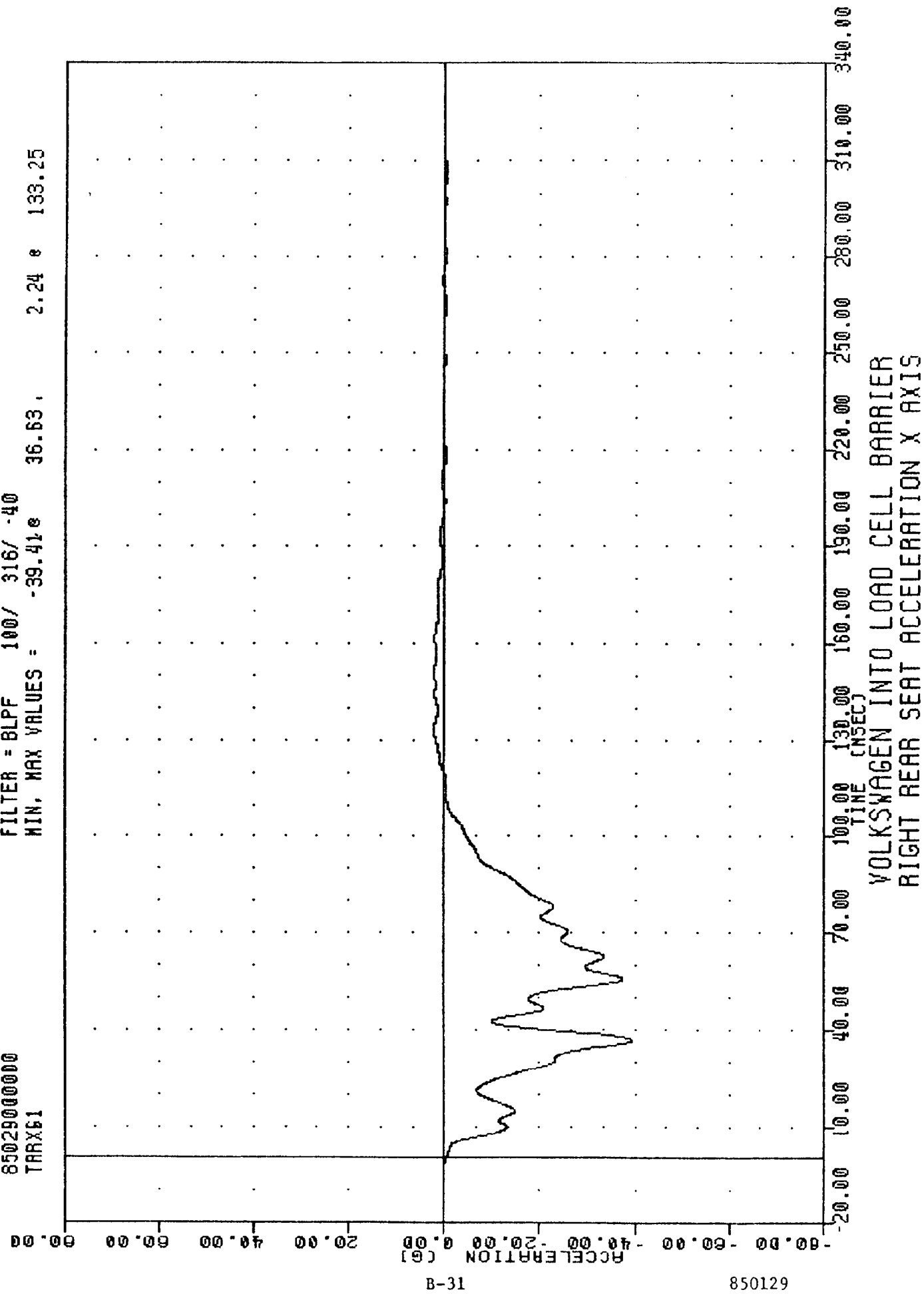


2.68 2.40.38

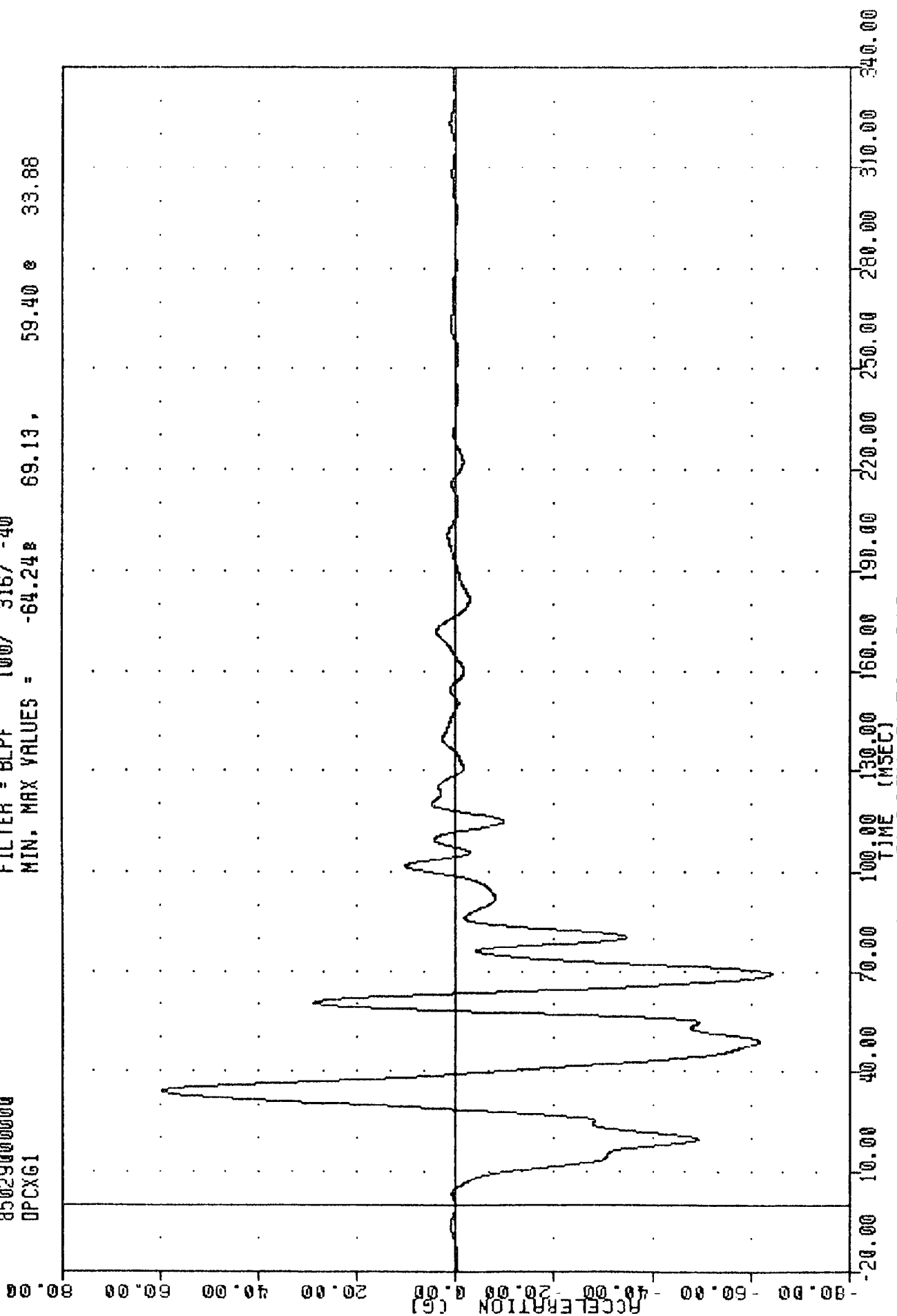




TAC 850129 050129 050129 050129 050129 050129 050129 050129 050129 050129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 TARYC1  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -39.41e 36.63, 2.24 e 133.25

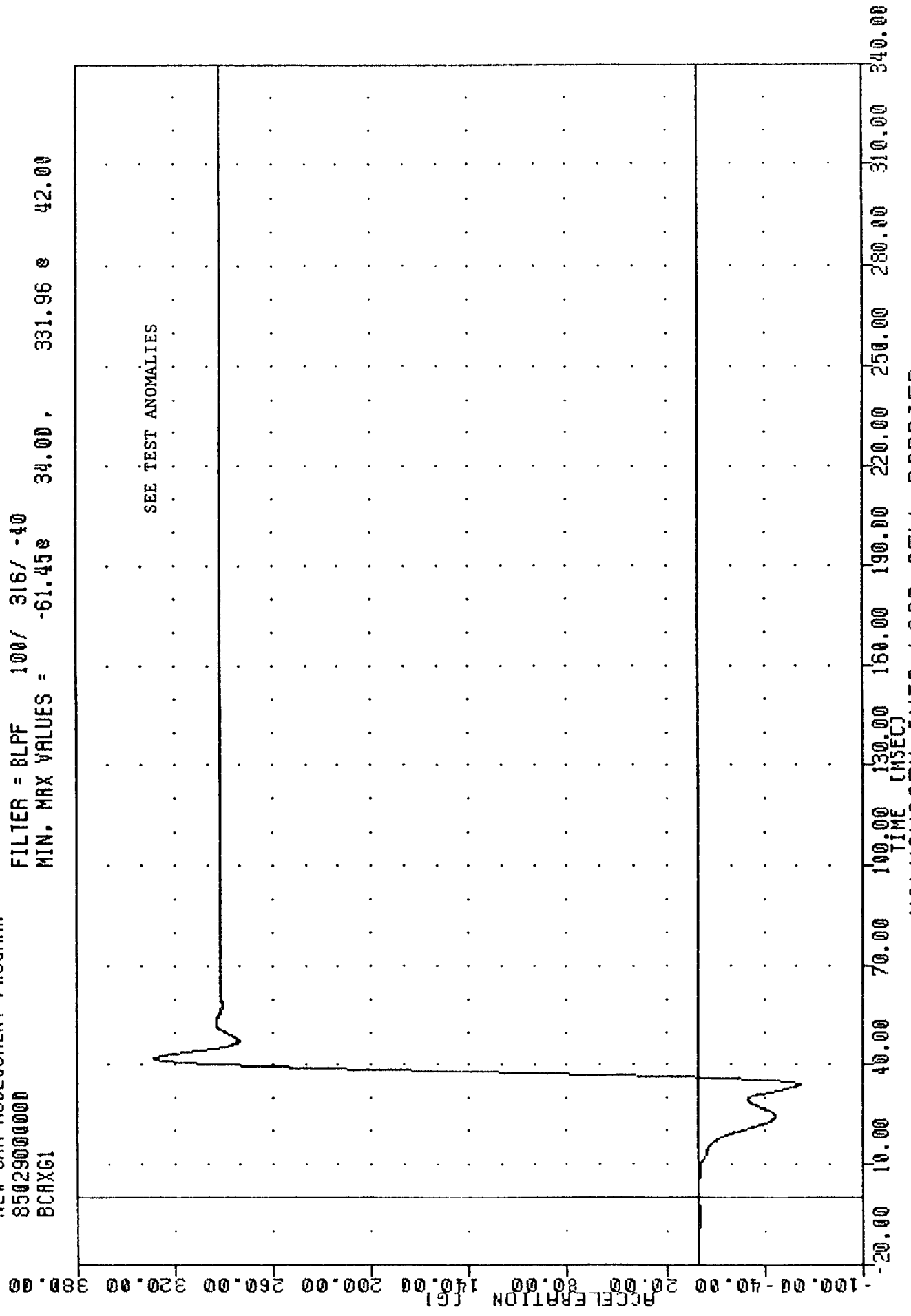


T 012 FEB 02: 00  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 0PCXG1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -64.24 69.13, 59.40 33.88

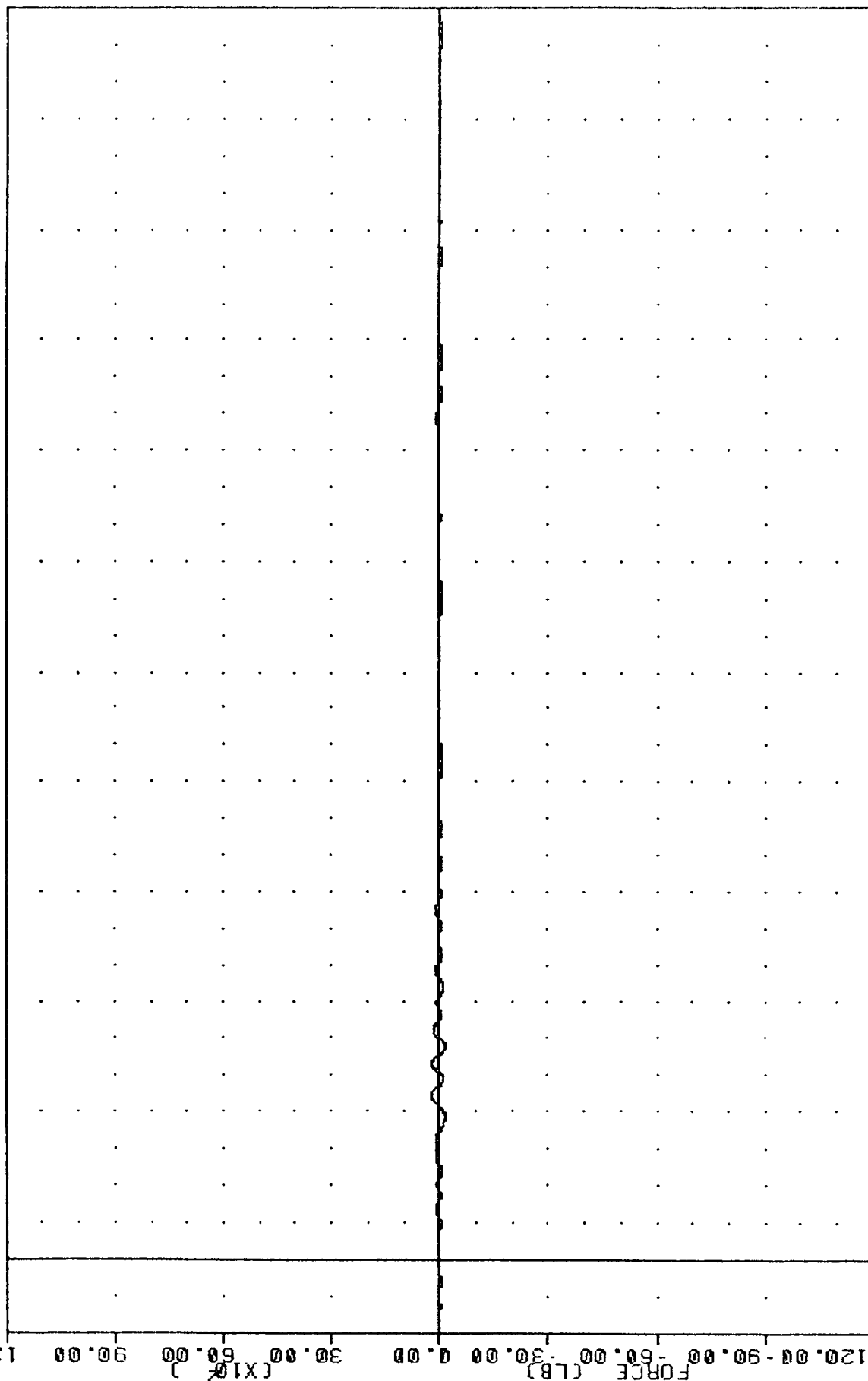


VOLKSWAGEN INTO LOAD CELL BARRIER  
 DASH PANEL CENTER ACCELERATION X AXIS

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BCXG1  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -61.45 34.00, 331.96 42.00  
 13-02:09



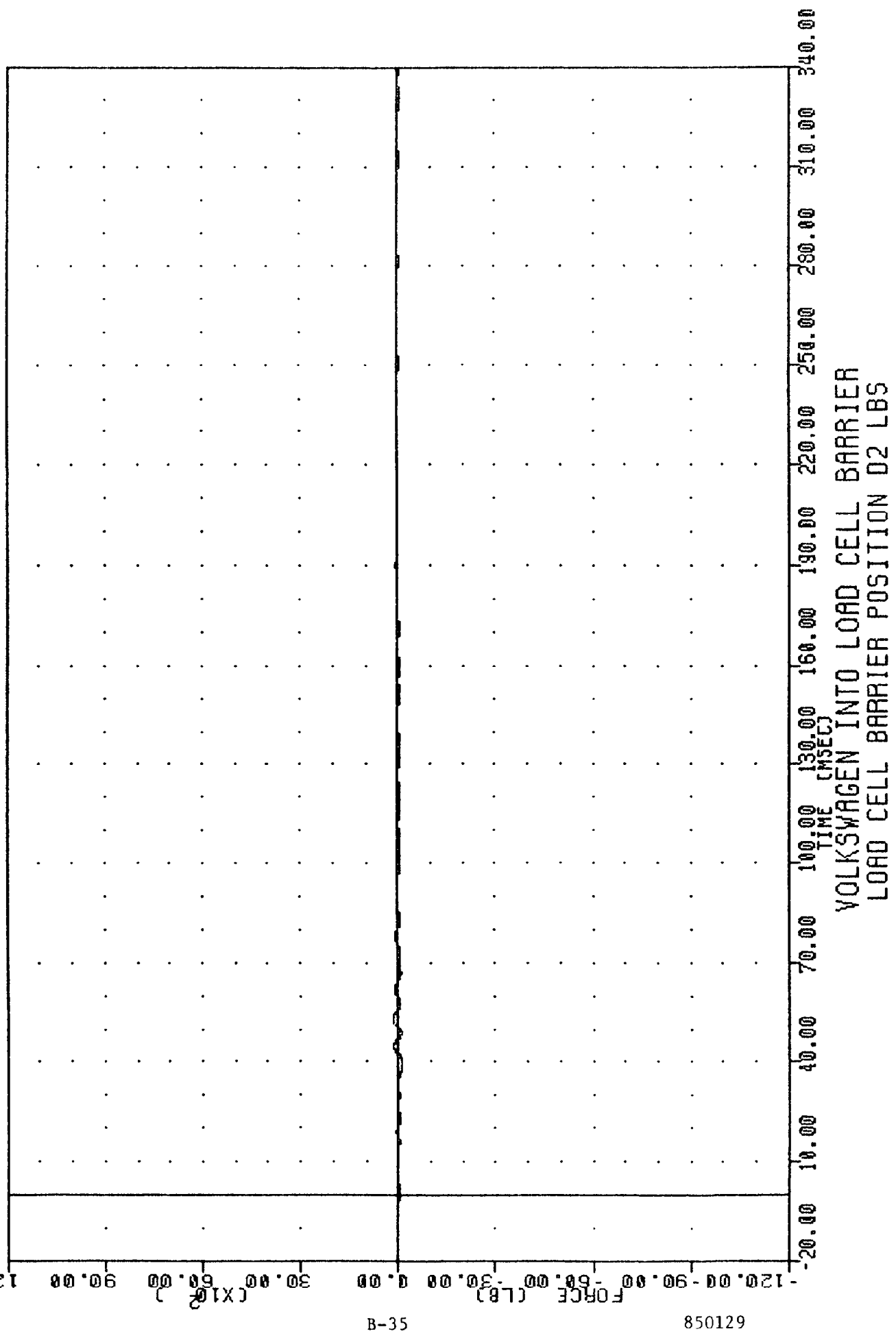
THE 850129 PEST DATE 17:00  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 801F  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -189.72 57.63, 233.15 44.25



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION 01 LBS

TRC 850129 850129 850129 850129 850129 850129 850129 850129 850129 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BD2F

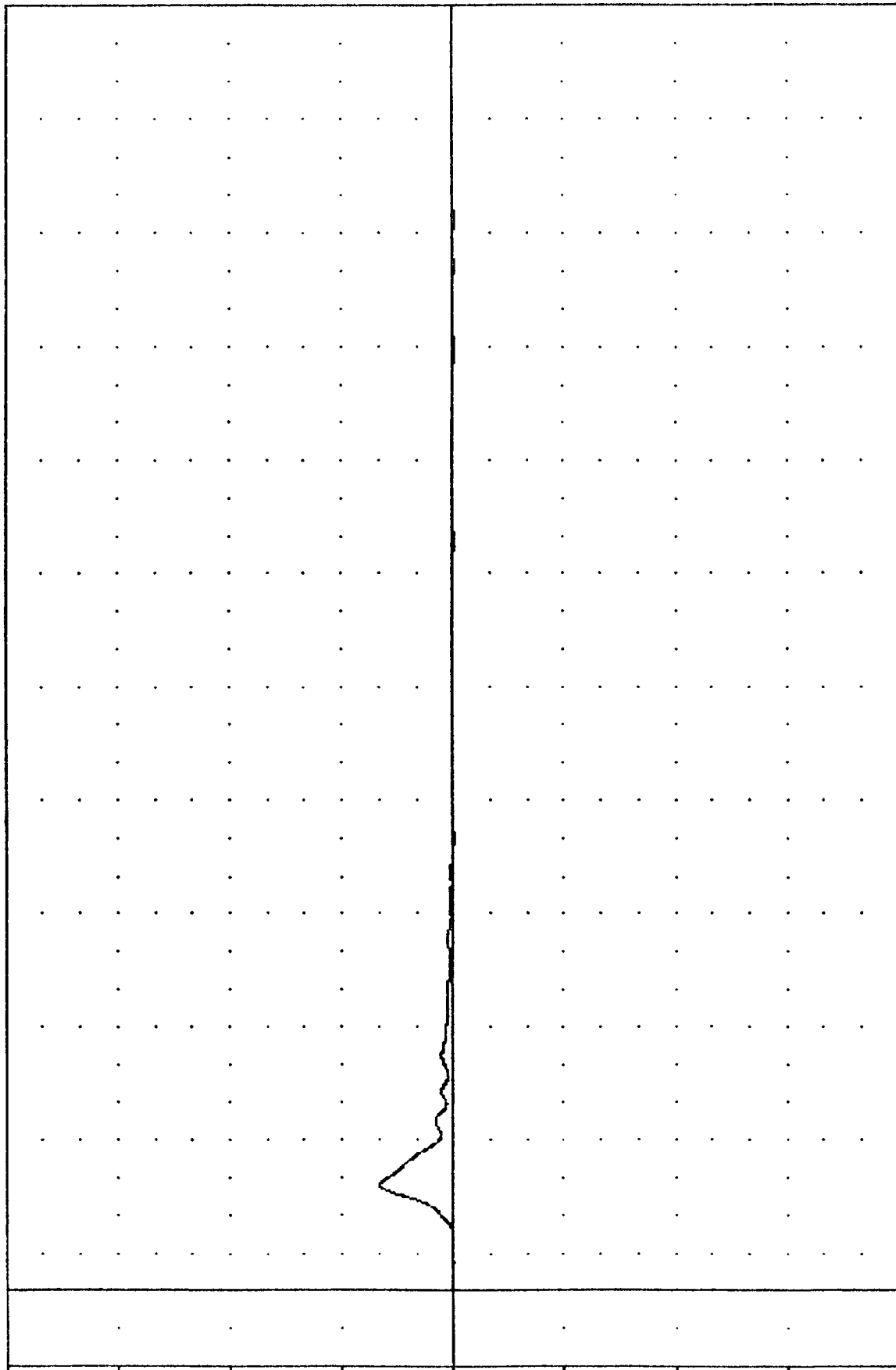
FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -142.84e 39.50 , 165.64 e 52.88



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D2 LBS

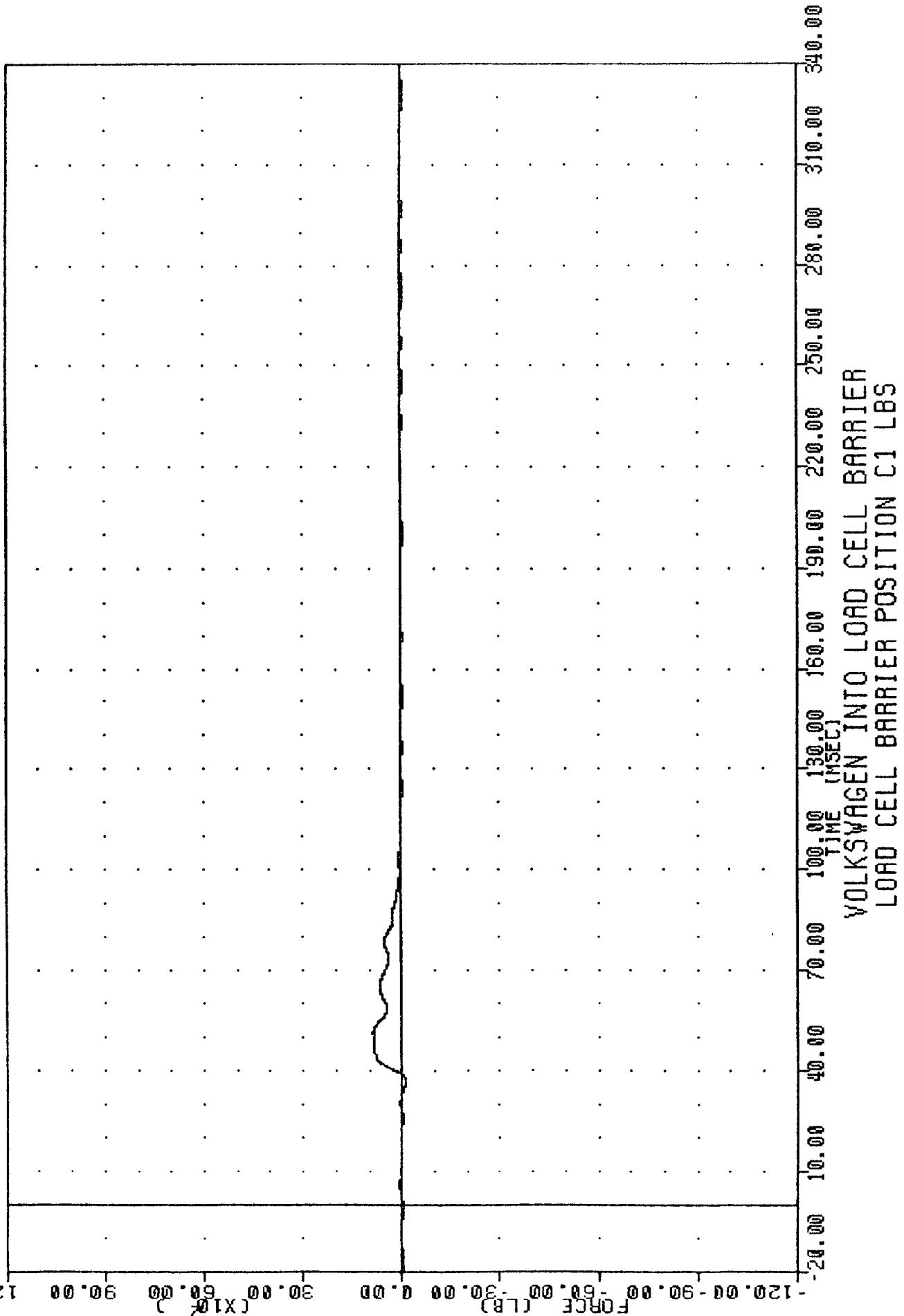
19.17:39

-120.00 -90.00 -60.00 -30.00 0.00  
FORCE (LB)  
90.00 60.00 30.00 0.00  
(X10<sup>2</sup>)  
90.00 60.00 30.00 0.00  
-120.00 -90.00 -60.00 -30.00 0.00



| TIME (NSEC)                       | 100.00 | 130.00 | 160.00 | 190.00 | 220.00 | 250.00 | 280.00 | 310.00 | 340.00 |
|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| VOLKSWAGEN INTO LOAD CELL BARRIER |        |        |        |        |        |        |        |        |        |
| LOAD CELL BARRIER POSITION D3 LBS |        |        |        |        |        |        |        |        |        |

