

REPORT NO. 208-MGA-97-003  
212-MGA-97-003  
301-MGA-97-003

11498

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  
1997 Econoline Van E150  
NHTSA NO. CV0212

MGA RESEARCH CORPORATION  
5000 WARREN ROAD  
BURLINGTON, WI 53105



Test Date: November 7, 1996

Report Date: January 13, 1997

Final Report

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
SAFETY ASSURANCE  
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3/24/97  
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16. Abstract  Compliance tests were conducted on the subject 1997 Ford Econoline Van E150 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP208-09 on November 7, 1996 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	
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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 MGA Research Corporation (MGA) under Contract No. DTNH22-93-D-21089. The purpose of this test was to determine whether the subject vehicle, a 1997 Ford Econoline Van E150, NHTSA No. CV0212, 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 (ATDs). The dummies were positioned in the front outboard 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; a chest potentiometer to measure longitudinal deflection; lower leg load cells to measure tibia forces and moments; and left and right femur load cells to measure axial forces.

The fifty-one (51) data channels were multiplexed and recorded on six 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 November 7, 1996.

The test vehicle, a 1997 Ford Econoline E150 Van, NHTSA No. CV0212, 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 5455 pounds. The vehicle's impact speed was 29.1 mph. The vehicle's maximum static crush was 15.5 inches.

The driver's HIC was 263. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 47.3 g's. The driver's chest maximum deflection was 1.2 inches. The driver's left and right femur maximum compressive forces were 1393 pounds and 1401 pounds, respectively.

The right front passenger's HIC was 147. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 44.6 g's. The right front passenger's chest maximum deflection was .5 inches. The right front passenger's left and right femur maximum compressive forces were 1226 pounds and 1593 pounds, respectively.

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

Following the impact, not fluid spilled from the vehicle's fuel system prior or during the static rollover test.

TEST NOTES

1. The driver dummy's hand was outside the plane of the vehicle window following the impact.

TABLE 1 CRASH TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Type: Frontal Barrier Impact

Test Date: 11/07/96 Time: 2:25 p.m. Temp: 70°F

Vehicle Test Weight: 5455 lbs. Vehicle/Barrier Impact Angle: 0°

Impact Velocity: 29.1 mph Maximum Static Crush: 15.1 inches

Vehicle Rebound: 14.4 inches

Dummies:	Driver	Passenger
Dummy Type	<u>Part 572E</u>	<u>Part 572E</u>
Serial Number	<u>340</u>	<u>312</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: Opened Left Rear: N/A  
Right Front: Opened Right Rear: N/A

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

Visible Dummy Contact Points:	Driver	Passenger
Head	<u>Airbag, seatback</u>	<u>Airbag, seatback</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash</u>	<u>Dash</u>

TABLE 2 GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

NHTSA No: CV0212 VIN: 1FTEE1460VHA13741 Body Color: White

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

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

Date Received: 9/20/96; Odometer Reading: 20 miles

Dealer's Name/Address: Miller Ford-Mercury, Inc.  
2421 S. Milwaukee Aveune  
Burlington, WI 53105

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Ford Motor Company

Date of Manufacture: 8/96; VIN: 1FTEE1460VHA13741

GVWR: 6700 lbs; GAWR Front: 3240 lbs. GAWR Rear: 3800 lbs.

DATA FROM TIRE PLACARD:

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

Recommended Tire Size: P235/75R15

Recommended Cold Tire Pressure: Front 35 psi; Rear 41 psi

Tires on Vehicle: P235/75R15; Manufacturer: Goodyear

Type of Spare Tire: Standard

Number of Occupants: 2 Front;    Rear;    3rd Seat; 2 TOTAL

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

Type of Front Seat Back:    Fixed; X Adj. With X Lever;    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 = 1360 lbs                      Right Rear = 1067 lbs

Left Front = 1350 lbs                      Left Rear = 1047 lbs

TOTAL FRONT WEIGHT = 2710 lbs ( 56.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2114 lbs ( 43.8 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 4824 lbs

CALCULATION FOR TARGET TEST WEIGHT:

UDW (Unloaded Delivered Weight) = 4824 lbs

VCW (Vehicle Capacity Weight) = 1876 lbs

DSC (Designated Seating Capacity) = 2

RCLW\*(Rated Cargo/Luggage Weight) = VCW - 150 (DSC) = 1876 - 150 (2) = 300 lbs

Target Test Weight = UDW + RCLW + (2 Dummies x Dummy Weight)

Target Test Weight = 4824 + 300 + 344 = 5468 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO WEIGHT:

Right Front = 1476 lbs                      Right Rear = 1303 lbs

Left Front = 1399 lbs                      Left Rear = 1277 lbs

TOTAL FRONT WEIGHT = 2875 lbs ( 52.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2580 lbs ( 47.3 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 5455 lbs

Weight of ballast secured in vehicle = 125 lbs

Vehicle components removed to meet target weight or to install instrumentation:

Jack assembly, hub caps, and rear bumper cover

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:                      RF 32.7    LF 33.1    RR 34.3    LR 34.5

Fully Loaded Attitude:                      RF 32.2    LF 32.6    RR 33.3    LR 33.5

Test Attitude:                              RF 32.4    LF 32.8    RR 32.8    LR 33.1

Wheel Base: 138.0 in.;    C.G. = 65.3 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: 11/07/96                      Time: 2:25 p.m.                      Temperature: 70° F  
Vehicle NHTSA No.: CV0212                      VIN: 1FTEE1460VHA13741

BARRIER IMPACT VELOCITY

Required Impact Velocity Range:    28.9 to 29.9 mph  
Impact Velocity:            Primary = 29.1 mph; Secondary = 29.2 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 <u>212.0</u>	C <sub>L</sub> <u>217.0</u>	L <u>212.1</u>
	Post-test	= R <u>200.2</u>	C <sub>L</sub> <u>201.9</u>	L <u>200.9</u>
	Crush	= R <u>11.8</u>	C <sub>L</sub> <u>15.1</u>	L <u>11.2</u>
	Average	= <u>12.7</u>		

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

R 13.7 in            C<sub>L</sub> 15.5 in            L 14.2 in

TABLE 4 ACCIDENT INVESTIGATION DIVISION DATA

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Veh. NHTSA No.: CV0212; VIN: 1FTEE1460VHA13741

Build Date: 8/96; Test Date: 11/07/96

Veh. Size Category: Full size van; Test Weight: 5455 lbs

Veh. Wheelbase: 138.0 in; Front Overhang: 29.8 in;

Overall Width: 77.8 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 = 11.2 inches

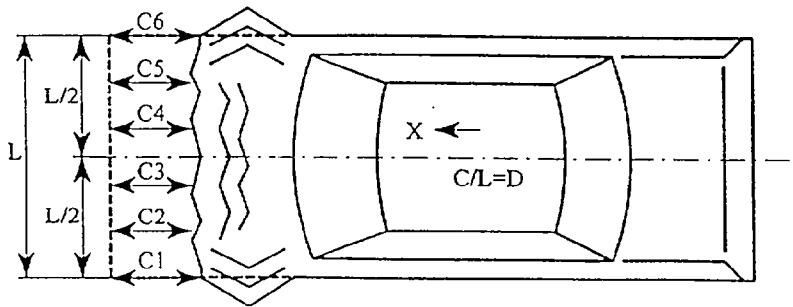
Dimensions: C2 = 12.6 inches

C3 = 14.6 inches

C4 = 14.9 inches

C5 = 13.5 inches

C6 = 11.9 inches



Midpoint of Damage: D = Vehicle Longitudinal Centerline

Length of Damaged Region: L = 70.3 inches

TABLE 5 POST TEST AIRBAG DATA

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

NHTSA No: CV0212; Test Date: 11/07/96; Technician: Chris Novak

- A. No of Vent Holes: Driver 2; Passenger 2
- B. Size of Vent Holes: Driver .6 in. dia.; Passenger 1.7 in. dia.
- C. Total Vent Area: Driver .6 in<sup>2</sup>; Passenger 4.5 in<sup>2</sup>
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
- |            |                      |                     |                         |
|------------|----------------------|---------------------|-------------------------|
| Driver;    | Length <u>N/A</u> ;  | Width <u>N/A</u> ;  | Diameter <u>23.6 in</u> |
| Passenger; | Length <u>27.0</u> ; | Width <u>18.9</u> ; | Diameter <u>N/A</u>     |

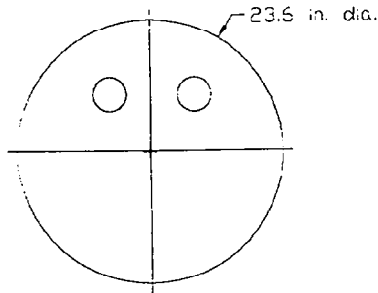
E. Is the Airbag Tethered?

Driver;  Yes;  No; If yes, record length of tether 9.5 in

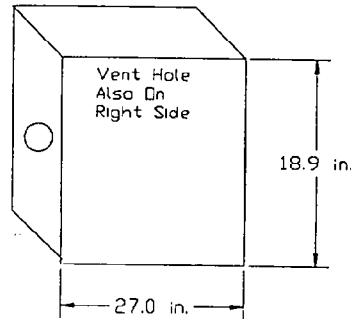
Passenger;  Yes;  No; If yes, record length of tether \*

\* The bag had external tethers on the upper and lower surfaces: Upper 9 in.  
Lower 21 in.

Driver Airbag



Passenger Airbag



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

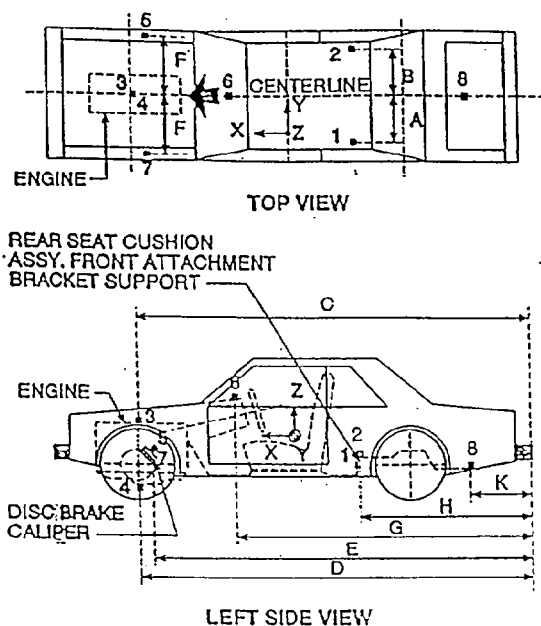
Driver; Mfr Morton; Airbag 170673R; Gen 1ZQB215J20147

Passenger; Mfr Morton; Airbag Unknown; Gen FDN882330084

TABLE 6 VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212; Test Date: 11/07/96



ACCELEROMETER LOCATION (inches)		
	PRE-TEST	POST-TEST
A	24.0	24.0
B	24.0	24.0
C	163.1	163.0
D	172.8	172.6
E	181.3	179.3
F	29.3	28.7
G	164.3	164.3
H	127.0	127.0
K	15.7	15.7

ACCELEROMETER DATA SUMMARY					
No.	DESCRIPTION	MAXIMUM (g's)	TIME (msec)	MINIMUM (g's)	TIME (msec)
1	Left Rear Seat Crossmember	2.2	103	-38.7	16
2	Right Rear Seat Crossmember	1.6	120	-37.9	15
3	Top of Engine Block	3.9	68	-44.5	43
4	Bottom of Engine	3.8	116	-48.9	54
5	Right Disc Brake Caliper	14.7	45	-79.6	14
6	Instrument Panel	65.9	45	-56.4	37
7	Left Disc Brake Caliper	9.8	52	-76.0	15
8	Trunk	37.0	10	-44.5	15

TABLE 7 REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

Contract Number: DTNH22-93-D-21089

From: MGA Research Corporation To: Mr. Charles Case, COTR  
5000 Warren Road Office of Vehicle Safety Compliance  
Burlington, WI 53105

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: 1997/Ford/Econoline/E150 Van  
Vehicle NHTSA No.: CV0212 Body Color: White  
VIN: 1FTEE1460VHA13741 Cost: \$21,395.00  
Odometer: Arrival Date: 9/20/96 Reading: 20 miles  
Completion Date: 11/11/96 Reading:     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: P235/75R15; Manufacturer: Goodyear

Air Conditioner	<u>No</u>	Console	<u>Yes</u>	Brakes	<u>Power</u>
Tinted Glass	<u>Yes</u>	Tachometer	<u>No</u>	Front	<u>Disc</u>
Power Steering	<u>Yes</u>	Cruise Control	<u>No</u>	Rear	<u>Drum</u>
Power Windows	<u>No</u>	Rear Window Def.	<u>No</u>	Front Seats	<u>Bucket</u>
Power Door Locks	<u>No</u>	Sun/Moon Roof	<u>No</u>	Seat Type	
Radio	<u>Yes</u>	T-Top	<u>No</u>	Front	<u>Manual</u>
Clock	<u>Yes</u>	Tilt Steering Wheel	<u>No</u>	Rear	<u>None</u>
Roof Rack	<u>No</u>	Other Options:	<u>Heavy Duty</u>	No. of Seats	<u>Two</u>
			<u>Handling Package</u>		

Equipment that is no longer on the vehicle as noted above: Side mirrors

Explanation:

Items removed for testing.

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: 1997/Ford/Econoline/E150 Van

Veh. NHTSA No.: CV0212 Test Date: 11/07/96

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #340	PASSENGER DUMMY #312
Head Channel X	-41.2	-26.7
Head Channel Y	-14.4	-56.3
Head Channel Z	25.6	-35.2
HEAD RESULTANT	44.3	58.9
Chest Channel X	-48.3	-41.7
Chest Channel Y	5.9	-8.1
Chest Channel Z	-12.3	-27.5
CHEST RESULTANT	48.7	45.7

HEAD INJURY CRITERIA (HIC)  
VALUES:

HIC	262.9	147.0
t <sub>1</sub> = (msec)	61.3	64.8
t <sub>2</sub> = (msec)	97.3	100.8

[The maximum time interval from t<sub>1</sub> to t<sub>2</sub> is 36 milliseconds.]

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

CLIP	47.3	44.6
t <sup>1</sup> = (msec)	78.8	75.8
t <sup>2</sup> = (msec)	81.9	78.9
CHEST DEFLECTION (in)	1.2	.5

TABLE 8 FMVSS 208 OCCUPANT INJURY CRITERIA (CONTINUED)

Veh. Yr./Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Veh. NHTSA No.: CV0212      Test Date: 11/07/96

MAX. COMPRESSIVE FEMUR FORCES: (lbs)	DRIVER DUMMY#403	PASSENGER DUMMY #401
Left Side	1393	1226
Right Side	1401	1593

TIBIA FORCES: (lbs)

Left Lower Tibia Force X	-204	-211
Left Lower Tibia Force Z	1024	491
Right Lower Tibia Force X	-210	-131
Right Lower Tibia Force Z	648	688

TIBIA MOMENTS: (in/lbs)

Left Lower Tibia Moment Y	462	-519
Left Upper Tibia Moment X	-294	-1102
Left Upper Tibia Moment Y	426	2216
Right Lower Tibia Moment Y	345	361
Right Upper Tibia Moment X	-358	-410
Right Upper Tibia Moment Y	-1236	1494

TABLE 9 DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver 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 driver dummy was restrained by the airbag. The dummy rebounded rearward into the seatback with the dummy's head contacting the seatback. 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 and airbag. 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 with the dummy's head contacting 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: 1997/Ford/Econoline/E150 Van

NHTSA No.: CV0212; Date of Comfort/Convenience Check: 11/07/96

Technician Performing Check: Chris Novak

GVWR: 6700 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 .4 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 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

Veh. Yr./Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Veh. NHTSA No.: CV0212 Date of Check: 11/07/96

Technician Performing Check: Chris Novak

GVWR: 6700 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 6 seconds and the reminder light stayed on for 6 seconds.

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 was 0 seconds and the reminder light stayed on for 6 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 on the sunvisor.

The airbag system is required to be inspected after a collision or if the indicator light does not function correctly.

Appropriate instructions concerning maintenance and/or replacement of this system were provided in the owner's manual on page 60.

TABLE 11 FMVSS 208 EQUIPMENT DATA (Cont.)

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

A description of the functional operation of the system was provided in the owner's manual on page 59.

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 56-62.

FMVSS 208 READINESS INDICATOR DATA

The vehicle contained a crash-deployed occupant protection system which was not totally electrical. The readiness indicator was located on the lower left 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 61.

FMVSS 208 REAR OUTBOARD SEATING POSITION SEAT BELTS

Not Applicable

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

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

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

Rubber trim with glue retention

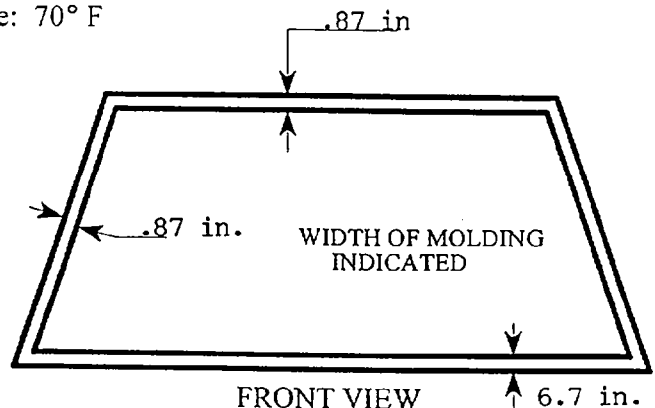
CLIPS OR BRACKETS USED TO RETAIN WINDSHIELD: None

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	97.4	97.4	100%
LEFT SIDE	97.4	97.4	100%
TOTAL	194.8	194.8	100%

Pre-Test Windshield Mounting Material Temperature: 70° F



FAILURE DETAILS: None

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

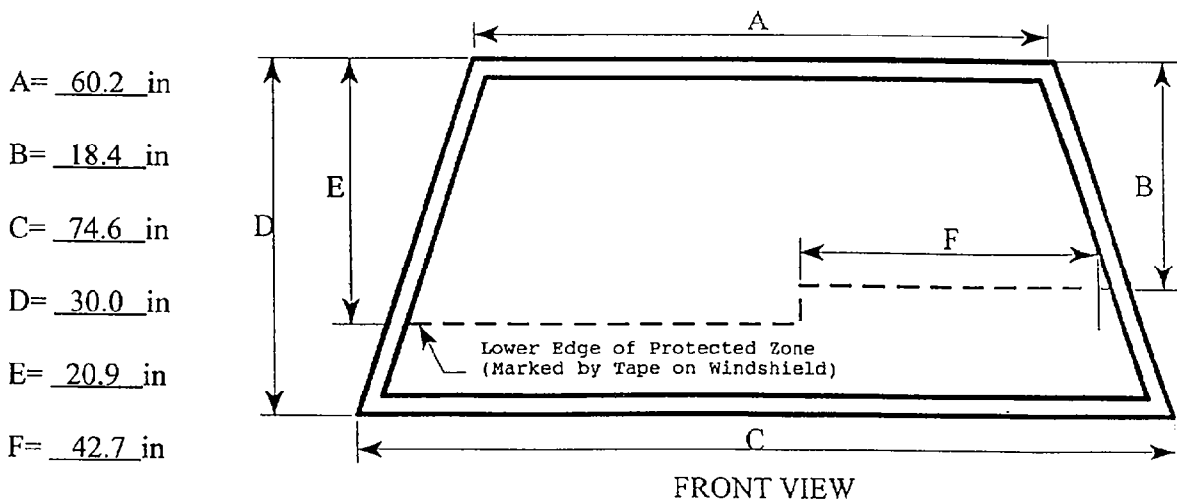
Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

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 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

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: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

Fuel System Capacity from Owner's Manual = 35.0 gallons

Usable Capacity Figure Furnished by COTR = 35.0 gallons

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

= 32.2 to 32.9 gallons

Actual Test Volume = 32.5 gallons

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

Kinematic Viscosity = 1.788 centistokes; Color = Purple

Type of Fuel Pump:  Electric;  Mechanical

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

Yes;  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: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

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

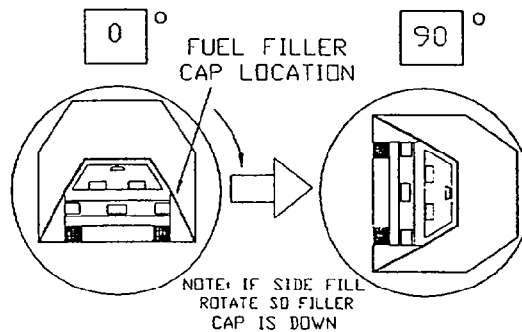
FUEL SPILLAGE LOCATION(S): None

TABLE 16 FMVSS 301 STATIC ROLLOVER TEST DATA

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

TEST PHASE: 0° - 90°



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time = 2 minutes 50 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 50 seconds

Next Whole Minute Interval = 8 minutes

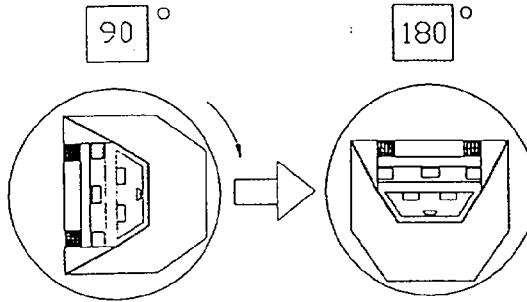
FUEL SPILLAGE MEASUREMENT:

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 35 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 35 seconds

Next Whole Minute Interval = 8 minutes

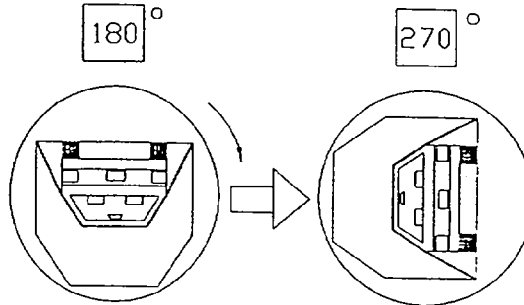
FUEL SPILLAGE MEASUREMENT:

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 25 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time = 5 minutes 0 seconds

TOTAL TIME = 7 minutes 25 seconds

Next Whole Minute Interval = 8 minutes

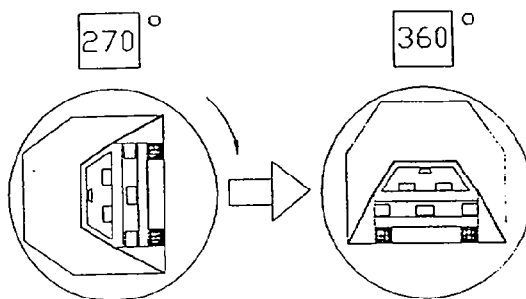
FUEL SPILLAGE MEASUREMENT:

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 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

SECTION 4  
OCCUPANT, VEHICLE, AND CAMERA INFORMATION

TABLE 17 SEAT AND STEERING COLUMN POSITIONING DATA

Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

NOMINAL DESIGN RIDING POSITION:

Driver Seat:            Seat Back Angle = 17.1°

Passenger Seat:        Seat Back Angle = 10.7° (Non-adjustable)

SEAT FORE AND AFT POSITIONS:

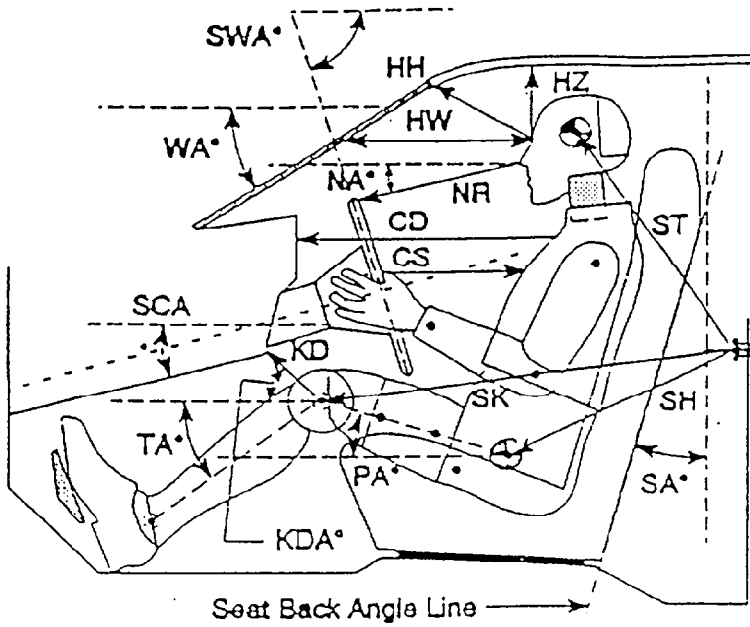
Driver Seat:            The seat track had a total position movement of 19 notches and was positioned 10 notches rearward from the foremost position with the forwardmost locking position as zero.

Passenger Seat:        The seat track had a total position movement of 15 notches and was positioned 8 notches rearward from the foremost position with the forwardmost locking position as zero.

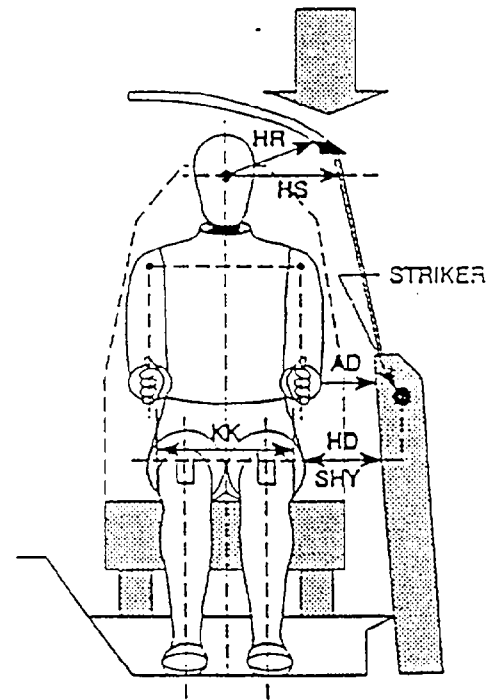
STEERING COLUMN ADJUSTMENTS:

The steering column was non-adjustable. The angle of the steering column was 21.3°.

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

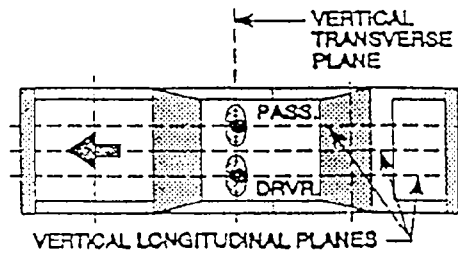


TABLE 18 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

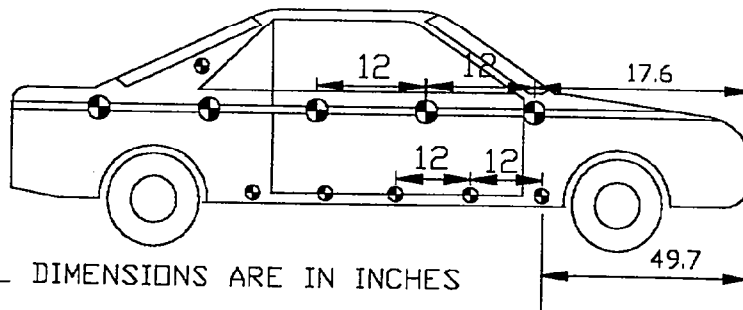
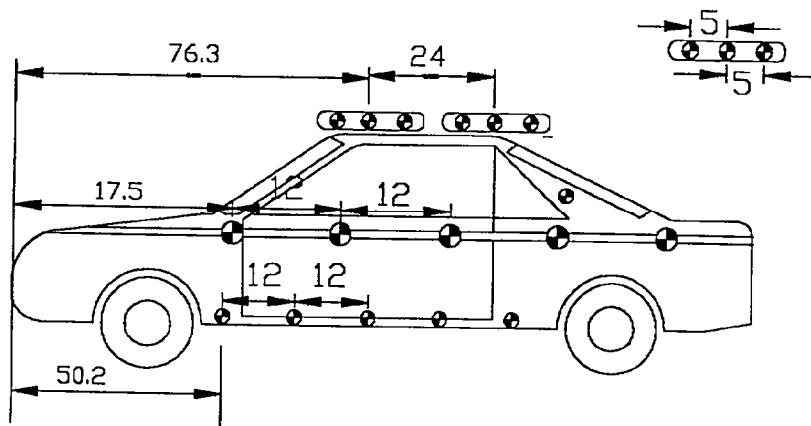
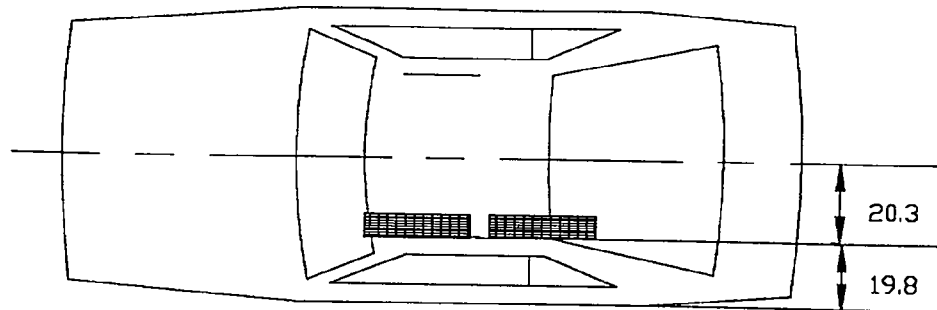
Vehicle Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

Vehicle NHTSA No.: CV0212 Test Date: 11/07/96

	DRIVER (Serial #403)	PASSENGER (Serial #401)
WA°	43.7°	43.7°
SWA°	68.4°	N/A
SCA°	21.3°	N/A
SA°	17.1°	10.5°
HZ	11.1 in	10.4 in
HH	18.3 in	18.7 in
HW	26.1 in	26.3 in
HR	13.1 in	12.6 in
NR	13.5 in Angle (NA) 13.2°	N/A
CD	22.4 in	20.8 in
CS	11.1 in	N/A
RA	6.9 in	N/A
KDL	6.3 in Angle (KDA) 17.9°	5.2 in
KDR	5.2 in	6.4 in Angle (KDA) 17.7°
PA°	24.1°	20.2°
TA°	50.3°	68.3°
KK	9.3 in	8.8 in
ST*	20.7 in Angle 80.4°	21.5 in Angle 77.3°
SK*	23.8 in Angle -8.0°	21.5 in Angle -5.6°
SH*	8.6 in Angle -34.0°	6.4 in Angle -50.0°
SHY	9.8 in	9.1 in
HS	14.9 in	14.9 in
HD	6.2 in	5.9 in
AD	4.7 in	4.9 in

\* measured from horizontal

FIGURE 2 VEHICLE TARGET LOCATIONS



ALL DIMENSIONS ARE IN INCHES

Steering Column Target

X = 54.1 from front of vehicle  
 Y = 20.0 from centerline  
 Z = 55.4 from floor of vehicle

FIGURE 3 CAMERA POSITIONS

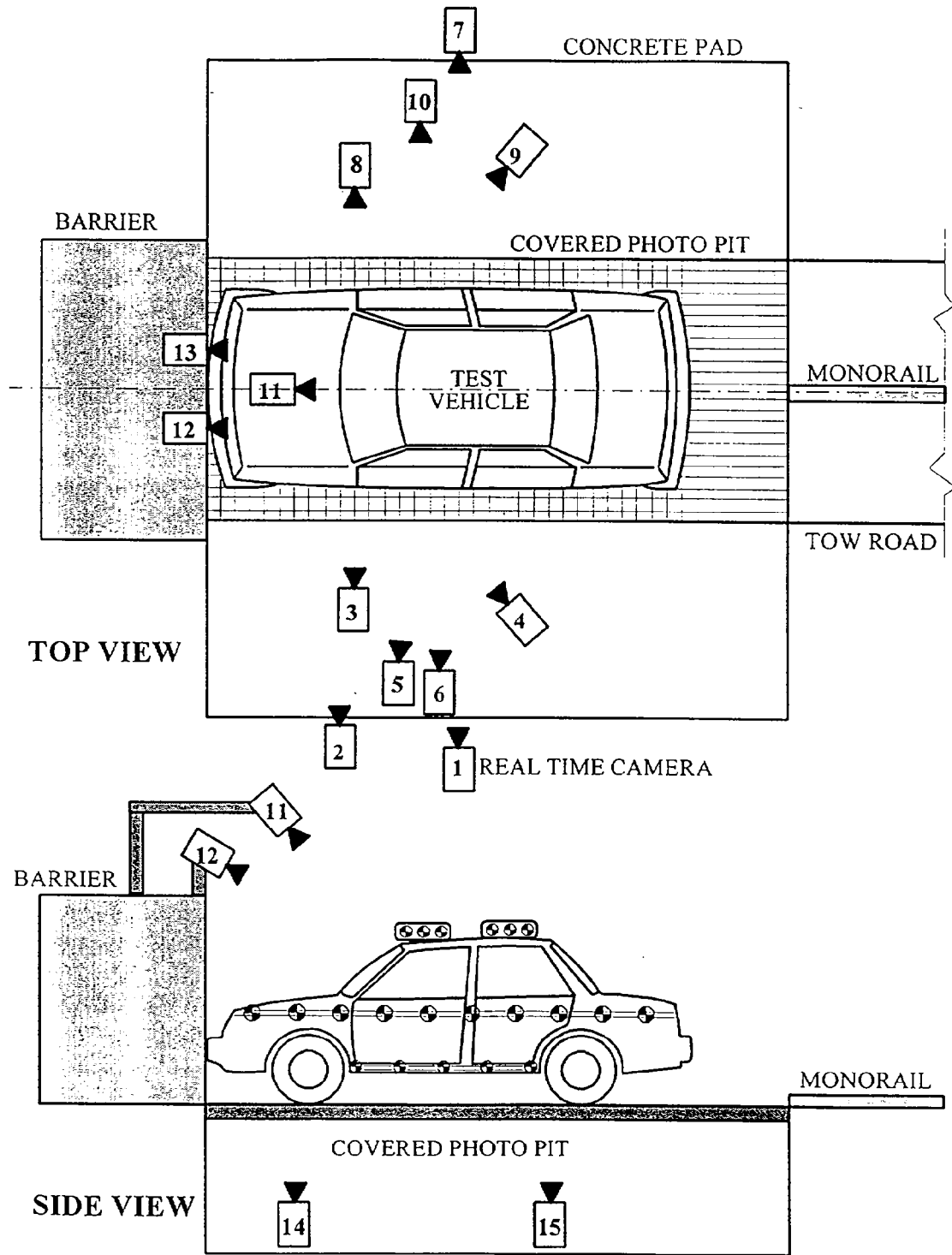


TABLE 19 CAMERA LOCATIONS

Veh. Year/Make/Model/Body Style: 1997/Ford/Econoline/E150 Van

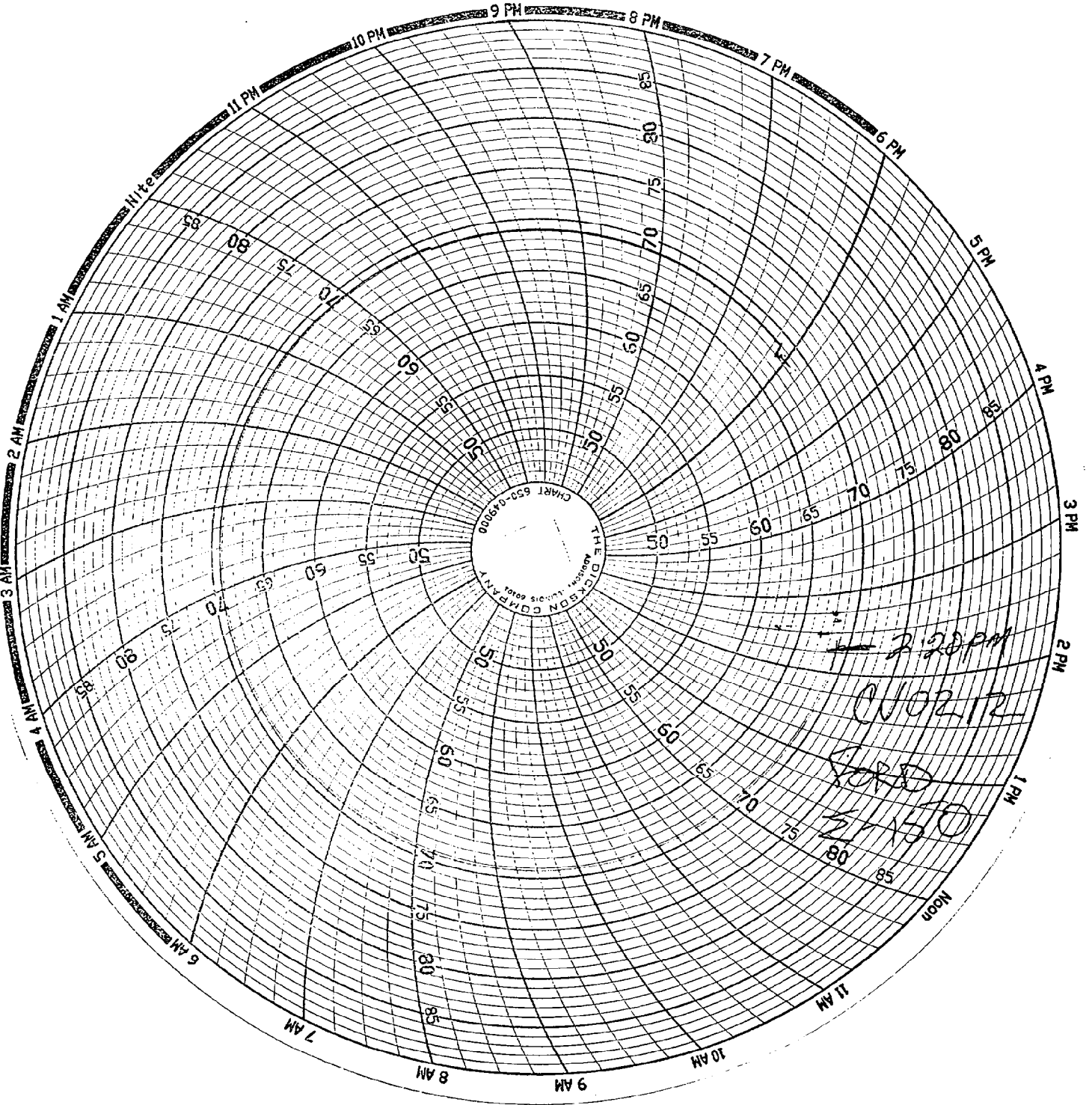
Vehicle NHTSA No.: CV0212 ; Test Date: 11/07/96

	VIEW	CAMERA POSITIONS (inches)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View						10	24
2	Left Front	-51.6	-353.1	61.4	90	-374.4	25	1000
3	Driver Close-up	-41.3	-405.1	59.1	90	-426.4	75	1076
4	Driver Angle Motion	-169.3	-185.0	82.9			50	1000
5	Steering Column Top	-76.4	-348.8	61.8	90	-370.1	25	1010
6	Steering Column Bottom	-75.6	-347.2	39.6	90	-368.5	25	645
7	Right Overall	-88.6	318.1	64.2	90	296.9	13	1020
8	Right Close-up	-35.4	407.5	67.7	90	386.2	75	885
9	Right Angle	-171.7	233.1	76.0			50	1176
10	Right Passenger	52.8	334.3	67.1	90	313.0	25	1020
11	Top Overall	7.5	0	102.0			8	893
12	Top Driver	7.1	-19.3	92.5			13	826
13	Top Passenger	8.7	20.5	91.7			13	1205
14	Pit Front	-48.0	0	125.0			13	1010
15	Pit Rear View	-115.4	0	123.6			13	1000

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

NR = Not Recorded

FIGURE 4 AIR PROBE TEMPERATURE



APPENDIX A  
PHOTOGRAPHS

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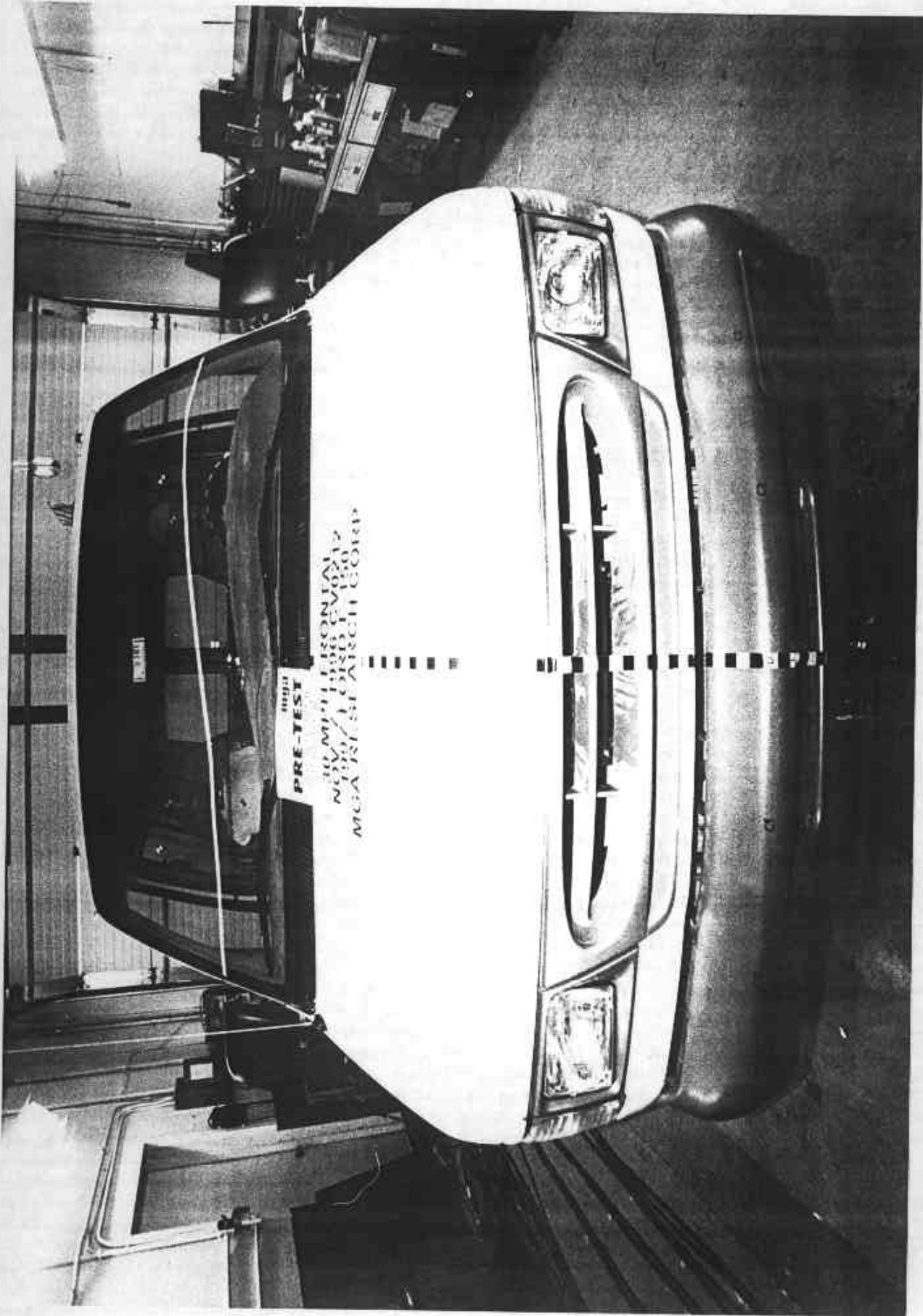
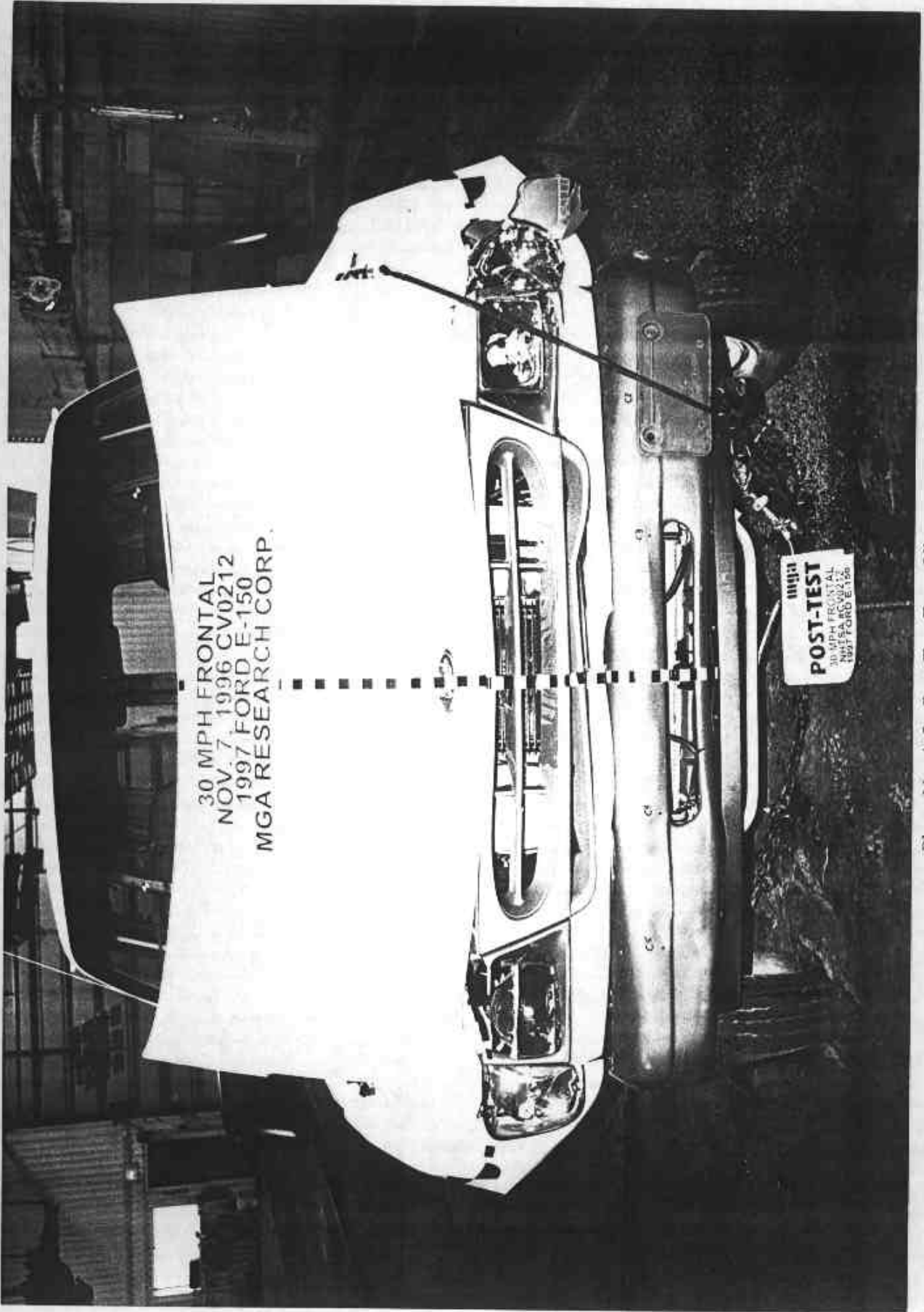


