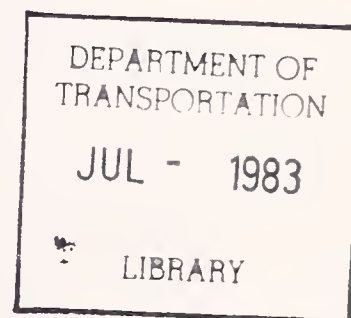


LIGHT TRUCK AGGRESSIVITY STUDY- TEST REPORT 3- TRUCK-TO-CAR RIGHT OFFSET IMPACT TESTS

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R. Cropper
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Dynamic Science, Inc.
A Talley Industries Company
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027



Contract No. DOT-HS-8-01942
Contract Amt. \$60,048



DECEMBER 1978
FINAL REPORT

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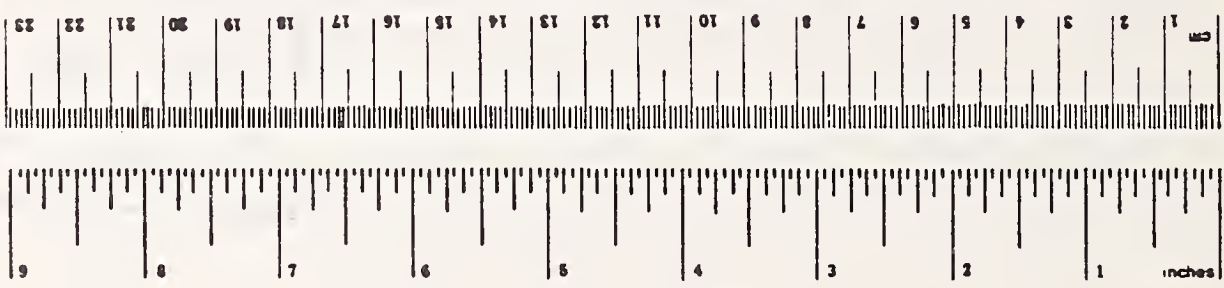
Prepared For
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Washington, D.C. 20590

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TECHNICAL REPORT STANDARD TITLE PAGE

| | | | | | |
|---|--|--|--|---|-----------|
| 1. Report No. DOT-HS-805-610 | | 2. Government Accession No. | | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle LIGHT TRUCK AGGRESSIVITY STUDY - TEST REPORT 3 - TRUCK-TO-CAR RIGHT OFFSET IMPACT TESTS | | | | 5. Report Date December 1978 | |
| 7. Author(s) R. Yee, R. Cropper, S. Davis | | | | 8. Performing Orgn Rpt No. 3051-78-200A | |
| 9. Performing Organization Name and Address Dynamic Science, Inc. A Talley Industries Company 1850 West Pinnacle Peak Road Phoenix, Arizona 85027 | | | | 10. Work Unit No. | |
| 12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590 | | | | 11. Contract or Grant No. DOT-HS-8-01942 | |
| 15. Supplementary Notes Tests No. 5 and 6 of a series of 7 tests. | | | | 13. Type of Report and Period Covered FINAL REPORT Oct - Dec 1978 | |
| 16. Abstract A series of seven full-scale truck-to-car crash tests was conducted as required under Task 2 of DOT-HS-8-01942, "Light Truck Aggressivity Study," sponsored by the National Highway Traffic Safety Administration. This test report presents the results of Tests No. 3051-5 and No. 3051-6, frontal, 21-inch right offset, truck-to-car collisions. Two 1979 Chevrolet C-10, 8-foot, full-bed, 8-cylinder, pickup trucks were used for the tests. The car used in Test No. 3051-5 was a 1978 Plymouth Horizon 4-door sedan. The car used in Test No. 3051-6 was a 1979 Chevrolet Impala 4-door sedan. The object of these tests is to provide truck-to-car collision data. The crash test data from this program will be used to study the aggressivity of light trucks compared to passenger cars, support current vehicle standards, and provide information to upgrade future standards. | | | | 14. Sponsoring Agency Code | |
| 17. Key Words Chevrolet C-10 Truck, Plymouth Horizon, Chevrolet Impala, Aggressivity, 21-inch Right Offset Impact | | | 18. Distribution Statement Copies of Document are available to the public through the National Technical Information Service, Springfield, Virginia 22161 | | |
| 19. Security Classif. (of this report) Unclassified | | 20. Security Classif. (of this page) Unclassified | | 21. No. Pages 114 | 22. Price |

METRIC CONVERSION FACTORS

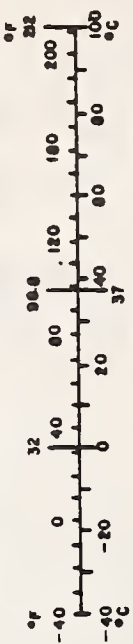


Approximate Conversions to Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|----------------------------|------------------------|----------------------------|---------------------|-----------------|
| LENGTH | | | | |
| in | inches | 2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| AREA | | | | |
| in ² | square inches | 6.5 | square centimeters | cm ² |
| ft ² | square feet | 0.09 | square meters | m ² |
| yd ² | square yards | 0.8 | square meters | m ² |
| mi ² | square miles | 2.6 | square kilometers | km ² |
| acres | acres | 0.4 | hectares | ha |
| MASS (weight) | | | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| VOLUME | | | | |
| teaspoon | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| ft ³ | cubic feet | 0.03 | cubic meters | m ³ |
| yd ³ | cubic yards | 0.76 | cubic meters | m ³ |
| TEMPERATURE (exact) | | | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |

Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|----------------------------|-----------------------------------|-------------------|------------------------|-----------------|
| LENGTH | | | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| AREA | | | | |
| cm ² | square centimeters | 0.15 | square inches | in ² |
| m ² | square meters | 1.2 | square yards | yd ² |
| km ² | square kilometers | 0.4 | square miles | mi ² |
| ha | hectares (10,000 m ²) | 2.5 | acres | acres |
| MASS (weight) | | | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | short tons |
| VOLUME | | | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| m ³ | cubic meters | 35 | cubic feet | ft ³ |
| m ³ | cubic meters | 1.3 | cubic yards | yd ³ |
| TEMPERATURE (exact) | | | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



* 1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10-286.

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1.0 INTRODUCTION. | 1-1 |
| 1.1 TEST OBJECTIVE | 1-1 |
| 1.2 TEST SCOPE | 1-1 |
| 2.0 PRESENTATION OF RESULTS (TEST 3051-5) | 2-1 |
| 3.0 PRESENTATION OF RESULTS (TEST 3051-6) | 3-1 |
| APPENDIX A - CALCOMP PLOTS (TEST 3051-5) | A-1 |
| APPENDIX B - CALCOMP PLOTS (TEST 3051-6) | B-1 |

LIST OF ILLUSTRATIONS

Figure

| | | |
|------|---|------|
| 2-1 | 1979 Chevrolet C-10 Truck Accelerometer Instrumentation (Test 3051-5). | 2-5 |
| 2-2 | 1978 Plymouth Horizon Accelerometer Instrumentation (Test 3051-6). | 2-6 |
| 2-3 | Pre- and Post-test Vehicle Configuration (Test 3051-5). | 2-11 |
| 2-4 | Post-test Chevrolet C-10 Truck Configuration (Test 3051-5). | 2-12 |
| 2-5 | Post-test Plymouth Horizon Configuration (Test 3051-5). | 2-13 |
| 2-6 | Chevrolet C-10 Truck Dummy Configuration (Test 3051-5). | 2-14 |
| 2-7 | Plymouth Horizon Dummy Configuration (Test 3051-5). | 2-15 |
| 2-8 | Chevrolet C-10 Truck Exterior Static Crush (Test 3051-5). | 2-25 |
| 2-9 | Chevrolet C-10 Truck Interior Intrusion (Test 3051-5). | 2-26 |
| 2-10 | Plymouth Horizon Exterior Static Crush (Test 3051-5). | 2-27 |

LIST OF ILLUSTRATIONS (CONTD)

| <u>Figure</u> | | <u>Page</u> |
|---------------|--|-------------|
| 2-11 | Plymouth Horizon Interior Intrusion (Test 3051-5) | 2-28 |
| 3-1 | 1979 Chevrolet C-10 Truck Accelerometer Instrumentation (Test 3051-6) | 3-5 |
| 3-2 | 1979 Chevrolet Impala Accelerometer Instrumentation (Test 3051-6) | 3-6 |
| 3-3 | Pre- and Post-test Vehicle Configurations (Test 3051-6) | 3-11 |
| 3-4 | Post-test Chevrolet C-10 Truck Configuration (Test 3051-6) | 3-12 |
| 3-5 | Post-test Chevrolet Impala Configuration (Test 3051-6) | 3-13 |
| 3-6 | Chevrolet C-10 Truck Dummy Configuration (Test 3051-6) | 3-14 |
| 3-7 | Chevrolet Impala Dummy Configuration (Test 3051-6) | 3-15 |
| 3-8 | Chevrolet C-10 Truck Exterior Static Crush (Test 3051-6) | 3-25 |
| 3-9 | Chevrolet C-10 Truck Interior Intrusion (Test 3051-6) | 3-26 |
| 3-10 | Chevrolet Impala Exterior Static Crush (Test 3051-6) | 3-27 |
| 3-11 | Chevrolet Impala Interior Intrusion (Test 3051-6) | 3-28 |

LIST OF TABLES

| <u>Table</u> | | |
|--------------|--|-----|
| 1-1 | Summary of Car-to-Car Test Conditions (Test 3051-5) | 1-2 |
| 2-1 | Crash Test Summary (Test 3051-5). | 2-2 |
| 2-2 | Bullet Vehicle Inspection Sheet (Test 3051-5) . | 2-3 |
| 2-3 | Target Vehicle Inspection Sheet (Test 3051-5) . | 2-4 |
| 2-4 | Instrumentation Summary (Test 3051-5) | 2-7 |

LIST OF TABLES (CONTD)

| <u>Table</u> | | <u>Page</u> |
|--------------|---|-------------|
| 2-5 | Camera Locations - Offset Impact (Test 3051-5) | 2-8 |
| 2-6 | Summary of Pre-test Engine/Bumper/Firewall Characteristics - Chevrolet C-10 Truck (Test 3051-5) | 2-9 |
| 2-7 | Chevrolet C-10 Truck Pre-test Dummy Positions (Test 3051-5) | 2-9 |
| 2-8 | Summary of Pre-test Engine/Bumper/Firewall Characteristics - Plymouth Horizon (Test 3051-5) | 2-10 |
| 2-9 | Plymouth Horizon Pre-test Dummy Positions (Test 3051-5) | 2-10 |
| 2-10 | Chronology of Events (Test 3051-5). | 2-16 |
| 2-11 | Summary of Post-test Observations - Chevrolet C-10 Truck (Test 3051-5). | 2-17 |
| 2-12 | Summary of Post-test Observations - Plymouth Horizon (Test 3051-5) | 2-18 |
| 2-13 | Pre- and Post-test Dimension Measurements - Bullet Vehicle (Test 3051-5). | 2-19 |
| 2-14 | Pre- and Post-test Dimension Measurements - Target Vehicle (Test 3051-5). | 2-20 |
| 2-15 | Chevrolet C-10 Truck Exterior Profiles and Static Crush (Test 3051-5). | 2-21 |
| 2-16 | Chevrolet C-10 Truck Interior Profiles and Static Crush (Test 3051-5). | 2-22 |
| 2-17 | Plymouth Horizon Exterior Profiles and Static Crush (Test 3051-5) | 2-23 |
| 2-18 | Plymouth Horizon Interior Profiles and Static Crush (Test 3051-5) | 2-24 |
| 2-19 | Chevrolet C-10 Truck Steering Wheel Measurements and Displacement Values (Test 3051-5) | 2-29 |
| 2-20 | Plymouth Horizon Steering Wheel Measurements and Displacement Values (Test 3051-5) | 2-29 |

LIST OF TABLES (CONTD)

| <u>Table</u> | | <u>Page</u> |
|--------------|---|-------------|
| 2-21 | Summary of Vehicle Accelerometer Data (Test 3051-5) | 2-30 |
| 2-22 | Occupant Response Data Summary (Test 3051-5) | 2-31 |
| 2-23 | Summary of Restraint System Data (Test 3051-5) | 2-32 |
| 3-1 | Crash Test Summary (Test 3051-6). | 3-2 |
| 3-2 | Bullet Vehicle Inspection Sheet (Test 3051-6) | 3-3 |
| 3-3 | Target Vehicle Inspection Sheet (Test 3051-6) | 3-4 |
| 3-4 | Instrumentation Summary (Test 3051-6) | 3-7 |
| 3-5 | Camera Locations - Offset Impact (Test 3051-6) | 3-8 |
| 3-6 | Summary of Pre-test Engine/Bumper/Firewall Characteristics - Chevrolet C-10 Truck (Test 3051-6) | 3-9 |
| 3-7 | Chevrolet C-10 Truck Pre-test Dummy Positions (Test 3051-6) | 3-9 |
| 3-8 | Summary of Pre-test Engine/Bumper/Firewall Characteristics - Chevrolet Impala (Test 3051-6) | 3-10 |
| 3-9 | Chevrolet Impala Pre-test Dummy Positions (Test 3051-6) | 3-10 |
| 3-10 | Chronology of Events (Test 3051-6). | 3-16 |
| 3-11 | Summary of Post-test Observations - Chevrolet C-10 Truck (Test 3051-6). | 3-17 |
| 3-12 | Summary of Post-test Observations - Chevrolet Impala (Test 3051-6). | 3-18 |
| 3-13 | Pre- and Post-test Dimension Measurements - Bullet Vehicle (Test 3051-6). | 3-19 |
| 3-14 | Pre- and Post-test Dimension Measurements - Target Vehicle (Test 3051-6). | 3-20 |
| 3-15 | Chevrolet C-10 Truck Exterior Profiles and Static Crush (Test 3051-6). | 3-21 |

LIST OF TABLES (CONTD)

| <u>Table</u> | | <u>Page</u> |
|--------------|--|-------------|
| 3-16 | Chevrolet C-10 Truck Interior Profiles and Static Crush (Test 3051-6) | 3-22 |
| 3-17 | Chevrolet Impala Exterior Profiles and Static Crush (Test 3051-6) | 3-23 |
| 3-18 | Chevrolet Impala Interior Profiles and Static Crush (Test 3051-6) | 3-24 |
| 3-19 | Chevrolet C-10 Truck Steering Wheel Measurements and Displacement Values (Test 3051-6) . . | 3-29 |
| 3-20 | Chevrolet Impala Steering Wheel Measurements and Displacement Values (Test 3051-6) | 3-29 |
| 3-21 | Summary of Vehicle Accelerometer Data (Test 3051-6) | 3-30 |
| 3-22 | Occupant Response Data Summary (Test 3051-6) . . | 3-31 |
| 3-23 | Summary of Restraint System Data (Test 3051-6) | 3-32 |

1.0 INTRODUCTION

A series of seven full-scale truck-to-car crash tests was conducted as required under Task 2 of DOT-HS-8-01942, "Light Truck Aggressivity Study," sponsored by the National Highway Traffic Safety Administration. This test report presents the results of Test 3051-5 and 3051-6, frontal, 21-inch right offset, truck-to-car collisions. Two 1979 Chevrolet C-10, 8-foot, full-bed, 8-cylinder, pickup trucks were used for the tests. The car used in Test 3051-5 was a 1978 Plymouth Horizon 4-door sedan. The car used in Test 3051-6 was a 1979 Chevrolet Impala 4-door sedan.

1.1 TEST OBJECTIVE

The object of these tests is to provide truck-to-car collision data. The crash test data from this program will be used to study the aggressivity of light trucks compared to passenger cars, support current vehicle standards, and provide information to upgrade future standards.

1.2 TEST SCOPE

The test matrix and summary of test conditions for conducting truck-to-car collisions are shown in Table 1-1. For these tests, the truck is designated as the bullet vehicle and the car designated as the target vehicle. The target vehicle (Vehicle B) contained two instrumented, Part 572, 50th percentile male anthropomorphic dummies (GFE) in the two front outboard seating positions.

The truck (Vehicle A) contained one instrumented Alderson Part 572, (driver) and one uninstrumented (passenger) 50th percentile dummy used as ballast. Each occupant was properly restrained with the vehicle's production restraint system. The seat tracks were put at midposition but not welded in place. The centerline of the truck struck 21 inches to the right of the car centerline.

TABLE 1-1. SUMMARY OF CAR-TO-CAR TEST CONDITIONS - 3051

| Test No. | Test Date | Test Condition | Test Vehicle* | Test Weight (lb) | Closing Speed (mph) |
|----------|-----------|--------------------------------------|---|------------------|---------------------|
| 3051-1 | 10/10/78 | Head-on (Symmetric) | A - 1979 C-10 Chevrolet Pickup Truck | 5180 | 61.54 |
| | | | B - 1978 Plymouth Horizon | 2688 | |
| 3051-2 | 10/12/78 | Head-on (Symmetric) | A - 1979 C-10 Chevrolet Pickup Truck | 5182 | 74.50 |
| | | | B - 1979 Chevrolet Impala | 4404 | |
| 3051-3 | 10/23/78 | Left Side - 90° (C of A at H-pt.) | A - 1979 C-10 Chevrolet Pickup Truck | 5189 | 29.74 |
| | | | B - 1978 Plymouth Horizon | 2686 | |
| 3051-4 | 11/17/78 | Left Side - 90° (C of A at H-pt.) | A - 1979 C-10 Chevrolet Pickup Truck | 5183 | 29.99 |
| | | | B - 1979 Chevrolet Impala | 4398 | |
| 3051-5 | 10/30/78 | Right Offset (21 in.) | A - 1979 C-10 Chevrolet Pickup Truck | 5183 | 61.62 |
| | | | B - 1978 Plymouth Horizon | 2682 | |
| 3051-6 | 11/28/78 | Right Offset (21 in.) | A - 1979 C-10 Chevrolet Pickup Truck | 5176 | 75.78 |
| | | | B - 1979 Chevrolet Impala | 4397 | |
| 3051-7 | 2/1/79 | Rear-end (Symmetric) | A - 1979 C-10** Chevrolet Pickup Truck | 5178 | 40.28 |
| | | | B - 1978 Plymouth Horizon | 3008 | |

*A = Bullet Vehicle; B = Target Car
 **Repaired truck from Test 3

2/9/79

2.0 PRESENTATION OF RESULTS (TEST 3051-5)

This section of the report presents the results of Test 3051-5, a frontal, 21-inch right offset crash test between a 1979 Chevrolet C-10 pickup truck (bullet vehicle) and a 1978 Plymouth Horizon 4-door sedan (target vehicle).

This report presents all test results without analysis or discussion. Included in this document are: still photographs, film chronologies, vehicle damage sketches and tabulated pre- and post-test dimensions, accelerometer location identification, summaries of electronic data, and summaries of the simulated occupant data, including injury criteria values. High-speed motion pictures were also obtained for this test and have been submitted to the sponsor. Appendix A contains Calcomp plots of all electronic data for this test.

TABLE 2-1. CRASH TEST SUMMARY (TEST NO. 3051-5)

TEST NO. 3051-5 CONTRACT: DOT-HS-8-01942
 TEST DATE: October 30, 1978 TIME: 1403 TEMPERATURE: 78 °F
 TEST CONFIGURATION: Front-to-Front 21" Right Offset
 VEHICLE NO. 1: 1979 Chevrolet C-10 Truck
 VEHICLE NO. 2: 1978 Plymouth Horizon, 4-door Sedan

| VEHICLE DATA: | VEHICLE NO. 1 | | VEHICLE NO. 2 | |
|---|---------------|---------|---------------|--------|
| Overall Length/Width (in.) | 217.1/78.0 | | 163.4/66.2 | |
| Test Weight by Wheel (lb) | LF 1437 | RF 1331 | LF 762 | RF 743 |
| | LR 1215 | RR 1200 | LR 591 | RR 586 |
| Test Weight (lb) | 5183 | | 2682 | |
| Wheelbase (in.) | 131.8 | | 99.5 | |
| Longitudinal C.G. (From Center of Front Axle) (in.) | 61.4 | | 43.7 | |
| Impact Angle (deg)* | 0 | | 0 | |
| Offset Distance (in.)** | 0 | | -21.0 | |
| Car Speed (mph) | +30.8 | | +30.8 | |
| Final Speed (mph @ msec) | +4.9 @ 200 | | -13.4 @ 200 | |
| Velocity Change (mph) | 25.9 | | 44.2 | |
| Maximum Compartment Acceleration (G @ msec) | -19.4 @ 73 | | -32.4 @ 56 | |
| Maximum Engine Acceleration (G @ msec) | -48.6 @ 44 | | -87.2 @ 40 | |
| Maximum Mutual Dynamic Crush (Film Data) (in.) | | | 63.3 | |
| Maximum Static Crush | | | | |
| ● Hood Level (in.) | 7.4 | | 19.1 | |
| ● Between Hood/Bumper (in.) | 16.0 | | 28.4 | |
| ● Bumper Level (in.) | 29.5 | | 22.8 | |
| Maximum Post-test Intrusion (in.) | 3.6 | | 8.4 | |

OCCUPANTS

| Type | Alderson Part 572 | Alderson Part 572 |
|------------|--------------------------------|--------------------------------|
| Location | LF - Driver RF - Passenger | LF - Driver RF - Passenger |
| Restraints | Standard Lap/ Shoulder Belt | Standard Lap/ Shoulder Belt |

INSTRUMENTATION

| | | |
|-------------------------|----|----|
| Number of Data Channels | 14 | 28 |
| Number of Cameras | 4 | 5 |

*With respect to tow track centerline.

**21-inch right offset between centerline of vehicles.

TABLE 2-2. BULLET VEHICLE INSPECTION SHEET (TEST 3051-5)

Contractor: Dynamic Science, Inc. Contract No.: DOT-HS-8-01942
 VIN NO.: CCL 449F319839 Make: Chevrolet
 NHTSA No.: R&D
 Year: 1979 Color: White Model: C-10 Truck
 Auto Trans: yes no Pwr Steering: yes no Seats: Bench: X
 Pwr Brakes: yes no Auto Speed Cont: yes no (front) Bucket: _____
 Pwr Seats: yes no Anti Skid Brake: yes no Split
 Pwr Windows: yes no Air Conditioning: yes no Bench: _____
 Tinted Glass: yes no Rear Window Def.: yes no Split
 Radio: yes no Brakes: drum: R disc: F Back
 Clock: yes no Bench: _____
 Tire Size: L78-15 Ply Rating: _____ Mfg. & Line: Uniroyal F-Glassbelt, R-Snowplow
 Bias Ply: _____ Belted: X Radial _____ / Type V-8 Eng. Total 350
 Cylinders: 8 Displ: CID
 Trans, # Fwd. Speeds: 4 Shipping Weight: _____ Odometer: 18

Dealer (name, address, and phone number)
Courtesy Chevrolet
1233 East Camelback Road
Phoenix, Arizona

Remarks (list additional accessories not listed above)

Dual Fuel Tanks

Date of Manufacture: 9-78 Dynamic Science No.: 759 Date Received: 10-13-78
 Tilting Steering Wheel: yes no Telescoping Steering Wheel: yes no
 Fuel Capacity: _____ "Space Saver" Spare Tire yes no
 (from owner's manual)

Restraint System: Std. Lap and Shoulder Belts

1. Is the vehicle stock throughout? Describe: Yes. Except mirrors removed. All fluids drained except 100% water in both fuel tanks. 151 lb of lead added as ballast placed over rear axle.
2. Does vehicle show evidence of prior accident history? Describe: Yes. Small leakage of water from top of fuel tank on left tank. Not necessary to repair as leakage was small.
3. Does vehicle show any significant corrosion? Describe: No.
4. Check condition of the front bumper and frame: OK.

TABLE 2-3. TARGET VEHICLE INSPECTION SHEET (TEST 3051-5)

Contractor: Dynamic Science, Inc. Contract No.: DOT-HS-8-01942
 VIN NO.: ML44A8D233627 Make: Plymouth
 NHTSA No.: R&D

Year: 1978 Color: Metallic Green Model: Horizon

Auto Trans: yes no Pwr Steering: yes no Seats: Bench: _____
 Pwr Brakes: yes no Auto Speed Cont: yes no (front) Bucket: X
 Pwr Seats: yes no Anti Skid Brake: yes no Split Bench: _____
 Pwr Windows: yes no Air Conditioning: yes no Split Back Bench: _____
 Tinted Glass: yes no Rear Window Def.: yes no
 Radio: yes no Brakes: drum: R disc: F
 Clock: yes no

Tire Size: P155/80R-13 Ply Rating: 3 Mfg. & Line: Firestone Deluxe Champion
 Eng. Trans- Total 105
 Bias Ply: _____ Belted: _____ Radial X / Type verse Cylinders: 4 Displ: CID
 Trans, # Fwd. Speeds: 3 Shipping Weight: _____ Odometer: 608.0

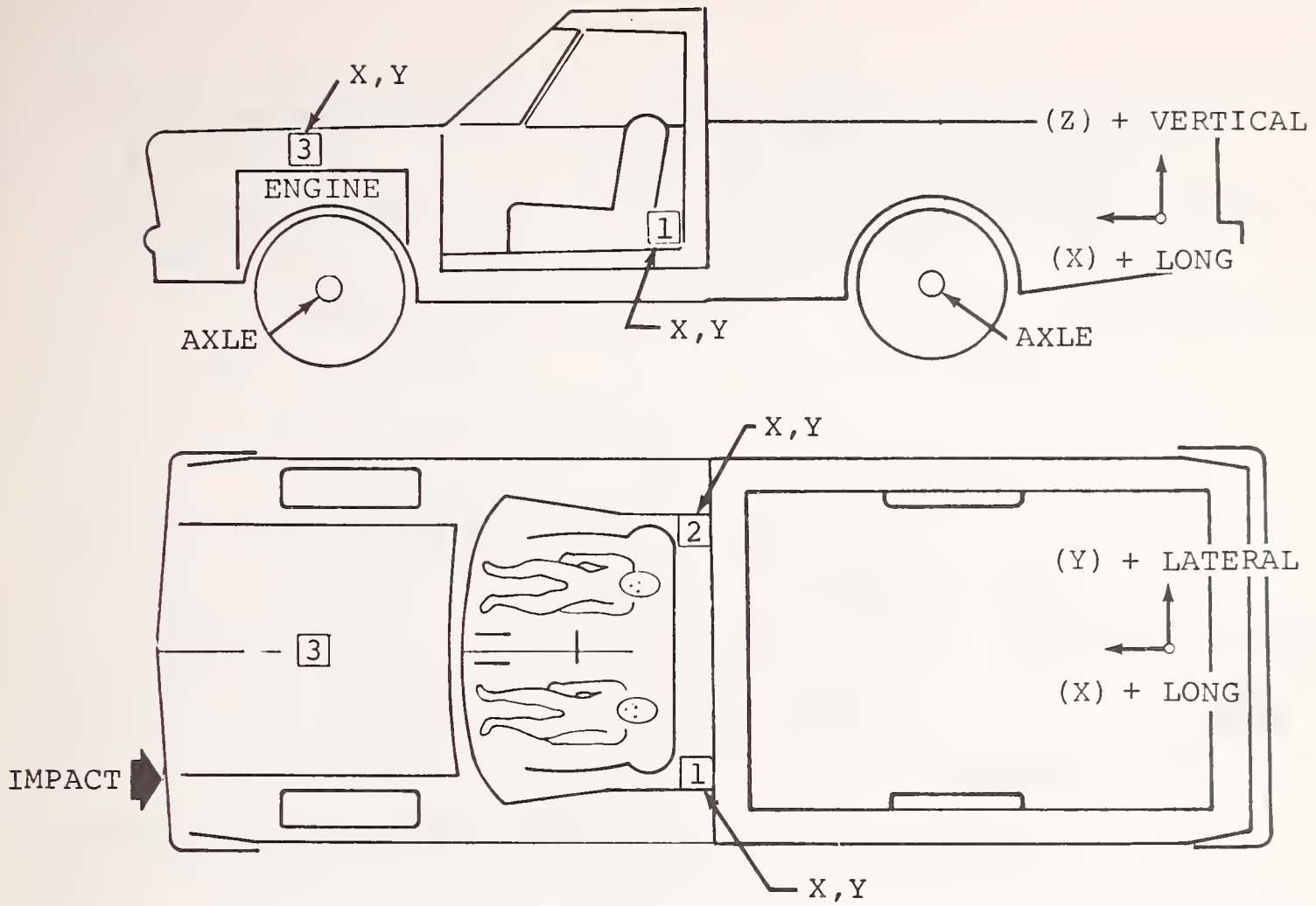
Dealer (name, address, and phone number)
Auto Driveway
Riverside, California

Remarks (list additional accessories not listed above)

Date of Manufacture: 6-78 Dynamic Science No.: 762 Date Received: 10-16-78
 Tilting Steering Wheel: yes no Telescoping Steering Wheel: yes no
 Fuel Capacity: _____ "Space Saver" Spare Tire yes no
 (from owner's manual)

Restraint System: Standard Lap/Shoulder Belts

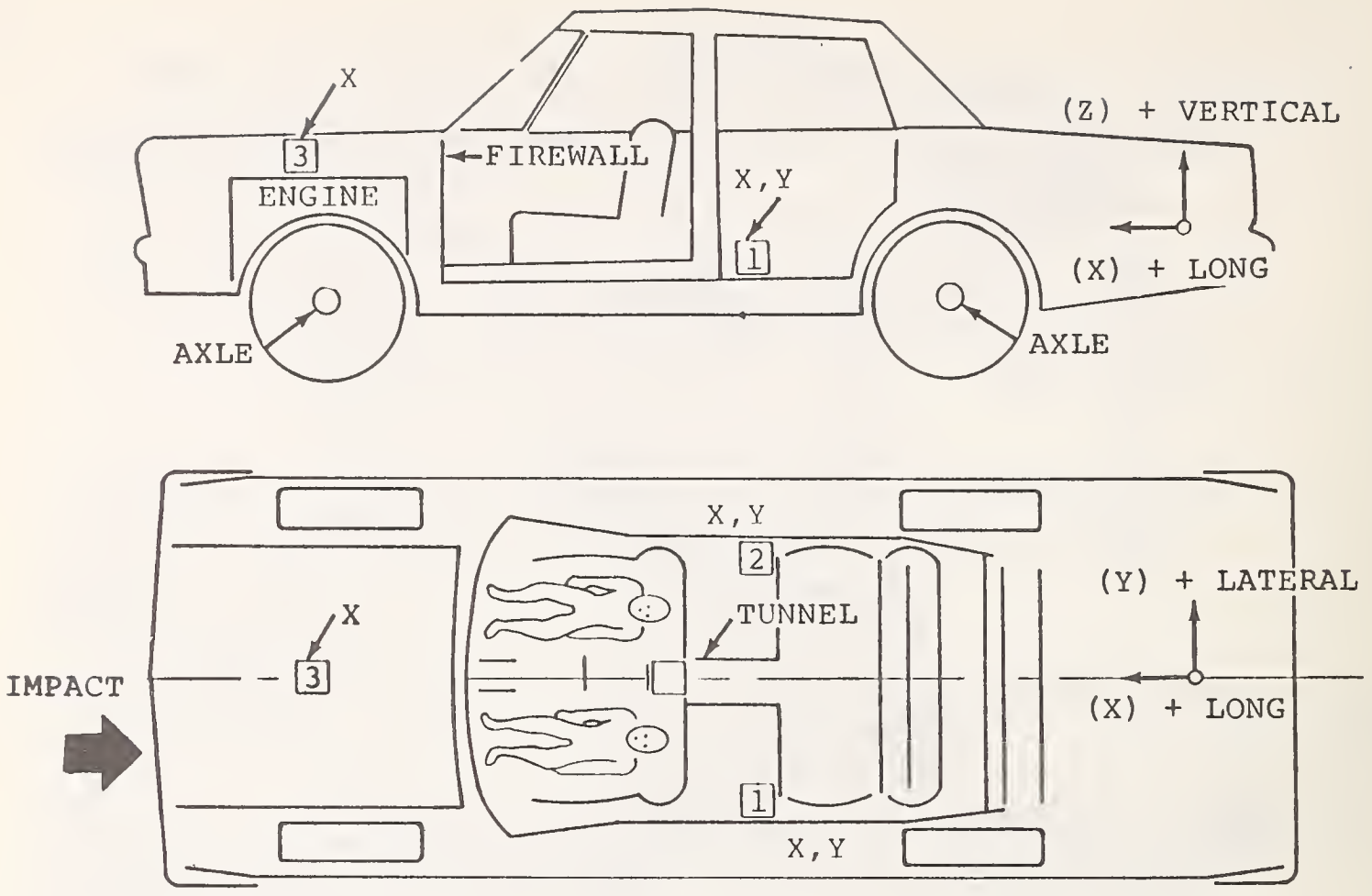
1. Is the vehicle stock throughout? Describe: Carpeting, floor insulation, spare tire and jack removed. Mirrors removed. Water in gas tank 100% full. Windshield wipers removed. Empty fluids. 50 pounds of lead behind rear passenger seat as ballast.
2. Does vehicle show evidence of prior accident history? Describe: No
3. Does vehicle show any significant corrosion? Describe: No
4. Check condition of the front bumper and frame: OK



| VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES | | | | MAXIMUM EXPECTED READINGS | | | |
|--|--|-----|-----|---------------------------|-------|------|-------|
| NO. | DESCRIPTION OF LOCATION | X** | Y** | Z** | LONG* | LAT* | VERT* |
| 1 | Rocker panel near B-pillar behind driver's seat | 112 | -28 | 30 | 50 | 50 | |
| 2 | Rocker panel near B-pillar behind passenger's seat | 112 | +28 | 30 | 50 | 50 | |
| 3 | Top of engine block | 180 | 0 | 36 | 200 | 200 | |

*G
 **Reference points:
 X - Direction - Centerline of rear bumper
 Y - Direction - Centerline of vehicle - left centerline (-), right centerline (+)
 Z - Direction - Ground level

Figure 2-1. 1979 Chevrolet C-10 Truck Accelerometer Instrumentation (Test 3051-5).



VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES MAXIMUM EXPECTED READINGS

| NO. | DESCRIPTION OF LOCATION | X** | Y** | Z** | LONG* | LAT* | VERT* |
|-----|--|-----|-----|-----|-------|------|-------|
| 1 | Rocker panel near B-pillar behind driver's seat | 69 | -23 | 13 | 50 | 50 | |
| 2 | Rocker panel near B-pillar behind passenger's seat | 69 | +23 | 13 | 50 | 50 | |
| 3 | Top of engine block | 128 | +5 | 27 | 200 | | |

*G
 **Reference points:
 X - Direction - Centerline of rear bumper
 Y - Direction - Centerline of vehicle - left centerline (-), right centerline (+)
 Z - Direction - Ground level

Figure 2-2. 1978 Plymouth Horizon Accelerometer Instrumentation (Test 3051-5).

TABLE 2-4. INSTRUMENTATION SUMMARY (TEST 3051-5)

TEST NO. 3051-5 VEHICLE: 1979 Chevrolet C-10 Truck

| Instrument | Numbers | Total No. of Data Channels |
|---|-------------|----------------------------|
| Vehicle Accelerometers* | 3 locations | 6 |
| Dummy Instrumentation = Head (3), Chest (3) | 1 location | 6 |
| Seat Belt Load Cells = Lap (1), Shoulder (1) | 1 location | 2 |
| | TOTAL | 14 - 1 RSCM |

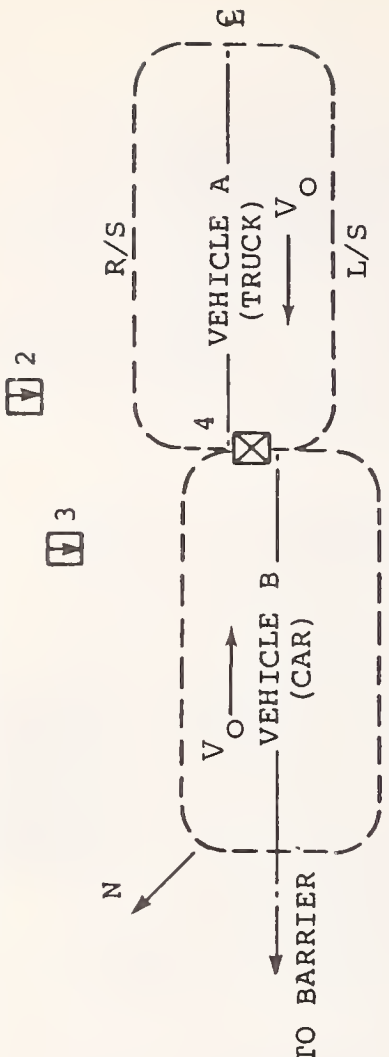
VEHICLE: 1978 Plymouth Horizon

| | | |
|---|-------------|---------------|
| Vehicle Accelerometers** | 3 locations | 5 |
| Dummy Instrumentation = Head (3), Chest (3), Femur (2) | 2 locations | 16 |
| Seat Belt Load Cells = Lap (2), Shoulder (1) | 2 locations | 6 |
| Impact Switch | | 1 |
| | TOTAL | 28 - 2 RSCM's |

*See Figure 2-1 for locations.

**See Figure 2-2 for locations.

TABLE 2-5. CAMERA LOCATIONS - OFFSET IMPACT (TEST 3051-5)



Test No: 5 Test Date: 10/30/78

Test Type: Truck-to-Car Offset Impact Test

Vehicle A (Away): 1979 Chevrolet C-10 Pickup Truck

Vehicle B (Barrier): 1978 Plymouth Horizon

Comments: All high-speed cameras will be perpendicular to the line of vehicle travel.

- CAMERA SYMBOLS
- PIT
 - GROUND
 - BARRIER
 - OVERHEAD
 - ON-BOARD
- FRAME RATE
- 1. 1000 fr/sec
 - 2. 200 fr/sec
 - 3. Other 24 fr/sec
 - 4. 400 fr/sec
 - 5. 500 fr/sec
- MID RANGE
- HAND HELD
- TIMING LIGHT SPEED
- 1. 100 Hz (10 msec/light)
 - 2. 200 Hz (5 msec/light)
 - 3. Other

| CAMERA | YES |
|----------|-----|
| STILLS | X |
| SLIDES | X |
| MOVIE | X |
| POLAROID | |
| VIDEO | |

| Loc. No. | Location | Field of View | Lens Size | Frm Rate | Tmng Spd | Ser No | Impact Dist-X | C.L. Dist-Y | CAM Hght-Z |
|----------|-----------------------------------|---|-----------|----------|----------|--------|---------------|-------------|------------|
| 1 | Left Side | Overall of Truck and Car | 13 | 1 | 1 | | | | |
| 2 | Right Side | B-Pillar-to-B-Pillar of Both Vehicles | 13 | 1 | 1 | | | | |
| 3 | Right Side | Front Occupant Compartment of Car B | VAR | 5 | 1 | | | | |
| 4 | Overhead | Front Half or Both Vehicles at Impact* | 13 | 1 | 1 | | | | |
| 5 | Left Side | Panning Test and Overall Results | | 3 | | | | | |
| 6 | Left Side | Impact of Cars at \approx 100 msec (Still Camera 4x5) | | | | | | | |
| 7 | | Color Negative) | | | | | | | |
| 8 | | | | | | | | | |
| 9 | *NOTE: CAMERA FAILED DURING TEST. | | | | | | | | |

TABLE 2-6. SUMMARY OF PRE-TEST ENGINE/BUMPER/FIREWALL CHARACTERISTICS - CHEVROLET C-10 TRUCK (TEST 3051-5)

| | | | |
|-------------------------------|----------------------|---------------------|----------------------------------|
| Test No. | 3051-5 | Type | Frontal, 21-inch Right Offset |
| Car Model | Chevrolet C-10 Truck | Dynamic Science No. | 762 |
| Engine Size | 350 CID | | |
| Engine Weight* (lb) | 675 | | |
| Engine Height/Width (in.) | 35.1/21.3 | | |
| Bumper to Engine (in.) | 28.9 | | |
| Engine Length (in.) | 21.5 | | |
| Engine to Firewall (in.) | 2.5 | | |
| Bumper to Firewall (in.) | 52.9 | | |
| Bumper Height (max/min) (in.) | 24.4/15.0 | | |

*Includes engine and rigid attachments such as transmission and drive train.

TABLE 2-7. CHEVROLET C-10 TRUCK PRE-TEST DUMMY POSITIONS (TEST 3051-5)

| Distances (in.) | Driver | Passenger |
|--|--------|-----------|
| Chest to Steering Wheel Hub (horizontal) | 11.6 | |
| Nose to Steering Wheel Upper Rim | 14.6 | |
| Nose to Windshield (horizontal) | 25.0 | 28.0 |
| Knee to Lower Panel (closest point) | | |
| Left | 8.0 | 6.1 |
| Right | 8.6 | 6.0 |
| Chest to Dash (horizontal) | 24.6 | 25.4 |
| Forehead to Header | 18.6 | 22.0 |
| Dummy Serial Number | A03 | A04 |

TABLE 2-8. SUMMARY OF PRE-TEST ENGINE/BUMPER/FIREWALL CHARACTERISTICS - PLYMOUTH HORIZON (TEST 3051-5)

| | | | |
|-------------------------------|------------------|---------------------|----------------------------------|
| Test No. | 3051-5 | Type | Frontal, 21-inch Right Offset |
| Car Model | Plymouth Horizon | Dynamic Science No. | 759 |
| Engine Size | 105 CID | | |
| Engine Weight* (lb) | 475 | | |
| Engine Height/Width (in.) | 30.0/16.2** | | |
| Bumper to Engine (in.) | 17.0 | | |
| Engine Length (in.) | 12.4 | | |
| Engine to Firewall (in.) | 10.2 | | |
| Bumper to Firewall (in.) | 39.6 | | |
| Bumper Height (max/min) (in.) | 21.1/15.9 | | |

*Includes engine and rigid attachments such as transmission and drive train.

**Engine plus transmission width = 36"

TABLE 2-9. PLYMOUTH HORIZON PRE-TEST DUMMY POSITIONS (TEST 3051-5)

| Distances (in.) | Driver | Passenger |
|--|--------|-----------|
| Chest to Steering Wheel Hub (horizontal) | 16.1 | |
| Nose to Steering Wheel Upper Rim | 17.4 | |
| Nose to Windshield (horizontal) | 19.8 | 21.4 |
| Knee to Lower Panel (closest point) | | |
| Left | 7.3 | 7.3 |
| Right | 7.3 | 7.1 |
| Chest to Dash (horizontal) | 20.4 | 24.3 |
| Forehead to Header | 13.0 | 14.4 |
| Dummy Serial Number | 759 | 760 |



a) Pre-test



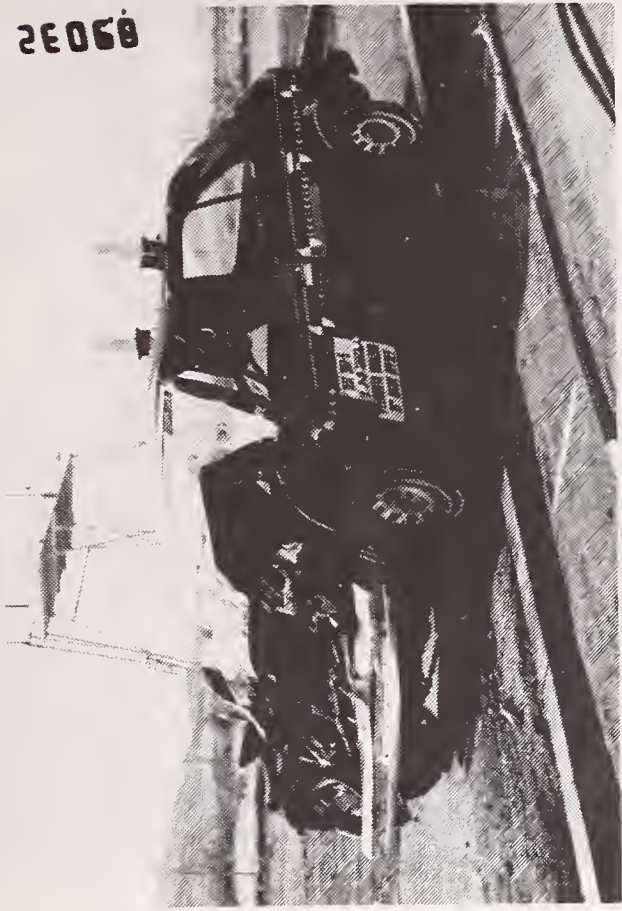
b) Post-test

Figure 2-3. Pre- and Post-test Vehicle Configuration (Test 3051-5).



Figure 2-4. Post-test Chevrolet C-10 Truck Configuration (Test 3051-5).

2E060



6E060



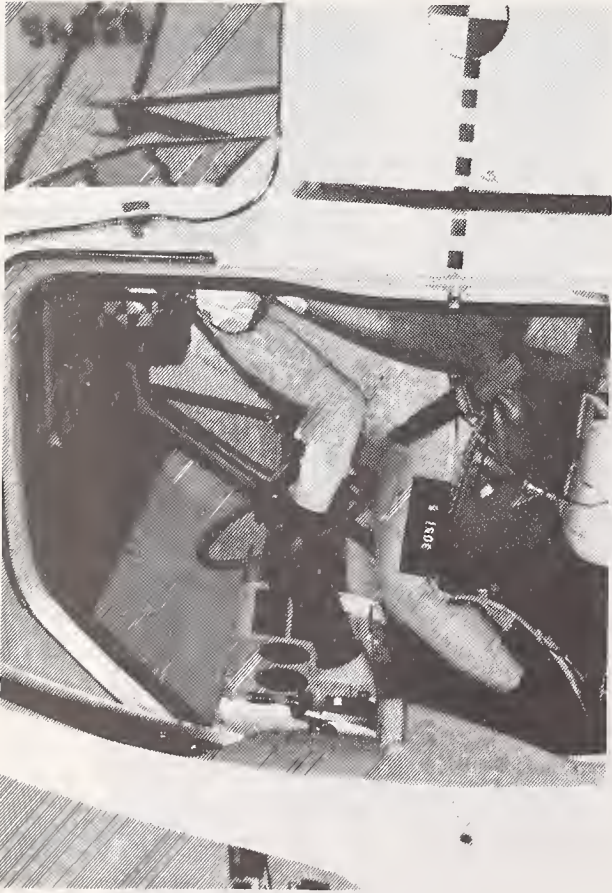
EE060



01 060



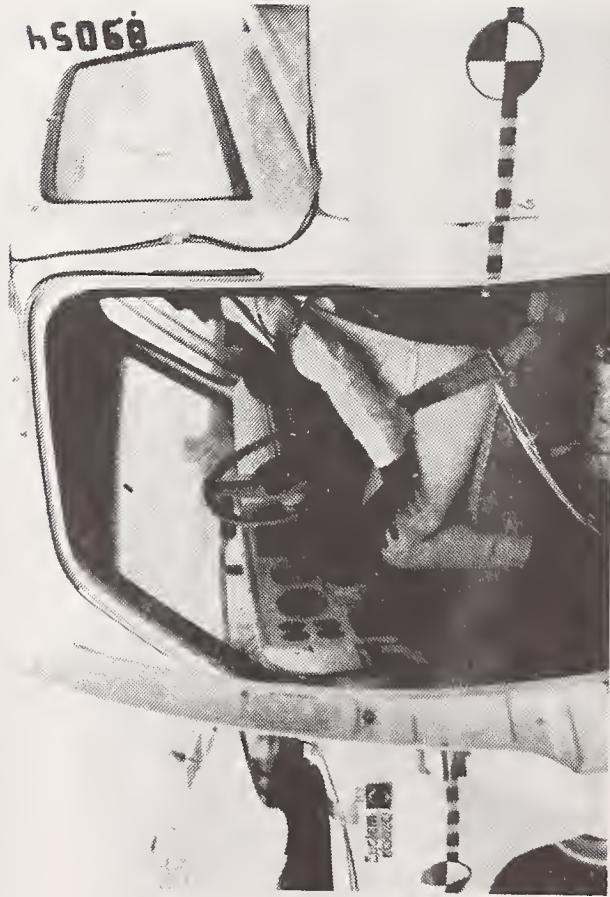
Figure 2-5. Post-test Plymouth Horizon Configuration (Test 3051-5).



a) Pre-test Driver



b) Pre-test Passenger

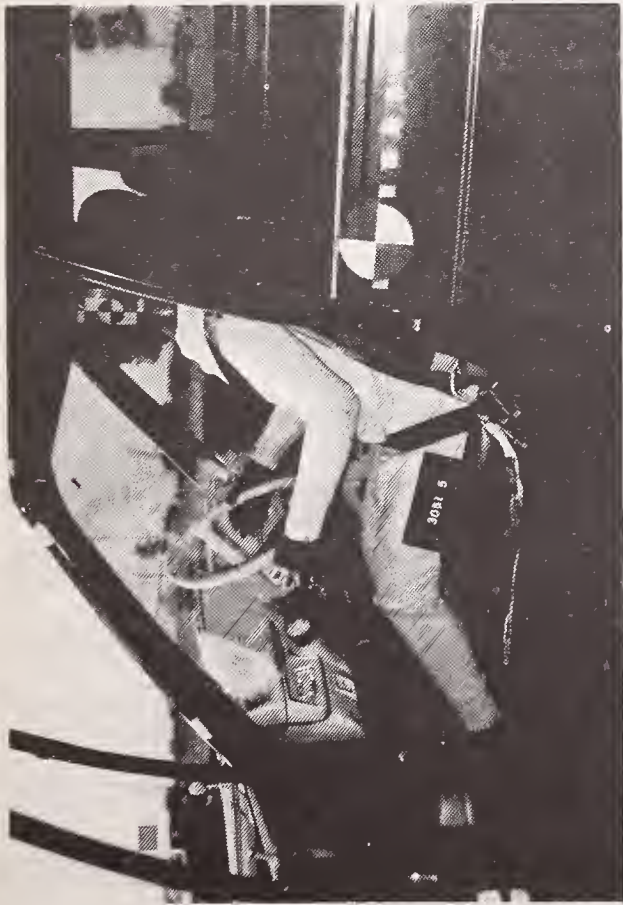


c) Post-test Driver

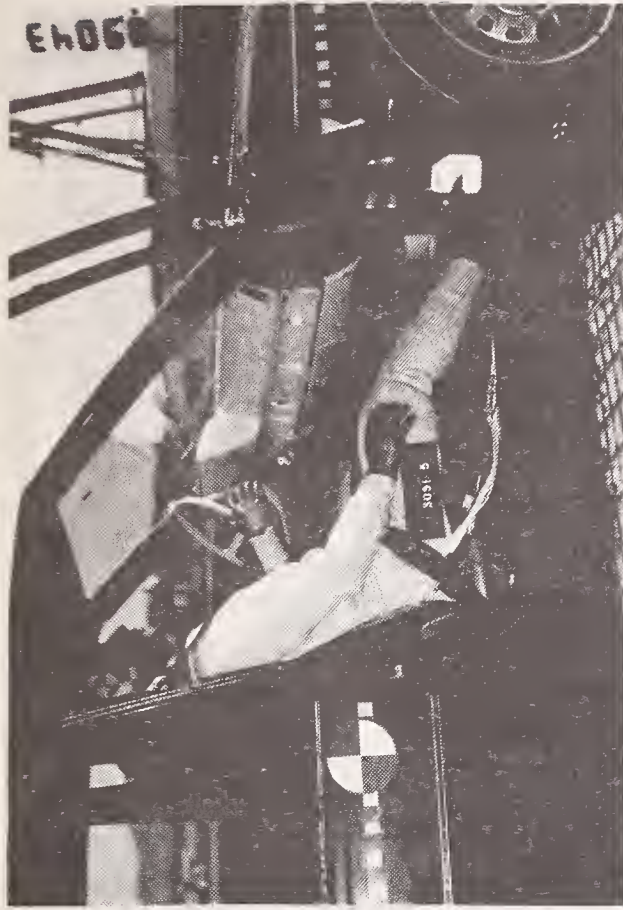


d) Post-test Passenger

Figure 2-6. Chevrolet C-10 Truck Dummy Configuration (Test 3051-5).



a) Pre-test Driver



b) Pre-test Passenger



c) Post-test Driver



d) Post-test Passenger

Figure 2-7. Plymouth Horizon Dummy Configuration (Test 3051-5).

