V2160

REPORT NO. MGA-95-NØØ7

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

General Motor Corporation
1995 Saturn SL2
4 Door
NHTSA NO. MSØ1Ø8

MGA PROVING GROUNDS
5ØØØ WARREN ROAD
BURLINGTON, WI 53105

Test Date: September 26, 1994

Report Date: October 21, 1994

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
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15. Supplementary Notes

16. Abstract

A 56 kph (35 mph) frontal barrier impact using a 30 load cell barrier was conducted on a 1995 Saturn SL2 4 Door Sedan at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on September 26, 1994.

The barrier impact velocity was 56.3 kph (35.0 mph), and the ambient temperature at the time of impact was 21°C. The post-test maximum static crush was 616 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 632.8 and the 3 msec. Clip (Chest g's) was 45.1 g's. The right femur loads for the driver were 3192 and the left femur load data was lost during the test. The passenger's HIC was 505.8 and the 3 msec Clip was 47.5 g's. The left and right femur maximum loads were 4577 and 3659 Newtons respectively.

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP) FMVSS 212 Indicant Testing FMVSS 219 (partial) Indicant Testing FMVSS 301 Indicant Testing	Copies of this report are available from: Technical Ref. Division, NHTSA, NASSIF Building, Room 5108 400 Seventh Street, S.W. Washington, D.C. 20590

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_____
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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY'95 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 1995 Saturn SL2 4-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 September 26, 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, neck load cell, and right/left femur load cells. The driver was also instrumented with right and left lower leg sensors. Seat belt load cells were also on the driver's and passenger's shoulder and lap belts to measure dummy torso and pelvic section loading. Both the driver ATD (Serial No. 37) and the right-front passenger ATD (Serial No. 36) had two prior exposures (for 1995 Mazda Millenia and Subaru Legacy NCAP tests) but did not exceed injury criteria. 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.

The driver's head struck the inflated airbag. The driver HIC was 632.8. The maximum chest deceleration over 3 milliseconds was 45.1 g's. The right femur load was 3192 Newtons and the left femur load data was lost in this test.

The right front passenger's HIC was 505.8 and maximum chest deceleration over 3 milliseconds was 47.5 g's. The left and right femur loads were 4577 and 3659 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Saturn/SL2/4 Door Sedan

NHTSA No.: MS0108 VIN.: 1G8ZK5279SZ109171

Body color: White Date of Manufacture: 07-94

Engine: 4 Cylinders; __C.I.D.; 1.9liters;

X Gas; __Diesel; __Turbocharged

__Longitudinal; X Transverse

Transmission: 4 Speed; __Manual; X Automatic; __Overdrive

Final Drive: X Front Wheel; __Rear Wheel; __Four Wheel

Odometer Reading: 110 miles

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

__P/seats; X Tilt Wheel; __Cruise Control;

Type of Occupant Restraint: Driver and passenger airbag and type II belt system

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 2.5 kg/cm^2 (35 Psi) Rear 2.5 kg/cm^2 (35 Psi)

Recommended Tire Size: P195/60R15

Recommended Cold Tire Pressure: Front 2.1 kg/cm^2; Rear 1.8 kg/cm^2

Tires on Vehicle: P195/60R15 ; Manufacturer: Firestone

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; __Power; X Lever

Vehicle Capacity Weight (VCW) = 392 kg. (A)

No. of Occupants x 68.0 kg. = 340 kg. (B)

Rated Cargo Weight (RCW) A-B = 52 kg.

GVWR 1523 kg. GAWR: Front 797 kg.; Rear 726 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 322 kg Right Rear = 197 kg

Left Front = 335 kg Left Rear = 204 kg

TOTAL FRONT WEIGHT = 657 kg (62 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 401 kg (38 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1058 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1058 kg

VCW = Vehicle Capacity Weight 392 kg DSC = Designated Seating Capacity 5

RCW = VCW - 68 (DSC) = 52 *kg

Target Test Weight = UDW + RCW + (2 dummies x 75.8 kg/dummy)

Target Test Weight = 1262 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 378 kg Right Rear = 249 kg

Left Front = 379 kg Left Rear = 250 kg

TOTAL FRONT WEIGHT = 757 kg (60 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 499 kg (40 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1256 kg

Weight of ballast secured in vehicle trunk area = 0 kg

Vehicle components removed to meet target weight: Rear seat back & cushion, spare tire, rear bumper, tail lamps, jack and tool kit, exhaust pipe.

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 660 LF 655 RR 666 LR 667

Test Attitude: RF 645 LF 641 RR 639 LR 632

Wheel Base: 2608 mm; C.G. = 1036 mm rearward of front wheel C/L

Remarks: None

*light trucks and MPVs RCW is 136 kgs or manufacturer's 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: September 26, 1994 Time of Test: 3:44 p.m.

Ambient Temperature: 21 °C (Spec. Range = 18.8 to 25.6°C)

Temperature in Occupant Compartment: 21° C

Windshield Molding Temperature: 21° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.3 kph; secondary = 56.4 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1210 mm

Exiting Speed Trap: 210 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length: Pre-test = R 4181 C_L 4299 L 4172

Post-test = R 3588 C_L 3683 L 3645

Crush = R 593 C_L 616 L 527

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

R 814 mm C_L 772 mm L 825 mm

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	To airbag	To airbag
Chest	To airbag	To airbag
Abdomen	No visible contact	No visible contact
Left Knee	To lower dash panel	To lower dash panel
Right Knee	To lower dash panel	To lower dash panel

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
Door Opening	Left	Right	Left	Right
(without use of tools)	Yes	Yes	Yes	Yes

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Movement	Ø	Ø	N/A	N/A
Seat Shift (mm)	5	Ø	N/A	N/A

Glazing Damage

Backlight/Windshield Cracked windshield

Other Notable Impact Effects: None

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

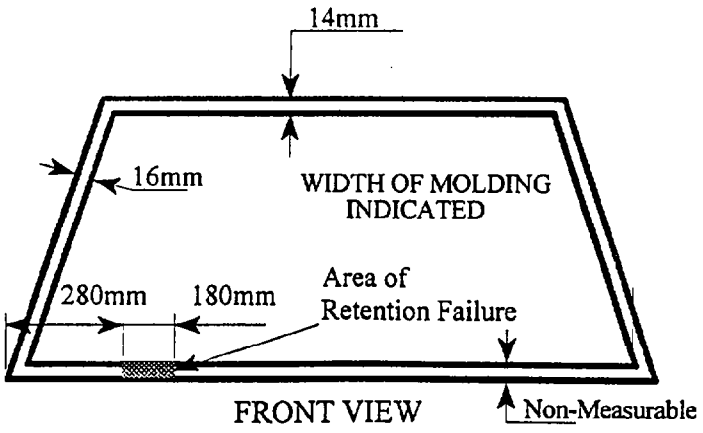
Details of windshield mounting such as retention method, trim type, etc.:
Windshield set in rubber molding within windshield frame

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	2193	2013	92%
LEFT SIDE	2193	2193	100%
TOTAL	4386	4206	96%

AREA OF RETENTION FAILURE:



FAILURE DETAILS: 180 mm of windshield mounting was failed at right lower area.

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= 1184 mm

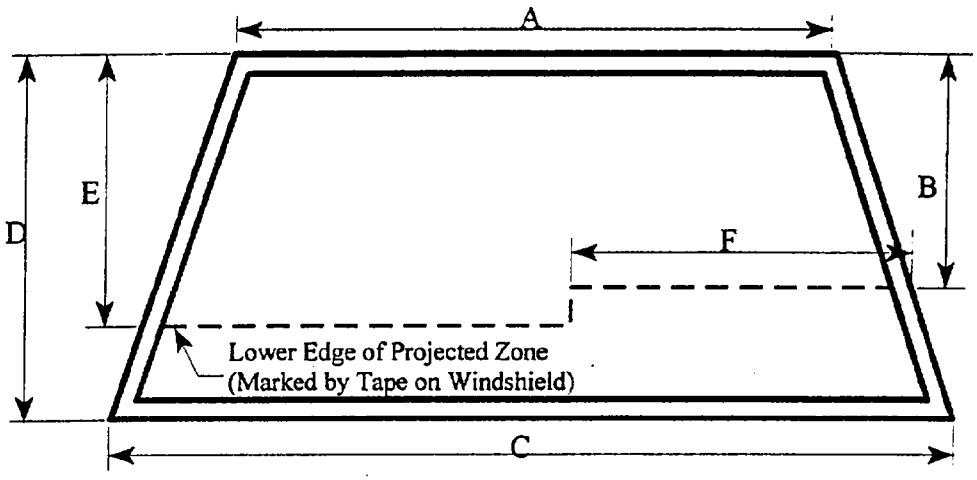
B= 492 mm

C= 1753 mm

D= 724 mm

E= 533 mm

F= 535 mm



FRONT VIEW

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

NONE

FMVSS NO. 301-75, FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: MS0108 Test Date: September 26, 1994

Vehicle Mfgr./Make/Model: 1995/Saturn/SL2/4 Door Sedan

Usable Capacity of Vehicle's Fuel Tank: 48 Liters
(figure furnished by vehicle manufacturer)

TEST REQUIREMENTS:

Test vehicle's engine operated to "run dry" condition, and then a small amount of stoddard solvent which has been dyed red shall be added to the vehicle's fuel tank. Operate the fuel pump enough to completely fill the fuel system ahead of the fuel tank, and add 92 to 94% of the stated USABLE CAPACITY to the fuel tank.

AMOUNT OF STODDARD SOLVENT ADDED TO VEHICLE'S FUEL TANK:

45 Liters which is 94 % of the stated USABLE CAPACITY.

TEST VEHICLE IMPACT TYPE:

X Frontal (35 mph)

___ Oblique (30 mph) with ___° barrier face first contacting (driver/passenger) side

___ Rear Moving Barrier (30 mph)

___ Side Impact MDB (33.2 mph)

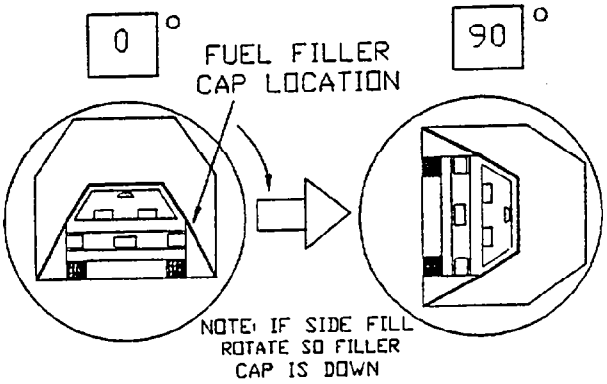
FUEL SPILLAGE MEASUREMENT:

	ACTUAL	MAX ALLOWED
1. From impact until vehicle motion ceases	0	1 OZ
2. For 5 minute period after vehicle motion ceases	0	5 OZ
3. For next 25 minutes	0	1 oz./1 MIN

SOLVENT SPILLAGE DETAILS: None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° - 90° Vehicle NHTSA ID No.: MS0108



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 56 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 56 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:

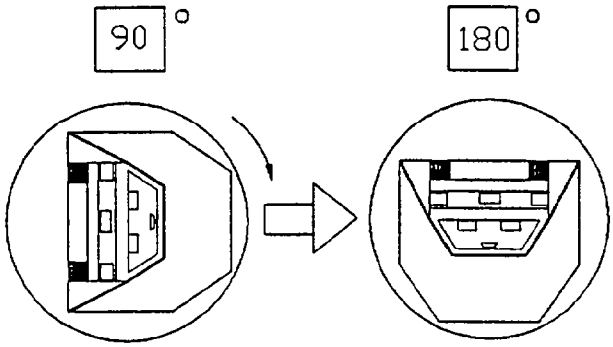
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° - 180° Vehicle NHTSA ID No.: MS0108



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

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:

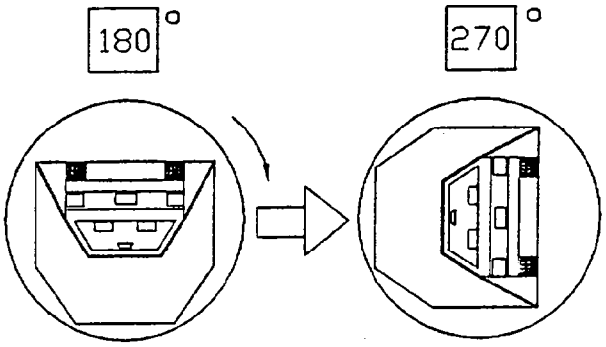
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° - 270° Vehicle NHTSA ID No.: MS0108



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 14 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 14 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:

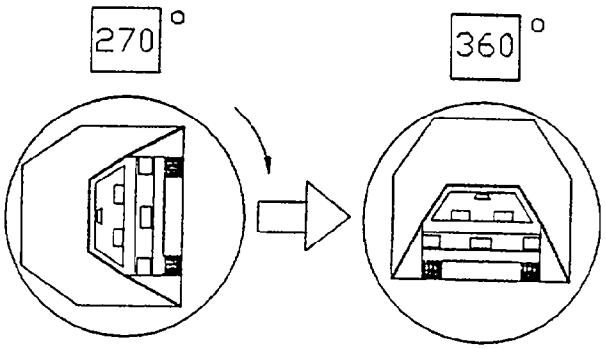
0	0	0	0

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

IV. SOLVENT SPILLAGE LOCATIONS(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° - 360° Vehicle NHTSA ID No.: MS0108



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 43 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 43 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. Dummy Injury Criteria Data Summary
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: 1995/Saturn/SL2/4 Door Sedan

VEH. NHTSA NO.: MS0108 TEST DATE: September 26, 1994

MAX. ACCELERATION VALUES: (g's)	DRIVER # 37	PASSENGER # 36
Head Channel X	-58.6	-50.6
Head Channel Y	-12.3	-18.6
Head Channel Z	27.3	26.4
HEAD RESULTANT	64.5	56.3
Chest Channel X	-45.2	-48.1
Chest Channel Y	-6.5	-7.4
Chest Channel Z	-9.6	11.6
CHEST RESULTANT (CLIP)	45.1	47.5
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 72.0 t_2 = 74.9	t_1 = 73.7 t_2 = 76.6

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	632.8	505.8
t_1 = (msec)	61.4	70.3
t_2 = (msec)	97.4	106.2
Avg. Accel. t_1 to t_2 (g's)	49.9	45.7

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	N/A*	4577
Right Side (N)	3192	3659

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	2608	2082
Shoulder Belt (N)	5353	6389

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 collected in this channel

HYBRID III NECK AND CHEST DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1995/Saturn/SL2/4 Door Sedan

VEHICLE NHTSA NO.: MS0108 TEST DATE: September 26, 1994

MAXIMUM VALUES	DRIVER DUMMY #37	PASSENGER DUMMY #36
Neck Load X (N)	852.3	-587.3
Neck Load Y (N)	-175.3	-395.3
Neck Load Z (N)	-2012.0	-2254.6
Neck Moment X (N.M)	12.8	11.8
Neck Moment Y (N.M)	-71.4	-49.7
Neck Moment Z (N.M)	-17.7	-25.0
Chest Deflection X (mm)	38.9	32.6
Time of Max. Occurrence	78 msec.	95 msec.

PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MS0108 Vehicle: 1995 Saturn SL2 4 Door

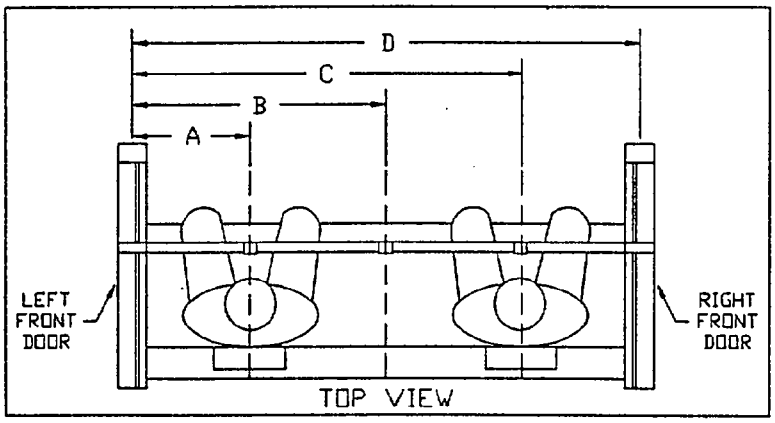
SEAT TYPE:	ADJUSTER TYPE:	BUCKET SEAT BACK TYPE:
____Bench	Driver: _X_Manual	____Fixed
_X_Bucket	___Power	_X_Adjustable Reclining
____Split Bench		
	Passenger: _X_Manual	
	____Power	

Driver

Seat notch 10th from front

Passenger

Seat notch 10th from front



37 DUMMY ID 36

A	= Left Door to Driver Centerline	420 mm
B	= Left Door to Center Passenger Centerline	750 mm
C	= Left Door to Right Passenger Centerline	1100 mm
D	= Left Door to Right Door	1500 mm

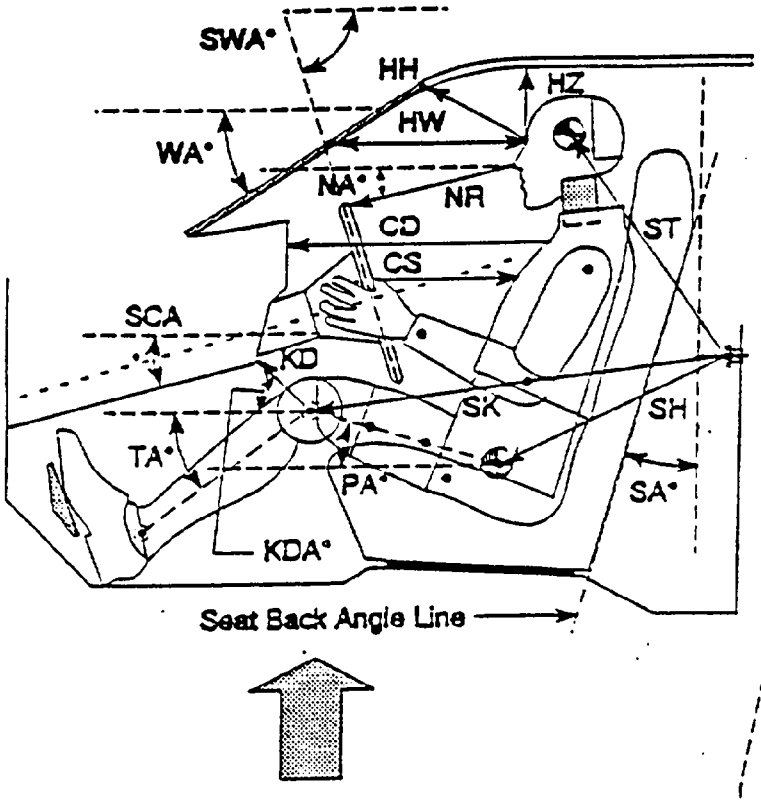
FRONT SEAT MEASUREMENT TABLE

Units (mm)

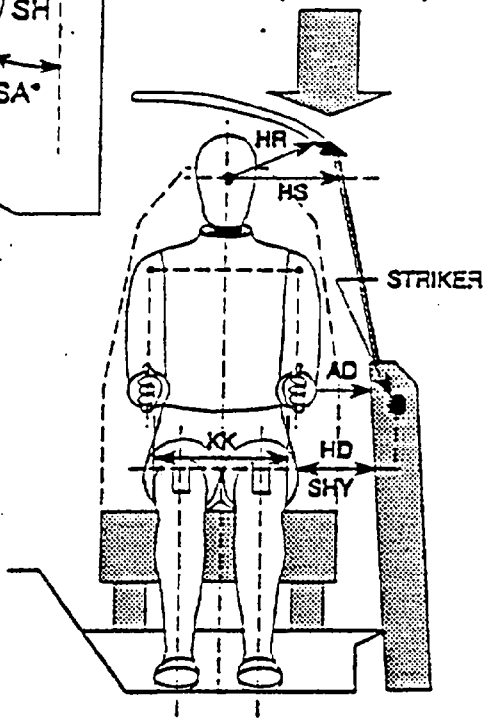
	DRIVER (Serial #37)	PASSENGER (Serial #36)
WA°	25.8°	
SWA°	71.0°	N/A
SCA°	N/A	N/A
SA°	9.8° (at headrest)	9.8° (at headrest)
HZ	187	179
HH	374	360
HW	655	645
HR	240	232
NR	388 Angle 12.5°	N/A
CD	510	476
CS	342	N/A
RA	200	N/A
KDL	164 Angle 23.7°	148
KDR	170	151 Angle 21.7°
PA°	24.7°	23.5°
TA°	26.3°	38.6°
KK	280	255
ST	477 Angle 80.4°	468 Angle 78.8°
SK	620 Angle -7.6°	583 Angle -1.5°
SH	261 Angle -38.3°	284 Angle -42.7°
SHY	212	209
HS	312	317
HD	158	152
AD	100	95

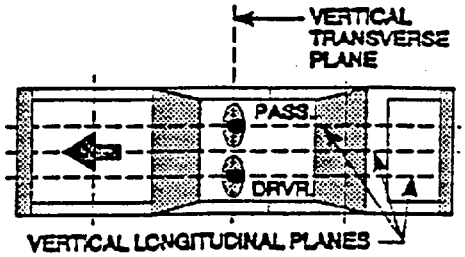
N/A = Not Applicable

FRONT SEAT MEASUREMENTS



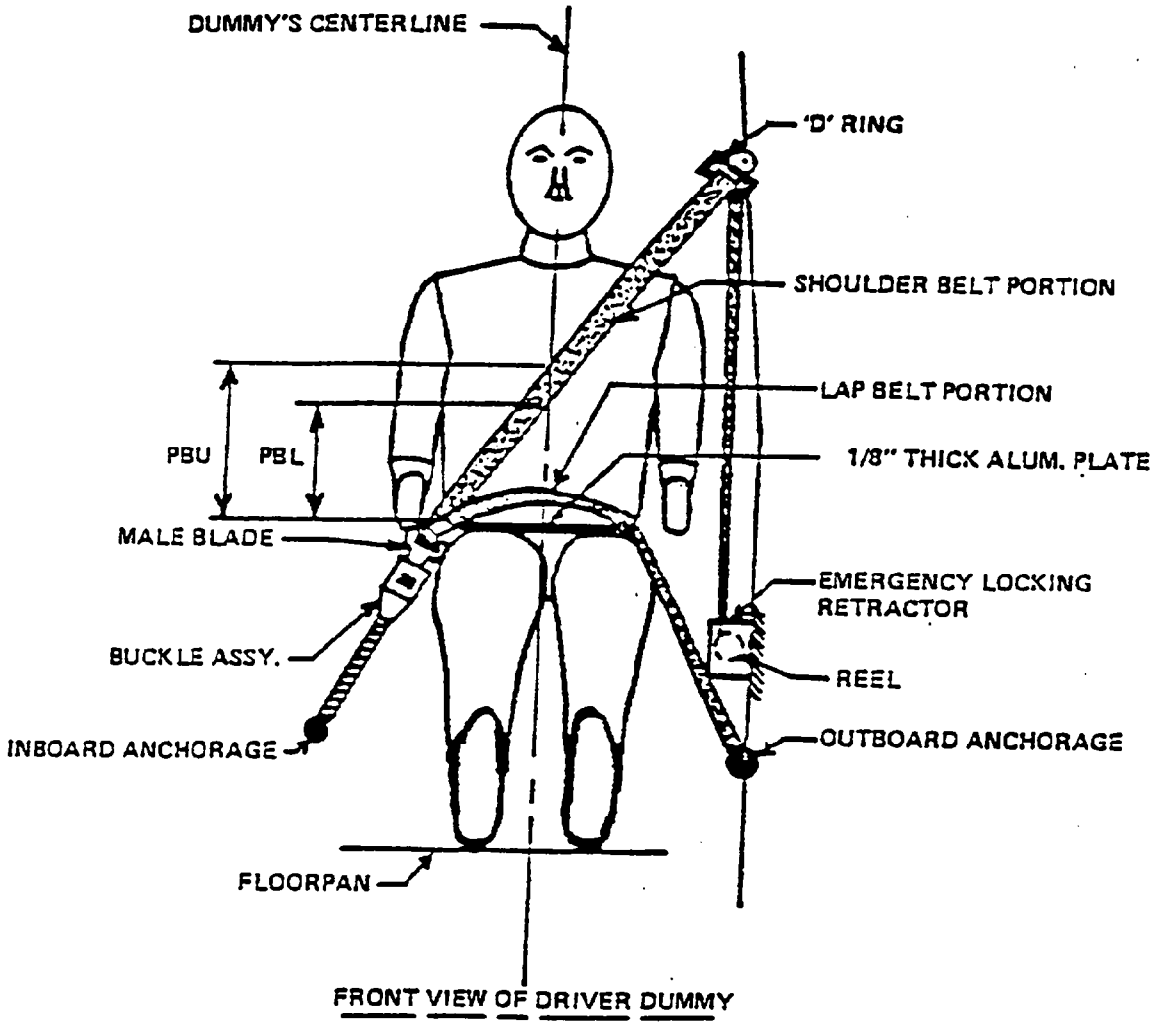
AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
SHY- Striker to H-Point (Y Direction)





CD	-	Chest to Dash
CS	-	Steering Wheel to Chest
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



(illustration)

Dimension = mm

		DRIVER DUMMY	PASSENGER DUMMY
PBU --	Top surface of alum. plate to upper edge	337	352
PBL --	Top surface of alum. plate to belt lower edge	262	274

Note: Adjustable "D" ring set in the fourth position for the highest.

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	192 mm	196 mm
Shoulder belt length as measured on Part 572 Dummy.	855 mm	857 mm
Lap belt length as measured on Part 572 Dummy.	825 mm	845 mm
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis	84 mm	107 mm
As determined mechanically	99 mm	128 mm
As determined electronically	75 mm	92 mm
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	N/A	N/A
Measured mechanically	0	0
RETRACTOR LOCK-UP TIME:		
As determined by shoulder belt spool-off observed in on-board cameras	21 msec	20 msec

CAMERA LOCATIONS

VEH. NHTSA NO.: MS0108 ; TEST DATE: September 26, 1994; TIME: 3:44 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1995/Saturn/SL2/4 Door Sedan

CAMERA POSITION NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (mm)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-	10	24
2	Left Front View	1010	7510	1130	90°	7168	25	1031
3	Steering Column Top	2140	7150	1560	90°	6808	25	870
4	Steering Column Bottom	2110	7140	1030	90°	6798	25	1010
5	Left Driver Close-up	1460	5950	1050	90°	5608	35	1282
6	Left Angle	4600	5670	2120	50°		50	1099
7	Driver Onboard Seat Belt						35	1000
8	Passenger Onboard Seat Belt						35	1000
9	Right Overall	2090	-7320	1050	90°	6988	13	1020
10	Right Front	880	-7550	1075	90°	7218	25	1010
11	Right Passenger Close-up	1280	-7000	1090	90°	6336	50	1064
12	Right Angle	4120	-5330	2220	50°		35	885
13	Top View Wide	330	0	4350			13	1170
14	Top Driver	-310	350	2400			13	1124
15	Top Passenger	-350	-390	2400			13	909
16	Pit Engine	1180	0	-3175			13	1010
17	Fuel Tank	2650	0	-3185			13	935

* COORDINATES:

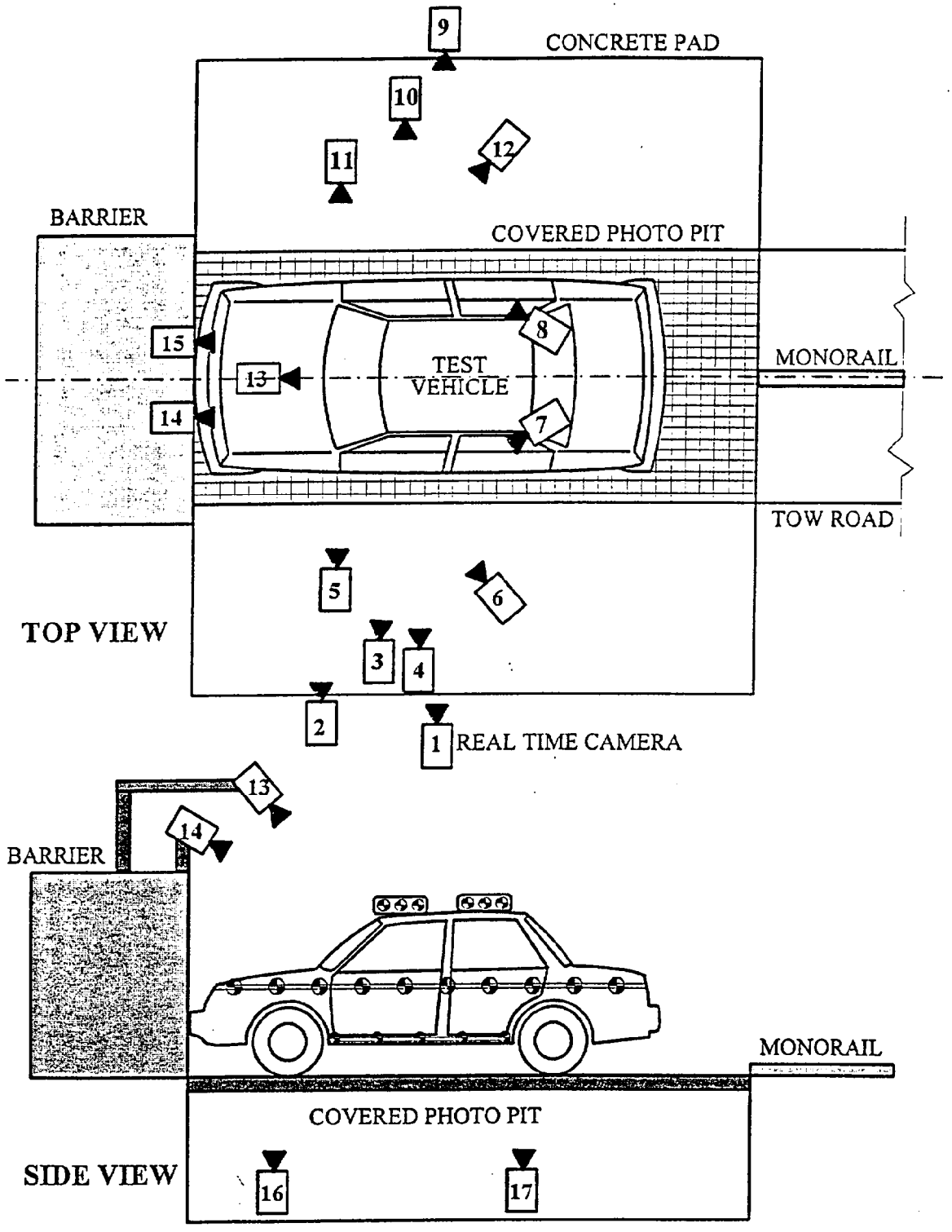
+X = film plane rearward of barrier

+Y = film plane to left of monorail centerline

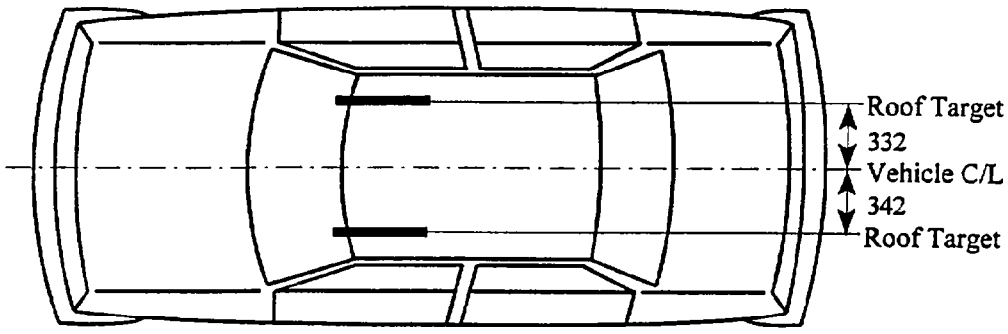
+Z = film plane to above ground level

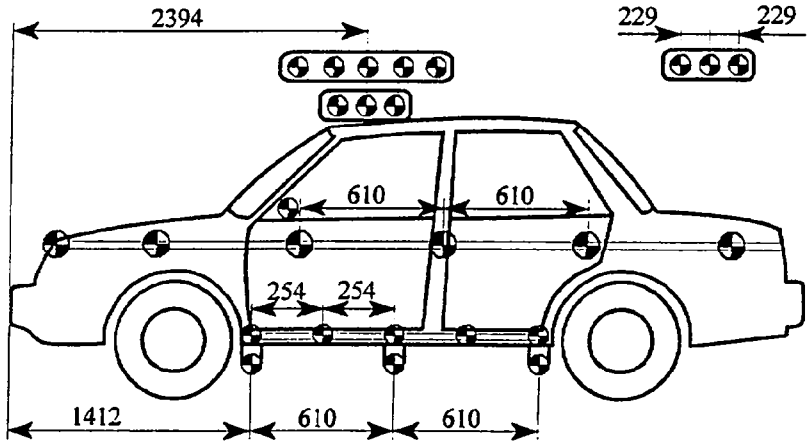
ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

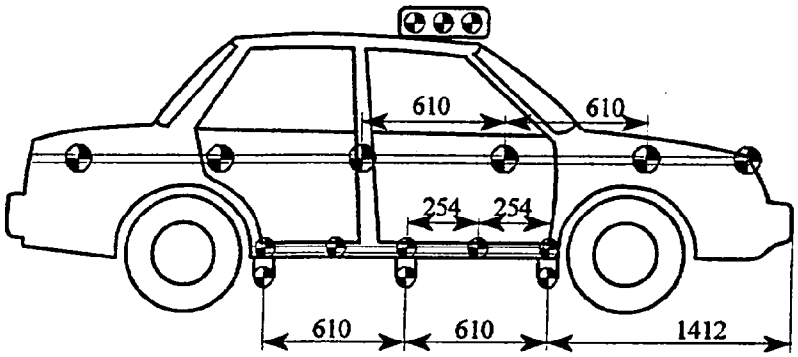
CAMERA LOCATIONS (Cont'd)



VEHICLE TARGET LOCATIONS







(DIMENSIONS IN MM)

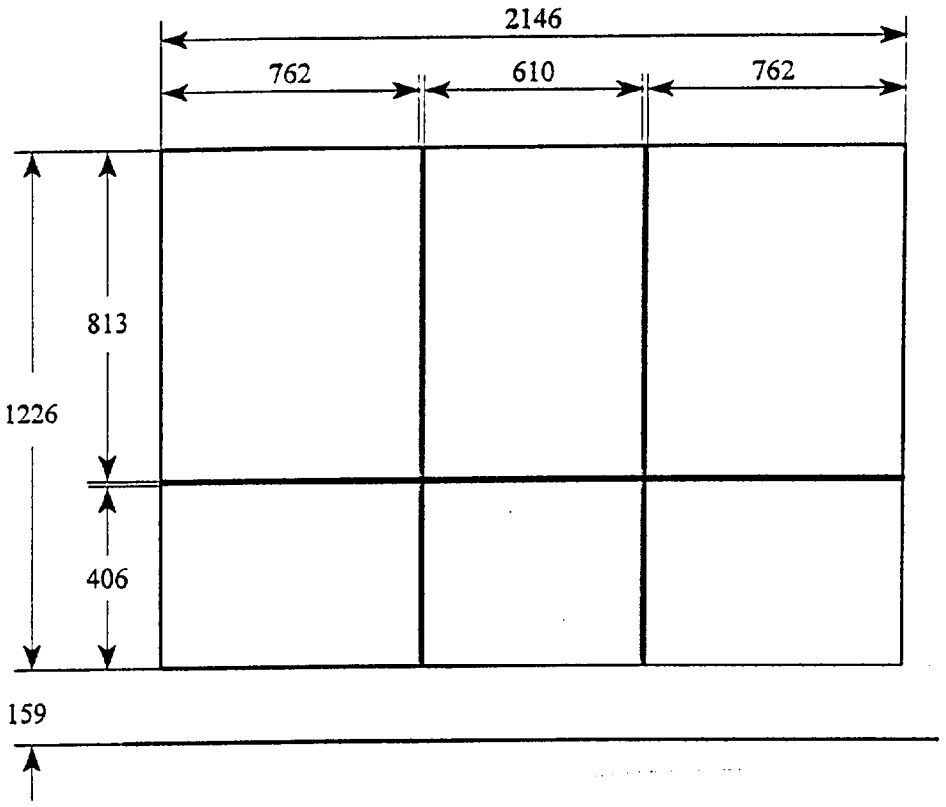
LOAD CELL LOCATIONS ON FIXED BARRIER

30 Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

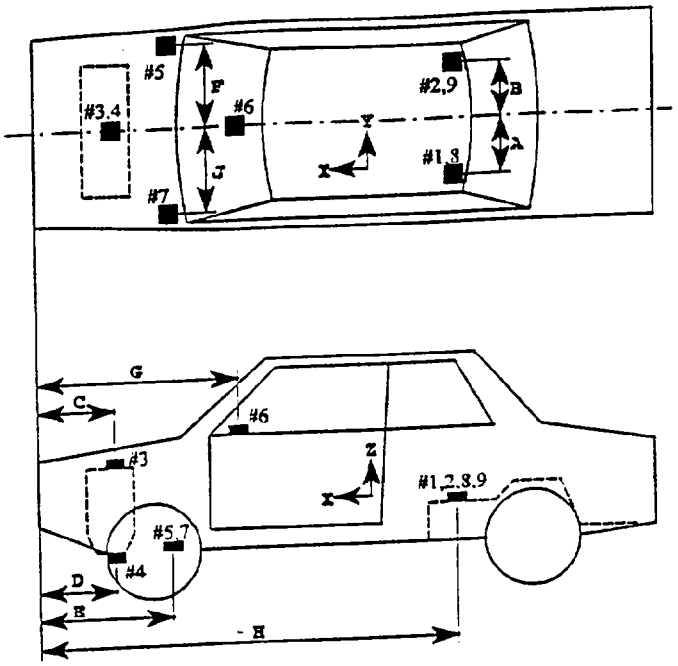


The following data is presented in Appendix B:

(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



Units: (mm)

Dimension	Length
A	438
B	445
C	822
D	838
E	870
F	686
G	1486
H	2858
J	686

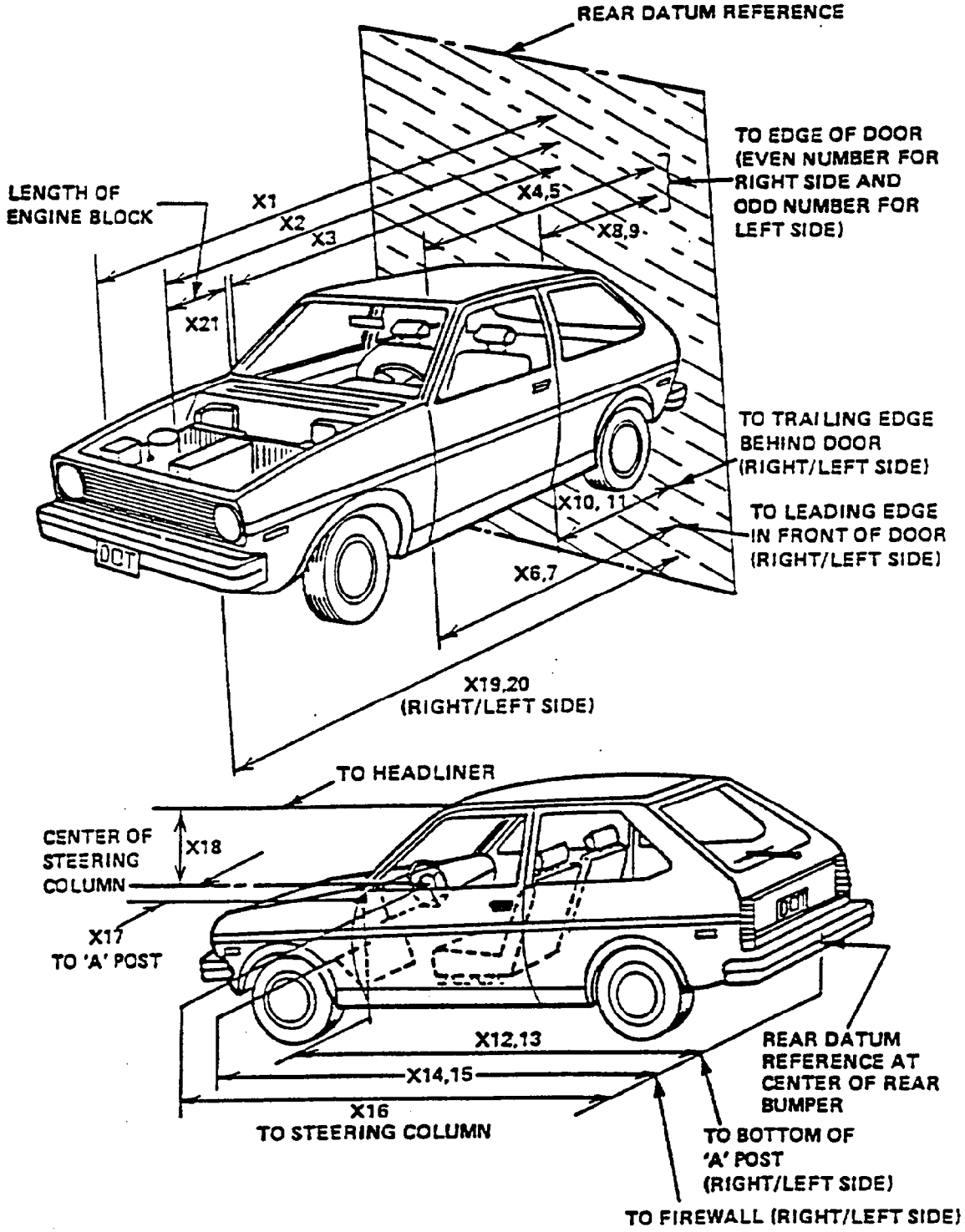
ACCEL. NO.	ACCELEROMETER	DIRECTION
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

* 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	4299	3683	616
X2	Rear Surface of Vehicle to Front of Engine	3594	3378	216
X3	Rear Surface of Vehicle to Firewall	3150	2997	153
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2781	2781	0
X5	Rear Surface to Upr. Leading Edge of Left Door	2781	2778	3
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2775	2772	3
X7	Rear Surface to Lwr. Leading Edge of Left Door	2775	2772	3
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1749	1749	0
X9	Rear Surface to Upr. Trailing Edge of Left Door	1749	1746	3
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1781	1778	3
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1781	1772	9
X12	Rear Surface to Bottom of 'A' Post on Rt. Side	2791	2788	3
X13	Rear Surface to Bottom of 'A' Post on Left Side	2788	2781	7
X14	Rear Surface to Firewall on Right Side	3137	3105	32
X15	Rear Surface to Firewall on Left Side	3137	3118	19
X16	Rear Surface to Steering Column	2362	2324	38
X17	Center of Steering Column to 'A' Post	364	359	5
X18	Center of Steering Column to Headlining	411	406	5
X19	Rear Surface to Right Side of Front Bumper	4181	3588	593
X20	Rear Surface to Left Side of Front Bumper	4172	3645	527
X21	Length of Engine Block	445	445	0

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1995/Saturn/SL2/4 Door Sedan

VEH. NHTSA NO.: MS0108 ; VIN: 1G8ZK5279SZ109171

MODEL YEAR: 1995 ; BUILD DATE: 07-94 ; TEST DATE: September 26, 1994

VEH. SIZE CATEGORY: Compact ; TEST WEIGHT: 1256 kg

VEH. WHEELBASE: 2608 mm ; FRONT OVERHANG: 990 mm ; OVERALL WIDTH: 1672 mm

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-12

CALIBRATION PROCEDURE: As per MGA Calibration Procedure

LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal

VEH: IMPACT SPEED: 56.3 kph ; TIME OF SEPARATION: 88 msec

VELOCITY CHANGE: 63.8 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 527 mm

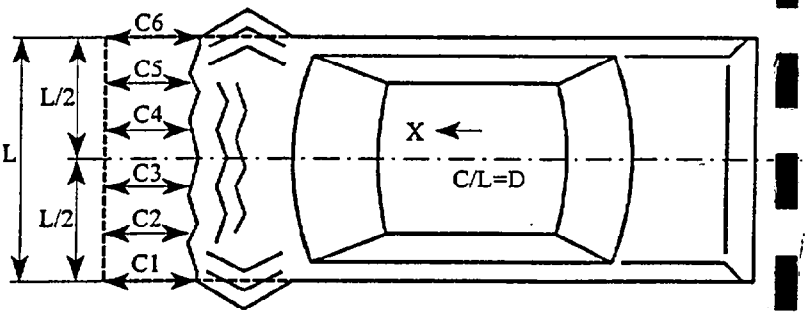
C2 = 591 mm

C3 = 609 mm

C4 = 616 mm

C5 = 597 mm

C6 = 593 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitude)