Photo No. A-1 - Pre-Test Front View

A-1



30 MPH FRONTAL  
NOV. 7 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

30 MPH  
**POST-TEST**  
30 MPH FRONTAL  
NOV. 7 1996 CV0212

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

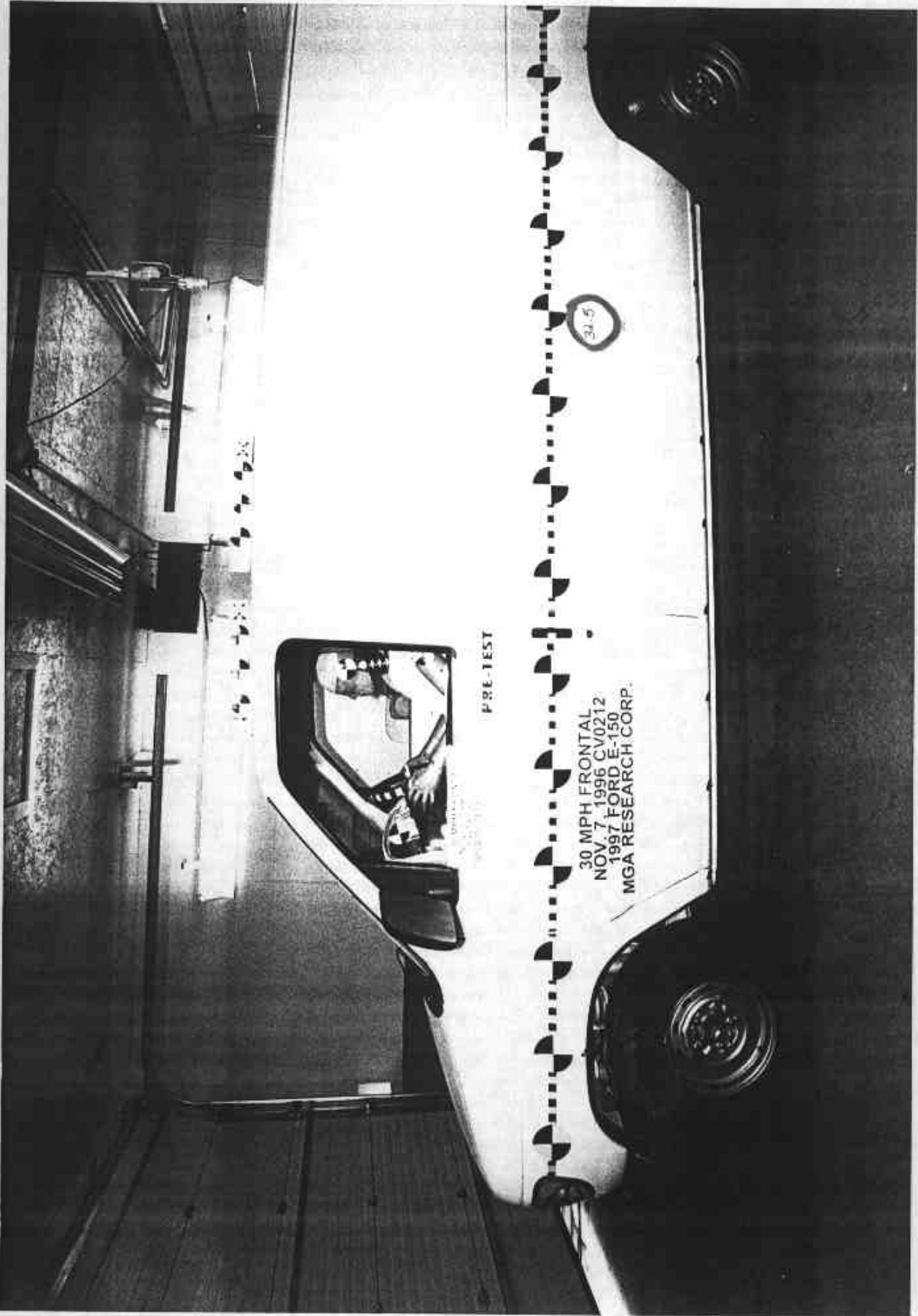
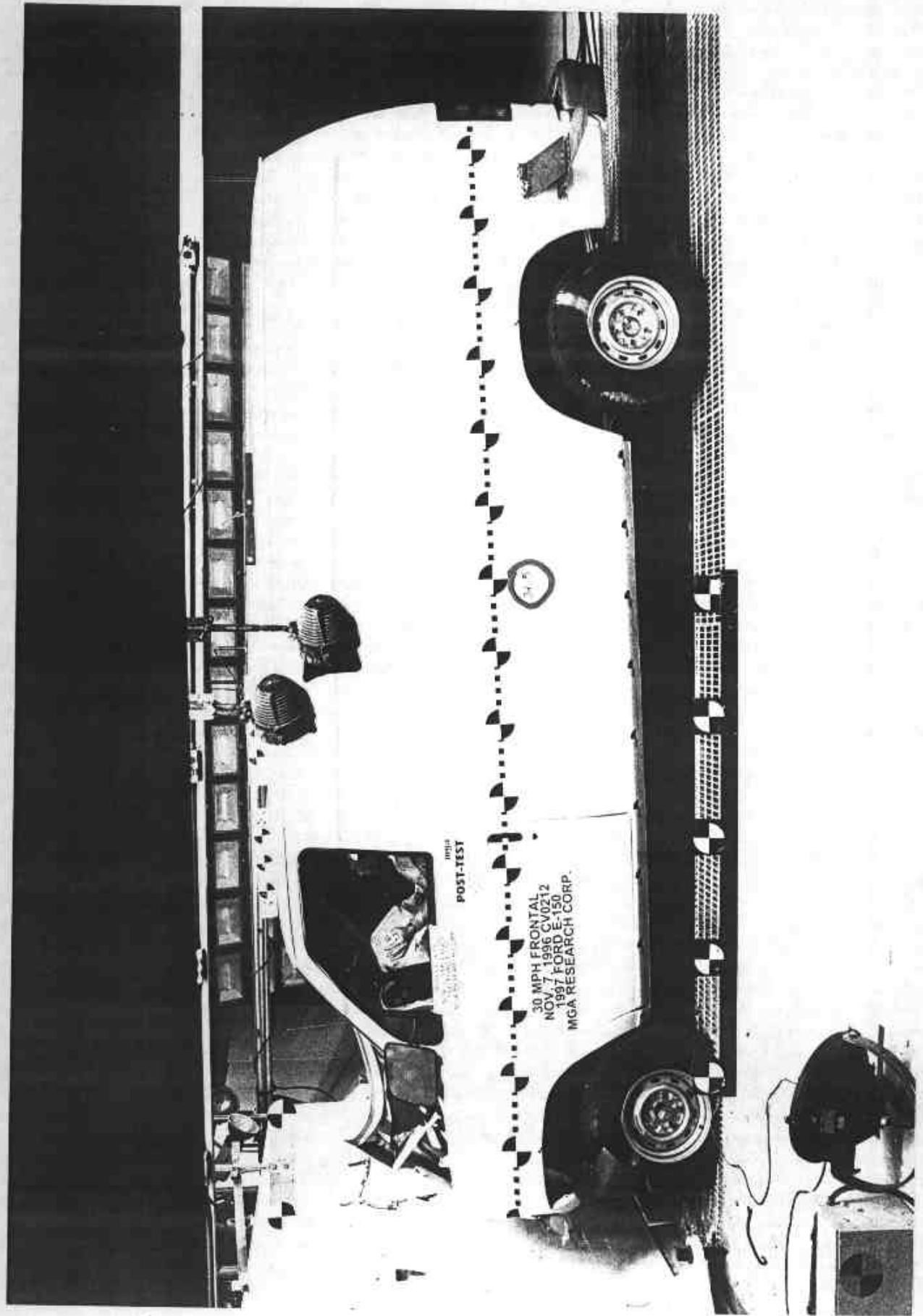
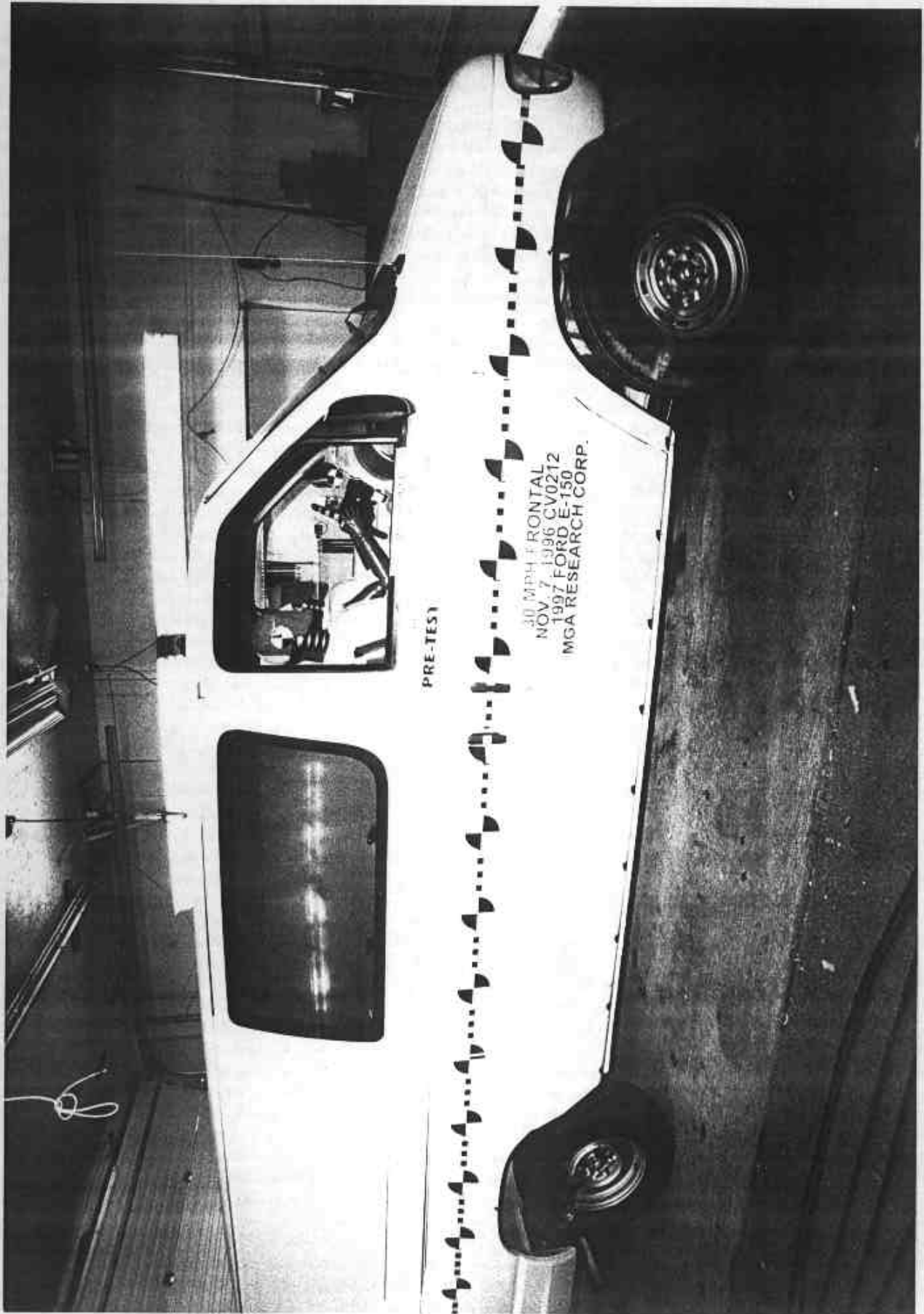


Photo No. A-3 - Pre-Test Left Side View



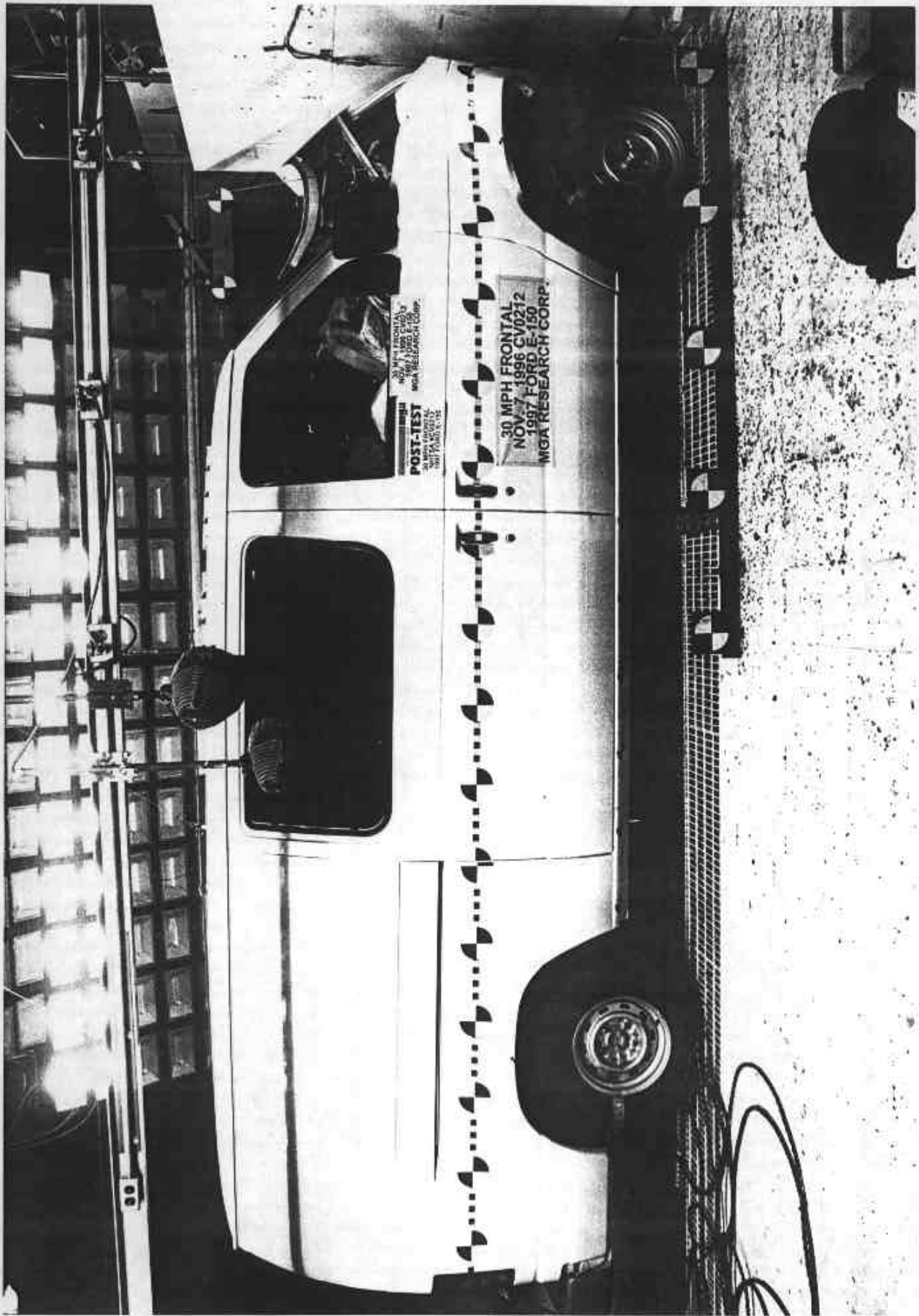
A-4

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



A-5

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



A-6

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

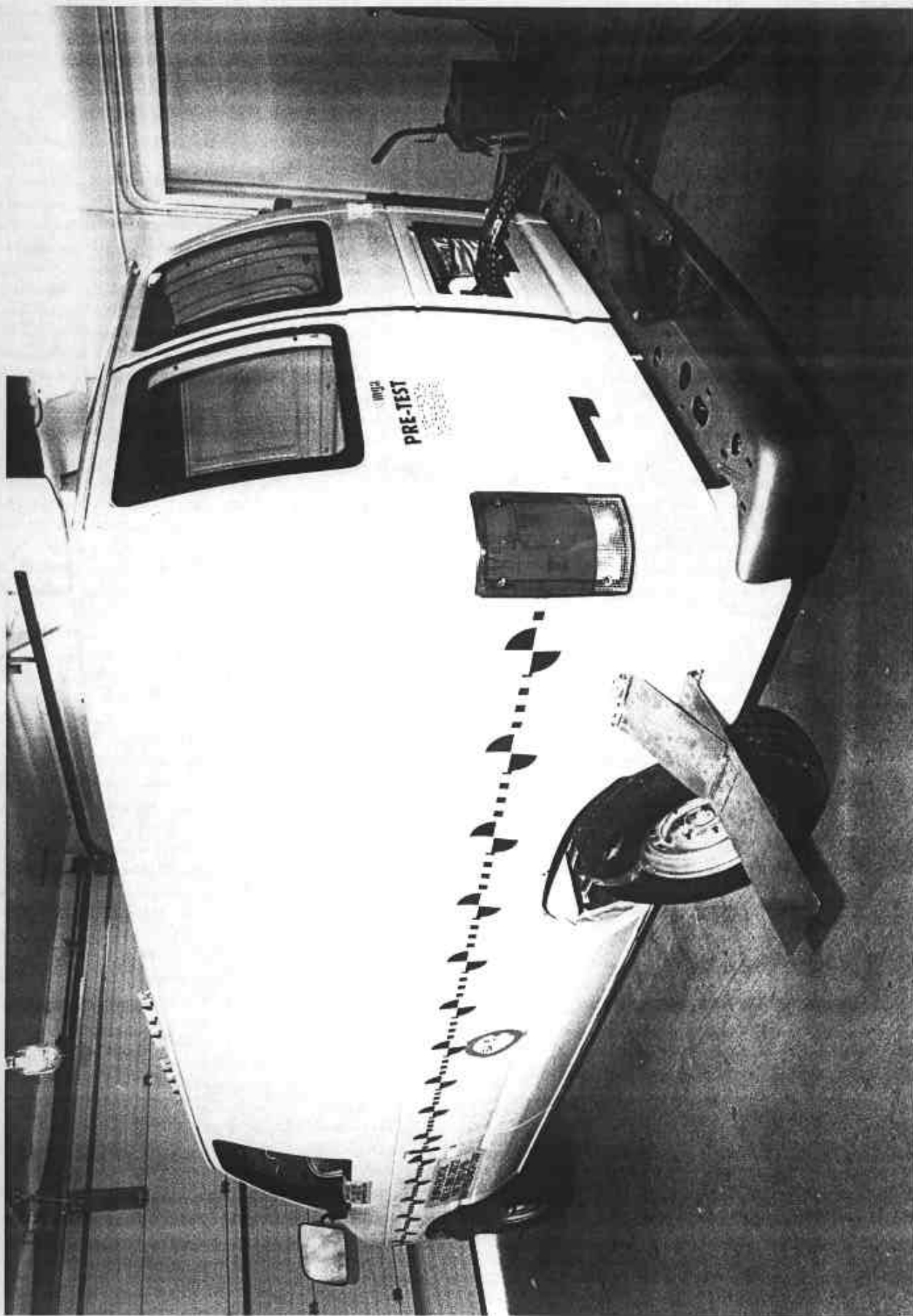


Photo No. A-7 - Pre-Test 3/4 Left Rear View

A-7

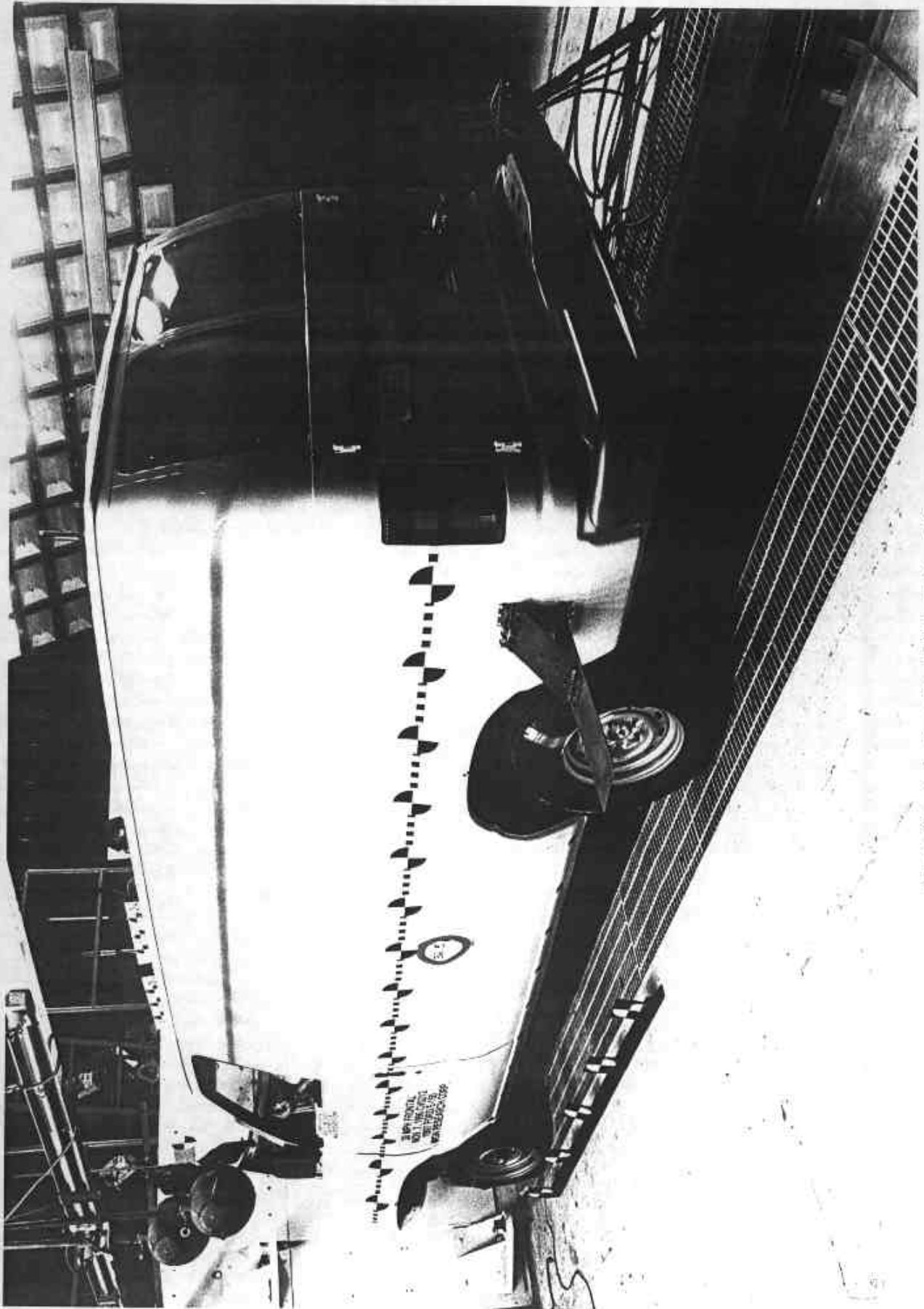
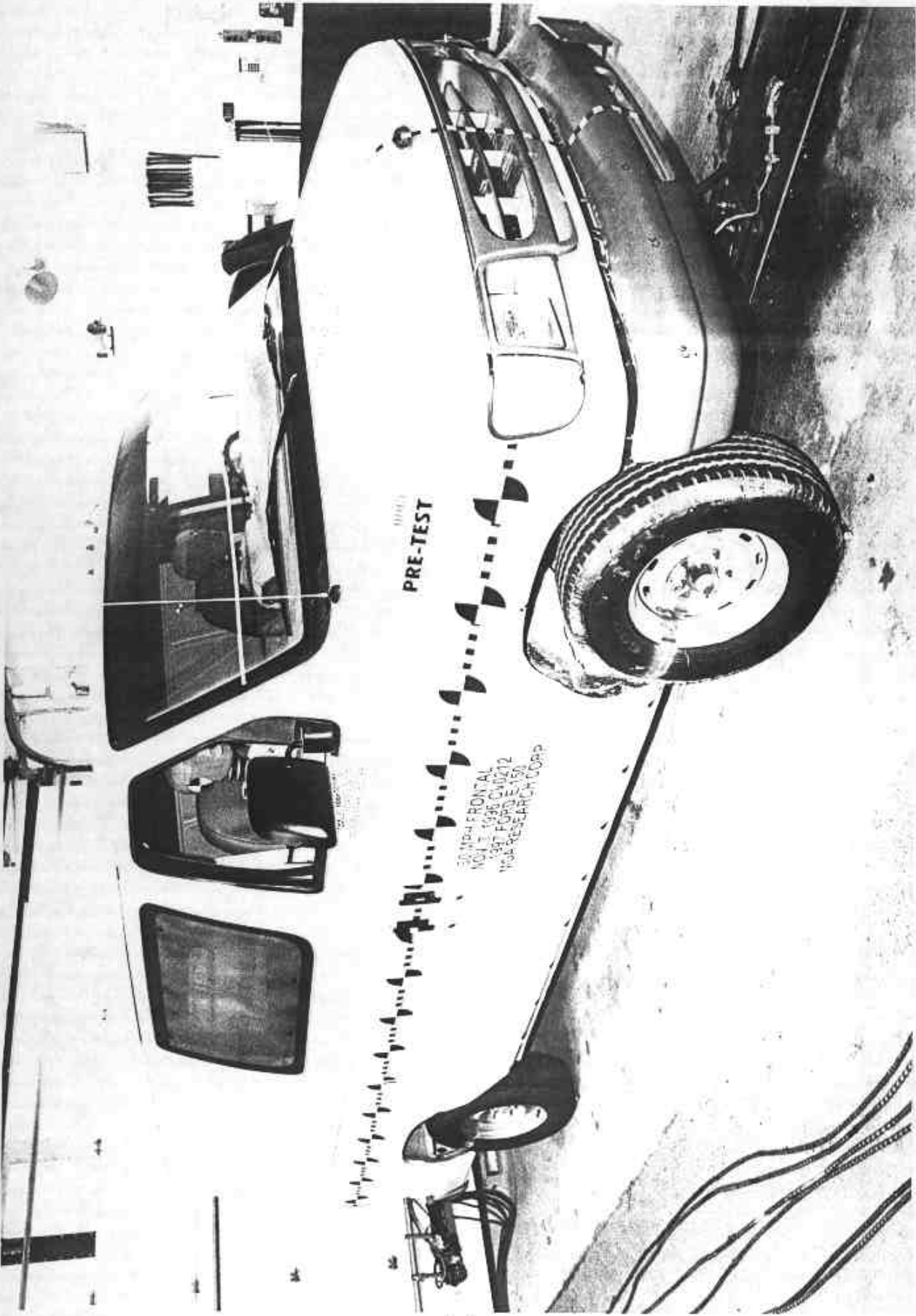


