

REPORT NO. MGA-94-N003

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

Oldsmobile
1994 Oldsmobile Achieva
2 Door
NHTSA NO. MR0107

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: February 17, 1994

Report Date: March 29, 1994

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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TECHNICAL REPORT STANDARD TITLE PAGE

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<p>16. Abstract</p> <p>A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1994 Oldsmobile Achieva 2 Door at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on February 17, 1994.</p> <p>The barrier impact velocity was 56.3 kph (35.0 mph), and the ambient temperature at the time of impact was 22° C. The post-test average crush was 484 mm.</p> <p>The test vehicle appeared to comply with the requirements of the following Federal Motor Vehicle Safety Standards:</p> <ol style="list-style-type: none"> 1. FMVSS 212, "Windshield Mounting" 2. FMVSS 219 (partial), "Windshield Zone Intrusion" 3. FMVSS 301, "Fuel System Integrity" <p>With regard to FMVSS 208, "Occupant Crash Protection" injury criteria, the driver's HIC was 844 and the 3 msec. Clip (Chest g's) was 46.2 g's. The left and right maximum femur loads for the driver were 5156 and 3758 Newtons, respectively. The passenger's HIC was 1103 and the 3 msec Clip was 48.8 g's. The left and right femur maximum loads were 2774 and 4257 Newtons respectively. No valid data was recorded for the passenger shoulder belt load. The cause of the data loss is unknown.</p>			
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP) FMVSS 212 Indicant Testing FMVSS 219 (partial) Indicant Testing FMVSS 301 Indicant Testing		18. Distribution Statement Copies of this report are available from: Technical Ref. Division, National Highway Traffic Safety Adm., NASSIF Building, Room 5108 400 Seventh Street, S.W. Washington, D.C. 20590	
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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY'93 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-12121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48 kph (30 mph) FMVSS 208/212/219/301-75 requirements.

The 56 kph (35 mph) frontal barrier impact test was conducted in accordance with the National Highway Traffic Safety Administration (NHTSA) Indicant Test Procedure for New Car Assessment Program (NCAP) dated January 1, 1990. Data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

SECTION 2
SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 30 load cells was impacted by a 1994 Oldsmobile Achieva 2-Door at a velocity of 56.3 kph (35.0 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on February 17, 1994. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers, a six channel neck transducer, a chest displacement transducer, and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. No valid data was recorded for the passenger shoulder belt load. The cause of the data loss is unknown. The driver ATD (Serial No. 36) and the right-front passenger ATD (Serial No. 37) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

Fifty-two channels of data were recorded on 5 computers. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the inflated airbag. The driver HIC was 844. The maximum chest deceleration over 3 milliseconds was 46.2 G's. The left and right femur loads were 5156 and 3758 Newtons respectively.

The passenger's head struck his legs above the knees. The right front passenger's HIC was 1103 and maximum chest deceleration over 3 milliseconds was 48.8 g's. The left and right femur loads were 2774 and 4257 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1994 Oldsmobile Achieva 2 Door

NHTSA No.: MR0107 VIN.: 1G3NL1530RM000821

Body color: Blue Date of Manufacture: 9-93

Engine: 4 Cylinders; C.I.D.; 2.3liters; CC

 Gas; Diesel; Turbocharged

 Longitudinal; X Transverse

Transmission: 3 Speed; Manual; X Automatic; Overdrive

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

Date Received: 12-22-93 Odometer Reading: 68

 X A/C; X P/S; X P/B; P/wdo;

 P/seats; X Tilt Wheel; Cruise Control;

Type of Occupant Restraint: Manual door mounted 2 retractor 3 point lap and shoulder belt
with driver side airbag

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 2.11 kg/cm² 30 Psi; Rear 2.11 kg/cm² 30 Psi:

Recommended Tire Size: P185/75R14

Recommended Cold Tire Pressure: Front 2.11 kg/cm²; Rear 2.11 kg/cm²

Tires on Vehicle: P185/75R14 ; Manufacturer: Michelin

Number of Occupants: 2 Front; 3 Rear; 3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 400 kg. (A)

No. of Occupants x 68 kg. = 340.0 kg. (B)

Rated Cargo Weight (RCW) A-B = 60.0 kg.

GVWR 1684 kg. GAWR: Front 926 kg.; Rear 758 kg.

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

Right Front = 413.2 kg Right Rear = 215.9 kg
Left Front = 411.9 kg Left Rear = 231.8 kg
TOTAL FRONT WEIGHT = 825.1 kg (65 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 447.7 kg (35 % of Total Vehicle Weight)
TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1272.8 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1272.8 kg
VCW = Vehicle Capacity Weight 400 kg DSC = Designated Seating Capacity 5
RCW = VCW - 68 (DSC) = 60 *kg
Target Test Weight = UDW + RCW + (2 dummies x 75.7 kg/dummy)
Target Test Weight = 1484.2 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 450.4 kg Right Rear = 280.8 kg
Left Front = 446.8 kg Left Rear = 305.3 kg
TOTAL FRONT WEIGHT = 897.2 kg (60 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 586.1 kg (40 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 1483.3 kg
Weight of ballast secured in vehicle = 0 kg

Vehicle components removed to meet target weight or to make room for instrumentation: Spare tire and jack, trunk floor and carpet, rear seats, left rear taillight

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 708 LF 705 RR 733 LR 726
Test Attitude: RF 688 LF 684 RR 679 LR 674
Wheel Base: 2624 mm; C.G. = 1037 mm rearward of front wheel C/L
Remarks: None

*light trucks and MPVs RCW is 136 kgs or the calculated value, whichever is less

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

POST-IMPACT DATA:

Type of Test: 35 mph Frontal Impact Impact Angle: 90°
Date of Test: February 17, 1994 Time of Test: 2:03 p.m.
Ambient Temperature: 22 °C (Spec. Range = 18.8 to 25.6°C)
Temperature in Occupant Compartment: 22 °C
Windshield Molding Temperature: 22 °C
Required Impact Velocity Range: 55.5 to 57.1 kph
Impact Velocity: primary = 56.6 kph; secondary = 56.1 kph
Distance From Front Bumper to Barrier Face When
Entering Speed Trap: 1400 mm
Exiting Speed Trap: 400 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length: Pre-test = R 4534 C_L 4781 L 4534
Post-test = R 4051 C_L 4234 L 4113
Crush = R 483 C_L 547 L 421

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

R 535 mm C_L 456 mm L 354 mm

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Airbag</u>	<u>Above the knees</u>
Chest	<u>Airbag</u>	<u>No visible contact</u>
Abdomen	<u>Unknown</u>	<u>No visible contact</u>
Left Knee	<u>Lower instrument panel</u>	<u>Lower instrument panel</u>
Right Knee	<u>Lower instrument panel</u>	<u>Lower instrument panel</u>

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

<u>Door Opening</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
(without use of tools)	<u>Yes</u>	<u>Yes</u>	<u>N/A</u>	<u>N/A</u>

<u>Seat Movement</u>	<u>Front</u>	
	<u>Left</u>	<u>Right</u>
Seat Back Movement	<u>0</u>	<u>0</u>
Seat Shift (mm)	<u>0</u>	<u>0</u>

Glazing Damage

Backlight/Windshield Front Windshield

Other Notable Impact Effects: None Noted

SECTION 3

SUMMARY OF RESULTS FOR-----

FMVSS 212, "Windshield Mounting"

FMVSS 219 (Partial), "Windshield Zone Intrusion"

FMVSS 301-75, "Fuel System Integrity"

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

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

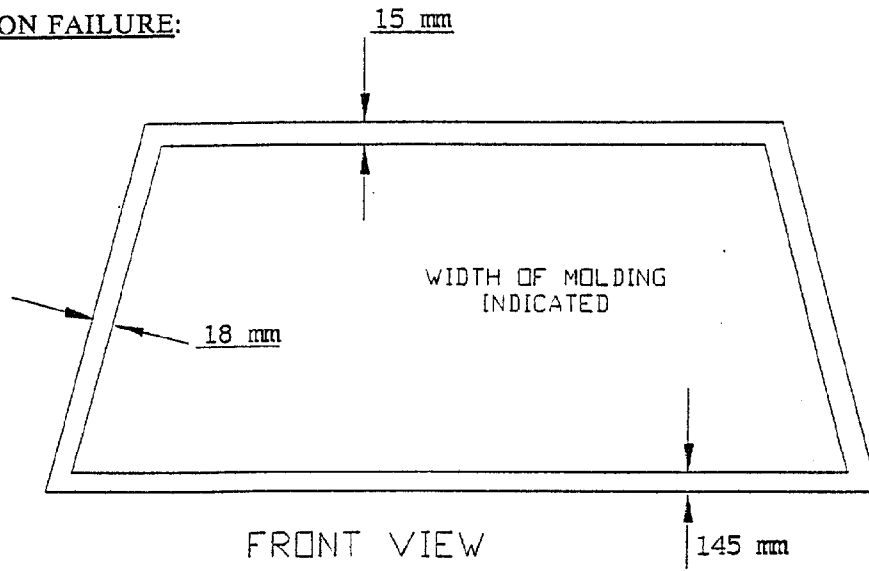
Rubber with glue retention

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST (mm)	PERCENT RETENTION
RIGHT SIDE	2026	2003	99%
LEFT SIDE	2026	2003	99%
TOTAL	4052	4006	99%

AREA OF RETENTION FAILURE:



FAILURE DETAILS: None

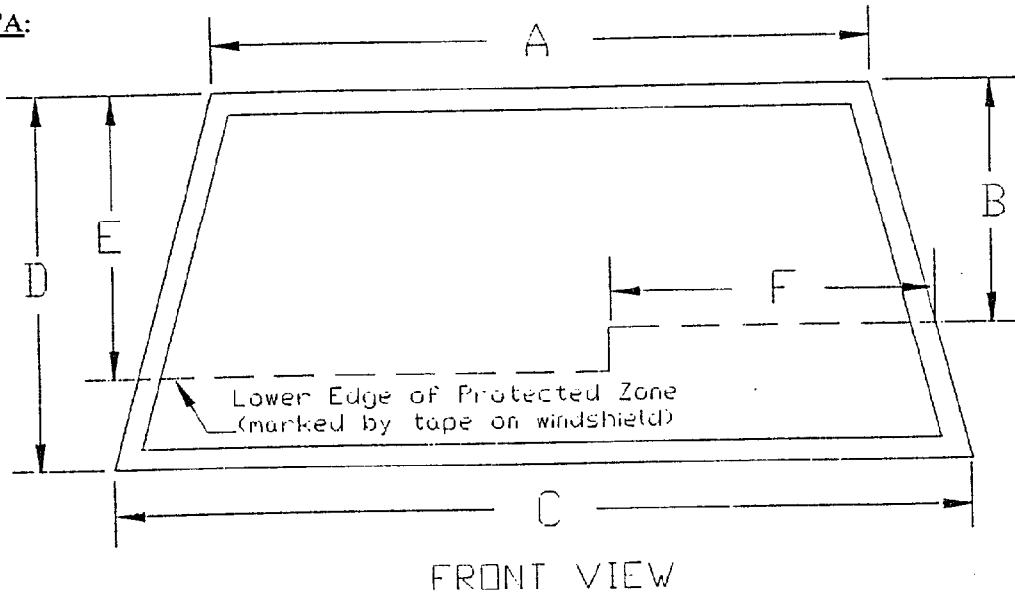
FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield 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.

FMVSS 219 TEST DATA:

A= 1081 mm
B= 372 mm
C= 1528 mm
D= 755 mm
E= 541 mm
F= 698 mm



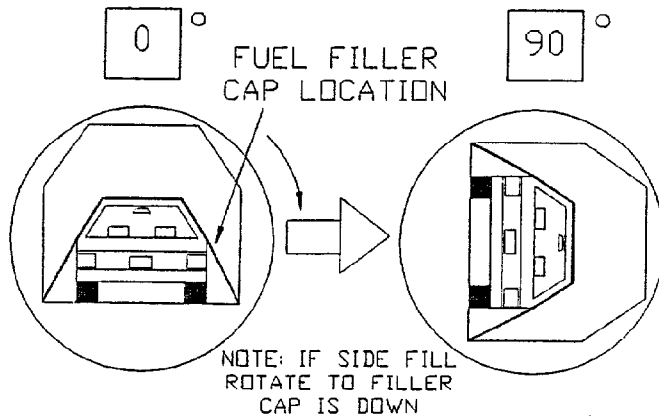
DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration)

NONE

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90°

Vehicle NHTSA ID No.: MR0107



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 32 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 32 seconds
Next whole minute interval 8 minutes

I. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
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II. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
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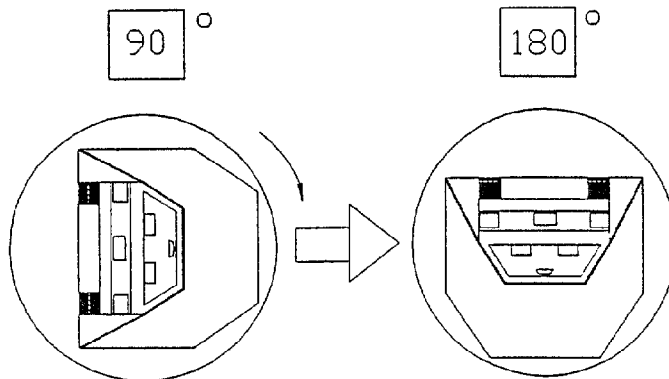
Note: Record Spillage for whole minute intervals only as determined above.

V. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180°

Vehicle NHTSA ID No.: MR0107



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 41 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 41 seconds
 Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
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III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
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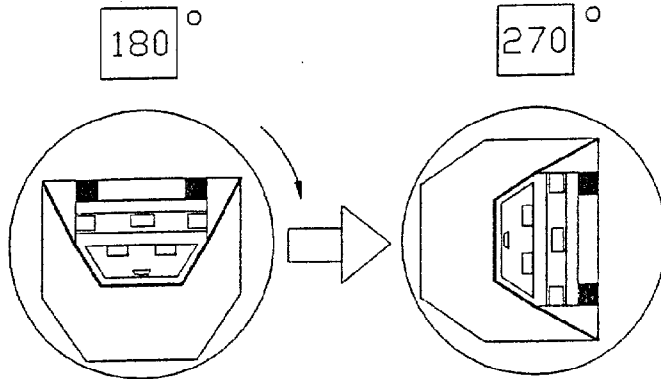
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270°

Vehicle NHTSA ID No.: MR0107



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 30 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 30 seconds

Next whole minute interval 8 minutes

I. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

II. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

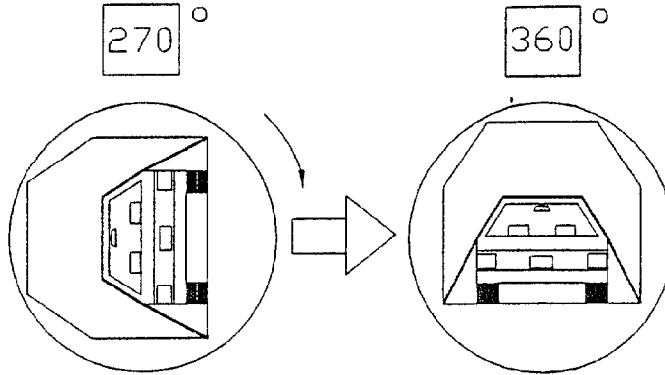
Note: Record Spillage for whole minute intervals only as determined above.

V. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360°

Vehicle NHTSA ID No.: MR0107



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 45 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 45 seconds
 Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

SECTION 4
OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. "Occupant Crash Protection Data Sheet"
2. Dummy Positioning Data
3. Seat Belt Positioning Data
4. Seat Belt Performance Assessment Data
5. Driver Dummy to Steering Column Dimensions
6. Camera Locations
7. Vehicle Target Locations

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data
3. Test Vehicle Measurements

III. AID DATA

1. Accident Investigation Damage Data Summary

FMVSS NO. 208, "OCCUPANT CRASH PROTECTION", DATA SHEET

VEH. YR./MAKE/MODEL/BODY STYLE: 1994 Oldsmobile Achieva 2 Door

VEH. NHTSA NO.: MR0107 TEST DATE: February 17, 1994

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY # <u>36</u>	PASSENGER DUMMY # <u>37</u>
Head Channel X	-68.4	-63.8
Head Channel Y	-10.5	5.0
Head Channel Z	21.1	64.3
HEAD RESULTANT	68.5	79.4
Chest Channel X	-46.9	-48.7
Chest Channel Y	20.1	21.1
Chest Channel Z	4.8	-11.0
CHEST RESULTANT (CLIP)	46.2	48.8
TIME INTERVAL (msec) [0.003 seconds minimum]	t ₁ = 71.56 t ₂ = 74.62	t ₁ = 77.55 t ₂ = 80.61

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	844	1103
t ₁ = (msec)	66.8	85.1
t ₂ = (msec)	100.6	121.1
Avg. Accel. t ₁ to t ₂ (g's)	57.4	62.3

[The maximum time interval from t₁ to t₂ is 36 milliseconds.]

MAXIMUM FEMUR FORCES:

Right Side (N)	-3758	-4257
Left Side (N)	-5156	-2774

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	5854	3752
Shoulder Belt (N)	5973	*

NOTE: All values listed must occur during primary impact event.
(Head X,Y,Z and R listed must be during t₁ to t₂ HIC interval)

* Data Loss During Impact

HYBRID III NECK AND CHEST DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1994 Oldsmobile Achieva 2 Door

VEHICLE NHTSA NO.: MR0107 TEST DATE: February 17, 1994

MAXIMUM VALUES	DRIVER DUMMY #36	PASSENGER DUMMY #37
Neck Load X (N)	-1253	2195
Neck Load Y (N)	-166	1161
Neck Load Z (N)	-1985	-3058
Neck Moment X (N.M)	8.2	23.9
Neck Moment Y (N.M)	-84.0	-125.5
Neck Moment Z (N.M)	20.1	-10.7
Chest Deflection X (mm)	31	42
Time of Max. Occurrence	84 msec	99 msec

PART 572 DUMMY IN-VEHICLE POSITION

Test No.: MR0107 Vehicle: Oldsmobile Achieva

SEAT TYPE:

Bench
 Bucket
 Split Bench

ADJUSTER TYPE:

Driver
 Manual
 Power

 Passenger
 Manual (adjustable reclining)
 Power

BUCKET SEAT BACK TYPE:

Fixed
 Adjustable Reclining

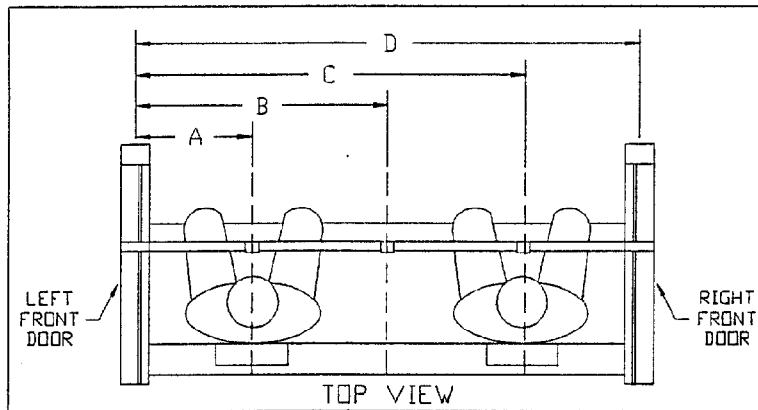
Driver

Passenger

Seat notch 11 from rear most position
 out of 21 total

Seat notch 11 from rear most position
 out of 21 total

Steering Column: 3rd notch out of 5 total



36 DUMMY ID 37

- | | |
|---|----------------|
| A = Left Door to Driver Centerline | <u>390</u> mm |
| B = Left Door to Vehicle Centerline | <u>741</u> mm |
| C = Left Door to Right Passenger Centerline | <u>1126</u> mm |
| D = Left Door to Right Door | <u>1482</u> mm |

FRONT SEAT MEASUREMENT TABLE

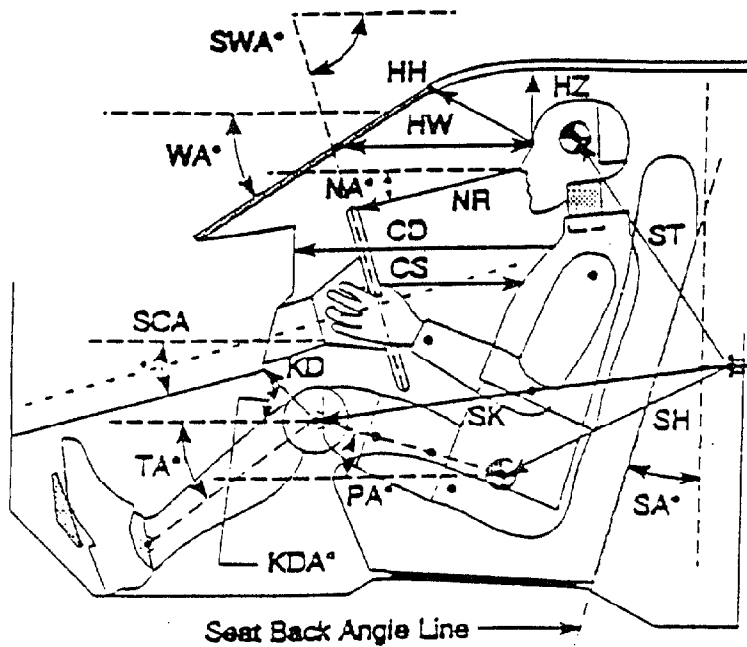
Units (mm)

	DRIVER (Serial #36)	PASSENGER (Serial #37)
WA°	27.4°	27.4°
SWA°	19.4°	N/A
SCA°	20.5°	N/A
SA°	21°	21°
HZ	167	140
HH	302	322
HW	562	520
HR	194	162
NR	392 Angle 9°	N/A
CD	506	522
CS	312	N/A
RA	192	N/A
KDL	138 Angle 27.4°	150 Angle 31°
KDR	142	150
PA°	23°	22°
TA°	41.4°	49°
KK	222	200
ST	651 Angle 34.8°	634 Angle 32°
SK	900 Angle 3°	900 Angle 2°
SH	548 Angle 12.8°	527 Angle 13.8°
SHY	212	212
HS	280	274
HD	112	105
AD	108	92

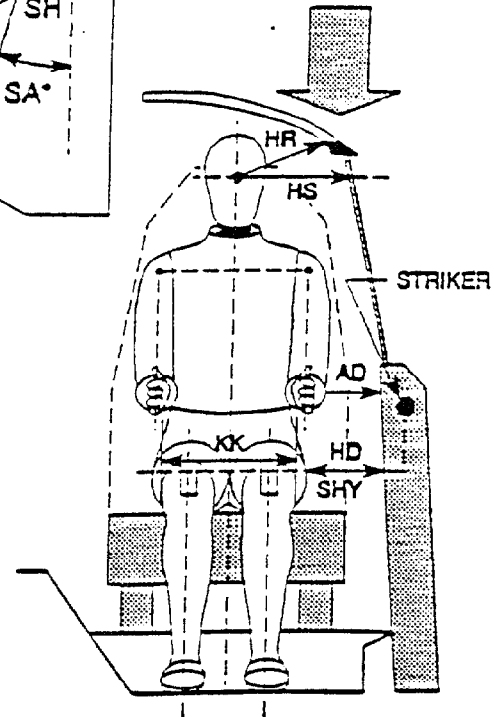
N/A = Not Applicable

N/R = Not Recordable

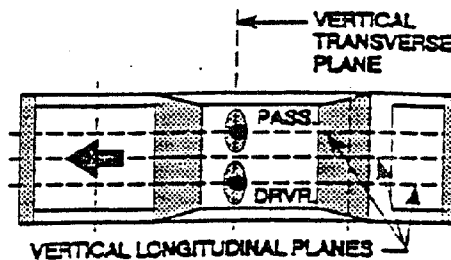
FRONT SEAT MEASUREMENTS



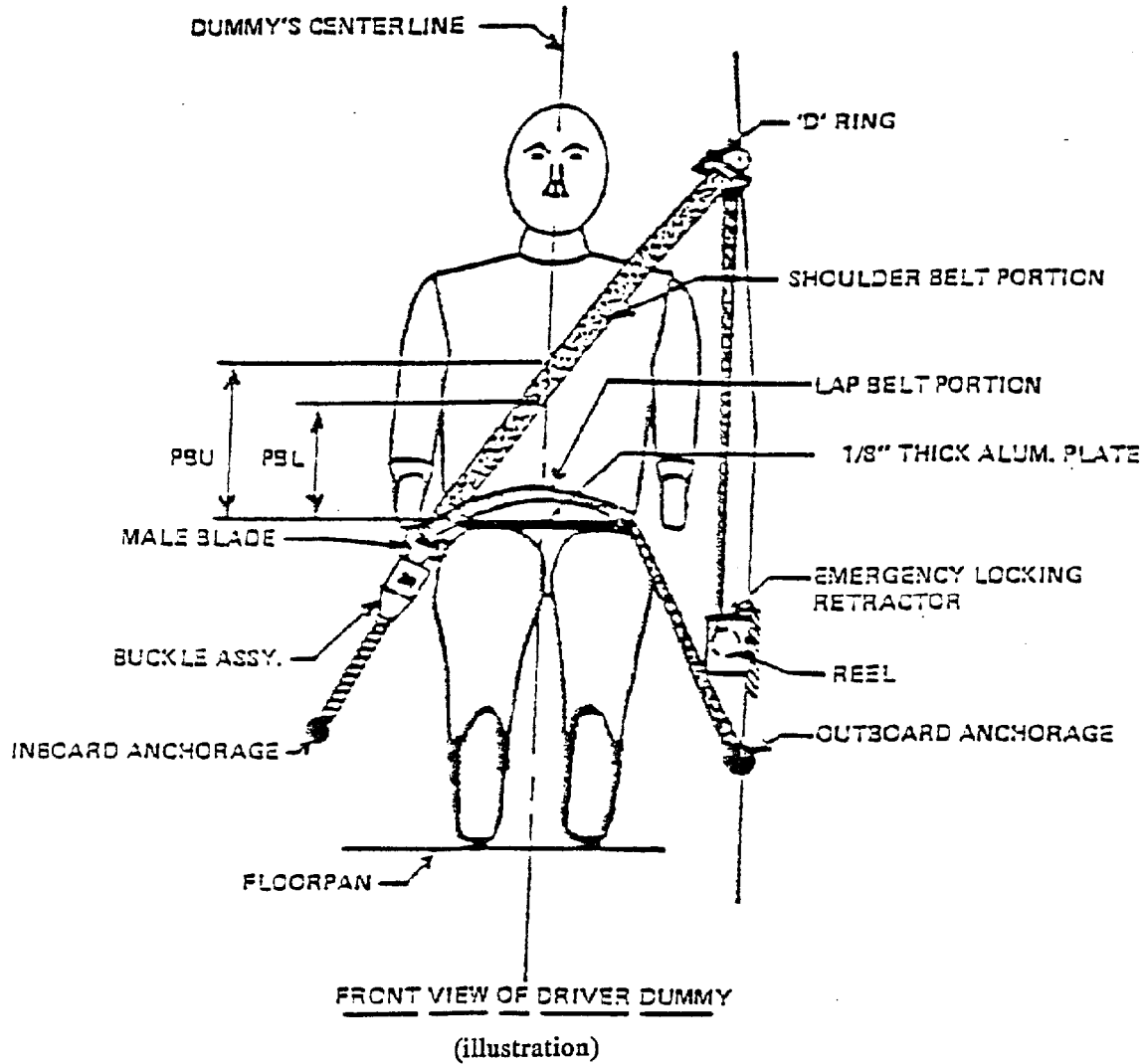
- AD - Arm to Door
- HD - H-Point to Door
- HR - Head to Side Header
- HS - Head to Side Window
- KK - Knee to Knee
- SHY - Striker to H-Point (Y Direction)



- 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



SEAT BELT POSITIONING DATA



		DRIVER DUMMY	PASSENGER DUMMY
<u>PBU</u> --	Top surface of alum. plate to upper edge (mm)	336	304
<u>PBL</u> --	Top surface of alum. plate to belt lower edge (mm)	250	218
<u>LAP BELT TENSION</u> (kgs.)		N/R	N/R
<u>SHOULDER BELT TENSION</u> (kgs.)		N/R	N/R

* N/R = Not Recorded

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>BELT LENGTH DATA:</u>	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>228 mm</u>	<u>226 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>910 mm</u>	<u>987 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>518 mm</u>	<u>535 mm</u>
Total belt length	<u>1656 mm</u>	<u>1748 mm</u>
 <u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis	<u>76 mm</u>	<u>95 mm</u>
As determined mechanically	<u>57 mm</u>	<u>65 mm</u>
As determined electronically	<u>N/R</u>	<u>N/R</u>
 <u>LAP BELT SPOOL OFF DATA:</u>		
As determined mechanically	<u>50 mm</u>	<u>55 mm</u>
 <u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>N/R</u>	<u>N/R</u>
Measured mechanically	<u>**</u>	<u>**</u>
 <u>RETRACTOR LOCK-UP TIME:</u>		
As determined by shoulder belt spool-off observed in on-board cameras	<u>14 msec</u>	<u>24 msec</u>

** No valid data recorded
NR = Not Recorded

CAMERA LOCATIONS

VEH. NHTSA NO.: MR0107 ; TEST DATE: February 17, 1994 ; TIME: 2:03 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1994 Oldsmobile Achieva 2 Door

	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Left Side View					10	24
3	Left Front View	515	8190	1190	90°	25	952
16	Steering Column Top	1858	7940	1555	90°	25	740
15	Steering Column Bottom	1858	7940	1015	90°	25	1000
12	Left Driver Close-up	1300	8700	1126	90°	50	870
9	Left Angle	6000	7535	2190	50°	50	1070
13	Driver Onboard Seat Belt					35	1000
14	Passenger Onboard Seat Belt					35	1000
2	Right Overall	2675	-7518	1062	90°	13	1111
17	Right Front	840	-7960	1205	90°	25	1000
11	Right Passenger Close-up	1692	-6700	1126	90°	35	1000
10	Right Angle	5000	-5810	2110	50°	35	1000
4	Top View Wide	0	0	4400		13	1176
8	Top Driver	-240	380	2280		13	952
7	Top Passenger	-270	-400	2367		13	No timing
5	Pit Engine	740	0	-2400		13	971
6	Pit Fuel Tank	3000	0	-2198		13	588

ORDINATES:

X = film plane to monorail centerline

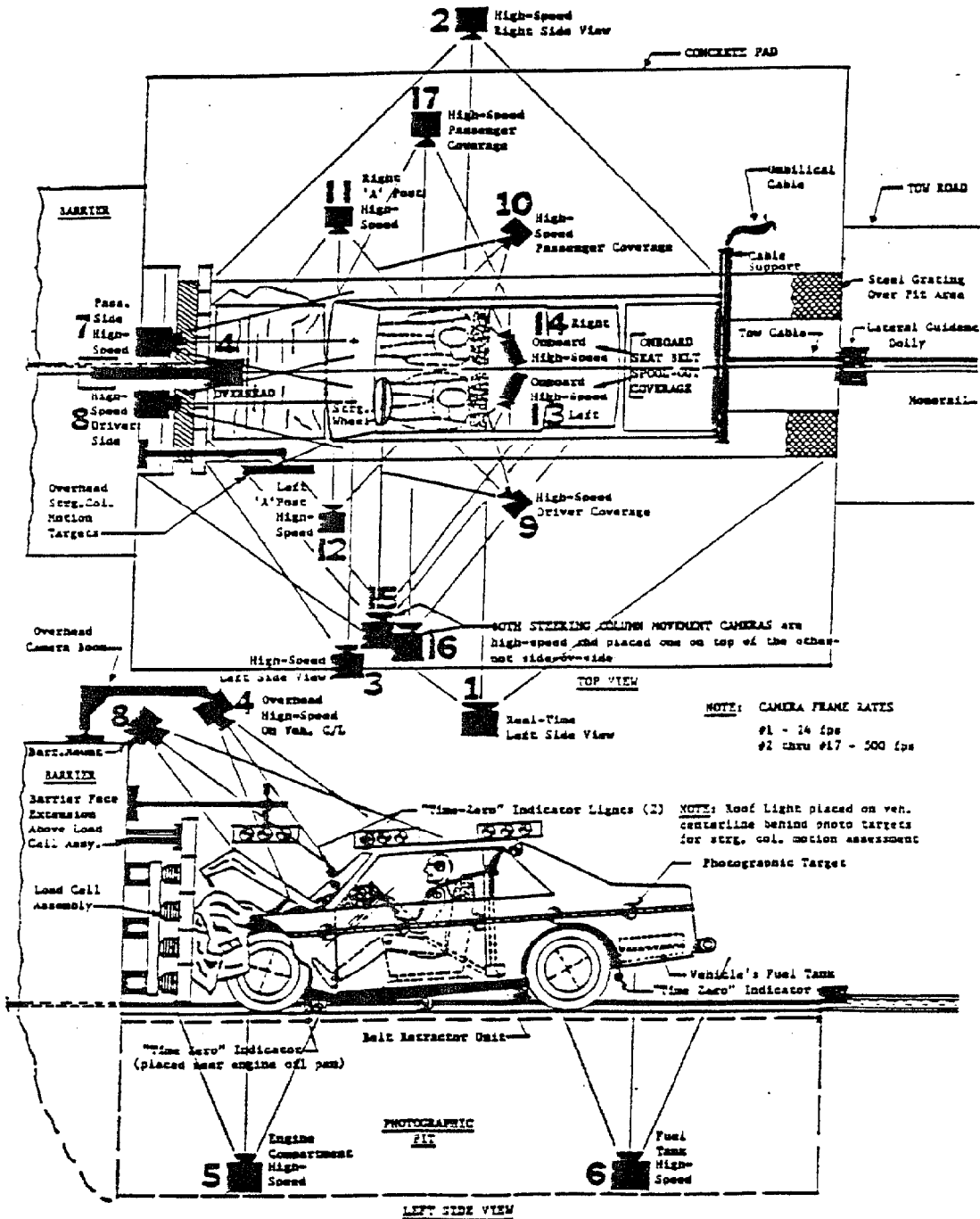
Y = film plane to barrier face

Z = film plane to ground

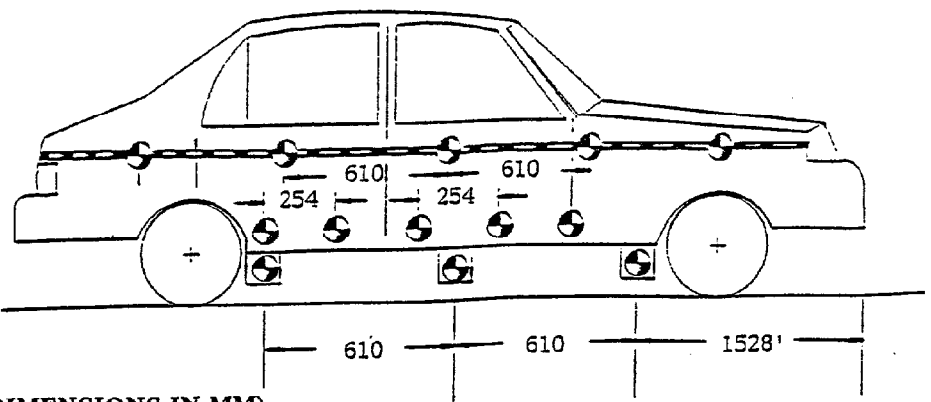
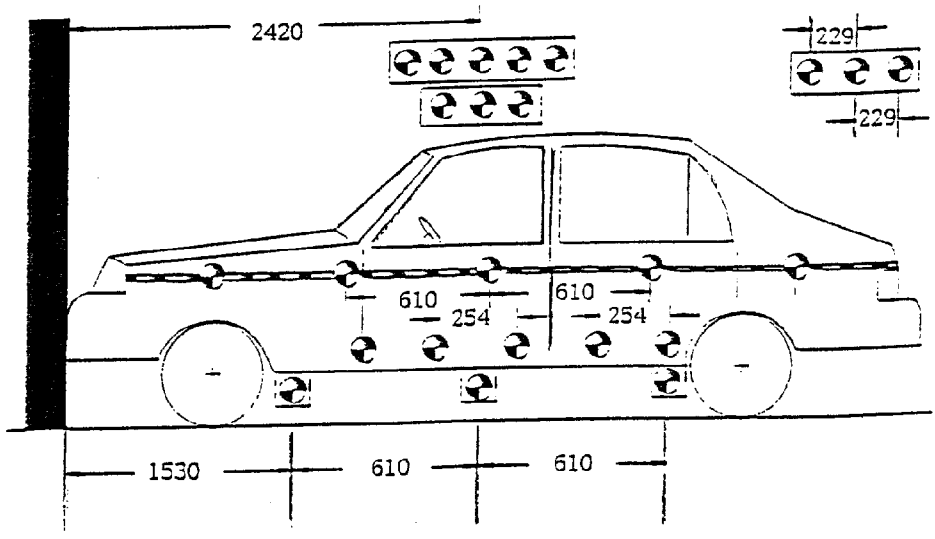
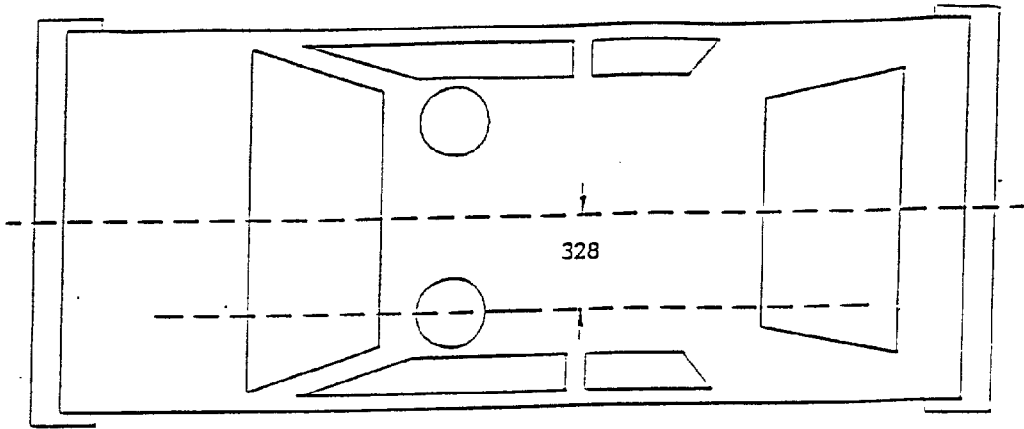
ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

CAMERA LOCATIONS (CONTINUED)

CAMERA REQUIREMENTS FOR 35 MPH FRONTAL BARRIER IMPACT ASSESSMENT PROGRAM TEST



VEHICLE TARGET LOCATIONS



(DIMENSIONS IN MM)

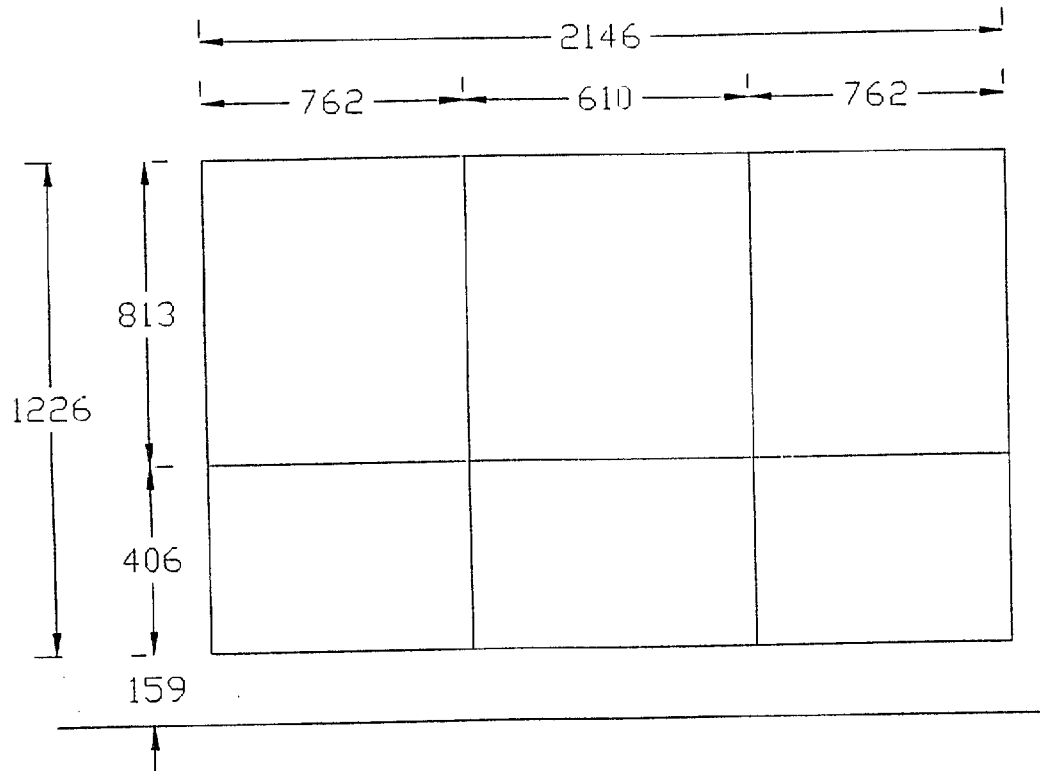
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

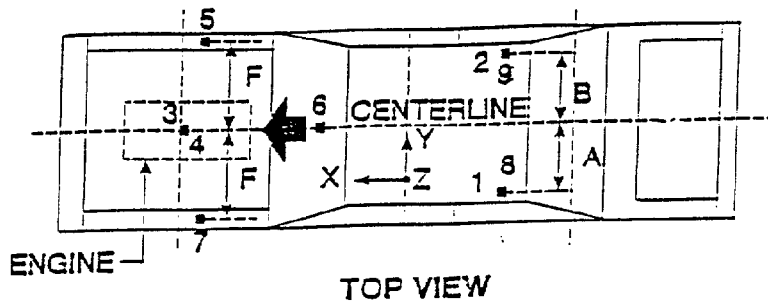
6 Groupings (5 cells/group)



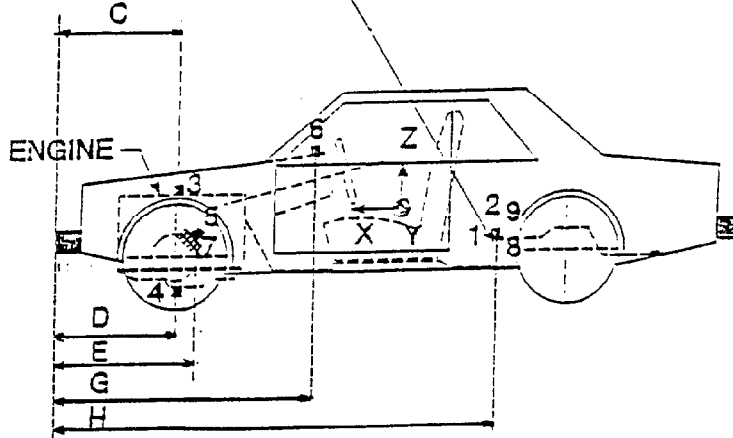
The following data is presented in Appendix B:

- (1) Total or Sum of 30 individual load cells
- (2) Data from 6 Groupings shown above (5 cells/group)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



Units: (mm)

Dimension	Length
A	610
B	597
C	965
D	762
E	940
F	940
G	1651
H	3137

ACCELEROMETER	ACCELEROMETER LOCATION	DIRECTIO
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

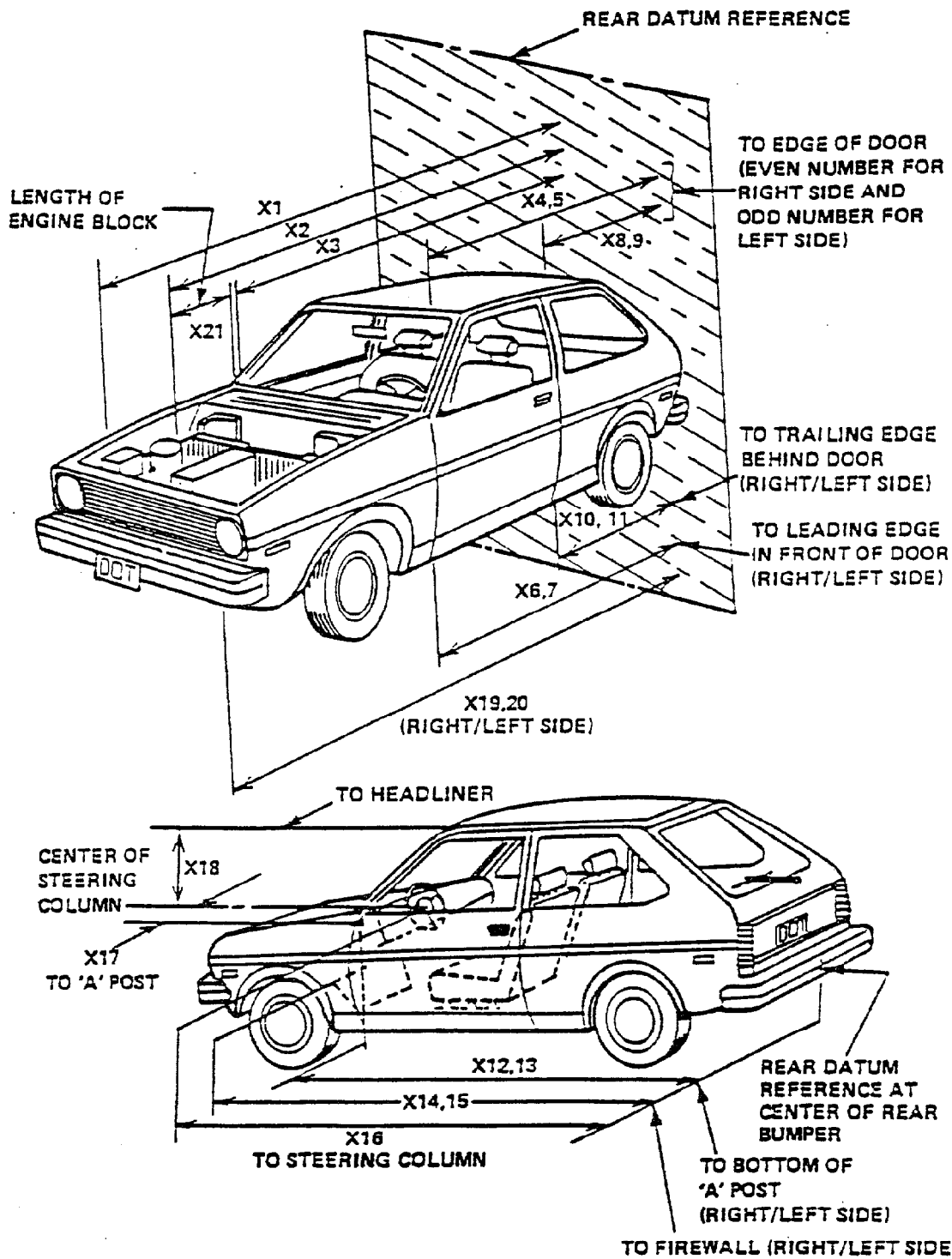
* The accelerometer pack number can be correlated with the vehicle response data traces in Appendix B.

TEST VEHICLE MEASUREMENTS

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4781	4234	547
X2	Rear Surface of Vehicle to Front of Engine	3997	3640	357
X3	Rear Surface of Vehicle to Firewall	3471	3343	128
X4	Rear Surface to Upr. Leading Edge of Rt. Door	3174	3168	6
X5	Rear Surface to Upr. Leading Edge of Left Door	3181	3175	6
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	3183	3151	32
X7	Rear Surface to Lwr. Leading Edge of Left Door	3188	3158	30
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1871	1883	-12
X9	Rear Surface to Upr. Trailing Edge of Left Door	1873	1878	-5
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1841	1820	21
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1842	1829	13
X12	Rear Surface to Bottom of 'A' Post on Rt. Side	3208	3187	21
X13	Rear Surface to Bottom of 'A' Post on Left Side	3210	3179	31
X14	Rear Surface to Firewall on Right Side	3408	3353	55
X15	Rear Surface to Firewall on Left Side	3391	3370	21
X16	Rear Surface to Steering Column	2733	2686	47
X17	Center of Steering Column to 'A' Post	345	290	55
X18	Center of Steering Column to Headlining	394	301	93
X19	Rear Surface to Right Side of Front Bumper	4534	4051	483
X20	Rear Surface to Left Side of Front Bumper	4534	4113	421
X21	Length of Engine Block	440	440	0

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

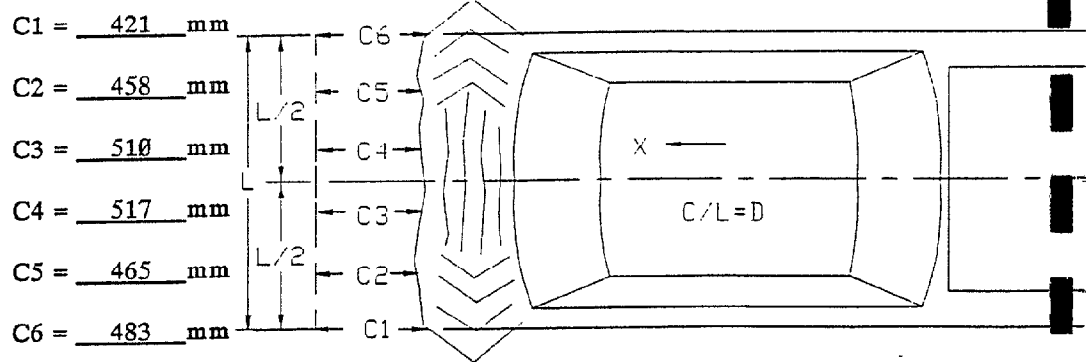
VEHICLE MAKE/MODEL/BODY STYLE: Oldsmobile Achieva 2-Door
 VEH. NHTSA NO.: MR0107 ; VIN: 1G3NL1530RM000821
 MODEL YEAR: 1994 ; BUILD DATE: 9-93 ; TEST DATE: 2-17-94
 VEH. SIZE CATEGORY: Mid Size ; TEST WEIGHT: 1483.3 kg
 VEH. WHEELBASE: 2624 mm ; FRONT OVERHANG: 1143 mm ; OVERALL WIDTH: 1412 mm

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-13
 CALIBRATION PROCEDURE: As per MGA Calibration Procedure
 LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal
 VEH: IMPACT SPEED: 56.3 kph ; TIME OF SEPARATION: 148 msec
 VELOCITY CHANGE: 68 kph
 COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH
DIMENSIONS:



MIDPOINT OF
DAMAGE:

D = Vehicle Centerline
(Longitude)

LENGTH OF
DAMAGED REGION:

L = 1412 mm

APPENDIX A
PHOTOGRAPHS

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(Door Open)	
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(Door Open)	

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Photo No. A-34 - Pre-Test Passenger Seat Position View	A-34
Photo No. A-35 - Post-Test Passenger Seat Position View	A-35
Photo No. A-36 - Vehicle Certification	A-36
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Photo No. A-38 - Rollover 180°	A-38
Photo No. A-39 - Rollover 270°	A-39
Photo No. A-40 - Rollover 360°	A-40

