V1729

REPORT NO. MGA-90-N008

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

Ford
1992 Ford Festiva
2 Door Hatchback
NHTSA NO. MN0203

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

July 20, 1992

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
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NHTSA New Car Assessment Program (NCAP) 1991 Frontal Barrier Impact test on 1992 Ford Festiva 2 Door Hatchback to indicant requirements FMVSS No. 208, 212, 219 (partial) and 301.	July 20, 1992
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15. Supplementary Notes

16. Abstract

A 35 mph frontal barrier impact using a 30 load cell barrier was conducted on a 1992 Ford Festiva at the MGA Proving Grounds Crash Test Facility in Burlington, Wisconsin, on May 12, 1992.

The barrier impact velocity was 34.9 mph, and the ambient temperature at the time of impact was 70° Fahrenheit. The post test average crush was 20.2 inches.

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 not reportable and the 3 msec Clip (Chest g's) was 46.4. The left and right femur maximum loads for the driver were 1210 lbs. and 1197 lbs respectively. The passenger's HIC was 477 and the 3 msec Clip (Chest g's) was 41.8. The left and right femur maximum loads for the passenger were 2207 lbs. and 586 lbs. 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 Reference Division National Highway Traffic Safety Adm. NASSIF Building, Room 5108 400 Seventh St., S.W. Wash. 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'92 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH 22-90-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 30 mph FMVSS 208/212/219/301-75 requirements.

The 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 TEST NUMBER MNØ2Ø3

A load cell barrier consisting of 3Ø load cells was impacted by a 1992 Ford Festiva 2 Door Hatchback at a velocity of 34.89 mph. The test was performed at the MGA Proving Grounds and Crash Test Center on May 12, 1992. 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 15 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 5Øth 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 and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 465) and the right-front passenger ATD (Serial No. 466) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 39 channels of data were recorded on 4 computers. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the steering wheel rim and hub. The maximum chest deceleration over 3 milliseconds was 46.4 g's and the left and right femur loads were 12Ø9 and 1196 pounds respectively.

The right front passenger's HIC was 476.9 and maximum chest deceleration over 3 milliseconds was 41.8 g's. The left and right femur load were 22Ø7 and 585 pounds respectively.

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1992 Ford Festiva 2 Door Hatchback

NHTSA No.: MN0203 VIN.: KNJPT05HON6107345

Body color: White Date of Manufacture: 10/10/91

Engine: 4 Cylinders; ___C.I.D.; 1.3 liters; ___CC

X Gas; ___Diesel; ___Turbocharged

___Longitudinal; X Transverse

Transmission: 5 Speed; X Manual; ___Automatic; X Overdrive

Final Drive: X Front Wheel; ___Rear Wheel; ___Four Wheel

Date Received: 4/15/92 Odometer Reading: 51

___A/C; ___P/S; X P/B; ___P/wdo; ___ Tilt Wheel

___P/seats; ___Cruise Control

Type of Occupant Restraint: The vehicle was equipped with motorized shoulder belts located in the doors, and manual lap belts. Shoulder belt retractors are located under the respective seats.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 32 psi, Rear 32 psi

Recommended Tire Size: 145SR12

Recommended Cold Tire Pressure: Front 32 psi, Rear 32 psi

Tires on Vehicle: 145SR12 ; Manufacturer: Yokohama

Number of Occupants: 2 Front; 2 Rear; ___3rd Seat; 4 TOTAL

Type of Front Seats: X Bucket; ___Bench; ___Split Bench

Type of Front Seat Back: ___Fixed; X Adj. With X Level ___Rot. Knob

Vehicle Capacity Weight (VCW) = 680 lbs. (A)

No. of Occupants x 150 lbs. = 600 lbs. (B)

Rated Cargo Weight (RCW) A-B = 80 lbs.

GVWR 2645 lbs. GAWR: Front 1450 lbs. Rear 1200 lbs.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

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

Right Front = 524 lbs. Right Rear = 399 lbs.

Left Front = 544 lbs. Left Rear = 405 lbs.

