

V334

REPORT NO. 208-MGA-96-002
212-MGA-96-002
301-MGA-96-002

VEHICLE SAFETY COMPLIANCE TESTING
FOR
FMVSS 208, OCCUPANT CRASH PROTECTION
FMVSS 212, WINDSHIELD MOUNTING
FMVSS 219, WINDSHIELD INTRUSION (PARTIAL)
FMVSS 301, FUEL SYSTEM INTEGRITY

FORD MOTOR COMPANY
1996 Lincoln Towncar 4 Door Sedan
NHTSA NO. CT0202

MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: October 30, 1995

Report Date: November 21, 1995

Final Report

Prepared For:

U.S DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY ASSURANCE
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NSA-30
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This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-93-D-21089. This document is disseminated under the sponsorship of the U.S. Dept. of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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MGA Research Corporation

APPROVED BY: John J. Fleck DATE: 11-22-95
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Contracting Officer's Technical Representative (COTR)
NHTSA, Office of Vehicle Safety Compliance

12/16/95
Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 208-MGA-96-002 212-MGA-96-002 301-MGA-96-002		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report for FMVSS 208 Compliance Testing of a 1996 Lincoln Towncar 4 Door Sedan NHTSA No. CT0202				5. Report Date November 21, 1995	
				6. Performing Organization Code MGA	
7. Author(s) Nicole Walter				8. Performing Organization Report No. MGA-DOT-208-02	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105				10. Work Unit No.	
				11. Contract or Grant No. DTNH22-93-D-21089	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (Mail Code: NEF-30) 400 Seventh St., S.W., Room 6115 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report October-November 1995	
				14. Sponsoring Agency Code NEF-30	
15. Supplementary Notes					
16. Abstract Compliance tests were conducted on the subject 1996 Lincoln Towncar 4 Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP208-09 on October 23, 1995 for the determination of FMVSS 208 compliance. Test failures identified were as follows: NONE					
17. Key Words Frontal Impact 30 mph Vehicle Safety Compliance Testing FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"				18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division, Room 5108 (NAD-52), 400 Seventh Street, S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 Attn: Robert Hornickle	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified		21. No. of Pages 172	22. Price	

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SECTION 1
PURPOSE AND TEST PROCEDURE

PURPOSE

This 30 mph flat frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial), and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the MGA Research Corporation (MGA) under Contract No. DTNH22-93-D-21089. The purpose of this test was to determine whether the subject vehicle, a 1996 Lincoln Towncar 4 Door Sedan, NHTSA No. CT0202, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," in the flat frontal barrier impact mode.

TEST PROCEDURE

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-09 dated March 15, 1993. Data was obtained relative to FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion"; and FMVSS 301, "Fuel System Integrity," performance.

The test vehicle was instrumented with seven (7) accelerometers to measure longitudinal axis accelerations and one (1) accelerometer to measure vertical axis acceleration. The vehicle's specified impact velocity range was 28.9 to 29.9 mph. The vehicle impacted a fixed flat barrier of which face was covered with a sheet of 3/4 inch thick plywood.

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedures specified in Appendix C of the Laboratory Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. Each Part 572 E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection and lower leg load cells to measure tibia forces and moments.

The forty-six (46) data channels were multiplexed and recorded on five IBM PC compatible computers with Metrabyte DAS-16F A/D converter boards. The data was digitally sampled at 10,000 samples per second and processed per Section 11.13 through 11.15 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and fourteen (14) high-speed motion picture cameras. The pre-test and post-test conditions were recorded by the real-time motion picture camera.

The vehicle and occupant data are summarized in Section 2. The FMVSS 208, 212, 219 (partial) and 301 data are presented in Section 3. The vehicle, occupant, and camera measurements are presented in Section 4. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the manufacturer's vehicle information.

SECTION 2
SUMMARY OF FRONTAL BARRIER IMPACT TEST

TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at MGA Research Corporation on October 30, 1995.

The test vehicle, a 1996 Lincoln Towncar, NHTSA No. CT0202, appeared to comply with the performance requirements of FMVSS 208, 212, 219 (partial), and 301 in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's. The compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by Part 572 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy, the chest deflection did not exceed 3.0 inches. The vehicle's restraint system met the applicable comfort and convenience requirements. The windshield periphery retention on each side of the vehicle centerline was greater than 50 percent. There was no penetration into any portion of the windshield. No fluid spilled from the vehicle's fuel system following the impact or during the static rollover test.

The test vehicle was equipped with an airbag and a Type 2 seat belt in the front outboard designated seating positions. Both dummies were restrained only by the airbag during the test. The vehicle's test weight was 4564 pounds. The vehicle's impact speed was 29.47 mph. The vehicle's maximum static crush was 19.5 inches.

The driver's HIC was 153. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41 g's. The driver's chest maximum deflection was 1.3 inches. The driver's left and right femur maximum compressive forces were 1366 pounds and 835 pounds, respectively.

The right front passenger's HIC was 113. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 37 g's. The right front passenger's chest maximum deflection was 0.5 inches. The right front passenger's left and right femur maximum compressive forces were 955 pounds and 1161 pounds, respectively.

There was no loss of windshield periphery retention and no penetration through the windshield.

Following the impact, no fluid spilled from the vehicle's fuel system prior to the static rollover test.

TEST NOTES

TABLE 1 CRASH TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Type: Frontal Barrier Impact

Test Date: 10/30/95 Time: 2:07 p.m. Temp: 70°F

Vehicle Test Weight: 4564 lbs. Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.47 mph Maximum Static Crush: 19.5 inches

Vehicle Rebound: 24.6 inches

Dummies:	Driver	Passenger
Dummy Type	<u>Part 572E</u>	<u>Part 572E</u>
Serial Number	<u>312</u>	<u>340</u>
Restraint System	<u>Airbag</u>	<u>Airbag</u>
No. of Data Channels	<u>19</u>	<u>19</u>

Number of Cameras: 1 Real Time
14 High Speed

Door Opening Data:	Left Front: <u>Opened</u>	Left Rear: <u>Opened</u>
	Right Front: <u>Opened</u>	Right Rear: <u>Opened</u>

Front Seat(s) Data:	Driver	Passenger
Seat Track Failure	<u>0 in.</u>	<u>0.1 in.</u>
Seat Back Failure	<u>None</u>	<u>None</u>

Visible Dummy Contact Points:	Driver	Passenger
Head	<u>Airbag, Sunvisor, Headrest</u>	<u>Airbag, Sunvisor</u>
Chest	<u>Airbag, Steering Wheel</u>	<u>Airbag</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash, Counsel</u>	<u>Dash</u>

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

NHTSA No: CT0202 VIN: 1LNLM81W0TY601509 Body Color: Gray

Engine: 8 Cylinders; C.I.D.; 4.6 liters; CC

X Gas; Diesel; Turbocharged

X Longitudinal; Transverse

Transmission: 4 Speed; Manual; X Automatic; X Overdrive

Final Drive: Front Wheel; X Rear Wheel; Four Wheel

Major Option: X A/C; X P/S; X P/B; X P/wdo; X P/door locks;

X P/seats; X Tilt Wheel; X Anti-skid Brakes; X Cruise Control

Date Received: 10/09/95; Odometer Reading: 109 miles

Dealer's Name/Address: Joe Carini L-M Sales, Inc.
1583 E. Moreland Blvd.
Waukesha, WI

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Ford Motor Company

Date of Manufacture: 8/95; VIN: 1LNLM81W0TY601509

GVWR: 5346 lbs; GAWR Front: 2548 lbs. GAWR Rear: 2842 lbs.

DATA FROM TIRE PLACARD:

Tire Pressure with maximum capacity vehicle load: Front 32 psi Rear 35 psi

Recommended Tire Size: P215/70R15 975

Recommended Cold Tire Pressure: Front 32 psi; Rear 35 psi

Tires on Vehicle: P215/70R15 975; Manufacturer: Michelin

Type of Spare Tire: Space Saver

Number of Occupants: 3 Front; 3 Rear; 3rd Seat; 6 TOTAL

Type of Front Seats: Bucket; Bench; X Split Bench

Type of Front Seat Back: Fixed; X Adj. With; Lever; Rot. Knob X Power

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 1117 lbs Right Rear = 914 lbs
Left Front = 1106 lbs Left Rear = 903 lbs
TOTAL FRONT WEIGHT = 2223 lbs (55.0% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1817 lbs (45.0% of Total Vehicle Weight)
TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 4040 lbs

CALCULATION FOR TARGET TEST WEIGHT:

UDW (Unloaded Delivered Weight) = 4040 lbs
VCW (Vehicle Capacity Weight) = 1100 lbs
DSC (Designated Seating Capacity) = 6
RCLW*(Rated Cargo/Luggage Weight) = VCW - 150 (DSC) = 827 - 150 (5) = 200 lbs
Target Test Weight = UDW + RCLW + (2 Dummies x Dummy Weight)
Target Test Weight = 4040 + 200 + 344 = 4584 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO WEIGHT:

Right Front = 1190 lbs Right Rear = 1118 lbs
Left Front = 1175 lbs Left Rear = 1081 lbs
TOTAL FRONT WEIGHT = 2365 lbs (51.8% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 2199 lbs (48.2% of Total Vehicle Weight)
TOTAL TEST WEIGHT = 4564 lbs
Weight of ballast secured in vehicle = 95 lbs
Vehicle components removed to meet target weight: None

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 28.5 LF 29.0 RR 28.5 LR 28.6
Fully Loaded Attitude: RF 28.1 LF 28.6 RR 26.9 LR 26.8
Test Attitude: RF 28.0 LF 28.7 RR 28.3 LR 29.0
Wheel Base: 117.3 in; C.G. = 56.5 in rearward of front wheel centerline

*Cargo weight for multi-purpose passenger vehicles, truck, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

TABLE 3 POST-IMPACT DATA

Type of Test: Frontal Barrier Impact Impact Angle: 0°

Test Date: 10/30/95 Time: 2:07 p.m. Temperature: 69° F

Vehicle NHTSA No.: CT0202 VIN: 1LNLM81W0TY601509

BARRIER IMPACT VELOCITY

Required Impact Velocity Range: 28.9 to 29.9 mph

Impact Velocity: Primary = 29.47 mph; Secondary = 29.40 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 51.4 inches

Exiting Speed Trap: 12.0 inches

VEHICLE STATIC CRUSH AND REBOUND (inches):

Vehicle Length: Pre-test = R 209.9 C_L 217.6 L 210.2

Post-test = R 196.1 C_L 200.4 L 191.2

Crush = R 13.8 C_L 17.2 L 19.0

Average = 16.7

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

R 17.2 in C_L 12.9 in L 24.6 in

TABLE 4 ACCIDENT INVESTIGATION DIVISION DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Veh. NHTSA No.: CT0202; VIN: 1LNLM81W0TY601509

Build Date: 8/95; Test Date: 10/30/95

Veh. Size Category: Large; Test Weight: 4564 lbs

Veh. Wheelbase: 117.3 in; Front Overhang: 44.1 in;

Overall Width: 76.8 in

ACCELEROMETER DATA:

Location: As per measurements on page 2-11

Calibration Procedure: As per MGA Calibration Procedure

Linearity: >99.9%; Integration Algorithm: Trapezoidal

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

Impact Mode: Frontal Barrier

Crush Depth C1 = 19.0 inches

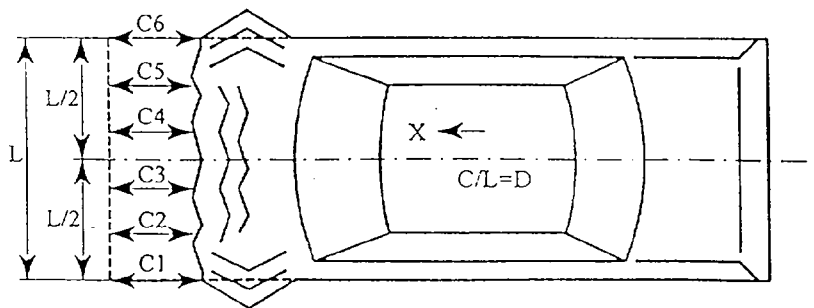
Dimensions: C2 = 19.1 inches

C3 = 19.5 inches

C4 = 16.5 inches

C5 = 14.9 inches

C6 = 13.8 inches



Midpoint of Damage: D = Vehicle Longitudinal Centerline

Length of Damaged Region: L = 61.3 inches

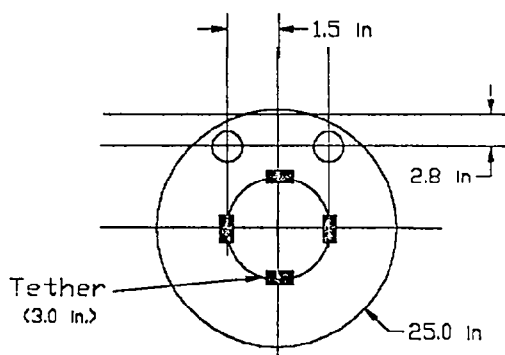
TABLE 5 POST TEST AIRBAG DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

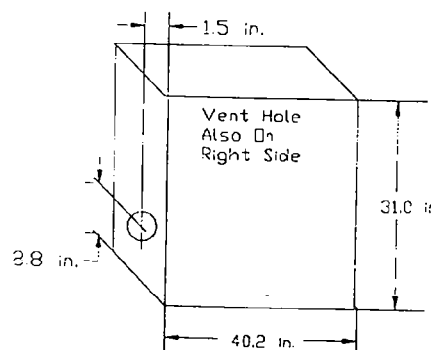
NHTSA No: CT0202; Test Date: 10/30/95; Technician: Nikki Walter

- A. No of Vent Holes: Driver 2; Passenger 1
- B. Size of Vent Holes: Driver 0.6 in. dia.; Passenger 1.2 in. dia.
- C. Total Vent Area: Driver 0.57 in²; Passenger 1.1 in²
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
- | | | | |
|------------|----------------------|---------------------|-------------------------|
| Driver; | Length <u>N/A</u> ; | Width <u>N/A</u> ; | Diameter <u>25.0 in</u> |
| Passenger; | Length <u>31.0</u> ; | Width <u>40.2</u> ; | Diameter <u>N/A</u> |
- E. Is the Airbag Tethered?
- | | | |
|------------|-------------------|--|
| Driver; | <u>X</u> Yes; (4) | <u> </u> No; If yes, record length of tether <u>8.75 in</u> |
| Passenger; | <u> </u> Yes; | <u>X</u> No; If yes, record length of tether <u>N/A in</u> |

Driver Airbag



Passenger Airbag



- F. Part Numbers and Manufacture Name of Airbag and Gas Generator

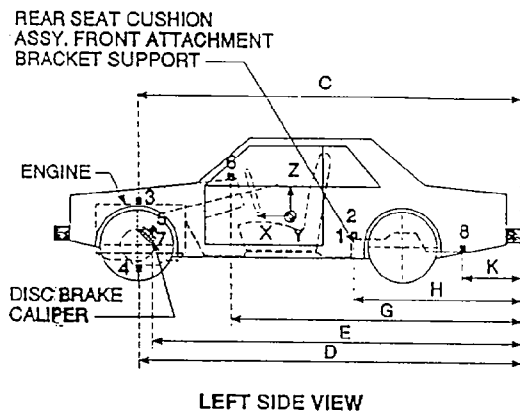
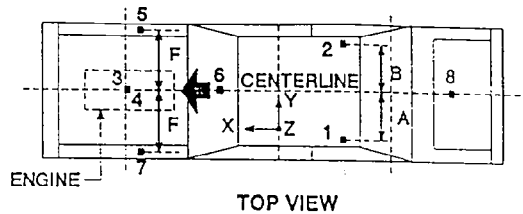
Driver;	Mfr <u>*</u> ;	Airbag <u>P114824-01C</u> ;	Gen <u>FCBF7U5RAQC</u>
Passenger;	Mfr <u>*</u> ;	Airbag <u>*</u> ;	Gen <u>MP1M190I20694</u>

* Not Available

TABLE 6 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202; Test Date: 10/30/95



ACCELEROMETER LOCATION (inches)		
	PRE-TEST	POST-TEST
A	21.9	21.9
B	21.9	21.9
C	175.0	166.9
D	165.9	163.4
E	168.1	164.2
F	26.2	28.1
G	136.0	136.8
H	89.7	87.4
K	12.0	12.0

ACCELEROMETER DATA SUMMARY					
No.	DESCRIPTION	MAXIMUM (g's)	TIME (msec)	MINIMUM (g's)	TIME (msec)
1	Left Rear Seat Crossmember	2.3	172	-20.4	81
2	Right Rear Seat Crossmember	1.9	180	-21.6	30
3	Top of Engine Block	18.0	99	-38.1	52
4	Bottom of Engine	4.0	135	-33.6	75
5	Right Disc Brake Caliper	40.0	98	-67.5	31
6	Instrument Panel	24.7	38	-77.5	43
7	Left Disc Brake Caliper	42.3	48	-54.9	73
8	Trunk	No Valid Data Collected			

TABLE 7 REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

Contract Number: DTNH22-93-D-21089

From: MGA Research Corporation
5000 Warren Road
Burlington, WI 53105

To: Mr. Charles Case, COTR
Office of Vehicle Safety Compliance

The following vehicle has been subjected to testing for FMVSS 208. The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. The vehicle was again inspected after the above test had been conducted, and all changes were noted below. The final condition of the vehicle was also noted in detail.

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Body Color: Gray

VIN: 1LNLM81W0TY601509 Cost: \$38,510.00

Odometer: Arrival Date: 10/09/95 Reading: 93 miles

Completion Date: 10/30/95 Reading: 109 miles

Engine: 8 Cylinders; 4.6 Liters; X Gas; Diesel

Transmission: 4 Speed; Manual; X Automatic

Final Drive: Front Wheel; X Rear Wheel; Four Wheel

Tire Size: P215/70R15 975; Manufacturer: Michelin

Air Conditioner	<u>Yes</u>	Console	<u>Yes</u>	Brakes	<u>Power</u>
Tinted Glass	<u>No</u>	Tachometer	<u>No</u>	Front	<u>Disc</u>
Power Steering	<u>Yes</u>	Cruise Control	<u>Yes</u>	Rear	<u>Disc</u>
Power Windows	<u>Yes</u>	Rear Window Def.	<u>Yes</u>	Front Seats	<u>Split Bench</u>
Power Door Locks	<u>Yes</u>	Sun/Moon Roof	<u>No</u>	Seat Type	Front <u>Power</u>
Radio	<u>Yes</u>	T-Top	<u>No</u>		Rear <u>Power</u>
Clock	<u>Yes</u>	Tilt Steering Wheel	<u>Yes</u>		
Roof Rack	<u>No</u>	Other Options:	<u>Leather Seats</u>	No. of Seats	<u>Six</u>

Equipment that is no longer on the vehicle as noted above: Rear seat, spare tire,
and cargo area trim

Explanation:

Items removed to allow installation of data acquisition system.

Vehicle Condition:

The vehicle was subjected to a 30 mph frontal crash test. There is severe structural damage on the front body. Various interior and exterior portions of the vehicle have been painted and have had holes drilled to facilitate attachment of instrumentation. Various body parts have been removed. Stoddard solvent replaced the fuel in the fuel system and engine. THE VEHICLE IS FOR SALVAGE ONLY AND IS NOT TO BE REPAIRED FOR HIGHWAY USE.

SECTION 3
SUMMARY OF RESULTS FOR FMVSS 208
212, 219 (PARTIAL), AND 301

TABLE 8 FMVSS 208 OCCUPANT INJURY CRITERIA

Veh. Yr./Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Veh. NHTSA No.: CT0202 Test Date: 10/30/95

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #312	PASSENGER DUMMY #340
Head Channel X	-30.8	-38.8
Head Channel Y	4.6	9.4
Head Channel Z	14.2	-19.1
HEAD RESULTANT	32.4	40.5
Chest Channel X	-39.2	-30.3
Chest Channel Y	7.4	-4.3
Chest Channel Z	22.3	22.5
CHEST RESULTANT	41.7	37.1

HEAD INJURY CRITERIA (HIC)
VALUES:

HIC	153.1	113.0
t_1 = (msec)	116.2	82.6
t_2 = (msec)	152.2	104.3

[The maximum time interval from t_1 to t_2 is 36 milliseconds.]

CHEST INJURY CRITERIA (CLIP) VALUES: (g's)

CLIP	41.2	36.7
t^1 = (msec)	108.5	110.9
t^2 = (msec)	111.6	114.0
CHEST DEFLECTION (in)	-1.3	-0.5

TABLE 8 FMVSS 208 OCCUPANT INJURY CRITERIA (CONTINUED)

Veh. Yr./Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Veh. NHTSA No.: CT0202 Test Date: 10/30/95

MAX. COMPRESSIVE FEMUR FORCES: (lbs)	DRIVER DUMMY #312	PASSENGER DUMMY #340
Left Side	1365.8	955.0
Right Side	835.2	1160.9

TIBIA FORCES: (LBS)	DRIVER DUMMY #312	PASSENGER DUMMY #340
Left Lower Tibia Force X	-89.0	-163.7
Left Lower Tibia Force Z	319.4	-346.7
Right Lower Tibia Force X	-298.4	-247.7
Right Lower Tibia Force Z	664.9	-713.6

TIBIA MOMENTS: (IN/LBS)		
Left Lower Tibia Moment Y	-611.2	1413.4
Left Upper Tibia Moment X	469.9	-166.3
Left Upper Tibia Moment Y	519.2	806.1
Right Lower Tibia Moment Y	-2908.8	2280.4
Right Upper Tibia Moment X	507.1	-429.2
Right Upper Tibia Moment Y	1143.0	-564.4

TABLE 9 DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag with the dummy's head rotating rearward. The driver dummy was restrained by the airbag. The dummy rebounded rearward into the seat back with the dummy's head contacting the head restraint. The driver dummy came to rest in the seat.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the dashboard. The dummy's head and chest impacted the airbag with the dummy's head rotating rearward. The right front passenger dummy was restrained by the airbag. The dummy rebounded rearward into the seat back. The right front passenger dummy came to rest in the seat.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

NHTSA No.: CT0202; Date of Comfort/Convenience Check: 10/30/95

Technician Performing Check: Nicole Walter

GVWR: 5346 lbs

Automatic seat belts installed in any vehicle, other than a walk-in van-type vehicle which has a gross vehicle weight rating of 10,000 pounds or less, and is manufactured on or after September 1, 1986, shall meet the requirements for convenience hooks, webbing tension relieving devices, and belt contact force.

Manual seat belts installed for compliance with this standard in front outboard designated seating positions of any vehicle, other than a walk-in van-type vehicle which has a gross vehicle rating of 10,000 pounds or less, and is manufactured on or after September 1, 1989, shall meet the requirements for belt contact force, plate access, retraction and seat belt guides, and hardware.

VEHICLE EQUIPMENT:

The vehicle's front outboard seating positions were equipped with manual Type 2 seat belts which must comply with the dynamic test requirements of S5.1; requirements for webbing tension-relieving devices (S7.4.2), belt contact force (S7.4.3), latchplate access (S7.4.4), retraction (S7.4.5), and seat belt guides and hardware (S7.4.6) apply.

CONVENIENCE HOOKS (S7.4.1):

Not applicable, the vehicle was not equipped with automatic seat belts.

WEBBING TENSION-RELIEVING DEVICE (S7.4.2)

The seat belt assembly on the front outboard seating positions did not have webbing tension-relieving devices.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS, (Cont'd)

BELT CONTACT FORCE (S7.4.3)

The belt contact force on the chest of the test dummy was 0.1 pounds.

LATCHPLATE ACCESS (S7.4.4)

The seat belt latchplates, in their normal stowed position, were within the reach envelope.

The clearance test block moved unhindered to the latchplate or buckle.

RETRACTION (S7.4.5):

The seat belt automatically retracted when the seat belt latchplate was released.

The stowed seat belt webbing and hardware were not pinched when the door was closed.

SEAT BELT GUIDES AND HARDWARE (S7.4.6)

The seat cushion was movable, but the seat back did not serve as a function other than seating.

The seat was not removable.

The seat was not movable so that the space formerly occupied by the seat could be used for a secondary function.

Note: If the seat or seat cushion is removable or if the seat is movable so that the space formerly occupied by the seat can be used for a secondary function, the seat belt guides and hardware requirements do not apply.

TABLE 10 FMVSS 208 SEAT BELT COMFORT AND CONVENIENCE TEST SUMMARY
FRONT OUTBOARD DESIGNATED SEATING POSITIONS. (Cont'd)

SEAT BELT GUIDES AND HARDWARE (S7.4.6)(Cont'd)

The webbing was not designed to pass through the seat cushion or between the cushion and seat back.

The remaining two parts (the seat belt latchplate and the buckle) were accessible under normal conditions.

The latchplate and buckle did not pass through the guides provided and fall behind the seat when the belt was completely retracted (or detached if not retractable) and the seat was moved to any position.

TABLE 11 FMVSS 208 EQUIPMENT DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Date of Check: 10/30/95

Technician Performing Check: Nicole Walter

GVWR: 5346 lbs

FMVSS 208 SEAT BELT WARNING SYSTEM DATA

With an occupant in the driver's position and the lap belt/unibelt in stowed position and the ignition switch placed in the "start/on" position, the duration of audible warning signal was 7.0 seconds and the reminder light stayed on.

With an occupant in the driver's position and the lap belt/unibelt in use and the ignition switch placed in the "start/on" position, the duration of audible warning signal and the reminder light operation was 0 second.

Note: The audible warning should not operate.

The wording of the visual seat belt warning was the symbol from Table 2 of FMVSS 101.

FMVSS 208 LABELING AND DRIVER'S MANUAL DATA

The labels which describe manufacturer's maintenance or replacement schedule for the crash-deployed occupant protection system were located in the owners manual.

The airbag system is required to be replaced after deployment.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 24.

TABLE 11 FMVSS 208 EQUIPMENT DATA, (Cont'd)

FMVSS 208 LABELING AND DRIVER'S MANUAL DATA (Cont'd)

A description of the functional operation of the system was provided in the owner's manual on pages 20 - 23.

A reference to the instructions and description of the system was included on a label located on the sunvisor.

An owner's manual was provided.

The owner's manual contained appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems on pages 20 - 24.

FMVSS 208 READINESS INDICATOR DATA

The vehicle contained a crash-deployed occupant protection system which was not totally mechanical. The readiness indicator was located in the lower right corner of the instrument panel.

The readiness indicator was clearly visible to the driver.

A list of the elements in the occupant restraint system, being monitored by the readiness indicator, was provided in the owner's manual on page 17.

FMVSS 208 REAR OUTBOARD SEATING POSITION SEAT BELTS

All rear outboard seating positions had Type 2 seat belts.

TABLE 12 FMVSS 212, "WINDSHIELD MOUNTING", DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Rubber trim with glue retention

CLIPS OR BRACKETS USED TO RETAIN WINDSHIELD: None

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY (inches)		
	PRE-TEST	POST-TEST	PERCENT RETENTION
RIGHT SIDE	87.1	87.1	100%
LEFT SIDE	86.7	86.7	100%
TOTAL	173.8	173.8	100%

Pre-Test Windshield Mounting Material Temperature: 70° F

* Lower Trim Extends
To Firewall

FAILURE DETAILS: None

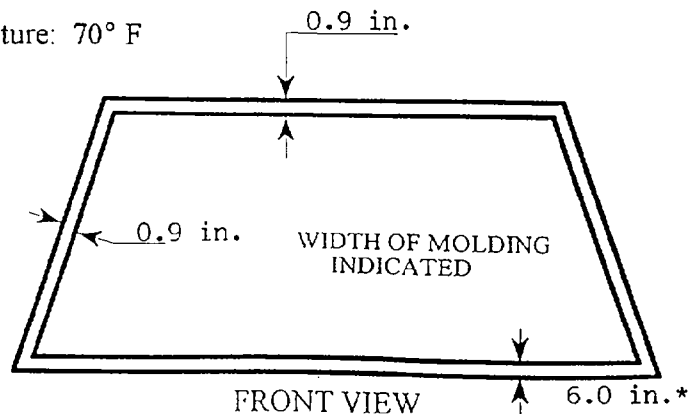


TABLE 13 FMVSS 219, "WINDSHIELD ZONE INTRUSION", DATA SUMMARY

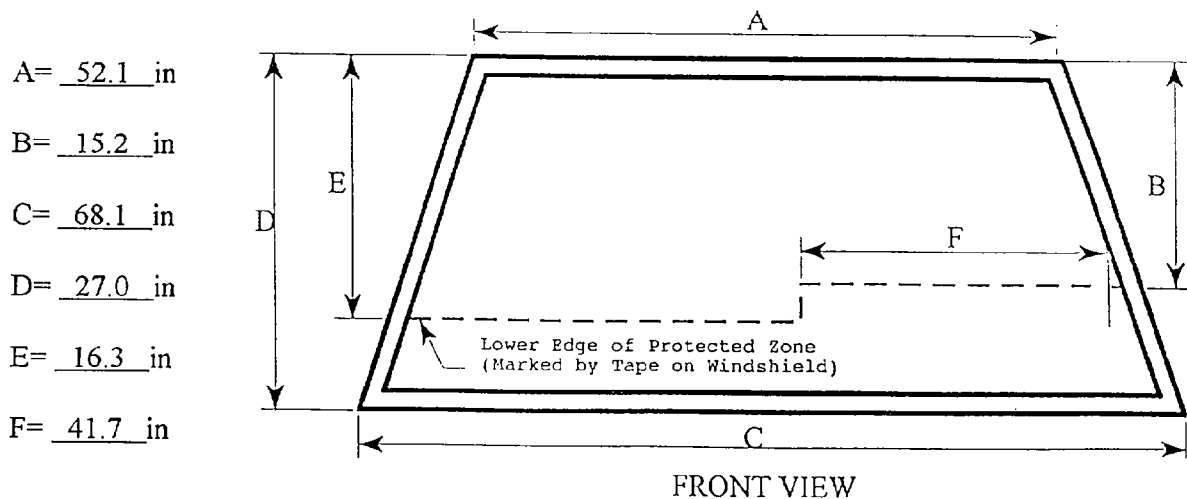
Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contact points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and ½" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

WINDSHIELD MEASUREMENTS:



AREAS OF WINDSHIELD TEMPLATE PENETRATION GREATER THAN 1/4 IN:

None

AREAS OF WINDSHIELD PENETRATION, BELOW THE PROTECTED ZONE, THROUGH THE INNER SURFACE OF THE WINDSHIELD:

None

TABLE 14 FUEL SYSTEM DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

Fuel System Capacity from Owner's Manual = 20.0 gallons

Usable Capacity Figure Furnished by COTR = 20.0 gallons

Test Volume Range (92 to 94% of Usable Capacity)

= 18.4 to 18.8 gallons

Actual Test Volume = 18.6 gallons

Test Fluid Type: Stoddard Solvent; Spec. Grav. = 0.77

Kinematic Viscosity = 1.788 centistokes; Color = Purple

Type of Fuel Pump: X Electric; Mechanical

Does electric pump operate with ignition switch "On" and engine "Off"?

 Yes; X No

Details of Fuel System:

Vehicle contained an EFI fuel system.

TABLE 15 FMVSS 301 POST IMPACT TEST DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

TEST REQUIREMENTS:

Test vehicle's fuel tank filled to 92 to 94% of manufacturer's usable capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572E test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

- ☒ Frontal (30 mph)
☐ Oblique (30 mph) with ___ ° barrier face first
 contacting (driver/passenger) side
☐ Rear Moving Barrier (30 mph)
☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0 oz	1 oz
2. For 5 minute period after vehicle motion ceases	0 oz	5 oz
3. For next 25 minutes	0 oz	1 oz./1 min

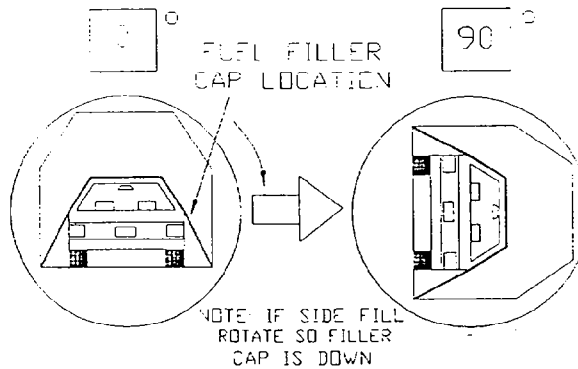
FUEL SPILLAGE LOCATION(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 40 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 40 seconds

Next Whole Minute Interval = 8 minutes

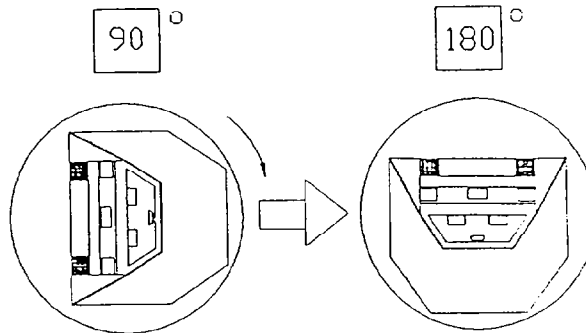
FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

TEST PHASE: 90° - 180°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 24 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 24 seconds

Next Whole Minute Interval = 8 minutes

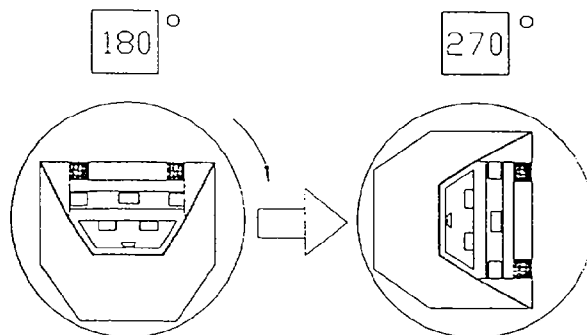
FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA (Cont'd)

TEST PHASE: 180° - 270°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 15 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 15 seconds

Next Whole Minute Interval = 8 minutes

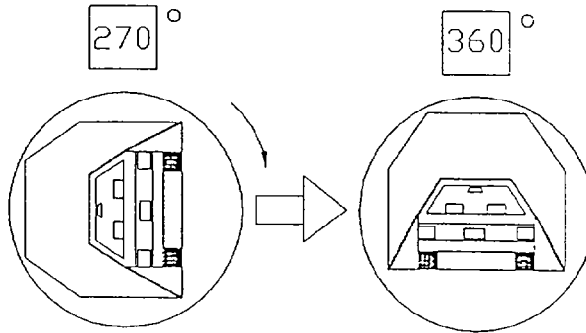
FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

FUEL SPILLAGE LOCATIONS(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA

TEST PHASE: 270° - 360°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 45 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 45 seconds

Next Whole Minute Interval = 8 minutes

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION (FILLER CAP DOWN)	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0 oz.	5 oz
2. Sixth Minute From Onset of Rotation	0 oz.	1 oz
3. Seventh Minute From Onset of Rotation	0 oz.	1 oz
4. Eighth Minute if Required	0 oz.	1 oz

FUEL SPILLAGE LOCATIONS(S): None

SECTION 4
OCCUPANT, VEHICLE, AND CAMERA INFORMATION

TABLE 17 SEAT AND STEERING COLUMN POSITIONING DATA

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

NOMINAL DESIGN RIDING POSITION:

Driver Seat: Seat Back Angle = 20.7°

The seat back angle was measured on the seat back frame with the inclinometer.

Passenger Seat: Seat Back Angle = 20.6°

The seat back angle was measured on the seat back frame with the inclinometer.

SEAT FORE AND AFT POSITIONS:

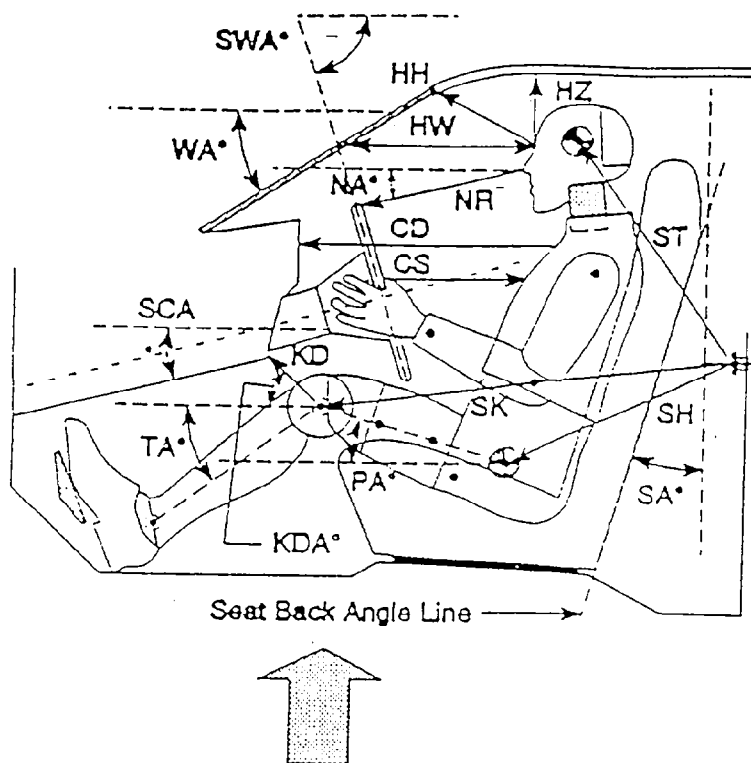
Driver Seat: The seat track had a total position movement of 10.2 inches and was positioned 5.1 inches rearward from the foremost position.

Passenger Seat: The seat track had a total position movement of 9.8 inches and was positioned 4.9 inches rearward from the foremost position.

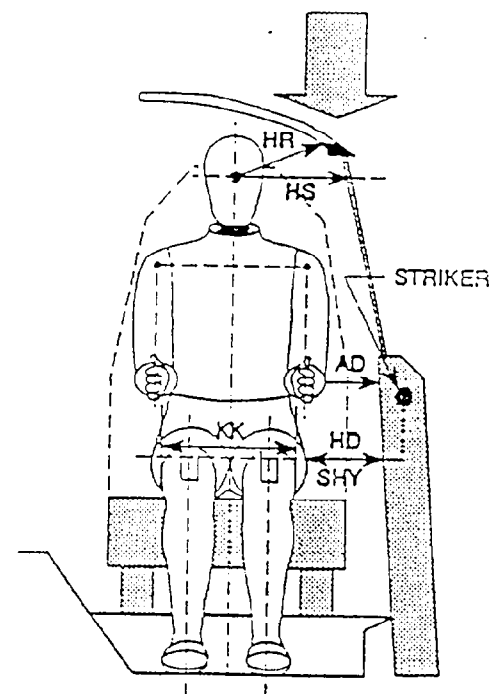
STEERING COLUMN ADJUSTMENTS:

The steering column was positioned at the mid-point of its swing. The angle of the steering column was set at the 3rd notch of 5 (23.7 ° from horizontal).

