V2158

REPORT NO. MGA-95-NØØ6

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

FUJI HEAVY INDUSTRIES LTD.
1995 Subaru Legacy
4 Door
NHTSA NO. MS55ØØ

MGA PROVING GROUNDS
5ØØØ WARREN ROAD
BURLINGTON, WI 531Ø5

Test Date: September 1, 1994

Report Date: Novmeber 15, 1994

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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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 Subaru Legacy 4 Door Sedan at the MGA Proving Grounds and Crash Test Center in Burlington, WI. on September 1, 1994.

The barrier impact velocity was 56.6 kph (35.2 mph), and the ambient temperature at the time of impact was 21°C. The post-test maximum static crush was 492 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 482.1 and the 3 msec. Clip (Chest g's) was 46.1 g's. The left and right femur loads for the driver were 864 and 4491 Newtons, respectively. The passenger's HIC was 531.7 and the 3 msec Clip was 51.4 g's. The left and right femur maximum loads were 1333 and 1982 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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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 Subaru Legacy 4-Door at a velocity of 56.6 kph (35.2 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on September 1, 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. The driver ATD (Serial No. 37) and the right-front passenger ATD (Serial No. 36) had one prior exposure but did not exceed injury criteria. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 59 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 482.1. The maximum chest deceleration over 3 milliseconds was 46.1 g's. The left and right femur loads were 864 and 4491 Newtons respectively.

The right front passenger's HIC was 531.7 and maximum chest deceleration over 3 milliseconds was 51.4 g's. The left and right femur loads were 1333 and 1982 Newtons respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1995/Subaru Legacy/4 Door Sedan

NHTSA No.: MS5500 VIN.: 4S3BD6355S9211068

Body color: Mica Ruby Date of Manufacture: 4-94

Engine: 4 Cylinders; __C.I.D.; 2.2liters; __CC

X Gas; __Diesel; __Turbocharged

X Longitudinal (Horizontally opposed); __Transverse

Transmission: 4 Speed; __Manual; X Automatic; __Overdrive

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

Odometer Reading: 229 miles

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

__P/seats; X Tilt Wheel; X 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 2.2 kg/cm^2 (32 Psi) Rear 2.1 kg/cm^2 (30 Psi)

Recommended Tire Size: P185/70R14

Recommended Cold Tire Pressure: Front 2.2 kg/cm^2; Rear 2.1 kg/cm^2

Tires on Vehicle: P185/70R14 ; Manufacturer: Bridgestone

Number of Occupants: 2 Front; 3 Rear; __3rd Seat; 5 TOTAL

Type of Front Seats: X Bucket; __Bench; __Split Bench

Type of Front Seat Back: __Fixed; X Adj. With; X Lever

Vehicle Capacity Weight (VCW) = 385 kg. (A)

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

Rated Cargo Weight (RCW) A-B = 45 kg.

GVWR 1783 kg. GAWR: Front 937 kg.; Rear 846 kg.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 350 kg Right Rear = 240 kg

Left Front = 367 kg Left Rear = 247 kg

TOTAL FRONT WEIGHT = 717 kg (60 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 487 kg (40 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1204 kg

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1204 kg

VCW = Vehicle Capacity Weight 385 kg DSC = Designated Seating Capacity 5

RCW = VCW - 68 (DSC) = 45 *kg

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

Target Test Weight = 1401 kg

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 382 kg Right Rear = 297 kg

Left Front = 409 kg Left Rear = 306 kg

TOTAL FRONT WEIGHT = 791 kg (57 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 603 kg (43 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1394 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

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 696 LF 700 RR 699 LR 699

Test Attitude: RF 673 LF 676 RR 664 LR 664

Wheel Base: 2630 mm; C.G. = 1138 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 1, 1994 Time of Test: 2:50 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 = 56.6 kph; secondary = 56.6 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 4226 C_L 4426 L 4226

Post-test = R 3810 C_L 3934 L 3807

Crush = R 416 C_L 492 L 419

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

R 987 mm C_L 904 mm L 952 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	No	Yes	Yes

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

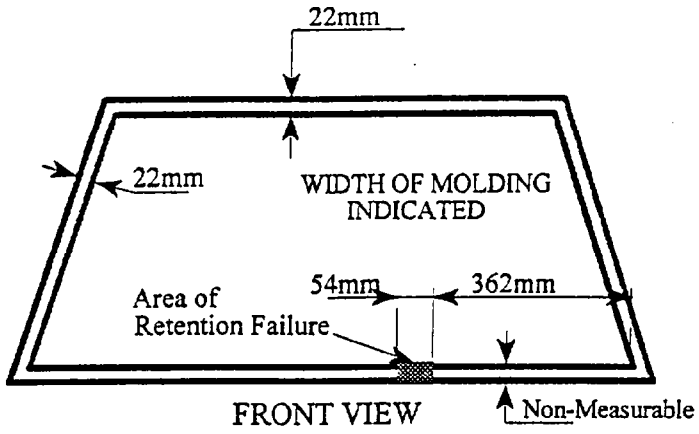
Details of windshield mounting such as retention method, trim type, etc.:
Windshield set in rubber molding within windshield frame

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	2093	2093	100%
LEFT SIDE	2093	2039	97%
TOTAL	4186	4132	99%

AREA OF RETENTION FAILURE:



FAILURE DETAILS: 54 mm of windshield mounting was failed around lower center 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= 1121 mm

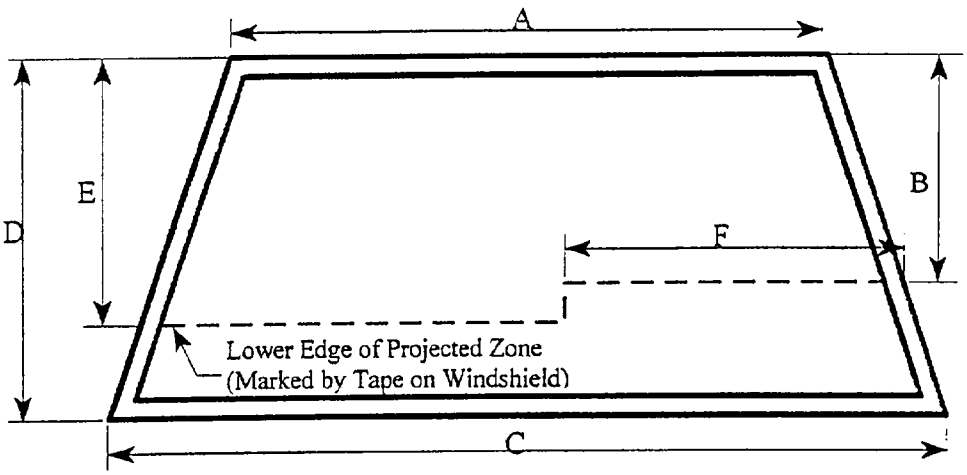
B= 543 mm

C= 1505 mm

D= 780 mm

E= 537 mm

F= 562 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.: MS5500 Test Date: September 1, 1994

Vehicle Mfgr./Make/Model: 1995/Subaru/Legacy/4 Door Sedan

Usable Capacity of Vehicle's Fuel Tank: 60 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:

56 Liters which is 93 % 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)

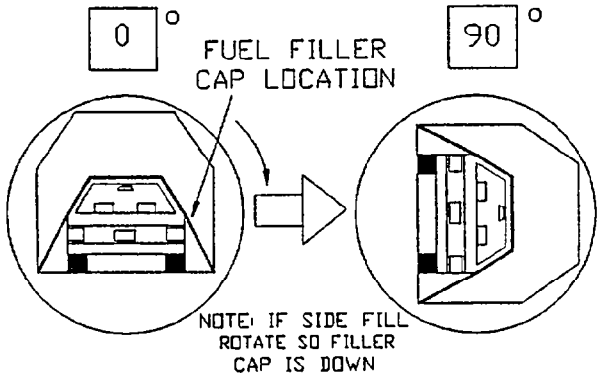
FUEL SPILLAGE MEASUREMENT:

	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.: MS5500



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 41 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 41 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

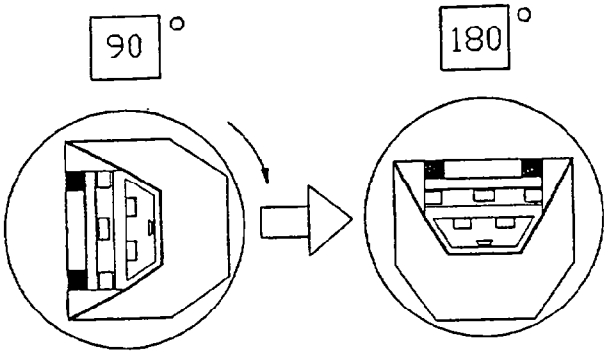
0	0	0	0

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.: MS5500



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 33 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 33 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:

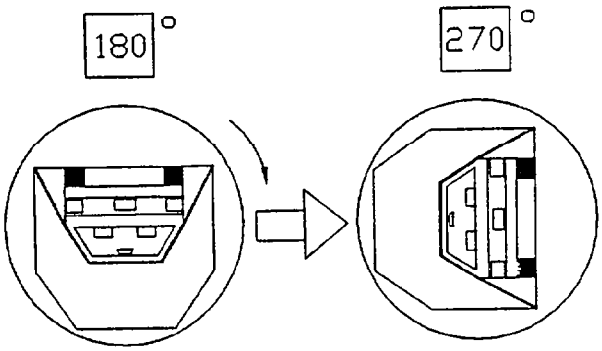
0	0	0	0

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.: MS5500



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:

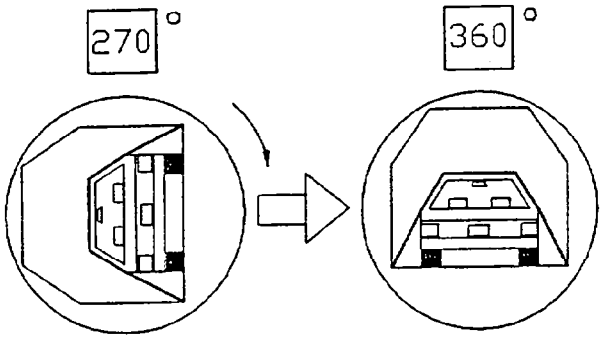
0	0	0	0

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.: MS5500



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 47 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 47 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/Subaru Legacy/4 Door Sedan

VEH. NHTSA NO.: MS5500 TEST DATE: September 1, 1994

MAX. ACCELERATION VALUES: (g's)	DRIVER # 37	PASSENGER # 36
Head Channel X	-48.3	-55.0
Head Channel Y	-26.3	-18.3
Head Channel Z	20.2	25.5
HEAD RESULTANT	54.3	58.8
Chest Channel X	-46.0	-53.3
Chest Channel Y	-9.0	-3.2
Chest Channel Z	-9.9	-10.3
CHEST RESULTANT (CLIP)	46.1	51.4
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 62.1 t_2 = 65.1	t_1 = 62.7 t_2 = 65.7

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	482.1	531.7
t_1 = (msec)	56.4	57.8
t_2 = (msec)	92.4	93.8
Avg. Accel. t_1 to t_2 (g's)	44.7	46.5

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

MAX. COMPRESSIVE FEMUR FORCES:

Left Side (N)	864	1333
Right Side (N)	4491	1982

MAXIMUM SEAT BELT FORCES:

Lap Belt (N)	4673	7419
Shoulder Belt (N)	9006	7582

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)

HYBRID III NECK AND CHEST DATA SHEET

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1995/Subaru Legacy/4 Door Sedan

VEHICLE NHTSA NO.: MS5500 TEST DATE: September 1, 1994

MAXIMUM VALUES	DRIVER DUMMY #37	PASSENGER DUMMY #36
Neck Load X (N)	377.3	497.9
Neck Load Y (N)	181.2	222.9
Neck Load Z (N)	-1814.6	-1962.8
Neck Moment X (N.M)	15.6	11.8
Neck Moment Y (N.M)	-26.5	30.5
Neck Moment Z (N.M)	-28.6	-26.7
Chest Deflection X (mm)	32.1	35.7
Time of Max. Occurrence	85 msec.	72 msec.

PART 572 DUMMY IN-VEHICLE POSITION

Vehicle NHTSA No.: MS5500 Vehicle: 1995 Subaru Legacy 4 Door

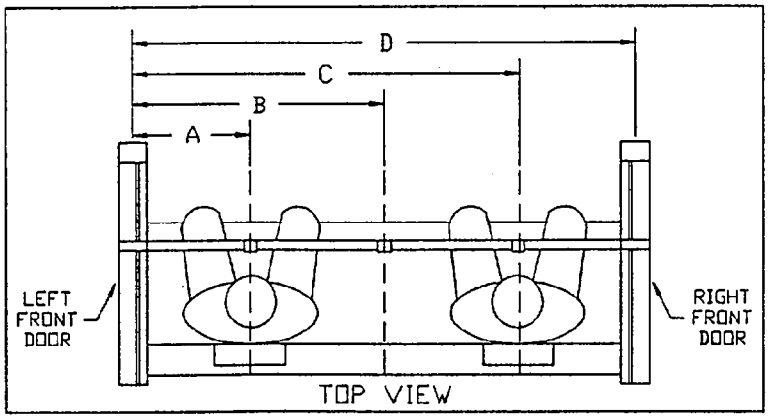
SEAT TYPE:	ADJUSTER TYPE:	BUCKET SEAT BACK TYPE:
____Bench	Driver: _X_Manual	____Fixed
_X_Bucket	___Power	_X_Adjustable Reclining
____Split Bench		
	Passenger: _X_Manual	
	____Power	

Driver

Seat notch to 10th from front

Passenger

Seat notch 10th from front



37 DUMMY ID 36

A	= Left Door to Driver Centerline	410 mm
B	= Left Door to Center Passenger Centerline	743 mm
C	= Left Door to Right Passenger Centerline	1094 mm
D	= Left Door to Right Door	1485 mm

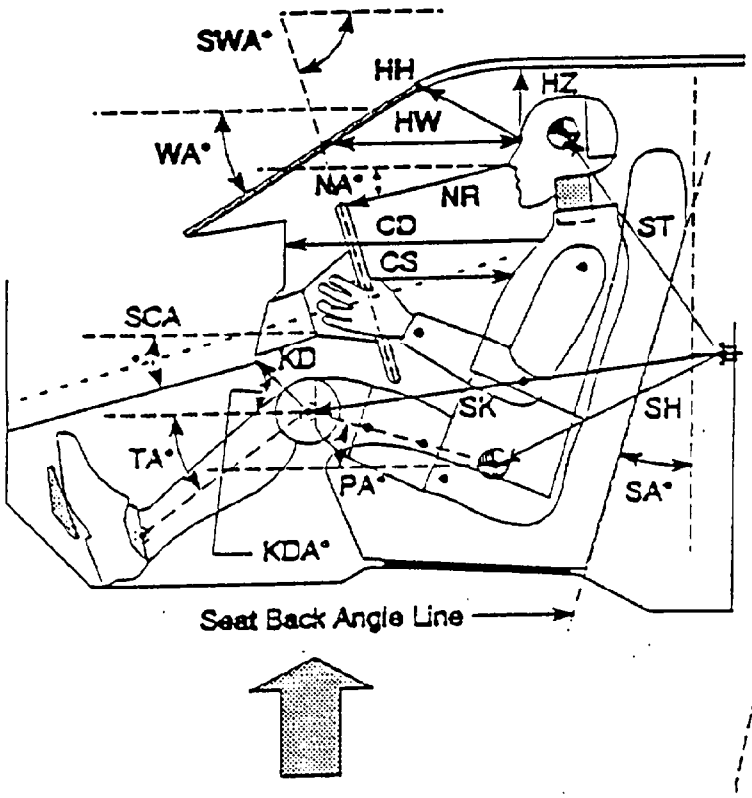
FRONT SEAT MEASUREMENT TABLE

Units (mm)

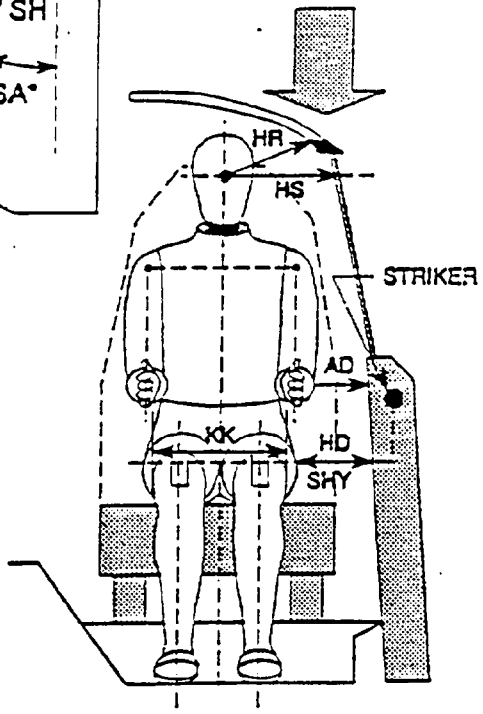
	DRIVER (Serial #37)	PASSENGER (Serial #36)
WA°	29.1°	
SWA°	67.0°	N/A
SCA°	23.2°	N/A
SA°	25.0°	25.0°
HZ	193	183
HH	330	316
HW	598	556
HR	248	247
NR	415 Angle 12.3°	N/A
CD	522	635
CS	296	N/A
RA	200	N/A
KDL	192 Angle 27.8°	192
KDR	175	191 Angle 10.2°
PA°	22.0°	22.5°
TA°	39.7°	44.0°
KK	266	258
ST	557 Angle 85.8°	539 Angle 81.7°
SK	552 Angle 2.3°	558 Angle 3.1°
SH	213 Angle -37.4°	221 Angle -29.6°
SHY	242	232
HS	304	294
HD	174	155
AD	101	97

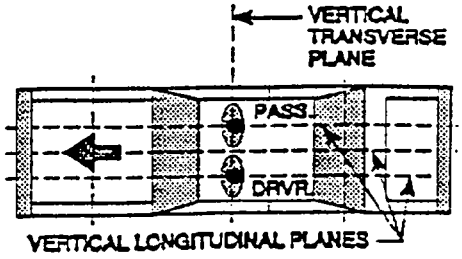
N/A = Not Applicable

FRONT SEAT MEASUREMENTS



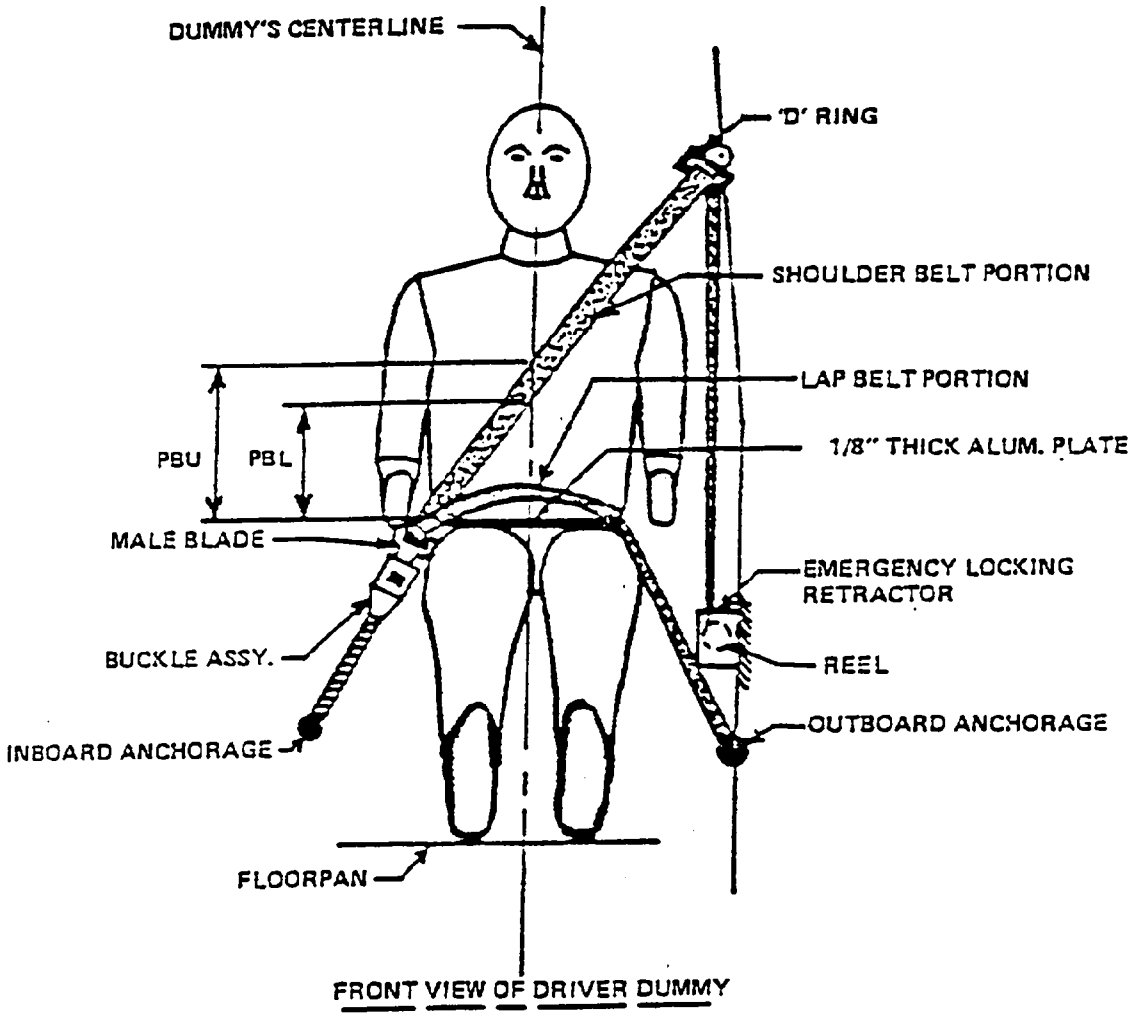
AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
SHY- Striker to H-Point (Y Direction)





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	362	330
PBL --	Top surface of alum. plate to belt lower edge	285	235

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.	215 mm	215 mm
Shoulder belt length as measured on Part 572 Dummy.	845 mm	850 mm
Lap belt length as measured on Part 572 Dummy.	722 mm	745 mm
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis	48.3 mm	43.2 mm
As determined mechanically	116 mm	106 mm
As determined electronically*	NR	NR
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	N/A**	25 msec

NR = Not Recorded

* The potentiometer was not installed in this test because of no space.

** The lock-up time was unable to be determined because of no light in this film.

CAMERA LOCATIONS

VEH. NHTSA NO.: MS5500 ; TEST DATE: September 1, 1994; TIME: 2:50 p.m.

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1995/Subaru/Legacy/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	1090	8470	1170	90°	8126	25	1010
3	Steering Column Top	1310	7620	1560	90°	7276	25	1143
4	Steering Column Bottom	1310	7600	1015	90°	7256	25	1000
5	Left Driver Close-up	1720	6410	1000	90°	6066	35	1005
6	Left Angle	4280	5000	1930	50°		50	1087
7	Driver Onboard Seat Belt						35	1000
8	Passenger Onboard Seat Belt						35	800
9	Right Overall	2360	-8010	985	90°	7658	13	1026
10	Right Front	950	-7430	1080	90°	7078	25	1000
11	Right Passenger Close-up	1310	-6590	1070	90°	6238	50	1099
12	Right Angle	3890	-5000	2170	50°		35	922
13	Top View Wide	370	0	4340			13	1198
14	Top Driver	-250	380	2350			13	1000
15	Top Passenger	-250	-380	2470			13	855
16	Pit Engine	1170	0	-3155			13	1010
17	Fuel Tank	2200	330	-3165			13	971

COORDINATES:

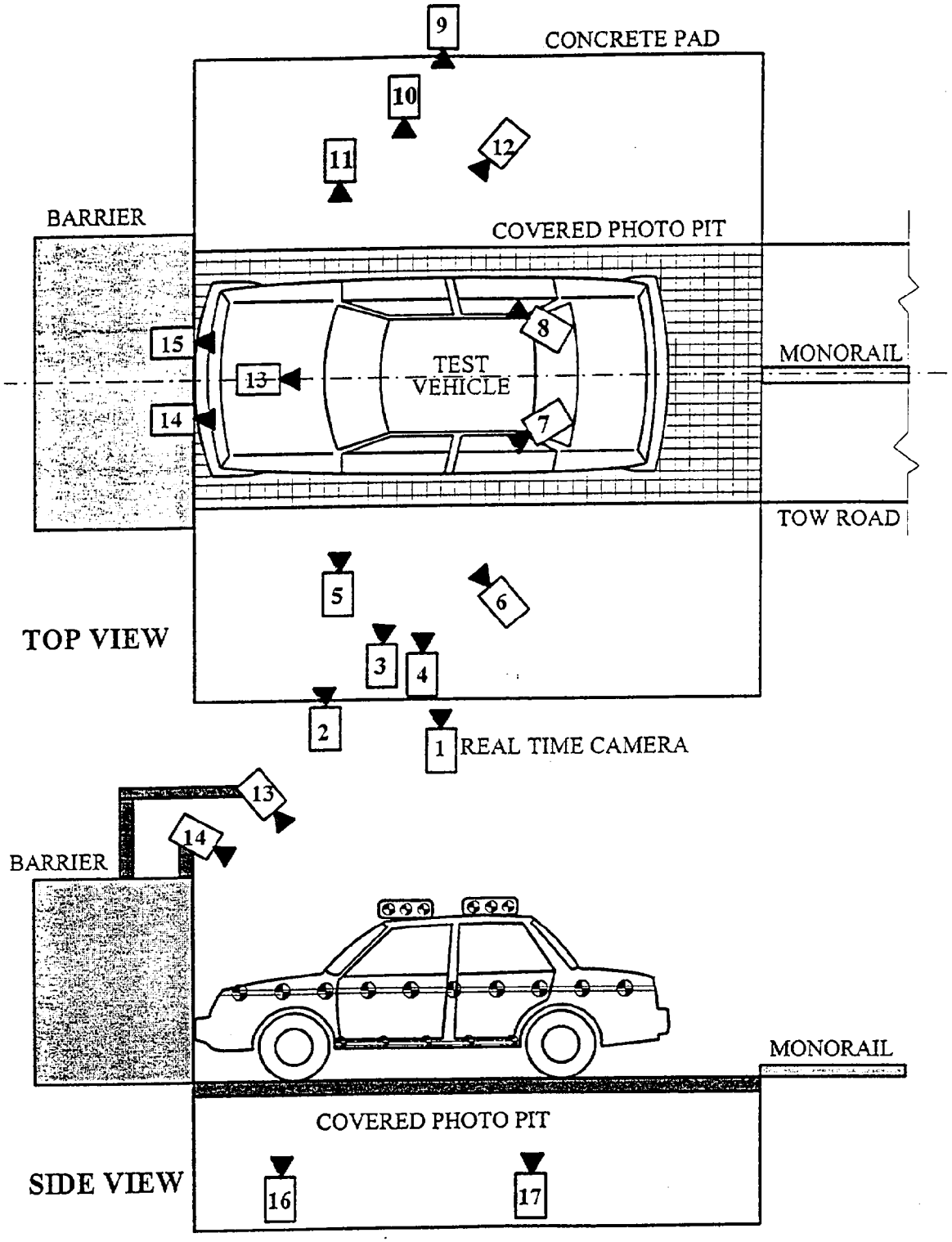
* X = film plane to monorail centerline

Y = film plane to barrier face

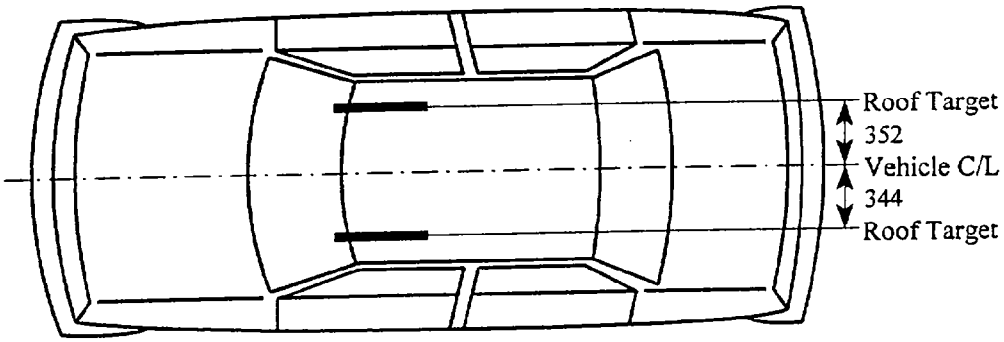
Z = film plane to ground

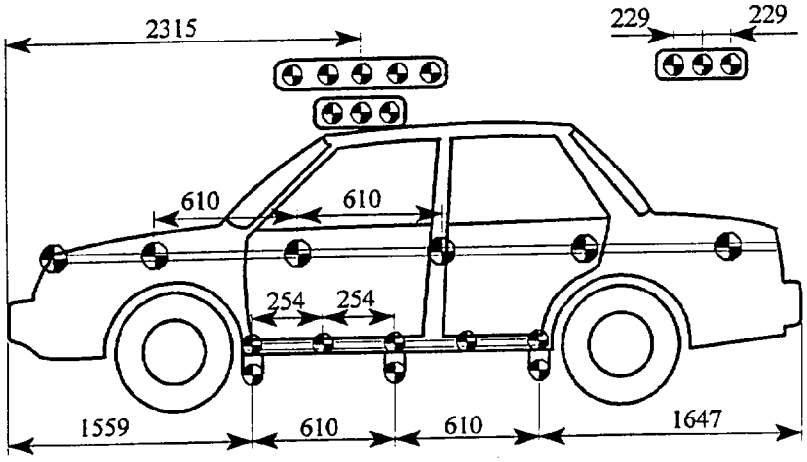
ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

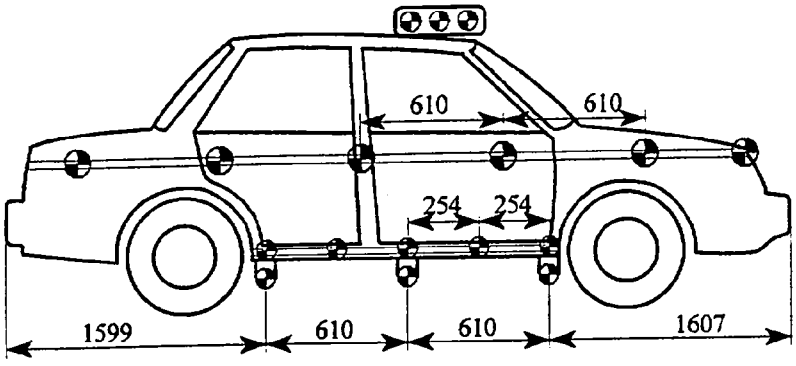
CAMERA LOCATIONS



VEHICLE TARGET LOCATIONS







(DIMENSIONS IN MM) .

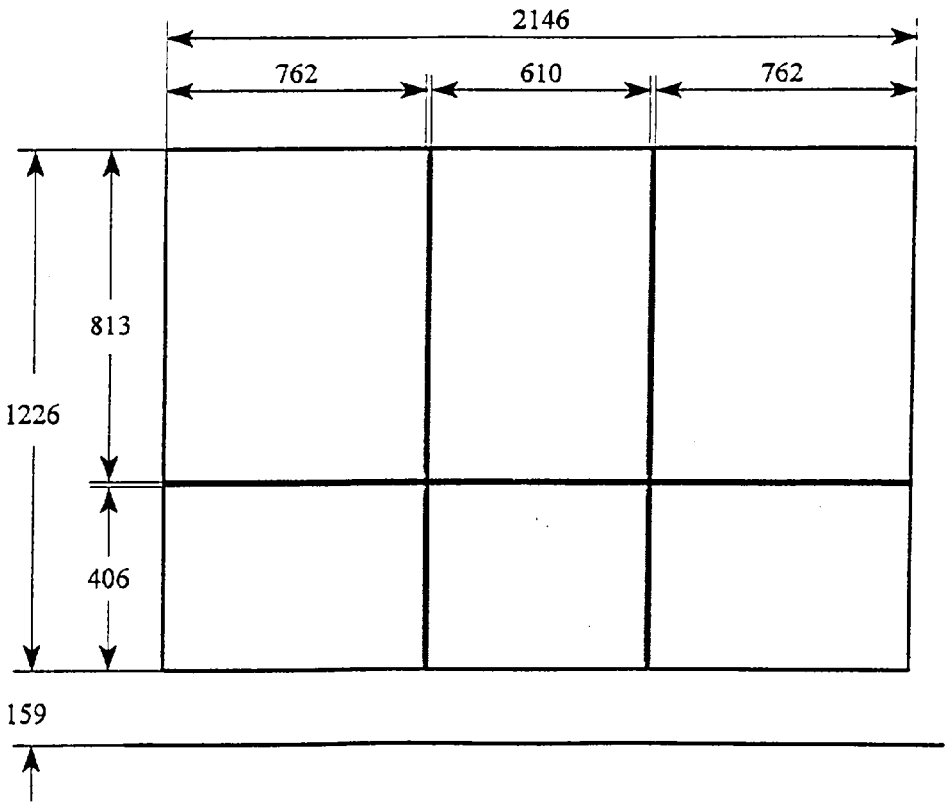
LOAD CELL LOCATIONS ON FIXED BARRIER

3Ø Load Cells

6 Rows

9 Columns

6 Groupings (5 cells/group)

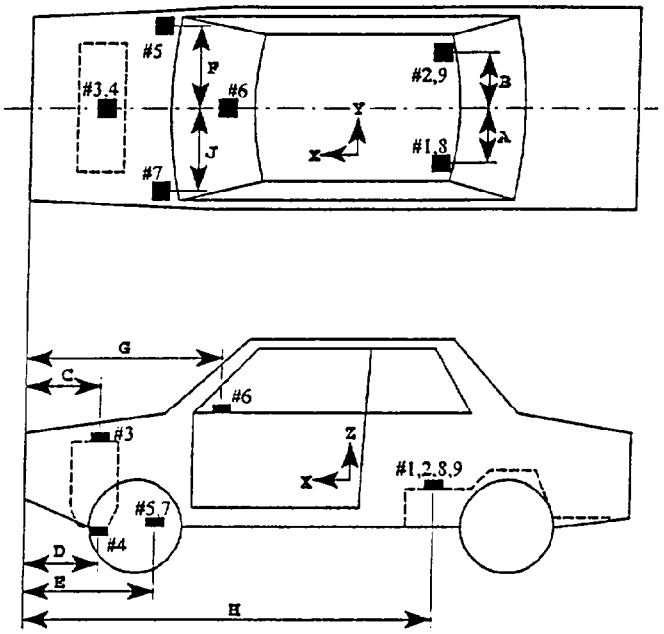


The following data is presented in Appendix B:

(1) Total or Sum of 3Ø individual load cells

(2) Data from 6 Groupings shown above (5 cells/group)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Units: (mm)

Dimension	Length
A	610
B	610
C	622
D	603
E	1111
F	616
G	1475
H	2838
J	616

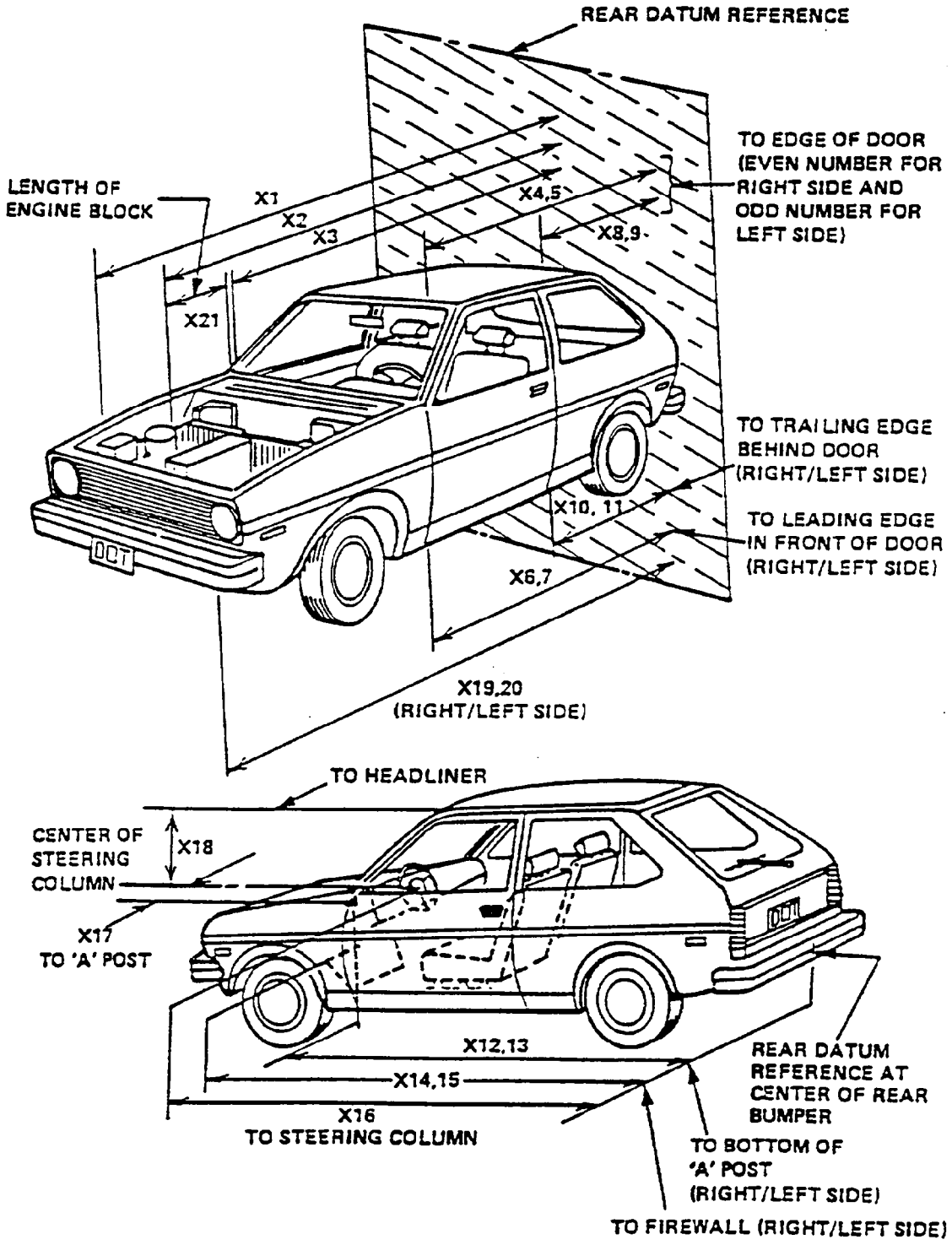
ACCELEROMET	ACCELEROMETER	DIRECTIO
1 and 8	Left Rear Seat Crossmember	X
2 and 9	Right Rear Seat Crossmember	X
3	Top of Engine	X
4	Bottom of Engine	X
5	Right Side Brake Caliper	X
6	Instrument Panel	X
7	Left Disc Brake Caliper	X

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

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4426	3934	492
X2	Rear Surface of Vehicle to Front of Engine	38Ø4	3458	346
X3	Rear Surface of Vehicle to Firewall	3273	3162	111
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2962	2962	Ø
X5	Rear Surface to Upr. Leading Edge of Left Door	2962	2965	-3
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2981	2978	3
X7	Rear Surface to Lwr. Leading Edge of Left Door	2983	2978	5
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1946	1943	3
X9	Rear Surface to Upr. Trailing Edge of Left Door	1943	1949	-6
X1Ø	Rear Surface to Lwr. Trailing Edge of Rt. Door	1956	1946	1Ø
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1949	1946	3
X12	Rear Surface to Bottom of 'A' Post on Rt. Side	2988	298Ø	8
X13	Rear Surface to Bottom of 'A' Post on Left Side	2985	2983	2
X14	Rear Surface to Firewall on Right Side	3264	32Ø7	57
X15	Rear Surface to Firewall on Left Side	3264	3159	1Ø5
X16	Rear Surface to Steering Column	25Ø5	25Ø8	-3
X17	Center of Steering Column to 'A' Post	397	362	35
X18	Center of Steering Column to Headlining	449	433	16
X19	Rear Surface to Right Side of Front Bumper	4226	381Ø	416
X2Ø	Rear Surface to Left Side of Front Bumper	4226	38Ø7	419
X21	Length of Engine Block	343	343	Ø

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1995/Subaru/Legacy/4 Door Sedan

VEH. NHTSA NO.: MS5500 ; VIN: 4S3BD6355S9211068

MODEL YEAR: 1995 ; BUILD DATE: 4-94 ; TEST DATE: September 1, 1994

VEH. SIZE CATEGORY: Mid ; TEST WEIGHT: 1394 kg

VEH. WHEELBASE: 2630 mm ; FRONT OVERHANG: 914 mm ; OVERALL WIDTH: 1710 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: 56.6 kph ; TIME OF SEPARATION: 82 msec

VELOCITY CHANGE: 66.1 kph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 419 mm

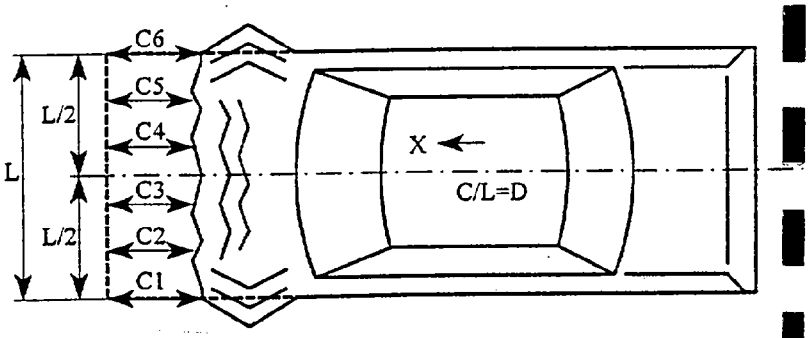
C2 = 457 mm

C3 = 483 mm

C4 = 492 mm

C5 = 489 mm

C6 = 416 mm



MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitude)

LENGTH OF DAMAGED REGION: L = 1619 mm

APPENDIX A

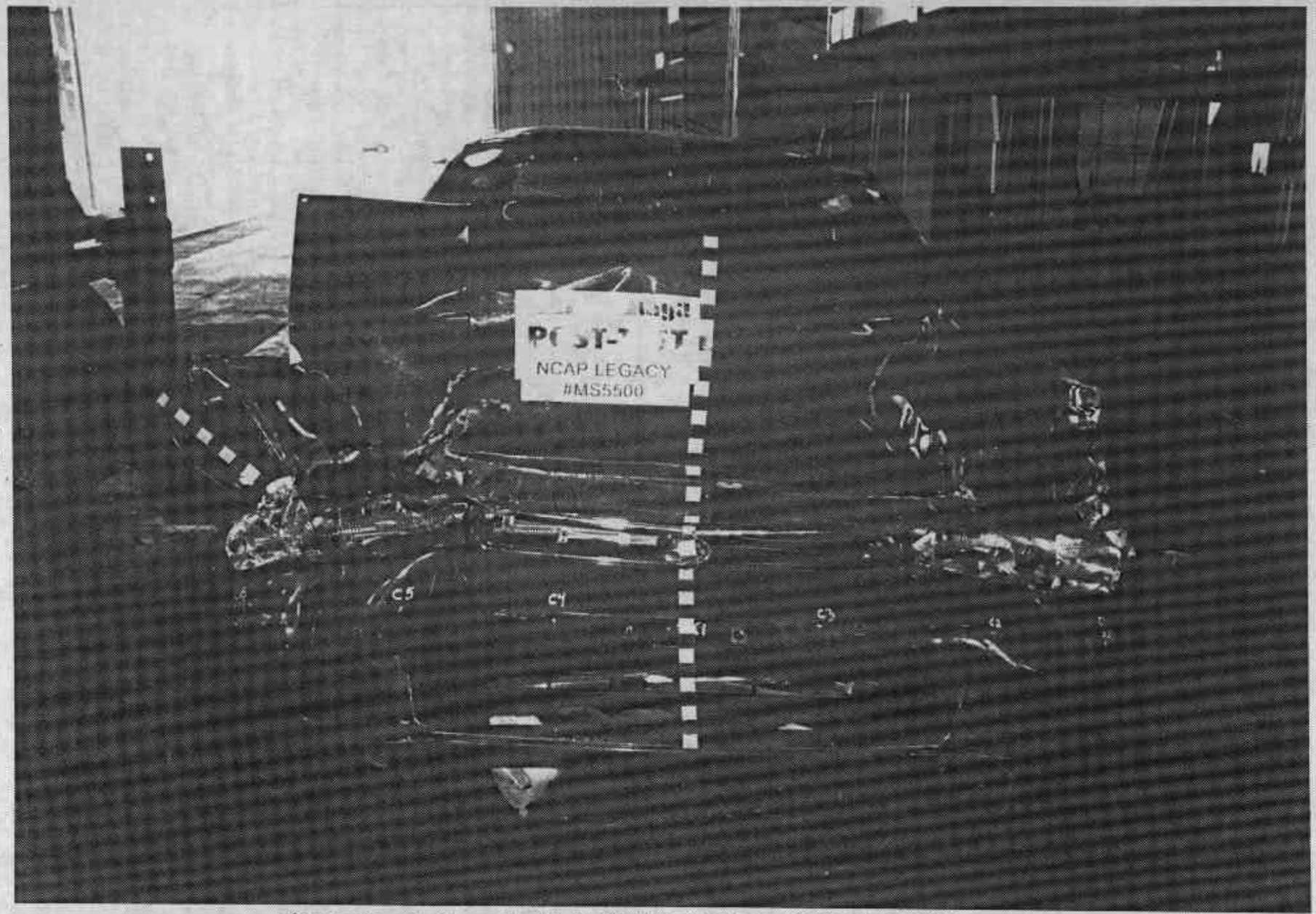
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

A-1

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



A-2

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

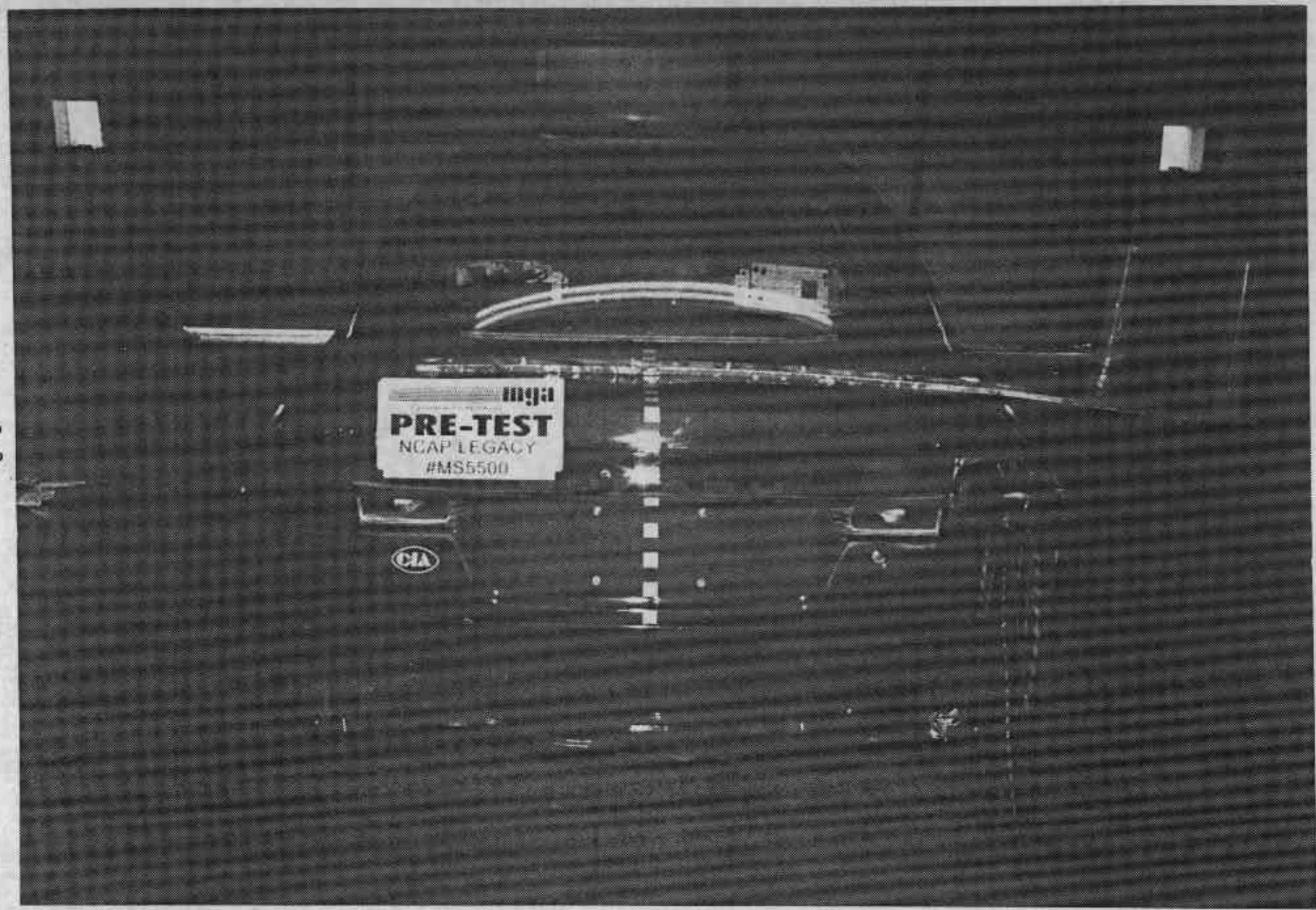


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

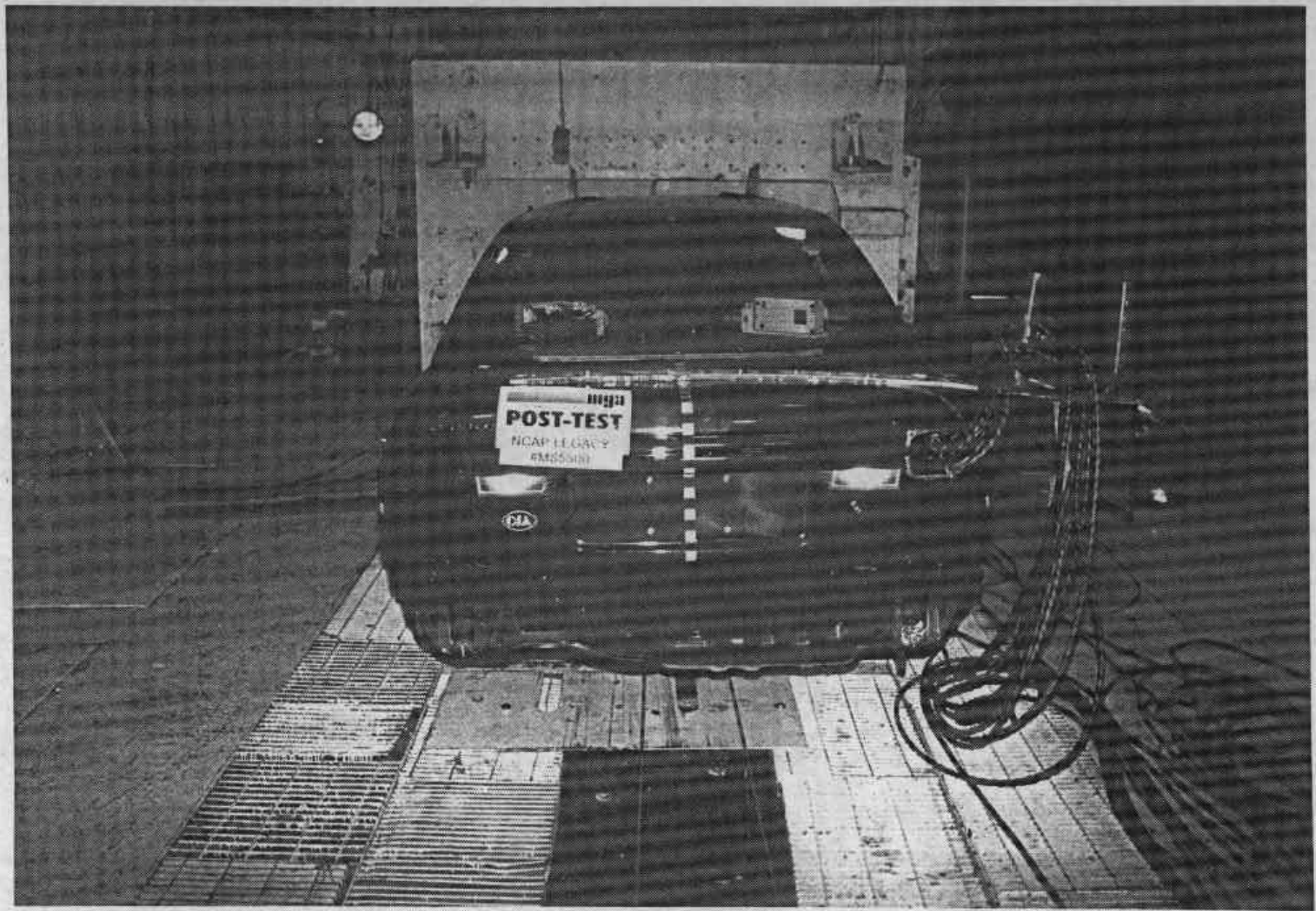
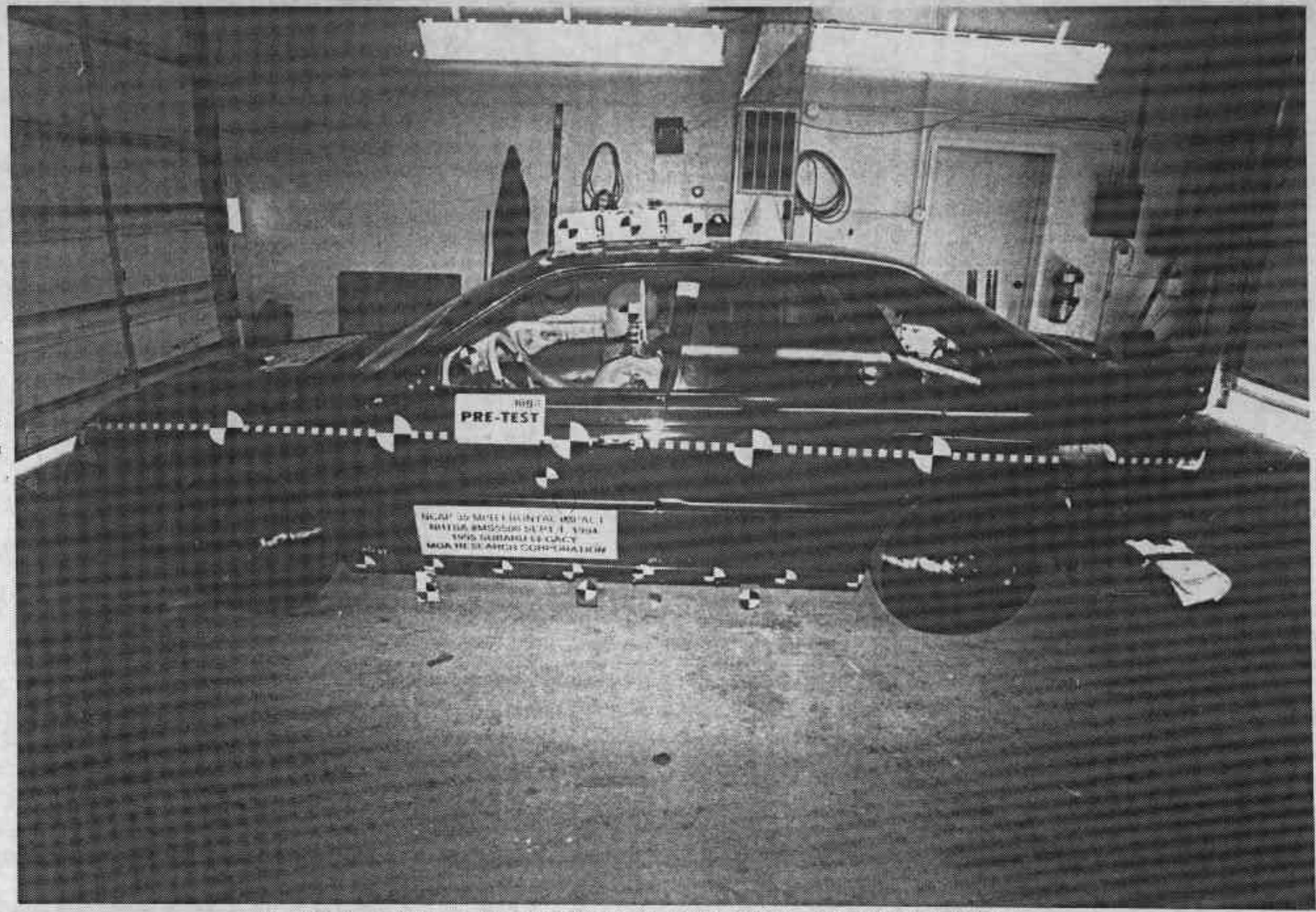


Photo No. A-4 - Post-Test Rear View of Test Vehicle



A-5

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

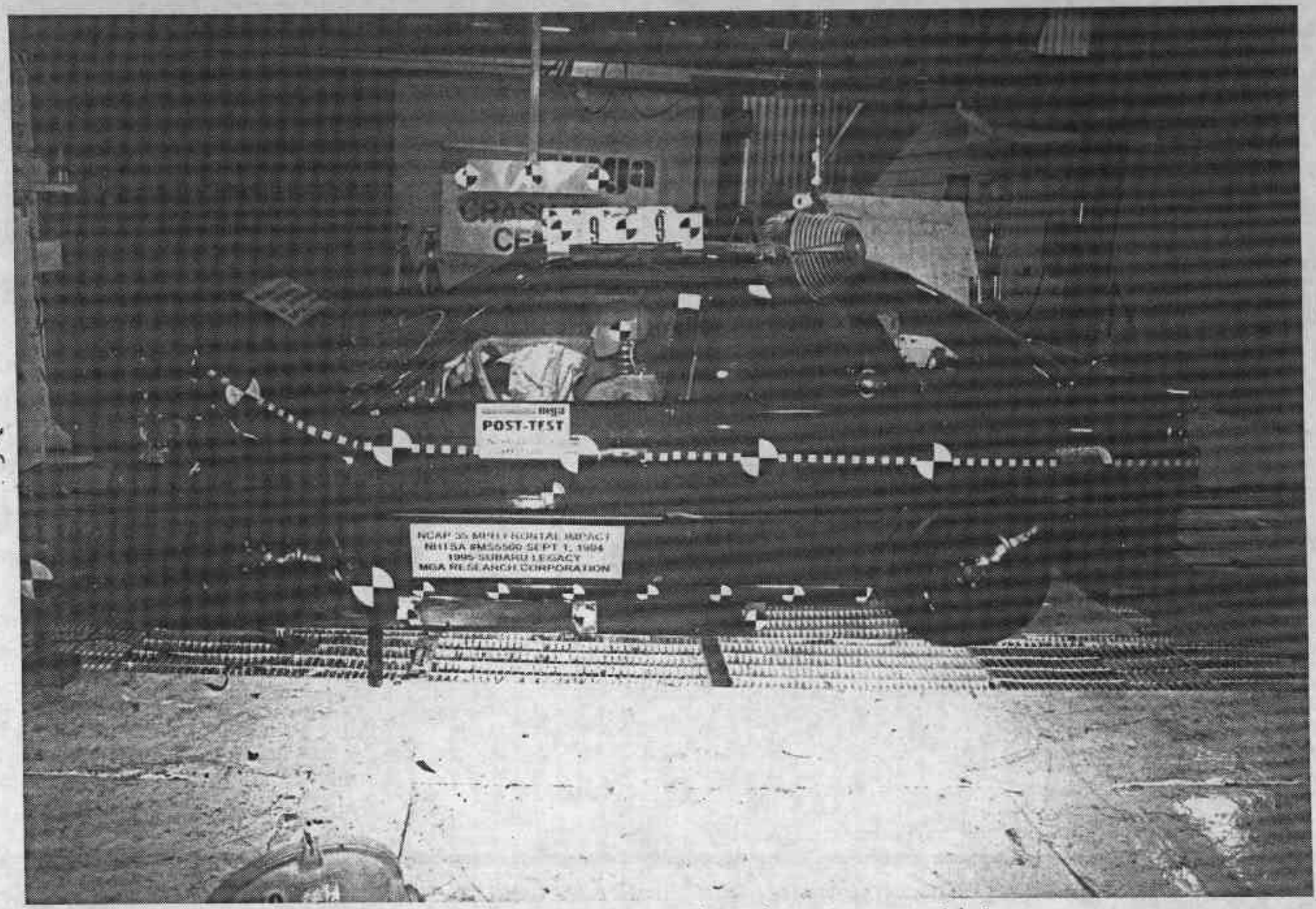
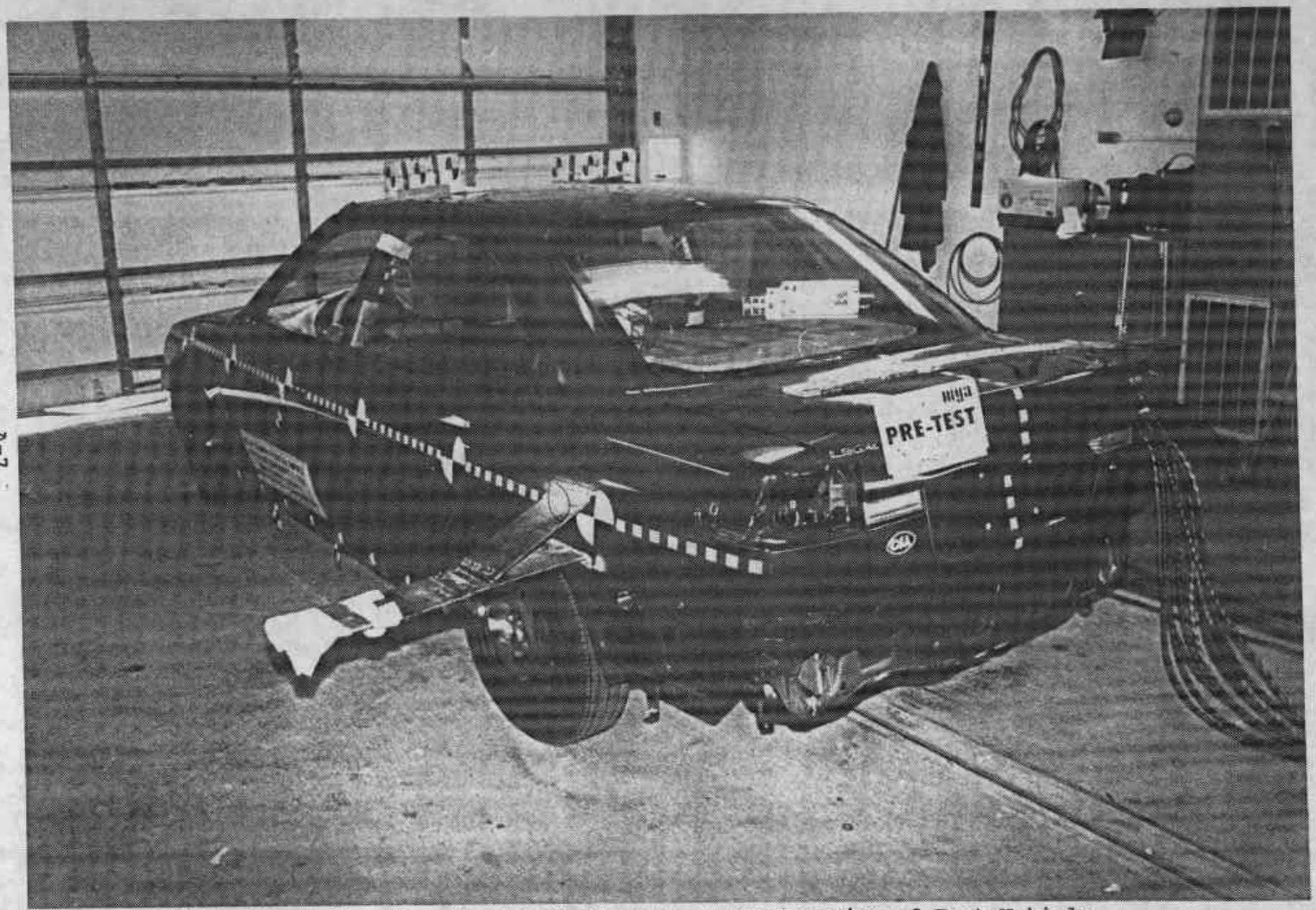


