

REPORT NO. MGA-94-N010

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

Chevrolet
1994 Chevrolet Beauville
Sport Van
NHTSA NO. MR0105

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: March 22, 1994

Report Date: May 16, 1994

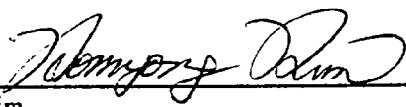
FINAL REPORT

Prepared For:

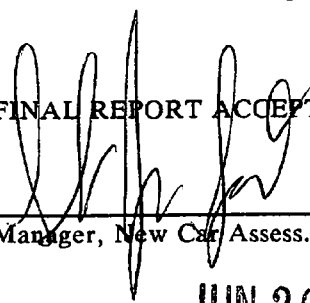
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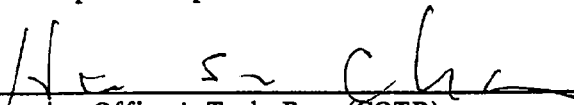
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16. Abstract A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1994 Chevrolet Beauville Van at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on March 22, 1994. The barrier impact velocity was 56.4 kph (35.1 mph), and the ambient temperature at the time of impact was 2° C. The post-test maximum static crush was 590 mm. The test vehicle appeared to comply with the requirements of the following Federal Motor Vehicle Safety standards: 1. FMVSS 212, "Windshield Mounting" 2. FMVSS 219 (partial), "Windshield Zone Intrusion" 3. FMVSS 301, "Fuel System Integrity" With regard to FMVSS 208, "Occupant Crash Protection" injury criteria, the driver's HIC was 1027 and the 3 msec. Clip (Chest g's) was 54.8 g's. The left and right maximum femur loads for the driver were 3493 and 11647 Newtons, respectively. The passenger's HIC was 1049 and the 3 msec Clip was 48.7 g's. The left and right femur maximum loads were 2064 and 2296 Newtons respectively.					
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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 Chevrolet Beauville Van at a velocity of 56.4 kph (35.1 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on March 22, 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 14 high speed cameras. Camera locations and other pertinent camera information can be found in this report. Onboard cameras were not used to document the seat belt webbing movement at the retractor unit because the retractor was attached to the seat frame. The position of the retractor unit made it difficult to obtain an appropriate view from onboard cameras. Instead, string potentiometers were used to measure the belt webbing movement.

Two calibrated 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.

The driver ATD (Serial No. 36) and passenger ATD (Serial No. 66) were fully instrumented with head and chest triaxial accelerometers, right/left femur load cells, six channel neck transducers, and chest displacement transducers. Additionally, the driver had instrumented lower legs. 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. The driver ATD had been used in two previous tests and the passenger ATD in one previous test. Both dummies did not exceed the injury criteria limits in the previous tests. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 61 channels of data were recorded on 6 computers. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Channel 48 had a wire cut at approximately 47 msec.

The driver's head struck the inflated airbag. The driver's HIC was 1027. The maximum chest deceleration over 3 milliseconds was 54.8 G's. The left and right maximum femur loads were 3493 and 11647 Newtons respectively.

The right front passenger's HIC was 1049 and maximum chest deceleration over 3 milliseconds was 48.7 g's. The left and right femur loads were 2064 and 2296 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1994/Chevrolet/Beauville Van

NHTSA No.: MR0105 VIN.: 1GNEG25KXRF129405

Body color: White Date of Manufacture: 11-93

Engine: 8 Cylinders; C.I.D.; 5.7 liters; CC

X Gas; Diesel; Turbocharged

X Longitudinal; Transverse

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

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

Odometer Reading: 59

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

 P/seats; X Tilt Wheel; X Cruise Control;

Type of Occupant Restraint: 1 retractor seat mounted manual 3 point lap and shoulder belt with driver side airbag

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 2.46 kg/cm² 35 Psi; Rear 2.46 kg/cm² 35 Psi:

Recommended Tire Size: P225/75R15

Recommended Cold Tire Pressure: Front 2.46 kg/cm²; Rear 2.46 kg/cm²

Tires on Vehicle: P225/75R15; Manufacturer: Uniroyal

Number of Occupants: 2 Front; 3 Rear; 3 3rd Seat; 8 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) = 712 kg. (A)

No. of Occupants x 68 kg. = 544 kg. (B)

Rated Cargo Weight (RCW) A-B = 168 kg.

GVWR 2994 kg. GAWR: Front 1542 kg.; Rear 1545 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 622 kg Right Rear = 522 kg
Left Front = 573 kg Left Rear = 565 kg
TOTAL FRONT WEIGHT = 1195 kg (52.4% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1087 kg (47.6% of Total Vehicle Weight)
TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 2282 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 2282 kg
VCW = Vehicle Capacity Weight 712 kg DSC = Designated Seating Capacity 8
RCW = VCW - 68 (DSC) = 136 *kg
Target Test Weight = UDW + RCW + (2 dummies x 75.8 kg/dummy)
Target Test Weight = 2570 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 684 kg Right Rear = 583 kg
Left Front = 653 kg Left Rear = 639 kg
TOTAL FRONT WEIGHT = 1337 kg (52.2% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1222 kg (47.8% of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2559 kg
Weight of ballast secured in vehicle = 204 kg
Vehicle components removed to meet target weight or to make room for instrumentation: rear seat,
rear window, and jack

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 777 LF 783 RR 778 LR 769
Test Attitude: RF 747 LF 751 RR 755 LR 749
Wheel Base: 3180 mm; C.G. = 1519 mm rearward of front wheel C/L
Remarks: None

*light trucks and MPVs RCW is 136 kgs or manufacturer's value, whichever is less

POST-IMPACT DATA:

VEHICLE REBOUND AND CRUSH (mm):

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

VISIBLE DUMMY CONTACT POINTS:

2-4

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
<u>Door Opening</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
(without use of tools)	<u>No</u>	<u>No</u>	<u>N/A</u>	<u>No</u>

	<u>Front</u>		<u>Rear</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>	<u>2nd</u>	<u>3rd</u>
Seat Back Movement	<u>0</u>	<u>0</u>	<u>N/A</u>	<u>0</u>
Seat Shift (mm)	<u>0</u>	<u>0</u>	<u>N/A</u>	<u>0</u>

Glazing Damage

Backlight/Windshield Windshield cracked

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.:

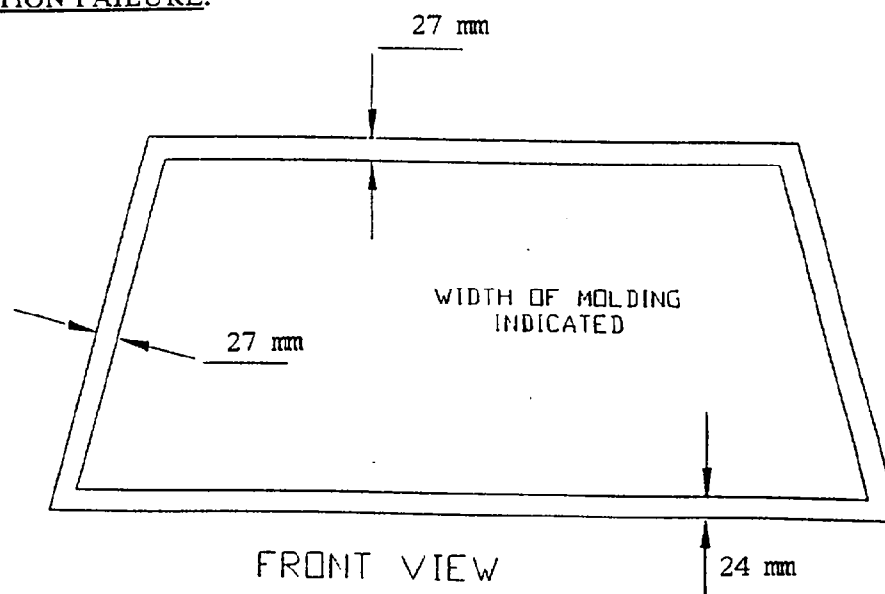
Rubber with glue retention

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	2343	2343	100%
LEFT SIDE	2343	2343	100%
TOTAL	4686	4686	100%

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= 1649 mm

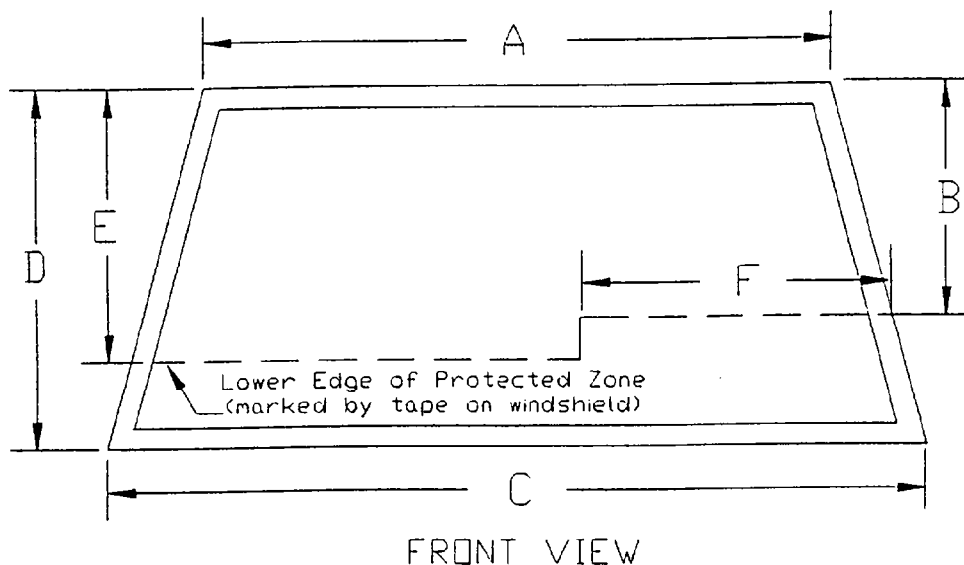
B= 362 mm

C= 1959 mm

D= 668 mm

E= 441 mm

F= 1155 mm



* Protected zone straight across windshield

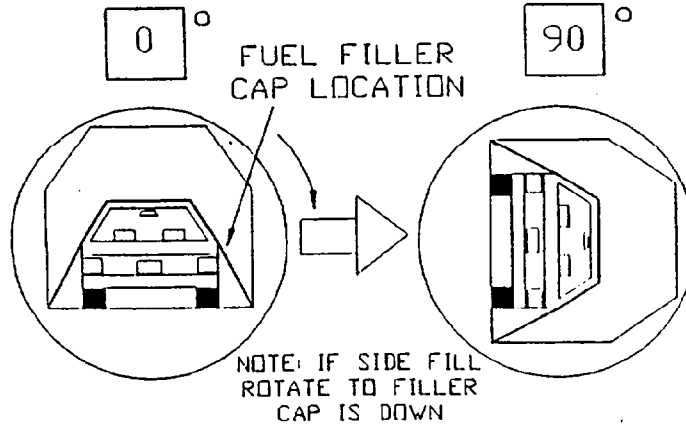
DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":
(Show location of penetration)

NONE

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90°

Vehicle NHTSA ID No.: MR0105



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 40 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 40 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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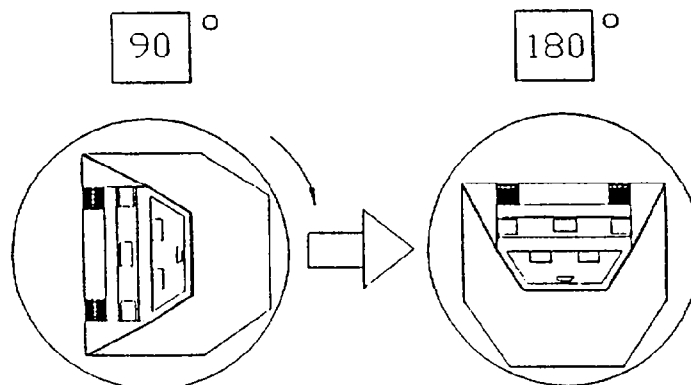
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180°

Vehicle NHTSA ID No.: MR0105



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 23 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 23 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
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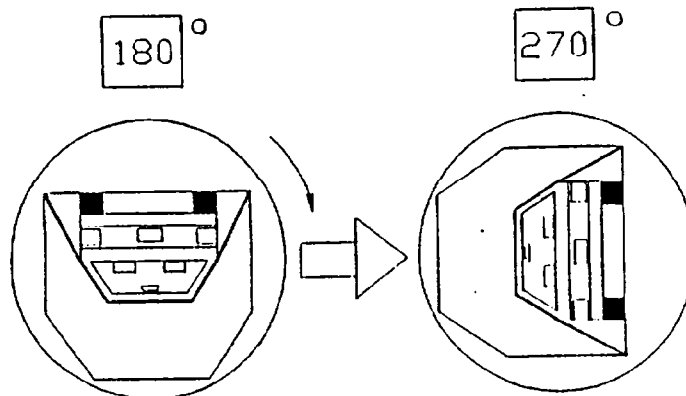
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270°

Vehicle NHTSA ID No.: MR0105



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 27 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 27 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
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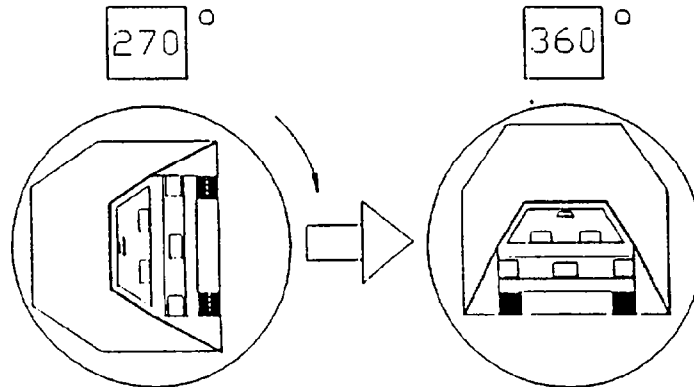
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360°

Vehicle NHTSA ID No.: MR0105



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 39 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 39 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. Camera Locations
6. 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/Chevrolet/Beauville/Van

VEH. NHTSA NO.: MR0105 TEST DATE: March 22, 1994

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #36	PASSENGER DUMMY #66
Head Channel X	-85.7	-43.7
Head Channel Y	15.2	-13.0
Head Channel Z	-23.3	67.1
HEAD RESULTANT	86.7	76.0
Chest Channel X	-57.2	-49.0
Chest Channel Y	17.2	-10.4
Chest Channel Z	-11.0	17.2
CHEST RESULTANT (CLIP)	54.8	48.7
TIME INTERVAL (msec) [0.003 seconds minimum]	$t_1 = 62.1$ $t_2 = 65.1$	$t_1 = 69.3$ $t_2 = 72.2$

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	1026.7	1049.1
$t_1 =$ (msec)	49.0	70.9
$t_2 =$ (msec)	75.5	106.9
Avg. Accel. t_1 to t_2 (g's)	68.3	61.1

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

MAXIMUM FEMUR FORCES:

Right Side (N)	-11647	-2296
Left Side (N)	-3493	-2064

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	4306	N/A*
Shoulder Belt (N)	7131	8725

NOTE: All values listed must occur during primary impact event.
(Head X,Y,Z and R listed must be during t_1 to t_2 HIC interval)

* Invalid data was available after 47 msec due to wire cut.

FMVSS NO. 208, "OCCUPANT CRASH PROTECTION", DATA SHEET (continued)

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1994/Chevrolet/Beauville/Van

VEHICLE NHTSA NO.: MR0105 TEST DATE: March 22, 1994

NECK FORCES AND MOMENTS:	DRIVER DUMMY # 36	PASSENGER DUMMY #66
Neck Load X (N)	1056	1651
Neck Load Y (N)	-224	585
Neck Load Z (N)	-3824	-2661
Neck Moment X (N.M)	-15.9	32.3
Neck Moment Y (N.M)	72.0	-393.5*
Neck Moment Z (N.M)	13.3	9.5
Chest Deflection X (mm)	38.8	36.1
Time of Max. Occurrence	57 msec	93 msec

MAXIMUM TIBIA FORCES AND MOMENTS:	DRIVER DUMMY #36	PASSENGER DUMMY #66
Left Upper Tibia Moment X (N.M)	-70.7	N/A**
Left Upper Tibia Moment Y (N.M)	-202.5	N/A
Left Lower Tibia Force X (N)	-1650.3	N/A
Left Lower Tibia Moment Y (N.M)	71.6	N/A
Left Lower Tibia Force Z (N)	5847.1	N/A
Right Upper Tibia Moment X (N.M)	-88.4	N/A
Right Upper Tibia Moment Y (N.M)	-241.8	N/A
Right Lower Tibia Force X (N)	-2035.8	N/A
Right Lower Tibia Moment Y (N.M)	-60.7	N/A
Right Lower Tibia Force Z (N)	9141.1	N/A

* Invalid data recorded between 91 msec and 95 msec (see data plot in Appendix B)

** Passenger dummy's lower legs were not instrumented

PART 572 DUMMY IN-VEHICLE POSITION

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1994/Chevrolet/Beauville/Van

VEHICLE NHTSA NO.: MR0105 TEST DATE: March 22, 1994

SEAT TYPE:

 Bench
 X Bucket
 Split Bench

ADJUSTER TYPE:

Driver
 X Manual
 Power

Passenger
 X Manual
 Power

BUCKET SEAT BACK TYPE:

 Fixed
 X Adjustable Reclining

FRONT SEAT TRACK ADJUSTMENT POSITIONS:

Driver Seat

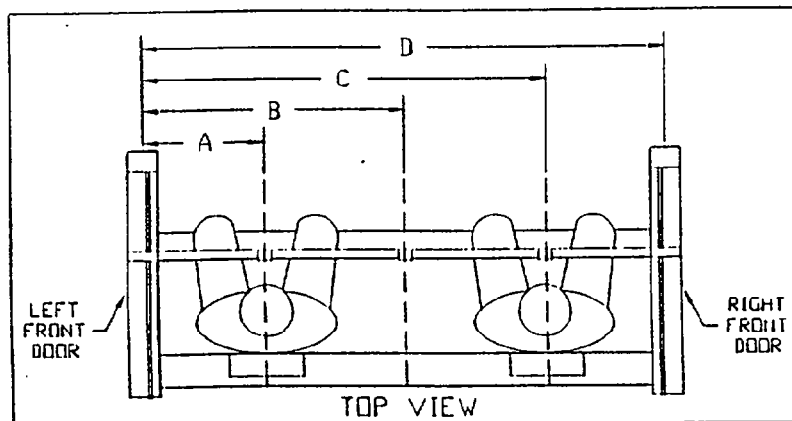
 6th notch from rear

11 total

Passenger Seat

 6th notch from rear

11 total



 36 DUMMY ID 66

A = Left Door to Driver Centerline	<u> 388 </u> mm
B = Left Door to Vehicle Centerline	<u> 913 </u> mm
C = Left Door to Right Passenger Centerline	<u> 1485 </u> mm
D = Left Door to Right Door	<u> 1825 </u> mm

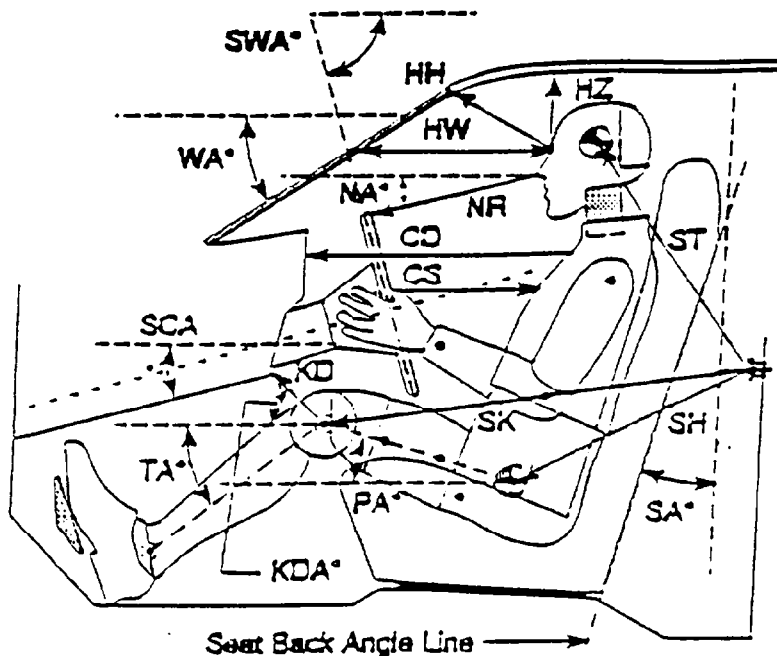
FRONT SEAT MEASUREMENT TABLE

Units (mm)

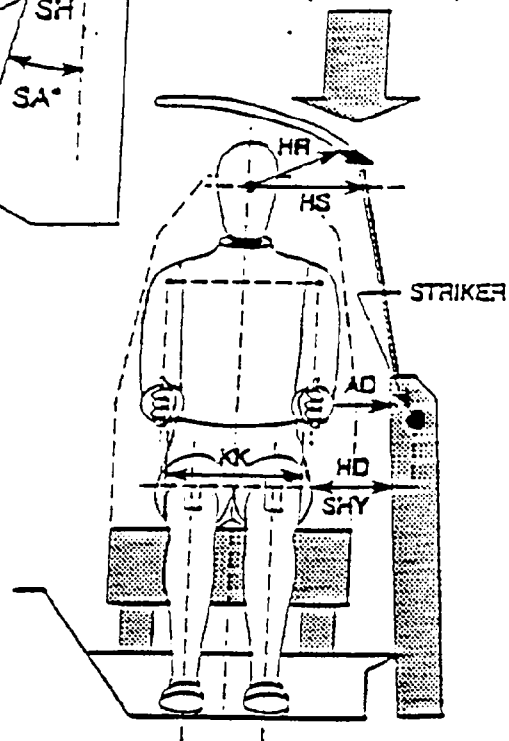
	DRIVER (Serial #36)	PASSENGER (Serial #66)
WA°	46.8°	46.8°
SWA°	59.9°	N/A
SCA°	32.3°	N/A
SA°	22.8°	22.8°
HZ	237	245
HH	621	702
HW	724	808
HR	270	272
NR	486 Angle (N/A) 15.4°	N/A
CD	652	860
CS	356	N/A
RA	222	N/A
KDL	262 Angle (KDA) 25.6°	390
KDR	269	375 Angle (KDA) 7°
PA°	21.8°	23°
TA°	40°	42°
KK	262	215
ST	607 Angle 4.6°	682 Angle N/A
SK	569 Angle 0.8°	465 Angle -0.7°
SH	172 Angle 18.6°	93 Angle 32.4°
SHY	224	234
HS	305	300
HD	151	158
AD	103	74

N/A = Not Applicable

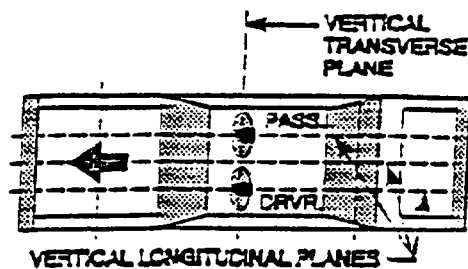
FRONT SEAT MEASUREMENTS



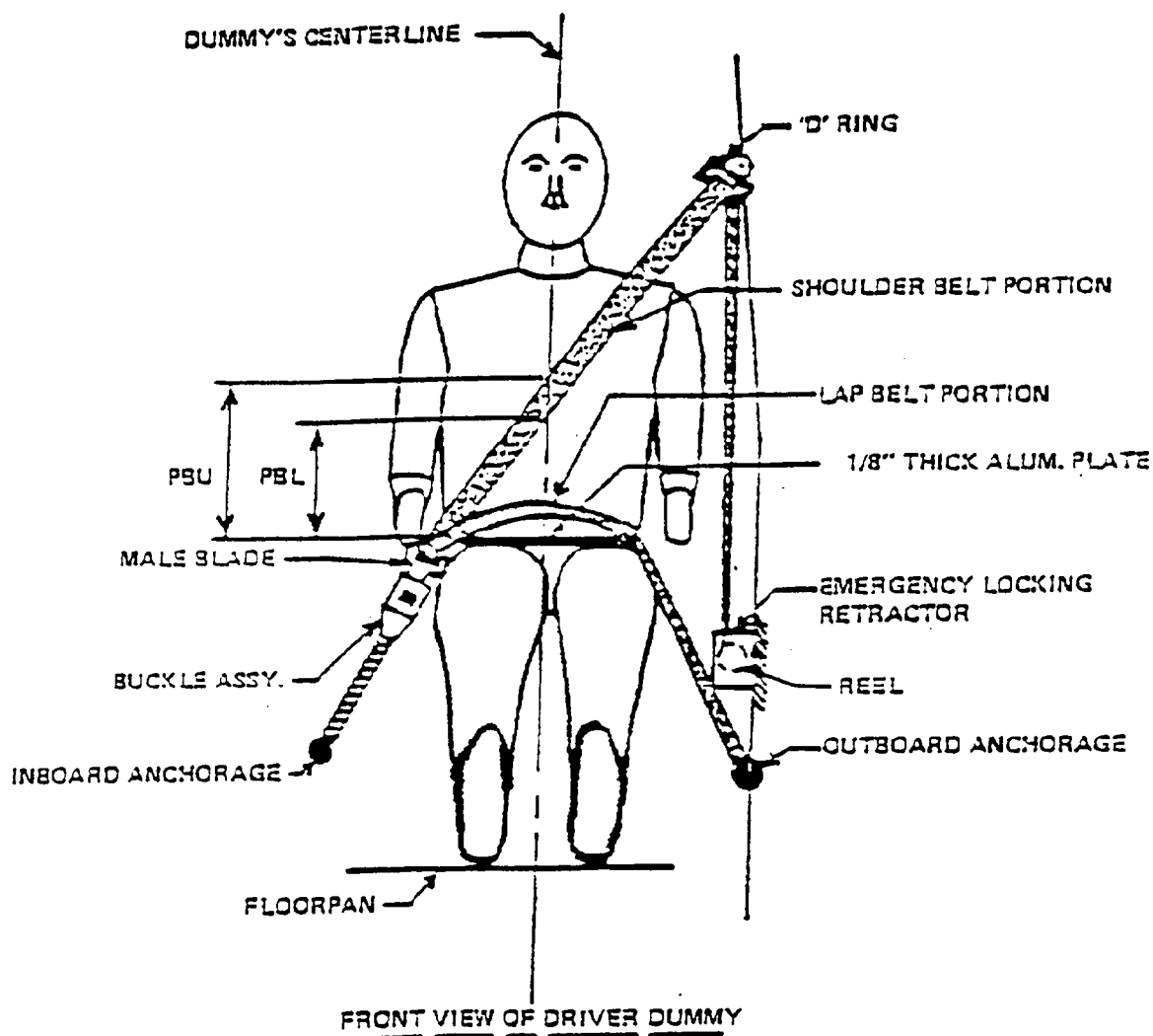
AD - Arm to Door
 HD - H-Point to Door
 HR - Head to Side Header
 HS - Head to Side Window
 KK - Knee to Knee
 SHY - Striker to H-Point (Y Direction)



CD - Chest to Dash
 CS - Steering Wheel to Chest
 HE - 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
 SE - 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



(illustration)

		DRIVER DUMMY	PASSENGER DUMMY
<u>PBU</u> --	Top surface of alum. plate to upper edge (mm)	320	297
<u>PBL</u> --	Top surface of alum. plate to belt lower edge (mm)	240	210
<u>LAP BELT TENSION</u> (kgs.)		<.9	<.9
<u>SHOULDER BELT TENSION</u> (kgs.)		<.9	<.9

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>839 mm</u>	<u>880 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>780 mm</u>	<u>725 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>630 mm</u>	<u>585 mm</u>

<u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis	<u>N/A*</u>	<u>N/A*</u>
As determined mechanically	<u>55 mm</u>	<u>148 mm</u>
As determined electronically	<u>80 mm</u>	<u>131 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>N/R</u>	<u>N/R</u>

<u>RETRACTOR LOCK-UP TIME:</u>		
As determined by shoulder belt spool-off observed in on-board cameras	<u>N/A*</u>	<u>N/A*</u>

N/R = Not recorded

N/A = Not available

* Onboard cameras were not used

CAMERA LOCATIONS

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1994/Chevrolet/Beauville/Van

VEH. NHTSA NO.: MR0105 ; TEST DATE: March 22, 1994 ; TIME: 5:18 p.m.

	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View						10	24
3	Left Front View	950	8270	1455	90°		25	no timing ¹
16	Steering Column Top	2000	8620	1573	90°		25	1000
15	Steering Column Bottom	2000	8620	1015	90°		25	1000
12	Left Driver Close-up	1320	7080	1475	90°		50	1136
9	Left Angle	3975	3630	2170	50°		25	722
13	Driver Onboard Seat Belt	NOT USED						
14	Passenger Onboard Seat Belt	NOT USED						
2	Right Overall	2340	7500	1080	90°		13	1000
17	Right Front	660	7220	1550	90°		25	769
11	Right Passenger Close-up	1220	5500	1375	90°		35	1274
10	Right Angle	4000	5200	2240	50°		50	1000
4	Top View Wide	1300	0				13	1111
8	Top Driver	3100	0				13	1005
7	Top Passenger						13	985
5	Pit Engine						13	905
6	Pit Fuel Tank						13	1389

COORDINATES:

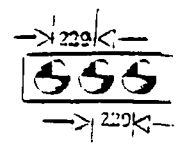
* X = film plane to monorail centerline

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.

¹ There was not camera timing due to a cord short. The camera was set at 1000 frames/sec.

[illegible]

4-11

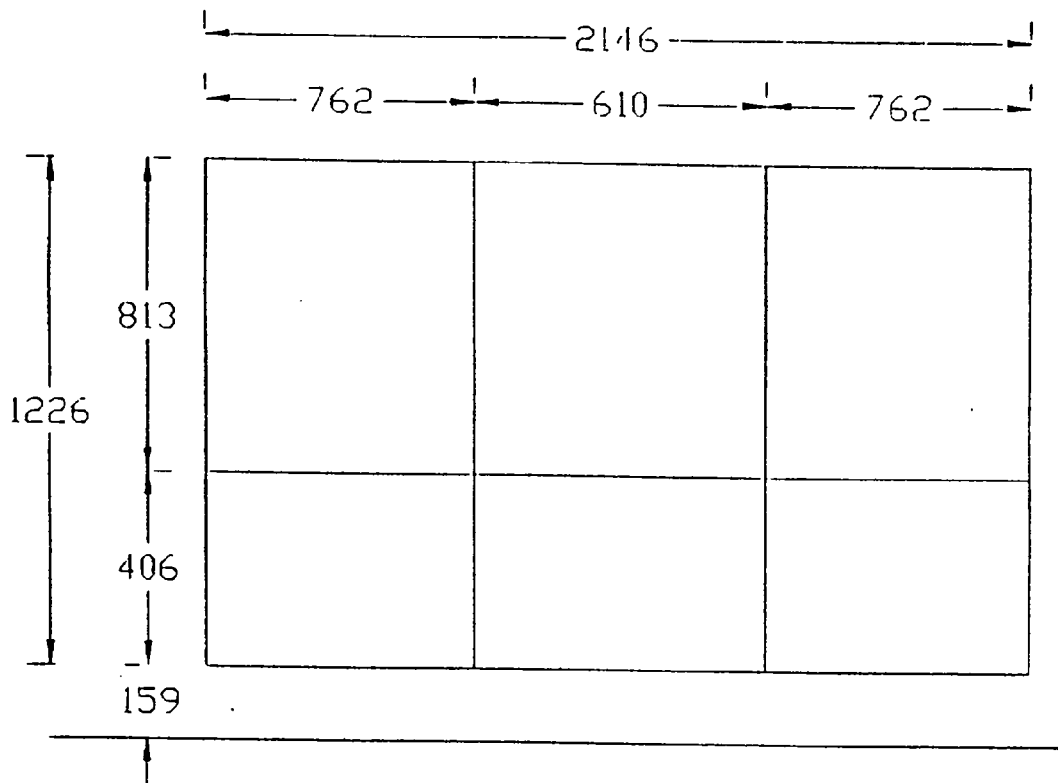
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

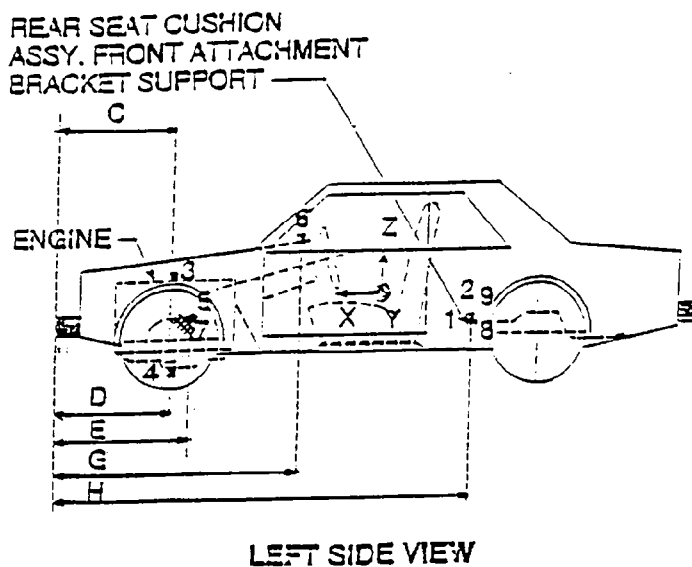
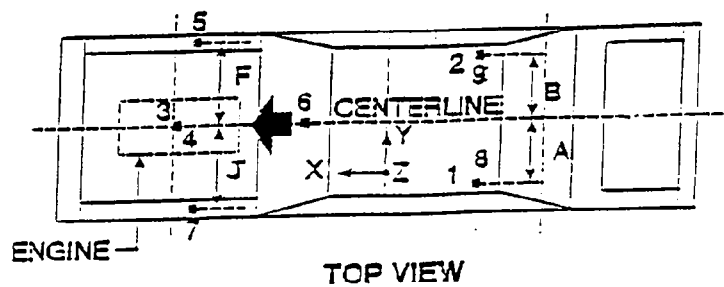
6 Groupings (5 cells/group)



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



Units: (mm)

Dimension	Length
A	530
B	530
C	1080
D	1140
E	990
F	795
G	840
H	2432
J	795

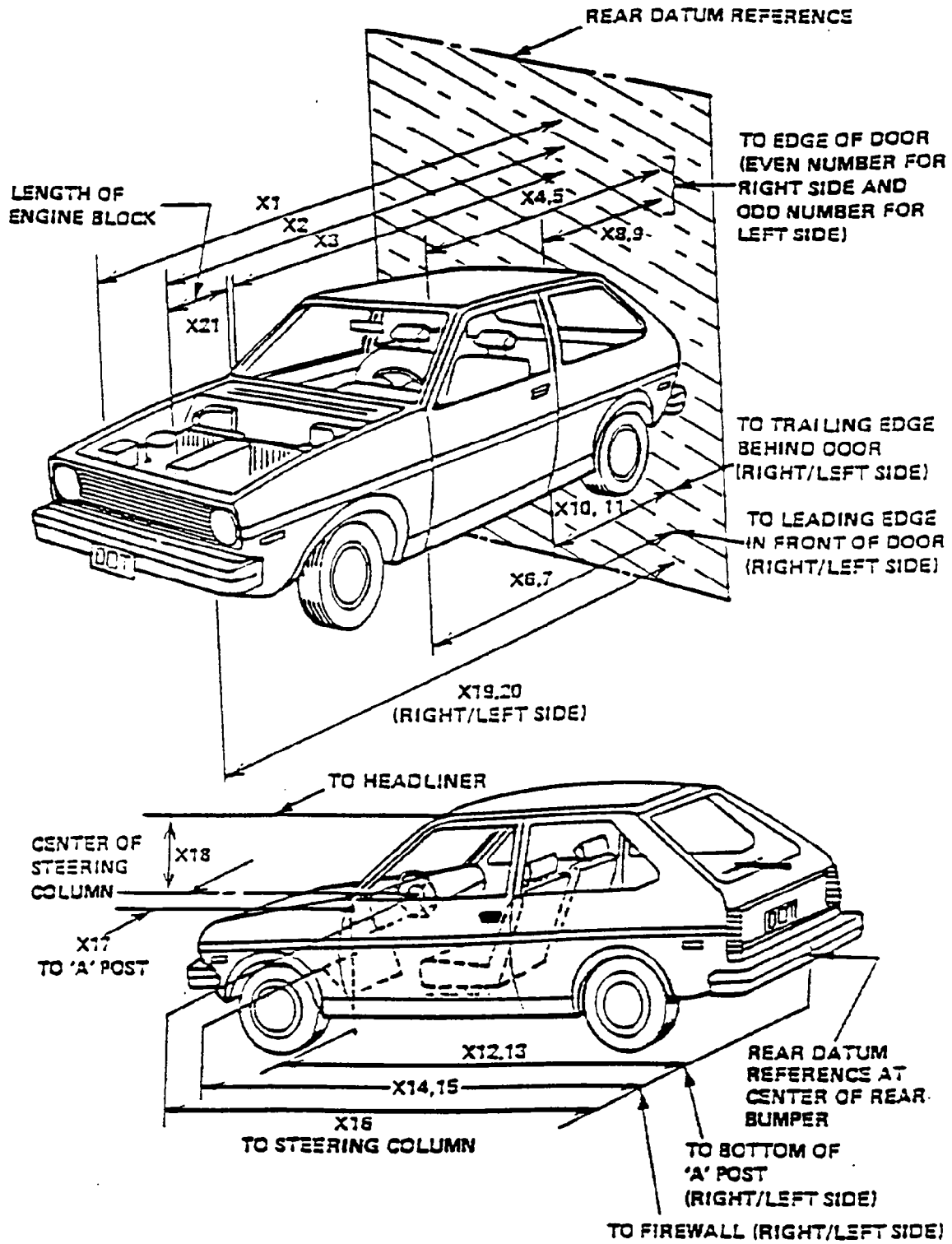
ACCELEROMETER	ACCELEROMETER LOCATION	DIRECTIO
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

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

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	5140	4599	541
X2	Rear Surface of Vehicle to Front of Engine	4530	4365	165
X3	Rear Surface of Vehicle to Firewall	4630	4502	128
X4	Rear Surface to Upr. Leading Edge of Rt. Door	4347	4303	44
X5	Rear Surface to Upr. Leading Edge of Left Door	4320	4218	102
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	4360	4252	108
X7	Rear Surface to Lwr. Leading Edge of Left Door	4354	4154	200
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	3372	3357	15
X9	Rear Surface to Upr. Trailing Edge of Left Door	3368	3346	22
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	3366	3375	-9
X11	Rear Surface to Lwr. Trailing Edge of Left Door	3364	3375	-11
X12	Rear Surface to Bottom of 'A' Post on Rt. Side	4363	4237	126
X13	Rear Surface to Bottom of 'A' Post on Left Side	4361	4160	201
X14	Rear Surface to Firewall on Right Side	4633	4498	135
X15	Rear Surface to Firewall on Left Side	4639	4405	234
X16	Rear Surface to Steering Column	3922	3834	88
X17	Center of Steering Column to 'A' Post	400	411	-11
X18	Center of Steering Column to Headlining	430	406	24
X19	Rear Surface to Right Side of Front Bumper	5087	4562	525
X20	Rear Surface to Left Side of Front Bumper	5080	4626	454
X21	Length of Engine Block	N/A	N/A	N/A

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: Chevrolet/Beauville/Van
VEH. NHTSA NO.: MR0105 ; VIN: 1GNEG25KXRF129405
MODEL YEAR: 1994 ; BUILD DATE: 11-93 ; TEST DATE: 3-22-94
VEH. SIZE CATEGORY: Mini Van ; TEST WEIGHT: 2559 kg
VEH. WHEELBASE: 3180 mm ; FRONT OVERHANG: 820 mm ; OVERALL WIDTH: 1710 mm

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-13
CALIBRATION PROCEDURE: As per MGA Calibration Procedure
LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal

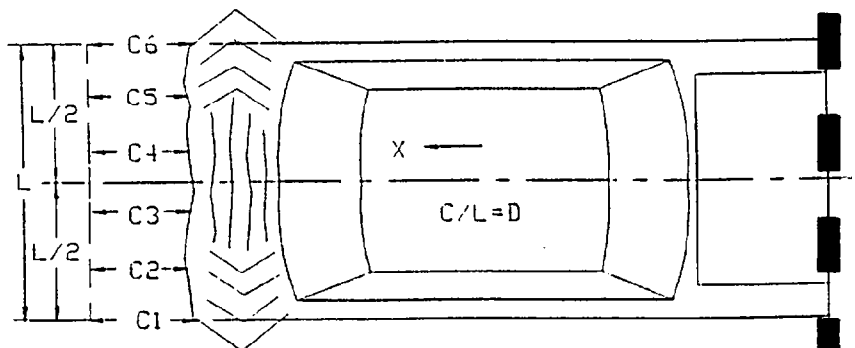
VEH. IMPACT SPEED: 56.4 kph ; TIME OF SEPARATION: 115 msec
(as determined from film)
VELOCITY CHANGE: 65.0 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

Impact Mode: F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 454 mm
C2 = 514 mm
C3 = 495 mm
C4 = 571 mm
C5 = 590 mm
C6 = 525 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline
(Longitude)

LENGTH OF DAMAGED REGION: L = 1710 mm

APPENDIX A
PHOTOGRAPHS

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Photo No. A-35 - Rollover 180°	A-35
Photo No. A-36 - Rollover 270°	A-36
Photo No. A-37 - Rollover 360°	A-37

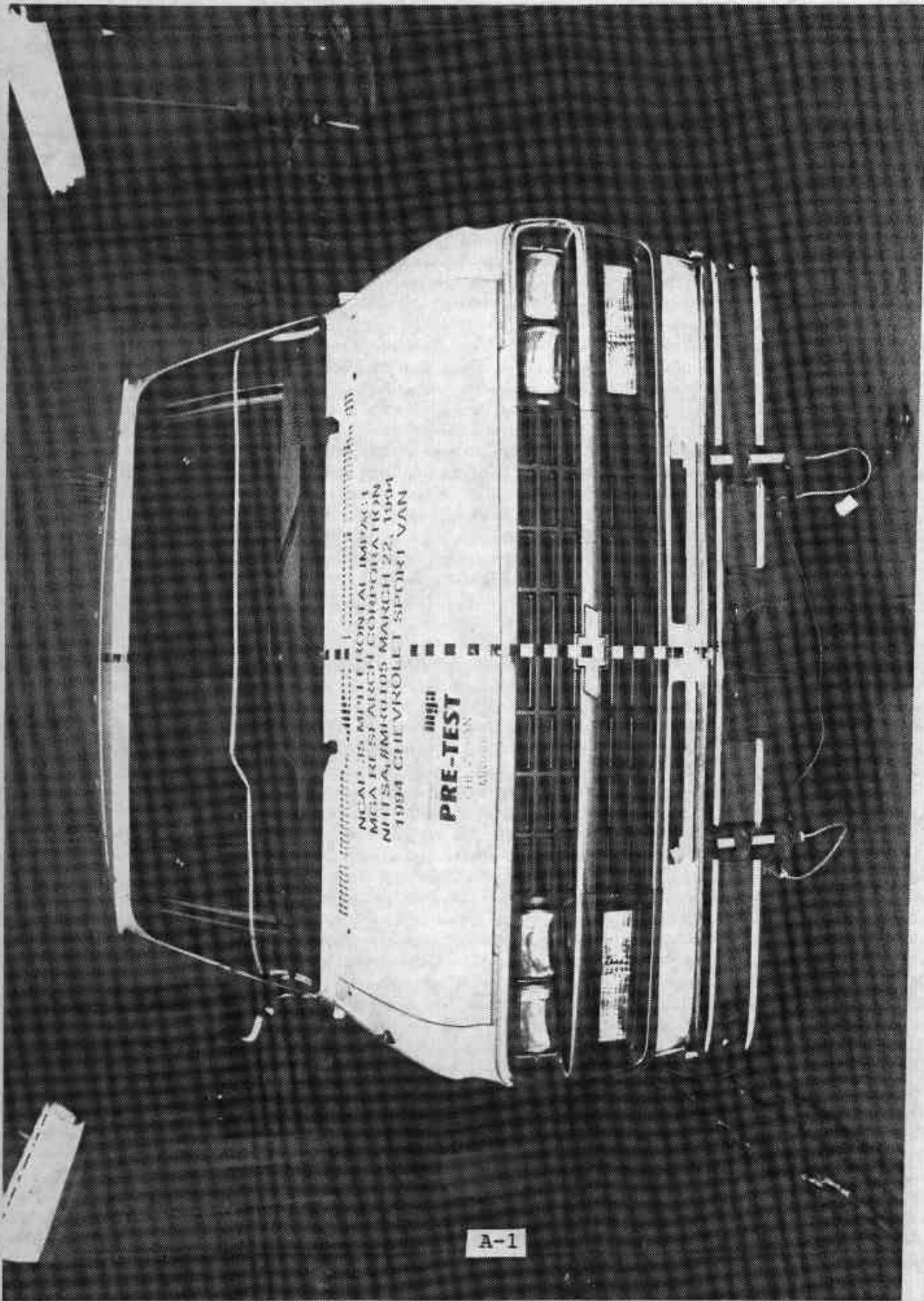


Photo No. A-1 - Pre-Test Front View

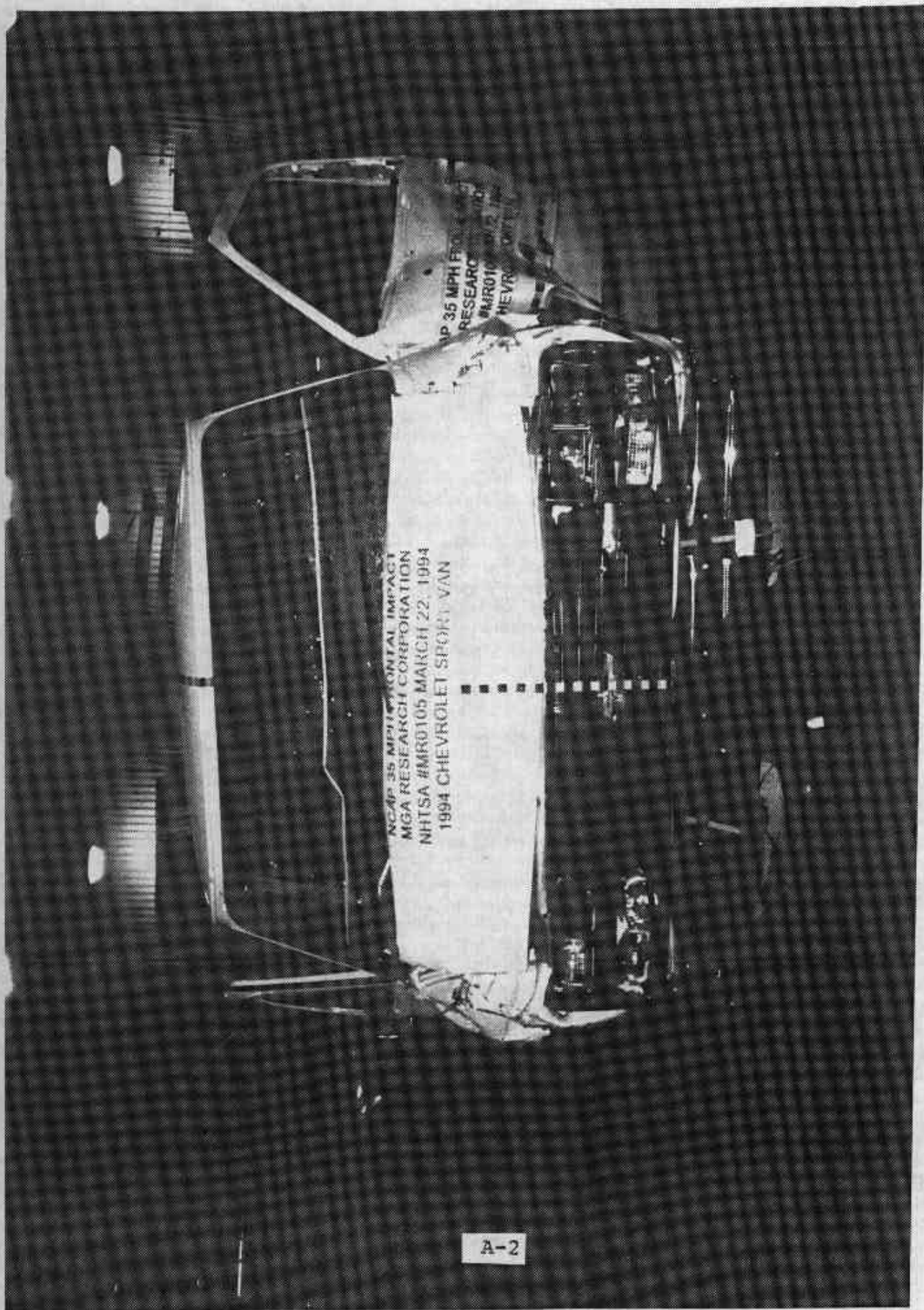


Photo No. A-2 - Post-Test Front View

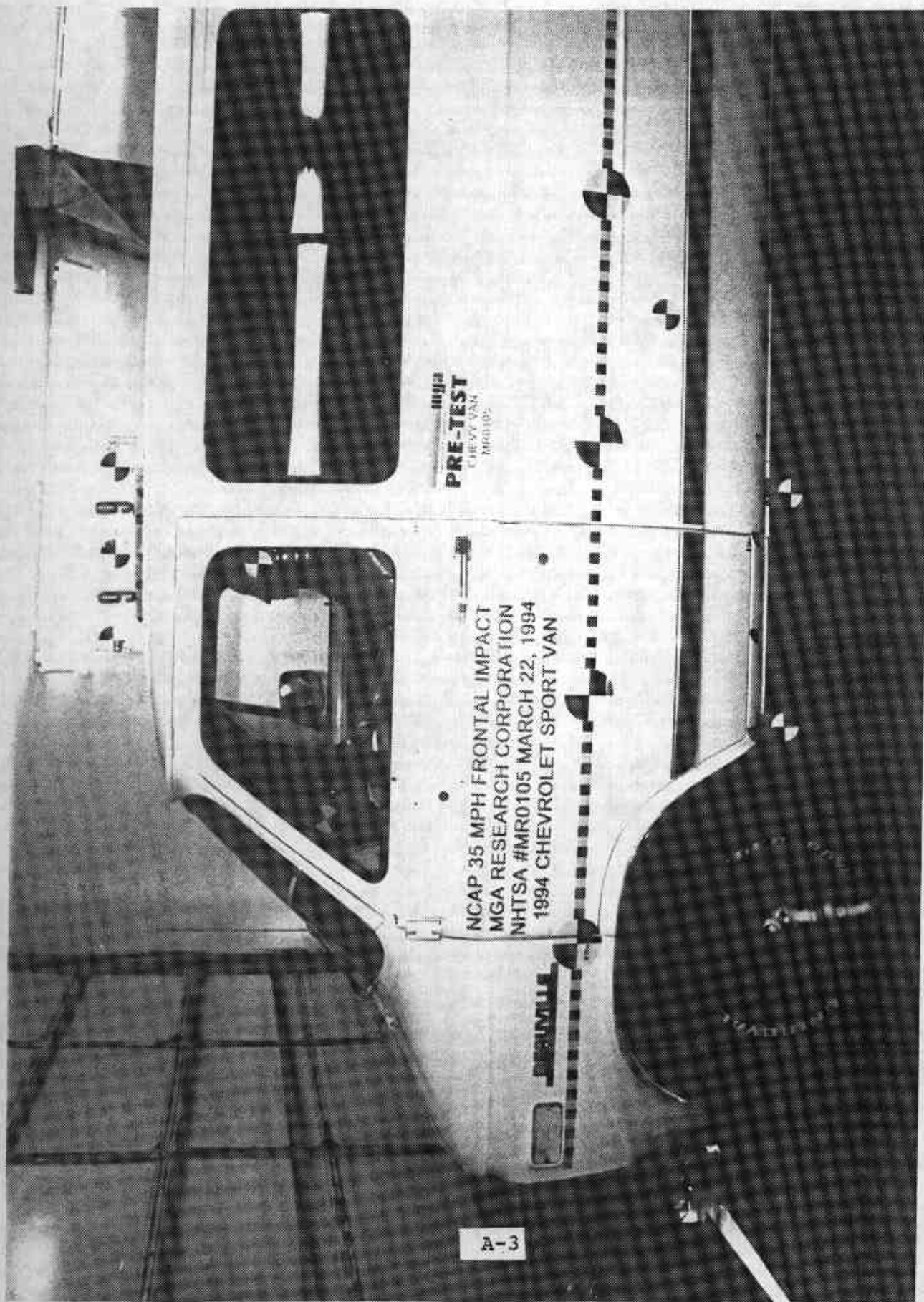
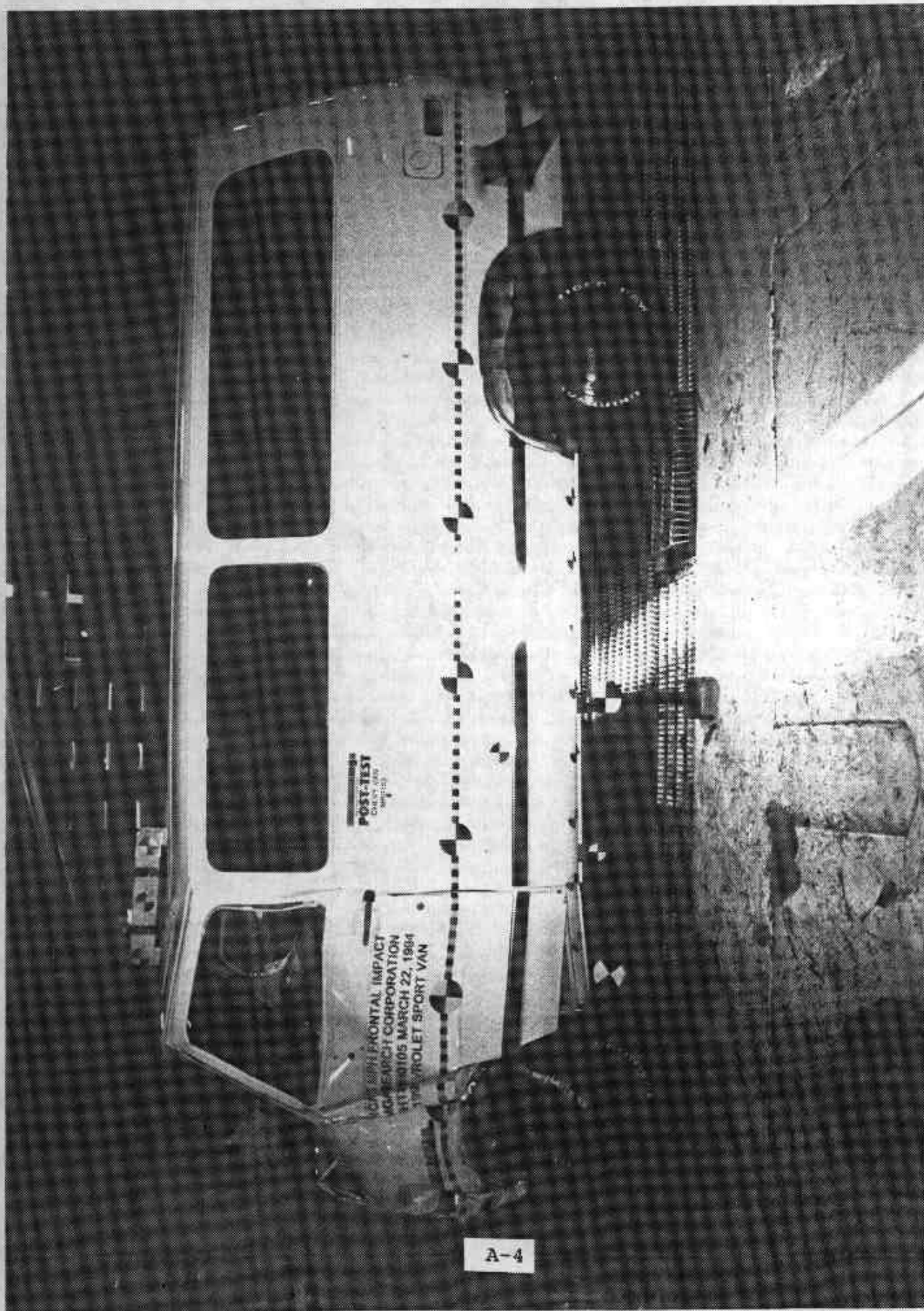