TABLE 2-10. CHRONOLOGY OF EVENTS (TEST 3051-5)

| Time (msec) | Chevrolet C-10 Truck | Time (msec) | Plymouth Horizon |
|----------------|---|----------------|---|
| 0 | Impact (visual) | 0 | Impact (visual) |
| 7 | Truck bumper strikes grille of car | 18 | Hood buckles |
| 8 | Left fender buckles | 26 | Right fender buckles |
| 12 | Grilles of the two vehicles hit | 44 | Steering wheel begins compartment intrusion |
| 18 | Left front tire is struck by car bumper | 53 | Rear seat fails |
| 33 | Left front tire is pushed to back of wheel well | 54 | Roof buckles |
| 46 | Hood latch fails | 62 | Car hood pushed into windshield. Windshield shatters |
| 69 | Left front tire leaves ground | 67 | Driver hits steering wheel with chest |
| 92 | Driver hits steering wheel with face | 91 | Windshield struck by hood of truck |
| 101 | Maximum mutual dynamic crush (63.3 in.) | 93 | Left rear wheel leaves ground. Driver and passenger hit dash with heads |
| 147 | Left rear tire leaves ground | 101 | Driver forward motion stops |
| 159 | Passenger hits dash with head | 148 | Passenger forward motion stops |
| 163 | Passenger begins rotation | 167 | Left front tire leaves ground |
| 167 | Passenger forward motion stops | 179 | Driver recontacts headrest |
| 215 | Driver recontacts seat with upper back | 204 | Passenger recontacts headrest |
| 575 | Left front tire recontacts ground | 216 | Left rear tire recontacts ground |
| 590 | Left rear tire recontacts ground | 711 | Left front wheel recontacts ground |

TABLE 2-11. SUMMARY OF POST-TEST OBSERVATIONS - CHEVROLET
C-10 TRUCK (TEST 3051-5)

VEHICLE: 1979 Chevrolet C-10 Truck

| Dummy Contact Points: | Left Front | Right Front |
|-----------------------|--------------------------|-------------------|
| Head----- | Top of Steering Wheel | Front of dash |
| Chest----- | Steering Column Hub | No contact |
| Knees----- | No contact | Glove Compartment |

Glazing: 100% intact

Doors: Left front door difficult to open.

Right front door opened easily.

Seat Belt Anchorages and Restraints: OK. No seat movement.

Vehicle Centerline to Barrier Centerline: Front - on centerline.

Rear - 48" to right.

Fuel Leakage: Yes. 103 ml/min from top of left fuel tank. Evi-
dence of fuel leakage observed before test was conducted.

General Observations: Hood latch failed. Rotation of both dum-
mies. Passenger dummy lap belt appeared to have excessive belt
stretch at impact. Front of truck 8 feet from impact. Left
front tire punctured by Horizon's bumper. Left front and
left rear tire in trench. Both vehicles caught in monorail
trench preventing some rotation. Left front tire rim bent.

TABLE 2-12. SUMMARY OF POST-TEST OBSERVATIONS - PLYMOUTH HORIZON (TEST 3051-5)

VEHICLE: 1978 Plymouth Horizon 4-door sedan

| Dummy Contact Points: | Left Front | Right Front |
|-----------------------|-----------------------|---------------------|
| Head----- | Top of Steering Wheel | Windshield and Dash |
| Chest----- | Steering Wheel Hub | No Contact |
| Knees----- | Knee Bolsters | Glove Compartment |

Glazing: 55% retained, but completely shattered

Doors: Left front door required tools to open. Left rear was difficult to open. Right side doors opened easily.

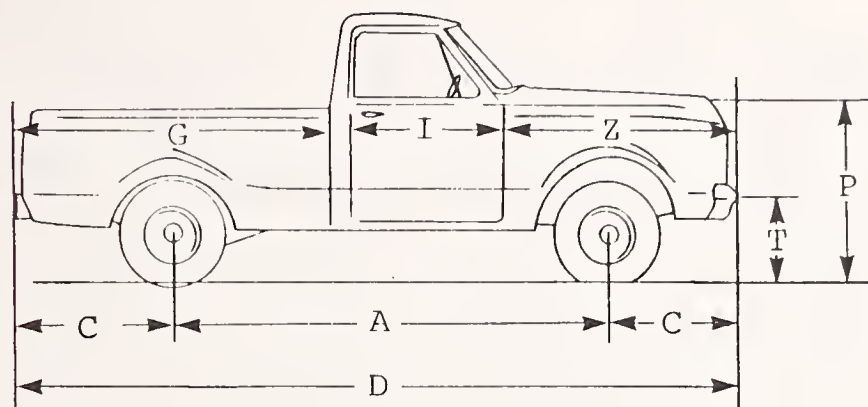
Seat Belt Anchorages and Restraints: OK. No seat movement.

Vehicle Centerline to Barrier Centerline: Front - 48" right.
Rear - 27" right.

Fuel Leakage: None

General Observations: Front of car 21 feet from impact. Left front window broken. Left front A-frame on ground. Left rear tire in trench. Left front tire punctured by truck bumper. Left front wheel bent by impact. Sheet metal around left front tire completely pushed away. Roof deformation.

TABLE 2-13. PRE- AND POST-TEST DIMENSION MEASUREMENTS - BULLET VEHICLE (TEST 3051-5)

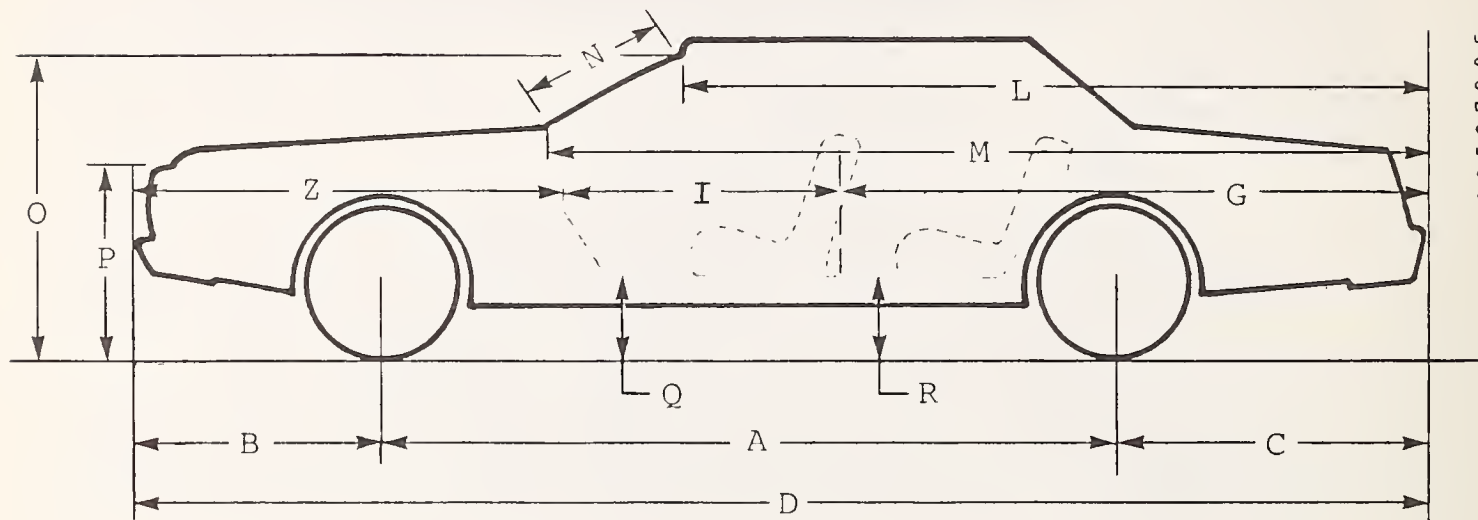


80902302

VEHICLE: 1979 Chevrolet C-10 Truck

| | Pre-test (in.) | | Post-test (in.) | | Difference (in.) | |
|---|-------------------|-------|--------------------|-------|---------------------|------|
| | LS | RS | LS | RS | LS | RS |
| A | 131.9 | 131.7 | 117.6 | 133.0 | 14.3 | -1.3 |
| B | 33.1 | 33.4 | 30.8 | 28.4 | 2.3 | 5.0 |
| C | 51.9 | 52.1 | 51.8 | 52.0 | 0.1 | 0.1 |
| D | 216.9 | 217.2 | 200.2 | 213.4 | 16.7 | 3.8 |
| I | 38.6 | 38.7 | 38.6 | 38.9 | 0 | -0.2 |
| G | 107.5 | 107.7 | 107.9 | 107.8 | -0.4 | -0.1 |
| P | 39.7 | 39.6 | 22.1 | 34.0 | 17.6 | 5.6 |
| T | 23.1 | 23.0 | 13.8 | 13.6 | 9.3 | 9.4 |
| Z | 64.0 | 63.7 | 47.7 | 58.6 | 16.3 | 5.1 |

TABLE 2-14. PRE- AND POST-TEST DIMENSION MEASUREMENTS - TARGET VEHICLE (TEST 3051-5)



80507905

VEHICLE: 1978 Plymouth Horizon 4-door sedan

| | Pre-test (in.) | | Post-test (in.) | | Difference (in.) | |
|---|-------------------|-------|--------------------|-------|---------------------|------|
| | LS | RS | LS | RS | LS | RS |
| A | 99.3 | 99.6 | 94.1 | 99.3 | 5.2 | 0.3 |
| B | 32.4 | 32.3 | 17.1 | 25.4 | 15.3 | 6.9 |
| C | 31.5 | 31.6 | 31.9 | 32.0 | -0.4 | -0.4 |
| D | 163.2 | 163.5 | 143.1 | 156.7 | 20.1 | 6.8 |
| I | 37.5 | 37.5 | 34.9 | 37.1 | 2.6 | 0.4 |
| G | 73.1 | 73.1 | 73.0 | 73.2 | 0.1 | -0.1 |
| L | 89.4 | 89.3 | 91.5 | 91.6 | -2.1 | -2.3 |
| M | 109.0 | 108.8 | 106.1 | 108.9 | 2.9 | -0.1 |
| N | 26.4 | 26.5 | 26.3 | 26.3 | 0.1 | 0.2 |
| O | 53.3 | 53.5 | 50.6 | 51.7 | 2.7 | 1.8 |
| P | 29.8 | 29.5 | 36.9 | 36.1 | -7.1 | -6.6 |
| Q | 13.9 | 14.0 | 6.4 | 11.0 | 7.5 | 3.0 |
| R | 14.0 | 14.3 | 9.0 | 12.5 | 5.0 | 1.8 |
| Z | 52.6 | 52.9 | 35.2 | 46.4 | 17.4 | 6.5 |

TABLE 2-15. CHEVROLET C-10 TRUCK EXTERIOR PROFILES AND STATIC CRUSH (TEST 3051-5)

| Location | Height at E | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | | |
|--|-------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|------|------|------|------|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 39.9 | 220 | 8.2 | 7.9 | 6.3 | 6.1 | 5.9 | 5.7 | 5.6 | 5.6 | 5.7 | 5.8 | 6.0 | 7.3 | 7.6 |
| Between Bumper/Hood | 31.5 | 220 | 9.0 | 10.4 | 7.0 | 6.7 | 6.6 | 6.5 | 6.4 | 6.4 | 6.5 | 6.6 | 6.9 | 10.0 | 8.6 |
| Bumper Level | 20.3 | 220 | 5.1 | 4.0 | 3.6 | 3.5 | 3.3 | 3.6 | 3.6 | 3.6 | 3.3 | 3.4 | 3.5 | 3.7 | 5.0 |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 30.4 | 220 | 15.2 | 15.3 | 13.1 | 12.9 | 12.5 | 12.3 | 12.5 | 9.5 | 7.0 | 6.2 | 6.0 | 6.2 | 5.6 |
| Between Bumper/Hood | 29.4 | 220 | 23.9 | 23.7 | 21.7 | 22.3 | 22.1 | 22.5 | 21.9 | 21.9 | 21.7 | 17.8 | 15.1 | 10.2 | 7.4 |
| Bumper Level | 21.6 | 220 | 34.6 | 30.4 | 26.2 | 22.5 | 21.1 | 23.4 | 24.3 | 23.6 | 18.0 | 13.8 | 10.7 | 8.1 | 6.7 |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | | |
| Hood Level | 9.5 | | 7.0 | 7.4 | 6.8 | 6.8 | 6.6 | 6.6 | 6.9 | 3.6 | 1.3 | 0.4 | 0.0 | -1.1 | -2.0 |
| Between Bumper/Hood | 2.1 | | 14.9 | 13.3 | 14.7 | 15.6 | 15.5 | 16.0 | 15.5 | 15.5 | 15.2 | 11.2 | 8.2 | 0.2 | -1.2 |
| Bumper Level | -1.3 | | 29.5 | 26.4 | 22.6 | 19.0 | 17.8 | 19.8 | 20.7 | 20.0 | 14.7 | 3.8 | 7.2 | 4.4 | 1.7 |

*As viewed from driver position in truck.

**Reference Plane from rear bumper of truck.

TABLE 2-16. CHEVROLET C-10 TRUCK INTERIOR PROFILES AND STATIC CRUSH (TEST 3051-5)

| Location | Height at \bar{E} | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | |
|--|------------------------|------|-----------------------------------|------|------|------|------|------|------------------------------------|------|------|------|------|----|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 49.8 | 130 | 19.7 | 21.5 | 21.5 | 21.1 | 19.5 | 24.7 | 24.5 | 24.3 | 24.1 | 23.6 | 22.9 | |
| Knee Level | 37.8 | 130 | 20.2 | 22.2 | 22.6 | 22.8 | 20.7 | 23.5 | 23.5 | 23.5 | 23.4 | 23.4 | 23.0 | |
| Floor Level | 28.3 | 140 | 21.8 | 21.9 | 22.0 | 22.0 | 20.7 | 20.5 | 21.1 | 21.9 | 21.9 | 21.8 | 21.8 | |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 44.6 | 130 | 20.1 | 22.0 | 22.4 | 22.4 | 20.5 | 25.7 | 26.0 | 25.9 | 25.9 | 25.6 | 25.1 | |
| Knee Level | 33.0 | 130 | 19.9 | 22.5 | 22.6 | 22.6 | 21.0 | 23.9 | 24.1 | 24.7 | 24.6 | 24.5 | 24.5 | |
| Floor Level | 24.5 | 142 | 17.6 | 17.4 | 17.8 | 17.0 | 16.5 | 14.9 | 16.2 | 18.5 | 19.3 | 19.9 | 20.0 | |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | |
| Dash Level | 5.2 | | -0.4 | -0.5 | -0.9 | -1.3 | -1.0 | -1.0 | -1.5 | -1.6 | -1.8 | -2.0 | -2.2 | |
| Knee Level | 4.8 | | 0.3 | -0.3 | 0.0 | 0.2 | -0.3 | -0.4 | 0.6 | -1.2 | -1.1 | -1.1 | -1.5 | |
| Floor Level | 3.8 | | 2.2 | 2.5 | 2.2 | 3.0 | 2.2 | 3.6 | 2.9 | 1.4 | 0.6 | -0.1 | -0.2 | |

*As viewed from driver position in truck.

**Reference Plane from rear bumper of truck.

TABLE 2-17. PLYMOUTH HORIZON EXTERIOR PROFILES AND STATIC CRUSH (TEST 3051-5)

| Location | Height at E | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | |
|--|-------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|------|------|----|
| | | | 36 | 27 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 27 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Hood Level | 29.9 | 165 | 10.9 | 10.1 | 9.4 | 9.0 | 8.8 | 8.7 | 8.8 | 9.0 | 9.5 | 10.1 | 11.1 | |
| Between Bumper/Hood | 25.5 | 165 | 9.6 | 8.9 | 9.8 | 7.8 | 7.6 | 7.1 | 7.5 | 7.6 | 9.7 | 8.9 | 9.6 | |
| Bumper Level | 18.4 | 165 | 3.3 | 2.7 | 2.3 | 2.0 | 1.8 | 1.8 | 1.8 | 2.0 | 2.4 | 2.8 | 3.4 | |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Hood Level | 33.9 | 165 | 32.0 | 26.9 | 26.1 | 25.5 | 26.3 | 27.8 | 27.5 | 25.6 | 25.0 | 24.1 | 22.7 | |
| Between Bumper/Hood | 23.3 | 165 | - | 33.0 | 31.7 | 34.0 | 36.0 | 28.8 | 25.9 | 22.2 | 21.0 | 16.9 | 15.2 | |
| Bumper Level | +2.7 | 165 | 26.1 | 25.1 | 23.4 | 22.0 | 21.2 | 18.9 | 16.7 | 14.6 | 11.9 | 10.0 | 8.9 | |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | |
| Hood Level | -4.0 | | 21.1 | 16.8 | 16.7 | 16.6 | 17.5 | 19.1 | 18.7 | 16.6 | 15.5 | 14.0 | 11.6 | |
| Between Bumper/Hood | 2.2 | | - | 24.1 | 21.9 | 26.2 | 28.4 | 21.7 | 18.4 | 14.6 | 11.3 | 8.0 | 5.6 | |
| Bumper Level | 5.7 | | 22.8 | 22.4 | 21.1 | 20.0 | 19.4 | 17.1 | 14.9 | 12.6 | 9.5 | 7.2 | 5.5 | |

*As viewed from driver position in car.

**Reference Plane from rear bumper of car.

TABLE 2-18. PLYMOUTH HORIZON INTERIOR PROFILES AND STATIC CRUSH (TEST 3051-5)

| Location | Height at E | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | |
|--|-------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|----|----|----|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 37.4 | 85 | 22.0 | 17.5 | 18.0 | 23.9 | 24.0 | 23.8 | 23.4 | 22.8 | 22.1 | | | |
| Knee Level | 26.7 | 85 | 22.6 | 23.7 | 23.5 | 23.9 | 23.9 | 24.0 | 23.6 | 23.2 | 22.6 | | | |
| Floor Level | 15.8 | 99 | 18.5 | 20.0 | 20.0 | 20.9 | 19.0 | 19.3 | 19.9 | 19.5 | 18.5 | | | |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 32.5 | 85 | 18.1 | 15.3 | 16.4 | 20.9 | 21.6 | 21.9 | 21.9 | 21.9 | 21.6 | | | |
| Knee Level | 21.3 | 85 | 15.4 | 18.2 | 15.1 | 17.2 | 18.0 | 20.5 | 22.2 | 22.4 | 22.1 | | | |
| Floor Level | 10.3 | 98 | 16.7 | 14.8 | 14.9 | 15.5 | 15.9 | 17.5 | 19.4 | 19.3 | 18.7 | | | |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | |
| Dash Level | 4.9 | | 3.9 | 2.2 | 1.6 | 3.0 | 2.4 | 1.9 | 1.5 | 0.9 | 0.5 | | | |
| Knee Level | 5.3 | | 7.2 | 5.5 | 8.4 | 6.7 | 5.9 | 3.5 | 1.4 | 0.8 | 0.5 | | | |
| Floor Level | 5.5 | | 2.8 | 6.2 | 6.1 | 6.4 | 4.1 | 2.8 | 1.5 | 1.2 | 0.8 | | | |

*As viewed from driver position in car.

**Reference Plane from rear bumper of car.

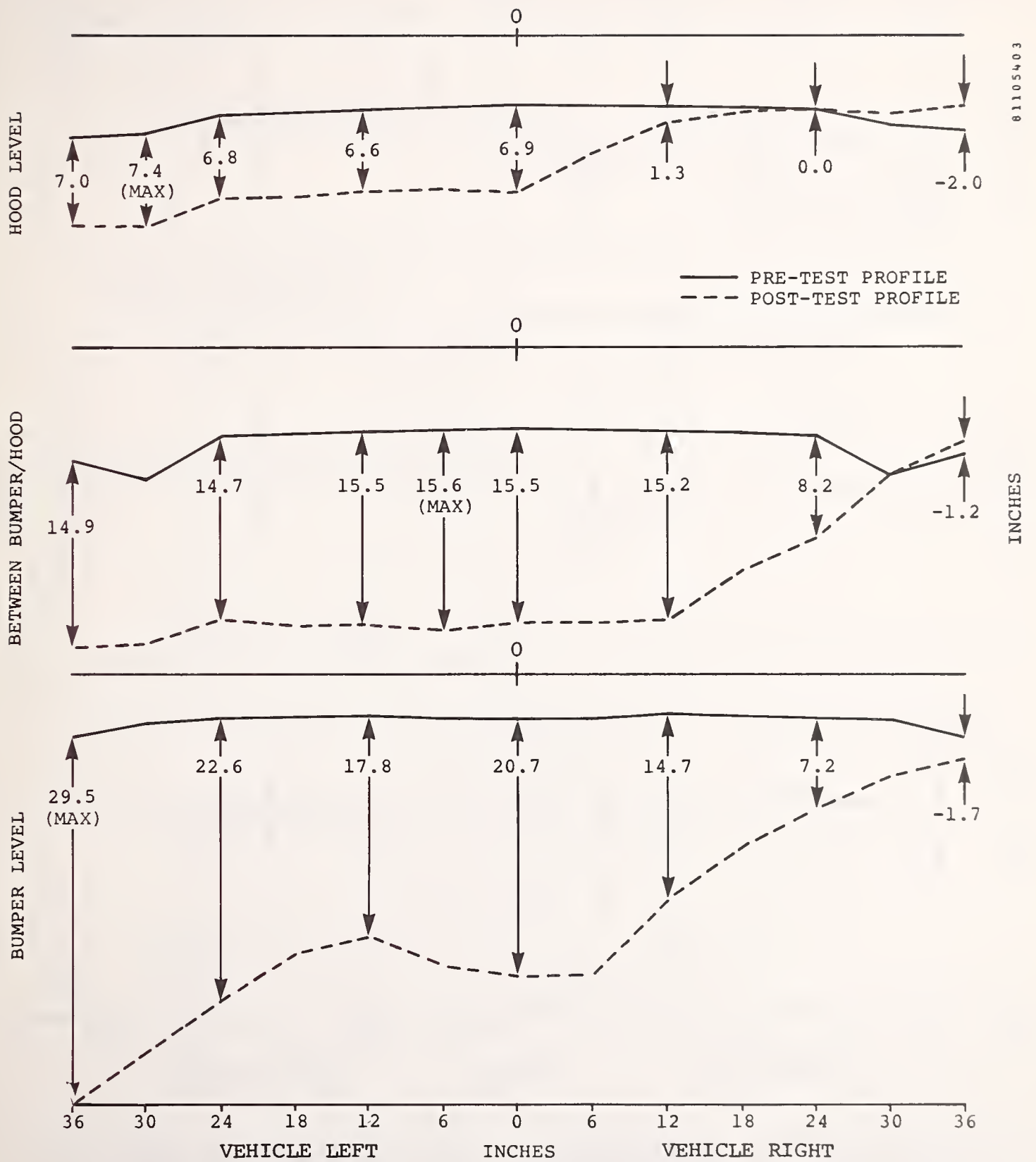


Figure 2-8. Chevrolet C-10 Truck Exterior Static Crush (Test 3051-5).

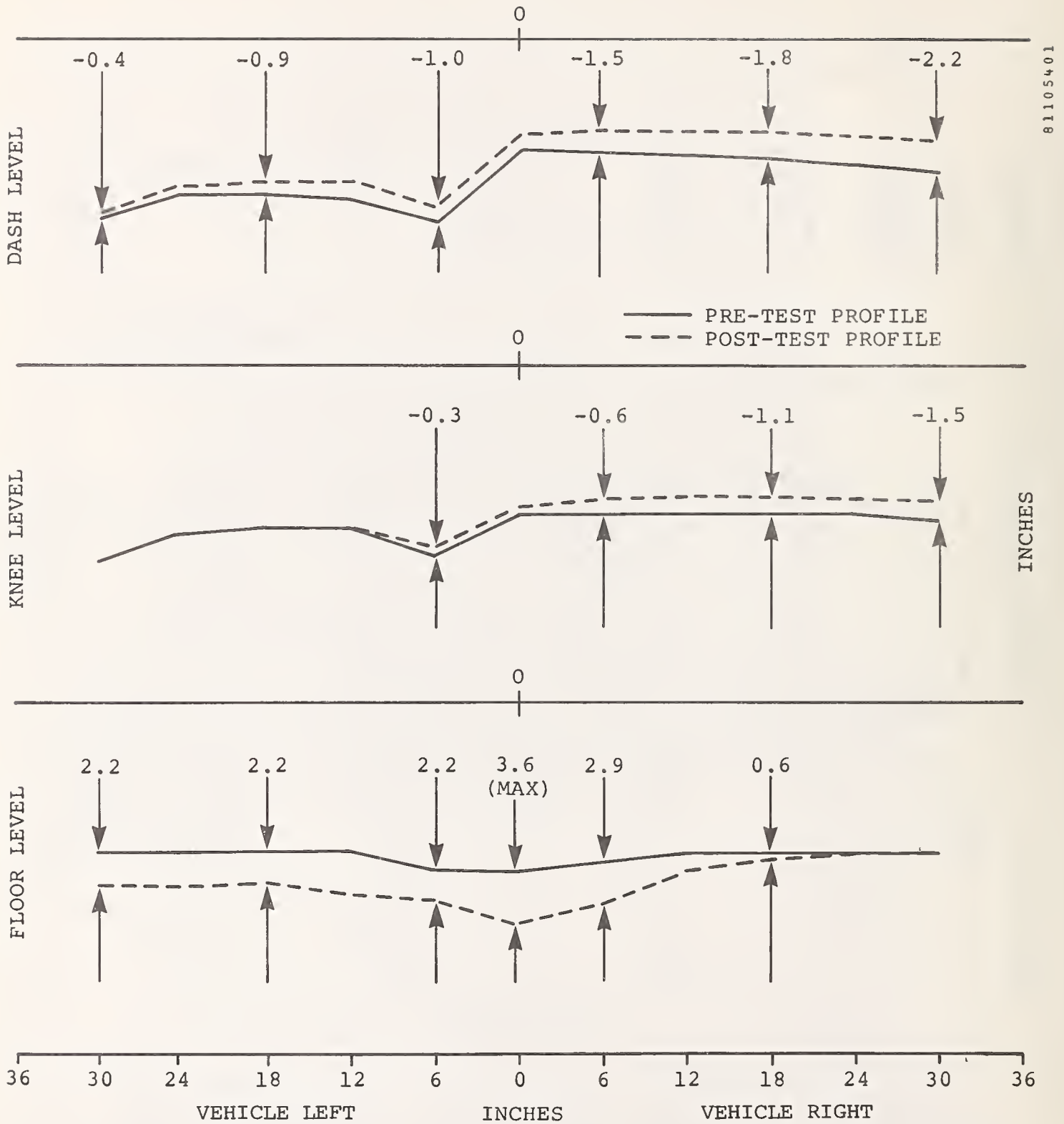


Figure 2-9. Chevrolet C-10 Truck Interior Intrusion (Test 3051-5).

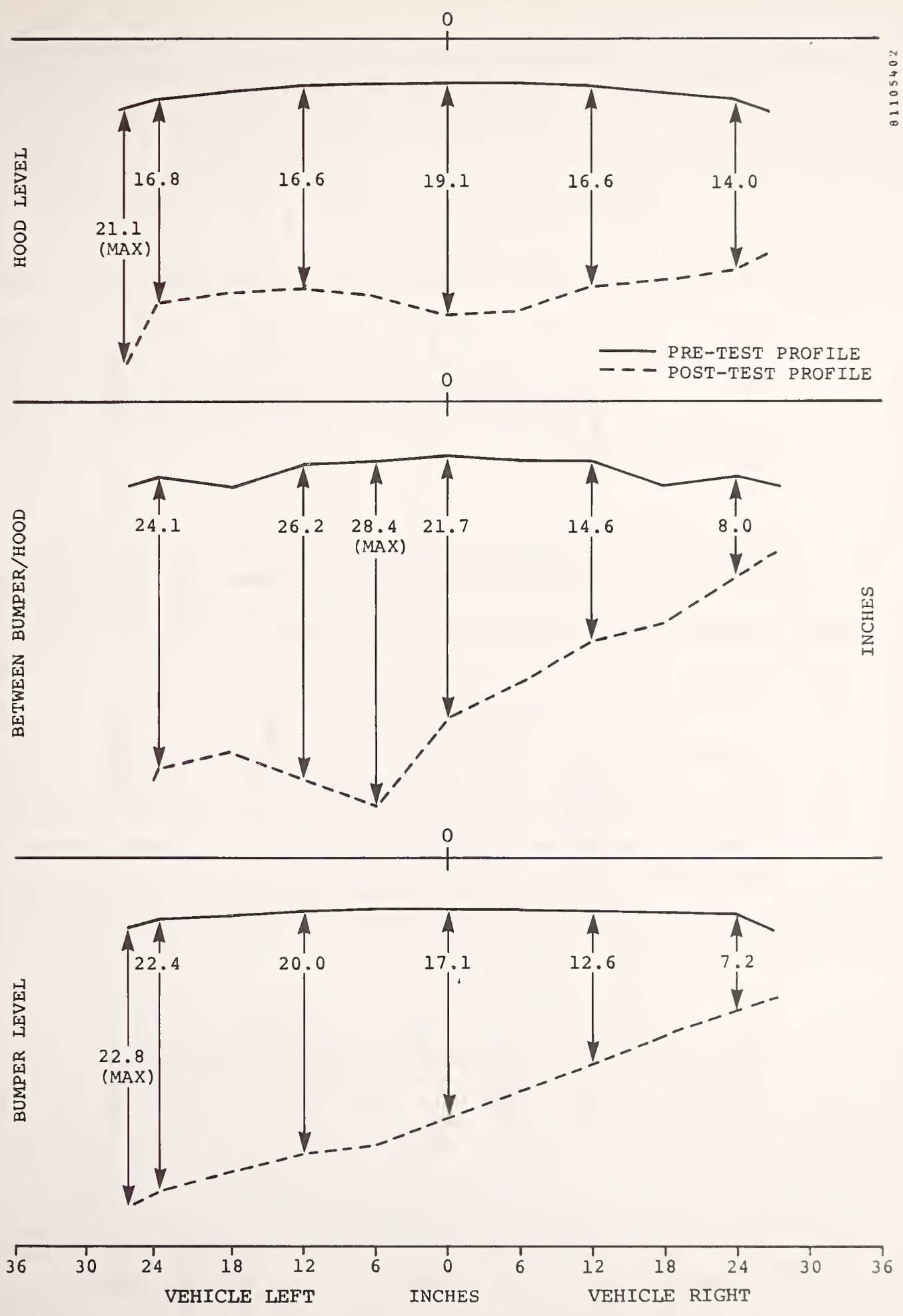


Figure 2-10. Plymouth Horizon Exterior Static Crush (Test 3051-5).

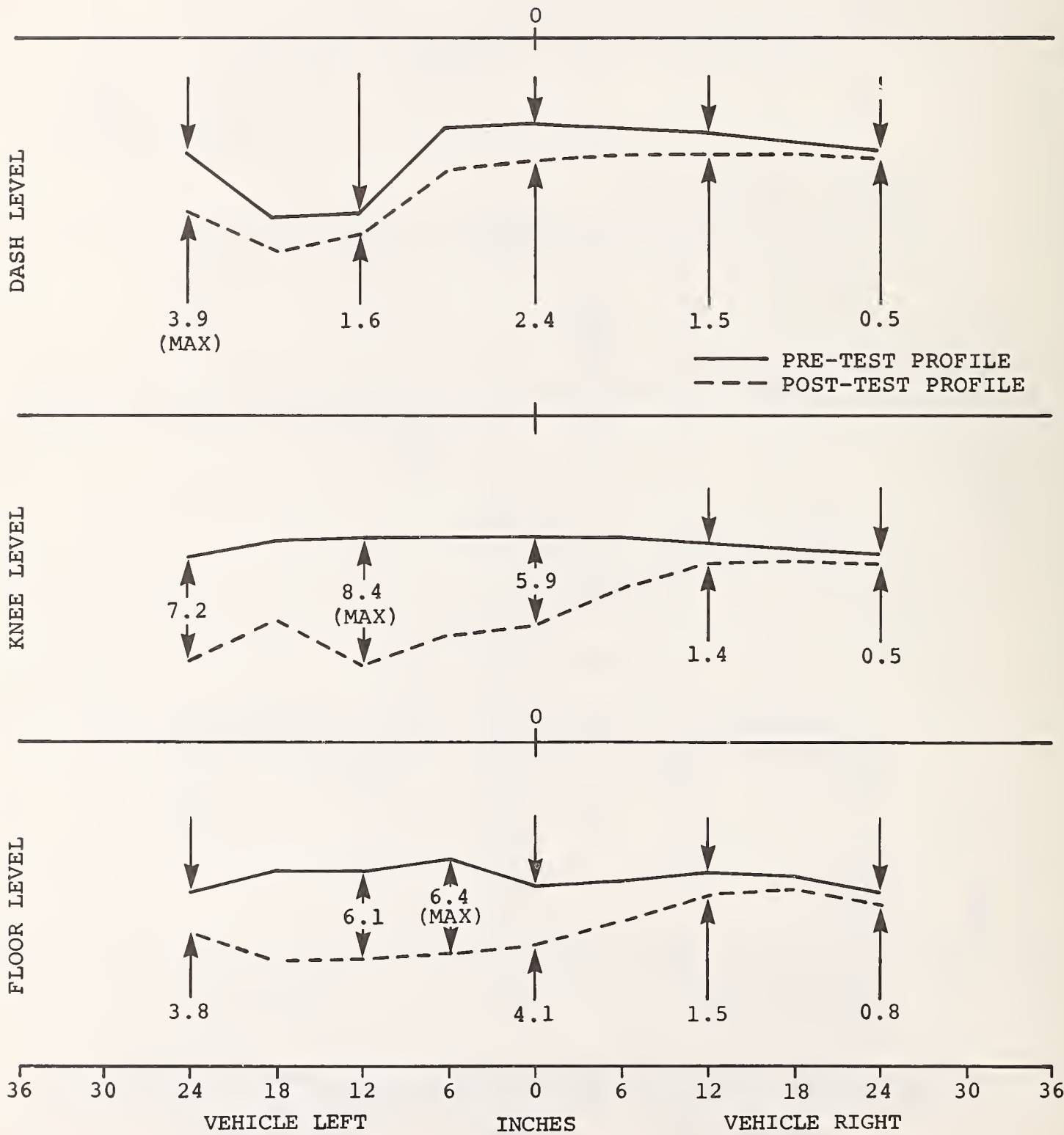


Figure 2-11. Plymouth Horizon Interior Intrusion (Test 3051-5).

TABLE 2-19. CHEVROLET C-10 TRUCK STEERING WHEEL MEASUREMENTS AND DISPLACEMENT VALUES (TEST 3051-5)

| Wheel Location | Pre-test (in.) | | | Post-test (in.) | | | Displacement (in.) | | |
|----------------|----------------|-------|------|-----------------|-------|------|--------------------|-----|-----|
| | X* | Y* | Z* | X | Y | Z | X | Y | Z |
| Top | 141.0 | -18.4 | 53.2 | 142.2 | -20.1 | 47.0 | -1.2 | 1.7 | 6.2 |
| Hub | 138.2 | -18.4 | 45.9 | 138.6 | -19.0 | 40.7 | -0.4 | 0.6 | 5.2 |
| Bottom | 134.5 | -18.4 | 39.5 | 135.3 | -19.0 | 34.1 | -0.8 | 0.6 | 5.4 |

*Reference for X, Y, and Z measurements are rear bumper, vehicle centerline, and ground level, respectively.

TABLE 2-20. PLYMOUTH HORIZON STEERING WHEEL MEASUREMENTS AND DISPLACEMENT VALUES (TEST 3051-5)

| Wheel Location | Pre-test (in.) | | | Post-test (in.) | | | Displacement (in.) | | |
|----------------|----------------|-------|------|-----------------|-------|------|--------------------|------|-----|
| | X* | Y* | Z* | X | Y | Z | X | Y | Z |
| Top | 99.2 | -12.9 | 41.5 | 94.6 | -16.2 | 34.0 | 4.6 | 3.3 | 7.5 |
| Hub | 99.4 | -12.9 | 33.3 | 92.1 | -12.8 | 30.4 | 7.3 | -0.1 | 2.9 |
| Bottom | 92.5 | -12.9 | 29.2 | 90.8 | -14.1 | 21.1 | 1.7 | 1.2 | 8.1 |

*Reference for X, Y, and Z measurements are rear bumper, vehicle centerline, and ground level, respectively.

TABLE 2-21. SUMMARY OF VEHICLE ACCELEROMETER DATA (TEST 3051-5)

VEHICLE: 1979 Chevrolet C-10 Truck

| Accelerometer* No. | Maximum Acceleration | | Minimum Velocity | | Maximum Displacement | |
|-----------------------|-------------------------|----------------|---------------------|----------------|-------------------------|----------------|
| | A (G) | Time (msec) | V (mph) | Time (msec) | S (in.) | Time (msec) |
| 1X | -22.0 | 73 | +4.0 | 167 | 48.9 | 200 |
| 1Y | -13.6 | 41 | +6.4 | 102 | 10.8 | 200 |
| 2X | -17.5 | 72 | +5.5 | 200 | 53.0 | 200 |
| 2Y | -10.5 | 42 | +4.8 | 97 | 7.9 | 200 |
| Average 1X and 2X | -19.4 | 73 | +4.8 | 166 | 51.0 | 200 |
| 3X | -48.6 | 44 | +5.4 | 200 | 49.1 | 200 |
| 3Y | -16.5 | 80 | +6.2 | 73 | 6.6 | 180 |

VEHICLE: 1978 Plymouth Horizon 4-door Sedan

| | | | | | | |
|----------------------|-------|----|-------|-----|------|-----|
| 1X | -41.5 | 56 | -13.6 | 152 | 26.8 | 79 |
| 1Y | -27.3 | 60 | -0.4 | 9 | 3.2 | 200 |
| 2X | -30.6 | 40 | -13.4 | 200 | 26.5 | 80 |
| 2Y | +13.1 | 19 | -0.2 | 15 | 8.7 | 200 |
| Average 1X and 2X | -32.4 | 56 | -13.4 | 200 | 26.7 | 80 |
| 3X | -87.2 | 40 | -5.0 | 193 | 18.6 | 91 |

*See Figures 2-1 and 2-2 for definition of accelerometer locations.

TABLE 2-22. OCCUPANT RESPONSE DATA SUMMARY (TEST 3051-5)

| | | VEHICLE: 1979 Chevrolet C-10 Truck | | | | VEHICLE: 1978 Plymouth Horizon 4-dr Sedan | | | |
|--------|---------------------|------------------------------------|----------------------|----------|---------------------|---|----------------------|----------|--|
| HEAD | LEFT FRONT OCCUPANT | | RIGHT FRONT OCCUPANT | | LEFT FRONT OCCUPANT | | RIGHT FRONT OCCUPANT | | |
| | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | |
| X | -71.0 | 98 | ND | | -177.8 | 69 | -40.9 | 119 | |
| Y | -30.8 | 105 | ND | | -32.5 | 69 | +50.3 | 97 | |
| Z | +28.1 | 102 | ND | | +55.6 | 90 | +70.8 | 96 | |
| R* | 61.7 | 108 | ND | | 67.5 | 90 | 68.8 | 0 | |
| HIC | 470 @ 93-116 | | | | 1070 @ 58-107 | | 1021 @ 70-133 | | |
| CHEST | | | | | | | | | |
| X | -38.9 | 101 | ND | | -57.8 | 74 | -46.0 | 76 | |
| Y | -13.8 | 101 | ND | | -35.8 | 78 | +14.6 | 80 | |
| Z | -13.4 | 103 | ND | | +72.2 | 60 | +17.9 | 48 | |
| R* | 38.6 | 103 | ND | | 56.2 | 77 | 45.0 | 77 | |
| SI | 215 @ 200 | | | | 520 @ 200 | | 453 @ 200 | | |
| FEMURS | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | |
| LF | ND | | ND | | -1669 | 64 | -1047 | 82 | |
| RT | ND | | ND | | -1244 | 66 | -754 | 45 | |

*3-msec clip

ND = No Data (Data not measured)

TABLE 2-23. SUMMARY OF RESTRAINT SYSTEM DATA
(TEST 3051-5)

VEHICLE: 1979 Chevrolet C-10 Truck

| | Peak Load (lb) | @ | Time (msec) |
|--------------------------|-------------------|---|----------------|
| Left Front Occupant | | | |
| Peak Shoulder Belt Load | 1020 | @ | 105 |
| Peak Left Lap Belt Load | 622 | @ | 98 |
| Peak Right Lap Belt Load | | | ND |
| Right Front Occupant | | | |
| Peak Shoulder Belt Load | | | ND |
| Peak Left Lap Belt Load | | | ND |
| Peak Right Lap Belt Load | | | ND |

VEHICLE: 1978 Plymouth Horizon 4-door Sedan

| | | | |
|--------------------------|------|---|-----|
| Left Front Occupant | | | |
| Peak Shoulder Belt Load | 1097 | @ | 78 |
| Peak Left Lap Belt Load | 1061 | @ | 60 |
| Peak Right Lap Belt Load | 1189 | @ | 82 |
| Right Front Occupant | | | |
| Peak Shoulder Belt Load | 1824 | @ | 100 |
| Peak Left Lap Belt Load | 1089 | @ | 64 |
| Peak Right Lap Belt Load | 1780 | @ | 65 |

ND = No Data (Data not measured)

3.0 PRESENTATION OF RESULTS (TEST 3051-6)

This section of the report presents the results of Test 3051-6, a frontal, 21-inch right offset crash test between a 1979 Chevrolet C-10 pickup truck (bullet vehicle) and a 1979 Chevrolet Impala 4-door sedan (target vehicle).

This report presents all test results without analysis or discussion. Included in this document are: still photographs, film chronologies, vehicle damage sketches and tabulated pre- and post-test dimensions, accelerometer location identification, summaries of electronic data, and summaries of the simulated occupant data, including injury criteria values. High-speed motion pictures were also obtained for this test and have been submitted to the sponsor. Appendix B contains Calcomp plots of all electronic data for this test.

TABLE 3-1. CRASH TEST SUMMARY (TEST 3051-6)

TEST NO. 3051-6 CONTRACT: DOT-HS-8-01942
 TEST DATE: November 28, 1978 TIME: 1423 TEMPERATURE 62 °F
 TEST CONFIGURATION: Front-to-Front Frontal, 21" right offset
 VEHICLE NO. 1: 1979 Chevrolet C-10 Truck
 VEHICLE NO. 2: 1979 Chevrolet Impala 4-door Sedan

| VEHICLE DATA | VEHICLE NO. 1 | VEHICLE NO. 2 |
|---|------------------------------------|------------------------------------|
| Overall Length/Width (in.) | 217.2 | 211.0 |
| Test Weight by Wheel (lb) | LF 1407 RF 1331 LR 1246 RR 1192 | LF 1105 RF 1111 LR 1100 RR 1081 |
| Total Weight (lb) | 5176 | 4397 |
| Wheelbase (in.) | 131.6 | 116.1 |
| Longitudinal C.G. (From Center of Front Axle) (in.) | 62.0 | 58.6 |
| Impact Angle (deg)* | 0 | 0 |
| Offset Distance (in.)** | 0 | -21.0 |
| Car Speed (mph) | +37.9 | +37.9 |
| Final Speed (mph @ msec) | +3.0 @ 200 | -8.6 @ 200 |
| Velocity Change (mph) | 34.9 | 46.49 |
| Maximum Compartment Acceleration (G @ msec) | -27.7 @ 46 | -33.3 @ 54 |
| Maximum Engine Acceleration (G @ msec) | -70.1 @ 37 | -126.4 @ 41 |
| Maximum Mutual Dynamic Crush (Film Data) (in.) | 92.3 | |
| Maximum Static Crush | | |
| ● Hood Level (in.) | 35.7 | 44.6 |
| ● Between Hood/Bumper (in.) | 40.4 | 45.6 |
| ● Bumper Level (in.) | 50.9 | 48.9 |
| Maximum Post-test Intrusion (in.) | 11.9 | 7.8 |

OCCUPANTS

| Type | Alderson Part 572 | Alderson Part 572 |
|------------|--------------------------------|--------------------------------|
| Location | LF - Driver RF - Passenger | LF - Driver RF - Passenger |
| Restraints | Standard Lap/ Shoulder Belt | Standard Lap/ Shoulder Belt |

INSTRUMENTATION

| | | |
|-------------------------|----|----|
| Number of Data Channels | 14 | 28 |
| Number of Cameras | 5 | |

*With respect to tow track centerline.

**21-inch right offset between vehicle centerlines.

TABLE 3-2. BULLET VEHICLE INSPECTION SHEET (TEST 3051-6)

Contractor: Dynamic Science, Inc. Contract No.: DOT-HS-8'-01942
 VIN NO.: 1L69L9C116144 Make: Chevrolet

NHTSA No.: _____

Year: 1979 Color: Red/White Model: Impala

| | | |
|---|---|-------------------------|
| Auto Trans: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Pwr Steering: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Seats: Bench: <u>X</u> |
| Pwr Brakes: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Auto Speed Cont: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | (front) Bucket: _____ |
| Pwr Seats: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | Anti Skid Brake: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | Split Bench: _____ |
| Pwr Windows: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | Air Conditioning: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Split Back Bench: _____ |
| Tinted Glass: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Rear Window Def.: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | |
| Radio: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no | Brakes: drum: <u>R</u> disc: <u>F</u> | |
| Clock: <input type="checkbox"/> yes <input checked="" type="checkbox"/> no | | |

Tire Size: FR78-15 Ply Rating: 4 Mfg. & Line: Uniroyal PR6

Bias Ply: _____ Belted: _____ Radial X /Eng.Type: V-8 Cylinders: 8 Total Displ: 350 CID
 Trans, # Fwd. Speeds: 3 Shipping Weight: _____ Odometer: 26

Dealer (name, address, and phone number)
Courtesy Chevrolet
1233 East Camelback Road
Phoenix, Arizona

Remarks (list additional accessories not listed above)

White Vinyl Roof

Date of Manufacture: 10-78 Dynamic Science No.: 770 Date Received: 11-8-78

Tilting Steering Wheel: yes no Telescoping Steering Wheel: yes no

Fuel Capacity: _____ "Space Saver" Spare Tire yes no
 (from owner's manual)

Restraint System: Standard lap/shoulder belts

1. Is the vehicle stock throughout? Describe: Yes, except mirros, windshield wipers, wheel covers, spare tire, jack removed. 88 lb of lead added as ballast in trunk and 60 lb in right rear passenger floorboard. Fuel Tank 100% full of water.
2. Does vehicle show evidence of prior accident history? Describe: No
3. Does vehicle show any significant corrosion? Describe: No
4. Check condition of the front bumper and frame: OK, no bumper guards

TABLE 3-3. TARGET VEHICLE INSPECTION SHEET (TEST 3051-6)

Contractor: Dynamic Science, Inc. Contract No.: DOT-HS-8-01942
 VIN NO.: CCL449F319845 Make: Chevrolet Pickup Truck
 NHTSA No.: _____

Year: 1979 Color: White Model: C-10

| | | |
|--|--|-------------------------|
| Auto Trans: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | Pwr Steering: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> | Seats: Bench: <u>X</u> |
| Pwr Brakes: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> | Auto Speed Cont: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | (front) Bucket: _____ |
| Pwr Seats: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | Anti Skid Brake: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | Split Bench: _____ |
| Pwr Windows: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | Air Conditioning: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> | Split Back Bench: _____ |
| Tinted Glass: <input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> | Rear Window Def.: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | |
| Radio: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | Brakes: drum: <u>R</u> disc: <u>F</u> | |
| Clock: yes <input type="checkbox"/> no <input checked="" type="checkbox"/> | | |

Tire Size: L78-15 Ply Rating: _____ Mfg. & Line: Uniroyal: F - Glass Belted R - Snow Plow
 Bias Ply: X Belted: _____ Radial _____ /Eng.Type: V-8 Cylinders: 8 Total 350 Displ: CID
 Trans, # Fwd. Speeds: 4 Shipping Weight: _____ Odometer: 23

Dealer (name, address, and phone number)
Courtesy Chevrolet
1233 East Camelback Road
Phoenix, Arizona

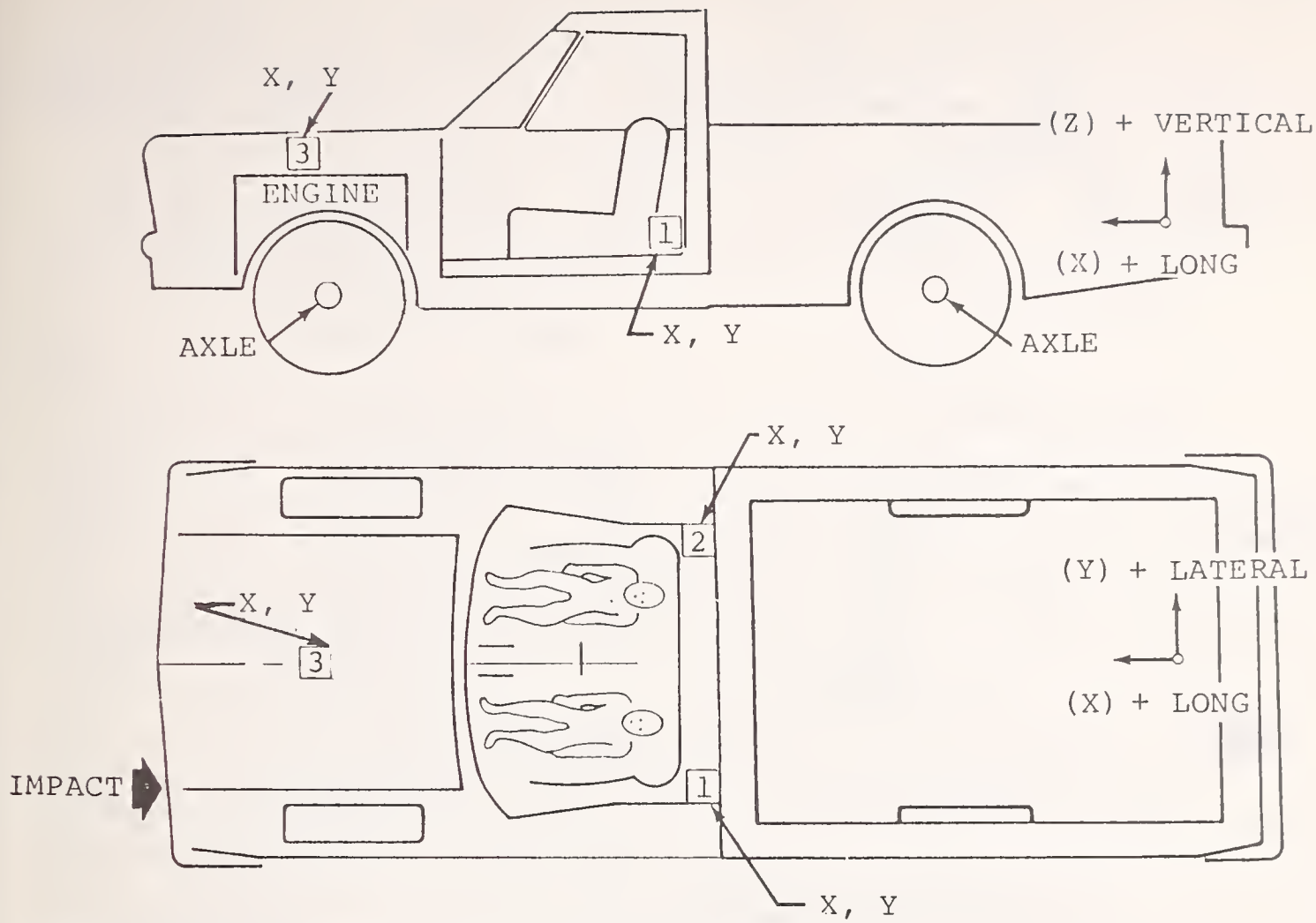
Remarks (list additional accessories not listed above)

Dual Fuel Tanks

Date of Manufacture: 9-78 Dynamic Science No.: 761 Date Received: 10-12-78
 Tilting Steering Wheel: yes no Telescoping Steering Wheel: yes no
 Fuel Capacity: _____ "Space Saver" Spare Tire yes no
 (from owner's manual)

Restraint System: Standard Lap/Shoulder Belts

- Is the vehicle stock throughout? Describe: Yes, except 192 lb of lead as ballast placed over rear axle. All fluids drained except fuel tanks 100% full of water. Windshield wipers & mirrors removed.
- Does vehicle show evidence of prior accident history? Describe: NO
- Does vehicle show any significant corrosion? Describe: NO
- Check condition of the front bumper and frame: OK



VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES

MAXIMUM EXPECTED READINGS

| NO. | DESCRIPTION OF LOCATION | X** | Y** | Z** | LONG* | LAT* | VERT* |
|-----|--|-----|-----|-----|-------|------|-------|
| 1 | Rocker panel near B-pillar behind driver's seat | 111 | -28 | 28 | 50 | 50 | |
| 2 | Rocker panel near B-pillar behind passenger's seat | 111 | 28 | 29 | 50 | 50 | |
| 3 | Top of engine block | 178 | 0 | 31 | 200 | 200 | |

*G's.