LENGTH OF DAMAGED REGION: L = 1191 mm

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

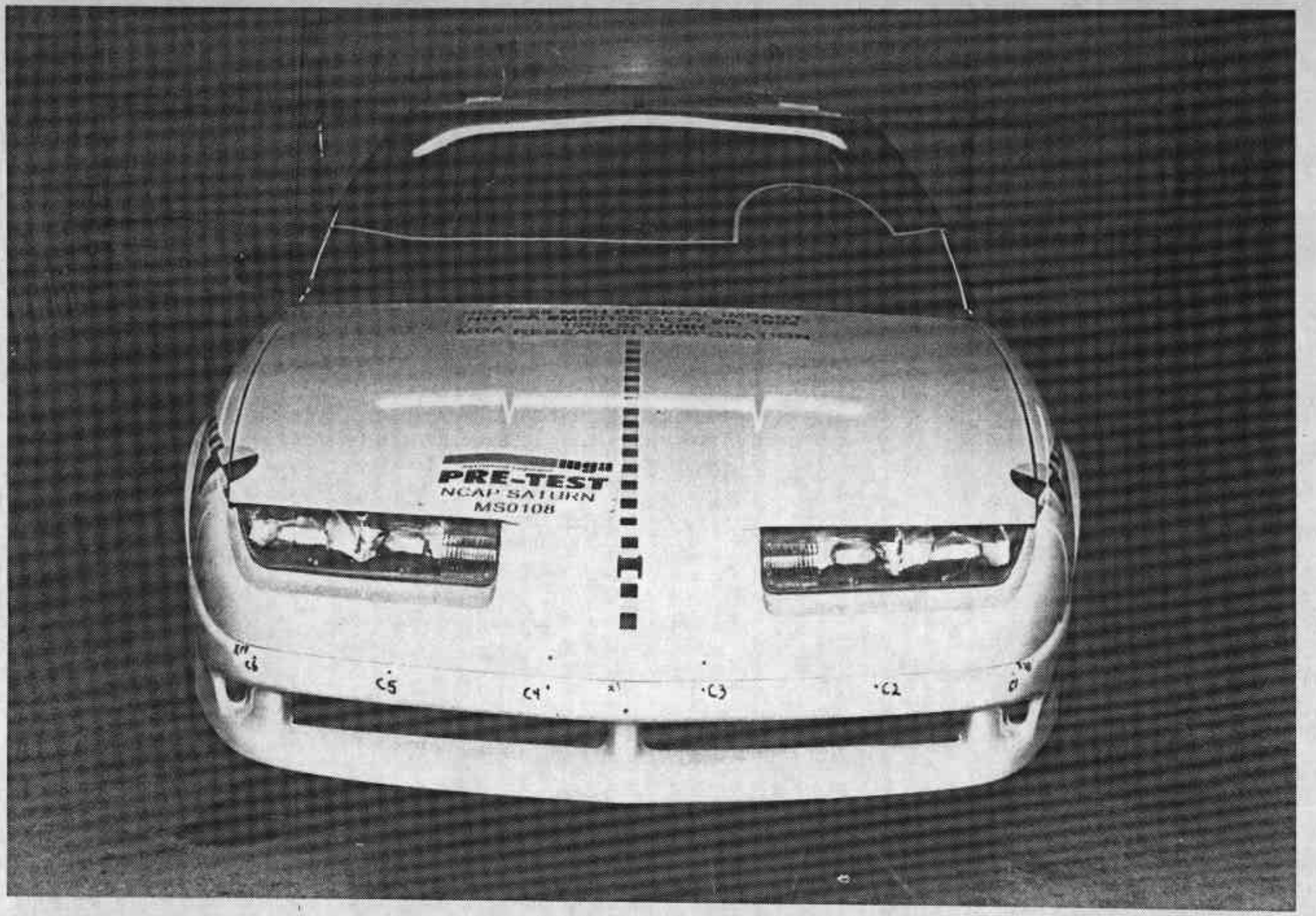


Photo No. A-1 - Pre-Test Front View of Test Vehicle

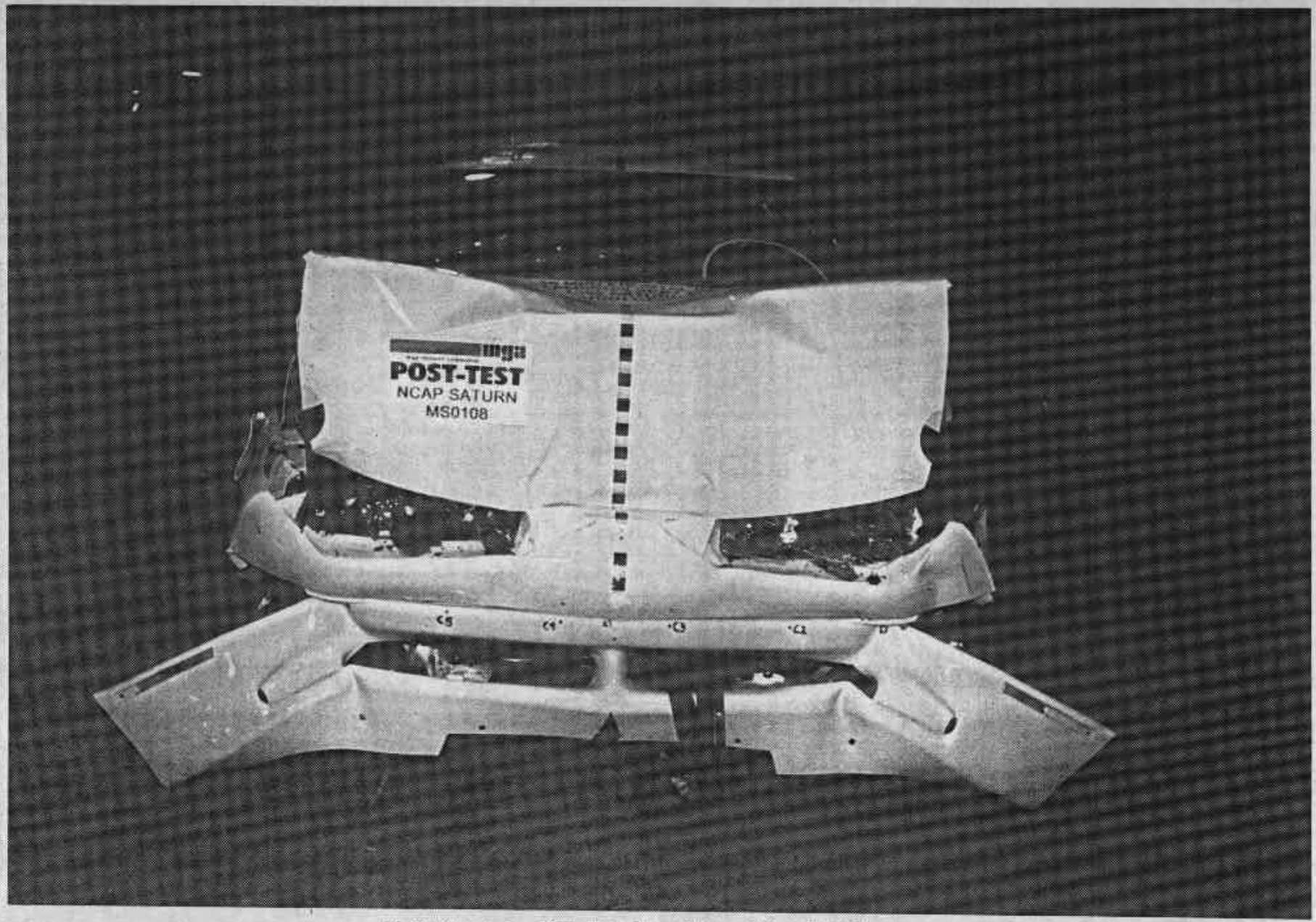


Photo No. A-2 - Post-Test Front View of Test Vehicle

Photo No. A-3 - Pre-Test Rear View of Test Vehicle

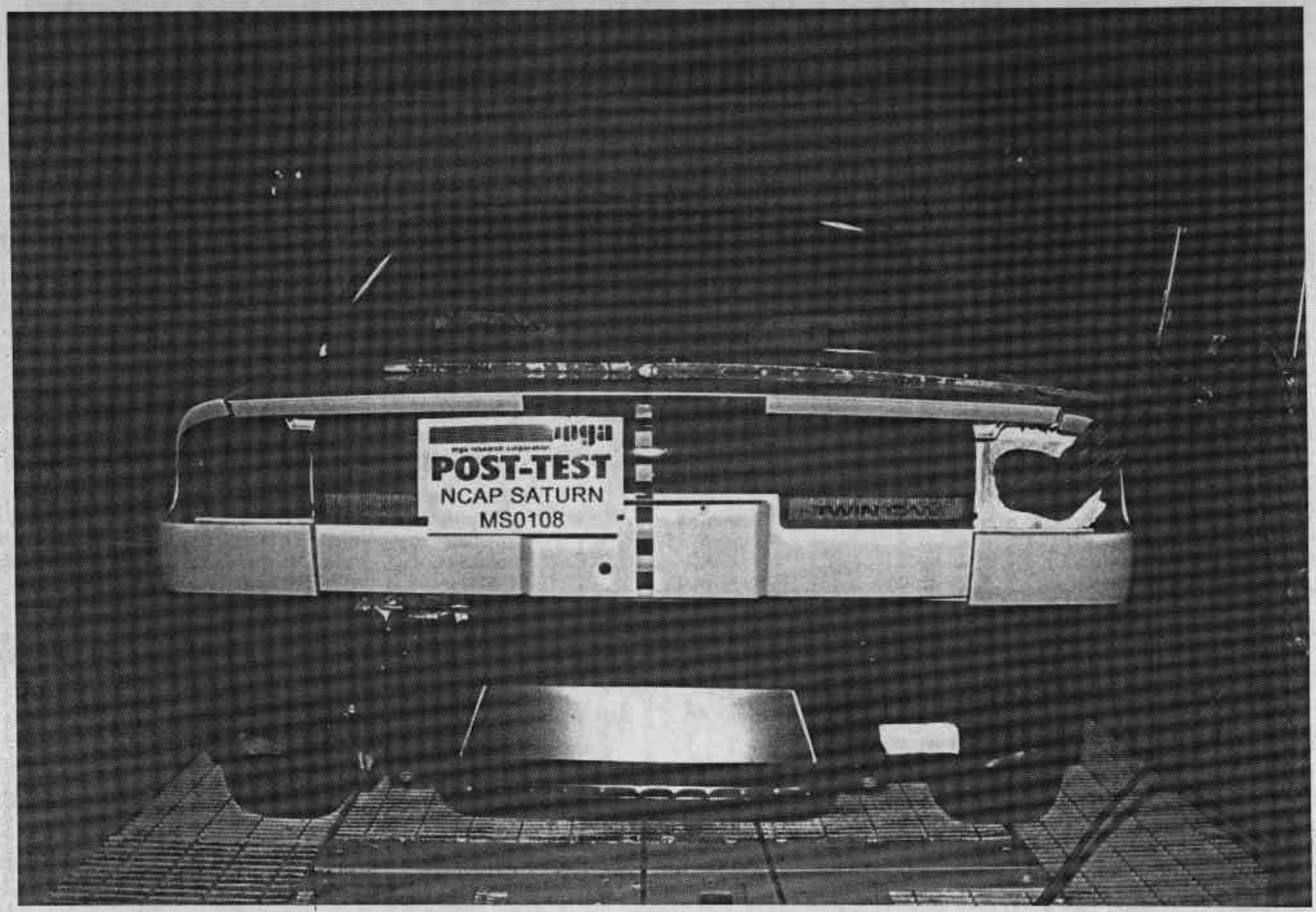


Photo No. A-4 - Post-Test Rear View of Test Vehicle

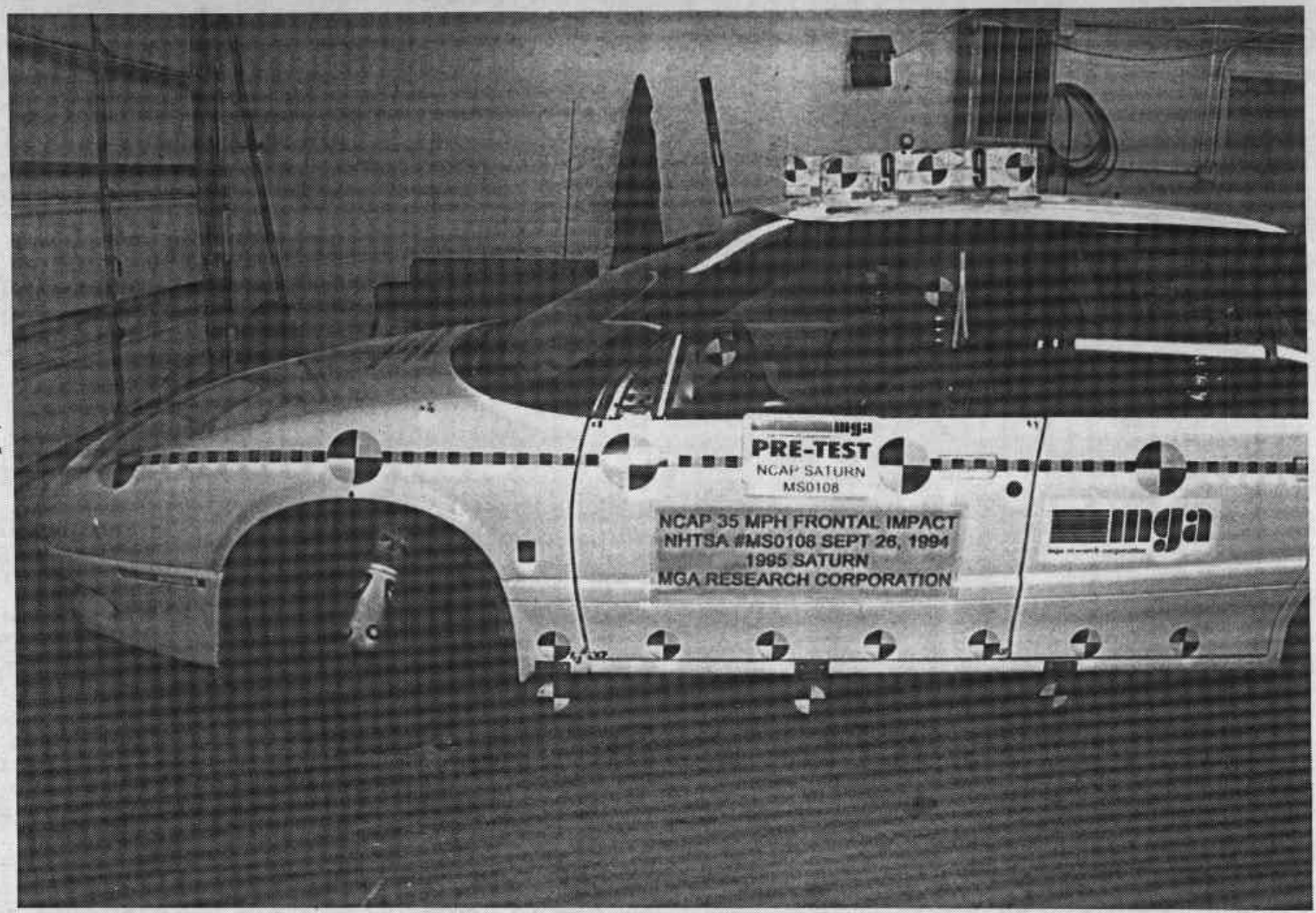


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

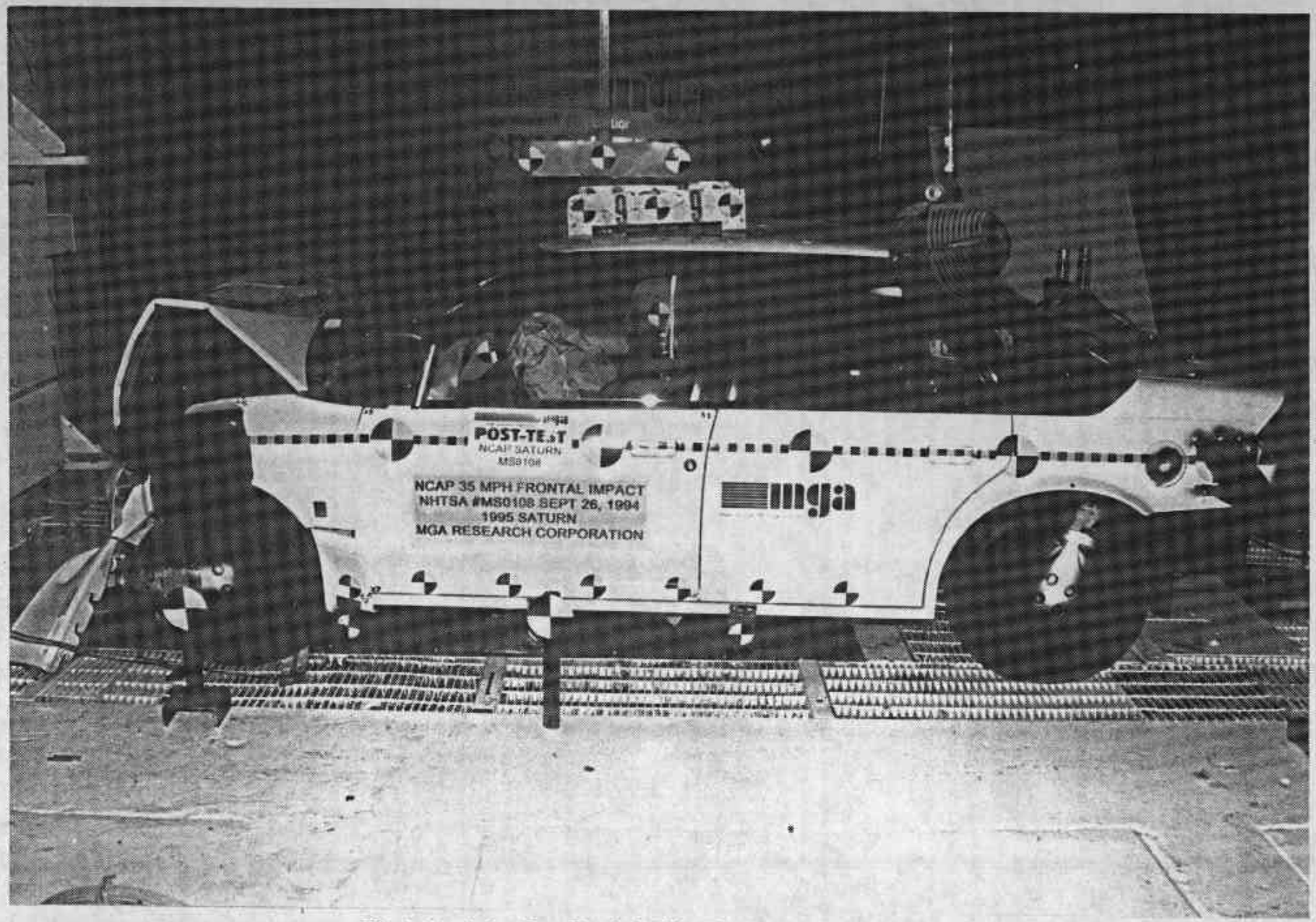


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

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

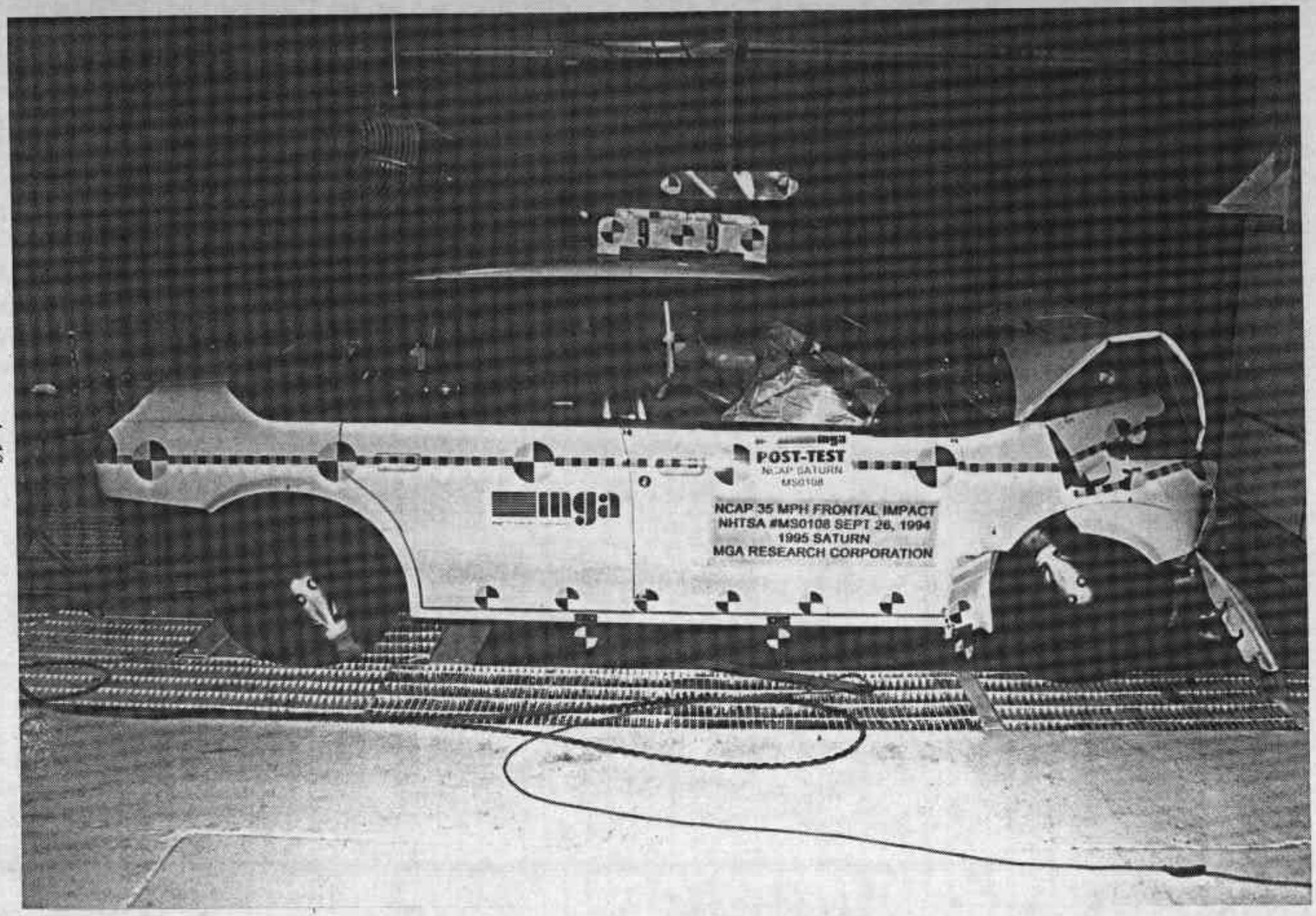


Photo No. A-10 - Post-Test Right Side View of Test Vehicle

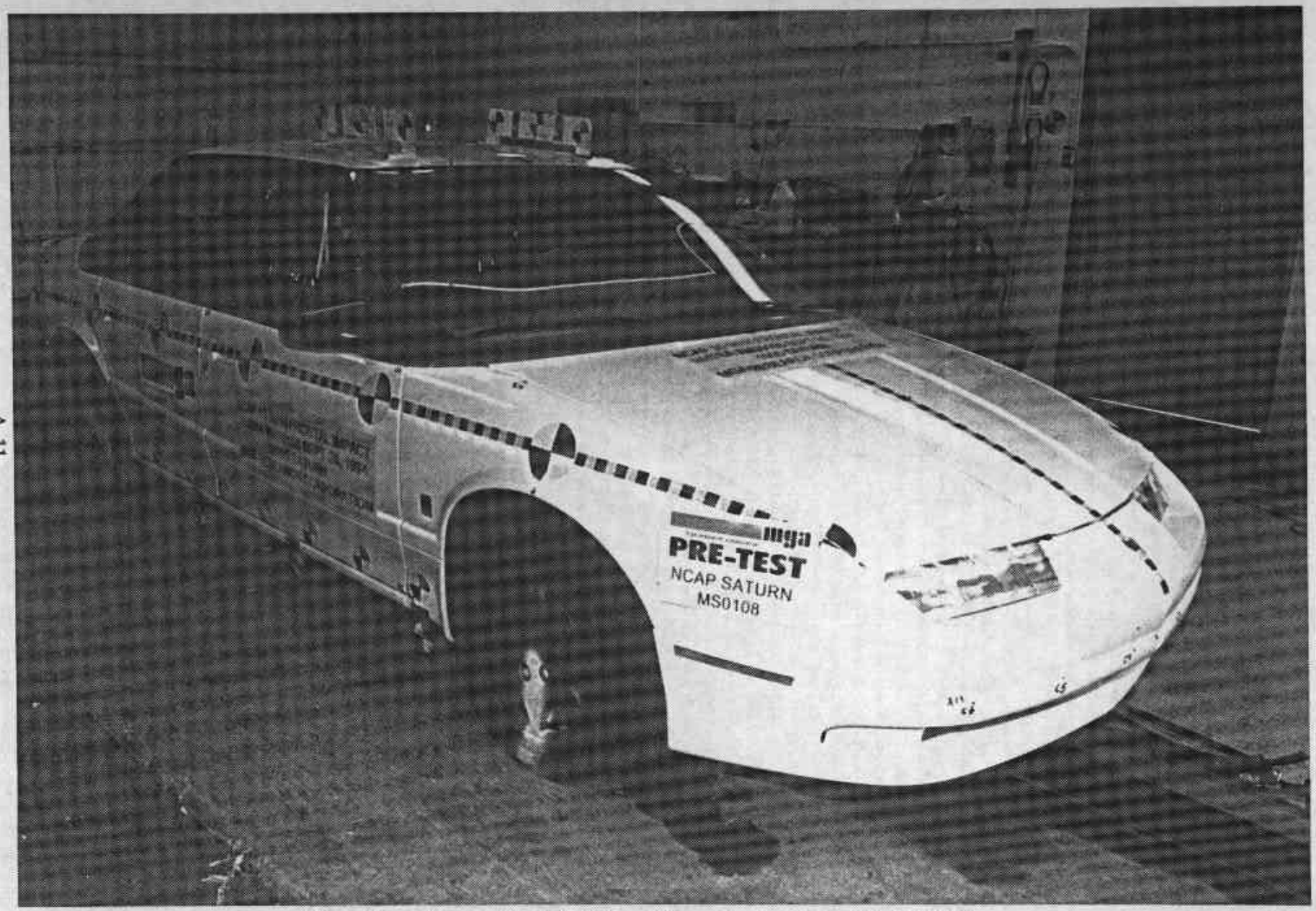


Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle

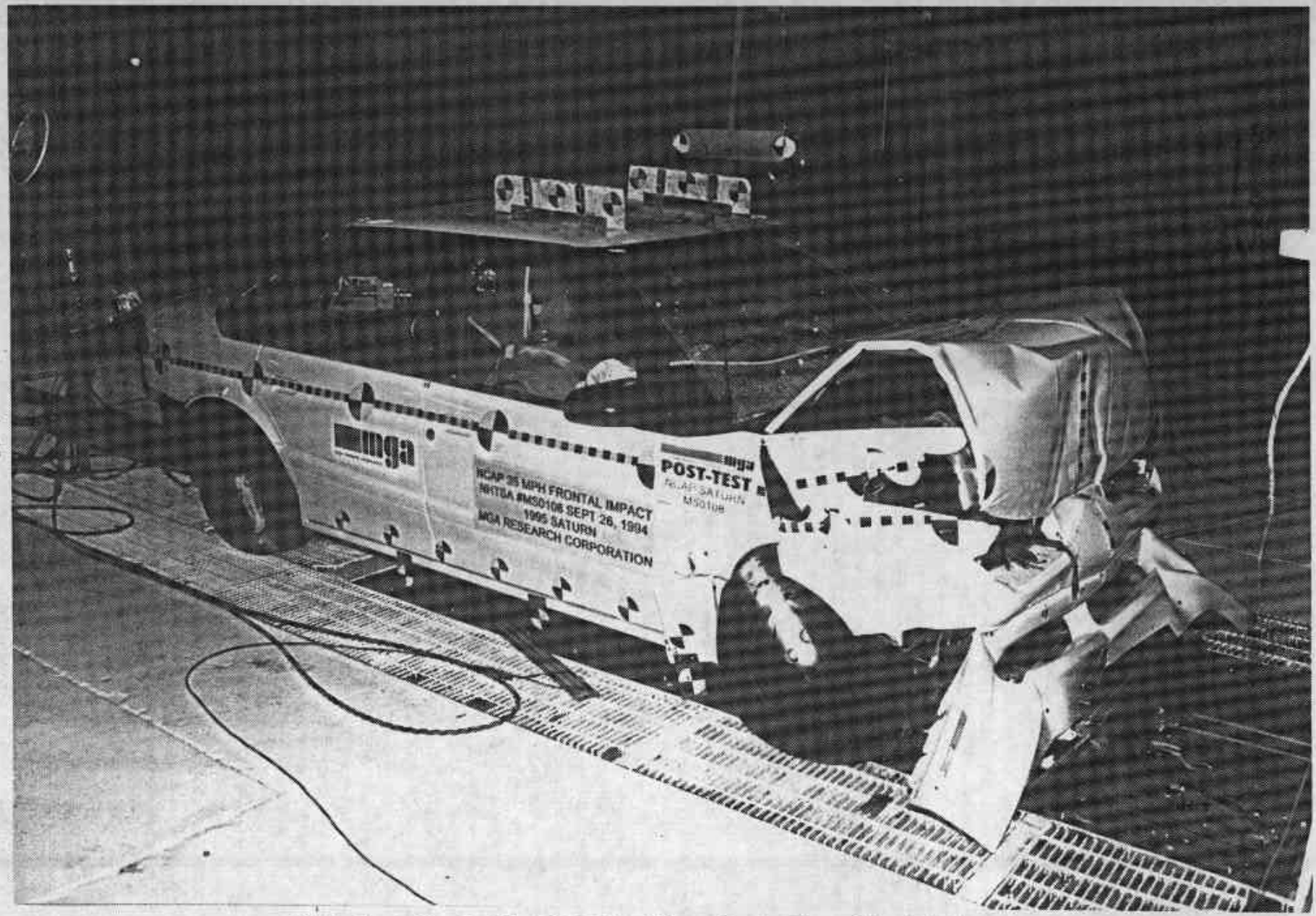


Photo No. A-12 - Post-Test Right Front Three-Quarter View of Test Vehicle

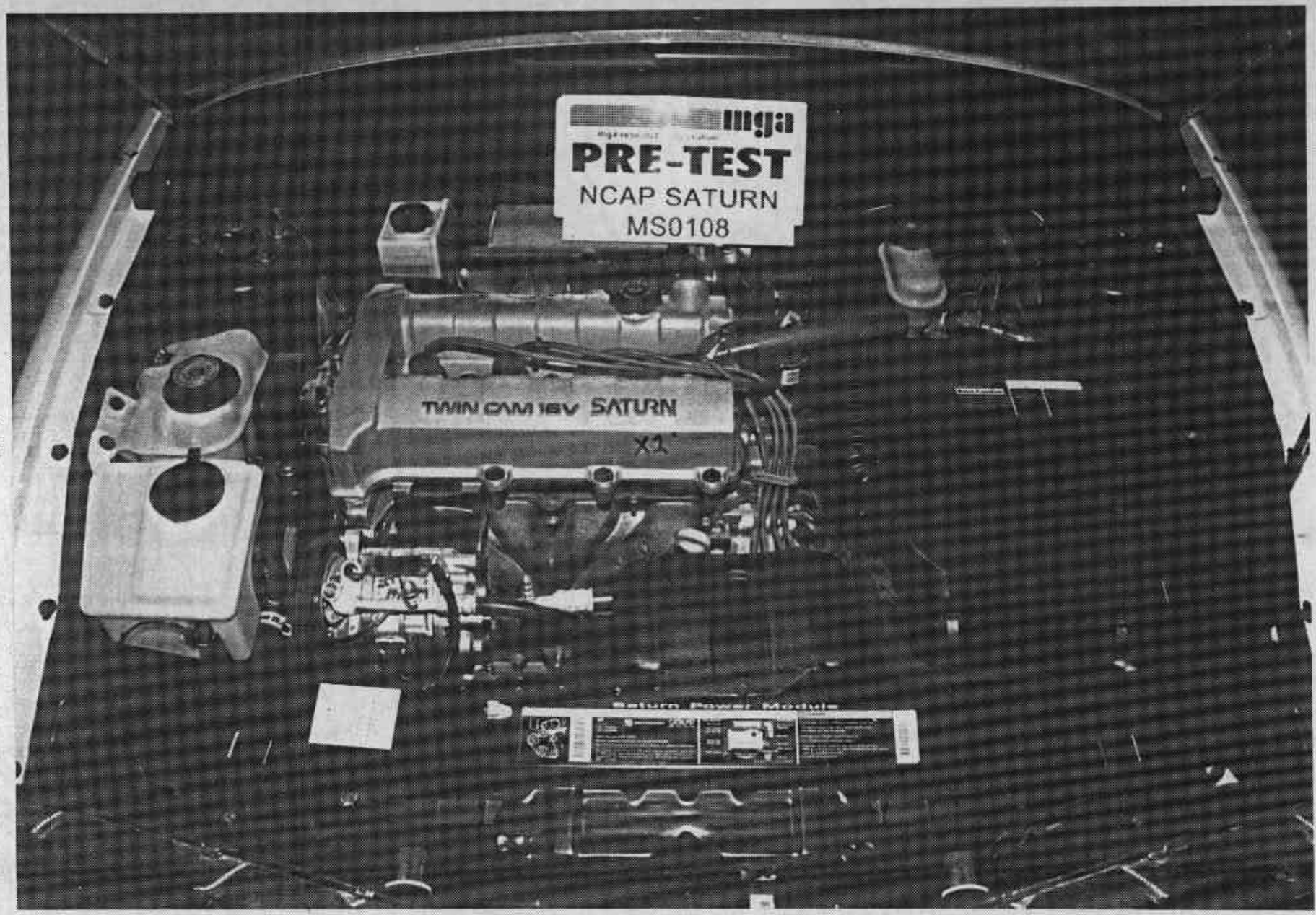


Photo No. A-13 - Pre-Test Engine Compartment View

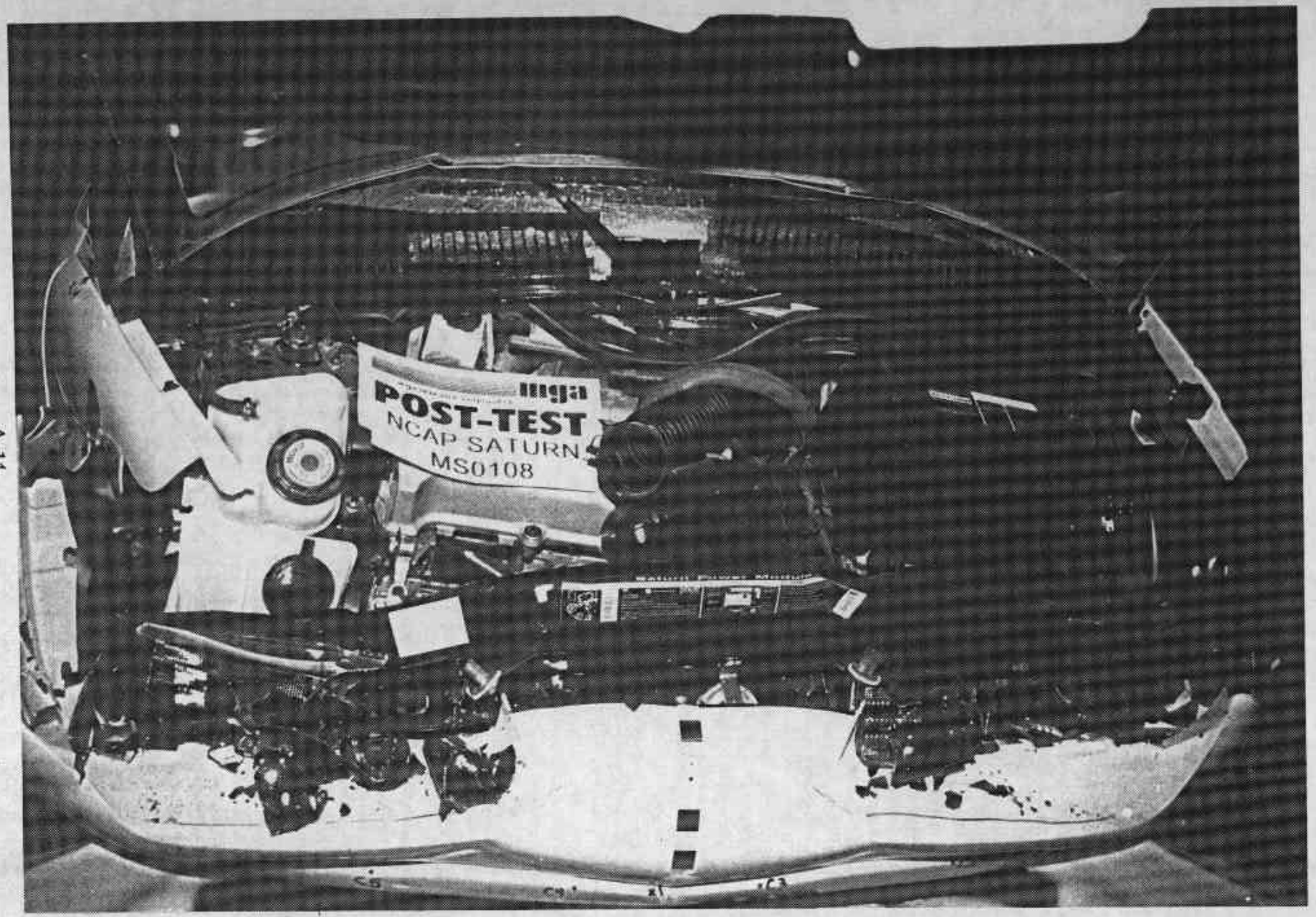


Photo No. A-14 - Post-Test Engine Compartment View

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

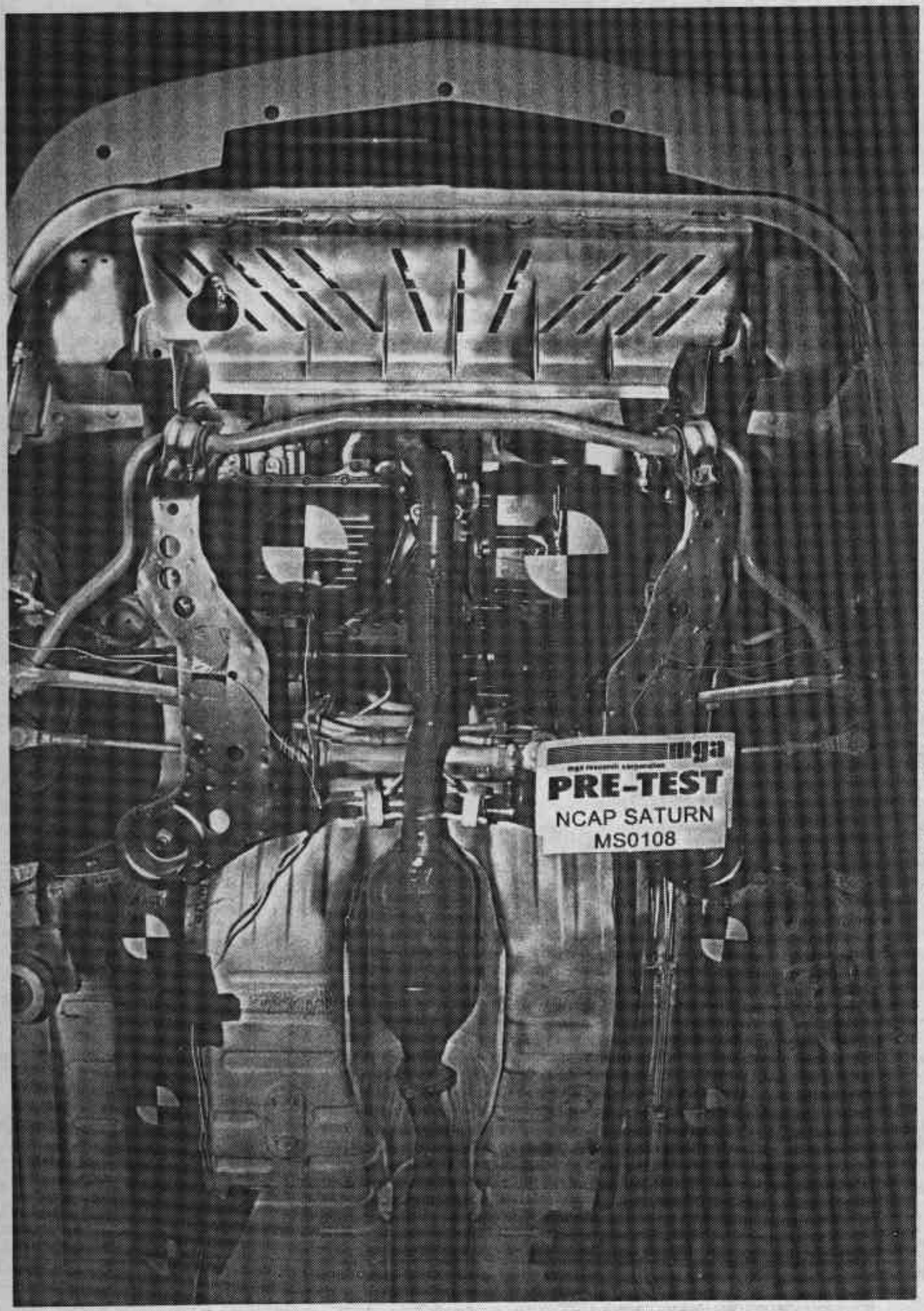


Photo No. A-16 - Pre-Test Front Underbody View

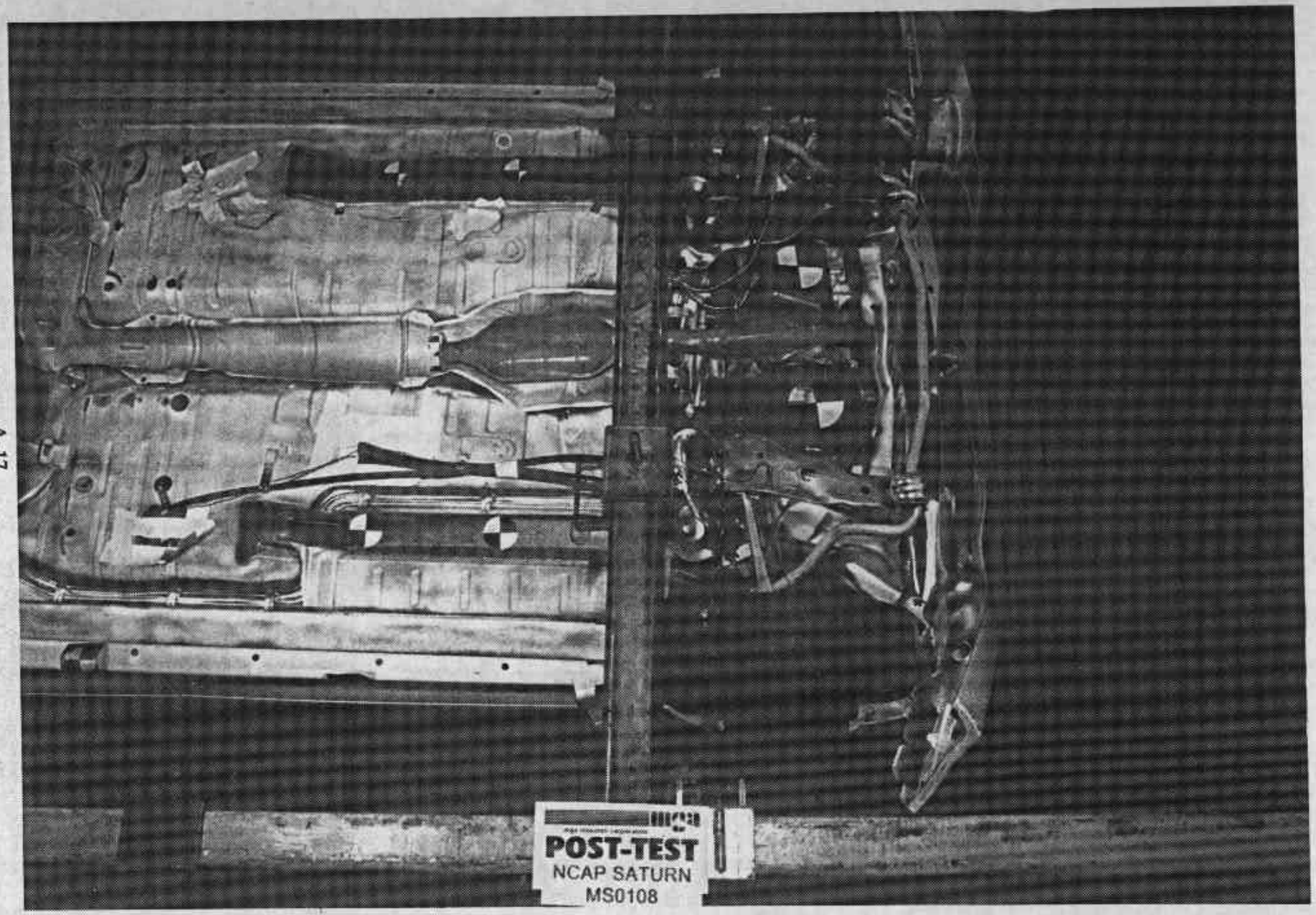


Photo No. A-17 - Post-Test Front Underbody View

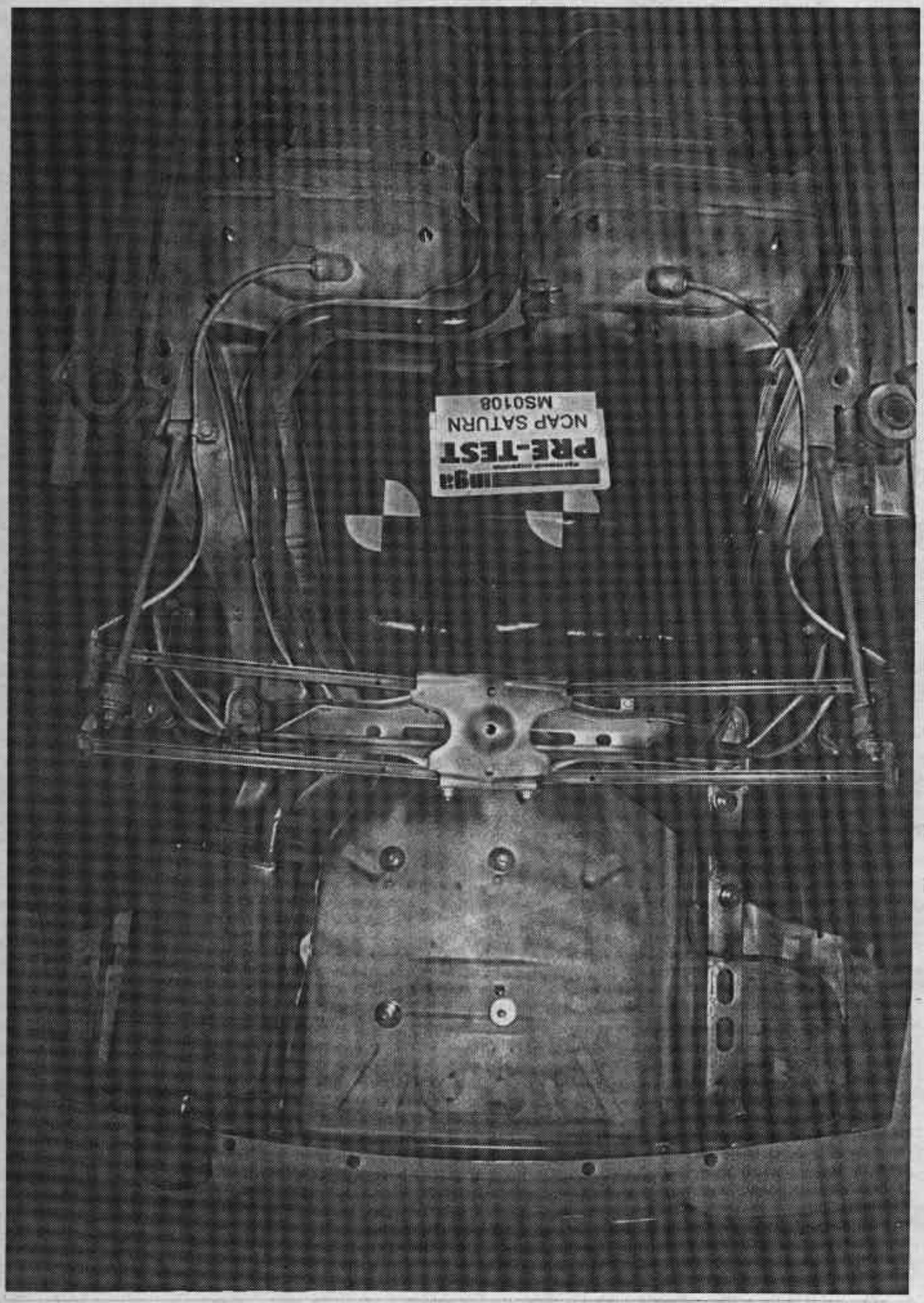


Photo No. A-18 - Pre-Test Rear Underbody View

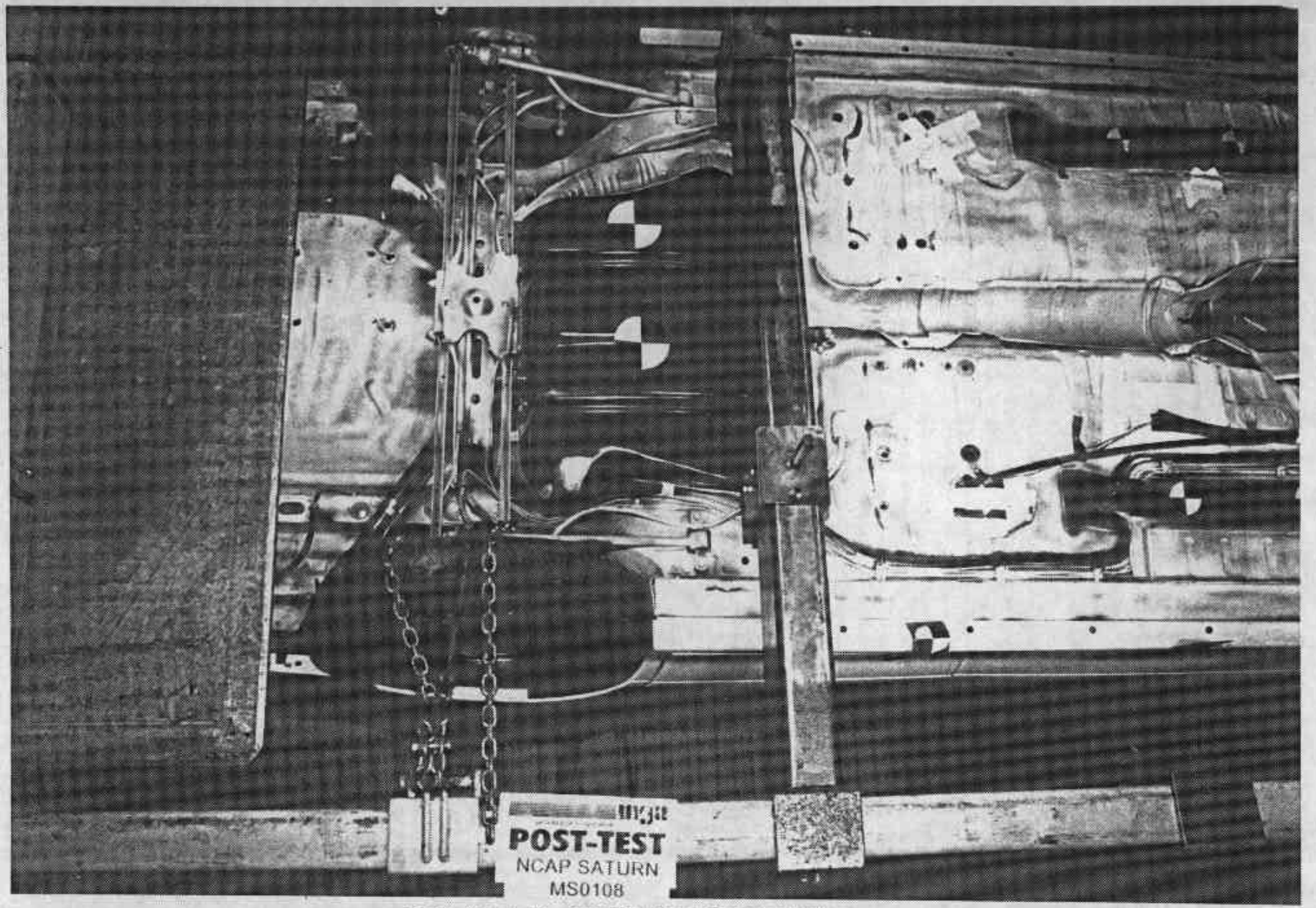
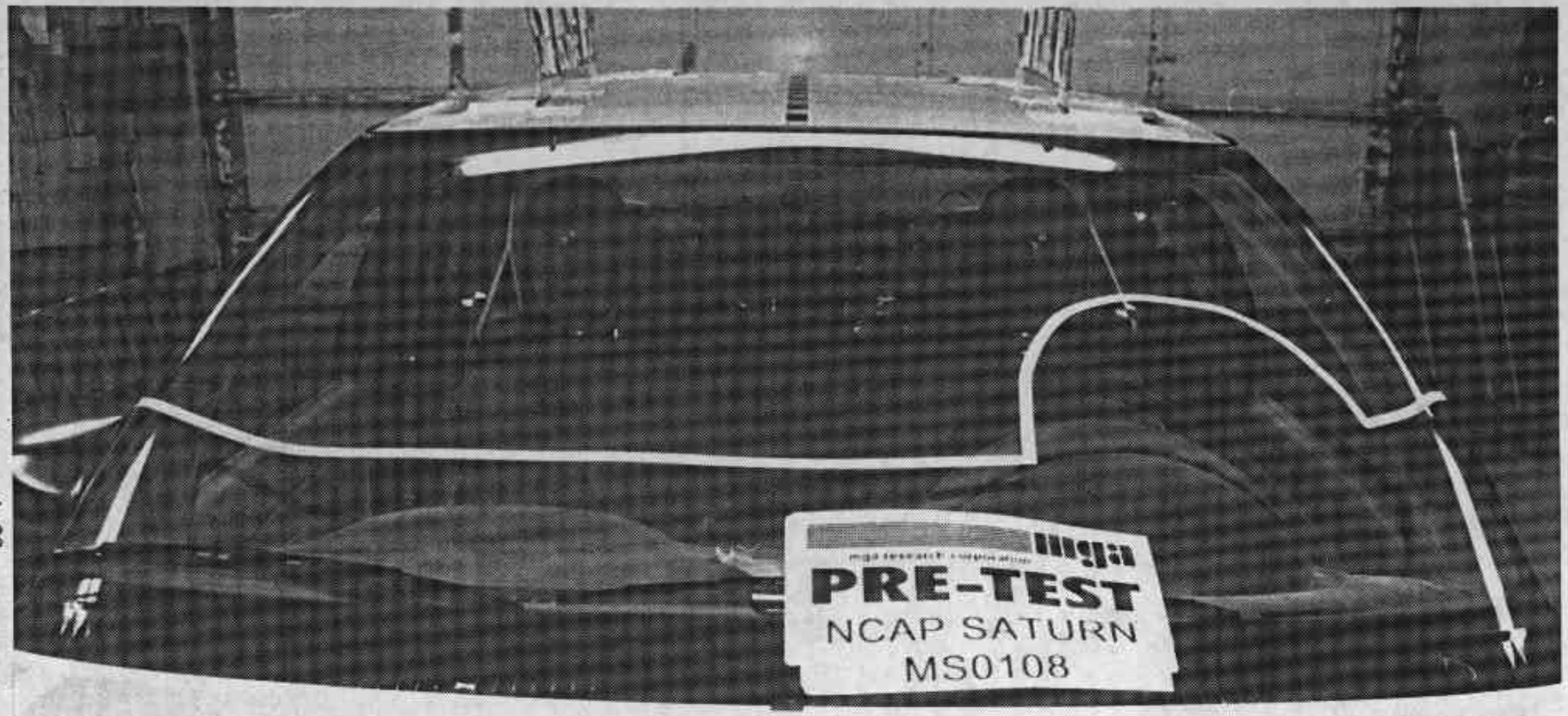


Photo No. A-19 - Post-Test Rear Underbody View



NCAP 35 MPH FRONTAL IMPACT
NHTSA #MS0108 SEPT 26, 1994
1995 SATURN
MGA RESEARCH CORPORATION

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

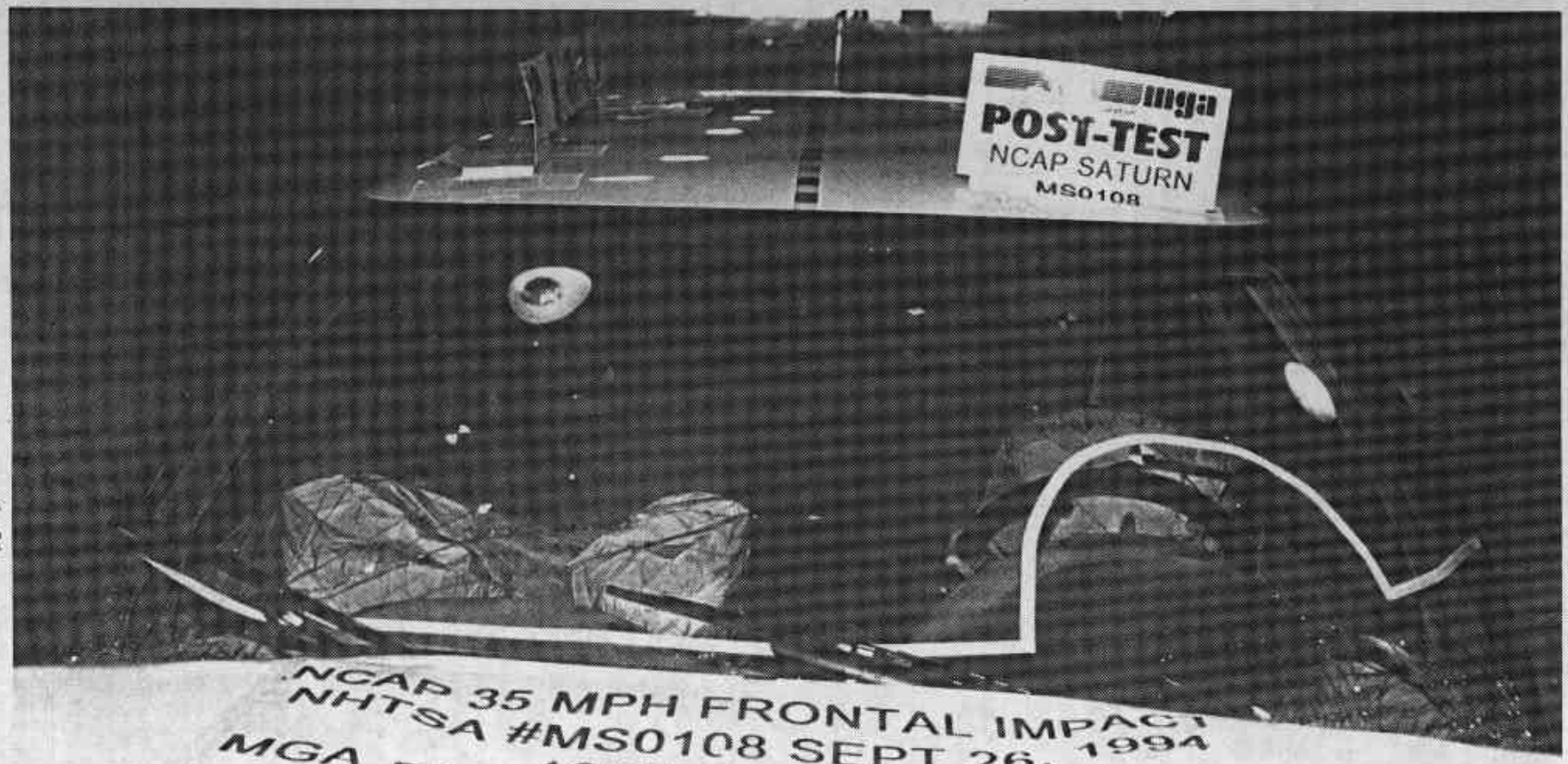


Photo No. A-21 - Post-Test Windshield View

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

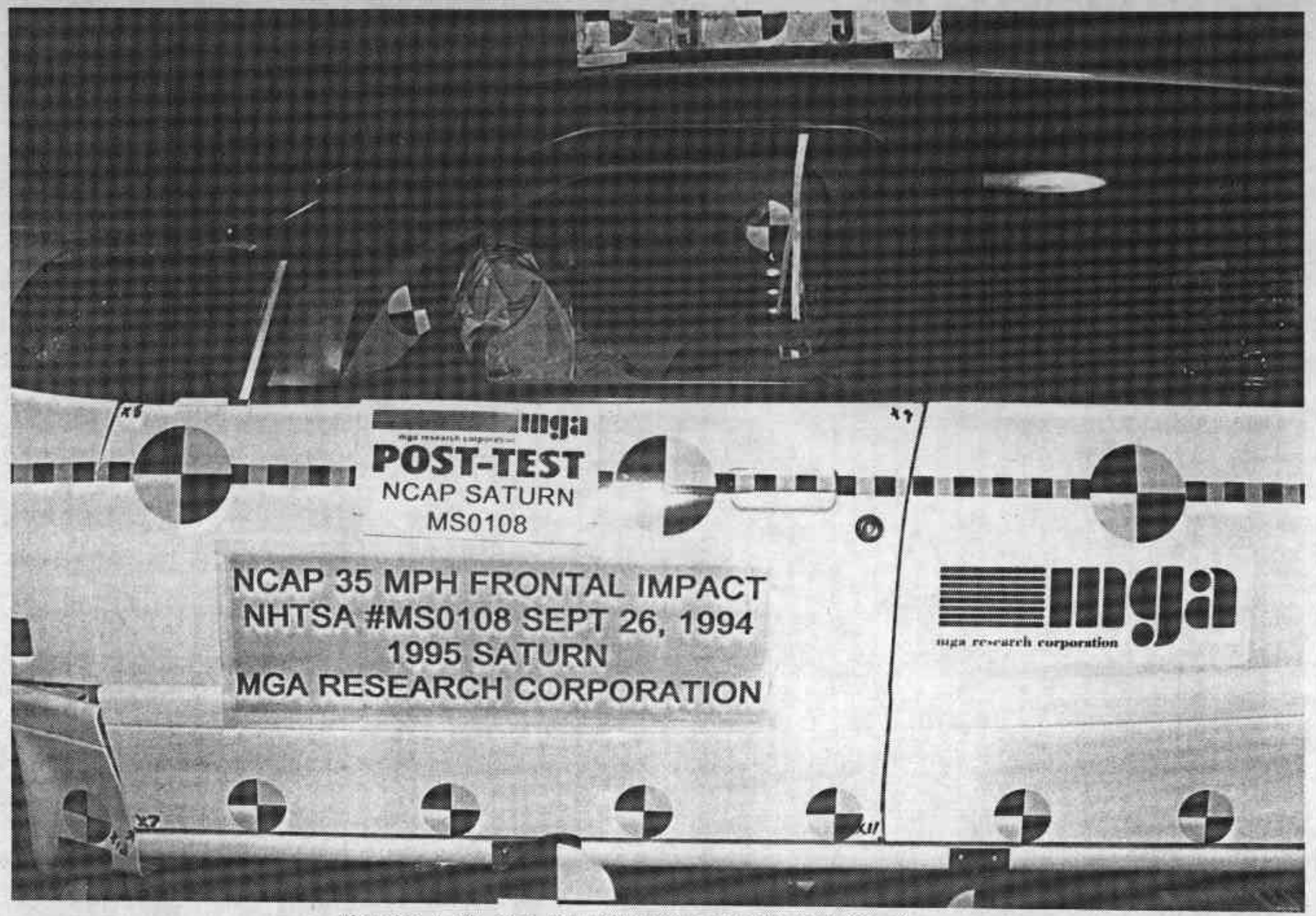


Photo No. A-23 - Post-Test Driver Dummy Position Left Side View

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

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

A-26

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

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

A-28

Photo No. A-28 - Pre-Test Driver Dummy Knee Position

Photo No. A-29 - Post-Test Driver Dummy Knee Position

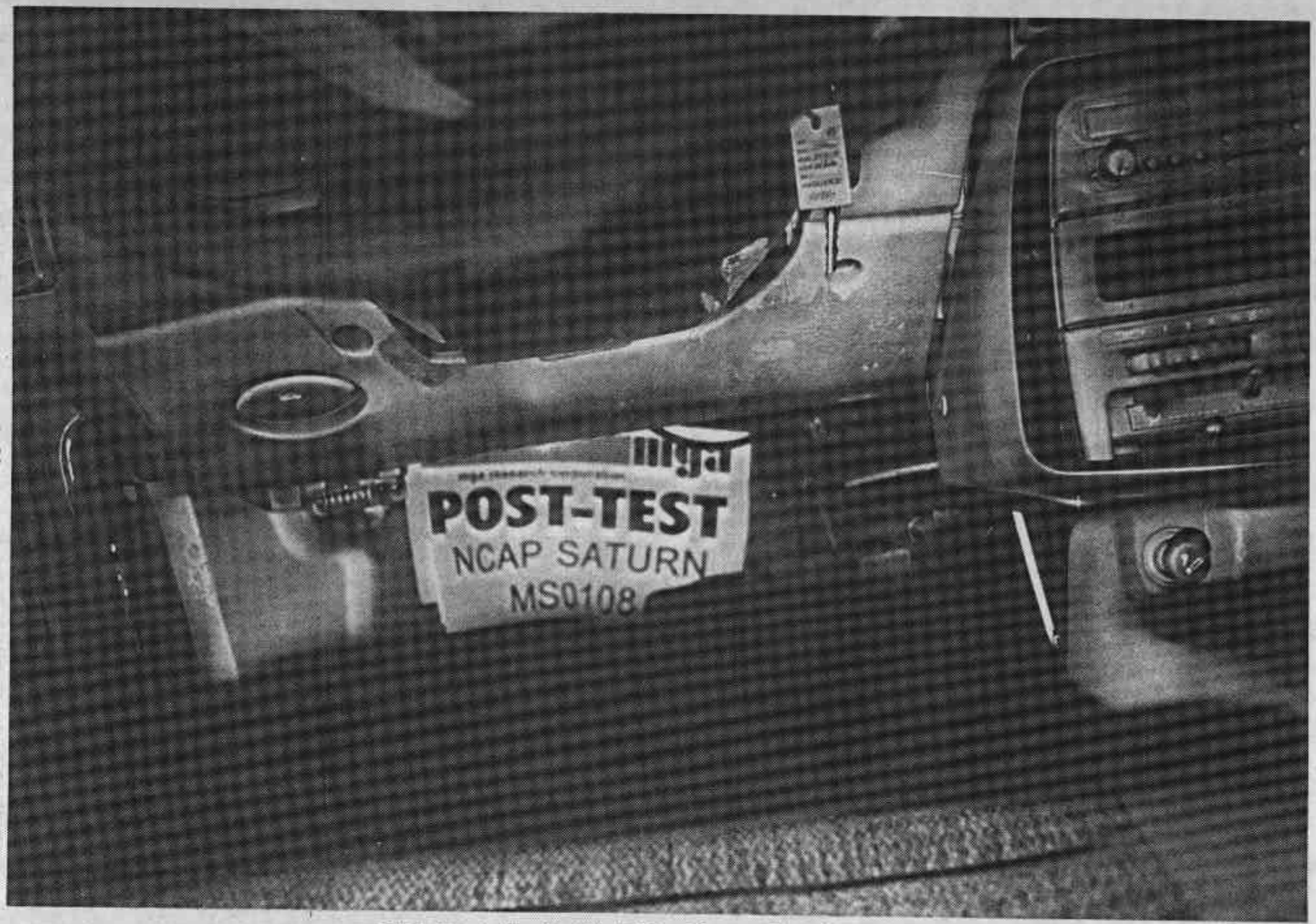


Photo No. A-3Ø - Post-Test Driver Dummy Knee Contact

Photo No. A-31 - Post-Test Driver Airbag Contact

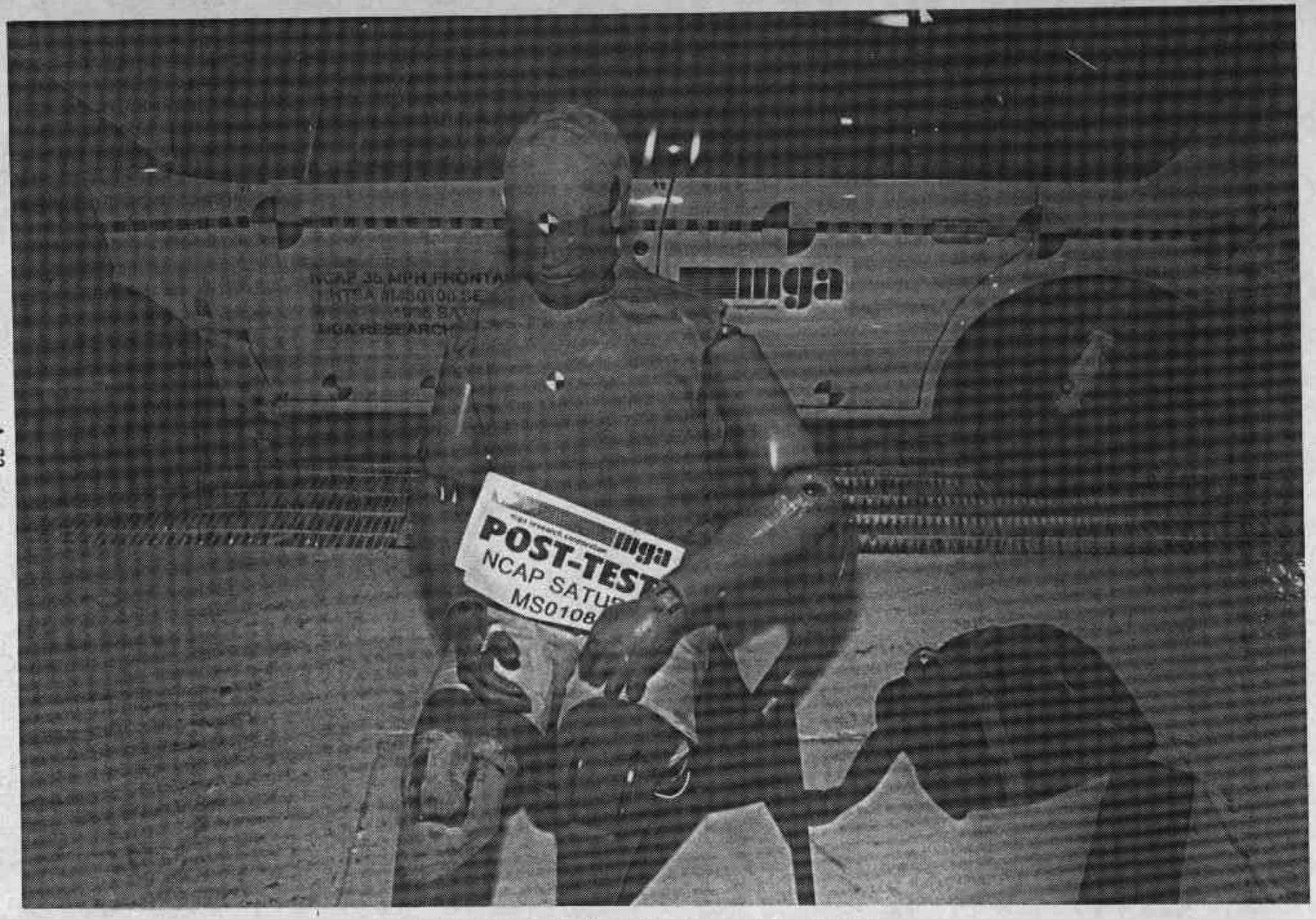


Photo No. A-32 - Post-Test Driver Dummy Out of Vehicle

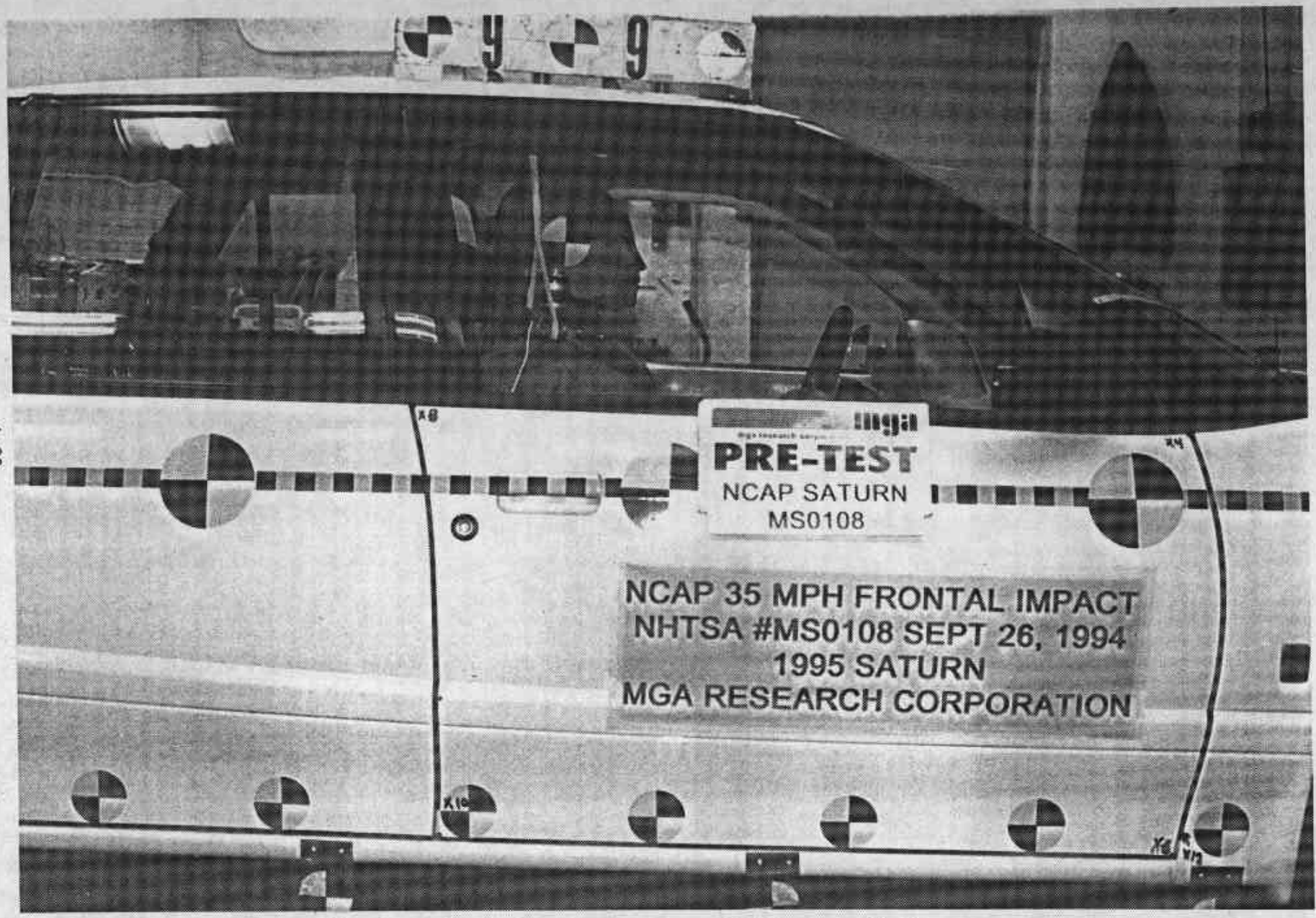


Photo No. A-33 - Pre-Test Passenger Dummy Position Right Side View

Photo No. A-34 - Post-Test Passenger Dummy Position Right Side View

Photo No. A-35 - Pre-Test Passenger Dummy Position Right Side View (Door Open)

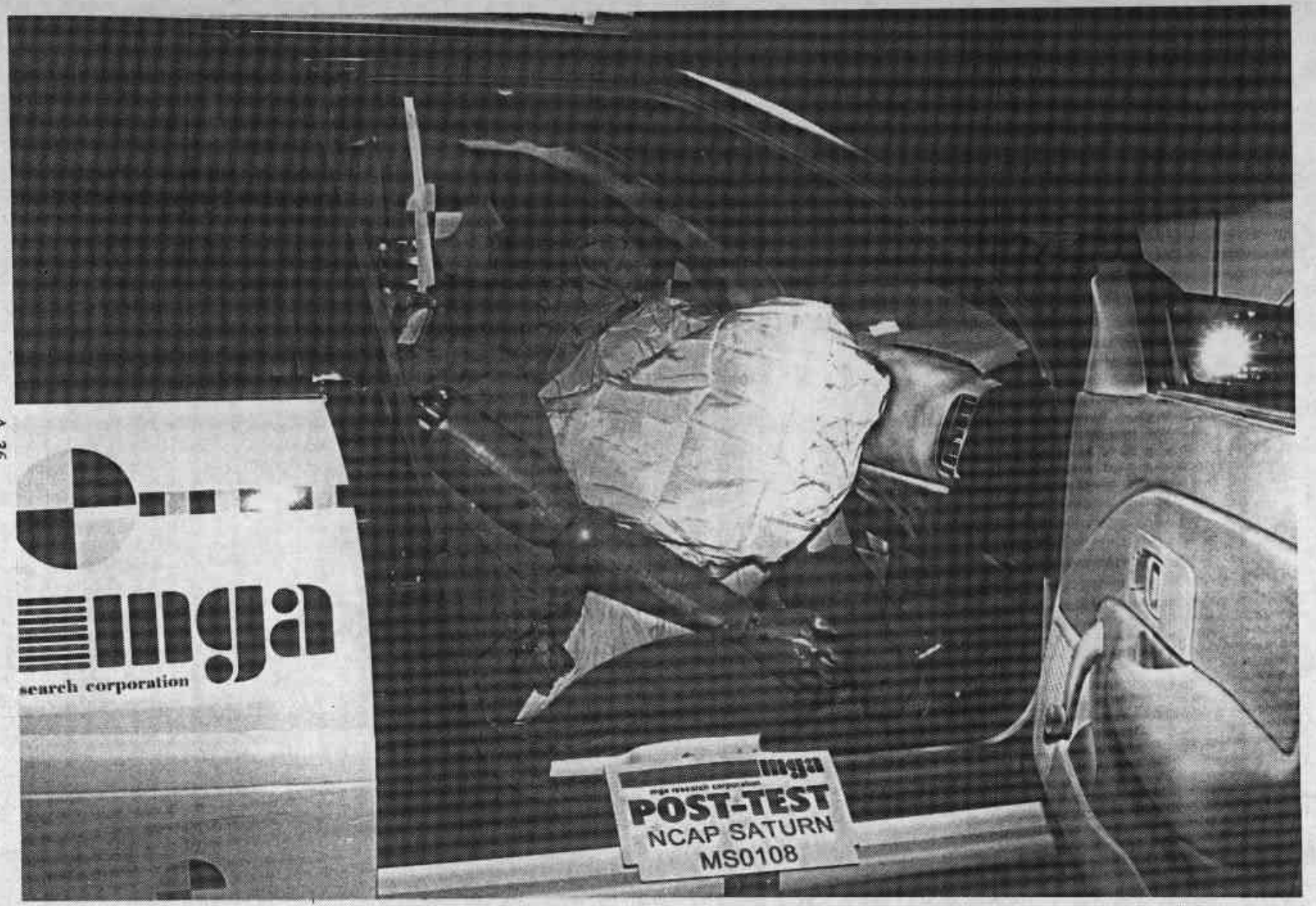


Photo No. A-36 - Post-Test Passenger Dummy Position Right Side View (Door Open)

A-37

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

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

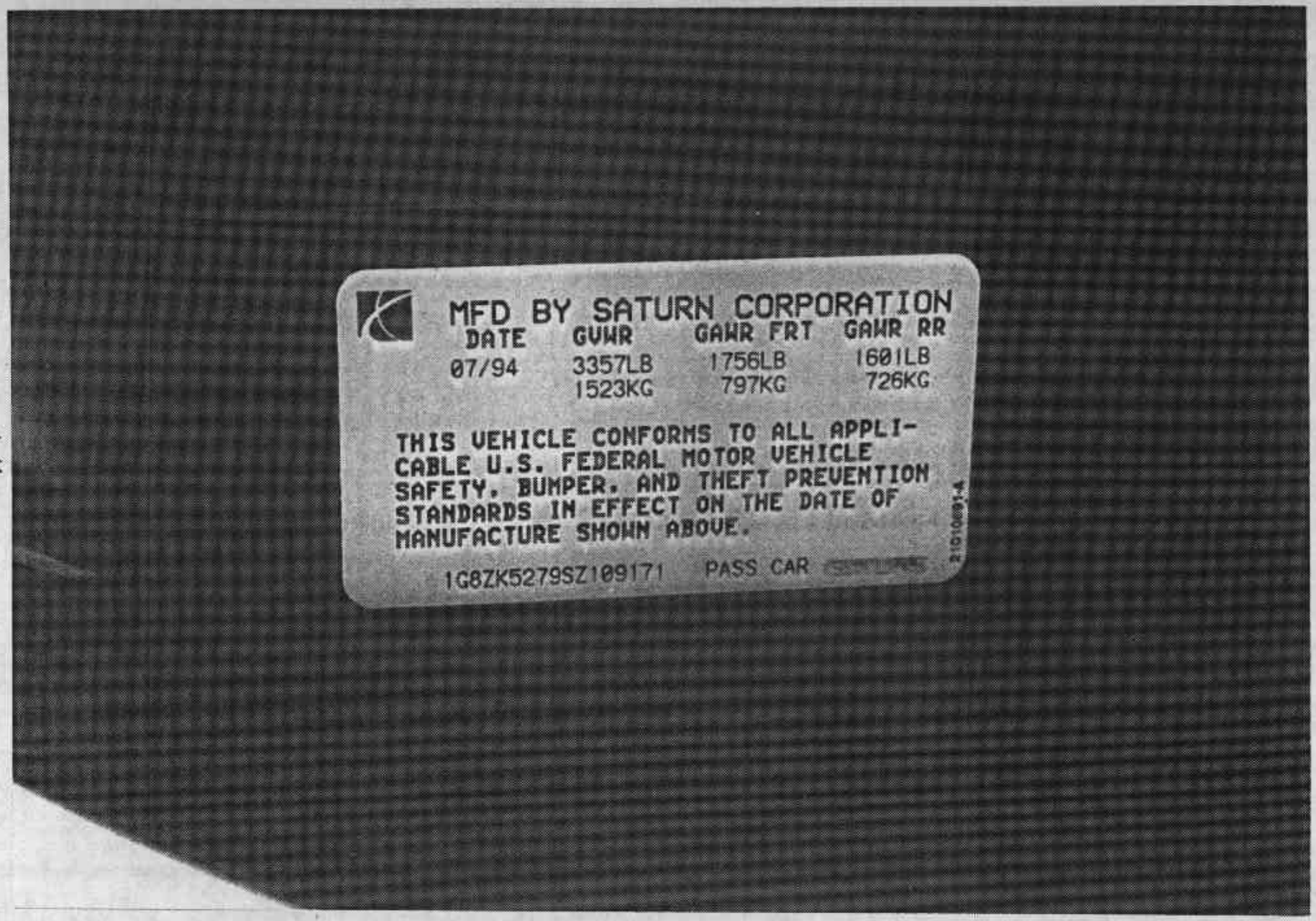
Photo No. A-39 - Pre-Test Passenger Dummy Knee Position