Photo No. A-3 - Pre-Test Left Side View



A-4

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

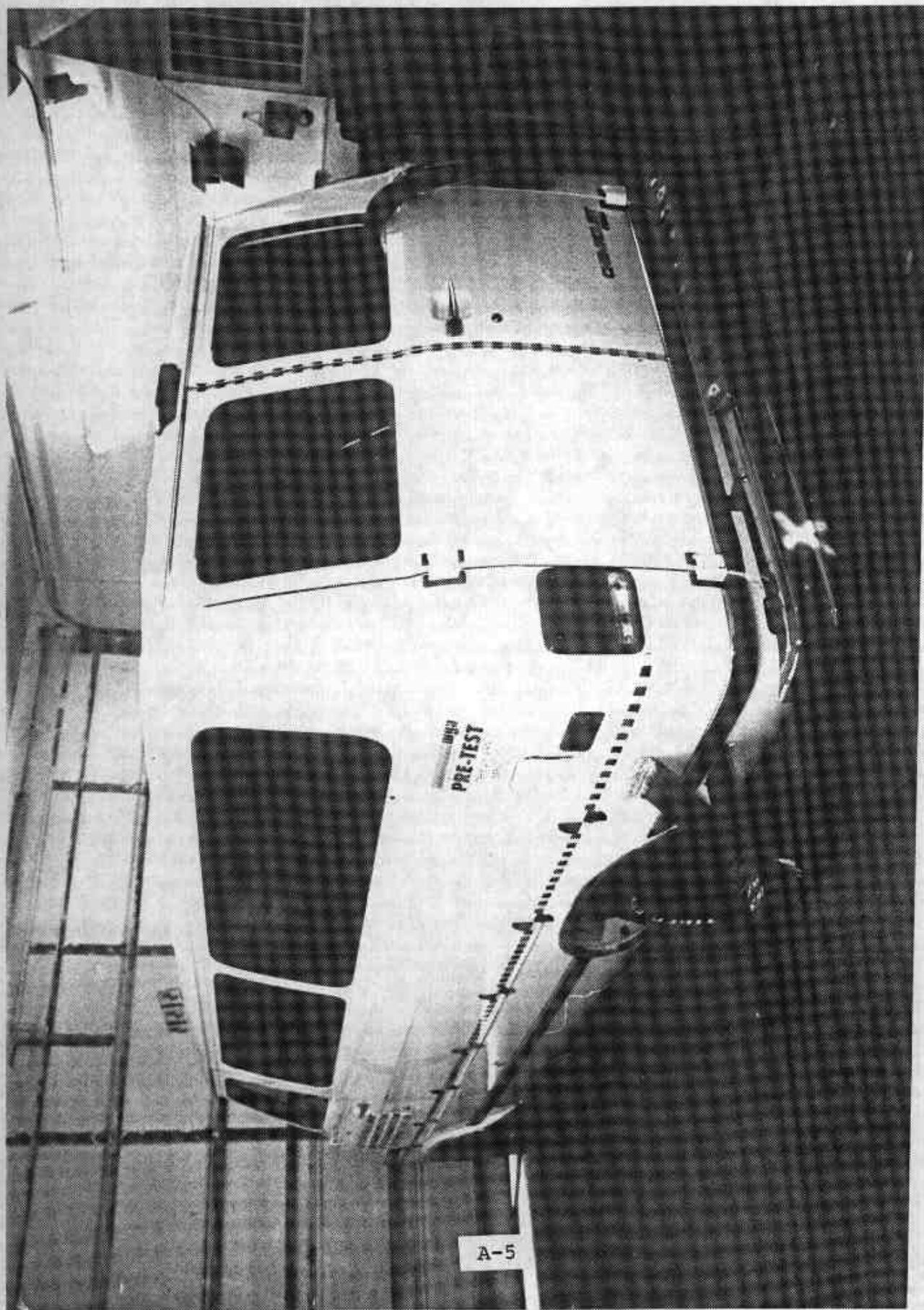


Photo No. A-5 - Pre-Test Left Rear Three-Quarter View

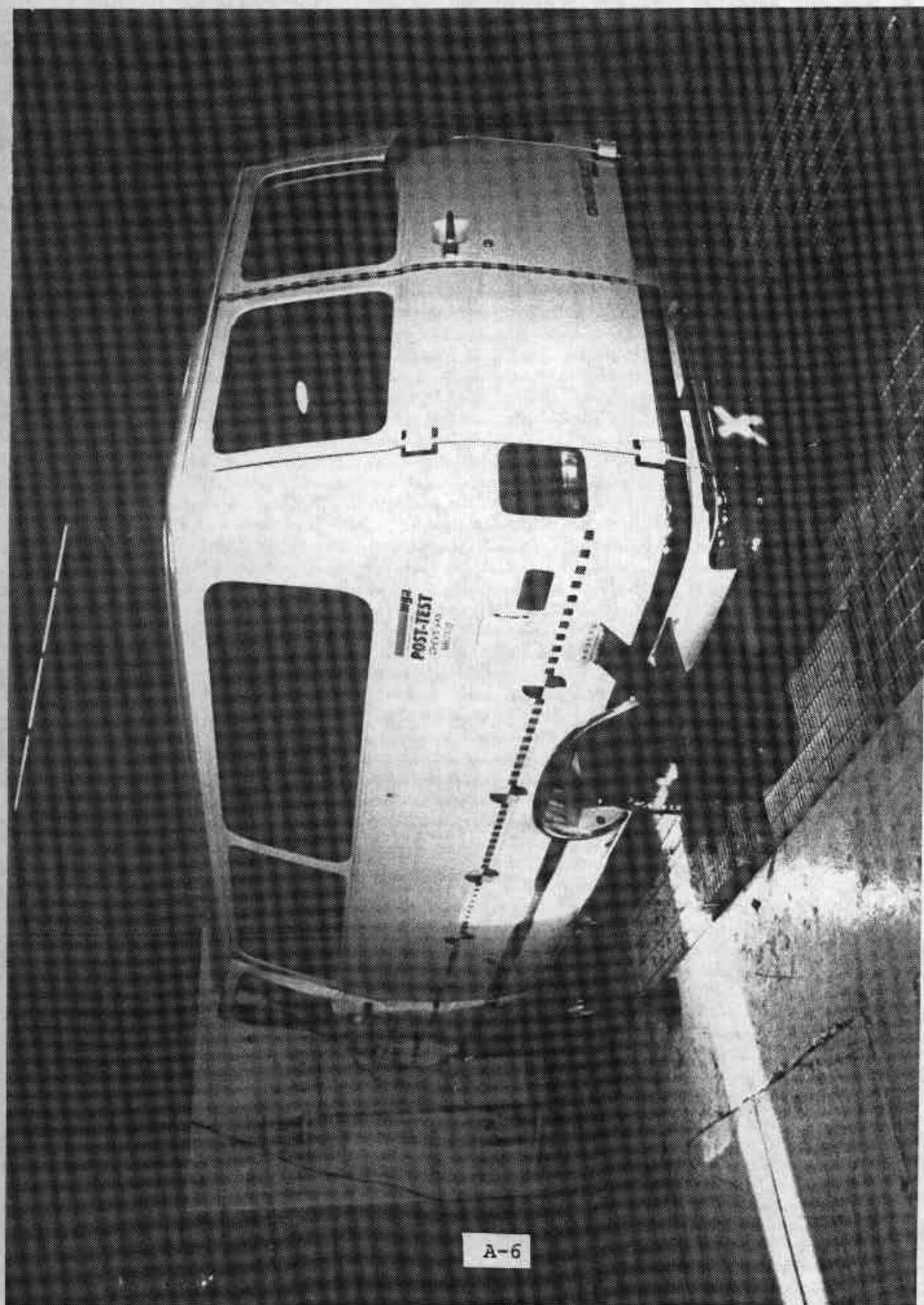


Photo No. A-6 - Post-Test Left Rear Three-Quarter View

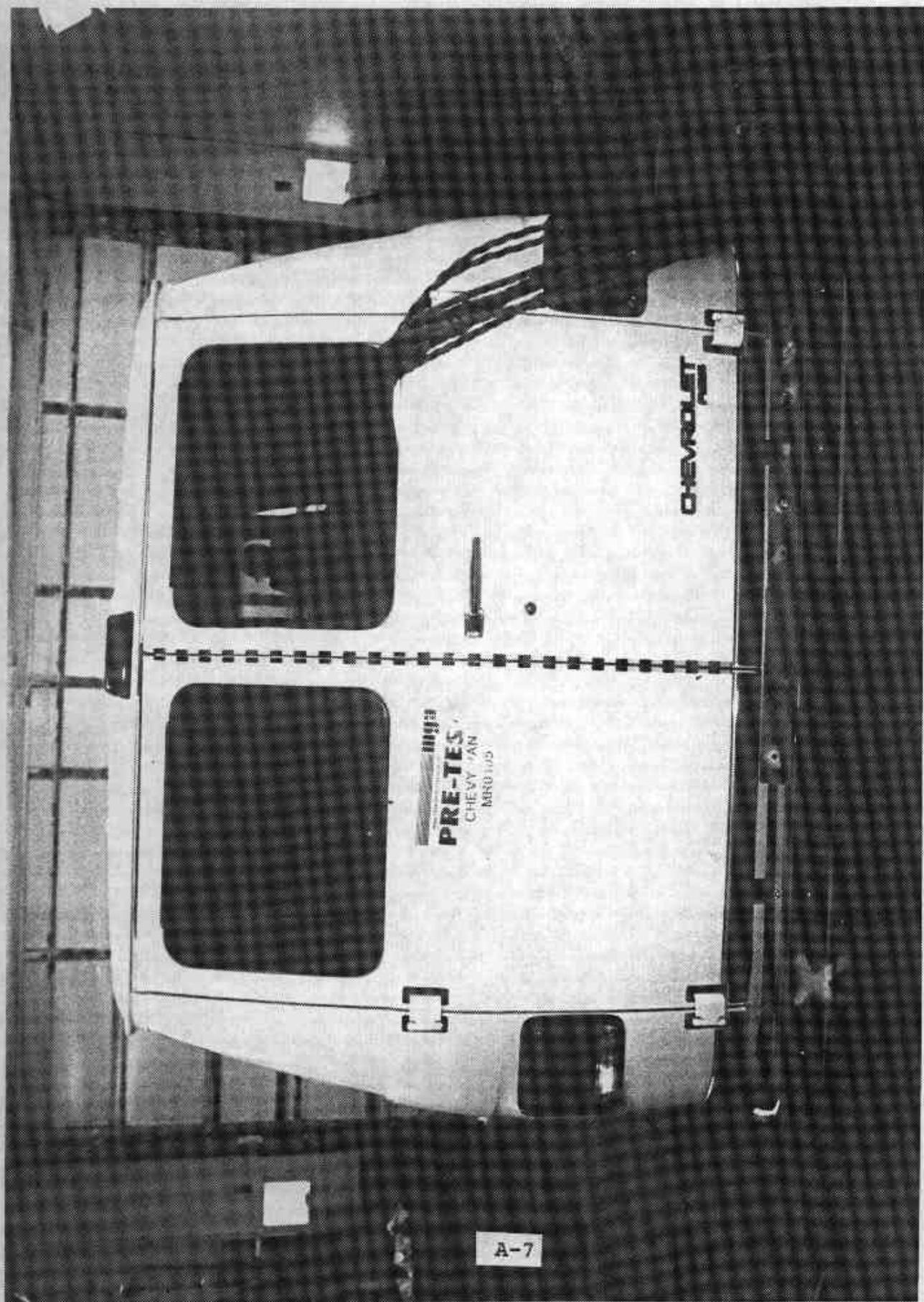


Photo No. A-7 - Pre-Test Rear View

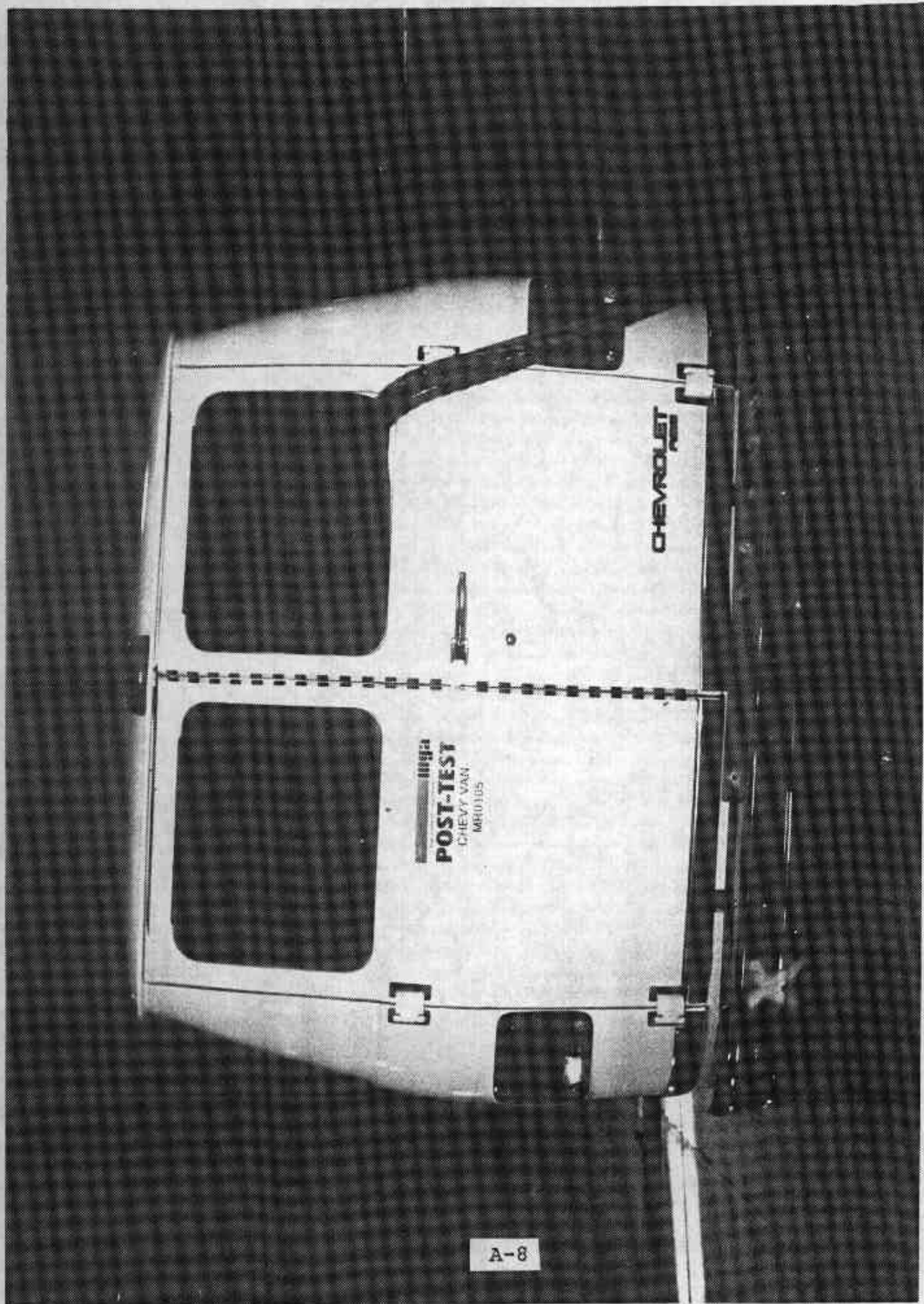


Photo No. A-8 - Post-Test Rear View

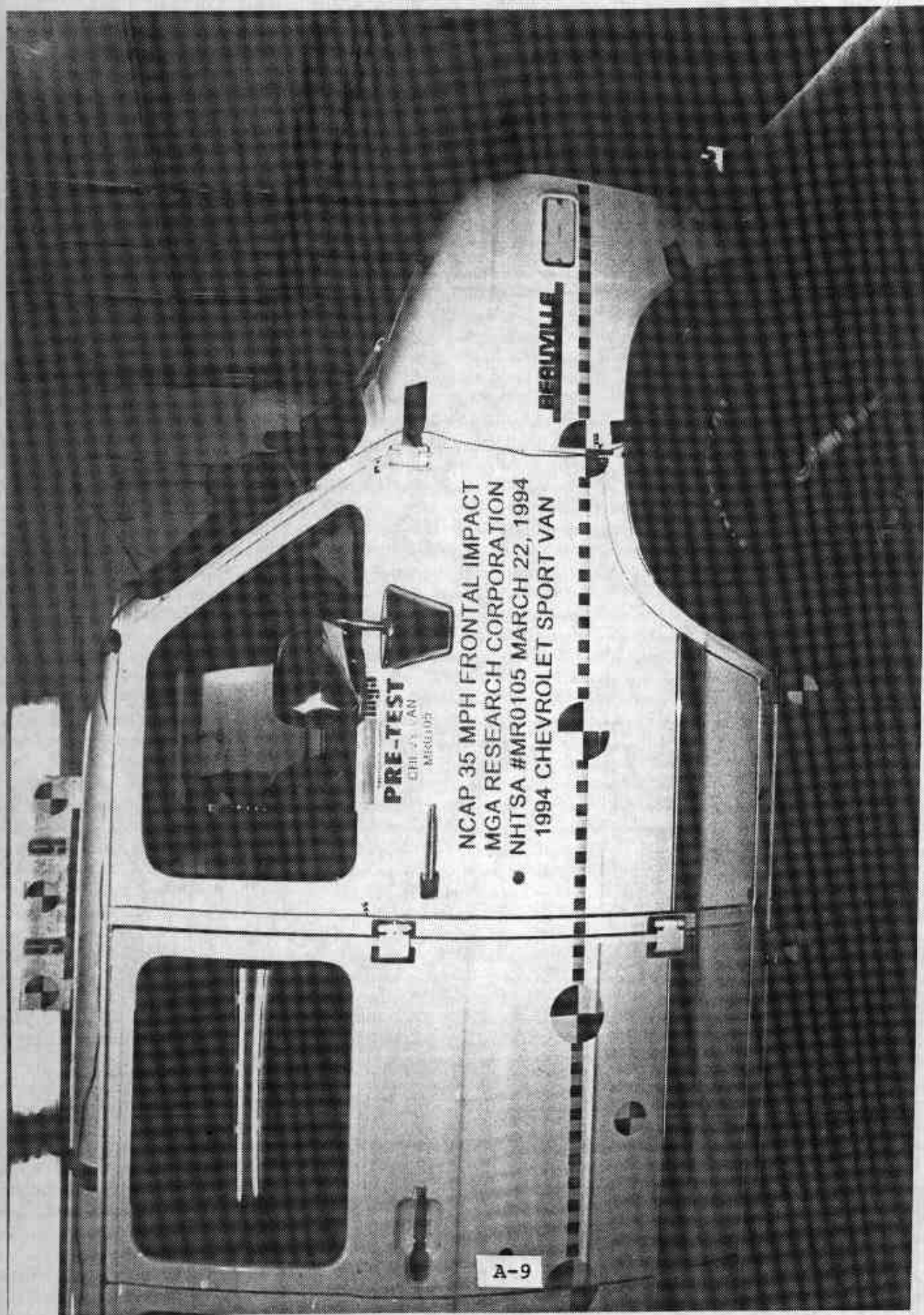


Photo No. A-9 - Pre-Test Right Side View

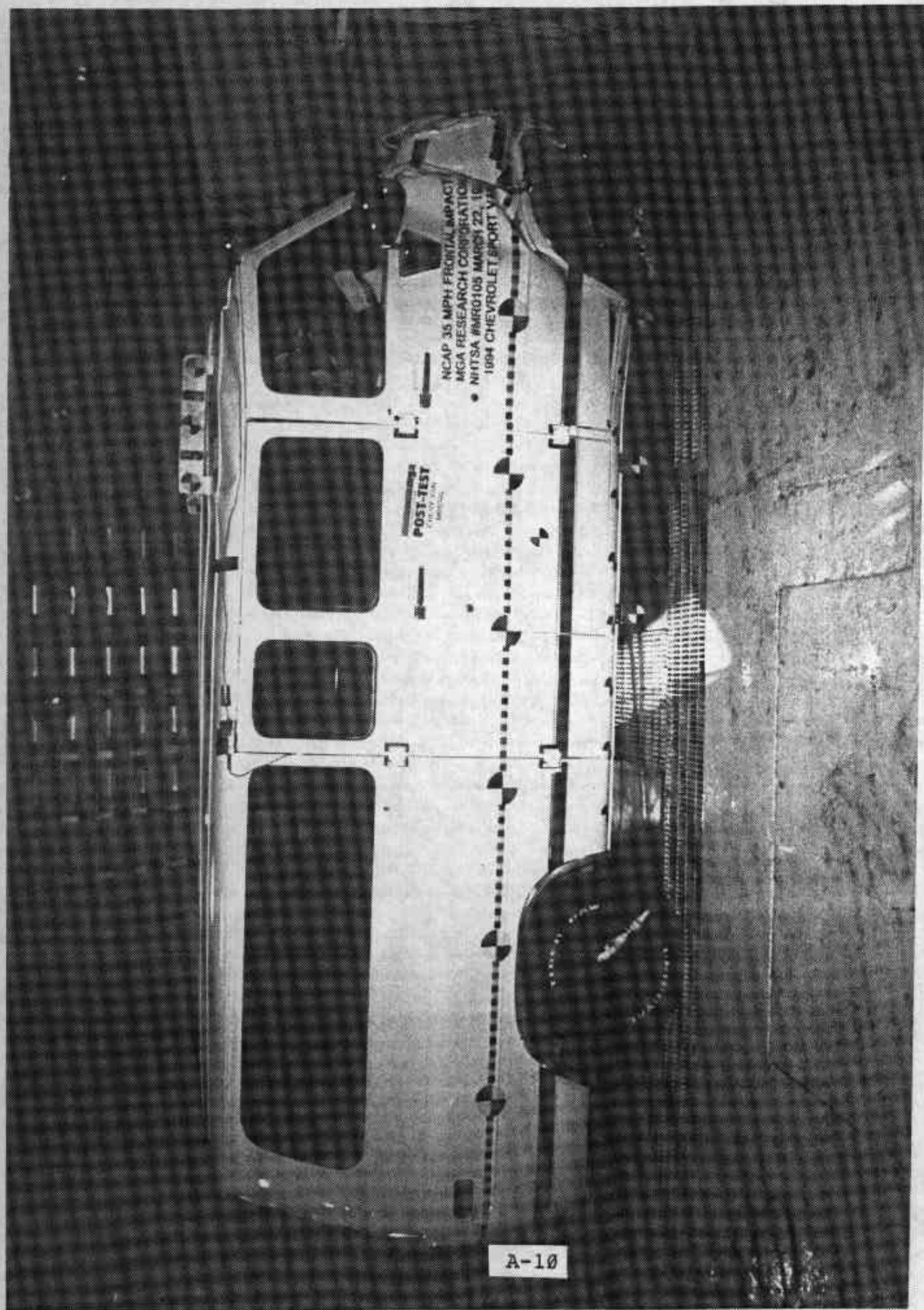


Photo No. A-10 - Post-Test Right Side View

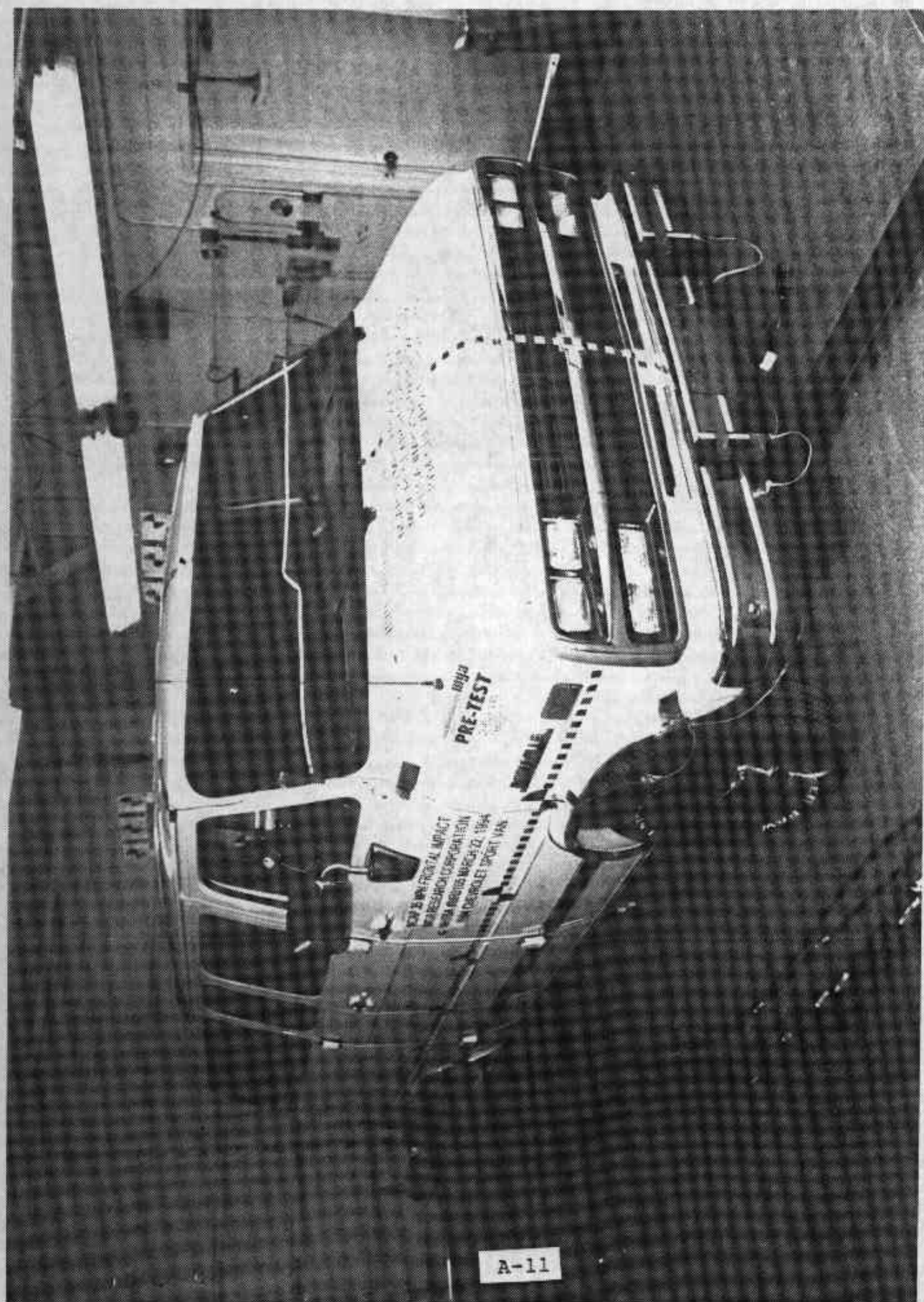


Photo No. A-11 - Pre-Test Right Front Three-Quarter View

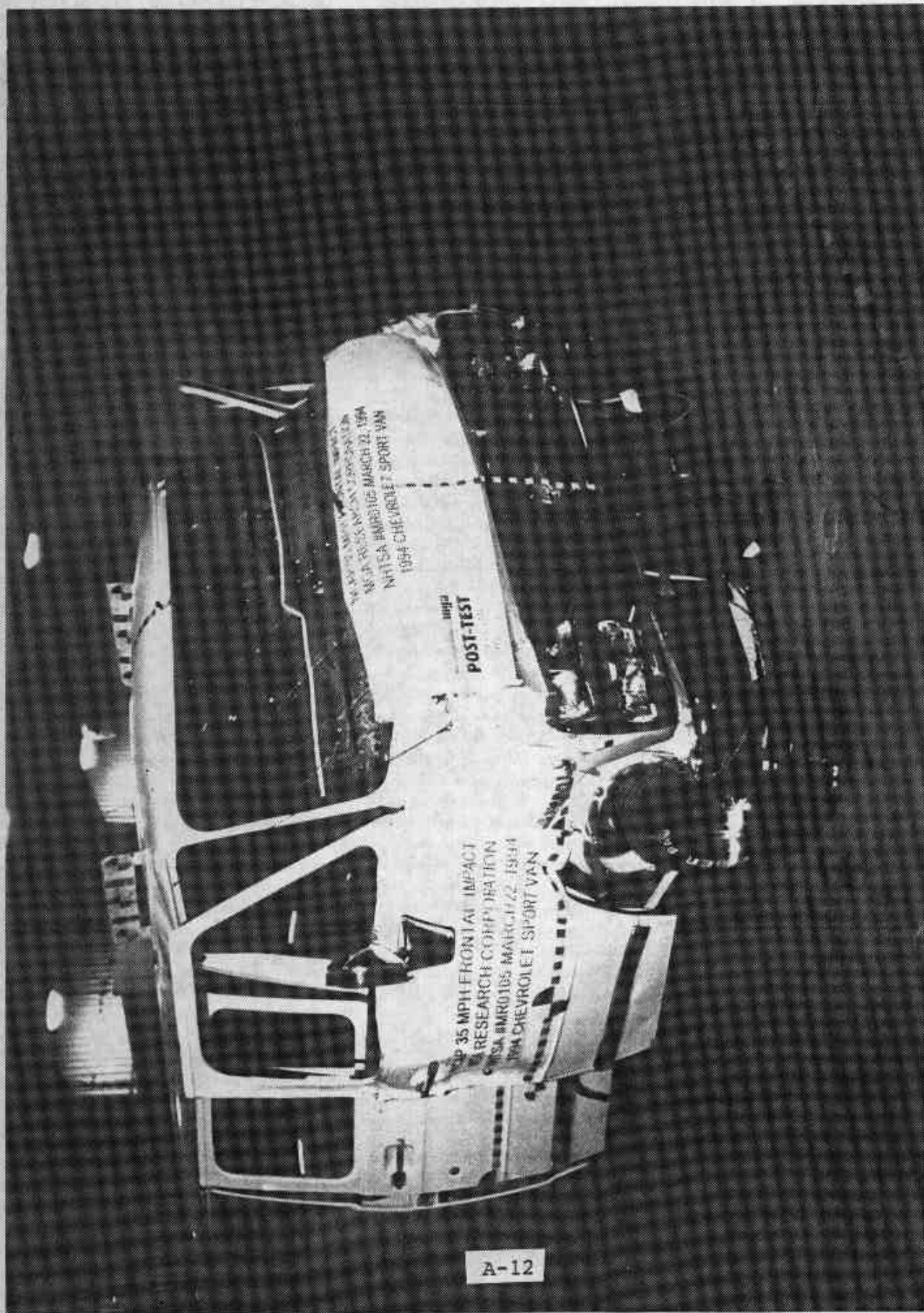


Photo No. A-12 - Post-Test Right Front Three-Quarter View

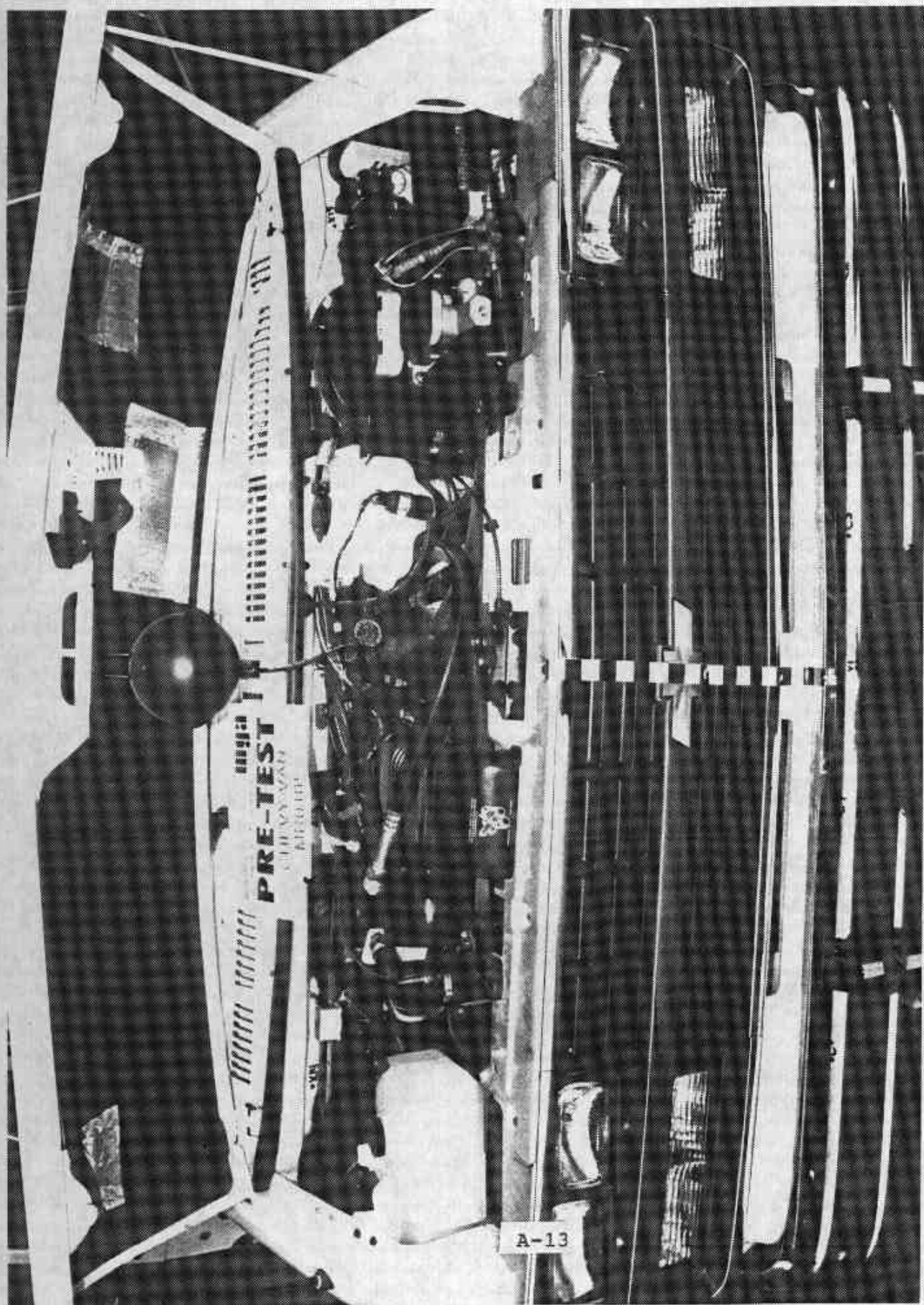


Photo No. A-13 - Pre-Test Engine Compartment View



mga research corporation

PRE-TEST

CHEVY VAN

MR0105

A-14

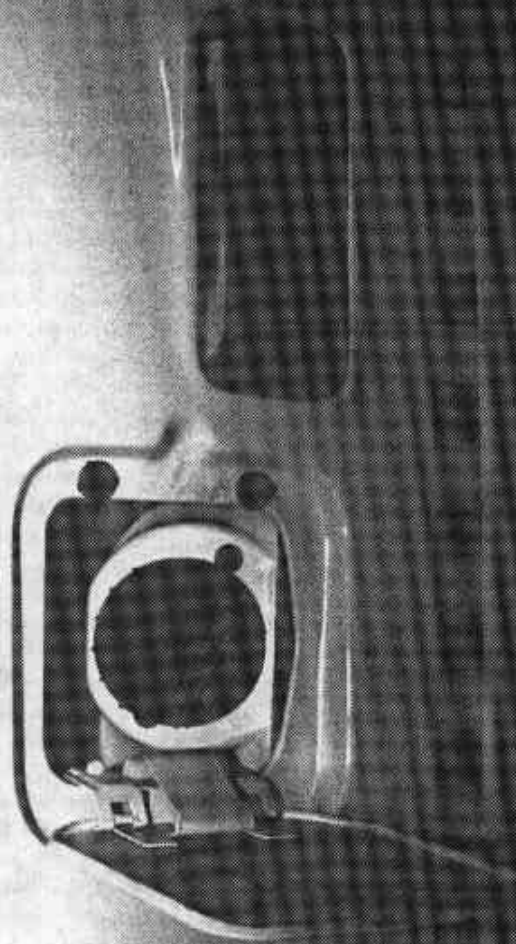


Photo No. A-14 - Pre-Test Fuel Filler Cap View

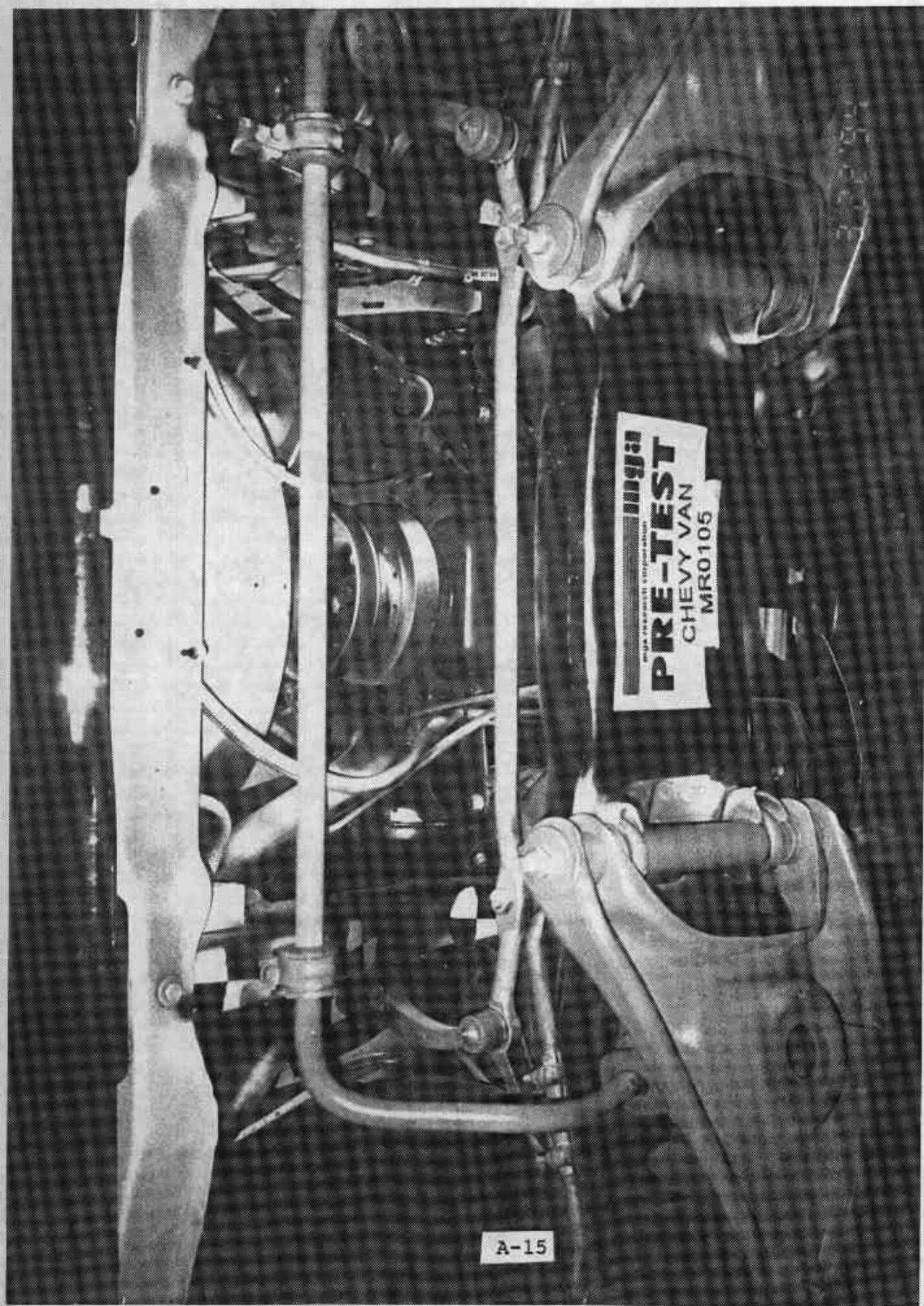


Photo No. A-15 - Pre-Test Front Underbody View

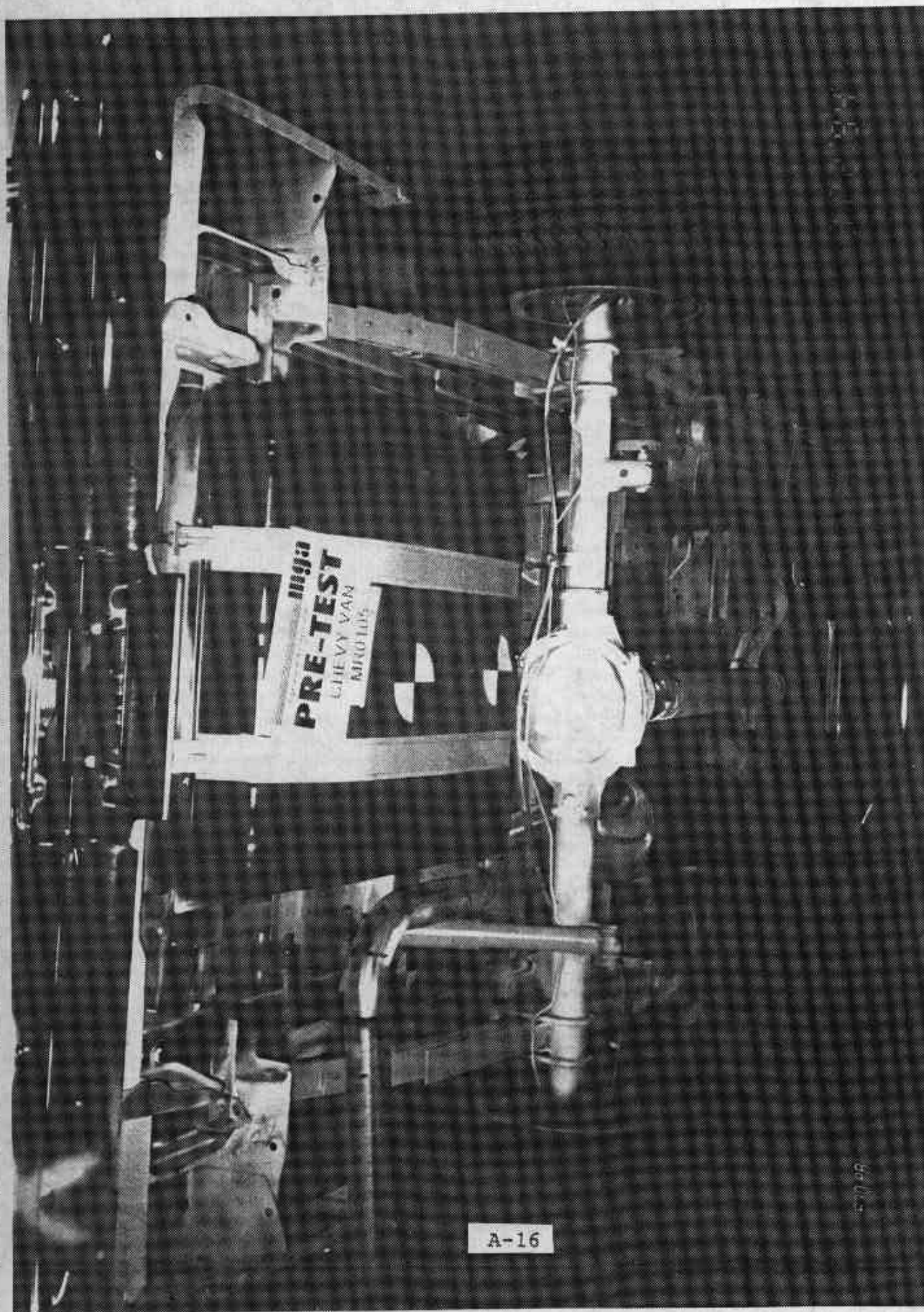
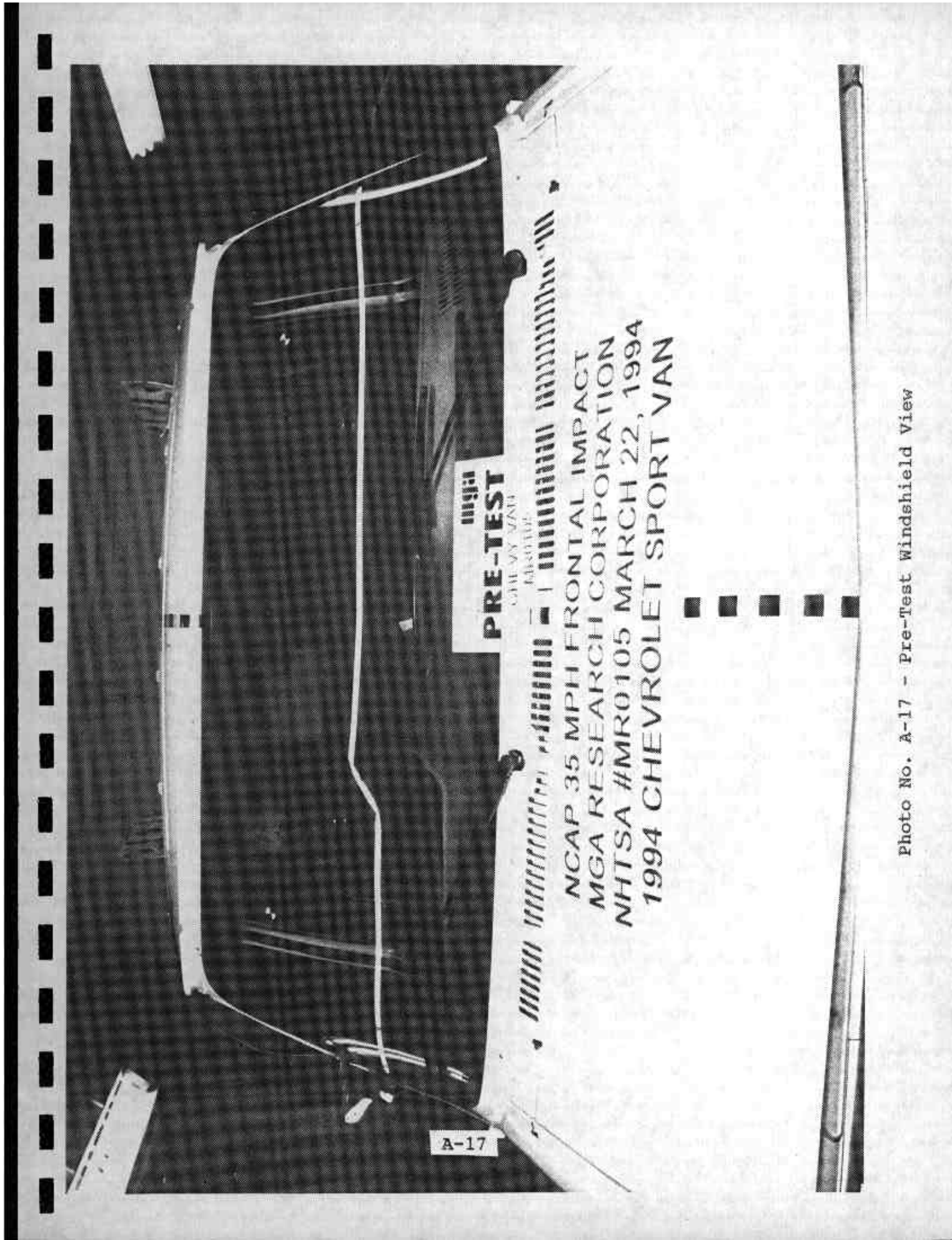


Photo No. A-16 - Pre-Test Rear Underbody View



A-17

PRE-TEST
CHEVROLET SPORT VAN

NCAP 35 MPH FRONTAL IMPACT
MGA RESEARCH CORPORATION
NHTSA #MR0105 MARCH 22, 1994
1994 CHEVROLET SPORT VAN

Photo No. A-17 - Pre-Test Windshield View

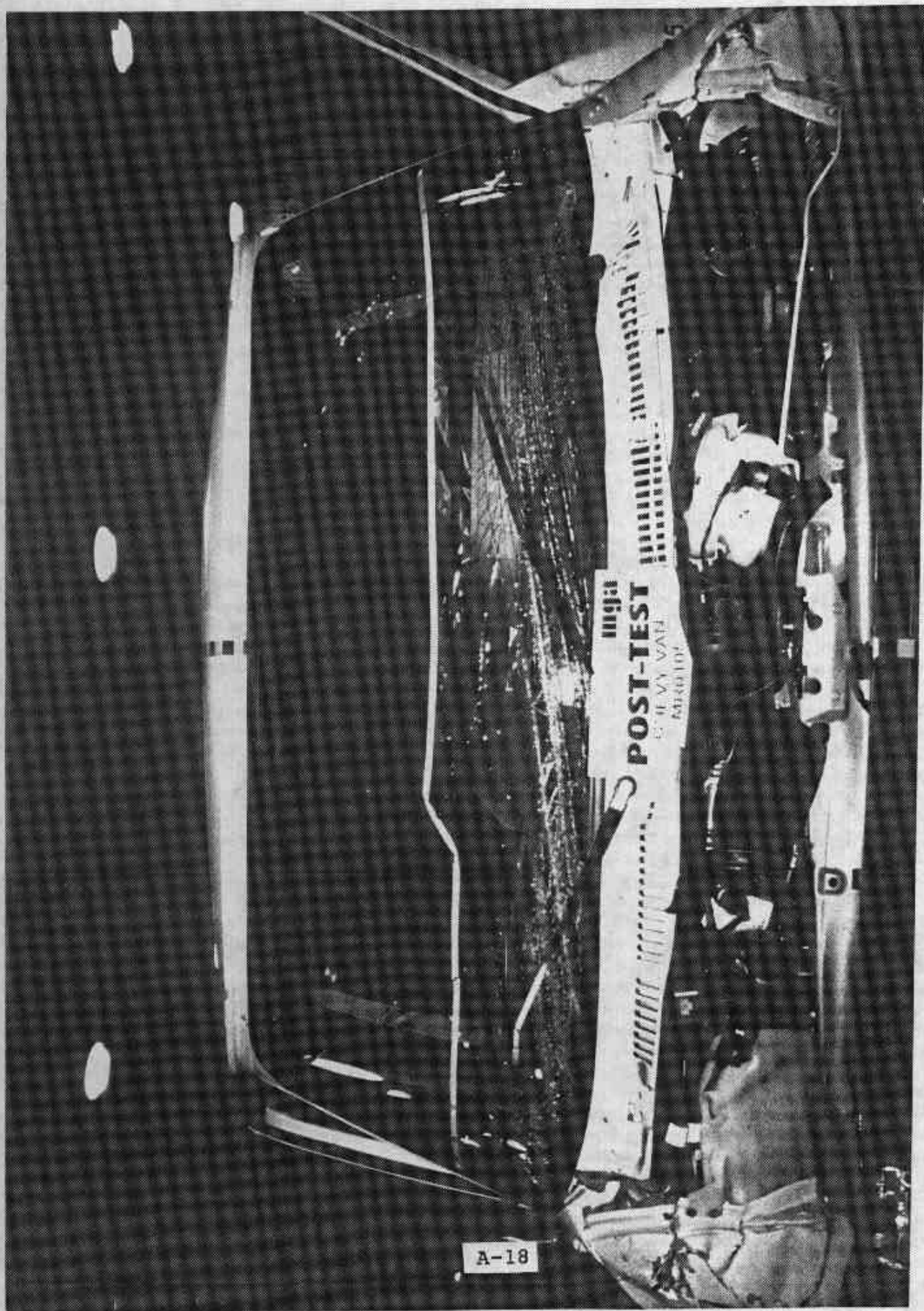


Photo No. A-18 - Post-Test Windshield View

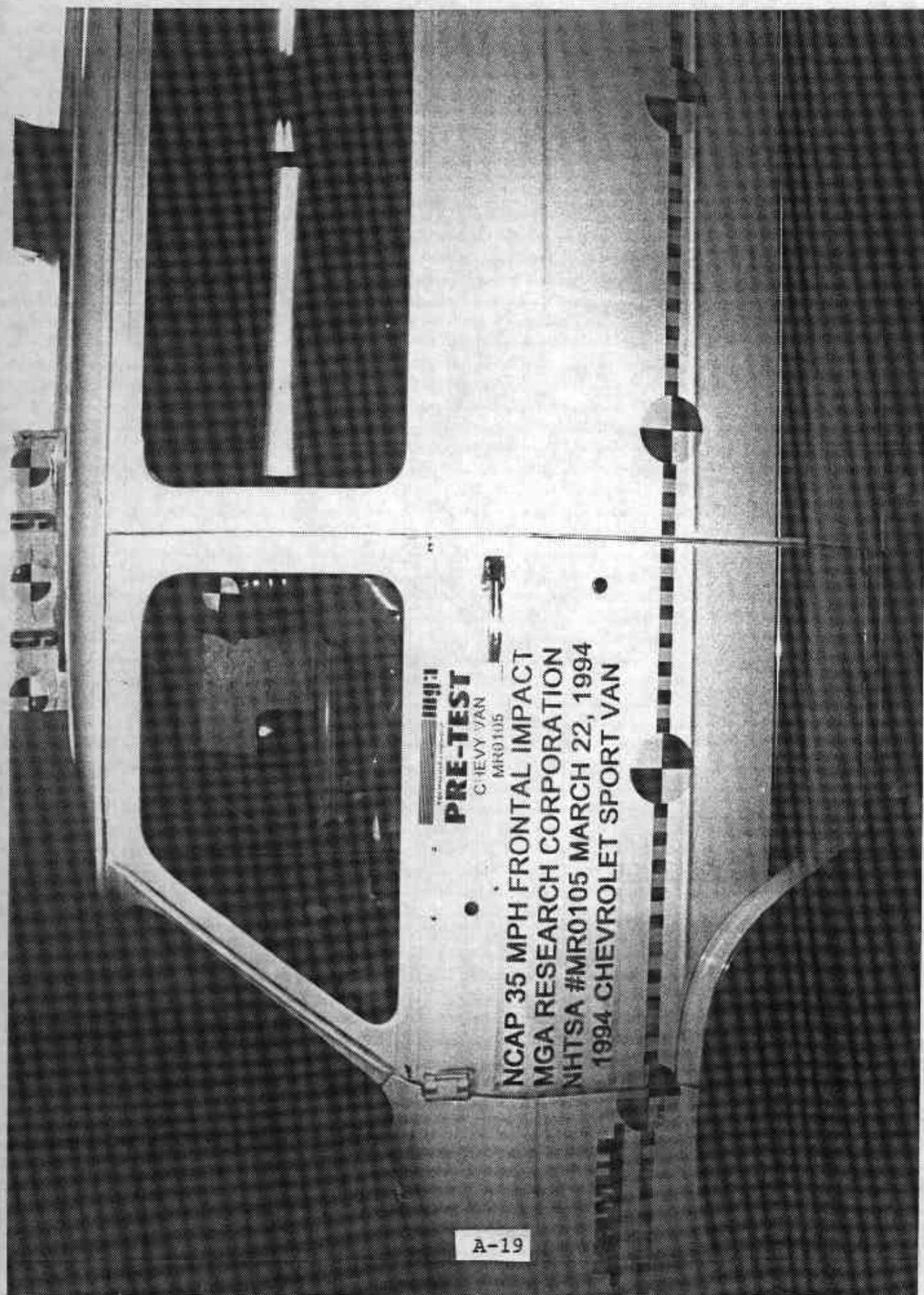


Photo No. A-19 - Pre-Test Driver Dummy Position View

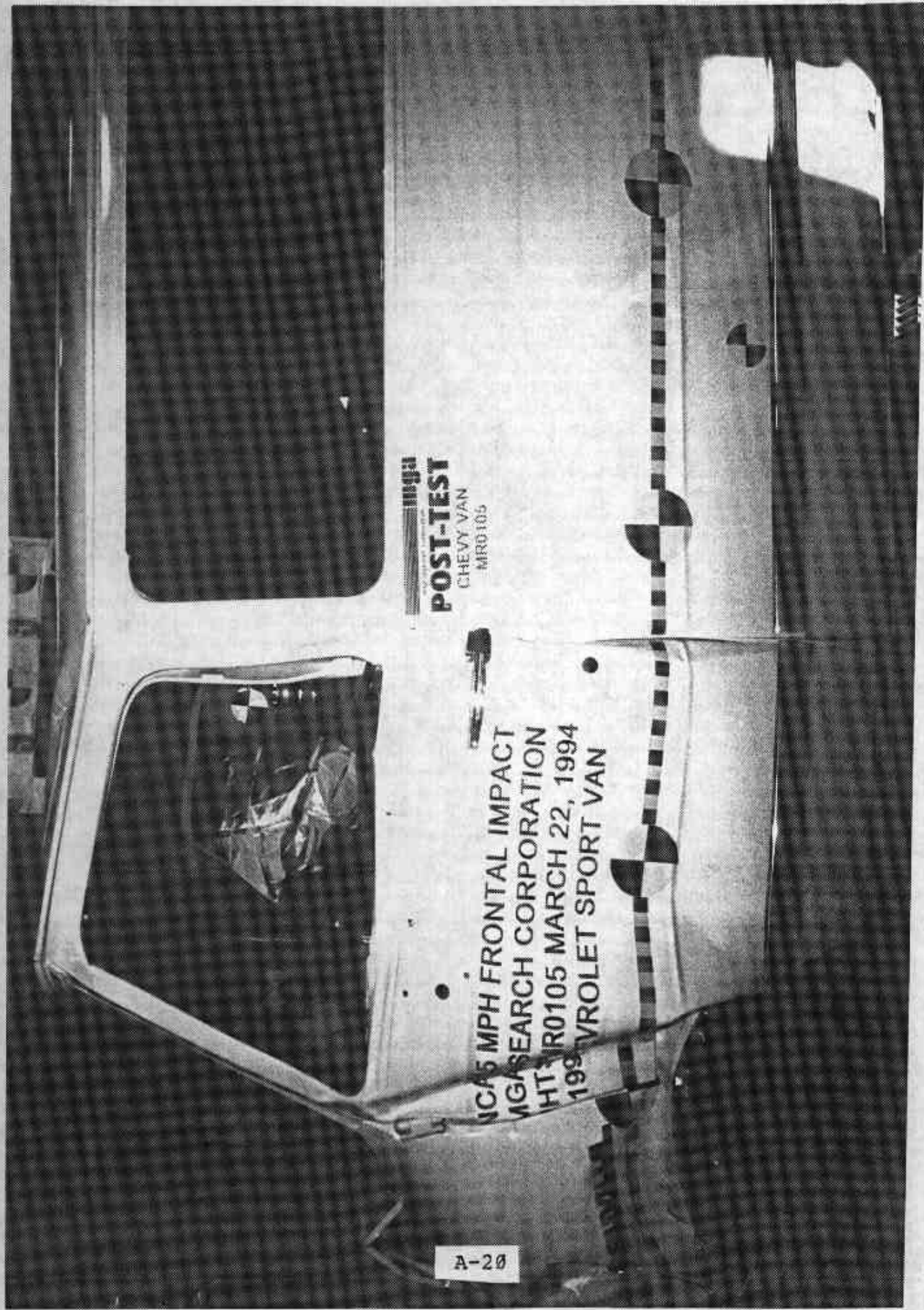


Photo No. A-20 - Post-Test Driver Dummy Position View



Photo No. A-21 - Pre-Test Driver Dummy Position View (Door Open)

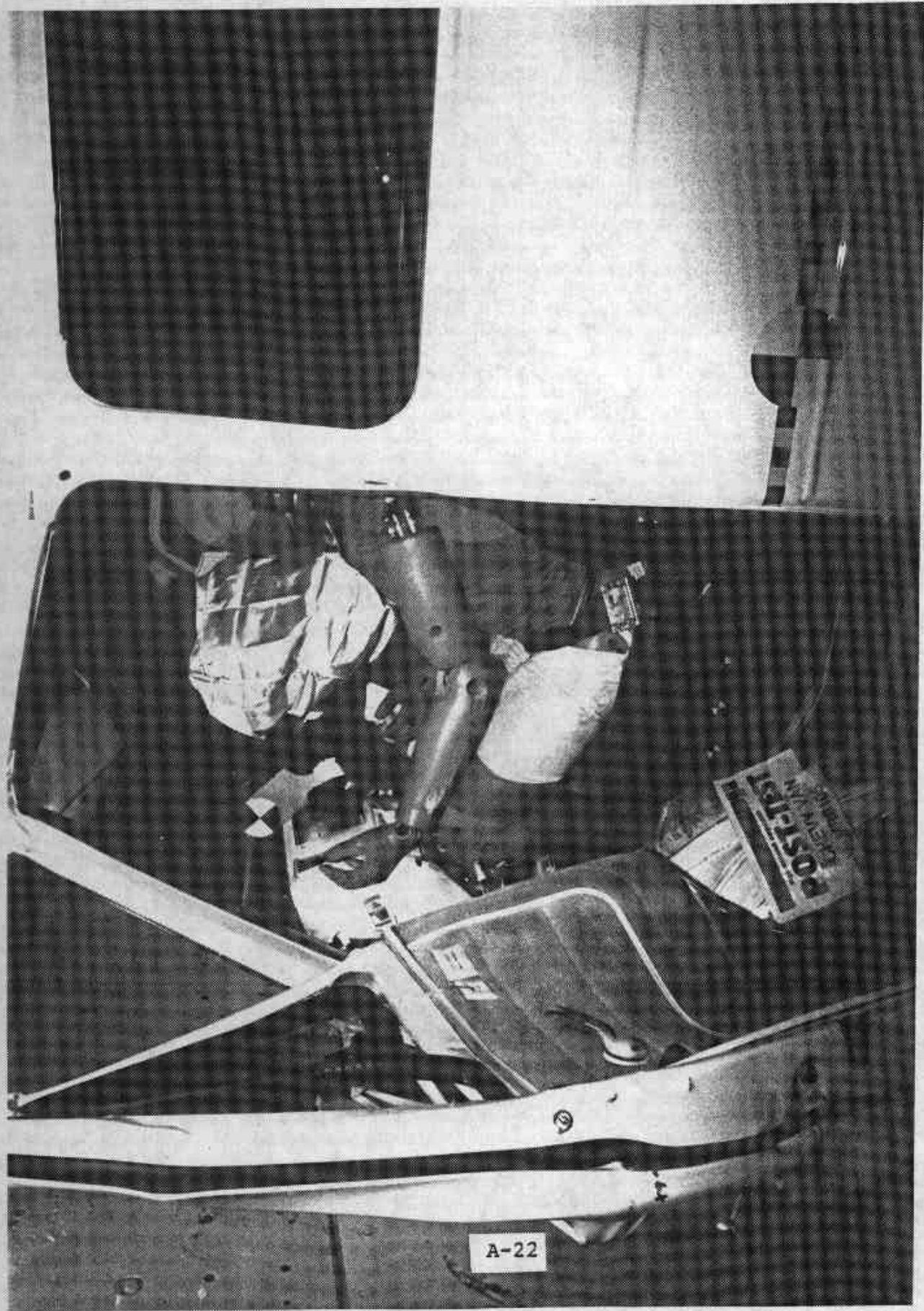


Photo No. A-22 - Post-Test Driver Dummy Position View (Door Open)

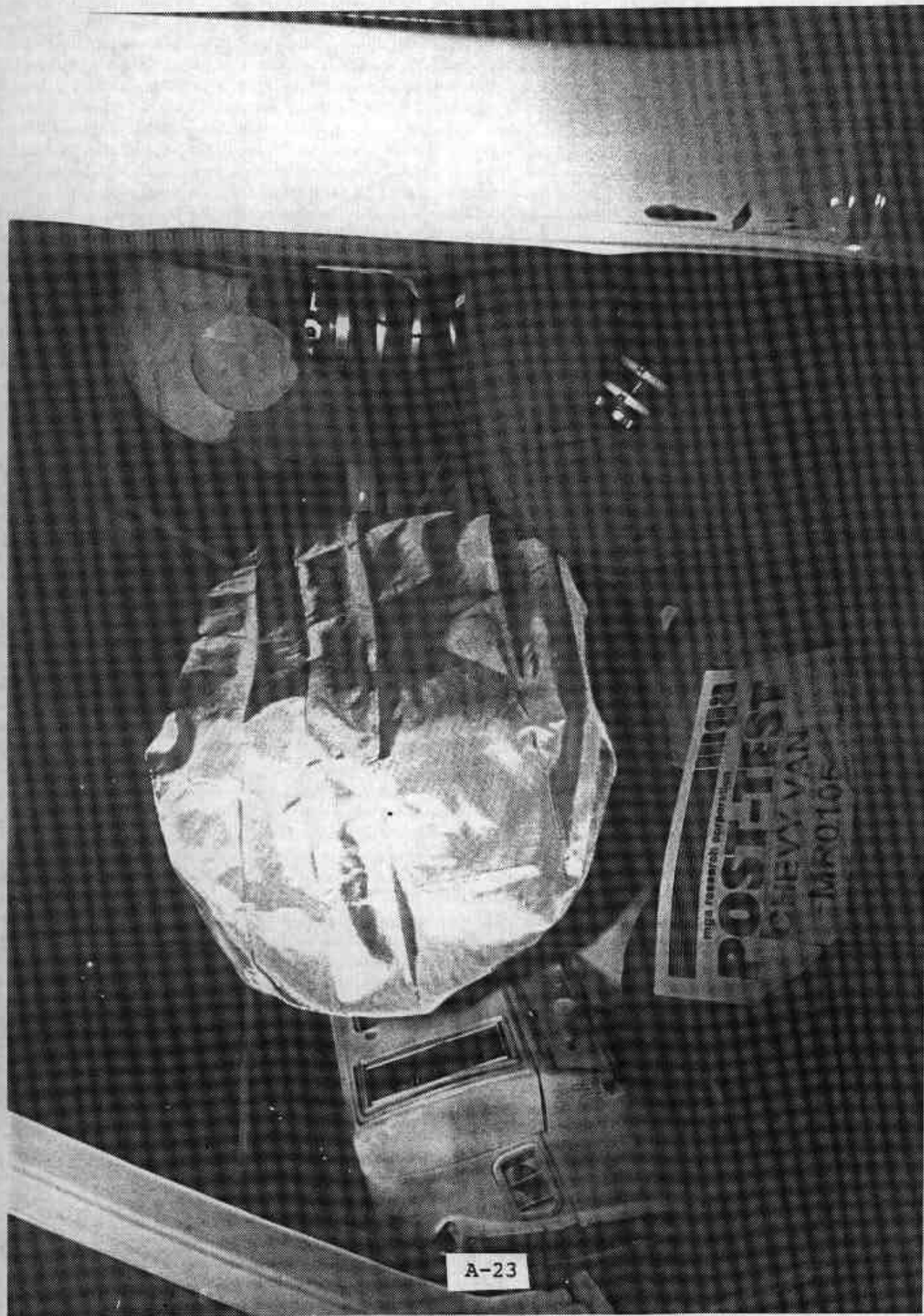


Photo No. A-23 - Post-Test Driver Airbag Contact



Photo No. A-24 - Post-Test Driver Knee Contact



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



A-26

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

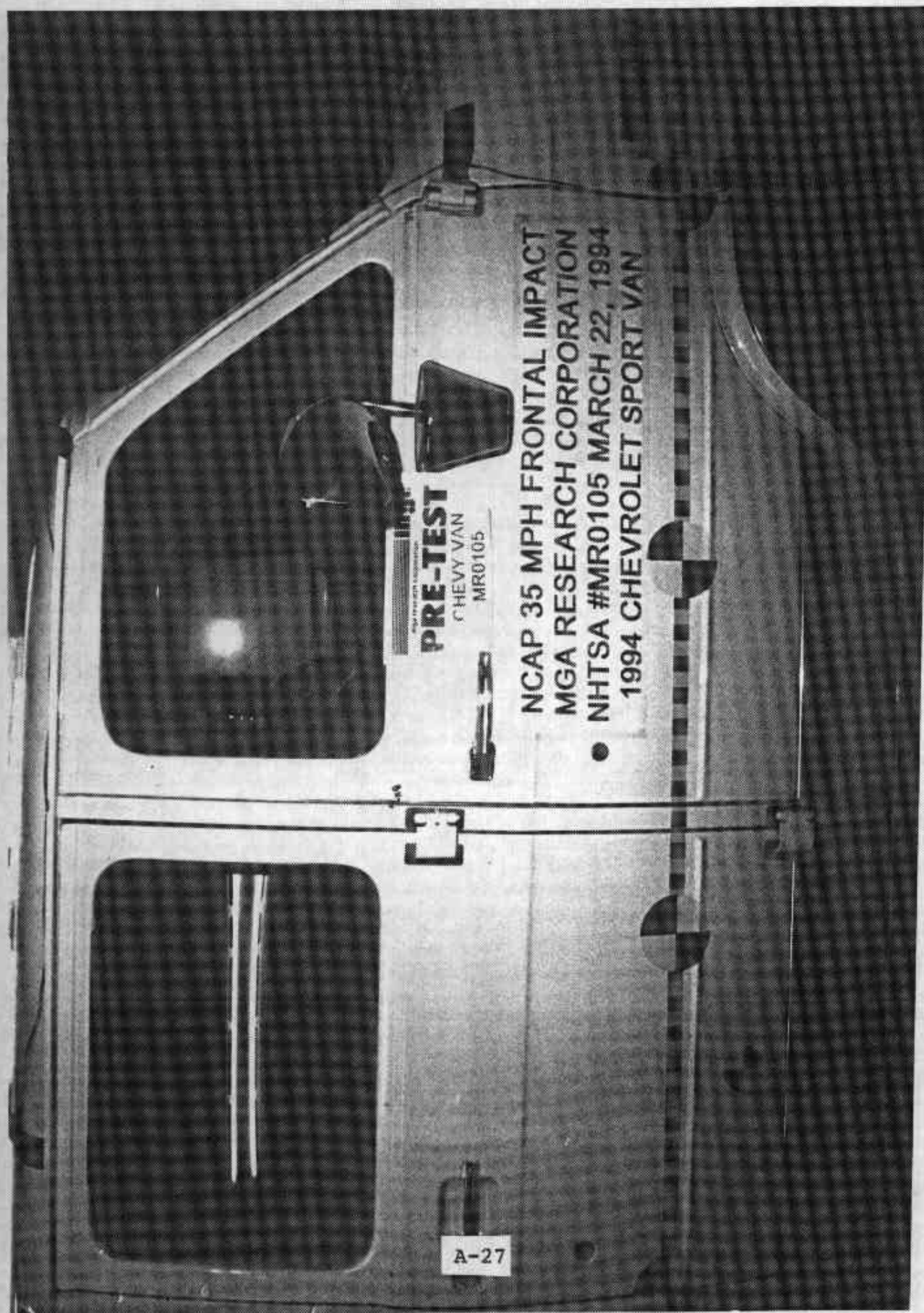


Photo No. A-27 - Pre-Test Passenger Dummy Position View



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

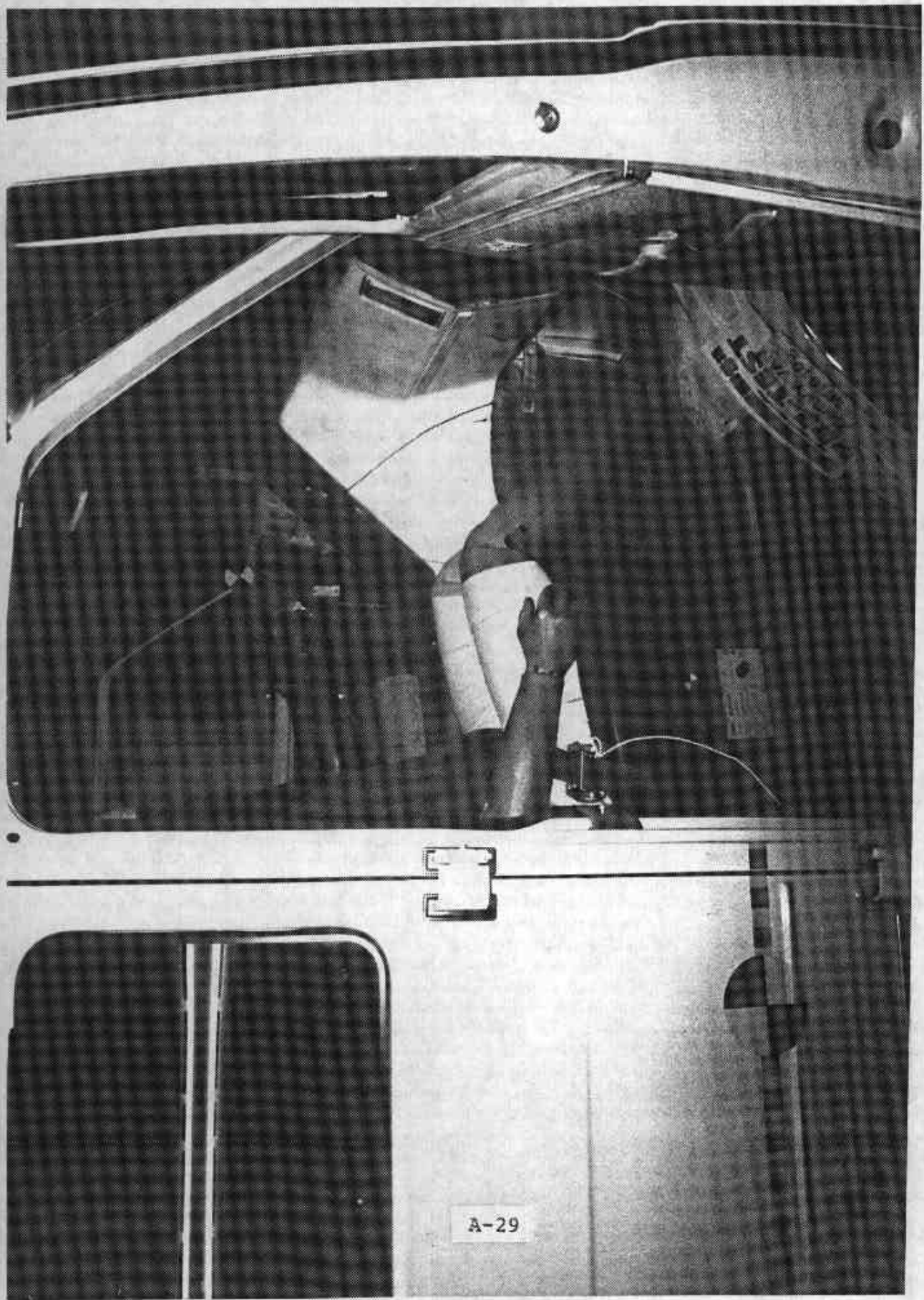


Photo No. A-29 - Pre-Test Passenger Dummy Position View (Door Open)

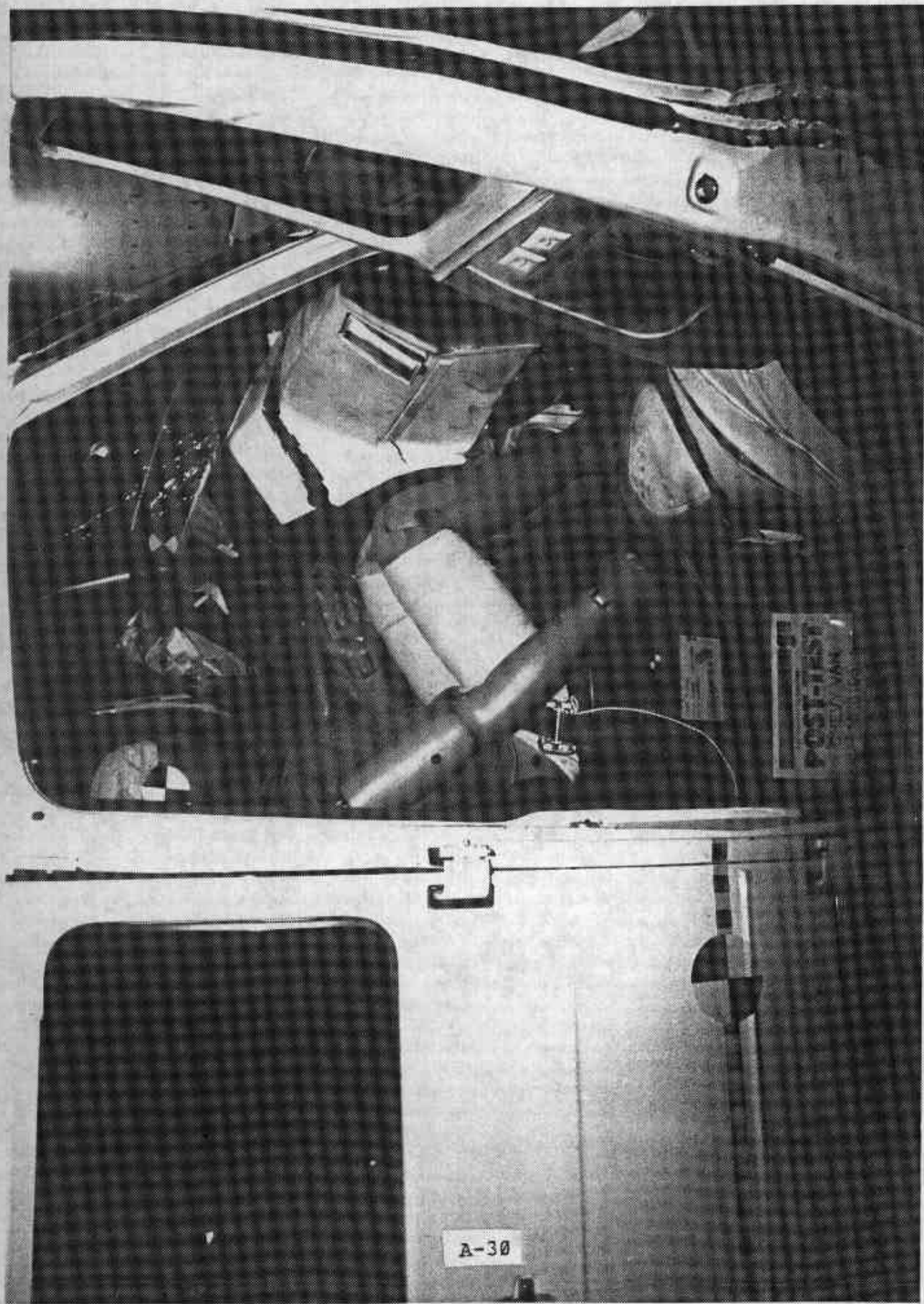


Photo No. A-30 - Post-Test Passenger Dummy Position View (Door Open)