Photo No. A-8 - Post-Test 3/4 Left Rear View

A-8



A-9

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

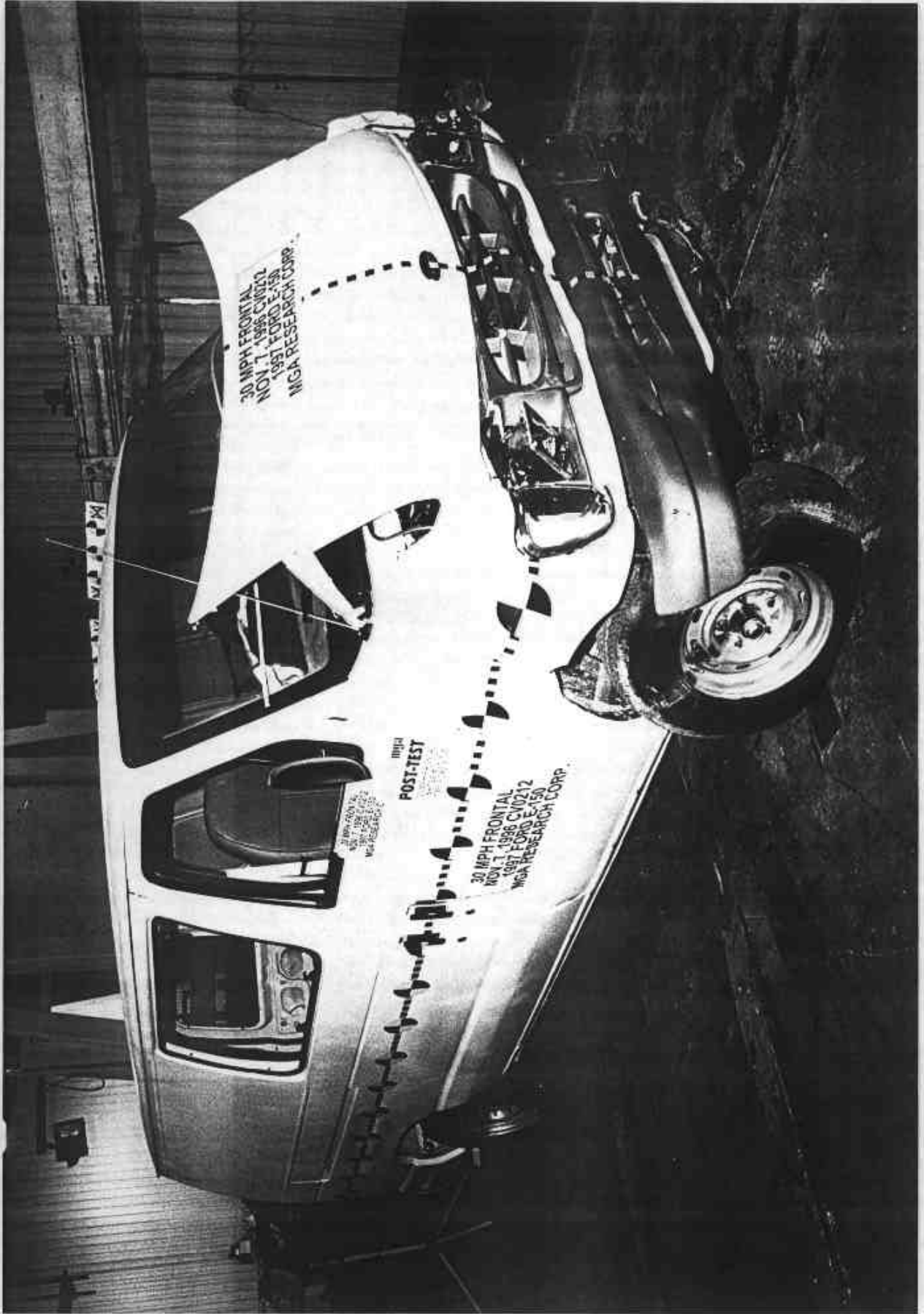


Photo No. A-10 - Post-Test: 3/4 Right Front View

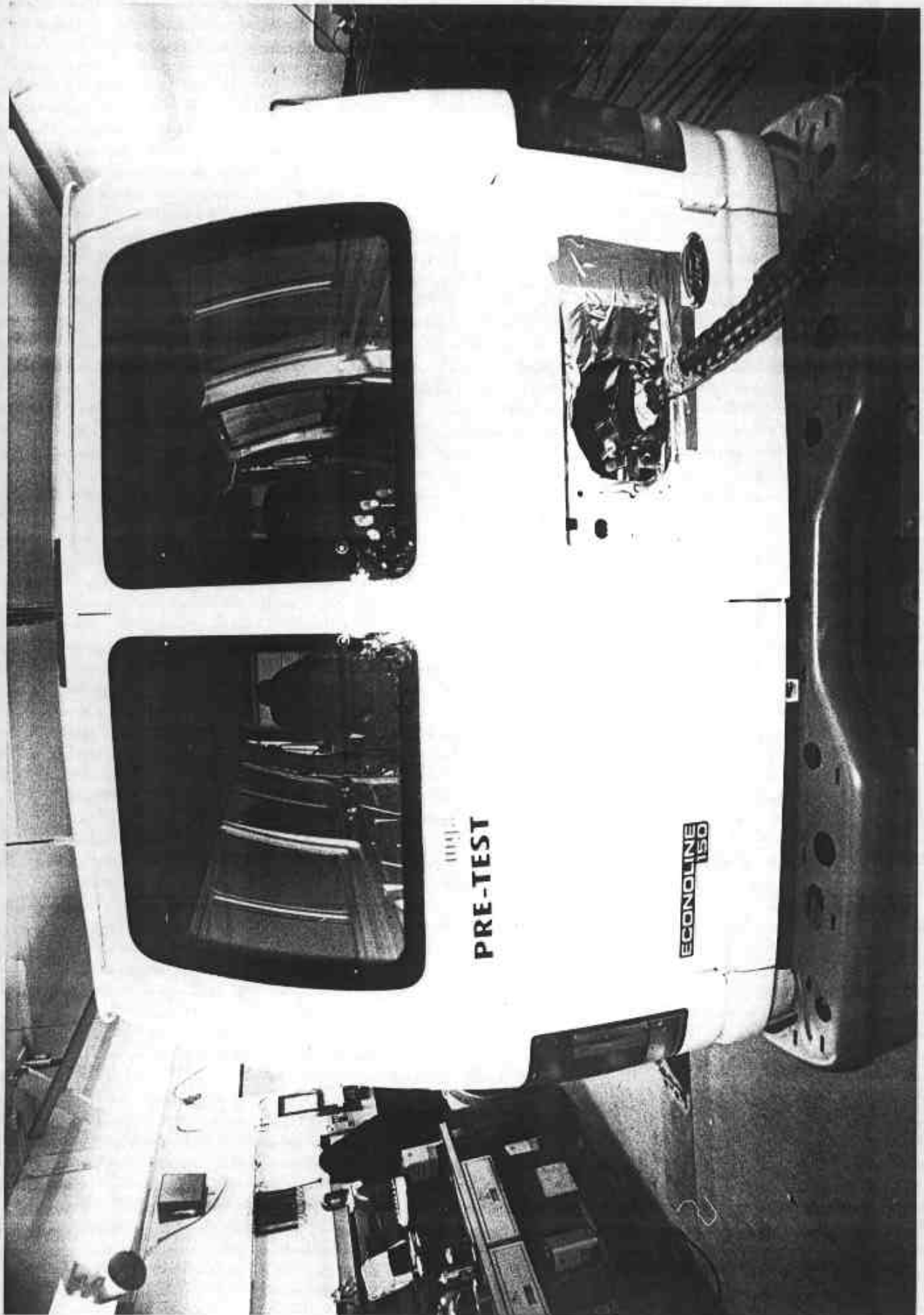


Photo No. A-11 - Pre-Test Rear View

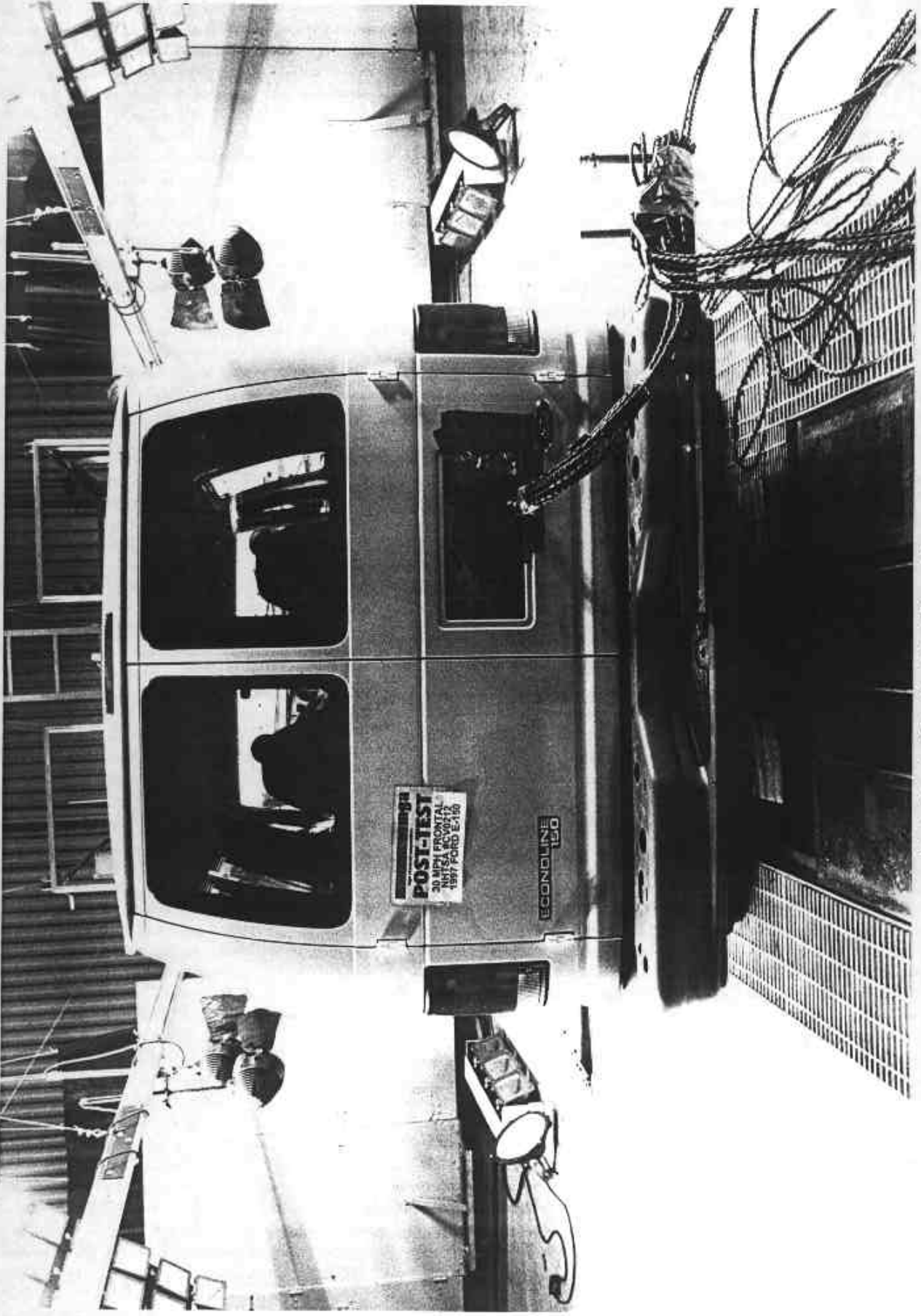


Photo No. A-12 - Post-Test Rear View

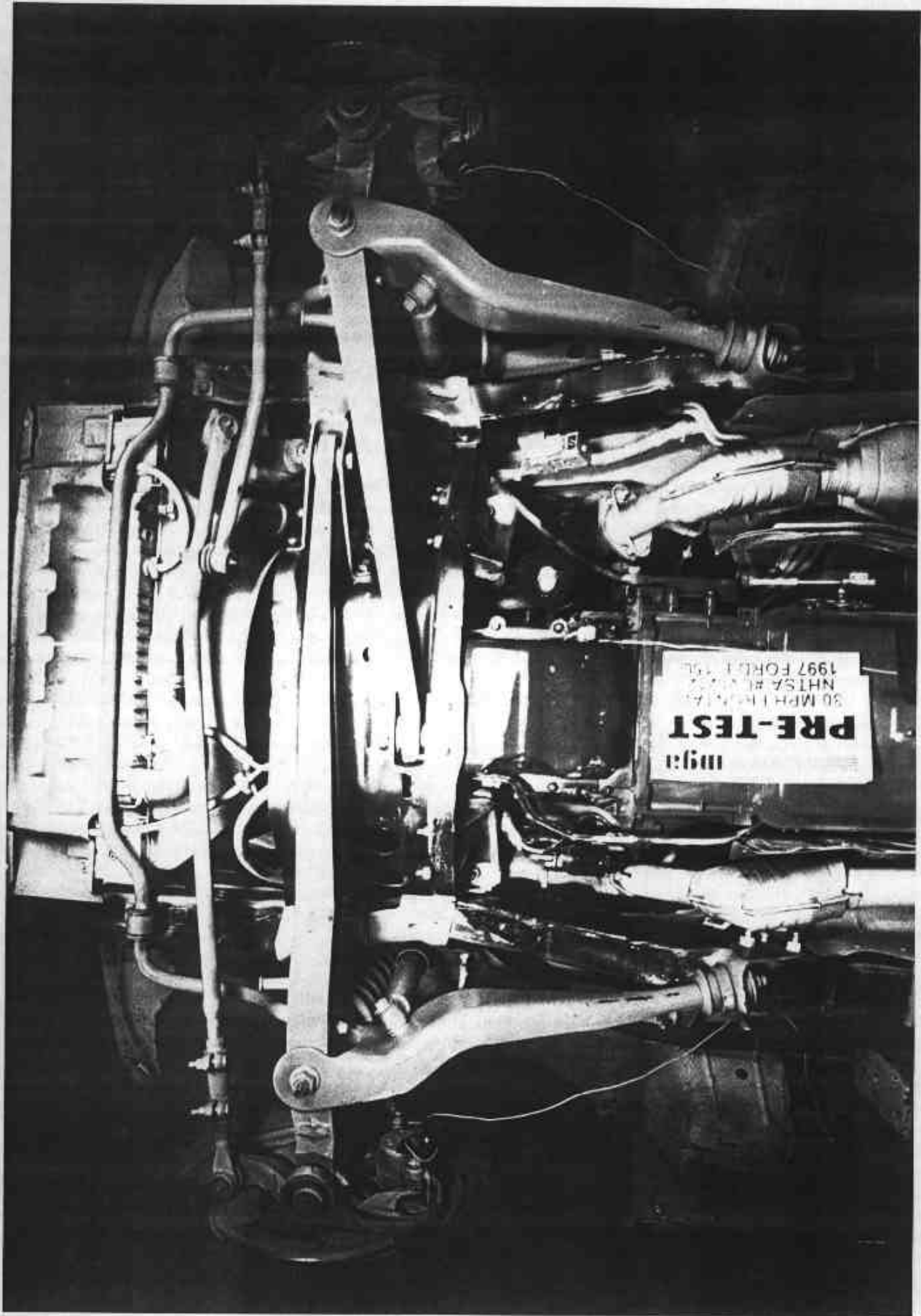


Photo No. A-13- Pre-Test Front Underbody View

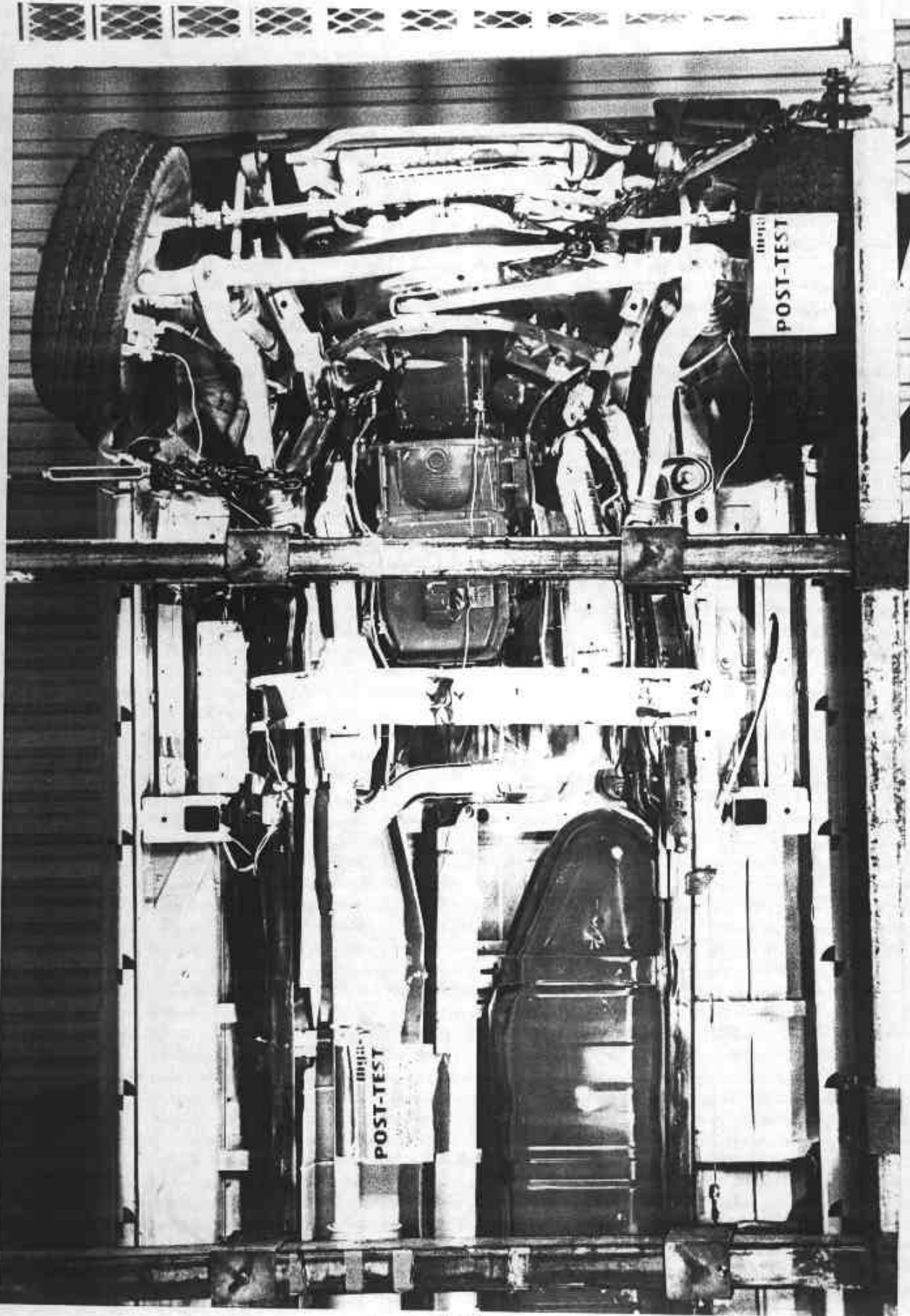


Photo No. A-14 - Post-Test Front Underbody View

A-14

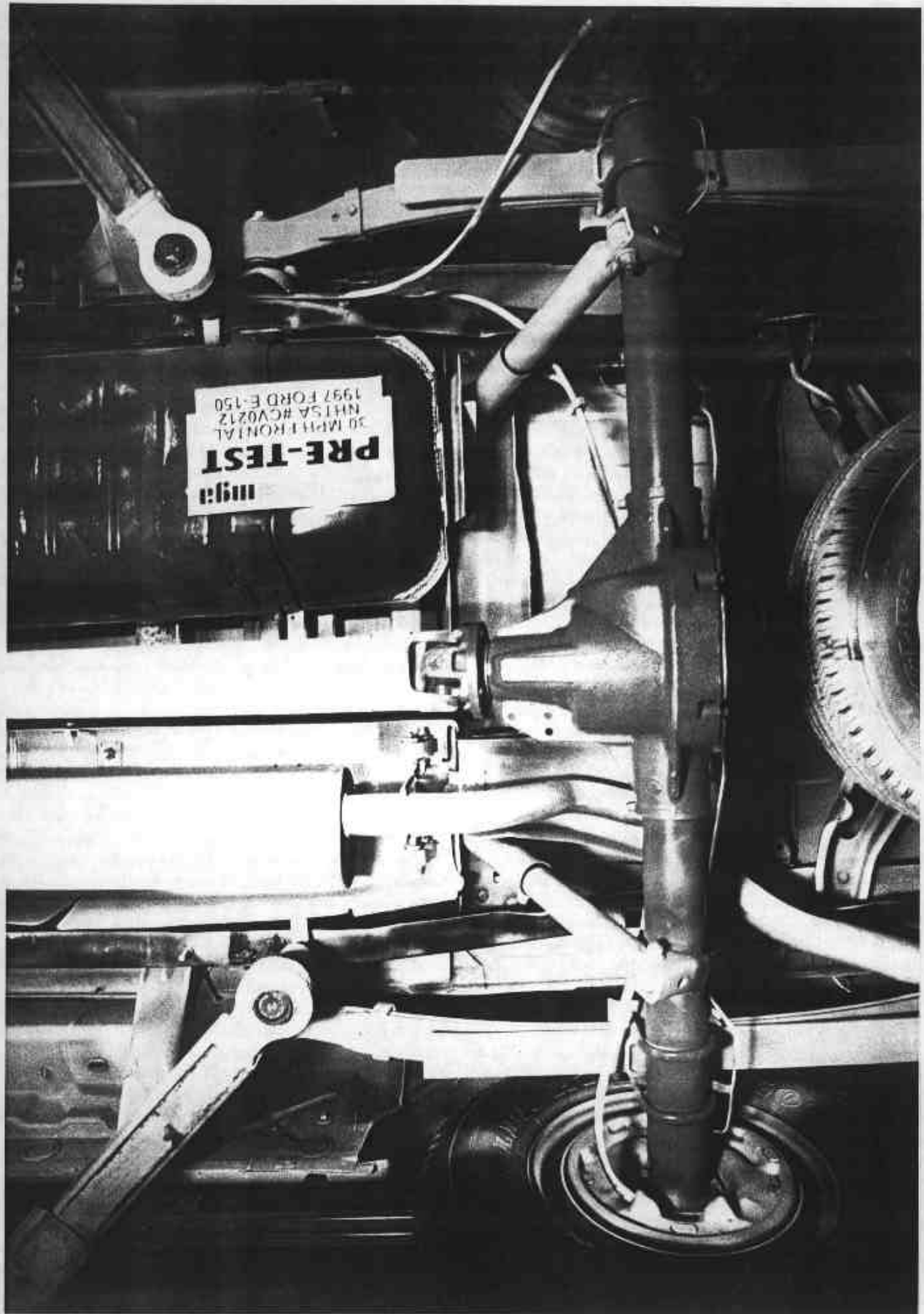


Photo No. A-15 - Pre-Test Rear Underbody View

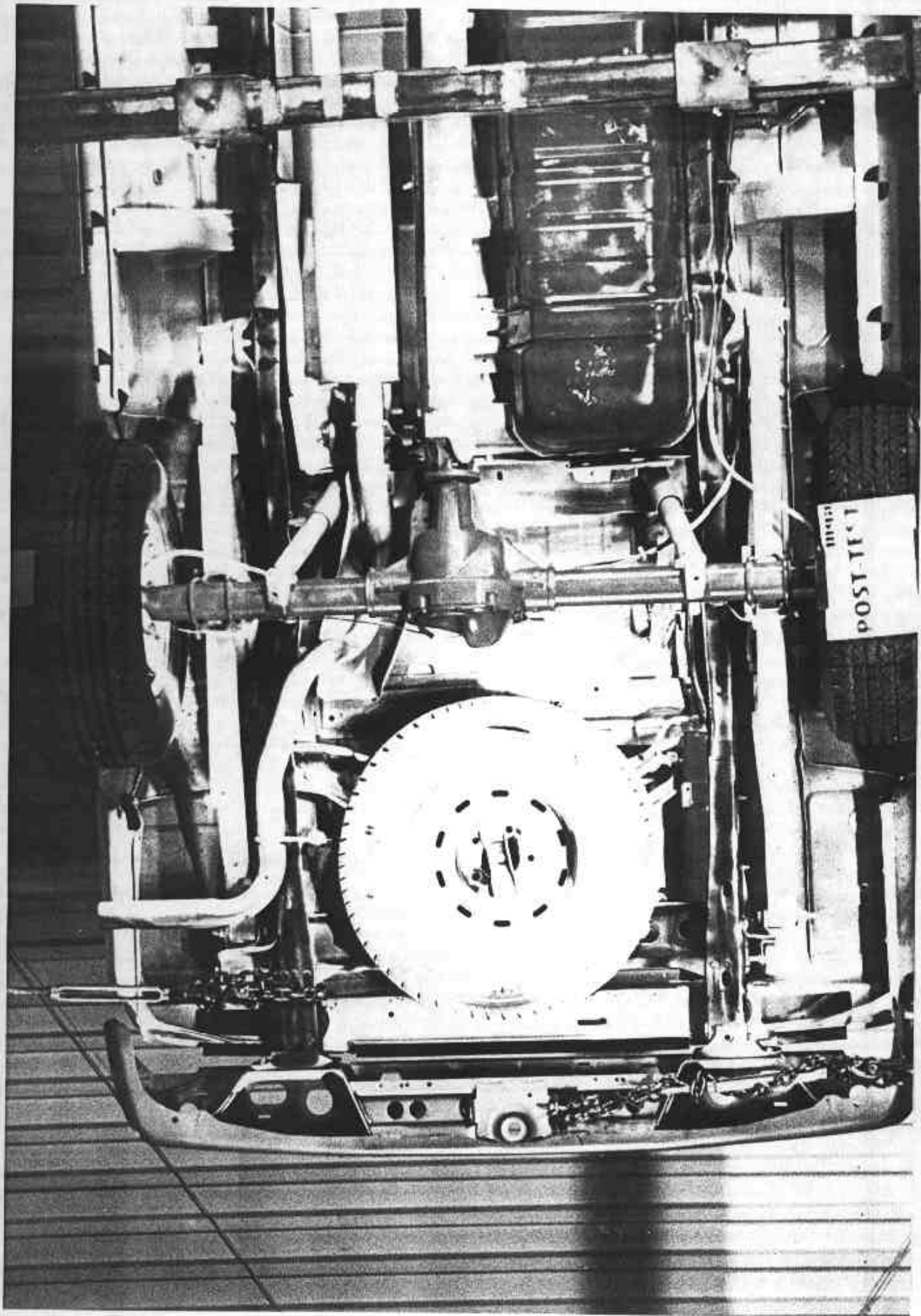
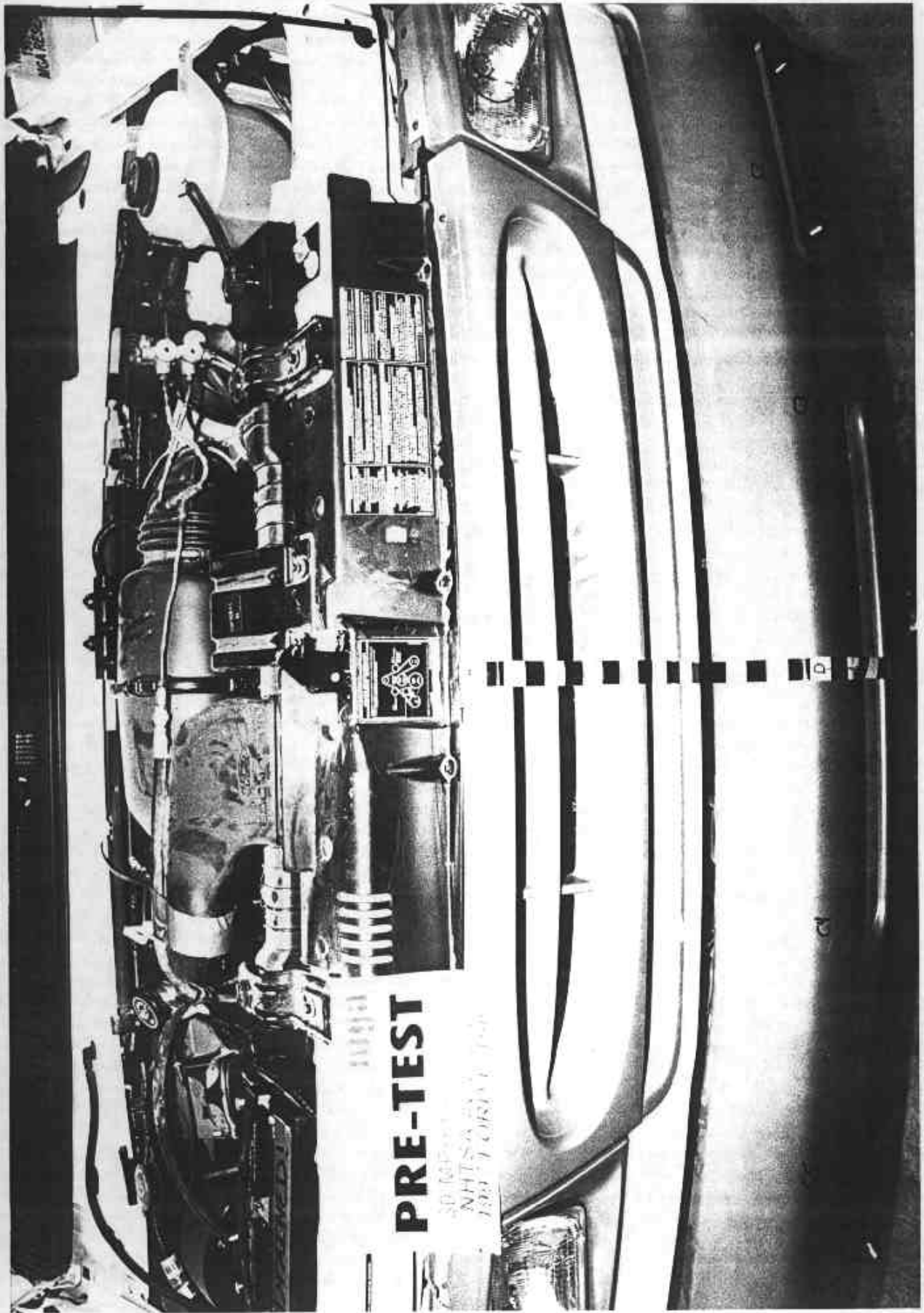


Photo No. A-16 - Post-Test Rear Underbody View

A-16



A-17

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

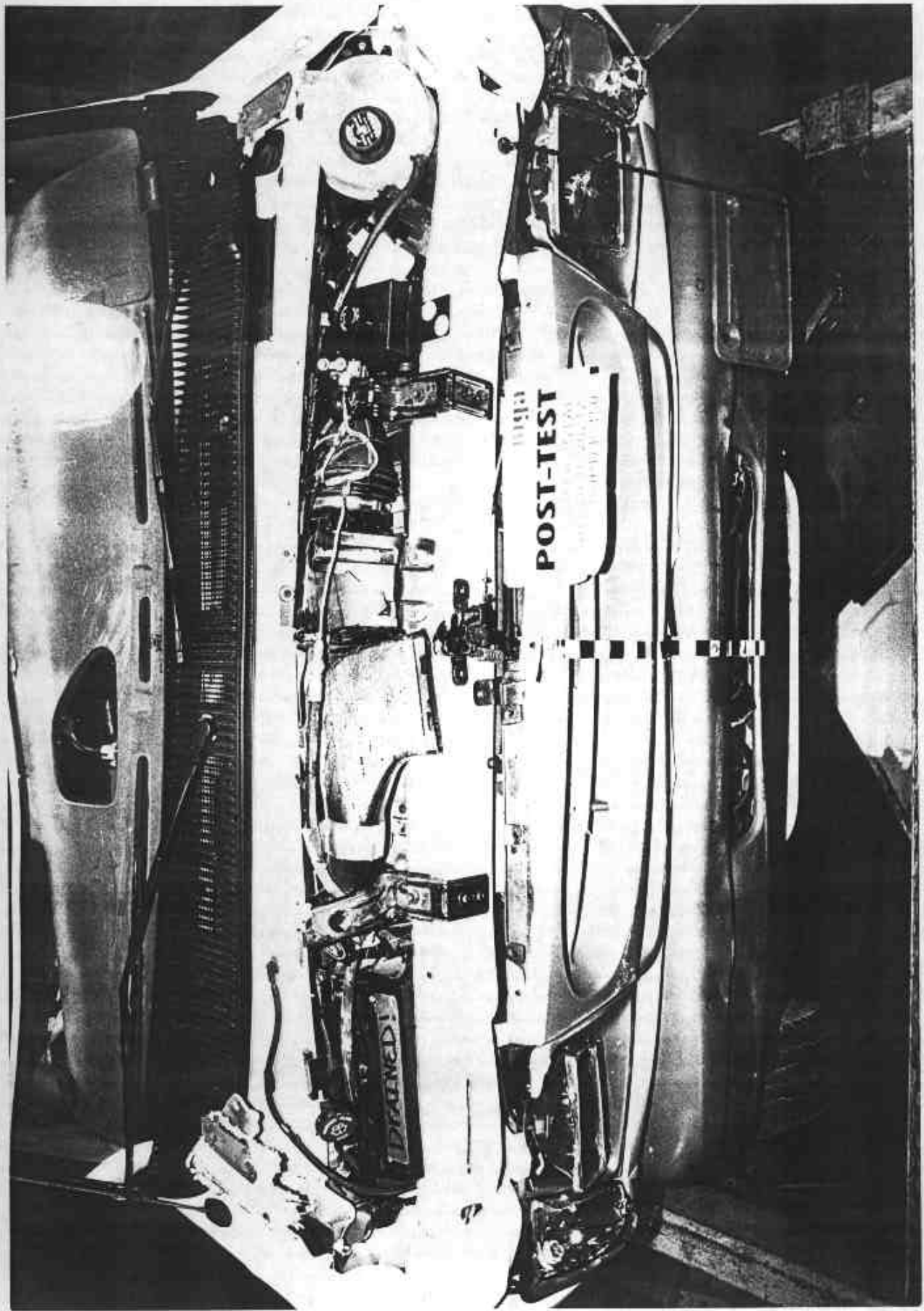


Photo No. A-18 - Post-Test Engine Compartment View

A-18

**mgja**

mpja nhtsa technical cooperation

# PRE-TEST

30 MPH FRONTAL  
NHTSA #CV0212  
1997 FORD E-150

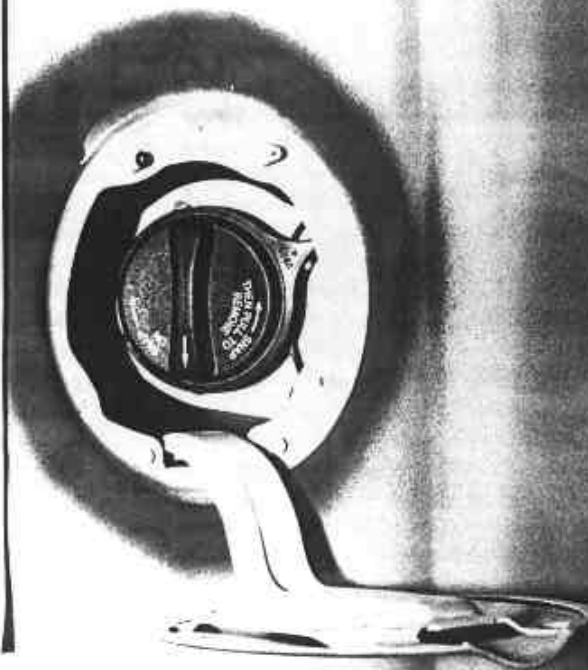
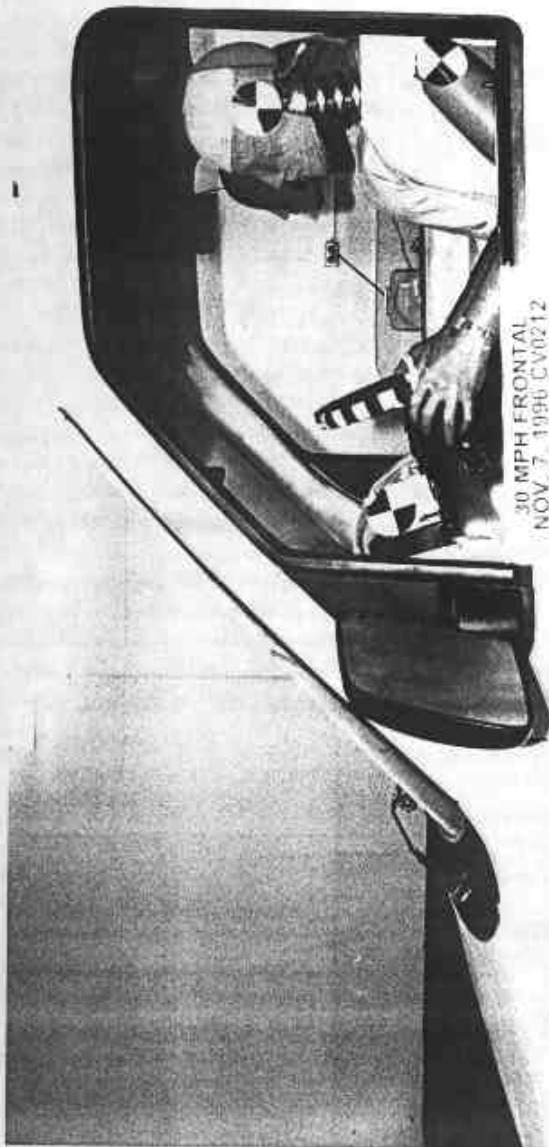


Photo No. A-19 - Pre-Test Fuel Filler Cap View



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP

mga

**PRE-TEST**

30 MPH FRONTAL  
NHISA #G0072  
1997 FORD E-150



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

Photo No. A-20 - Pre-Test Driver Dummy Position View



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

**POST-TEST**

30 MPH FRONTAL  
NOV. 7, 1996  
1997 FORD E-150  
MGA RESEARCH CORP.

30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.



Photo No. A-21 - Post-Test Driver Dummy Position View

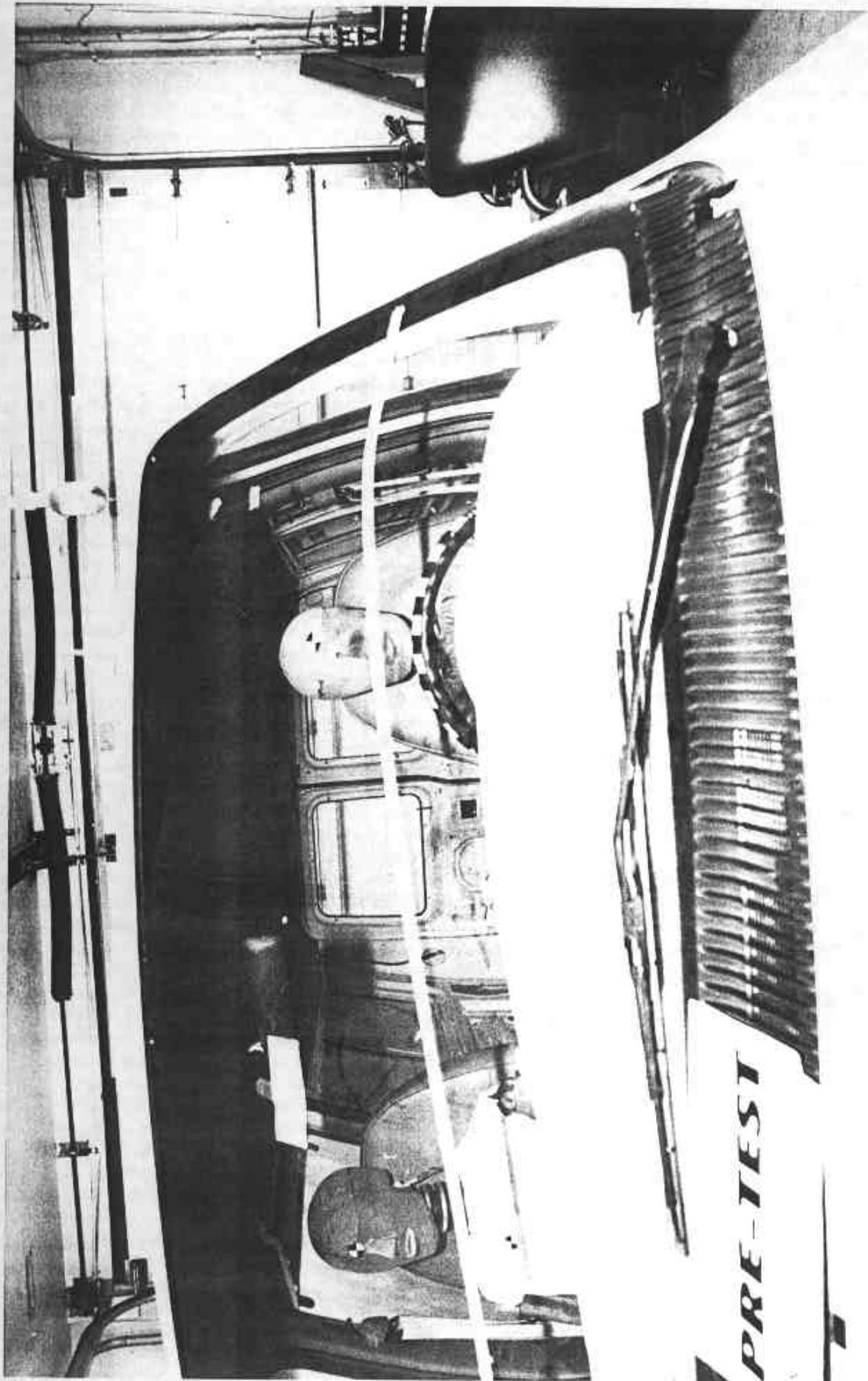


Photo No. A-22 - Pre-Test Driver Dummy Position View (Door Open)



Photo No. A-23 - Post-Test Driver Dummy Position View (Door Open)

A-23



**PRE-TEST**  
**FRONTAL**  
**WINDSHIELD**

Photo No. A-24 - Pre-Test Driver Dummy Windshield View





Photo No. A-26 - Pre-Test Driver Dummy Seat Position View



Photo No. A-27 - Post-Test Driver Dummy Seat Position View



A-28

Photo No. A-28 - Pre-Test Driver Dummy Knee Bolster View



Photo No. A-29 - Post-Test Driver Dummy Knee Bolster View



Photo No. A-30 - Post-Test Driver Dummy Airbag View

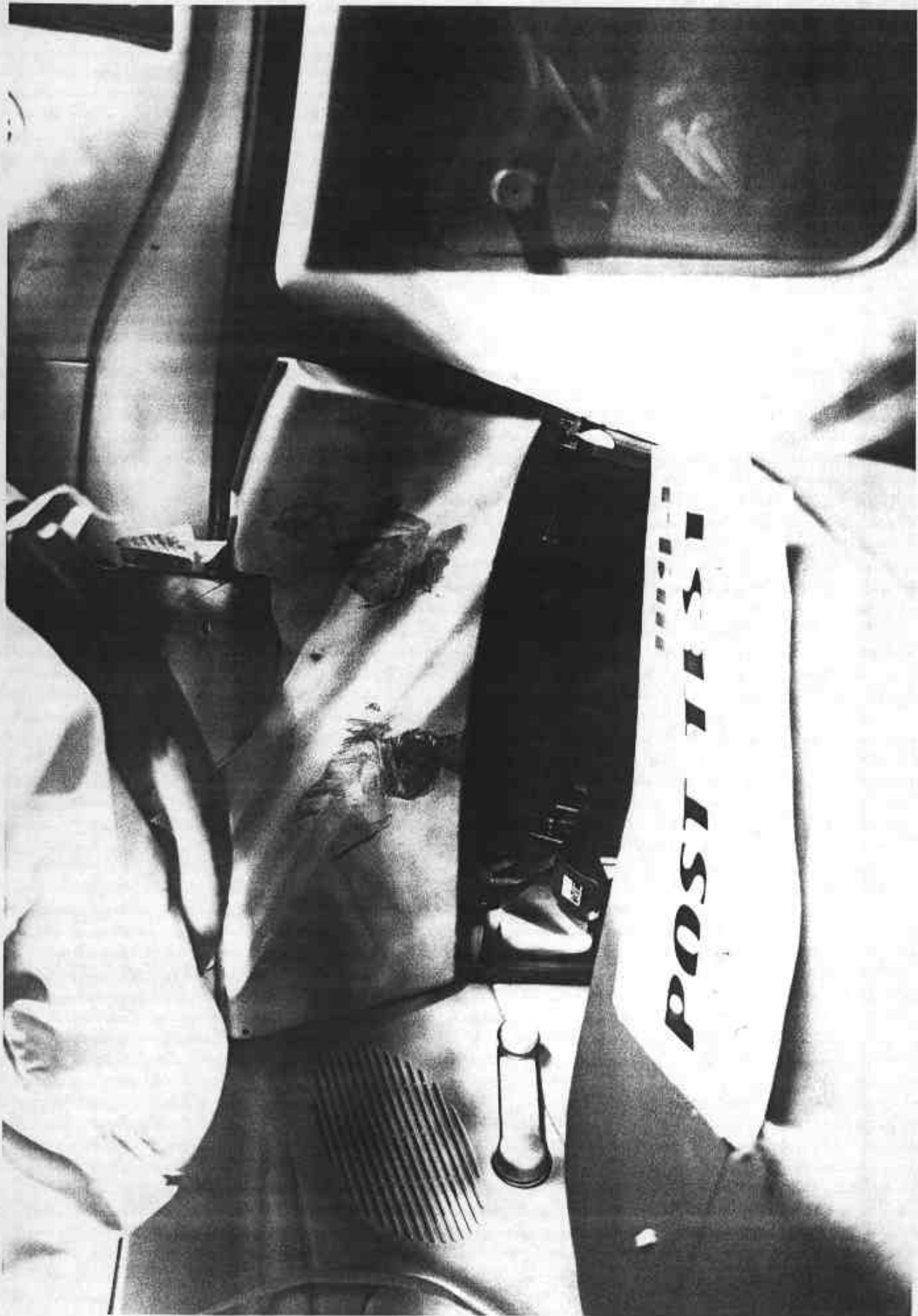
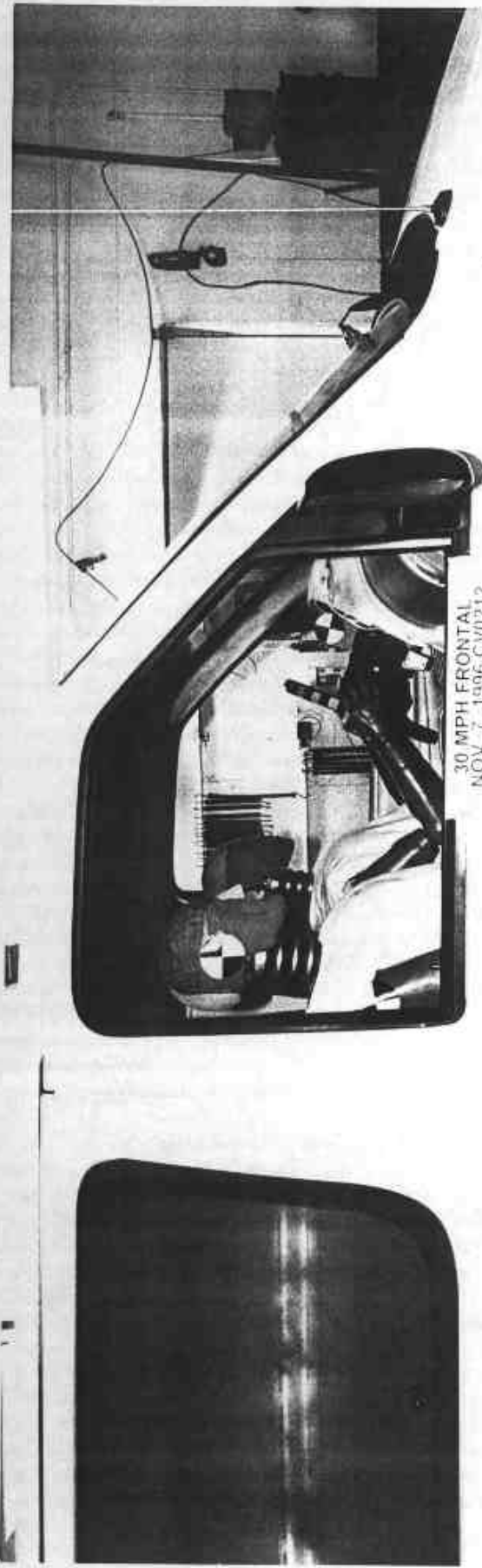


Photo No. A-31 - Post-Test Driver Dummy Knee Contact View

A-31



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

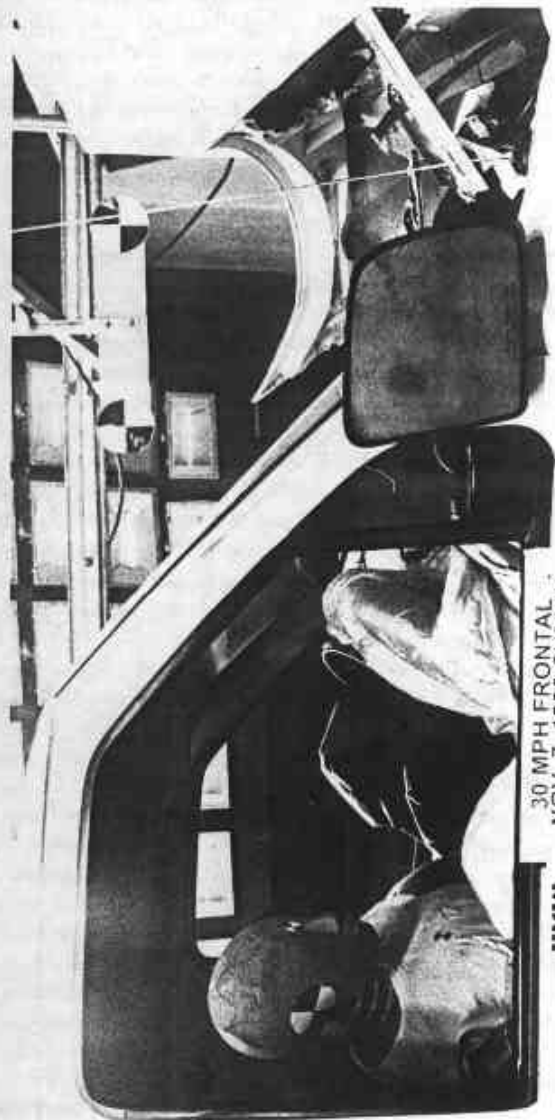
**PRE-TEST**

W. J. ...  
MGA RESEARCH CORP.

30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.



Photo No. A-32 - Pre-Test Passenger Dummy Position View



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

**POST-TEST**  
30 MPH FRONTAL  
NHUSA #CV0212  
1997 FORD E-150



30 MPH FRONTAL  
NOV. 7, 1996 CV0212  
1997 FORD E-150  
MGA RESEARCH CORP.

A-33

Photo No. A-33 - Post-Test Passenger Dummy Position View

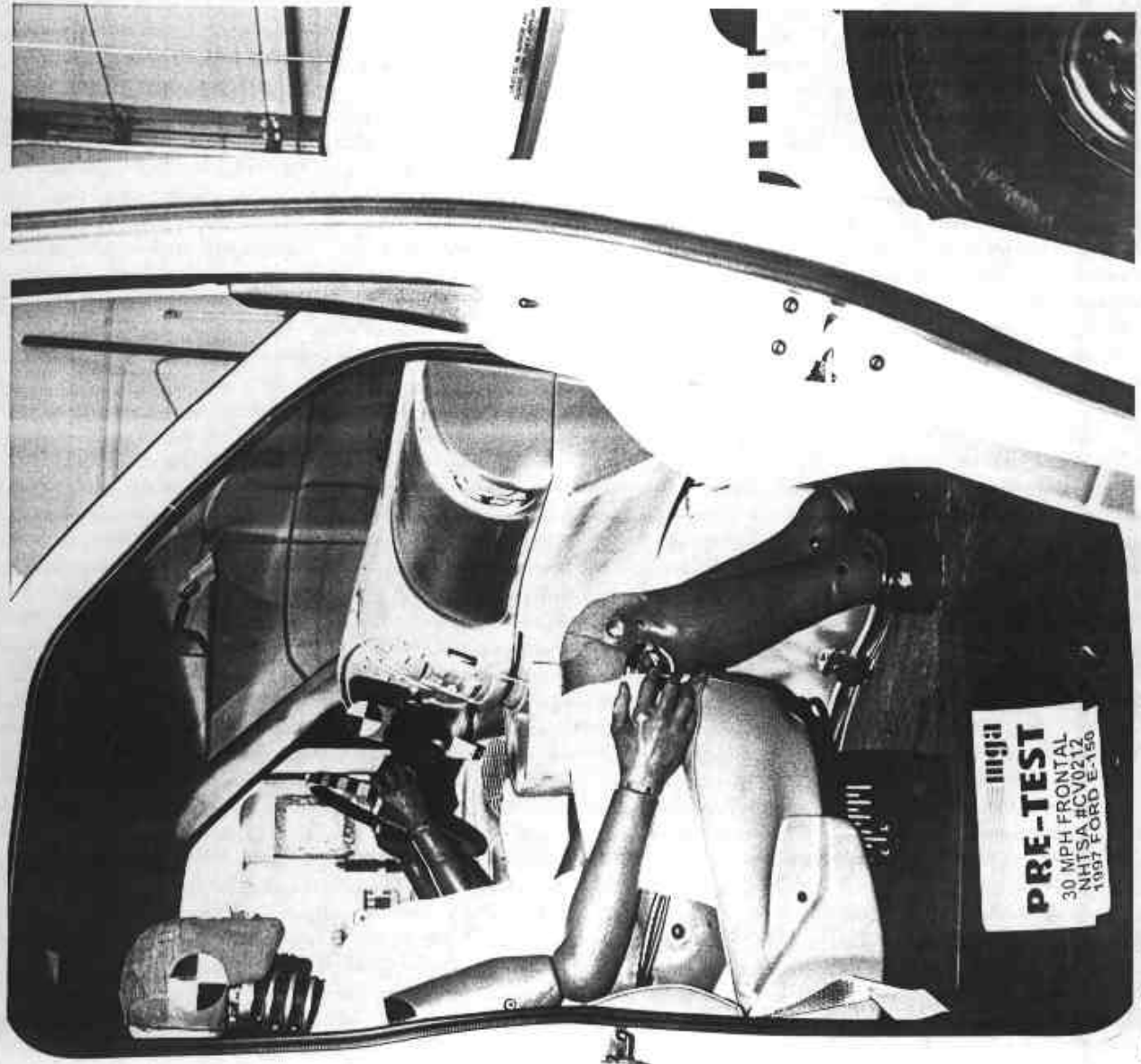
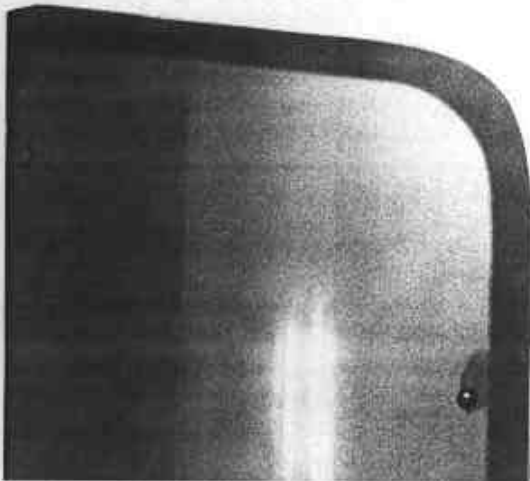


Photo No. A-34 - Pre-Test Passenger Dummy Position View (Door Open)

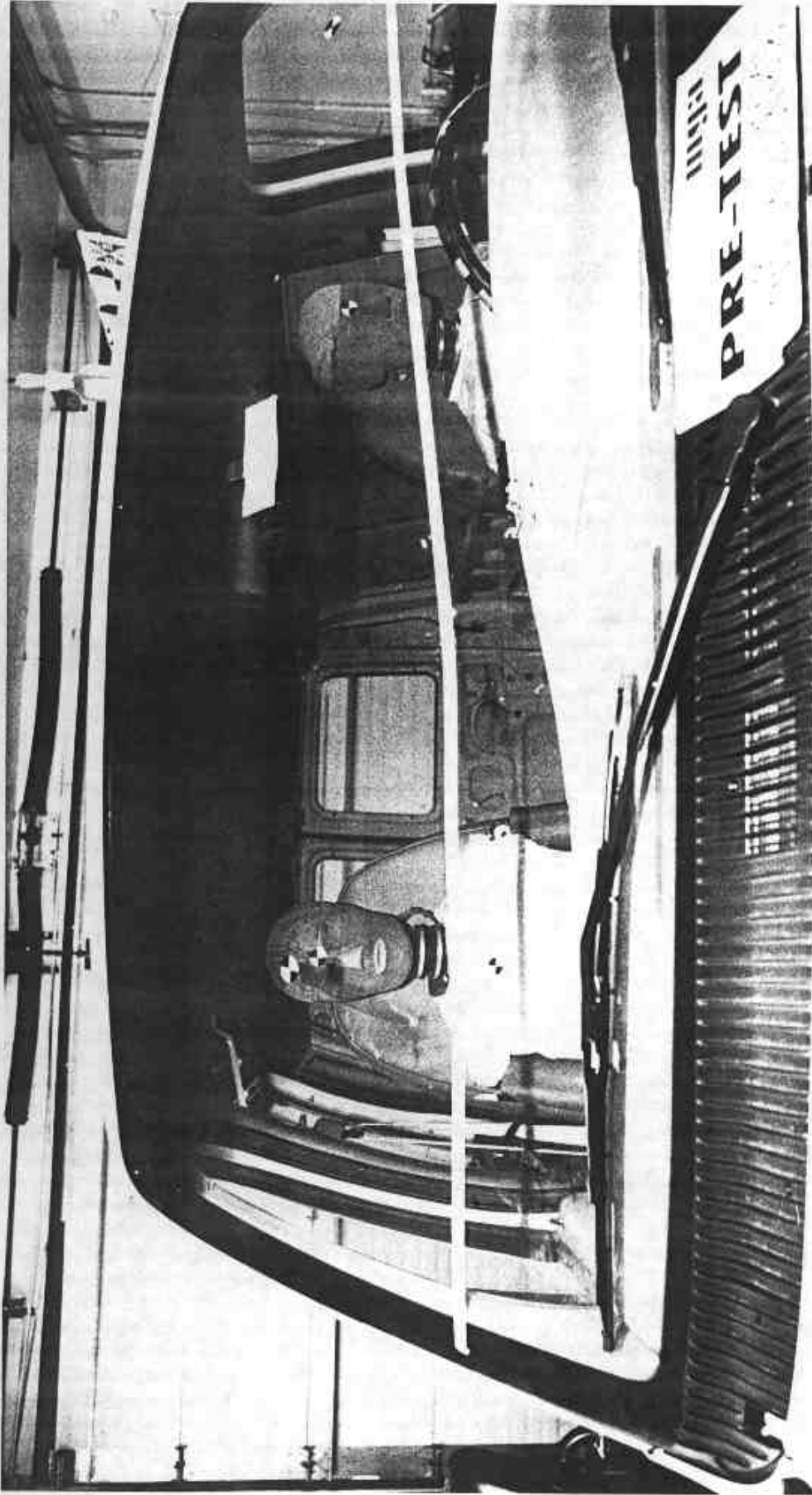


A-34



Photo No. A-35 - Post-Test Passenger Dummy Position View (Door Open)

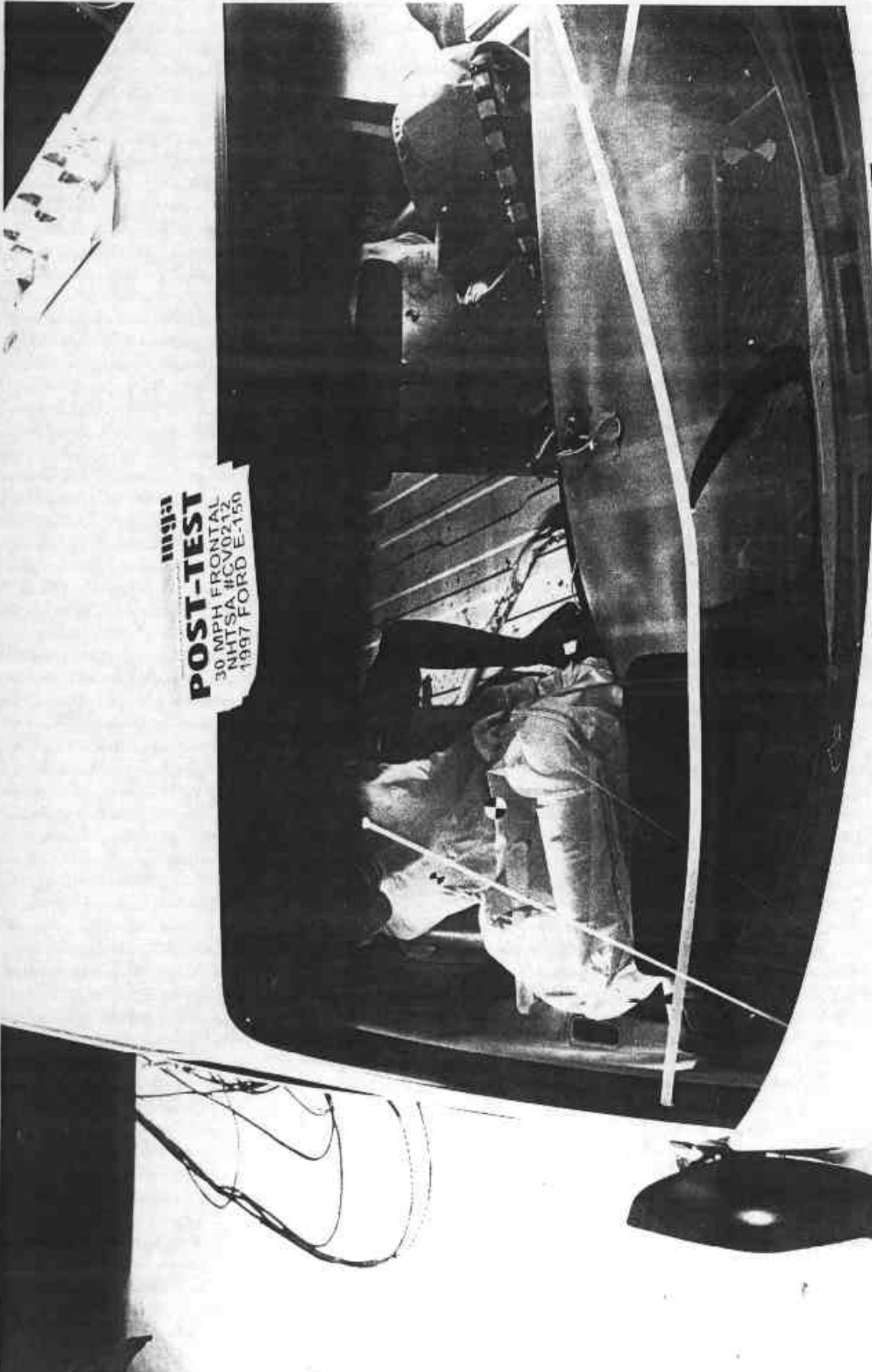
A-35



30 MPH FRO  
NOV 7 1996  
1997 FOR  
OFFICE

Photo No. A-36 - Pre-Test Passenger Dummy Windshield View

A-36



**POST-TEST**  
30 MPH FRONTAL  
NHTSA #CV0212  
1997 FORD E-150

**MDH FRONT**

Photo No. A-37 - Post-Test Passenger Dummy Windshield View



Photo No. A-38 - Pre-Test Passenger Dummy Seat Position View

A-38



Photo No. A-39 - Post-Test Passenger Dummy Seat Position View



Photo No. A-40 - Pre-Test Passenger Dummy Lower Leg Position View

A-40



Photo No. A-41 - Post-Test Passenger Dummy Lower Leg Position View

A-41



Photo No. A-42 - Post-Test Passenger Dummy Knee Bolster View



Photo No. A-43 - Post-Test Passenger Dummy Airbag View

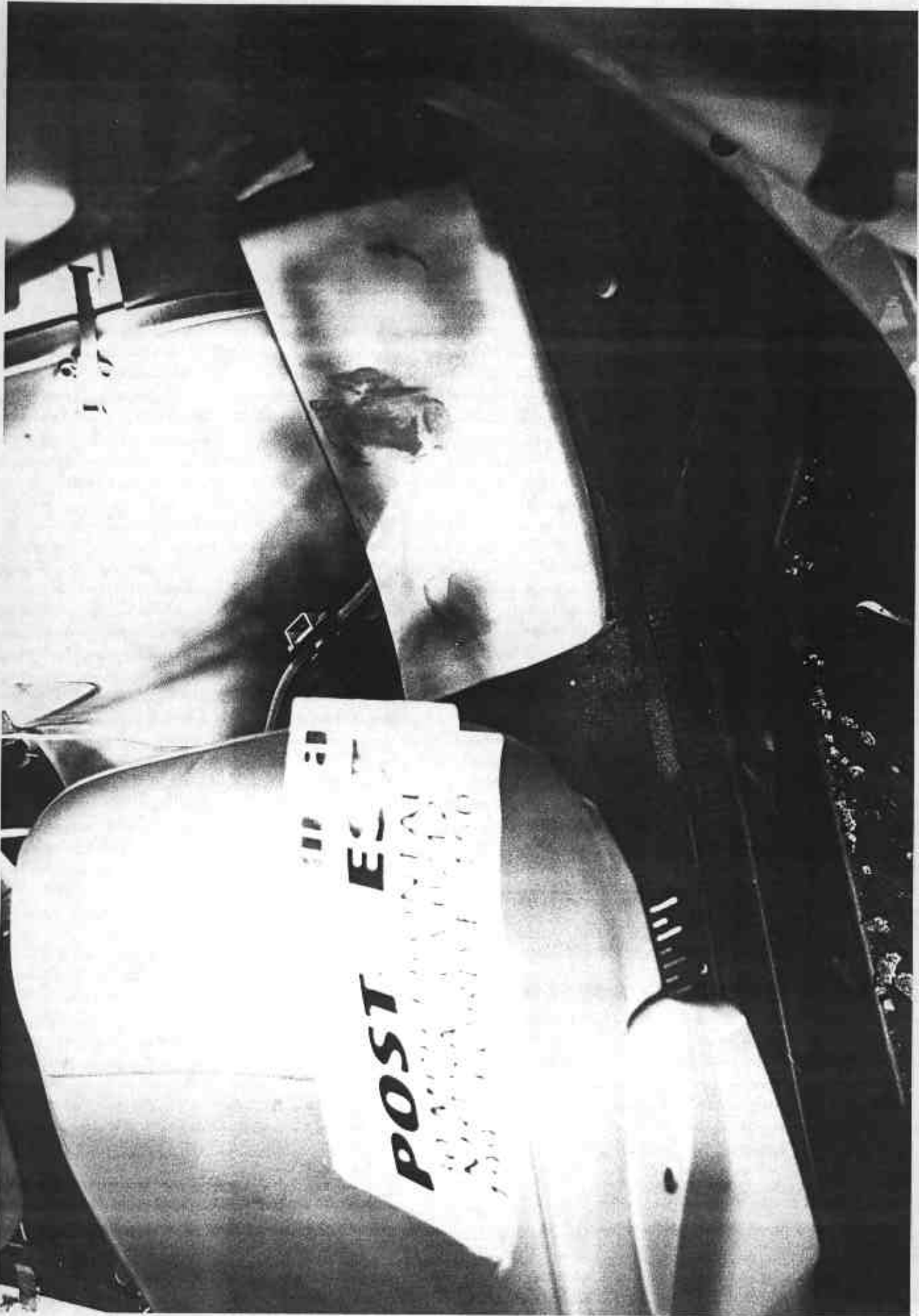


Photo No. A-44 - Post-Test Passenger Dummy Knee Contact View

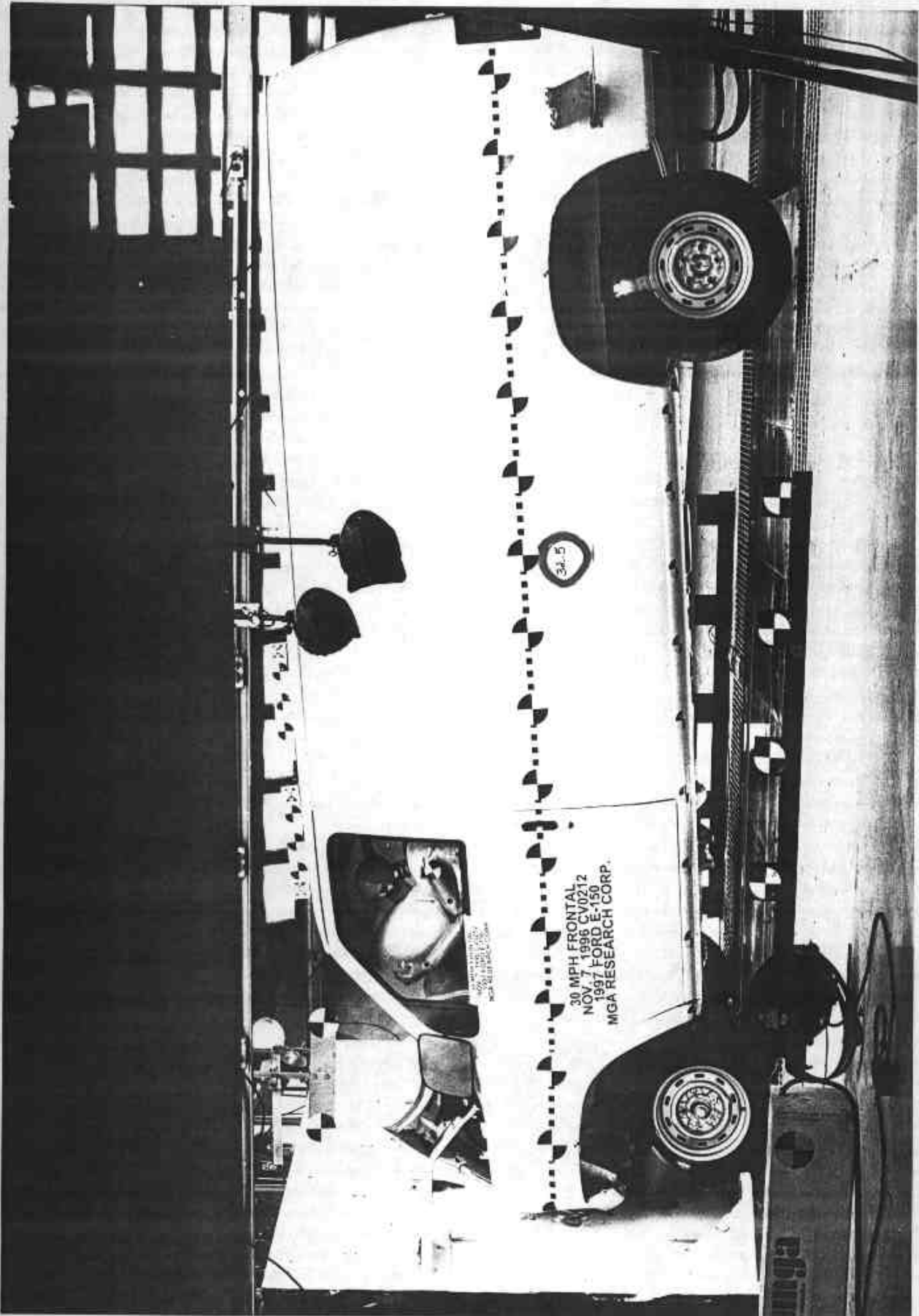


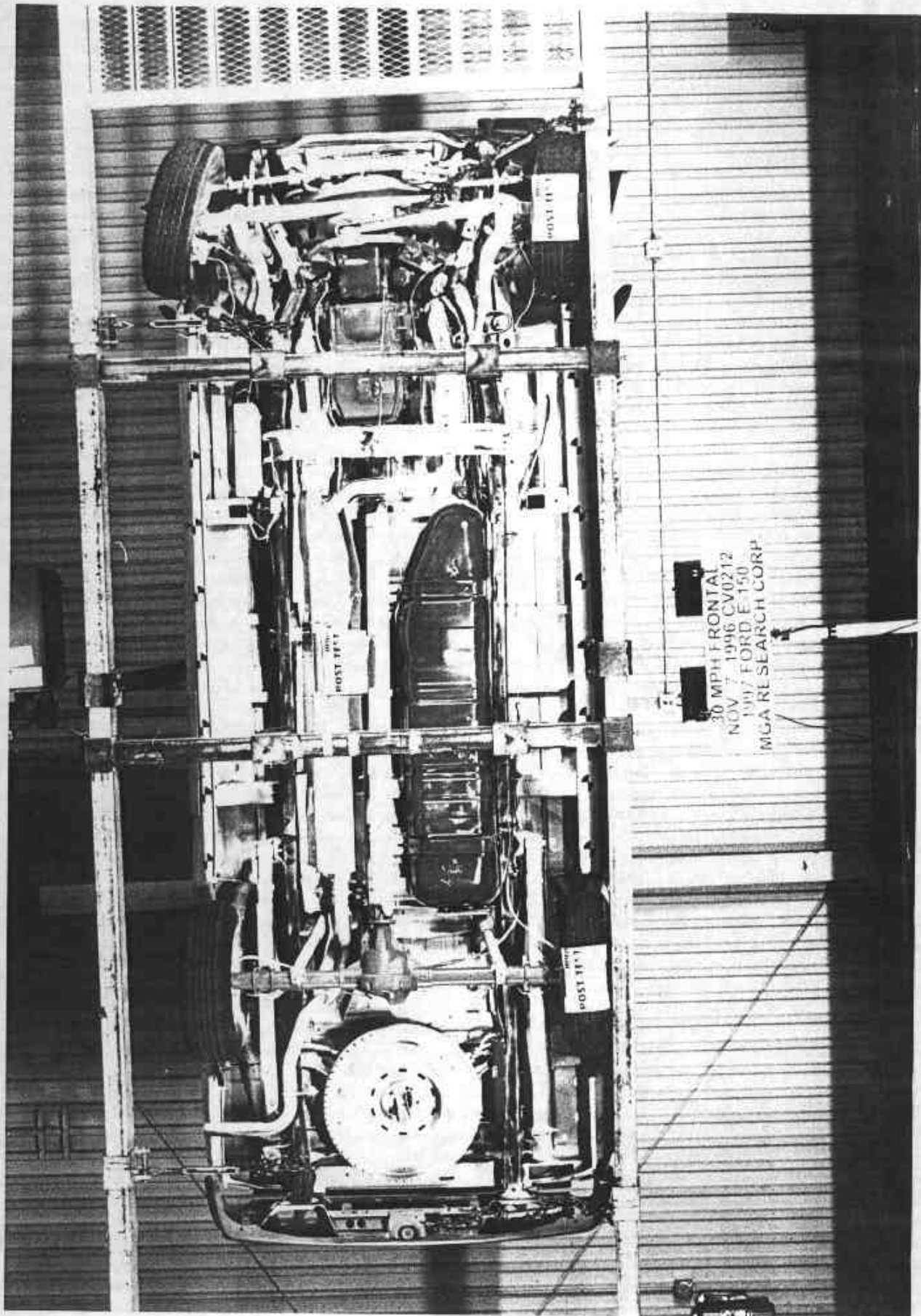
Photo No. A-45 - Vehicle Impact

MFD. BY FORD MOTOR CO. DATE: 08/96 GVWR: 6700LB/ 3039KG  
 FRONT GAWR: 3240LB 1469KG REAR GAWR: 3800LB 1723KG  
 WITH P235/75R15XL TIRES RIMS WITH P235/75R15XL TIRES RIMS  
 15X6.0J AT 283 kPa/ 41 PSI COLD  
 AT 241 kPa/ 35 PSI COLD  
 THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE  
 SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.  
 VIN: 1FTEE1460VHA13741 TYPE: TRUCK