Photo No. A-40 - Post-Test Passenger Dummy Knee Position

Photo No. A-41 - Post-Test Passenger Dummy Knee Contact Marks

Photo No. A-42 - Post-Test Passenger Airbag Contact

Photo No. A-43 - Post-Test Passenger Dummy Out of Vehicle



A-44

Photo No. A-44 - Vehicle Certification Label

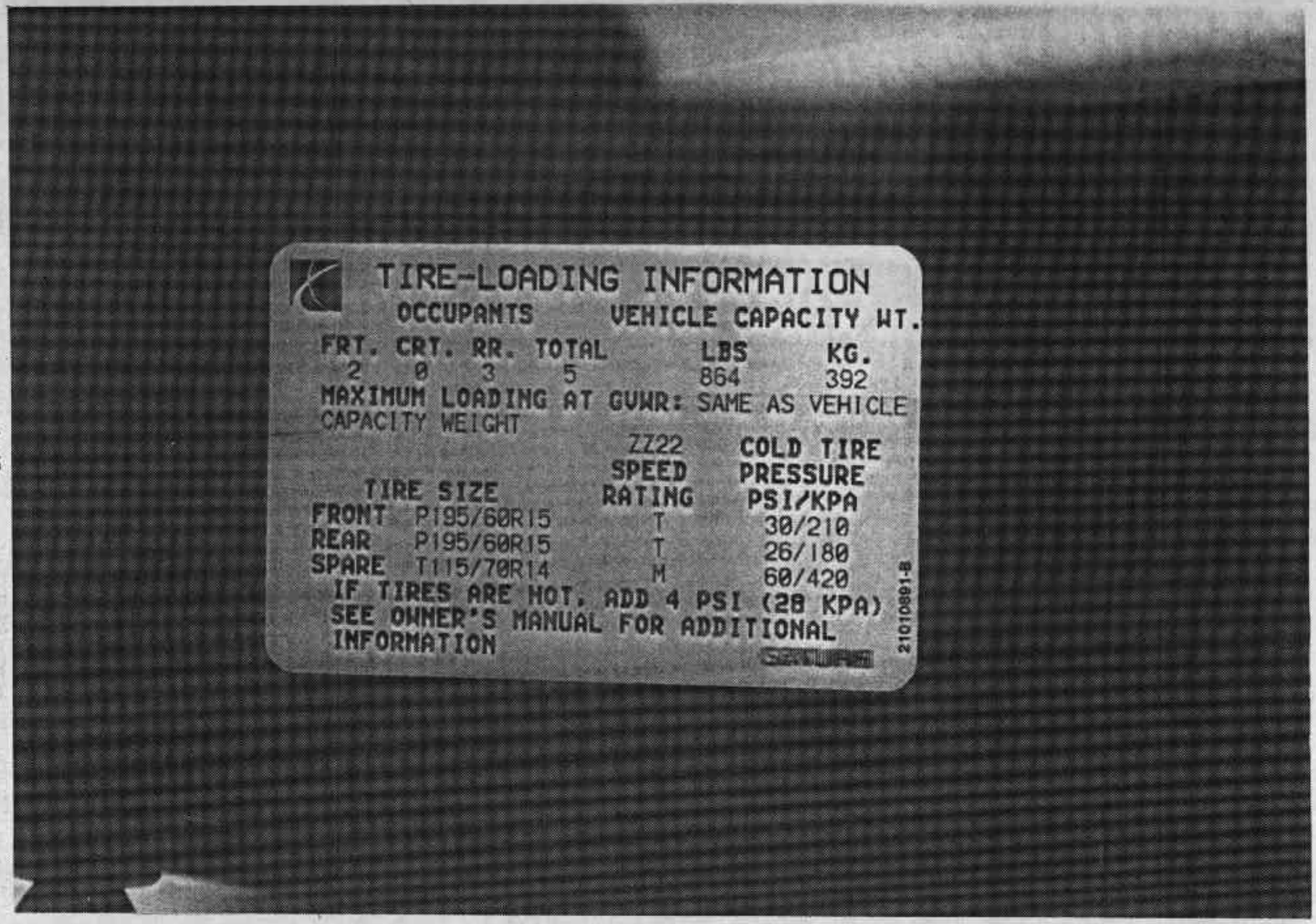


Photo No. A-45 - Tire Placard

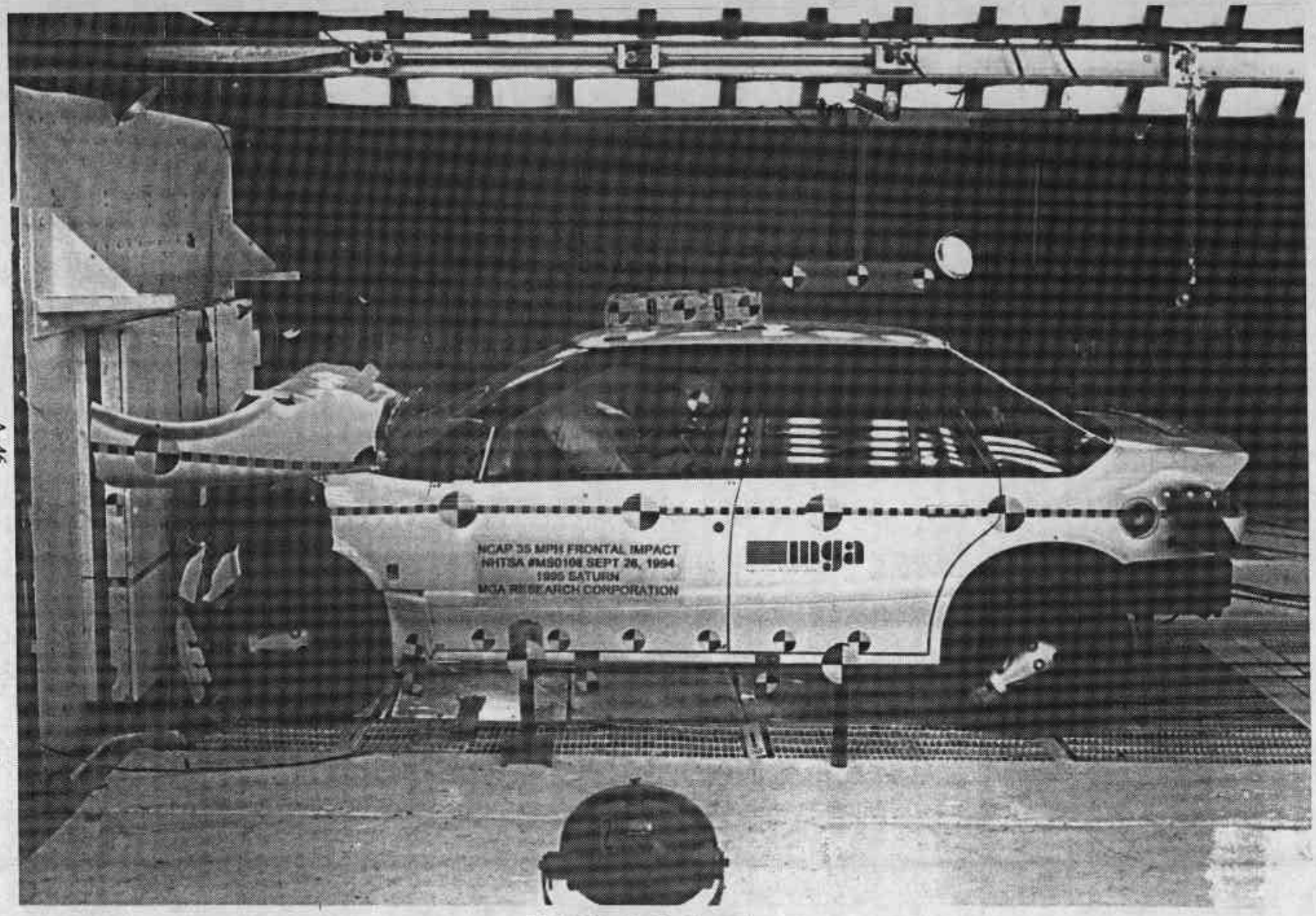


Photo No. A-46 - Impact

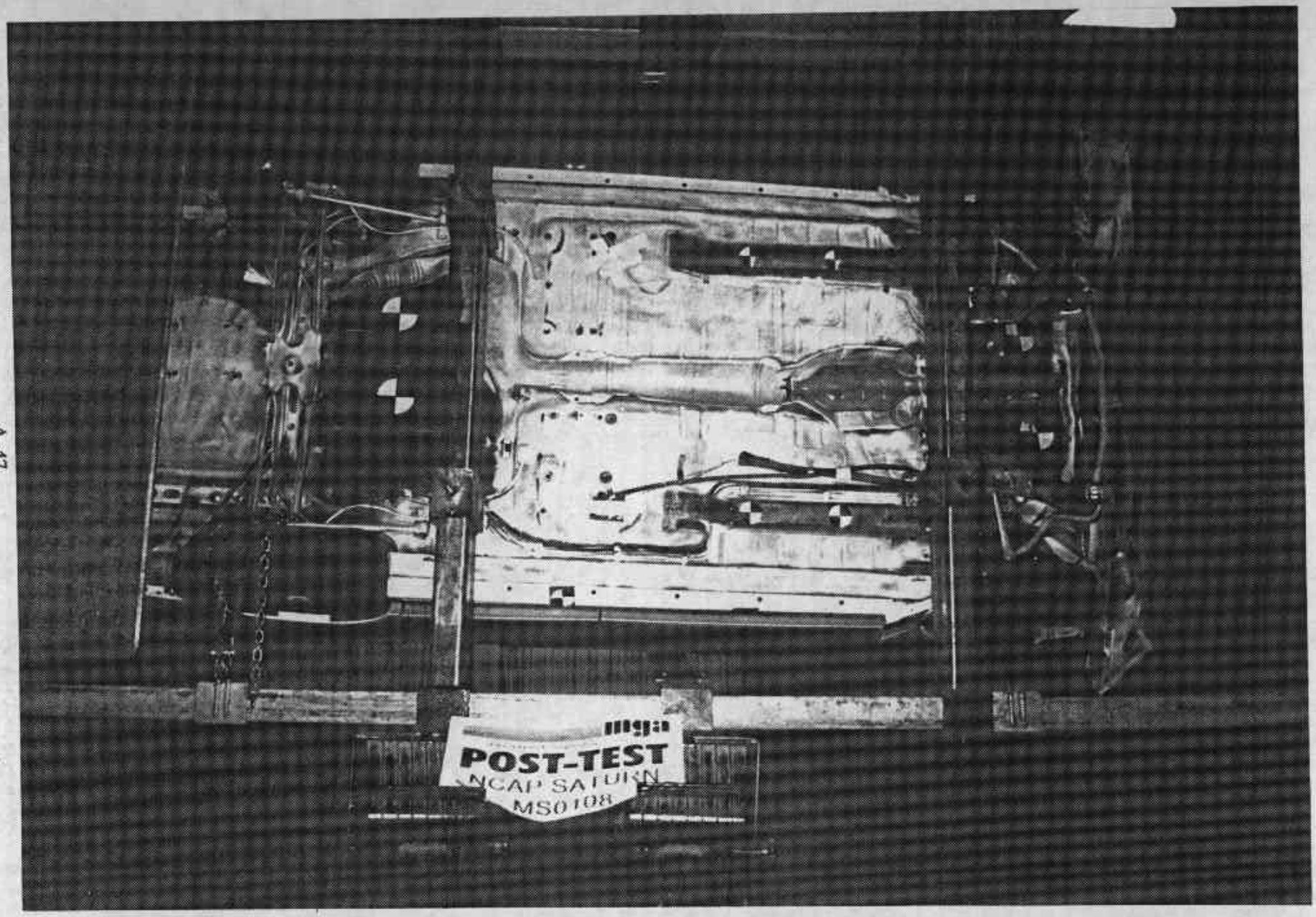


Photo No. A-47 - Rollover 90°

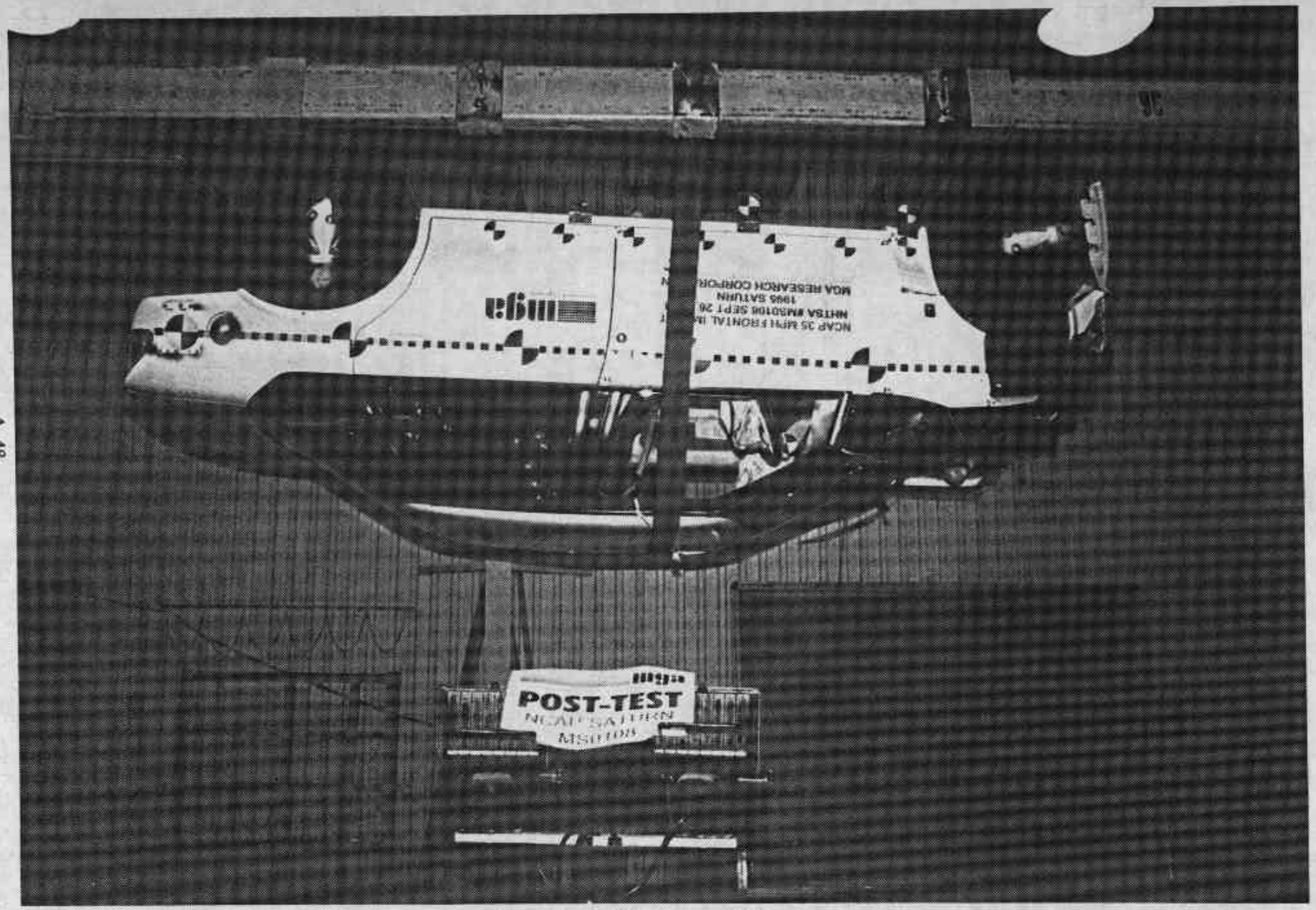


Photo No. A-48 - Rollover 180°

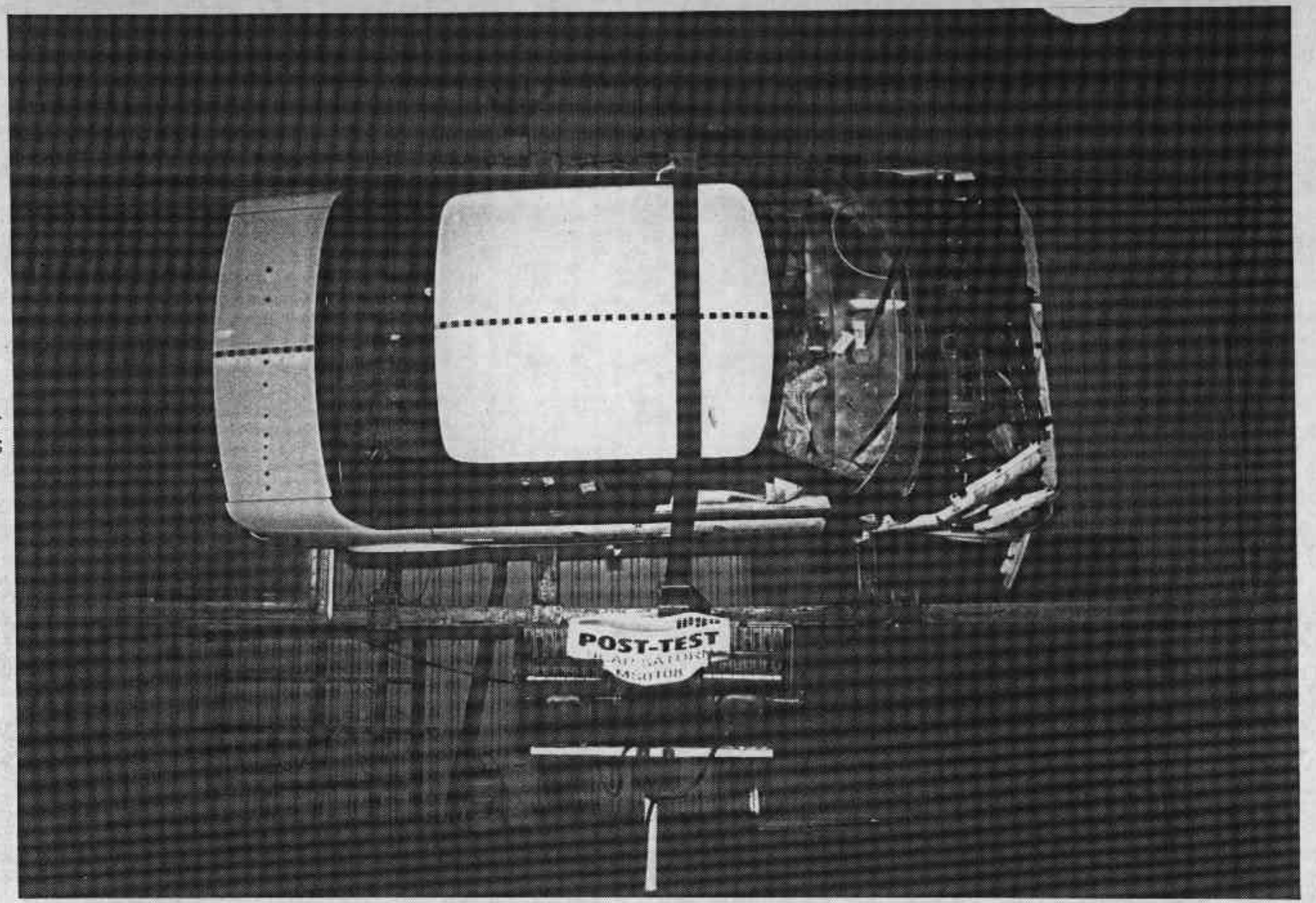


Photo No. A-49 - Rollover 270°

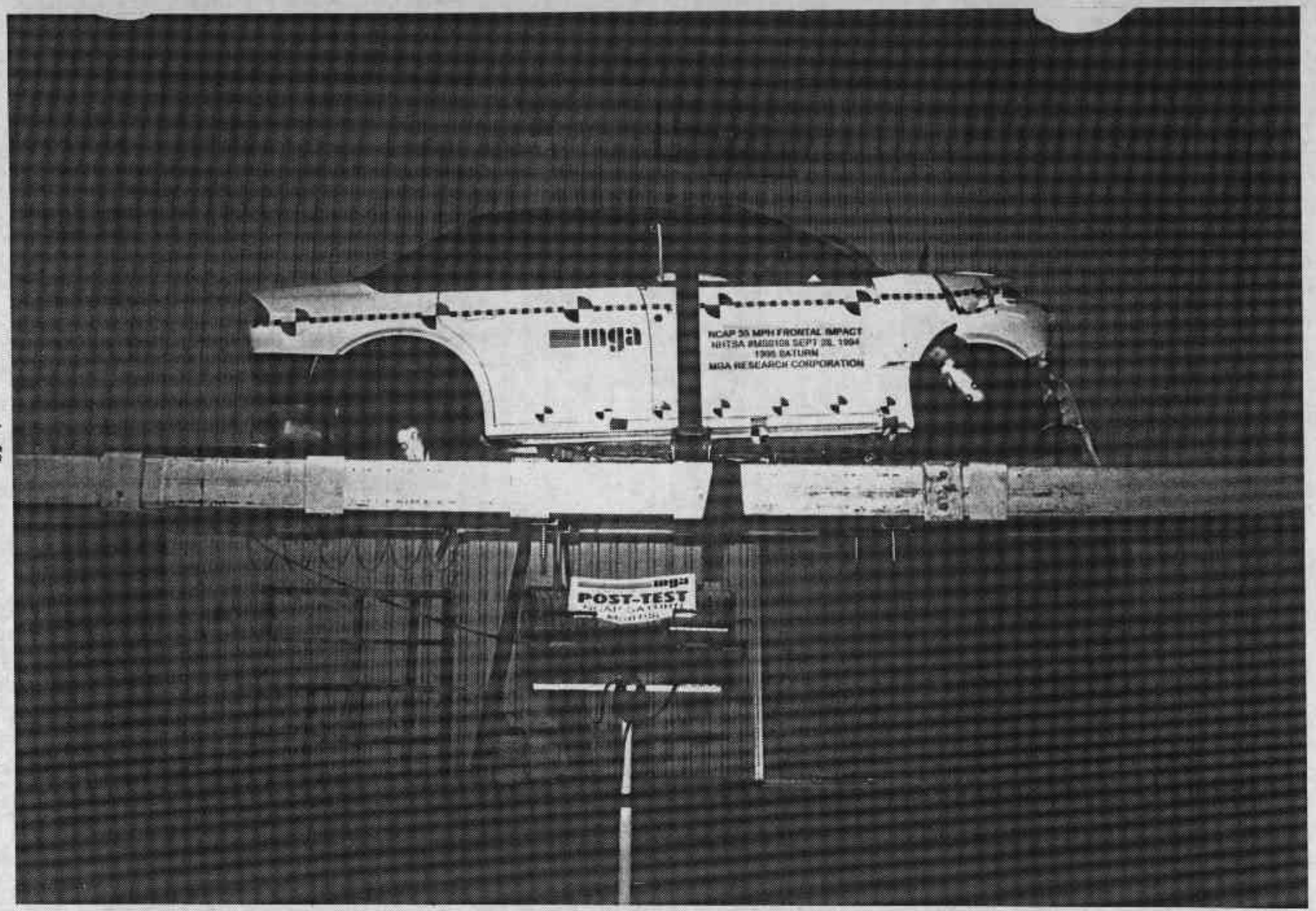


Photo No. A-5Ø - Rollover 36Ø°

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1995 Saturn SL2 4-Door

NHTSA NO.: MS0108

VEHICLE DATA		FILTER CHANNEL CLASS
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)

* Invalid data collected in this channel during test.