TOTAL FRONT WEIGHT = 1068 lbs. (57.1% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 804 lbs. (42.9% of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 1872 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (1872 lbs.)

VCW = Vehicle Capacity Weight (680 lbs.)

DSC = Designated Seating Capacity (4)

RCW = VCW - 150 (DSC) = 80 *lbs.

Target Test Weight = UDW + RCW + (2 dummies x 164 lbs./dummy)

Target Test Weight = 2280 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 620 lbs. Right Rear = 510 lbs.

Left Front = 660 lbs. Left Rear = 490 lbs.

TOTAL FRONT WEIGHT = 1280 lbs. (56% of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1000 lbs. (44% of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2280 lbs.

Weight of ballast secured in vehicle trunk area = 0 lbs.

Vehicle components removed to meet target weight: Rear seat, all rear panels, spare tire, and rear hatch

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 24.9 LF 24.8 RR 24.4 LR 24.2

Test Attitude: RF 23.5 LF 23.4 RR 23.0 LR 22.9

Wheel Base: 90.5 in.; C.G. = 39.7 in. rearward of front wheel C/L

Remarks: None

*light trucks and MPVs RCW is 300 lbs. or manufacturer's value, whichever is less

POST-IMPACT DATA:

Type of Test: 35mph Frontal Impact Impact Angle: 0 °

Date of Test: May 12, 1992 Time of Test: 3:36 p.m.

Ambient Temperature: 70 °F (Spec. Range = 66 to 78°F)

Temperature in Occupant Compartment: 72 °F

Windshield Molding Temperature: 69 °F

Required Impact Velocity Range: 34.5 to 35.1 mph

Impact Velocity: primary = 34.9 mph, secondary = 35.2 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 50.3 inches

Exiting Speed Trap: 11.0 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length: Pre-test = R 138.0 C_L 141.0 L 139.0

Post-test = R 119.1 C_L 119.1 L 120.4

Crush = R 18.9 C_L 21.9 L 18.6

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

R 19.1 in. C_L 20.0 in. L 22.0 in.

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	to steering wheel hub	None
Chest	to steering wheel	None
Abdomen	to steering wheel rim	None
Left Knee	to instrument panel	to instrument panel
Right Knee	to instrument panel	to instrument panel

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
	Left	Right	Left	Right
Door Opening (without use of tools)	Opened	Opened	N/A	N/A

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Movement	No	No	N/A	N/A
Seat Shift (inches)	+.2	+.1	N/A	N/A

Glazing Damage

Backlight/Windshield None

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

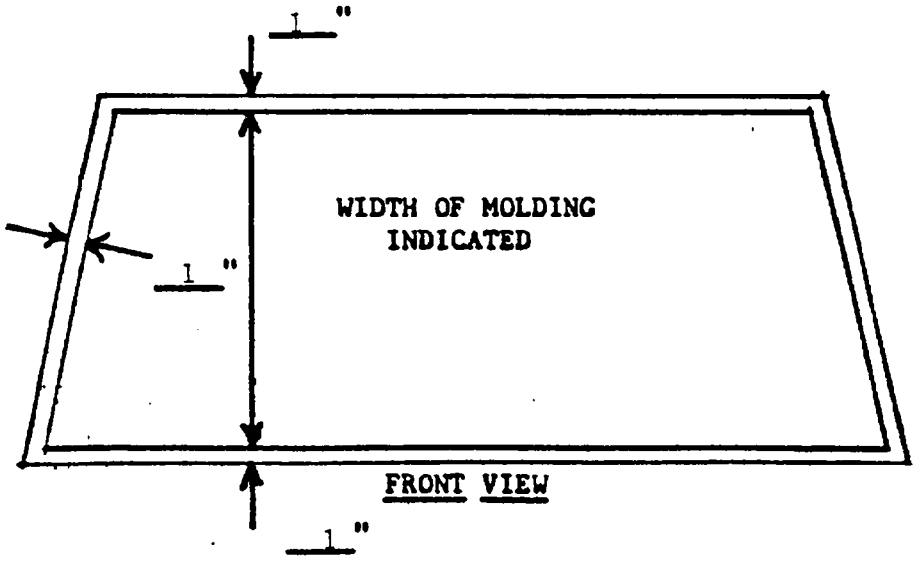
Details of windshield mounting such as retention method, trim type, etc.:
Steel trim with glue retention

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

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	71	71	100%
LEFT SIDE	71	71	100%
TOTAL	142	142	100%

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

NONE

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable 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= 39.3 in.