EXT PAINT COLORS: YO RC: 41 DSO:  
 WB BRK INT TR TP/PS R AXLE TR SPR F0119  
 138 B A2 H9 U G4C T0342  
 MADE IN U.S.A. ULC OF 606-3520472-44

Photo No. A-46 - Vehicle Certification Label and Tire Placard



A-47

Photo No. A-47 - Rollover 90°

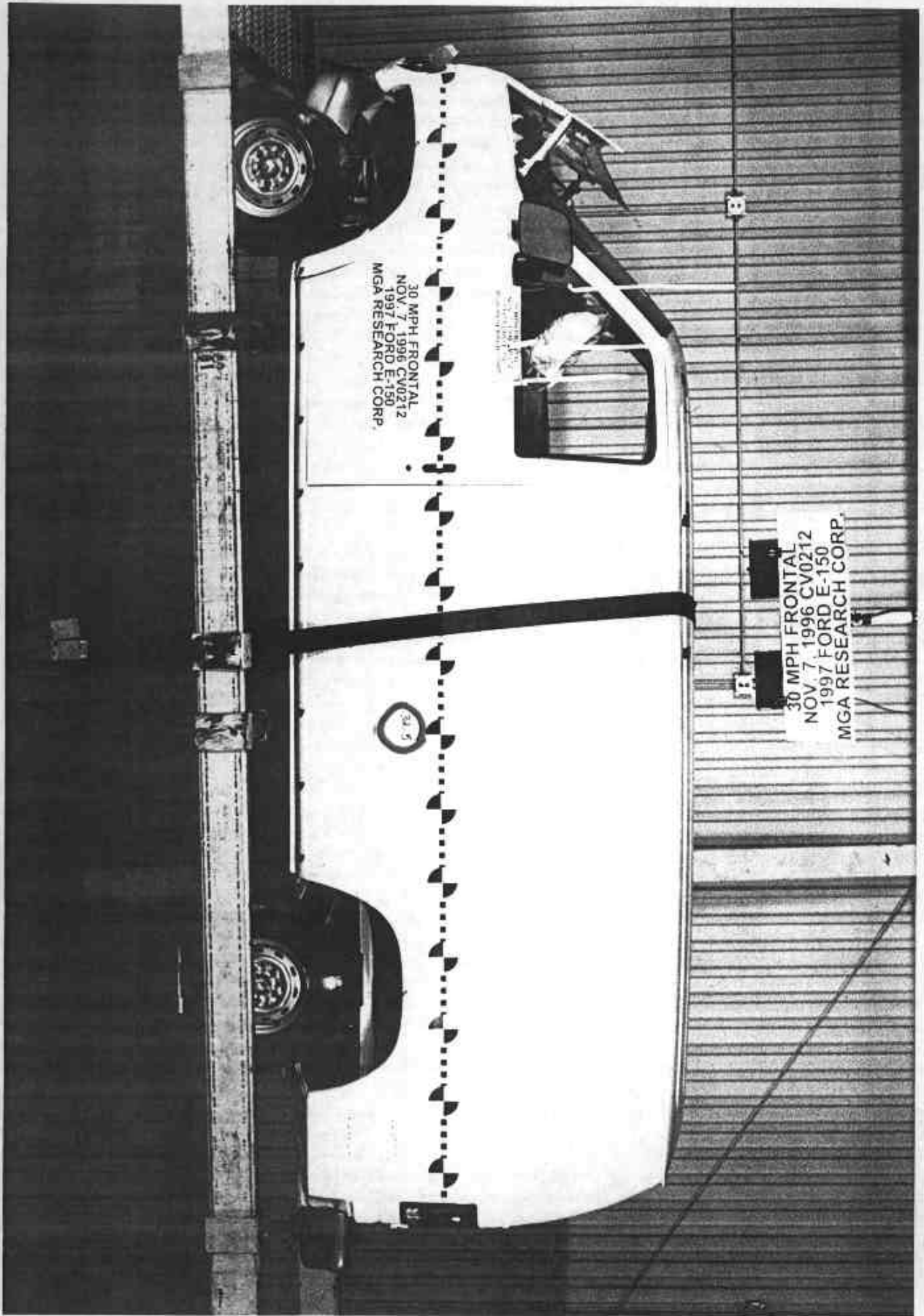


Photo No. A-48 - Rollover 180°

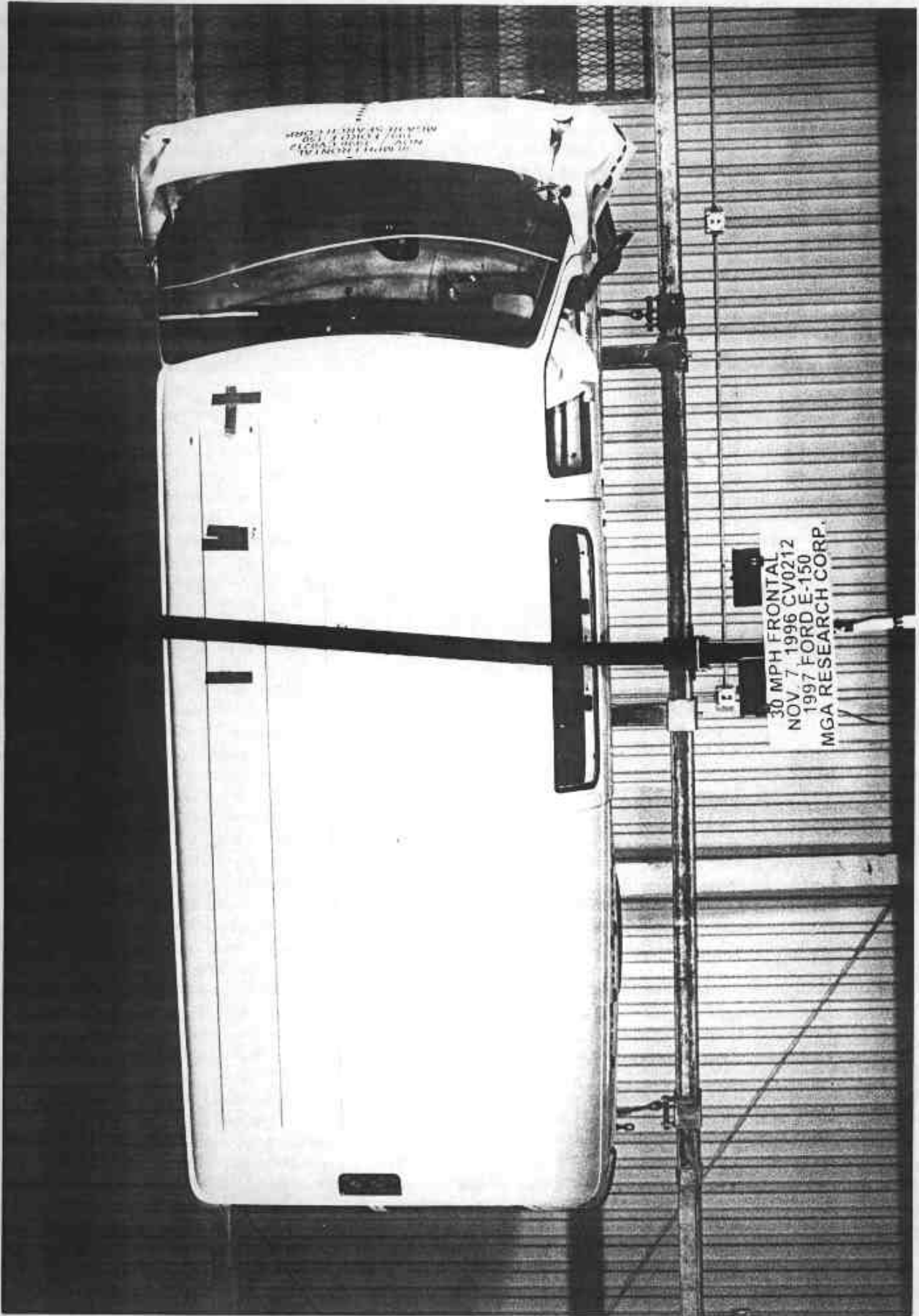
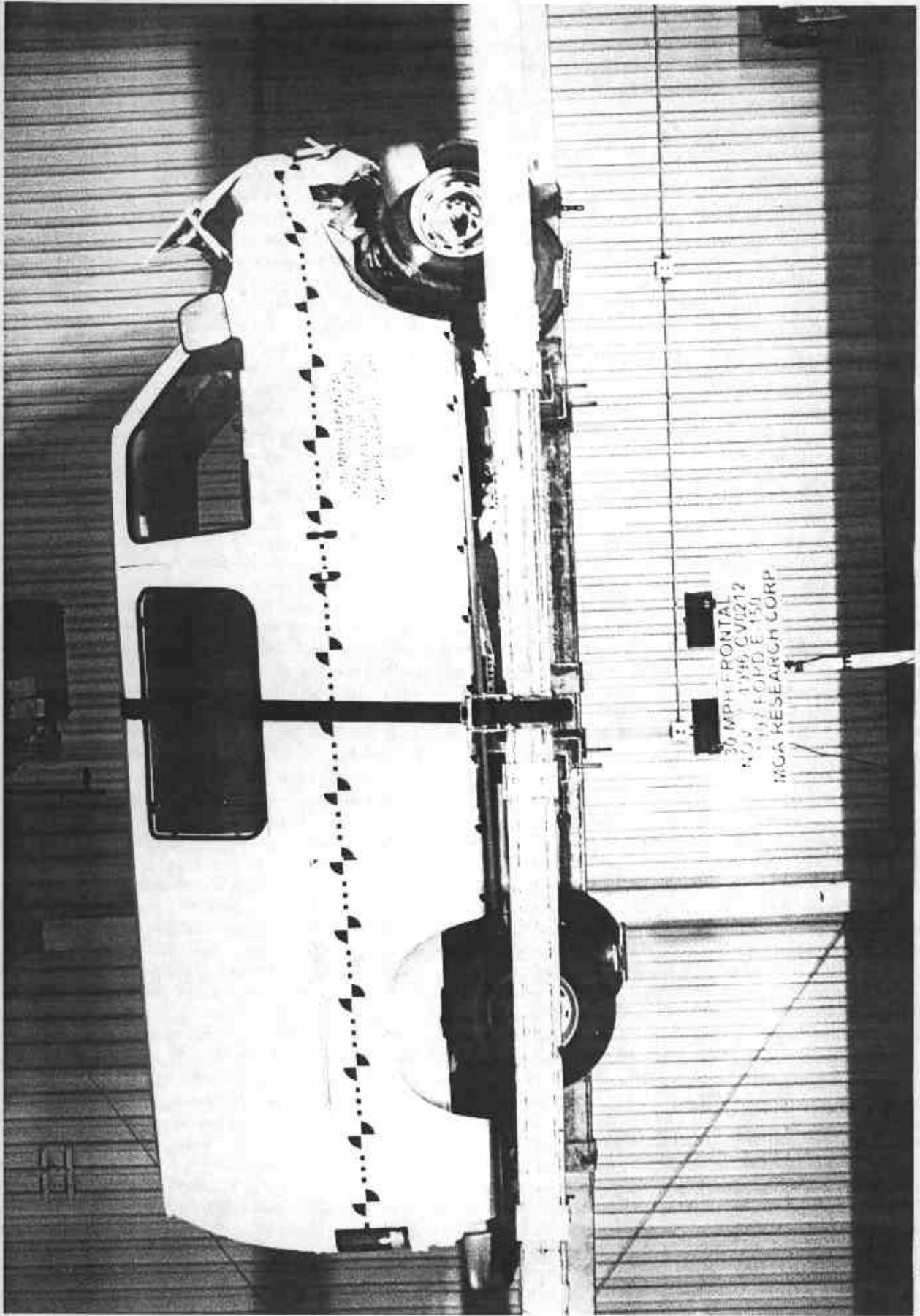


Photo No. A-49 - Rollover 270°



A-50

Photo No. A-50 - Rollover 360°

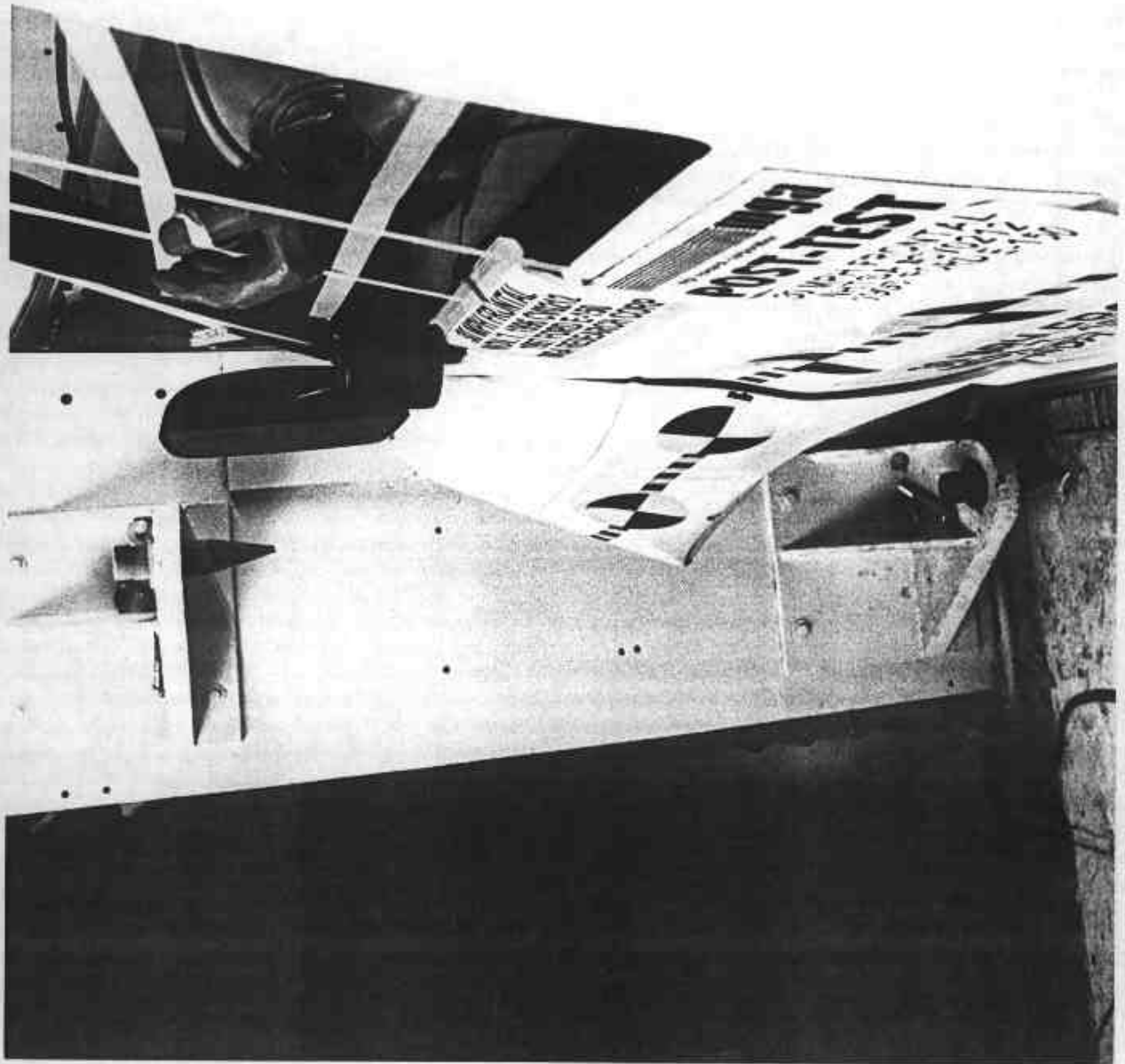


Photo No. A-51 - Post-Test Driver Dummy Arm Position View

A-51

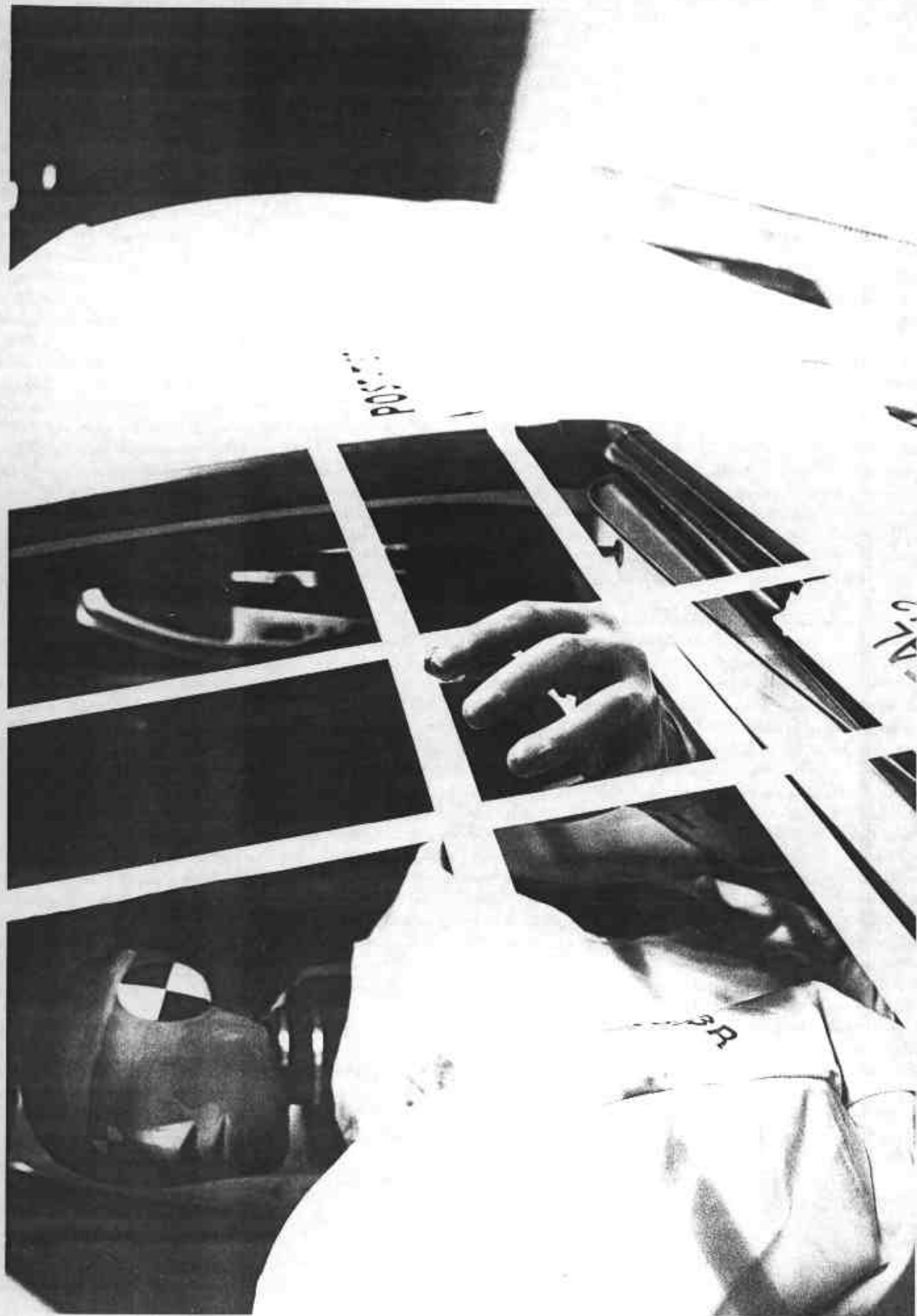


Photo No. A-52 - Post-Test Driver Dummy Arm Position View

A-52

APPENDIX B  
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TEST DATE: 11-07-1996

TEST: 30 MPH FRONTAL BARRIER IMPACT

Speed: 29.1 MPH 46.8 KPH

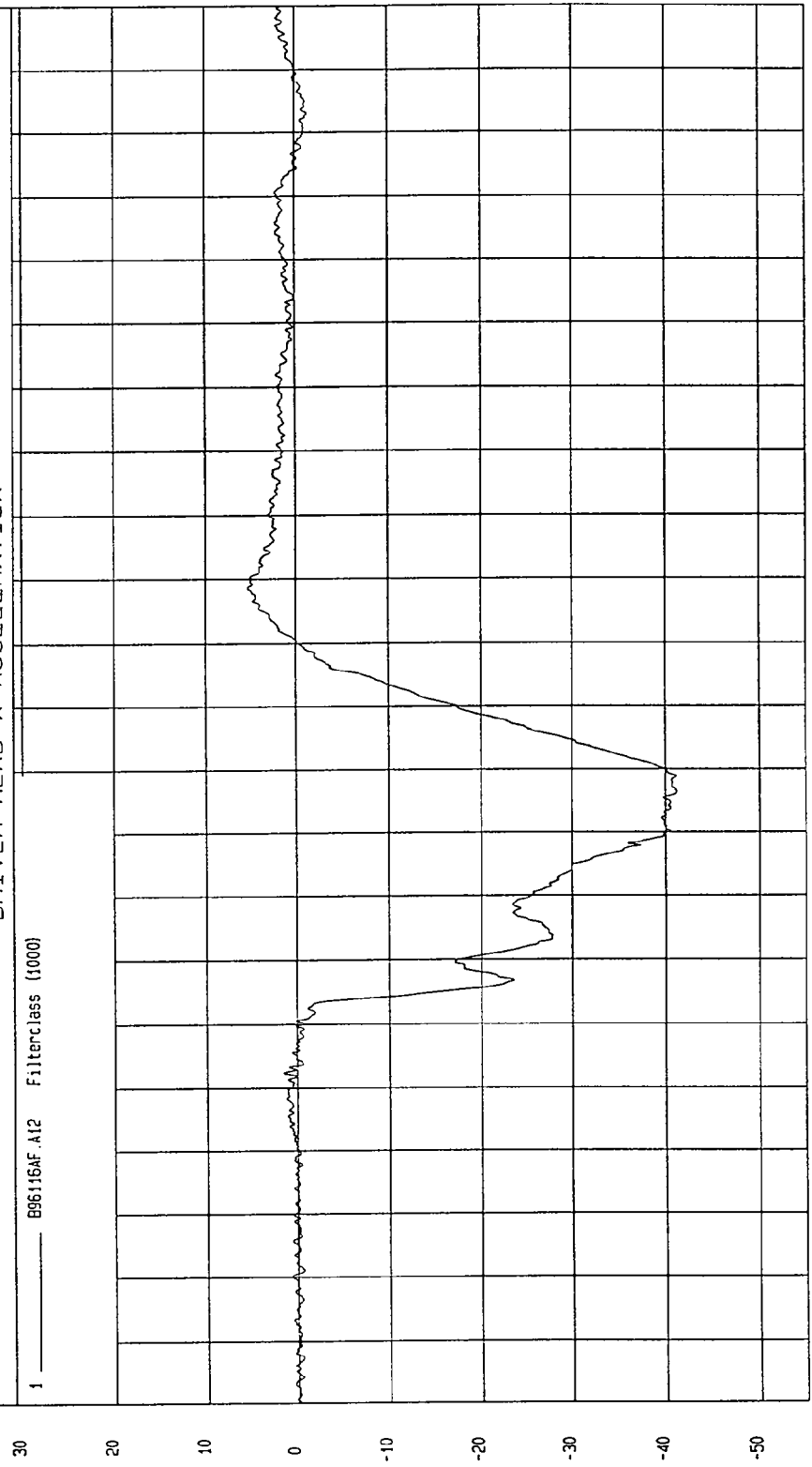
COMPONENT: 1997 FORD E-150 (CV0212)

YMIN=-41.20729 G'S at 76. msec

YMAX= 5.384946 G'S at 108 msec

DRIVER HEAD X ACCELERATION

1 ——— B96116AF.A12 Filterclass (1000)



TIME (SECONDS)

MCA Research  
11-20-1996 22:22

S.G

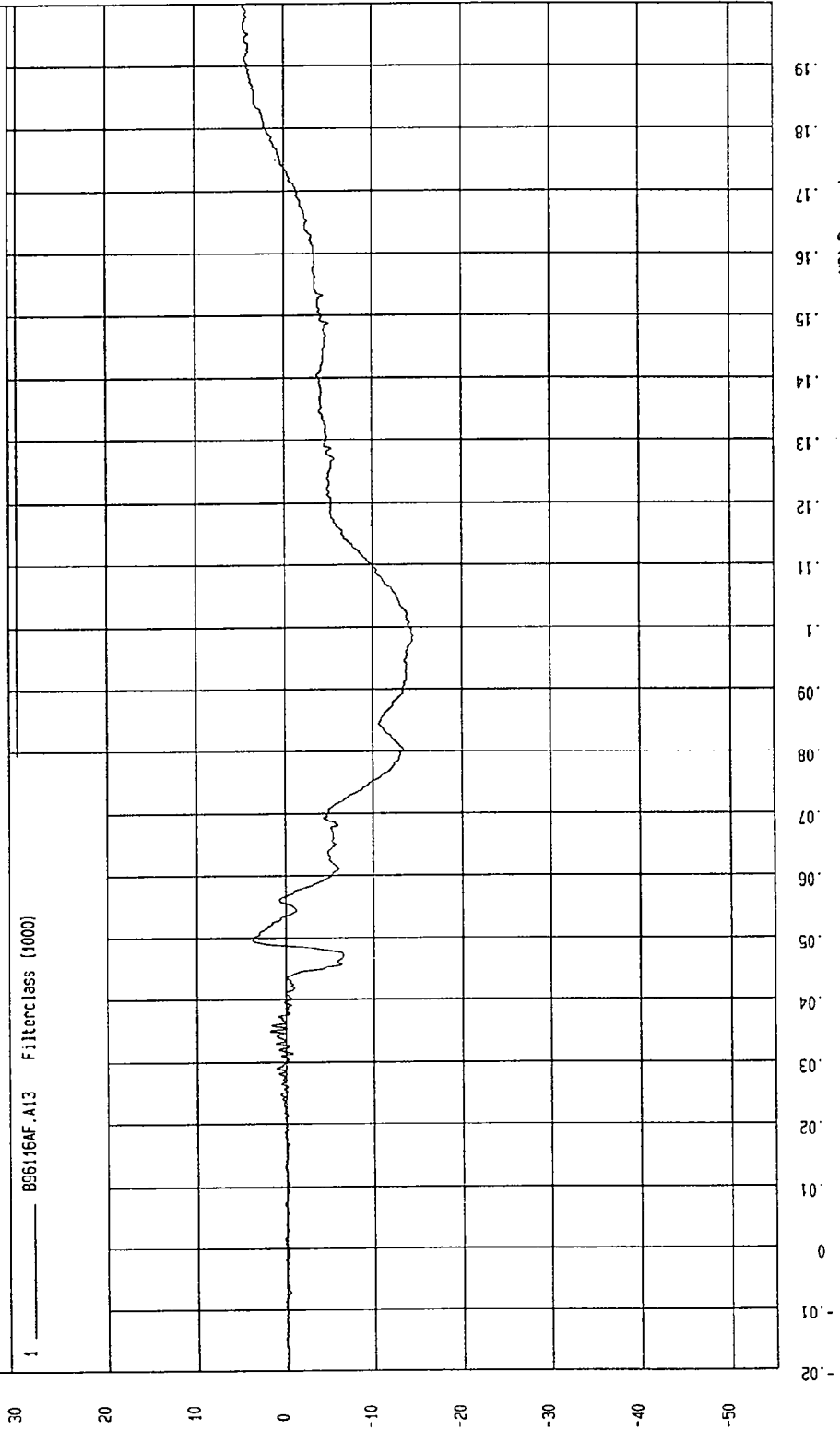
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-14.43936 G'S at 98. msec YMAX= 4.559793 G'S at 199 msec

DRIVER HEAD Y ACCELERATION

1 ——— 896116AF.A13 Filterclass (1000)



MSA Pressat Co.  
11-20-1996 02:37

TEST DATE: 11-07-1996

TEST: 30 MPH FRONTAL BARRIER IMPACT

Speed: 29.1 MPH 46.8 KPH

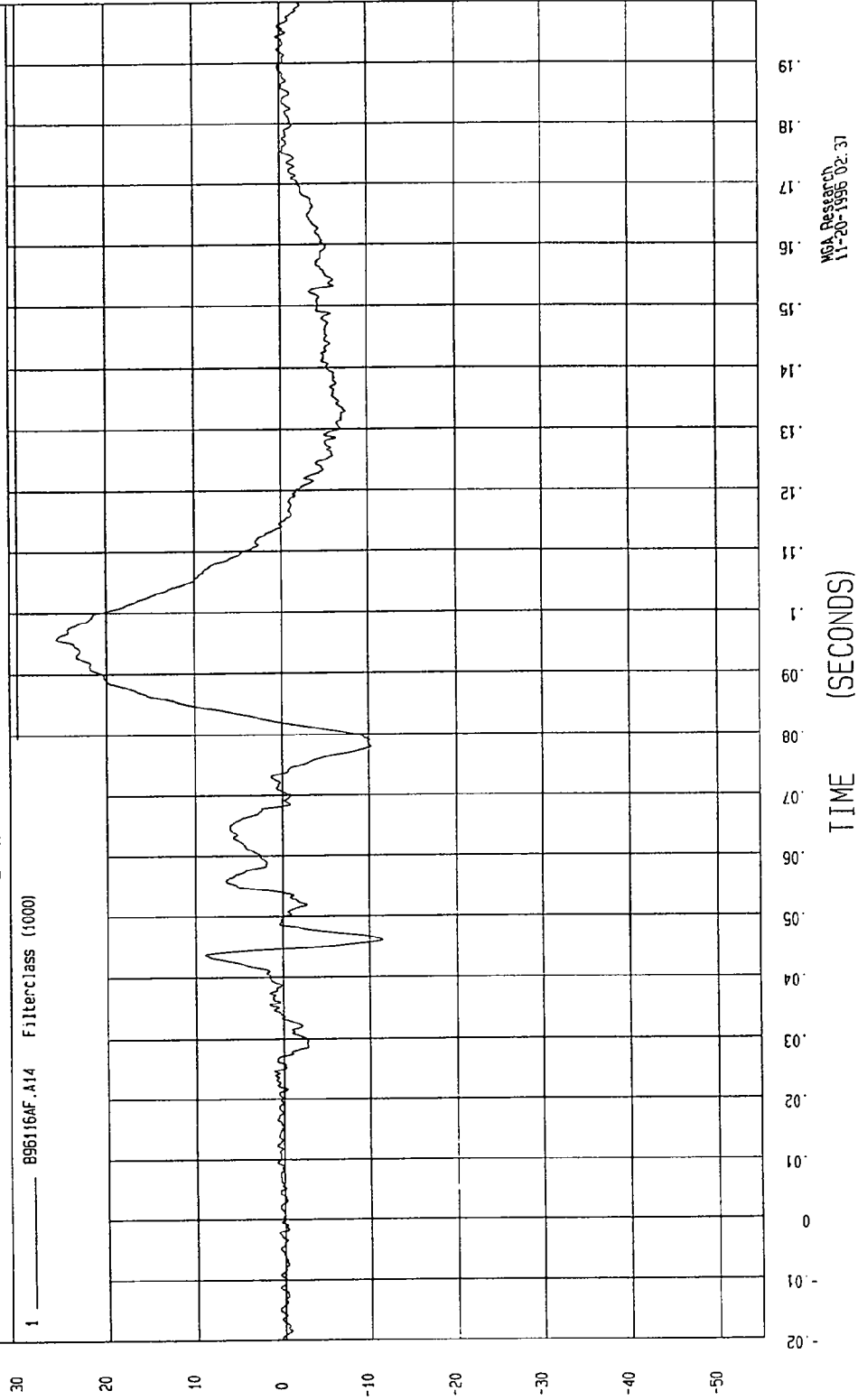
COMPONENT: 1997 FORD E-150 (CV0212)

YMAX= 25.59188 G'S at 95. msec

YMIN= -11.49951 G'S at 46. msec

DRIVER HEAD Z ACCELERATION

1 ——— 89616AF.A14 Filterclass (1000)



WGA\_Reset.ch  
11-20-1996 02:37

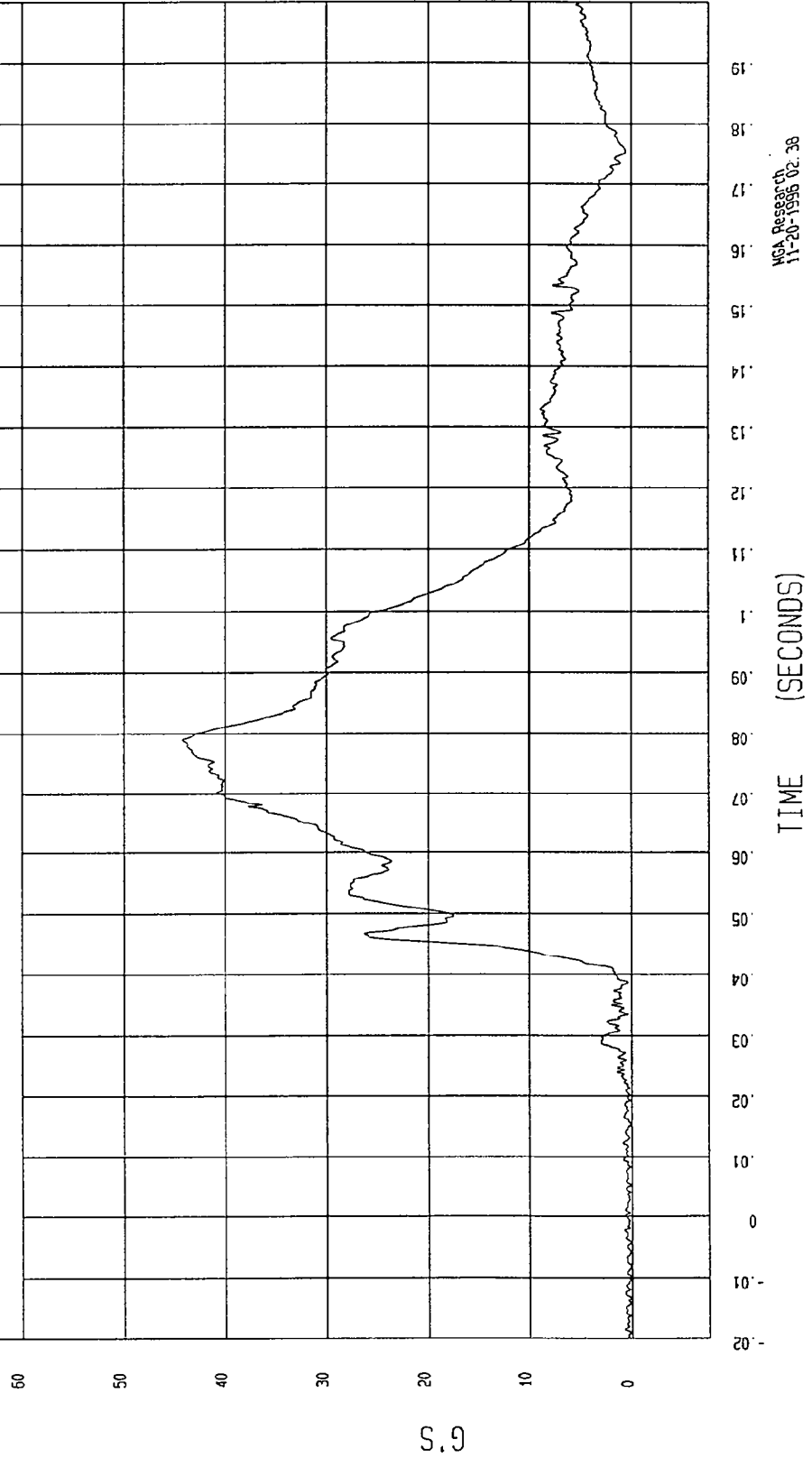
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

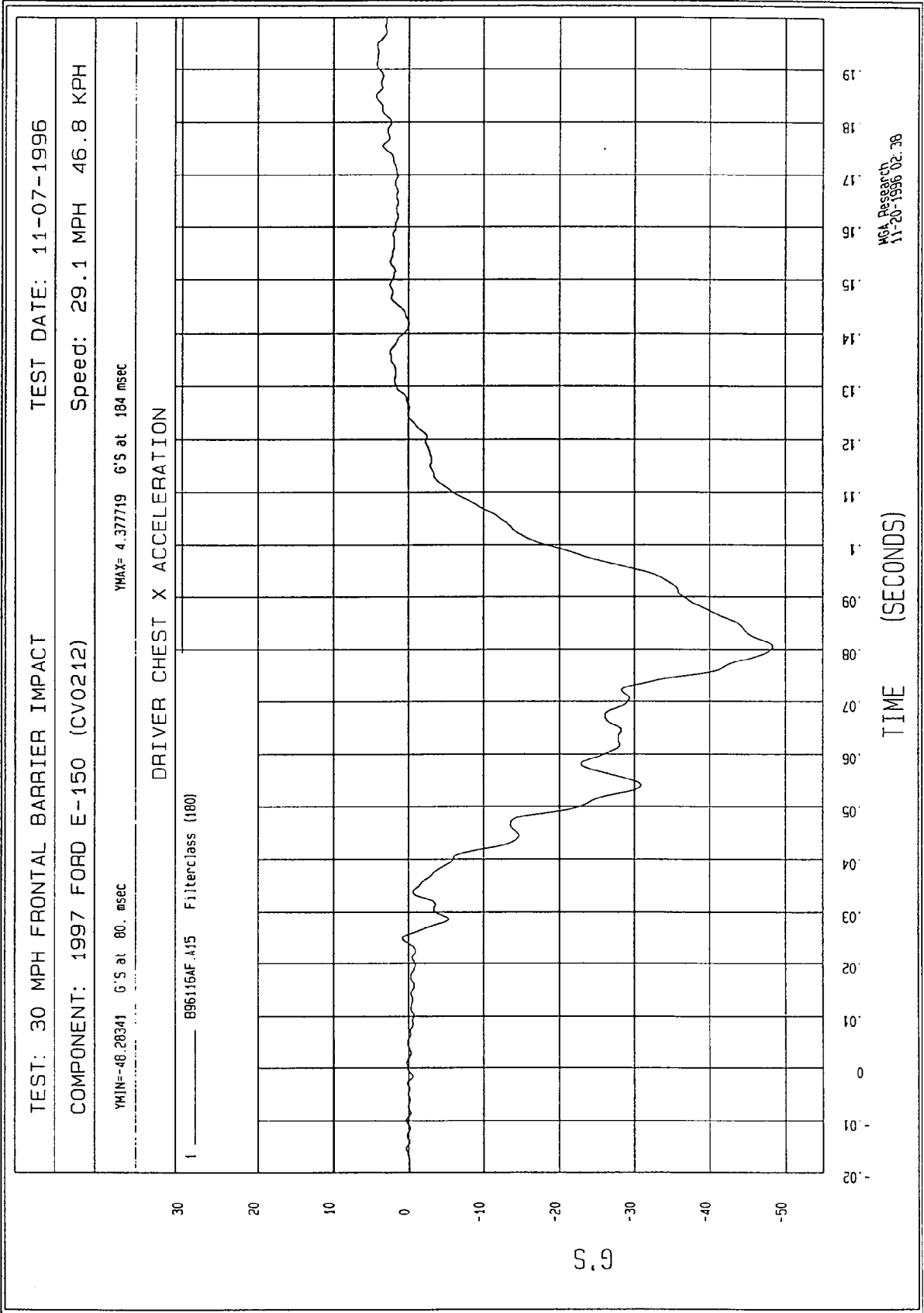
YMIN= 2.231326E-02 G'S at -4.3 msec YMAX= 44.29032 G'S at 76. msec

DRIVER HEAD RESULTANT ACCELERATION

1 \_\_\_\_\_ B96116AV.A12 Filterclass (1000)



MCA Research  
11-20-1996 02:30



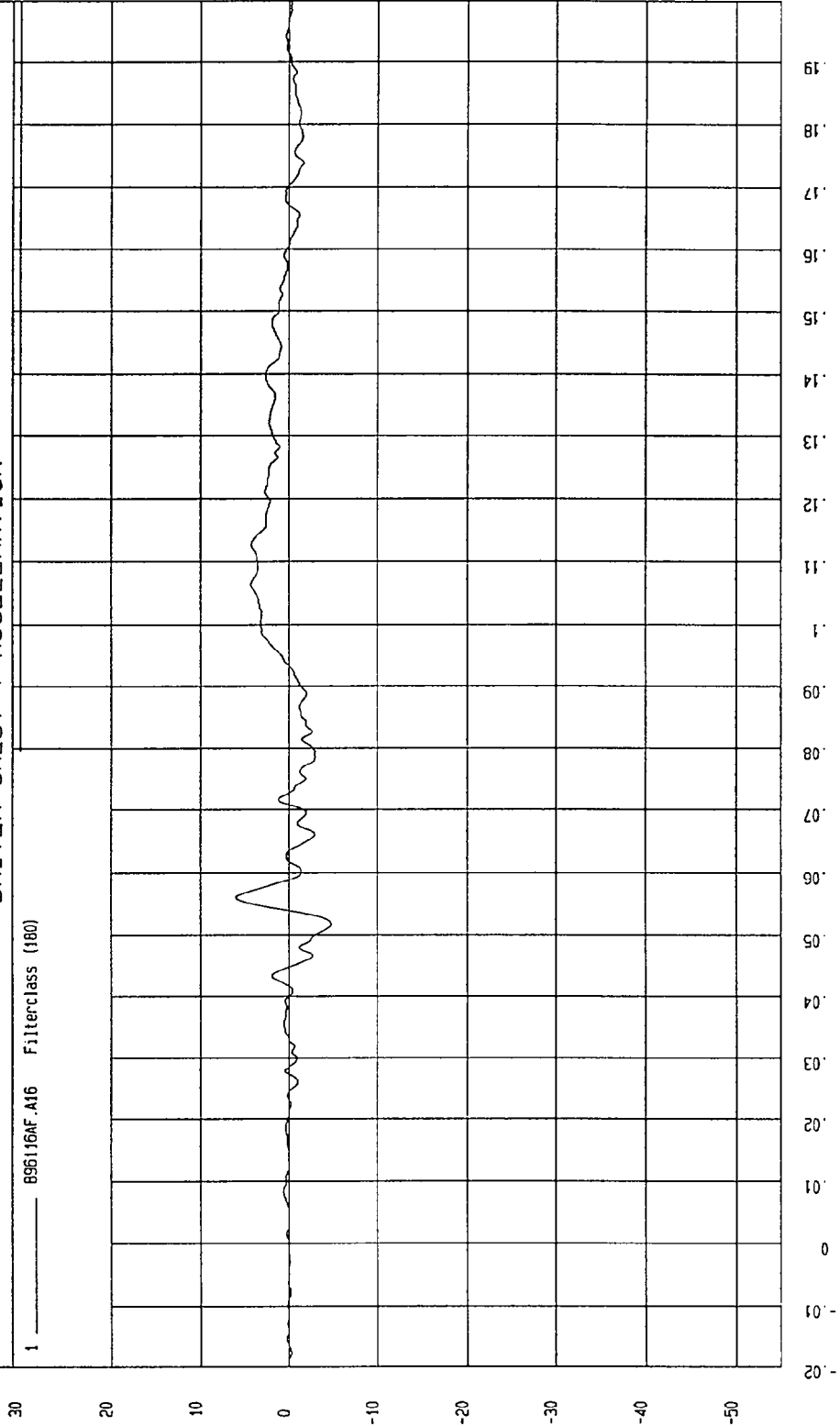
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-4.676437 G'S at 51. msec YMAX= 5.944503 G'S at 56 msec