TMC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BC1F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -130.36 37.13, 875.66 51.38  
 FEB 83 17:53



TRC 850129

850129

NEW CAR ASSESSMENT PROGRAM

85029000000

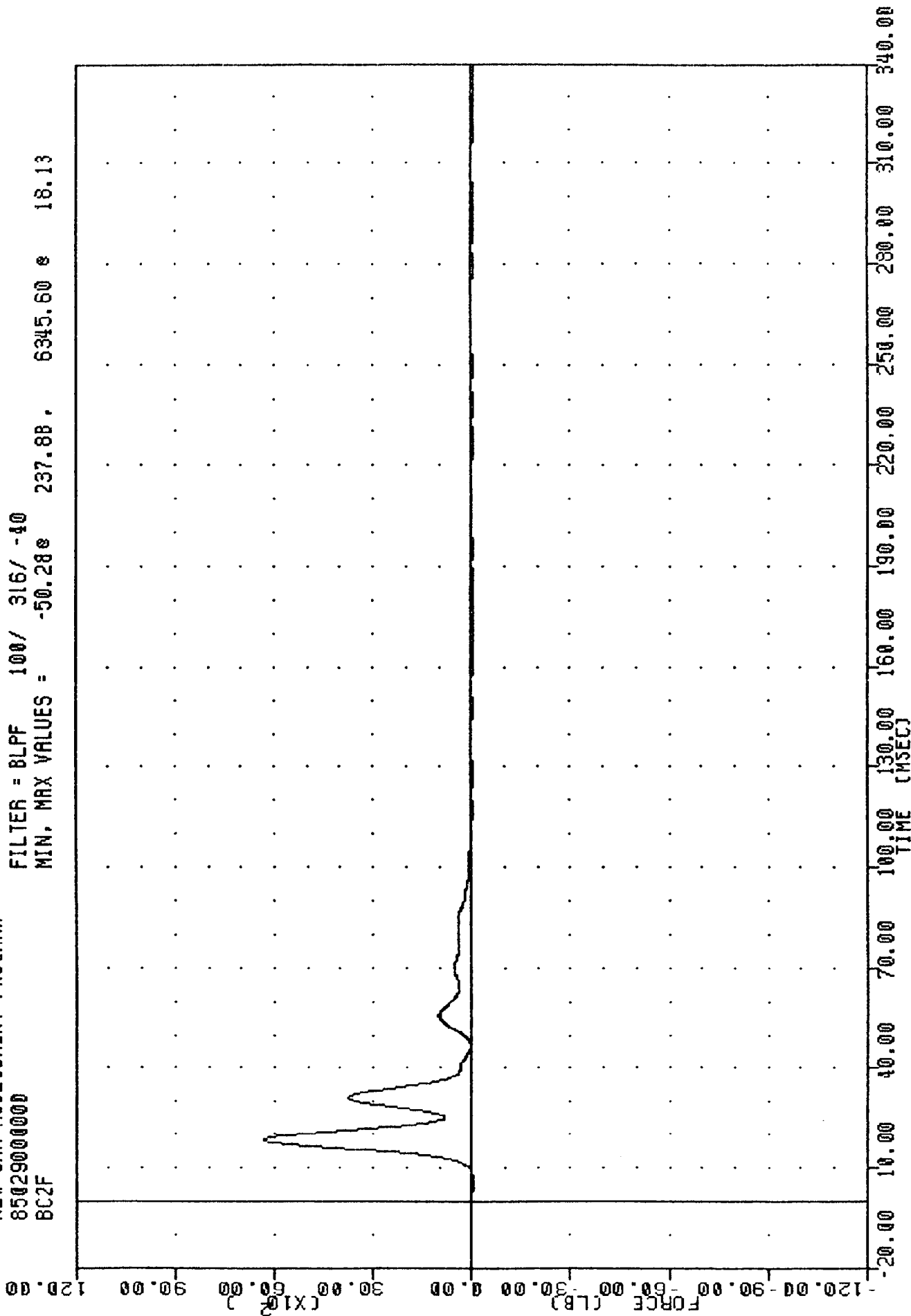
BC2F

14-FEB-83

14:17:39

FILTER = 8LPF 100/ 316/ -40

MIN. MAX VALUES = -50.28 237.88, 6345.60 18.13



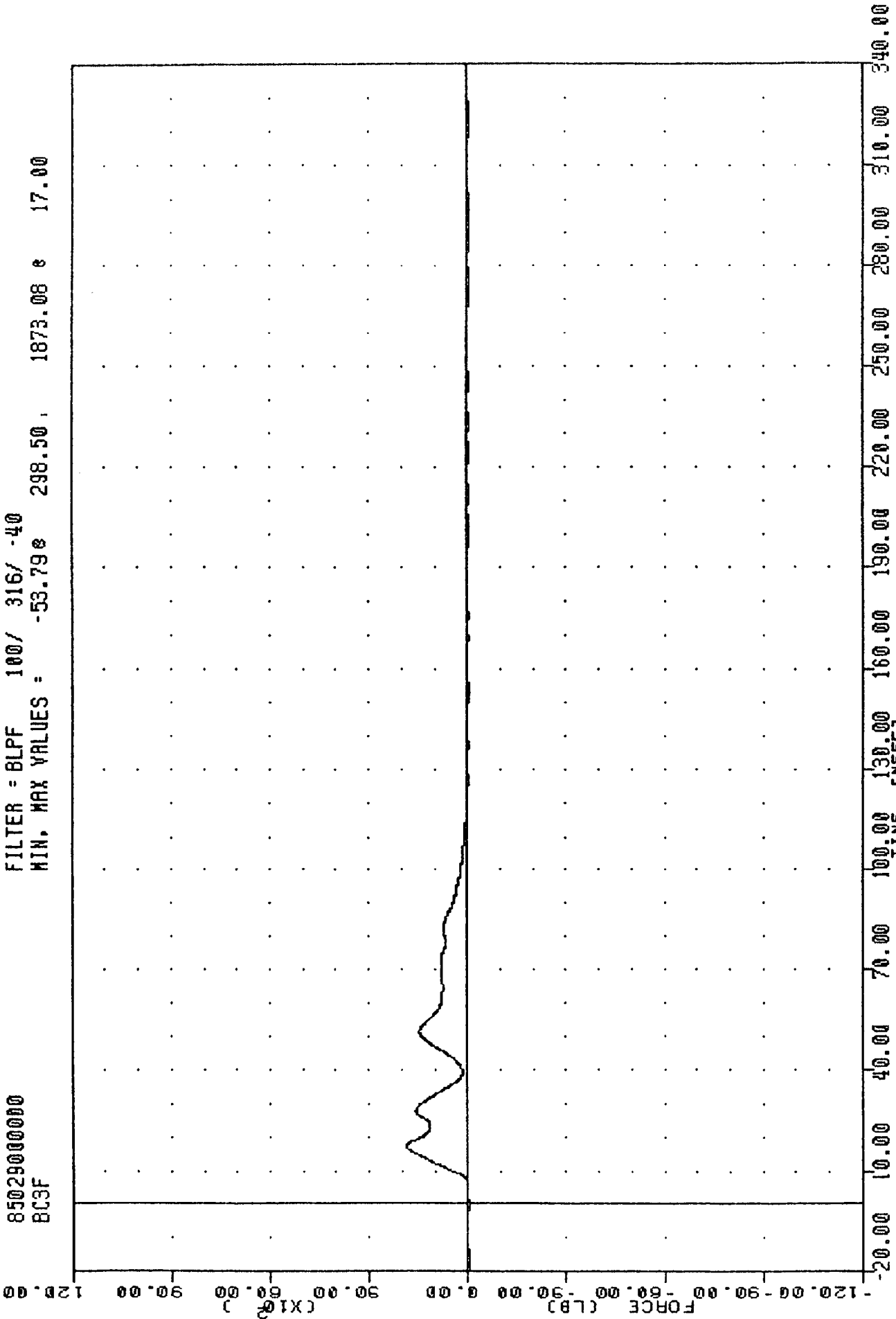
VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION C2 LBS



TNC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 BC3F

PLT DATE FEB-83 17:53

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -53.798 298.50 1873.08 17.00



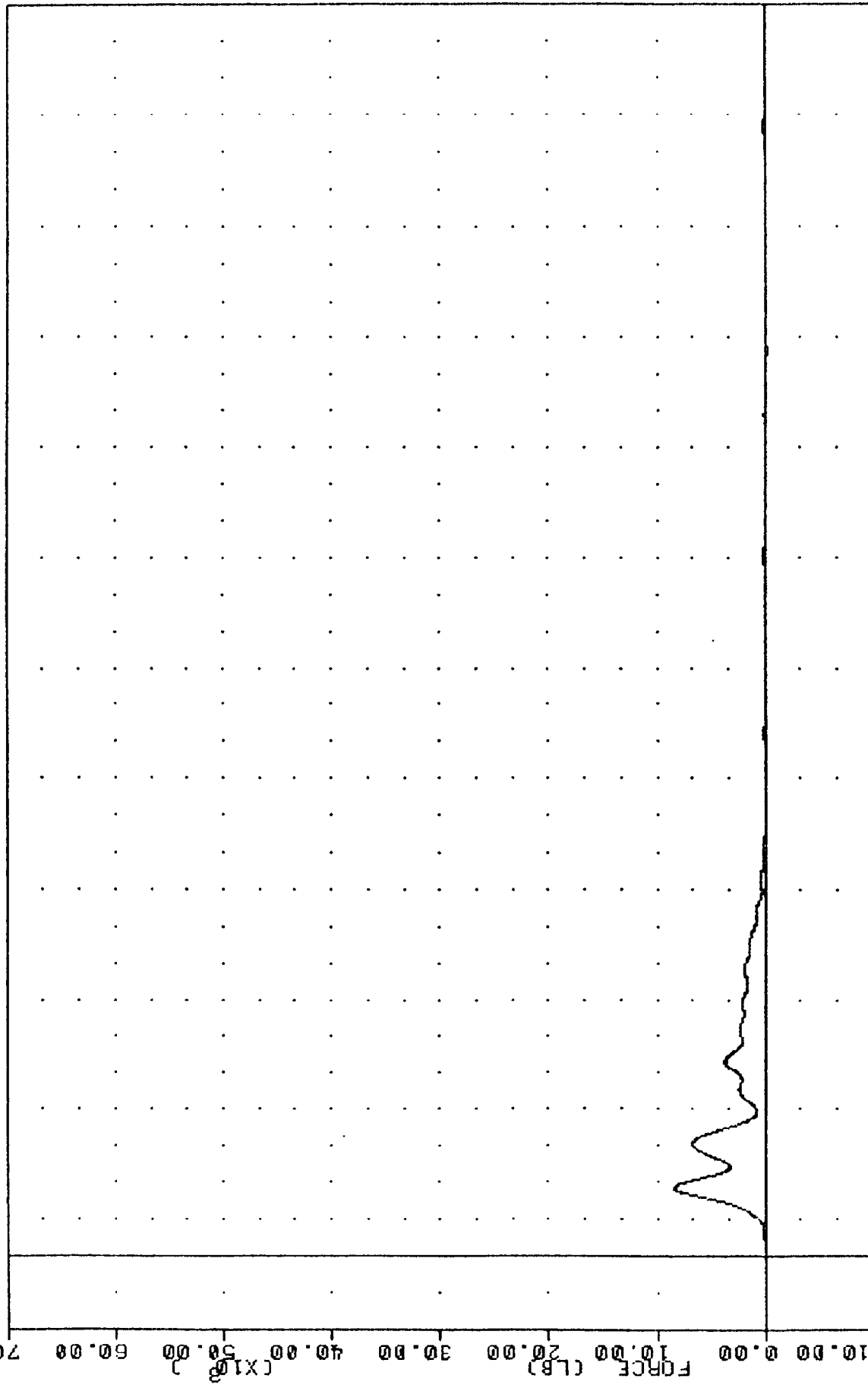
B-39

850129

VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C3 LBS

NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 LCBG1F  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -183.42 246.25, 8340.45 18.13  
 850129 FEB 08:12

70.00

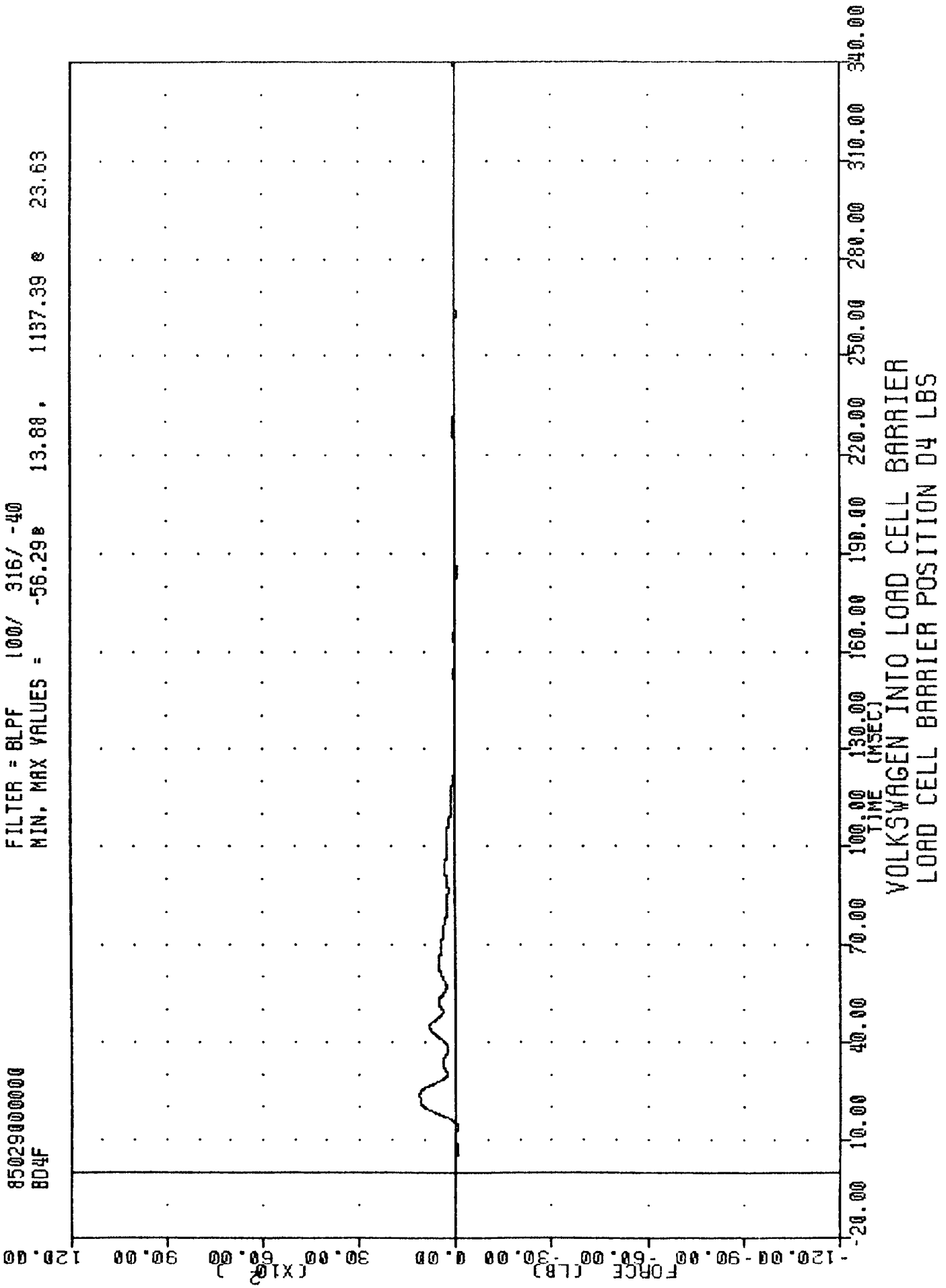


B-40

850129

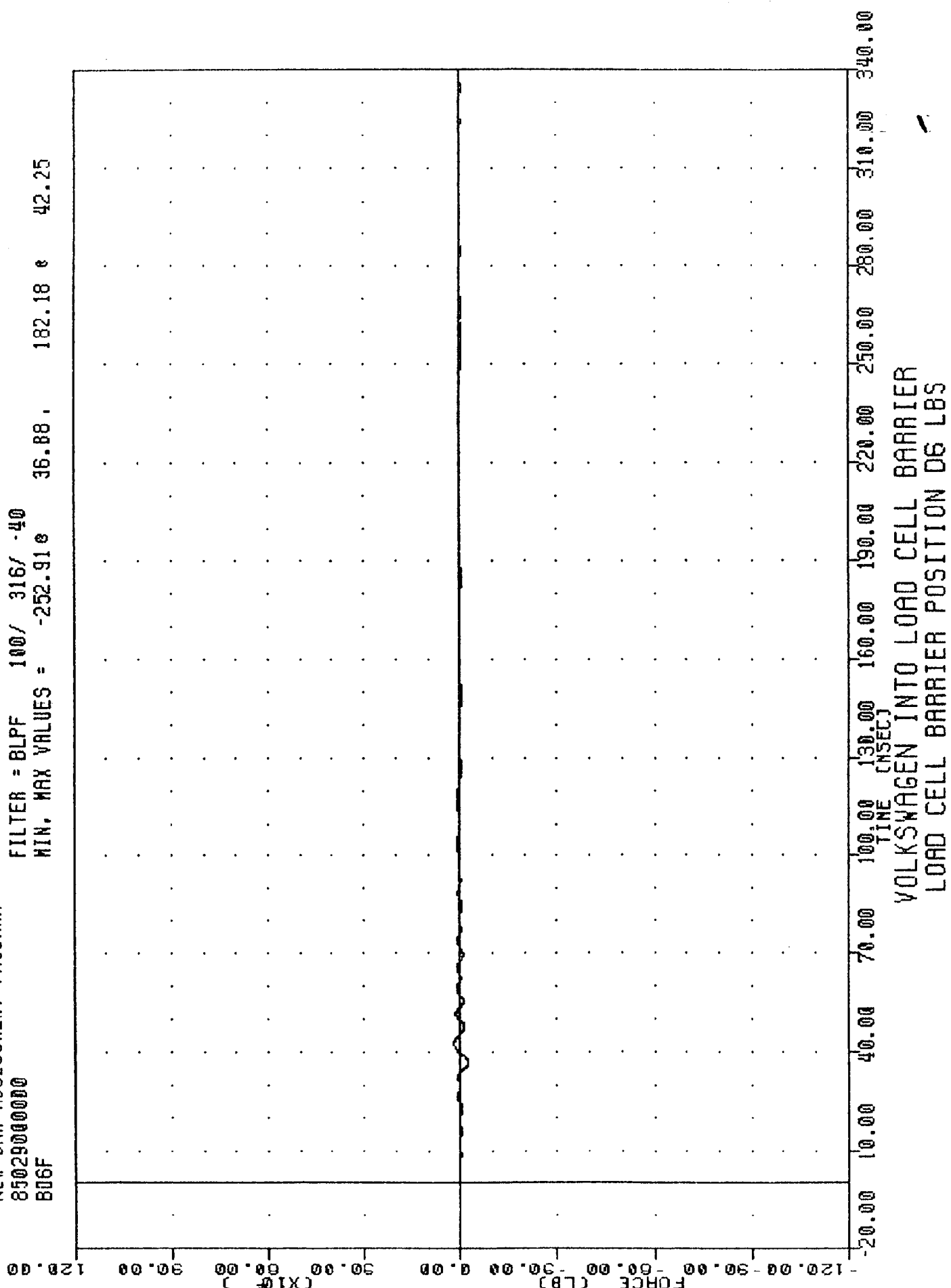
-10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER GROUP #1 FORCE TOTAL

850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 804F  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -56.29 13.88, 1137.39 23.63  
 14-FEB-83 17:53

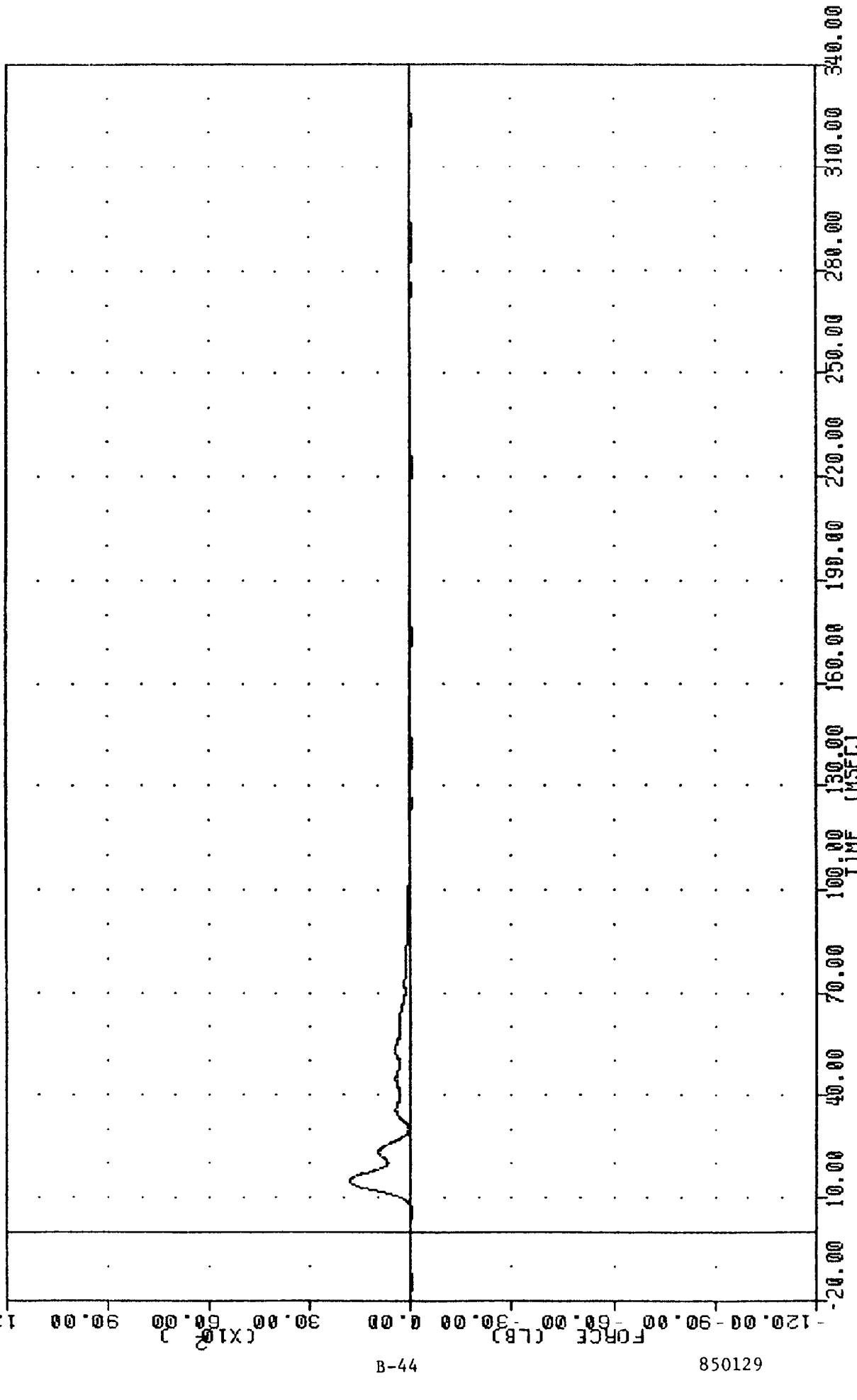




THE 850129 FEB 03 17:30  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 B06F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -252.91 182.18 42.25