Photo No. A-31 - Post-Test Passenger Knee Contact

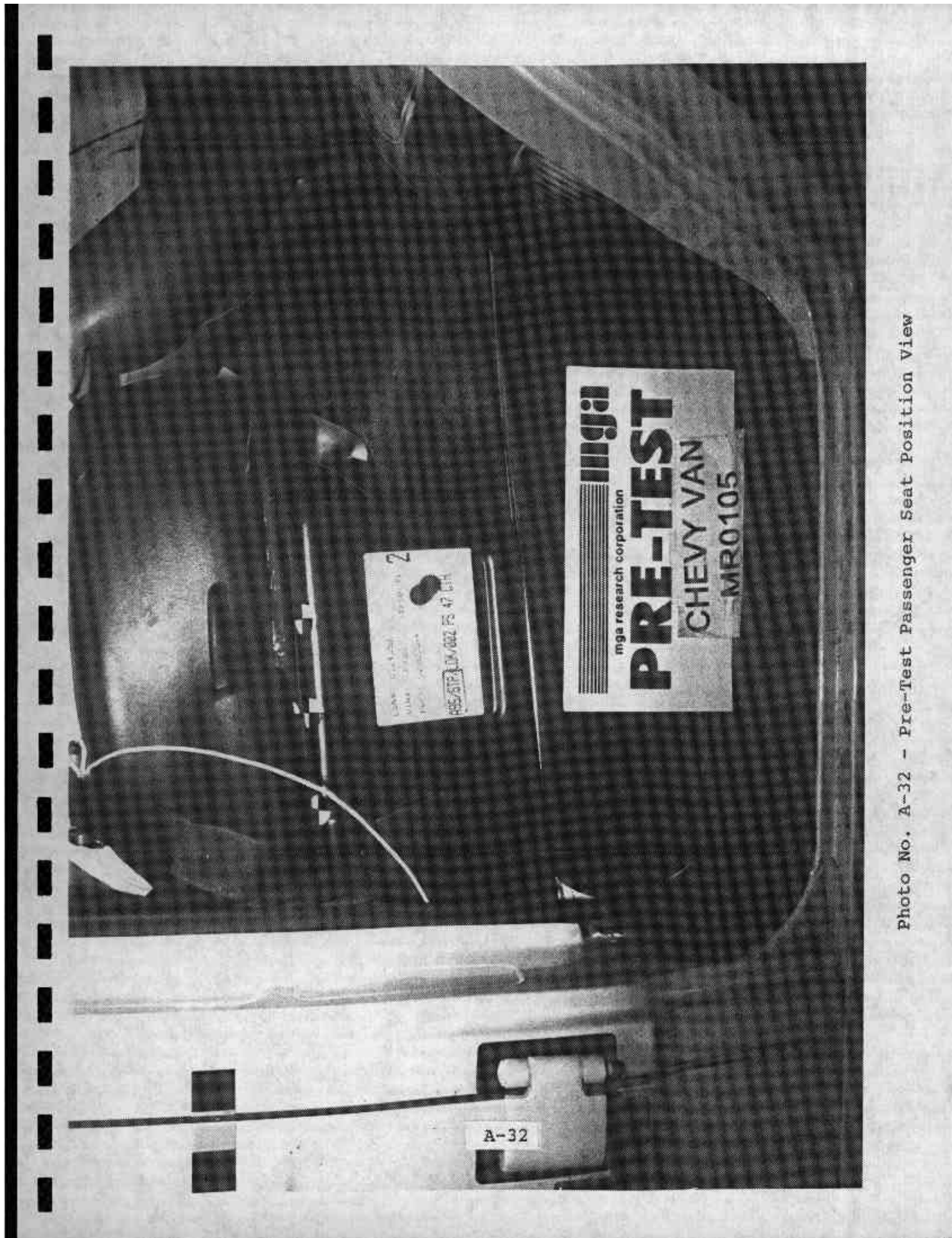


Photo No. A-32 - Pre-Test Passenger Seat Position View



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

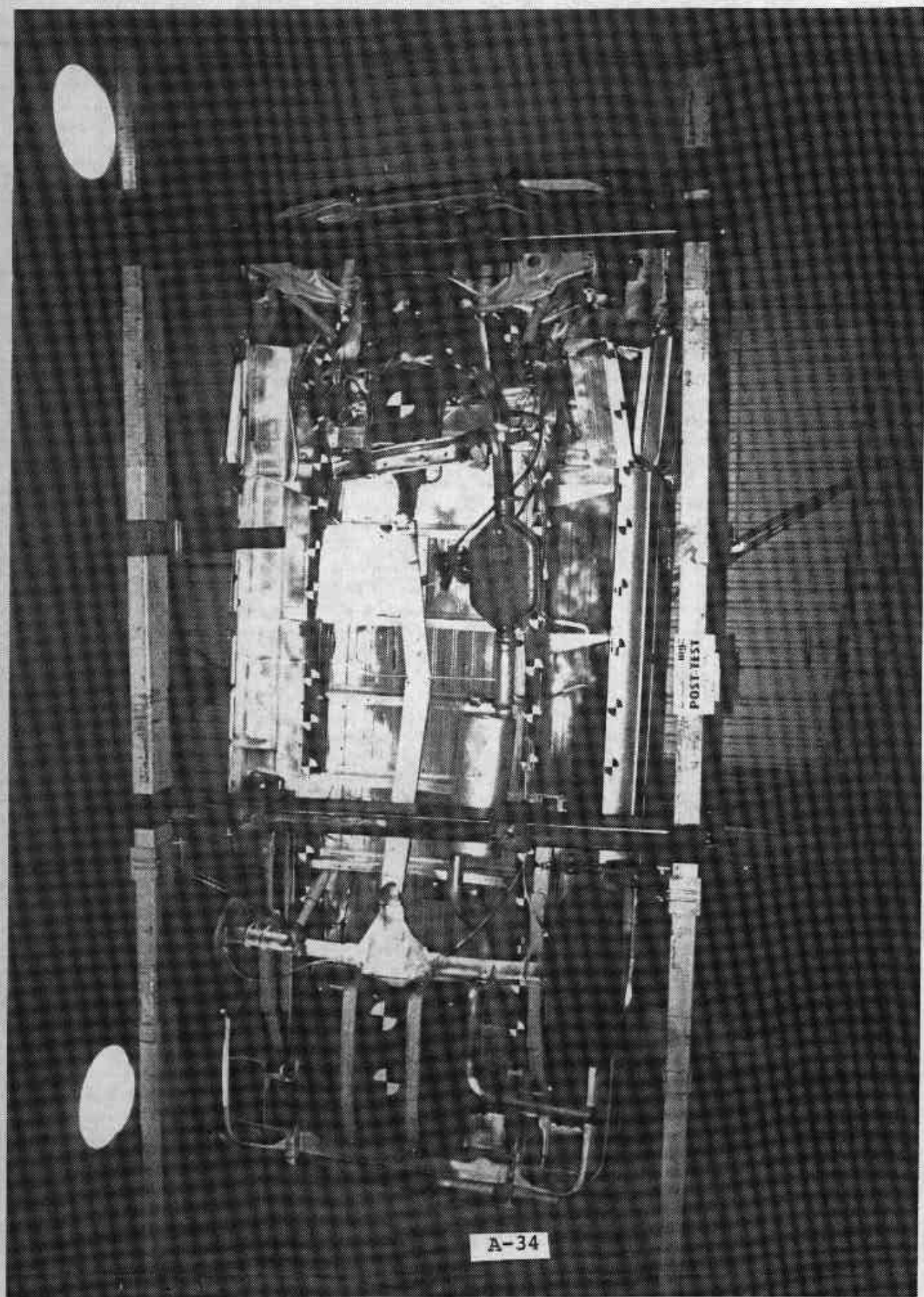
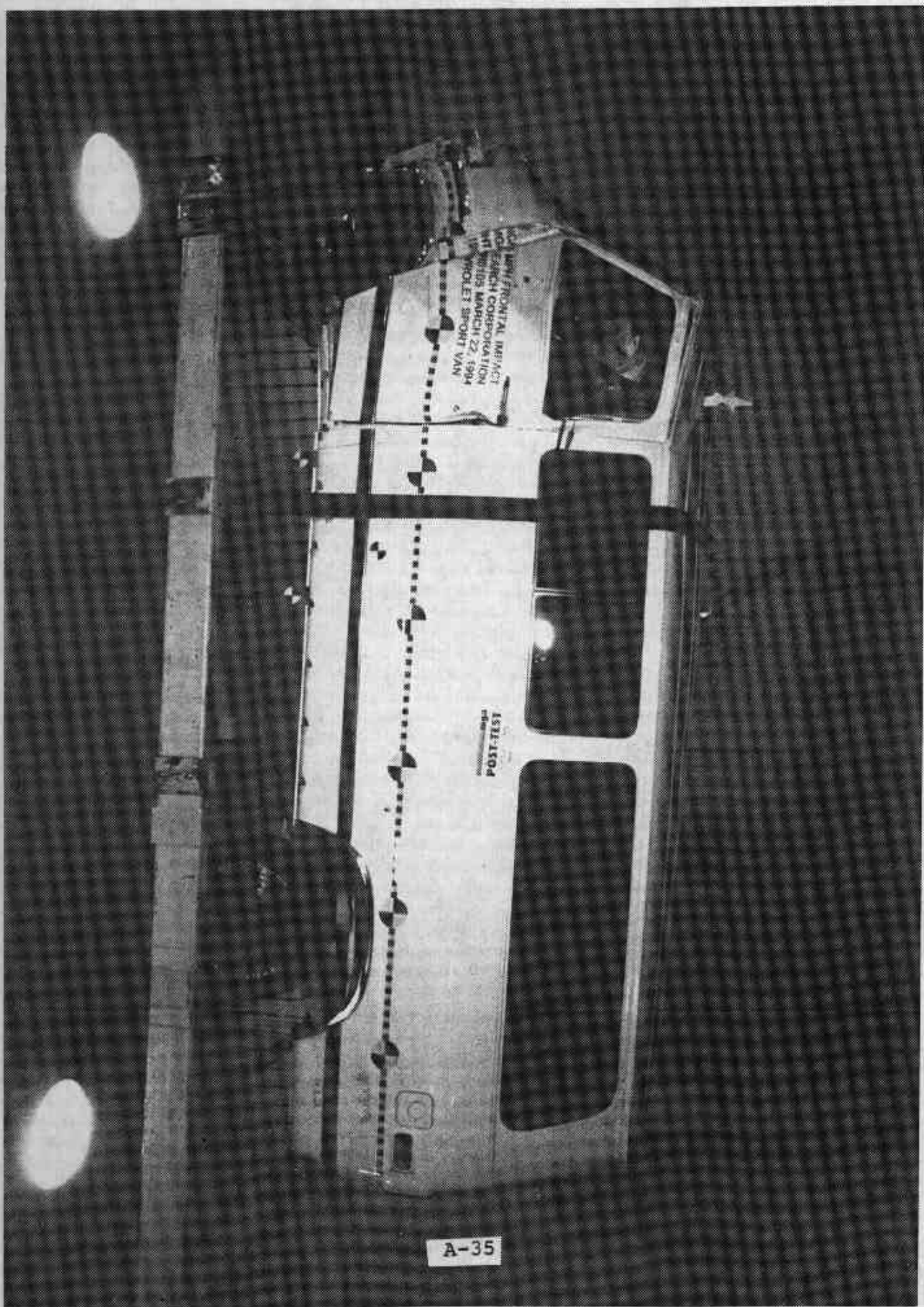


Photo No. A-34 - Rollover 90°



A-35

Photo No. A-35 - Rollover 180°

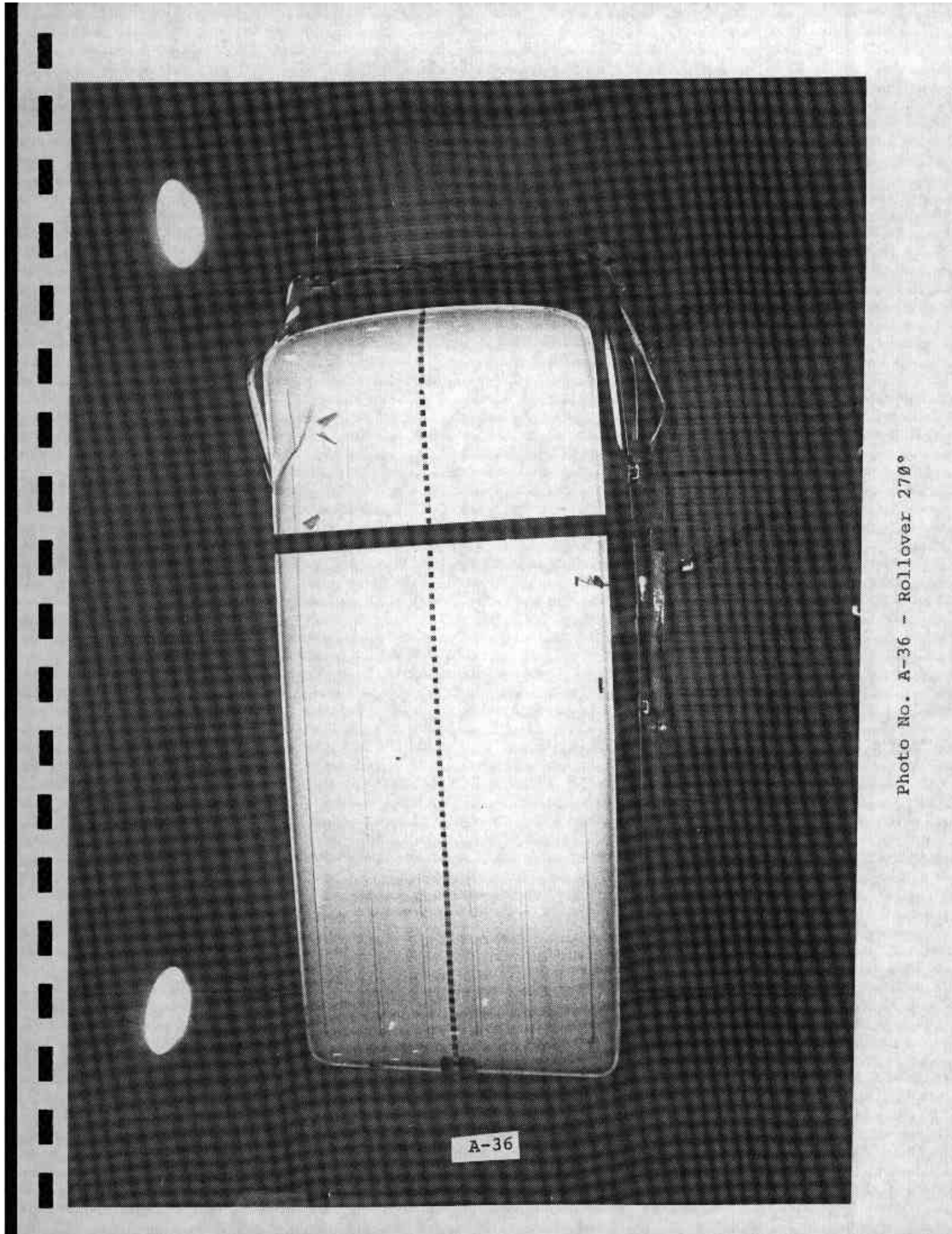


Photo No. A-36 - Rollover 270°

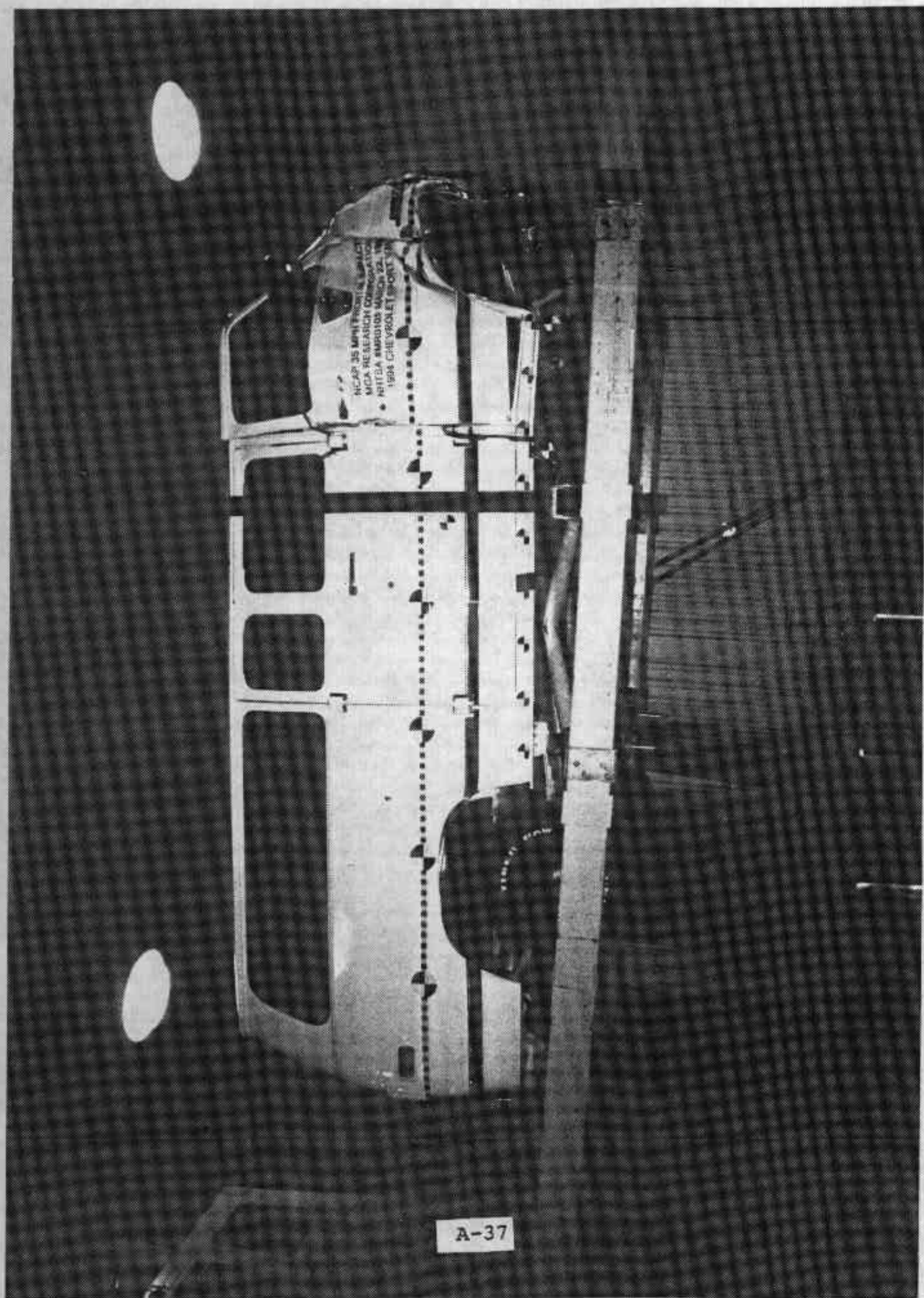


Photo No. A-37 - Rollover 360°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1994 CHEVROLET BEAUVILLE VAN
NHTSA NO.: MR0105

<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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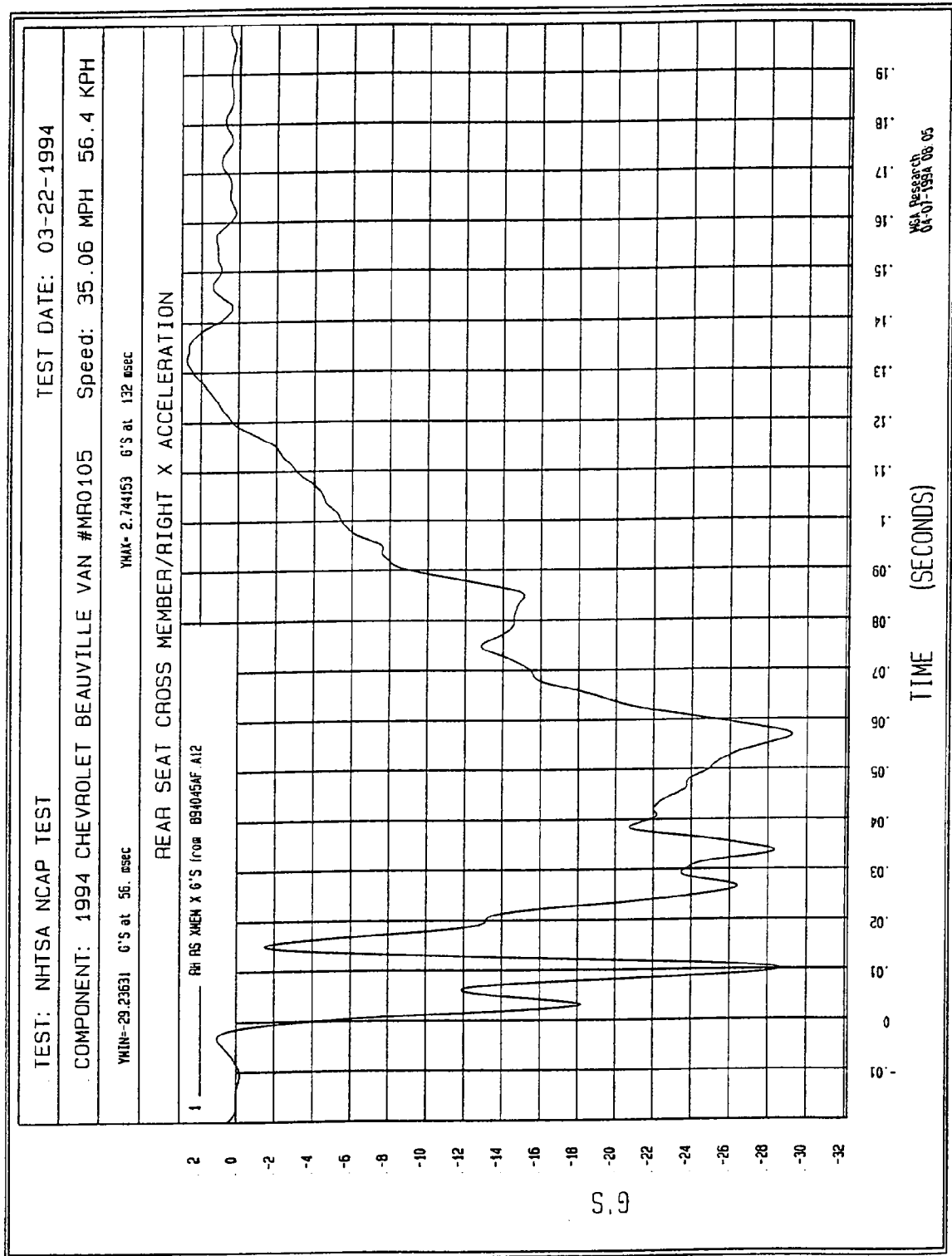


Figure B-1 - Right Rear Seat Crossmember X Accel. vs. Time

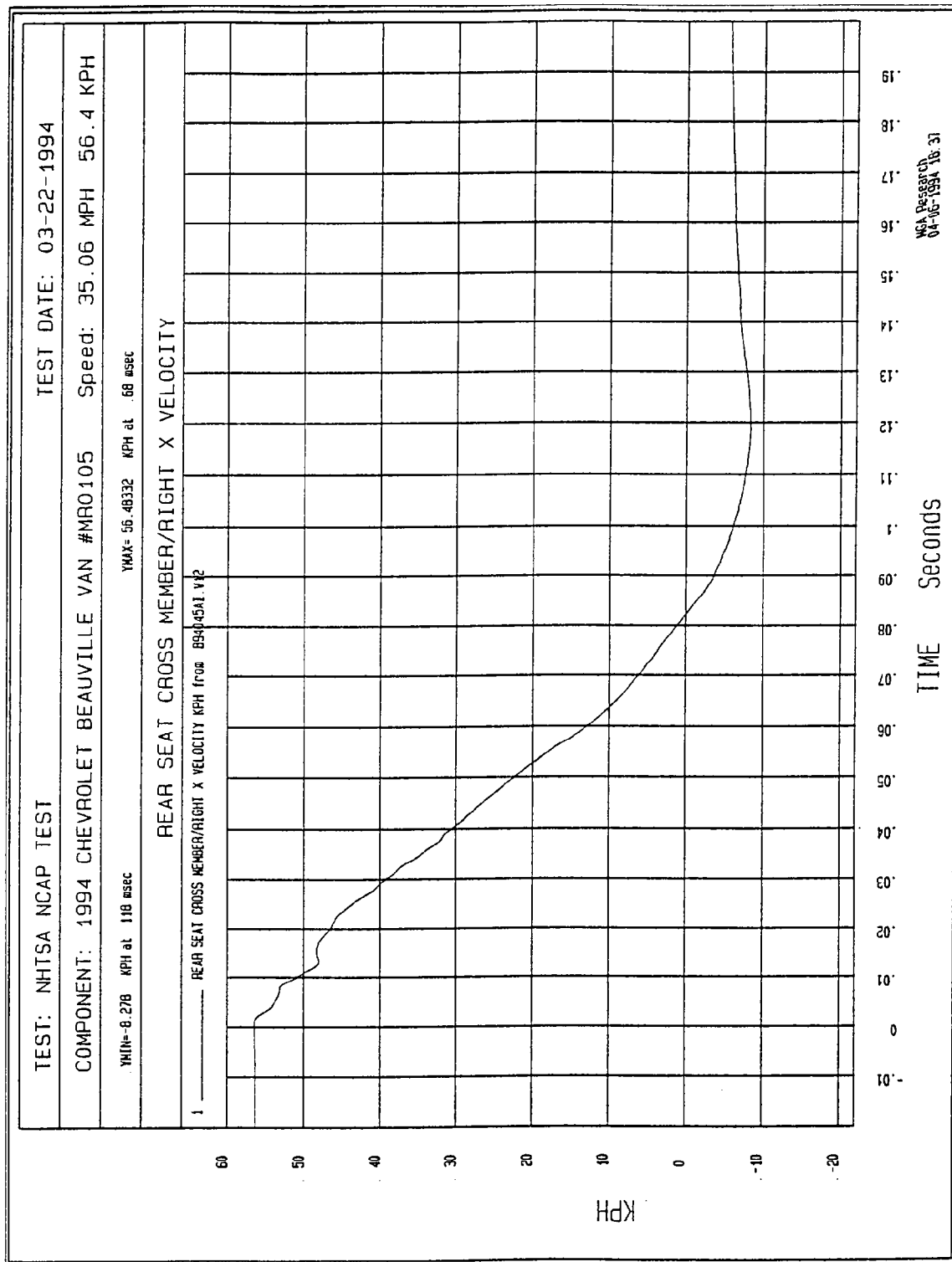


Figure B-2 - Right Rear Seat Crossmember X Velocity vs. Time

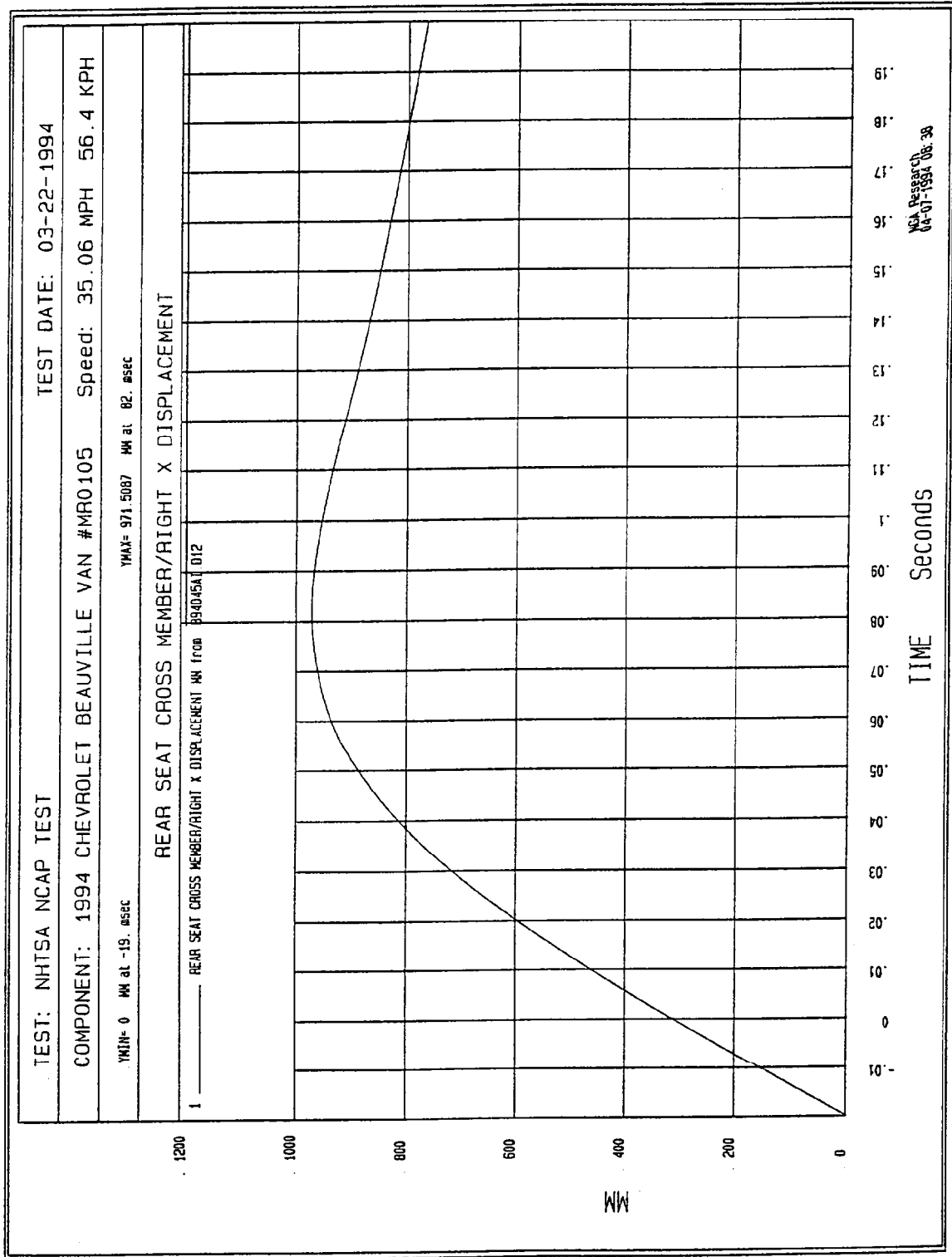


Figure B-3 - Right Rear Seat Crossmember X Displacement vs. Time

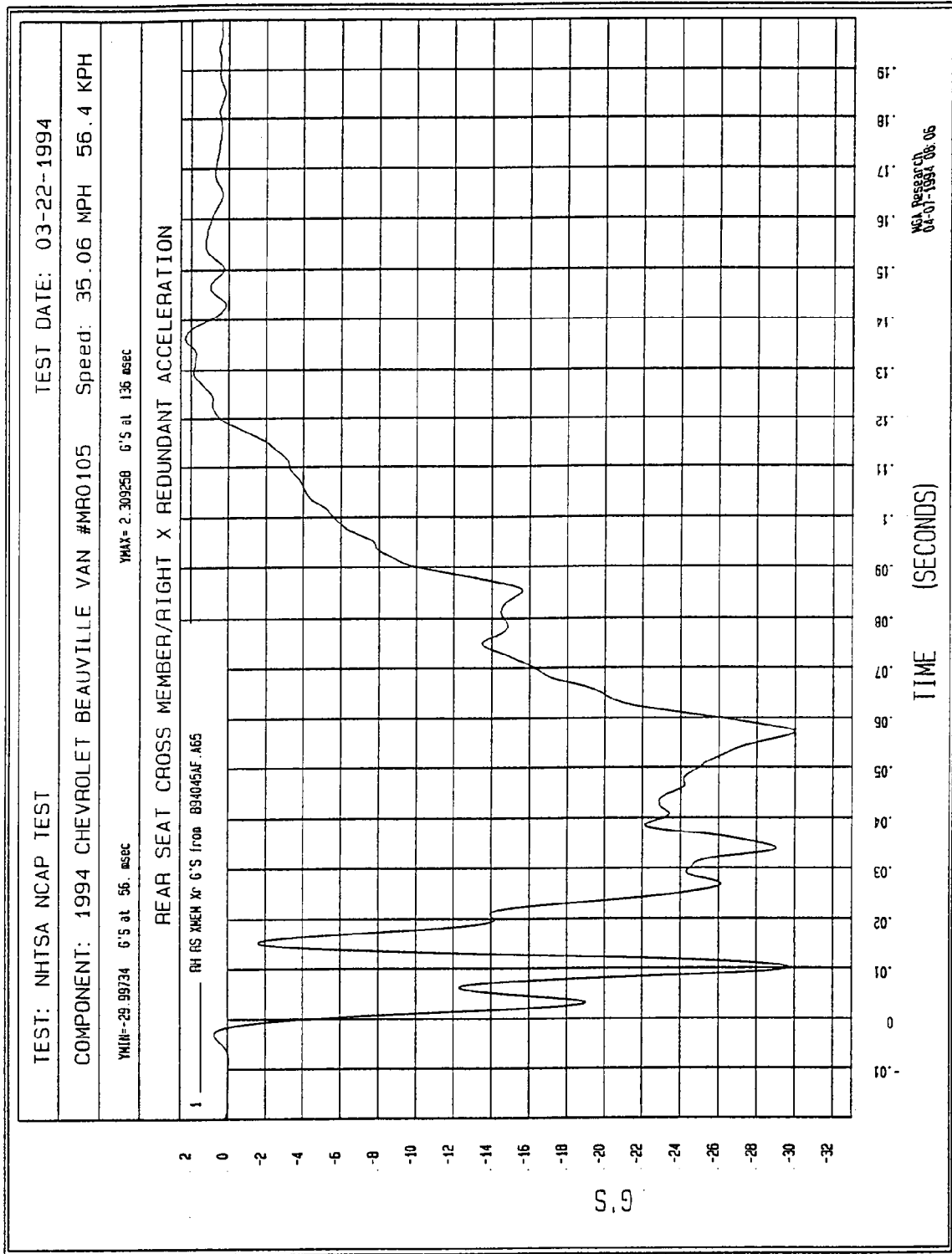


Figure B-4 - Right Rear Seat Crossmember X Redundant Acceleration vs. Time

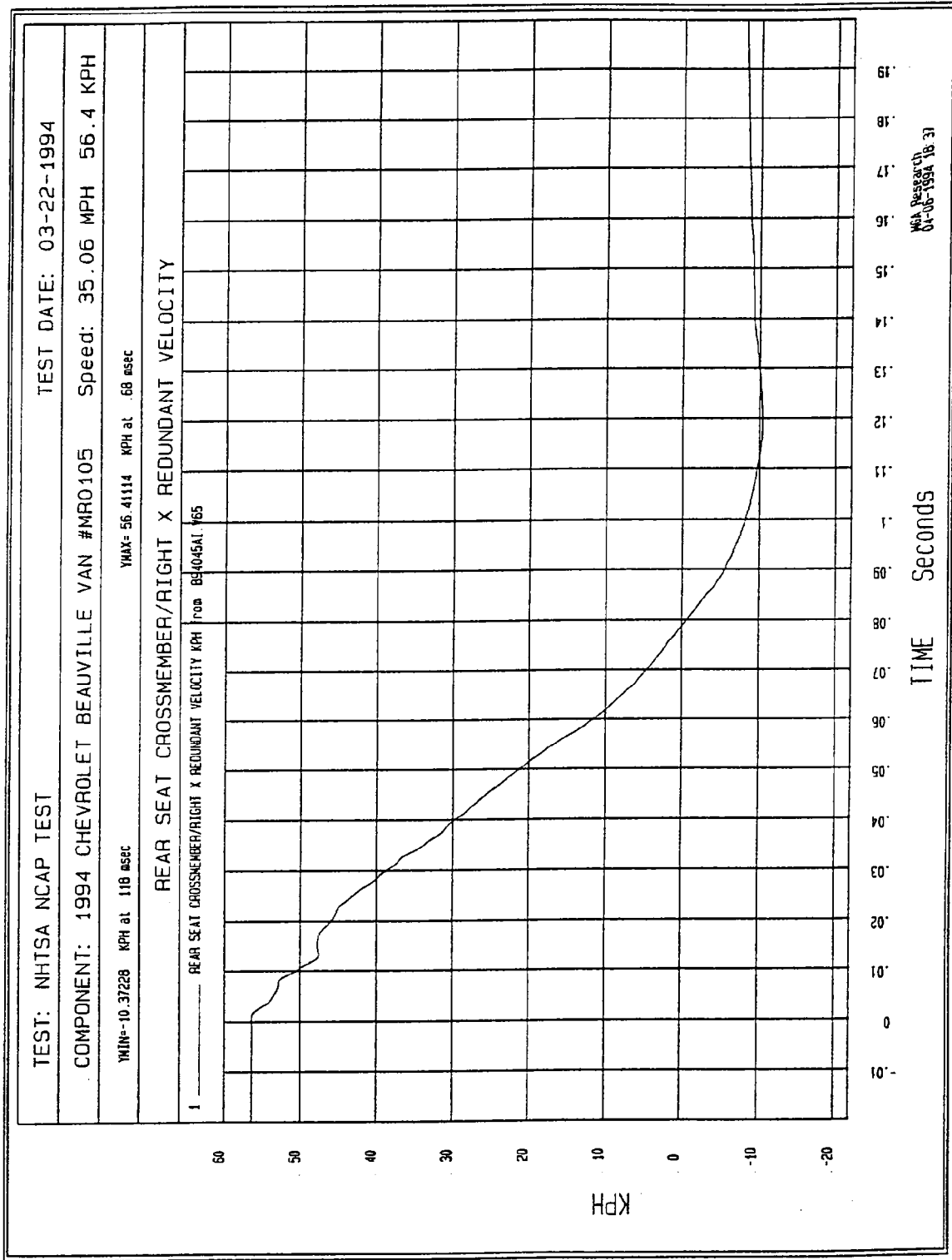


Figure B-5 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

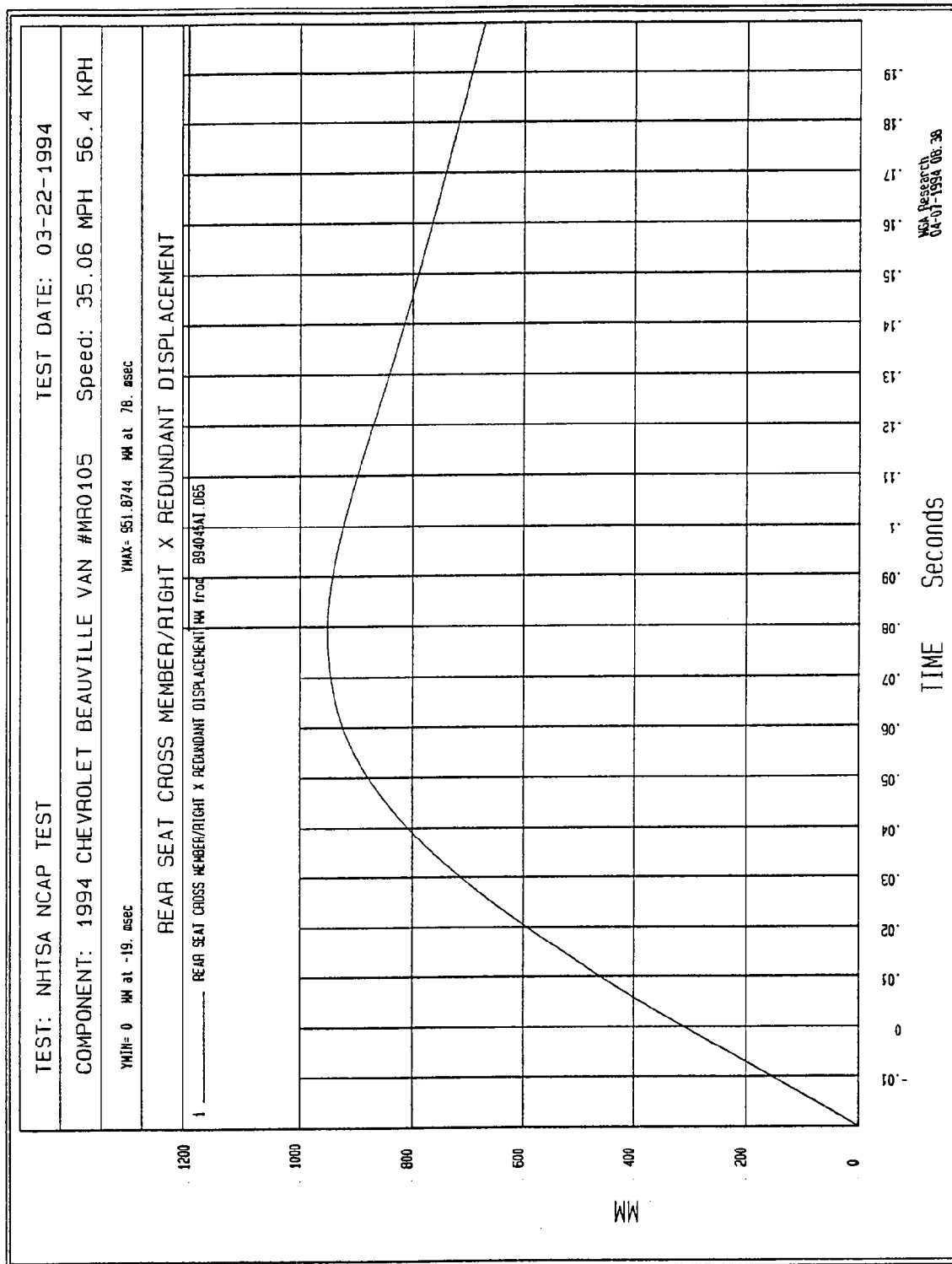


Figure B-6 - Right Rear Seat Crossmember X Redundant Displacement vs. Time

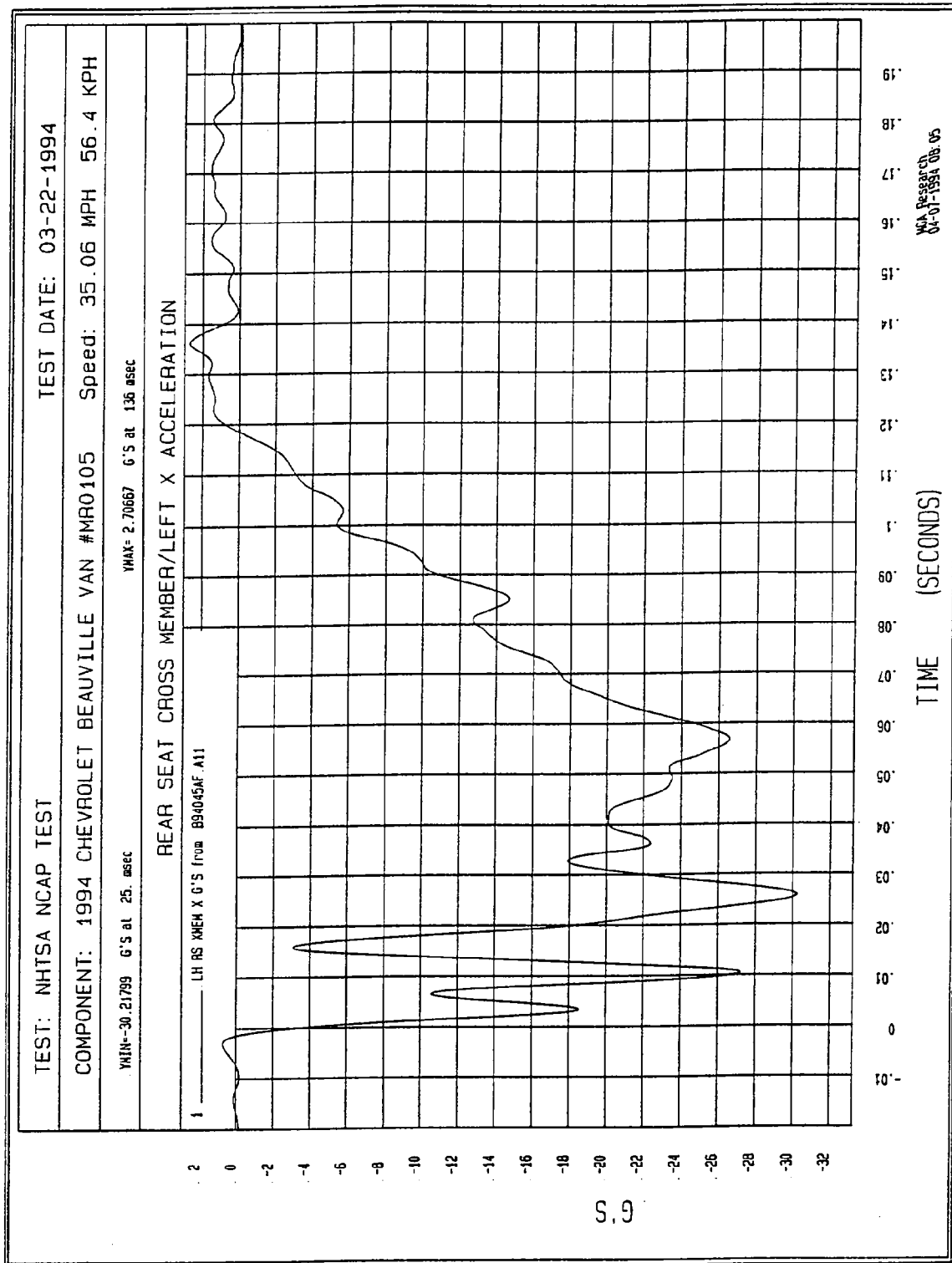


Figure B-7 - Left Rear Seat Crossmember X Acceleration vs. Time

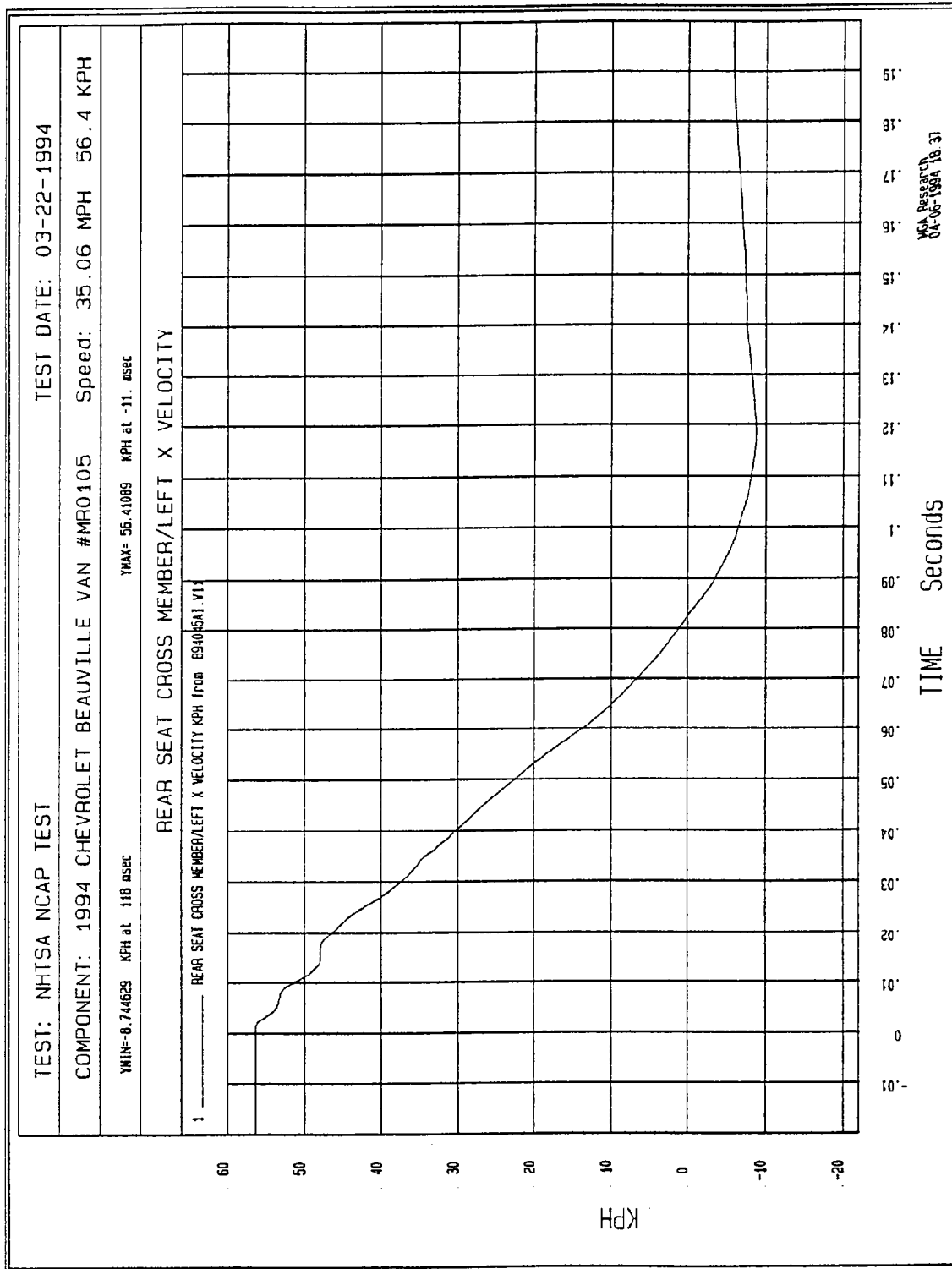


Figure B-8 - Left Rear Seat Crossmember X Velocity vs. Time

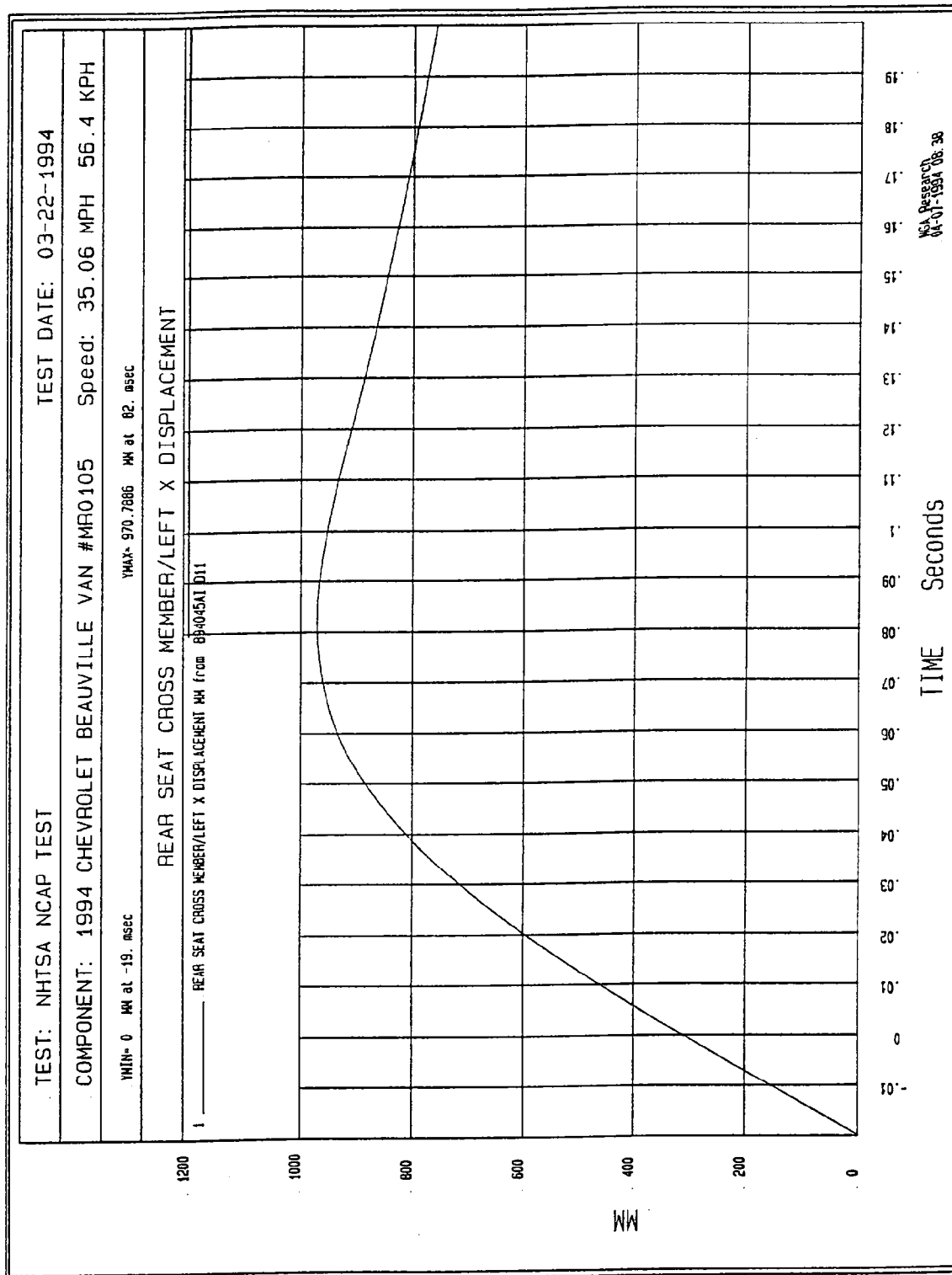


Figure B-9 - Left Rear Seat Crossmember X Displacement vs. Time

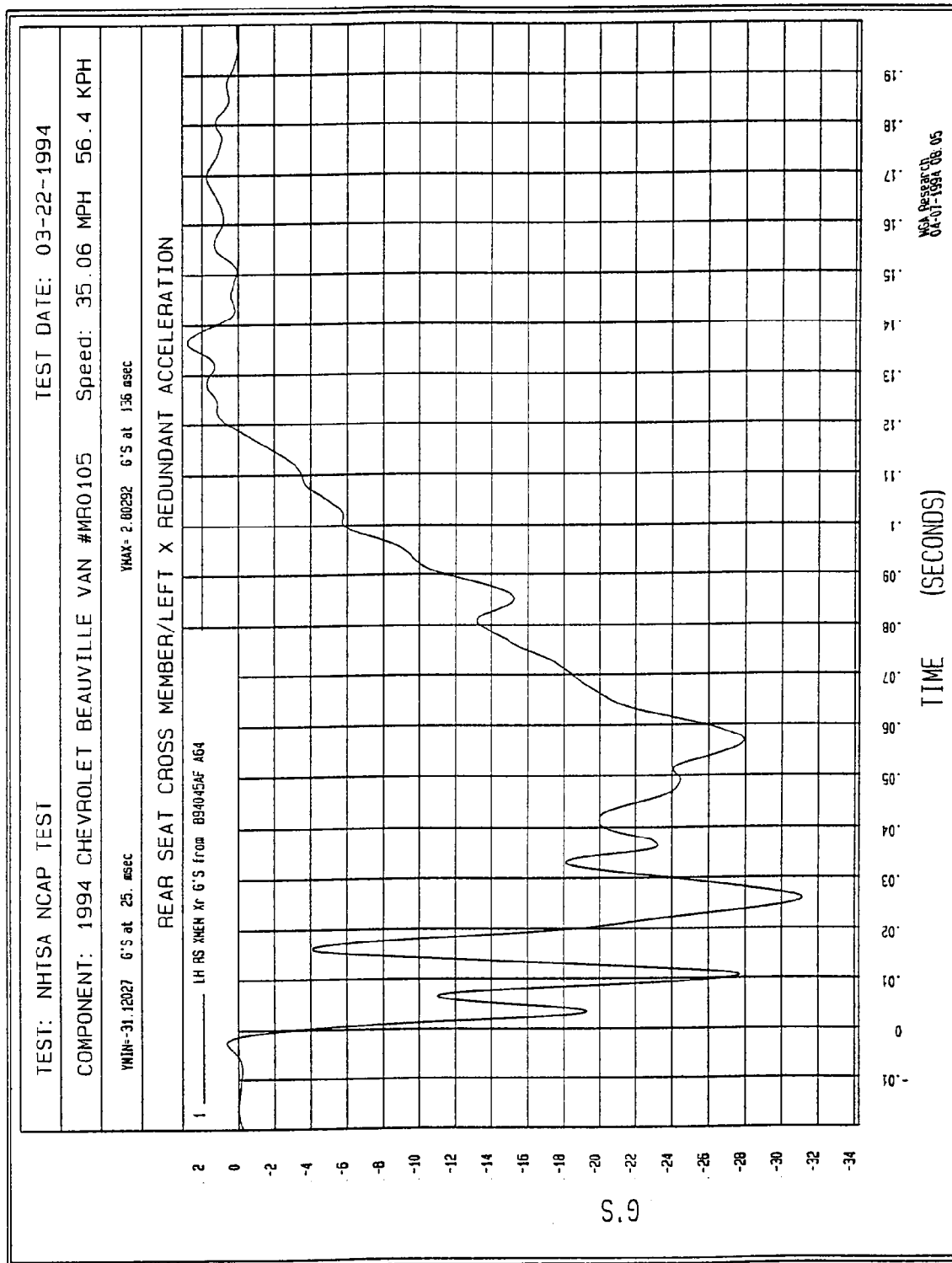


Figure B-10 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

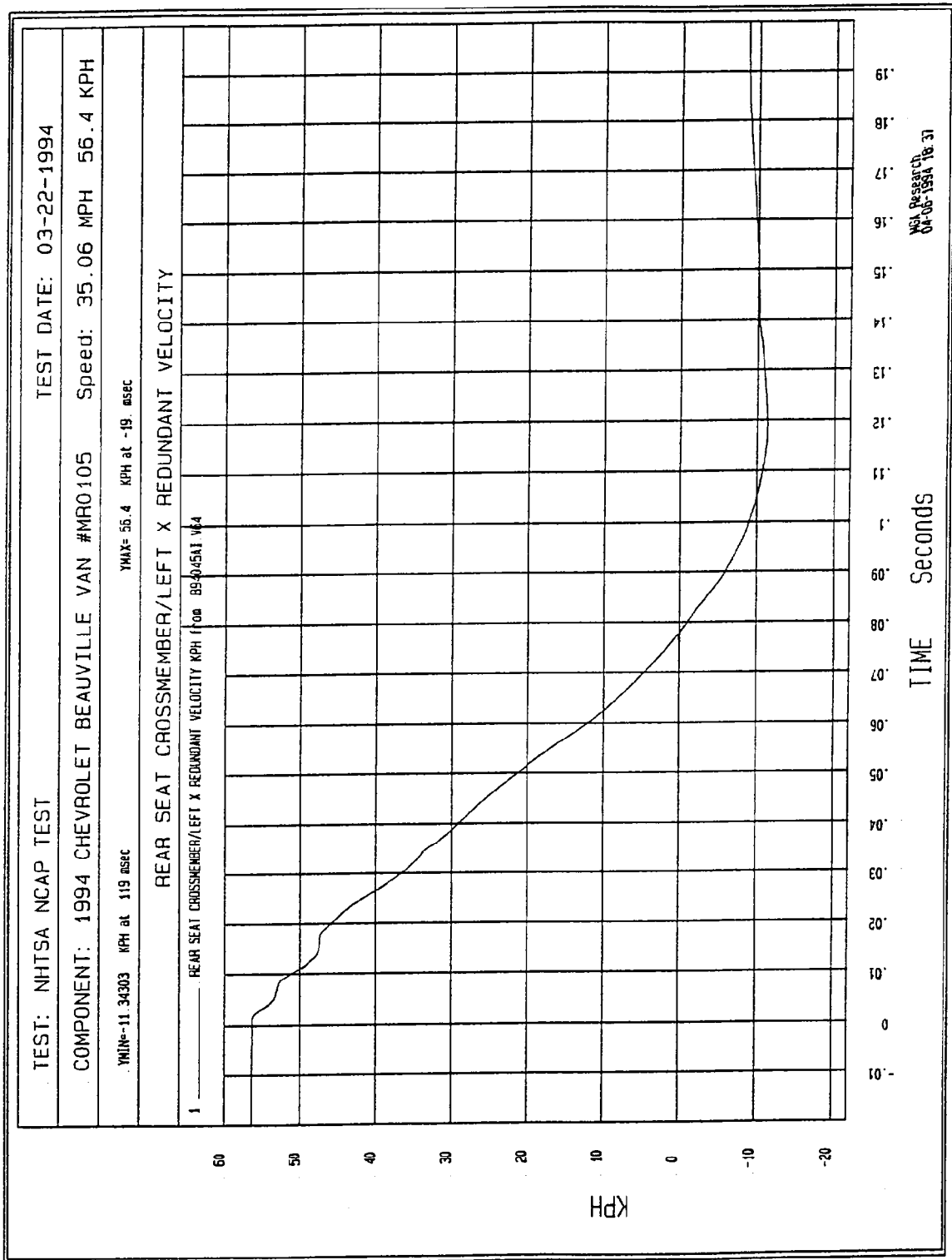


Figure B-11 - Left Rear Seat Crossmember X Redundant Velocity vs. Time

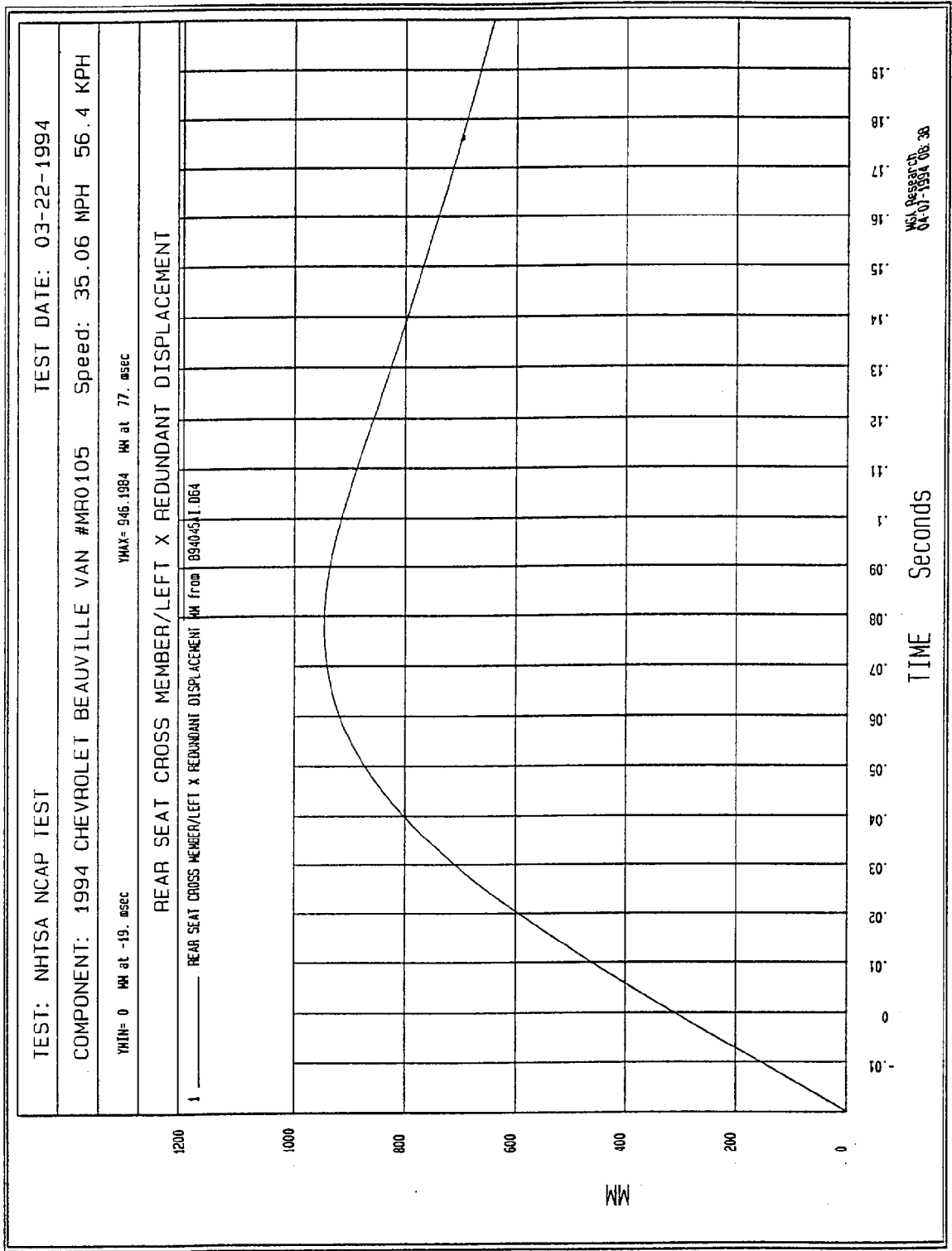


Figure B-12 - Left Rear Seat Crossmember X Redundant Displacement vs. Time

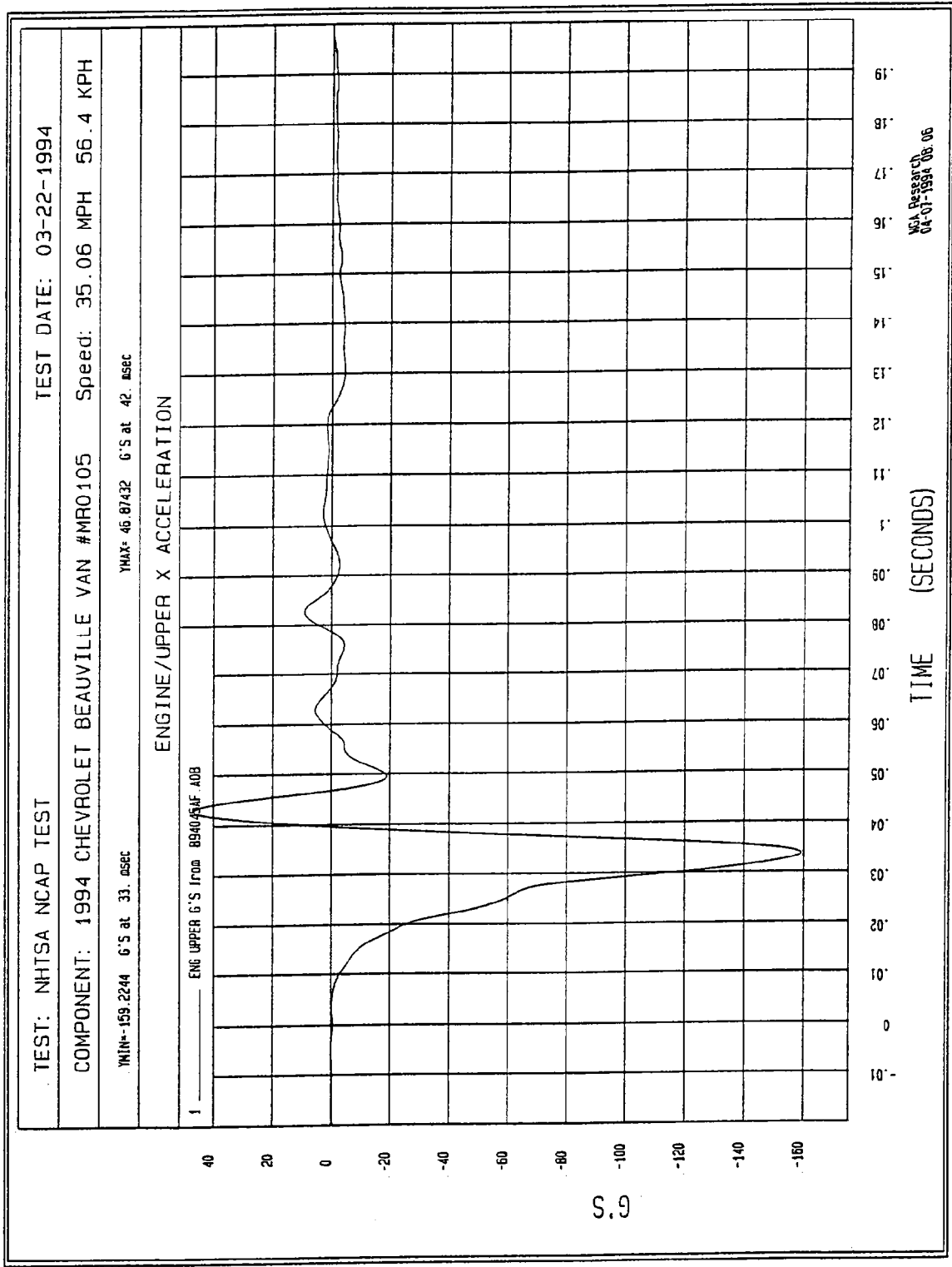
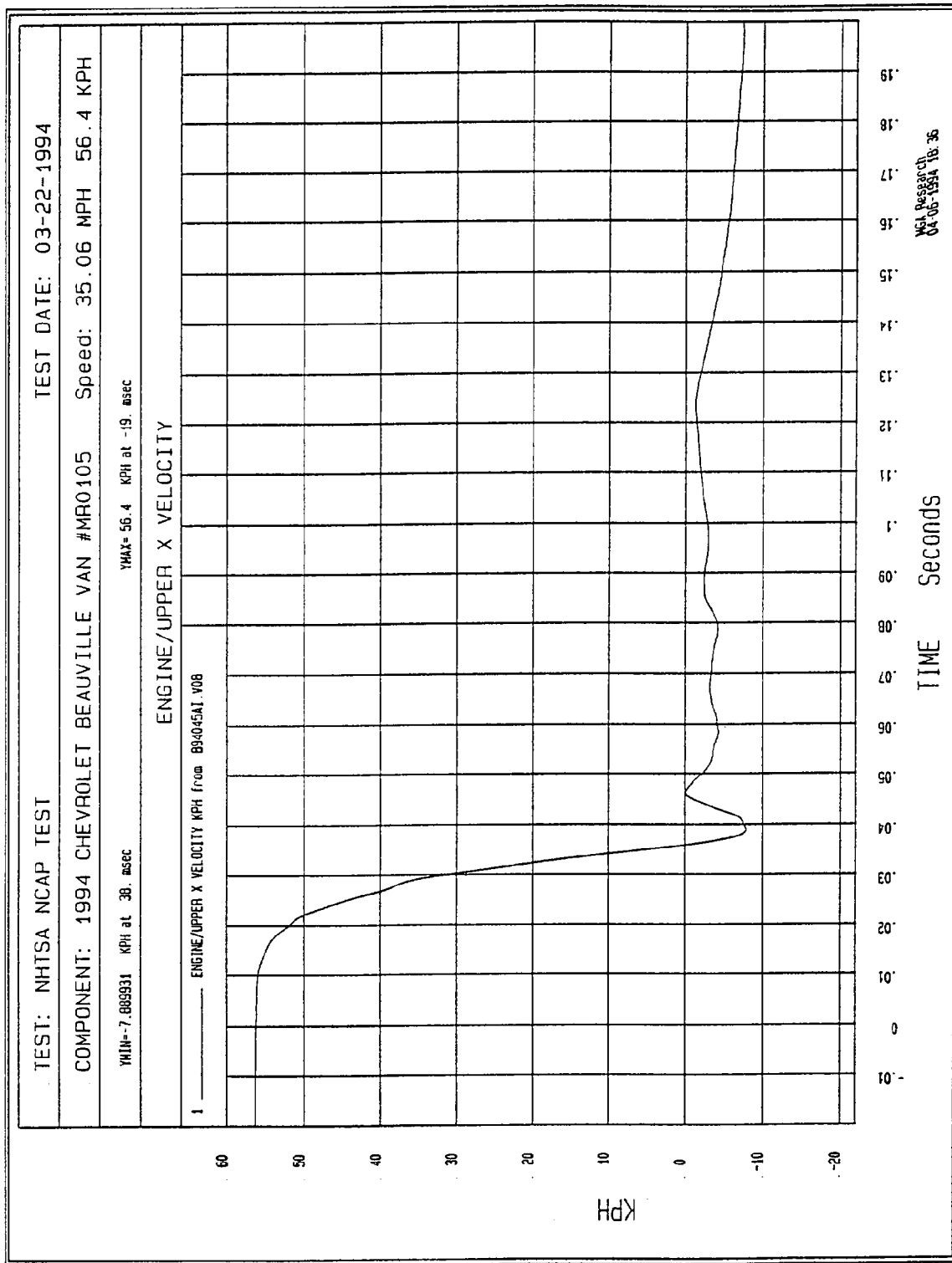