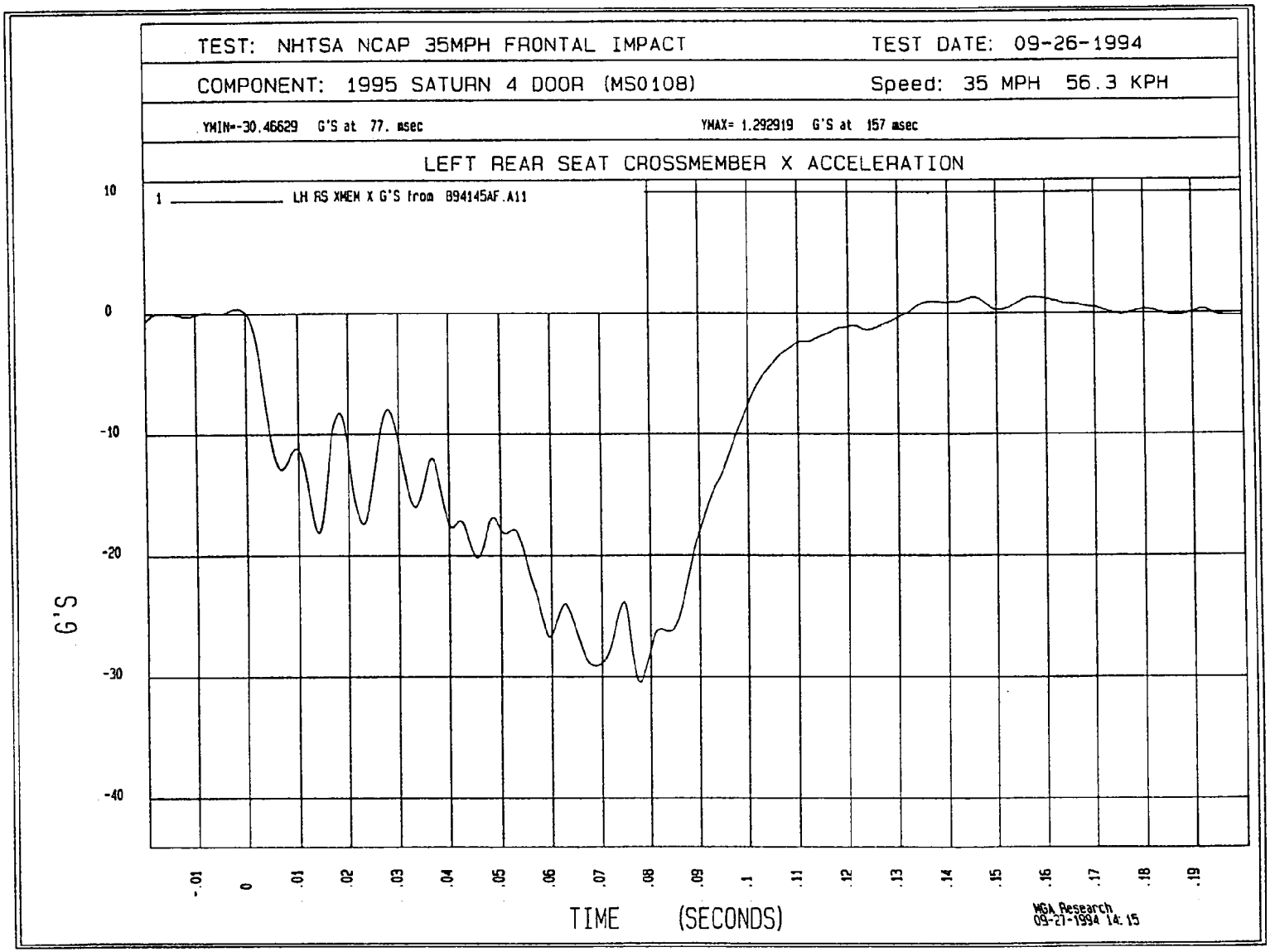


Figure B-1 - Left Rear Seat Crossmember X Acceleration vs. Time

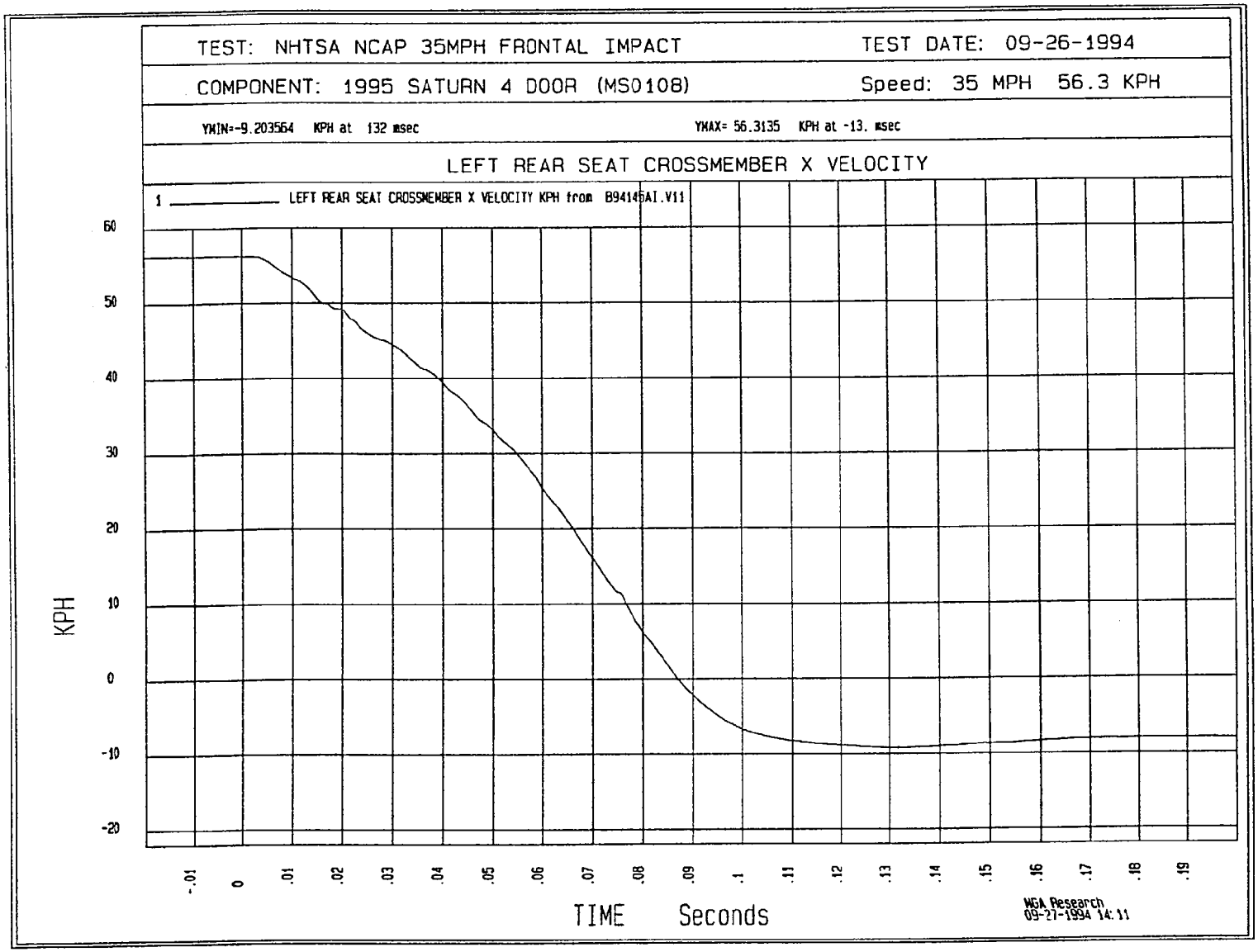


Figure B-2 - Left Rear Seat Crossmember X Velocity vs. Time

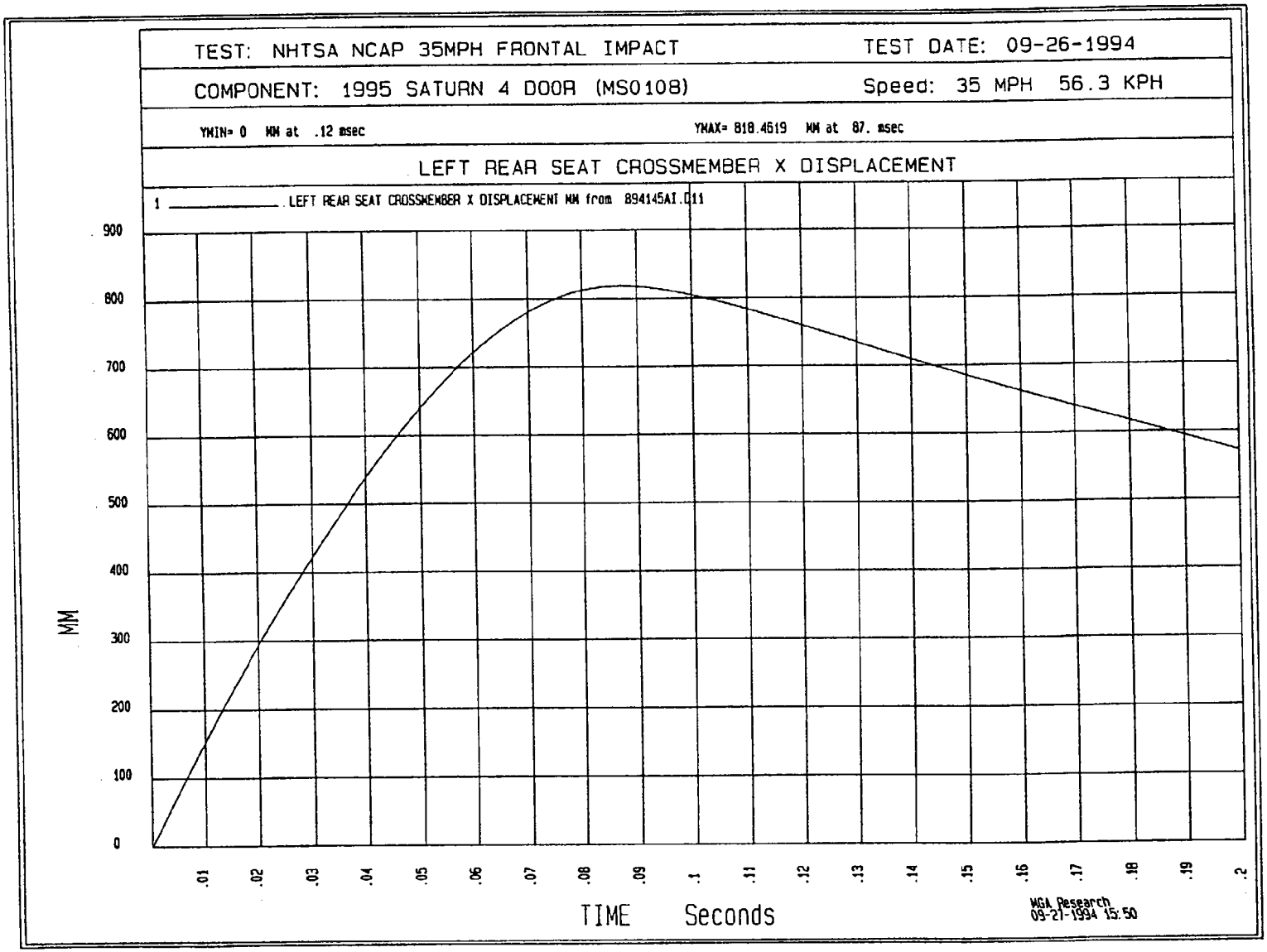


Figure B-3 - Left Rear Seat Crossmember X Displacement vs. Time

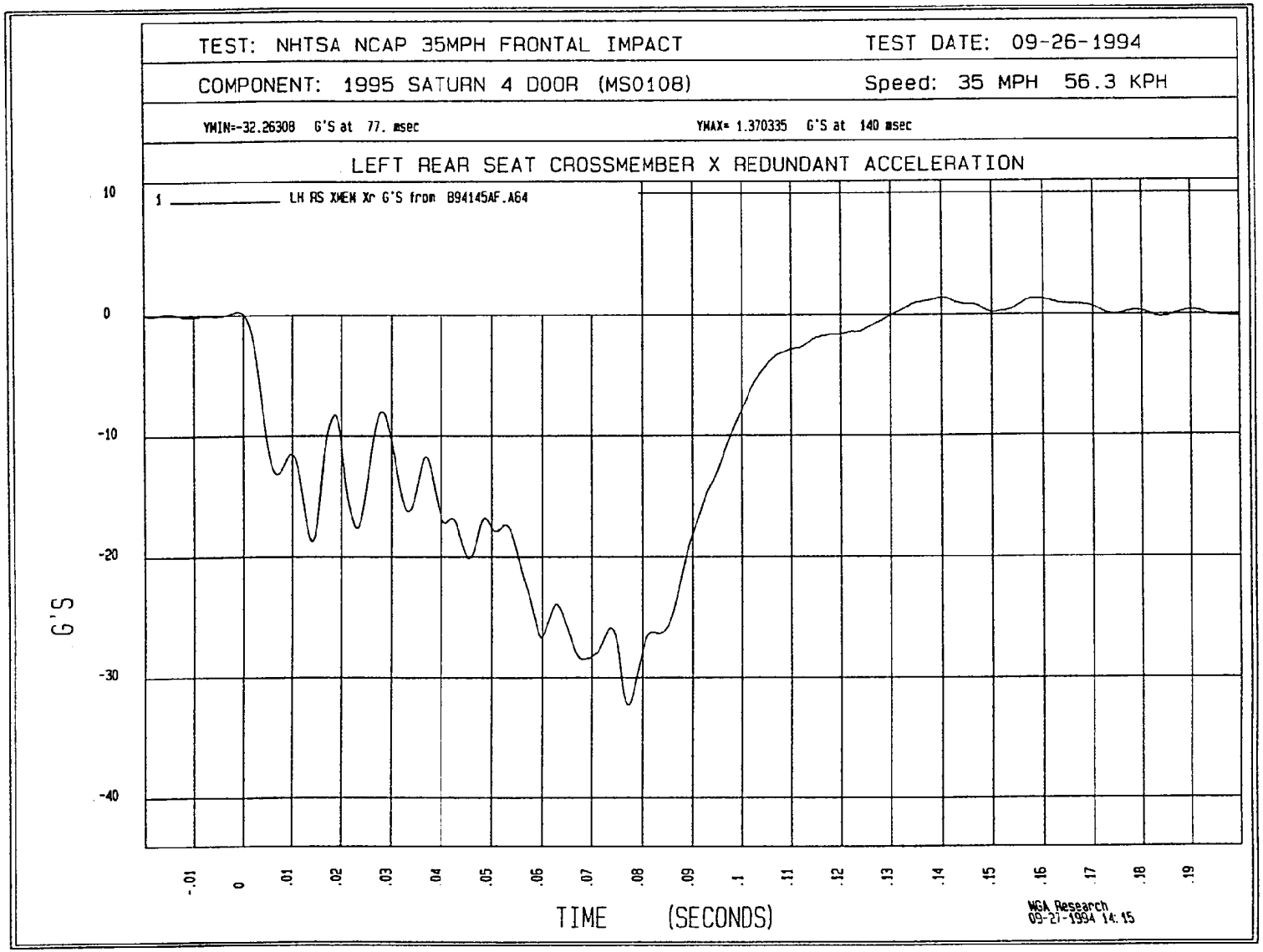


Figure B-4 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

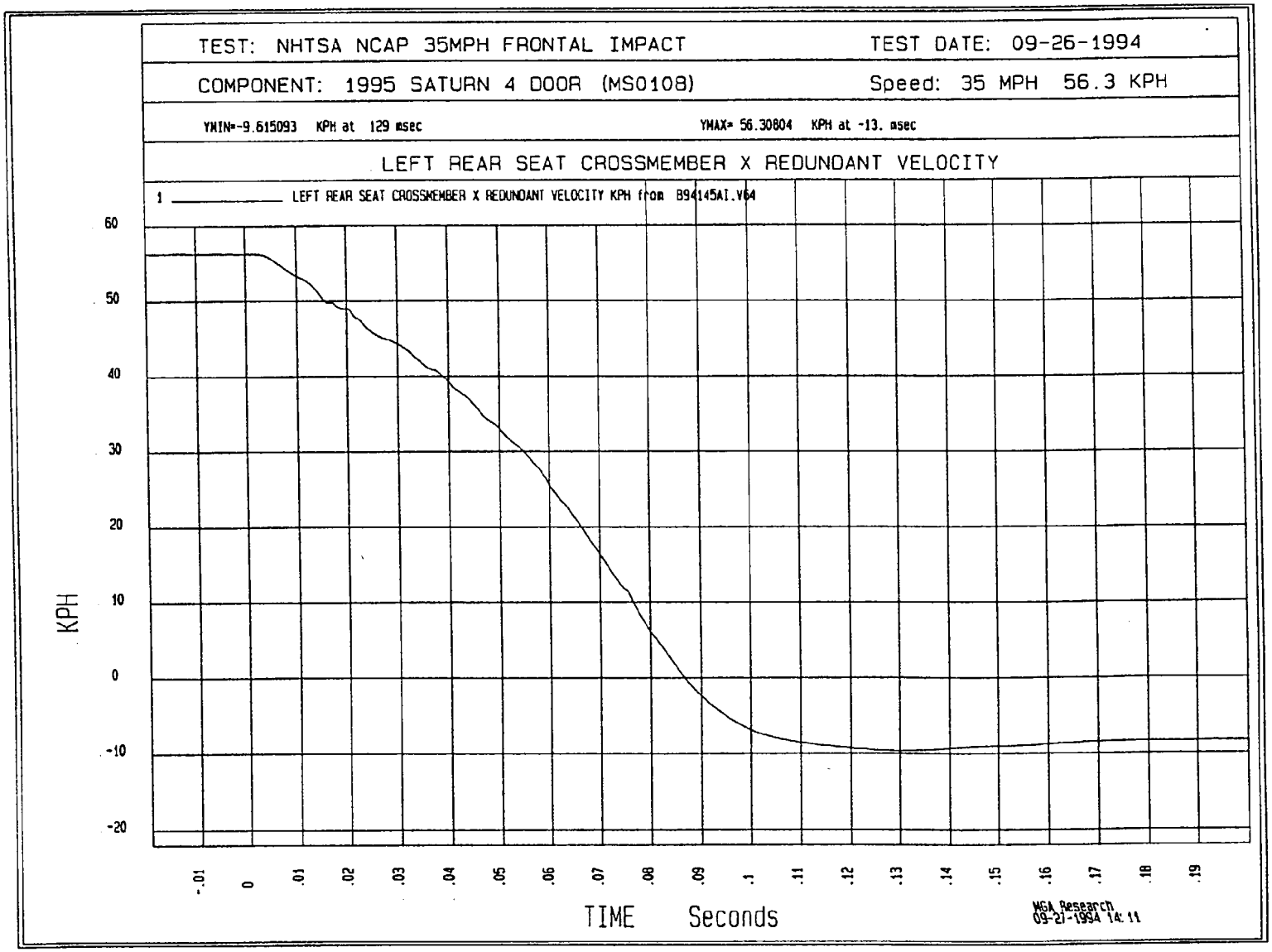


Figure B-5 - Left Rear Seat Crossmember X Redundant Velocity vs. Time

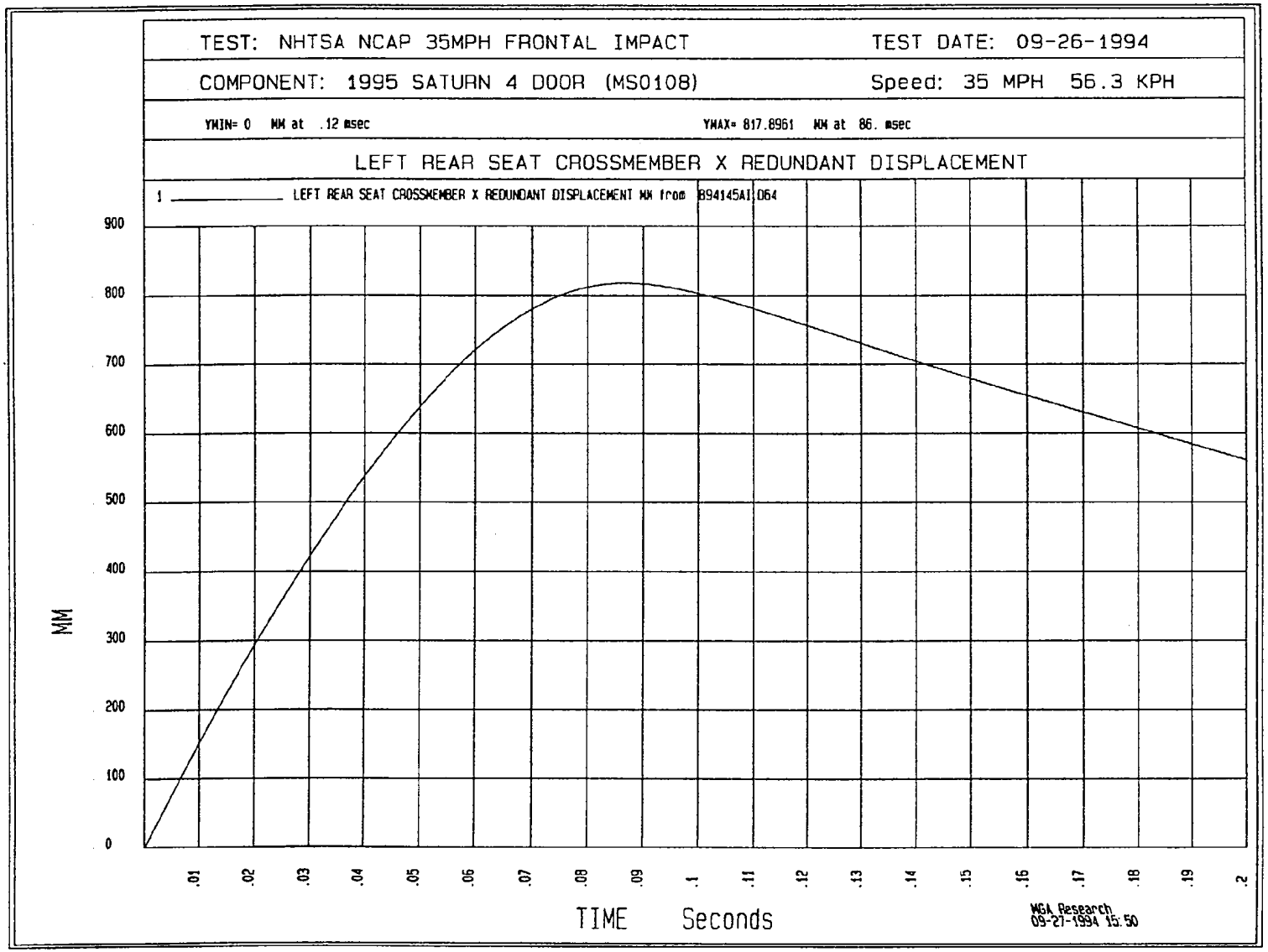


Figure B-6 - Left Rear Seat Crossmember X Redundant Displacement vs. Time

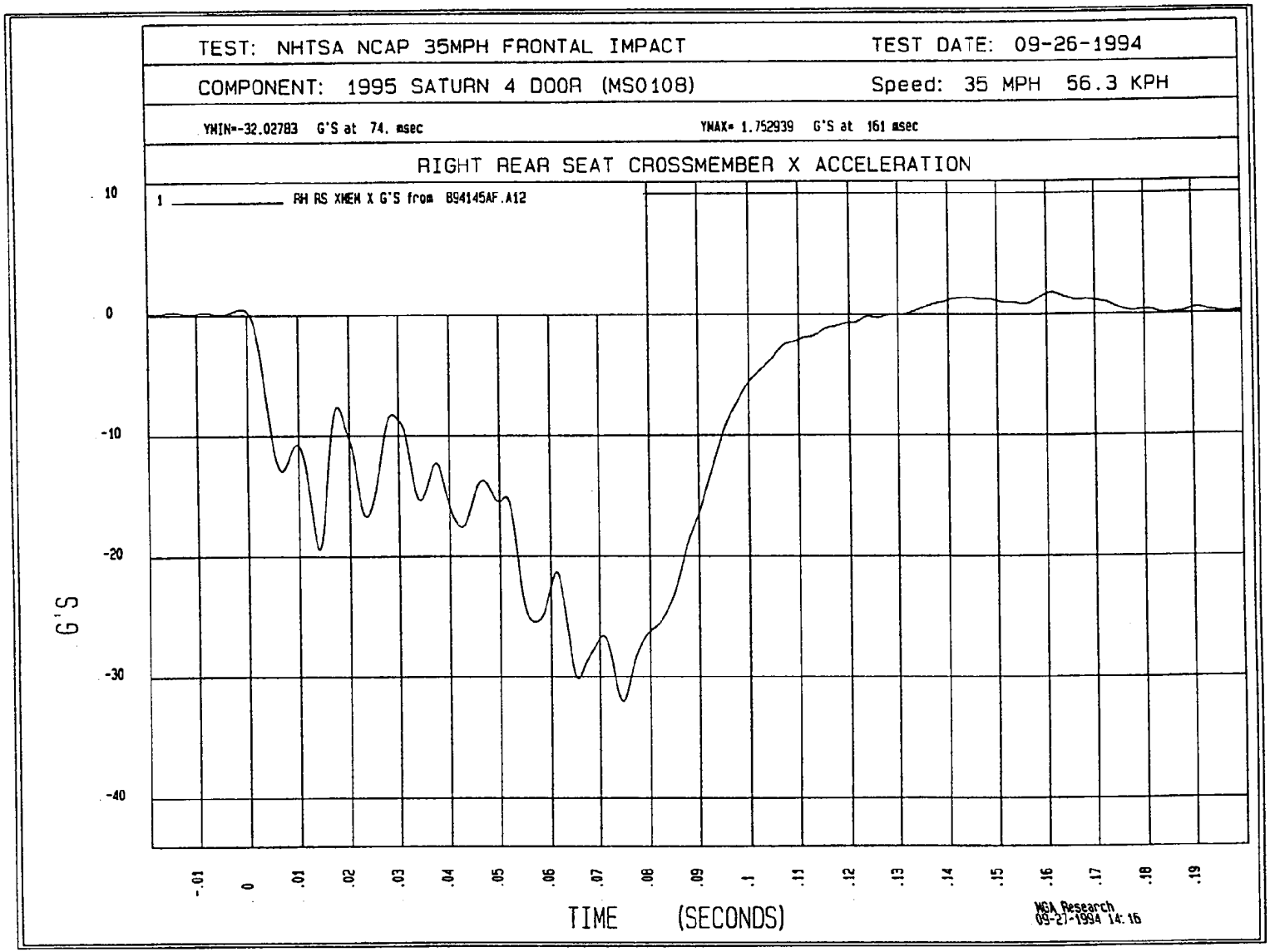


Figure B-7 - Right Rear Seat Crossmember X Acceleration vs. Time

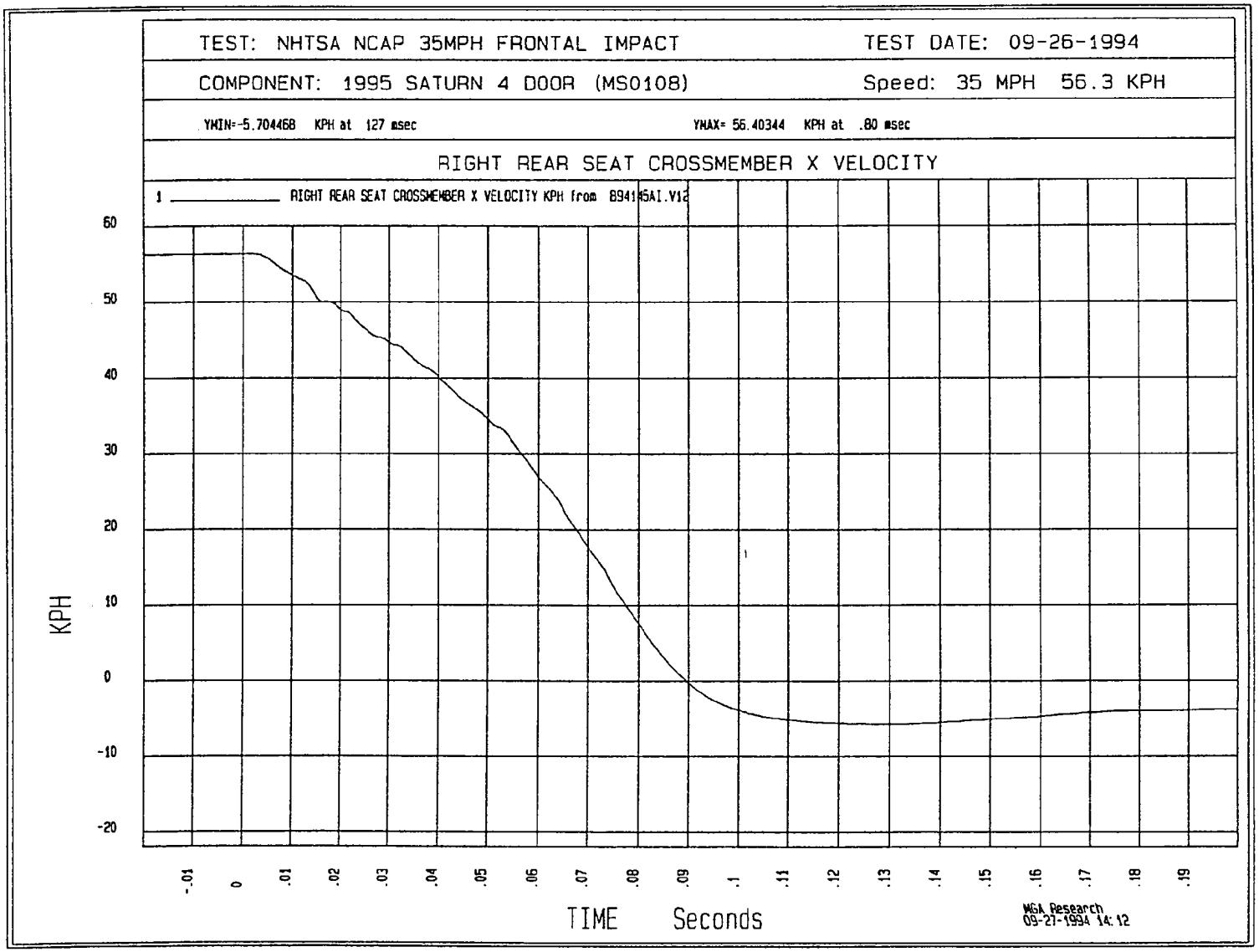


Figure B-8 - Right Rear Seat Crossmember X Velocity vs. Time

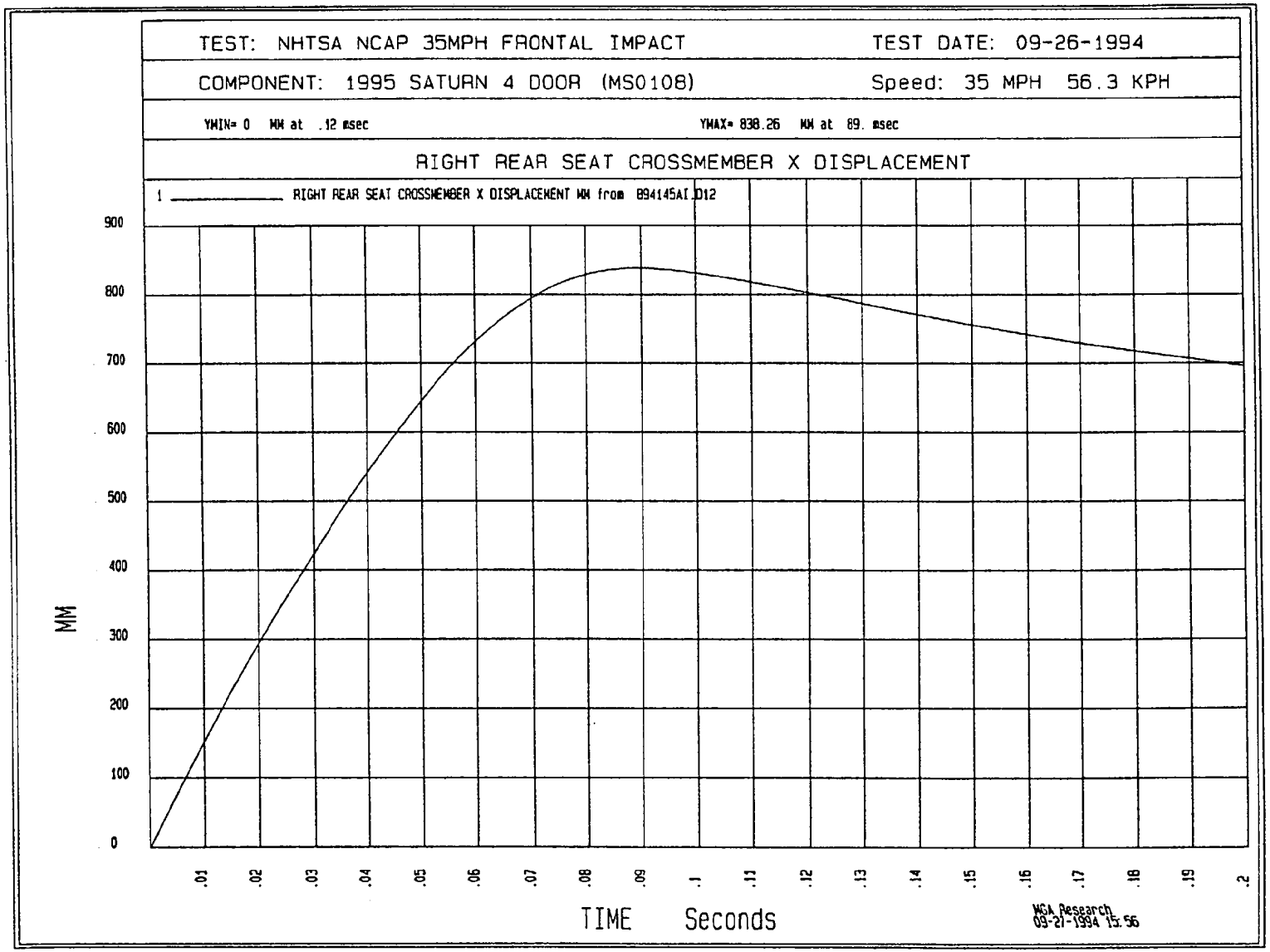


Figure B-9 - Right Rear Seat Crossmember X Displacement vs. Time

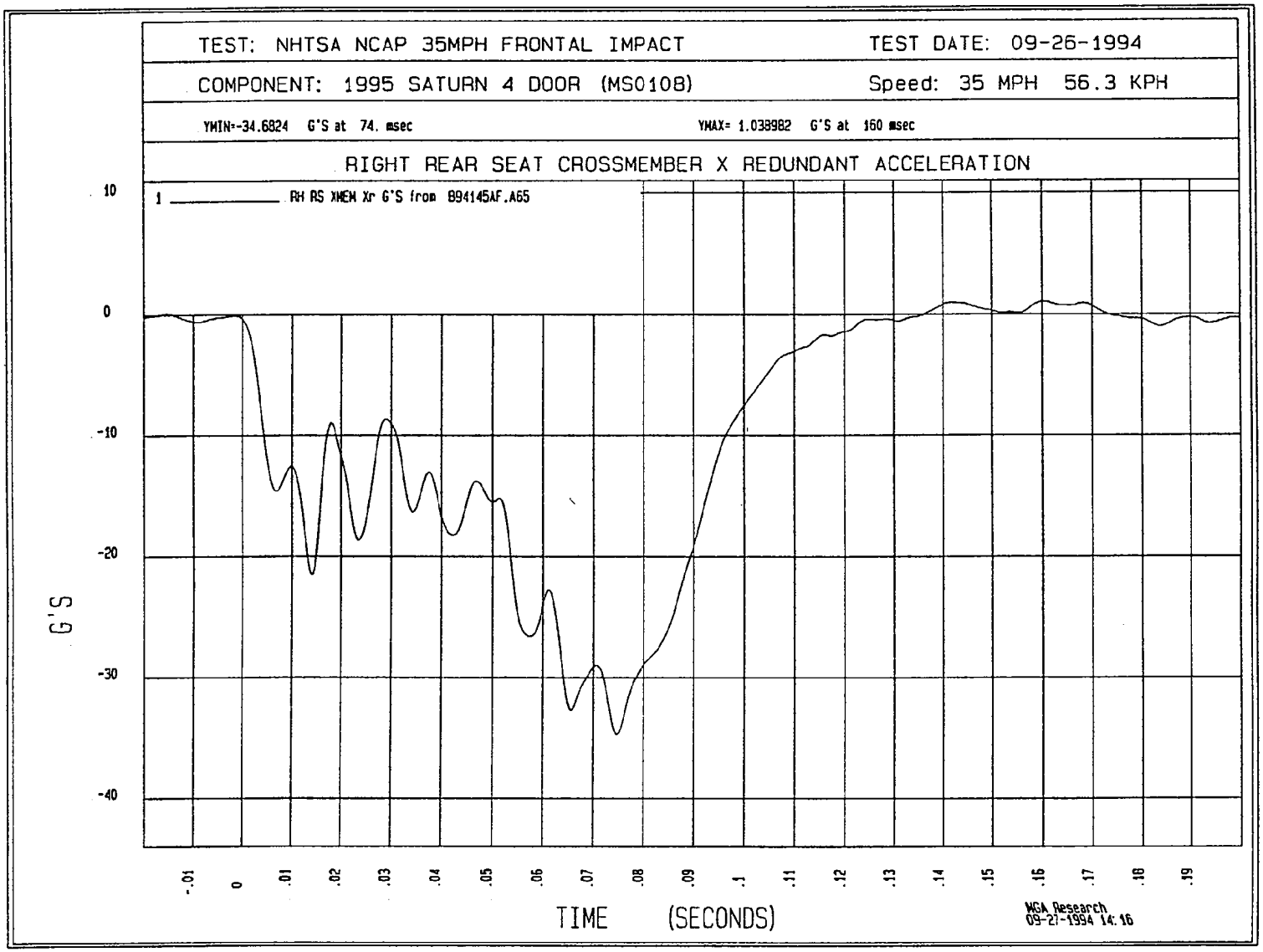


Figure B-10 - Right Rear Seat Crossmember X Redundant Acceleration vs. Time

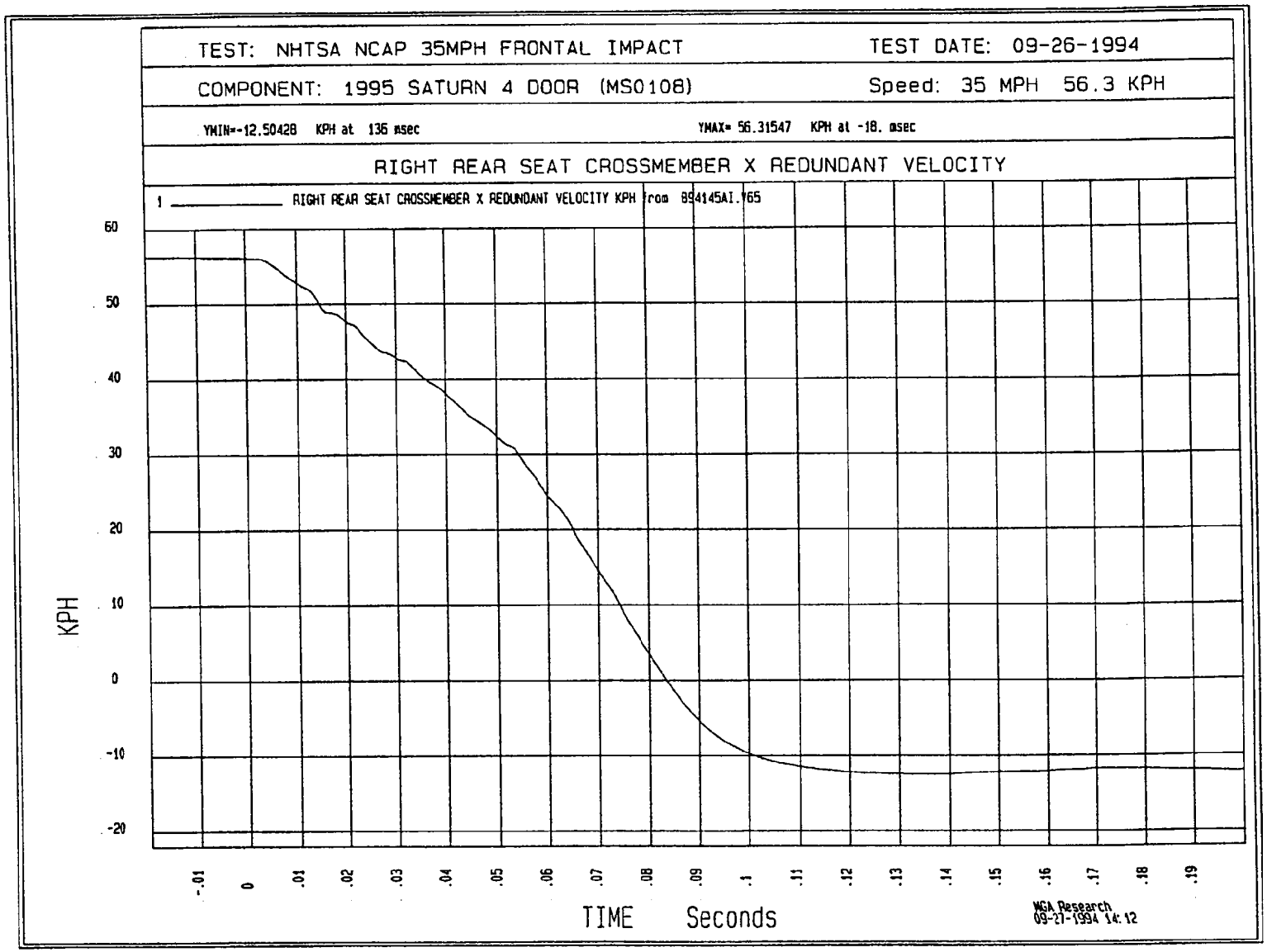


Figure B-11 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

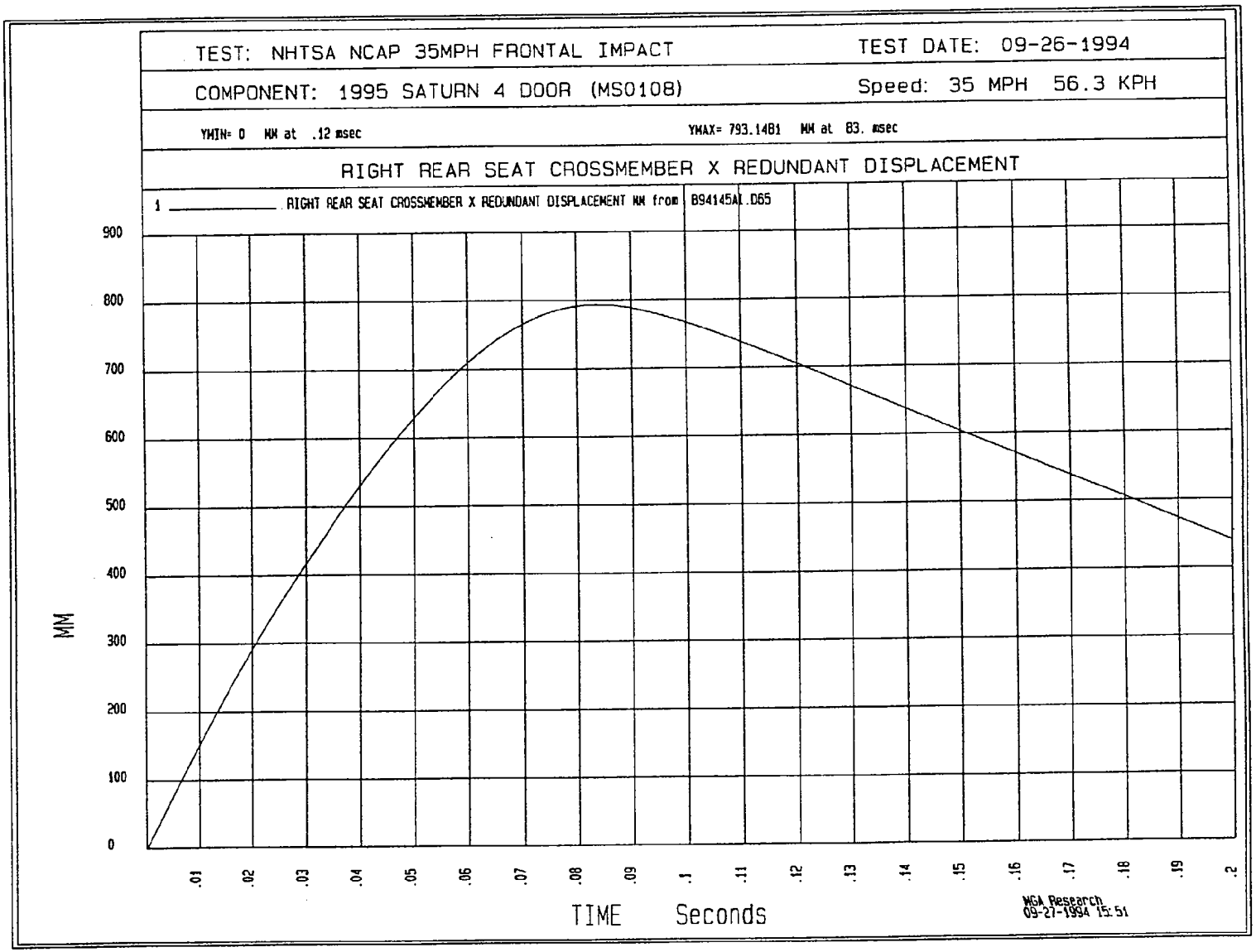


Figure B-12 - Right Rear Seat Crossmember X Redundant Displacement vs. Time

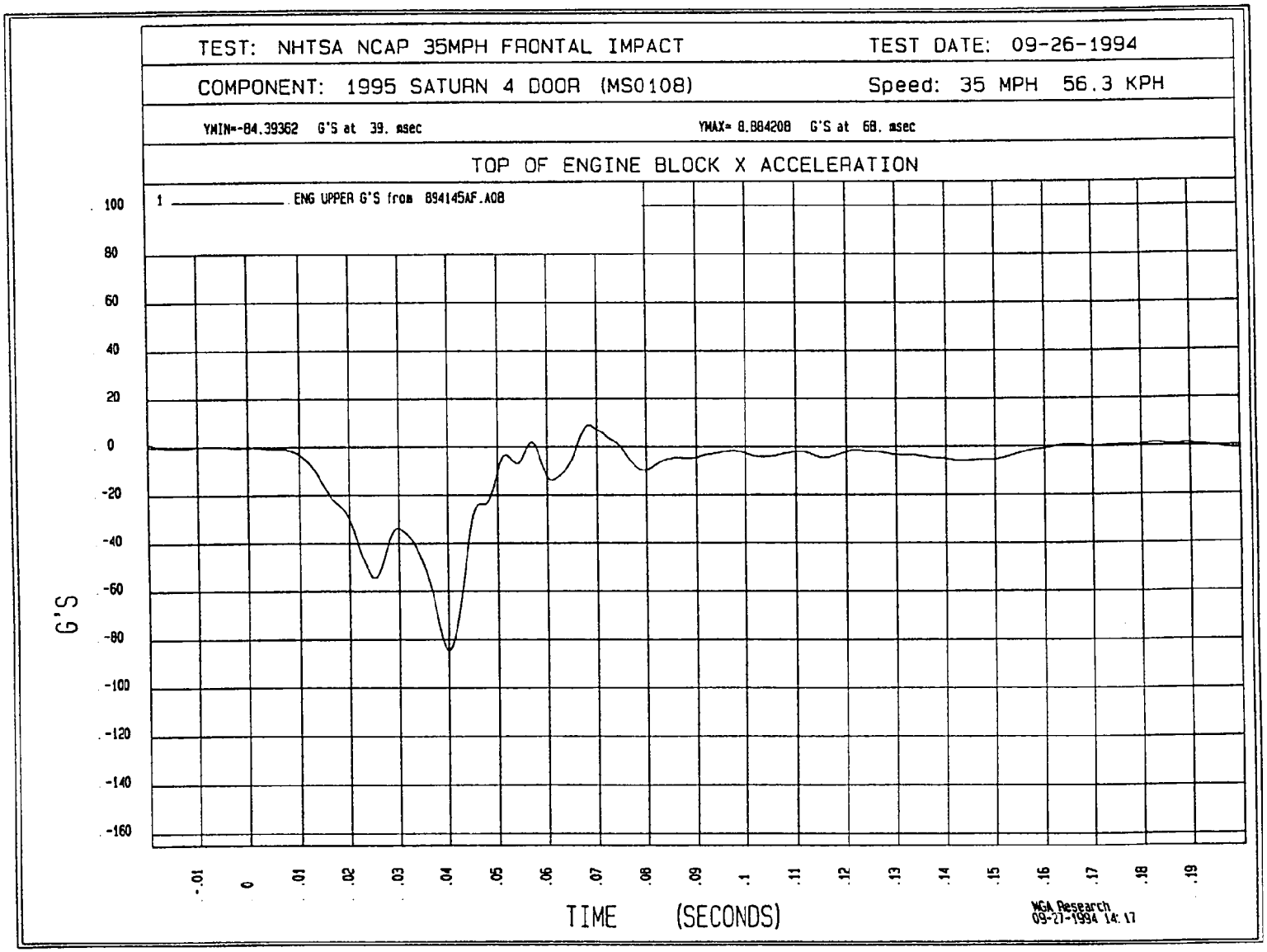


Figure B-13 - Top of Engine Block X Acceleration vs. Time

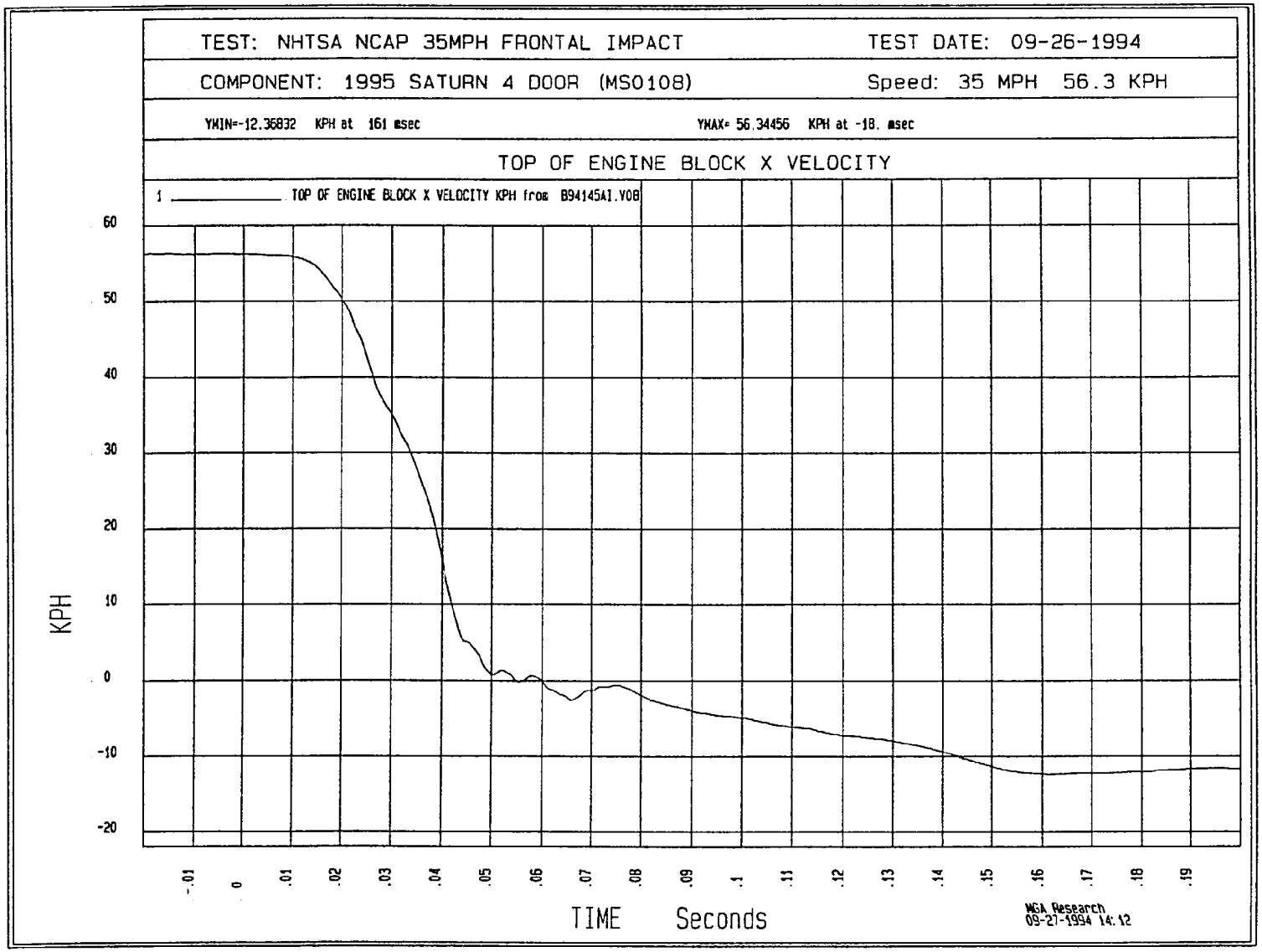


Figure B-14 - Top of Engine Block X Velocity vs. Time

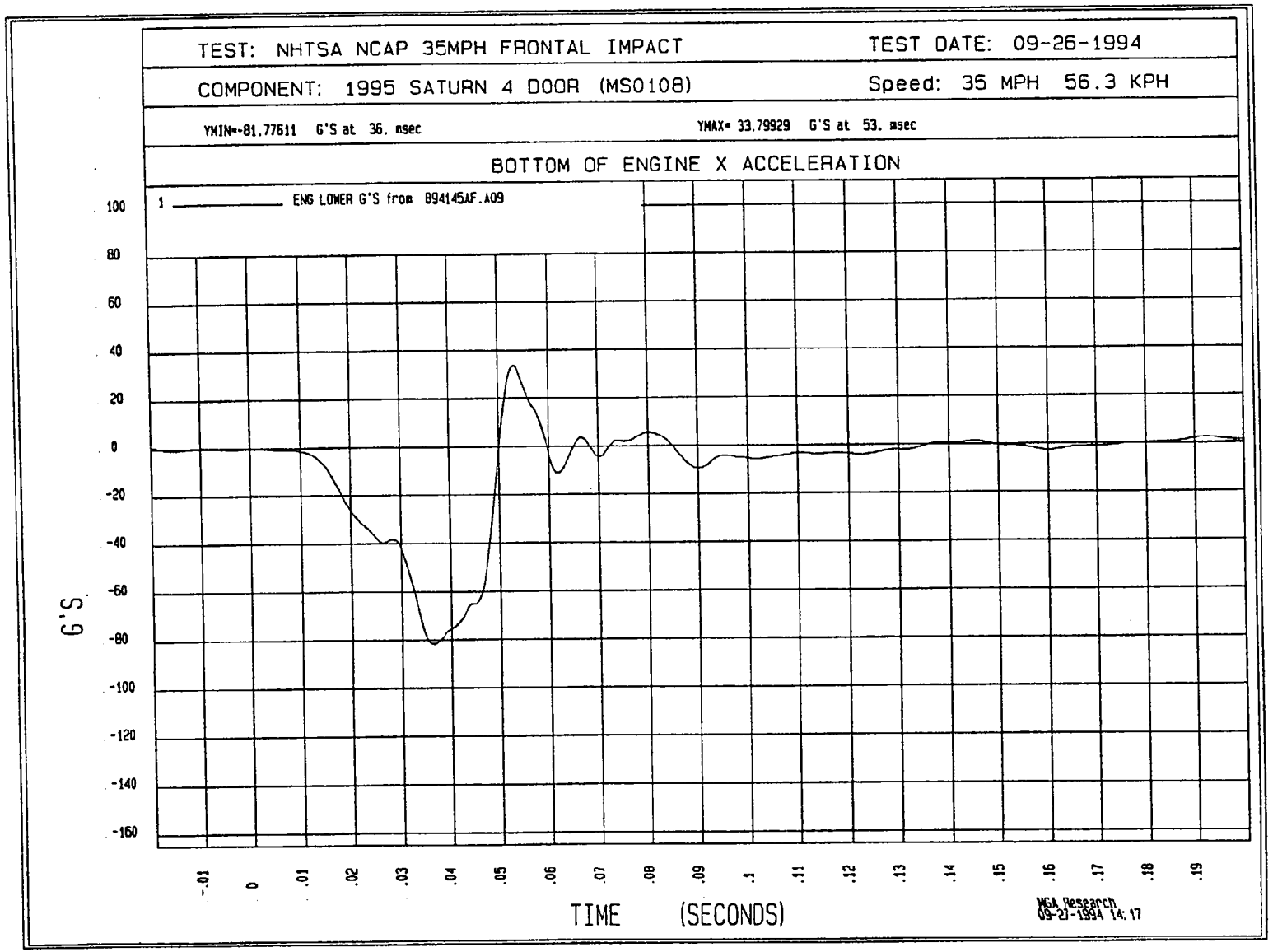


Figure B-15 - Bottom of Engine X Acceleration vs. Time

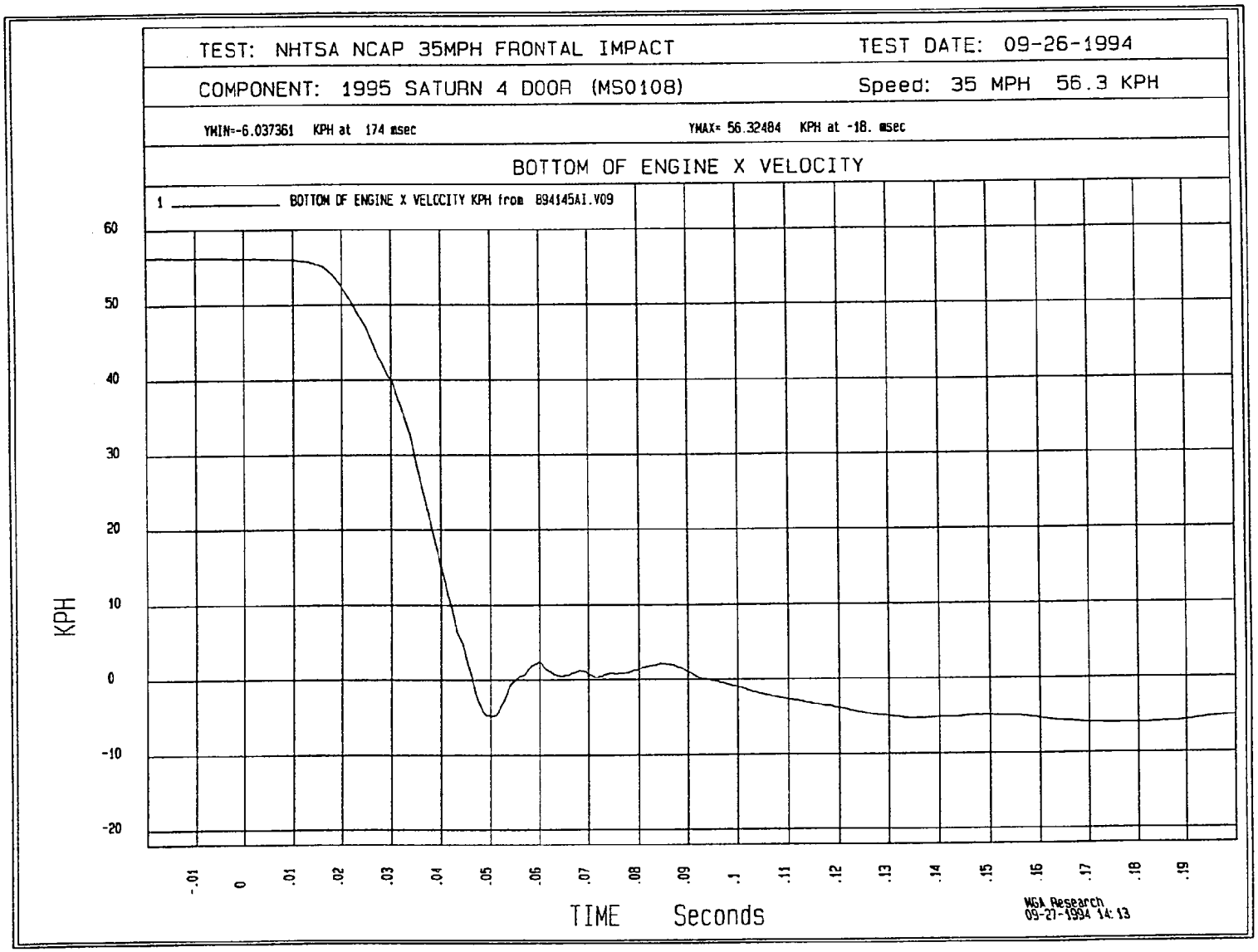


Figure B-16 - Bottom of Engine X Velocity vs. Time

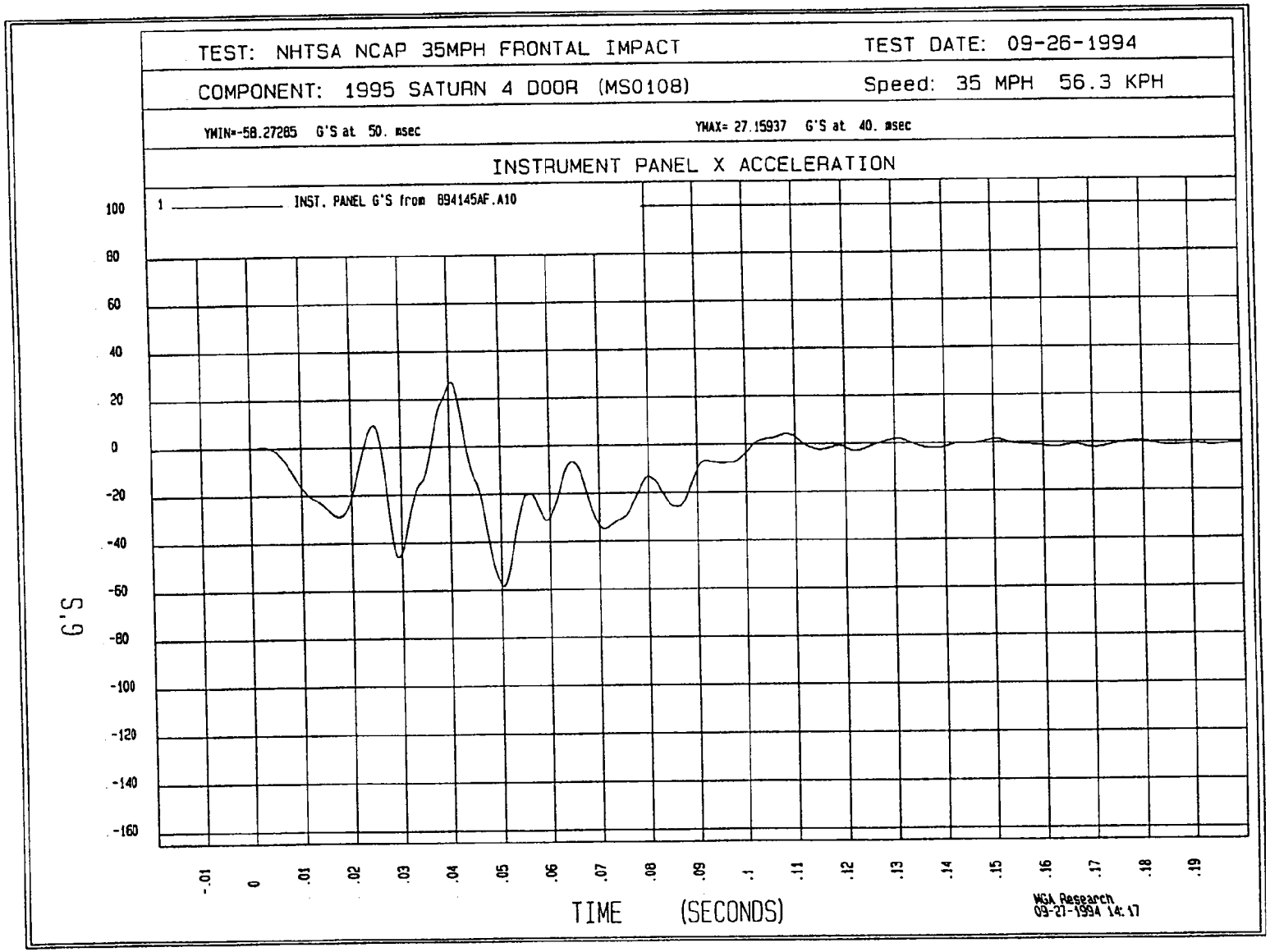


Figure B-17 - Instrument Panel X Acceleration vs. Time

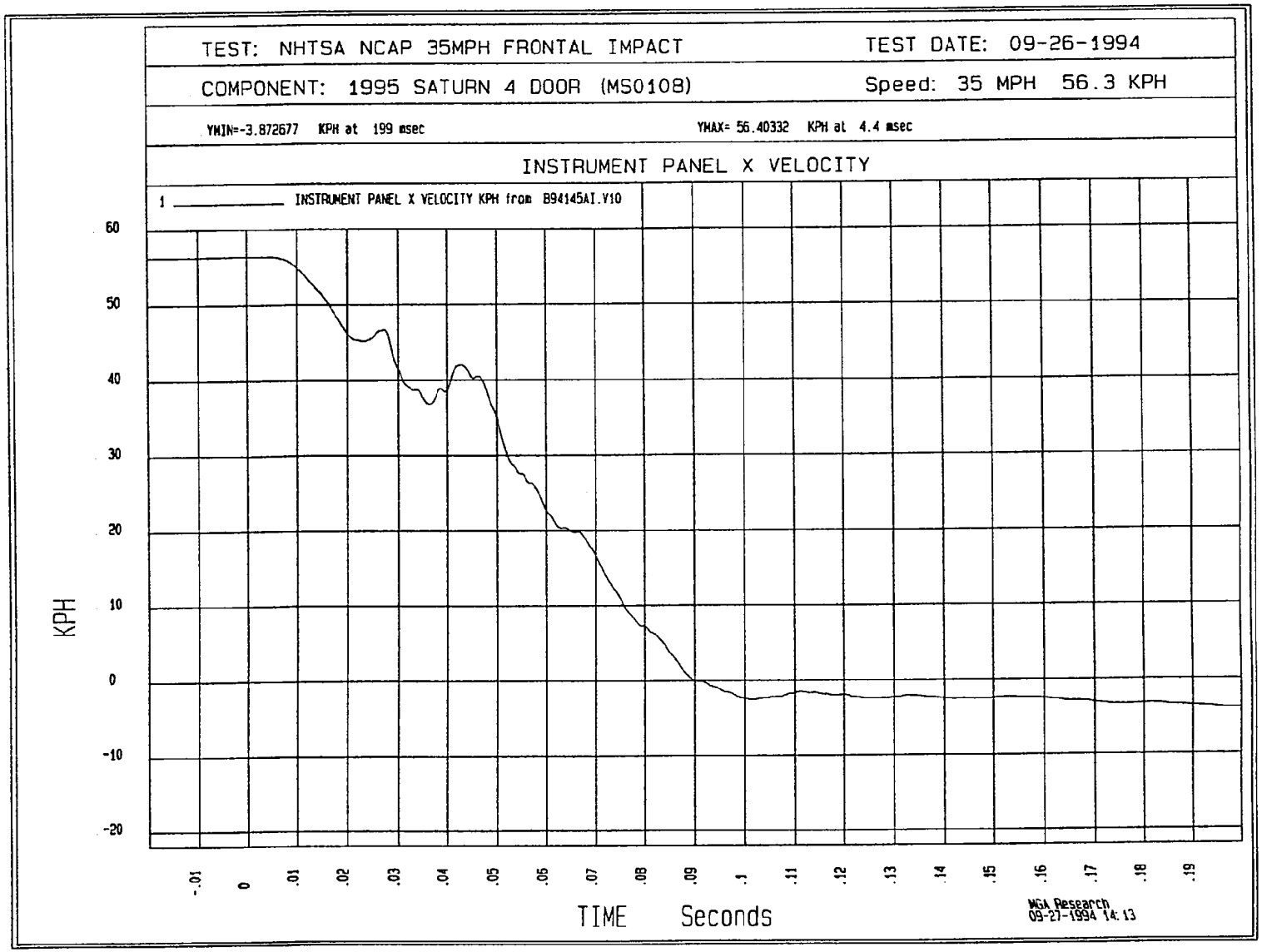


Figure B-18 - Instrument Panel X Velocity vs. Time

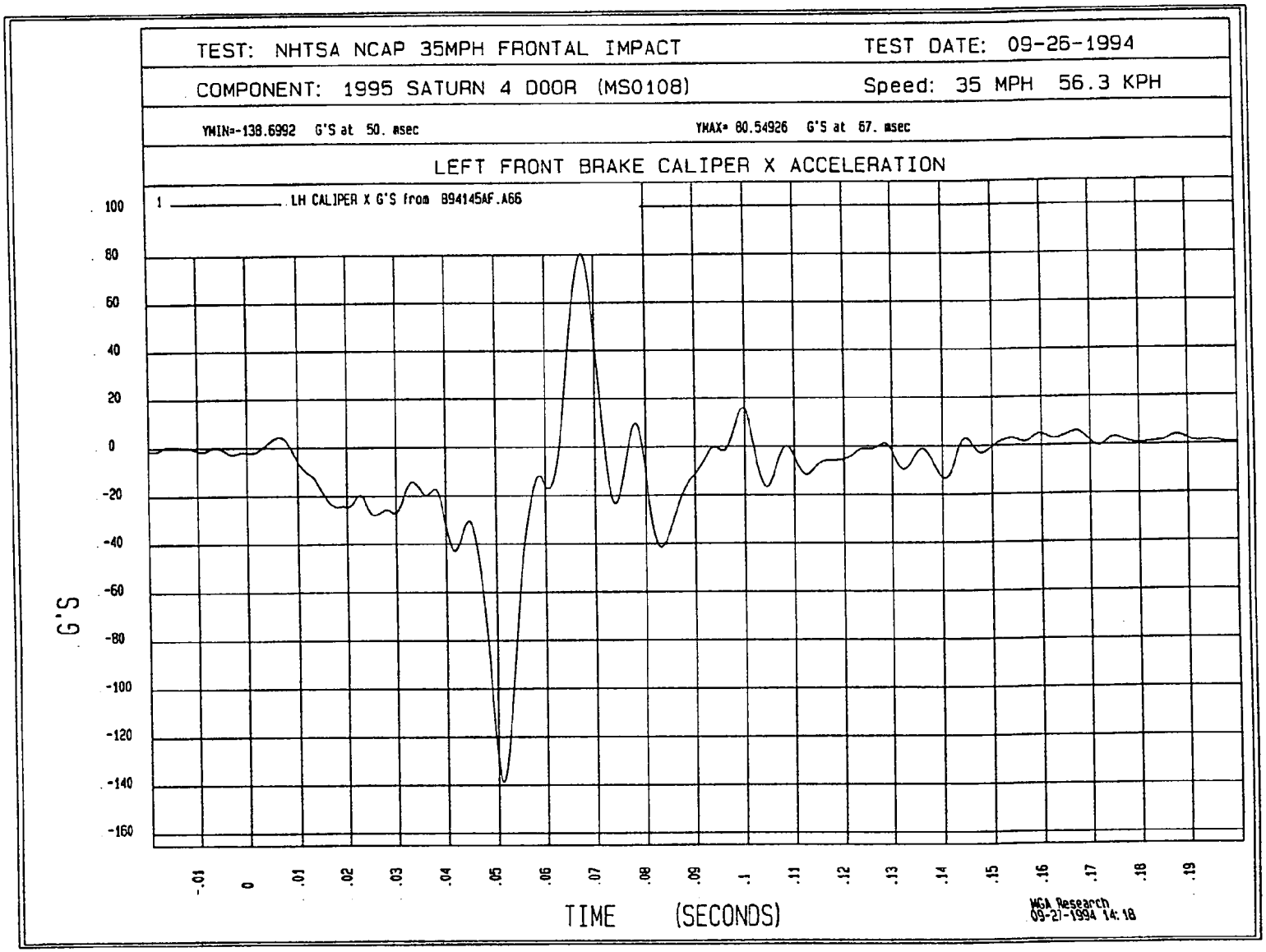


Figure B-19 - Left Brake Caliper X Acceleration vs. Time

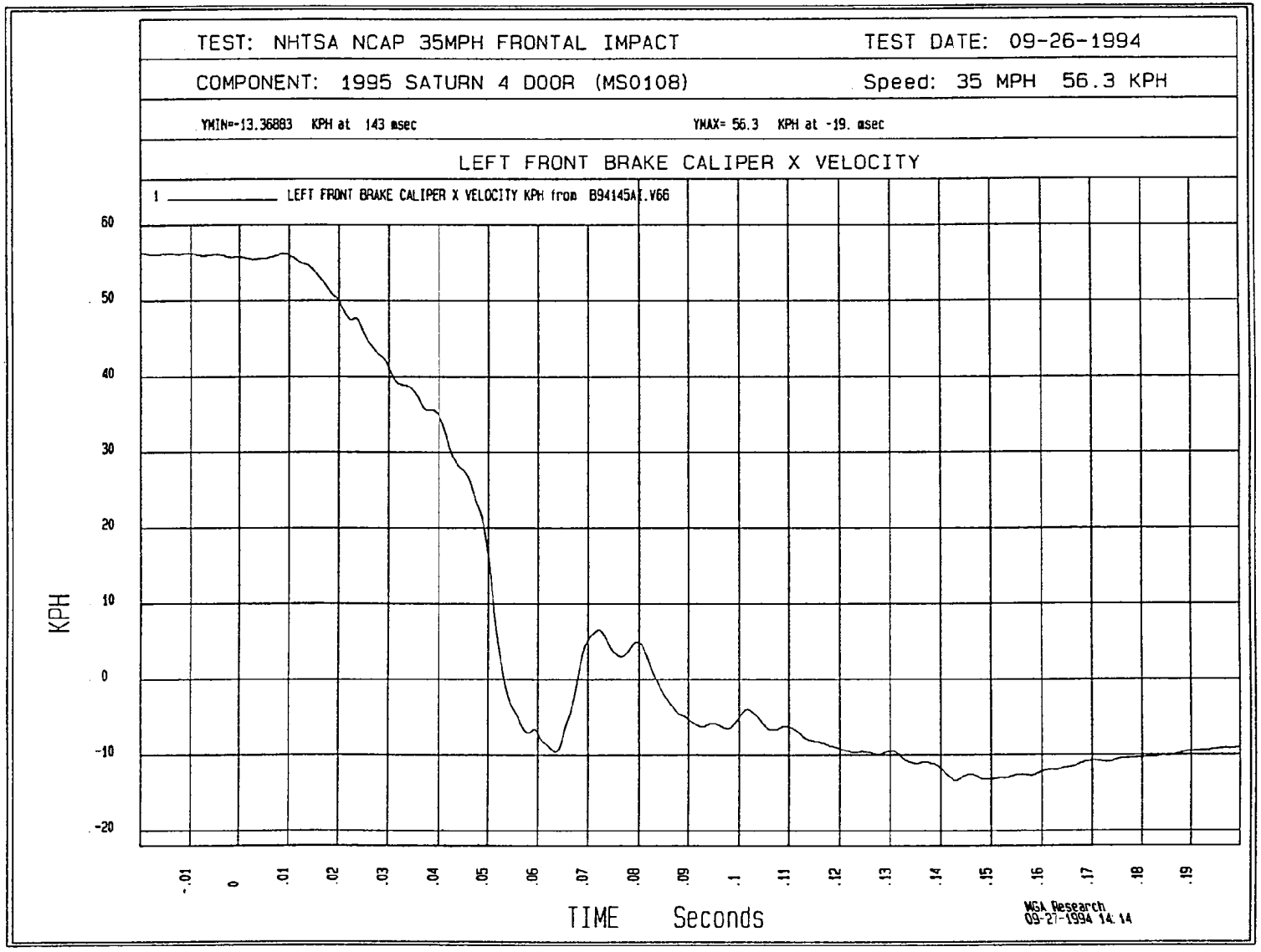


Figure B-2Ø - Left Brake Caliper X Velocity vs. Time

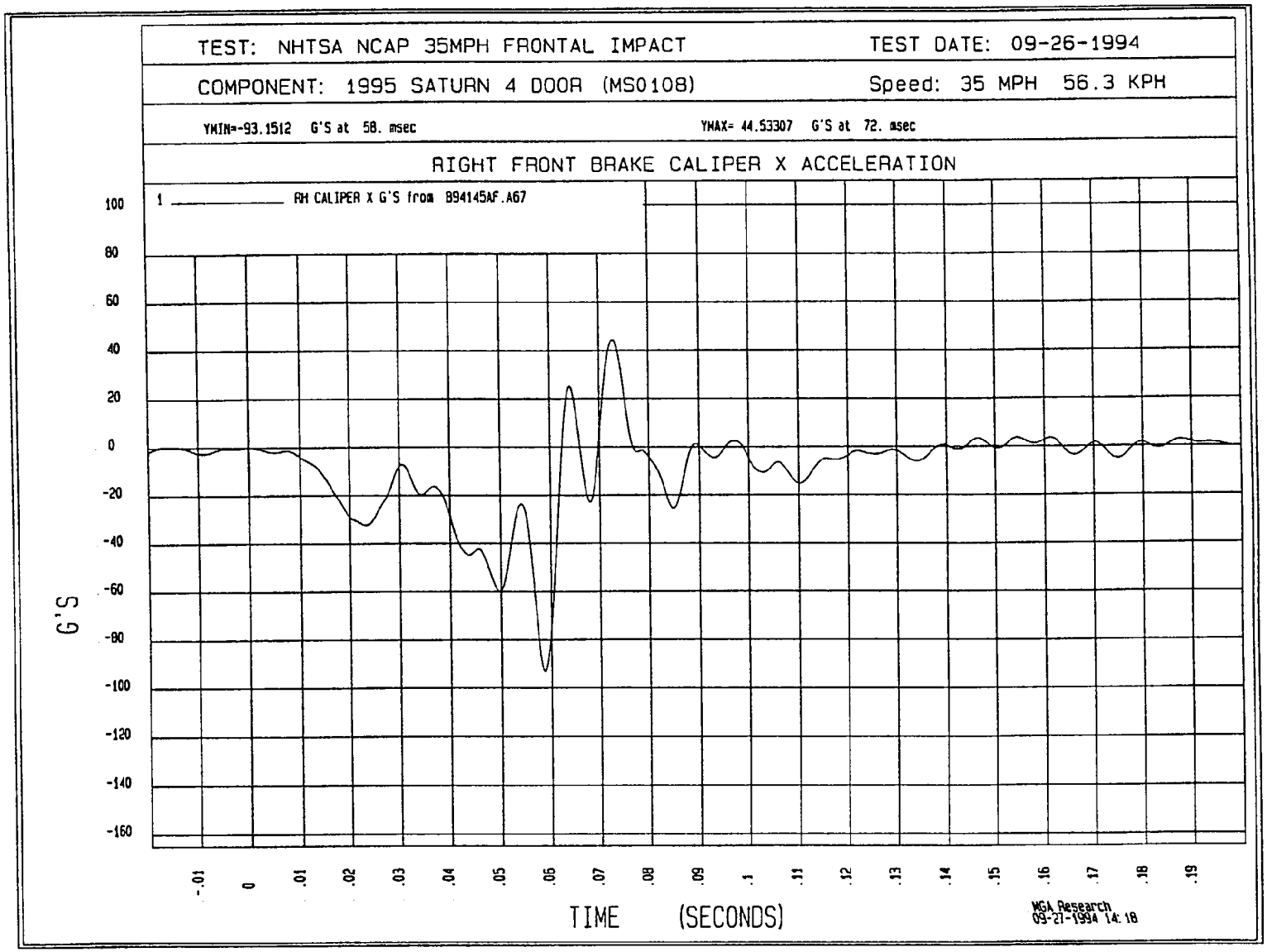


Figure B-21 - Right Brake Caliper X Acceleration vs. Time

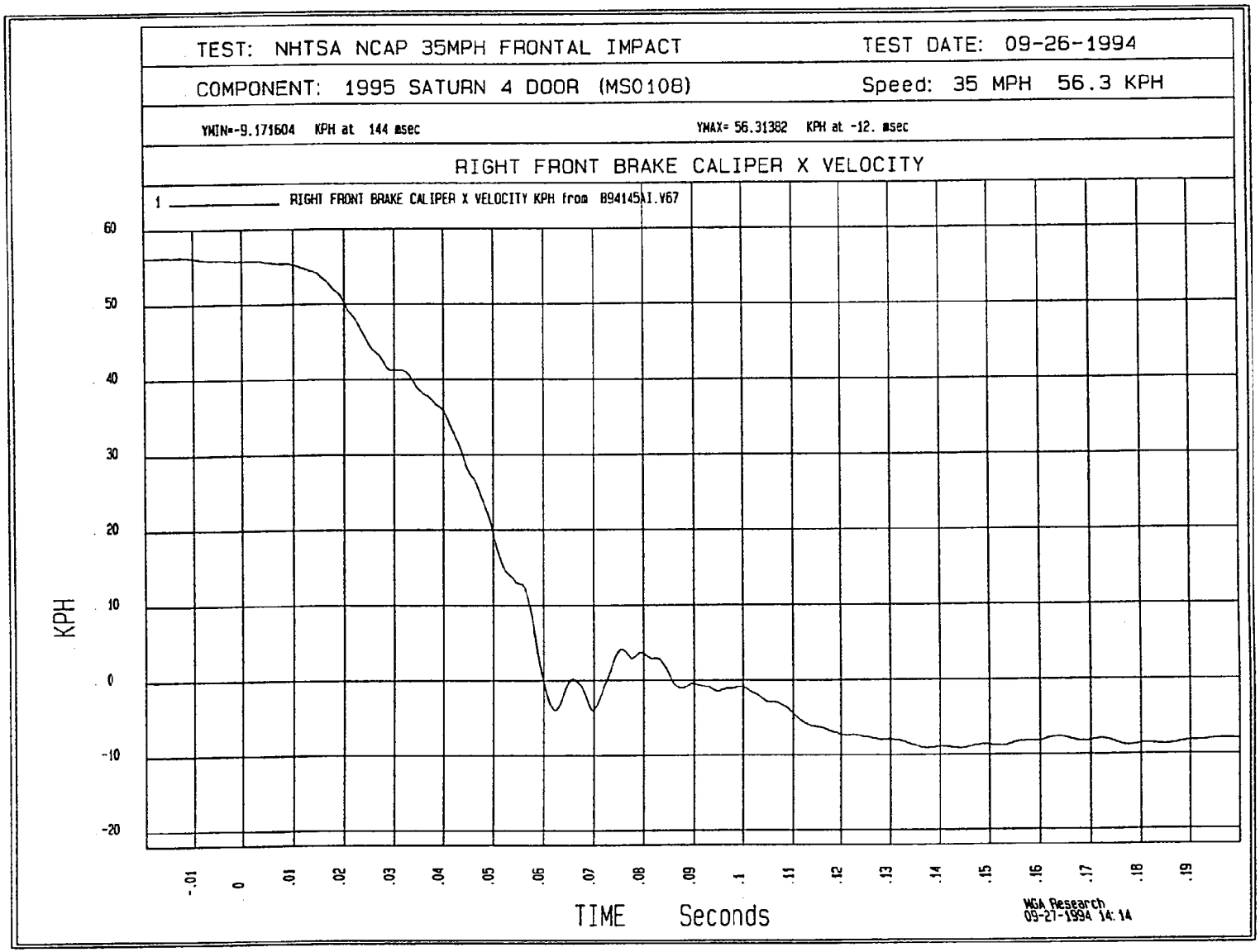


Figure B-22 - Right Brake Caliper X Velocity vs. Time

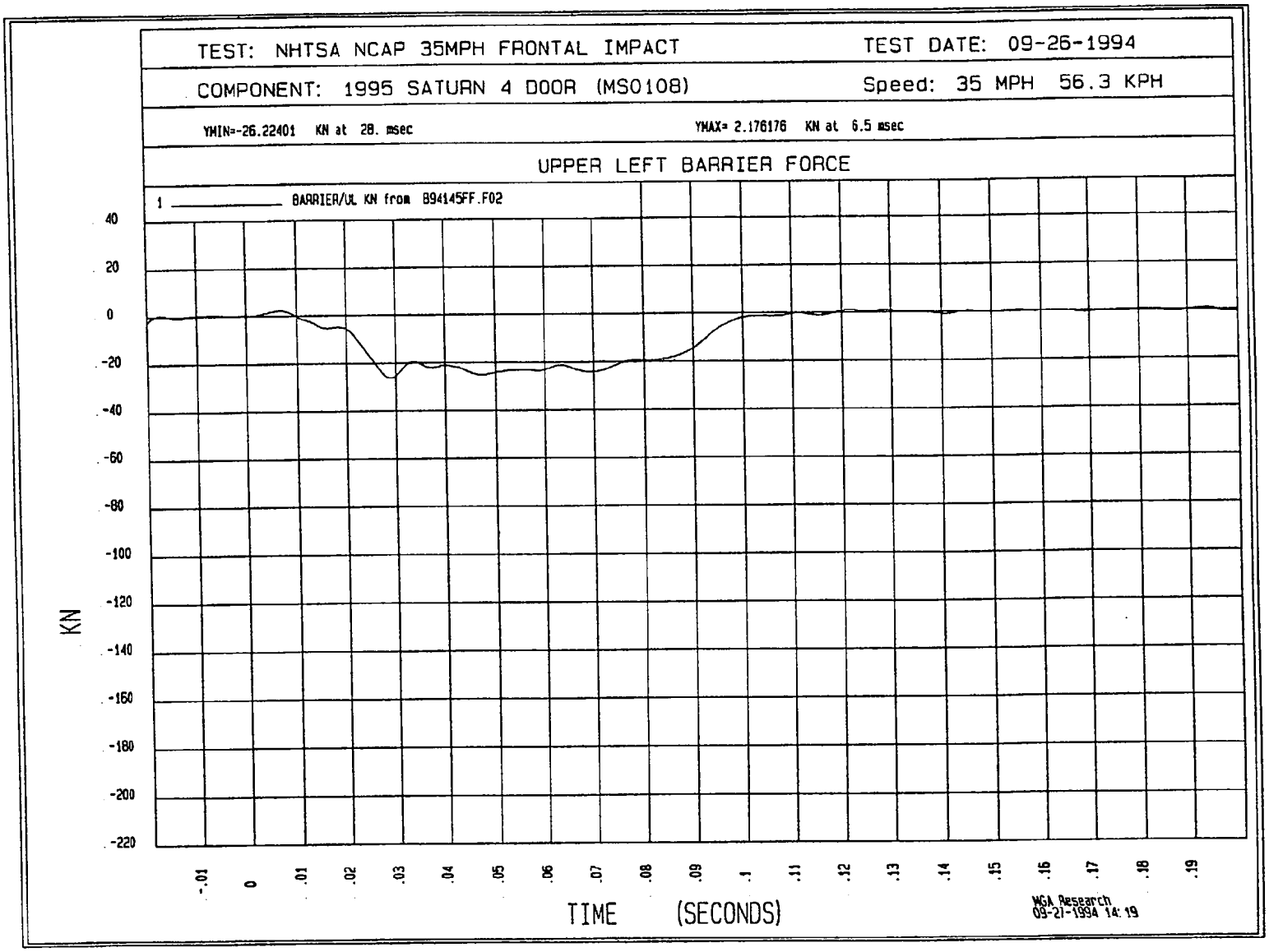


Figure B-23 - Upper Left Barrier Force vs. Time

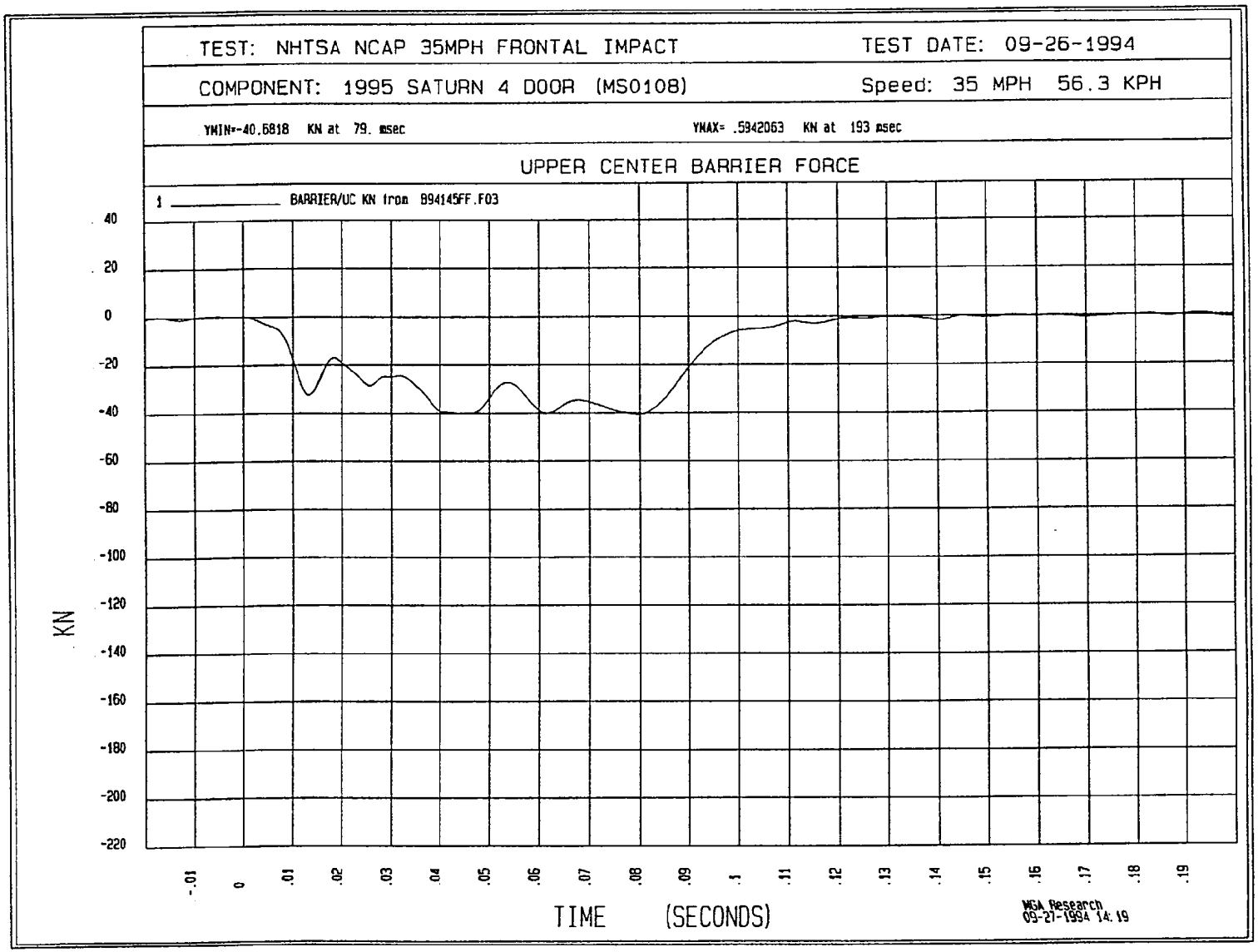


Figure B-24 - Upper Center Barrier Force vs. Time

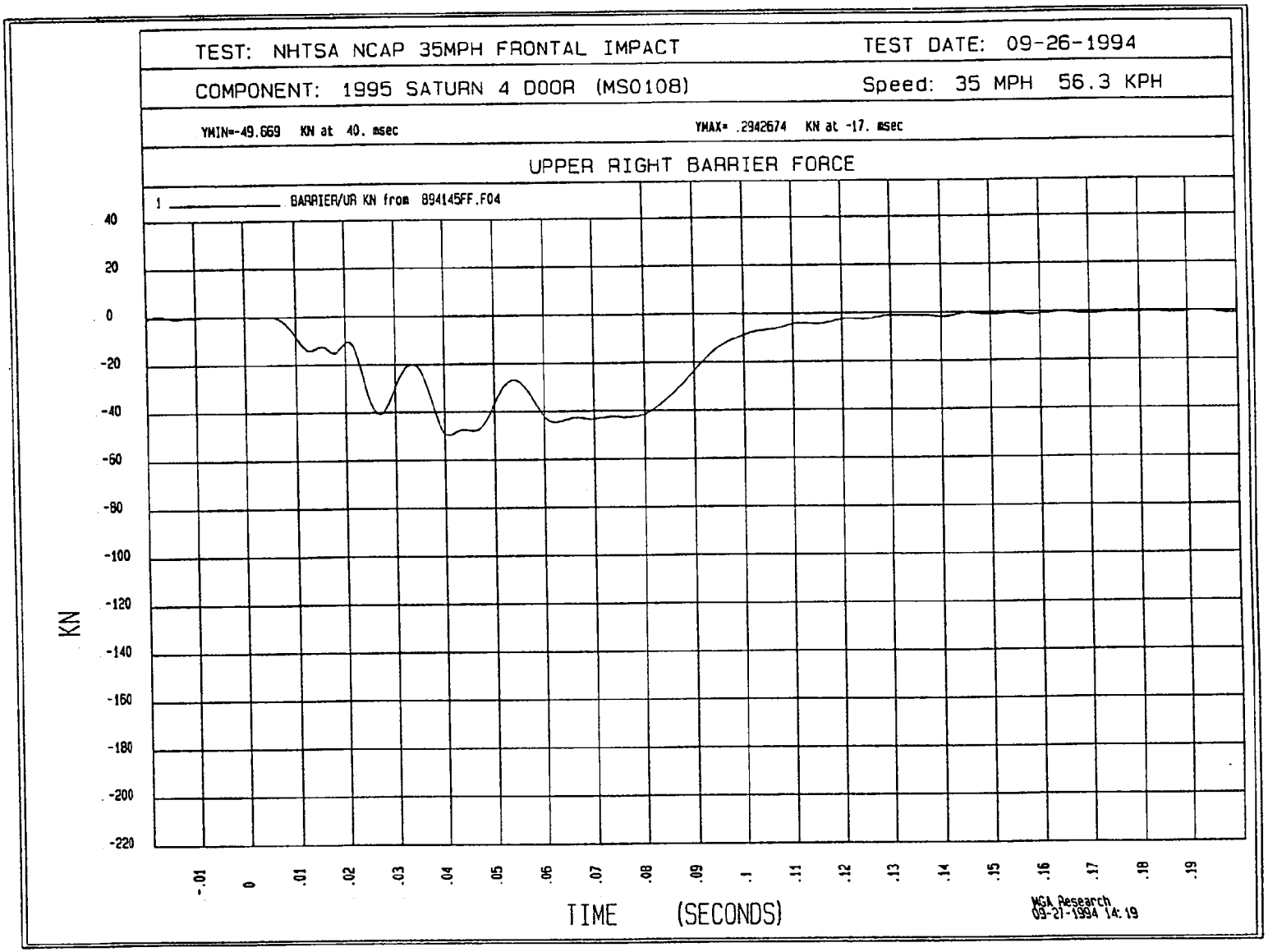


Figure B-25 - Upper Right Barrier Force vs. Time

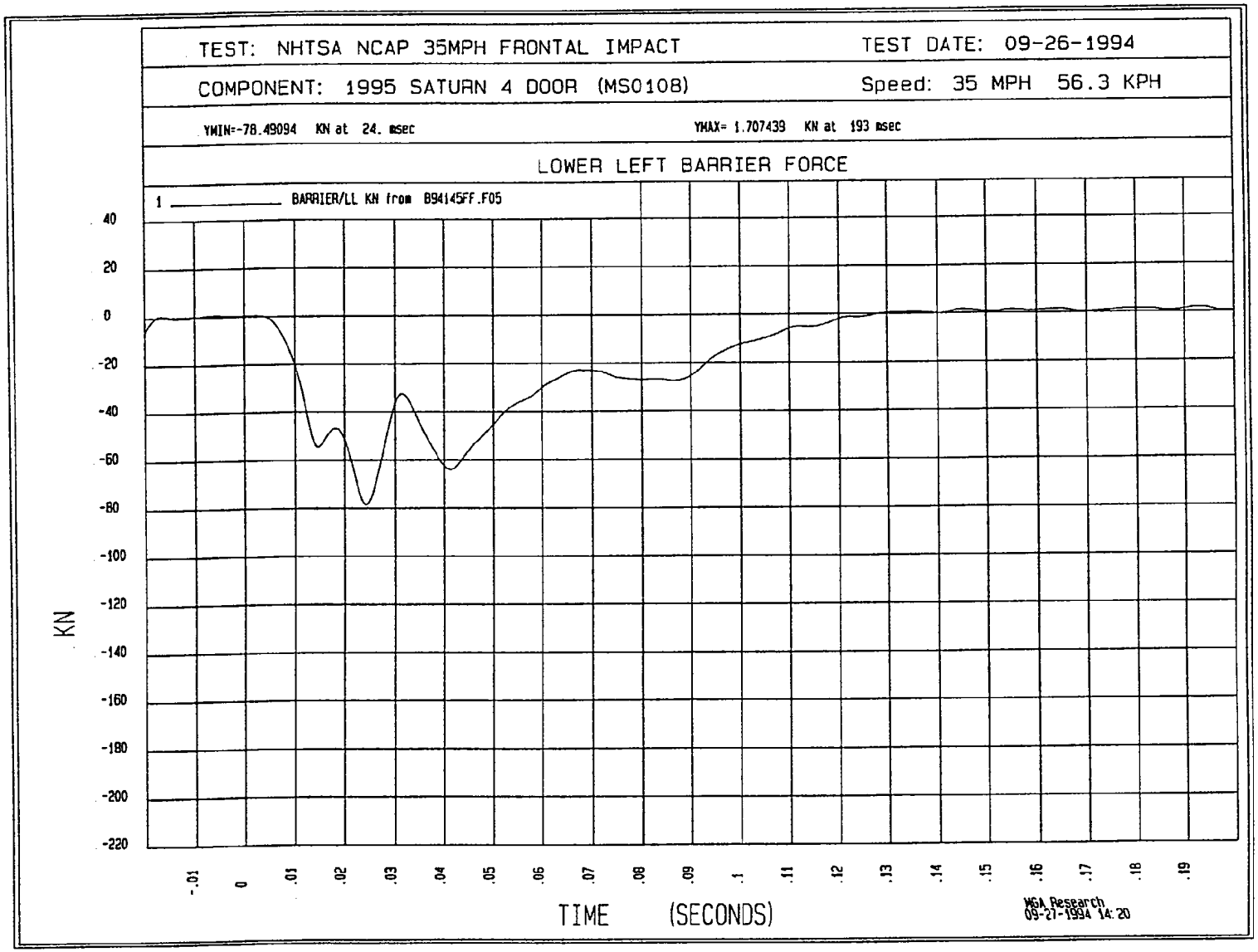


Figure B-26 - Lower Left Barrier Force vs. Time

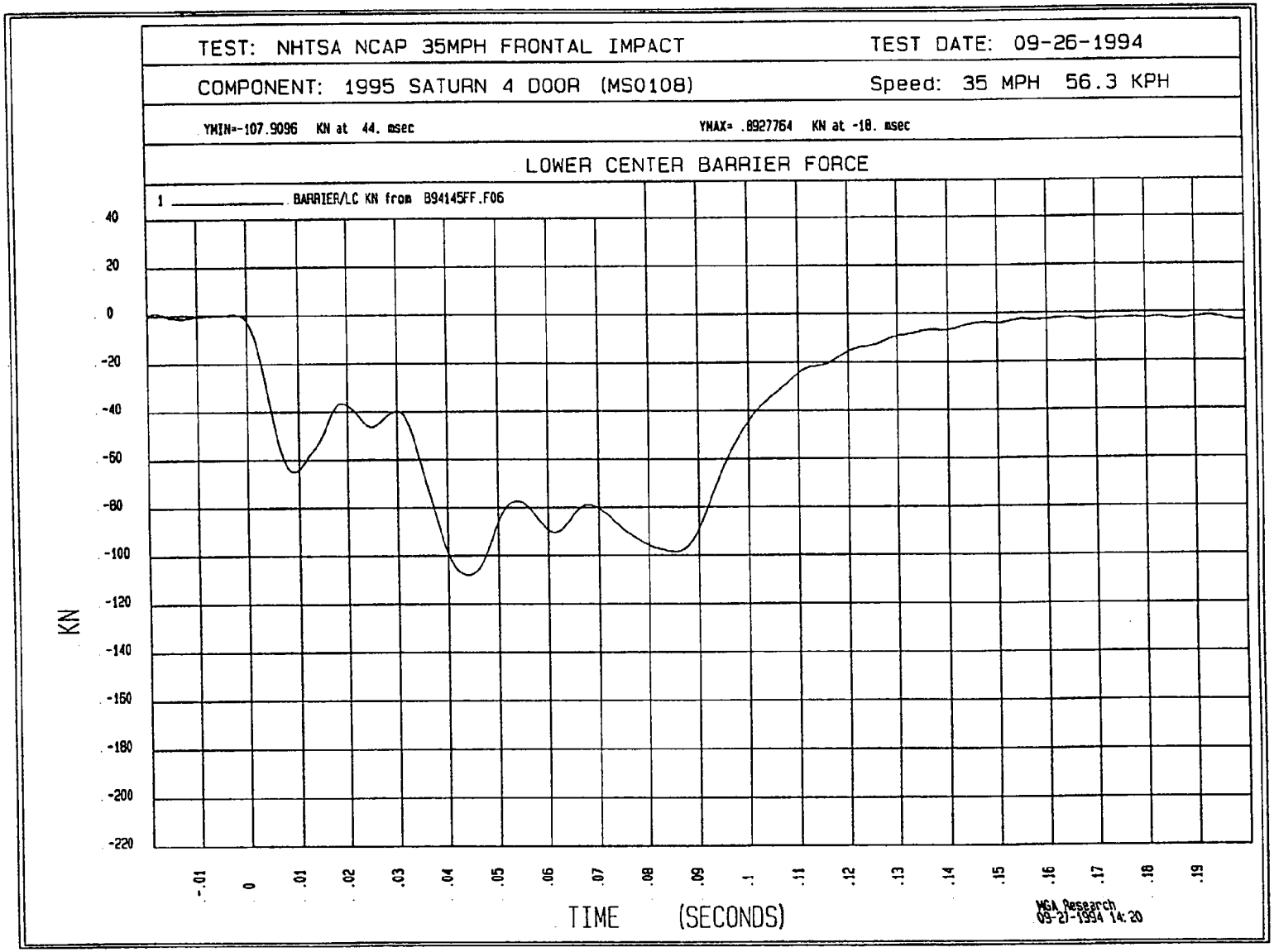


Figure B-27 - Lower Center Barrier Force vs. Time

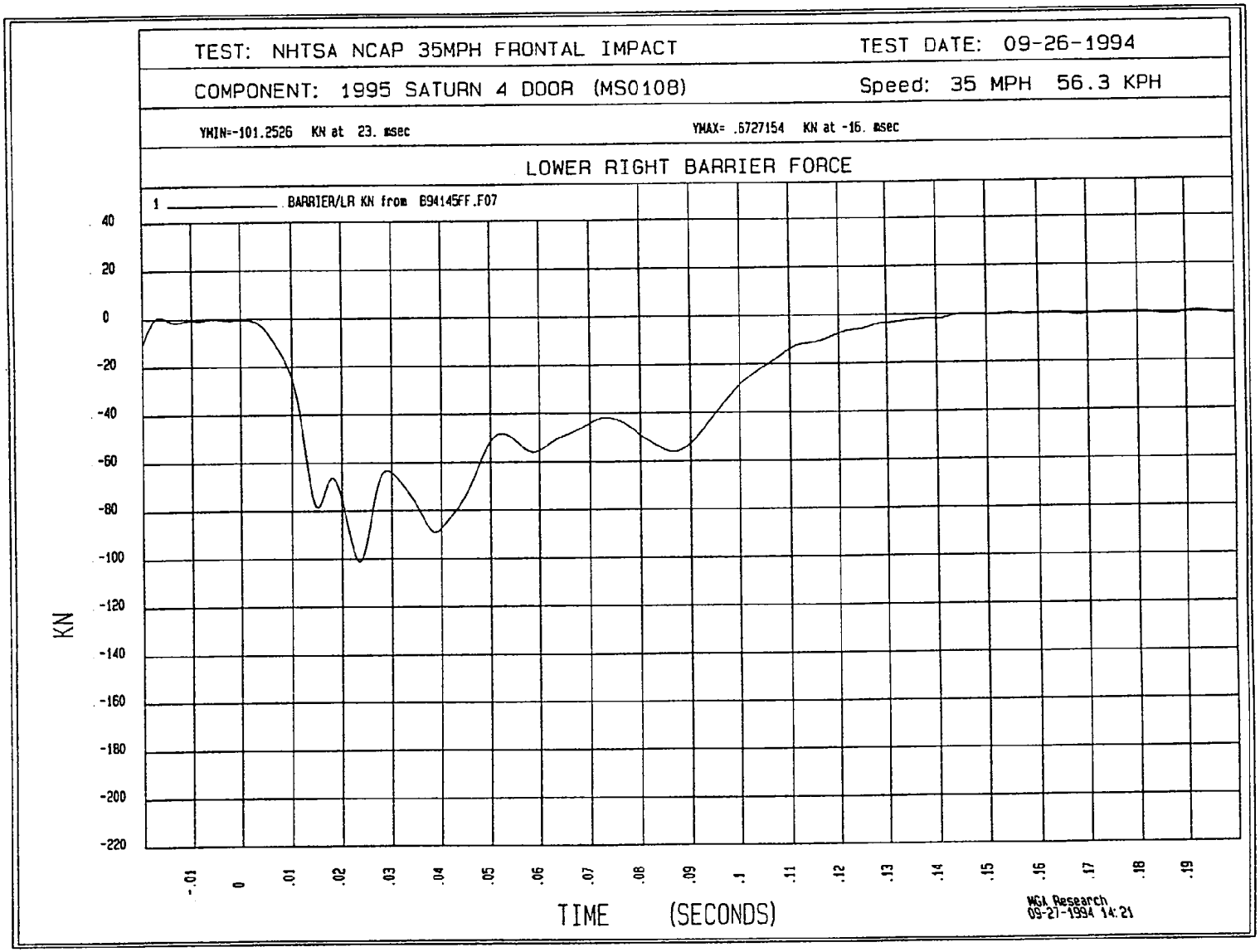


Figure B-28 - Lower Right Barrier Force vs. Time

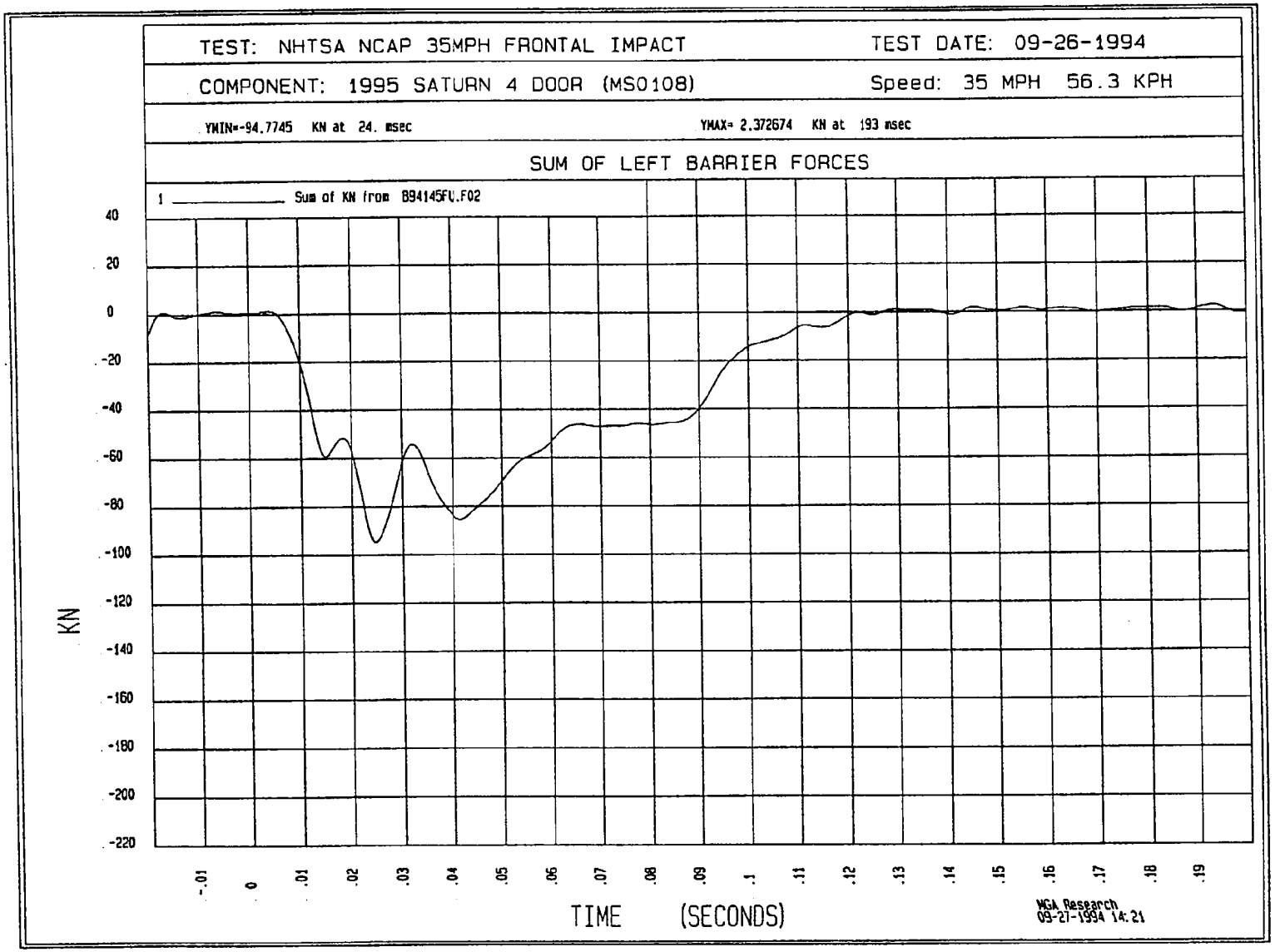


Figure B-29 - Sum of Left Barrier Forces vs. Time

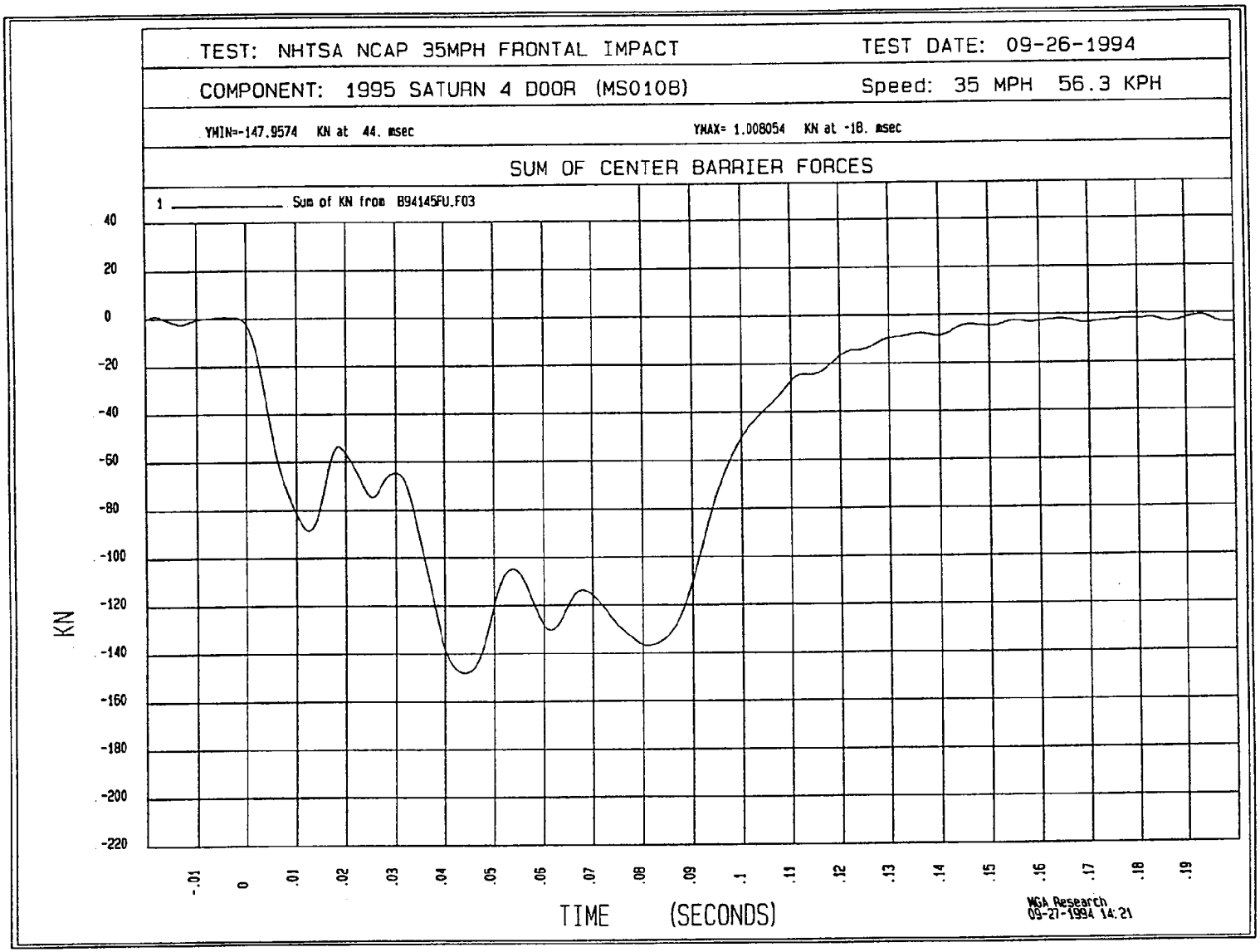


Figure B-3Ø - Sum of Center Barrier Forces vs. Time

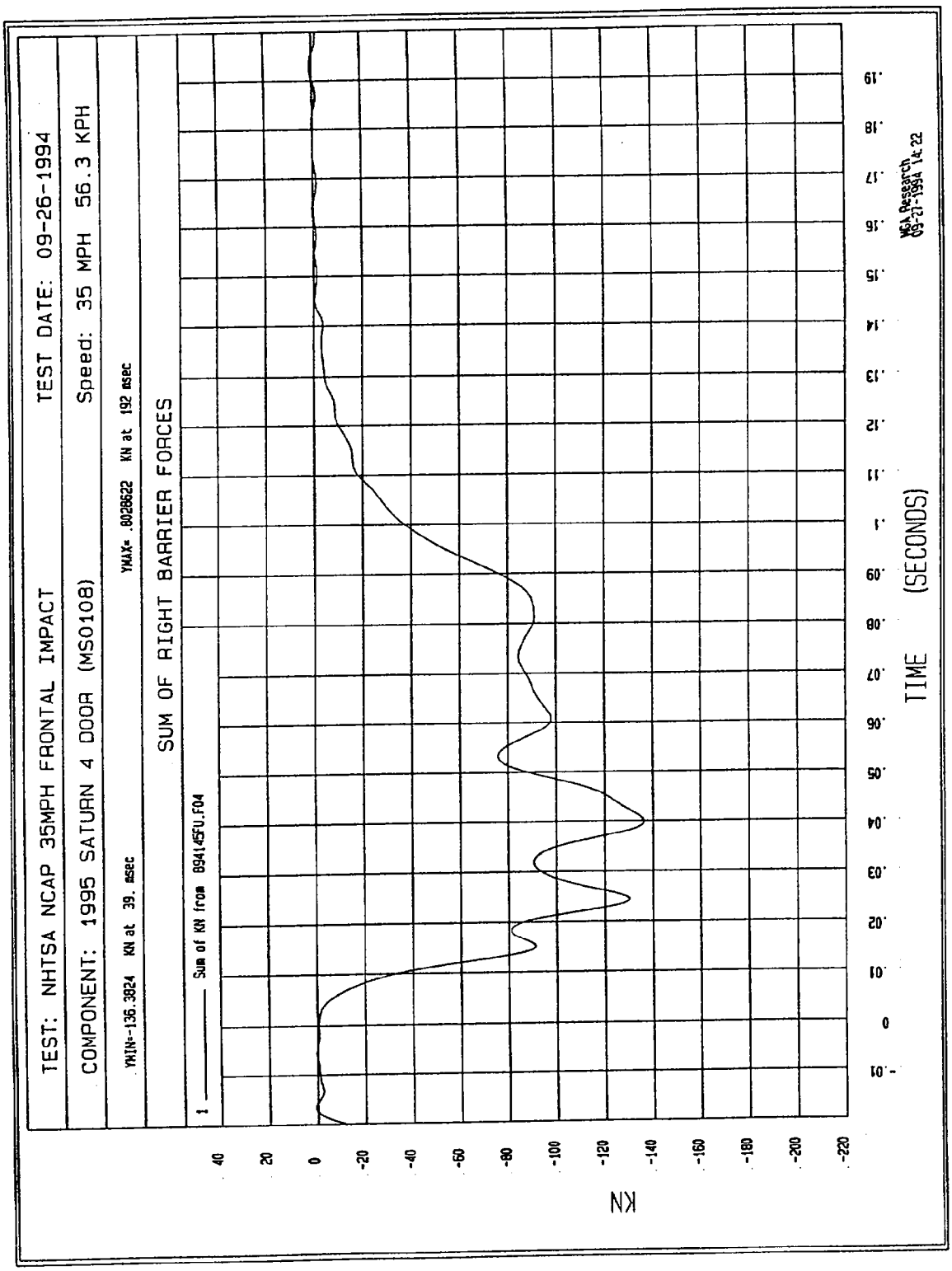


Figure B-31 - Sum of Right Barrier Forces vs. Time

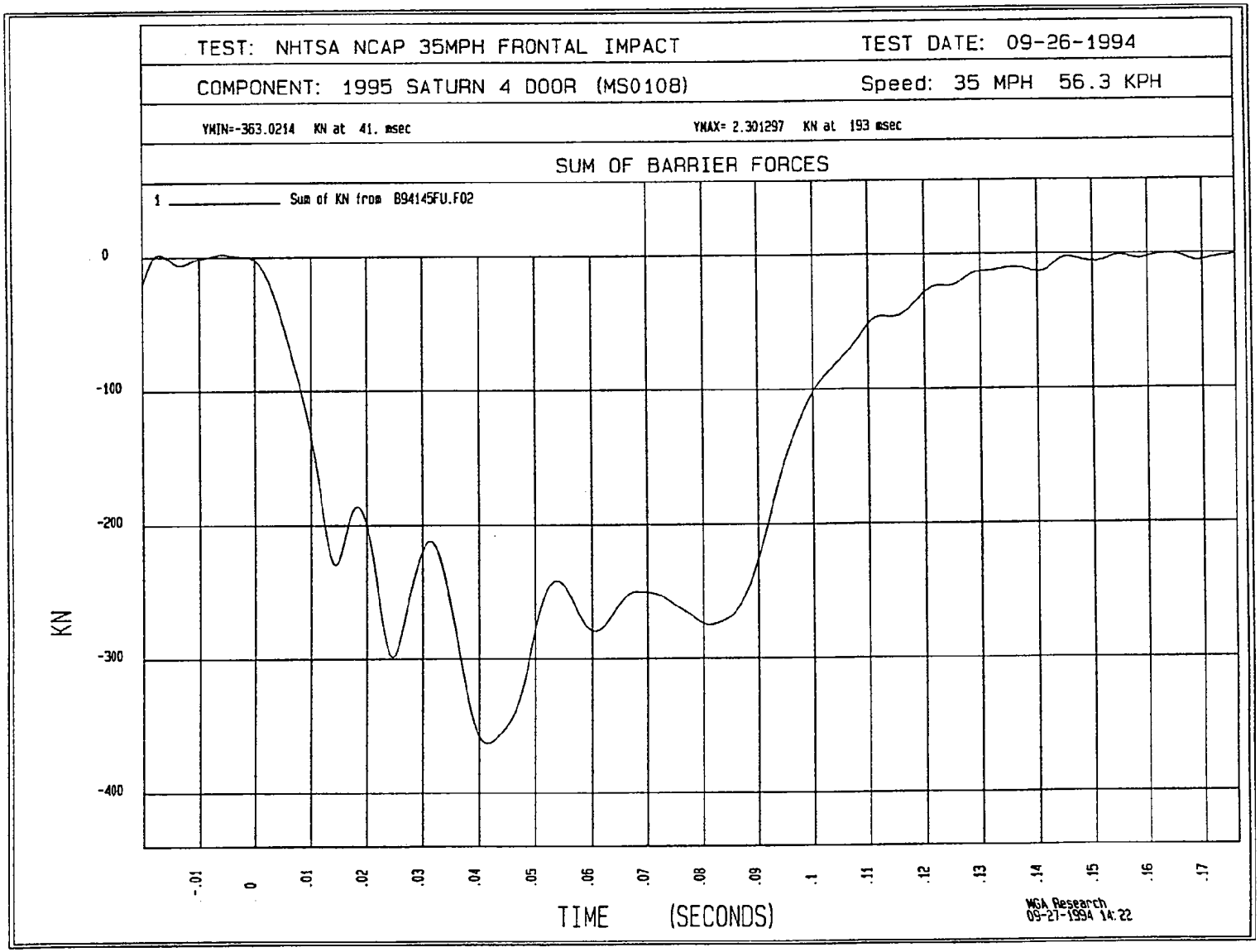


Figure B-32 - Sum of Barrier Forces vs. Time

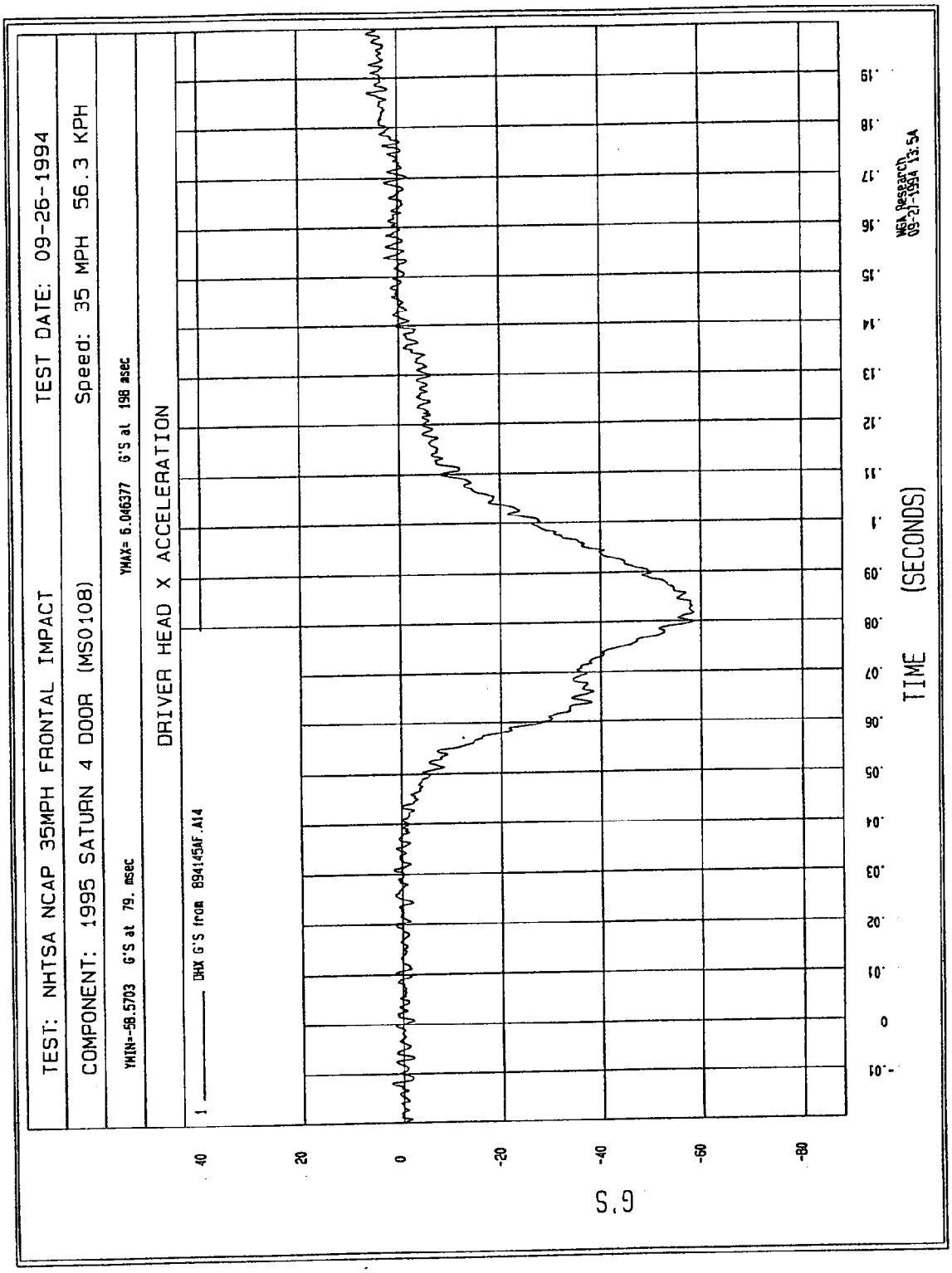


Figure B-33 - Driver Head X Acceleration vs. Time

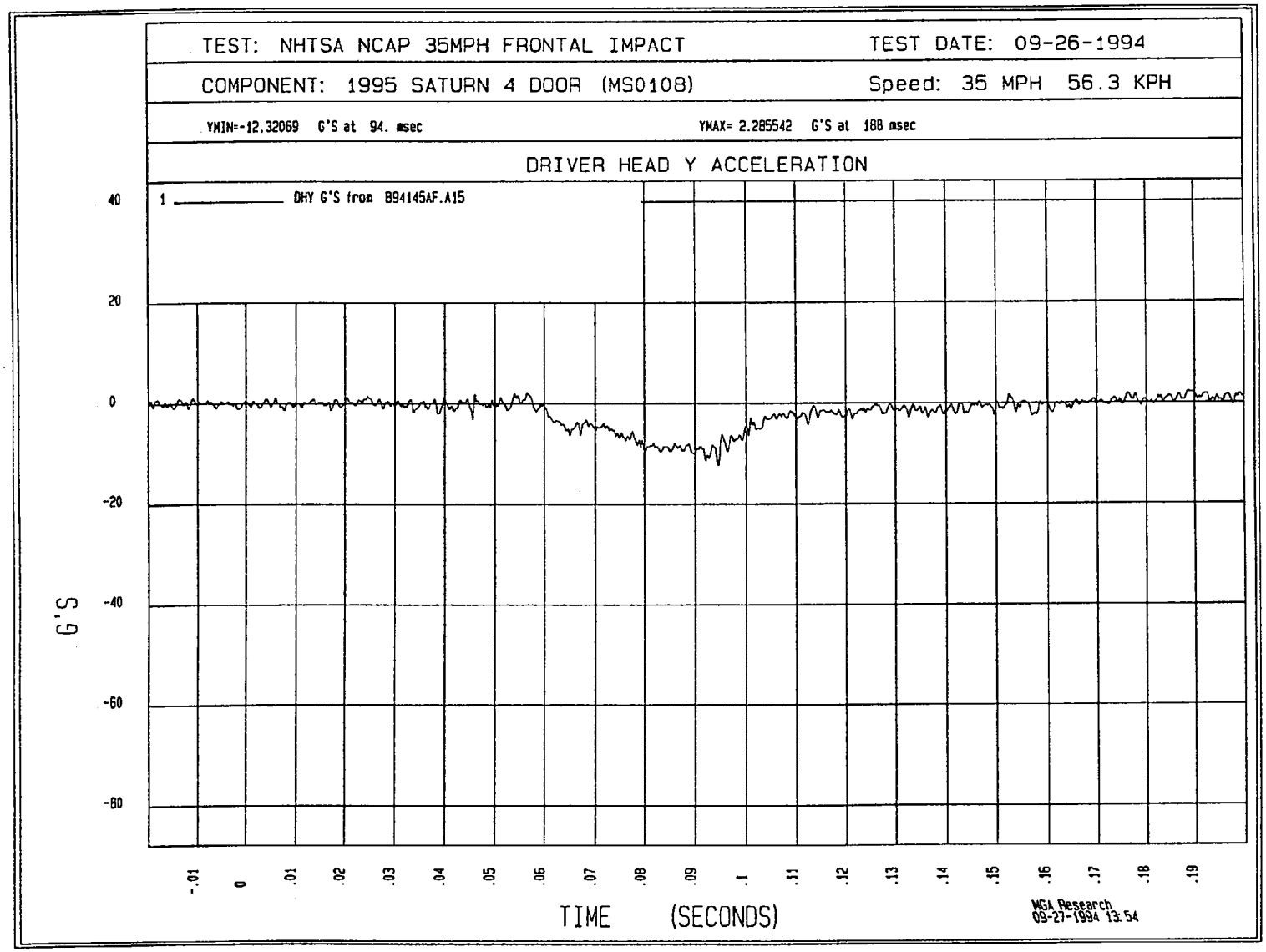


Figure B-34 - Driver Head Y Acceleration vs. Time

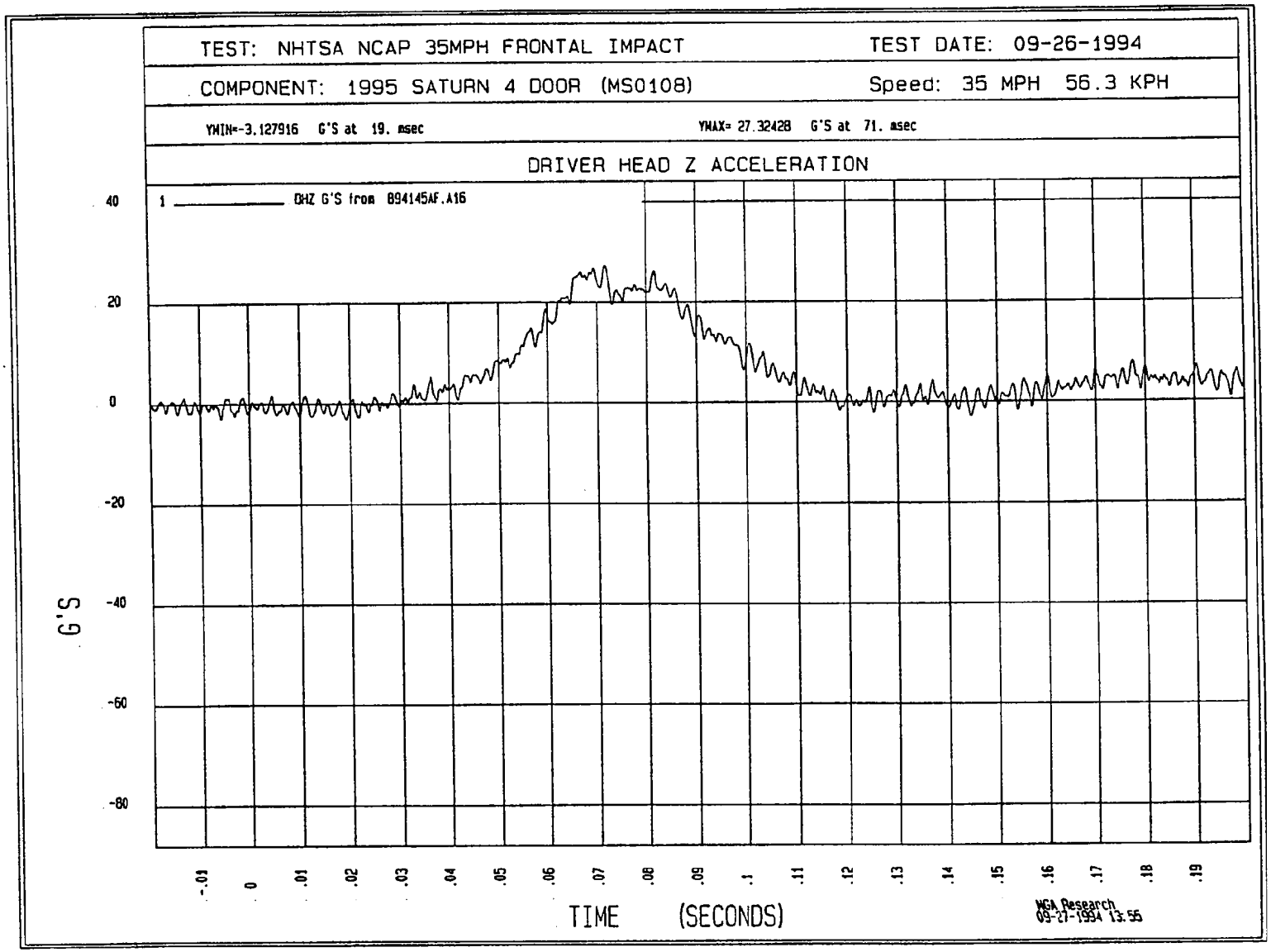


Figure B-35 - Driver Head Z Acceleration vs. Time

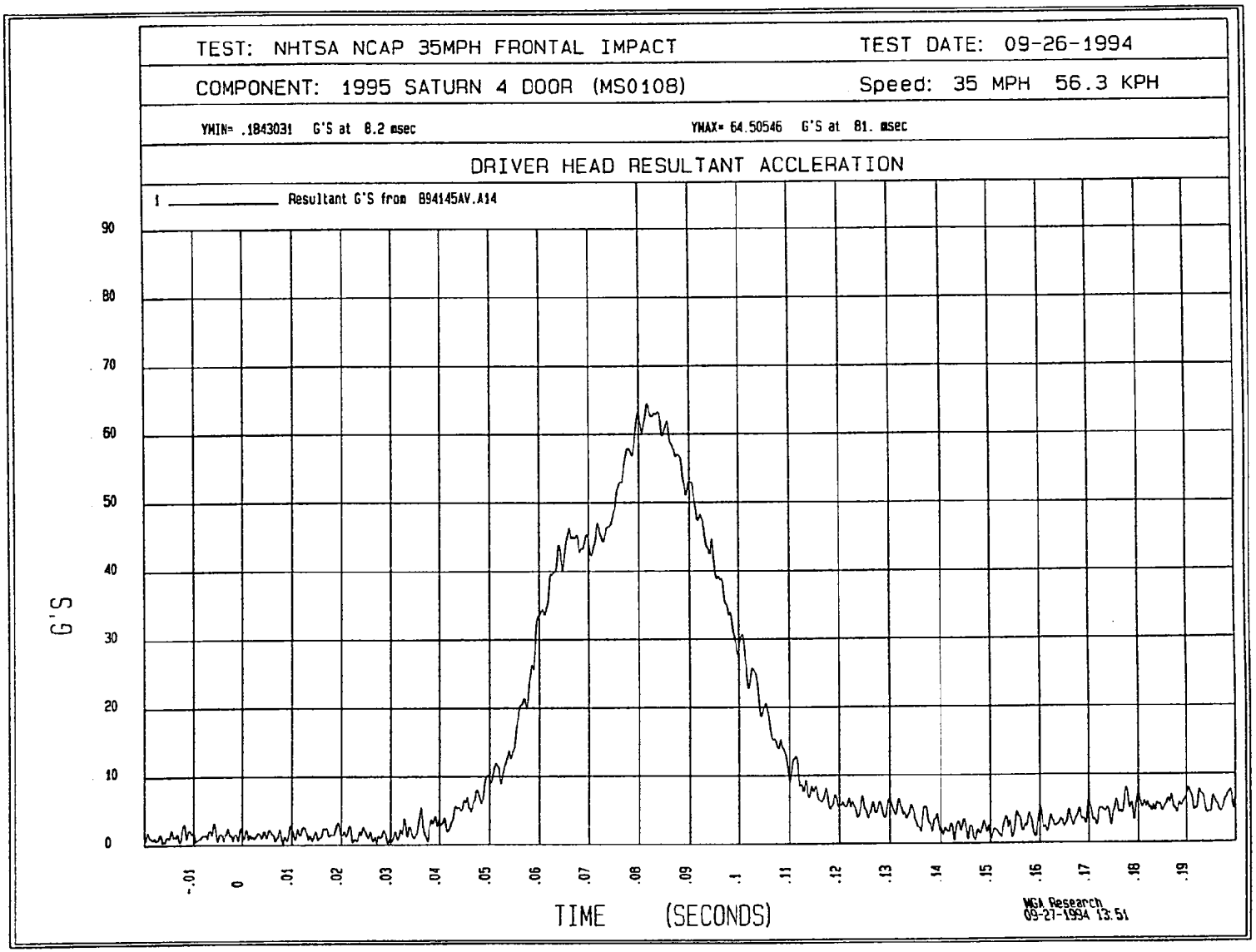


Figure B-36 - Driver Head Resultant Acceleration vs. Time

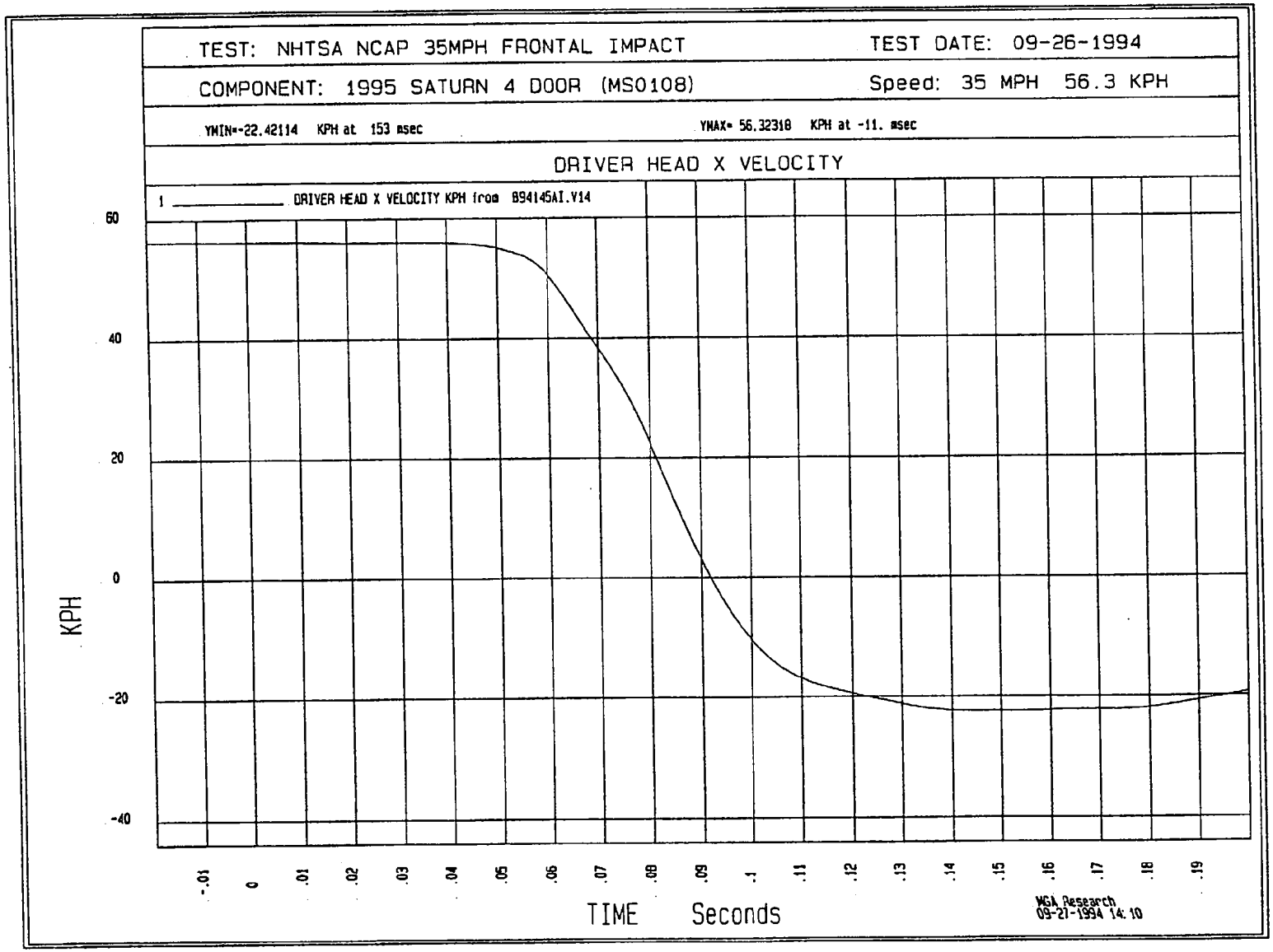


Figure B-37 - Driver Head X Velocity vs. Time

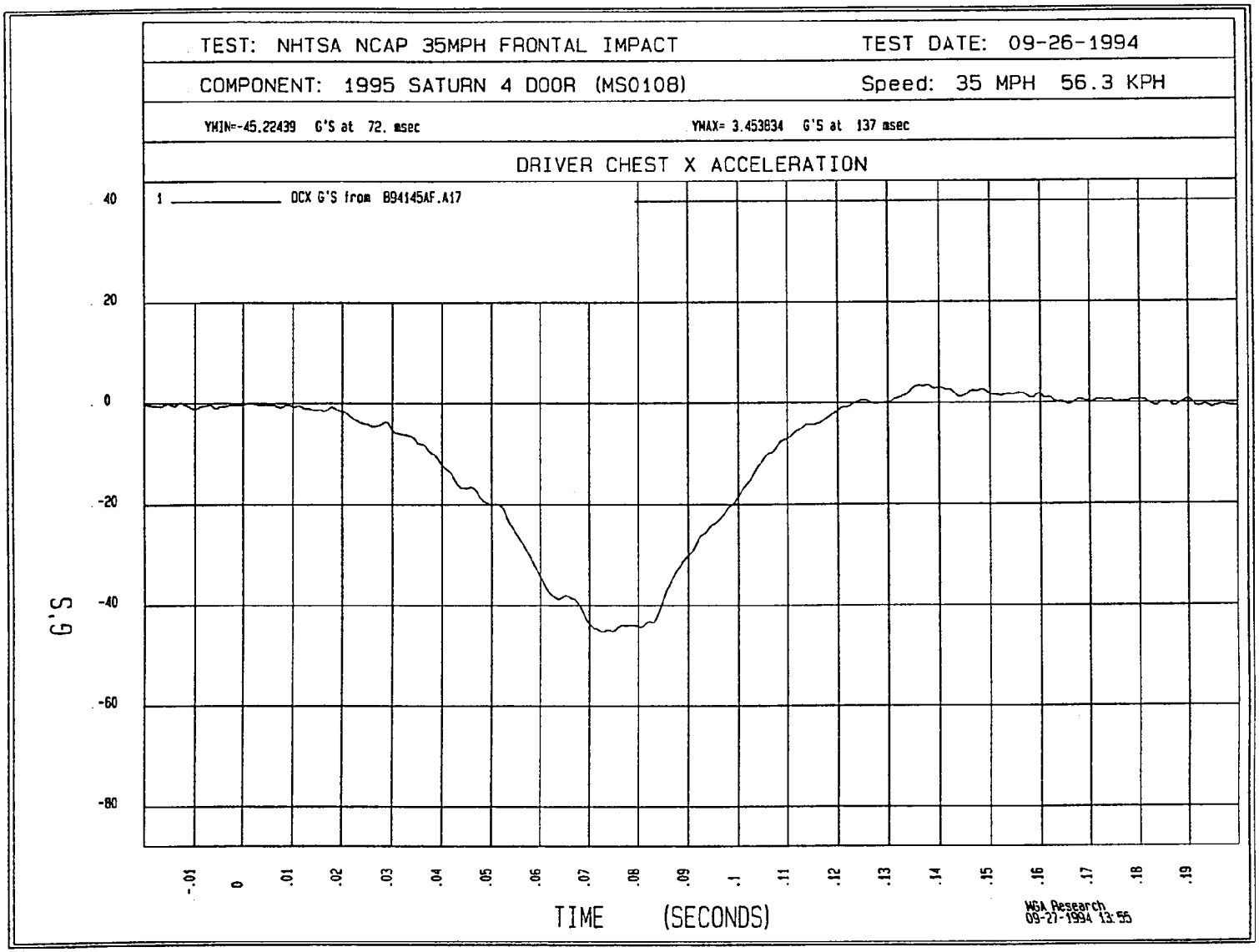


Figure B-38 - Driver Chest X Acceleration vs. Time

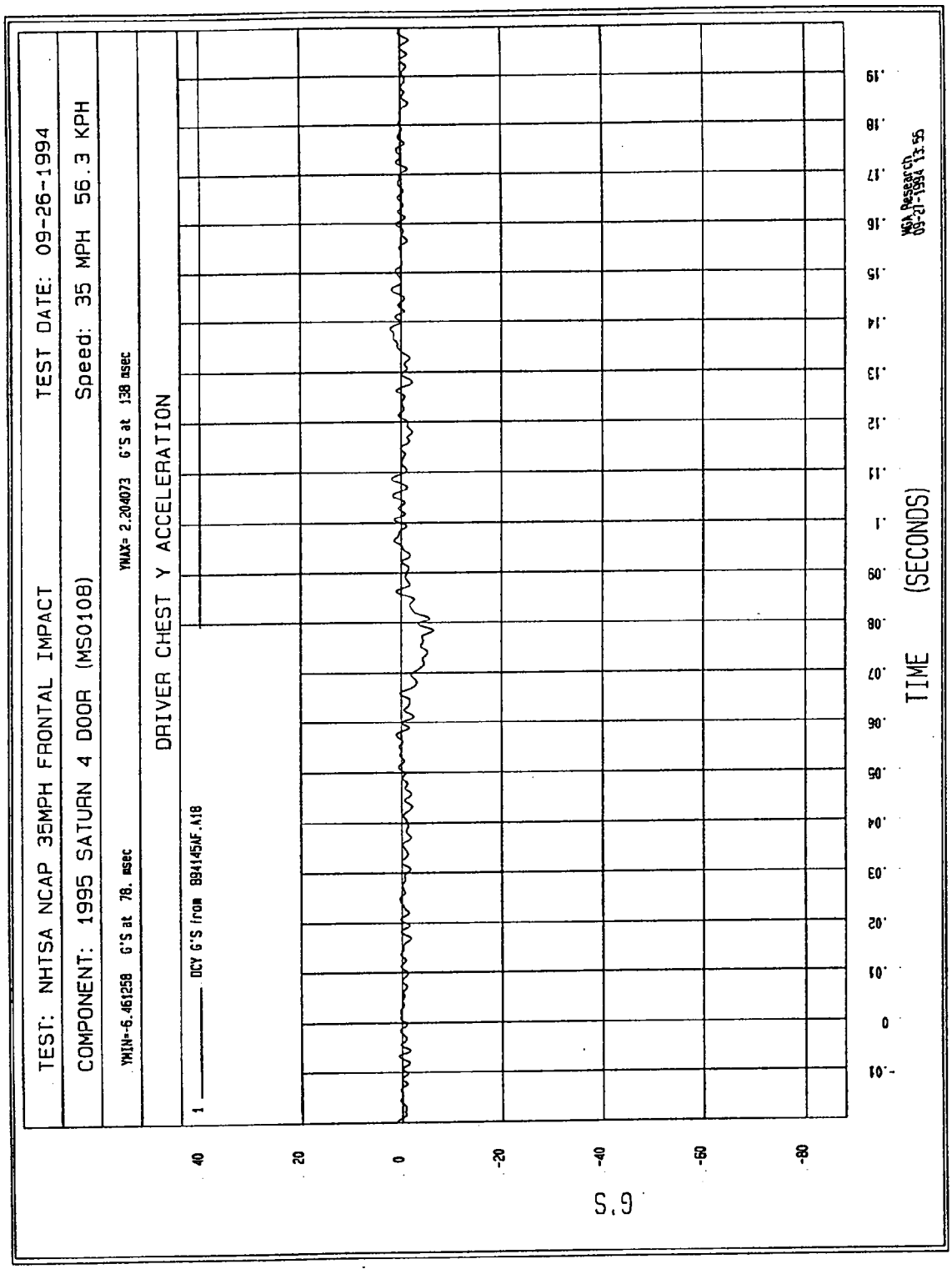


Figure B-39 - Driver Chest Y Acceleration vs. Time

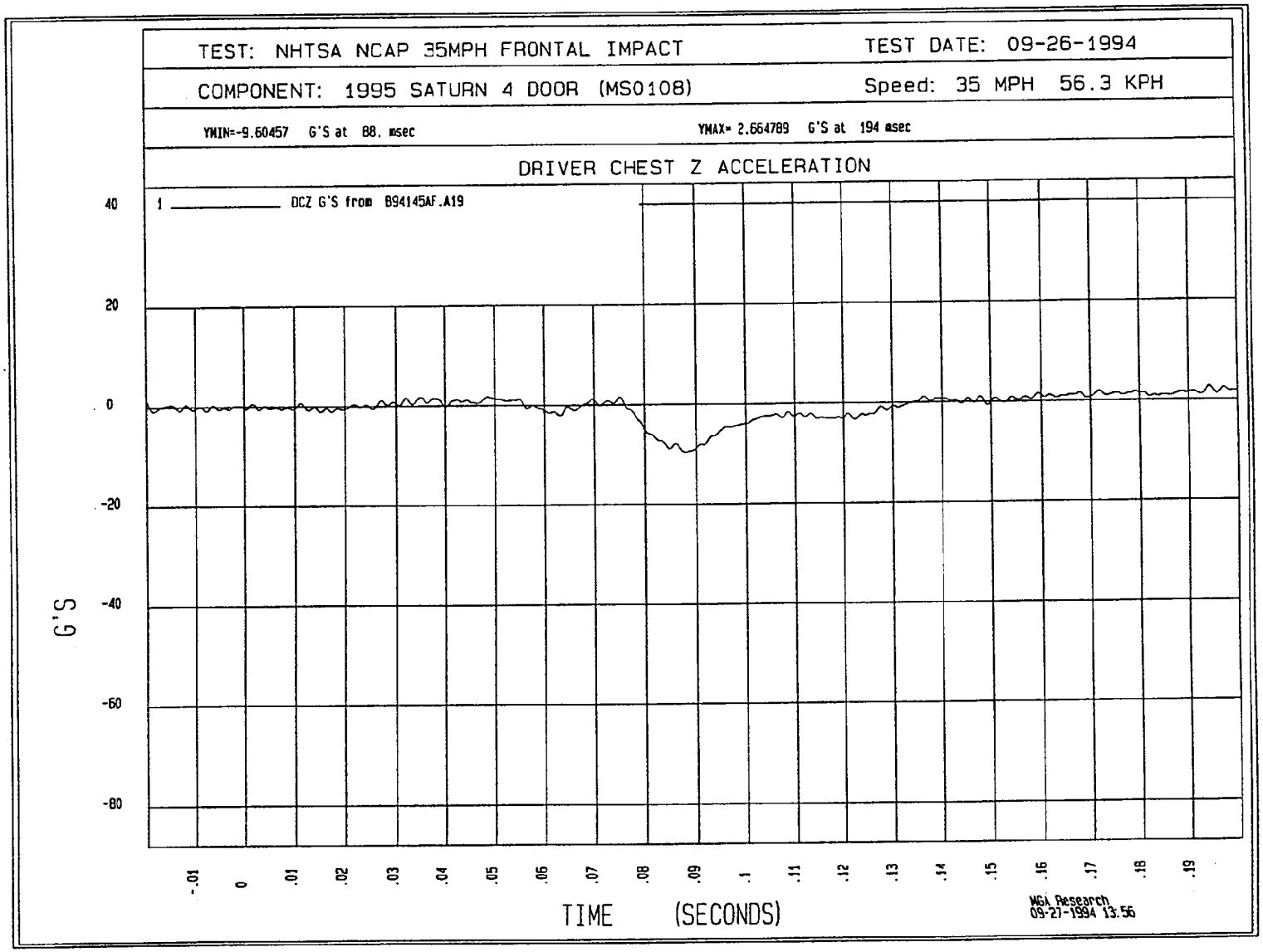


Figure B-40 - Driver Chest Z Acceleration vs. Time

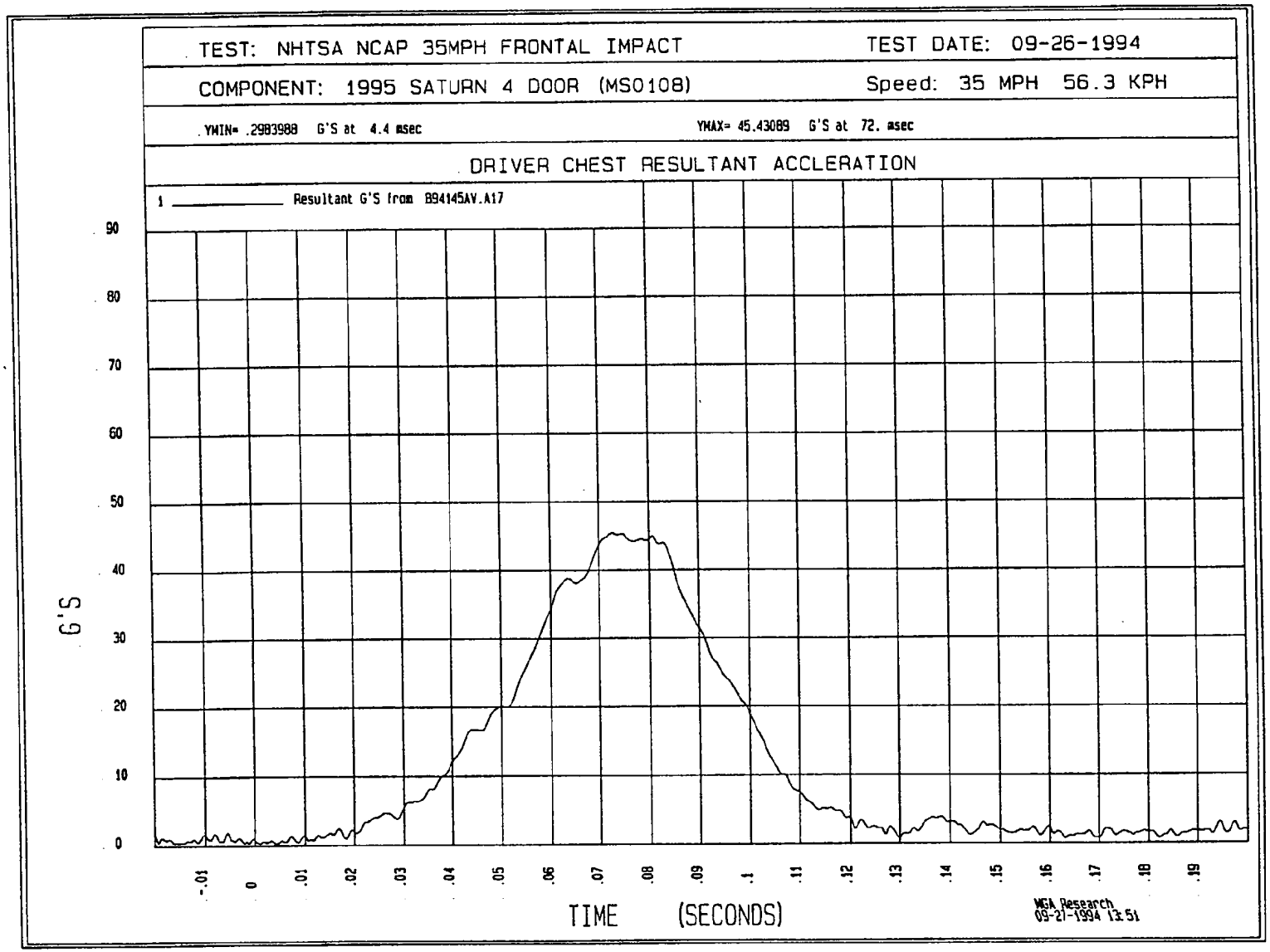


Figure B-41 - Driver Chest Resultant vs. Time

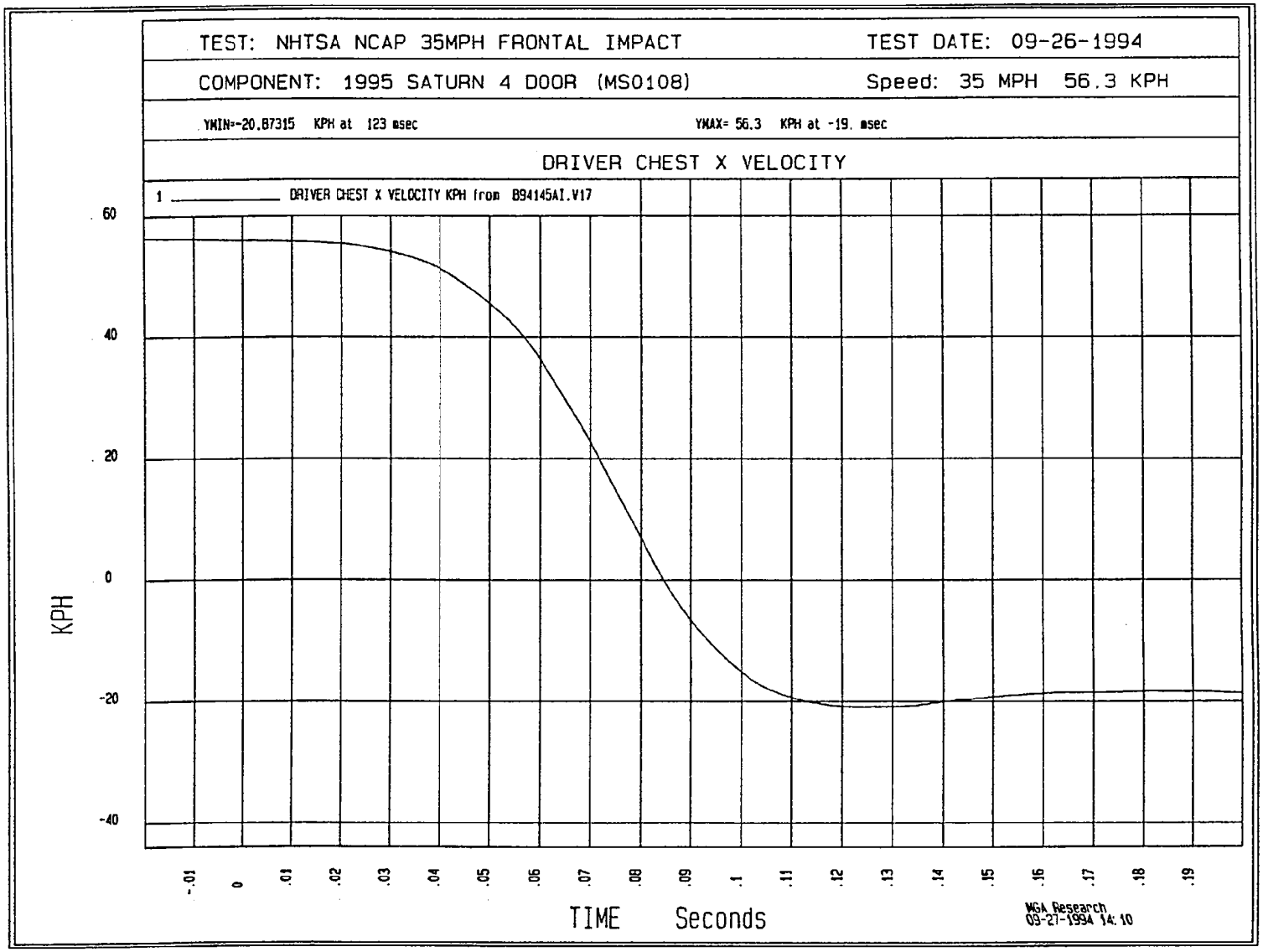


Figure B-42 - Driver Chest X Velocity vs. Time

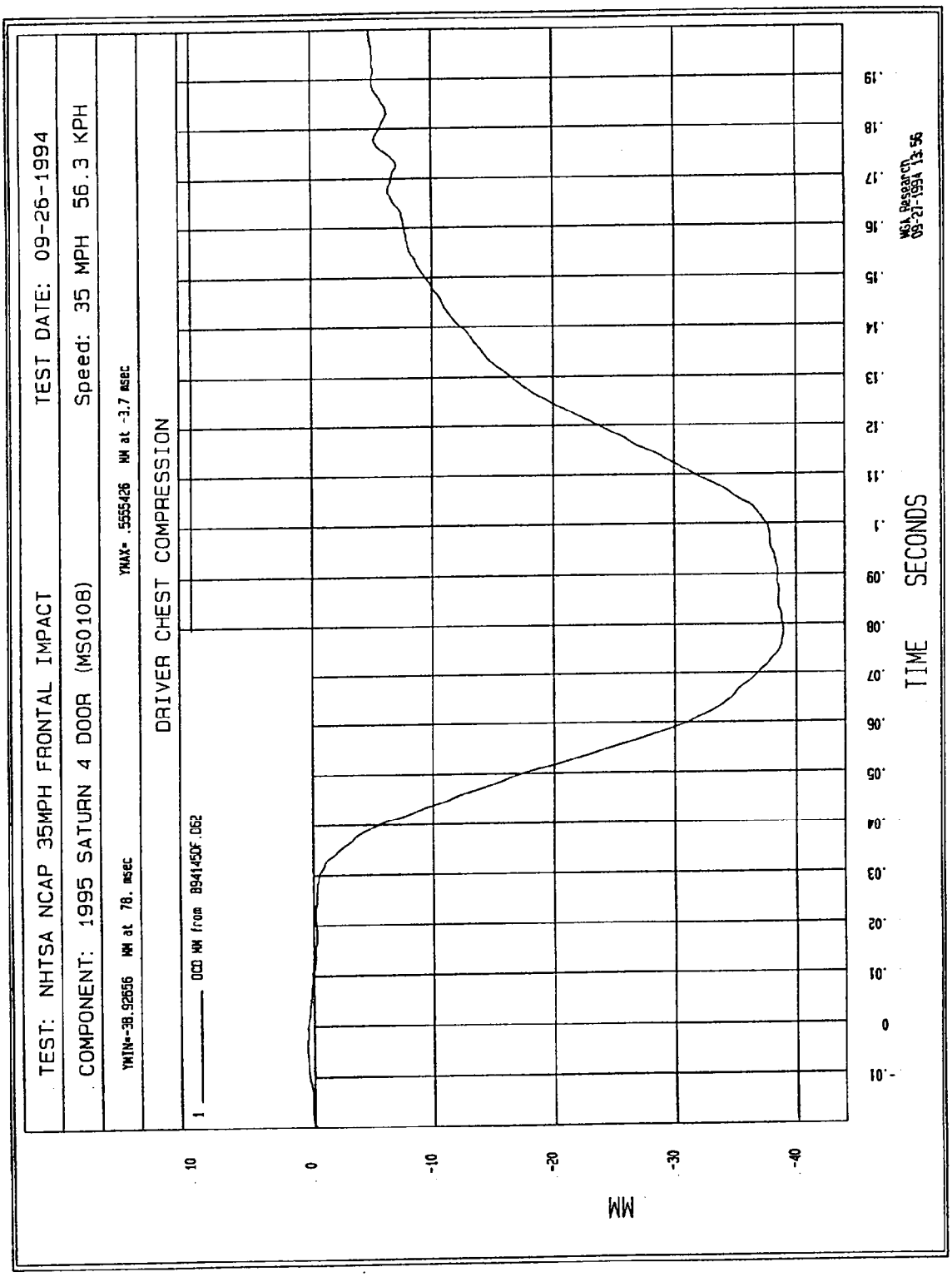


Figure B-43 - Driver Chest Compression vs. Time

Invalid Data Collected in This Channel
During Test

Figure B-44 - Driver Left Femur Force vs. Time

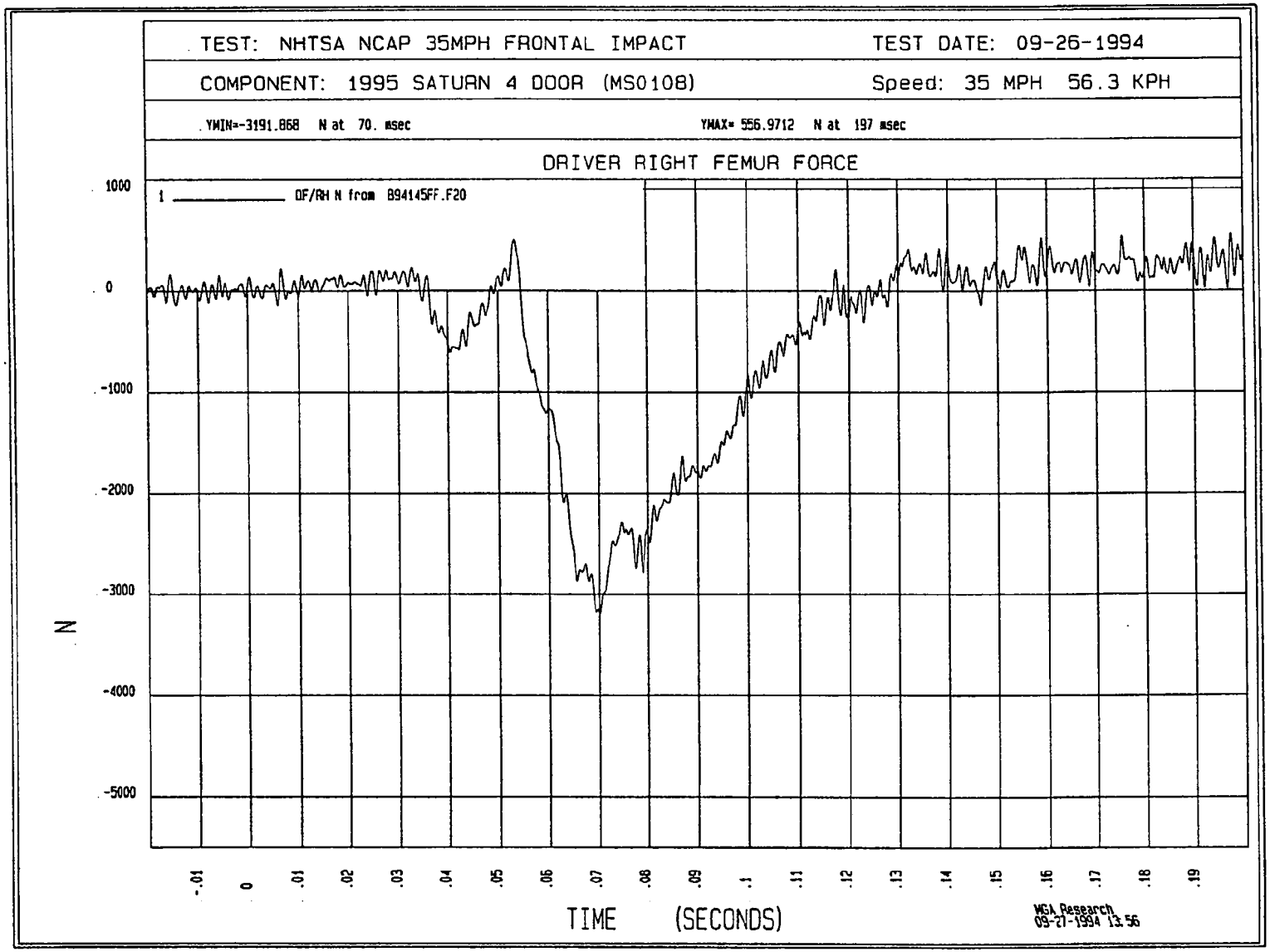


Figure B-45 - Driver Right Femur Force vs. Time

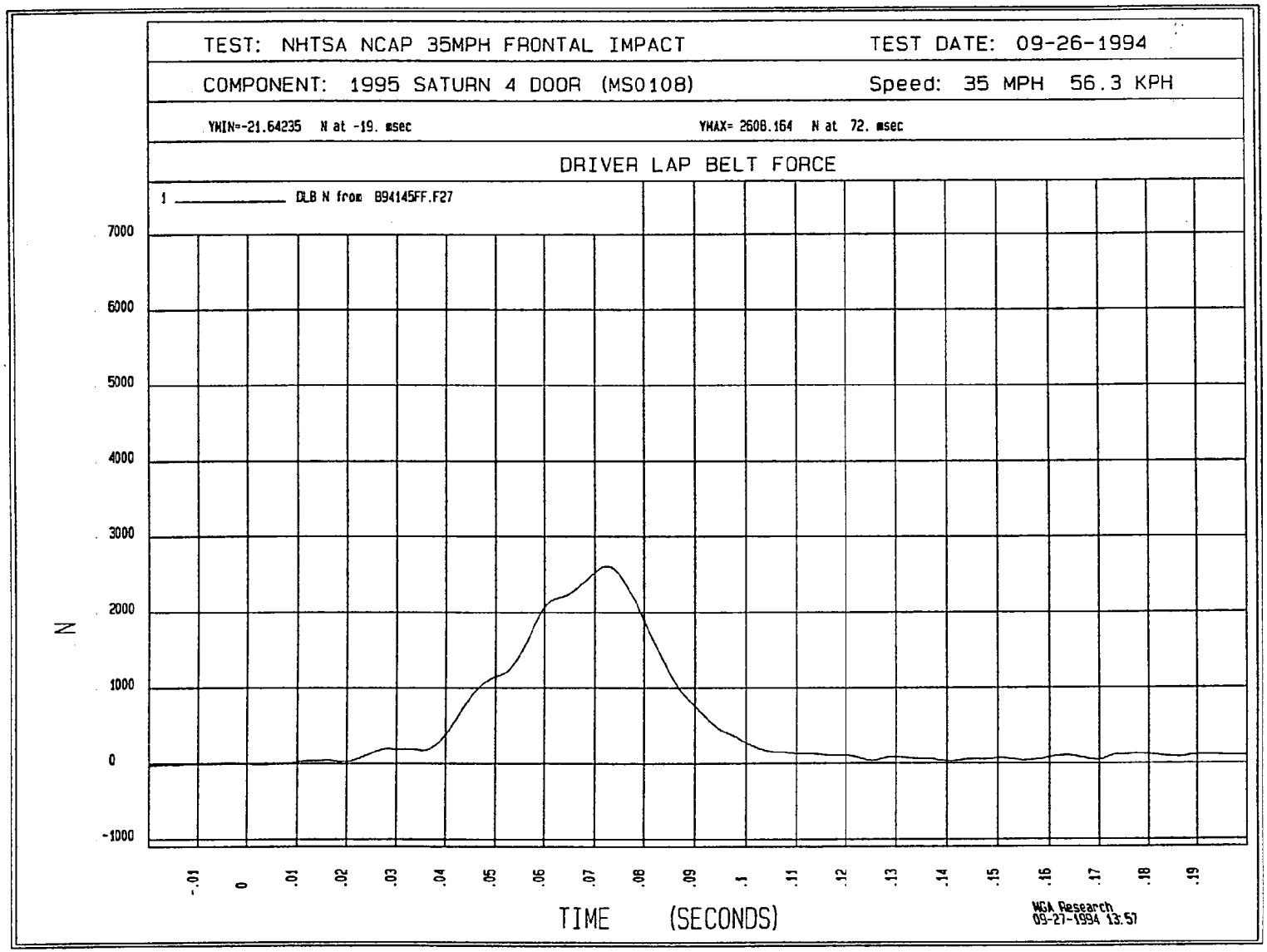


Figure B-46 - Driver Lap Belt Force vs. Time

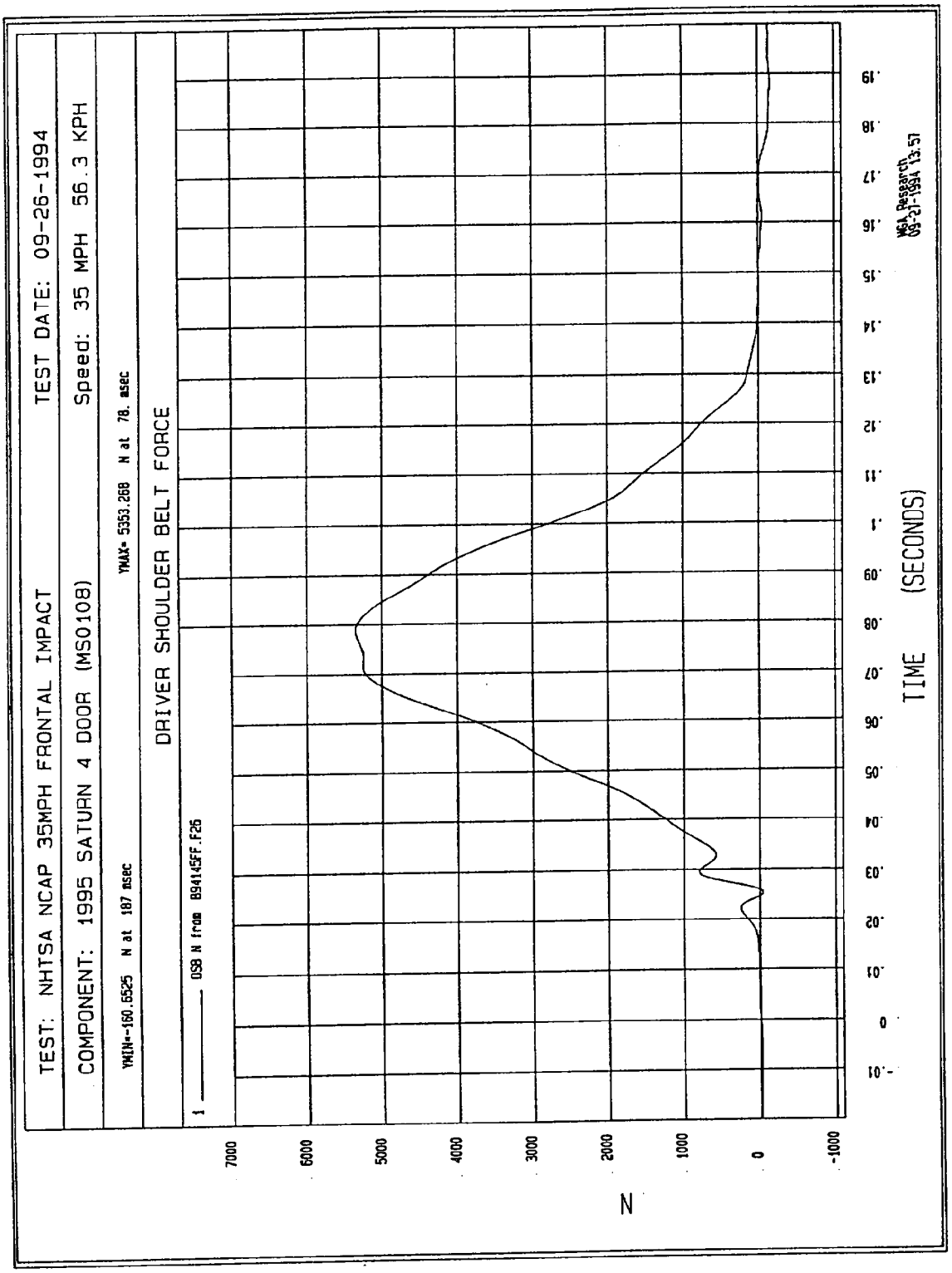


Figure B-47 - Driver Shoulder Belt Force vs. Time

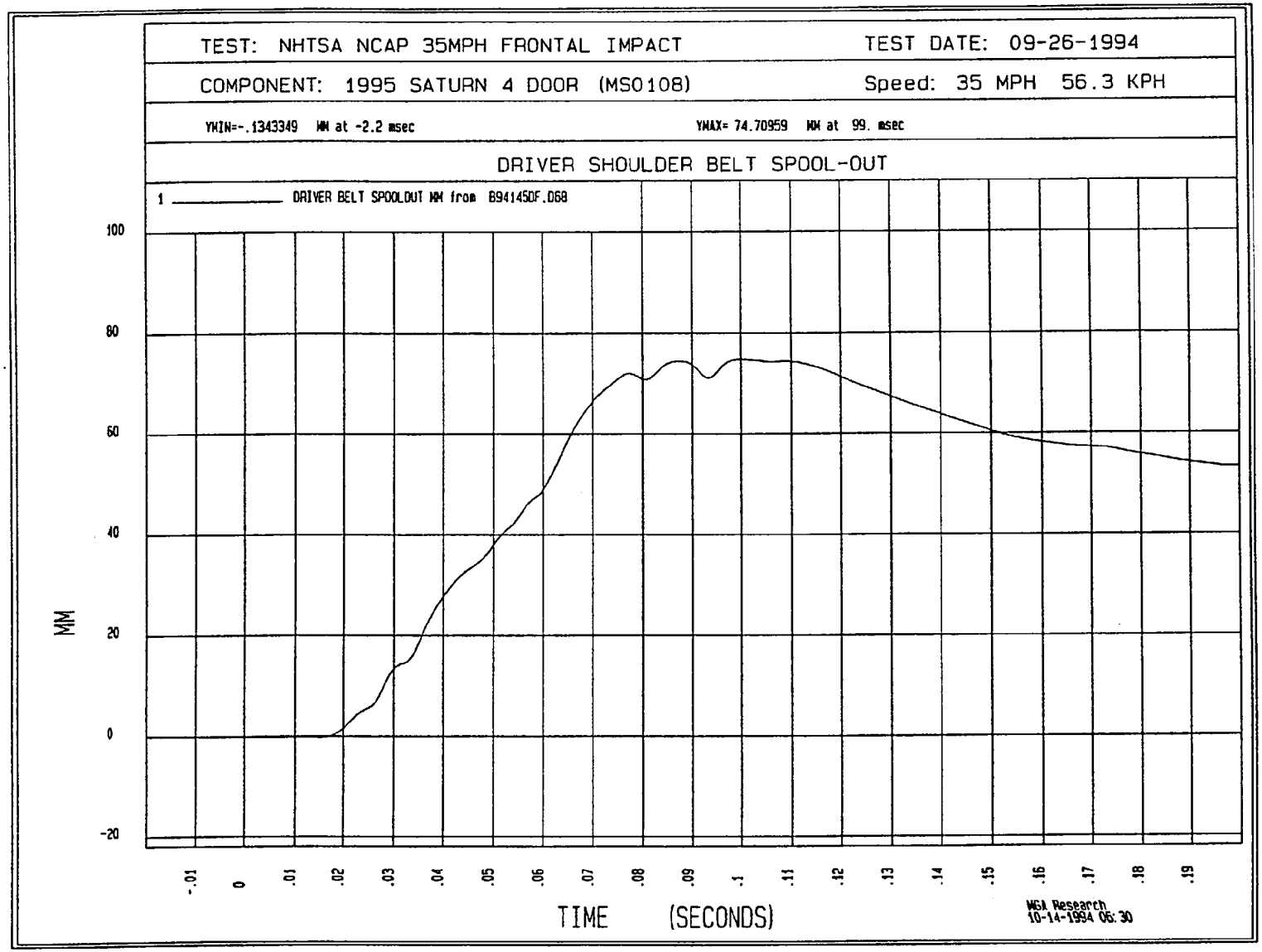


Figure B-48 - Driver Shoulder Belt Spool-Out vs. Time

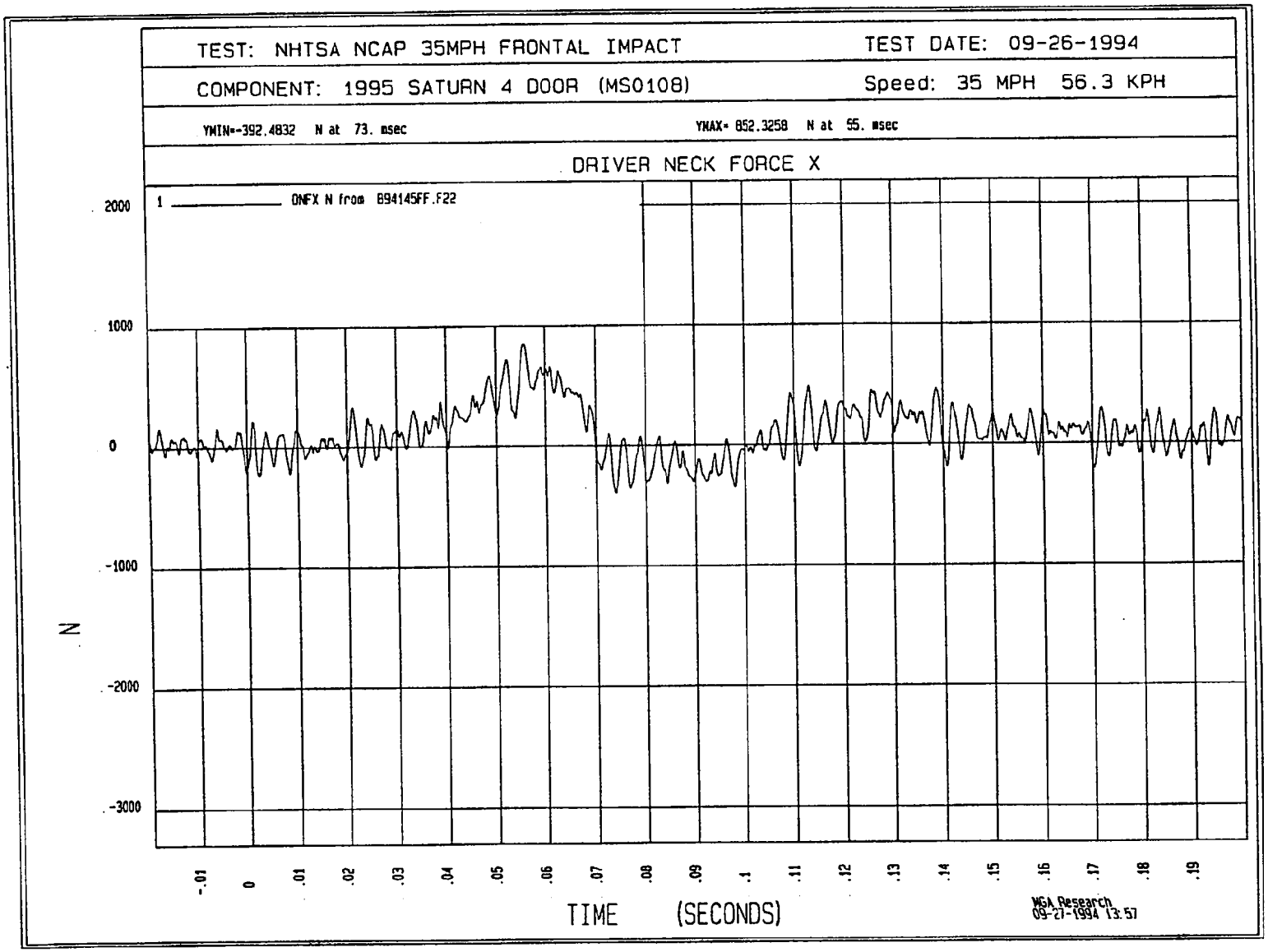


Figure B-49 - Driver Neck Force X vs. Time

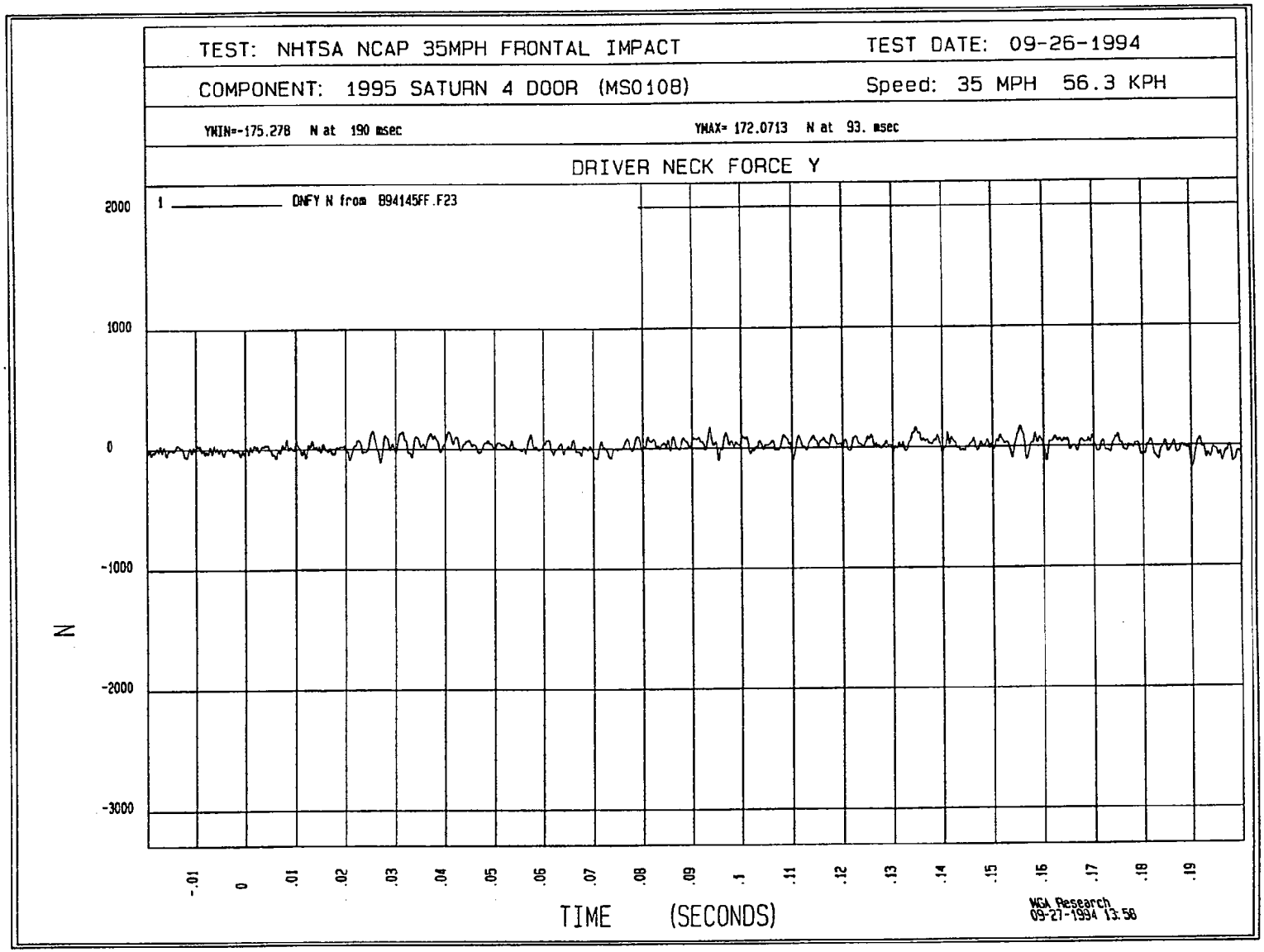


Figure B-5Ø - Driver Neck Force Y vs. Time

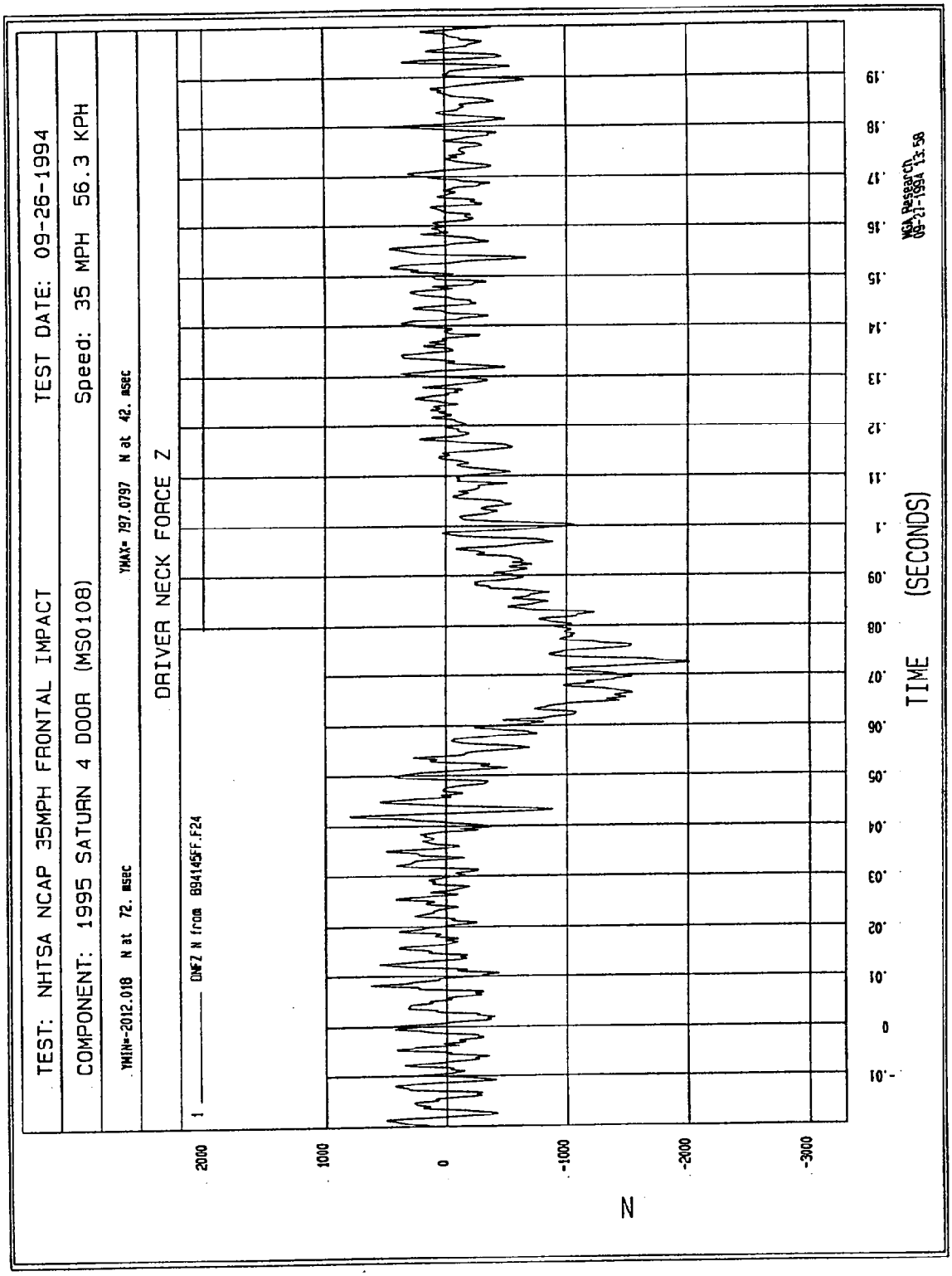


Figure B-51 - Driver Neck Force Z vs. Time

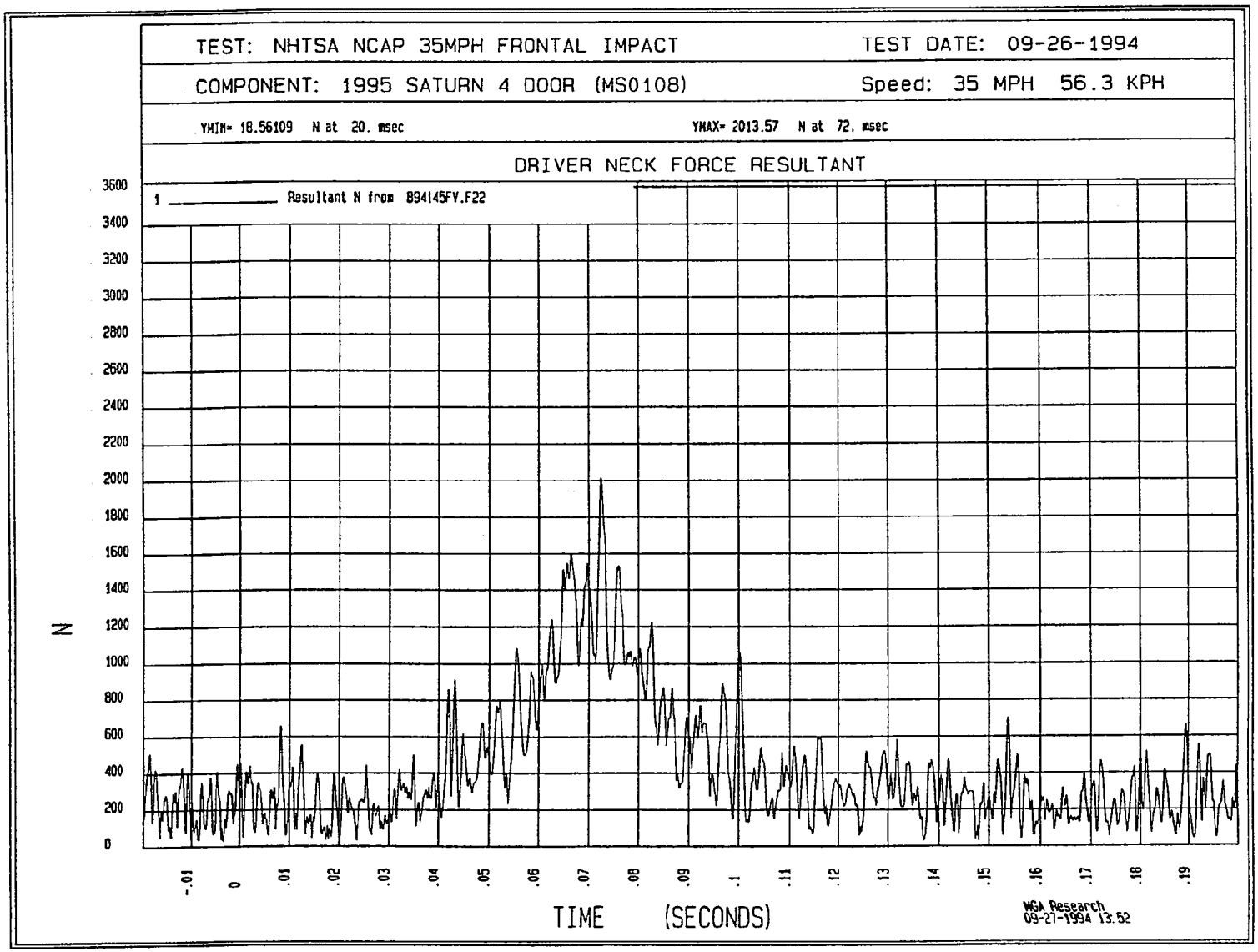


Figure B-52 - Driver Neck Force Resultant vs. Time

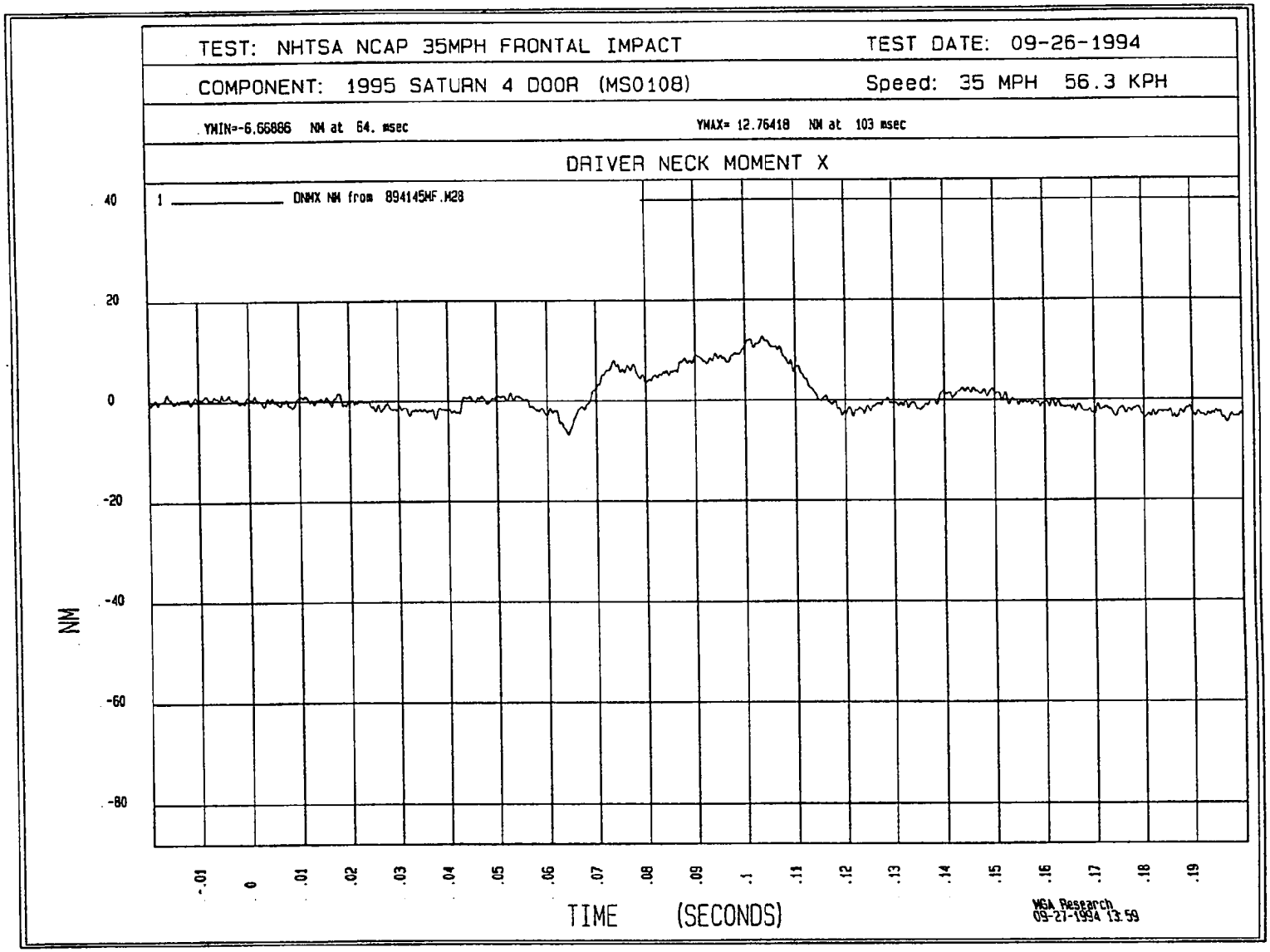


Figure B-53 - Driver Neck Moment X vs. Time

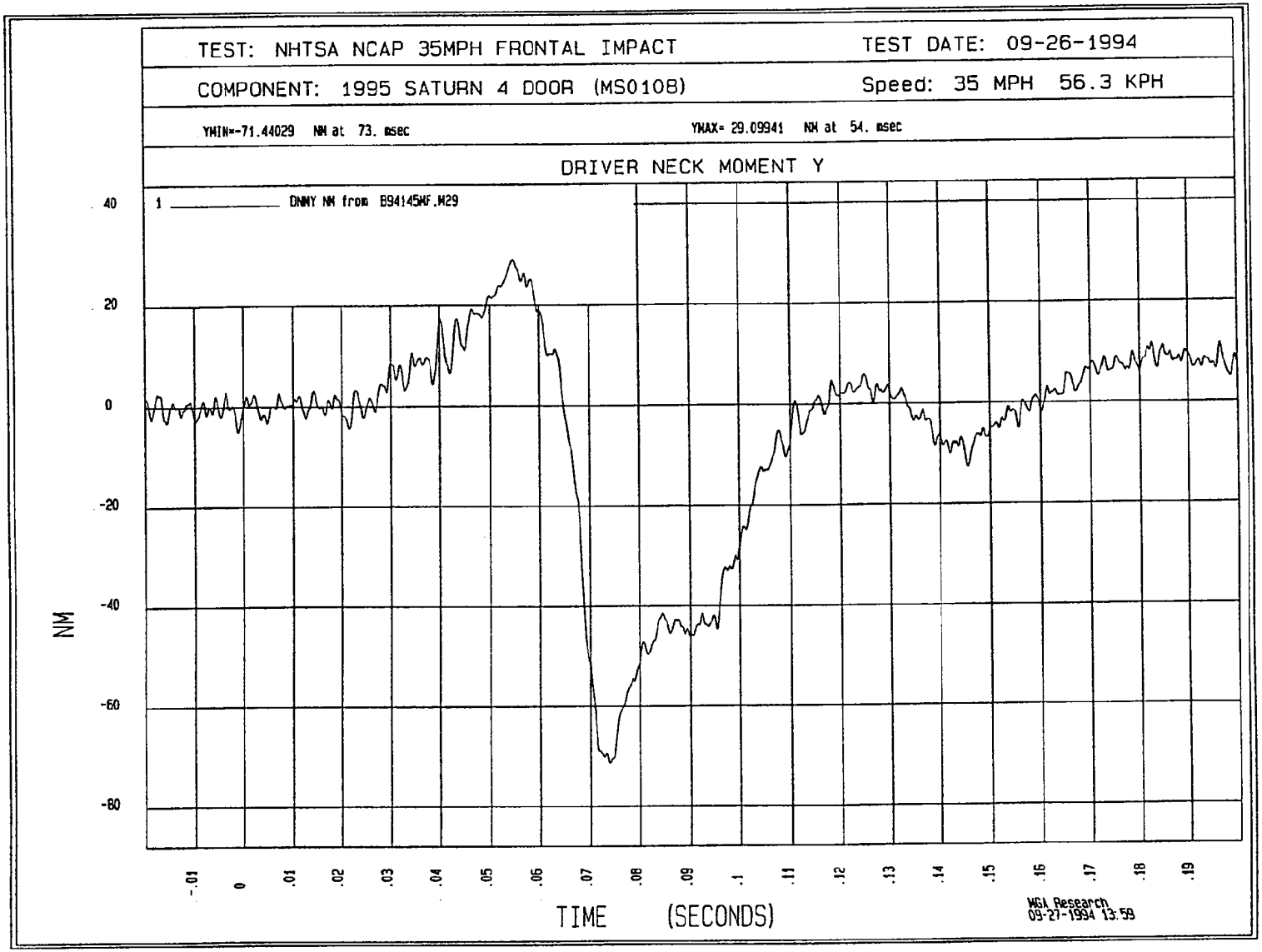


Figure B-54 - Driver Neck Moment Y vs. Time

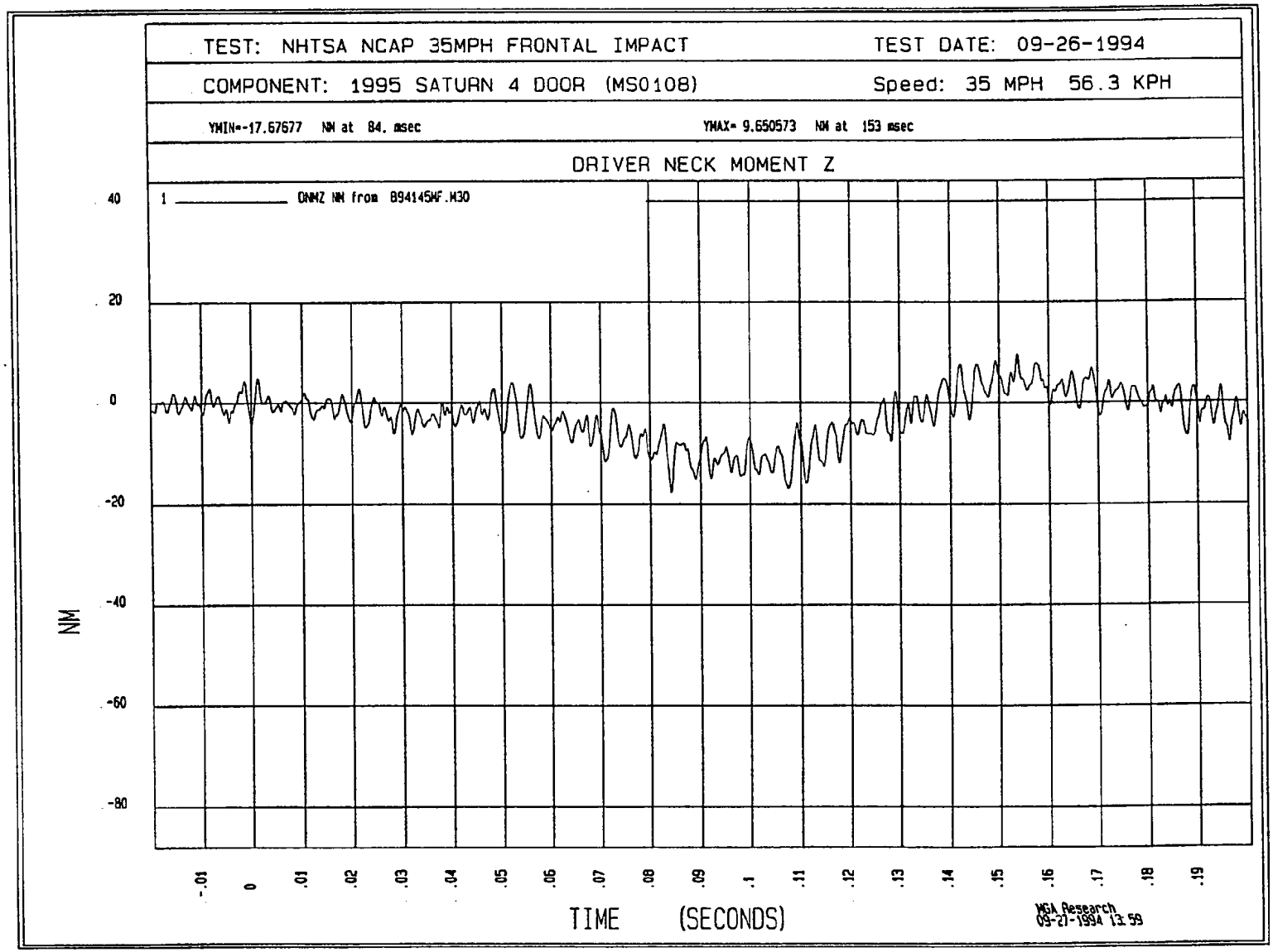


Figure B-55 - Driver Neck Moment Z vs. Time

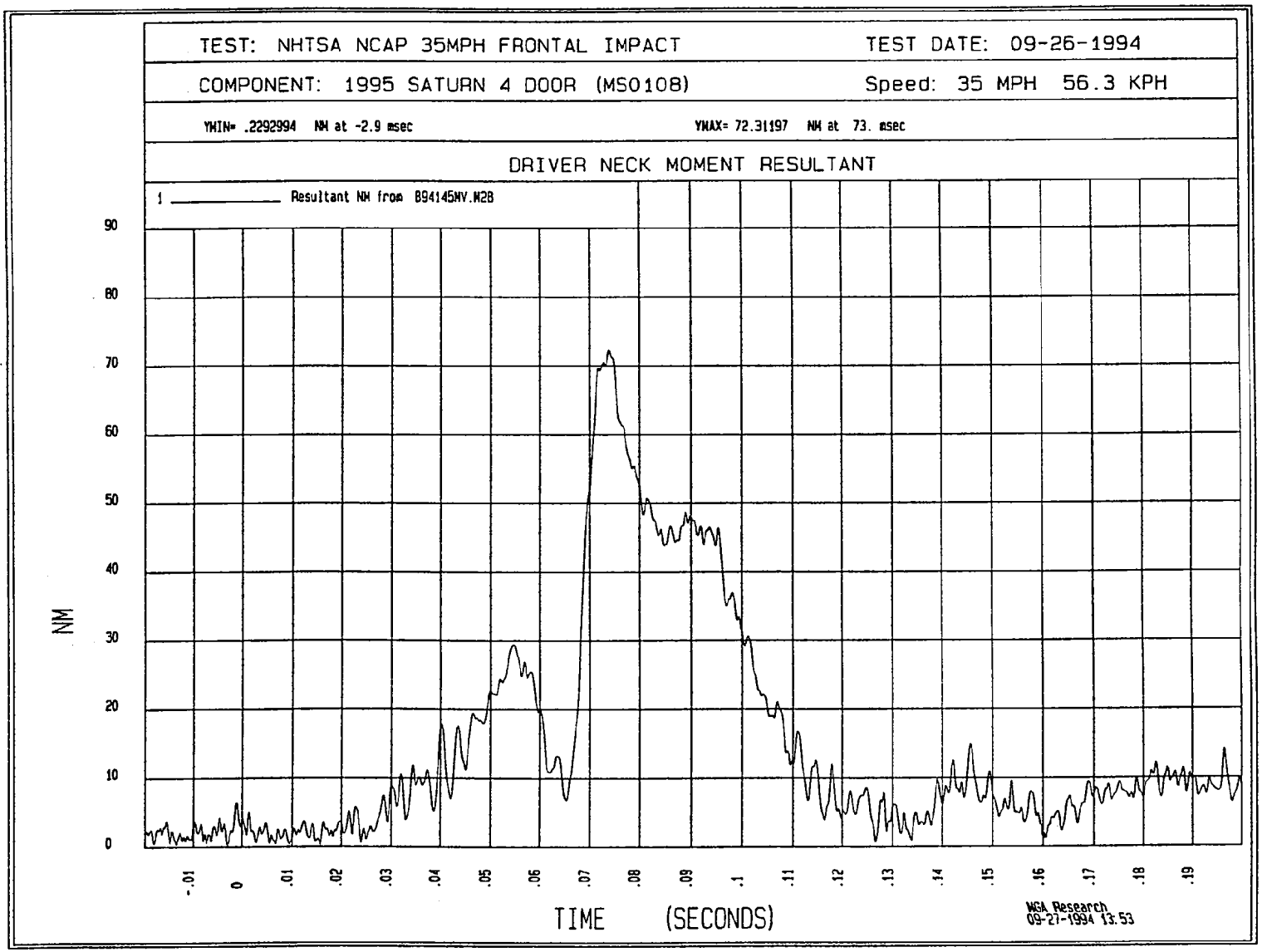


Figure B-56 - Driver Neck Moment Resultant vs. Time

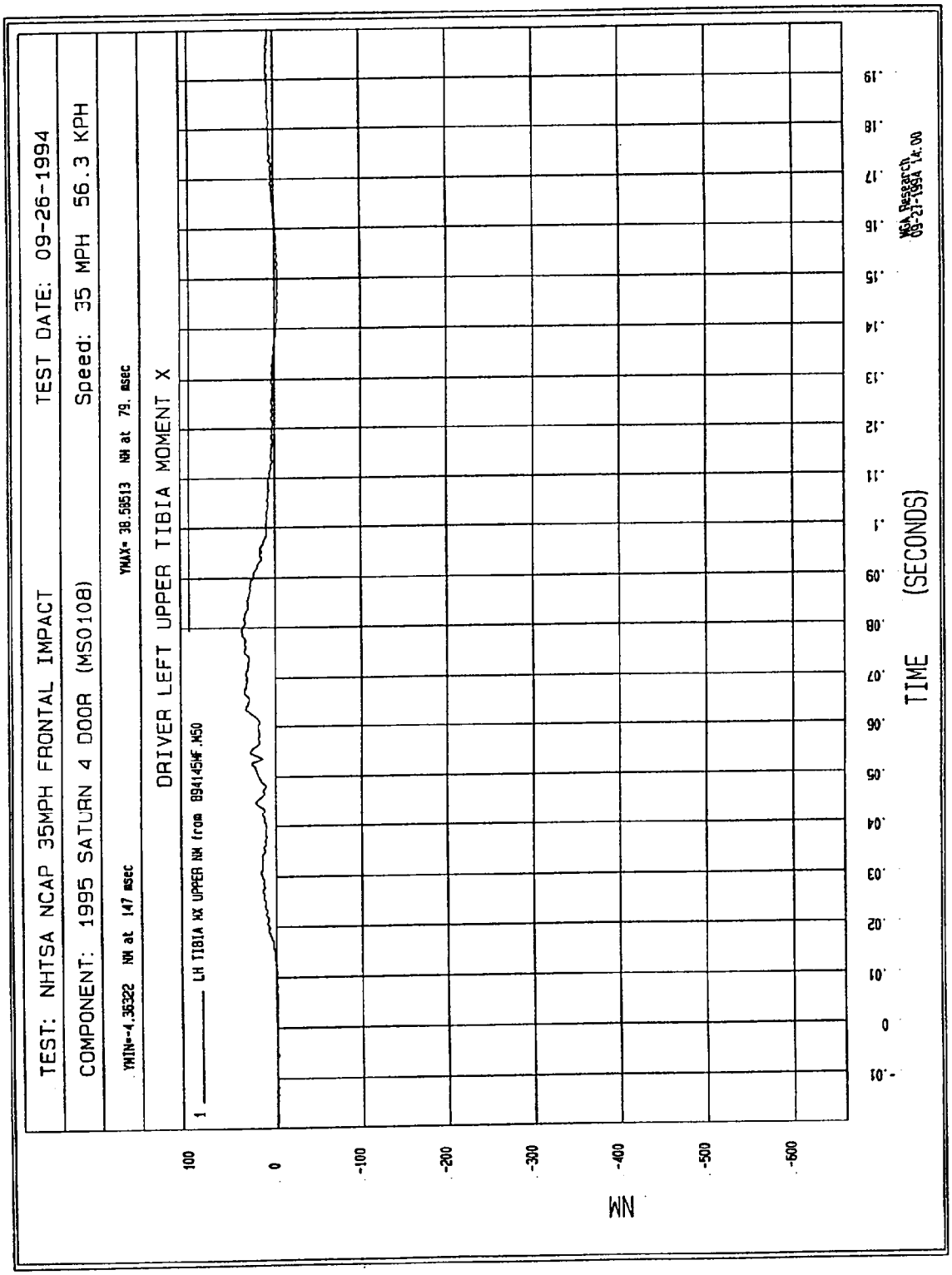