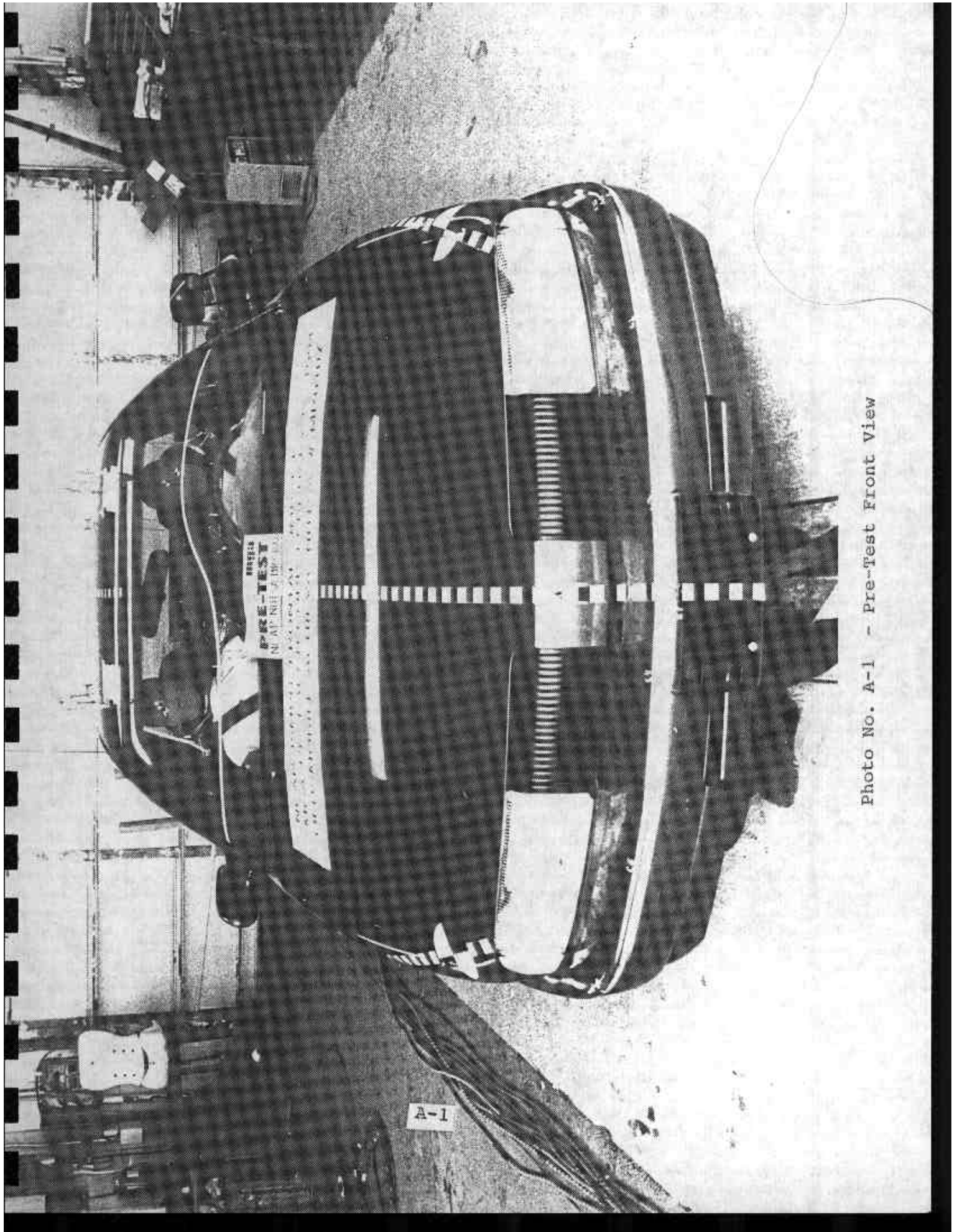


Photo No. A-1 - Pre-Test Front View

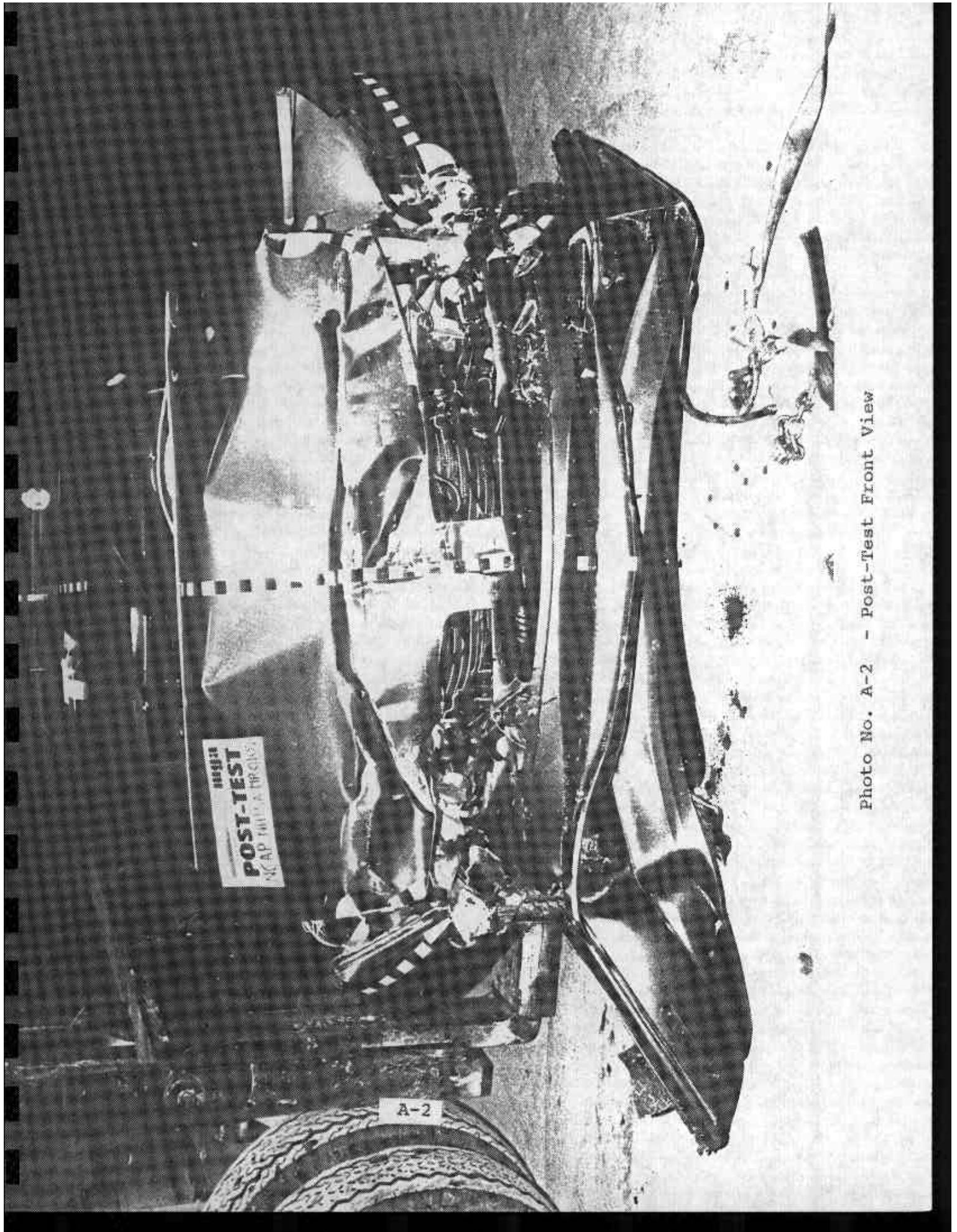


Photo No. A-2 - Post-Test Front View

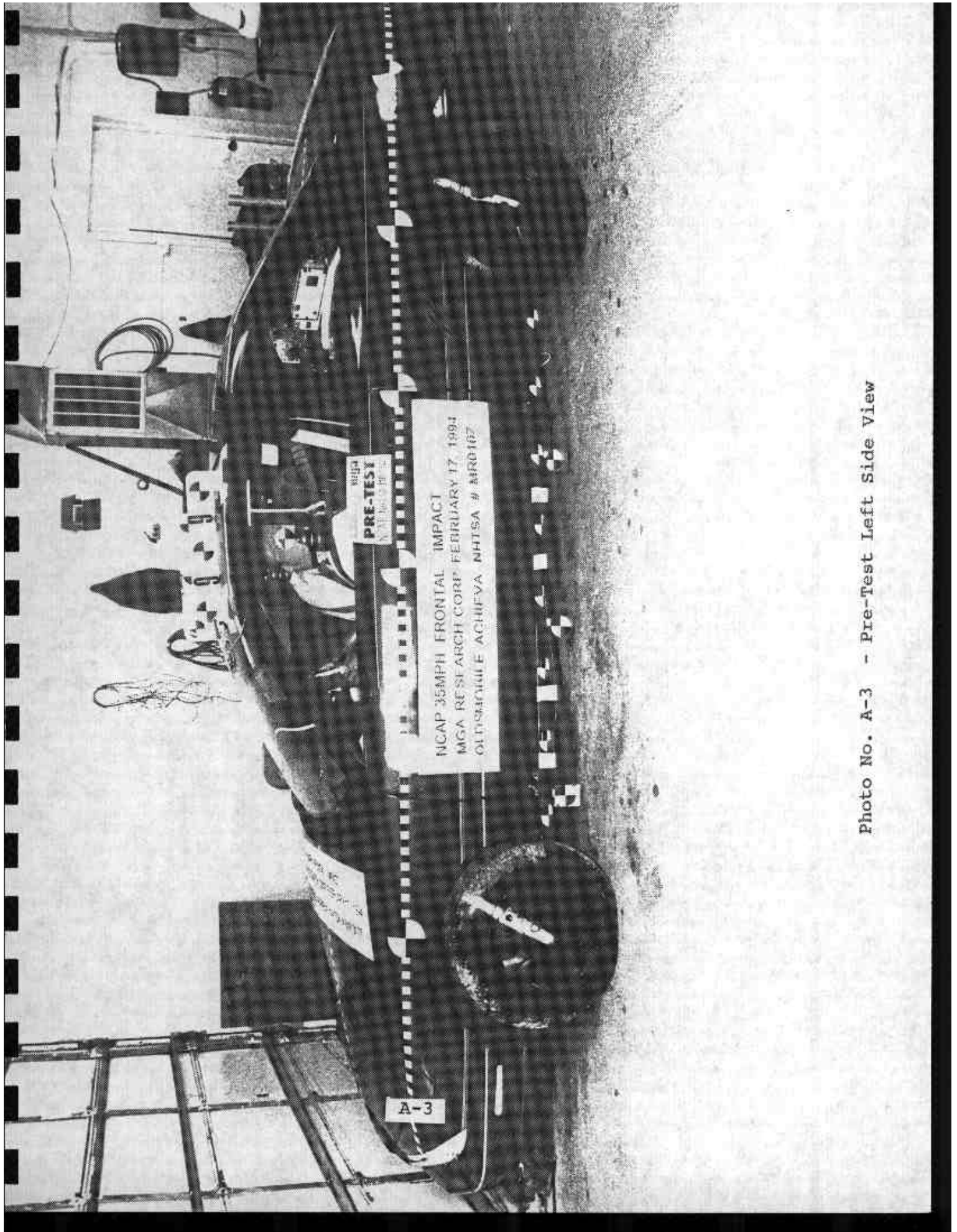


Photo No. A-3 - Pre-Test Left Side View

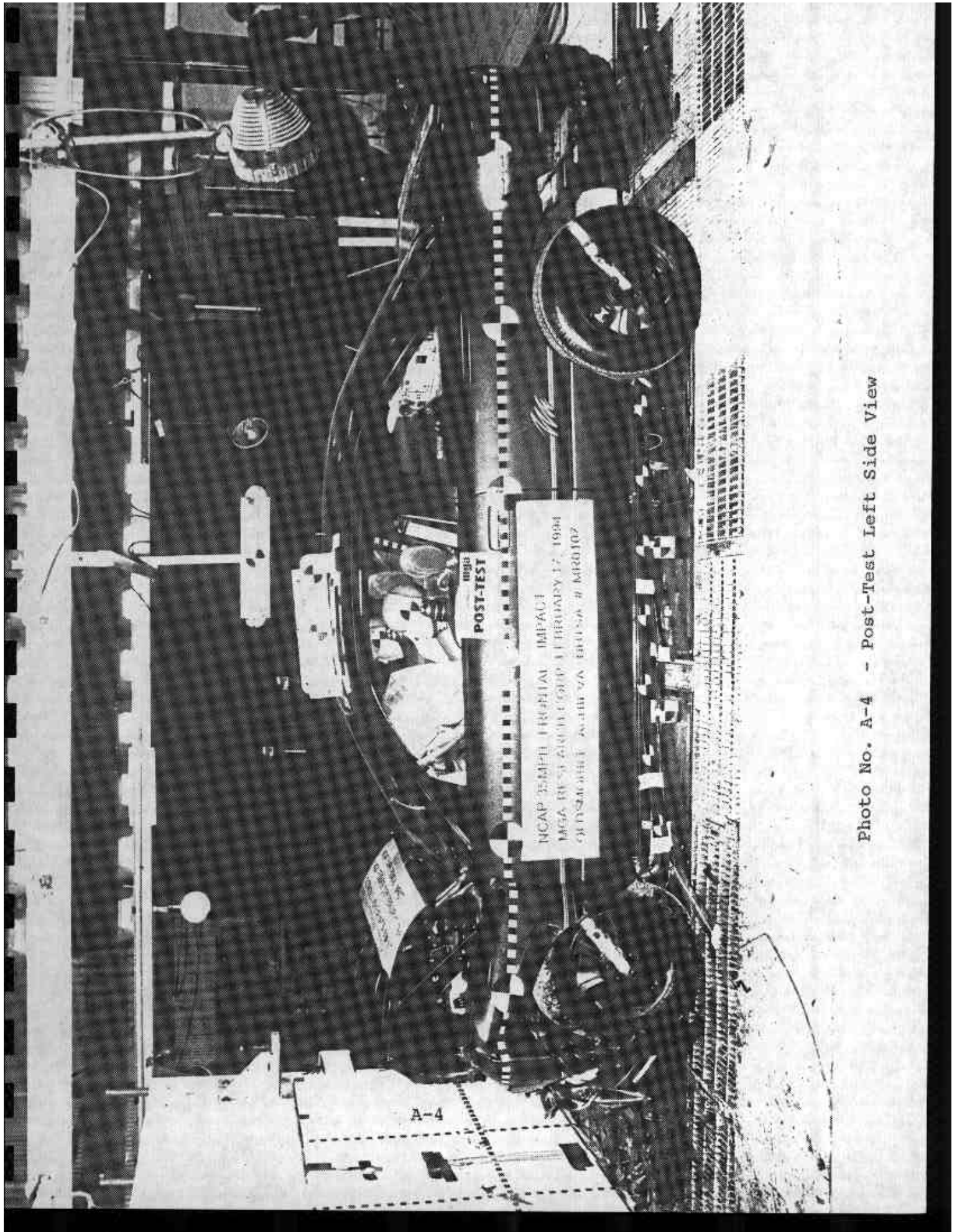


Photo No. A-4 - Post-Test Left Side View

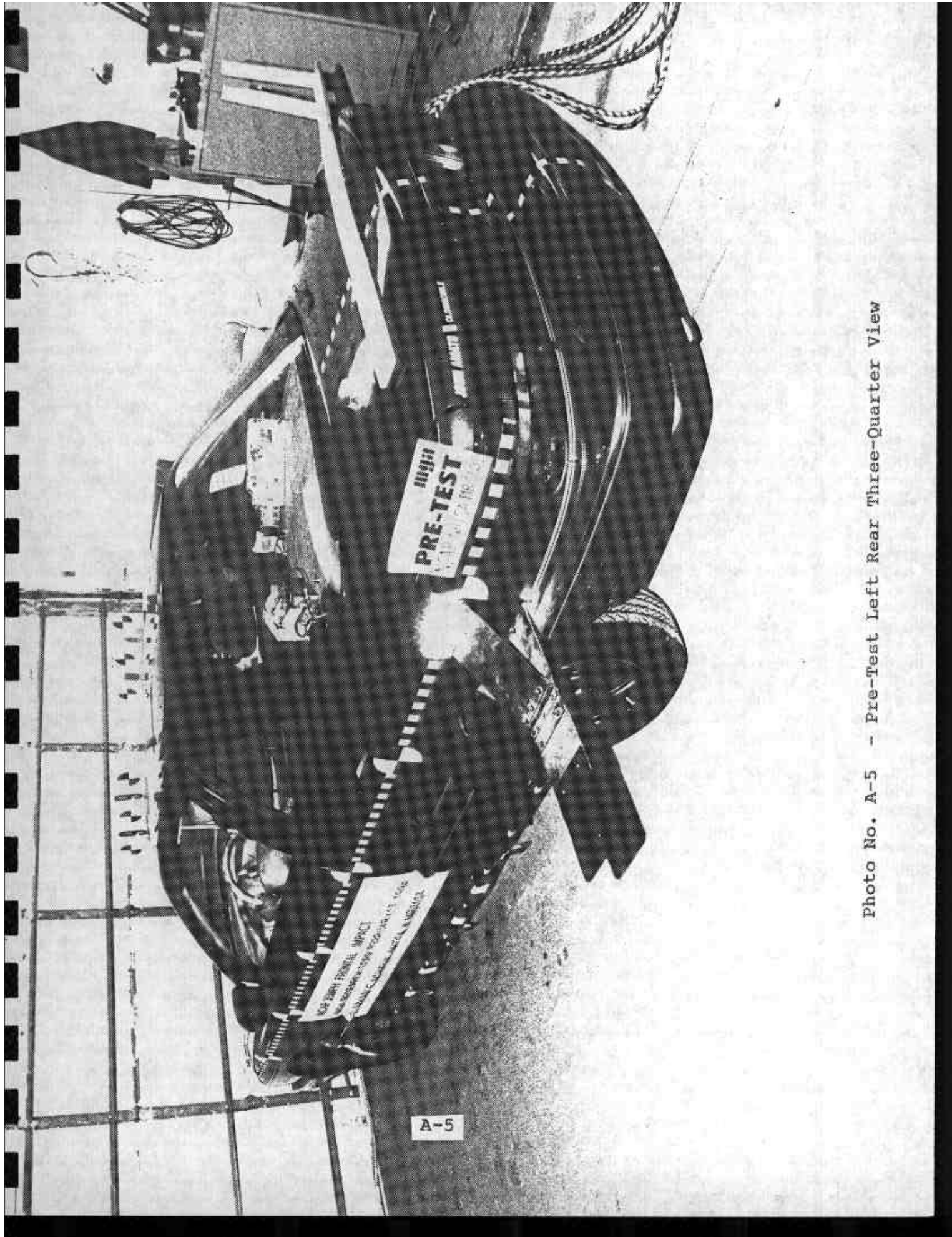


Photo No. A-5 - Pre-Test Left Rear Three-Quarter View

A-5

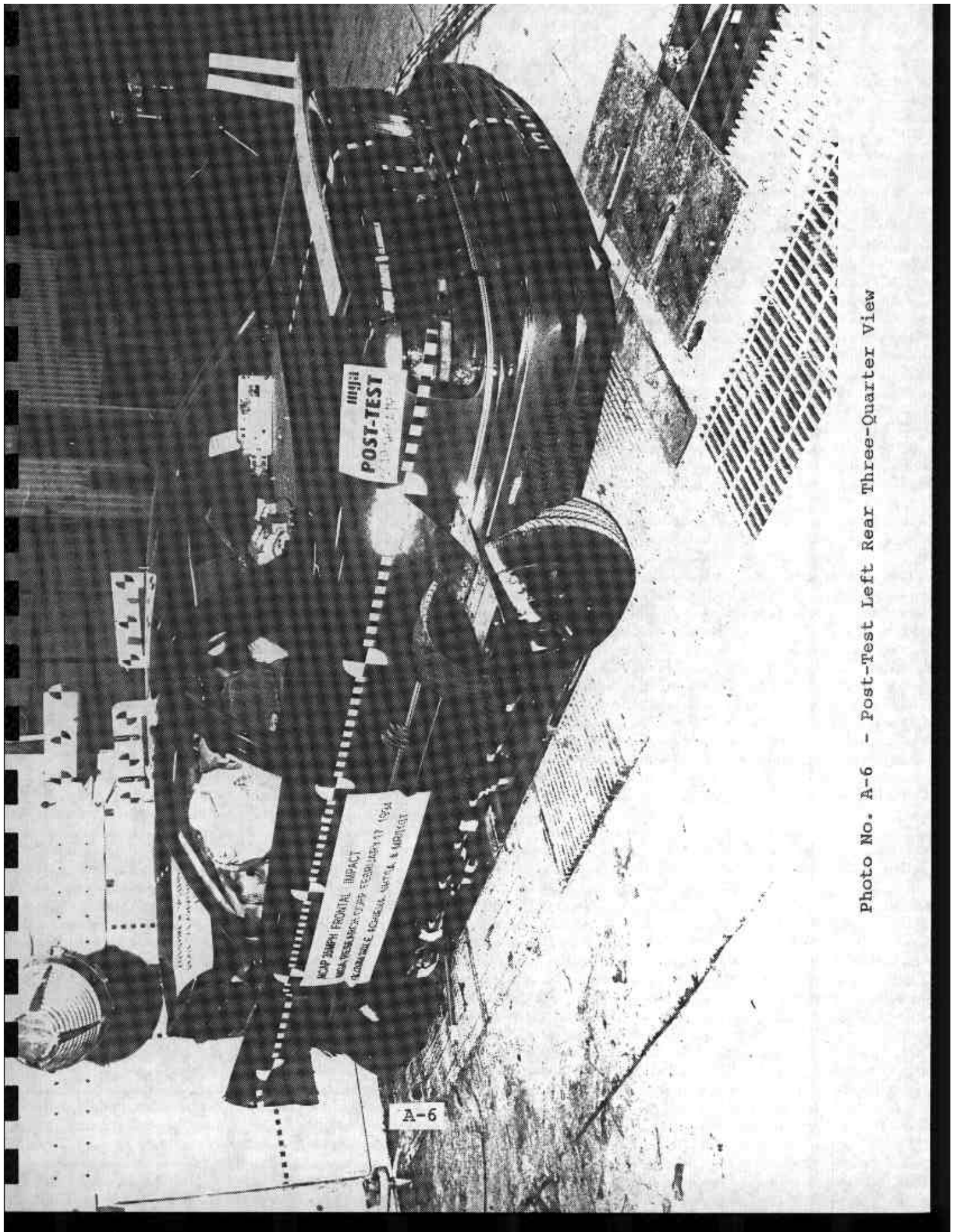


Photo No. A-6 - Post-Test Left Rear Three-Quarter View

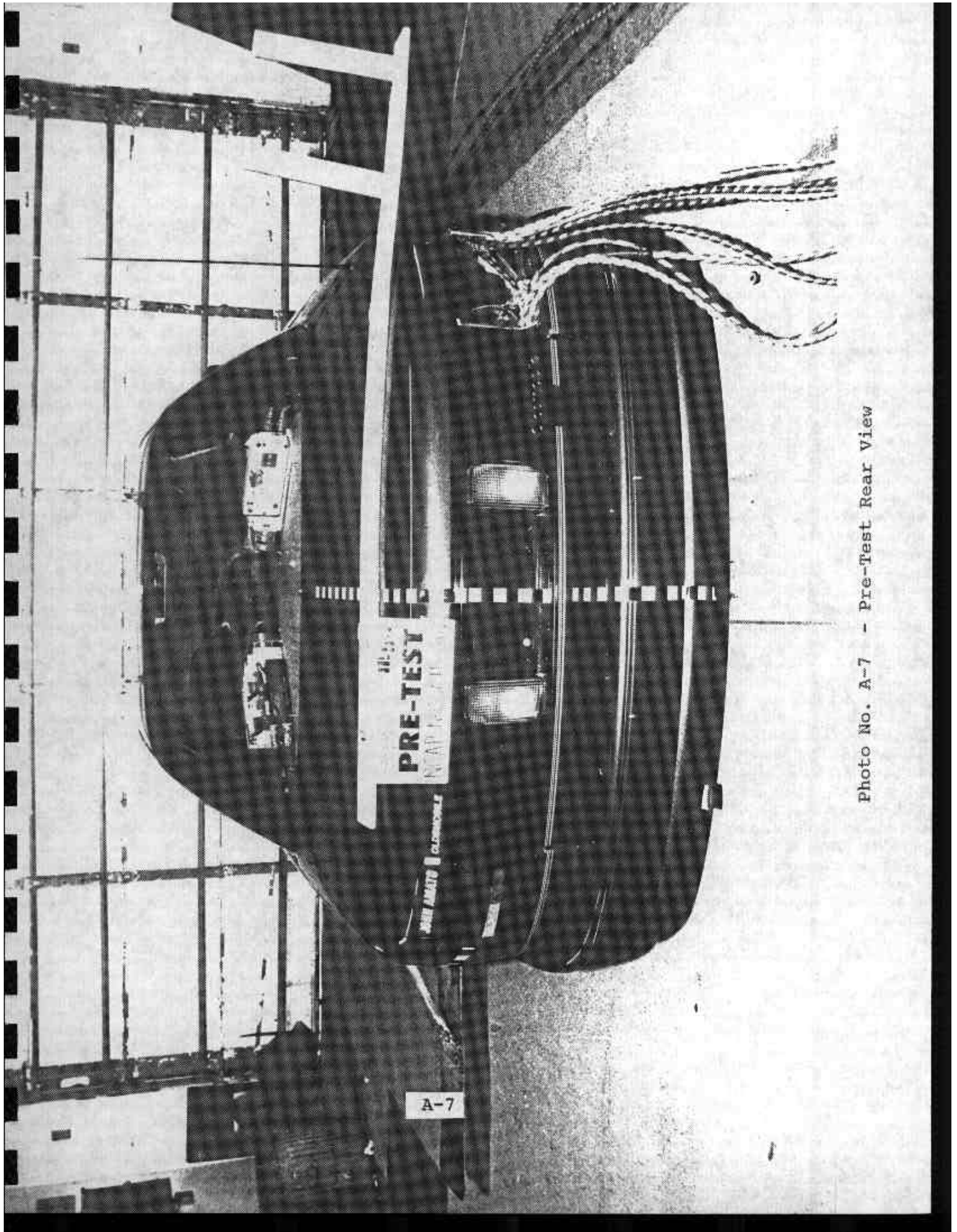
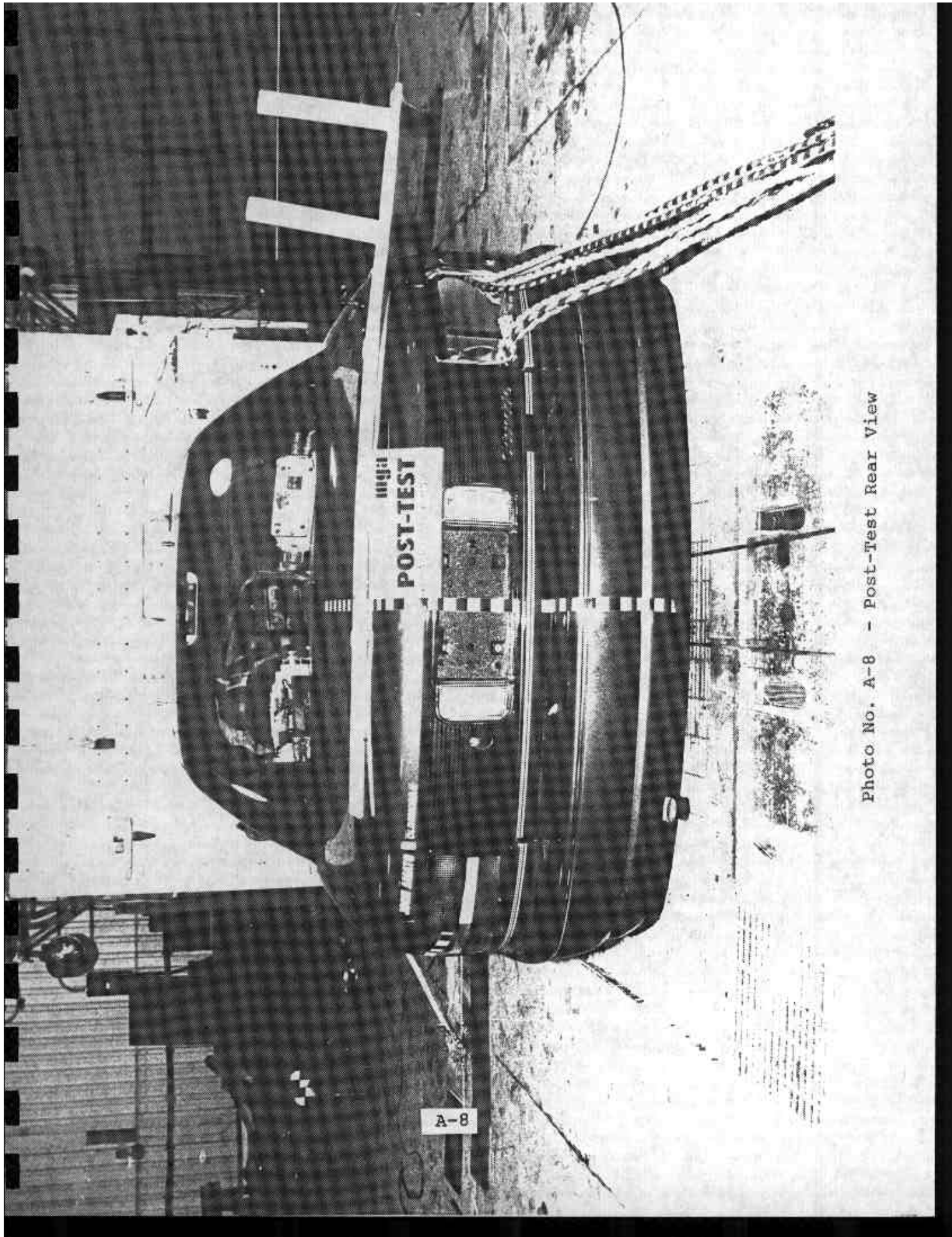


Photo No. A-7 - Pre-Test Rear View

A-7



A-8

Photo No. A-8 - Post-Test Rear View

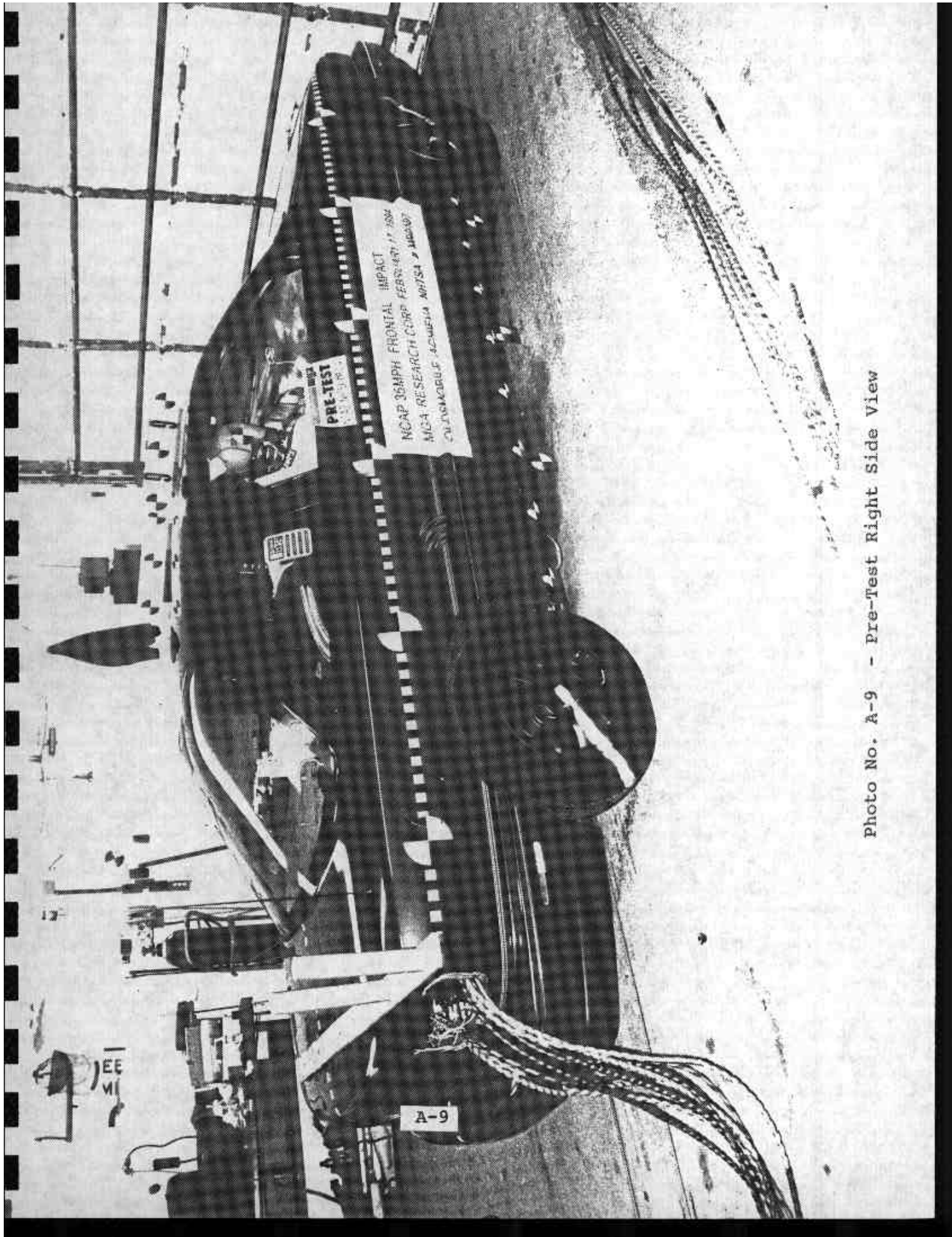


Photo No. A-9 - Pre-Test Right Side View

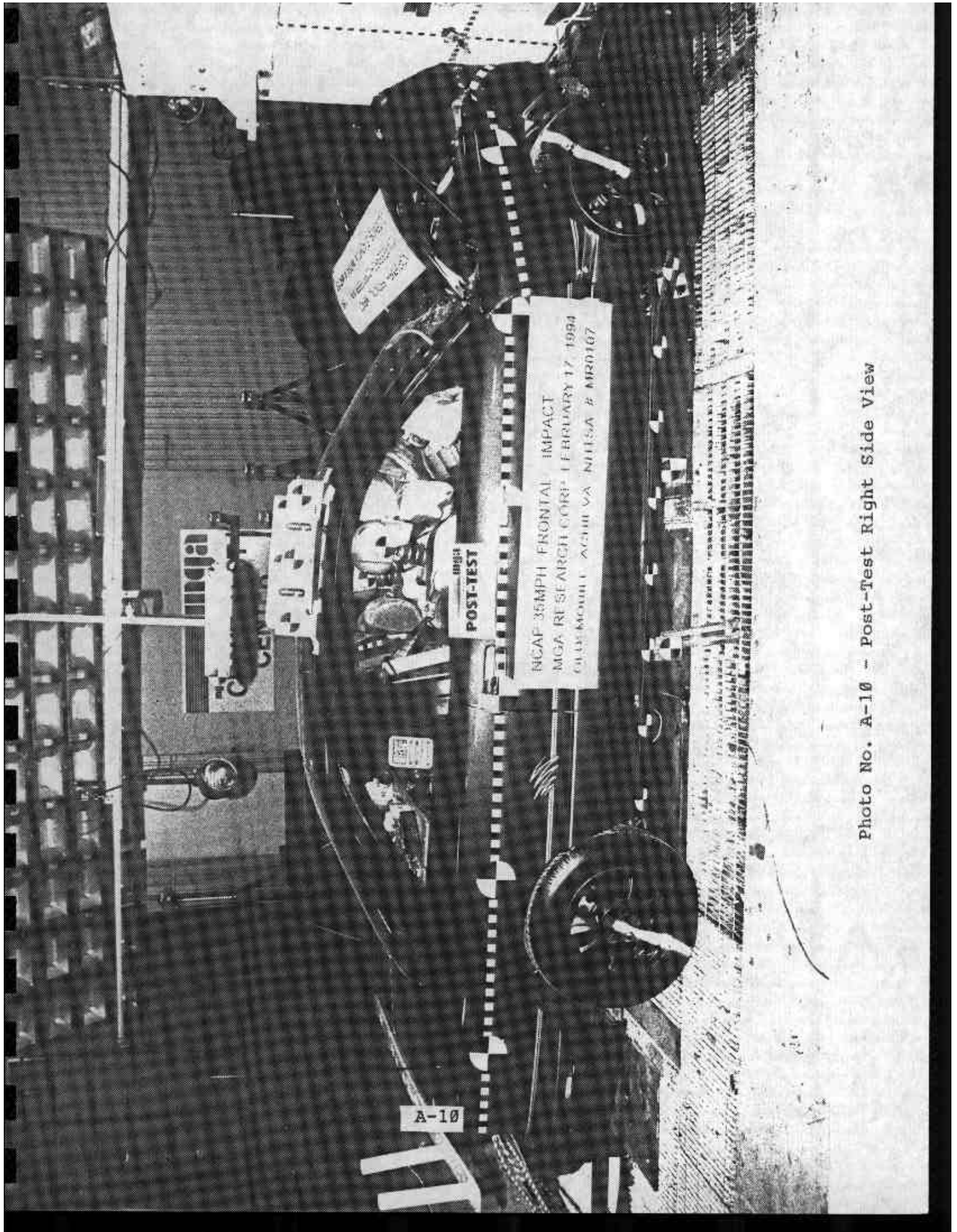


Photo No. A-10 - Post-Test Right Side View

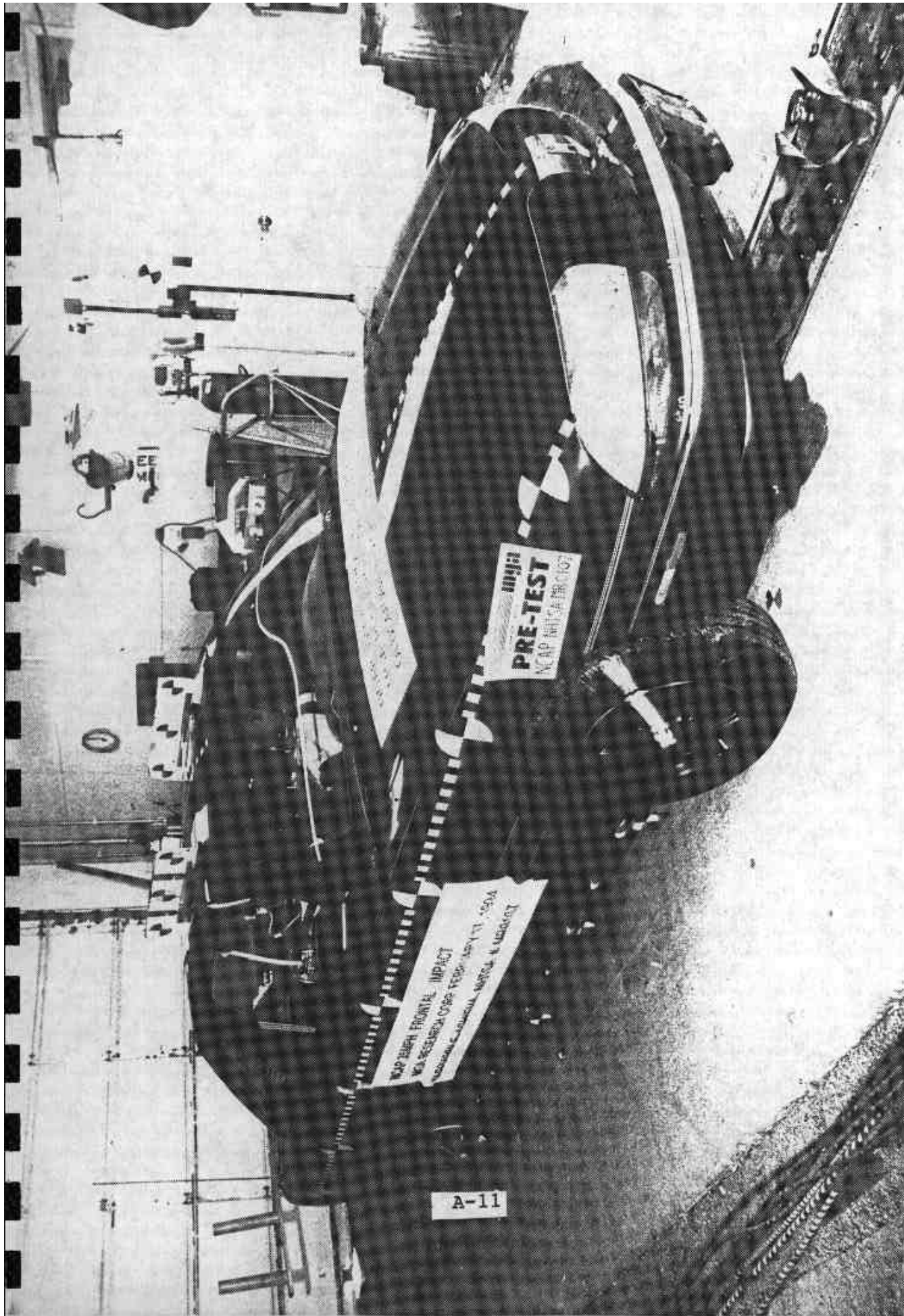
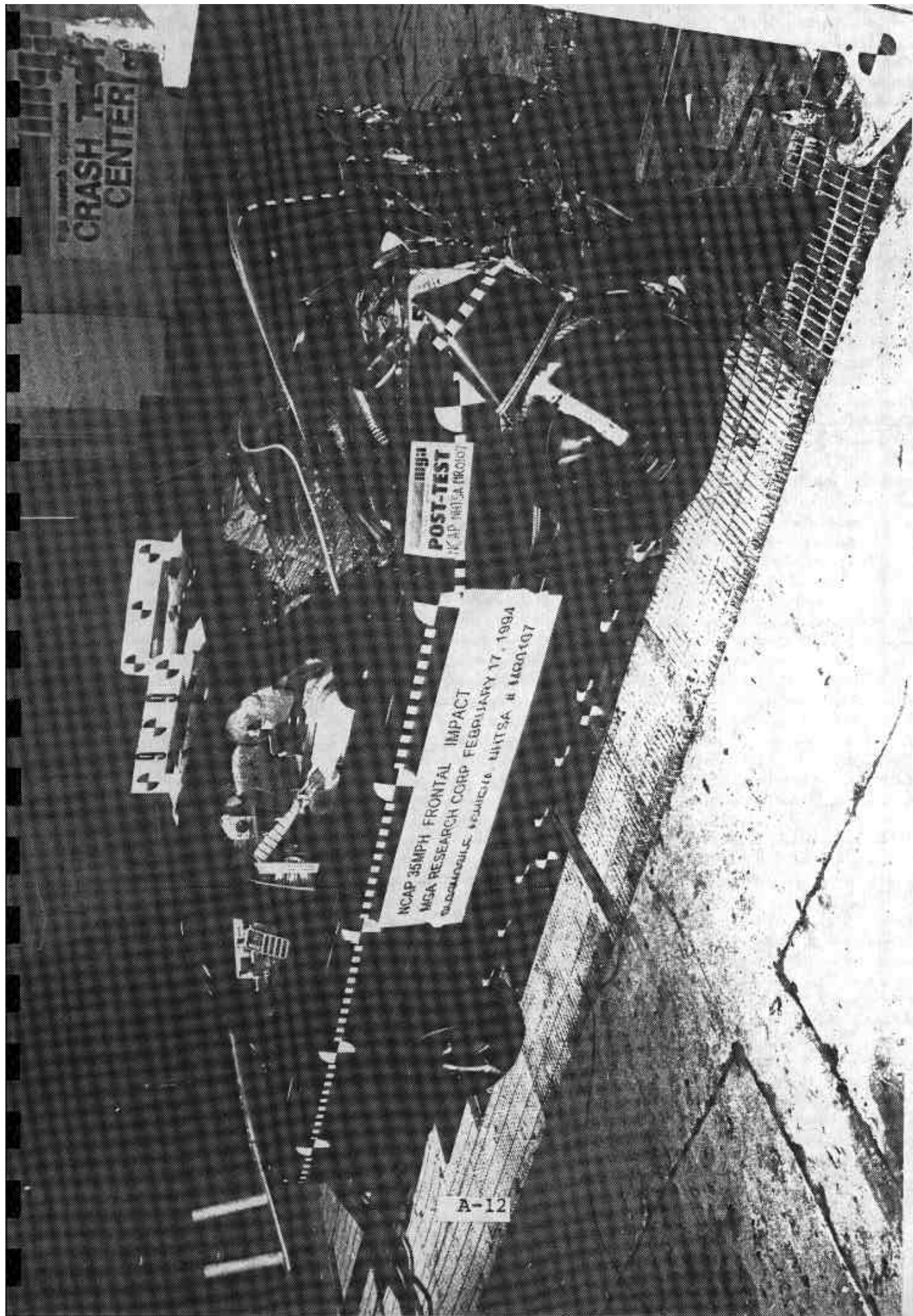


Photo No. A-11 - Pre-Test Right Front Three-Quarter View



For research information
**CRASH TEST
CENTER**

POST-TEST
HEAD IMPACT PROJECT

NCAP 35MPH FRONTAL IMPACT
MSA RESEARCH CORP. FEBRUARY 17, 1994
BIRMINGHAM, ALABAMA VEHICLE #11TSA # 1400187

A-12

Photo No. A-12 - Post-Test Right Front Three-Quarter View

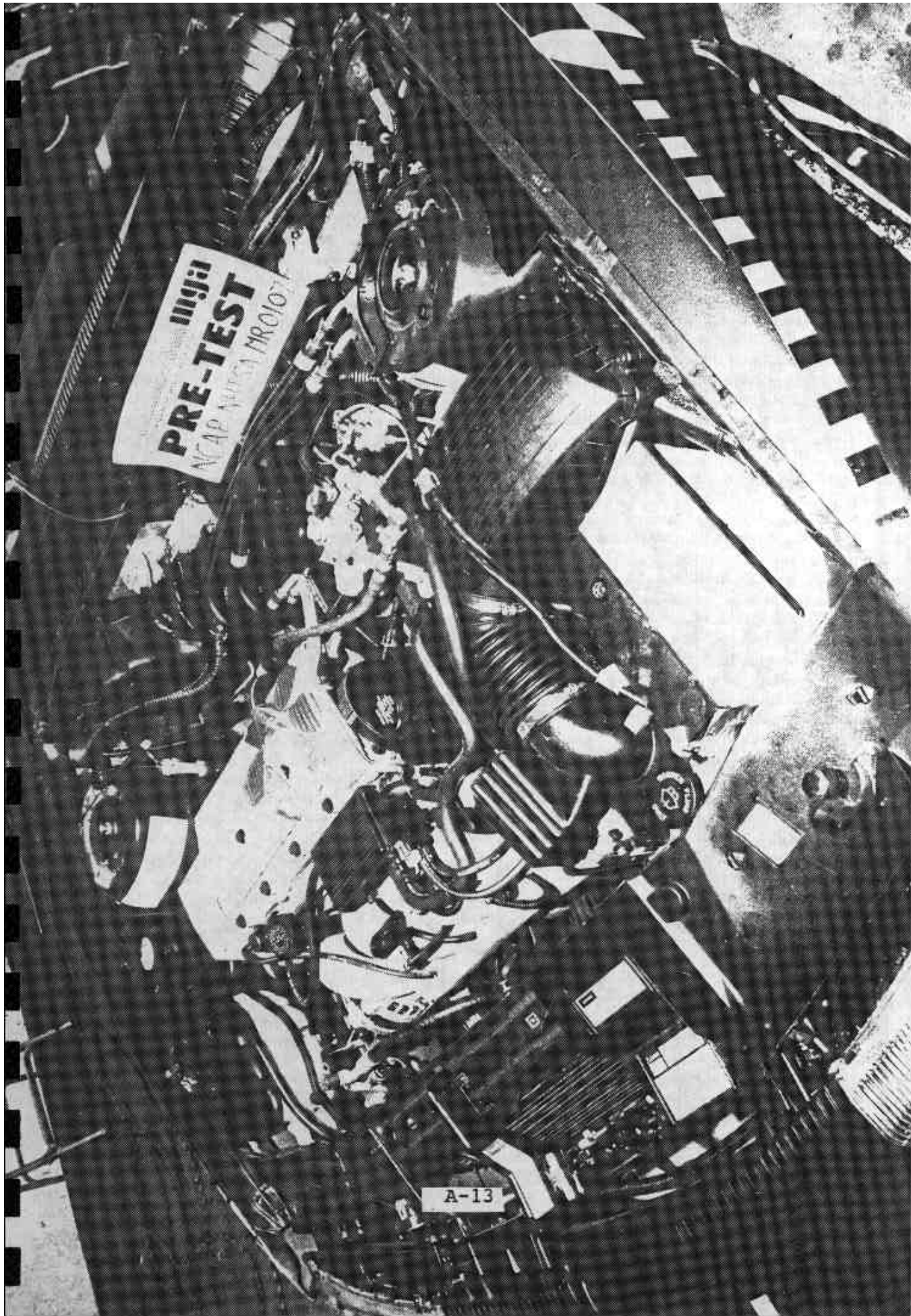


Photo No. A-13 - Pre-Test Engine Compartment View

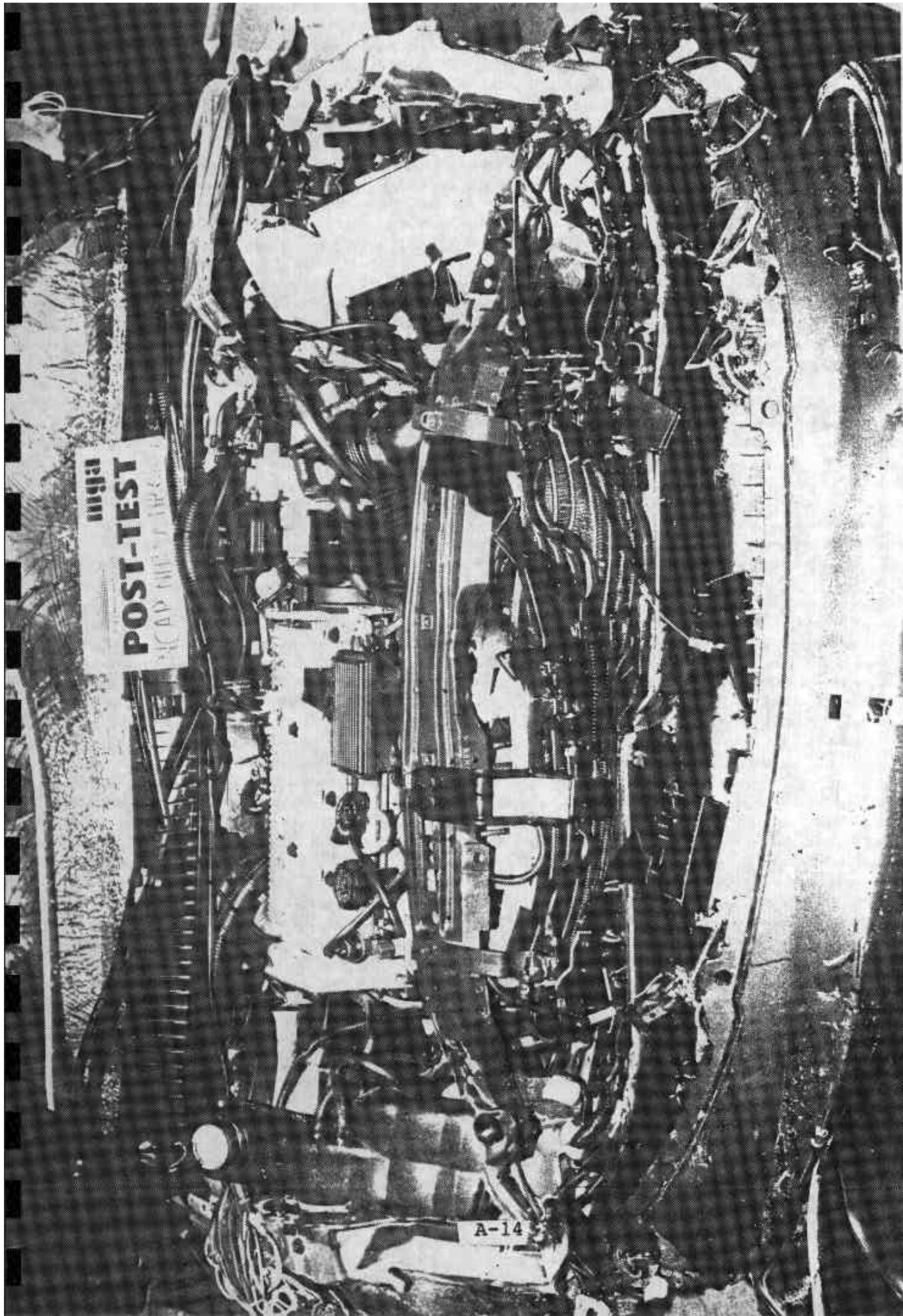


Photo No. A-14 - Post-Test Engine Compartment View

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Corporation
PRE-TEST
NCAP NHI SA TIROLO

A-15

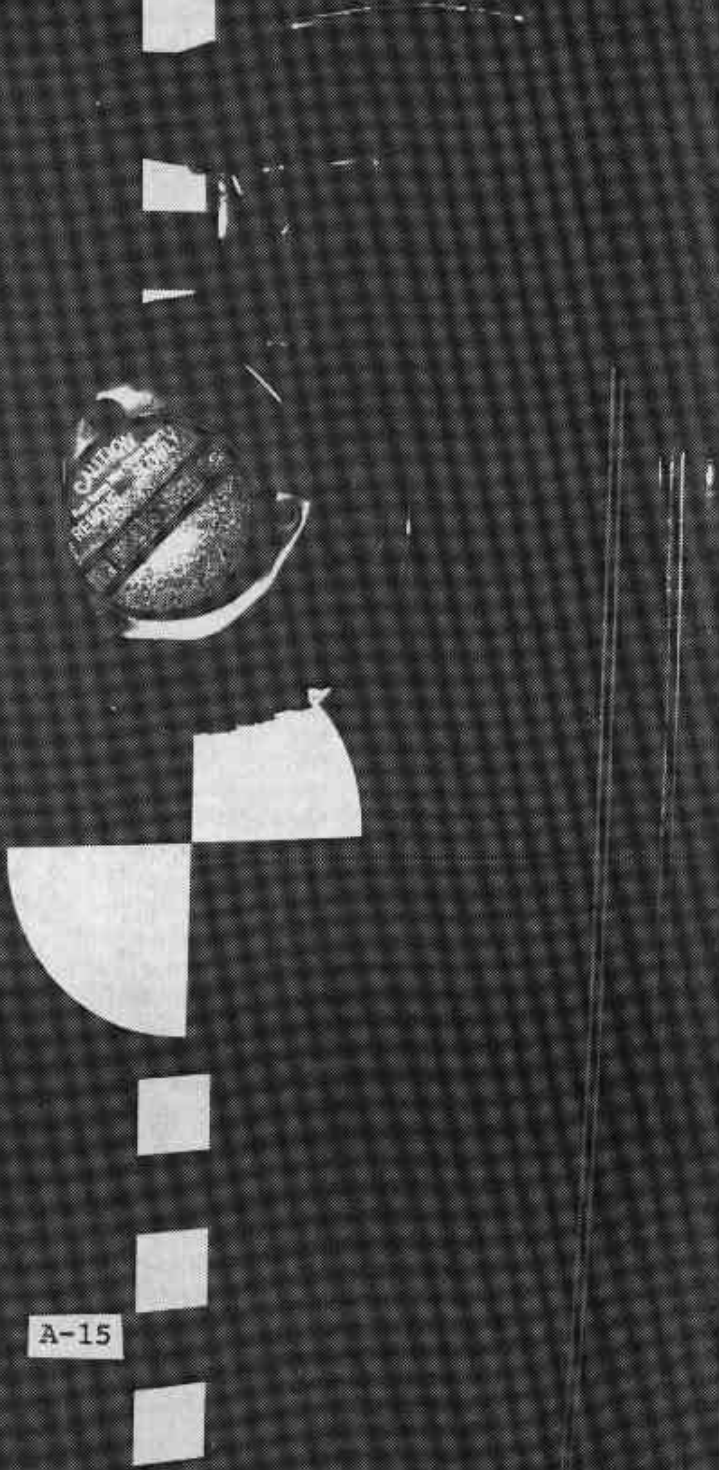


Photo No. A-15 - Pre-Test Fuel Filler Cap View

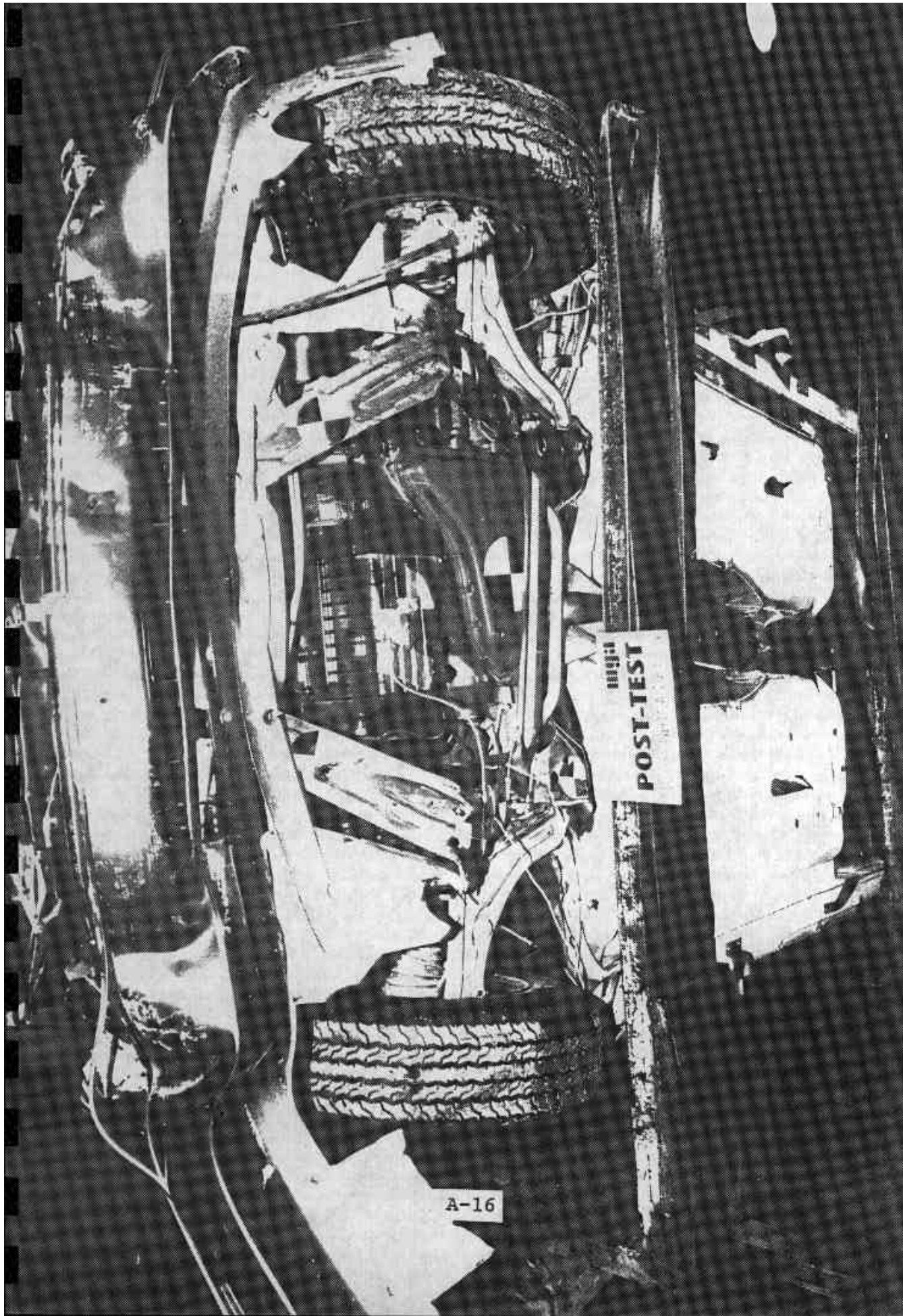
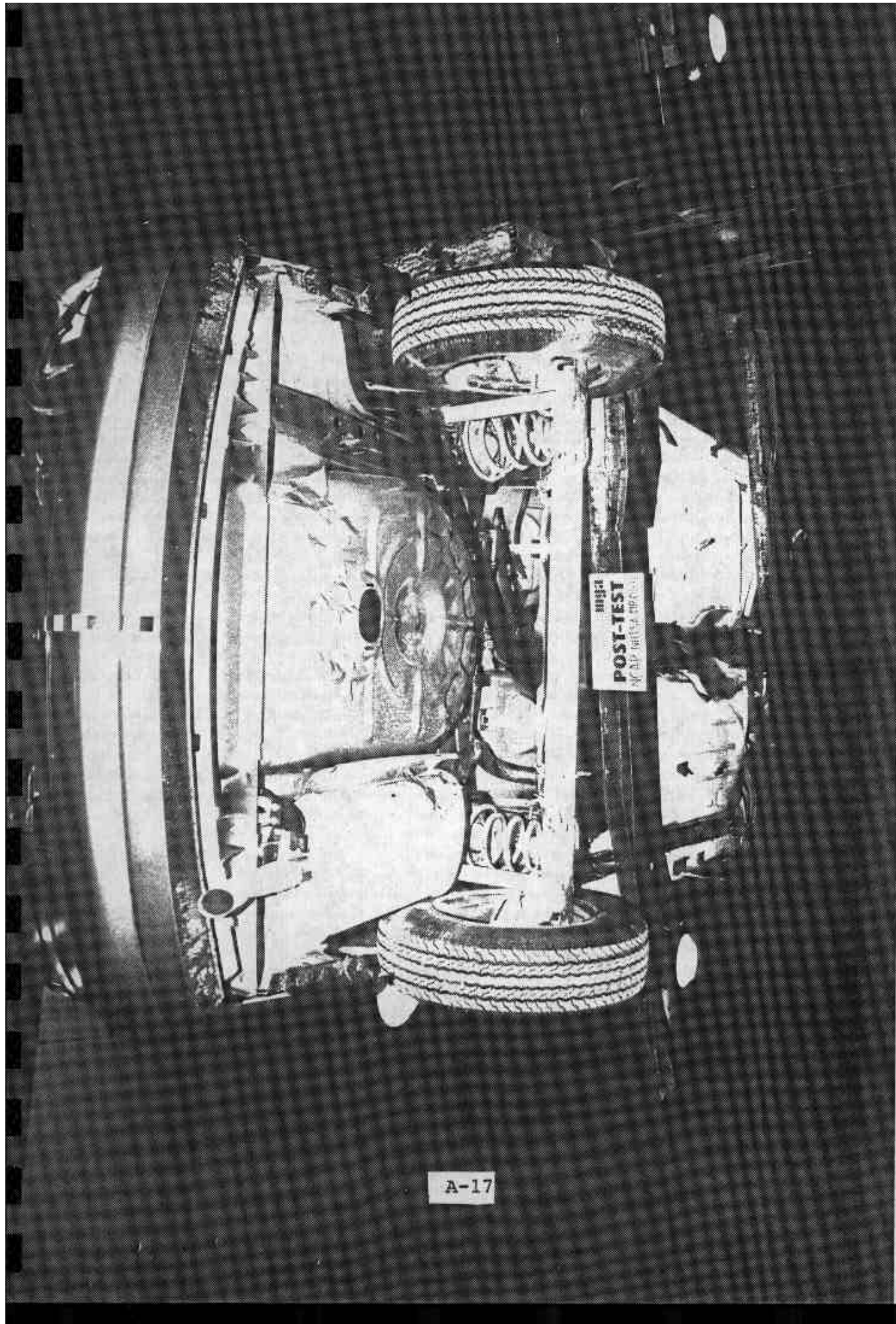
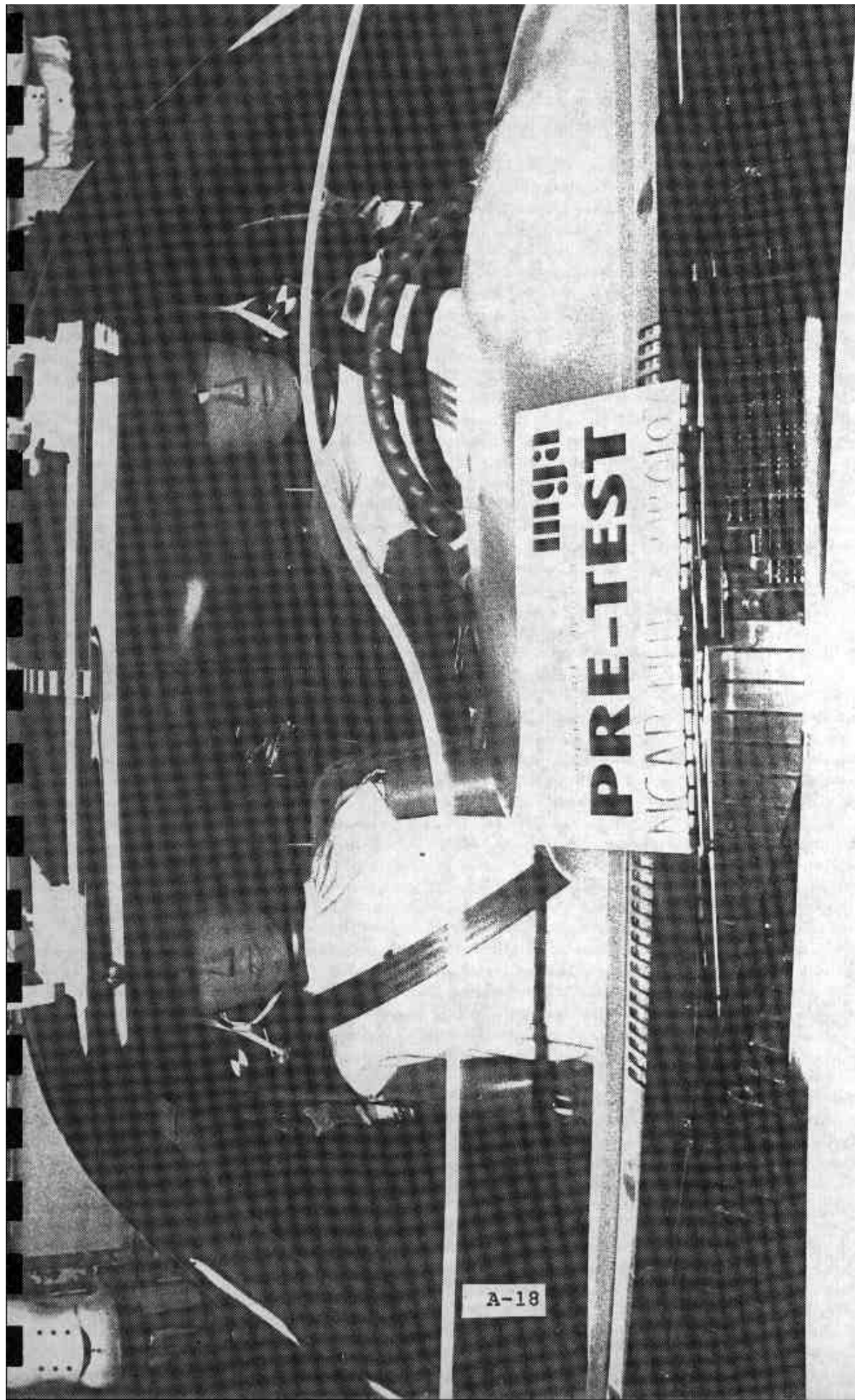


Photo No. A-16 - Post-Test Front Underbody View



A-17

Photo No. A-17 - Post-Test Rear Underbody View

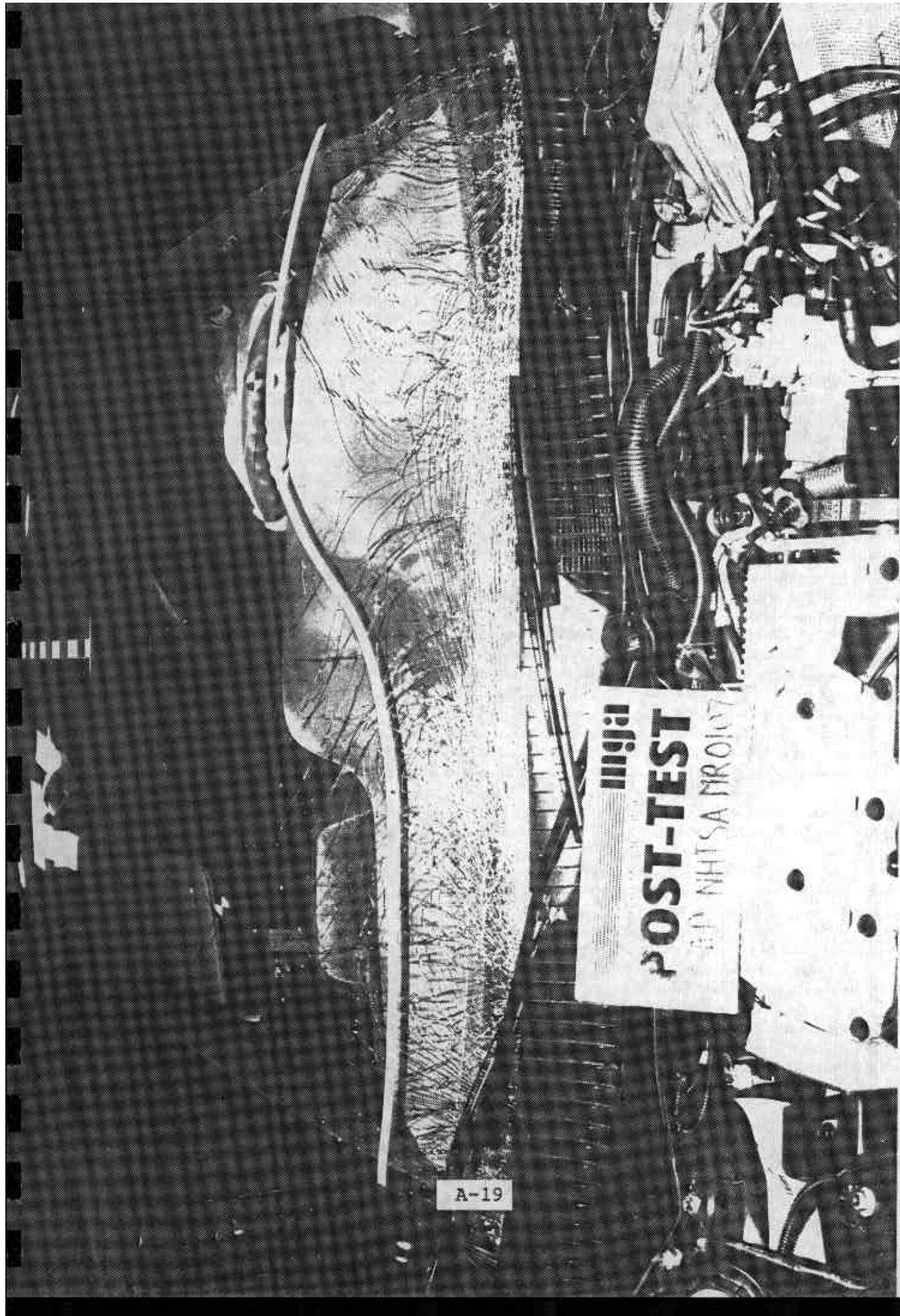


A-18

PRE-TEST
NICAD

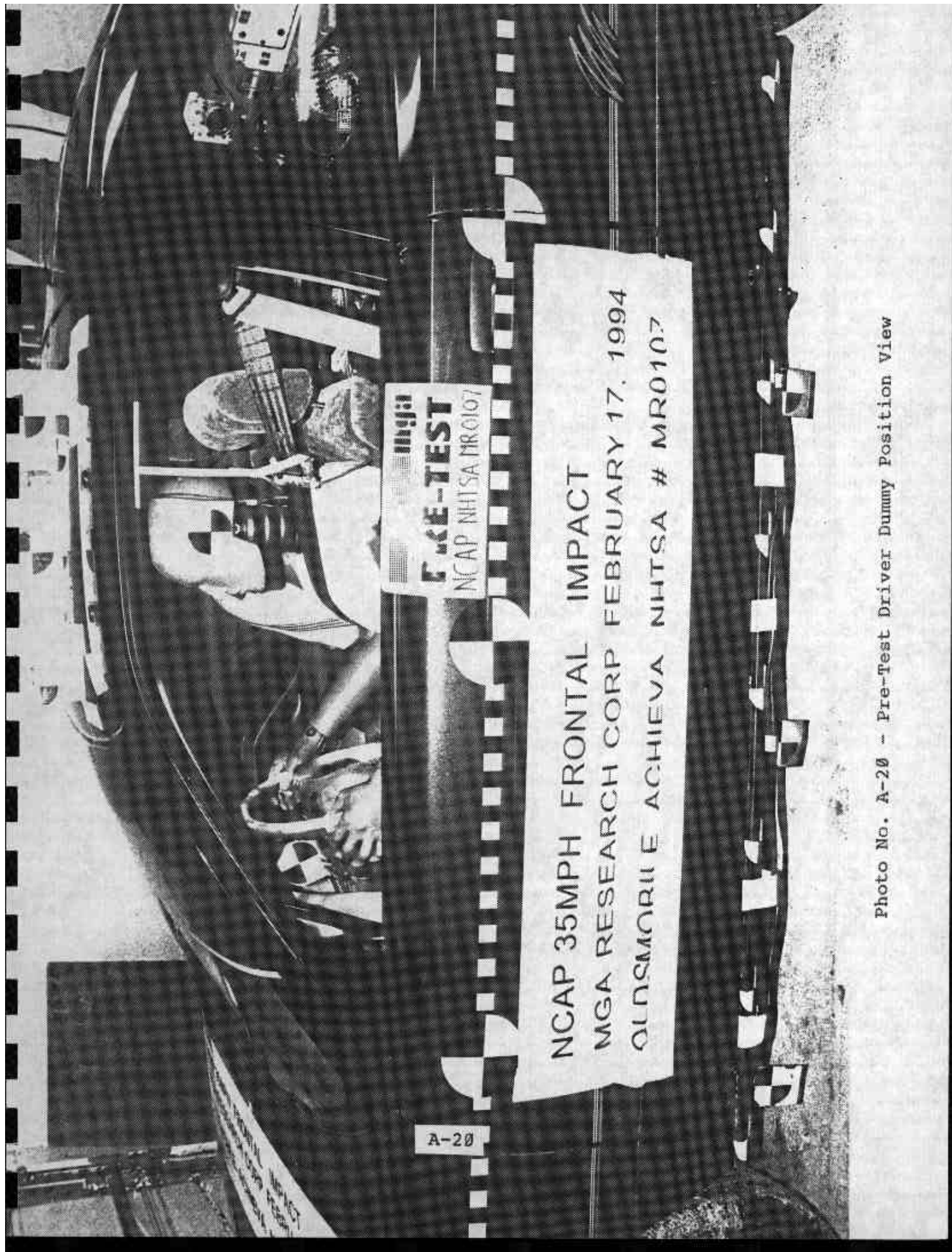
35MPH FRONTAL IMPACT

Photo No. A-18 - Pre-Test Windshield View



A-19

Photo No. A-19 - Post-Test Windshield View

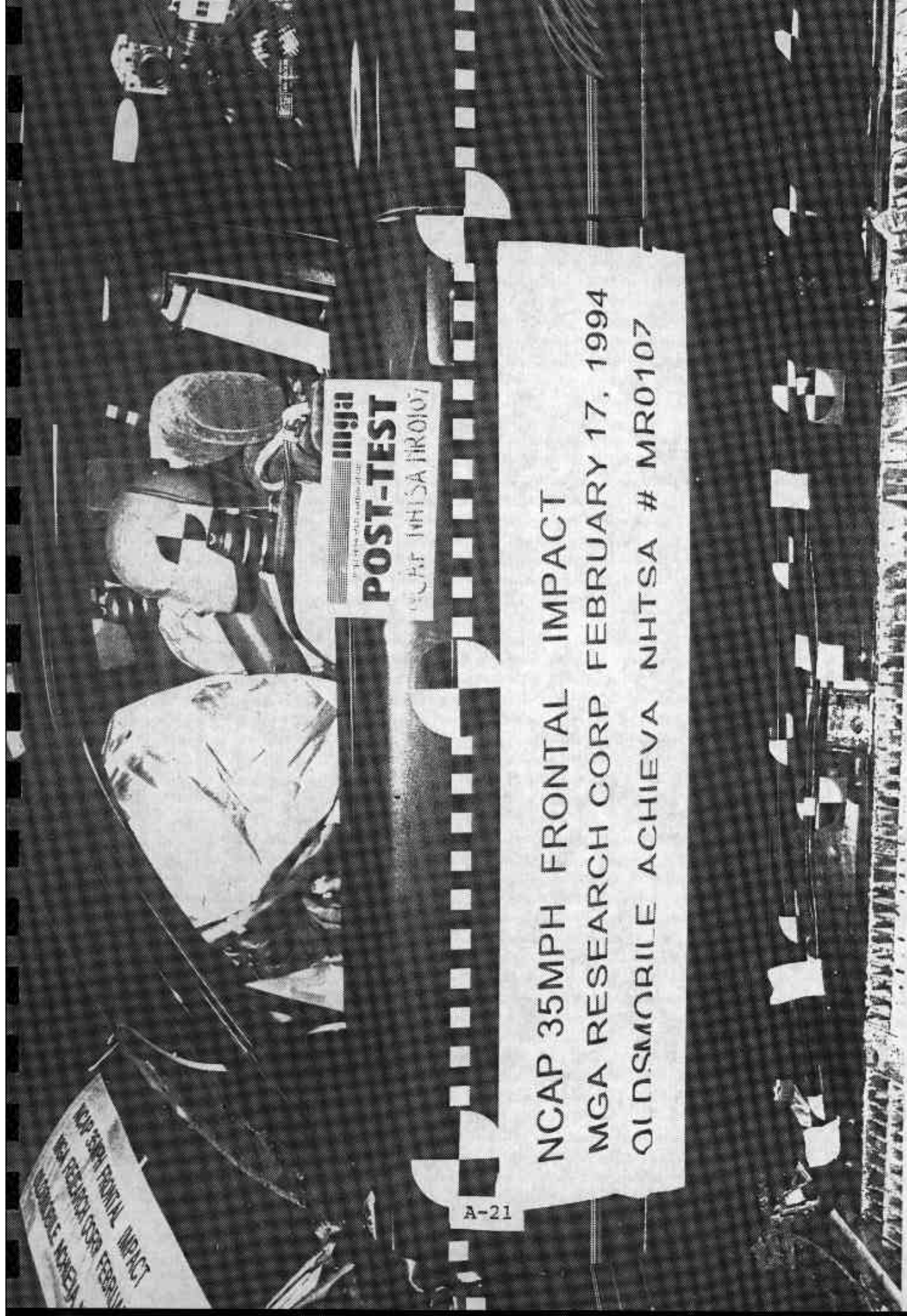


A-20

PRE-TEST
NCAP NHTSA MR0107

NCAP 35MPH FRONTAL IMPACT
MGA RESEARCH CORP FEBRUARY 17, 1994
OLDSMOBILE ACHIEVA NHTSA # MR0107

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



POST-TEST
NHTSA # MR0107

A-21

NCAP 35MPH FRONTAL IMPACT
MGA RESEARCH CORP FEBRUARY 17, 1994
OLDSMOBILE ACHIEVA NHTSA # MR0107

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

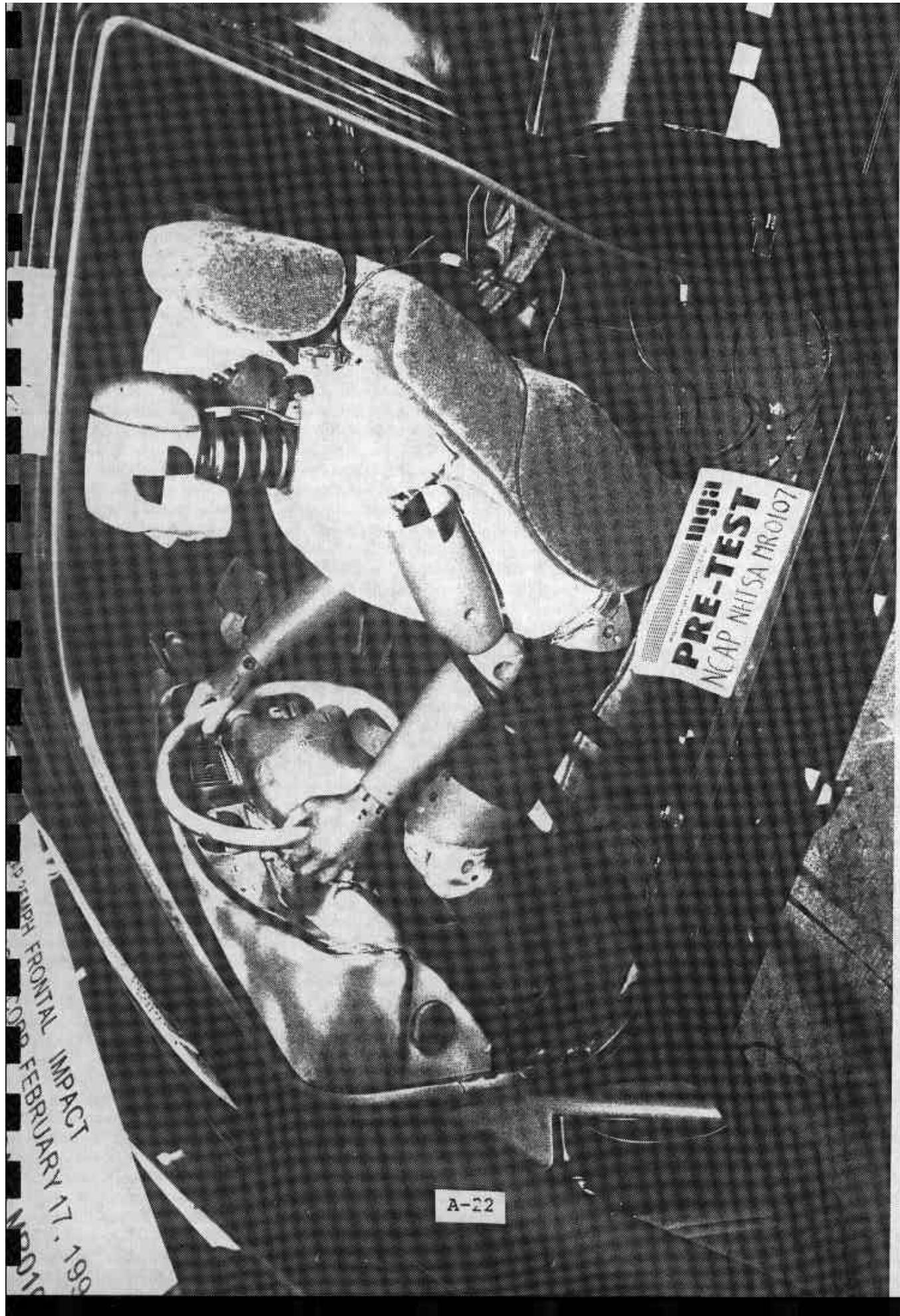


Photo No. A-22 - Pre-Test Driver Dummy Position View (Door Open)