Photo No. A-6 - Post-Test Left Side View of Test Vehicle



A-7

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

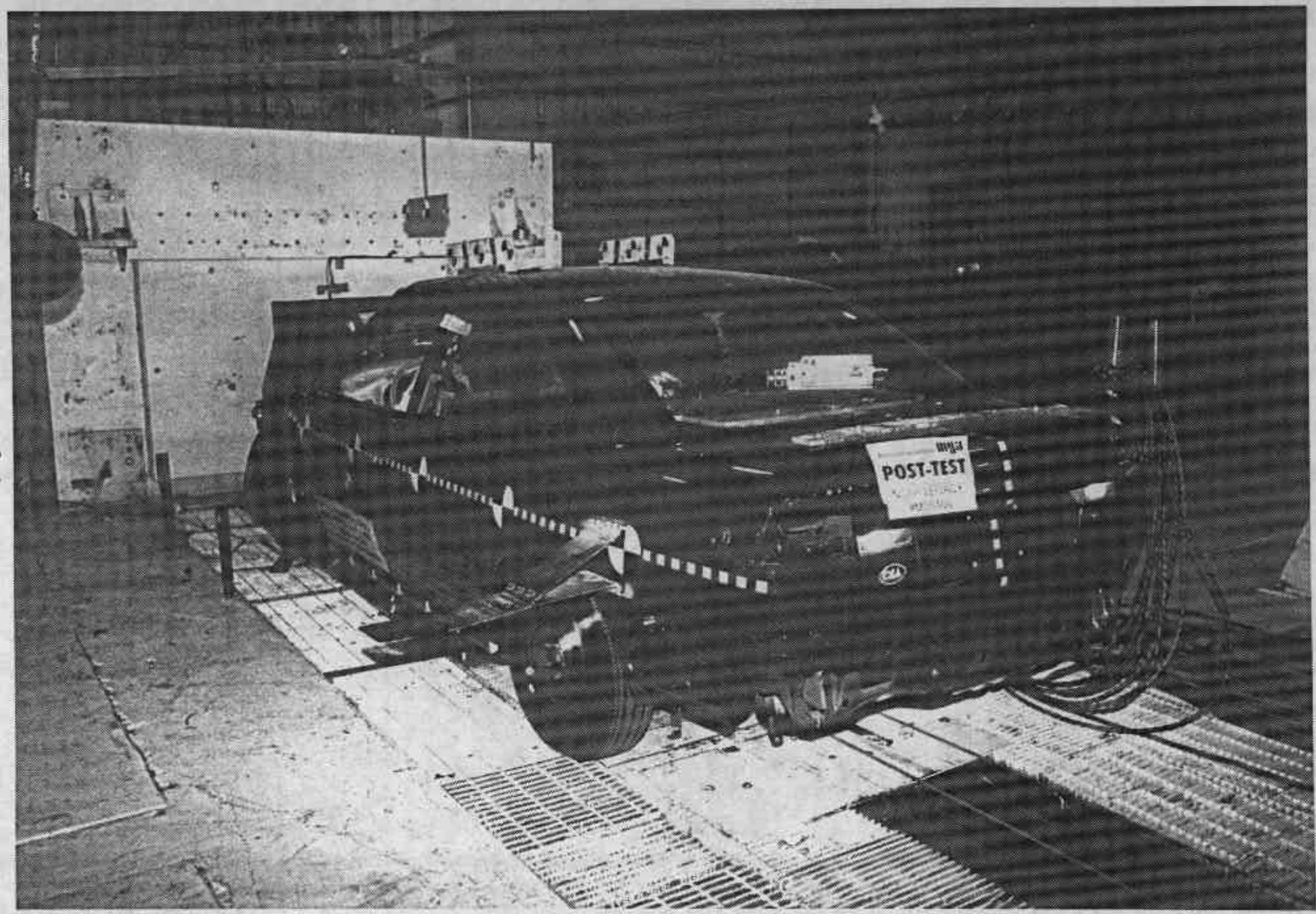


Photo No. A-8 - Post-Test Left Rear Three-Quarter View of Test Vehicle

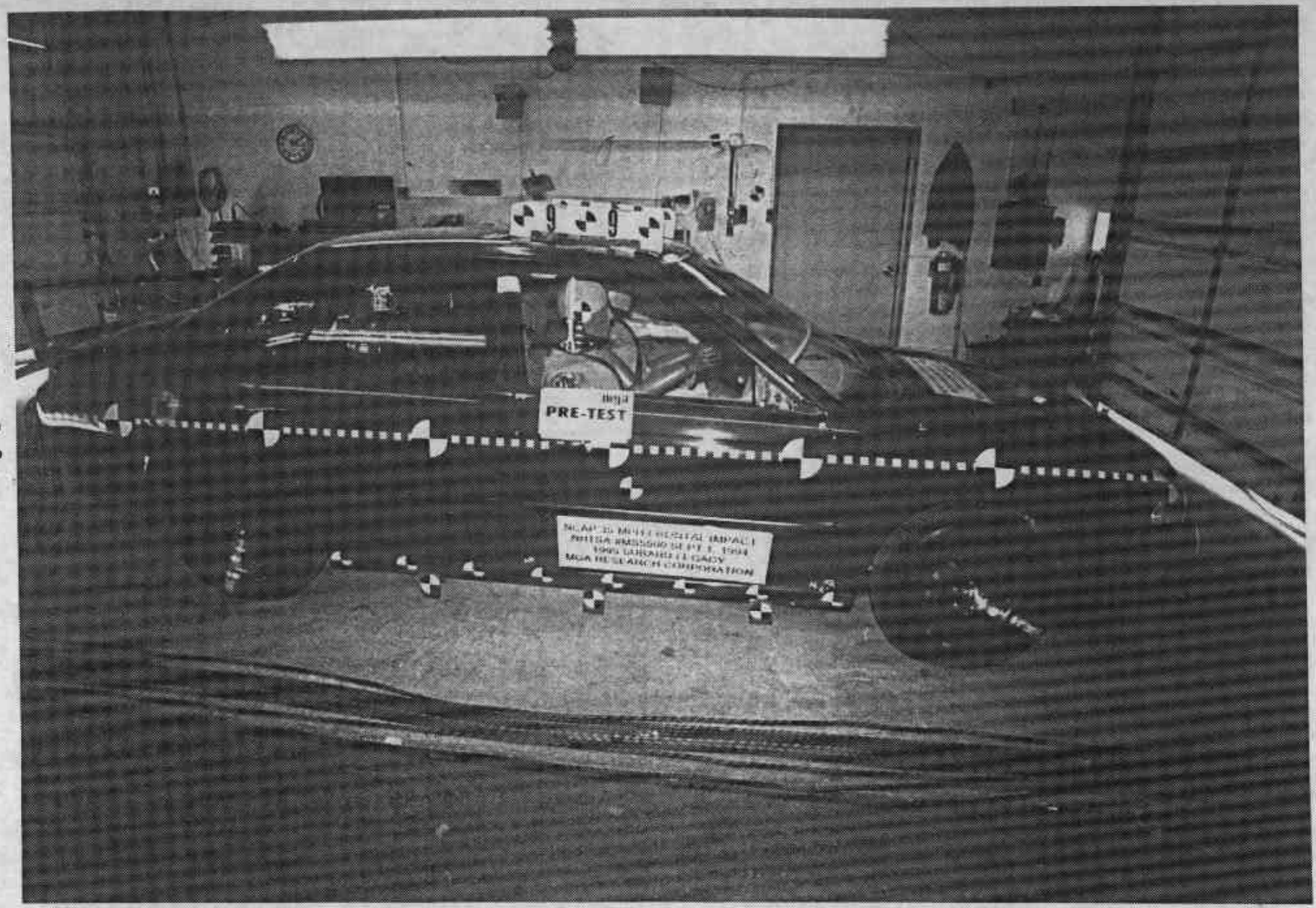


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

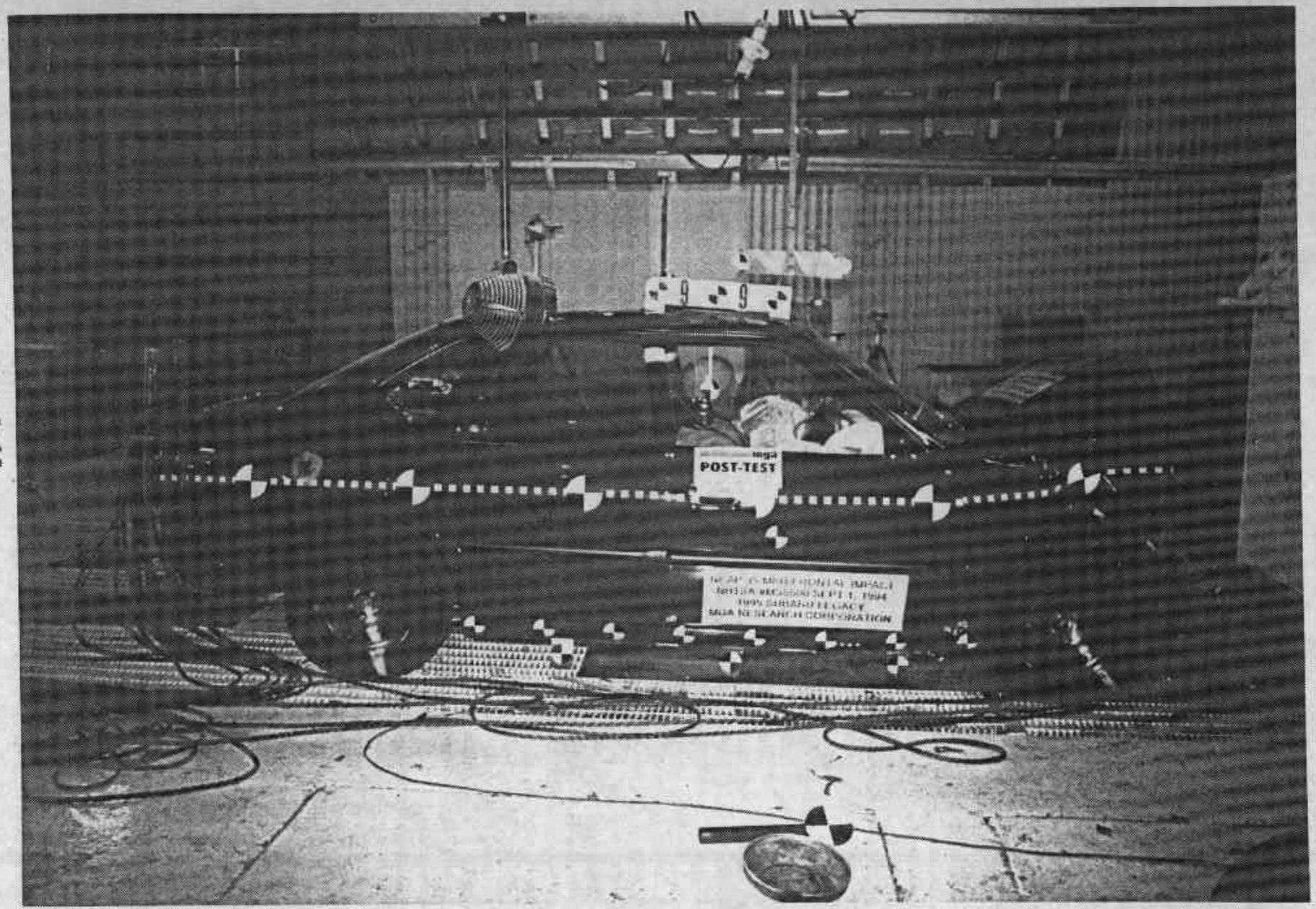


Photo No. A-10 - Post-Test Right Side View of Test Vehicle

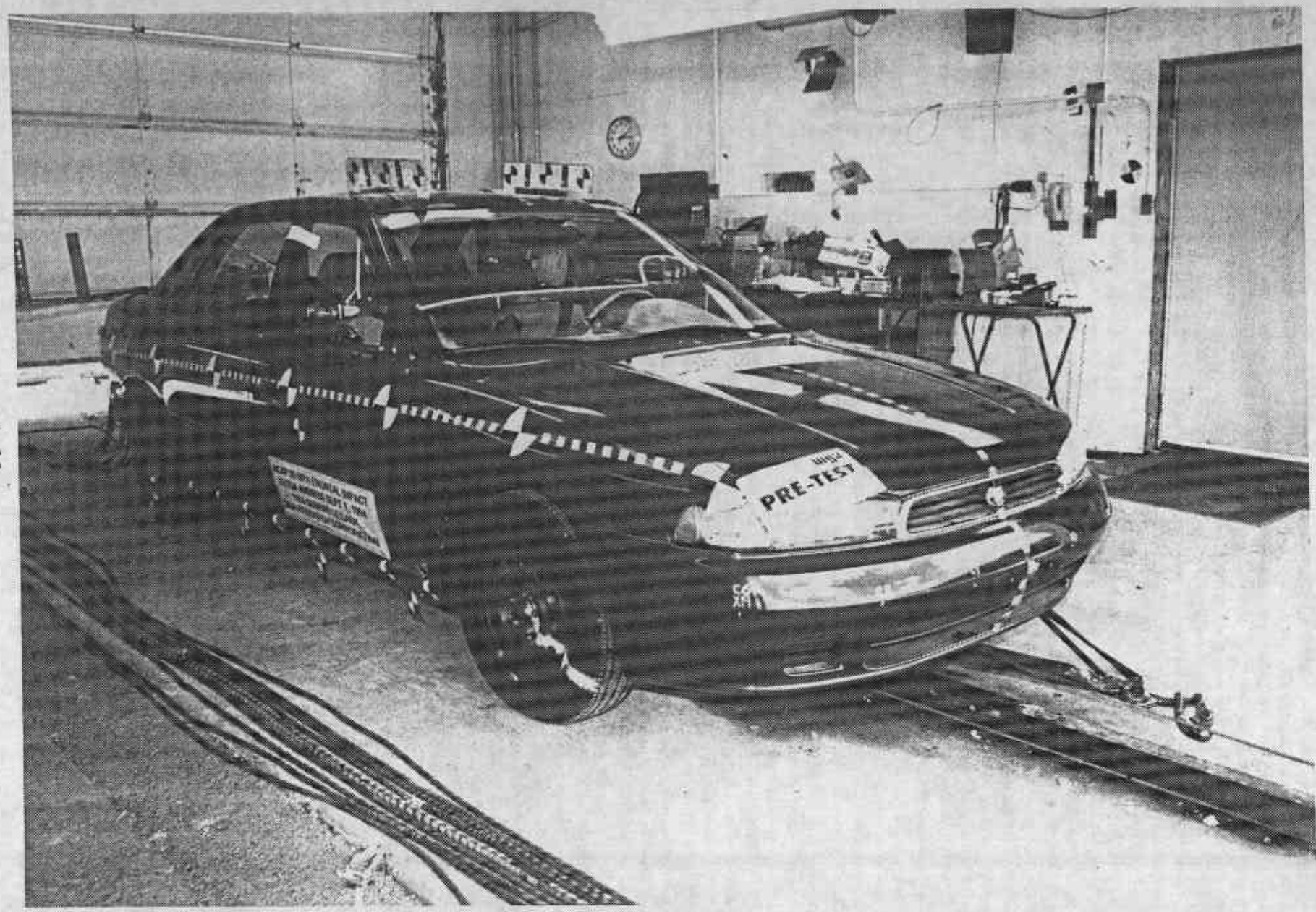


Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle

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

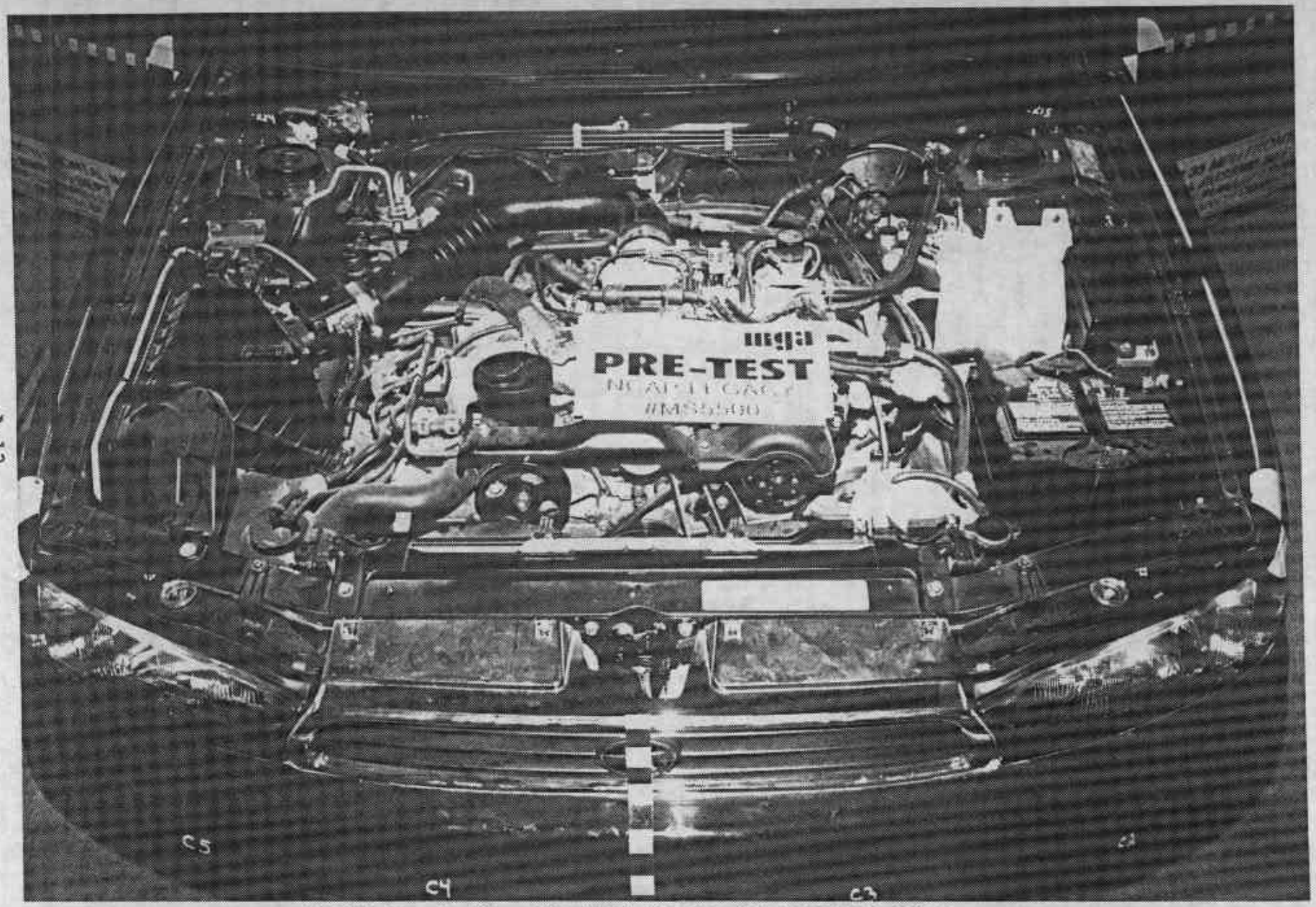


Photo No. A-13 - Pre-Test Engine Compartment View

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

A-15

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

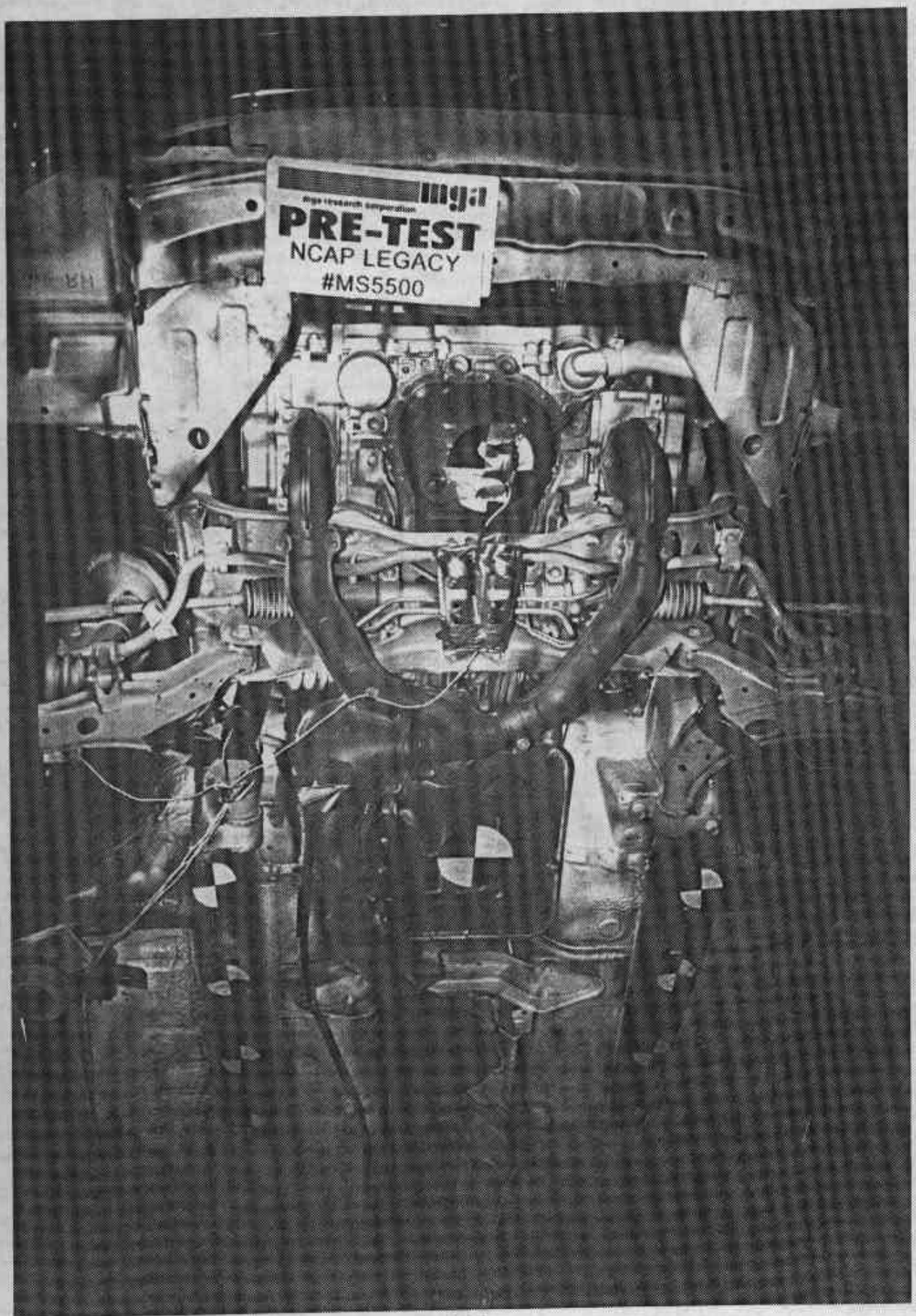


Photo No. A-16 - Pre-Test Front Underbody View

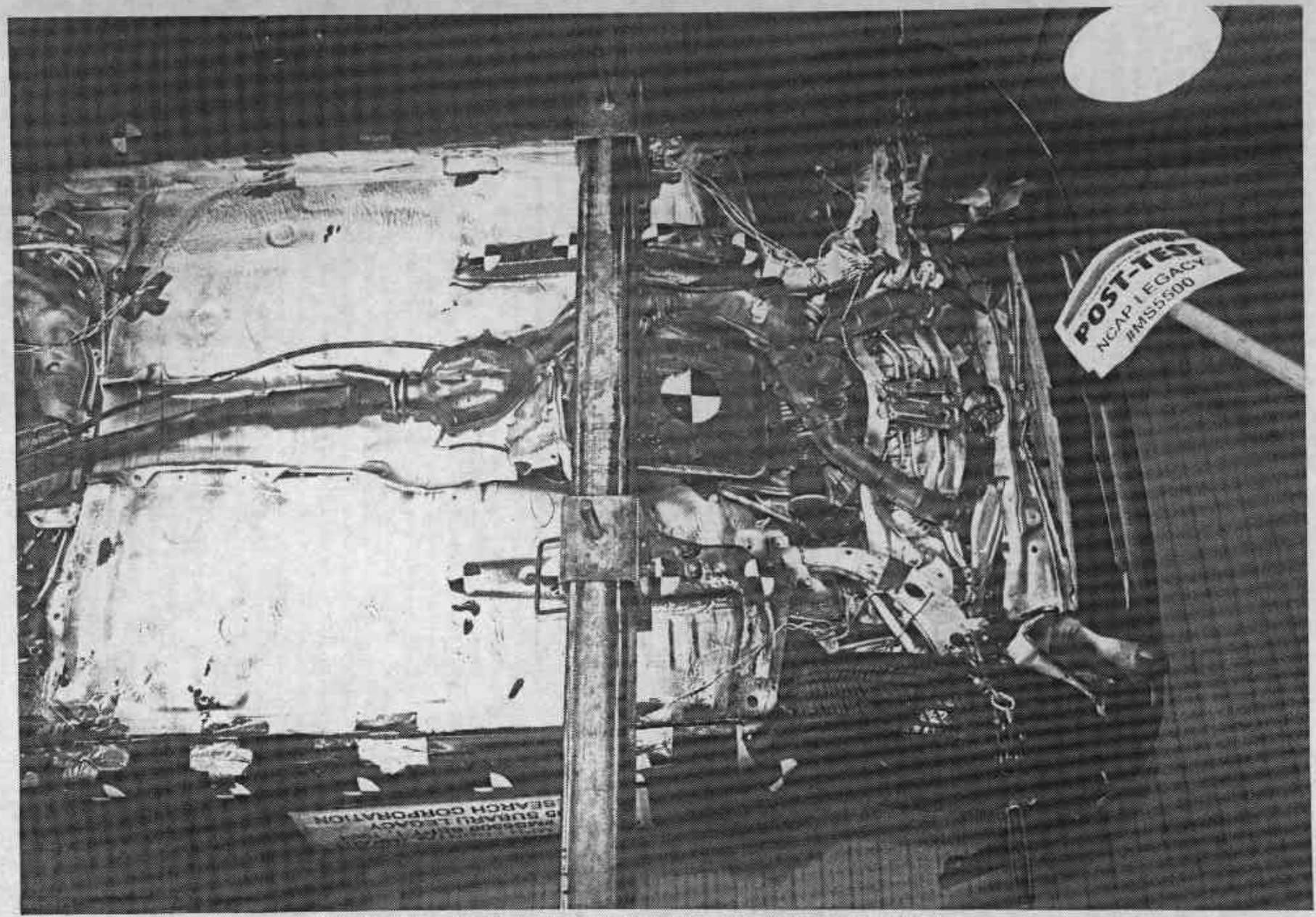


Photo No. A-17 - Post-Test Front Underbody View

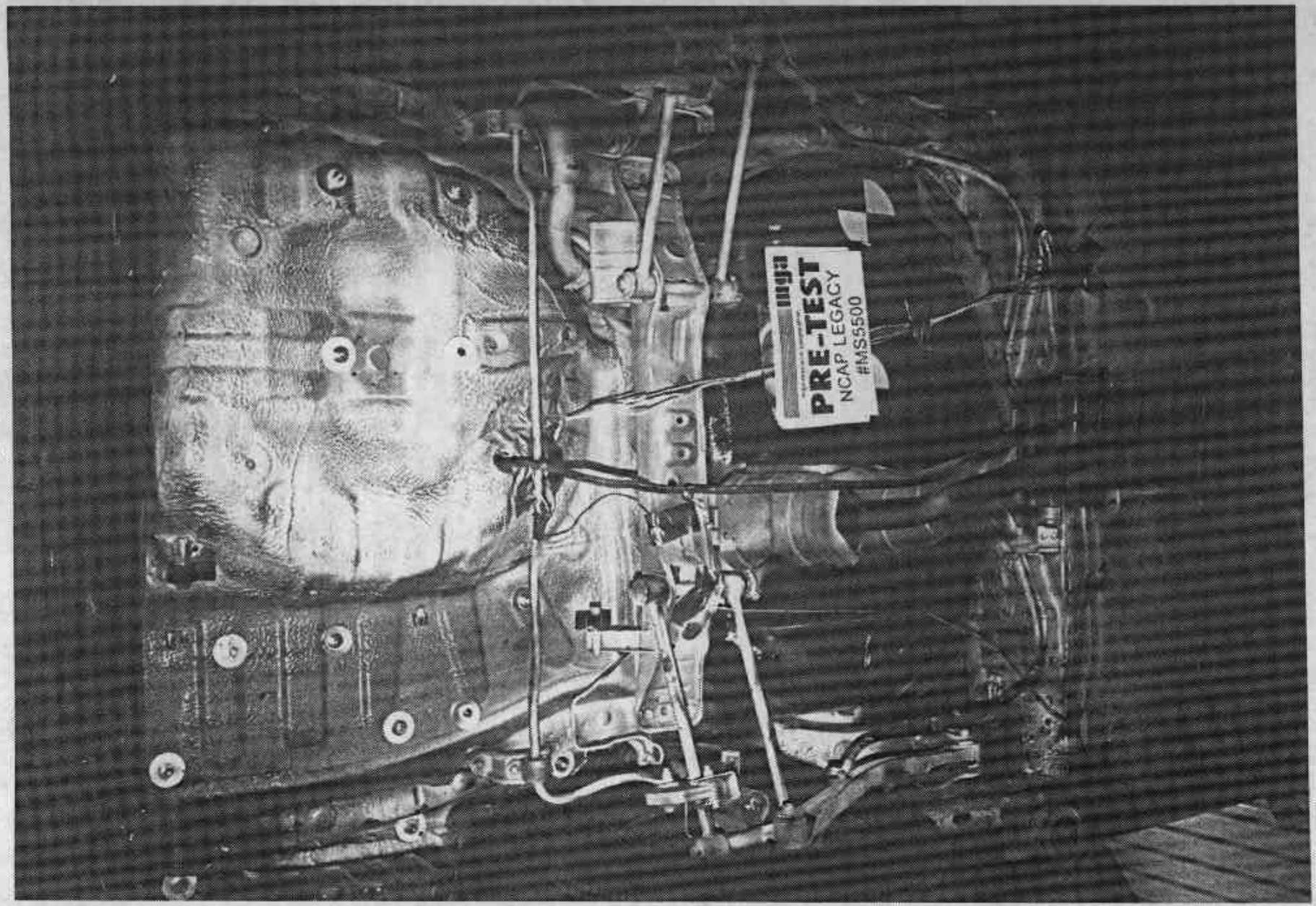


Photo No. A-18 - Pre-Test Rear Underbody View

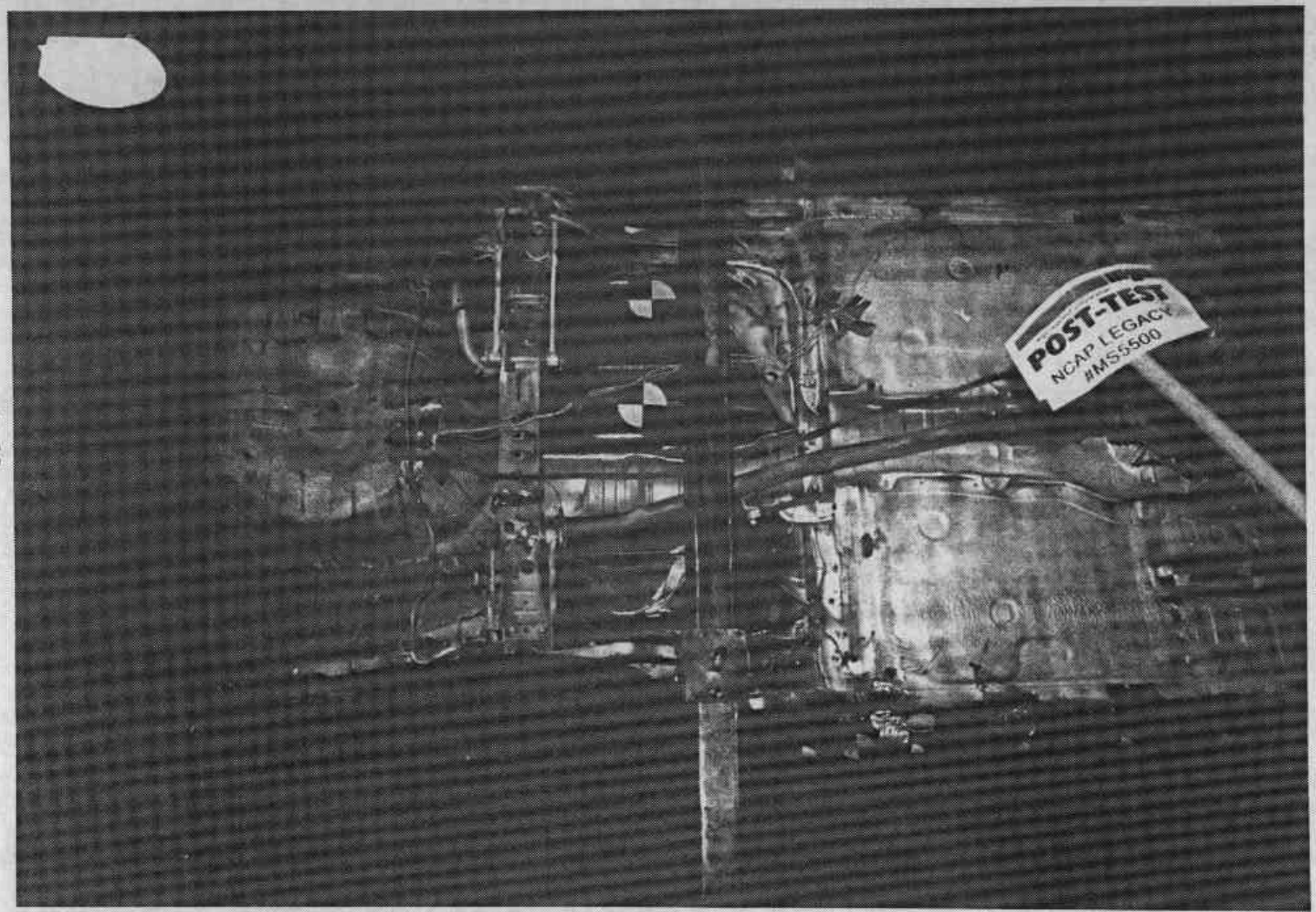
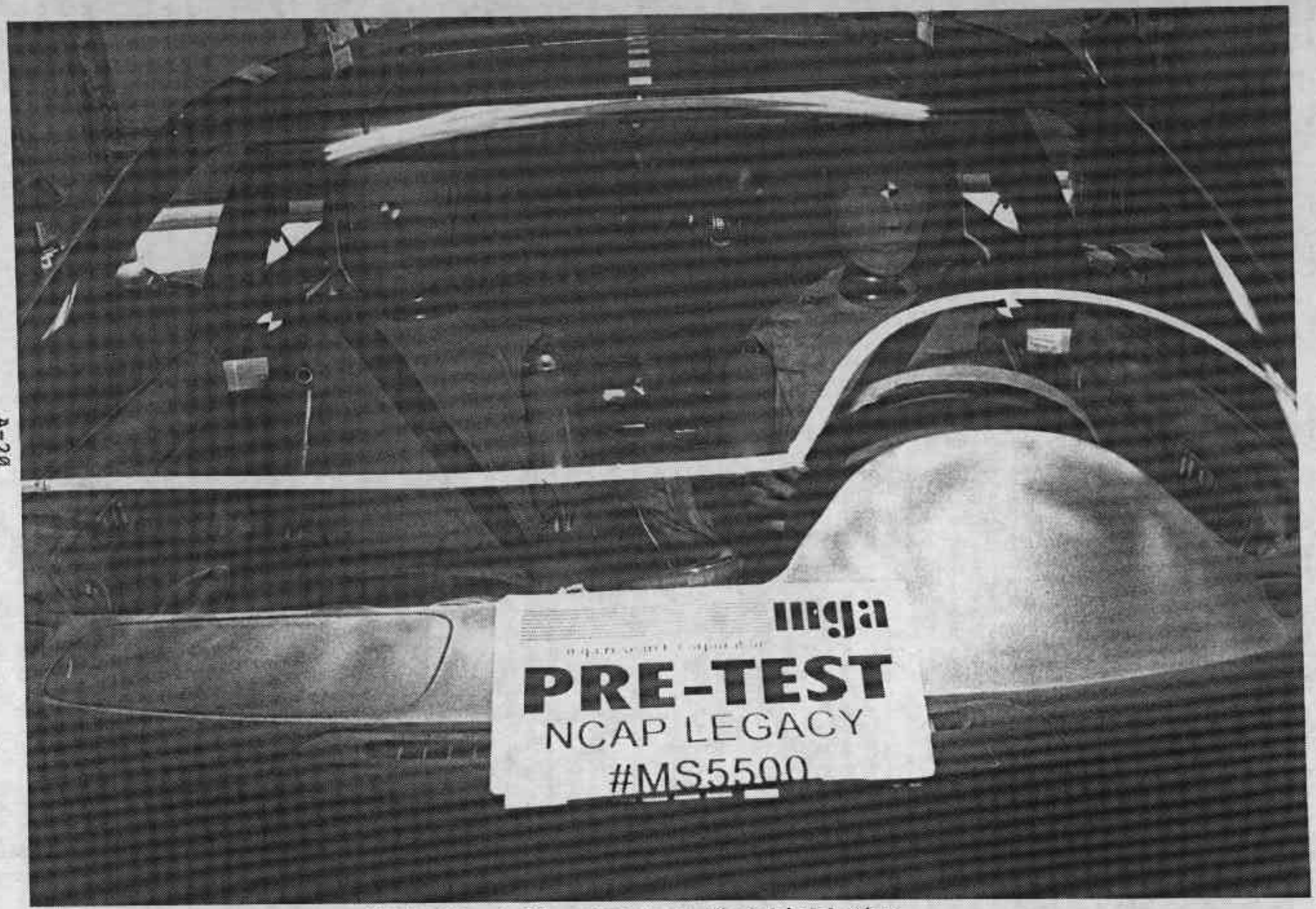


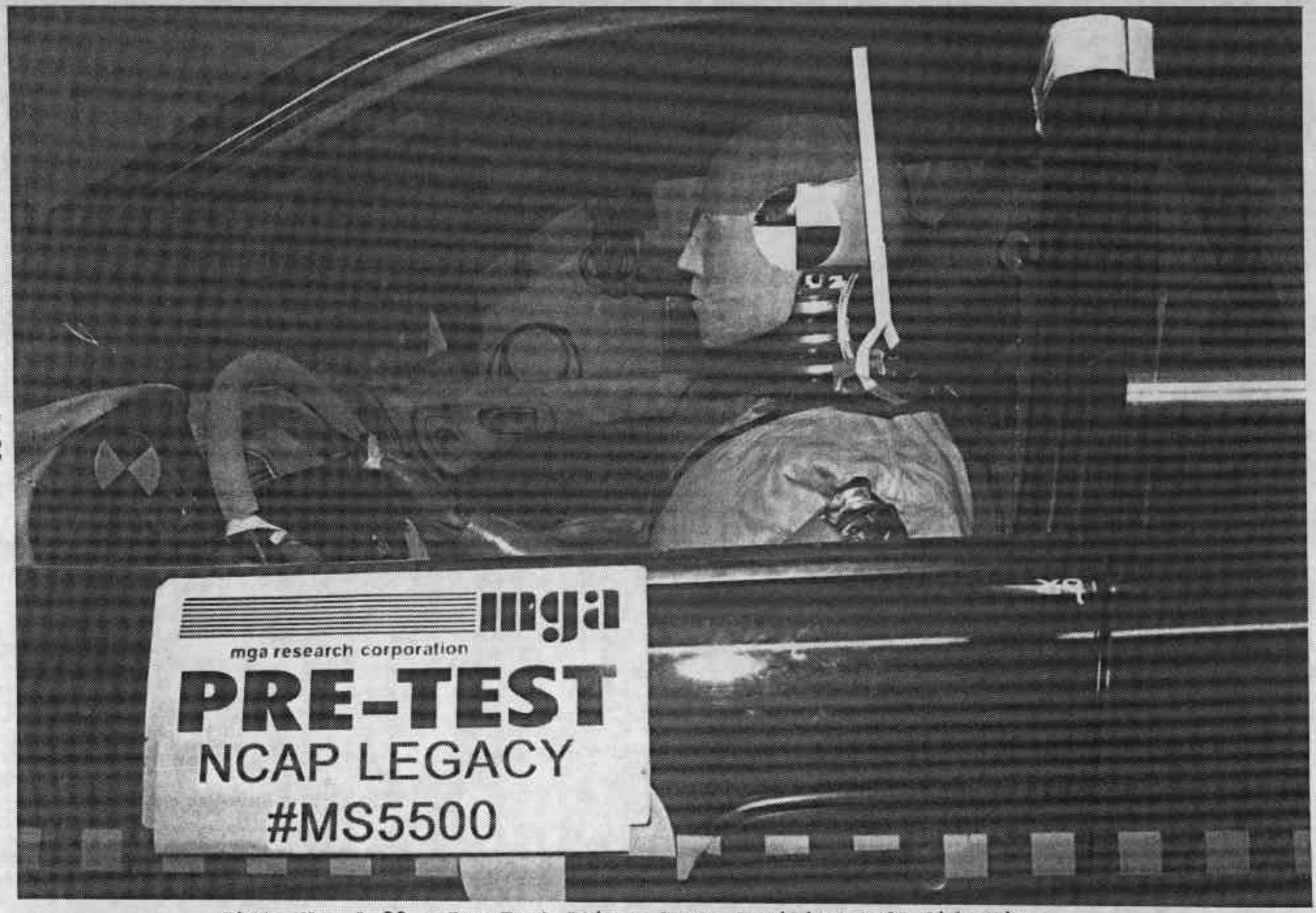
Photo No. A-19 - Post-Test Rear Underbody View



A-20

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

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



A-22

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

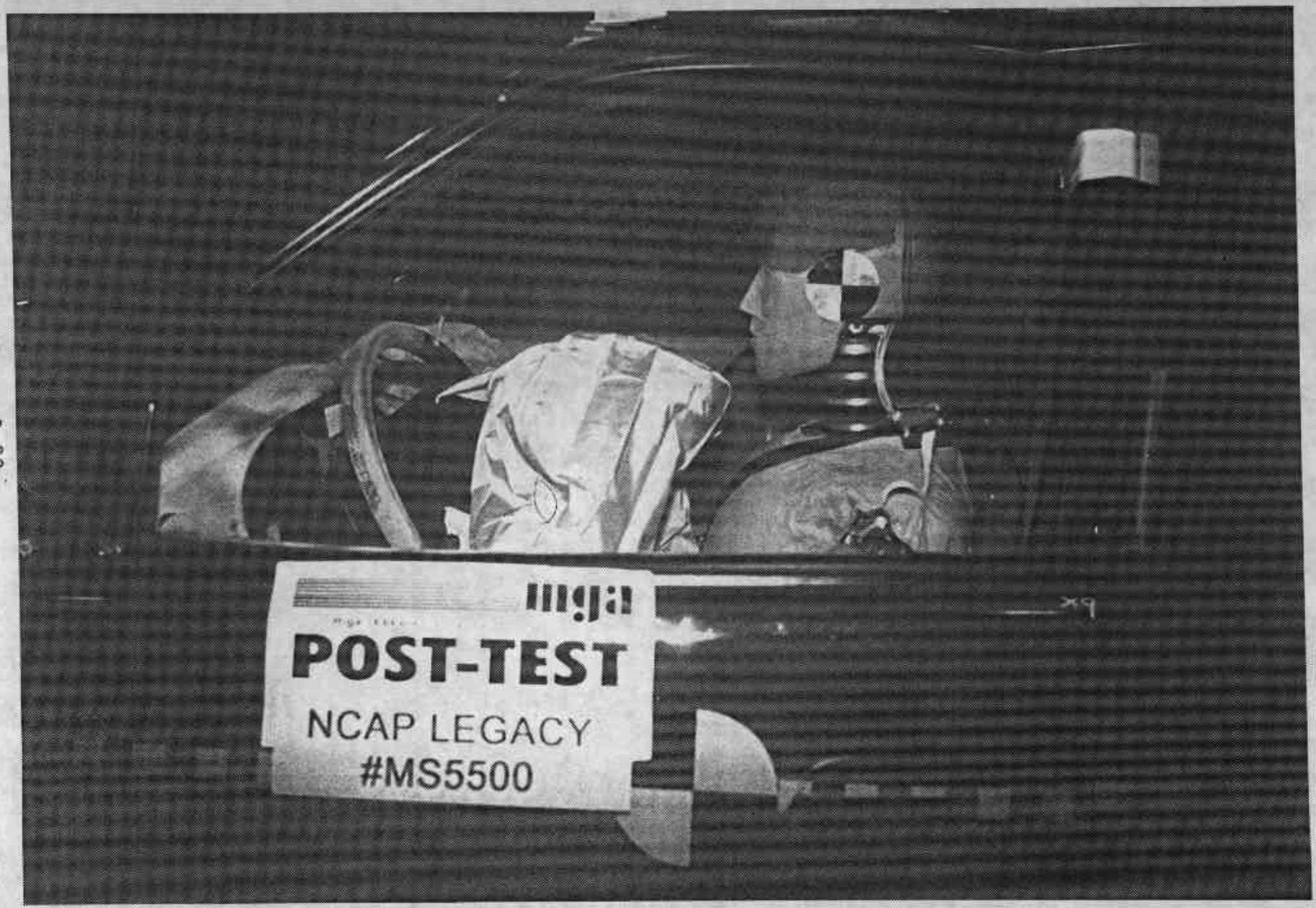


Photo No. A-23 - Post-Test Driver Dummy Position Left Side View

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

A-27

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

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

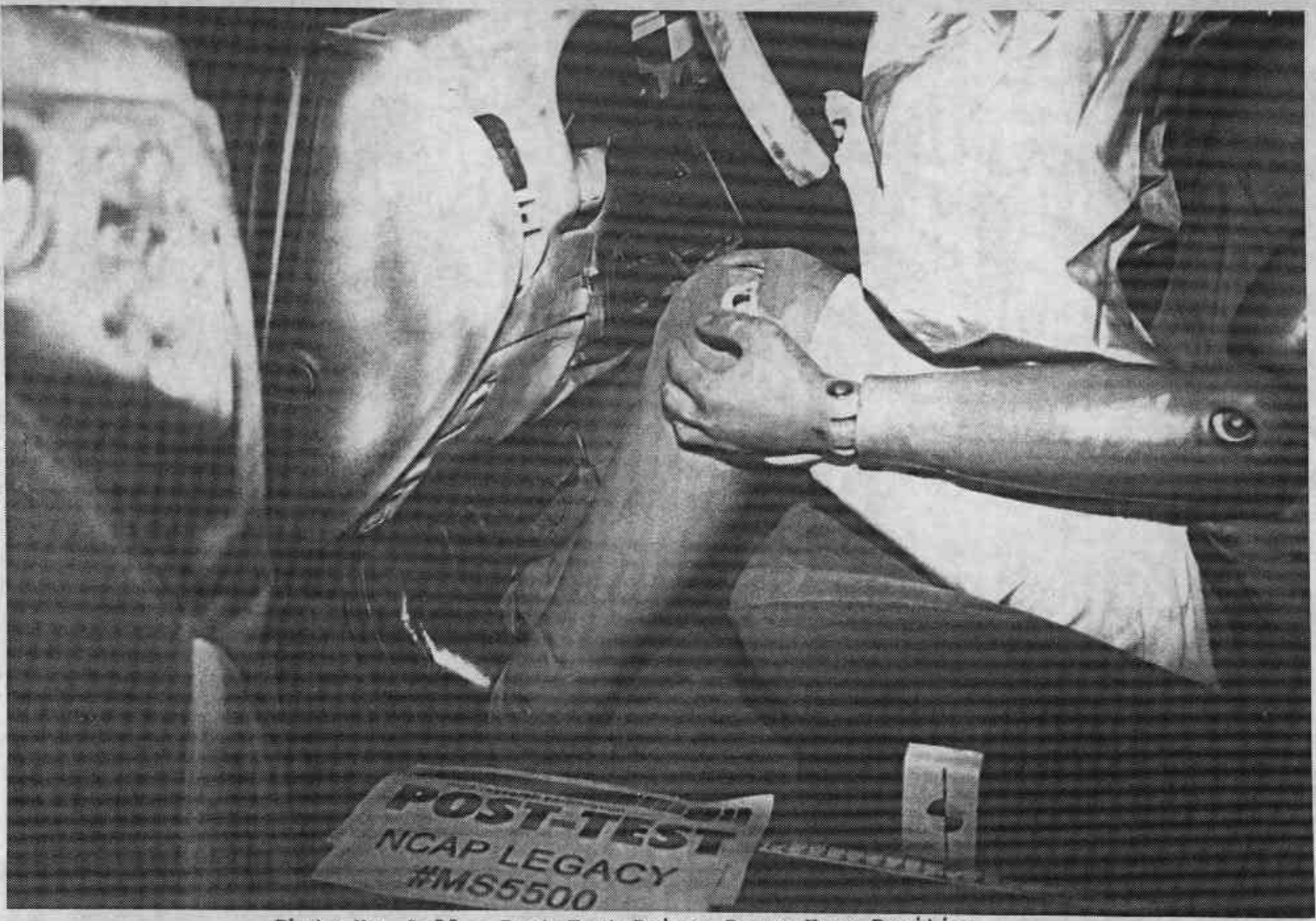
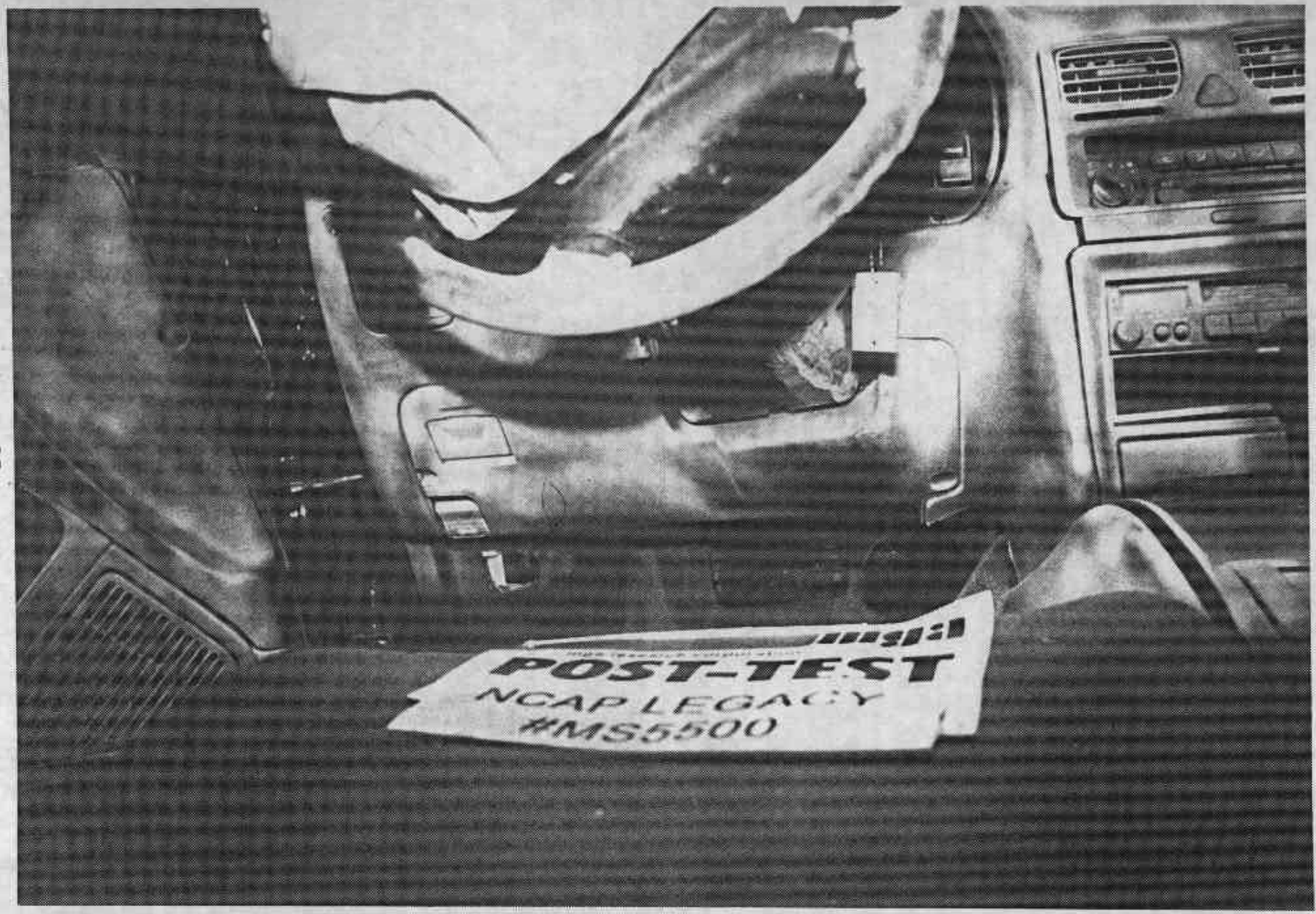


Photo No. A-29 - Post-Test Driver Dummy Knee Position



A-30

Photo No. A-30 - Post-Test Driver Dummy Knee Contact

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

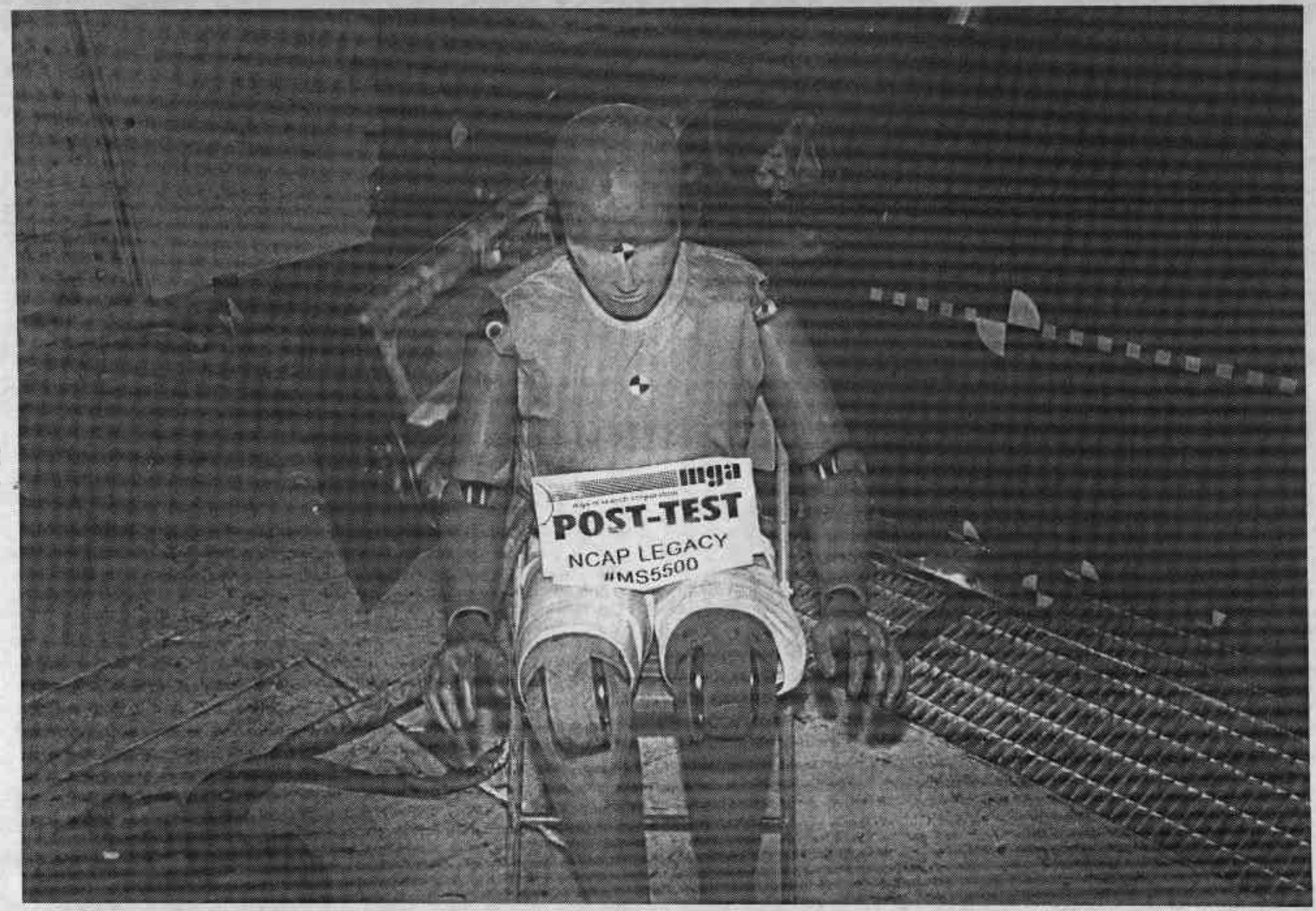
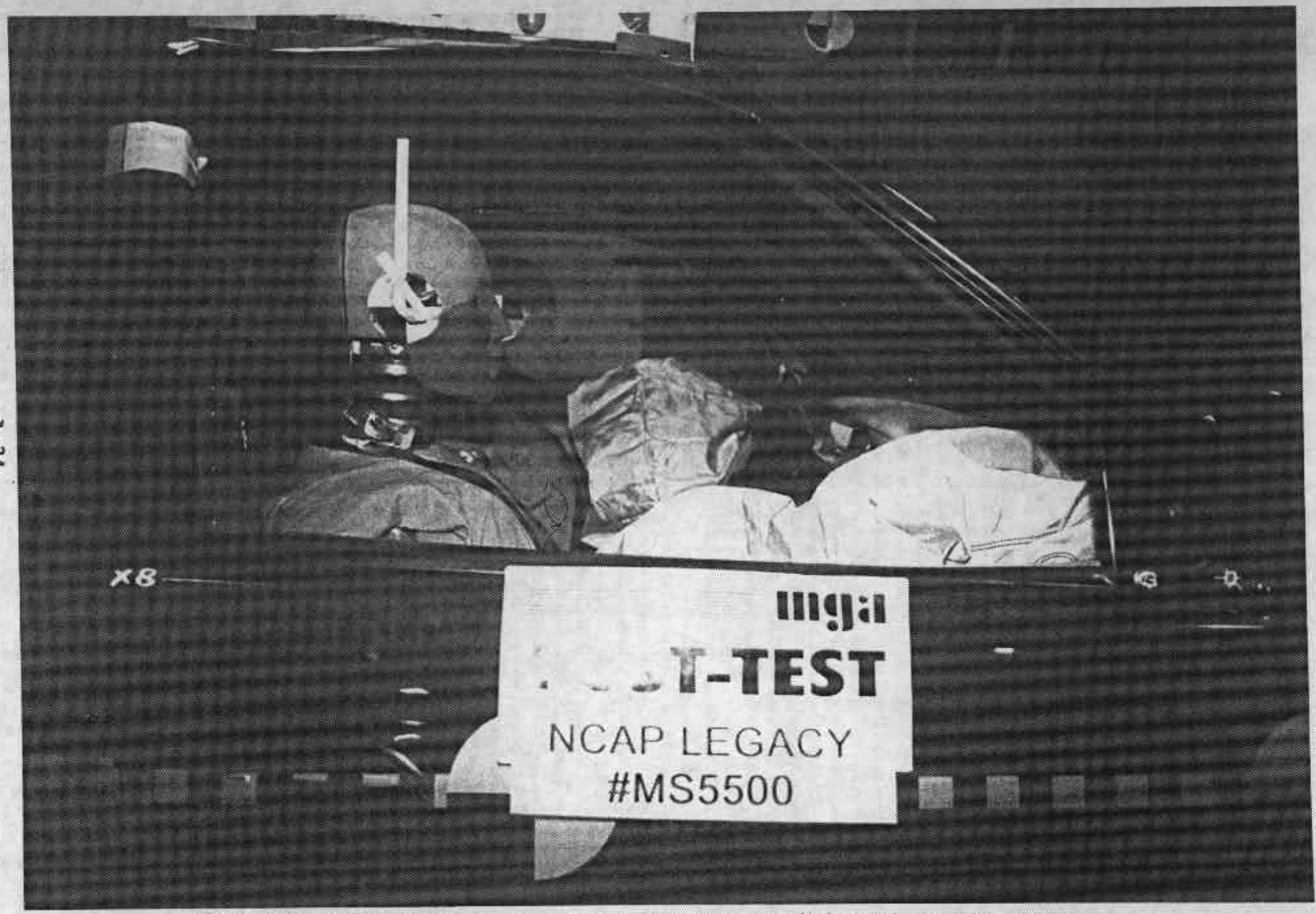


Photo No. A-32 - Post-Test Driver Dummy Out of Vehicle

A-33

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



A-34

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)