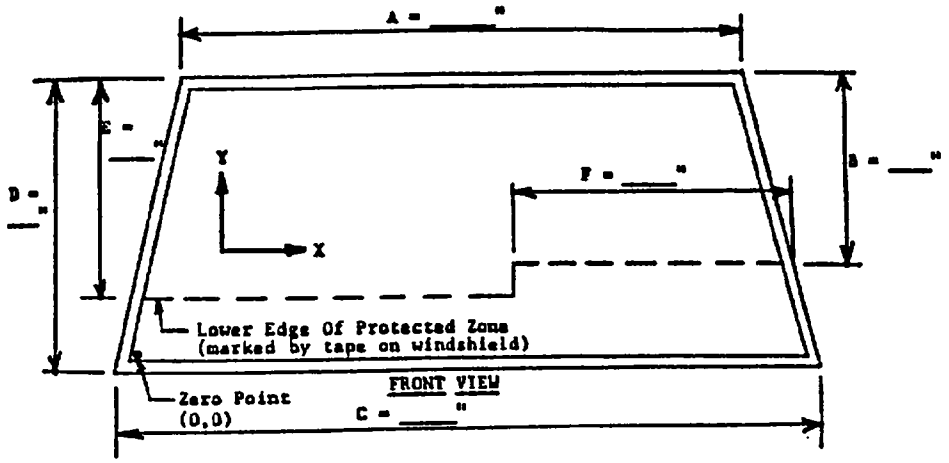
B= 15.5 in.

C= 52.Ø in.

D= 25.Ø in.

E= 18.8 in.

F= 23.Ø in.



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

NONE

FMVSS NO. 301-75, "FUEL SYSTEM INTEGRITY", DATA SHEETS

TEST VEHICLE NHTSA NO.: MN0203 TEST DATE: March 12, 1992

VEHICLE MAKE/MODEL/BODY STYLE: 1992 FORD FESTIVA 2 DOOR HATCHBACK

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 9.46 Gallons (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:

8.7 Gallons Which is 92 % of the Stated USABLE CAPACITY.

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

	Actual	Maximum Allowable
From impact until vehicle motion ceases------	0	1 oz.
For 5 min. period after vehicle motion ceases	0	5 oz.
For next 25 minutes at barrier face----------	0	1 oz./1 minute

SOLVENT SPILLAGE DETAILS:

NONE

*STATIC ROLLOVER MACHINE ROTATION TIME INFORMATION: (Spec. Range-1 to 3min.)

Time reqd. for machine to rotate 90° = N/A minutes, N/A seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 0 seconds

TOTAL---------- = N/A minutes, N/A seconds

Next Whole Minute Interval - - - - - = N/A minutes

* Not applicable - test not performed as per NHTSA COTR

FMVSS NO. 301-75 TEST DATA . . . Continued:

*VEHICLE STATIC ROLLOVER DATA:

	First 5 Minutes FROM ONSET OF ROTATION	6th Minute	7th Minute	8th Minute
Maximum Allowable Solvent Spillage	5 oz.	1 oz.	1 oz.	1 oz.
0 to 90° (filler cap down)	N/A	N/A	N/A	N/A
90° to 180°	N/A	N/A	N/A	N/A
180 to 270°	N/A	N/A	N/A	N/A
270 to 360°	N/A	N/A	N/A	N/A

Solvent Spillage Location(s):

N/A

* Not Applicable - test not performed as per NHTSA COTR

SECTION 4
OMI FINAL DATA

Occupant and Vehicle Information

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   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: 1992 FORD FESTIVA 2 DOOR HATCHBACK