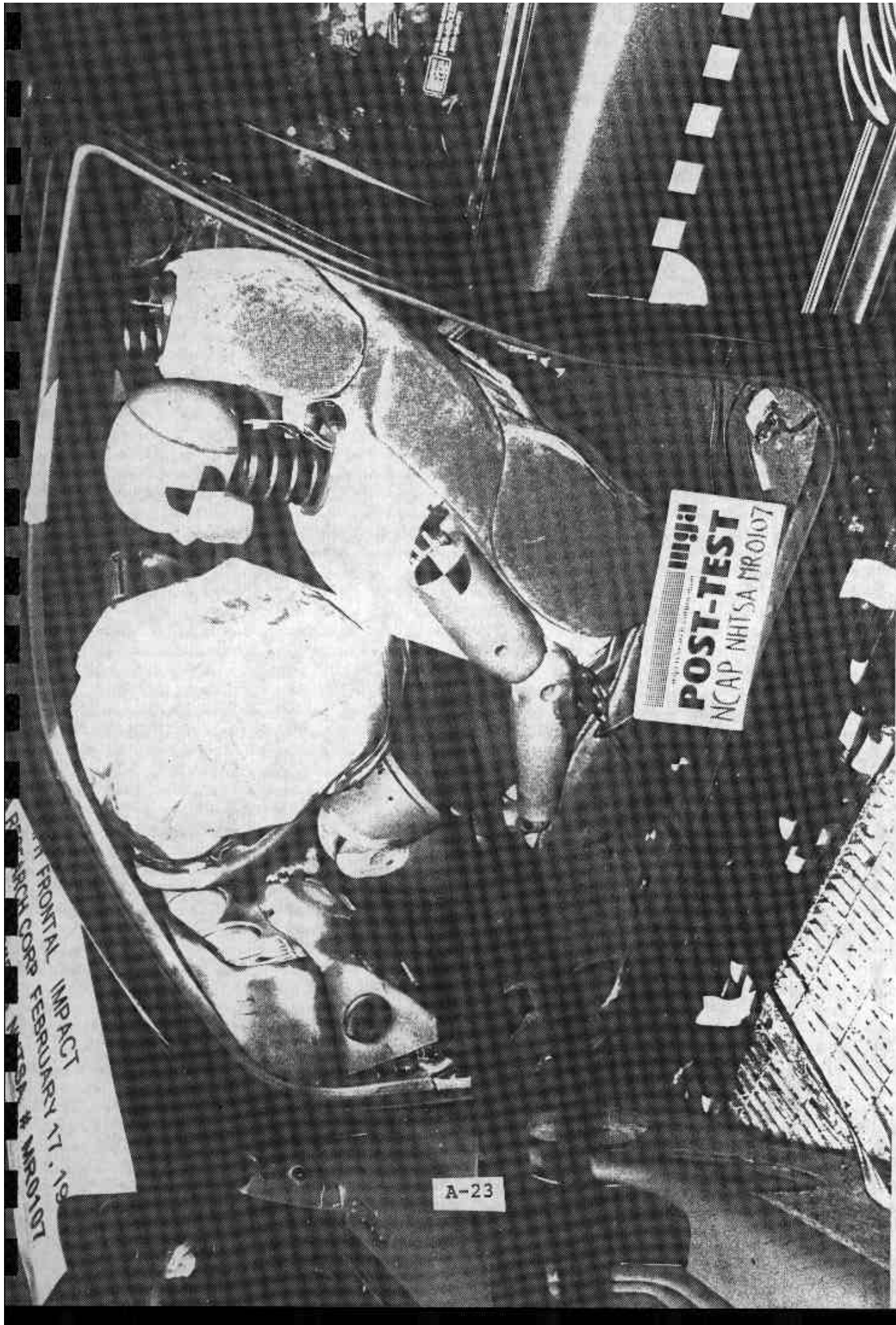
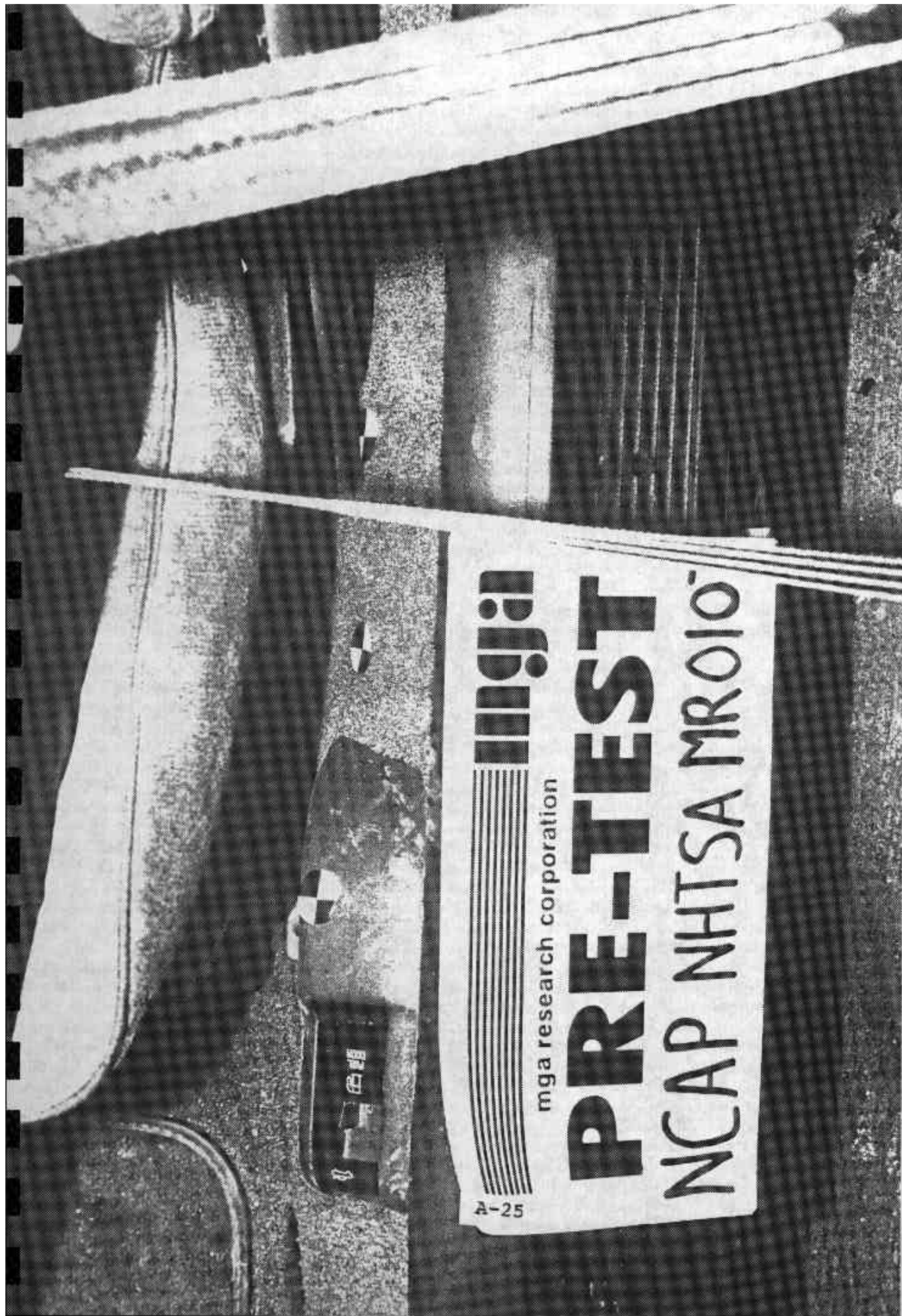


Photo No. A-23 - Post-Test Driver Dummy Position View (Door Open)



A-25



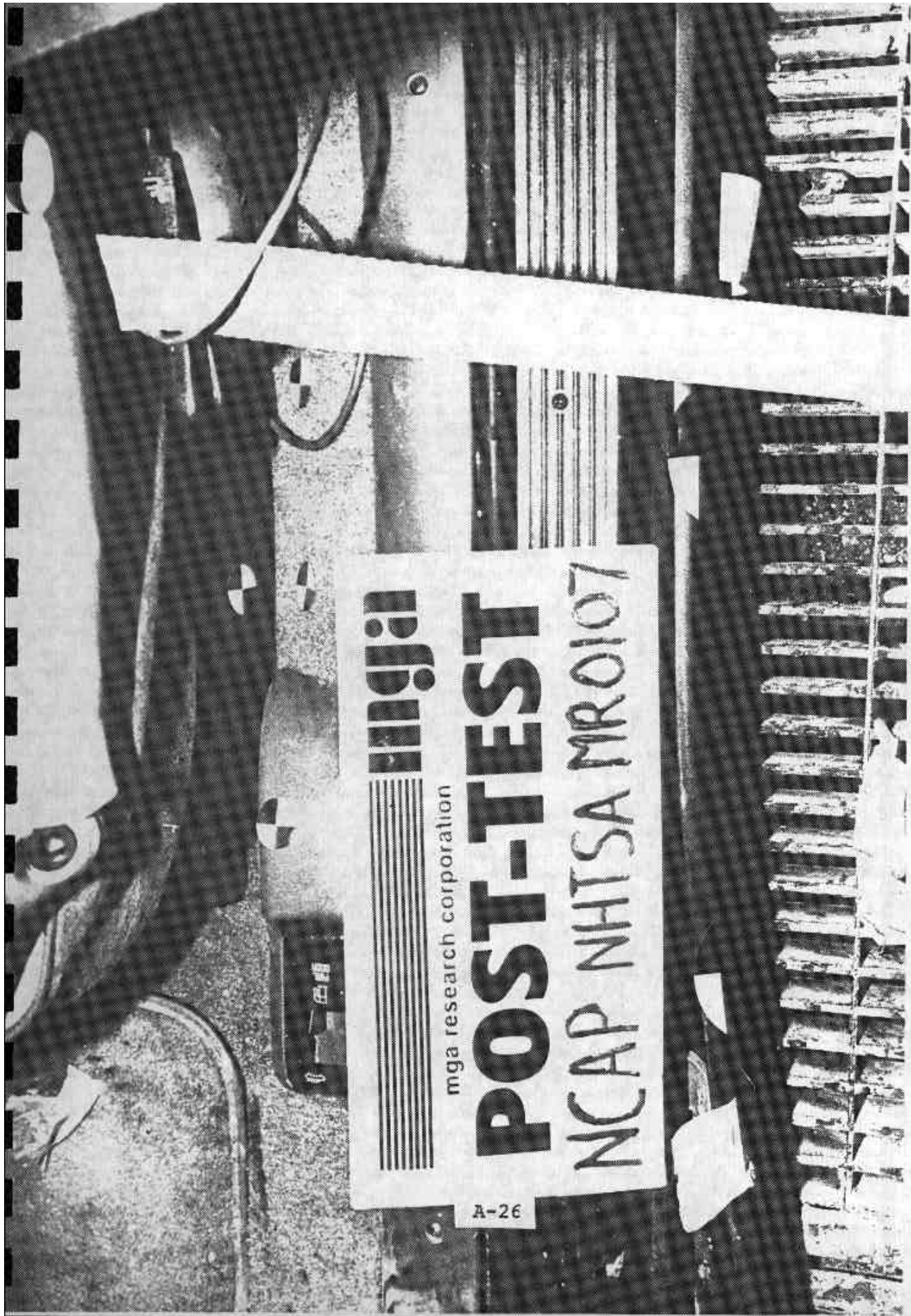
mga research corporation

mga

PRE-TEST

NCAP NHTSA MROIO

Photo No. A-25 - Pre-Test Driver Seat Position View

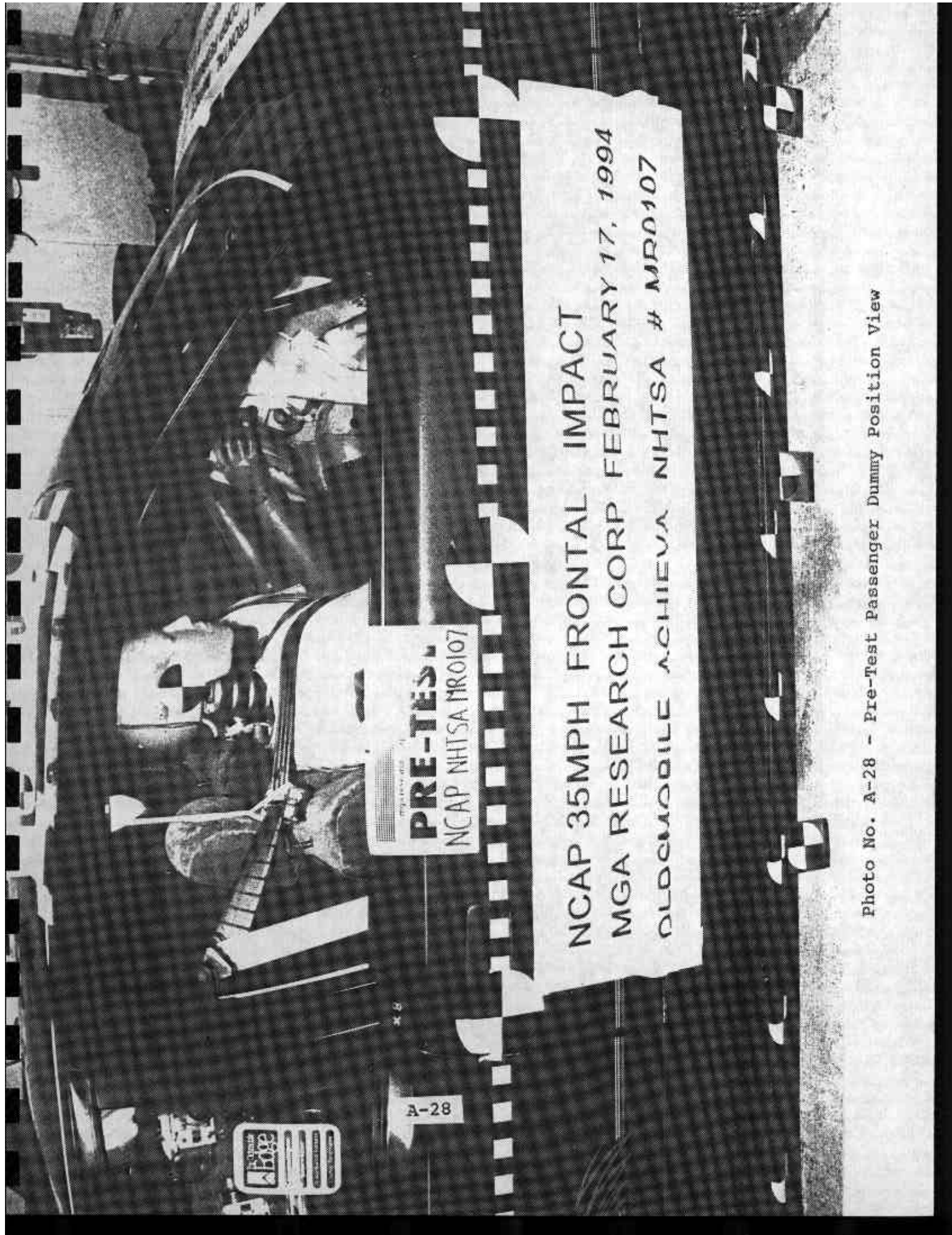


A-26

Photo No. A-26 - Post-Test Driver Seat Position View



Photo No. A-27 - Post-Test Airbag Contact Marks



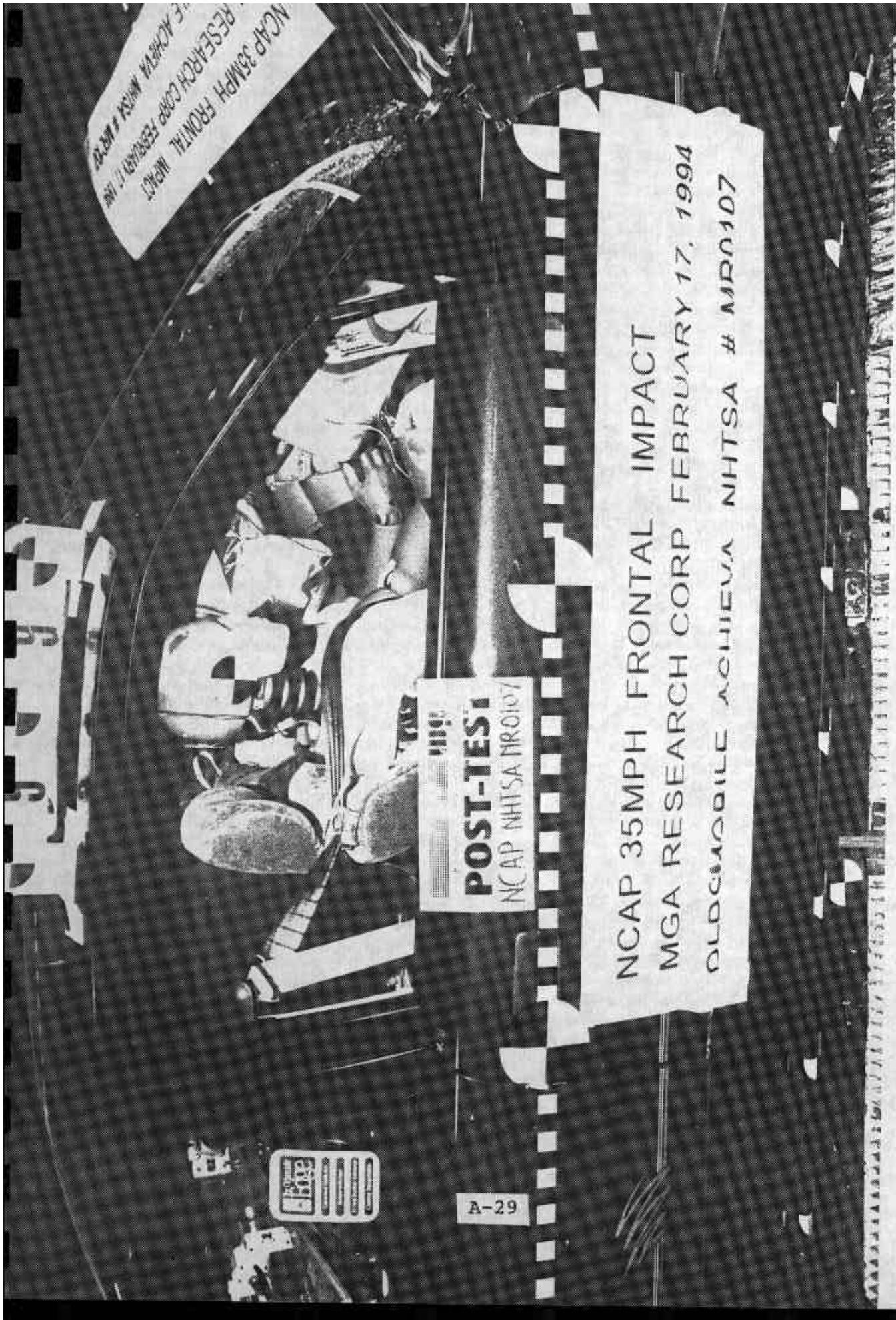
PRE-TEST
NCAP NHTSA MR0107

NCAP 35MPH FRONTAL IMPACT
MGA RESEARCH CORP FEBRUARY 17, 1994
OLDCMOBILE ACHIEVA NHTSA # MRD107

A-28

Outside Above

Photo No. A-28 - Pre-Test Passenger Dummy Position View



NCAP 35MPH FRONTAL IMPACT
RESEARCH CORP FEBRUARY 17, 1994
MOBILE ACHIEVA # MR0107

POST-TEST
NCAP NHTSA PROTOTYP

NCAP 35MPH FRONTAL IMPACT
MGA RESEARCH CORP FEBRUARY 17, 1994
MOBILE ACHIEVA NHTSA # MR0107

POST-TEST
1500

A-29

Photo No. A-29 - Post-Test Passenger Dummy Position View

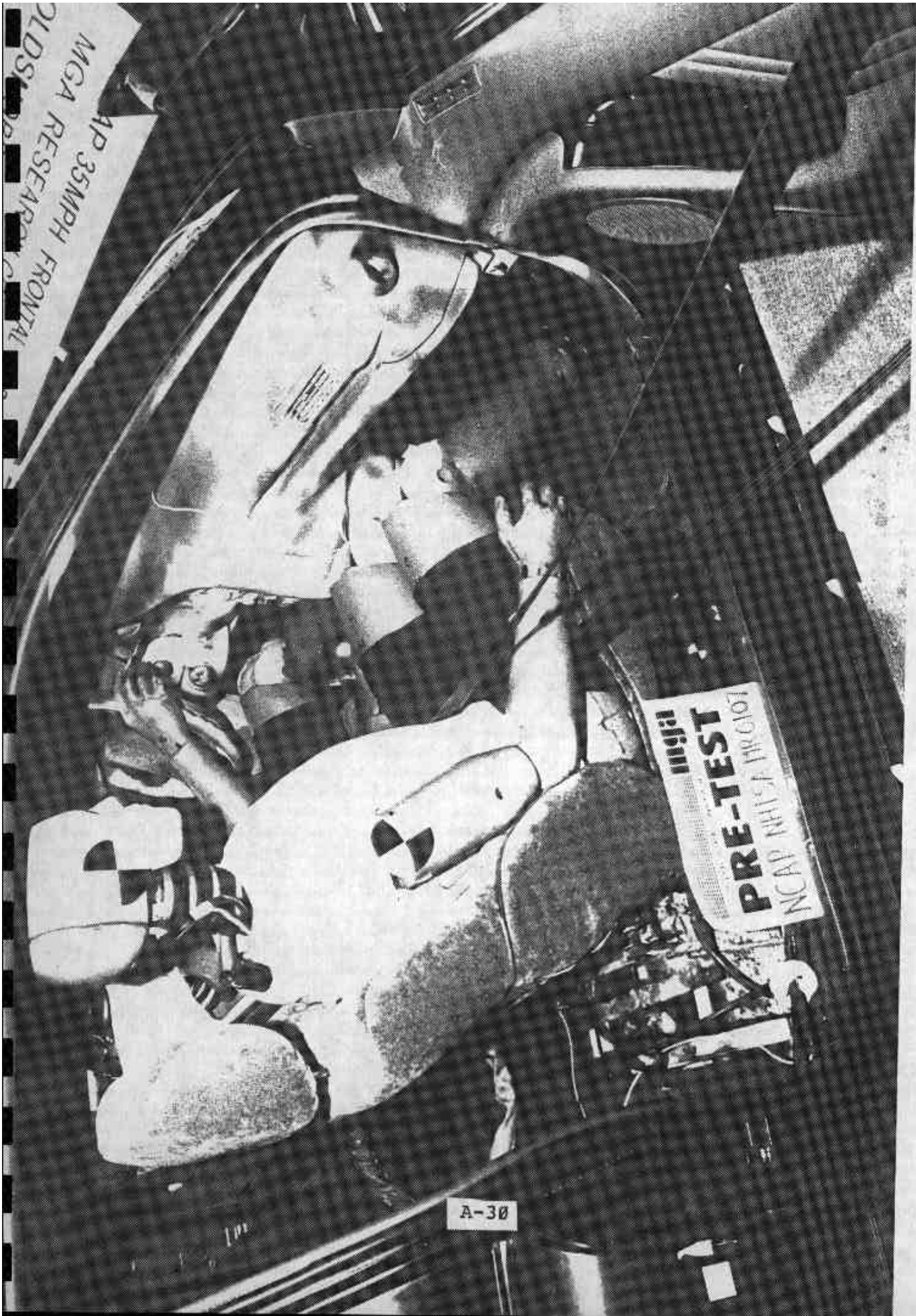


Photo No. A-30 - Pre-Test Passenger Dummy Position View (Door Open)

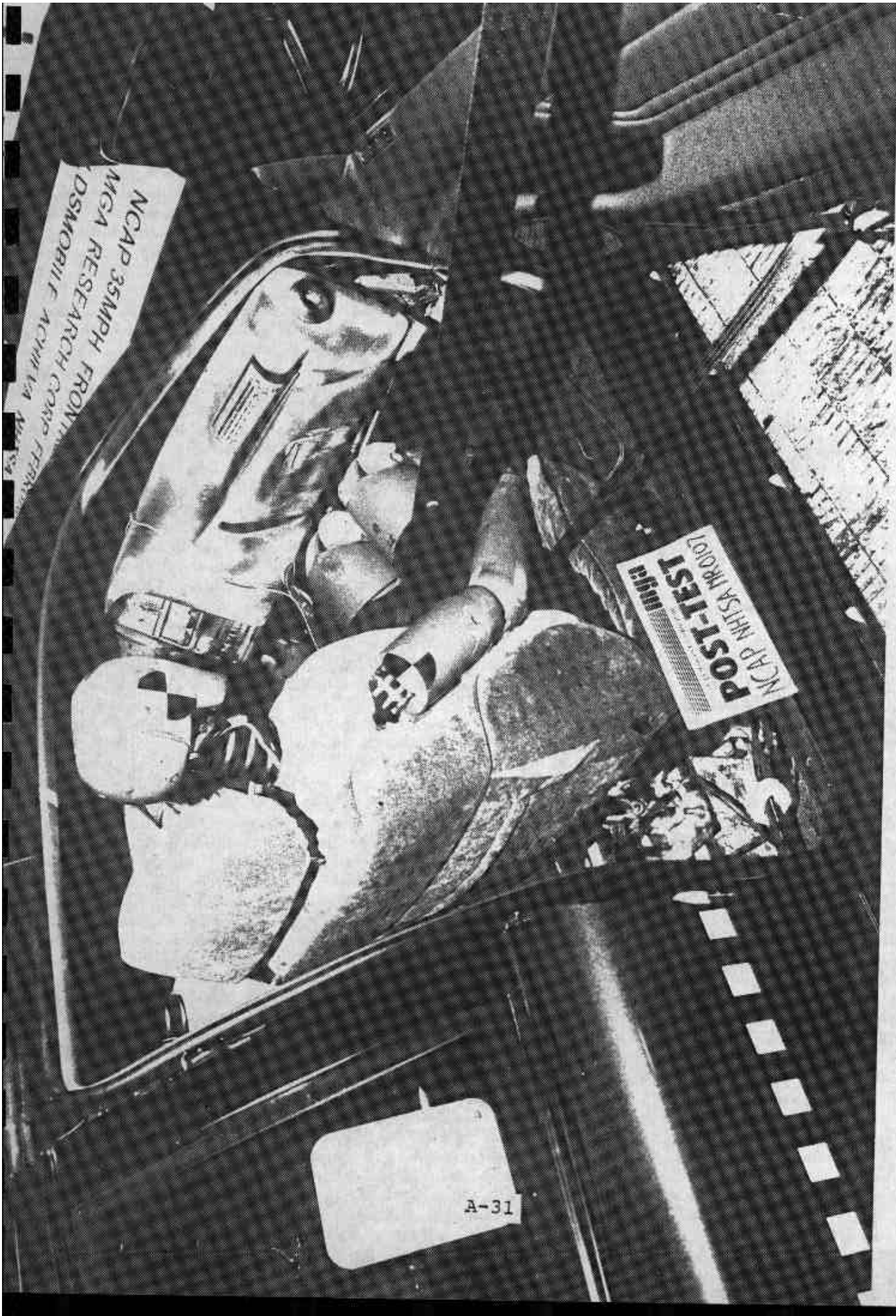


Photo No. A-31 - Post-Test Passenger Dummy Position View (Door Open)

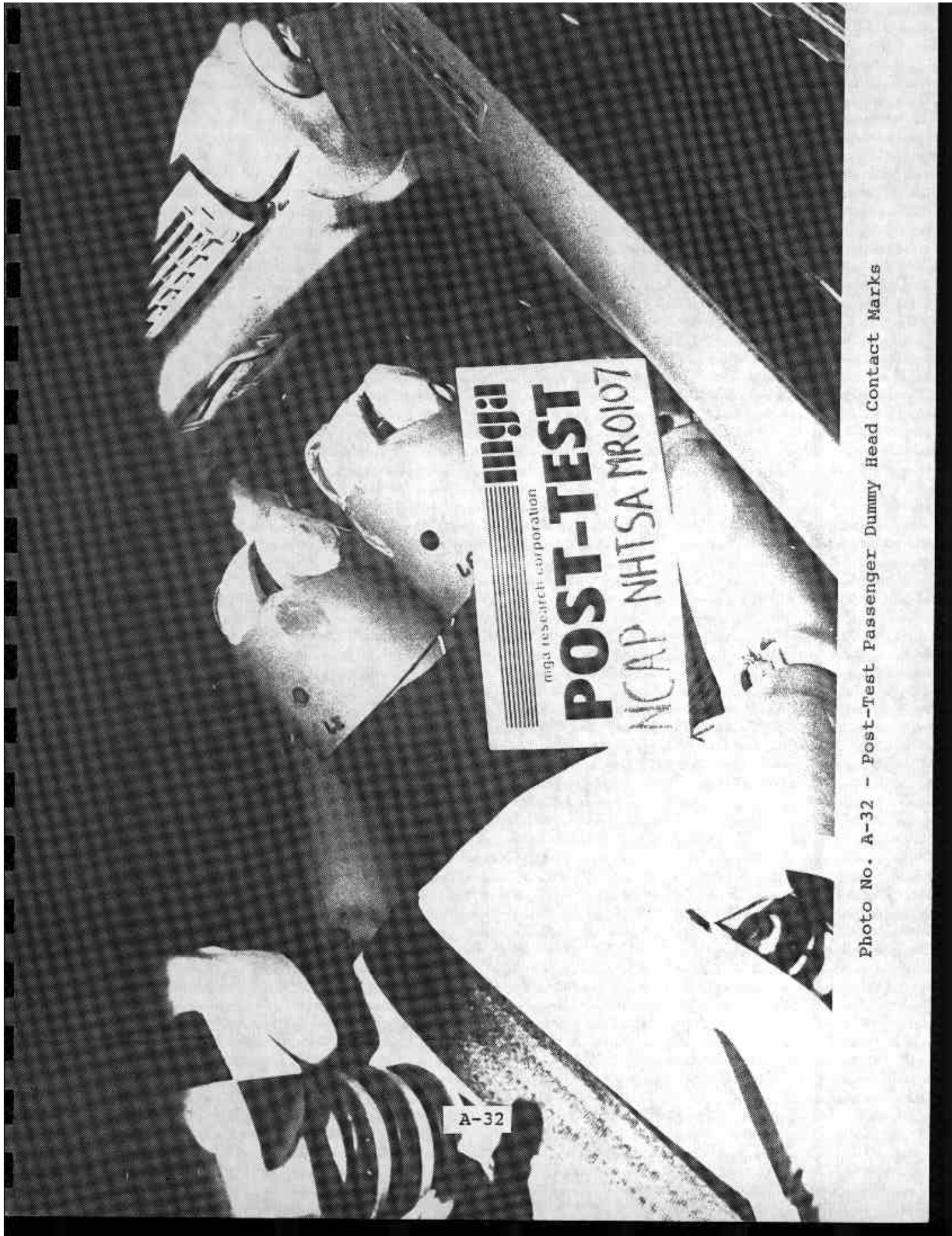
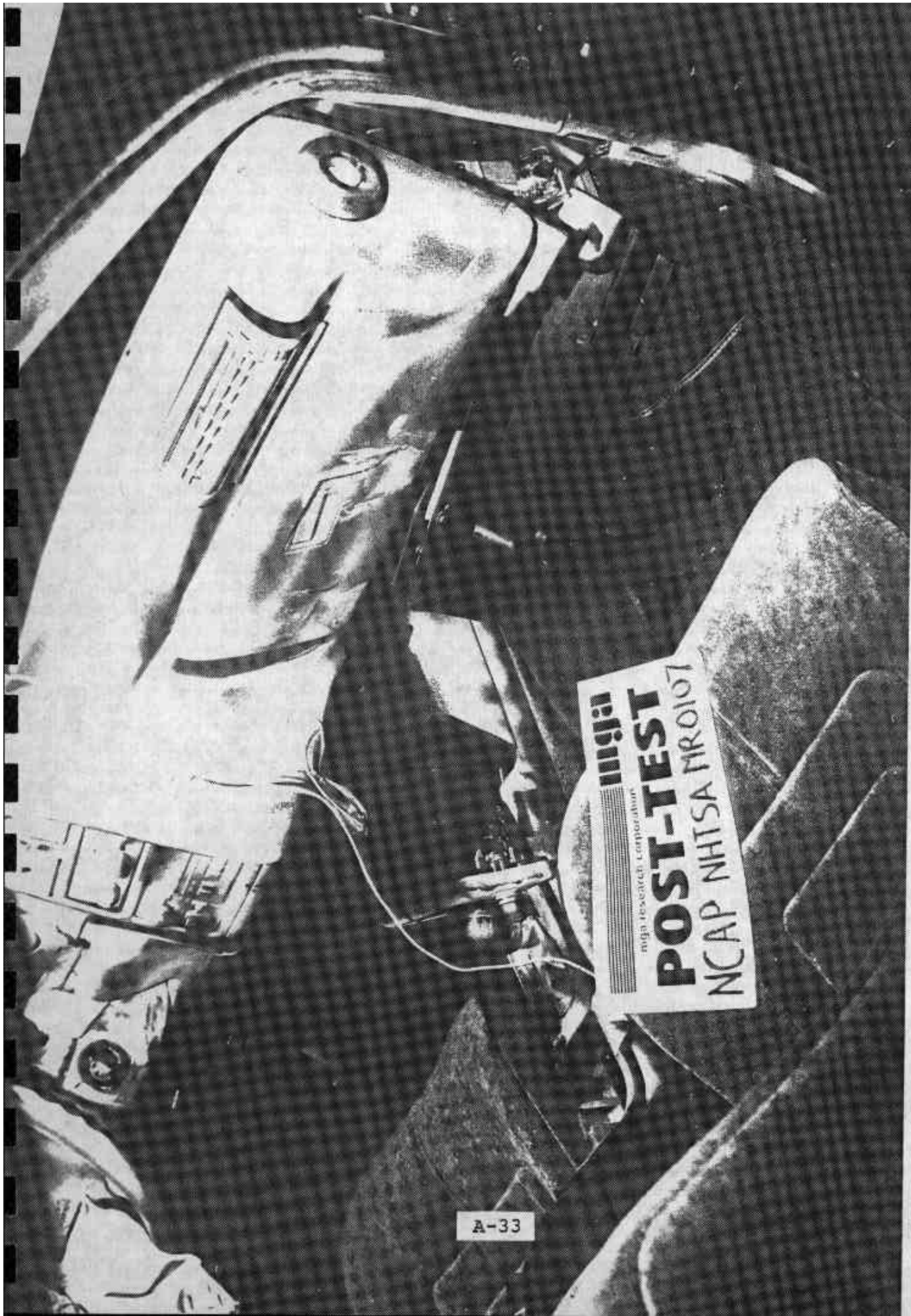


Photo No. A-32 - Post-Test Passenger Dummy Head Contact Marks



A-33

Photo No. A-33 - Post-Test Passenger Dash



Photo No. A-34 - Pre-Test Passenger Seat Position View

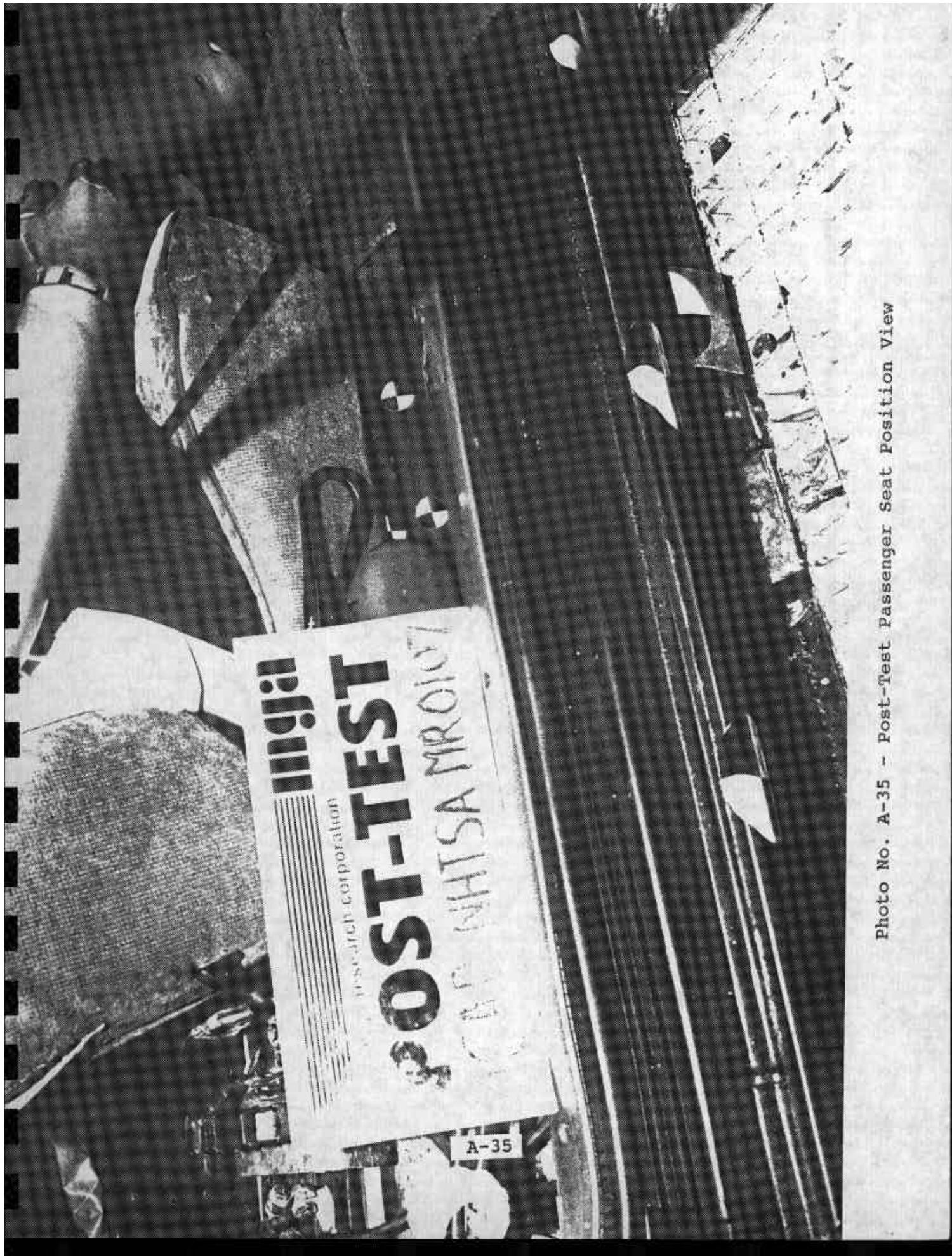


Photo No. A-35 - Post-Test Passenger Seat Position View

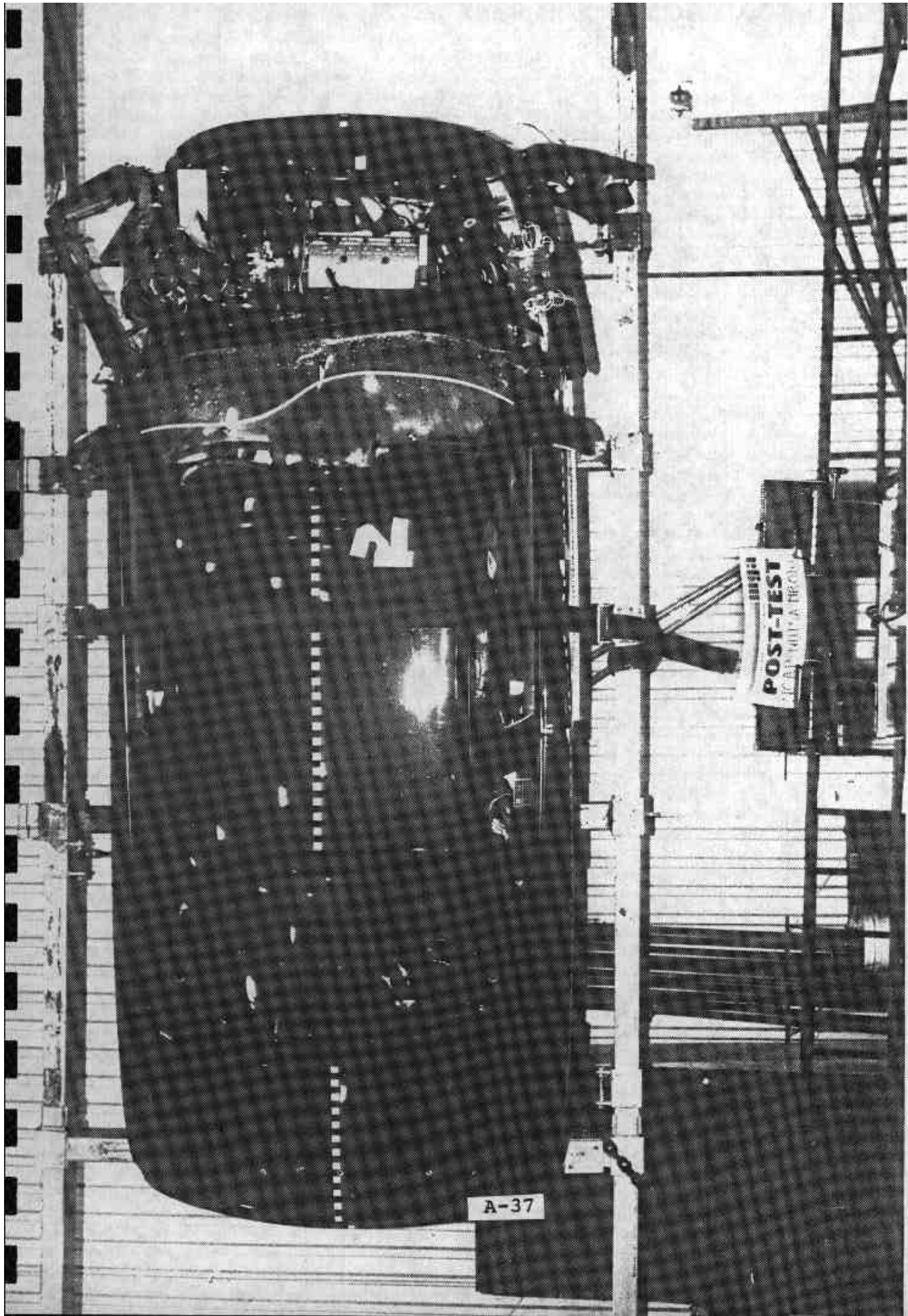


Photo No. A-37 - Rollover 90°

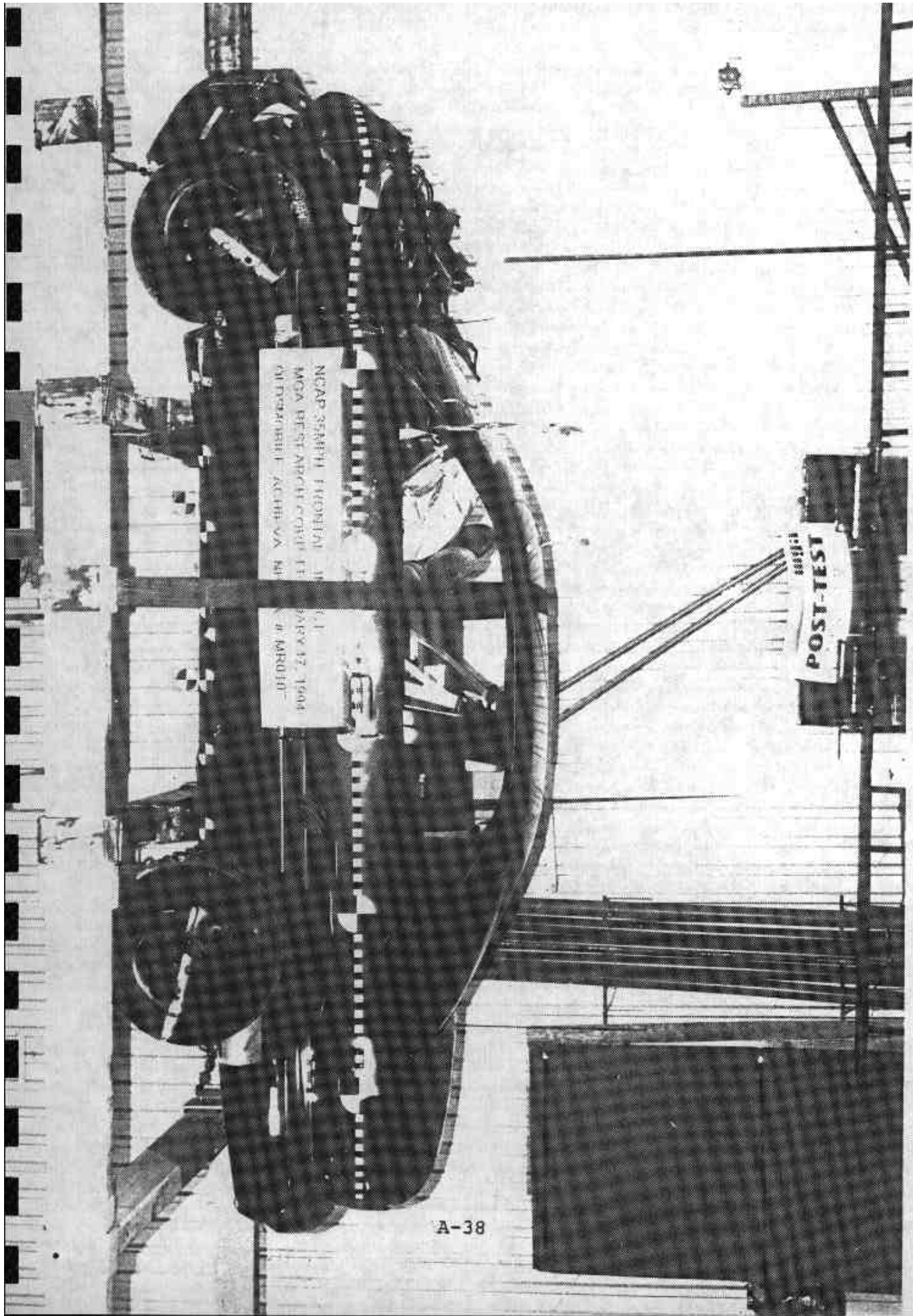


Photo No. A-38 - Rollover 180°

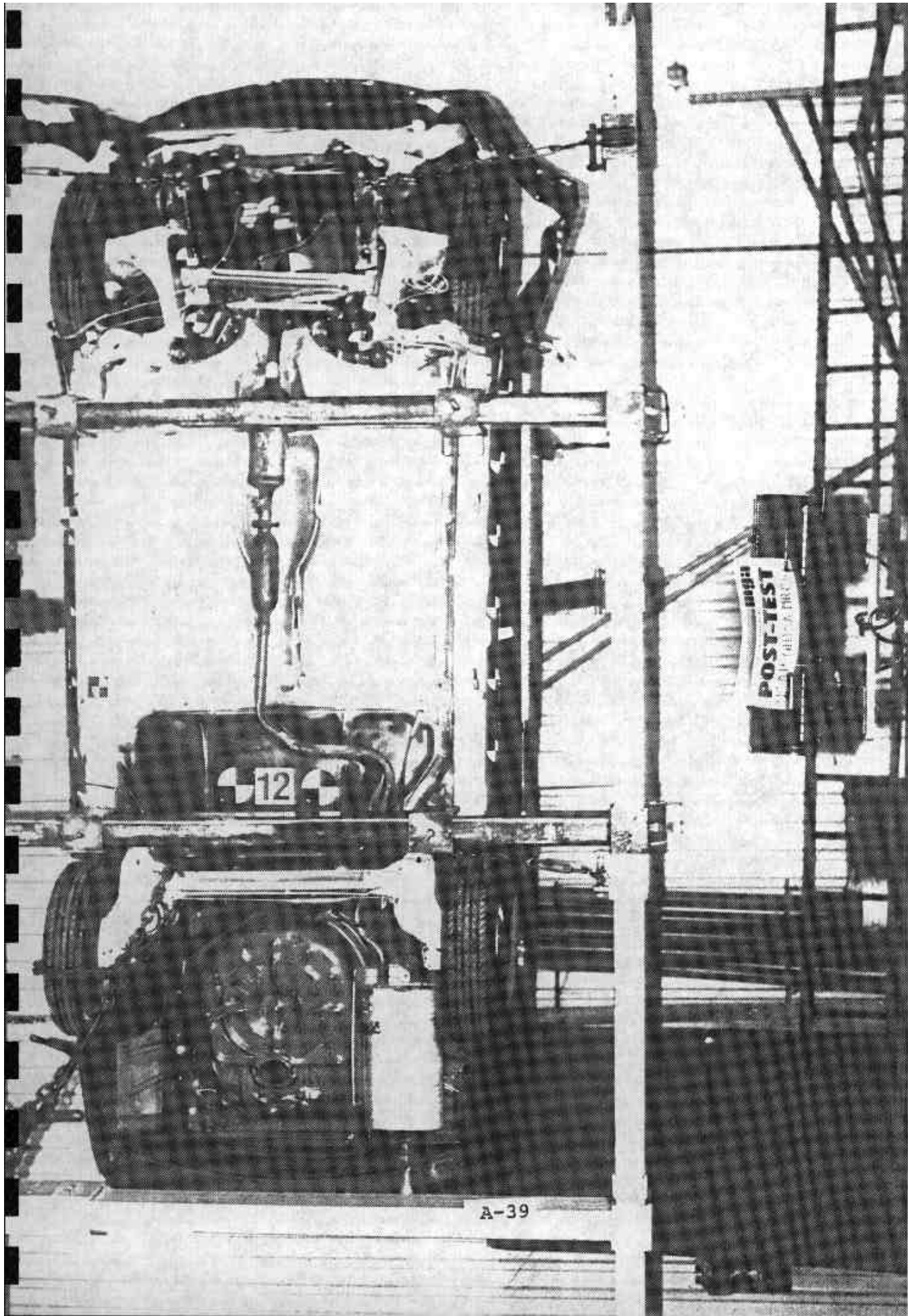


Photo No. A-39 - Rollover 270°

A-39

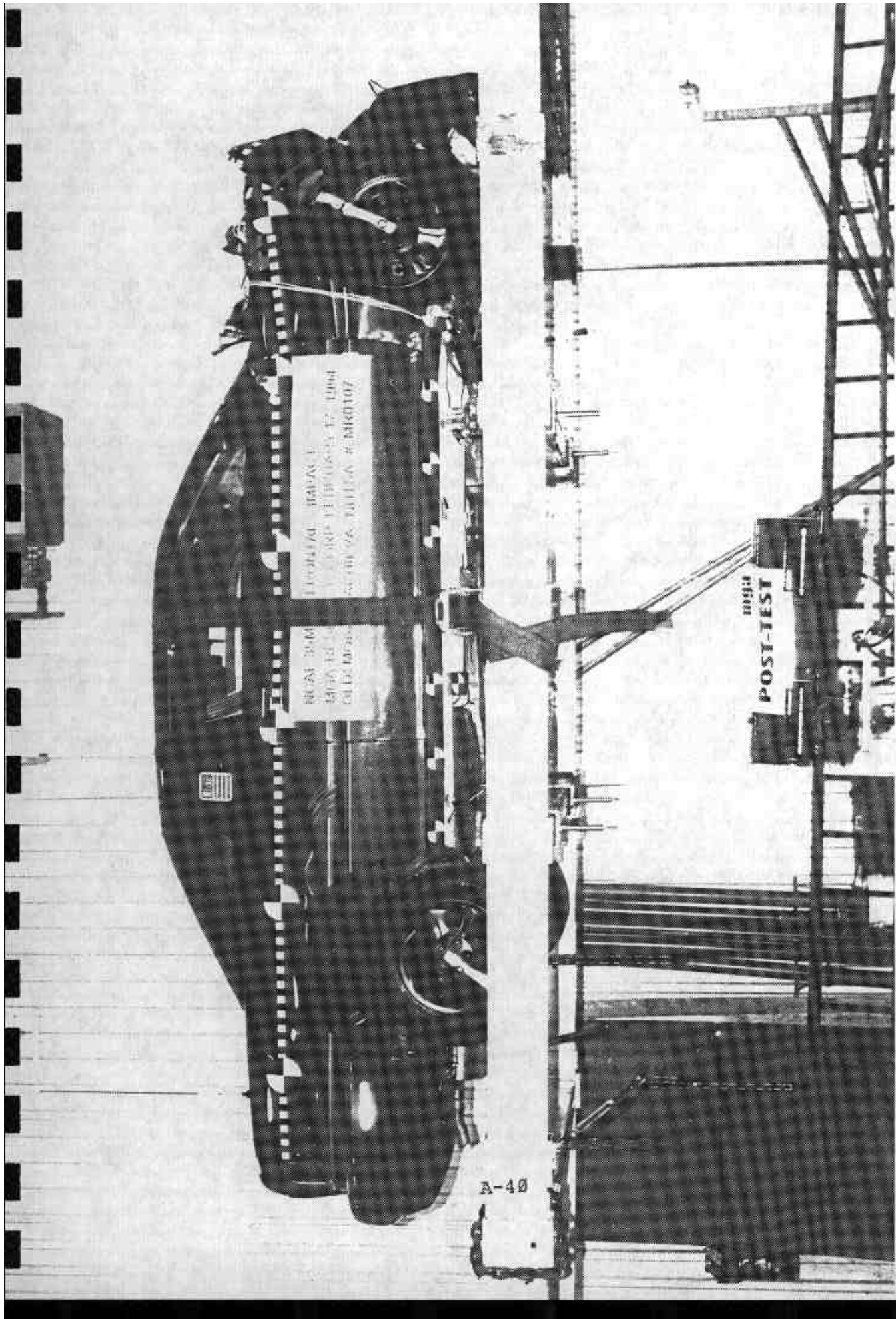


Photo No. A-40 - Rollover 360°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1994 OLDSMOBILE ACHIEVA 2-DOOR
NHTSA NO.: MR0202

<u>VEHICLE DATA</u>	<u>FILTER CHANNEL CLASS</u>
Head Accelerations	1000 (1650 Hz)
Chest Accelerometers	180 (300 Hz)
Vehicle Accelerometers	60 (100 Hz)
Barrier Load Cells	60 (100 Hz)
Femur Load Cells	600 (1000 Hz)
Lap and Torso Belts	60 (100 Hz)

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Figure B-82 - Passenger Neck Moment Z vs. Time	B-82
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* No valid data collected