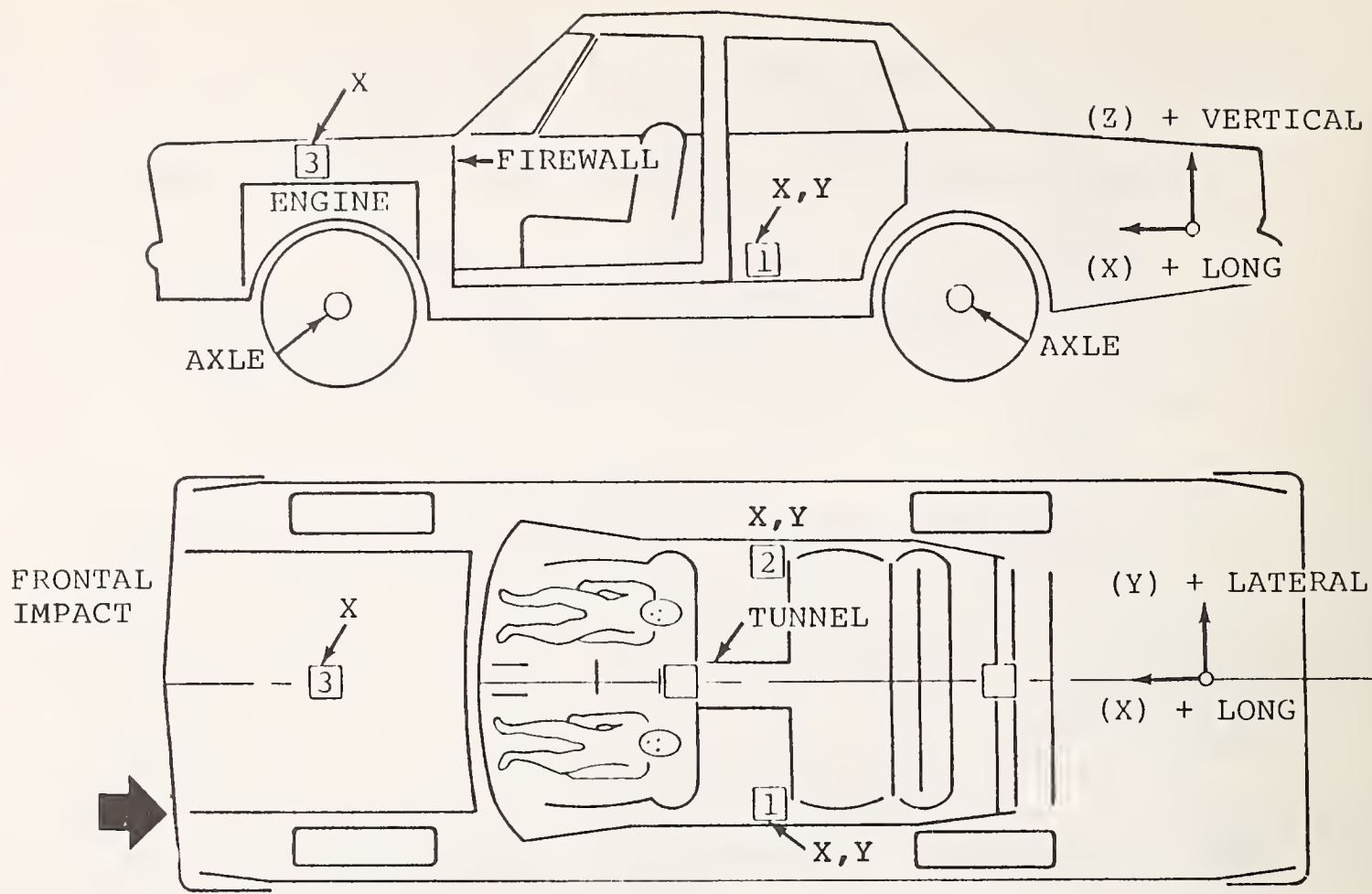
**Reference points:

X - Direction - Centerline of rear bumper

Y - Direction - Centerline of vehicle - left centerline (-), right centerline (+)

Z - Direction - Ground level

Figure 3-1. 1979 Chevrolet C-10 Truck Accelerometer Instrumentation (Test 3051-6).



VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES MAXIMUM EXPECTED READINGS

| NO. | DESCRIPTION OF LOCATION | X** | Y** | Z** | LONG* | LAT* | VERT* |
|-----|--|-----|-----|-----|-------|------|-------|
| 1 | Rocker panel near B-pillar behind driver's seat | 94 | -24 | 12 | 50 | 50 | |
| 2 | Rocker panel near B-pillar behind passenger's seat | 94 | +24 | 12 | 50 | 50 | |
| 3 | Top of engine block | 168 | 0 | 31 | 200 | | |

*G's
 **Reference points:
 X - Direction - Centerline of rear bumper
 Y - Direction - Centerline of vehicle - left centerline (-), right centerline (+)
 Z - Direction - Ground level

Figure 3-2. 1979 Chevrolet Impala Accelerometer Instrumentation (Test 3051-6).

TABLE 3-4. INSTRUMENTATION SUMMARY (TEST 3051-6)

TEST NO. 3051-6 VEHICLE: 1979 Chevrolet C-10 Truck

| <u>Instrument</u> | <u>Numbers</u> | <u>Total No. of Data Channels</u> |
|---|----------------|-----------------------------------|
| Vehicle Accelerometers* | 3 locations | 6 |
| Dummy Instrumentation = Head (3), Chest (3) | 1 location | 6 |
| Seat Belt Load Cells = Lap (1), Shoulder (1) | 1 location | 2 |
| | TOTAL | 14 - 1 RSCM |

VEHICLE: 1979 Chevrolet Impala

| | | |
|---|-------------|---------------|
| Vehicle Accelerometers** | 3 locations | 5 |
| Dummy Instrumentation = Head (3), Chest (3), Femur (2) | 2 locations | 16 |
| Seat Belt Load Cells = Lap (2), Shoulder (1) | 2 locations | 6 |
| Impact Switch | | 1 |
| | TOTAL | 28 - 2 RSCM's |

*See Figure 3-1 for locations.

**See Figure 3-2 for locations.

TABLE 3-6. SUMMARY OF PRE-TEST ENGINE/BUMPER/FIREWALL CHARACTERISTICS - CHEVROLET C-10 TRUCK (TEST 3051-6)

| | | | |
|-------------------------------|----------------------|---------------------|---------------------------|
| Test No. | 3051-6 | Type | Head-on, 21" right offset |
| Car Model | Chevrolet C-10 Truck | Dynamic Science No. | 761 |
| Engine Size | 350 CID | | |
| Engine Weight* (lb) | 675 | | |
| Engine Height/Width (in.) | 34.9/21.0 | | |
| Bumper to Engine (in.) | 29.2 | | |
| Engine Length (in.) | 21.5 | | |
| Engine to Firewall (in.) | 2.1 | | |
| Bumper to Firewall (in.) | 52.8 | | |
| Bumper Height (max/min) (in.) | 24.0/14.9 | | |

*Includes engine and rigid attachments such as transmission and drive train.

TABLE 3-7. CHEVROLET C-10 TRUCK PRE-TEST DUMMY POSITIONS (TEST 3051-6)

| Distances (in.) | Driver | Passenger |
|--|--------|-----------|
| Chest to Steering Wheel Hub (horizontal) | 11.3 | |
| Nose to Steering Wheel Upper Rim | 15.0 | |
| Nose to Windshield (horizontal) | 25.0 | 25.9 |
| Knee to Lower Panel (closest point) | | |
| Left | 8.7 | 6.3 |
| Right | 8.3 | 6.8 |
| Chest to Dash (horizontal) | 25.5 | 23.4 |
| Forehead to Header | 18.5 | 20.3 |
| Dummy Serial Number | A03 | A04 |

TABLE 3-8. SUMMARY OF PRE-TEST ENGINE/BUMPER/FIREWALL CHARACTERISTICS - CHEVROLET IMPALA (TEST 3051-6)

| | | | |
|---------------------------------|------------------|---------------------|---------------------------|
| Test No. | 3051-6 | Type | Head-on, 21" right offset |
| Car Model | Chevrolet Impala | Dynamic Science No. | 770 |
| Engine Size | 350 CID | | |
| Engine Weight* (lb) | 675 | | |
| Engine Height/Width (in.) | 30.1/20.9 | | |
| Bumper to Engine (in.) | 34.8 | | |
| Engine Length (in.) | 21.8 | | |
| Engine to Firewall (in.) | 3.7 | | |
| Bumper to Firewall (in.) | 60.3 | | |
| Bumper Height (max./min.) (in.) | 22.8/13.0 | | |

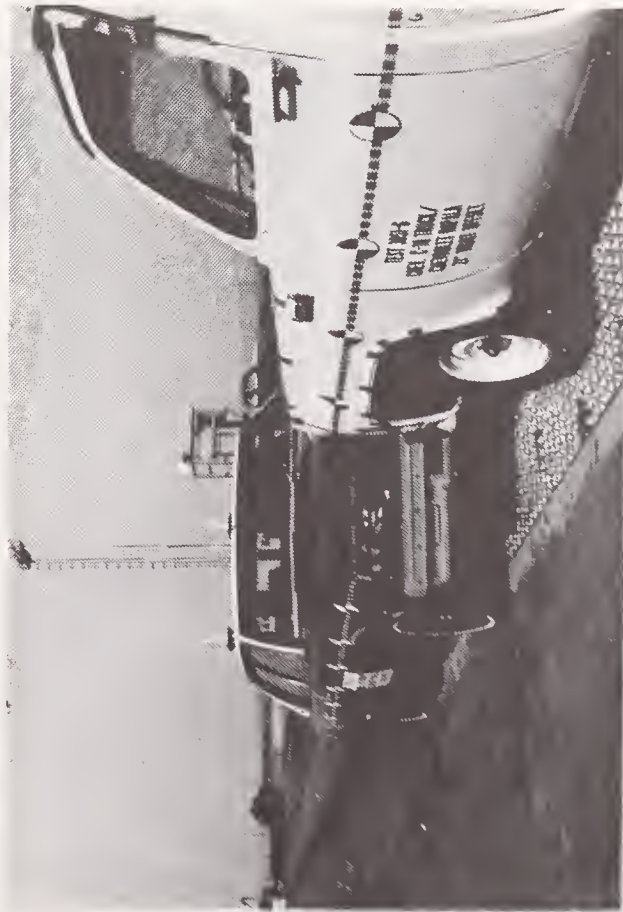
*Includes engine and rigid attachments such as transmission and drive train.

TABLE 3-9. CHEVROLET IMPALA PRE-TEST DUMMY POSITIONS (TEST 3051-6)

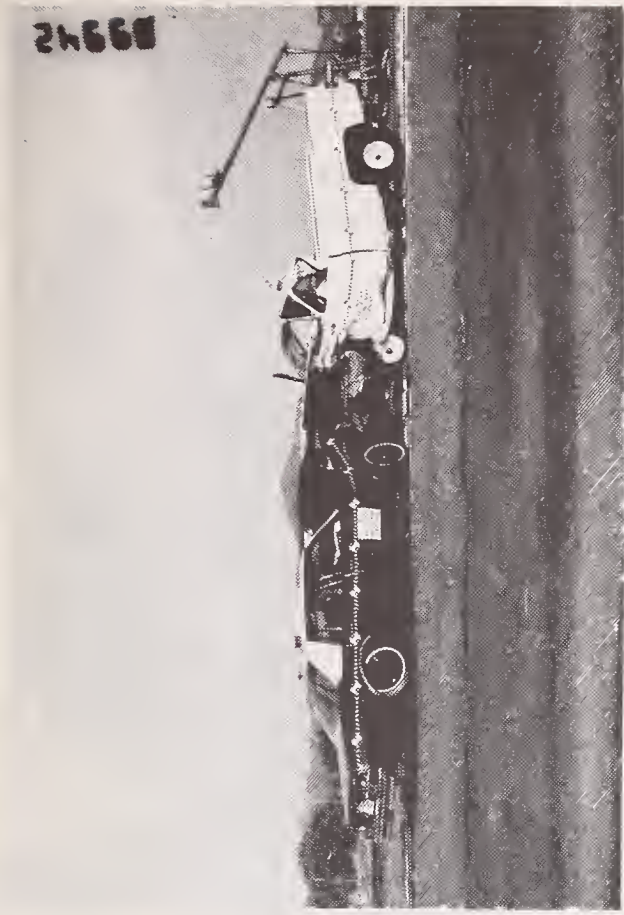
| Distances (in.) | Driver | Passenger |
|--|--------|-----------|
| Chest to Steering Wheel Hub (horizontal) | 12.8 | |
| Nose to Steering Wheel Upper Rim | 14.8 | |
| Nose to Windshield (horizontal) | 21.9 | 21.6 |
| Knee to Lower Panel (closest point) | | |
| Left | 7.6 | 8.5 |
| Right | 8.4 | 8.4 |
| Chest to Dash (horizontal) | 20.8 | 19.9 |
| Forehead to Header | 13.6 | 14.4 |
| Dummy Serial Number | 759 | 760 |



a) Pre-test



b) Pre-test



c) Post-test



d) Post-test

Figure 3-3. Pre- and Post-test Vehicle Configurations (Test 3051-6).

9 003

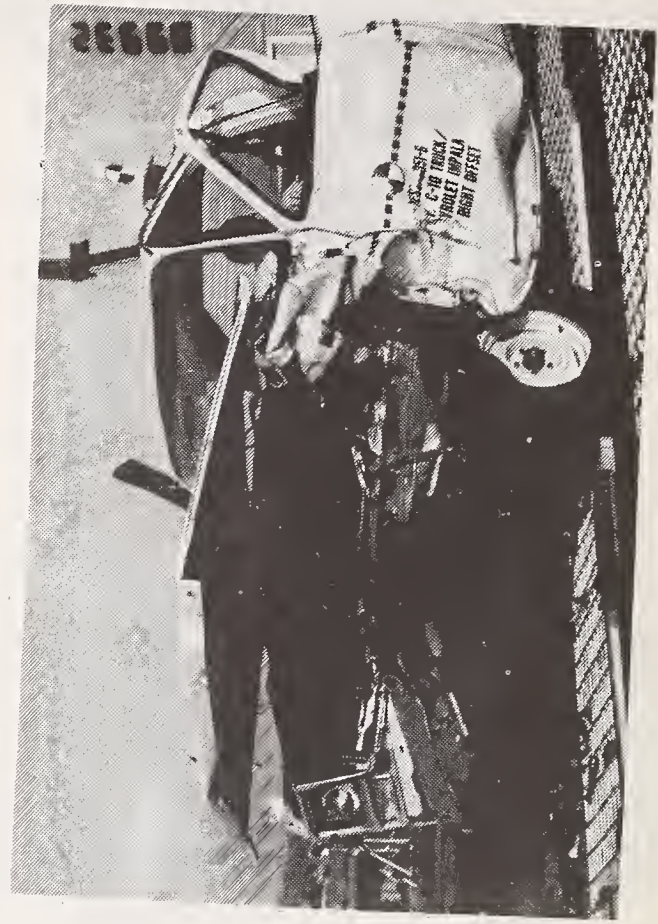
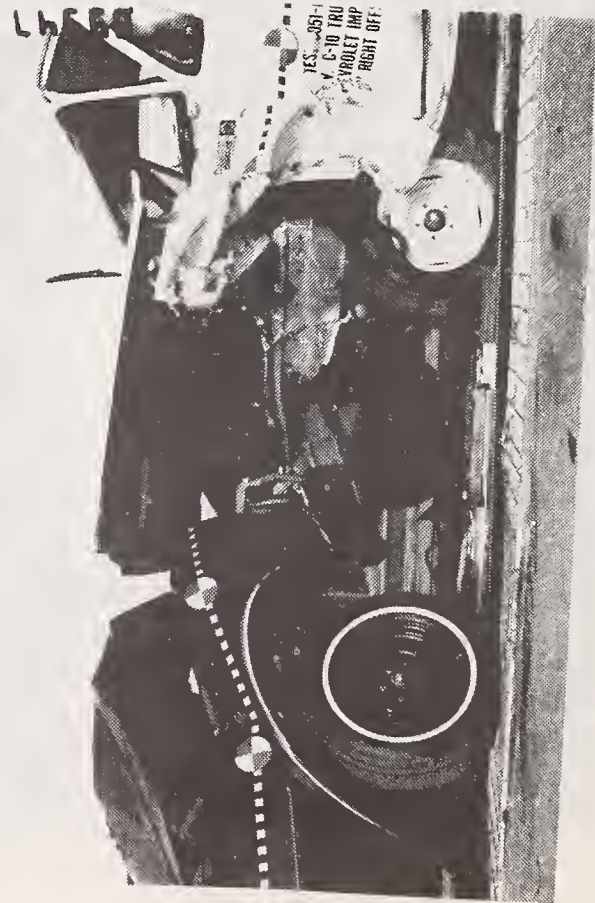


Figure 3-4. Post-test Chevrolet C-10 Truck Configuration (Test 3051-6).

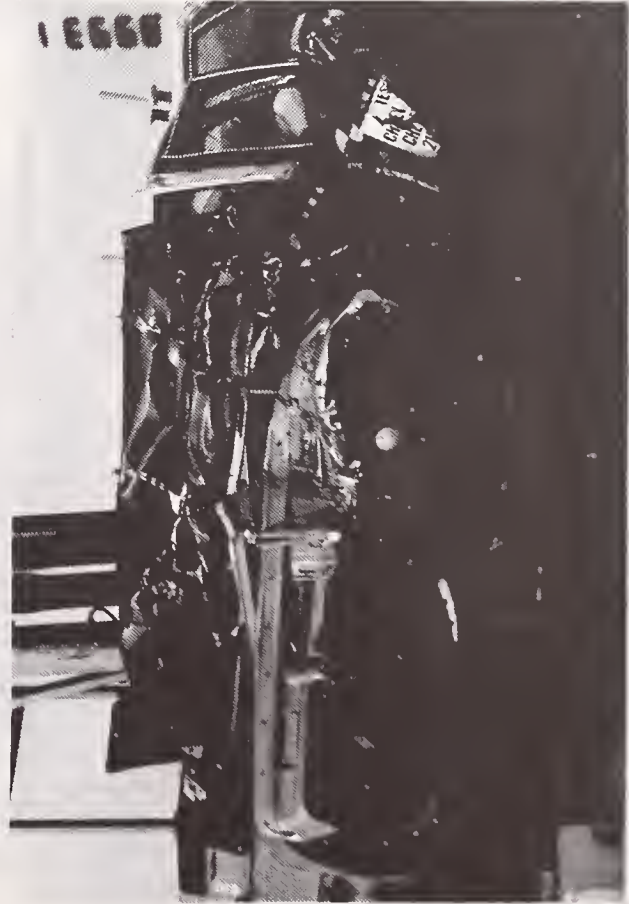
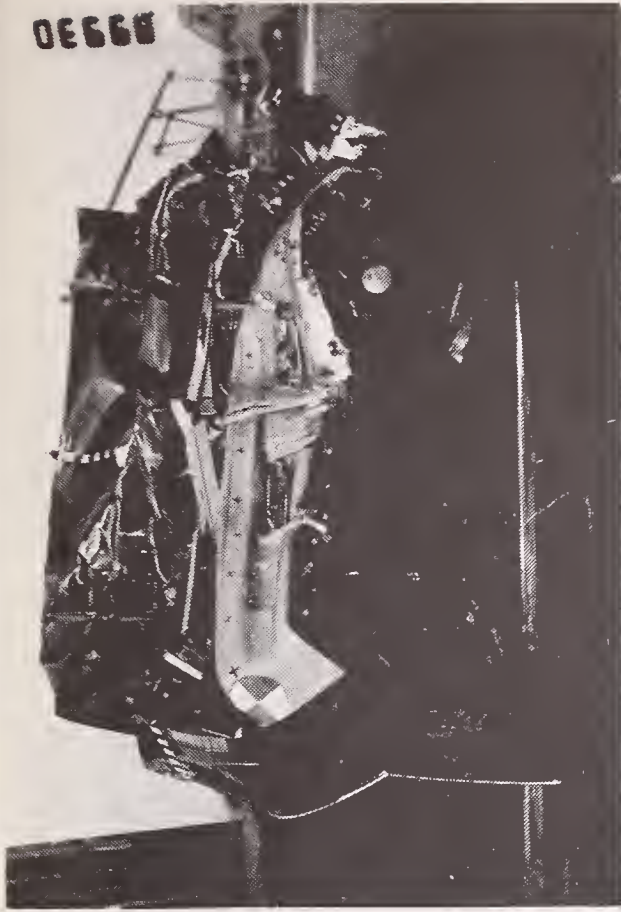
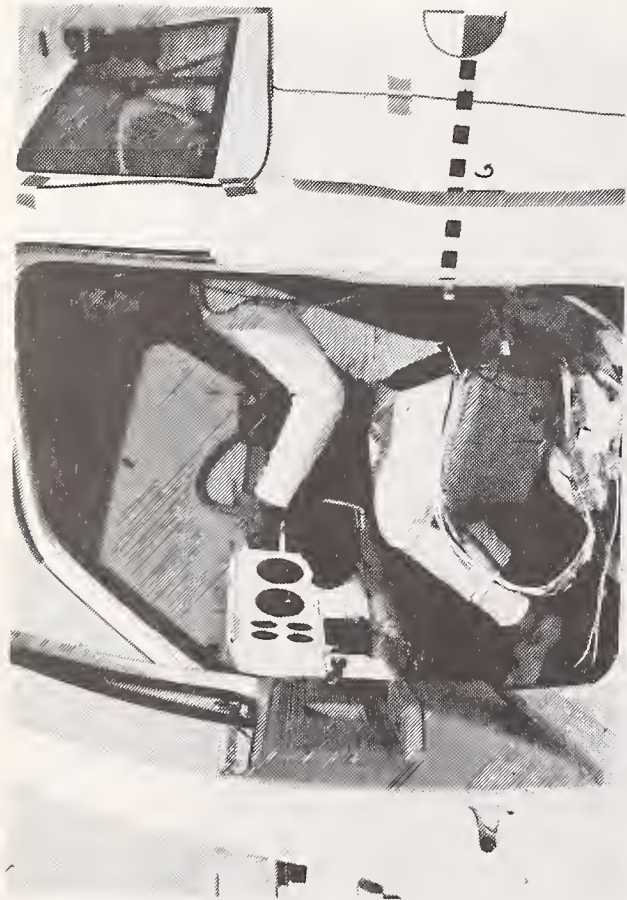
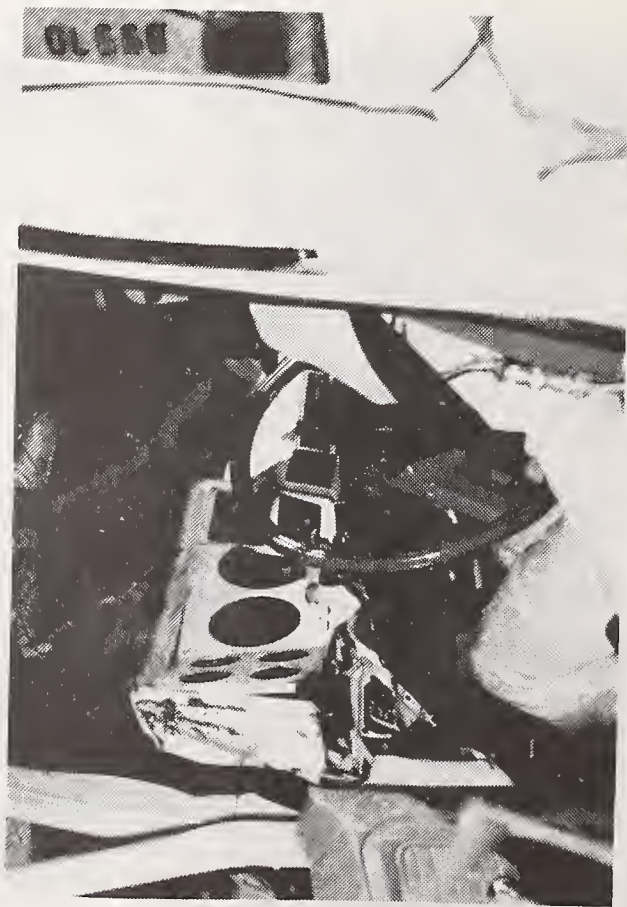


Figure 3-5. Post-test Chevrolet Impala Configuration (Test 3051-6).



a) Pre-test Driver



b) Post-test Driver



c) Pre-test Passenger



d) Post-test Passenger

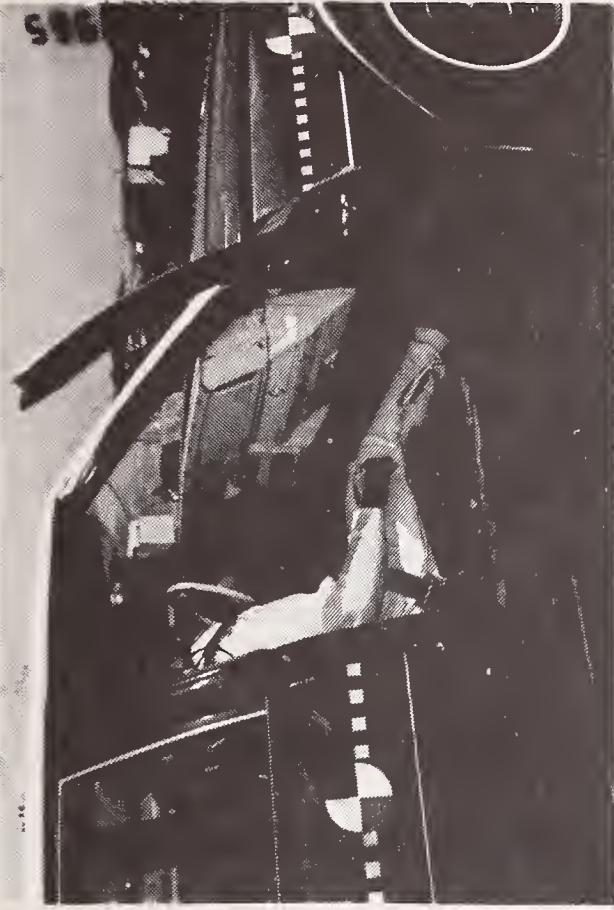
Figure 3-6. Chevrolet C-10 Truck Dummy Configuration (Test 3051-6).



a) Pre-test Driver



b) Post-test Driver



c) Pre-test Passenger



d) Post-test Passenger

Figure 3-7. Chevrolet Impala Dummy Configuration (Test 3051-6).

TABLE 3-10. CHRONOLOGY OF EVENTS (TEST 3051-6)

| Time (msec) | Chevrolet C-10 Truck | Time (msec) | Chevrolet Impala |
|-------------|---|-------------|---|
| 0 | Impact (visual) | 0 | Impact (visual) |
| 10 | Vehicle grilles contact | 16 | Hood buckles |
| 22 | Bumper of car hits truck left front tire | 77 | Windshield breaks |
| 45 | Hood of truck latch fails | 83 | Driver hits steering wheel |
| 57 | Dash begins intrusion; right front tire twists forward into front fender well | 86 | Passenger hits dash |
| 67 | Driver hits steering column | 89 | Rear axle breaks |
| 74 | Windshield shatters | 104 | Driver hits dash: passenger stops forward motion |
| 95 | Driver stops forward motion | 118 | Driver stops forward motion; left rear tire leaves ground |
| 112 | Driver recontacts seat back | 136 | Maximum vehicle inclination (4.5°) |
| 115 | Passenger hits dash | 183 | Driver recontacts seat back |
| 128 | Right front and left rear tires leave ground | | |
| 132 | Passenger stops forward motion | | |
| 135 | Driver's head contacts rear of truck cab | | |
| 139 | Maximum mutual dynamic crush (92.3") | | |
| 158 | Maximum vehicle inclination (8.25°) | | |
| 163 | Left front tire leaves ground | | |
| 235 | Passenger recontacts seat back | | |
| 296 | Right front tire touches ground | | |
| 338 | Left front tire touches ground | | |

TABLE 3-11. SUMMARY OF POST-TEST OBSERVATIONS - CHEVROLET C-10 TRUCK (TEST 3051-6)

VEHICLE: 1979 Chevrolet C-10 Truck

| Dummy Contact Points: | Left Front | Right Front |
|-----------------------|------------------------|-------------|
| Head----- | Top of steering column | Top of dash |
| Chest----- | Steering column hub | No contact |
| Knees----- | Dash | Dash |

Glazing: 100% shattered, 40% retained

Doors: Right side opened easily.

Left side required tools to open.

Seat Belt Anchorages and Restraints: No seat movement.

Vehicle Centerline to Barrier Centerline: Front - 24 inches right,
Rear - 53 inches right

Fuel Leakage: None

General Observations: Hood latch failed. Driver door latch failed. Left front tire flat and in trench. Left front rim bent. Front of truck 8 feet past impact. Transmission on track. Driver compartment severely damaged showing large amounts of compartment intrusion. Front axle at approximately 15° angle from original position. Large amount of floor intrusion.

TABLE 3-12. SUMMARY OF POST-TEST OBSERVATIONS - CHEVROLET
C-10 TRUCK (TEST 3051-6)

VEHICLE: 1979 Chevrolet Impala

| Dummy Contact Points: | Left Front | Right Front |
|-----------------------|---------------------|-------------|
| Head----- | Top of dash | Top of dash |
| Chest----- | Steering column hub | No contact |
| Knees----- | Dash | Dash |

Glazing: 100% shattered, 100% retrained

Doors: Right side doors easy to open. Left rear door difficult to open. Left front required tools.

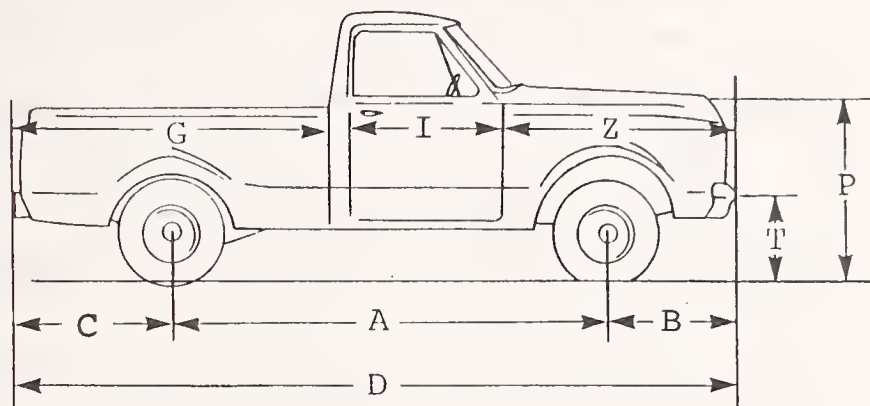
Seat Belt Anchorages and Restraints: OK, No seat movement.

Vehicle Centerline to Barrier Centerline: Front - 16 inches left, Rear - 75 inches right

Fuel Leakage: None

General Observations: Right front tire in trench. Left front tire flat. Rear axle broken at differential casing. Front of car rebounded 5 feet from impact. Transmission pushed down onto track. Front axle bent at approximately 25° angle from original position. Large amounts of compartment intrusion. Bumper and engine rotated upwards.

TABLE 3-13. PRE- AND POST-TEST DIMENSION MEASUREMENTS -
BULLET VEHICLE (TEST 3051-6)

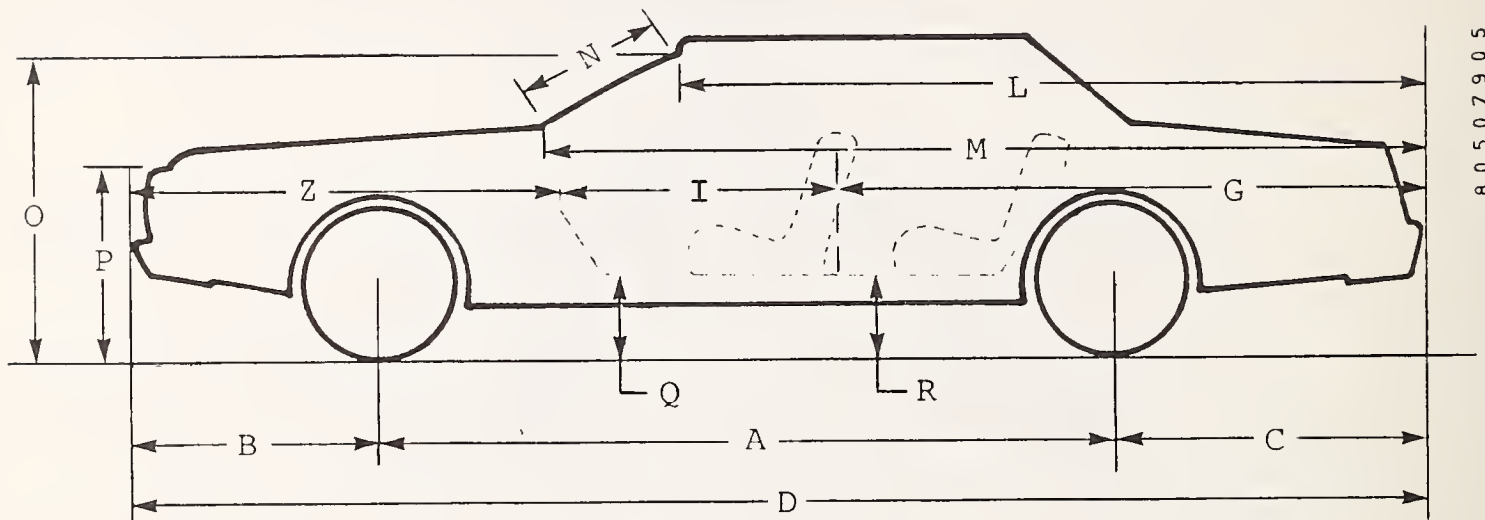


80902302

VEHICLE: 1979 Chevrolet C-10 Truck

| | Pre-test (in.) | | Post-test (in.) | | Difference (in.) | |
|---|-------------------|-------|--------------------|-------|---------------------|------|
| | LS | RS | LS | RS | LS | RS |
| A | 131.7 | 131.5 | 109.7 | 137.3 | 22.0 | -5.8 |
| B | 33.3 | 33.9 | 21.9 | 23.8 | 11.4 | 10.1 |
| C | 52.1 | 52.0 | 51.1 | 51.2 | 1.0 | .8 |
| D | 217.1 | 217.4 | 182.7 | 212.3 | 34.4 | 5.1 |
| I | 38.9 | 38.9 | 25.1 | 38.8 | 13.8 | .1 |
| G | 107.5 | 107.6 | 108.6 | 108.6 | -1.1 | -1.0 |
| P | 39.0 | 39.1 | 39.9 | 39.1 | -0.9 | 0.0 |
| T | 22.5 | 22.6 | 29.6 | 20.5 | -7.1 | 2.1 |
| Z | 63.4 | 64.1 | 41.6 | 58.8 | 21.8 | 5.3 |

TABLE 3-14. PRE- AND POST-TEST DIMENSION MEASUREMENTS - TARGET VEHICLE (TEST 3051-6)



VEHICLE: 1979 Chevrolet Impala

| | Pre-test (in.) | | Post-test (in.) | | Difference (in.) | |
|---|-------------------|-------|--------------------|-------|---------------------|------|
| | LS | RS | LS | RS | LS | RS |
| A | 116.2 | 116.0 | 98.3 | 118.0 | 17.9 | -2.0 |
| B | 40.1 | 40.1 | 19.8 | 35.0 | 20.3 | 5.1 |
| C | 54.8 | 55.0 | 56.3 | 54.3 | -1.5 | 0.7 |
| D | 211.0 | 211.1 | 174.4 | 207.3 | 36.6 | 3.8 |
| I | 38.0 | 38.0 | 28.0 | 37.3 | 10.0 | 0.7 |
| G | 102.9 | 103.0 | 103.5 | 104.1 | -0.6 | -1.1 |
| L | 120.2 | 119.6 | 123.4 | 122.1 | -3.2 | -2.5 |
| M | 139.5 | 138.9 | 127.5 | 140.0 | 12.0 | -1.1 |
| N | 25.6 | 26.0 | 23.6 | 25.9 | 2.0 | 0.1 |
| O | 55.0 | 55.3 | 53.7 | 53.7 | 1.3 | 1.6 |
| P | 31.2 | 31.0 | 37.8 | 39.7 | -6.6 | -8.7 |
| Q | 14.9 | 14.8 | 7.5 | 11.8 | 7.4 | 3.0 |
| R | 14.7 | 14.9 | 8.0 | 12.6 | 6.7 | 2.3 |
| Z | 70.1 | 70.1 | 42.9 | 65.9 | 27.2 | 4.2 |

TABLE 3-15. CHEVROLET C-10 TRUCK EXTERIOR PROFILES AND STATIC CRUSH (TEST 3051-6)

| Location | Height at \bar{E} | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | | |
|--|---------------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|------|------|------|-----|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 39.6 | 220 | 7.8 | 7.5 | 6.0 | 5.9 | 5.7 | 5.6 | 5.5 | 5.6 | 5.7 | 5.9 | 6.1 | 7.6 | 8.0 |
| Between Bumper/Hood | 31.1 | 220 | 8.5 | 9.7 | 6.6 | 6.5 | 6.4 | 6.2 | 6.2 | 6.3 | 6.4 | 6.6 | 6.9 | 10.0 | 8.4 |
| Bumper Level | 19.9 | 220 | 5.0 | 3.9 | 3.5 | 3.4 | 3.2 | 3.5 | 3.5 | 3.5 | 3.1 | 3.2 | 3.4 | 3.6 | 5.0 |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 43.1 | 220 | 43.5 | 41.6 | 36.6 | 33.7 | 30.9 | 28.0 | 26.2 | 22.9 | 19.1 | 16.6 | 13.5 | 11.6 | 8.9 |
| Between Bumper/Hood | 38.1 | 220 | 48.9 | 48.5 | 49.0 | 44.7 | 38.7 | 37.1 | 34.4 | 33.2 | 30.5 | 24.1 | 19.9 | 13.8 | 9.9 |
| Bumper Level | 28.6 | 220 | 55.9 | 51.8 | 47.7 | 42.6 | 38.3 | 36.0 | 32.1 | 28.5 | 23.0 | 18.1 | 13.9 | 10.2 | 7.2 |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | | |
| Hood Level | 3.5 | | 35.7 | 34.1 | 30.6 | 27.8 | 25.2 | 22.4 | 20.7 | 17.3 | 13.4 | 10.7 | 7.4 | 4.0 | 0.9 |
| Between Bumper/Hood | 7.0 | | 40.4 | 38.8 | 42.4 | 38.2 | 32.3 | 30.9 | 28.2 | 26.9 | 24.1 | 17.5 | 13.0 | 3.8 | 1.5 |
| Bumper Level | 8.7 | | 50.9 | 47.9 | 44.2 | 39.2 | 35.1 | 32.5 | 28.6 | 25.0 | 19.9 | 14.9 | 10.5 | 6.6 | 2.2 |

*As viewed from driver position in truck.

**Reference Plane from rear bumper of truck.

TABLE 3-16. CHEVROLET C-10 TRUCK INTERIOR PROFILES AND STATIC CRUSH (TEST 3051-6)

| Location | Height at \bar{C} | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | |
|--|------------------------|-------|-----------------------------------|------|------|------|------|------|------------------------------------|------|------|------|------|----|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 49.6 | 130 | 19.5 | 21.5 | 21.7 | 21.3 | 19.4 | 24.4 | 24.4 | 24.3 | 24.0 | 23.5 | 23.0 | |
| Knee Level | 37.9 | 130 | 23.0 | 23.4 | 23.5 | 23.2 | 23.4 | 21.0 | 23.0 | 22.9 | 22.4 | 20.5 | | |
| Floor Level | 28.0 | 140 | 21.2 | 21.7 | 22.1 | 22.7 | 21.2 | 20.5 | 20.4 | 21.0 | 20.5 | 20.0 | 19.6 | |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 48.7 | 130 | 9.0 | 11.9 | 13.1 | 13.8 | 12.7 | 18.9 | 20.1 | 21.0 | 21.7 | 22.4 | 22.5 | |
| Knee Level | 36.3 | 130 | 11.1 | 14.9 | 13.3 | 14.6 | 13.1 | 16.5 | 18.3 | 21.1 | 22.0 | 22.7 | 22.7 | |
| Floor Level | 26.8 | 143.5 | 9.7 | 9.0 | 10.9 | 10.1 | 8.1 | 6.0 | 5.5 | 10.1 | 11.9 | 15.8 | 16.5 | |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | |
| Dash Level | 0.9 | | 10.5 | 9.6 | 9.6 | 7.5 | 6.7 | 5.5 | 4.3 | 3.3 | 2.3 | 1.1 | .5 | |
| Knee Level | 1.6 | | 11.9 | 8.5 | 10.2 | 8.9 | 10.1 | 6.9 | 2.7 | 1.9 | -0.9 | -0.3 | -2.2 | |
| Floor Level | 1.2 | | 8.0 | 9.2 | 7.7 | 9.1 | 9.6 | 11.0 | 11.4 | 7.4 | 5.1 | 0.7 | -0.4 | |

*As viewed from driver position in truck.

**Reference Plane from rear bumper of truck.

TABLE 3-17. CHEVROLET IMPALA EXTERIOR PROFILES AND STATIC CRUSH (TEST 3051-6)

| Location | Height at \bar{C} | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | | |
|--|---------------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|------|------|------|------|
| | | | 36 | 30 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 31.9 | 220 | 17.9 | 17.4 | 16.6 | 15.8 | 15.0 | 14.2 | 13.5 | 14.3 | 15.1 | 15.8 | 16.6 | 17.3 | 17.8 |
| Between Bumper/Hood | 27.1 | 220 | 17.6 | 18.9 | 18.9 | 15.6 | 15.3 | 14.5 | 13.1 | 14.6 | 15.5 | 15.5 | 19.0 | 18.9 | 17.6 |
| Bumper Level | 20.2 | 220 | 14.1 | 13.0 | 12.2 | 11.4 | 10.6 | 9.8 | 9.0 | 9.8 | 10.6 | 11.3 | 12.0 | 12.9 | 14.2 |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | | |
| Hood Level | 41.0 | 210 | 52.5 | 51.5 | 49.5 | 46.9 | 44.0 | 40.8 | 35.7 | 34.0 | 30.9 | 31.2 | 27.2 | 24.0 | 12.5 |
| Between Bumper/Hood | 37.5 | 210 | - | 54.5 | 51.8 | 47.1 | 44.5 | 41.5 | 38.2 | 33.9 | 31.0 | 22.5 | 22.4 | 19.0 | 11.0 |
| Bumper Level | 34.4 | 210 | 53.0 | 50.4 | 47.5 | 44.6 | 43.1 | 38.5 | 33.1 | 28.6 | 24.3 | 19.0 | 13.7 | 8.5 | 3.5 |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | | |
| Hood Level | -9.1 | | 44.6 | 44.1 | 42.9 | 41.1 | 39.0 | 36.6 | 32.2 | 29.7 | 25.8 | 25.4 | 20.6 | 16.7 | 4.7 |
| Between Bumper/Hood | 10.4 | | - | 45.6 | 42.9 | 41.5 | 39.2 | 37.0 | 35.1 | 29.3 | 25.5 | 17.0 | 13.4 | 10.1 | 3.4 |
| Bumper Level | 14.2 | | 48.9 | 47.4 | 45.3 | 43.2 | 42.5 | 38.7 | 34.1 | 28.8 | 23.7 | 17.7 | 11.7 | 5.6 | -0.7 |

*As viewed from driver position in car.

**Reference Plane from rear bumper of car.

TABLE 3-18. CHEVROLET IMPALA INTERIOR PROFILES AND STATIC CRUSH (TEST 3051-6)

| Location | Height at \bar{C} | RP** | Distance Left of Center (in.)* | | | | | | Distance Right of Center (in.)* | | | | | |
|--|---------------------|------|--------------------------------|------|------|------|------|------|---------------------------------|------|------|------|------|------|
| | | | 36 | 28 | 24 | 18 | 12 | 6 | 0 | 6 | 12 | 18 | 24 | 28 |
| Pre-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 42.2 | 115 | 14.5 | 15.2 | 15.5 | 15.7 | 16.0 | 16.0 | 16.0 | 16.0 | 15.9 | 15.5 | 15.0 | 14.4 |
| Knee Level | 32.0 | 115 | 19.5 | 19.4 | 19.5 | 19.7 | 19.9 | 19.6 | 20.2 | 20.0 | 19.5 | 19.5 | 19.1 | |
| Floor Level | 21.1 | 128 | 20.3 | 20.5 | 20.7 | 22.0 | 19.5 | 17.4 | 18.6 | 21.0 | 21.0 | 20.9 | 21.0 | |
| Post-test Profile (Distance from R.P. - in.) | | | | | | | | | | | | | | |
| Dash Level | 38.8 | 115 | 8.0 | 10.1 | 10.7 | 11.6 | 12.9 | 13.8 | 14.6 | 14.8 | 14.9 | 14.5 | 14.4 | |
| Knee Level | 25.9 | 115 | 13.6 | 13.9 | 13.0 | 13.1 | 14.2 | 15.3 | 20.3 | 18.2 | 18.5 | 18.5 | 19.8 | |
| Floor Level | 15.7 | 130 | 13.2 | 12.0 | 10.9 | 12.4 | 11.4 | 10.6 | 12.6 | 16.9 | 18.4 | 19.0 | 19.3 | |
| Post-test Static Crush (in.) | | | | | | | | | | | | | | |
| Dash Level | 3.4 | | 6.5 | 5.1 | 4.8 | 4.1 | 3.1 | 2.2 | 1.4 | 1.1 | 0.6 | 0.5 | 0.0 | |
| Knee Level | 6.1 | | 5.9 | 5.5 | 6.5 | 6.6 | 5.7 | 4.3 | -0.1 | 1.8 | 1.5 | 1.0 | -0.7 | |
| Floor Level | 5.4 | | 5.1 | 6.5 | 7.8 | 7.6 | 6.1 | 4.8 | 4.0 | 2.1 | 0.6 | -0.1 | -0.3 | |

*As viewed from driver position in car.

**Reference Plane from rear bumper of car.

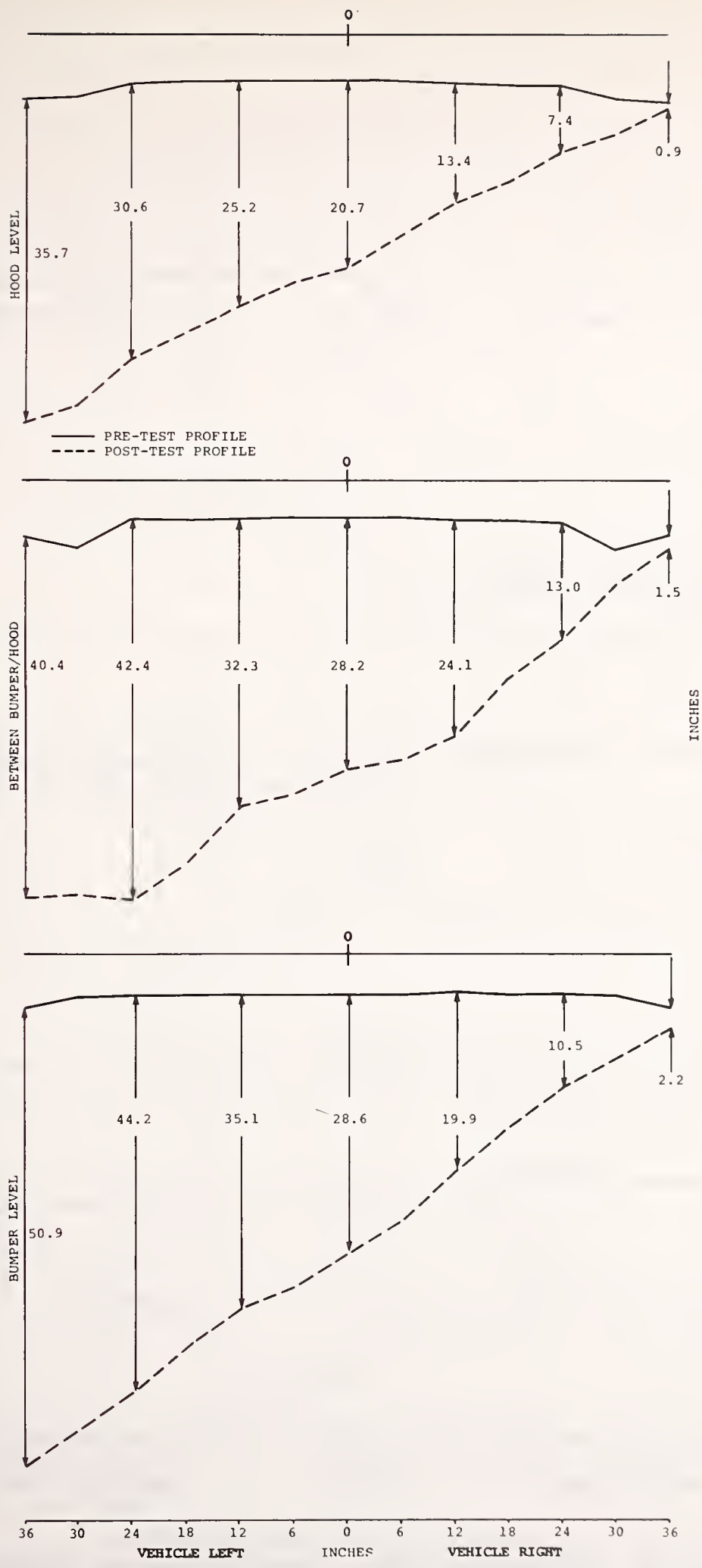


Figure 3-8. Chevrolet C-10 Truck Exterior Static Crush (Test 3051-6).