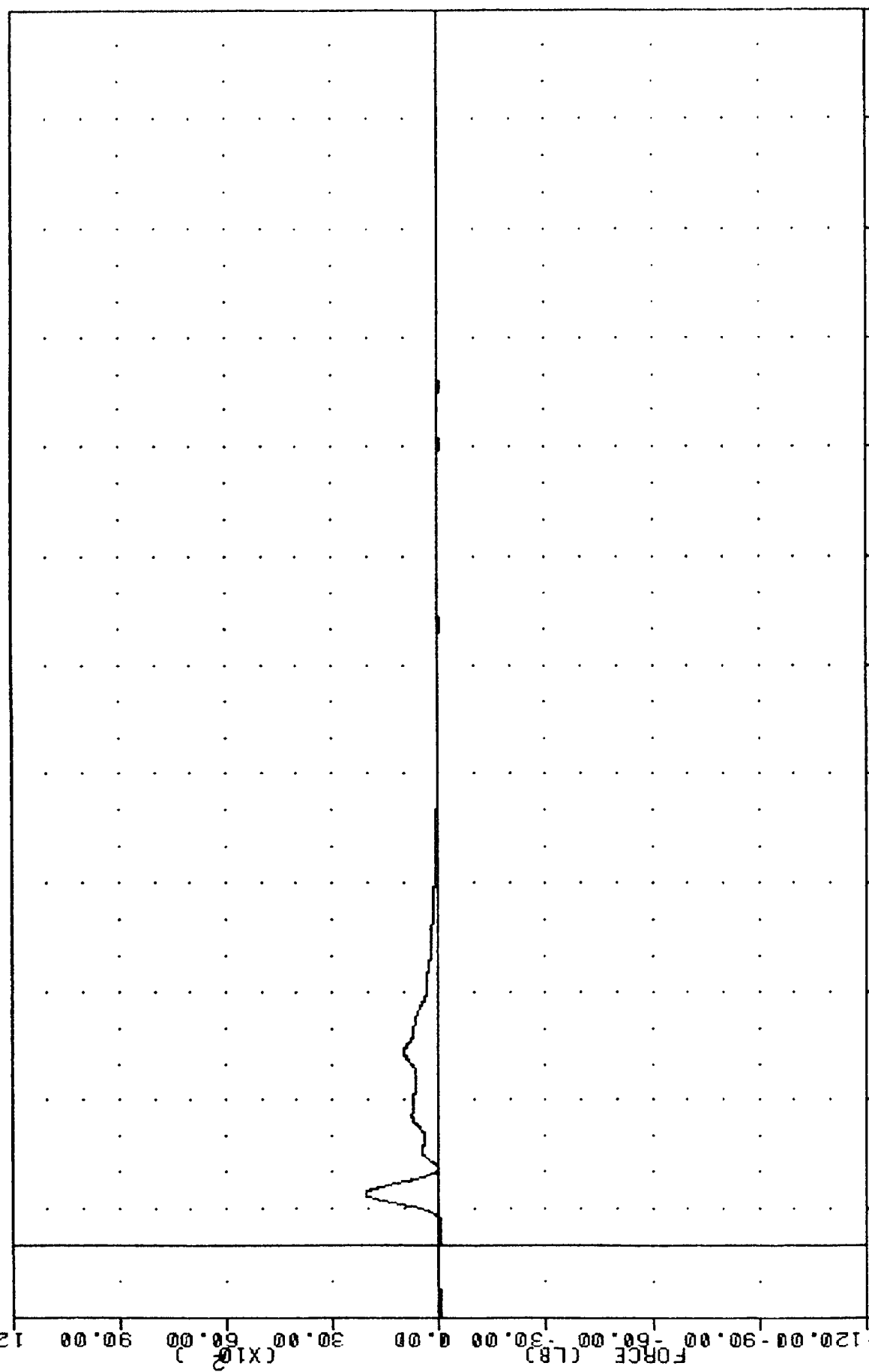
850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BC4F  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -41.00E 138.50, 1828.93 E 14.63



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C4 LBS

THE [REDACTED] 850129 [REDACTED] PLOT DATE [REDACTED] FEB 83 [REDACTED] 17:53  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BC5F

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -61.75e 5.63, 2077.91 e 13.88



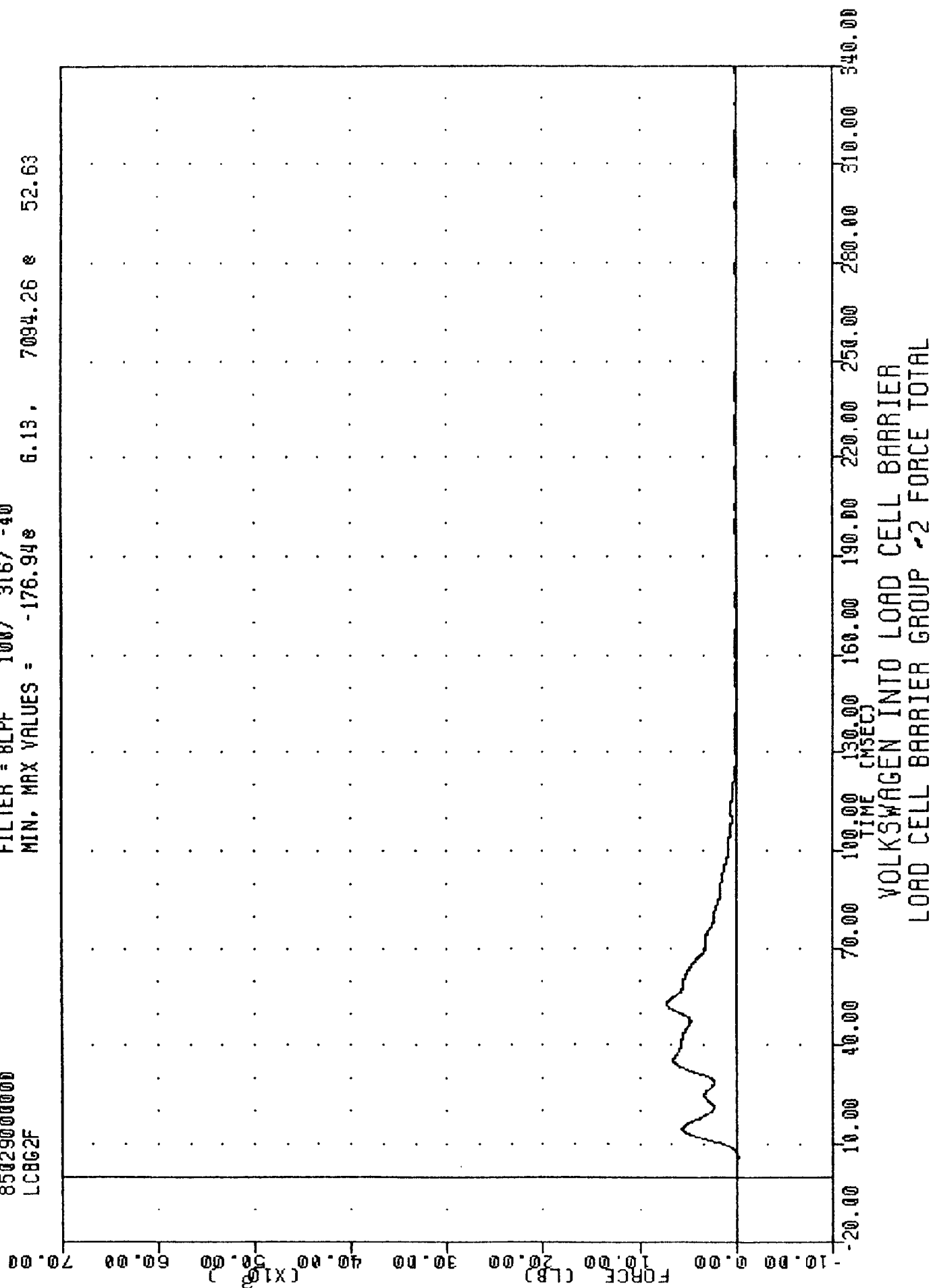
VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C5 LBS



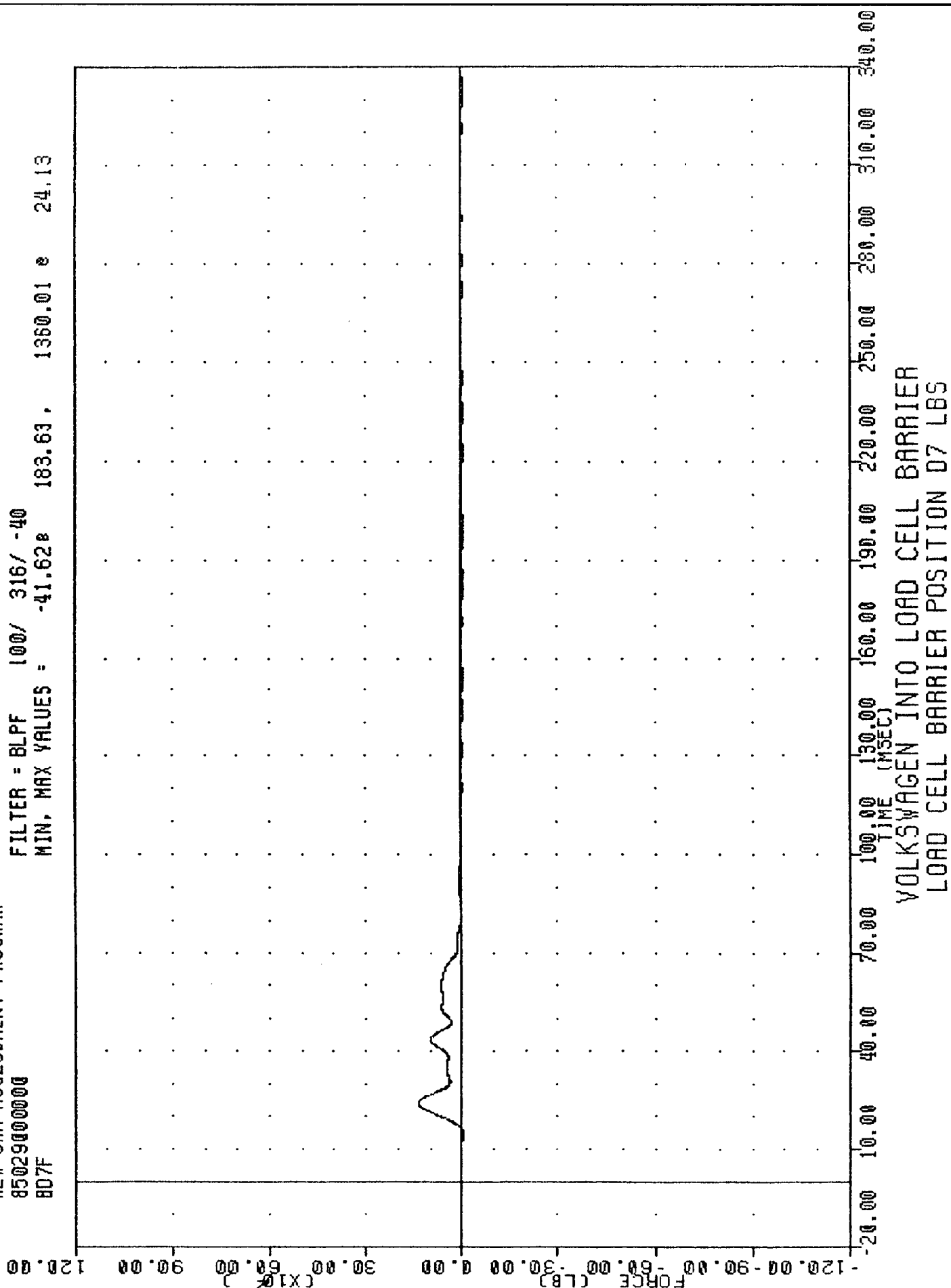


PLOT DATE [REDACTED] FEB-83  
 TV-08:12

FILTER = 8LPF 100/ 316/ -40  
MIN, MAX VALUES = -176.948 6.13, 7094.26 52.63



NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BD7F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -41.62e 183.63, 1360.01 e 24.13

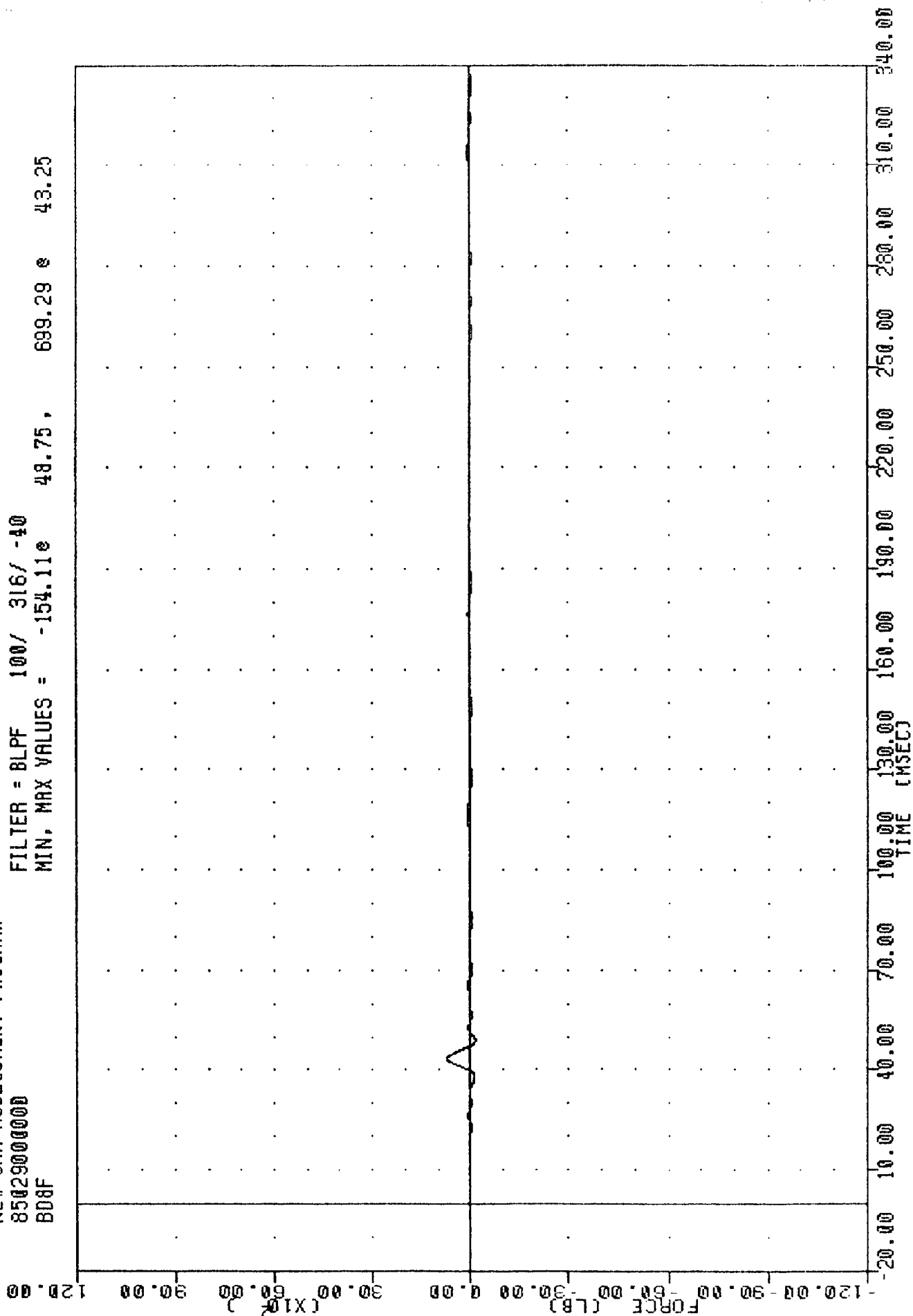


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D7 LBS

850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 B08F

P000 DR700 FEB 05 17:00

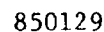
FILTER = 8LPF 100/ 316/ -40  
 MIN, MAX VALUES = -154.11e 48.75, 699.29 e 43.25



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION D8 LBS

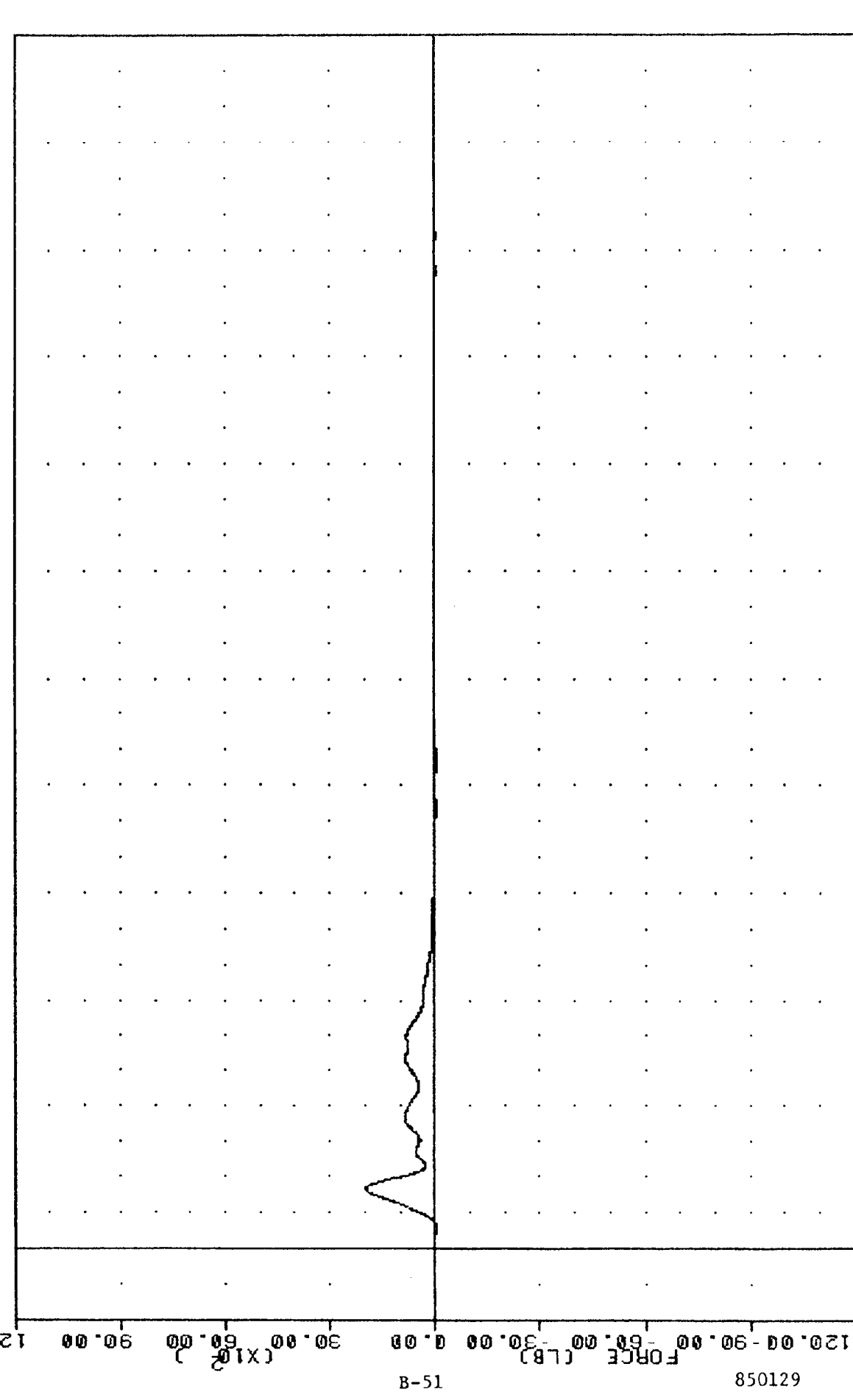
1

21.25



THE CHIEF  
VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION 09 LBS

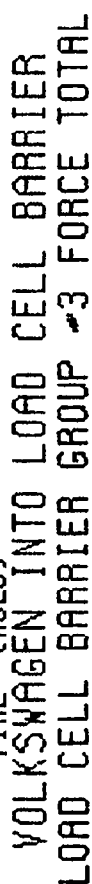
850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 BC7F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -39.51 136.75 1963.28 16.25  
 17:00



850129  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION C7 LBS

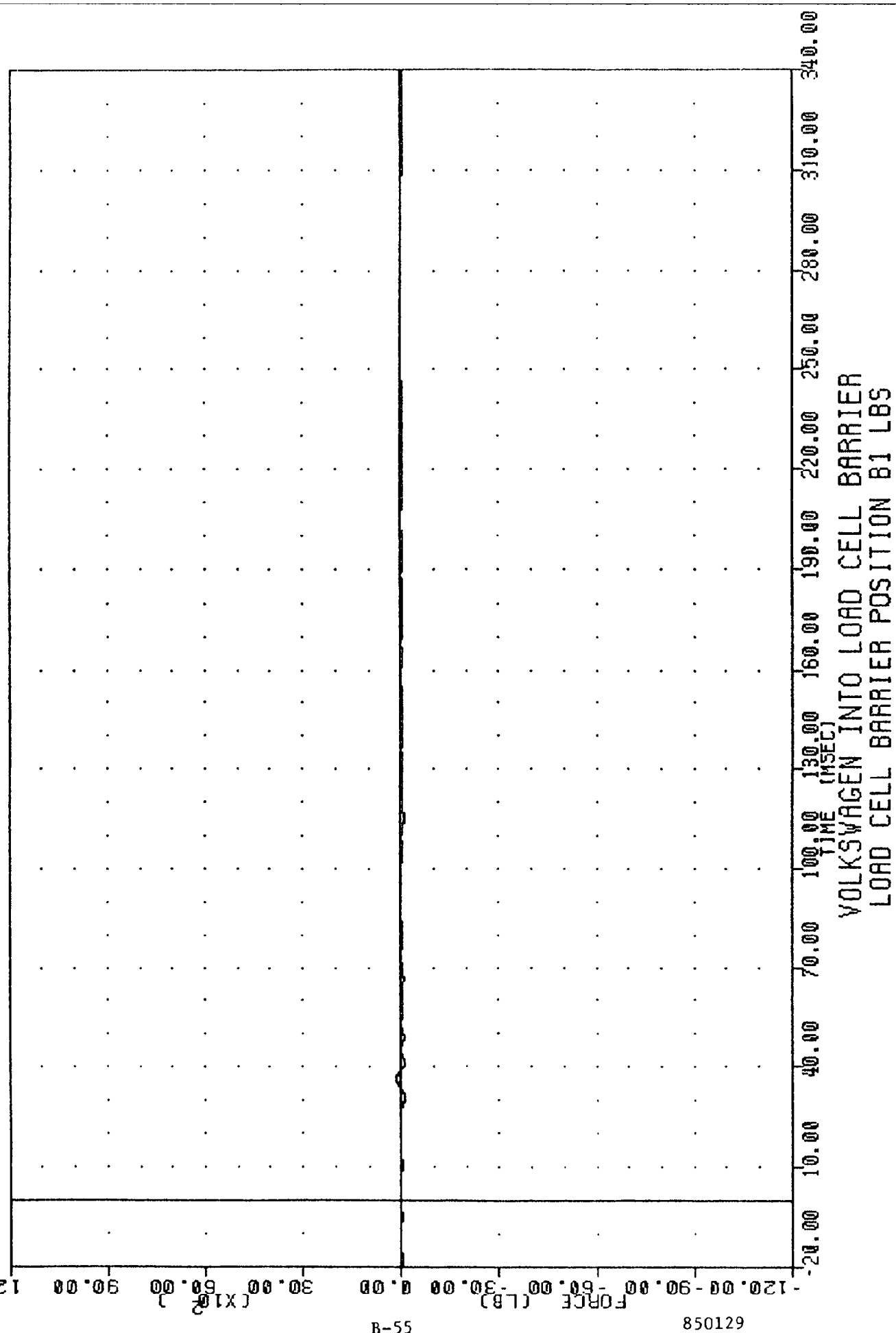
1

08.08.18



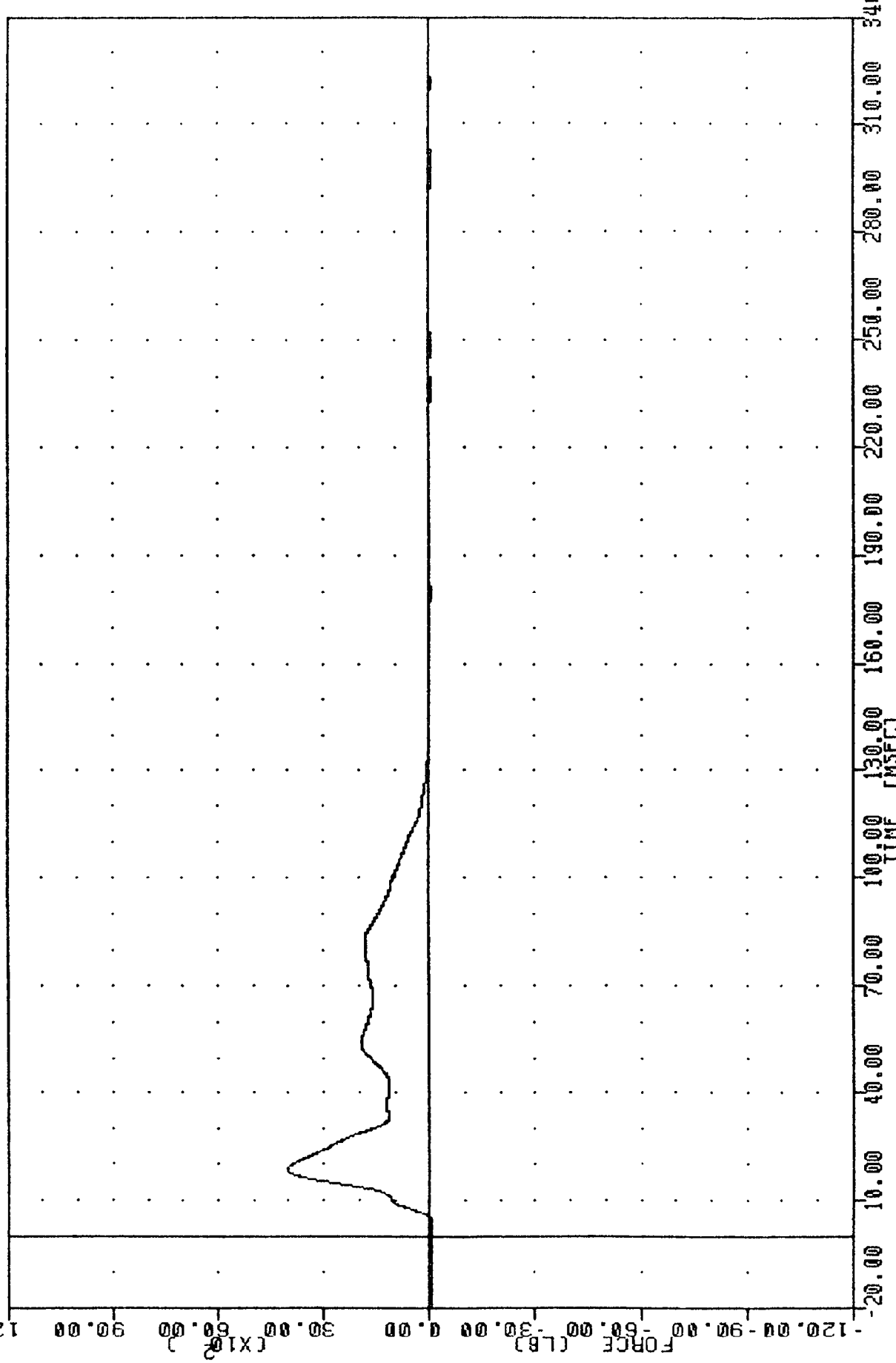
TRC 850129 850129 850129 850129 850129 850129 850129 850129 850129 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BB1F