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

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

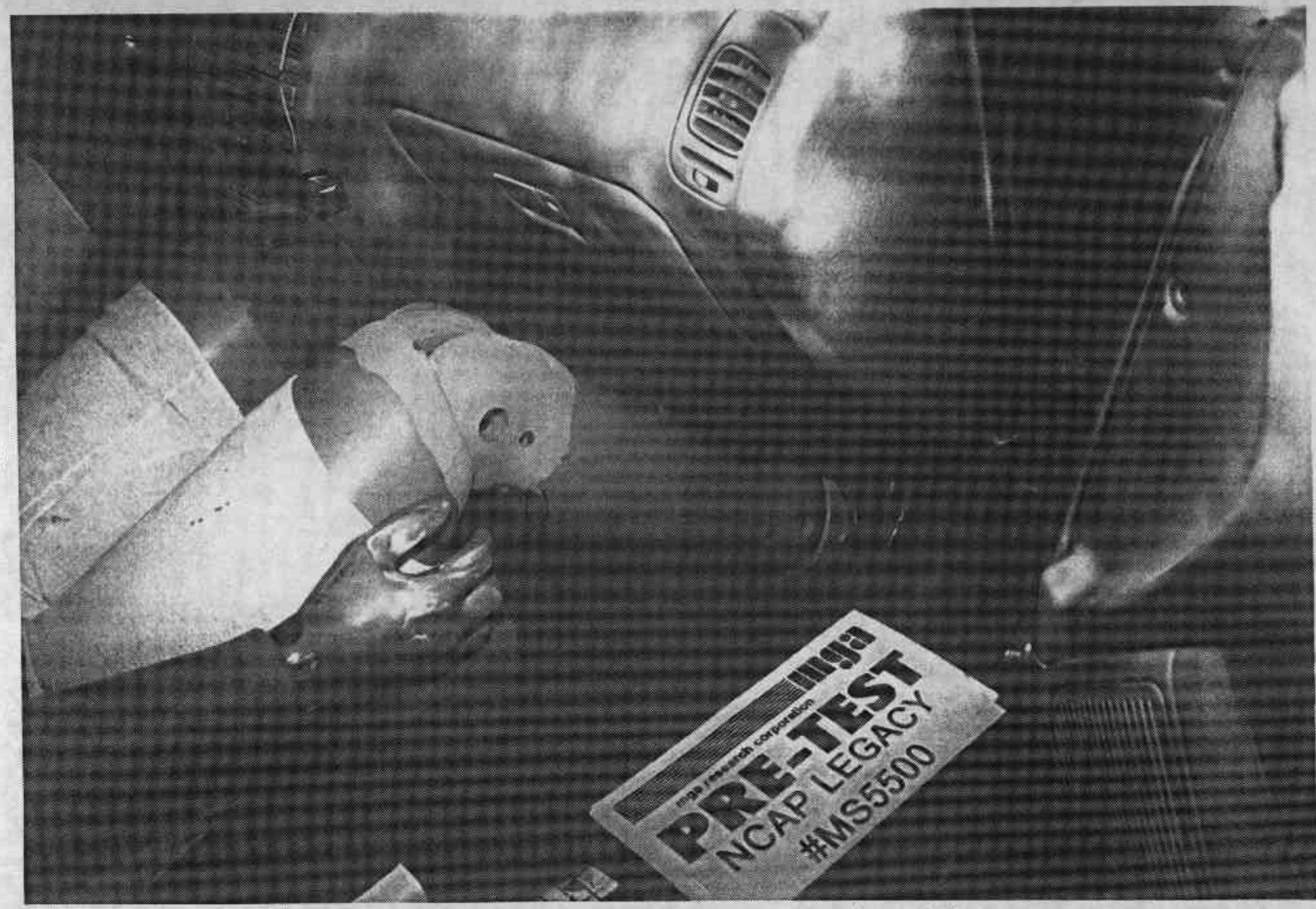


Photo No. A-39 - Pre-Test Passenger Dummy Knee Position

Photo No. A-40 - Post "est Passenger Dummy Knee Position

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

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

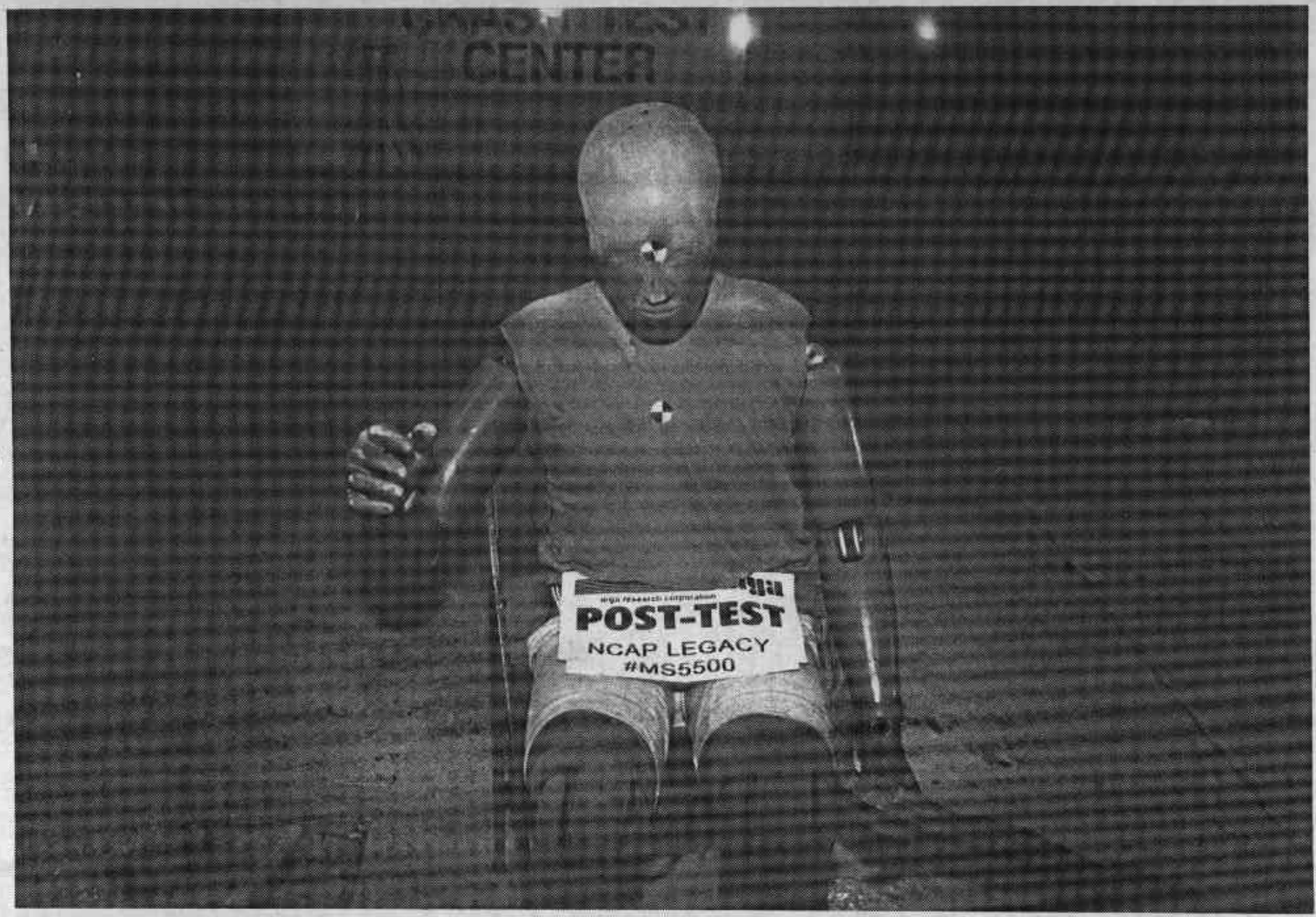


Photo No. A-43 - Post-Test Passenger Dummy Out of Vehicle

A-44

Photo No. A-44 - Vehicle Certification Label

A-45

Photo No. A-45 - Tire Placard

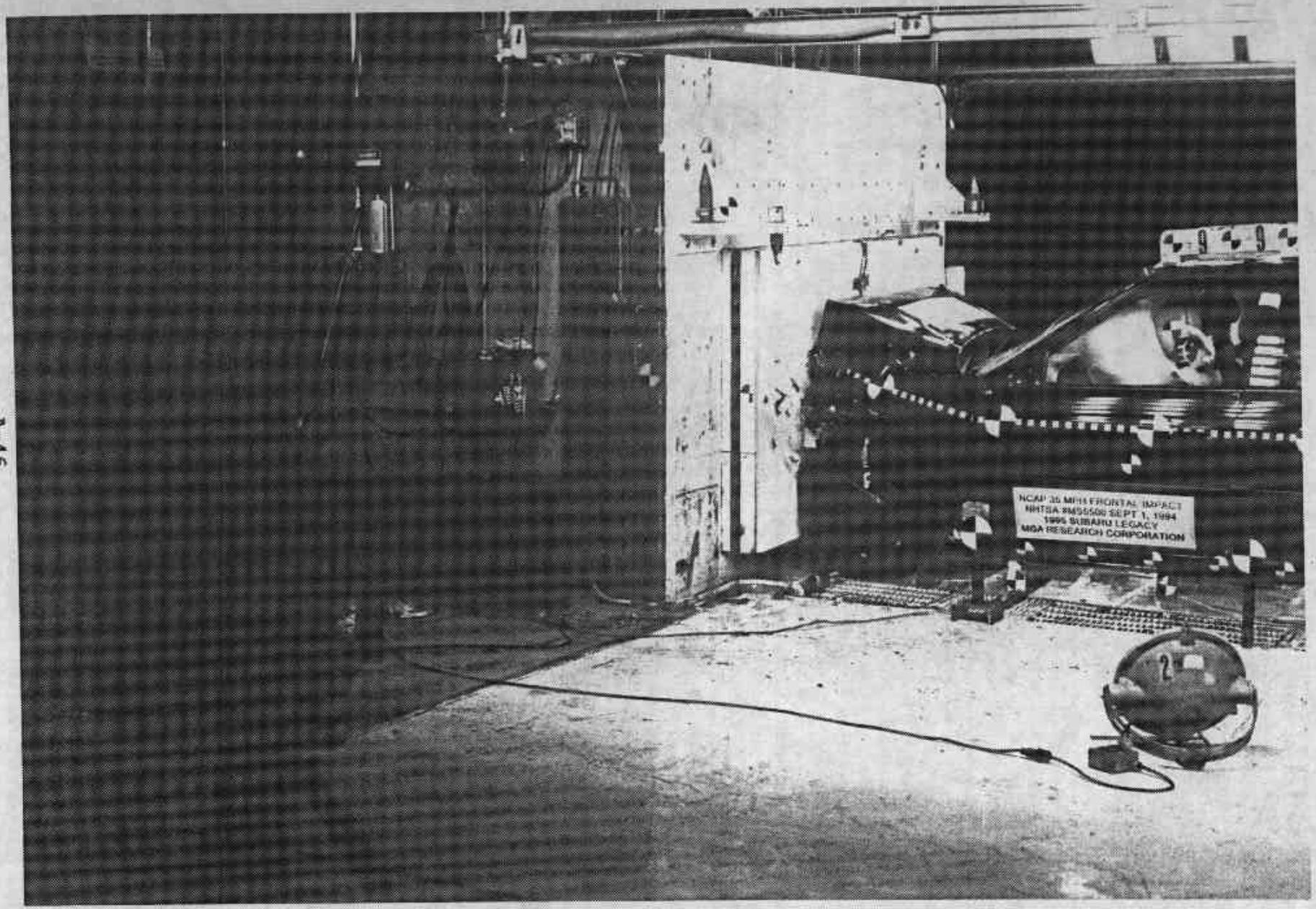


Photo No. A-46 - Impact

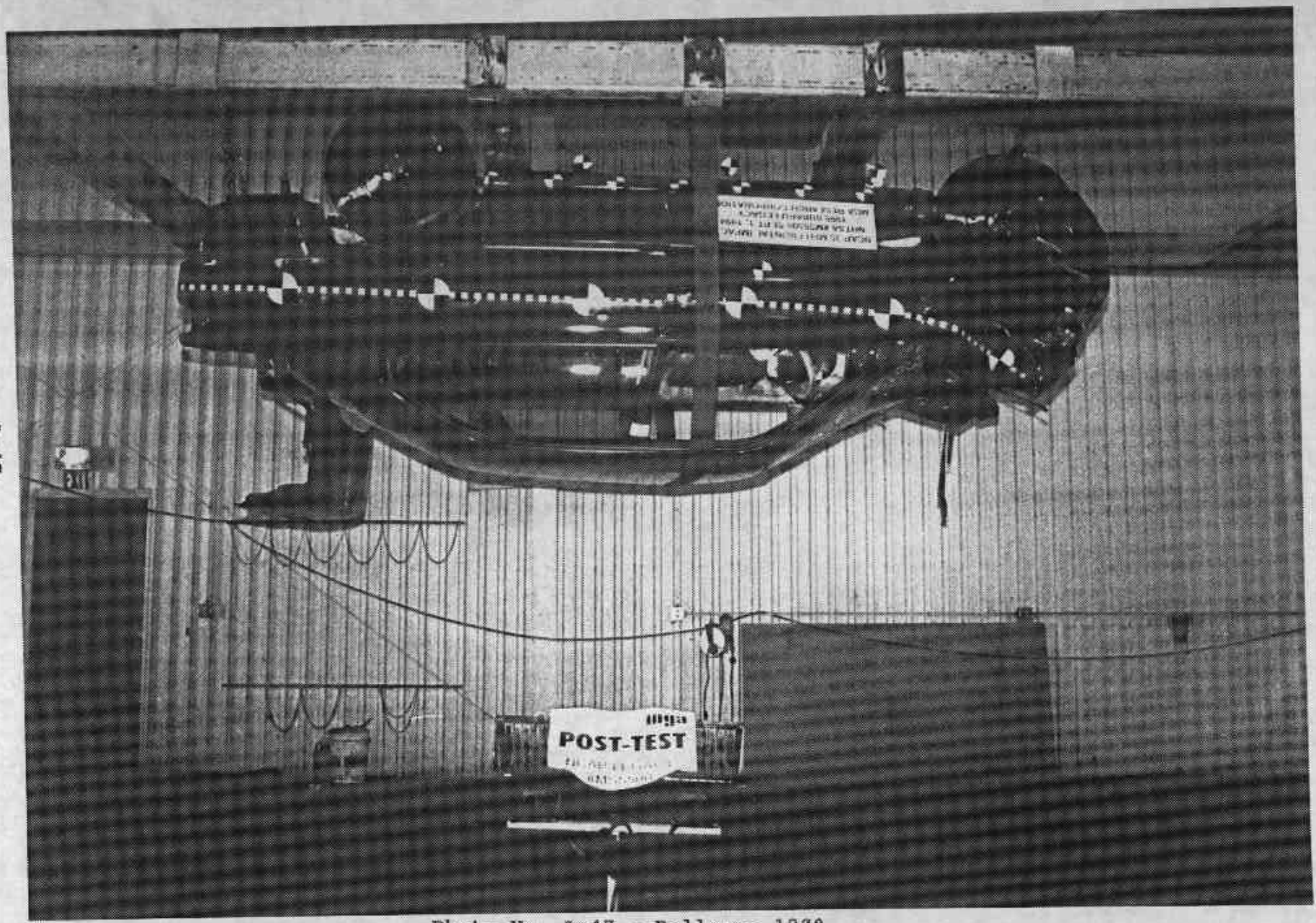


Photo No. A-47 - Rollover 180°

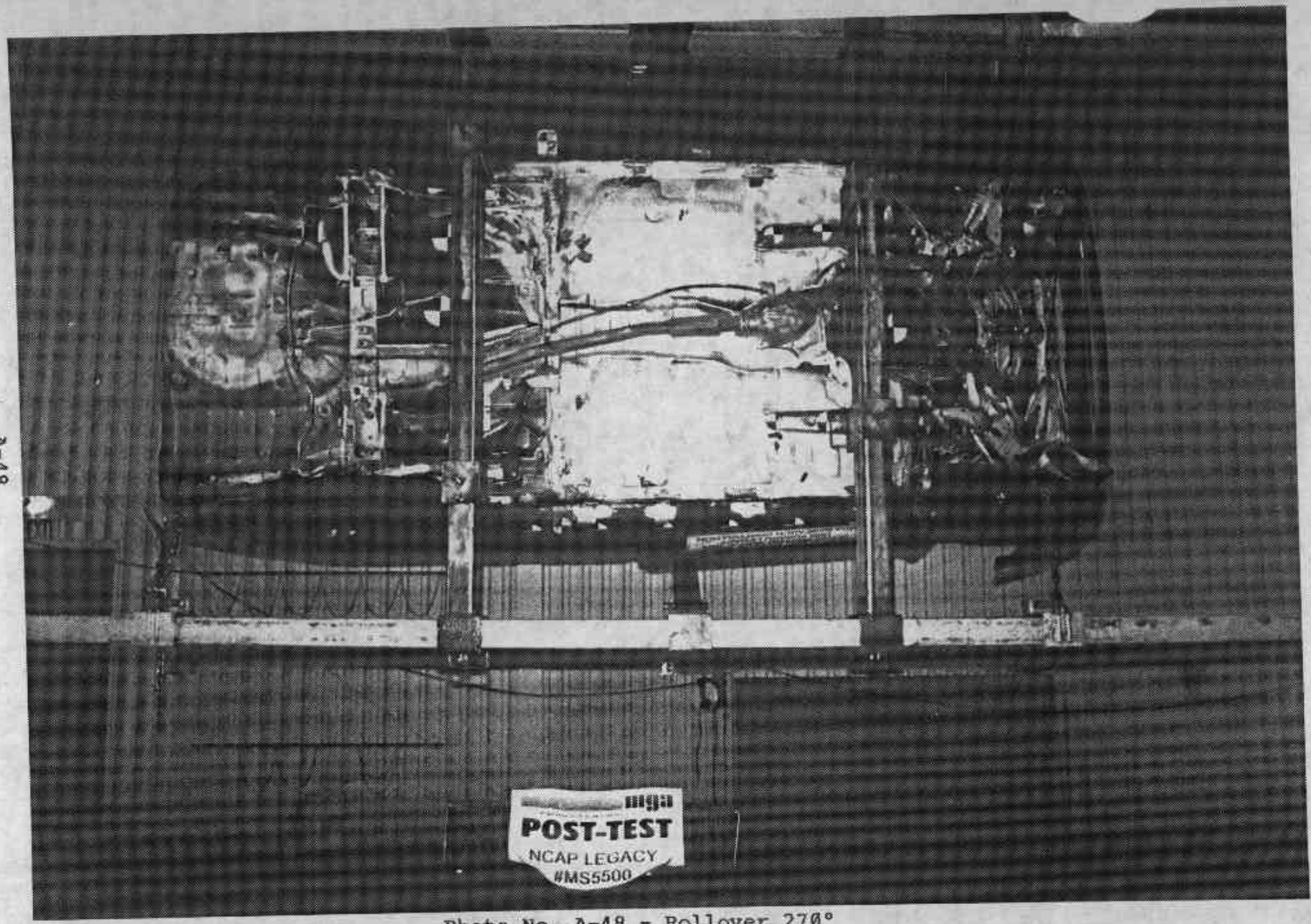


Photo No. A-48 - Rollover 270°

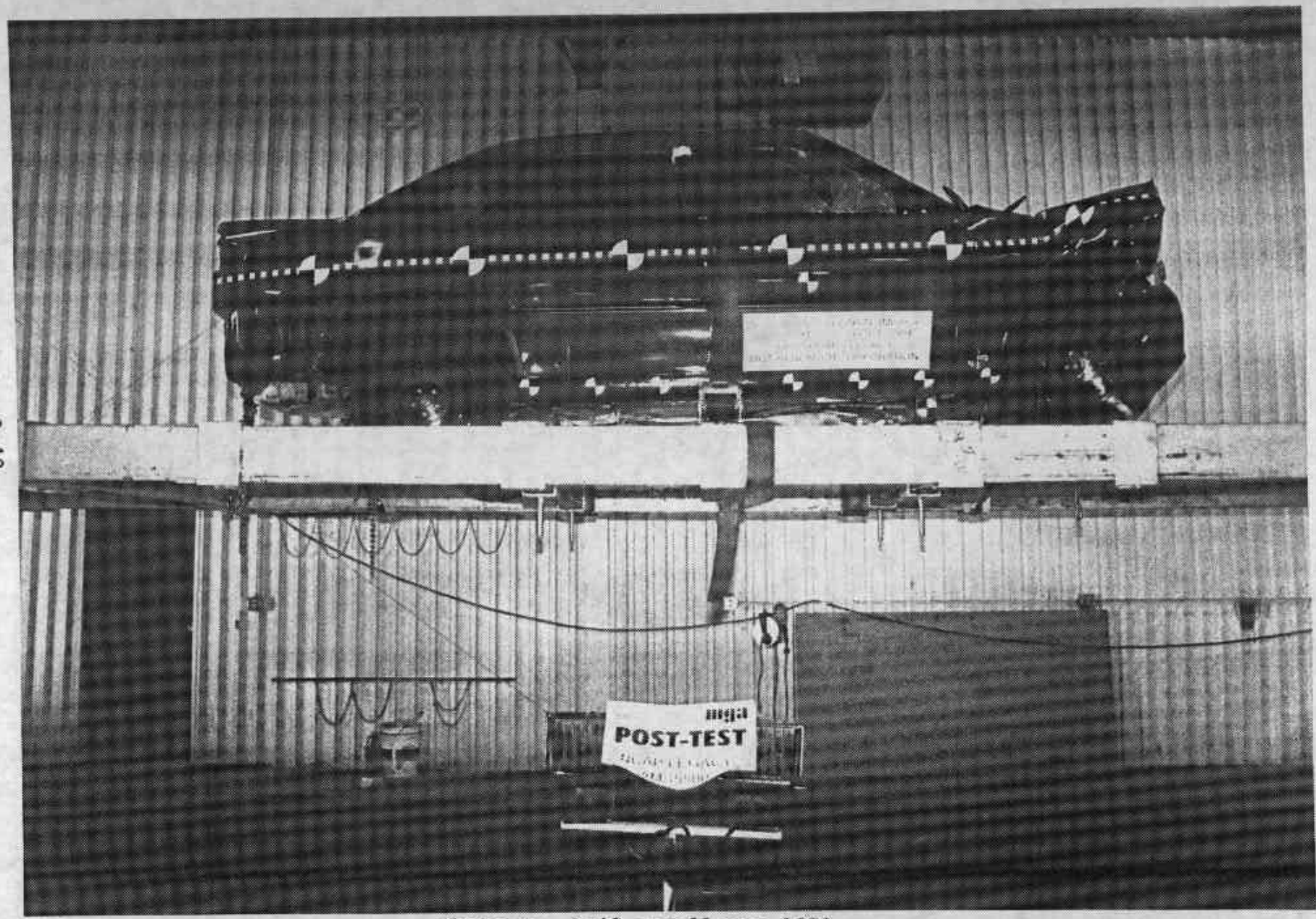


Photo No. A-49 - Rollover 360°

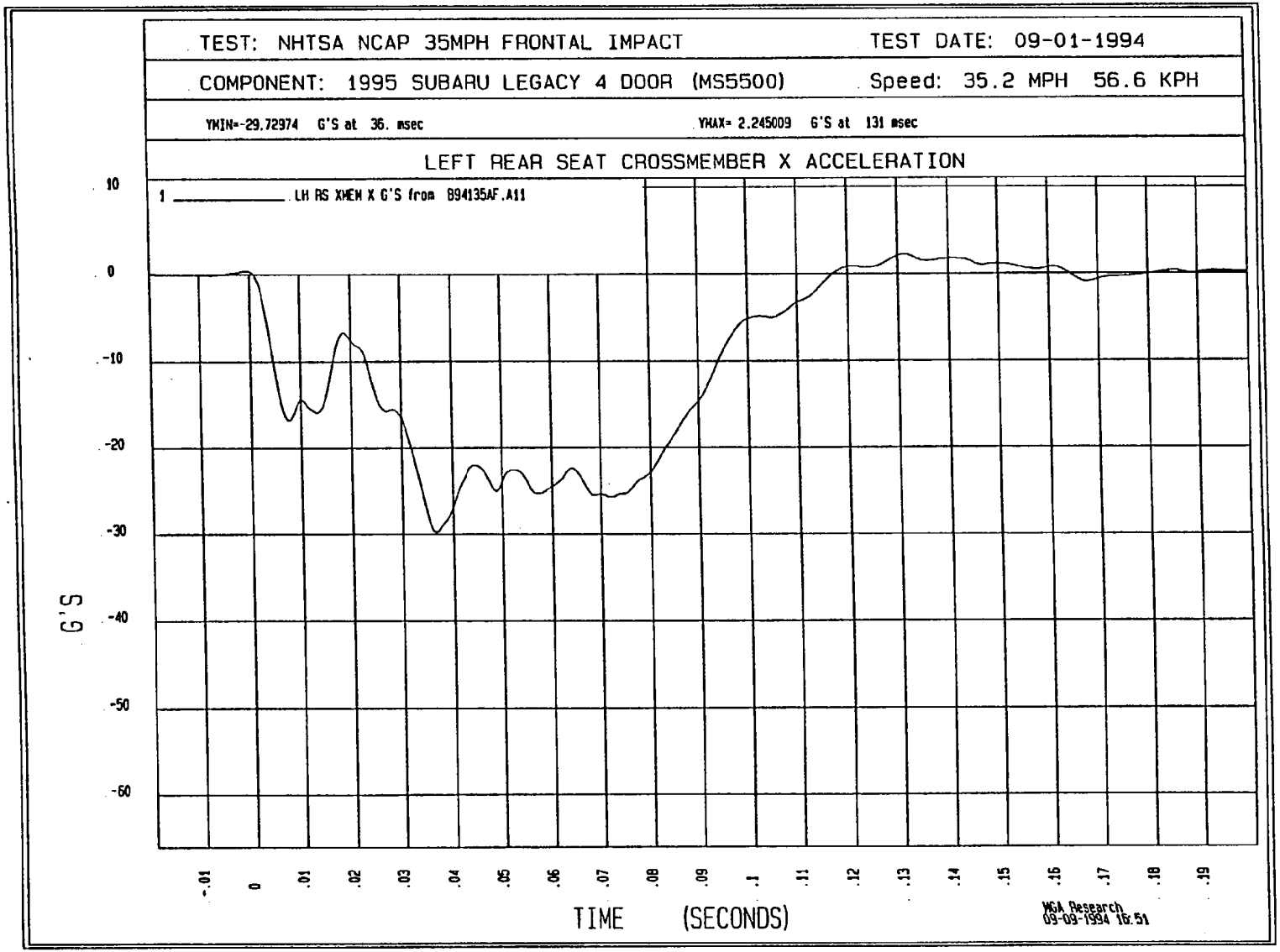
APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1995 SUBARU LEGACY 4-DOOR

NHTSA NO.: MS5500

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)



B-1

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

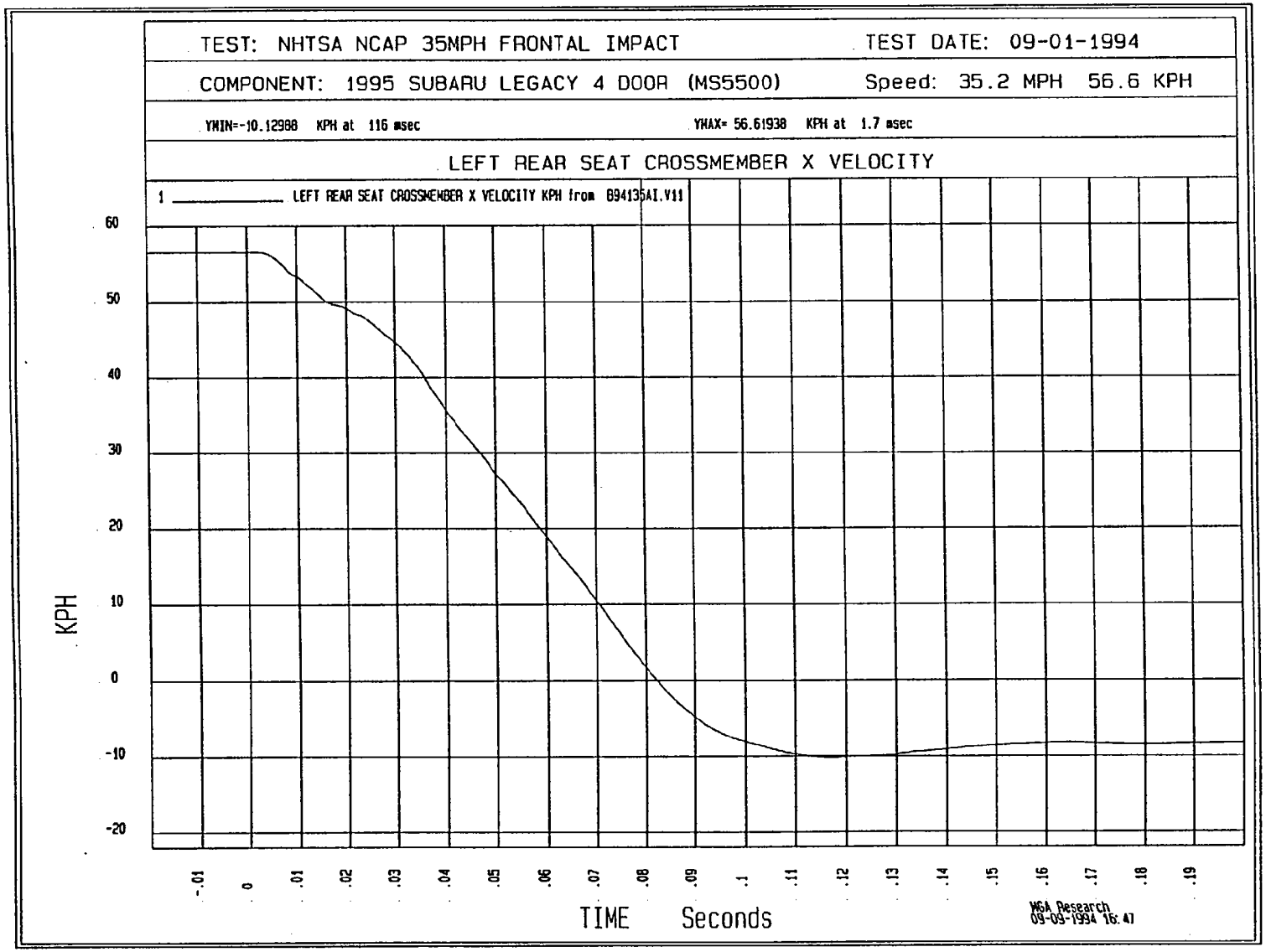


Figure B-2 - Left Rear Seat Crossmember X Velocity vs. Time

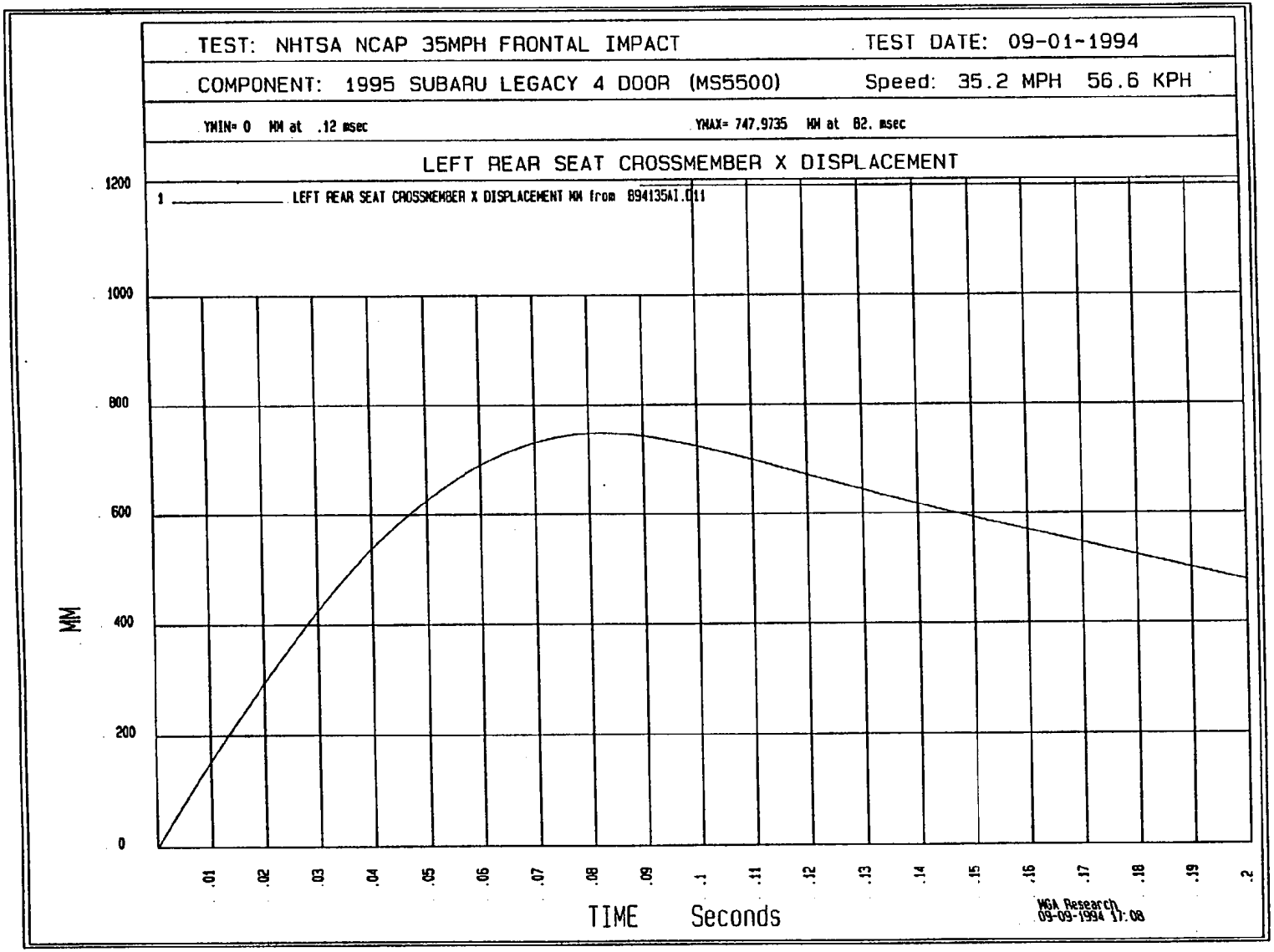


Figure B-3 - Left Rear Seat Crossmember X Displacement vs. Time

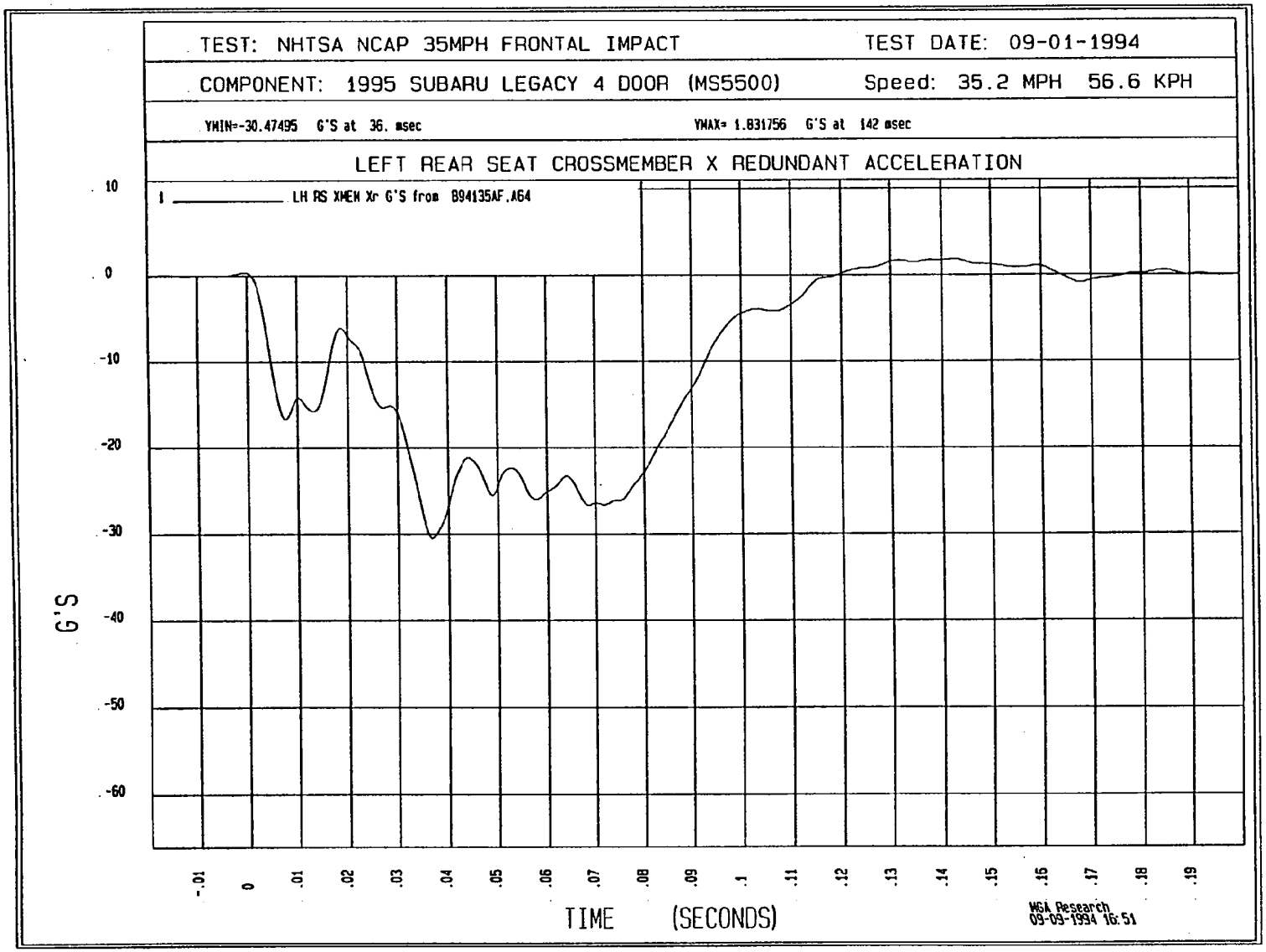


Figure B-4 - Left Rear Seat Crossmember X Redundant Acceleration vs. Time

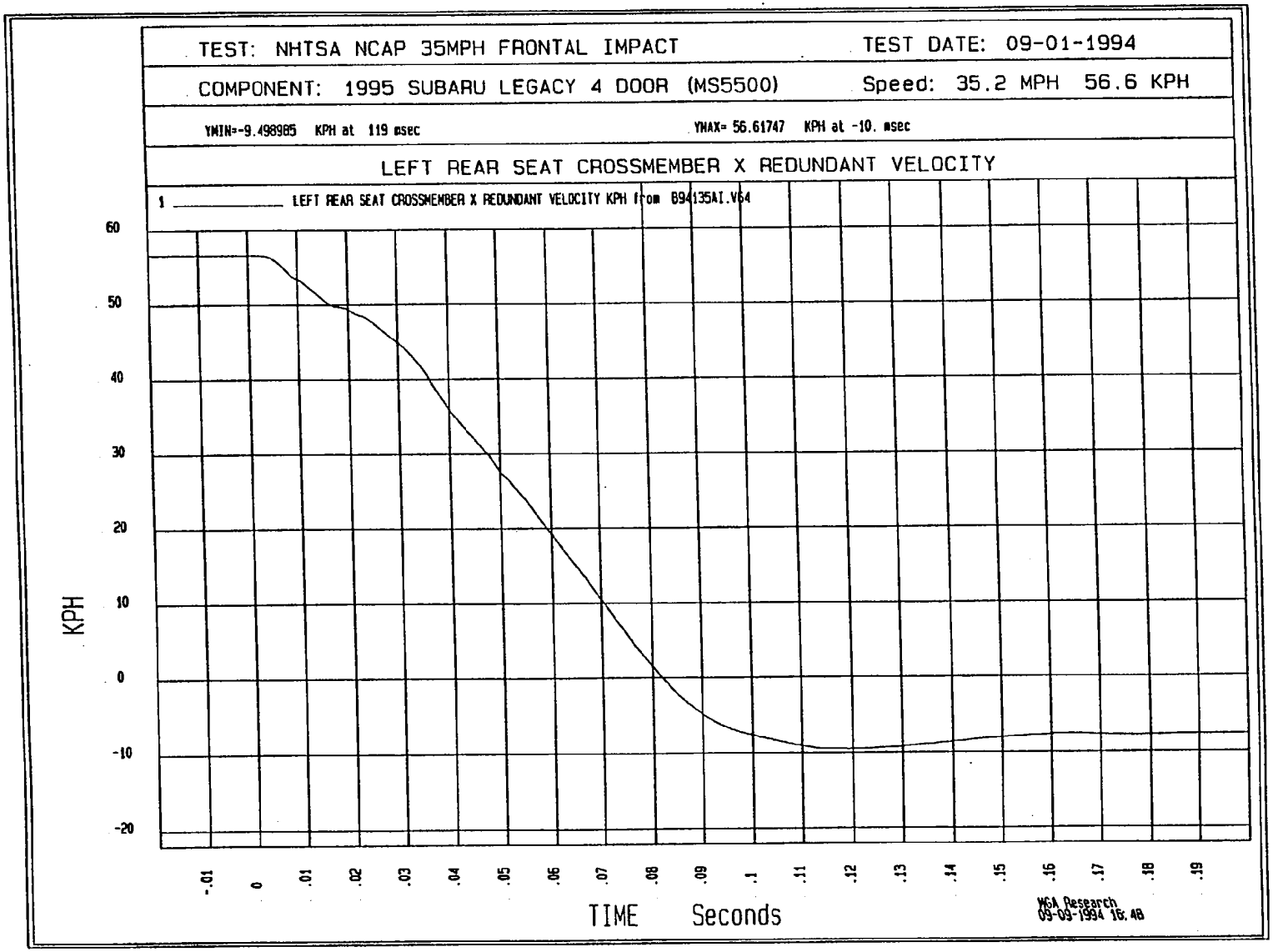
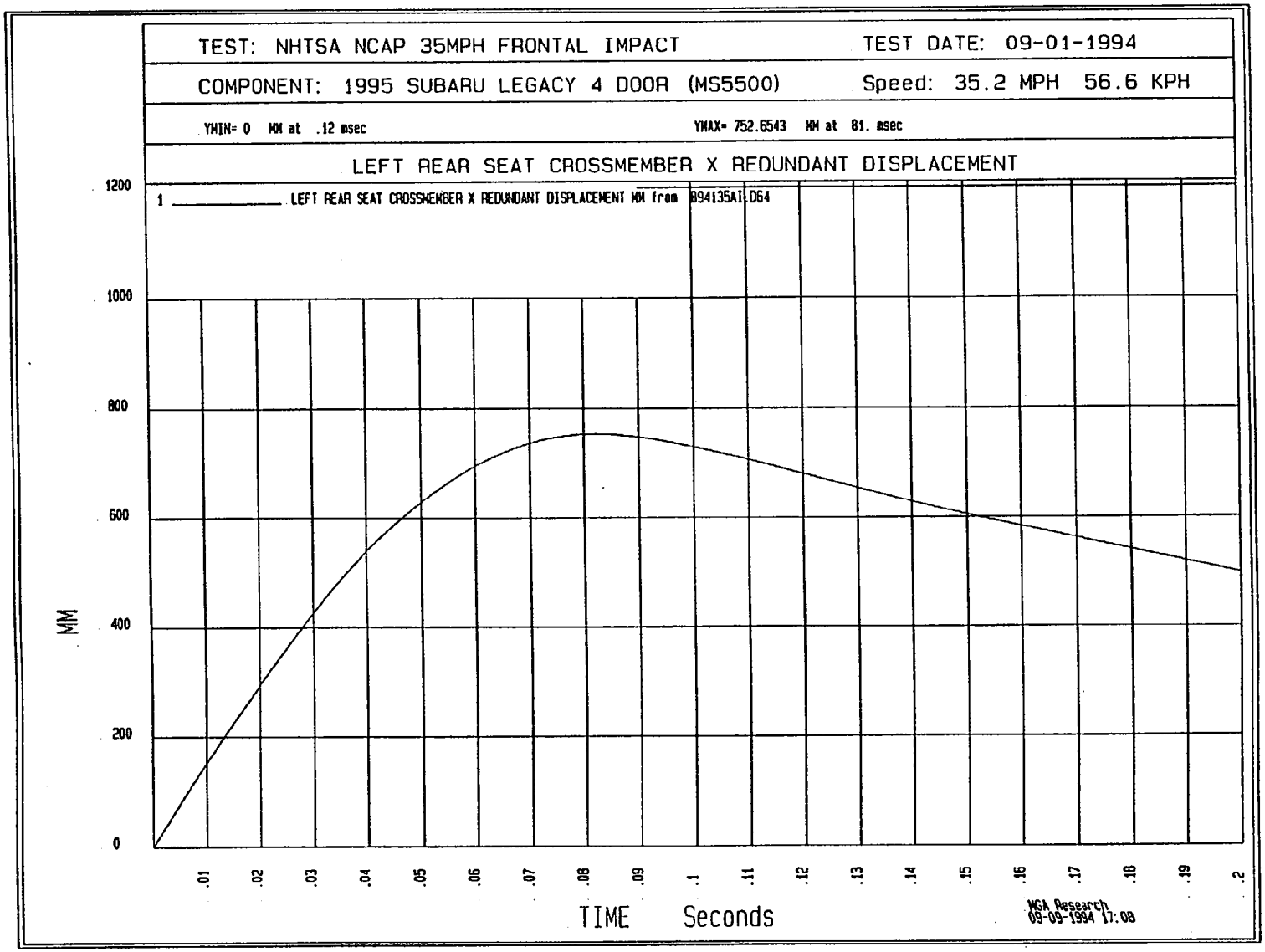