FIGURE 1 DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS



- AD - Arm to Door
- HD - H-Point to Door
- HR - Head to Side Header
- HS - Head to Side Window
- KK - Knee to Knee
- SHY - Striker to H-Point (Y-Direction)



- CD - Chest to Dash
- CS - Steering Wheel to Chest
- HH - Head to Header
- HW - Head to Windshield
- HZ - Head to Roof
- KDA - Knee to Dash Angle
- KDL - Left Knee to Dash
- KDR - Right Knee to Dash
- NA - Nose to Rim Angle
- NR - Nose to Rim
- PA - Pelvic Angle
- RA - Rim to Abdomen
- SA - Seat Back Angle
- SCA - Steering Column Angle
- SH - Striker to H-Point
- SK - Striker to Knee
- ST - Striker to Head
- SWA - Steering Wheel Angle
- TA - Tibial Angle
- WA - Windshield Angle

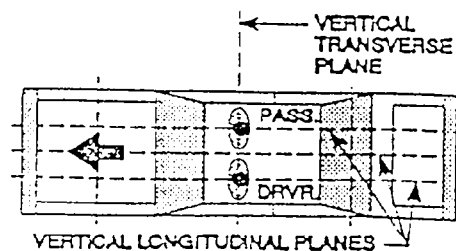


TABLE 18 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

Vehicle Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

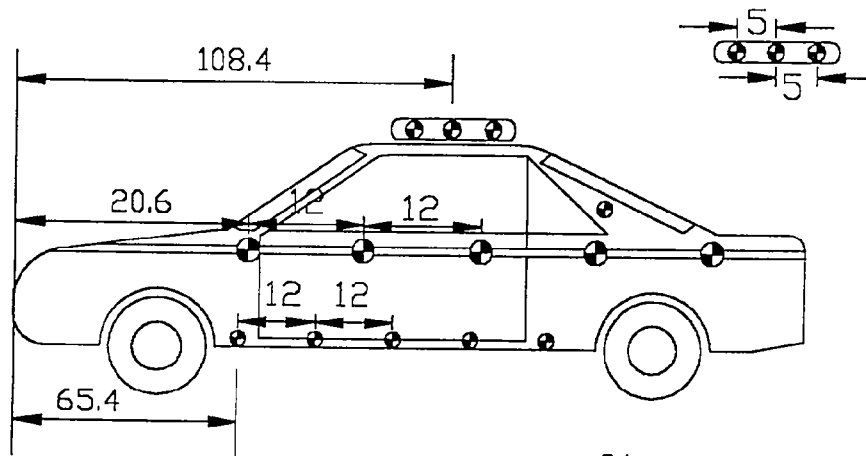
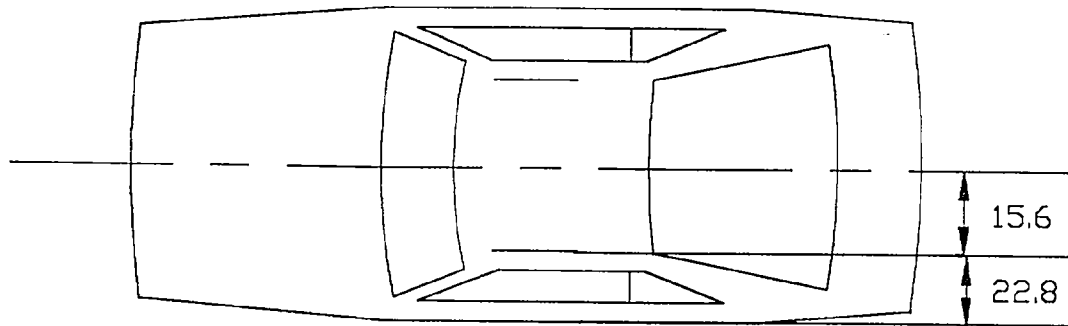
Vehicle NHTSA No.: CT0202 Test Date: 10/30/95

	DRIVER (Serial #312)	PASSENGER (Serial #340)
WA°	33.5°	N/A
SWA°	66.3°	N/A
SCA°	22.9**	N/A
SA°	20.7°	20.6°
HZ	7.4 in	6.9 in
HH	13.7 in	13.3 in
HW	23.1 in	22.0 in
HR	11.5 in	11.5 in
NR	14.4 in Angle (NA) 12.7°	N/A
CD	21.8 in	22.2 in
CS	11.3 in	N/A
RA	6.6 in	N/A
KDL	5.4 in Angle (KDA) 33.5°	5.8 in
KDR	5.3 in	6.0 in Angle (KDA) 15.7°
PA°	24.4°	22.7°
TA°	36.9°	35.4°
KK	12.7 in	10.8 in
ST*	20.6 in Angle 79.0°	20.3 in Angle 76.0°
SK*	23.9 in Angle -1.4°	24.0 in Angle -1.5°
SH*	10.9 in Angle -28.2°	10.6 in Angle -31.5°
SHY	11.9 in	11.4 in
HS	14.3 in	15.2 in
HD	6.6 in	6.9 in
AD	5.6 in	5.8 in

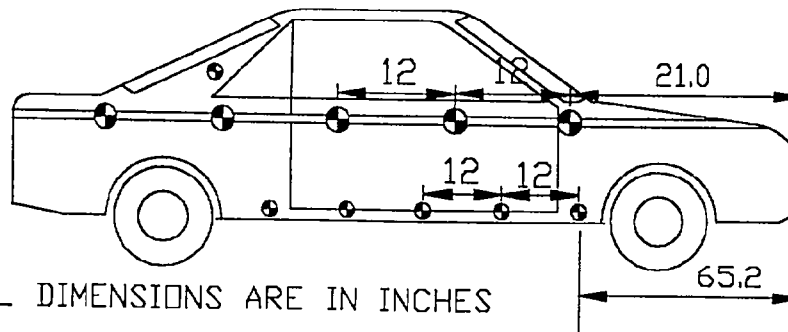
N/A = Not Applicable *Angles taken from horizontal

** The steering column was adjusted at the third notch of 5 total.

FIGURE 2 VEHICLE TARGET LOCATIONS



Steering Column Target
 X=85.8 from front of vehicle
 Y=15.7 from centerline
 Z=27.8 from floor of building



ALL DIMENSIONS ARE IN INCHES

FIGURE 3 CAMERA POSITIONS

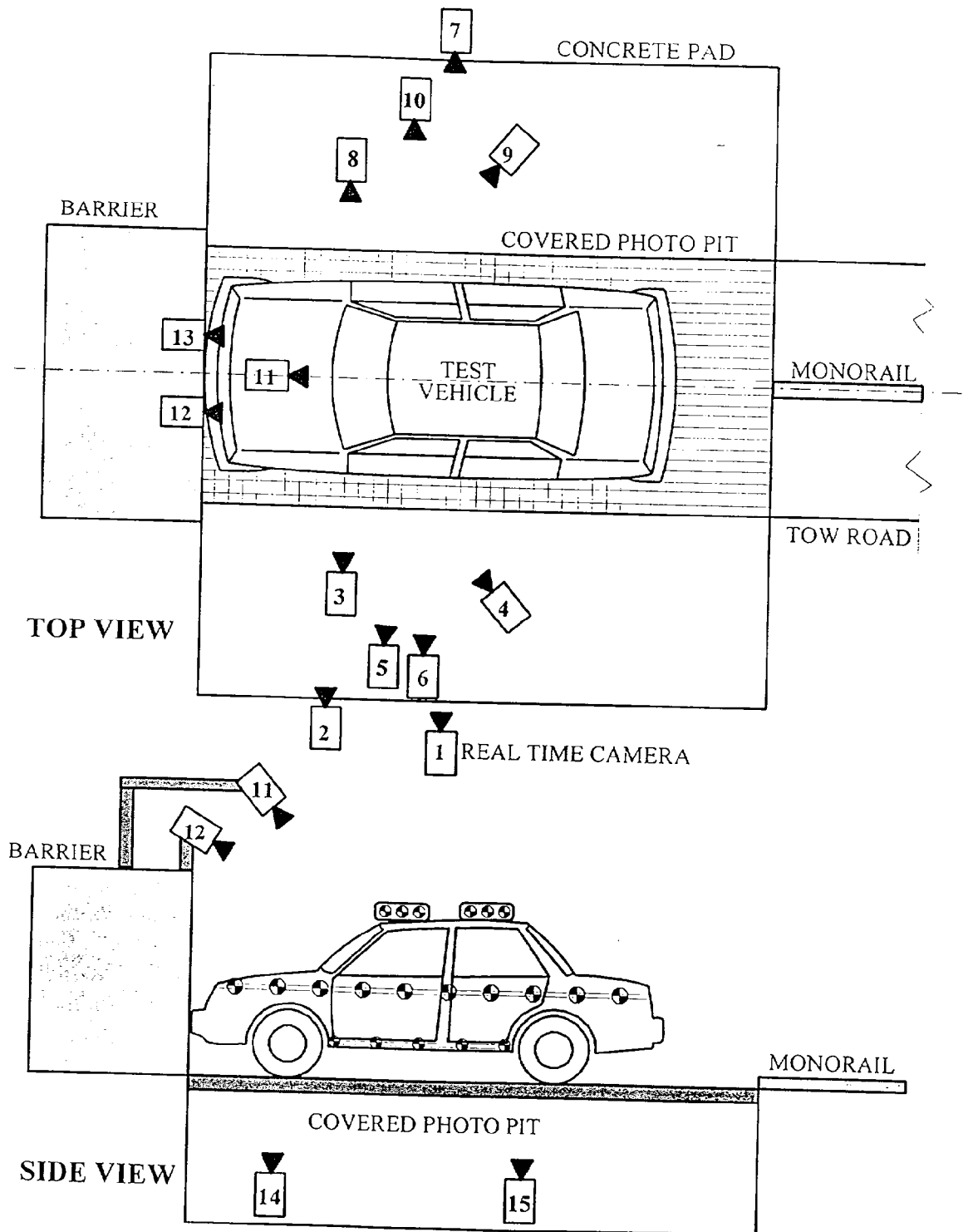


TABLE 19 CAMERA LOCATIONS

Veh. Year/Make/Model/Body Style: 1996/Lincoln/Towncar/4 Door Sedan

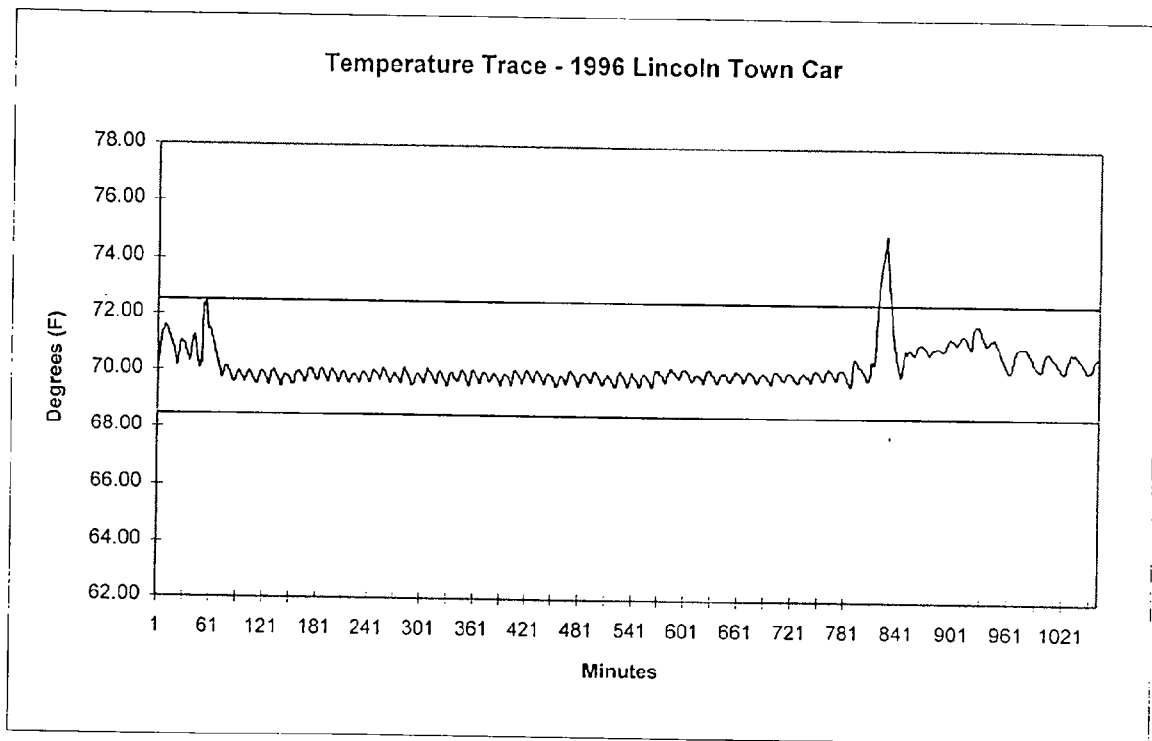
Vehicle NHTSA No.: CT0202 ; Test Date: 10/30/95

	VIEW	CAMERA POSITIONS (inches)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET	SPEED (fps)
		X	Y	Z			
1	Real-Time Left Side View						24
2	Left Front	50.0	345.3	62.6	90	325.2	1053
3	Driver Close-up	66.9	342.5	59.4	90	322.4	1010
4	Driver Angle Motion	220.9	254.3	77.6			1250
5	Steering Column Top	85.4	324.0	61.4	90	303.9	995
6	Steering Column Bottom	85.4	323.6	40.9	90	303.5	1010
7	Right Overall	111.0	-381.1	54.9	90	361.0	1020
8	Right Close-up	89.0	-336.2	63.4	90	316.1	1026
9	Right Angle	211.8	-226.8	80.3			1333
10	Right Passenger	51.2	-342.5	63.0	90	322.4	1020
11	Top Overall	98.2	0	210.6			893
12	Top Driver	-5.9	14.2	102.4			769
13	Top Passenger	-5.1	-14.2	101.2			1136
14	Pit Front	54.3	0	-124.2			943
15	Pit Rear View	122.8	0	-123.4			1015

- * +X = Film plane rearward of barrier
 +Y = Film plane to left of monorail centerline
 +Z = Film plane to above ground level

N/R = Not Recorded

FIGURE 4 AIR PROBE TEMPERATURE



Note: Spike in data at approximately 833 minutes is due to the temperature probe being touched. It does not depict the actual room temperature at this time.

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PHOTOGRAPHS

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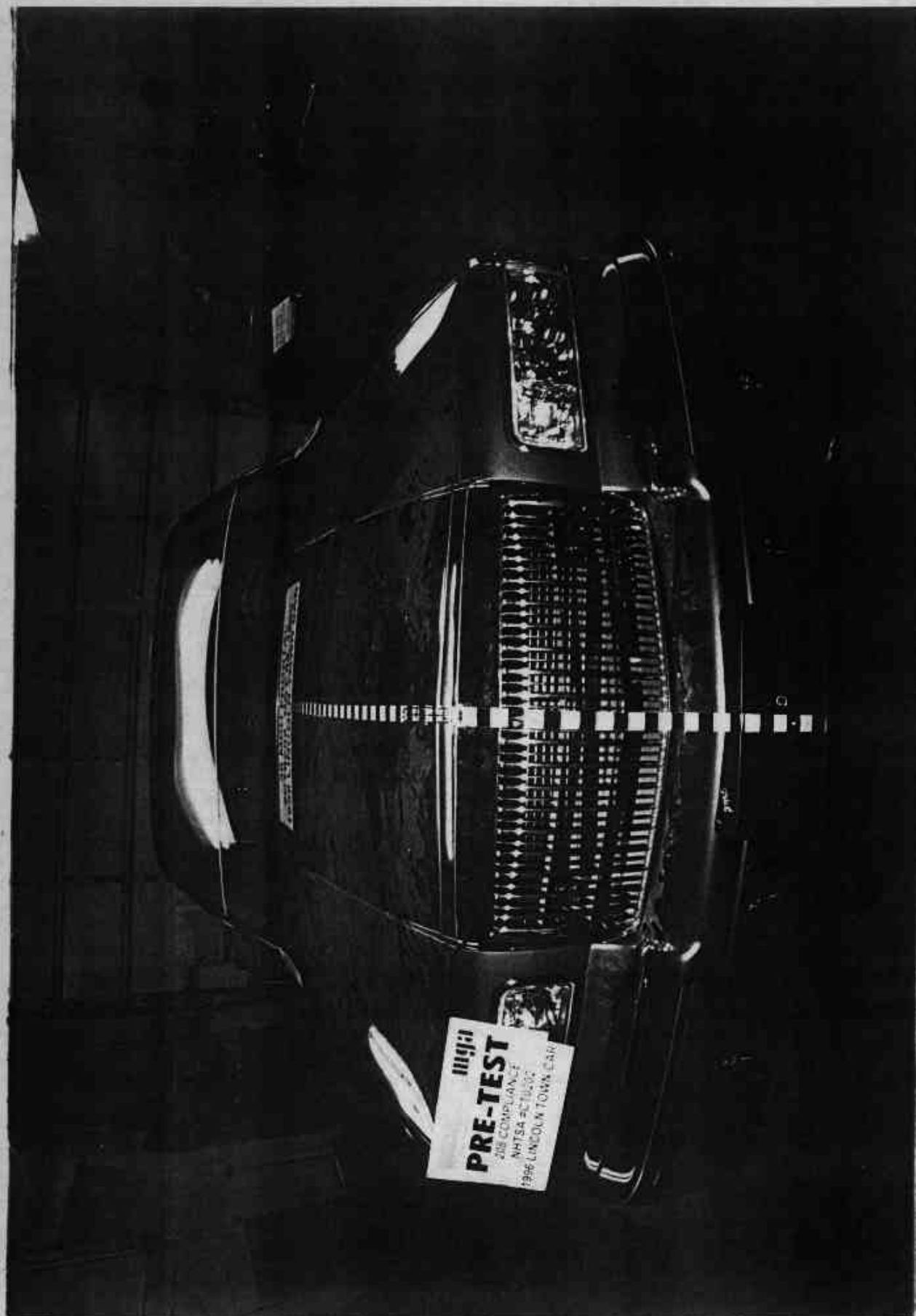