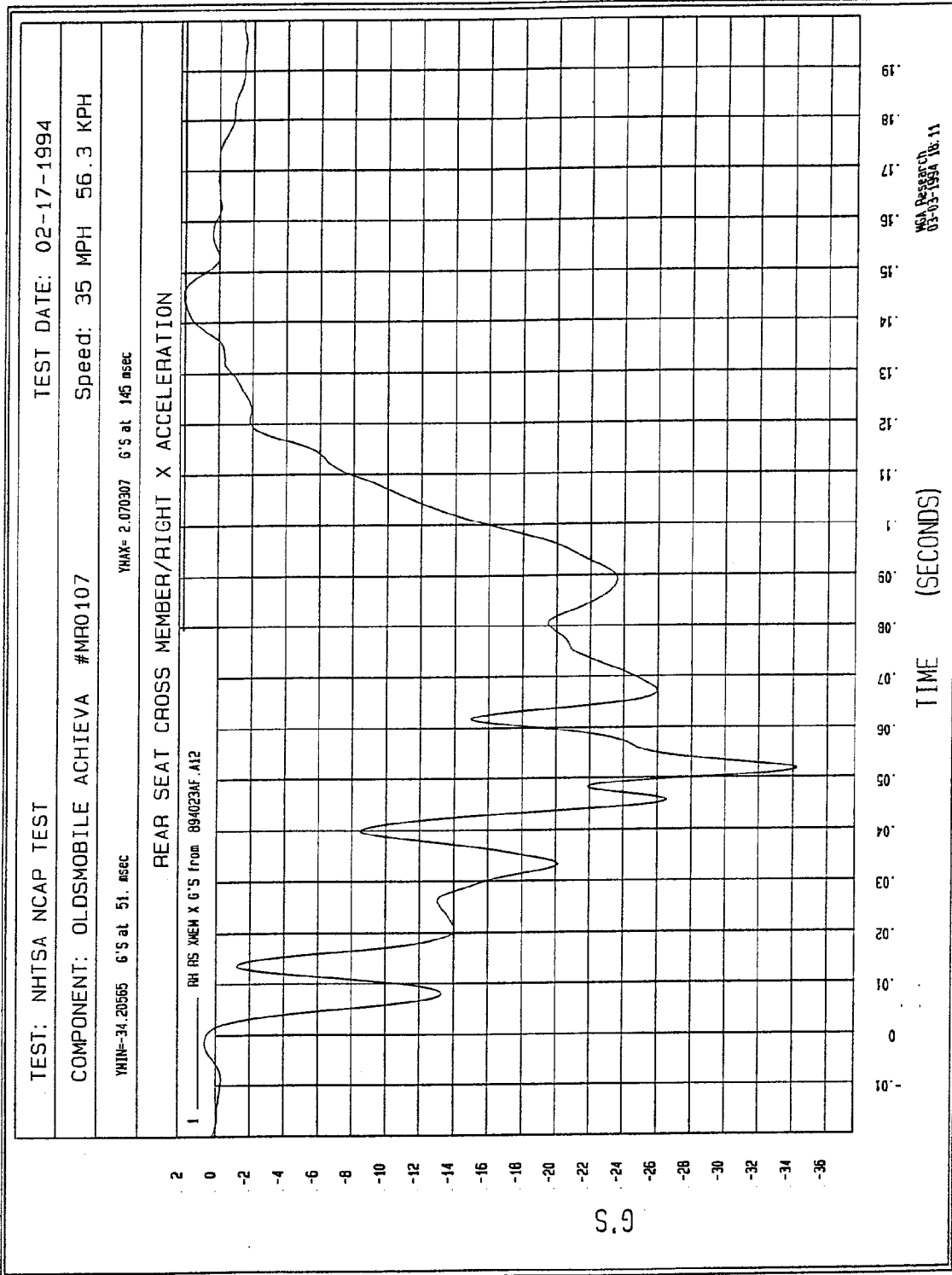


Figure B-1 - Right Rear Seat Crossmember X Accel. vs. Time

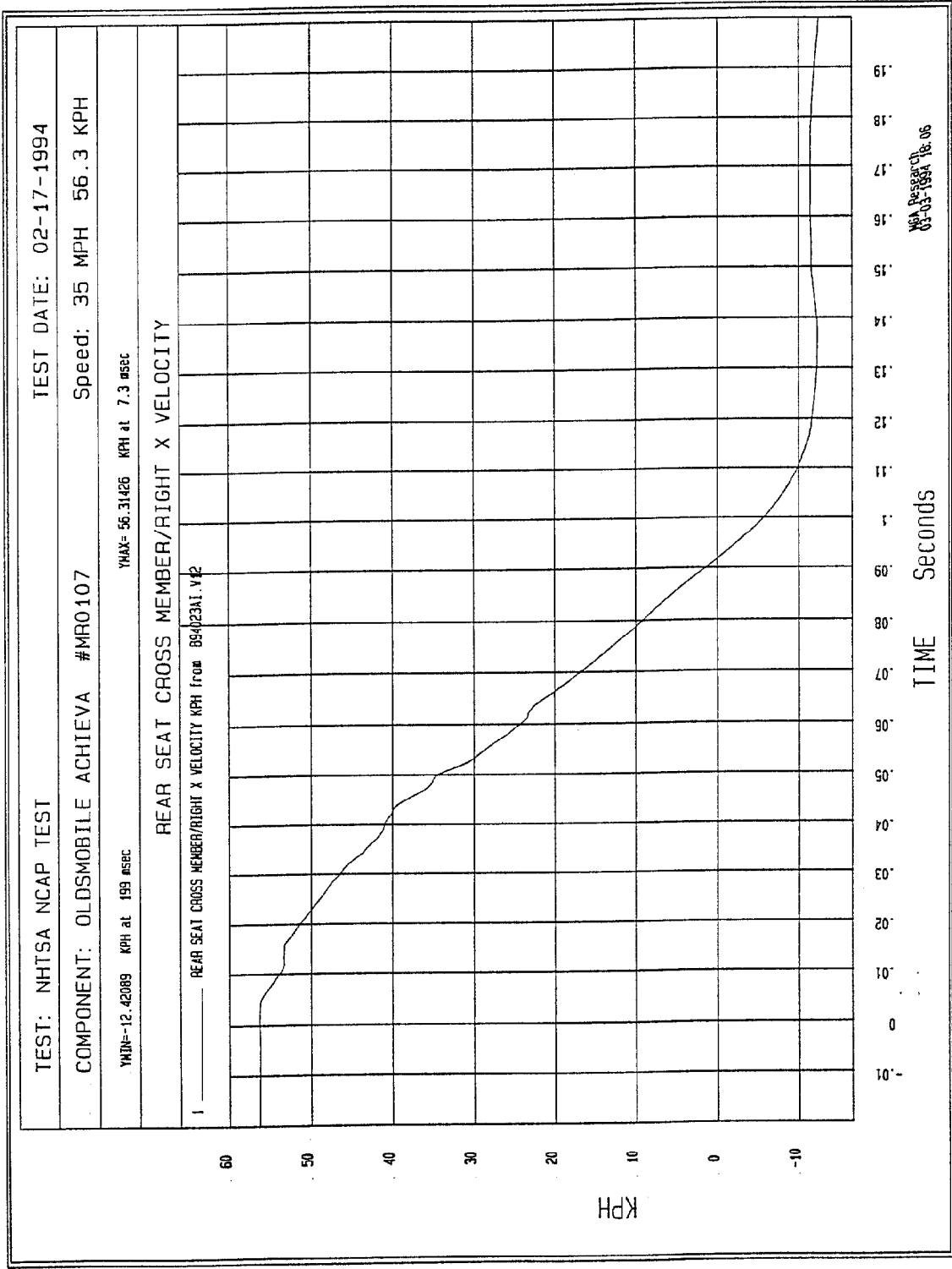


Figure B-2 - Right Rear Seat Crossmember X Velocity vs. Time

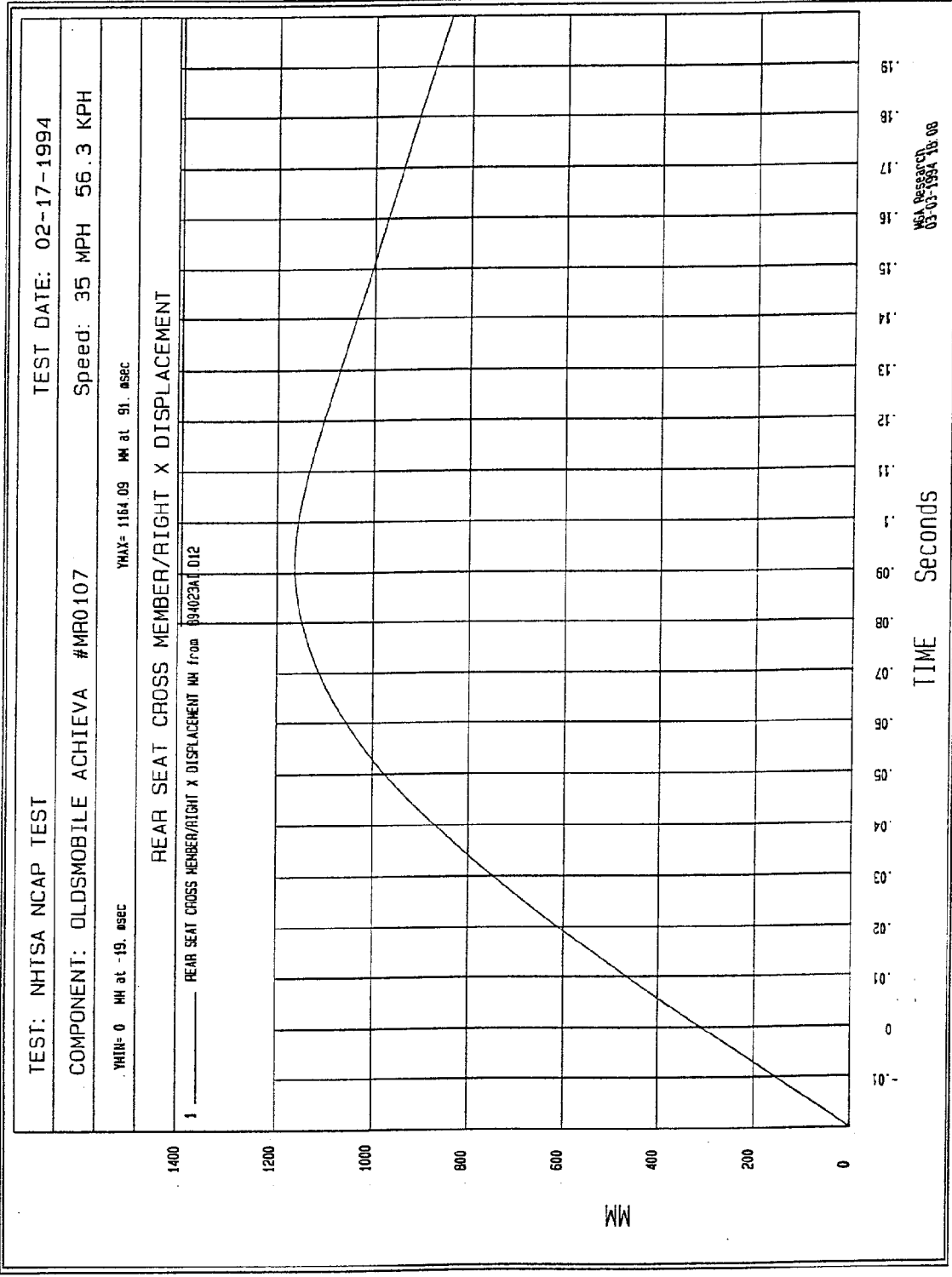


Figure B-3 - Right Rear Seat Crossmember X Displacement vs. Time

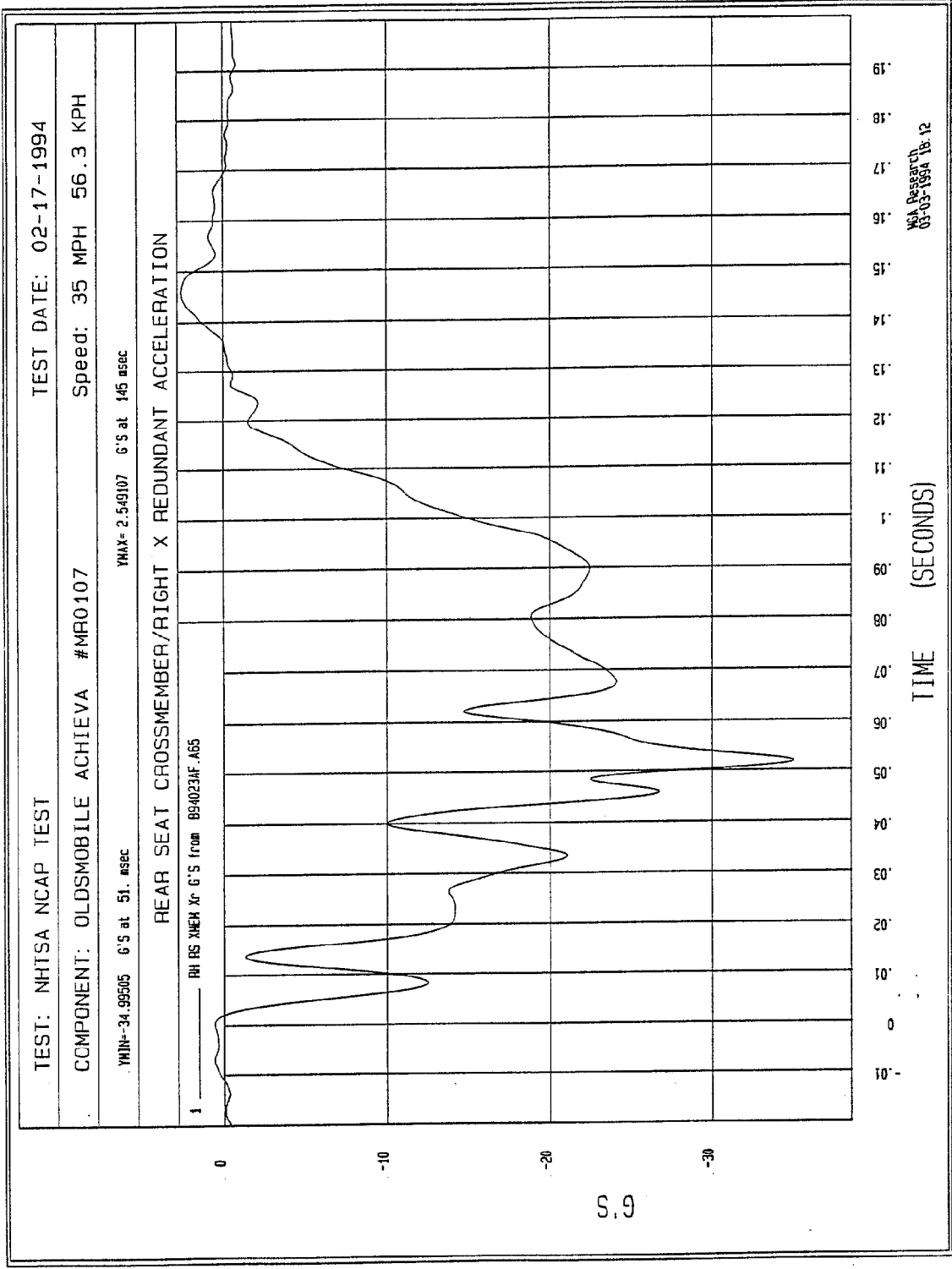


Figure B-4 - Right Rear Seat Crossmember X Redundant Acceleration vs. Time

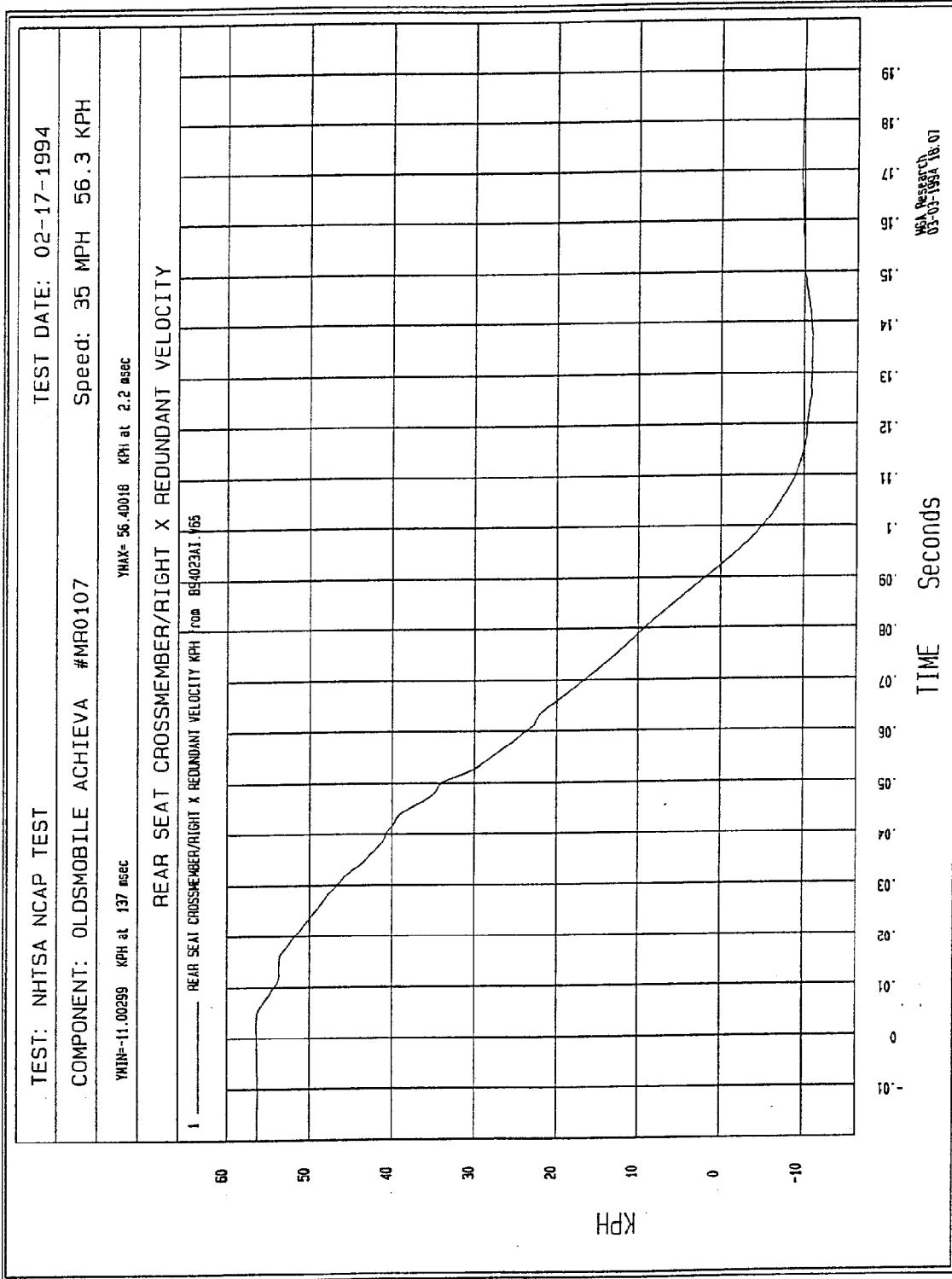


Figure B-5 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

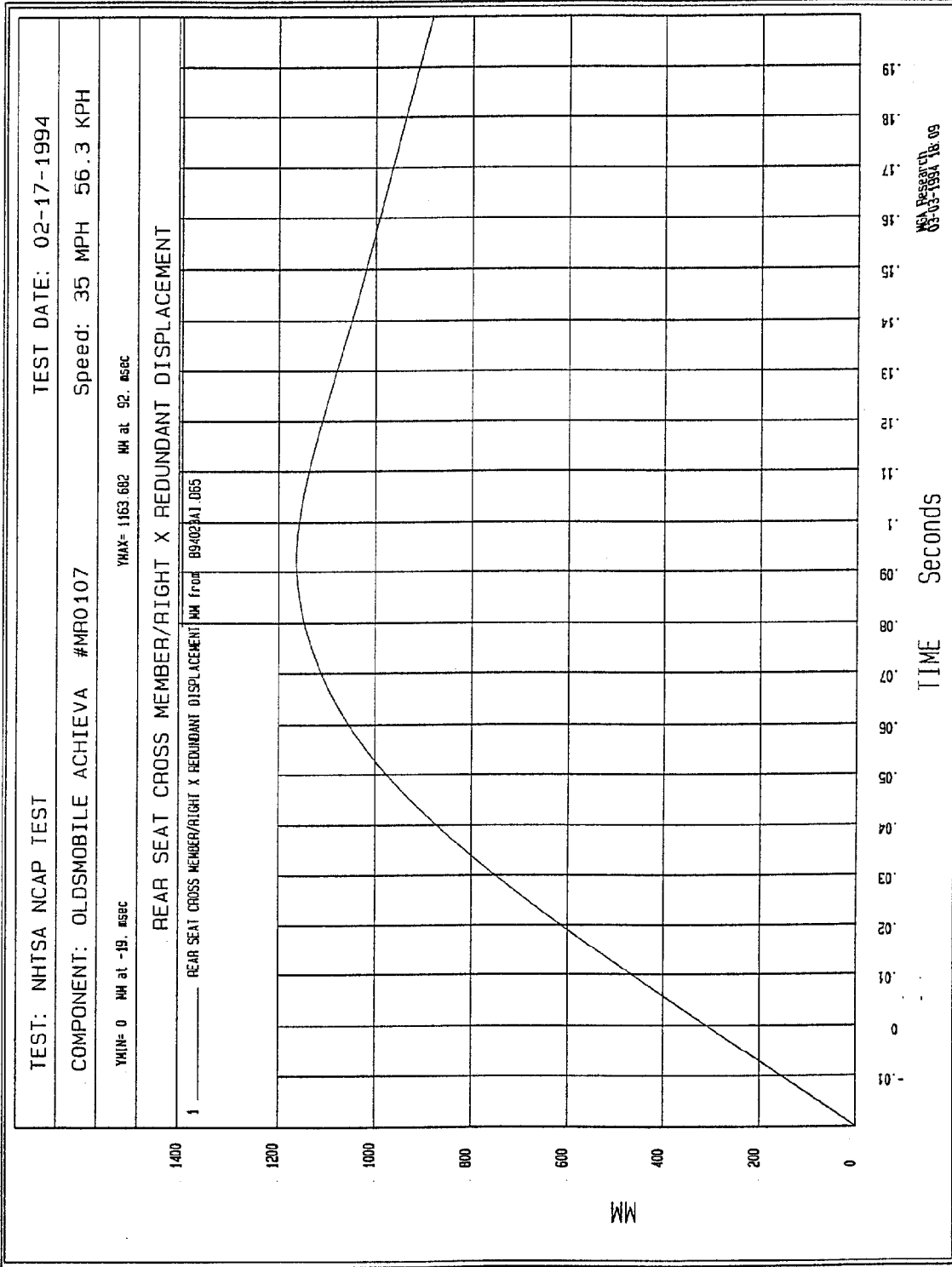
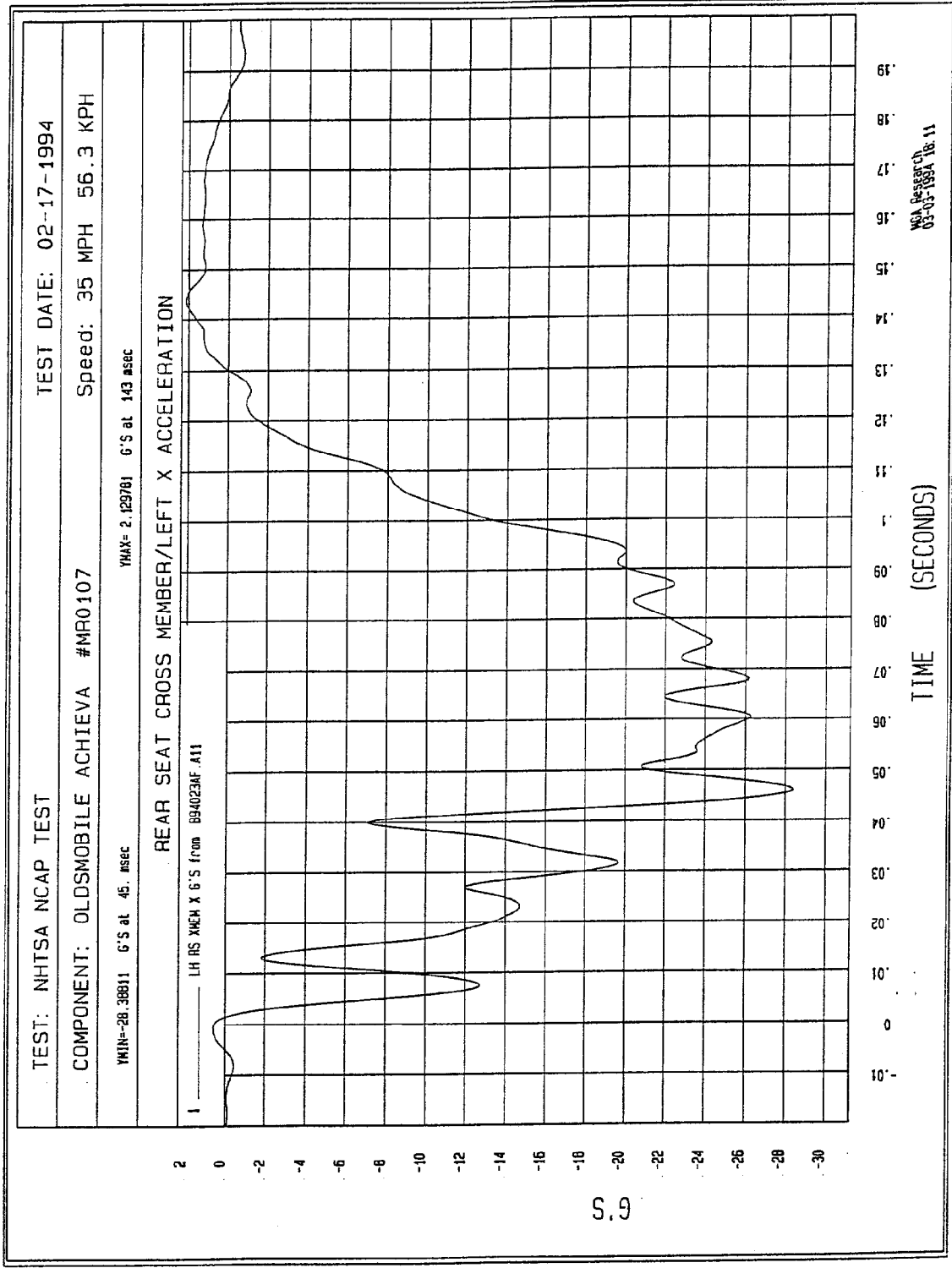


Figure B-6 - Right Rear Seat Crossmember X Redundant Displacement vs. Time



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03-03-1994 16:11

Figure B-7 - Left Rear Seat Crossmember X Acceleration vs. Time

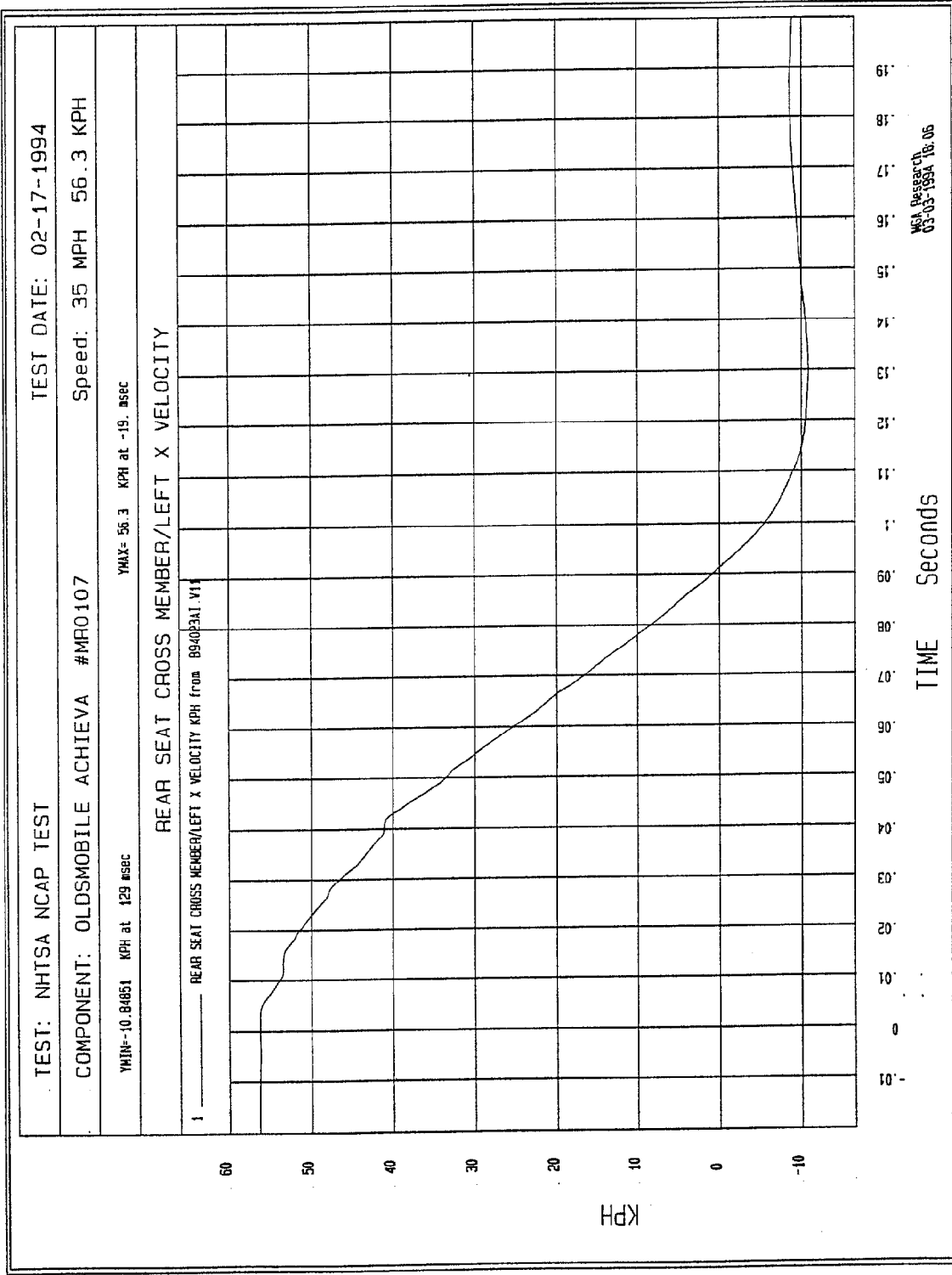


Figure B-8 - Left Rear Seat Crossmember X Velocity vs. Time

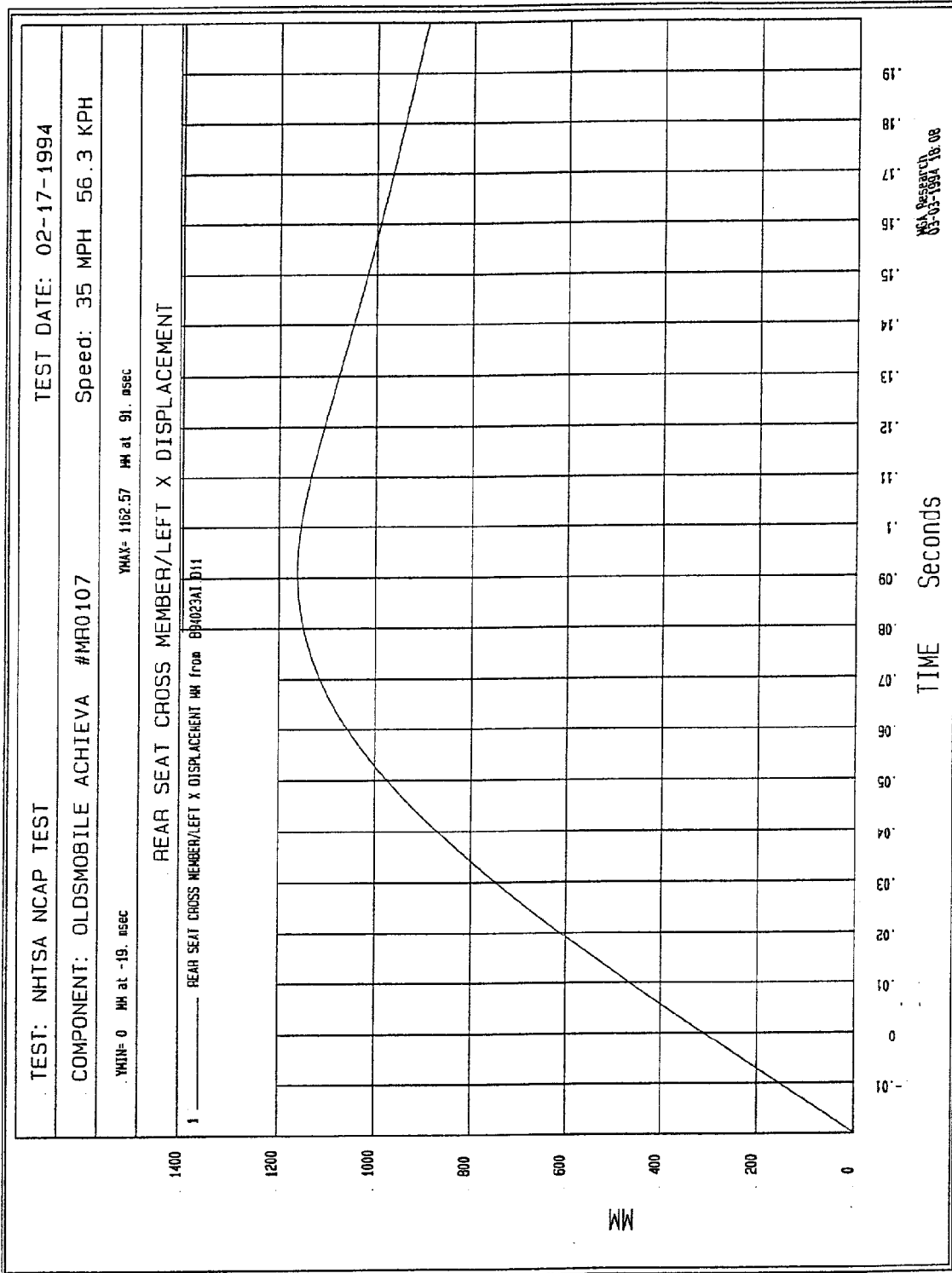
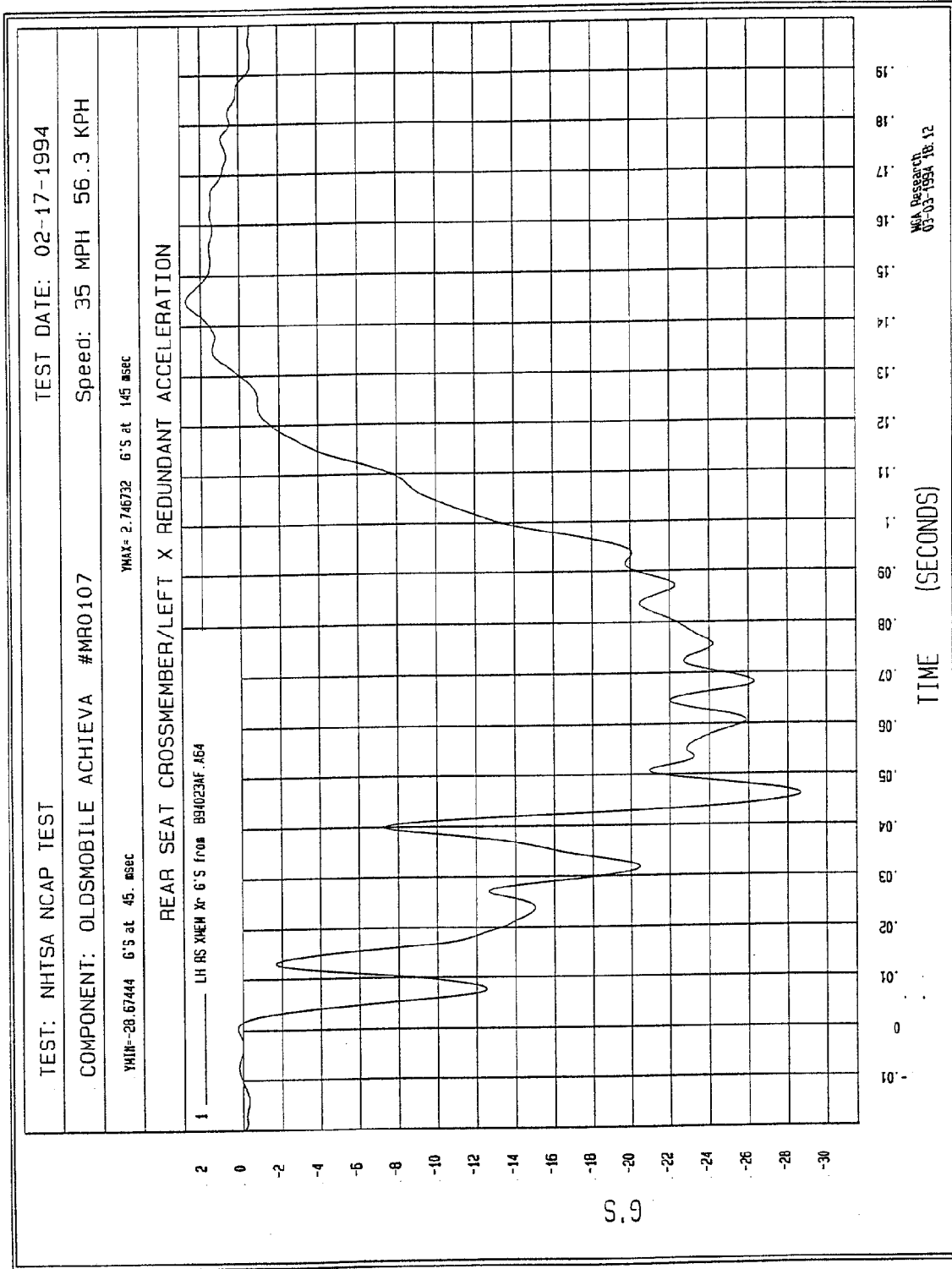


Figure B-9 - Left Rear Seat Crossmember X Displacement vs. Time



MVA Research
03-03-1994 16:12

Figure B-10 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

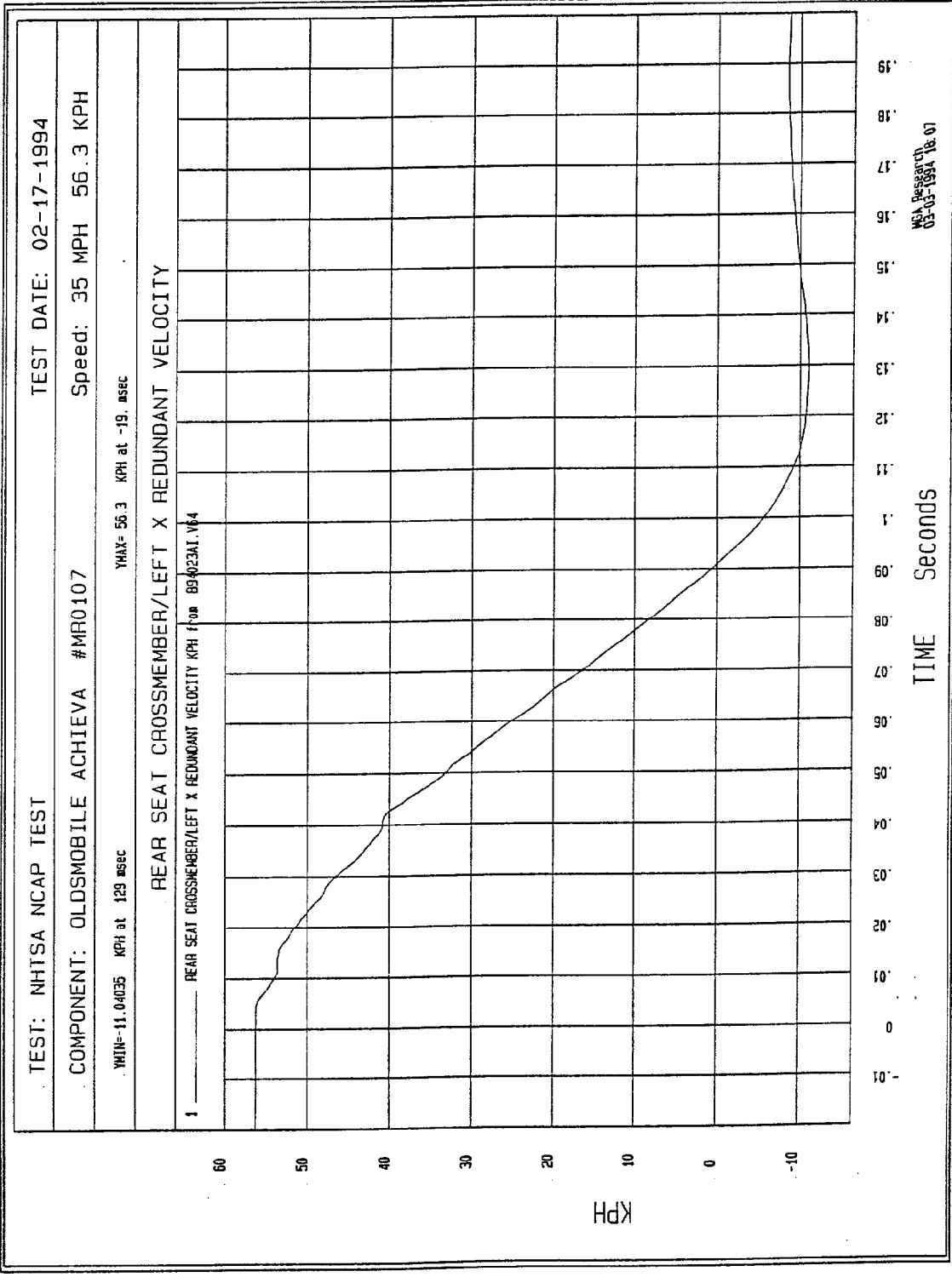
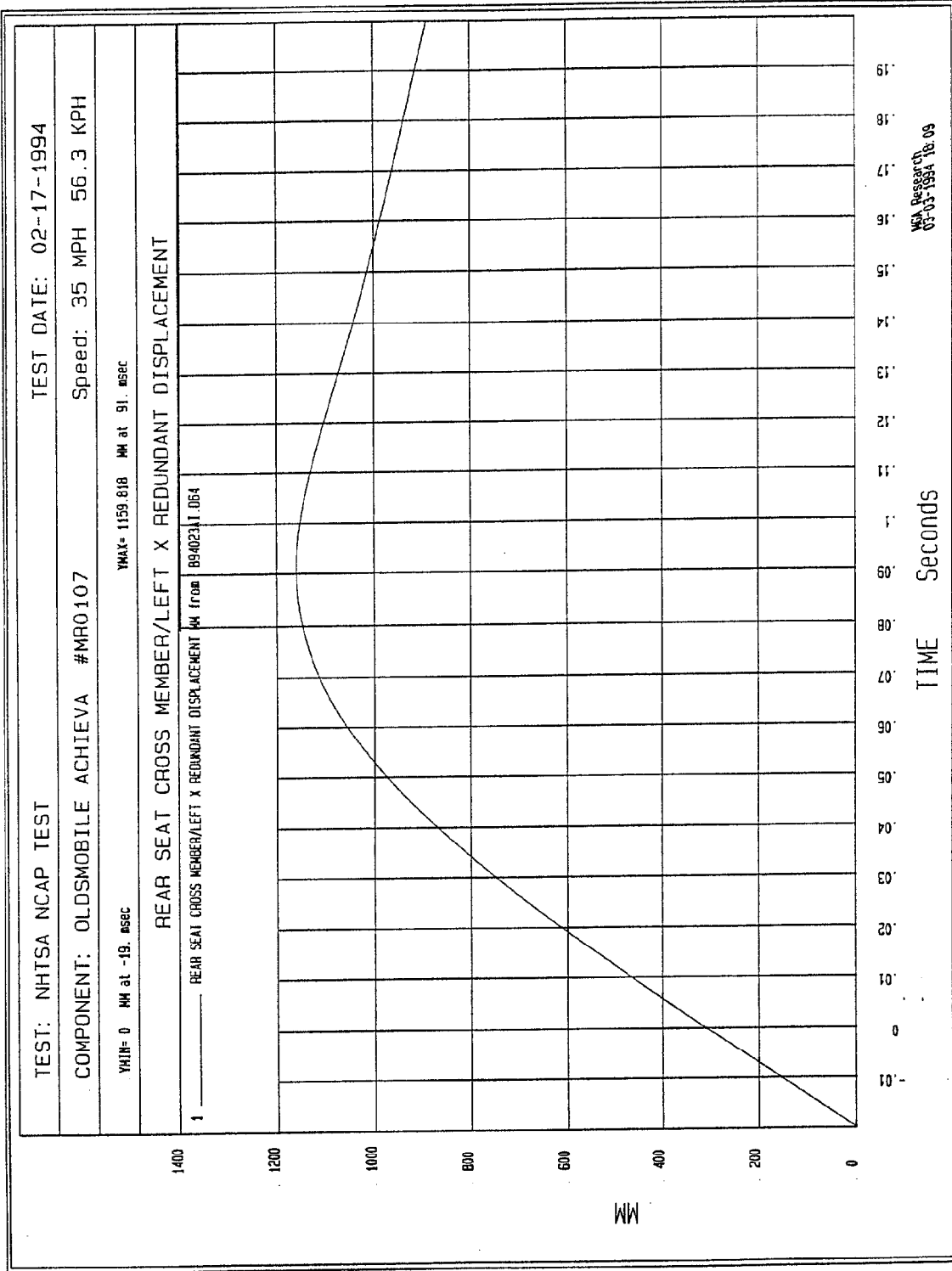


Figure B-11 - Left Rear Seat Crossmember X Redundant Velocity vs. Time



MM

TIME Seconds

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03-03-1994 16:09

Figure B-12 - Left Rear Seat Crossmember X Redundant Displacement vs. Time

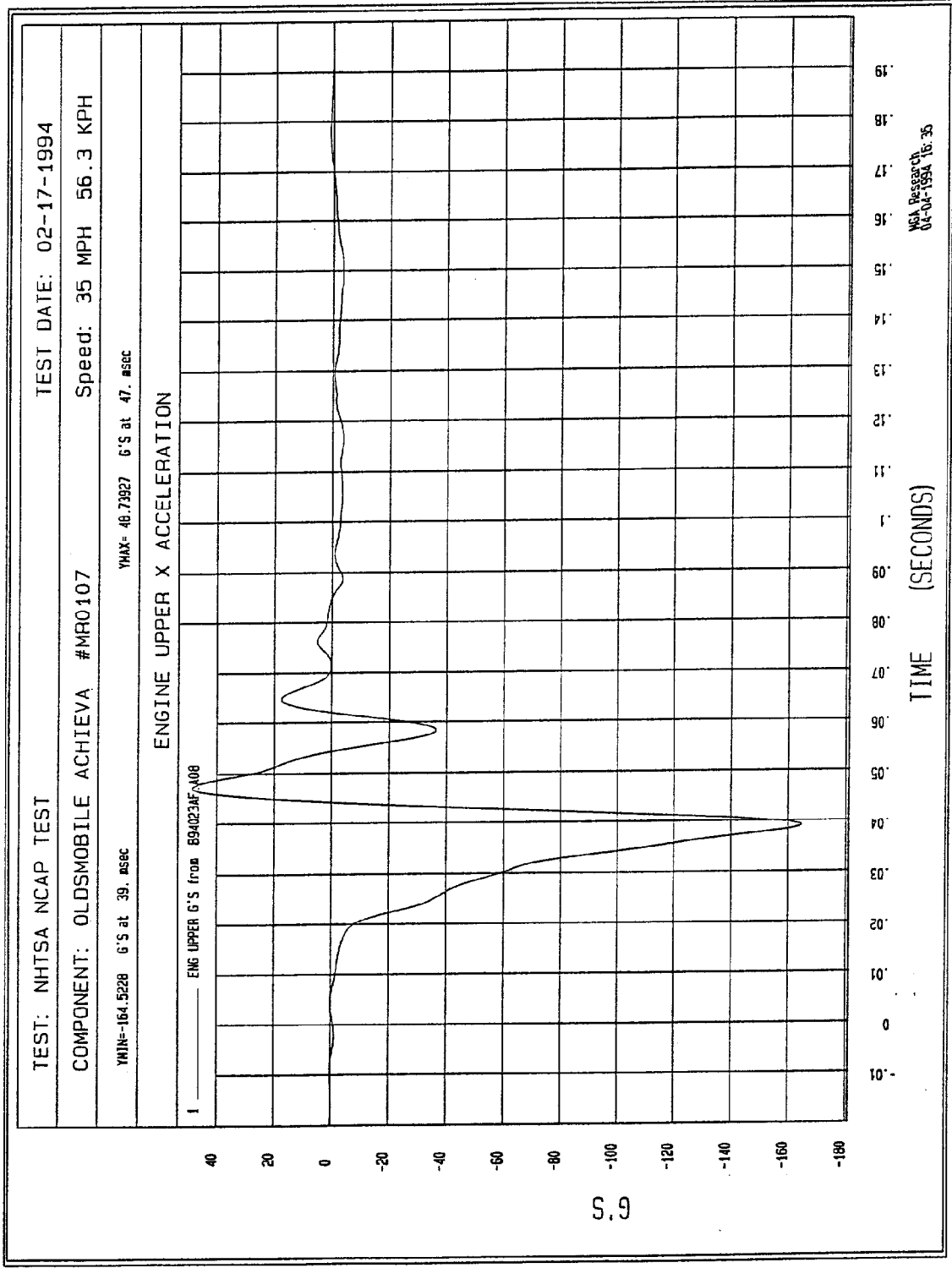


Figure B-13 - Upper Engine Block X Acceleration vs. Time

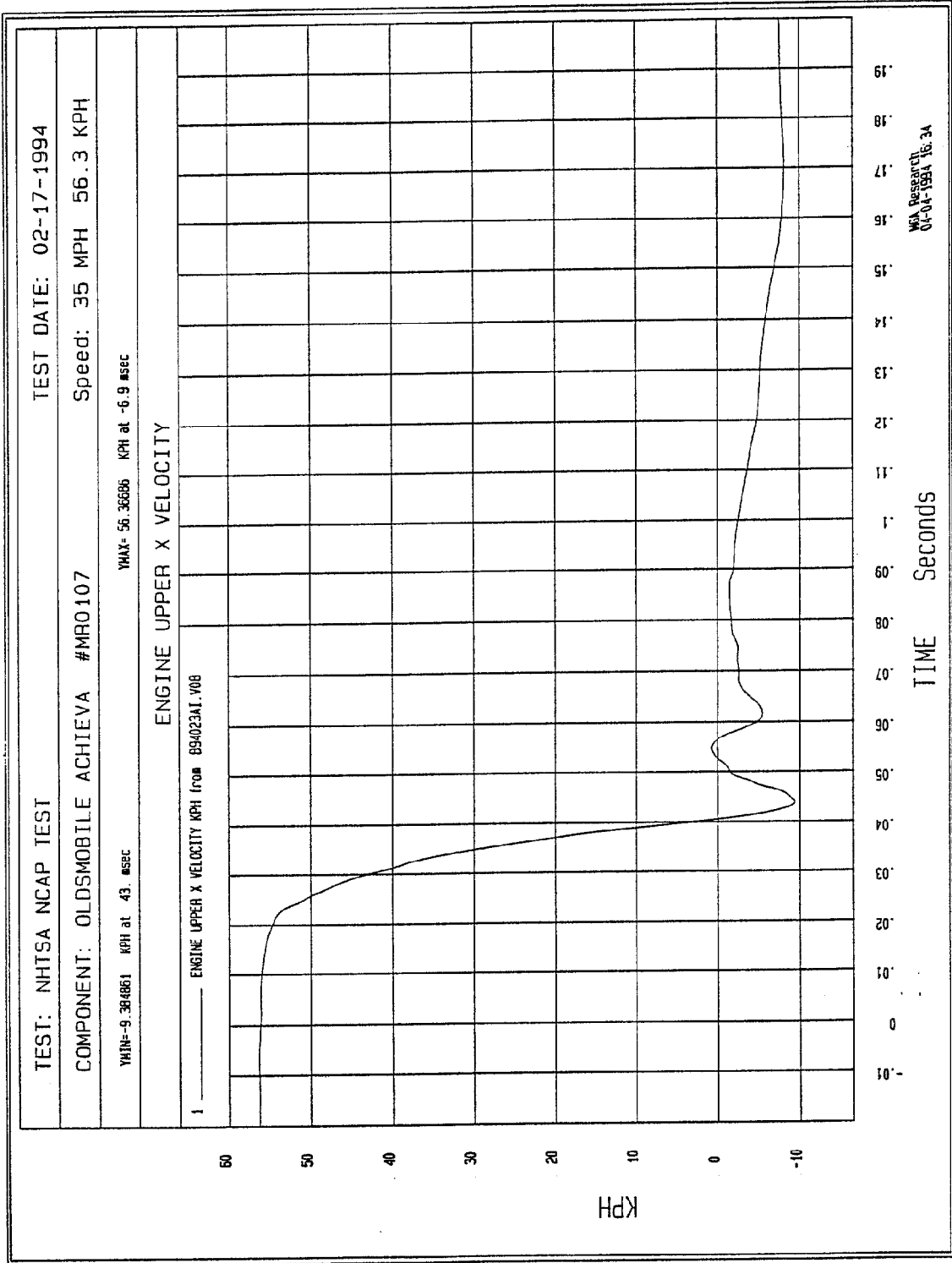


Figure B-14 - Upper Engine Block X Velocity vs. Time

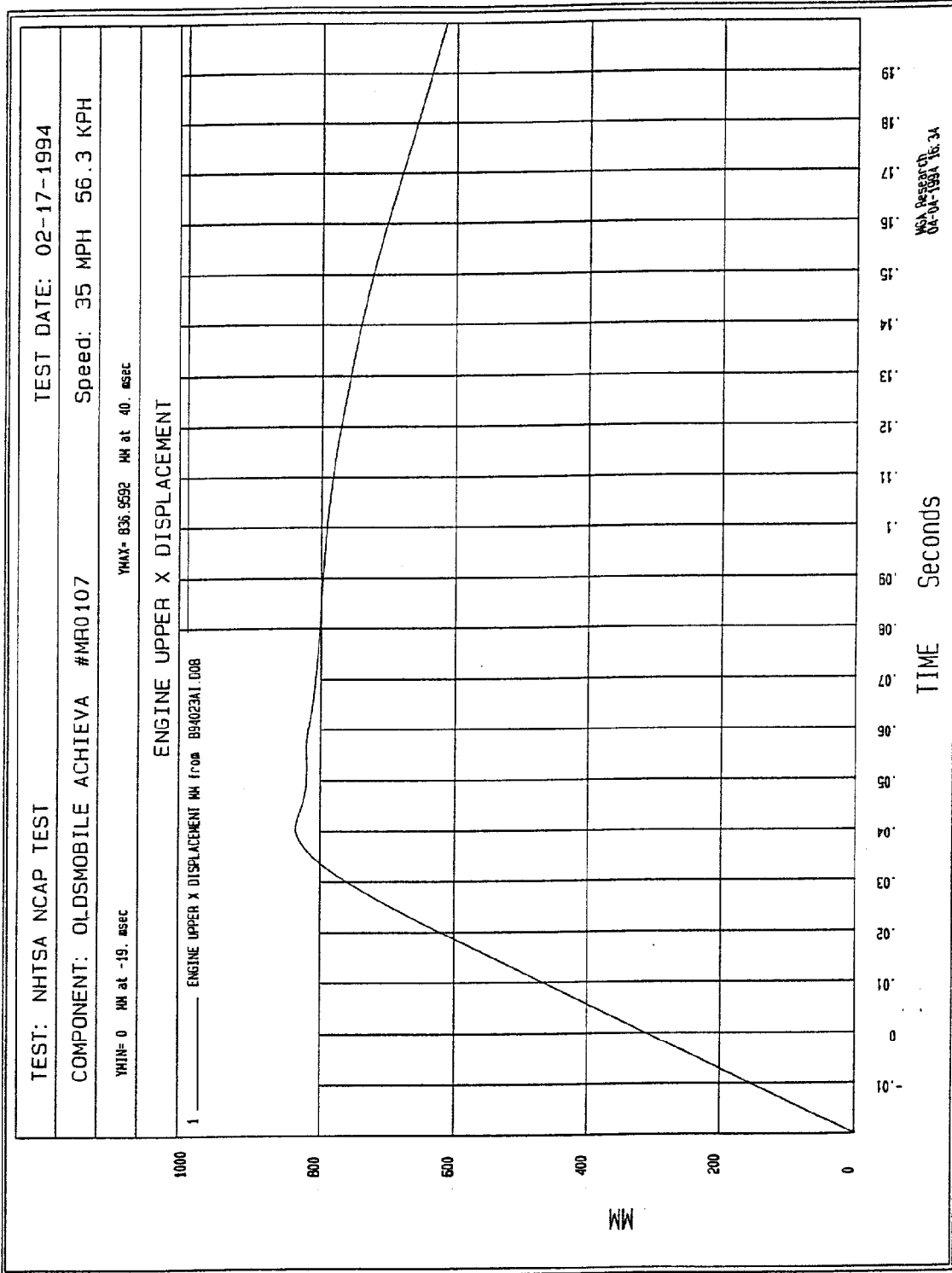


Figure B-15 - Upper Engine Block X Displacement vs. Time

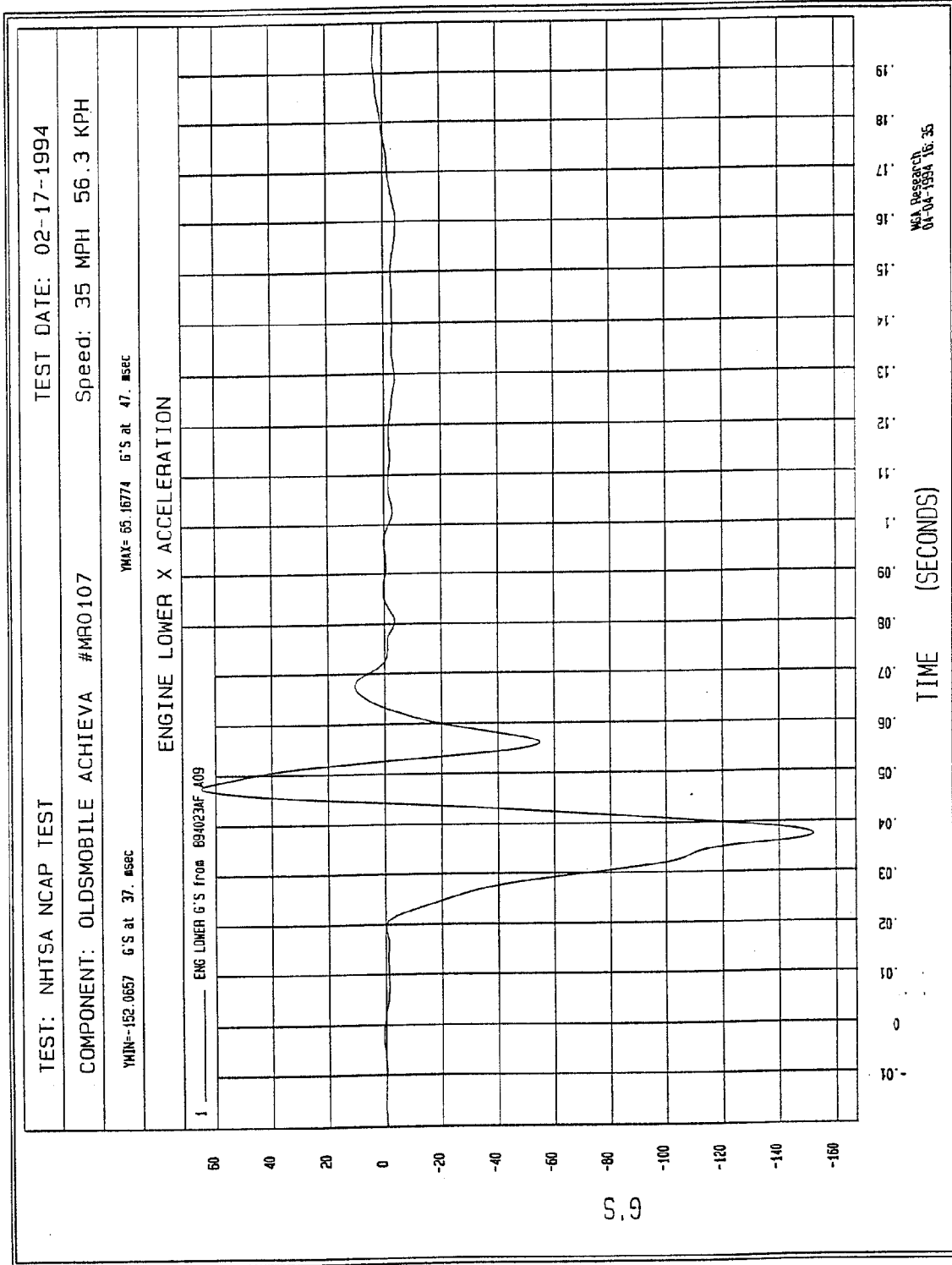


Figure B-16 - Bottom of Engine Block X Acceleration vs. Time

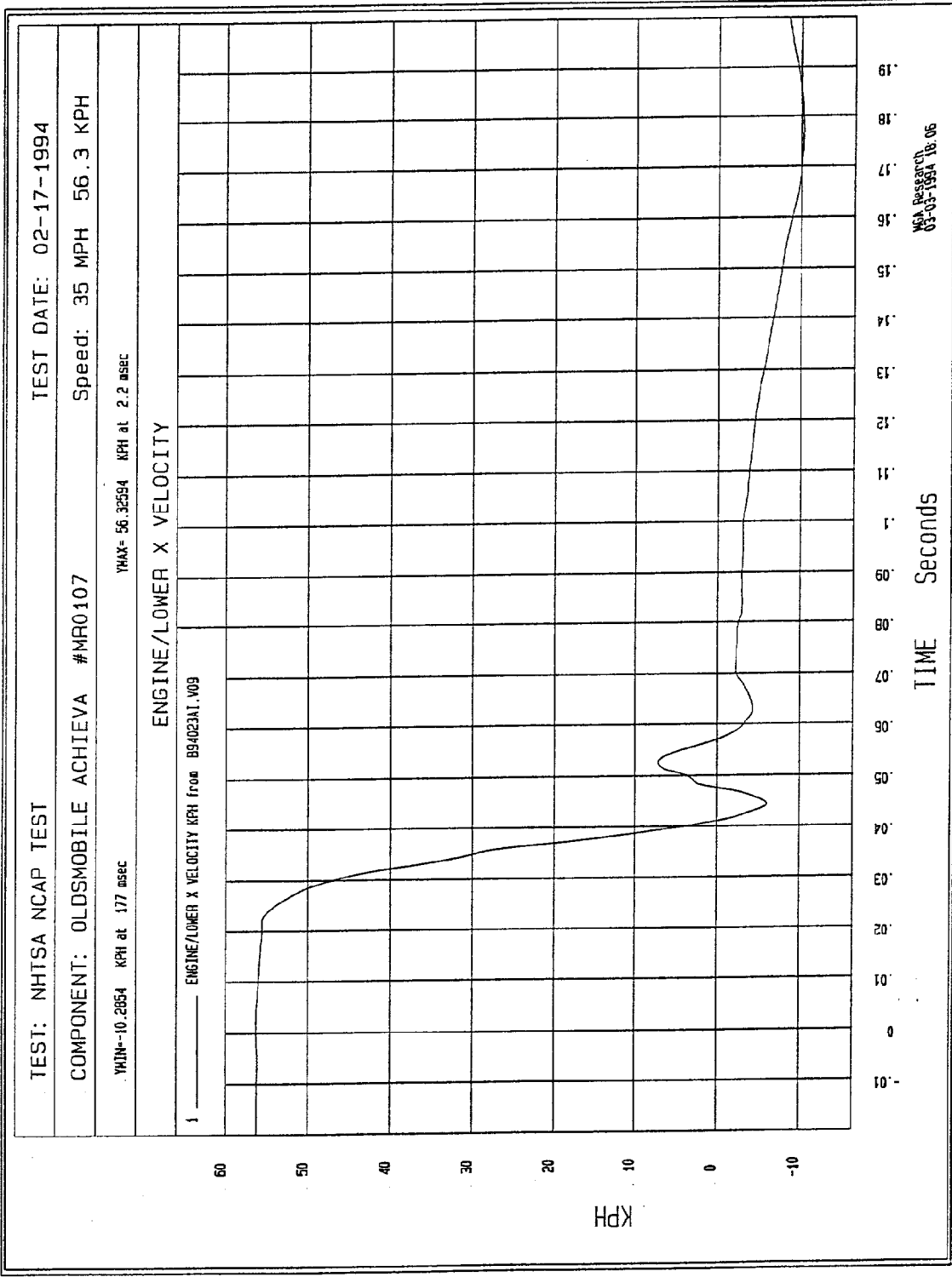


Figure B-17 - Bottom of Engine Block X Velocity vs. Time

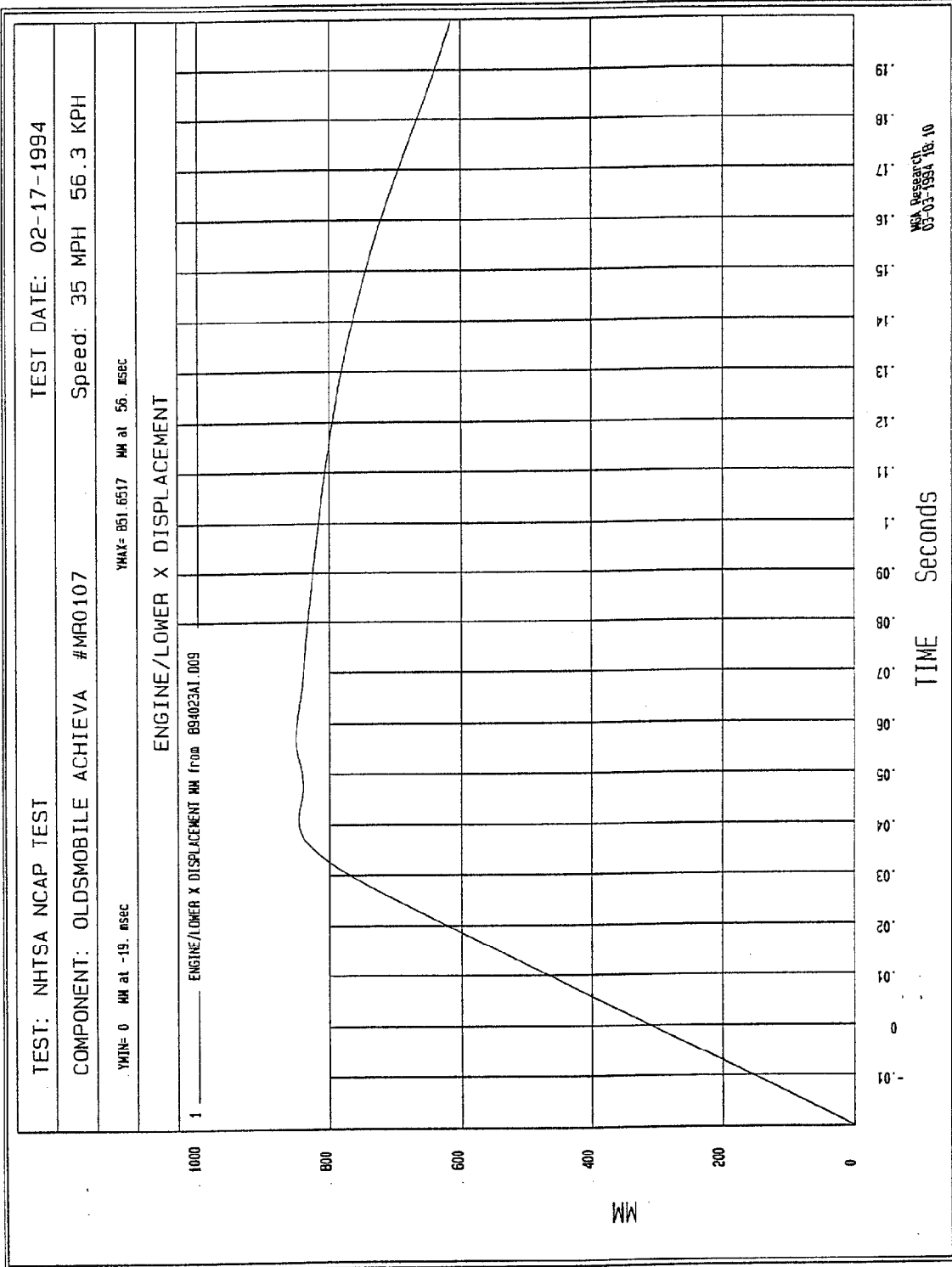


Figure B-18 - Bottom of Engine Block X Displacement vs. Time

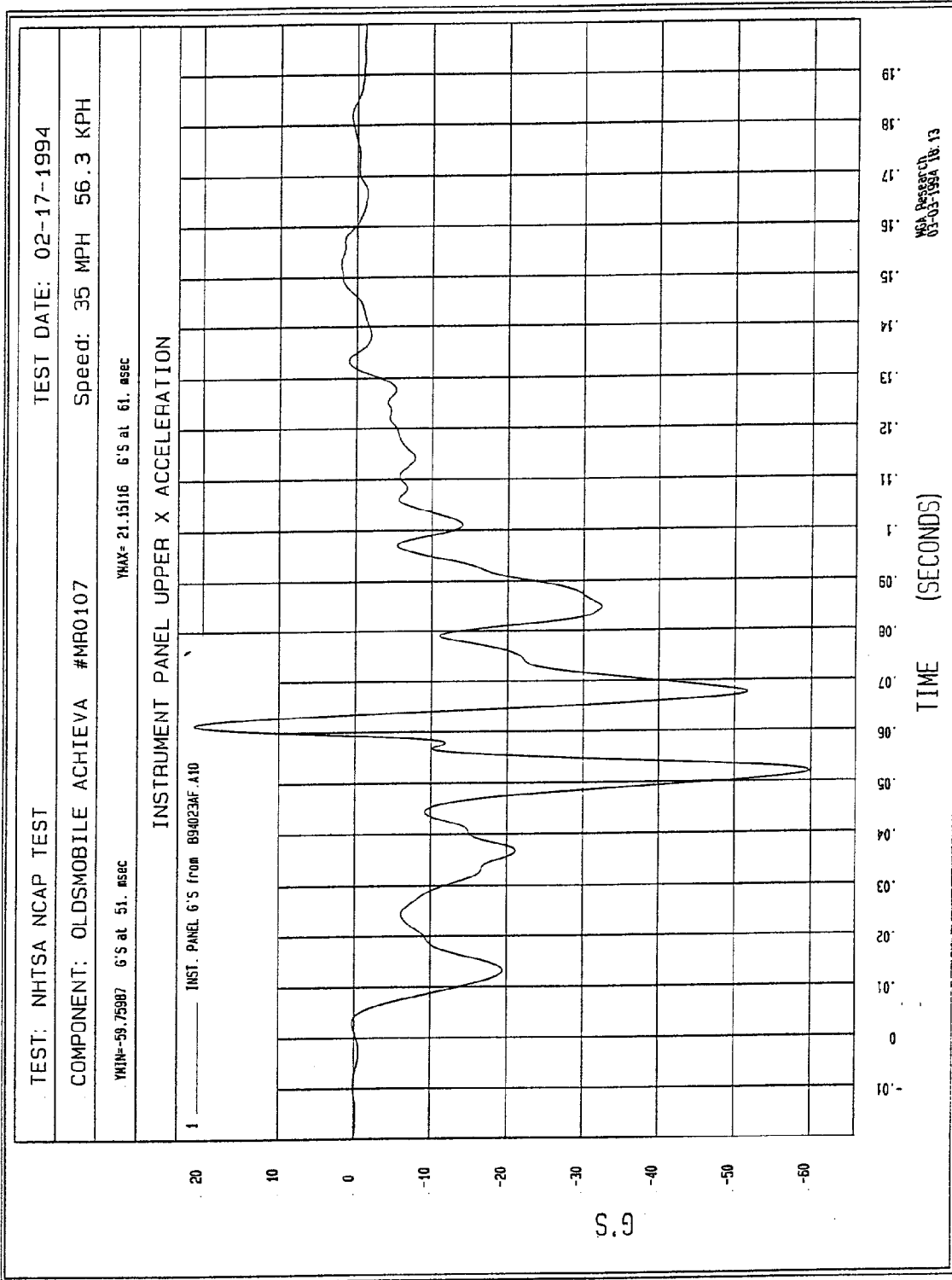


Figure B-19 - Instrument Panel X Acceleration vs. Time

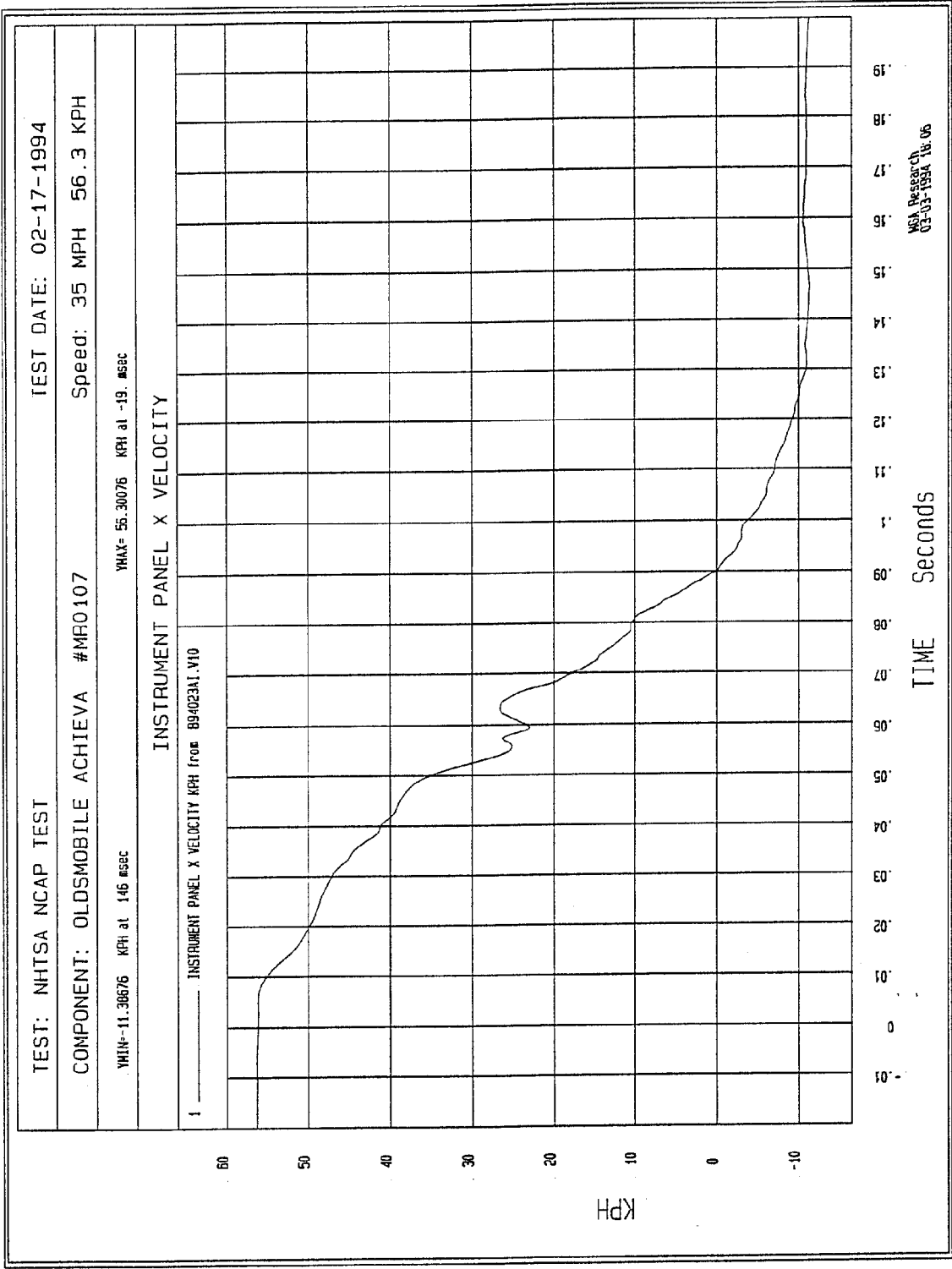


Figure B-20 - Instrument Panel X Velocity vs. Time

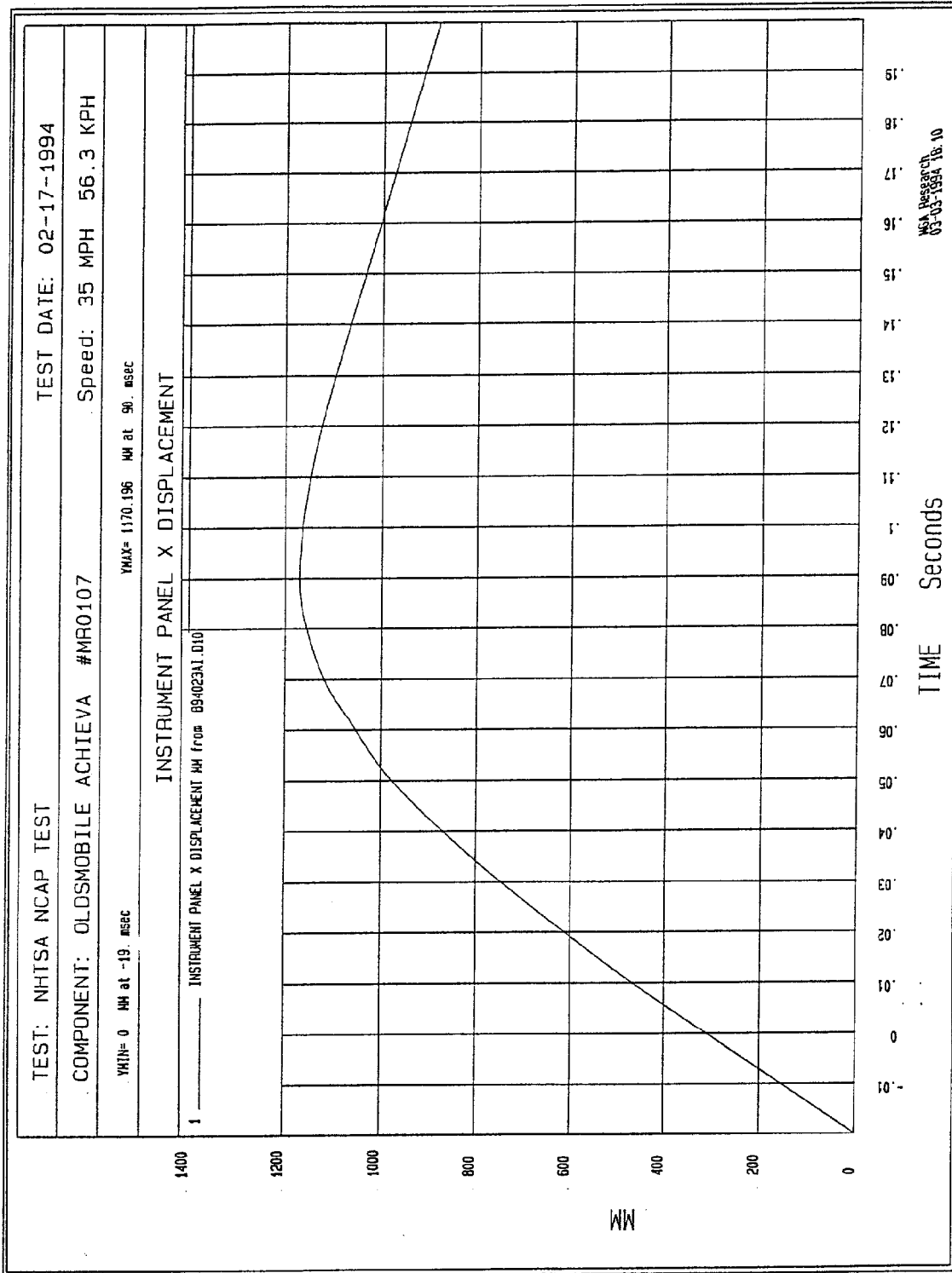
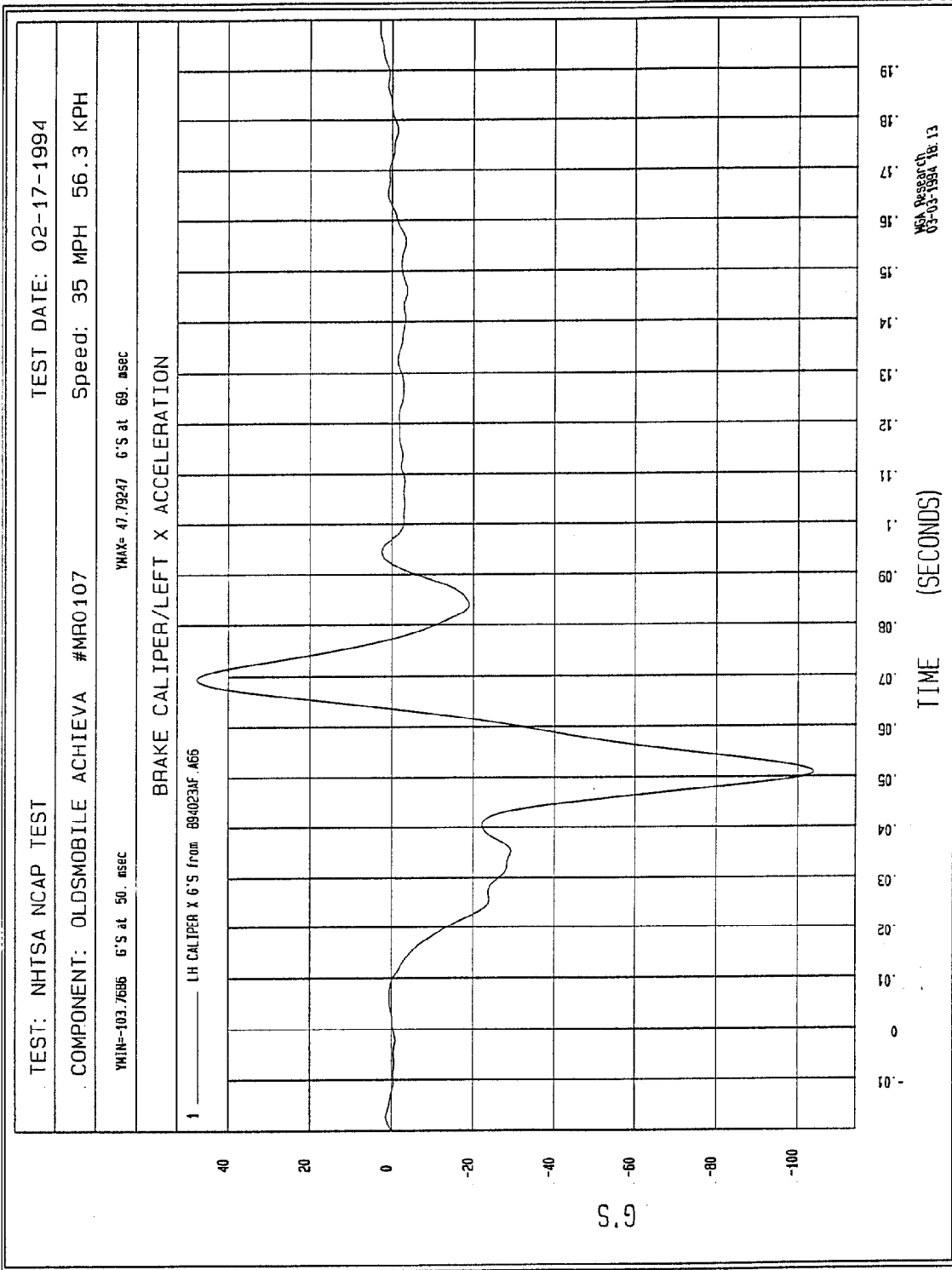