Figure B-13 - Upper Engine Block X Acceleration vs. Time



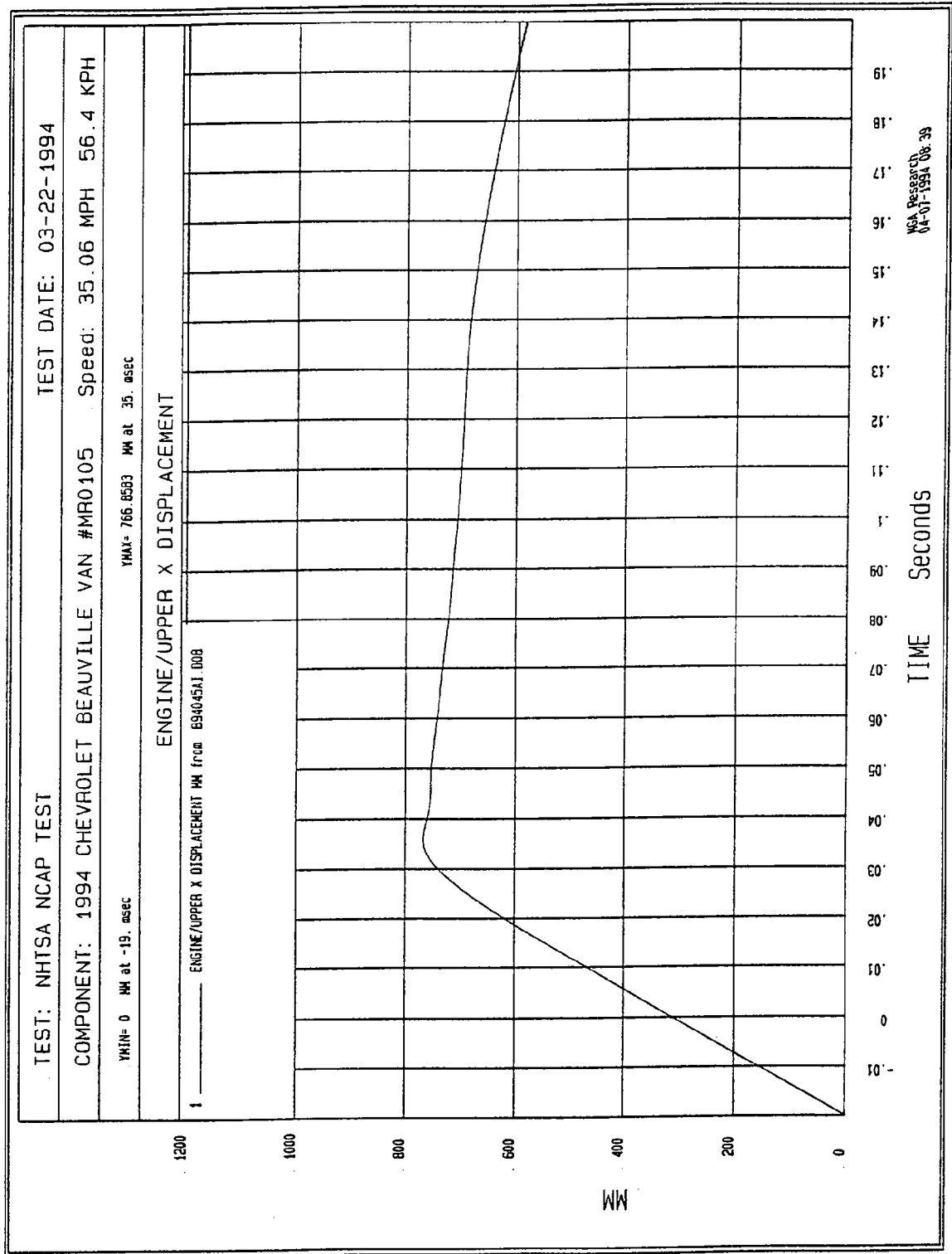


Figure B-15 - Upper Engine Block X Displacement vs. Time

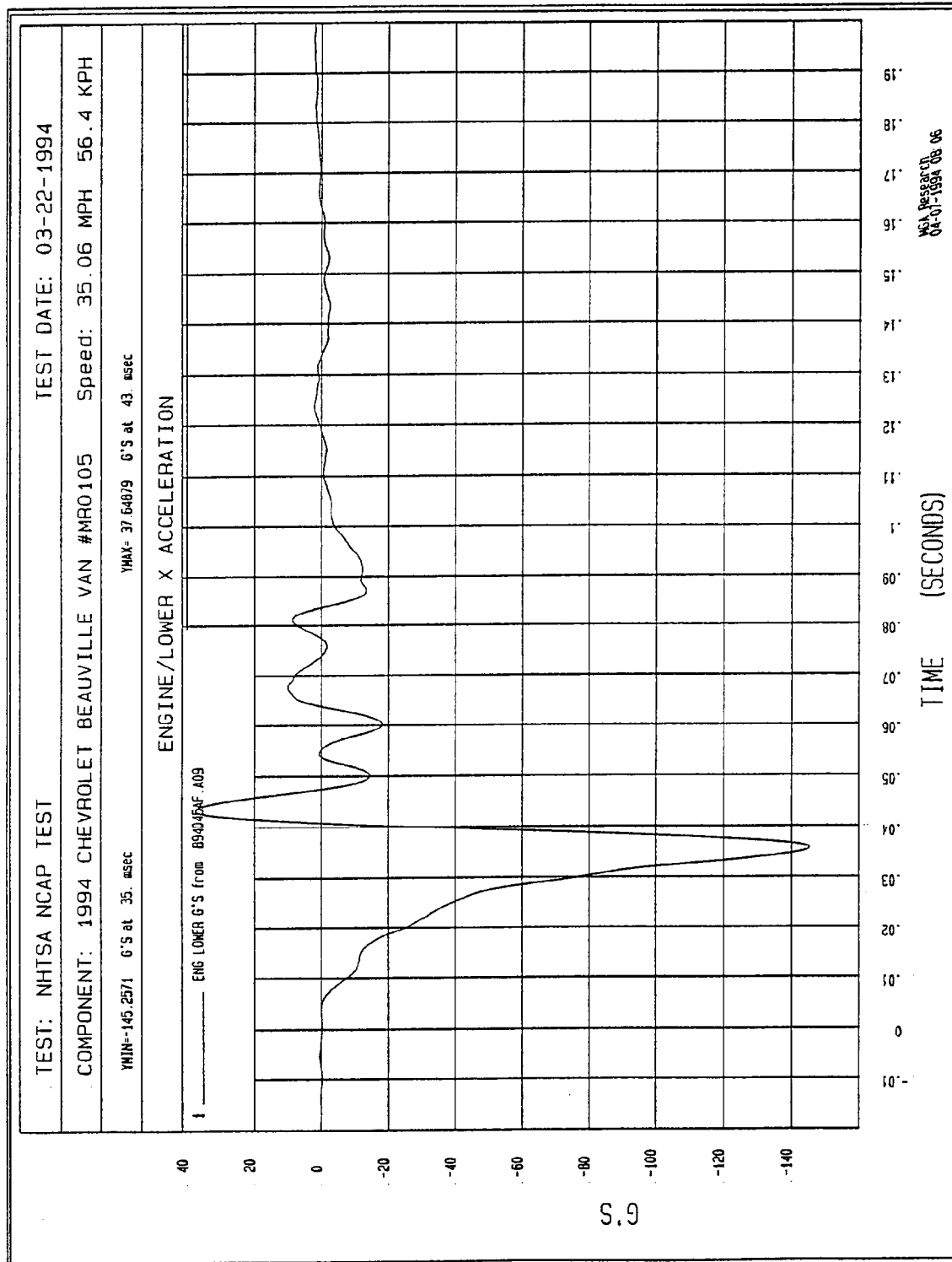


Figure B-16 - Bottom of Engine Block X Acceleration vs. Time

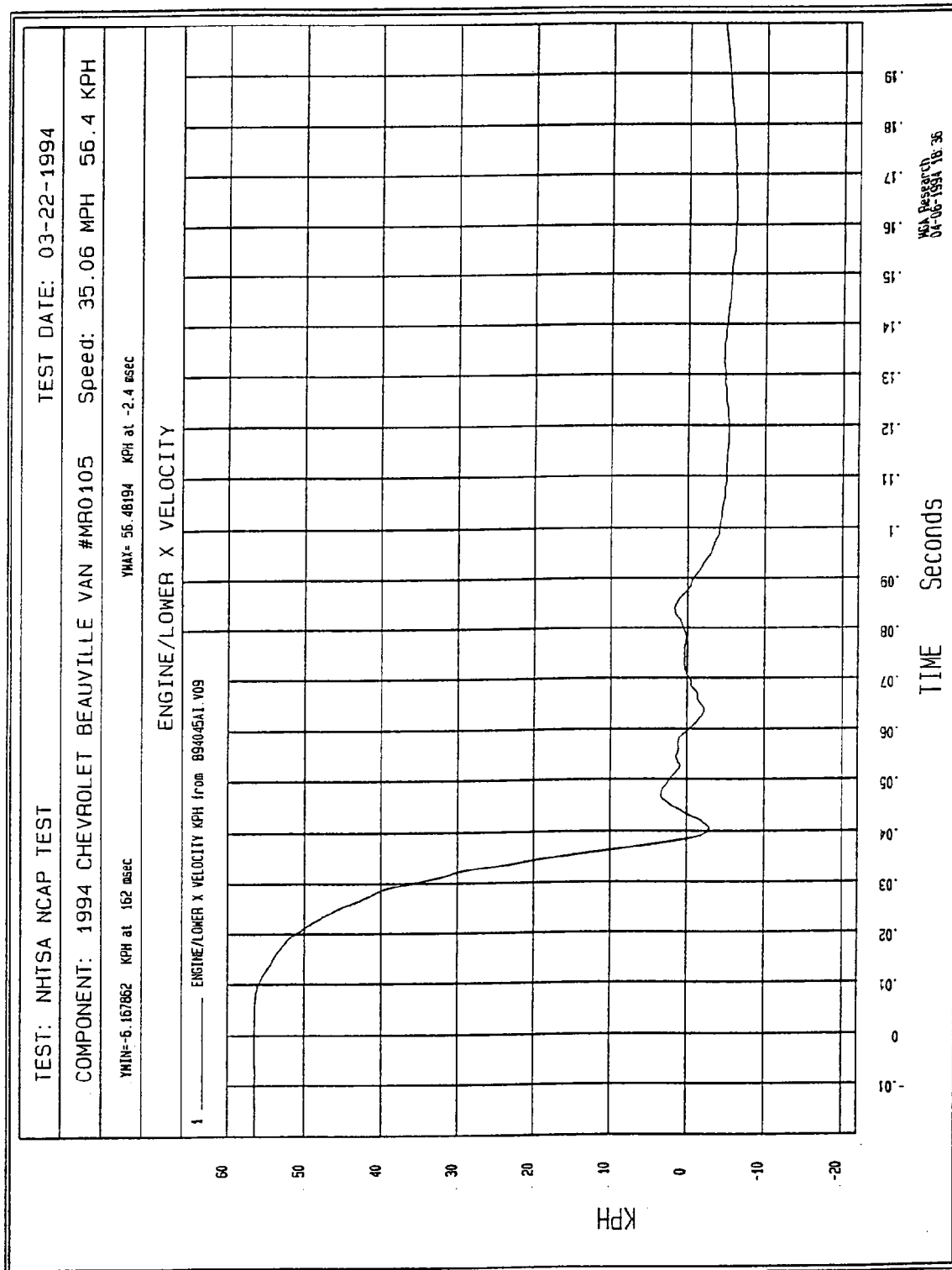


Figure B-17 - Bottom of Engine Block X Velocity vs. Time

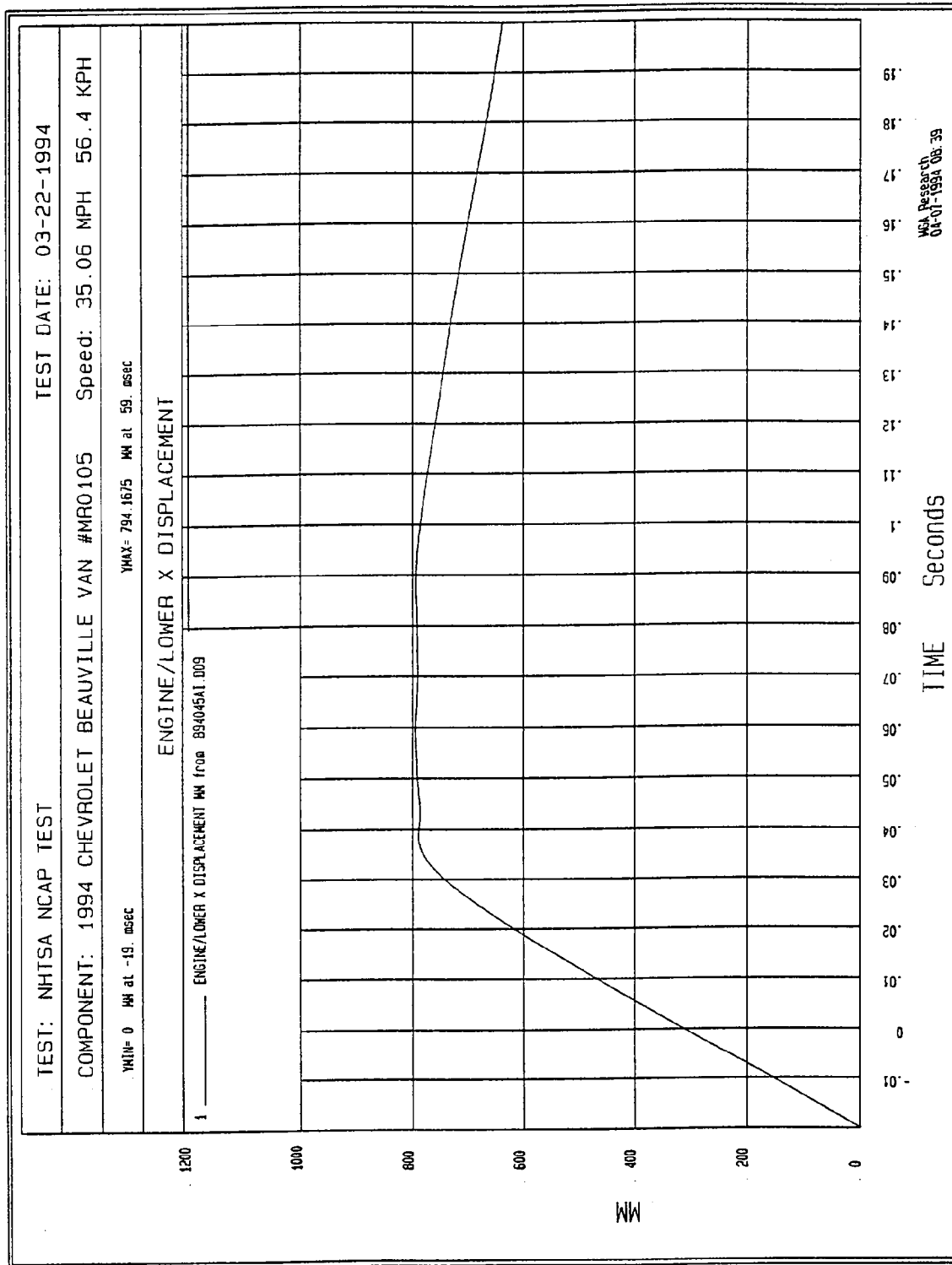


Figure B-18 - Bottom of Engine Block X Displacement vs. Time

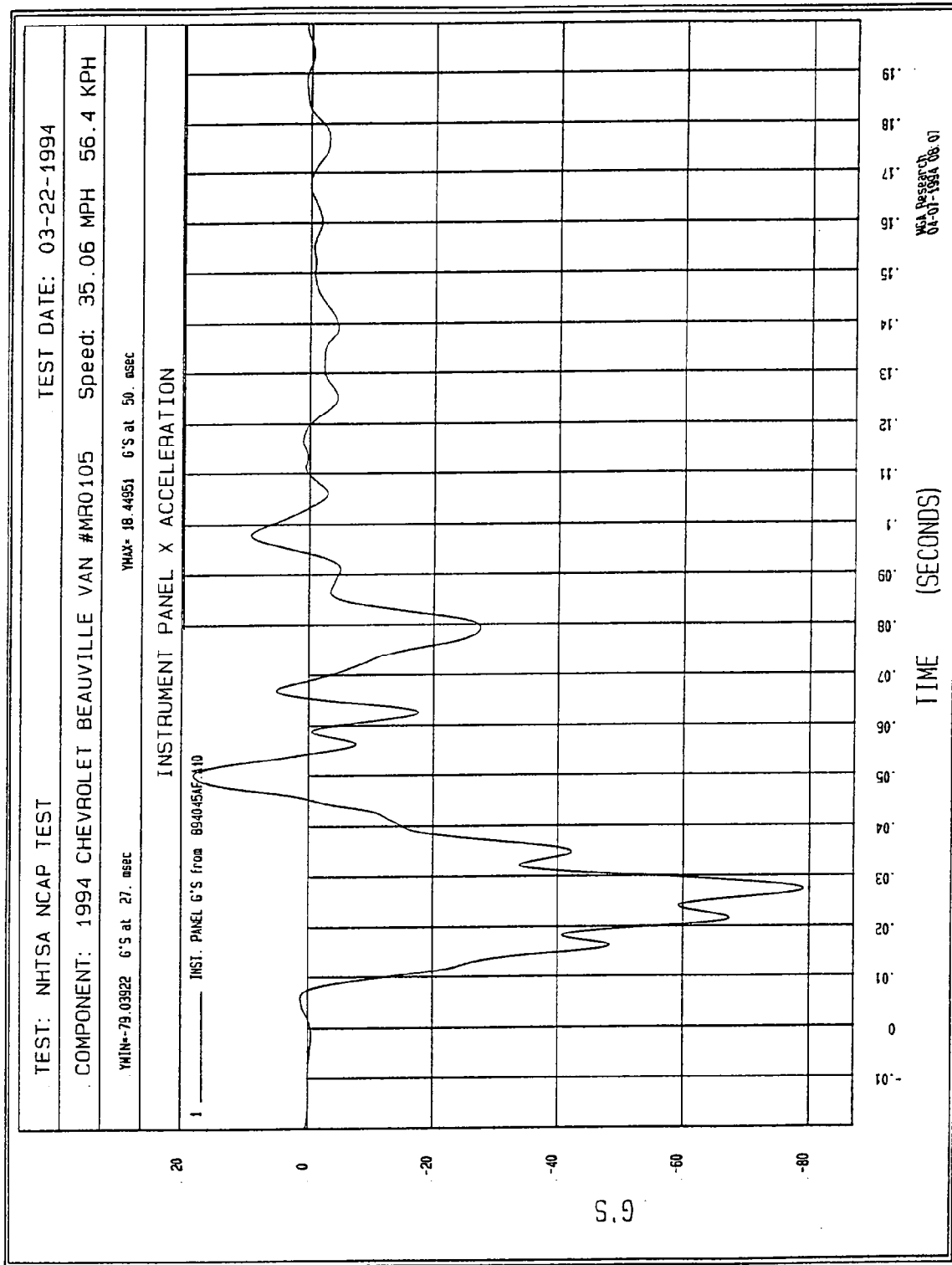


Figure B-19 - Instrument Panel X Acceleration vs. Time

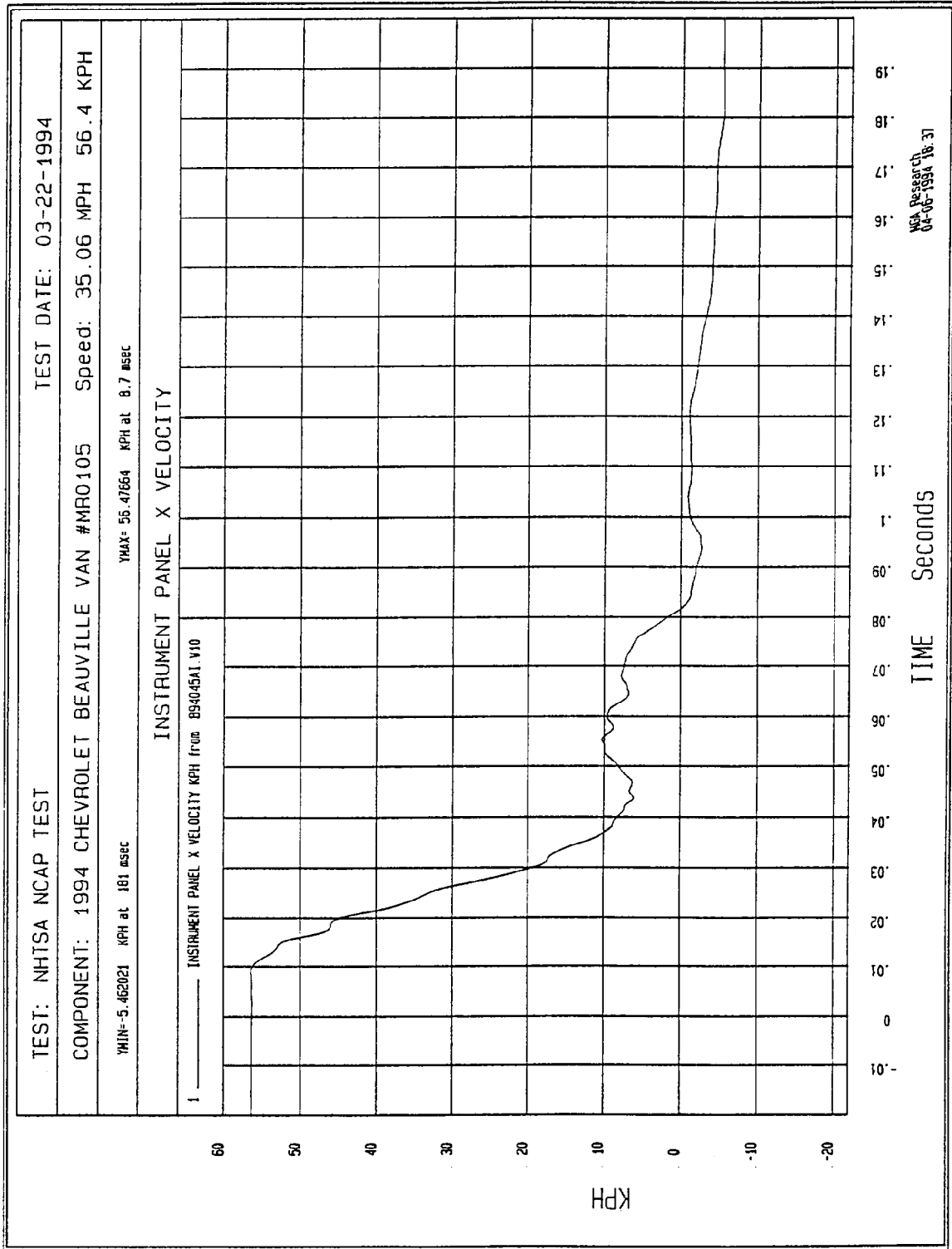


Figure B-20 - Instrument Panel X Velocity vs. Time

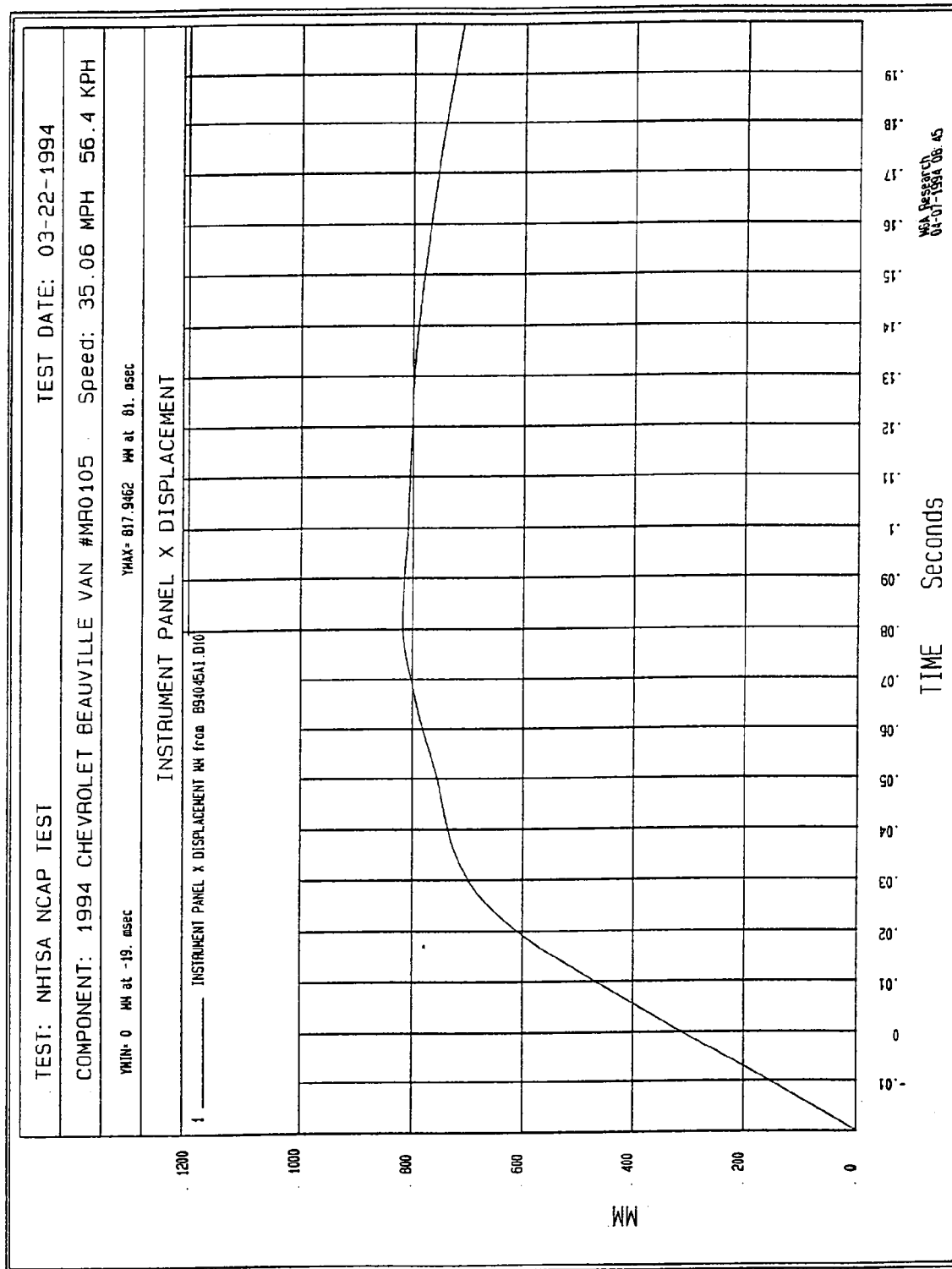


Figure B-21 - Instrument Panel X Displacement vs. Time

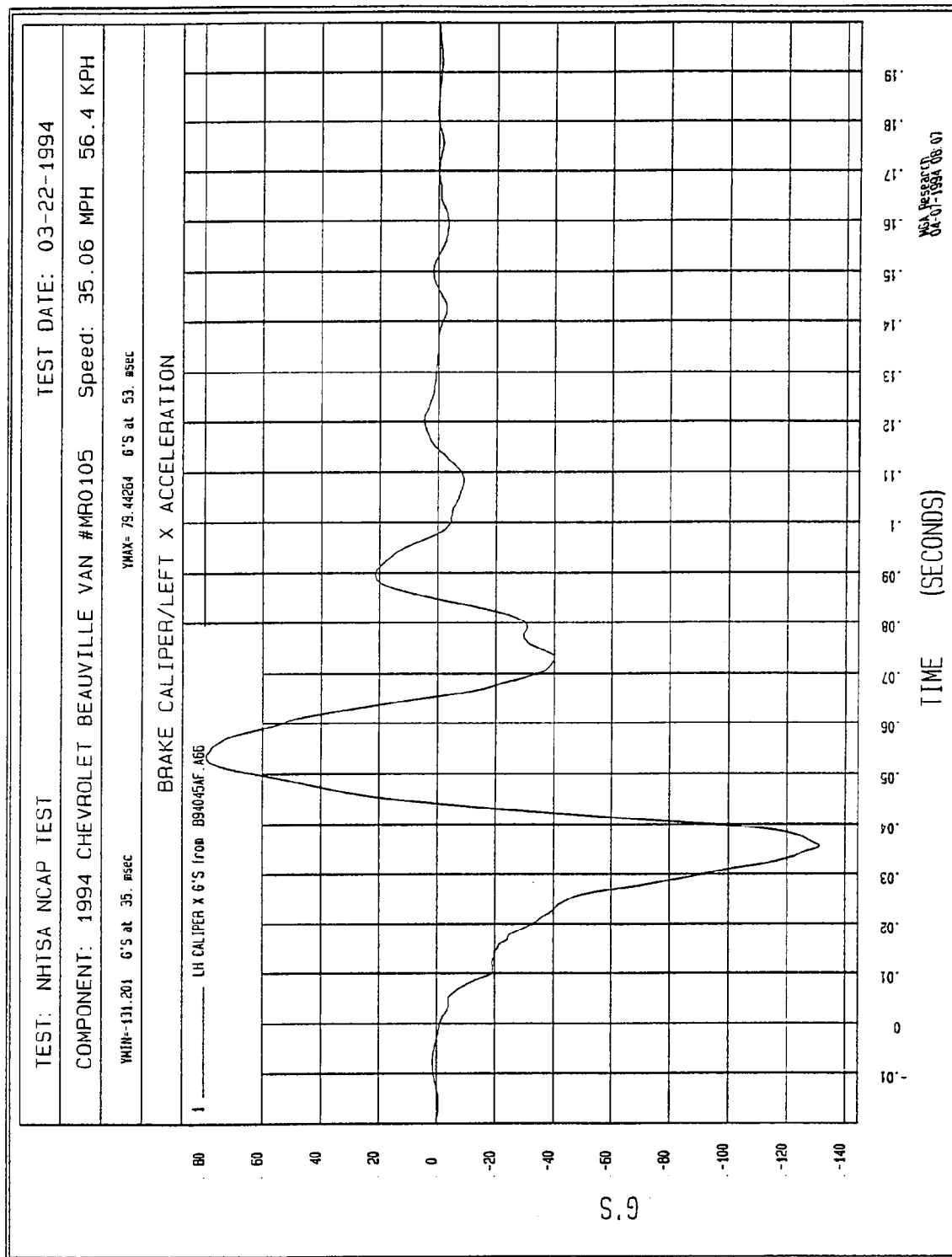


Figure B-22 ~ Left Brake Caliper X Acceleration vs. Time

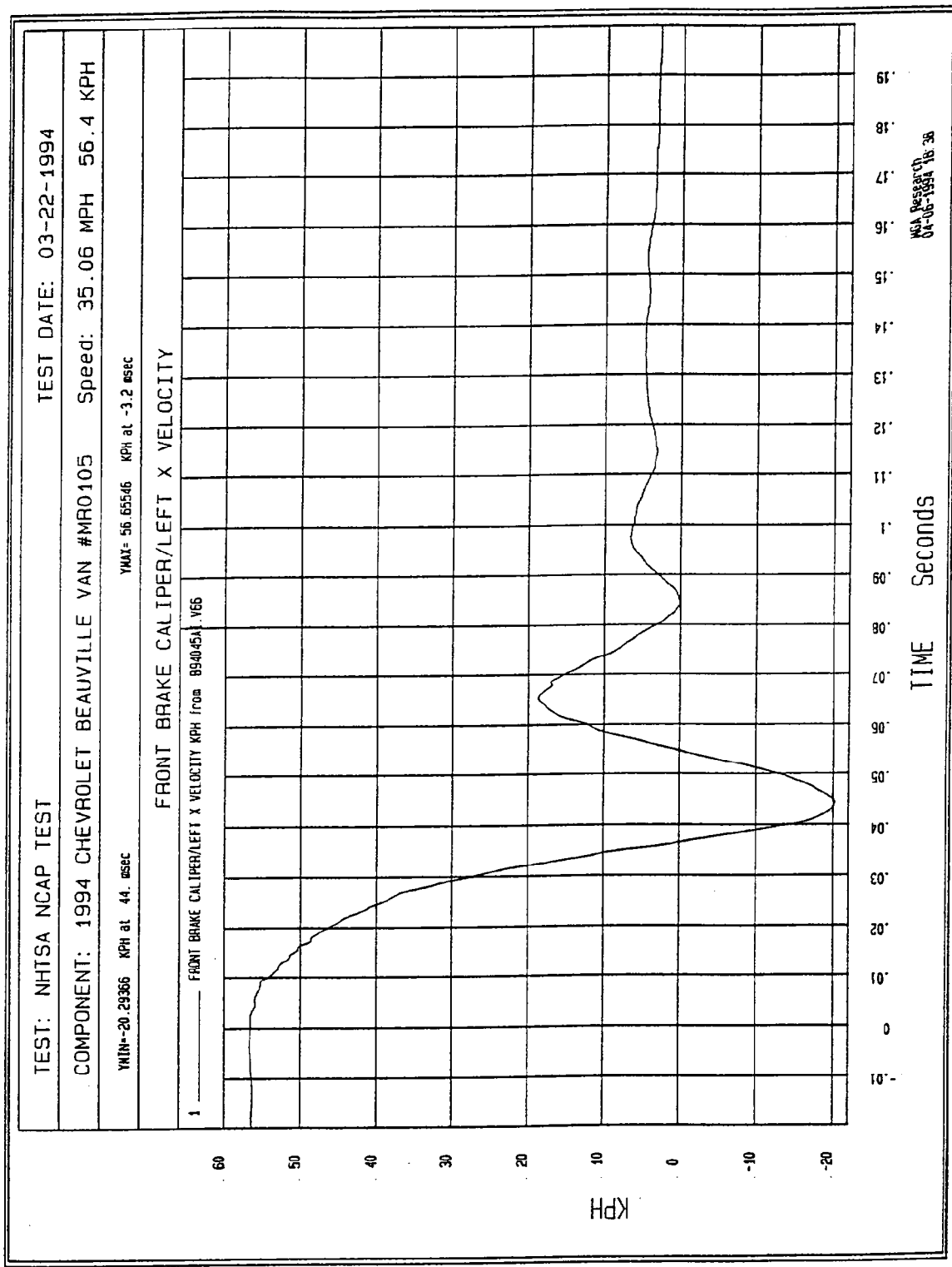


Figure B-23 - Left Brake Caliper X Velocity vs. Time

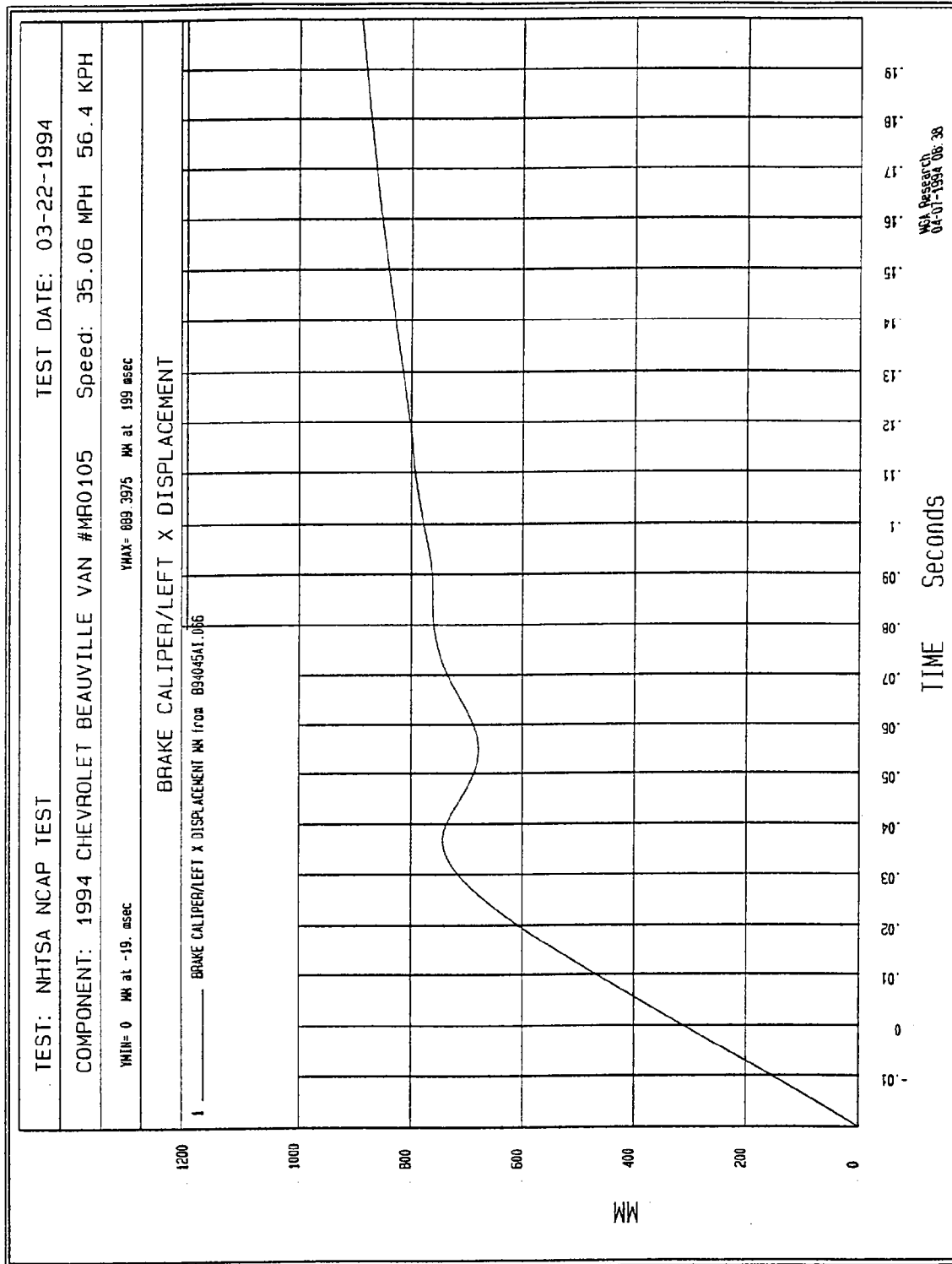


Figure B-24 - Left Brake Caliper X Displacement vs. Time

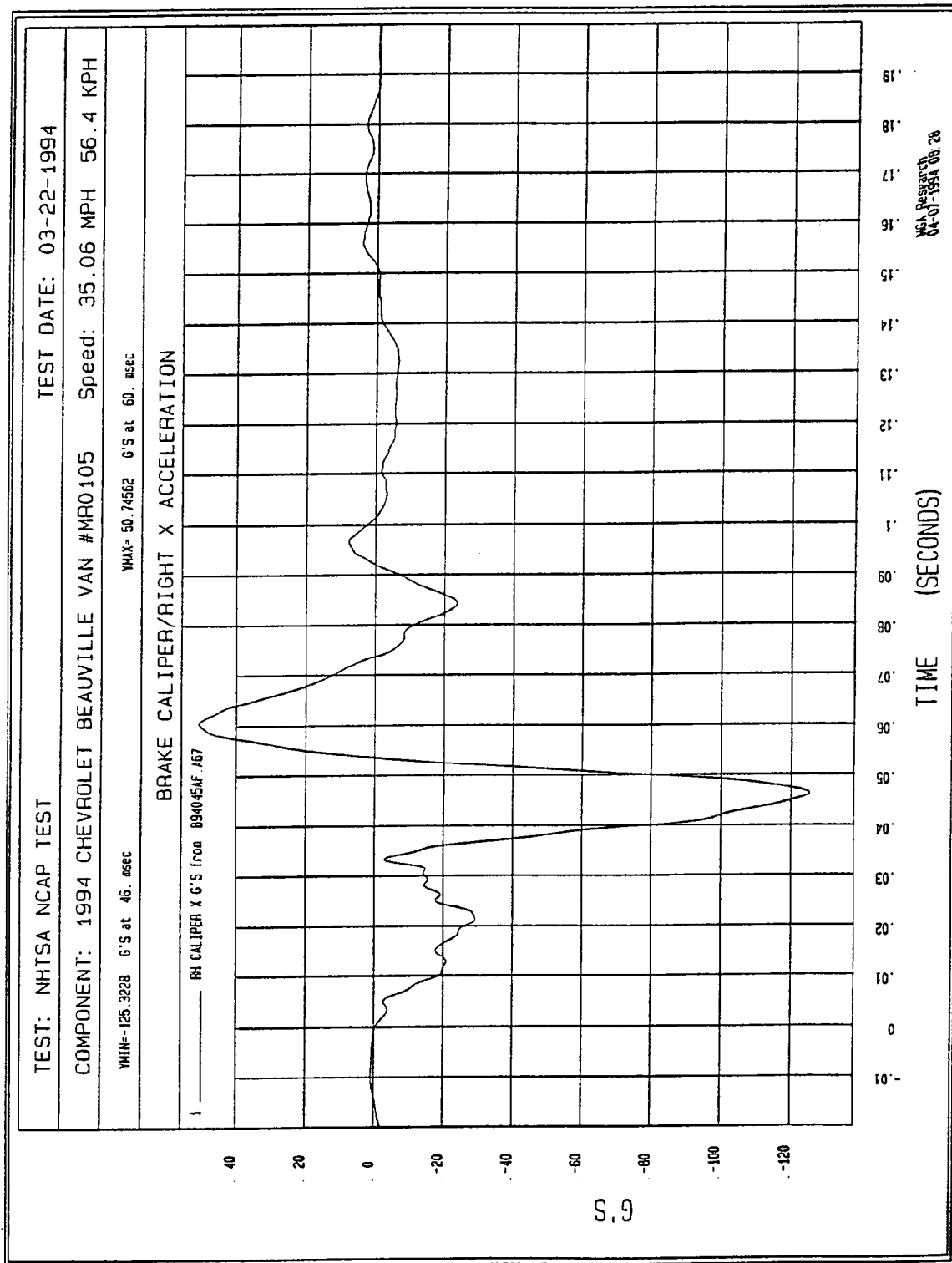


Figure B-25 - Right Brake Caliper X Acceleration vs. Time

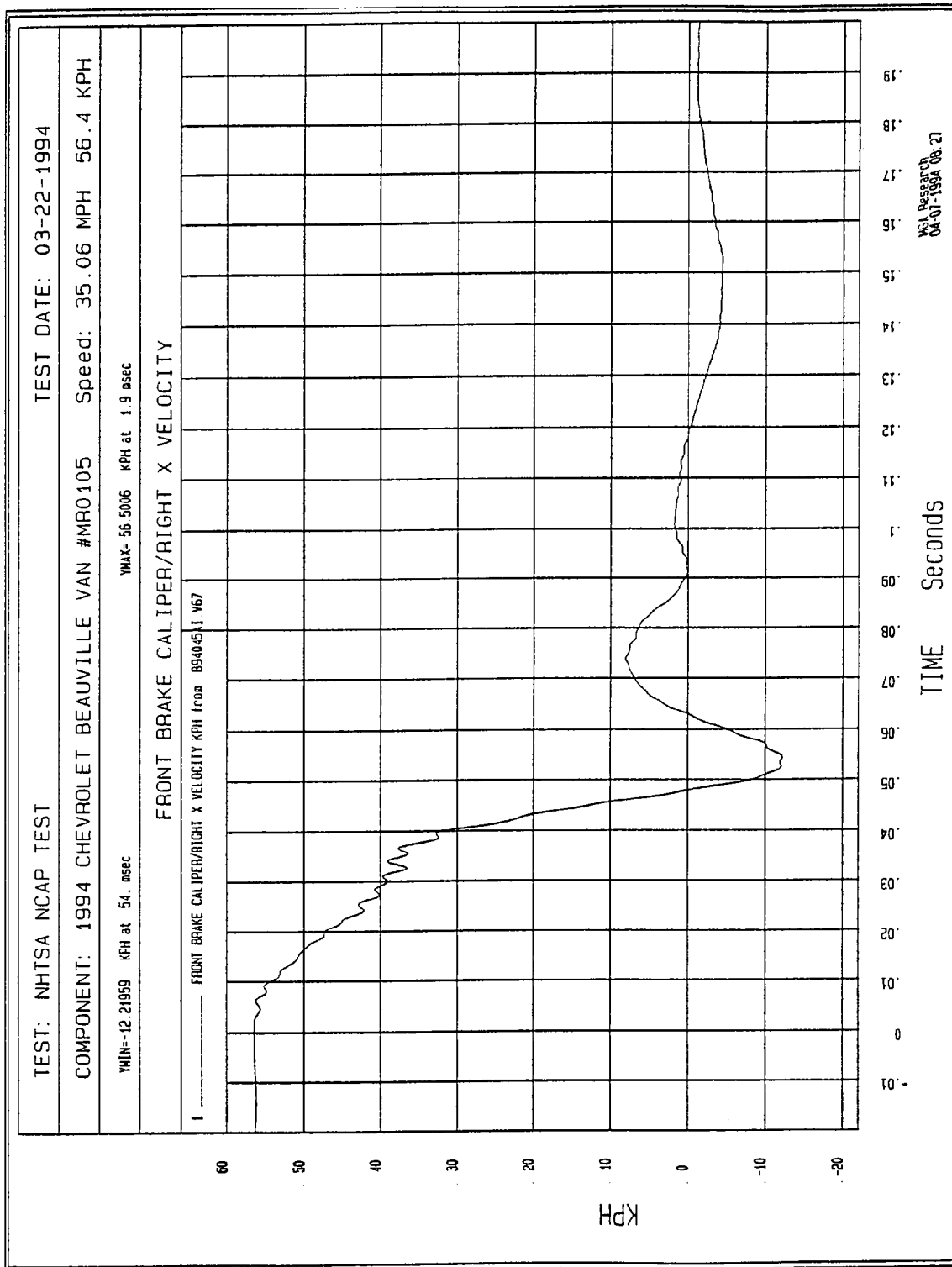


Figure B-26 - Right Brake Caliper X Velocity vs. Time

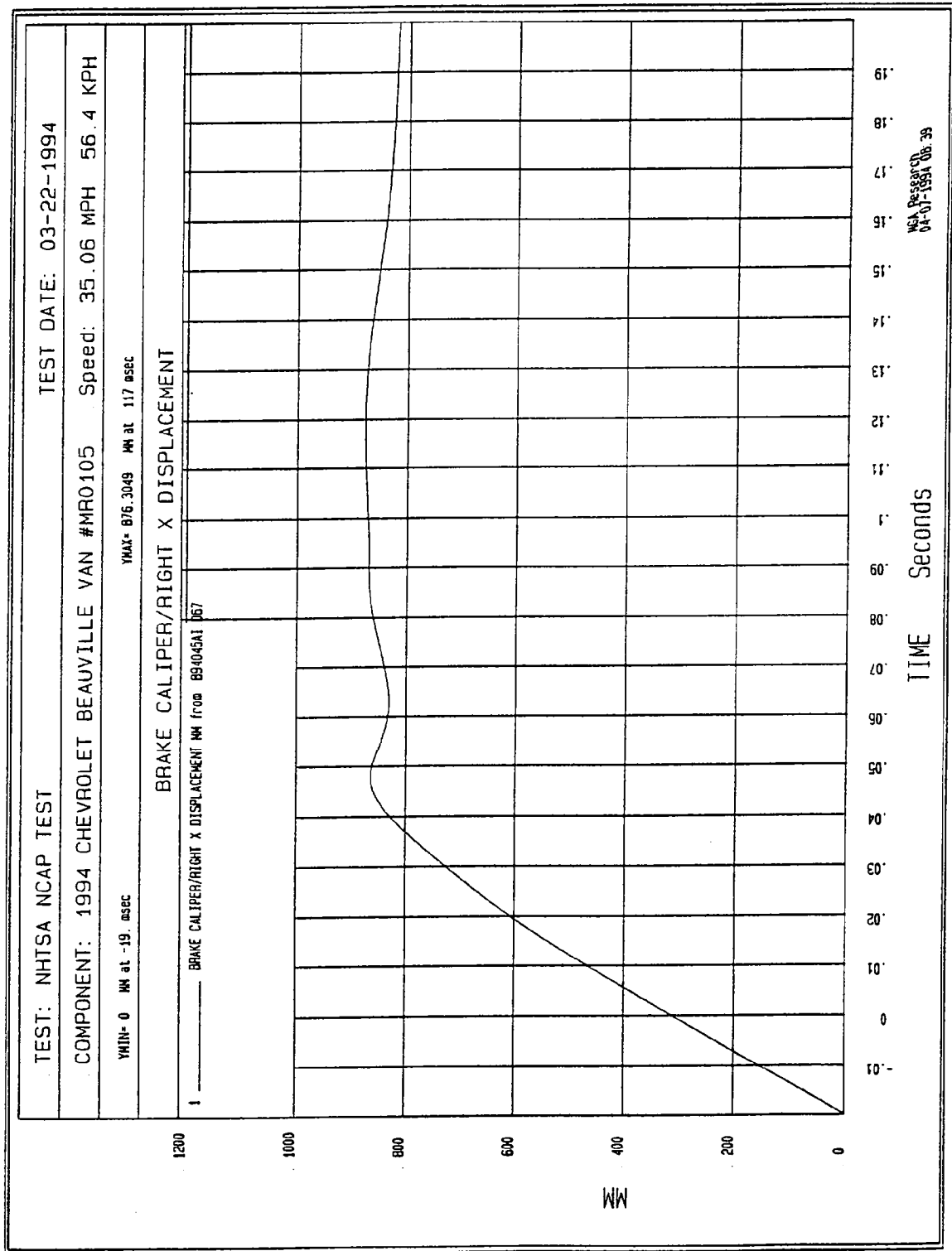


Figure B-27 - Right Brake Caliper X Displacement vs. Time

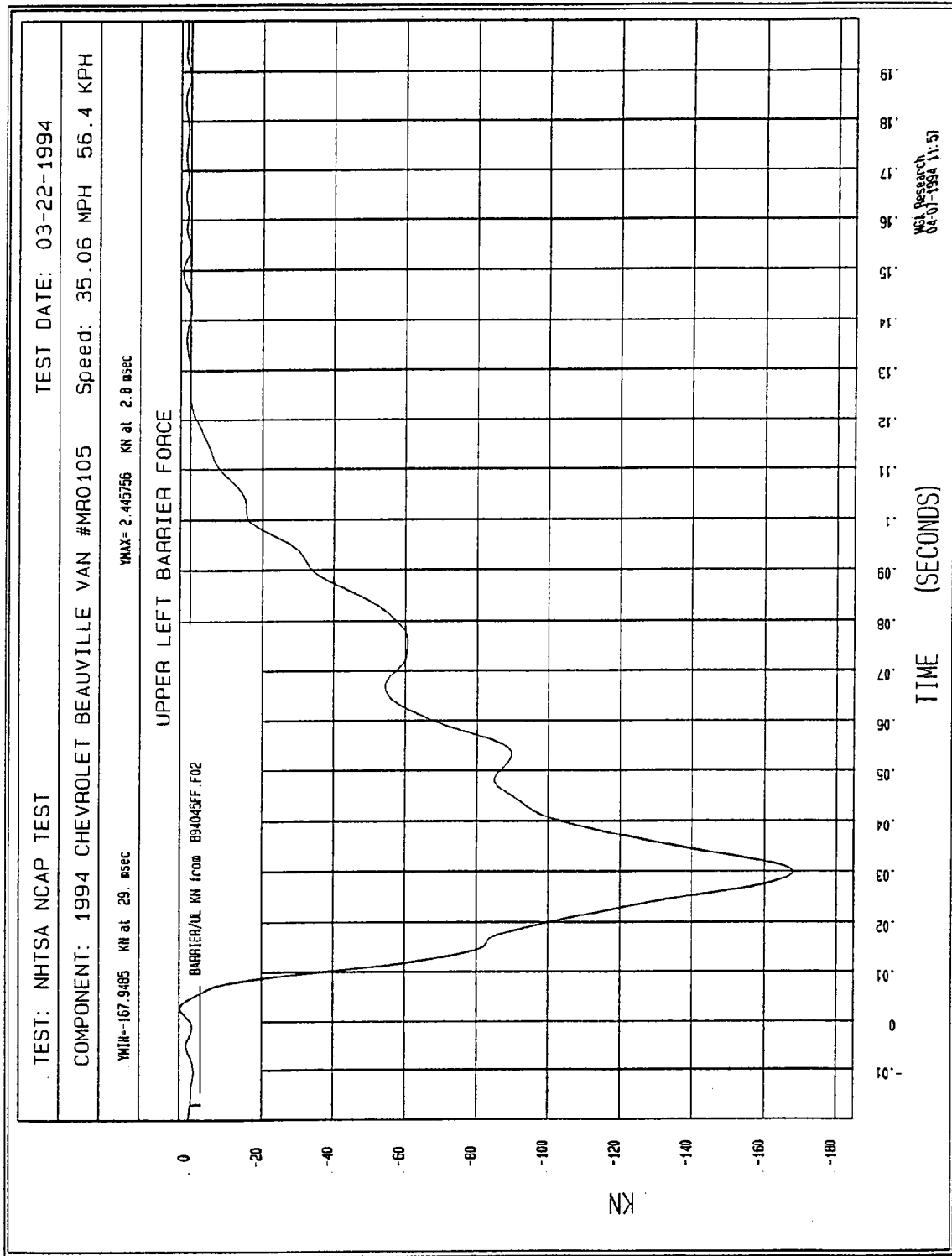


Figure B-28 - Upper Left Barrier Force vs. Time

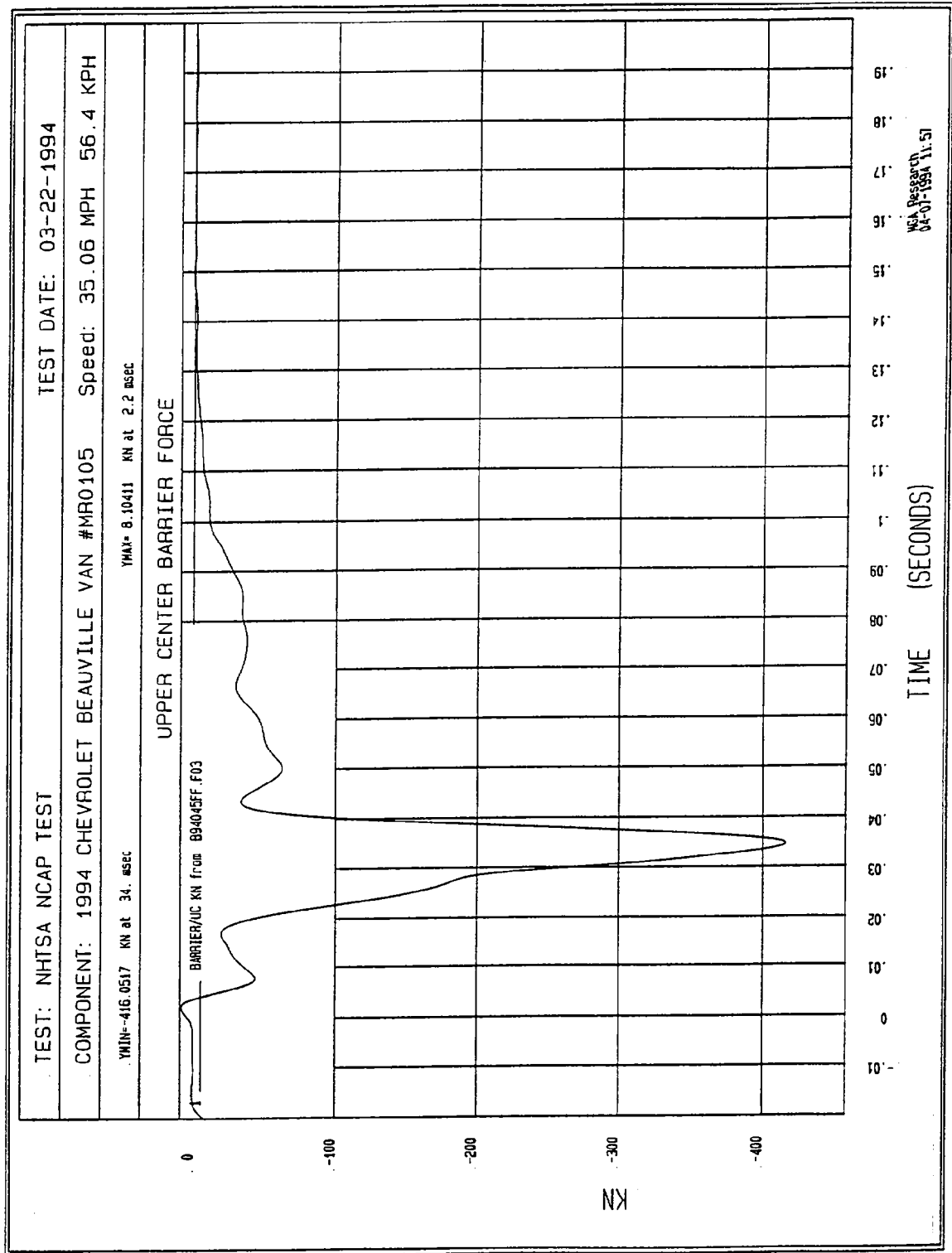


Figure B-29 - Upper Center Barrier Force vs. Time

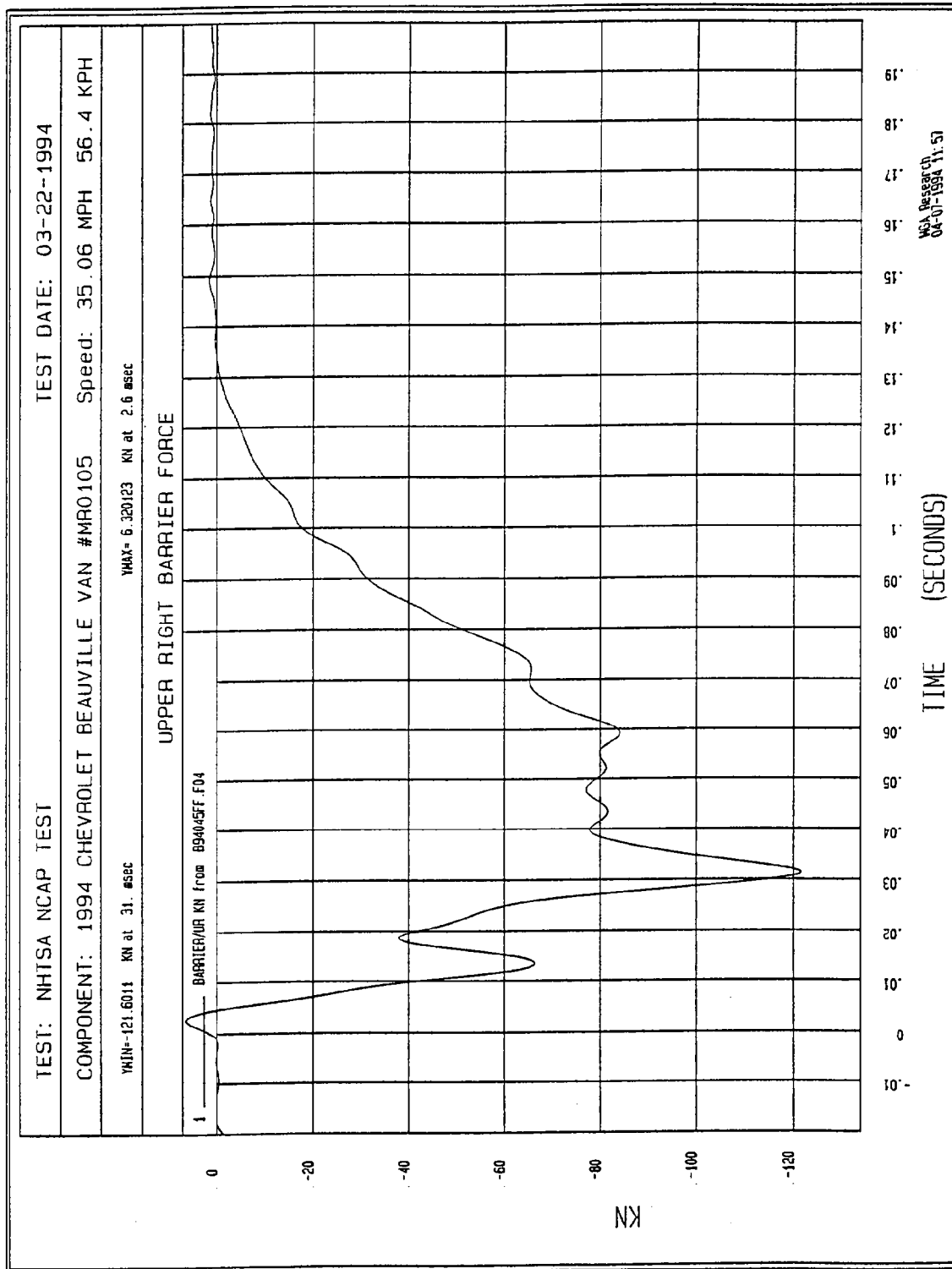


Figure B-30 - Upper Right Barrier Force vs. Time

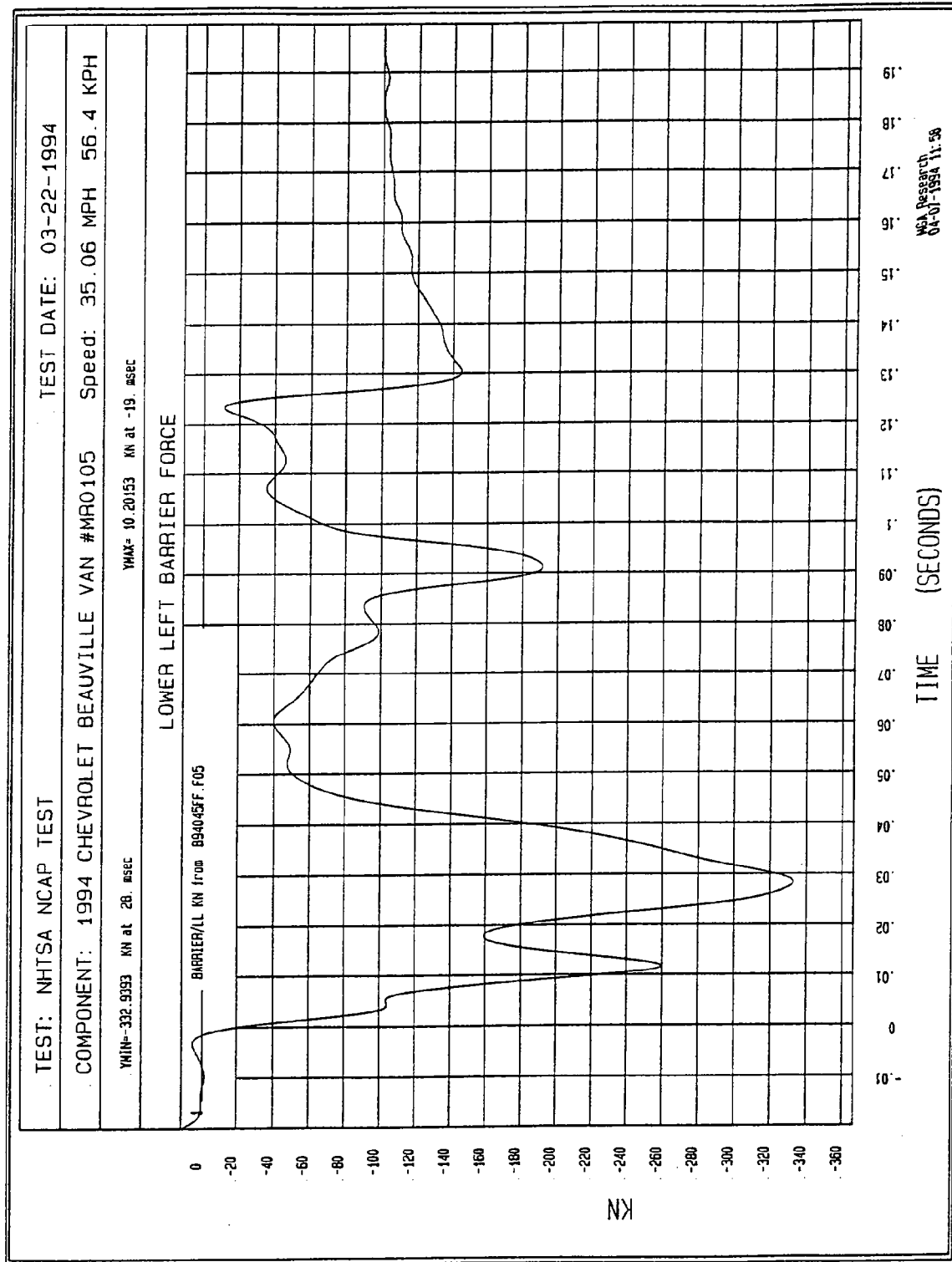
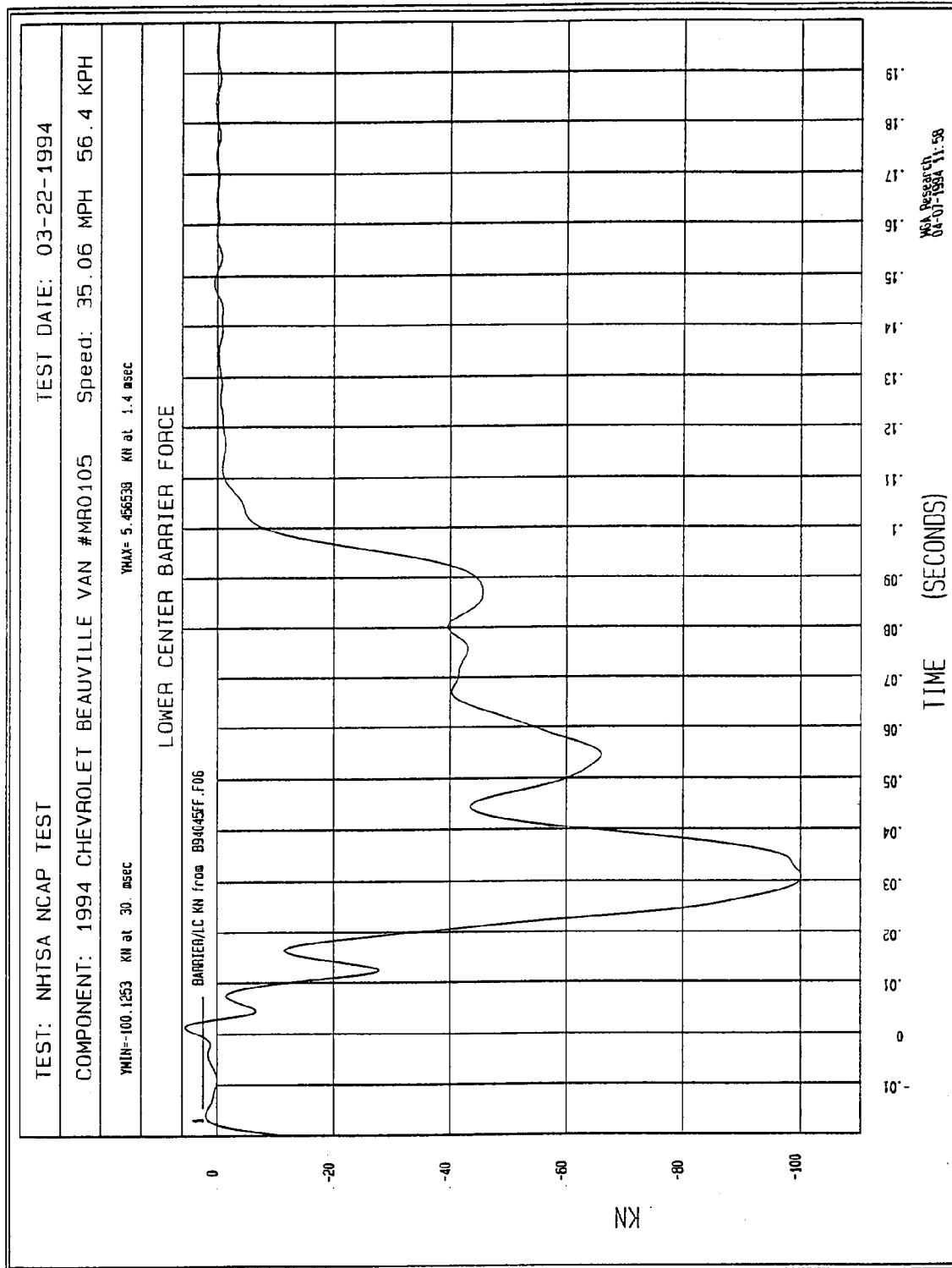