Photo No. A-1 - Pre-Test Front View



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



Photo No. A-3 - Pre-Test Left Side View

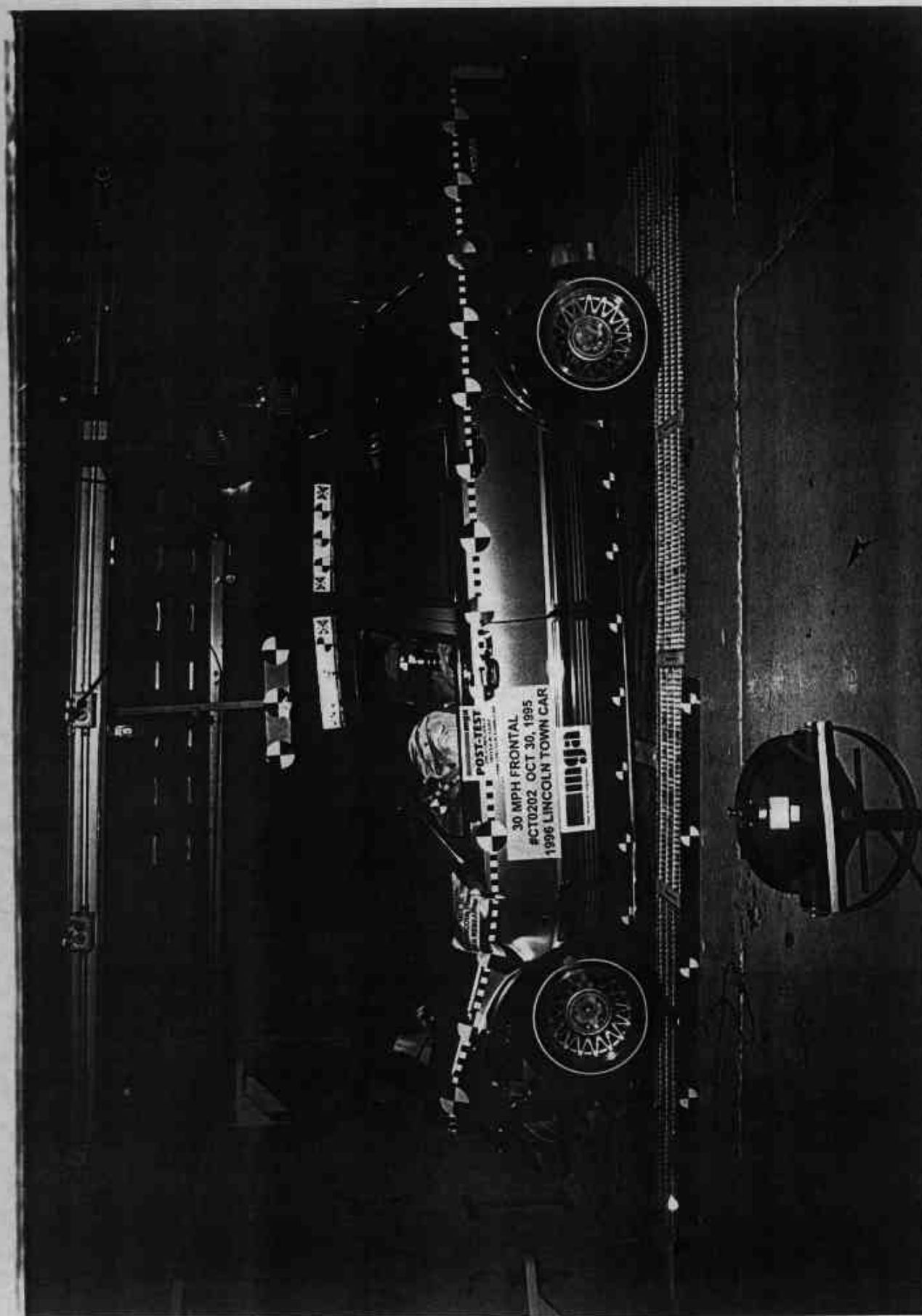


Photo No. A-4 - Post-Test Left Side View

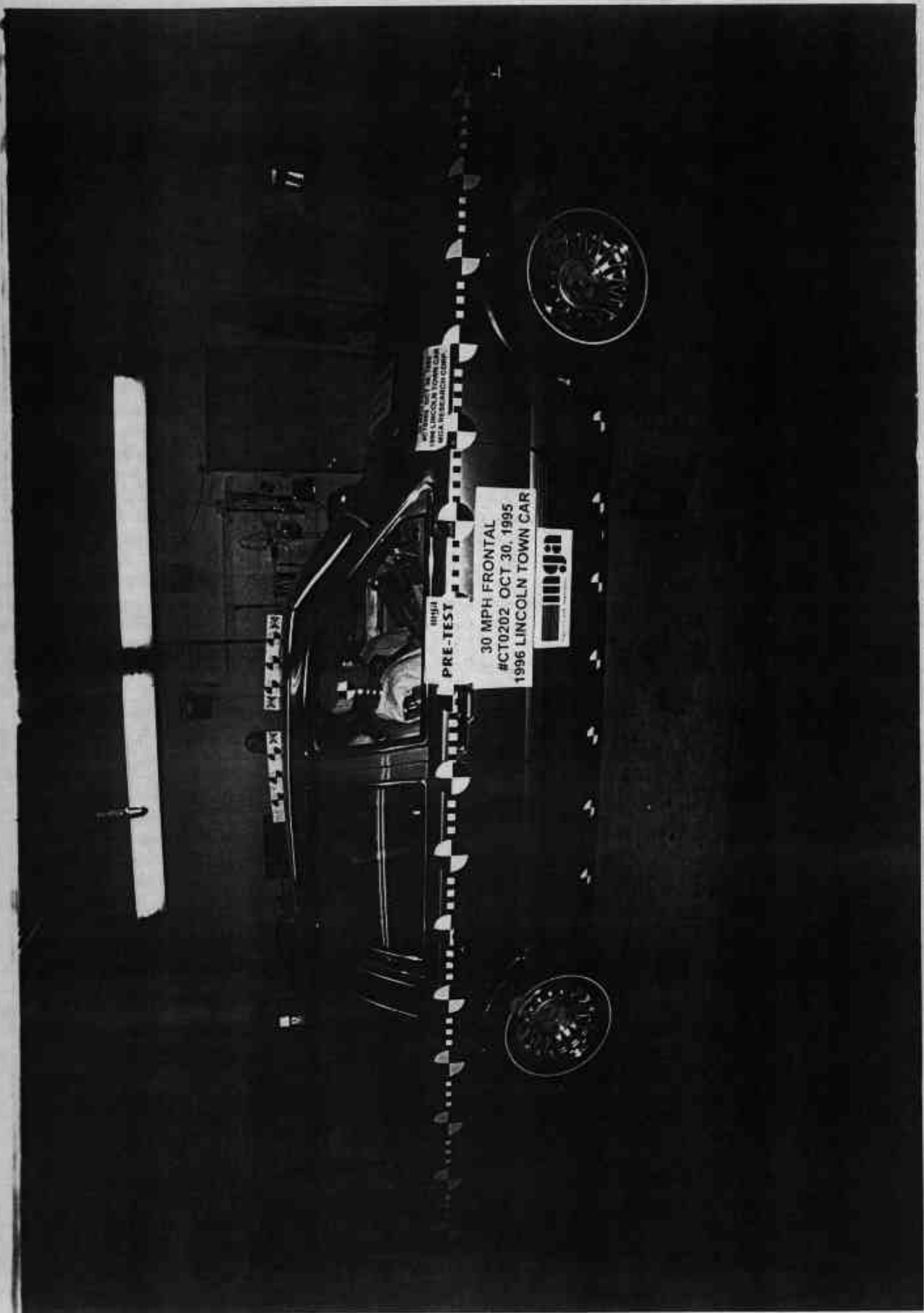


Photo No. A-5 - Pre-Test Right Side View

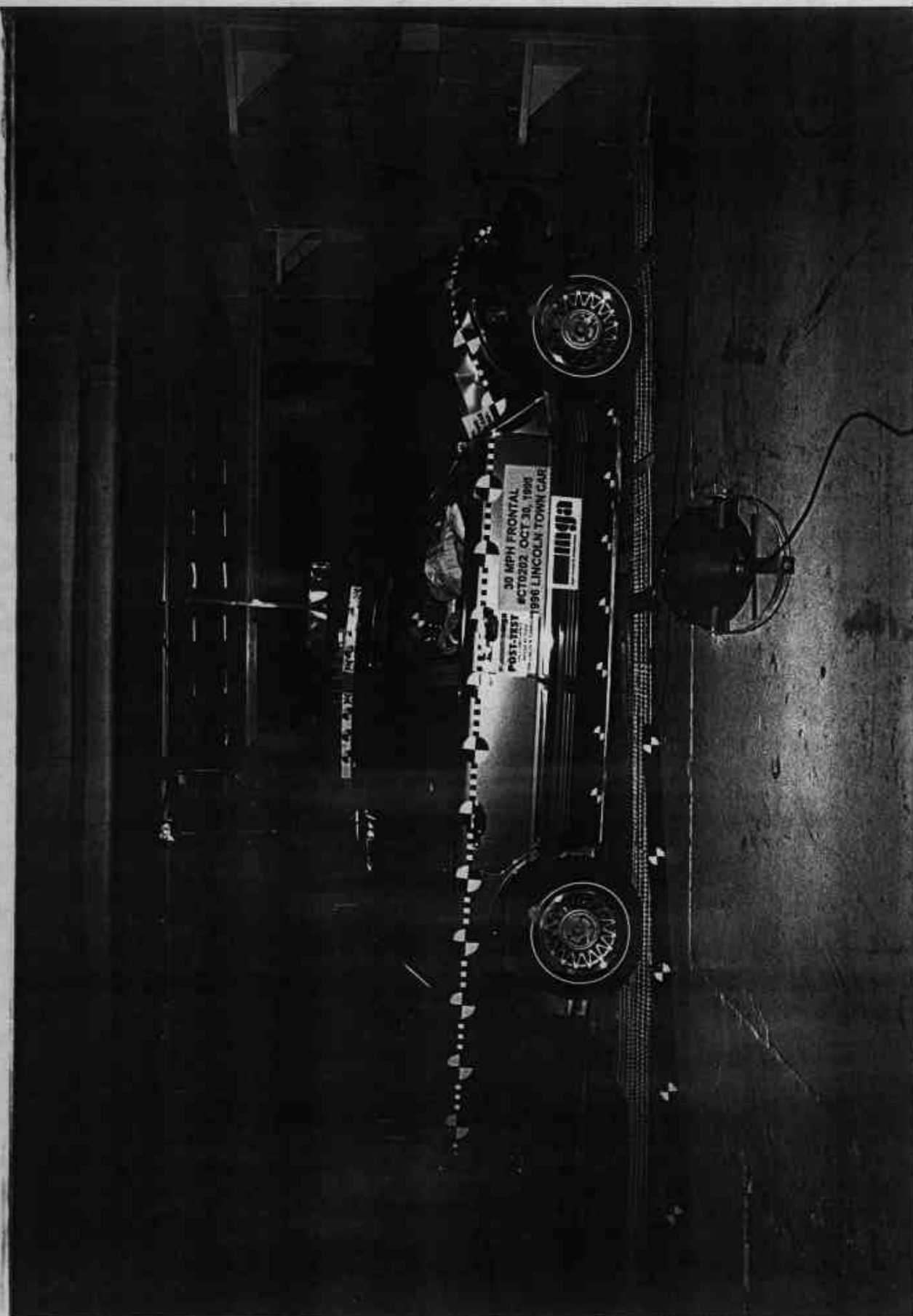


Photo No. A-6 - Post-Test Right Side View

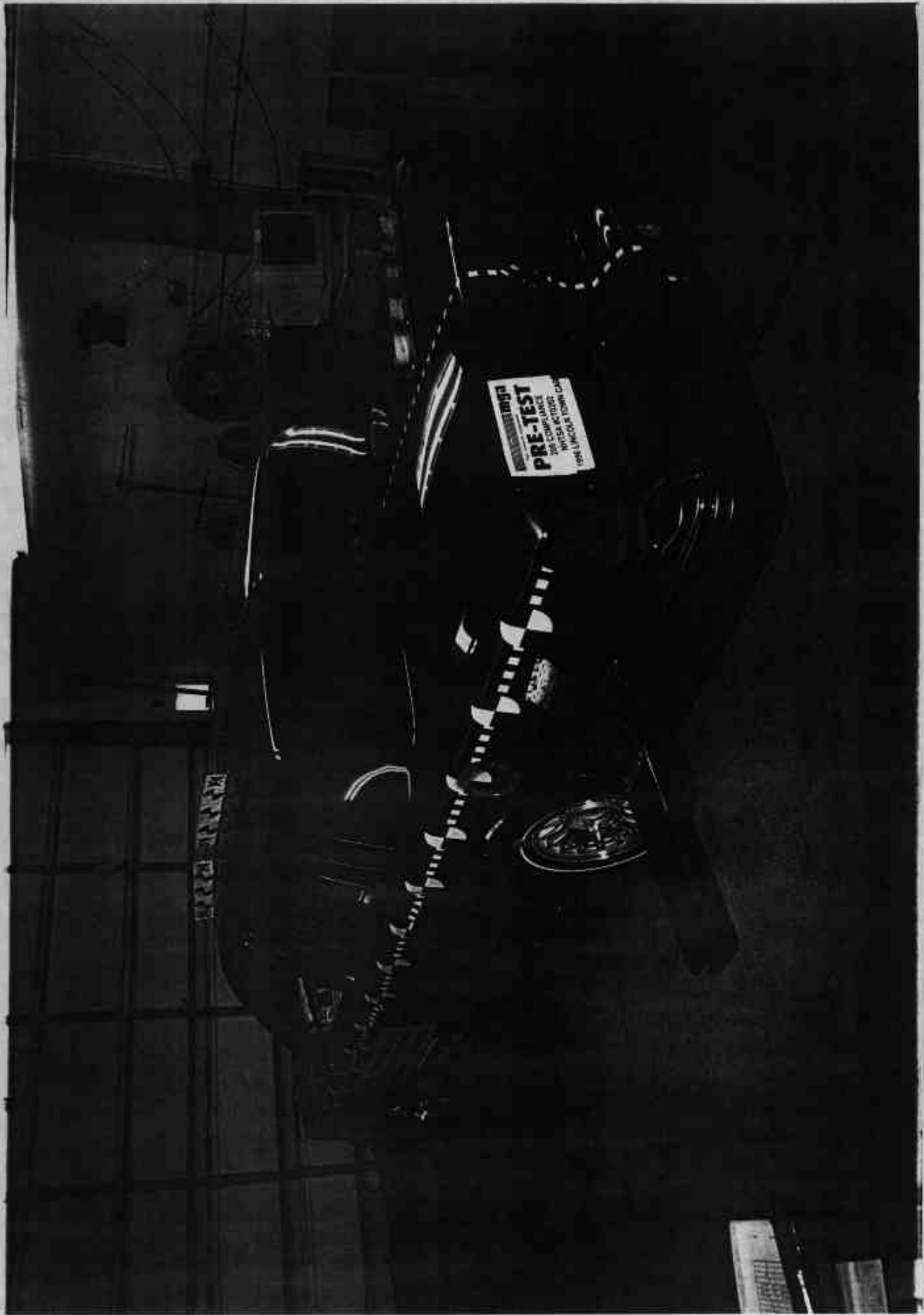


Photo No. A-7 - Pre-Test 3/4 Left Rear View

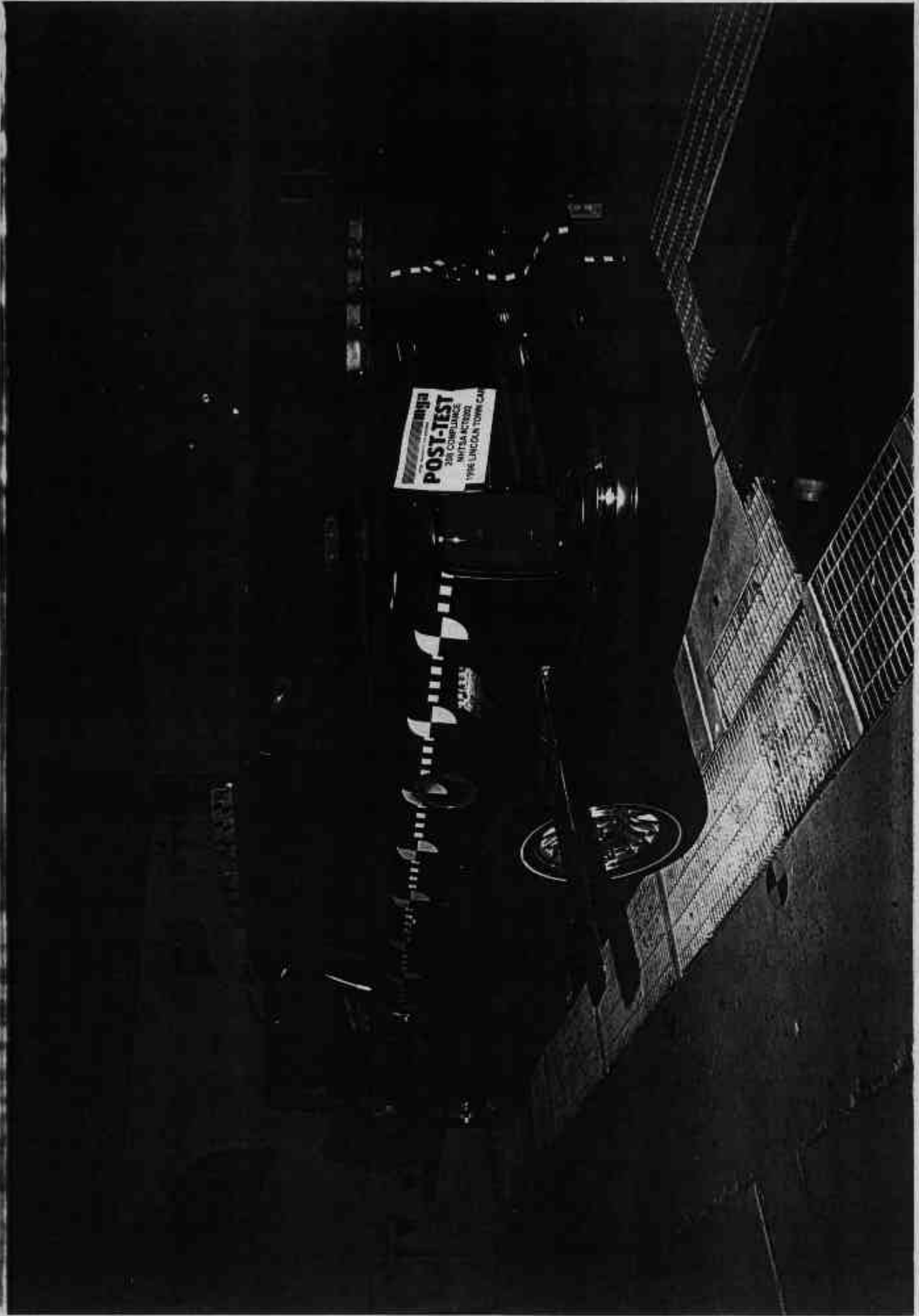


Photo No. A-8 - Post-Test 3/4 Left Rear View



Photo No. A-9 - Pre-Test 3/4 Right Front View



Photo No. A-10 - Post-Test 3/4 Right Front View

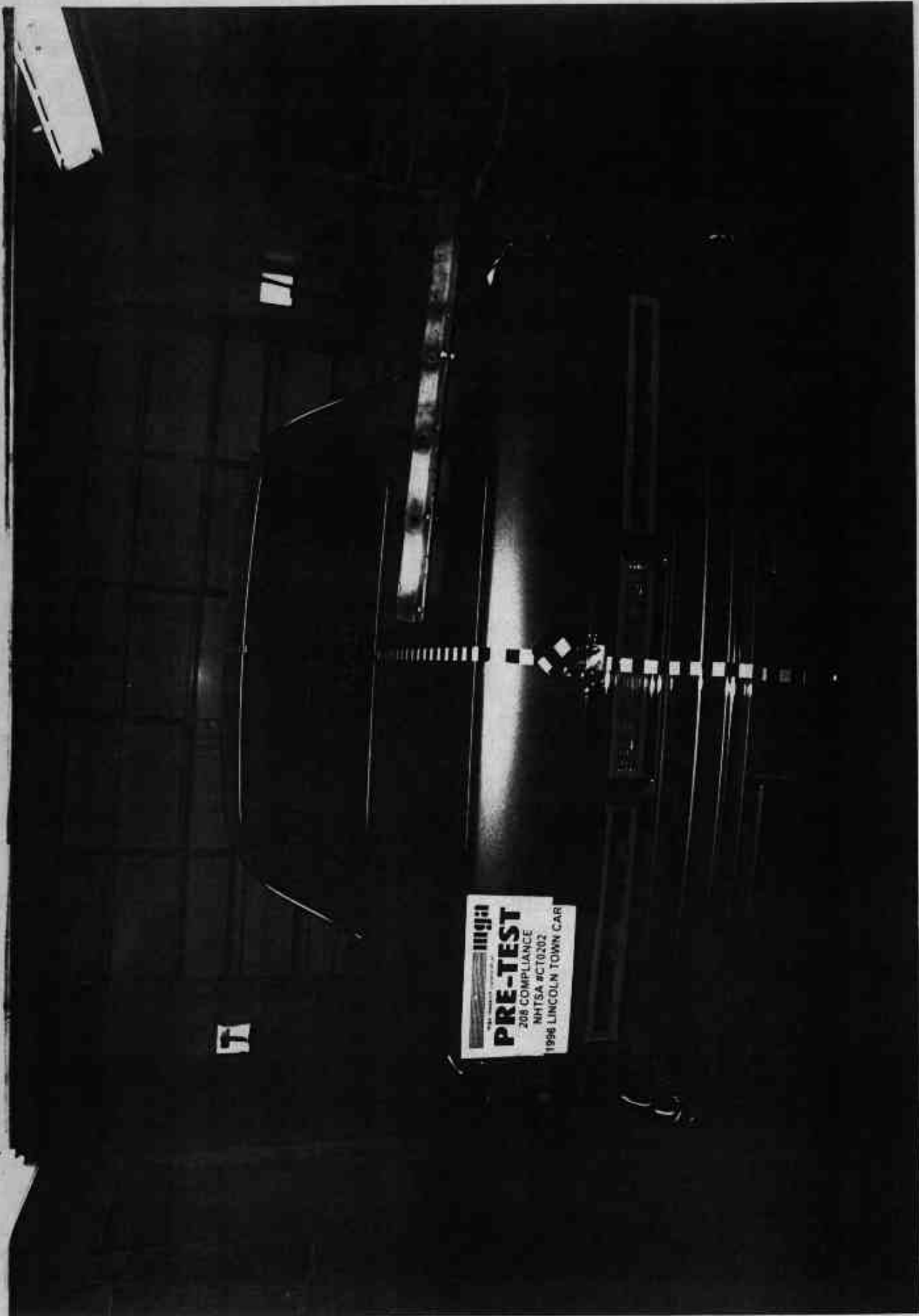


Photo No. A-11 - Pre-Test Rear View

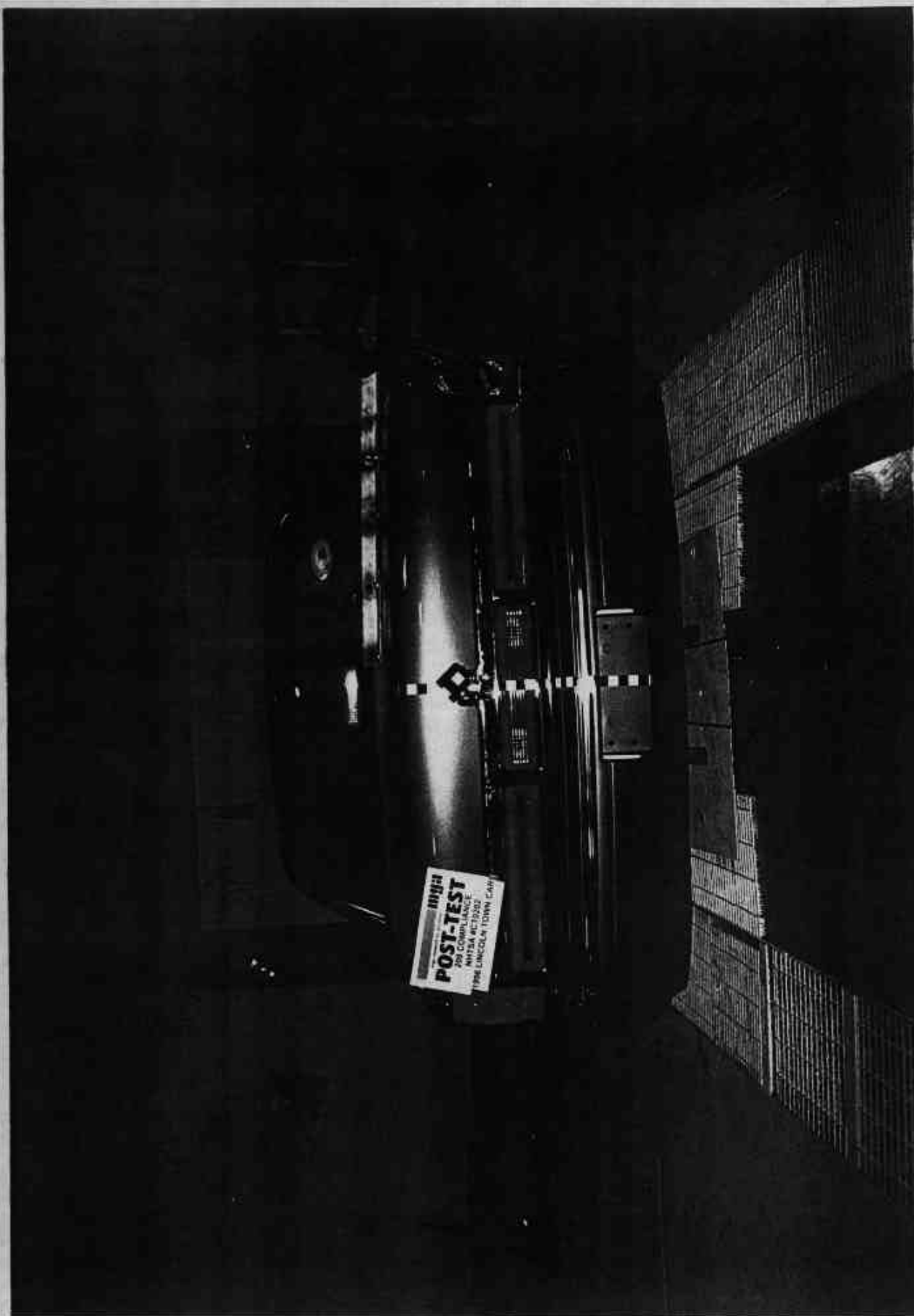


Photo No. A-12 - Post-Test Rear View

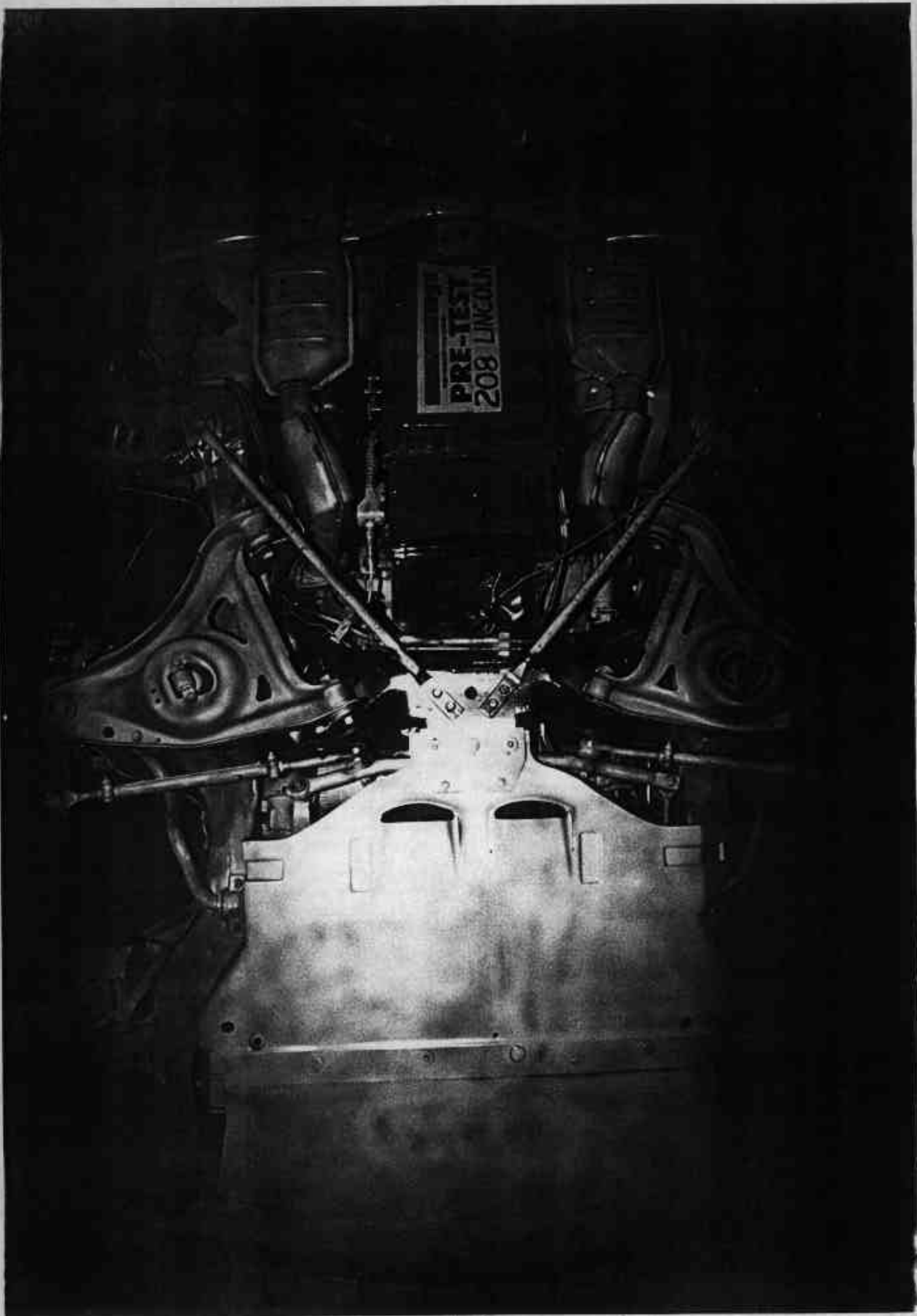


Photo No. A-13- Pre-Test Front Underbody View



Photo No. A-14 - Post-Test Front Underbody View



Photo No. A-15 - Pre-Test Rear Underbody View



Photo No. A-16 - Post-Test Rear Underbody View



Photo No. A-17 - Pre-Test Engine Compartment View

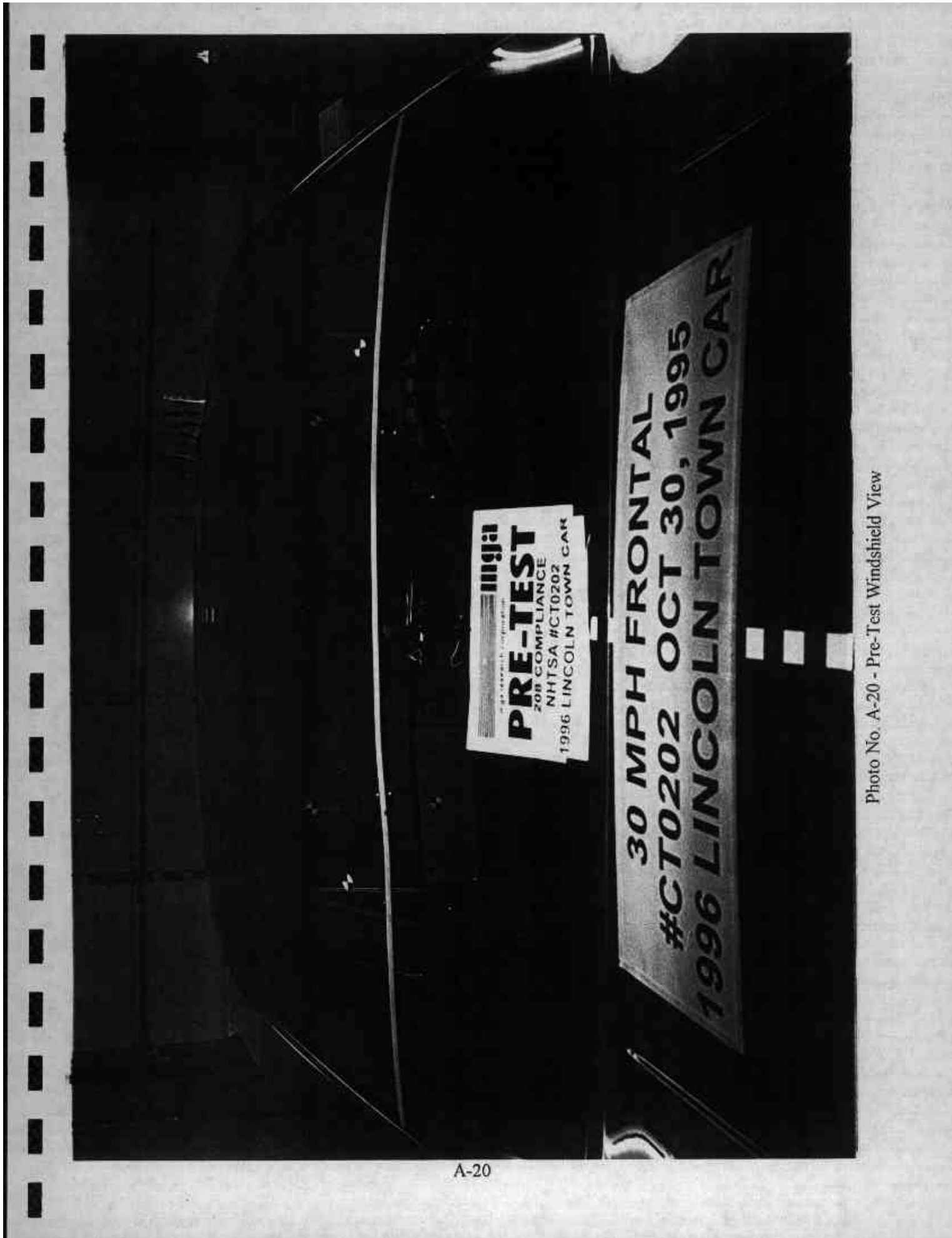


Photo No. A-18 - Post-Test Engine Compartment View

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PRE-TEST
208 COMPLIANCE
NHTSA #CT0202
1996 LINCOLN TOWN CAR



Photo No. A-19 - Pre-Test Fuel Filler Cap View



A-20

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

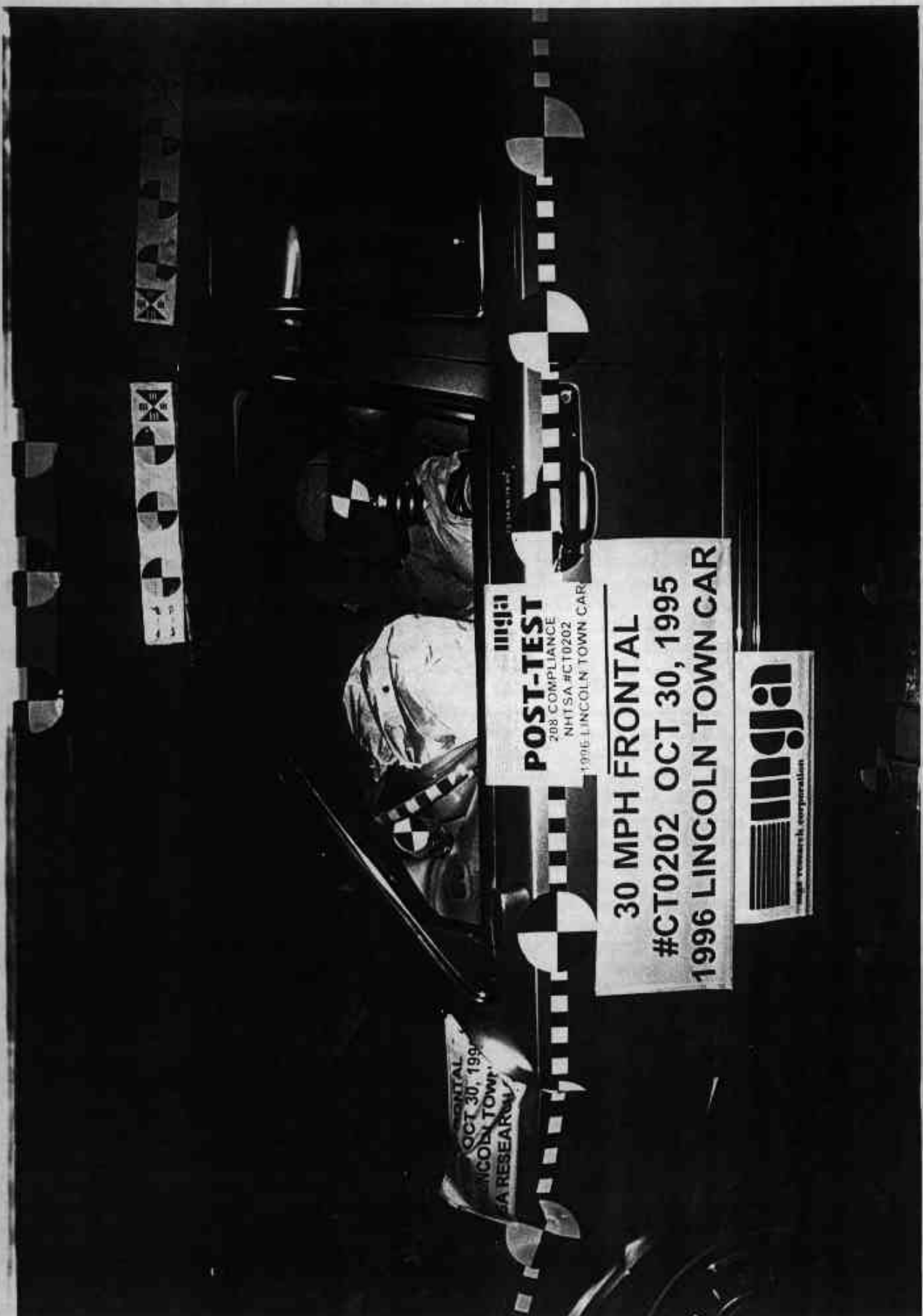


A-21

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



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



A-23

Photo No. A-23 - Post-Test Driver Dummy Position View



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



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

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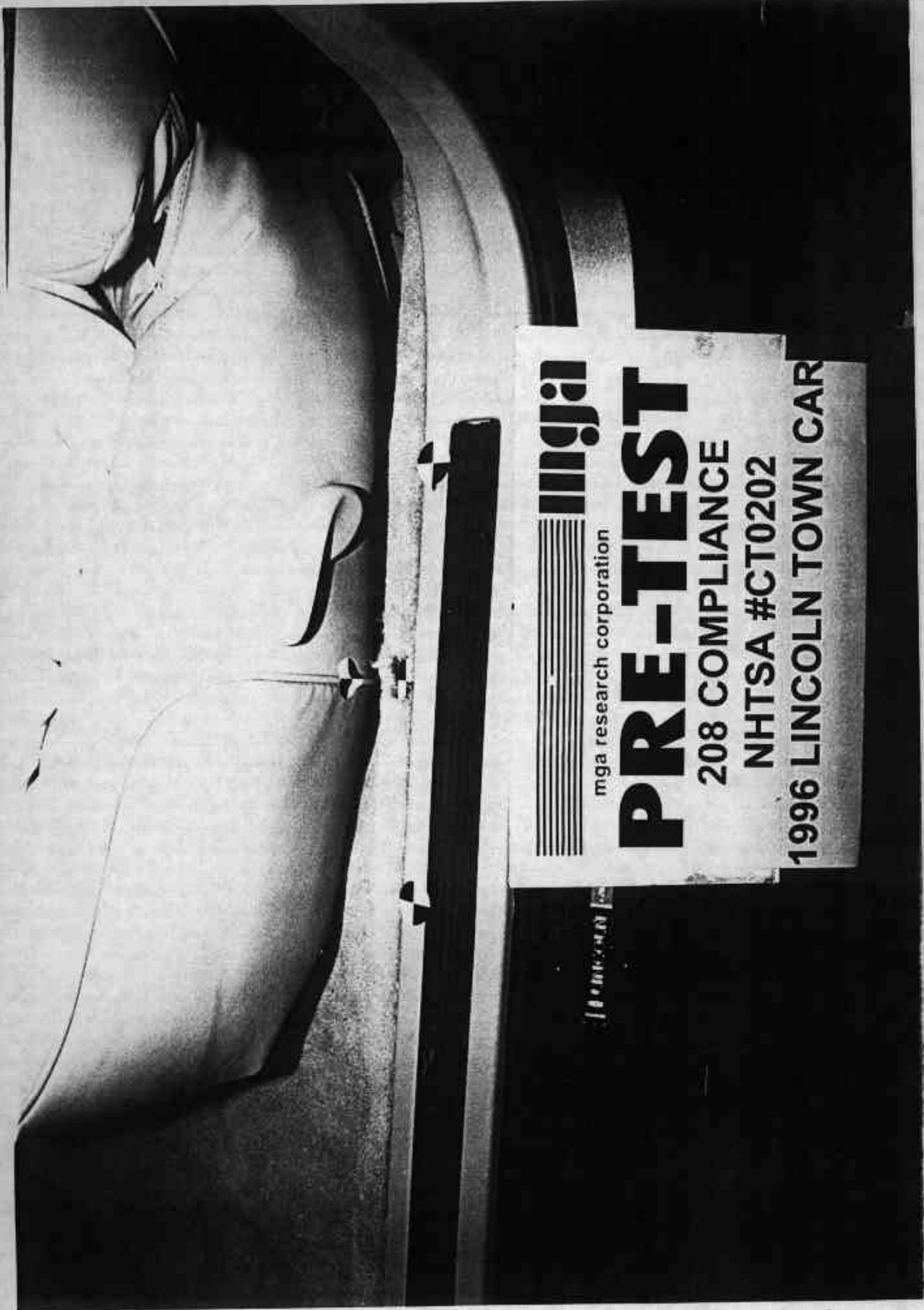
1996 LINCOLN TOWN CAR

Photo No. A-26 - Pre-Test Driver Windshield View

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0000000000 0000 0000000000

A-27

Photo No. A-27 - Post-Test Driver Windshield View



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1996 LINCOLN TOWN CAR

Photo No. A-28 - Pre-Test Driver Seat Position View



A-29

Photo No. A-29 - Post-Test Driver Seat Position View

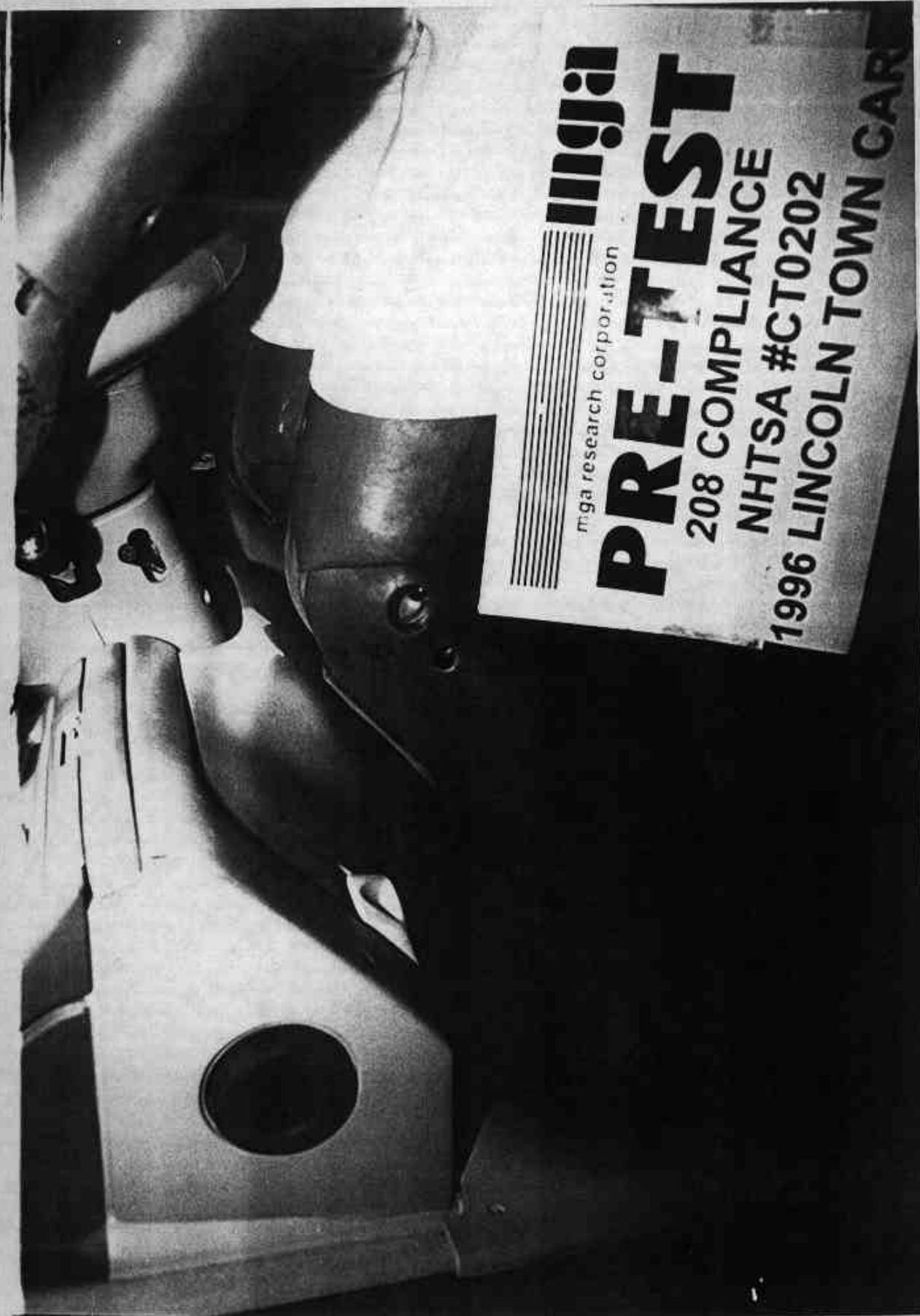


Photo No. A-30 - Pre-Test Driver Knee Bolster View



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

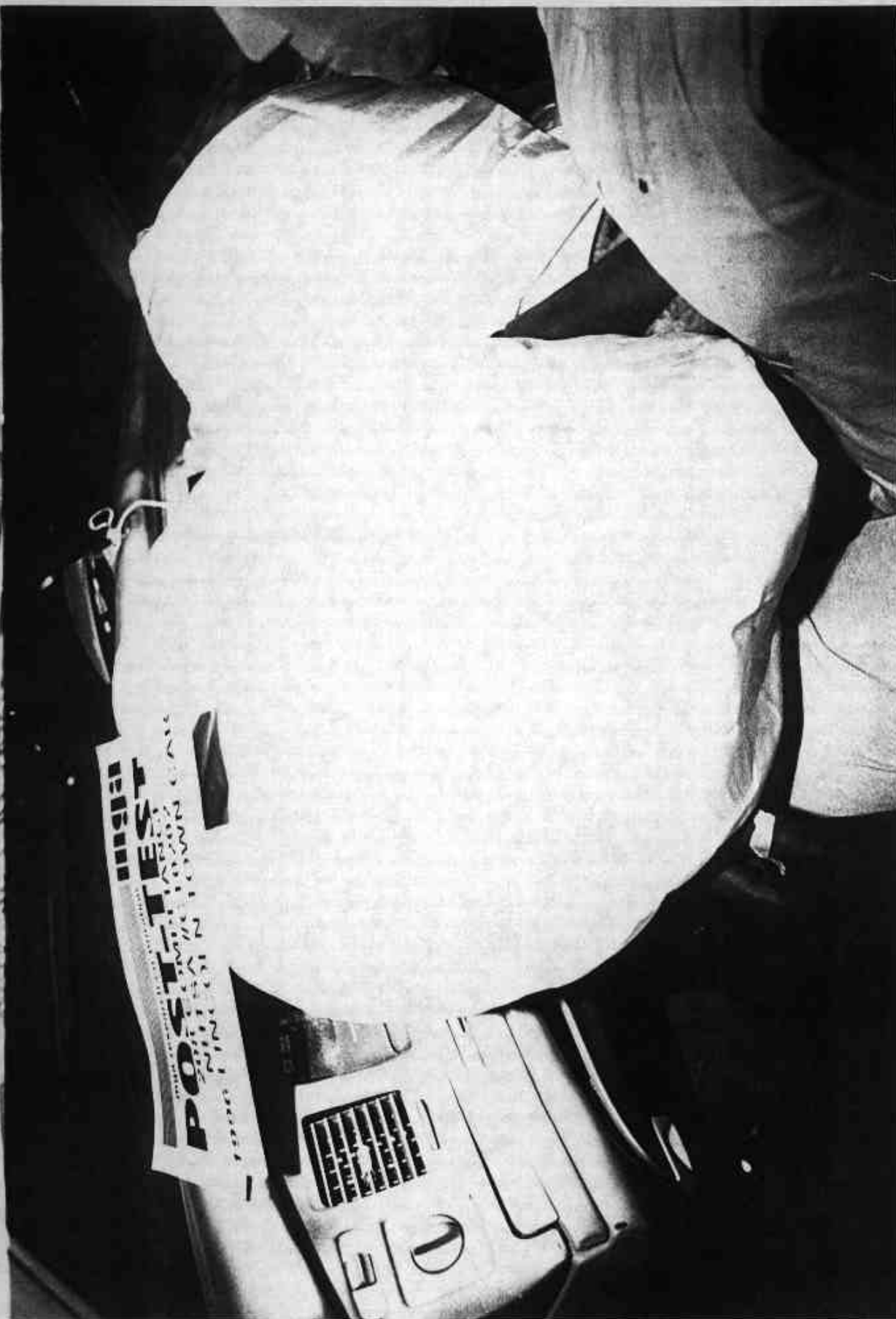


Photo No. A-32 - Post-Test Driver Airbag View



Photo No. A-33 - Post-Test Driver Knee Contact View



Photo No. A-34 - Post-Test Driver Head Contact View - Survivor



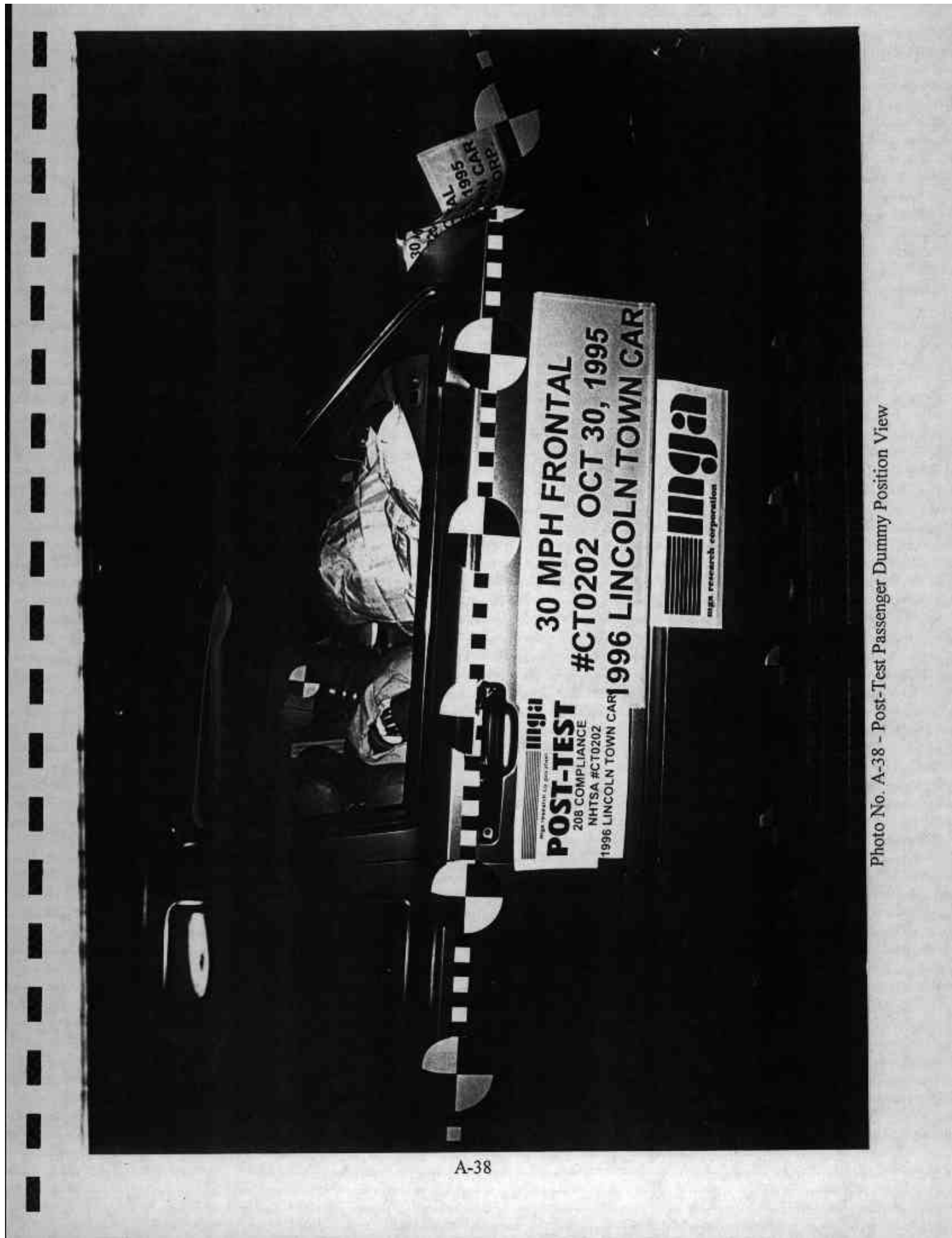
Photo No. A-35 - Post-Test Driver Head Contact View - Headrest



Photo No. A-36 - Post-Test Driver Chest Contact View



Photo No. A-37 - Pre-Test Passenger Dummy Position View



30 MPH FRONTAL
#CT0202 OCT 30, 1995
1996 LINCOLN TOWN CAR

POST-TEST
208 COMPLIANCE
NHTSA #CT0202
1996 LINCOLN TOWN CAR

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Photo No. A-38 - Post-Test Passenger Dummy Position View

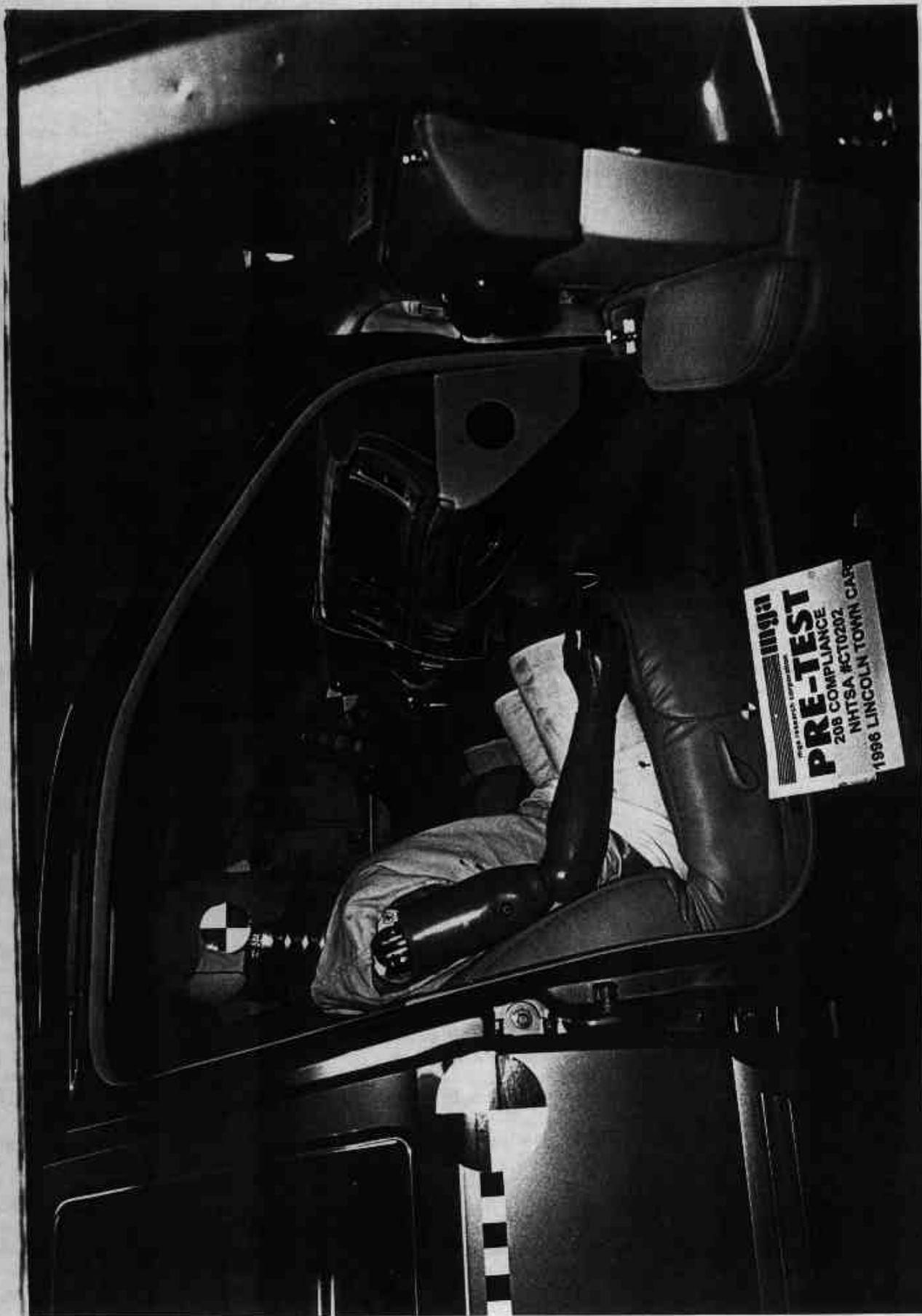


Photo No. A-39 - Pre-Test Passenger Dummy Position View (Door Open)

A-39

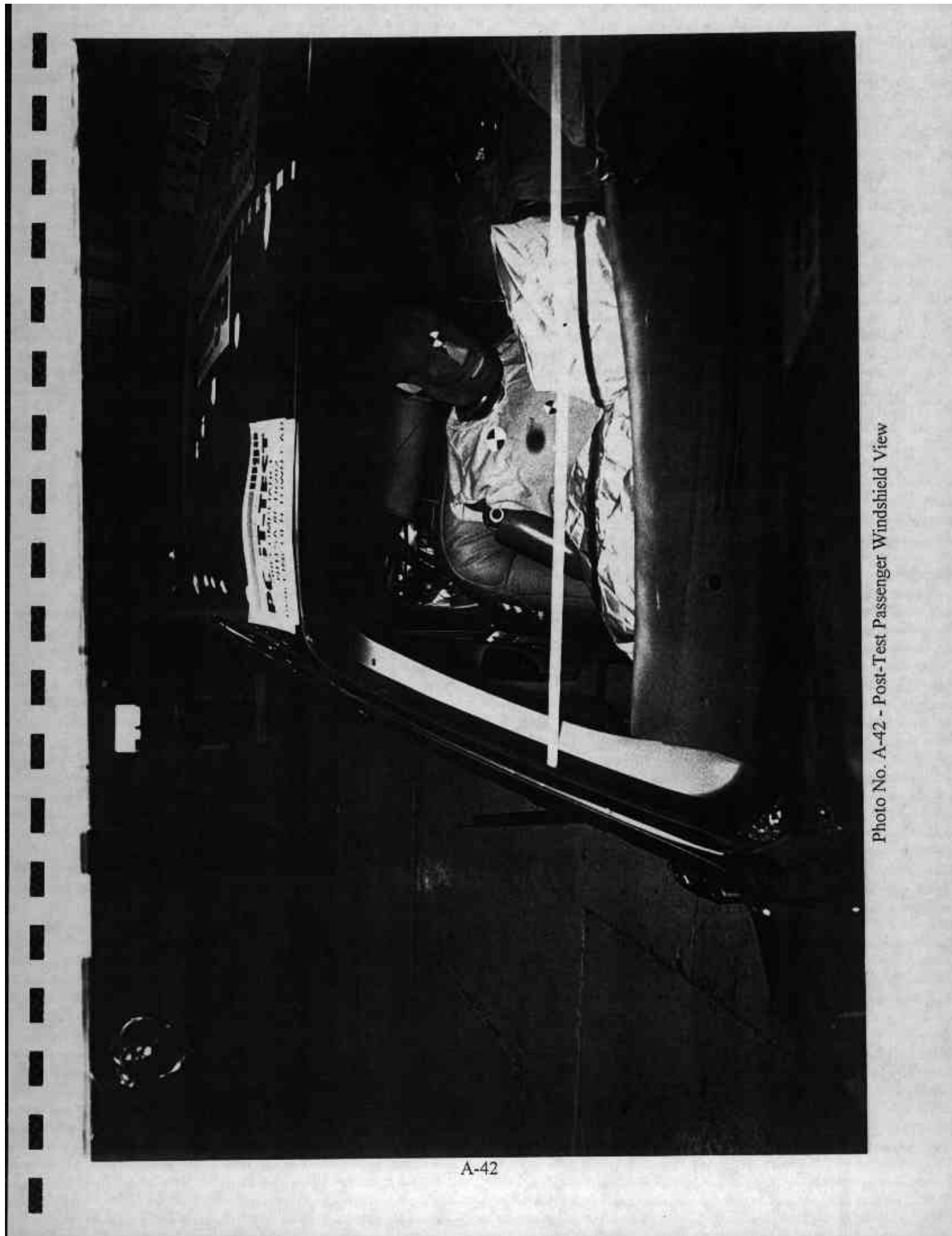


Photo No. A-40 - Post-Test Passenger Dummy Position View (Door Open)

A-40



Photo No. A-41 - Pre-Test Passenger Windshield View



A-42

Photo No. A-42 - Post-Test Passenger Windshield View



Photo No. A-43 - Pre-Test Passenger Seat Position View

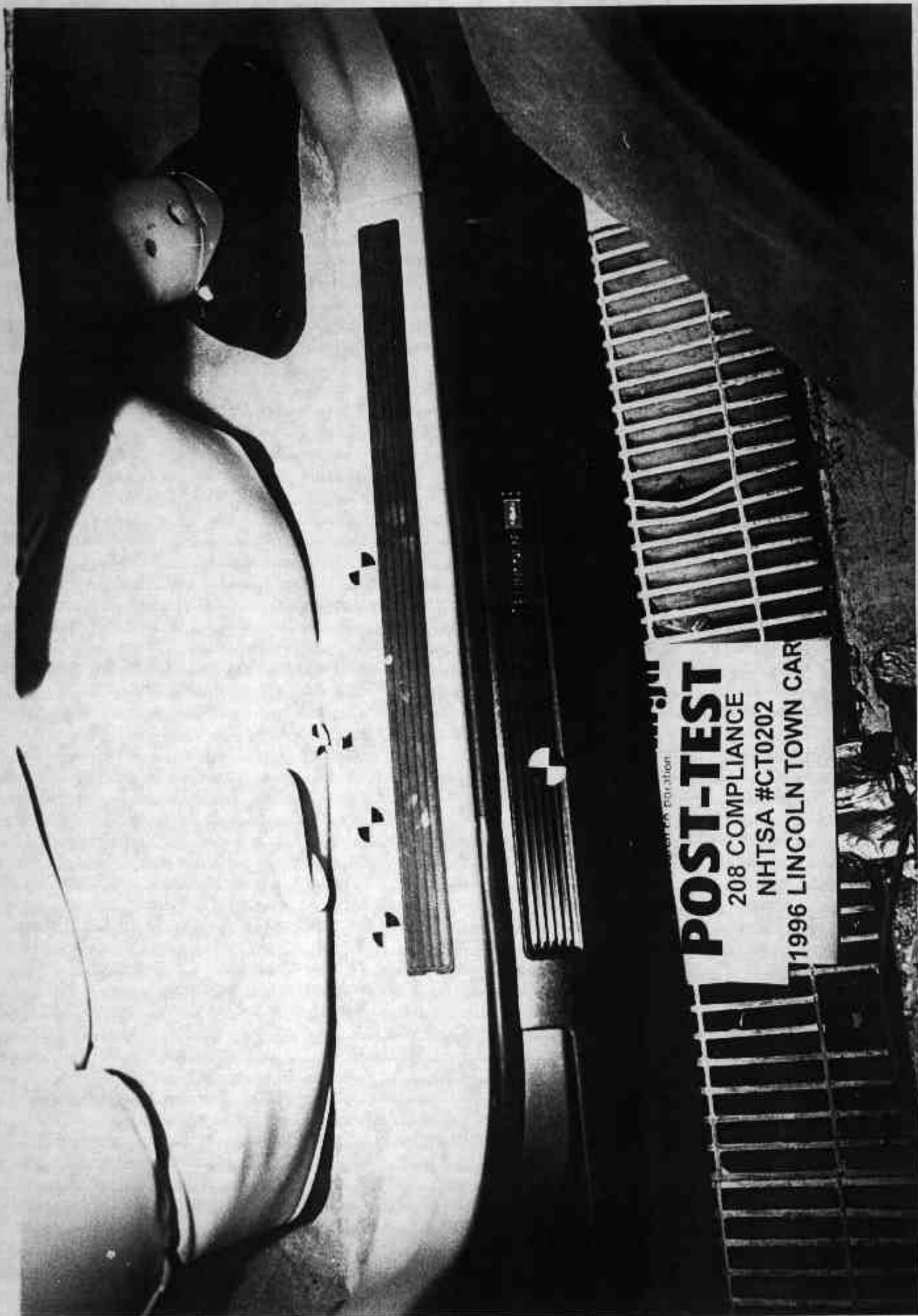


Photo No. A-44 - Post-Test Passenger Seat Position View



Photo No. A-45 - Pre-Test Passenger Dummy Knee Bolster View



Photo No. A-46 - Post-Test Passenger Dummy Knee Bolster View



Photo No. A-47 - Post-Test Passenger Dummy Airbag View



Photo No. A-48 - Post-Test Passenger Dummy Head Contact View - Airbag



Photo No. A-49 - Post-Test Passenger Dummy Head Contact View - Survivor



Photo No. A-50 - Post-Test Passenger Dummy Knee Contact View

DATE: 08/95
FRONT GAWR: 2548LB
REAR GAWR: 1289KG
GVWR: 5320

DATE: 08/95

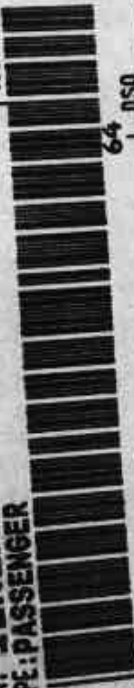
FRONT GAMR: 2548LB

FRONT CHAIR: 2842LB 1289K6
DEAR GARY: 2842LB 1289K6

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL STANDARDS FOR VEHICLE SAFETY, BURPER, AND THEFT PREVENTION STANDARDS. NO OTHER INFORMATION IS SHOWN ABOVE.

IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
VIN: 1LNLM81W0TY601509
TYPE: PASSENGER

F0120
R0050



1P	EXTERIOR PAINT COLORS	INT	TRIN	TAPE	R	S	AX	TR
500V	BLK	HLDS.	B2		6	Y	U	
444	4	CC						

Photo No. A-52 - Vehicle Certification Label

LINCOLN

RECOMMENDED TIRE SIZE and INFLATION PRESSURE (COLD) DIMENSIONS DES PNEUS et PRESSIONS DE GONFLAGE RECOMMANDEES (A FROID)

TIRE SIZE DIMENSIONS DES PNEUS	TIRE PRESSURE PRESSION DES PNEUS	
	FRONT	REAR
P215/70R15 97S*	32 PSI 32lb/po ² 220 kPa	35 PSI 35lb/po ² 240 kPa
P225/60R16 97S*	32 PSI 32lb/po ² 220 kPa	35 PSI 35lb/po ² 240 kPa
T125/80R16	60 PSI 60lb/po ² 415 kPa	60 PSI 60lb/po ² 415 kPa
P225/75R15 102S*	35 PSI 35lb/po ² 240 kPa	35 PSI 35lb/po ² 240 kPa

*MUST BE REPLACED WITH AN EQUIVALENT TYPE SPEED RATED TIRE. *NE REMPLACER QUE PAR UN PNEU DONT L'INDICE DE VITESSE EST LE MEME.

TOTAL LOAD = OCCUPANTS PLUS LUGGAGE CHARGE GLOBALE = OCCUPANTS PLUS BAGAGES

MAXIMUM LOAD CHARGE MAXIMALE	OCCUPANTS OCCUPANTS	DISTRIBUTION RÉPARTITION	
		FRONT	REAR
1100 lb/499 kg	6	3	3

FOR SUSTAINED HIGH SPEED, TRAILER TOWING, RECREATIONAL ACCESSORIES
AND TEMPORAL SPARE USAGE - SEE OWNER GUIDE.

HAUTES VITESSES SOUTENUES, REMORQUES, ACCESSOIRES DE PLAISANCE
ET PNEU DE SECOURS PROVISOIRE: CONSULTER LE GUIDE DU PROPRIETAIRE. ▽ F5VC-1532-AB



Photo No. A-54 - Rollover 90°

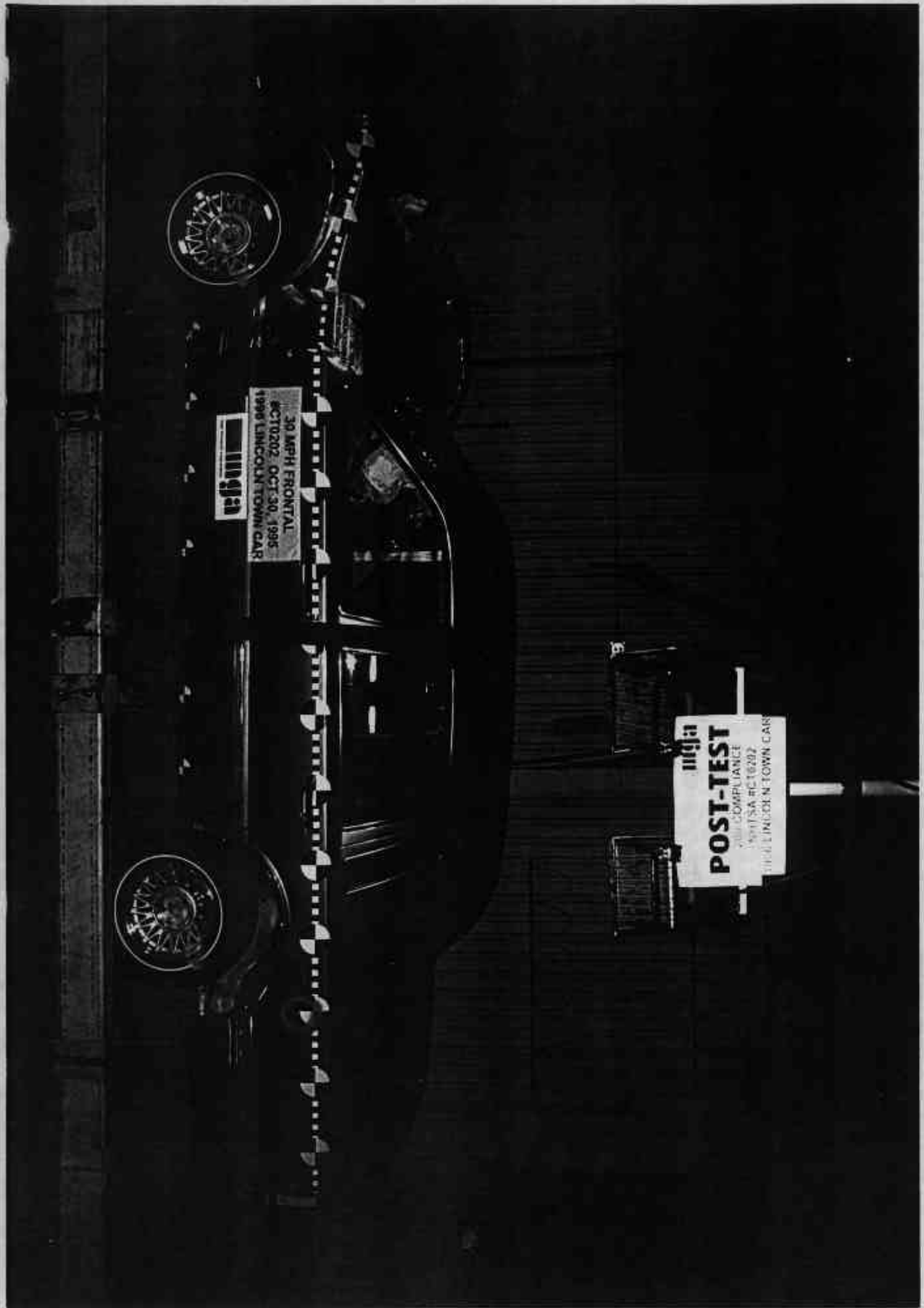


Photo No. A-55 - Rollover 180°



Photo No. A-56 - Rollover 270°



Photo No. A-57 - Rollover 360°

APPENDIX B
DATA PLOTS

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* No Valid DataCollected

TEST DATE: 10-30-1995

TEST: 30 MPH FRONTAL BARRIER IMPACT

COMPONENT: 1996 LINCOLN TOWN CAR CT0202 Speed: 29.47 MPH 47.4 KPH

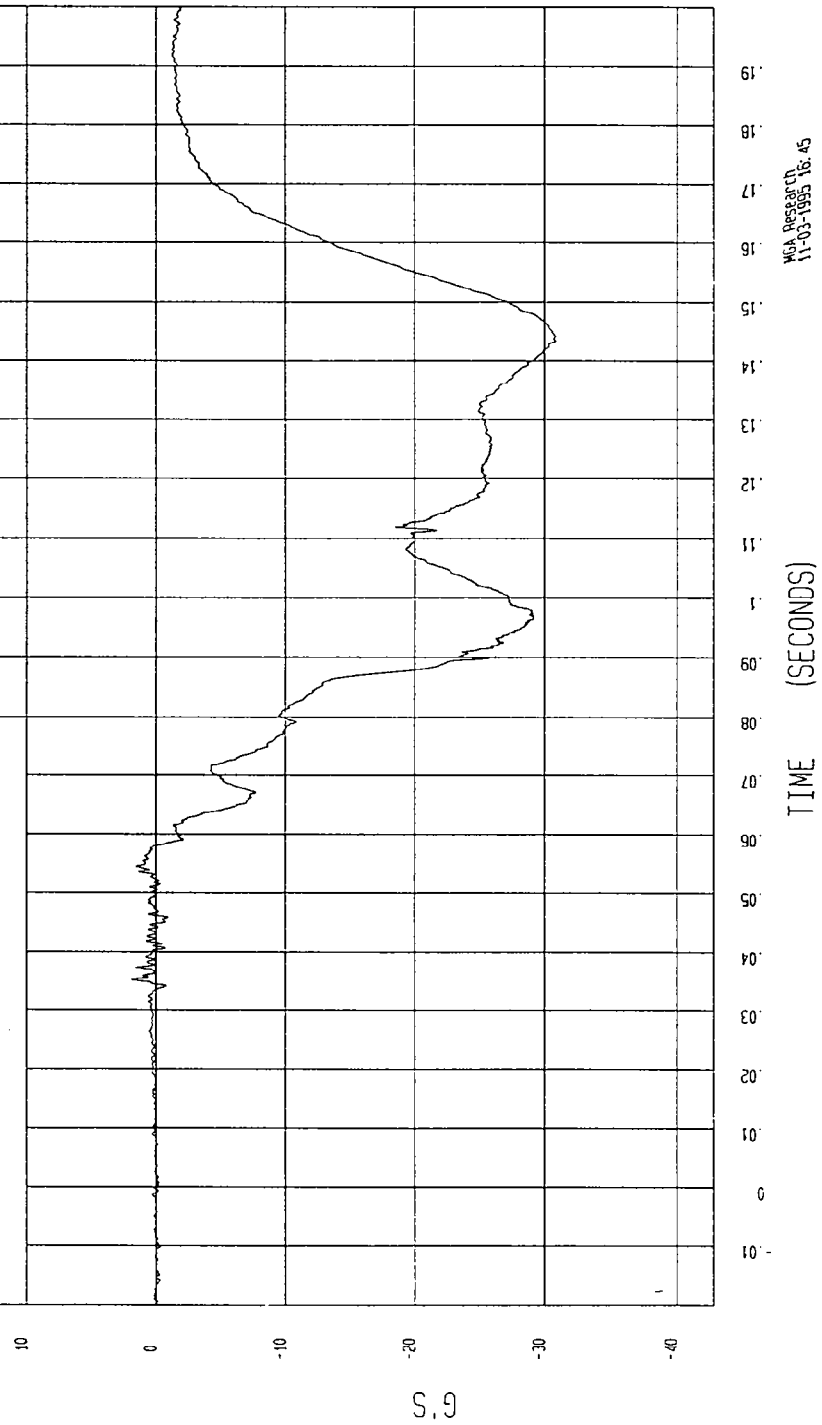
COMPONENT: 1996 LINCOLN TOWN CAR CT0202

YMAX= 1.863406 G'S at 35. msec

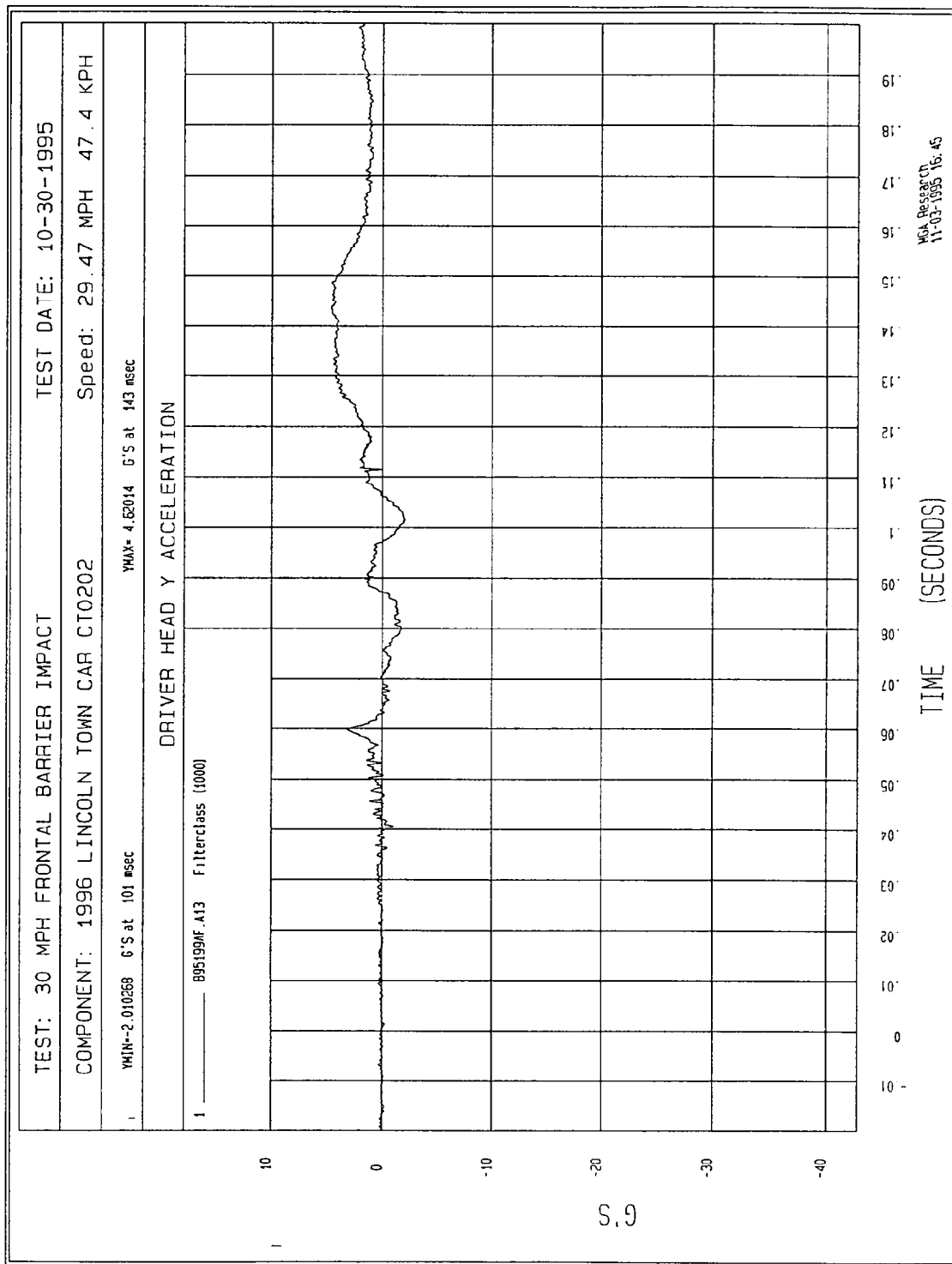
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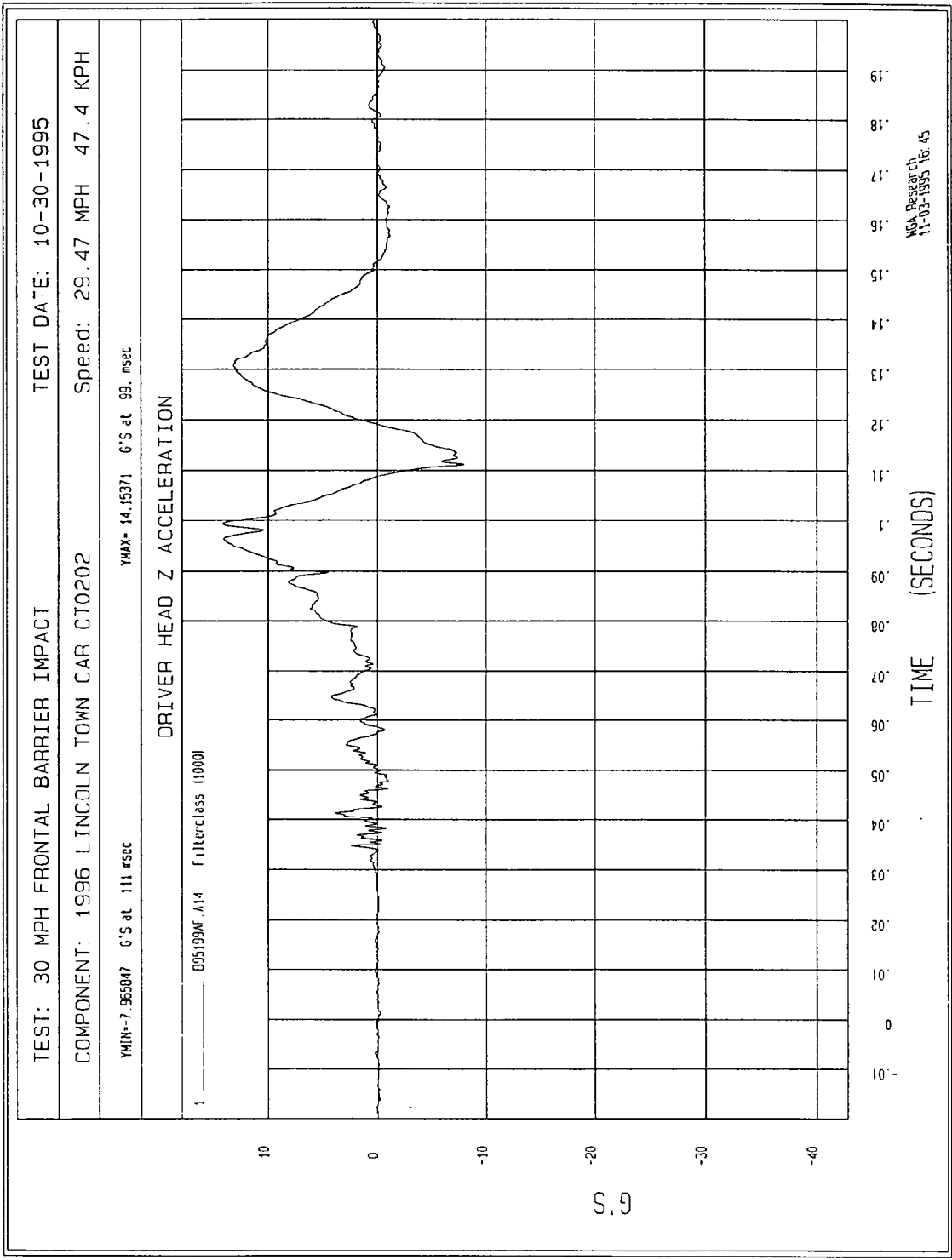
DRIVER HEAD X ACCELERATION

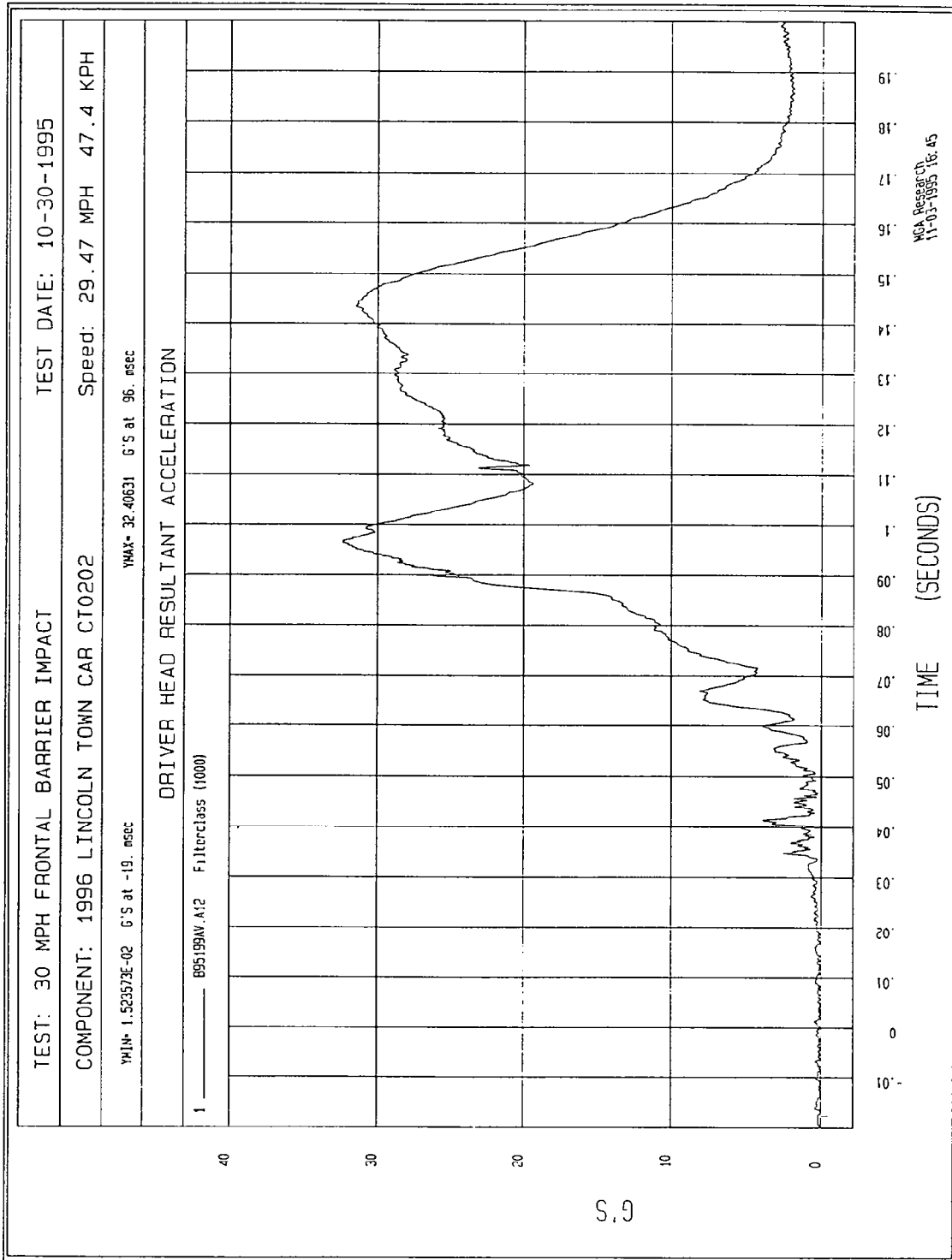
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MGA Research
11-03-1995 16:45







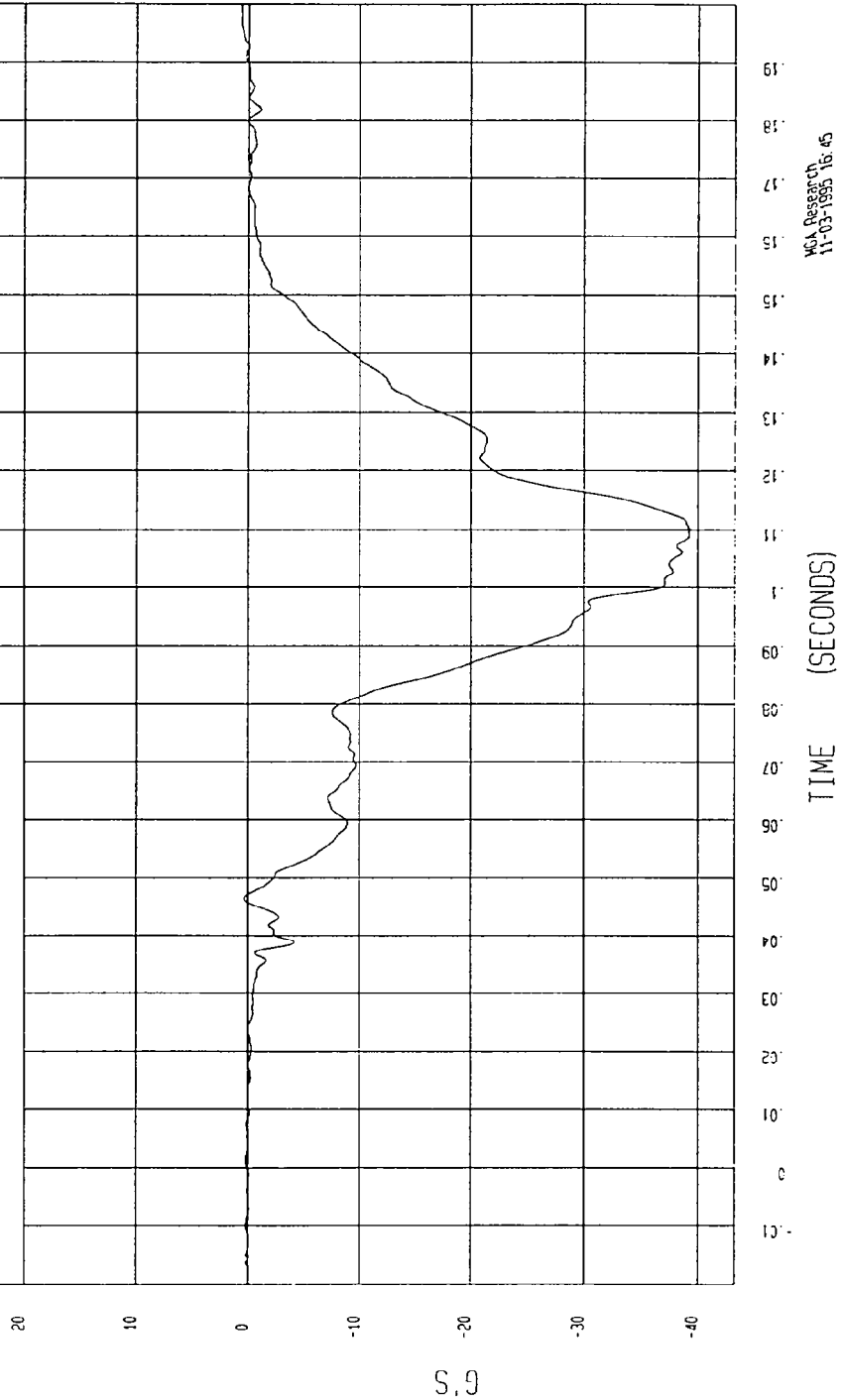
TEST DATE: 10-30-1995

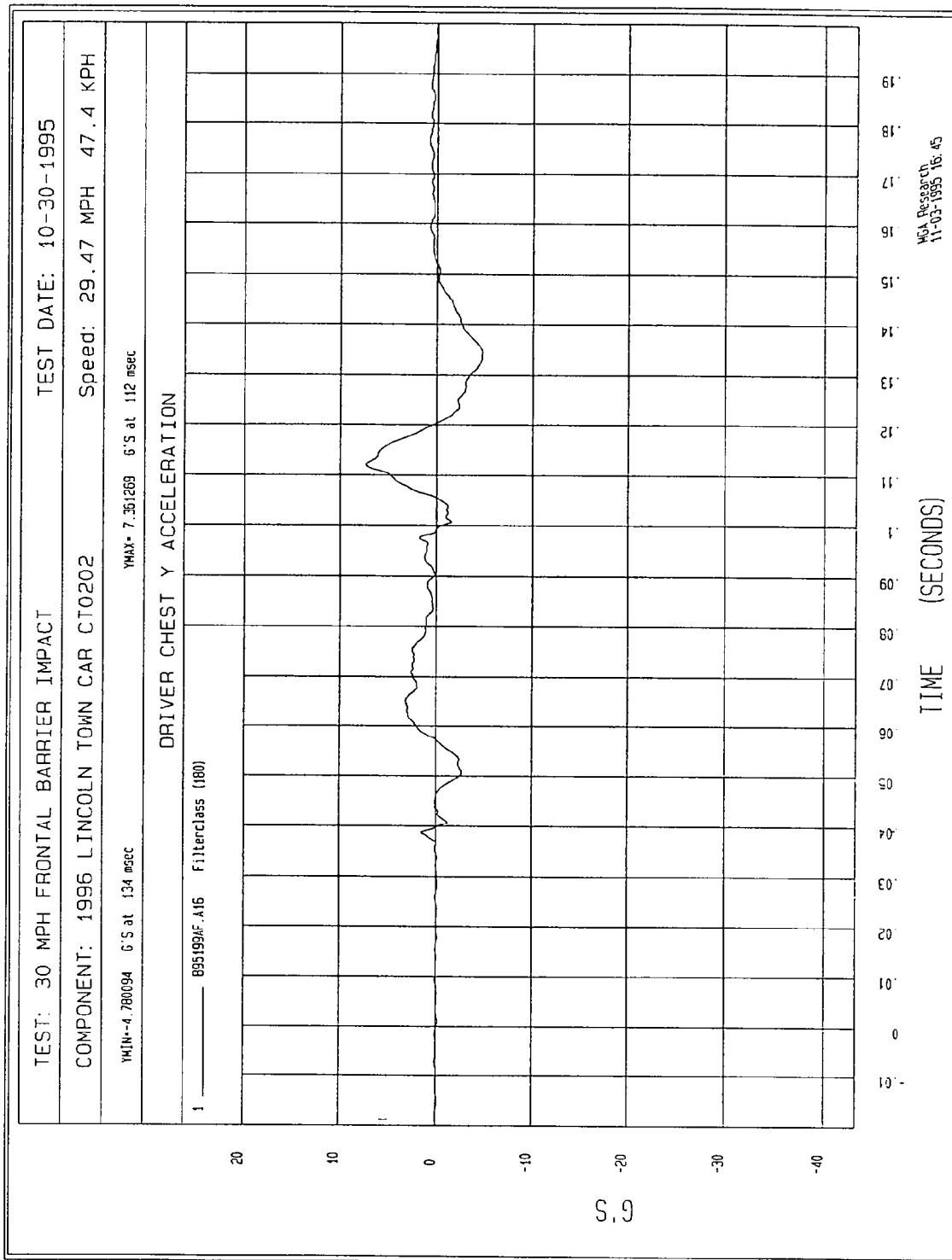
COMPONENT: 1996 LINCOLN TOWN CAR CT0202

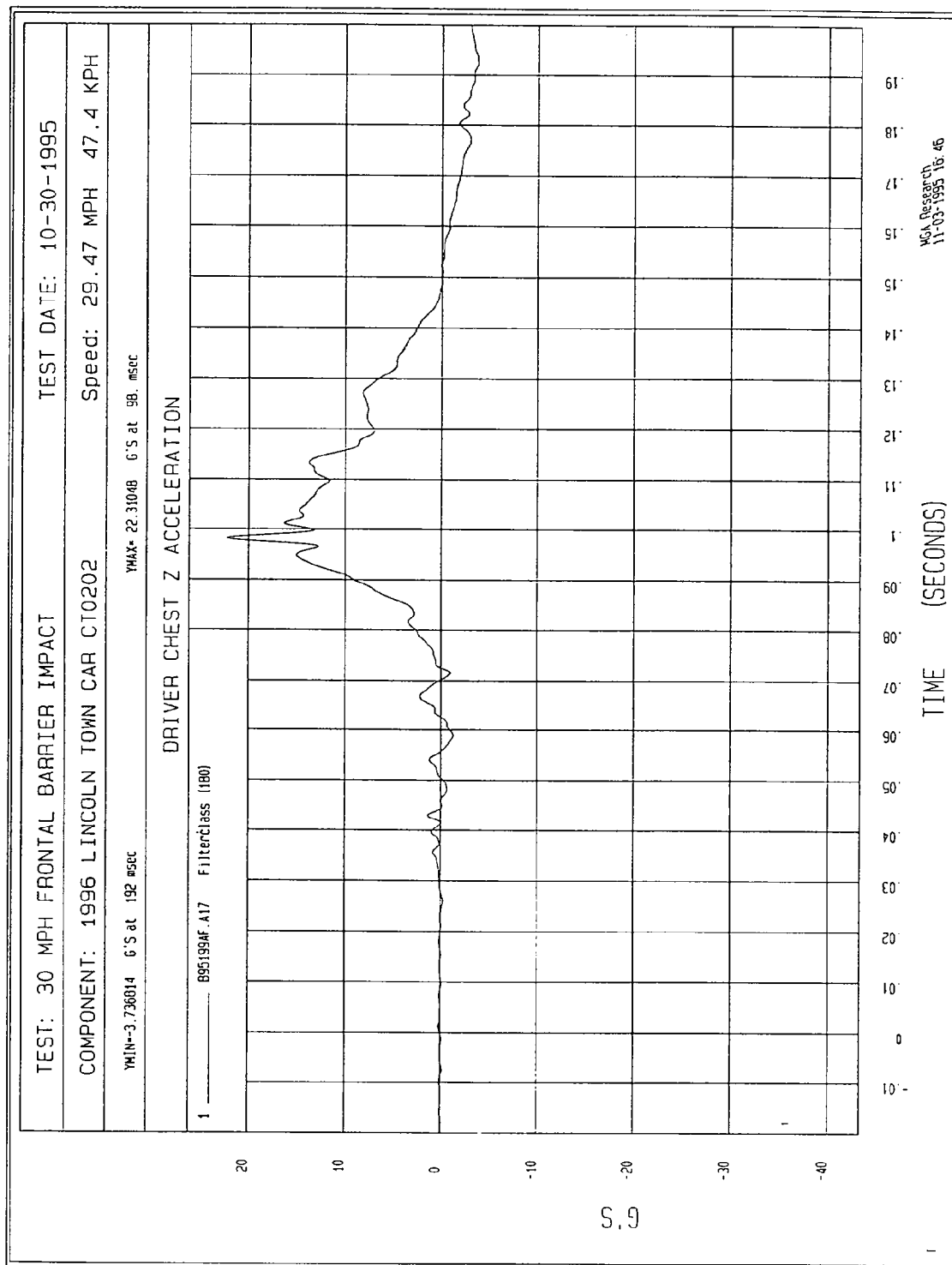
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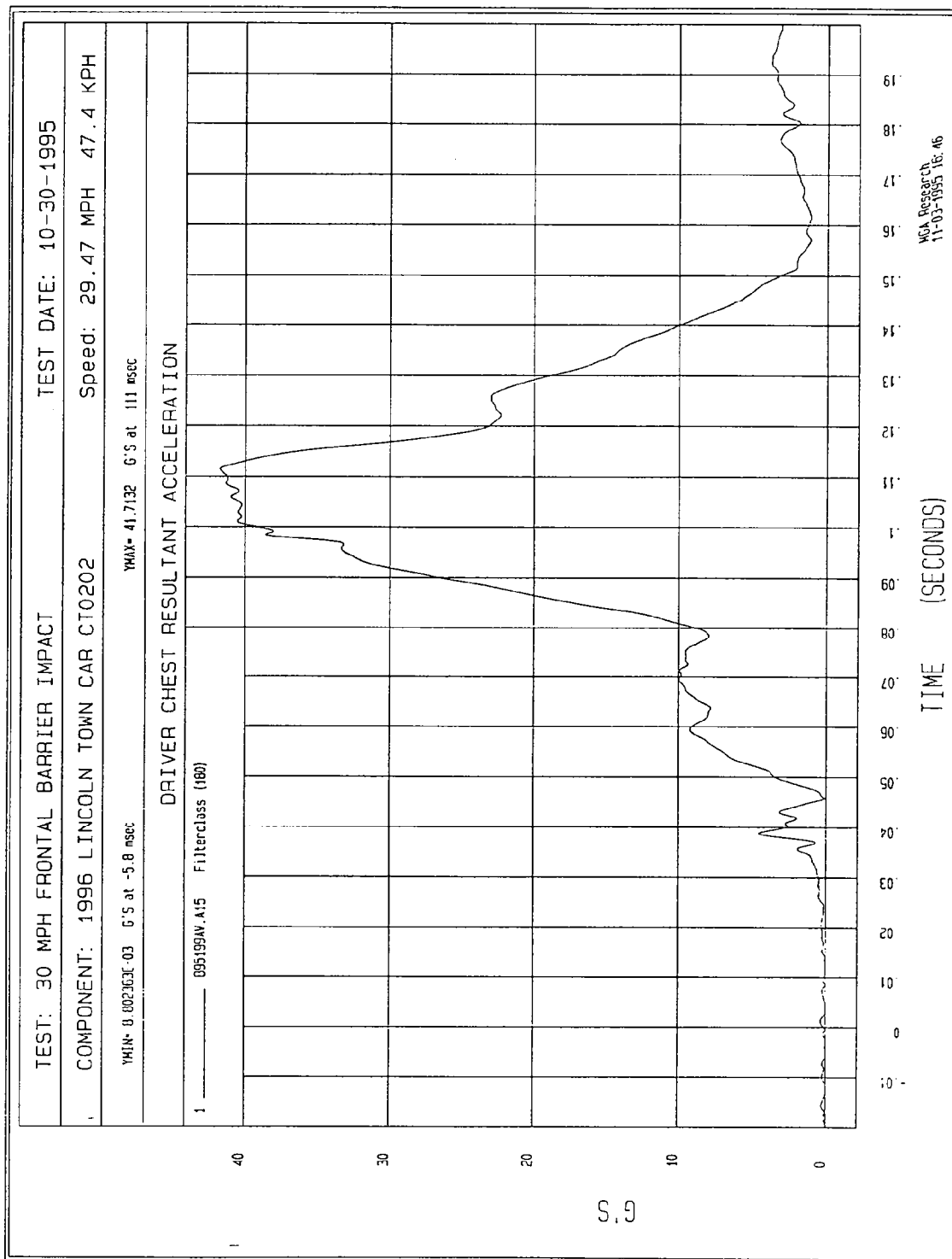
DRIVER CHEST X ACCELERATION

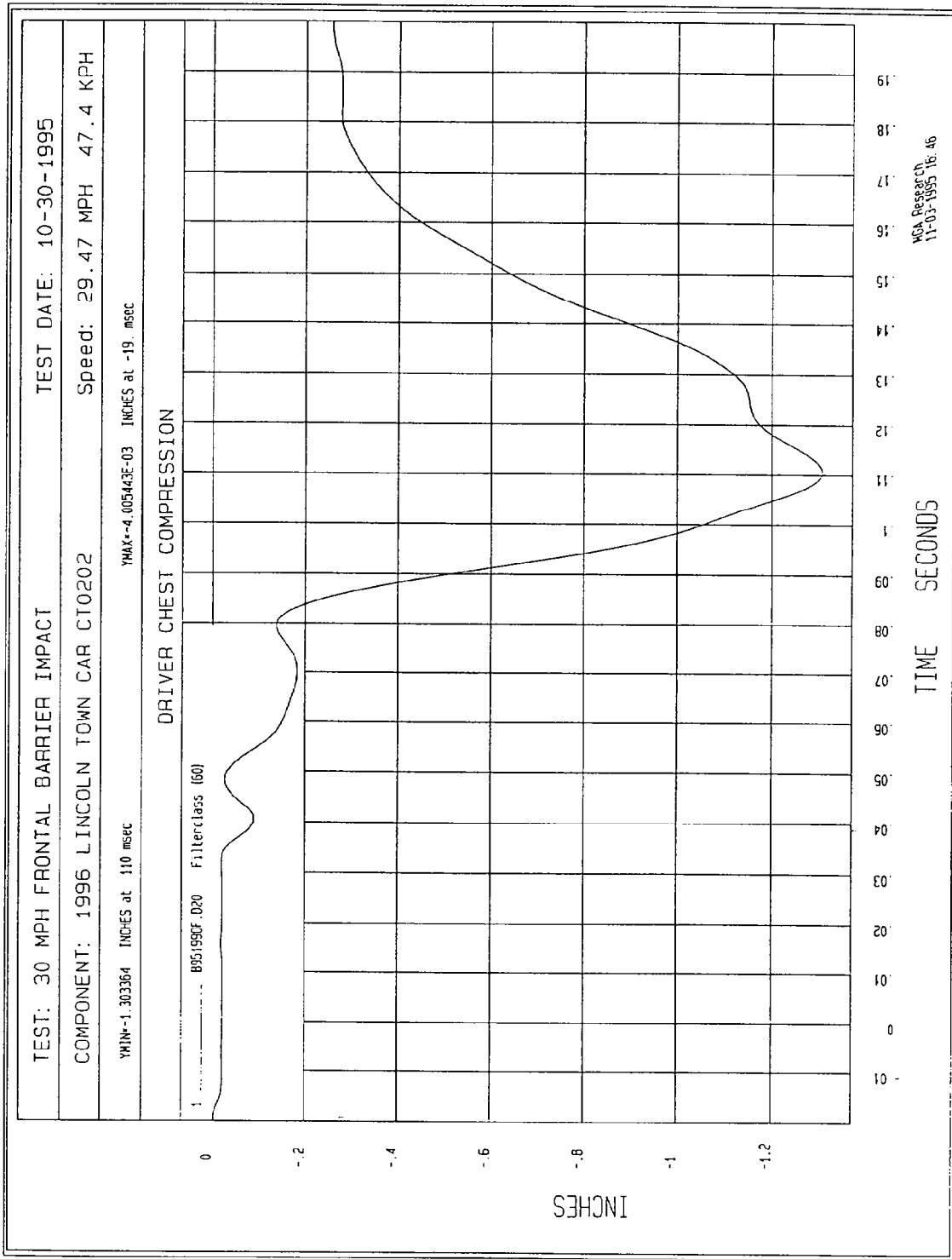
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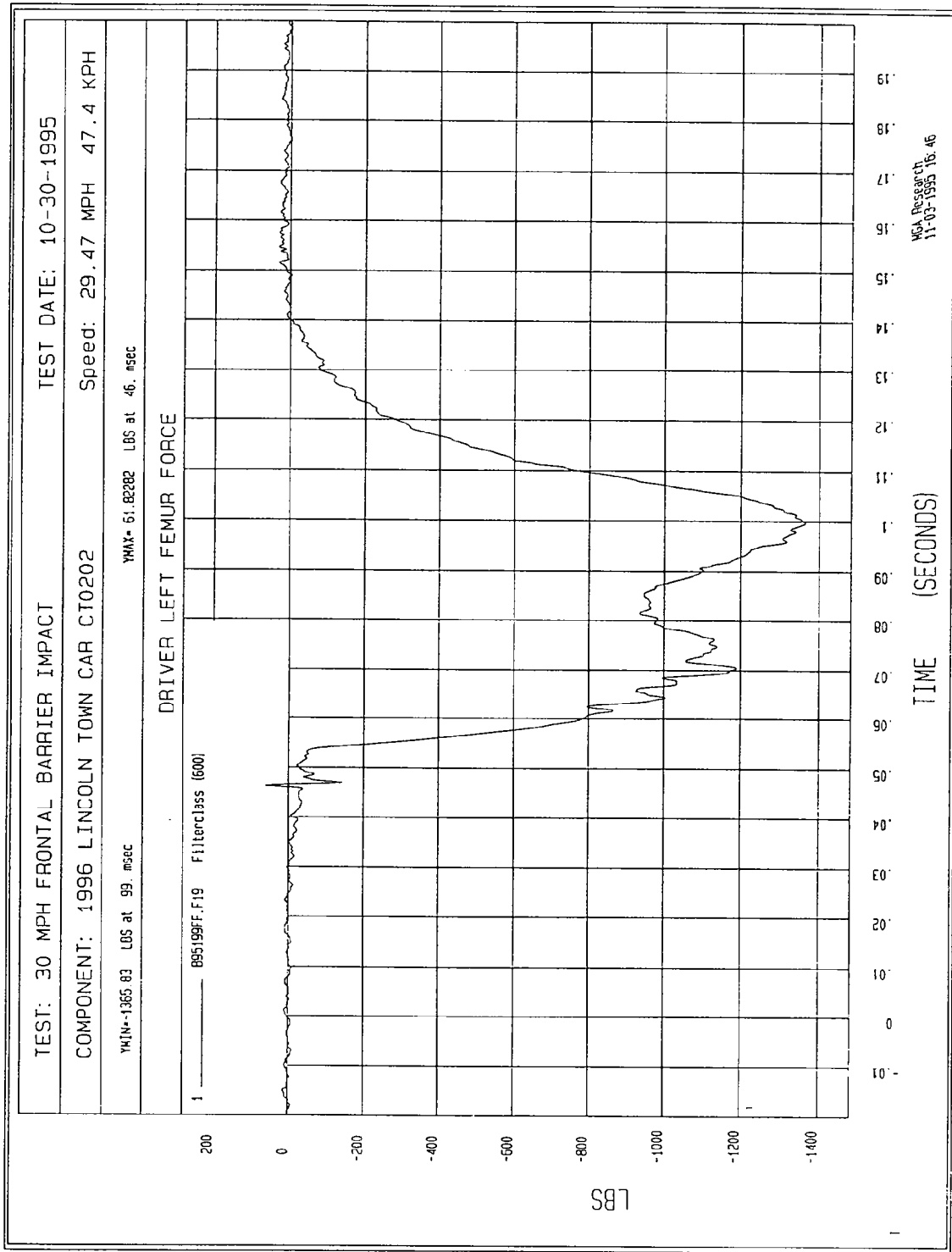