DRIVER CHEST Y ACCELERATION

1 ——— 896116MF A16 Filterclass (180)



MOA Research  
11-20-1996 02:39

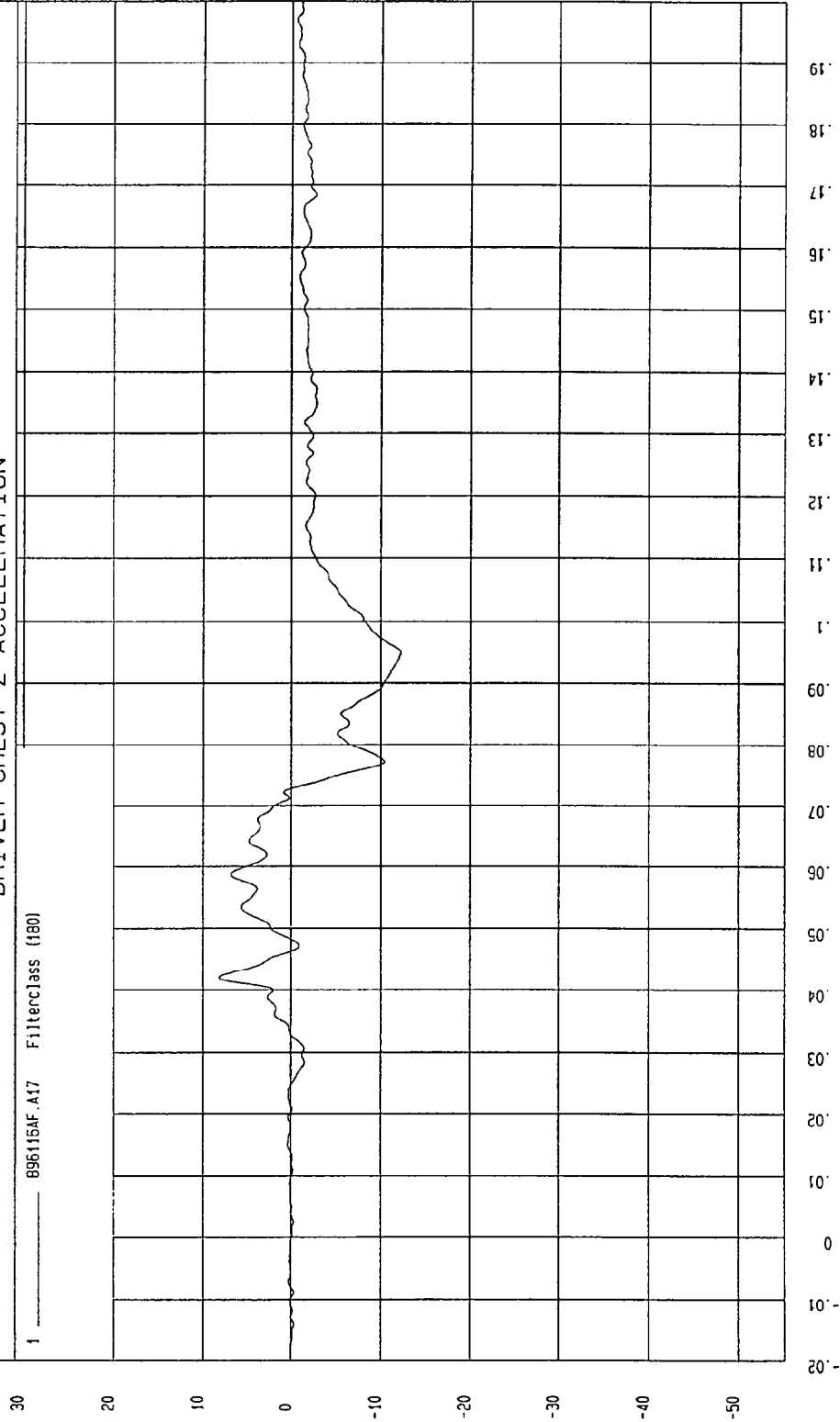
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-12.26182 6'S at 94. msec YMAX= 8.283939 6'S at 42 msec

DRIVER CHEST Z ACCELERATION

1 896115AF-A17 Filterclass (180)



MCA Research  
11-20-1996 02:38

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

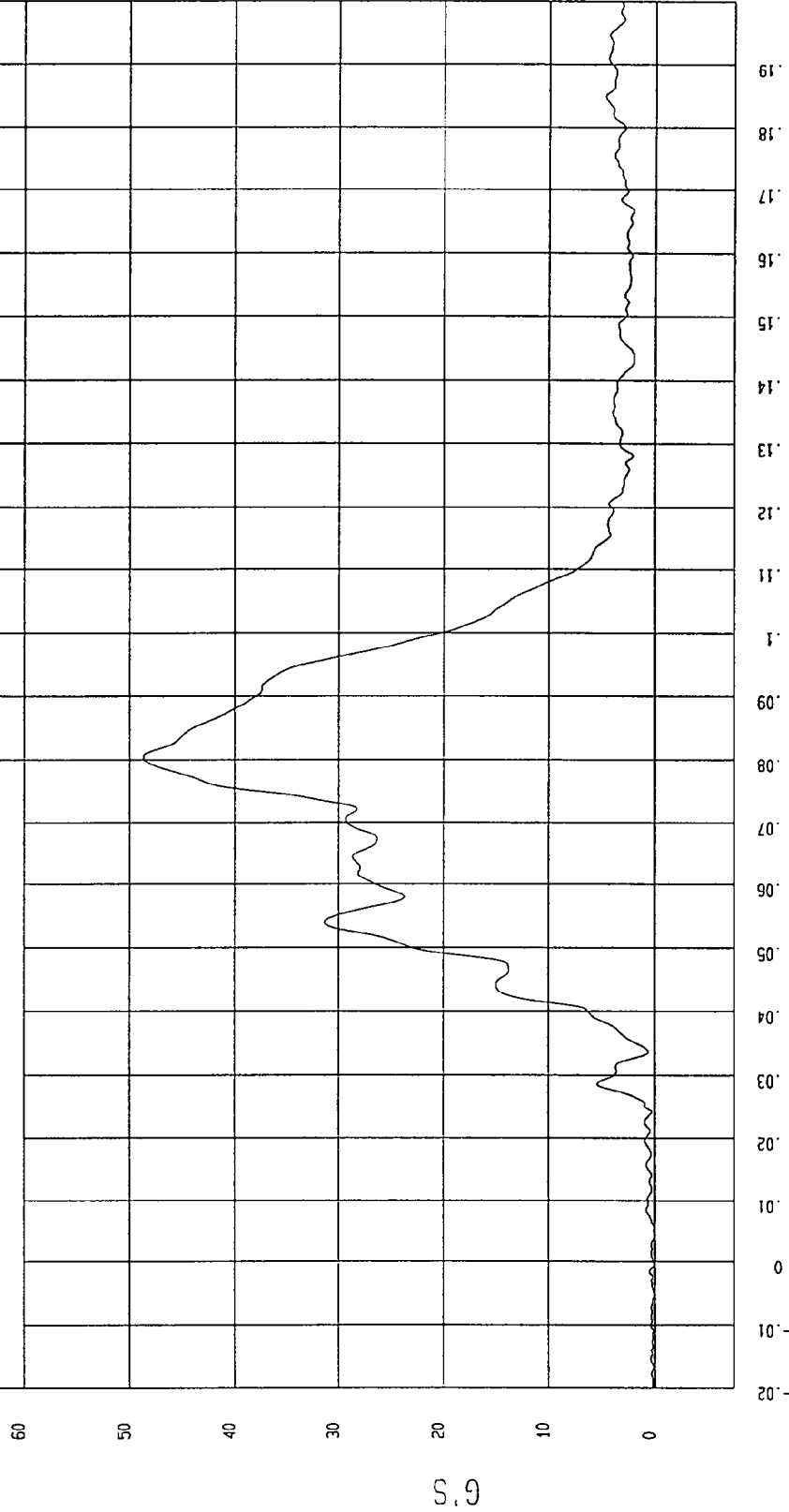
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN= 2.4622E-02 G'S at 4.0 msec

YMAX= 48.72057 G'S at 80. msec

DRIVER CHEST RESULTANT ACCELERATION

1 896116AV.A15 FilterClass (180)



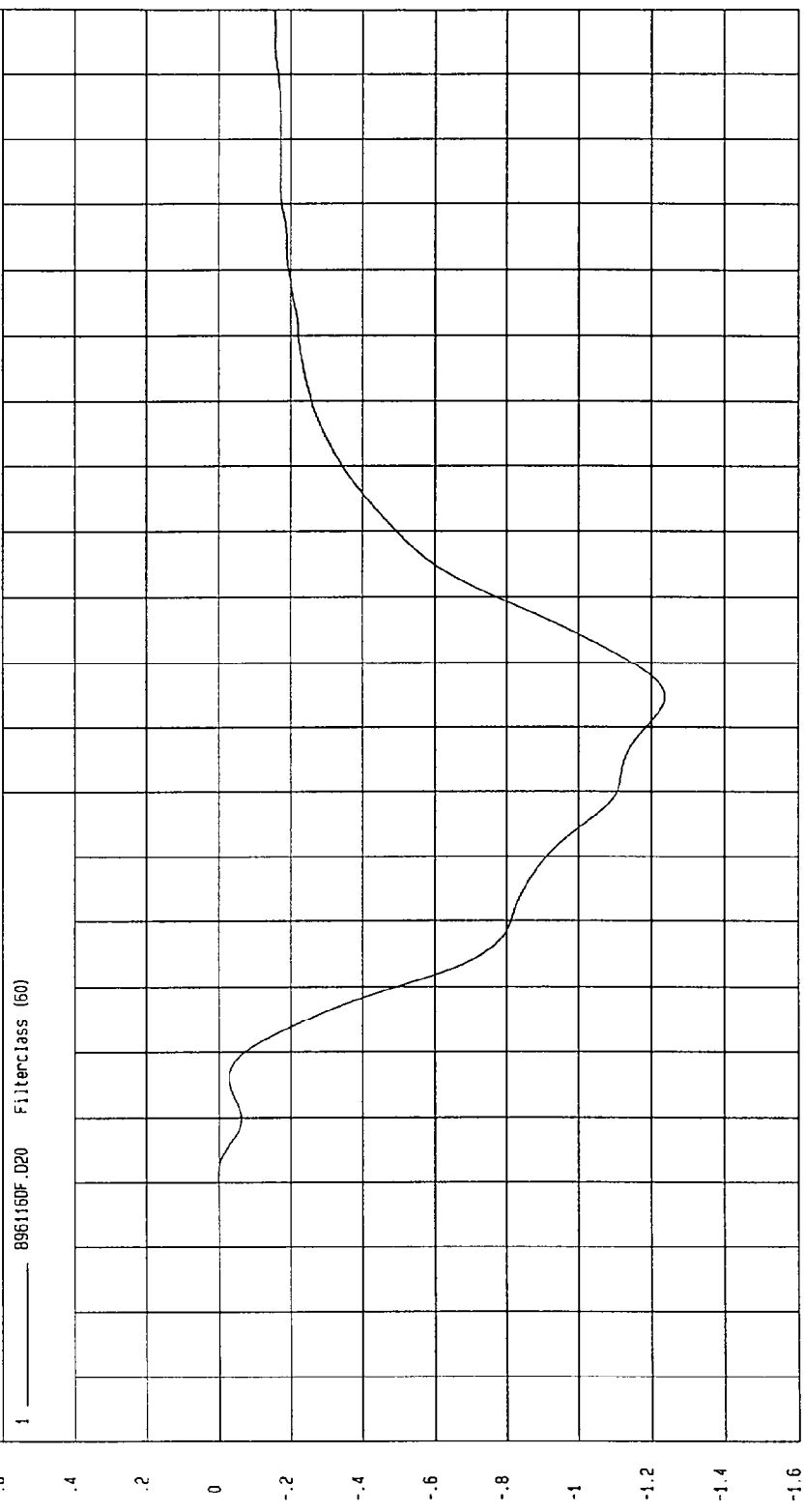
MCA Research  
11-20-1996 02:30

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996  
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

Minimum = -1.23 IN at 95 msec Maximum = 1.82E-03 IN at 21 msec

DRIVER CHEST COMPRESSION

1 896116DF.020 Filterclass (60)



NSA Research  
01-17-1997 12:38

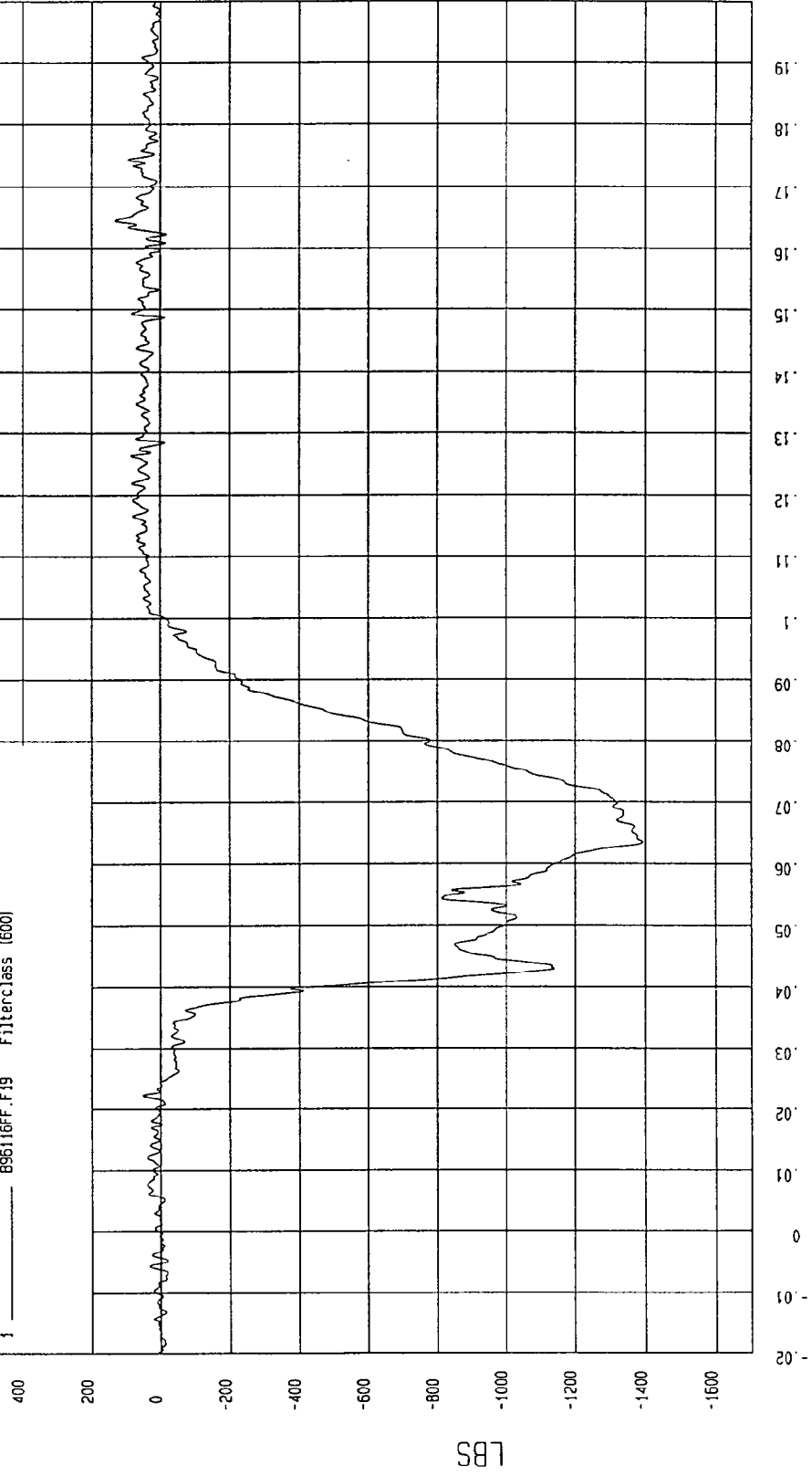
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

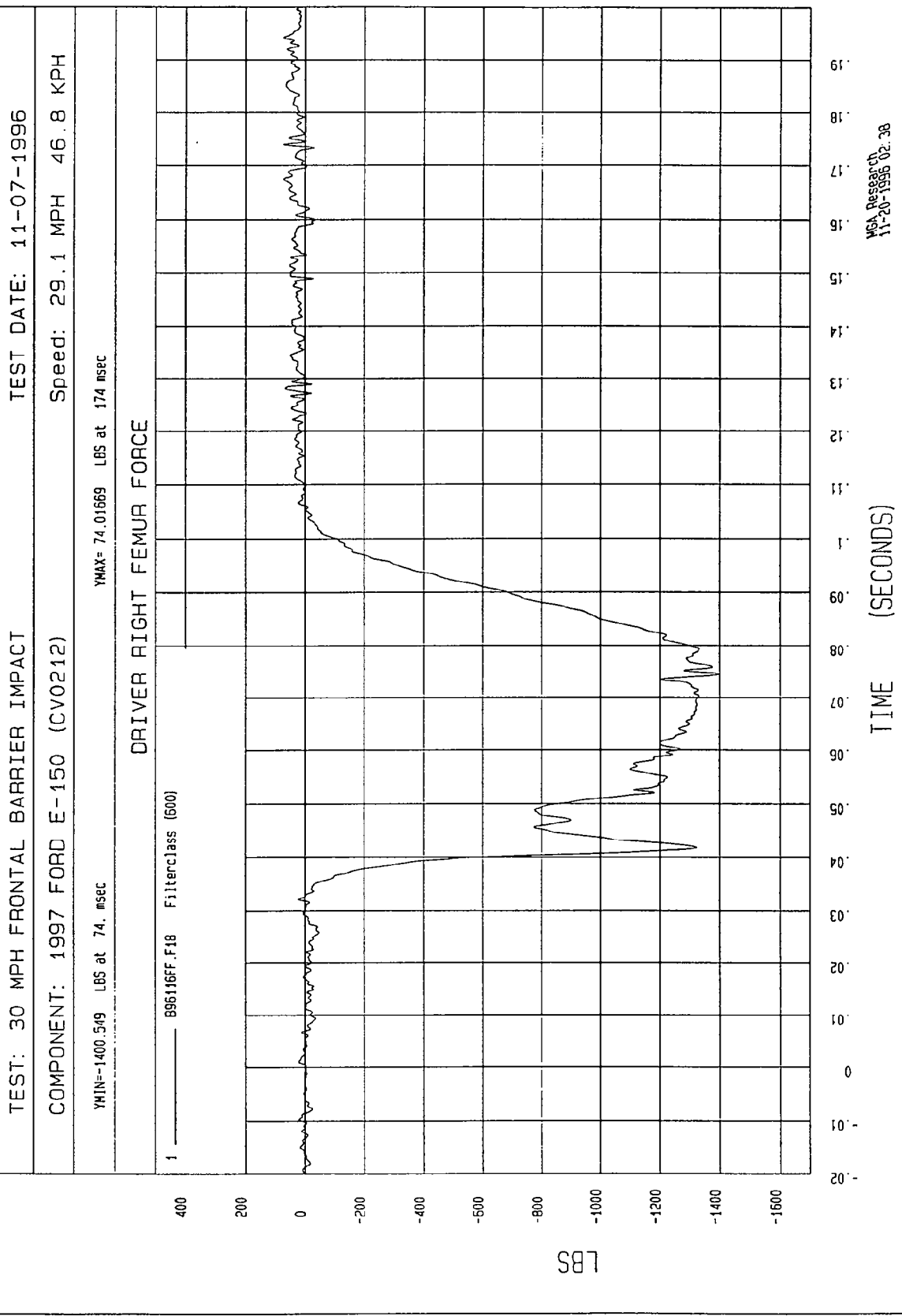
YMIN=-1392.692 LBS at 63. msec YMAX= 131.5902 LBS at 164 msec

DRIVER LEFT FEMUR FORCE

1 896116FF.F19 Filterclass (600)



MCA Research  
11-20-1996 02.38



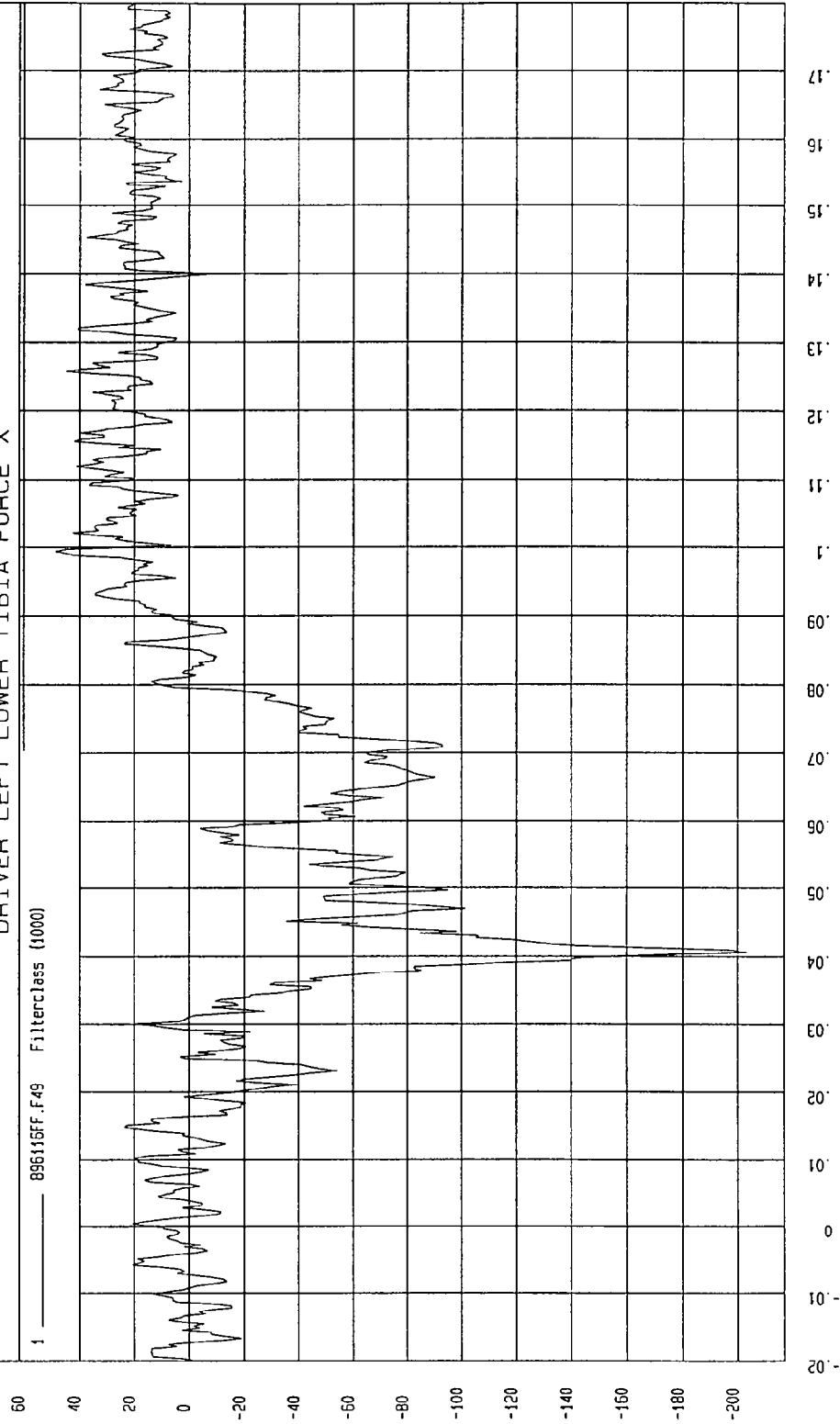
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-203.8336 LBS at 40. msec YMAX= 48.82928 LBS at 99. msec

DRIVER LEFT LOWER TIBIA FORCE X

1 856115F.F49 FilterClass (1000)



NCA Research  
11-20-1996 22:22

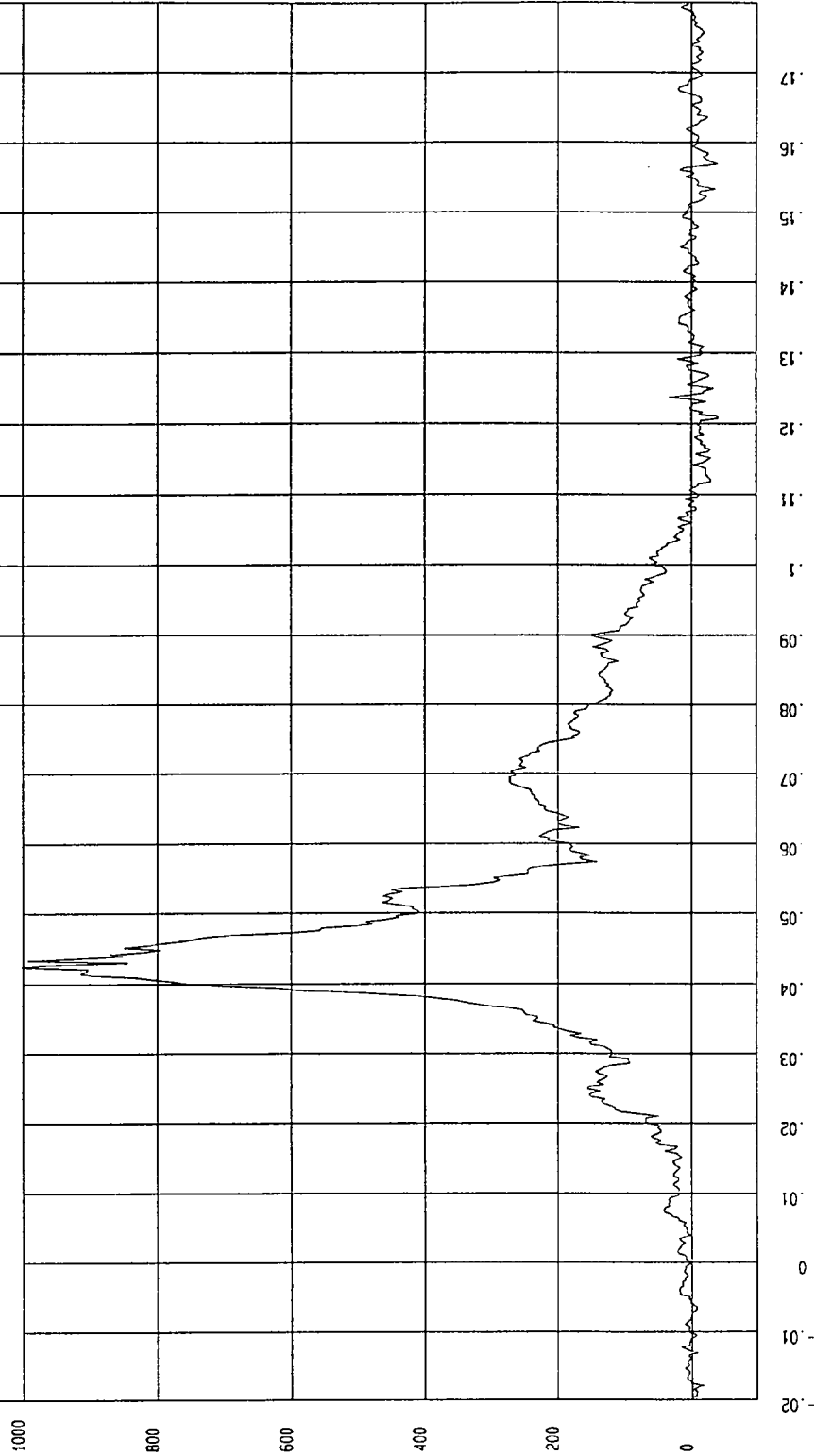
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-43.01825 LBS at 120 msec YMAX= 1024.442 LBS at 42. msec

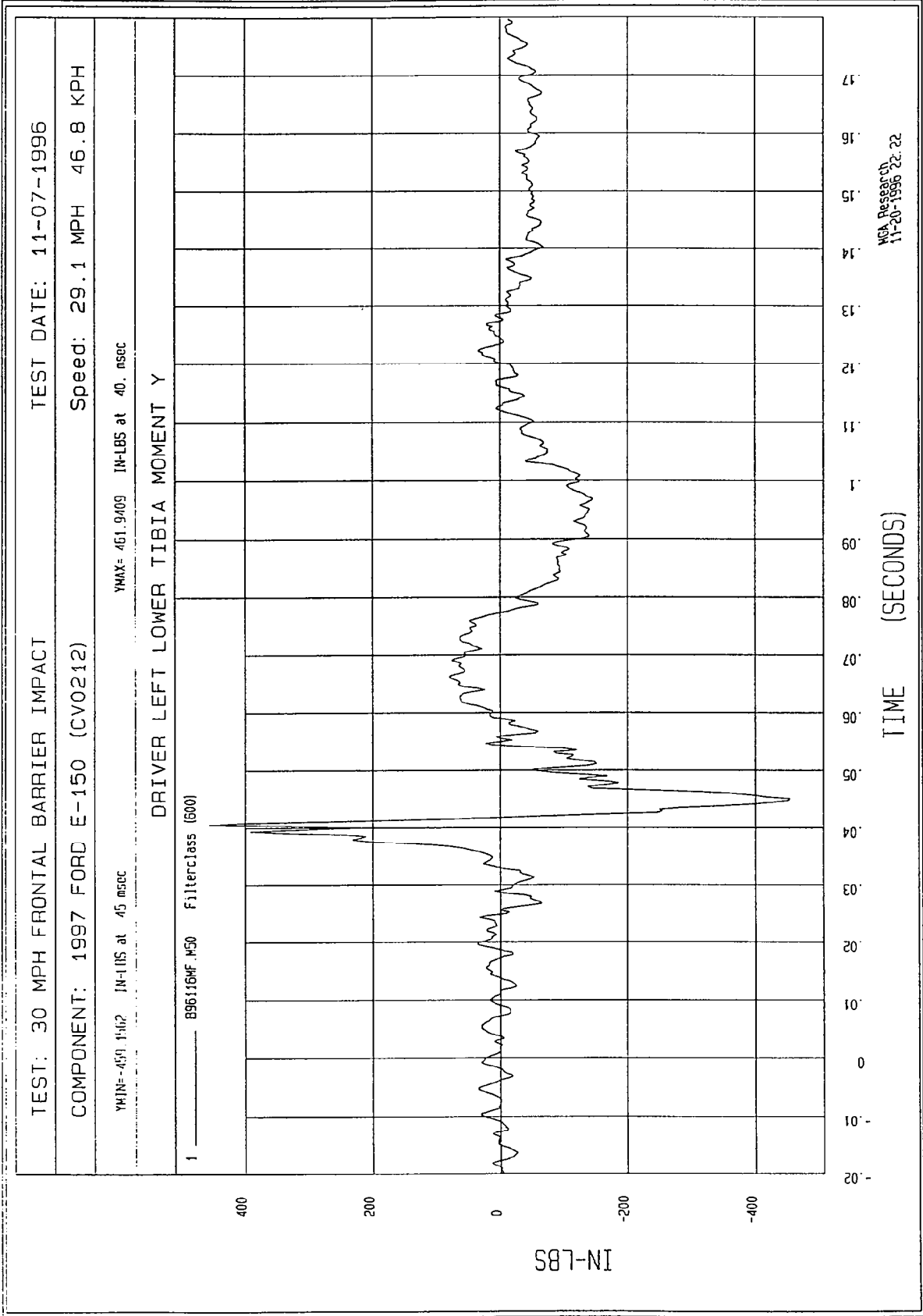
DRIVER LEFT LOWER TIBIA FORCE Z

1 ——— 896116FF.F51 Filterclass (1000)



MBA, Research Co  
11-20-1996 22:22

LBS



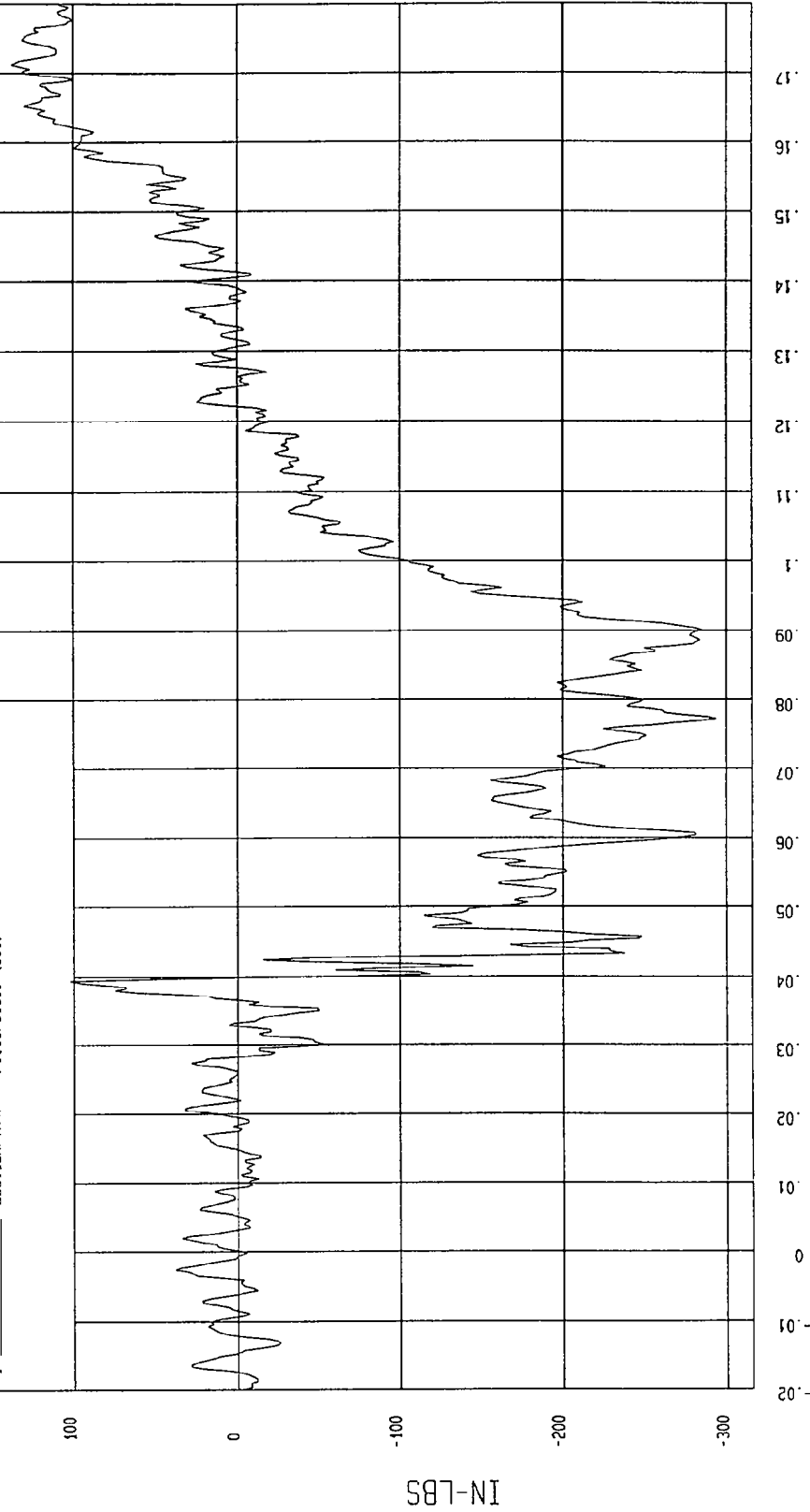
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-293.779 IN-LBS at 77. msec YMAX= 137.9419 IN-LBS at 171 msec

DRIVER LEFT UPPER TIBIA MOMENT X

1 896116MF.M47 FilterClass (600)



M&A Research  
11-20-1996 22:22

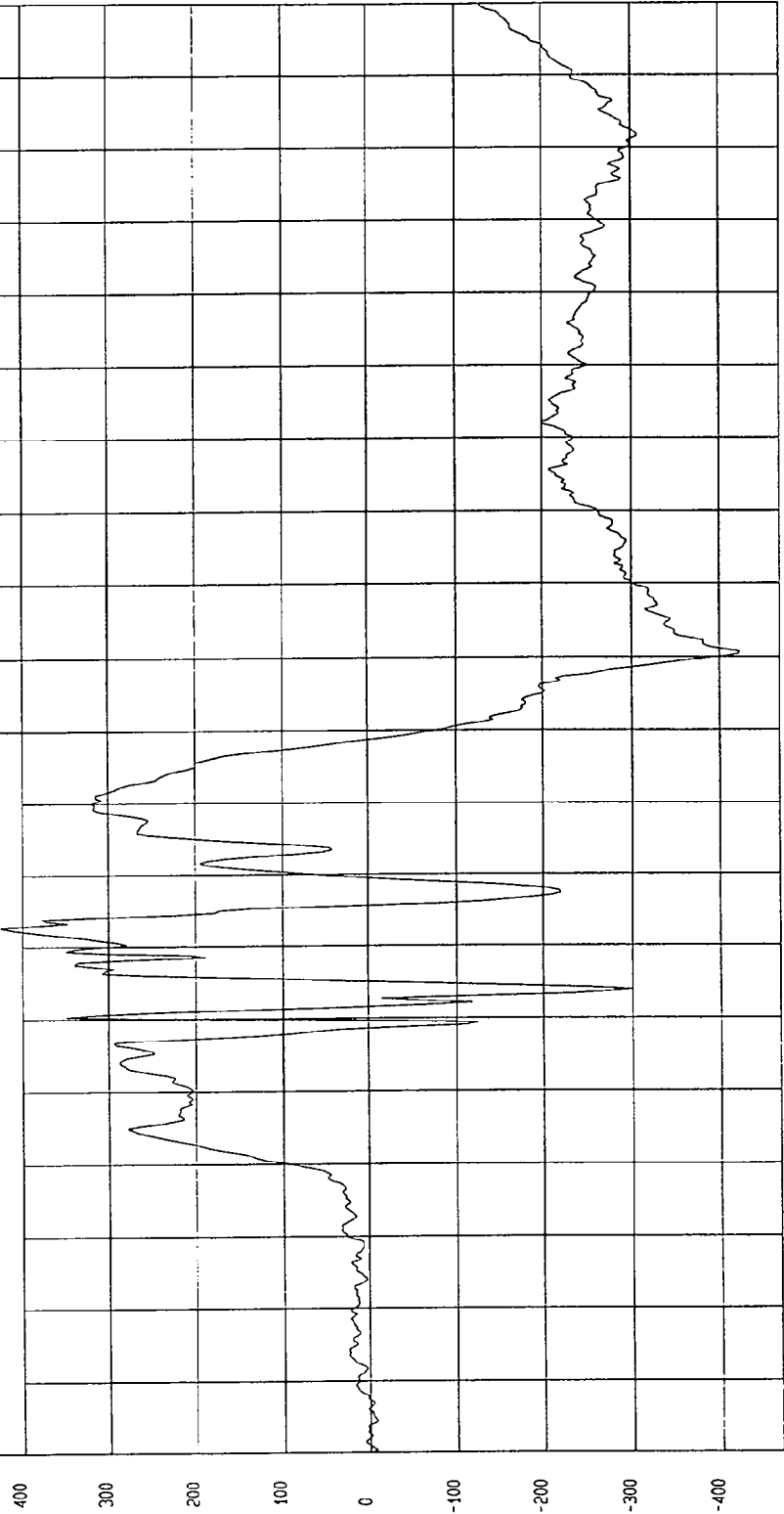
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-423.8752 IN-LBS at 90. msec YMAX= 425.8631 IN-LBS at 52. msec

DRIVER LEFT UPPER TIBIA MOMENT Y

1 896116MF.M48 FilterClass [600]

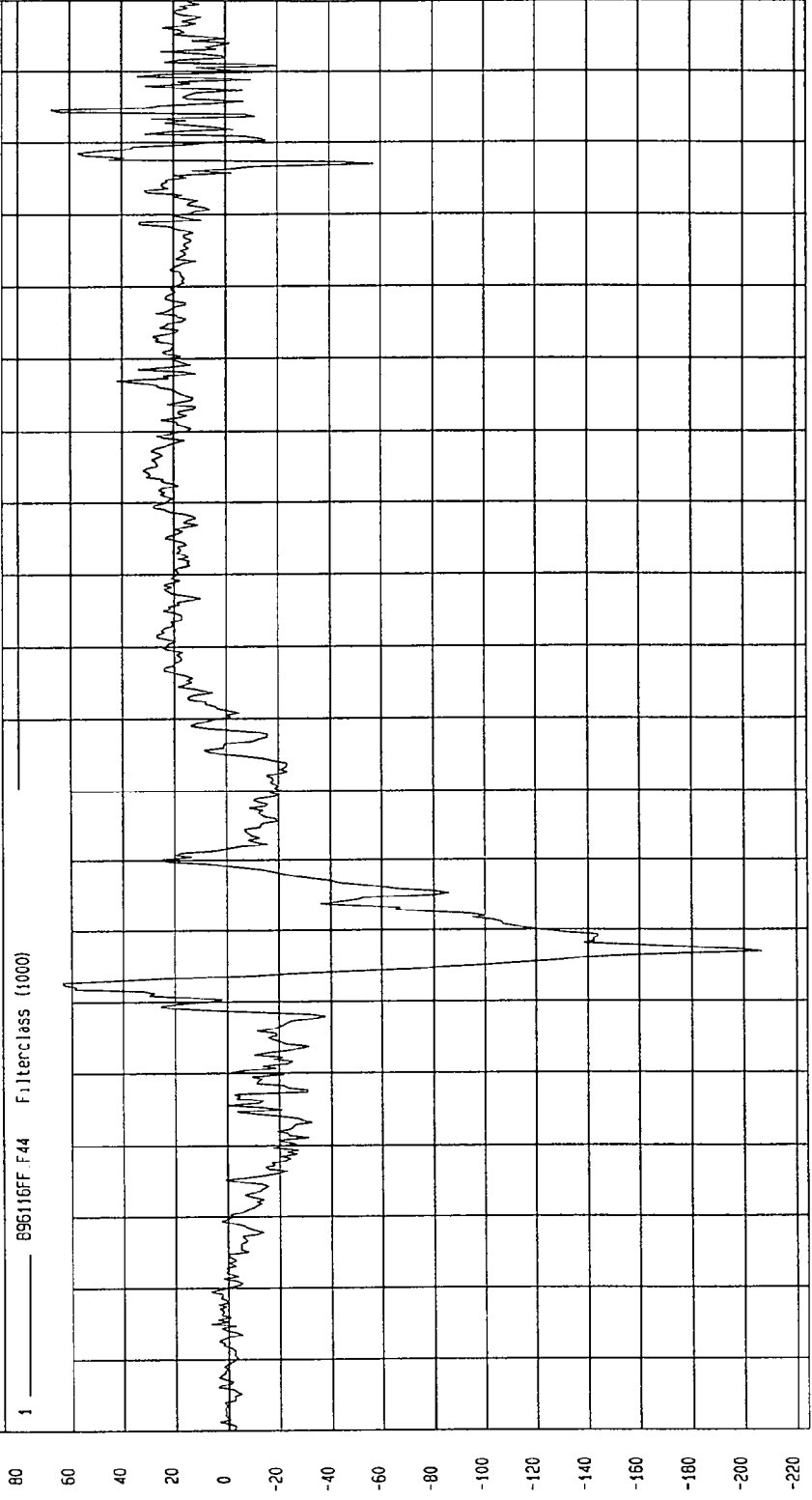


MSA Research  
11-20-1996 22:22

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996  
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-210.0762 LBS at 47 msec YMAX: 71.89585 LBS at 164 msec

DRIVER RIGHT LOWER TIBIA FORCE X



TIME (SECONDS)

MGA Research  
11-20-1996 22.23

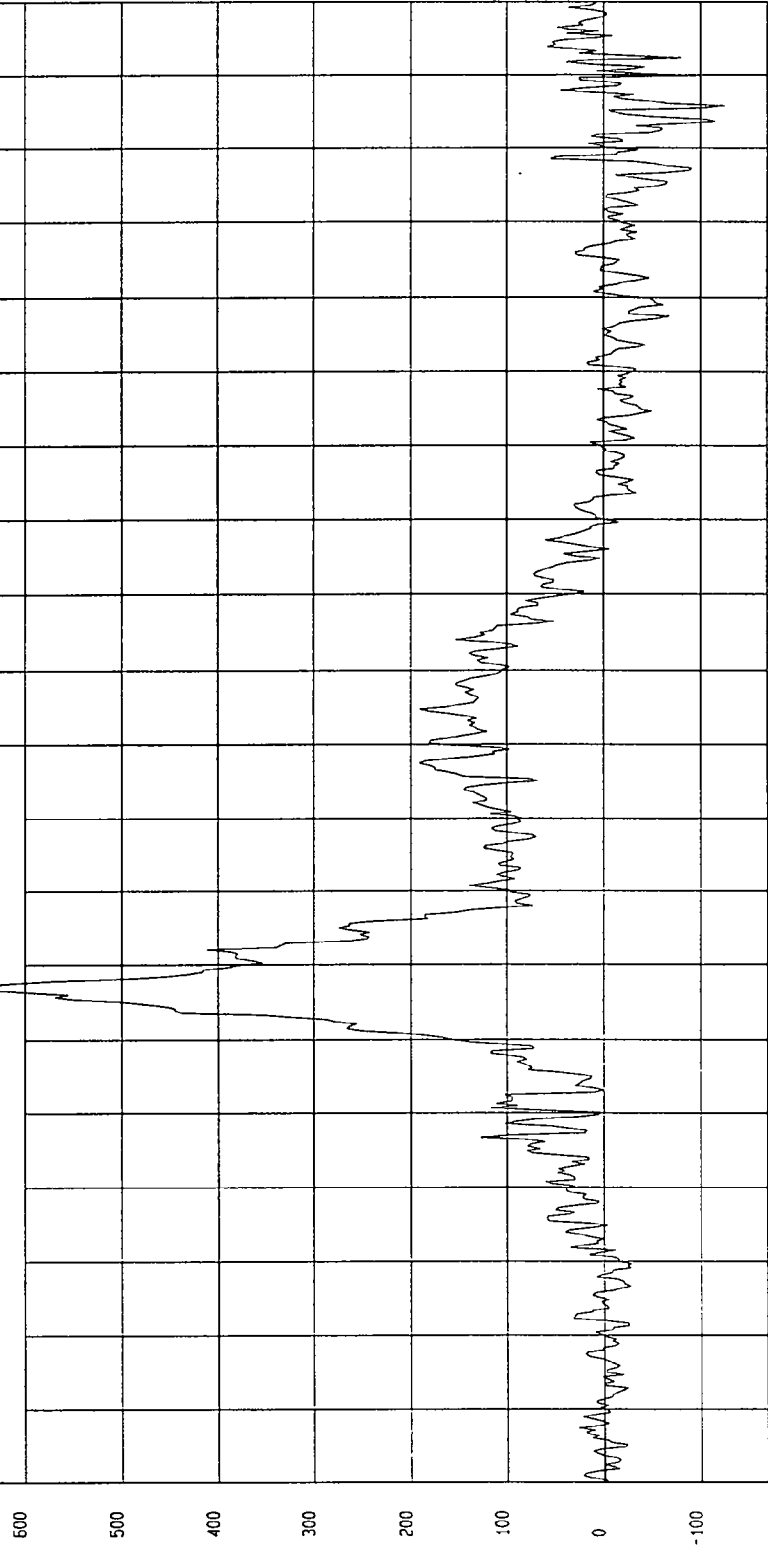
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-128.9036 LBS at 155 msec YMAX= 648.0267 LBS at 47. msec

DRIVER RIGHT LOWER TIBIA FORCE Z

1 ——— B95116FF.F46 Filterclass (1000)