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -114.35e 41.25, 144.58 e 36.38



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B1 LBS

TRC 850129 14:17:39  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BB2F  
 FILTER = 8LPF 100/ 316/ -40  
 MIN, MAX VALUES = -45.29 298.00, 4042.63 18.38



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B2 LBS



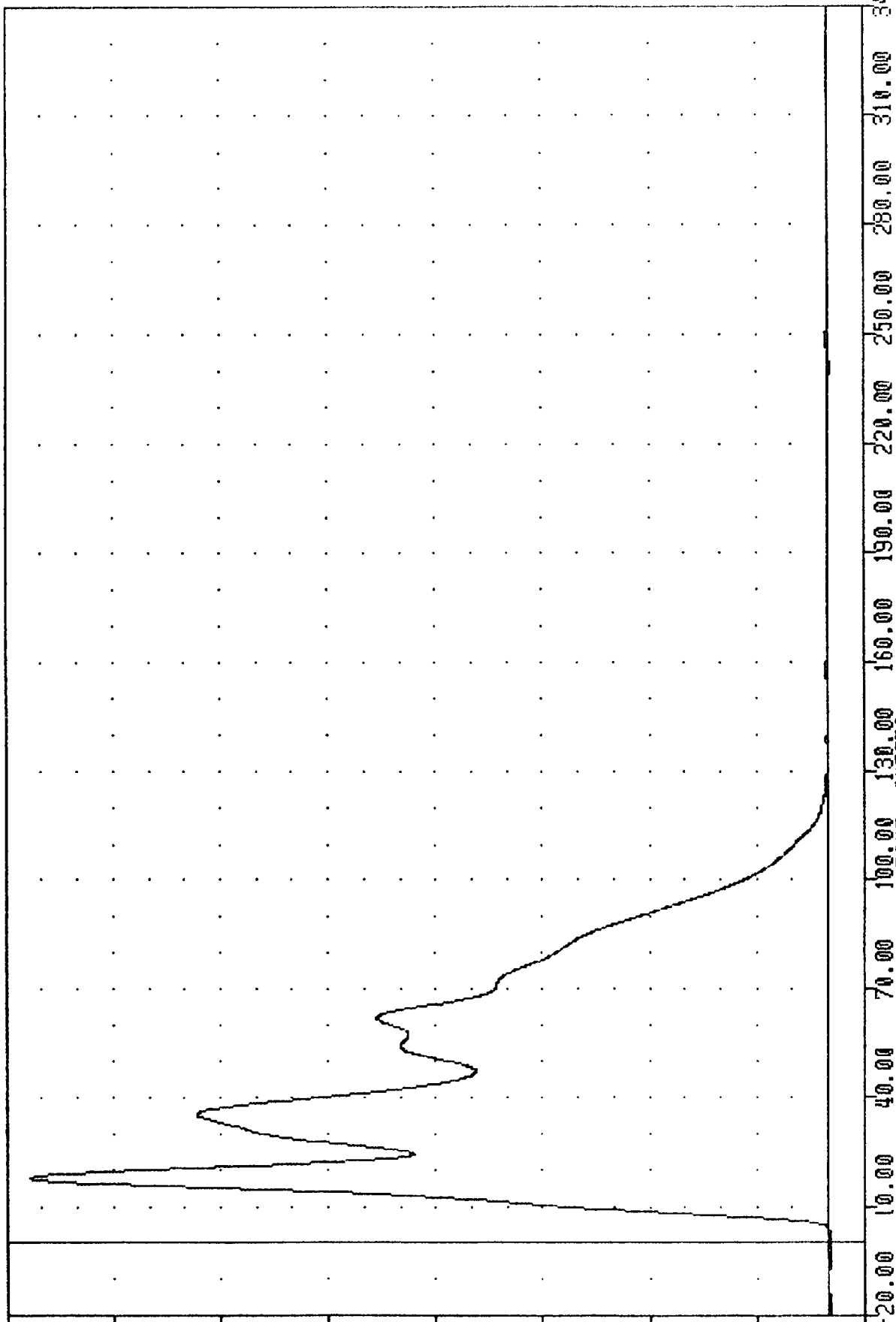
TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BB3F

PLUT DATE 4-FEB-83 14:17:39

FILTER = BLPF 100/ 316/ -40

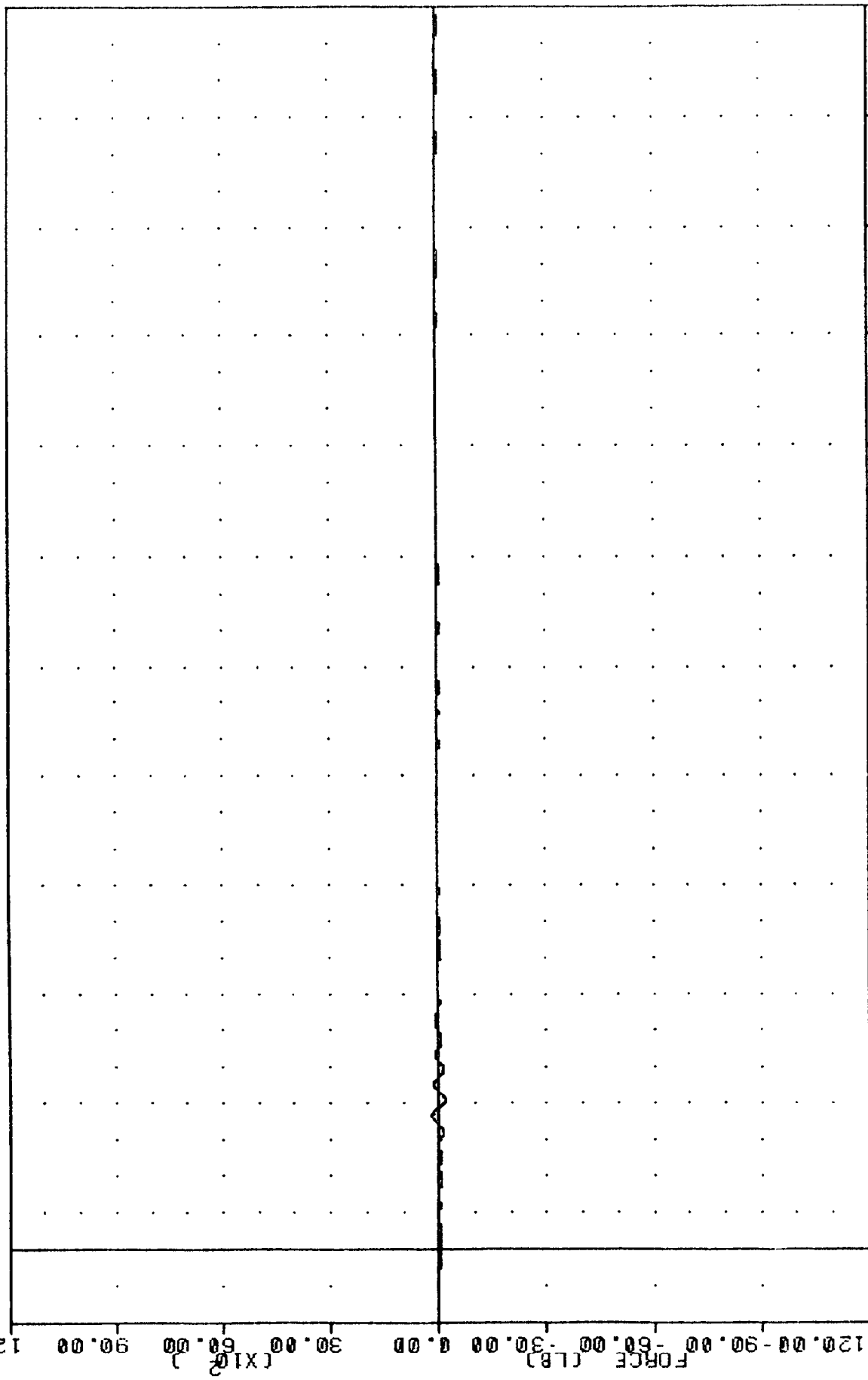
MIN. MAX VALUES = -72.68 18.75, 22338.81 17.50

FORCE (LBS)  $\times 10^3$



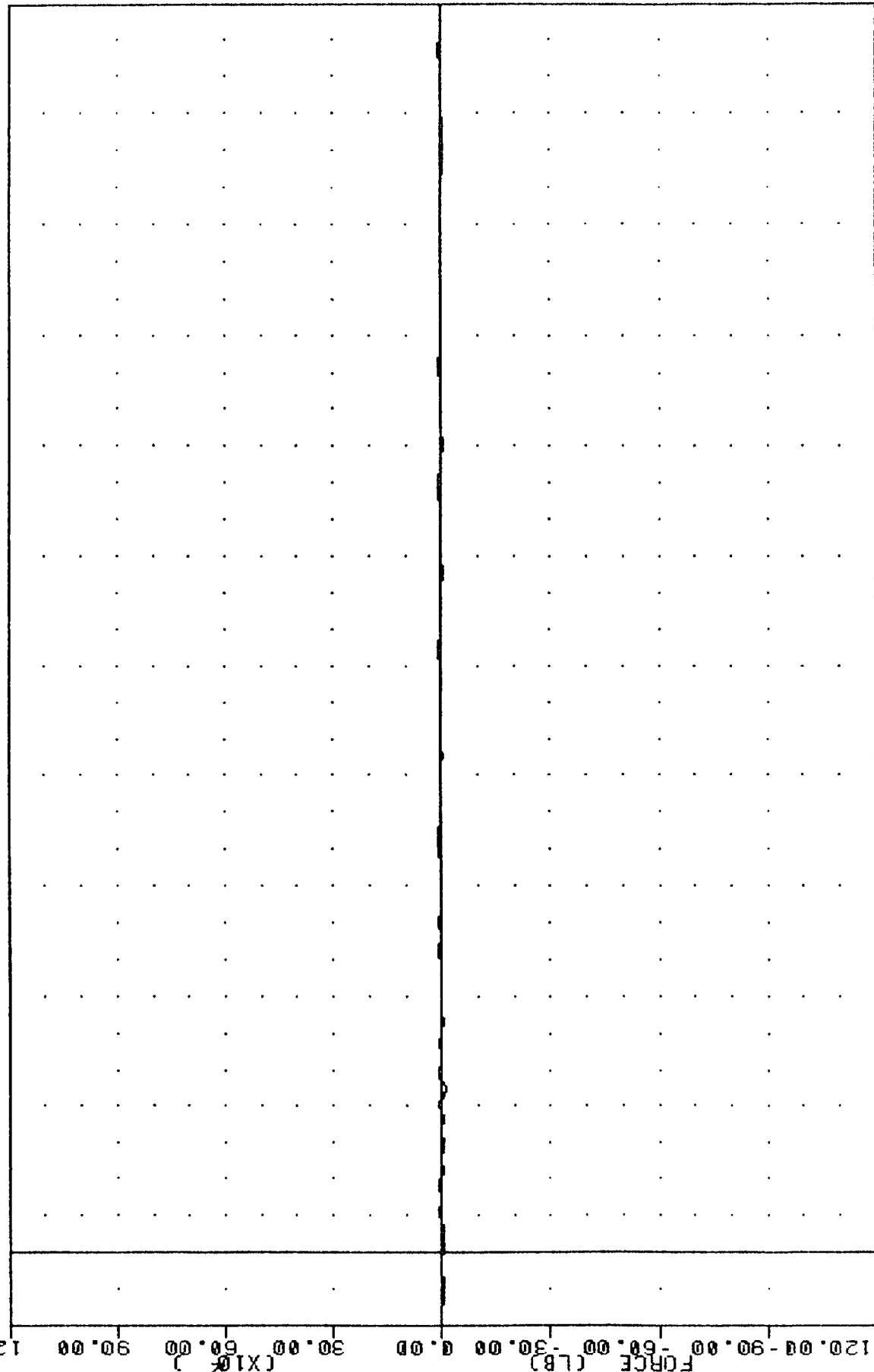
VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B3 LBS

01  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BR1F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -176.36 40.88, 184.12 36.50



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A1 LBS

THU 030129 000000  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BRZF  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -99.95 44.75 102.69 49.13  
 FEB-83 17:53

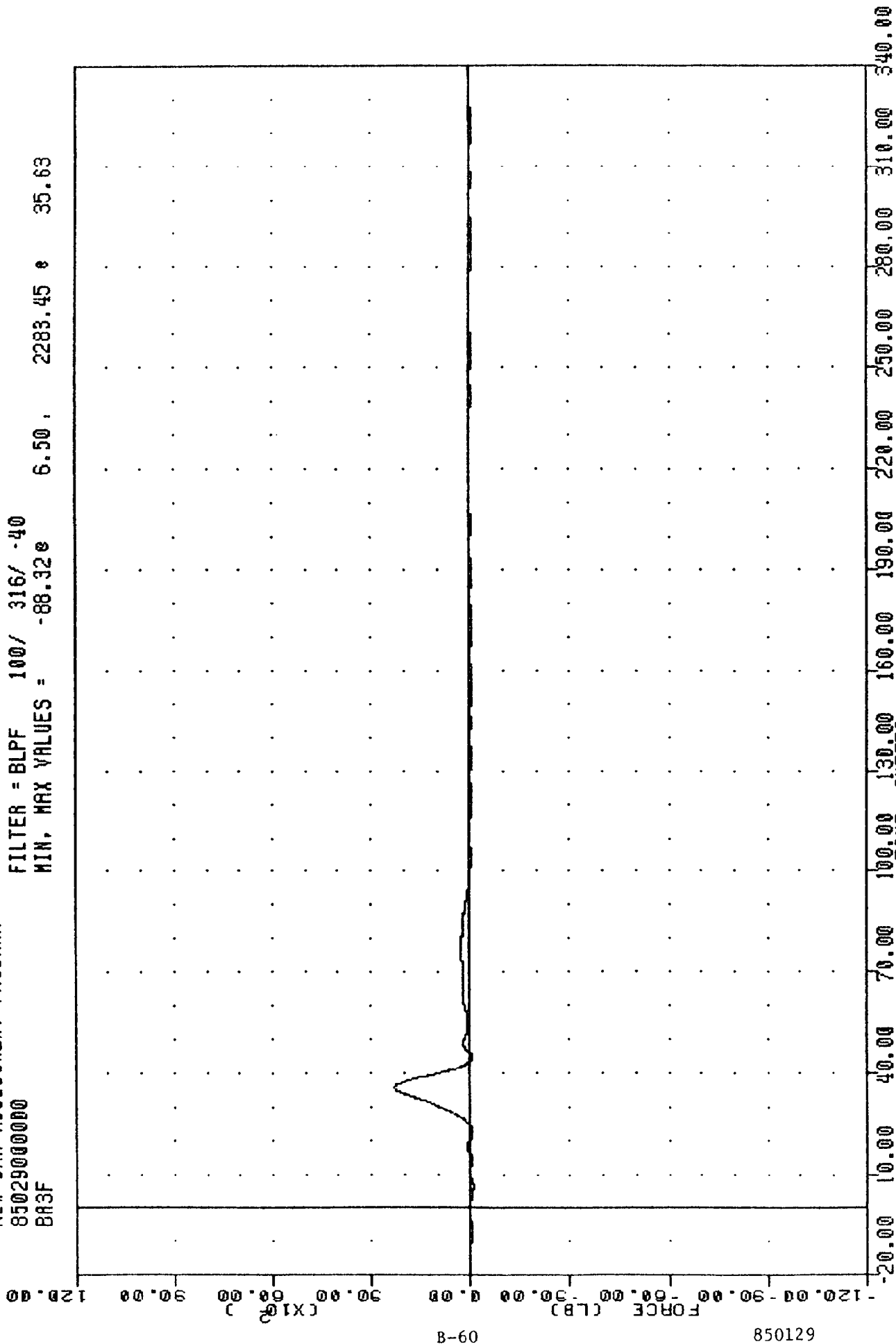


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A2 LBS

TAG 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 BR3F

PUNCH DATE 7:30

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -88.32 2283.45 35.63

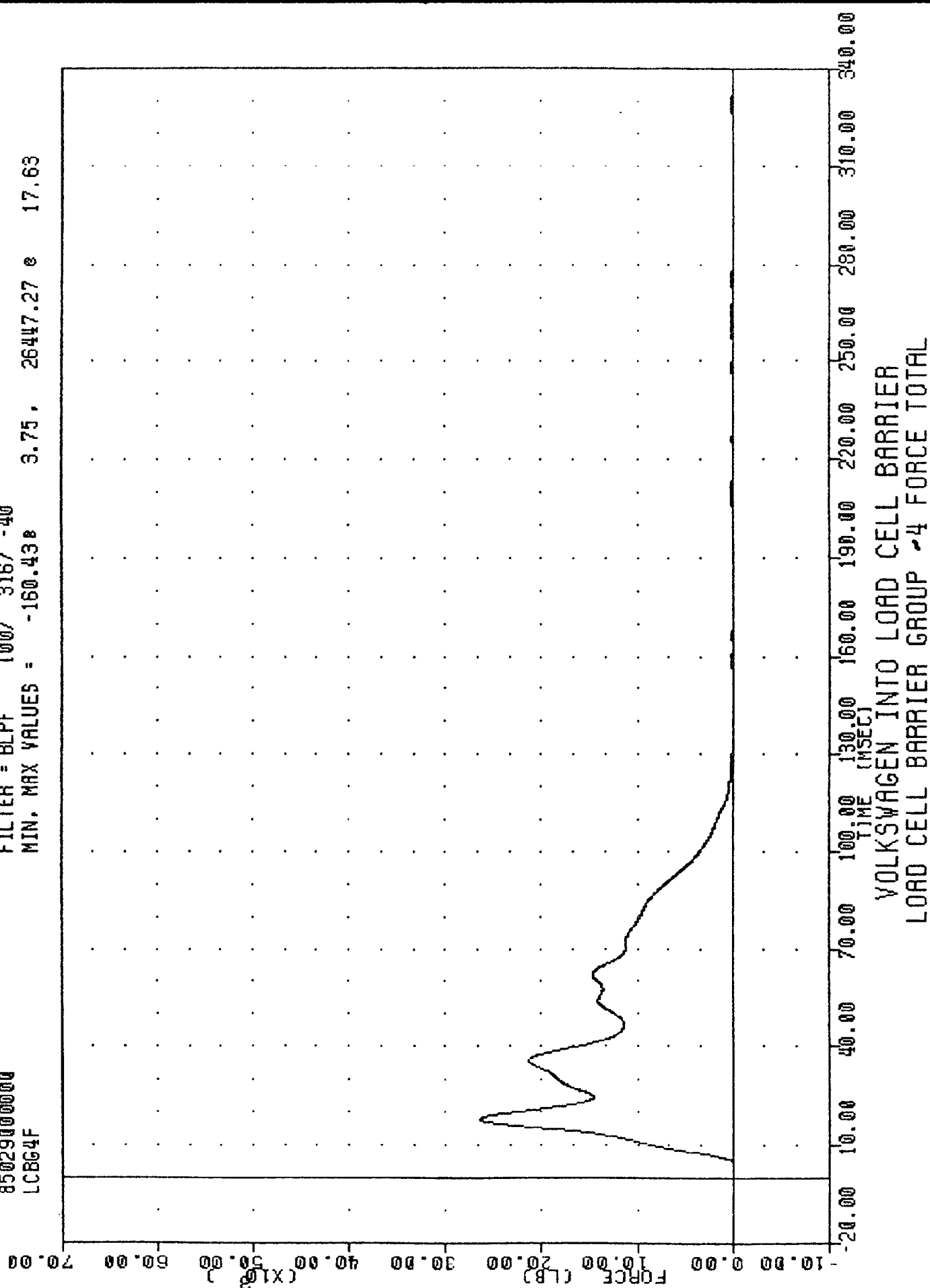


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A3 LBS

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 LCBG4F

PLOT DATE 4-FEB-85 13:08:12

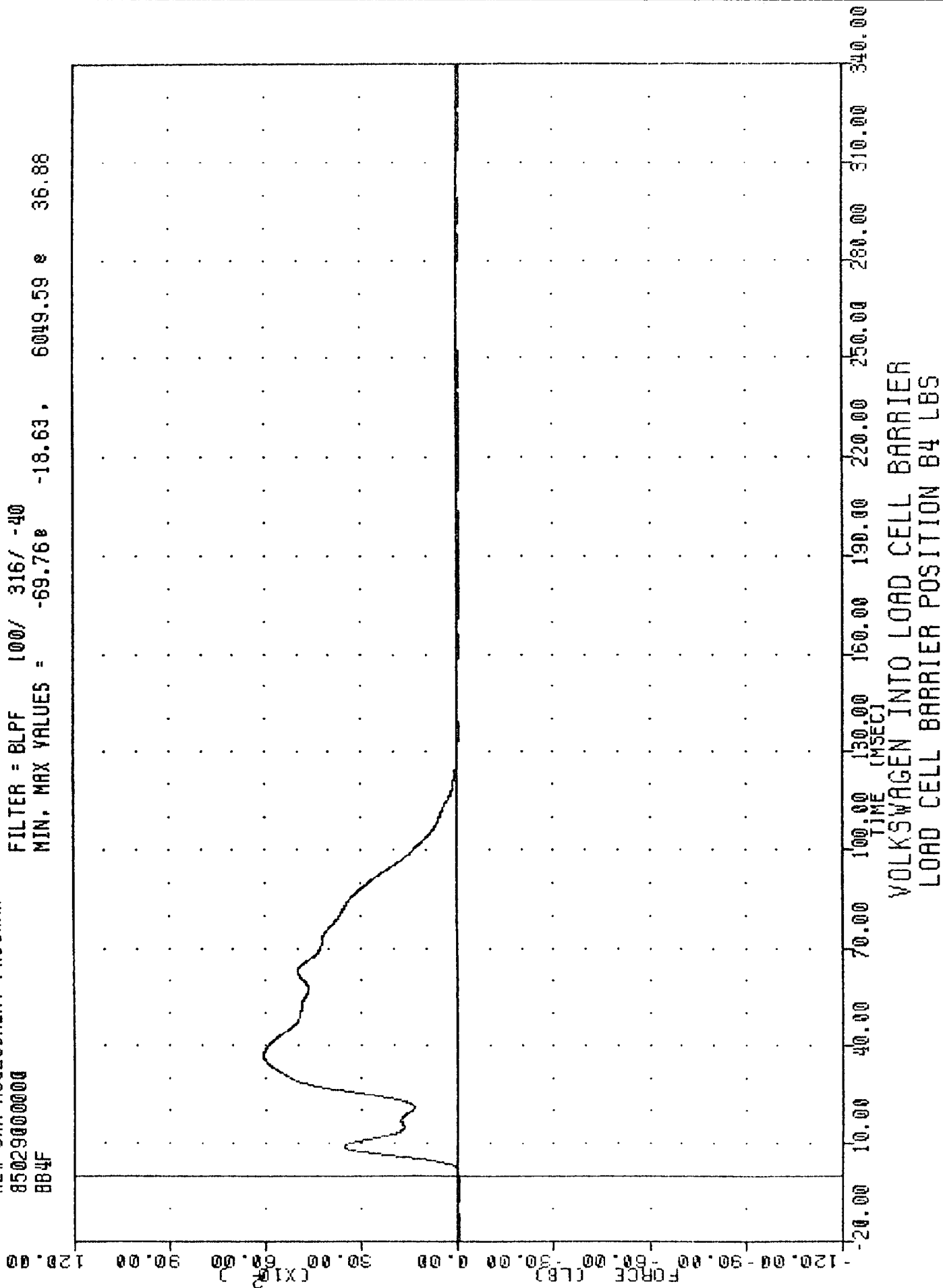
FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -160.438 3.75, 26447.27 e 17.63



TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BB4F

PLOT DATE 4 FEB 63 14:17:39

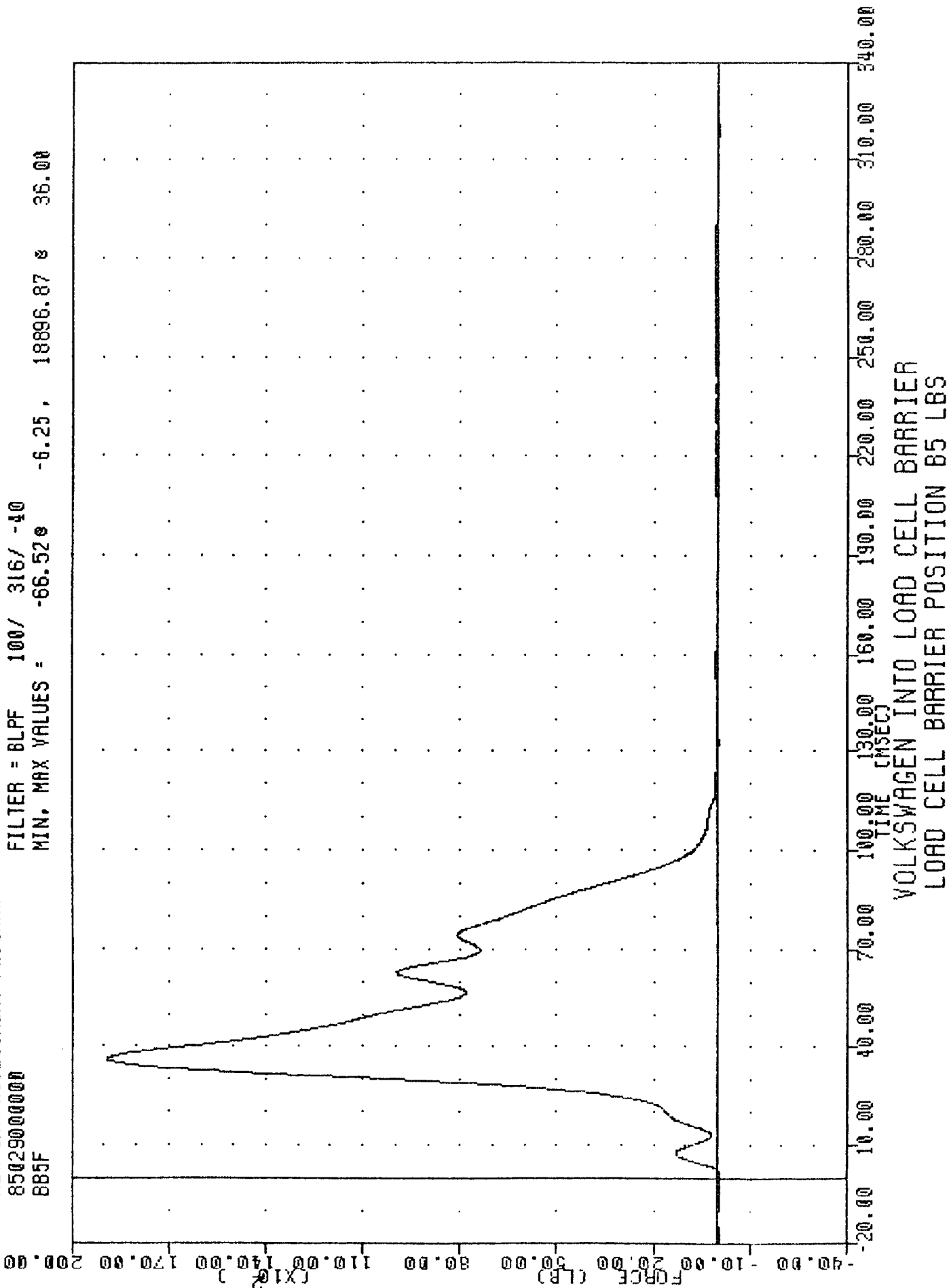
FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -69.76 6019.59 36.88



TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 885F

PLOT DATE 4-FEB-83 14:17:39

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -66.52 18896.87 36.00

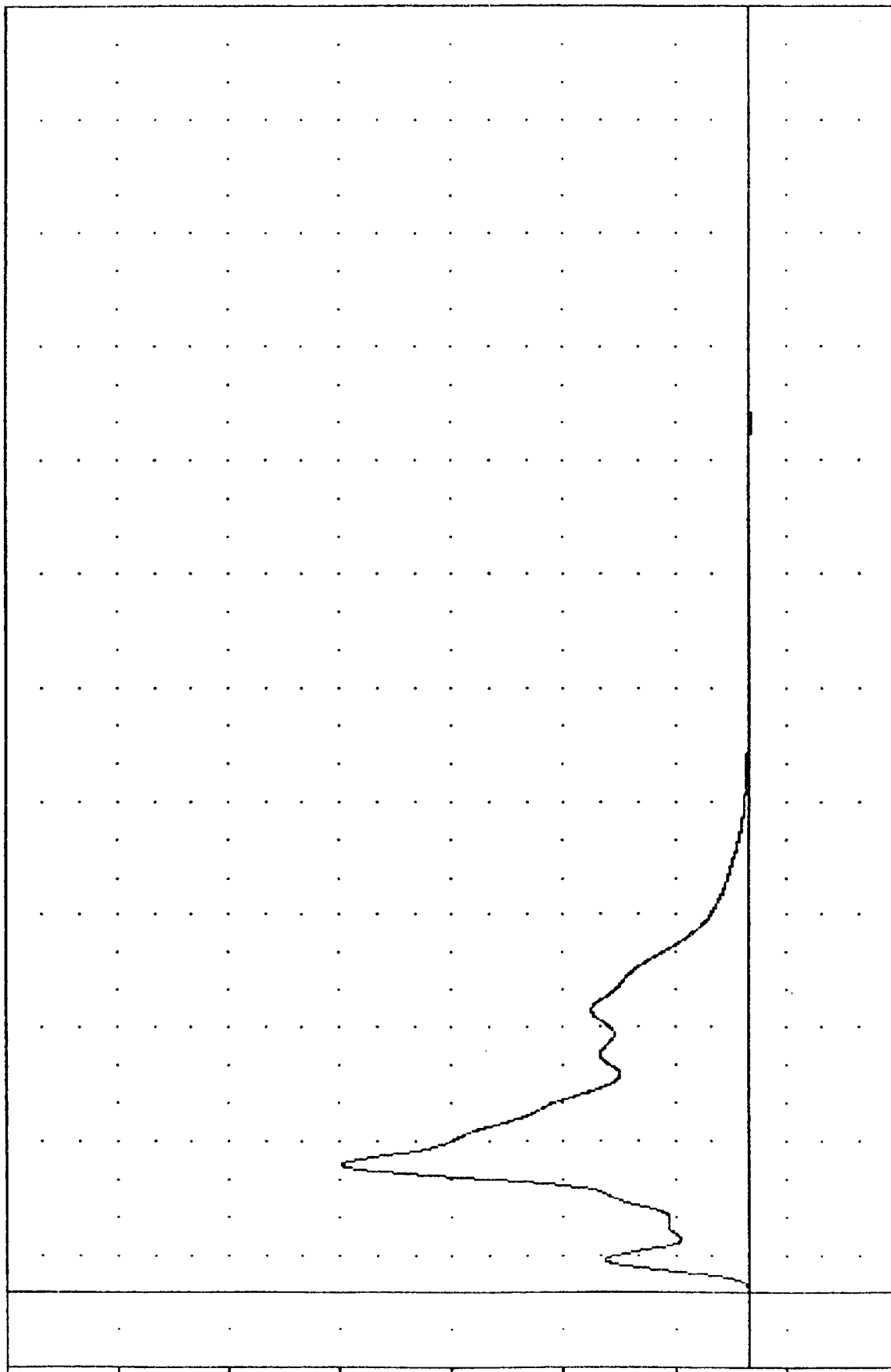


TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 B86F

PLOT DATE 4 FEB 63 14:17:59

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -41.01e 230.13, 10941.69 e 33.63

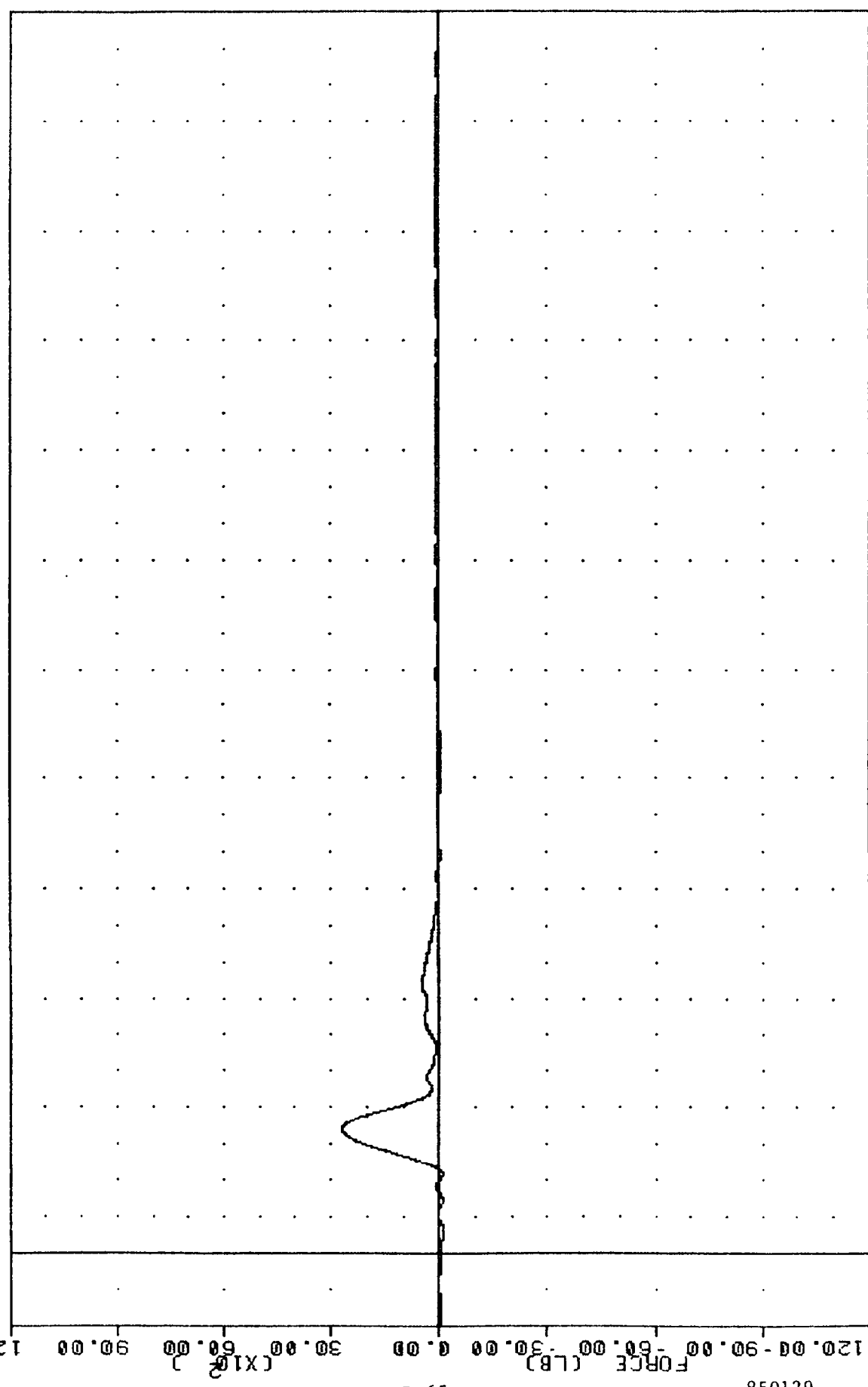
FORCE (LB)  
 (X10<sup>2</sup>)



VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION B6 LBS



TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BR4F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -125.54 2686.55 34.00  
 4 FEB 83 14:17:39

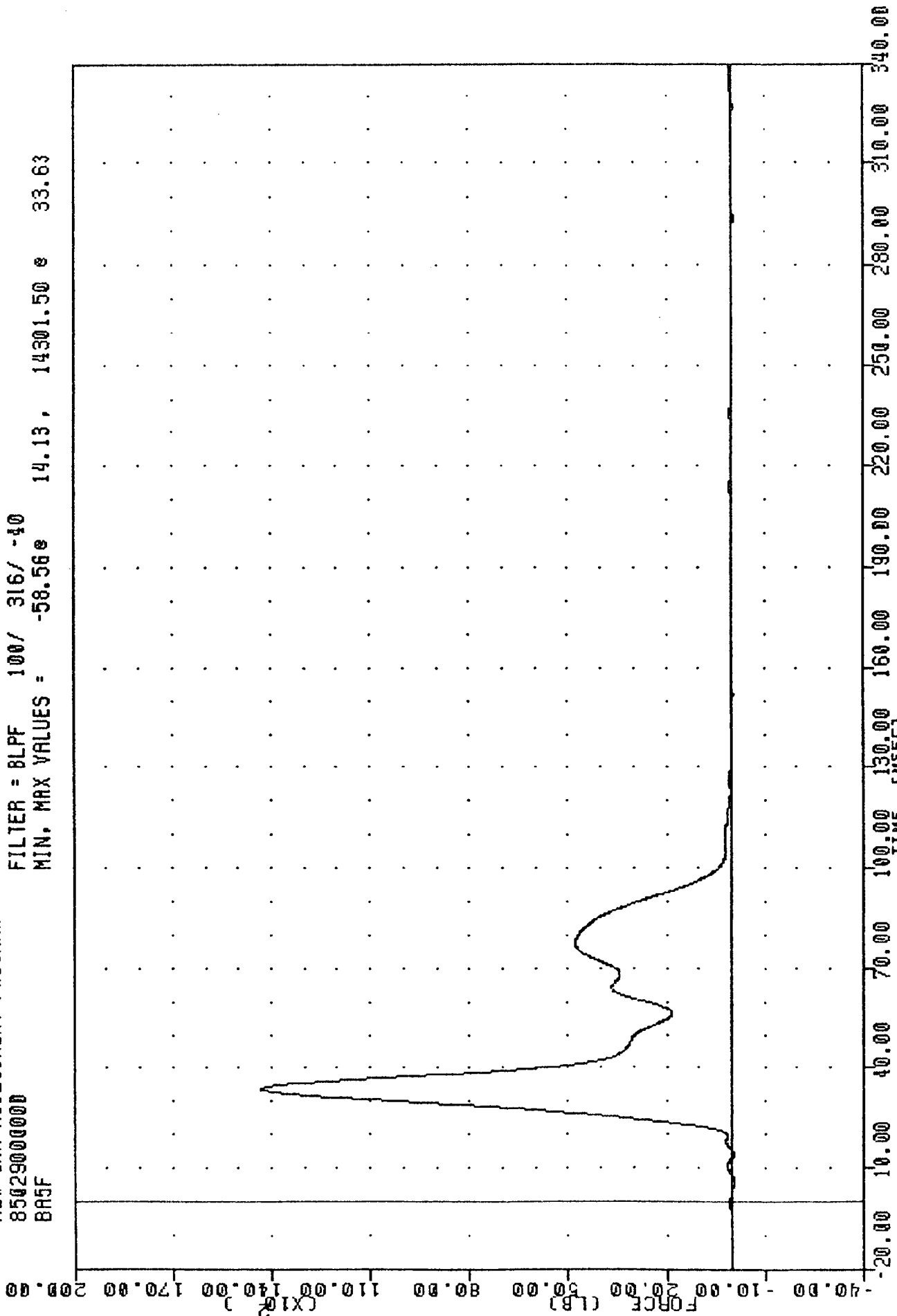


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A4 LBS

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BR5F

PLOT DATE 14-FEB-83 14:17:39

FILTER = 8LPF 100/ 316/ -40  
 MIN. MAX VALUES = -58.56e 14.13, 14301.50 e 33.63

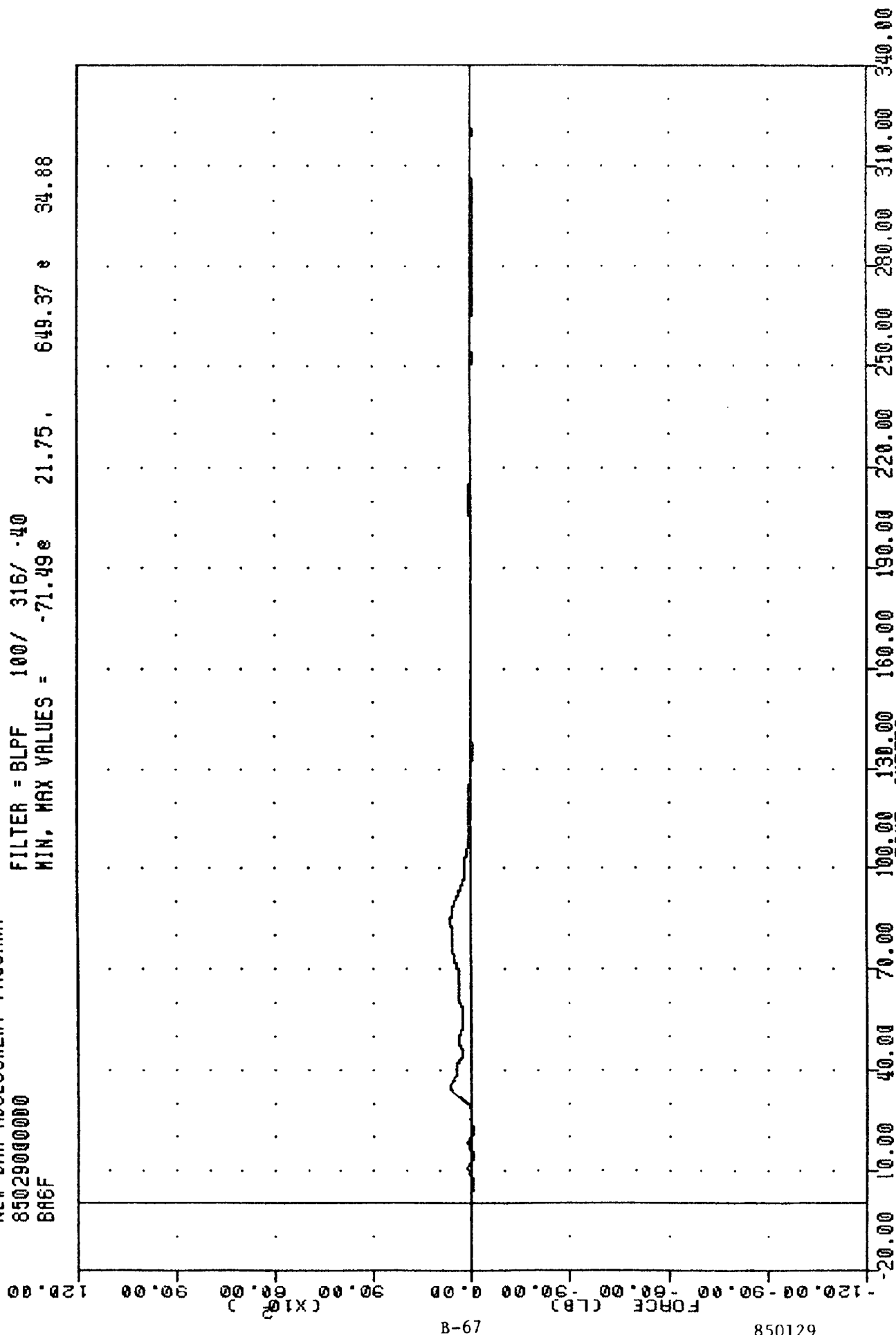


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER POSITION A5 LBS

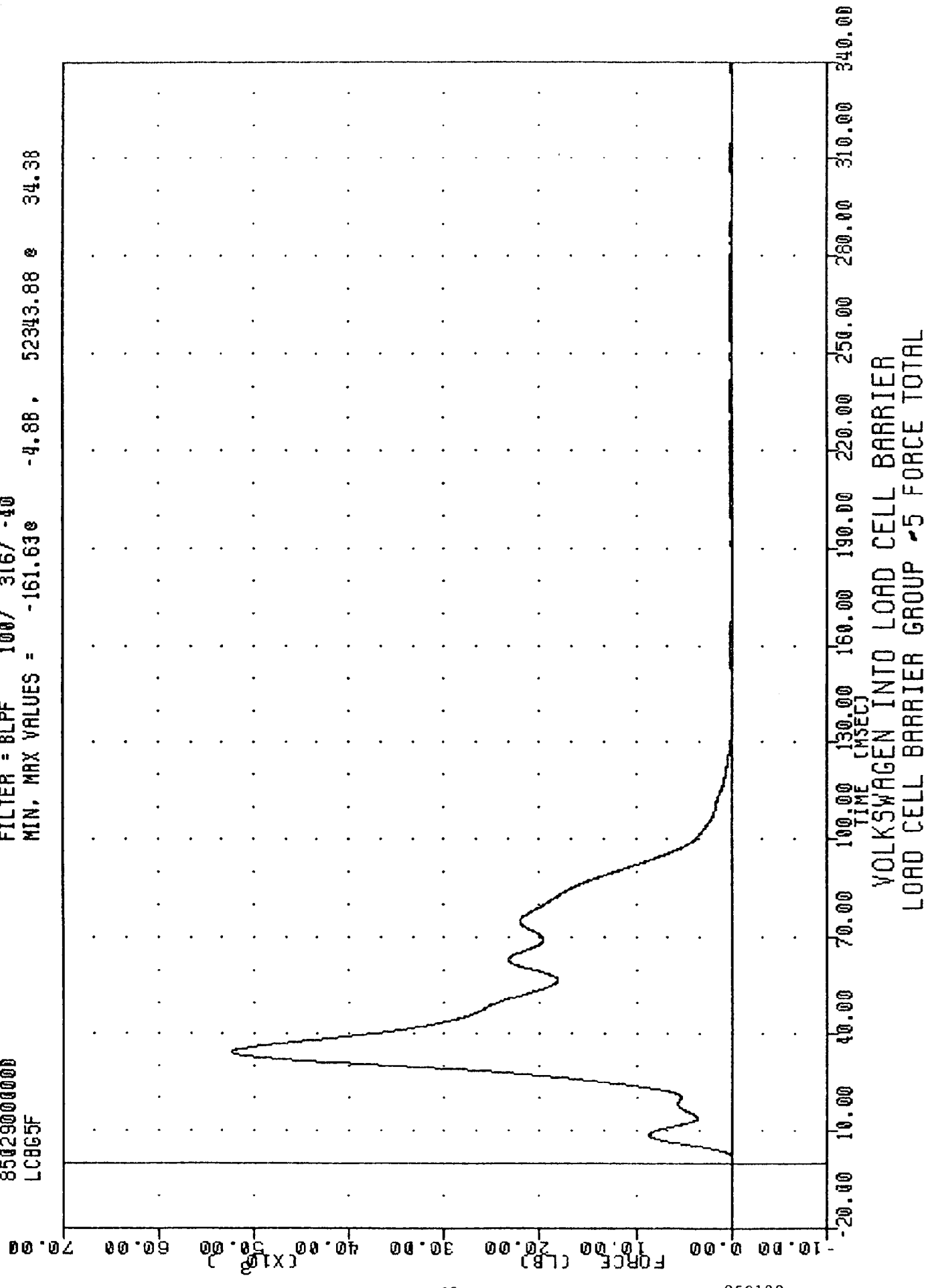
TAC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 BAEF

PLOT DATE 4-FEB-85 14:17:39

FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -71.49e 21.75, 649.37 e 34.88



TRC 850129 4-FEB-83 13:08:12  
 NEW CAR ASSESSMENT PROGRAM  
 850290000000  
 LCBG5F  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -161.630 -4.88, 52343.88 0 34.38