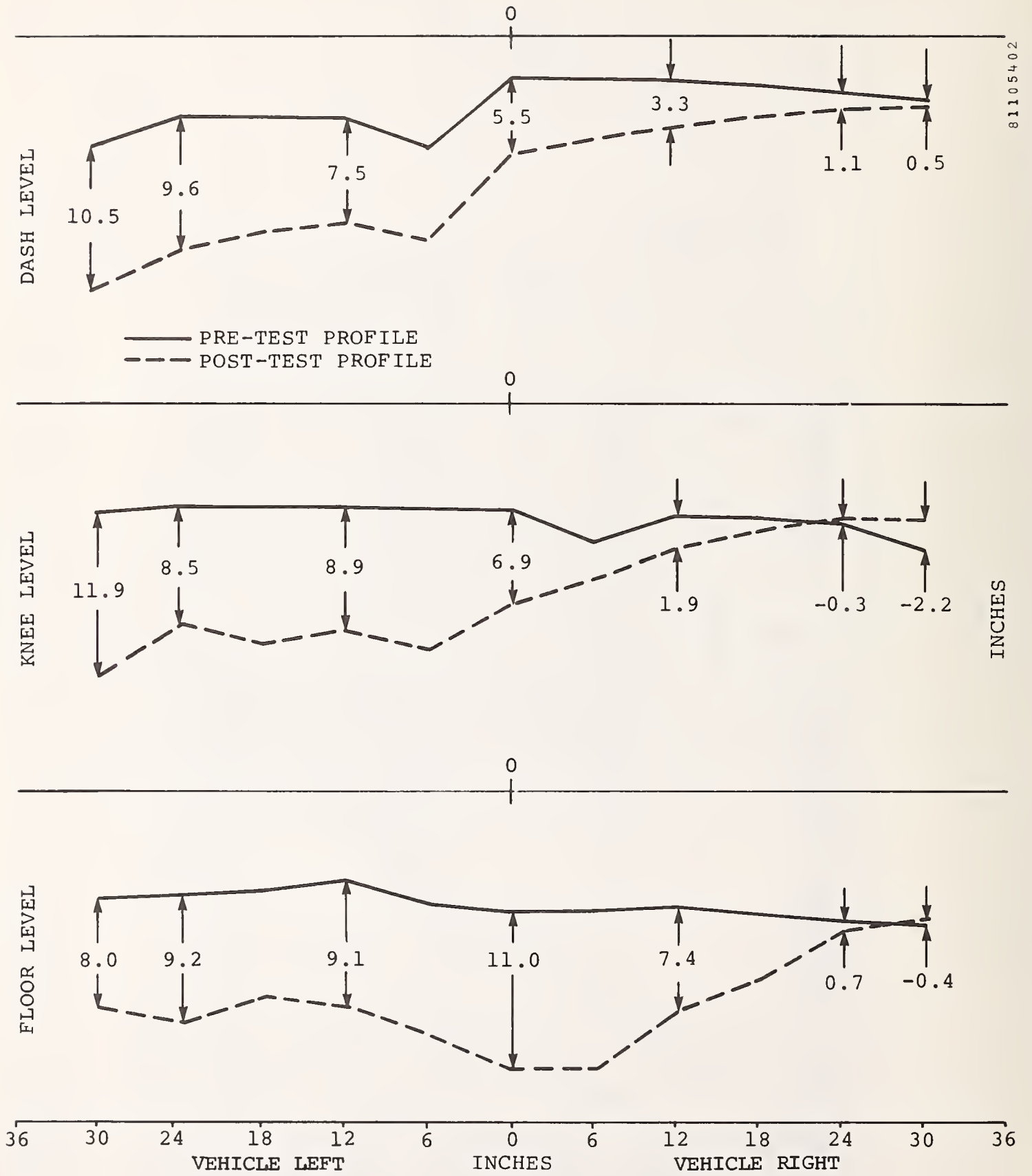


Figure 3-9. Chevrolet C-10 Truck Interior Intrusion (Test 3051-6).

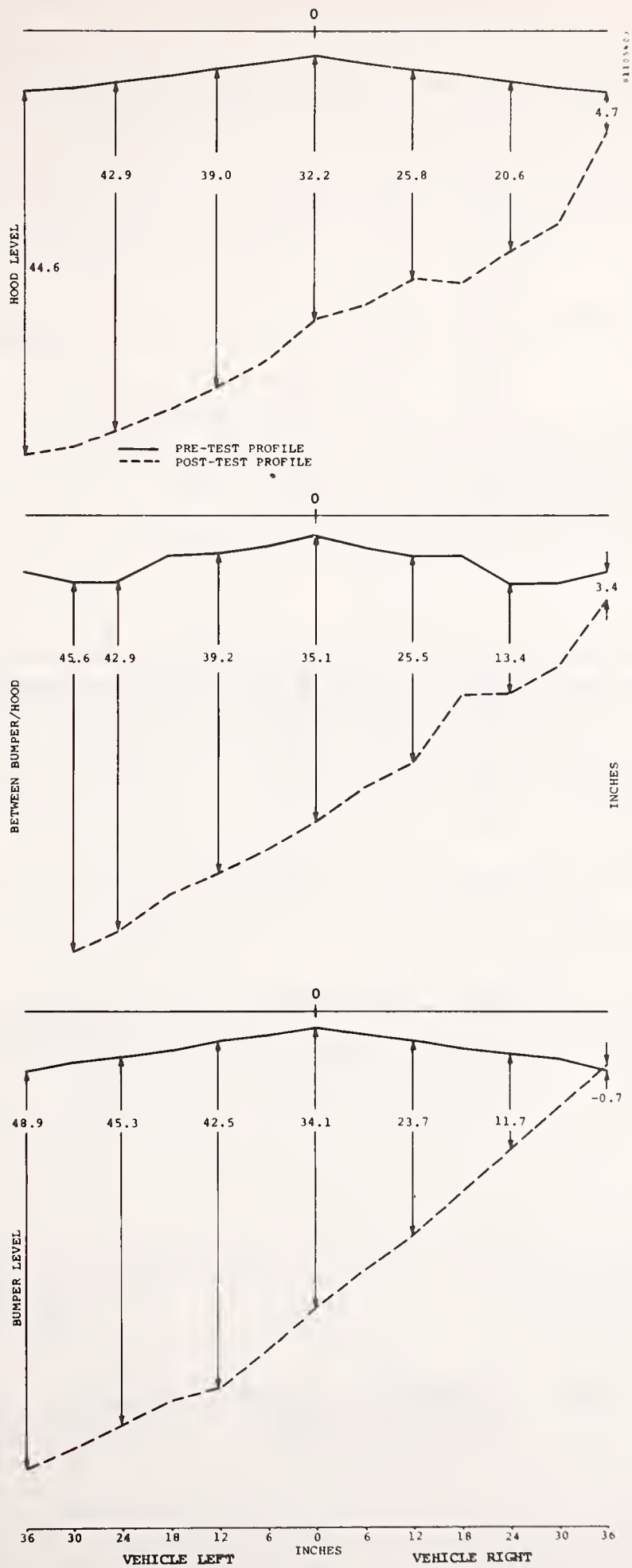


Figure 3-10. Chevrolet Impala Exterior Static Crush (Test 3051-6).

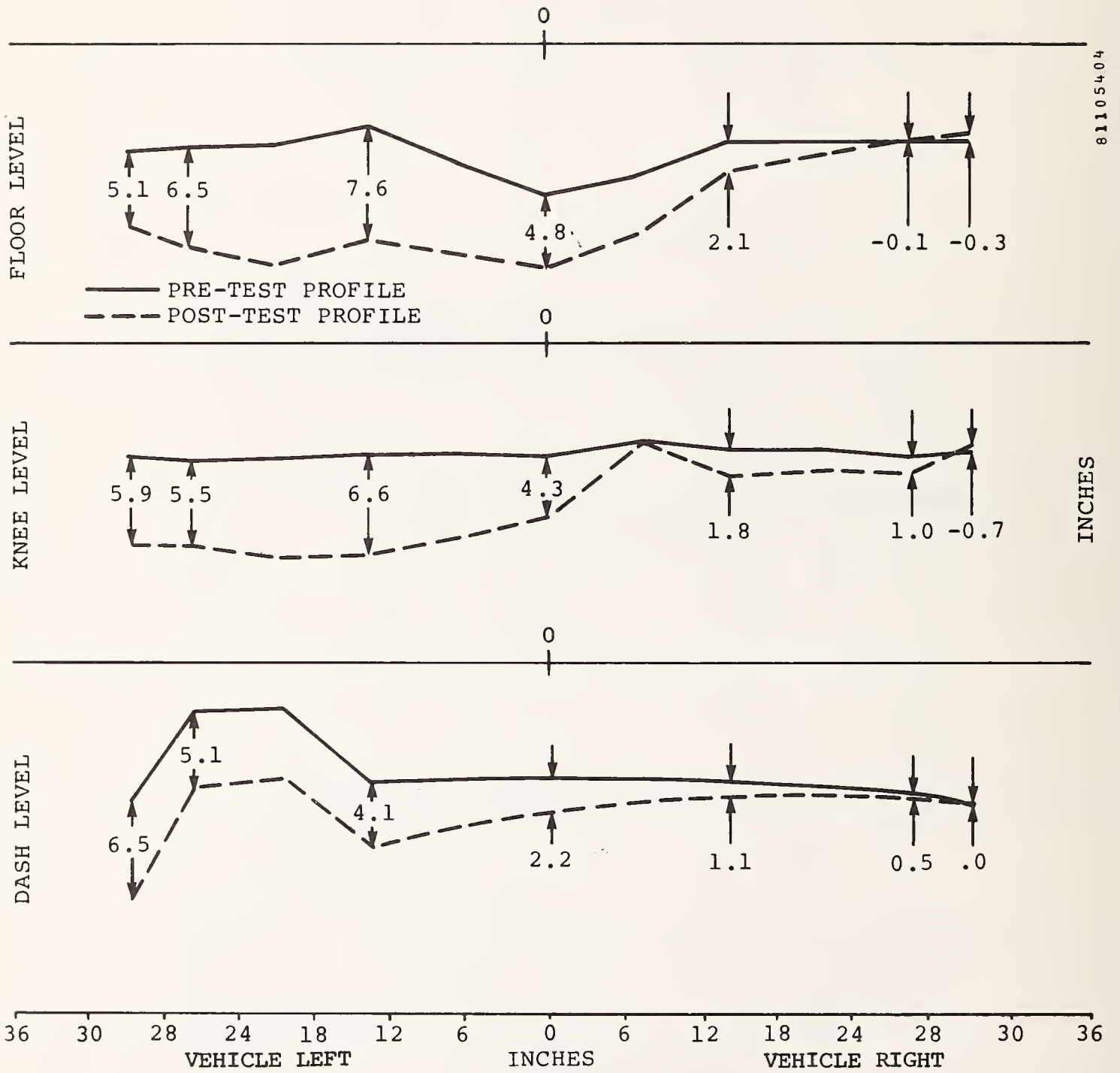


Figure 3-11. Chevrolet Impala Interior Intrusion (Test 3051-6).

TABLE 3-19. CHEVROLET C-10 TRUCK STEERING WHEEL MEASUREMENTS AND DISPLACEMENT VALUES (TEST 3051-6)

| Wheel Location | Pre-test (in.) | | | Post-test (in.) | | | Displacement (in.) | | |
|----------------|----------------|-------|------|-----------------|-------|------|--------------------|------|-----|
| | X* | Y* | Z* | X | Y | Z | X | Y | Z |
| Top | 140.7 | -18.4 | 52.9 | 132.8 | -21.6 | 46.6 | 7.9 | 3.2 | 6.3 |
| Hub | 138.7 | -18.4 | 45.2 | 129.3 | -19.0 | 39.9 | 9.4 | 0.6 | 5.3 |
| Bottom | 134.8 | -18.4 | 39.0 | 130.3 | -14.5 | 33.1 | 4.5 | -3.9 | 5.9 |

*Reference for X, Y, and Z measurements are rear bumper, vehicle centerline, and ground level, respectively.

TABLE 3-20. CHEVROLET IMPALA STEERING WHEEL MEASUREMENTS AND DISPLACEMENT VALUES (TEST 3051-6)

| Wheel Location | Pre-test (in.) | | | Post-test (in.) | | | Displacement (in.) | | |
|----------------|----------------|-------|------|-----------------|-------|------|--------------------|------|------|
| | X* | Y* | Z* | X | Y | Z | X | Y | Z |
| Top | 125.4 | -15.8 | 43.6 | 123.0 | -15.4 | 30.5 | 2.4 | -0.4 | 13.1 |
| Hub | 124.3 | -15.8 | 36.2 | 119.6 | -14.8 | 24.2 | 4.7 | -1.0 | 12.0 |
| Bottom | 120.6 | -15.8 | 29.9 | 121.1 | -13.7 | 16.6 | -0.5 | -2.1 | 13.3 |

*Reference for X, Y, and Z measurements are rear bumper, vehicle centerline, and ground level, respectively.

TABLE 3-21. SUMMARY OF VEHICLE ACCELEROMETER DATA
(TEST 3051-6)

VEHICLE: 1979 Chevrolet C-10 Truck

| Accelerometer No.* | Maximum Acceleration | | Minimum Velocity | | Maximum Displacement | |
|-----------------------|-------------------------|----------------|---------------------|----------------|-------------------------|----------------|
| | A (G) | Time (msec) | V (mph) | Time (msec) | S (in.) | Time (msec) |
| 1X | -27.4 | 20 | +1.9 | 200 | 57.5 | 200 |
| 1Y | +25.4 | 89 | +8.2 | 84 | 15.6 | 200 |
| 2X | -29.4 | 46 | +4.1 | 200 | 60.0 | 200 |
| 2Y | +23.9 | 75 | +7.9 | 85 | 13.0 | 200 |
| Average 1X and 2X | -27.7 | 46 | +3.0 | 200 | 58.7 | 200 |
| 3X | -70.1 | 37 | +2.5 | 200 | 40.5 | 200 |
| 3Y | -29.2 | 91 | +13.4 | 81 | +16.4 | 200 |

VEHICLE: 1979 Chevrolet Impala 4-door Sedan

| | | | | | | |
|----------------------|--------|----|-------|-----|-------|-----|
| 1X | -39.4 | 82 | -10.8 | 200 | +41.5 | 112 |
| 1Y | +24.4 | 67 | +5.0 | 73 | 7.6 | 200 |
| 2X | -35.5 | 56 | -6.4 | 200 | +43.7 | 122 |
| 2Y | +13.5 | 60 | +5.3 | 75 | +6.6 | 200 |
| Average 1X and 2X | -33.3 | 54 | -8.6 | 200 | +42.5 | 115 |
| 3X | -126.4 | 41 | -1.0 | 55 | +30.6 | 200 |

NOTE: See Figures 3-1 and 3-2 for definition of accelerometer locations.

TABLE 3-22. OCCUPANT RESPONSE DATA SUMMARY (TEST 3051-6)

| | | VEHICLE: 1979 Chevrolet C-10 Truck | | | | VEHICLE: 1979 Chevrolet Impala | | | |
|--------|----------------|------------------------------------|----------------|----------------------|----------------|--------------------------------|----------------|----------------------|----------|
| | | LEFT FRONT OCCUPANT | | RIGHT FRONT OCCUPANT | | LEFT FRONT OCCUPANT | | RIGHT FRONT OCCUPANT | |
| | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | MAX VALUE (G) | T (MSEC) | T (MSEC) |
| HEAD | | | | | | | | | |
| X | -233.7 | 74 | ND | | -245.0 | 81 | -135.5 | 92 | |
| Y | -30.1 | 74 | ND | | +34.0 | 99 | +65.7 | 107 | |
| Z | +58.5 | 78 | ND | | -106.7 | 92 | +88.3 | 98 | |
| R* | 110.5 | 138 | ND | | 131.0 | 90 | 106.0 | 108 | |
| HIC | 1173 @ 73-143 | | | | 2408 @ 80-106 | | 1489 @ 89-114 | | |
| CHEST | | | | | | | | | |
| X | -101.6 | 78 | ND | | -89.4 | 85 | -40.8 | 97 | |
| Y | -13.2 | 78 | ND | | +36.6 | 99 | +52.6 | 106 | |
| Z | -12.8 | 79 | ND | | +35.5 | 65 | +20.8 | 86 | |
| R* | 86.0 | 79 | ND | | 81.5 | 87 | 57.8 | 104 | |
| SI | 663 @ 200 | | | | 848 @ 200 | | 548 @ 200 | | |
| | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | MAX VALUE (LB) | T (MSEC) | T (MSEC) |
| FEMURS | | | | | | | | | |
| LF | ND | | ND | | -1016 | 132 | -678 | 54 | |
| RT | ND | | ND | | -2143 | 69 | -754 | 56 | |

*3-msec clip.
 ND = No Data (Data not measured)

TABLE 2-23. SUMMARY OF RESTRAINT SYSTEM DATA (TEST 3051-6)

VEHICLE: 1979 Chevrolet C-10 Truck

| | Peak Load (lb) | @ Time (msec) |
|--------------------------|-------------------|---------------------|
| Left Front Occupant | | |
| Peak Shoulder Belt Load | 807 | @ 69 |
| Peak Left Lap Belt Load | 1124 | @ 90 |
| Peak Right Lap Belt Load | | ND |
| Right Front Occupant | | |
| Peak Shoulder Belt Load | | ND |
| Peak Left Lap Belt Load | | ND |
| Peak Right Lap Belt Load | | ND |

VEHICLE: 1979 Chevrolet Impala 4-door Sedan

| | | |
|--------------------------|------|-------|
| Left Front Occupant | | |
| Peak Shoulder Belt Load | 934 | @ 66 |
| Peak Left Lap Belt Load | 1375 | @ 67 |
| Peak Right Lap Belt Load | 3160 | @ 77 |
| Right Front Occupant | | |
| Peak Shoulder Belt Load | 1368 | @ 101 |
| Peak Left Lap Belt Load | 3229 | @ 80 |
| Peak Right Lap Belt Load | 1228 | @ 82 |

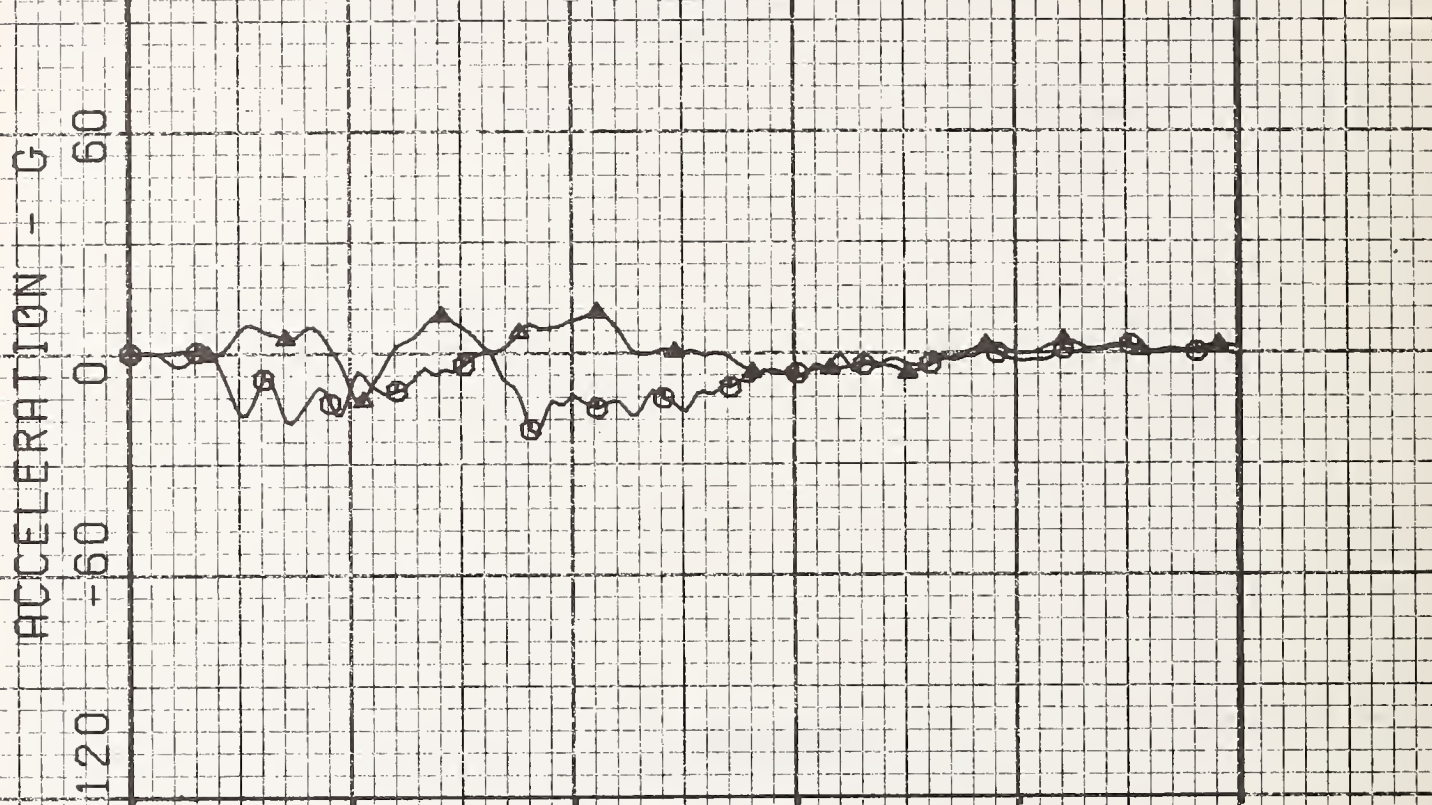
ND = No Data (Data no measured)

APPENDIX A

CALCOMP PLOTS (TEST 3051-5)

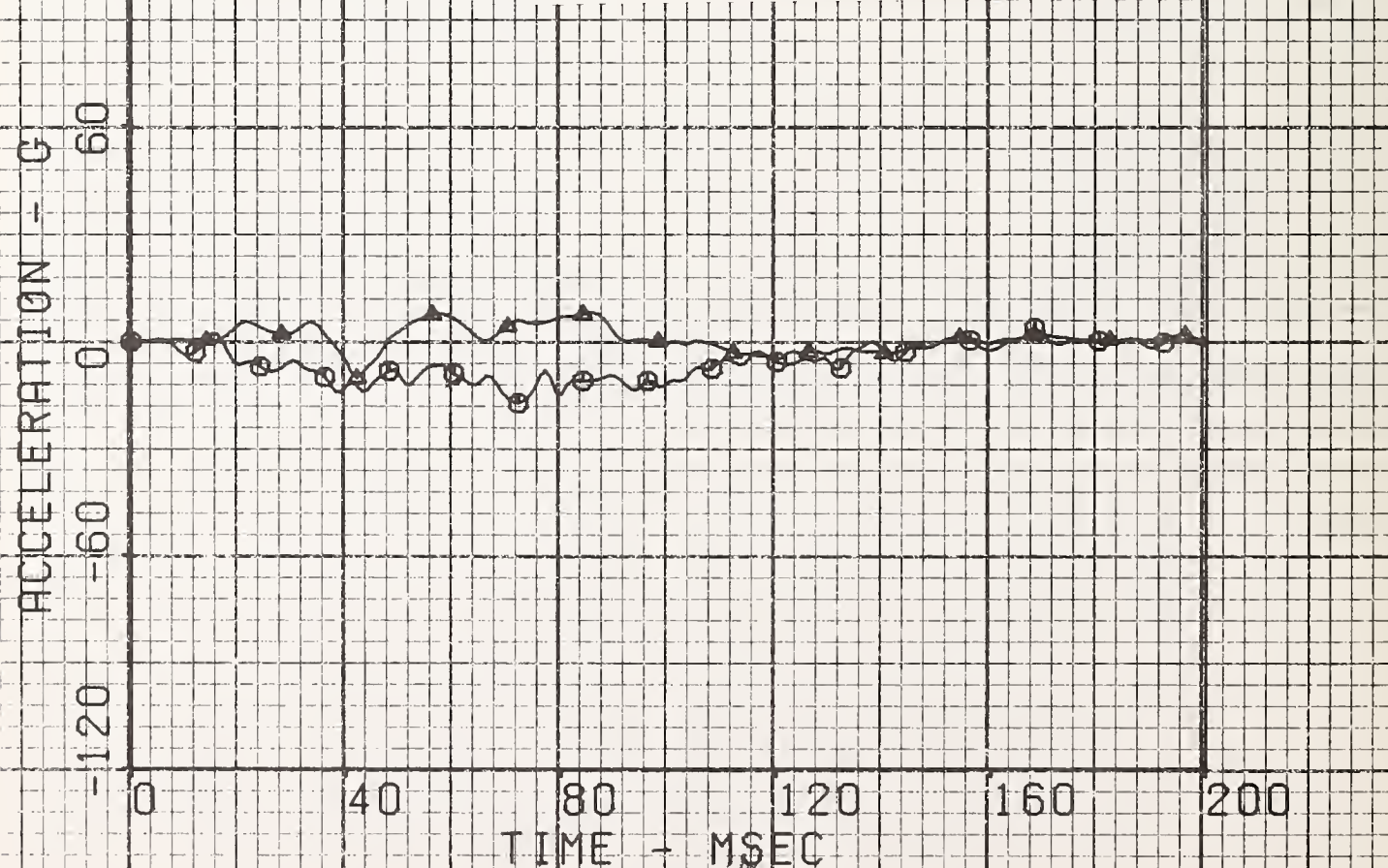
10-30-78 315/100 201 3051-5
O = AX Δ = AY CHEV TRUCK

LEFT COMPARTMENT ACCELERATION
LOCATION 1



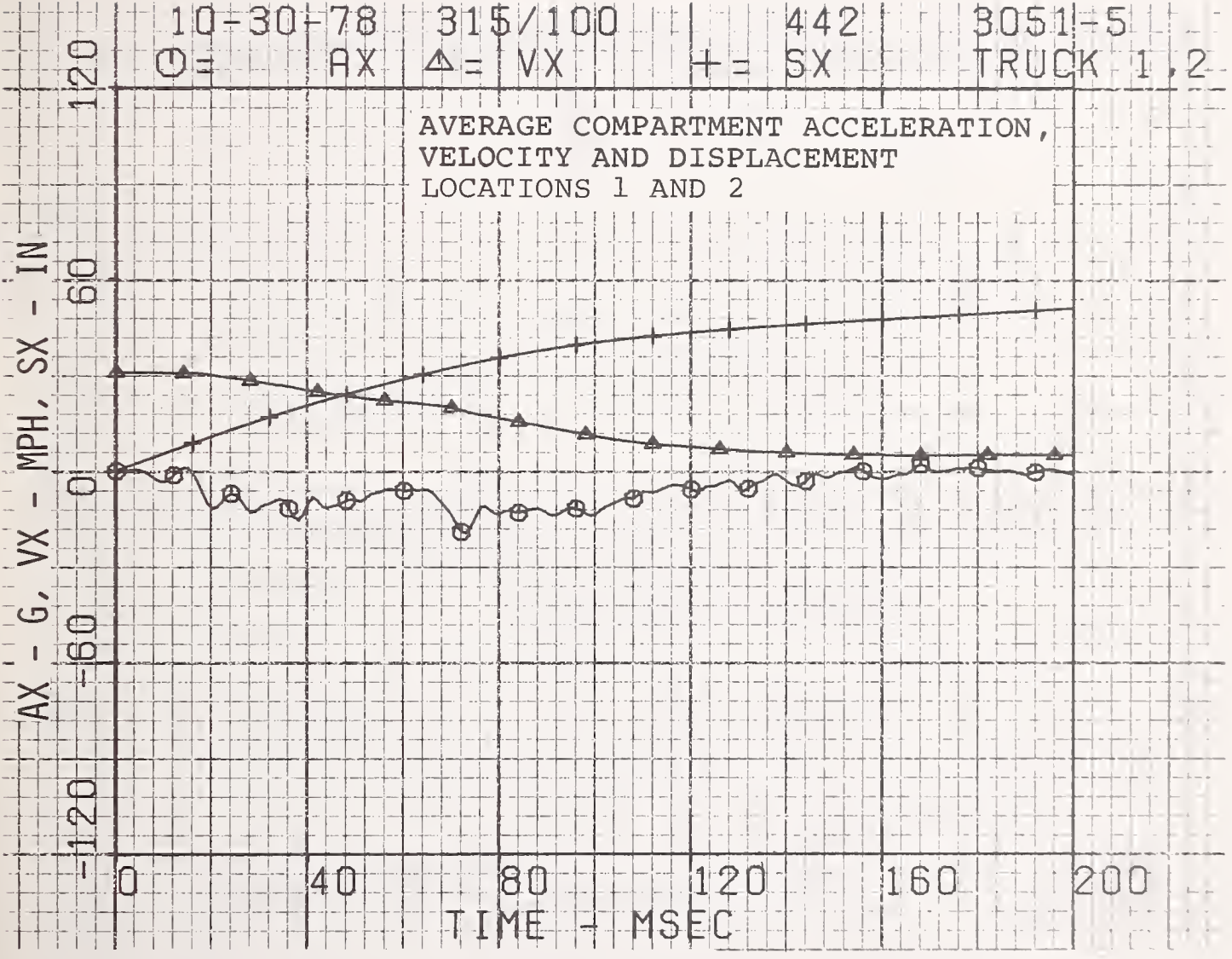
O = AX Δ = AY 202 CHEV TRUCK

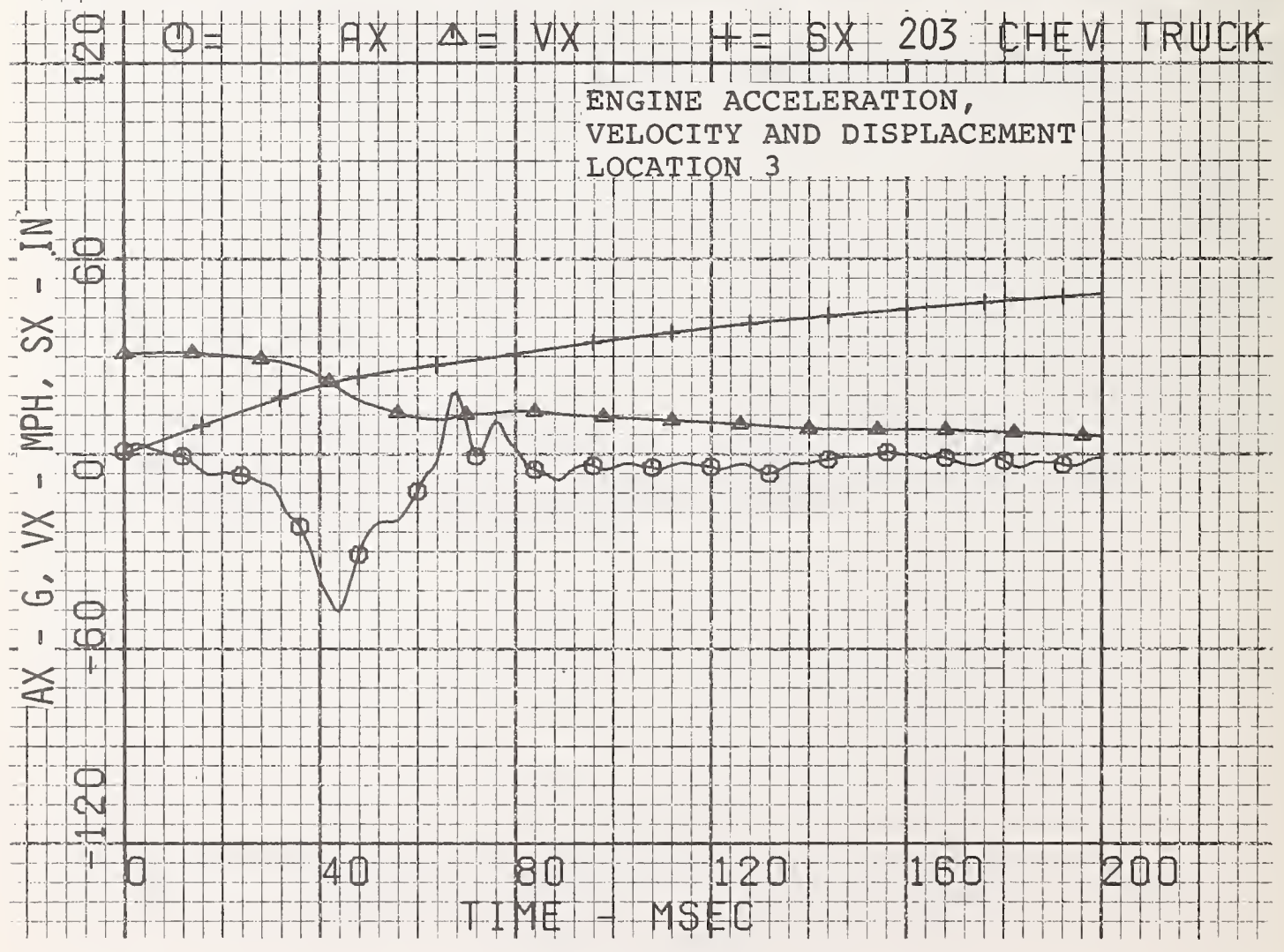
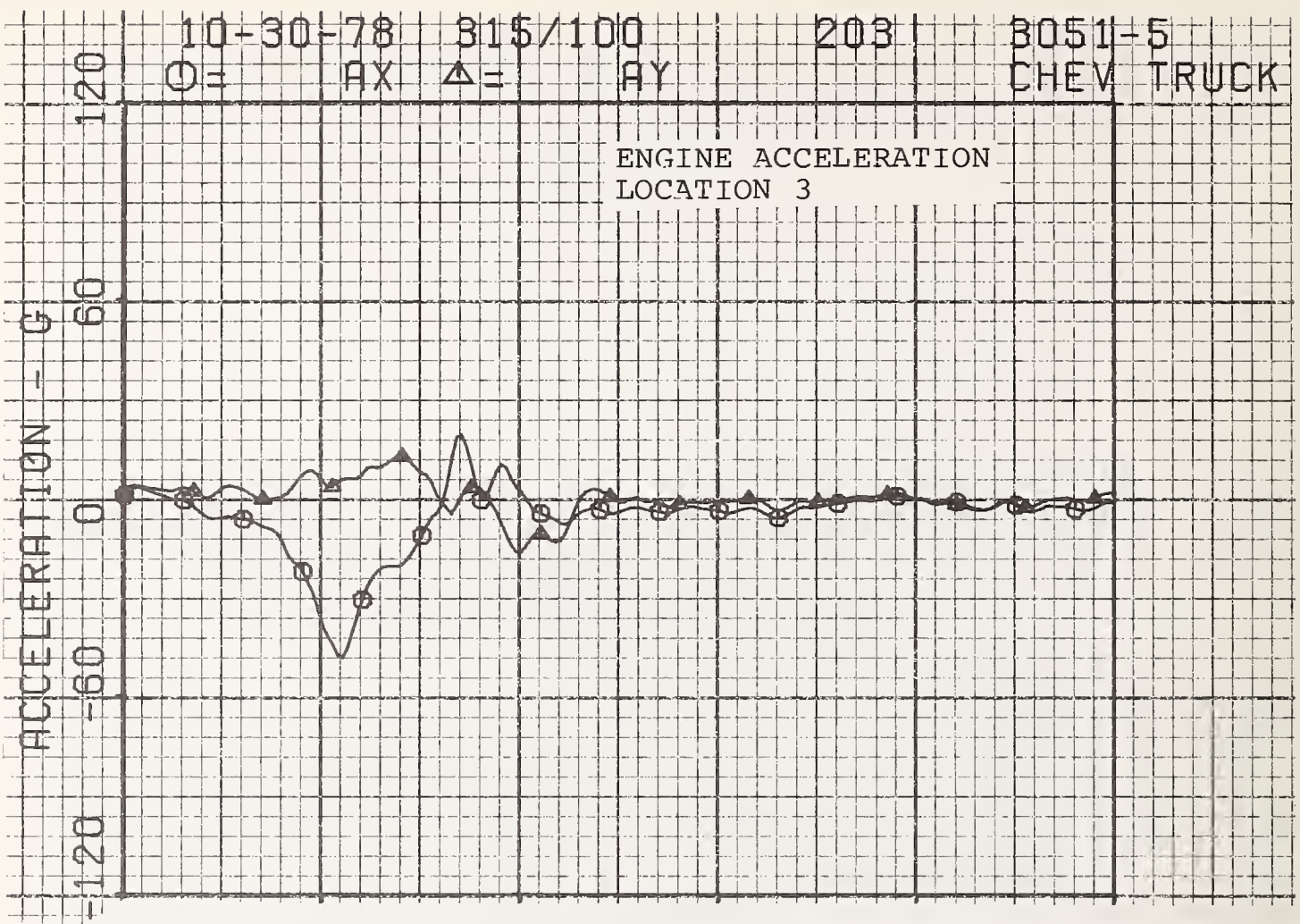
RIGHT COMPARTMENT ACCELERATION
LOCATION 2



10-30-78 315/100 442 3051-5
 O = AX Δ = VX + = SX TRUCK 1,2

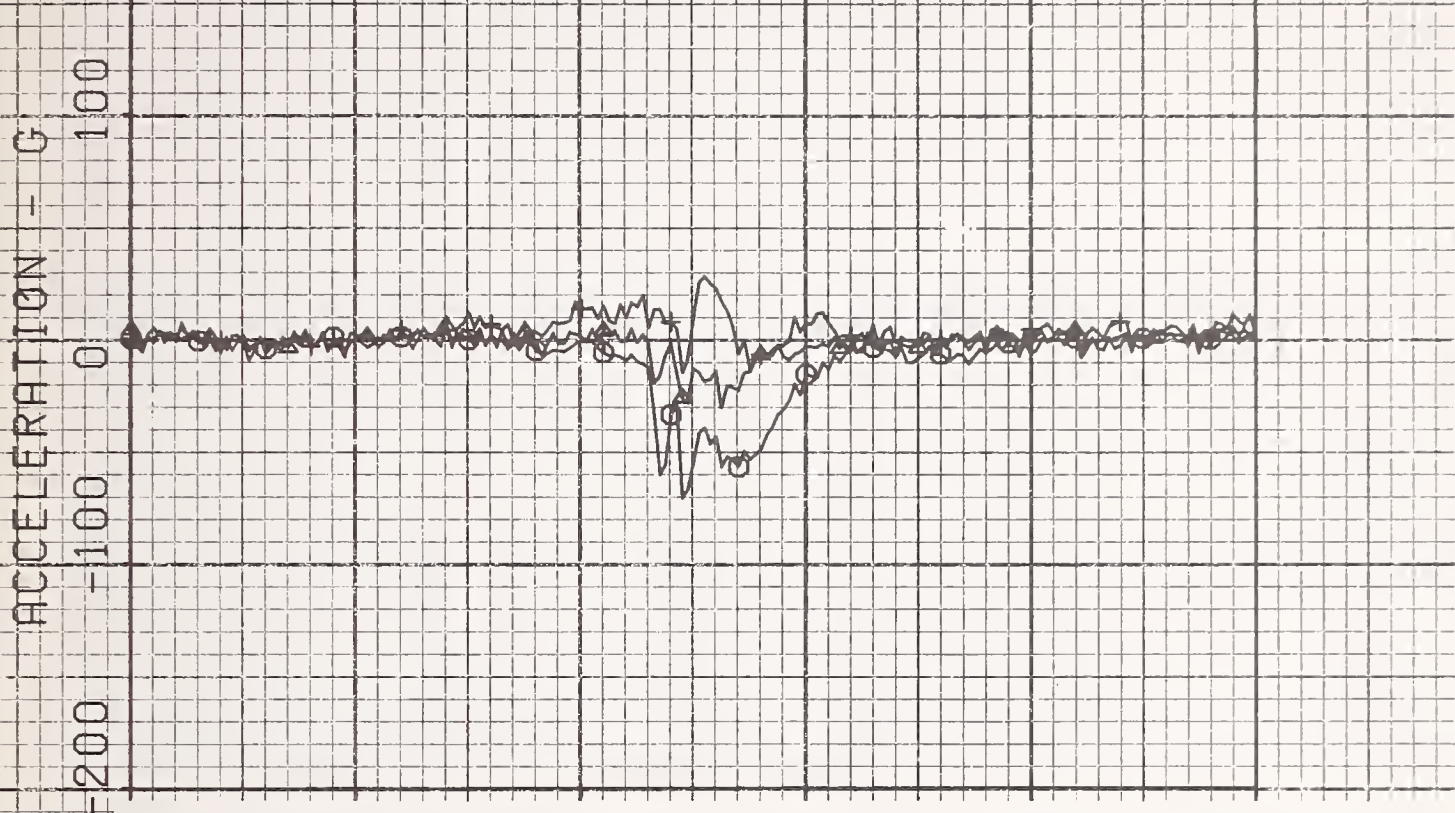
AVERAGE COMPARTMENT ACCELERATION,
 VELOCITY AND DISPLACEMENT
 LOCATIONS 1 AND 2





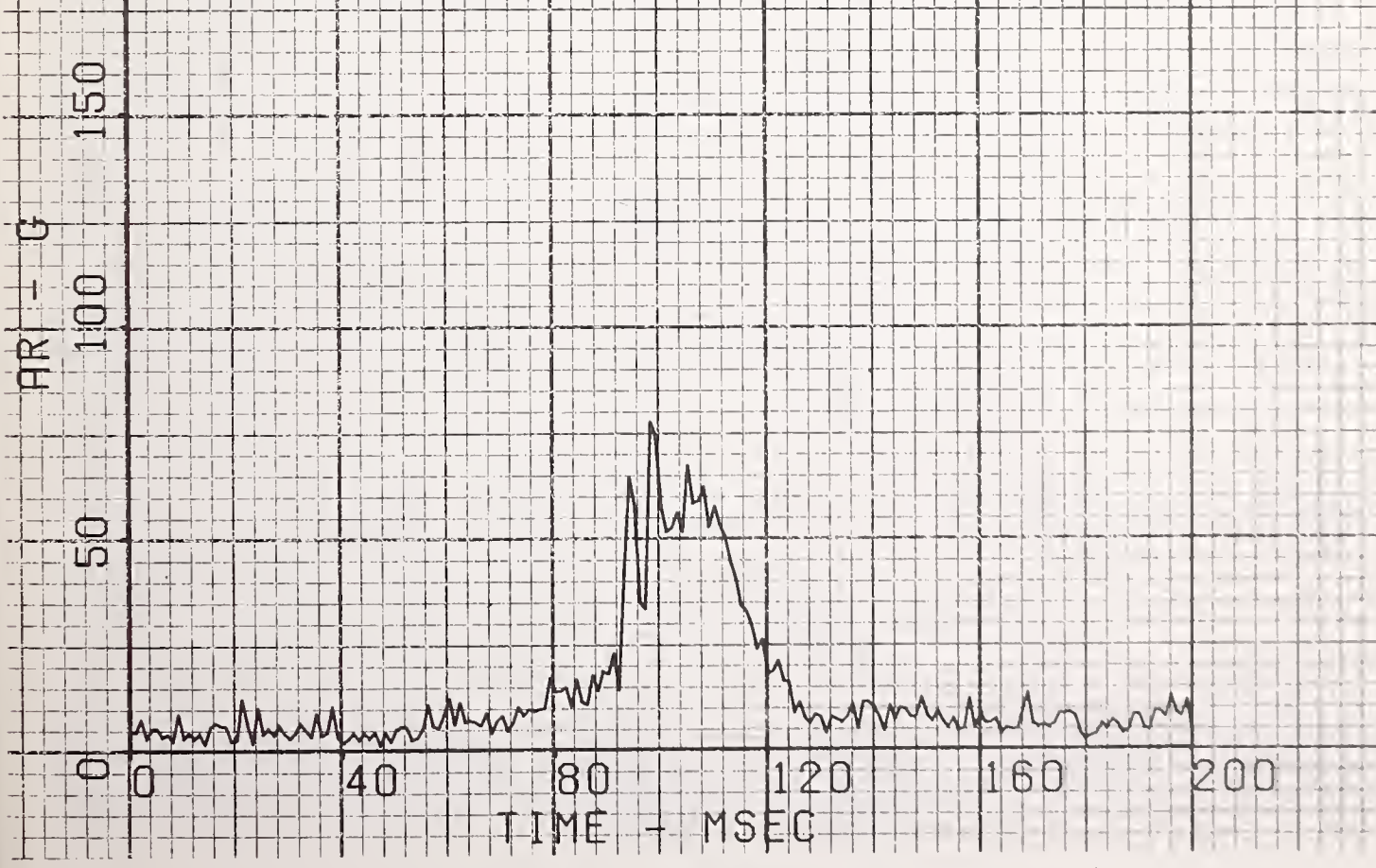
10-30-78 1600 601 3051-5
⊙ = AX △ = AY + = AZ CHEV TRUCK

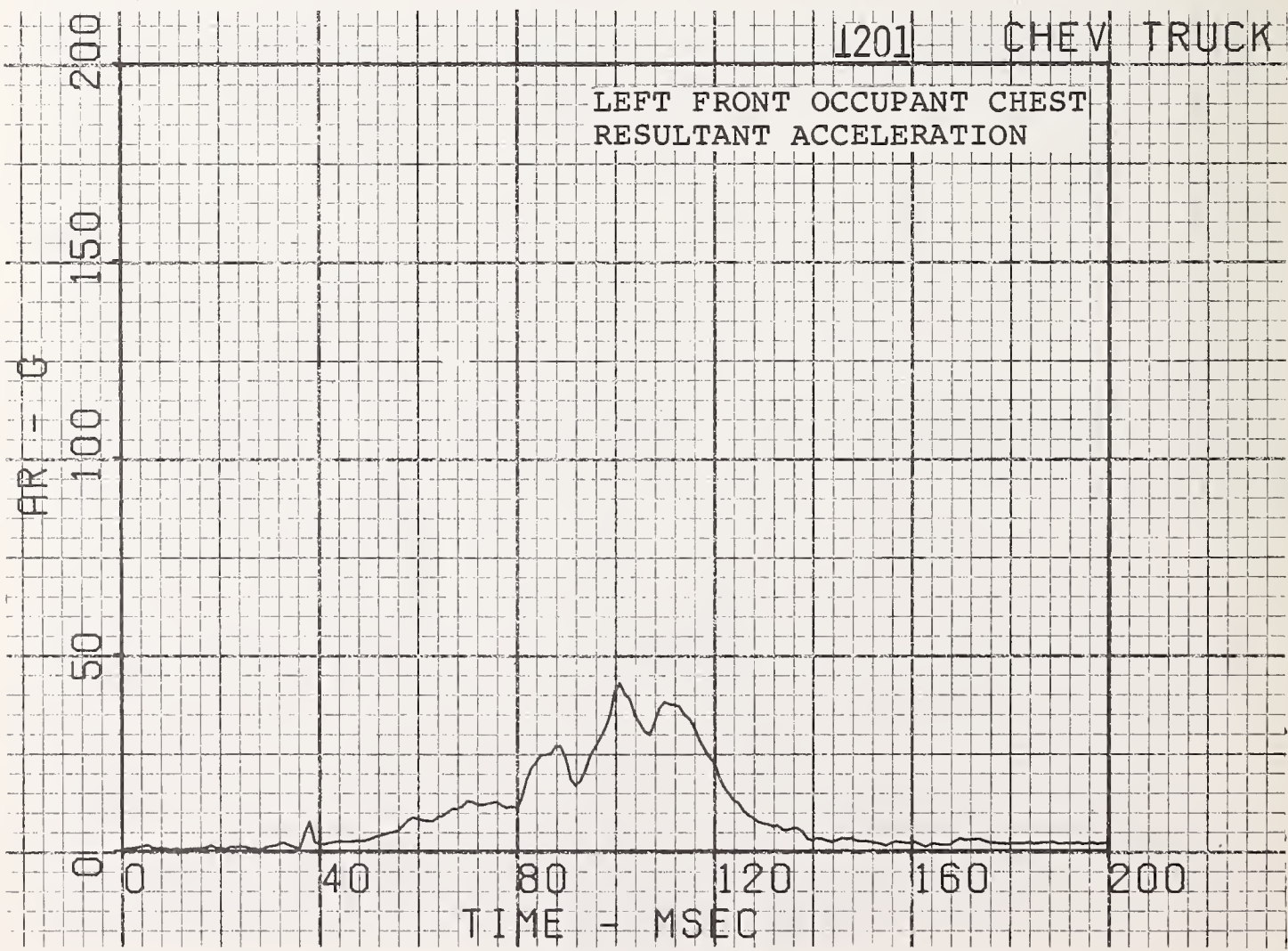
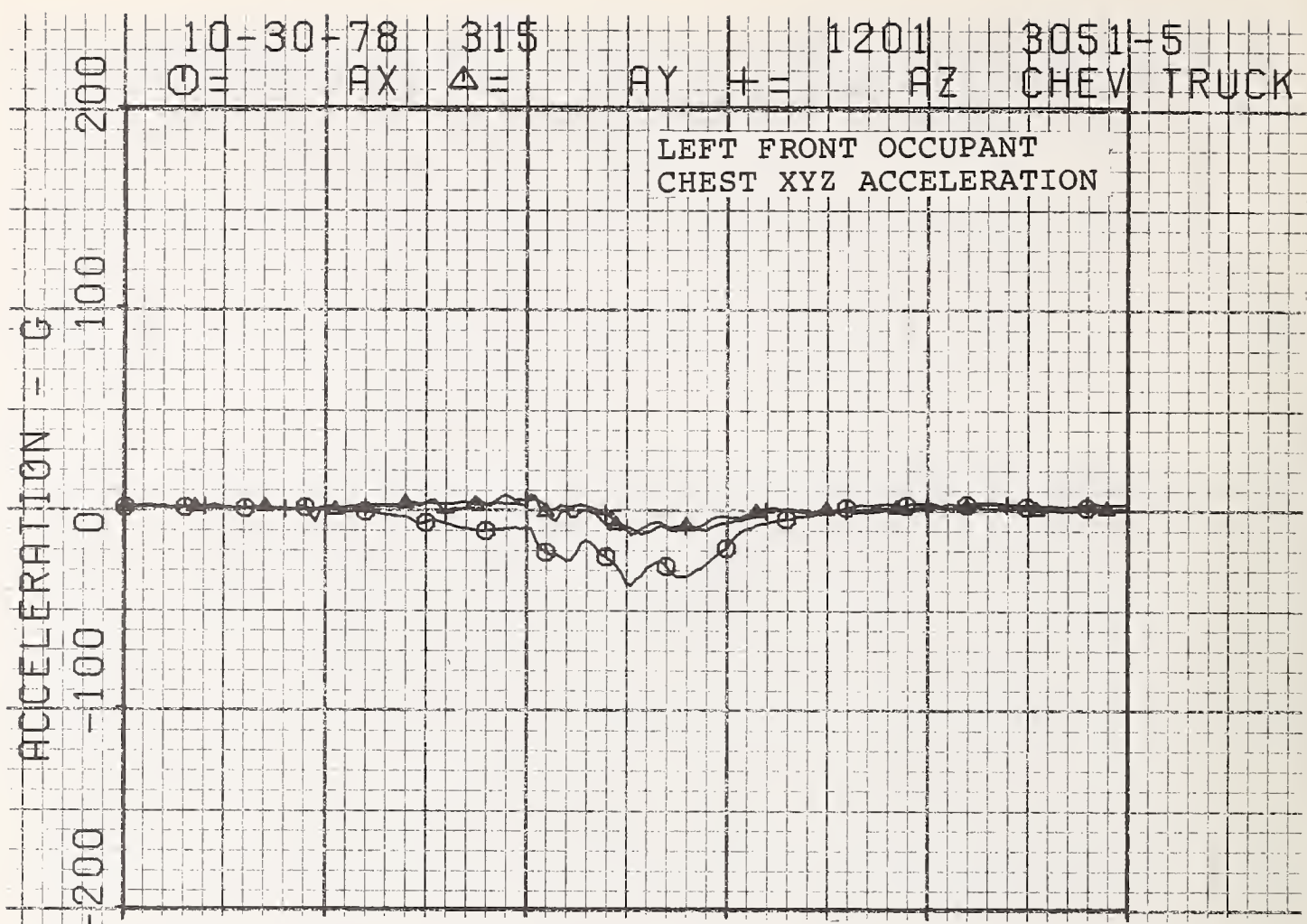
ACCELERATION - G
LEFT FRONT OCCUPANT
HEAD XYZ ACCELERATION