Figure B-31 - Lower Left Barrier Force vs. Time



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

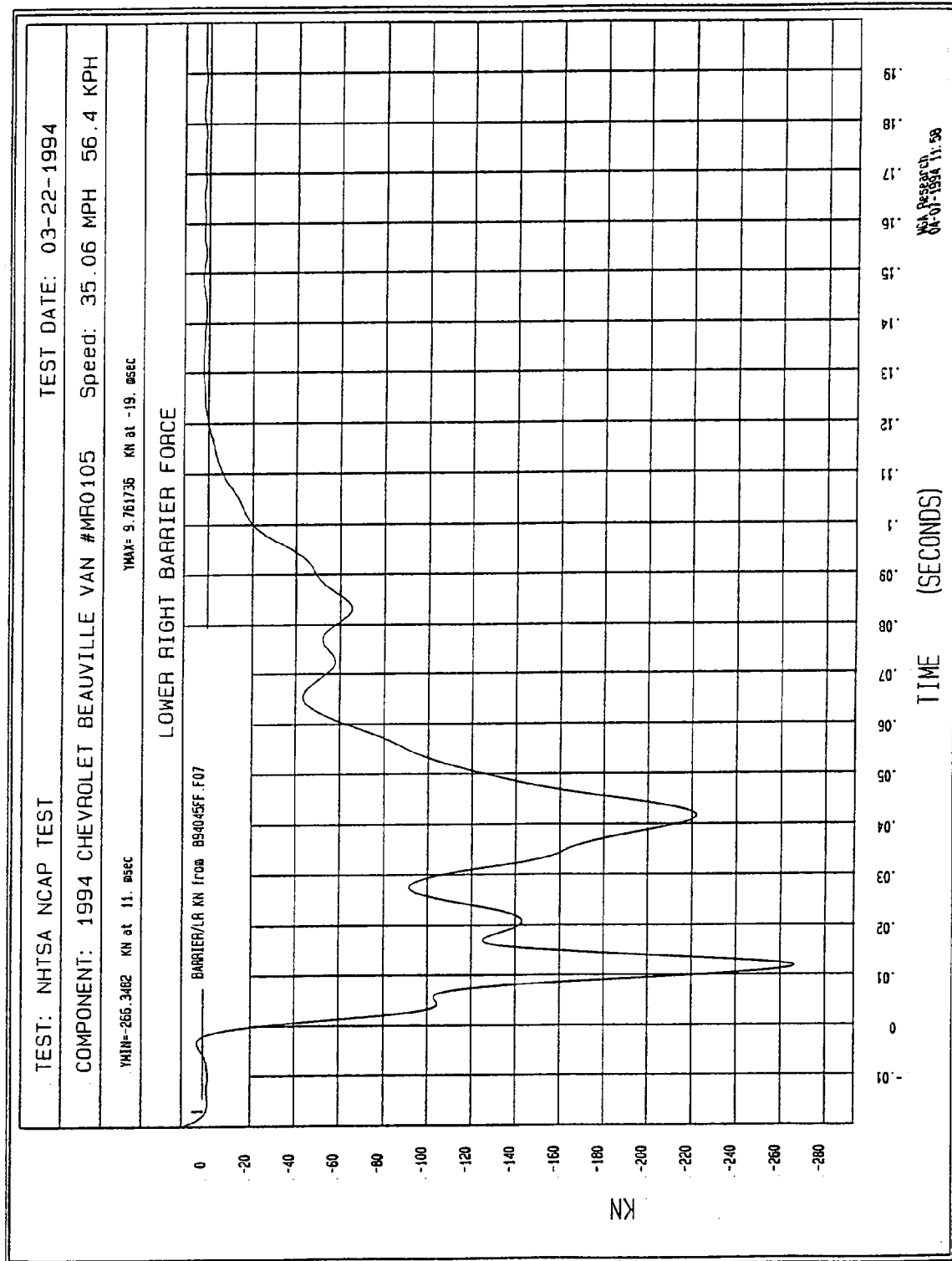


Figure B-33 - Lower Right Barrier Force vs. Time

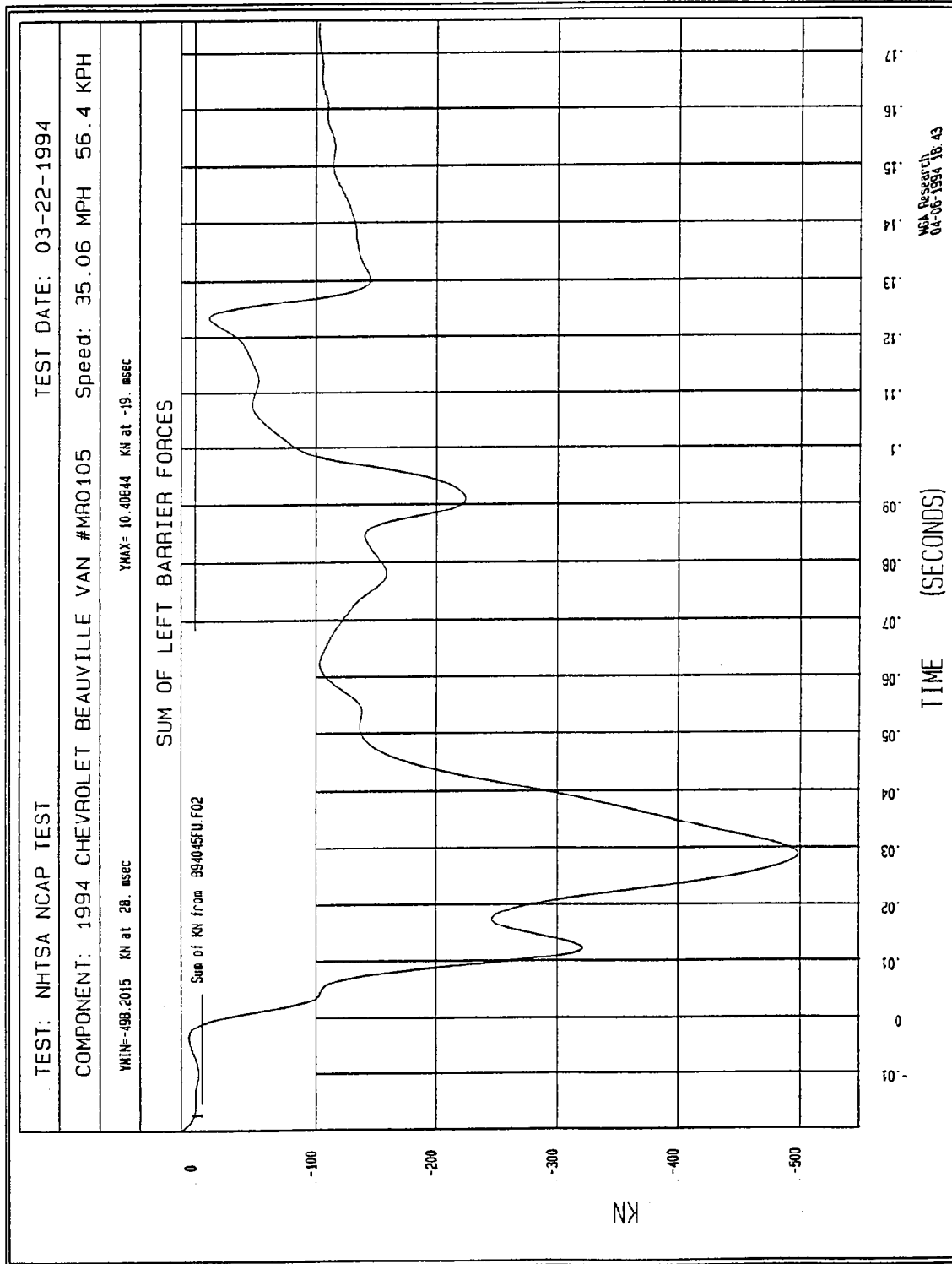


Figure B-34 - Sum of Left Barrier Forces vs. Time

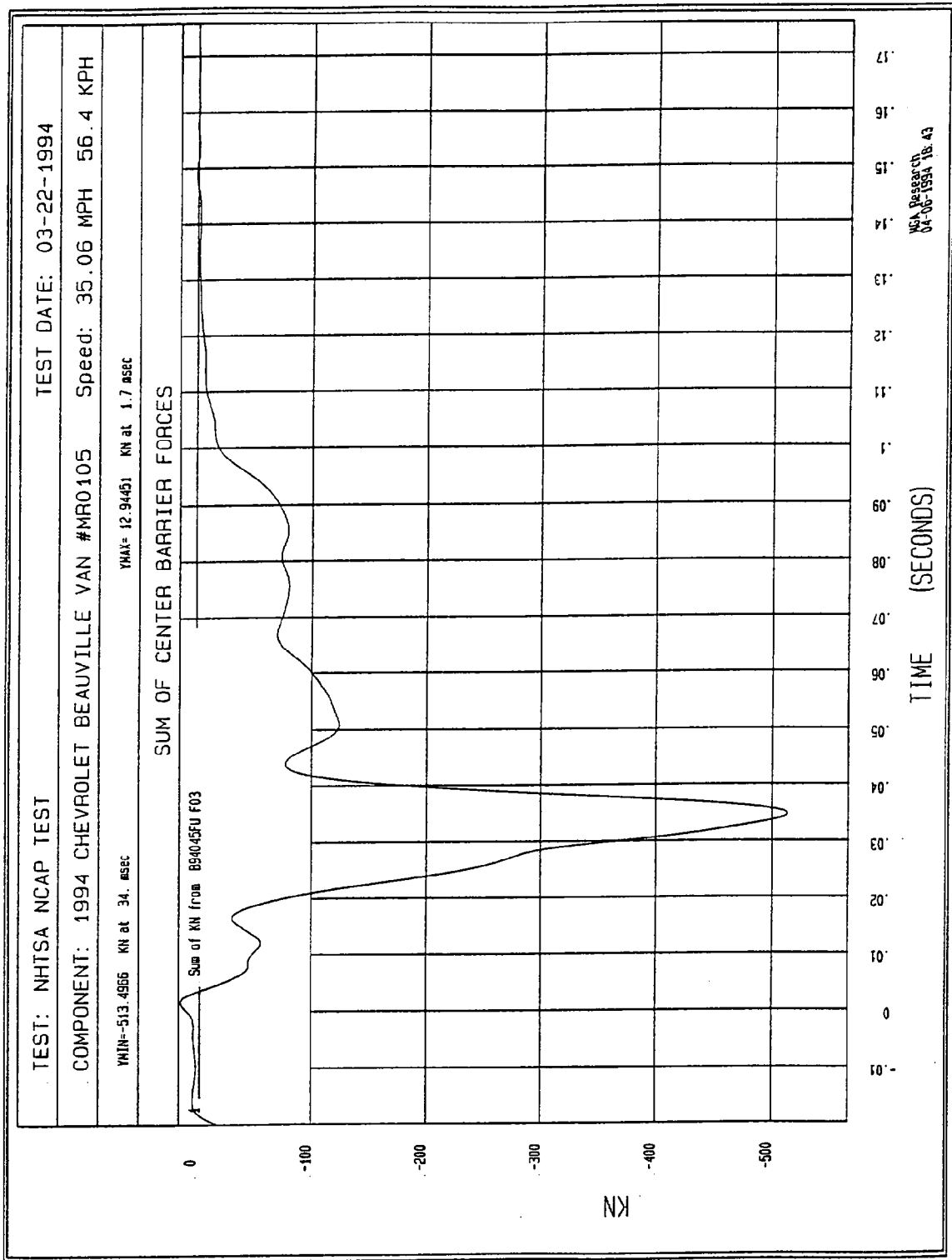


Figure B-35 - Sum of Center Barrier Forces vs. Time

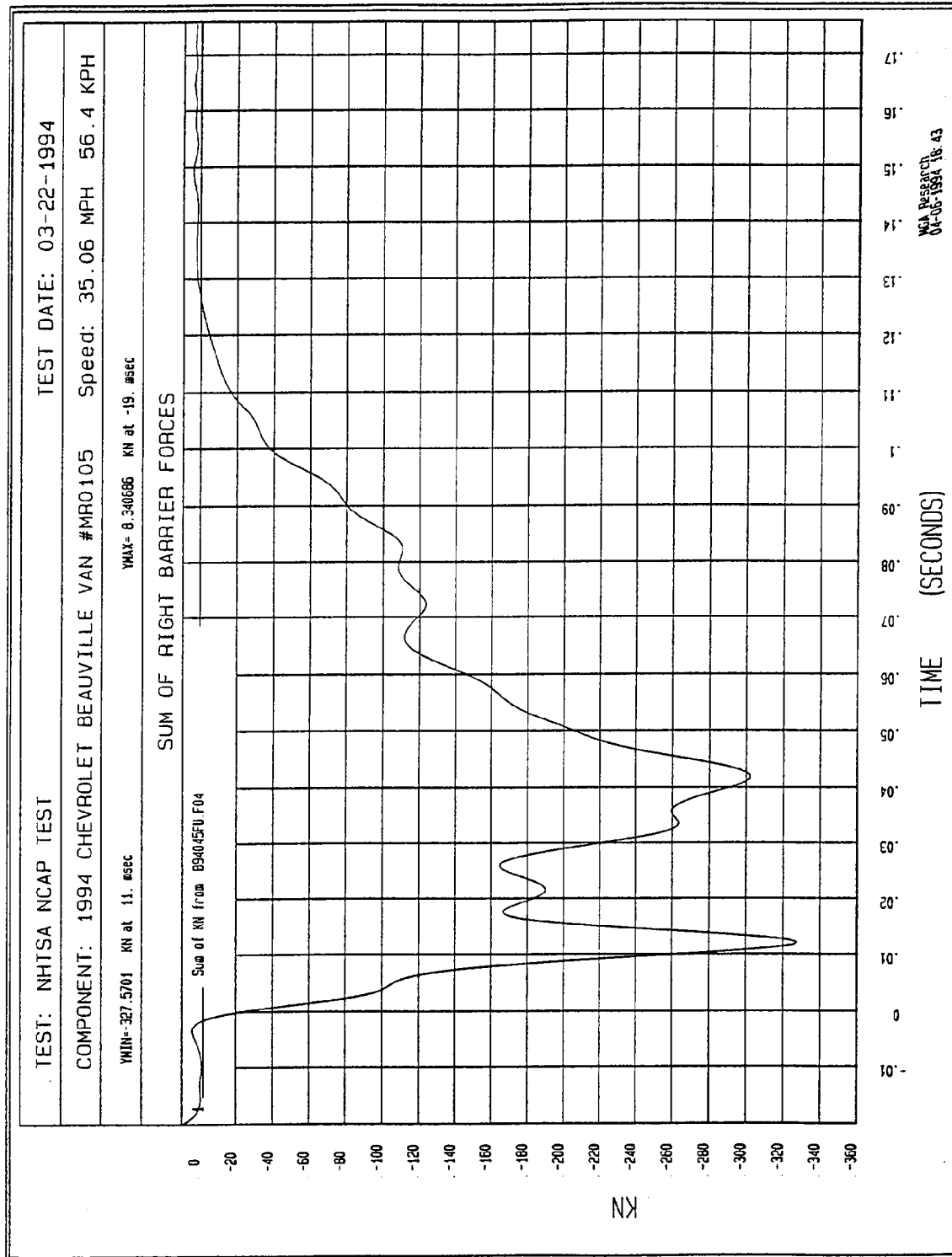


Figure B-36 - Sum of Right Barrier Forces vs. Time

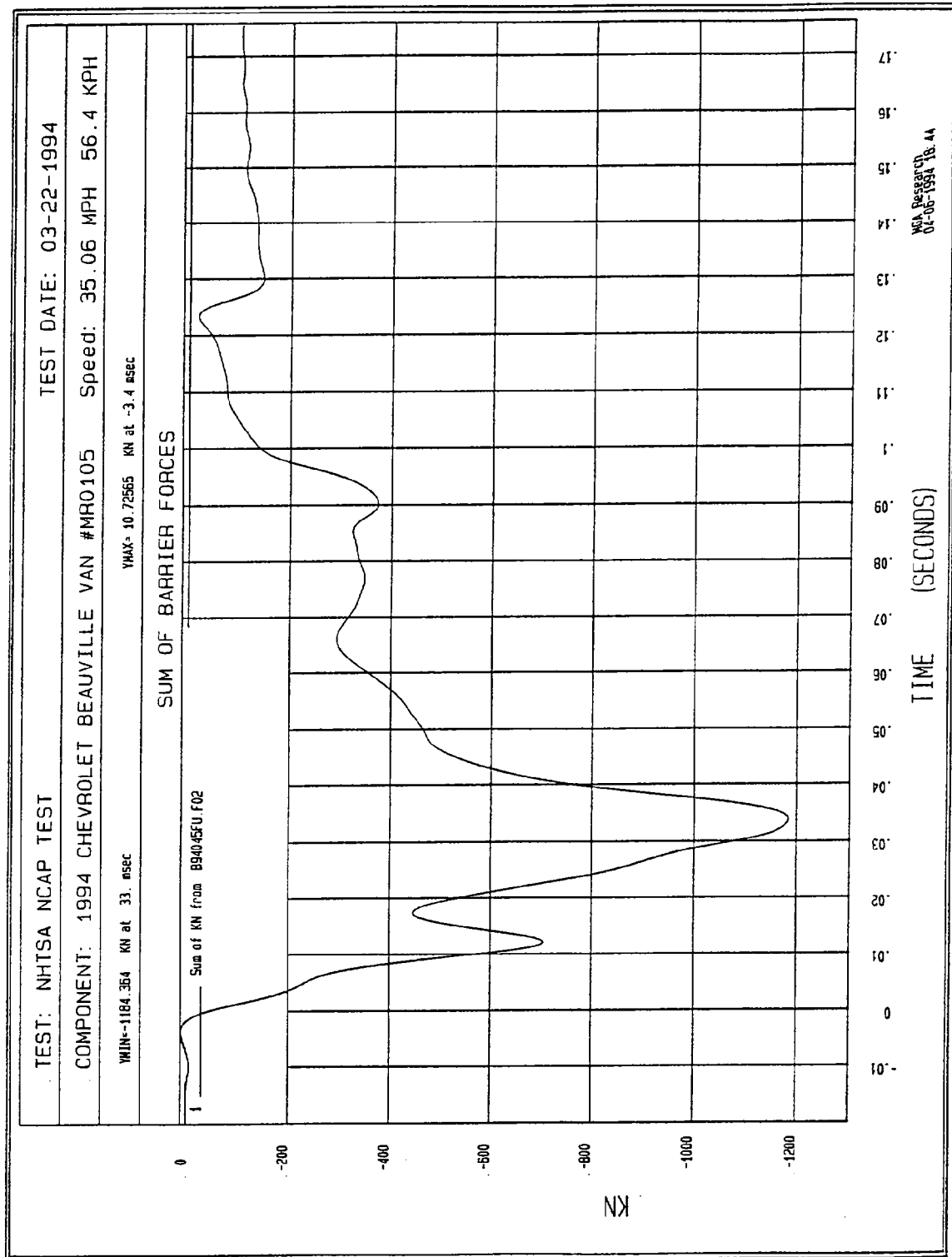


Figure B-37 - Sum of Barrier Forces vs. Time

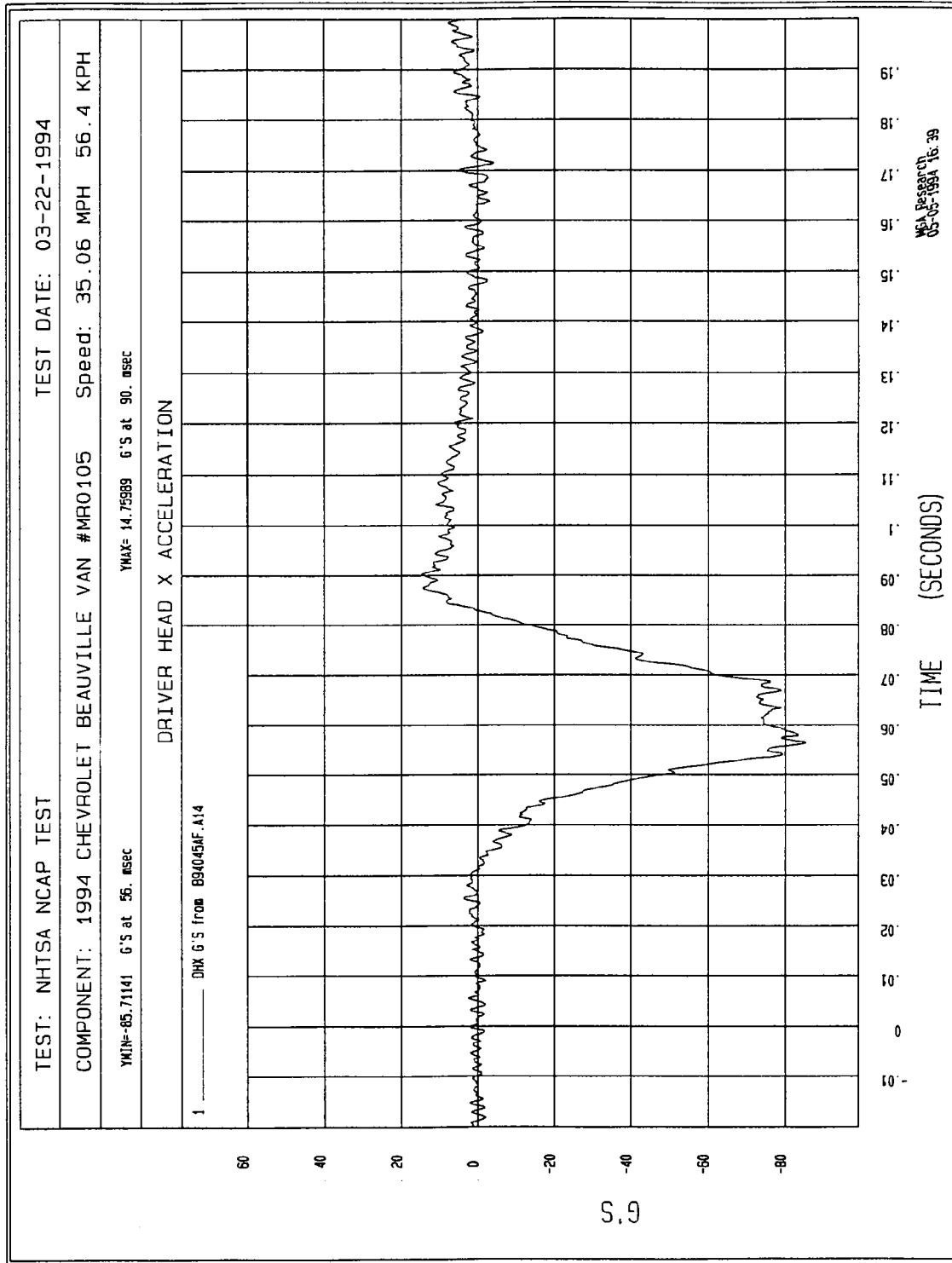


Figure B-38 - Driver Head X Acceleration vs. Time

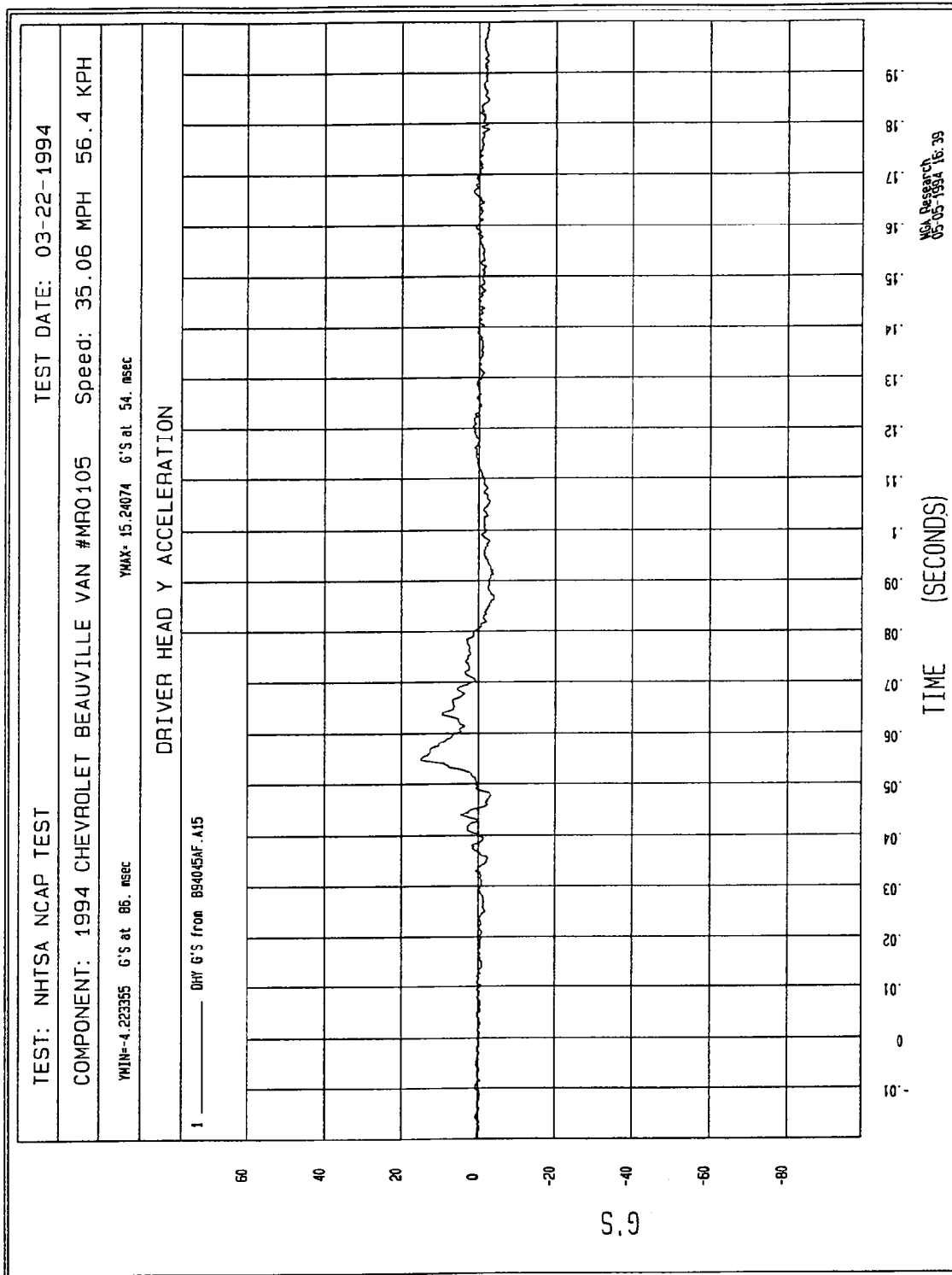


Figure B-39 - Driver Head Y Acceleration vs. Time

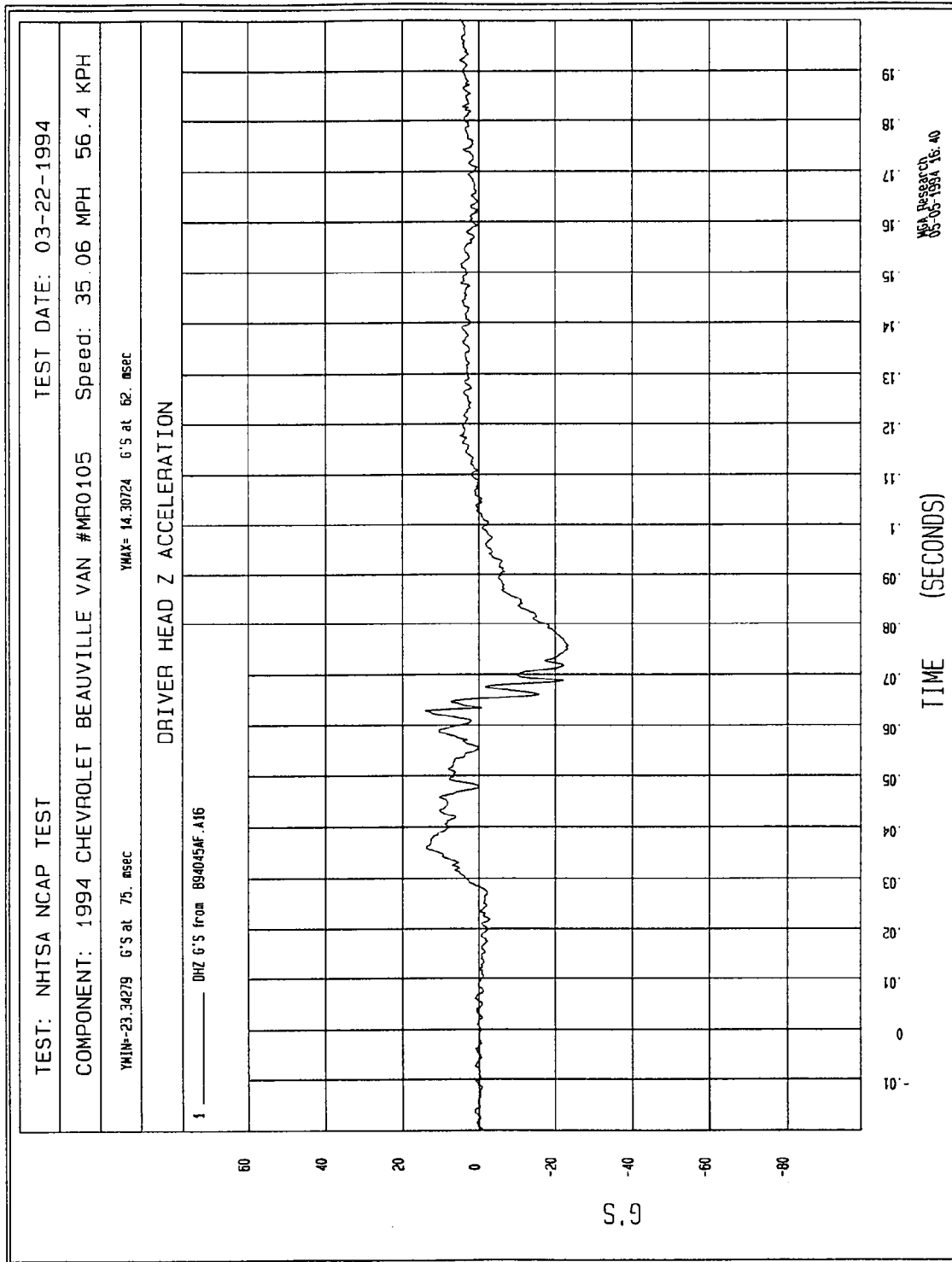


Figure B-40 - Driver Head Z Acceleration vs. Time

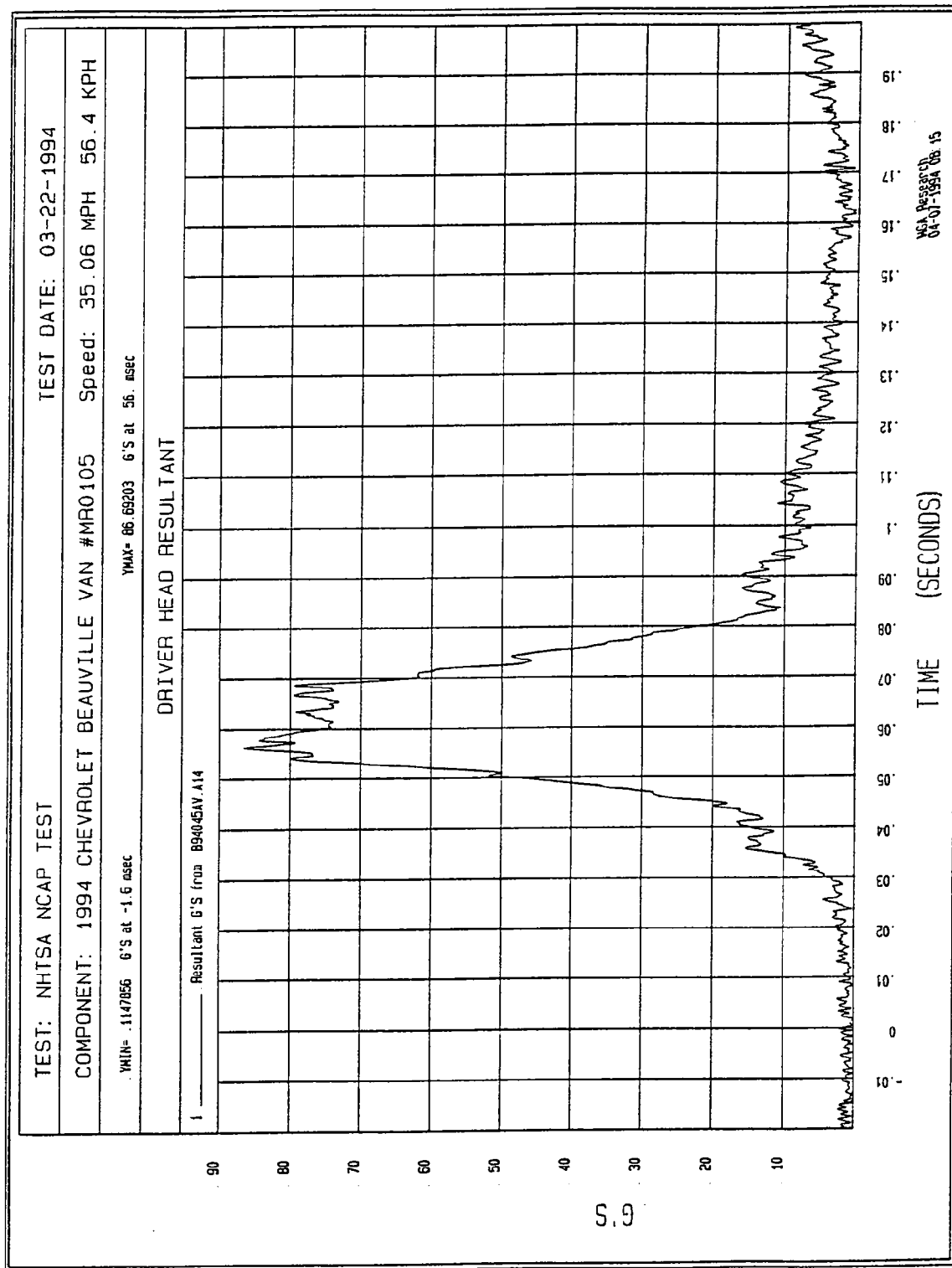


Figure B-41 - Driver Head Resultant Acceleration vs. Time

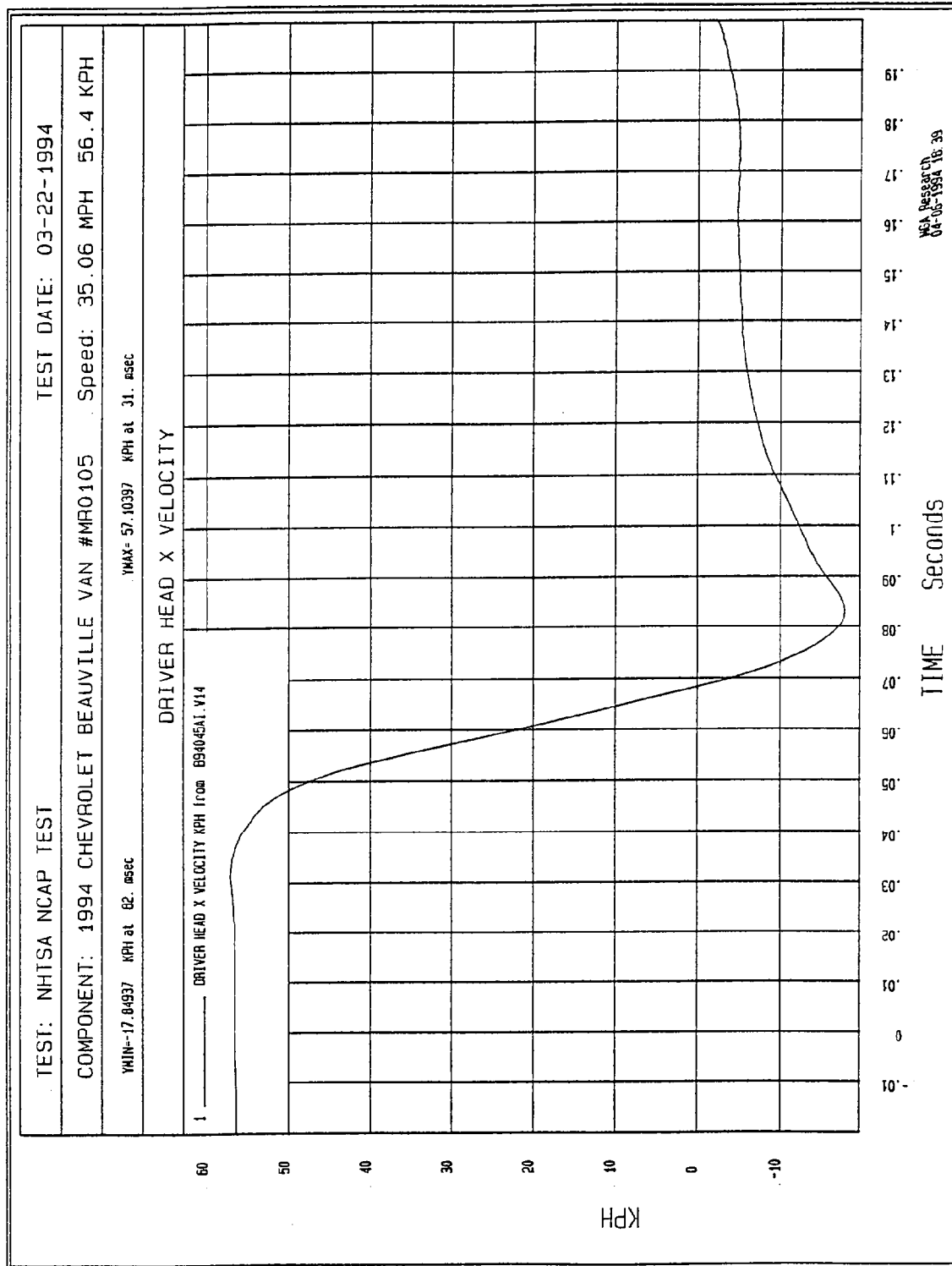


Figure B-42 - Driver Head X Velocity vs. Time

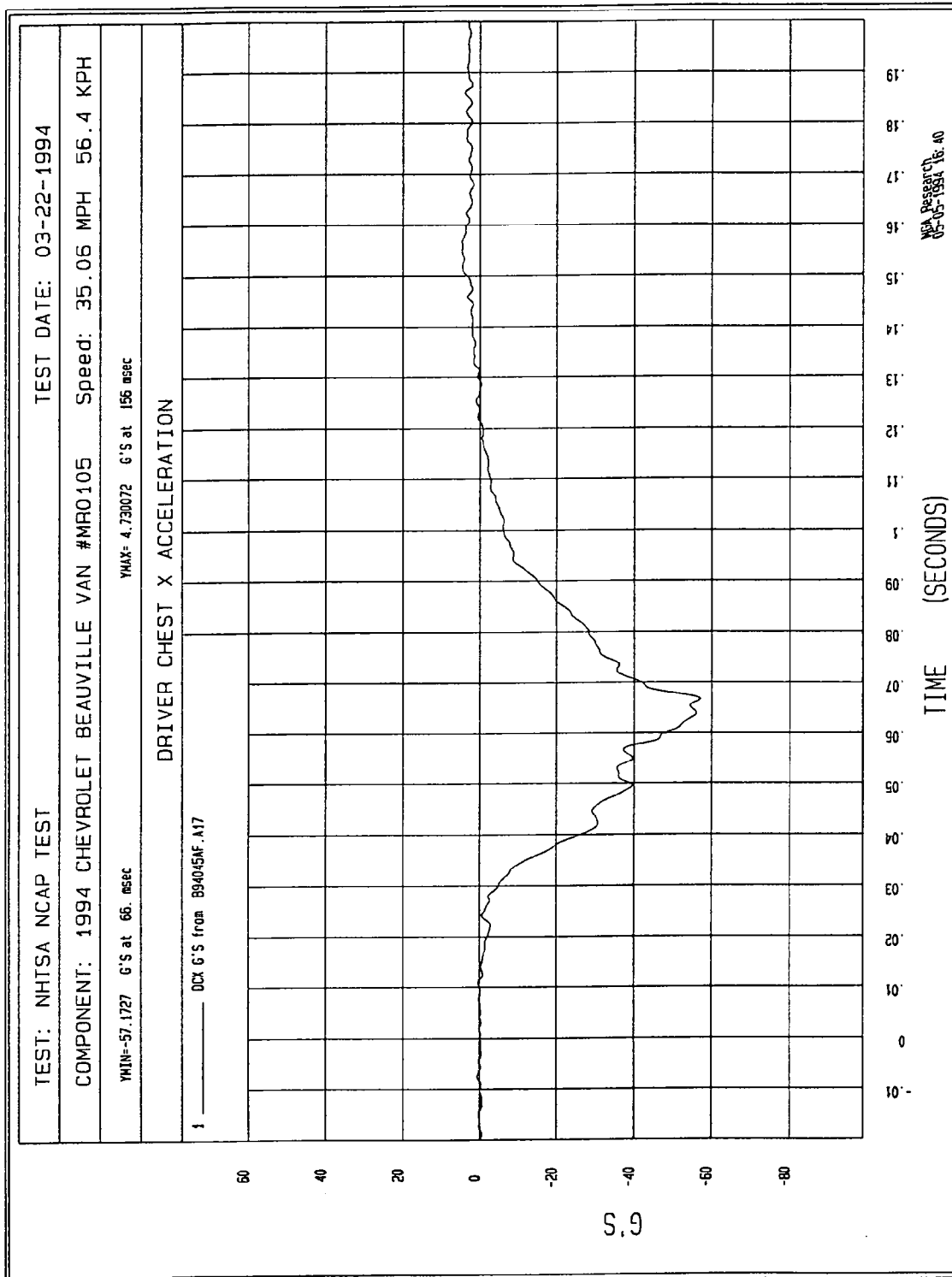


Figure B-43 - Driver Chest X Acceleration vs. Time

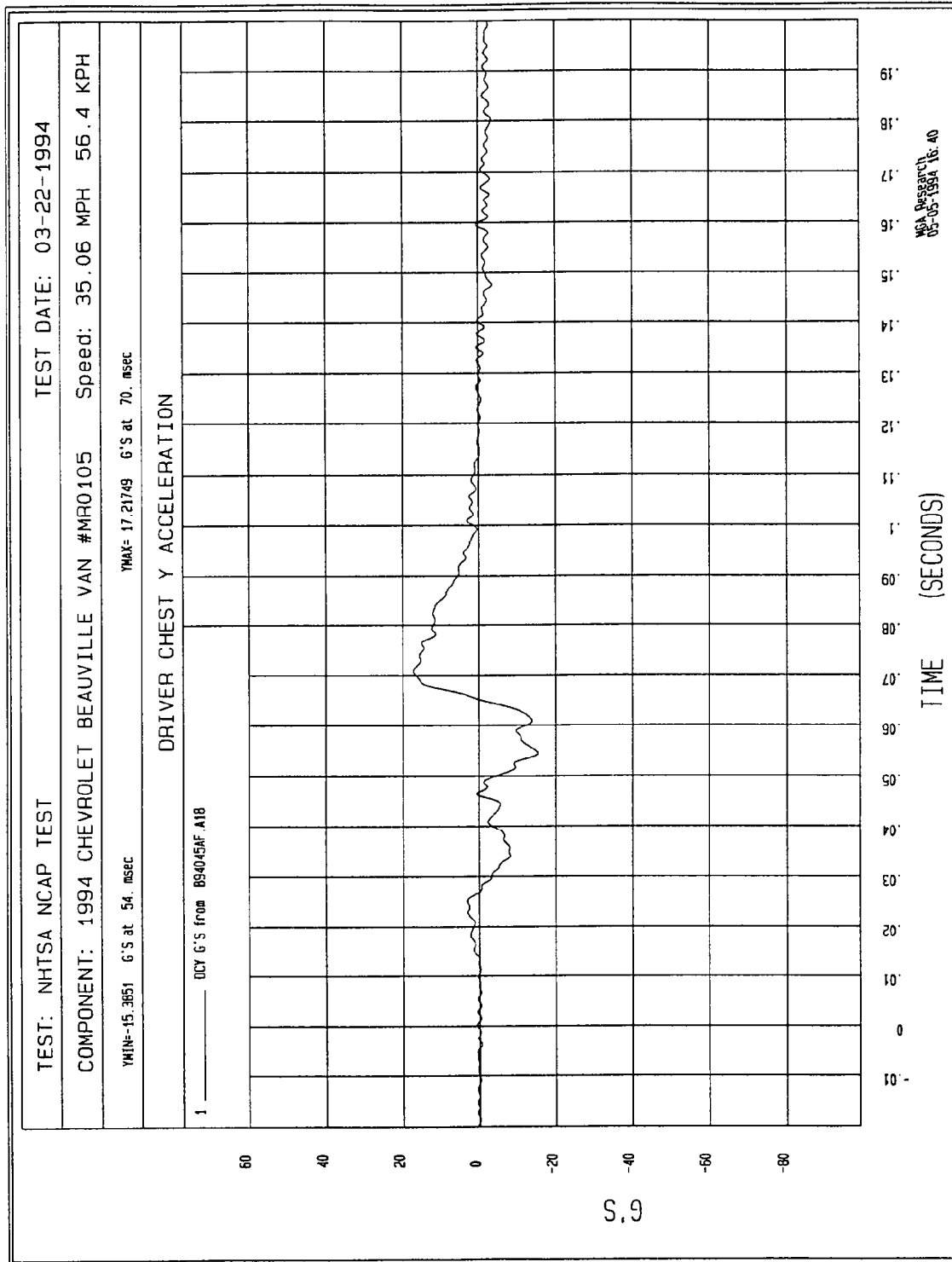


Figure B-44 - Driver Chest Y Acceleration vs. Time

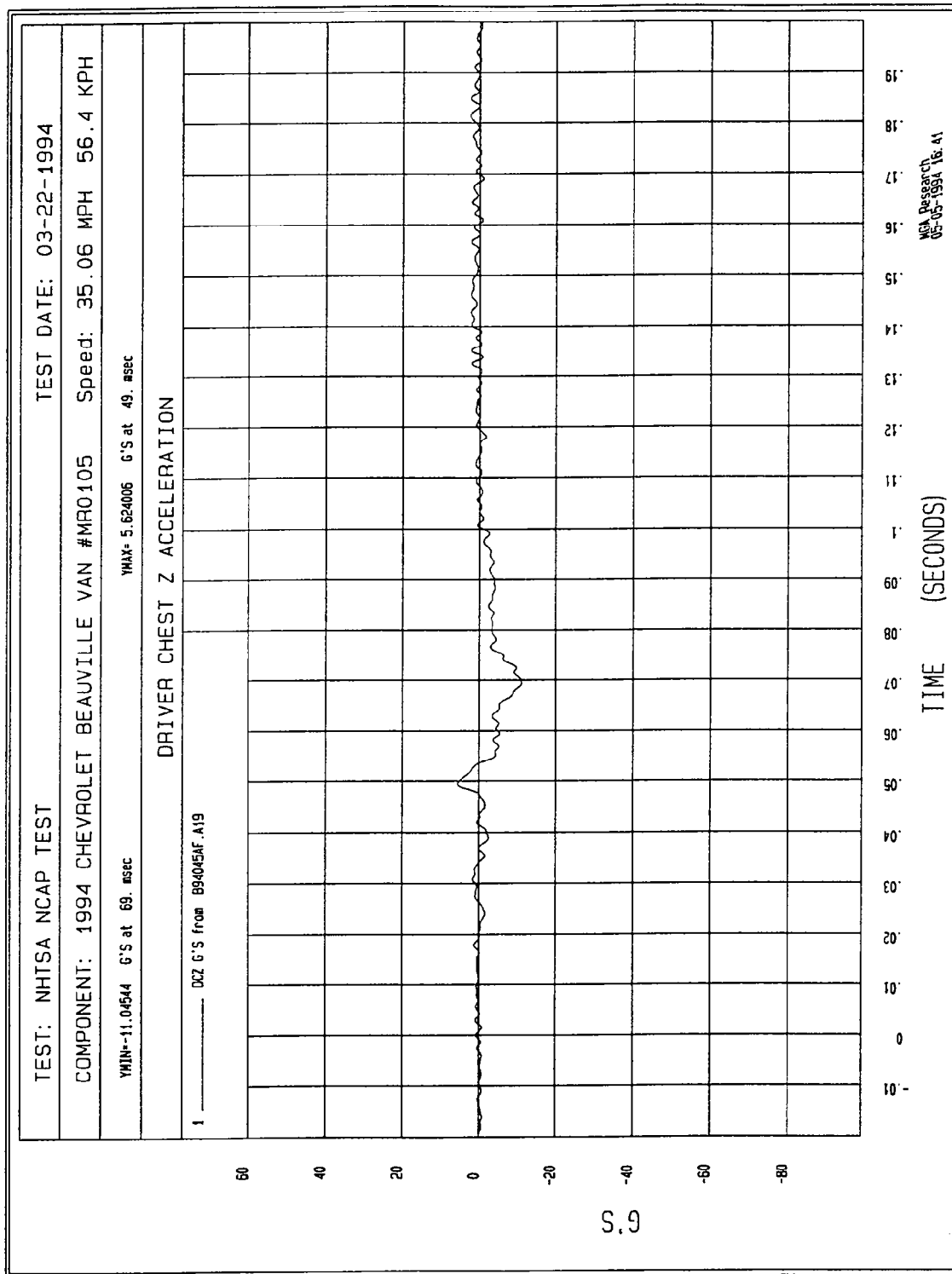