VEH. NHTSA NO.: MN0203 TEST DATE: May 12, 1992

MAXIMUM ACCELERATION VALUES: (g's)	DRIVER DUMMY #465	PASSENGER DUMMY #466
Head Channel X	*	-21.5
Head Channel Y	-19.3	15.2
Head Channel Z	55.8	56.0
HEAD RESULTANT	*	59.5
Chest Channel X	-46.0	-41.3
Chest Channel Y	-14.6	22.6
Chest Channel Z	23.3	23.5
CHEST RESULTANT	46.4	41.8
TIME INTERVAL (msec) [0.003 seconds minimum]	t_1 = 56.9 t_2 = 59.9	t_1 = 69.9 t_2 = 72.9

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	*	477
t_1 = (msec)	-	70.5
t_2 = (msec)	-	106.5
Avg. Accel. t_1 to t_2 (g's)	-	44.6

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

MAXIMUM FEMUR FORCES:

Right Side (lbs.)	-1197	-586
Left Side (lbs.)	-1210	-2207

MAXIMUM SEAT BELT FORCES:

Lap Belt (lbs.)	1038	1769
Shoulder Belt (lbs.)	2209	1825

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)

* Not reportable

HYBRID III NECK AND CHEST DATA SHEET*

VEHICLE YR./MAKE/MODEL/BODY STYLE: 1992 FORD FESTIVA 2 DOOR HATCHBACK

VEHICLE NHTSA NO.: MN0203 TEST DATE: May 12, 1992

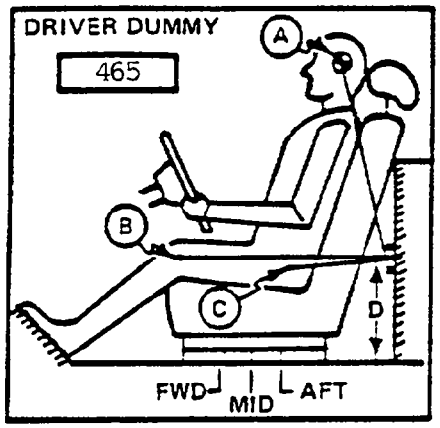
MAXIMUM VALUES	DRIVER DUMMY #	PASSENGER DUMMY #
Neck Load X	N/A	N/A
Neck Load Y	N/A	N/A
Neck Load Z	N/A	N/A
Neck Moment X	N/A	N/A
Neck Moment Y	N/A	N/A
Neck Moment Z	N/A	N/A
Chest Deflection X (in.)	N/A	N/A
Time of Max. Occurrence	N/A	N/A

NOTE: All values listed must occur during primary impact event.
* For Hybrid III Dummy Application Only

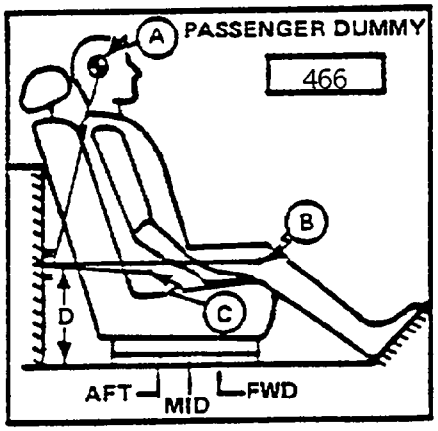
PART 572 DUMMY IN-VEHICLE POSITION

Test No.: MN0203 Vehicle: 1992 FORD FESTIVA

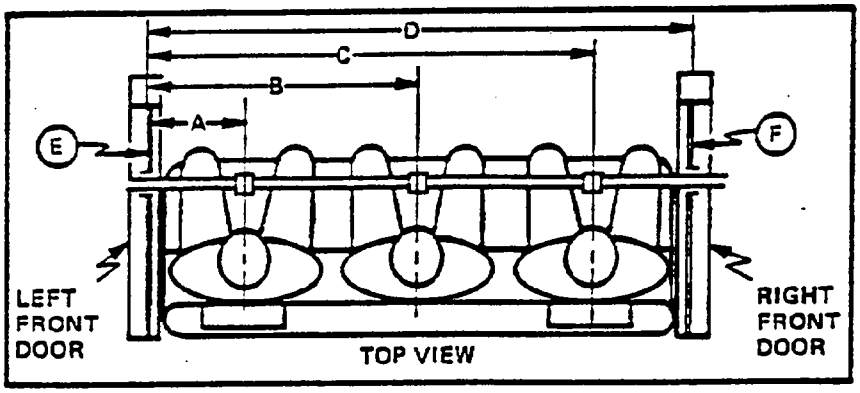
SEAT TYPE:	ADJUSTER TYPE:	BUCKET SEAT BACK TYPE:
_____ Bench	X Manual	_____ Fixed
X Bucket	_____ Power	X Adjustable Reclining
_____ Split Bench		