MGA, Reseat CD  
11-20-1996 22:23

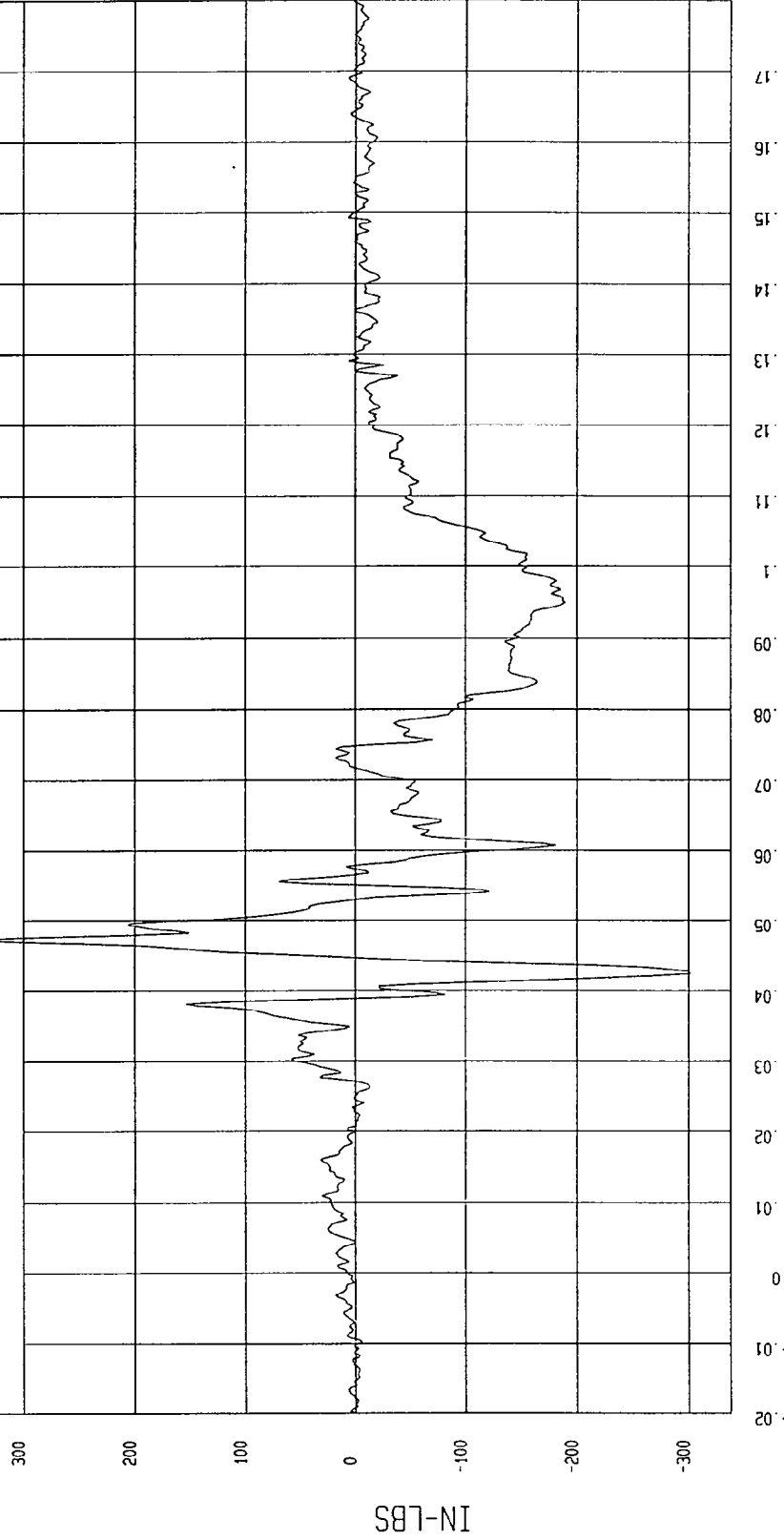
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-304.6519 IN-LBS at 42. msec YMAX= 345.4659 IN-LBS at 47. msec

DRIVER RIGHT LOWER TIBIA MOMENT Y

1 896116MF M45 Filterclass (500)



MGA Research  
11-20-1996 22: 23

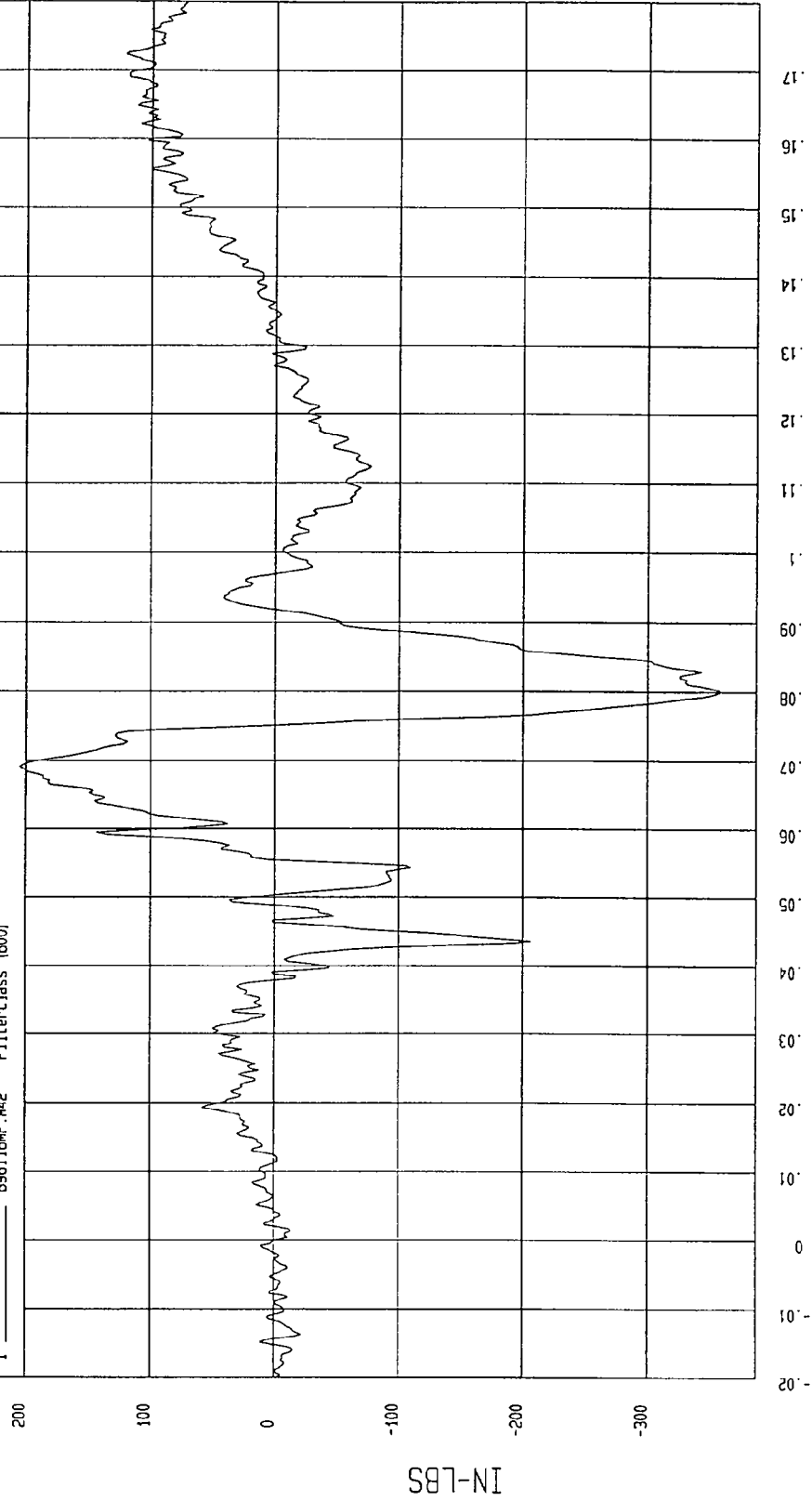
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-350 IN-LBS at 60. msec YMAX= 205.5408 IN-LBS at 69 msec

DRIVER RIGHT UPPER TIBIA MOMENT X

1 89616MF.M42 Filterclass (600)



MGA Research  
11-20-1996 22:23

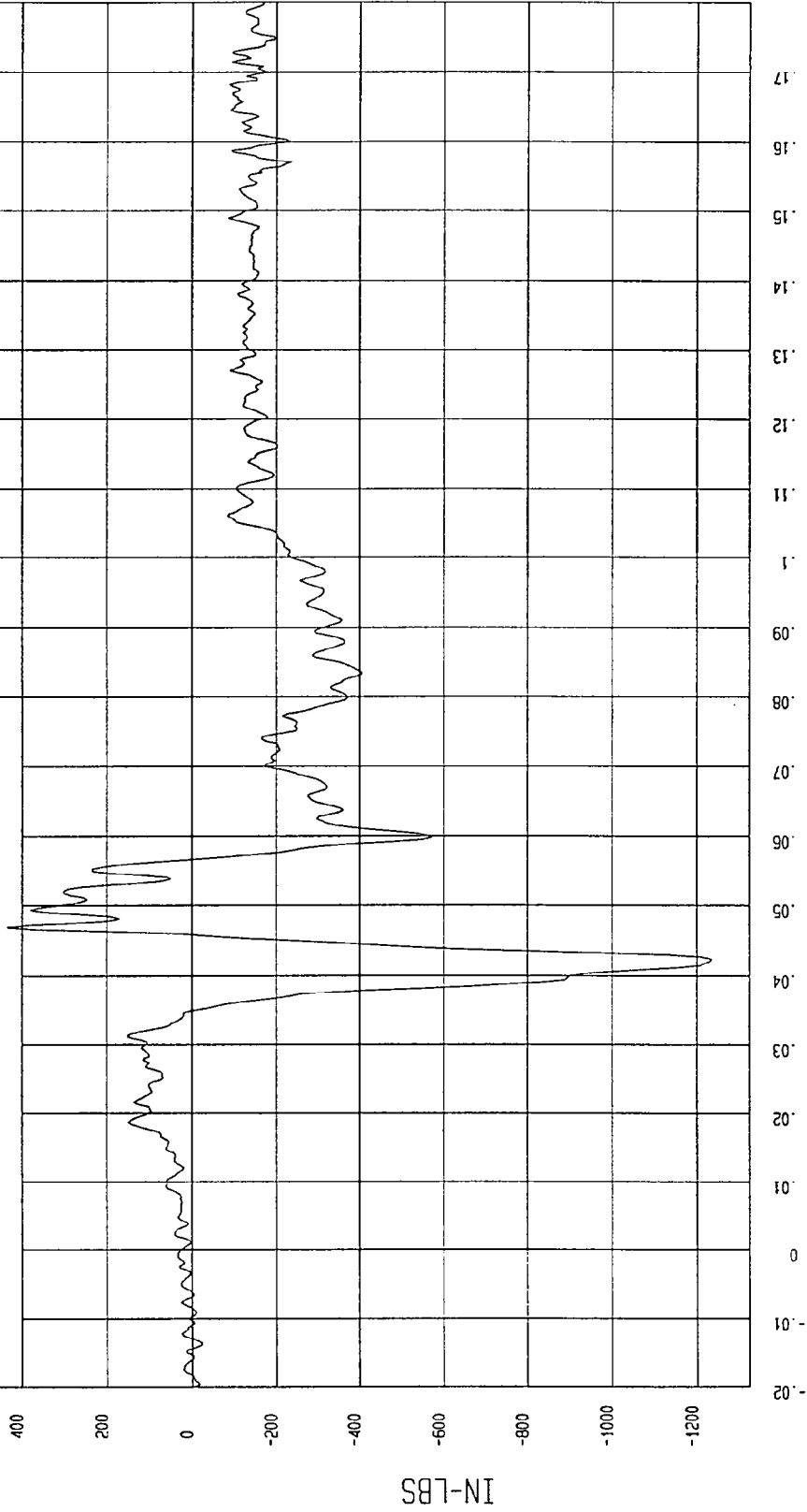
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-1235.665 IN-LBS at 42. msec YMAX= 436.7913 IN-LBS at 46. msec

DRIVER RIGHT UPPER TIBIA MOMENT Y

1 ——— 896116HF.M43 FilterClass (500)



MOA Research  
11-20-1996 22:23

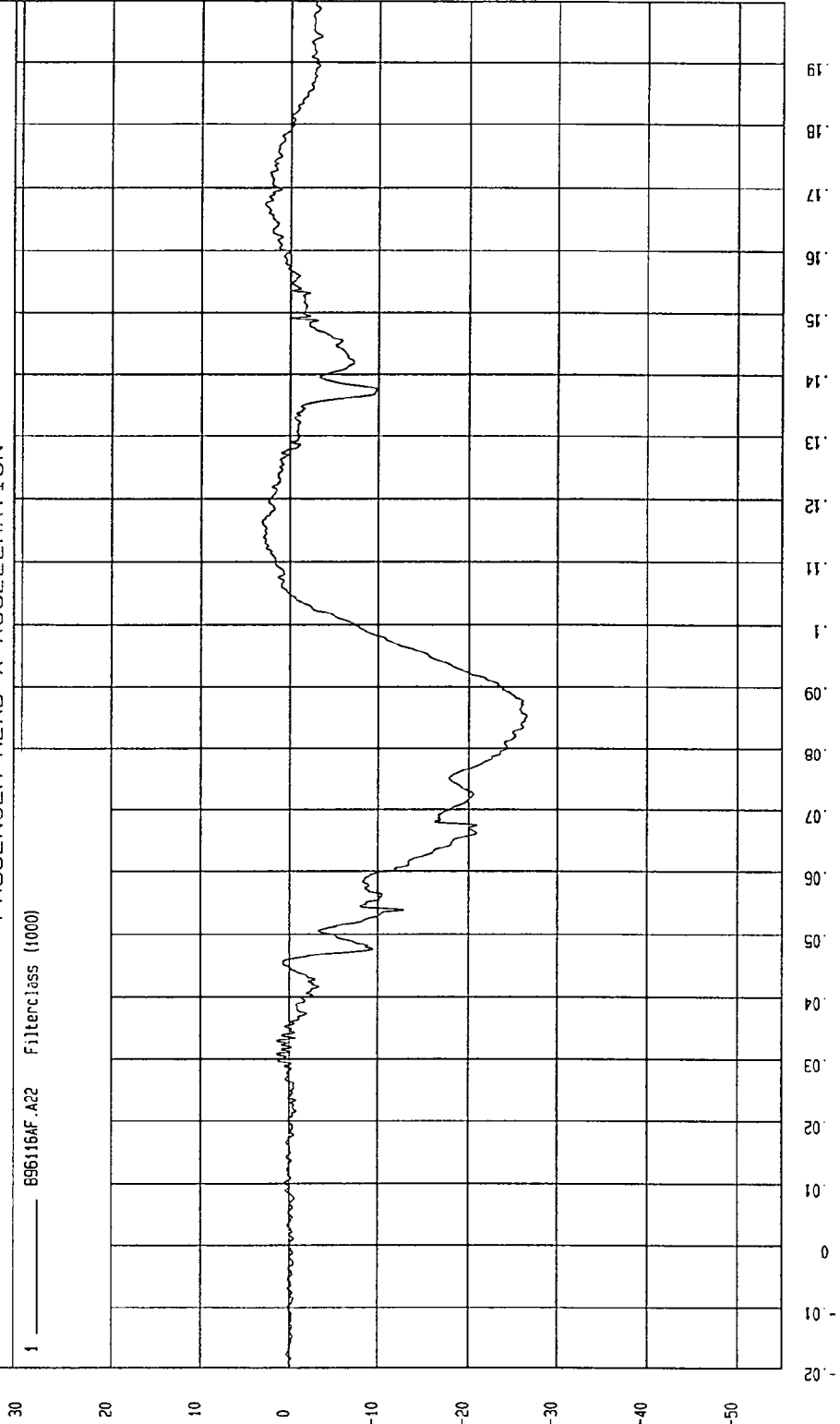
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-26.65712 G'S at 85. msec YMAX= 3.088445 G'S at 116 msec

PASSENGER HEAD X ACCELERATION

1 ——— 896116AF.A22 Filterclass (1000)



MOA Research  
11-20-1996 02:39

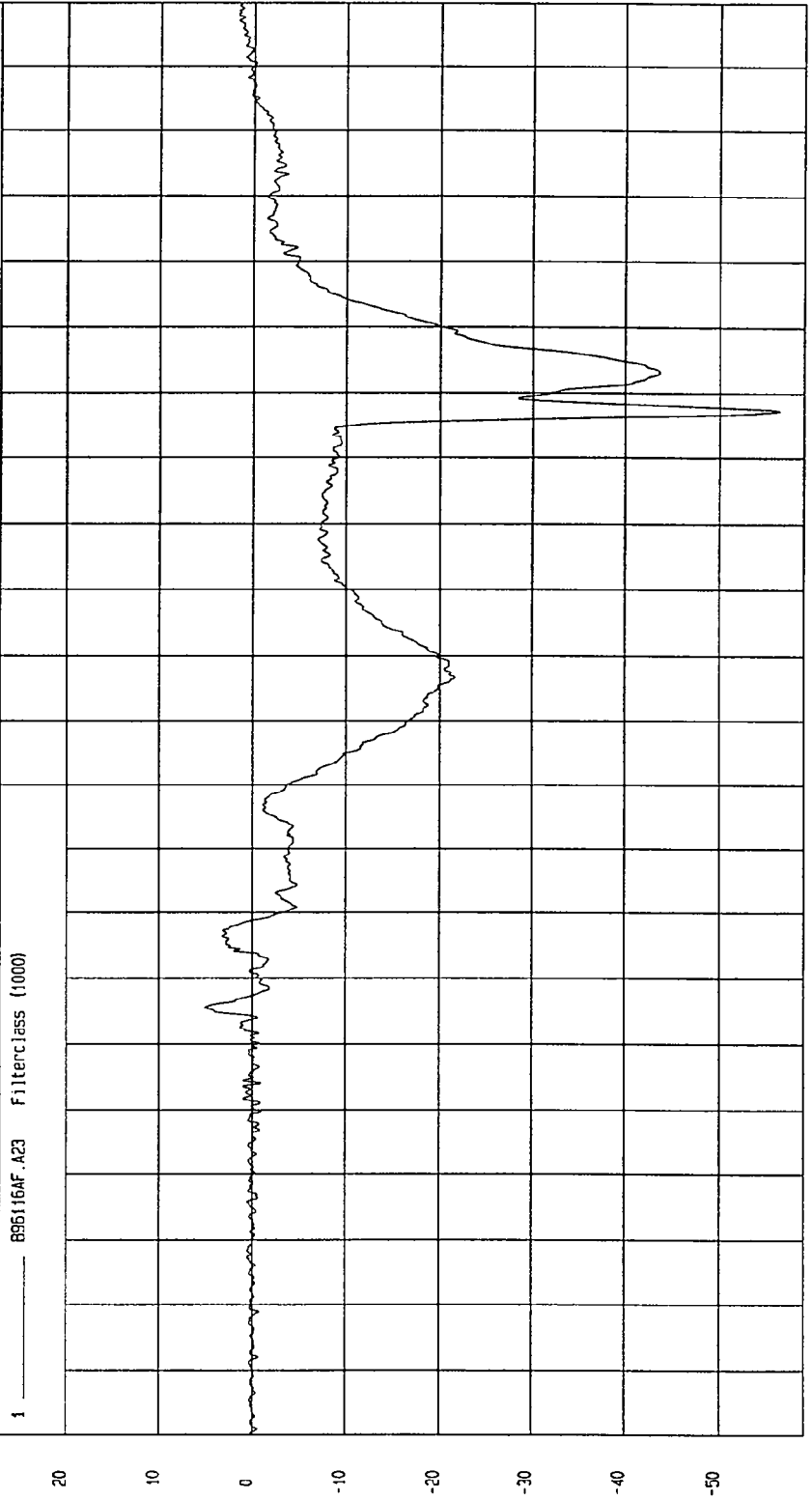
G.S

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-56.30593 G'S at 137 msec YMAX= 5.120428 G'S at 45. msec

PASSENGER HEAD Y ACCELERATION



TIME (SECONDS)

MCA Research  
11-20-1996 03.01

S.G

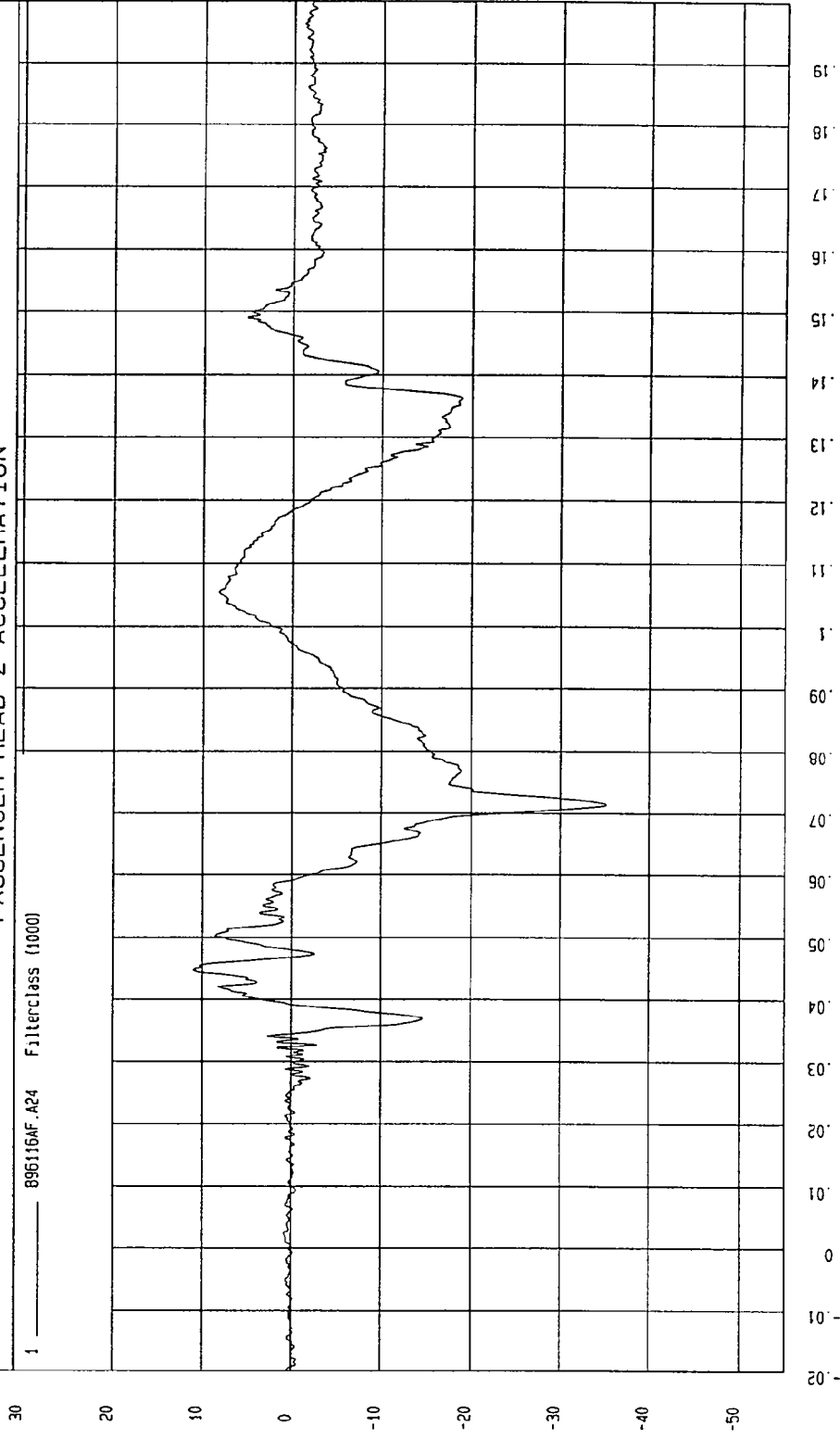
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-35.15352 G'S at 71. msec YMAX= 10.95674 G'S at 44. msec

PASSENGER HEAD Z ACCELERATION

1 ——— 896116AF.A24 Filterclass (1000)



MCA Research  
11-20-1996 02.40

S.9

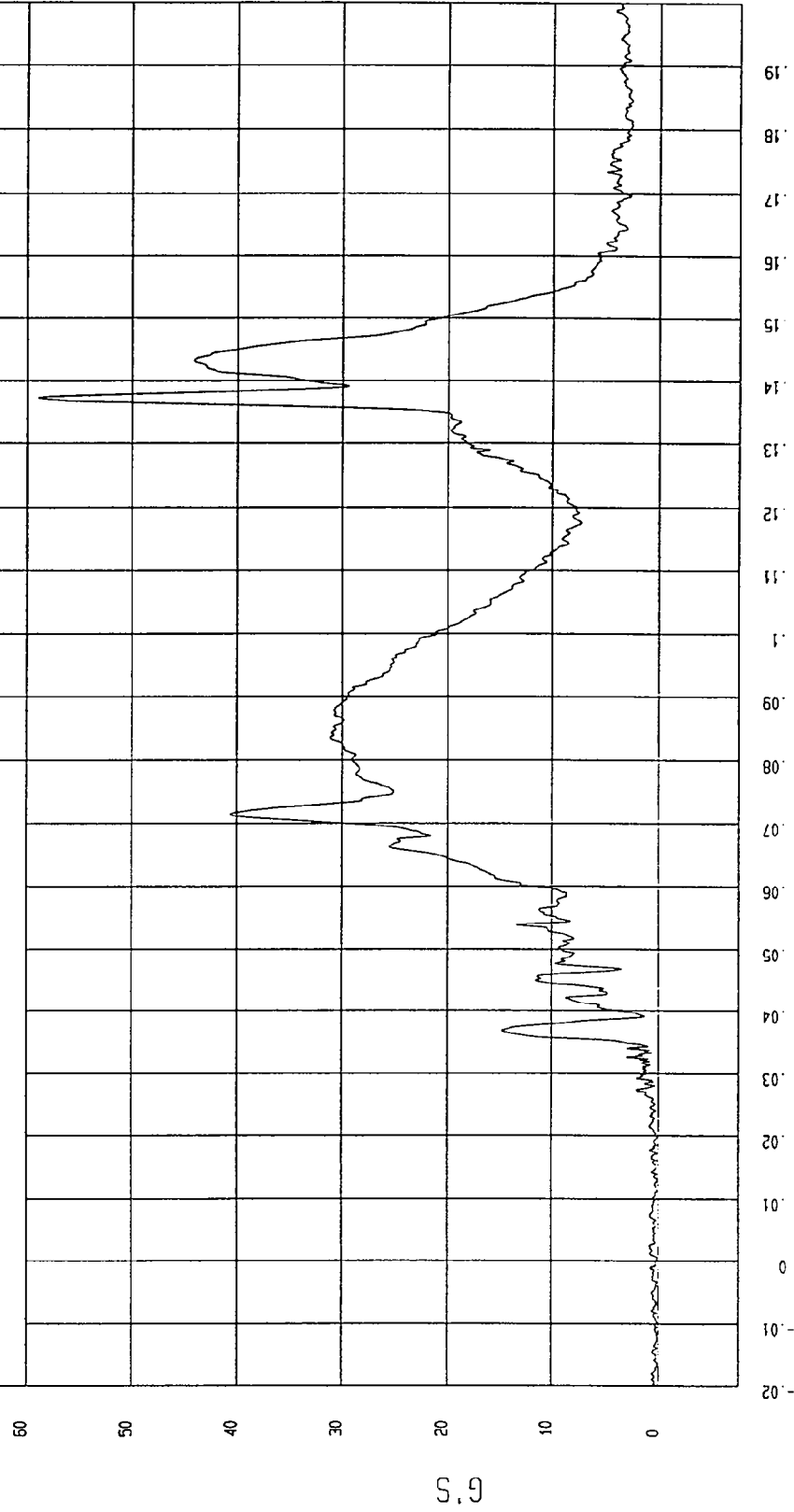
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 45.8 KPH

YMIN= 1.884957E-02 G'S at -12. msec YMAX= 58.92276 G'S at 137 msec

PASSENGER HEAD RESULTANT ACCELERATION

1 \_\_\_\_\_ B9616AV.A22 Filterclass (1000)



MGA Research  
11-20-1996 02:40

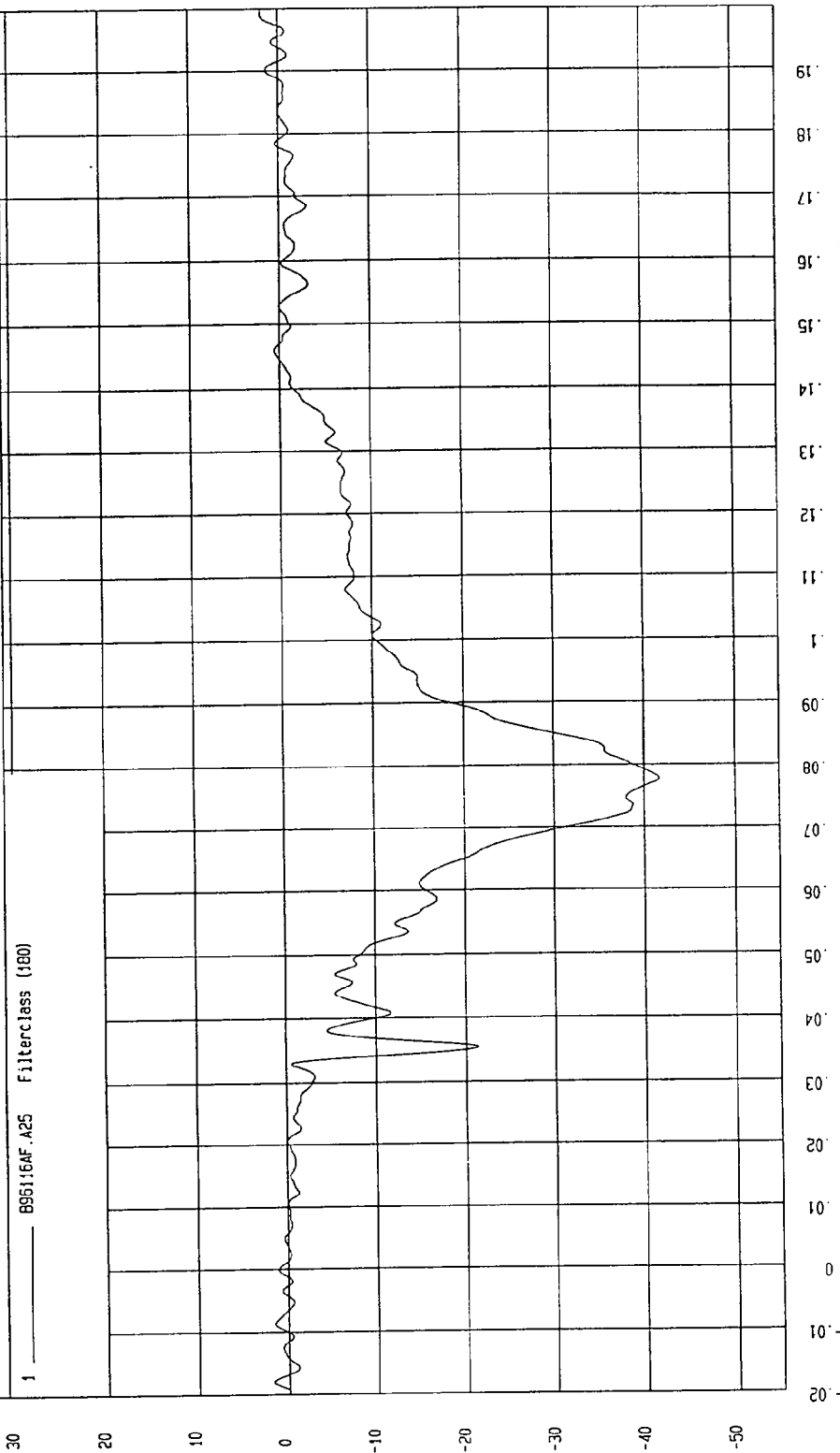
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-41.71415 G'S at 77. msec YMAX= 1.966818 G'S at 199 msec

PASSENGER CHEST X ACCELERATION

1 ——— B9516AF.A25 Filterclass (180)



MVA Research  
11-20-1996 02:40

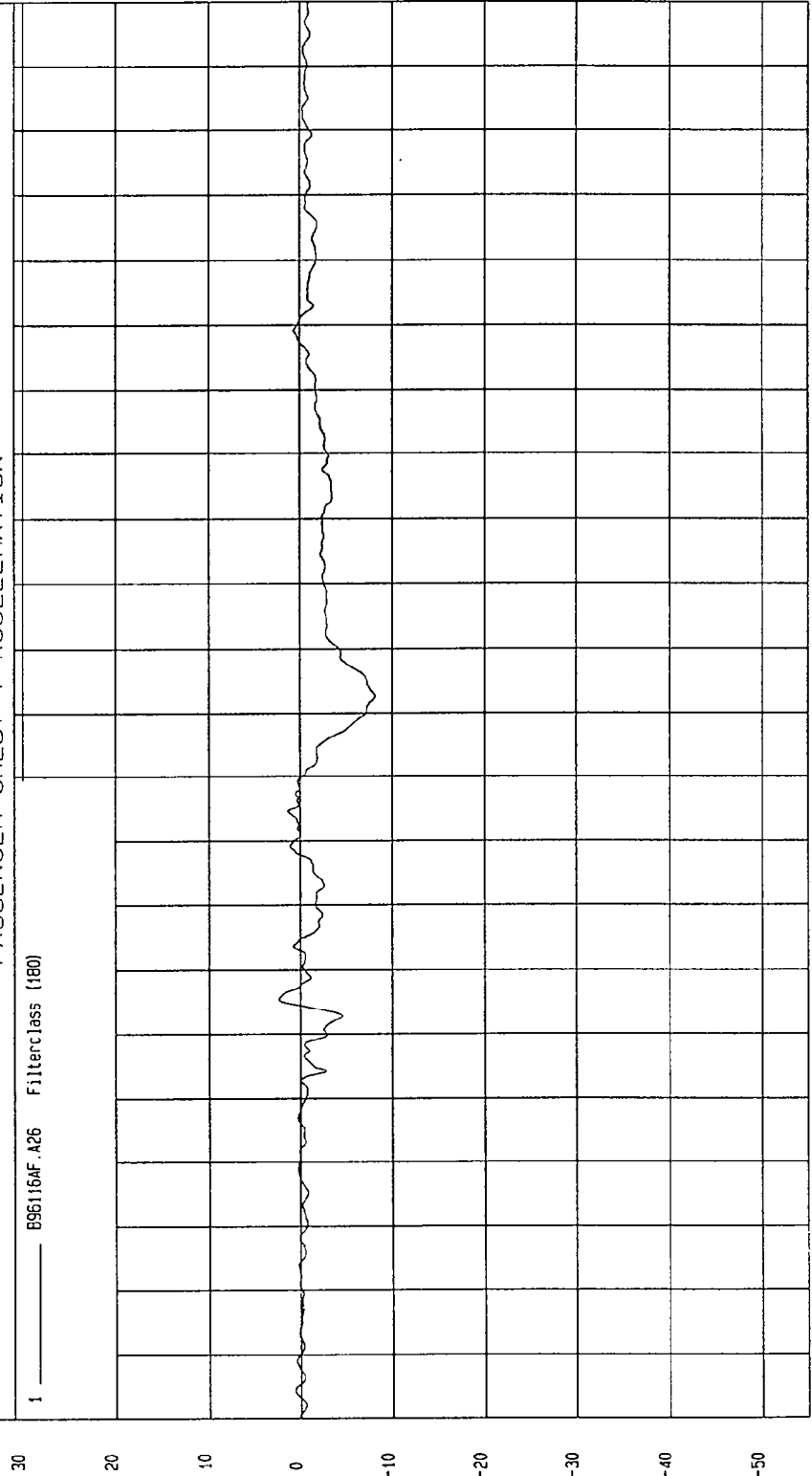
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-8.147002 G'S at 92. msec YMAX= 2.309021 G'S at 45. msec

PASSENGER CHEST Y ACCELERATION

1 ——— B9616AF.A26 Filterclass (180)



MCA Research  
11-20-1996 02.40

TEST DATE: 11-07-1996

TEST: 30 MPH FRONTAL BARRIER IMPACT

Speed: 29.1 MPH 46.8 KPH

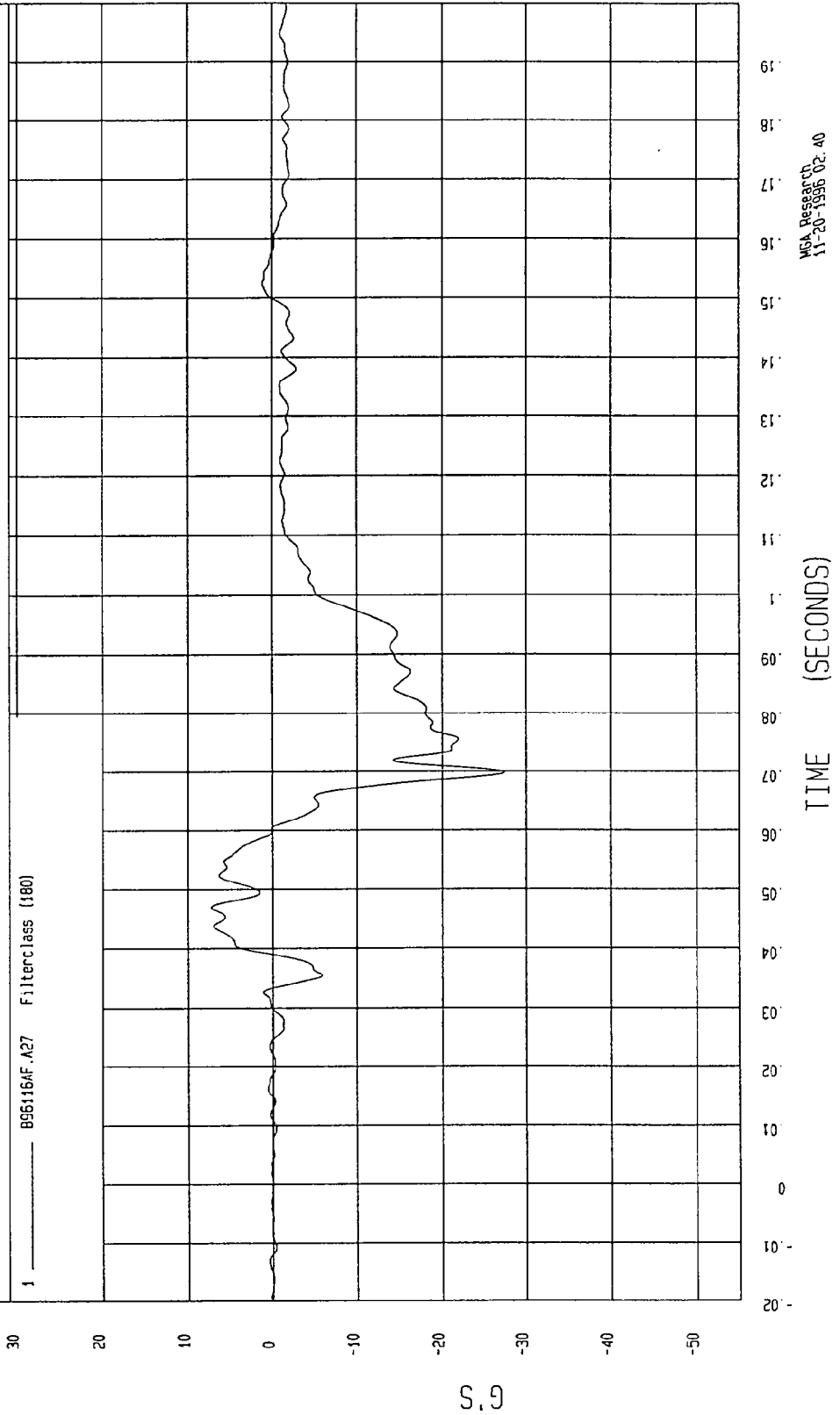
COMPONENT: 1997 FORD E-150 (CV0212)

YMAX= 7.305861 G'S at 47 msec

YMIN= -27.45071 G'S at 69 msec

PASSENGER CHEST Z ACCELERATION

1 \_\_\_\_\_ B956116AF.A27 Filterclass (180)



MEA Research  
11-20-1996 02:40

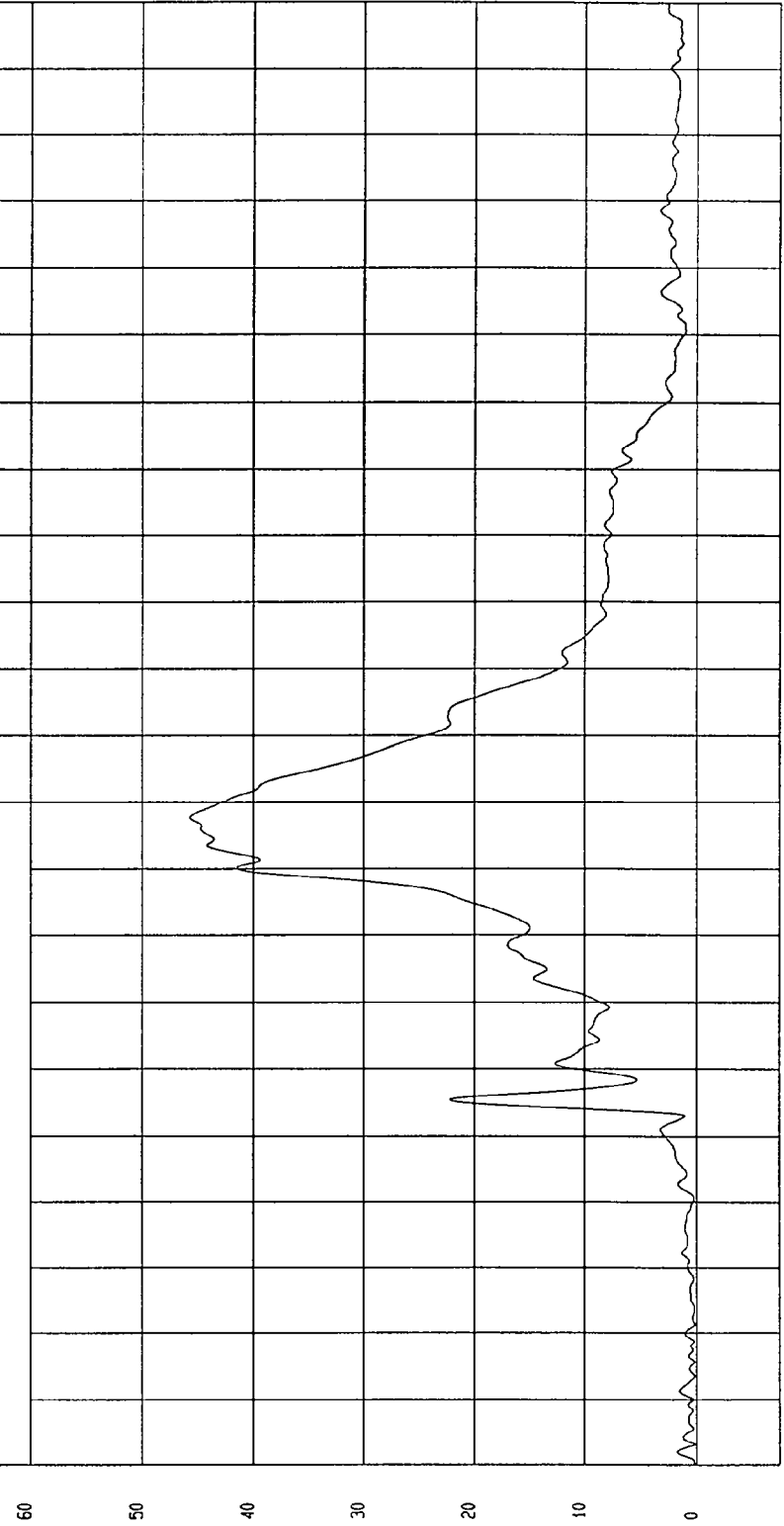
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN= 0.27/977E-02 G'S at -16. msec YMAX= 45.70357 G'S at 77. msec

PASSENGER CHEST RESULTANT ACCELERATION

1 896116AV.A25 Filterclass (160)



MGA Research Co.  
11-20-1996 02.40

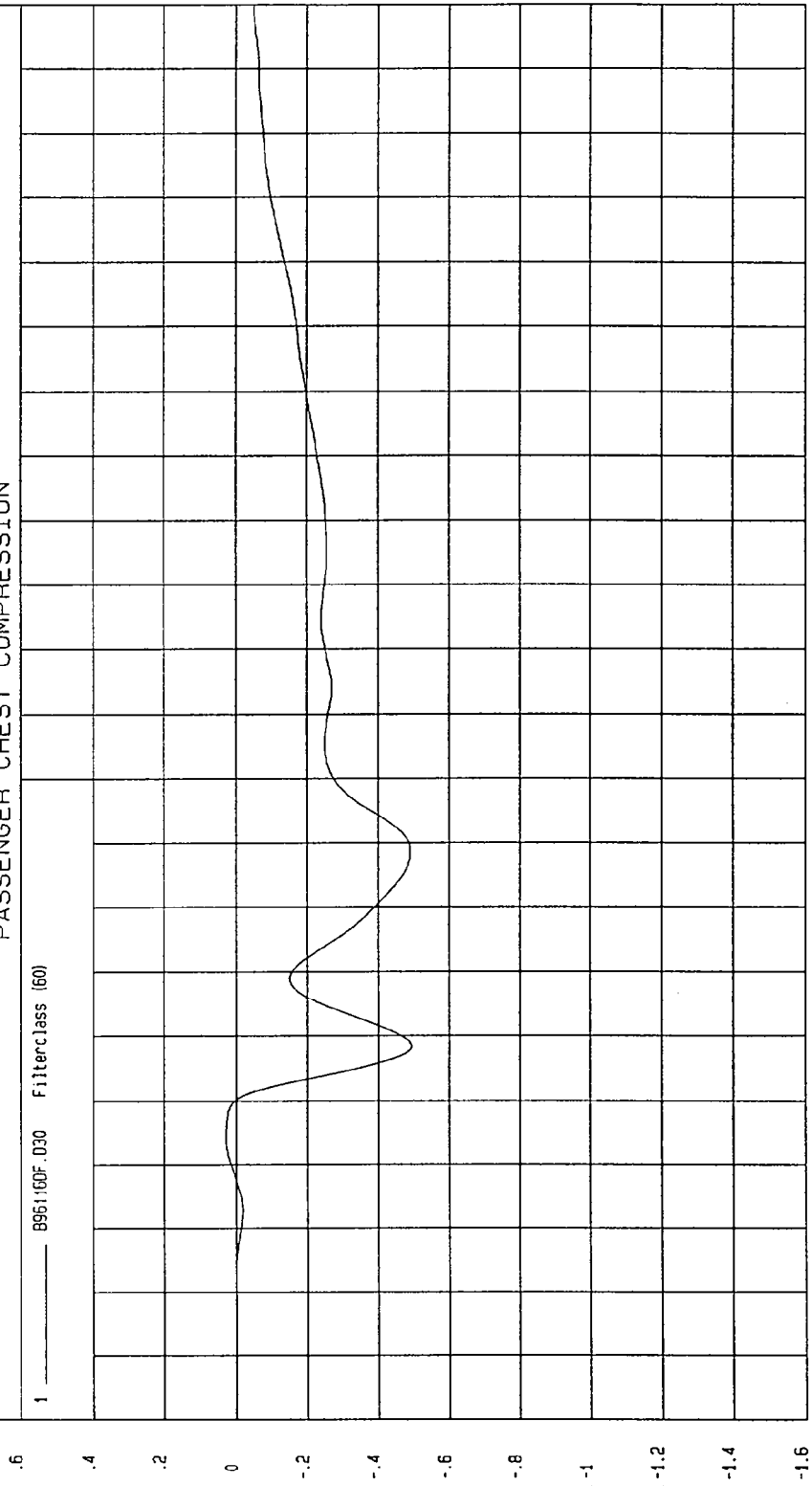
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

Minimum = -.49 IN at 38 msec Maximum = 2.79E-02 IN at 24 msec

PASSENGER CHEST COMPRESSION

1 896160F.030 Filterclass (60)