Figure B-45 - Driver Chest Z Acceleration vs. Time

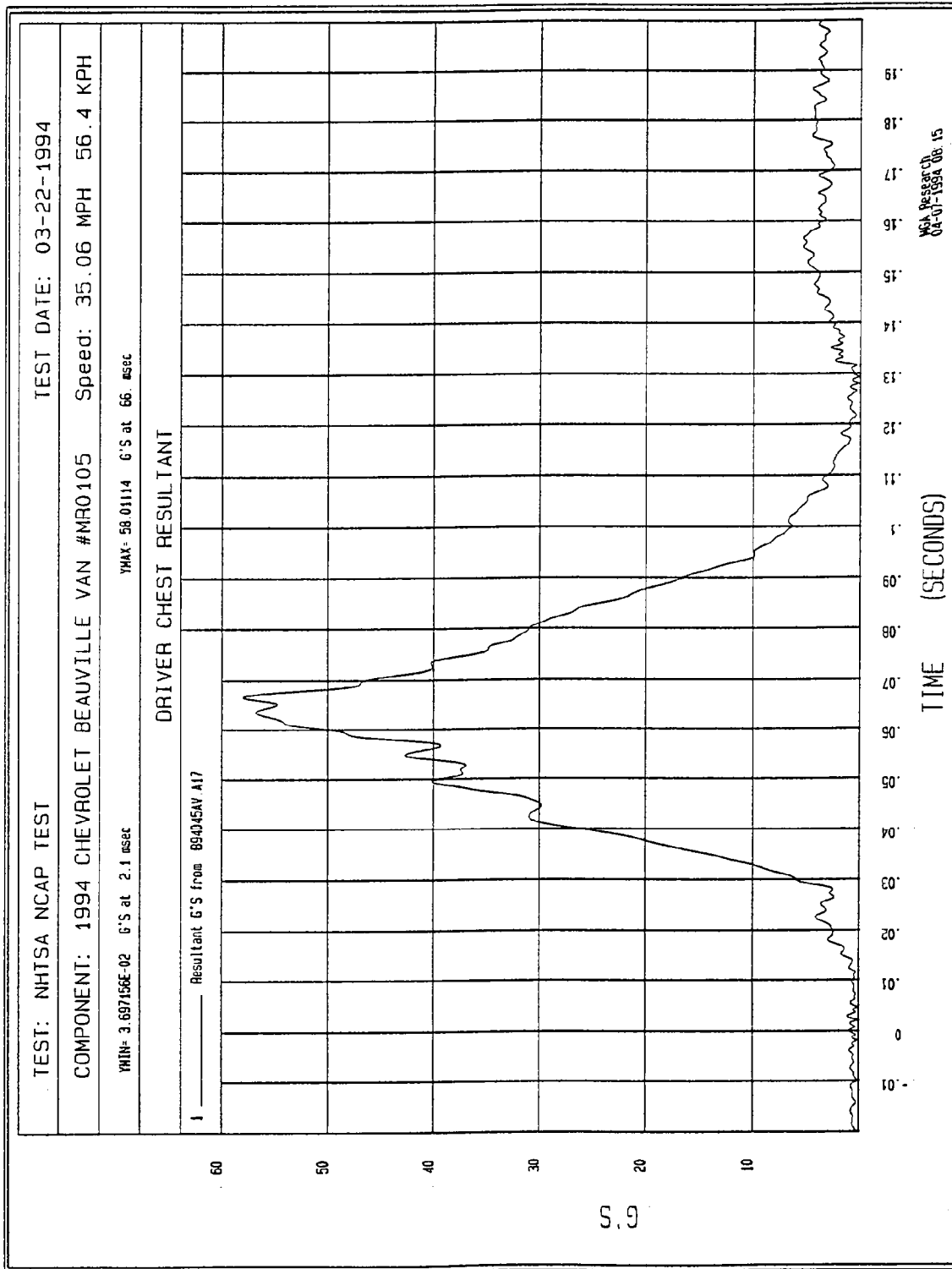


Figure B-46 - Driver Chest Resultant vs. Time

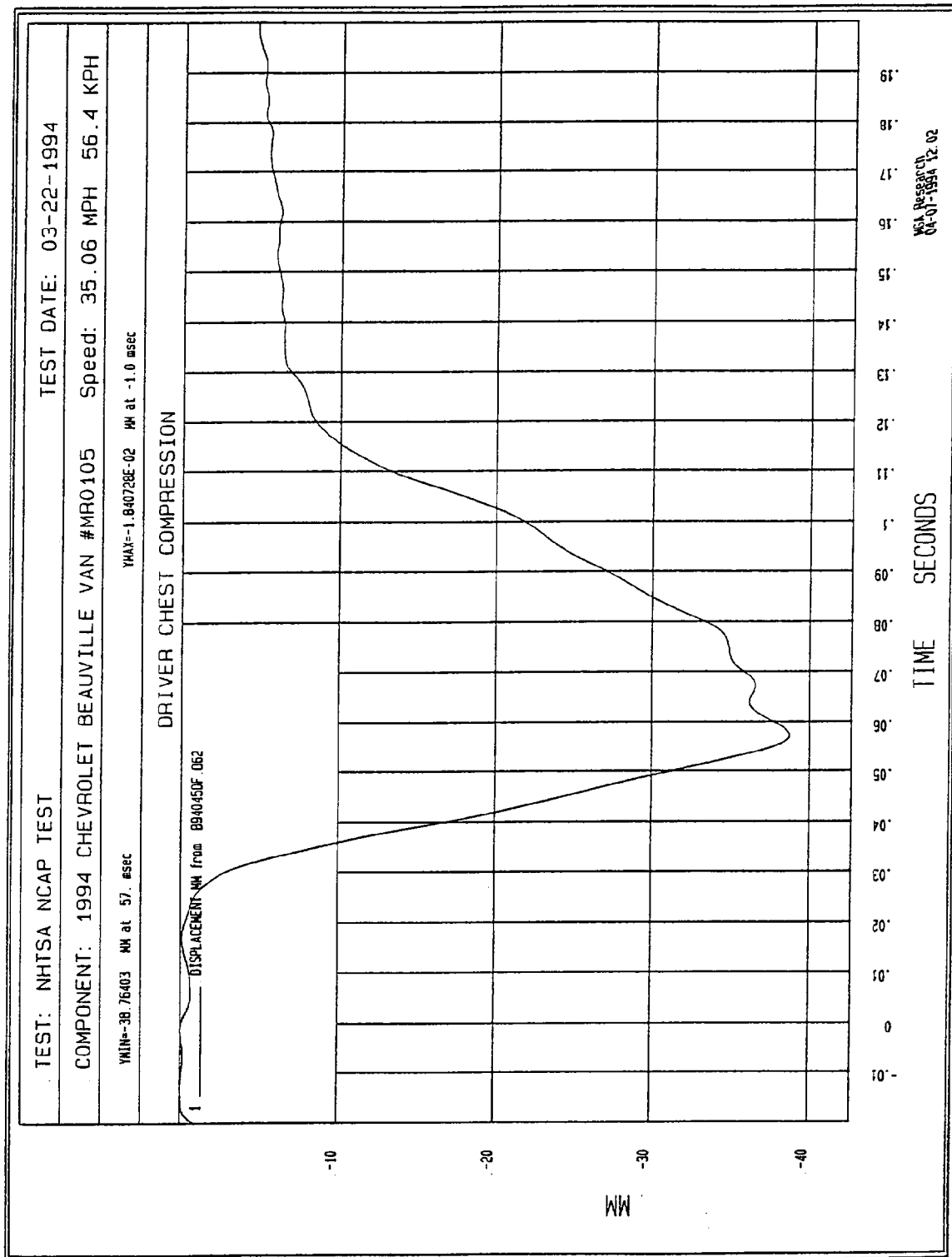


Figure B-47 - Driver Chest Compression vs. Time

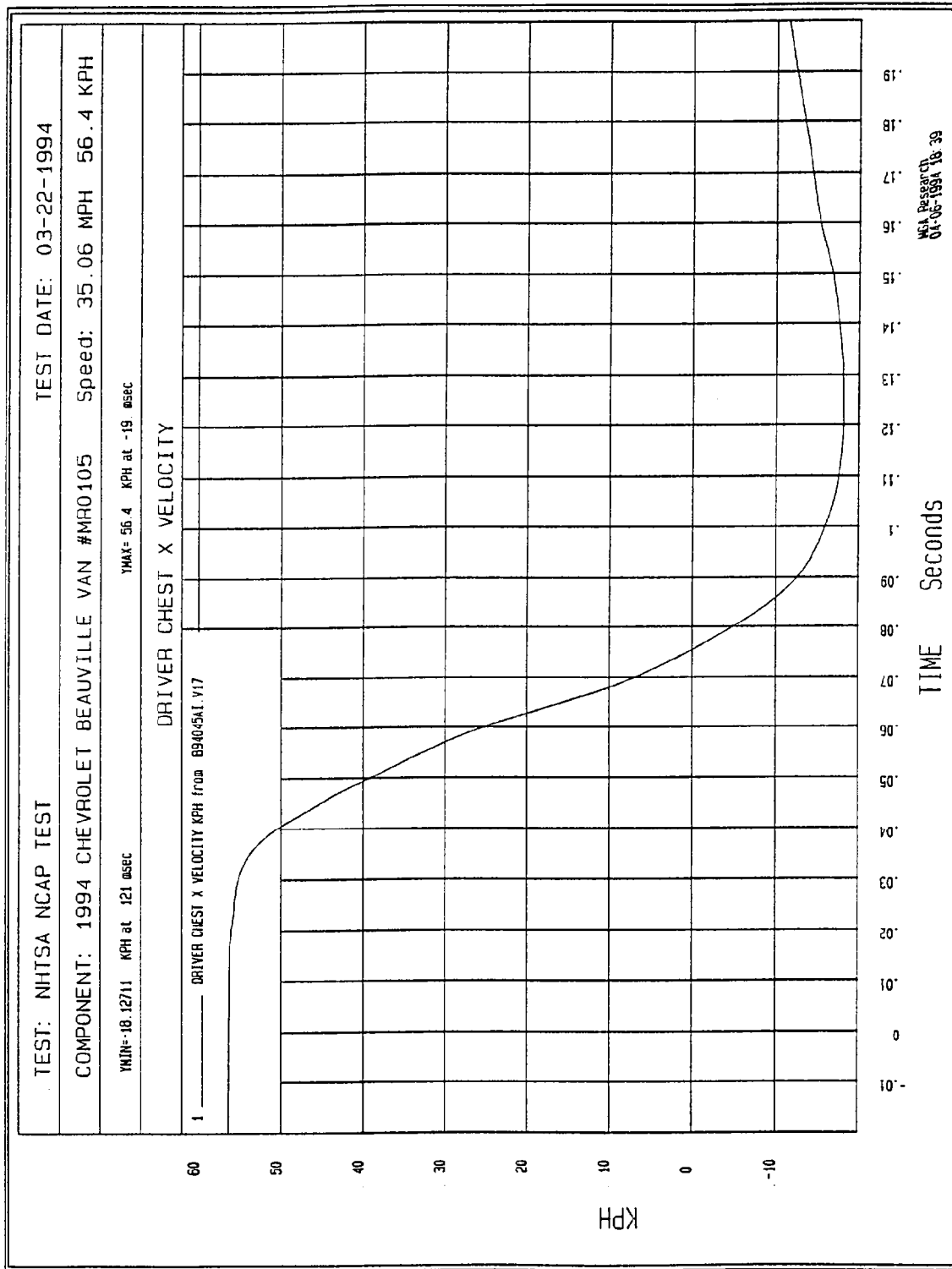


Figure B-48 - Driver Chest X Velocity vs. Time

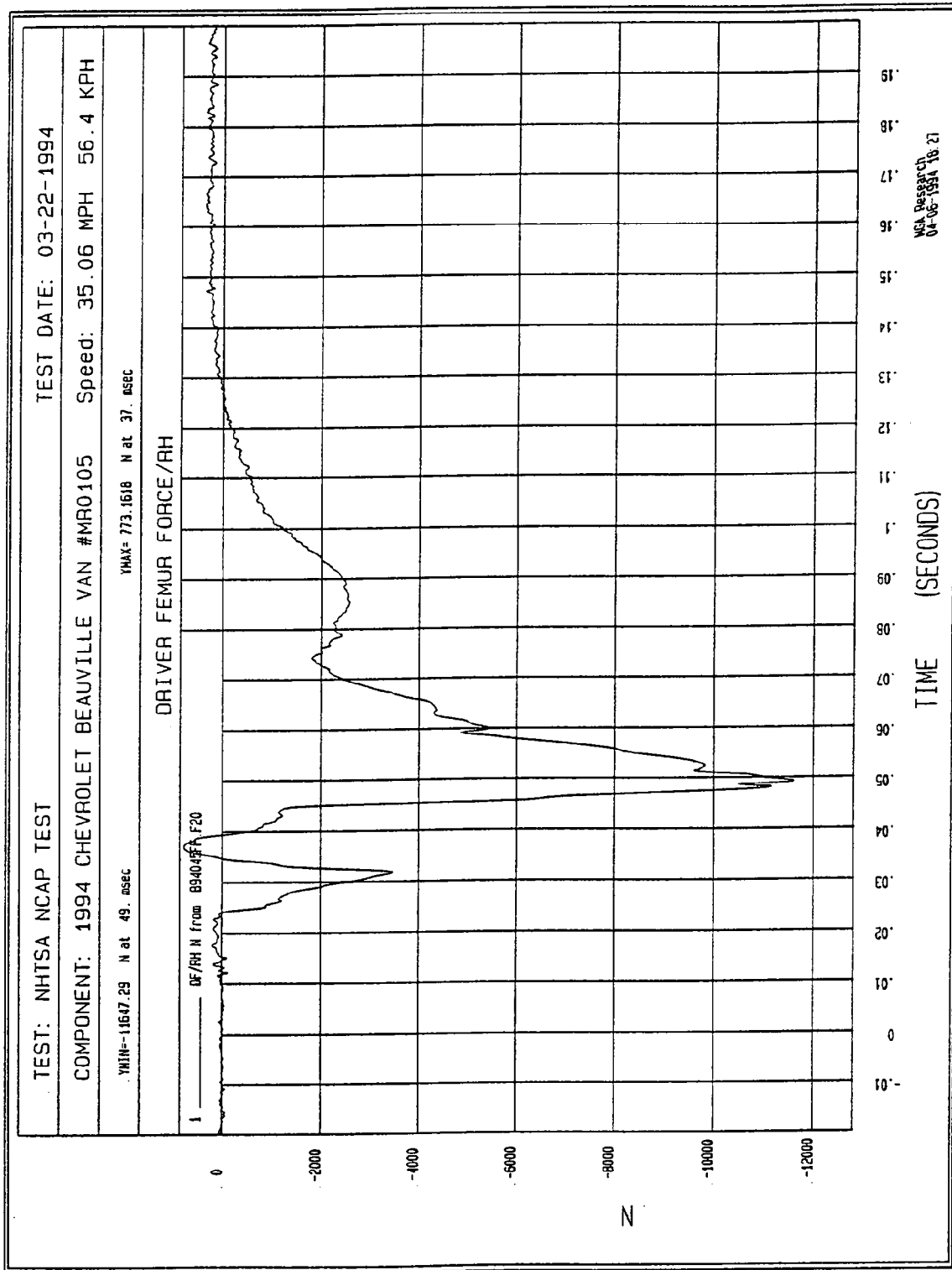


Figure B-49 - Driver Right Femur Force vs. Time

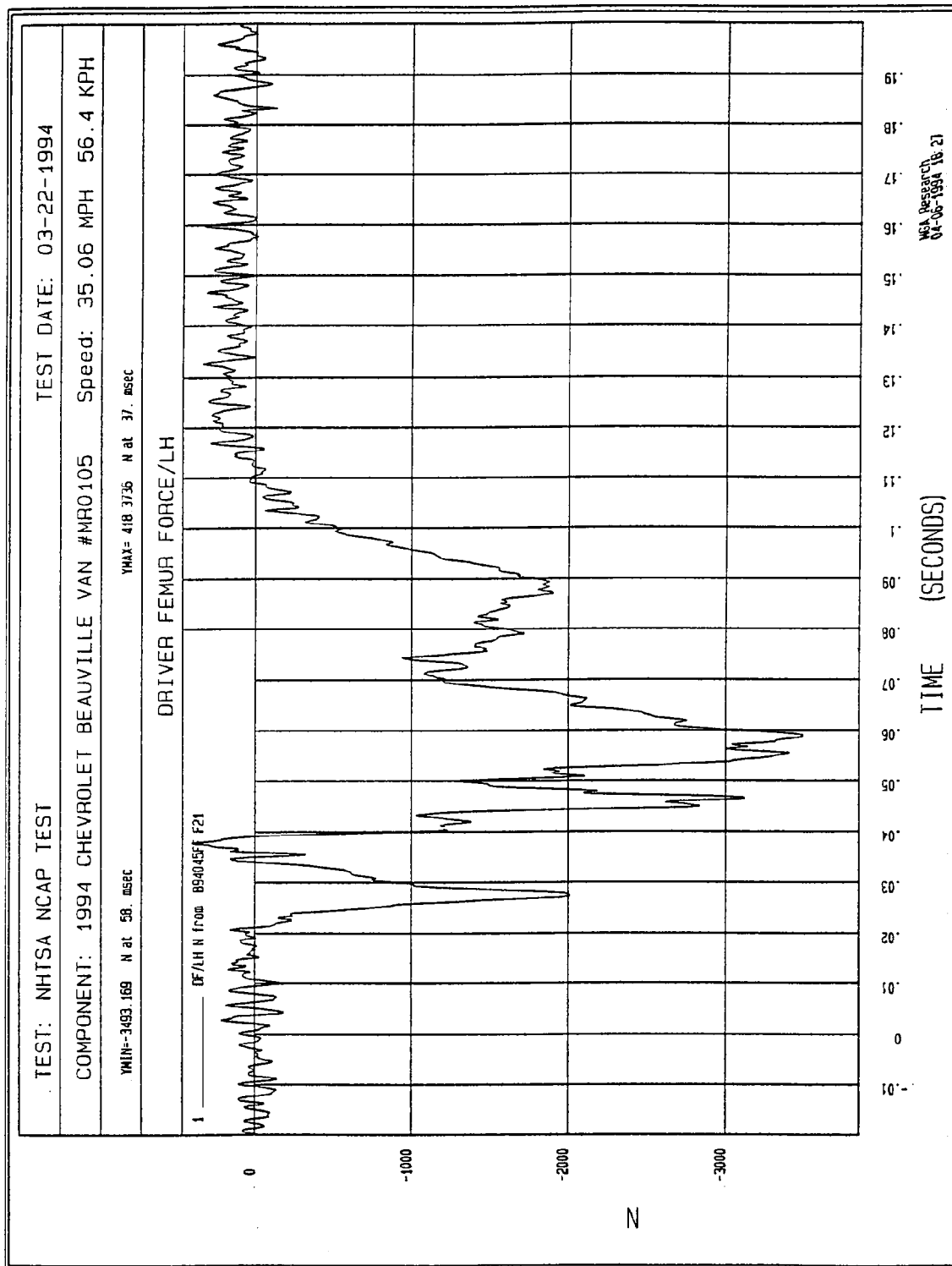


Figure B-50 - Driver Left Femur Force vs. Time

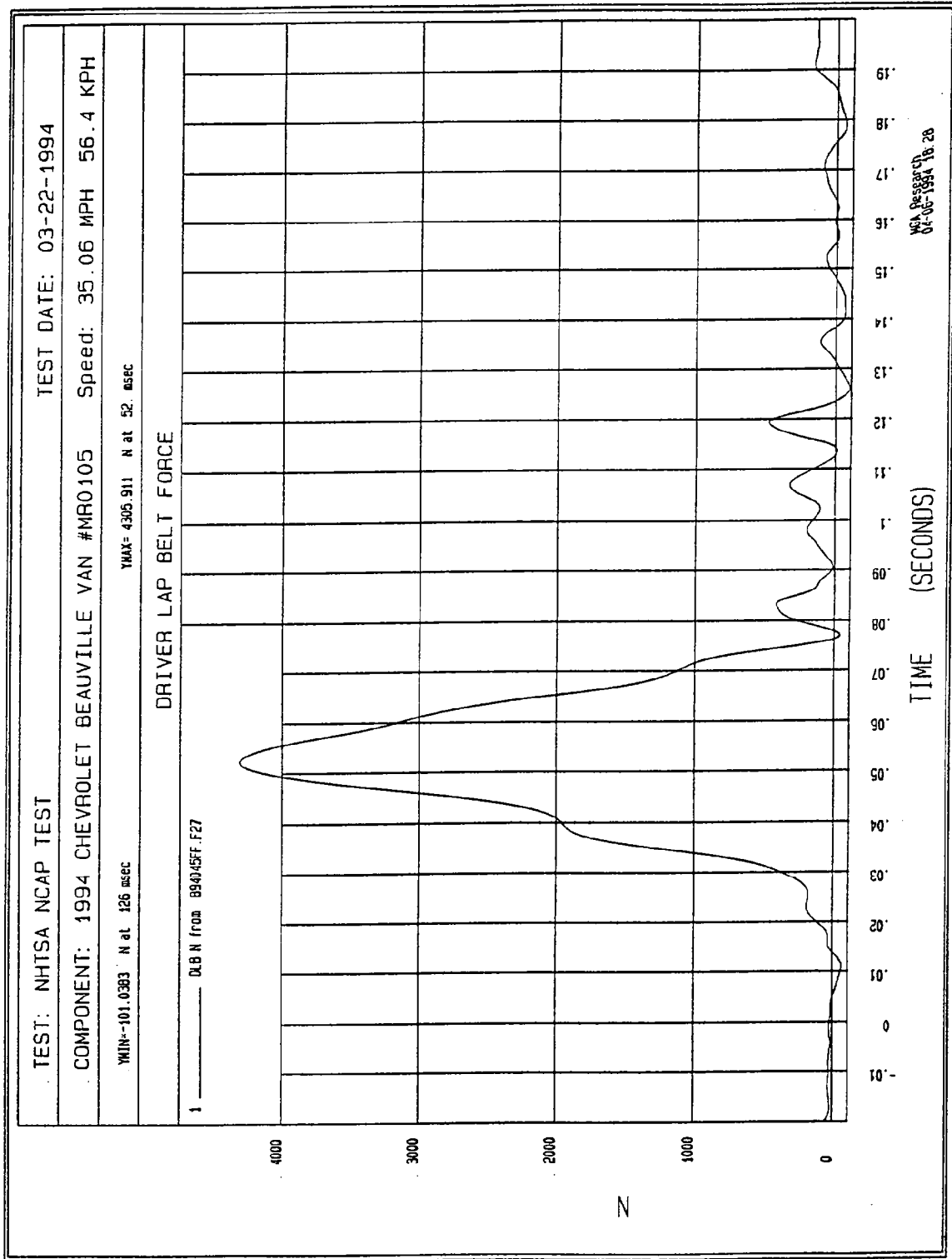


Figure B-51 - Driver Lap Belt Force vs. Time

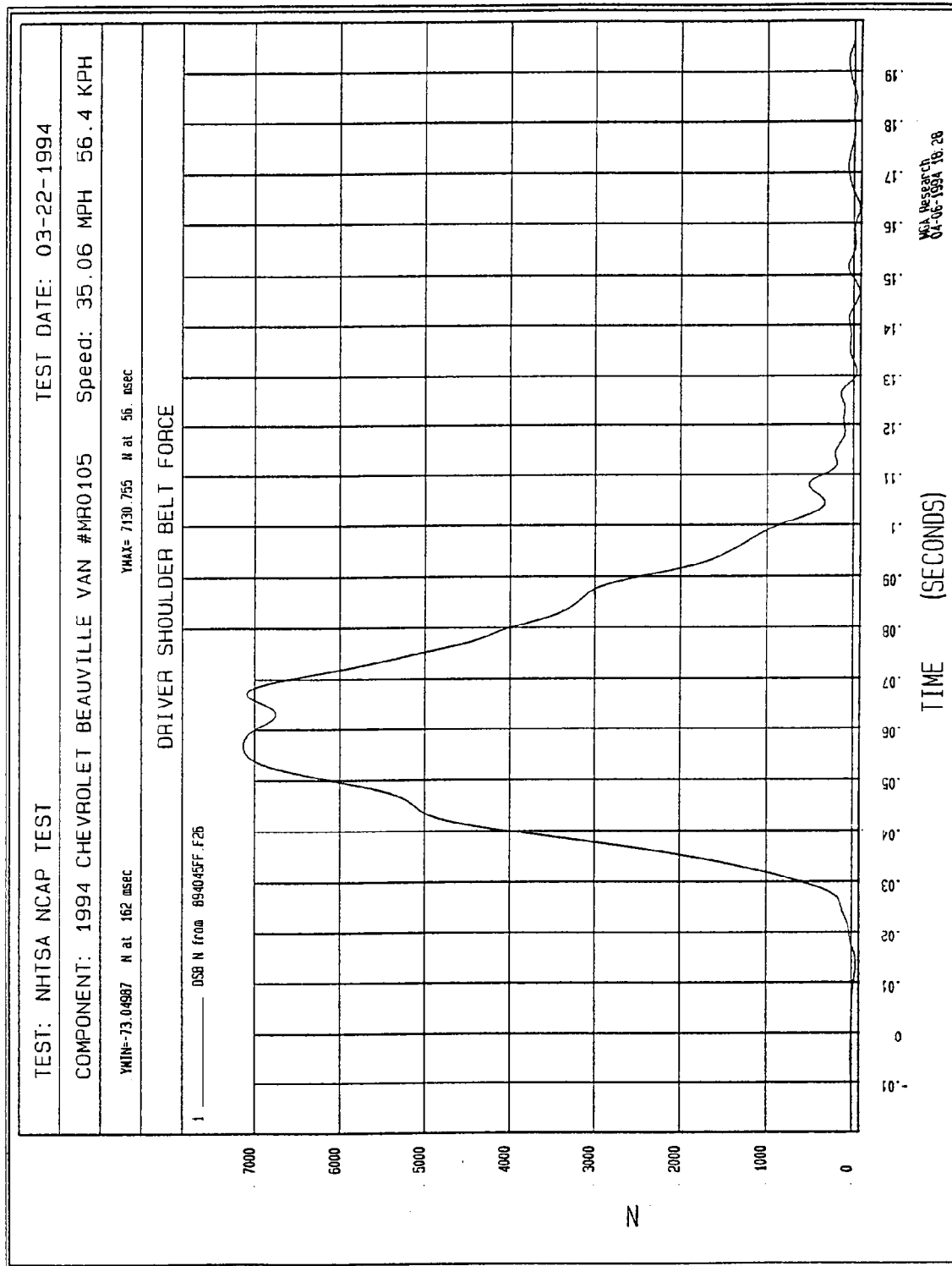


Figure B-52 - Driver Shoulder Belt Force vs. Time

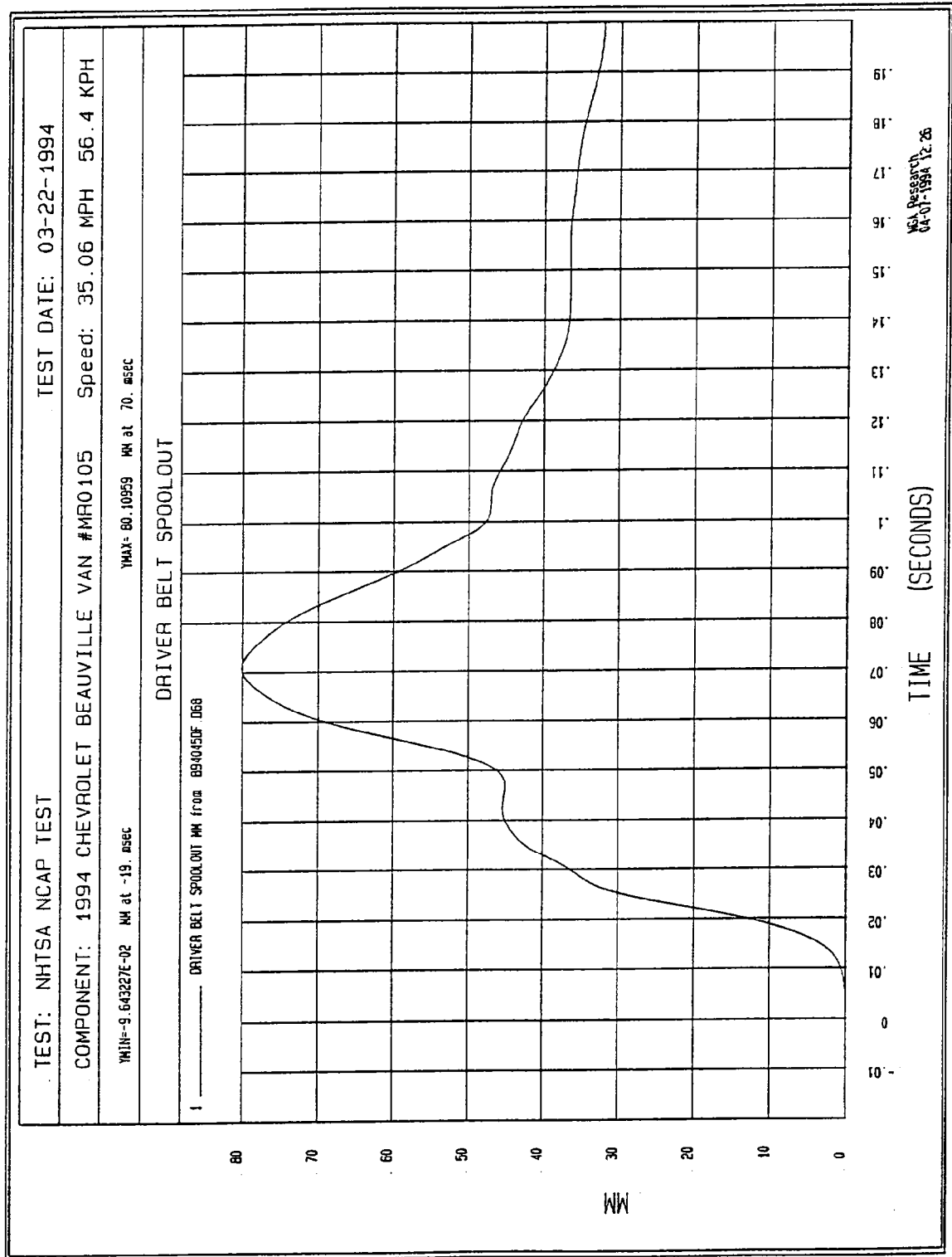


Figure B-53 - Driver Belt Spoolout vs. Time

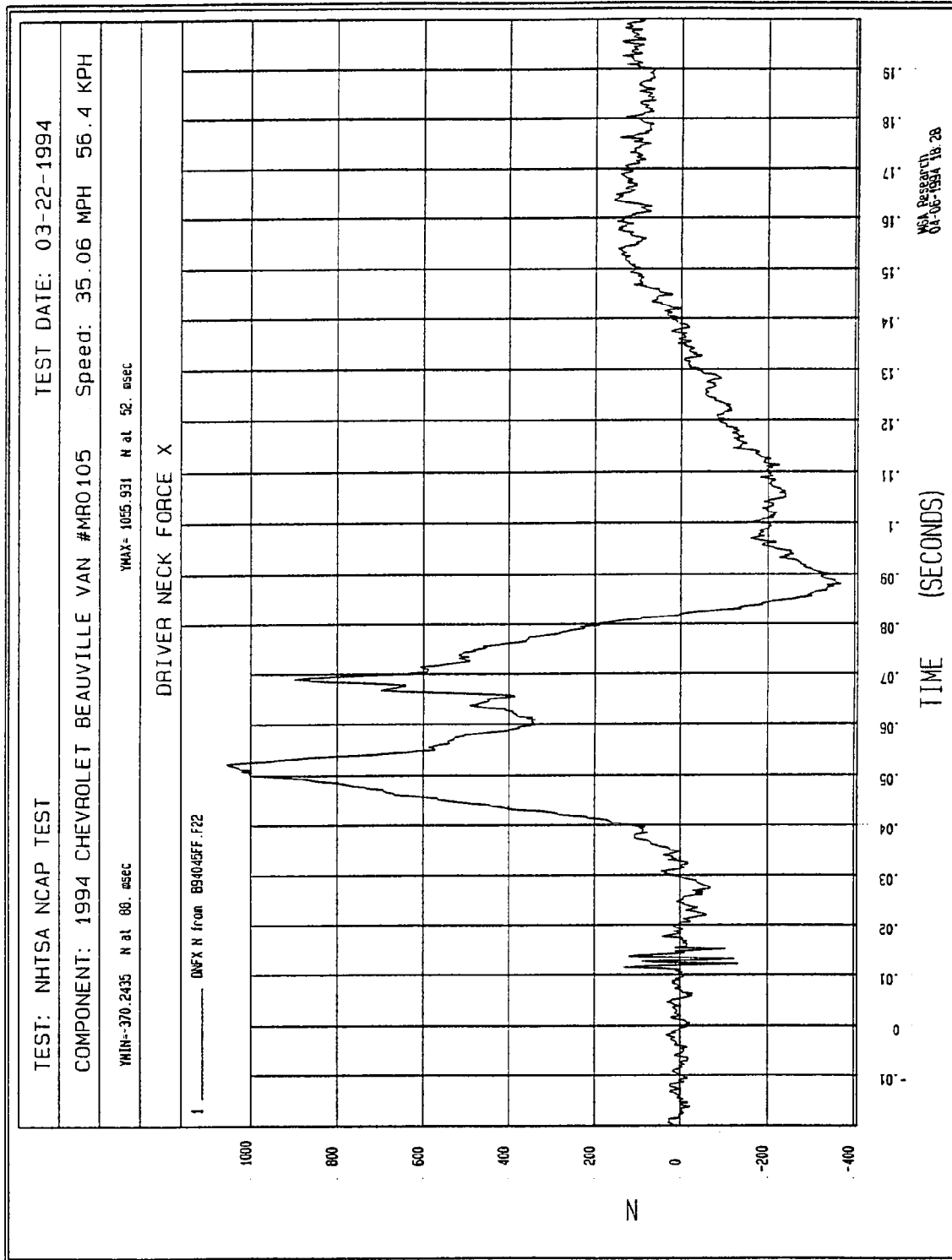


Figure B-54 - Driver Neck Force X vs. Time

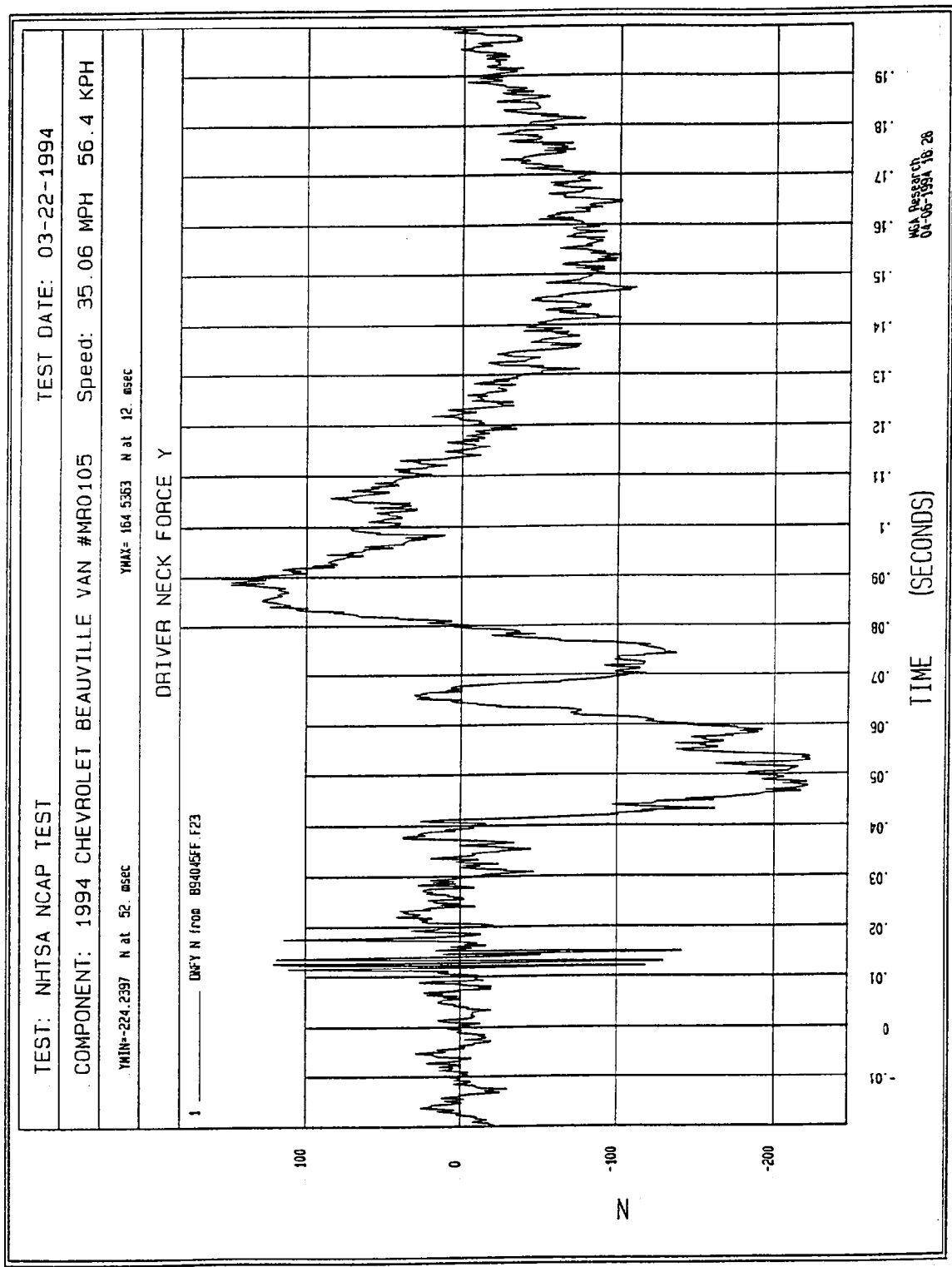


Figure B-55 - Driver Neck Force Y vs. Time

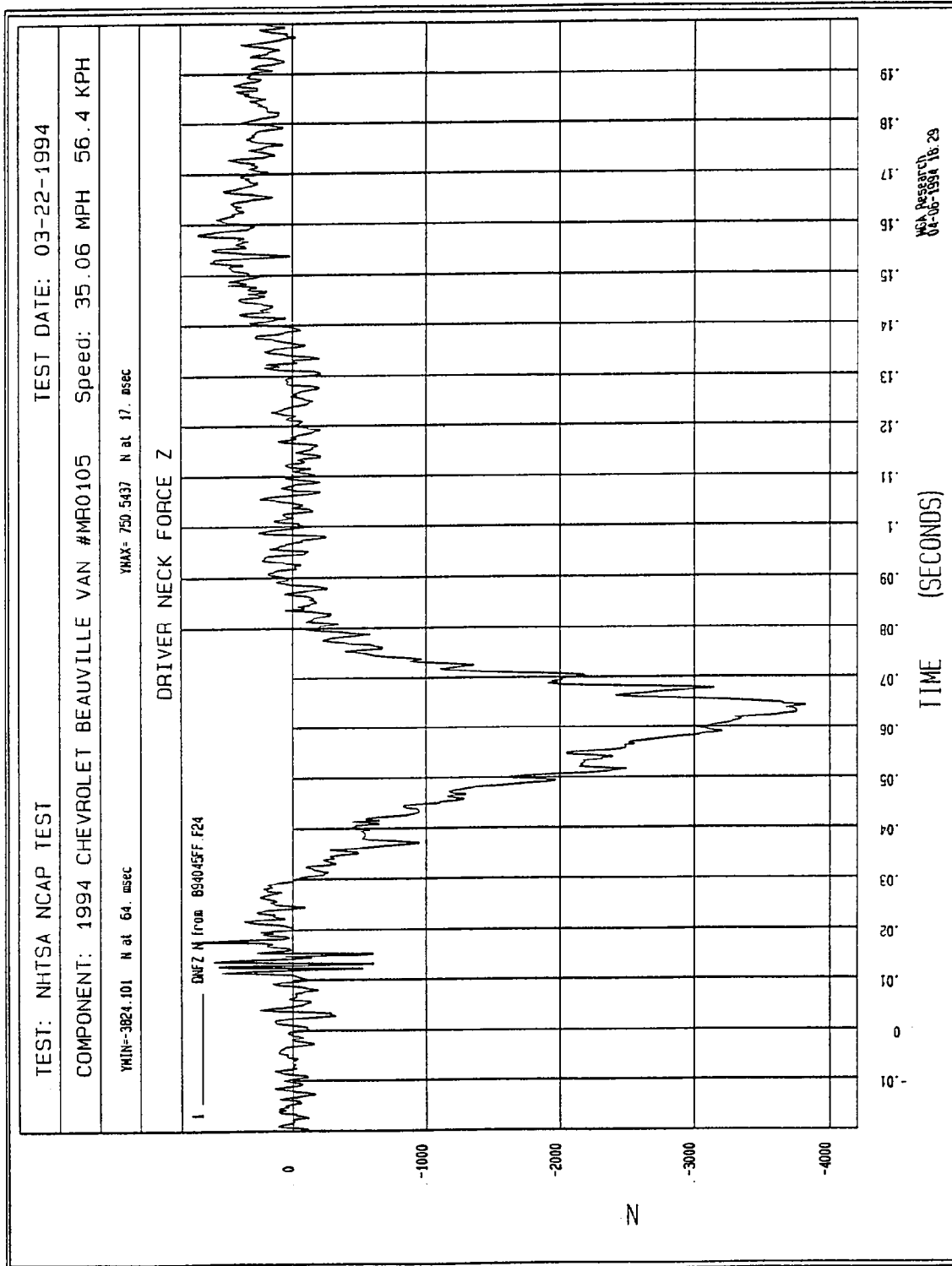


Figure B-56 - Driver Neck Force Z vs. Time

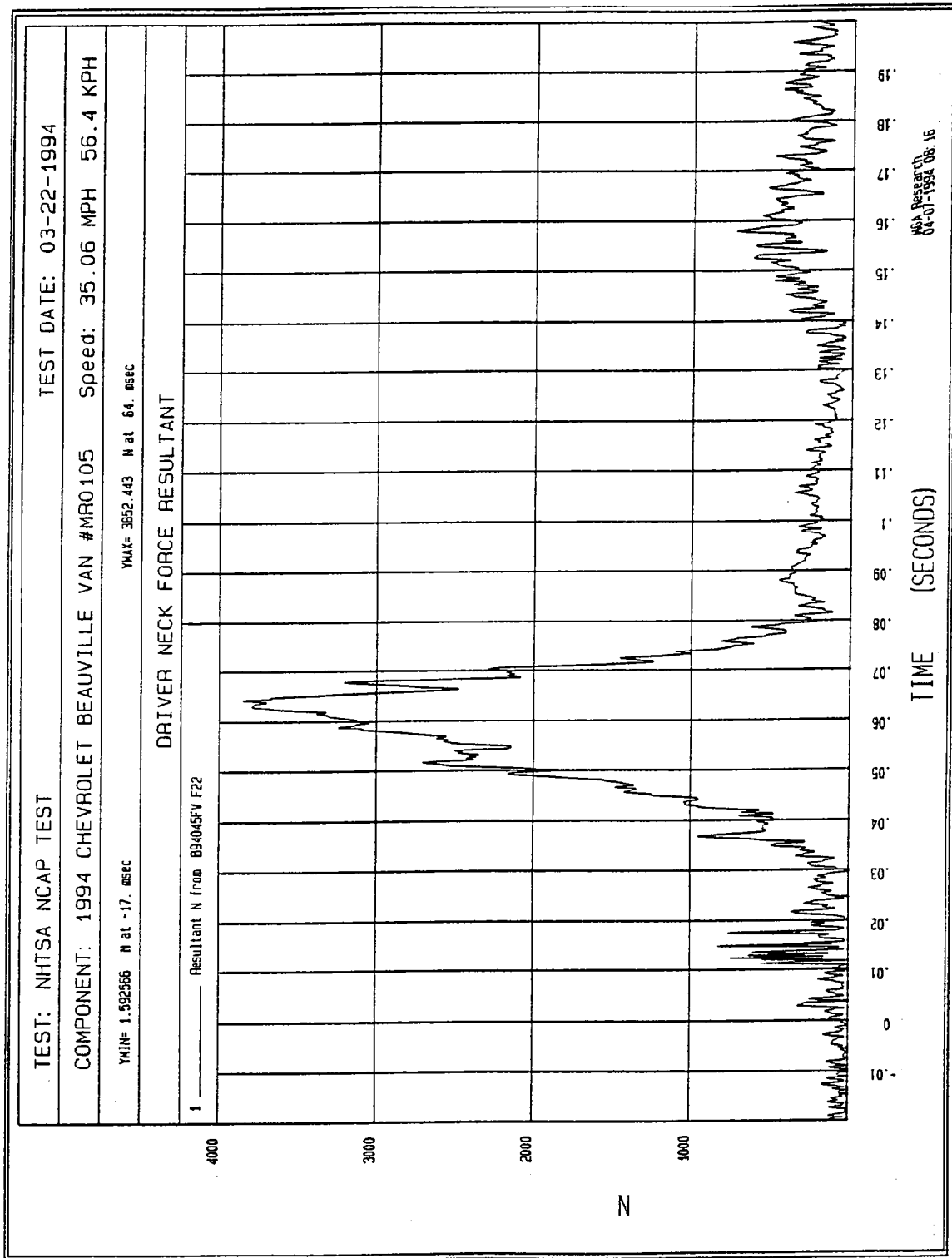


Figure B-57 - Driver Neck Force Resultant vs. Time

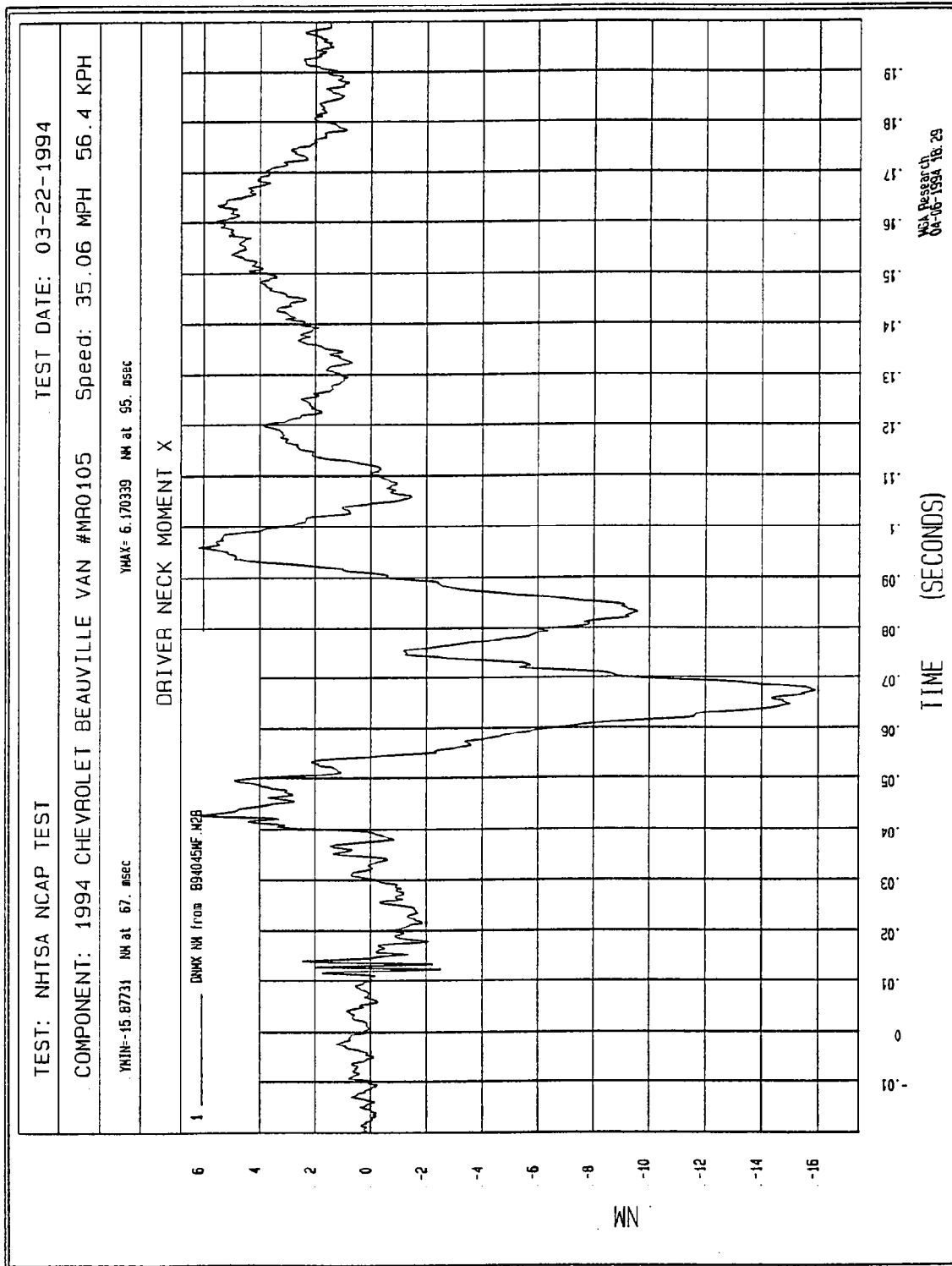


Figure B-58 - Driver Neck Moment X vs. Time

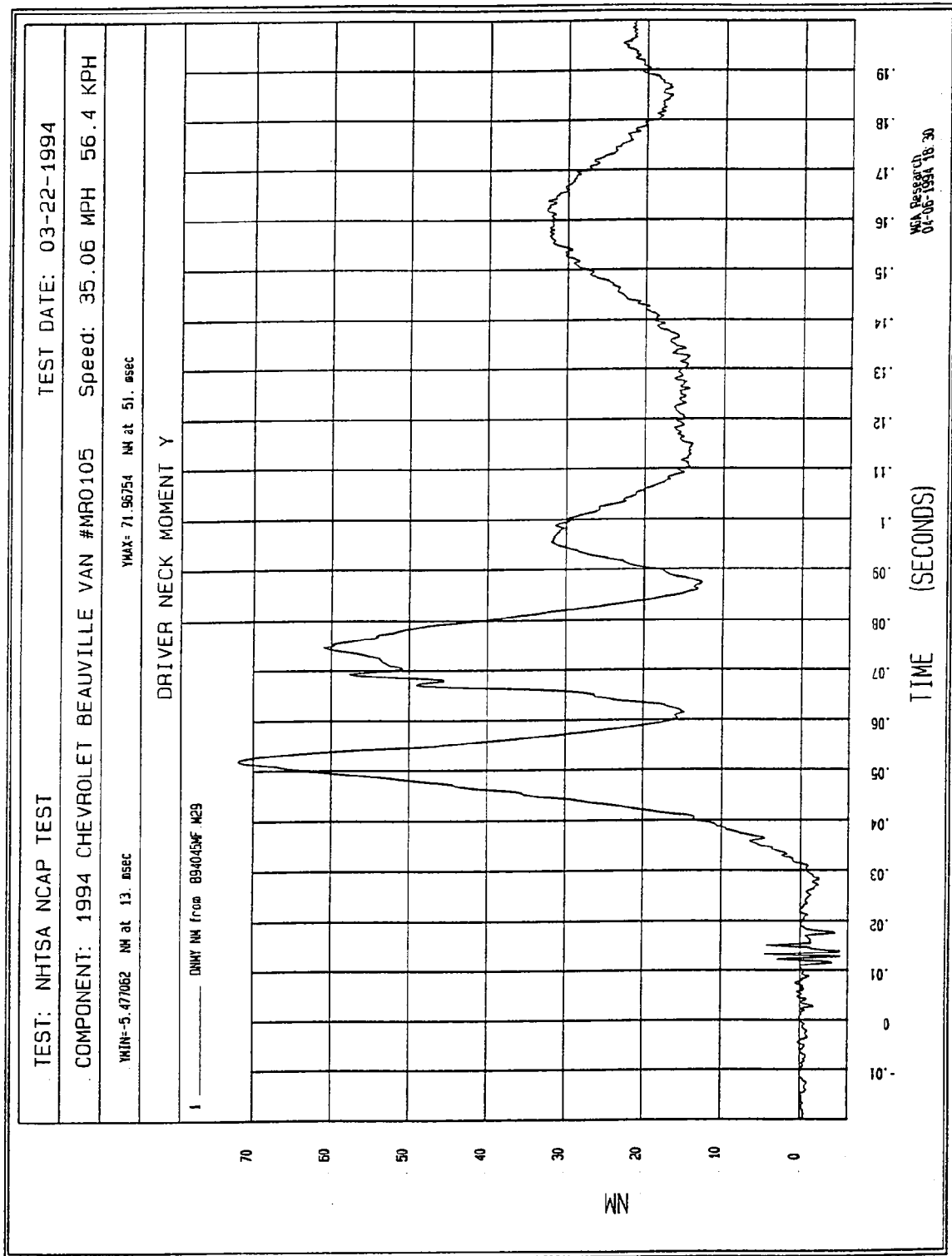
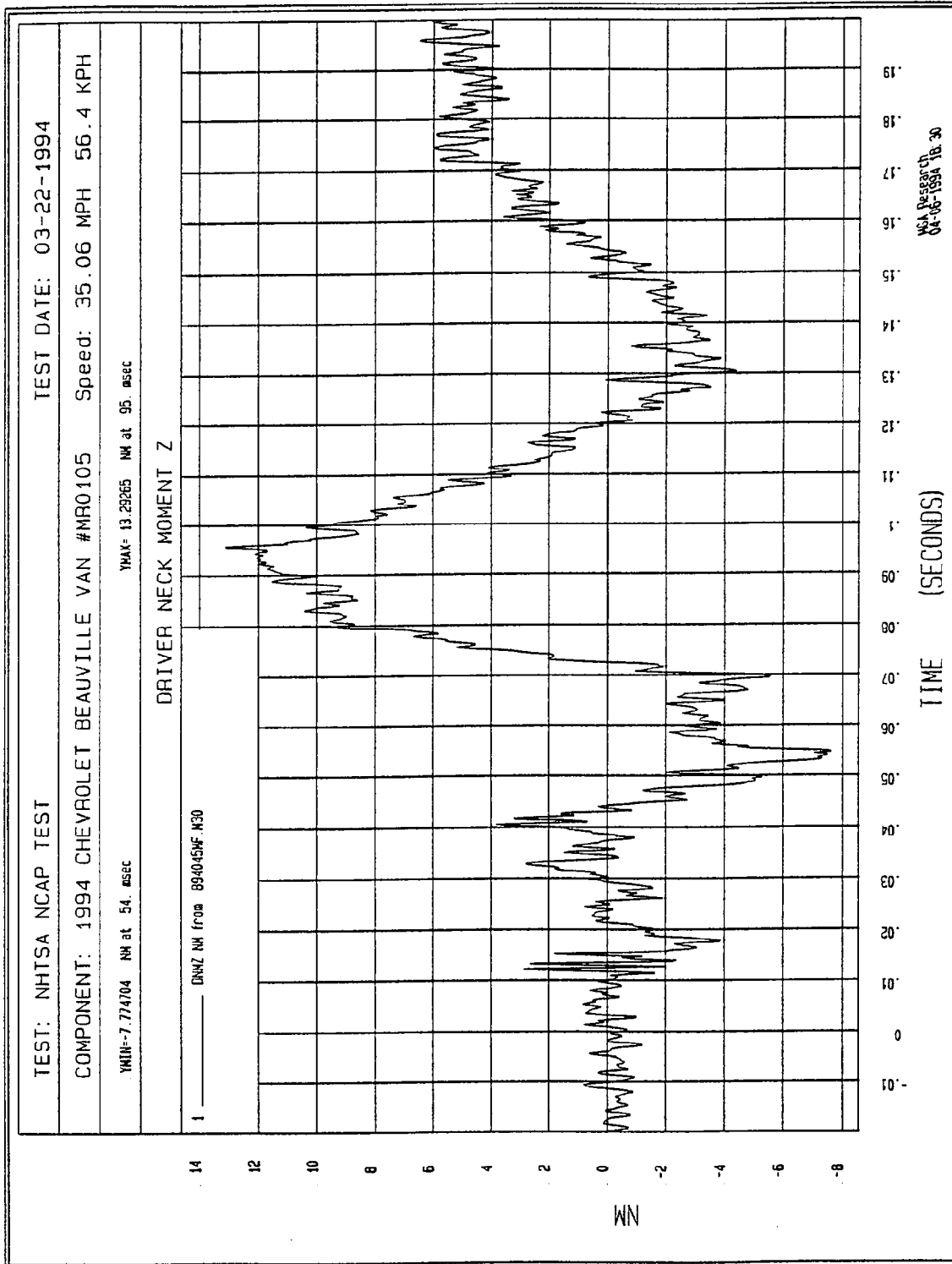