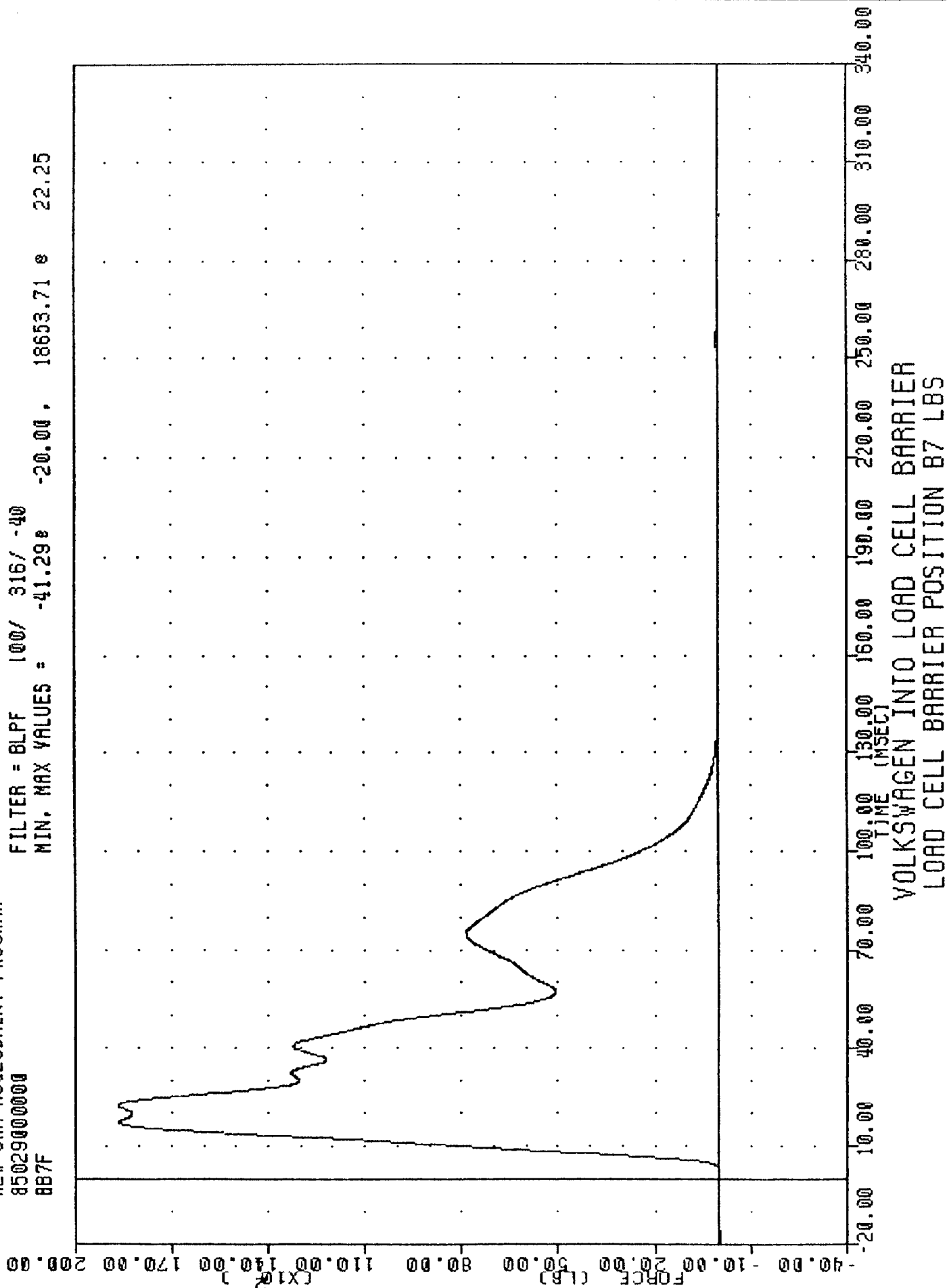


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER GROUP #5 FORCE TOTAL

TRC  
NEW CAR ASSESSMENT PROGRAM  
85029000000  
850129  
BB7F

PLOT DATE 4-FEB-85 14:17:39

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -41.29 18653.71 22.25

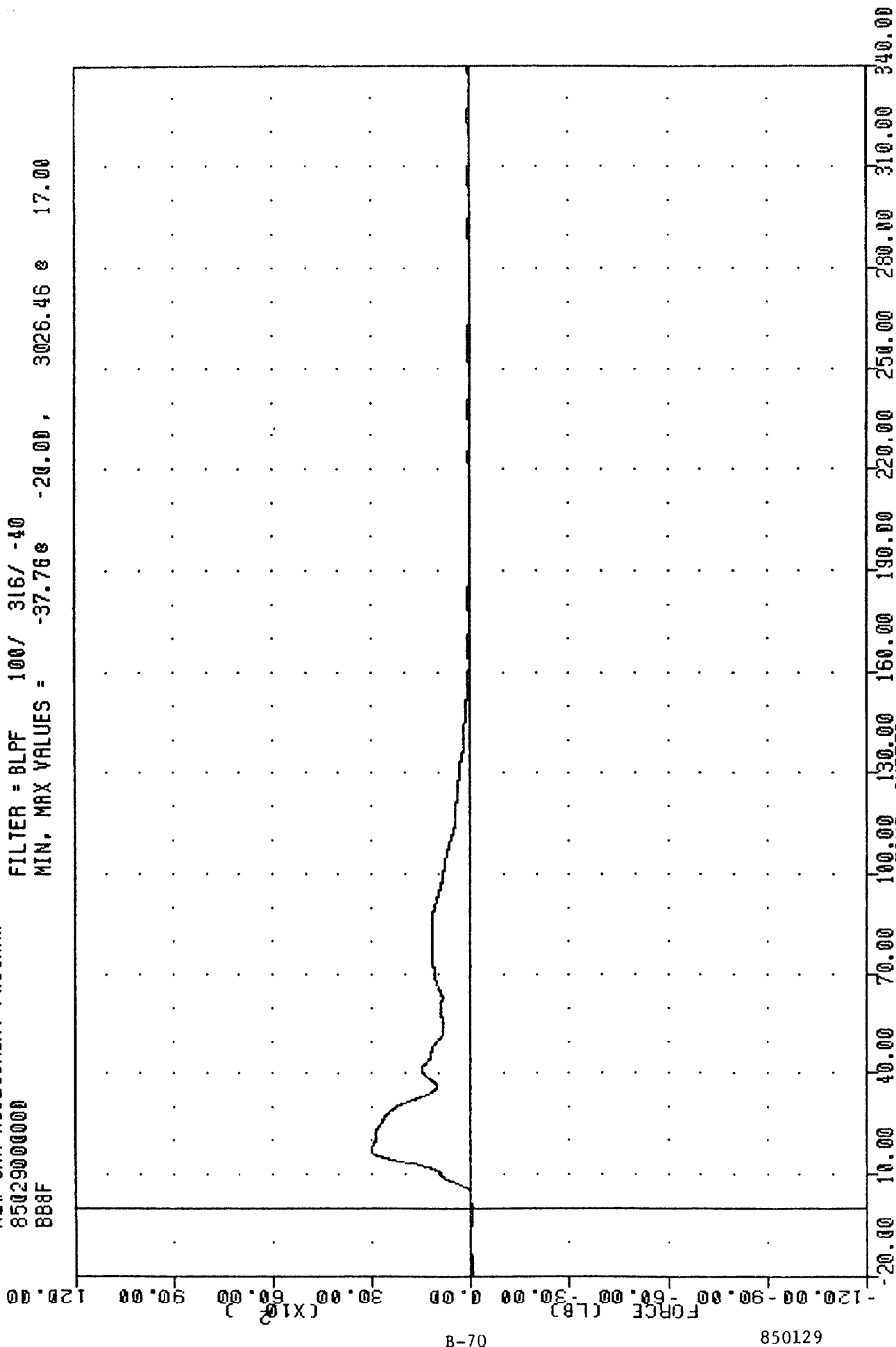


VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B7 LBS

TRC 850129  
NEW CAR ASSESSMENT PROGRAM  
85029000000  
BB8F

PLOT DATE 4-FEB-85 14:17:39

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -37.76e -20.00, 3026.46 e 17.00

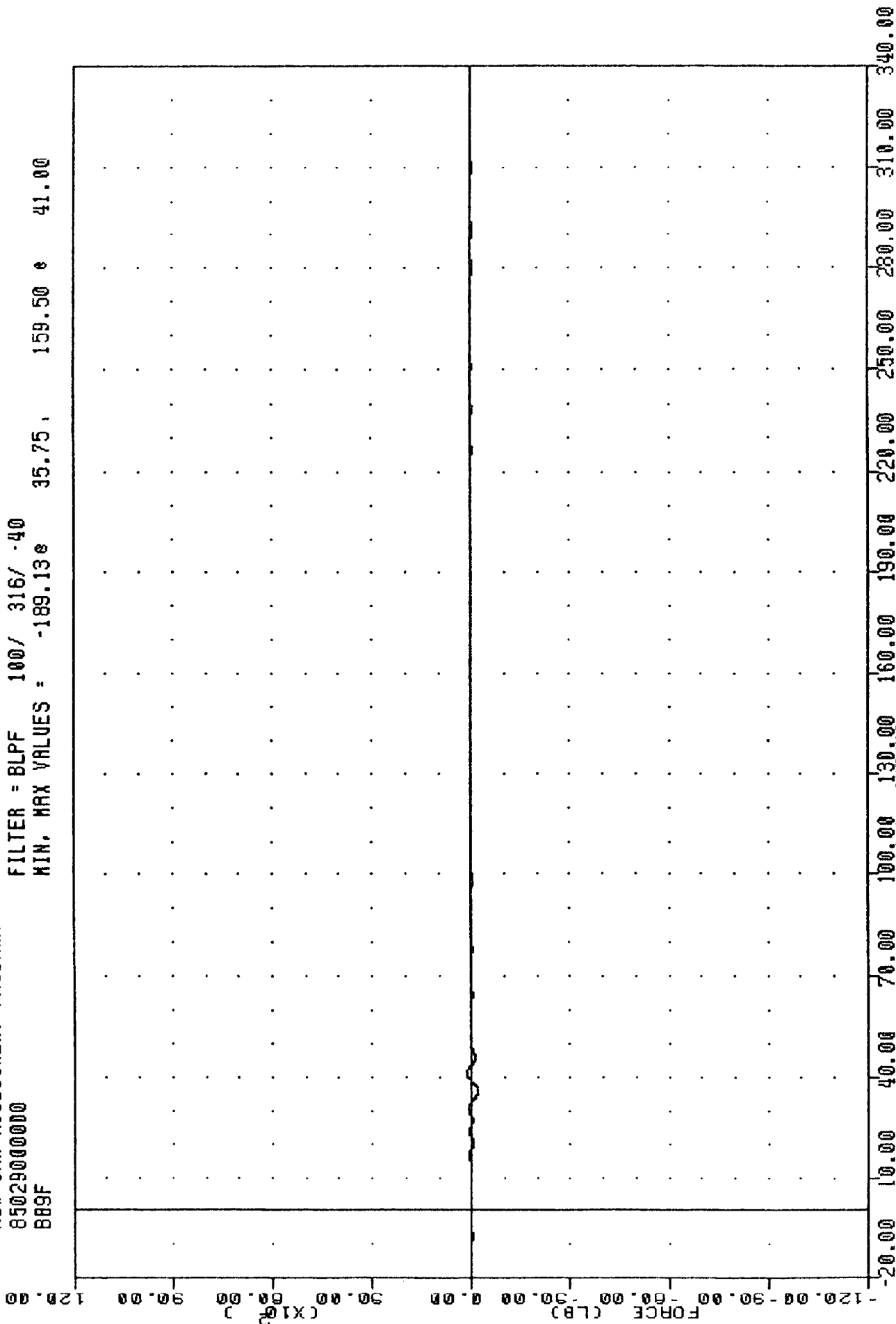


VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION B8 LBS

THC 850129  
NEW CAR ASSESSMENT PROGRAM  
85029000000  
B89F

PLUT DATE 4-FEB-85 14:17:39

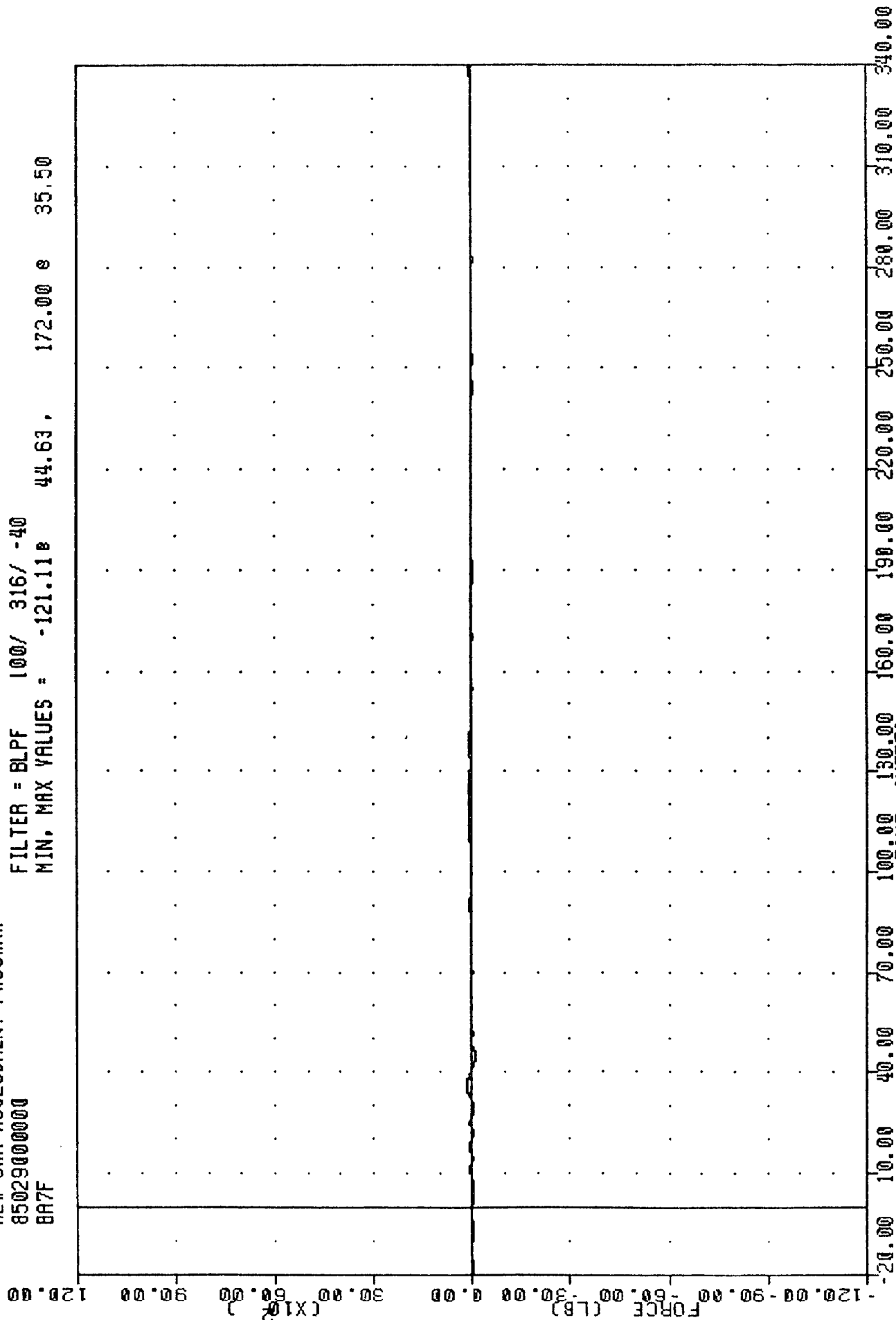
FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -189.13e 35.75, 159.50 e 41.00



TRC  
NEW CAR ASSESSMENT PROGRAM  
85029000000  
8A7F

PLOT DATE 4-FEB-85 14:17:39

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -121.118 44.63, 172.00 8 35.50

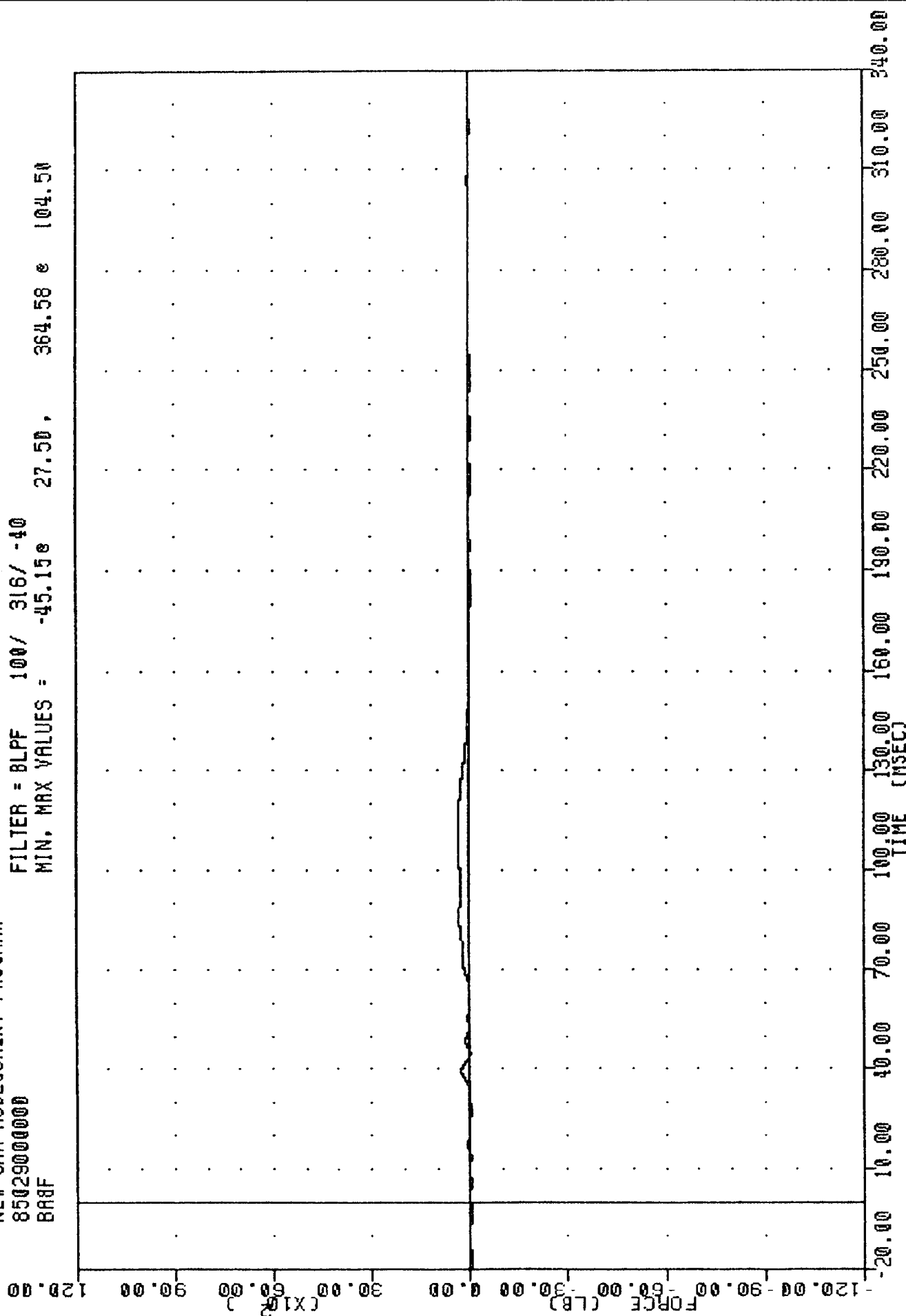


VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A7 LBS



P[RE]P[RO]C[ESS]ING DATA [REDACTED] EB- [REDACTED] [REDACTED] 7:  
 FILTER = BLPF 100/ 316/ -40  
 MIN, MAX VALUES = -45.150

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -45.150



THE CIRCLES  
VOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A8 LBS

7:33

NEW CAR ASSESSMENT PROGRAM

85029010010

093

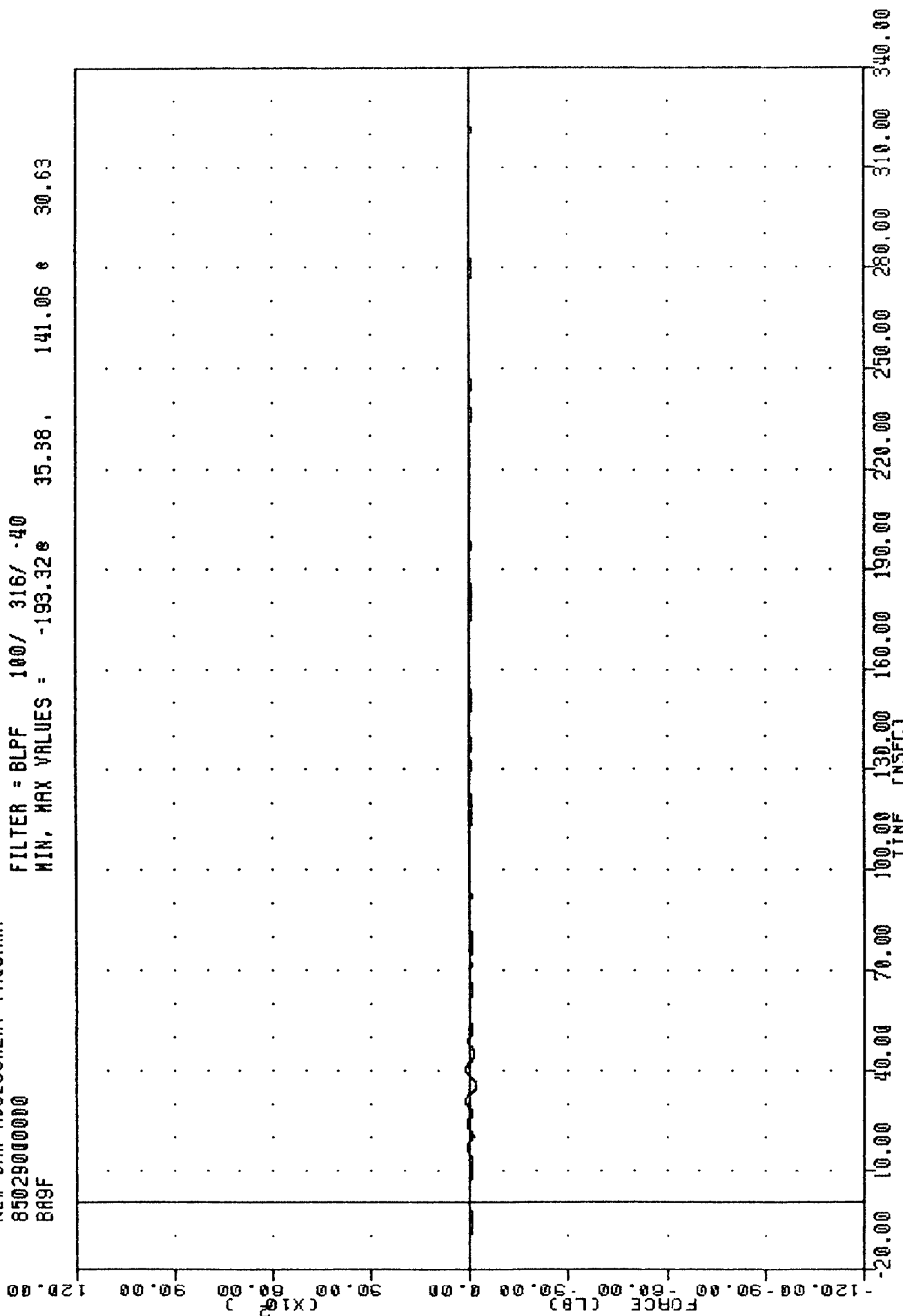
3918 = 83113

100/ 316/ -40

88. 5. 5.