Figure B-5 - Left Rear Seat Crossmember X Redundant Velocity vs. Time



B-6

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

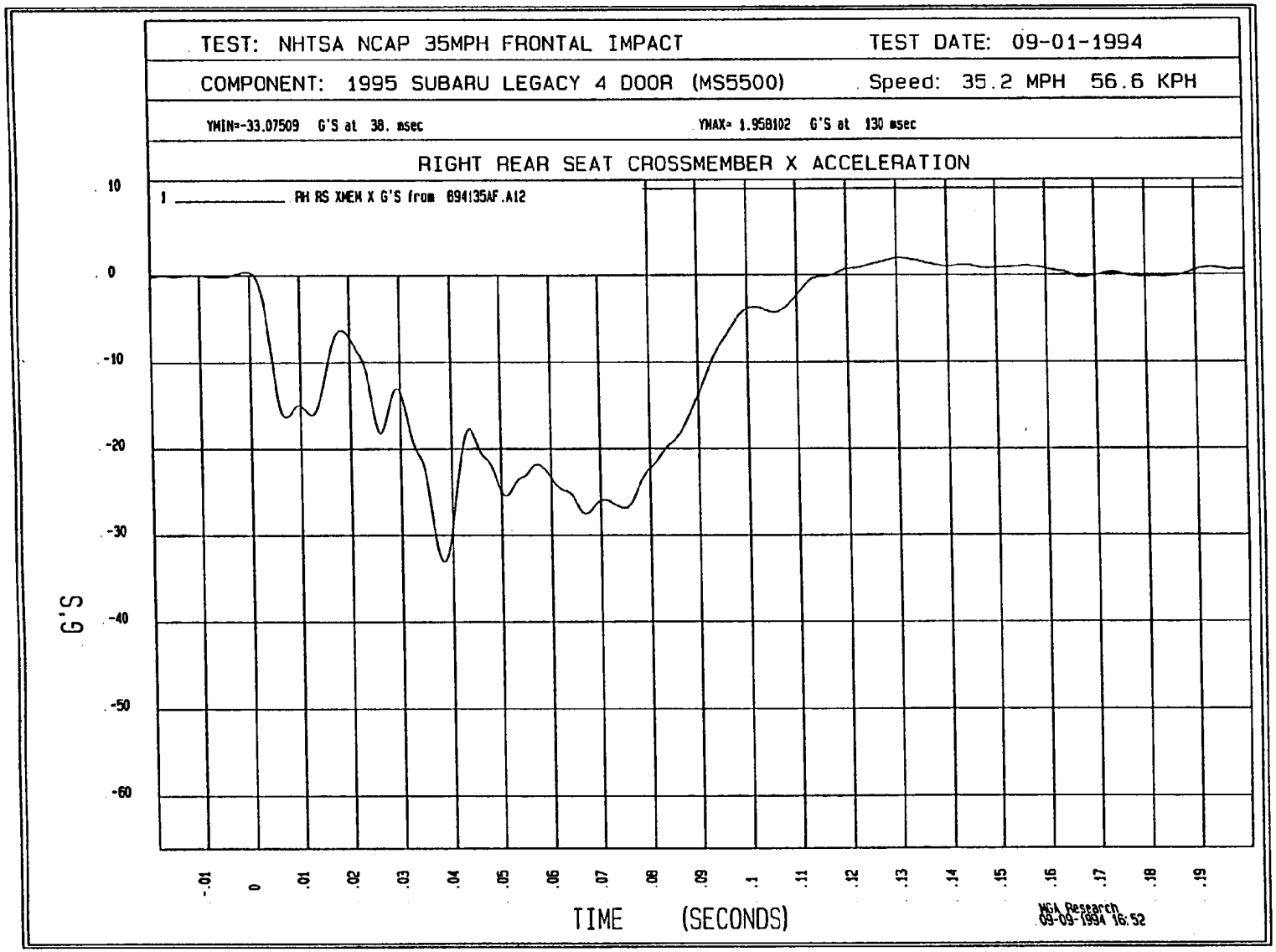


Figure B-7 - Right Rear Seat Crossmember X Acceleration vs. Time

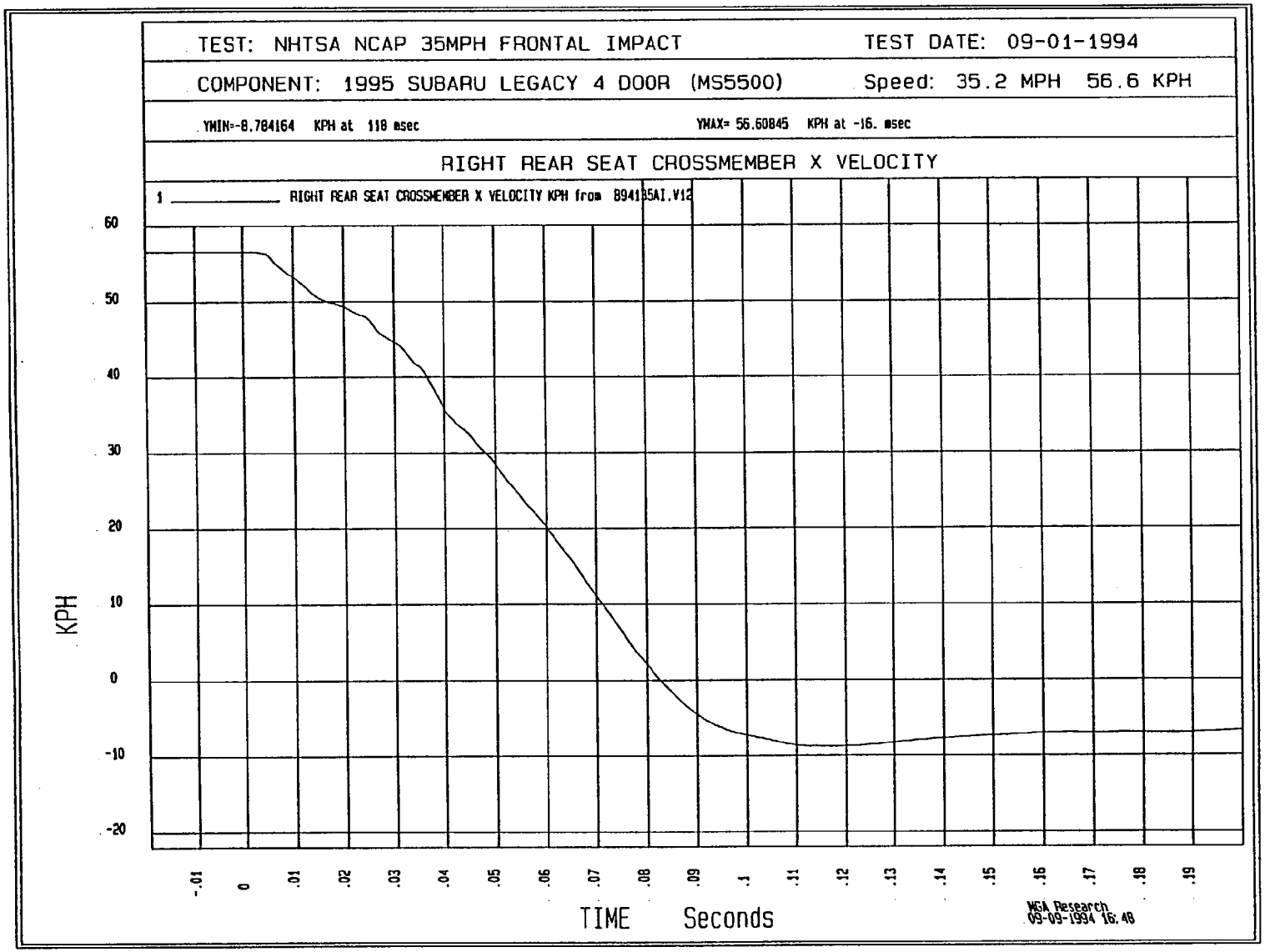


Figure B-8 - Right Rear Seat Crossmember X Velocity vs. Time

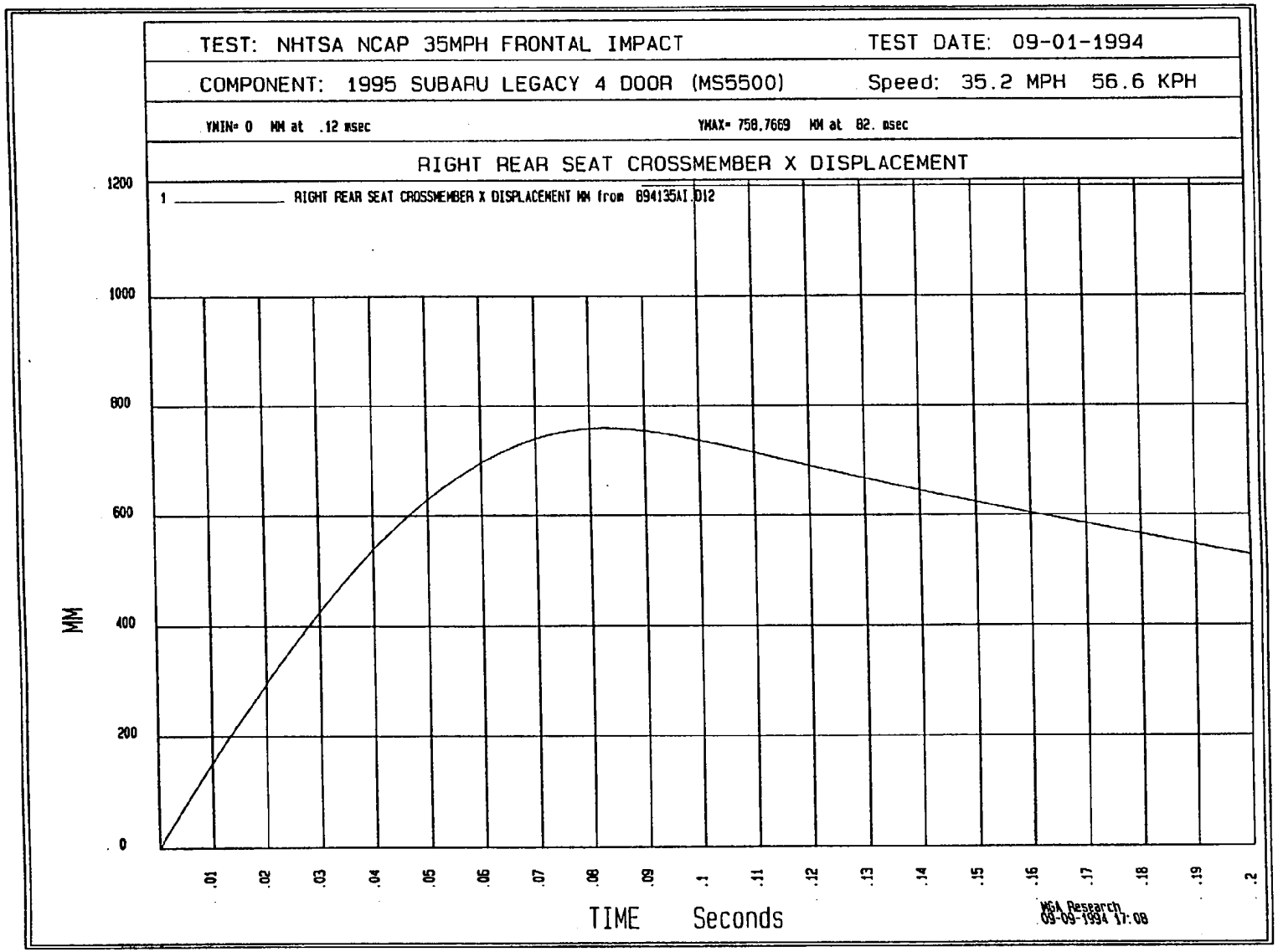


Figure B-9 - Right Rear Seat Crossmember X Displacement vs. Time

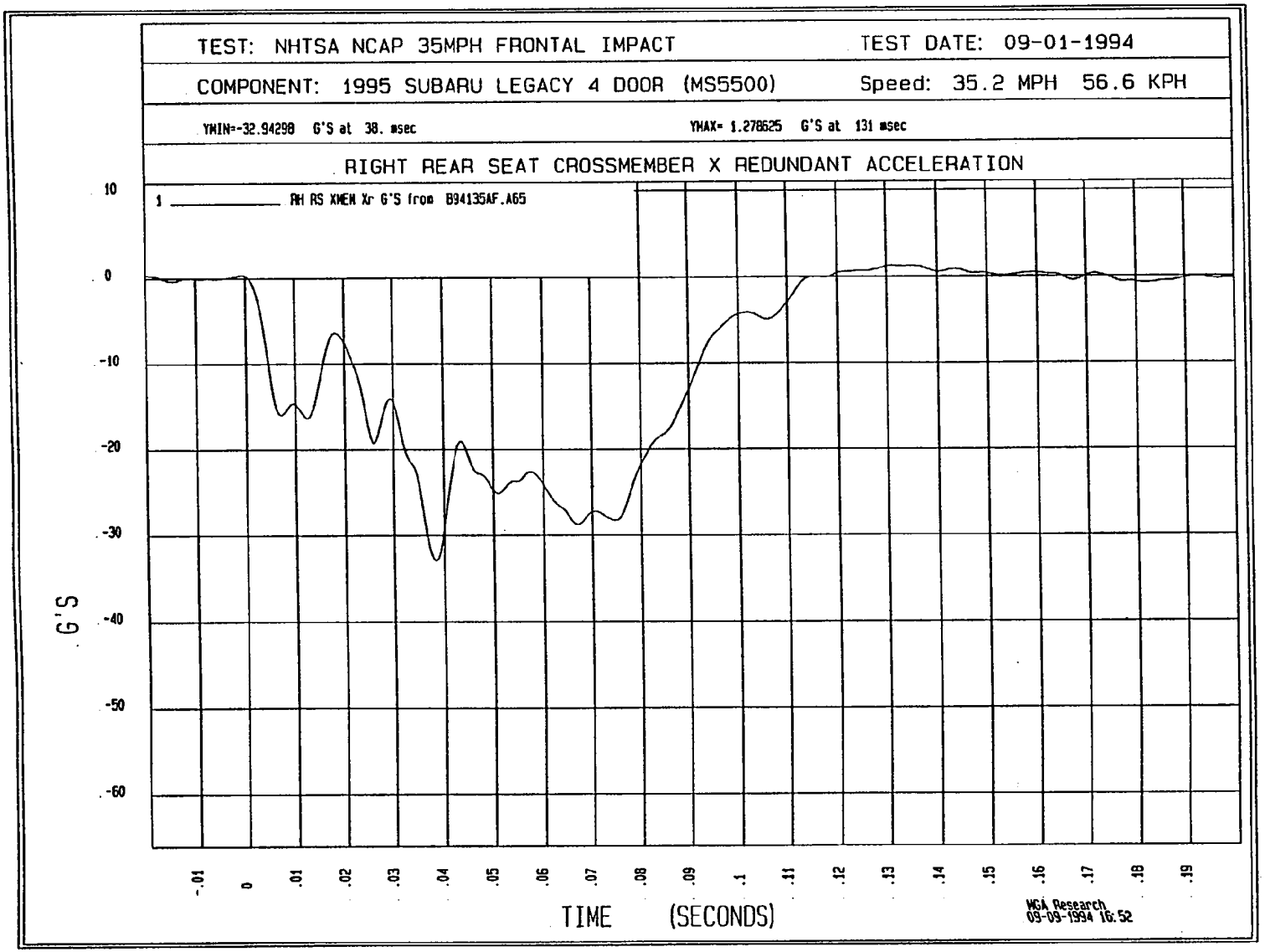


Figure B-10 - Right Rear Seat Crossmember X Redundant Acceleration vs. Time

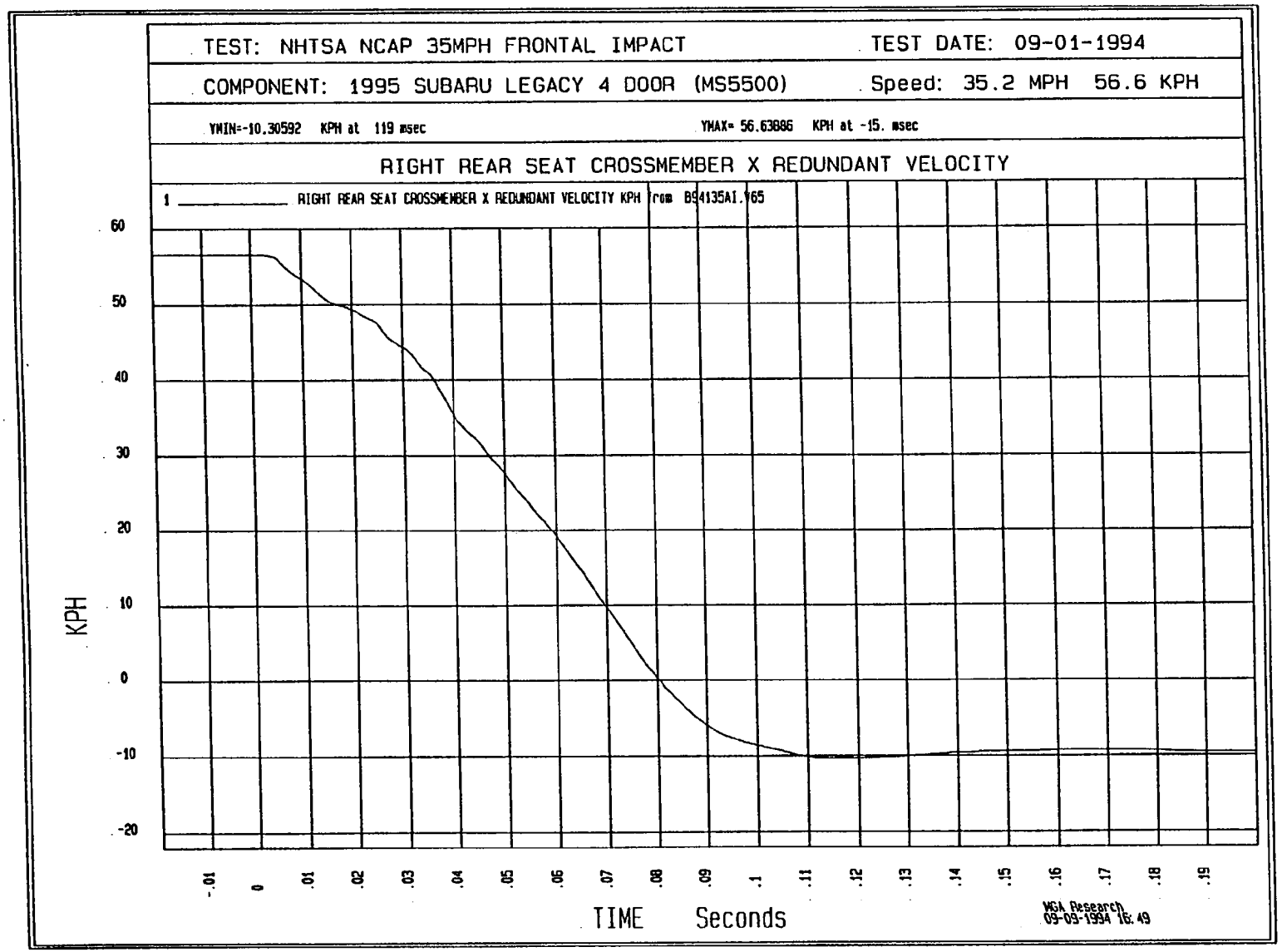


Figure B-11 - Right Rear Seat Crossmember X Redundant Velocity vs. Time

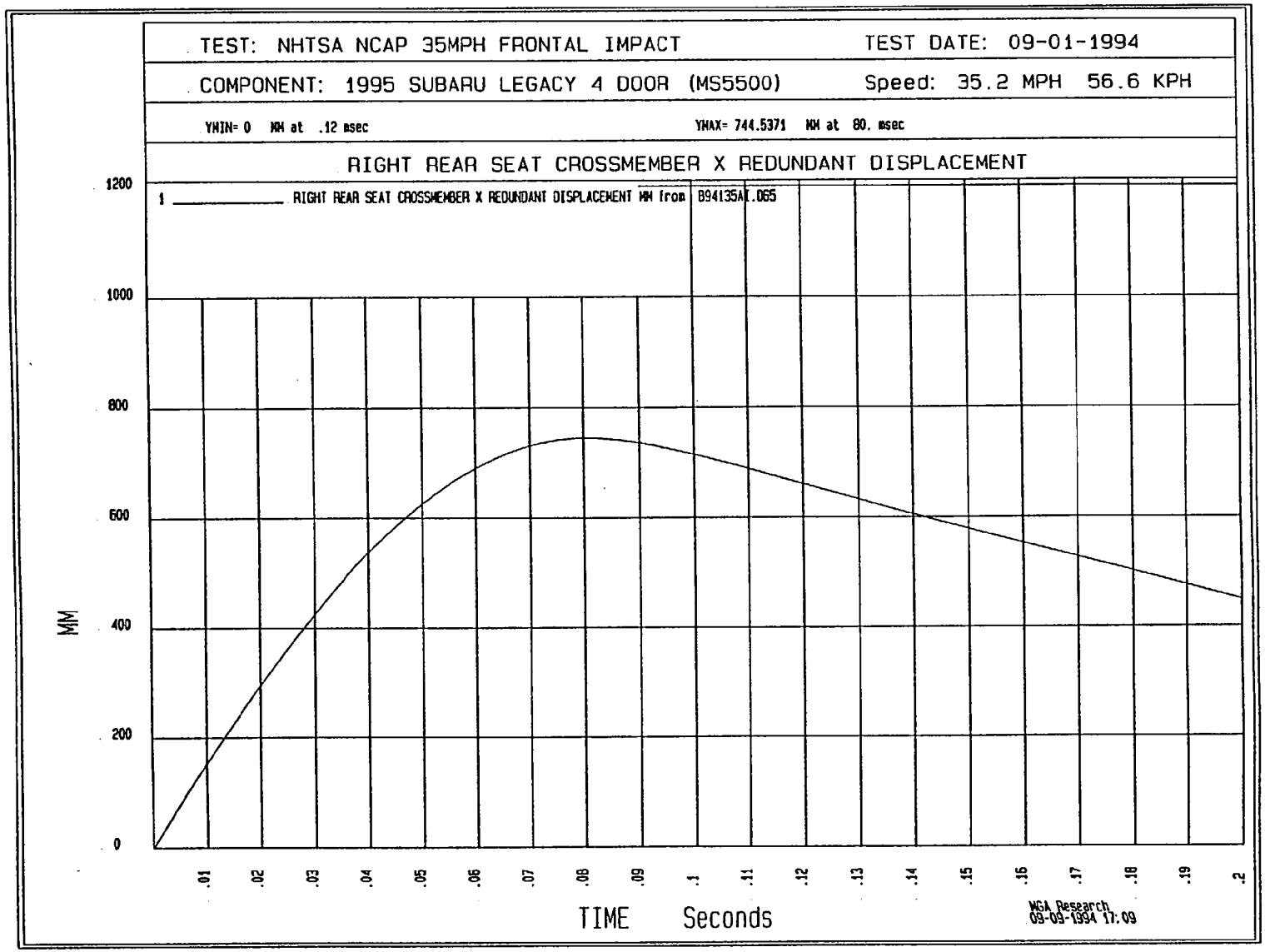


Figure B-12 - Right Rear Seat Crossmember X Redundant Displacement vs. Time

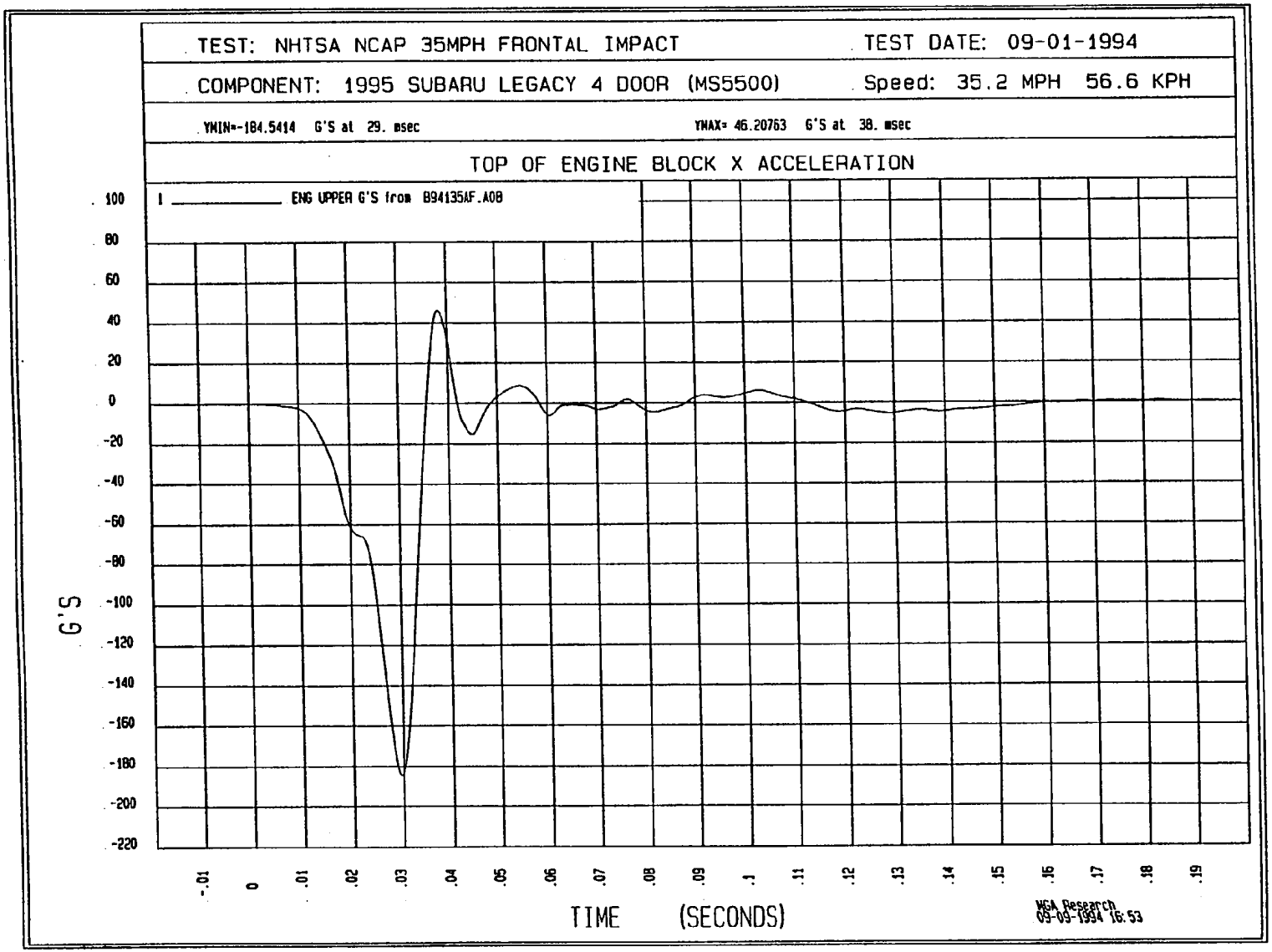


Figure B-13 - Top of Engine Block X Acceleration vs. Time

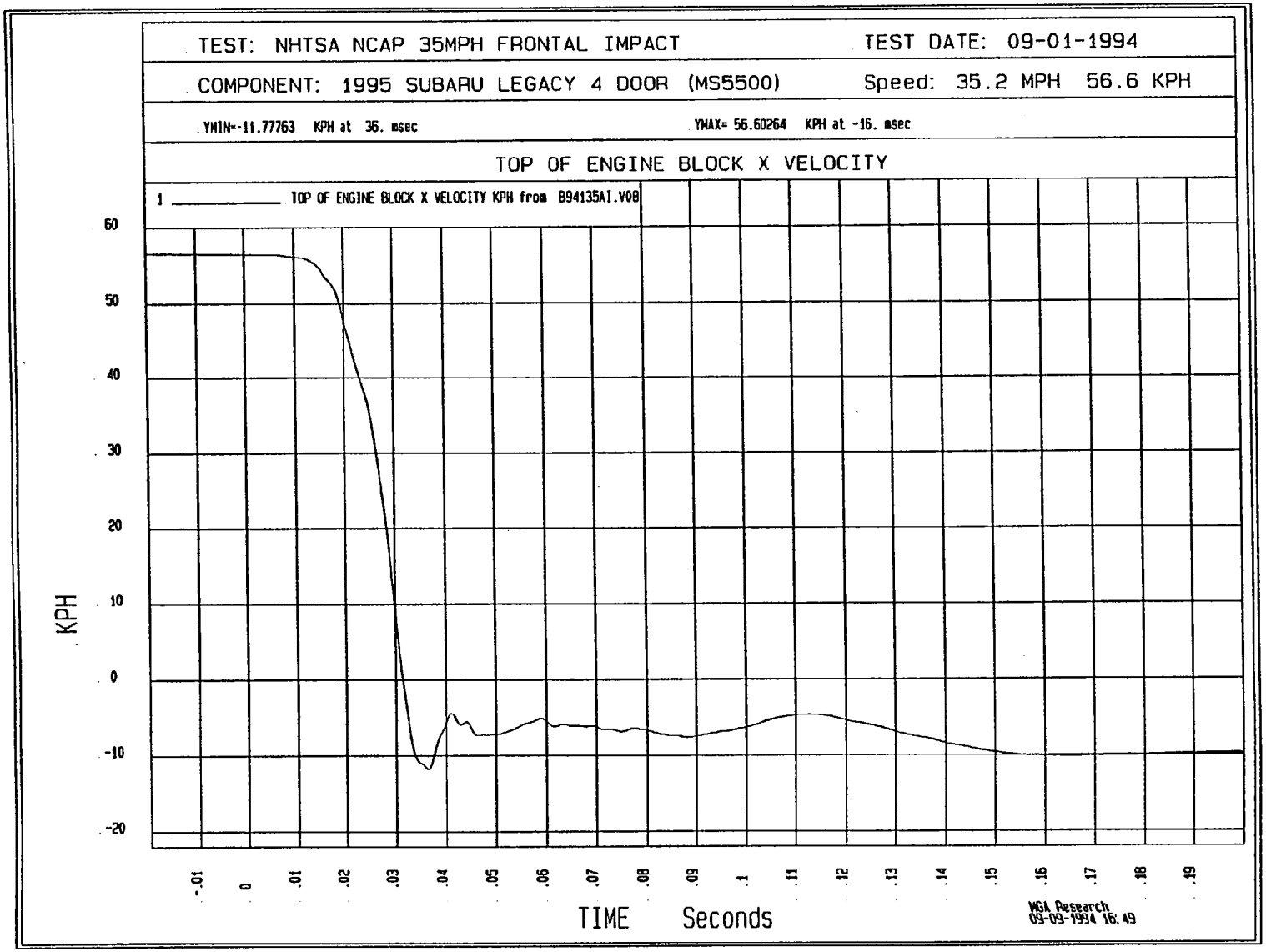


Figure B-14 - Top of Engine Block X Velocity vs. Time

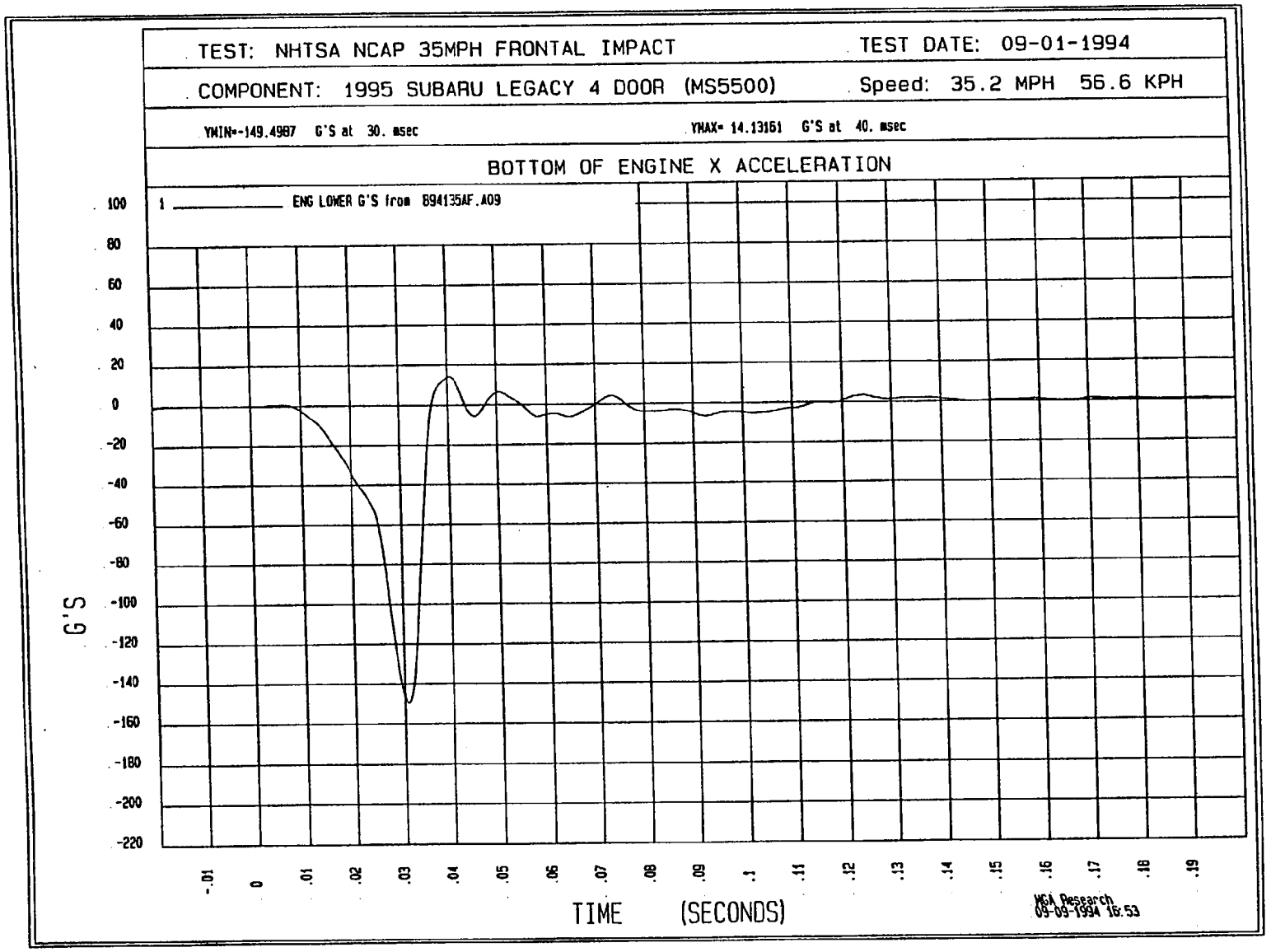


Figure B-15 - Bottom of Engine X Acceleration vs. Time

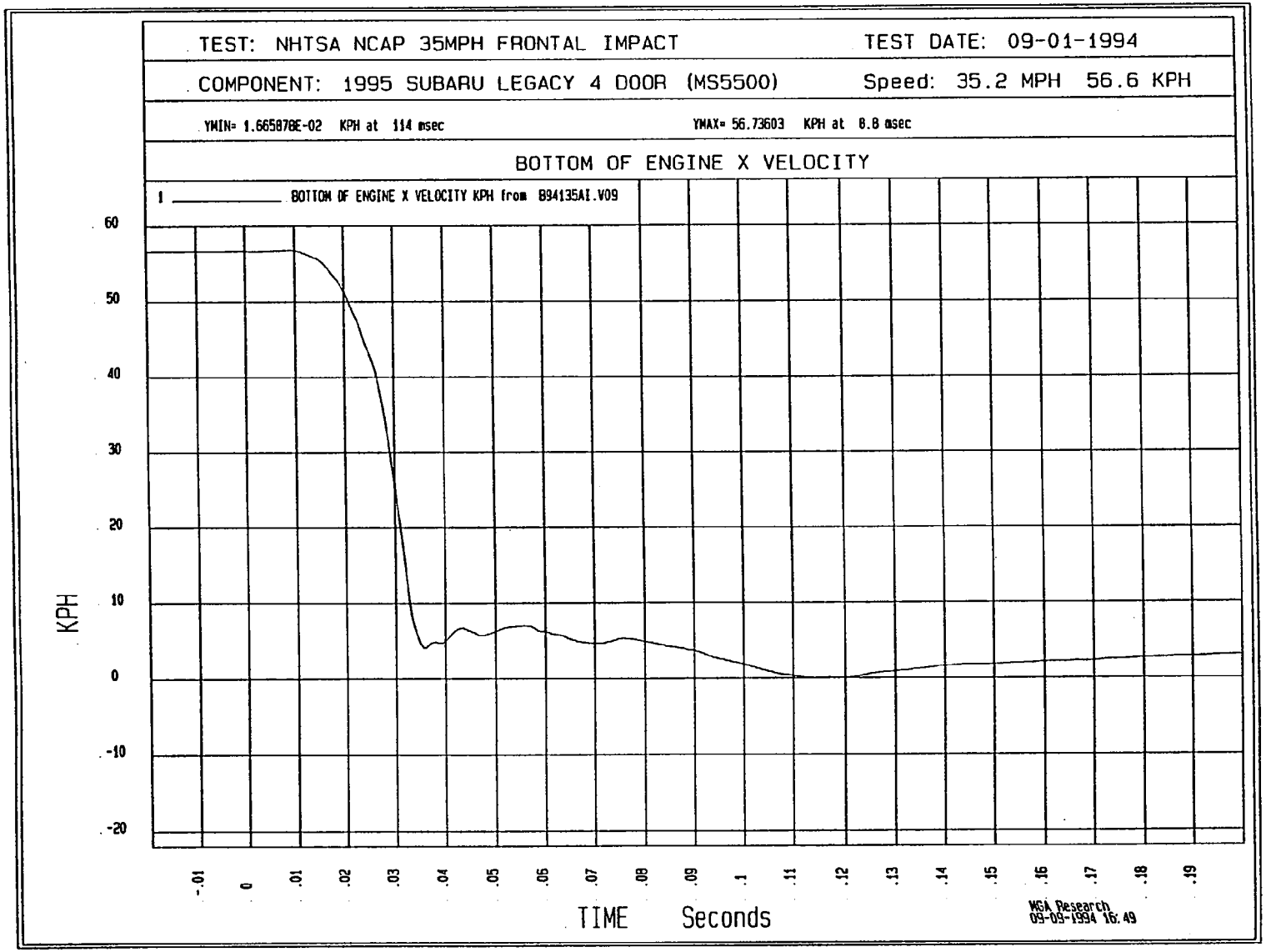


Figure B-16 - Bottom of Engine X Velocity vs. Time

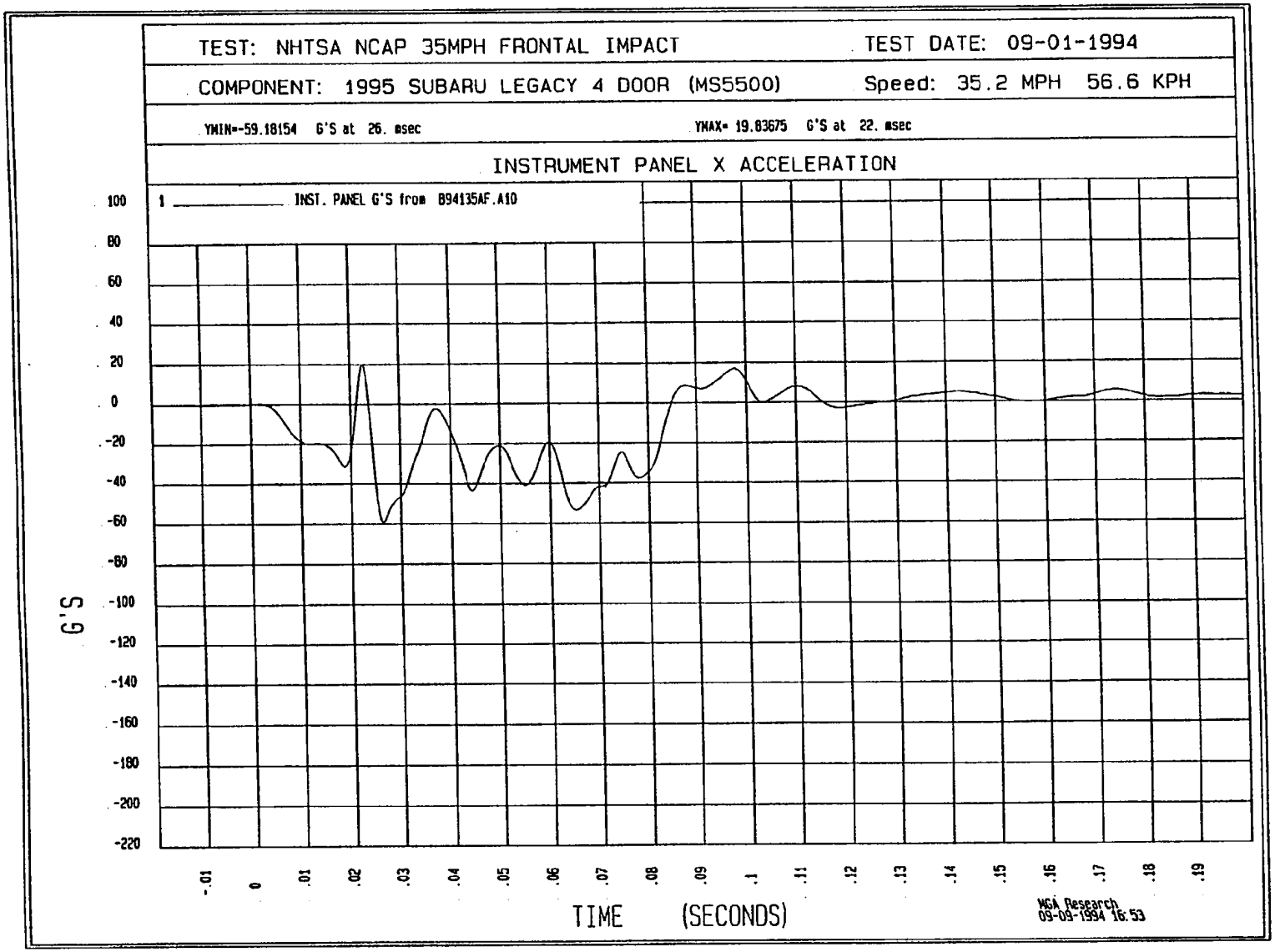


Figure B-17 - Instrument Panel X Acceleration vs. Time

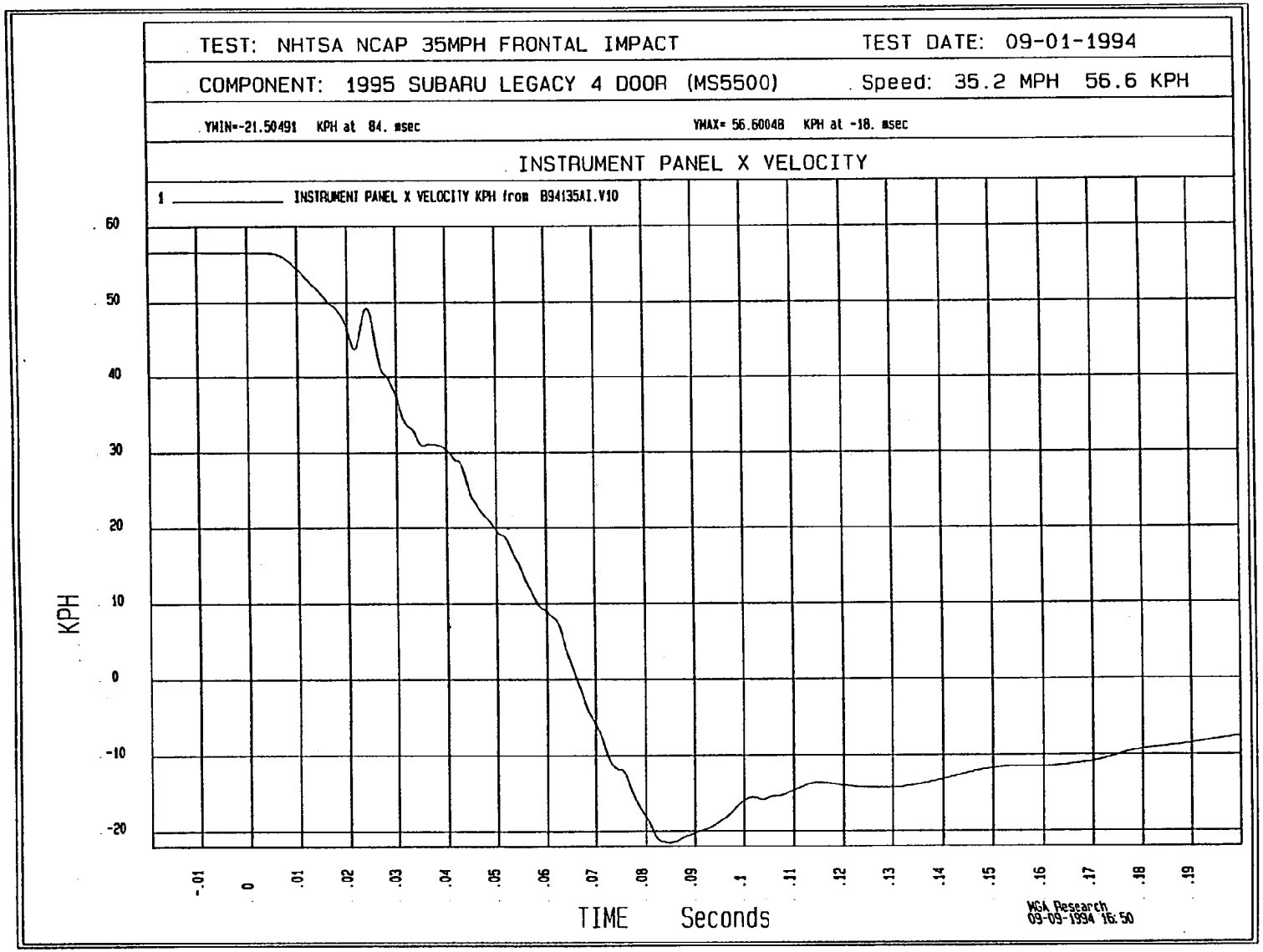


Figure B-18 - Instrument Panel X Velocity vs. Time

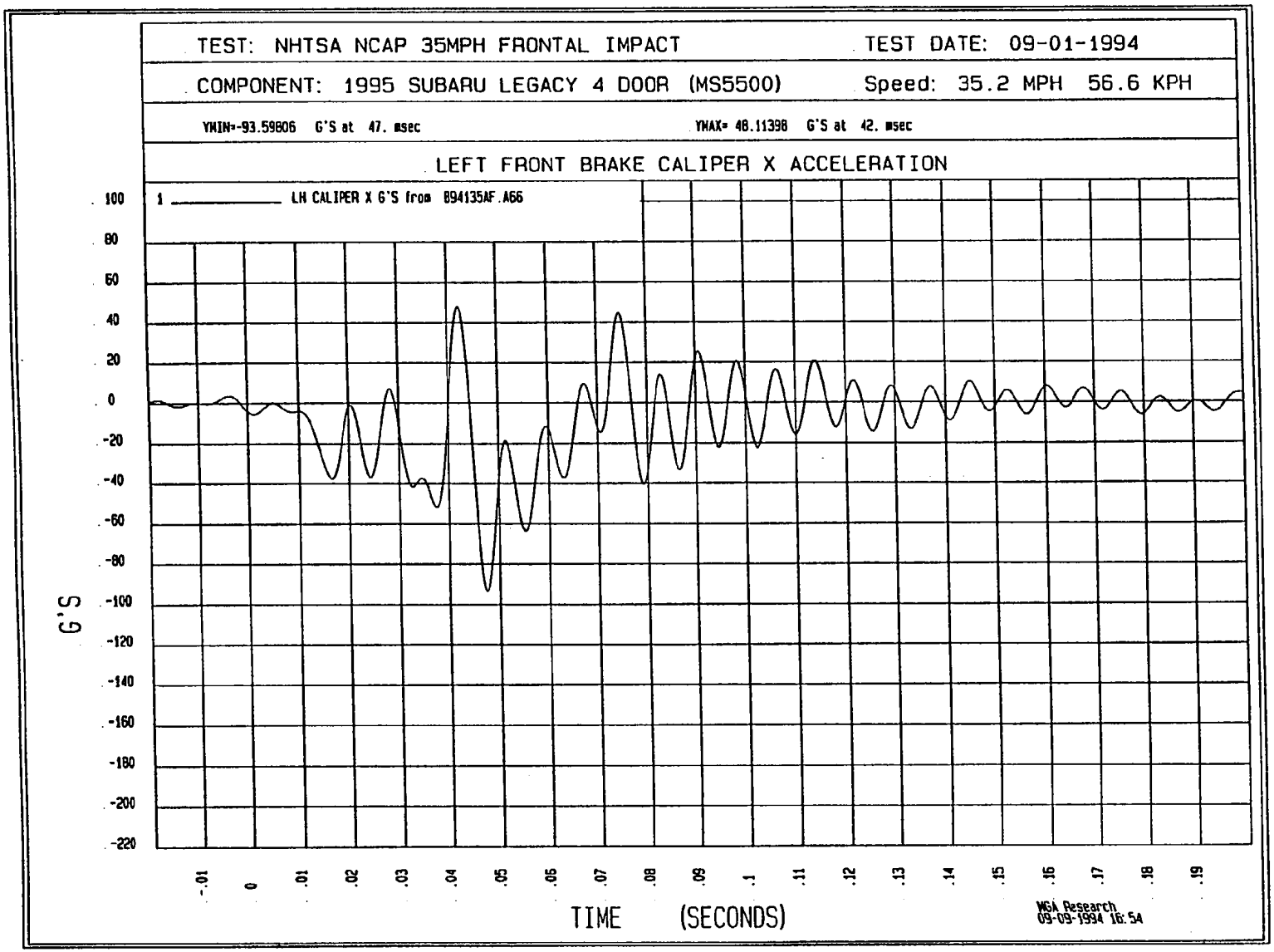


Figure B-19 - Left Brake Caliper X Acceleration vs. Time

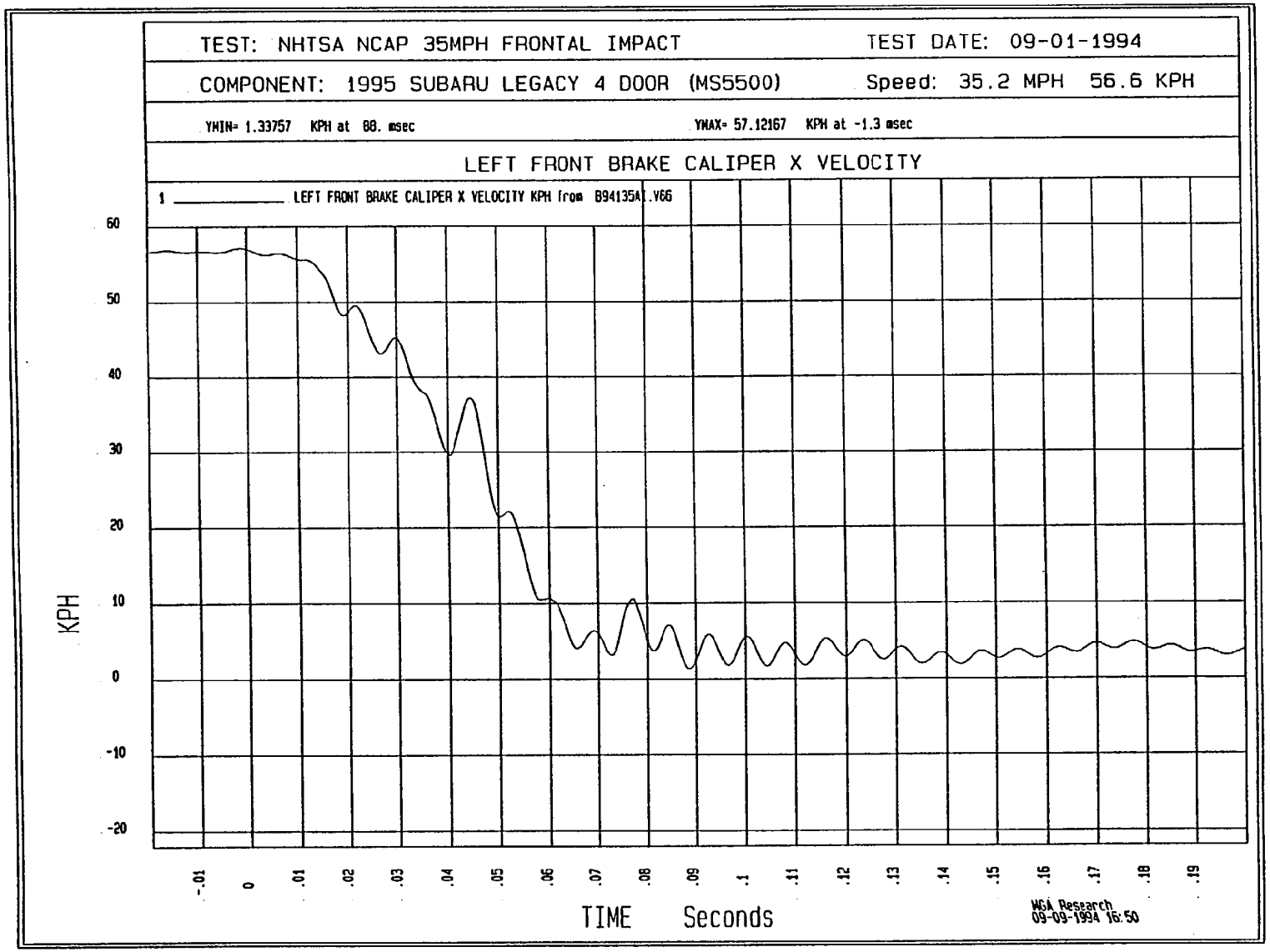


Figure B-20 - Left Brake Caliper X Velocity vs. Time

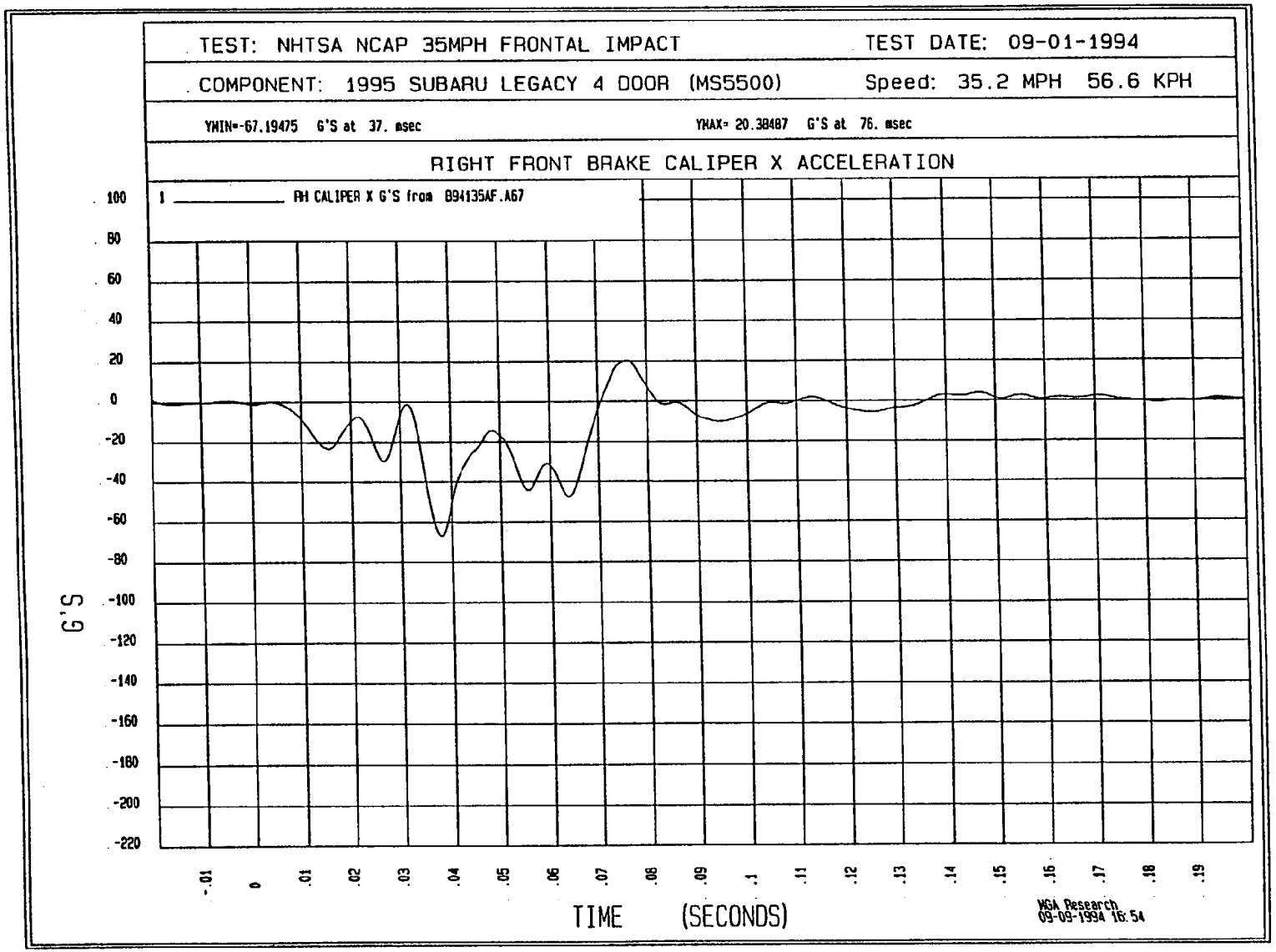


Figure B-21 - Right Brake Caliper X Acceleration vs. Time

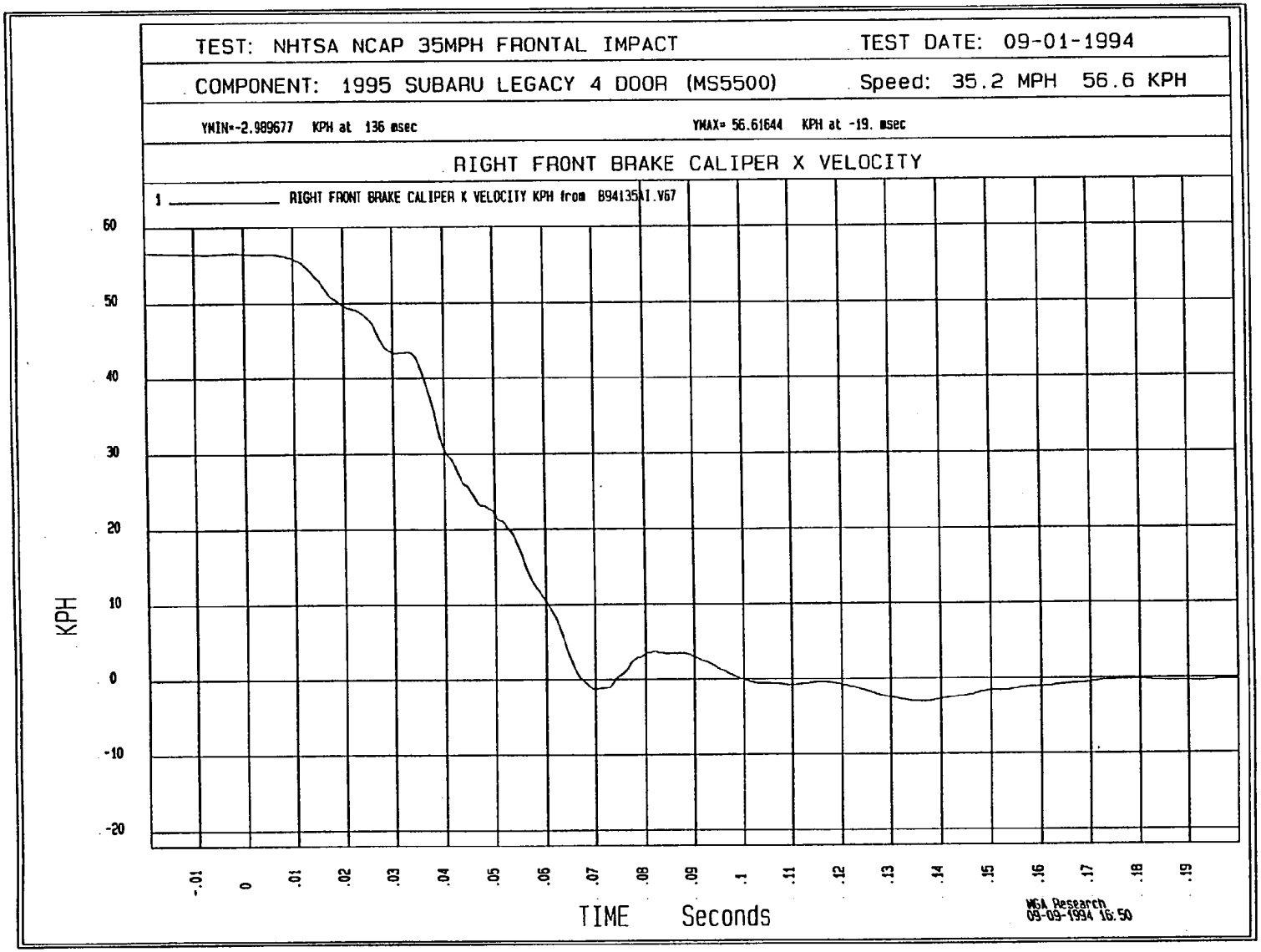


Figure B-22 - Right Brake Caliper X Velocity vs. Time