MGA Research  
01-17-1997 12:38

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

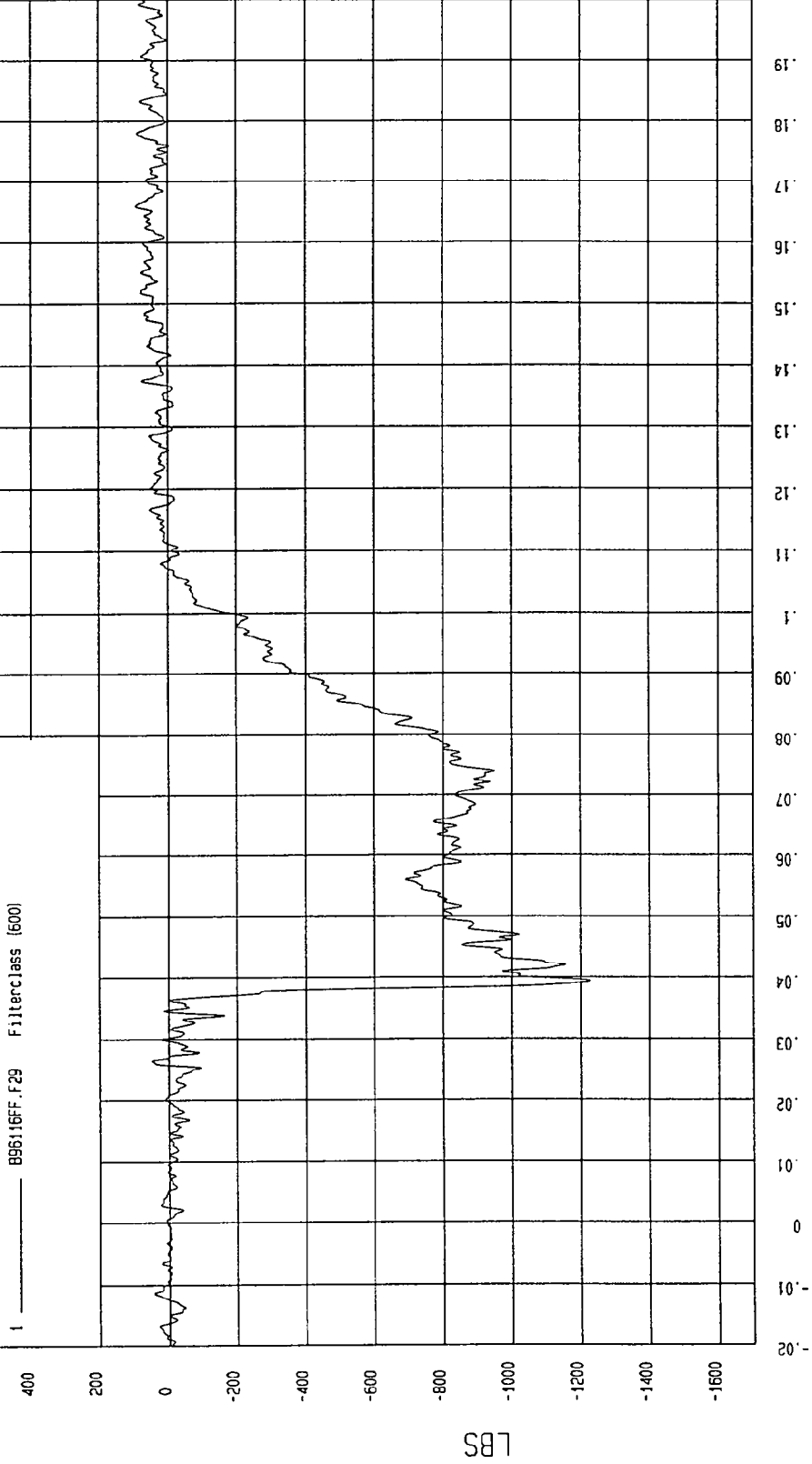
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-1226.118 LBS at 39. msec

YMAX= 92.26278 LBS at 165 msec

PASSENGER LEFT FEMUR FORCE

1 ——— BB6116FF.F29 Filterclass (500)



MGA Research  
11-20-1996 02:41

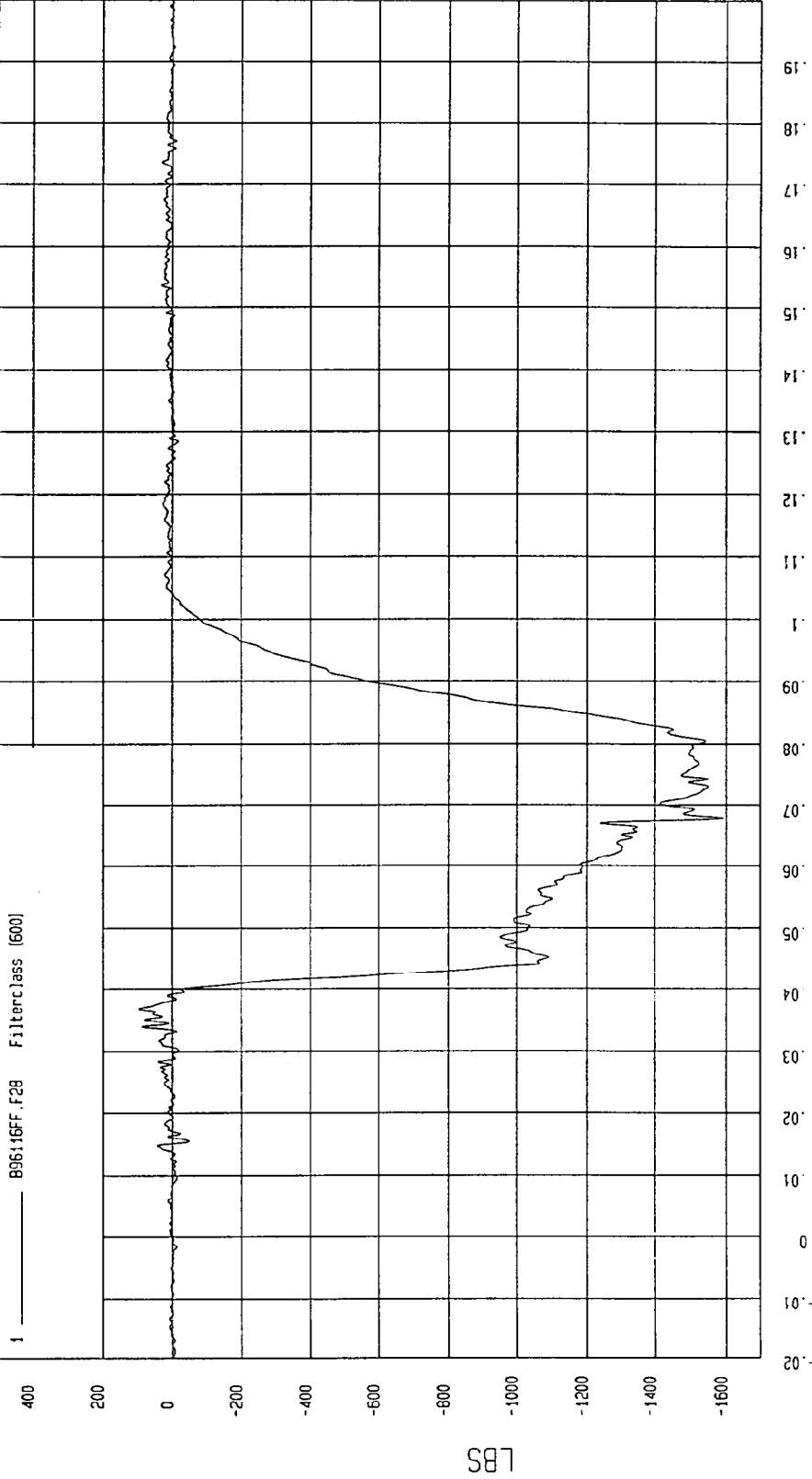
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-1592.756 LBS at 67. msec YMAX= 97.53504 LBS at 36. msec

PASSENGER RIGHT FEMUR FORCE

1 ——— B96116FF.F28 Filterclass (600)



MGA Research  
11-20-1996 02:41

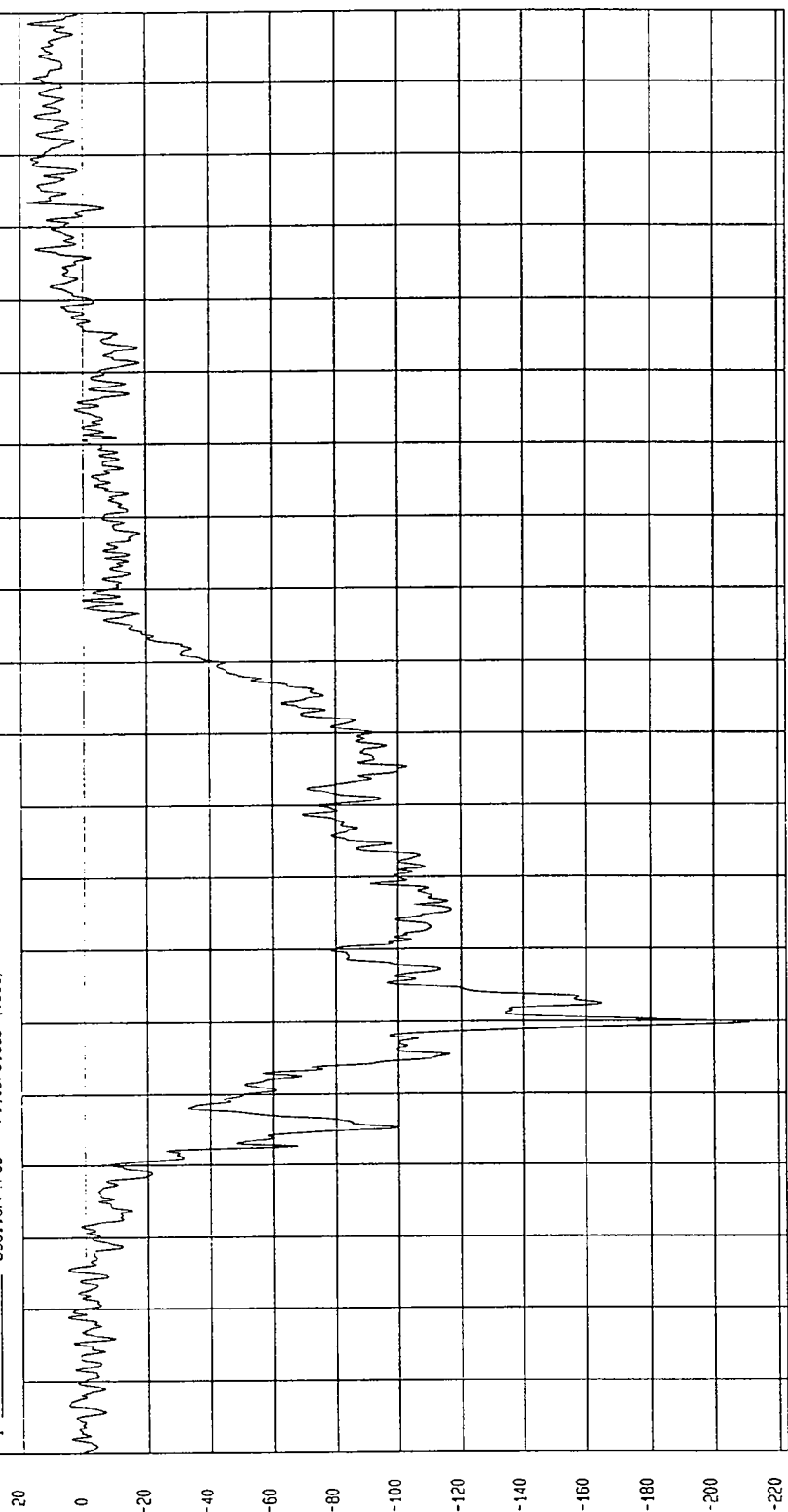
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-210.8416 LBS at 39. msec YMAX= 22.70034 LBS at 193 msec

PASSENGER LEFT LOWER TIBIA FORCE X

1 896116FF.F65 Filterclass (1000)



MSA Research  
11-20-1996 22:24

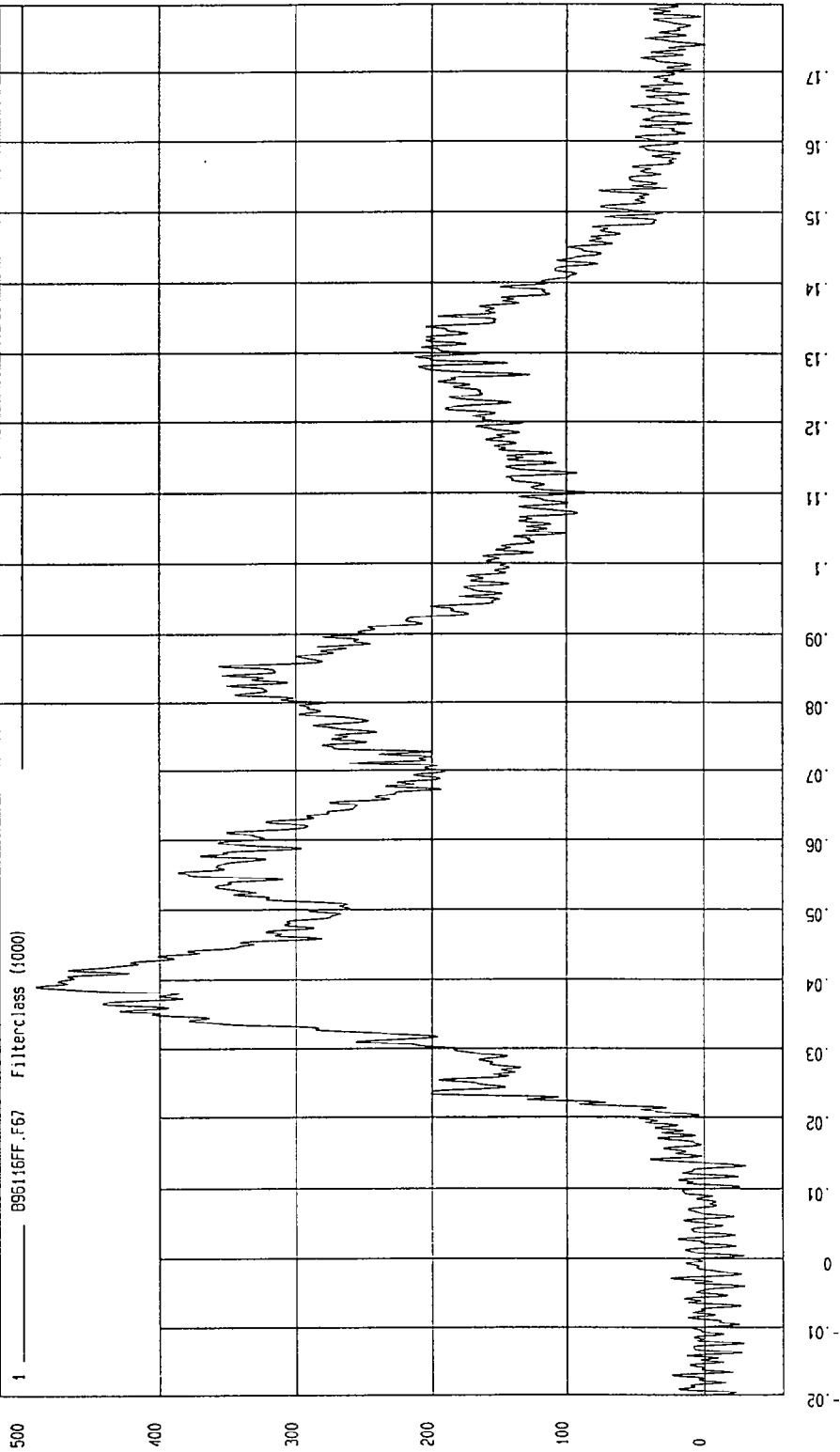
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-29.68216 LBS at 13. msec YMAX=490.5763 LBS at 39. msec

PASSENGER LEFT LOWER TIBIA FORCE Z

1 ——— 895116FF.F67 Filterclass (1000)



MGA Research  
11-20-1996 22:24

TEST DATE: 11-07-1996

TEST: 30 MPH FRONTAL BARRIER IMPACT

Speed: 29.1 MPH 46.8 KPH

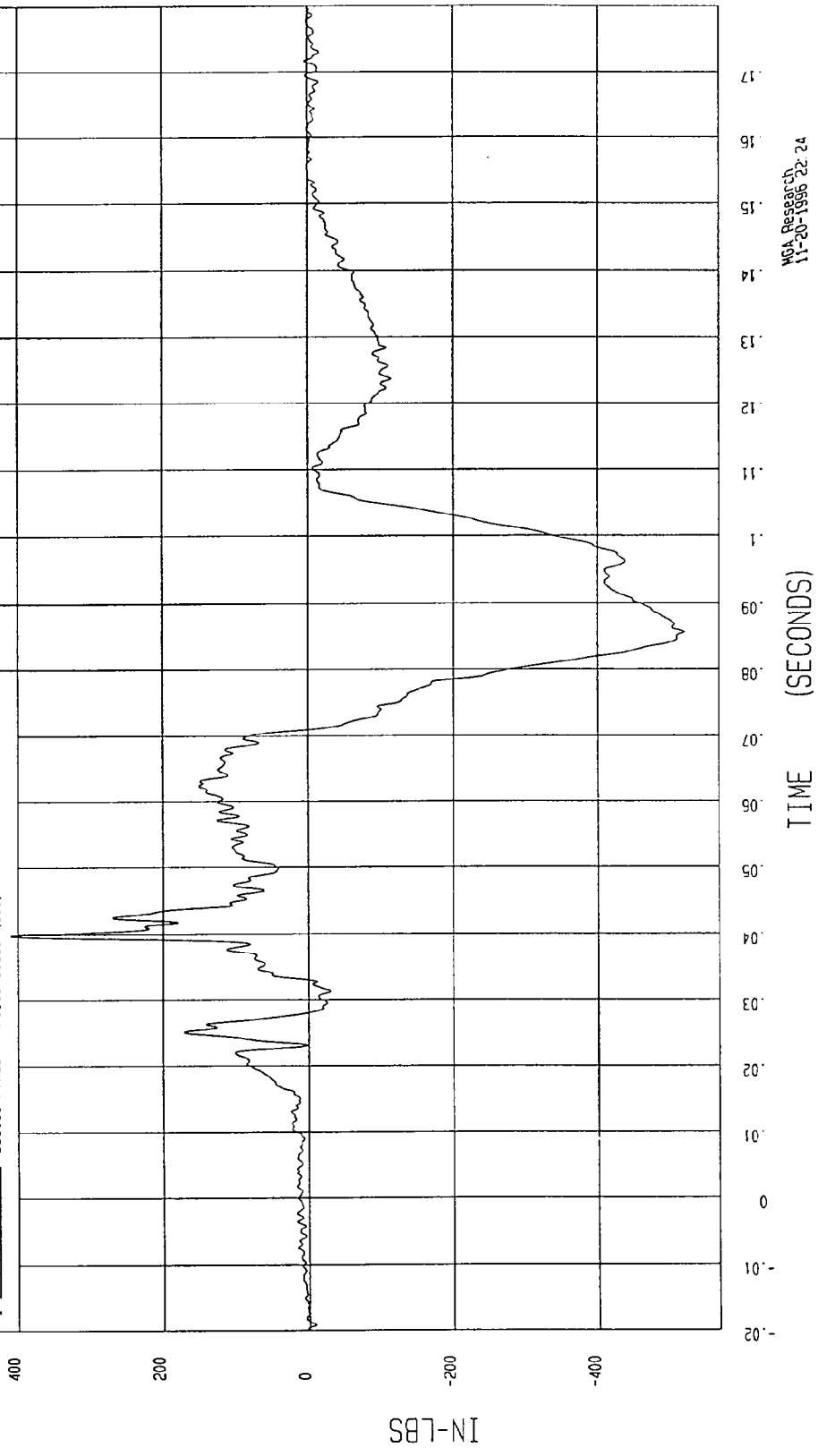
COMPONENT: 1997 FORD E-150 (CV0212)

YMIN=-519.0472 IN-LBS at 85. msec

YMAX= 410.1063 IN-LBS at 39. msec

PASSENGER LEFT LOWER TIBIA MOMENT Y

1 ——— B96116WF M66 Filterclass (600)



MGA Research  
11-20-1996 22:24

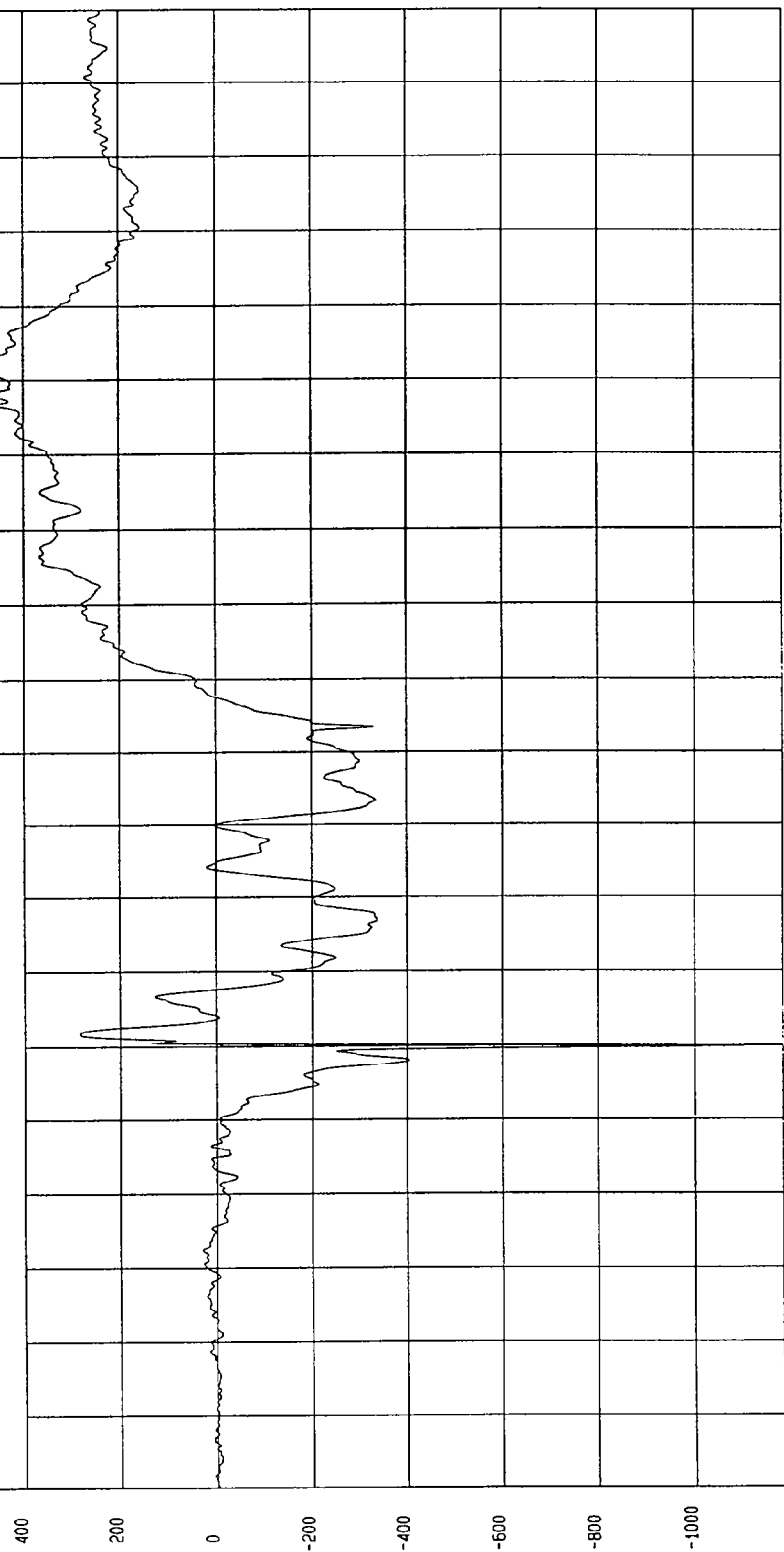
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-1102.338 IN-LBS at 39. msec YMAX= 471.2622 IN-LBS at 131 msec

PASSENGER LEFT UPPER TIBIA MOMENT X

1 896116MF .M53 Filterclass (600)



MGA Research  
11-20-1996 22: 23

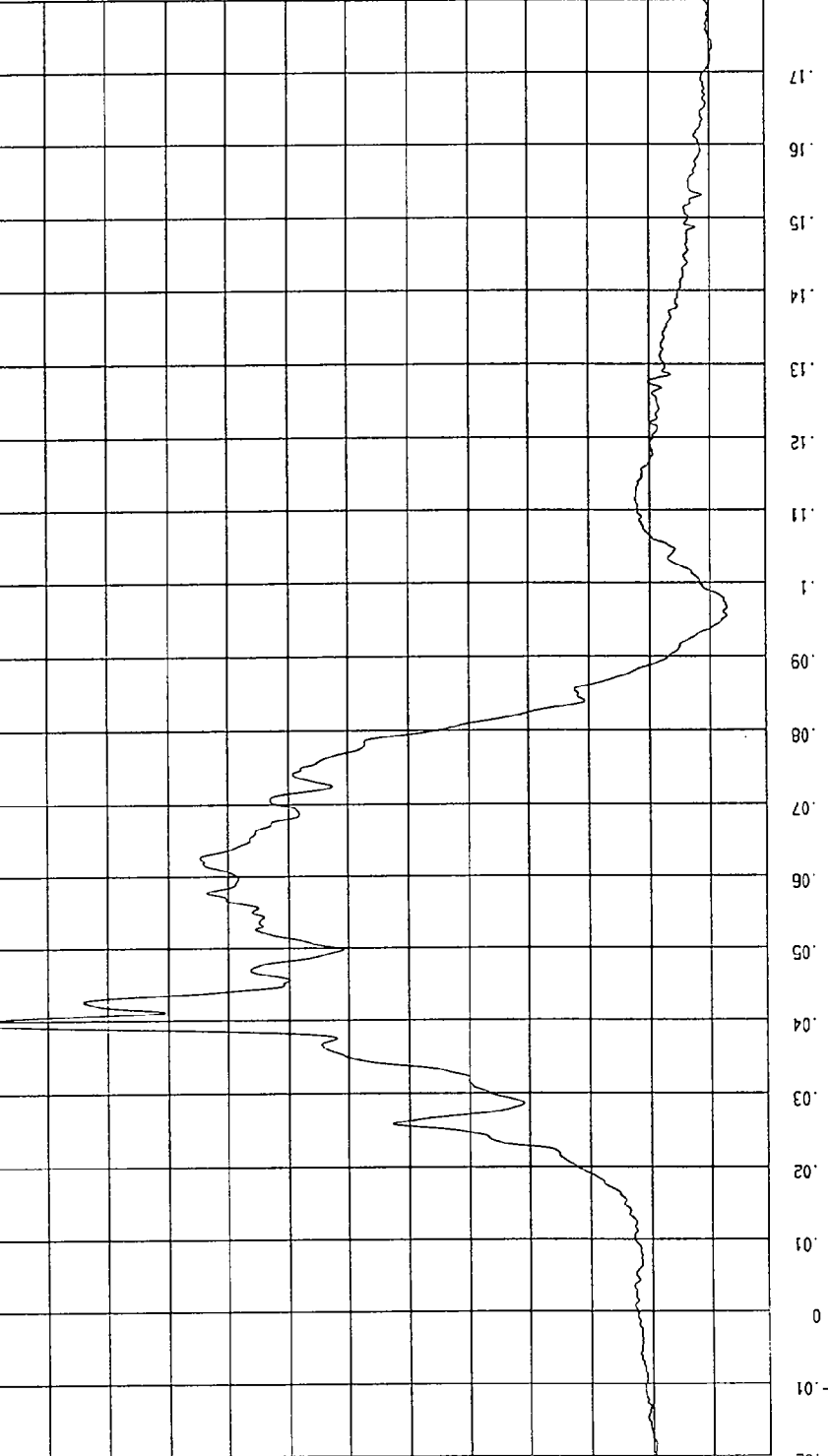
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YHAX= 2216.246 IN-LBS at 39. msec

YH(N=254.5286 IN-LBS at 96. msec

PASSENGER LEFT UPPER TIBIA MOMENT Y



TIME (SECONDS)

MGA Research 11-20-1996 22:23

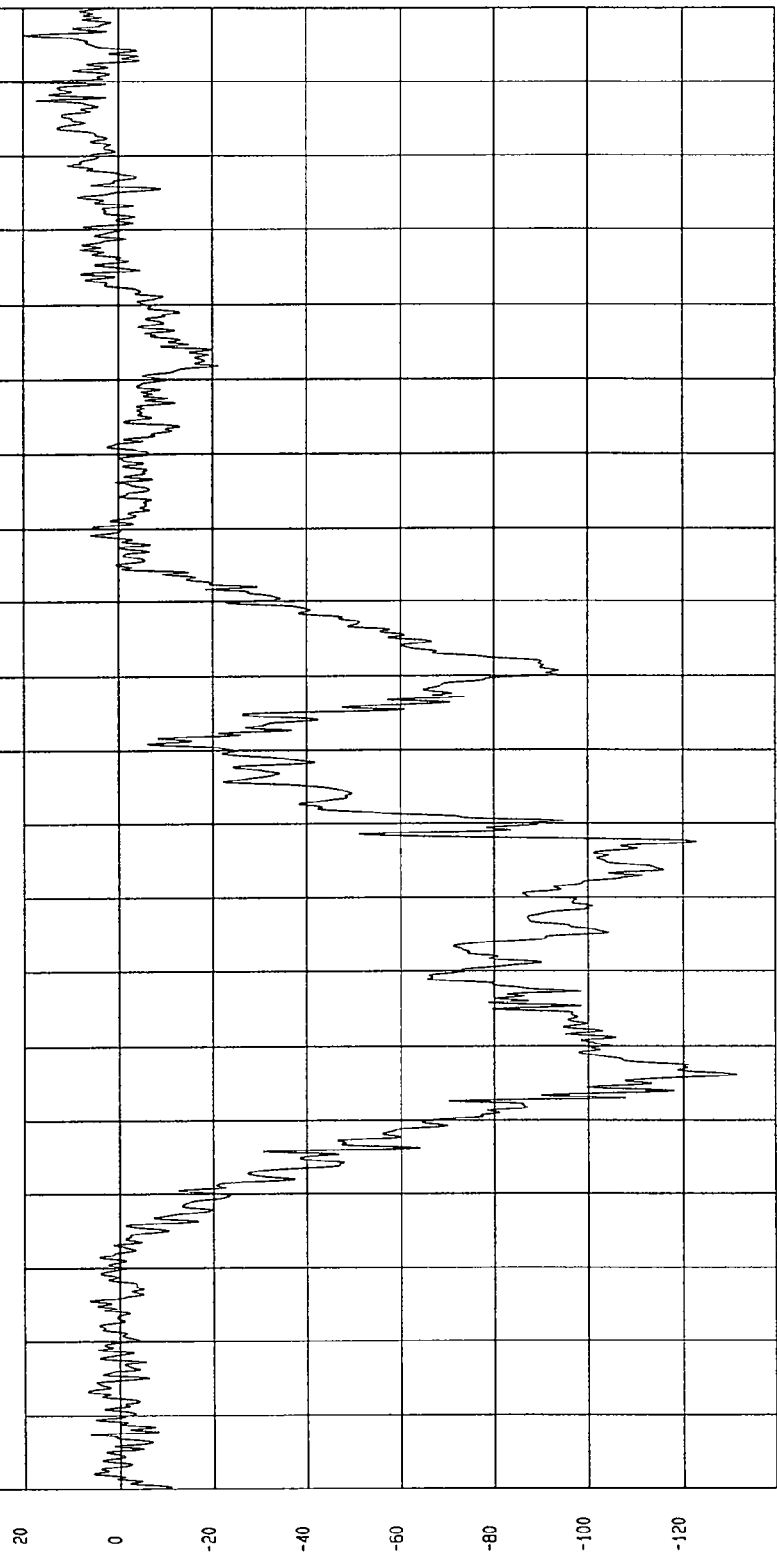
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-131.1250 LBS at 36. msec YMAX= 29.34226 LBS at 170 msec

PASSENGER RIGHT LOWER TIBIA FORCE X

1 896116FF.F60 FilterClass (1000)



NSA Research  
11-20-1996 22:24

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

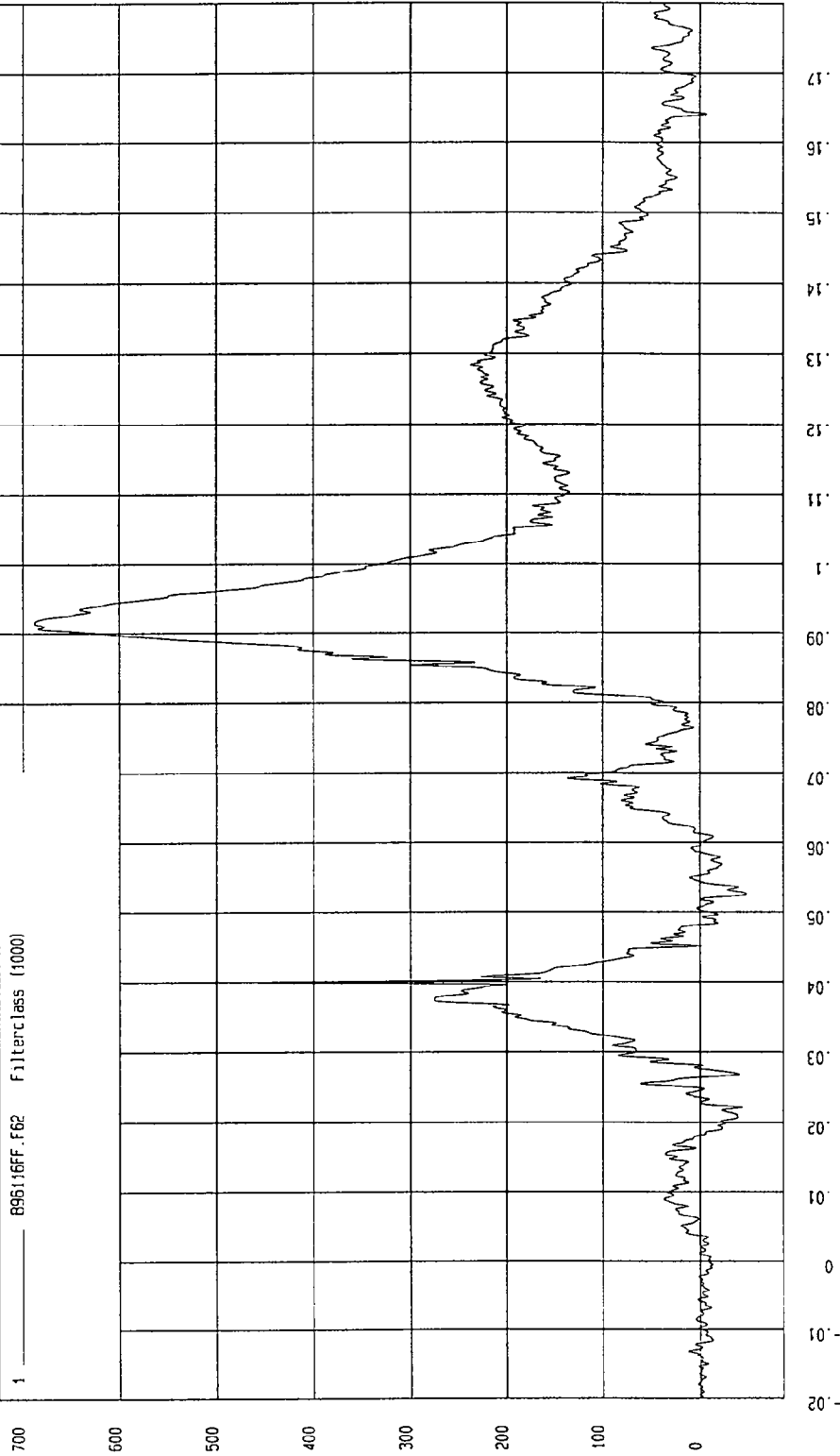
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-47.43371 LBS at 52. msec

YMAX=688.2152 LBS at 91. msec

PASSENGER RIGHT LOWER TIBIA FORCE Z

1 896116FF.F62 Filter:pass (1000)



MBL Report Ch  
11-20-1996 22:24

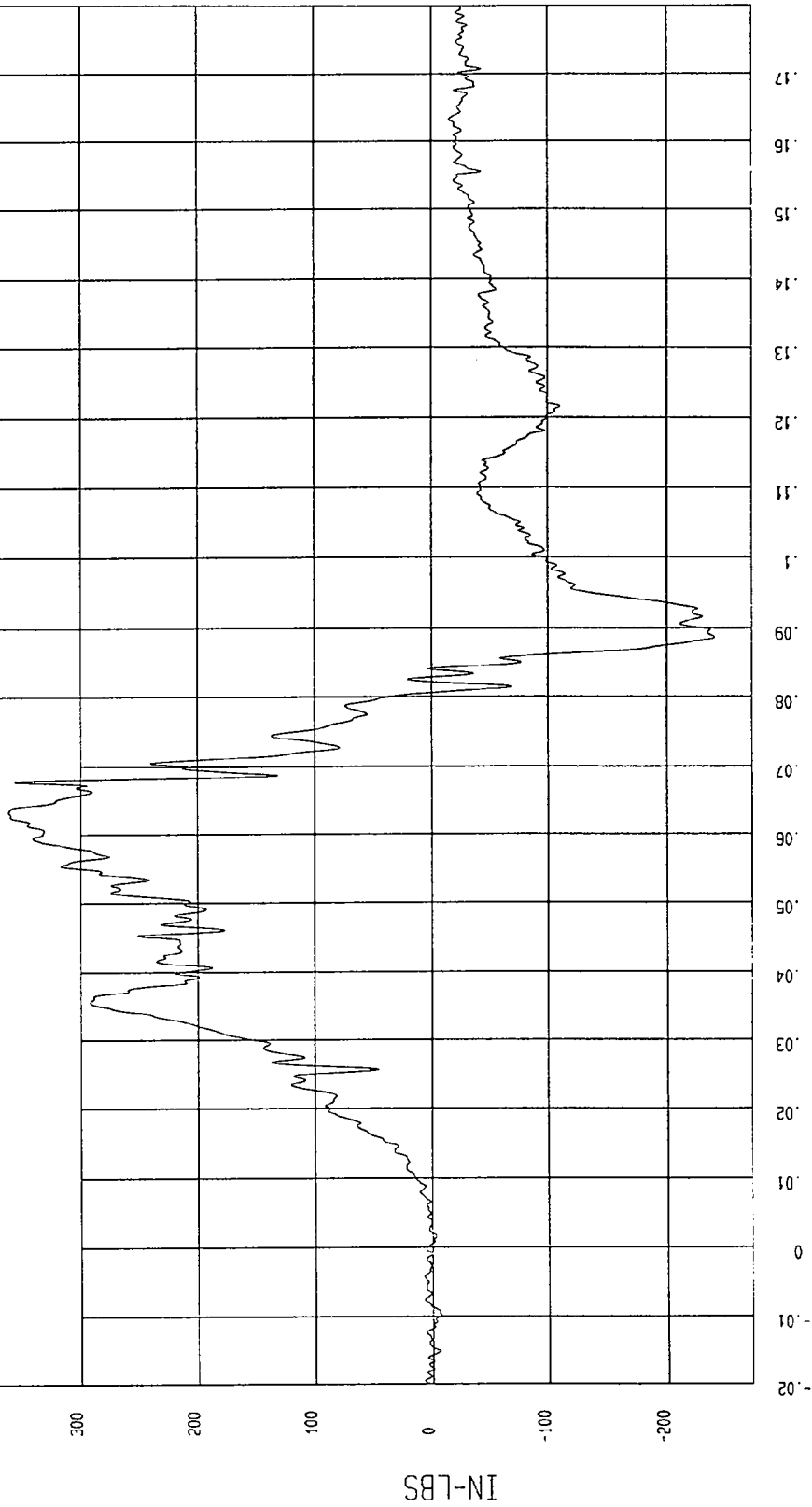
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-240.0659 IN-LBS at 88. msec YMAX= 361.4897 IN-LBS at 63. msec

PASSENGER RIGHT LOWER TIBIA MOMENT Y

1 ——— 896116MF.H61 Filterclass (600)

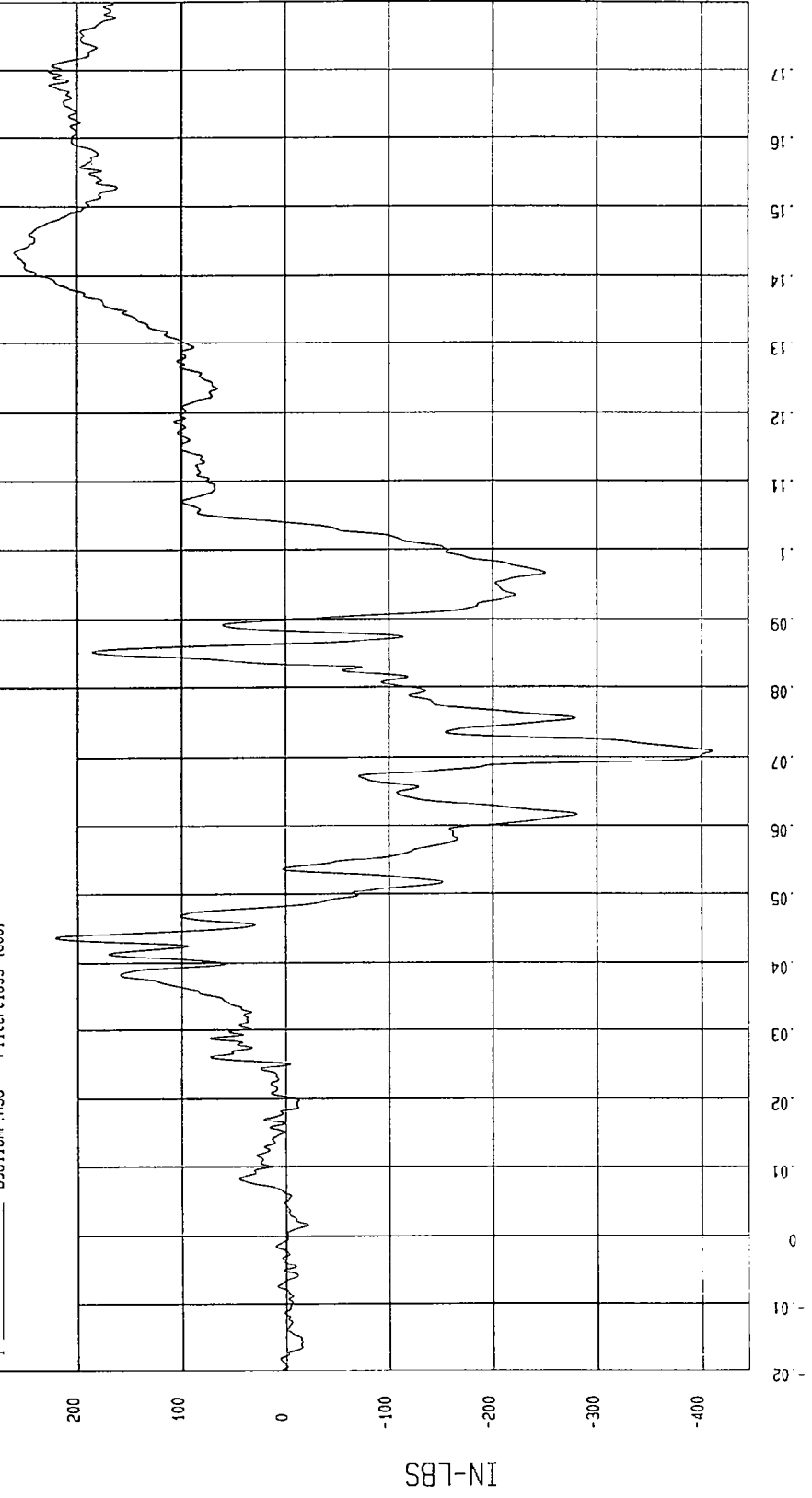


MCA Research  
11-20-1996 22:24

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996  
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-410 1533 IN-LBS at 70. msec YMAX= 260.9472 IN-LBS at 143 msec

PASSENGER RIGHT UPPER TIBIA MOMENT X



TIME (SECONDS)

MCA Research  
11-20-1996 22:24

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

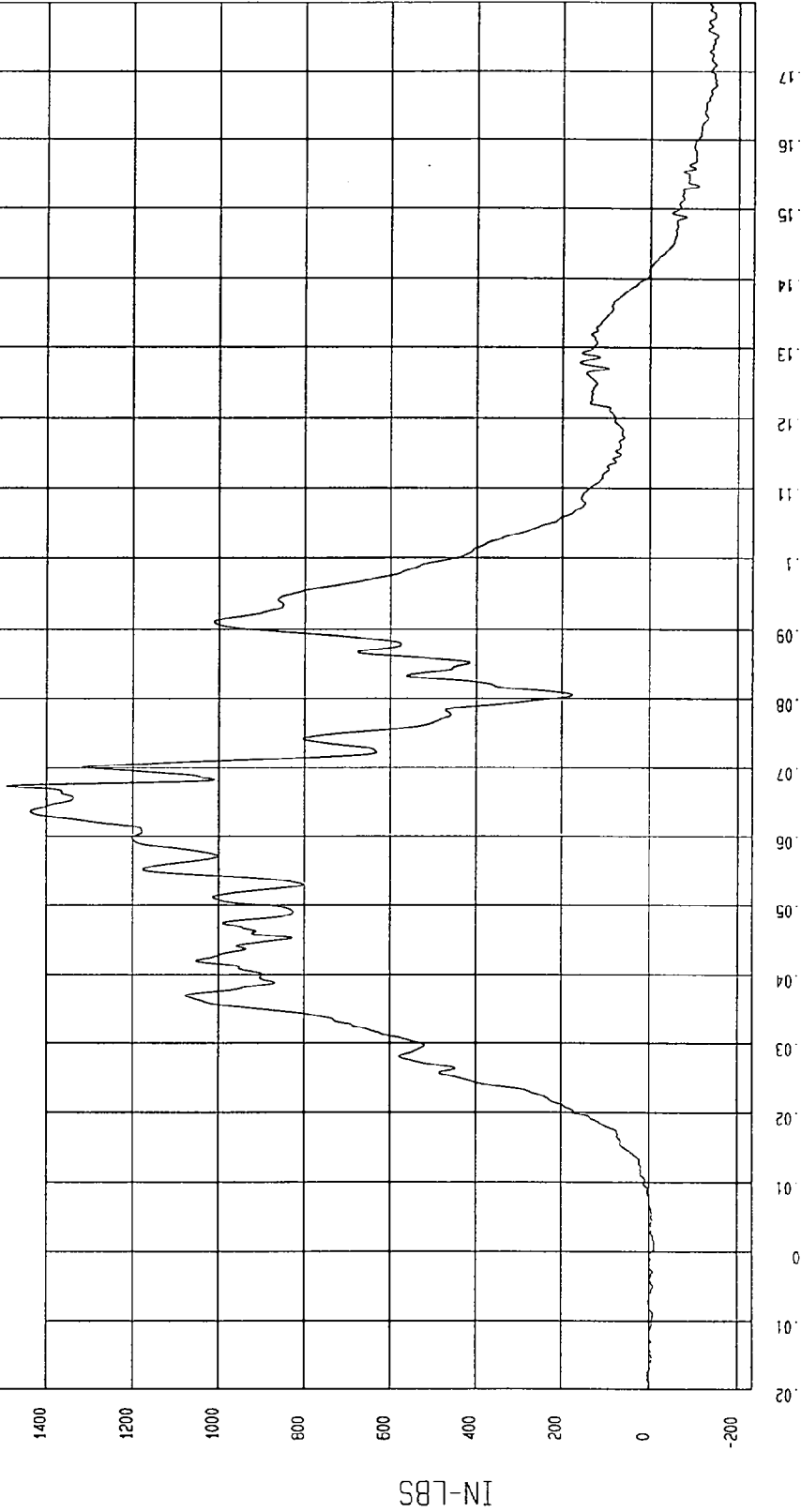
COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-151.4511 IN-LBS at 175 msec