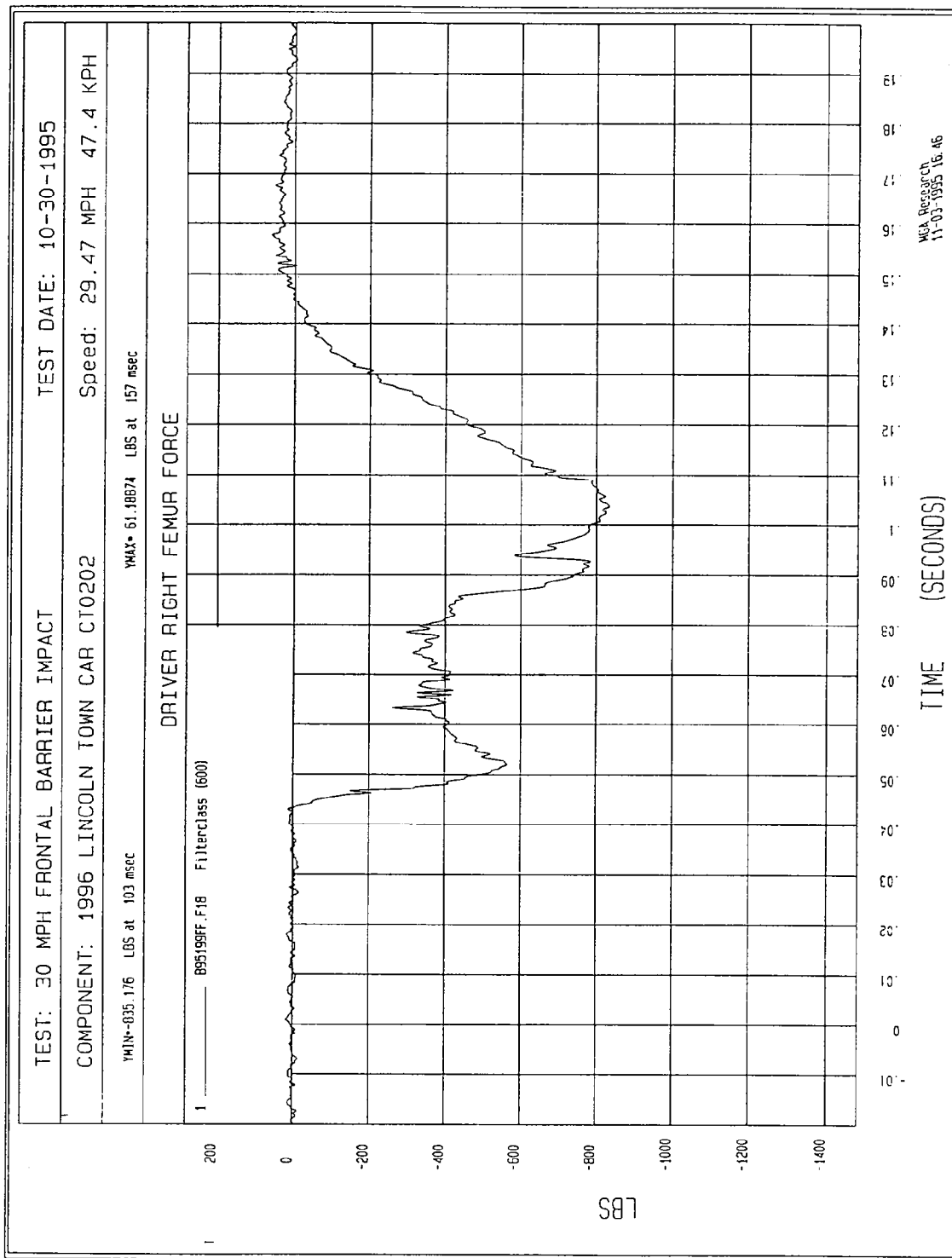


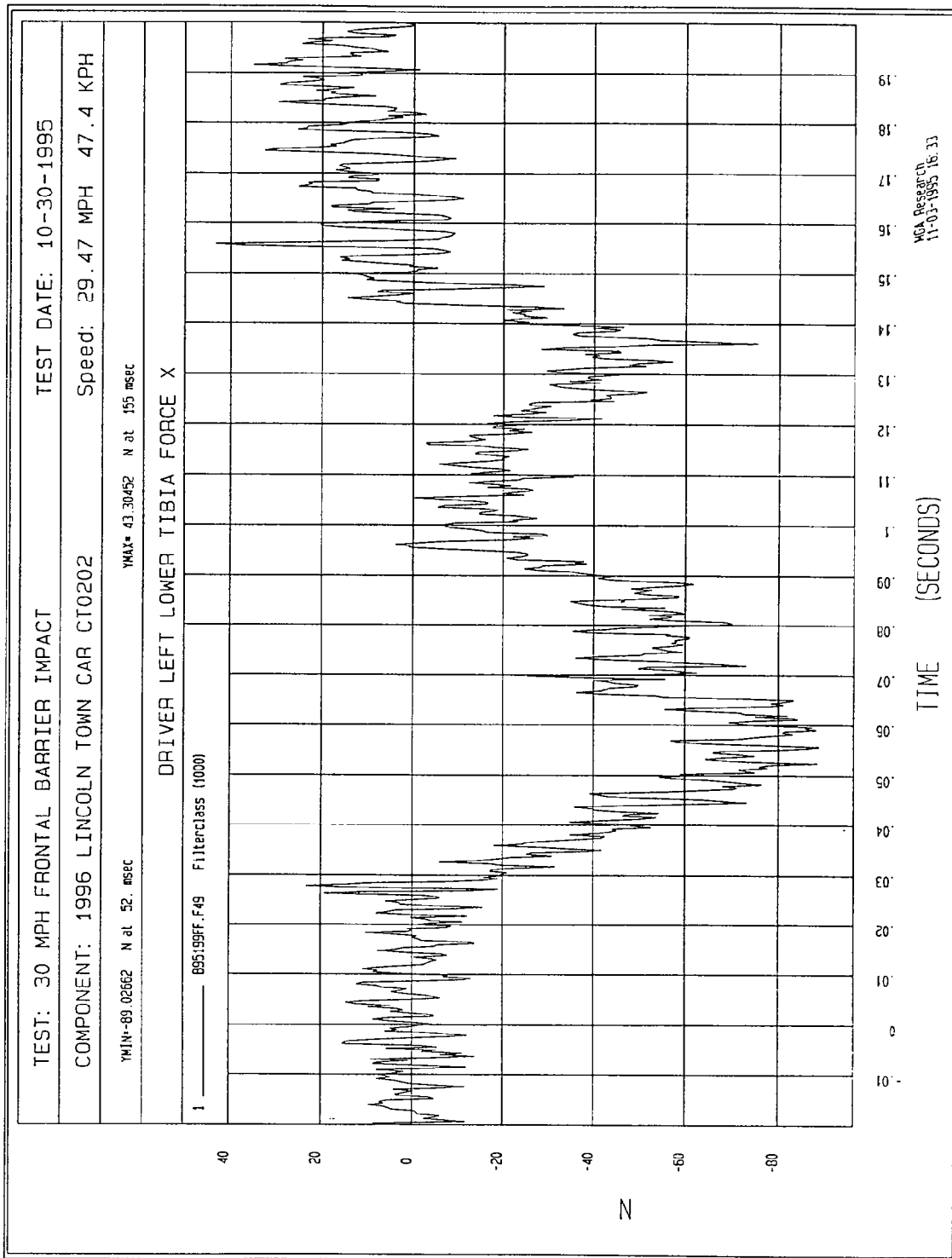


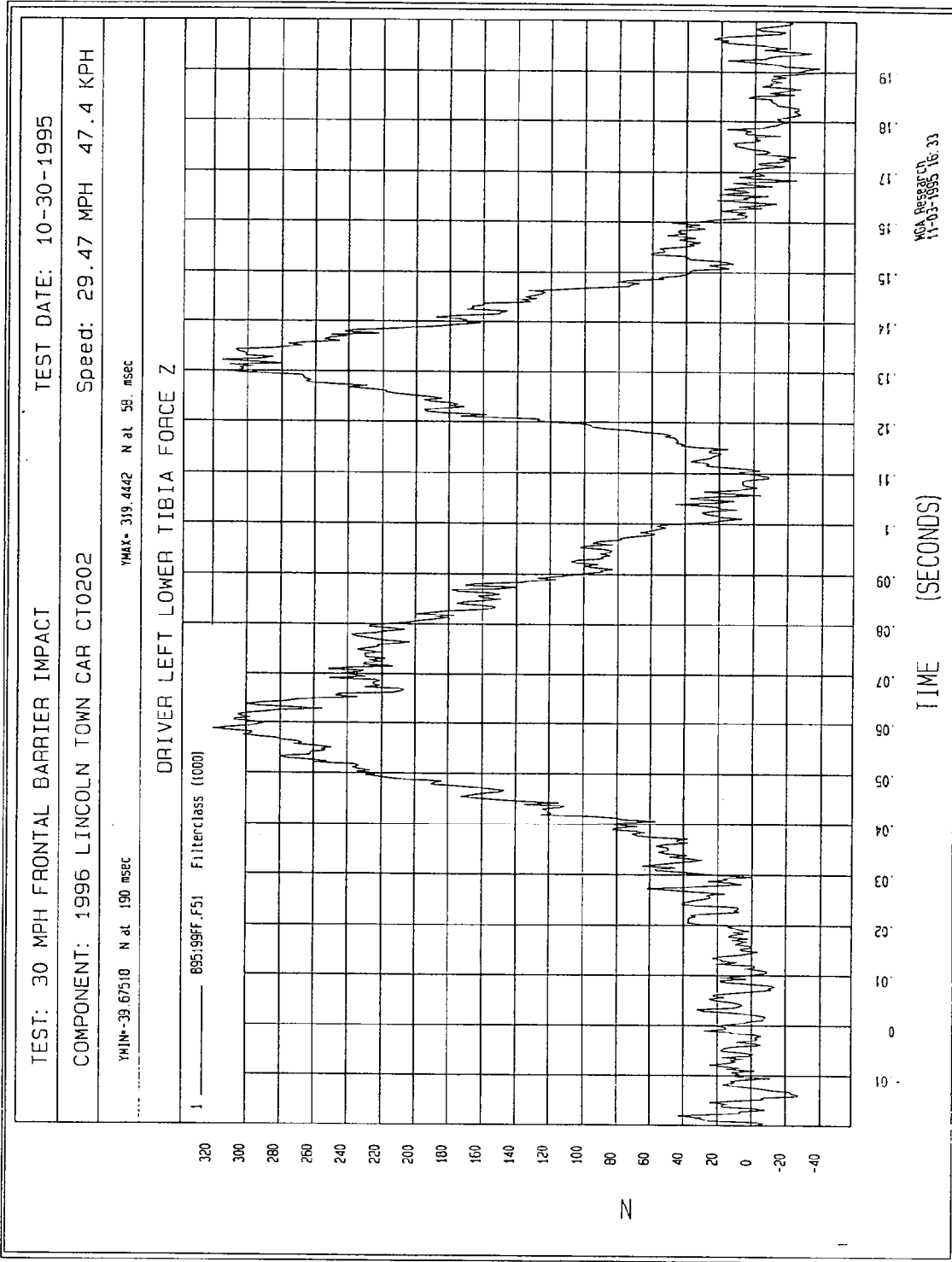


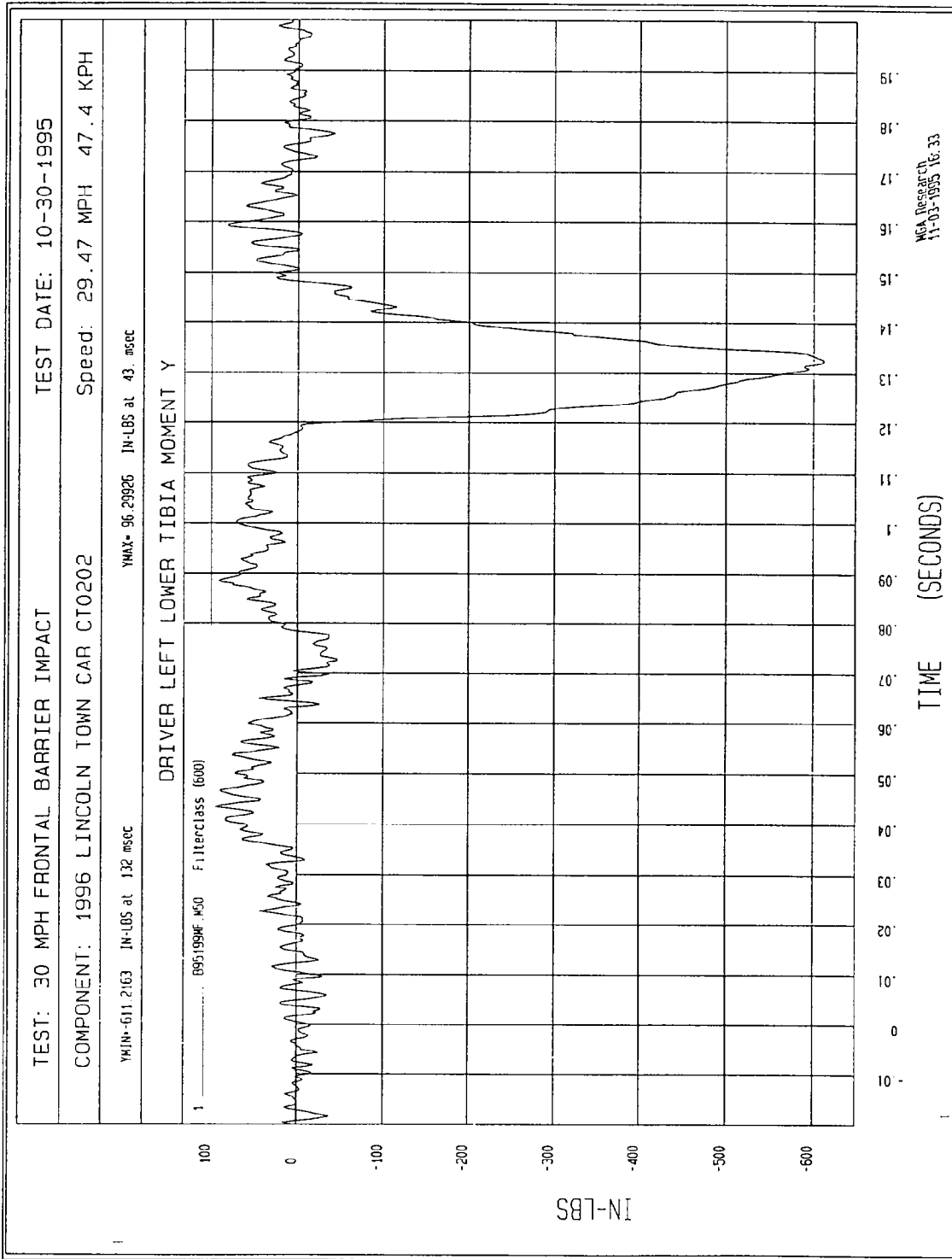


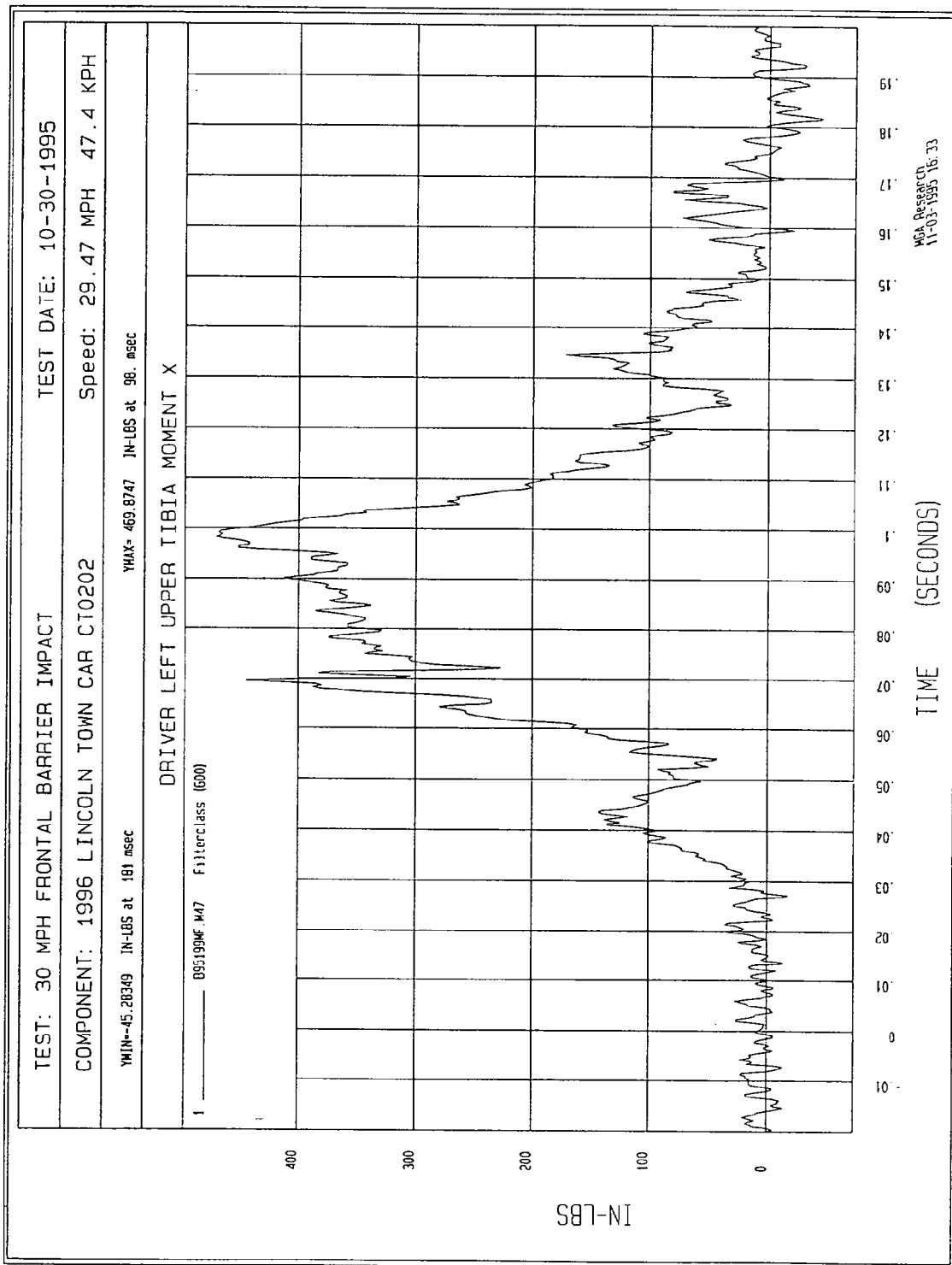


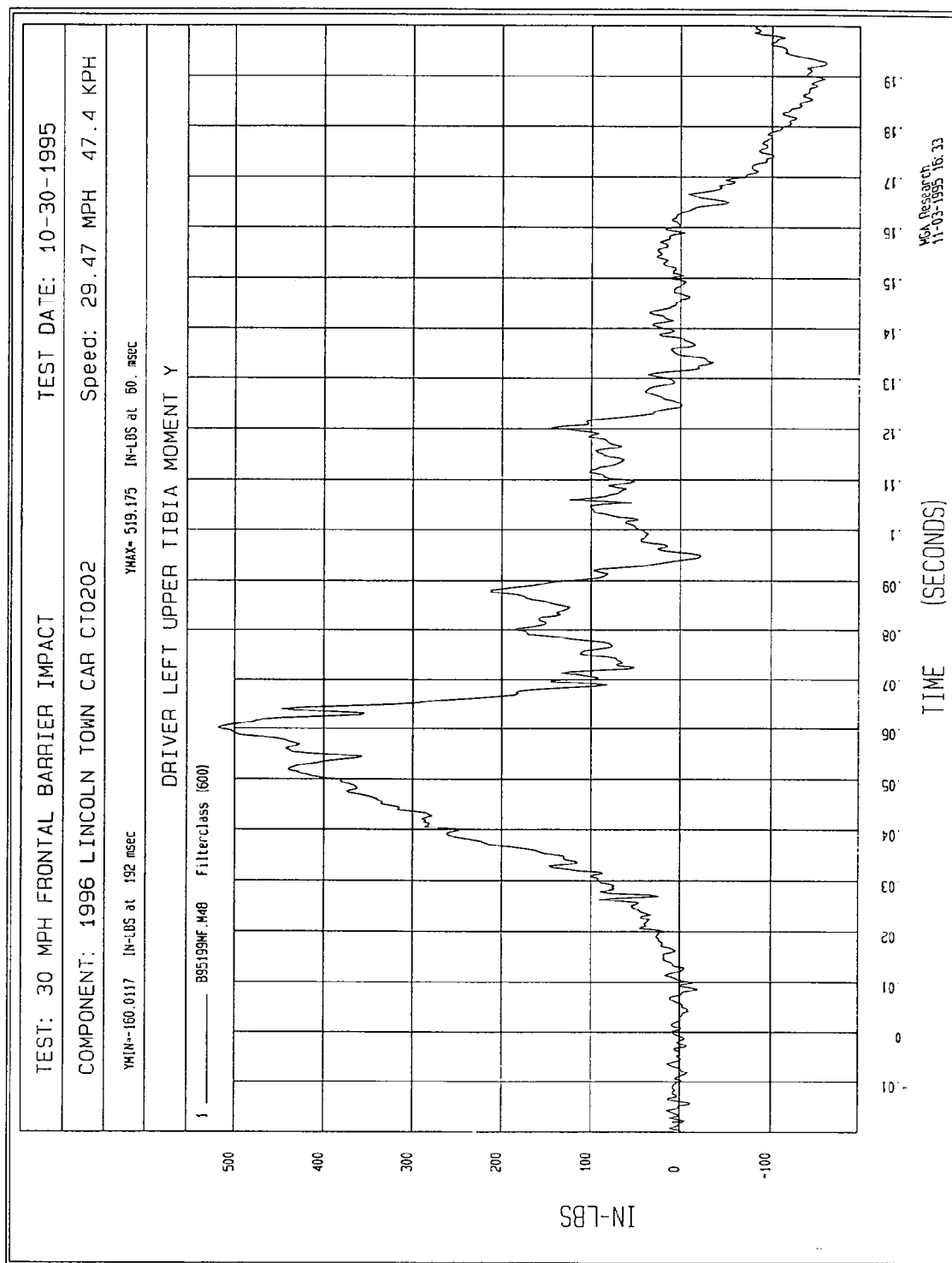


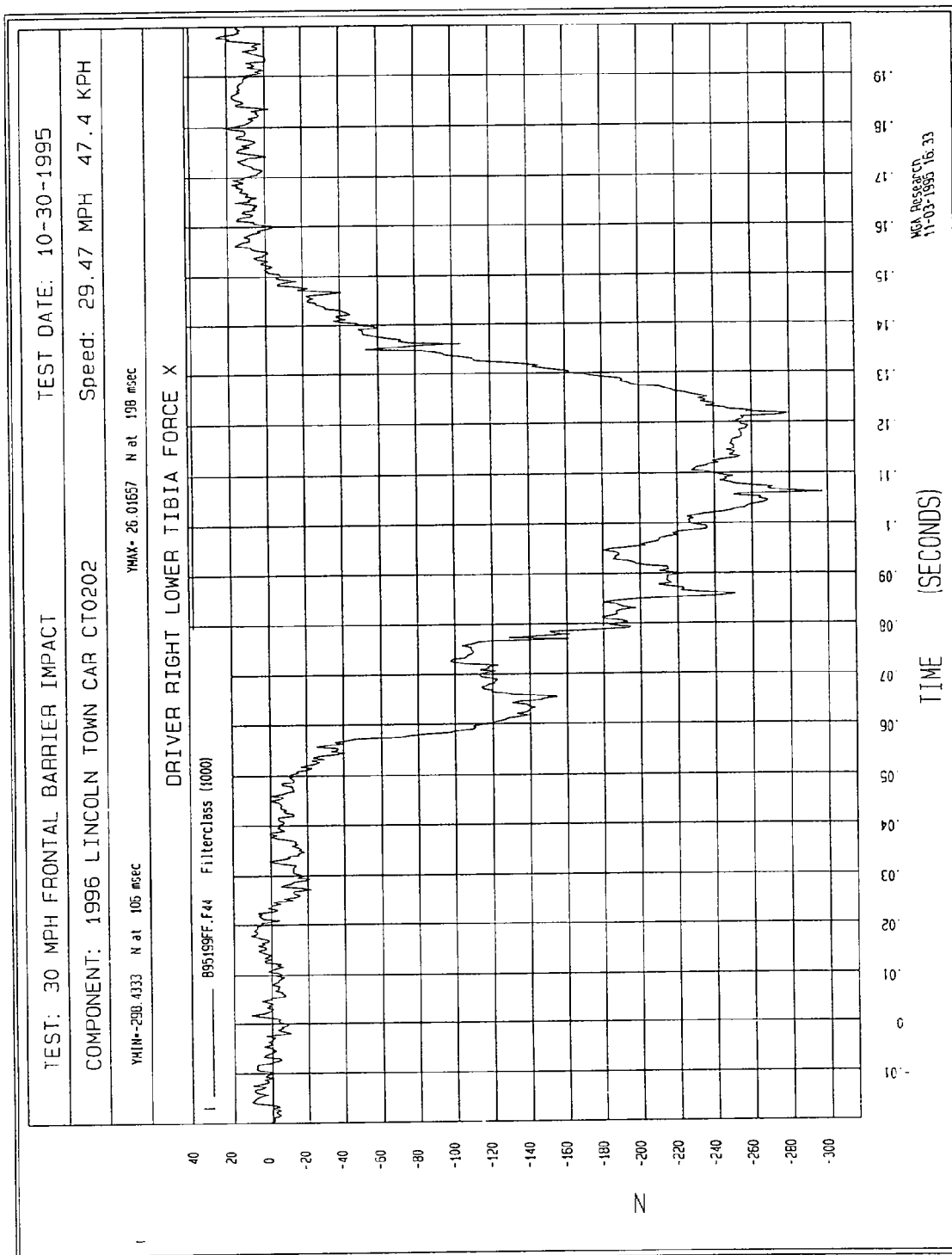


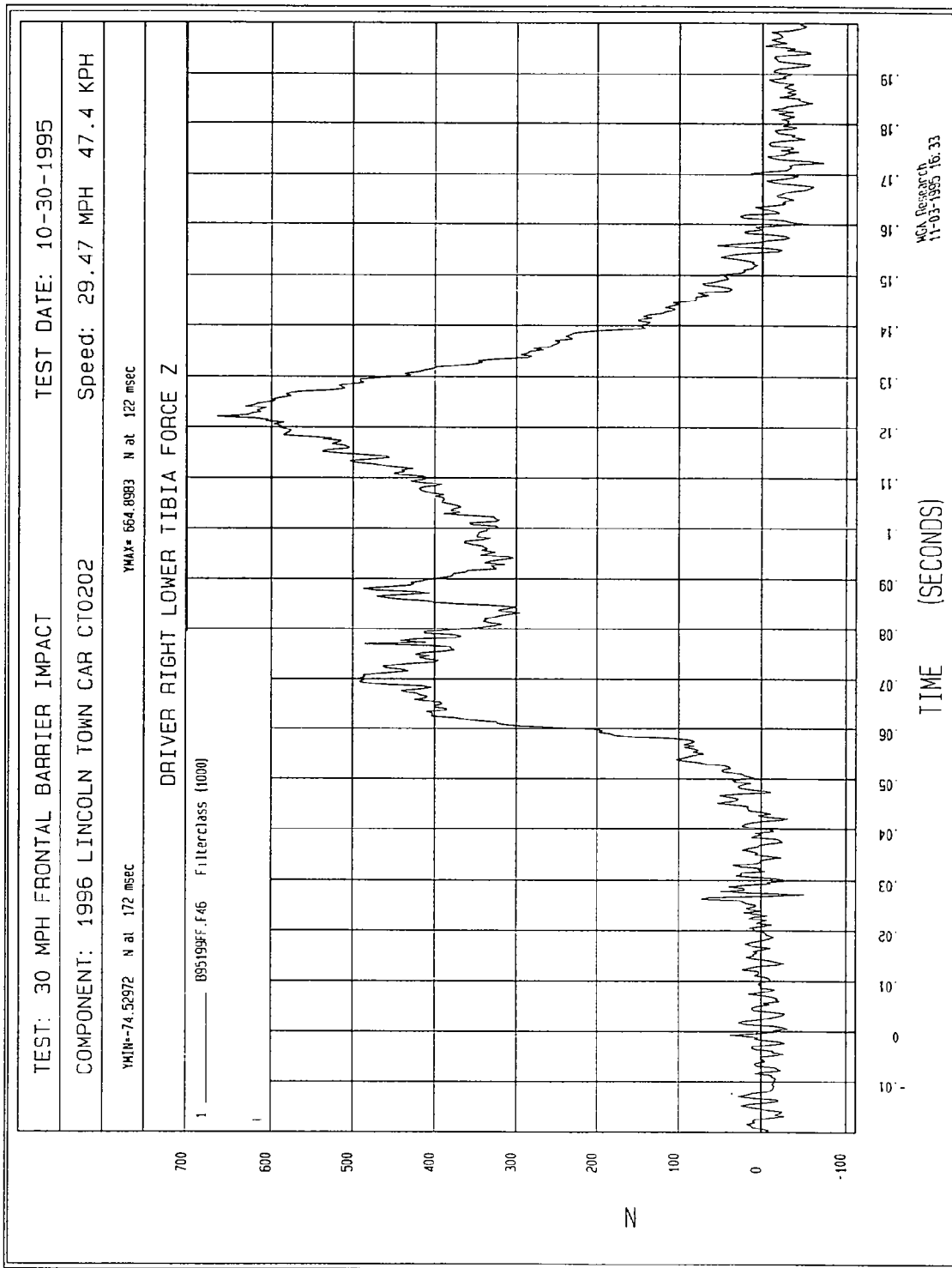


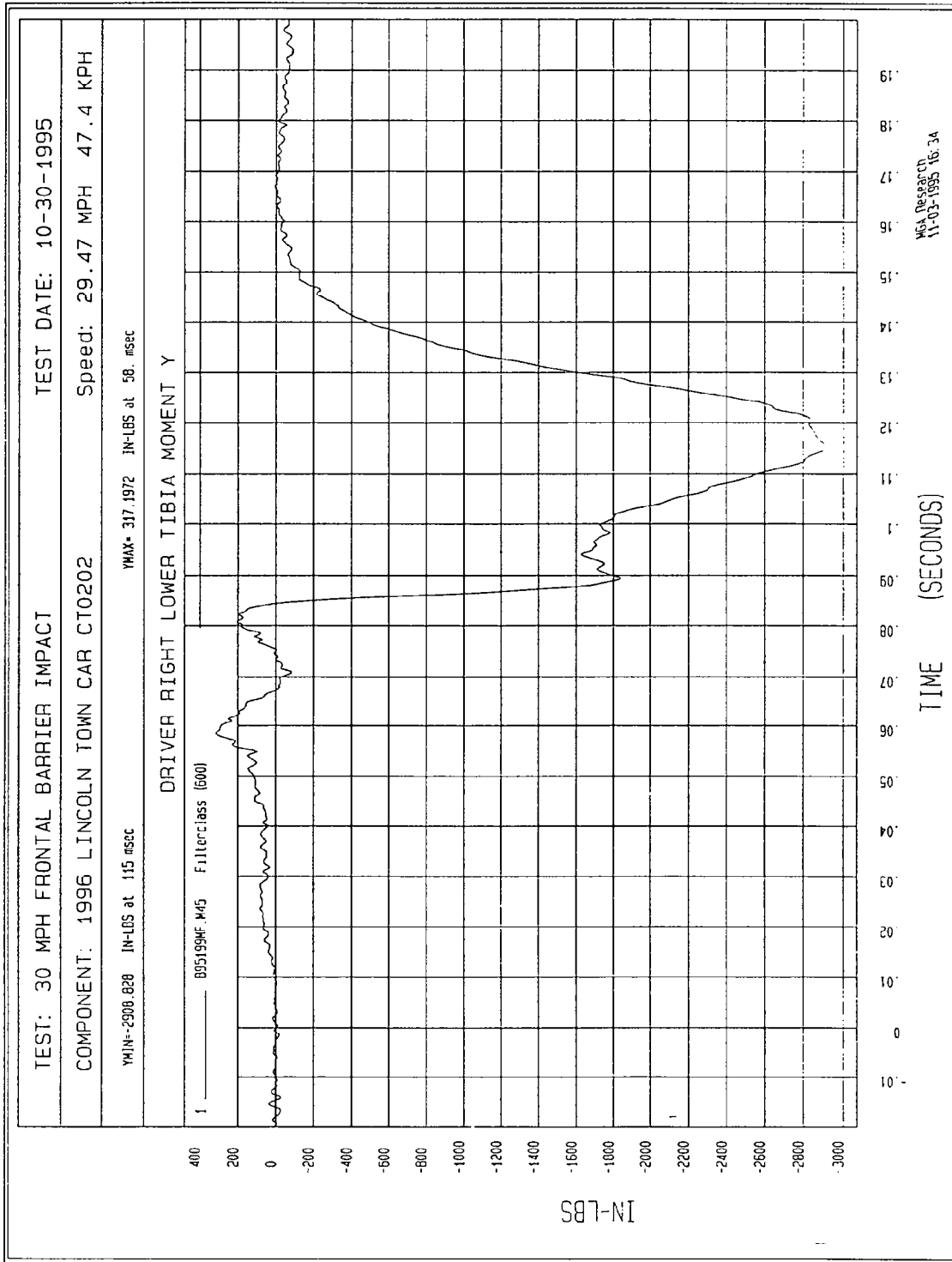


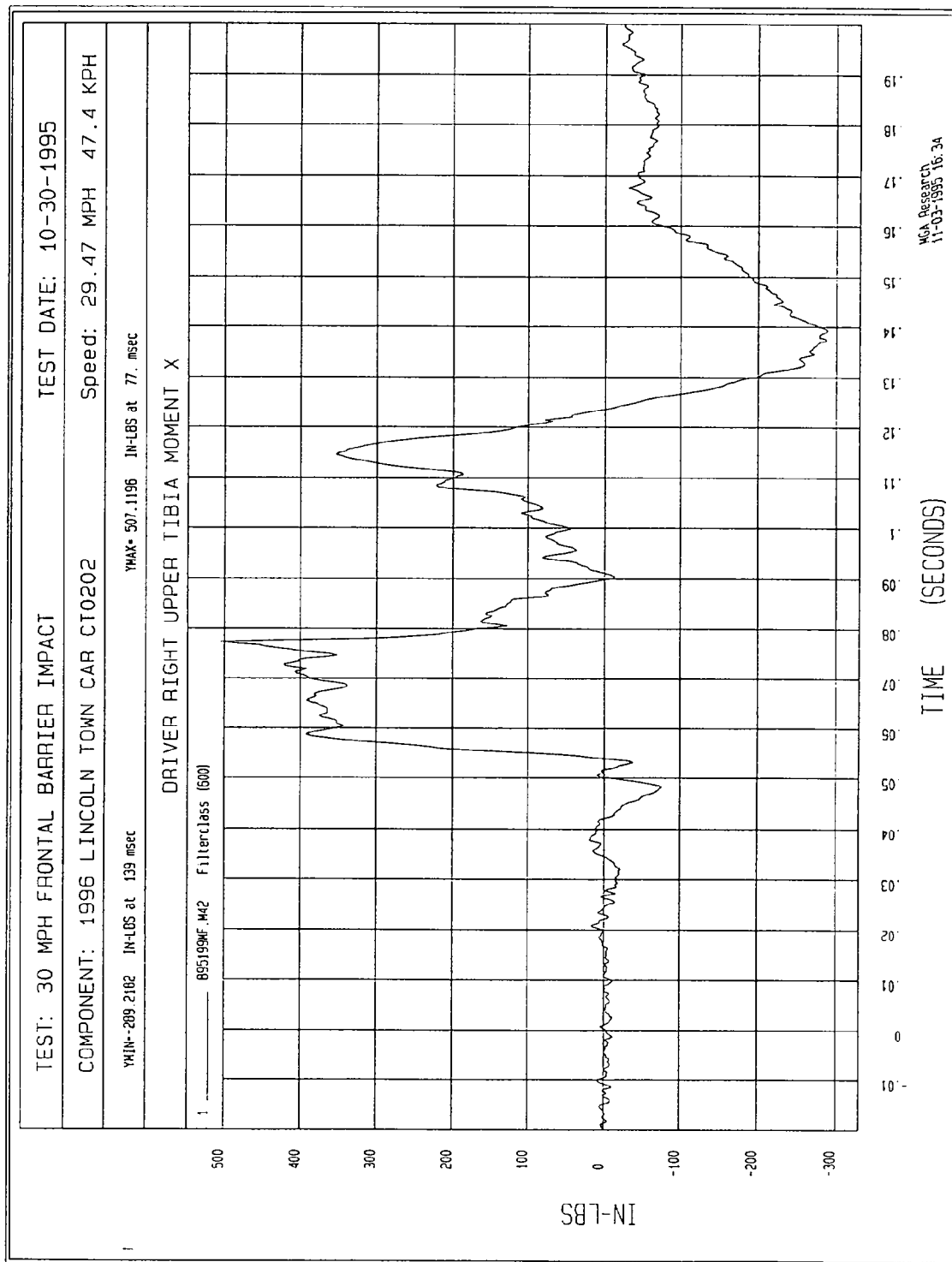


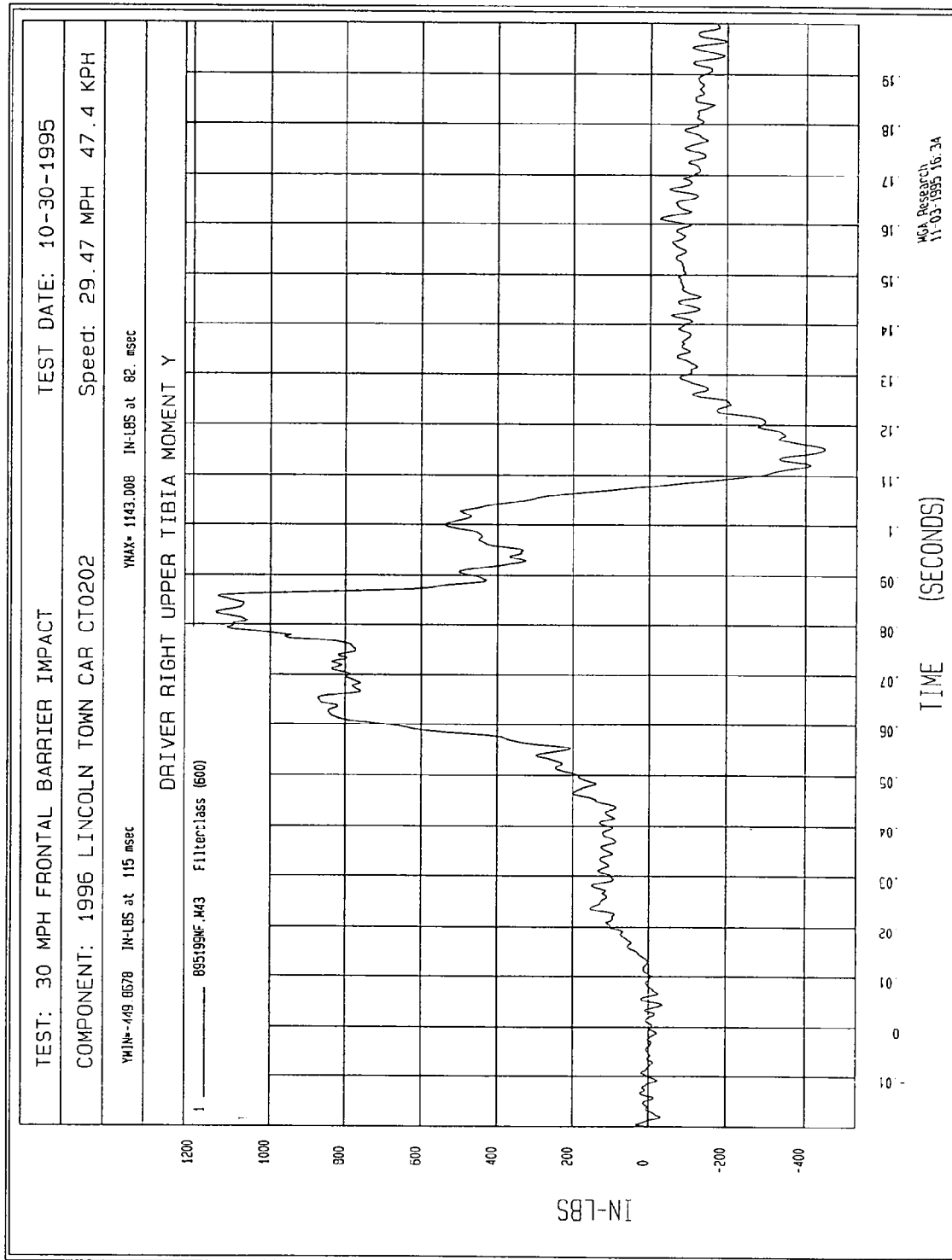


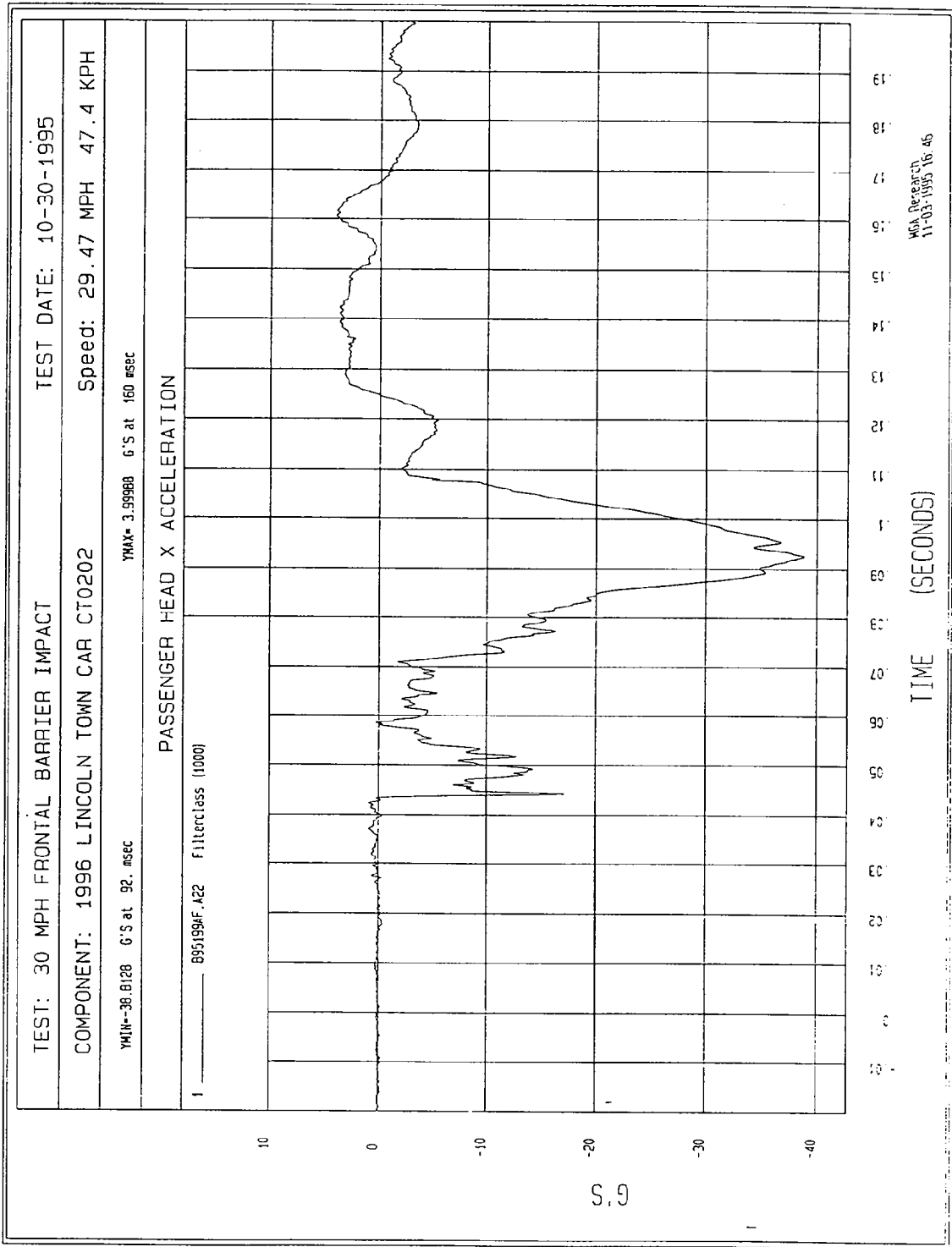


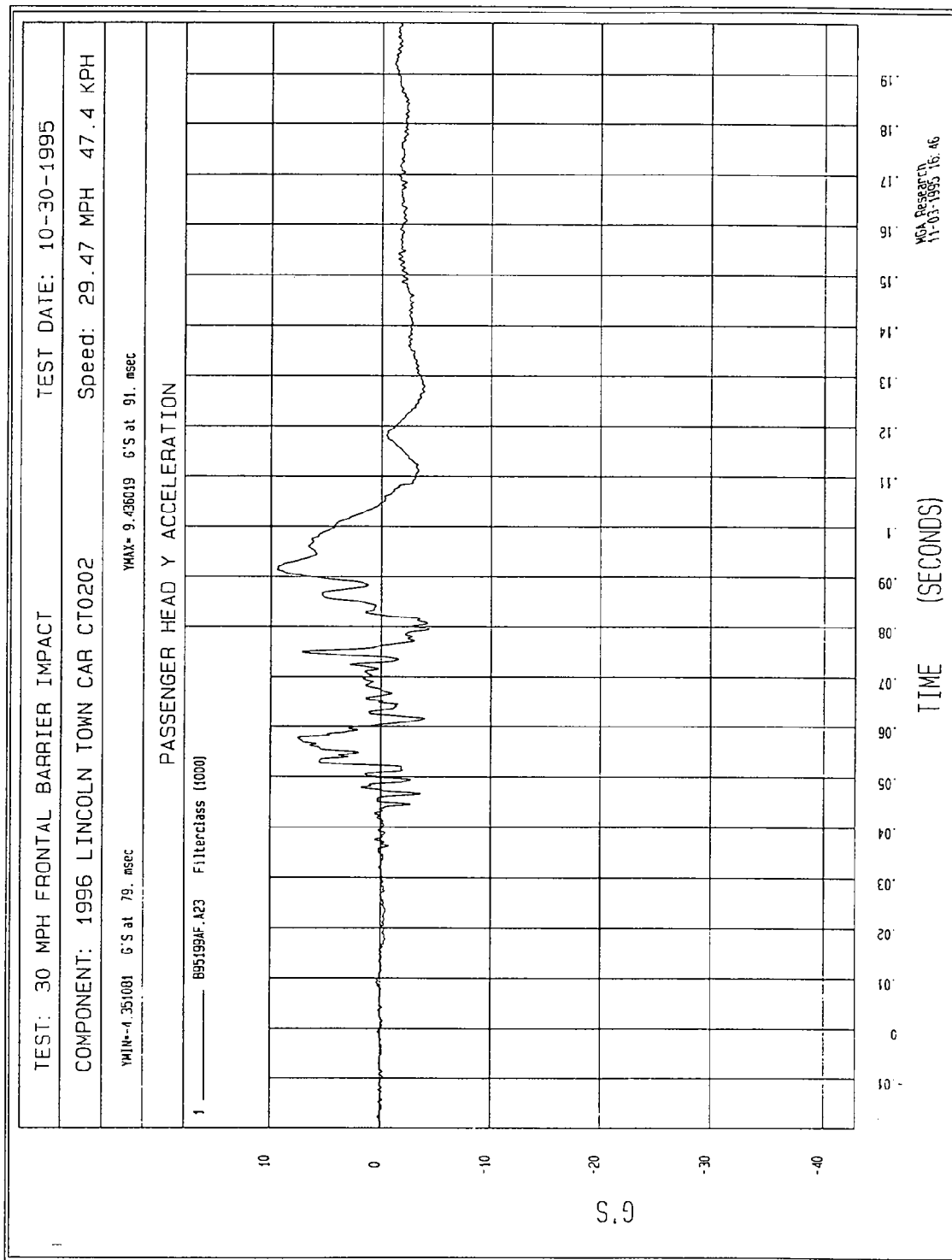


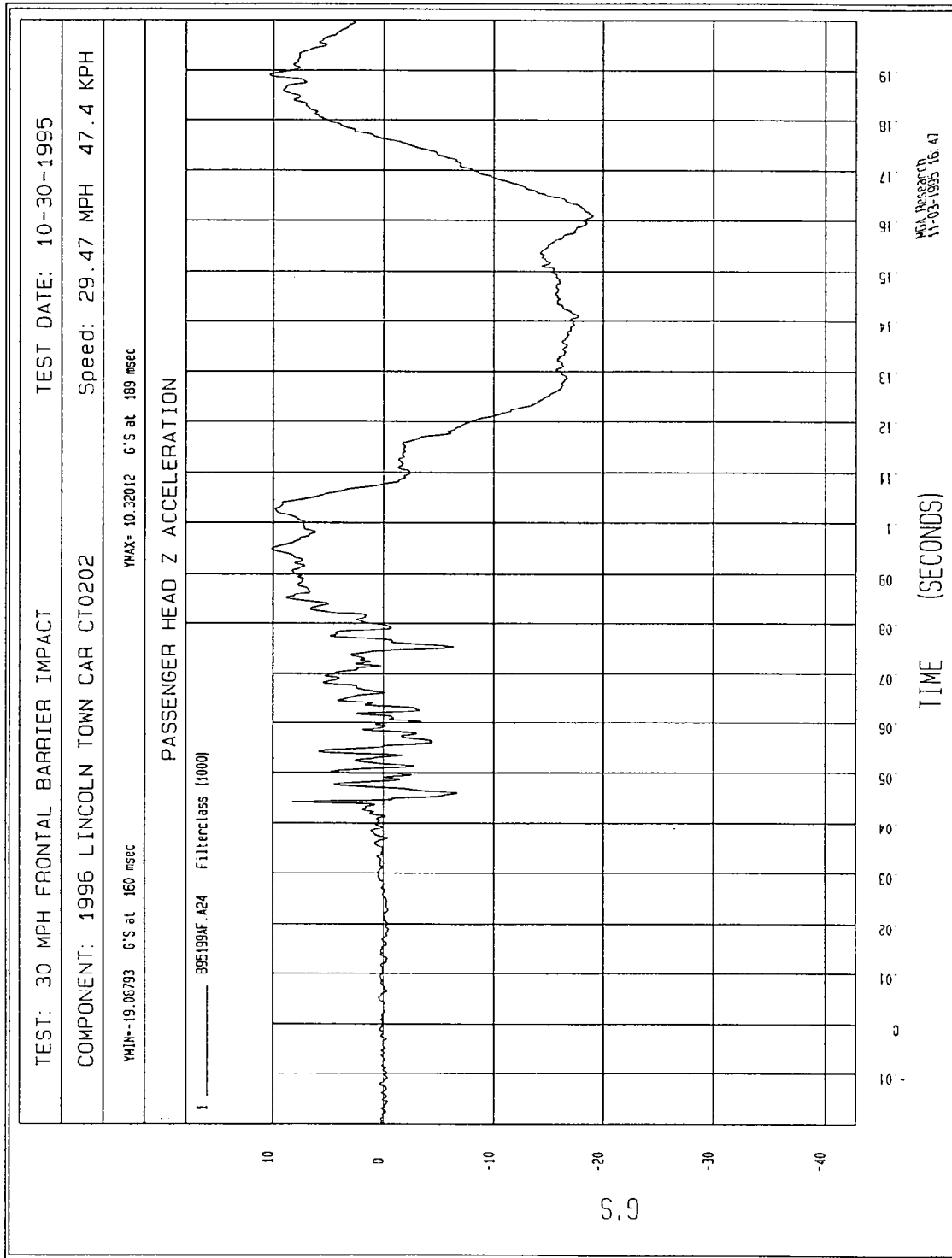


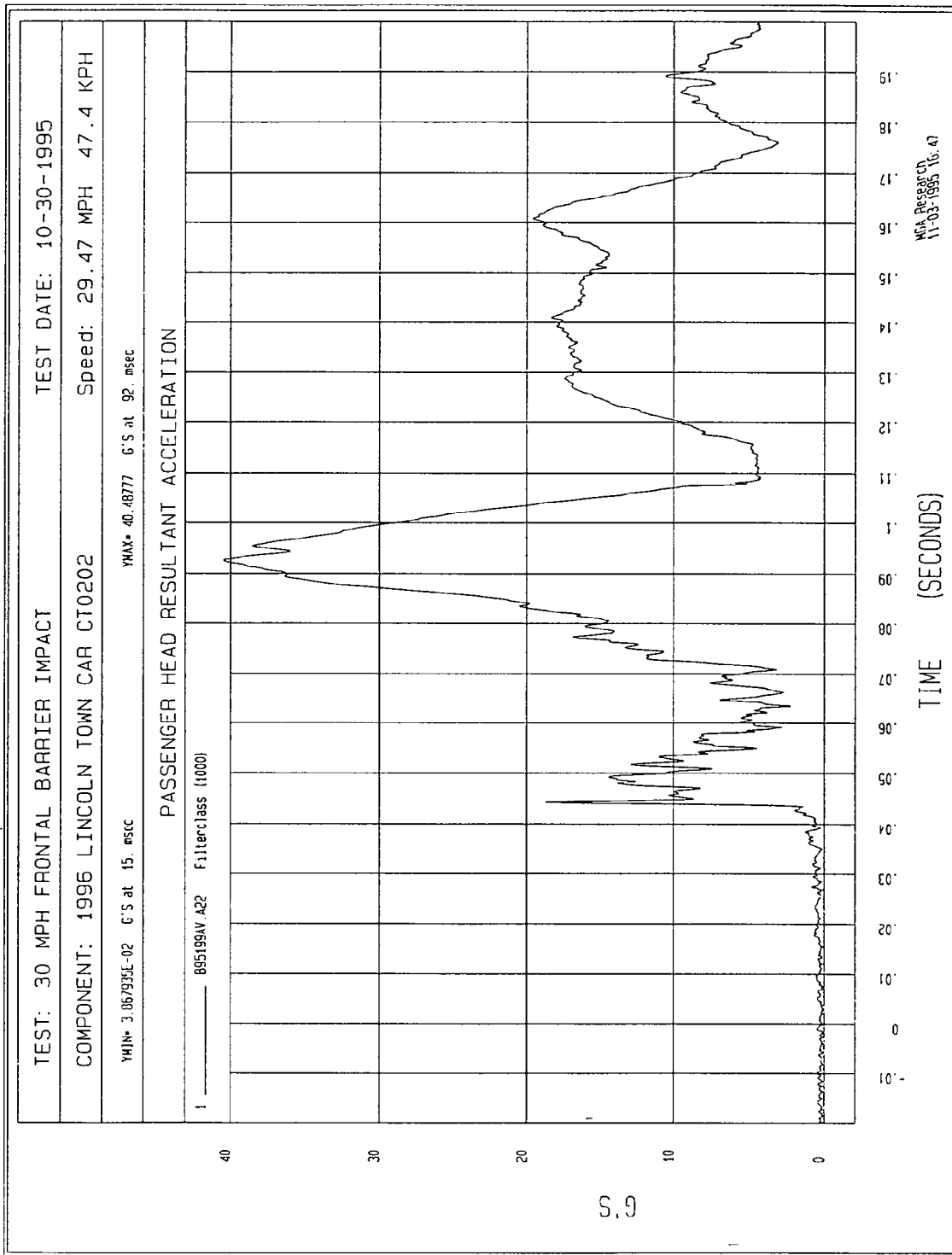


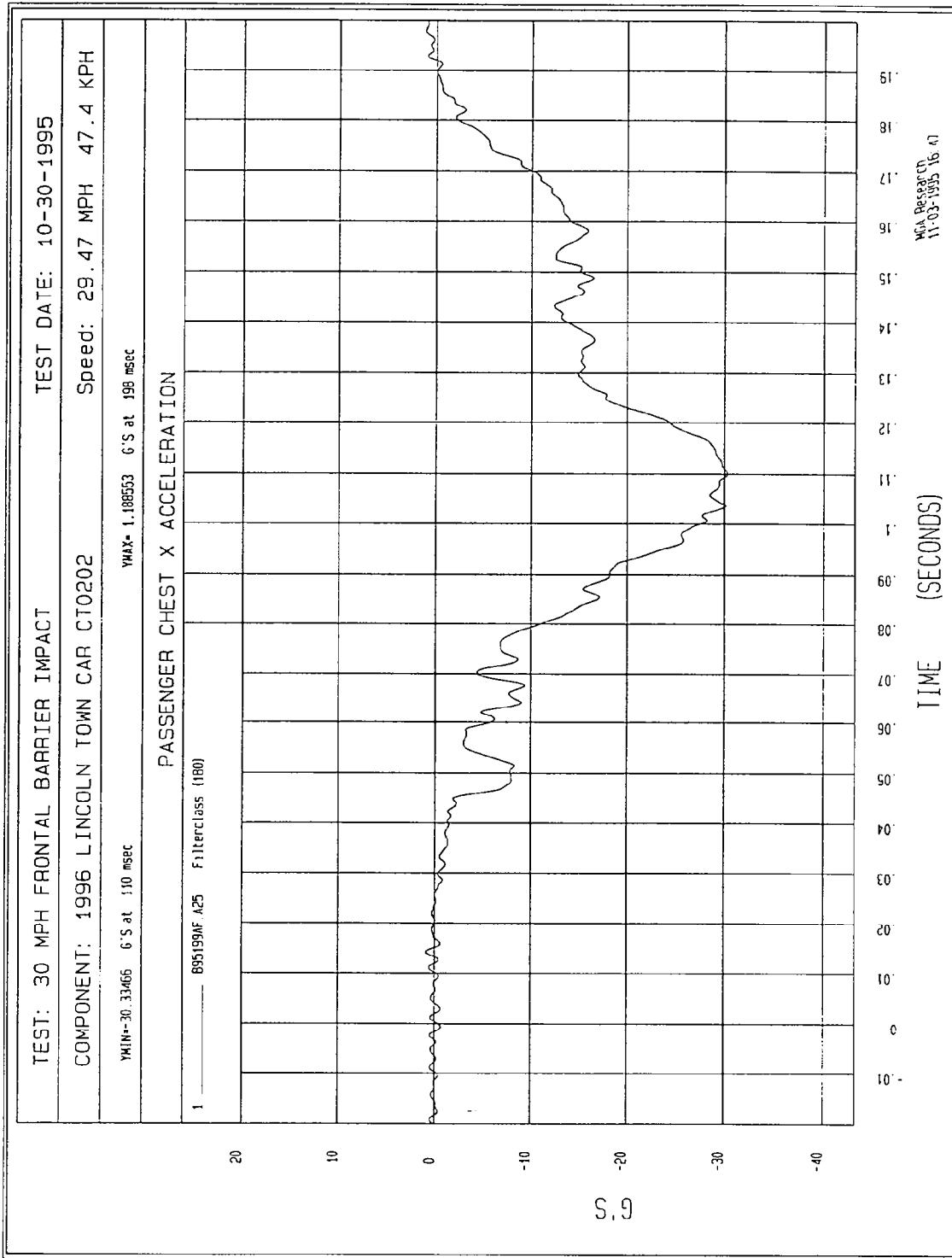


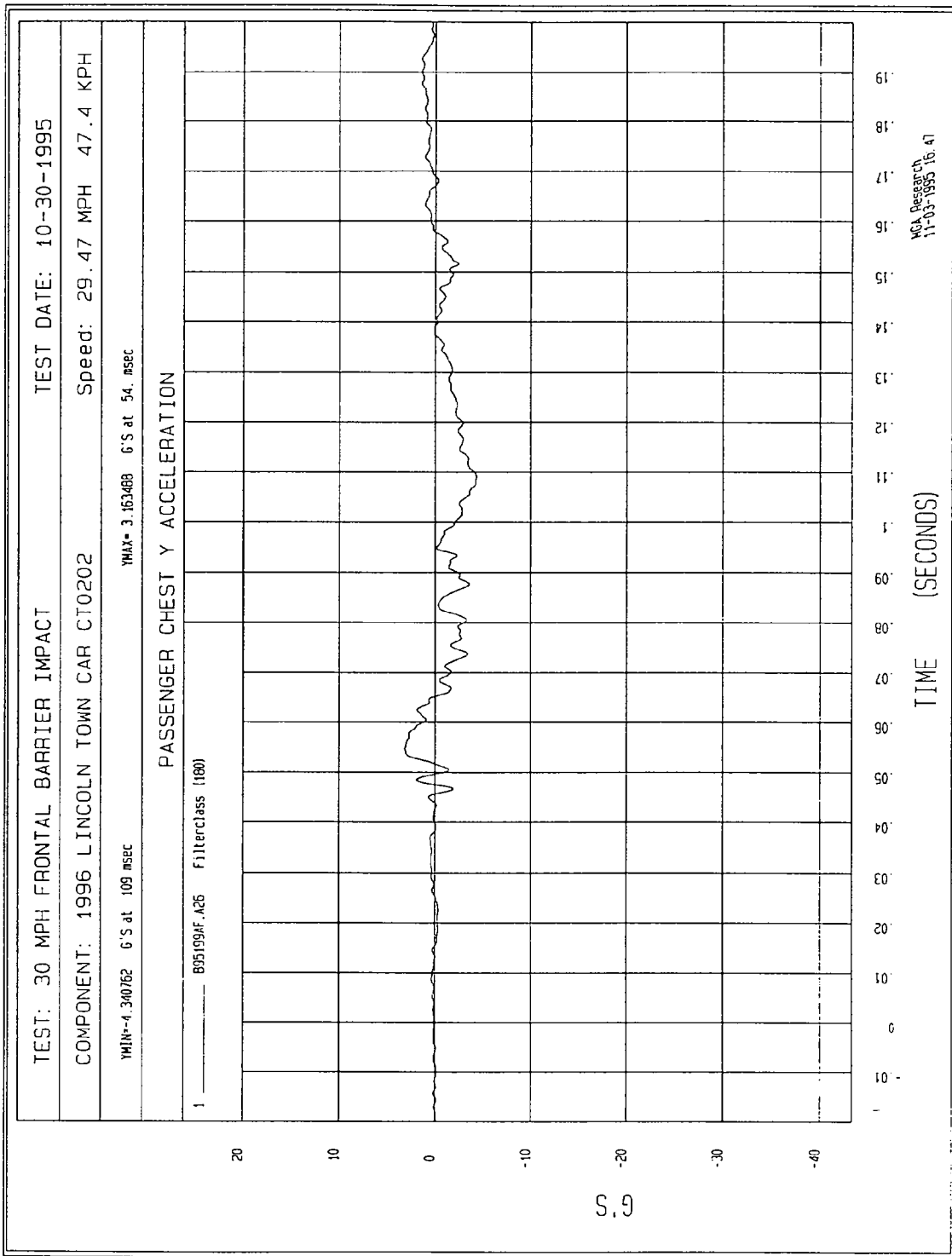


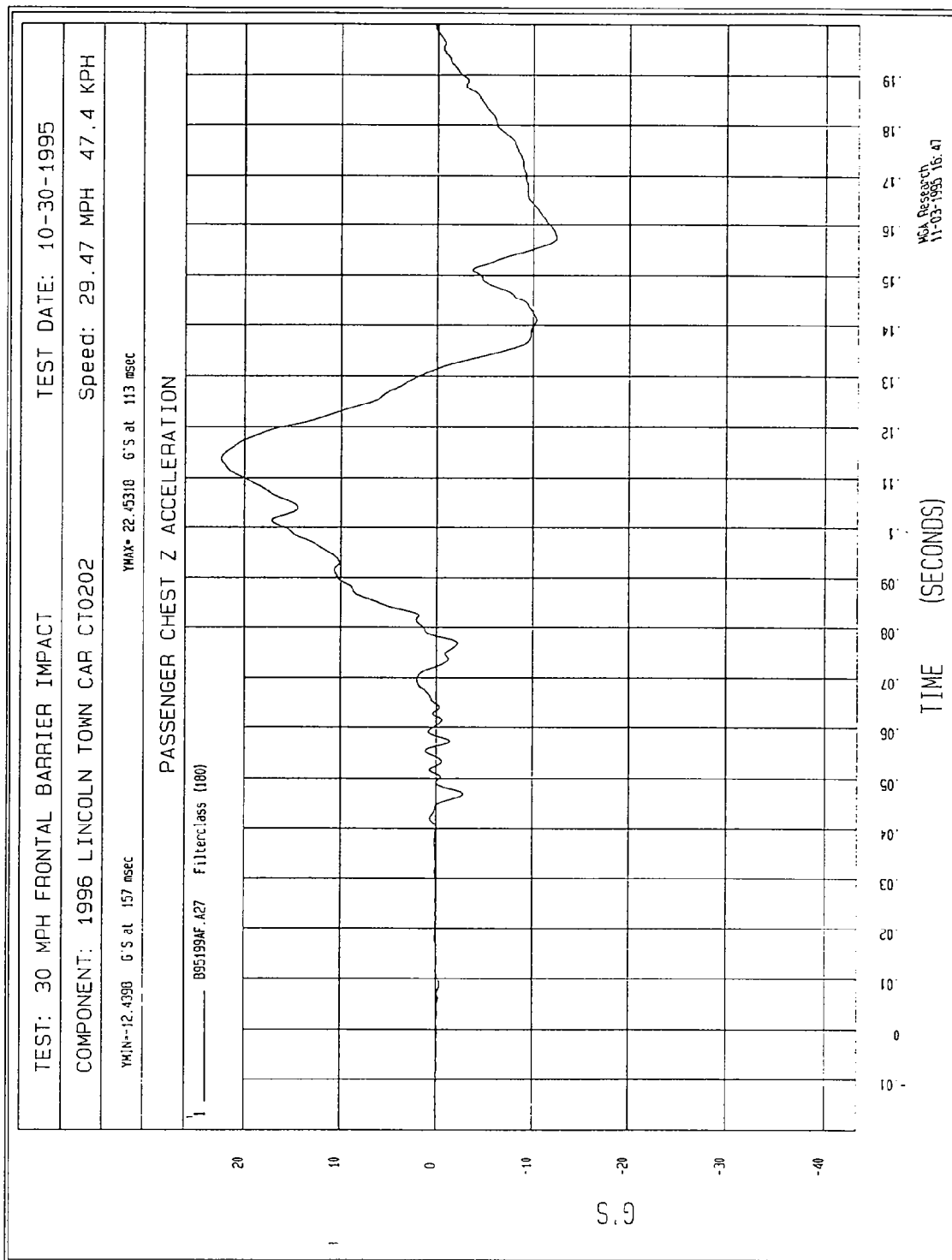


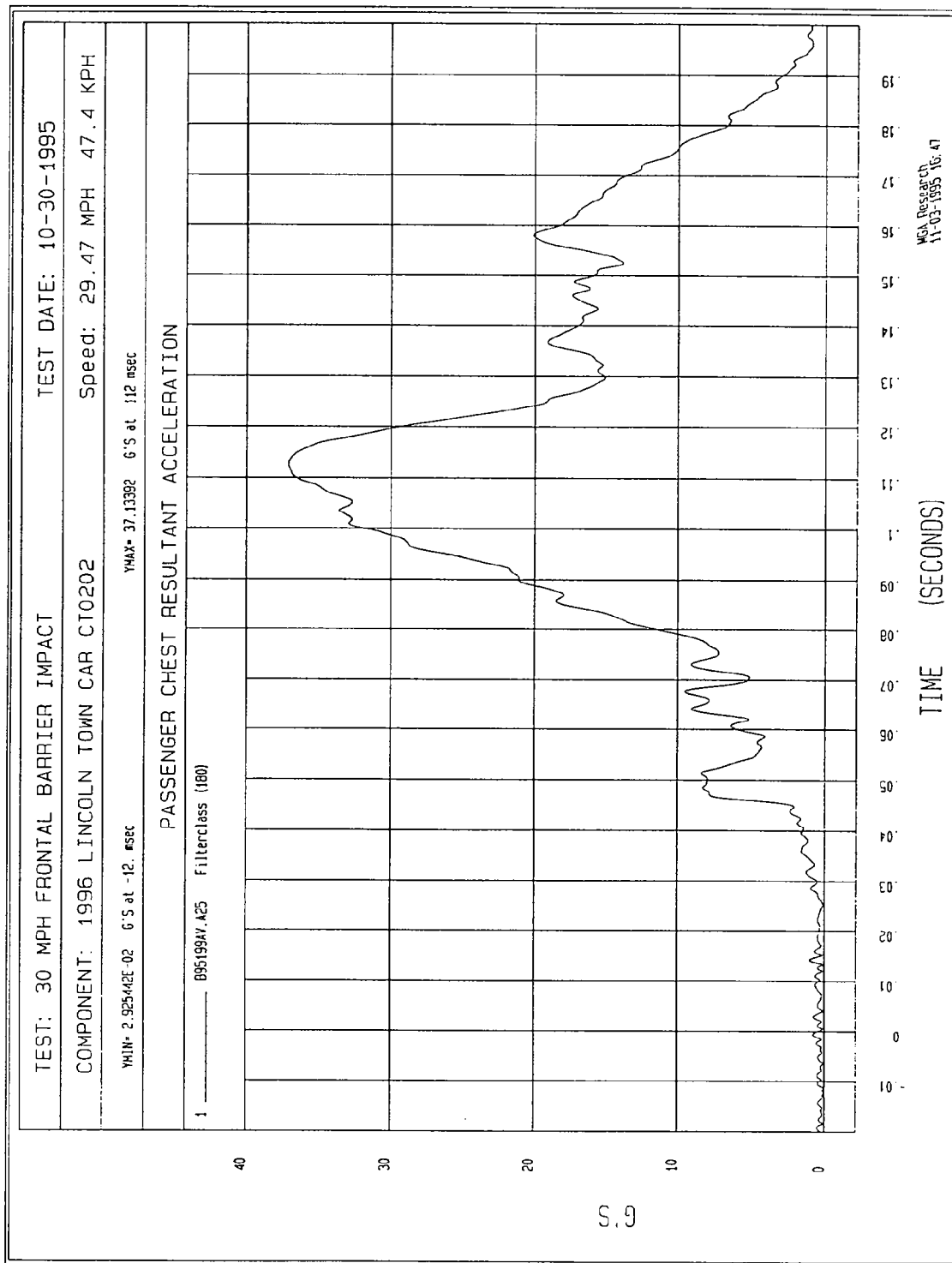


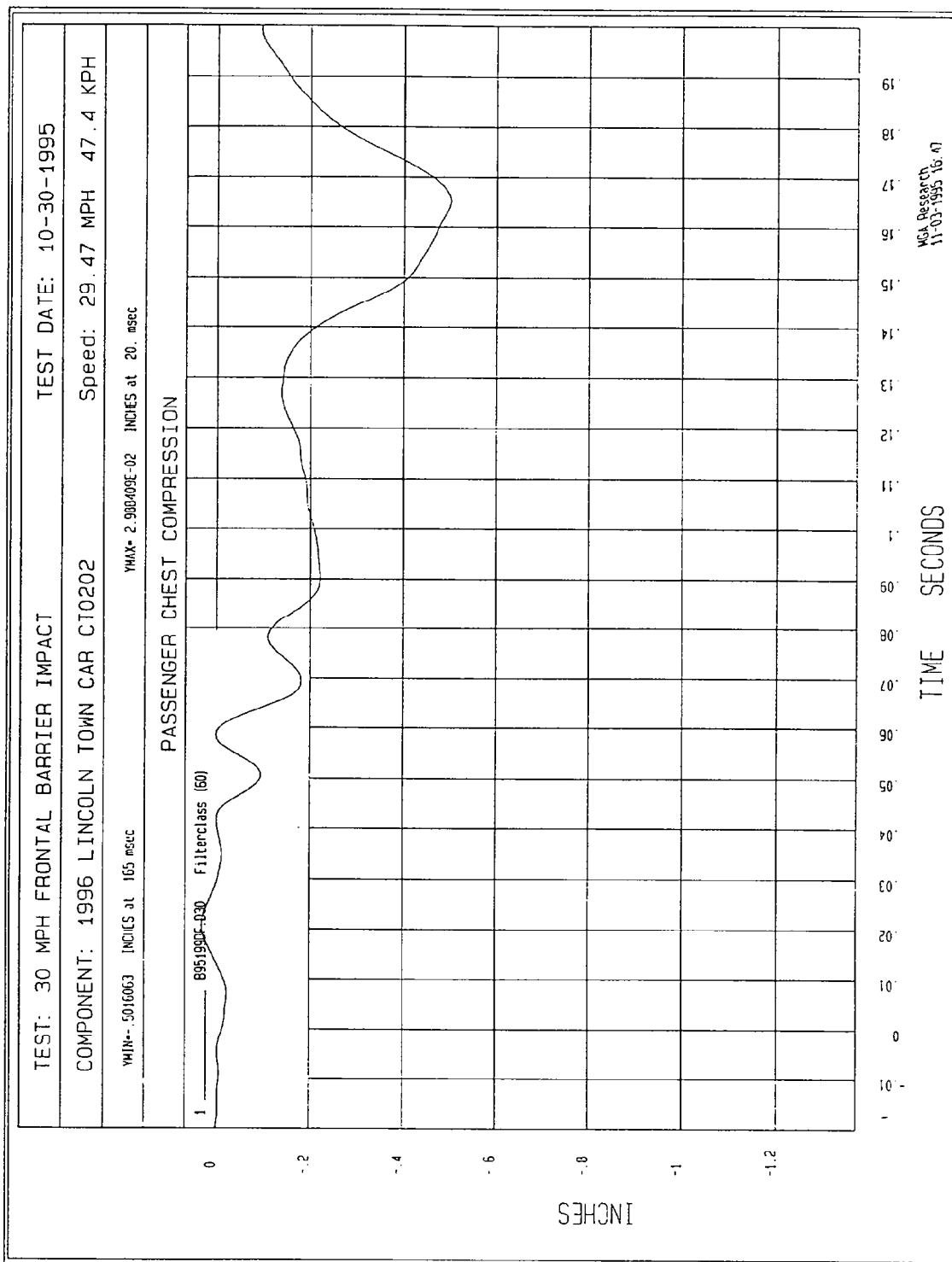


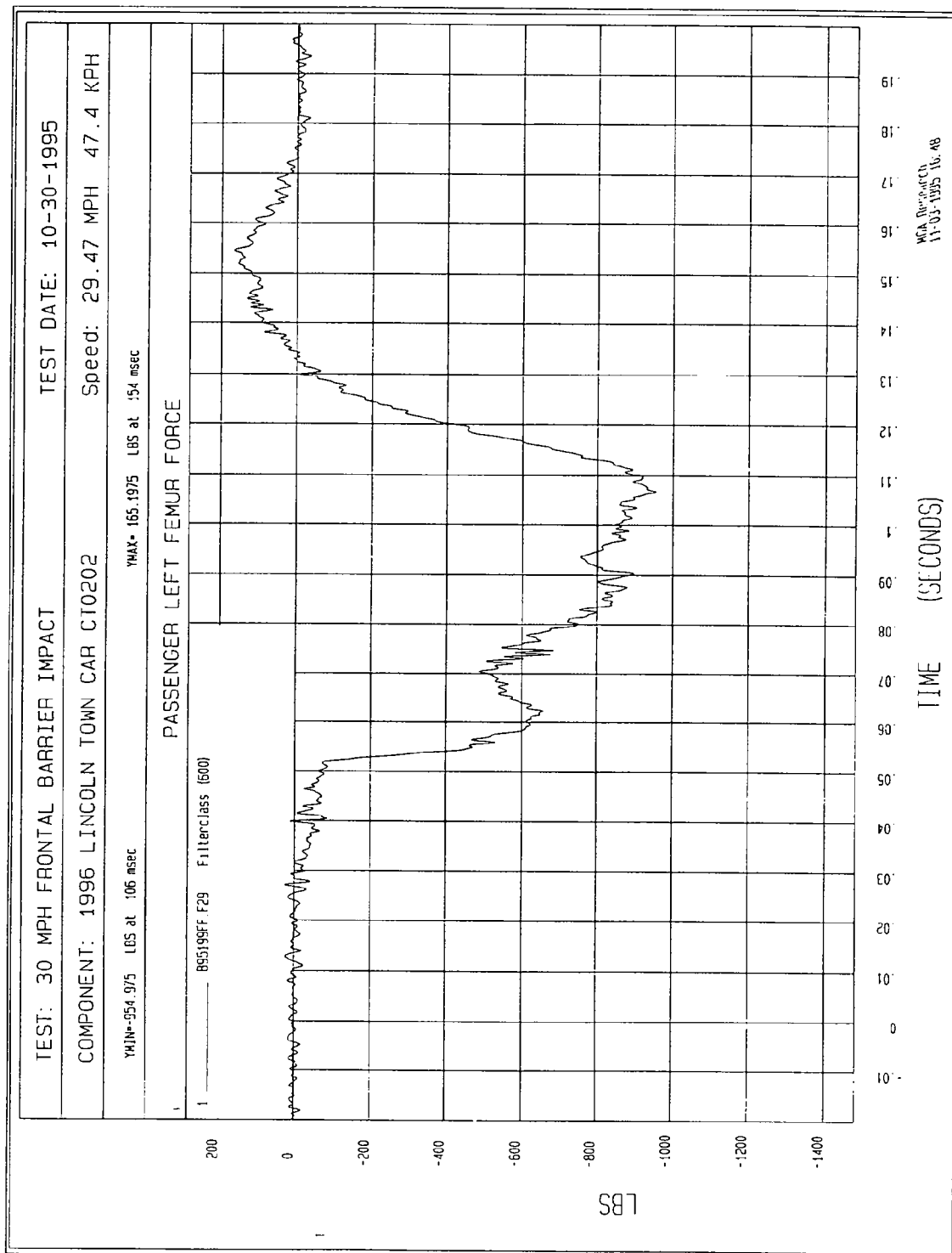


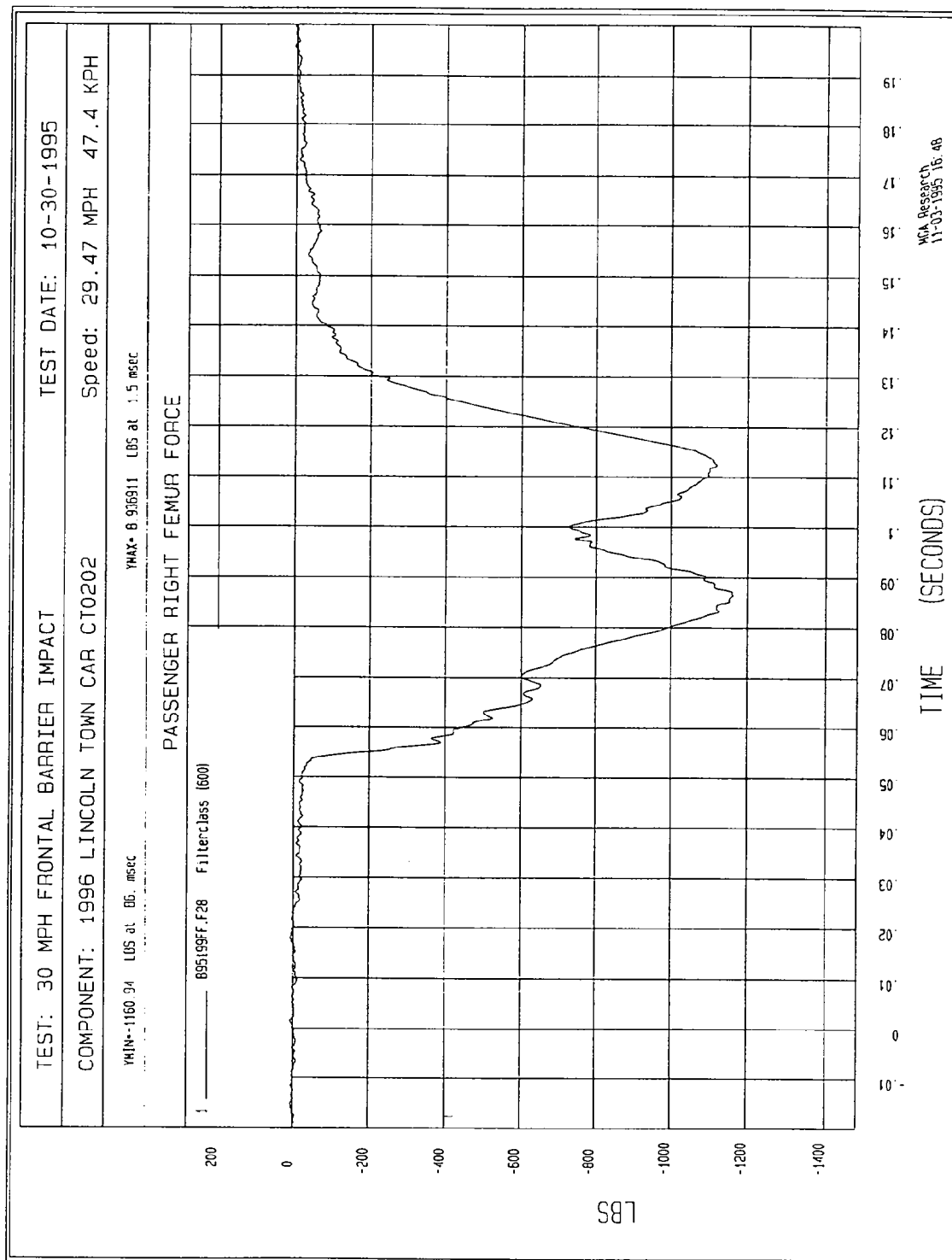


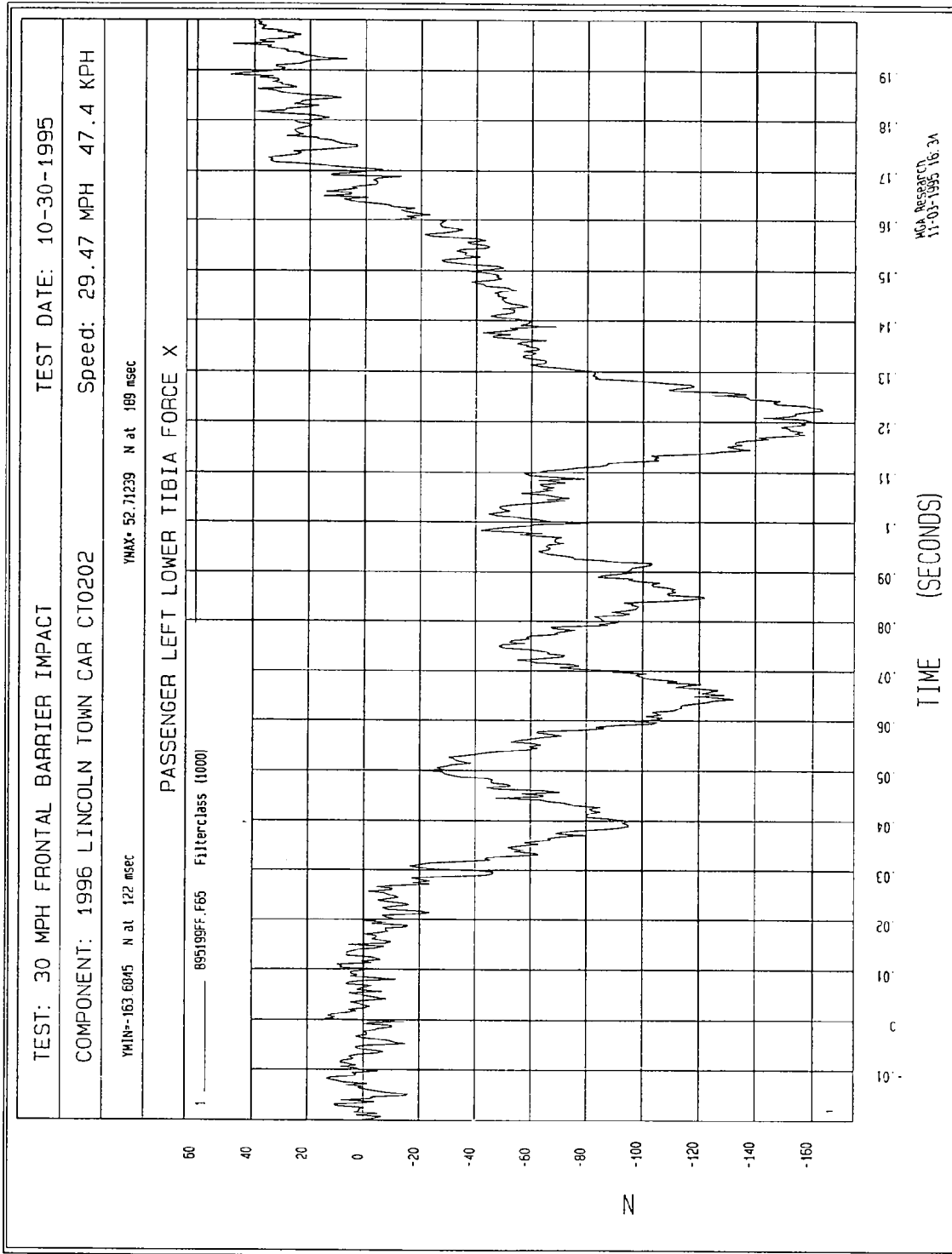


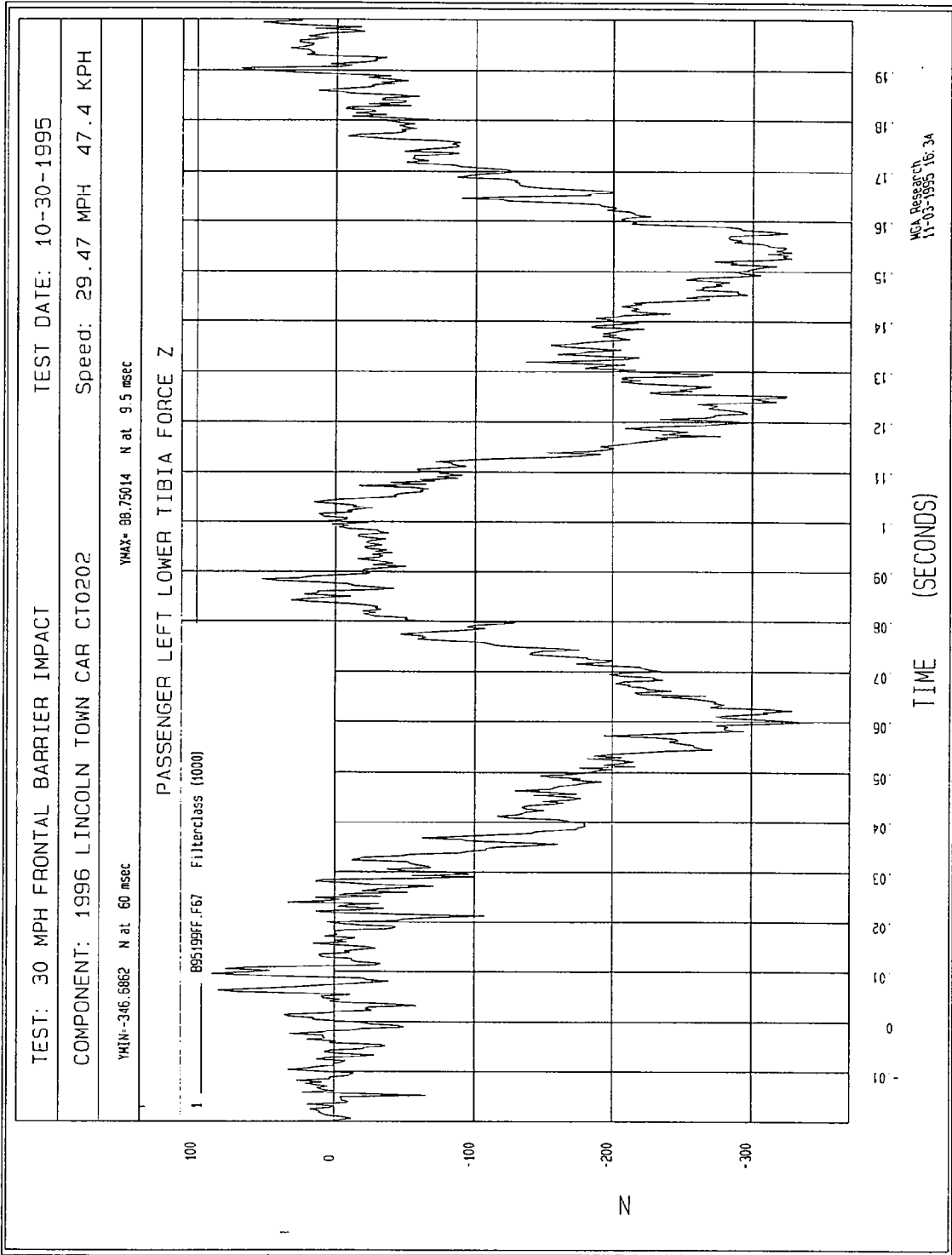


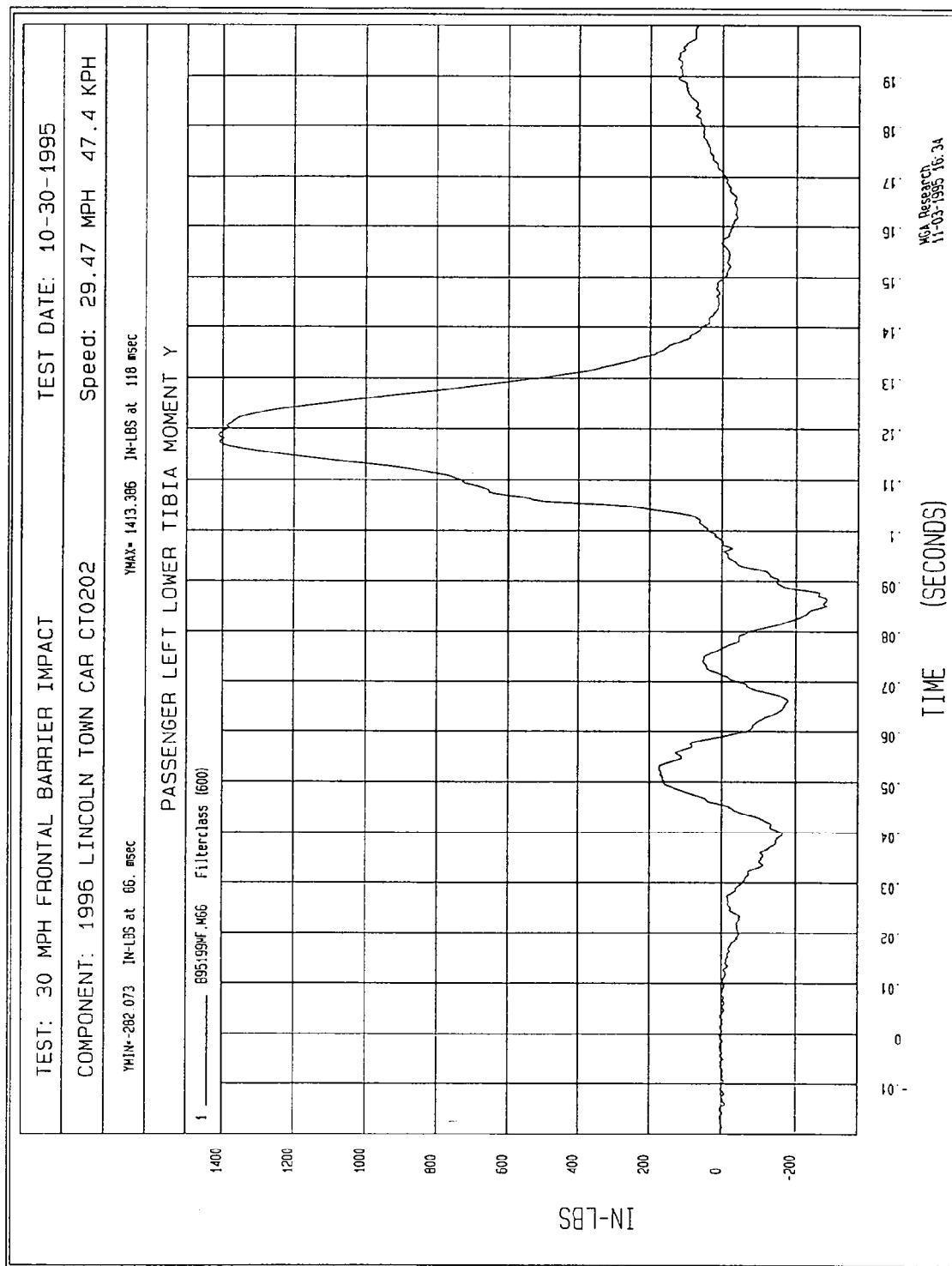


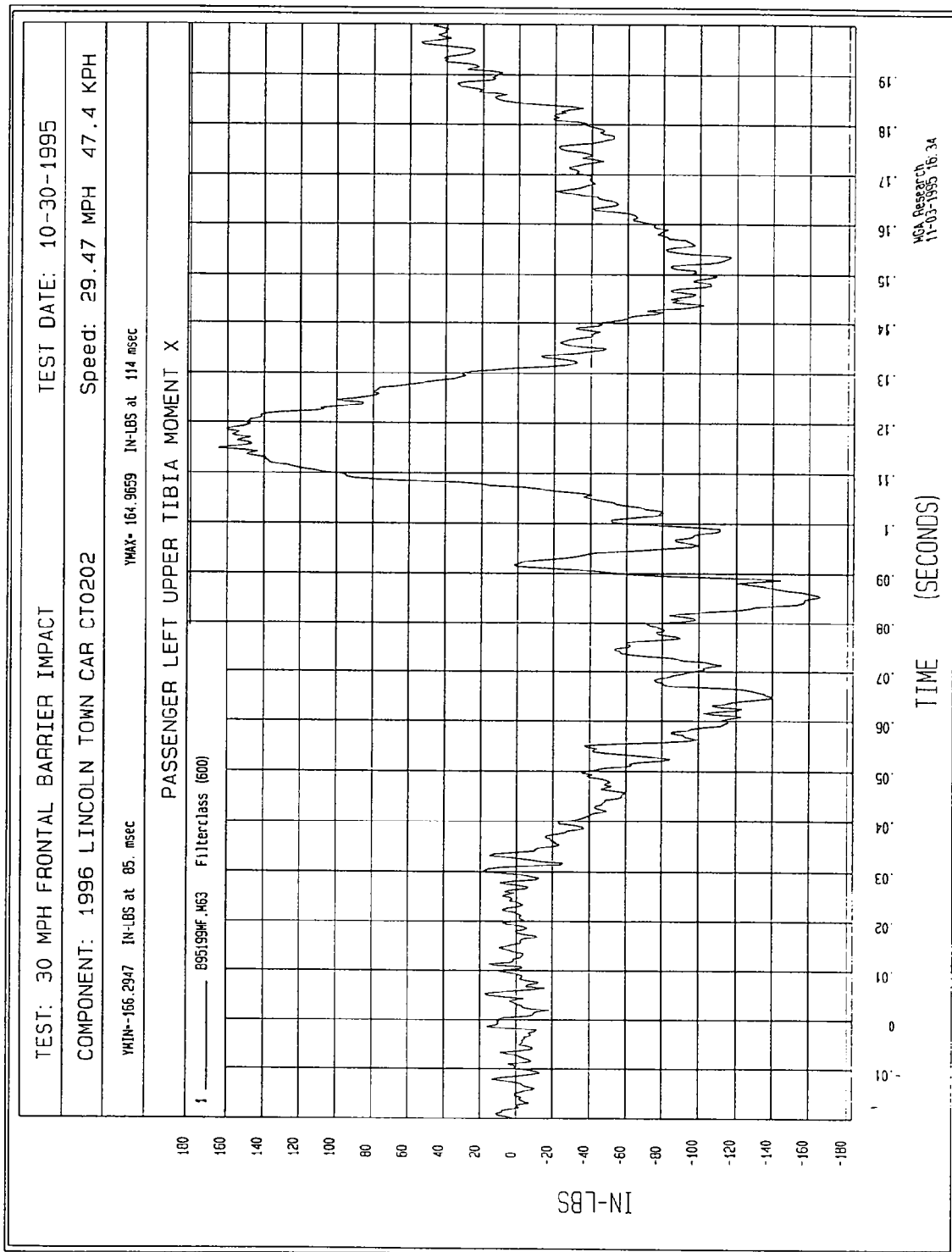


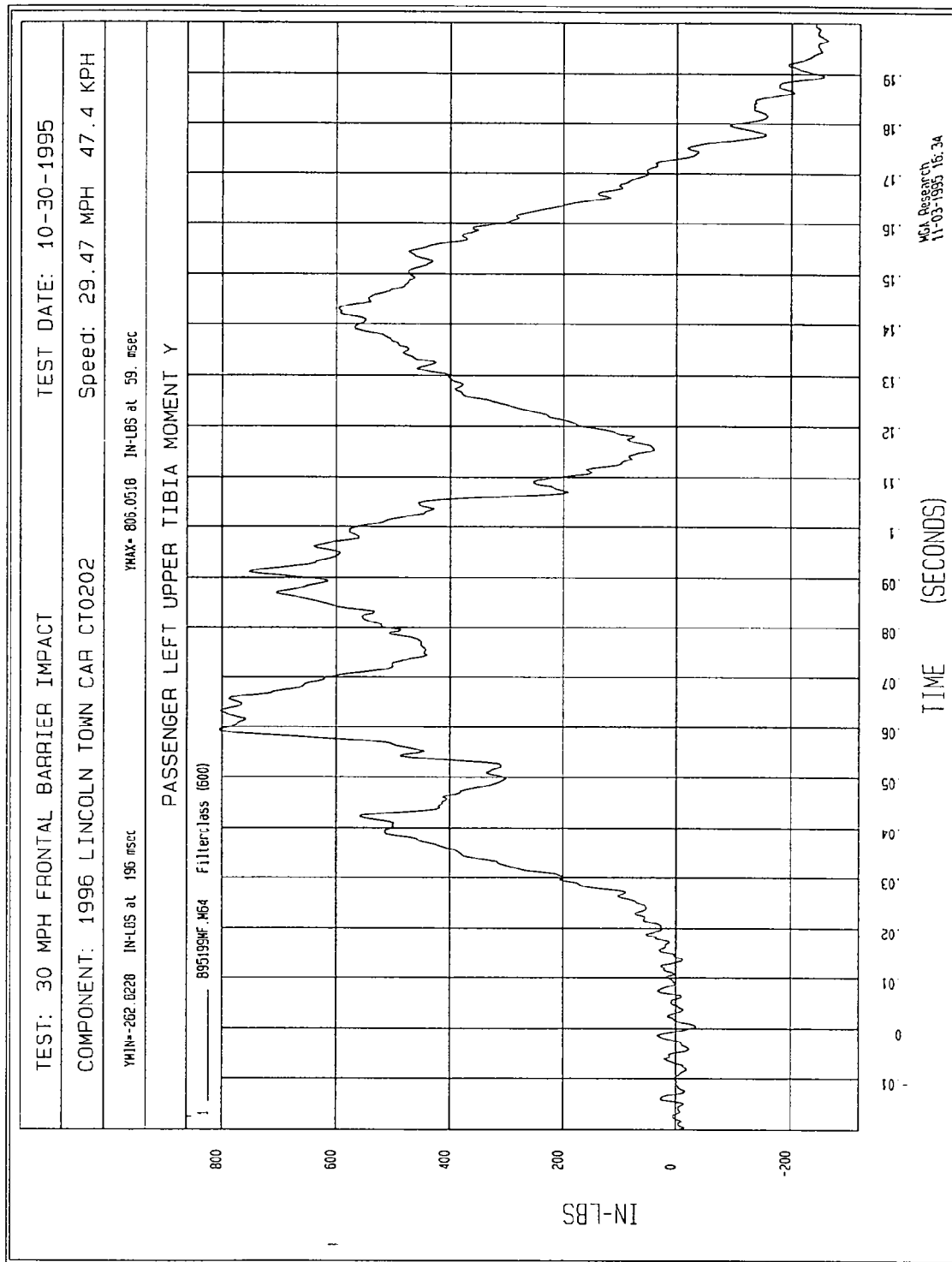


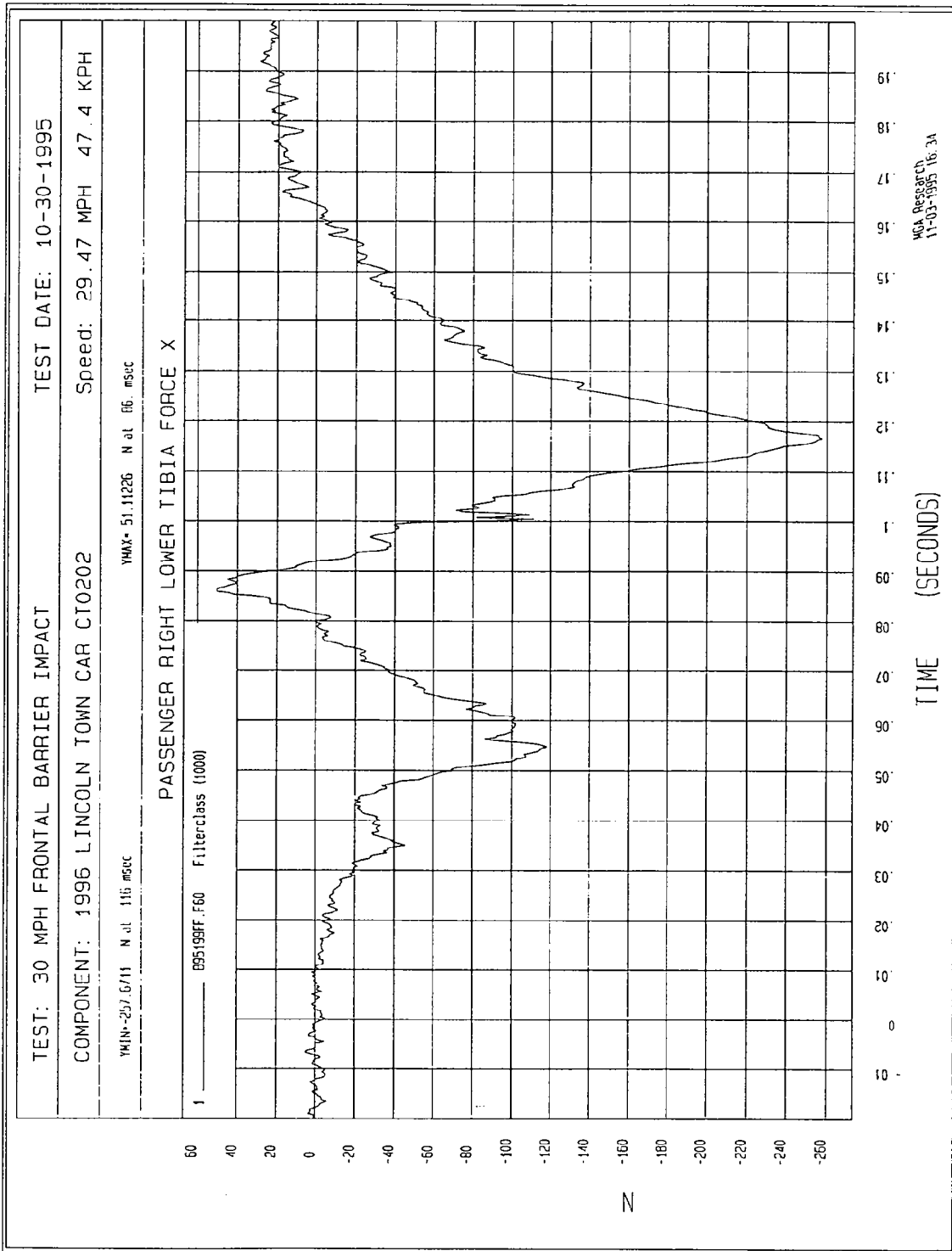


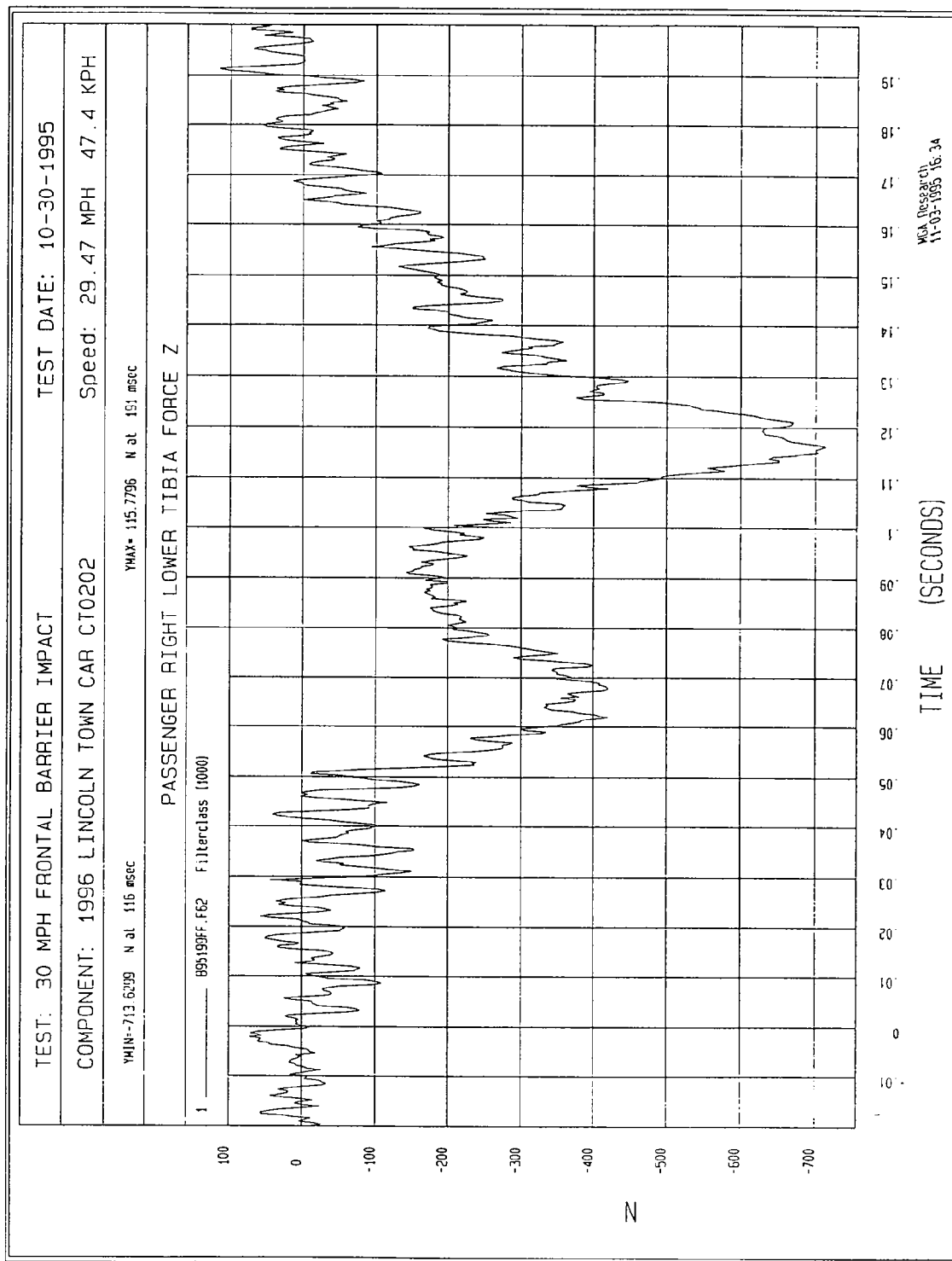


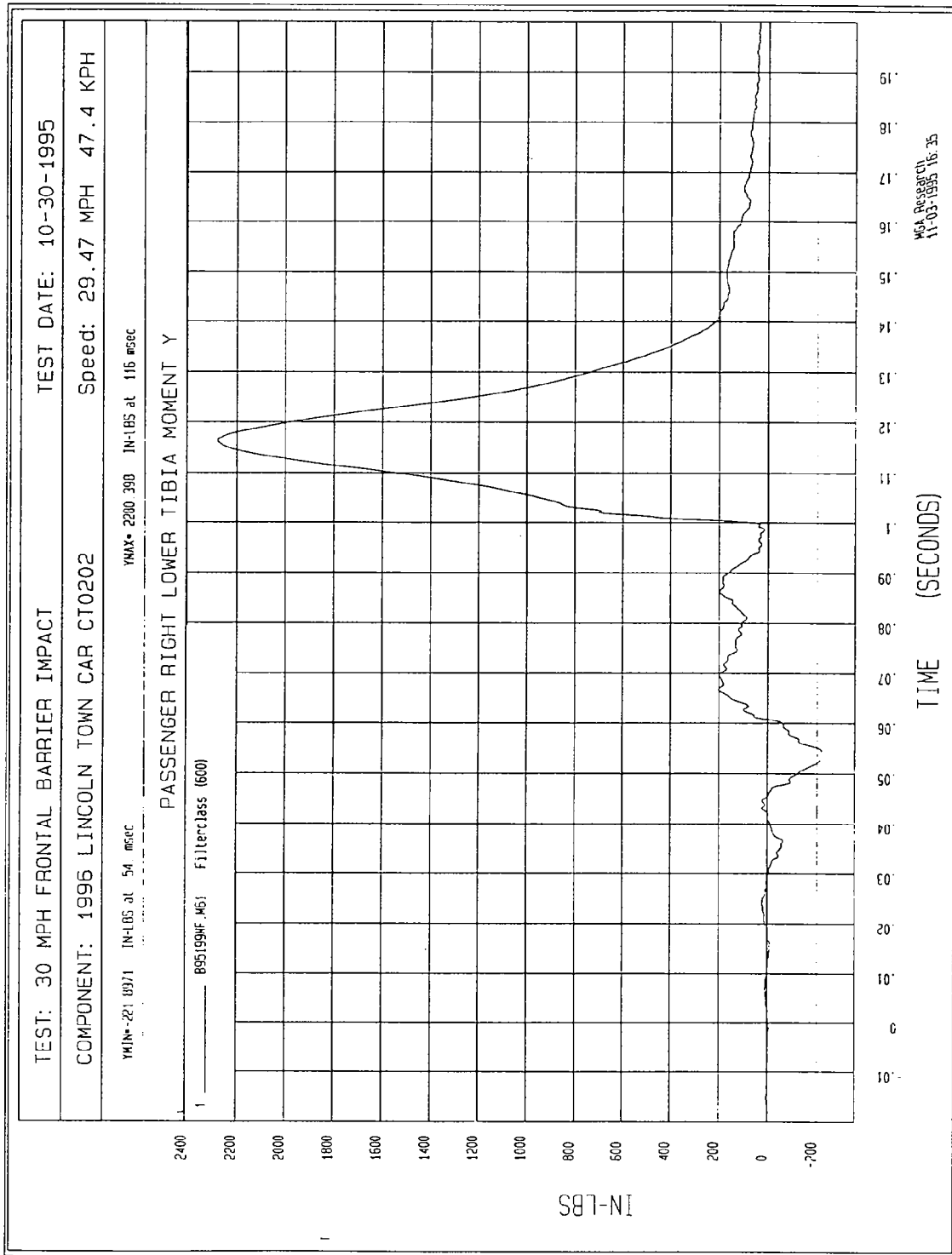


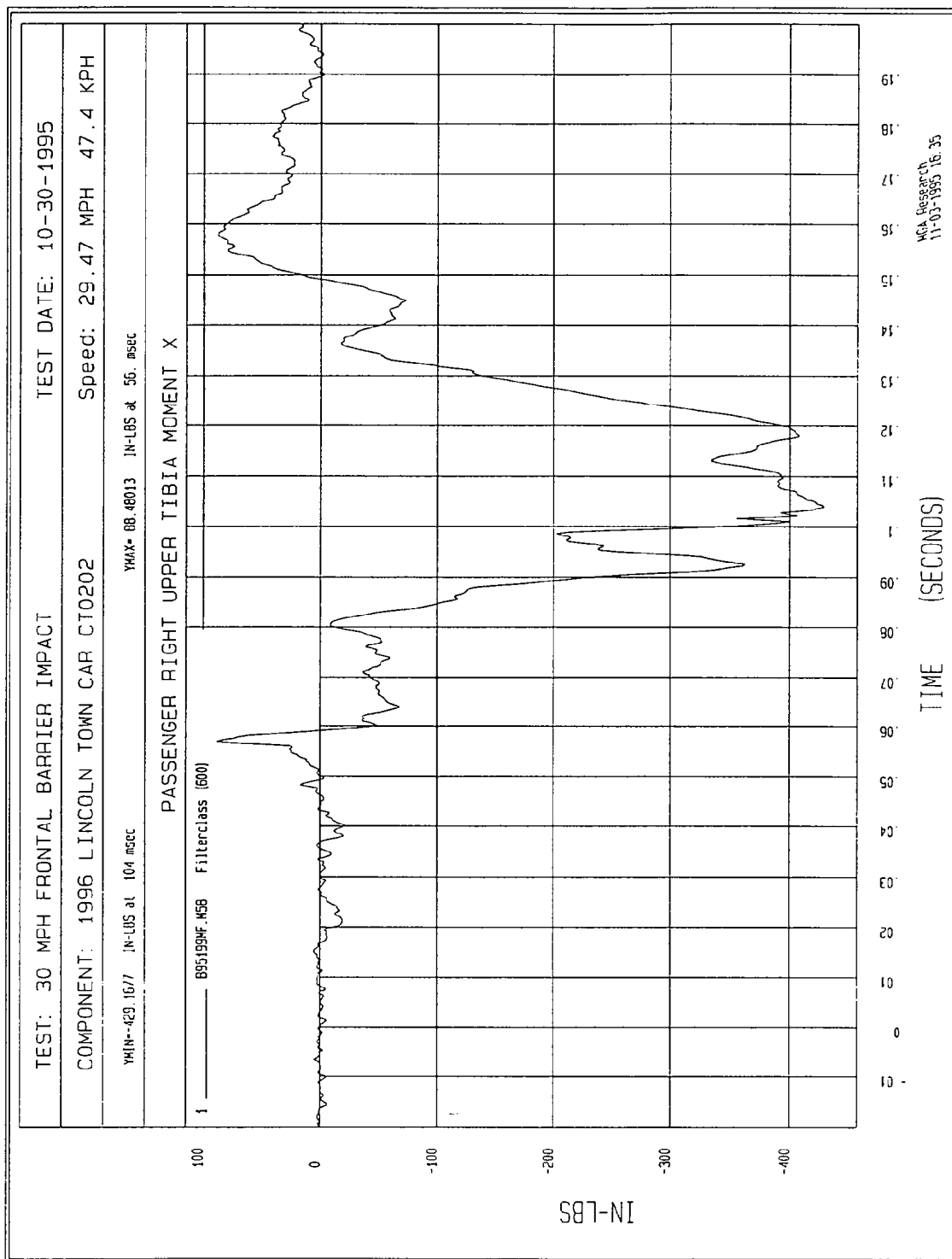


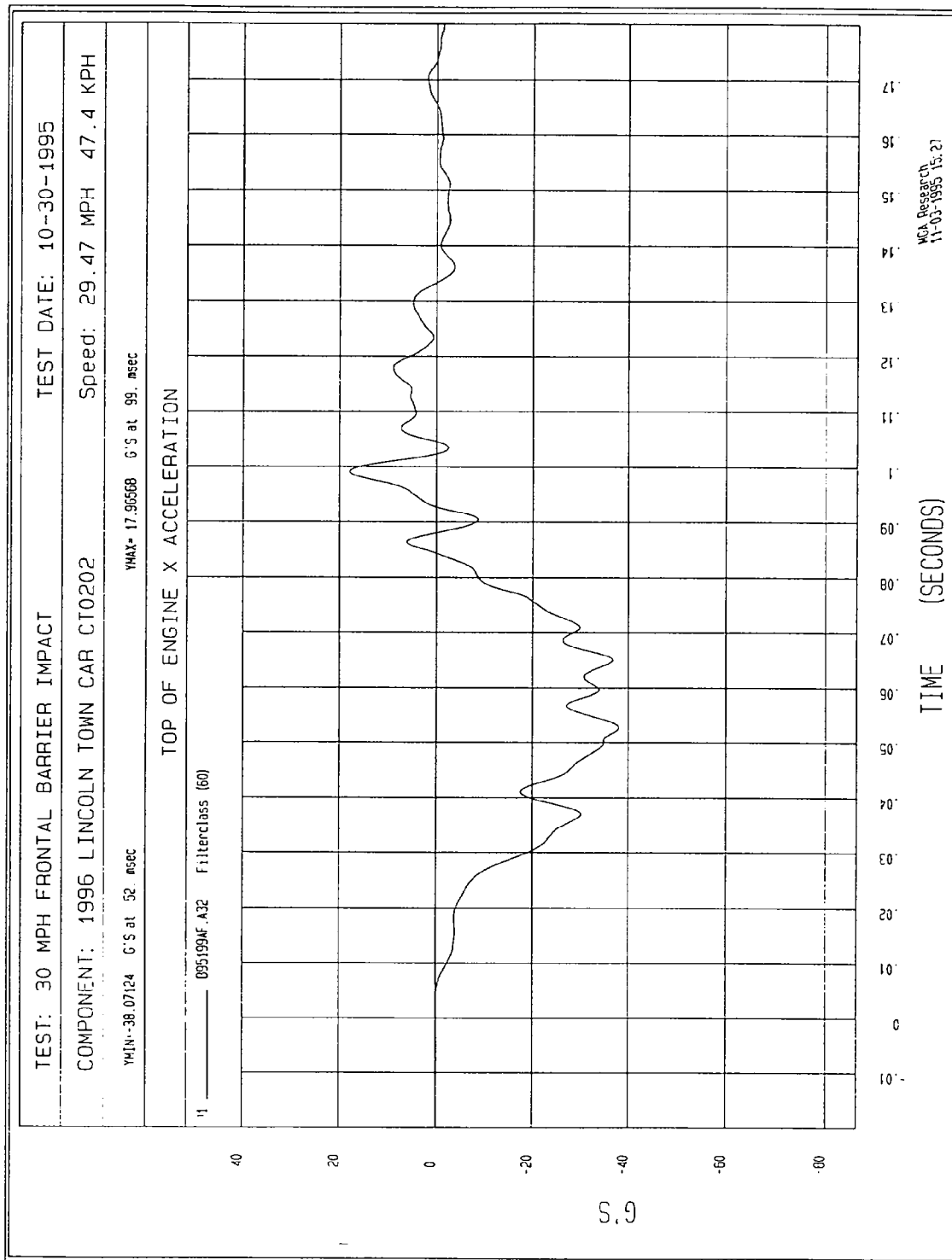


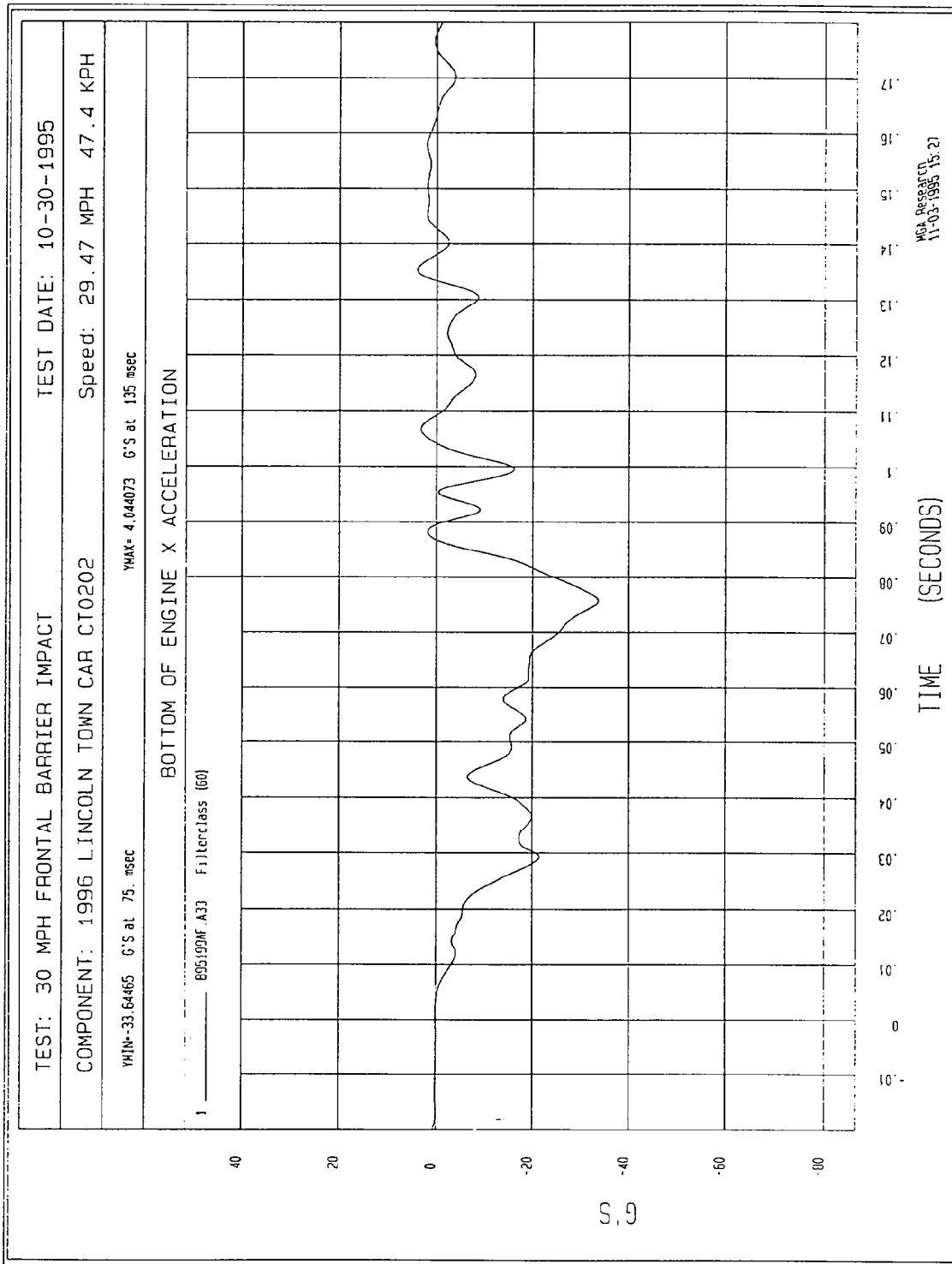


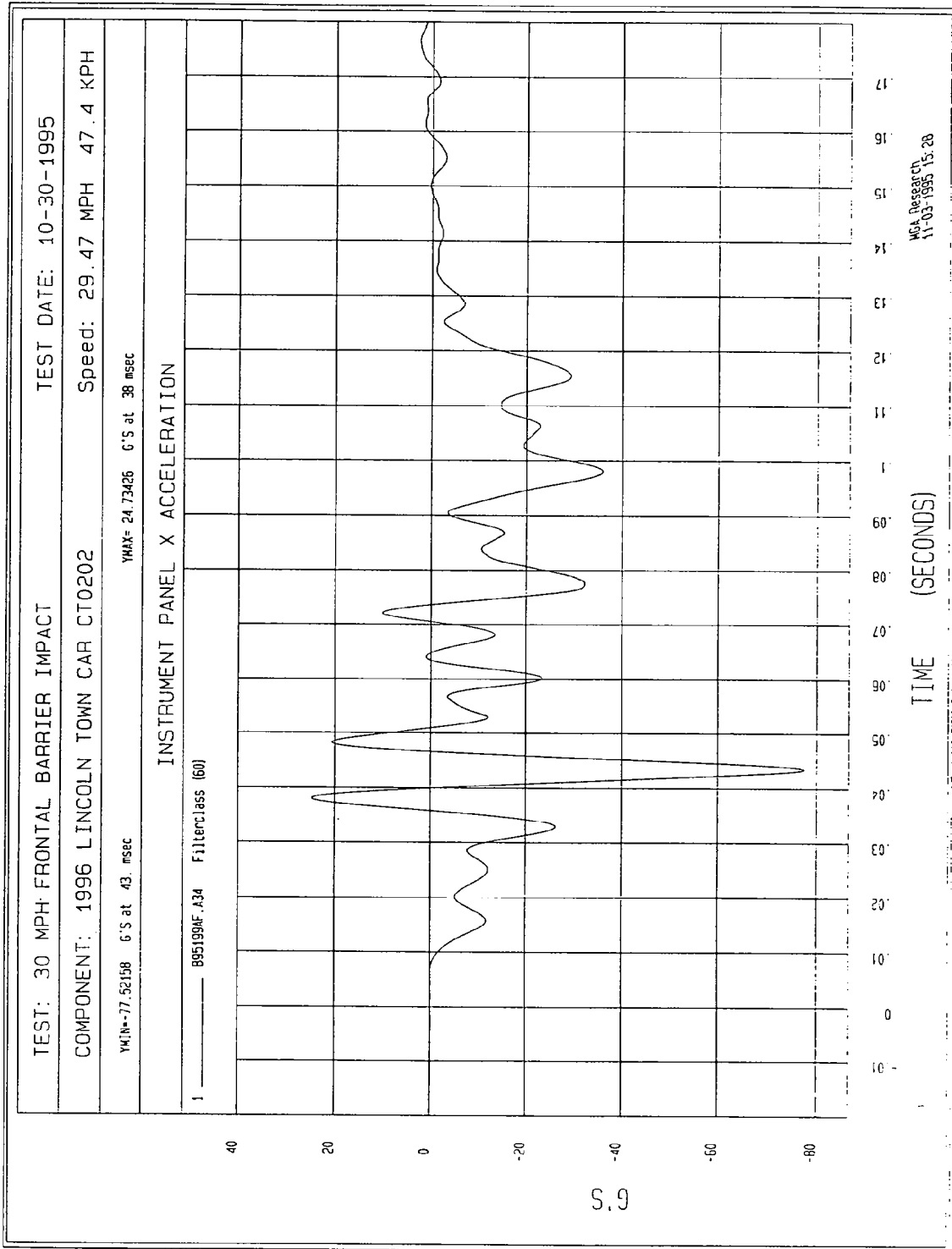


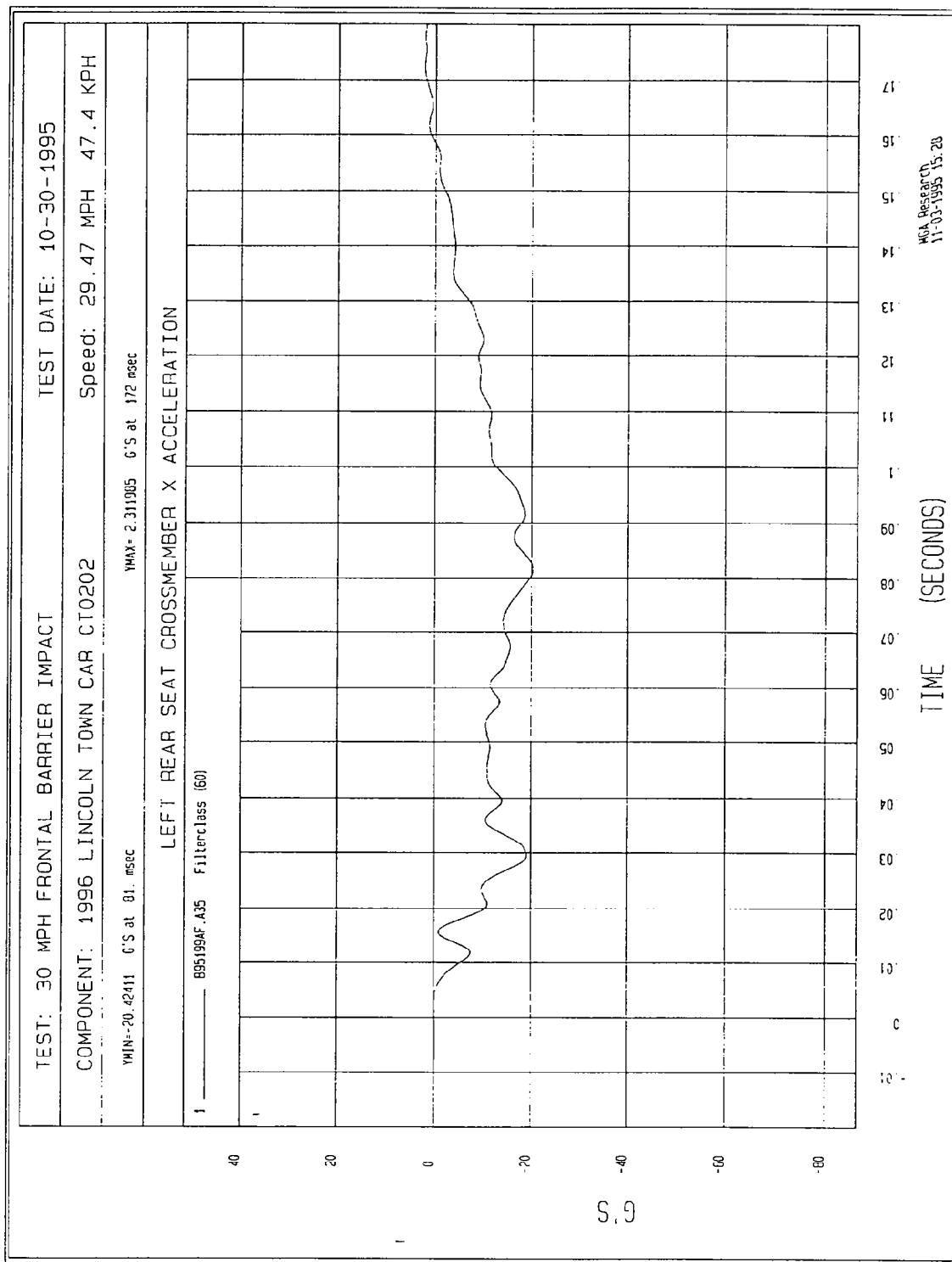


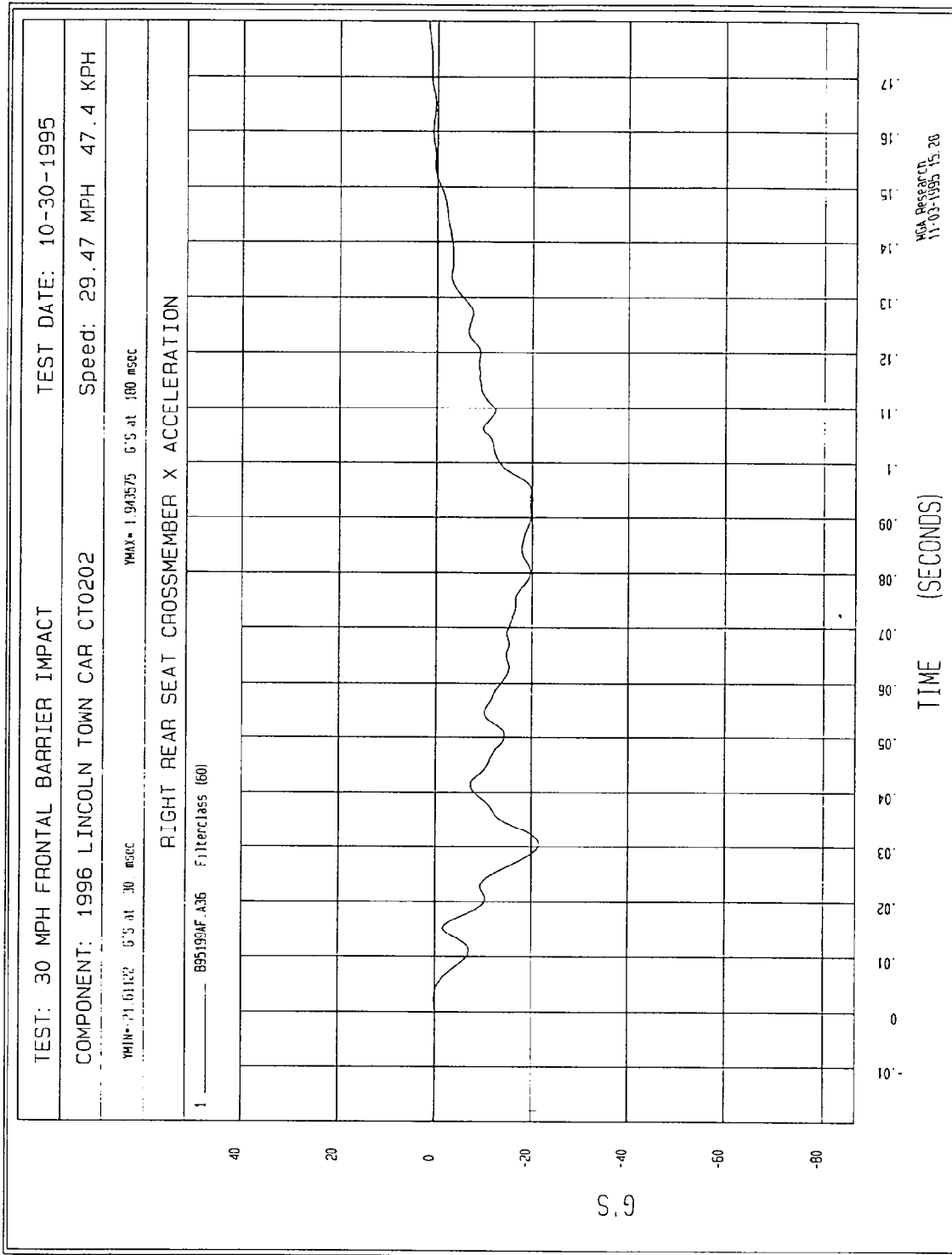


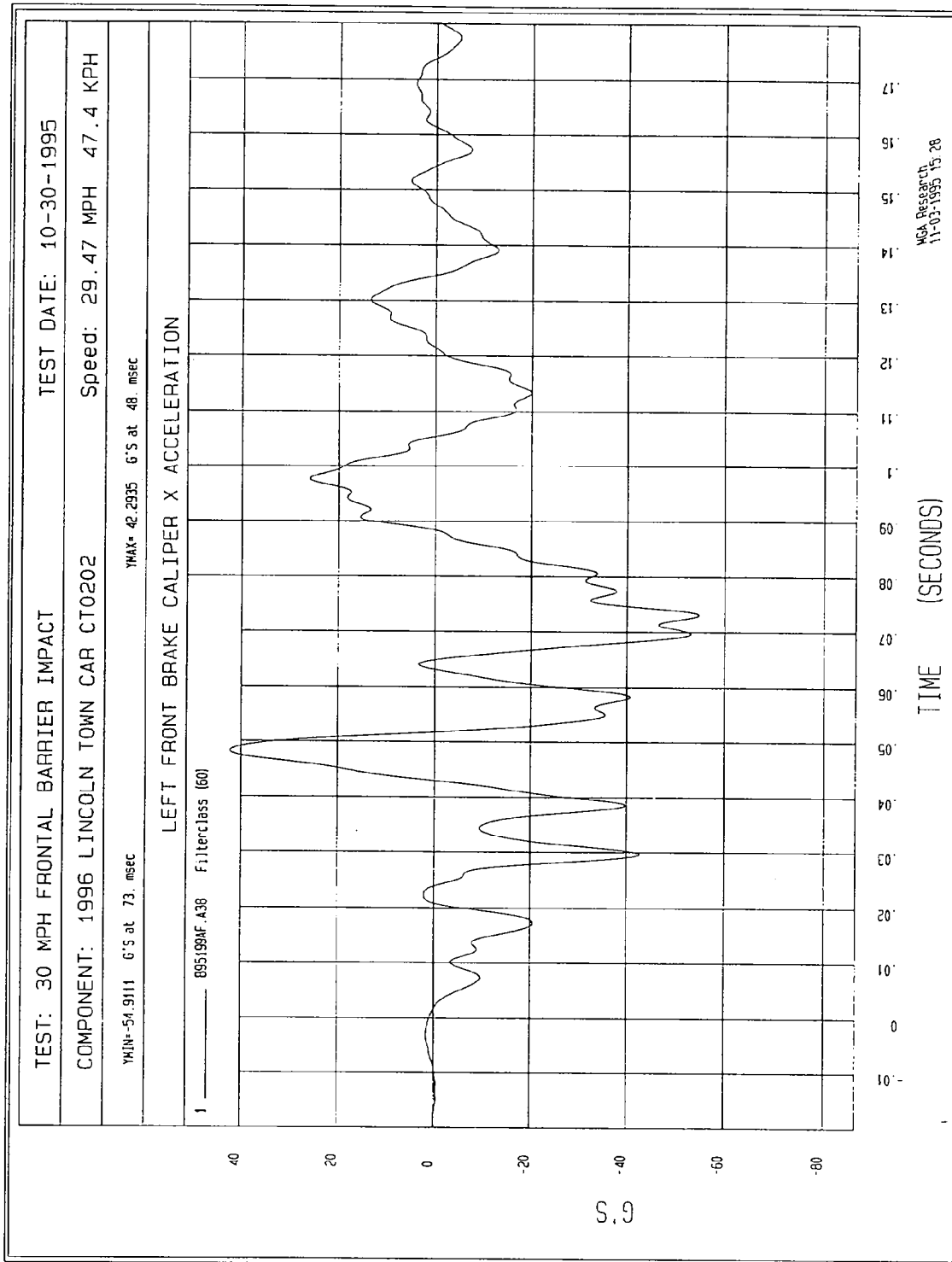


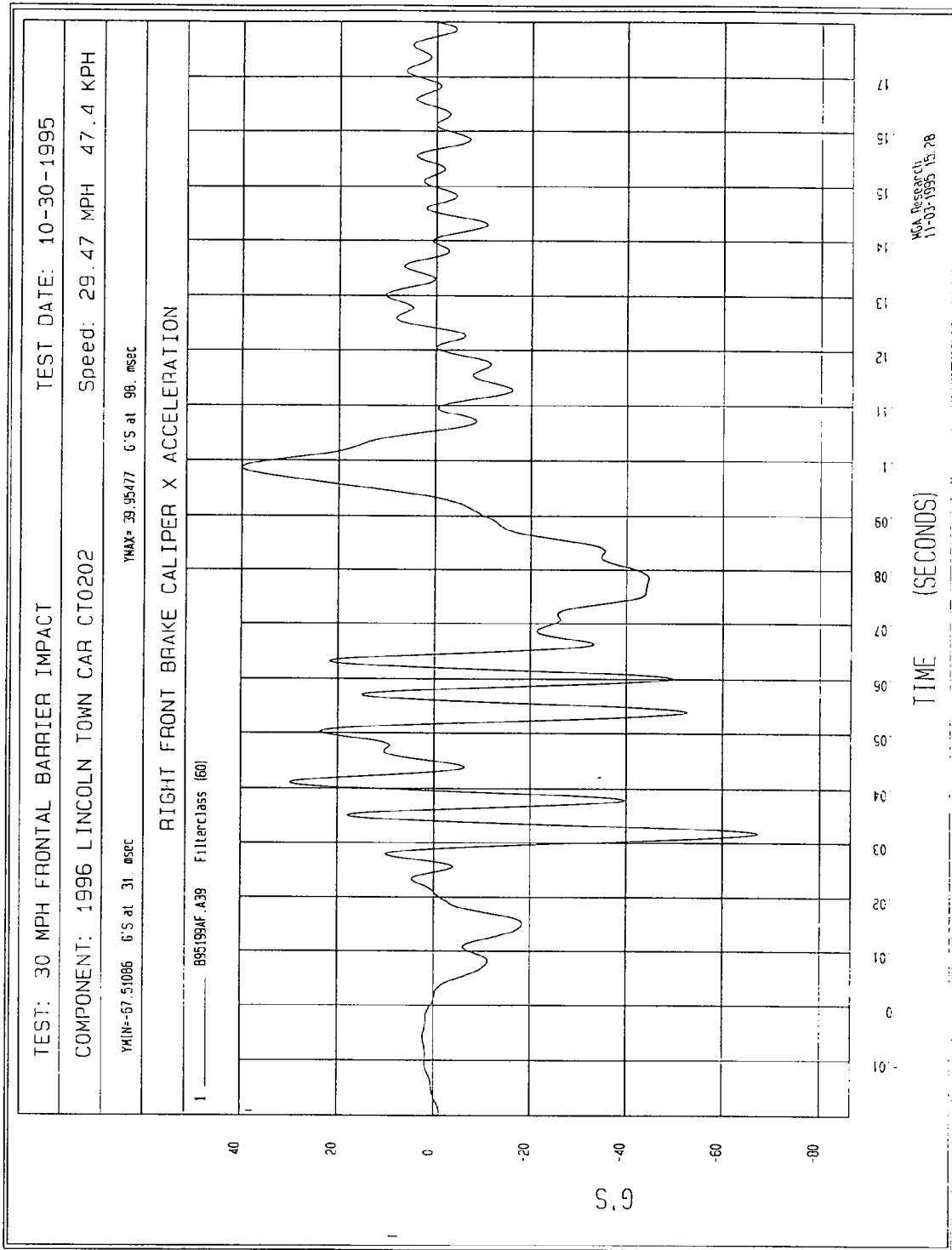












TRUNK Z ACCELERATION
NO VALID DATA COLLECTED

APPENDIX C
MANUFACTURER'S VEHICLE INFORMATION



RECEIVED NSA-30

95 SEP 14 P3:37

Robert H. Munson
Executive Director
Automotive Safety and Engineering Standards
Environmental and Safety
Engineering — FAC

Ford Motor Company
330 Town Center Drive
Dearborn, Michigan 48126

September 11, 1995

Mr. Harry Thompson
Chief, Vehicle Division
Office of Vehicle Safety Compliance
National Highway Traffic Safety
Administration
400 Seventh Street, S. W.
Washington, D.C. 20590

Dear Mr. Thompson:

Reference: NSA-31CCa/IR 1626

This is in response to your letter of August 3, 1995, requesting information relative to possible FMVSS 208 testing by OVSC of a 1996 model year Lincoln Town Car equipped with a driver and passenger air bag restraint system. Ford's responses to your several requests for information are given below. For your convenience, each request is listed followed by Ford's response.

Request No. 1

"Please inform OVSC whether the air bag automatic restraint systems provided at the driver's and passenger's seating positions in your vehicle are certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1(c)(2) for FMVSS No. 208. "

Response

The air bag automatic restraint system provided at the driver's and passenger's seating positions of the 1996 Lincoln Town Car was installed to meet the requirements of S4.1.2.1(c)(2) of FMVSS 208.

Request No. 2

"If the automatic restraint systems provided at the driver's and passenger's seating positions in the subject vehicle was installed to meet the requirements of S4.1.2.1(c)(1), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., moving barrier lateral impact and dynamic rollover) and a copy of the certification reports for the frontal/angular barrier impact test required by S4.1.2.1."

September 11, 1995

Response

The automatic restraint system provided at the driver's and passenger's seating positions was not installed in the 1996 Lincoln Town Car to meet the requirements of S4.1.2.1(c)(1).

Request No. 3

"If a manual 3-point safety belt is provided with the driver's automatic restraint system in order to meet the requirements of S4.1.2.1(c)(2), please provide a copy of the certification test reports for each of the test configurations required by that section of the standard (i.e., frontal/angular barrier impact test of the automatic restraint system with the manual safety belt unfastened and frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened)."

Response