Figure B-21 - Instrument Panel X Displacement vs. Time



B-22

Figure B-22 - Left Brake Caliper X Acceleration vs. Time

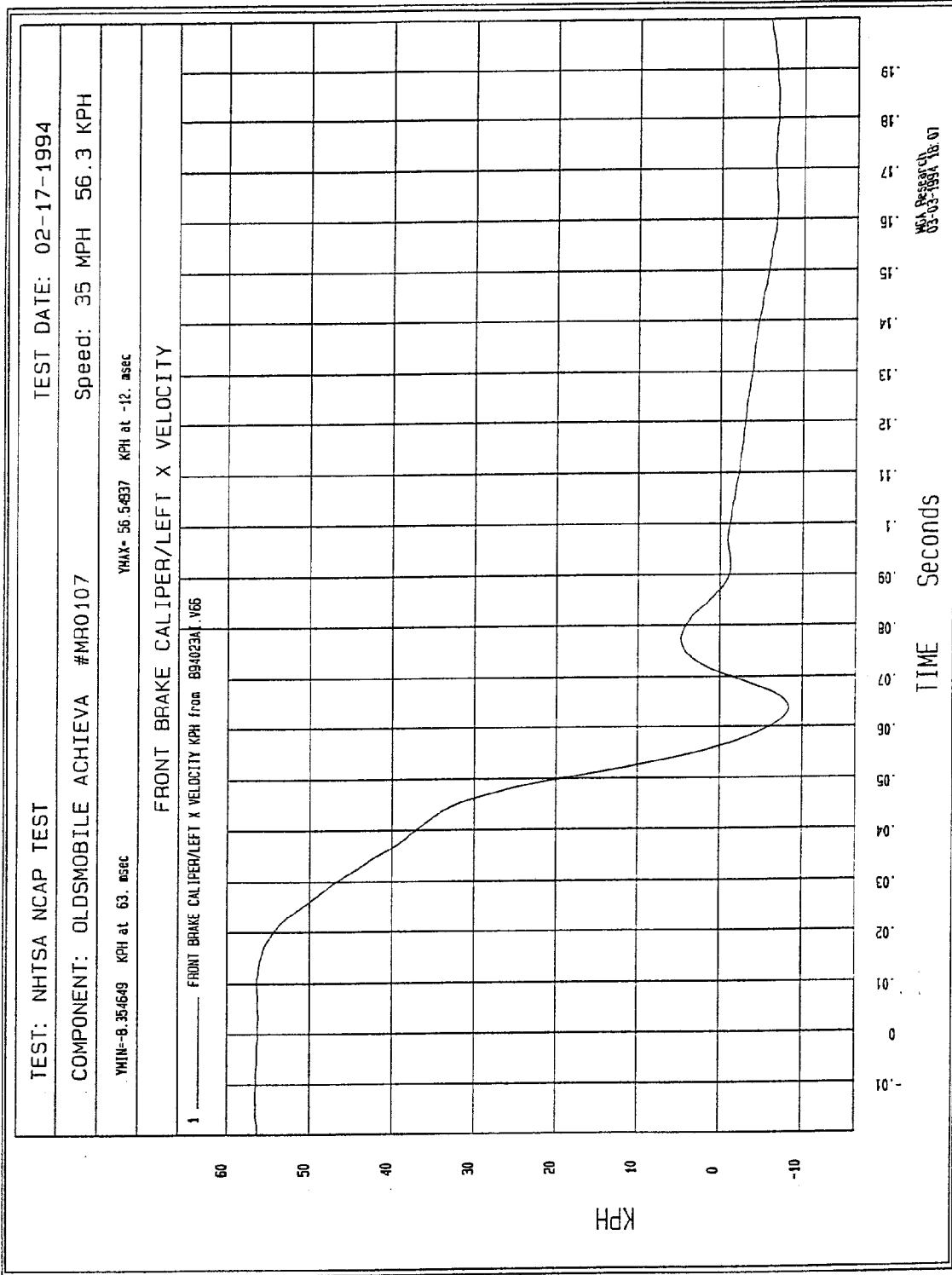


Figure B-23 - Left Brake Caliper X Velocity vs. Time

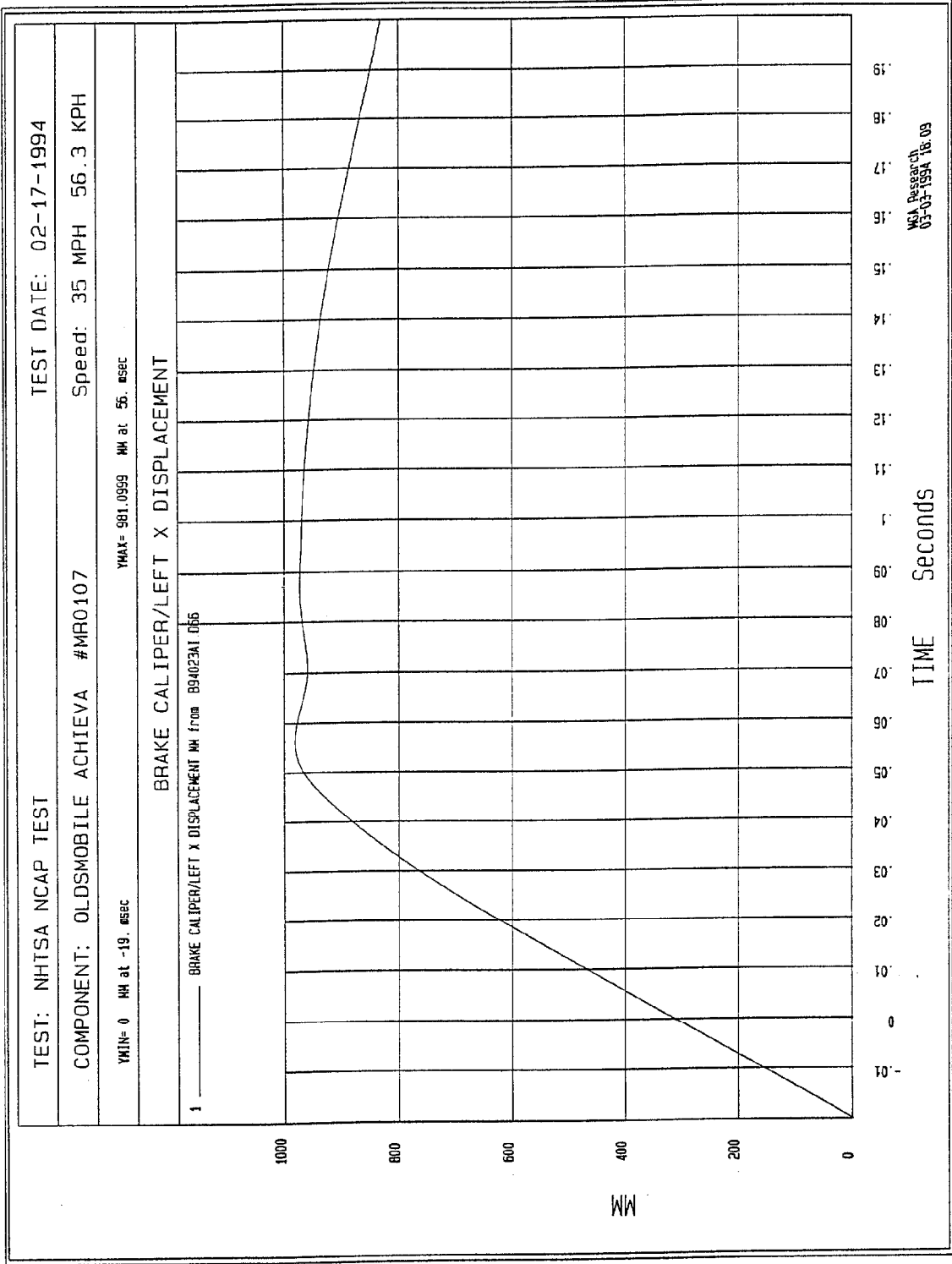


Figure B-24 - Left Brake Caliper X Displacement vs. Time

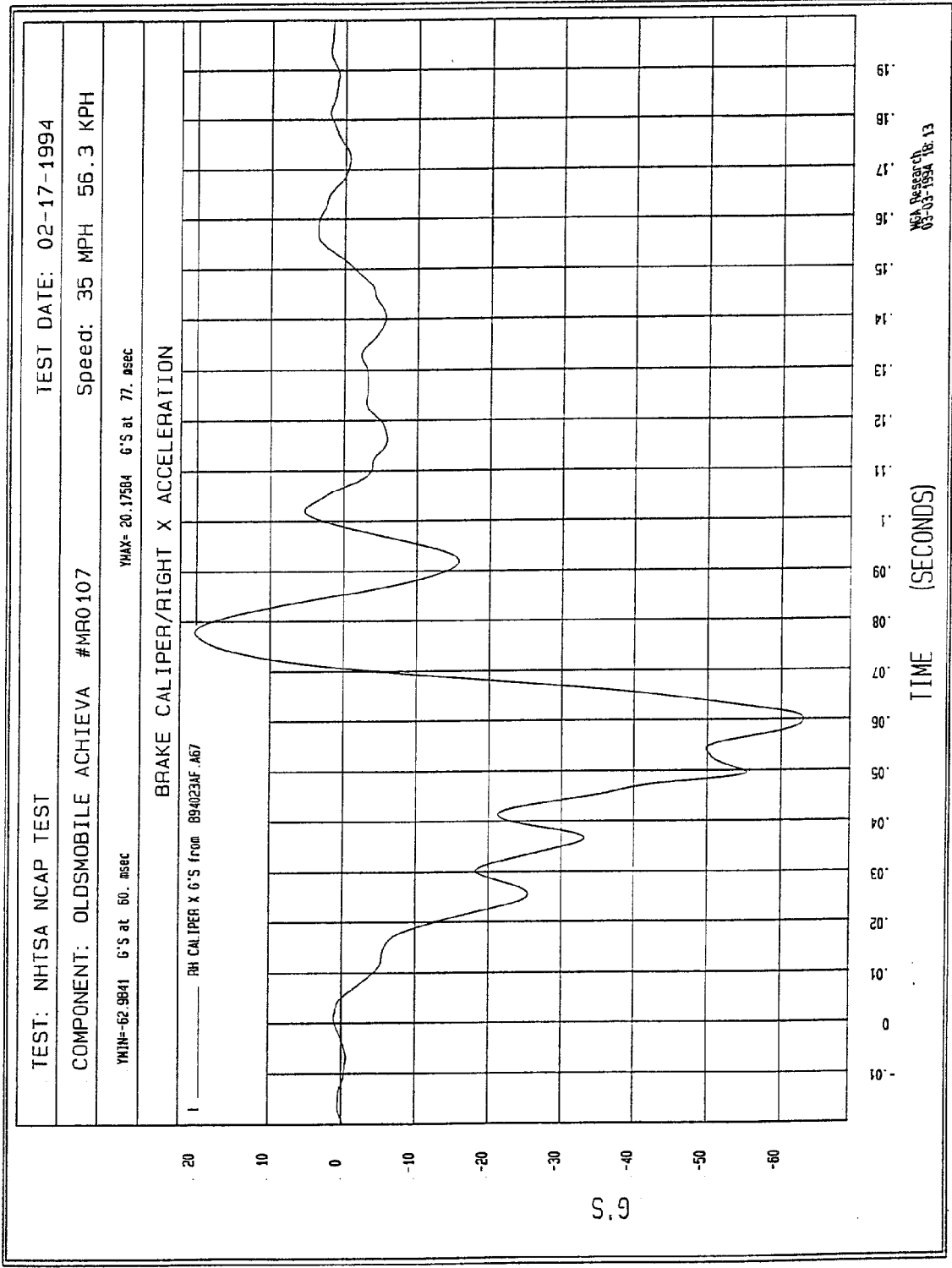
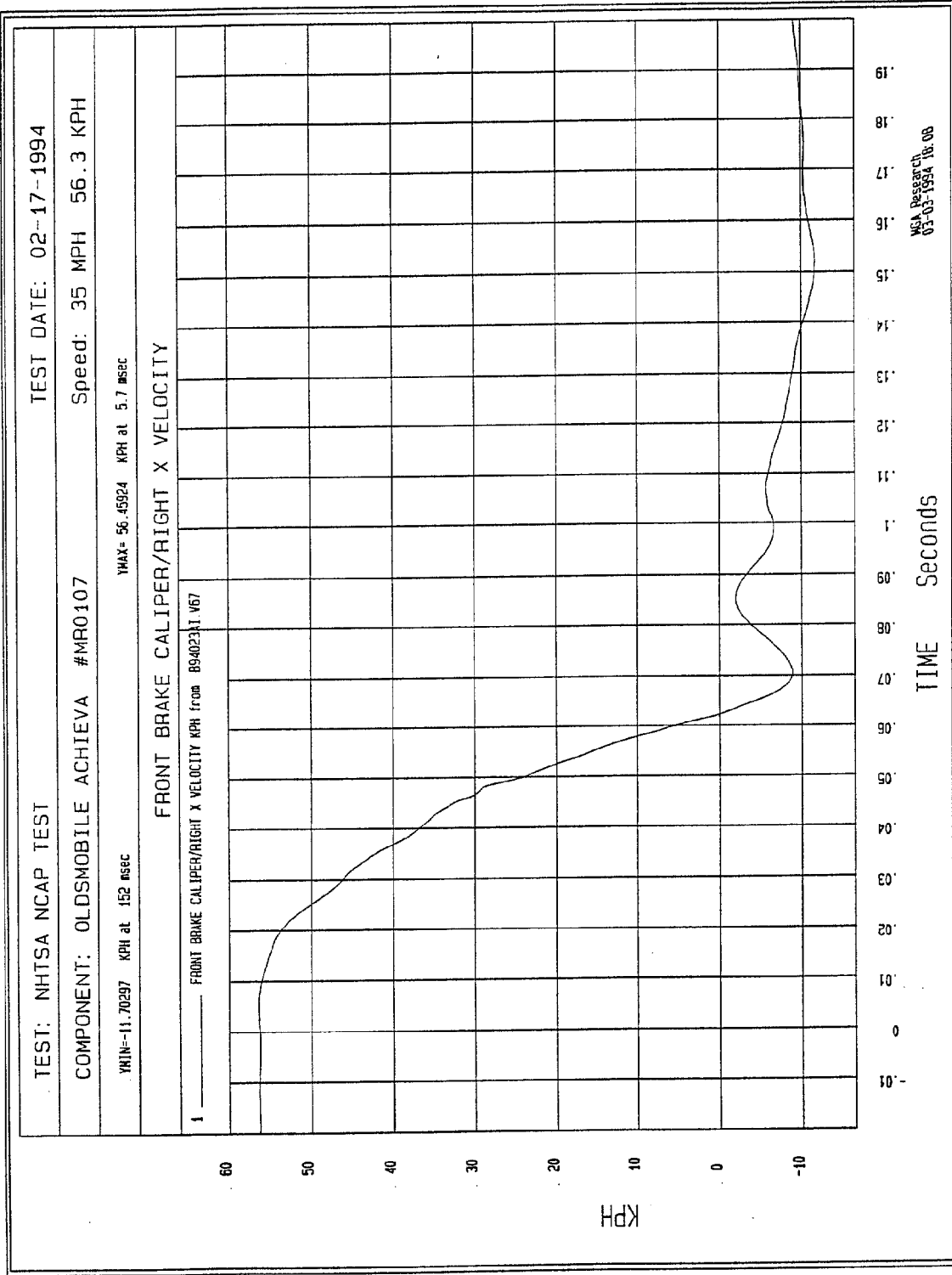


Figure B-25 - Right Brake Caliper X Acceleration vs. Time



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03-03-1994 10:00

Figure B-26 - Right Brake Caliper X Velocity vs. Time

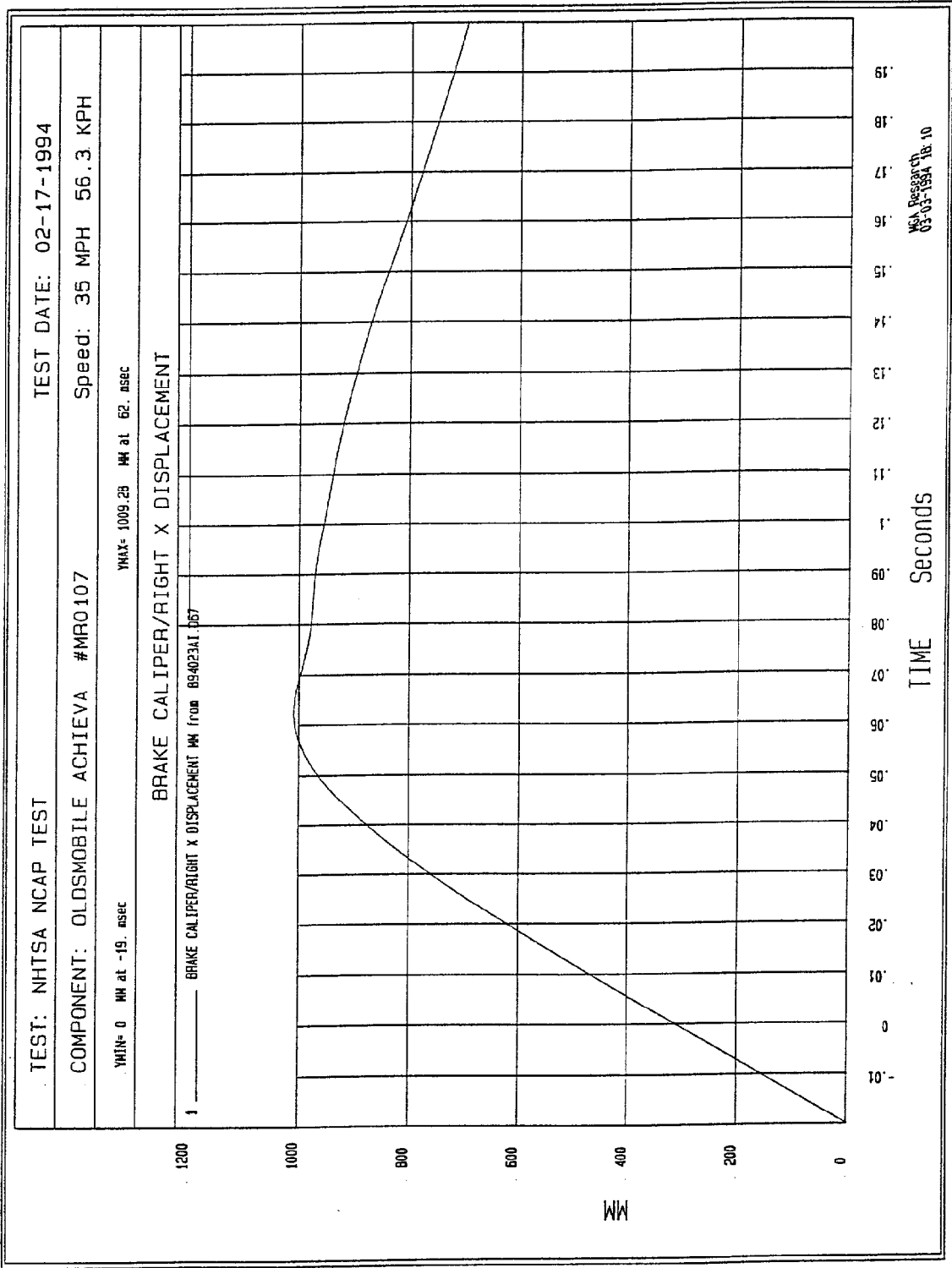


Figure B-27 - Right Brake Caliper X Displacement vs. Time

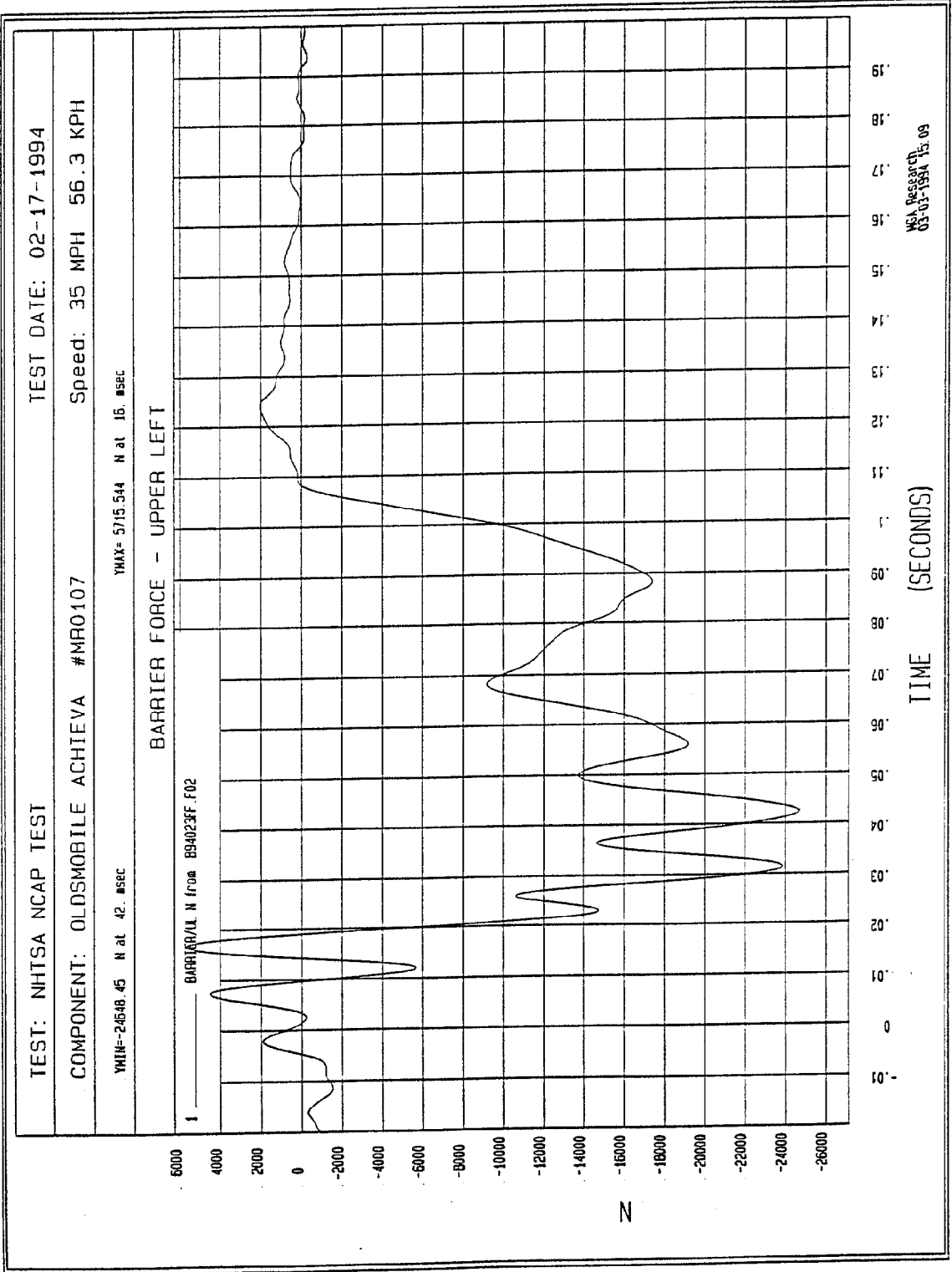
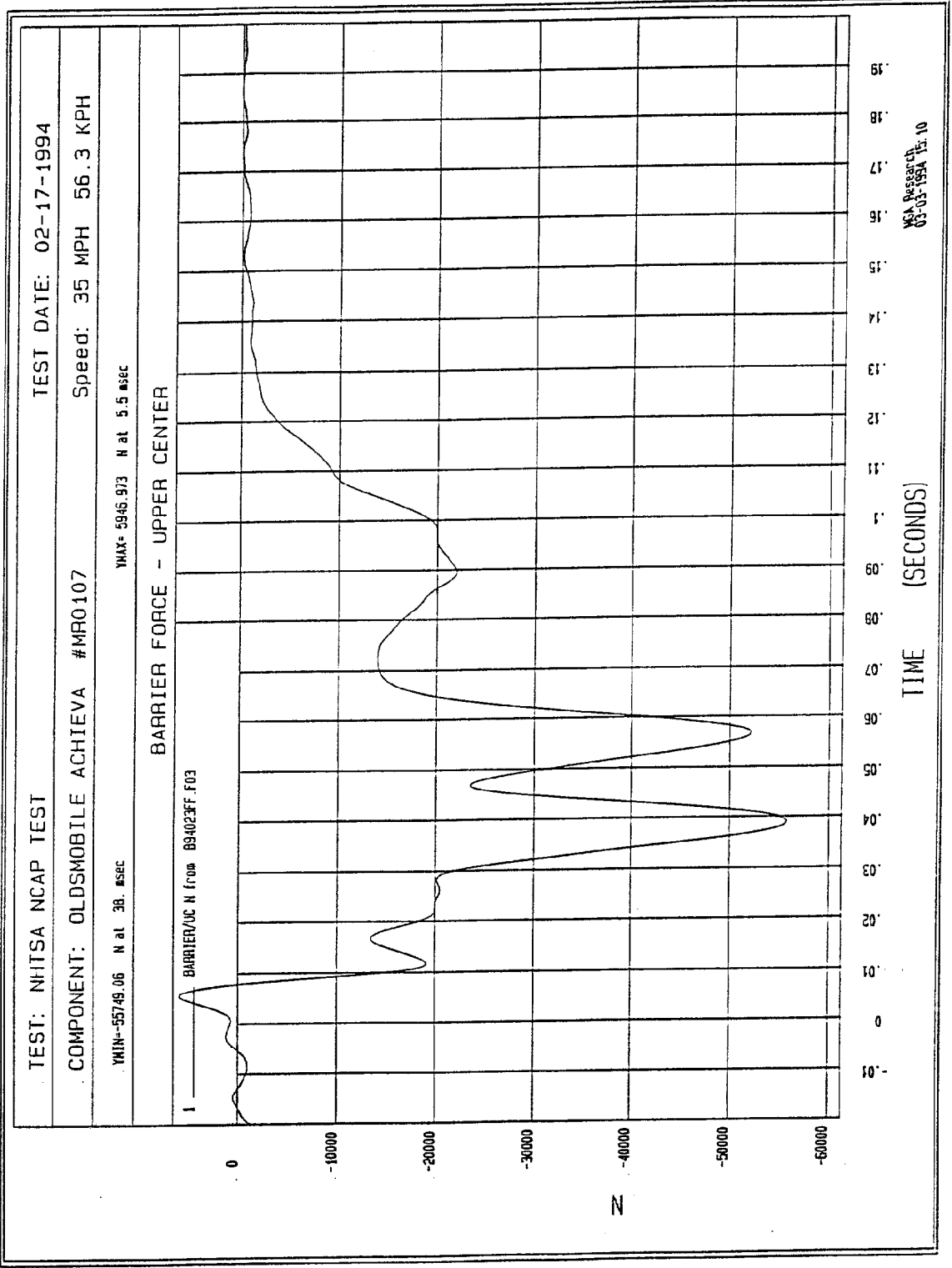
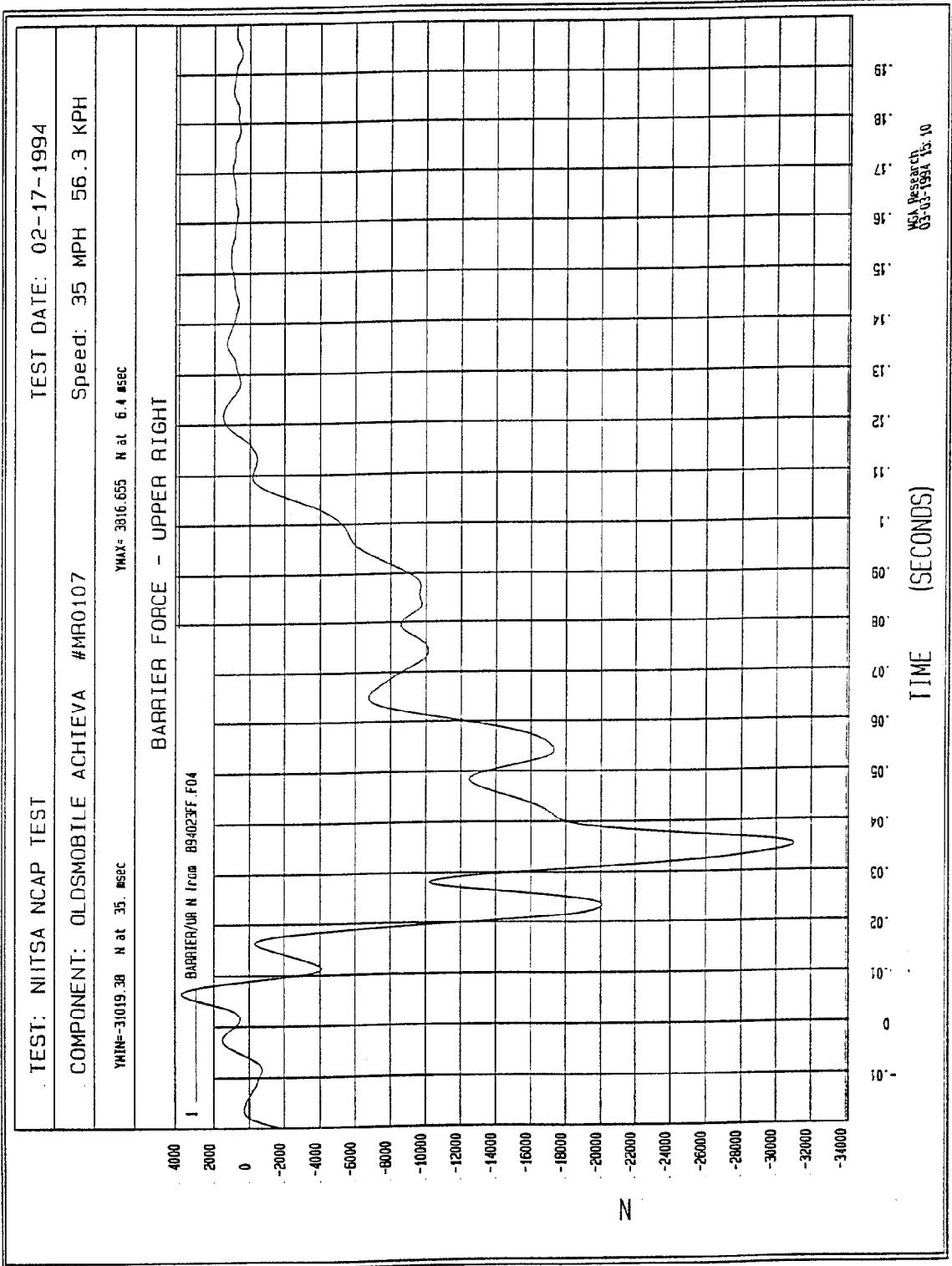


Figure B-28 - Upper Left Barrier Force vs. Time



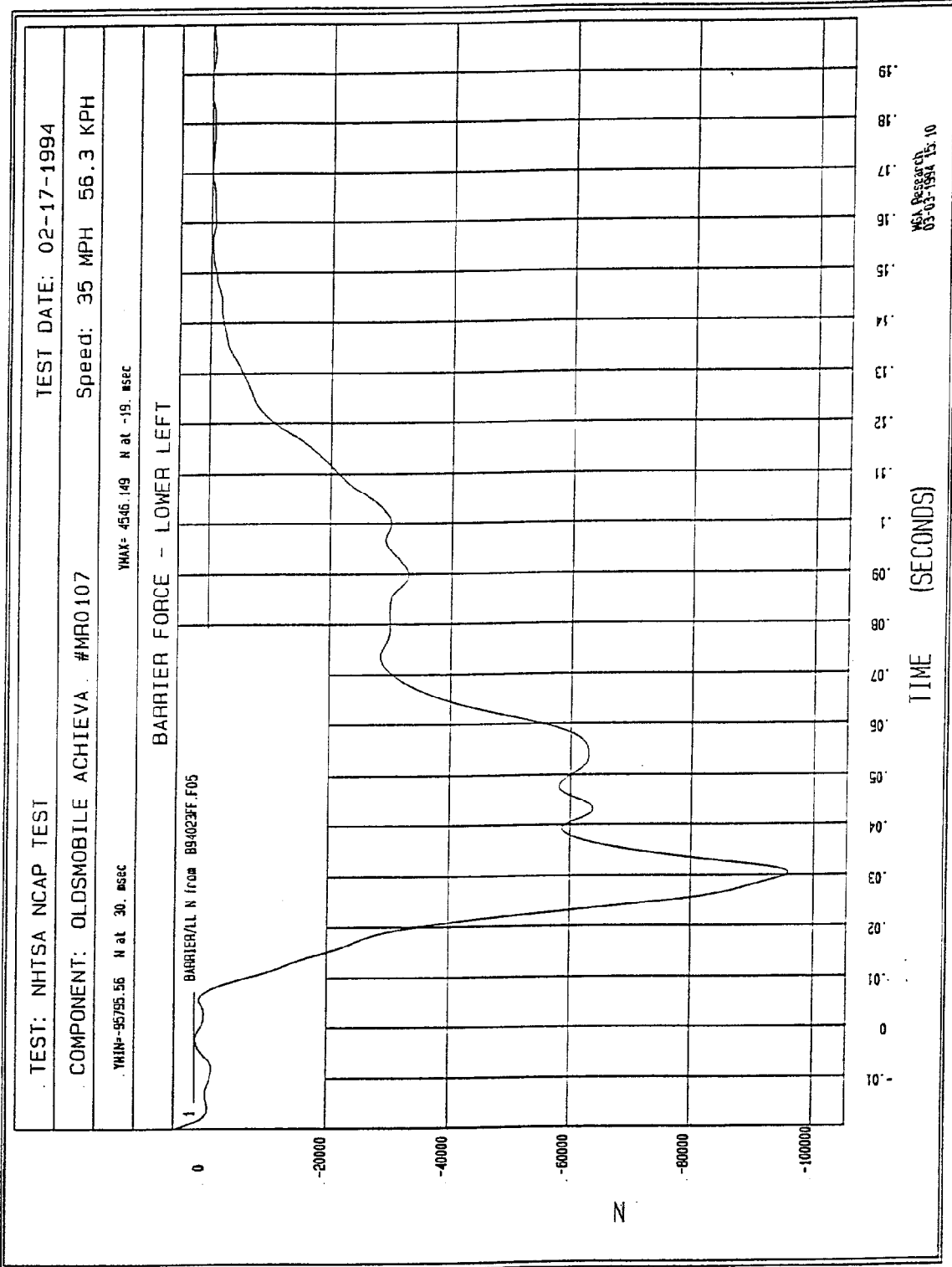
MCA Research
02-03-1994 15.10

Figure B-29 - Upper Center Barrier Force vs. Time



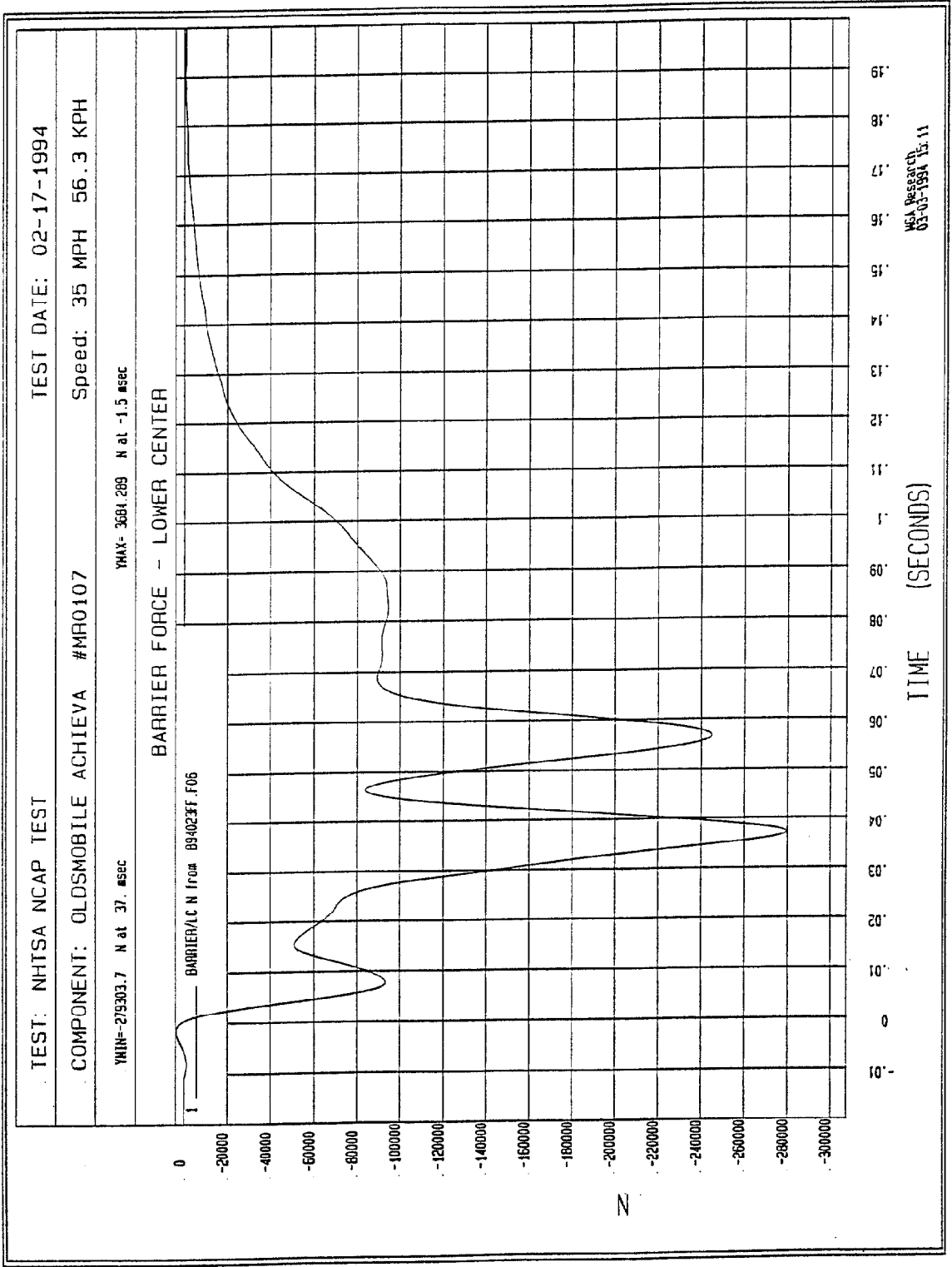
B-30

Figure B-30 - Upper Right Barrier Force vs. Time



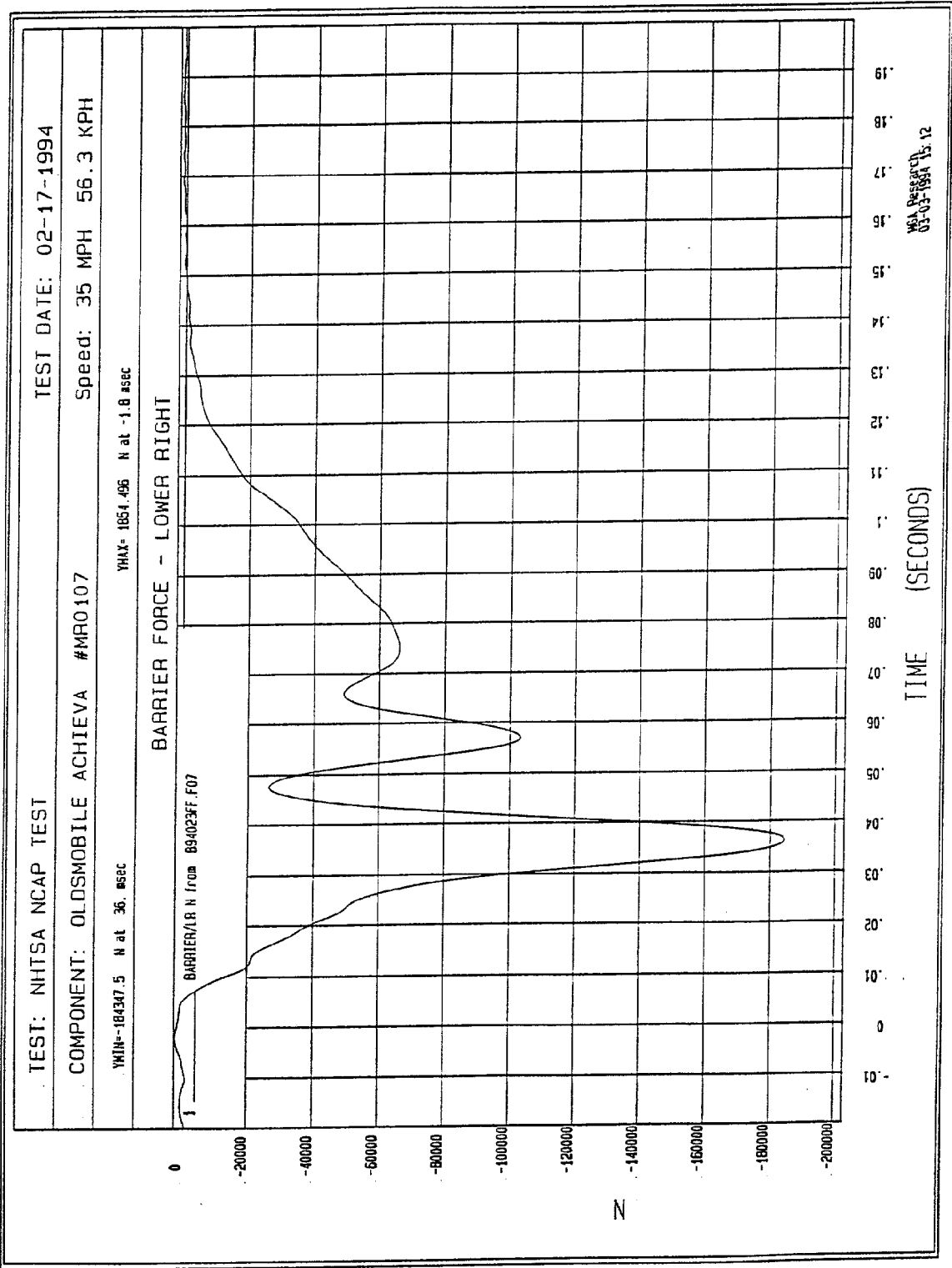
MSA Research
03-03-1994 15.10

Figure B-31 - Lower Left Barrier Force vs. Time



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 03-05-1994 11:11

Figure B-32 - Lower Center Barrier Force vs. Time



NHTSA Research
 03-03-1994 13.12

Figure B-33 - Lower Right Barrier Force vs. Time

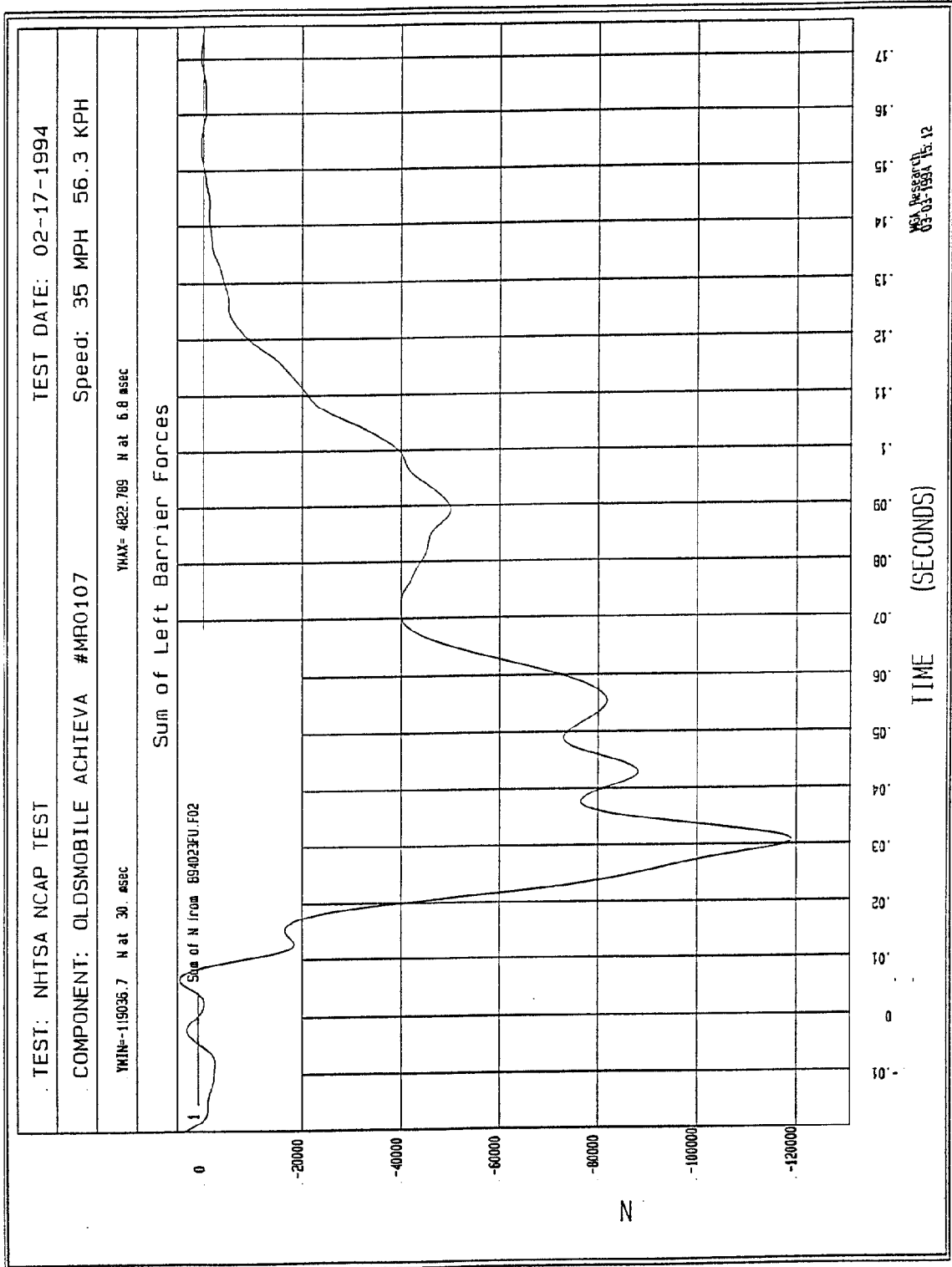


Figure B-34 - Sum of Left Barrier Forces vs. Time

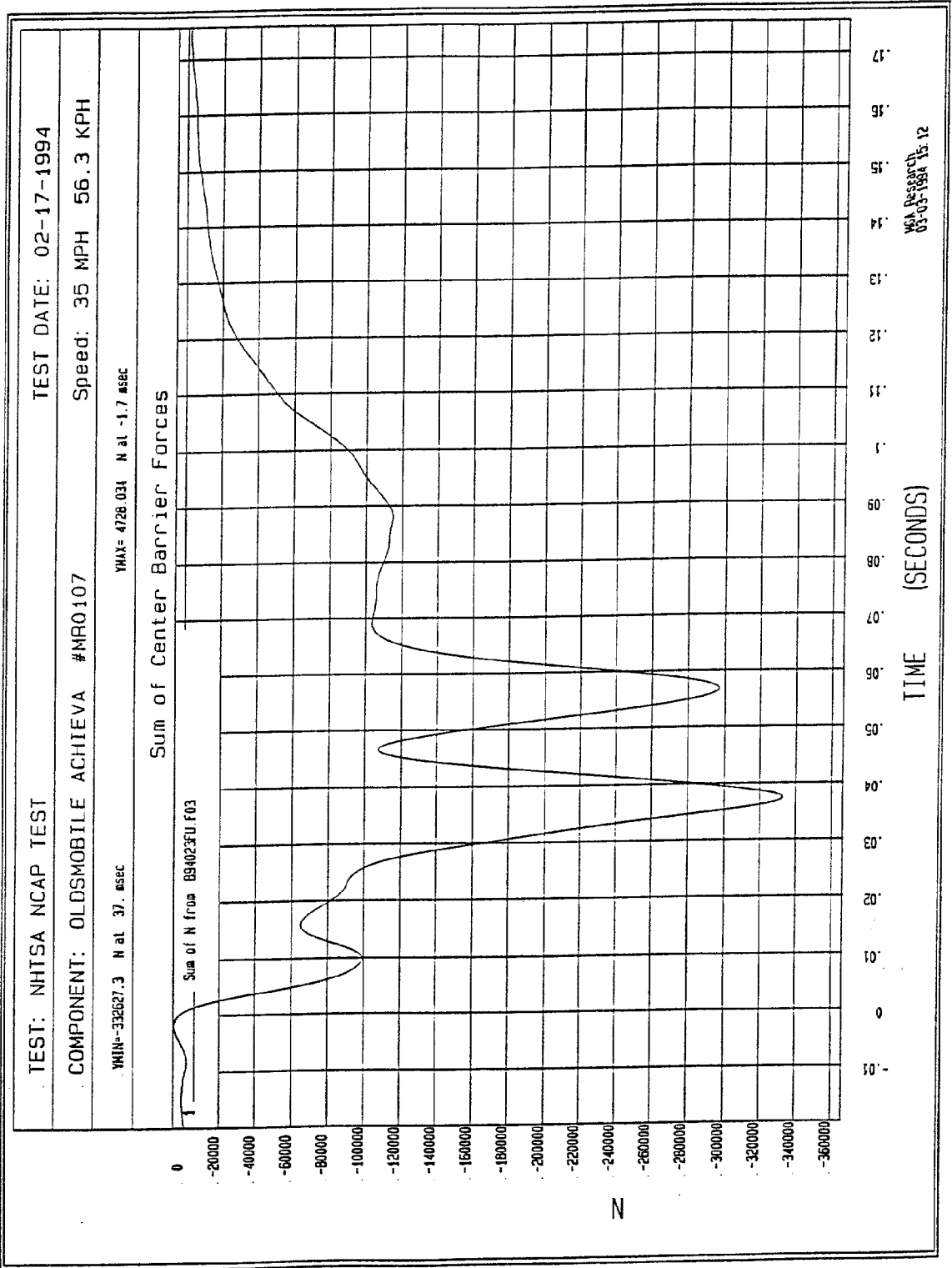
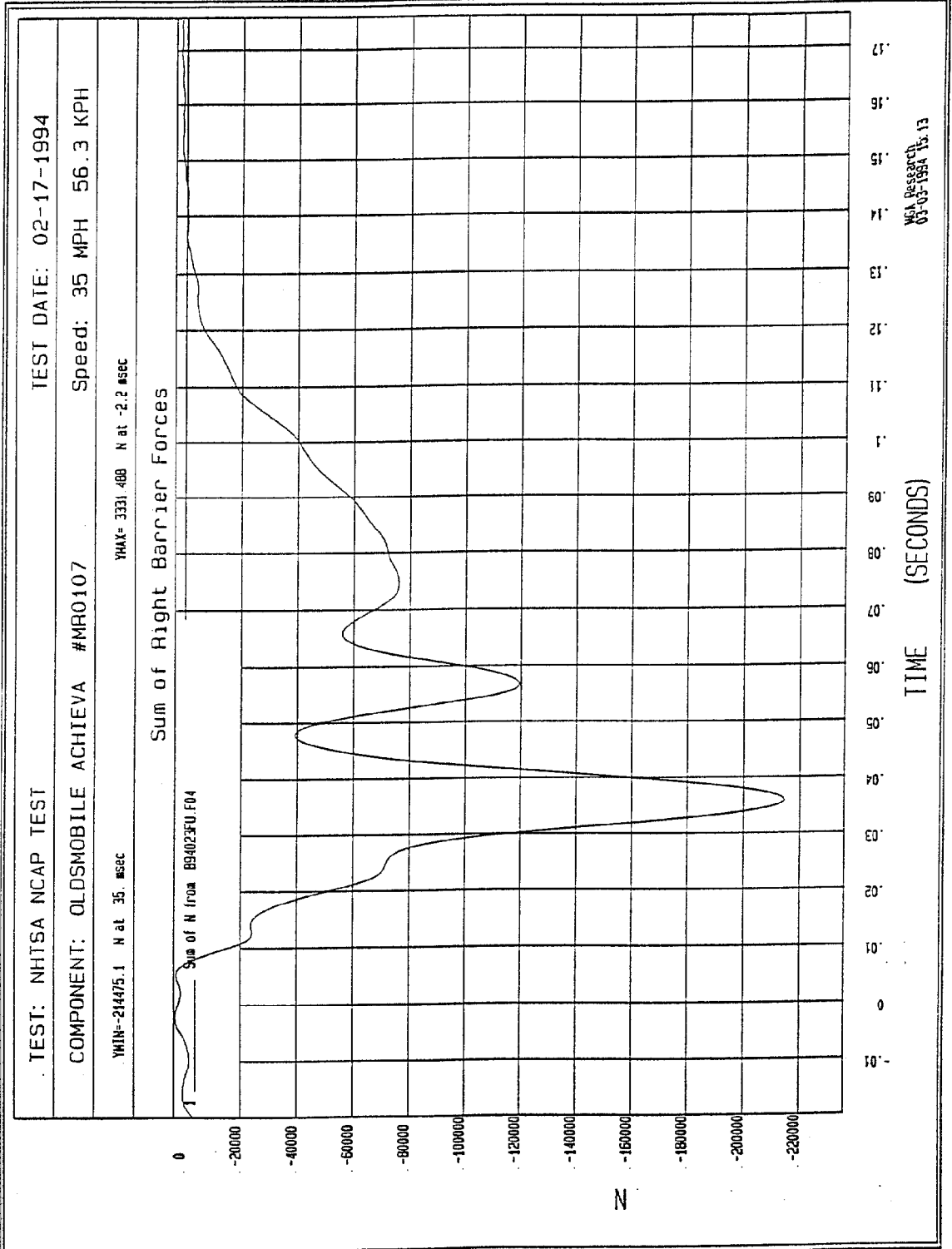


Figure B-35 - Sum of Center Barrier Forces vs. Time



NCA Research
 03-05-1994 13.13

Figure B-36 -- Sum of Right Barrier Forces vs. Time

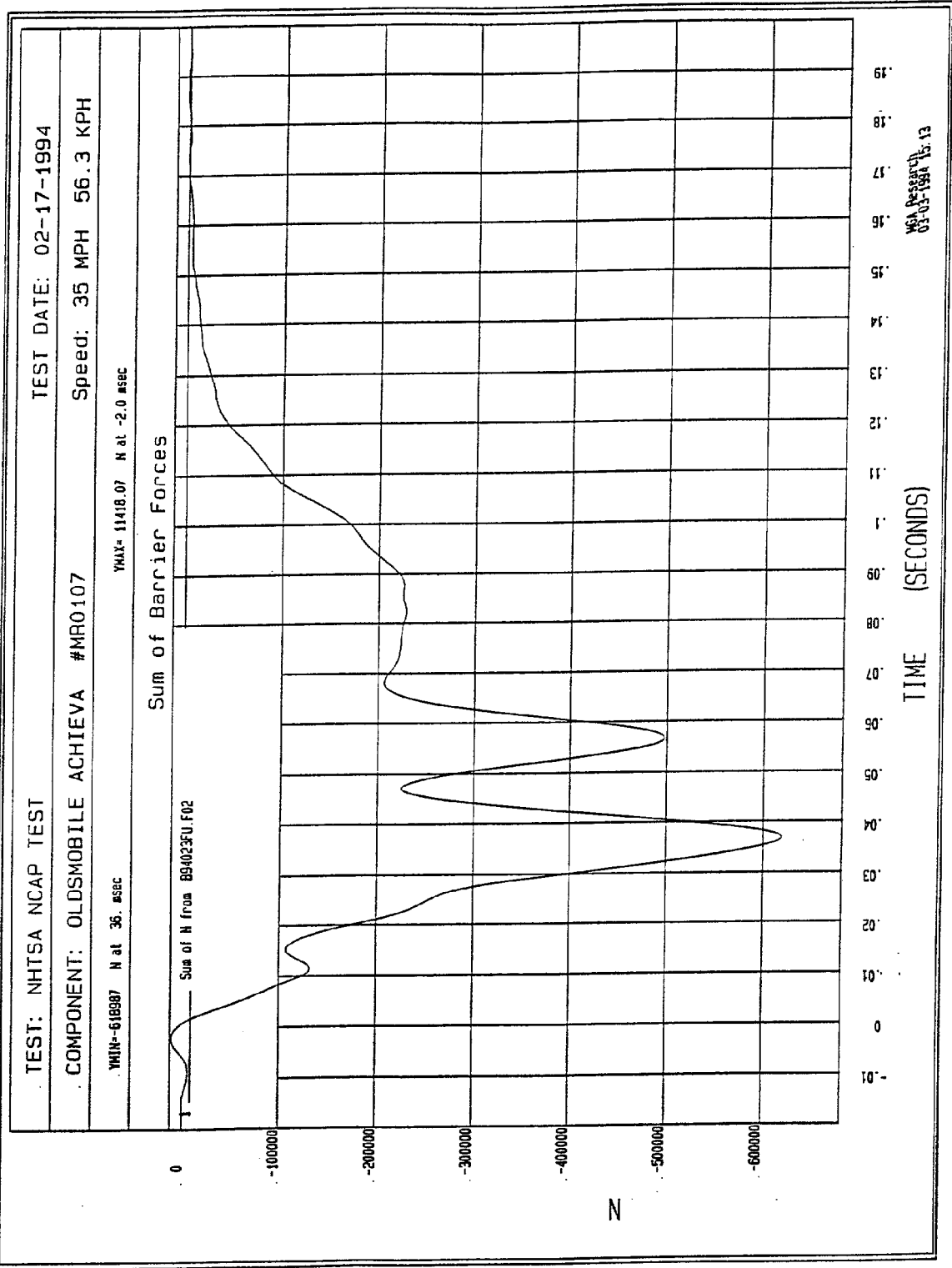


Figure B-37 - Sum of Barrier Forces vs. Time

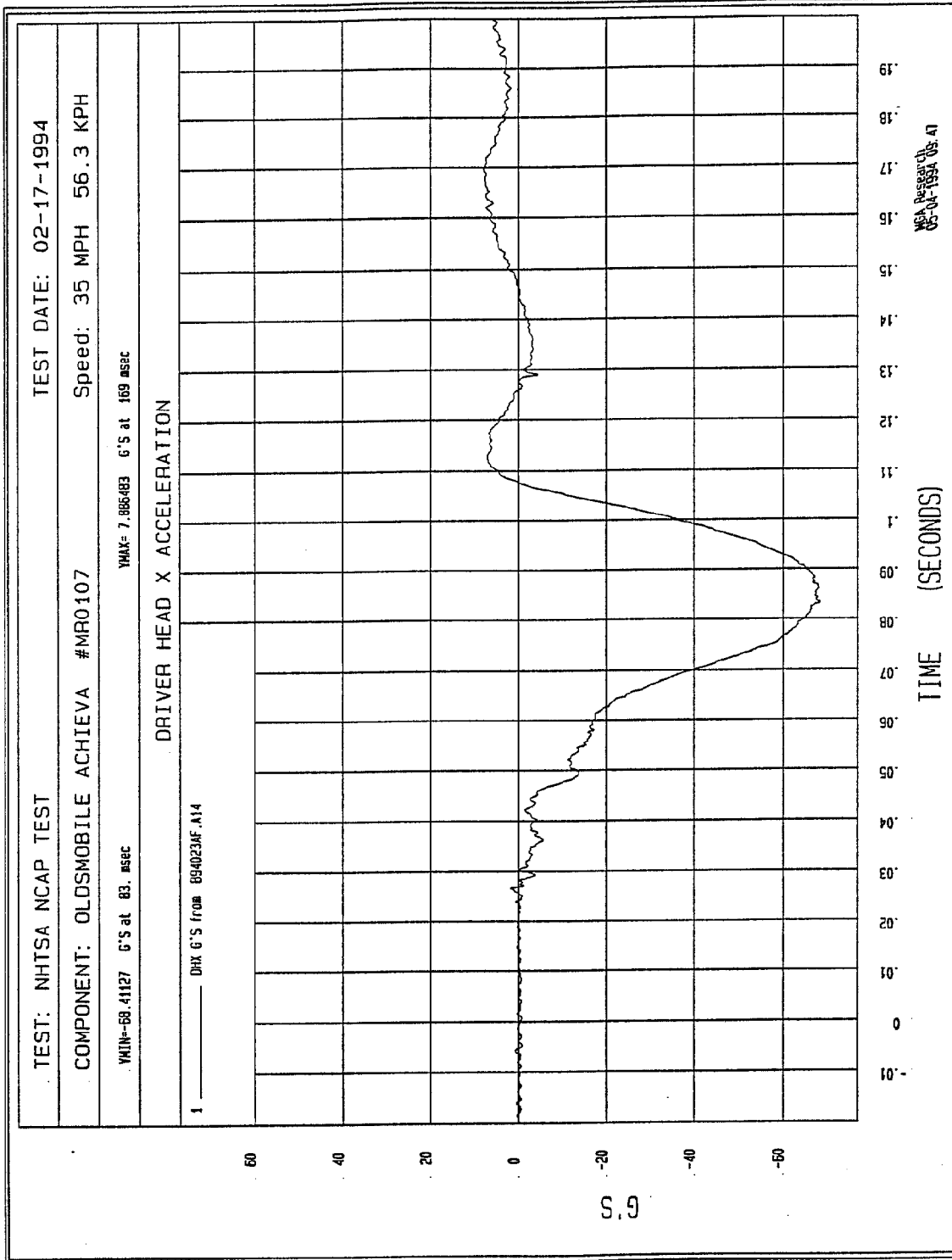


Figure B-38 - Driver Head X Acceleration vs. Time

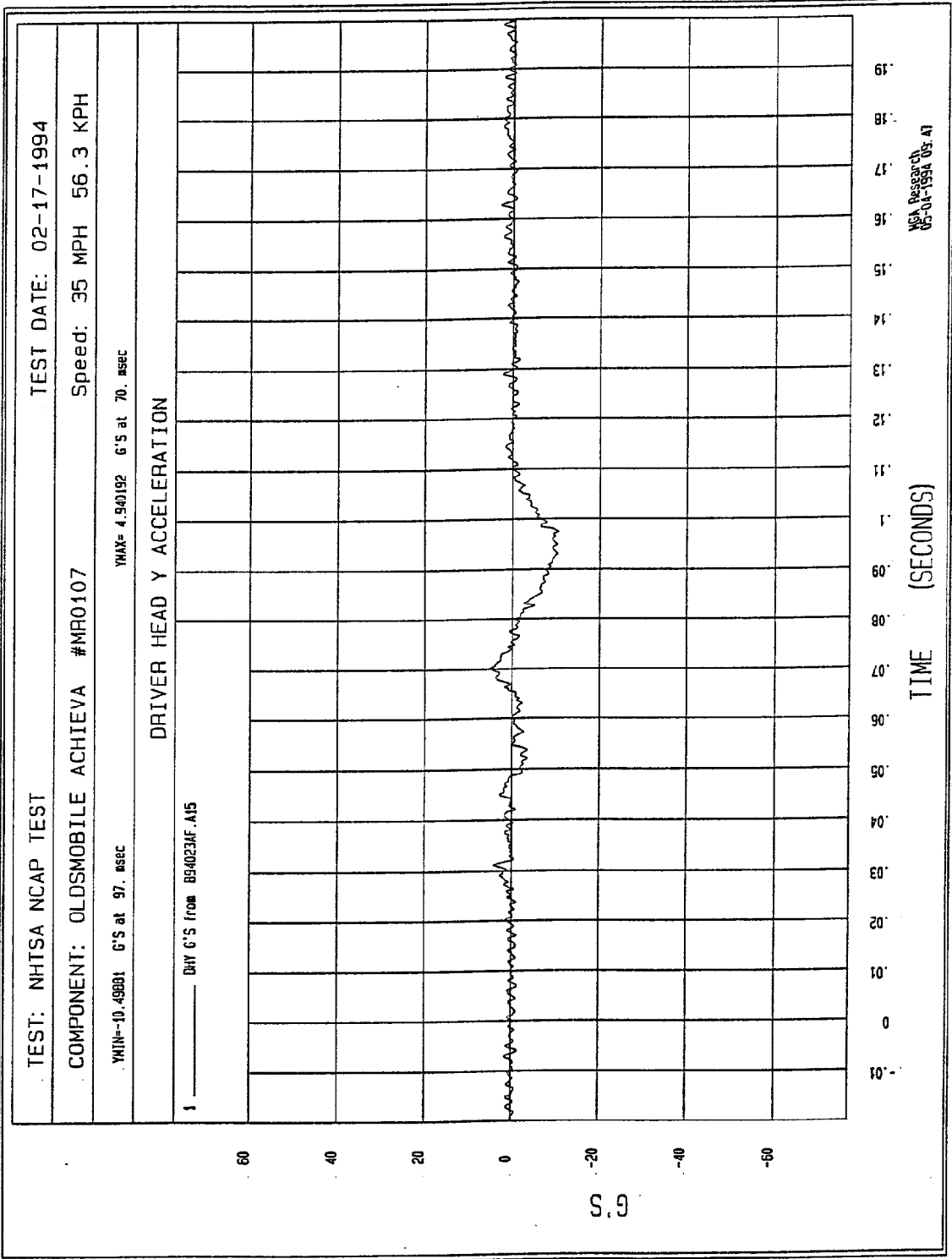
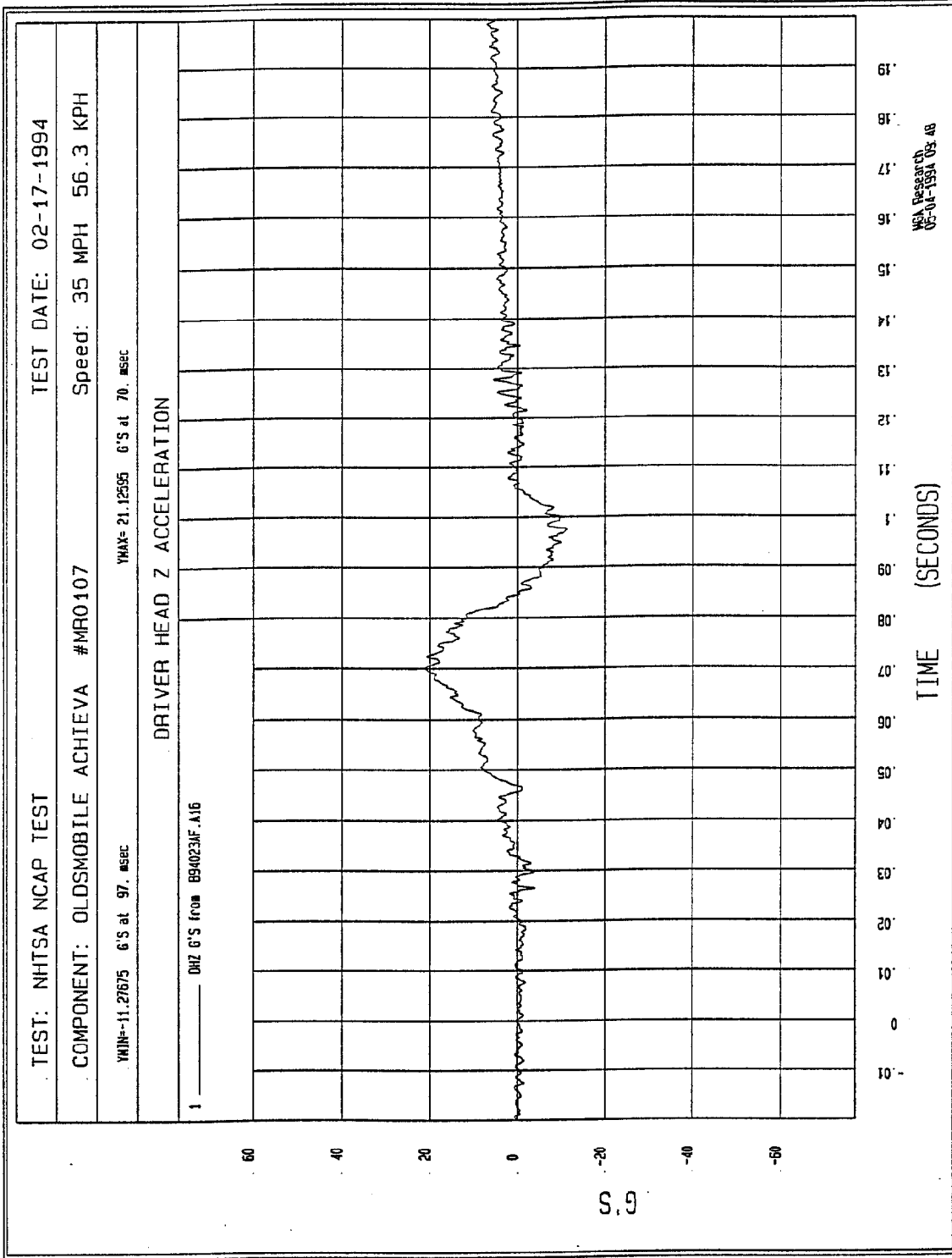