Figure B-59 - Driver Neck Moment Y vs. Time



B-60

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

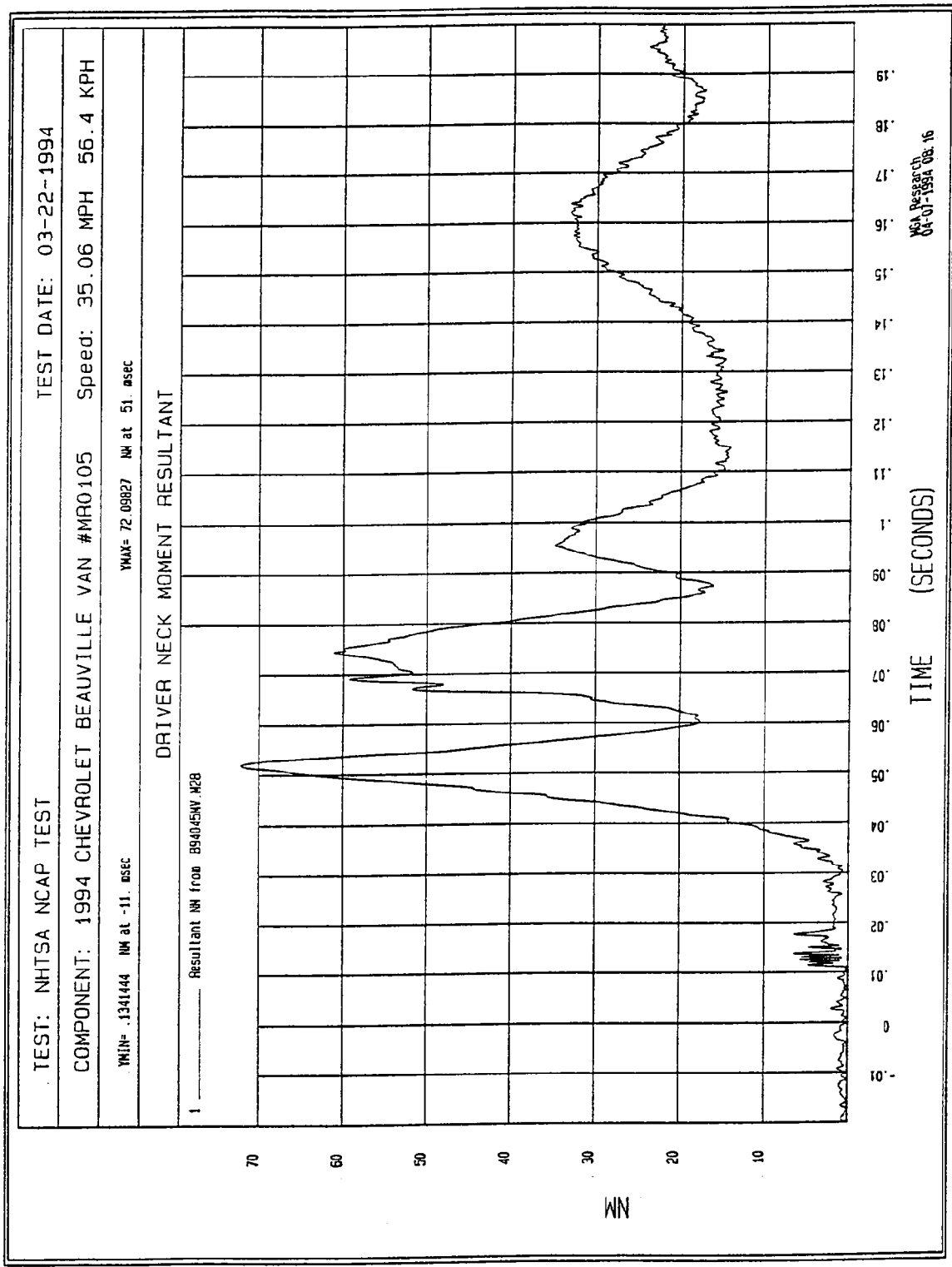


Figure B-61 - Driver Neck Moment Resultant vs. Time

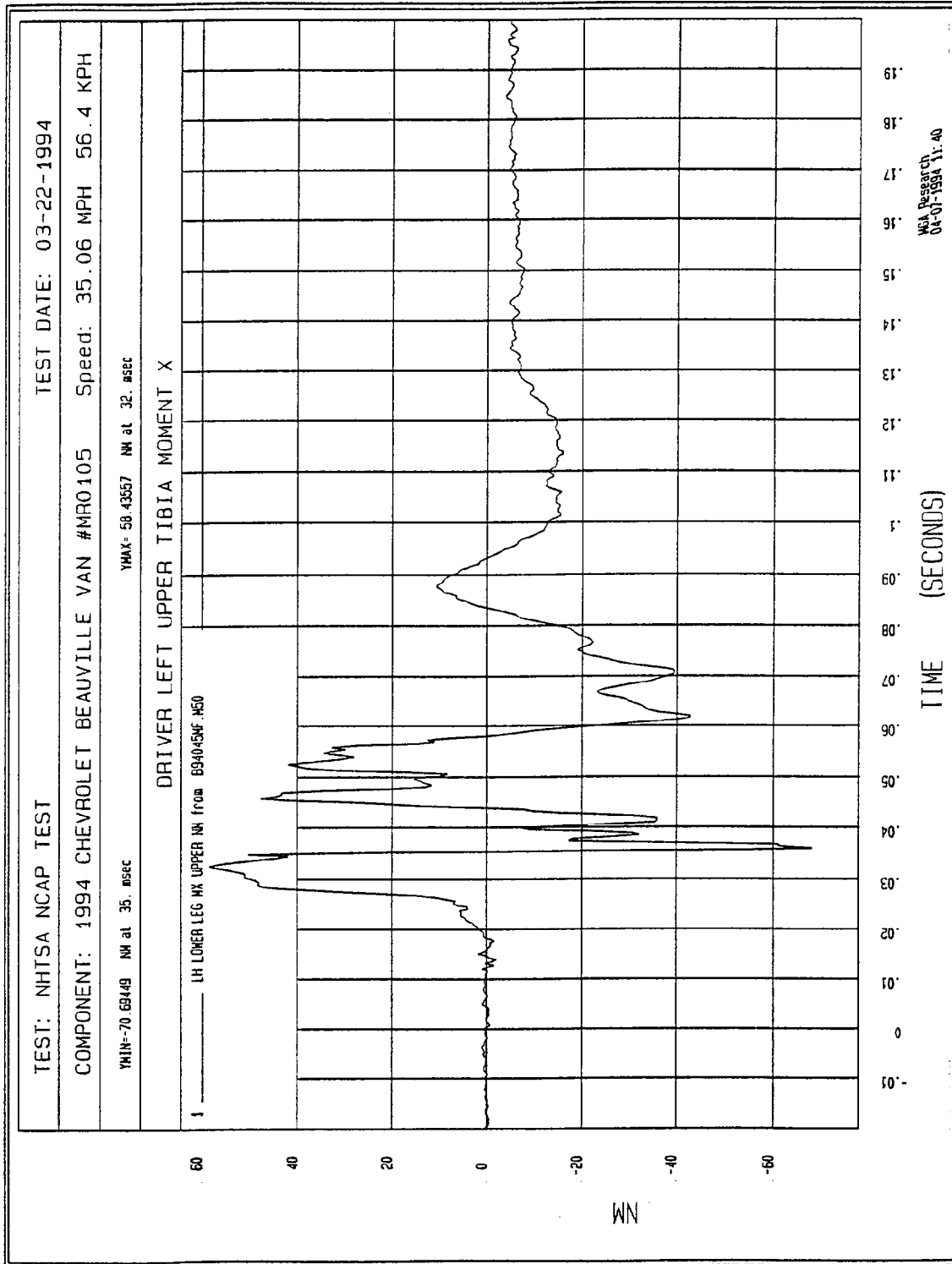


Figure B-62 - Driver Left Upper Tibia Moment X vs. Time

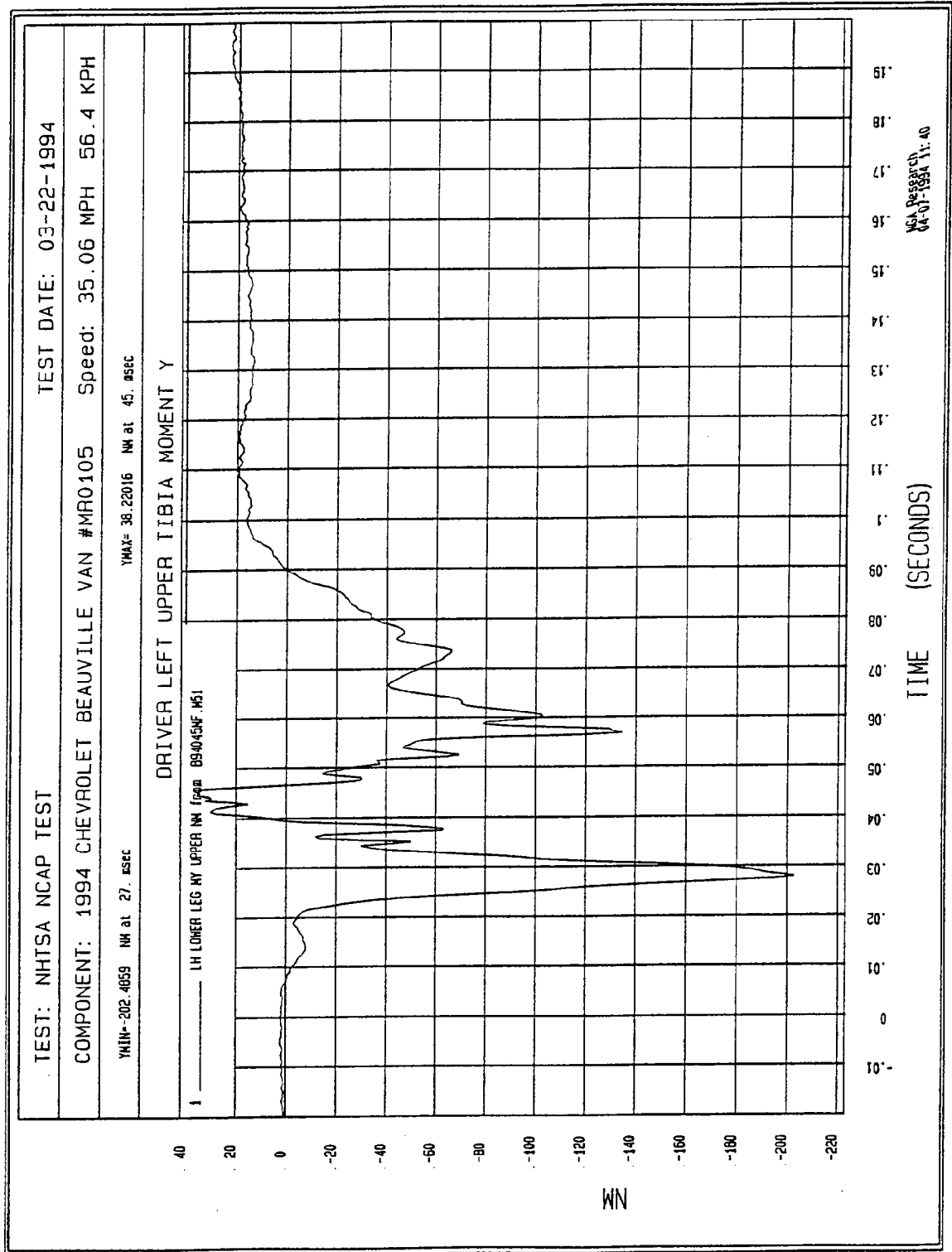


Figure B-63 - Driver Left Upper Tibia Moment Y vs. Time

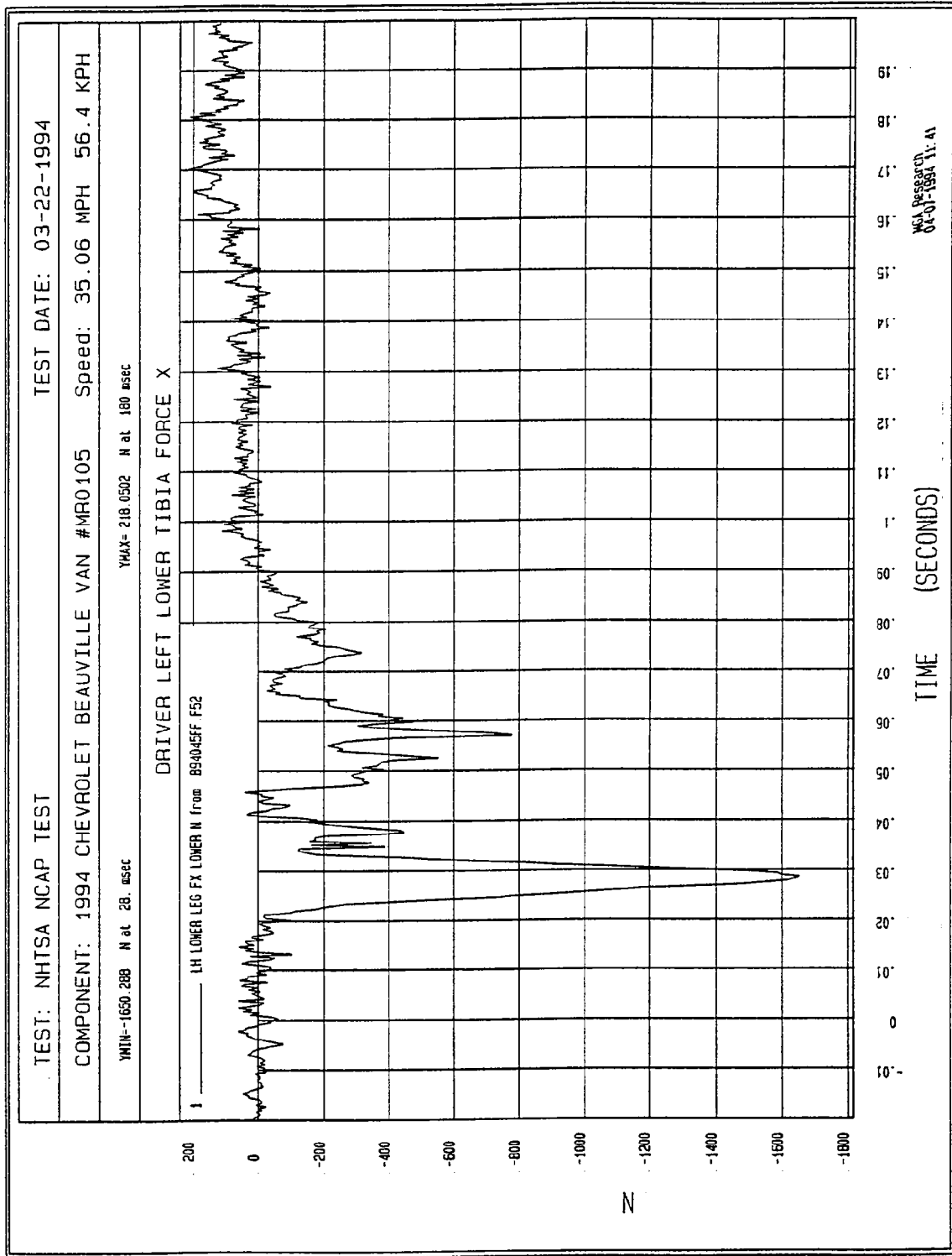


Figure B-64 - Driver Left Lower Tibia Force X vs. Time

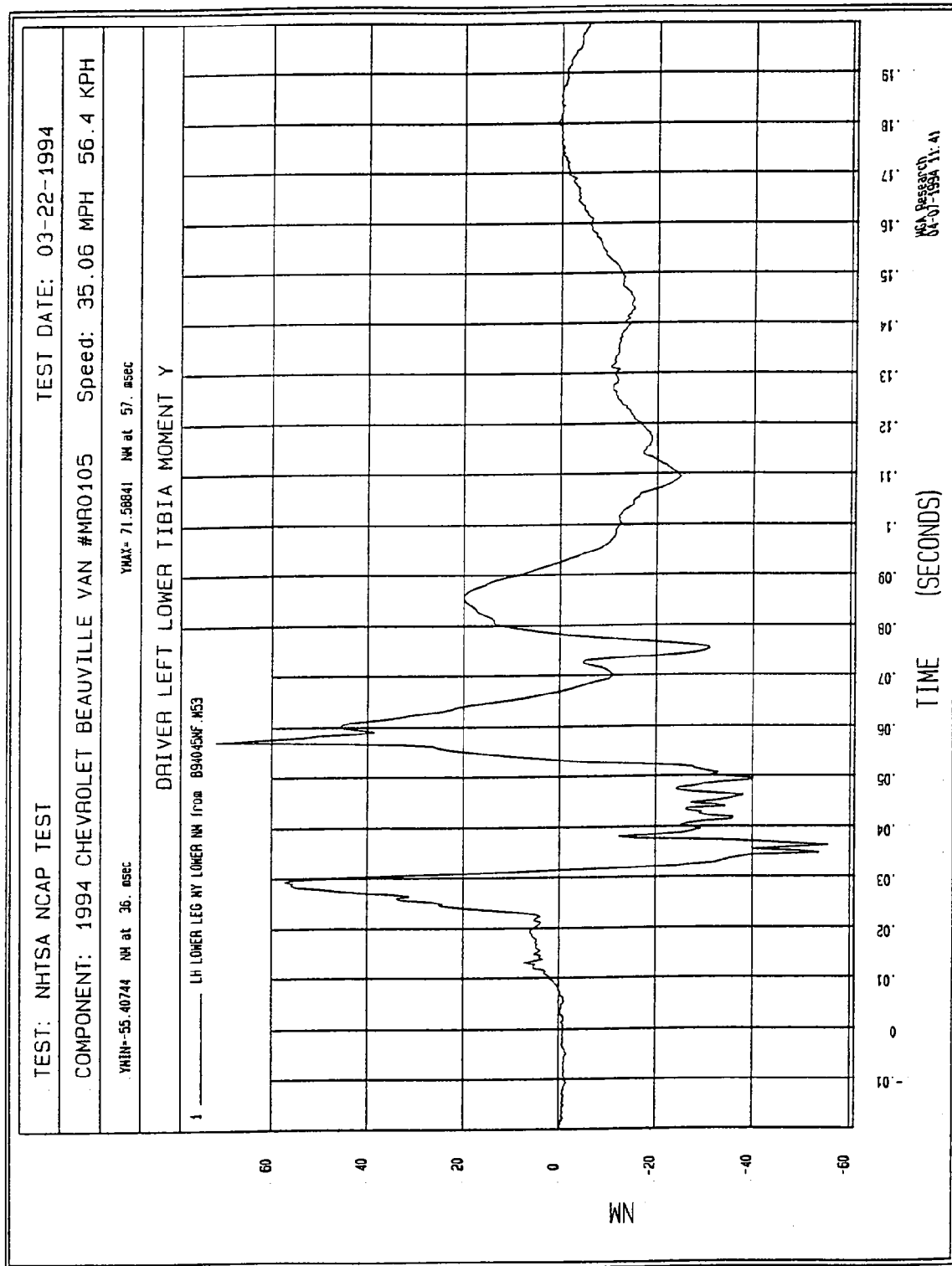


Figure B-65 - Driver Left Lower Tibia Moment Y vs. Time

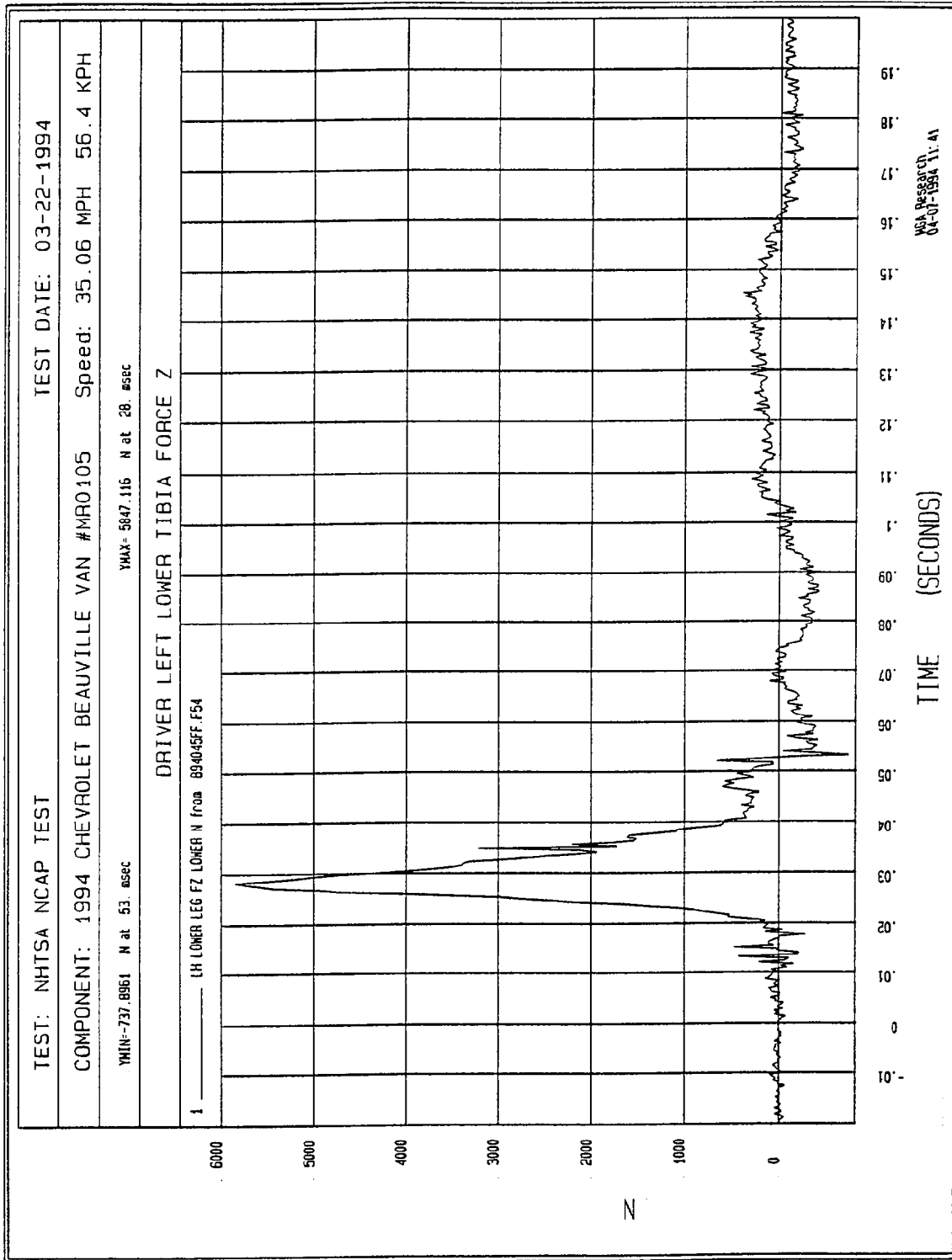


Figure B-66 - Driver Left Lower Tibia Force Z vs. Time

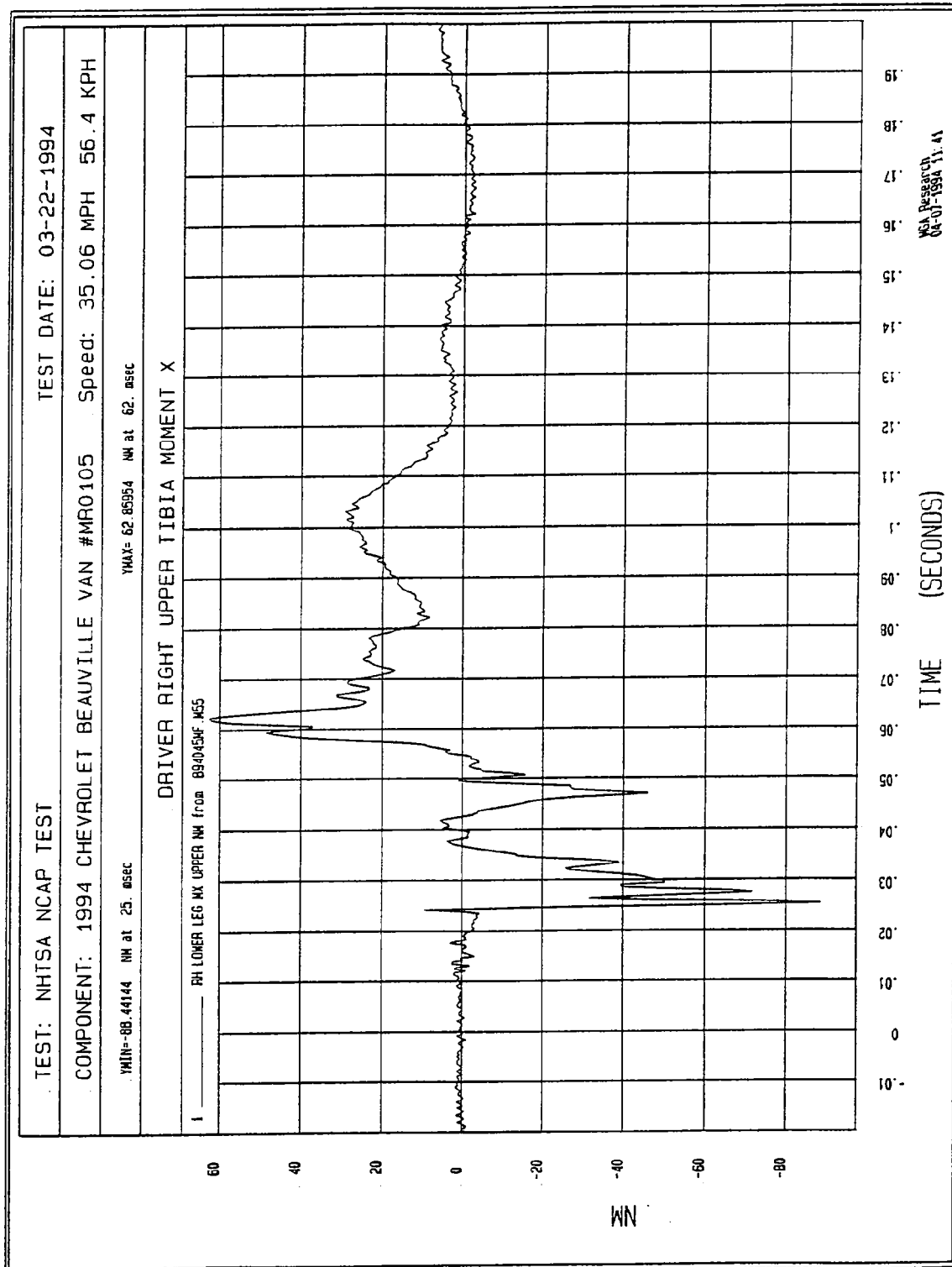


Figure B-67 - Driver Right Upper Tibia Moment X vs. Time

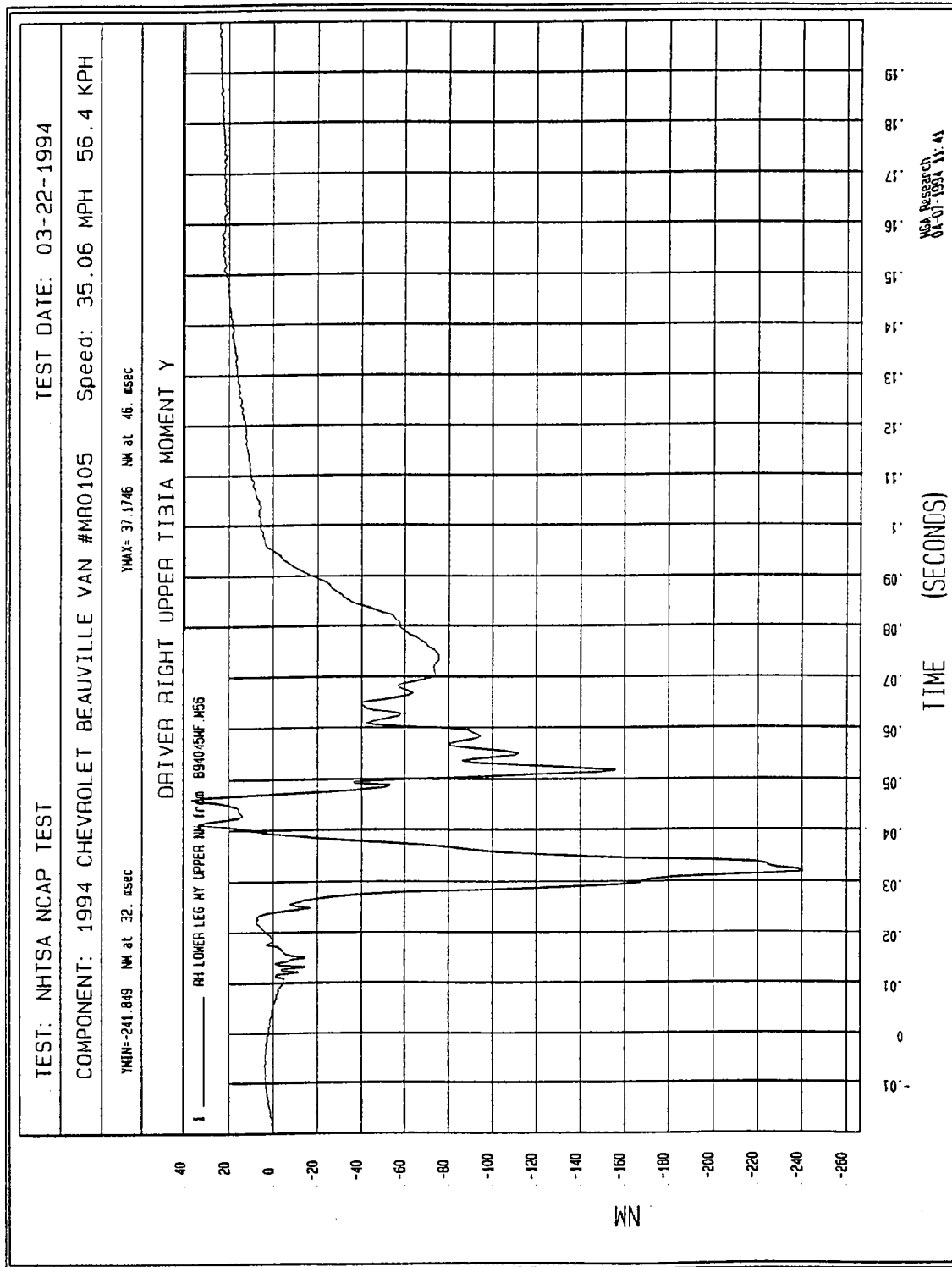


Figure B-68 - Driver Right Upper Tibia Moment Y vs. Time

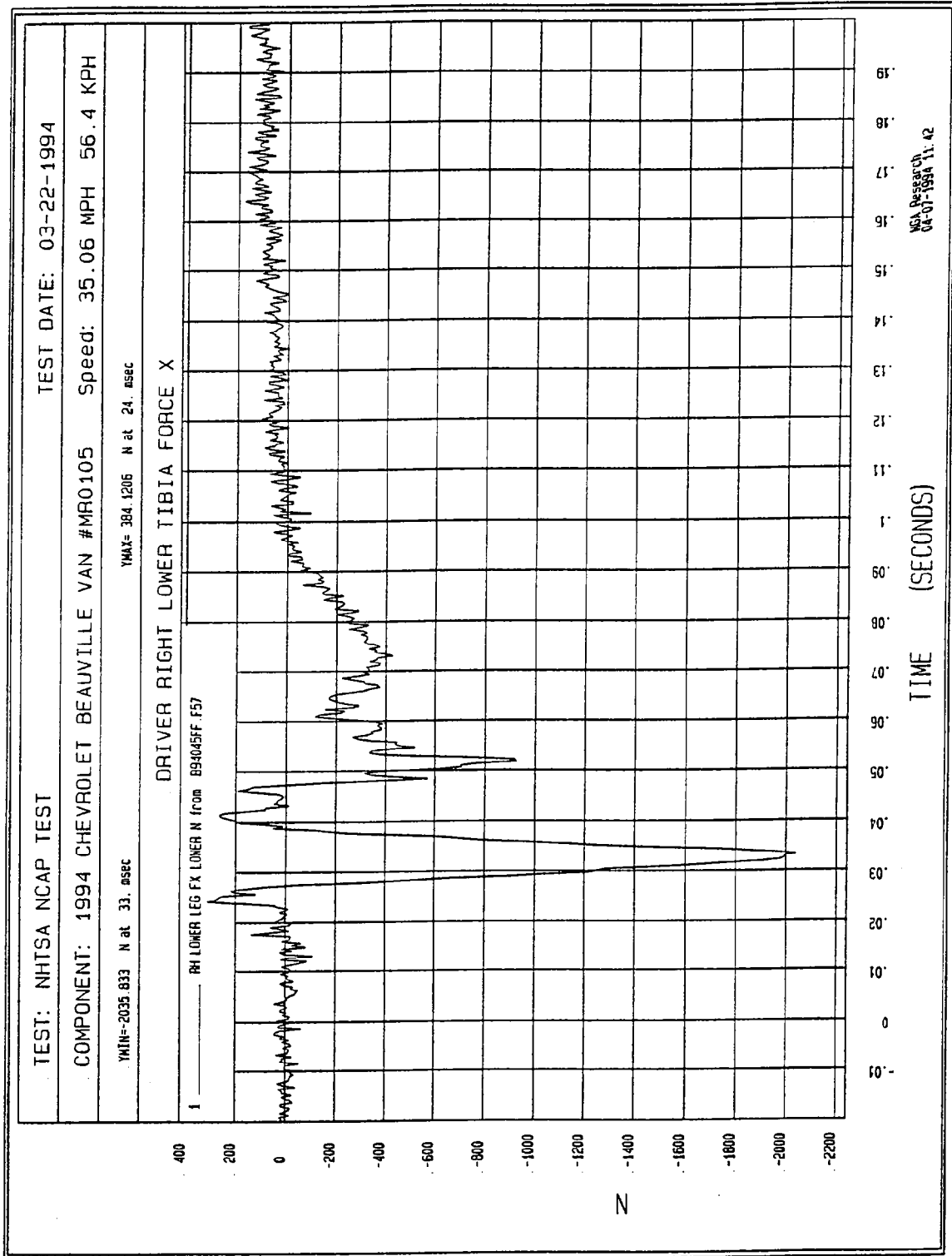
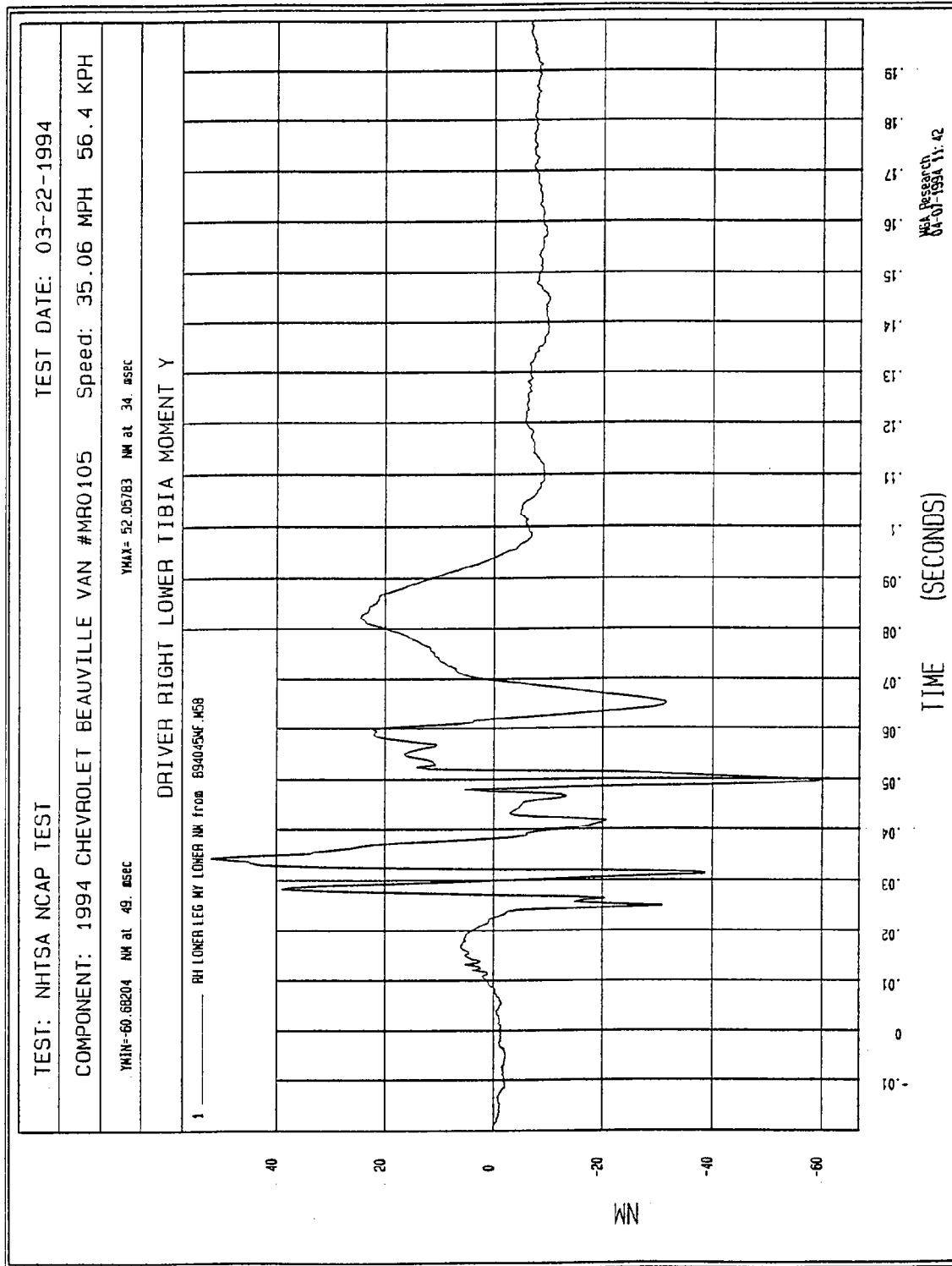


Figure B-69 - Driver Right Lower Tibia Force X vs. Time



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Figure B-70 - Driver Right Lower Tibia Moment Y vs. Time

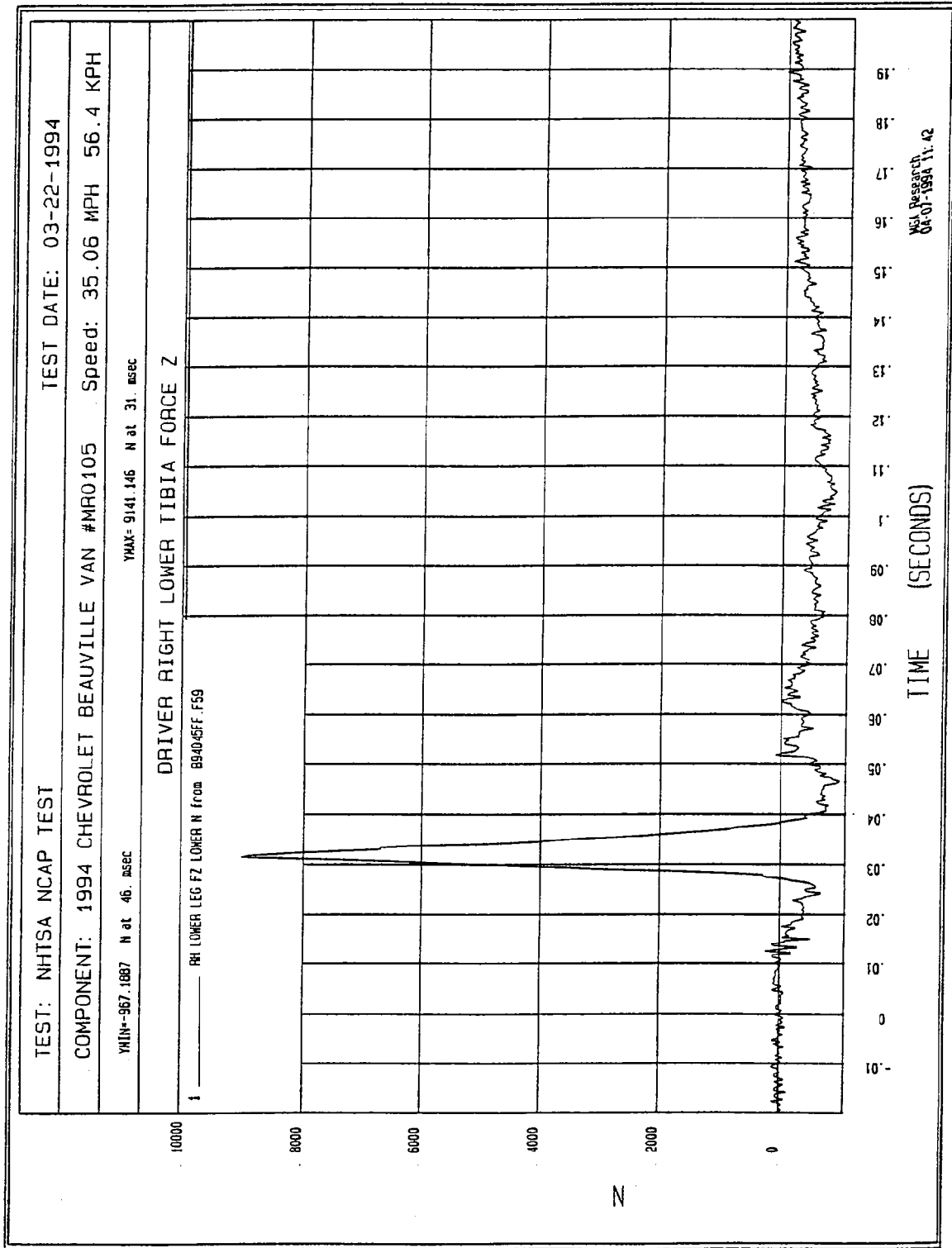
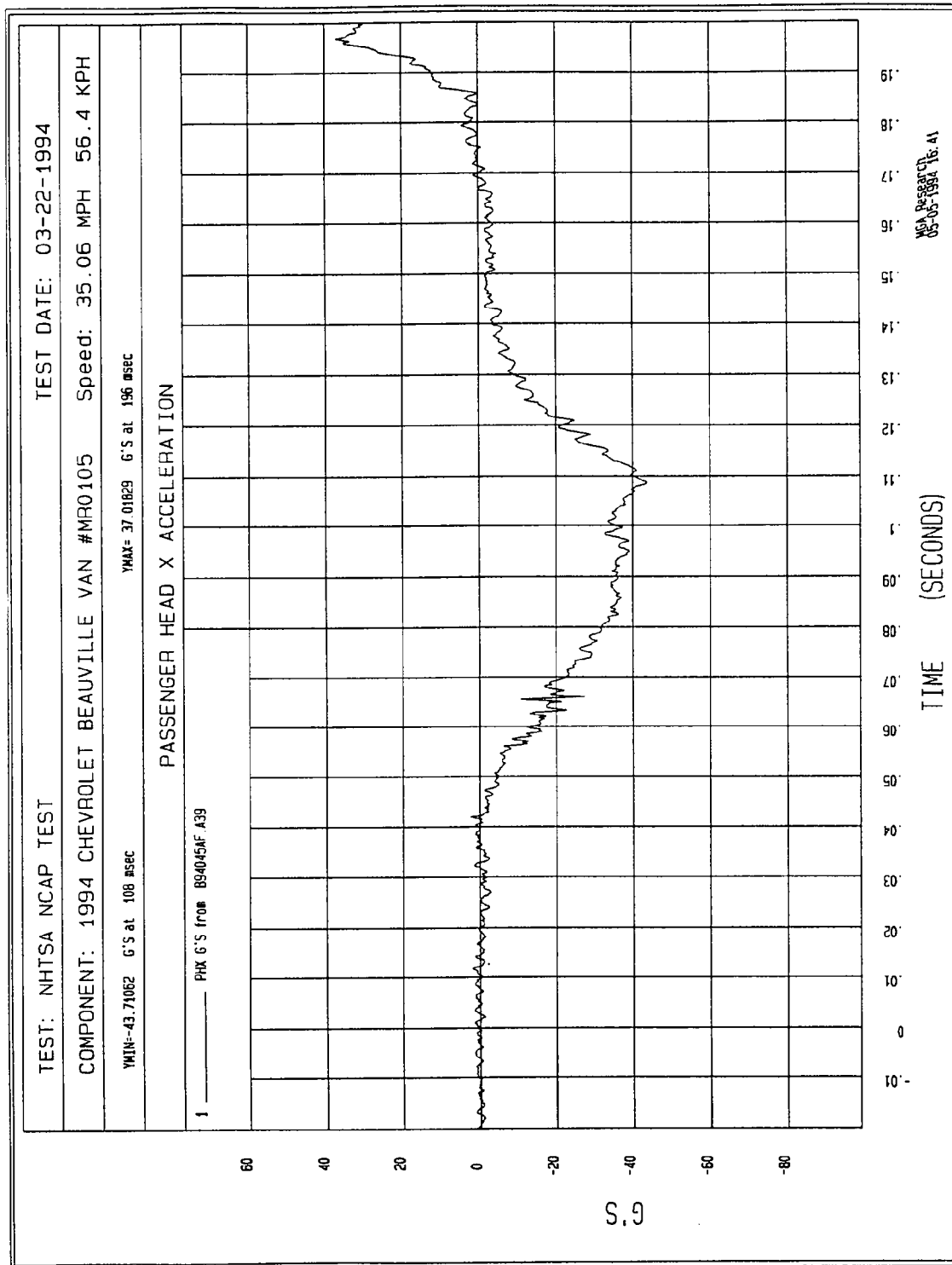


Figure B-71 - Driver Right Lower Tibia Force Z vs. Time



B-72

Figure B-72 - Passenger Head X Acceleration vs. Time

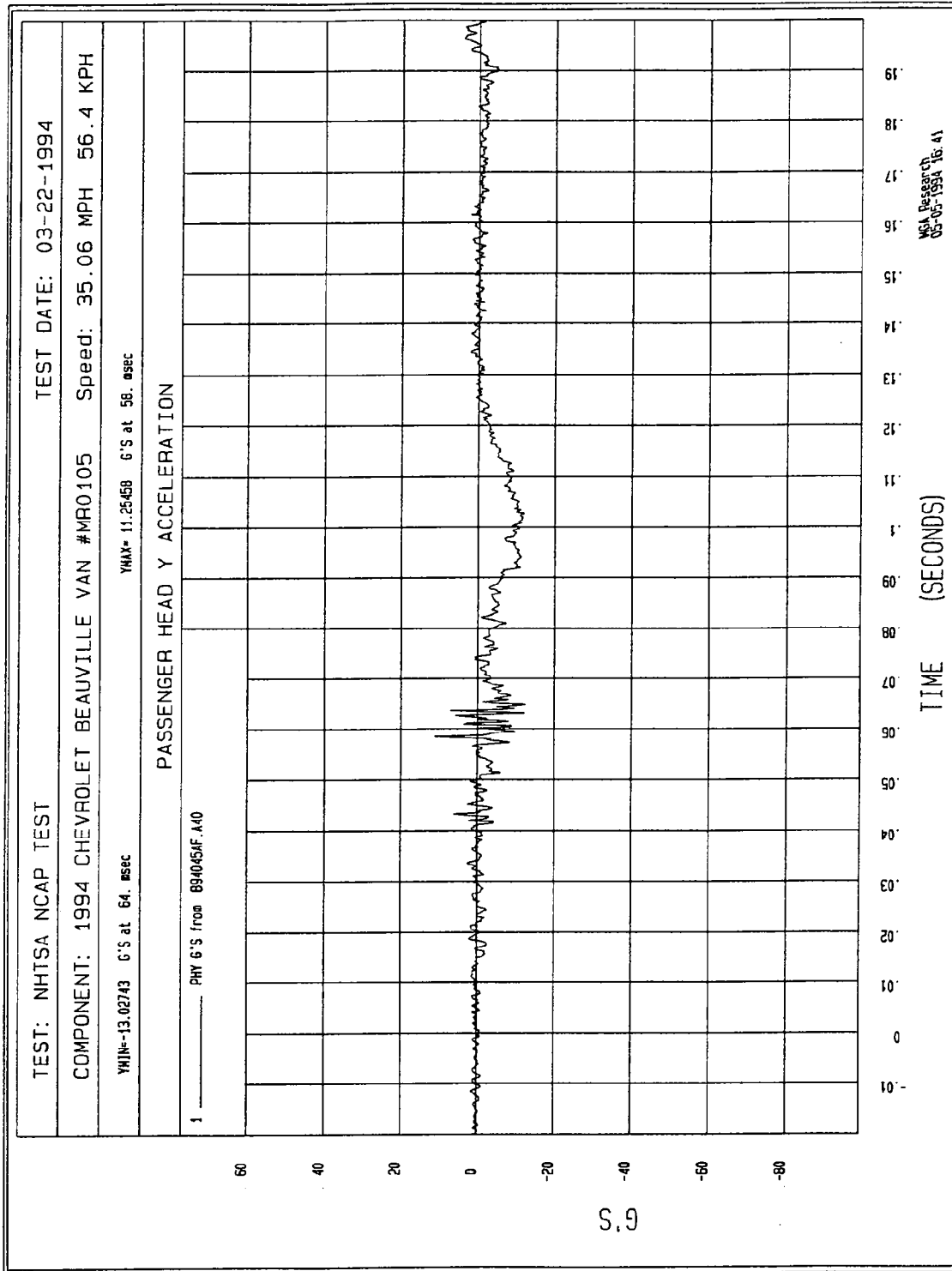


Figure B-73 - Passenger Head Y Acceleration vs. Time

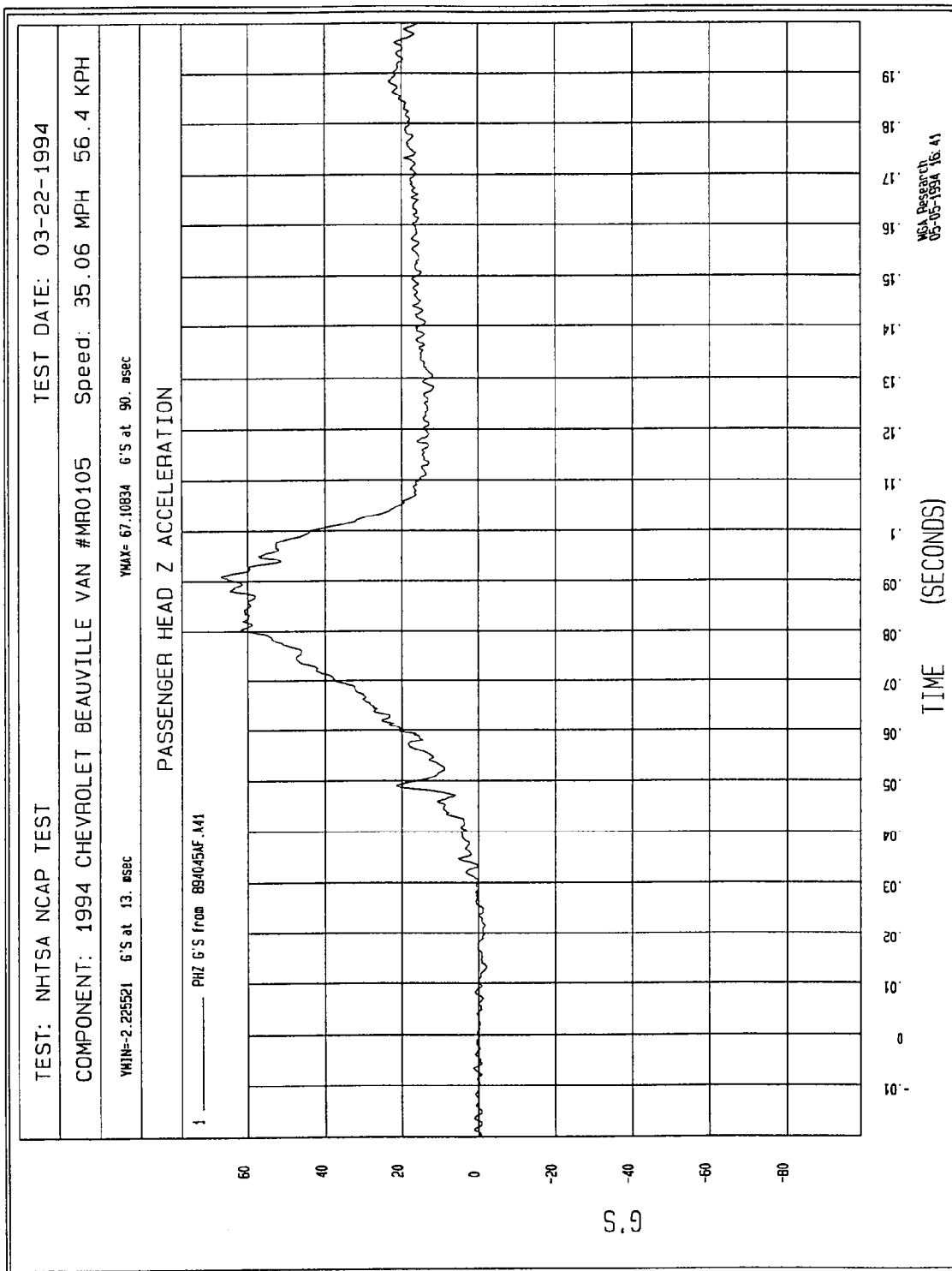


Figure B-74 - Passenger Head Z Acceleration vs. Time

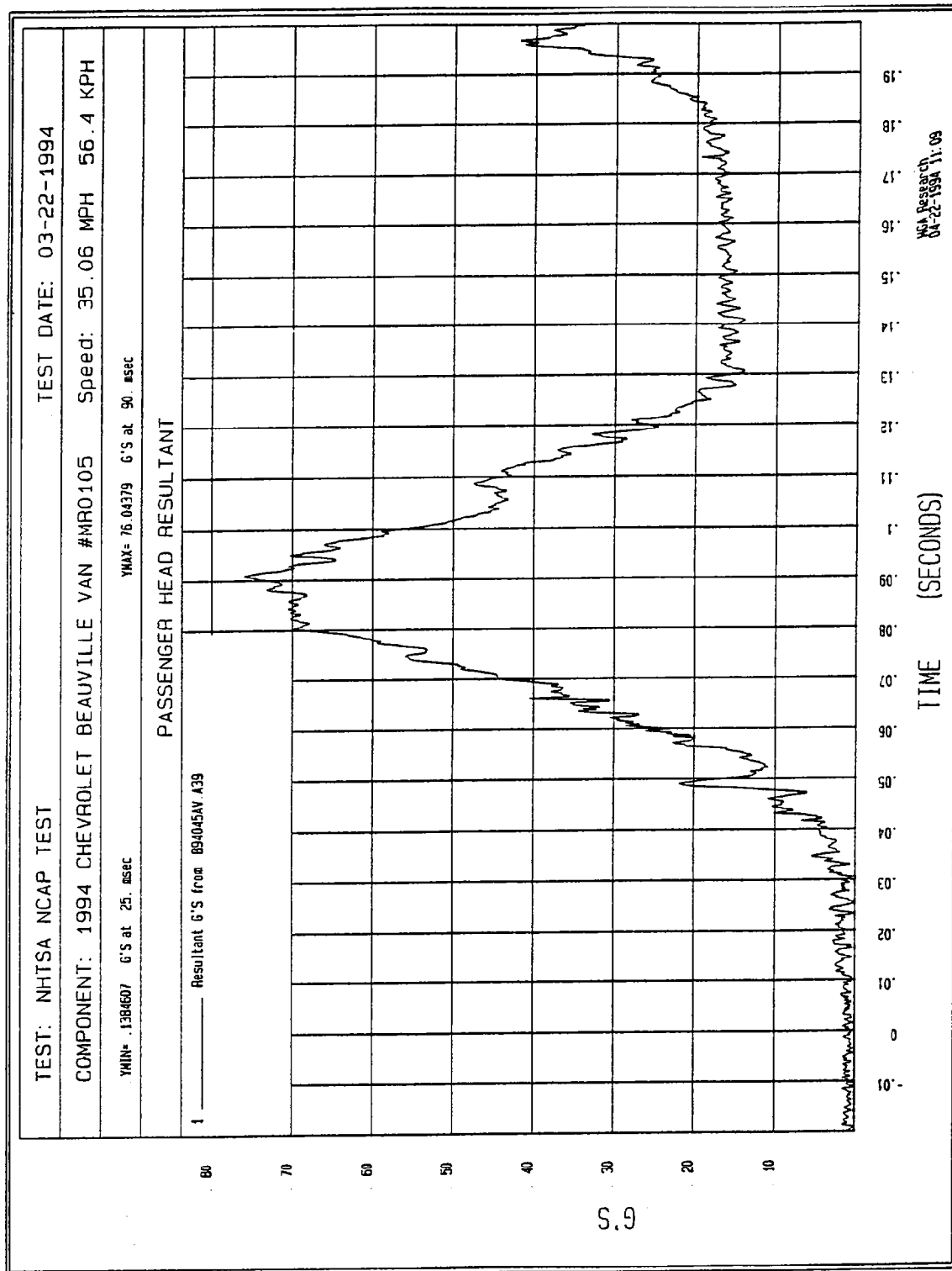


Figure B-75 - Passenger Head Resultant Acceleration vs. Time

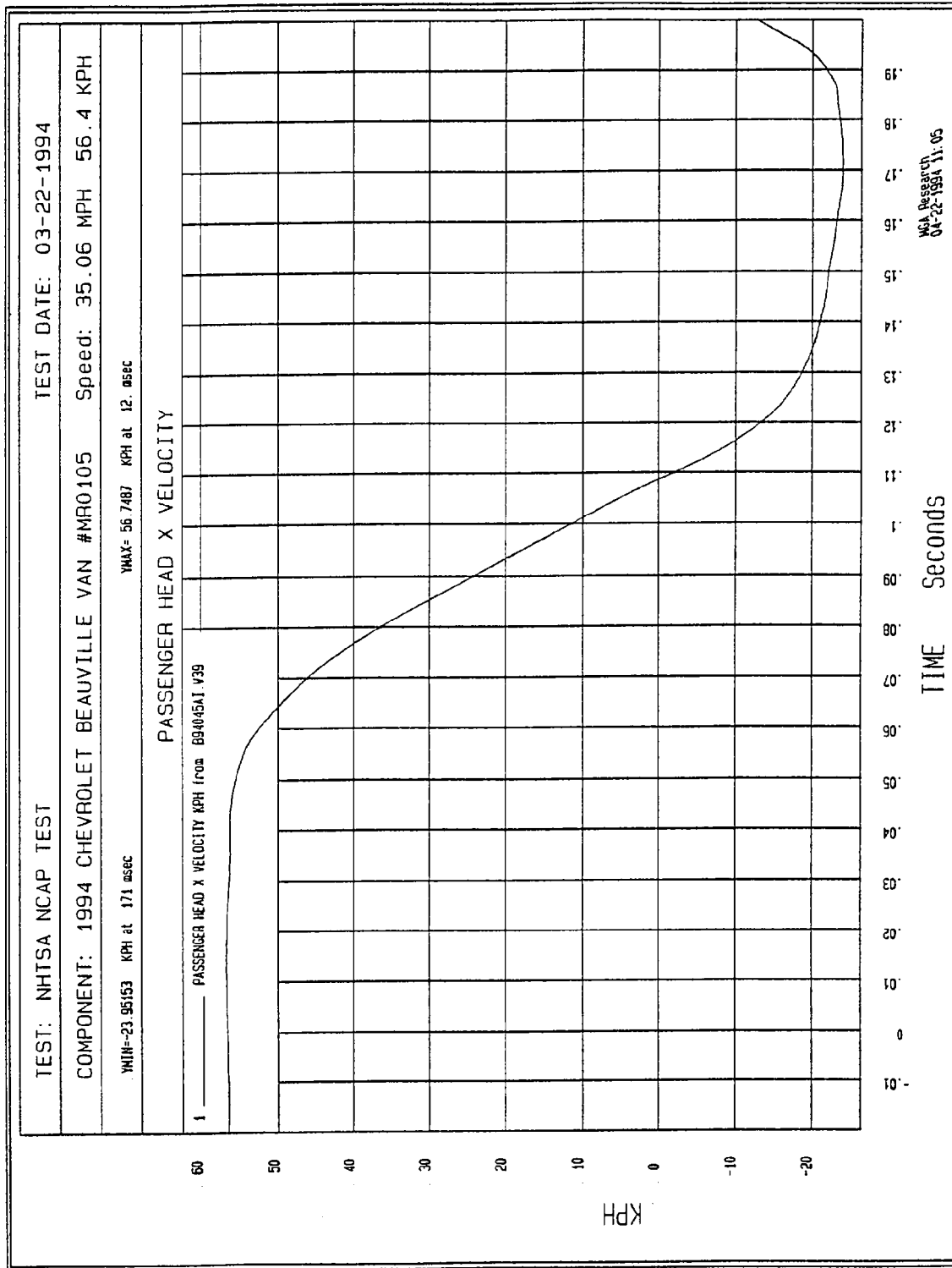


Figure B-76 - Passenger Head X Velocity vs. Time

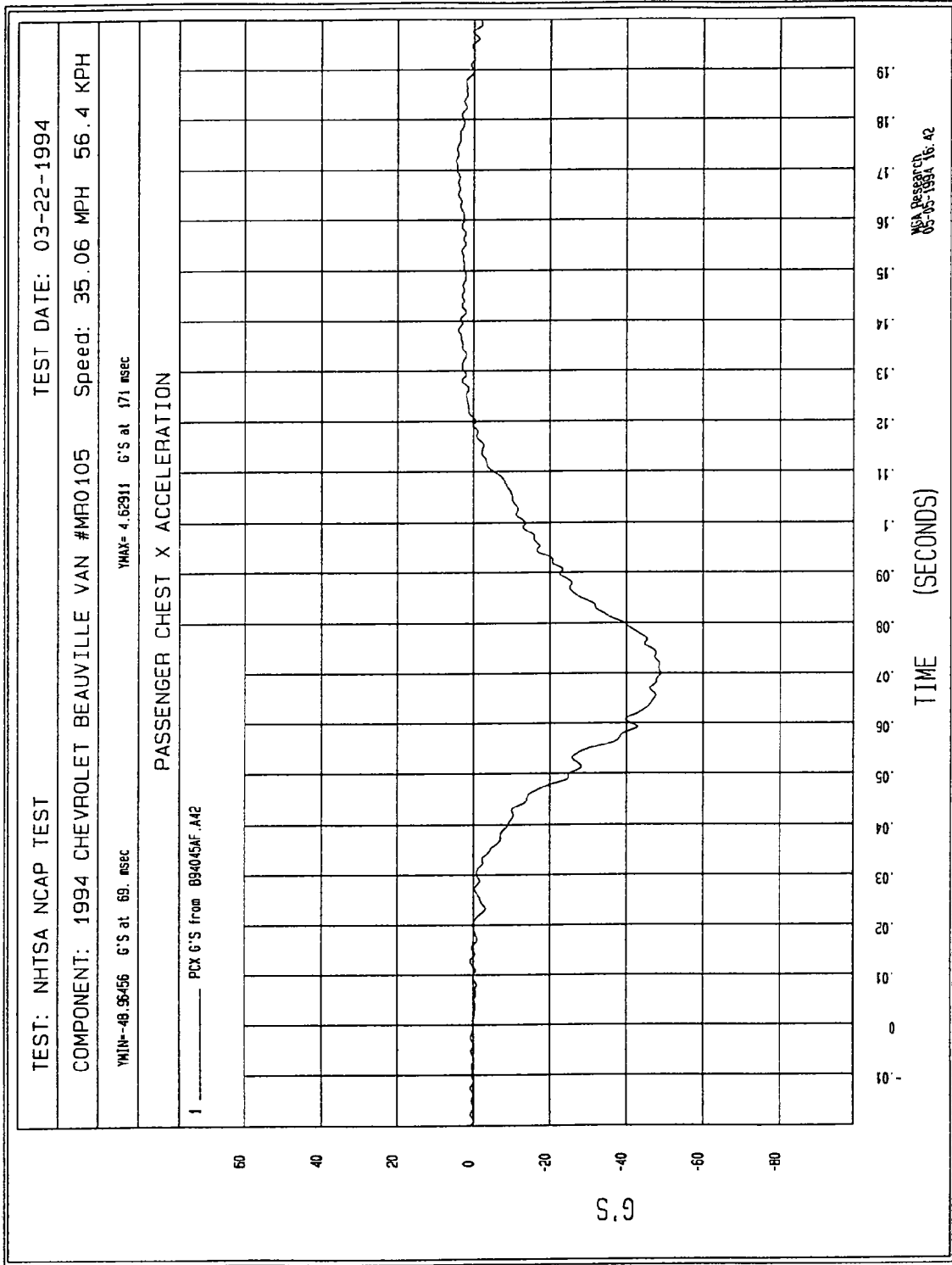


Figure B-77 - Passenger Chest X Acceleration vs. Time

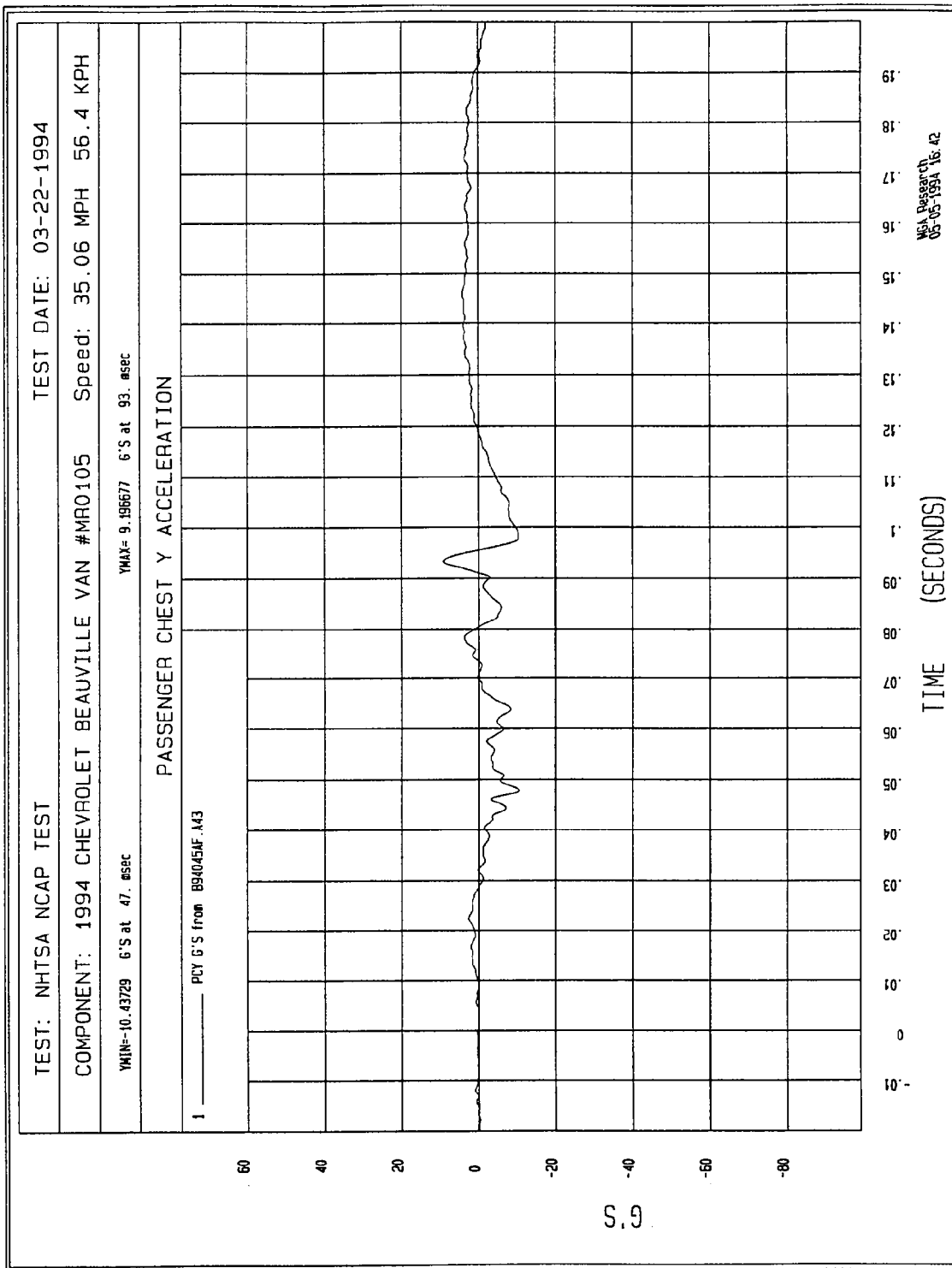


Figure B-78 - Passenger Chest Y Acceleration vs. Time

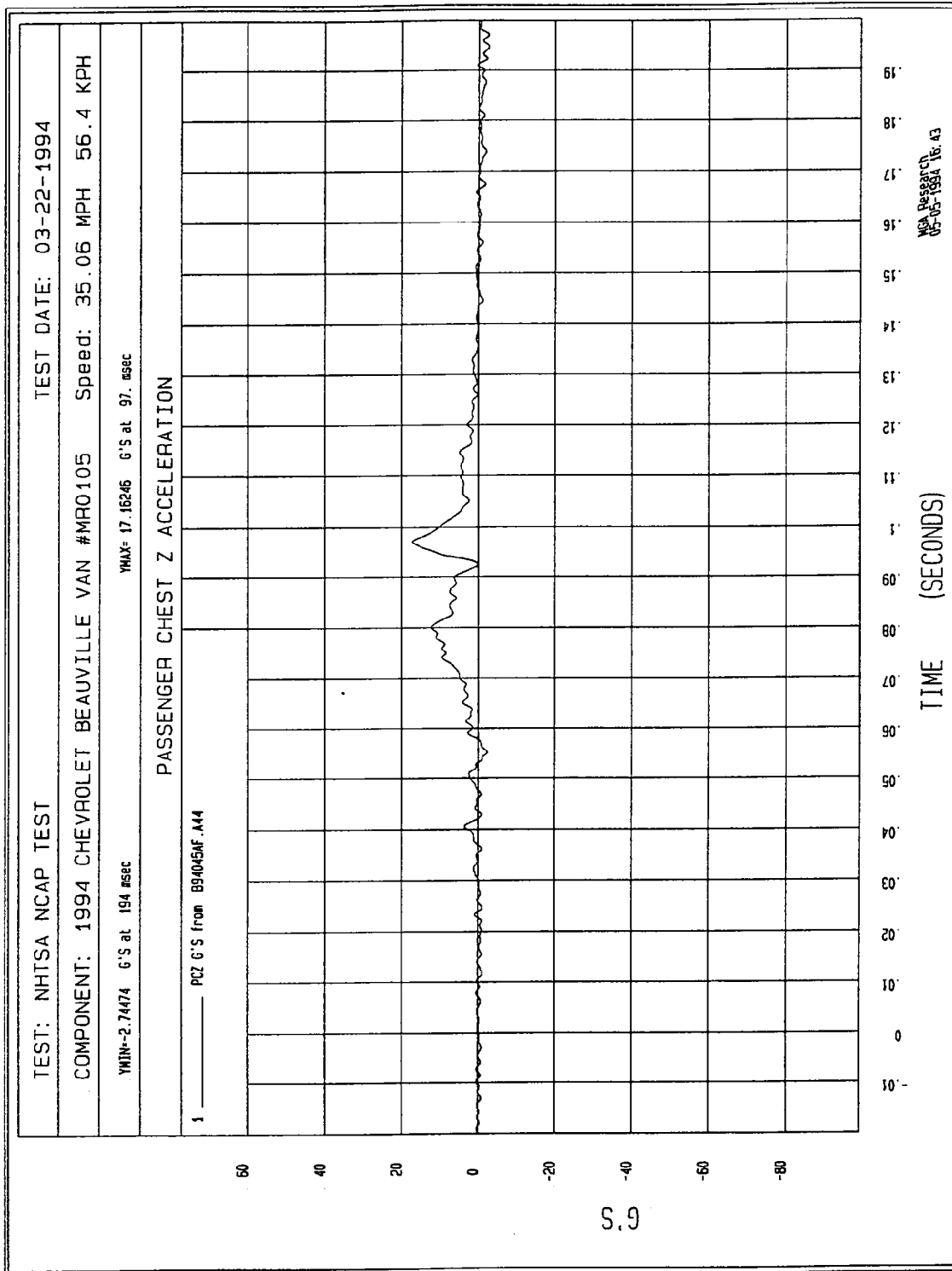


Figure B-79 - Passenger Chest Z Acceleration vs. Time

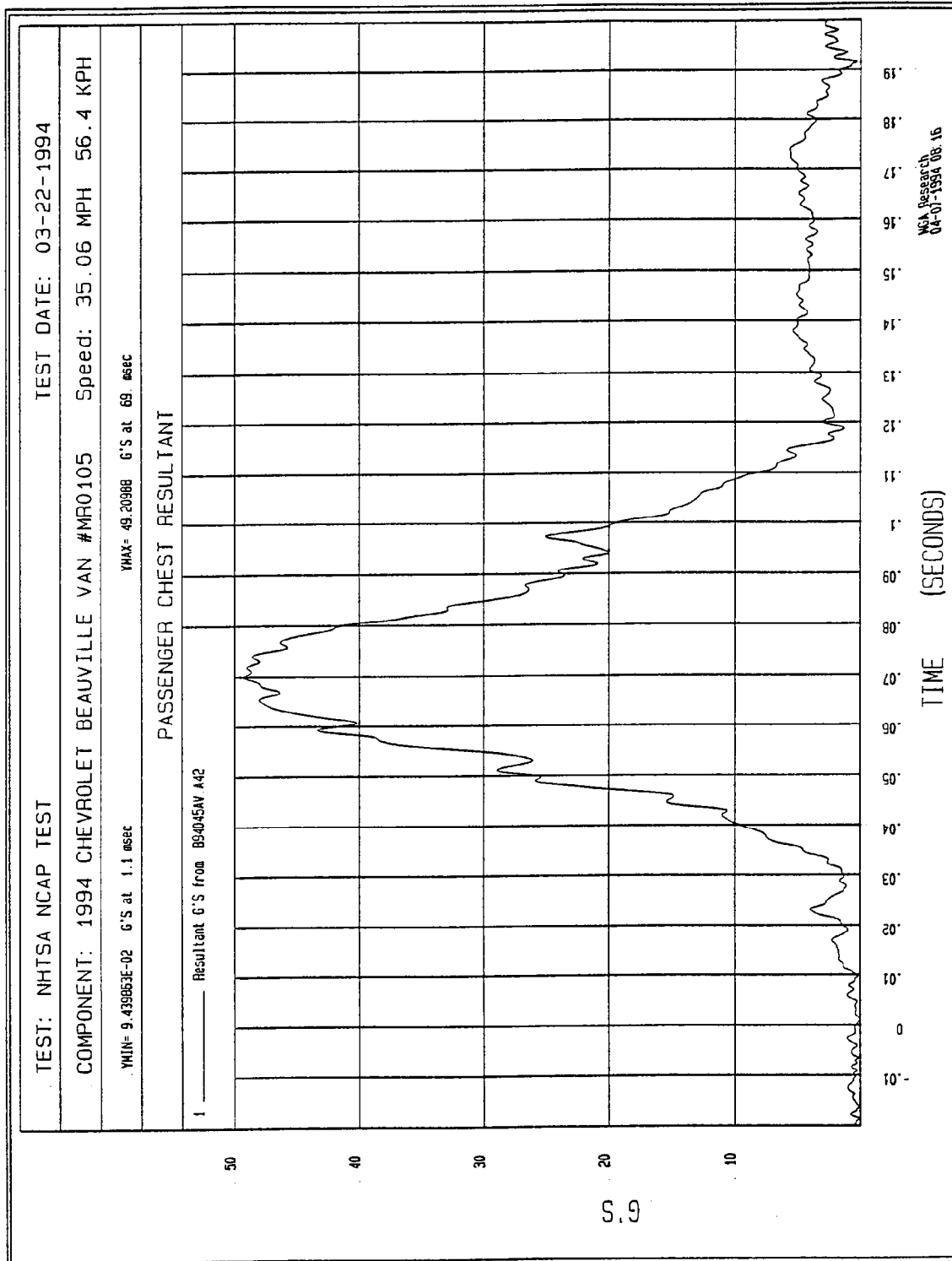


Figure B-80 - Passenger Chest Resultant vs. Time

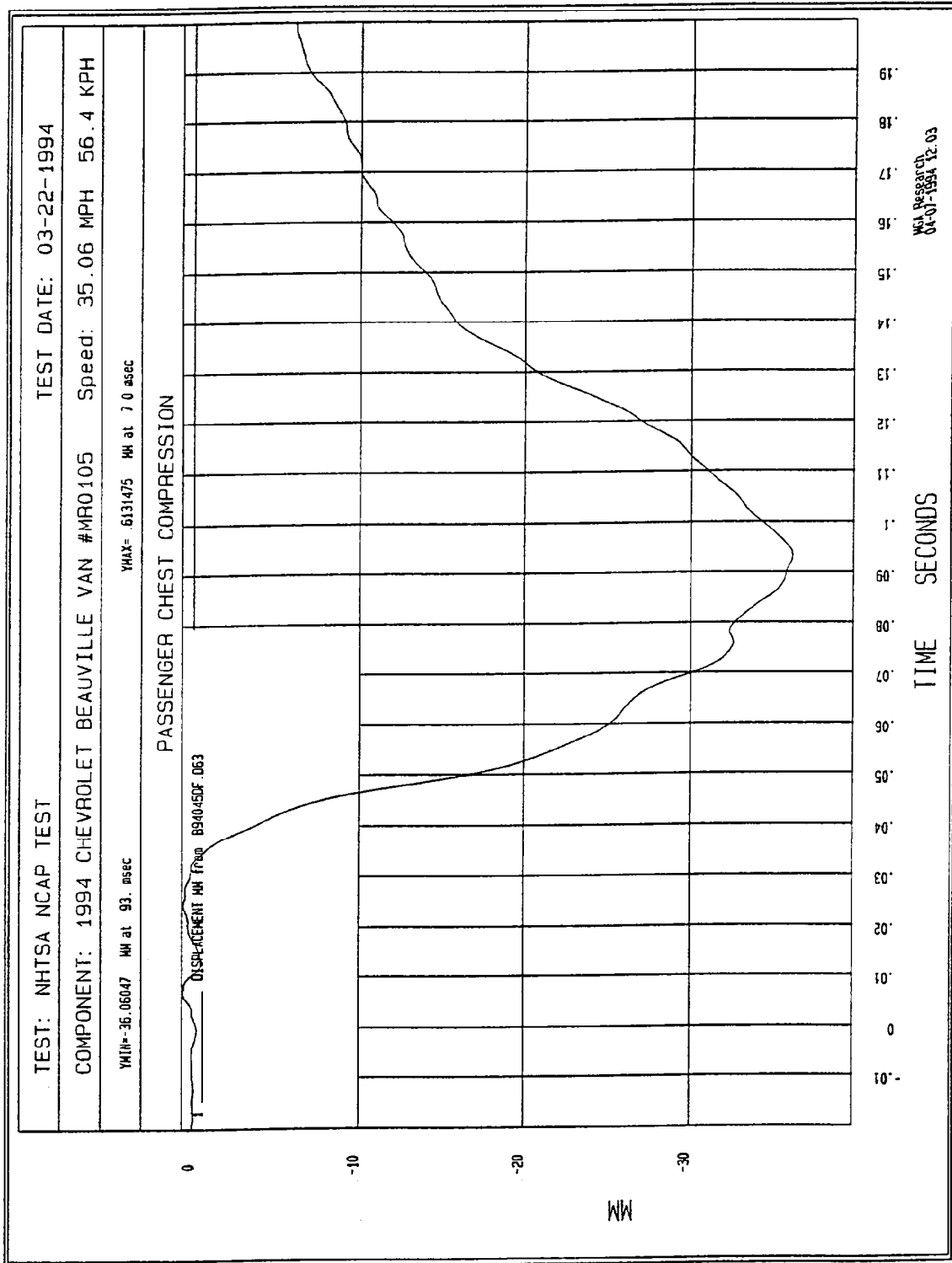
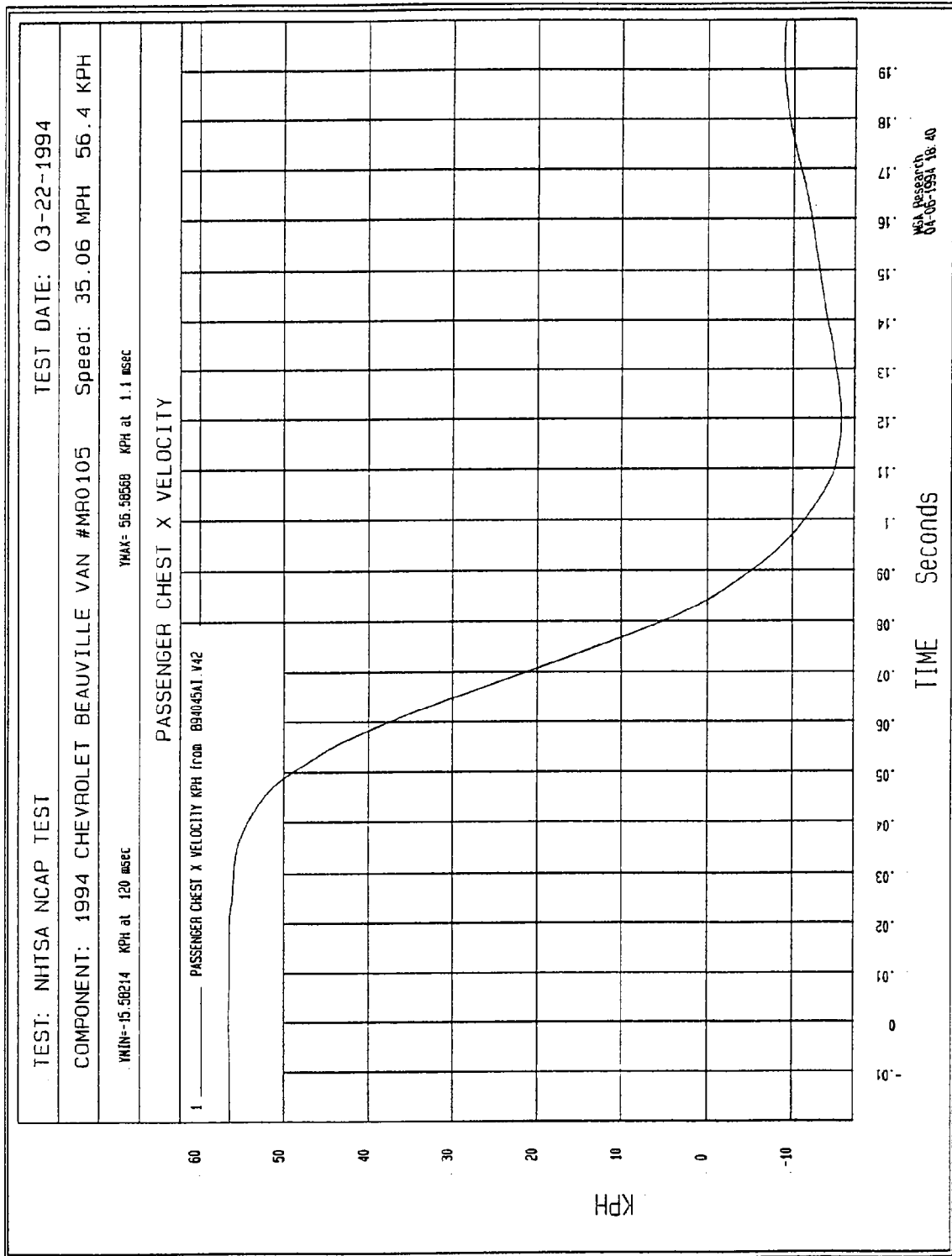