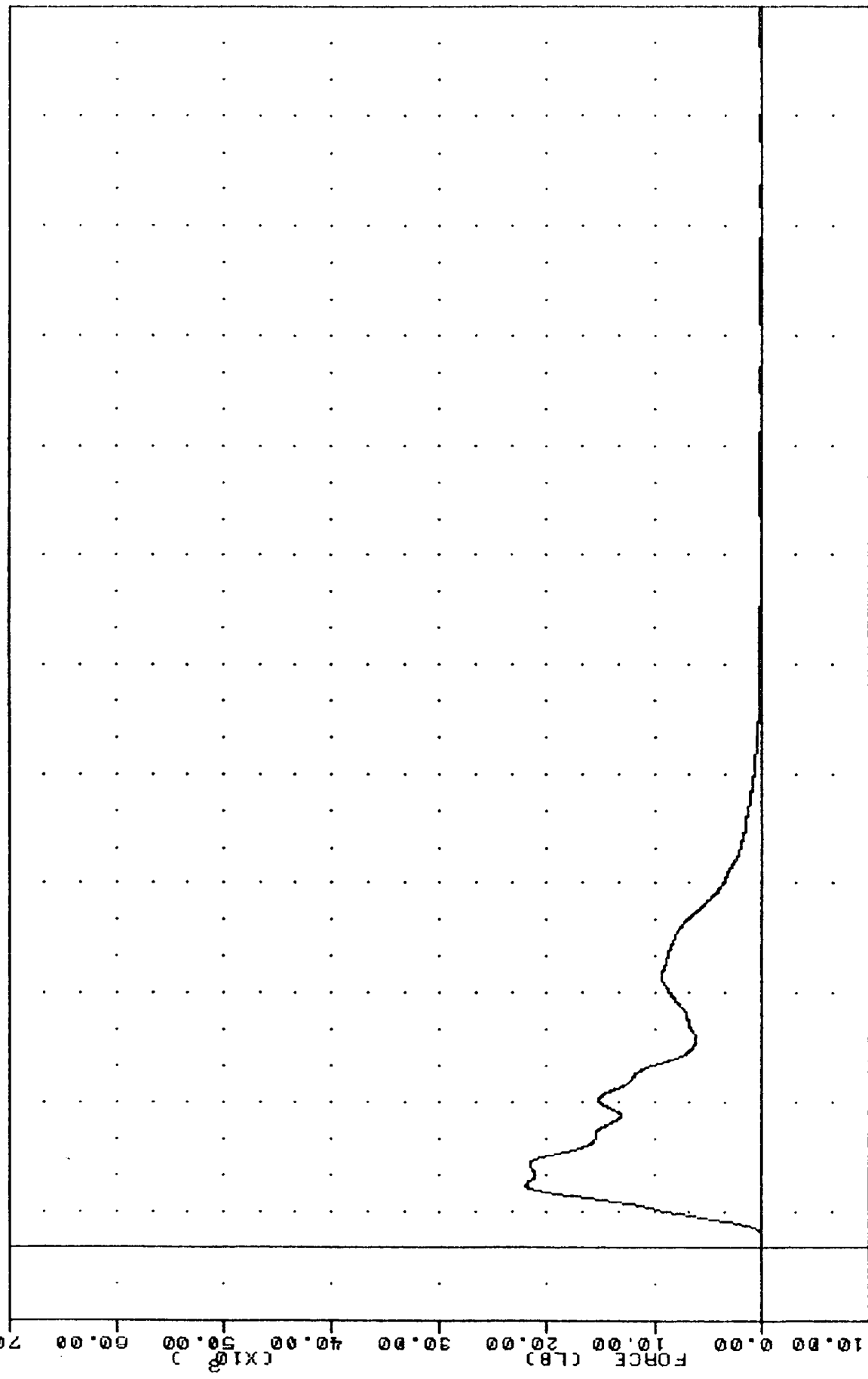
141.06 e

39.63



WOLKSWAGEN INTO LOAD CELL BARRIER  
LOAD CELL BARRIER POSITION A9 LBS

TRC 850129 4 FEB 83 13:08:12  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 LCBG6F  
 FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -126.11e -20.00, 21912.75 e 17.00

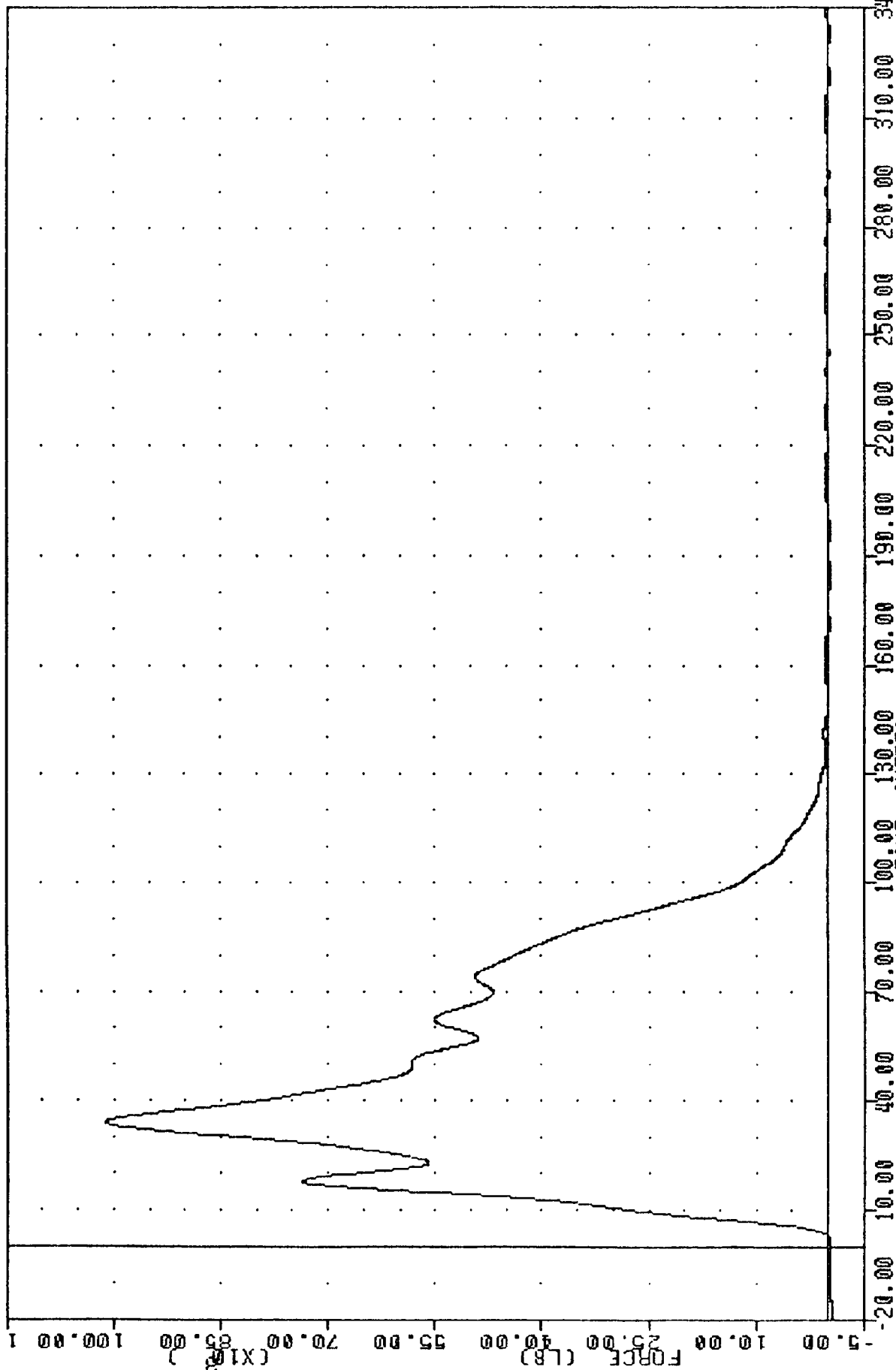


VOLKSWAGEN INTO LOAD CELL BARRIER  
 LOAD CELL BARRIER GROUP #6 FORCE TOTAL

TRC 850129  
 NEW CAR ASSESSMENT PROGRAM  
 85029000000  
 LCBGT

PLOT DATE 4-FEB-85 13:08:12

FILTER = BLPF 100/ 316/ -40  
 MIN. MAX VALUES = -473.218 -18.13, 101178.21 s 34.00



VOLKSWAGEN INTO LOAD CELL BARRIER  
 SUM OF LOAD CELL BARRIER FORCES

APPENDIX C  
DUMMY CERTIFICATION

## TRANSPORTATION RESEARCH CENTER OF OHIO

## EXTERNAL DIMENSIONS

PART 572

TEMPERATURE 71.00 F  
VRTC SRL98 ED82617RELATIVE HUMIDITY 28.00 %  
572 SN 826 EXT. DIMENSIONS 17

| DESCRIPTION                       | SPECIFICATION | TEST RESULTS |
|-----------------------------------|---------------|--------------|
| SN ALDERSON RESEARCH LAB 826      |               |              |
| Sitting Height                    | 35.6 - 35.8IN | 35.7 INS     |
| Shoulder Pivot Height             | 21.8 - 22.4IN | 22.3 INS     |
| Hip Pivot Height                  | 3.9 IN (ref.) | 3.9 INS      |
| Hip Pivot From Backline           | 4.8 IN (ref.) | 4.8 INS      |
| Knee Pivot From Backline          | 20.1 - 20.7IN | 20.4 INS     |
| Rear of Head From Backline        | 1.7 IN (ref)  | 1.7 INS      |
| Chest Depth                       | 9.1 - 9.6IN   | 9.4 INS      |
| Shoulder Width                    | 17.8 - 18.4IN | 17.9 INS     |
| Chest Circumference Over Nipples  | 36.8 - 40.0IN | 37.5 INS     |
| Waist Circumference at Min. Girth | 31.4 - 32.6IN | 32.4 INS     |
| Hip Width                         | 14.0 - 15.4IN | 15.2 INS     |
| Knee Pivot From Floor             | 19.3 - 19.9IN | 19.5 INS     |

## DUMMY MEETS SPECIFICATIONS

TECHNICIAN K. J. WaltherTEST SUPERVISOR A. E. L. L. L.

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

TEMPERATURE 71.00 F  
VRTC SRL98 LF82617

RELATIVE HUMIDITY 19.00 %  
572 SN826 LUMBAR FLEX CAL17

| DEFLECTION       | SPECIFICATION     | TEST RESULTS |
|------------------|-------------------|--------------|
| 0 Deg.           | 0 LBS             | 0.00 LBS     |
| 20 Deg           | 22.00 - 34.00 LBS | 30.00 LBS    |
| 30 Deg           | 34.00 - 46.00 LBS | 40.00 LBS    |
| 40 Deg           | 46.00 - 58.00 LBS | 52.00 LBS    |
| NET RETURN ANGLE | < 12 DEG          | 7.00 DEG     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. L. Watter  
TEST SUPERVISOR R. E. L. L.

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

TEMPERATURE 71.00 F  
VRTC SRL98 ABB2617

RELATIVE HUMIDITY 20.00 %  
572 SN 826 ABDOM COMPR CAL 17

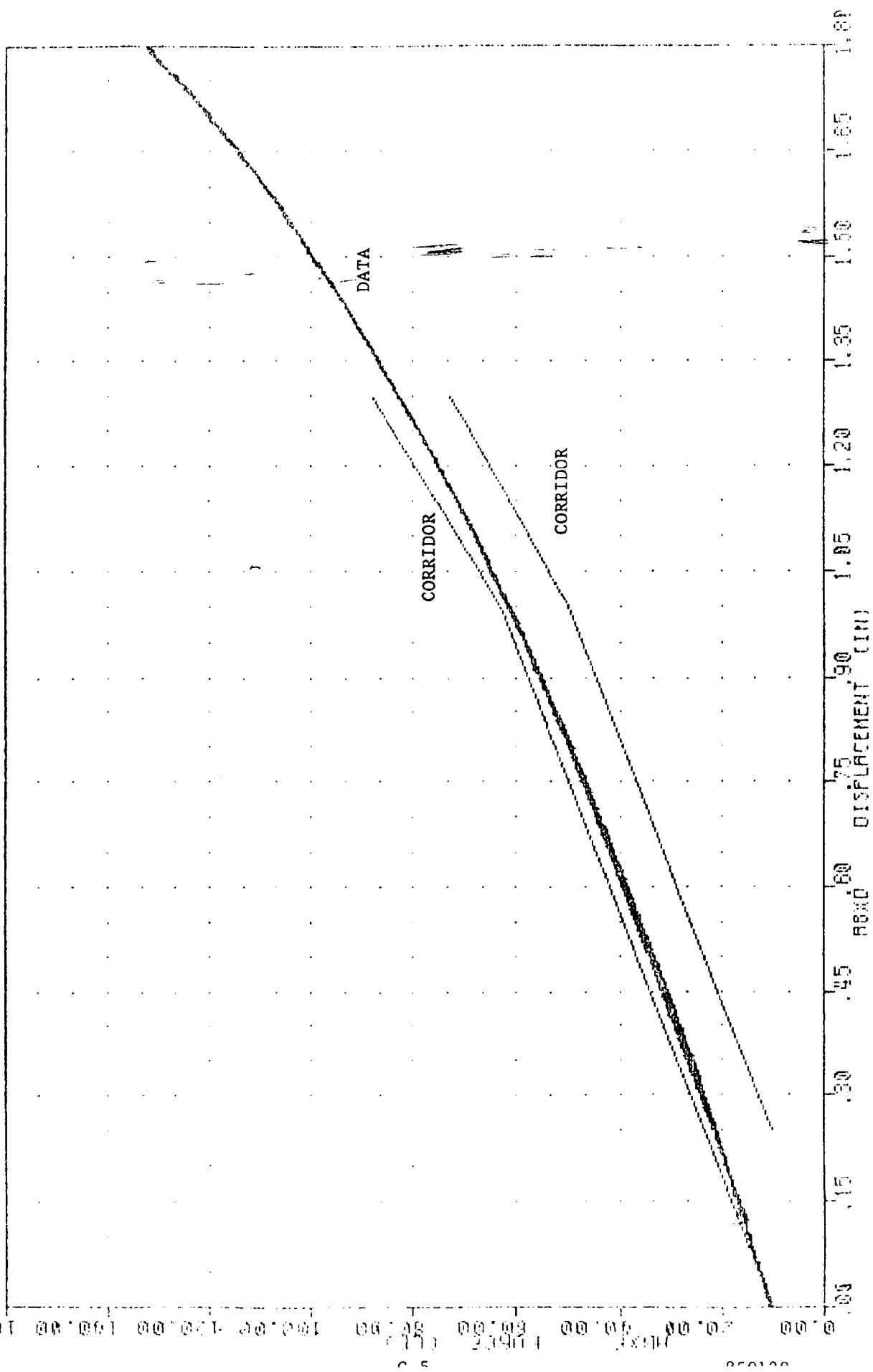
| TEST CORRIDORS |                   |              |
|----------------|-------------------|--------------|
| DISPLACEMENT   | FORCE             | TEST RESULTS |
| 0 IN.          | 10 LBS            | 10 LBS       |
| .50 IN.        | 23.00 - 36.00 LBS | 34.51 LBS    |
| .75 IN.        | 36.00 - 50.00 LBS | 47.23 LBS    |
| 1.00 IN.       | 50.00 - 63.00 LBS | 61.99 LBS    |
| 1.30 IN.       | 73.00 - 88.00 LBS | 82.75 LBS    |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Larry L. Phelps*  
TEST SUPERVISOR *V.L. Watters*



VRTIC SERIALS: 16R22617, 572 SM 826 ARDQM COMPRA CAL 17 81361, PLOT DATE 26-DEC-84 17:40:51  
 FILTER = ALPF, 1650/ 5214/ -40 MIN, MAX = 0.00, 132.32, 1.00, 1.00  
 1650/ 5214/ -40 MIN, MAX = 0.00, 132.32, 1.00, 1.00



ABDOMINAL COMPRESSION

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

TEMPERATURE 71 F  
VRTC SRL98 HD82617

RELATIVE HUMIDITY 20 %  
572 SN B26 HEAD DROP CAL 17

| TEST PARAMETER                  | SPECIFICATION | TEST RESULTS |
|---------------------------------|---------------|--------------|
| PEAK RESULTANT ACCELERATION     | 210 - 260 G   | 222.63 G     |
| TIME ABOVE 100 G LEVEL          | 0.9 - 1.5 MS  | 1.29 MS      |
| PEAK LATERAL ACCELERATION       | 10 G MAX      | -5.09 G      |
| IS ACCELERATION CURVE UNIMODAL? |               | YES          |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. L. Watters

TEST SUPERVISOR R. E. LeVine

# TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK PENDULUM TEST

### PART 572

TEMPERATURE 71.00 F  
VRTC SRL98 HN82617

RELATIVE HUMIDITY 20.00 %  
572 SN B26 HEAD/NECK CAL 17

| Test Parameter            | Specification    | Test Results |
|---------------------------|------------------|--------------|
| Pendulum velocity         | 21.5 to 25.5 fps | 23.53 fps    |
| Pendulum Deceleration:    |                  |              |
| T1 - T2: 5 - 20 G         | 3 ms. max        | 1.83 ms.     |
| T2 - T3: 20 - 20 G        | 25 - 30 ms.      | 28.42 ms.    |
| T3 - T4: 20 - 5 G         | 10 ms. max       | 5.88 ms.     |
| Avg. G level T2 - T3      | 20 - 24 G        | 22.50 G      |
| Maximum Rotation Angle    | 63 - 73 deg.     | 72.24 deg.   |
| Peak Head Resultant Accel | 26 G max         | 24.03 G      |

| Test Parameter              | Specification | Test Results           |
|-----------------------------|---------------|------------------------|
| Rotation Angle<br>(degrees) | Time<br>(ms.) | Chordal Disp.<br>(in.) |
| 0                           | -2.0 - +2.0   | -0.5 - +0.5            |
| 30                          | 25.6 - 34.4   | 2.1 - 3.1              |
| 60                          | 40.3 - 51.7   | 4.3 - 5.3              |
| max                         | 53.2 - 66.8   | 5.0 - 6.0              |
| 60                          | 67.0 - 83.0   | 4.3 - 5.3              |
| 30                          | 85.4 - 104.6  | 2.1 - 3.1              |
| 0                           | 101.0 - 123.0 | -0.5 - +0.5            |

\* DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Harry L. Phelps*

TEST SUPERVISOR *V. L. Watten*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 71 F  
VRTC SRL98 TL82617B

RELATIVE HUMIDITY 57 %  
572 SN 826 L.S.THORAX CAL 17B

| TEST PARAMETER       | LOW SPEED TEST     |              |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      | TEST RESULTS |
| PENDULUM VELOCITY    | 13.86-14.14 FT/SEC | 14.14 FT/SEC |
| PEAK DEFLECTION      | 1.1 INCHES MAX.    | 0.88 INCHES  |
| PEAK RESISTIVE FORCE | 1,450. POUNDS MAX. | 1306. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 54.1%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN K. L. Watters

TEST SUPERVISOR R. E. Livers

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 70 F  
VRTC SRL9B TH82617B

RELATIVE HUMIDITY 57 %  
572 SN 826 H.S.THORAX CAL 17B

| TEST PARAMETER       | HIGH SPEED TEST    | TEST RESULTS |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      |              |
| PENDULUM VELOCITY    | 21.78-22.22 FT/SEC | 22.22 FT/SEC |
| PEAK DEFLECTION      | 1.7 INCHES MAX.    | 1.31 INCHES  |
| PEAK RESISTIVE FORCE | 2,250. POUNDS MAX. | 2016. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 55.2%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.L. Watters

TEST SUPERVISOR R.E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 372

TEMPERATURE 72 F  
RIGHT KNEE  
VRTC SRL98 RK82617

RELATIVE HUMIDITY 54 %  
572 SN 826 R.KNEE IMP LBL 17

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 1932.87 LBS. |
| DURATION ABOVE 1000 LBS. | >=1.7 MS.          | 1.84 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Larry S. Phelps*

TEST SUPERVISOR

*V.L. Winters*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

TEMPERATURE 72 F  
LEFT KNEE  
VRTC SRL98 LK82617

RELATIVE HUMIDITY 54 %  
572 SN 826 L.KNEE IMP CAL 17

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 1877.20 LBS. |
| DURATION ABOVE 1000 LBS. | $\geq 1.7$ MS.     | 1.88 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Harry L. Phelps*

TEST SUPERVISOR

*K. J. Watters*

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

TEMPERATURE 71.00 F  
VRTC SRL9B EDA0909B

RELATIVE HUMIDITY 29.00 %  
572 SN A09 EXT. DIMENSIONS 09B

| DESCRIPTION                       | SPECIFICATION | TEST RESULTS |
|-----------------------------------|---------------|--------------|
| SN ALDERSON RESEARCH LAB A09      |               |              |
| Sitting Height                    | 35.6 - 35.8IN | 35.6 INS     |
| Shoulder Pivot Height             | 21.8 - 22.4IN | 22.2 INS     |
| Hip Pivot Height                  | 3.9 IN (ref.) | 3.9 INS      |
| Hip Pivot From Backline           | 4.8 IN (ref.) | 4.8 INS      |
| Knee Pivot From Backline          | 20.1 - 20.7IN | 20.7 INS     |
| Rear of Head From Backline        | 1.7 IN (ref)  | 1.7 INS      |
| Chest Depth                       | 9.1 - 9.6IN   | 9.3 INS      |
| Shoulder Width                    | 17.8 - 18.4IN | 17.9 INS     |
| Chest Circumference Over Nipples  | 36.8 - 40.0IN | 37.7 INS     |
| Waist Circumference at Min. Girth | 31.4 - 32.6IN | 32.5 INS     |
| Hip Width                         | 14.0 - 15.4IN | 14.8 INS     |
| Knee Pivot From Floor             | 19.3 - 19.9IN | 19.6 INS     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V.J. Wabbling

TEST SUPERVISOR R.E. LeVan



TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

TEMPERATURE 71.00 F  
VRTC SRL9B LFA0909B

RELATIVE HUMIDITY 19.00 %  
572 SNA09 LUMBAR FLEX CAL9B

| DEFLECTION       | SPECIFICATION     | TEST RESULTS |
|------------------|-------------------|--------------|
| 0 Deg.           | 0 LBS             | 0.00 LBS     |
| 20 Deg           | 22.00 - 34.00 LBS | 27.00 LBS    |
| 30 Deg           | 34.00 - 46.00 LBS | 46.00 LBS    |
| 40 Deg           | 46.00 - 58.00 LBS | 57.00 LBS    |
| NET RETURN ANGLE | < 12 DEG          | 10.00 DEG    |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. J. Watters  
TEST SUPERVISOR H. E. Loken

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

TEMPERATURE 71.00 F  
VRTC SRL9B ABA0909B

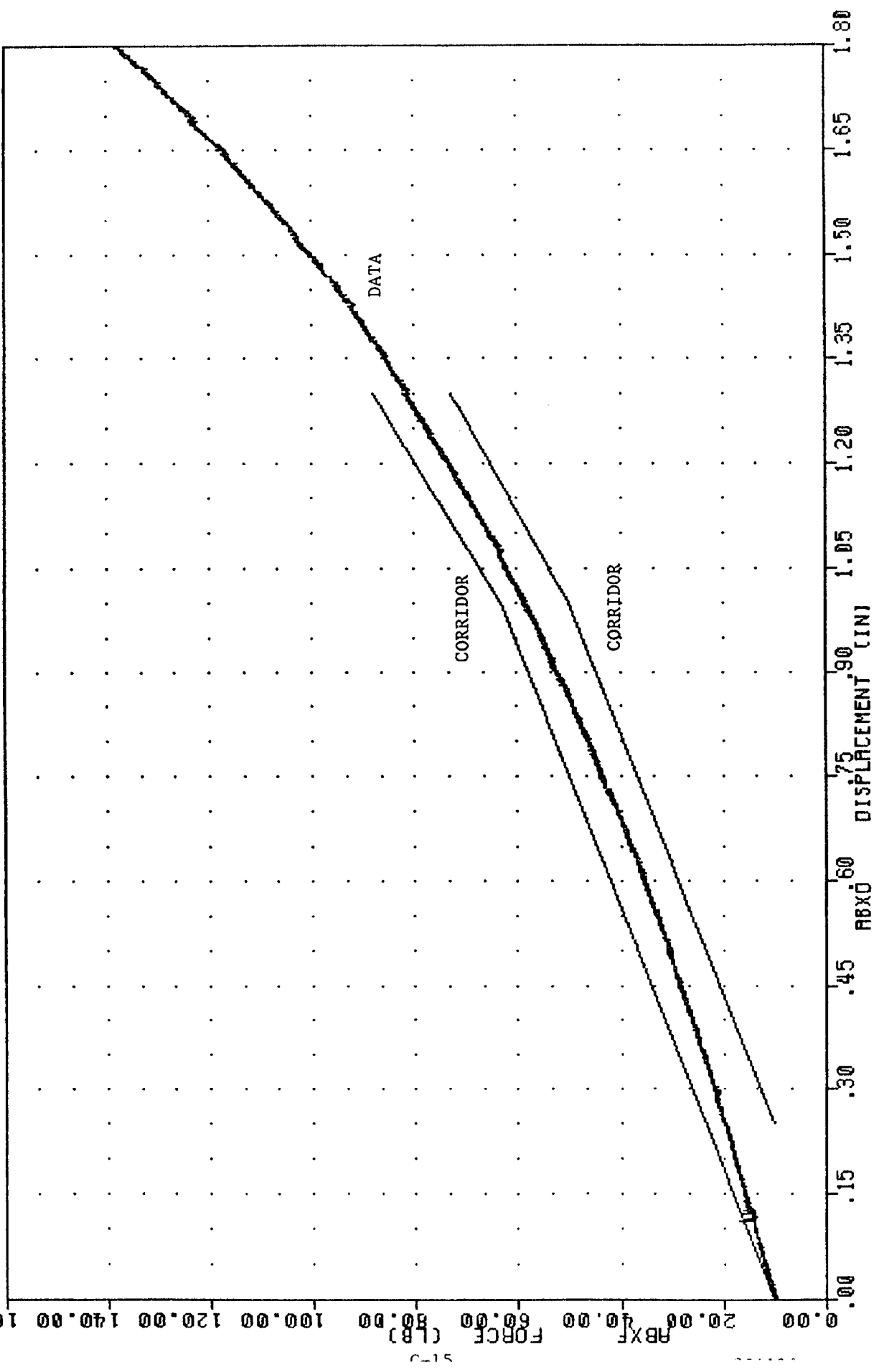
RELATIVE HUMIDITY 19.00 %  
572 SN A09 ABDOM COMPR CAL 9B

| TEST CORRIDORS |                   |              |
|----------------|-------------------|--------------|
| DISPLACEMENT   | FORCE             | TEST RESULTS |
| 0 IN.          | 10 LBS            | 10 LBS       |
| .50 IN.        | 23.00 - 36.00 LBS | 30.76 LBS    |
| .75 IN.        | 36.00 - 50.00 LBS | 43.89 LBS    |
| 1.00 IN.       | 50.00 - 63.00 LBS | 58.78 LBS    |
| 1.30 IN.       | 73.00 - 88.00 LBS | 81.69 LBS    |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Mary L. Phelps*  
TEST SUPERVISOR *V.L. Winters*

VOLT 0.000V  
 ABX0 0.000V  
 ABX1 0.000V  
 FILTER = ALP  
 1650/ 5214/ -40  
 1650/ 5214/ -40  
 MIN MAX  
 0.000 0.000  
 0.000 0.000  
 137.87 137.87



ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

TEMPERATURE 71 F  
VRTC SRL98 HDA0909

RELATIVE HUMIDITY 20 %  
572 SN A09 HEAD DROP CAL 09

| TEST PARAMETER                  | SPECIFICATION | TEST RESULTS |
|---------------------------------|---------------|--------------|
| PEAK RESULTANT ACCELERATION     | 210 - 260 G   | 231.92 G     |
| TIME ABOVE 100 G LEVEL          | 0.9 - 1.5 MS  | 1.24 MS      |
| PEAK LATERAL ACCELERATION       | 10 G MAX      | -9.92 G      |
| IS ACCELERATION CURVE UNIMODAL? |               | YES          |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. L. Waters