Figure B-39 - Driver Head Y Acceleration vs. Time



B-40

Figure B-40 - Driver Head Z Acceleration vs. Time

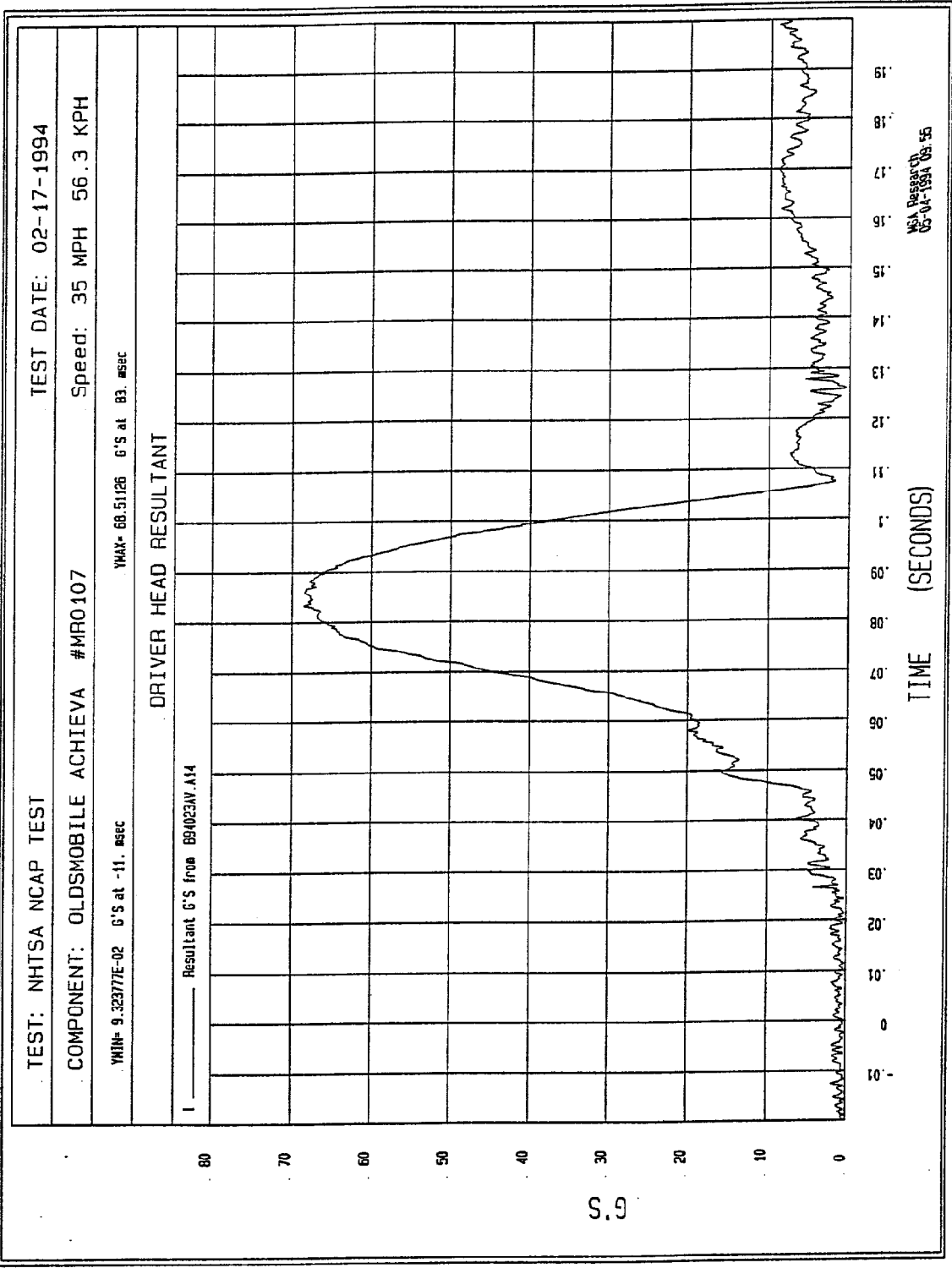
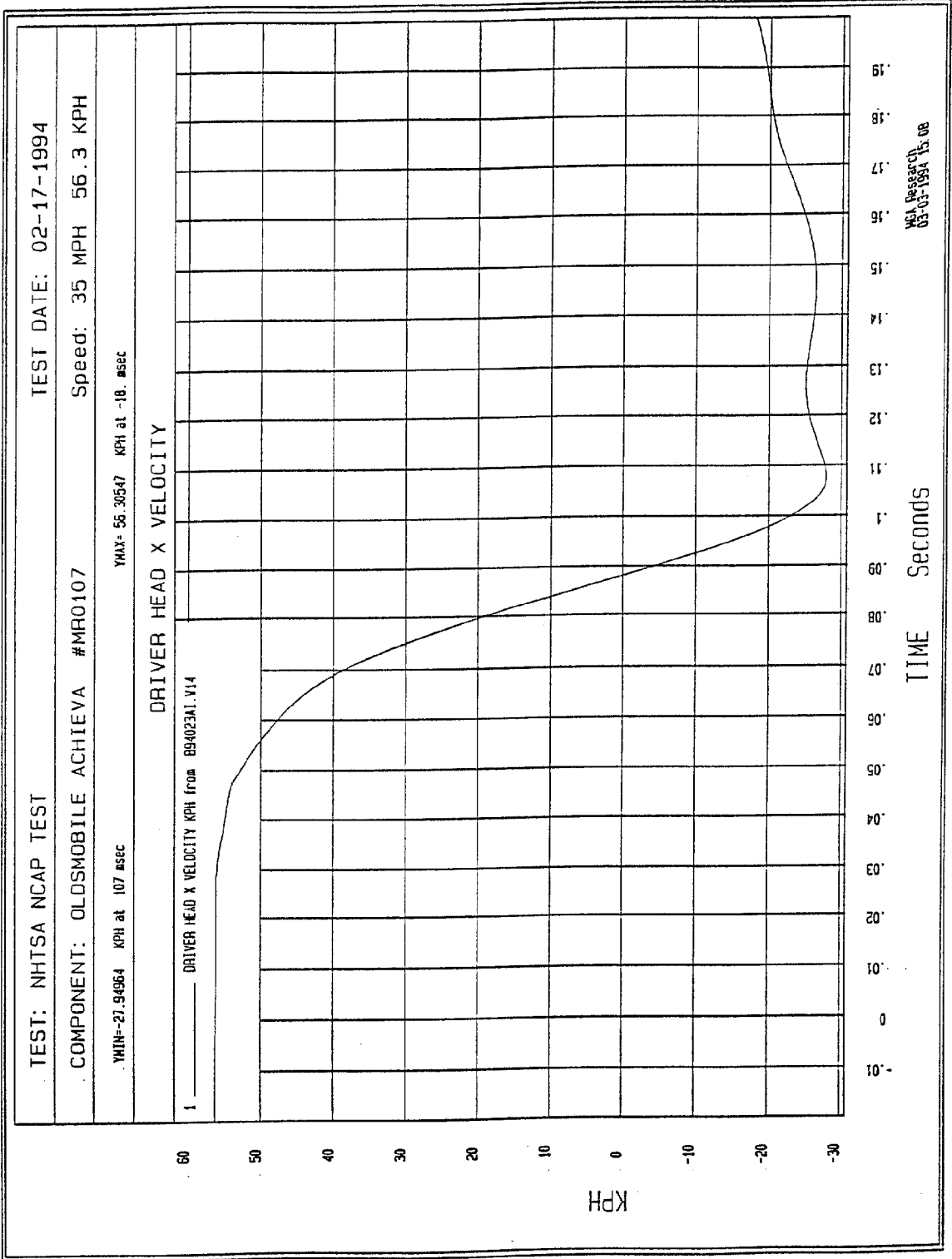


Figure B-41 - Driver Head Resultant Acceleration vs. Time



B-42

Figure B-42 - Driver Head X Velocity vs. Time

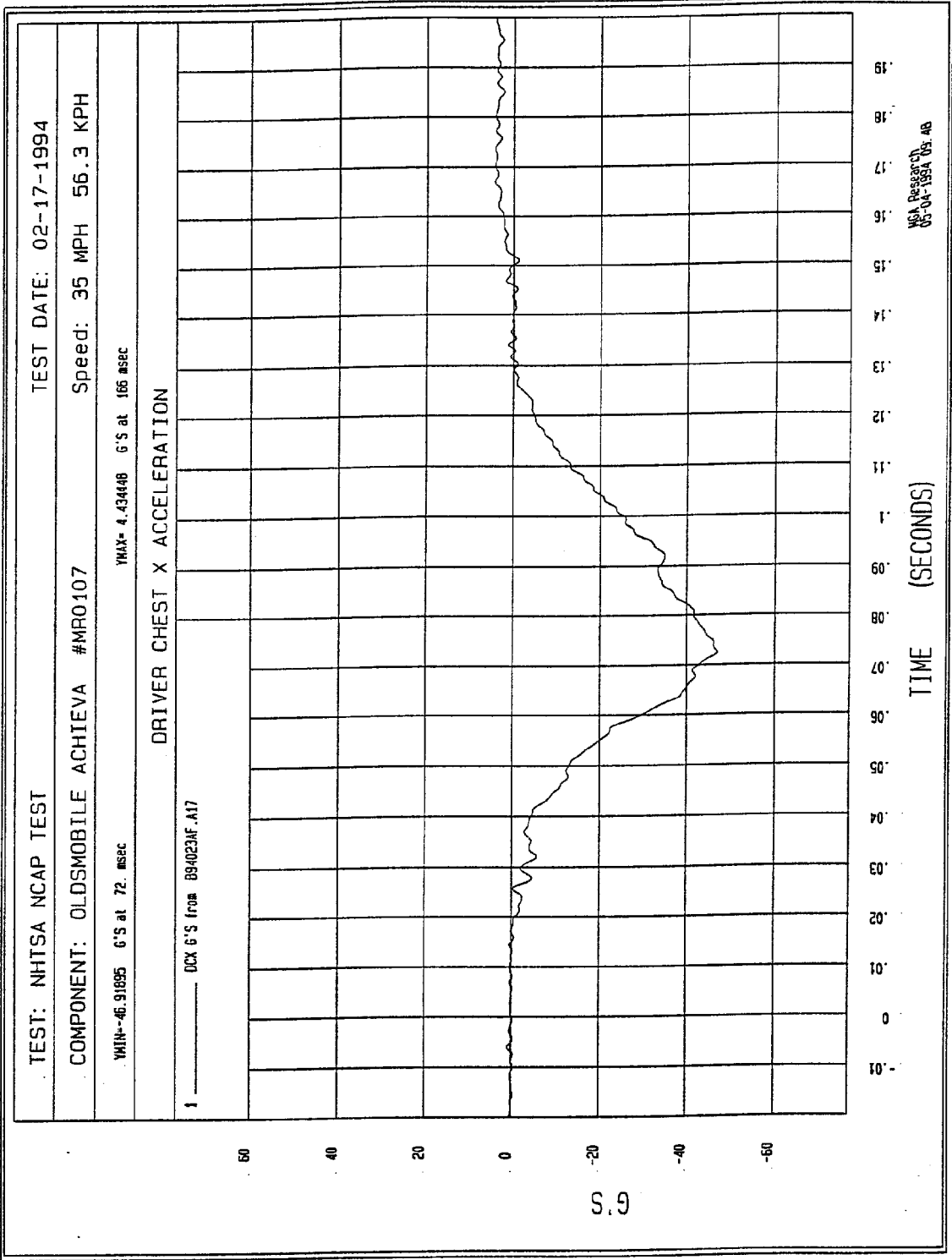


Figure B-43 - Driver Chest X Acceleration vs. Time

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 05-04-1994 05.48

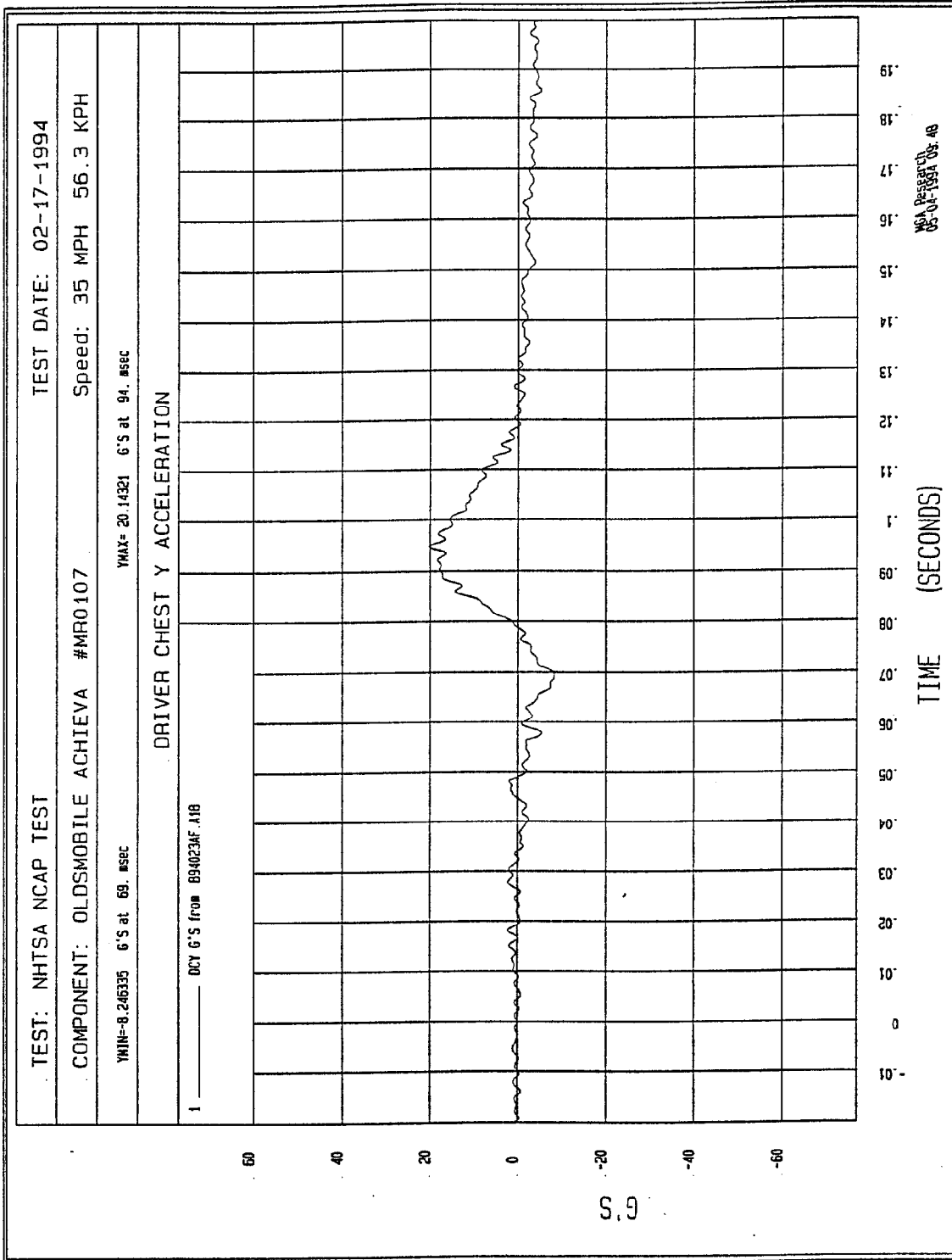


Figure B-44 - Driver Chest Y Acceleration vs. Time

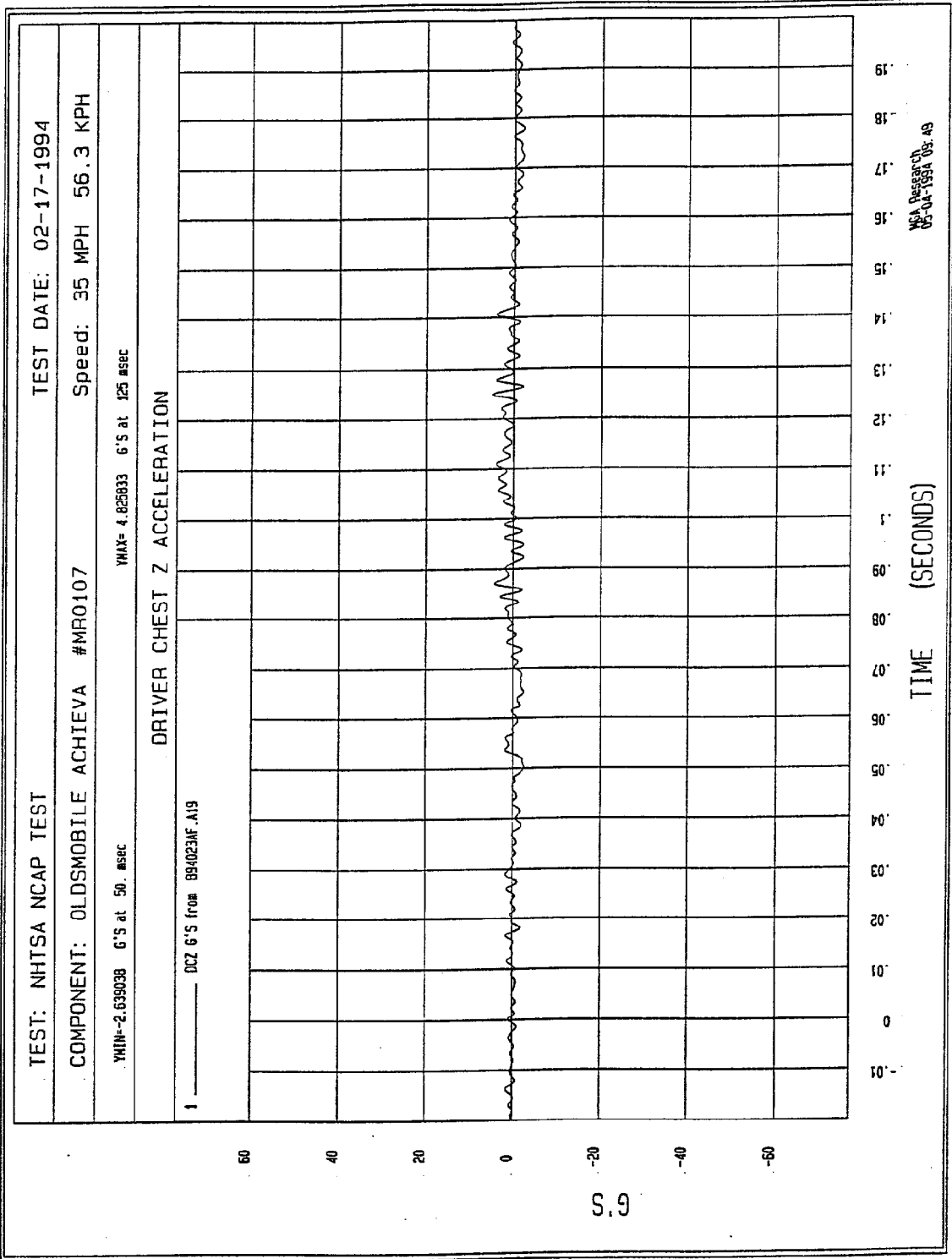


Figure B-45 - Driver Chest Z Acceleration vs. Time

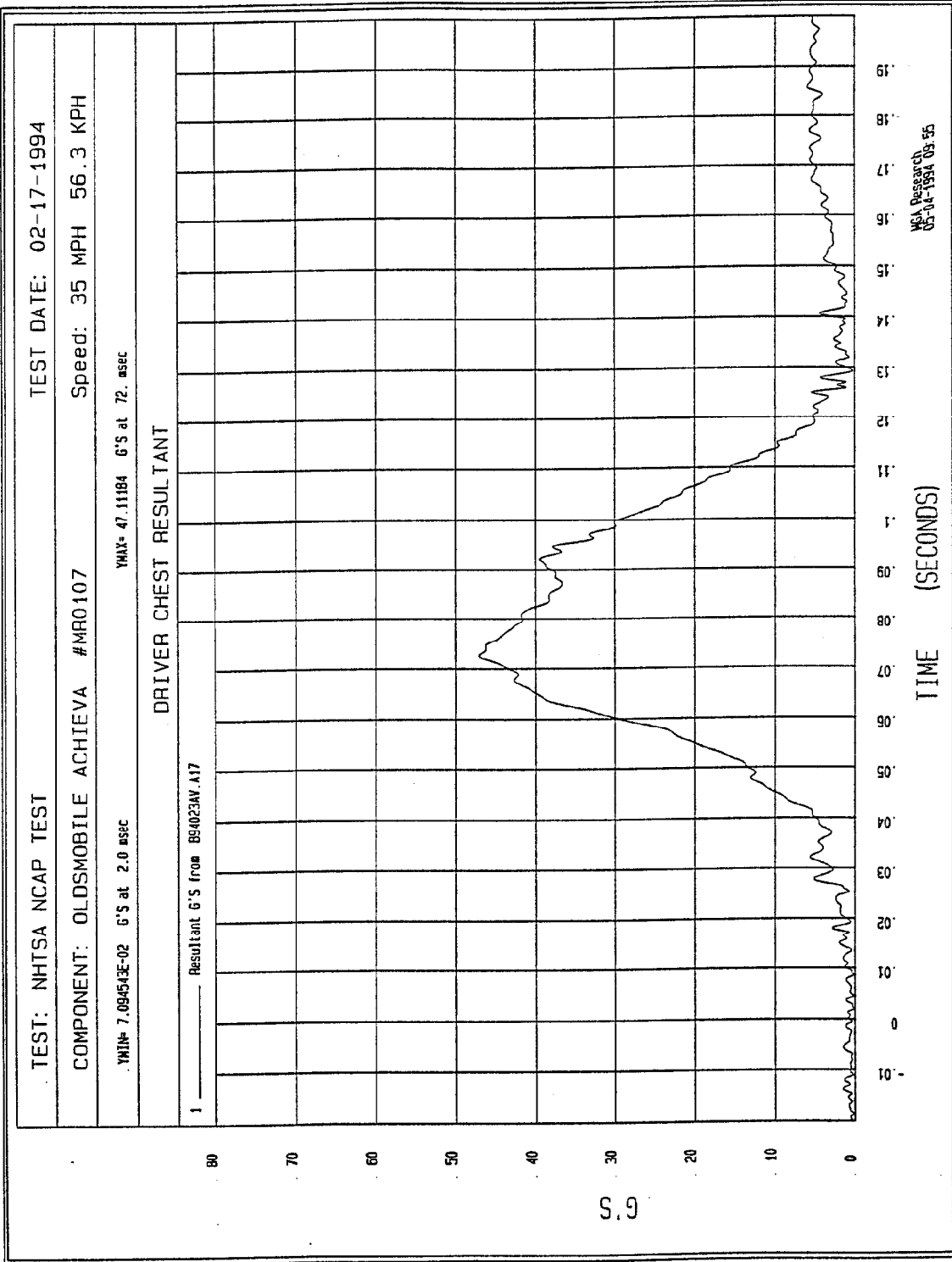


Figure B-46 - Driver Chest Resultant vs. Time

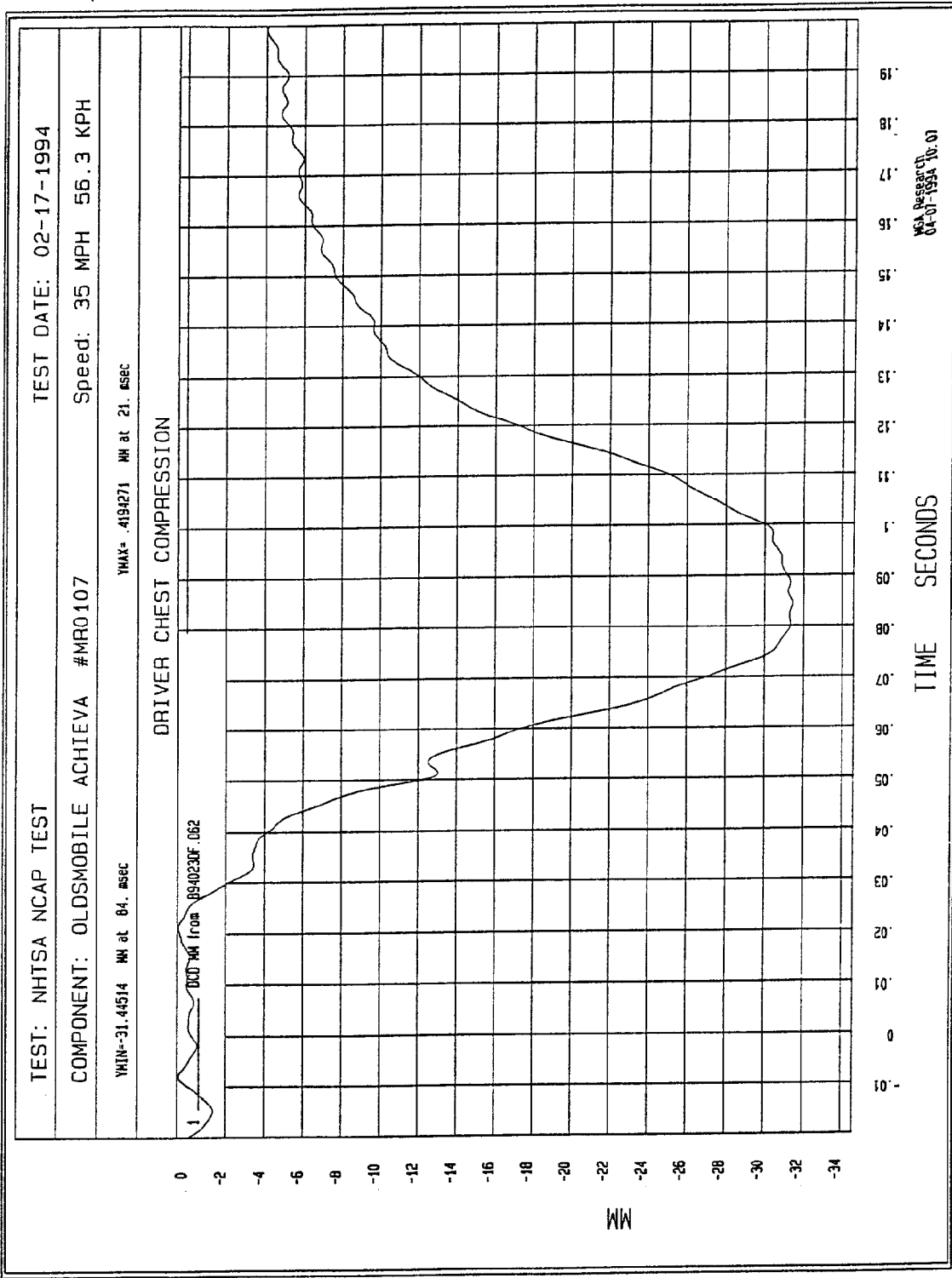
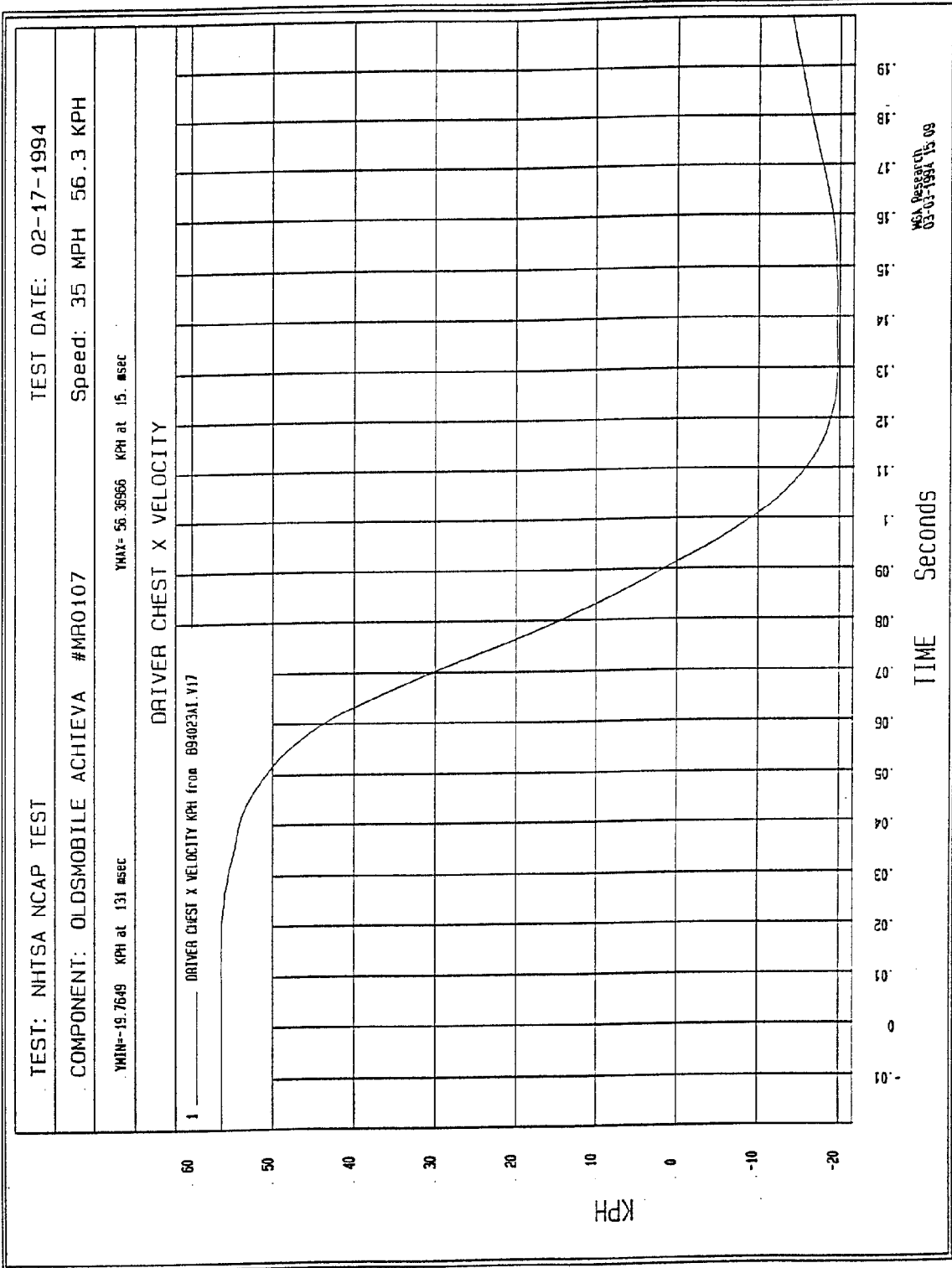


Figure B-47 - Driver Chest Compression vs. Time



B-48

Figure B-48 - Driver Chest X Velocity vs. Time

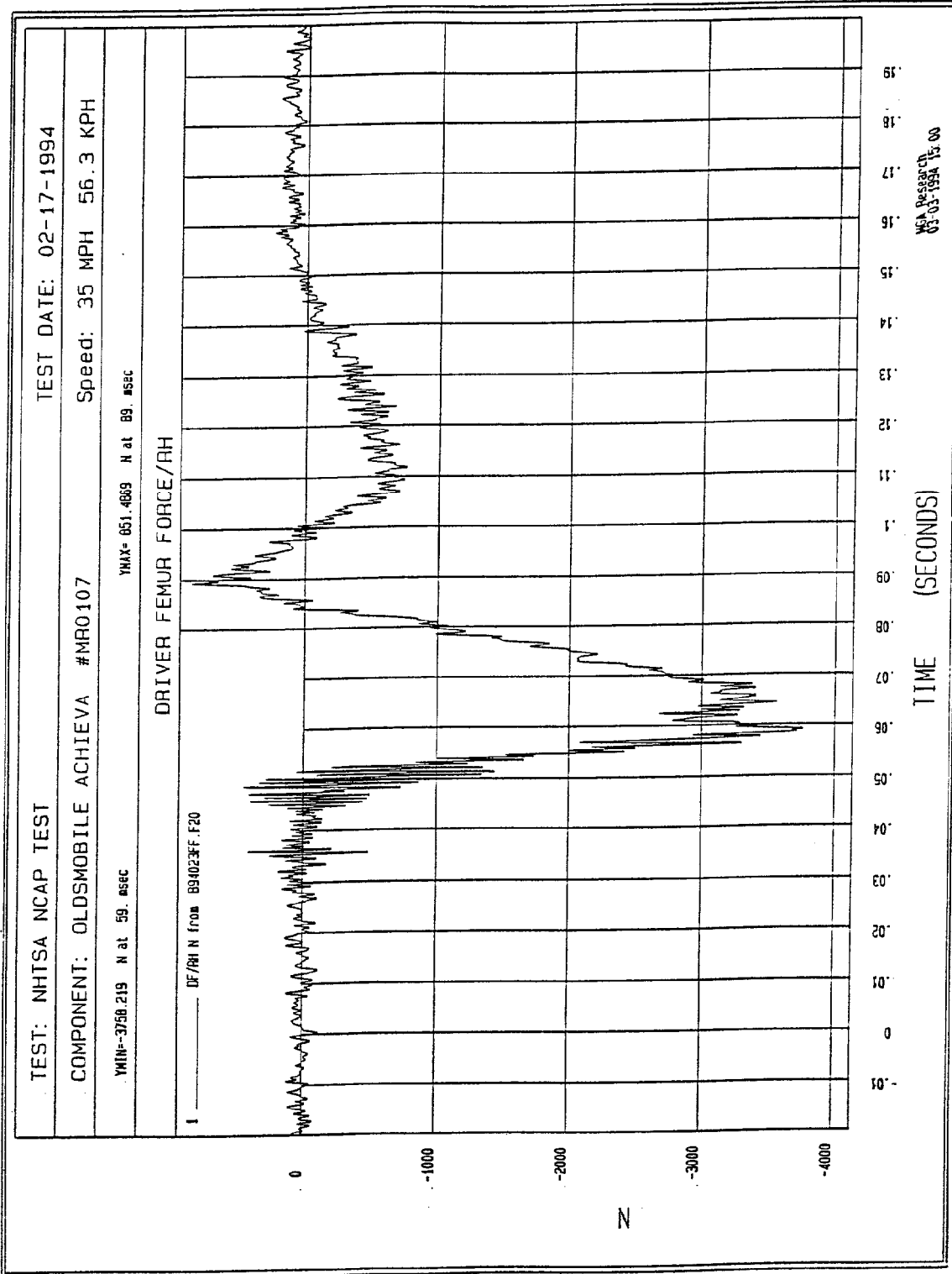
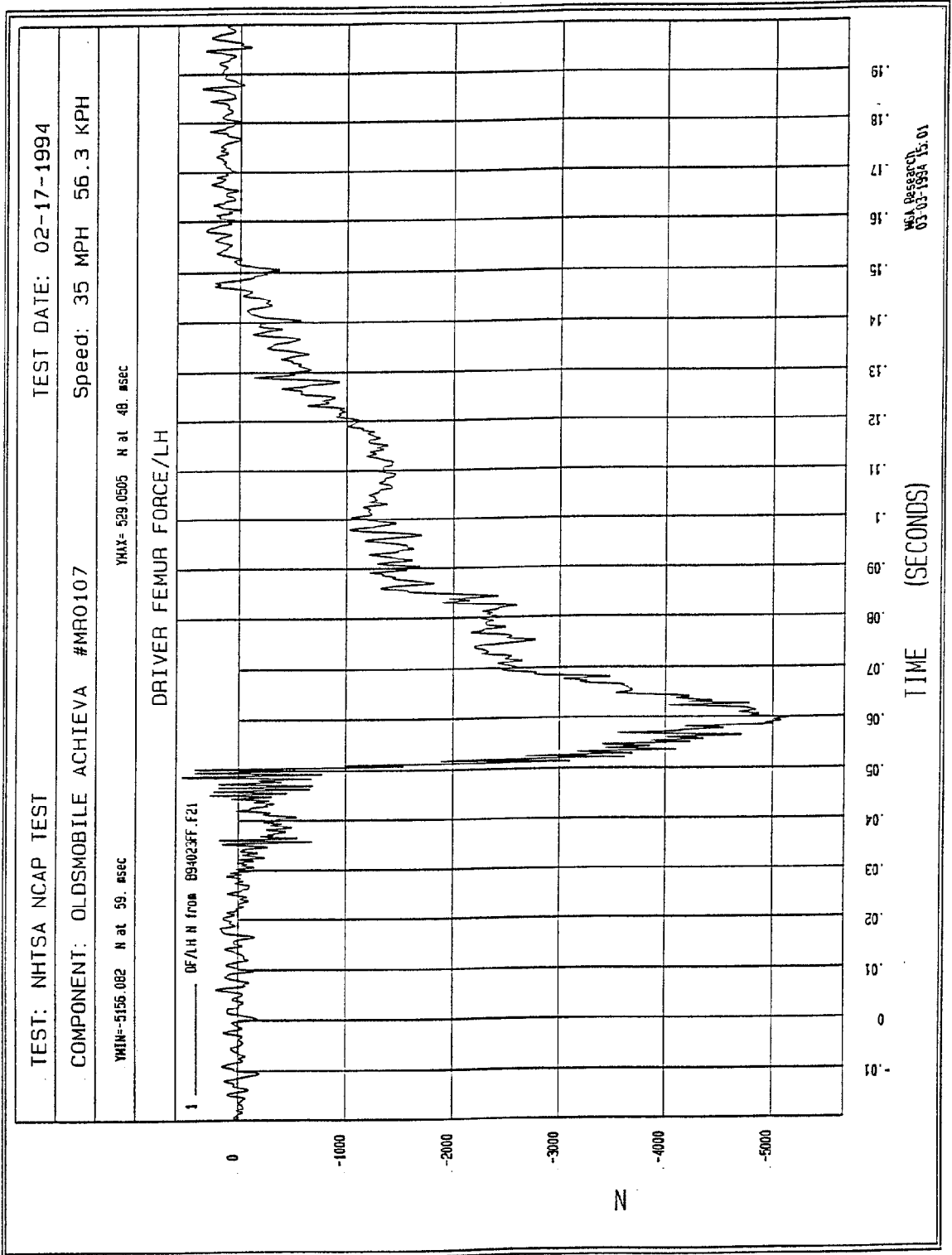


Figure B-49 - Driver Right Femur Force vs. Time



B-50

Figure B-50 - Driver Left Femur Force vs. Time

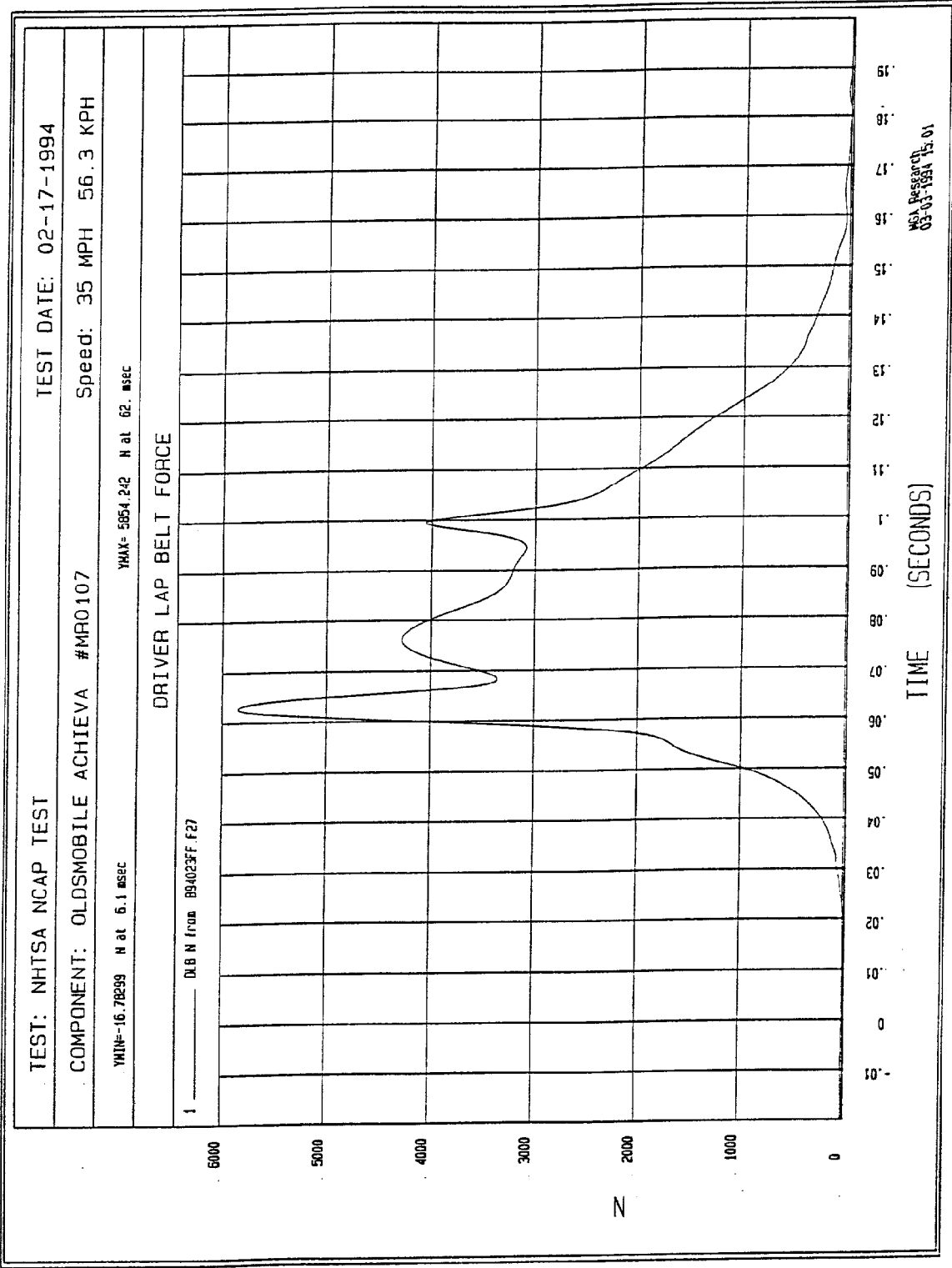
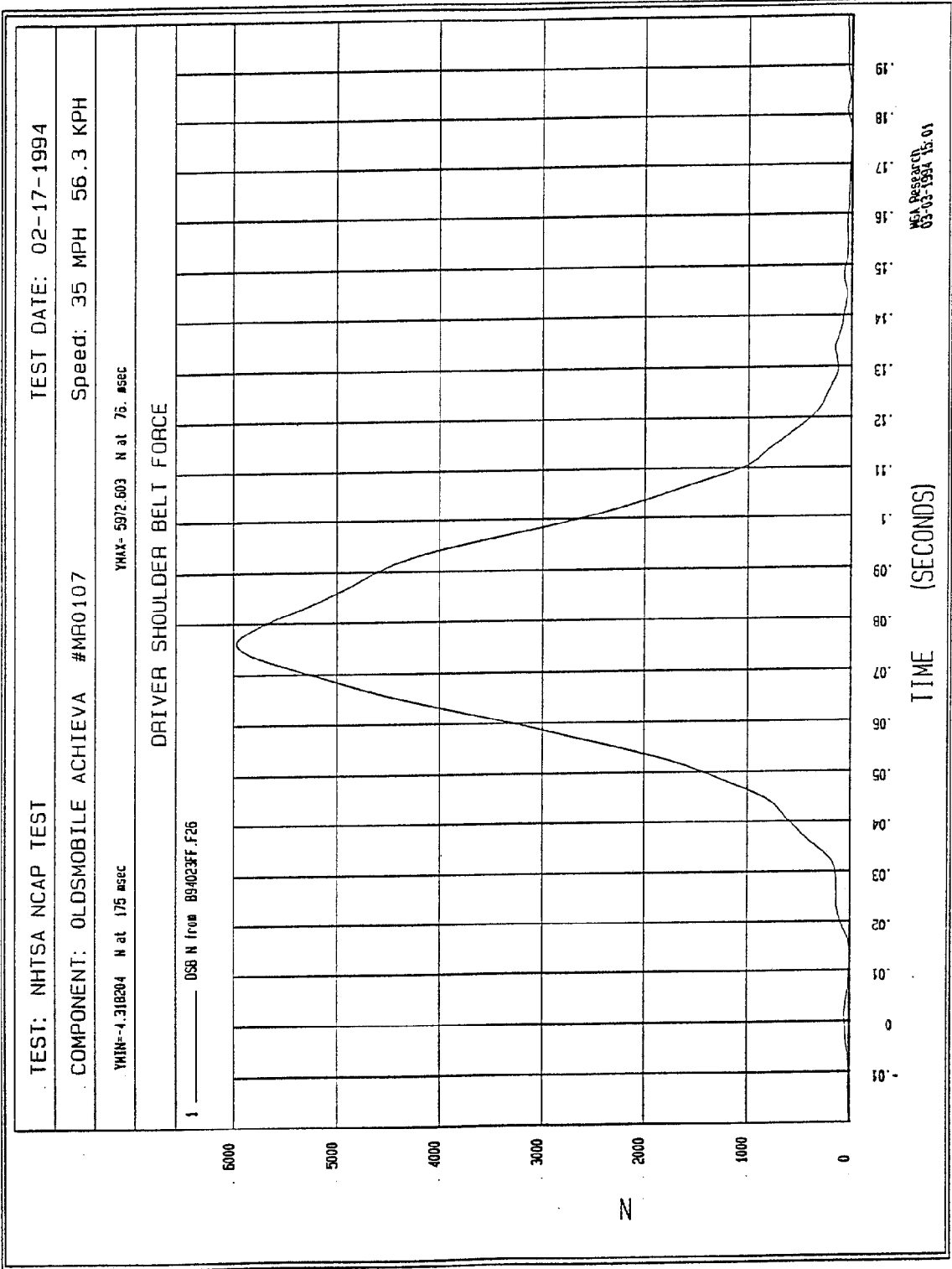


Figure B-51 - Driver Lap Belt Force vs. Time



B-52

Figure B-52 - Driver Torso Belt Force vs. Time

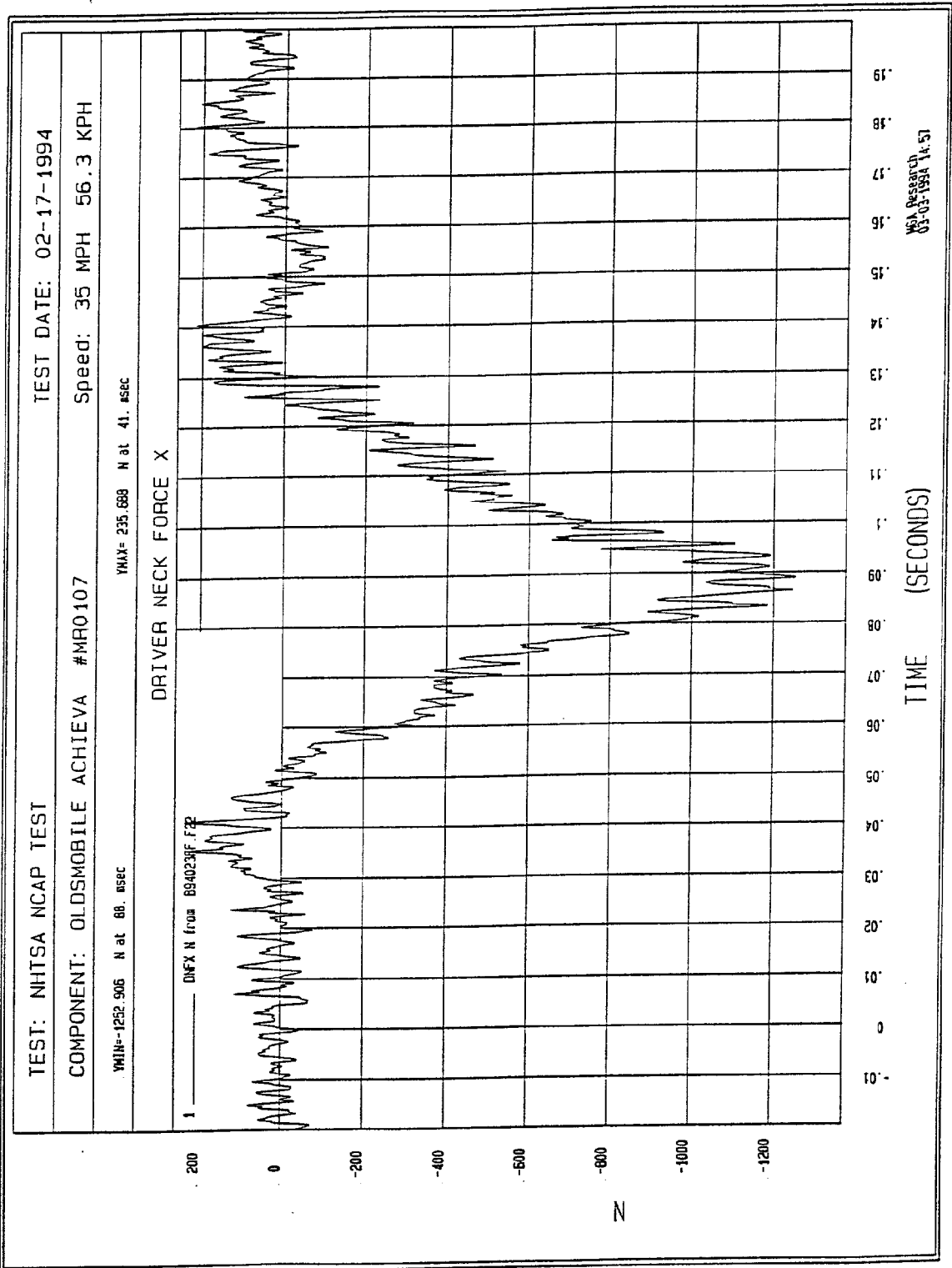


Figure B-53 - Driver Neck Force X vs. Time

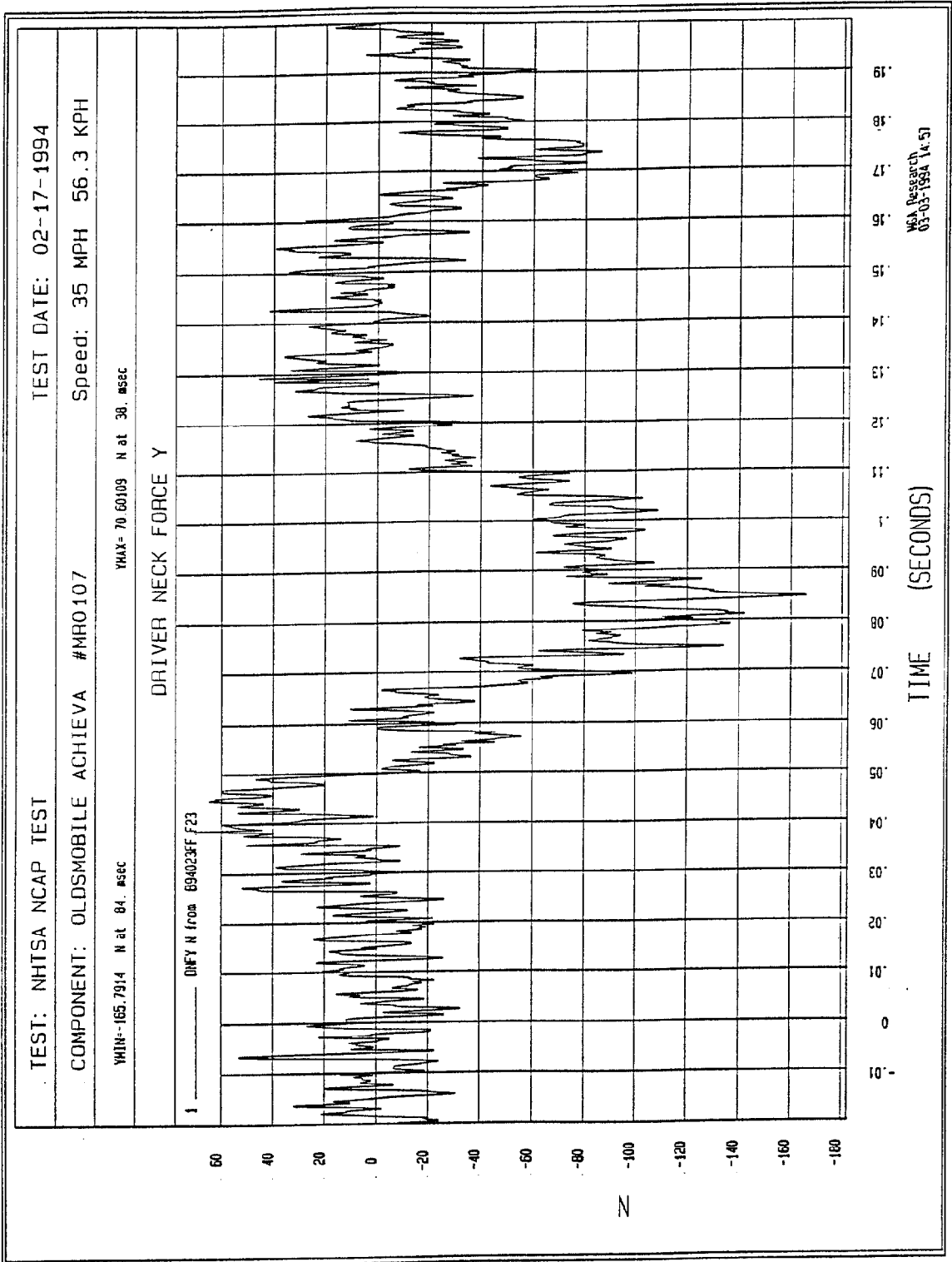


Figure B-54 - Driver Neck Force Y vs. Time

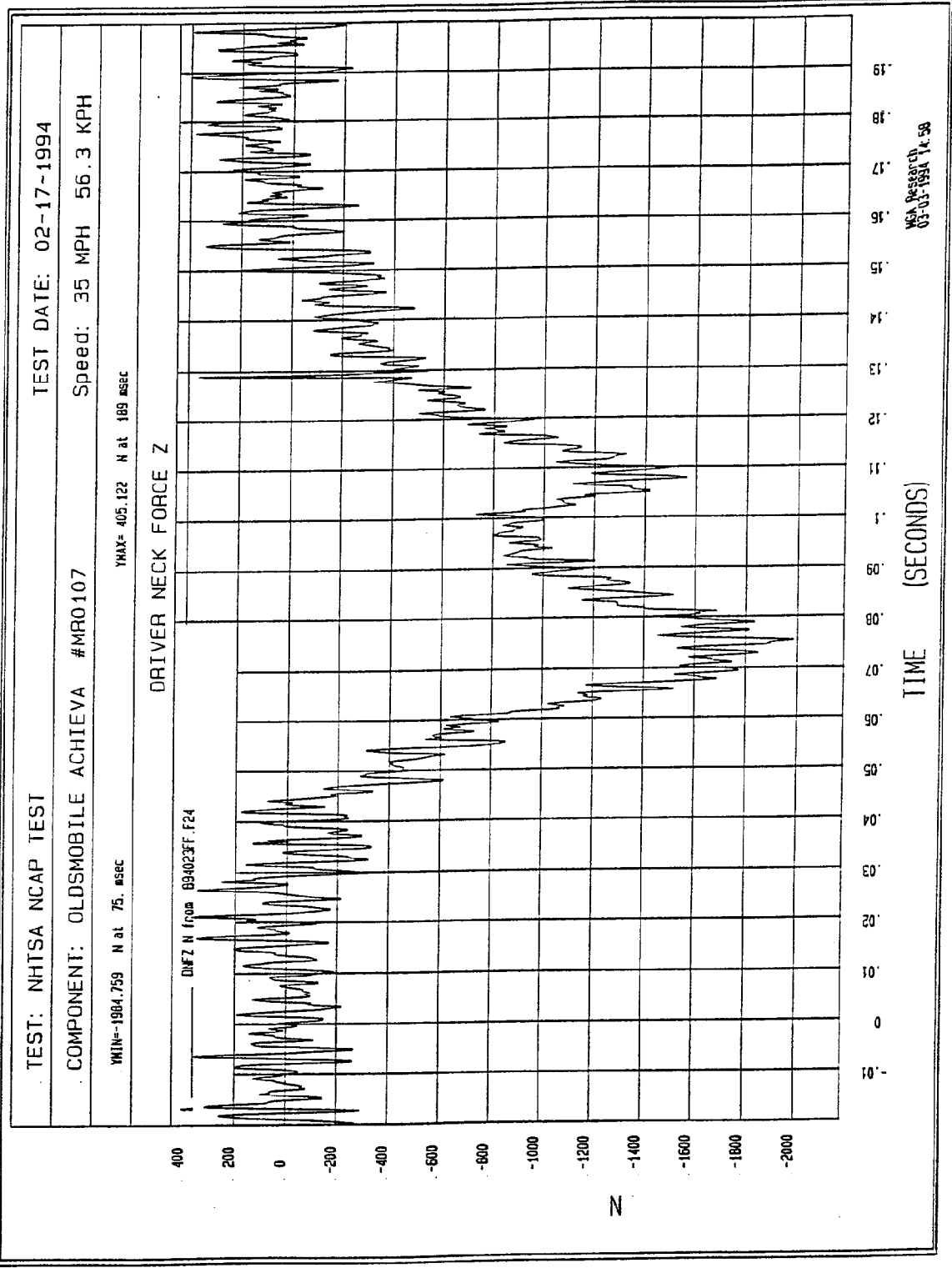


Figure B-55 - Driver Neck Force Z vs. Time

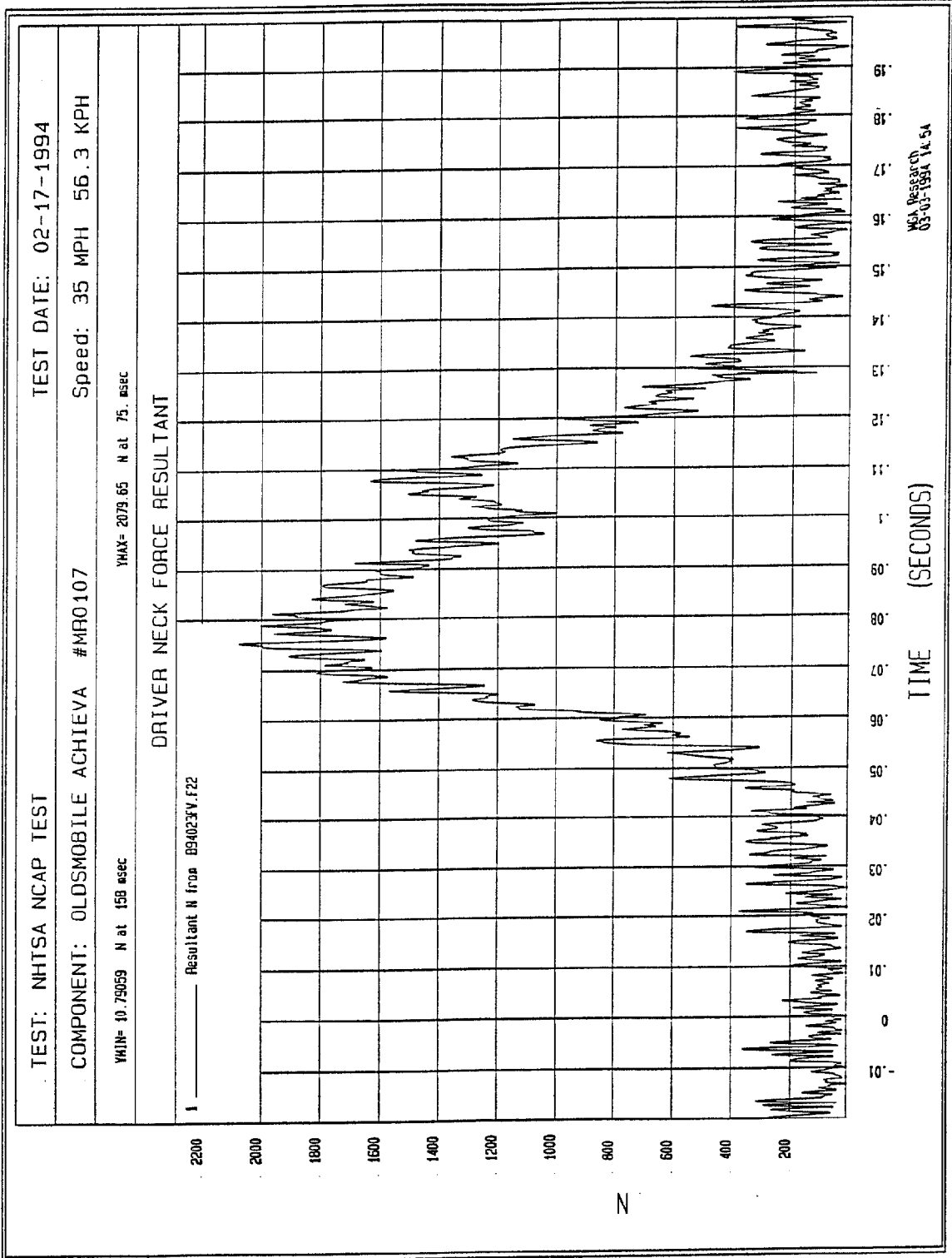


Figure B-56 - Driver Neck Force Resultant vs. Time

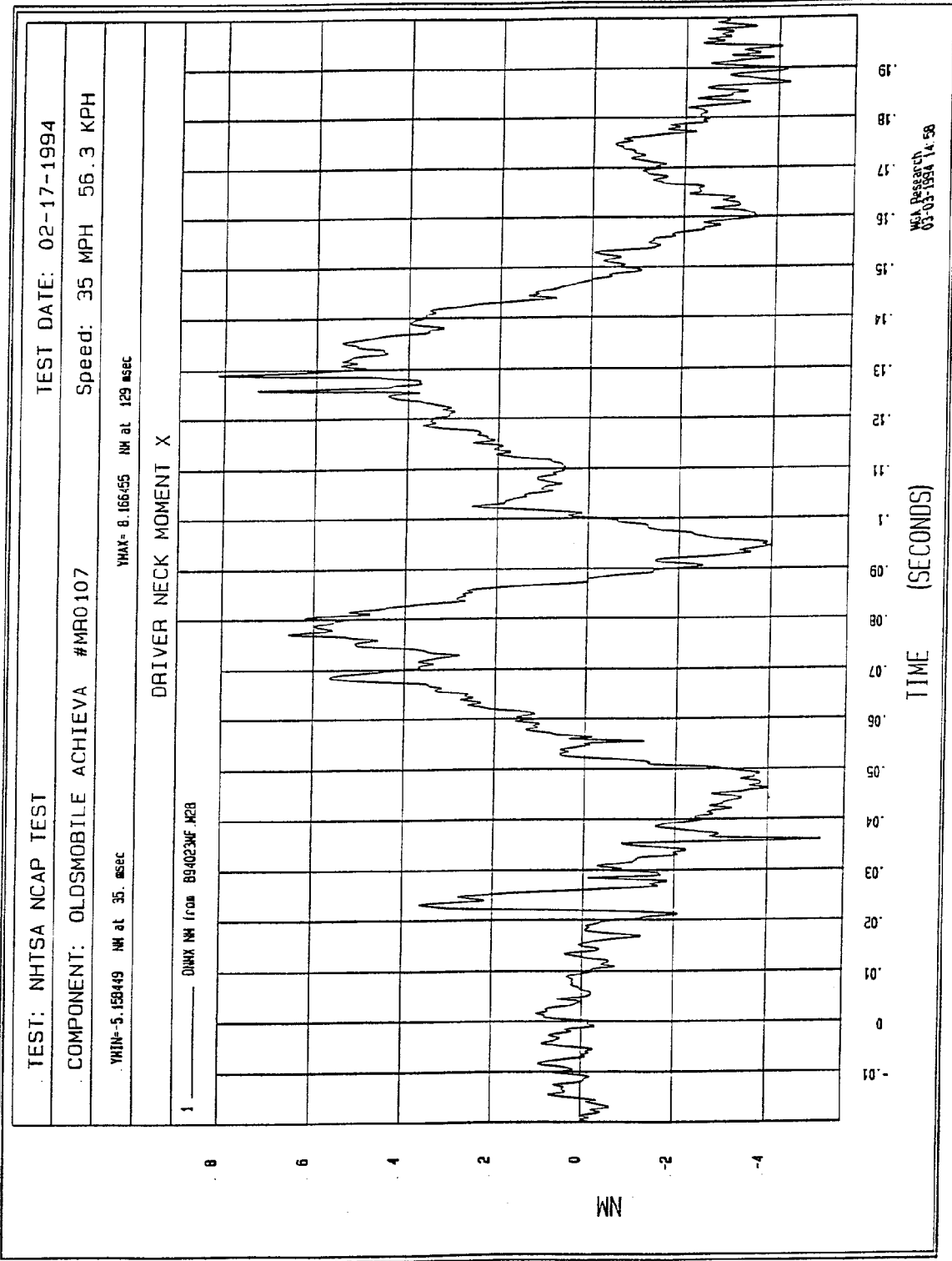
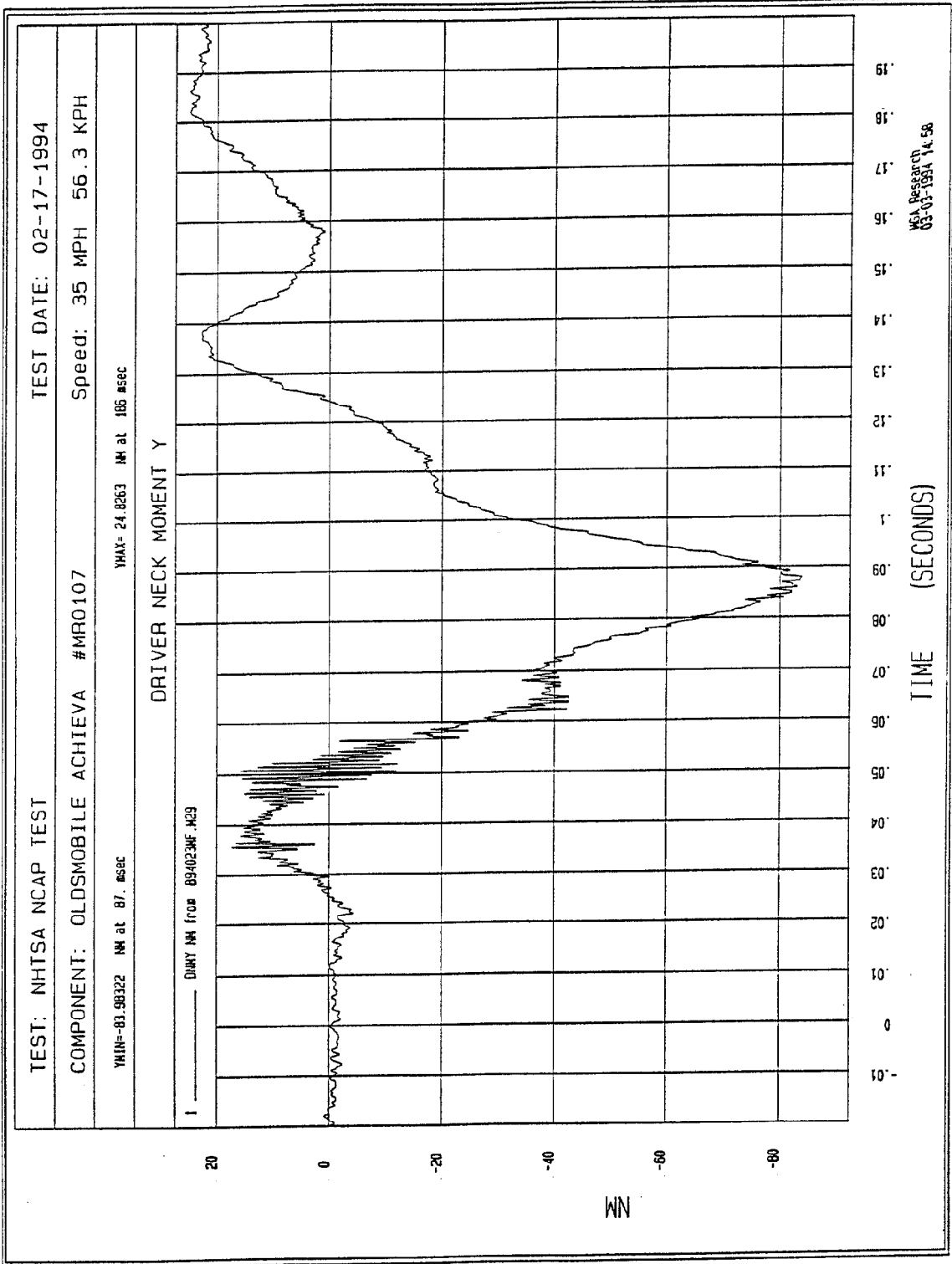