Figure B-81 - Passenger Chest Compression vs. Time



B-82

Figure B-82 - Passenger Chest x Velocity vs. Time

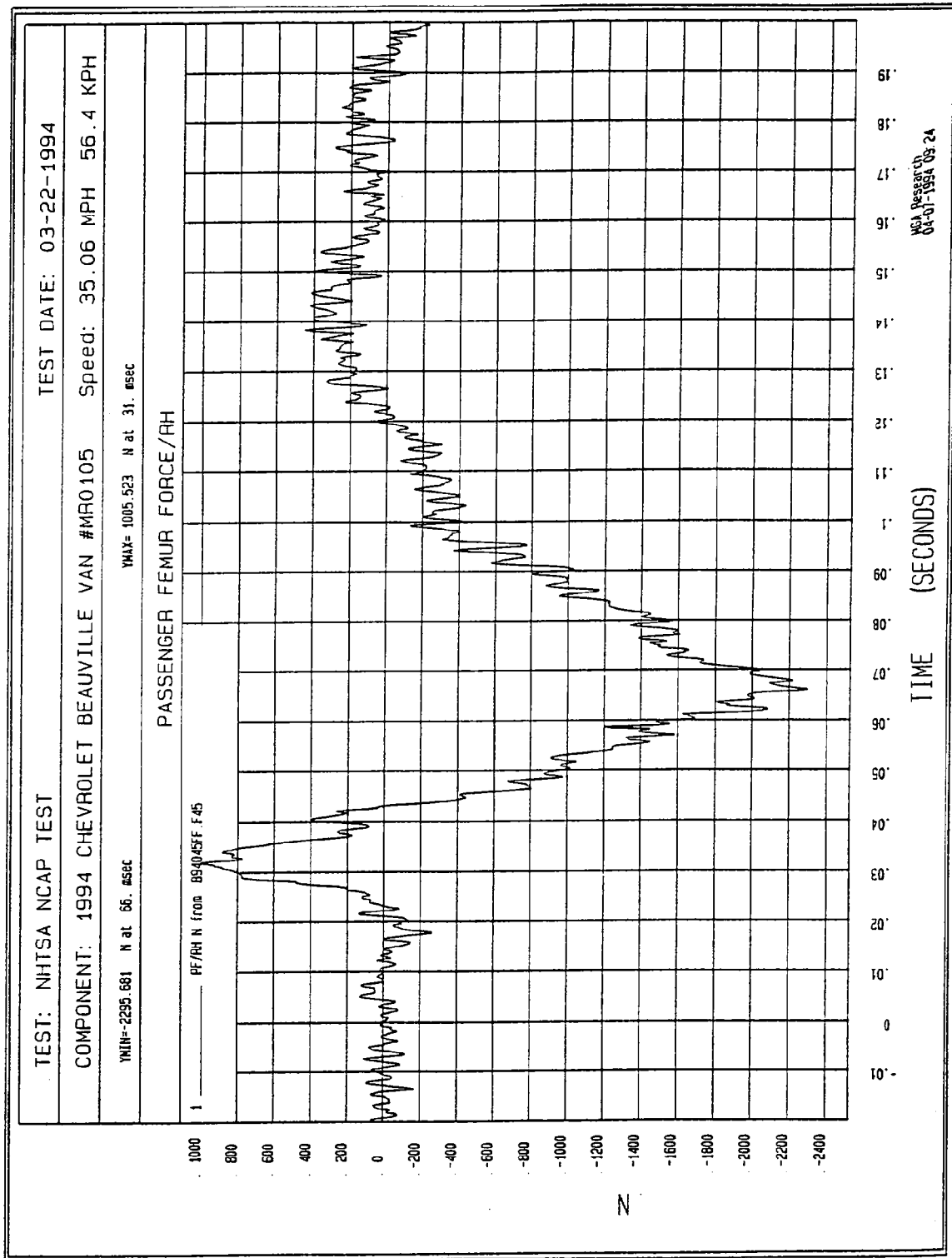


Figure B-83 - Passenger Right Femur Force vs. Time

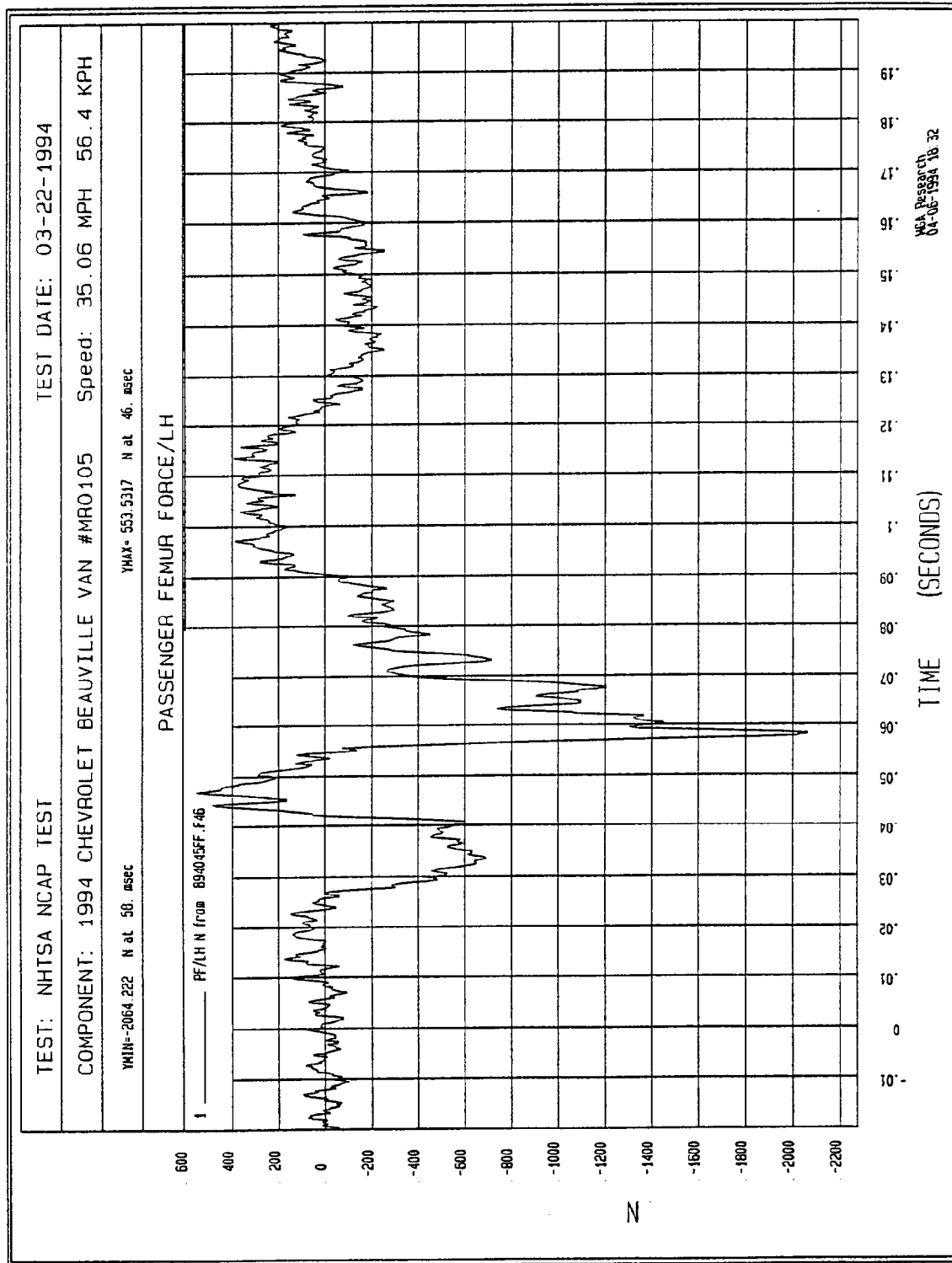


Figure B-84 - Passenger Left Femur Force vs. Time

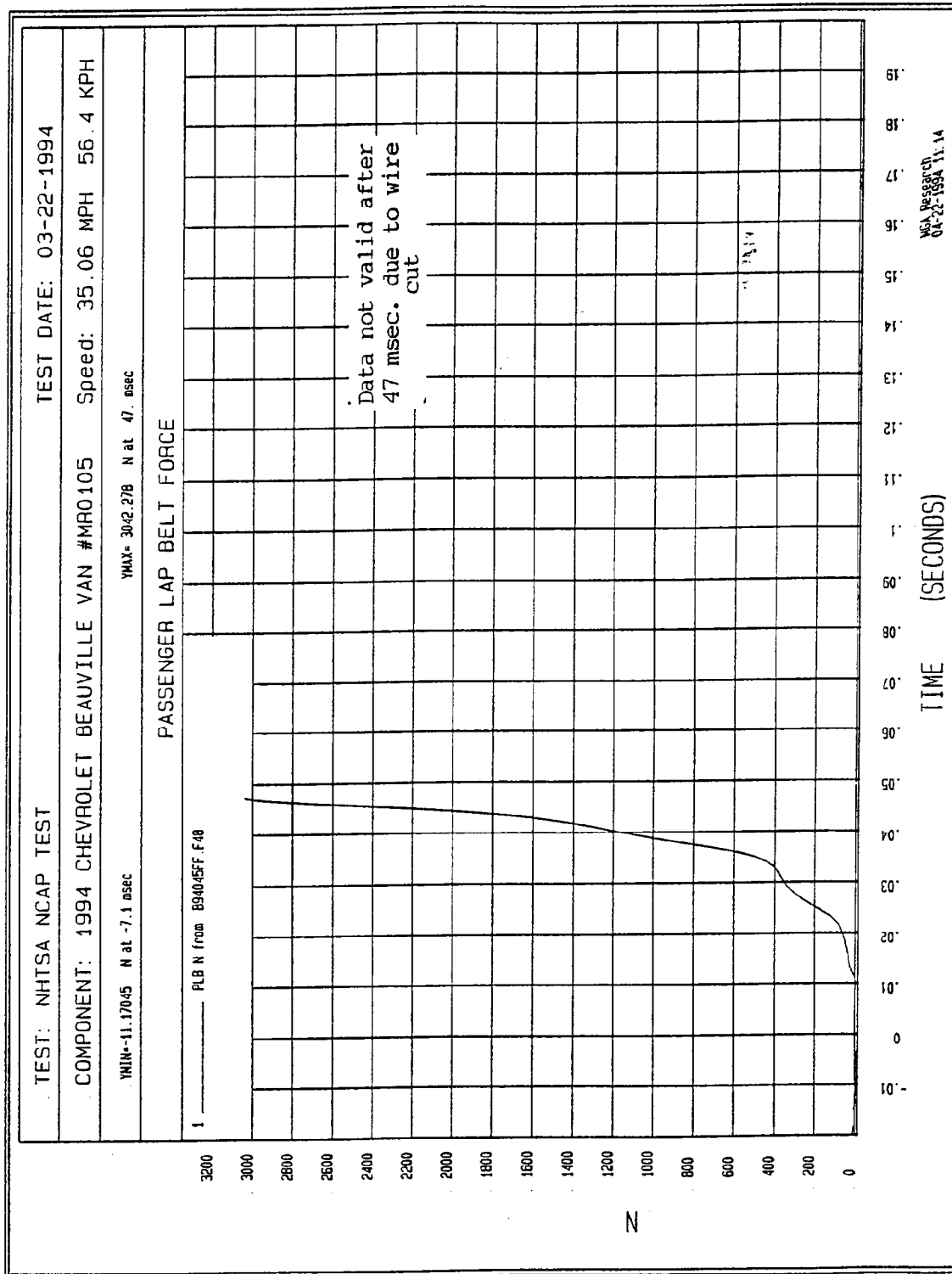


Figure B-85 - Passenger Lap Belt Force vs. Time

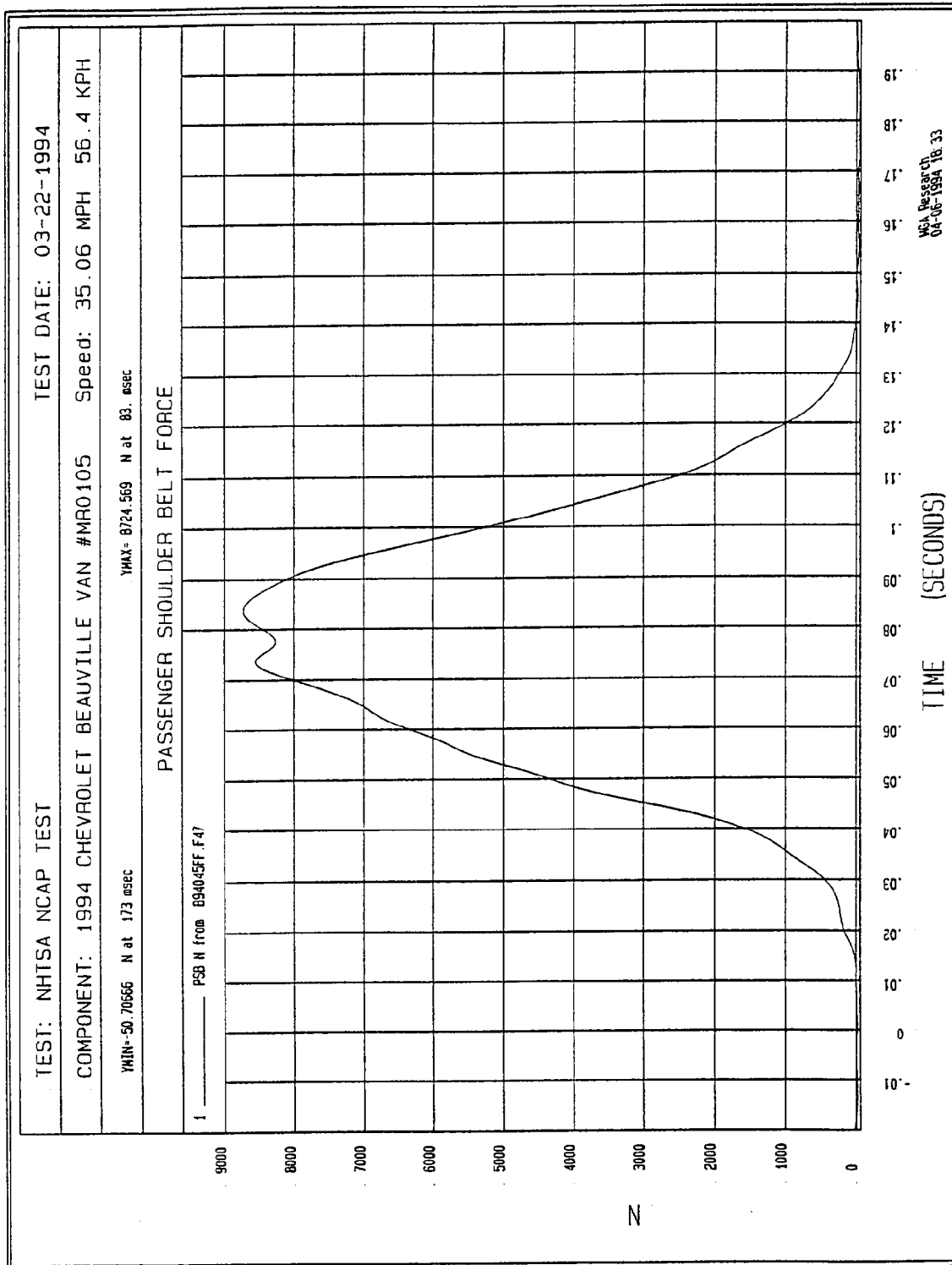


Figure B-86 - Passenger Shoulder Belt Force vs. Time

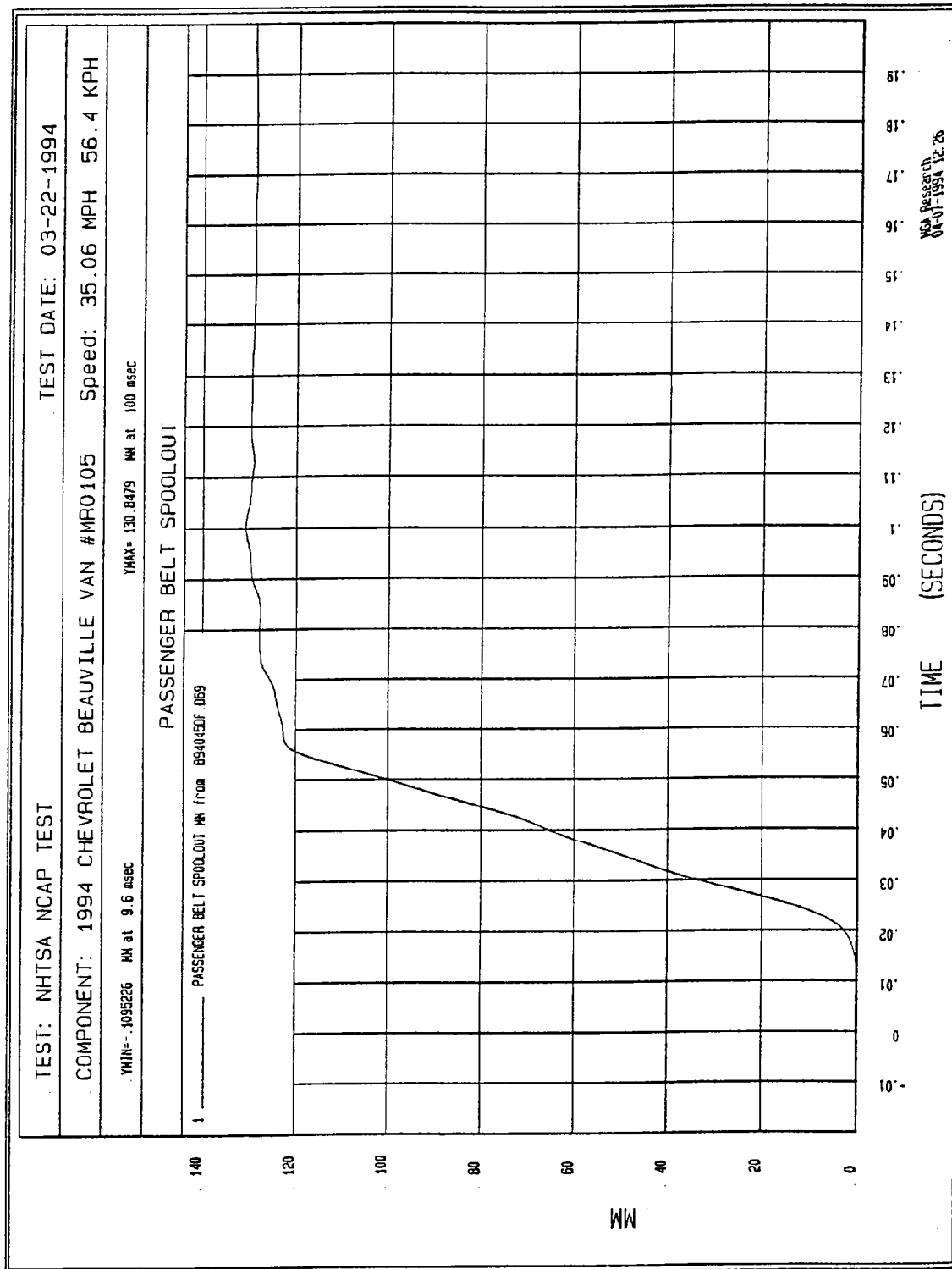


Figure B-87 - Passenger Belt Spoolout vs. Time

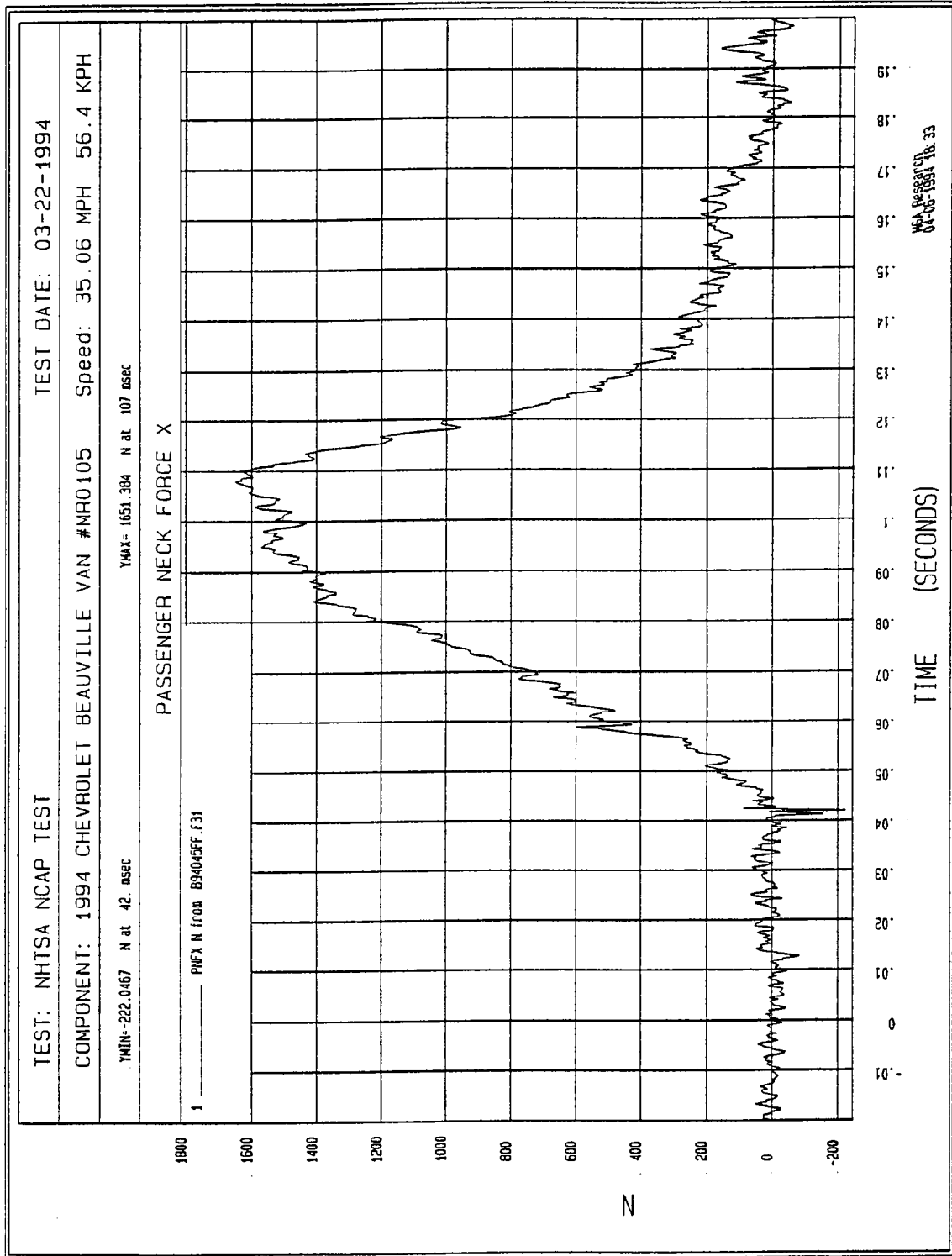


Figure B-88 - Passenger Neck Force X vs. Time

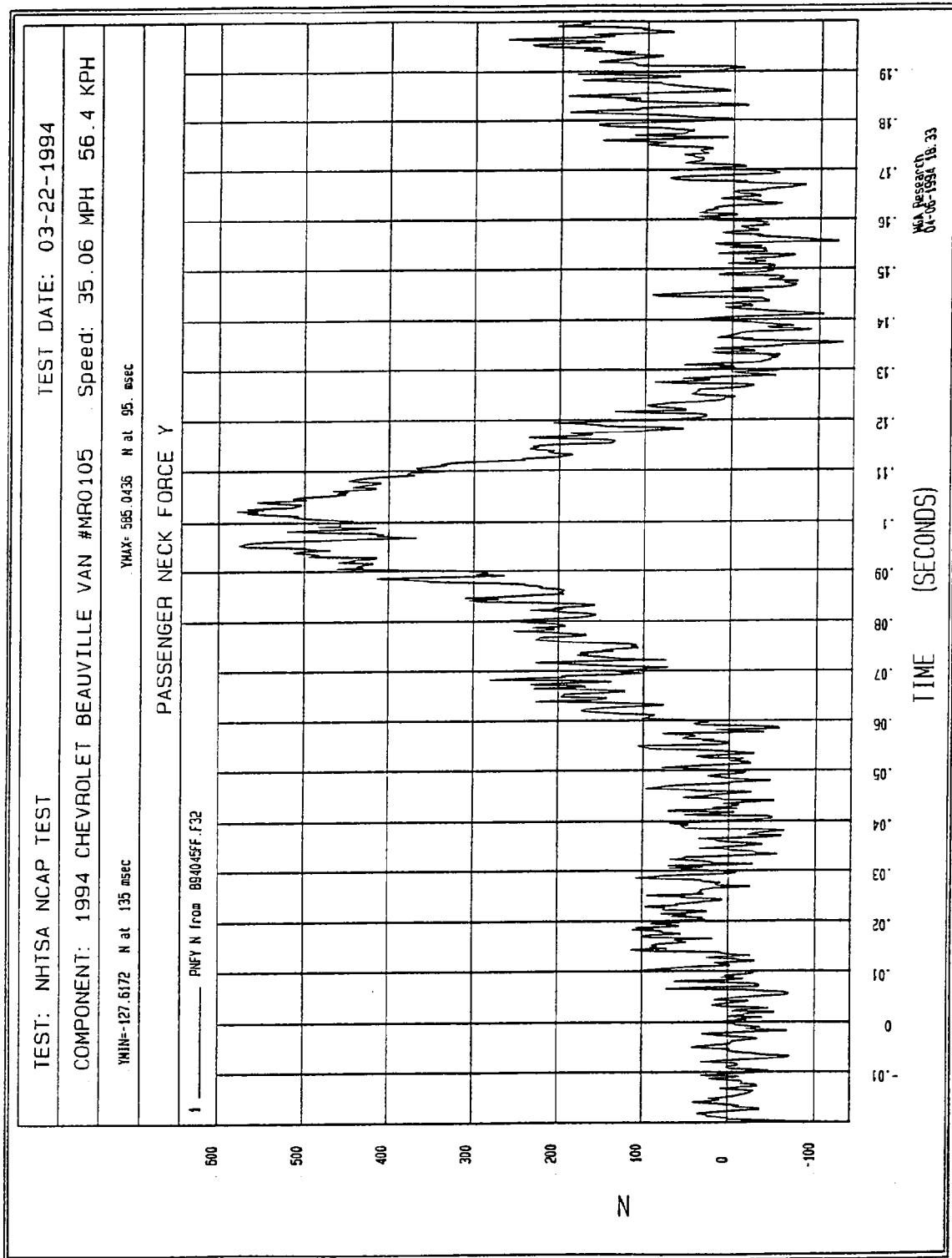


Figure B-89 - Passenger Neck Force Y vs. Time

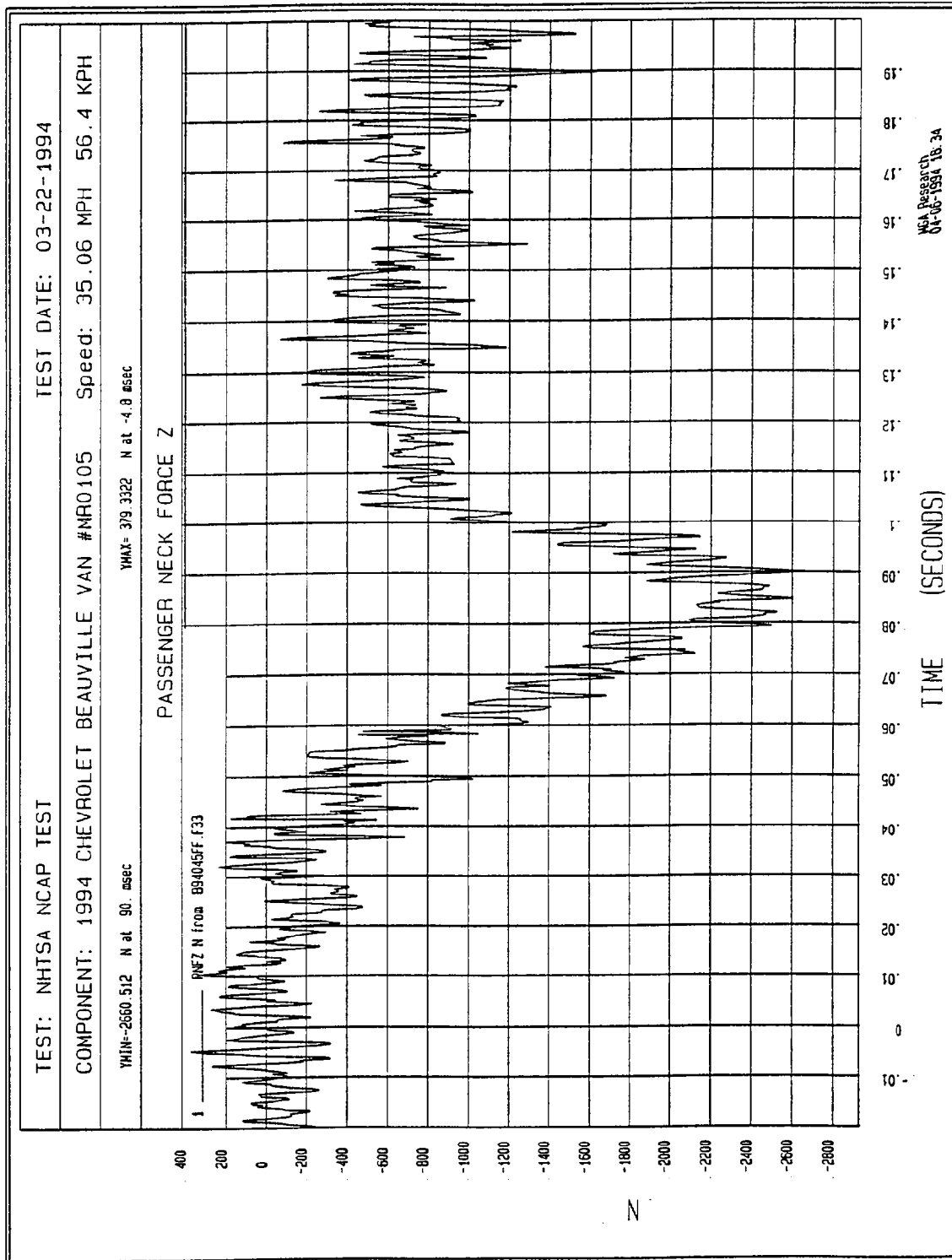


Figure B-90 - Passenger Neck Force Z vs. Time

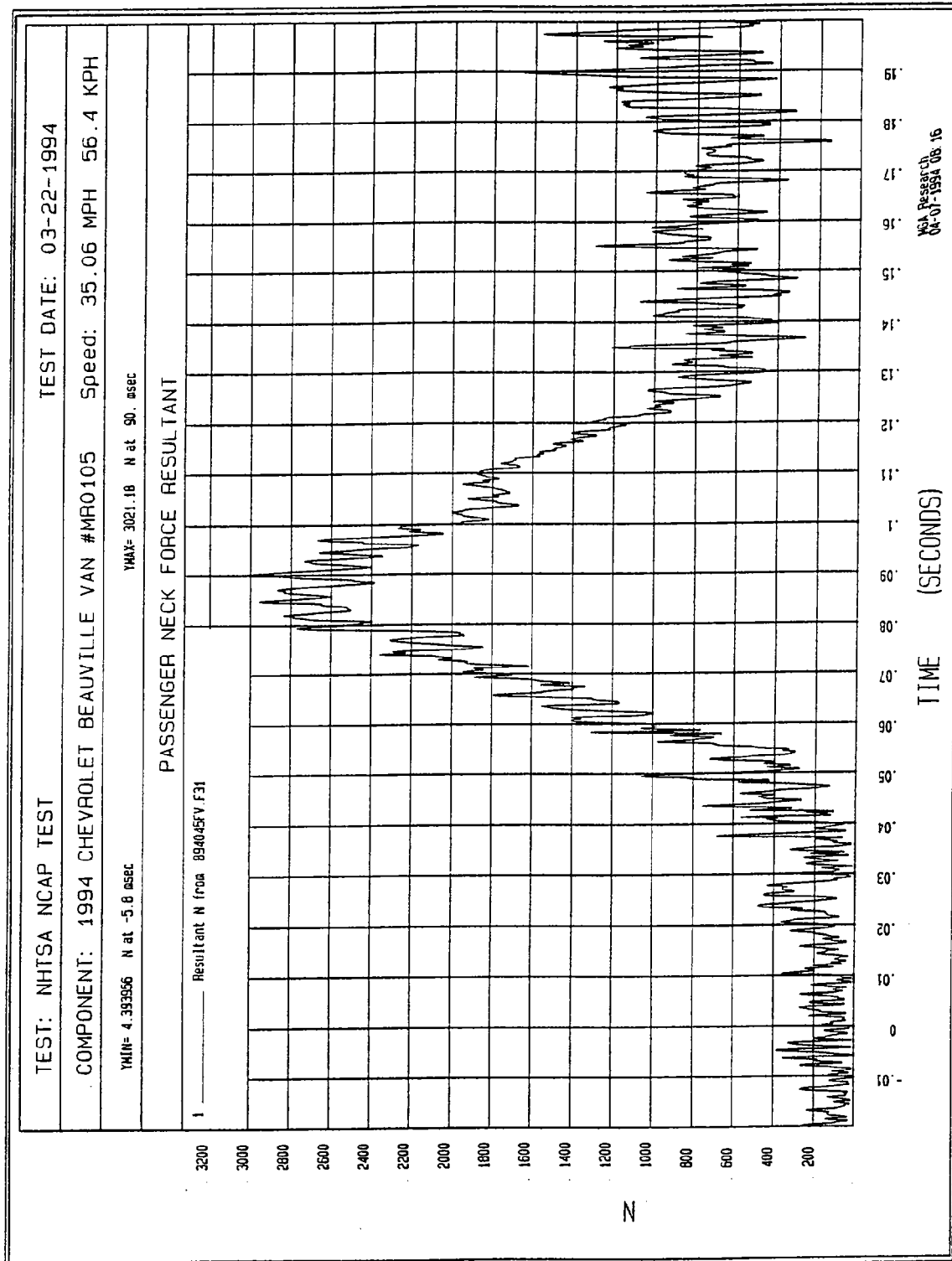


Figure B-91 - Passenger Neck Force Resultant vs. Time

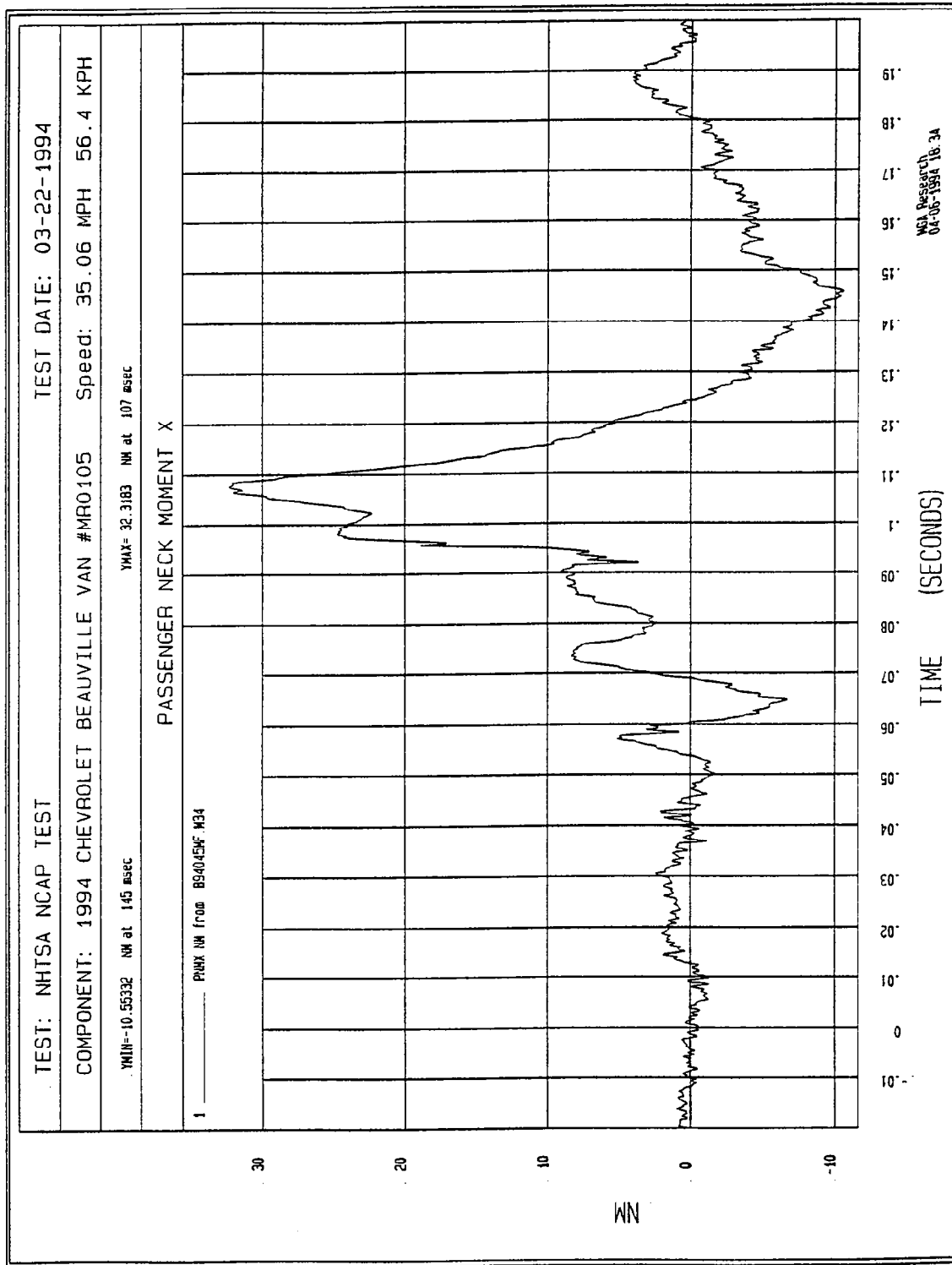


Figure B-92 - Passenger Neck Moment X vs. Time

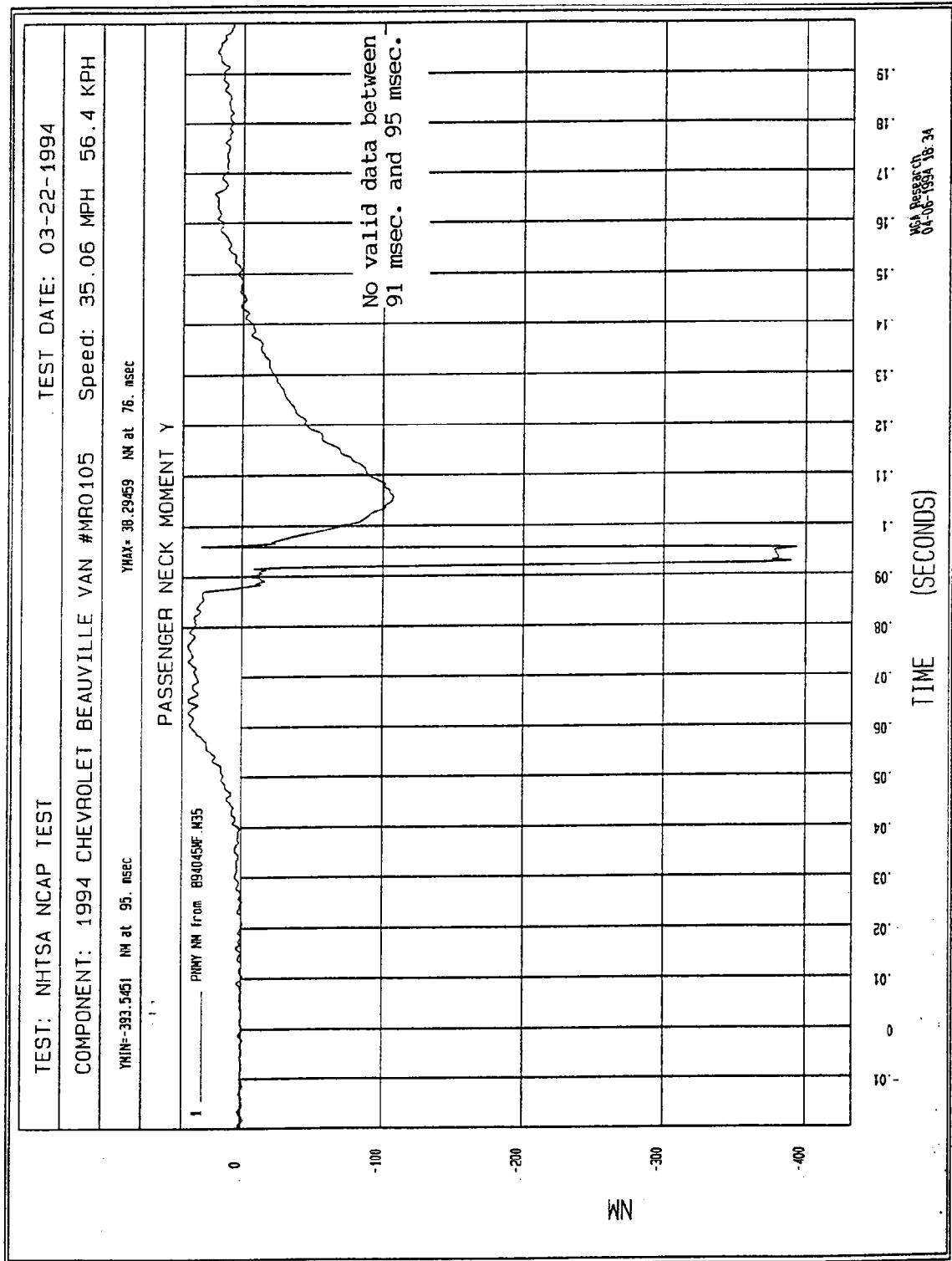


Figure B-93 - Passenger Neck Moment Y vs. Time

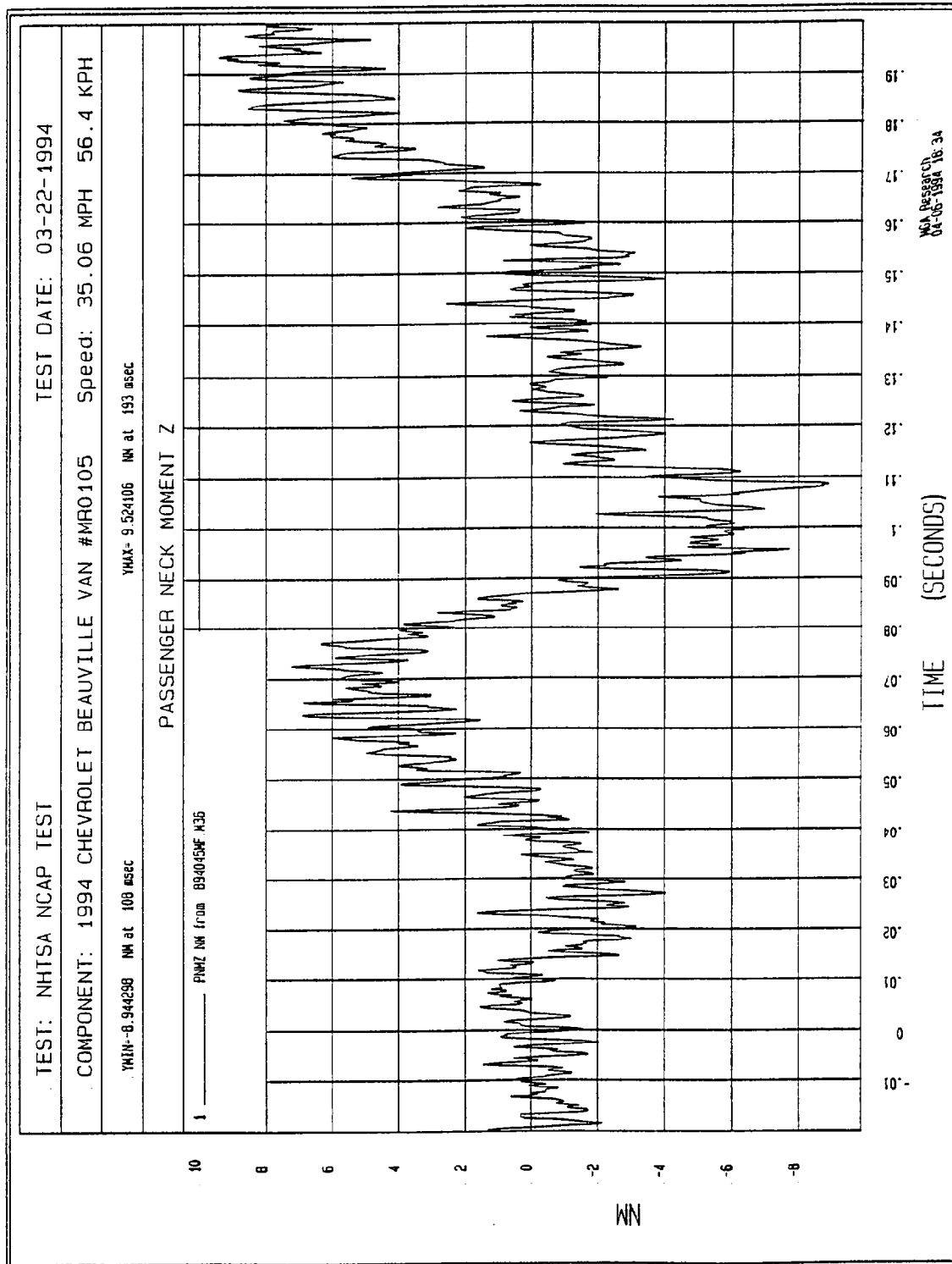


Figure B-94 - Passenger Neck Moment Z vs. Time

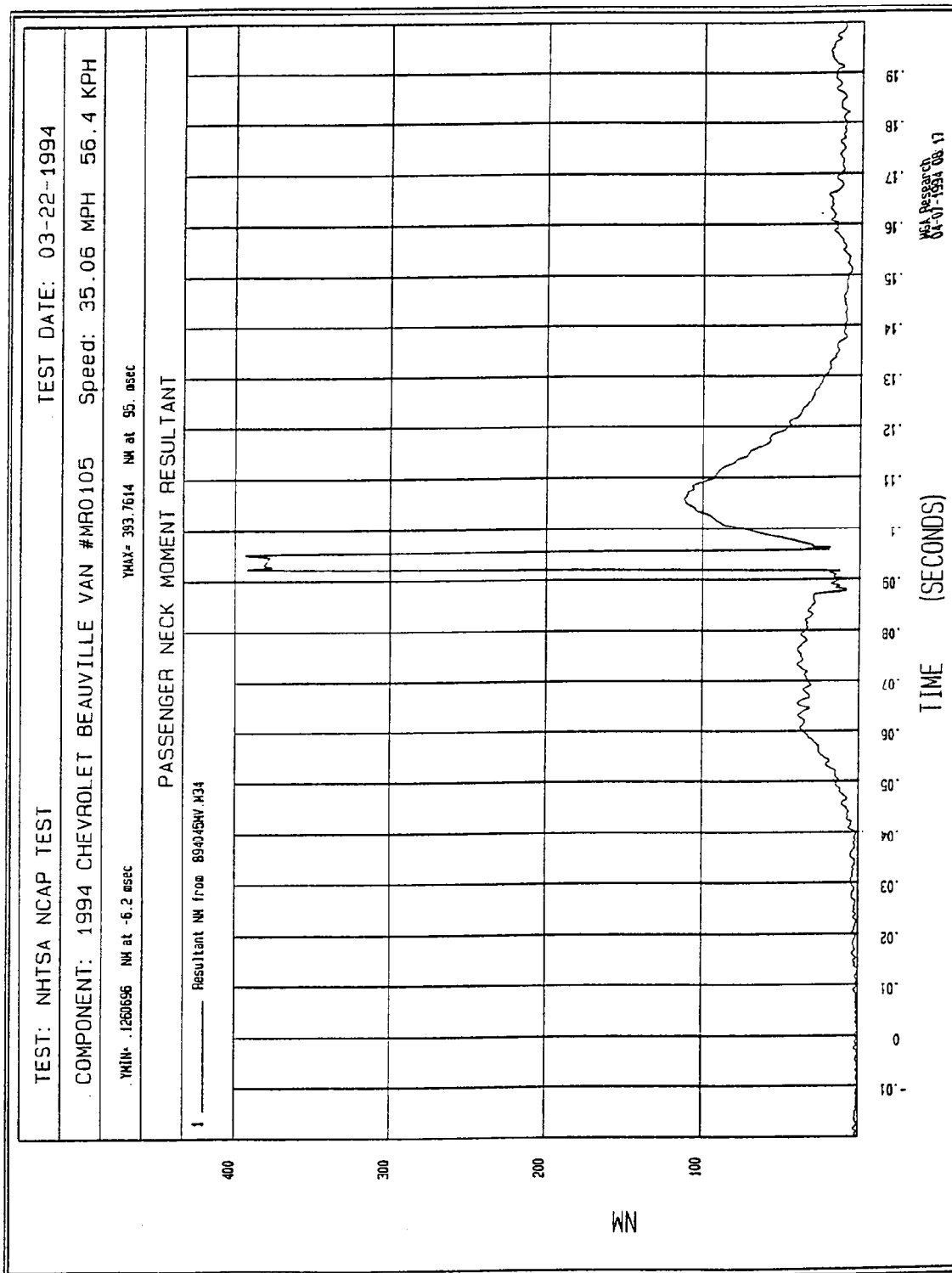


Figure B-95 - Passenger Neck Moment Resultant vs. Time

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 36 DUMMY CALIBRATION BY: Al Chalmers

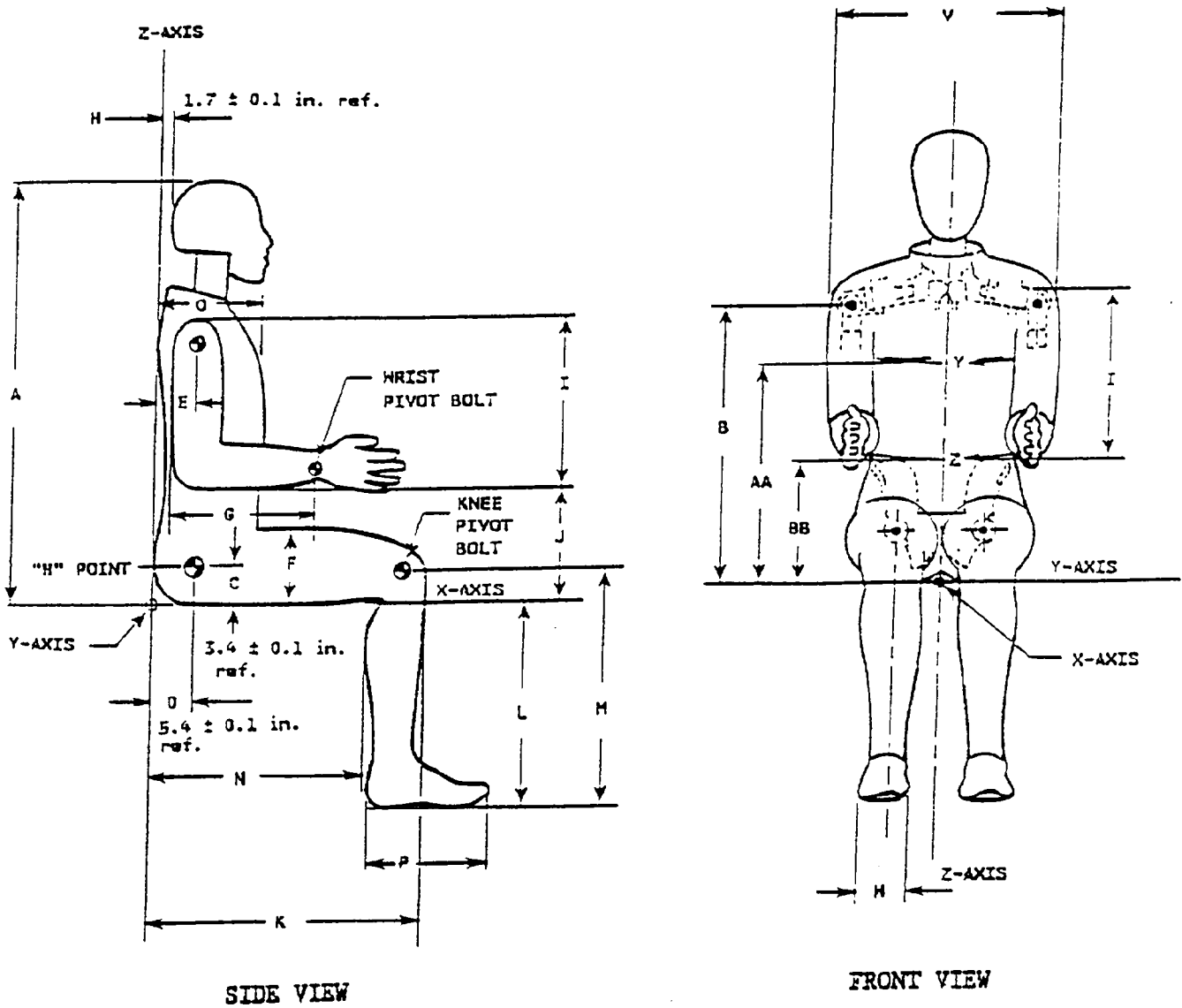
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 03-16-94

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 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

DUMMY NO.: 36 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 03-16-94

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	6
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	25.22
	20 MS	17.60 - 22.60 G	19.22
	30 MS	12.50 - 18.50 G	15.19
Max. Pendulum G Above 30 MS		29.0 G MAX	15.7
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
D Plane Rotation	MAX	64 - 78 DEG.	76
	TIME	57 - 64 MS	58
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	115
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	72
	TIME	47 - 58 MS	52
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	103

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.07
Pendulum Deceleration	10 MS	17.20 - 21.20 G	19.04
	20 MS	14.00 - 19.00 G	16.16
	30 MS	11.00 - 16.00 G	11.45
Max. Pendulum G Above 30 MS		22 G Max	11
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	46
D Plane Rotation	MAX	81 - 106 DEG.	96
	TIME	72 - 82 MS	76
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	155
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-48.9
	TIME	65 - 79 MS	70
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	22.2
Peak Deflection	2.50 to 2.86 IN.	2.55
Peak Resistive Force	1160 to 1325 LBS.	1300
Internal Hysteresis	69 to 85%	71

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.	1122

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1147

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 66 DUMMY CALIBRATION BY: Al Chalmers

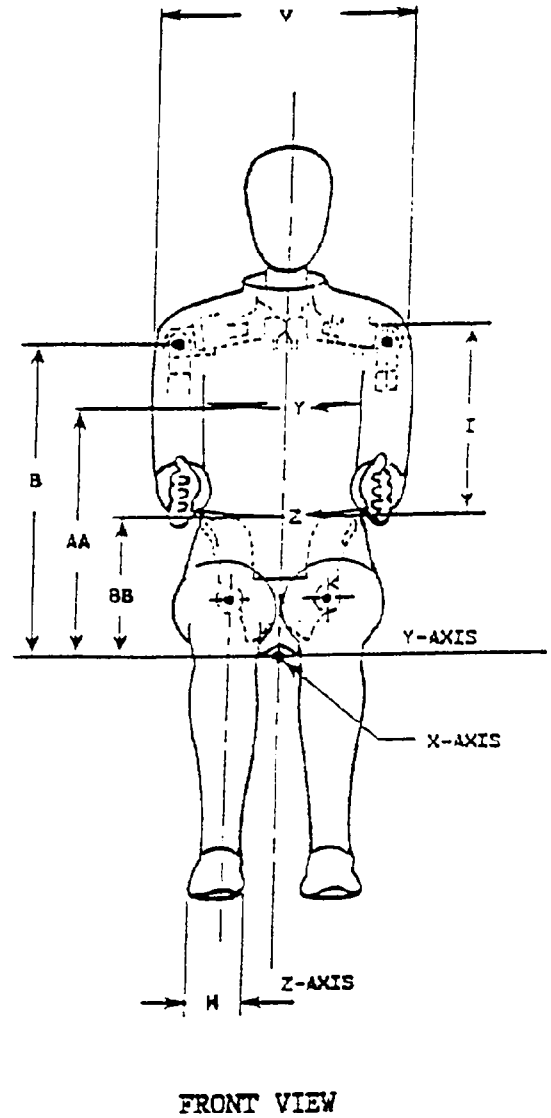
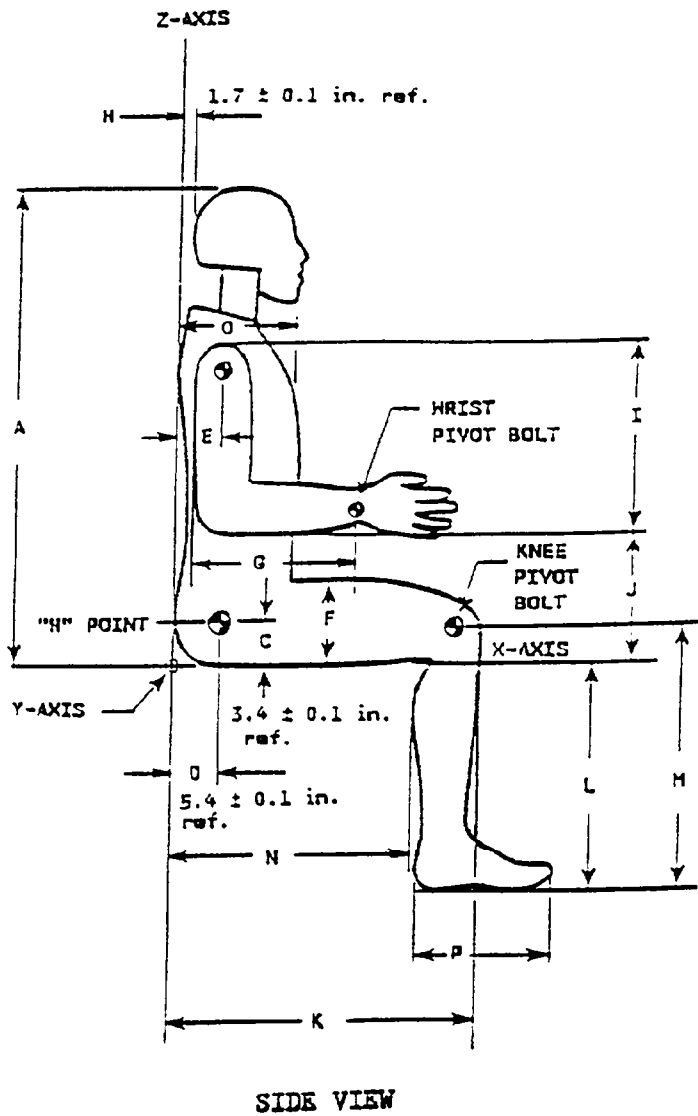
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 03-16-94

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.: 66 DUMMY CALIBRATION BY: Al Chalmers

VERIFICATION DATE: 03-16-94

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

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	271
Peak Lateral Acceleration	-15 G. MAX	8
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	24.47
	20 MS	17.60 - 22.60 G	21.36
	30 MS	12.50 - 18.50 G	14.42
Max. Pendulum G Above 30 MS		29.0 G MAX	16
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
D Plane Rotation	MAX	64 - 78 DEG.	75
	TIME	57 - 64 MS	58
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	115
Moment About Occipital Condyle	MIN.	65 - 80 FT.LBS	67
	TIME	47 - 58 MS	52
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	102

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.04
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.97
	20 MS	14.00 - 19.00 G	15.43
	30 MS	11.00 - 16.00 G	13.08
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	45
D Plane Rotation	MAX	81 - 106 DEG.	98
	TIME	72 - 82 MS	77
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	159
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-44.6
	TIME	65 - 79 MS	72
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	147

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	22.1
Peak Deflection	2.50 to 2.86 IN.	2.62
Peak Resistive Force	1160 to 1325 LBS.	1301
Internal Hysteresis	69 to 85%	71

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.88
Maximum Force	1060 - 1300 LBS.	1077

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.8
Maximum Force	1060 - 1300 LBS.	1078

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	ACC70	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	Denton	1/27/94
Left Femur Load Cell	260	Denton	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	Servo	2/21/94
Lap Belt Load Cell	661	Lebow	11/22/93
Torso Belt Load Cell	691	Lebow	11/22/93

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 36

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	439	Denton	8/18/93
Upper Right Tibia Moment Y	439	Denton	8/18/93
Lower Right Tibia Force X	427	Denton	8/18/93
Lower Right Tibia Moment Y	427	Denton	8/18/93
Lower Right Tibia Force Z	427	Denton	8/18/93
Upper Left Tibia Moment X	437	Denton	8/18/93
Upper Left Tibia Moment Y	437	Denton	8/18/93
Lower Left Tibia Force X	425	Denton	8/18/93
Lower Left Tibia Moment Y	425	Denton	8/18/93
Lower Left Tibia Force Z	425	Denton	8/18/93

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 66

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACC46	Endevco	1/25/94
Head Y	ACC47	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	950	GSE	12/13/93
Left Femur Load Cell	947	GSE	12/13/93
Neck Load Cell X	443	Denton	2/9/94
Neck Load Cell Y	443	Denton	2/9/94
Neck Load Cell Z	443	Denton	2/9/94
Neck Moment X	443	Denton	2/9/94
Neck Moment Y	443	Denton	2/9/94
Neck Moment Z	443	Denton	2/9/94
Chest Deflection Gauge	66	Bourns	3/8/94
Lap Belt Load Cell	624	Lebow	11/22/93
Torso Belt Load Cell	212	Lebow	11/22/93

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	MGA003	Entran	11/4/93
Right Rear Seat Crossmember X	MGA025	Entran	1/27/94
Top of Engine X	A06M	Endevco	11/30/93
Bottom of Engine X	MGA136	Entran	12/22/93
Left Brake Caliper X	MGA0	Entran	3/14/94
Right Brake Caliper X	AN47	Endevco	12/22/93
Instrument Panel X	AC9C0	Endevco	3/14/94
Redundant Left Rear Seat Crossmember X	MGA078	Entran	2/3/94
Redundant Right Rear Seat Crossmember X	MGA131	Entran	10/22/93

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

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

Safety Belts: They're For Everyone

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

And it explains the Supplemental Inflatable Restraint, or "air bag" system.



CAUTION:

Don't let anyone ride where they can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be *much* worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.



This figure lights up as a reminder to buckle up. (See "Safety Belt Reminder Light" in the Index.)

In many states and Canadian provinces, the law says to wear safety belts. Here's why: *They work.*

You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

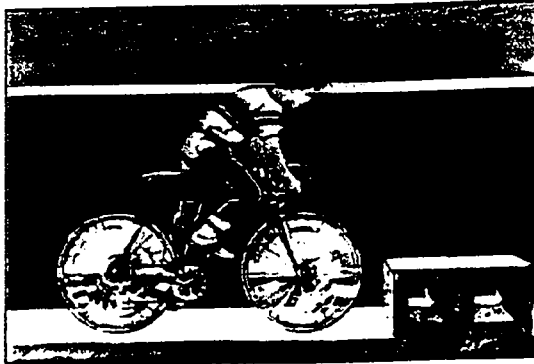
A few crashes are mild, and some crashes can be so serious that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could have been badly hurt or killed.

After more than 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter ... a lot!

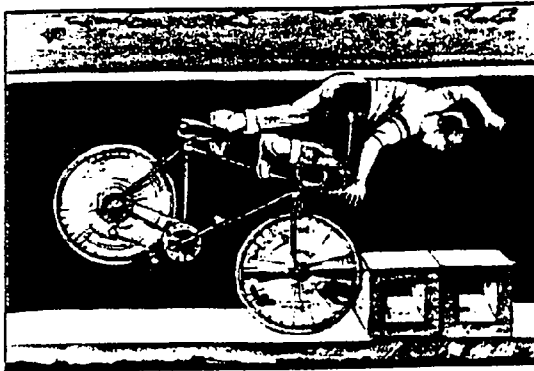


Why Safety Belts Work

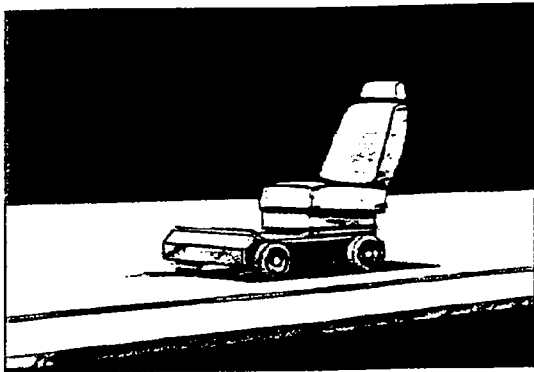
When you ride in or on anything, you go as fast as it goes.



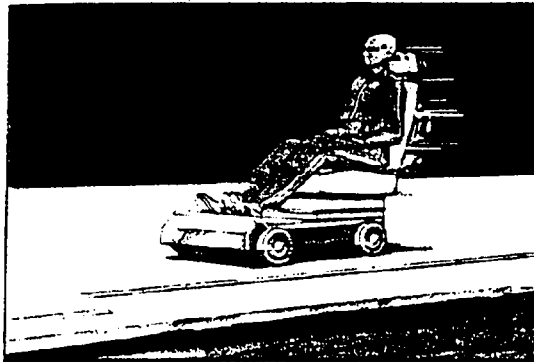
For example, if the bike is going 10 mph (16 km/h), so is the child.



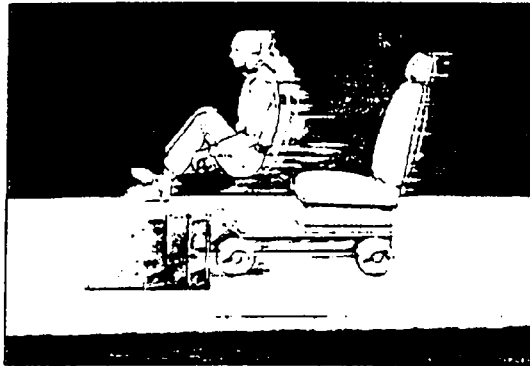
When the bike hits the block, it stops. But the child keeps going!



Take the simplest "vehicle." Suppose it's just a seat on wheels.



Put someone on it.



Get it up to speed.
Then stop the vehicle.
The rider doesn't stop.



The person keeps
going until stopped by
something.

In a real vehicle, it
could be the
windshield ...



or the instrument
panel ...



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts — and the Answers

Q: *Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?*

A: You *could* be — whether you're wearing a safety belt or not. But you can easily unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you can unbuckle and get out, is *much* greater if you are belted.

Q: *Why don't they just put in air bags so people won't have to wear safety belts?*

A: Air bags, or Supplemental Inflatable Restraint systems, are in some vehicles today and will be in more of them in the future. But they are supplemental systems only — so they work *with* safety belts, not instead of them. Every air bag system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has air bags, you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

Q: *If I'm a good driver, and I never drive far from home, why should I wear safety belts?*

A: You may be an excellent driver, but if you're in an accident — even one that isn't your fault — you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.

Safety Belt Reminder Light



When the key is turned to "Run" or "Start," a light will come on for about eight seconds to remind people to fasten their safety belts. Unless the driver's safety belt is already buckled, a tone will also sound.

How To Wear Safety Belts Properly

Adults

This section is only for people of adult size.

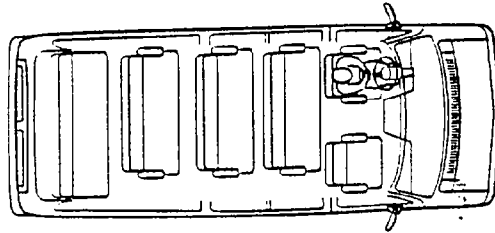
Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your vehicle, see the section after this one, called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has.

We'll start with the driver position.

Driver Position

This section describes the driver's restraint system.



Lap-Shoulder Belt

Van



Cab and Chassis



The driver has a lap-shoulder belt. Here's how to wear it properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see "Seats" in the Index) so you can sit up straight.

Van



Cab and Chassis



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.



For all models except the Cab & Chassis, if the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle the belt.

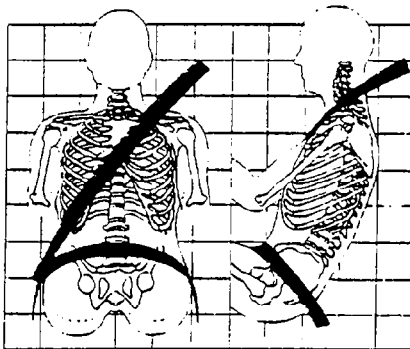
Pull up on the latch plate to make sure it is secure.

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.



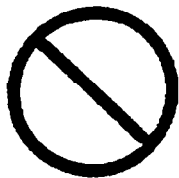
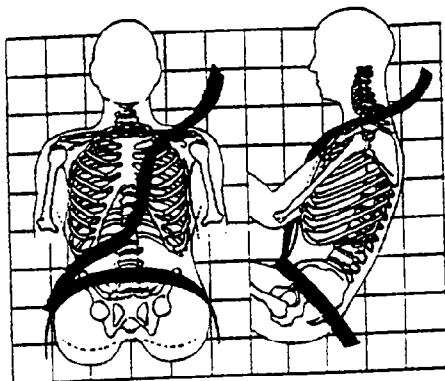
5. For all models except the Cub & Chassis, to make the lap belt tight, pull down on the buckle end of the belt as you pull up on the shoulder belt.



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.

Q: What's wrong with this?



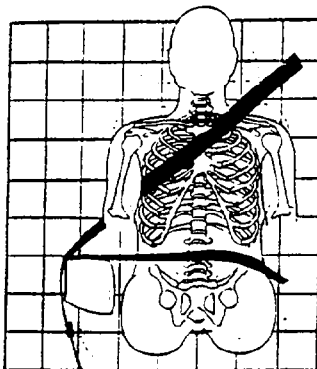
A: The shoulder belt is too loose. It won't give nearly as much protection this way.



CAUTION:

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

Q: What's wrong with this?



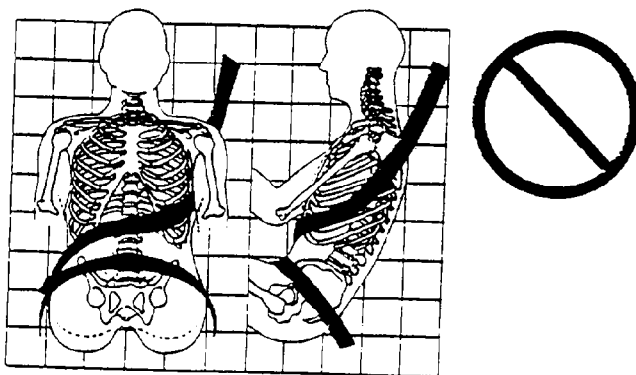
A: The belt is over an armrest.



CAUTION:

You can be seriously injured if your belt goes over an armrest like this. The belt would be much too high. In a crash, you can slide under the belt. The belt force would then be applied at the abdomen, not at the pelvic bones, and that could cause serious or fatal injuries. Be sure the belt goes under the armrests.

Q: What's wrong with this?



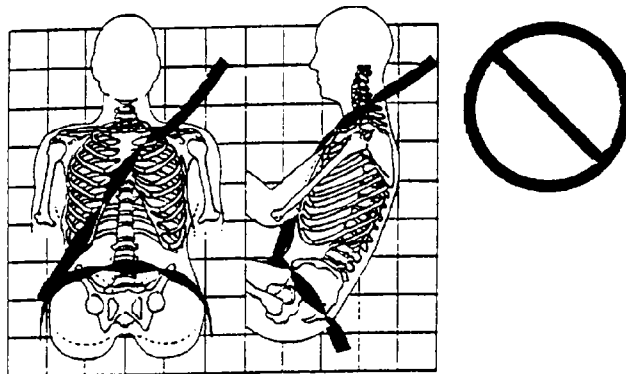
A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.



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 spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

Van



Cab and Chassis



To unlatch the belt, just push the button on the buckle. The belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

Driver's Facial Air Bag System

This section explains the Driver's Facial Air Bag system. 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:

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:

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:

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 System 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 Facial 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 is between 11 and 16 mph (17 and 23 km/h). However, this velocity threshold depends on the option content of the vehicle 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 vehicles. 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. 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. There will be small amounts of smoke coming from vents in the deflated air bag. 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.

- 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 in 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 of the driver's facial 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 Facial Air Bag-Equipped Vehicle

The facial air bag affects how your vehicle 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 GM dealer and the 1994 GM Service Manual have information about servicing your vehicle and the air bag system. The air bag system does not need regular maintenance.

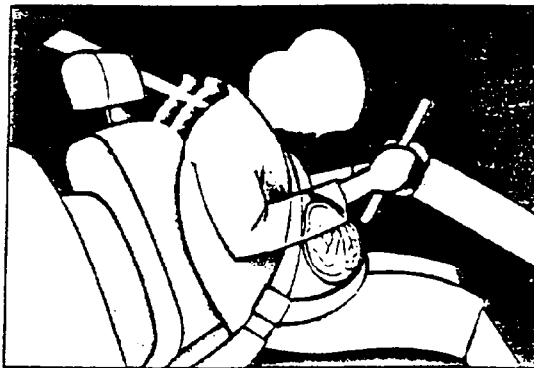


CAUTION:

For up to 2 minutes after the ignition key is turned off and the battery 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 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

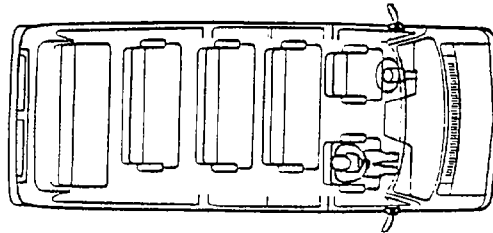
Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.



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.

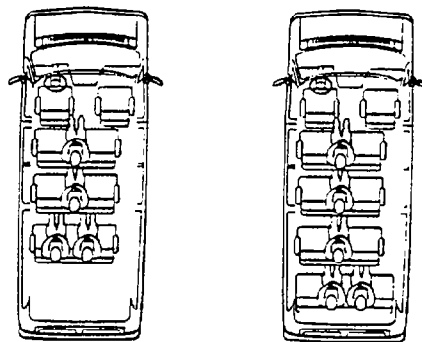
Right Front Passenger Position



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

If you have the Cub and Chassis model (Model 03), when the lap portion of the belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

Center Passenger Position (Rear Bench Seat)



Lap Belt

If your vehicle has rear bench seats, someone can sit in the center positions.



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.



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.

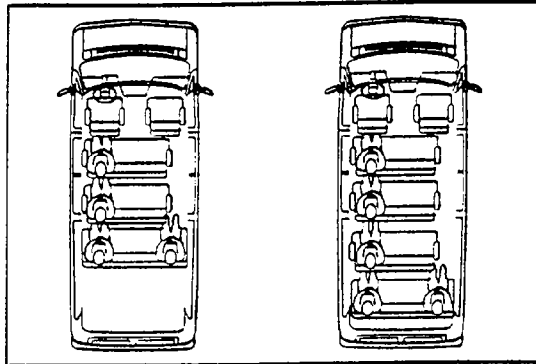
Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

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 (Except
Right Side of Second, Third and some Fourth Seats)***



Lap-Shoulder Belt

These positions have lap-shoulder belts. Here's how to wear one properly.



1. Pick up the latch plate and pull it across you. Don't let it get twisted.

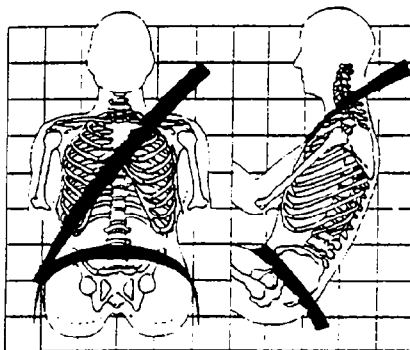
2. Push the latch plate into the buckle until it clicks. If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it. Pull up on the latch plate to make sure it is secure.

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.

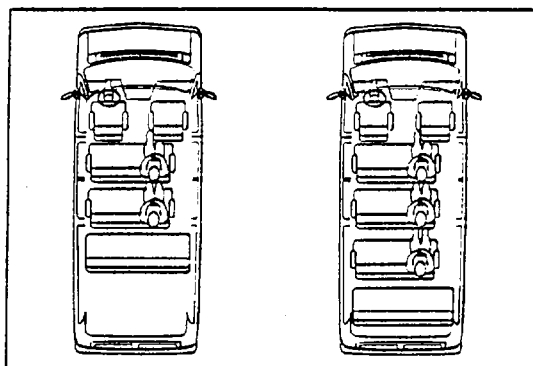
⚠ CAUTION:

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 Seat Outside Passenger Positions (Right Side
of Second and Third Seats and Some Fourth Seats)***

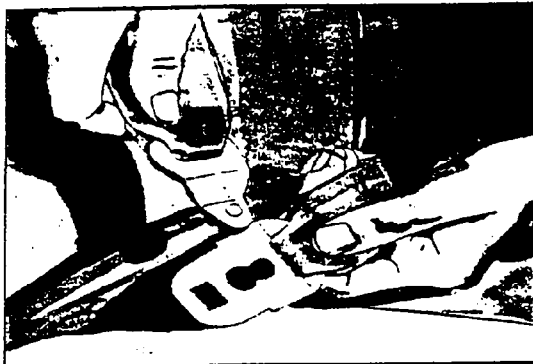


Lap-Shoulder Belt

These positions have lap-shoulder belts. Here's how to wear one properly.



1. Reach up and pull out the shoulder belt. Then, pull the lap belt out from its retractor on the seat.



2. Connect the shoulder belt to the lap belt like this. Be sure to pull the notch through to the small end of the slot. Don't twist the belt.

NOTE: The shoulder and lap belts should remain attached unless the seat is being removed.

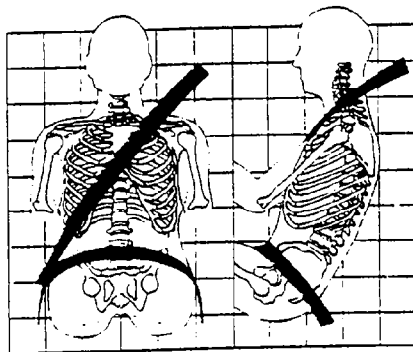


3. Pick up the latch plate of the combined lap-shoulder belt and, in a single motion, pull the belt across you. Don't let it get twisted.

4. Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure.

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.



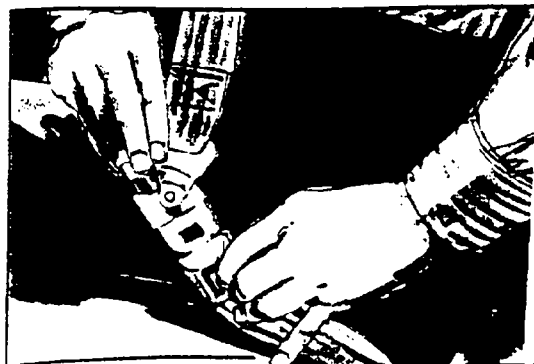
The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even 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 shoulder part of the belt locks if there's a sudden stop or a crash. The lap belt remains locked at all times.



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.



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



2. If the seat is being removed, disconnect the latch plate by sliding the notch toward the large end of the key slot.

3. Retract the shoulder belt into the roof; let the lap belt go into its retractor on the seat.