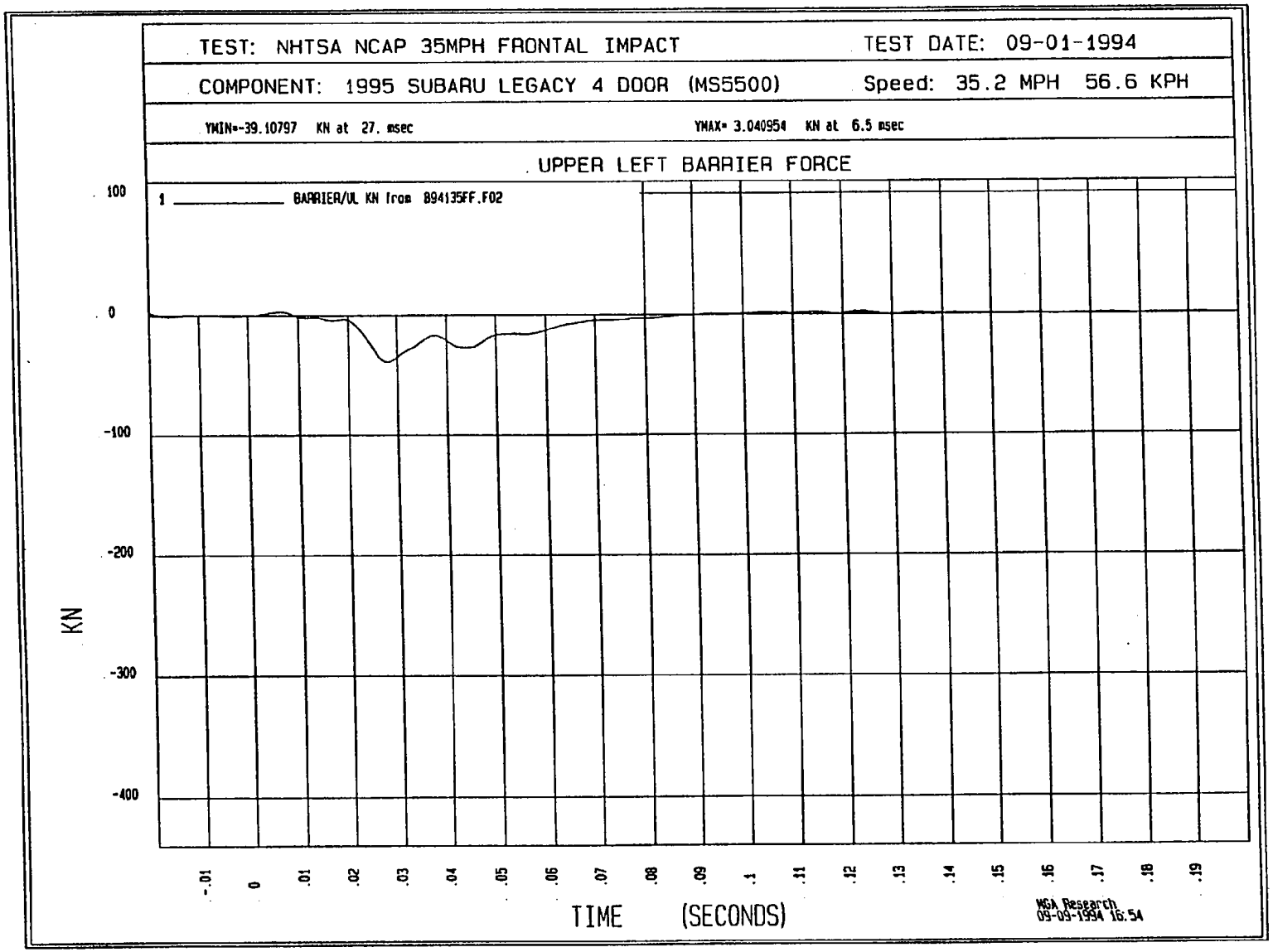


Figure B-23 - Upper Left Barrier Force vs. Time

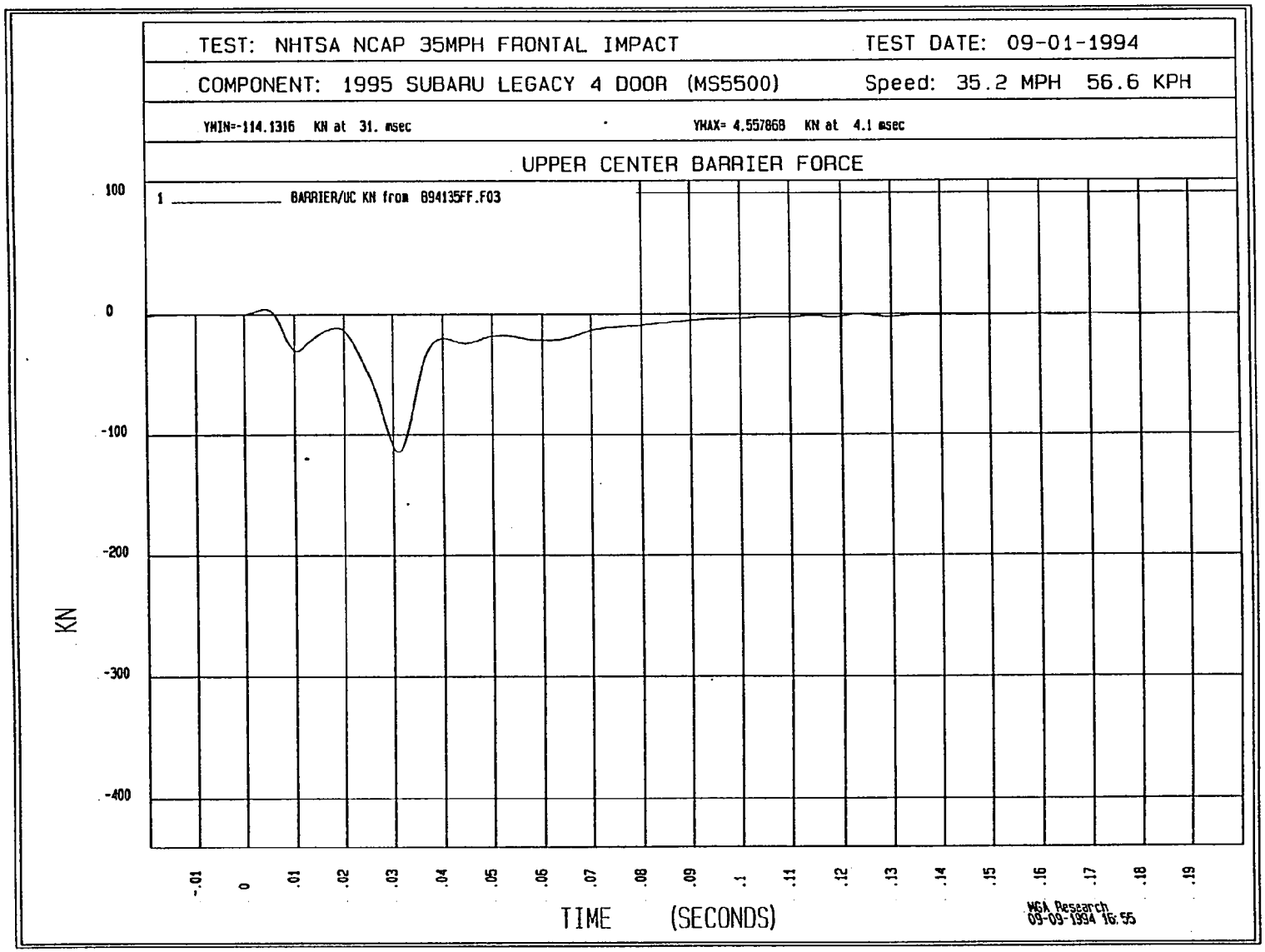


Figure B-24 - Upper Center Barrier Force vs. Time

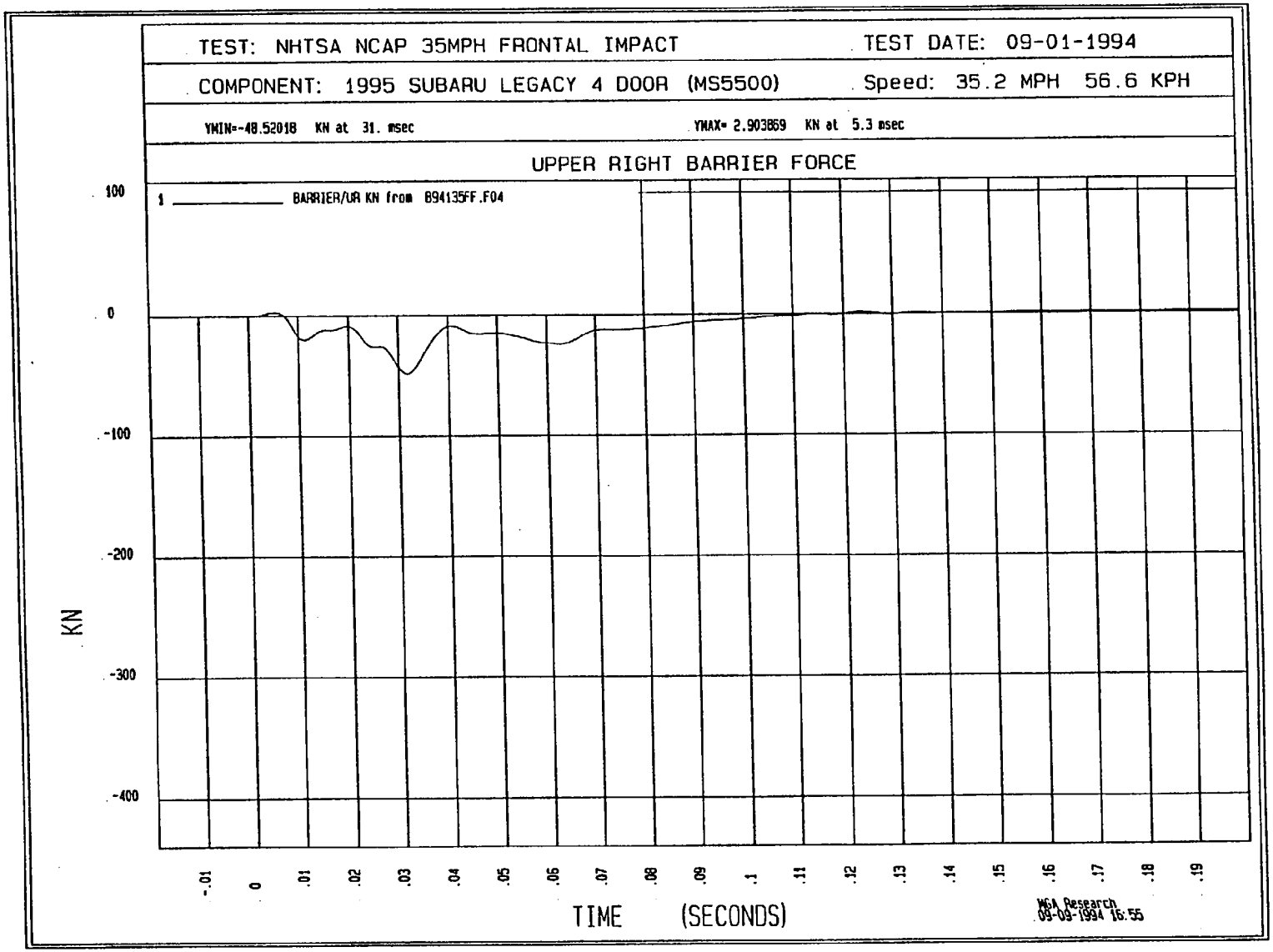


Figure B-25 - Upper Right Barrier Force vs. Time

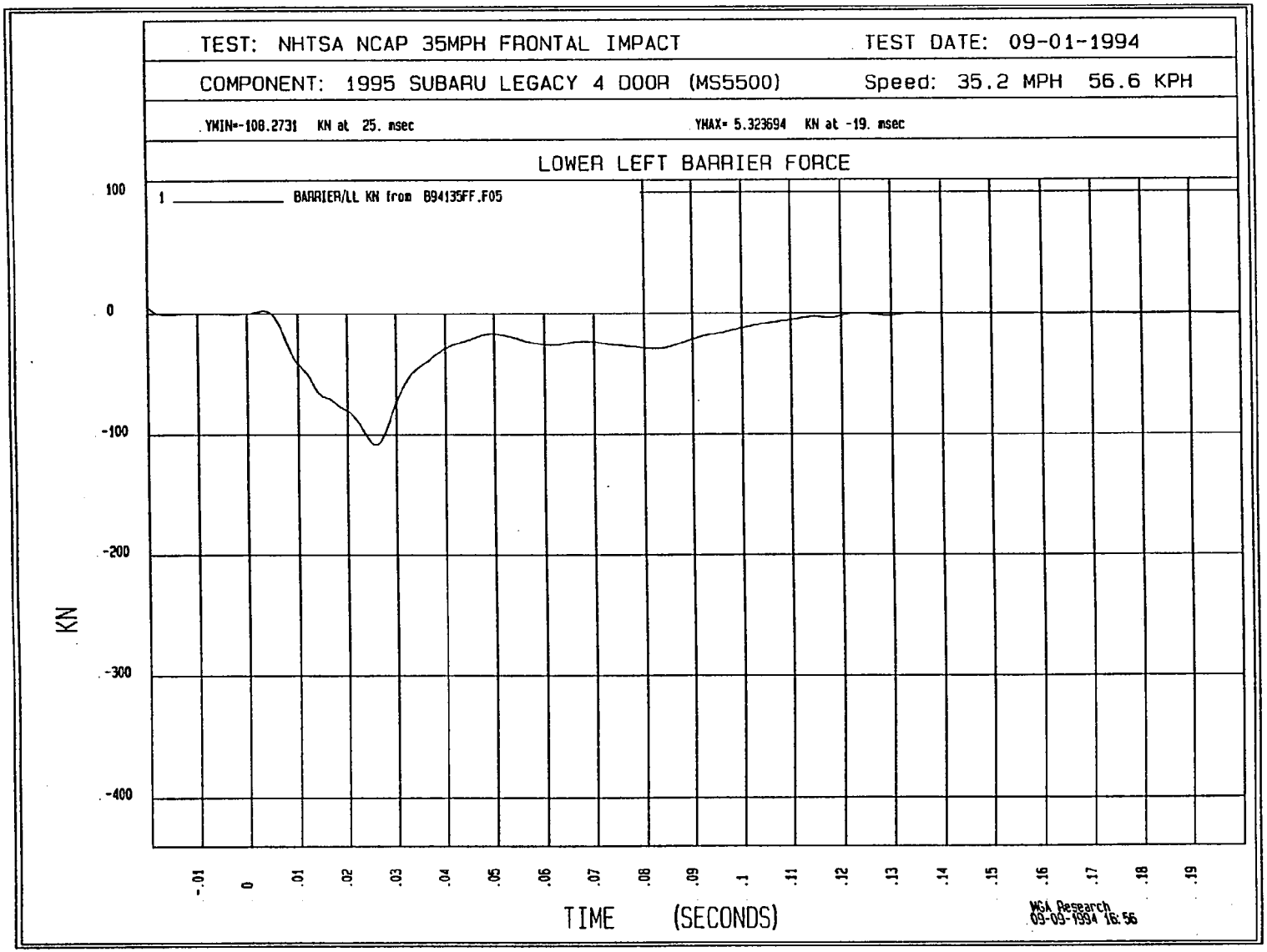


Figure B-26 - Lower Left Barrier Force vs. Time

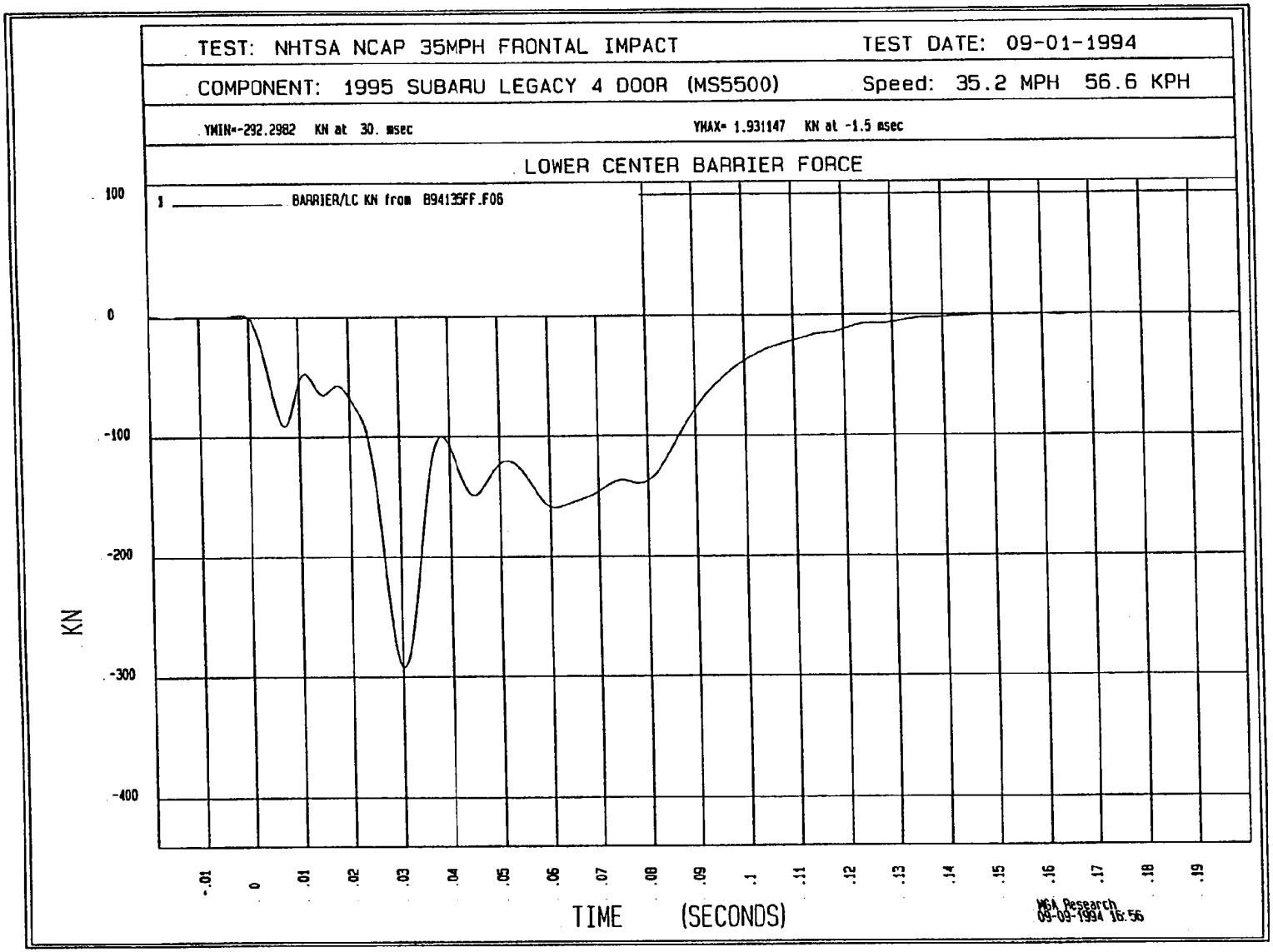


Figure B-27 - Lower Center Barrier Force vs. Time

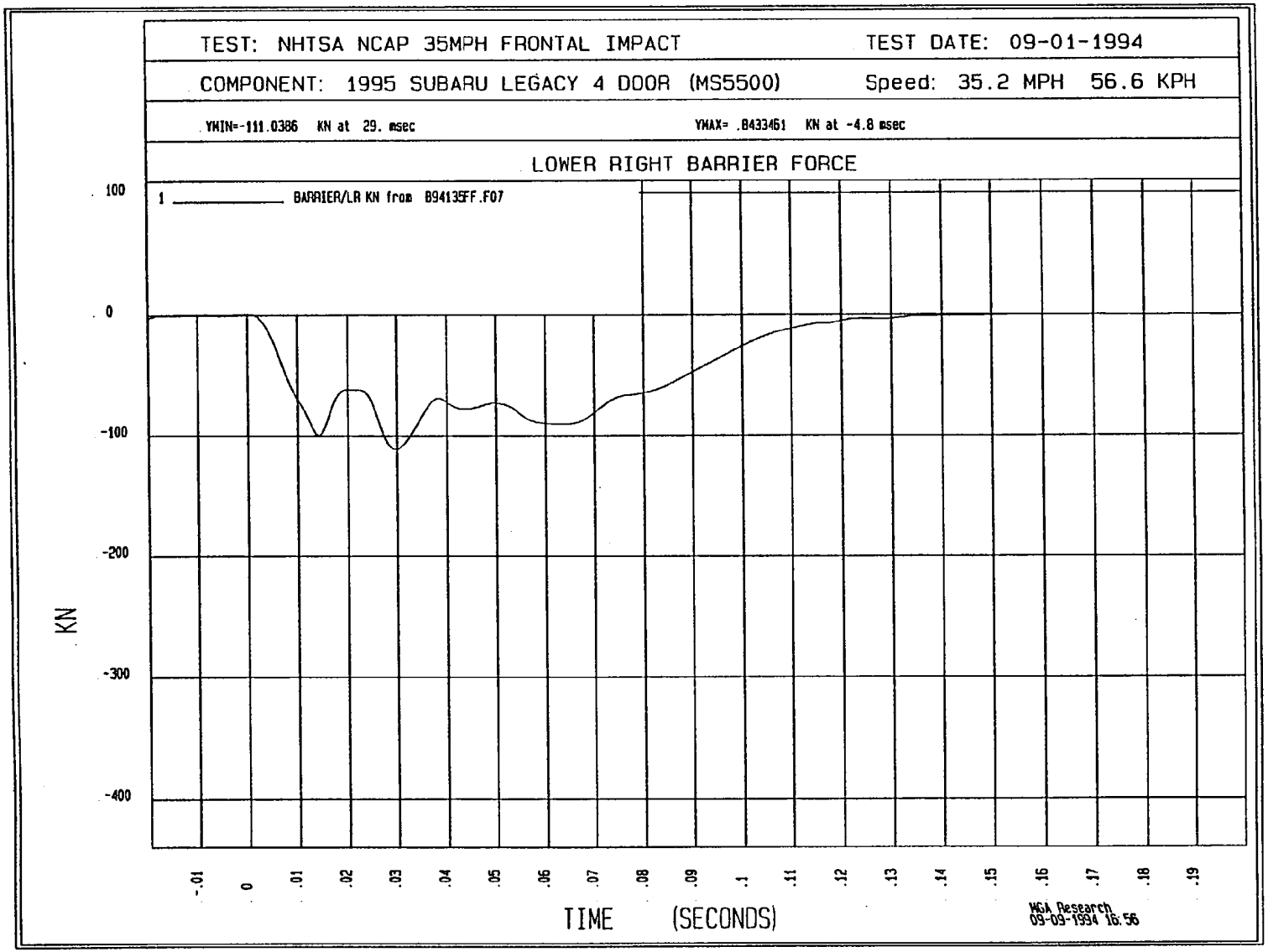


Figure B-28 - Lower Right Barrier Force vs. Time

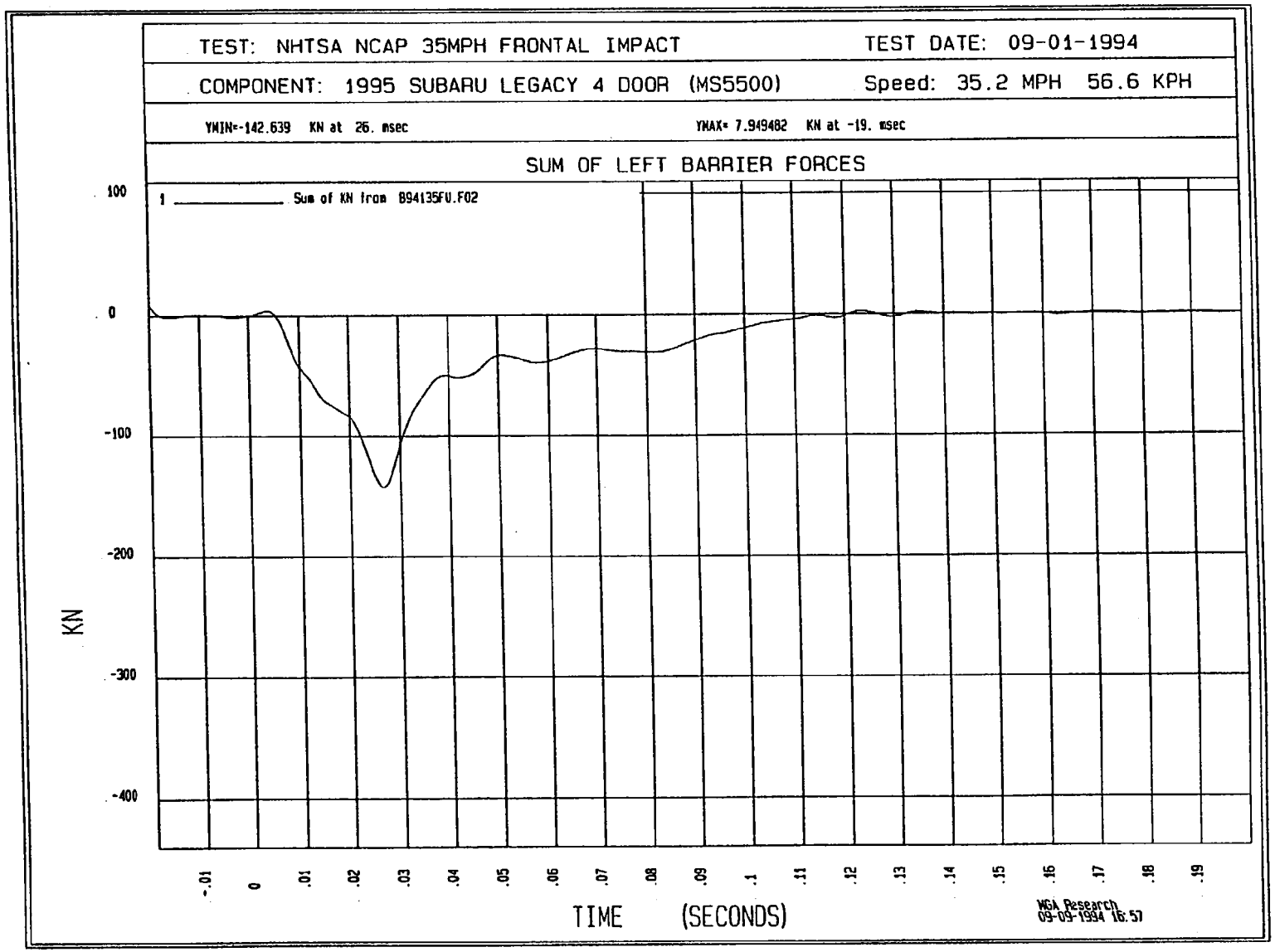


Figure B-29 - Sum of Left Barrier Forces vs. Time

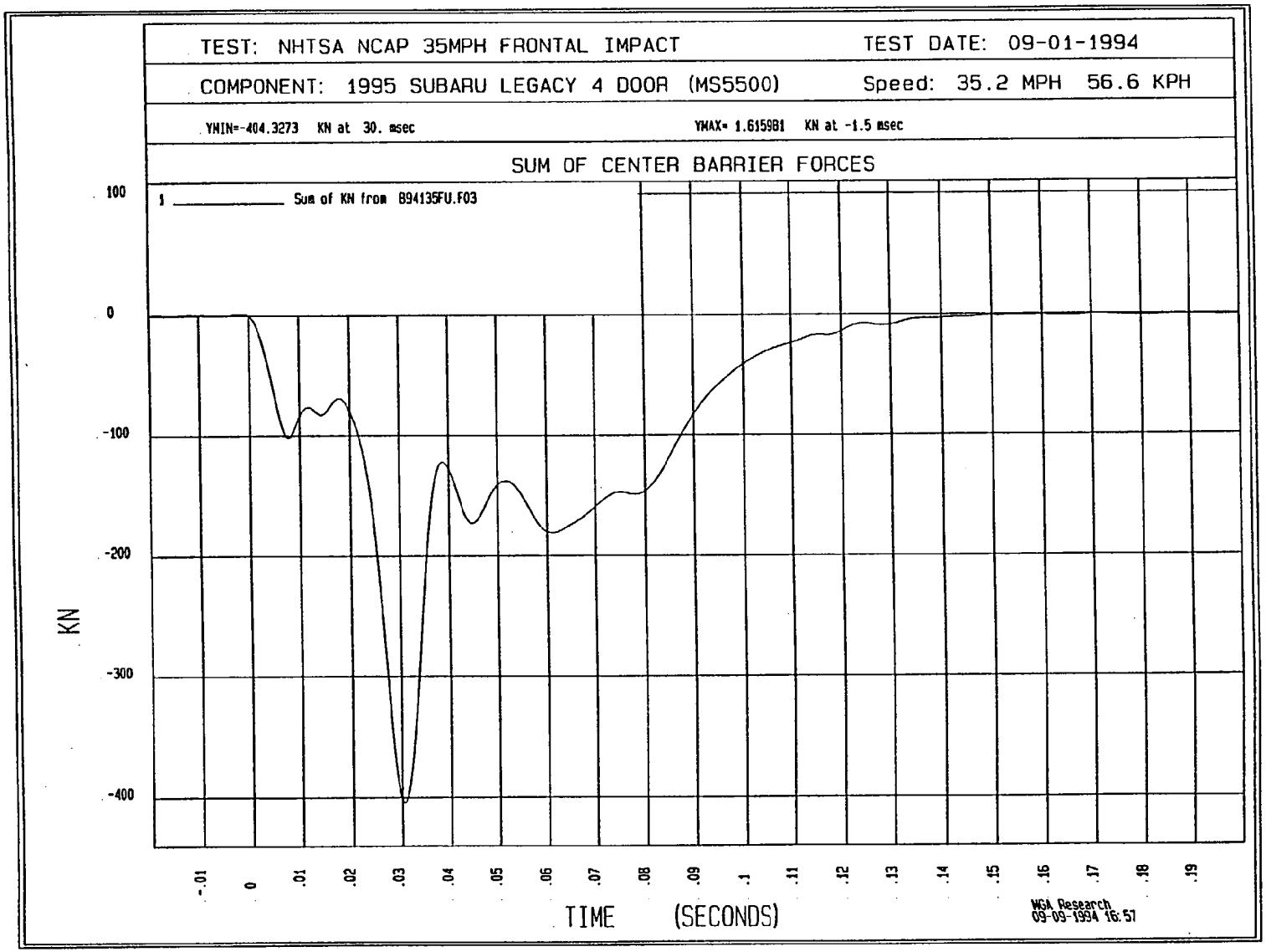


Figure B-30 - Sum of Center Barrier Forces vs. Time

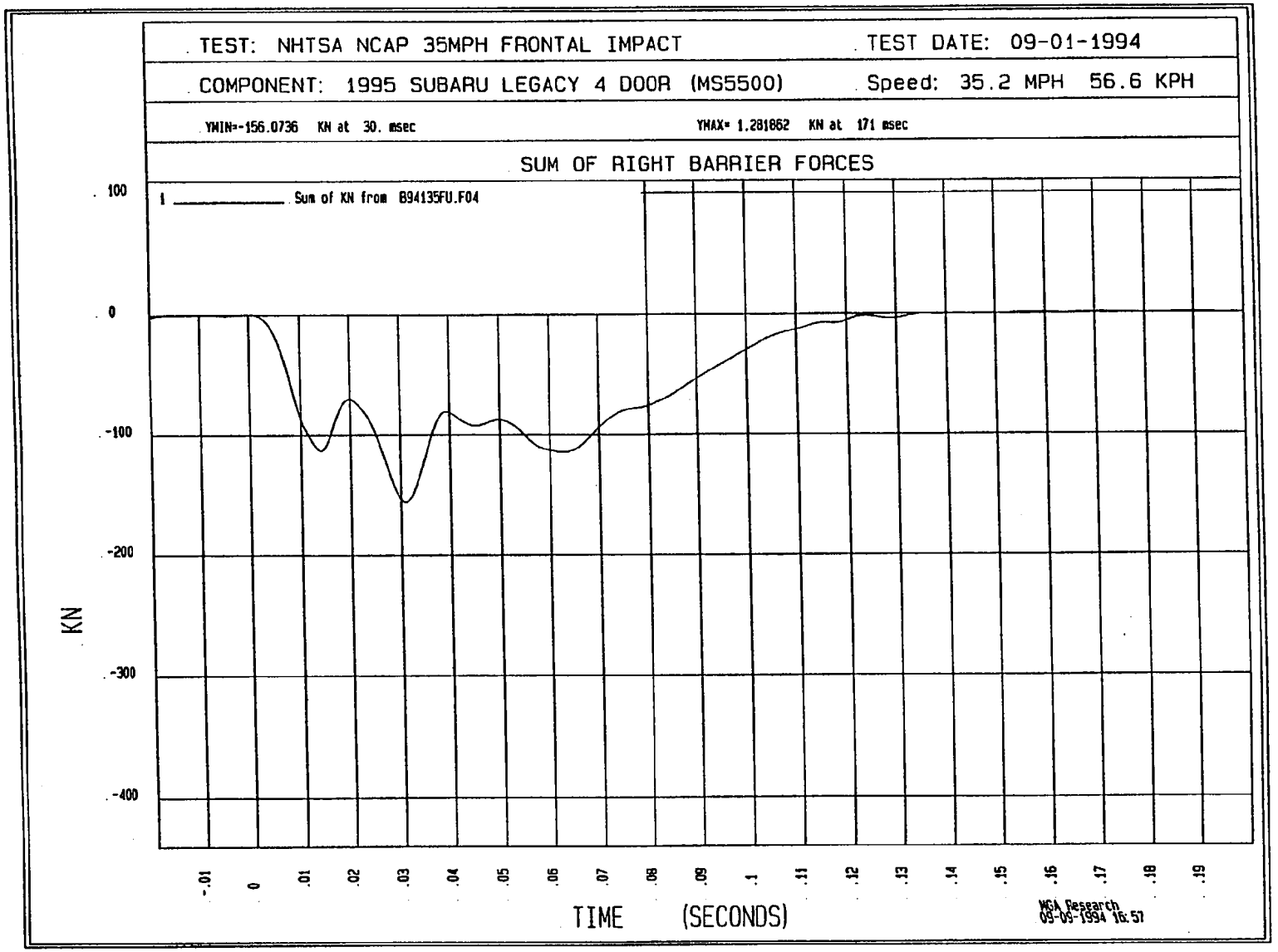


Figure B-31 - Sum of Right Barrier Forces vs. Time

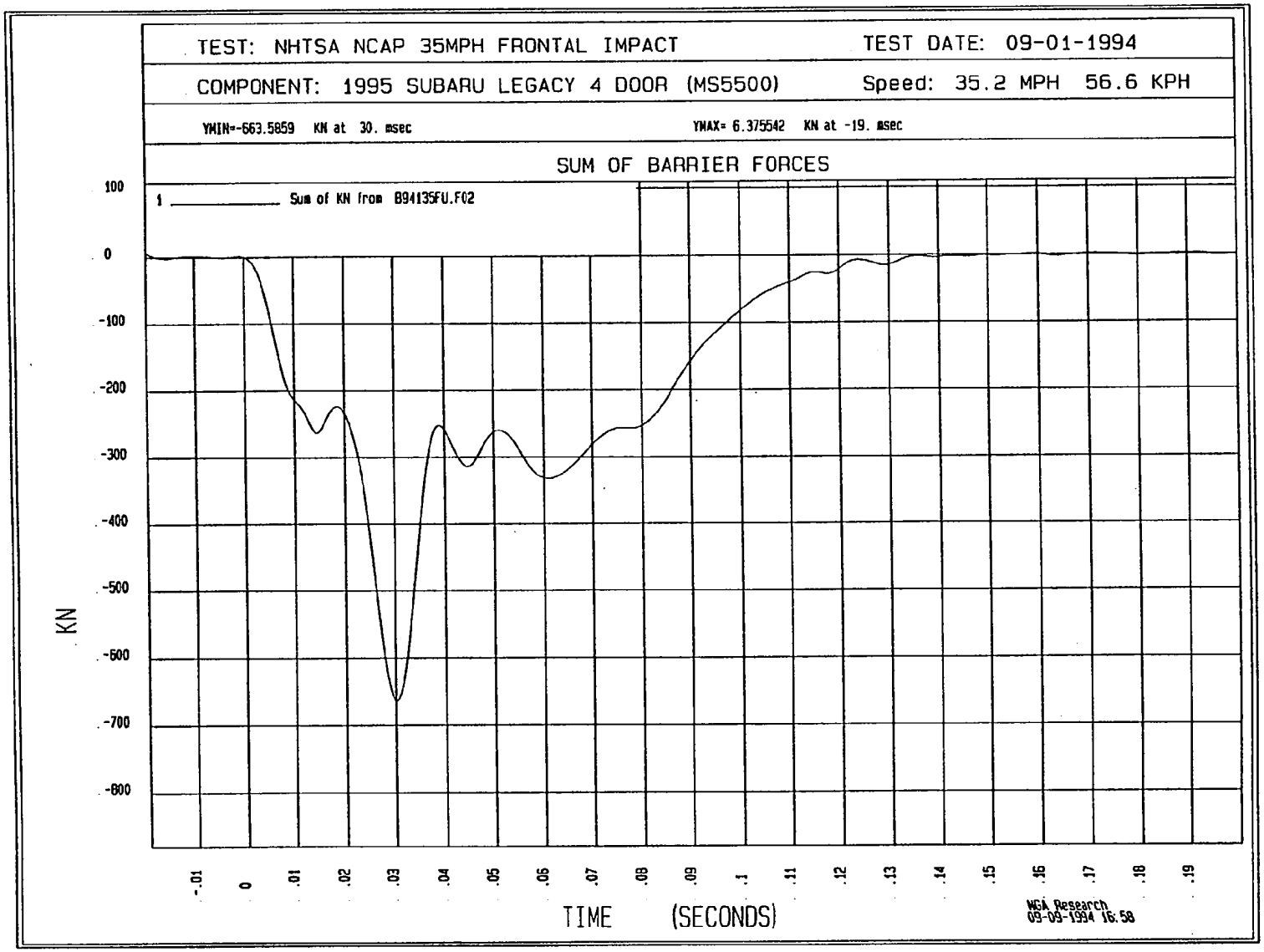


Figure B-32 - Sum of Barrier Forces vs. Time

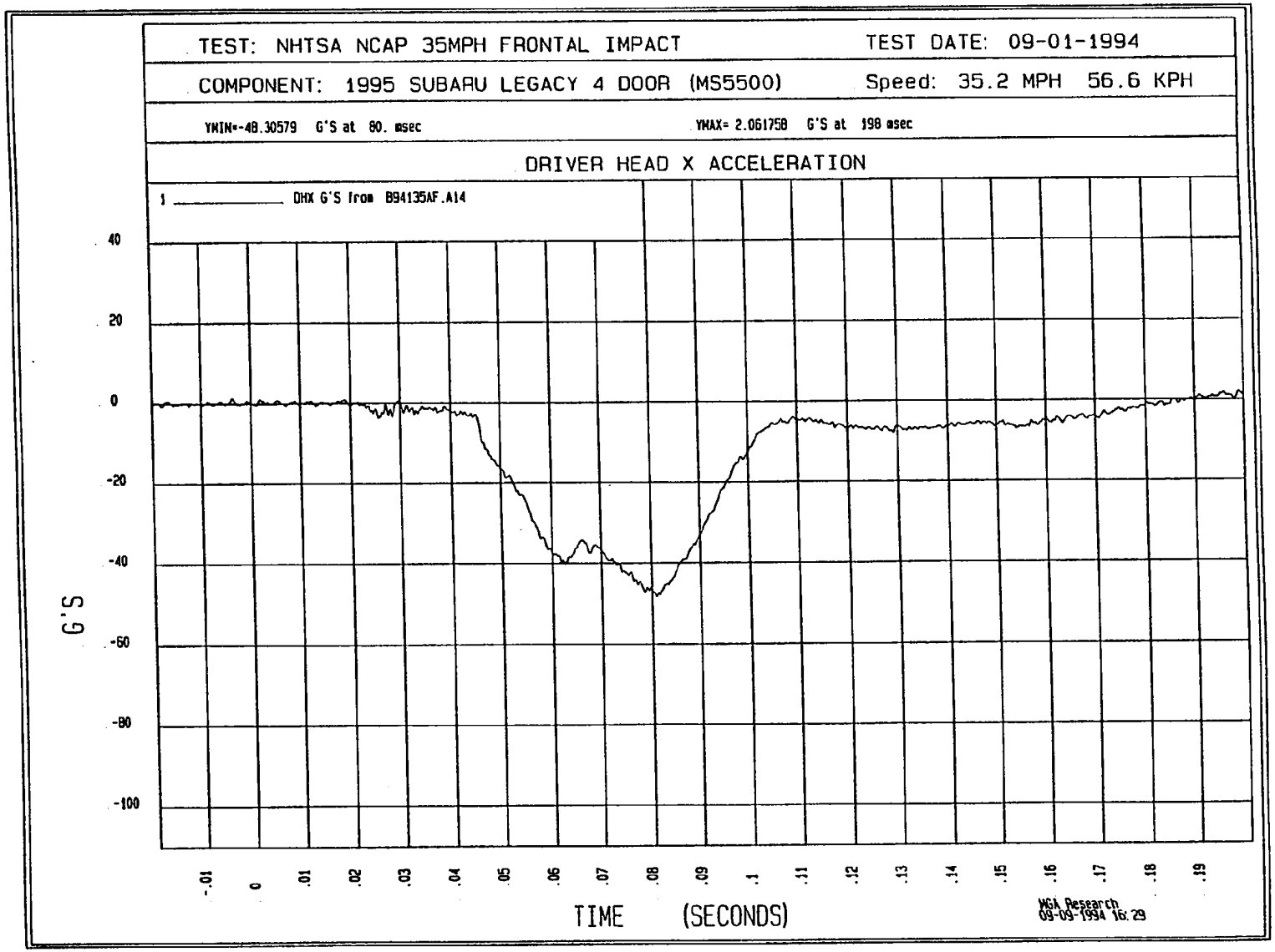


Figure B-33 - Driver Head X Acceleration vs. Time

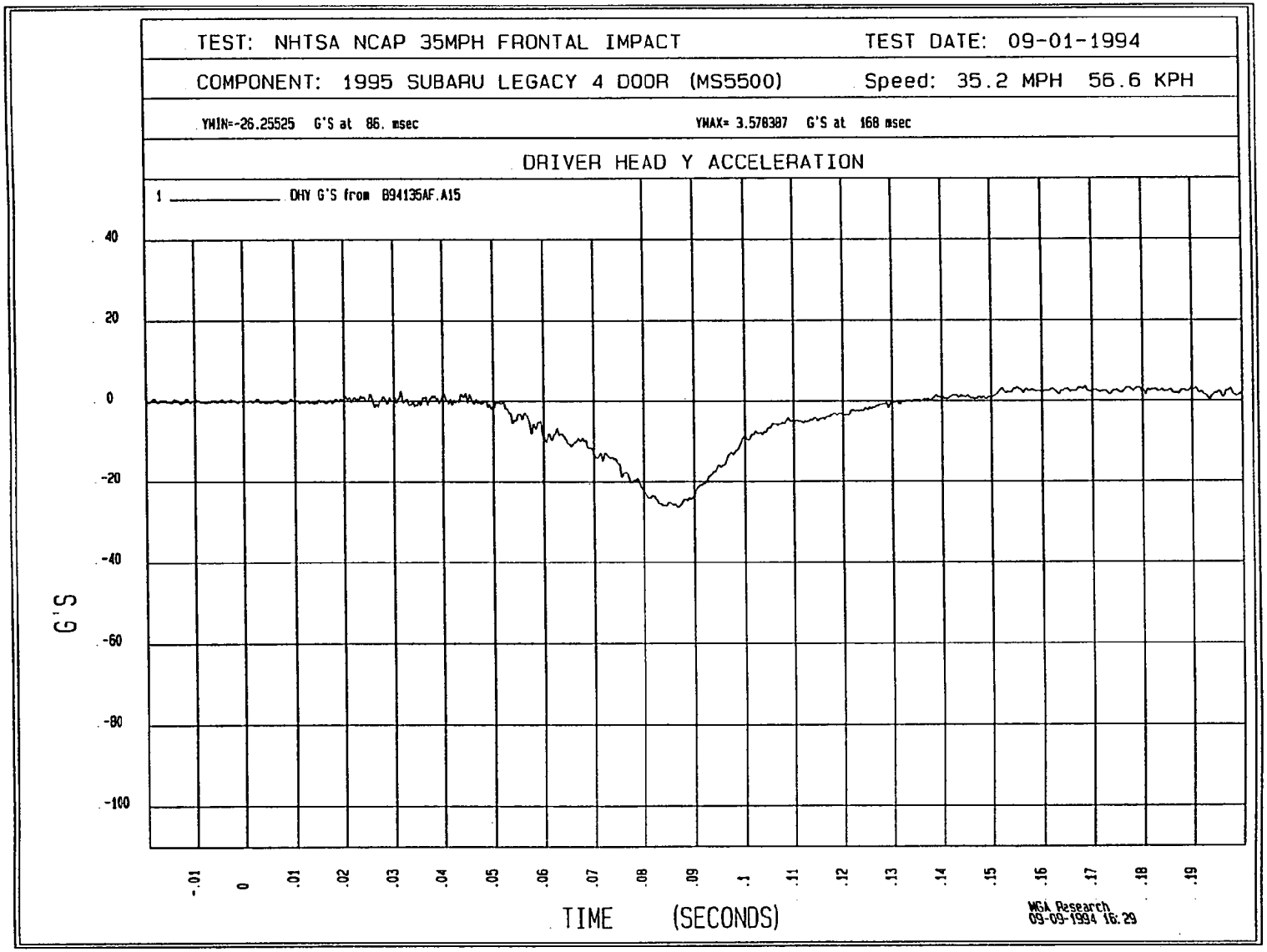


Figure B-34 - Driver Head Y Acceleration vs. Time

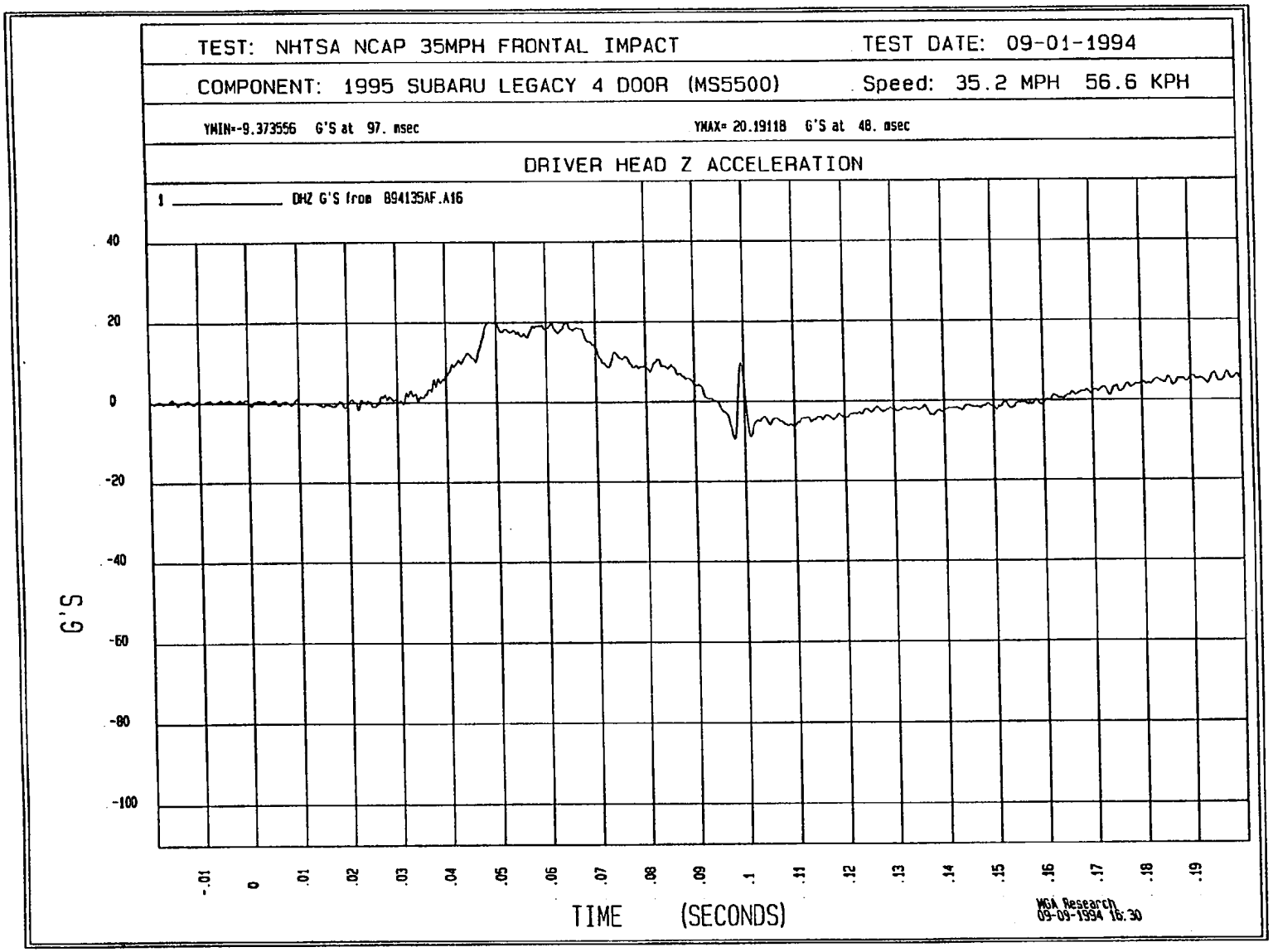


Figure B-35 - Driver Head Z Acceleration vs. Time

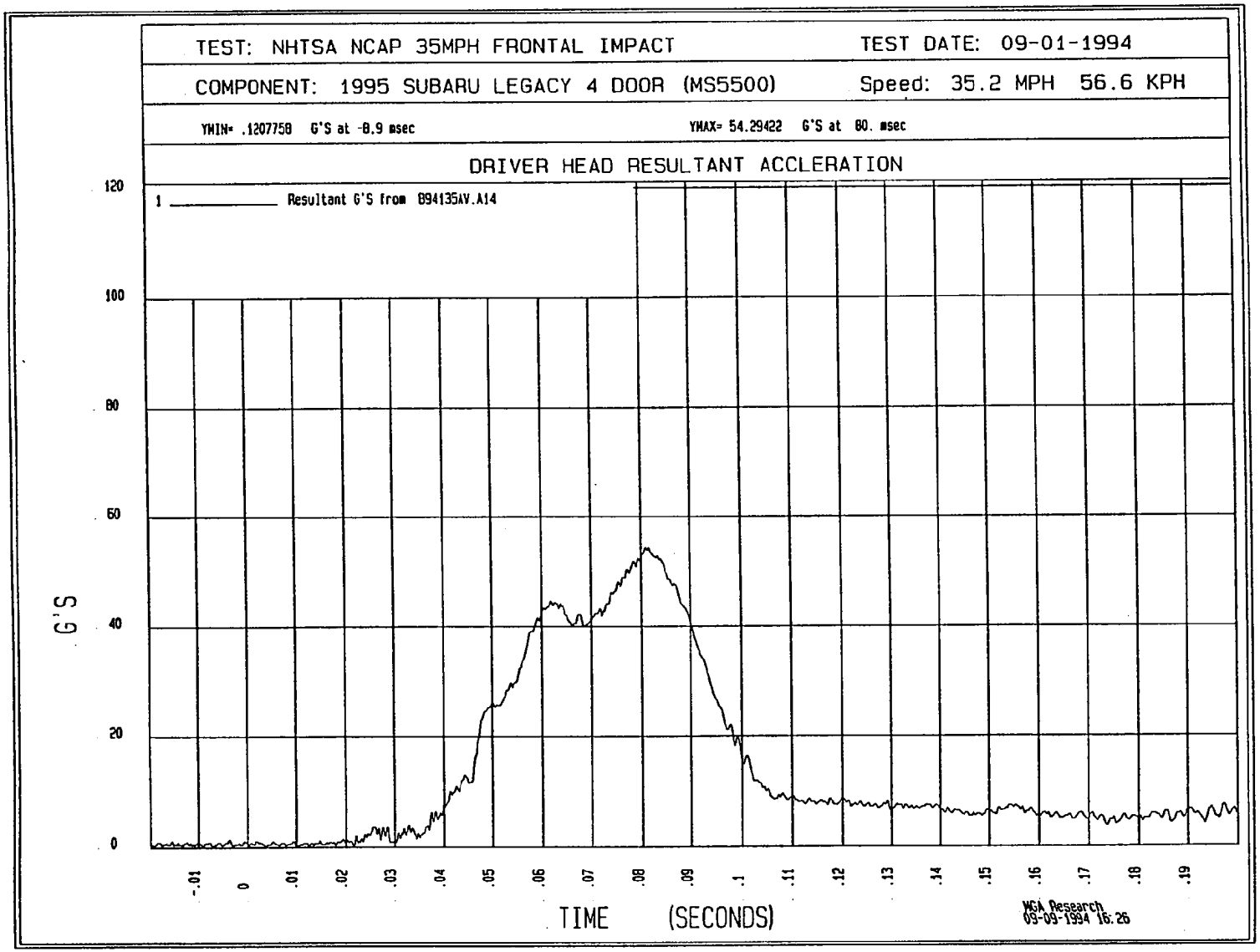


Figure B-36 - Driver Head Resultant Acceleration vs. Time

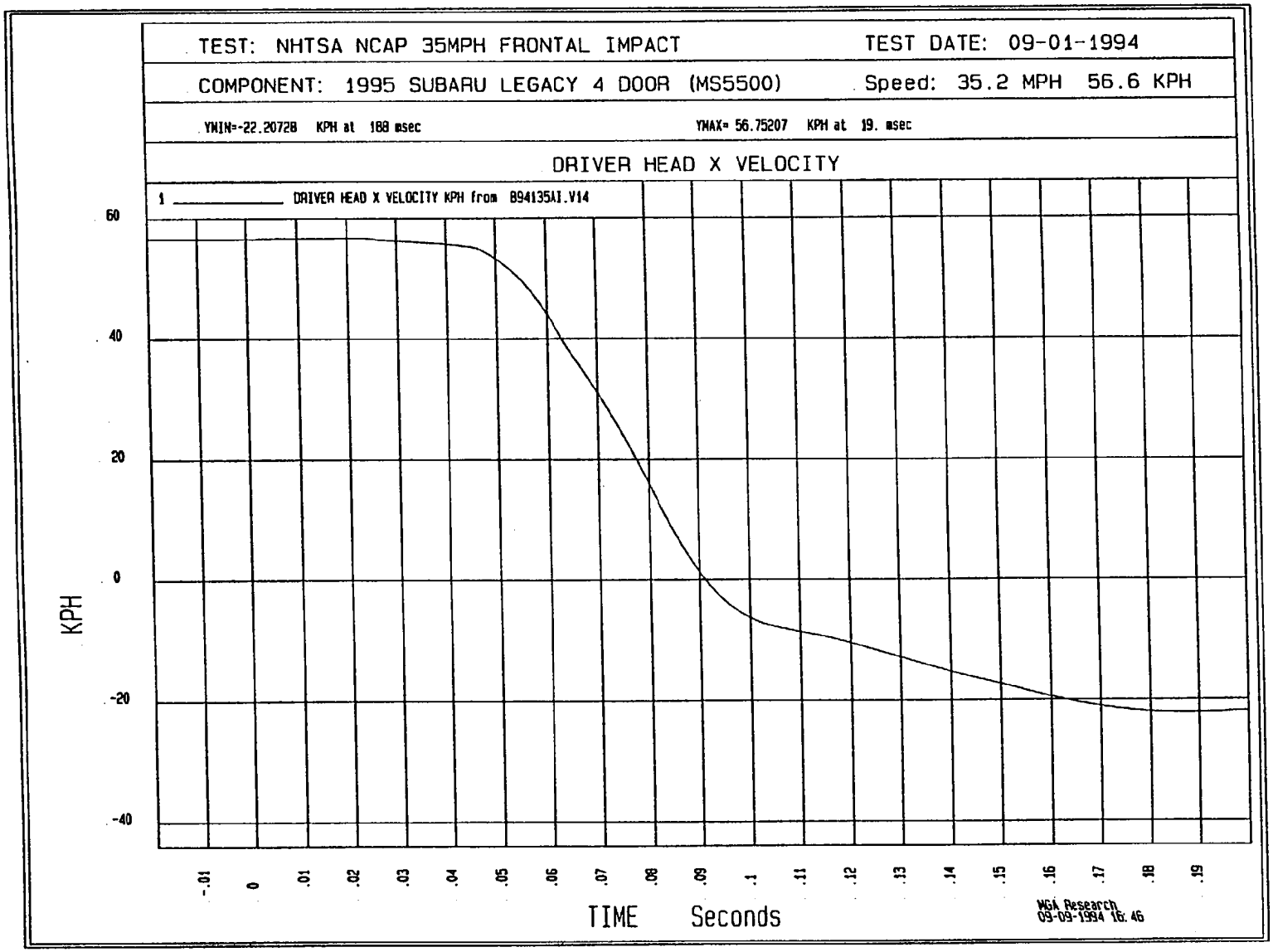


Figure B-37 - Driver Head X Velocity vs. Time

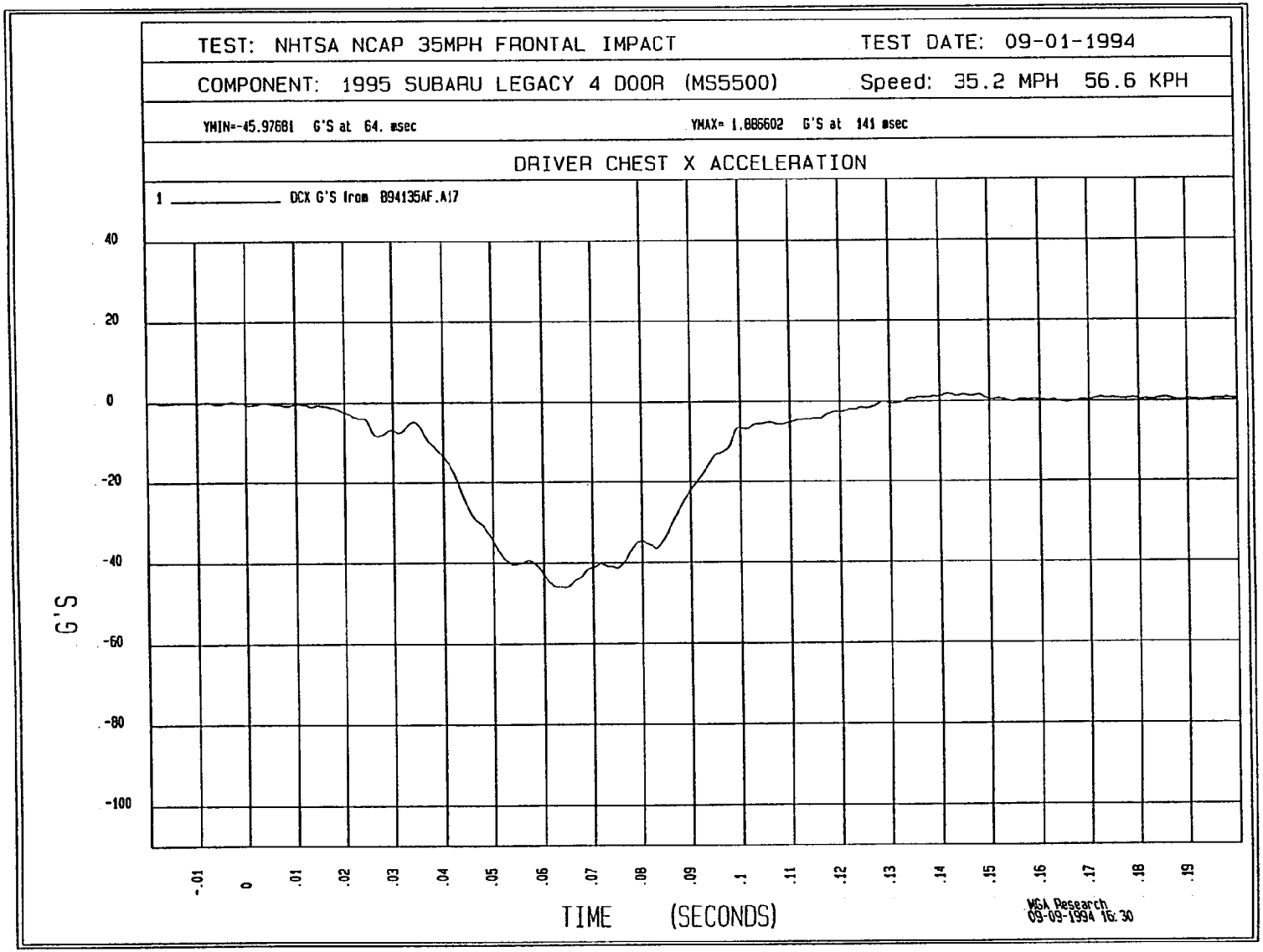


Figure B-38 - Driver Chest X Acceleration vs. Time

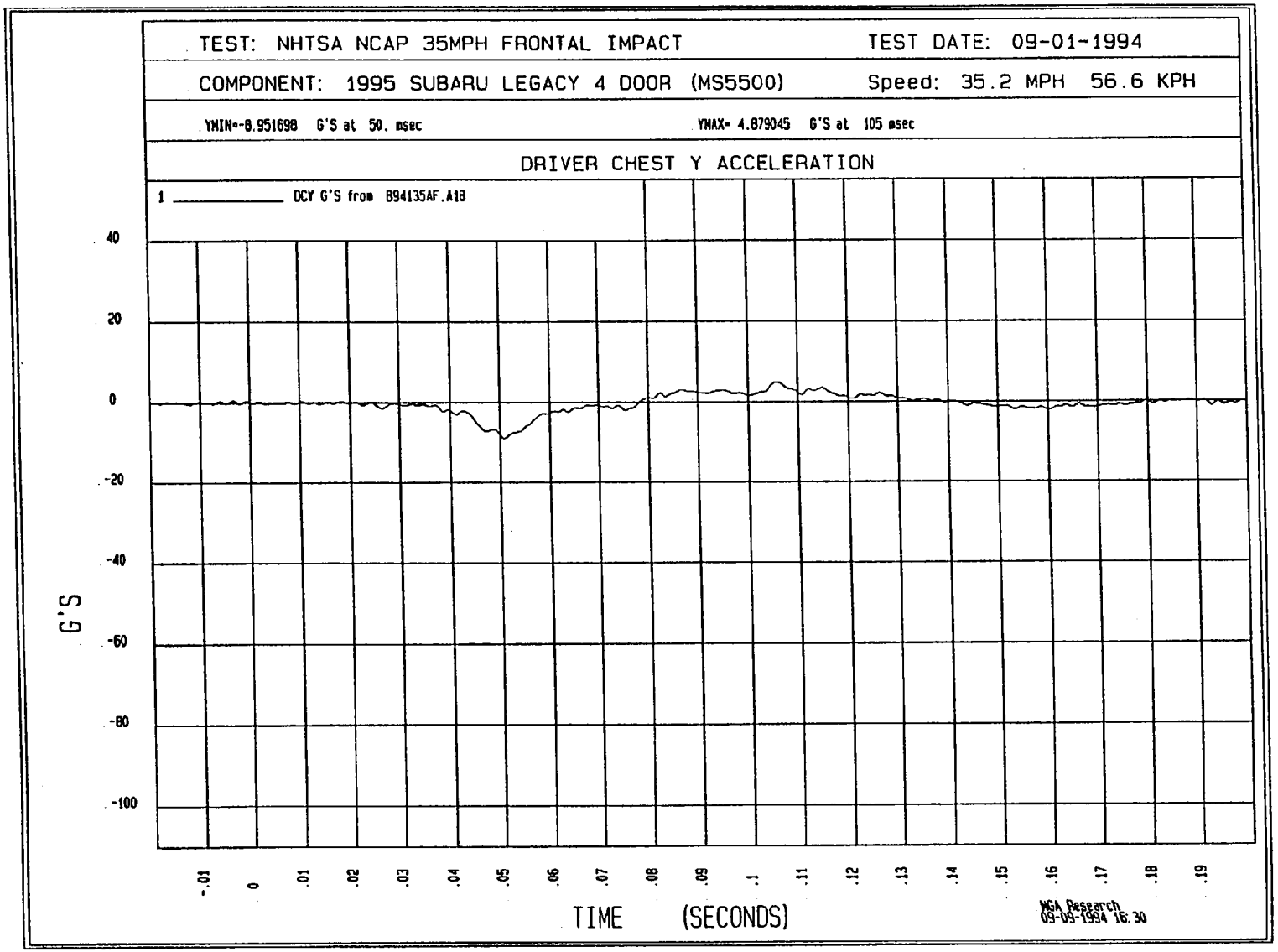


Figure B-39 - Driver Chest Y Acceleration vs. Time

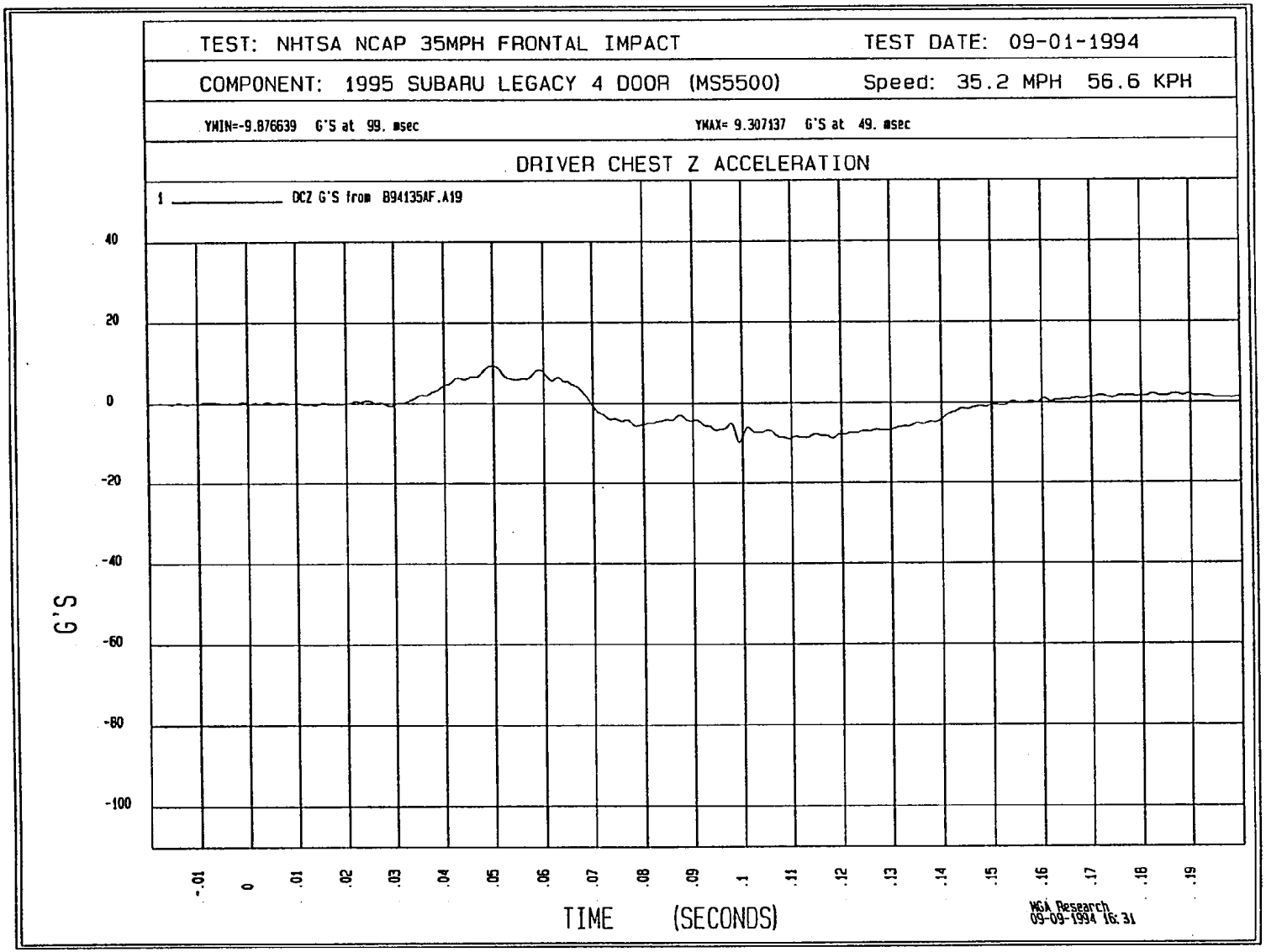


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Figure B-40 - Driver Chest Z Acceleration vs. Time