Figure B-57 - Driver Neck Moment X vs. Time



B-58

Figure B-58 - Driver Neck Moment Y vs. Time

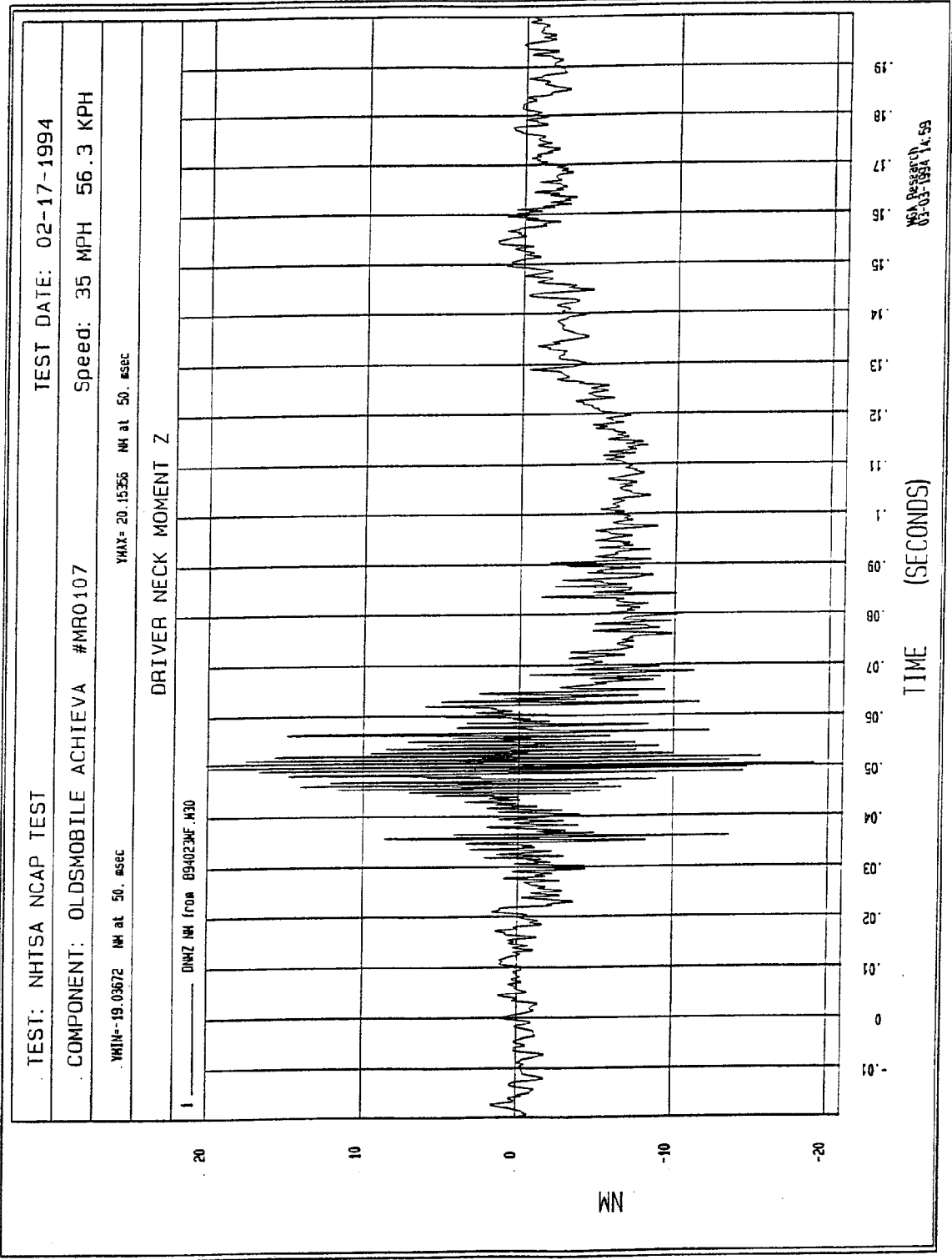
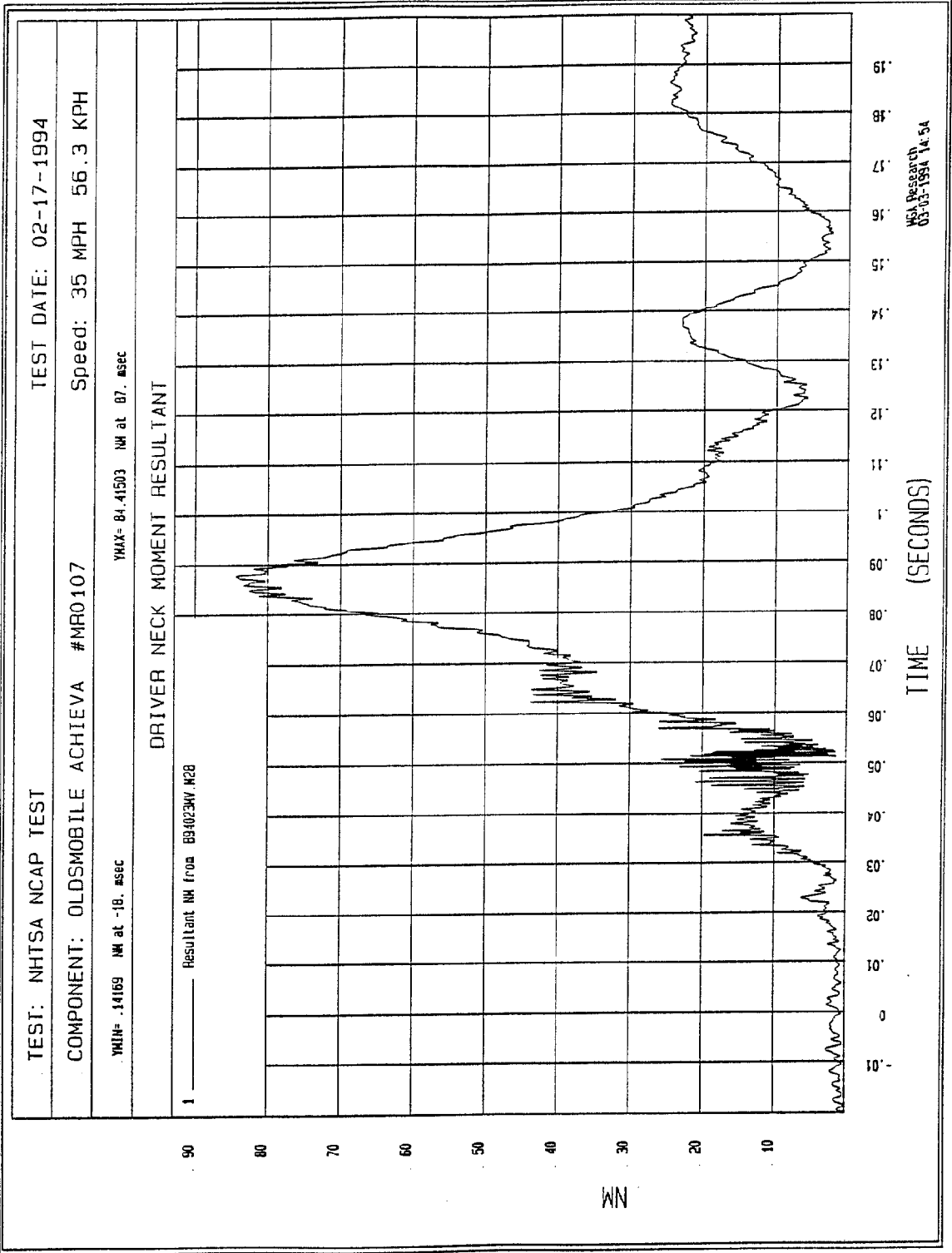


Figure B-59 - Driver Neck Moment Z vs. Time



B-60

Figure B-60 - Driver Neck Moment Resultant vs. Time

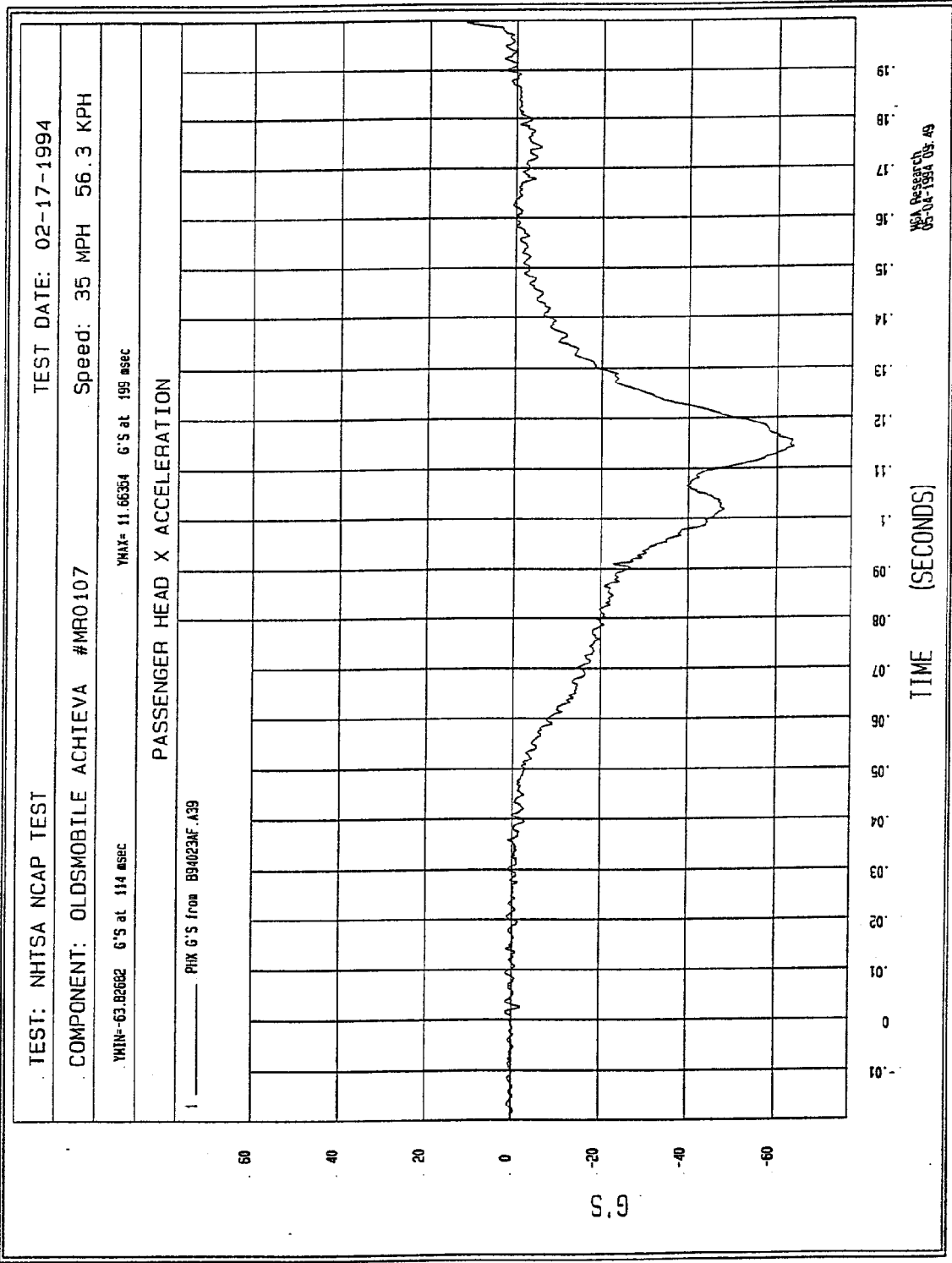


Figure B-61 - Passenger Head X Acceleration vs. Time

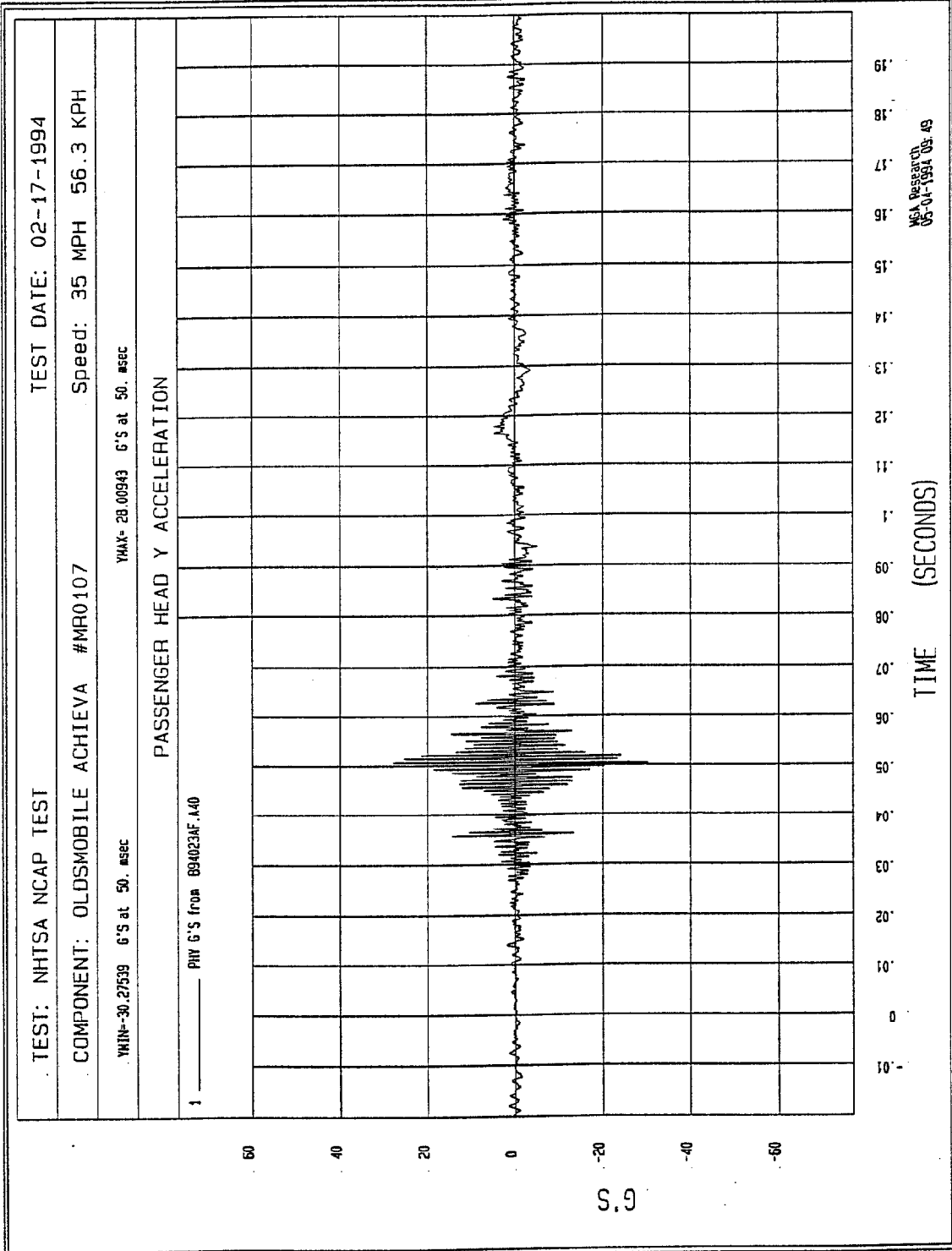


Figure B-62 - Passenger Head Y Acceleration vs. Time

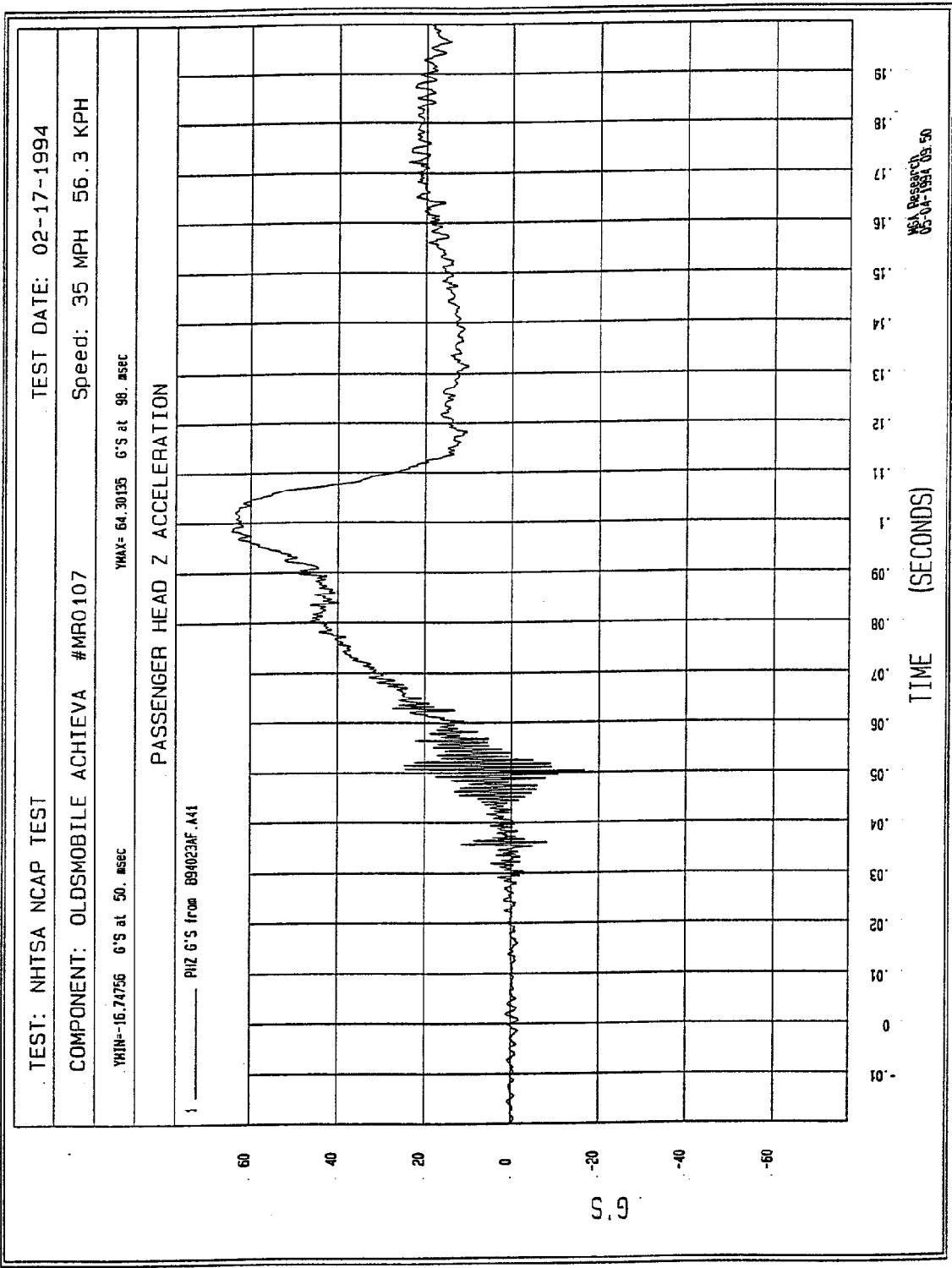


Figure B-63 - Passenger Head Z Acceleration vs. Time

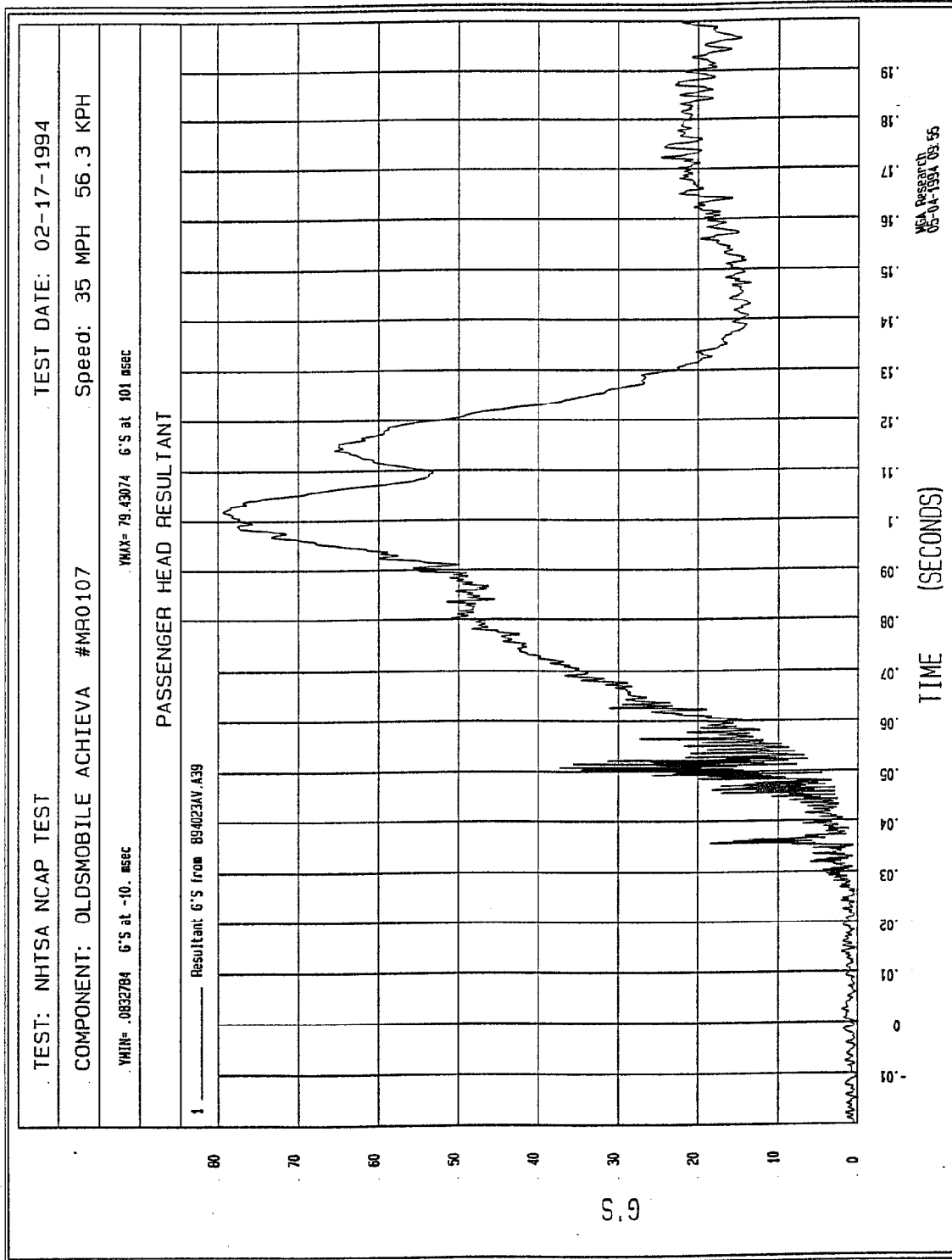


Figure B-64 - Passenger Head Resultant Acceleration vs. Time

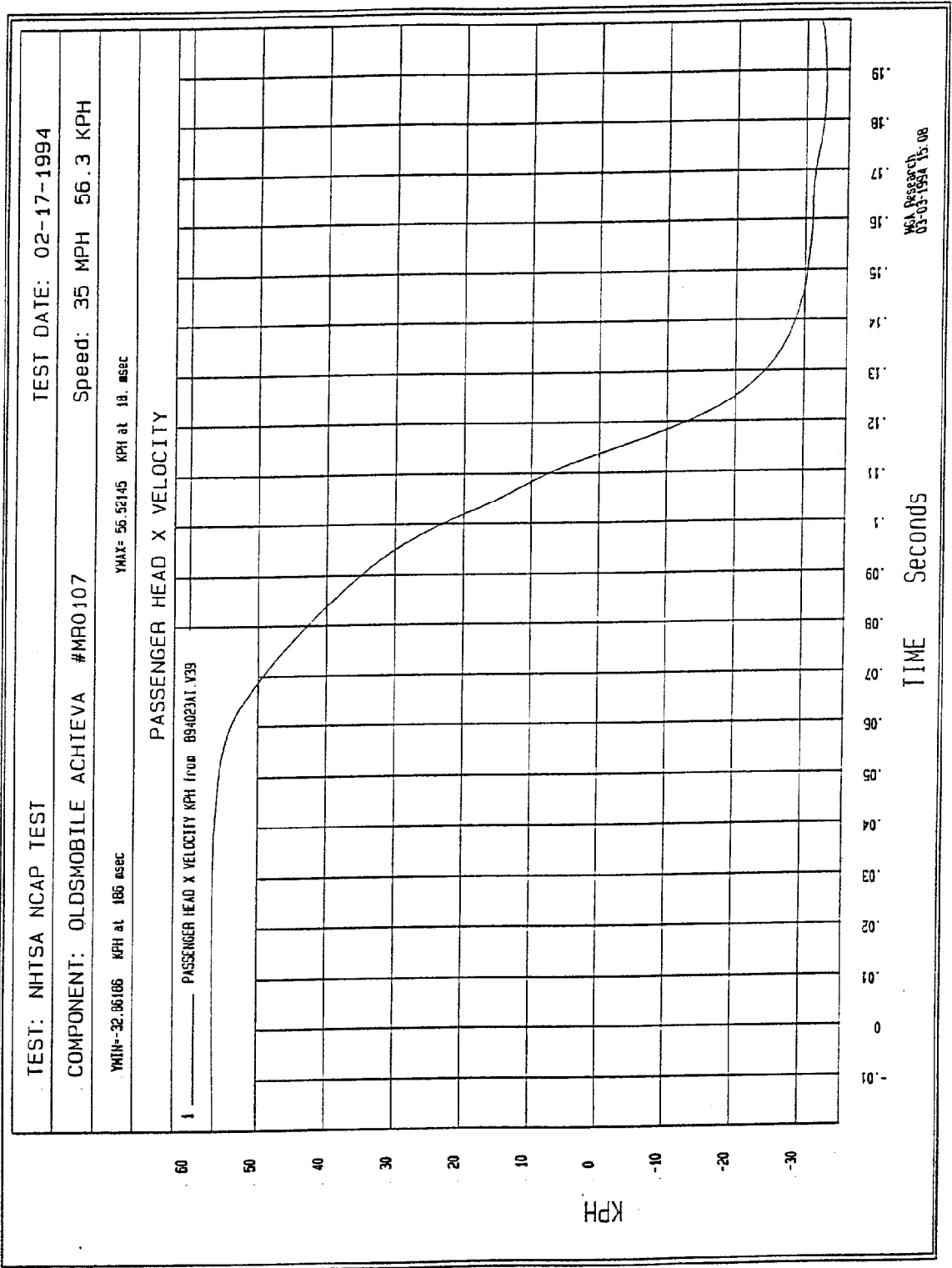


Figure B-65 - Passenger Head X Velocity vs. Time

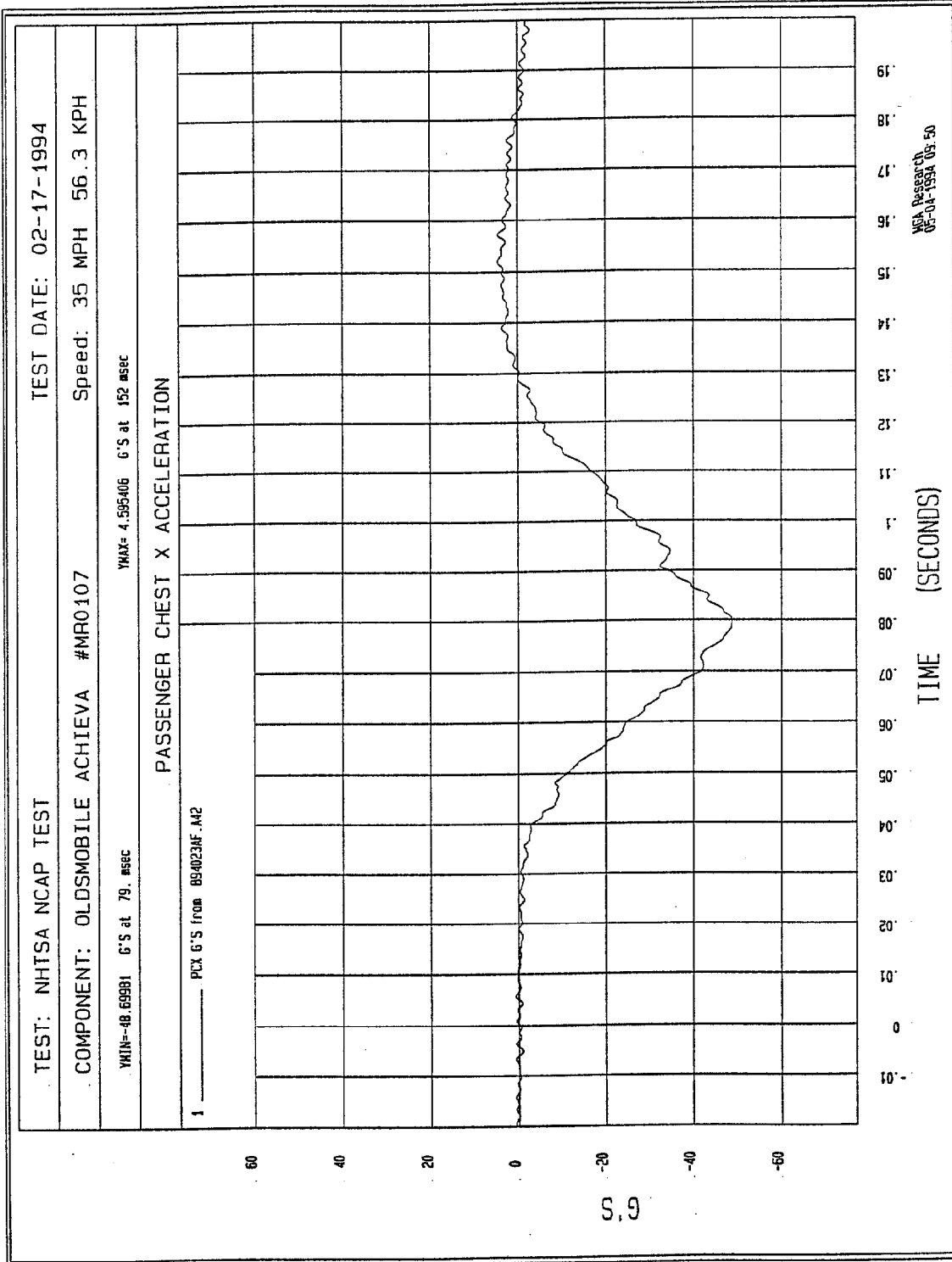
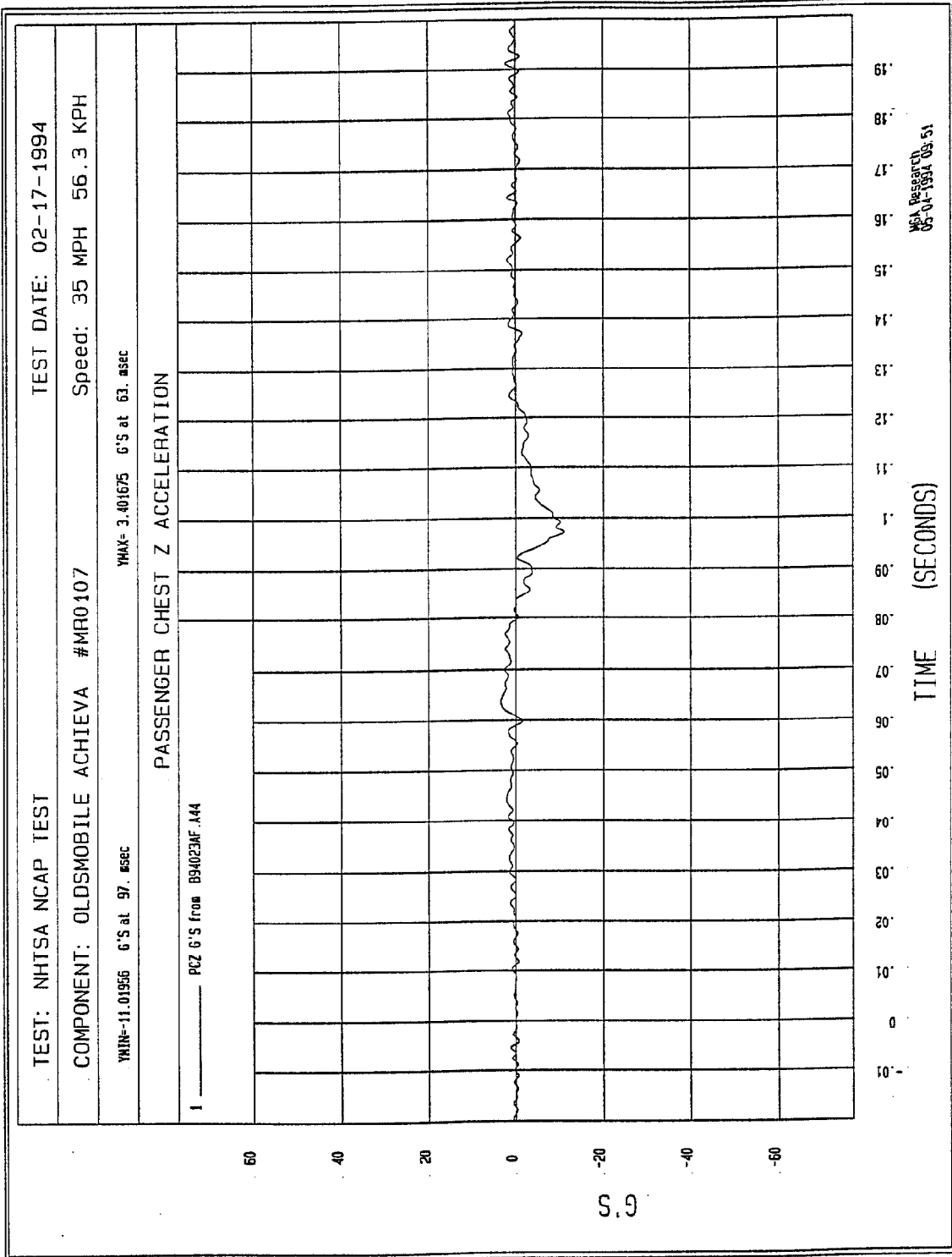
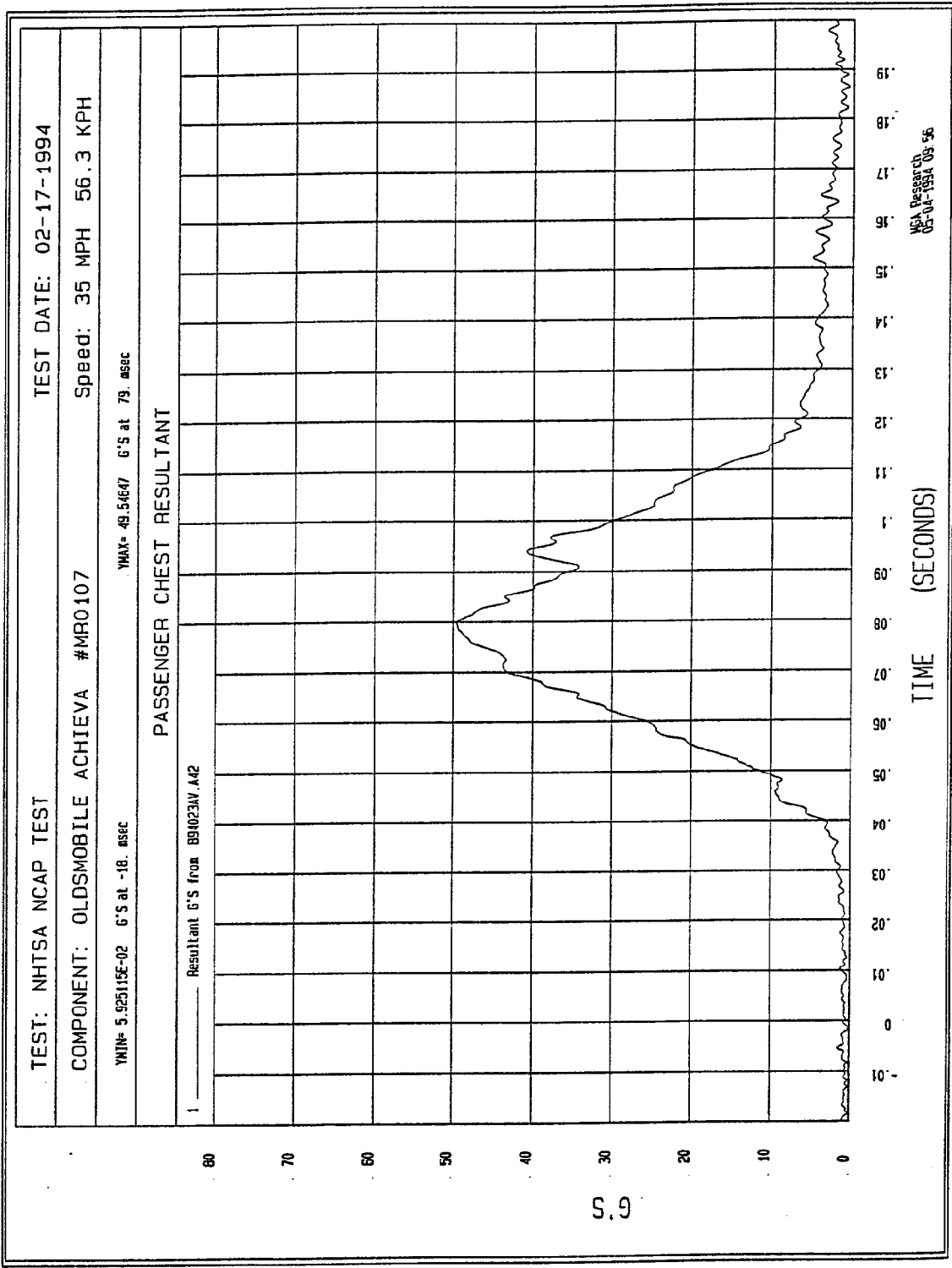


Figure B-66 - Passenger Chest X Acceleration vs. Time



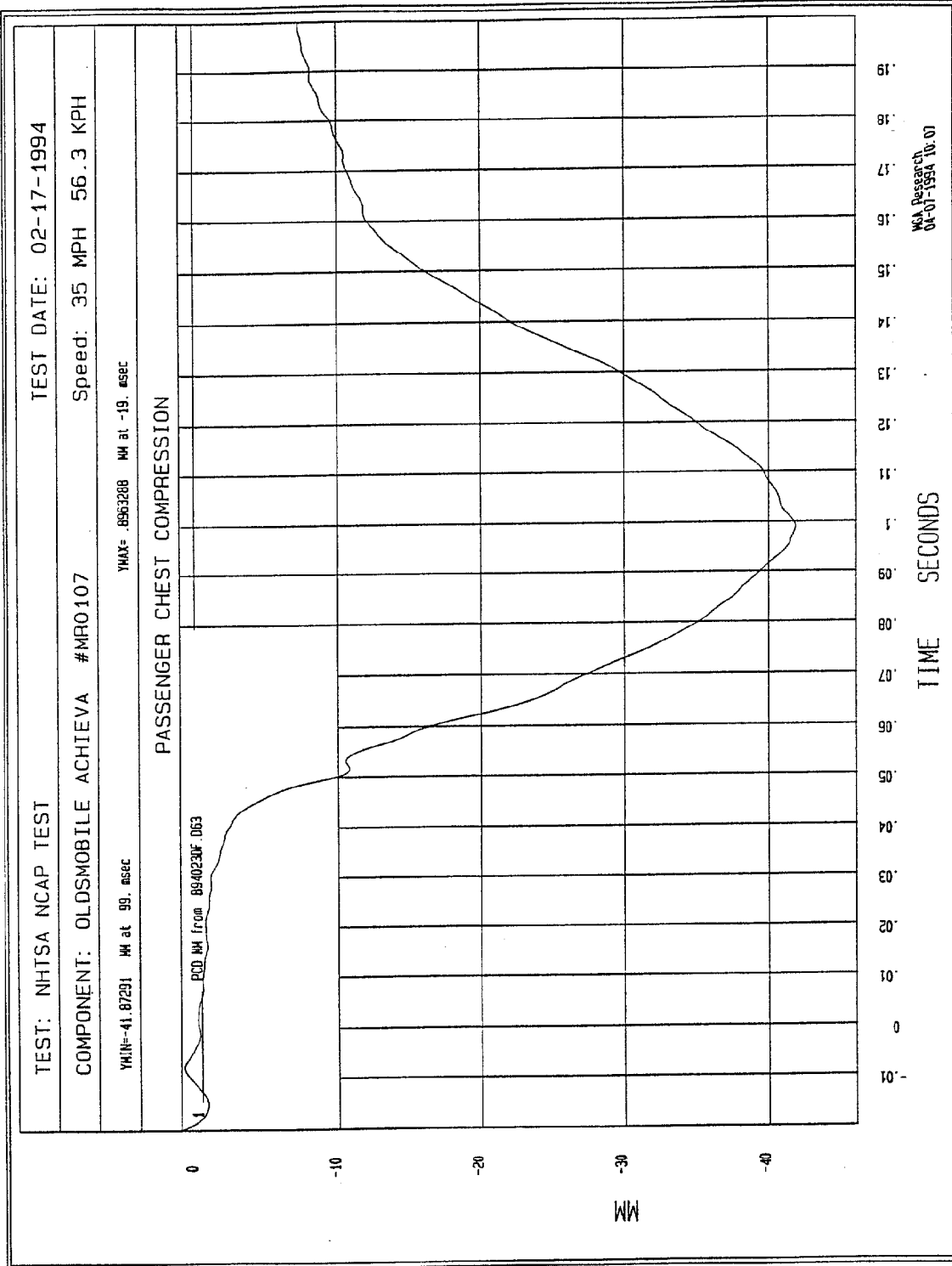
B-68

Figure B-68 - Passenger Chest Z Acceleration vs. Time



MSA Research
05-04-1994 09 '96

Figure B-69 - Passenger Chest Resultant vs. Time



MOA Research
04-01-1994 10: 01

Figure B-70 - Passenger Chest Compression vs. TimeB-70

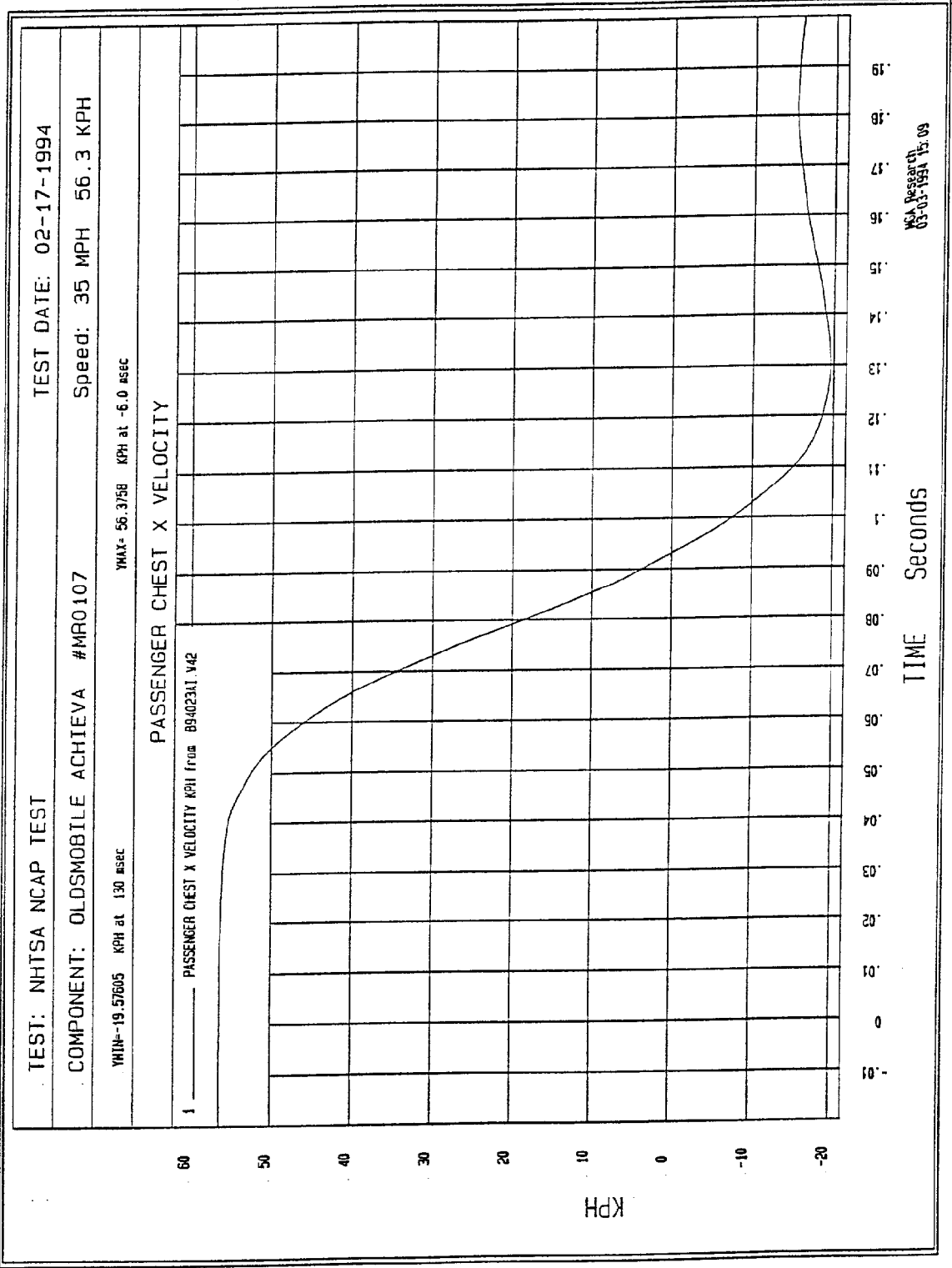
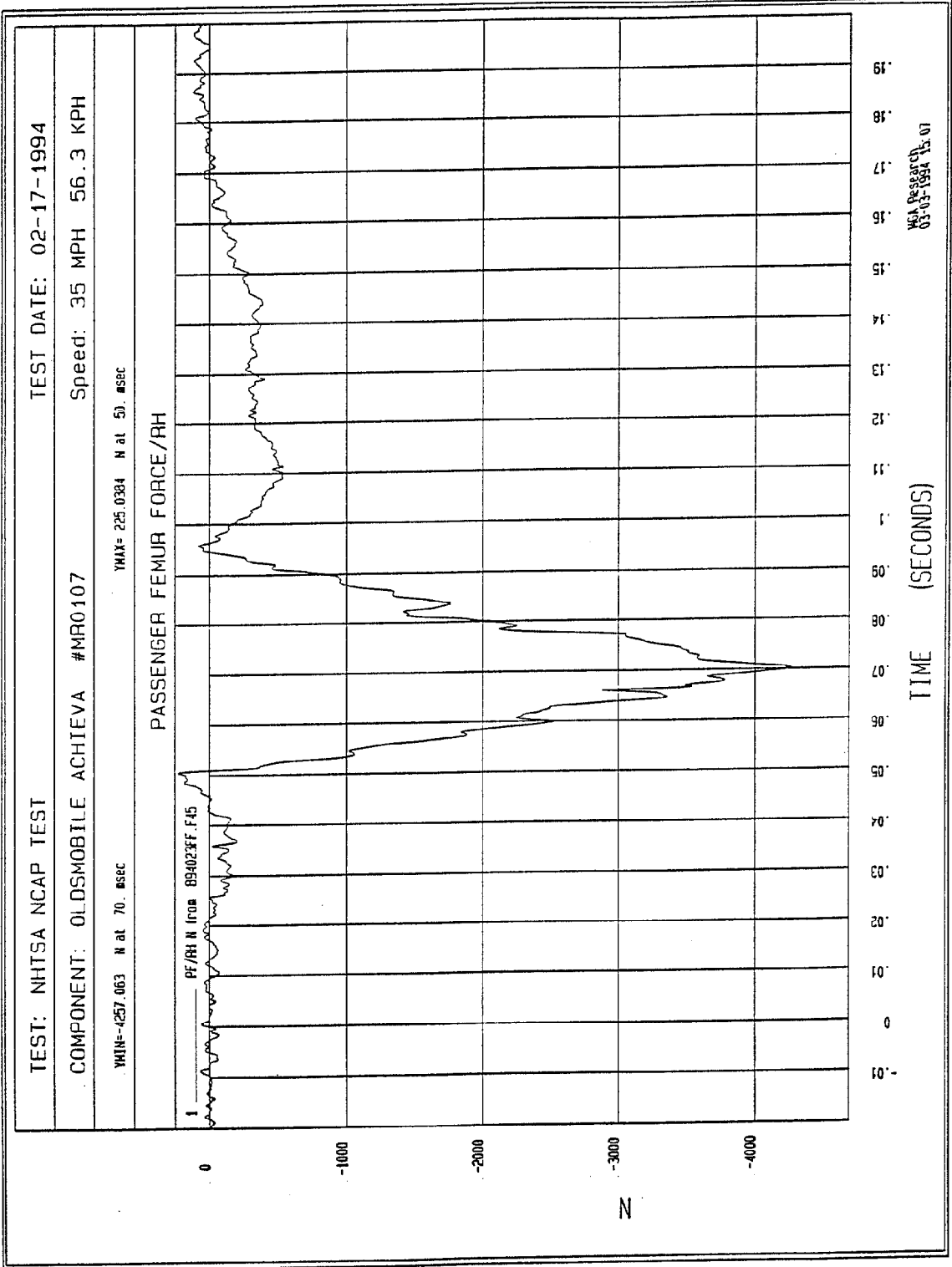


Figure B-71 - Passenger Chest X Velocity vs. Time



B-72

Figure B-72 - Passenger Right Femur Force vs. Time

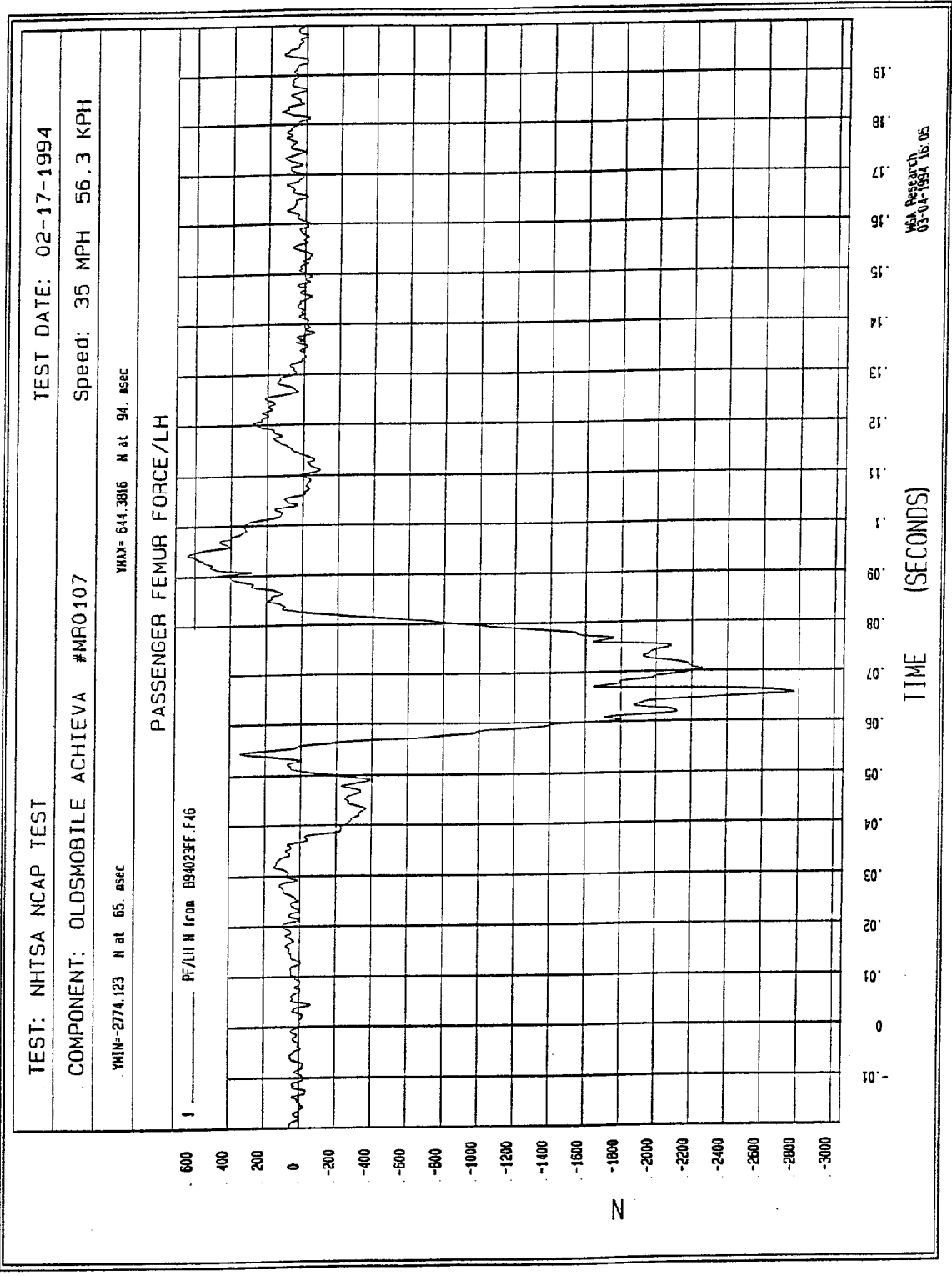


Figure B-73 - Passenger Left Femur Force vs. Time

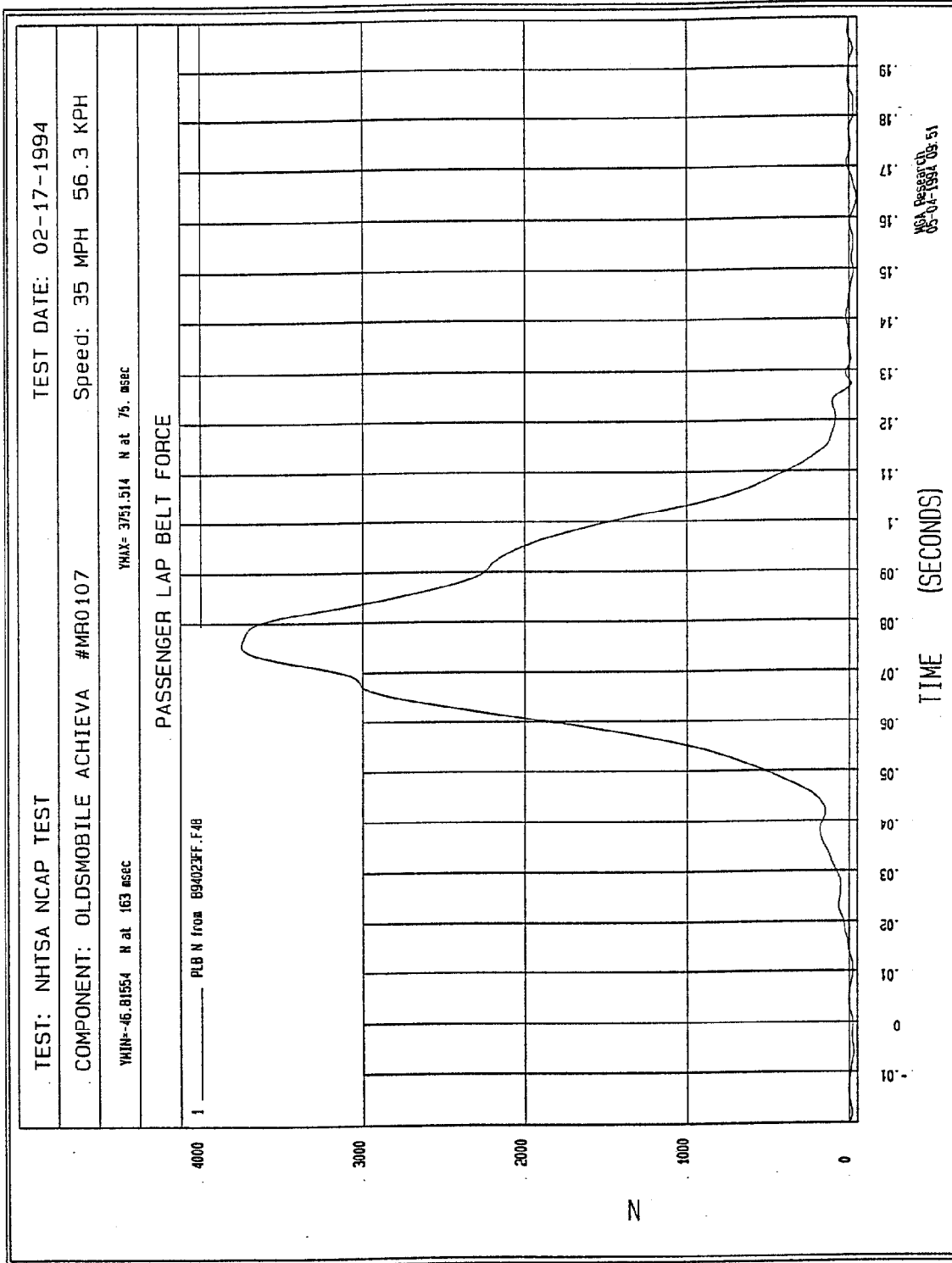
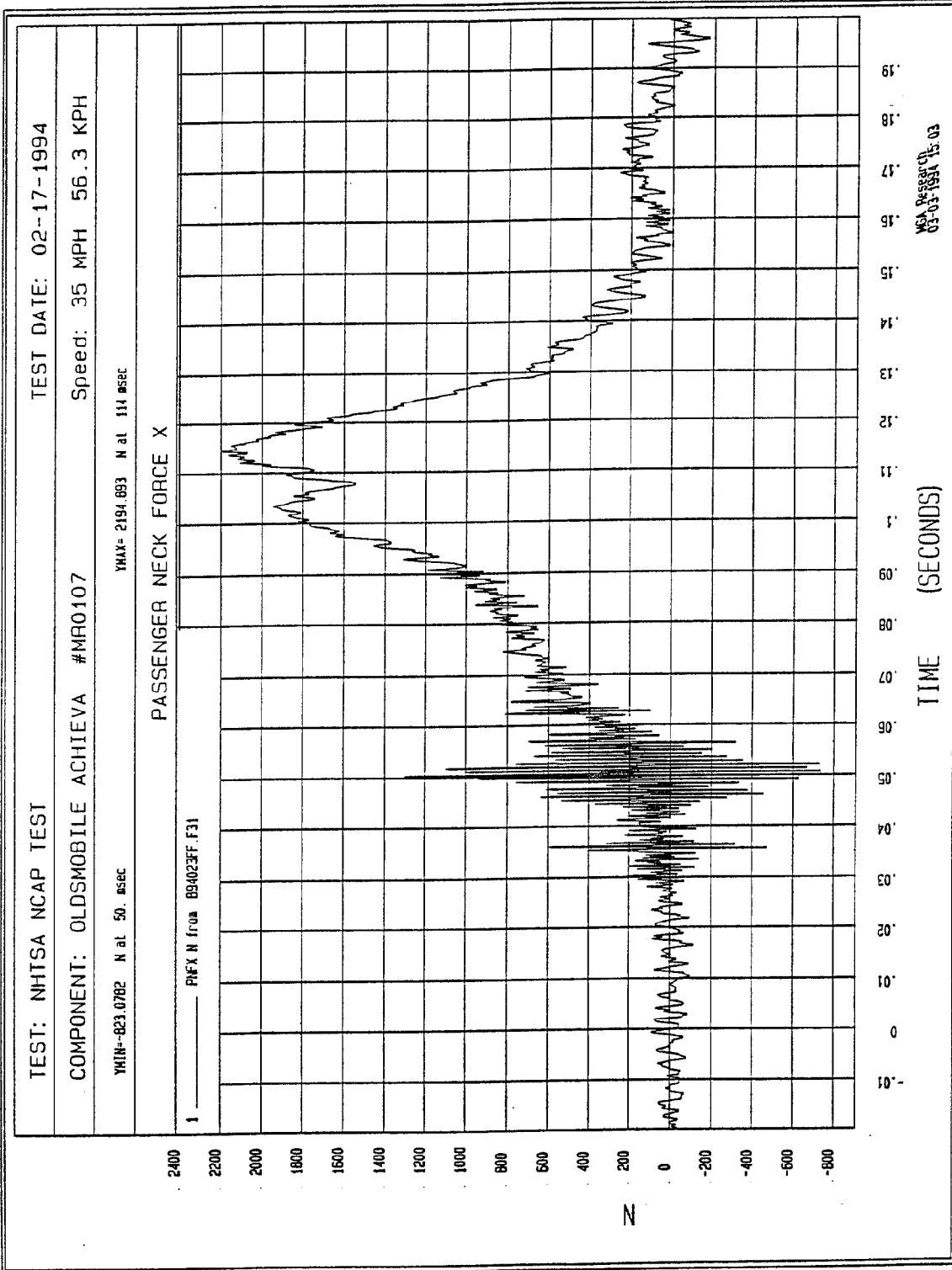