Figure B-57 - Driver Left Upper Tibia Moment X vs. Time

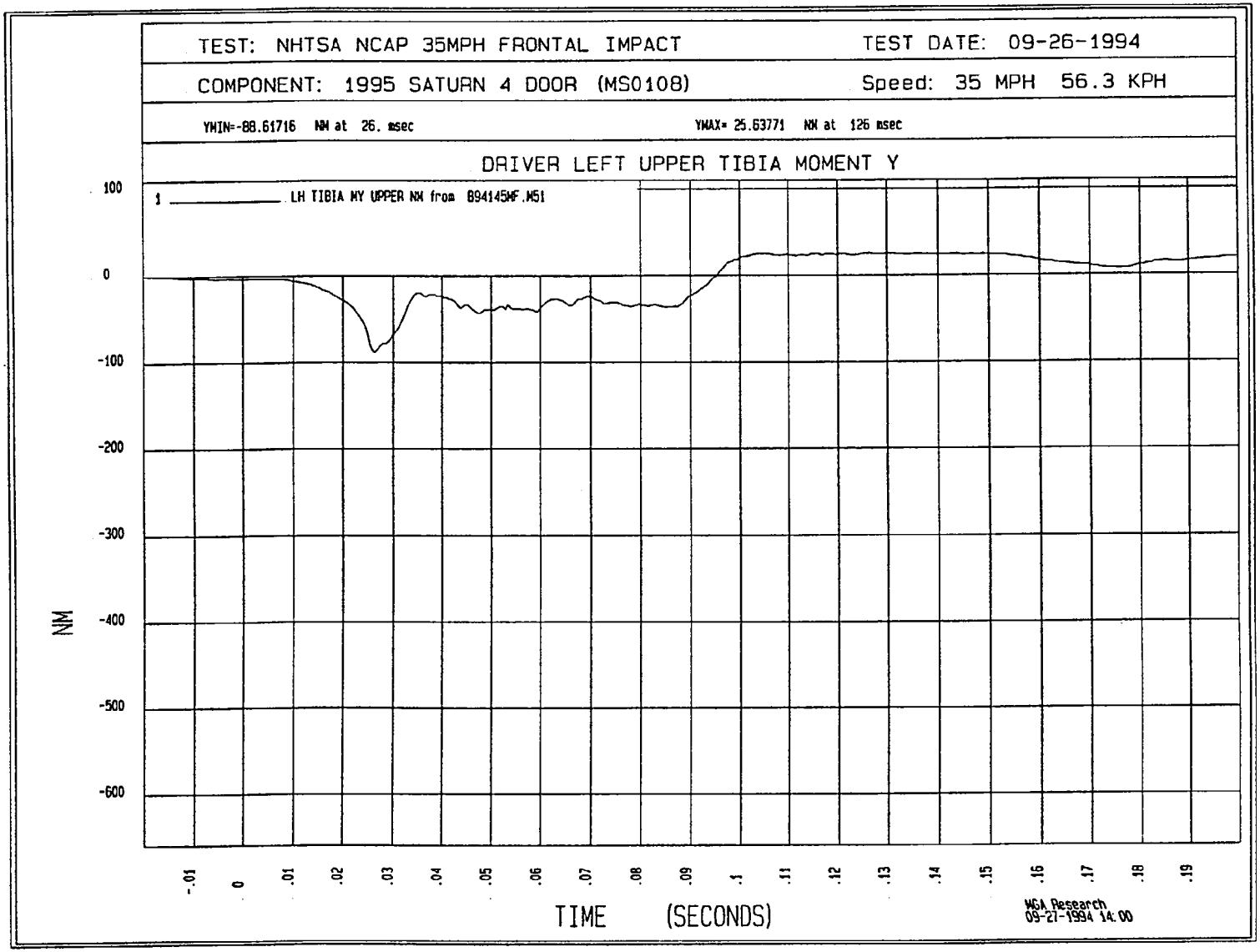


Figure B-58 - Driver Left Upper Tibia Moment Y vs. Time

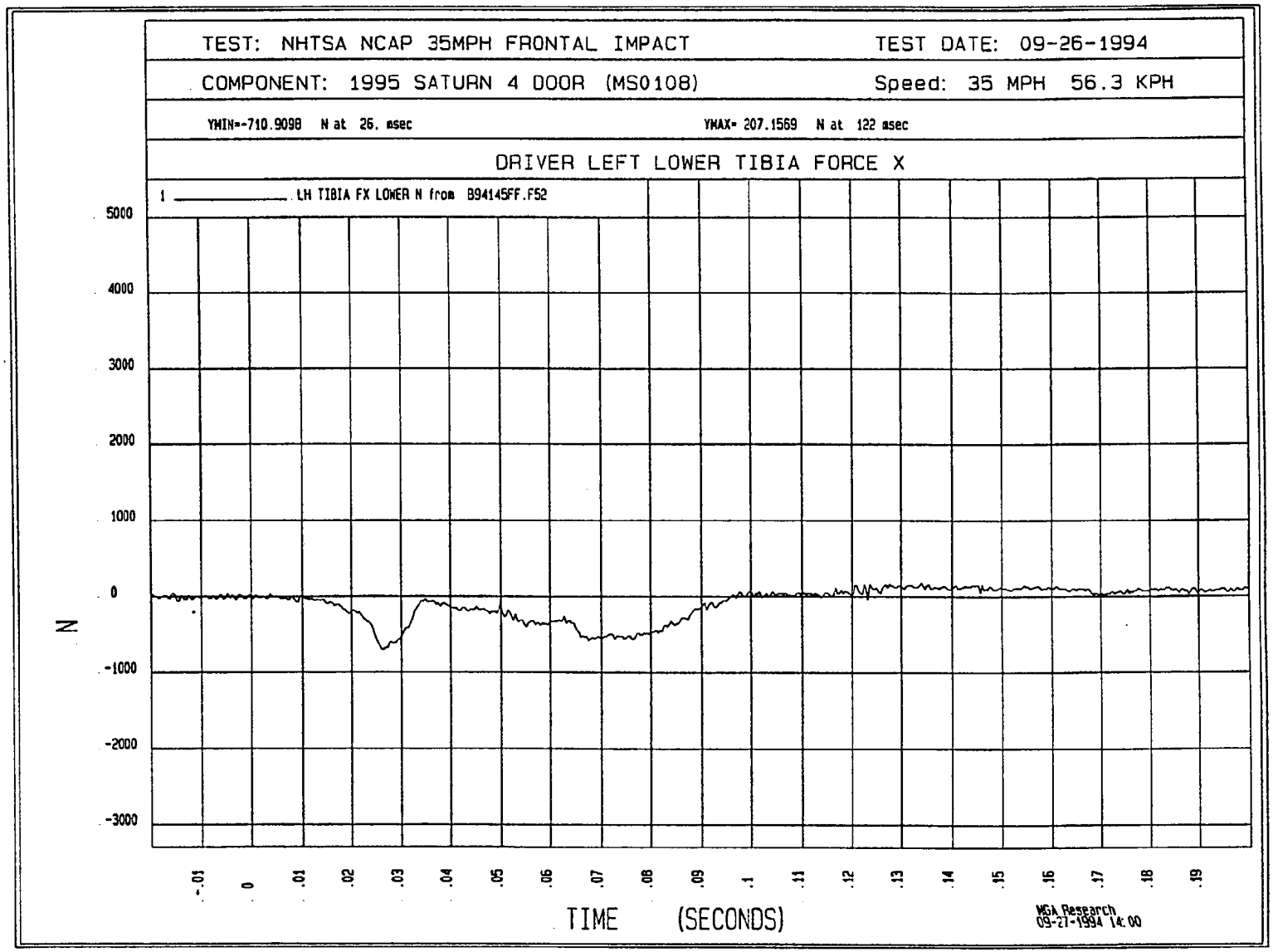


Figure B-59 - Driver Left Lower Tibia Force X vs. Time

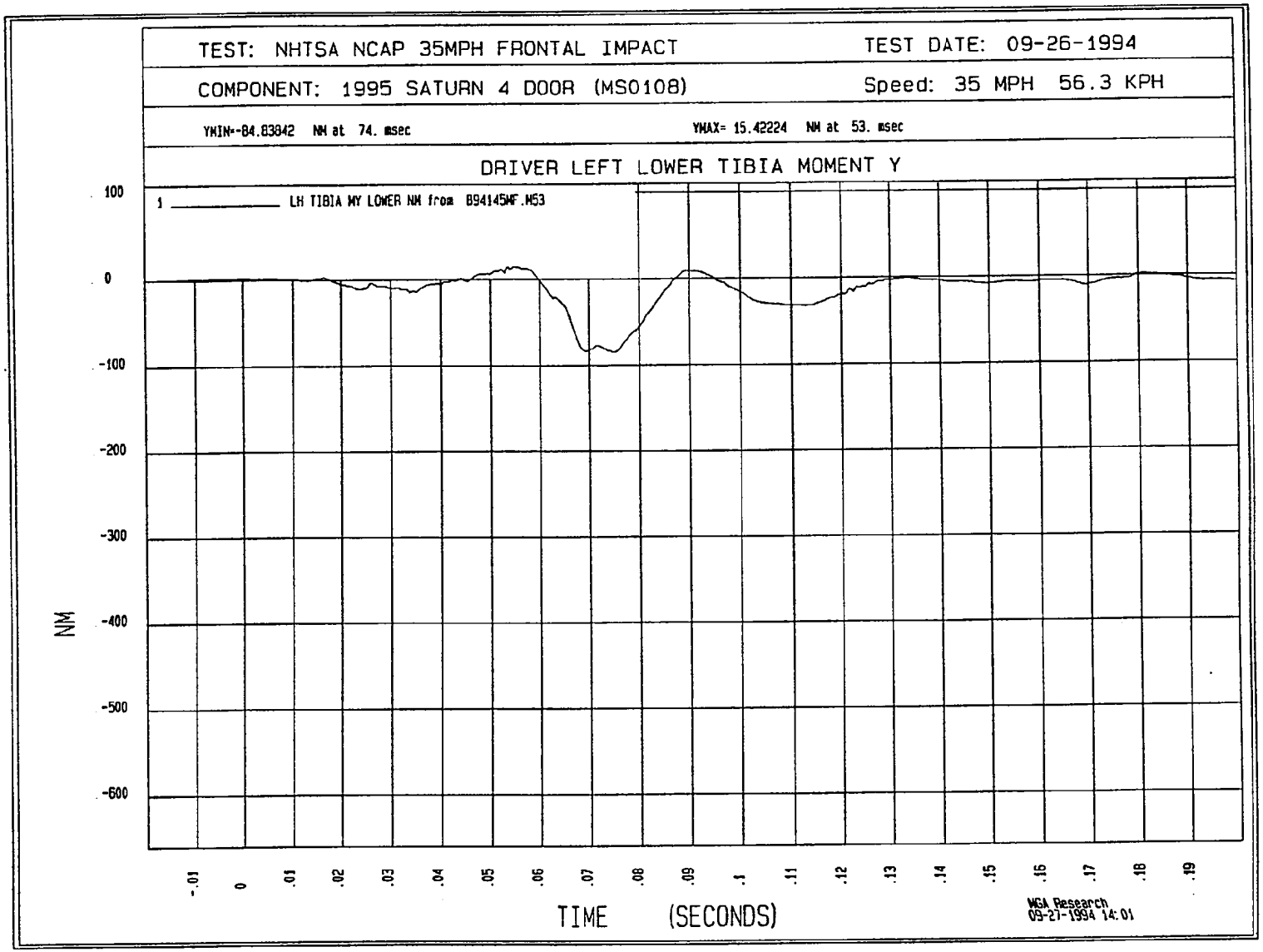


Figure B-60 - Driver Left Lower Tibia Moment Y vs. Time

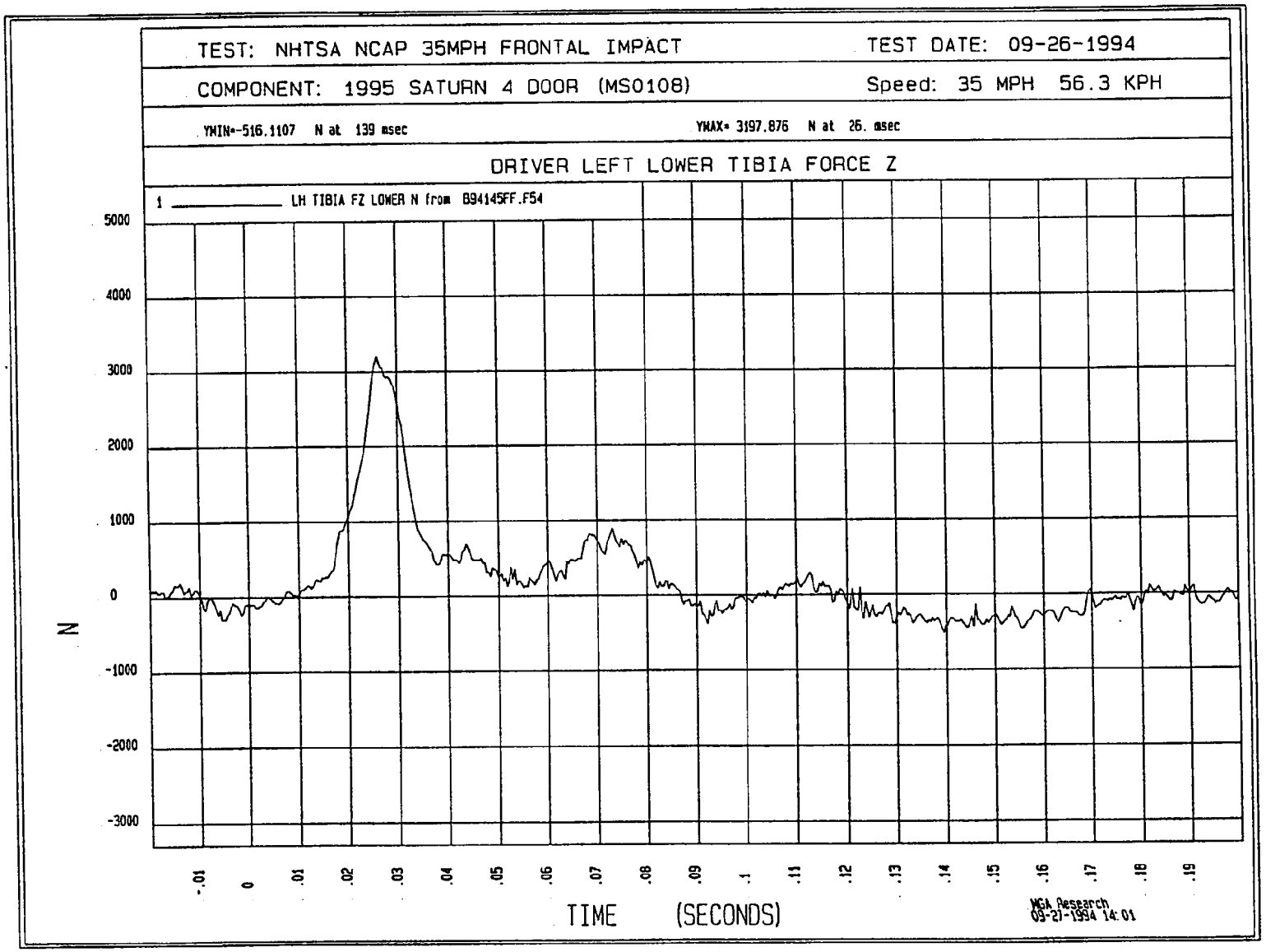


Figure B-61 - Driver Left Lower Tibia Force Z vs. Time

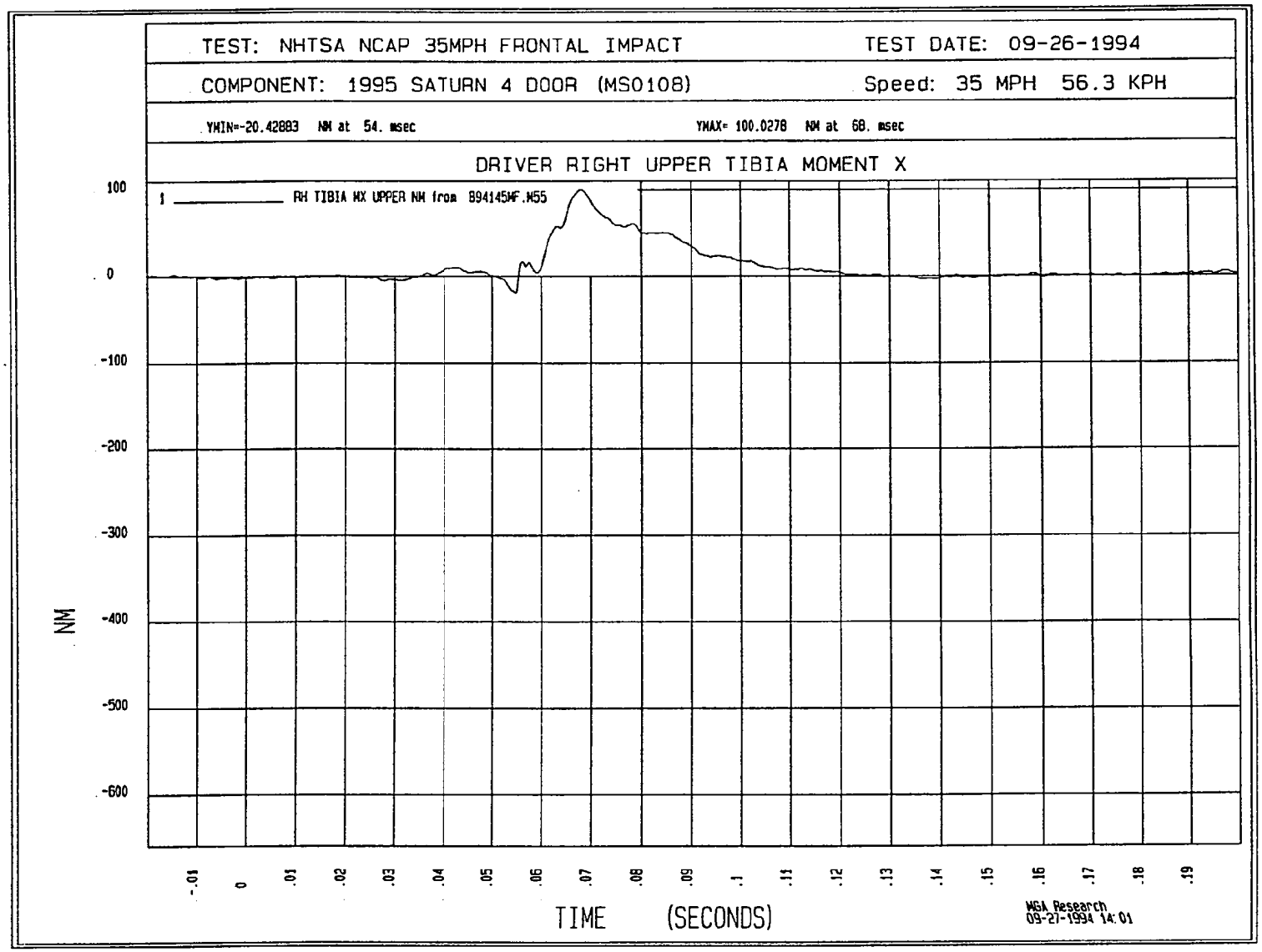


Figure B-62 - Driver Right Upper Tibia Moment X vs. Time

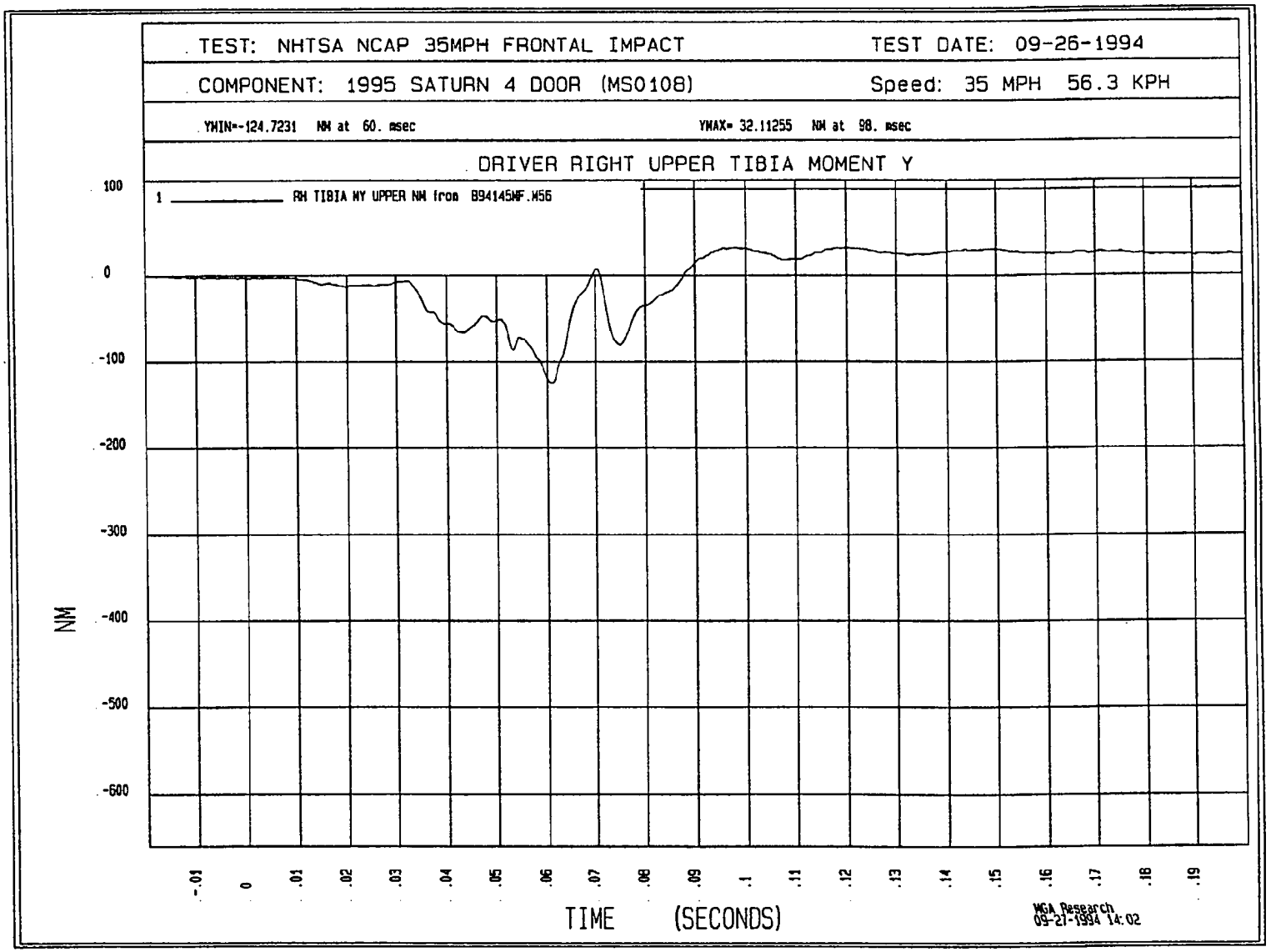


Figure B-63 - Driver Right Upper Tibia Moment Y vs. Time

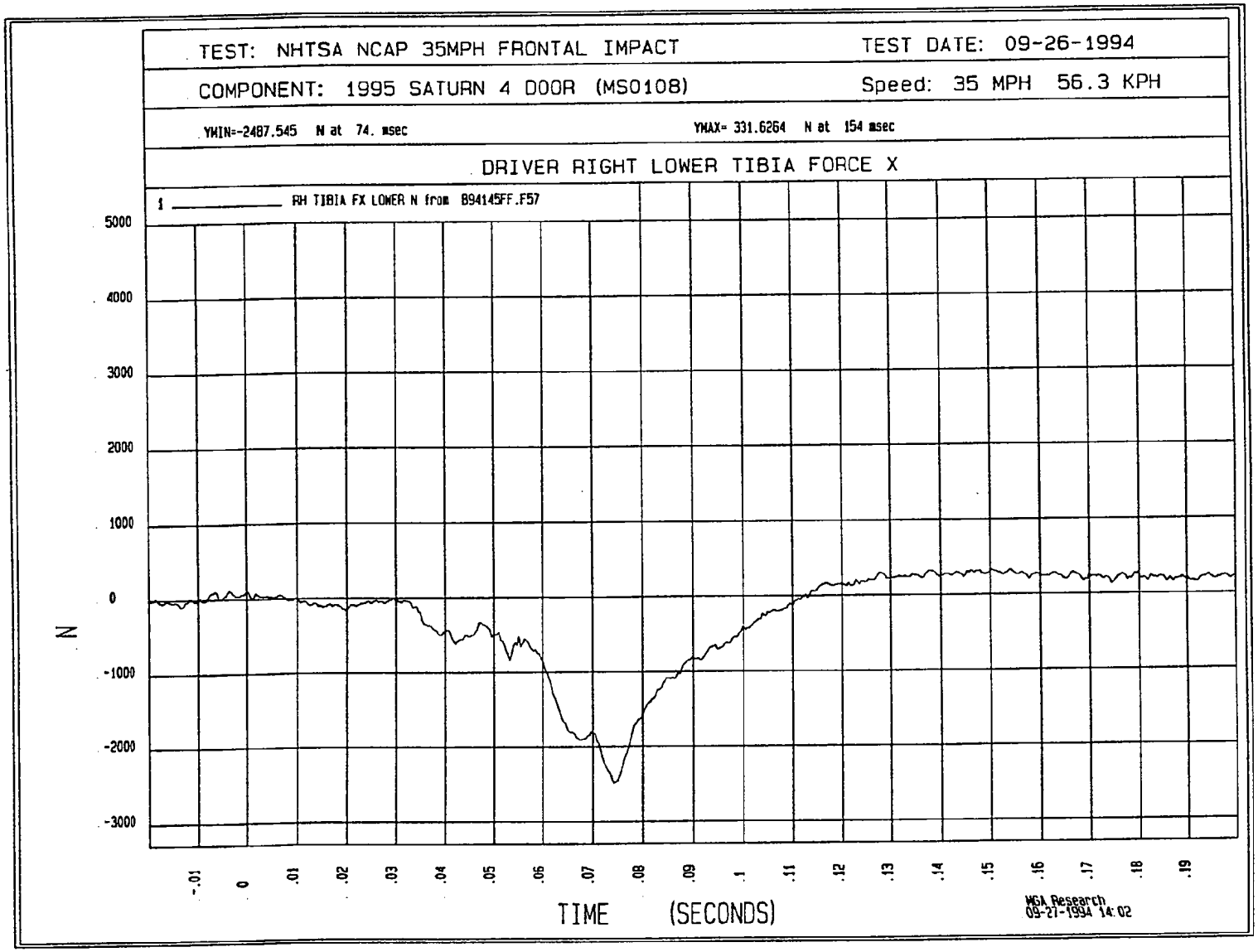


Figure B-64 - Driver Right Lower Tibia Force X vs. Time

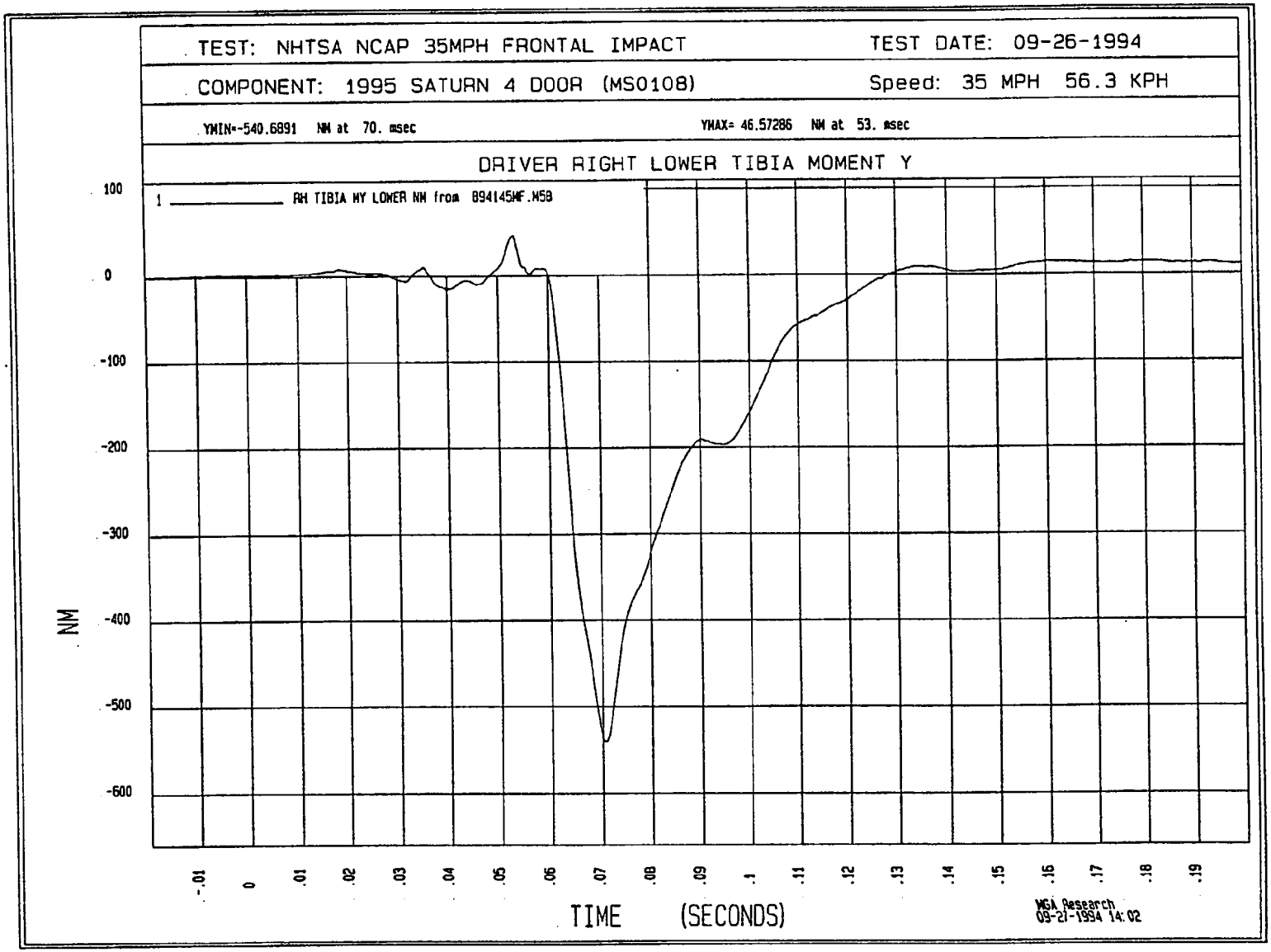


Figure B-65 - Driver Right Lower Tibia Moment Y vs. Time

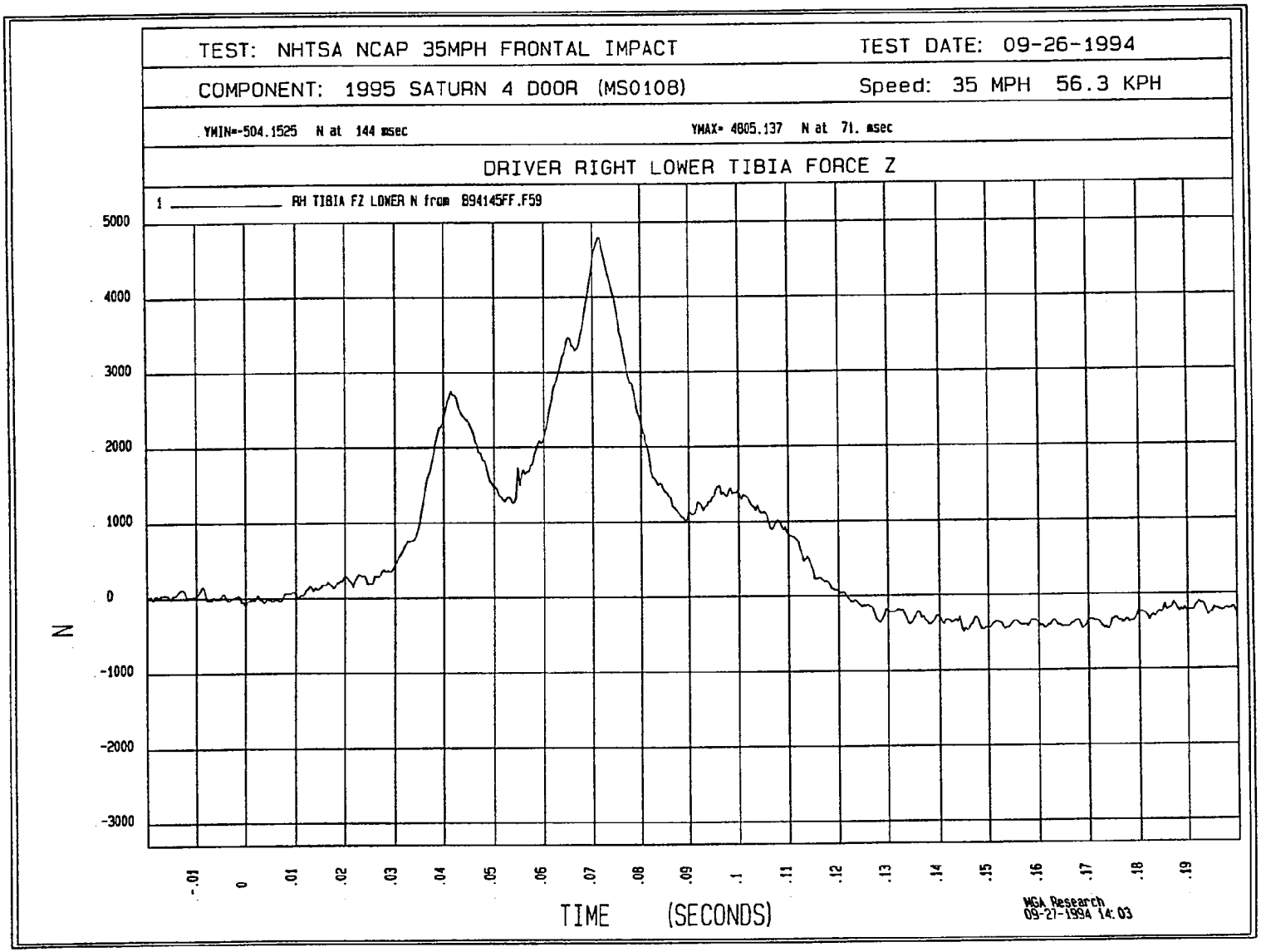


Figure B-66 - Driver Right Lower Tibia Force Z vs. Time

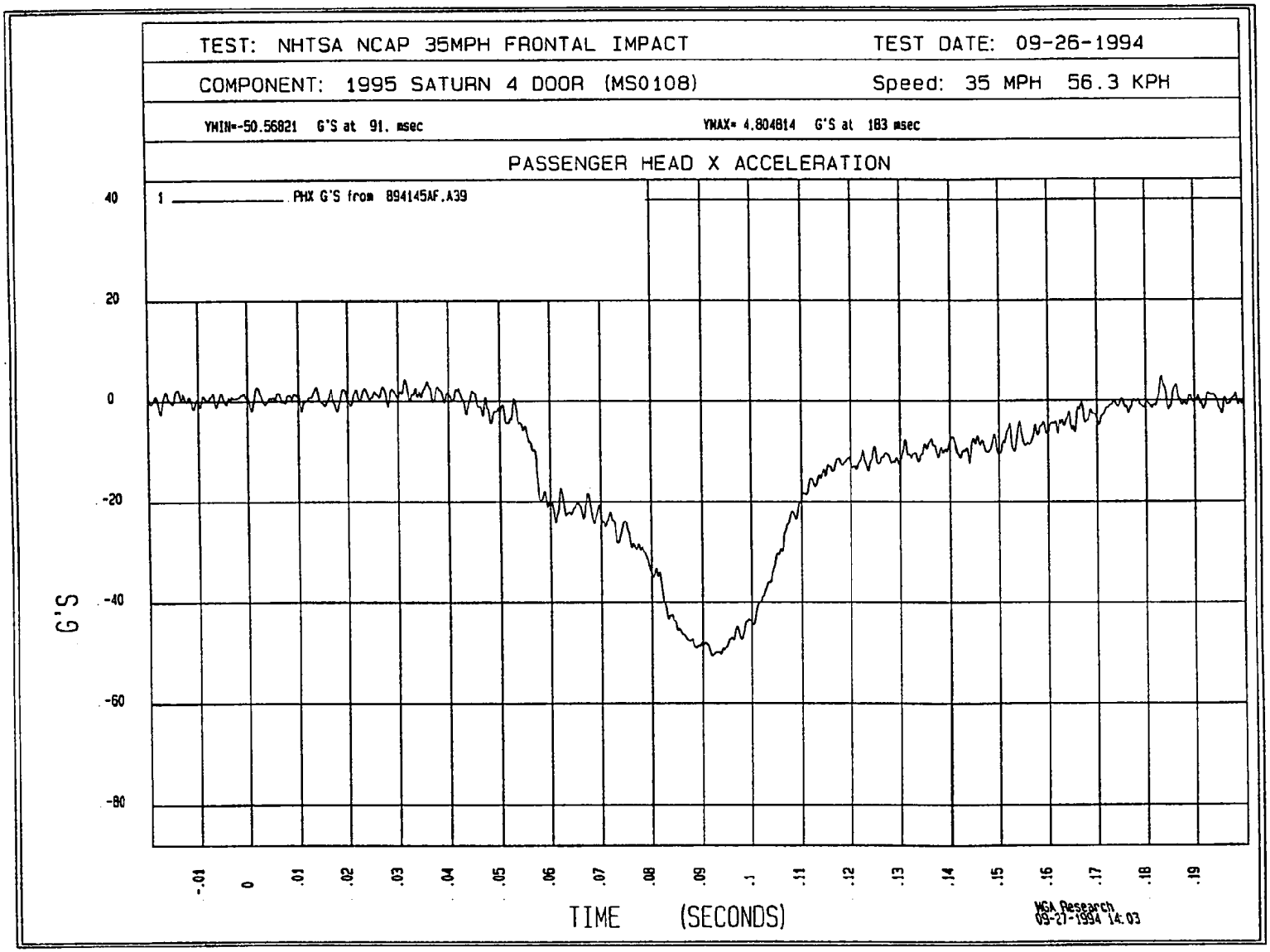


Figure B-67 - Passenger Head X Acceleration vs. Time

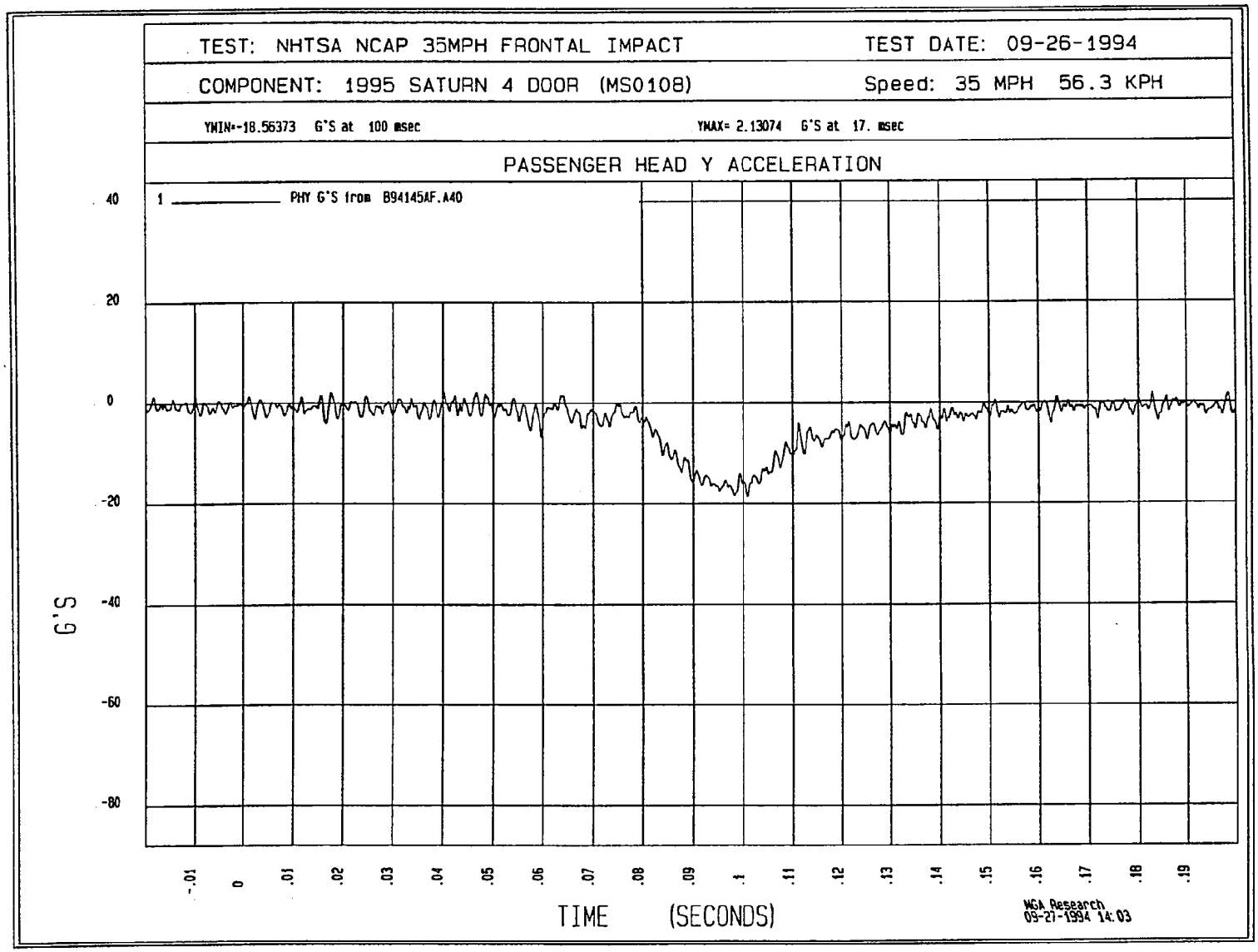


Figure B-68 - Passenger Head Y Acceleration vs. Time

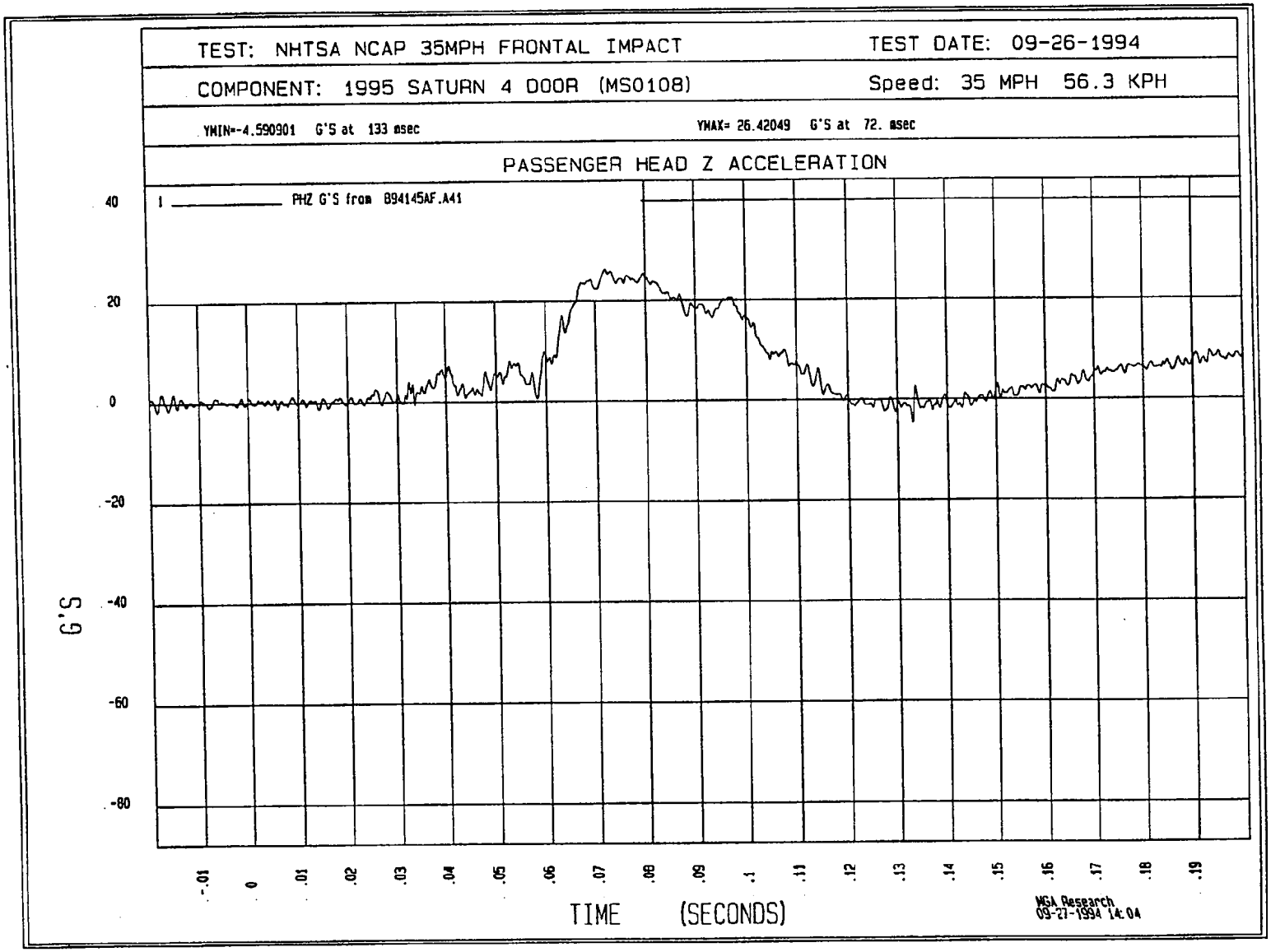


Figure B-69 - Passenger Head Z Acceleration vs. Time

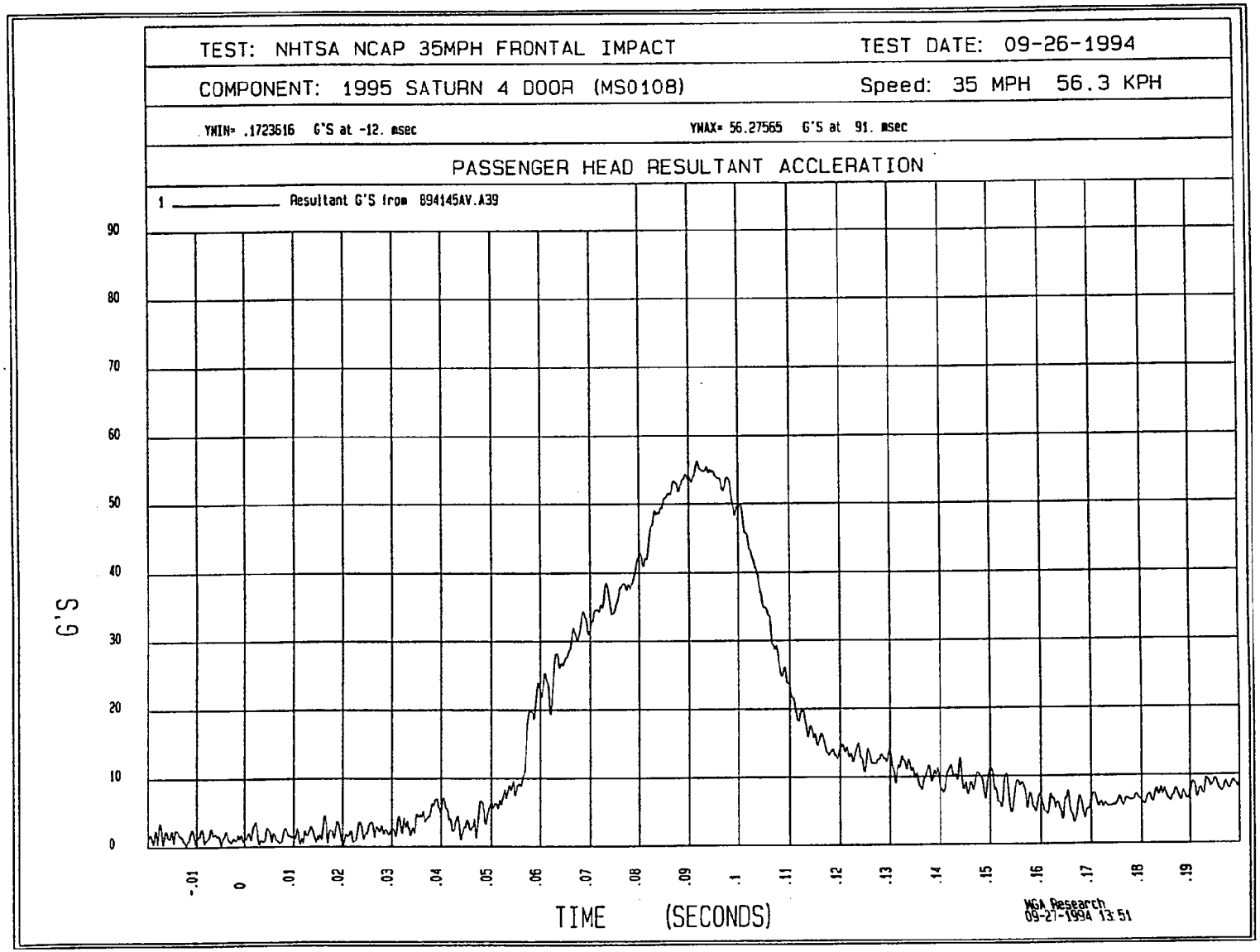


Figure B-7Ø - Passenger Head Resultant Acceleration vs. Time

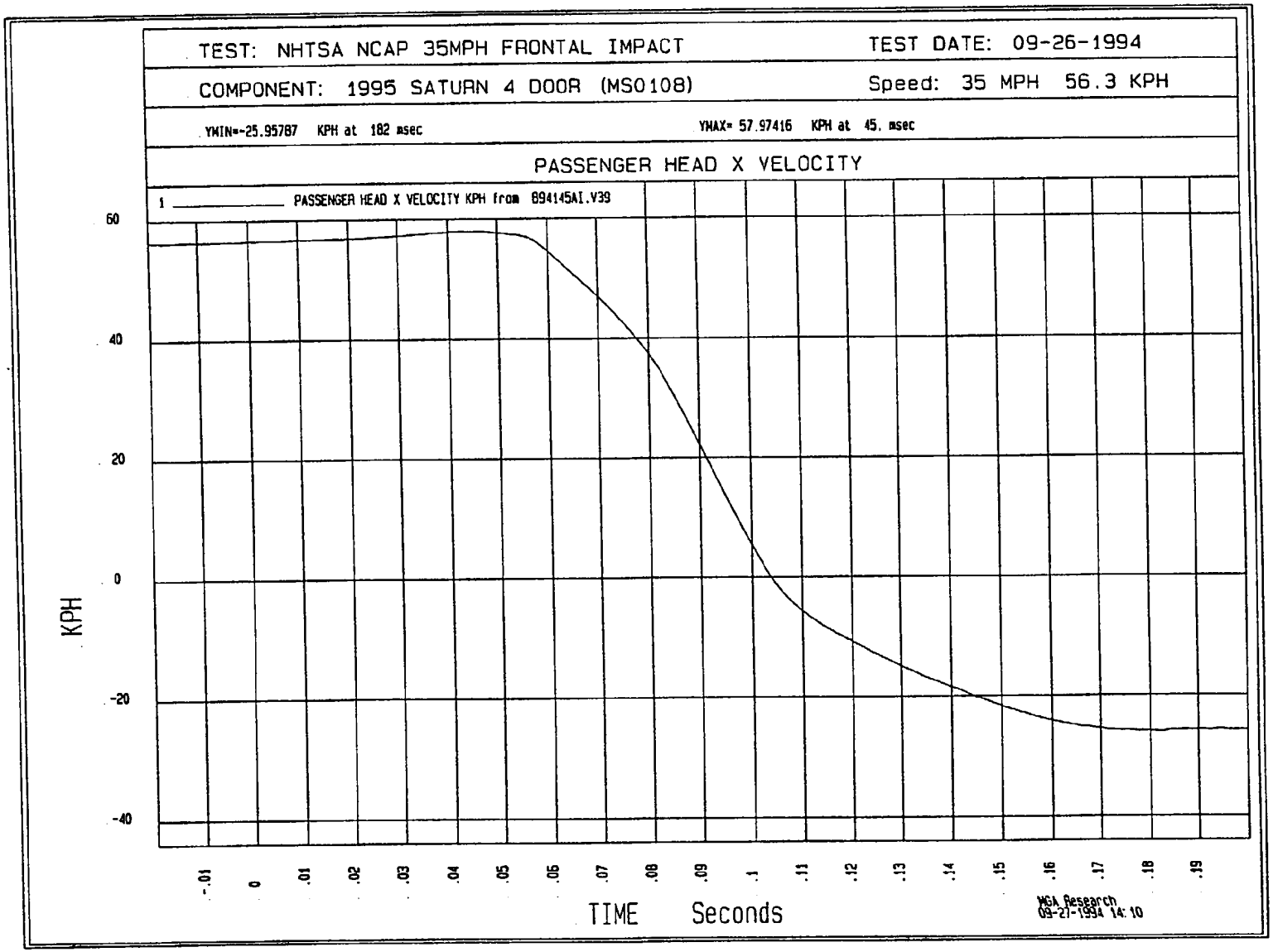


Figure B-71 - Passenger Head X Velocity vs. Time

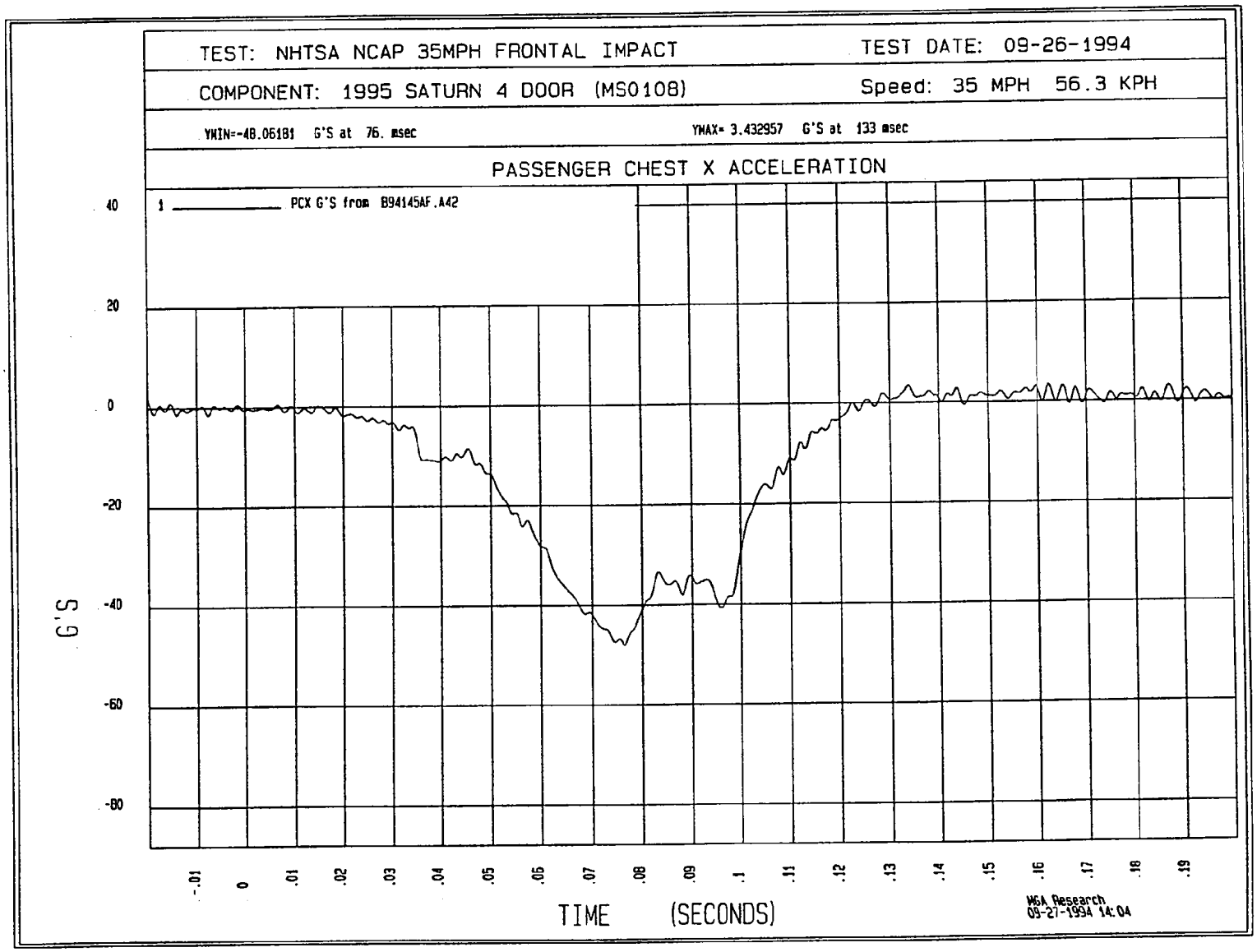


Figure B-72 - Passenger Chest X Acceleration vs. Time

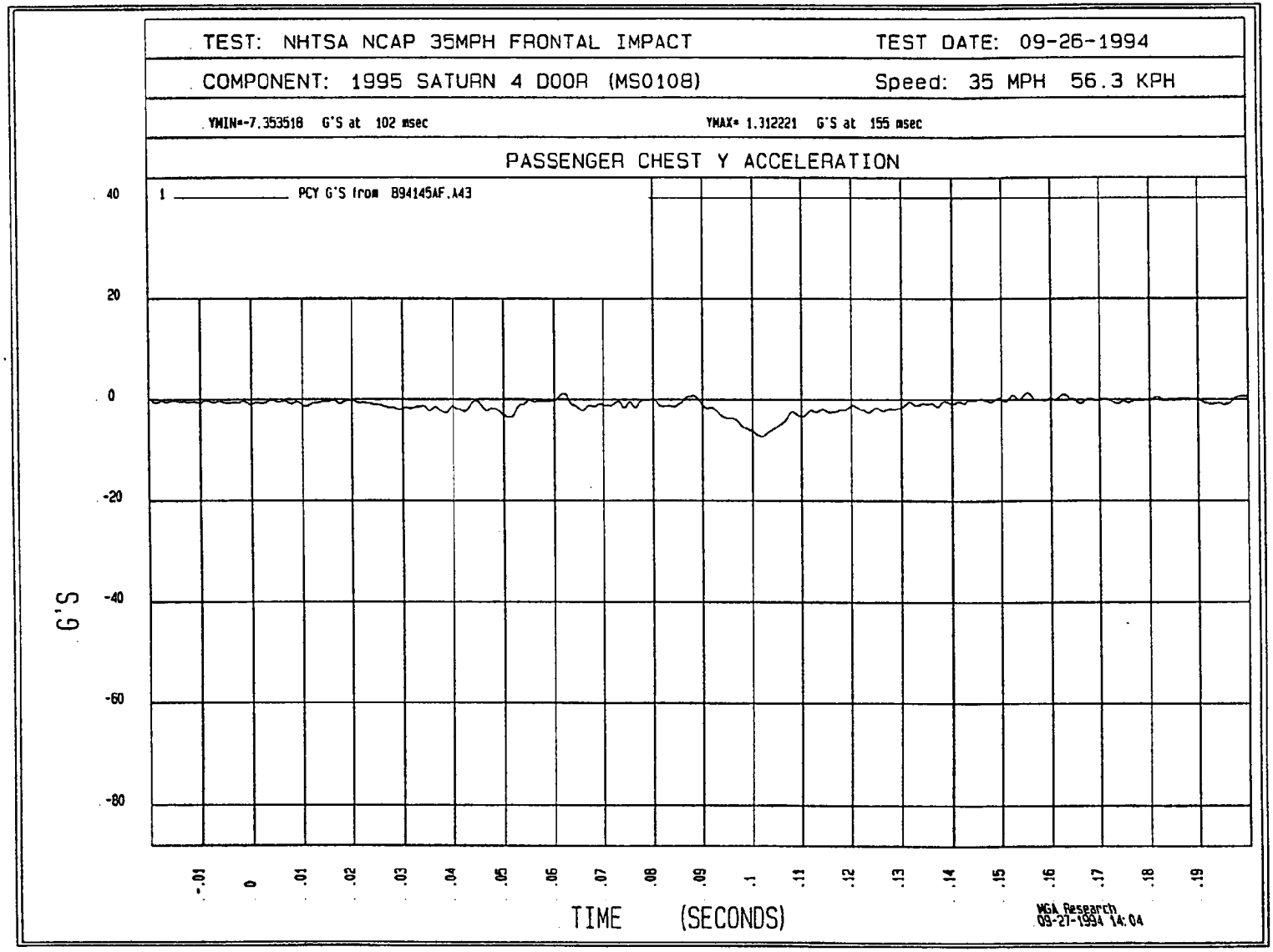


Figure B-73 - Passenger Chest Y Acceleration vs. Time

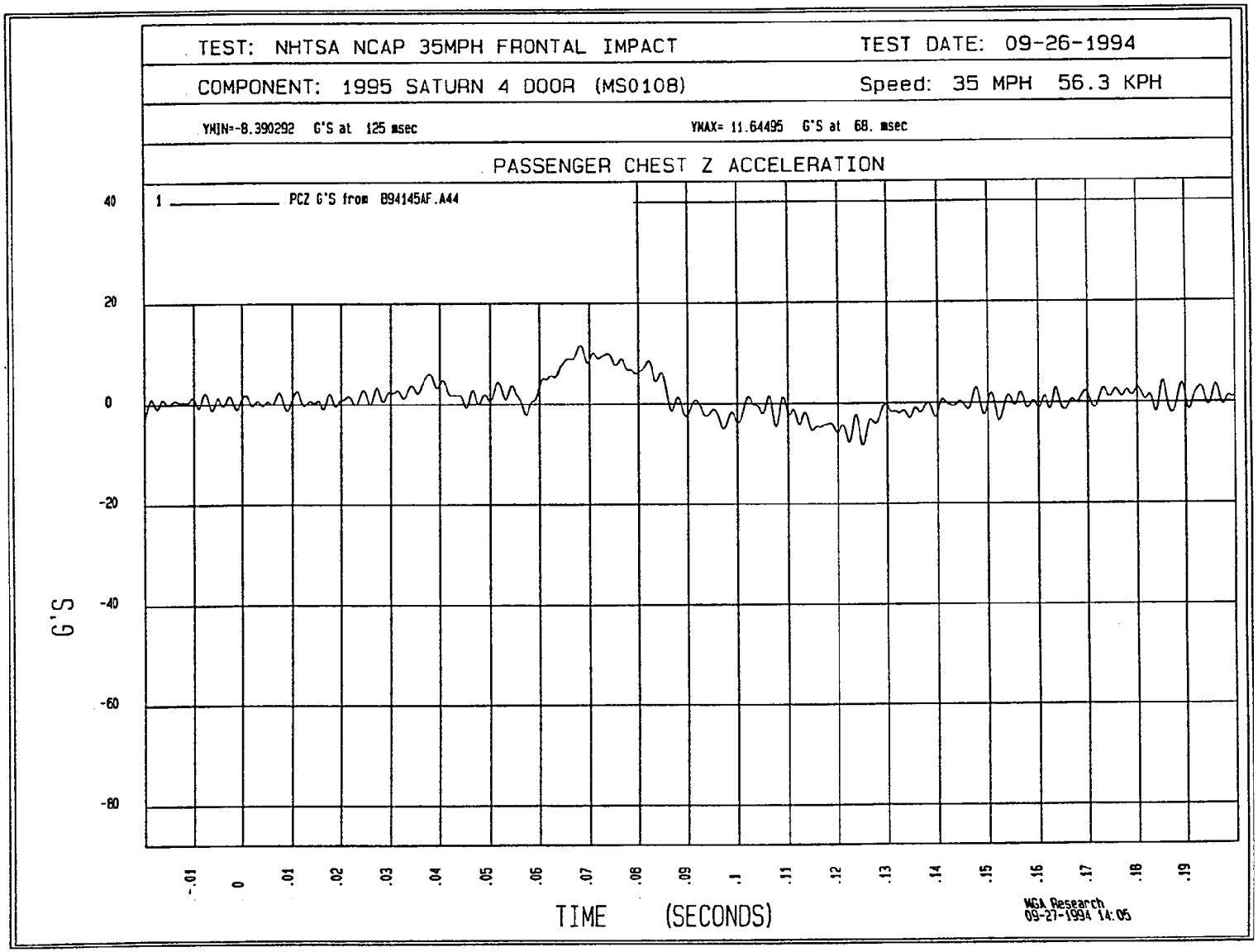


Figure B-74 - Passenger Chest Z Acceleration vs. Time

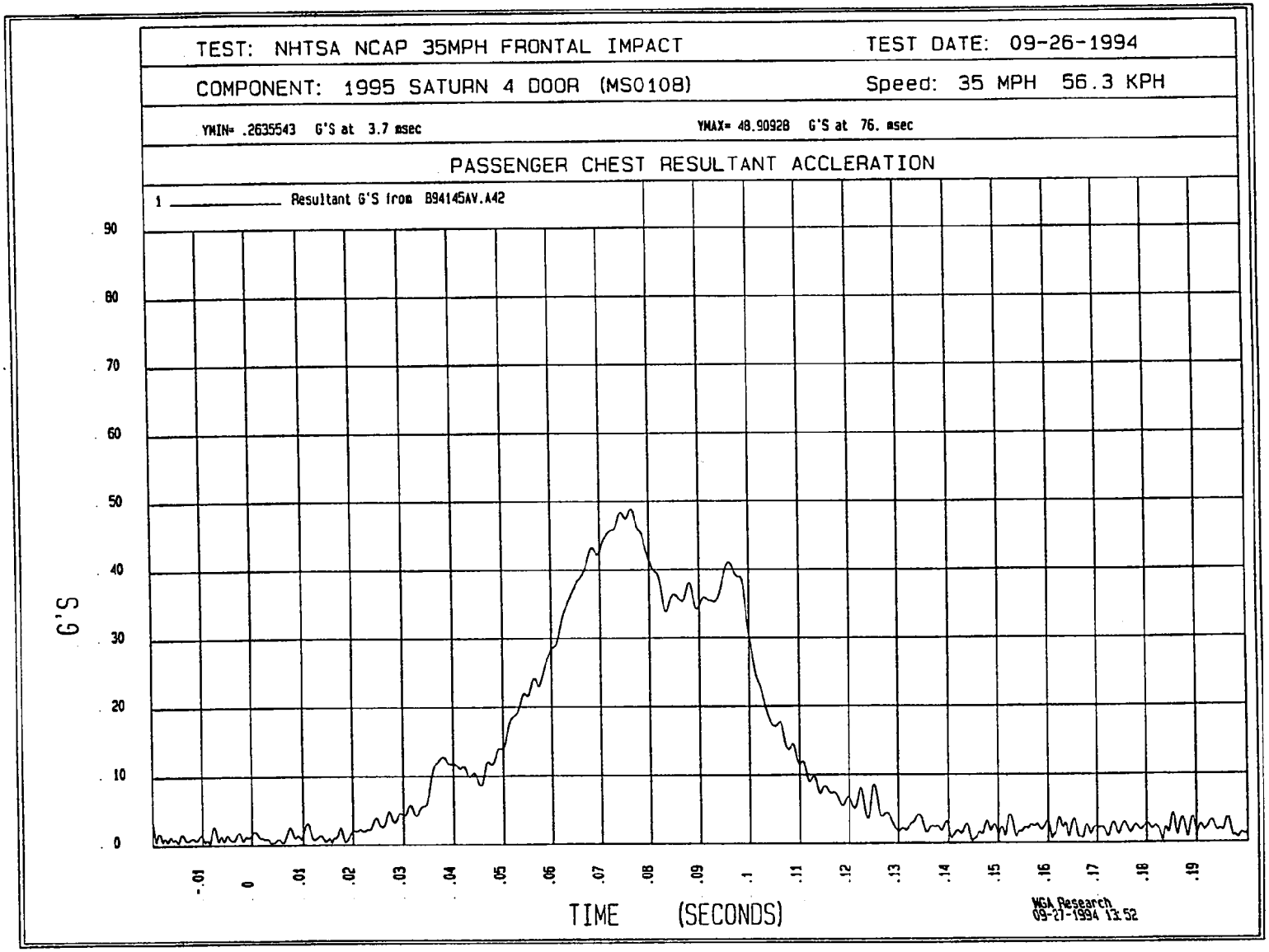


Figure B-75 - Passenger Chest Resultant vs. Time

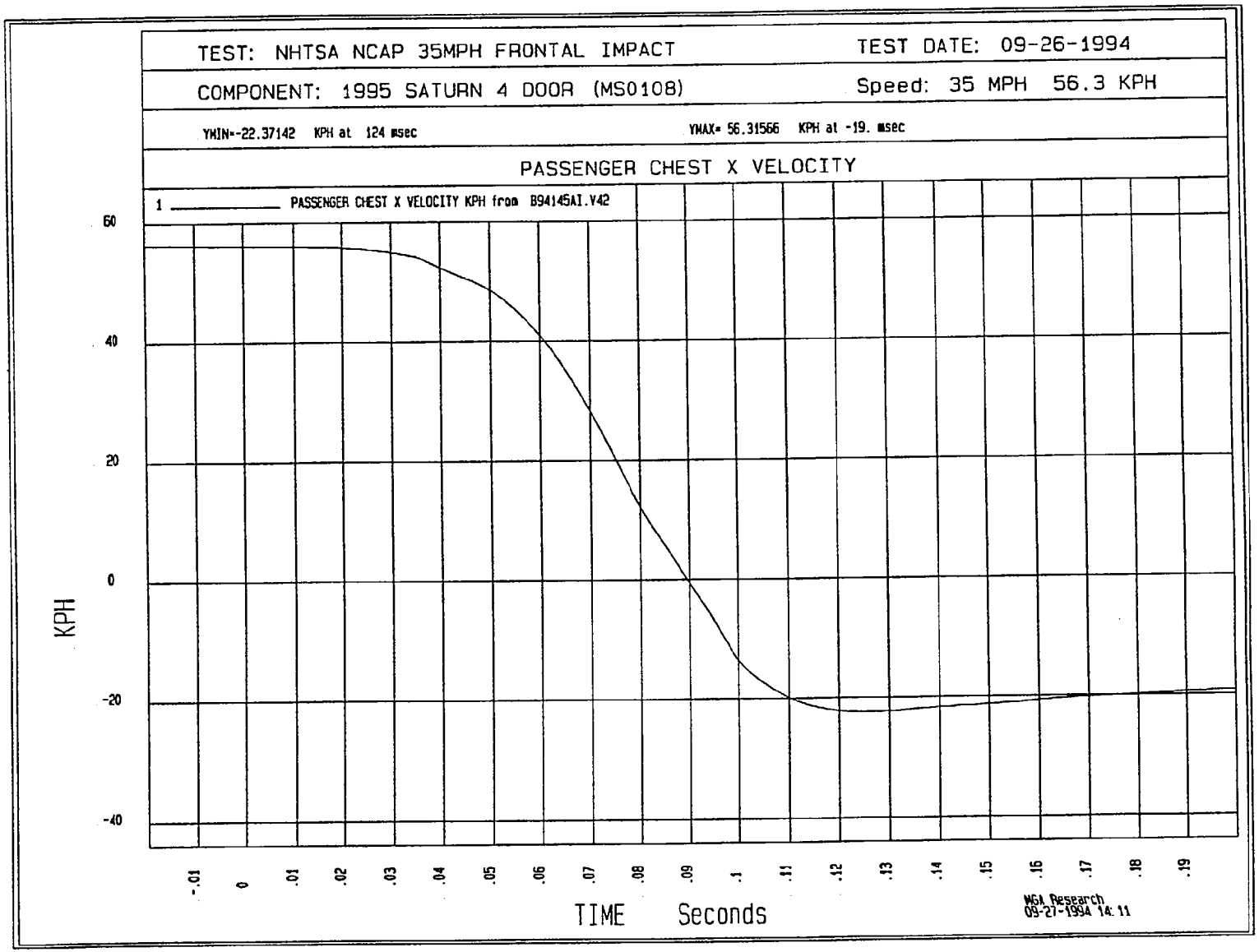


Figure B-76 - Passenger Chest X Velocity vs. Time

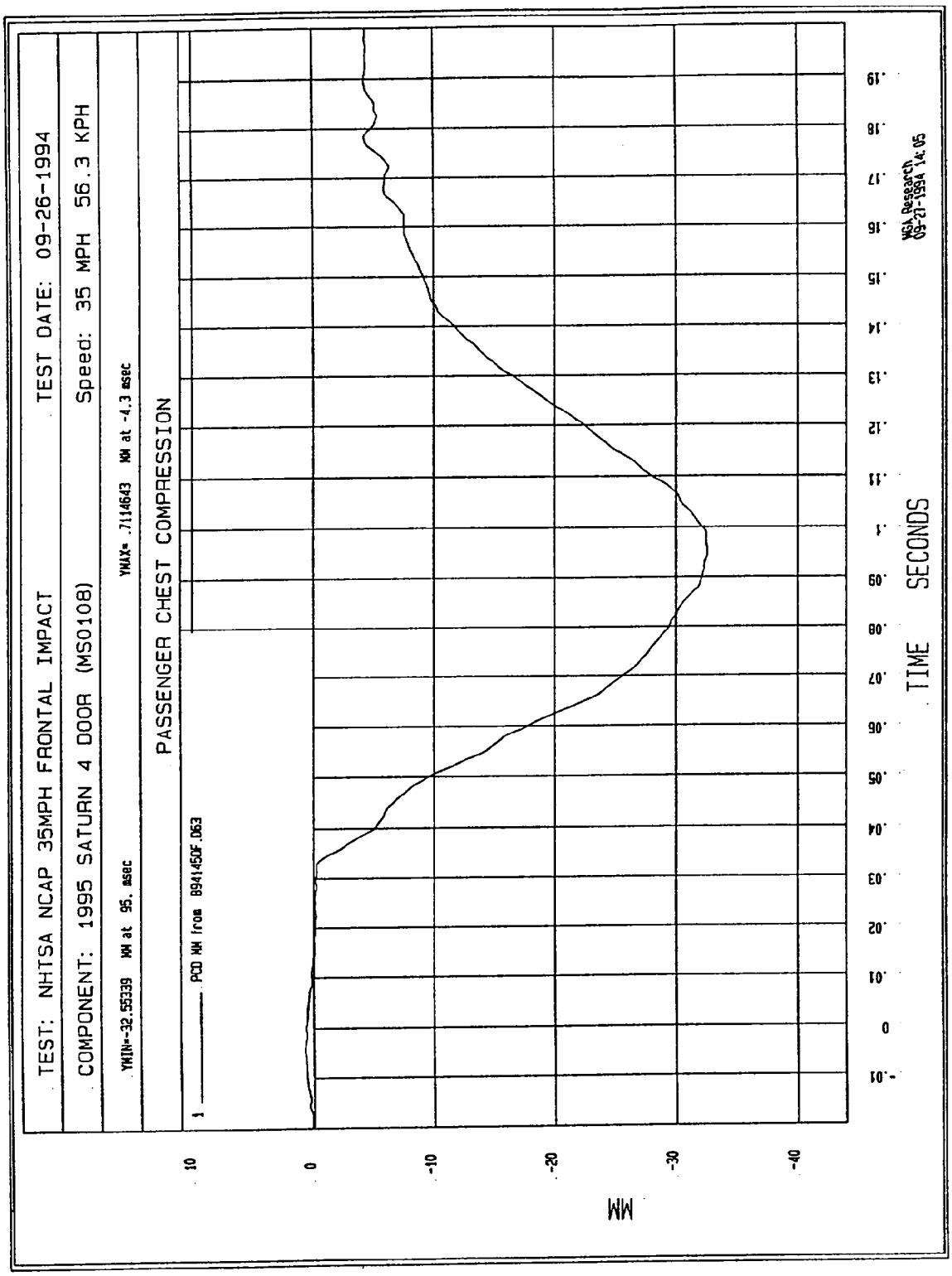


Figure B-77 - Passenger Chest Compression vs. Time

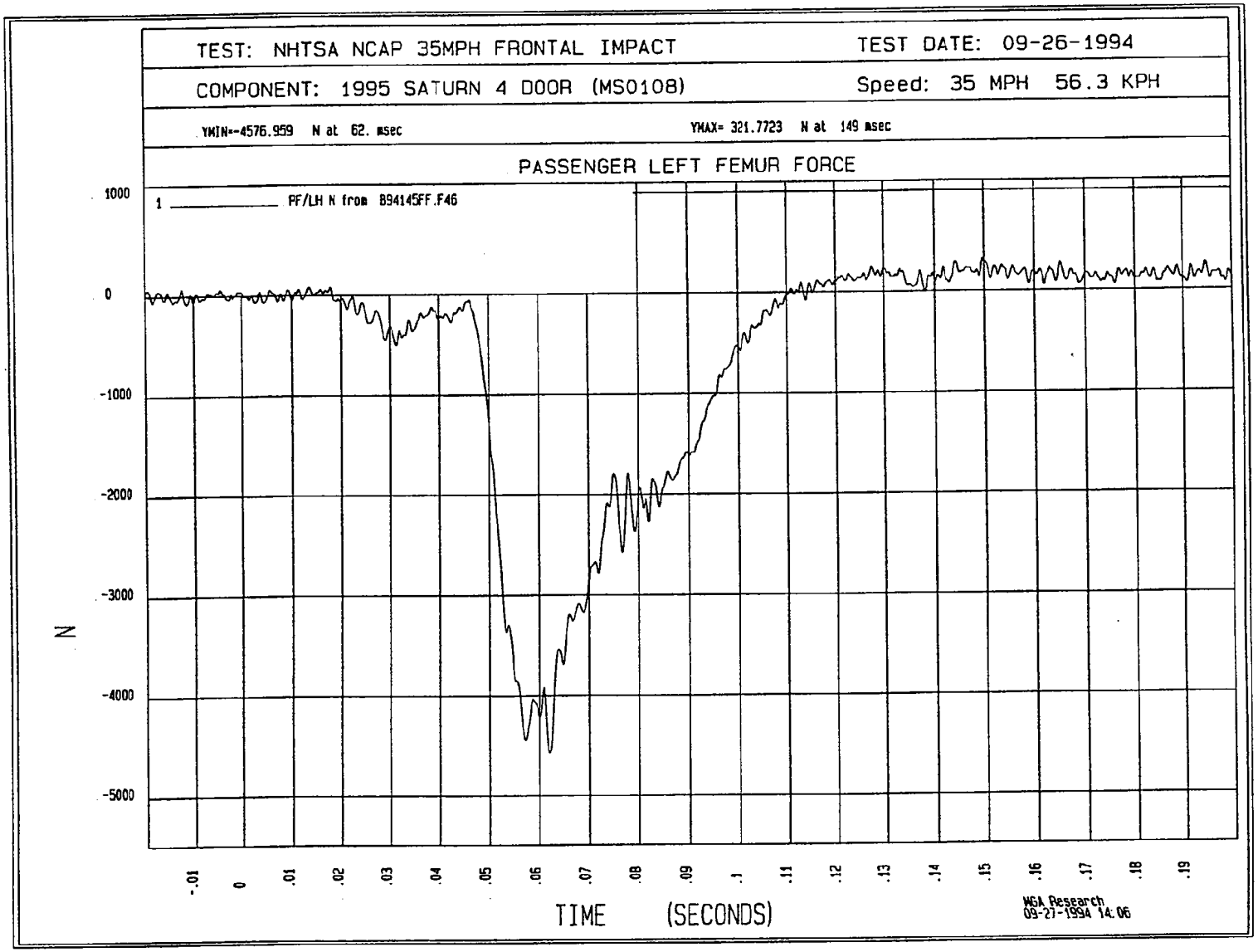


Figure B-78 - Passenger Left Femur Force vs. Time

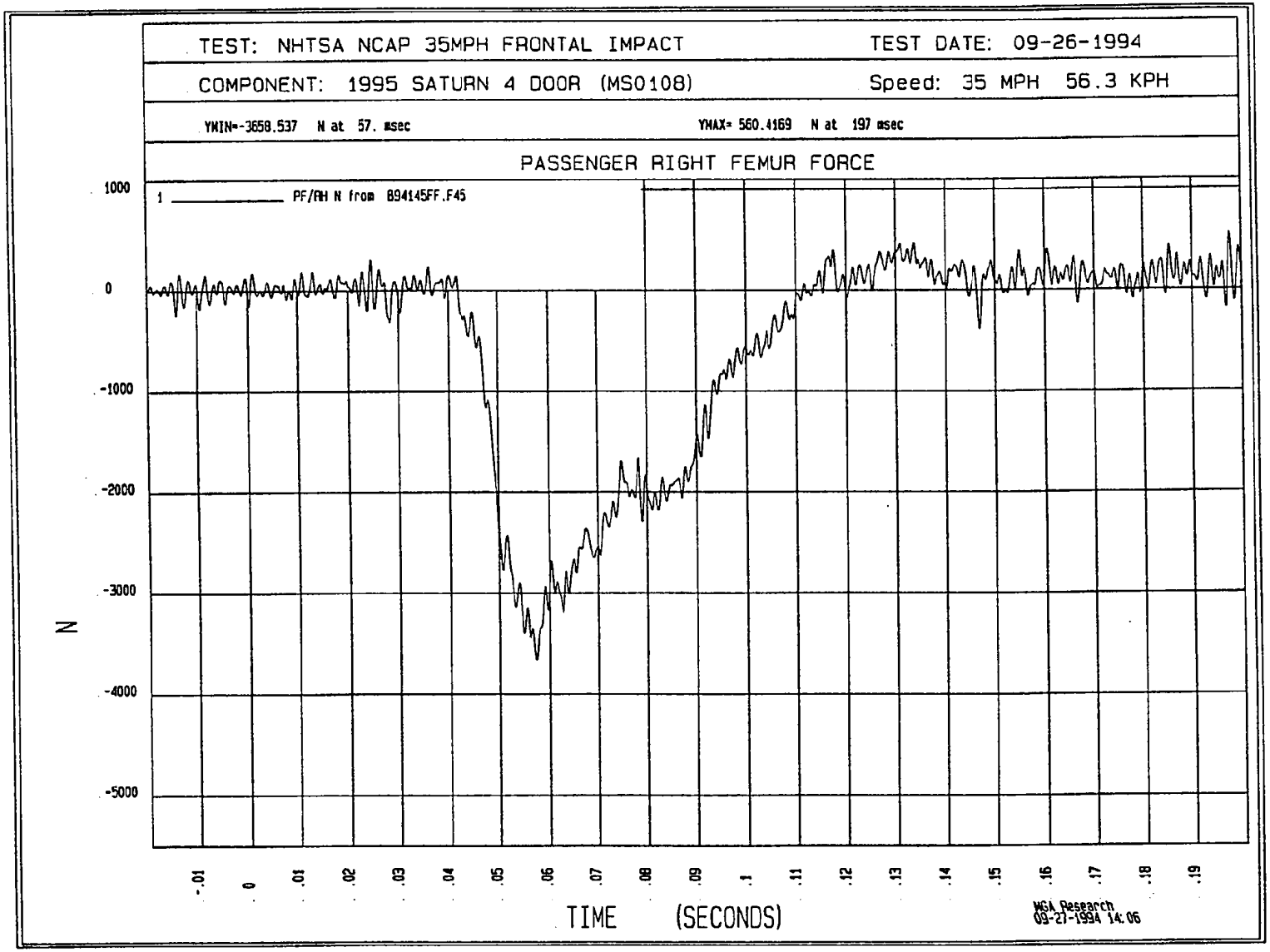


Figure B-79 - Passenger Right Femur Force vs. Time

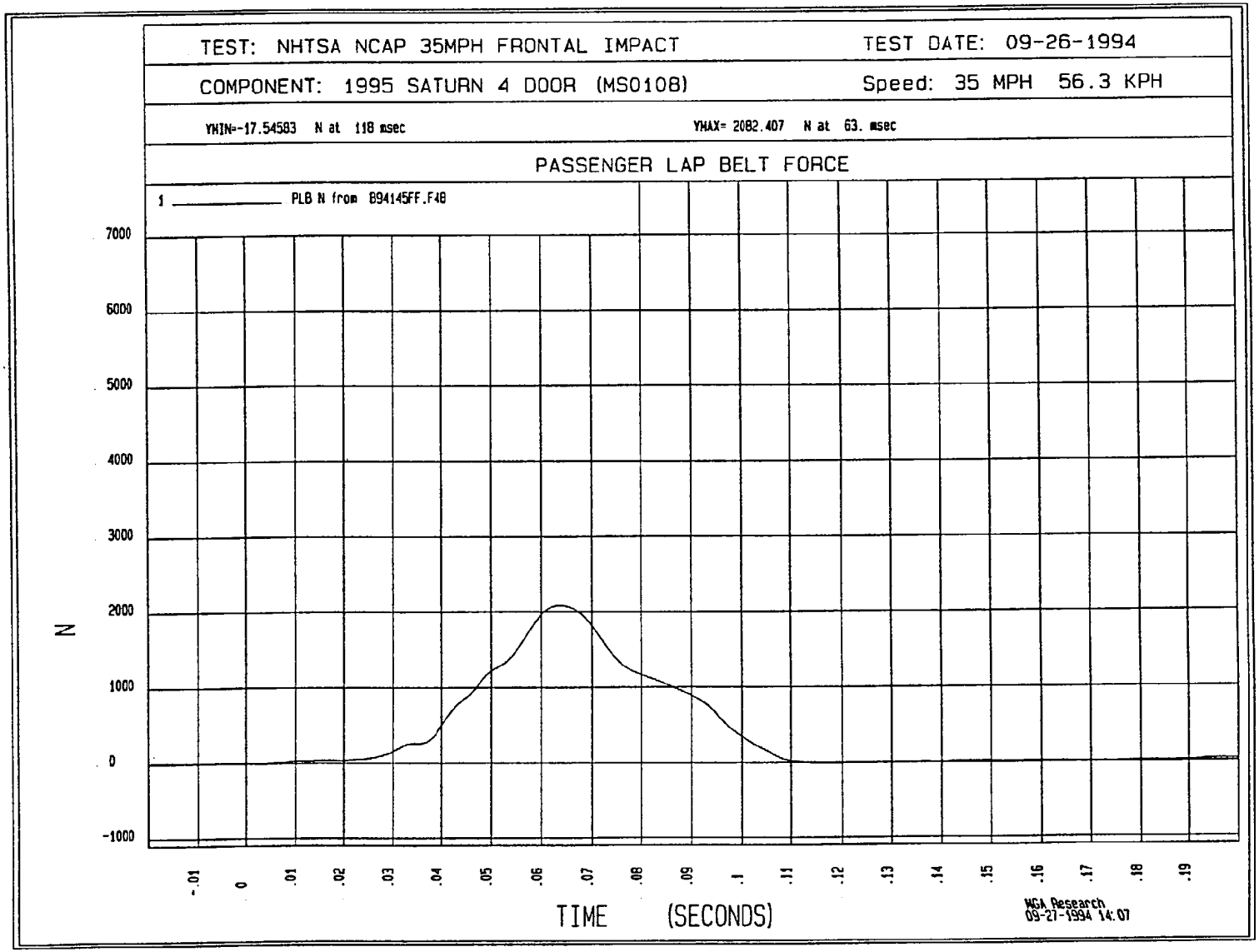


Figure B-8Ø - Passenger Lap Belt Force vs. Time

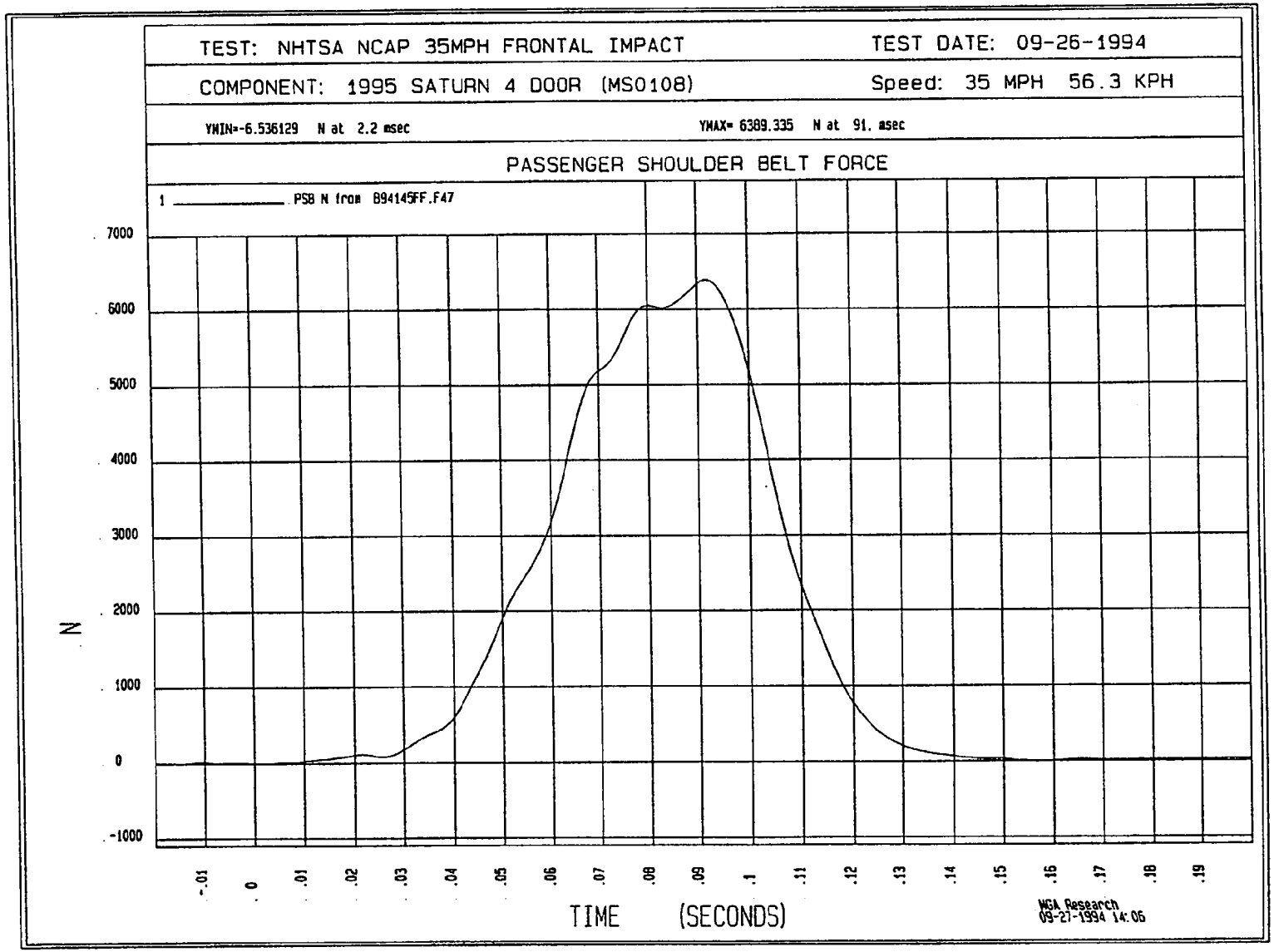


Figure B-81 - Passenger Shoulder Belt Force vs. Time

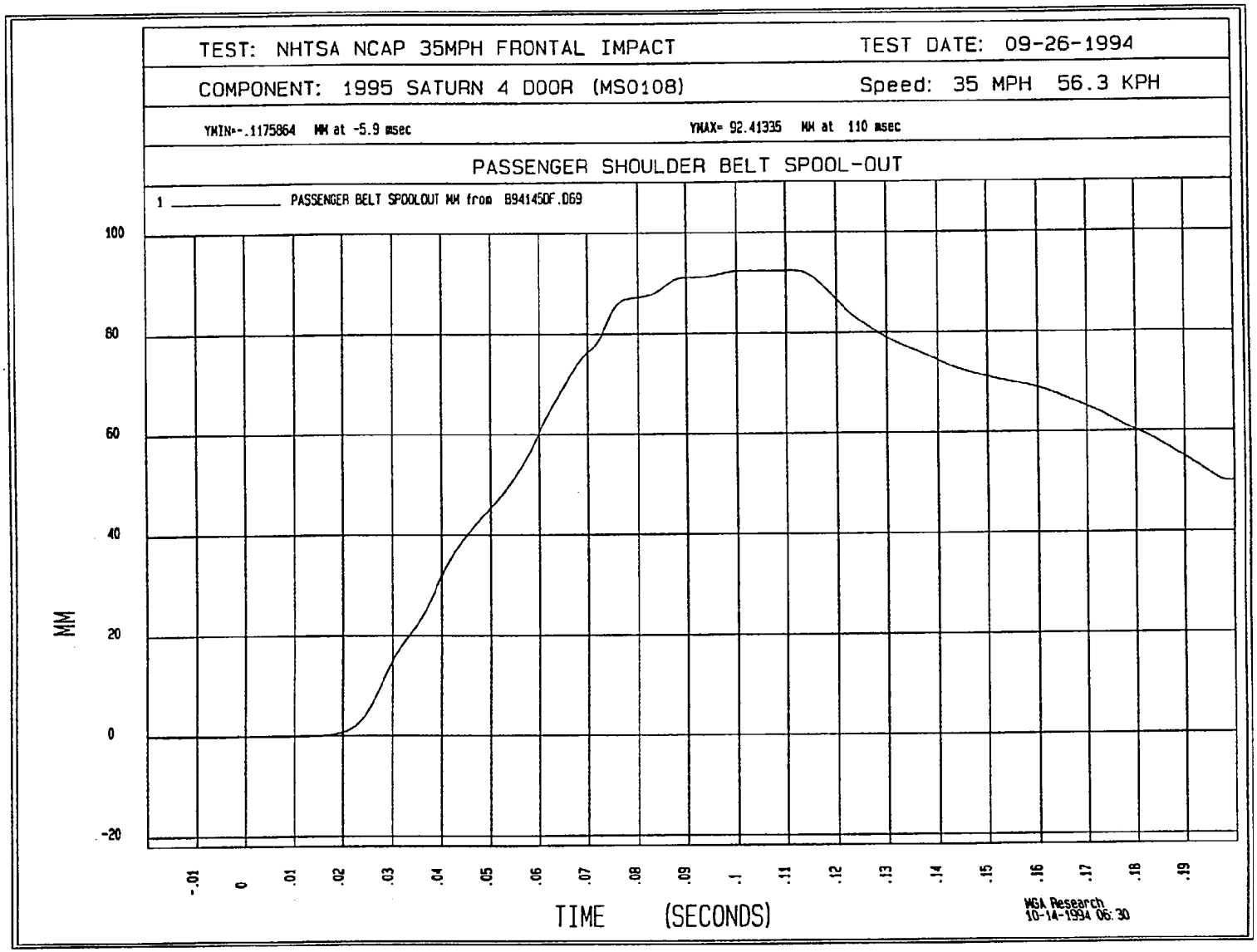


Figure B-82 - Passenger Shoulder Belt Spool-Out vs. Time

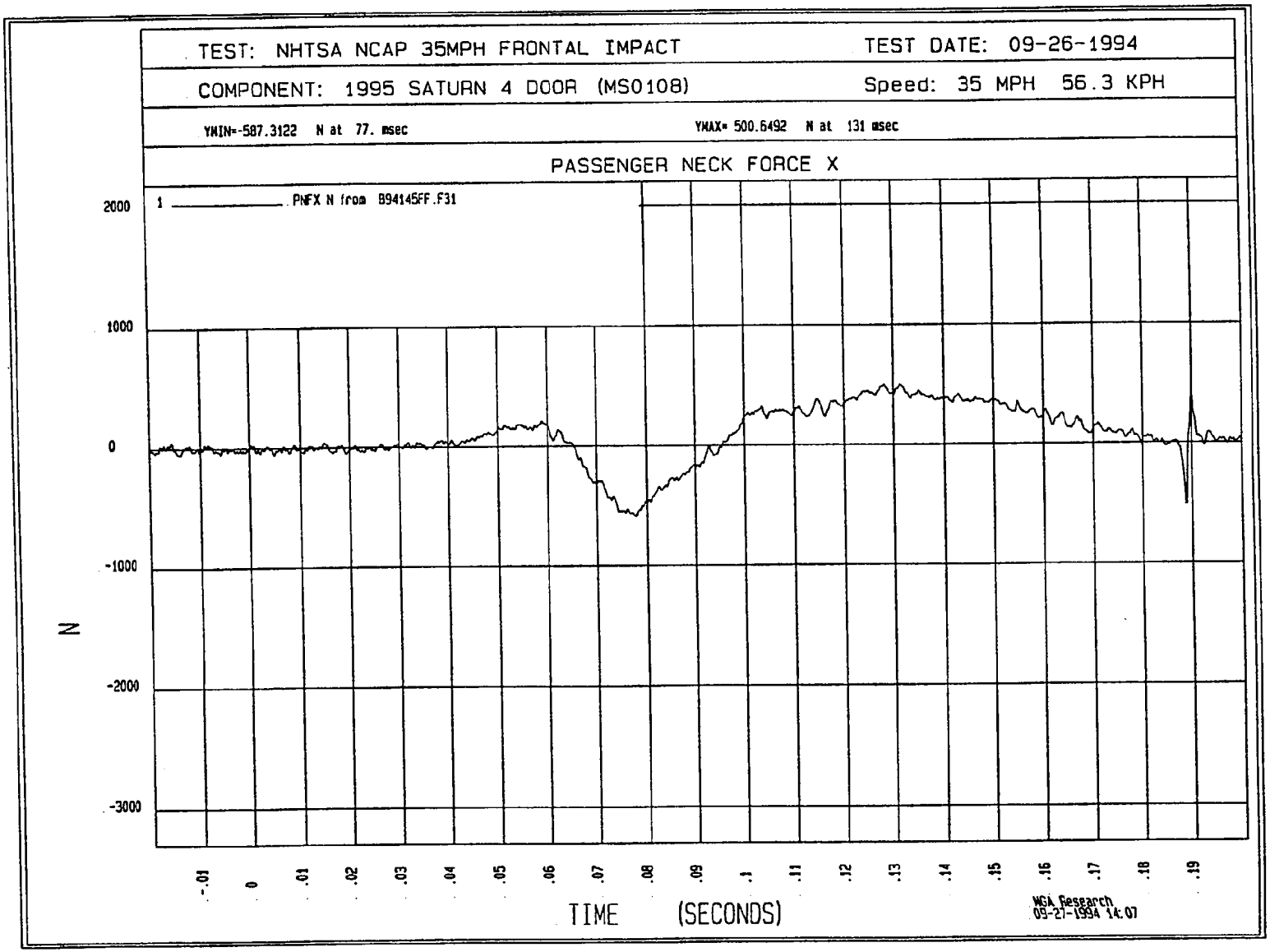


Figure B-83 - Passenger Neck Force X vs. Time

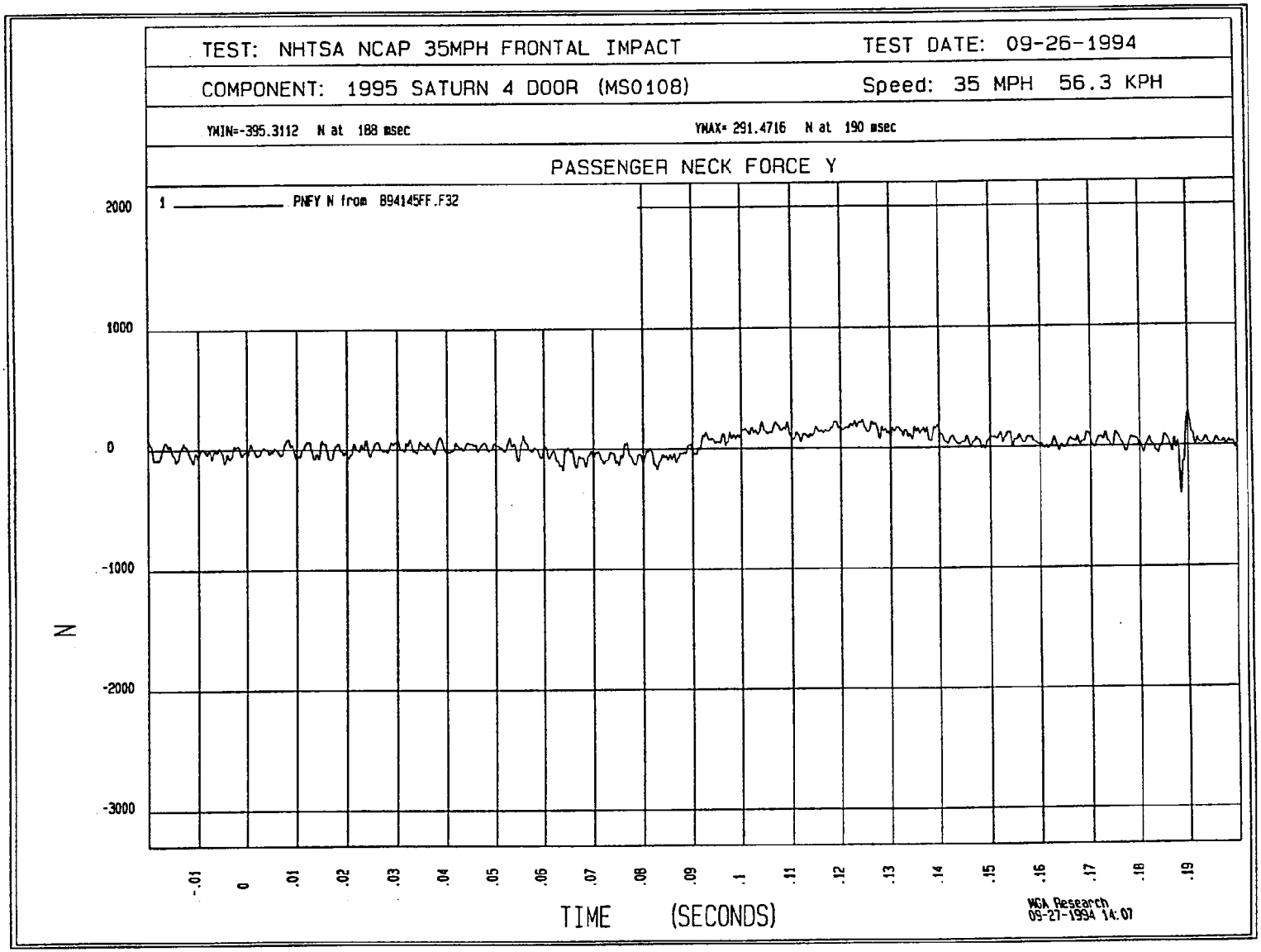


Figure B-84 - Passenger Neck Force Y vs. Time

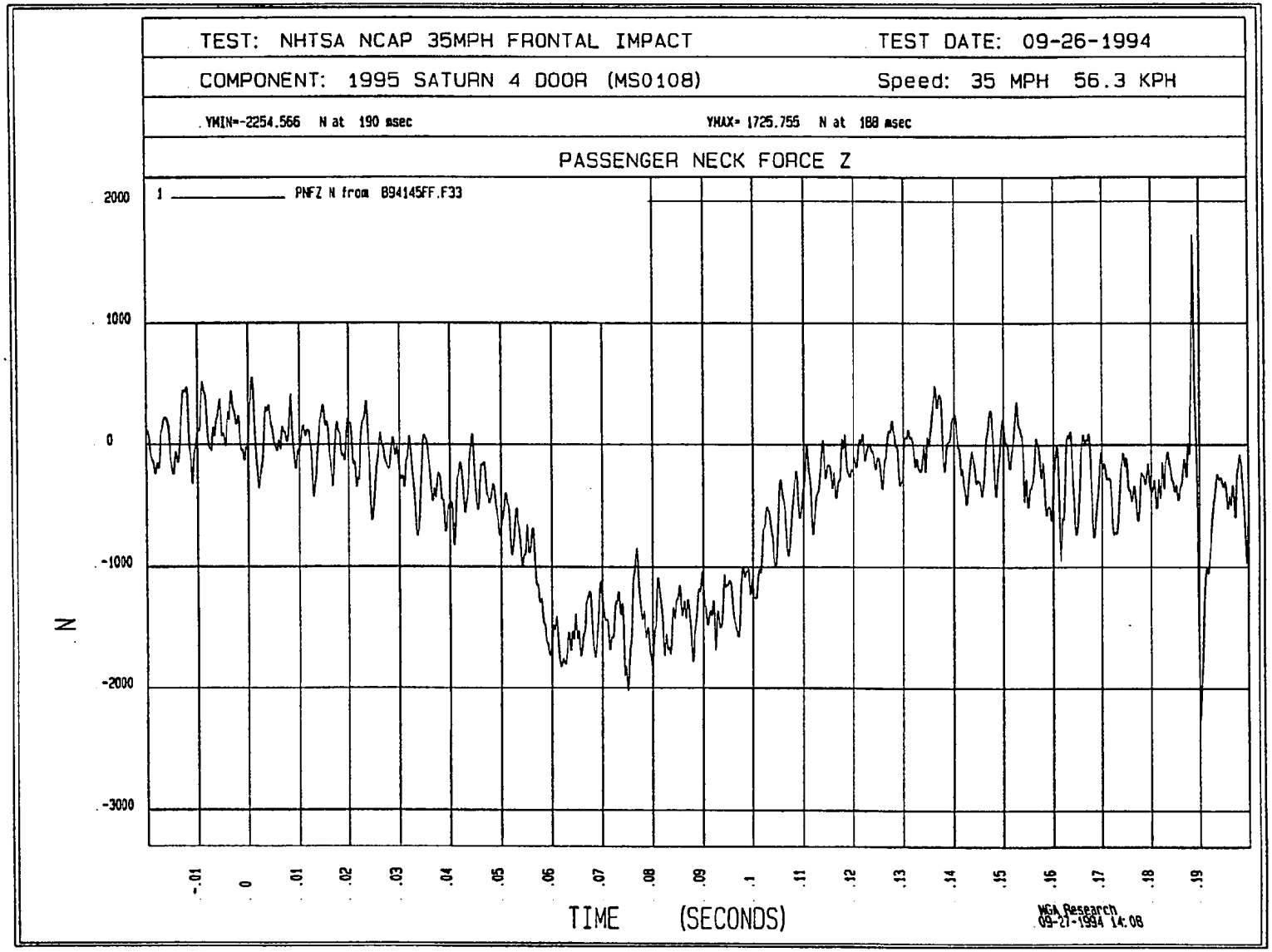


Figure B-85 - Passenger Neck Force Z vs. Time

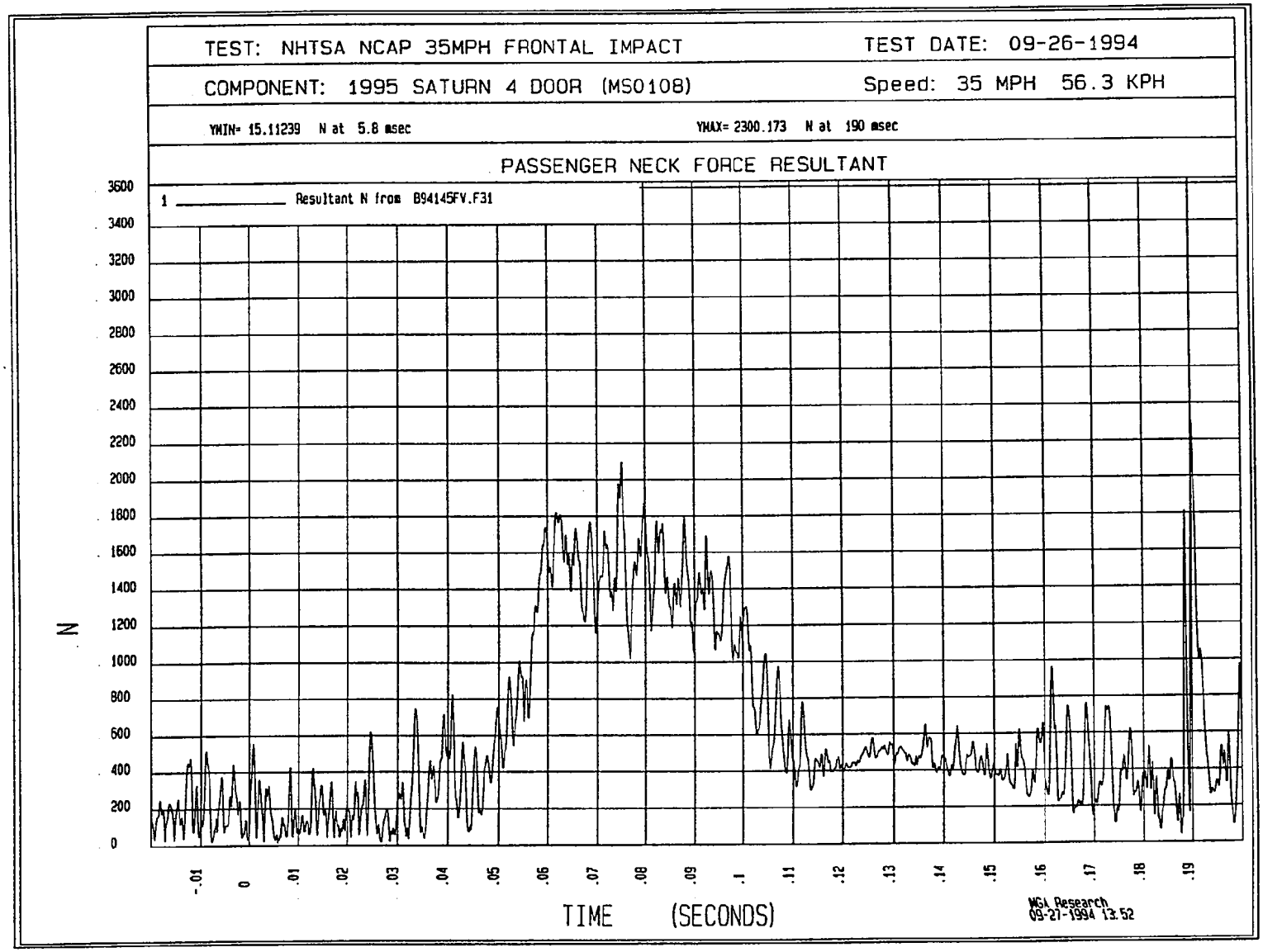


Figure B-86 - Passenger Neck Force Resultant vs. Time

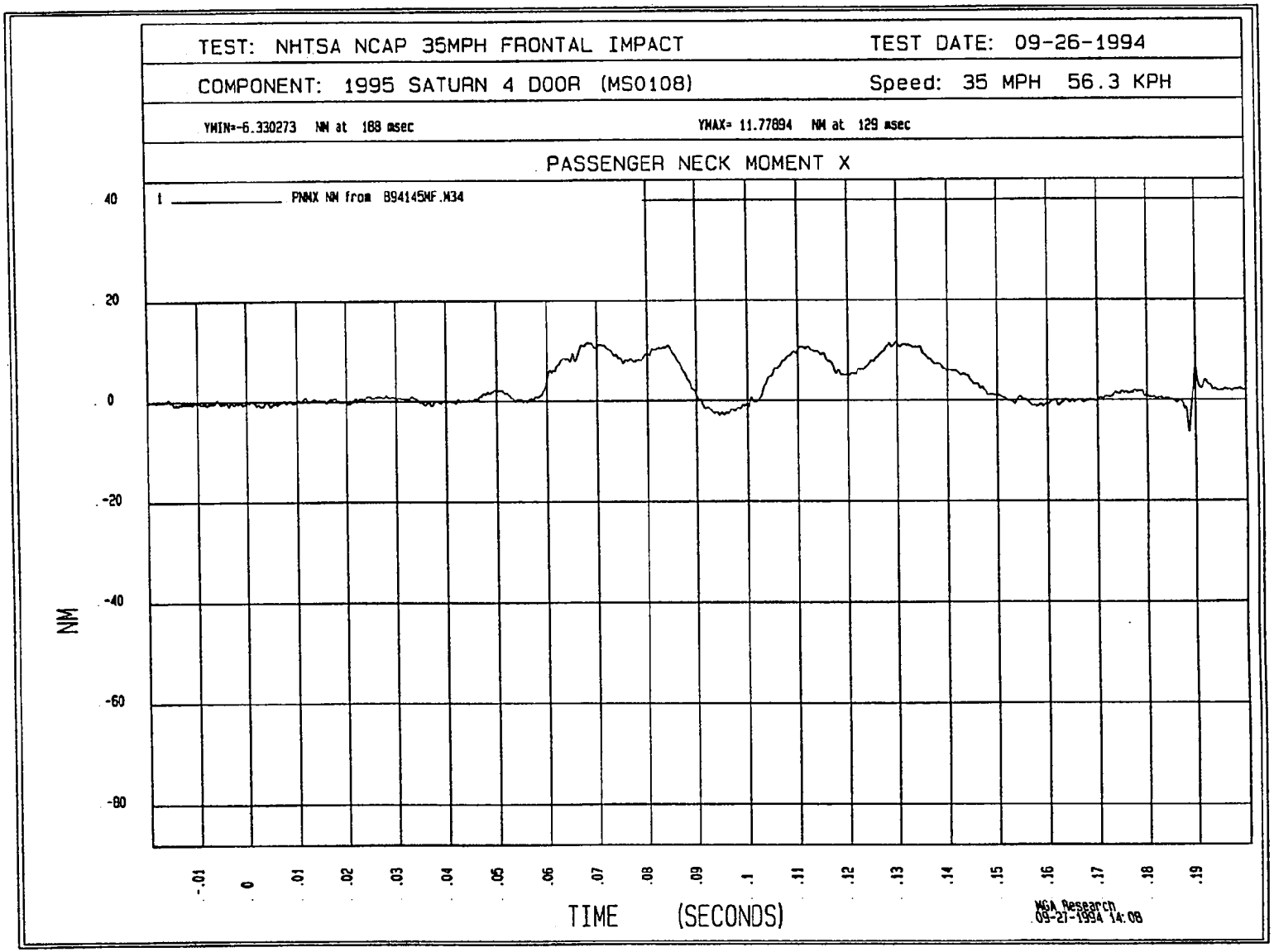


Figure B-87 - Passenger Neck Moment X vs. Time

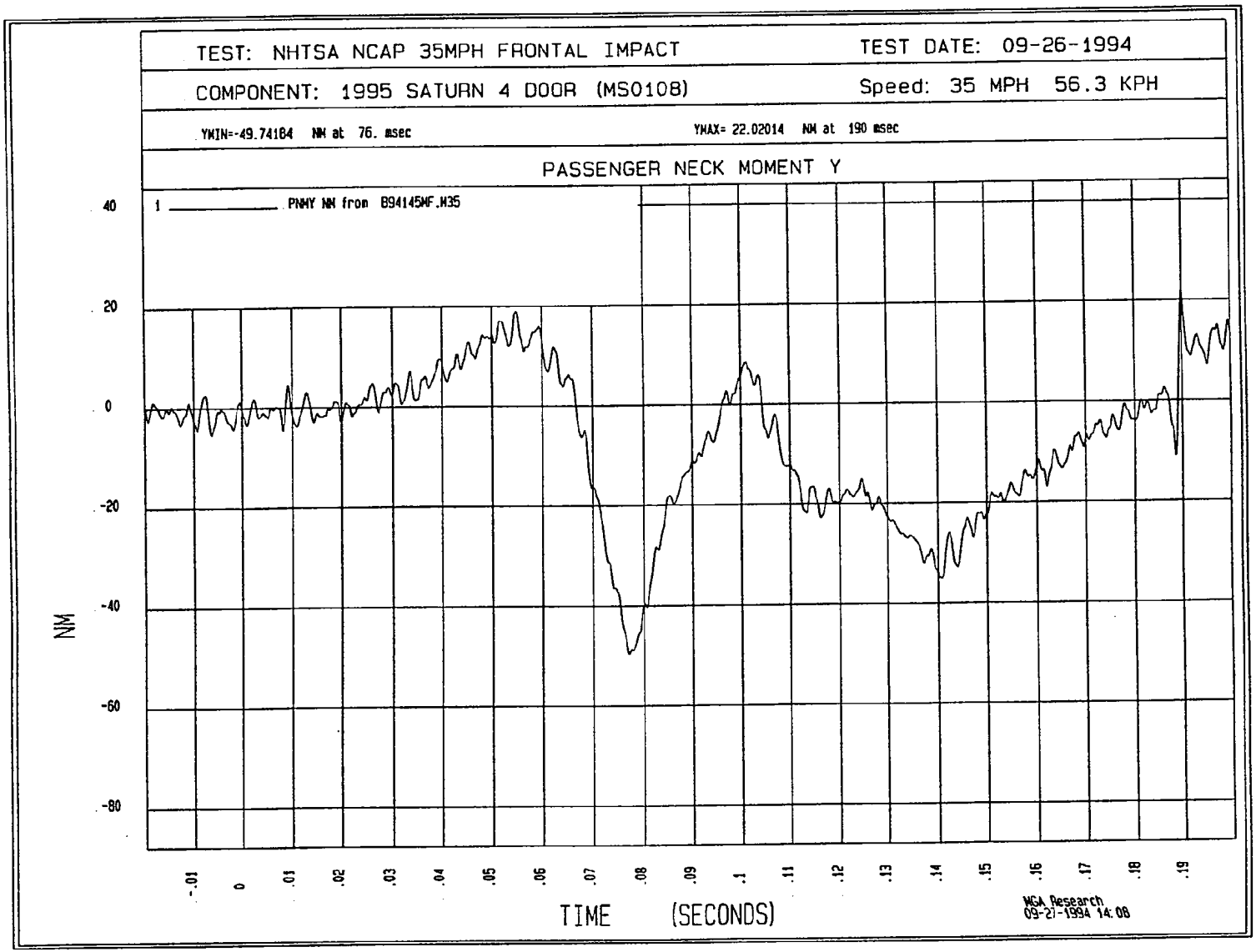


Figure B-88 - Passenger Neck Moment Y vs. Time

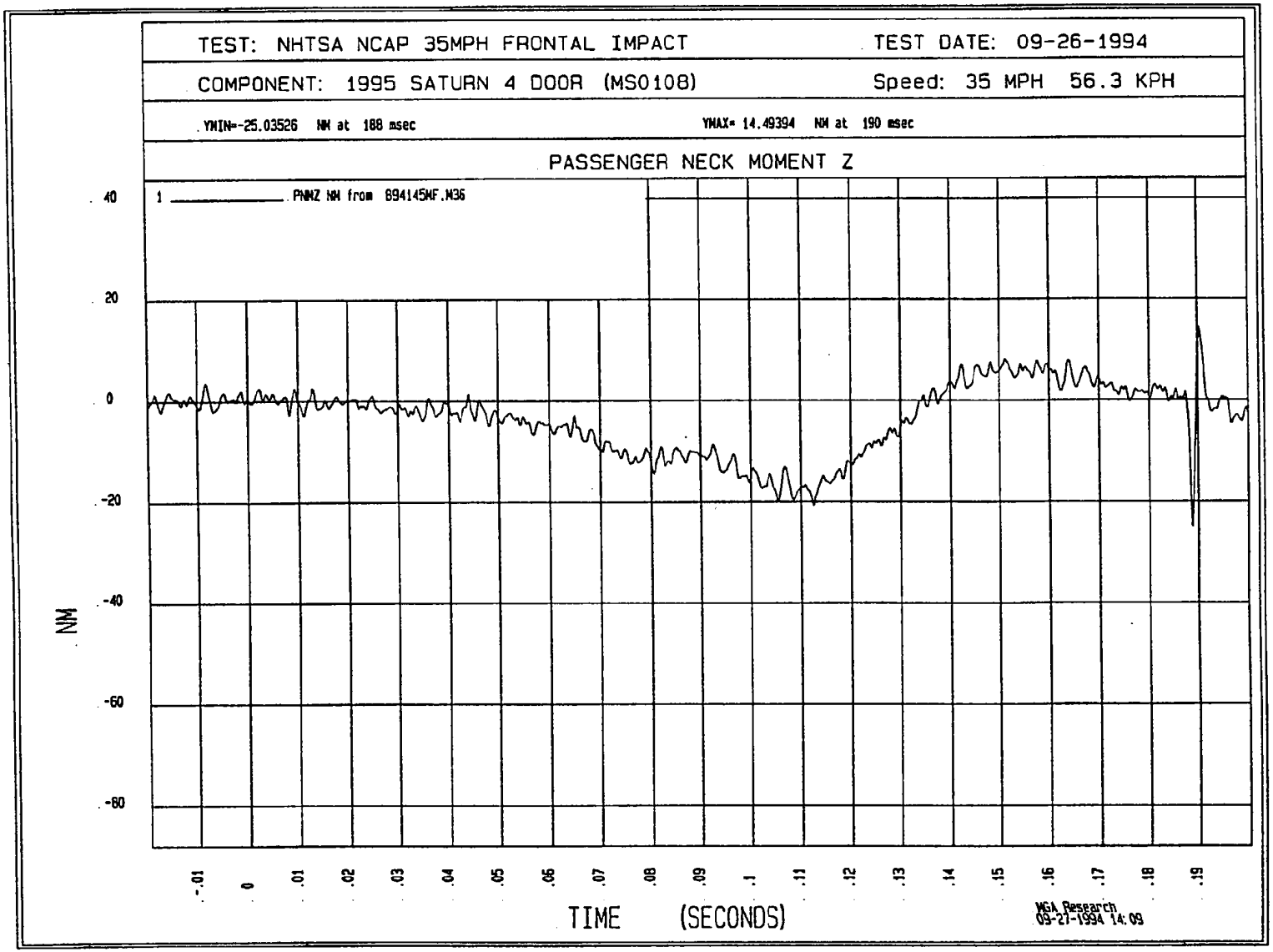


Figure B-89 - Passenger Neck Moment Z vs. Time

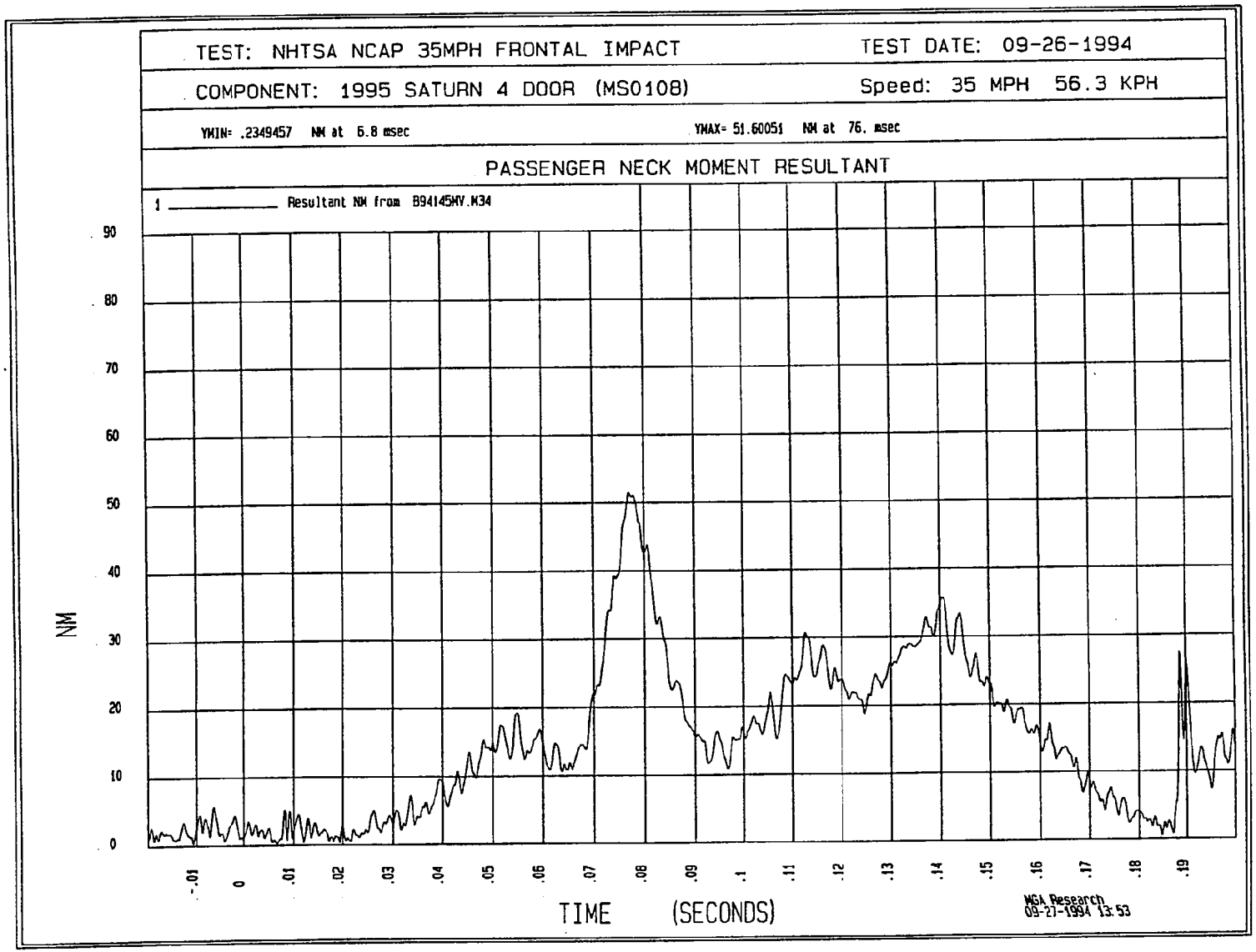


Figure B-9Ø - Passenger Neck Moment Resultant vs. Time

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 37 DUMMY CALIBRATION BY: Rod McClelland

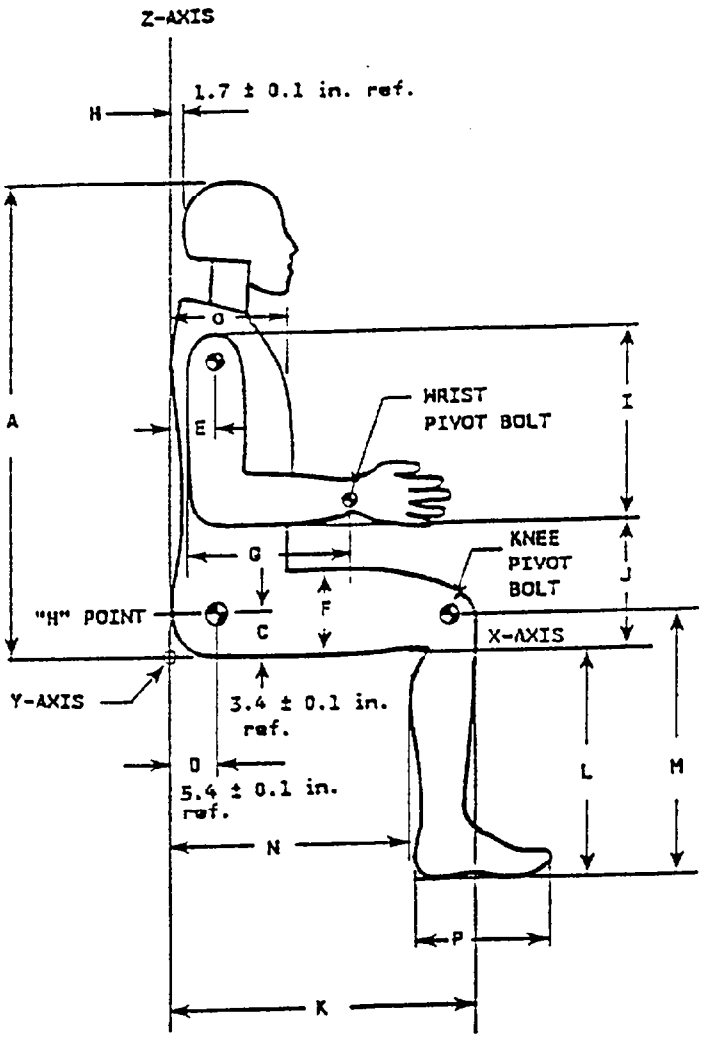
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-16-94

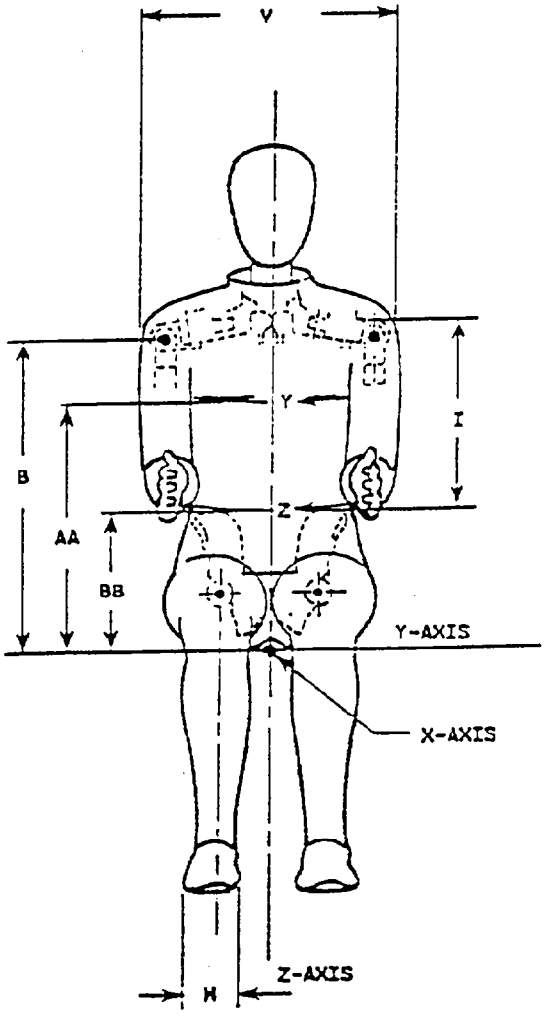
DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	35.0
B - Shoulder Pivot Height	19.9 - 20.5	20.0
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.0
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	8.5
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



SIDE VIEW



FRONT VIEW

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.: 37 DUMMY CALIBRATION BY: Rod McClelland

VERIFICATION DATE: 08-16-94

VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 69°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	256
Peak Lateral Acceleration	15 G. MAX	2
Is Acceleration Curve Unimodel	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	22.8
Pendulum Deceleration	10 MS	22.50 - 27.50 G	25.22
	20 MS	17.60 - 22.60 G	19.15
	30 MS	12.50 - 18.50 G	13.38
Max. Pendulum G Above 30 MS		29.0 G MAX	13.3
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	39
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

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	18.52
	20 MS	14.00 - 19.00 G	15.03
	30 MS	11.00 - 16.00 G	12.64
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.	101
	TIME	72 - 82 MS	75
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	160
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-49.5
	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	22.1
Peak Deflection	2.50 to 2.86 IN.	2.75
Peak Resistive Force	1160 to 1325 LBS.	1271
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.	1223

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1217

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 36 DUMMY CALIBRATION BY: Rod McClelland

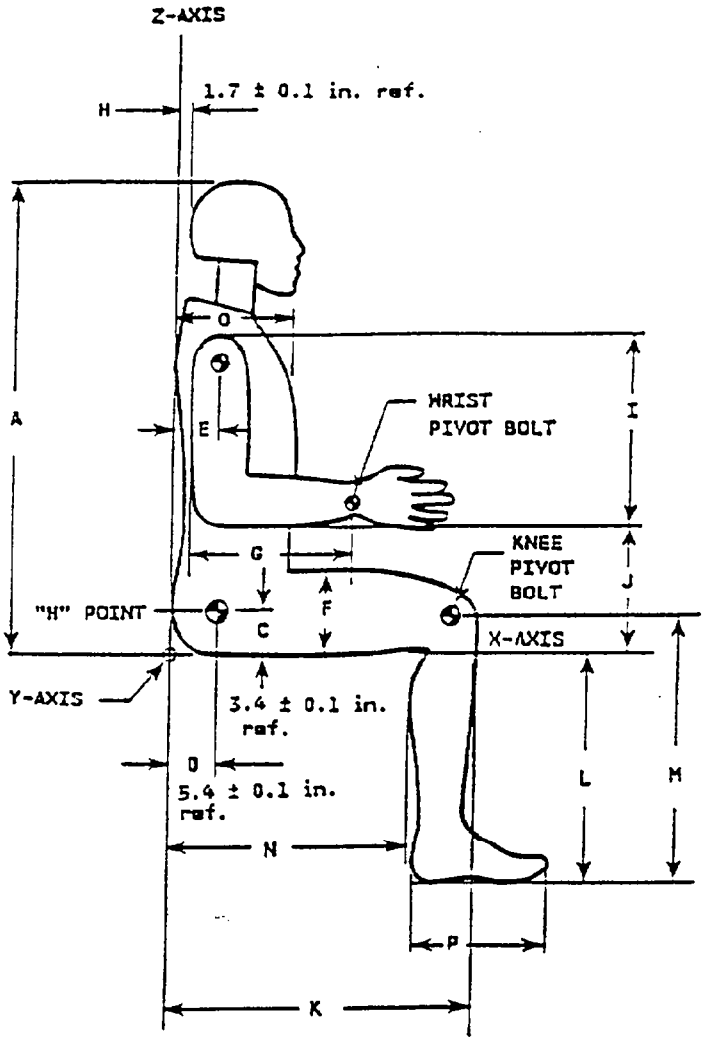
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-16-94

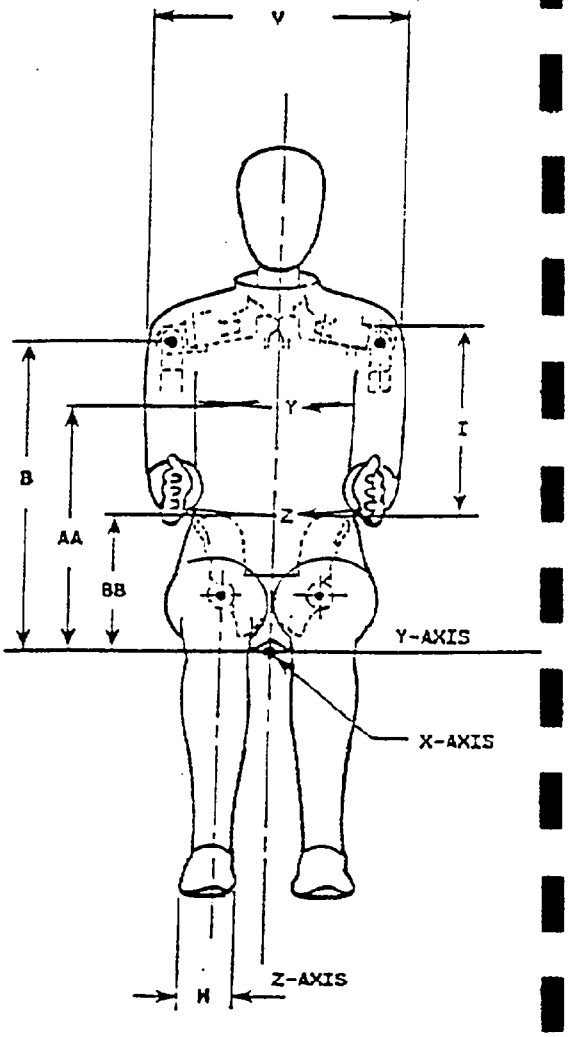
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.4
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	6.0
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	8.5
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



SIDE VIEW



FRONT VIEW