TEST SUPERVISOR R. E. LeVan

# TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK PENDULUM TEST

PART 572

TEMPERATURE 71.00 F  
VRTC SRL98 HNA0909

RELATIVE HUMIDITY 28.00 %  
572 SN A09 HEAD/NECK CAL 09

| Test Parameter            | Specification    | Test Results |
|---------------------------|------------------|--------------|
| Pendulum velocity         | 21.5 to 25.5 fps | 23.53 fps    |
| Pendulum Deceleration:    |                  |              |
| T1 - T2: 5 - 20 G         | 3 ms. max        | 1.89 ms.     |
| T2 - T3: 20 - 20 G        | 25 - 30 ms.      | 27.04 ms.    |
| T3 - T4: 20 - 5 G         | 10 ms. max       | 6.63 ms.     |
| Avg. G level T2 - T3      | 20 - 24 G        | 23.68 G      |
| Maximum Rotation Angle    | 63 - 73 deg.     | 68.80 deg.   |
| Peak Head Resultant Accel | 26 G max         | 23.36 G      |

| Test Parameter | Specification             | Test Results       |
|----------------|---------------------------|--------------------|
| Rotation Angle | Time Chordal Disp.        | Time Chordal Disp. |
| (degrees)      | (ms.) (in.)               | (ms.) (in.)        |
| 0              | -2.0 - +2.0 -0.5 - +0.5   | 0.25 0.01          |
| 30             | 25.6 - 34.4 2.1 - 3.1     | 29.43 2.36         |
| 60             | 40.3 - 51.7 4.3 - 5.3     | 44.55 4.40         |
| max            | 53.2 - 66.8 5.0 - 6.0     | 59.13 5.31         |
| 60             | 67.0 - 83.0 4.3 - 5.3     | 72.23 4.66         |
| 30             | 85.4 - 104.6 2.1 - 3.1    | 91.93 2.33         |
| 0              | 101.0 - 123.0 -0.5 - +0.5 | 106.54 0.11        |

\* DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Mary J. Phelps*

TEST SUPERVISOR

*V.L. Watten*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 71 F  
VRTC SRL98 TLA0909

RELATIVE HUMIDITY 41 %  
572 SN A09 L.S.THORAX CAL 09

| TEST PARAMETER       | LOW SPEED TEST     |              |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      | TEST RESULTS |
| PENDULUM VELOCITY    | 13.86-14.14 FT/SEC | 14.04 FT/SEC |
| PEAK DEFLECTION      | 1.1 INCHES MAX.    | 0.78 INCHES  |
| PEAK RESISTIVE FORCE | 1,450. POUNDS MAX. | 1358. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 51.9%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN V. L. Watters

TEST SUPERVISOR R. E. LeVan

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 71 F  
VRTC SRL98 THA0909

RELATIVE HUMIDITY 40 %  
572 SN A09 H.S.THORAX CAL 09

| TEST PARAMETER       | HIGH SPEED TEST    |              |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      | TEST RESULTS |
| PENDULUM VELOCITY    | 21.78-22.22 FT/SEC | 22.22 FT/SEC |
| PEAK DEFLECTION      | 1.7 INCHES MAX.    | 1.29 INCHES  |
| PEAK RESISTIVE FORCE | 2,250. POUNDS MAX. | 2065. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 52.9%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN K.L. Waters

TEST SUPERVISOR R.E. Sevan

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

TEMPERATURE 72 F  
RIGHT KNEE  
VRTC SRL98 RKA0909

RELATIVE HUMIDITY 54 %  
572 SN A09 R.KNEE IMP CAL 09

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 2221.02 LBS. |
| DURATION ABOVE 1000 LBS. | $\geq 1.7$ MS.     | 1.79 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Gary J. Phelps*

TEST SUPERVISOR

*V.L. Watters*



TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

TEMPERATURE 72 F  
LEFT KNEE  
VRTC SRL98 LKA0909

RELATIVE HUMIDITY 54 %  
572 SN A09 L.KNEE IMP CAL 9

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 1922.75 LBS. |
| DURATION ABOVE 1000 LBS. | $\geq 1.7$ MS.     | 1.74 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Harry L. Phelps*

TEST SUPERVISOR

*V. J. Watkins*

POST-TEST CALIBRATION

TRANSPORTATION RESEARCH CENTER OF OHIO

EXTERNAL DIMENSIONS

PART 572

TEMPERATURE 71.00 F  
NHTSA NCA EDA0910

RELATIVE HUMIDITY 39.00 %  
572 SNA09 EXT. DIMENSIONS 10

| DESCRIPTION                       | SPECIFICATION  | TEST RESULTS |
|-----------------------------------|----------------|--------------|
| SN ALDERSON RESEARCH LAB #A09     |                |              |
| Sitting Height                    | 35.6 - 35.8 IN | 35.6 INS     |
| Shoulder Pivot Height             | 21.8 - 22.4 IN | 22.3 INS     |
| Hip Pivot Height                  | 3.9 IN (ref.)  | 3.9 INS      |
| Hip Pivot From Backline           | 4.8 IN (ref.)  | 4.8 INS      |
| Knee Pivot From Backline          | 20.1 - 20.7 IN | 20.7 INS     |
| Rear of Head From Backline        | 1.7 IN (ref)   | 1.7 INS      |
| Chest Depth                       | 9.1 - 9.6 IN   | 9.5 INS      |
| Shoulder Width                    | 17.8 - 18.4 IN | 17.8 INS     |
| Chest Circumference Over Nipples  | 36.8 - 40.0 IN | 37.3 INS     |
| Waist Circumference at Min. Girth | 31.4 - 32.6 IN | 32.0 INS     |
| Hip Width                         | 14.0 - 15.4 IN | 14.6 INS     |
| Knee Pivot From Floor             | 19.3 - 19.9 IN | 19.6 INS     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Harry J. Phelps*  
TEST SUPERVISOR *11/1/77*

TRANSPORTATION RESEARCH CENTER OF OHIO

LUMBAR FLEXION TEST

PART 572

TEMPERATURE 72.00 F  
NHTSA NCA LFA0910A

RELATIVE HUMIDITY 39.00 %  
572 SN A09 LUMBAR FLEX CAL10

| DEFLECTION       | SPECIFICATION     | TEST RESULTS |
|------------------|-------------------|--------------|
| 0 Deg.           | 0 LBS             | 0.00 LBS     |
| 20 Deg           | 22.00 - 34.00 LBS | 30.00 LBS    |
| 30 Deg           | 34.00 - 46.00 LBS | 44.00 LBS    |
| 40 Deg           | 46.00 - 58.00 LBS | 56.00 LBS    |
| NET RETURN ANGLE | < 12 DEG          | 10.90 DEG    |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Gary L. Phelps

TEST SUPERVISOR V.L. Watters

TRANSPORTATION RESEARCH CENTER OF OHIO

ABDOMINAL COMPRESSION TEST

PART 572

TEMPERATURE 71.00 F  
NHTSA NCA ABA0910A

RELATIVE HUMIDITY 39.00 %  
572 SNA09 ABDOM COMPR CAL 10A

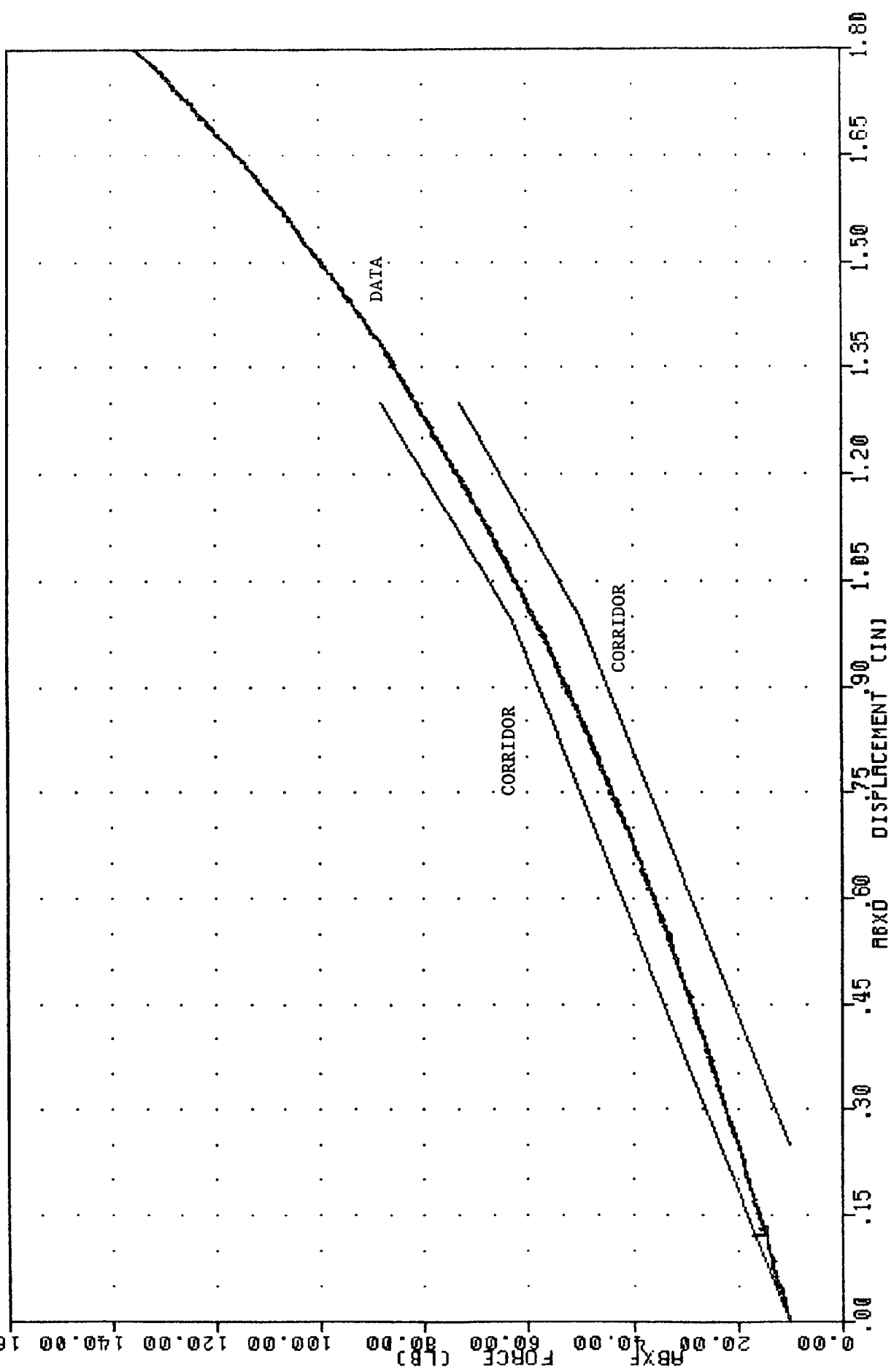
| TEST CORRIDORS |                   |              |
|----------------|-------------------|--------------|
| DISPLACEMENT   | FORCE             | TEST RESULTS |
| 0 IN.          | 10 LBS            | 10 LBS       |
| .50 IN.        | 23.00 - 36.00 LBS | 30.91 LBS    |
| .75 IN.        | 36.00 - 50.00 LBS | 43.94 LBS    |
| 1.00 IN.       | 50.00 - 63.00 LBS | 58.74 LBS    |
| 1.30 IN.       | 73.00 - 88.00 LBS | 81.15 LBS    |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN *Larry L. Phelps*

TEST SUPERVISOR *V.L. Watters*

TSF 72 09 10 85 4 09:28  
 ABXD 1650/ 5214/ -40 MIN, MAX = 0.00 8 1.80 135.78  
 ABXF 1650/ 5214/ -40 MIN, MAX = 9.81 8 1.80 135.78



ABDOMINAL COMPRESSION VS DISPLACEMENT

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

PART 572

TEMPERATURE 73 F  
NHTSA NCA HDA0910

RELATIVE HUMIDITY 39 %  
572 SN A09 HEAD DROP CAL 10

| TEST PARAMETER                  | SPECIFICATION | TEST RESULTS |
|---------------------------------|---------------|--------------|
| PEAK RESULTANT ACCELERATION     | 210 - 260 G   | 228.87 G     |
| TIME ABOVE 100 G LEVEL          | 0.9 - 1.5 MS  | 1.26 MS      |
| PEAK LATERAL ACCELERATION       | 10 G MAX      | 7.47 G       |
| IS ACCELERATION CURVE UNIMODAL? |               | YES          |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Harry L. Phelps

TEST SUPERVISOR V.L. Withers

# TRANSPORTATION RESEARCH CENTER OF OHIO

## NECK PENDULUM TEST

PART 572

TEMPERATURE 72.00 F  
NHTSA NCA HNA0910

RELATIVE HUMIDITY 49.00 %  
572 SN BOY HEAD/NECK LAL 19

| Test Parameter            | Specification    | Test Results |
|---------------------------|------------------|--------------|
| Pendulum velocity         | 21.5 to 25.5 fps | 23.60 fps    |
| Pendulum Deceleration:    |                  |              |
| T1 - T2: 5 - 20 G         | 3 ms. max        | 1.75 ms.     |
| T2 - T3: 20 - 20 G        | 25 - 30 ms.      | 27.10 ms.    |
| T3 - T4: 20 - 5 G         | 10 ms. max       | 7.52 ms.     |
| Avg. G level T2 - T3      | 20 - 24 G        | 23.54 G      |
| Maximum Rotation Angle    | 63 - 73 deg.     | 66.06 deg.   |
| Peak Head Resultant Accel | 26 G max         | 22.49 G      |

| Test Parameter | Specification             | Test Results       |
|----------------|---------------------------|--------------------|
| Rotation Angle | Time Chordal Diss.        | Time Chordal Diss. |
| (degrees)      | (ms.) (in.)               | (ms.) (in.)        |
| 0              | -2.0 - +2.0 -0.5 - +0.5   | 0.13 0.01          |
| 30             | 25.6 - 34.4 2.1 - 3.1     | 29.70 2.40         |
| 60             | 40.3 - 51.7 4.3 - 5.3     | 46.08 4.45         |
| max            | 53.2 - 66.8 5.0 - 6.0     | 58.75 5.08         |
| 60             | 67.0 - 83.0 4.3 - 5.3     | 69.50 4.68         |
| 30             | 85.4 - 104.6 2.1 - 3.1    | 90.39 2.37         |
| 0              | 101.0 - 123.0 -0.5 - +0.5 | 109.58 0.09        |

\* DUMMY MEETS SPECIFICATIONS

TECHNICIAN

TEST SUPERVISOR

*Mary L. Phelps*  
*V.L. Witter*



TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 72 F  
NHTSA NCA TLA0910A

RELATIVE HUMIDITY 41 %  
572 SN A09 L.S.THORAX CAL 10A

| TEST PARAMETER       | LOW SPEED TEST     |              |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      | TEST RESULTS |
| PENDULUM VELOCITY    | 13.86-14.14 FT/SEC | 14.04 FT/SEC |
| PEAK DEFLECTION      | 1.1 INCHES MAX.    | 0.86 INCHES  |
| PEAK RESISTIVE FORCE | 1,450. POUNDS MAX. | 1361. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 55.5%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Ray L. Phelps  
TEST SUPERVISOR V.L. Watters

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

PART 572

TEMPERATURE 71 F  
NHTSA NCA THA0910A

RELATIVE HUMIDITY 40 %  
572 SN A09 H.S. THORAX CAL 10A

| TEST PARAMETER       | HIGH SPEED TEST    |              |
|----------------------|--------------------|--------------|
|                      | SPECIFICATION      | TEST RESULTS |
| PENDULUM VELOCITY    | 21.78-22.22 FT/SEC | 22.22 FT/SEC |
| PEAK DEFLECTION      | 1.7 INCHES MAX.    | 1.35 INCHES  |
| PEAK RESISTIVE FORCE | 2,250. POUNDS MAX. | 2065. POUNDS |
| INTERNAL HYSTERESIS  | 50% - 70%          | 56.8%        |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Gary L. Phelps*

TEST SUPERVISOR

*V.L. Wooten*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

TEMPERATURE 72 F  
RIGHT KNEE  
NHTSA NCA RKA0910

RELATIVE HUMIDITY 41 %  
572 SN A09 R.KNEE IMP CAL 10

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 1920.13 LBS. |
| DURATION ABOVE 1000 LBS. | ≤ 1.7 MS.          | 1.84 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Larry L. Phelps*

TEST SUPERVISOR

*V.L. Walters*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

PART 572

TEMPERATURE 72 F  
LEFT KNEE  
NHTSA NCA LKA0910

RELATIVE HUMIDITY 41 %  
572 SN A09 L.KNEE IMP CAL 10

| TEST PARAMETER           | SPECIFICATION      | TEST RESULTS |
|--------------------------|--------------------|--------------|
| PROBE VELOCITY           | 6.76 - 7.04 FT/SEC | 6.96 FT/SEC  |
| PEAK KNEE IMPACT FORCE   | 1850 - 2500 LBS.   | 1980.55 LBS. |
| DURATION ABOVE 1000 LBS. | $\geq 1.7$ MS.     | 1.83 MS.     |

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Harry L. Phelps*

TEST SUPERVISOR

*K. L. Winters*

APPENDIX D  
RESTRAINT INSTRUCTION FROM OWNER'S MANUAL

## Combination lap-shoulder belts

### Belt warning system

An audio-visual warning system is interconnected with the driver's safety belt.

Every time the ignition is turned on, the safety belt warning light will come on for about 6 seconds as a reminder to buckle up. If the driver does not fasten the safety belt, the buzzer will also come on for the duration of this six second period. With the driver's door closed, the buzzer will go off as soon as the driver has buckled up.

### Inertia reel retractor

The combination lap-shoulder belt with inertia reel locking mechanism adjusts automatically to your size and movements as long as the pull on the belt is slow.

Rapid deceleration during hard braking or a collision locks the belt. The belt will also lock when you drive up or down a steep hill or in a sharp curve.

■ To fasten, grasp belt tongue and pull belt in continuous slow motion across your chest and lap.

■ Insert belt tongue into buckle on inboard side of seat. Push down until it is securely locked with an audible click. Pull belt to check.

■ Pull shoulder section to make sure belt fits snugly across the hips.

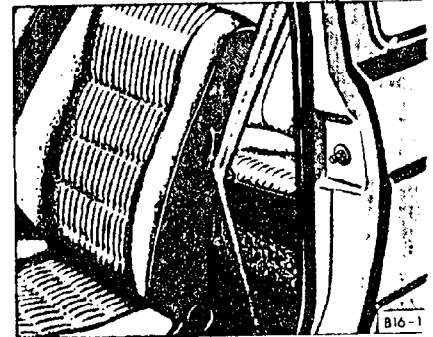
■ Belts should fit snugly across the pelvis and chest. Make sure any slack is wound on the retractor.

■ Do not wear shoulder part of belt under your arm or otherwise out of position. This would increase the possibility of serious injury in case of an accident.

■ To unfasten belt, push in release button on buckle. Belt will spring out of buckle.

■ To release a locked belt, lean back to take the body pressure off the belt.

■ To store lap-shoulder belt, allow belt to wind up on retractor as you guide belt tongue to its stowed position.

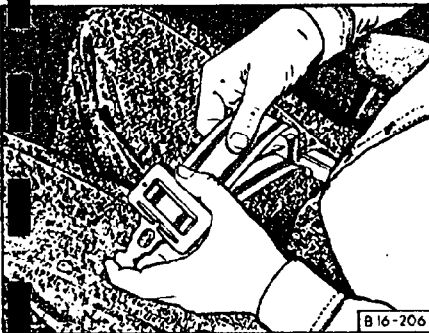


### Safety belt holder (two-door model)

The release lever on side of the seatback also serves as a convenient safety belt holder. Unhook the belt before pulling the lever up.

After returning the seatback to its original position, the belt should be hooked in the holder again so that it is easy to reach when buckling up.

## OPERATING CONTROLS



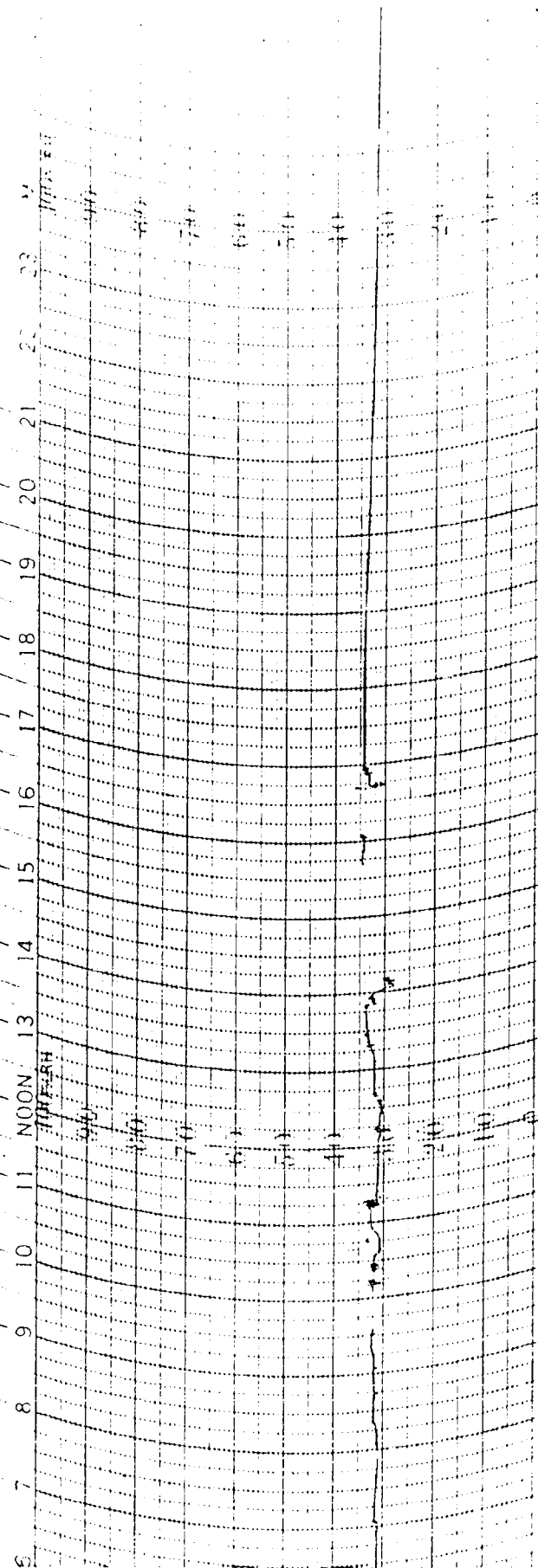
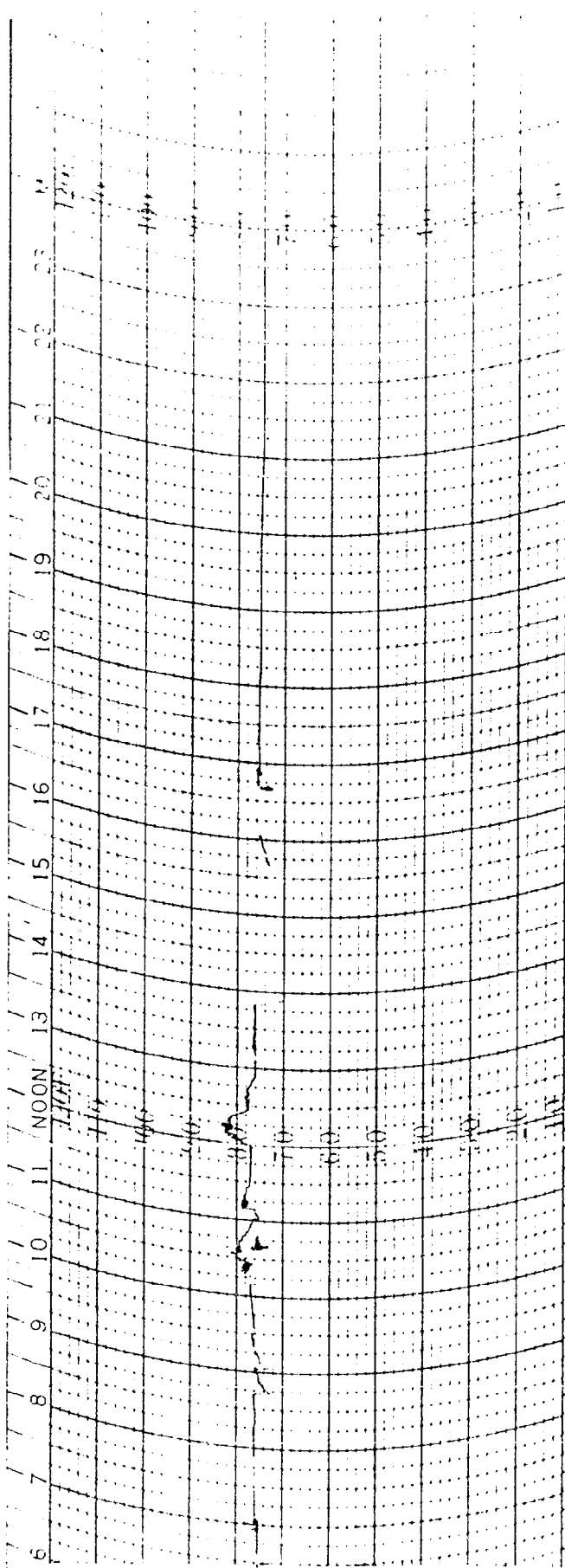
### Lap belts for rear center seating position

Belt tongue and buckle should always be kept on top of seat for ready use.

The safety belt for the center seating position is not equipped with a retractor, and has to be adjusted manually.

■ To lengthen the belt, hold belt tongue at a right angle and pull belt section out to desired length. Adjusting is easier if cap and tongue of buckle are pressed together. Take up any slack by moving the side of the belt.

To shorten the belt, just pull the loose end of belt.



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