Figure B-74 - Passenger Lap Belt Force vs. Time

NO VALID DATA COLLECTED

B-75

Figure B-75 - Passenger Torso Belt Force vs. Time



B-76

Figure B-76 - Passenger Neck Force X vs. Time

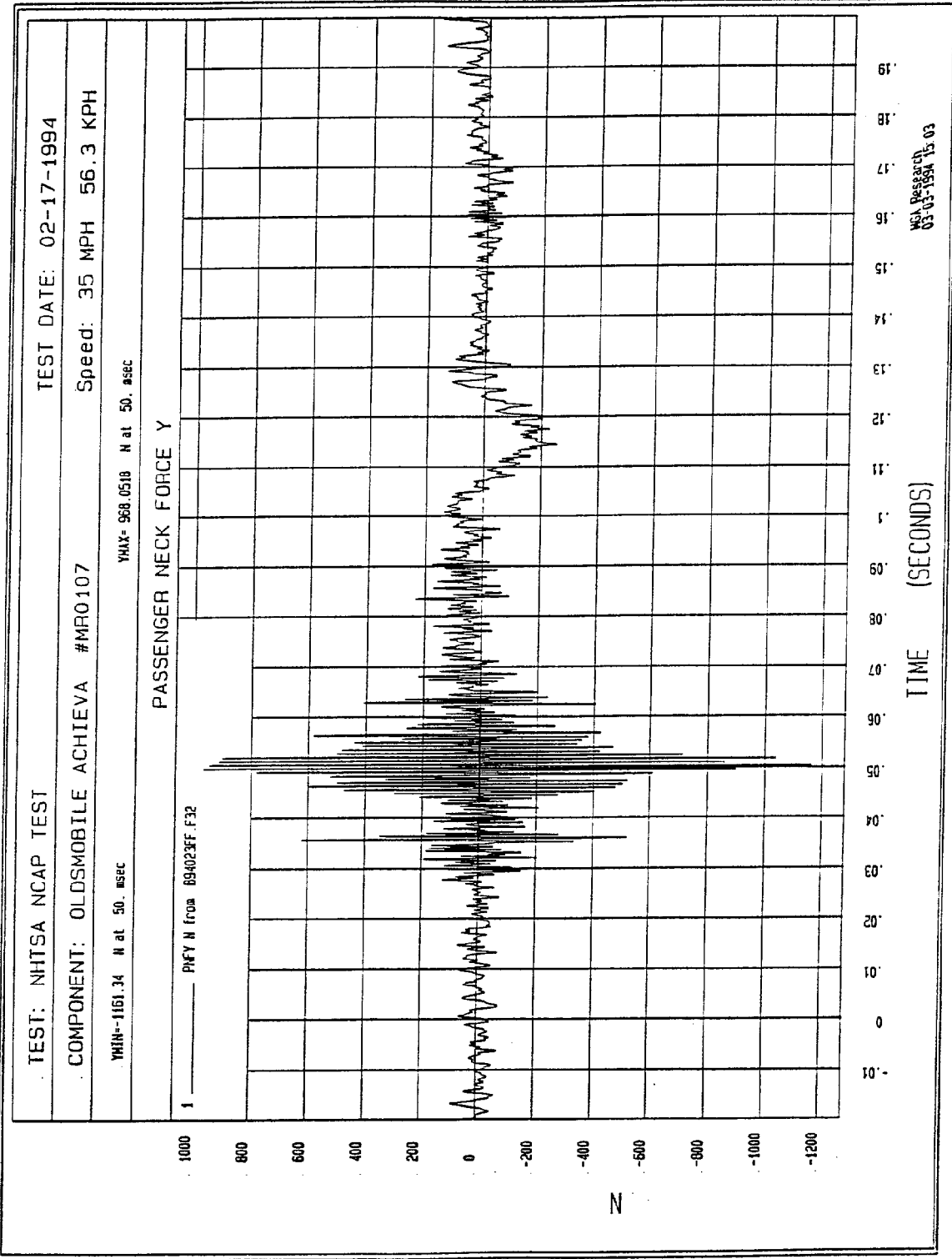
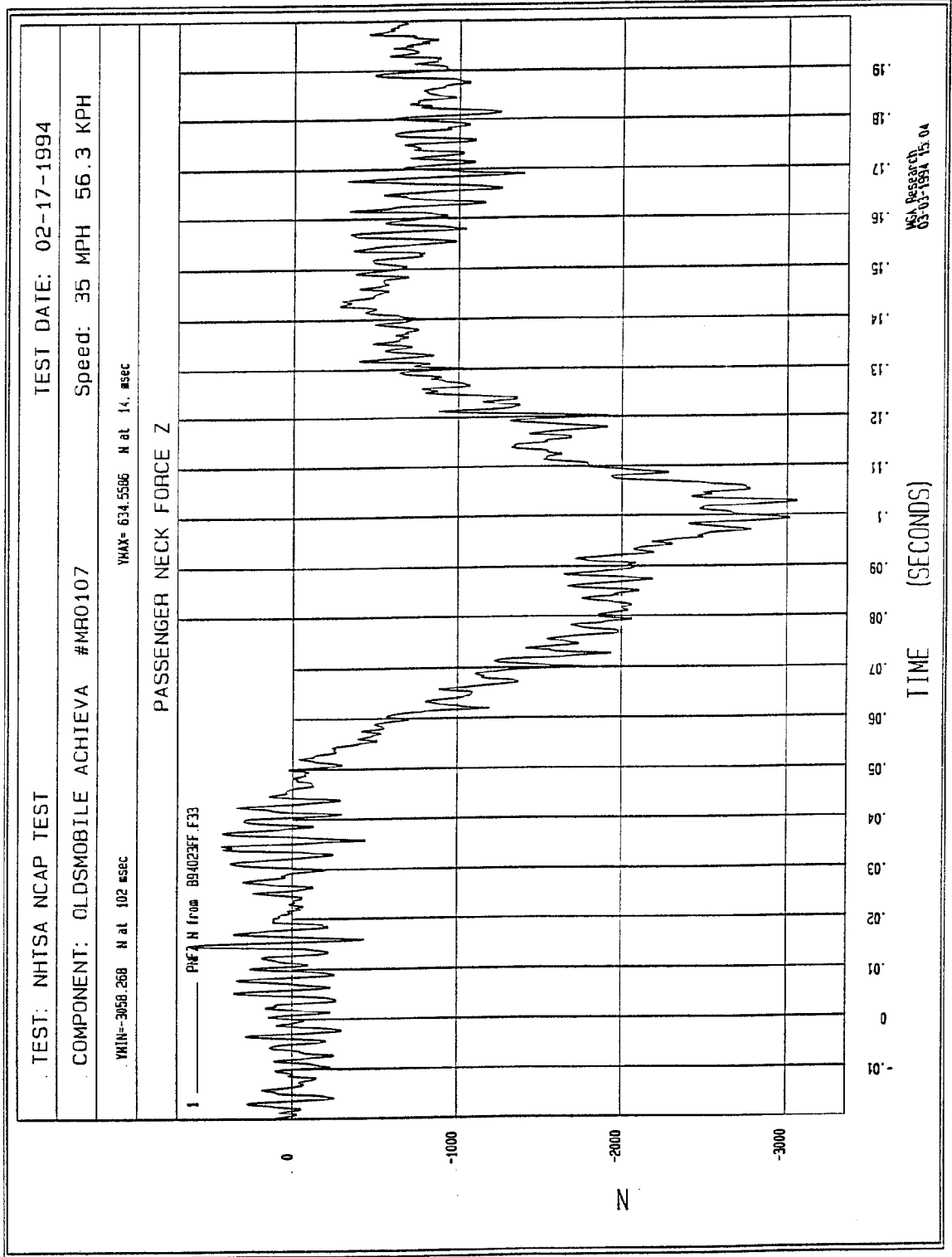


Figure B-77 - Passenger Neck Force Y vs. Time



B-78

Figure B-78 - Passenger Neck Force Z vs. Time

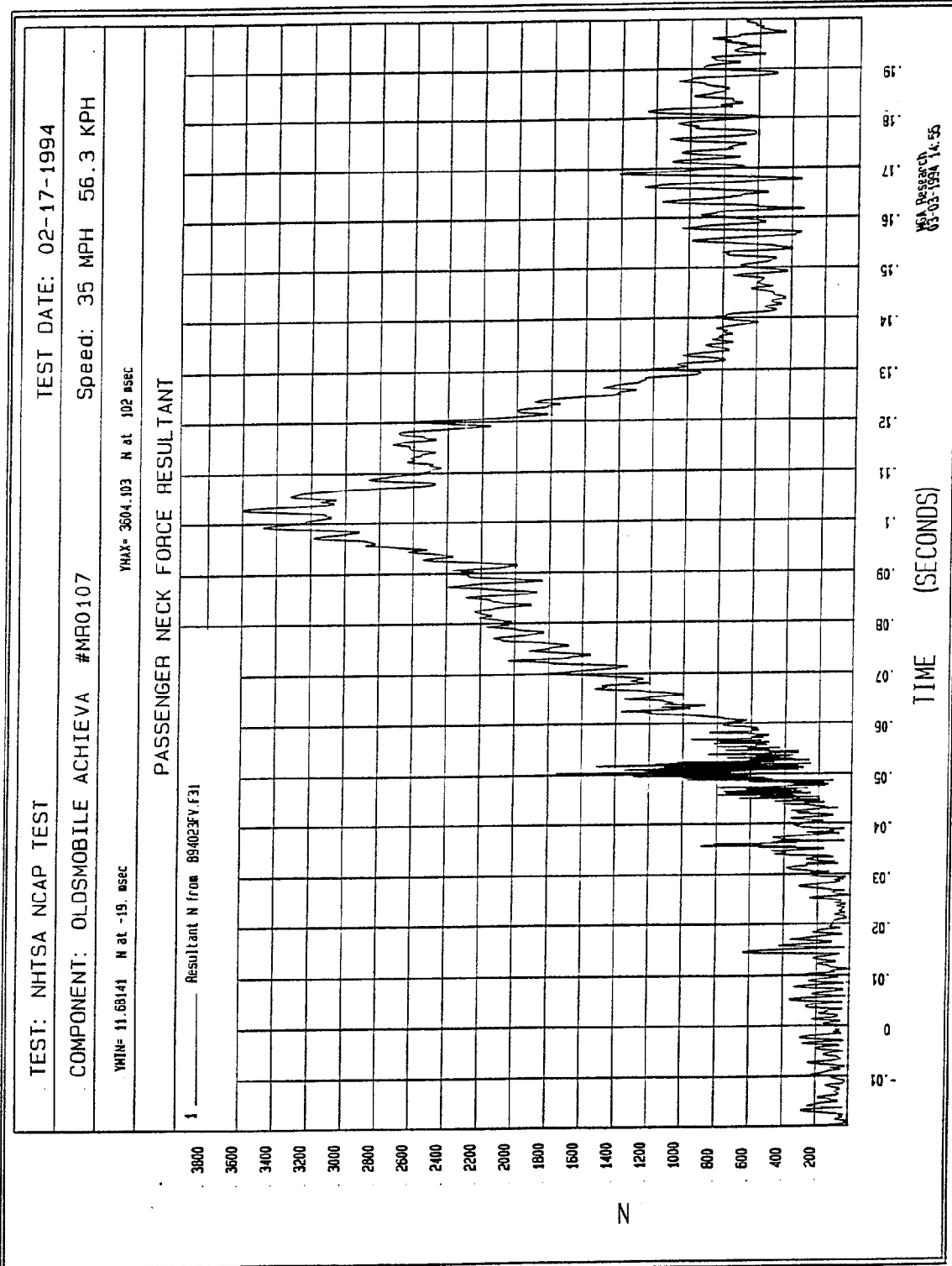


Figure B-79 - Passenger Neck Force Resultant vs. Time

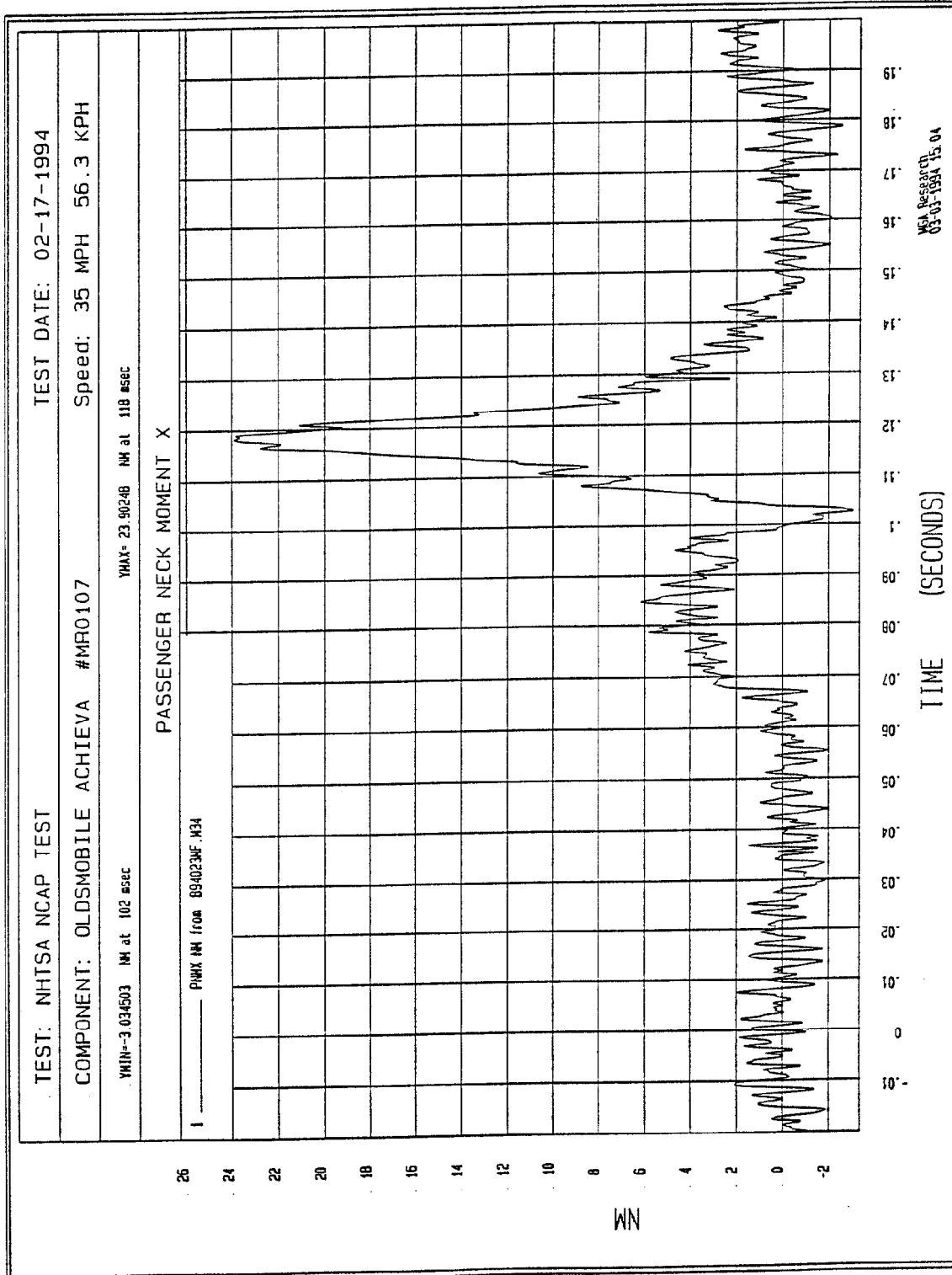


Figure B-80 - Passenger Neck Moment X vs. Time

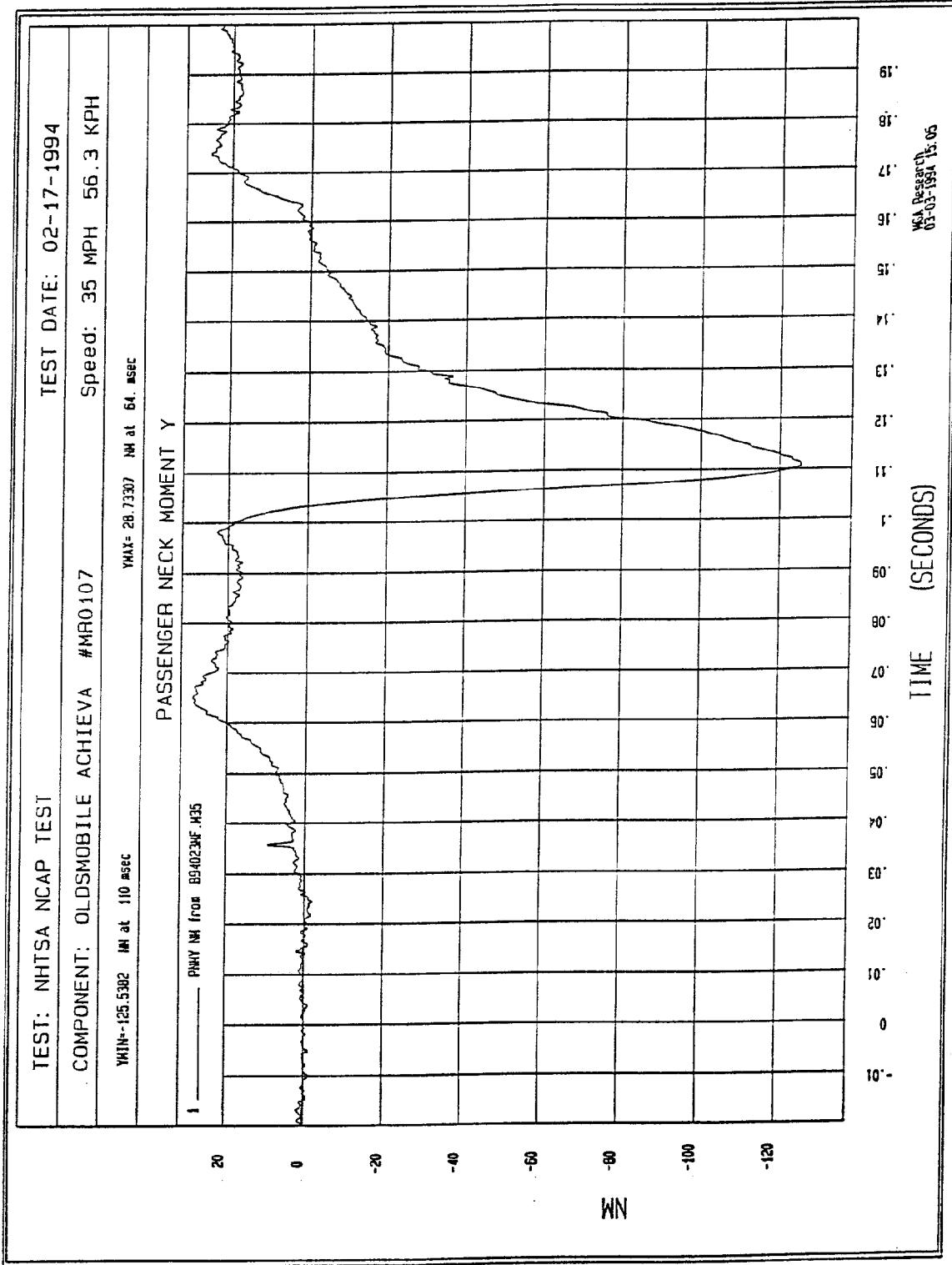
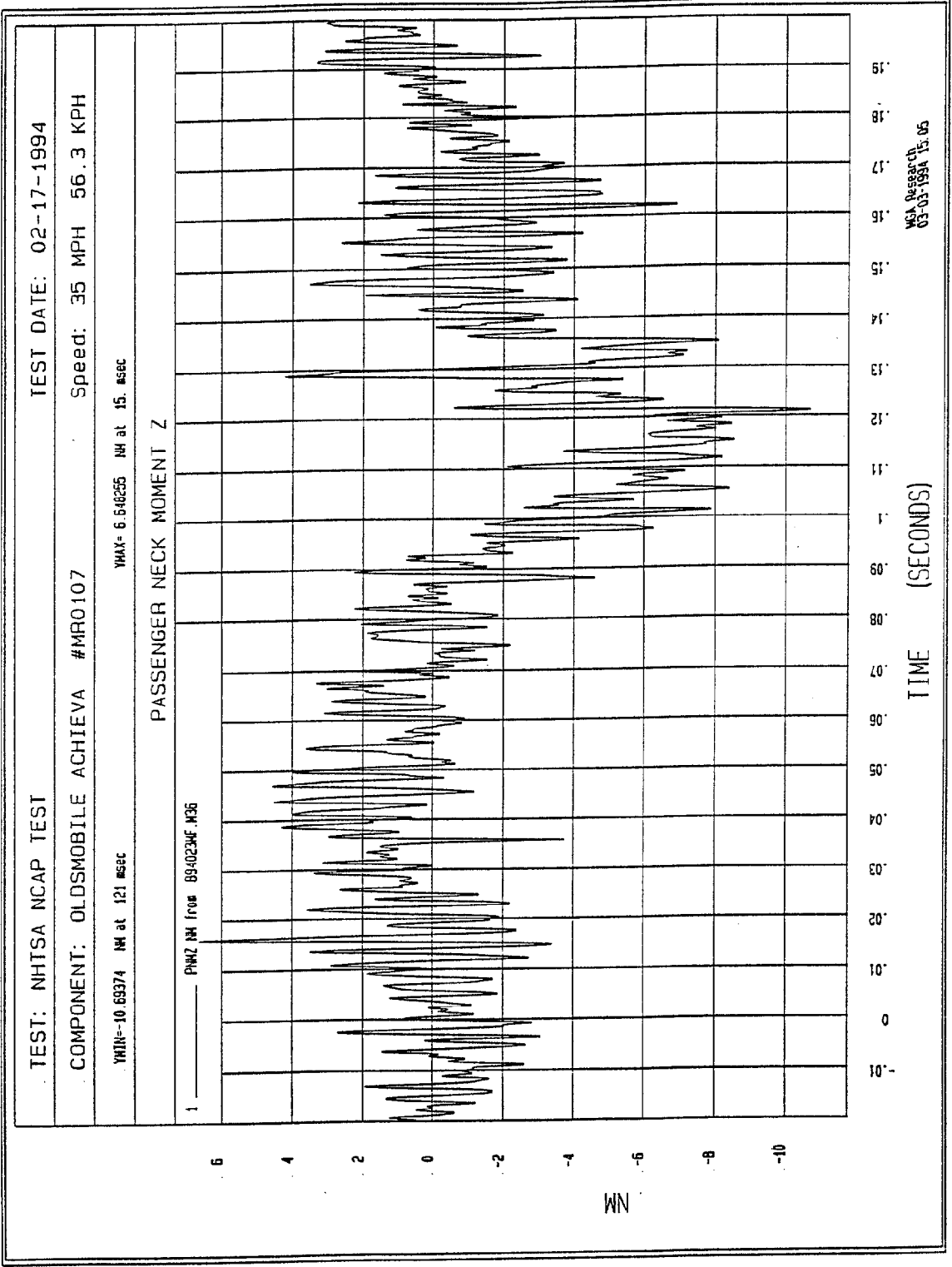


Figure B-81 - Passenger Neck Moment Y vs. Time



B-82

Figure B-82 - Passenger Neck Moment Z vs. Time

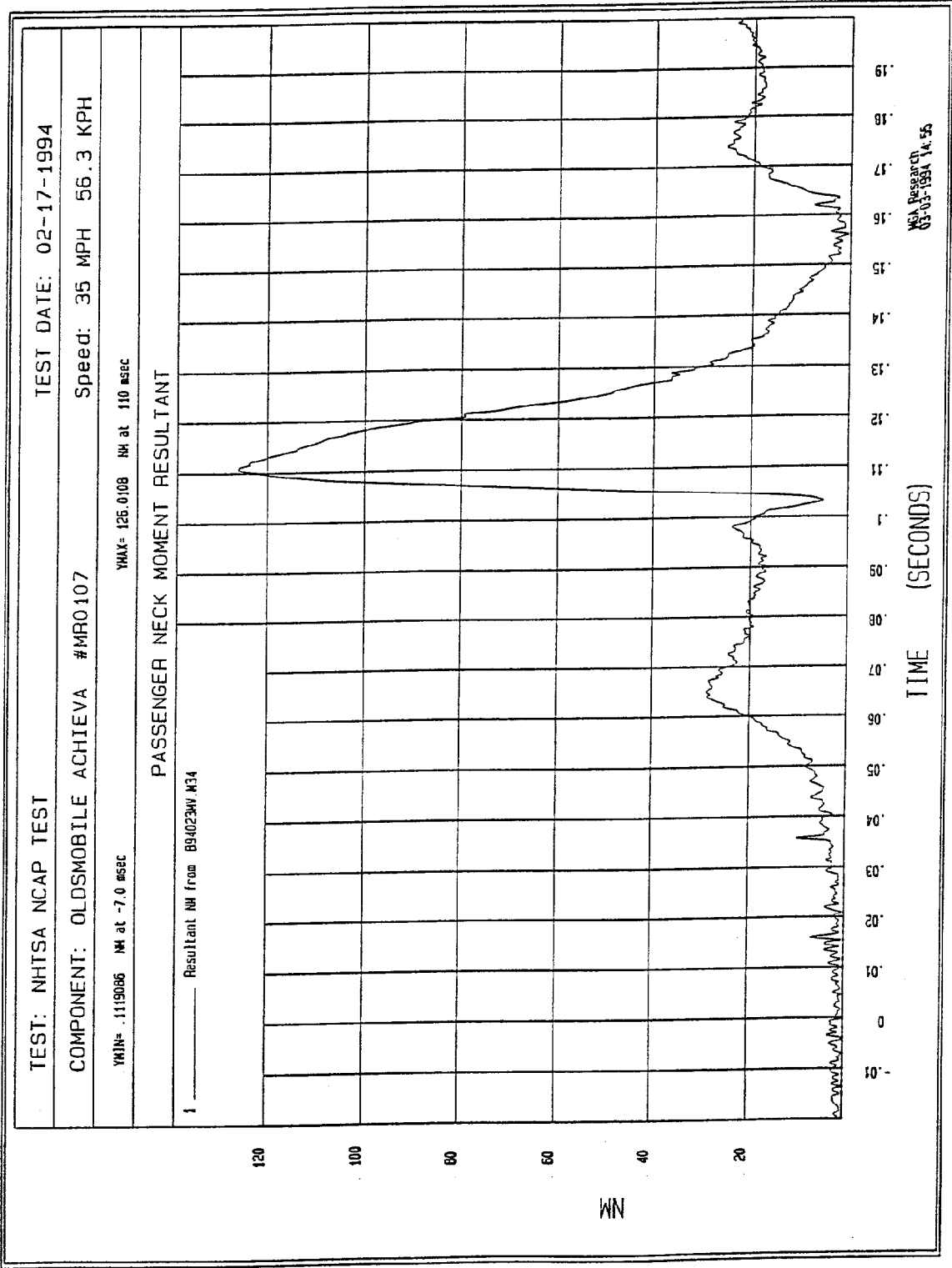


Figure B-83 - Passenger Neck Moment Resultant vs. Time



APPENDIX C
Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 36 DUMMY CALIBRATION BY: Jeff Robbins

I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 1/25/94

DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.1
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.5
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder - Elbow Length	13.0 - 13.6	13.0
J - Elbow Rest Height	7.5 - 8.3	8.0
K - Buttock to Knee Length	22.8 - 23.8	23.5
L - Popliteal Height	16.9 - 17.9	17.0
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.5
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.8
P - Foot Length	9.9 - 10.5	10.3
V - Shoulder Breadth	16.6 - 17.2	16.8
W - Foot Breadth	3.6 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.0
Z - Waist Circumference	32.9 - 34.1	33.5

Note: (See next page for external dimensions)

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET

DUMMY NO.: 36 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 1/25/94

VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	259
Peak Lateral Acceleration	15 G. MAX	3
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	25.00
	20 MS	17.60 - 22.60 G	19.62
	30 MS	12.50 - 18.50 G	15.60
Max. Pendulum G Above 30 MS		29.0 G MAX	15.7
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	38
D Plane Rotation	MAX	64 - 78 DEG.	75
	TIME	57 - 64 MS	57
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	114
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	70
	TIME	47 - 58 MS	52
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	100

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.05
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.48
	20 MS	14.00 - 19.00 G	15.03
	30 MS	11.00 - 16.00 G	12.32
Max. Pendulum G Above 30 MS		22 G Max	12
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	95
	TIME	72 - 82 MS	82
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	155
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-47.2
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	144

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.7
Peak Deflection	2.50 to 2.86 IN.	2.52
Peak Resistive Force	1160 to 1325 LBS.	1277
Internal Hysteresis	69 to 85%	70

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1073

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1077

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 37 DUMMY CALIBRATION BY: Jeff Robbins

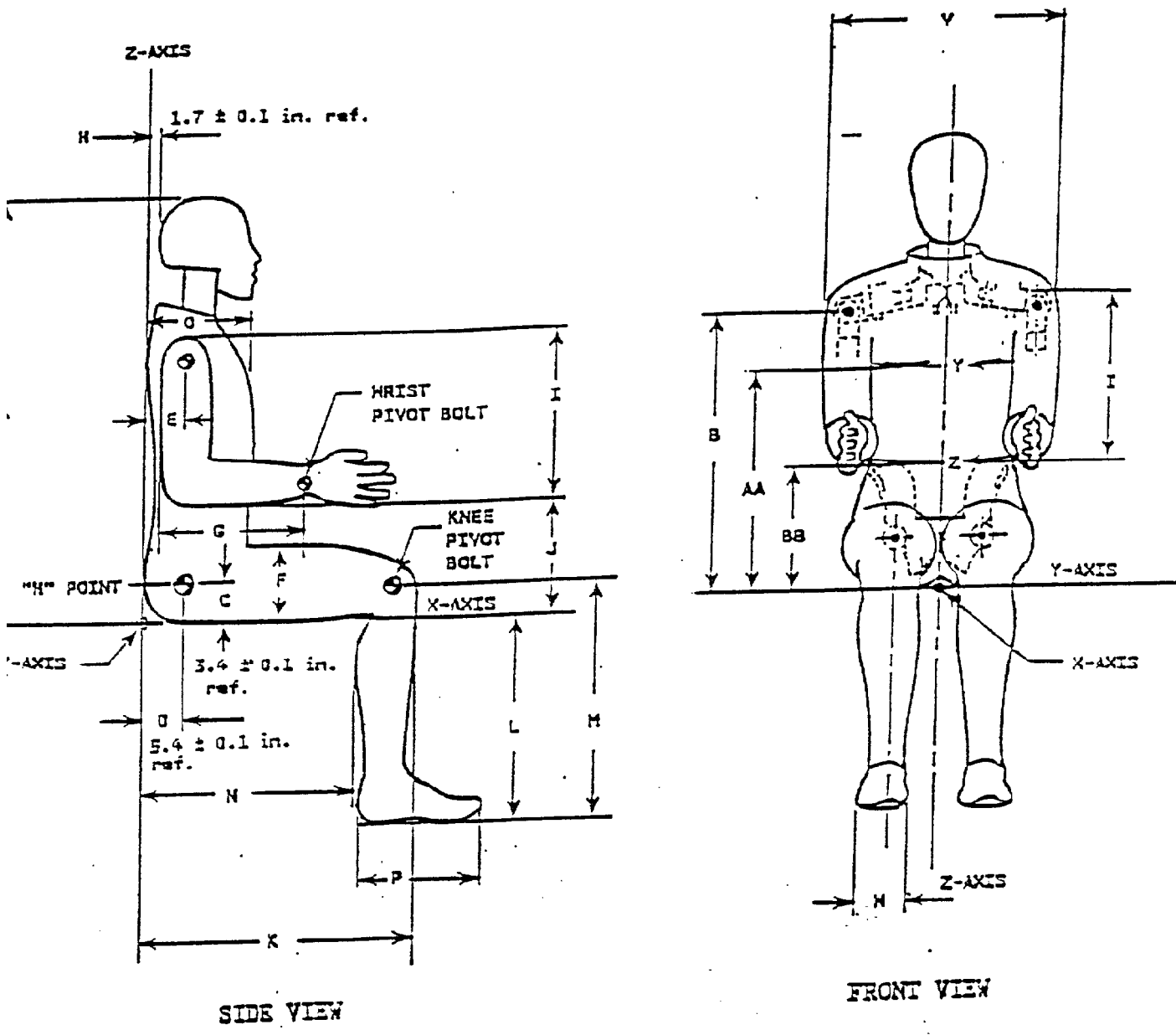
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 1/25/94

DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.9
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.1
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.5
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder Elbow Length	13.0 - 13.6	13.0
J - Elbow Rest Height	7.5 - 8.3	8.0
K - Buttock Knee Length	22.8 - 23.8	23.5
L - Popliteal Height	16.9 - 17.9	17.0
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.5
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.8
P - Foot Length	9.9 - 10.5	10.3
V - Shoulder Breadth	16.6 - 17.2	16.8
W - Foot Breadth	3.5 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.0
Z - Waist Circumference	32.9 - 34.1	33.5

Note: (See next page for external dimensions)

HYBRID III EXTERNAL DIMENSIONS



Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the hybrid III to be positioned in a perfect erect attitude.

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

DUMMY NO.: 37 DUMMY CALIBRATION BY: Jeff Robbins

VERIFICATION DATE: 1/25/94

VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	260
Peak Lateral Acceleration	-15 G. MAX	7
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	23.58
	20 MS	17.60 - 22.60 G	18.97
	30 MS	12.50 - 18.50 G	14.47
Max. Pendulum G Above 30 MS		29.0 G MAX	14.4
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	40
D Plane Rotation	MAX	64 - 78 DEG.	77
	TIME	57 - 64 MS	61
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	119
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	67
	TIME	47 - 58 MS	54
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	106

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.02
Pendulum Deceleration	10 MS	17.20 - 21.20 G	19.03
	20 MS	14.00 - 19.00 G	16.09
	30 MS	11.00 - 16.00 G	13.85
Max. Pendulum G Above 30 MS		22 G Max	14
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	97
	TIME	72 - 82 MS	81
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	157
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-50.1
	TIME	65 - 79 MS	71
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	146

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.7
Peak Deflection	2.50 to 2.86 IN.	2.65
Peak Resistive Force	1160 to 1325 LBS.	1276
Internal Hysteresis	69 to 85%	69

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1103

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1075



APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 36

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACDE7	Endevco	1/25/94
Head Y	ACC78	Endevco	1/25/94
Head Z	ACCW9	Endevco	1/25/94
Chest X	ACC78	Endevco	1/25/94
Chest Y	ACCE6	Endevco	1/25/94
Chest Z	ACC93	Endevco	1/25/94
Right Femur Load Cell	259	GSE	1/27/94
Left Femur Load Cell	268	GSE	1/27/94
Neck Load Cell X	442	Denton	2/9/94
Neck Load Cell Y	442	Denton	2/9/94
Neck Load Cell Z	442	Denton	2/9/94
Neck Moment X	442	Denton	2/9/94
Neck Moment Y	442	Denton	2/9/94
Neck Moment Z	442	Denton	2/9/94
Chest Deflection Gauge	36G	Bourns	9/2/93
Lap Belt Load Cell	211	Eaton	11/22/93
Torso Belt Load Cell	661	Eaton	11/22/93

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 37

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACC46	Endevco	1/25/94
Head Y	ACCH1	Endevco	1/25/94
Head Z	AAMW5	Endevco	1/25/94
Chest X	ACCY1	Endevco	1/25/94
Chest Y	ACCC8	Endevco	1/25/94
Chest Z	ACCT7	Endevco	1/25/94
Right Femur Load Cell	261	GSE	1/27/93
Left Femur Load Cell	262	GSE	1/27/93
Neck Load Cell X	443	Denton	2/9/93
Neck Load Cell Y	443	Denton	2/9/93
Neck Load Cell Z	443	Denton	2/9/93
Neck Moment X	443	Denton	2/9/93
Neck Moment Y	443	Denton	2/9/93
Neck Moment Z	443	Denton	2/9/93
Chest Deflection Gauge	37G	Bourns	9/2/93
Lap Belt Load Cell	657	Lebow	11/22/93
Torso Belt Load Cell	691	Lebow	11/22/93

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

VEHICLE ACCELEROMETERS		
	SERIAL NO.	CALIBRATION DATE
Left Rear Seat Crossmember X	MGA129	11/16/93
Right Rear Seat Crossmember X	MGA097	8/31/93
Top of Engine X	MGA042	11/30/93
Bottom of Engine X	AC9D5	1/10/94
Left Brake Caliper X	MGA118	10/22/93
Right Brake Caliper X	MGA116	10/11/93
Instrument Panel X	MGA078	2/3/94
Redundant Left Rear Seat Crossmember X	A84	12/13/93
Redundant Right Rear Seat Crossmember X	MGA136	12/22/93

LABORATORY INSTRUMENTS		
	SERIAL NO.	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	MGA126	10/22/93
Neck Bending Rotary Potentiometer	N/A	Prior to use
Neck Bending Linear Potentiometer	N/A	Prior to use
Femur/Chest/Thorax Probe Accelerometer	AC913	12/22/93
Abdomen Compression Force Gauge	N/A	N/A

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Seats & Restraint Systems

CAUTION:

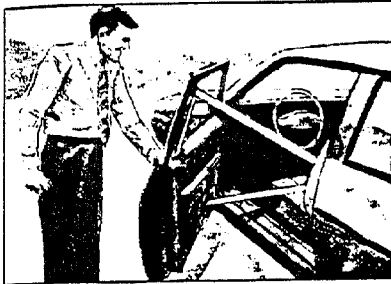
If your safety belt light ever comes on or stays on after the front doors are closed and the driver's belt is buckled, have your vehicle fixed. If you don't, the belt might not work as it should, and you might not have the protection you'd need in a crash.

■ How To Wear Safety Belts Properly

Adults

This section is only for people of adult size. Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your Oldsmobile, see the section after this one, called *Children*. Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has. We'll start with the driver position.



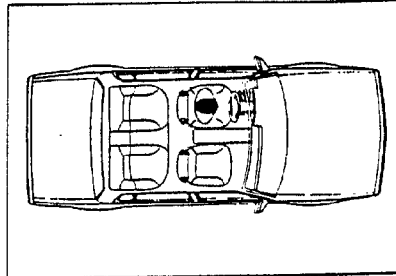
Automatic Lap-Shoulder Belt

This safety belt is called "automatic" because you don't have to buckle up when you get into your vehicle.

■ Vehicles First Sold In Canada

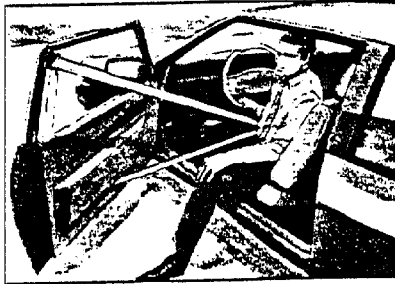
Was your Oldsmobile first sold, when new, in Canada? (If it was, a sticker on the driver's door will say "conforms to all applicable Canada motor vehicle..." etc.) If so, then the rest of Part I does not apply to your vehicle.

To learn how to use your safety belts, please read the **Owner's Manual Safety Belt Supplement**. It comes with every new Oldsmobile first sold in Canada.



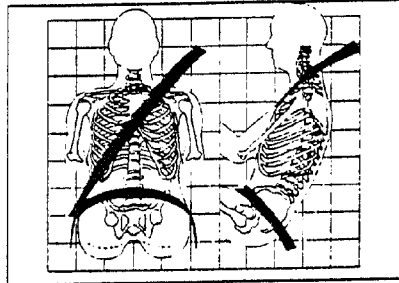
■ Driver Position

This section describes the driver's restraint system.



And you don't have to unbuckle when you get out.

Just get into your vehicle. Then close and lock the door. Adjust the seat (to see how, see *Seats* in the *Index*) so you can sit up straight.



The lap belt should be worn as low on the hips as possible. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash.

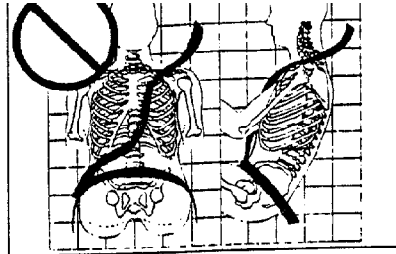
It's possible that an automatic belt could keep you from fully opening a door. That can happen if the door was slammed shut very hard. Just close the door all the way, then slowly open it. If that doesn't fix it, then your Oldsmobile needs service.



We hope you'll always keep your automatic belt buckled. However, you may need to unbuckle it in an emergency. To unbuckle the automatic belt, just push the button on the buckle.



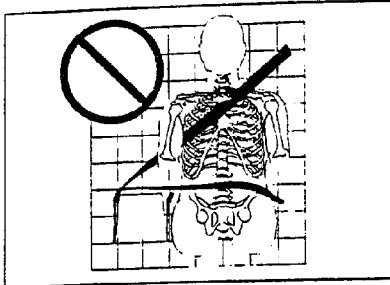
- To reattach the automatic belt:
1. Close and lock the door.
 2. Adjust the seat (to see how, see *Seats in the Index*) so you can sit up straight.
 3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
 4. Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure.



- Q: What's wrong with this?**
A: The shoulder belt is too loose. It won't give nearly as much protection this way.

CAUTION:

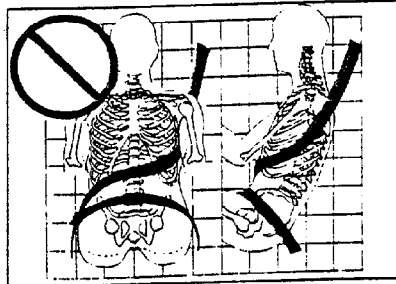
You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could significantly increase injury. The shoulder belt should fit against your body.



- Q: What's wrong with this?**
A: The belt is buckled in the wrong place.

CAUTION:

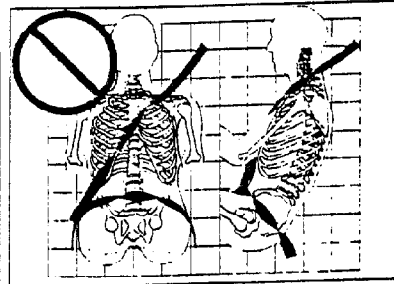
You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.



- Q: What's wrong with this?**
A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

CAUTION:

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

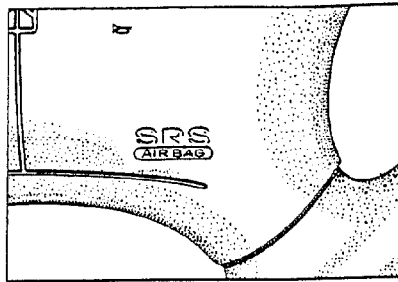


- Q: What's wrong with this?**
A: The belt is twisted across the body.

CAUTION:

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to take impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

Seats & Restraint Systems



■ Supplemental Restraint System (SRS)

This section explains the driver's Supplemental Restraint System (SRS), commonly referred to as an air bag. Here are the most important things to know:

⚠ CAUTION:

Even with an air bag, if you're not wearing a safety belt and you're in a crash, your injuries may be much worse. Air bags are not designed to inflate in rollovers or in rear, side or low-speed frontal crashes. You need to wear your safety belt to reduce the chance of hitting things inside the vehicle or being ejected from it. Always wear your safety belt, even with an air bag.

⚠ CAUTION:

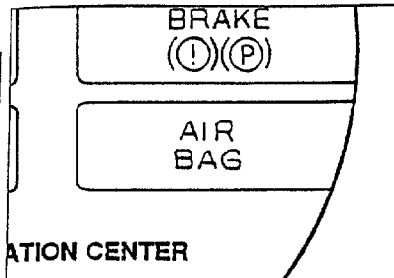
When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or door.

⚠ CAUTION:

Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, it could seriously injure you. Safety belts help keep you in position for an air bag inflation in a crash. Always wear your safety belt, even with an air bag, and sit as far back as you can while still maintaining control of your vehicle.

⚠ CAUTION:

Don't put anything on, or attach anything to, the driver air bag. Also, don't put anything (such as pets or objects) between the driver and the driver air bag. If something is between an occupant and an air bag, it could affect the performance of the air bag, or, worse, it could cause injury.



Air Bag Readiness Light

There is an air bag readiness light on the instrument panel, which shows **AIR BAG**. The system checks for electrical malfunctions, and the light tells you if there is a problem.

You will see this light flash for a few seconds when you turn your ignition to **Run** or **Start**. Then the light should go out, which means the system is ready.

Remember, if the air bag readiness light doesn't come on when you start your vehicle, or stays on, or comes on when you are driving, your air bag system may not work properly. Have your vehicle serviced right away.



How The Air Bag System Works

Where is the air bag?

The driver's air bag is in the middle of the steering wheel.

When is an air bag expected to inflate?

The air bag is designed to inflate in moderate to severe frontal or near-frontal crashes. The air bag will only inflate if the velocity of the impact is above the designed threshold level. When impacting straight into a wall that does not move or deform, the threshold level for most GM vehicles is between 9 and 15 mph (14 and 23 km/h). However, this velocity threshold depends on the vehicle design and may be several miles-per-hour faster or slower. In addition, this threshold

velocity will be considerably higher if the vehicle strikes an object such as a parked car which will move and deform on impact. The air bag is also not designed to inflate in rollovers, side impacts, or rear impacts where the inflation would provide no occupant protection benefit.

In any particular crash, the determination of whether the air bag should have inflated cannot be based solely on the level of damage on the vehicle(s). Inflation is determined by the angle of the impact and the vehicle's deceleration, of which vehicle damage is only one indication. Repair cost is not a good indicator of whether an air bag should have deployed.

What makes an air bag inflate?

In a frontal impact of sufficient severity, the air bag sensing system detects that the vehicle is suddenly stopping as a result of a crash. The sensing system triggers a chemical reaction of the sodium azide sealed in the inflator. The reaction produces nitrogen gas, which inflates the cloth bag. The inflator, cloth bag, and related hardware are all part of the air bag inflator module packed inside the steering wheel.

How does an air bag restrain?

In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel. The air bag supplements the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But air bags would not provide protection in many types of collisions, including rollovers and rear and side impacts, primarily because an occupant's motion is not toward the air bag. Air bags should never be regarded as anything more than a supplement to safety belt protection in moderate to severe frontal and near-frontal collisions.

What will you see after an air bag inflation?

After the air bag has inflated, it will then quickly deflate. This occurs so quickly that some people may not even realize that the air bag inflated. Some components of the air bag module in the steering wheel hub may be hot for a short time, but the portion of the bag that comes into contact with you will not be hot to the touch. There will be small amounts of smoke and dust coming from vents in the deflated air bag. The air bag will **not** impede the driver's vision or ability to steer the vehicle, nor will it hinder the occupants from exiting the vehicle.

- The air bag is designed to inflate only once. After it inflates, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include the air bag module and possibly other parts. The service manual has information about the need to replace other parts.

- Your vehicle is equipped with a diagnostic module, which records information about the air bag system if the air bag deploys during a crash. The module records information about the readiness of the system, which sensors activated the deployment, and whether the driver's safety belt was in use.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your dealer for service.

NOTICE:

If you damage the cover for the driver's air bag, it may not work properly. You may have to replace the air bag on the steering wheel. Do not open or break the air bag cover.

Is the smoke from an air bag inflation harmful?

The particles emitted during air bag inflation are not harmful to most people. Some people with respiratory ailments may experience difficulty breathing if they stay in the vehicle with the windows closed after air bag inflation. So, if your air bag inflates, you and any passengers should exit the vehicle if and when it is safe to do so. If you or your passengers can't get out of the vehicle, try to get fresh air by opening a window, turning on the fan, or opening a door.

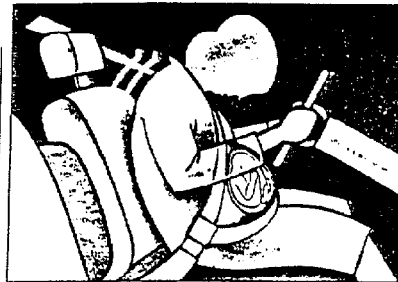
Servicing Your Air Bag-Equipped Oldsmobile

The air bag affects how your Oldsmobile should be serviced. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. Your Oldsmobile dealer and the 1994 Achieva Service Manual have information about servicing your vehicle and the air bag system. The air bag system does not need regular maintenance.



CAUTION:

For up to 2 minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid wires wrapped with yellow tape, or yellow connectors. They are probably part of the air bag system. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.



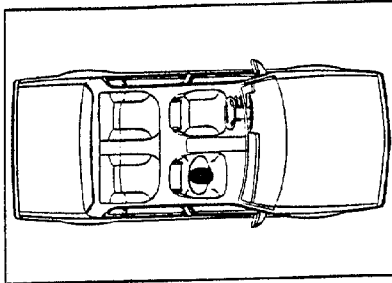
■ Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.

A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible throughout the pregnancy.

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

Seats & Restraint Systems



■ Right Front Passenger Position

The right front passenger's safety belt works the same way as the driver's safety belt. See *Driver Position*, earlier in this part.

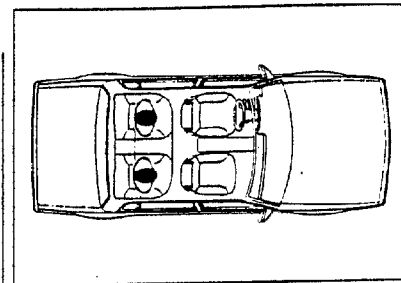


Adjust the seat (to see how, see *Seats* in the *Index*) so you can sit up straight. Move your seat far enough forward that your feet touch the part of the car that is called the "toeboard" (A). That way you'd be less likely to slide under the lap belt in a crash.

■ Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.



Rear Seat Outside Passenger Positions

Lap-Shoulder Belt

The positions next to the windows have lap-shoulder belts.



Here's how to wear one properly.

1. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
2. Push the latch plate into the buckle until it clicks.



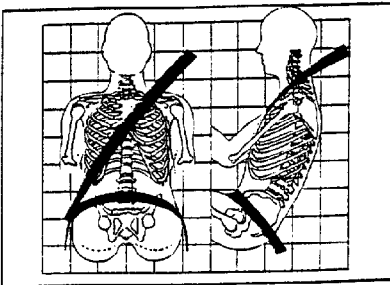
If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it.

Pull up on the latch plate to make sure it is secure.

If the belt is not long enough, see *Safety Belt Extender* at the end of this section. Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



3. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.



The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash.



CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.



To unlatch the belt, just push the button on the buckle.

Rear Safety Belt Comfort Guides for Children and Small Adults

Rear shoulder belt comfort guides will provide added comfort for children who have outgrown child restraints and for small adults. The comfort guides pull the shoulder belts away from the neck and head.

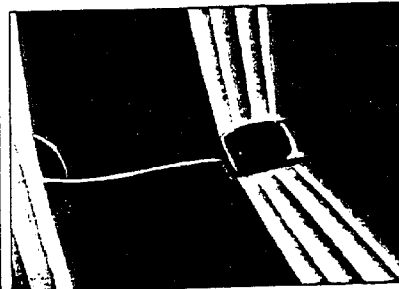


There is one guide for each outside passenger position in the rear seat. You will find them tucked in between the seatback and the interior body, about half-way down the edge of the seatback. Here is how you should install the comfort guide on the shoulder belts:

1. Pull the elastic cord out from between the edge of the seat back and the interior body to remove the guide from its storage clip.



2. Slide the guide under and past the belt. The elastic cord must be under the belt. Then, place the guide over the belt, and insert the two edges of the belt into the slots of the guide.



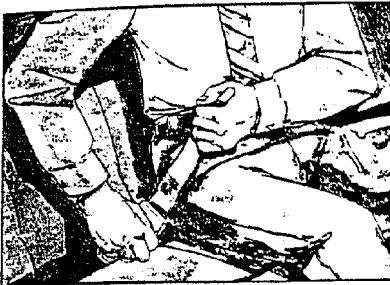
3. Be sure that the belt is not twisted and it lies flat. The elastic cord must be under the belt and the guide on top.

Seats & Restraint Systems



4. Buckle the belt around the child, and make sure that both the lap belt and the shoulder belt are secured properly. Make sure that the shoulder belt crosses the shoulder. See *Safety Belts, Rear Seat Passengers* in the *Index*.

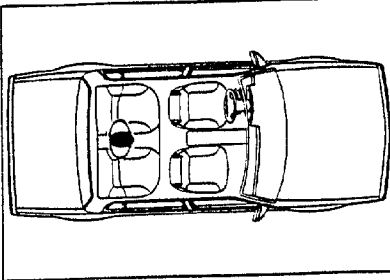
To remove and store the comfort guides, just perform these steps in reverse order. Squeeze the belt edges together so that you can take them out from the guides. Pull the guide upward to expose its storage clip, and then slide the guide onto the clip. Rotate the guide and clip inward and in between the seatback and the interior body, leaving only the loop of elastic cord exposed.



To make the belt shorter, pull its free end as shown until the belt is snug.

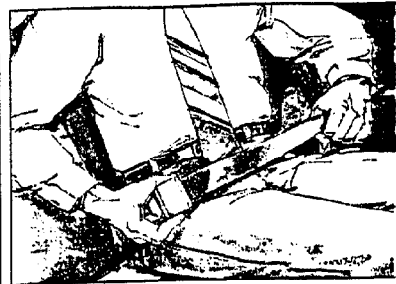
Buckle, position and release it the same way as the lap part of a lap-shoulder belt. If the belt isn't long enough, see *Safety Belt Extender* at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



■ *Center Passenger Position Lap Belt*

If your vehicle has a rear bench seat, someone can sit in the center position.



When you sit in a center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.



■ *Children*

Everyone in a vehicle needs protection! That includes infants and all children smaller than adult size. In fact, the law in every state in the United States and in every Canadian province says children up to some age must be restrained while in a vehicle.

Smaller Children and Babies



CAUTION:

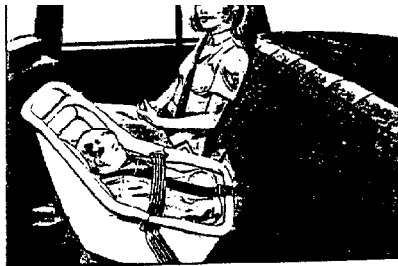
Smaller children and babies should always be restrained in a child or infant restraint. The instructions for the restraint will say whether it is the right type and size for your child. A very young child's hip bones are so small that a regular belt might not stay low on the hips, as it should. Instead, the belt will likely be over the child's abdomen. In a crash the belt would apply force right on the child's abdomen, which could cause serious or fatal injuries. So, be sure that any child small enough for one is always properly restrained in a child or infant restraint.



CAUTION:

Never hold a baby in your arms while riding in a vehicle. A baby doesn't weigh much — until a crash. During a crash a baby will become so heavy you can't hold it. For example, in a crash at only 25 mph (40 km/h), a 12-pound (5.5 kg) baby will suddenly become a 240-pound (110 kg) force on your arms. The baby would be almost impossible to hold.

CAUTION (Continued)



CAUTION (Continued)

Secure the baby in an infant restraint.

■ Child Restraints

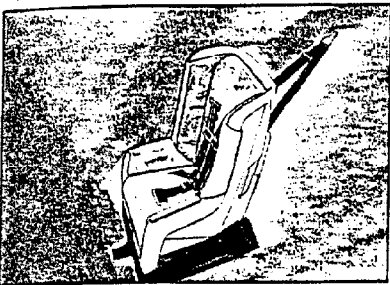
Be sure to follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. The instructions that come with the infant or child restraint will show you how to do that.

Where to Put the Restraint

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. We at General Motors therefore recommend that you put your child restraint in the rear seat unless the child is an infant and you're the only adult in the vehicle. In that case, you might want to secure the restraint in the front seat where you can keep an eye on the baby.

Wherever you install it, be sure to secure the child restraint properly.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.



Top Strap

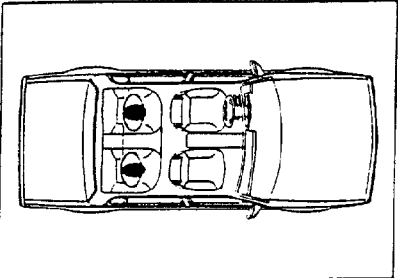
If your child restraint has a top strap, it should be anchored.

If you need to have an anchor installed, you can ask your Oldsmobile dealer to put it in for you. If you want to install an anchor yourself, your dealer can tell you how to do it.

For cars first sold in Canada, child restraints with a top strap must be anchored according to Canadian Law.

Your dealer can obtain the hardware kit and install it for you, or you may install it yourself using the instructions provided in the kit.

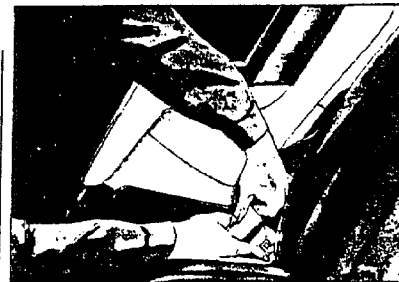
Use the tether hardware kit available from the dealer. The hardware and installation instructions were specifically designed for this vehicle.



Securing a Child Restraint in a Rear Outside Position

You'll be using the lap-shoulder belt. See the earlier section about the top strap if the child restraint has one.

1. Put the restraint on the seat. Follow the instructions for the child restraint.
2. Secure the child in the child restraint as the instructions say.
3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how. Tilt the latch plate to adjust the belt if needed. If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.



4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

Seats & Restraint Systems

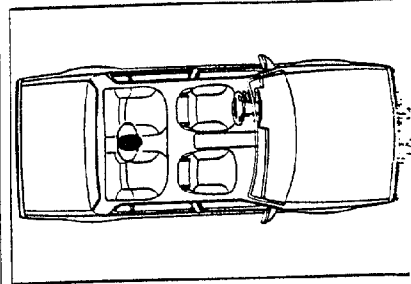


5. To tighten the belt, pull up on the shoulder belt while you push down on the child restraint.



6. Push and pull the child restraint in different directions to be sure it is secure.

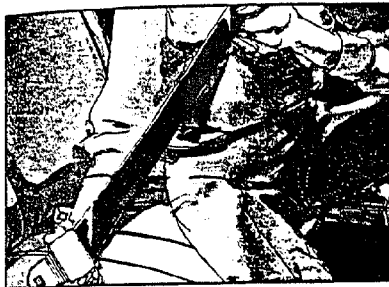
To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.



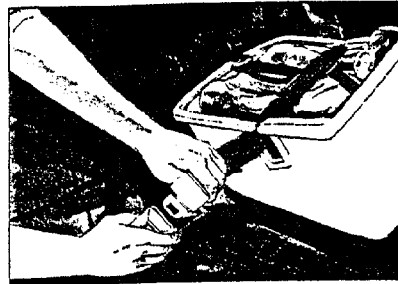
Securing a Child Restraint in the Rear Center Seat Position

When you secure a child restraint in a center seating position, you'll be using the lap belt.

See the earlier section about the top strap if the child restraint has one.



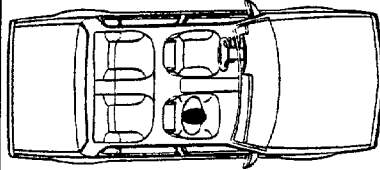
1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
2. Put the restraint on the seat. Follow the instructions for the child restraint.
3. Secure the child in the child restraint as the instructions say.



4. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.
5. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.
6. To tighten the belt, pull its free end while you push down on the child restraint.

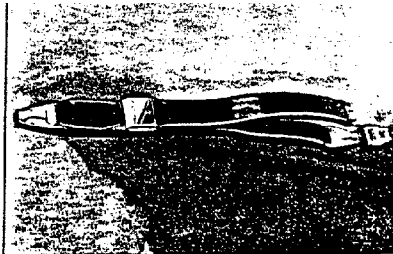
7. Push and pull the child restraint in different directions to be sure it is secure. If the child restraint isn't secure, turn the latch plate over and buckle it again. Then see if it is secure. If it isn't, secure the restraint in a different place in the vehicle and contact the child restraint maker for their advice about how to attach the child restraint properly.

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.



Securing a Child Restraint in the Right Front Seat

To use a child restraint here, you will need a special infant/child seat attaching belt and the hardware that goes with it. See the earlier section about the top strap if the child restraint has one.



Your dealer can get these and install the hardware for you. It's free. The special belt is GM Part No. 12340286. Your dealer can find the correct hardware in the accessory section of the GM Parts Catalog.



CAUTION:

Don't use the special infant/child seat attaching hardware in another vehicle. If you do, it may not work well and the child may not be protected properly in a crash. The special hardware is for your vehicle only. Also, don't use the special belt for anything but securing a child restraint in the right front seat. If an adult or older child uses it, the belt won't provide protection and may even increase injury in a crash.



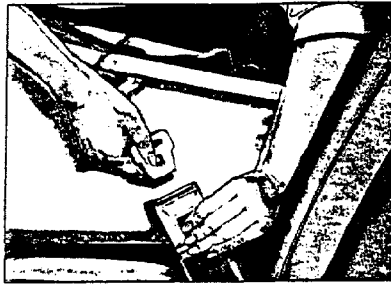
Once the special hardware is installed, please follow the instructions with it and these steps:

1. Unbuckle the automatic lap-shoulder belt by pushing the button on the buckle.

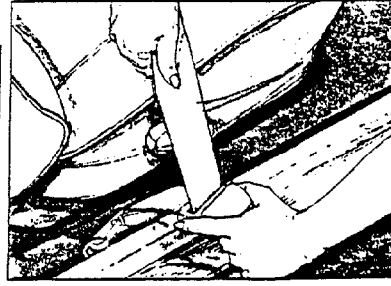
It will stay on the door, ready to be rebuckled for use by adults or older children.



2. Snap one hook of the infant/child seat attaching belt near the floor at the door side of the seat.



3. Put the belt's special latch plate into the vehicle's safety belt buckle.

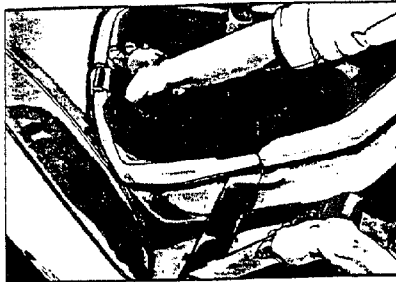


4. You can make the belt longer by tilting the buckle and pulling it along the belt.
5. Put the restraint on the seat. Follow the instructions for the child restraint.
6. Secure the child in the child restraint as the instructions say.
7. Run the belt through or around the child restraint. The child restraint instructions will show you how.

Seats & Restraint Systems



8. Put the hook on the free end through the slot in the latch plate.

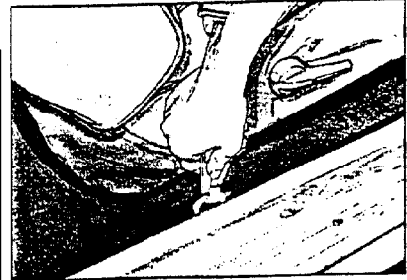


9. To make it tight, pull the belt while you push down on the child restraint. If the belt won't stay tight, switch it end for end.

10. Push and pull the child restraint in different directions to be sure it is secure.

To remove the infant/child seat restraint:

1. Push the button on the safety belt buckle and remove the special latch plate. Leave the latch plate on the special belt.



2. Push the spring on the hook near the door and remove the special belt.

3. Put the belt away in a safe place in your vehicle, so it won't fly around in a crash and injure someone.

4. Remember to reattach the automatic belt again, once the child restraint is removed. Be sure it isn't twisted.



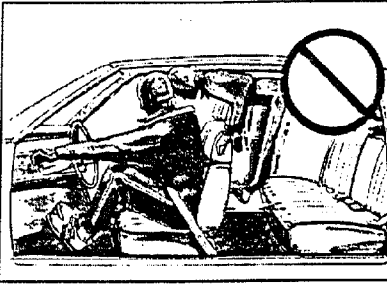
Larger Children

Children who have outgrown child restraints should wear the vehicle's safety belts.

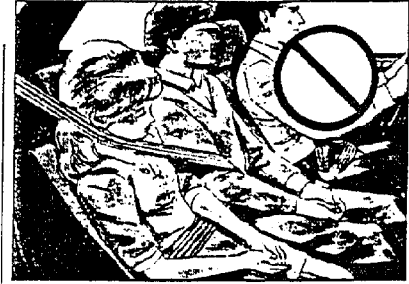
If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide.

Accident statistics show that children are safer if they are restrained in the rear seat. But they need to use the safety belts properly.

- Children who aren't buckled up can be thrown out in a crash.



- Children who aren't buckled up can strike other people who are.



CAUTION:

Never do this. Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

Q: What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

A: Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide. If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in the center seat position, the one that has only a lap belt. See *Rear Safety Belt Comfort Guides* in the *Index*.



CAUTION:

Never do this. Here a child is sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low and snug on the hips, just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

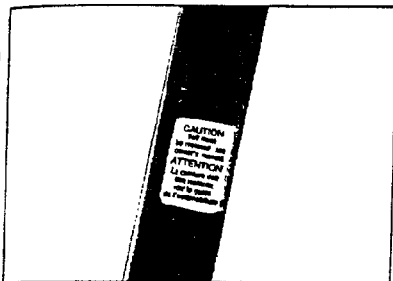
■ **Safety Belt Extender**

If the vehicle's safety belt will fasten around you, you should use it. The automatic lap-shoulder belt has plenty of extra length built in, so it will fasten around almost all people.

But if a safety belt isn't long enough to fasten, your dealer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

■ **Checking Your Restraint Systems**

Now and then, make sure all your belts, buckles, latch plates, retractors, anchorages and reminder systems are working properly. Look for any loose parts or damage. If you see anything that might keep a restraint system from doing its job, have it repaired.



■ **Replacing Safety Belts After a Crash**

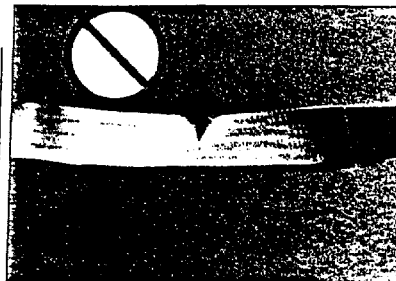
If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new belts.

If you ever see a label on a right front safety belt that says to replace the belt, be sure to do so. Then the new belt will be there to help protect you in an accident. You would see this label on the belt near the latch plate.

If belts are cut or damaged, replace them. Collision damage also may mean you will need to have safety belt or seat parts repaired or replaced. New parts and repairs may be necessary even if the belt wasn't being used at the time of the collision.

If your seat adjuster won't work after a crash, the special part of the safety belt that goes through the seat to the adjuster may need to be replaced.



Q: What's wrong with this?

A: The belt is torn.

Torn or frayed belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.