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.: 36 DUMMY CALIBRATION BY: Rod McClelland

VERIFICATION DATE: 08-16-93

VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 69°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	273
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	22.9
Pendulum Deceleration	10 MS	22.50 - 27.50 G	24.00
	20 MS	17.60 - 22.60 G	19.72
	30 MS	12.50 - 18.50 G	12.56
Max. Pendulum G Above 30 MS		29.0 G MAX	13.4
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	40
D Plane Rotation	MAX	64 - 78 DEG.	72
	TIME	57 - 64 MS	58
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	113
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	102

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.11
Pendulum Deceleration	10 MS	17.20 - 21.20 G	19.40
	20 MS	14.00 - 19.00 G	16.46
	30 MS	11.00 - 16.00 G	11.75
Max. Pendulum G Above 30 MS		22 G Max	12
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	44
D Plane Rotation	MAX	81 - 106 DEG.	98
	TIME	72 - 82 MS	75
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	154
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-48.6
	TIME	65 - 79 MS	68
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	141

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	21.8
Peak Deflection	2.50 to 2.86 IN.	2.63
Peak Resistive Force	1160 to 1325 LBS.	1269
Internal Hysteresis	69 to 85%	72

5.0 KNEE IMPACT TESTS

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.8
Maximum Force	1060 - 1300 LBS.	1102

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1174

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 37

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	7/28/94
Head Y	ACCH1	Endevco	7/28/94
Head Z	AAMW5	Endevco	7/28/94
Chest X	ACCY1	Endevco	7/28/94
Chest Y	ACCC8	Endevco	7/28/94
Chest Z	ACCT7	Endevco	7/28/94
Right Femur Load Cell	261	Denton	8/01/94
Left Femur Load Cell	262	Denton	8/01/94
Neck Load Cell X	443	Denton	7/14/94
Neck Load Cell Y	443	Denton	7/14/94
Neck Load Cell Z	443	Denton	7/14/94
Neck Moment X	443	Denton	7/14/94
Neck Moment Y	443	Denton	7/14/94
Neck Moment Z	443	Denton	7/14/94
Chest Deflection Gauge	37G	Bourns	8/03/94
Lap Belt Load Cell	663	Lebow	4/26/94
Torso Belt Load Cell	657	Lebow	5/31/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 37

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	439	Denton	5/09/94
Upper Right Tibia Moment Y	439	Denton	5/09/94
Lower Right tibia Moment Y	427	Denton	5/09/94
Lower Right Tibia Force X	427	Denton	5/09/94
Lower Right Tibia Force Z	427	Denton	5/09/94
Upper Left Tibia Moment X	437	Denton	5/09/94
Upper Left Tibia Moment Y	437	Denton	5/09/94
Lower Left Tibia Moment Y	425	Denton	5/09/94
Lower Left Tibia Force X	425	Denton	5/09/94
Lower Left Tibia Force Z	425	Denton	5/09/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 36

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACDE7	Endevco	7/28/94
Head Y	ACC7Ø	Endevco	7/28/94
Head Z	ACCW9	Endevco	7/28/94
Chest X	ACC78	Endevco	7/12/94
Chest Y	ACCE6	Endevco	7/12/94
Chest Z	ACCY3	Endevco	7/12/94
Right Femur Load Cell	259	Denton	8/Ø1/94
Left Femur Load Cell	26Ø	Denton	8/Ø1/94
Neck Load Cell X	442	Denton	7/14/94
Neck Load Cell Y	442	Denton	7/14/94
Neck Load Cell Z	442	Denton	7/14/94
Neck Moment X	442	Denton	7/14/94
Neck Moment Y	442	Denton	7/14/94
Neck Moment Z	442	Denton	7/14/94
Chest Deflection Gauge	36G	Bourns	8/Ø3/94
Lap Belt Load Cell	69Ø	Lebow	4/26/94
Torso Belt Load Cell	691	Lebow	4/27/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	AØ6M	Endevco	6/Ø9/94
Right Rear Seat Crossmember X	MGAØ98	Entran	6/Ø2/94
Top of Engine Block X	AHY57	Endevco	7/12/94
Bottom of Engine X	MGAØ6Ø	Entran	8/Ø4/94
Left Brake Caliper X	AC997	Endevco	8/22/94
Right Brake Caliper X	MGAØ52	Entran	8/22/94
Instrument Panel X	AHY51	Endevco	7/12/94
Redundant Left Rear Seat Crossmember X	MGAØ54	Entran	6/13/94
Redundant Right Rear Seat Crossmember X	MGA133	Entran	5/16/94

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AGH9Ø	Endevco	5/Ø6/94
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	4Ø3Ø69	Sensotec	3/3Ø/94
Abdomen Compression Force Gauge	N/A	Transducers Inc.	N/A

APPENDIX E

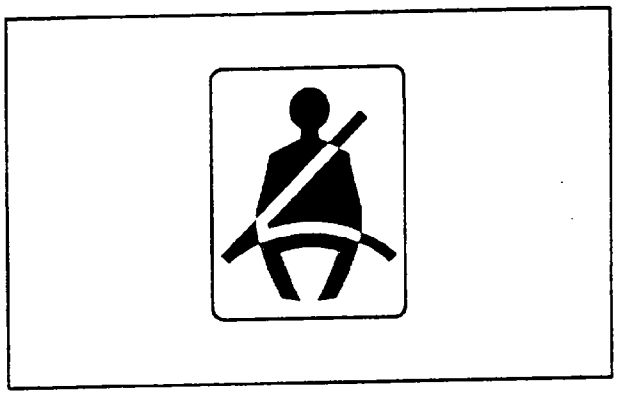
Vehicle Owner's Occupant Restraint System Instructions

SAFETY BELTS: THEY'RE FOR EVERYONE

This section 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 injured or killed if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.



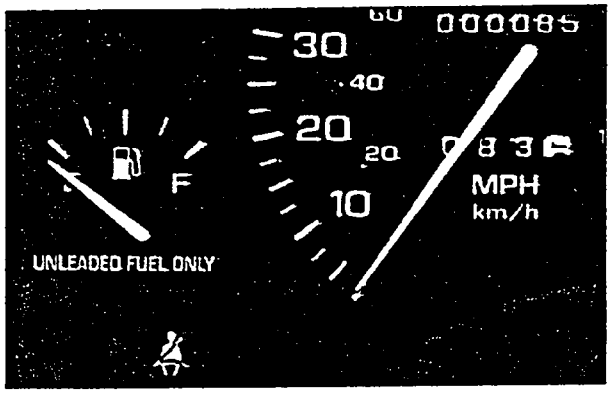
This figure lights up when you turn the key to "RUN" or "START" when your seat belt isn't buckled. A tone warning will sound if the belt isn't buckled. It's the reminder to buckle up. In many areas of the United States and Canadian provinces, the law says to wear safety belts. Here's why: **They work.**

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

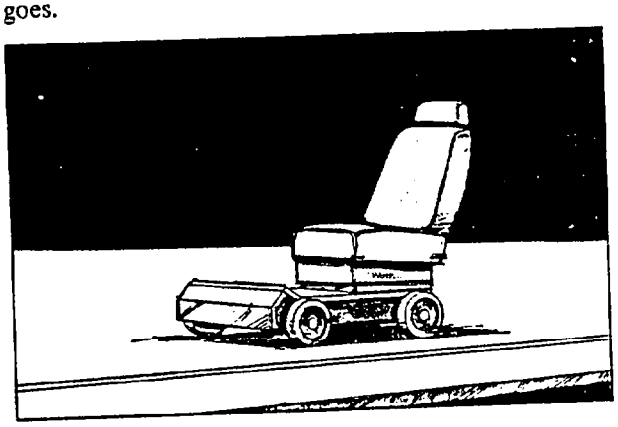
Safety Belt Reminder Light



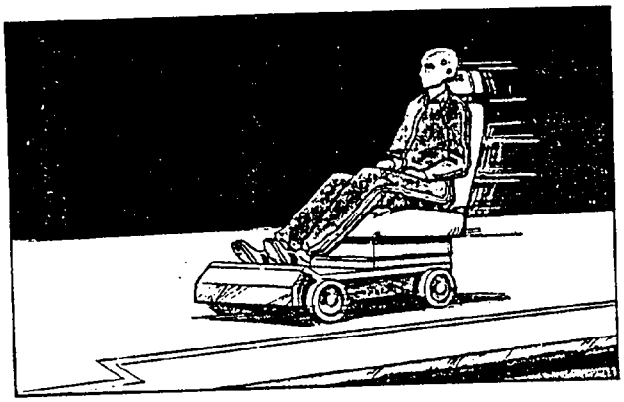
When the key is turned to "Run" or "Start, " a chime will come on for about eight seconds to remind people to fasten their safety belts, unless the driver's safety belt is already buckled. The safety belt light will also come on until the driver's belt is buckled.

WHY SAFETY BELTS WORK

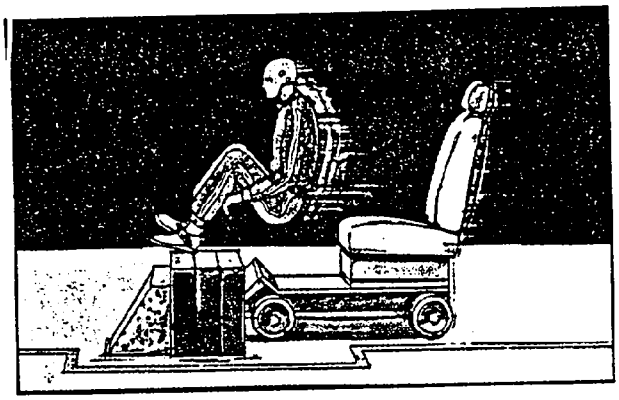
When you ride in or on anything, you go as fast as it goes.



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



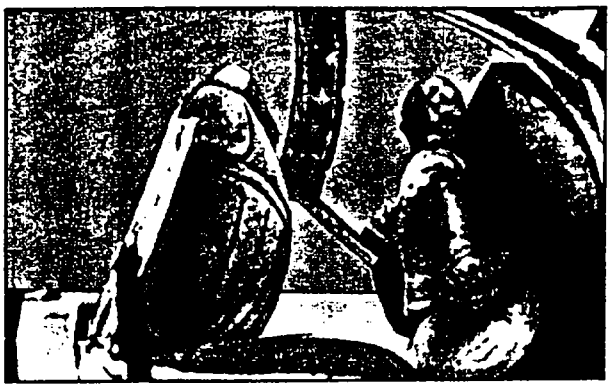
Put someone on it.



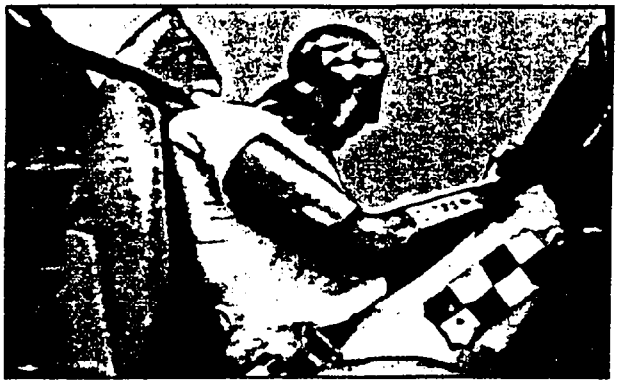
Get it up to speed. Then stop the "car." The rider doesn't stop.