601 CHEV TRUCK

LEFT FRONT OCCUPANT HEAD
RESULTANT ACCELERATION





10-30-78

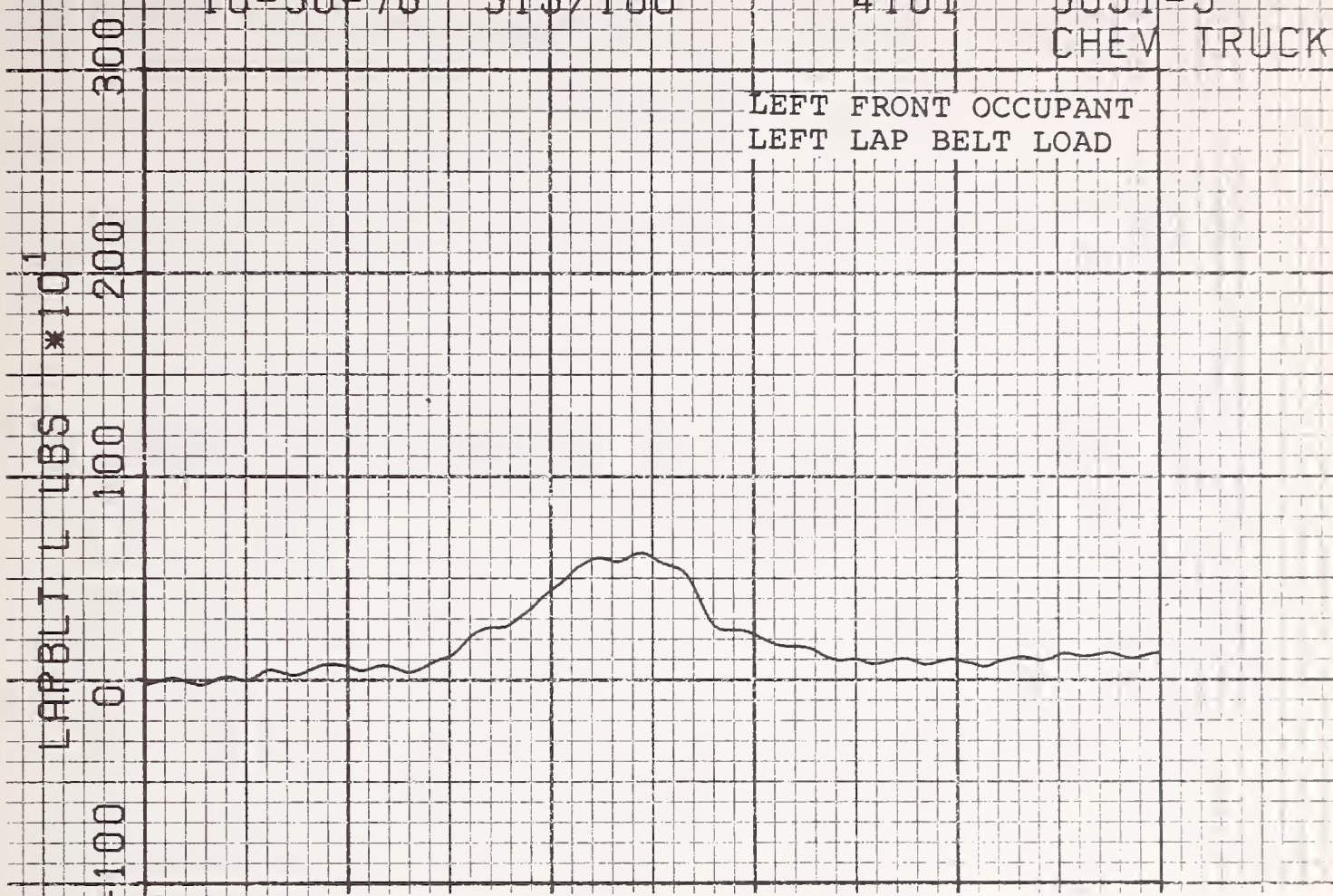
315/100

4101

3051-5

CHEV TRUCK

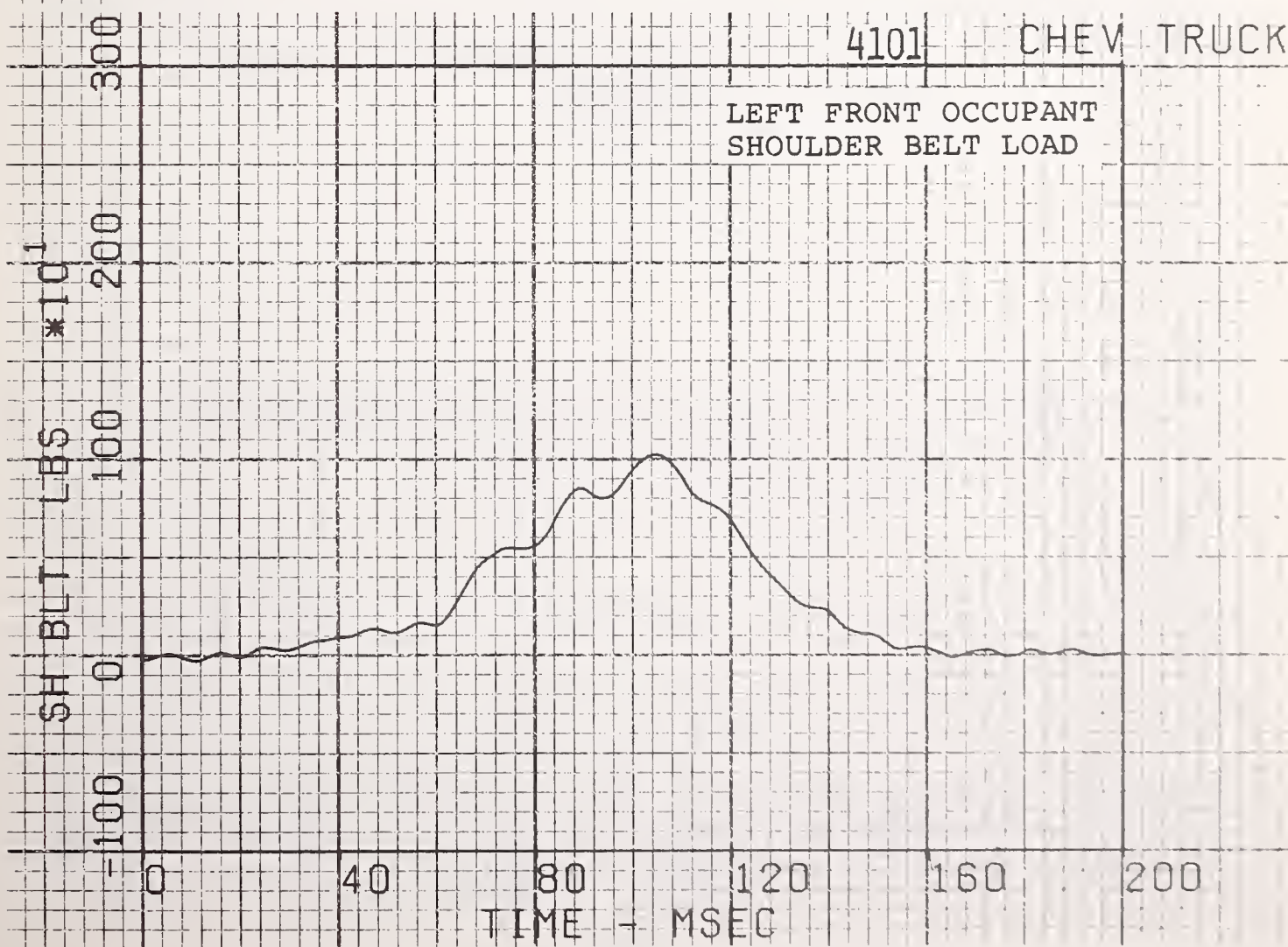
LEFT FRONT OCCUPANT
LEFT LAP BELT LOAD

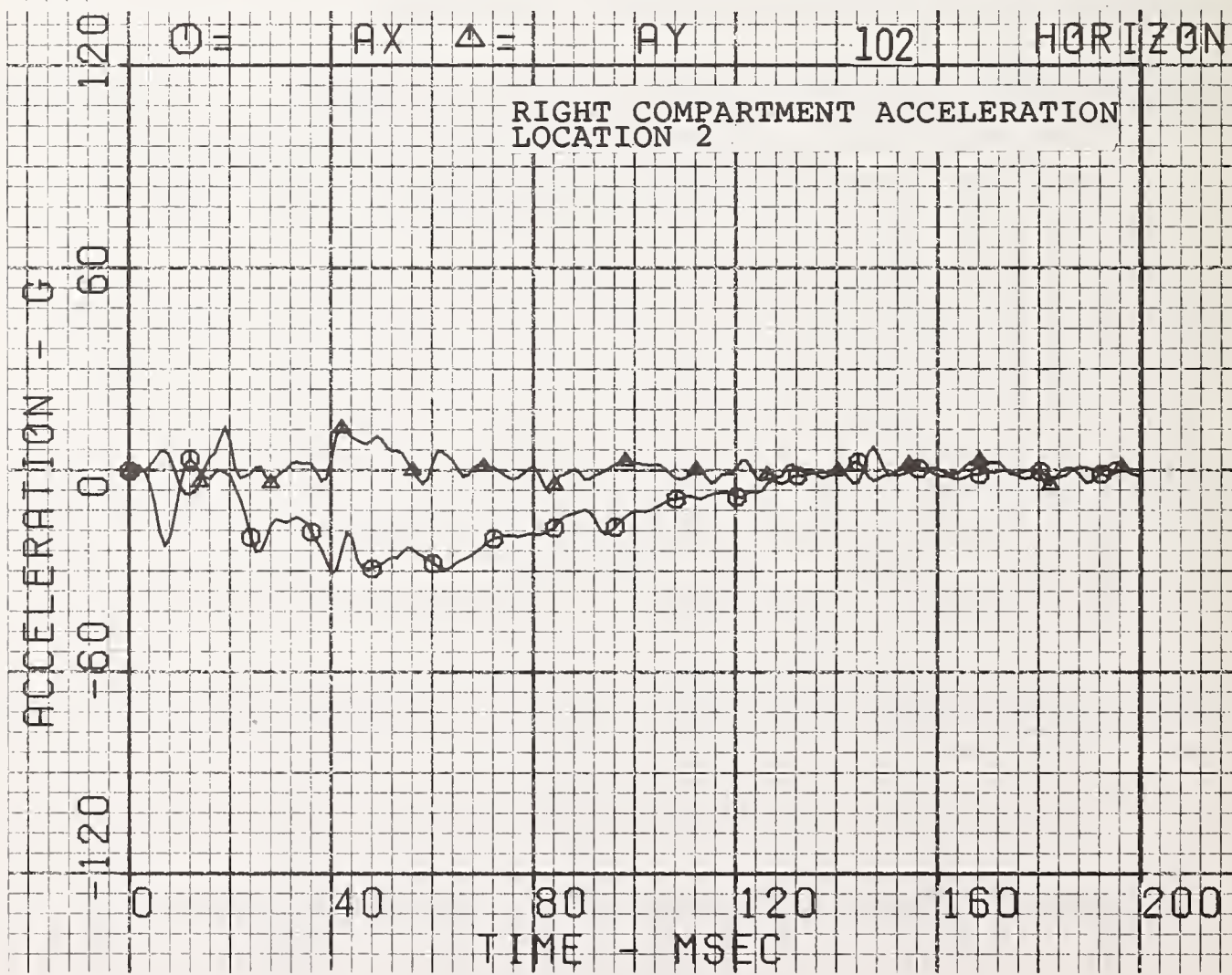
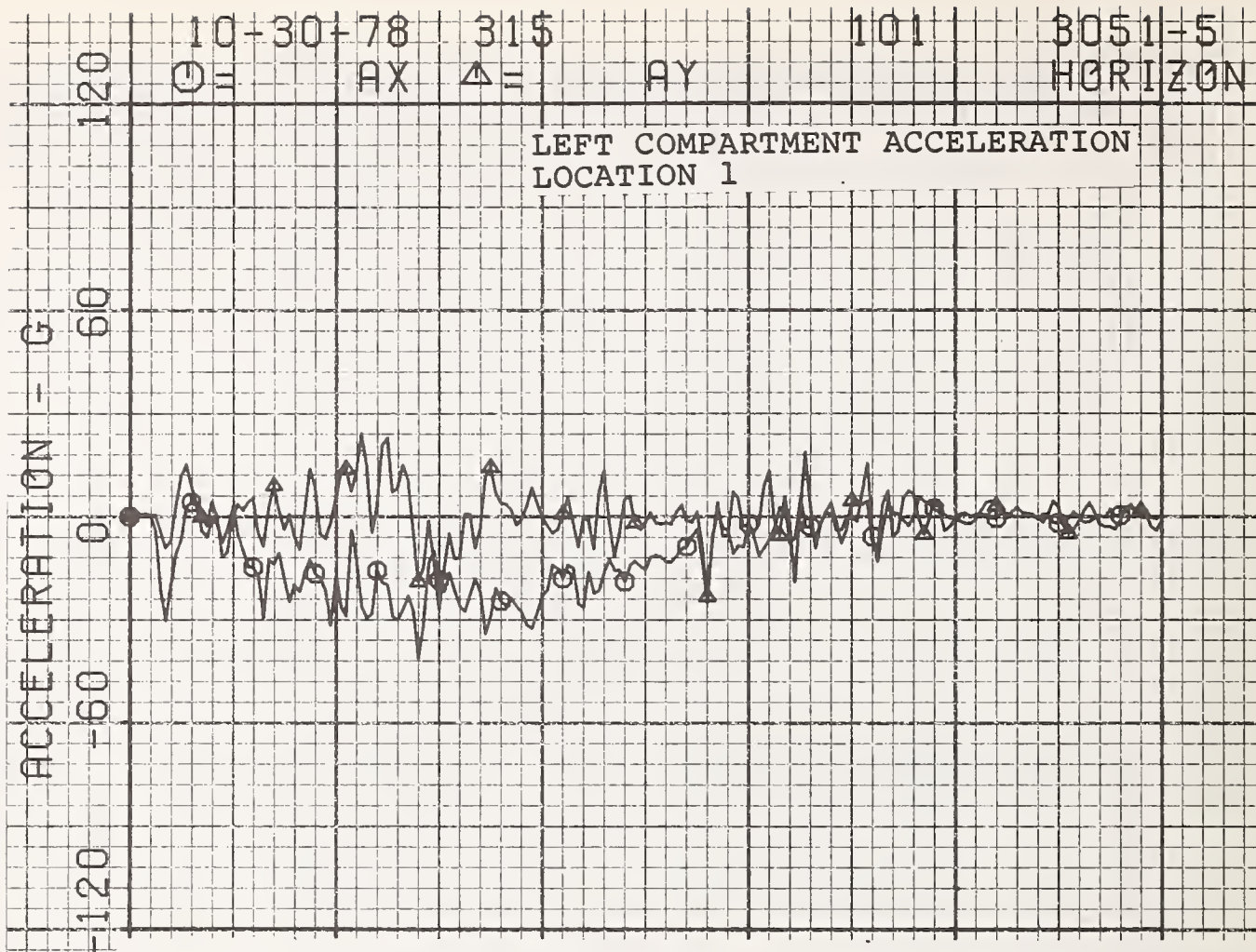


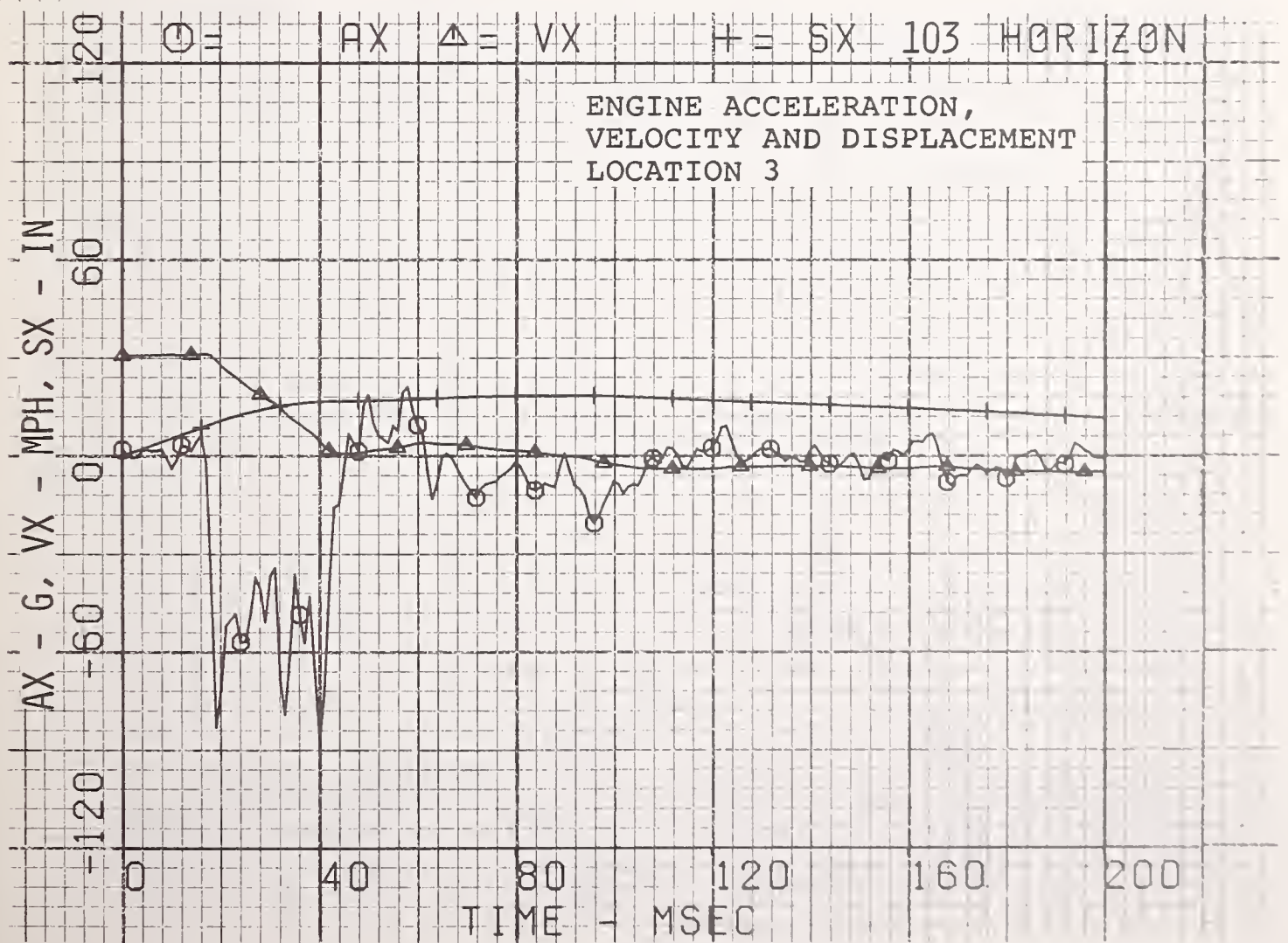
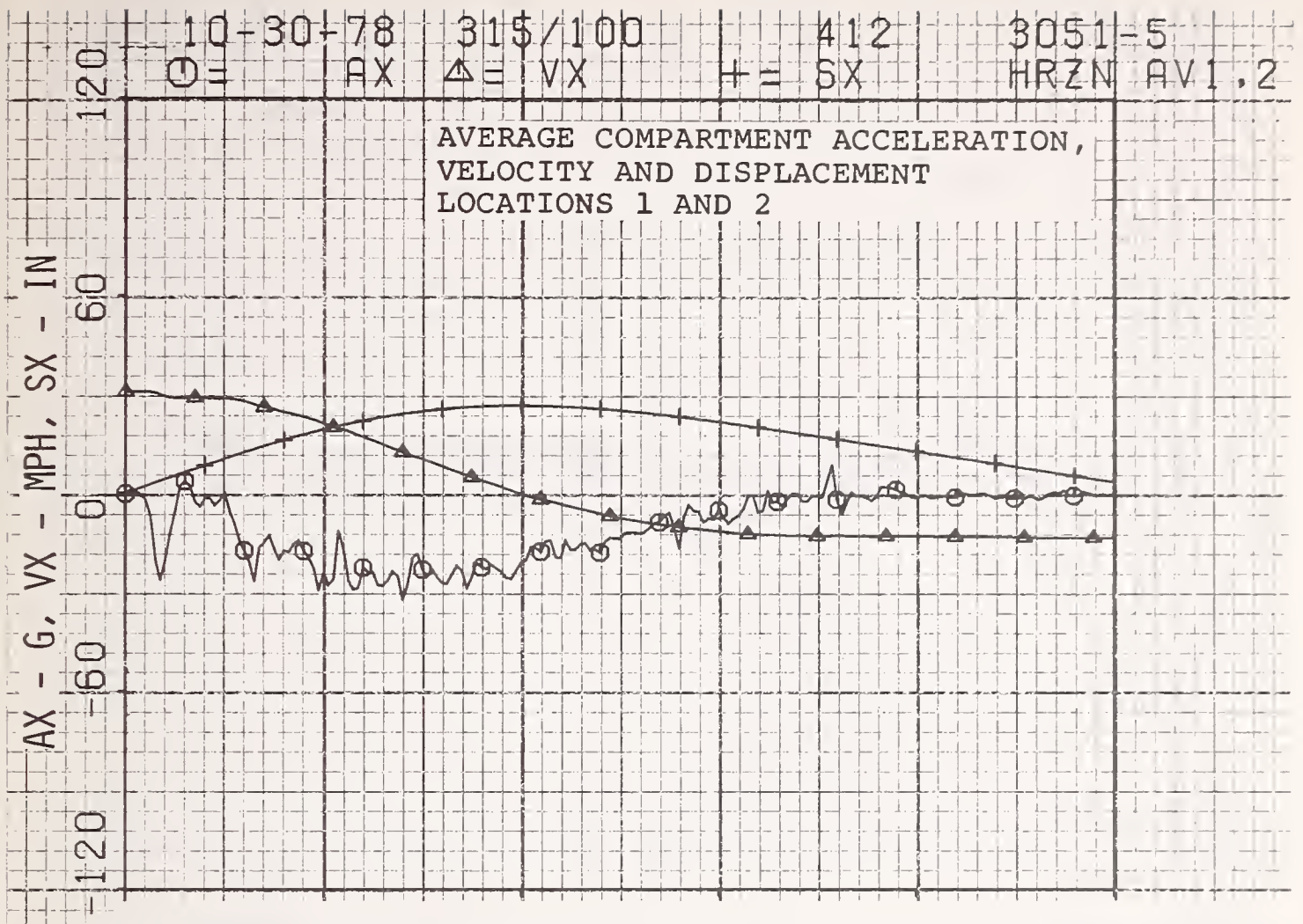
4101

CHEV TRUCK

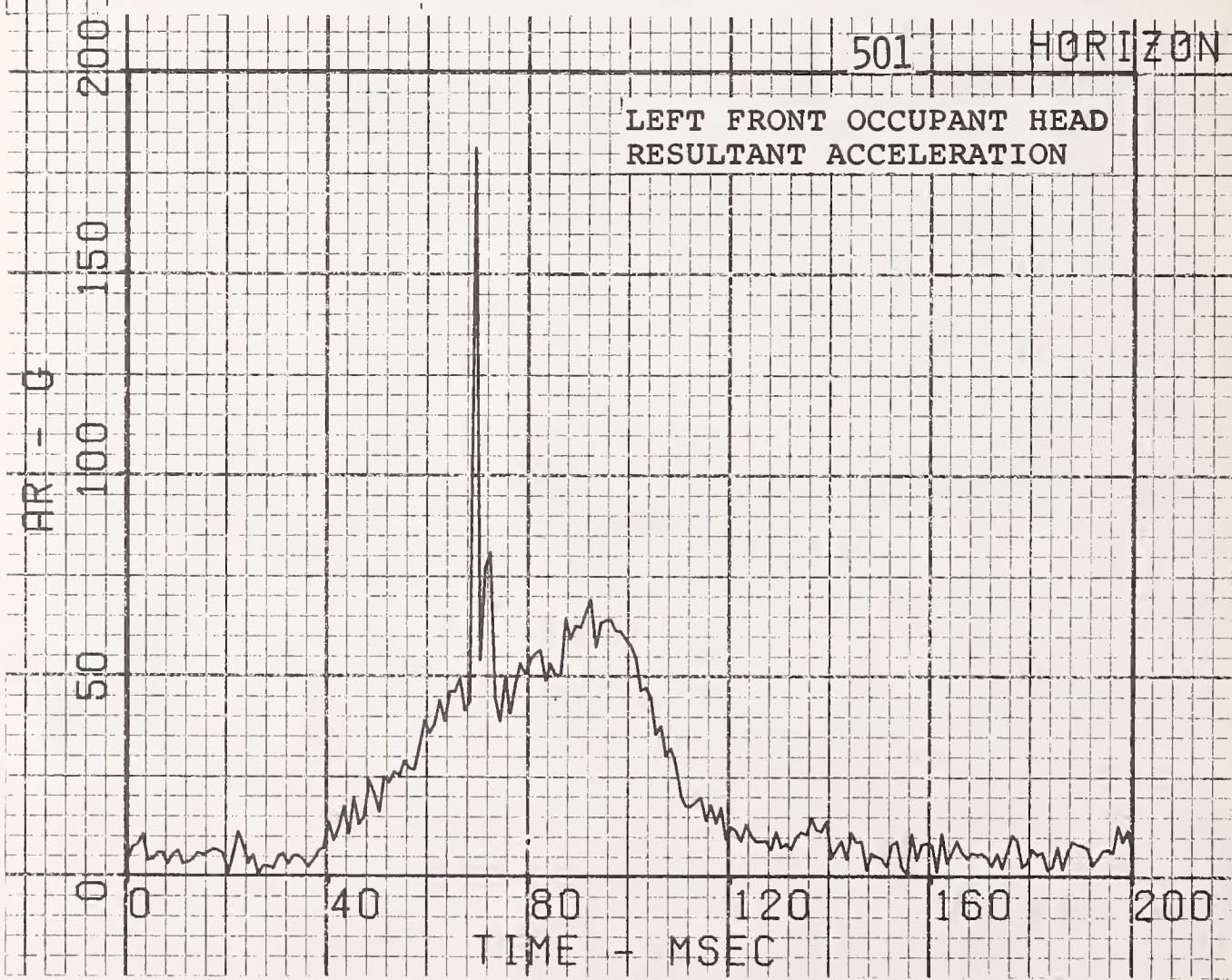
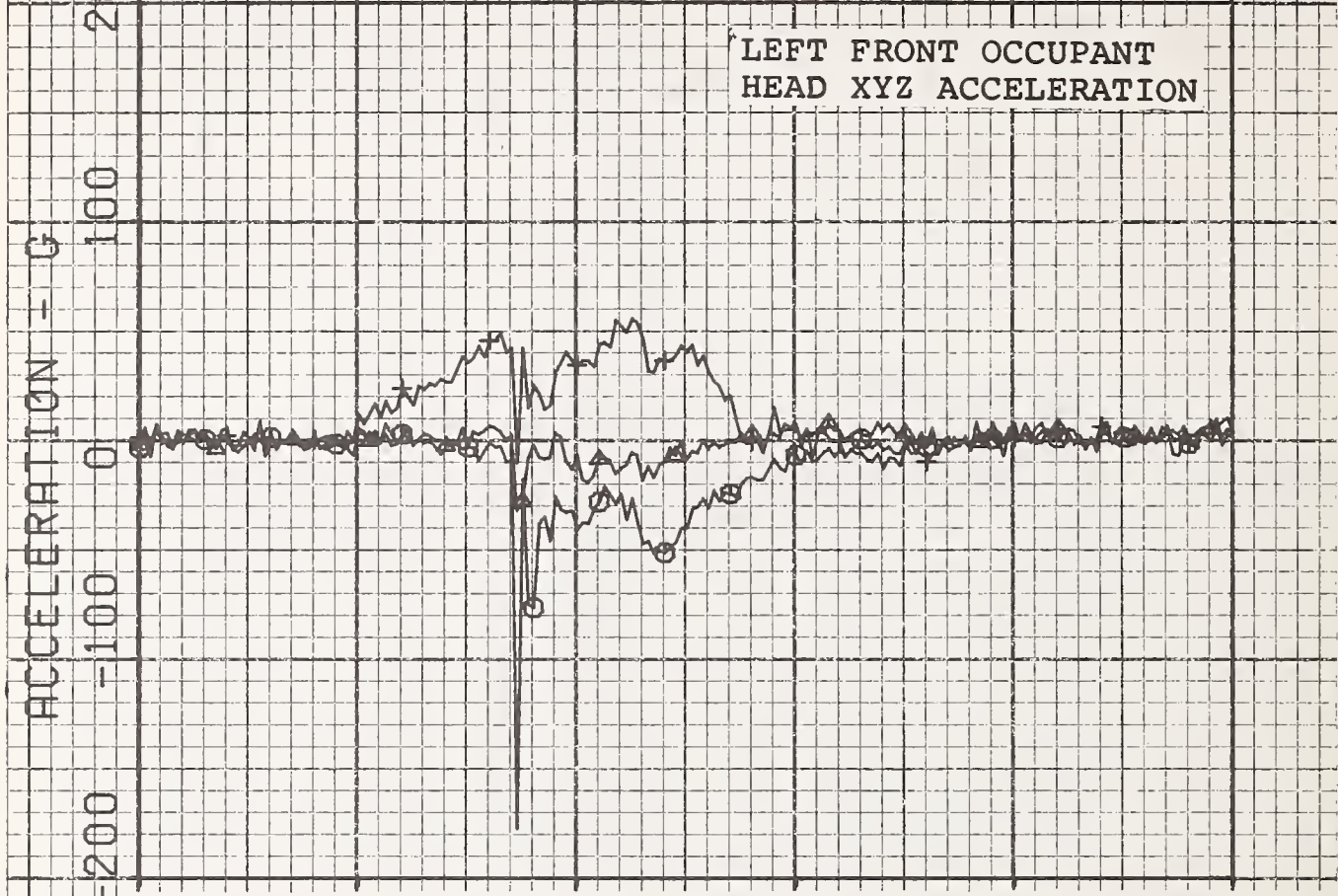
LEFT FRONT OCCUPANT
SHOULDER BELT LOAD

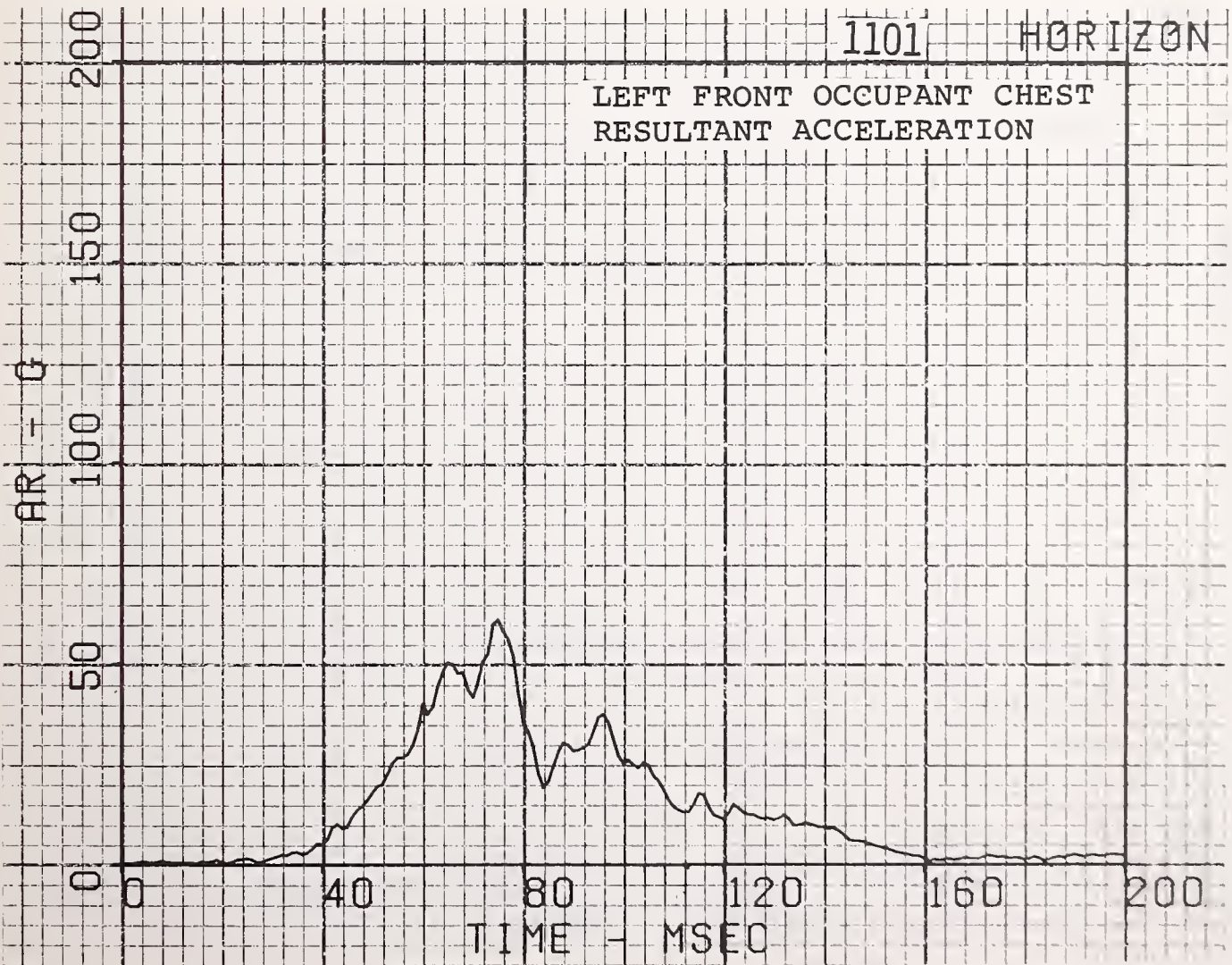
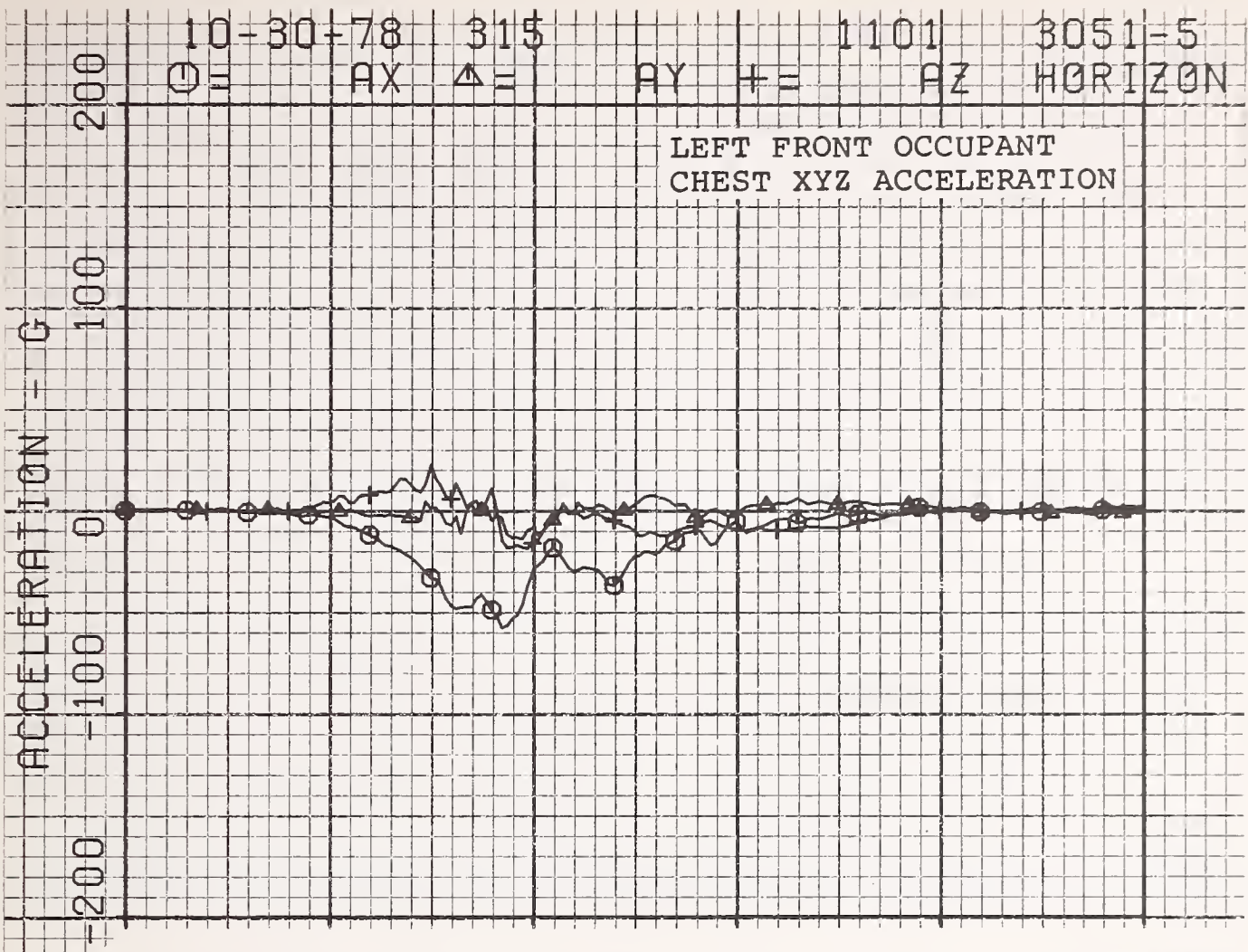






10-30-78 1600 501 3051-5
⊖ = AX Δ = AY ⊕ = AZ HORIZON

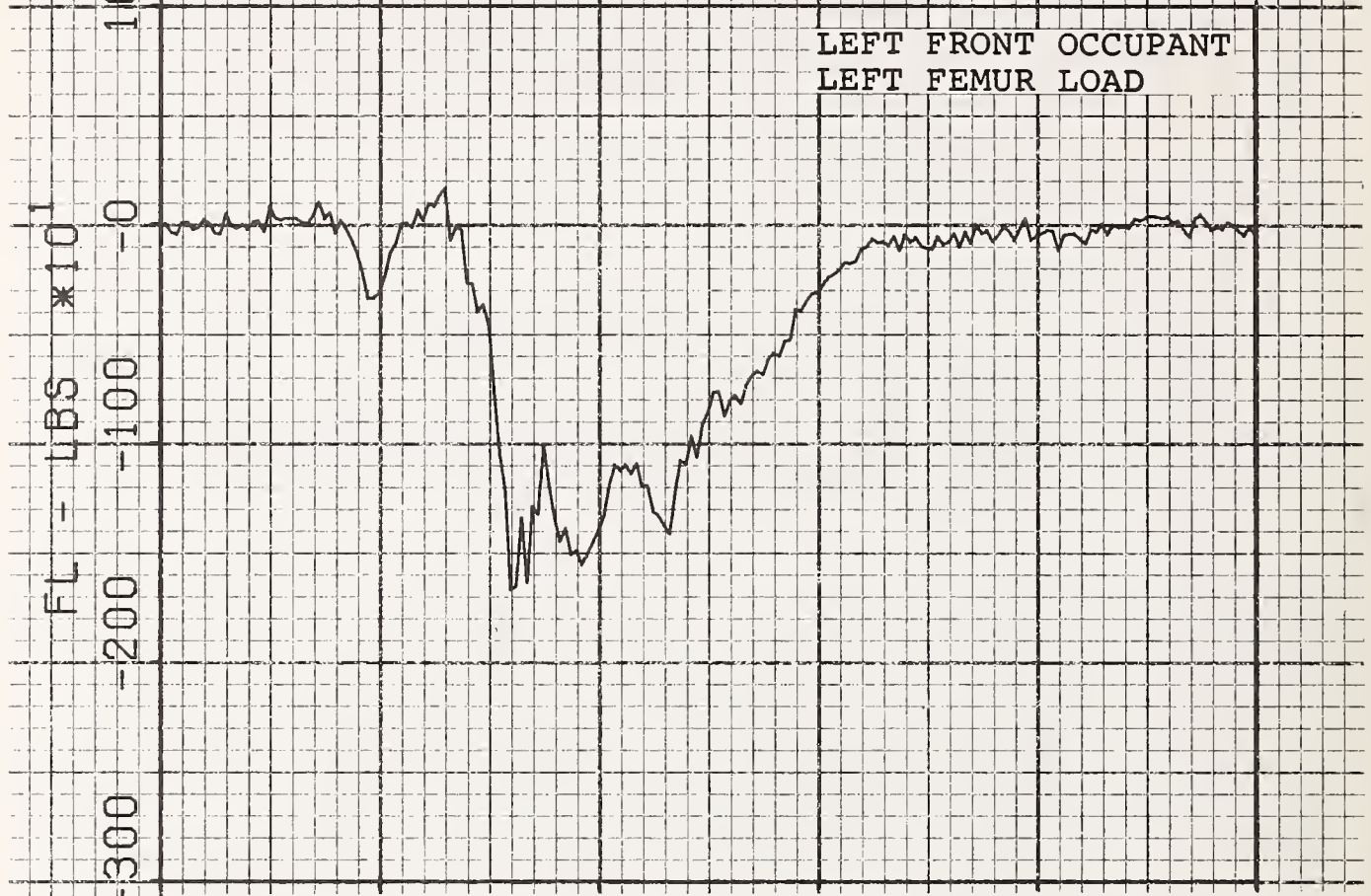




10-30-78 1000

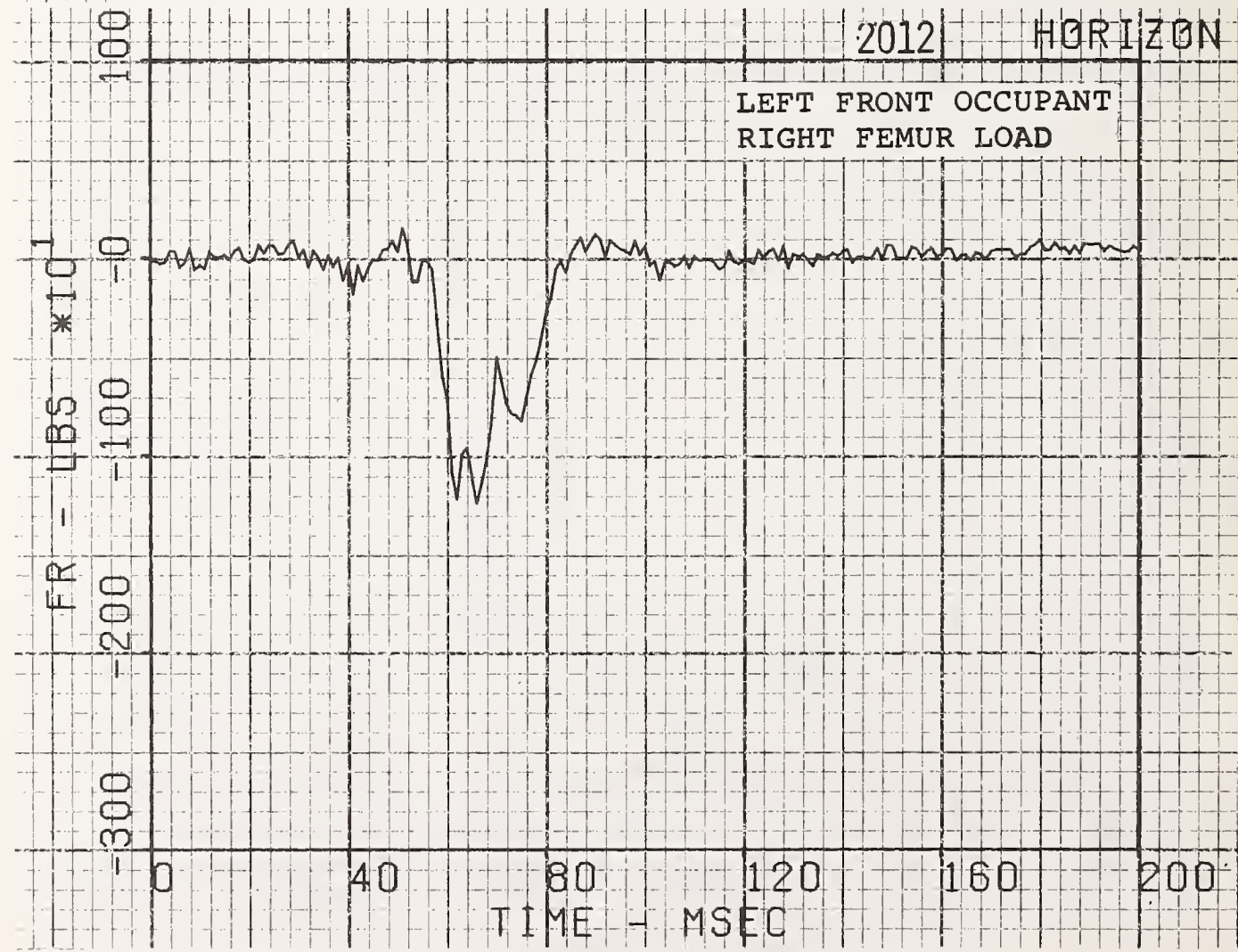
2011

3051-5
HORIZON



2012

HORIZON



10-30-78

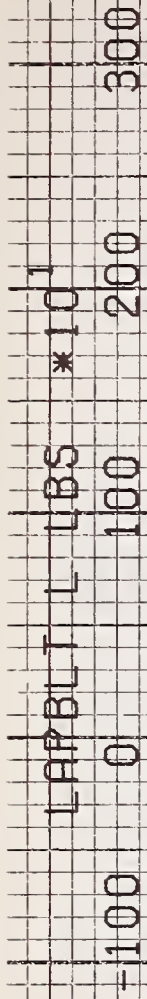
315/100

4001

3051-5
HORIZON

LEFT FRONT OCCUPANT
LEFT LAP BELT LOAD

LAPBLT L LBS *10¹

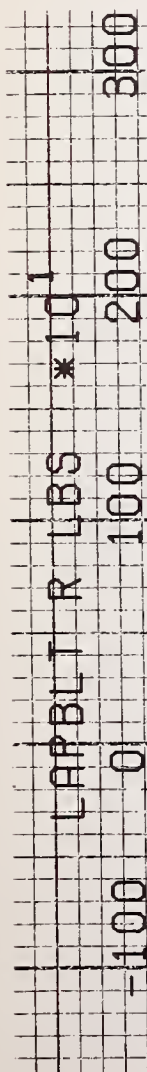


4001

HORIZON

LEFT FRONT OCCUPANT
RIGHT LAP BELT LOAD

LAPBLT R LBS *10¹



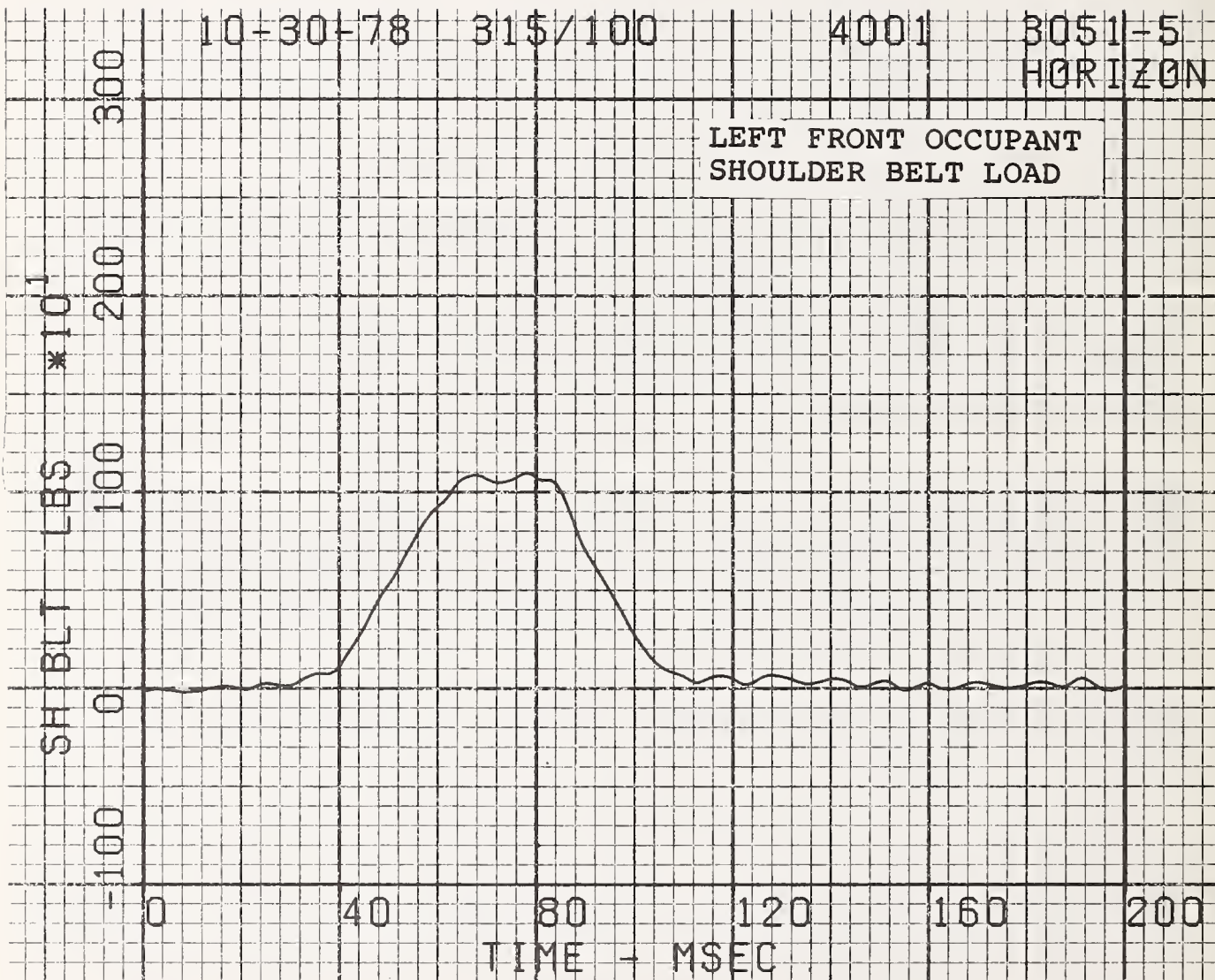
TIME - MSEC

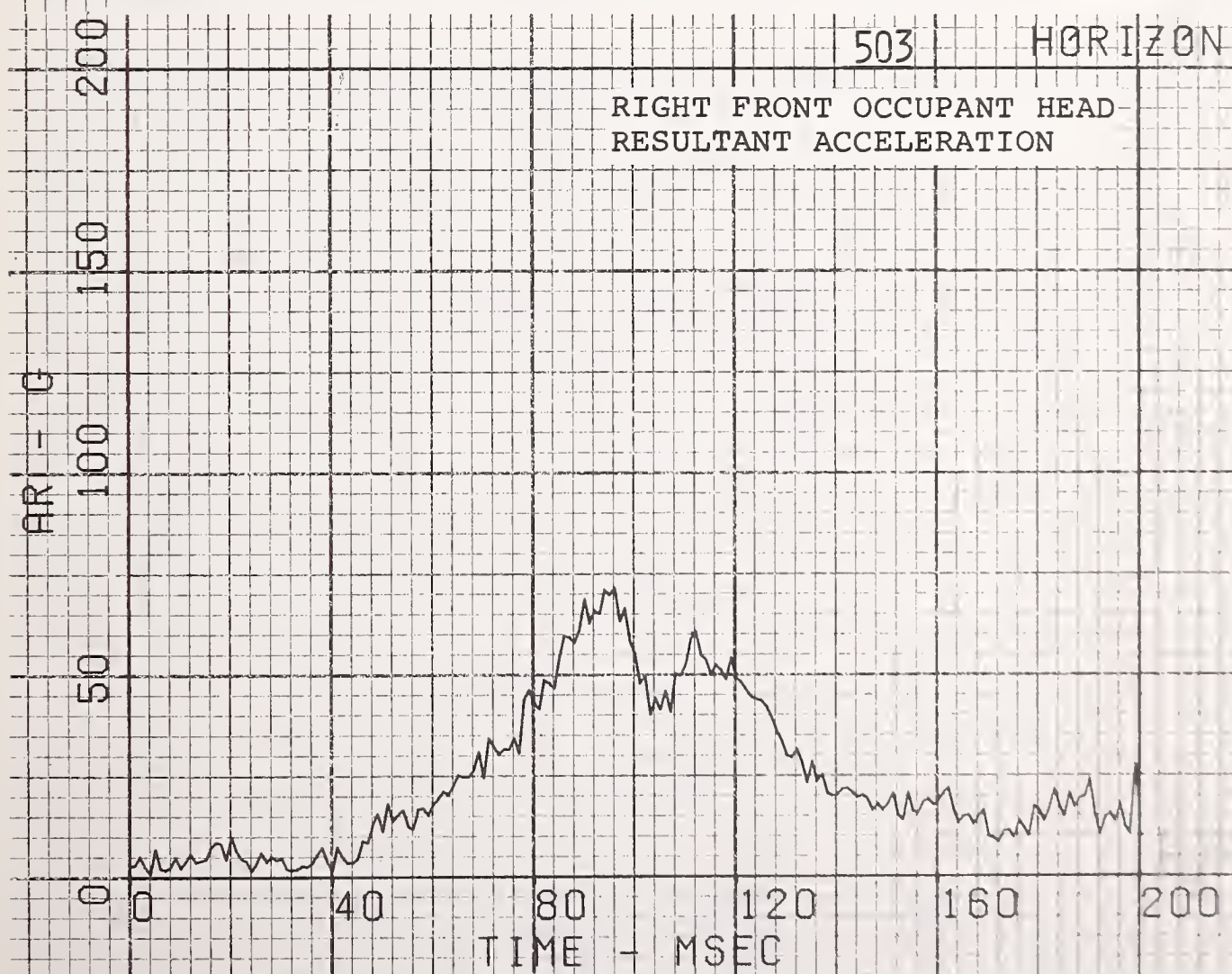
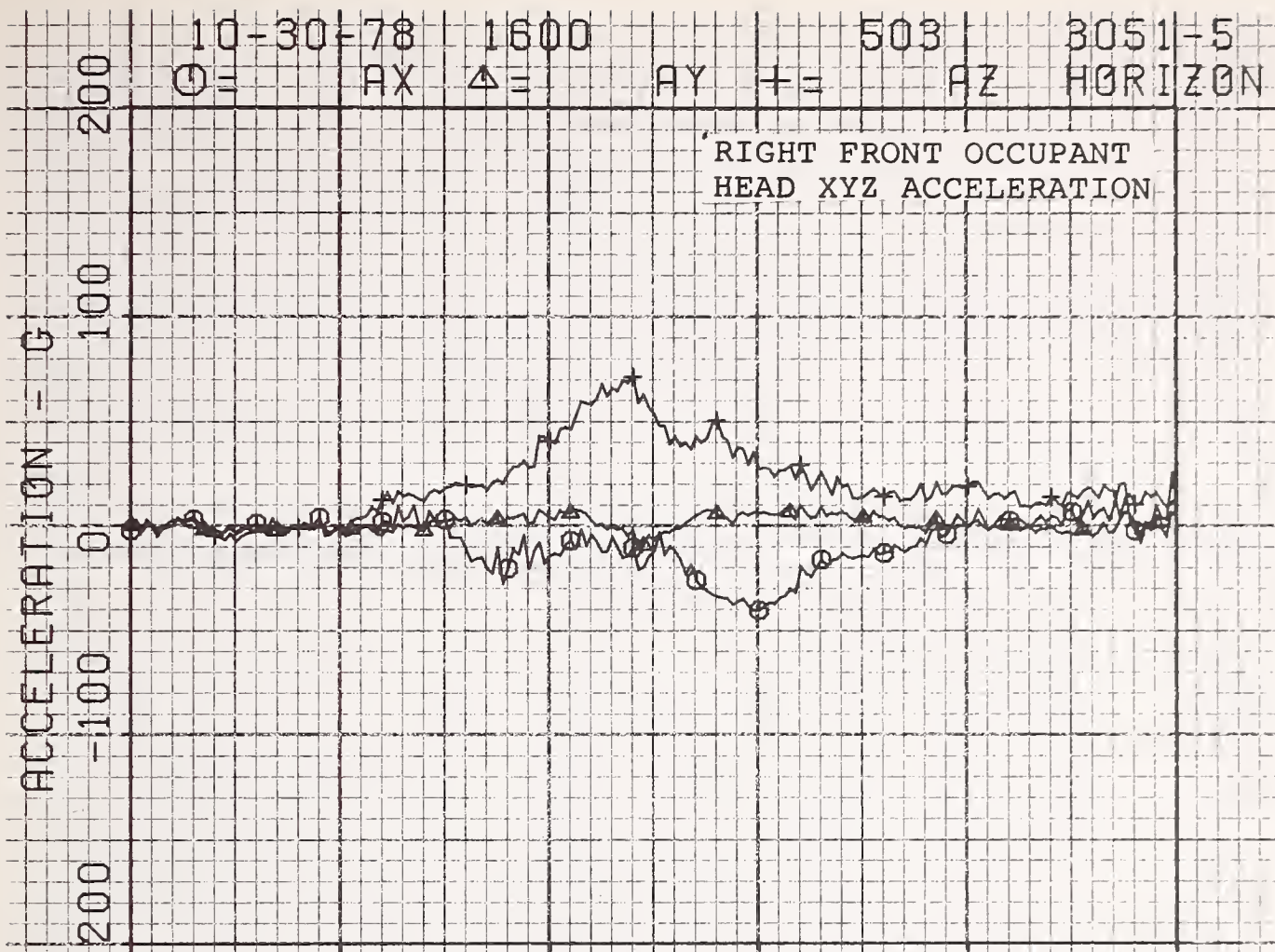
10-30-78