The manual 3-point safety belt[s] provided with the driver's [and passenger's] air bag restraint system[s] in the 1996 Lincoln Town Car were installed to meet the requirements of S4.1.2.1(c)(2) of FMVSS No. 208. Attachment I contains a copy of those portions of the final test report for Crash Test 9167, a 90 degree front fixed barrier impact tests with the manual safety belts unfastened, relevant to S4.1.2.1(c)(2). Attachment II contains a copy of those portions of the final test report for Crash Test 9158, a 90 degree front fixed barrier impact test with the manual safety belts fastened, relevant to S4.1.2.1(c)(2). These tests were of 1995 model year Lincoln Town Cars, which, for purposes of compliance to FMVSS No. 208, are essentially identical to the 1996 model year; accordingly, Ford relied on the results of these tests as a basis for certifying compliance of 1996 Lincoln Town Car vehicles equipped with driver's and passenger's air bag restraint systems with S4.1.2.1. For the belted tests, compliance at 30 mph is based on results of the 35 mph belted tests and engineering judgment.

Request No. 4

"If the manual safety belt provided at the driver's and passenger's seating positions was not installed to meet the requirements of S4.1.2.1(c)(2), please provide a copy of a crash test report or engineering analysis showing that the use of the manual safety belt with the automatic restraint system does not affect the ability of the vehicle to meet the requirements of FMVSS No. 208."

Response

As stated in our response to Request No. 3, the manual safety belts provided at the driver's and passenger's seating positions of the 1996 Lincoln Town Car were installed to meet the requirements of the S4.1.2.1(c)(2) of FMVSS No. 208.

Request No. 5

"If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.1."

Response

The 1996 Lincoln Town Car does not use a pressure vessel to inflate the driver and passenger air bags.

September 11, 1995

Request No. 6

"If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.2."

Response

Attachment III contains the engineering analyses and the related Morton and TRW test reports demonstrating compliance to S9.2 of FMVSS No. 208 for the driver and passenger air bag restraint systems for the 1995 Lincoln Town Car. Since these air bag systems are carryover for the 1996 Lincoln Town Car, compliance to S9.2 is based upon these test results.

Request No. 7

"State, for any safety belt system in this vehicle, whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7.4.2, if the tension-relieving device is used."

Response

Tension-relieving devices are not used in 1996 Lincoln Town Car manual safety belt systems.

Request No. 8

"FMVSS No. 208, S8.1.5 allows the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were opened or closed for the certification tests."

Response

Frontal crash tests upon which Ford relies as a basis for certification of 1996 Lincoln Town Car vehicles were conducted with all moveable windows fully open. 1996 Lincoln Town Car vehicles do not have moveable vent windows, either as standard or optional equipment.

Request No. 9

"FMVSS No. 208, S5.1 provides a manufacturer with the option of using either a Part 572(B) or Part 572(E) test dummy. Please inform OVSC which test dummy was used in each seat for each certification test. Submit dummy placement measurements, including diagrams or photographs which show exactly where measurements were taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use the dimension shown in the diagram to provide the individual dummy placement measurements.

State whether the vehicle has a foot rest for the driver.

If the vehicle can be equipped with a split front bench seat, state whether the driver dummy was located so that the midsagittal plane was centered on the steering wheel rim or the center of the seat cushion. Also, state whether the passenger dummy was located so that the midsagittal plane was centered the same distance from the longitudinal centerline of the vehicle as the driver dummy or in the center of the seat cushion."

September 11, 1995

Response

Part 572(E) (Hybrid III) test dummies were used at both front outboard designated seating positions of the test vehicles in those front barrier crash tests on which Ford relies as a basis for certification of 1996 Lincoln Town Car vehicles to FMVSS No. 208. Attachment IV contains dummy placement measurements applicable to the 1996 Lincoln Town Car.

The 1996 Lincoln Town Car does have a foot rest for the driver only.

The 1996 Lincoln Town Car is equipped with a split front bench seat. For this vehicle, both the driver and passenger dummies were positioned so that the midsagittal plane was in the center of the seat cushion.

Request No. 10

"Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating configuration, steering column or fuel tank are available on this vehicle, provide separate information for each."

Response