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 wearing your belt.

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 standard for the driver and front passenger. 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 speed of less than 40 mph (65 km/h).

Safety belts are for everyone.

HOW TO WEAR SAFETY BELTS PROPERLY

Adults

This section is for people of adult size only. Be aware that there are special things to know about safety belts and children. And there are different rules for babies and smaller children. If a child will be riding in your Saturn, see the section 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

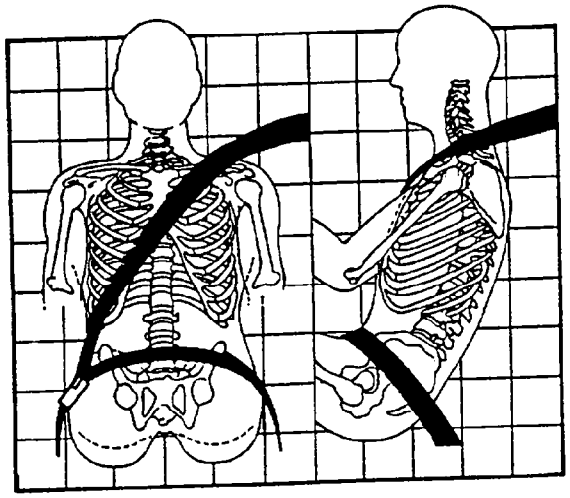
This section describes the driver's restraint system.

Lap–Shoulder Belt

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 the Index under "Seats") so you can sit up straight.
3. Pick up the latch plate and pull the belt across you. Don't let it get twisted. The safety belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.



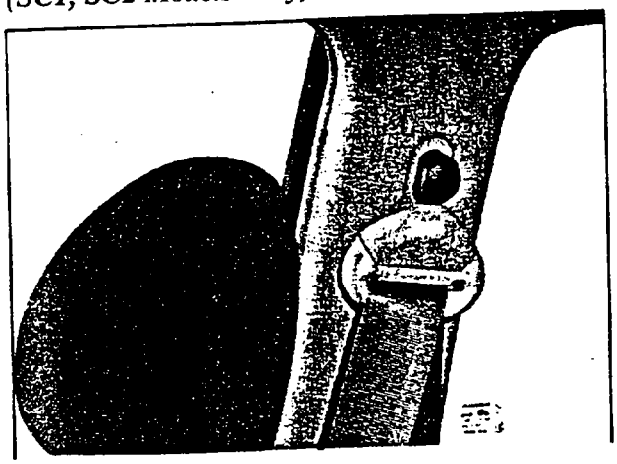
4. Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure. If the belt stops before it reaches the buckle, let it go back all the way and start again.

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.

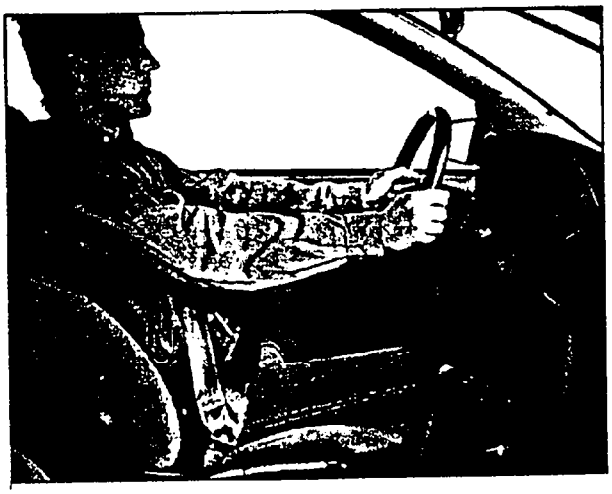
The safety belt locks if there's a sudden stop or crash.

Shoulder Belt Height Adjuster (SC1, SC2 Models Only)



Before you begin to drive, move the shoulder belt adjuster to the height that is right for you.

To move it up or down, pull the adjuster knob. When you release the knob to lock the adjuster, try to move it down a little to make sure it has locked into position.



Adjust the height so that the shoulder portion of the belt is properly positioned on your shoulder, away from your face and neck.

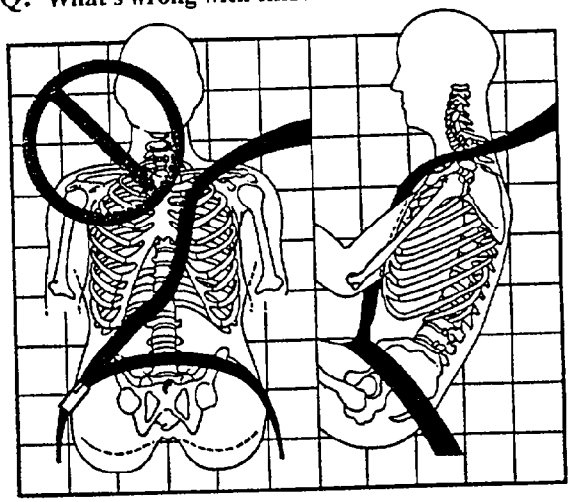
To help you find a height that is right for you, follow these guidelines:

For a tall person: Use the upper or upper–middle position.

For a person of average height: Use a position somewhere in the middle.

For a short person: Use the lower or lower–middle position.

Q: What's wrong with this?

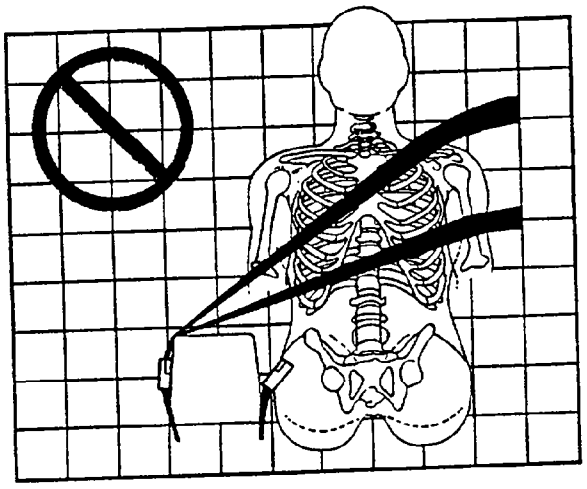


A: The shoulder belt portion of the safety belt is too loose. It won't give nearly as much protection this way.

⚠ 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 lap belt portion of the safety belt is buckled in the wrong place.

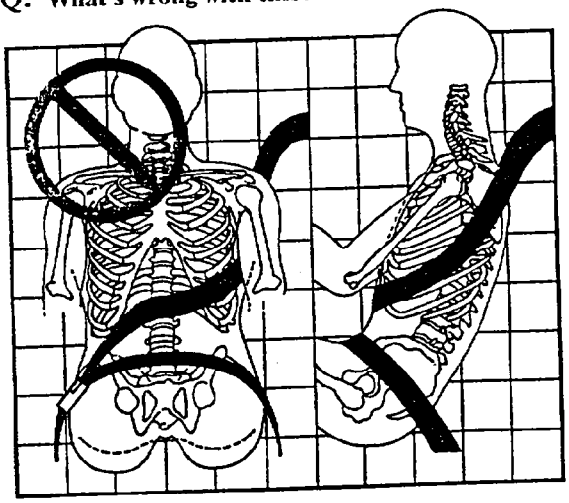
⚠ CAUTION

You can be seriously hurt if your lap 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.

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

Q: What's wrong with this?

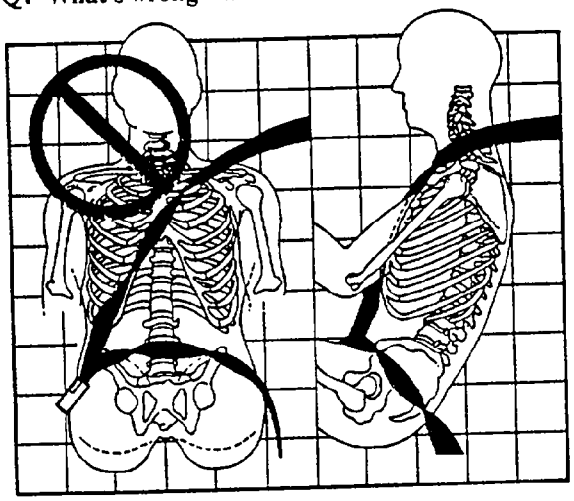


A: The shoulder belt portion of the safety belt is worn under the arm. It should be worn over the shoulder at all times.

⚠ 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 Saturn retailer to fix it.

SUPPLEMENTAL INFLATABLE RESTRAINT SYSTEM — "AIR BAG"

This section explains the Supplemental Inflatable Restraint (SIR) or "Air Bag" system. Your Saturn has an air bag for the driver and for the right-front passenger. Here are the most important things to know:

⚠ CAUTION

An inflating air bag can seriously injure small children. Always secure children properly in your vehicle. To read how, see the heading "Children" in this section of the handbook, and read the caution label on the front-passenger's safety belt.

⚠ CAUTION

You can be severely injured or killed in a crash if you aren't wearing your safety belt – even if you have an air bag. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. The air bag is only a "supplemental restraint". That is, it works with safety belts but doesn't replace them. Air bags are designed to work only in moderate to severe crashes where the front of your vehicle hits something. They aren't designed to inflate at all in rollover, rear, side, or low-speed frontal crashes. Everyone in your vehicle, including the driver, should wear a safety belt properly – whether or not there's an air bag for that person.

⚠ CAUTION

For maximum safety protection in all types of crashes, you must wear your safety belt.

Do not install rearward–facing child seats in any front passenger seat position.

Do not sit or lean unnecessarily close to the air bag.

Do not place any objects over the air bag or between the air bag and yourself.

⚠ CAUTION

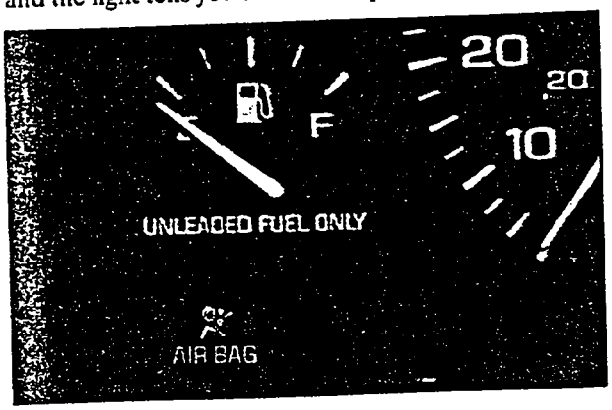
Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, it could seriously injure you. Safety belts help keep you in position for air bag inflation in a crash. Always wear your safety belt, even with an air bag, and sit as far back as you can while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

Air Bag Readiness Light

There is an air bag readiness light on the instrument panel which shows a driver or right–front passenger properly belted, with an inflated air bag labeled as "air bag". The system checks for electrical malfunctions, and the light tells you if there is a problem.



You will see the 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

Q: Where are the air bags?

A: The driver's air bag is in the middle of the steering wheel. The right–front passenger's air bag is located in the instrument panel on the passenger's side.

Q: When should an air bag inflate?

A: An air bag is designed to inflate in moderate to severe frontal or near–frontal crashes 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 Saturn vehicles is about 15 mph (24 km).