315/100

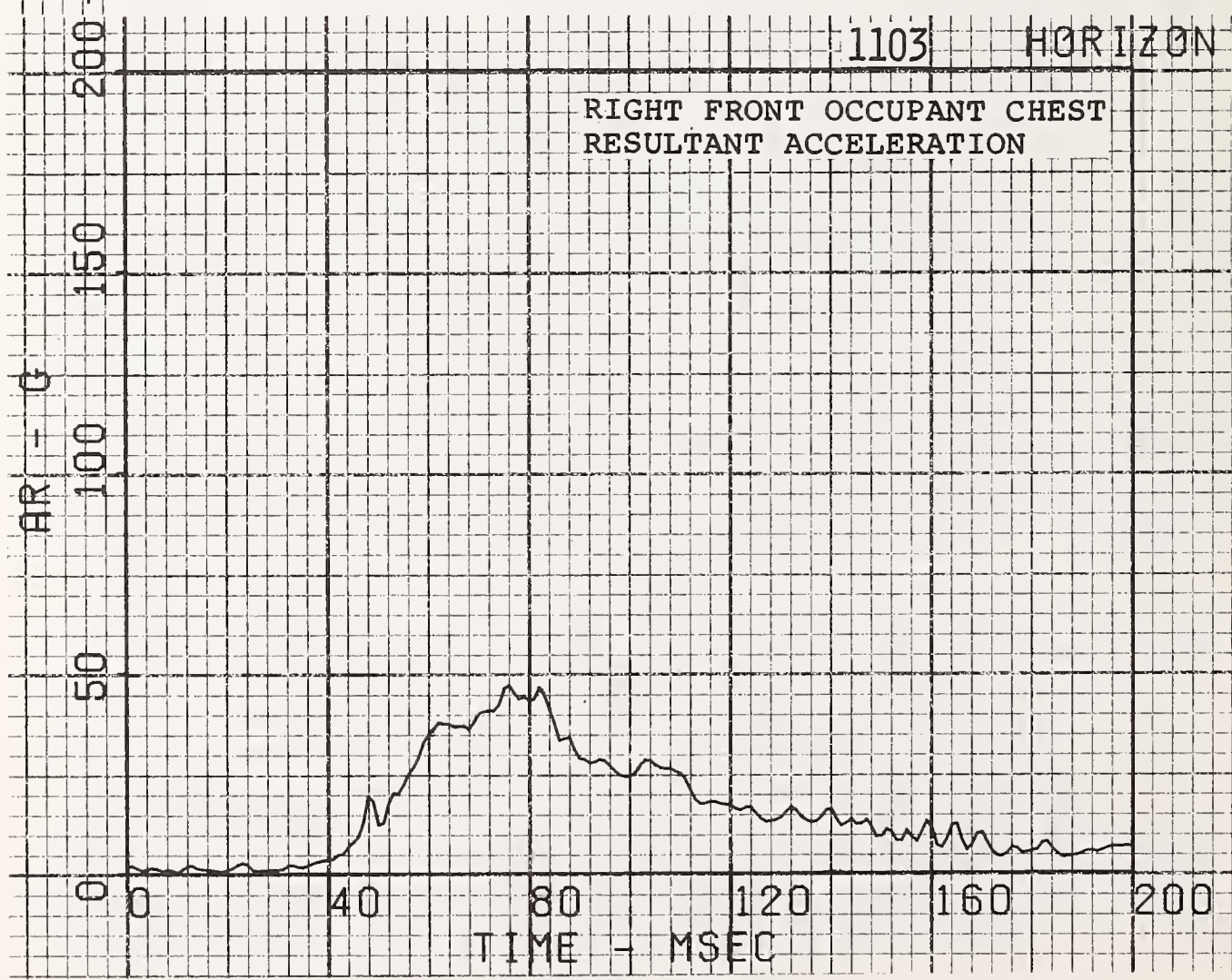
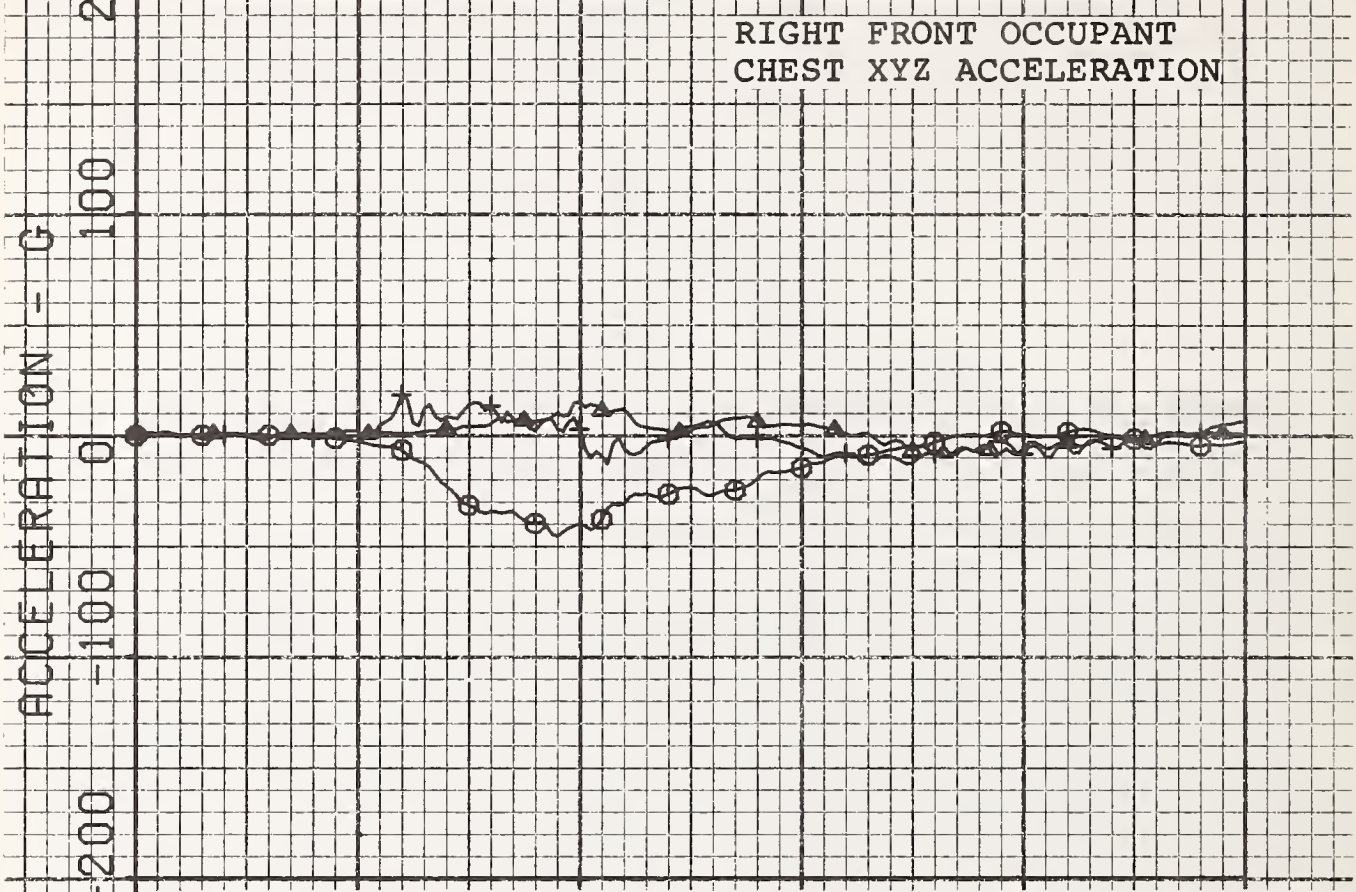
4001

3051-5
HORIZON





10-30-78 315 1103 3051-5
⊖ = AX Δ = AY ⊕ = AZ HORIZON

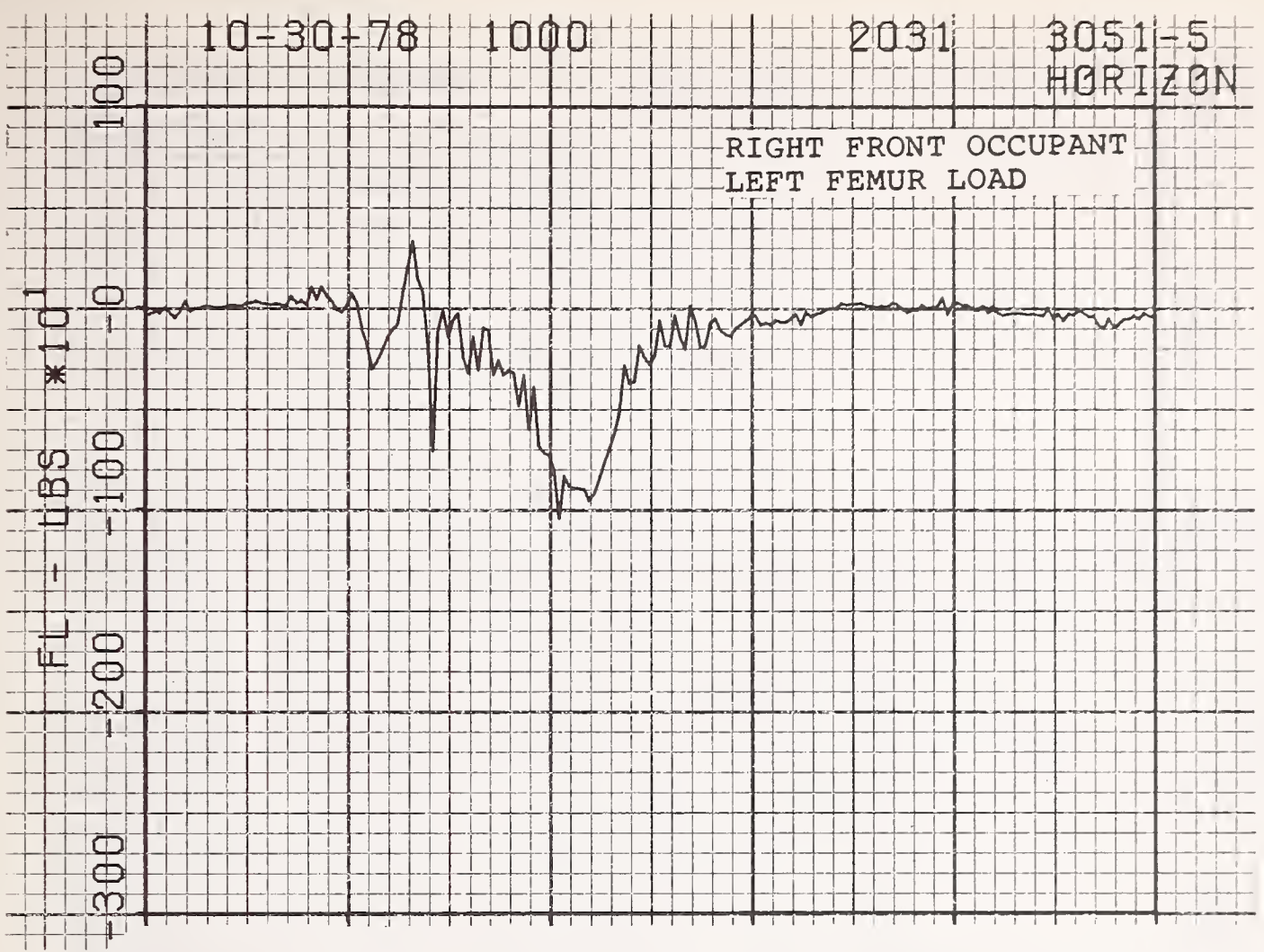


10-30-78

1000

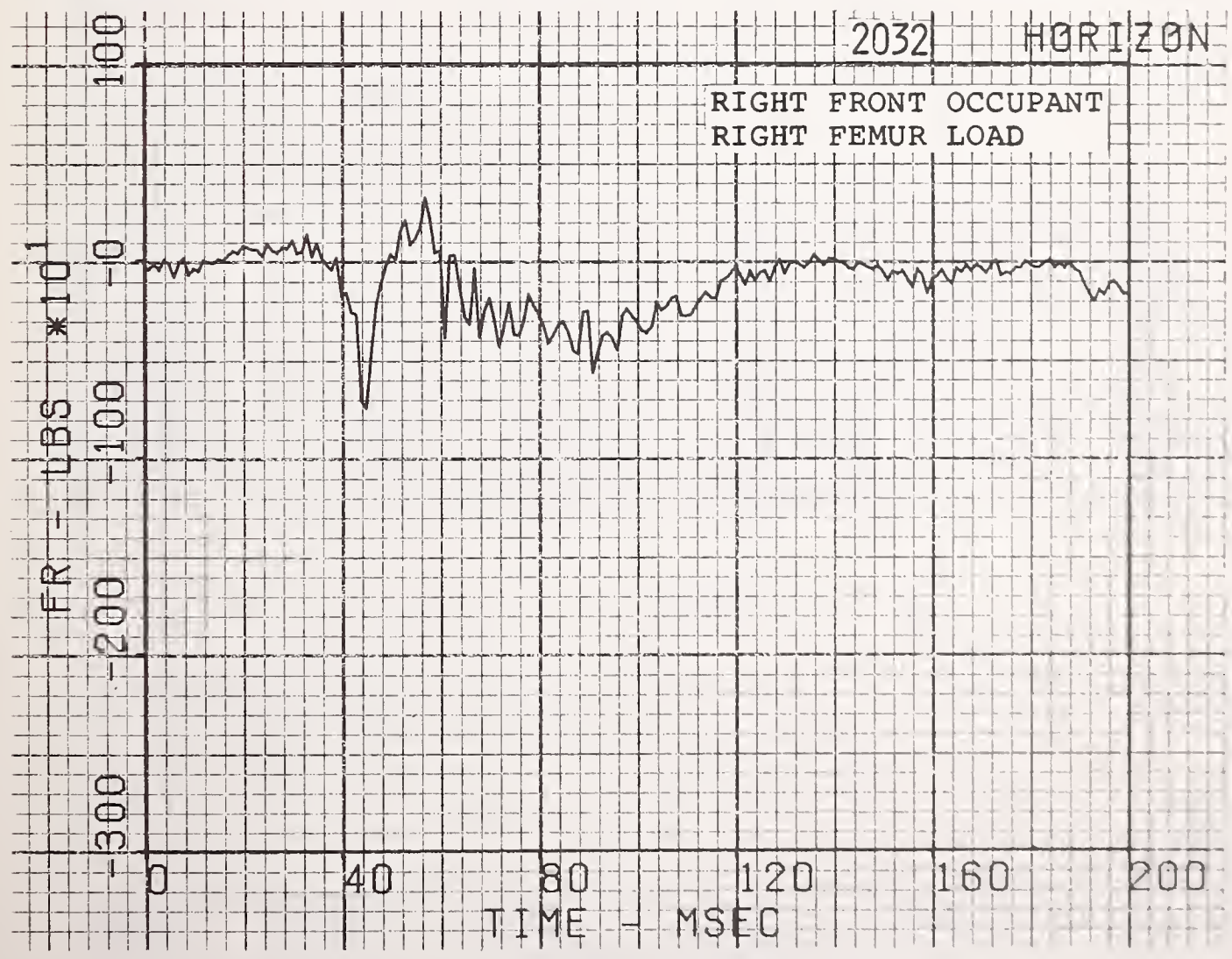
2031

3051-5
HORIZON



2032

HORIZON



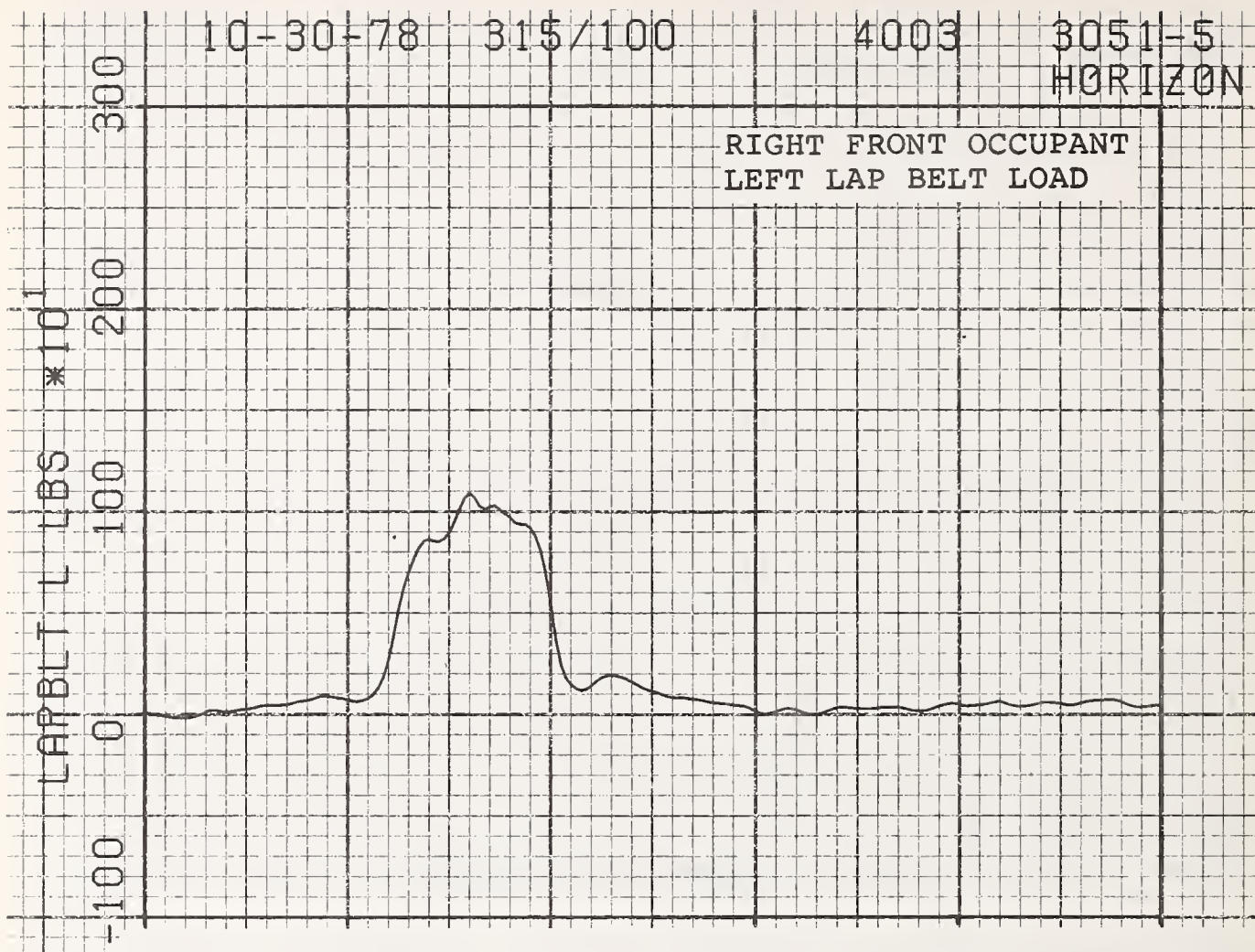
10-30-78

315/100

4003

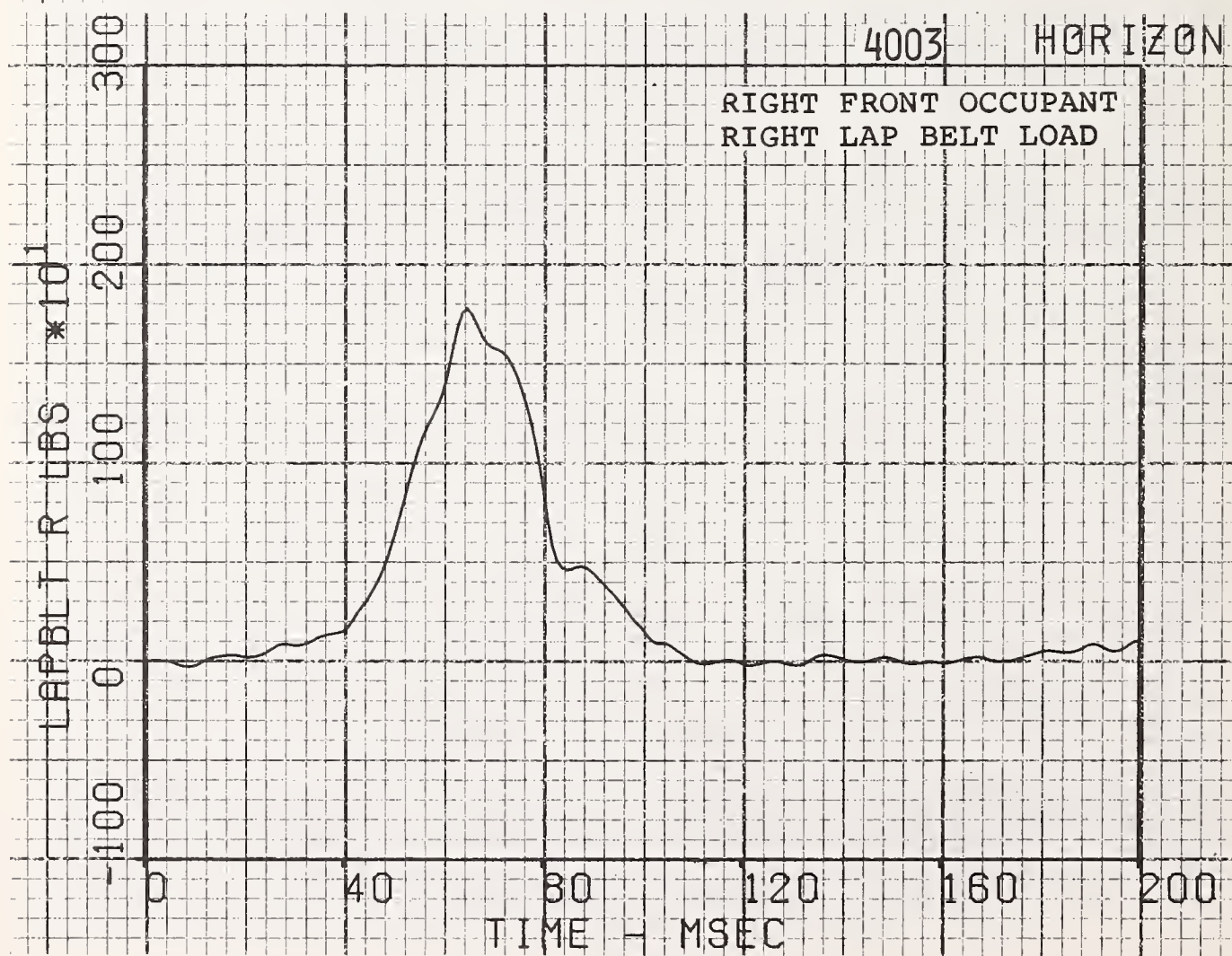
3051-5

HORIZON



4003

HORIZON



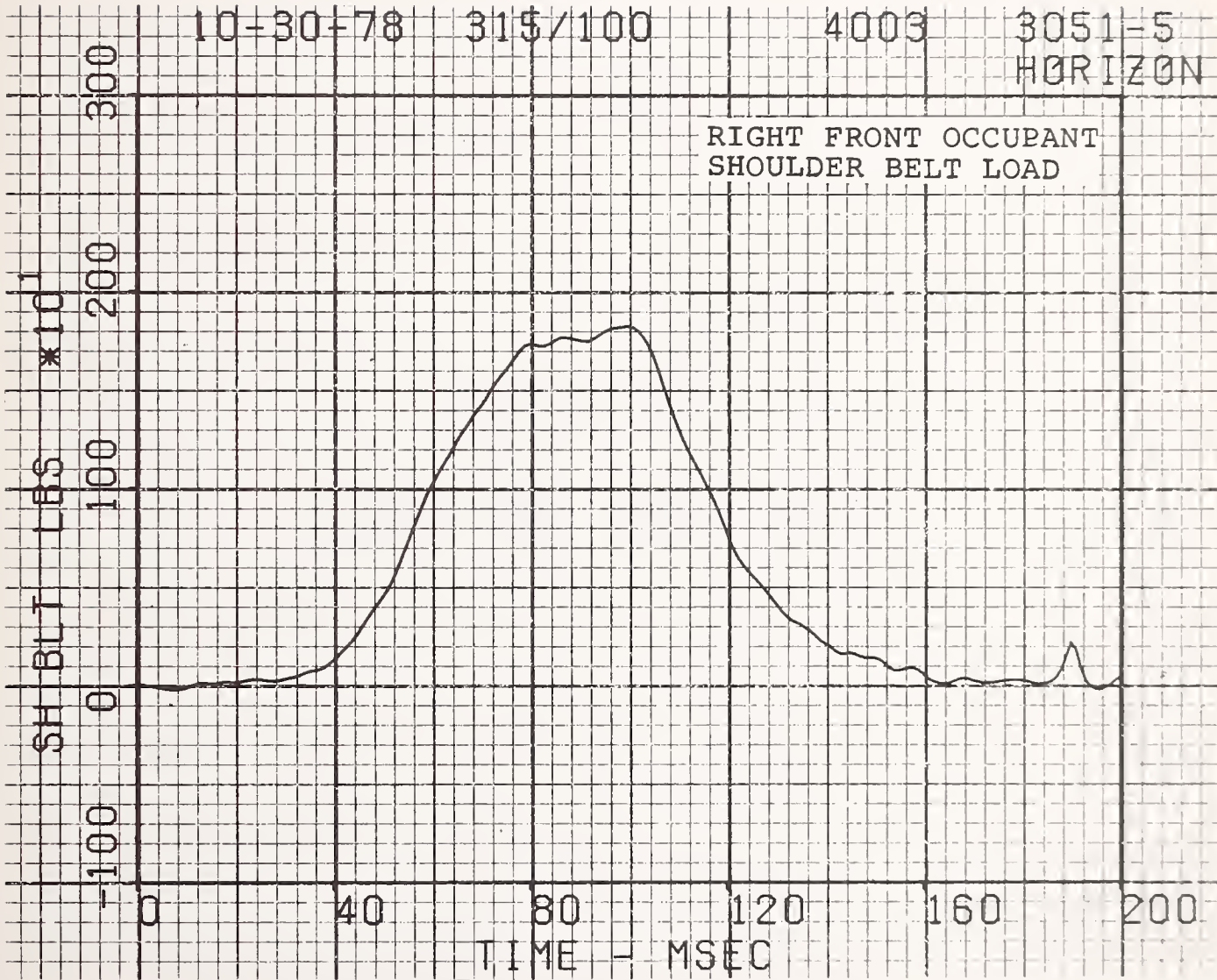
10-30-78

315/100

4003

3051-5

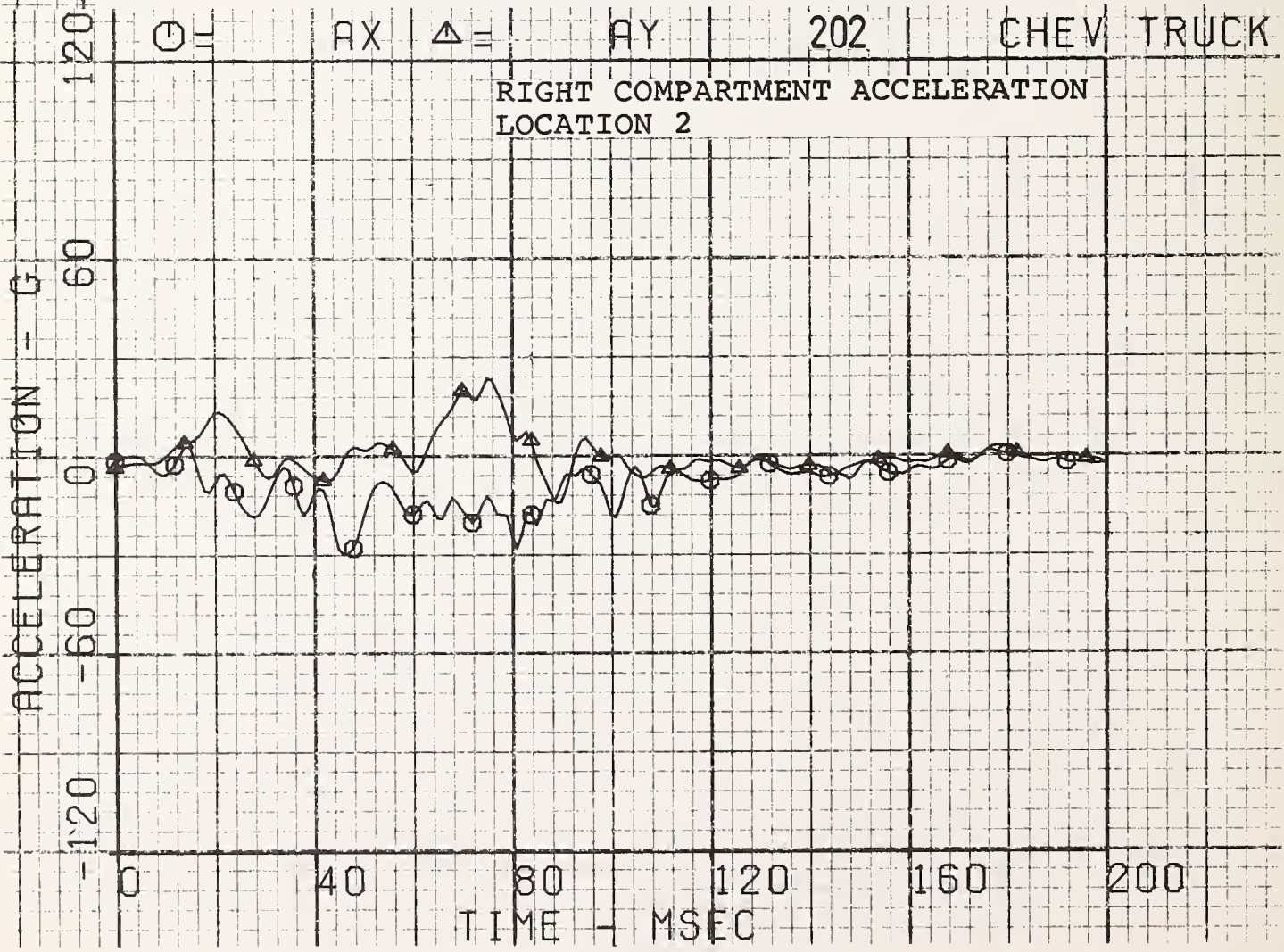
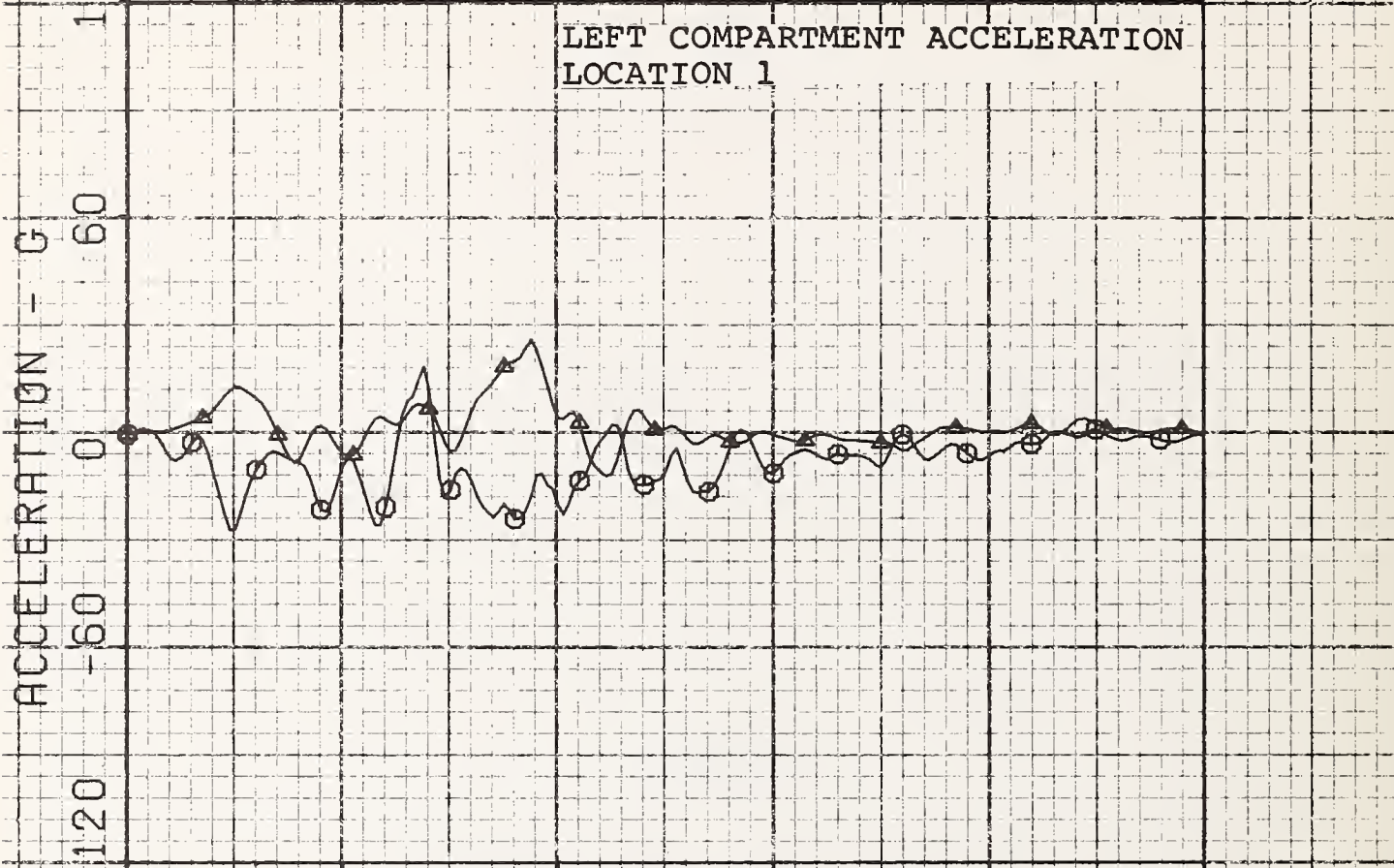
HORIZON



APPENDIX B

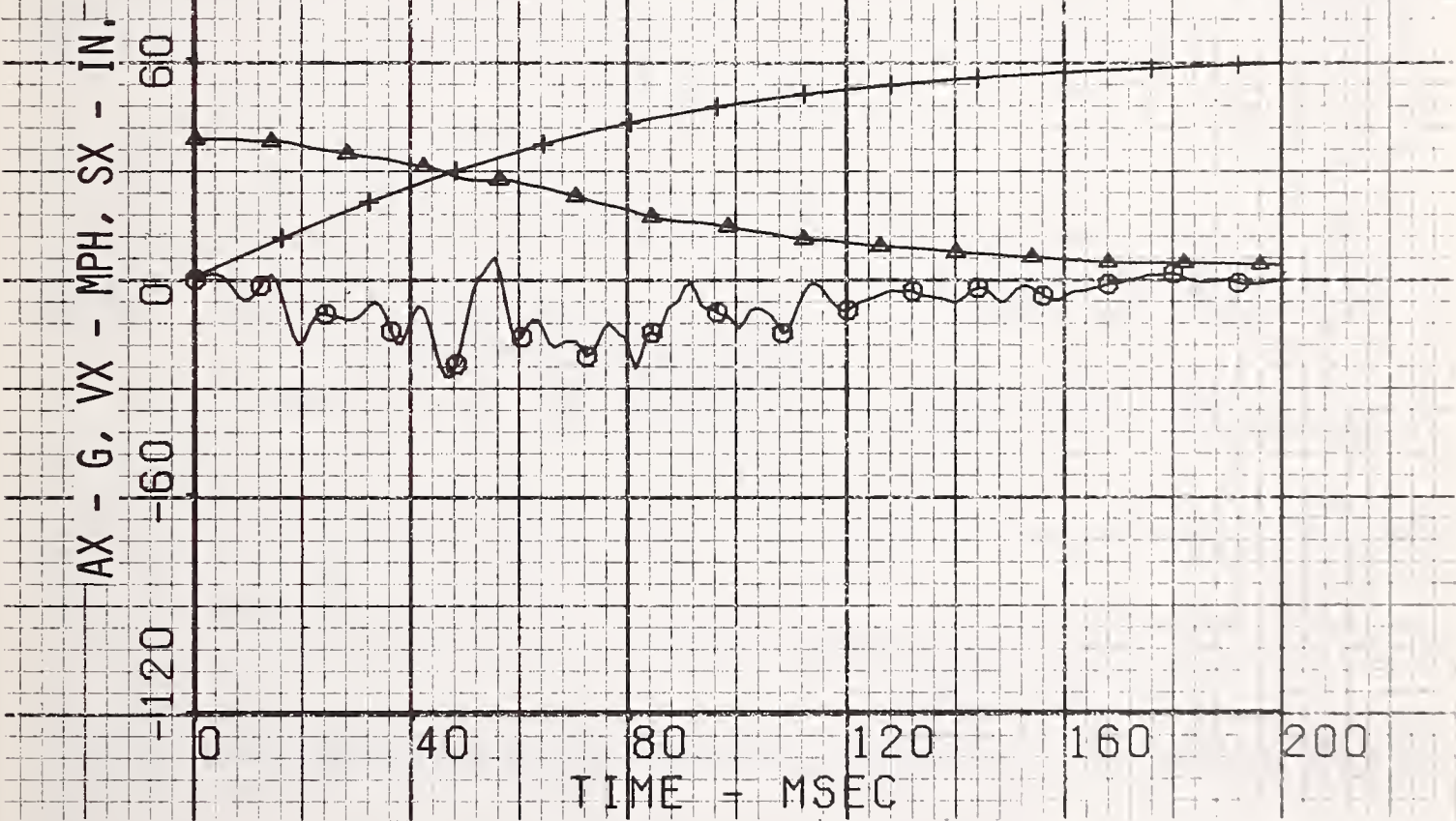
CALCOMP PLOTS (TEST 3051-6)

11-28-78 315/100 201 3051-6
O = AX Δ = AY CHEV TRUCK

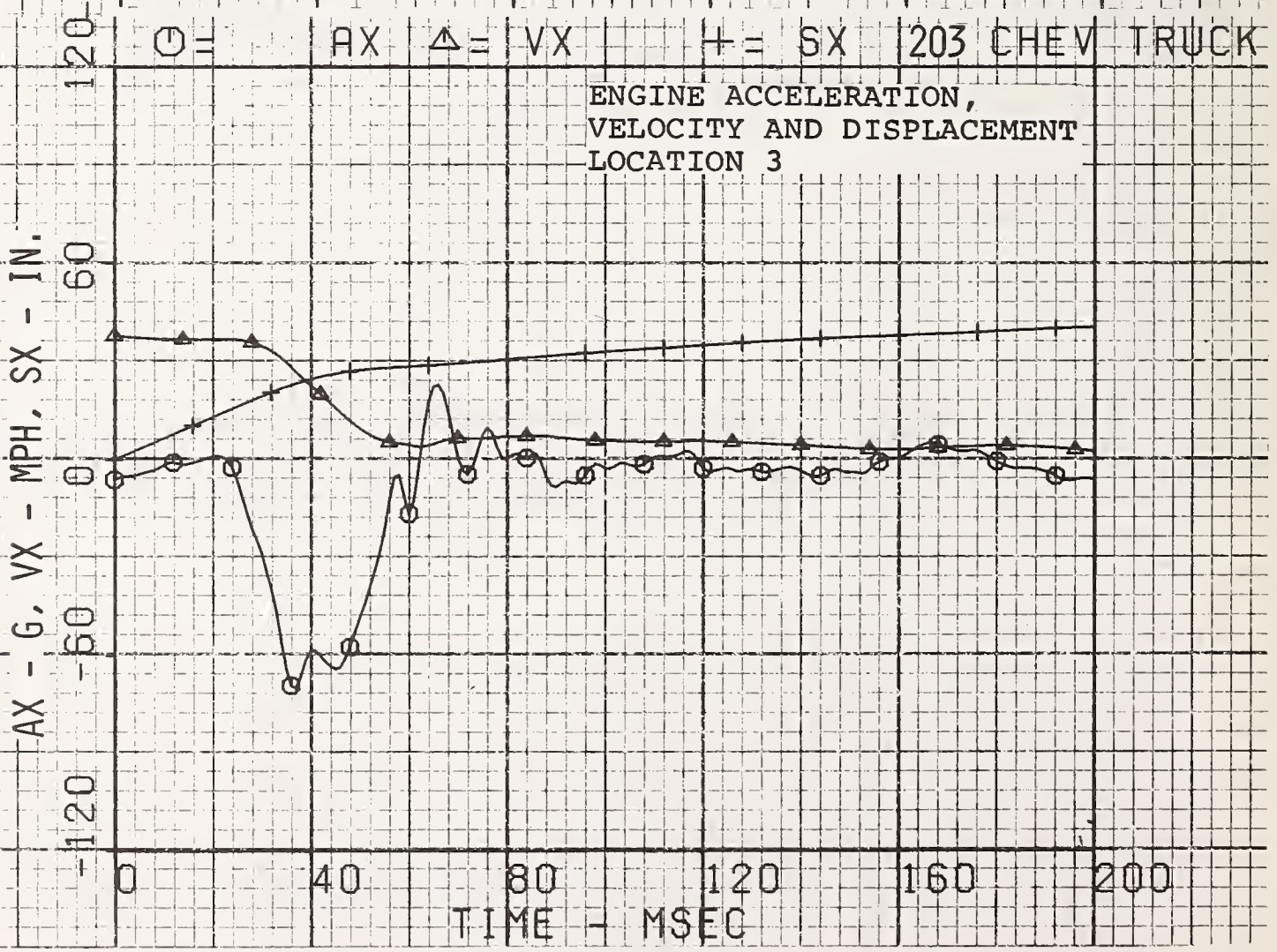
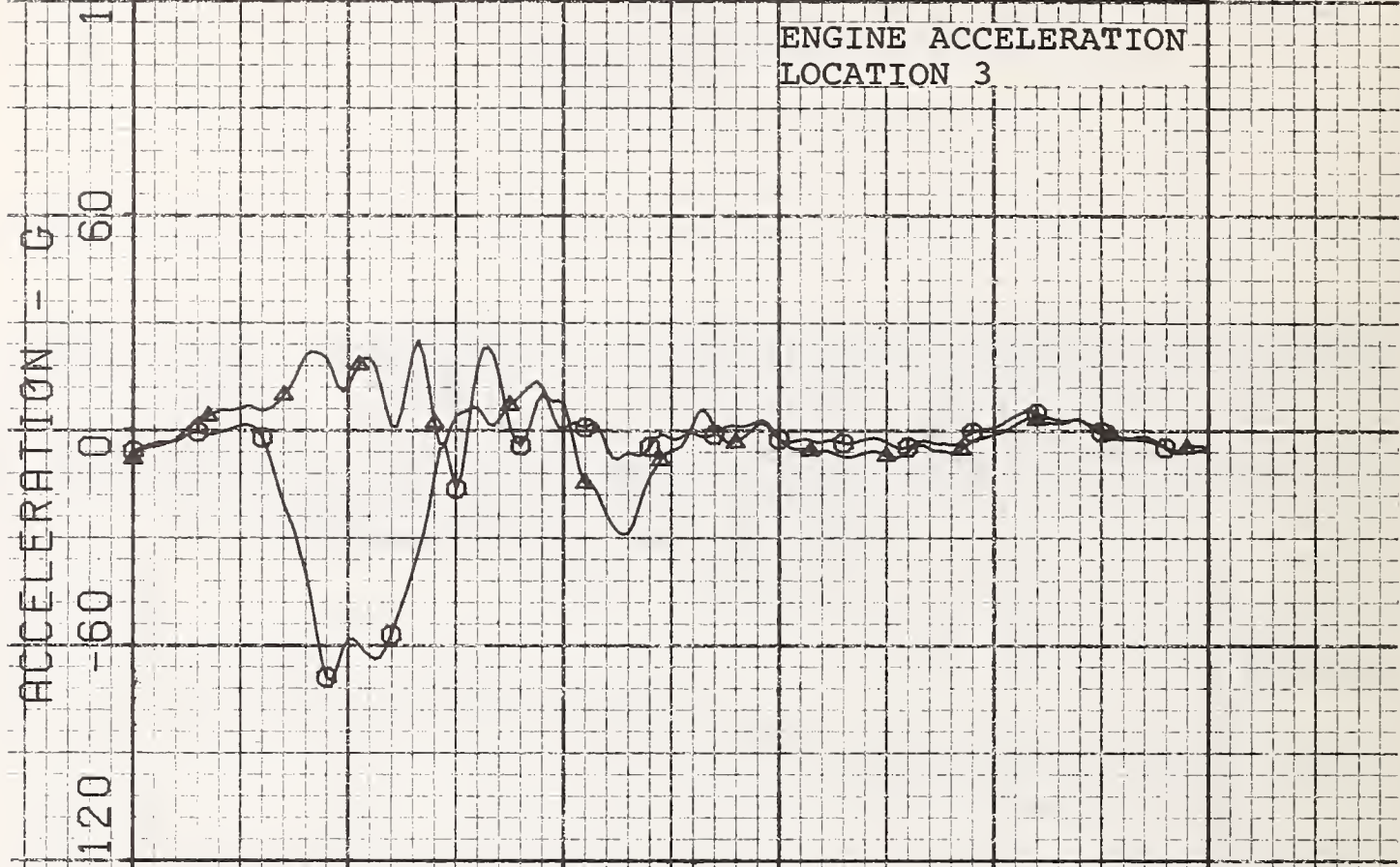