Attachment V contains the NHTSA form enclosed with your letter completed with the requested seat positioning, steering column positioning, and fuel tank data applicable to FMVSS No. 208 front barrier impact testing of the 1996 Lincoln Town Car.

Request No. 11

"If the vehicle is equipped with adjustable seat belt anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant."

Response

The 1996 Lincoln Town Car is equipped with adjustable seat belt anchorages. The nominal design position of the D-ring for the 50th percentile adult male occupant is in the mid position.

Request No. 12

"Provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression for the Part 572(E) dummy and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.2.1. In addition, include each dummy's head and chest acceleration versus time plots and femur load versus time plots for the full frontal barrier impact tests."

Response

The spreadsheet contained in Attachment VI includes the speed at impact, vehicle test weight, and injury criteria values recorded in compliance tests of the Lincoln Town Car to the requirements of FMVSS No. 208, S4.1.2.1. These tests were of 1995 model year Town Cars, which, for purposes of compliance to FMVSS No. 208, are essentially identical to the 1996 model year, as indicated previously. Attachment VII contains resultant head and chest acceleration versus time plots and femur loads versus time plots for each dummy for Crash Tests 8994 and 9020. These plots together with the plots from Crash Tests 9158 and 9167 which were provided in response to Request No. 3, represent all the full front barrier (90 degree) impact tests that were used as a basis to certify the 1996 Lincoln Town Car to FMVSS No. 208.

September 11, 1995

Request No. 13

"When vehicle components must be removed to obtain the proper test weight, what components do you recommend for removal and in what priority order do you recommend removal?"

Response

The following is a suggested list of items which may be removed from the test vehicle for frontal FMVSS No. 208 testing. The list below is in order of removal priority:

- ◇ Rear Seat
- ◇ Spare tire, trunk contents and trim
- ◇ Rear bumper
- ◇ Deck lid

All onboard instrumentation should be included in the vehicle test weight

Request No. 14

"Please provide FMVSS No. 204, "Steering Control Rearward Displacement" certification data. Include a copy of the test report and any engineering analysis forming the basis of the certification. The report should document the vehicle test weight, impact velocity, and the horizontal and vertical displacements of the steering control. Pre and post test photographs are also requested.

Discuss the test procedure detailing the vehicle preparation and the measurement technique used to determine the steering control rearward displacement.

Provide a diagram of the steering control system and describe how the components of the steering control system work to provide energy management in a frontal impact."

Response

The front end structure and steering column system for the 1996 Lincoln Town Car are essentially the same as prior model years. Therefore, based on prior model year testing (1991 Lincoln Town Car Crash Test Report 7589), compliance for all models is by engineering judgment for FMVSS No. 204. A copy of Crash Test Report 7589 with pre and post test photographs was submitted in IR 1290/NEF-31CCa dated September 7, 1993.

This test was conducted using Ford Engineering Test Procedure ST-14 (January 16, 1989). This test procedure was also previously provided to the agency in response to IR 1290. FMVSS No. 204 does not contain any requirements for the steering control system "to provide energy management." Rather, as the agency is aware, the standard sets a limit on the allowable rearward displacement of the upper end of the column. Ford does not have available any description or diagram describing the vehicle and column characteristics which serve to enable compliance with FMVSS No. 204 and must therefore respectfully decline to submit a description of this operation.

Request No. 15

"Inform OVSC if these vehicles have built-in child restraints either as standard equipment or optional equipment. If they do, identify the type of restraint (i.e., 5-point harness, T-shield, or other), and provide a copy of the certification test reports and any engineering analysis forming the basis for certification to FMVSS No. 213, "Child Restraint Systems."

Mr. Harry Thompson

6

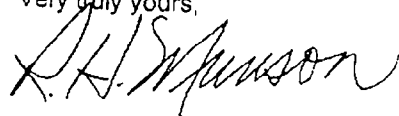
September 11, 1995

Response

Built-in child restraints are not available on the 1996 Lincoln Town Car vehicles.