YMAX= 1493.518 IN-LBS at 67. msec

PASSENGER RIGHT UPPER TIBIA MOMENT Y

1 B95116MF.M59 Filterclass (600)



MCA Research  
11-20-1996 22:24

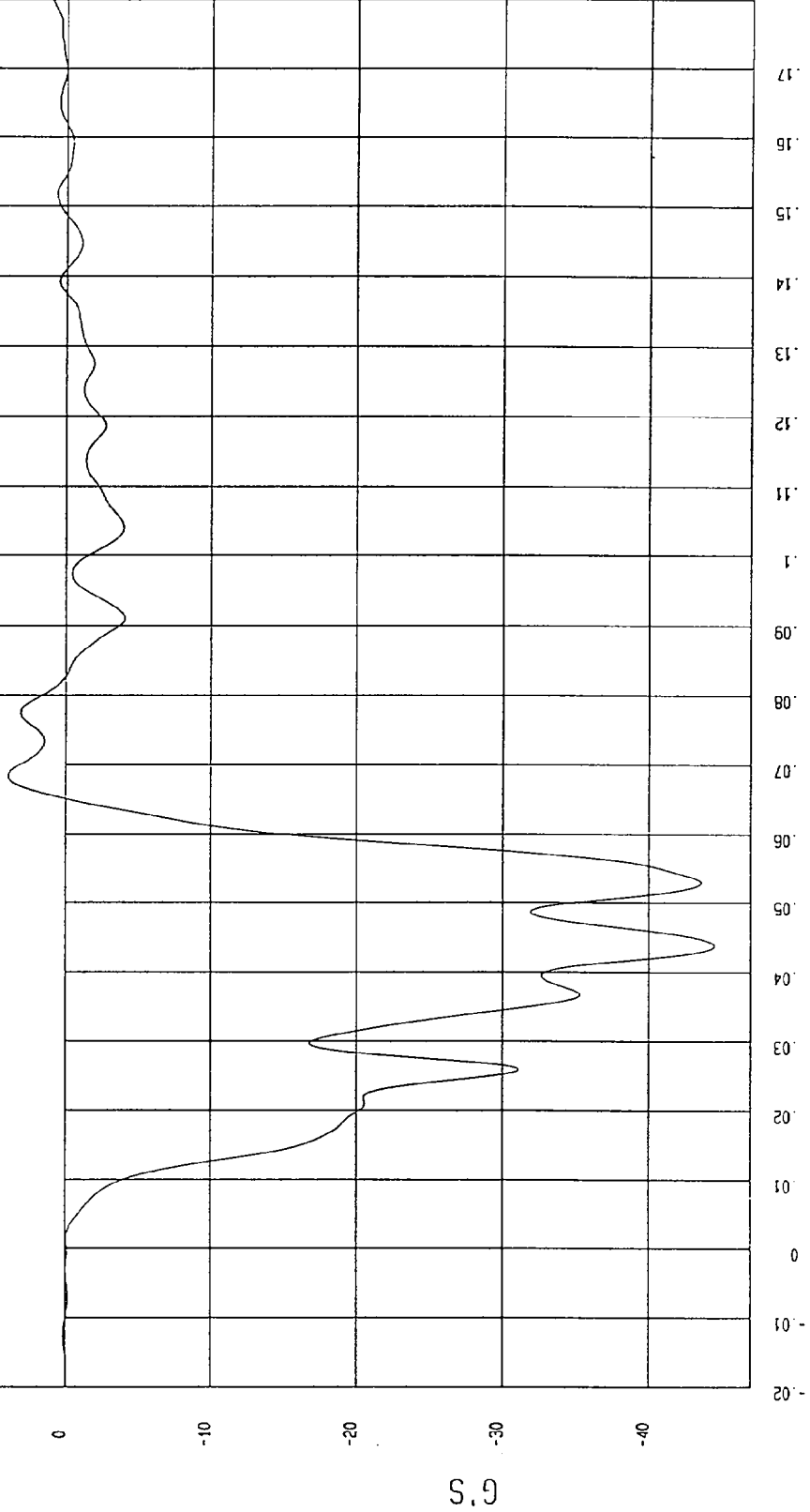
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-44.49157 G'S at 43. msec YMAX= 3.900394 G'S at 58. msec

TOP OF ENGINE X ACCELERATION

1 ——— B95116AF.A32 Filterclass (60)



MOA Research  
11-20-1996 22:25

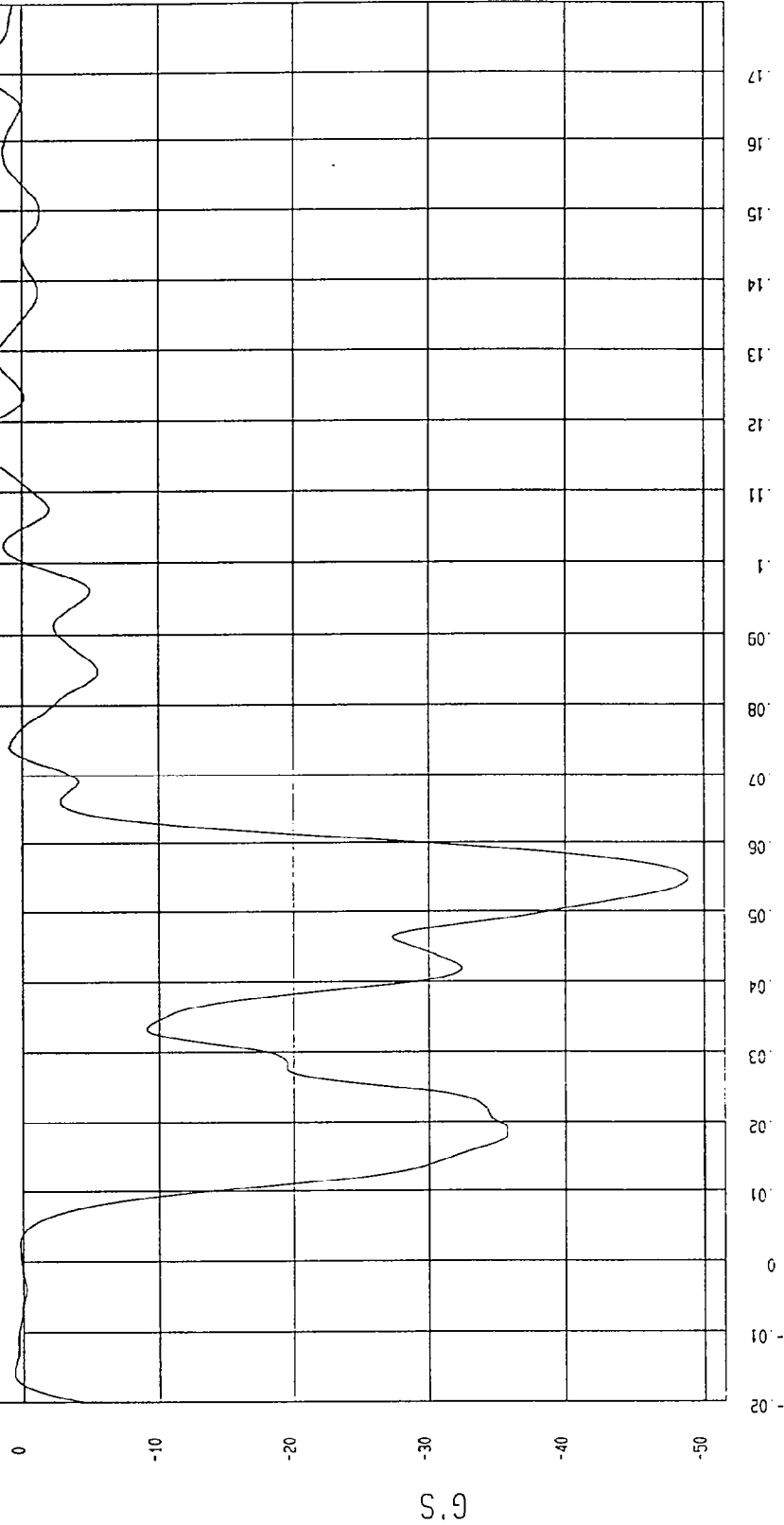
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

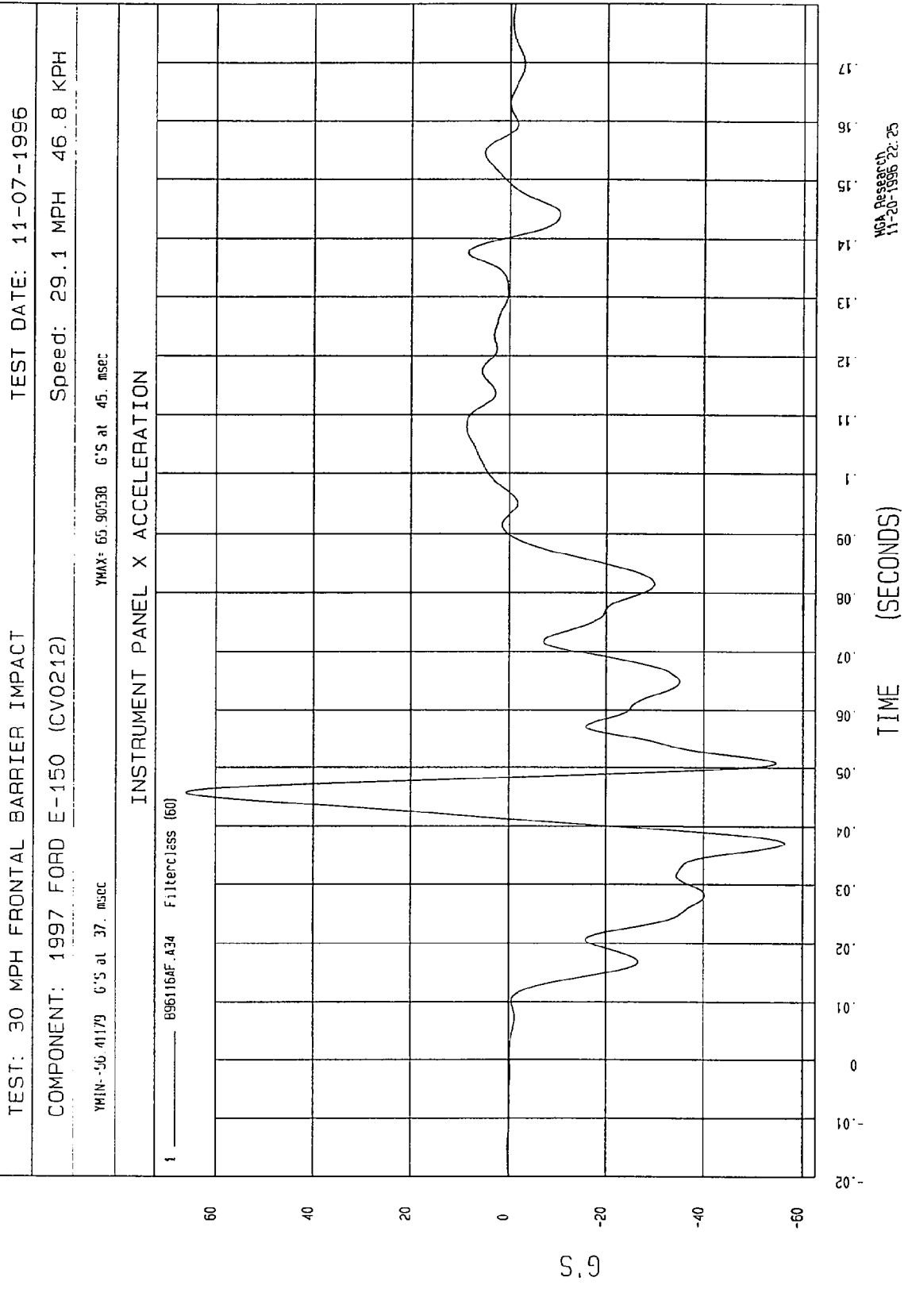
YMIN=-48.85125 6'S at 54. msec YMAX= 3.840227 6'S at 115 msec

BOTTOM OF ENGINE X ACCELERATION

1 — 895116AF.A33 Filterclass (60)



MGA Research  
11-20-1996 22.25



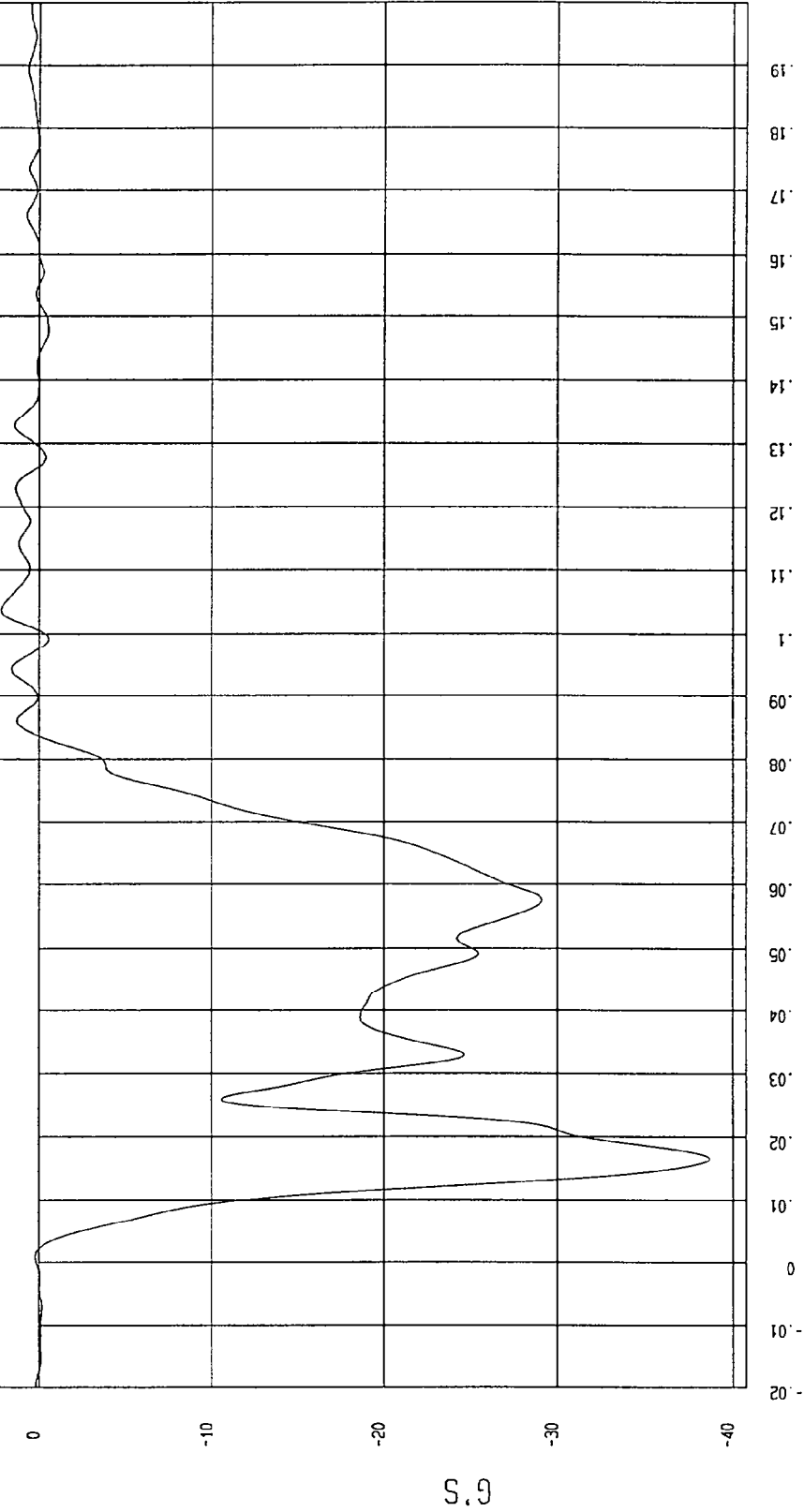
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-38.65277 G'S at 16. msec YMAX= 2.194045 G'S at 103 msec

LEFT REAR SEAT CROSSMEMBER X ACCELERATION

1 \_\_\_\_\_ B96116AF.A35 FilterClass (60)



MOA Research Co.  
11-20-1996 22:25

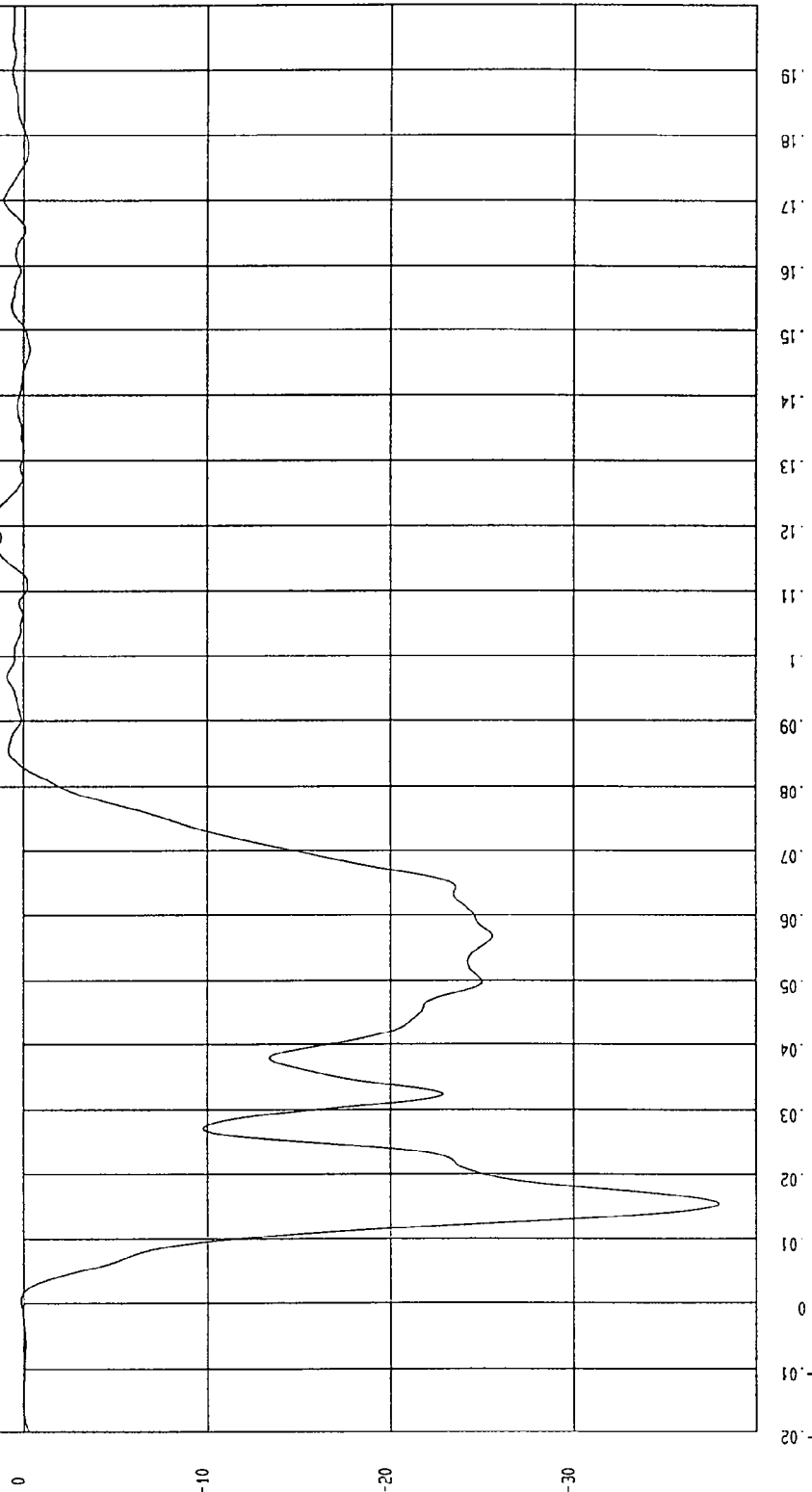
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-37.89015 G'S at 15. msec YMAX= 1.553236 G'S at 120 msec

RIGHT REAR SEAT CROSSMEMBER X ACCELERATION

1 096116AF.A36 Filterclass (60)



MCA Research  
11-20-1996 22.25

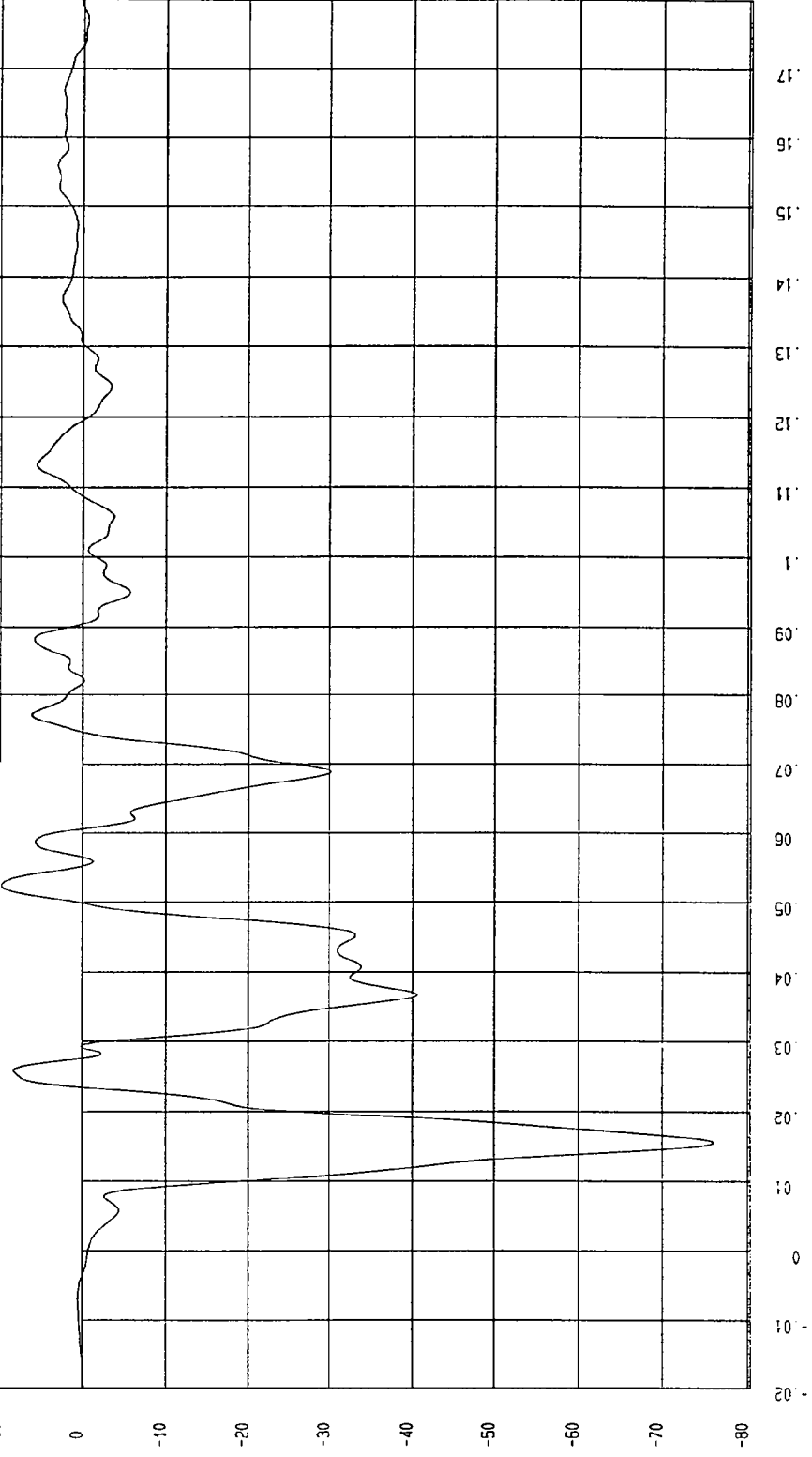
S.G

TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-76.02229 G'S at 15. msec YMAX= 9.79924 G'S at 52. msec

1 896116AF.A38 Filterclass (60) LEFT FRONT BRAKE CALIPER X ACCELERATION



TIME (SECONDS) MGA Report ch 11-20-1996 22:25

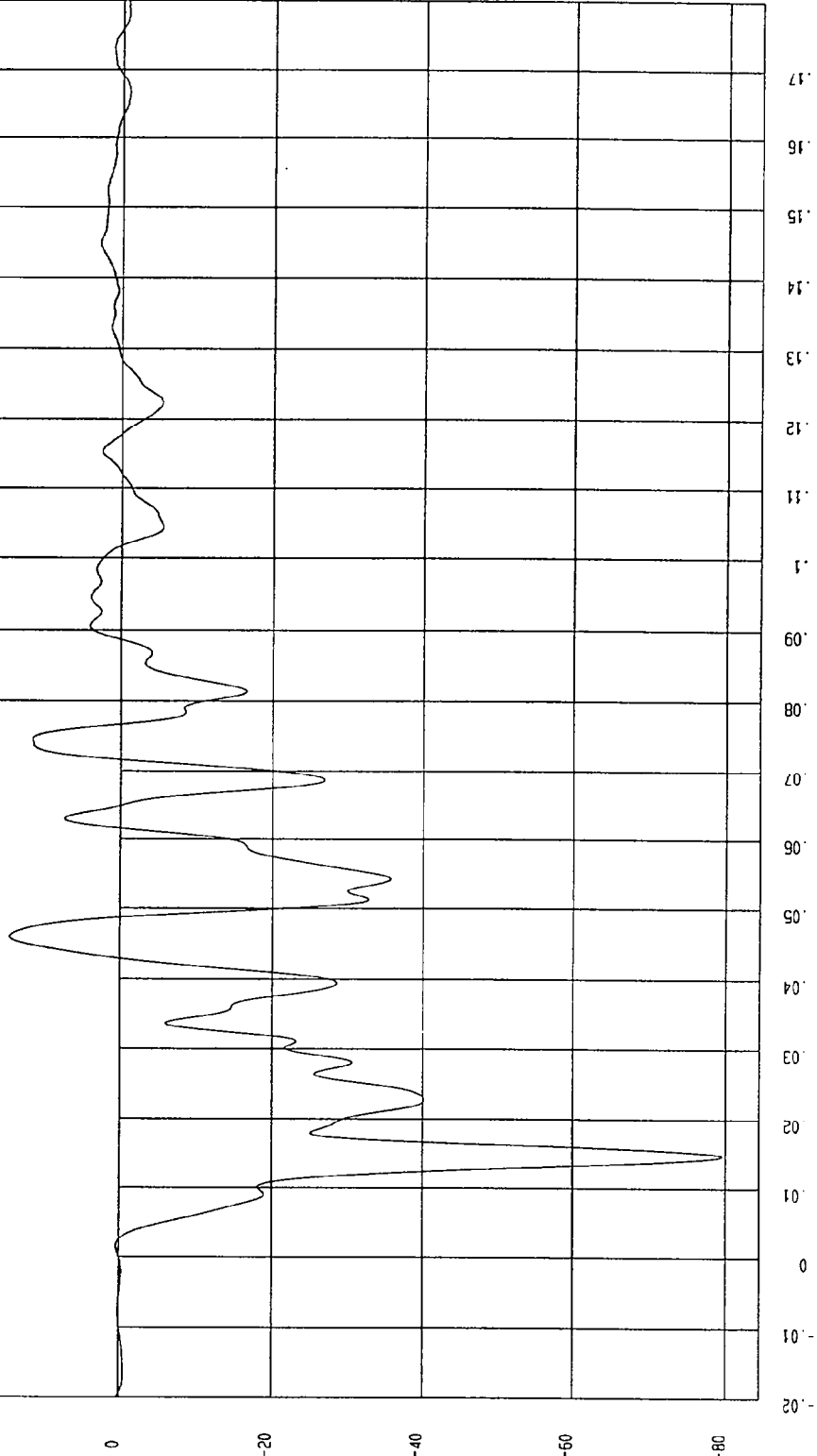
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-79.50093 G'S at 14. msec YMAX= 14.66552 G'S at 45. msec

RIGHT FRONT BRAKE CALIPER X ACCELERATION

1 ——— B96116AF.A39 Filterclass (60)



MGA Research  
11-20-1996 22:25

S.G

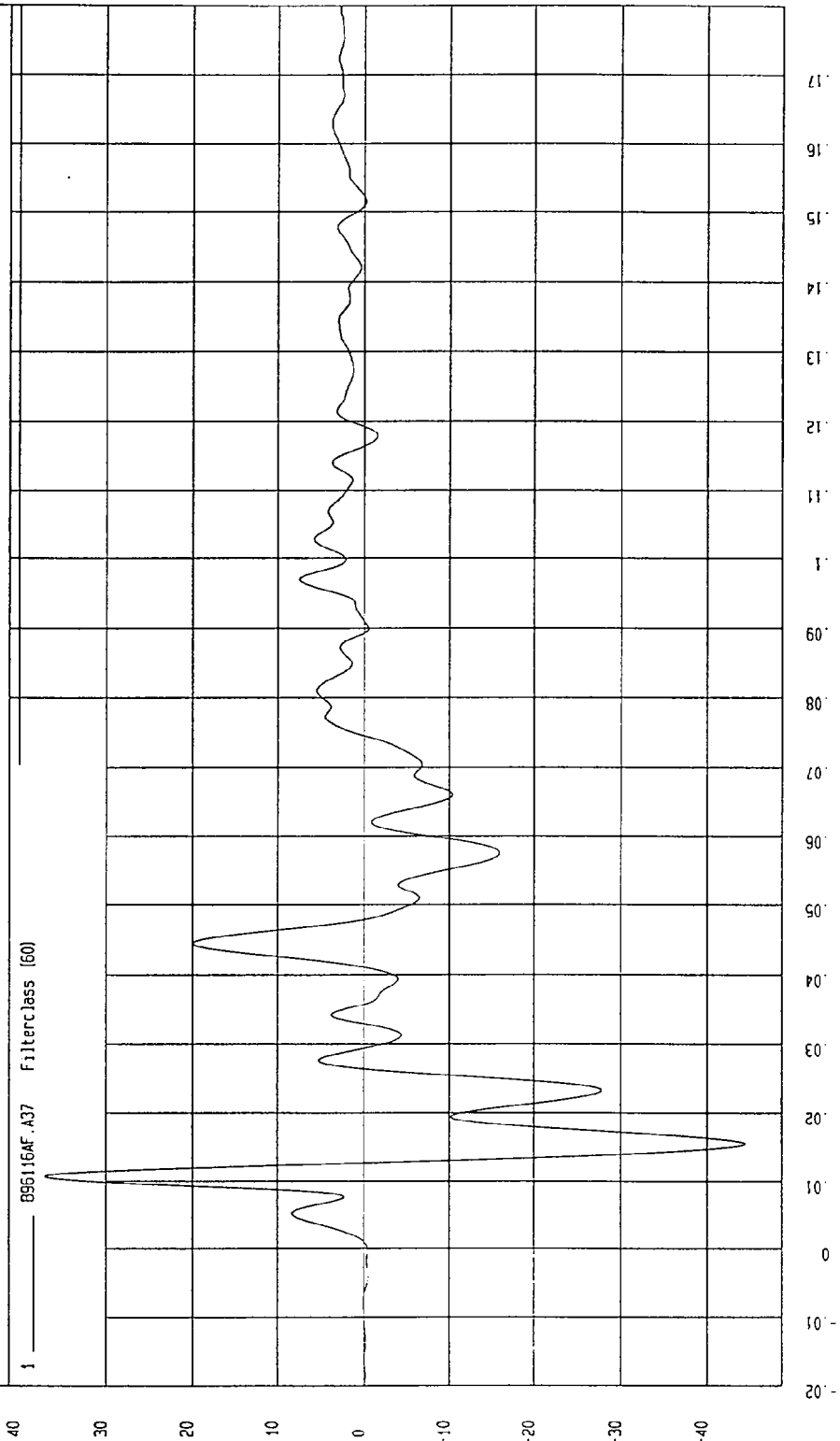
TEST: 30 MPH FRONTAL BARRIER IMPACT TEST DATE: 11-07-1996

COMPONENT: 1997 FORD E-150 (CV0212) Speed: 29.1 MPH 46.8 KPH

YMIN=-44.45744 G'S at 15. msec YMAX= 37.02711 G'S at 10. msec

TRUNK Z ACCELERATION

1 895115AF.A37 FilterClass (60)



WCA Research  
11-20-1996 22:25

APPENDIX C  
MANUFACTURER'S VEHICLE INFORMATION



L. W. Camp  
Director  
Automotive Safety and Engineering Standards  
Environmental and Safety  
Engineering — FAO

Ford Motor Company  
330 Town Center Drive  
Dearborn, Michigan 48126

October 22, 1996

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: IR 1749/NSA-31CCa

This is in response to your letter of August 26, 1996, requesting information relative to possible FMVSS 208 testing by OVSC of the 1997 model year Ford Econoline Van (all models; i.e., E-150, E-250 and Club Wagons) 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.

If it is, please inform OVSC whether the air bag restraint provided at the driver's and passenger's seating positions is certified to meet the requirements of S4.1.2.1(c)(1) or S4.1.2.1.(c)(2) for FMVSS No. 208.

If the air bag restraints were 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 test reports for the frontal/angular barrier impact test required by S4.1.2.1.

If the manual 3-point safety belts are provided with the driver's and passenger's air bag restraint in order to meet the requirements of S4.1.2.1(c)(2), please provide 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

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unfastened and frontal/angular barrier impact test of the automatic restraint system with the manual safety belt fastened)."

Response

The manual three-point safety belts provided with the driver's and passenger's air bag restraint systems in the 1997 model year Ford Econoline were installed to meet the requirements of S4.1.2.1(c)(2) of FMVSS 208. Attachments I and II contain copies of those portions of the final test reports for Crash Tests 10023 and 10067, 90 degree front fixed barrier impact tests with the manual safety belts unfastened, relevant to S4.1.2.1(c)(2). Attachment III contains a copy of those portions of the final test report for Crash Test 10071, a 90 degree front fixed barrier impact test with the manual safety belts fastened, relevant to S4.1.2.1(c)(2). Note that in each test report, material unrelated to FMVSS 208 has been deleted - material deleted on an individual page is noted by brackets. Ford relied on the results of these tests as a basis for certifying compliance of 1997 Ford Econoline vehicles equipped with driver's and passenger's air bag restraint systems with S4.1.2.1.

Request No. 2

"If the air bag restraints at the driver's and passenger's seating positions were not installed to meet the requirements of S4.1.2.1, please inform OVSC whether the 3-point manual belts provided in the front outboard seating positions were installed to meet the requirements of S.4.1.2.3 as reference by S.4.2.2.

If the manual belts provided at the front outboard seating positions were installed in accordance with S4.1.2.3, please provide a copy of your certification test reports for the requirements specified (frontal crash test requirements of S5.1) in S4.6 of the standard."

Response

As stated above, the manual safety belts provided at the driver's and passenger's seating positions of the 1997 Ford Econoline were installed to meet the requirements of the S4.1.2.1 of FMVSS No. 208.

Request No. 3

"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 1997 Ford Econoline does not use a pressure vessel to inflate the driver and passenger air bags.

Request No. 4

"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 IV contains the engineering analyses and the related TRW and Morton test reports demonstrating compliance to S9.2 of FMVSS No. 208 for the driver and passenger air bag restraint systems for the 1997 Ford Econoline.

Request No. 5

"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 1997 Econoline safety belt systems.

Request No. 6

"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 1997 Ford Econoline vehicles were conducted with all moveable windows and vents fully open for 90 degree perpendicular frontal impacts and in the fully closed position for all 30 degree front angular impacts.

Request No. 7

"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."

Response

SAE modified 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 1997 Ford Econoline vehicles to FMVSS No. 208. These dummies were modified at the ankles and pelvis in accordance with the NPRM Docket 74-14; Notice 96 to avoid femur load and chest acceleration anomalies (extraneous data). Attachment V contains dummy placement measurements applicable to the 1997 Econoline.

The 1997 Econoline does not have a foot rest for the driver.

The Econoline has bucket seats for both the driver and right front seat passenger. Split bench seats are not available.

Request No. 8

"Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form."

Response

Attachment VI 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 1997 Econoline.

Request No. 9

"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 1997 Econoline 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 (center detent of the five total positions).

Request No. 10

" 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 or S.4.1.2.3.

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 VII includes the speed at impact, vehicle test weight, and injury criteria values recorded in compliance tests of the 1997 Ford Econoline to the requirements of FMVSS No. 208, S4.1.2.1. Attachment VIII contains resultant head and chest acceleration versus time plots and femur loads versus time plots for each dummy for Crash Tests 9852, 9885, 9906, 9939, 9955, 9979, and 10058. These plots together with the plots from Crash Tests 10023, 10067 and 10071 which were provided in response to Request No. 1, represent all the full front barrier (90 degree) impact tests that were used as a basis to certify the 1997 Econoline to FMVSS No. 208.

Request No. 11

"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:

- ◊ 2nd and 3rd row bench seats
- ◊ Spare tire
- ◊ Interior trim rearward of B-pillar, and
- ◊ Rear bumper.

All onboard instrumentation should be included in the vehicle test weight.

Request No. 12

"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

No separate 1997 Econoline crash test was performed with the primary intent of measuring steering column intrusion. Compliance with FMVSS 204 is based on Engineering Judgment utilizing measurements obtained from linear displacement transducers, along with post crash examinations of the steering columns and reviews of all high speed film segments focused on the steering columns.

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. 13

"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'."

Response

Built-in child restraints are not available as either standard or optional equipment on the 1997 Ford Econoline vehicles.

Mr. Harry Thompson

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October 22, 1996

We believe the information and test reports contained herein are otherwise fully responsive to your request. If you have any questions, please call Mr. Roger Kolassa on (313) 337-6969.

Very truly yours,



L. W. Camp

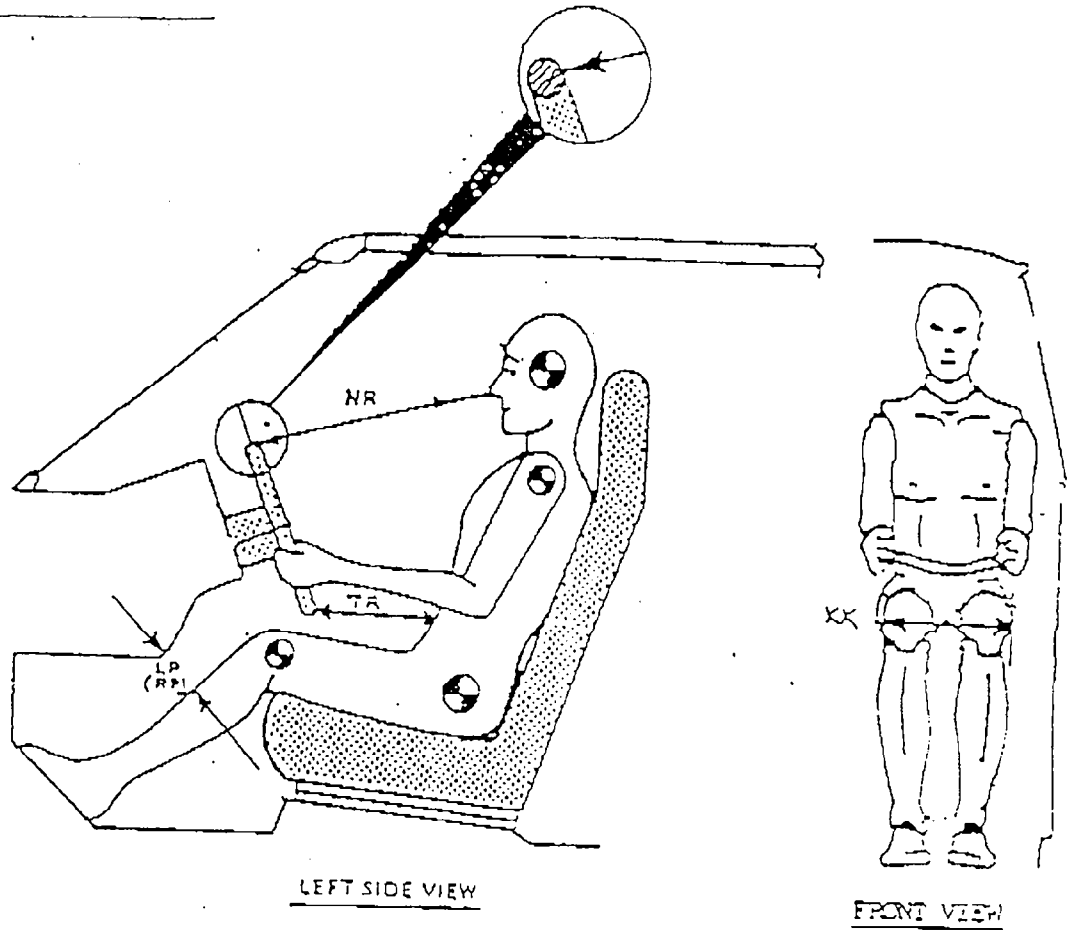
Attachments

IR1749.DOC

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS

VEHICLE 1997 ECONOLINE

IR# 1749

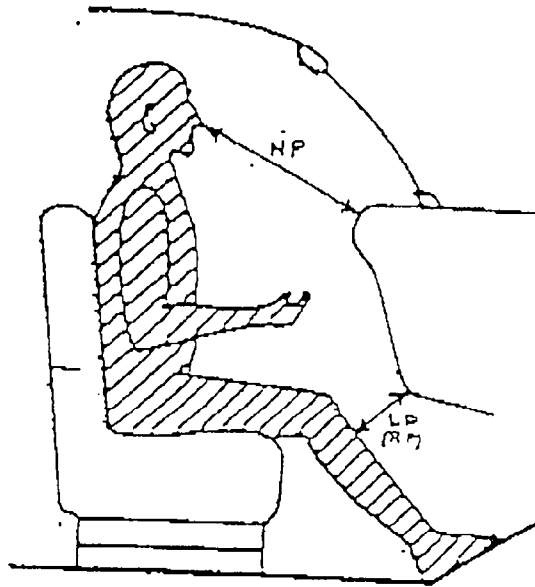


		MEASUREMENTS (All distances in inches)	
		TARGET	RANGE
NR	Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	13.7	(15.2 - 12.7)
TR	Horizontal distance from bottom rear surface of steering wheel rim to dummy's torso	6.7	(8.0 - 5.8)
LP	Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface	3.6	(4.5 - 2.3)
RP	Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface	3.3	(3.9 - 2.2)
KK	Distance between outside surfaces of dummy's legs measured at the knee bolts	7.9	(8.9 - 7.4)

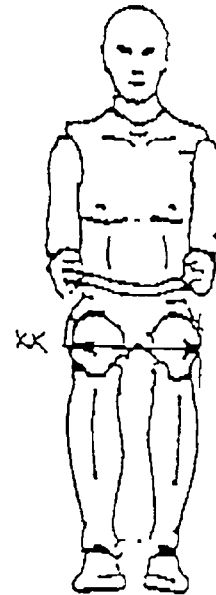
PASSENGER DUMMY PLACEMENT REFERENCE DIMENSIONS

VEHICLE 1997 ECONOLINE

IR# 1749



RIGHT SIDE VIEW



FRONT VIEW

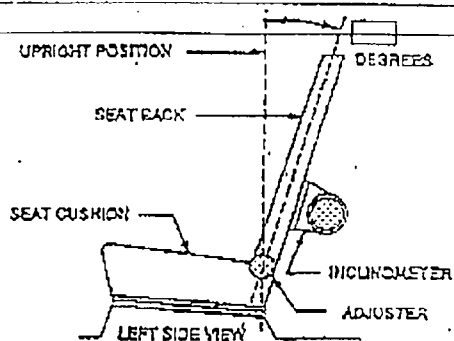
		MEASUREMENTS (All distances in inches)	
		TARGET	RANGE
NP	Distance from tip of dummy's nose to closest point on surface of instrument panel	24.7	(25.6 - 23.9)
LP	Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface	3.2	(3.5 - 2.4)
RP	Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface	4.0	(4.3 - 3.3)
KK	Distance between outside surfaces of dummy's legs measured at the knee bolts	N/A	N/A

## TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1997 Ford  
Vehicle Model & Body Style: Econoline (all models)

### 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.



Seat back angle for driver's seat =  \*  degrees.

Measurement instructions:

\* See detailed note below.

See attached sheet

Seat back angle for passenger's seat =  \*  degrees.

Measurement instructions:

Same as for Driver's Seat.

### 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, 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 the seat travel. If in the center position the manual latch does not engage, move the seat rearward until the first engagement.

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

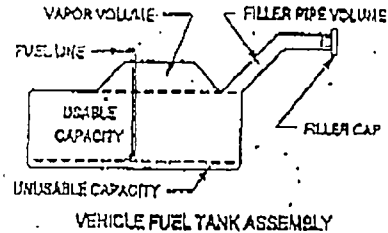
Same method as for driver's seat.

#### Note

The Ford procedure uses an inclinometer attached to a small fixture which contacts the back of the seat back frame at a specified location (13 inches up from the pivot on the outboard edge) using pins which penetrate the seat pads and trim. Using this procedure and the angle data provided, the seat back can be adjusted to assure that it is in the design riding position with a test dummy positioned in the seat.

3. FUEL TANK CAPACITY DATA - -

- 3.1 A. "Usable Capacity" of standard equipment fuel tank = 35.0 gallons.  
 B. "Usable Capacity" of optional equipment fuel tank = N/A gallons.  
 C. Capacity used when certification testing to requirements of FMVSS 301 = 35.0 gallons.



3.2 Amount of Stoddard solvent added to vehicle for certification test = 33.25 gallons

3.3 Is vehicle equipped with electric fuel pump?  YES  NO  
 If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

Electric Fuel Pump Operation

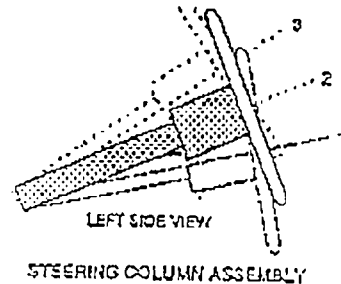
The electric fuel pump operates for 2 (two) seconds to pressurize the fuel system following actuation of the ignition. If no attempt has been made to start the engine within 2 (two) seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine 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.

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:

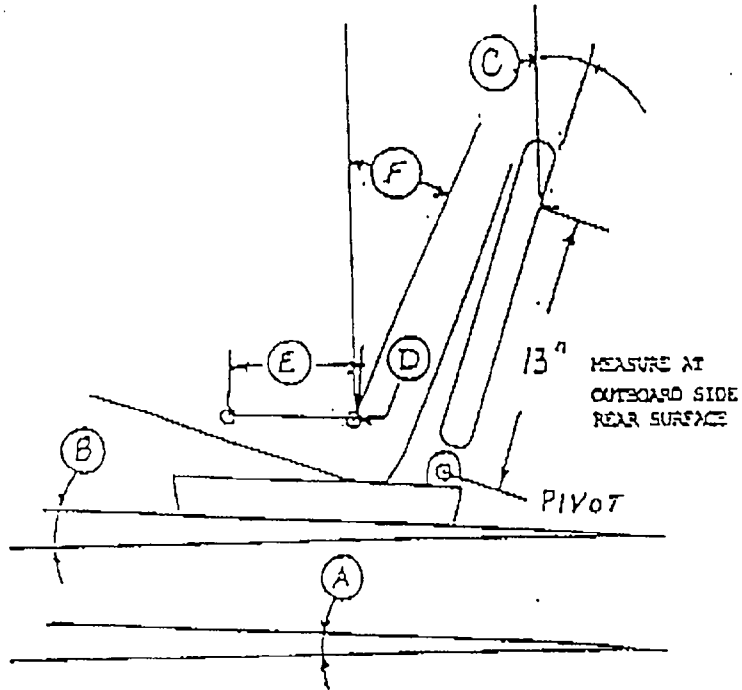


Adjustable steering columns are positioned in the center (mid-position) detent for FMVSS No. 208 testing. (Note: This vehicle has 5 positions on adjustable columns).



VEHICLE 1997 Econoline Front Passenger Seat

IR# 1749



A - SILL ANGLE	<u>0 Deg.</u>
B - DESIGN CUSHION FRAME ANGLE	<u>8 Degrees</u>
C - DESIGN SEAT BACK FRAME ANGLE	<u>21.0 Degrees</u>
D - REARMOST "H" POINT	<u>3206 +/- 15 mm</u>
E - TRACK TRAVEL	<u>178 Man., 168 Pwr. mm</u>
F - MANIKIN BACK ANGLE	<u>21.0 Degrees</u>