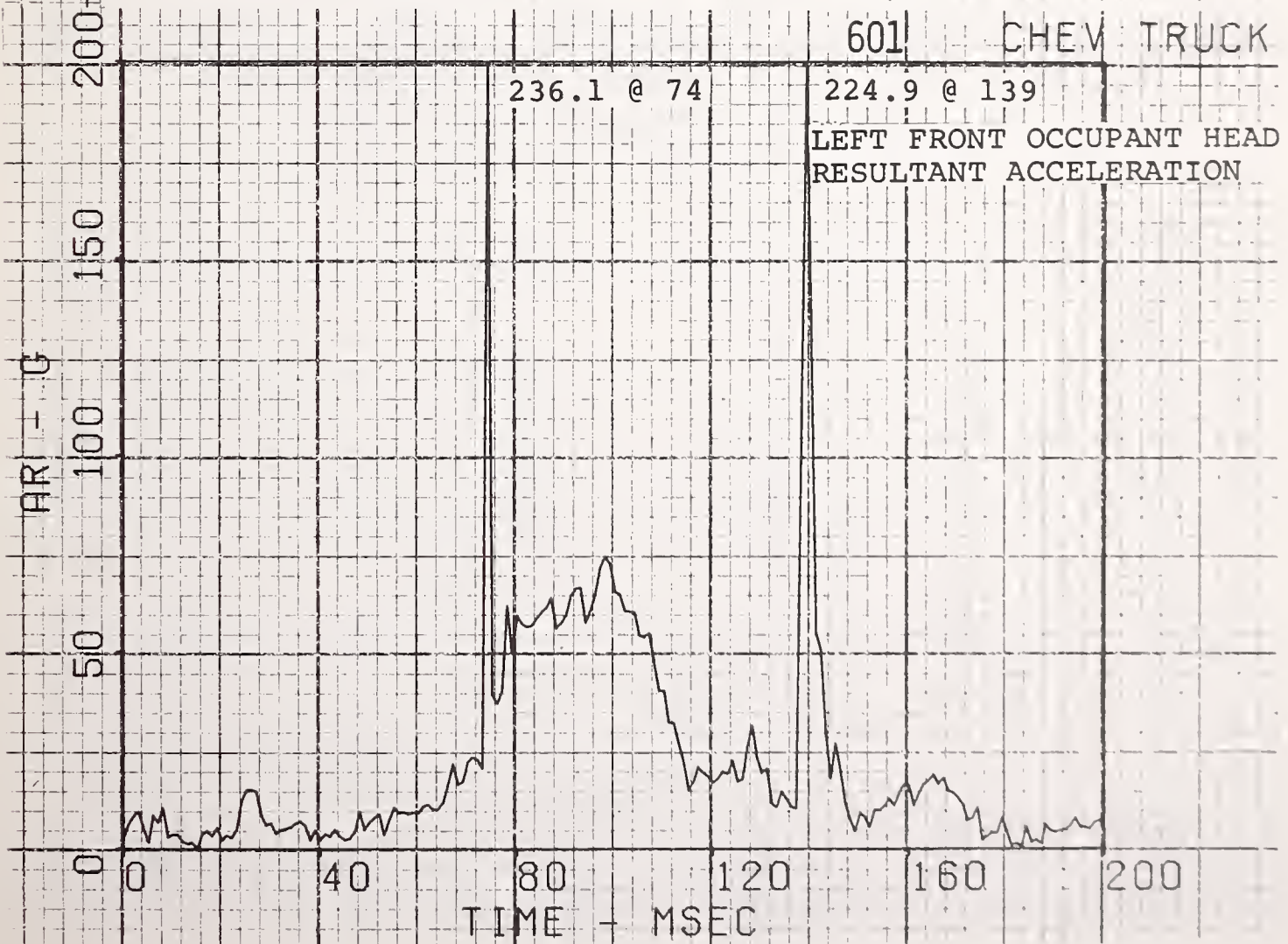
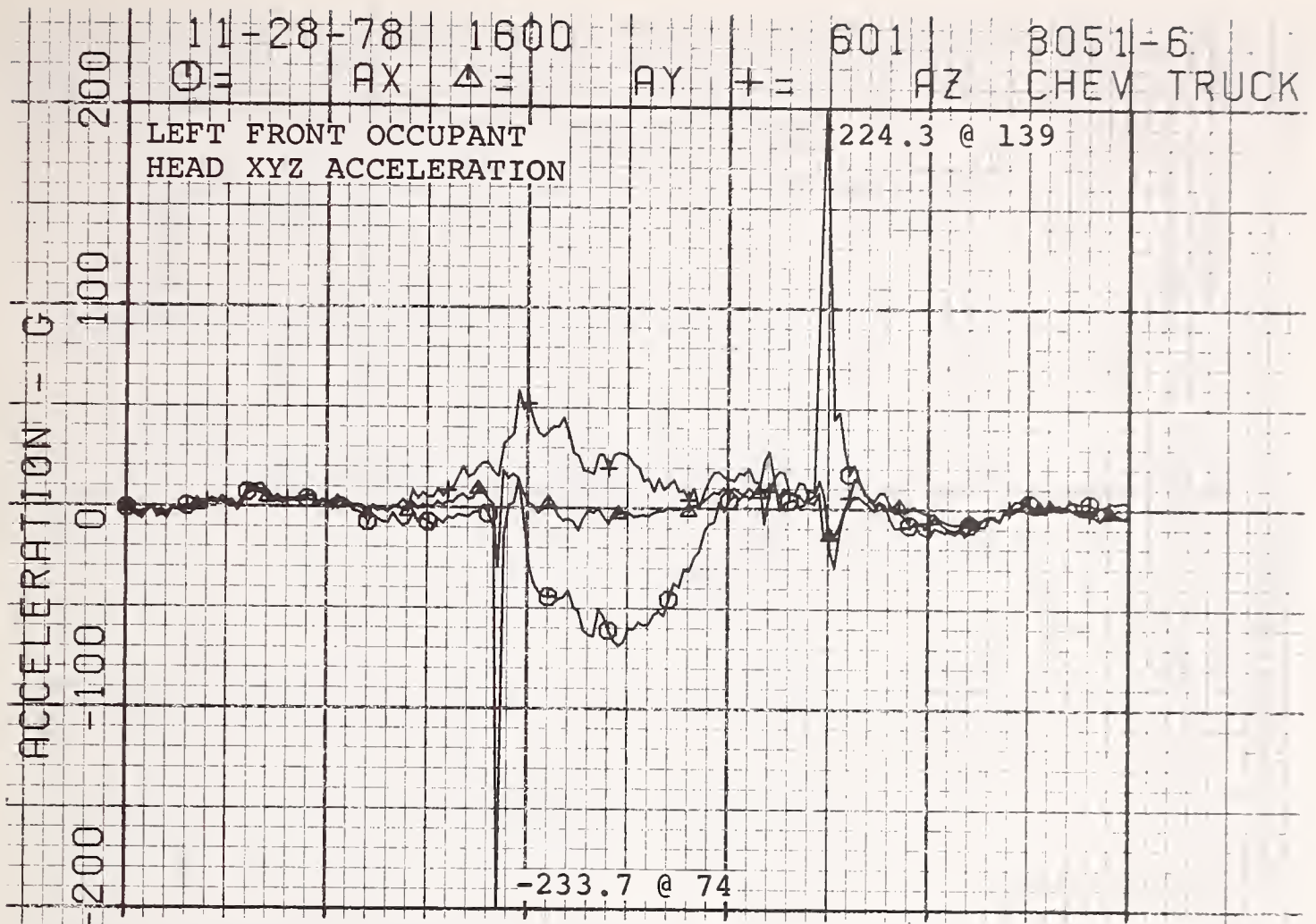
| | | | | |
|--------|----------|---------|----------|------------|
| 120178 | DATE | FILTER | LOCATION | TEST NO |
| | 11-28-78 | 315/100 | 442 | 3051-6 |
| | O = AX | Δ = VX | + = SX | TRUCK 1, 2 |

AVERAGE COMPARTMENT ACCELERATION,
VELOCITY AND DISPLACEMENT
LOCATIONS 1 AND 2

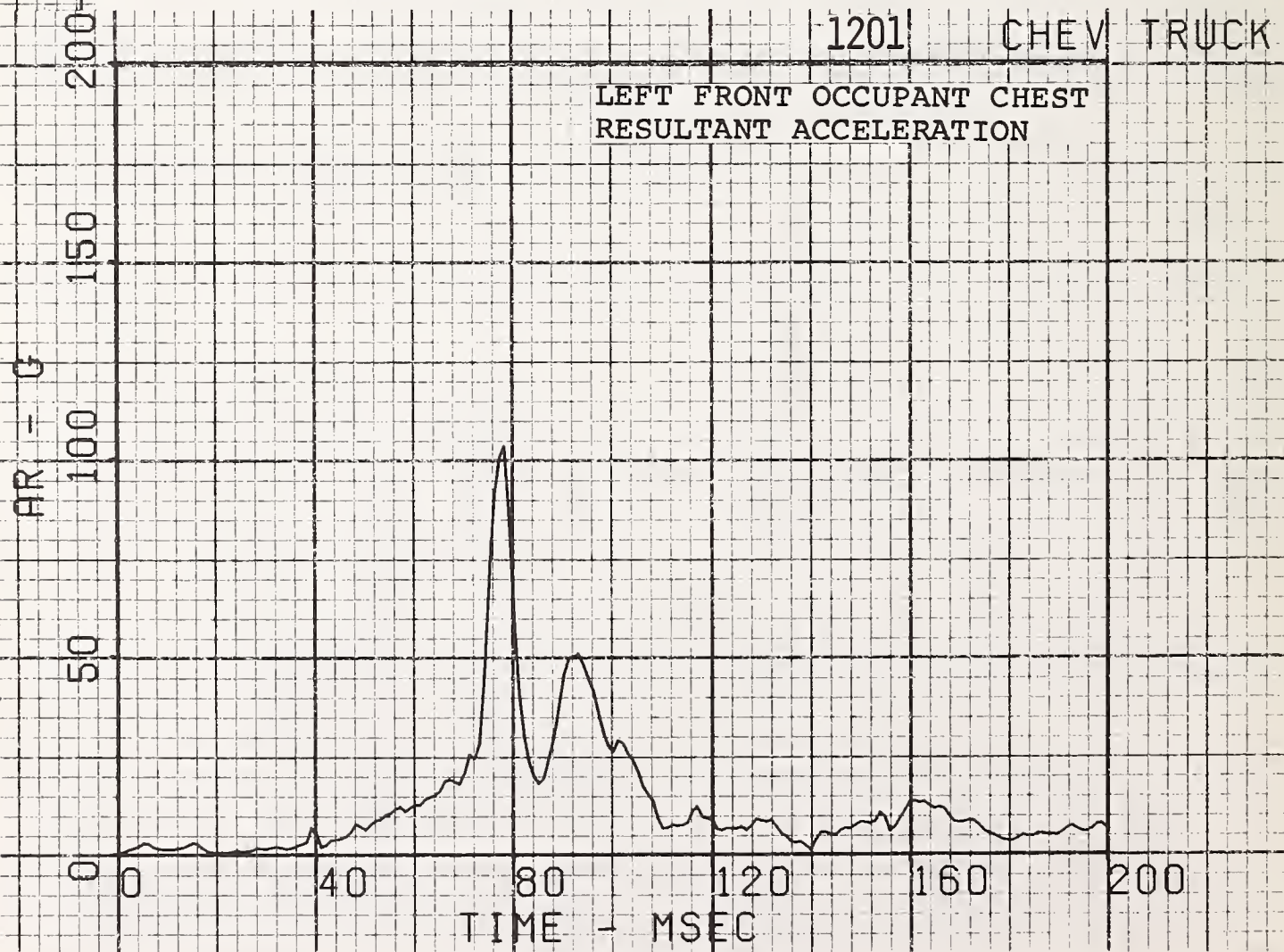
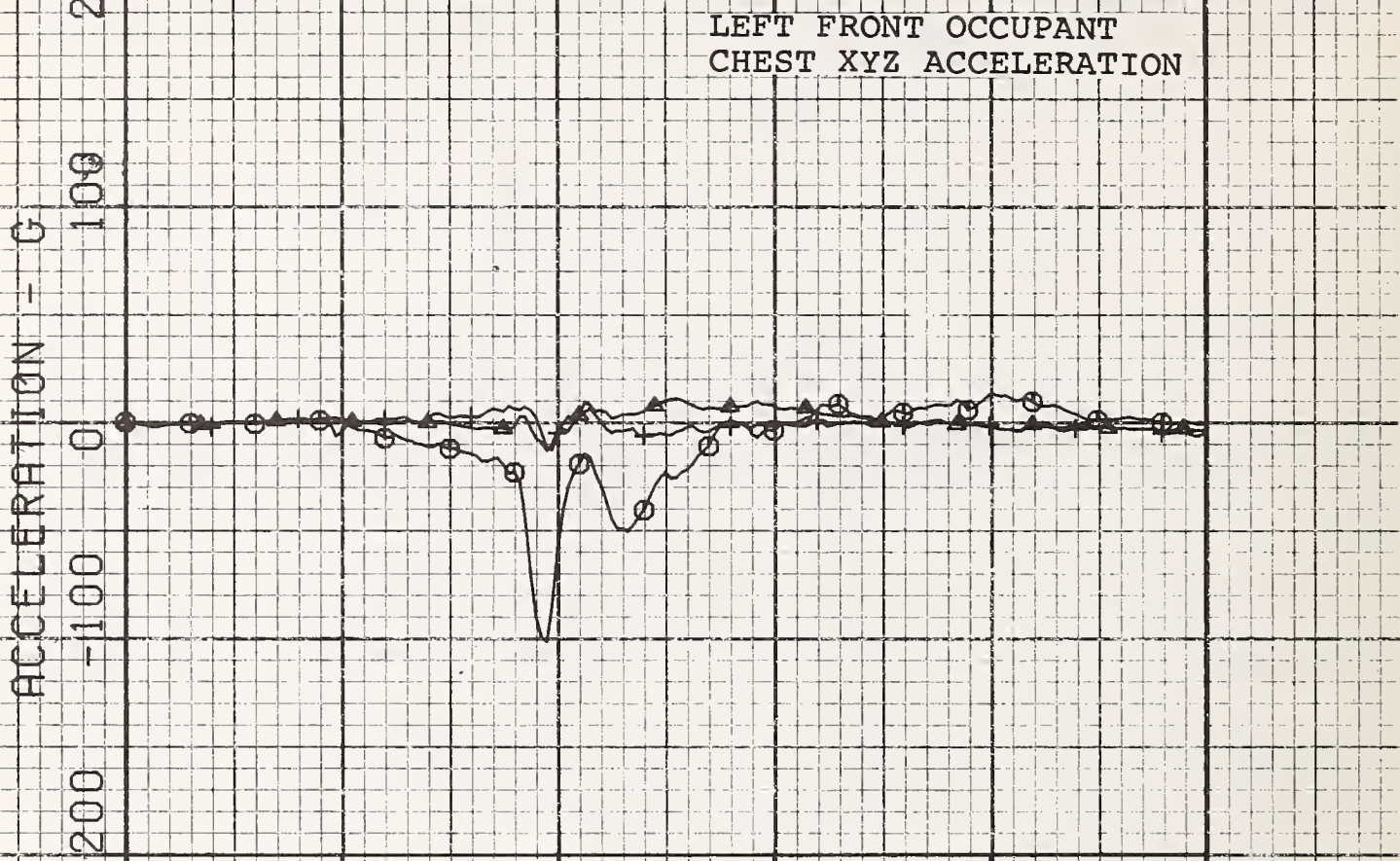


11-28-78 315/100 203 3051-6
 O = AX Δ = AY CHEV TRUCK





11-28-78 315 1201 3051-6
O = AX Δ = AY + = AZ CHEV TRUCK



11-28-78

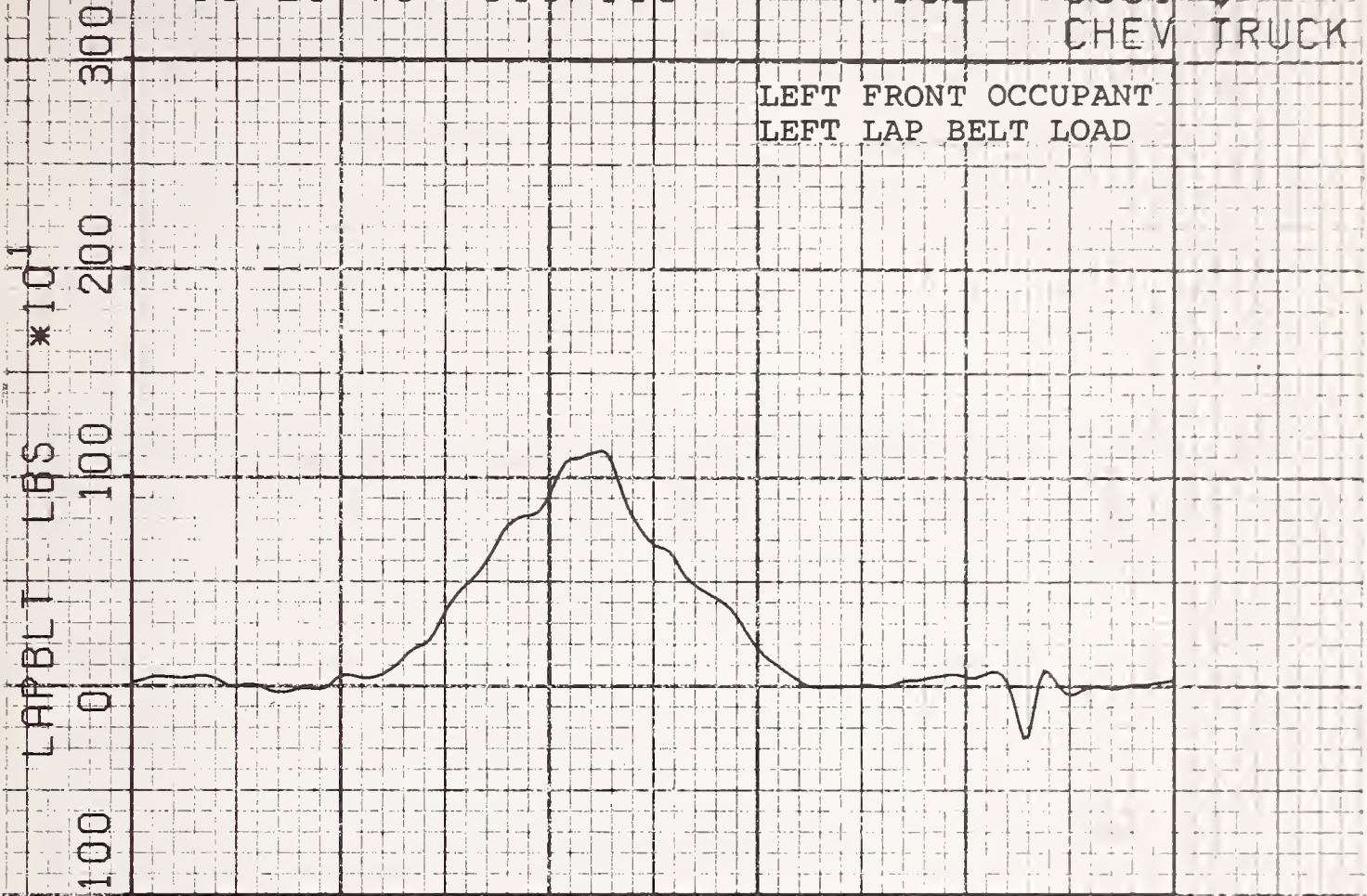
315/100

4101

3051-6

CHEV TRUCK

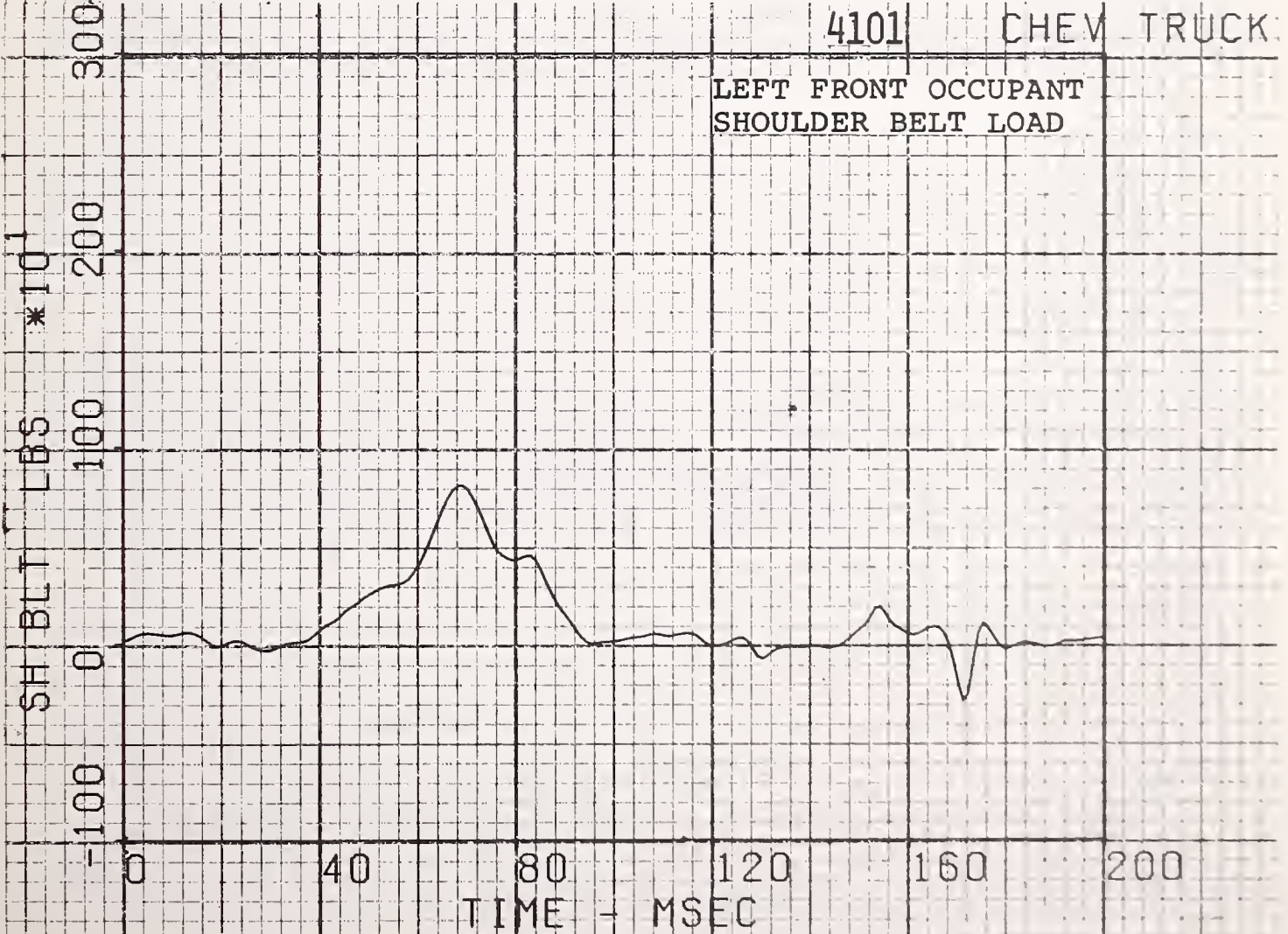
LEFT FRONT OCCUPANT
LEFT LAP BELT LOAD

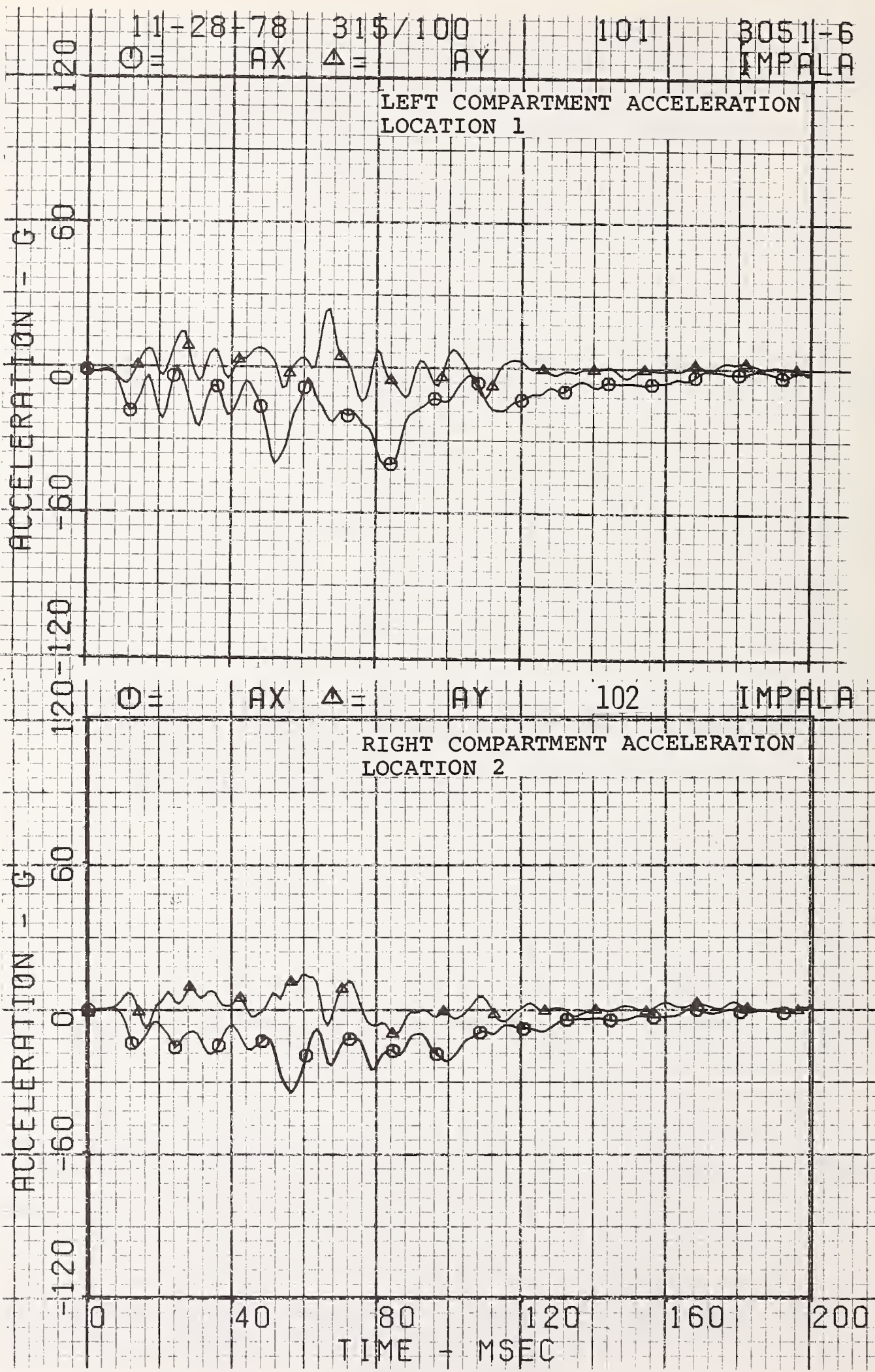


4101

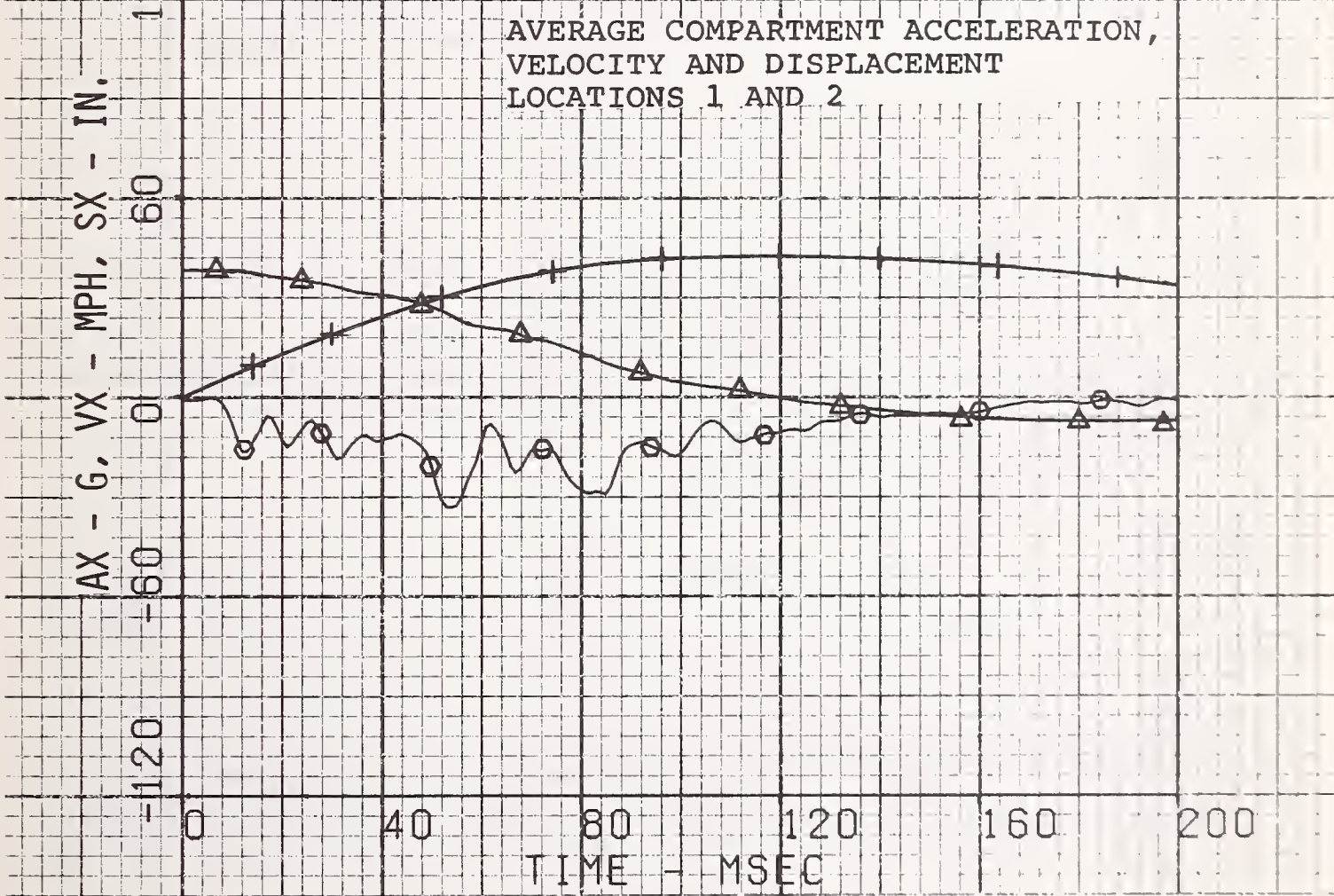
CHEV TRUCK

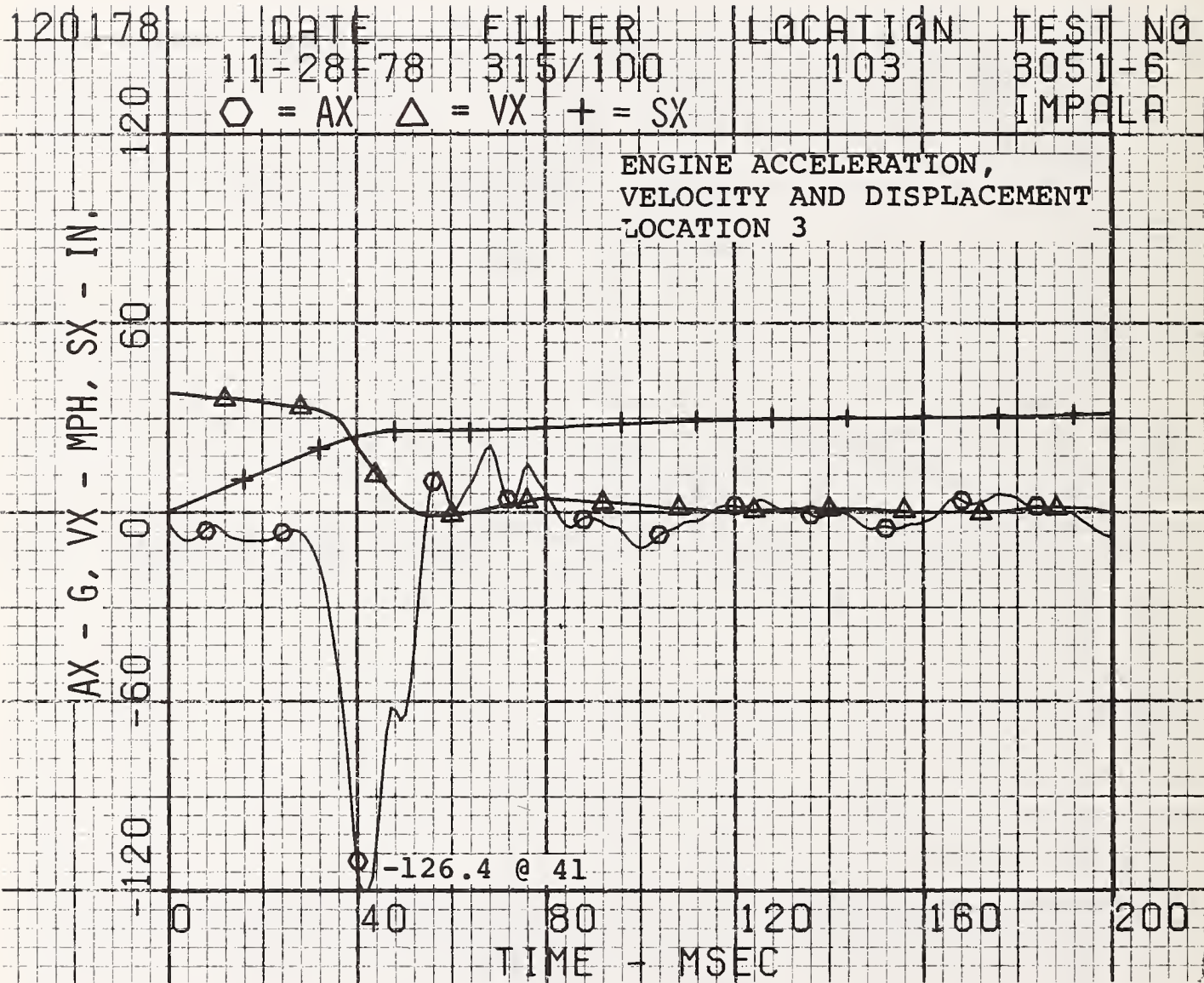
LEFT FRONT OCCUPANT
SHOULDER BELT LOAD

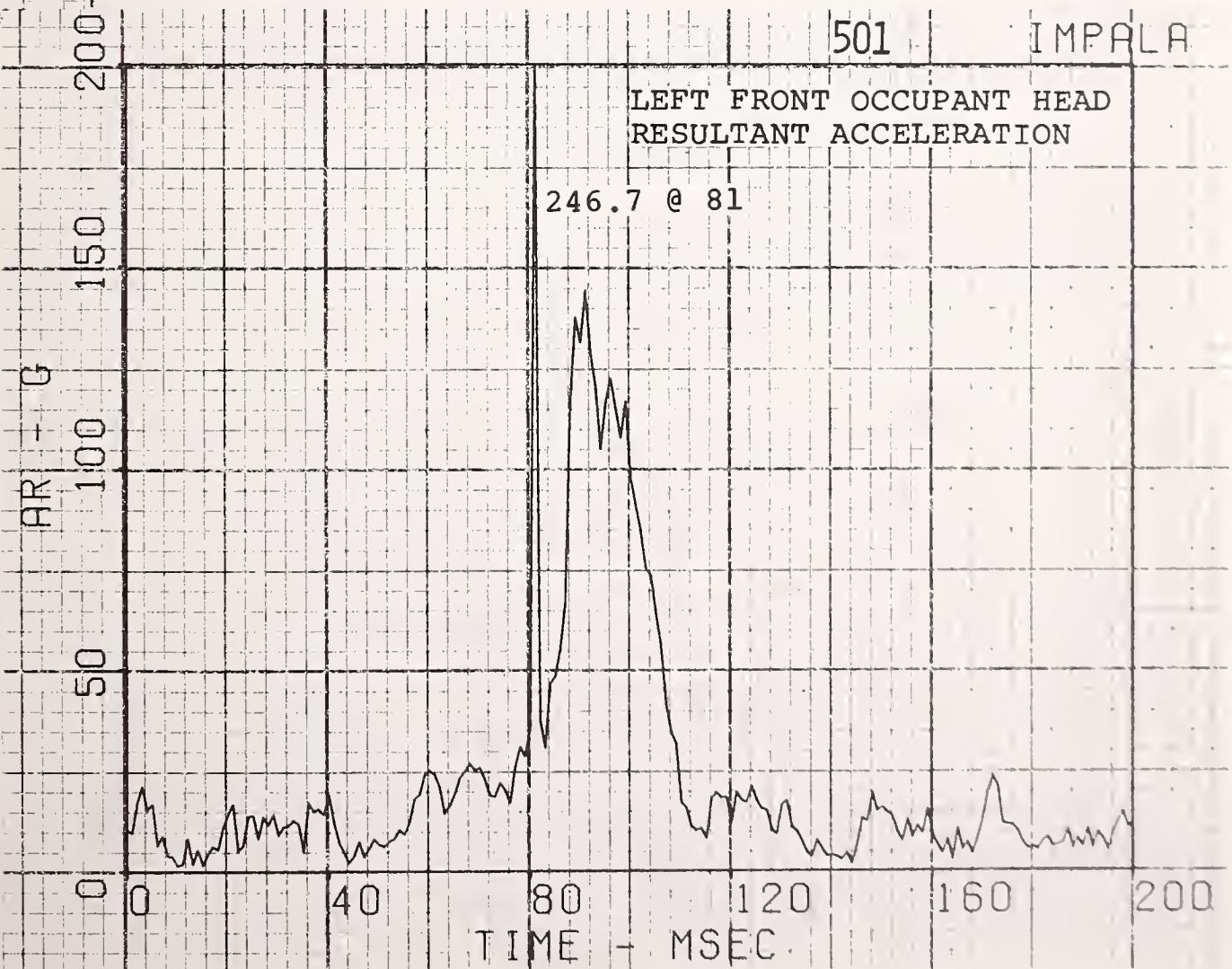
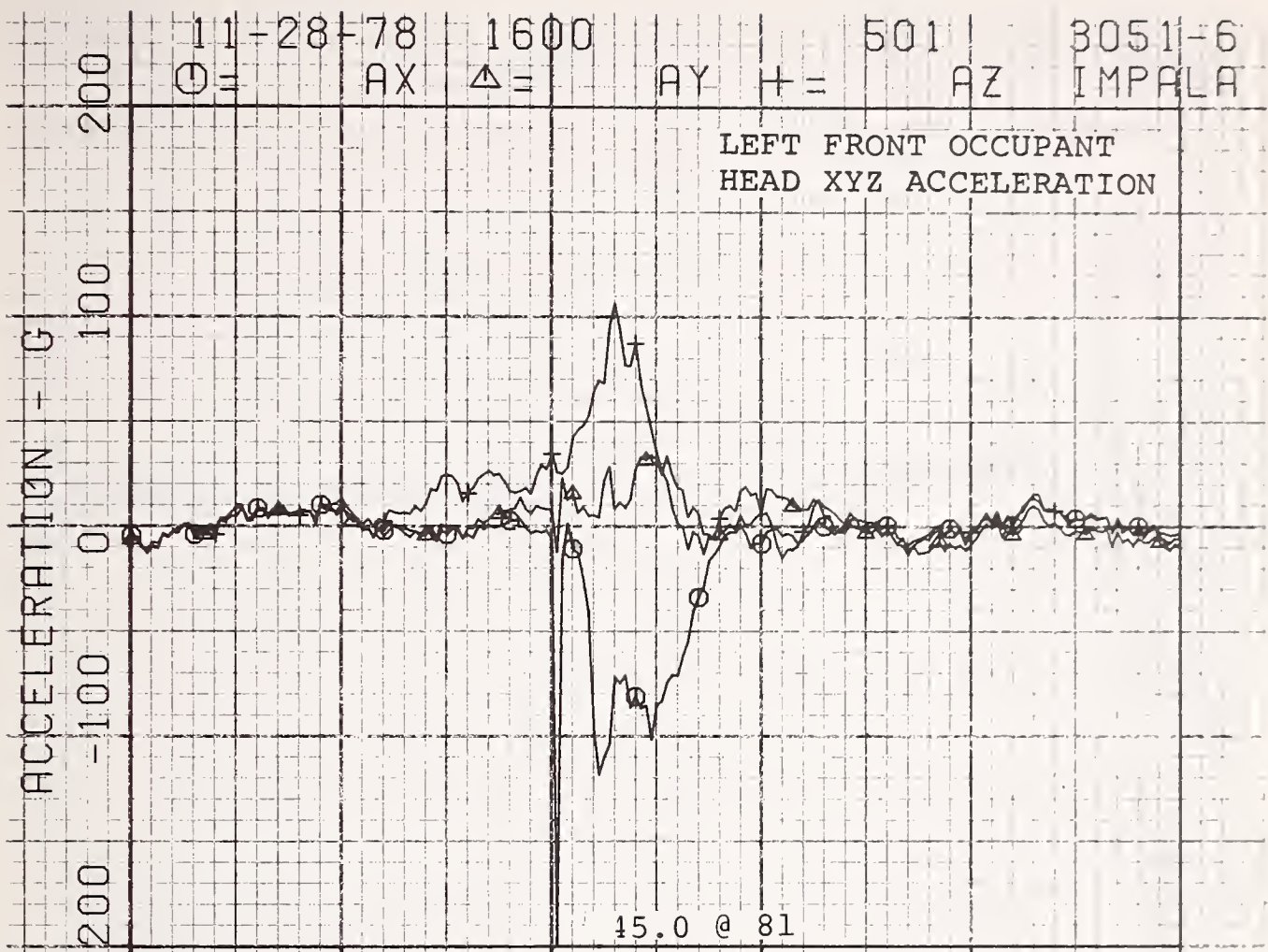


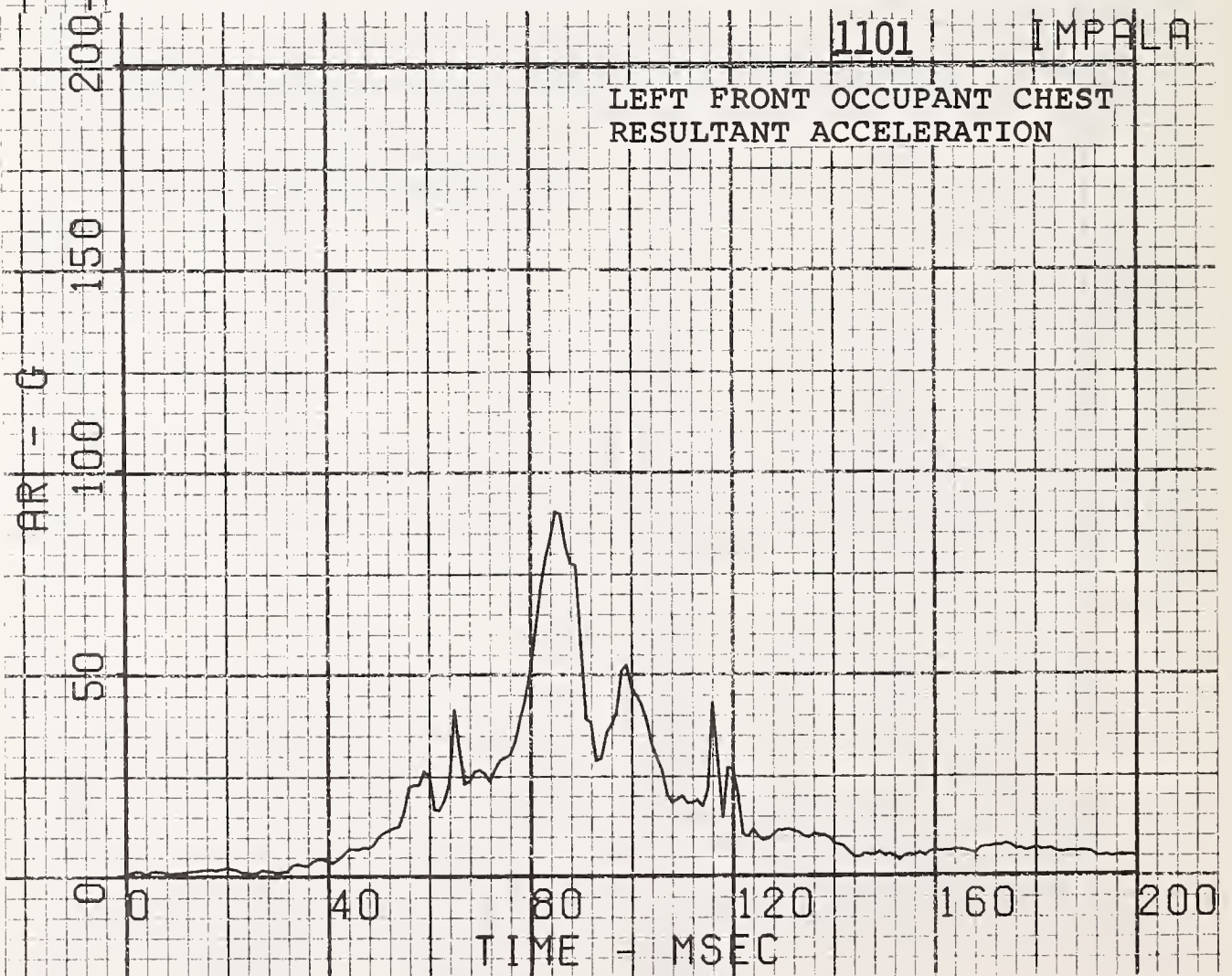
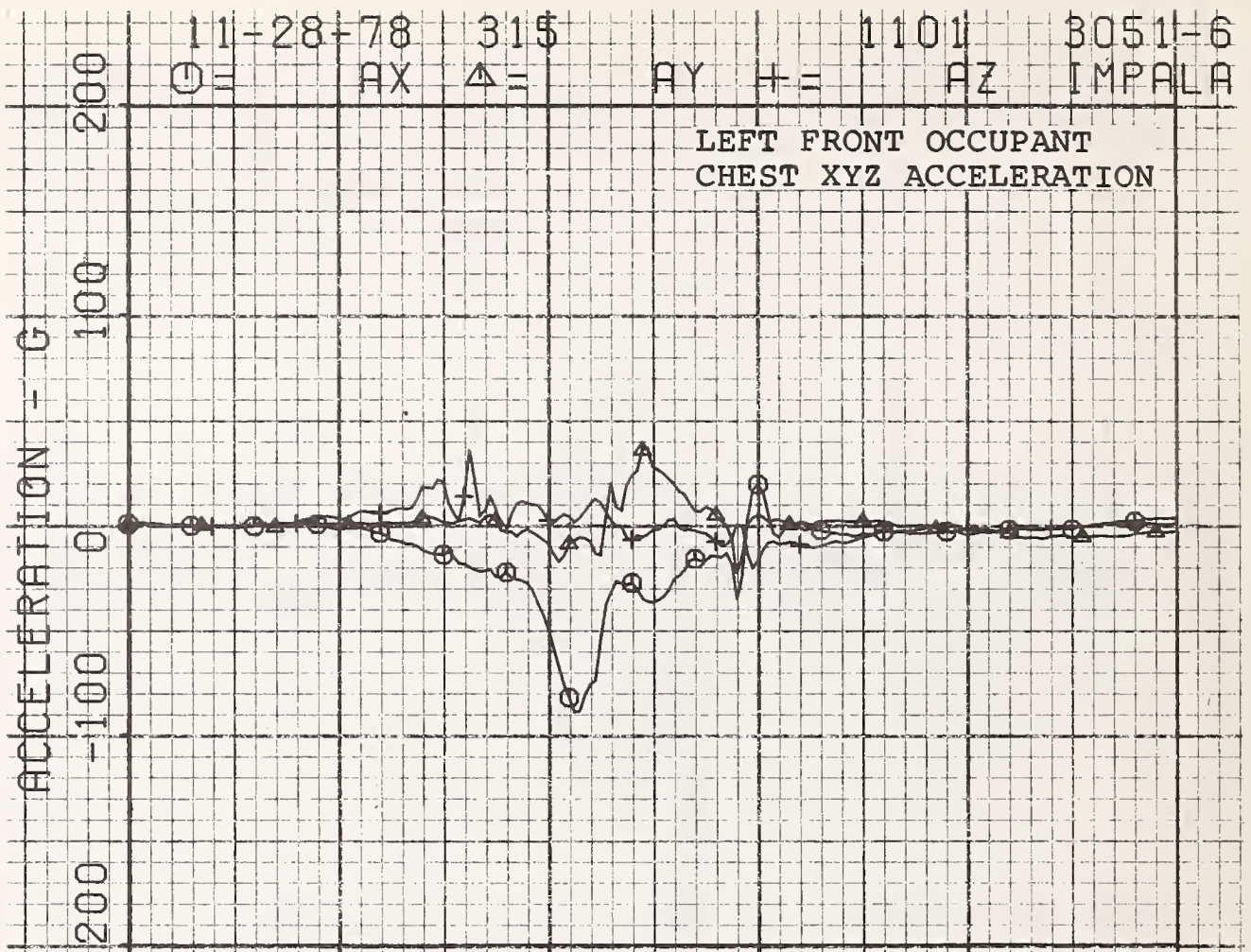


| | | | | |
|--------|----------|---------|----------|-----------|
| 120178 | DATE | FILTER | LOCATION | TEST NO |
| | 11-28-78 | 315/100 | 412 | 3051-6 |
| | ○ = AX | △ = VX | + = SX | IMP RV1,2 |