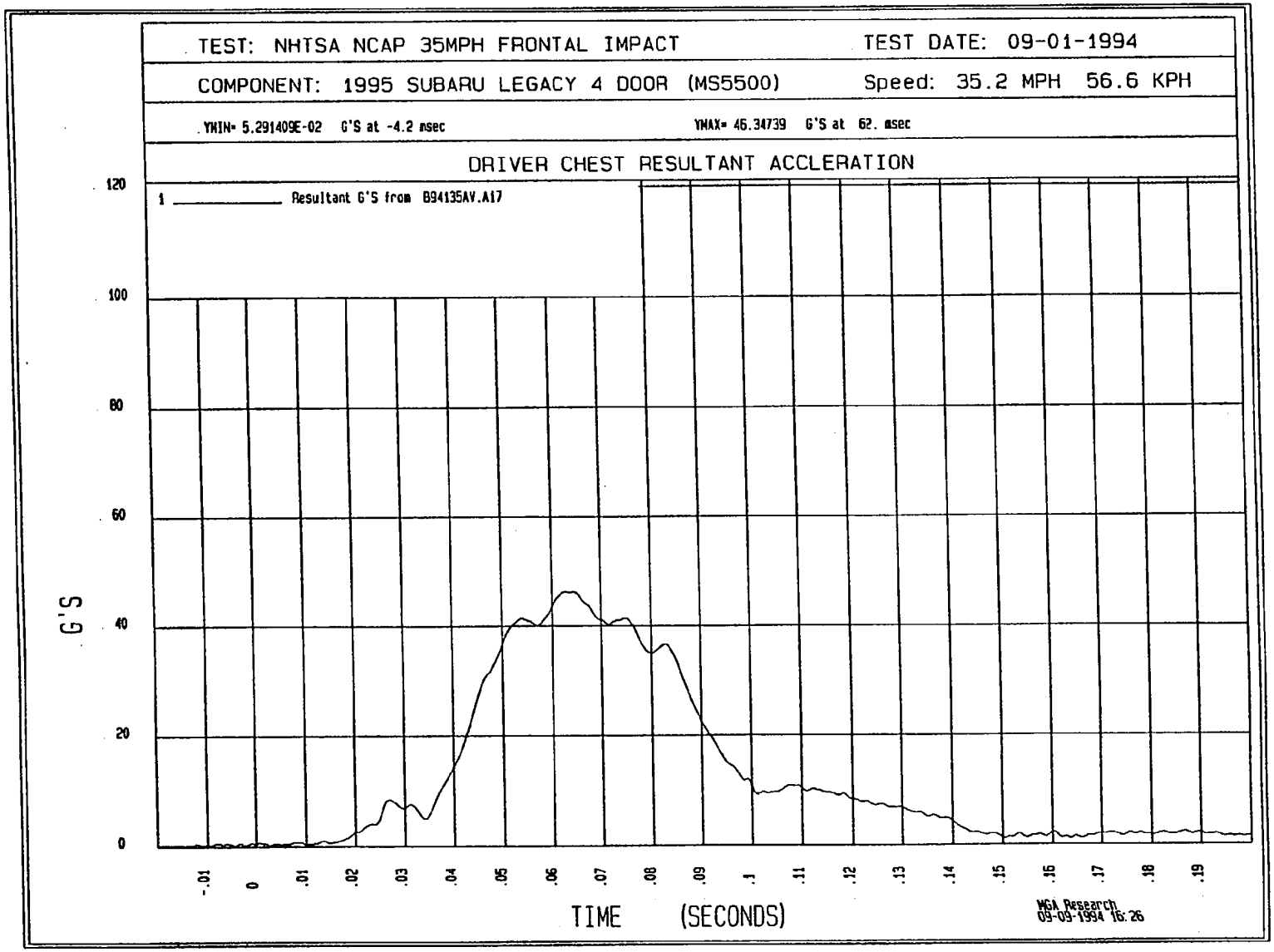

Figure B-41 - Driver Chest Resultant vs. Time

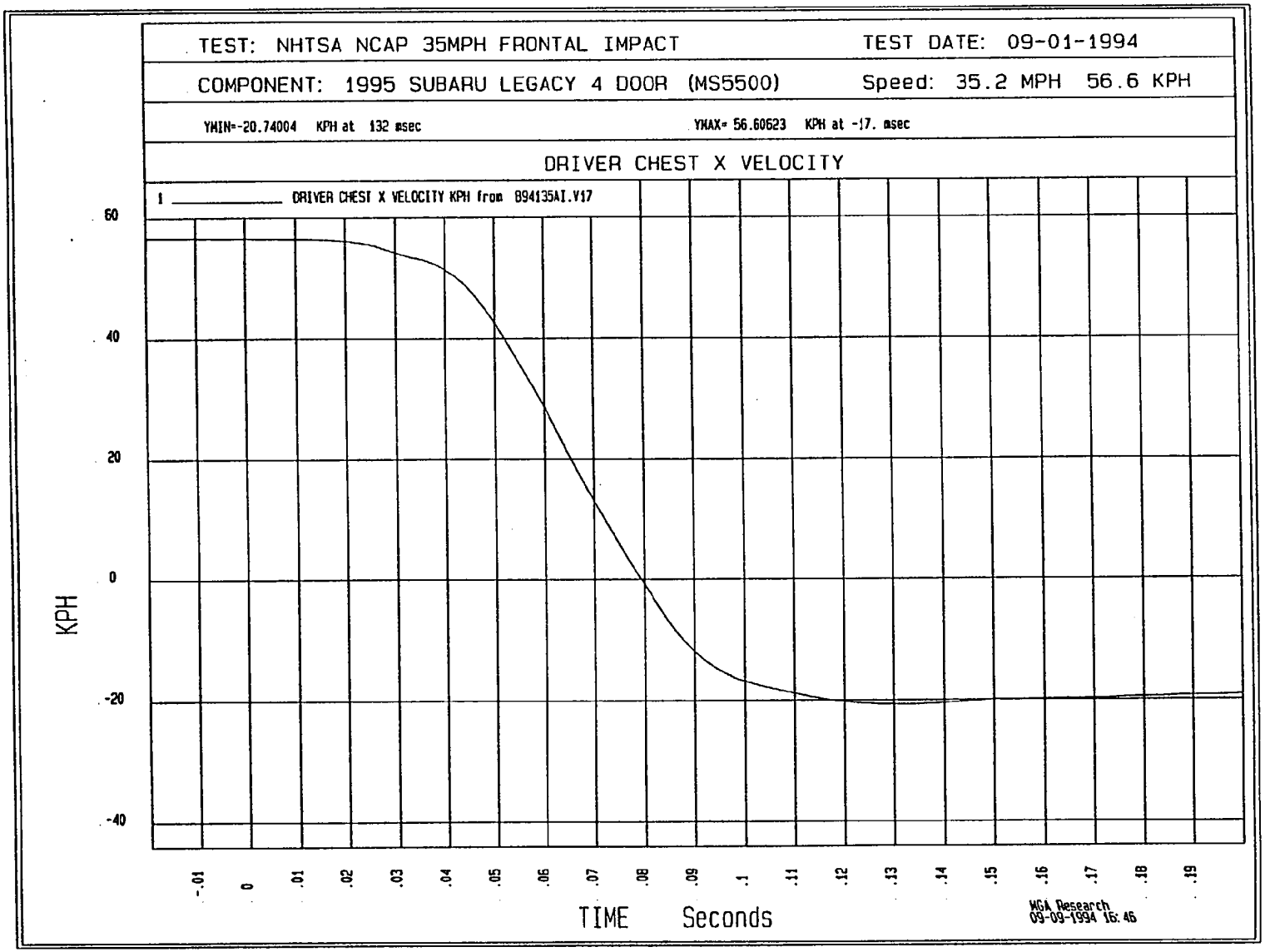

Figure B-42 - Driver Chest X Velocity vs. Time

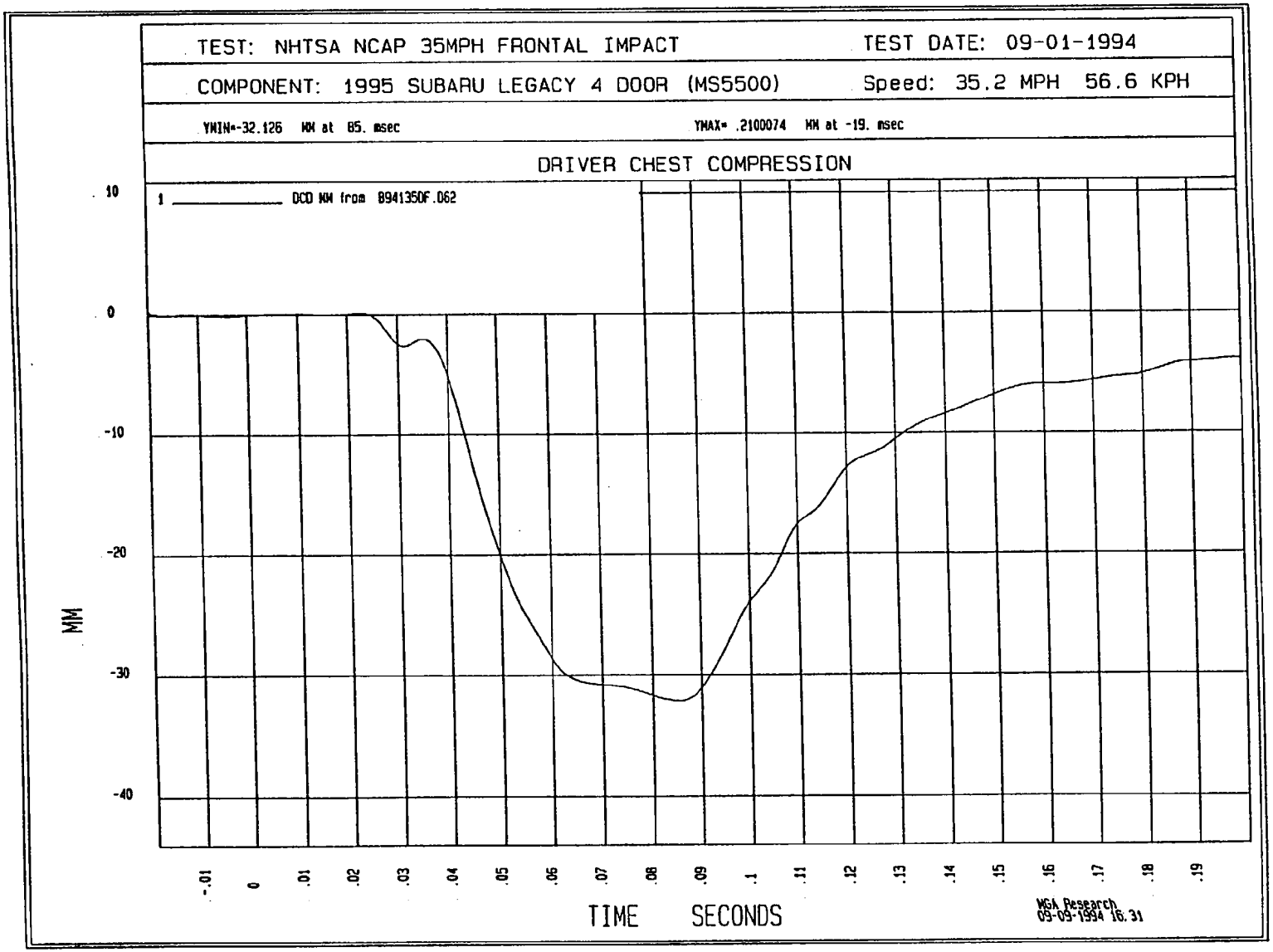

Figure B-43 - Driver Chest Compression vs. Time

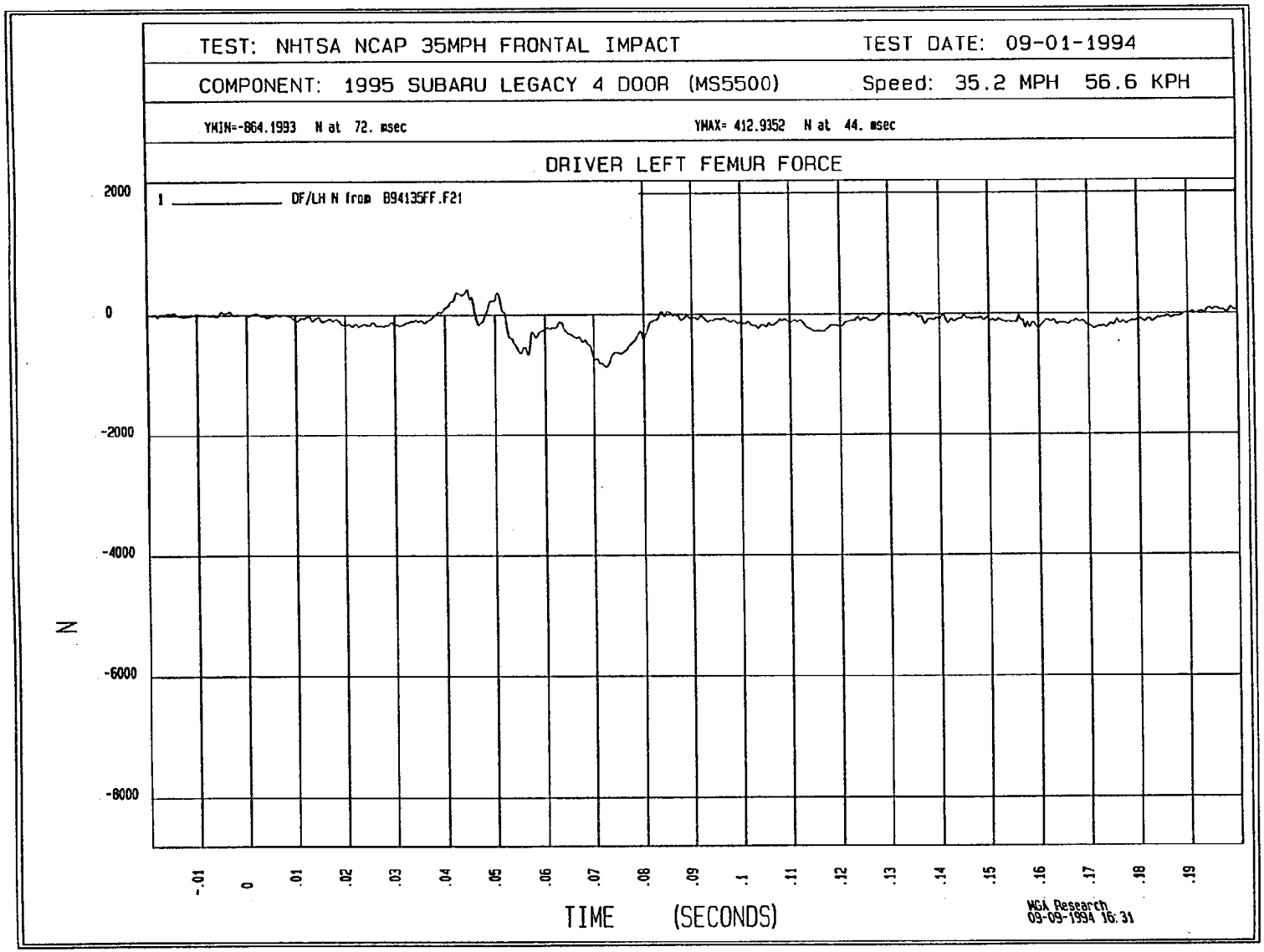

Figure B-44 - Driver Left Femur Force vs. Time

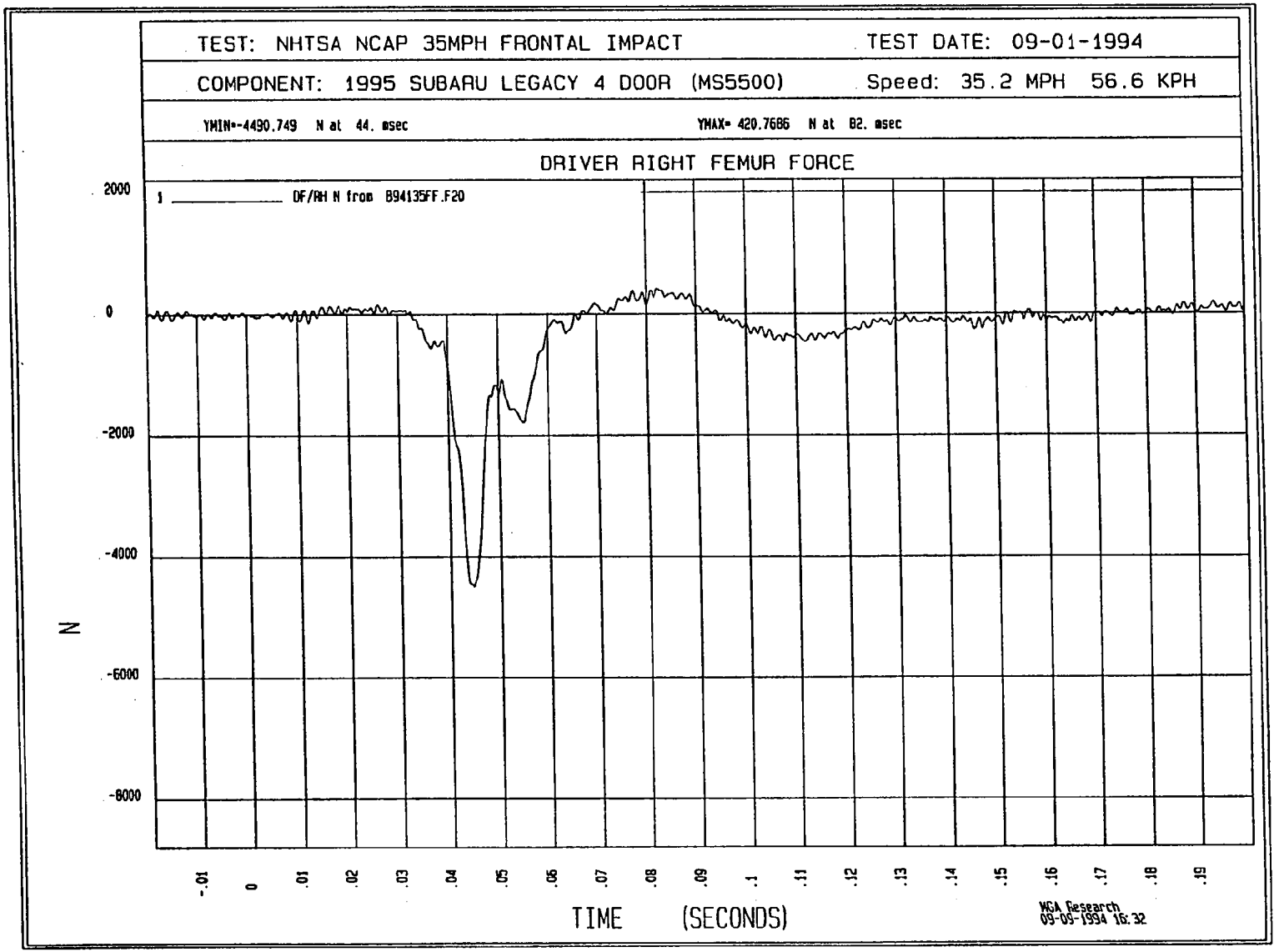

Figure B-45 - Driver Right Femur Force vs. Time

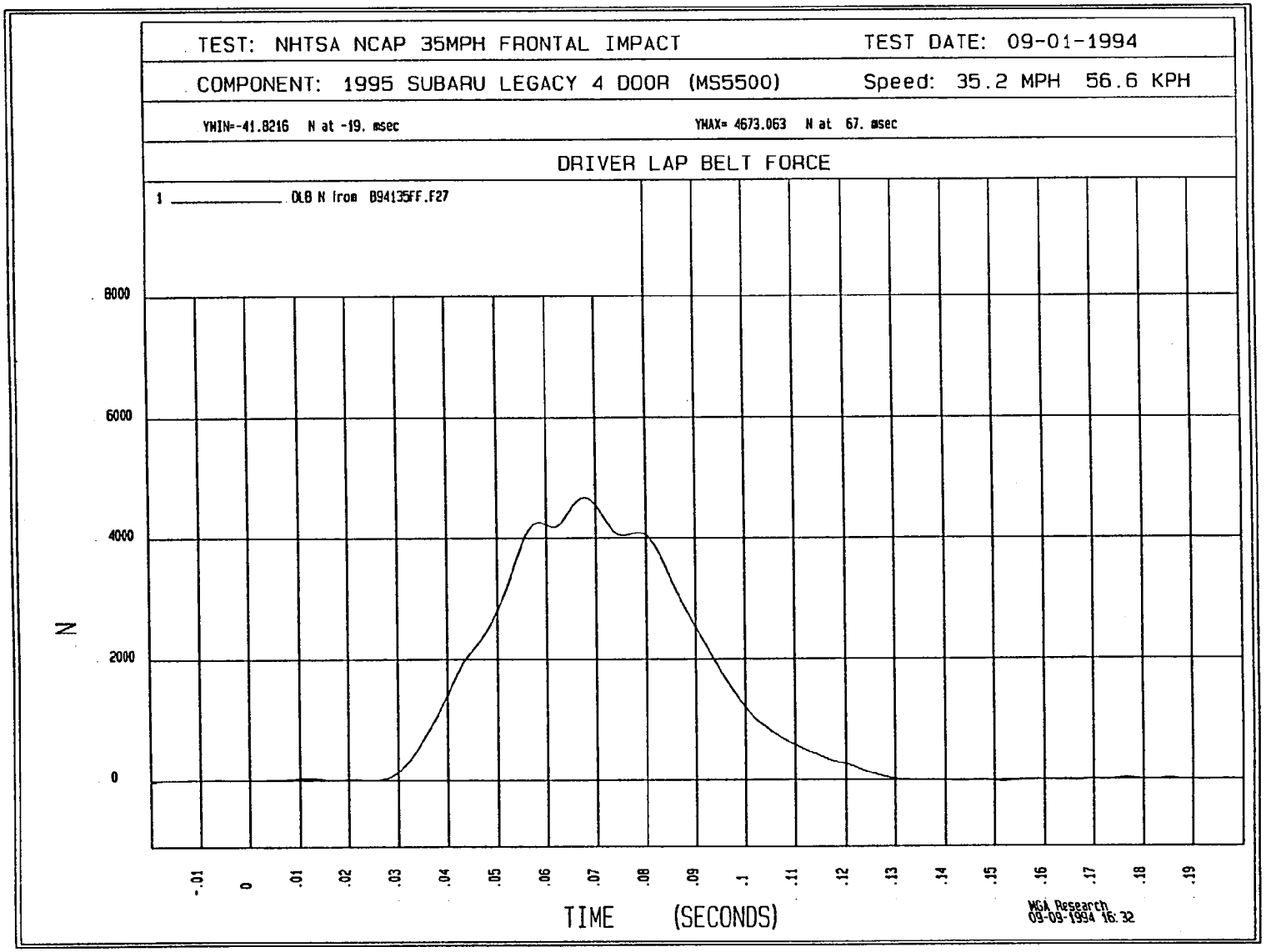

Figure B-46 - Driver Lap Belt Force vs. Time

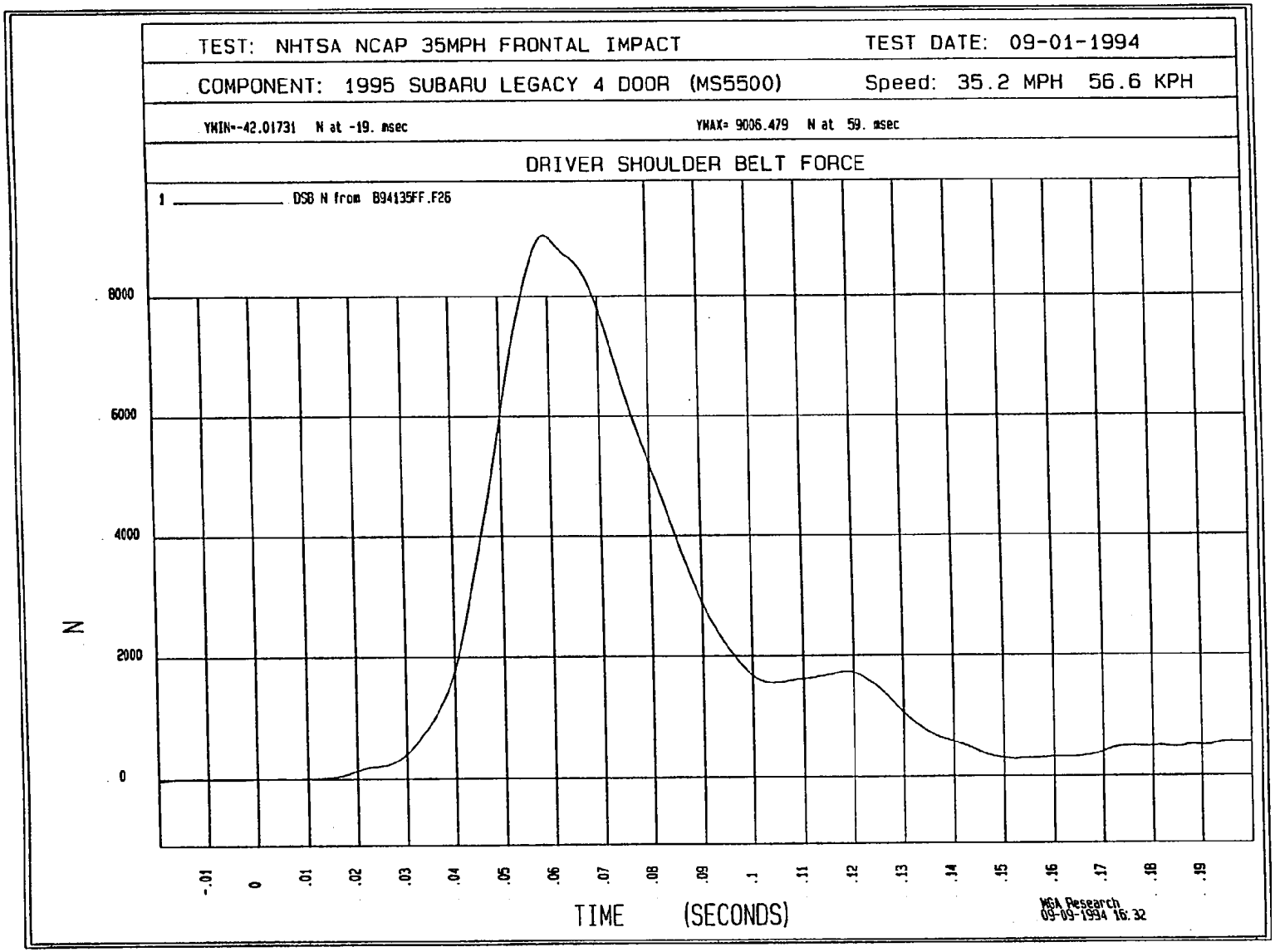

Figure B-47 - Driver Shoulder Belt Force vs. Time

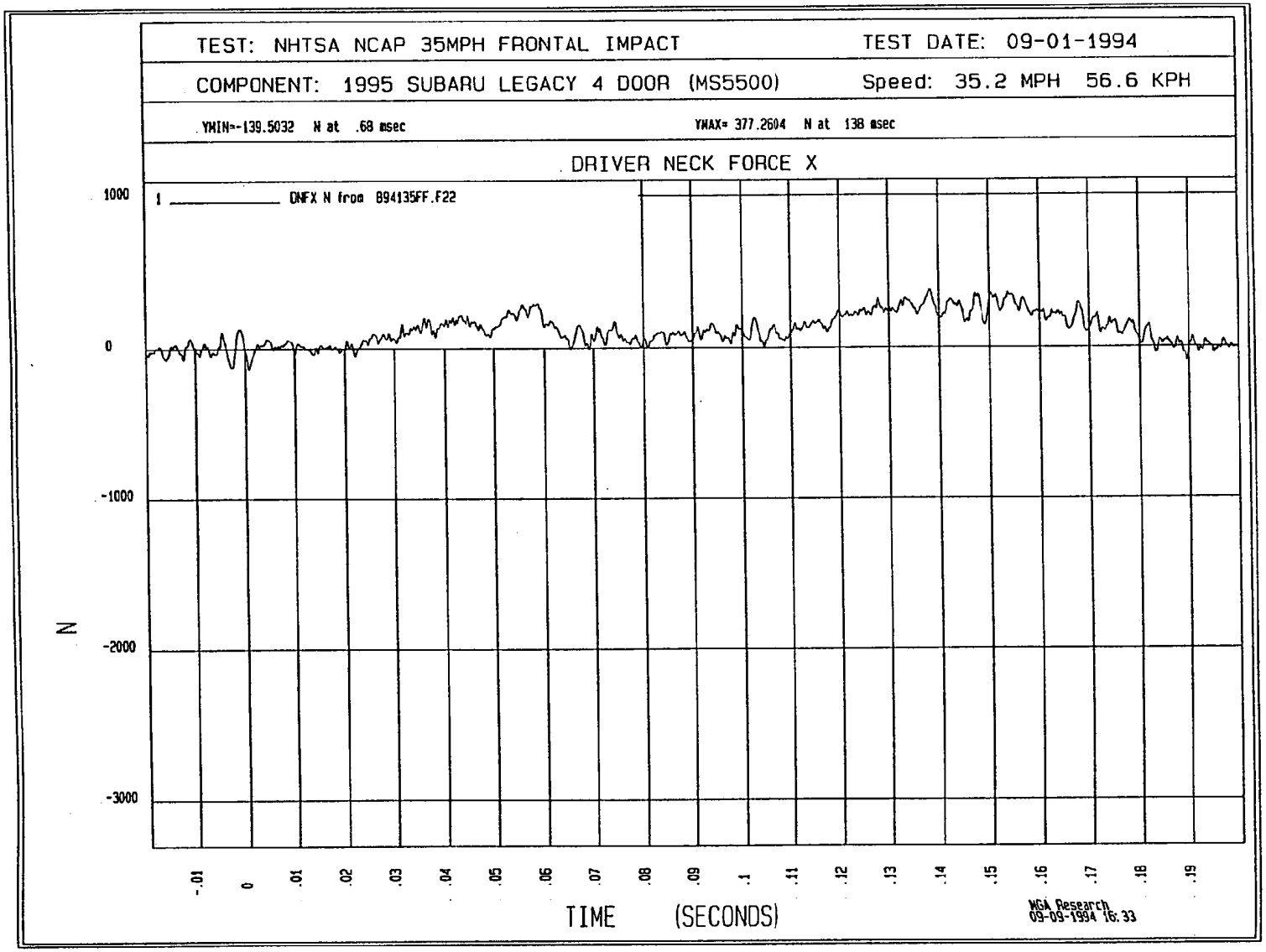

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Figure B-48 - Driver Neck Force X vs. Time