MEASUREMENT LOCATION
A - Head Target
B - Knee Joint
C - Approximate "H" Point
D - Sill to Reference Point



A = 23.5 in.	24.5 Degrees		A = 23.6 in.	24.7 Degrees	
B = 32.0 in.	12.7 Degrees		B = 32.0 in.	14.3 Degrees	
C = 17.1 in.	.4 Degrees		C = 16.8 in.	3.2 Degrees	
D = 13.4 in.			D = 13.5 in.		
Seat notch rearward 12			Seat notch rearward 12		

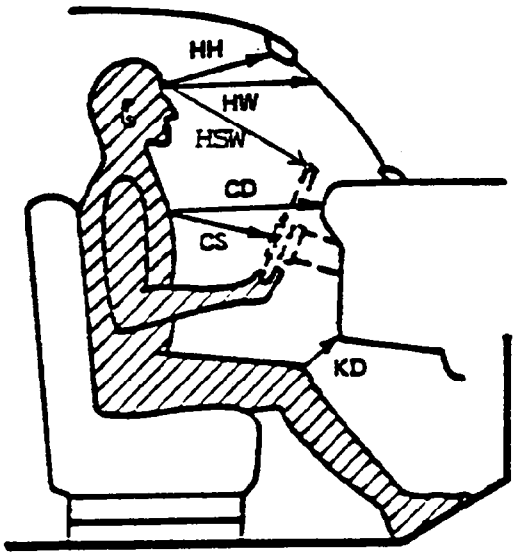


465 **DUMMY ID** 466

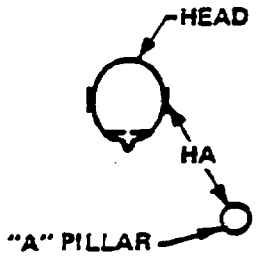
A = Left Door to Driver Centerline	14.5	in.
B = Left Door to Center Passenger Centerline	27	in.
C = Left Door to Right Passenger Centerline	39.5	in.
D = Left Door to Right Door	51.3	in.
E,F = Window Glass Height (Right and Left Must Be Equal)	0	in.

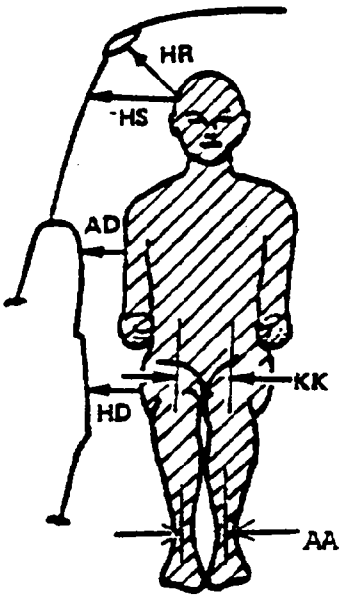
OCCUPANT CLEARANCE DIMENSIONS
Units (in.)