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 bags are 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, it cannot be determined whether the air bag(s) should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and the vehicle's deceleration.

Air bags are designed **not** to inflate in a crash **unless** inflation would be likely to reduce the risk of serious injury. An air bag inflates with great speed and force, and is capable of causing injuries to occupants who are too close to it when it inflates. This is why an air bag is designed not to deploy in side, rear, and low–speed frontal crashes.

Q: What makes an air bag inflate?

A: In a frontal impact of sufficient severity, the air bag sensing system located on the vehicle will detect that the vehicle is suddenly stopping as a result of a crash. The sensing system completes an electrical circuit, triggering a chemical reaction of the sodium azide sealed in the inflators. The reaction produces nitrogen gas, which inflates the air bags. The inflators, air bags, and related hardware are all part of the air bag inflator modules packed inside the steering wheel and in the instrument panel in front of the right–front passenger.

Q: How does an air bag restrain?

A: In moderate to severe frontal or near–frontal collisions, even belted occupants can contact the steering wheel or instrument panel. The air bags supplement 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 gradually. But, air bags would not provide protection in many types of collisions, including rollovers, 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 these moderate to severe frontal and near–frontal collisions.

Q: What will you see after air bag inflation?

A: 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 or the instrument panel for the right–front passenger 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 the deflated air bag. The nitrogen gas used to inflate the air bags will have vented into the passenger compartment, and the bag will be deflated within seconds after the collision. Nitrogen makes up about 80% of the air we breathe and is not hazardous. As the nitrogen vents from the bags, small particles are also vented into the passenger compartment. The air bag will *not* impede the driver's vision or ability to steer the vehicle, nor will it hinder the occupants from leaving the vehicle.

- The air bags are designed to inflate only once. After they inflate, 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 modules and possibly other parts. The Saturn 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 and the change in velocity your vehicle has experienced.
- 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 Saturn retailer for service.

NOTICE

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

⚠ CAUTION

Don't put anything on, or attach anything to, the air bags. Also, don't put anything (such as pets or objects) between any occupant and the driver air bag or right–front passenger 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.

Q: Is the smoke from an air bag inflation harmful?

A: The particles emitted during the 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 bags inflate, you and any passengers should exit the vehicle if 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 Saturn With the Air Bag System

Please tell or remind anyone who works on your Saturn that it has a dual air bag system. Air bags affect how your Saturn 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 car. The air bag system does not need regular maintenance. Your Saturn retailer and the 1995 Saturn Service Manual have information about the air bag system, including repair and disposal. To purchase a service manual set, see "Publications" in the Index.

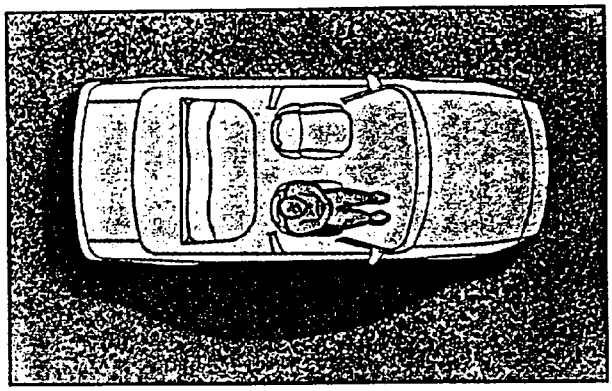
⚠ CAUTION

For up to 5 seconds after the ignition is turned off or 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 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.

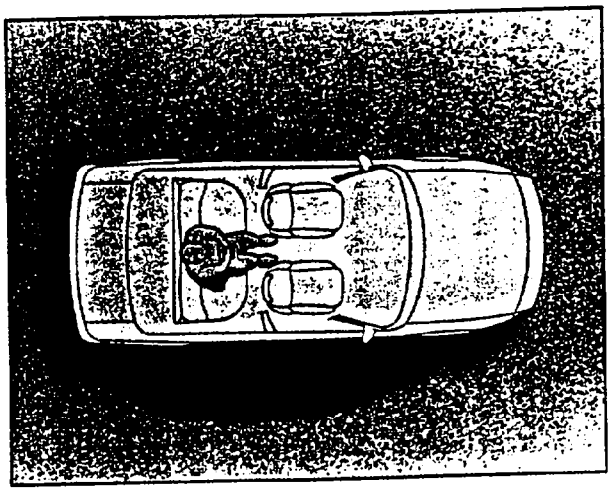
Right Front Passenger Position

The right front passenger's safety belts work the same way as the driver's safety belts. See "Driver Position," earlier in this section.

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



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

When you sit in the 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.

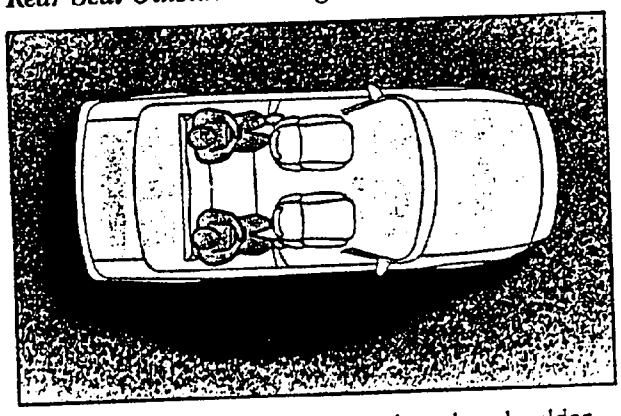
Buckle, position and release it the same way as a front seat lap belt. Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.

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 wearing safety belts 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



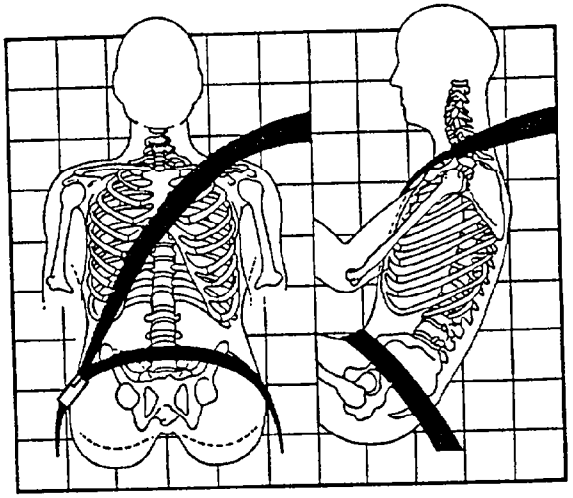
The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.

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

2. Push the latch plate into the buckle until it clicks. The rear lap-shoulder belt latch plate will <u>not</u> fit into the center buckle. This is designed for center passenger use only. If the belt stops before it reaches the buckle, tilt the latch plate and keep pulling until you can buckle it.

Make sure the release button on the buckle faces upward or outward so you would be able to unbuckle it quickly if you ever had to.

3. To make the lap belt 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 low and snug below 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 only 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.

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