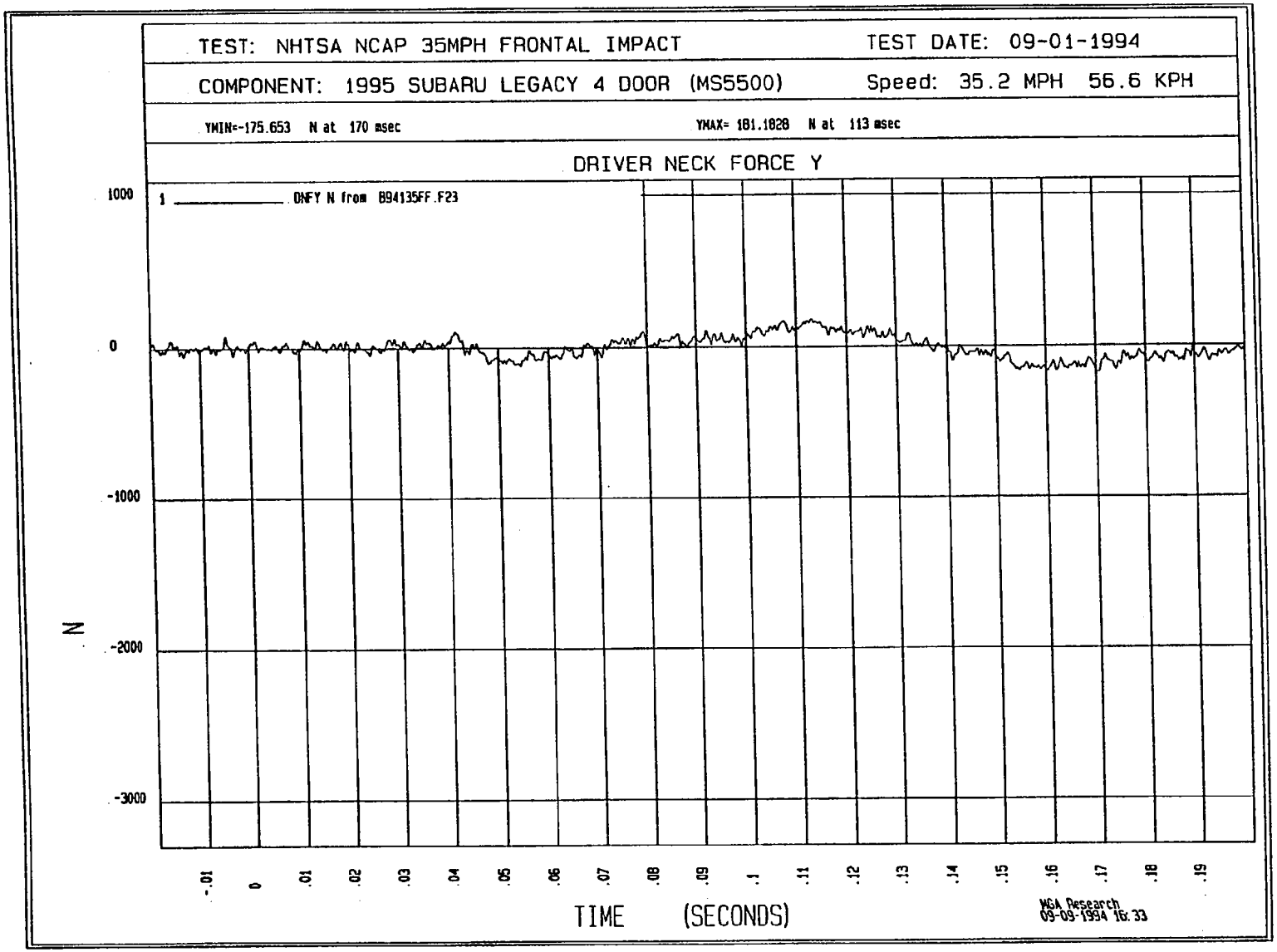


Figure B-49 - Driver Neck Force Y vs. Time

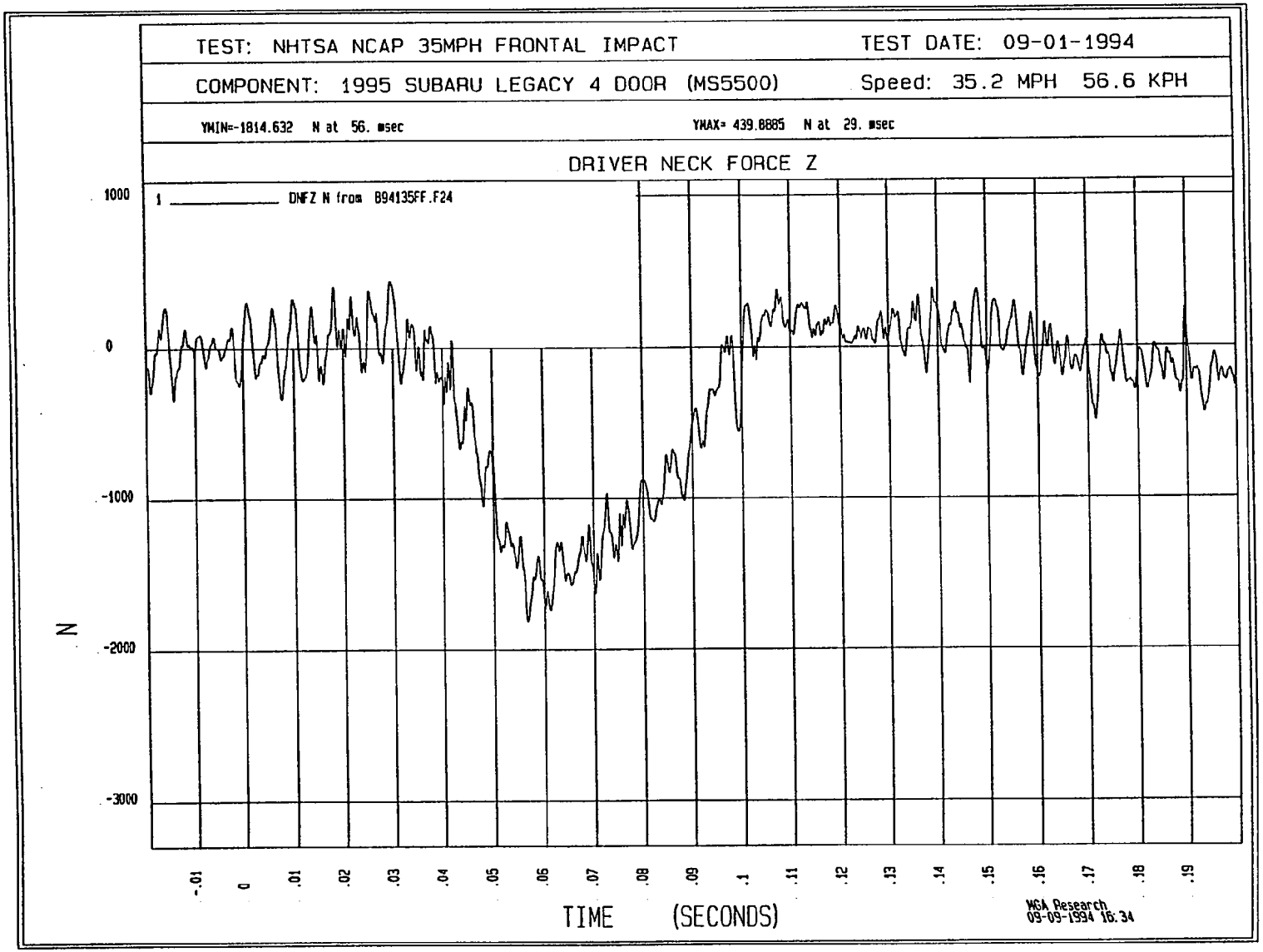


Figure B-50 - Driver Neck Force Z vs. Time

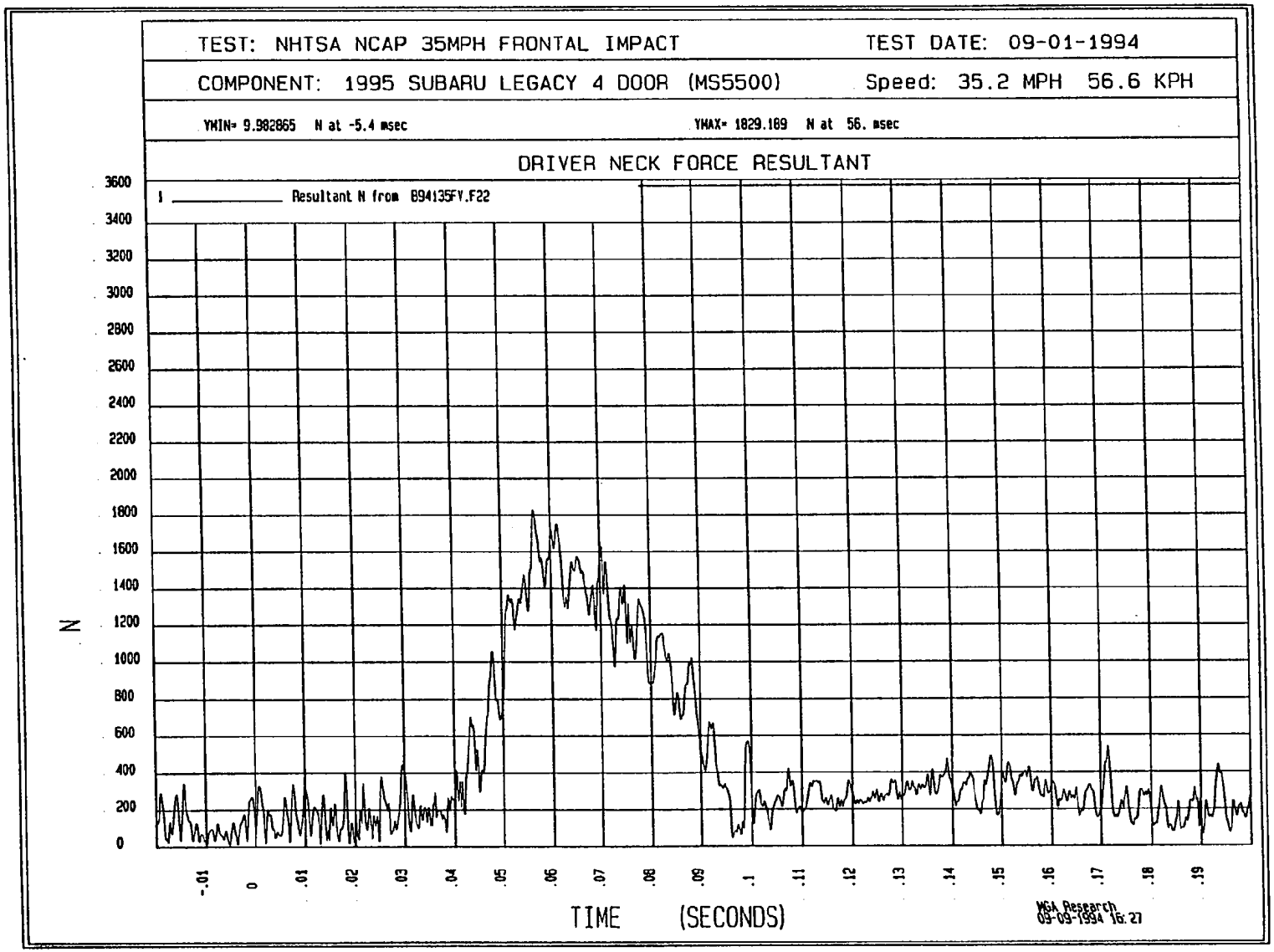


Figure B-51 - Driver Neck Force Resultant vs. Time

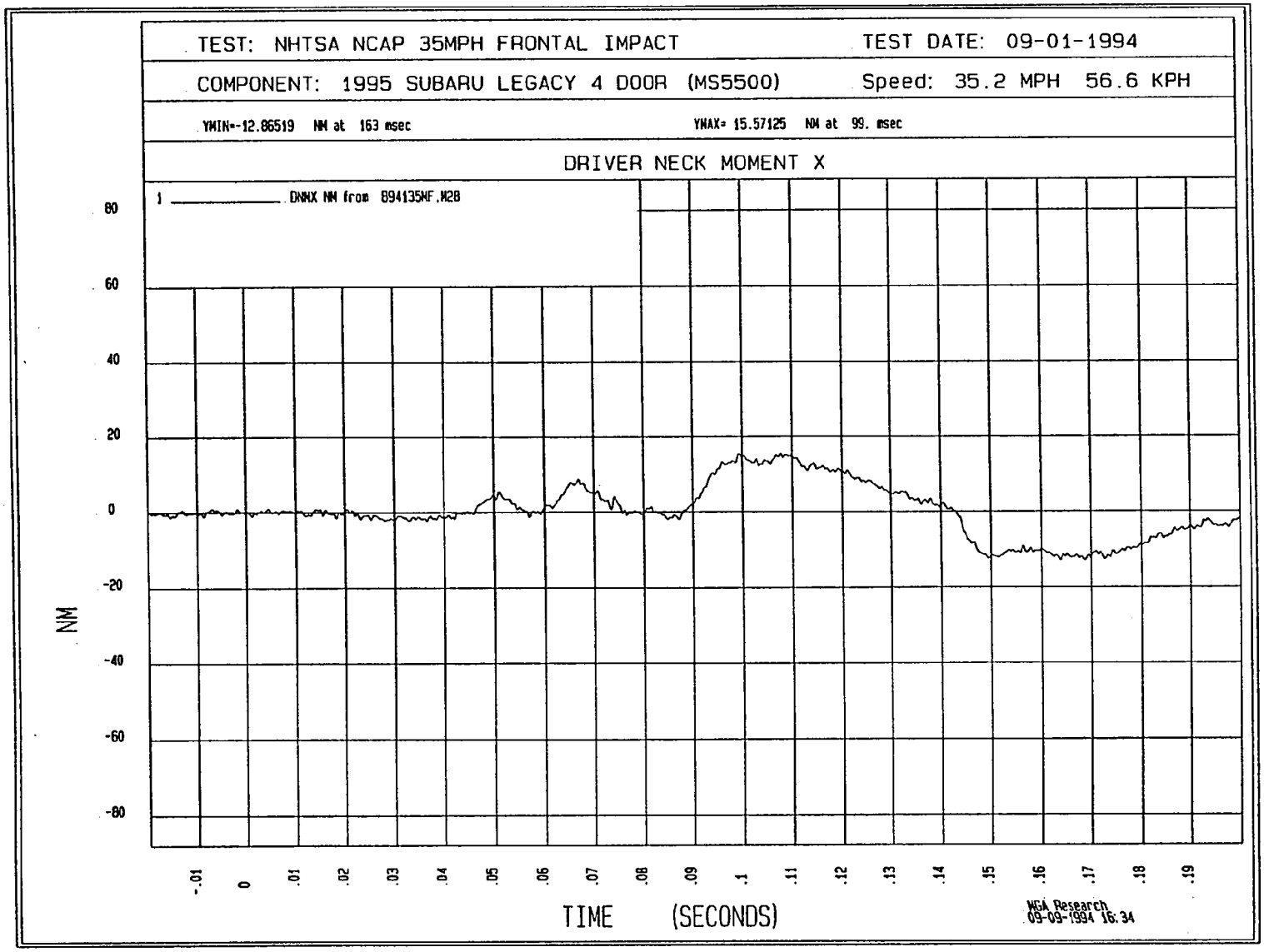


Figure B-52 - Driver Neck Moment X vs. Time

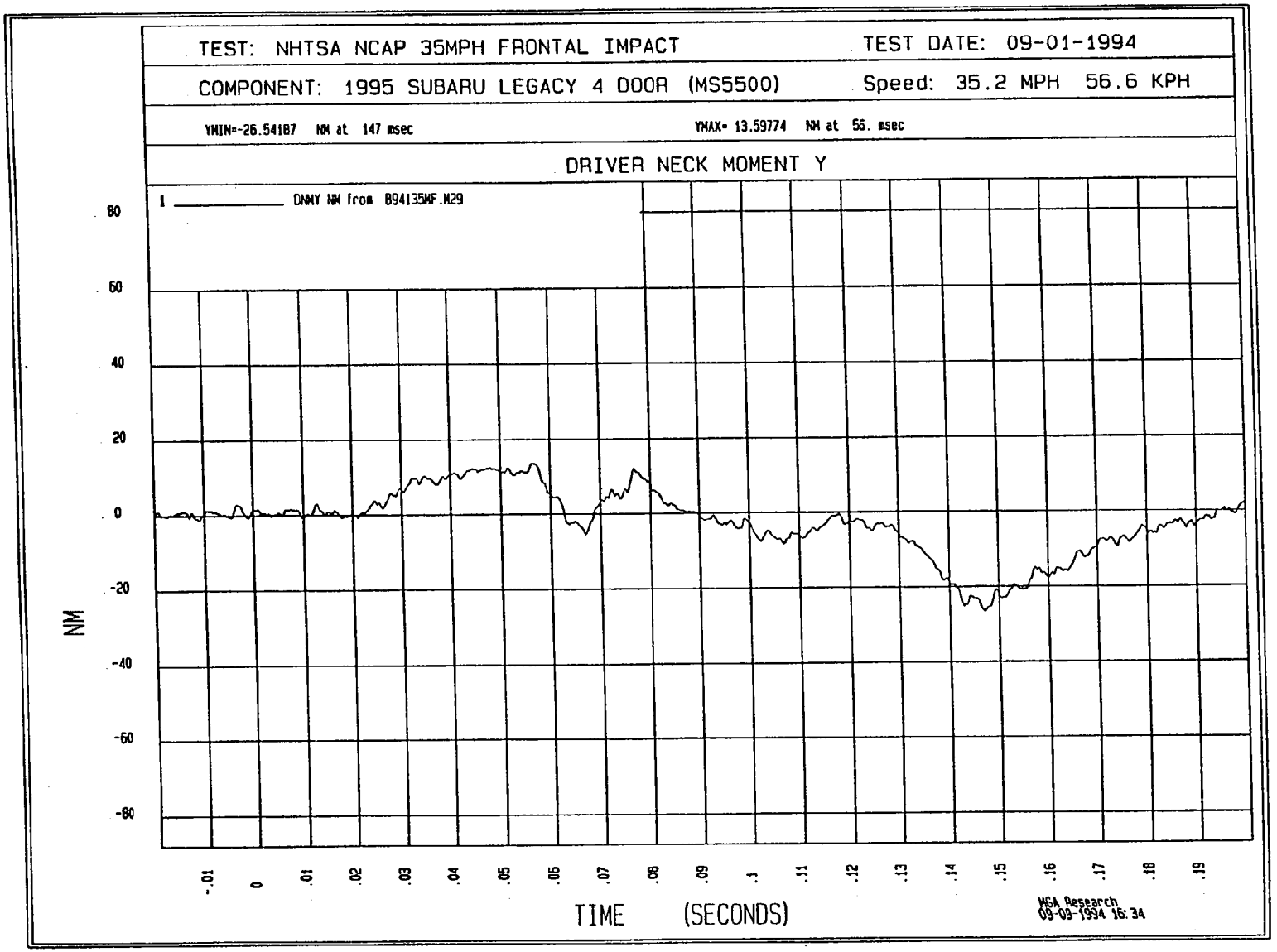


Figure B-53 - Driver Neck Moment Y vs. Time

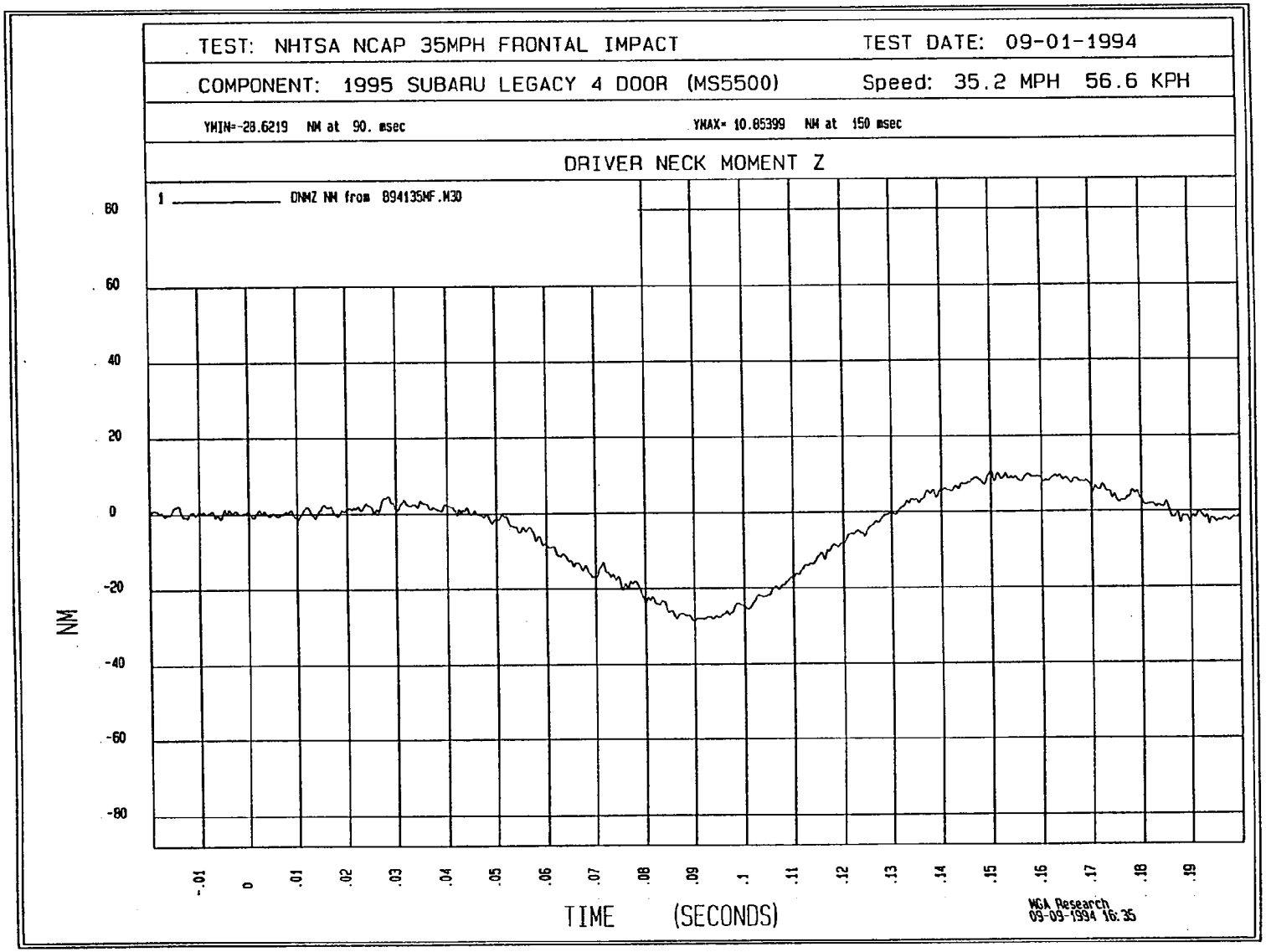


Figure B-54 - Driver Neck Moment Z vs. Time

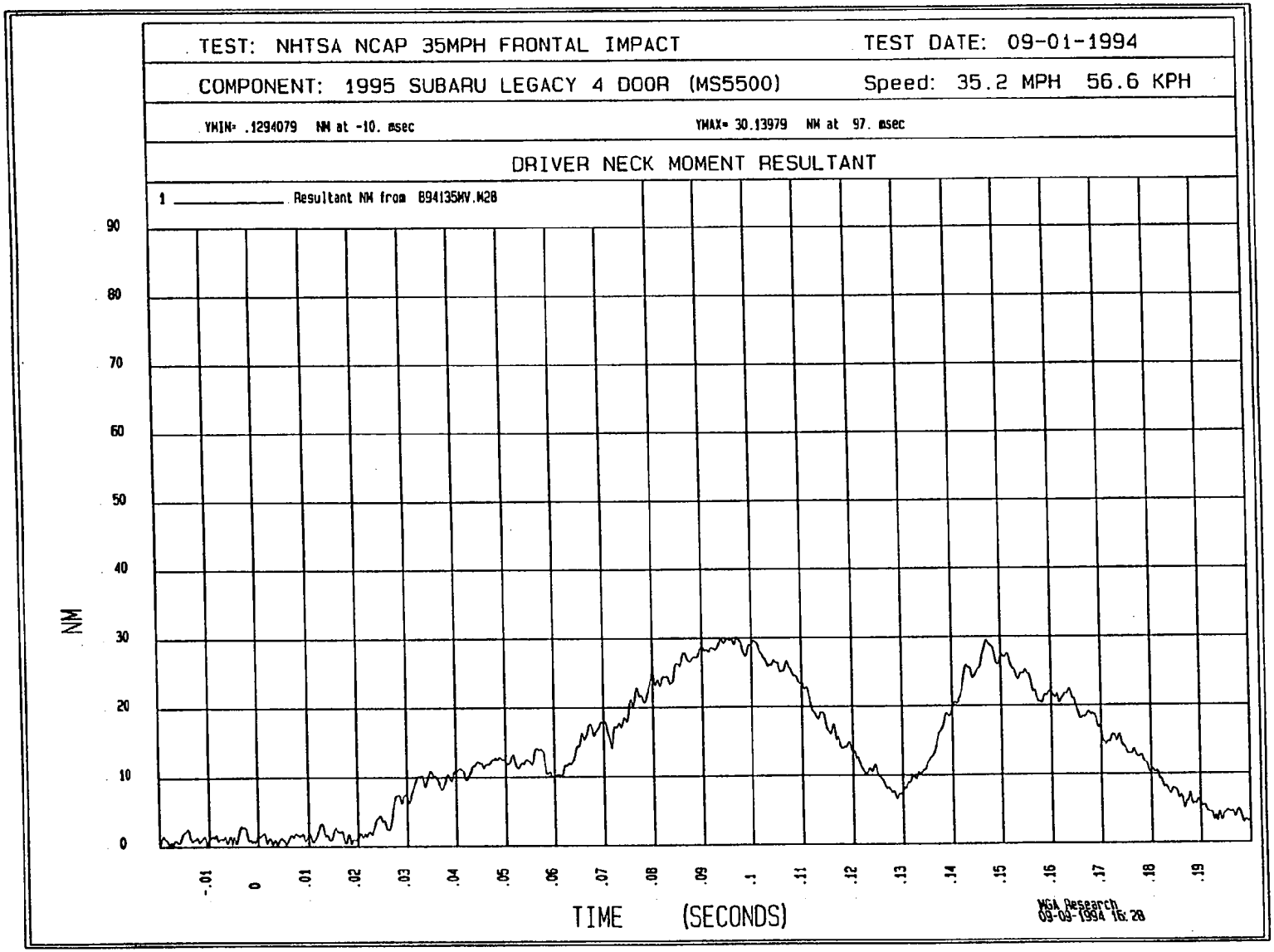


Figure B-55 - Driver Neck Moment Resultant vs. Time

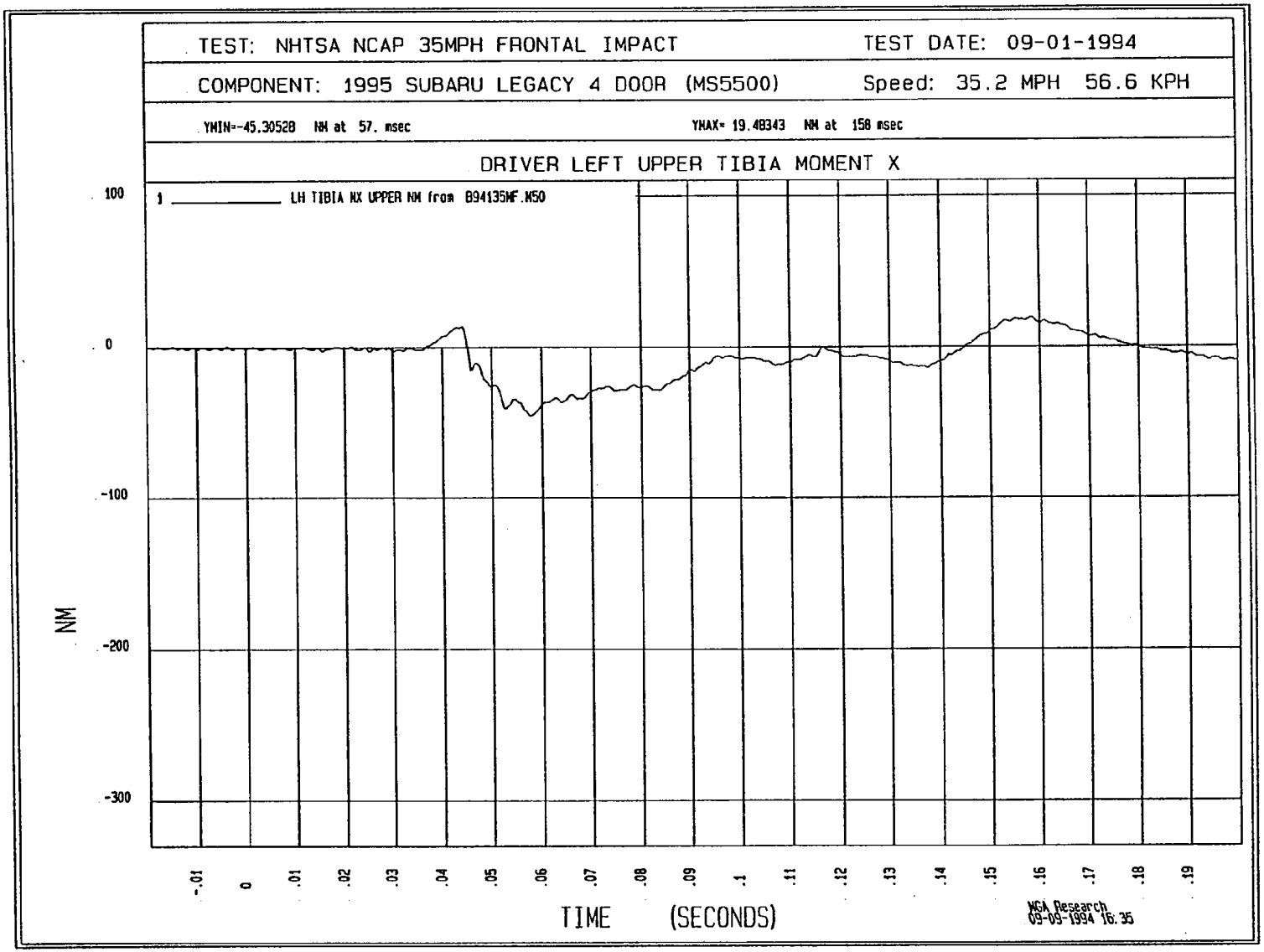


Figure B-56 - Driver Left Upper Tibia Moment X vs. Time

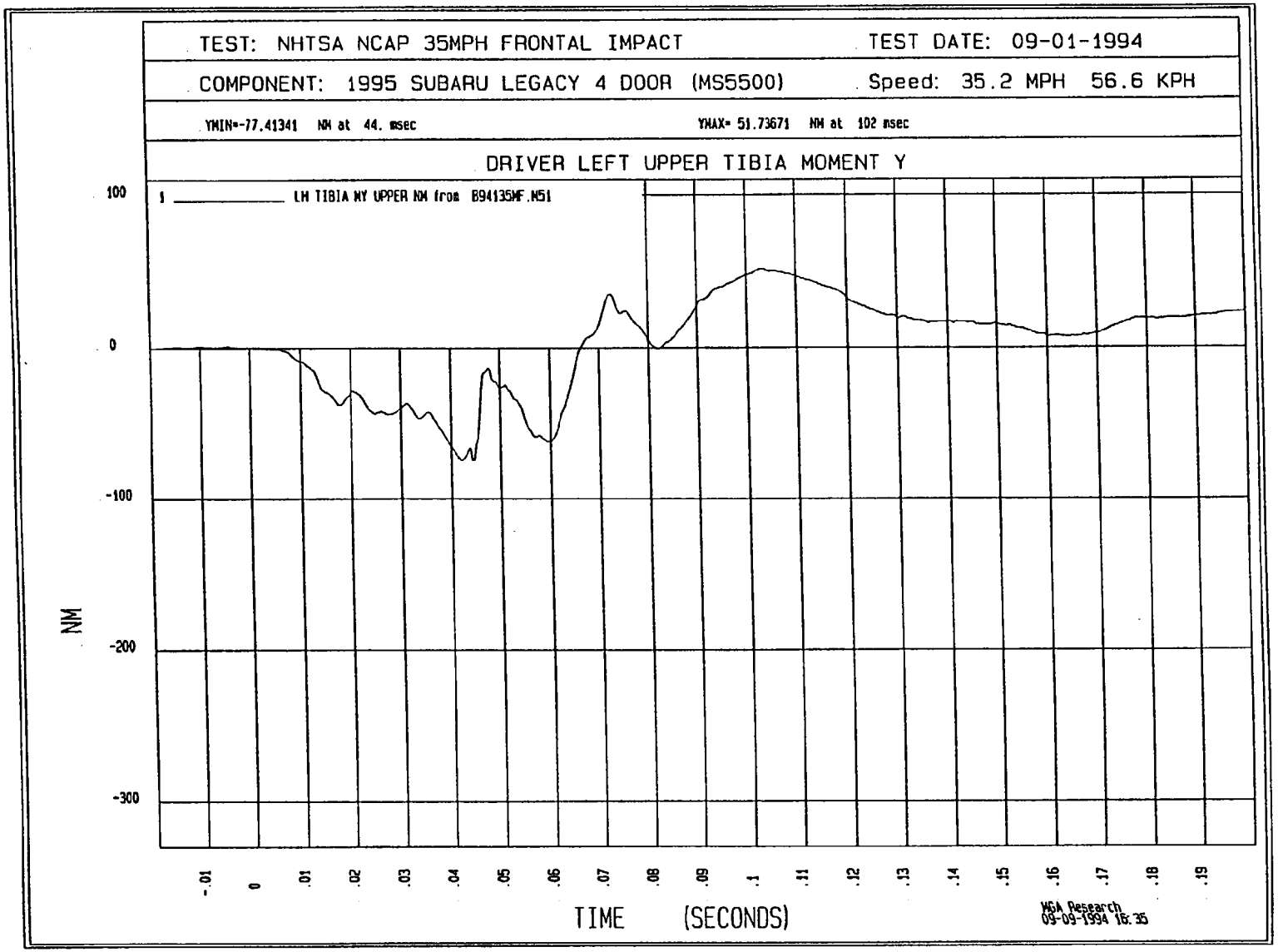


Figure B-57 - Driver Left Upper Tibia Moment Y vs. Time

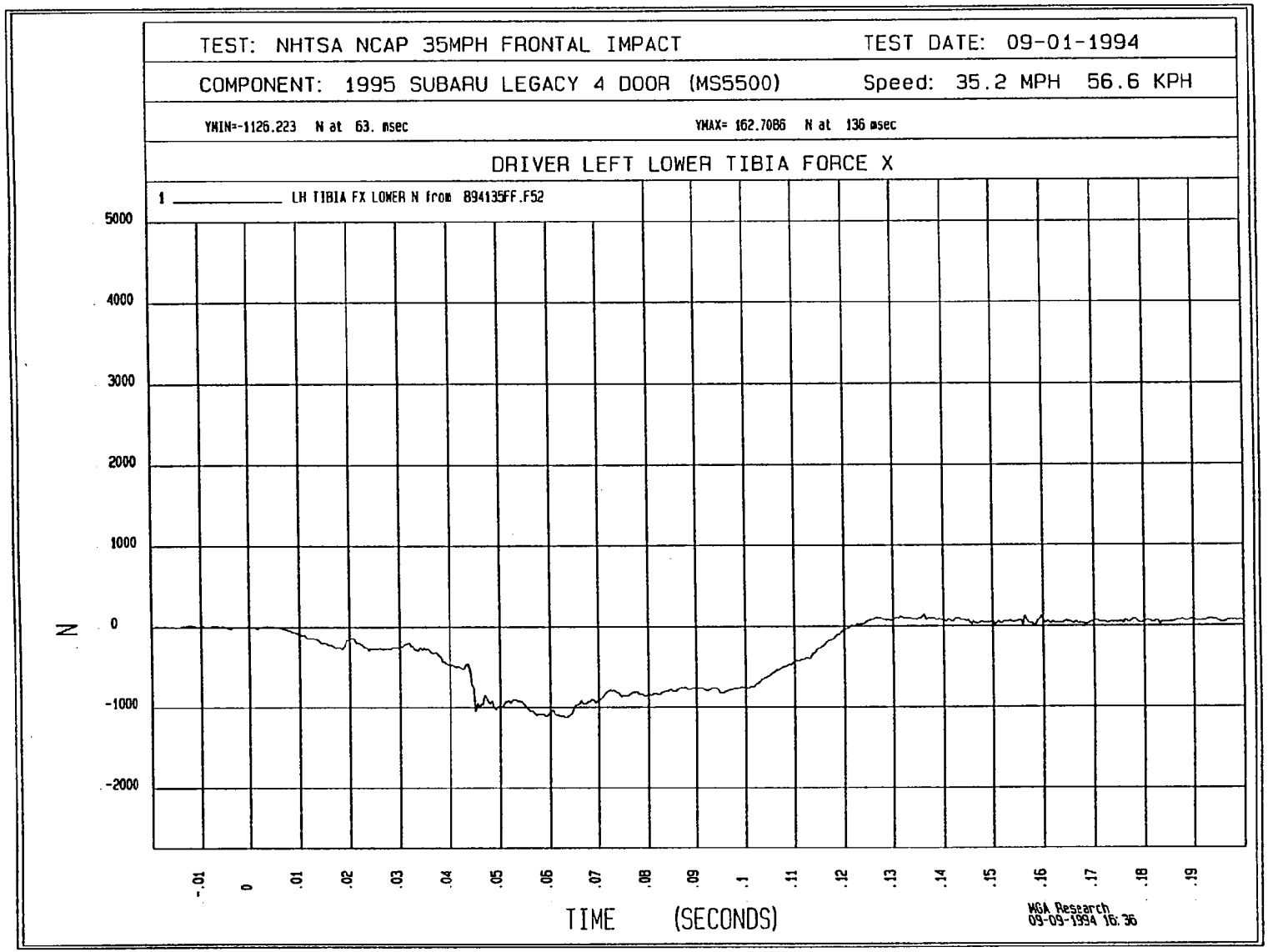


Figure B-58 - Driver Left Lower Tibia Force X vs. Time

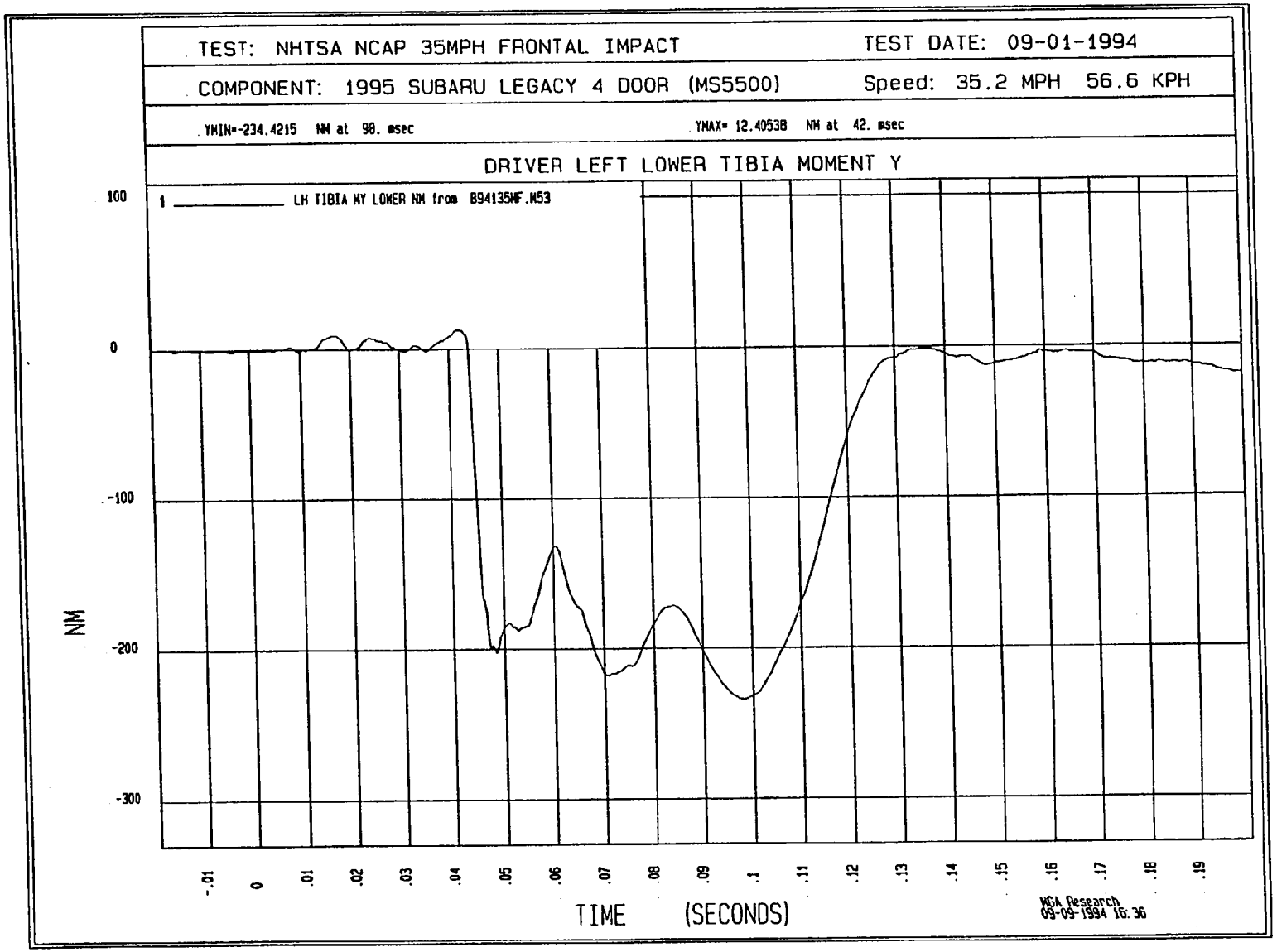


Figure B-59 - Driver Left Lower Tibia Moment Y vs. Time

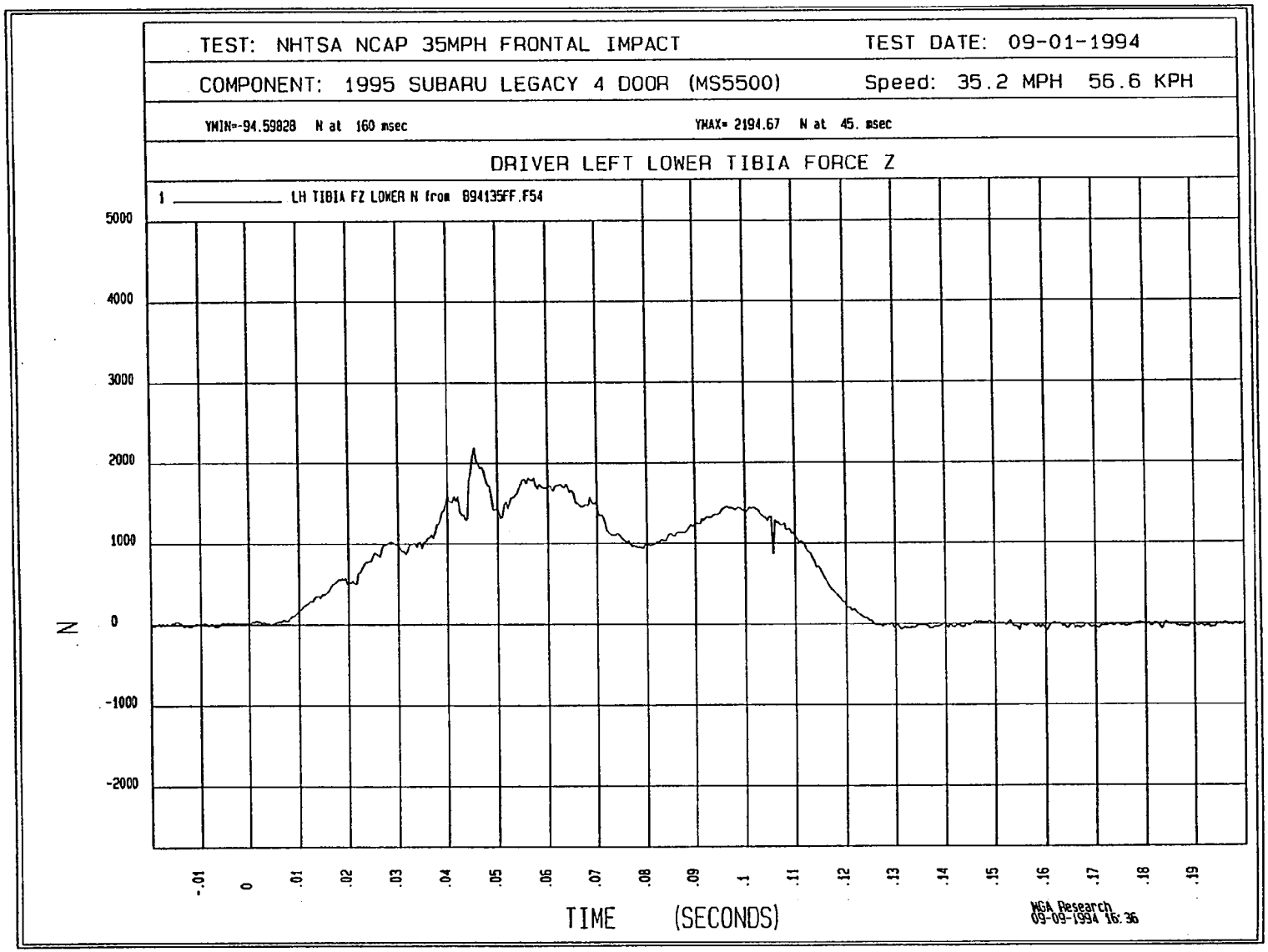


Figure B-60 - Driver Left Lower Tibia Force Z vs. Time

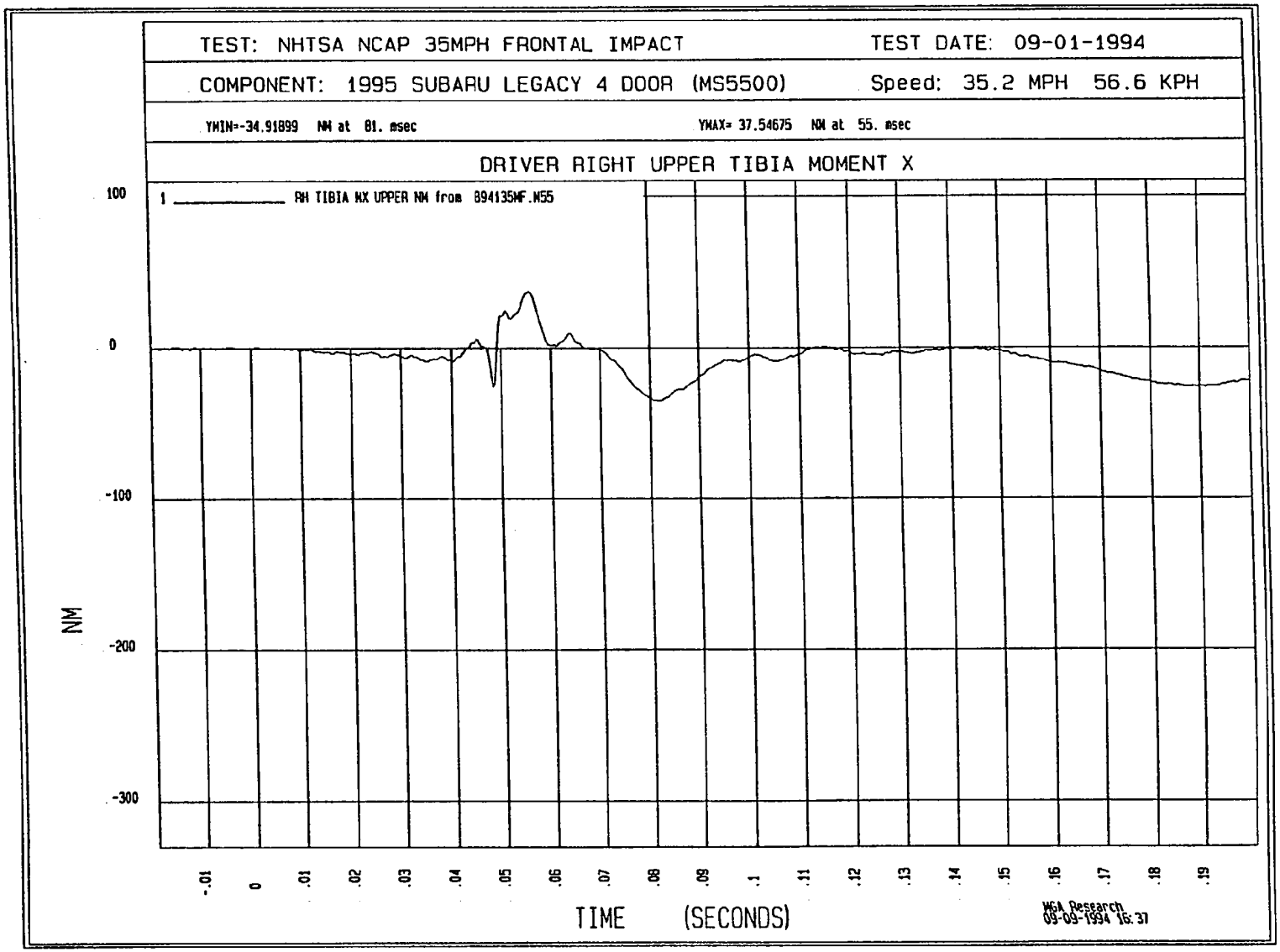


Figure B-61 - Driver Right Upper Tibia Moment X vs. Time

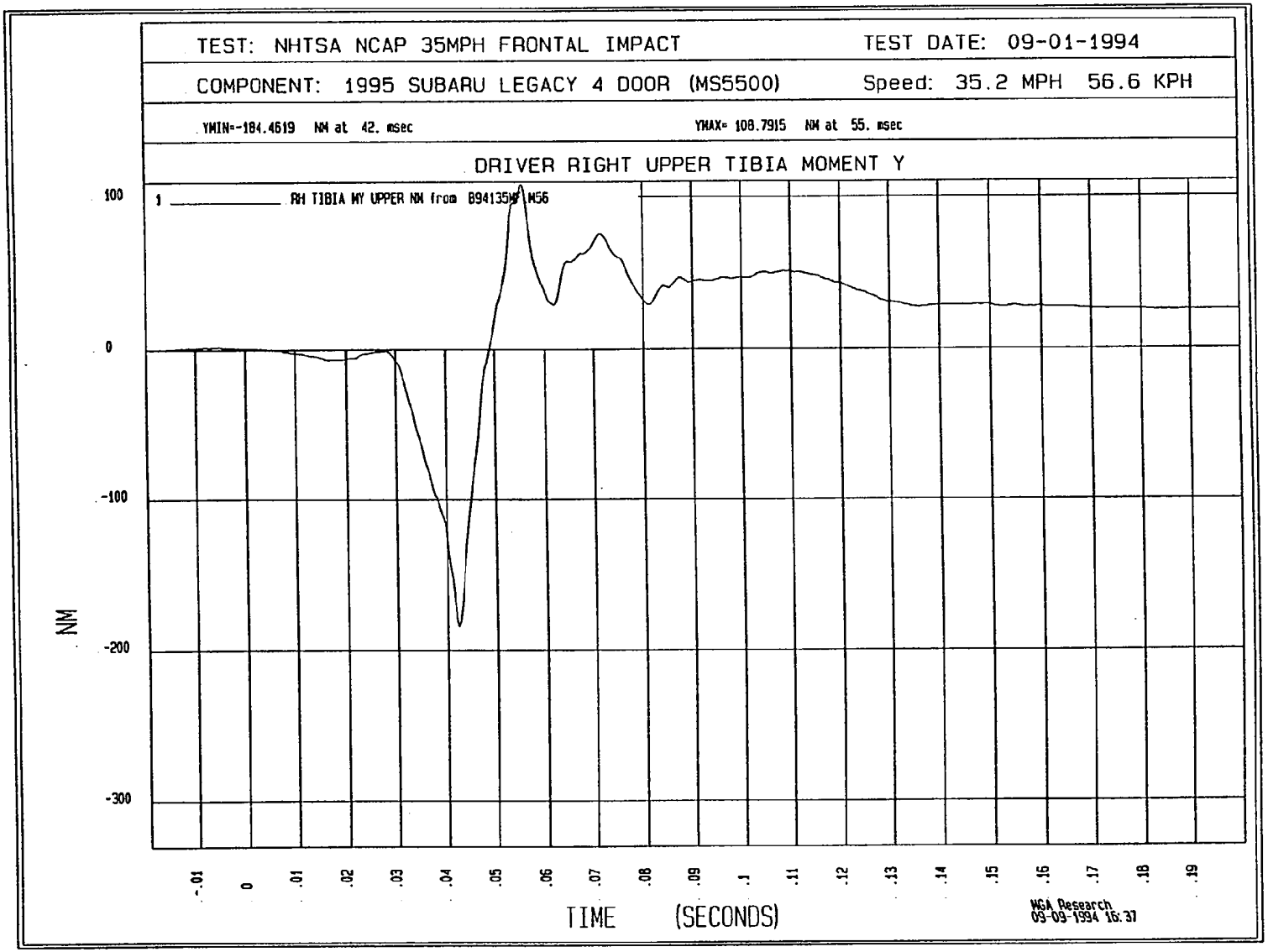


Figure B-62 - Driver Right Upper Tibia Moment Y vs. Time

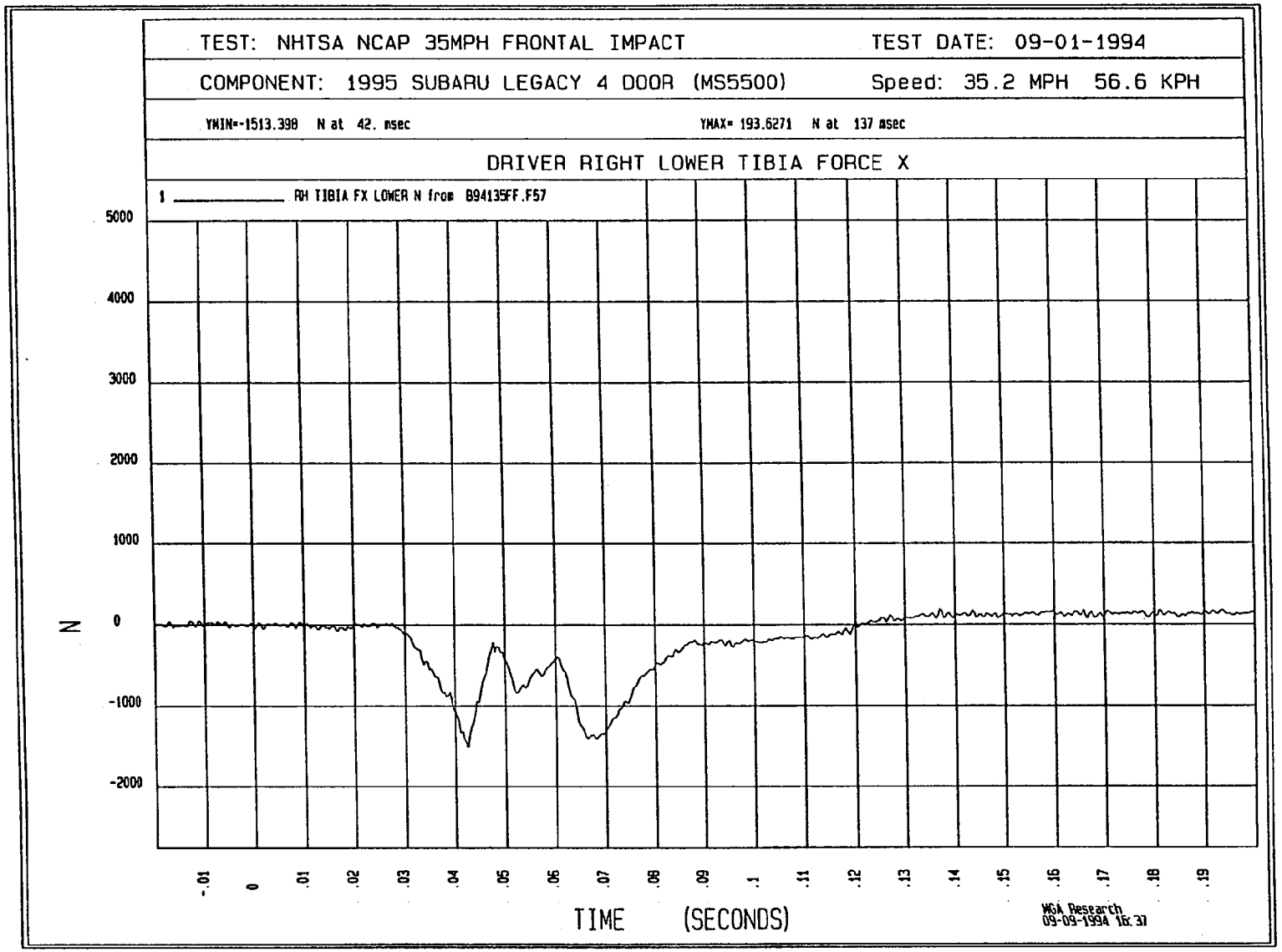


Figure B-63 - Driver Right Lower Tibia Force X vs. Time

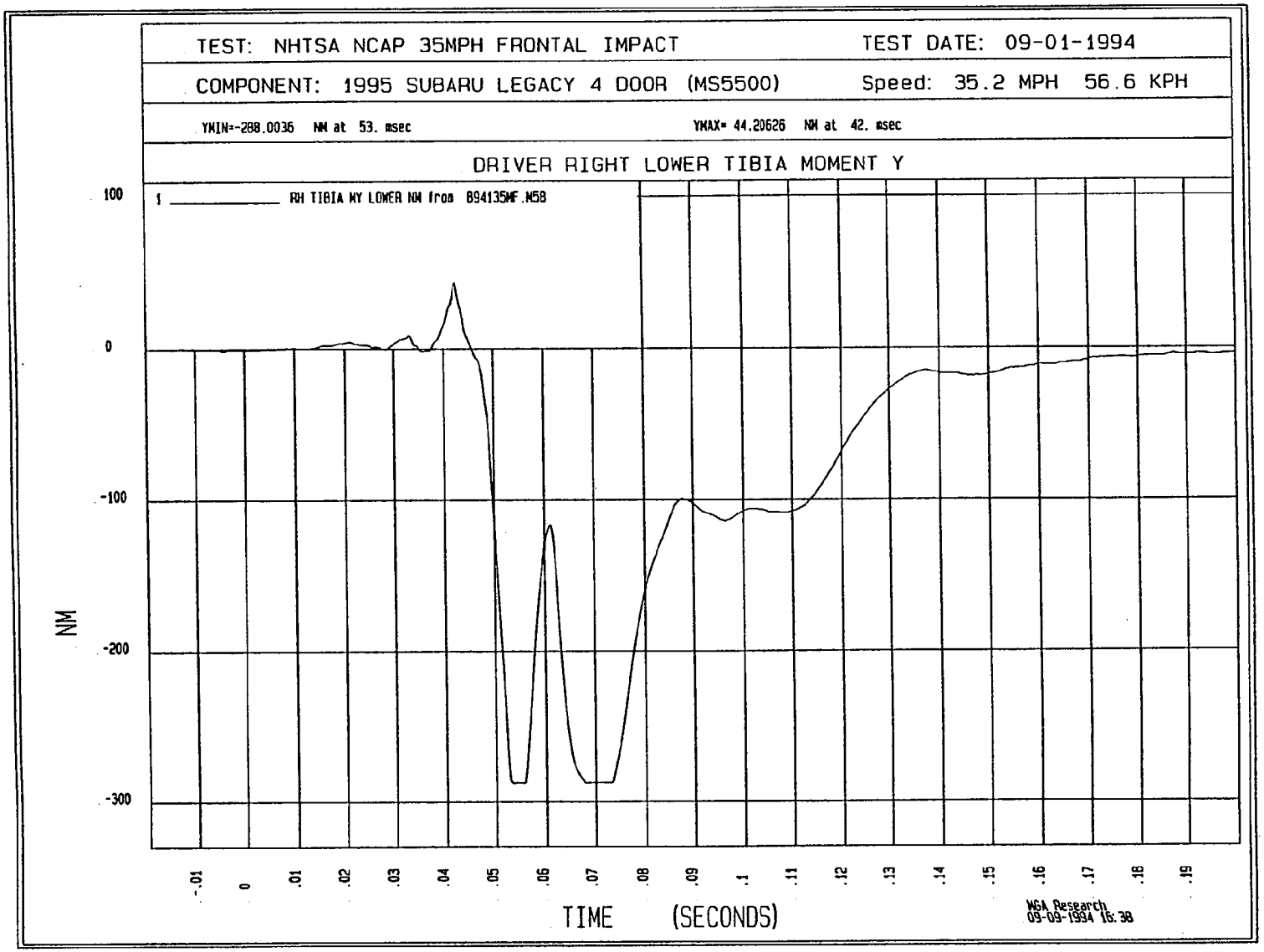
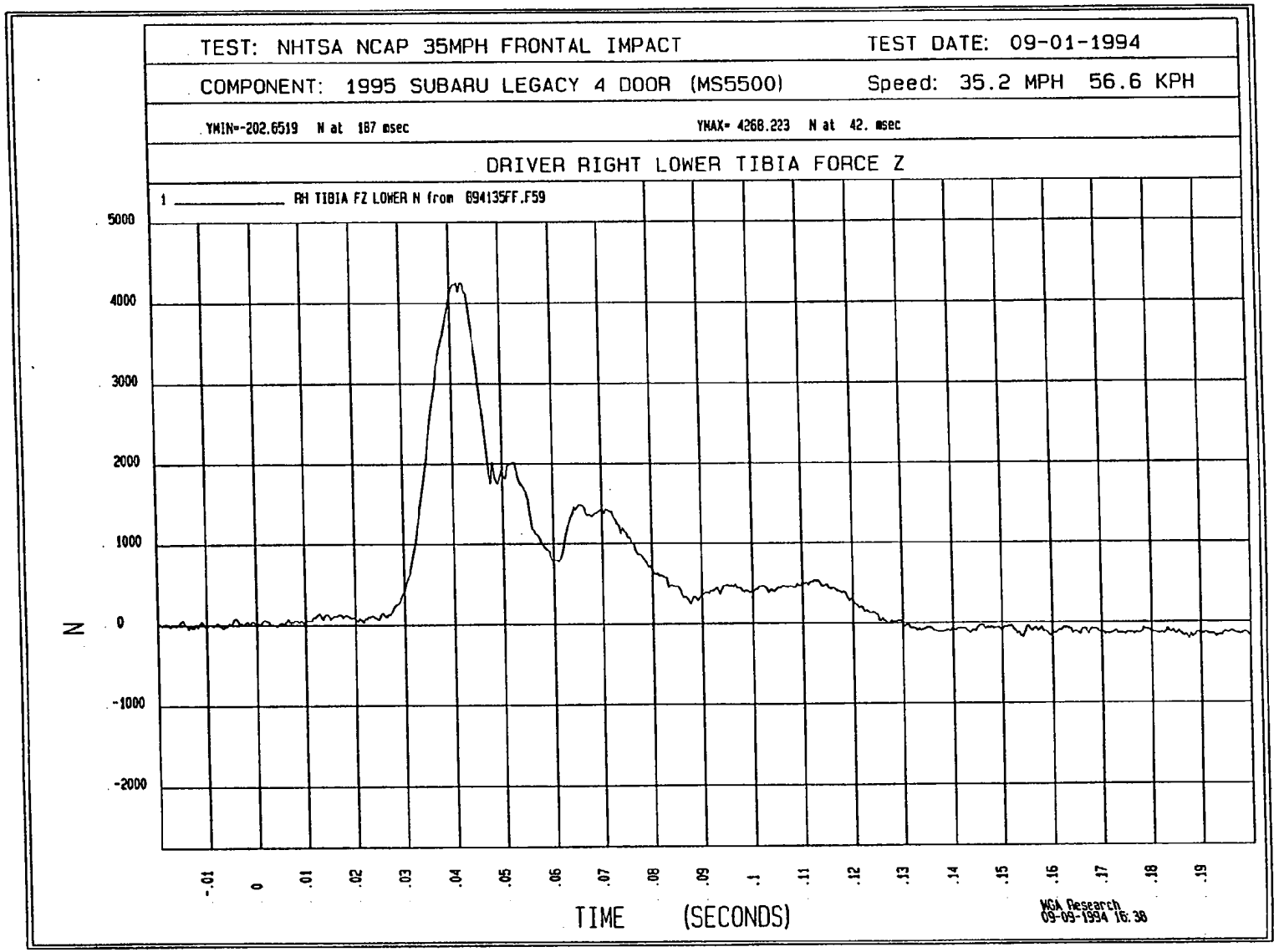


Figure B-64 - Driver Right Lower Tibia Moment Y vs. Time



B-65

Figure B-65 - Driver Right Lower Tibia Force Z vs. Time

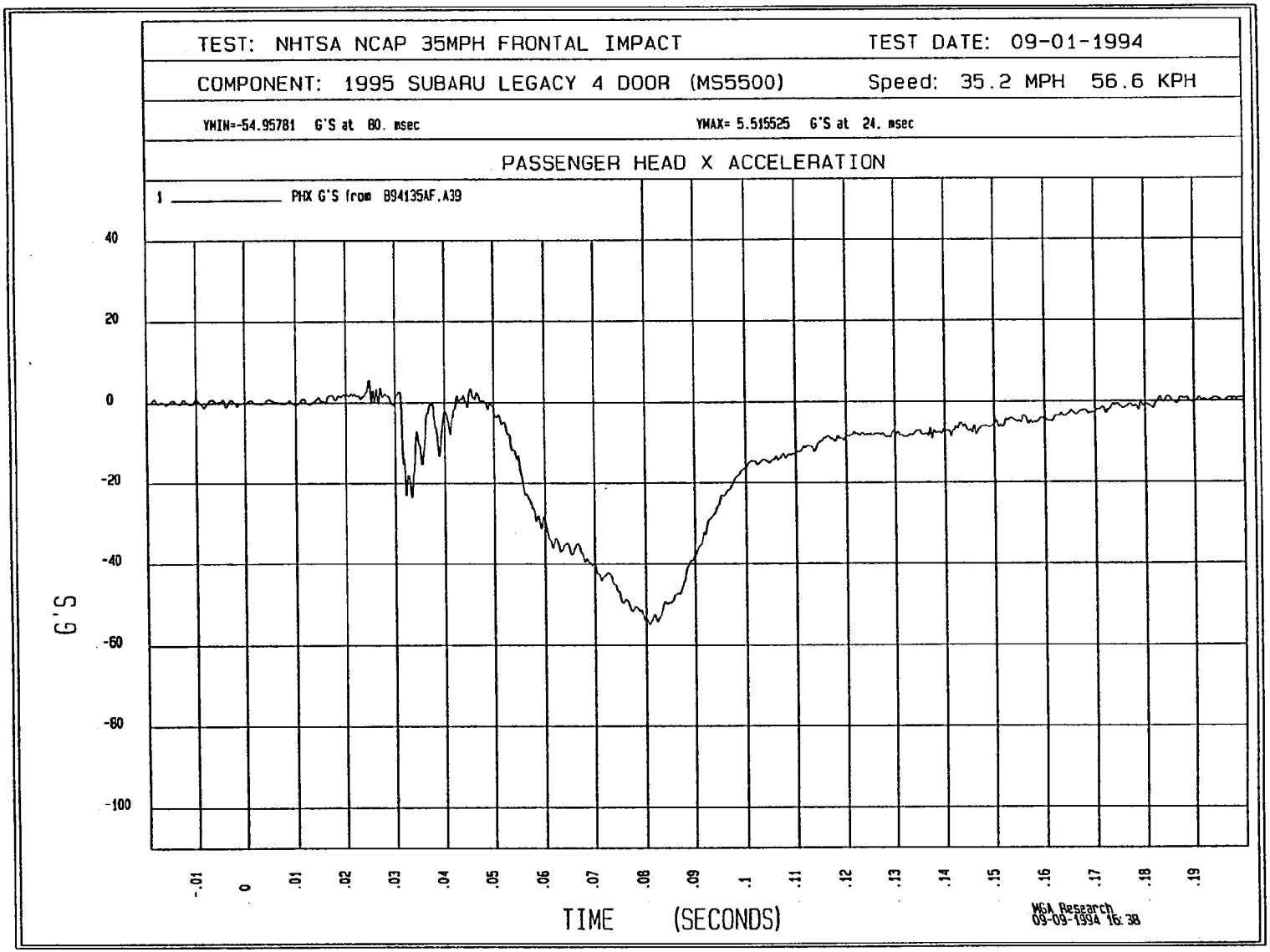


Figure B-66 - Passenger Head X Acceleration vs. Time

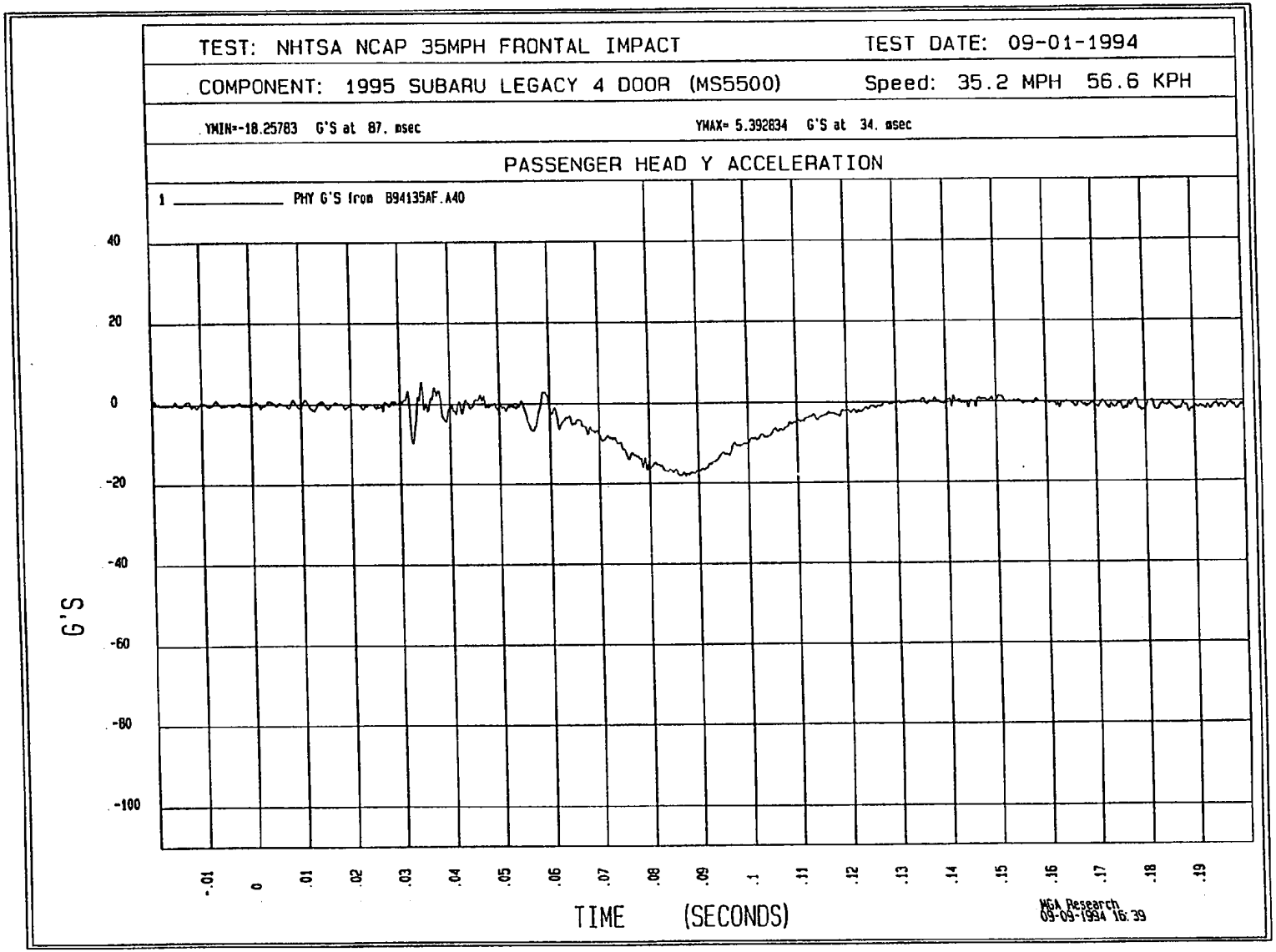
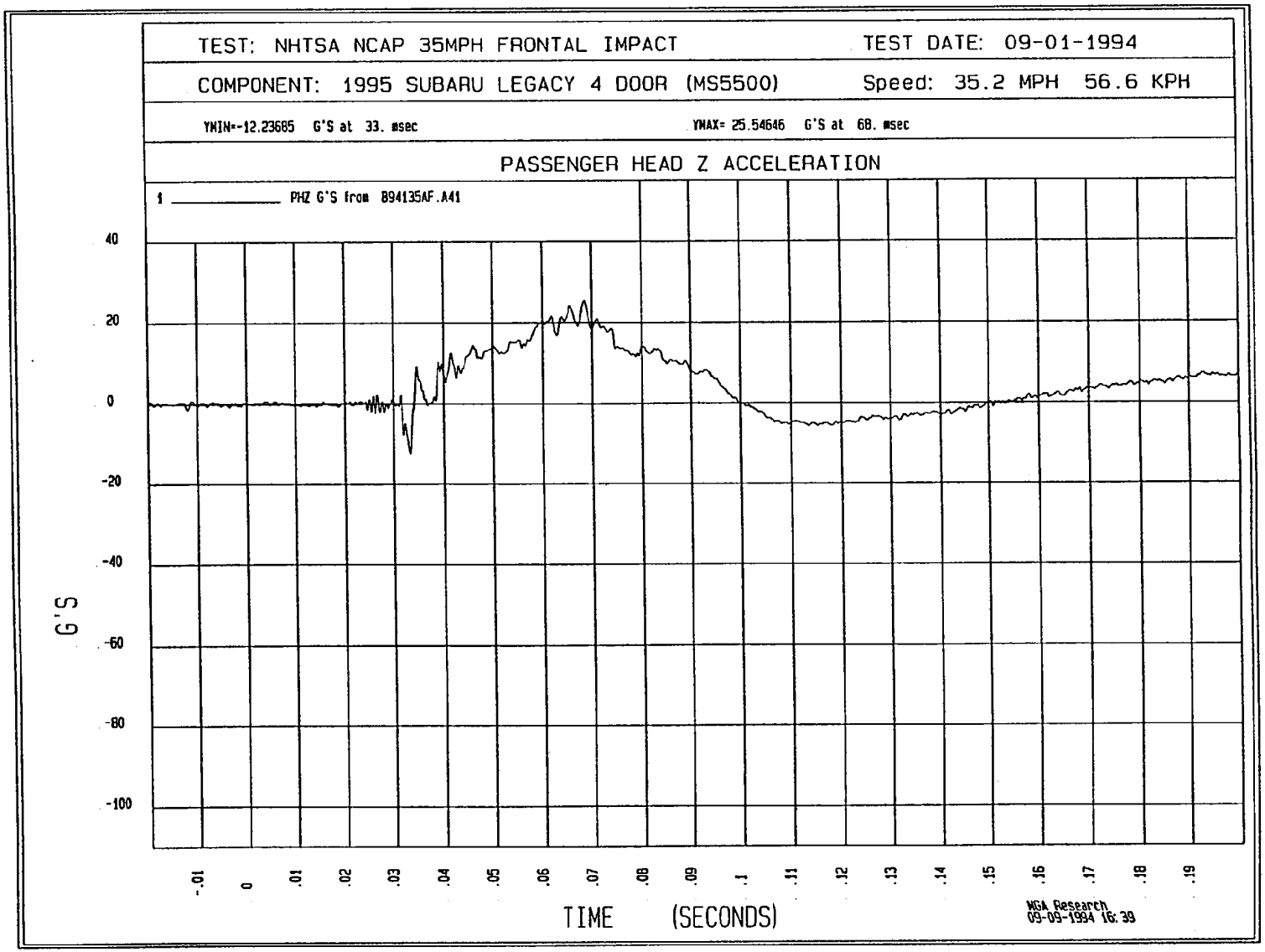
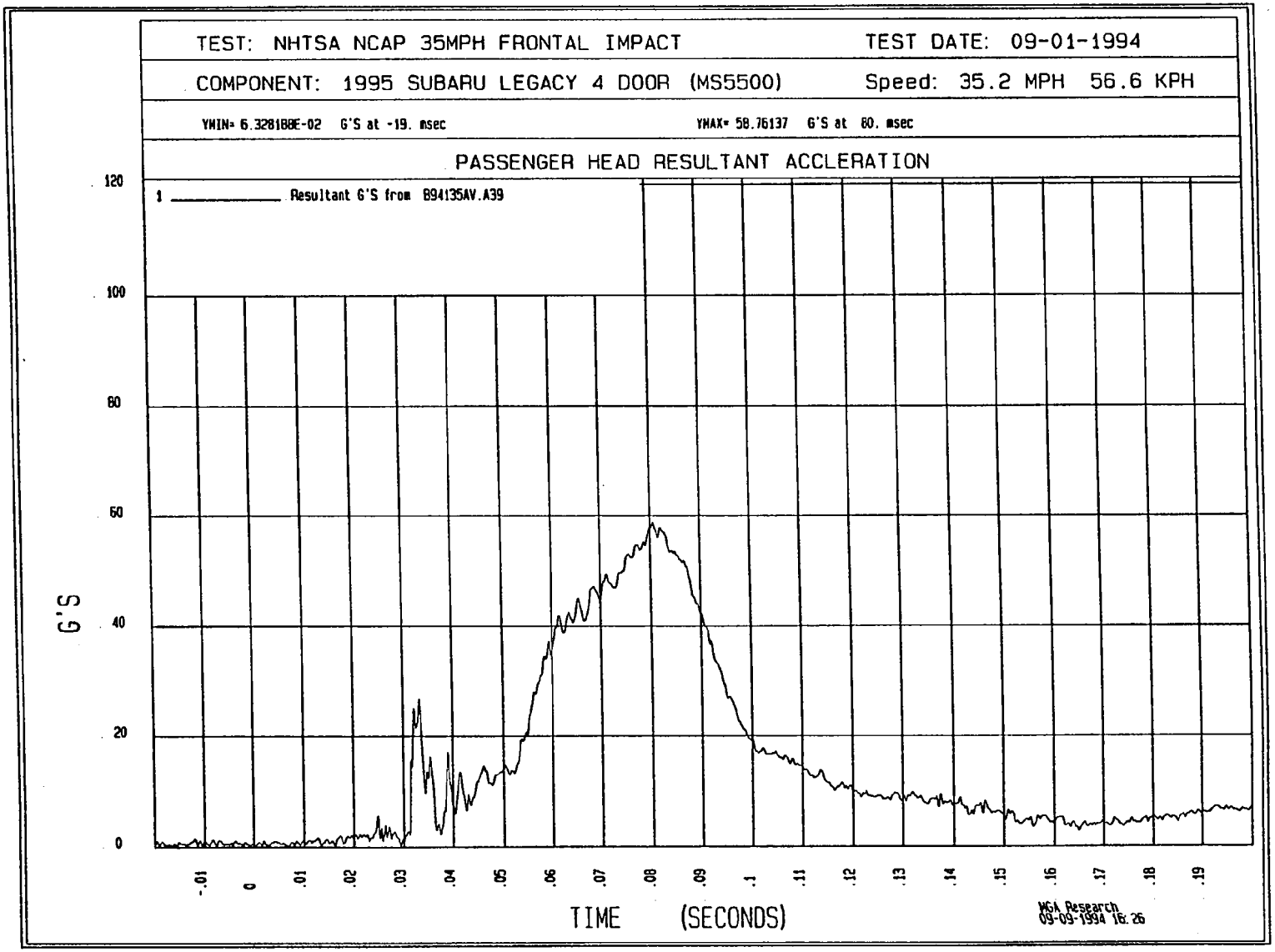


Figure B-67 - Passenger Head Y Acceleration vs. Time



B-68

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



B-69

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

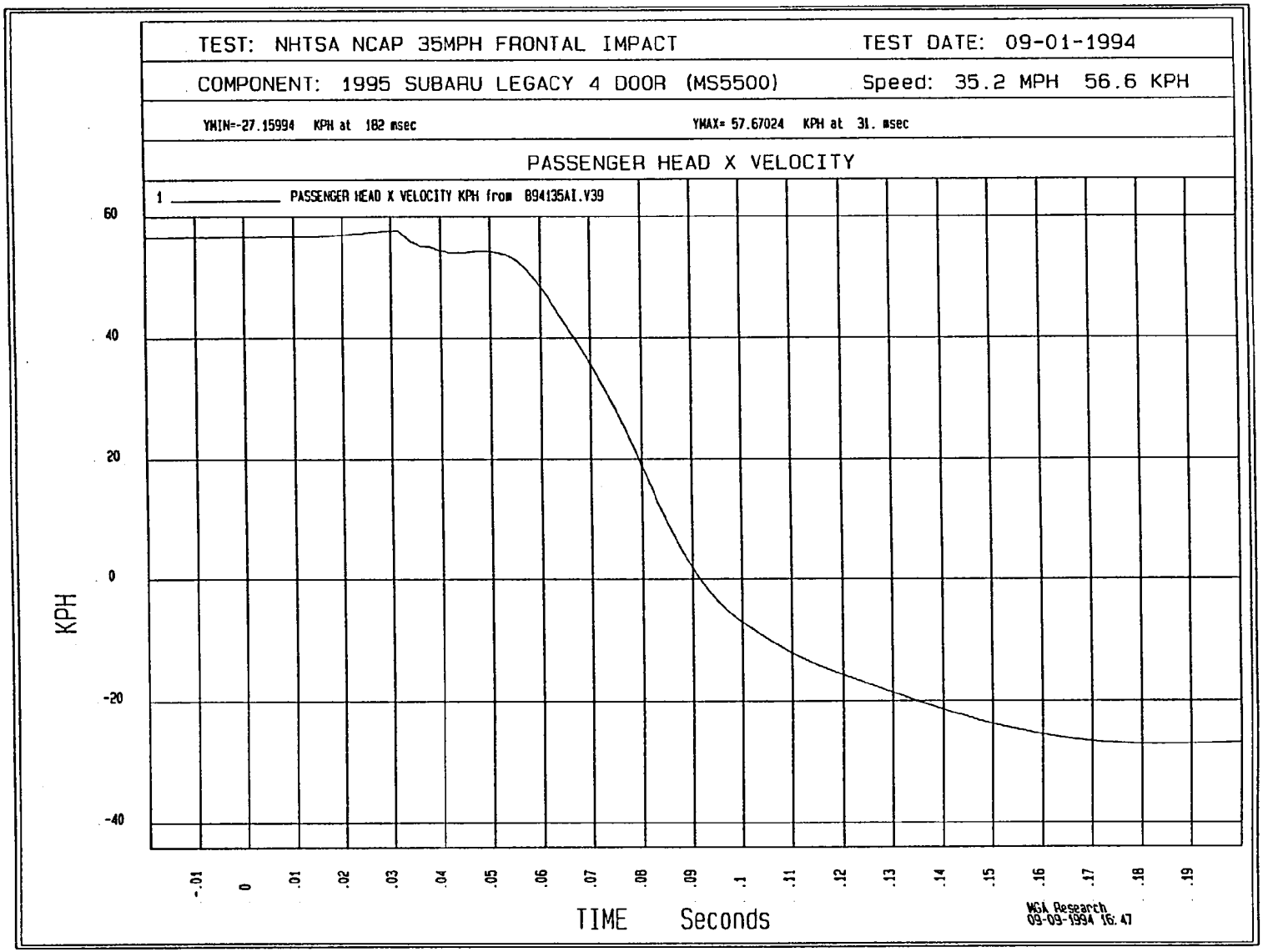


Figure B-70 - Passenger Head X Velocity vs. Time

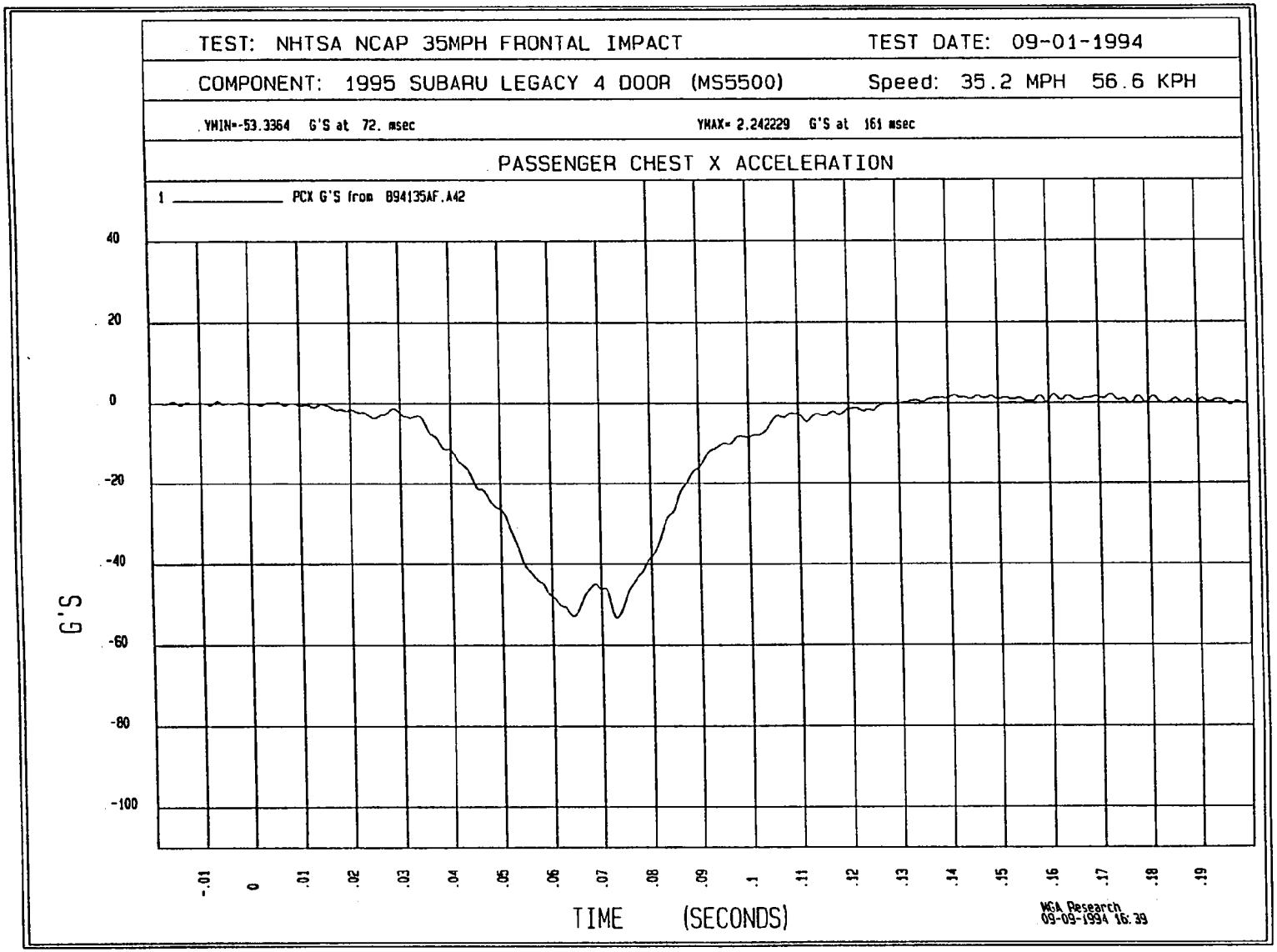


Figure B-71 - Passenger Chest X Acceleration vs. Time

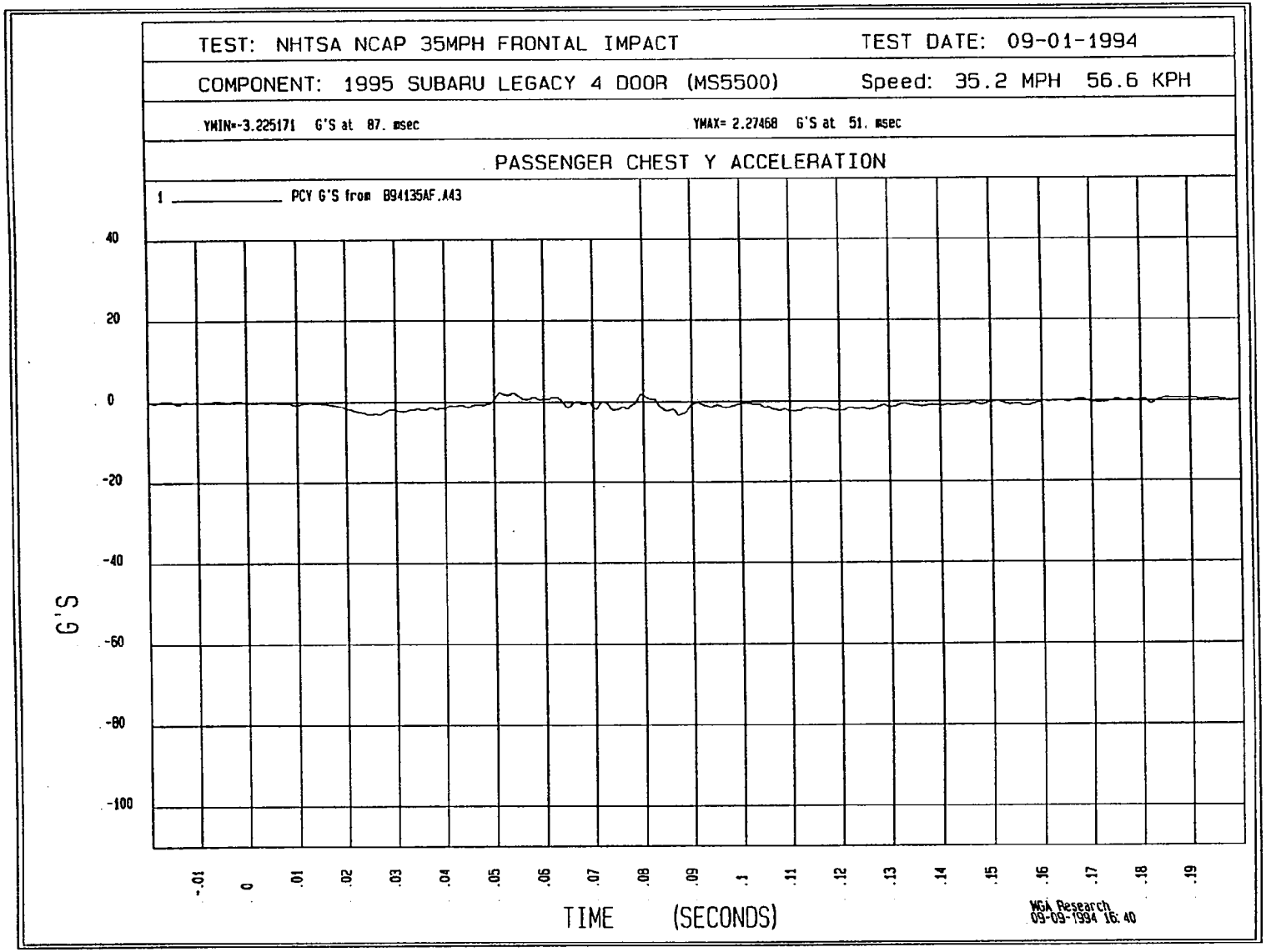


Figure B-72 - Passenger Chest Y Acceleration vs. Time

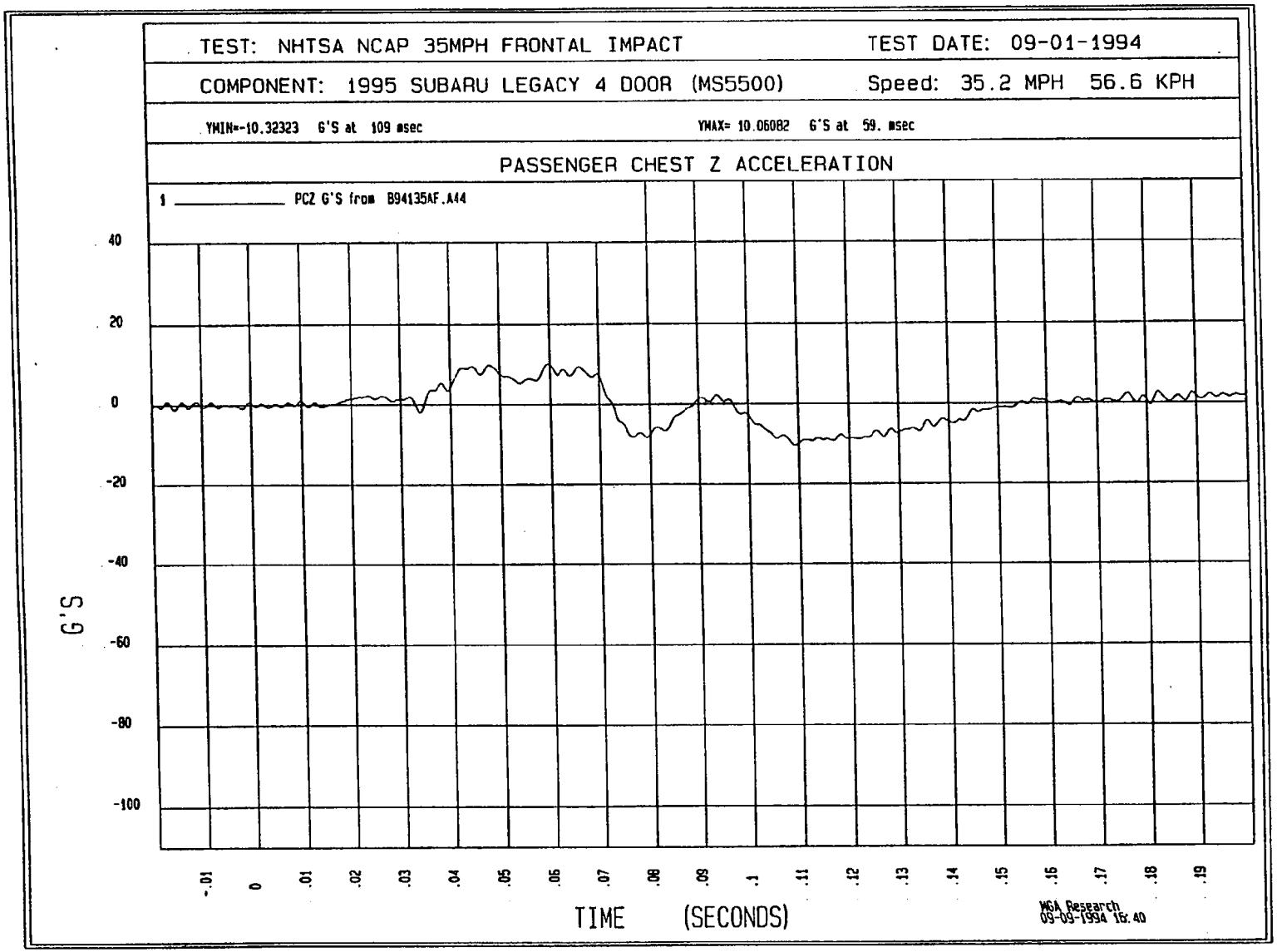


Figure B-73 - Passenger Chest Z Acceleration vs. Time

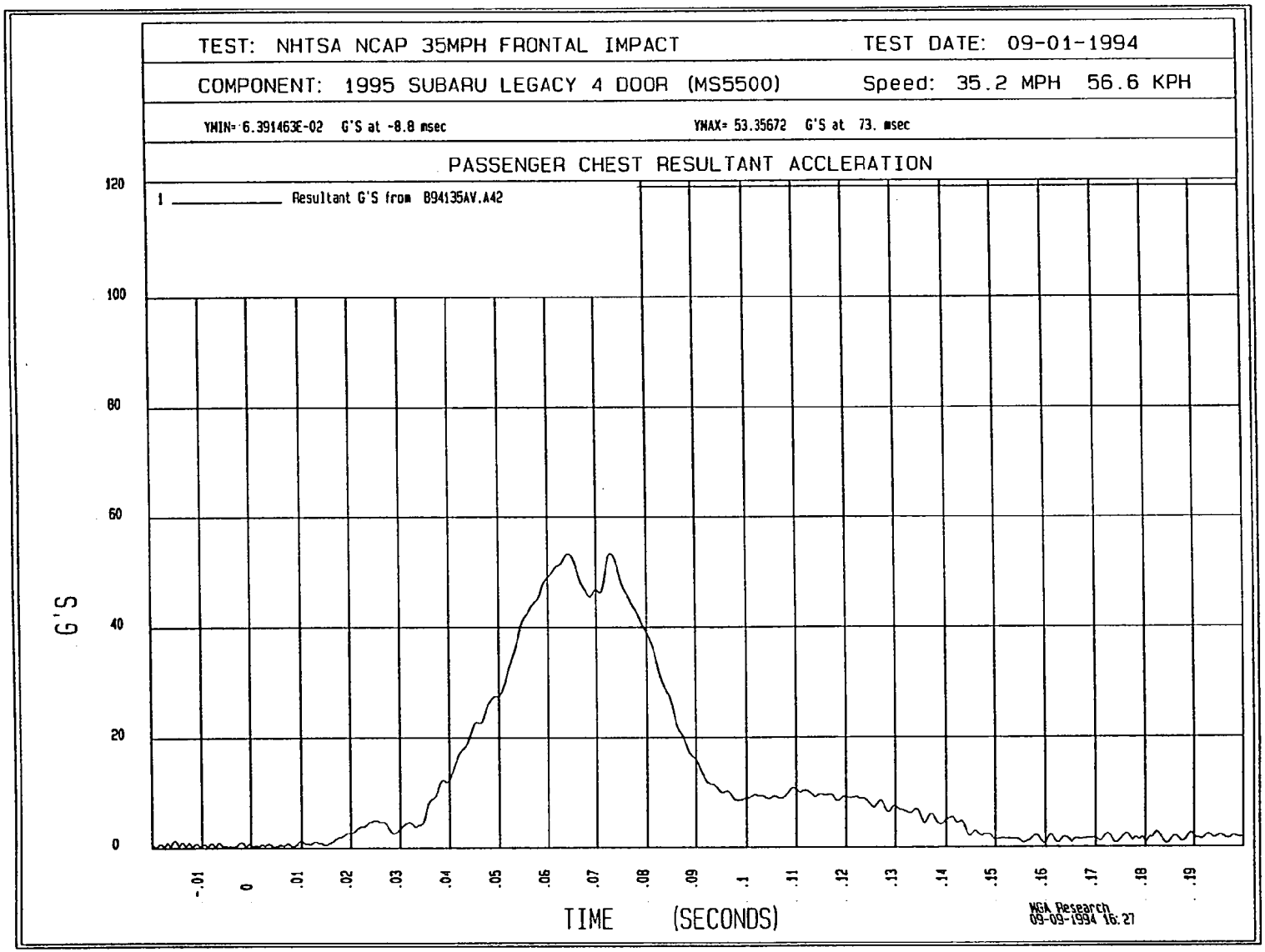


Figure B-74 - Passenger Chest Resultant vs. Time

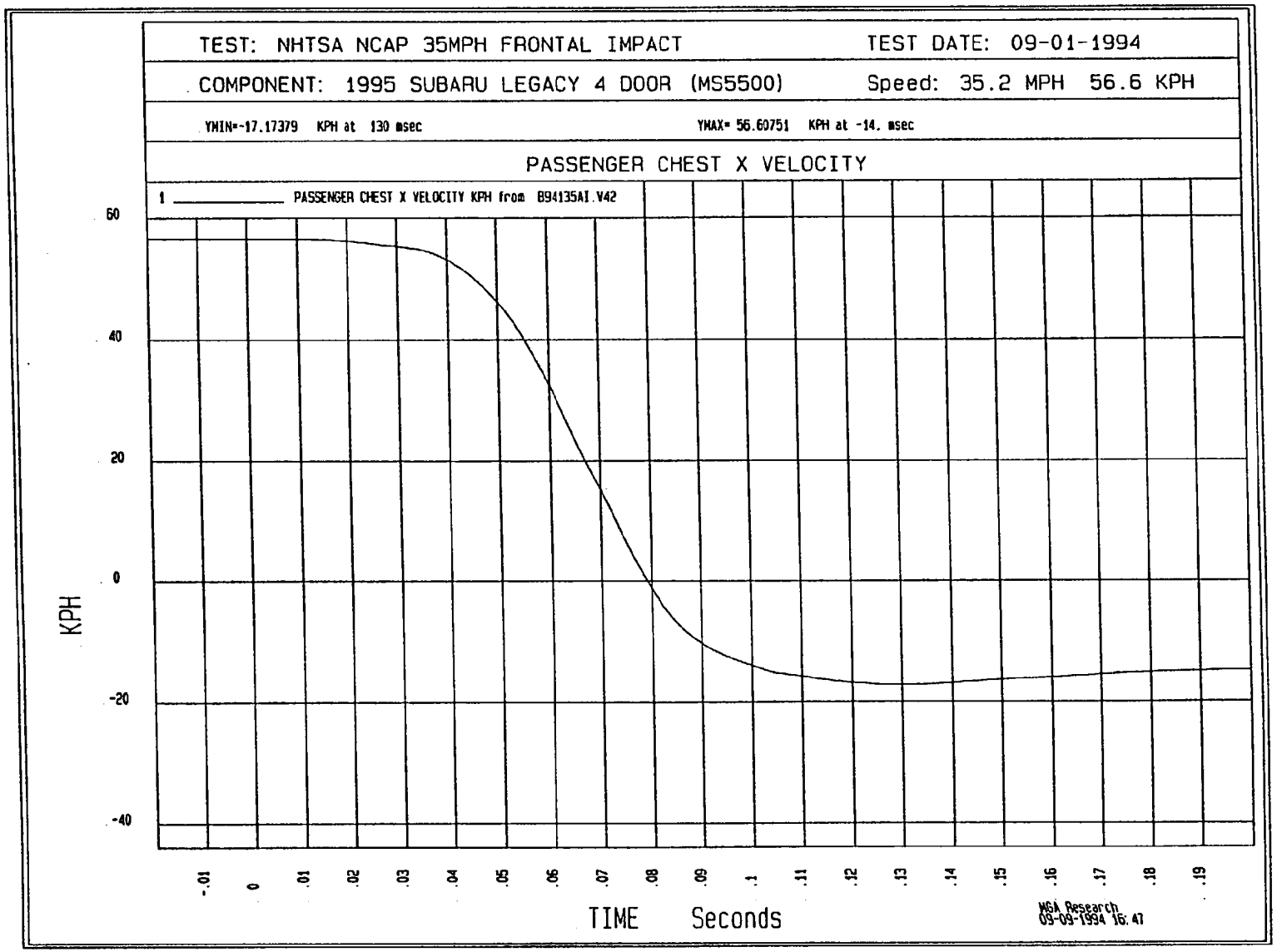


Figure B-75 - Passenger Chest X Velocity vs. Time

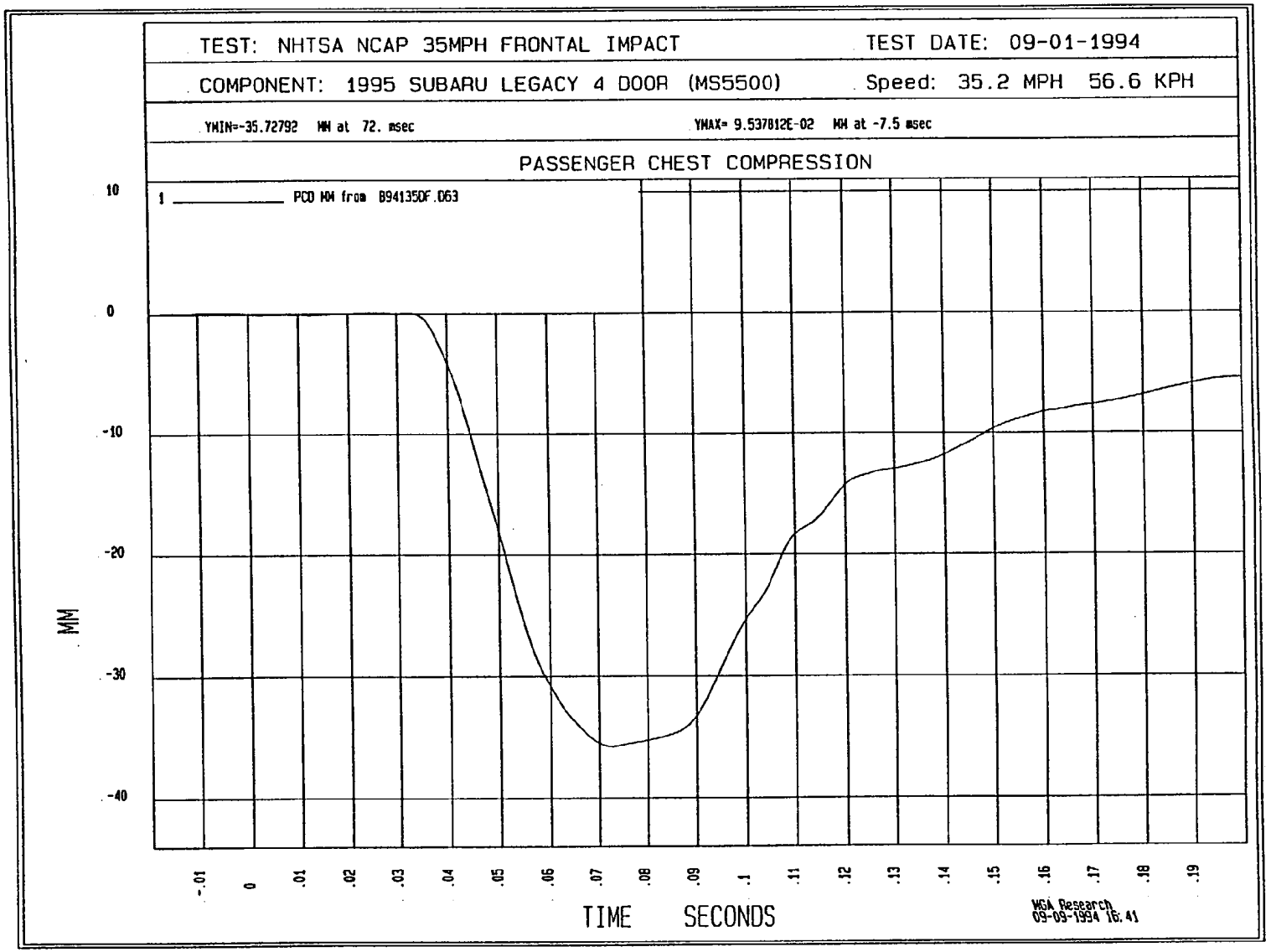
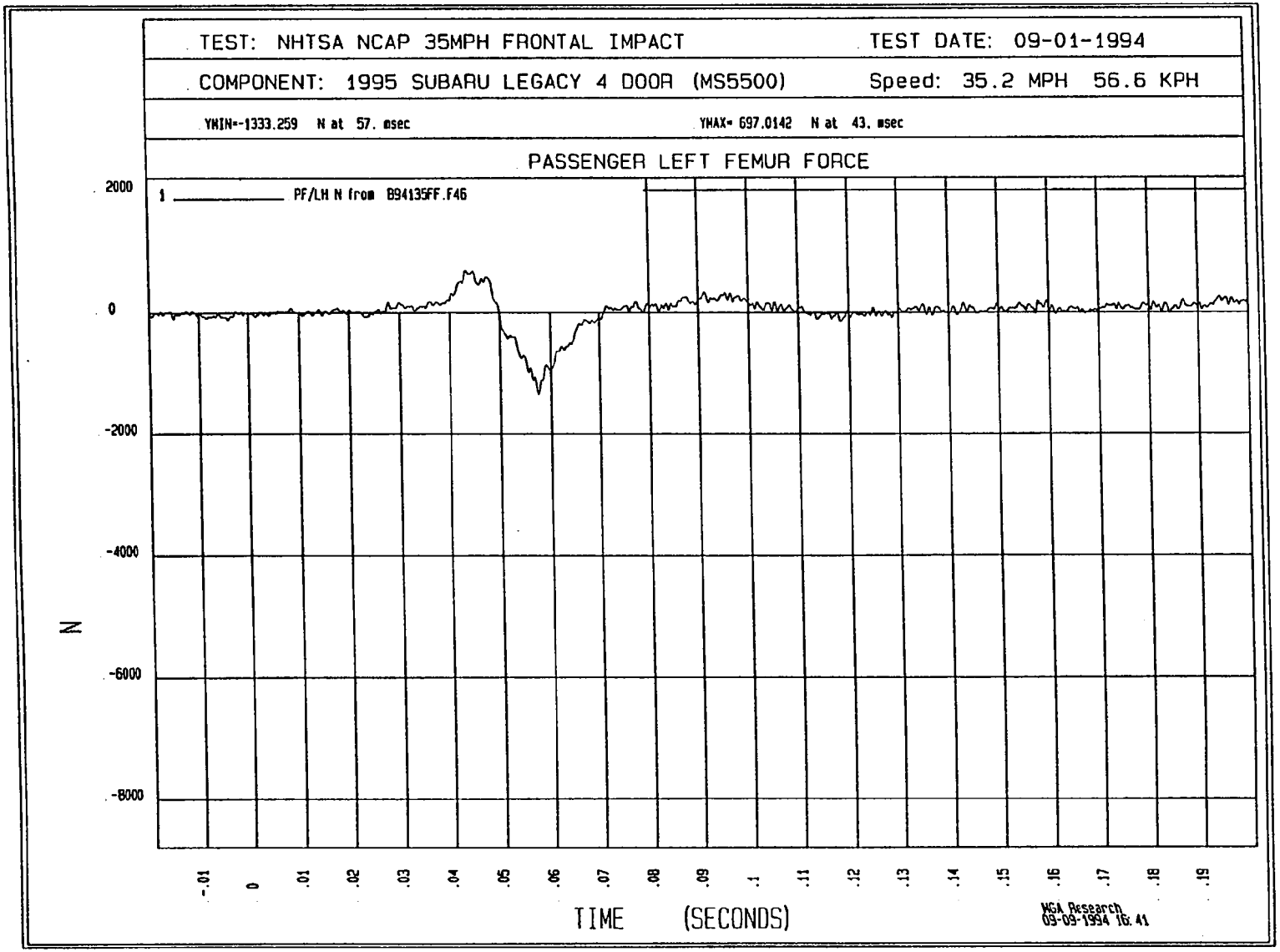
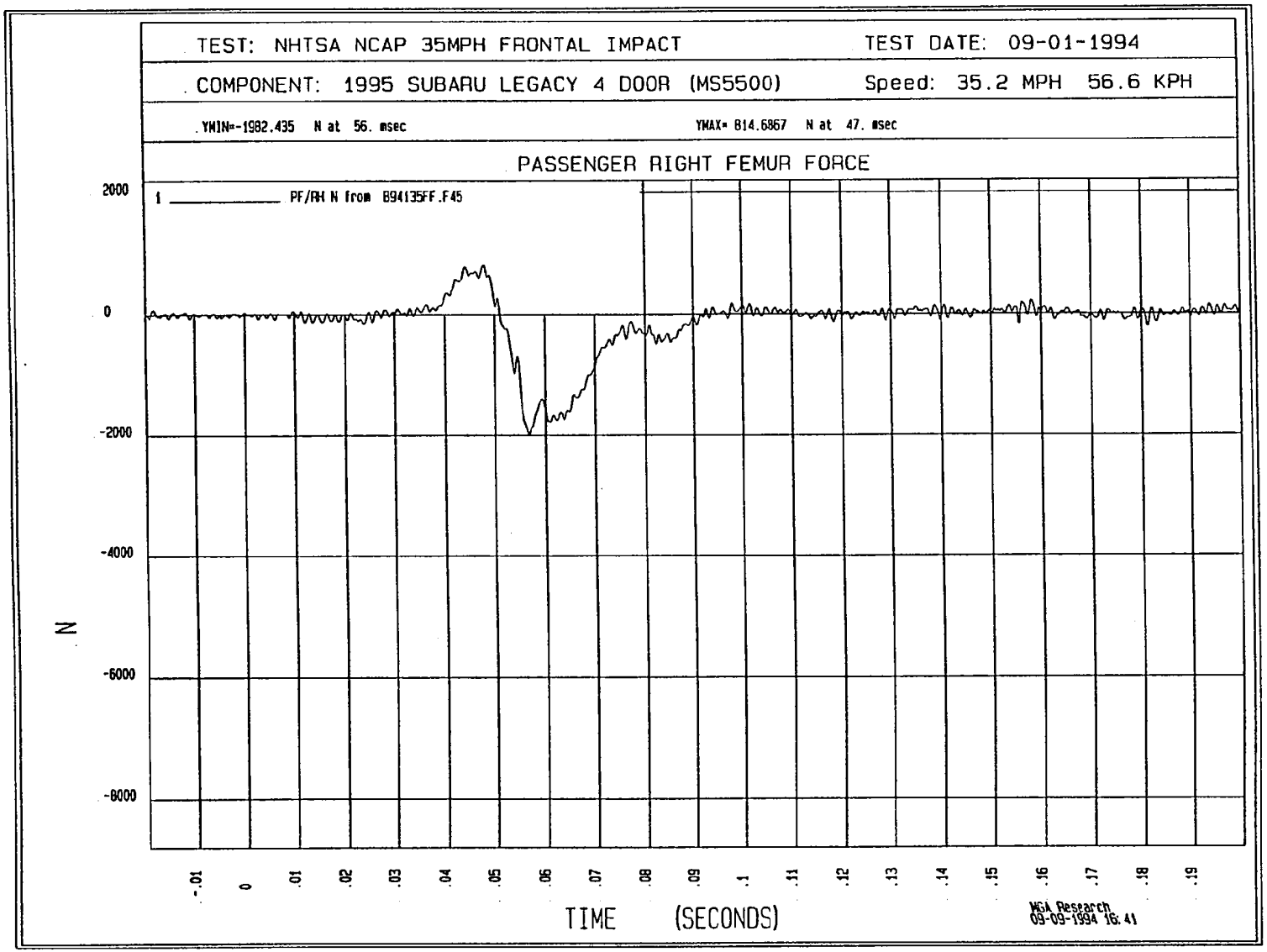