We believe the information and test reports contained herein are otherwise fully responsive to your request. If you have any questions, please call Mr. R.A. Nevi on (313) 594-7688.

Very truly yours,

A handwritten signature in dark ink, appearing to read "R.H. Munson", written in a cursive style.

R.H. Munson

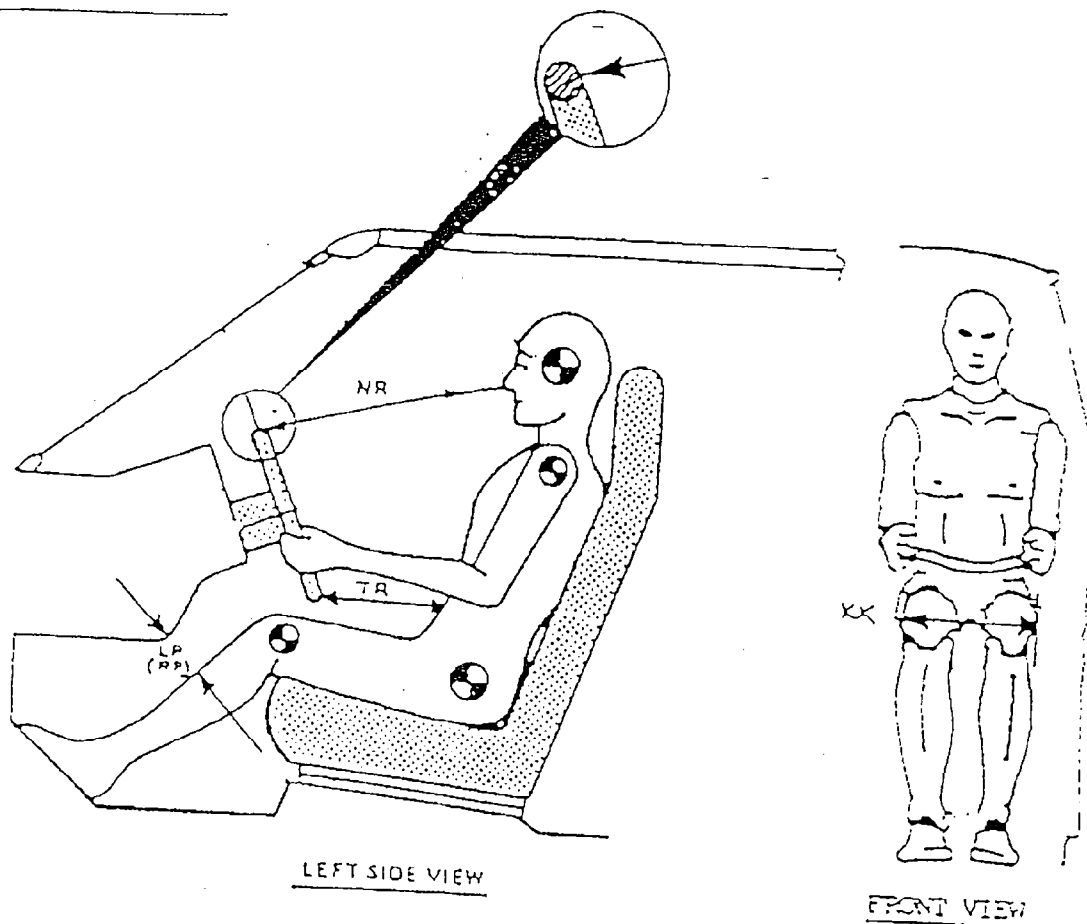
Attachments

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

1996

VEHICLE LINCOLN TOWN CAR

IR# 1626

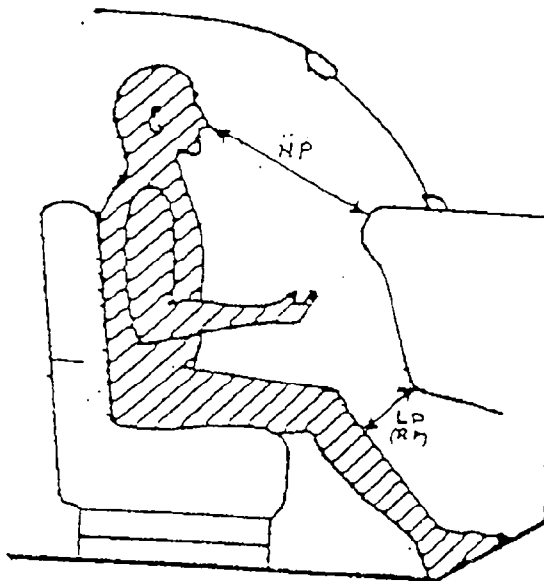


MEASUREMENTS (All distances in inches)		
	TARGET	RANGE
NR Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	14.6	13.4 - 17.8
TR Horizontal distance from bottom rear surface of steering wheel rim to dummy's torso	6.5	5.8 - 7.4
LP Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface	3.8	2.6 - 4.6
RP Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface	3	2 - 3.6
XX Distance between outside surfaces of dummy's legs measured at the knee bolts	9.6	9.2 - 10.6

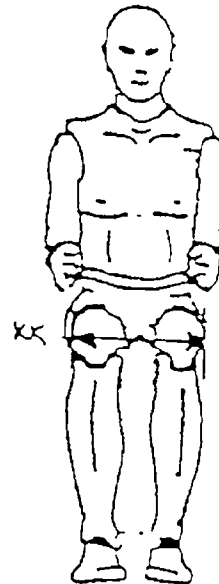
PASSENGER DUMMY PLACEMENT REFERENCE DIMENSIONS
1996

VEHICLE LINCOLN TOWN CAR

IR# 1626



RIGHT SIDE VIEW



FRONT VIEW

		MEASUREMENTS (All distances in inches)	
		TARGET	RANGE
NP	Distance from tip of dummy's nose to closest point on surface of instrument panel	23	22.1 - 23.9
LP	Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface	2.6	2 - 3.5
RP	Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface	3.0	2.5 - 3.7
XX	Distance between outside surfaces of dummy's legs measured at the knee bolts	N/A	- N/A

TEST VEHICLE INFORMATION

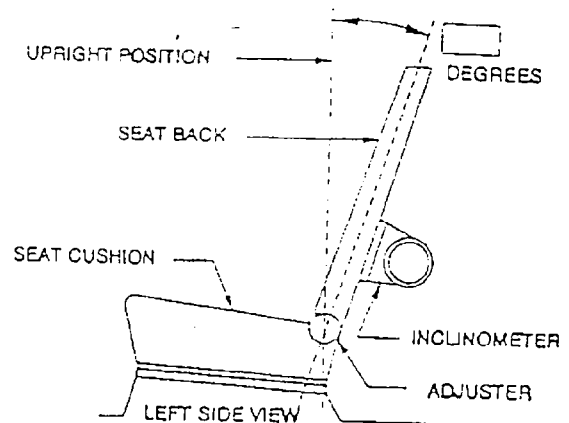
Vehicle Model Year & Make: 1996 Lincoln
Vehicle Model & Body Style: Town Car - 4 Door Sedan

1. NOMINAL DESIGN RIDING POSITION - -

For adjustable driver and passenger seat backs.
Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable. Indicate, if applicable, how the detents are numbered (Is the first detent "0" or "1"?). Indicate if the seat back angle is measured with the dummy in the seat.

Seat back angle for driver's seat = * degrees.
Measurement Instructions:

* See Attached Sheet



Seat back angle for passenger's seat = * degrees.
Measurement Instructions:

* See Attached Sheet

2. SEAT FORE & AFT POSITIONS - -

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, indicate how the detents are numbered (Is the first detent "0" or "1"?). Provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat:

Reference points are chosen on the seat and the seat track. total seat travel
is measured and the seat is then positioned at the center of seat travel.

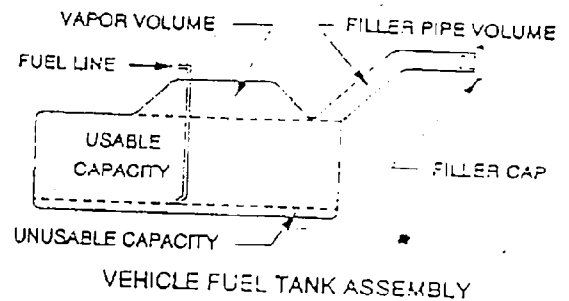
Positioning of the passenger's seat (if applicable):

Same method as for driver.

Rev. 7/11/94

3. FUEL TANK CAPACITY DATA --

- 3.1 A. "Usable Capacity" of standard equipment fuel tank = 20 gallons.
- B. "Usable Capacity" of optional equipment fuel tank = N/A gallons.
- C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 20 gallons.



Operational Instructions:

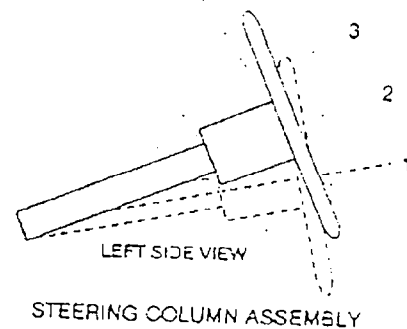
- 3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 19 gallons
- 3.3 Is vehicle equipped with electric fuel pump? X YES NO
If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.
See note below.

4. STEERING COLUMN ADJUSTMENTS --

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

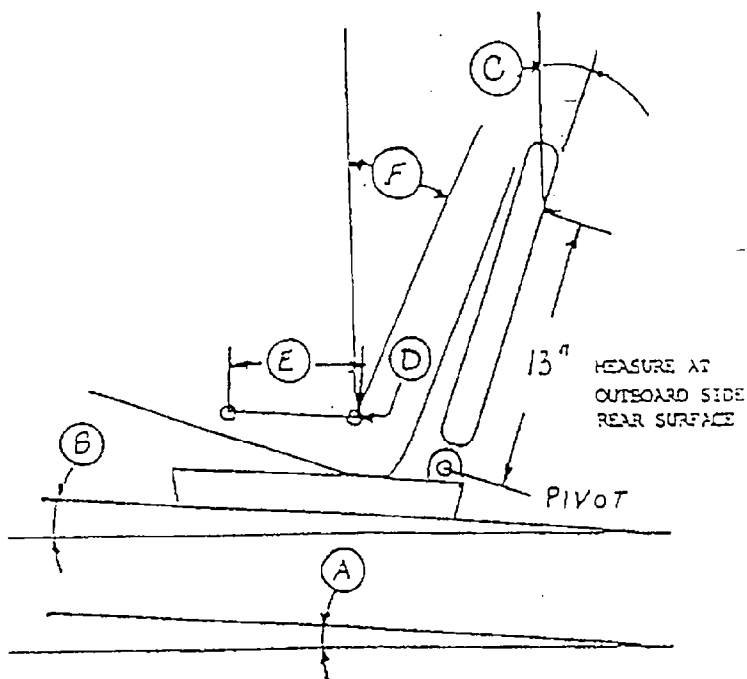
Operational Instructions:

Adjustable steering columns are positioned in
the center detent for FMVSS No. 206 testing.



NOTE: Electric Fuel Pump Operation

The electric fuel pump operates for 2 (two) seconds to pressurize the fuel system following actuation of the ignition. If no attempt has been made to start the engine within 2 (two) seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls, the fuel pump is inactivated. Also, if the vehicle sustains an impact (e.g., in an accident) a fuel pump shut-off switch is tripped.



- A - SILL ANGLE
 B - DESIGN CUSHION FRAME ANGLE
 C - DESIGN SEAT BACK FRAME ANGLE
 D - REARMOST 'H' POINT
 E - TRACK TRAVEL
 F - MANIKIN BACK ANGLE

95 EN114/FN116 TOWN CAR/CR.VIC/G.M.
 SPLIT BENCH SEAT (MANUAL TRACK)
 DRAWING

SILL ANGLE	0 DEG-30' DEG
DESIGN CUSHION FRAME ANGLE	7 DEG
DESIGN SEAT BACK FRAME ANGLE	20.7 DEG
MANIKIN BACK ANGLE	25 DEG +/- 2
R/M HORIZONTAL "H"PT. LOC.	3223.5 +/- 15
R/M VERTICAL "H"PT. LOCATION	688 +/- 15
TRACK TRAVEL	250 mm

95 EN114/FN116 TOWN CAR/CR.VIC/G.M.
 SPLIT BENCH SEAT (POWER TRACK)
 DRAWING

SILL ANGLE	0 DEG-30' DEG
DESIGN CUSHION FRAME ANGLE	7 DEG
DESIGN SEAT BACK FRAME ANGLE	20.7 DEG
MANIKIN BACK ANGLE	25 DEG +/- 2
R/M HORIZONTAL "H"PT. LOC.	3217.6 +/- 15
R/M VERTICAL "H"PT. LOCATION	689 +/- 15
TRACK TRAVEL	254 mm