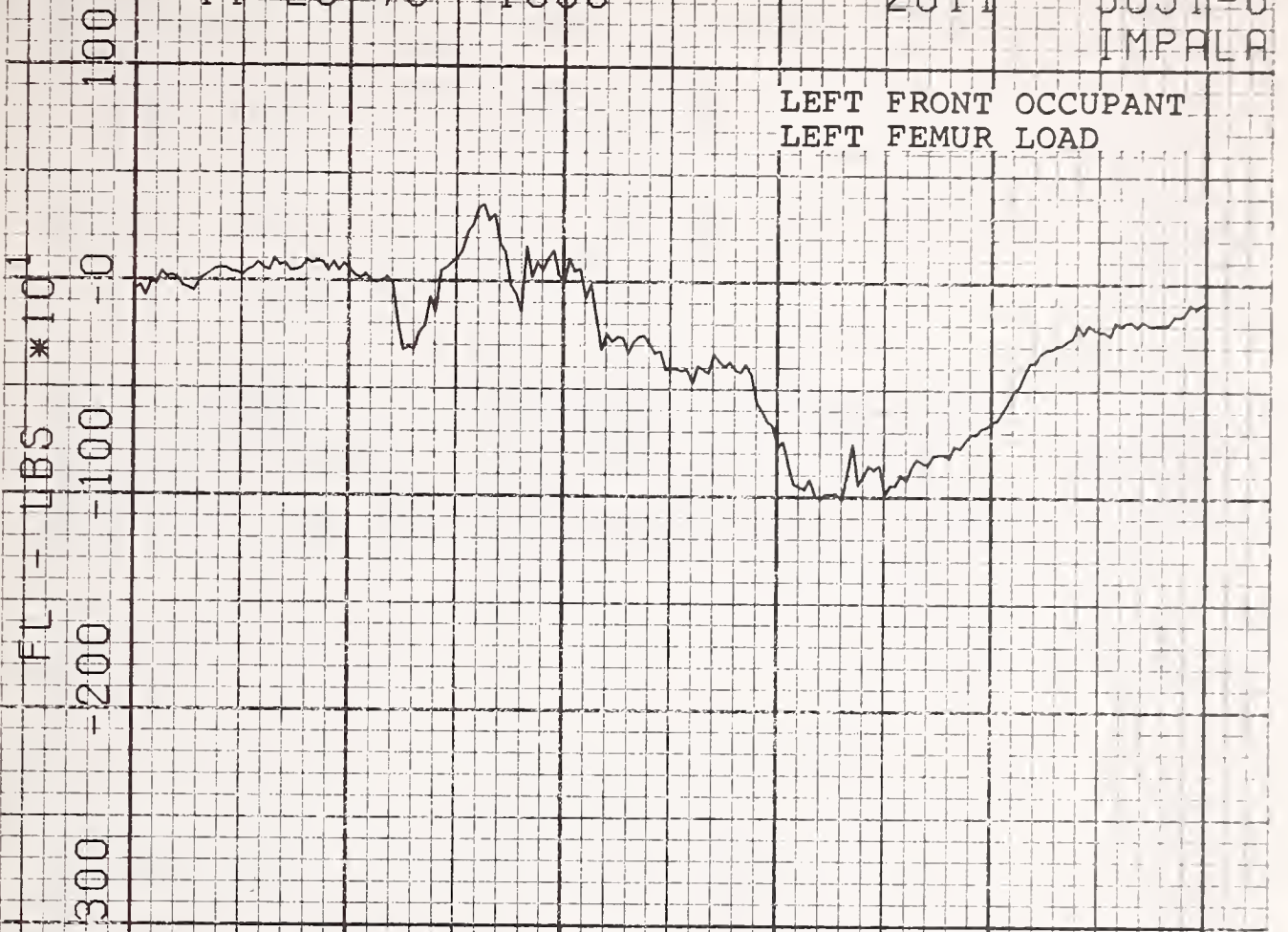


11-28-78 1000

2011

3051-6
IMPALA

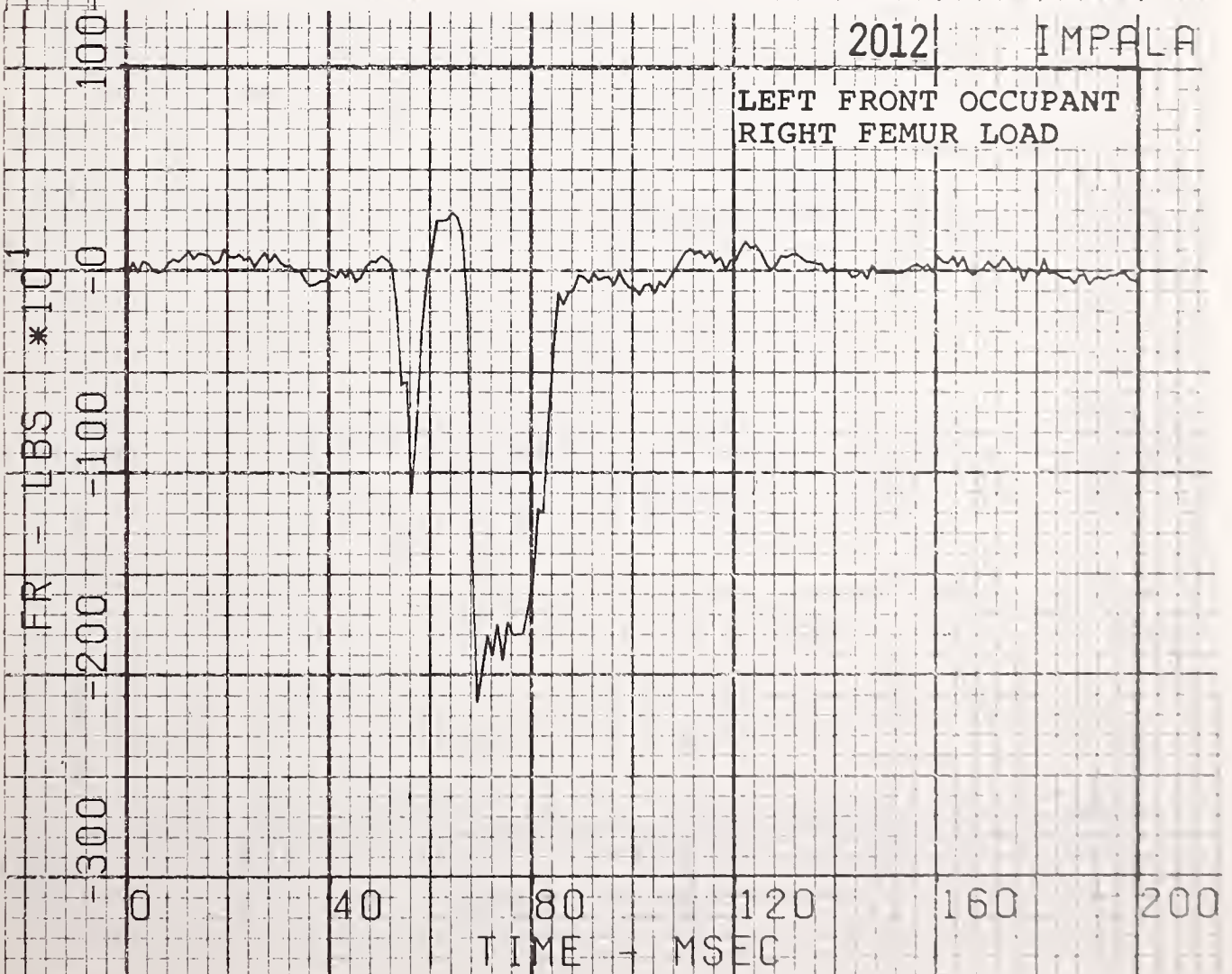
LEFT FRONT OCCUPANT
LEFT FEMUR LOAD



2012

IMPALA

LEFT FRONT OCCUPANT
RIGHT FEMUR LOAD

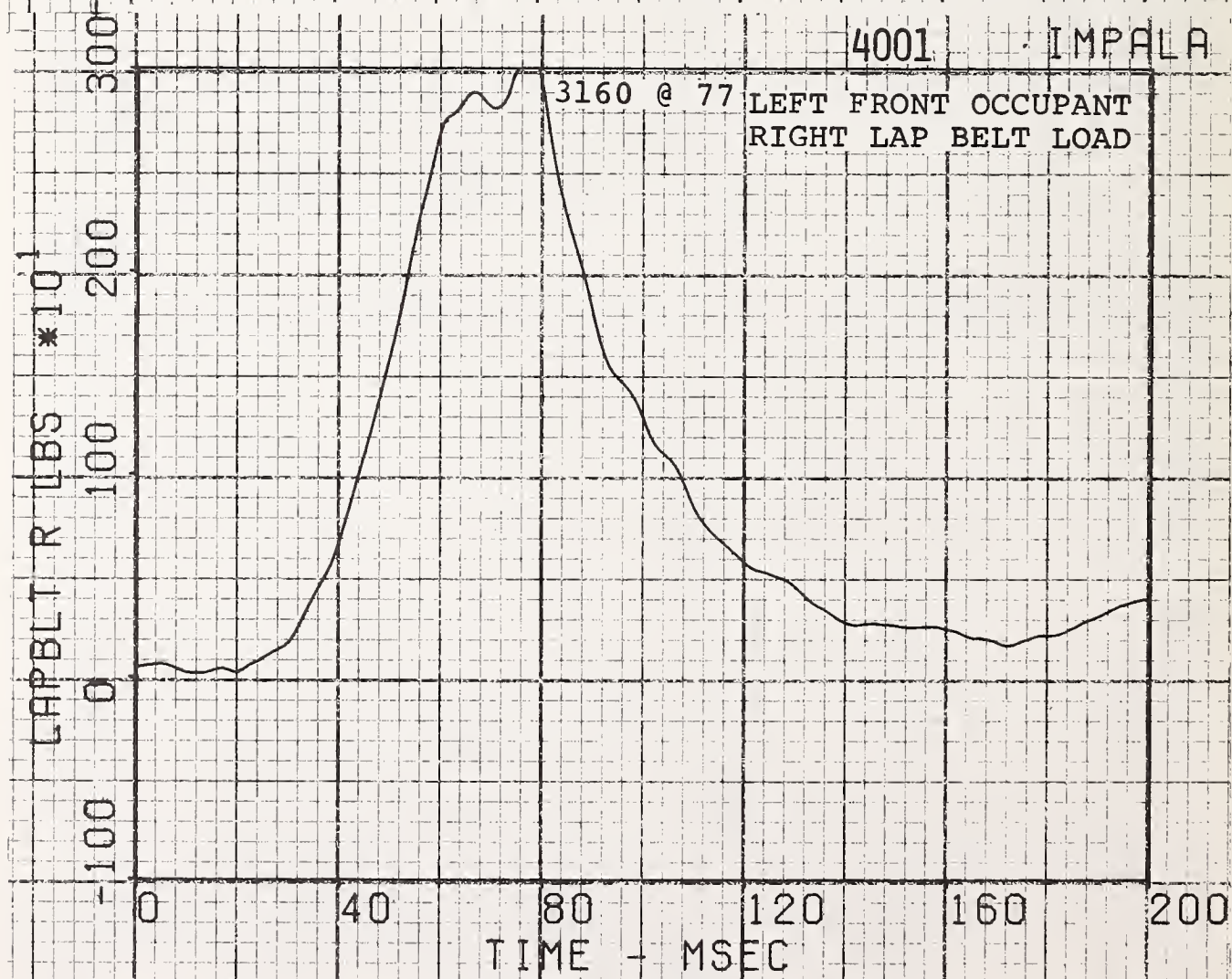
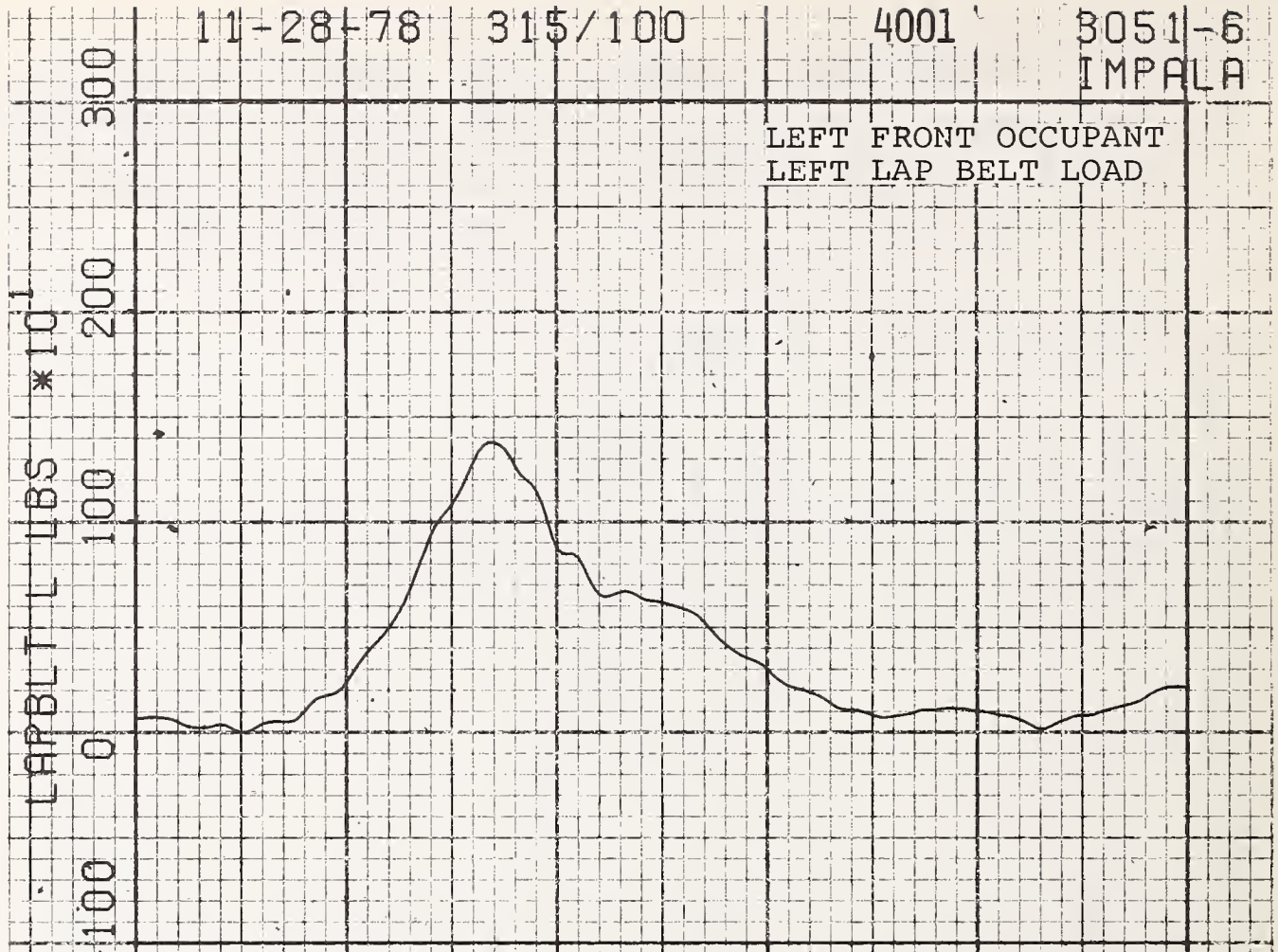


11-28-78

315/100

4001

3051-6
IMPALA



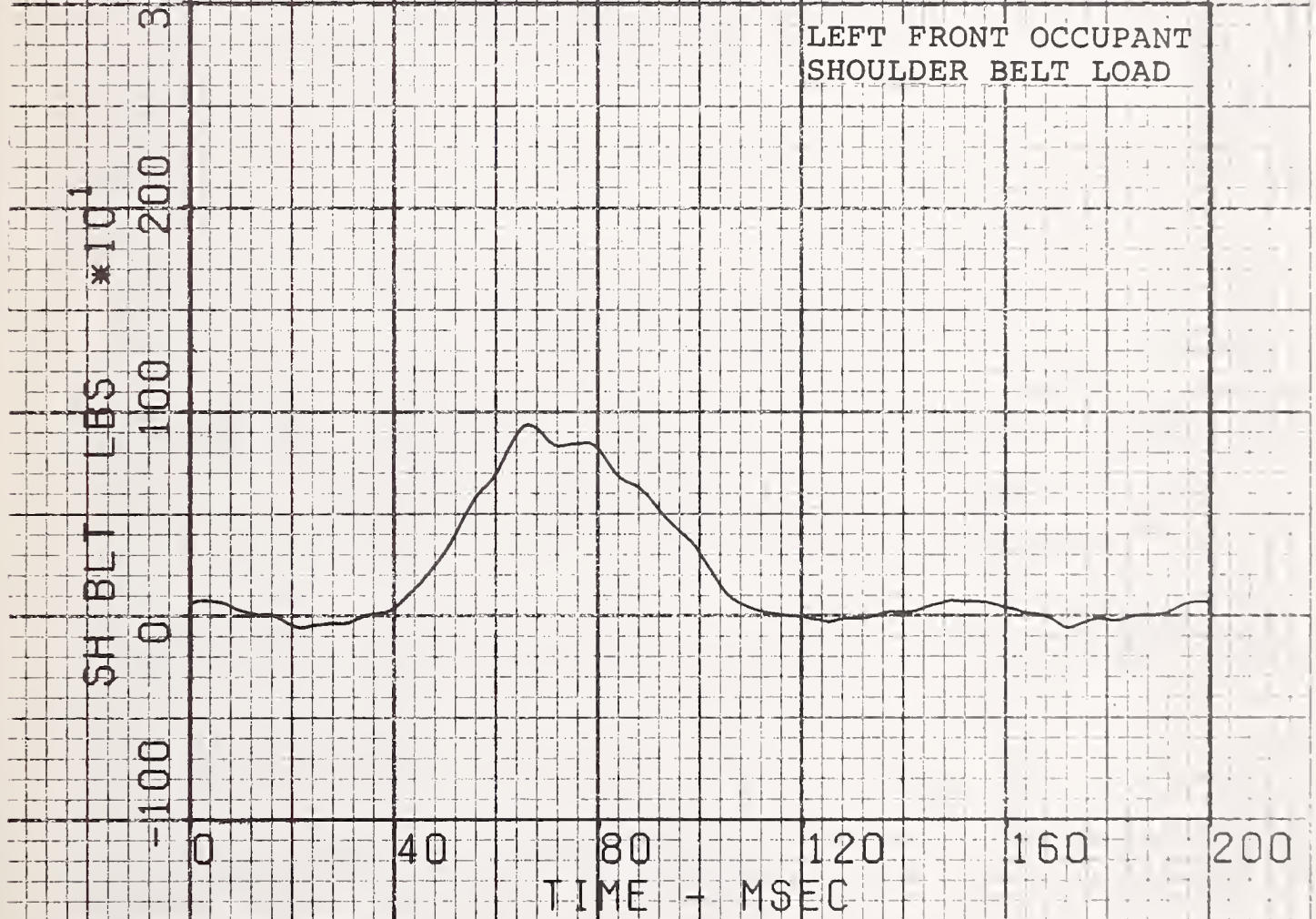
120178

DATE
11-28-78

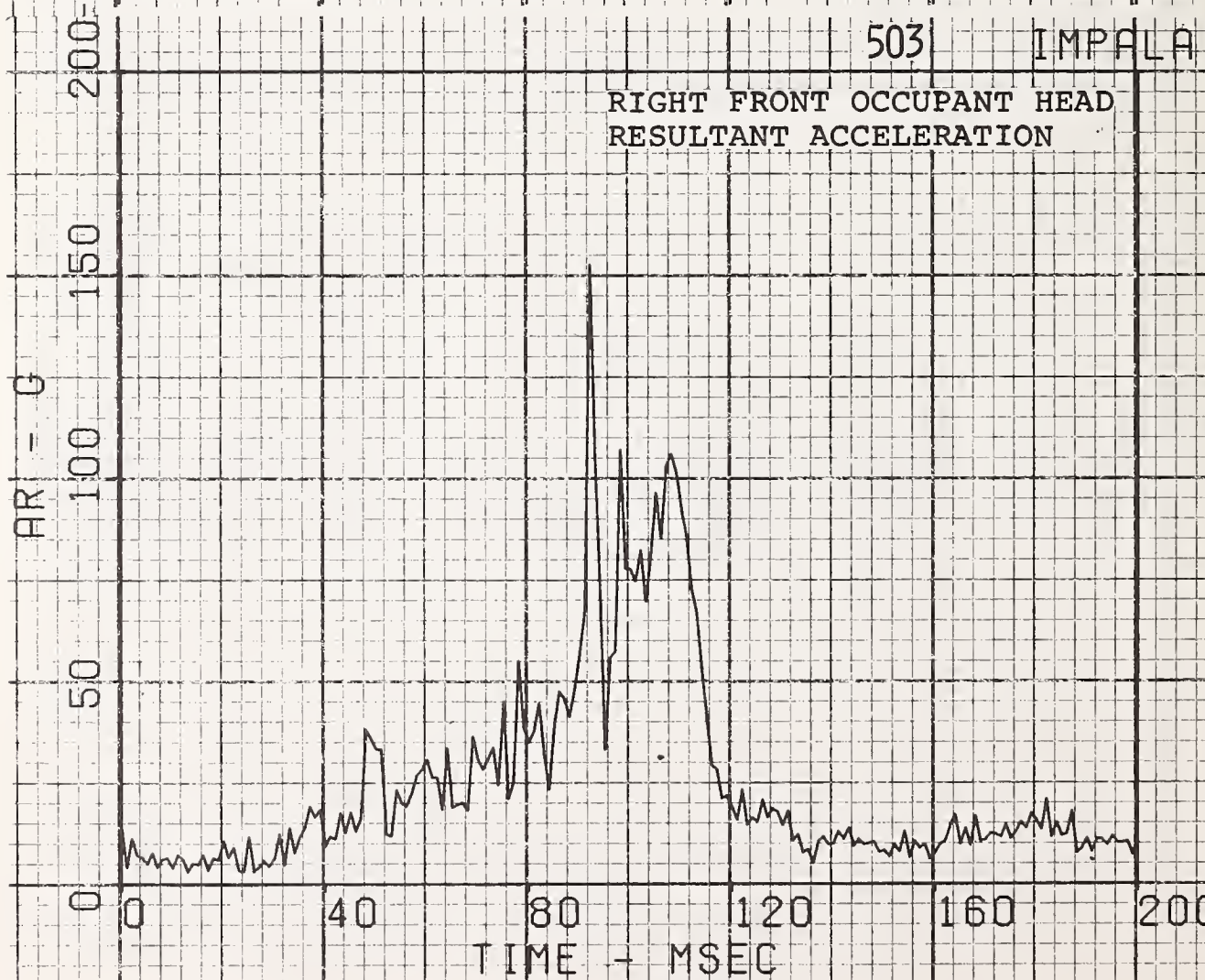
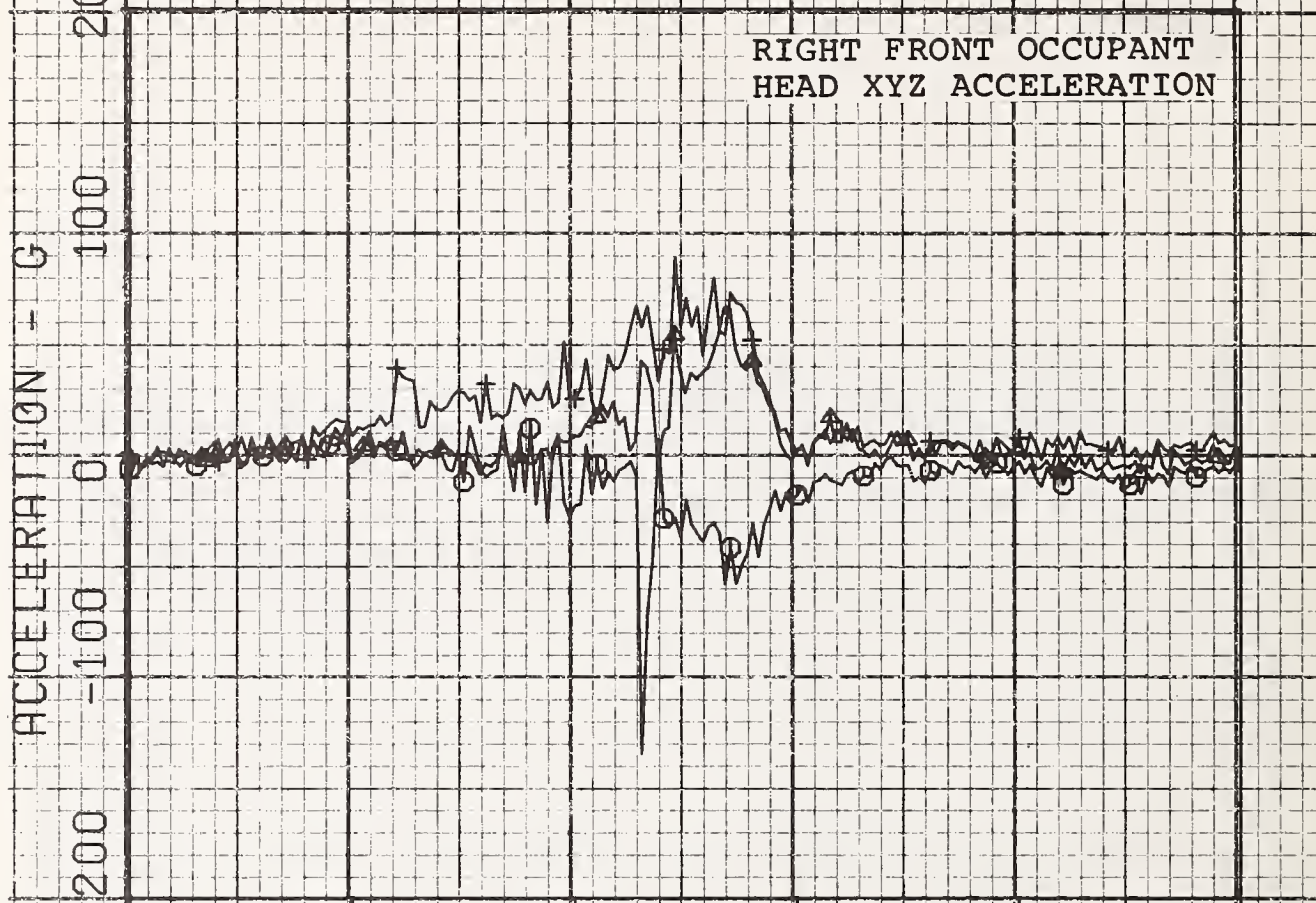
FILTER
315/100

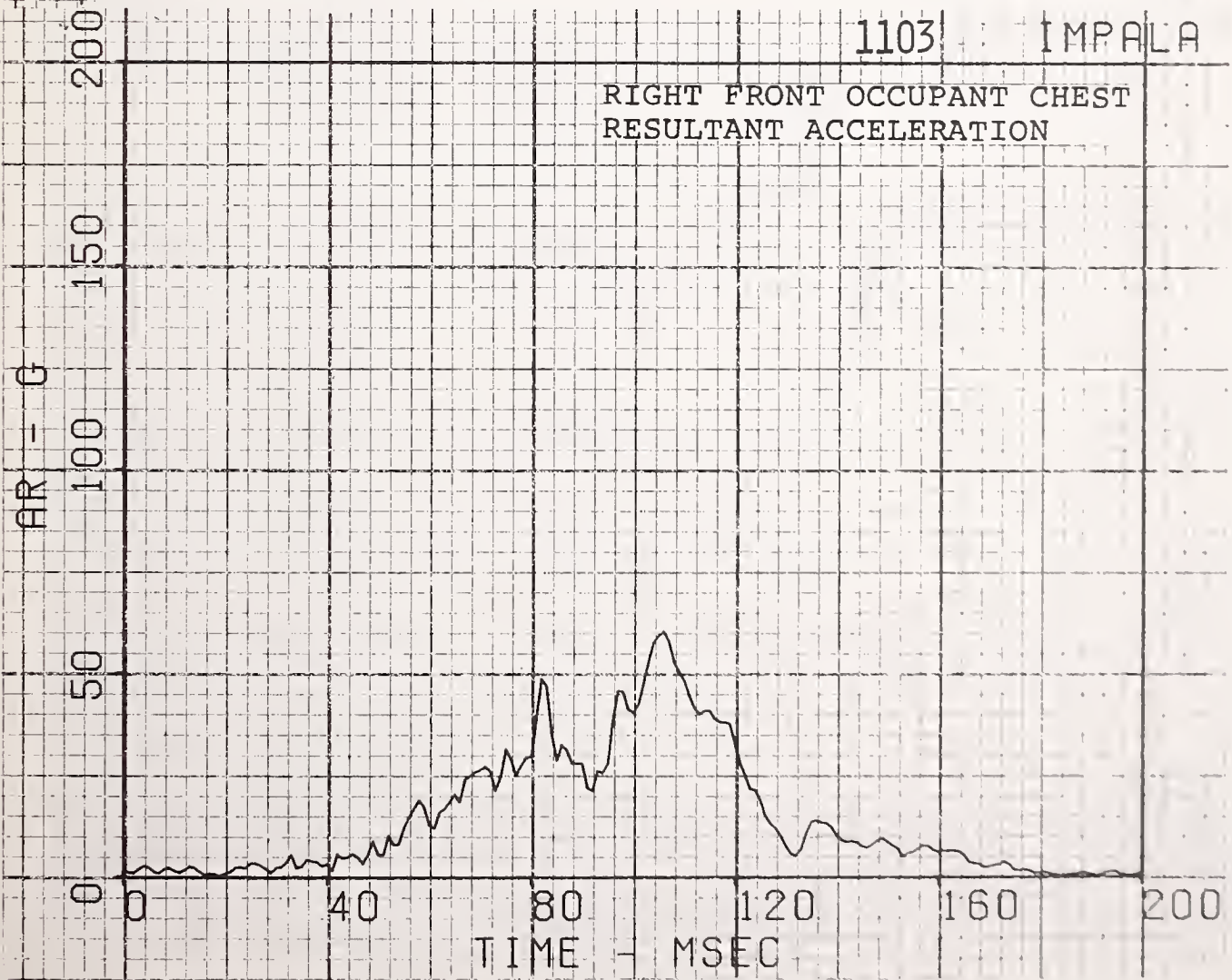
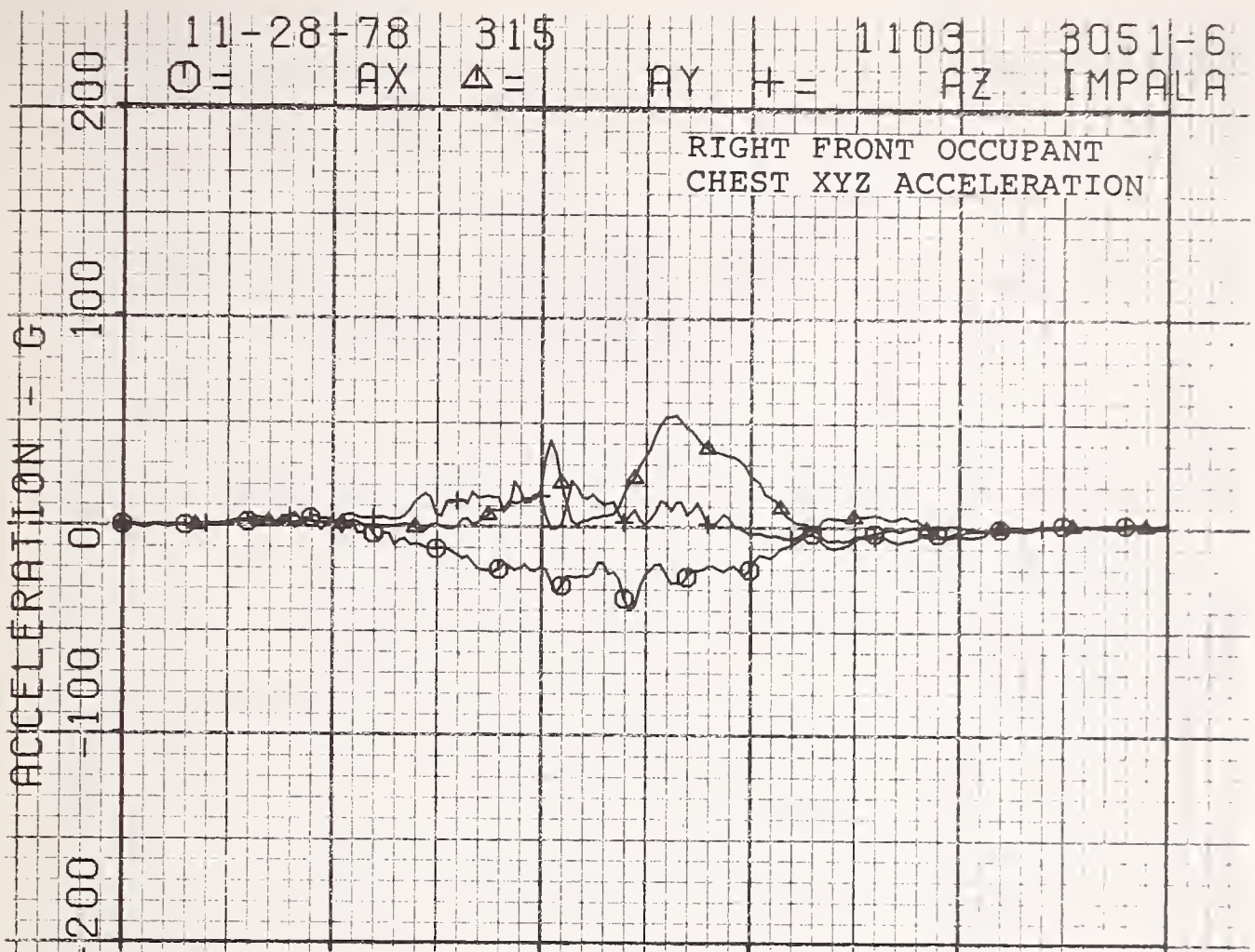
LOCATION
4001

TEST NO.
3051-6
IMPALA



11-28-78 1600 503 3051-6
O= AX Δ= AY += AZ IMPALA





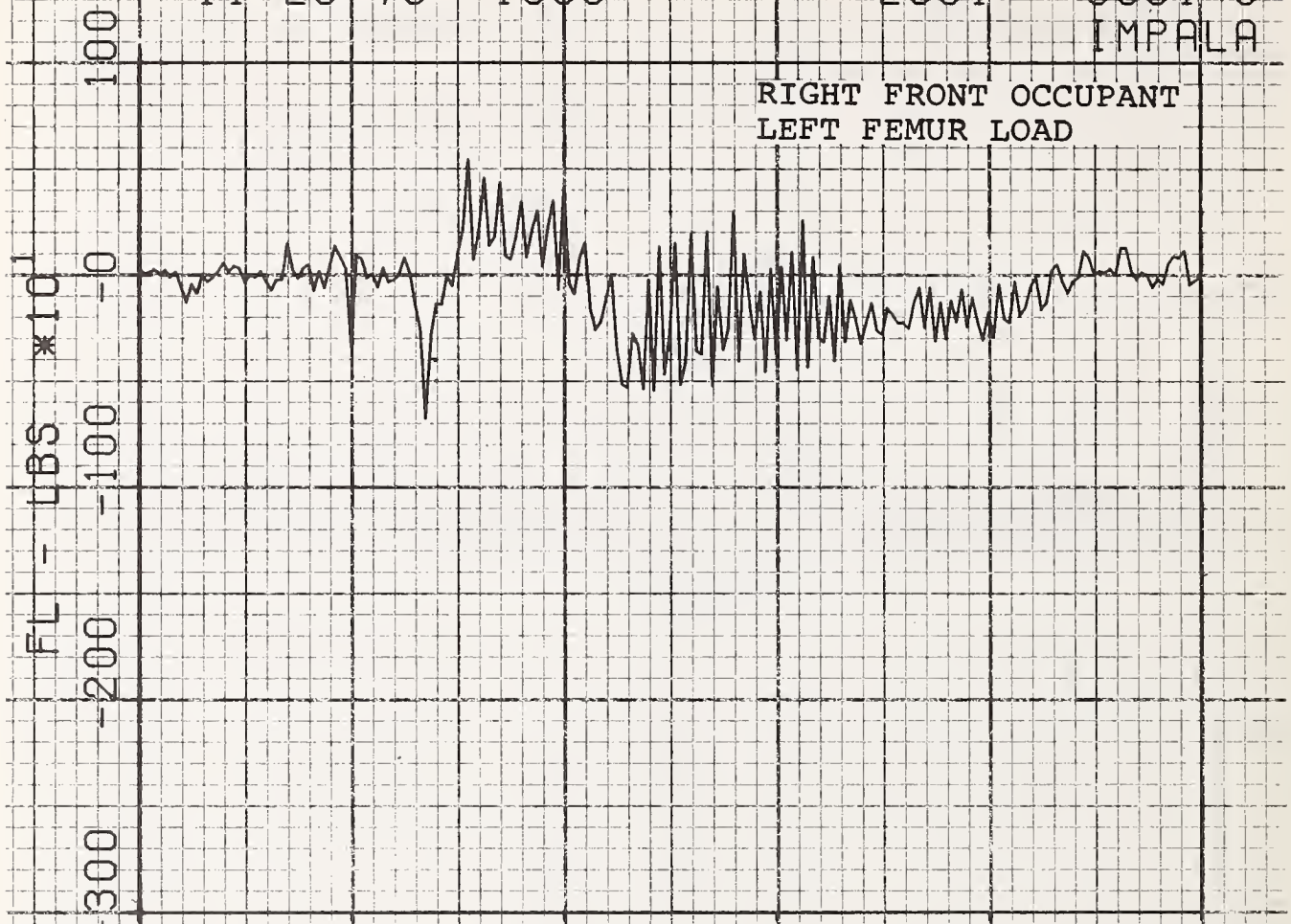
11-28-78

1000

2031

3051-6
IMPALA

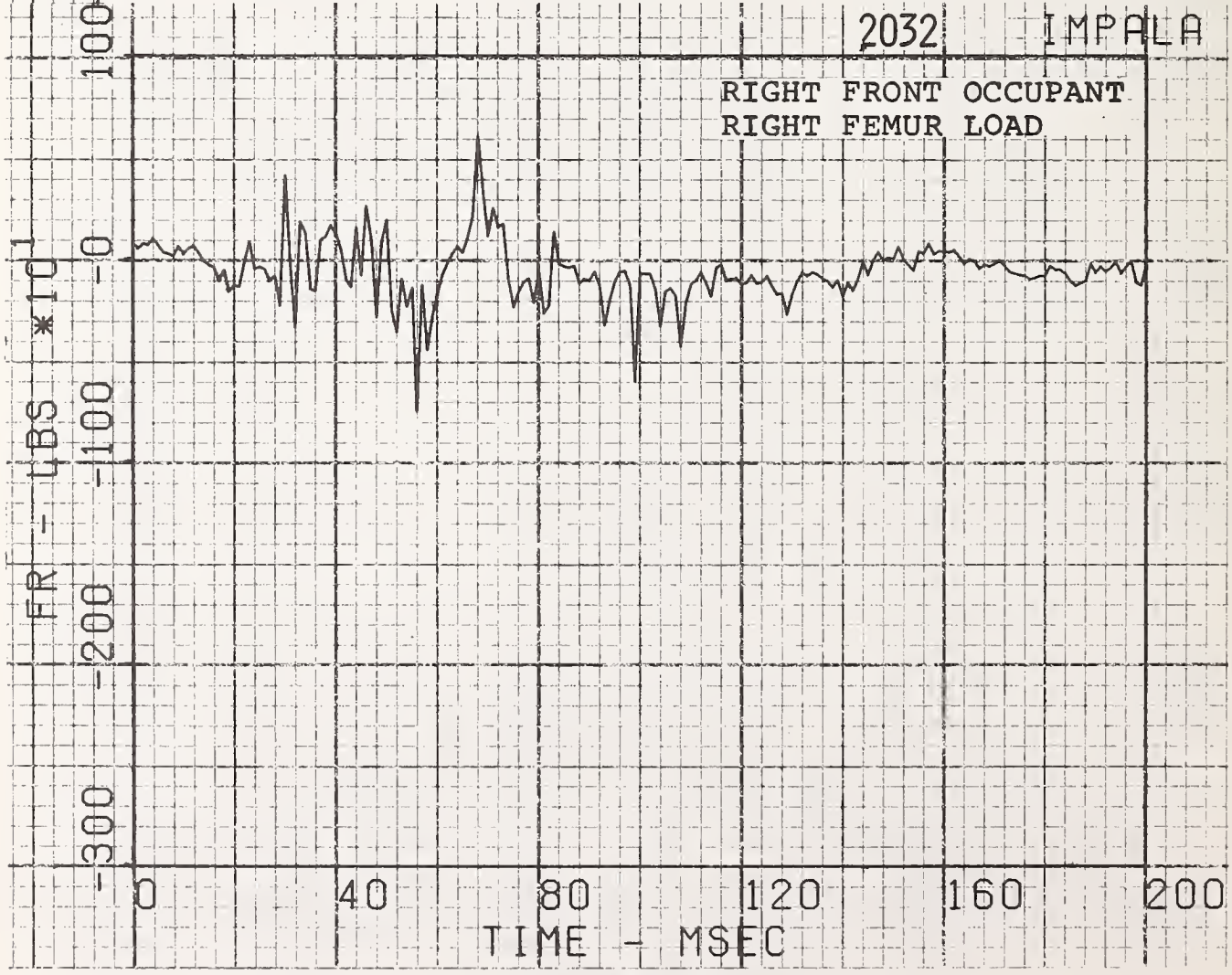
RIGHT FRONT OCCUPANT
LEFT FEMUR LOAD



2032

IMPALA

RIGHT FRONT OCCUPANT
RIGHT FEMUR LOAD



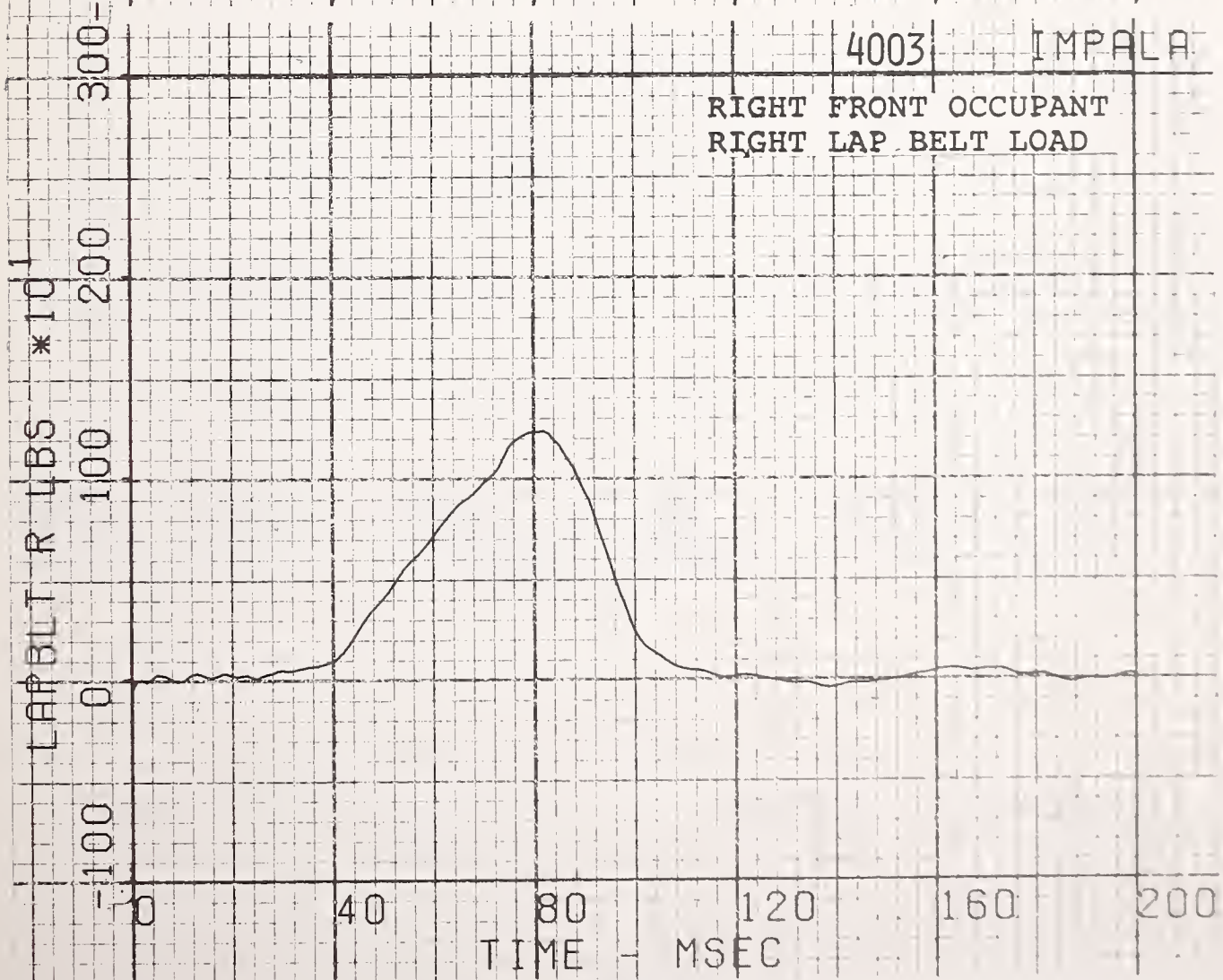
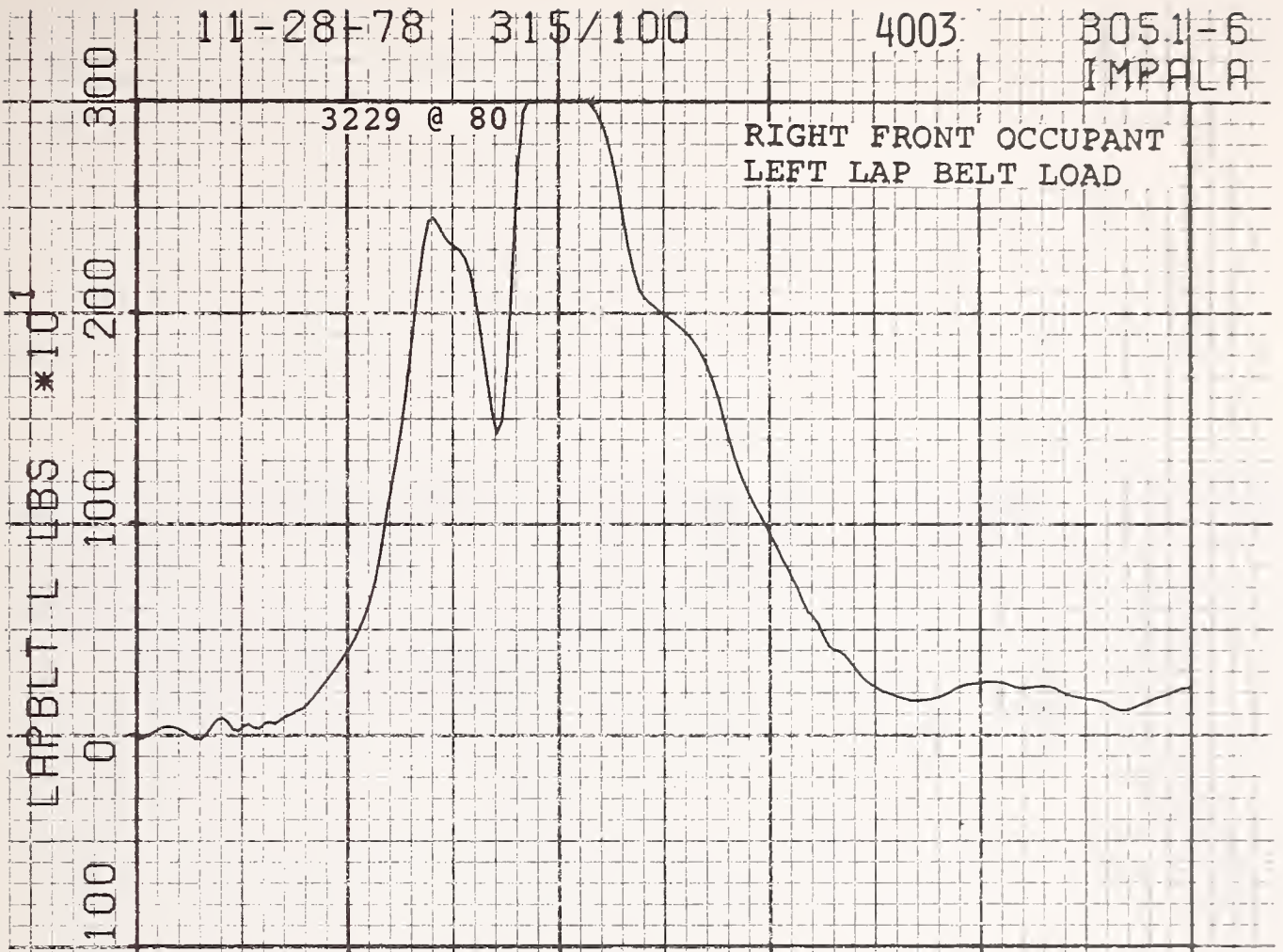
11-28-78

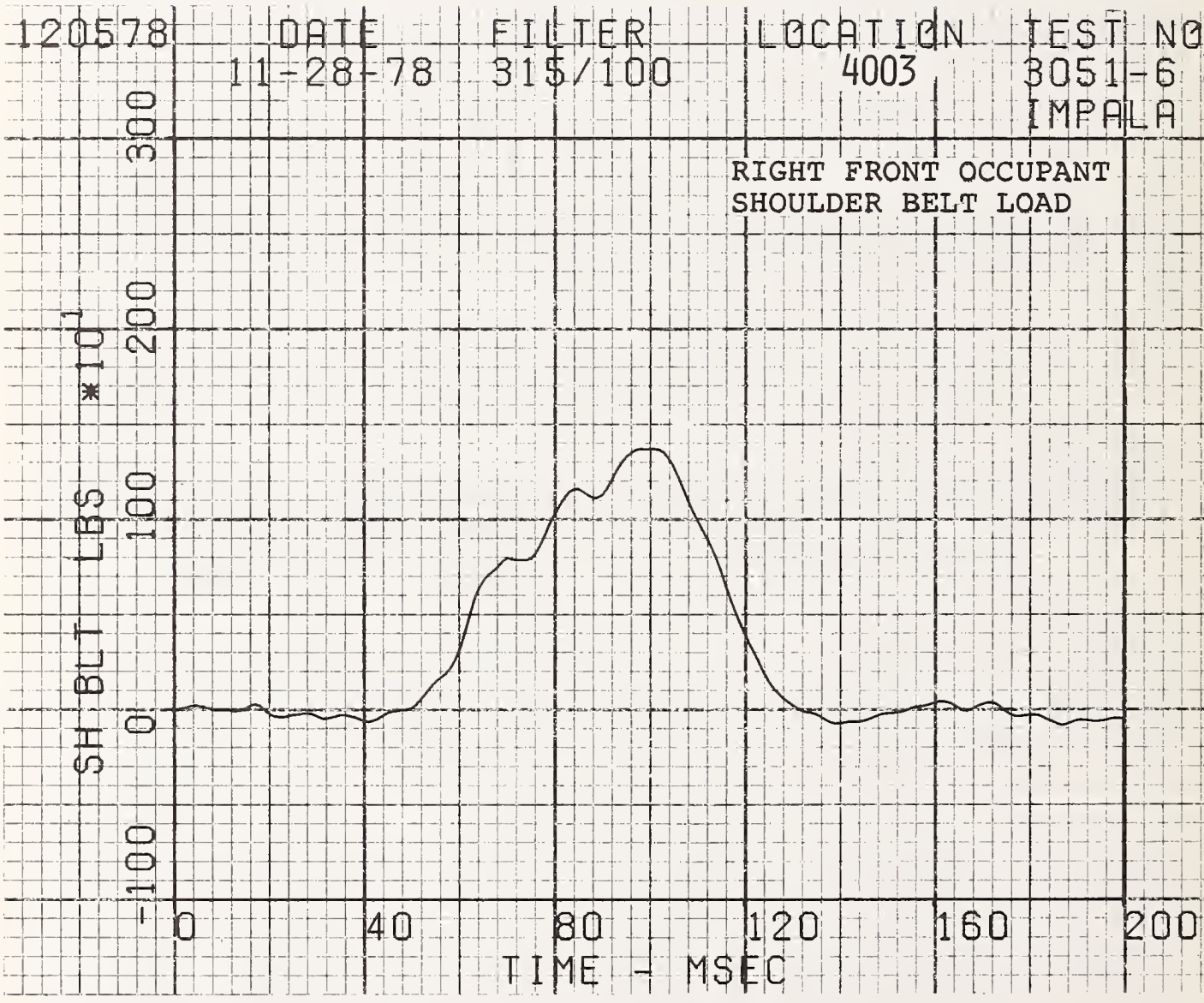
315/100

4003

3051-6

IMPALA





TL 242 .L53

Light truck
study :

Form DOT F 1720.
FORMERLY FORM DOT

DOT LIBRARY



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1
2
3
4