Figure B-76 - Passenger Chest Compression vs. Time



B-77

Figure B-77 - Passenger Left Femur Force vs. Time



B-78

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

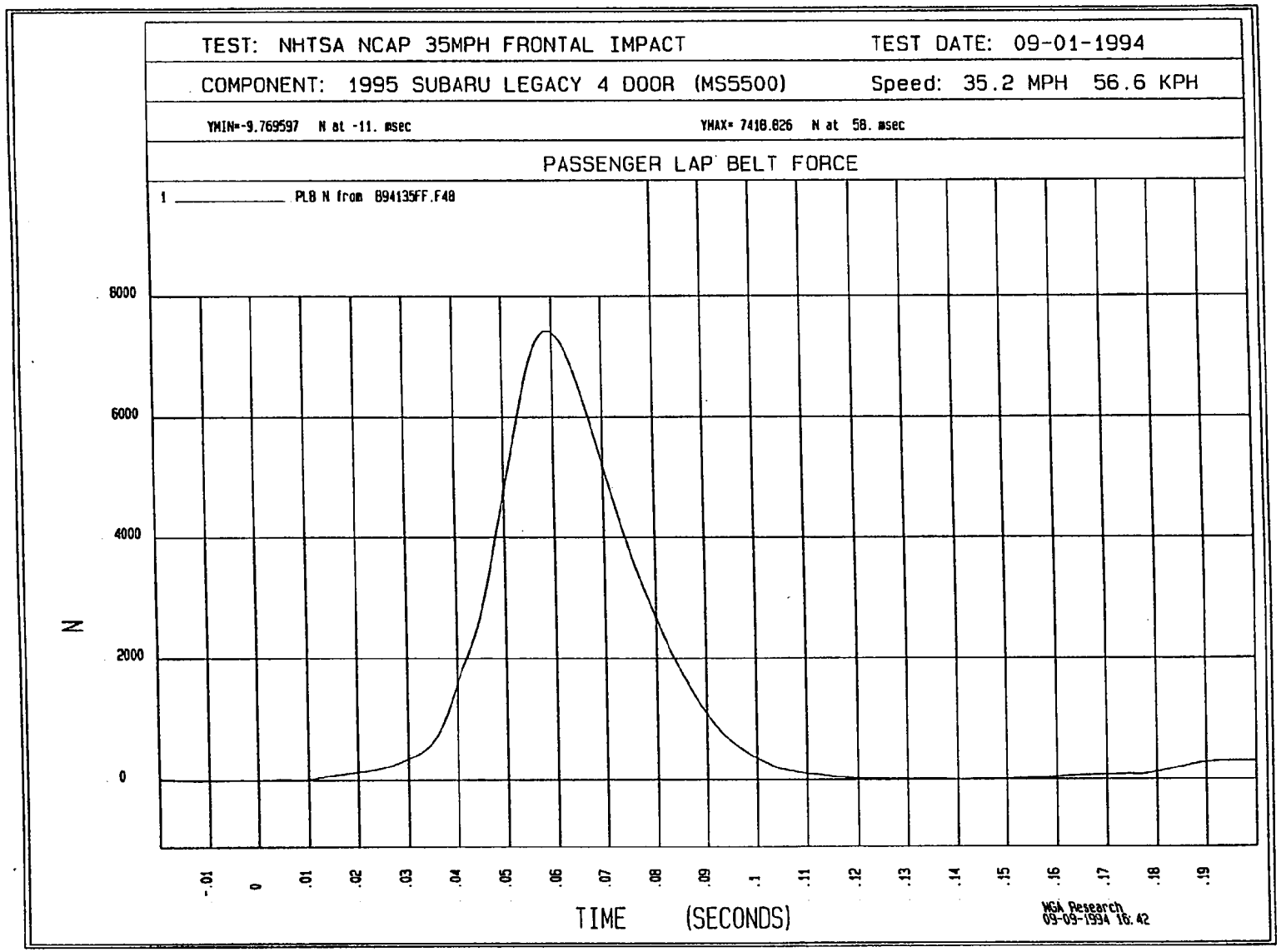


Figure B-79 - Passenger Lap Belt Force vs. Time

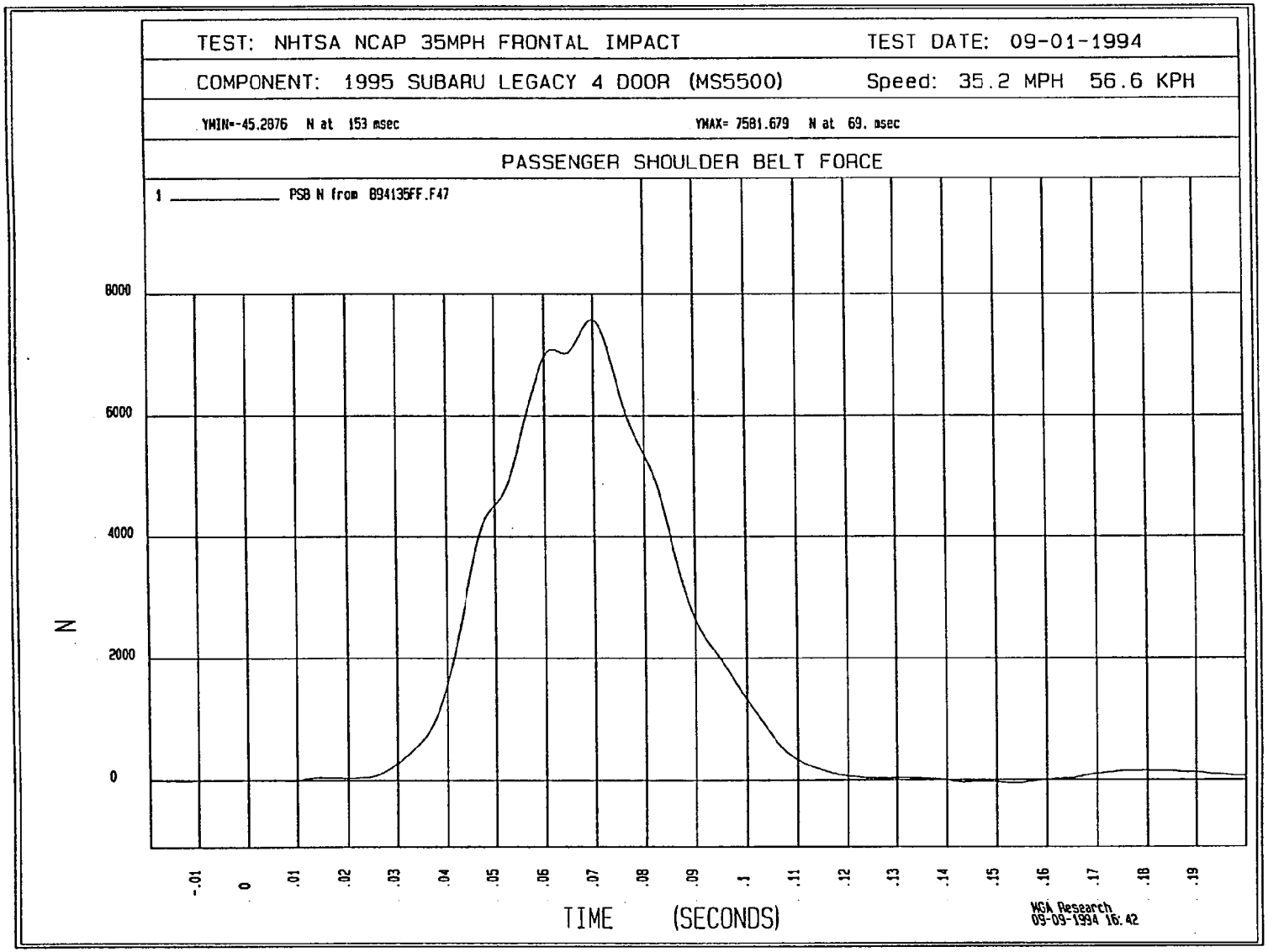


Figure B-80 - Passenger Shoulder Belt Force vs. Time

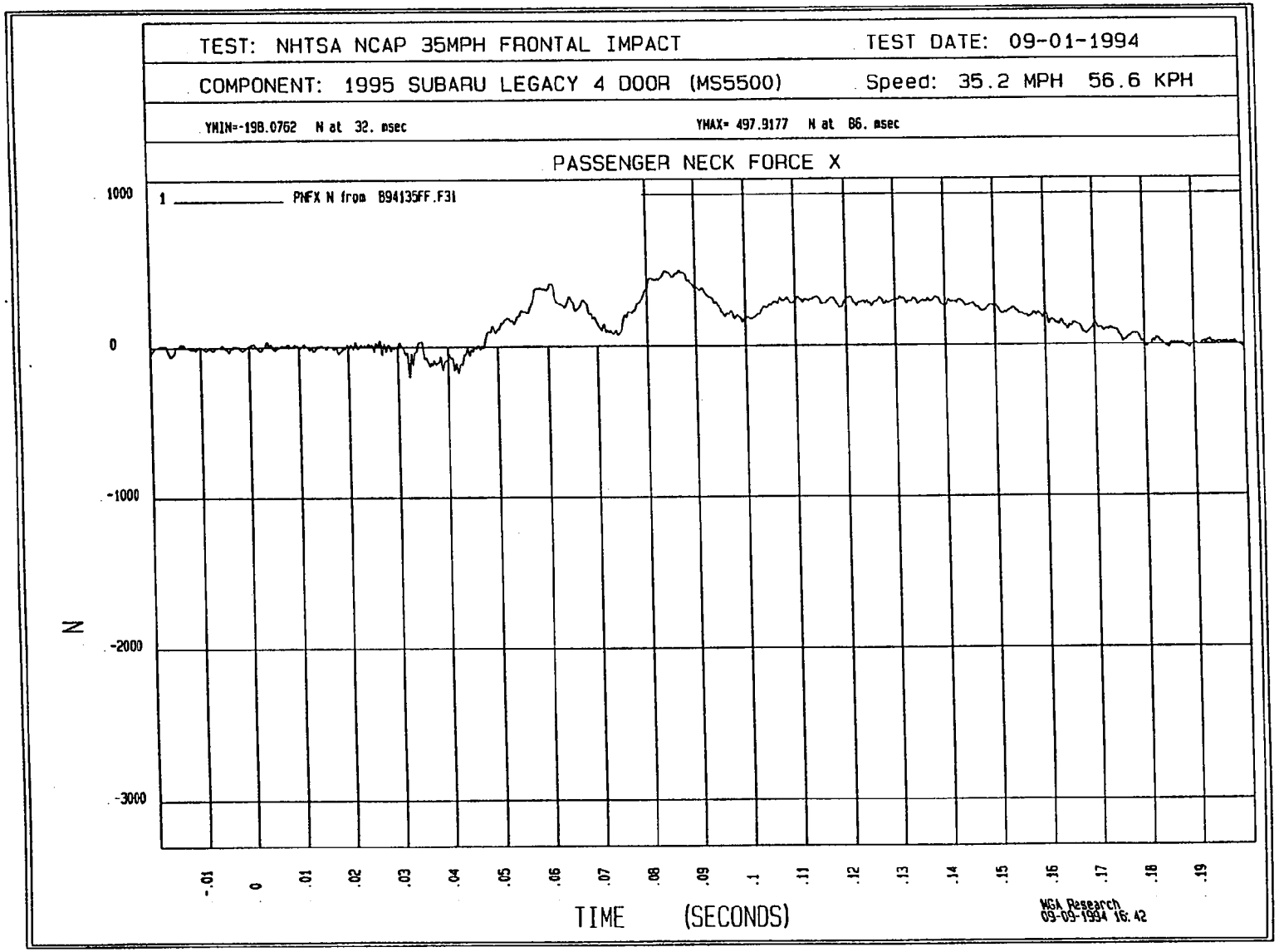


Figure B-81 - Passenger Neck Force X vs. Time

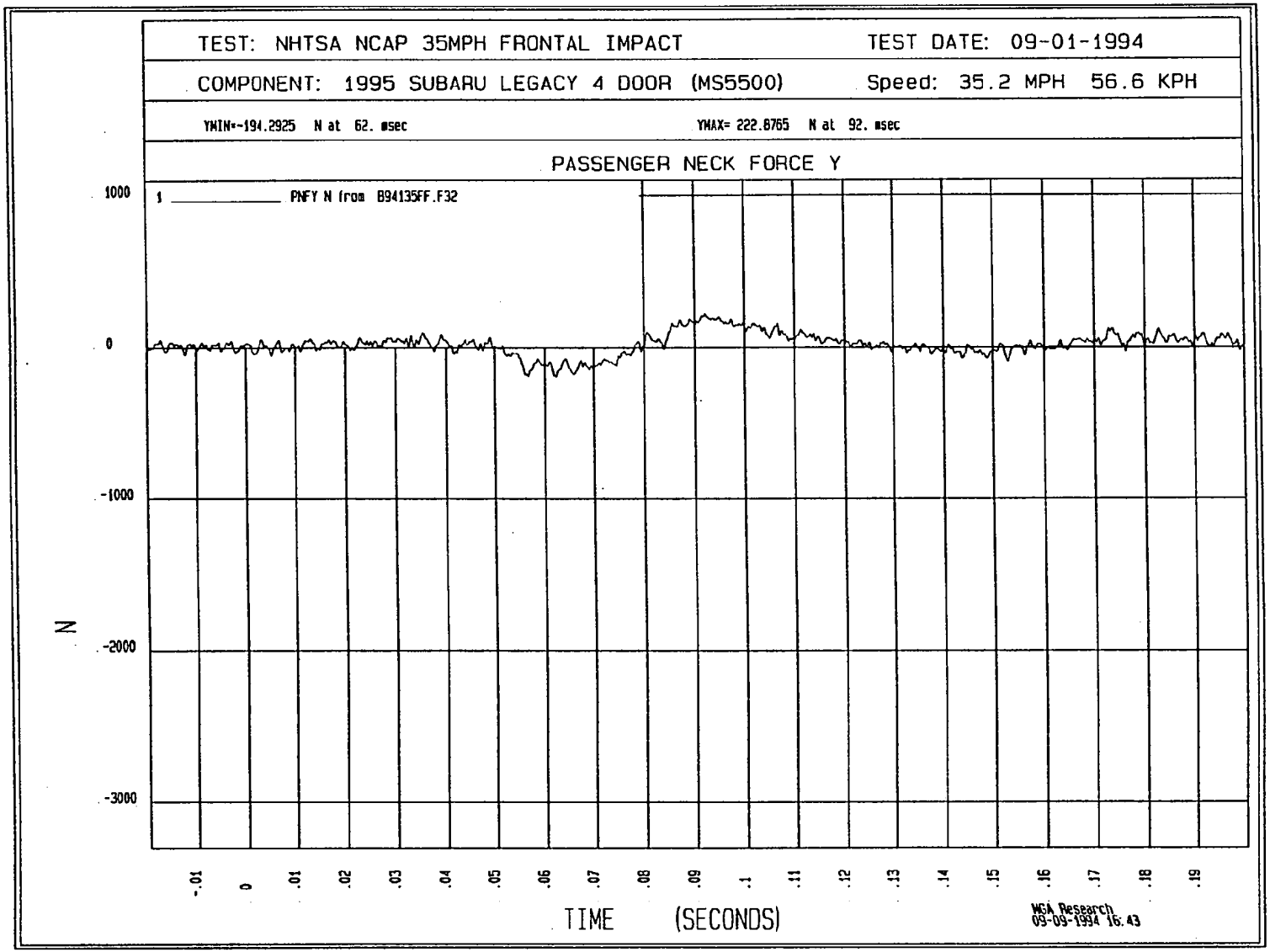


Figure B-82 - Passenger Neck Force Y vs. Time

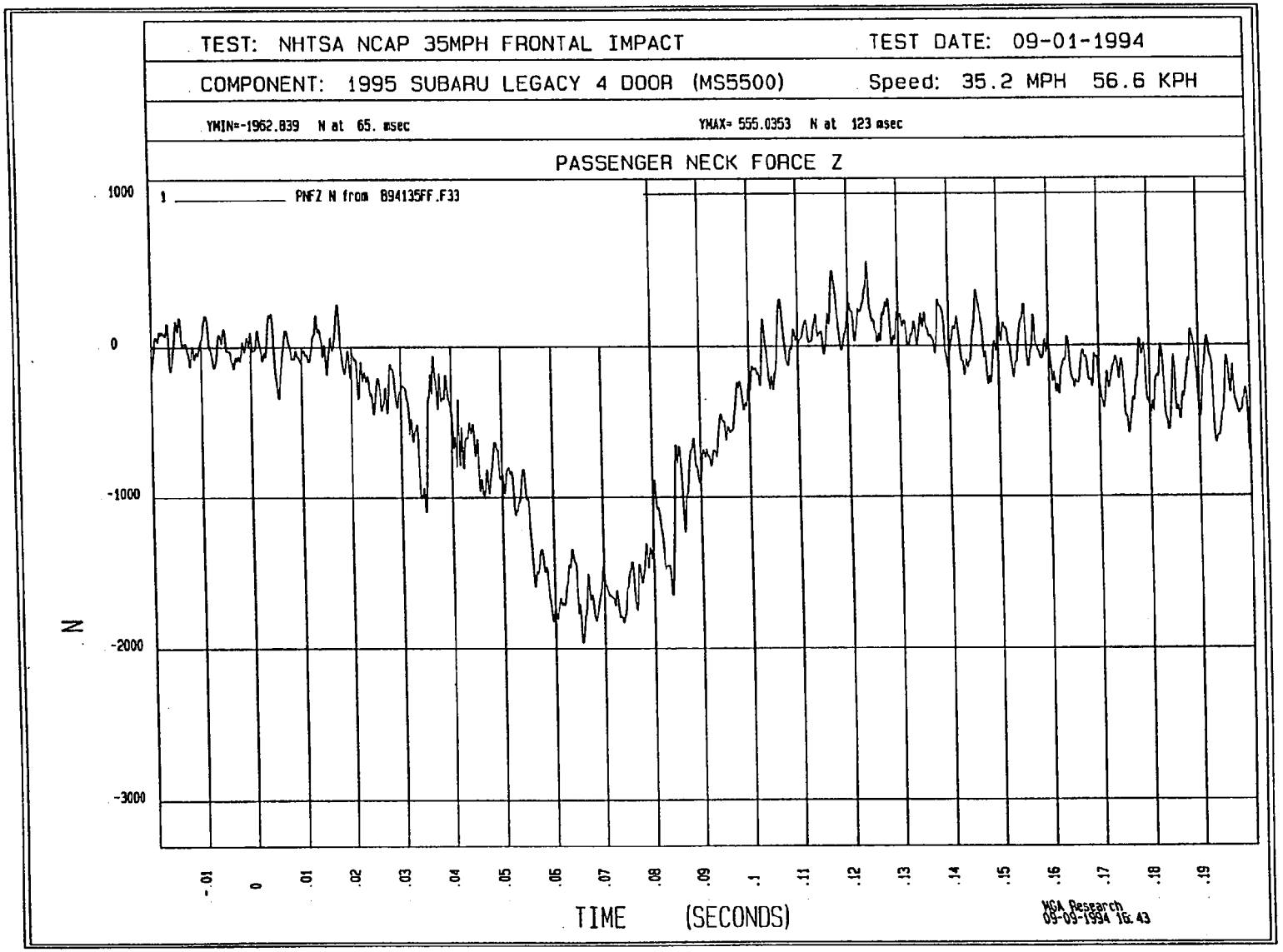


Figure B-83 - Passenger Neck Force Z vs. Time

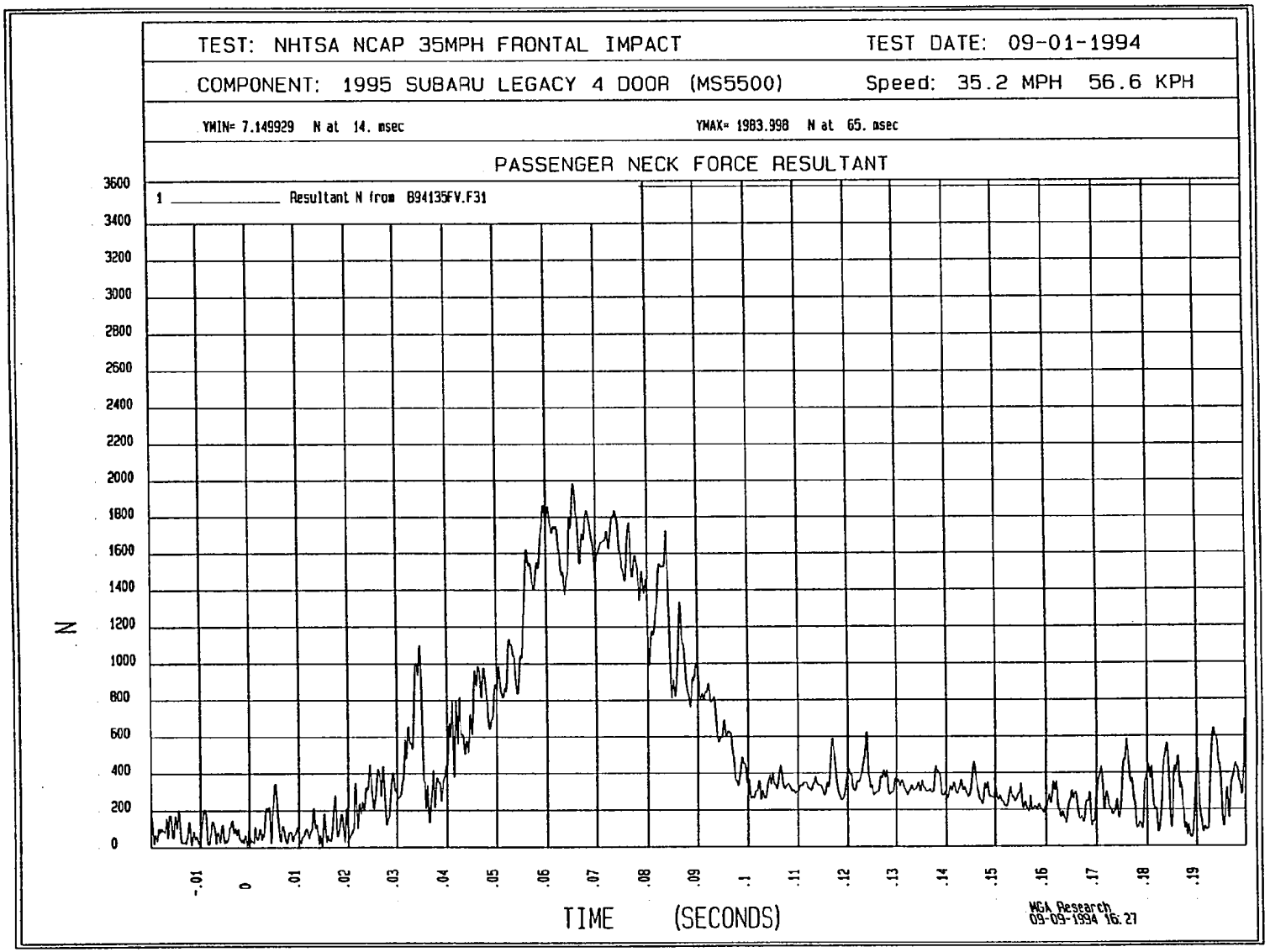
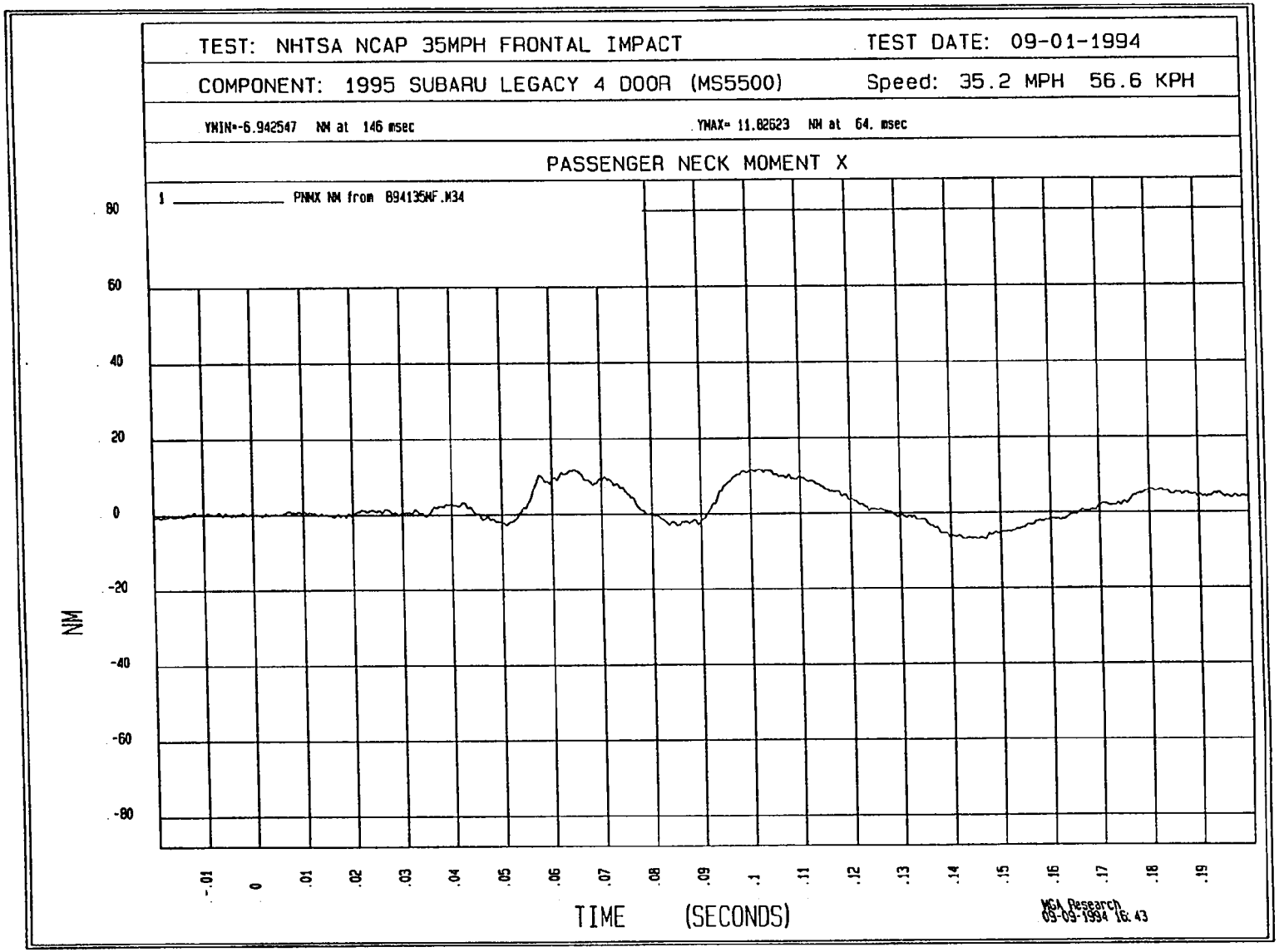


Figure B-84 - Passenger Neck Force Resultant vs. Time



B-85

Figure B-85 - Passenger Neck Moment X vs. Time

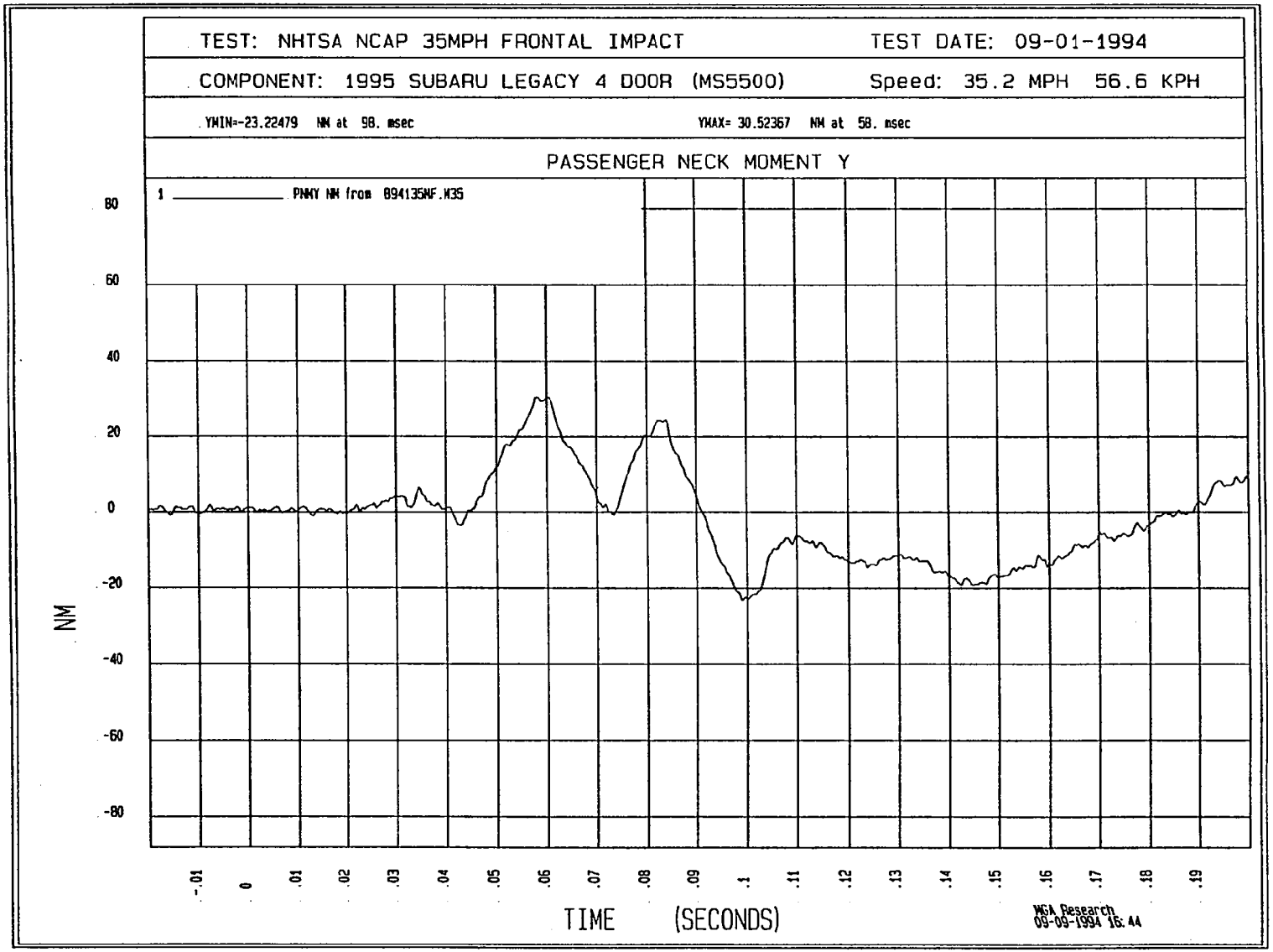


Figure B-86 - Passenger Neck Moment Y vs. Time

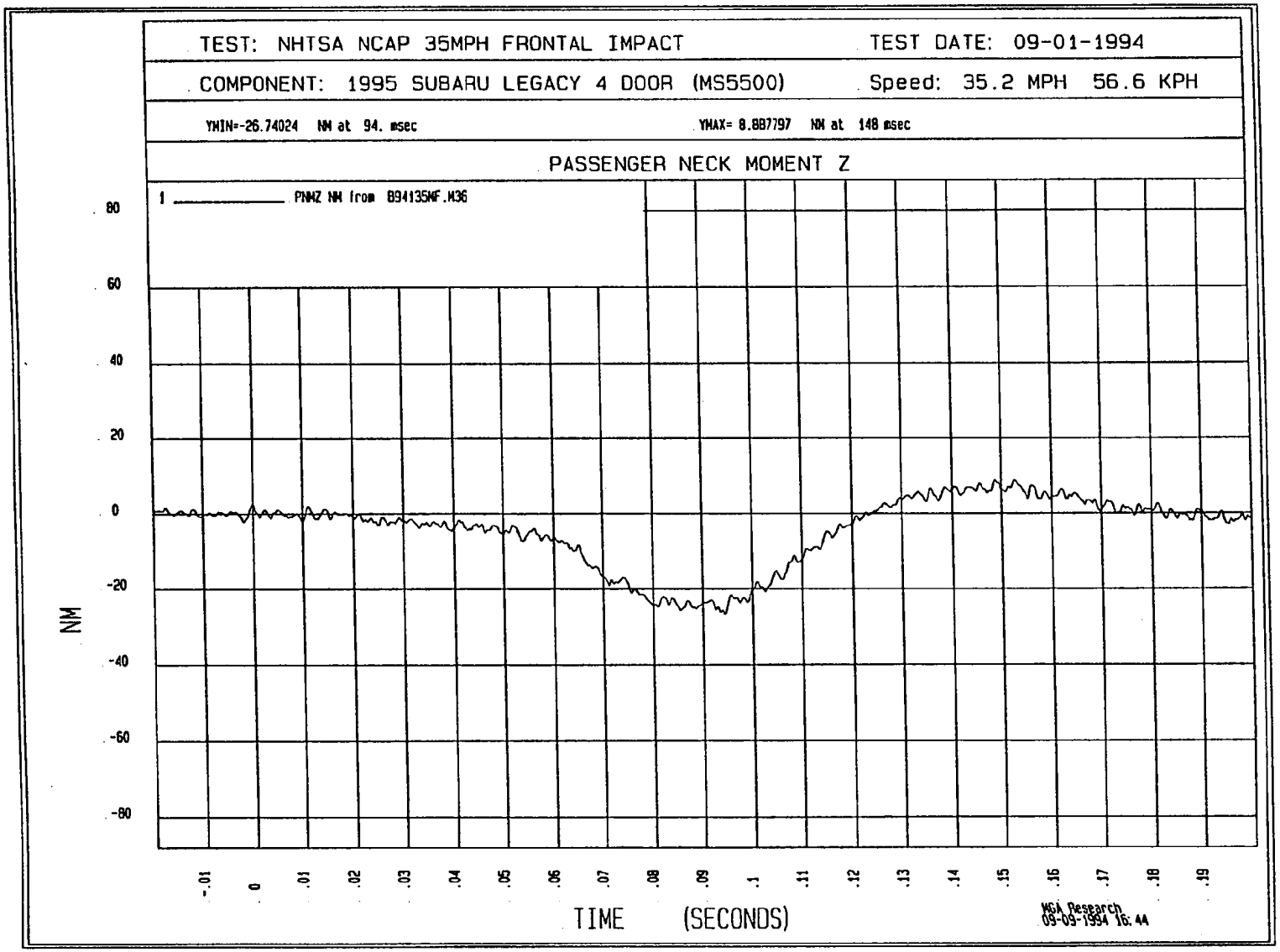


Figure B-87 - Passenger Neck Moment Z vs. Time

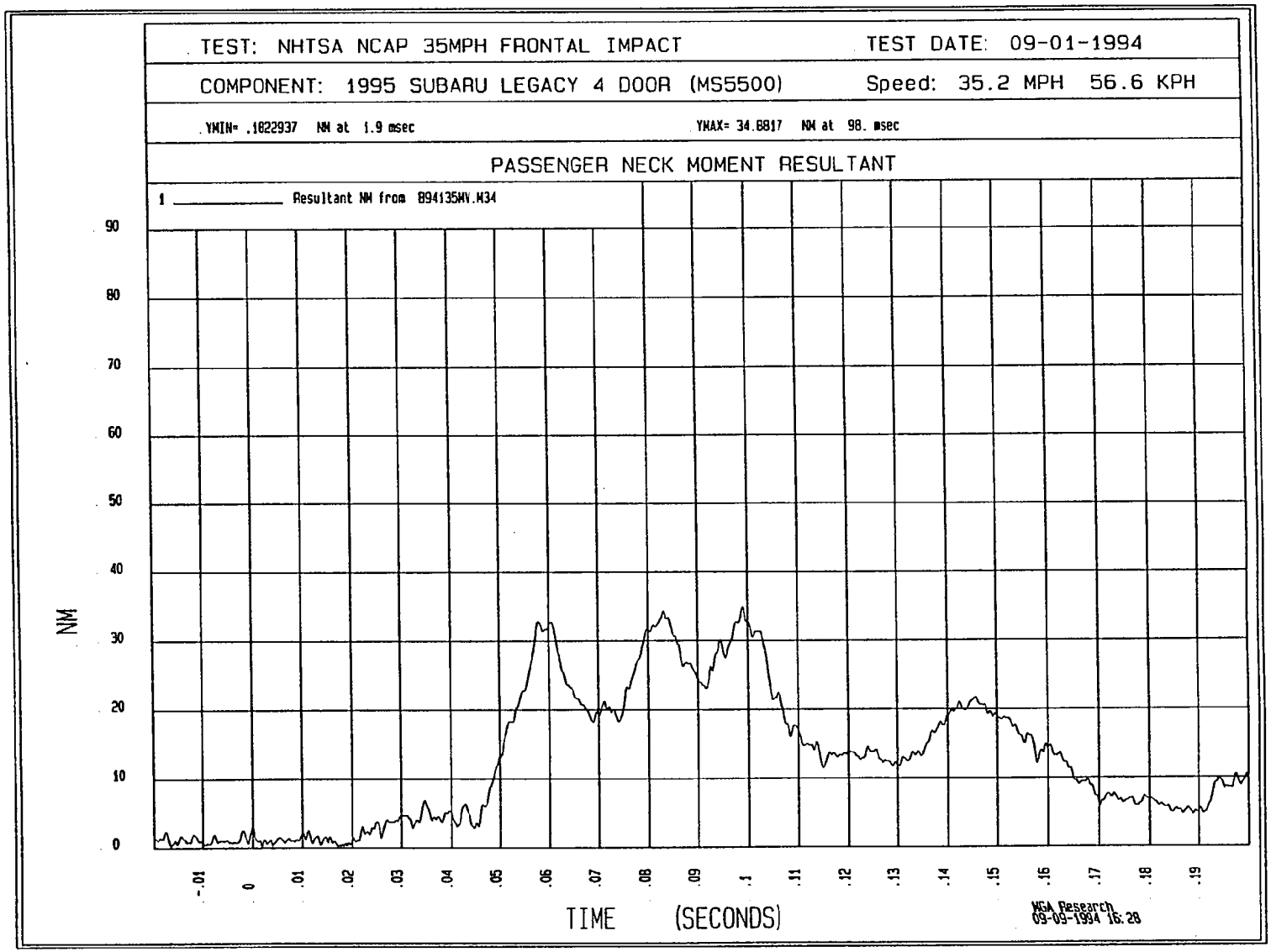


Figure B-88 - Passenger Neck Moment Resultant vs. Time

APPENDIX C

Dummy Configuration & Performance Verification Data

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 37 DUMMY CALIBRATION BY: Rod McClelland

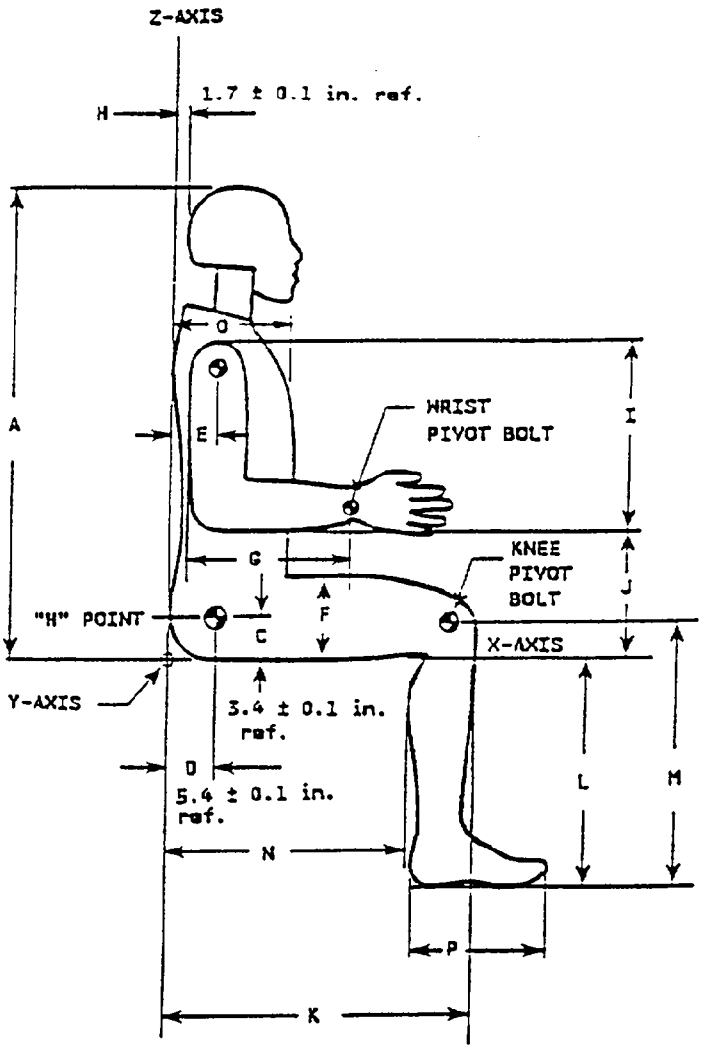
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-16-94

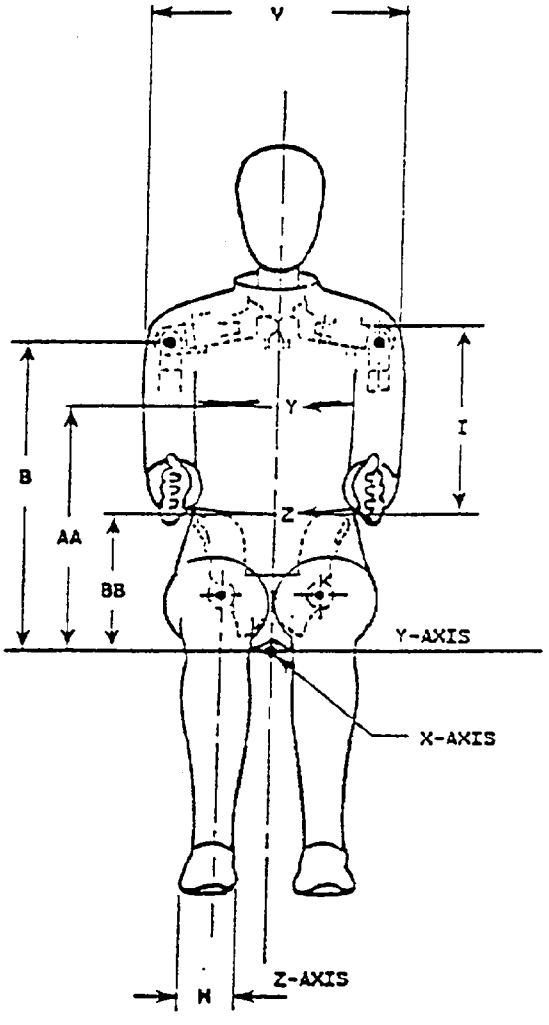
DESCRIPTION	SPECIFICATION (inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	35.0
B - Shoulder Pivot Height	19.9 - 20.5	20.0
C - "H" Point Height	3.3 - 3.5	3.5
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1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

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	20.07
Pendulum Deceleration	10 MS	17.20 - 21.20 G	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

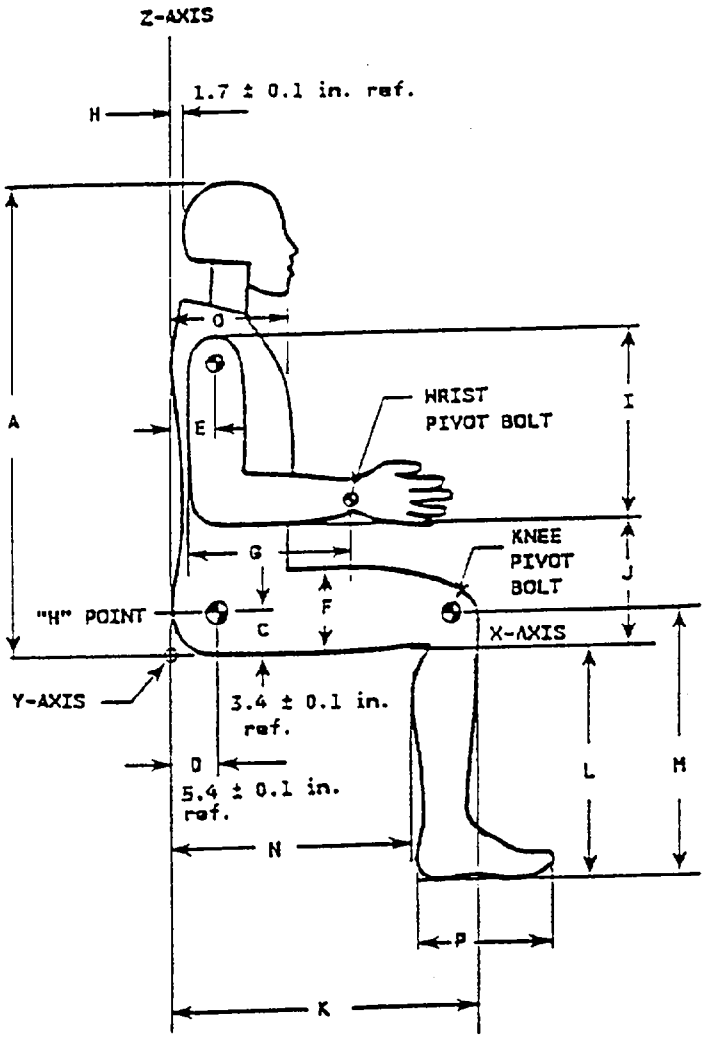
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: 08-16-94

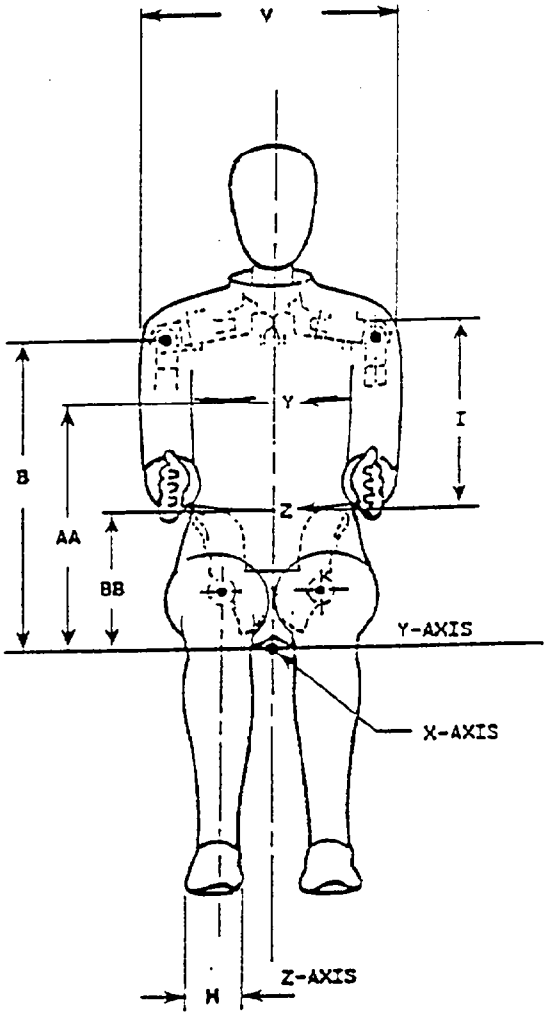
DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.5
C - "H" Point Height	3.3 - 3.5	3.4
D - "H" Point from Seat Back	5.3 - 5.5	5.5
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	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	691	Lebow	4/27/94
Torso Belt Load Cell	662	Lebow	4/28/94

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	211	GSE	4/28/94
Torso Belt Load Cell	625	Lebow	5/31/94

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	AHTA5	Endevco	7/12/94
Right Rear Seat Crossmember X	MGA130	Entran	6/14/94
Top of Engine Block X	MGAA84	Entran	8/04/94
Bottom of Engine X	MGA014	Entran	6/02/94
Left Brake Caliper X	AHYD5	Endevco	7/12/94
Right Brake Caliper X	MGA058	Entran	6/09/94
Instrument Panel X	MGA129	Entran	8/04/94
Redundant Left Rear Seat Crossmember X	MGA090	Entran	6/30/94
Redundant Right Rear Seat Crossmember X	DK75	Endevco	8/12/94

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	AGH90	Endevco	5/06/94
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	403069	Sensotec	3/30/94
Abdomen Compression Force Gauge	N/A	Transducers Inc.	N/A

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions

3-point type seat belts (Combination lap/shoulder belts)

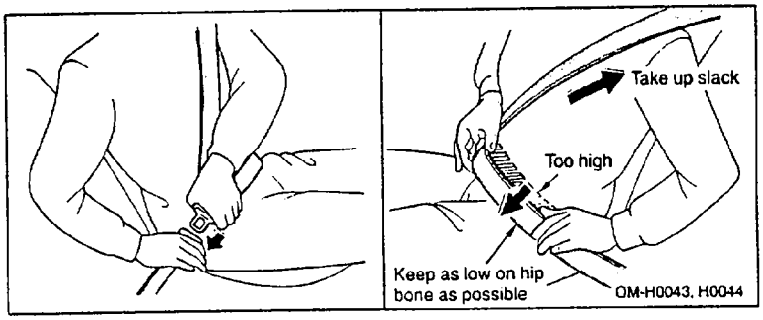
⚠ WARNING

- Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.
- Never place the shoulder belt under the arm. If an accident occurs, this can increase the risk or severity of injury.
- Keep the lap belt as low as possible on your hips. In a collision, this spreads the force of the lap belt over stronger hip bones instead of across the weaker abdomen.
- Seat belts provide maximum restraint when the occupant sits well back and upright in the seat. To eliminate the risk of sliding under the seat belt in a collision, the front seatbacks should be always used in the upright position while the vehicle is running. If the front seatbacks are not used in the upright position in a collision, the risk of sliding under the lap belt and of the lap belt sliding up over the abdomen will increase, and both can result in serious internal injury or death.

Especially when the occupant of the front passenger's seat is a child, be sure to position the seatback upright. Children are more likely to slide under the lap belt than adults if the seatback is reclined in a collision.

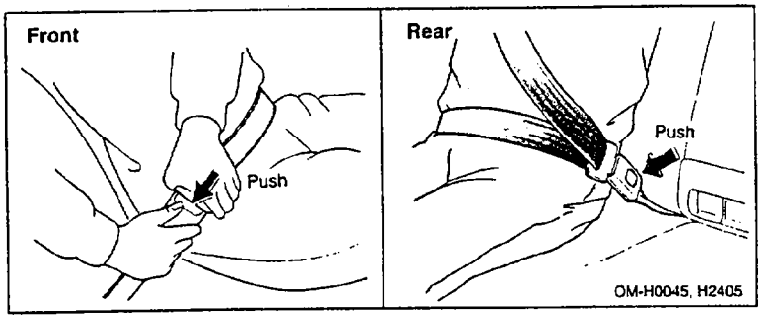
3-point type seat belts have an emergency locking retractor. This allows normal body movement but the retractor locks automatically during a sudden stop, impact or if you pull the belt very quickly out of the retractor.

■ **Fastening the seat belt**



1. Adjust the seat position and sit well back.
2. Pick up the tongue plate and pull the belt out slowly. Do not let it get twisted. If the belt stops before reaching the buckle, return the belt slightly and pull it out more slowly.
3. Insert the tongue plate into the buckle until you hear a click.
4. To make the lap part tight, pull up on the shoulder belt. And place the lap belt as low as possible on your hips, not on your waist.

■ **Unfastening the belt**



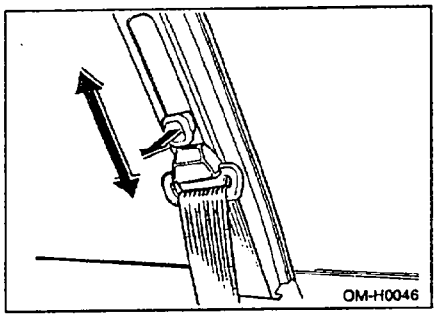
Push the button on the buckle.

Before closing the door, make sure that the belts retract properly.

■ **Adjusting the front seat shoulder belt anchor height**

⚠WARNING

When wearing the front seat belts, make sure the shoulder portion of the webbing does not pass over your neck. If it does, adjust the seat belt anchor to a lower position. Placing the shoulder belt over the neck may result in neck injury during sudden braking or in a collision. Be certain to follow this warning especially when the front seat occupant is a child.



The shoulder belt anchor height should be adjusted to the position best for you. To adjust the anchor height, pull the release knob and move the anchor to the desired position so that the shoulder belt passes over the middle of the shoulder without touching the neck.

■ **ALR (Automatic Locking Retractor) function (Rear seat belt only)**

When securing a child restraint system on either rear seat, the three-point type seat belt must be changed over to the ALR (Automatic Locking Retractor) mode.

When the child restraint system is removed, make sure that the retractor operates as an ELR (Emergency Locking Retractor). For instruction on how to convert the retractor to the ALR mode and restore it to the ELR mode, see the Child restraint system section in this manual.

2-point type seat belts (lap only belts)

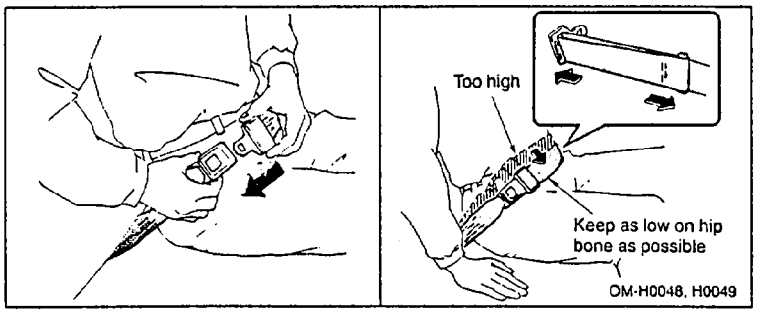
⚠WARNING

• Never use a belt that is twisted or reversed. In an accident, this can increase the risk or severity of injury.

• Keep the lap belt as low as possible on your hips. In a collision, this spreads the force of the lap belt over stronger hip bones instead of across the weaker abdomen.

The 2-point type seat belt has a manual adjustment device.

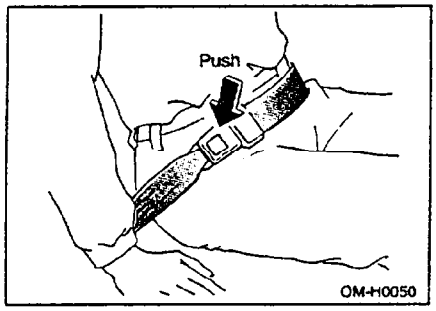
■ Fastening the seat belt



1. Sit well back and pick up the tongue plate marked "CENTER". Be careful not to twist the belt.
2. Insert the tongue plate into the buckle marked "CENTER" until you hear a click. If the belt is not long enough for you, hold the tongue plate at a right angle to the belt and pull the belt to extend.
3. To make the belt tight, pull up on the belt. And place the lap belt as low as possible on your hips, not on your waist.

The tongue plate marked "CENTER" can be fastened only into the buckle marked "CENTER".

■ **Unfastening the belt**



Push the button on the buckle.

When the belt is not in use, buckle the belt to prevent it from being caught in the door.

NOTE
When folding down the rear seat of the wagon, store the seat belts in the seat belt pocket to prevent them falling below the cushion.

Seat belt safety tips

⚠WARNING

• All persons in the vehicle should fasten their seat belts BEFORE the vehicle starts to move. Otherwise, the possibility of serious injury becomes greater in the event of a sudden stop or accident.
• All belts should fit snugly in order to provide full restraint. Loose fitting belts are not as effective in preventing or reducing injury.
• Each seat belt is designed to support only one person. Never use a single belt for two or more persons — even children.
• Replace all seat belt assemblies including retractors and attaching hardware worn by occupants of a vehicle that has been in a serious accident. The entire assembly should be replaced even if damage is not obvious.

■ **Infants or small children**

Use a child restraint system that is suitable for your vehicle. See information on "Child restraint system" in this section.

■ **Children**

If a child is too big for a child restraint system, the child should sit in the rear seat and be restrained using the seat belts. According to accident statistics, children are safer when properly restrained in the rear seat than in the front seat. Never allow a child to stand up or kneel on the seat.

If the shoulder portion of the belt crosses the face or neck, move the child closer to the center of vehicle to help provide a good shoulder belt fit. If the shoulder portion of the belt can not be properly positioned, a child restraint system should be used. If that is not possible, the child should sit in the center rear seat and use the 2-point type seat belt. Care must be taken to securely place the lap belt as low as possible on the hips and not on the child's waist.

■ **Expectant mothers**

Expectant mothers also need to use the seat belts. They should consult their doctor for specific recommendations. The lap belt should be worn securely and as low as possible over the hips, not over the waist.

■ **Maintenance**

⚠ CAUTION

- **Keep sharp edged or other objects that may cause damage away from belts and other parts of the passenger restraint system.**
- **Keep the belts free of polishes, oils, chemicals and particularly battery acid.**
- **Never attempt to make modifications or changes that will prevent the seat belt from operating properly.**

SRS AIRBAG

■ Vehicle with driver's side and passenger's side airbags and lap/shoulder restraints

⚠WARNING

• To obtain maximum protection in the event of an accident, the driver and all passengers in the vehicle should always wear seat belts when the vehicle is moving. The SRS AIRBAG does not do away with the need to fasten seat belts. In combination with the seat belts, it offers the best combined protection in case of a serious accident.

Not wearing a seat belt increases the chance of severe injury or death in a crash even when the car has the SRS AIRBAG.

For instructions and precautions concerning the seat belt system, see 3-point type seat belts on page 2-8 and 2-point type seat belts on page 2-11.

• Do not place any objects over the SRS AIRBAG cover or between you and the SRS AIRBAG. If the SRS AIRBAG deploys, those objects could interfere with its proper operation and could be propelled inside the car and cause injury.

• Do not sit or lean unnecessarily close to the SRS AIRBAG. The SRS AIRBAG deploys with considerable force and can injure an occupant whose body is too close to it. It is also important to wear your seat belt to help avoid injuries that can result when the SRS AIRBAG contacts an occupant not in proper position.

• Do not install a rearward facing child seat in the front seat. Doing so risks serious injury to the child by placing the child's head too close to the SRS AIRBAG. Because of the SRS AIRBAG, we strongly recommend that you do not put any type of child seat in the front passenger seat. If, however, you do install a forward facing child seat in the front seat, slide the seat to its rear-most position.

• To avoid accidental actuation of the system or rendering the system inoperative, which may result in serious injury, no modifications should be made to any components or wiring of the SRS AIRBAG.

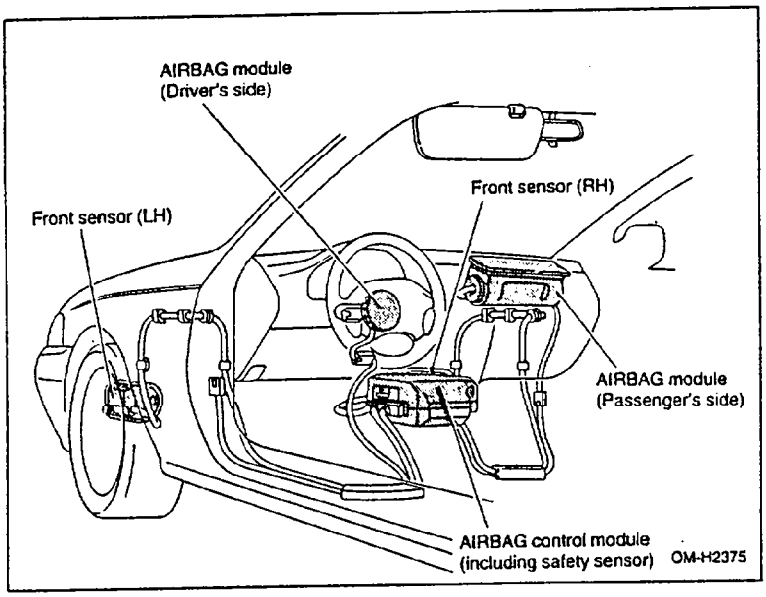
This includes the installation of "custom" steering wheels or additional trim material, or badges over the steering wheel hub. Installation of additional electrical/electronic equipment on or near SRS AIRBAG components and/or wiring is not advisable.

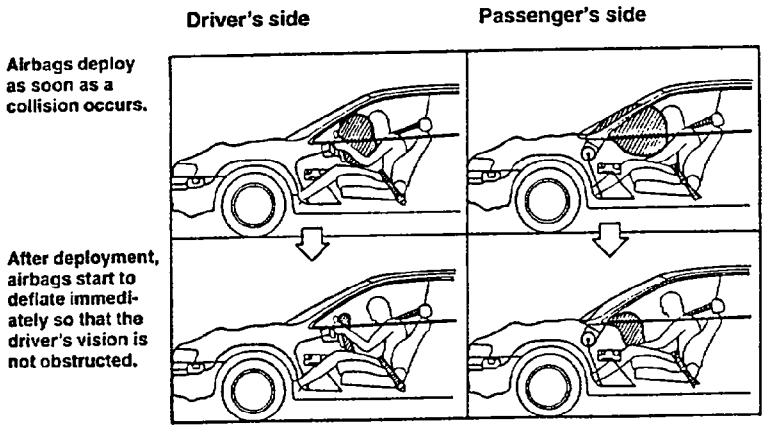
NOTE
The SRS AIRBAG can function only when the ignition switch is in the "ON" position.

The SRS (Supplemental Restraint System) AIRBAG in your vehicle affords the driver and front seat passenger additional protection during a frontal collision. This system is available for the driver and front seat passenger and is designed to supplement the protection provided by the seat belt.

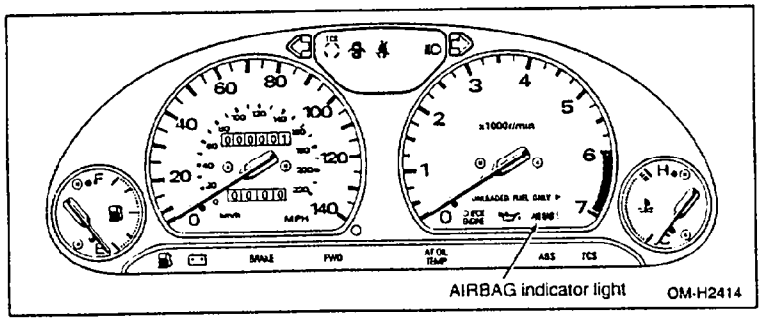
The SRS AIRBAG is designed to deploy in the event of an accident involving a moderate to severe frontal collision. It is not designed to assist the driver and front seat passenger in lesser frontal impacts, in side or rear impacts or in roll-over accidents. The SRS AIRBAG is designed to function on a one-time-only basis. In the event that the SRS AIRBAG is deployed, replacement of the system must be performed only by an authorized SUBARU dealer. When the components of SRS AIRBAG are replaced, use only genuine SUBARU parts.

The driver's side SRS AIRBAG is stored in the center portion of the steering wheel. The passenger's side SRS AIRBAG is stored near the top of the dashboard under marked "SRS AIRBAG".
If either the front sensor and safety sensor in the airbag control module detect a certain predetermined amount of force during a frontal or front-angled collision, both driver's and passenger's side airbags deploy instantly at the same time to help prevent the driver and front seat passenger from contacting the steering wheel or dashboard. After the deployment, the airbags immediately start to deflate so that the driver's vision is not obstructed.


AIRBAG module
(Driver's side)
Front sensor (RH)
Front sensor (LH)
AIRBAG module
(Passenger's side)
AIRBAG control module
(including safety sensor)
OM-H2375


Driver's side
Passenger's side
Airbags deploy as soon as a collision occurs.
After deployment, airbags start to deflate immediately so that the driver's vision is not obstructed.

■ System monitors



A diagnostic system continually monitors the readiness of the SRS AIRBAG while the vehicle is being driven. The AIRBAG indicator light will show normal system operation by lighting for about 8 seconds when the ignition key is first turned to the "ON" position and then turning off.
The following components are monitored by the indicator:

- Right front sensor
- Left front sensor
- AIRBAG control module
- AIRBAG module (driver's side)
- AIRBAG module (passenger's side)
- All related wiring

In the event of a malfunction indicated by any of following, the vehicle should be taken promptly to your nearest SUBARU dealer to have the system checked. Unless checked and repaired, the SRS AIRBAG will not function reliably:

- Flashing or flickering of the indicator light.
- Failure of the indicator light to illuminate when the ignition switch is first turned to the "ON" position.
- Continuous illumination of the indicator light.
- Illumination of the indicator light while driving.

■ Safety guidelines for the SRS AIRBAG

During a moderate to severe frontal impact, a sudden, fairly loud inflation noise will be heard and some smoke will be released. These occurrences are normal and not harmful. This smoke does not indicate a fire in the vehicle.

Although it is highly unlikely that the SRS AIRBAG would activate in a non-accident situation, should it occur, the bag will deflate quickly, not obscuring vision and will not interfere with the driver's ability to maintain control of the vehicle.

NOTE

When you sell your vehicle, we urge you to explain to the buyer that it is equipped with SRS AIRBAGS by alerting him to the applicable section in this owner's manual.

■ System servicing

⚠ WARNING

• When discarding an airbag module or scrapping the entire car damaged by a collision, consult your SUBARU dealer.

• The SRS AIRBAG has no user-serviceable parts. Tampering with or disconnecting the system's wiring could result in accidental inflation of the airbag or could make the system inoperative, which may result in serious injury. For required servicing of the SRS AIRBAG, see your nearest SUBARU dealer.

⚠ CAUTION

The impact sensors are located in both front fenders and under the center console. If you need service or repair in those areas or near the steering wheel and column, we recommended that you have an authorized SUBARU dealer perform the work.

To ensure its long-term reliability, the SRS AIRBAG must be inspected by a SUBARU dealer ten years after the date of manufacture, which is shown on the certification label attached to the driver's door jamb.