	Driver	Passenger
HH	16.3	16.8
HW	19.8	20.5
CD	22.1	23.3
CS	15.0	N/A
KDL	5.6	6.0
KDR	6.0	6.6
SA	5th notch	5th notch
TA	21.0°	24.7°
HSW	18.7	N/A



HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD(L\R) = Knees to Dash (Left/Right)
SA = Seat Back Angle
TA = Torso Angle
HSW = Nose to Steering Wheel
HA = Head Target to A Pillar
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle

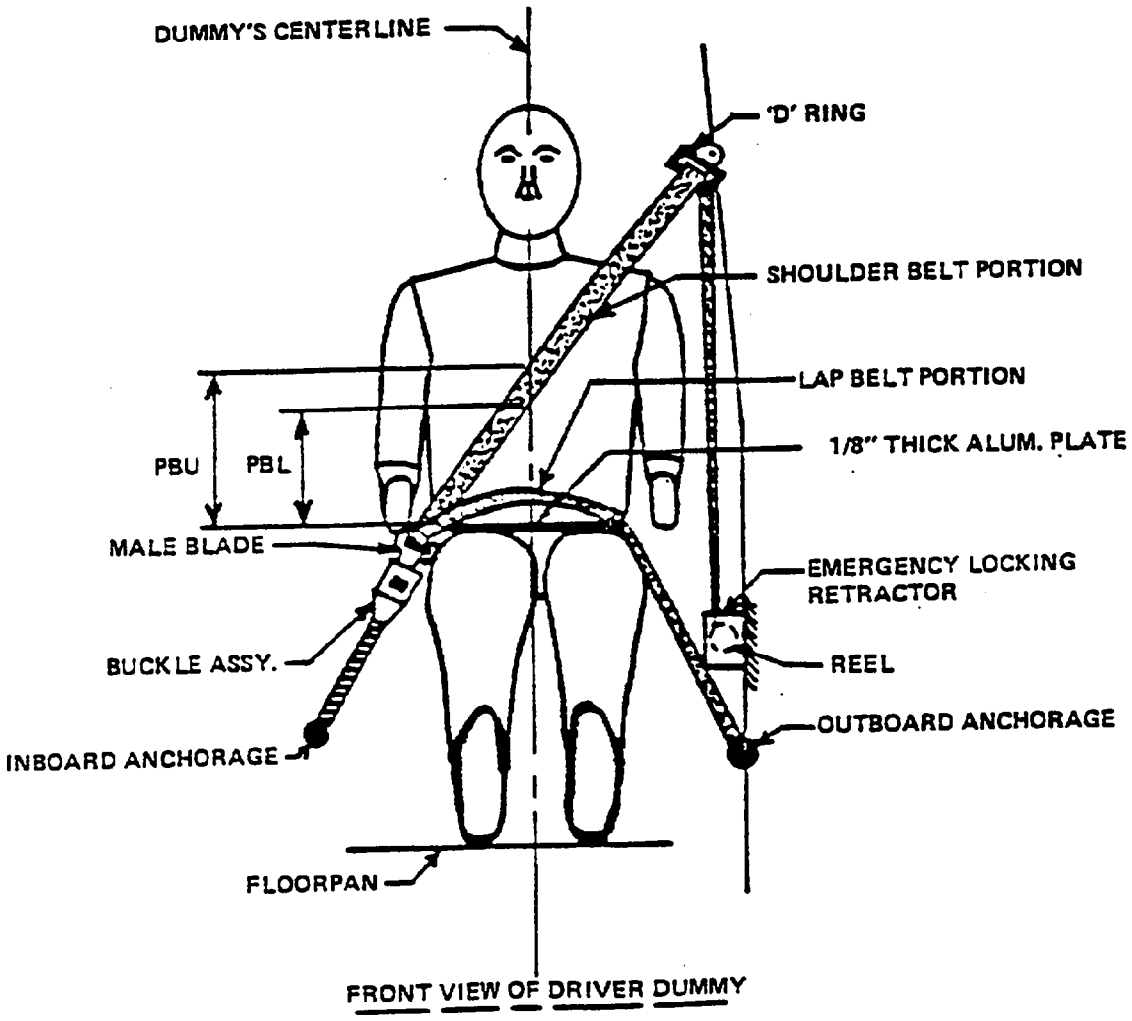




	Driver	Passenger
HR	6.8	6.6
HS	*	*
AD	4.5	4.8
HD	6.4	6.6
KK	12.3	8.3
HA	19.3	20
AA	12.0	8.3

*Vehicle Run With Windows Down

SEAT BELT POSITIONING DATA



(illustration)

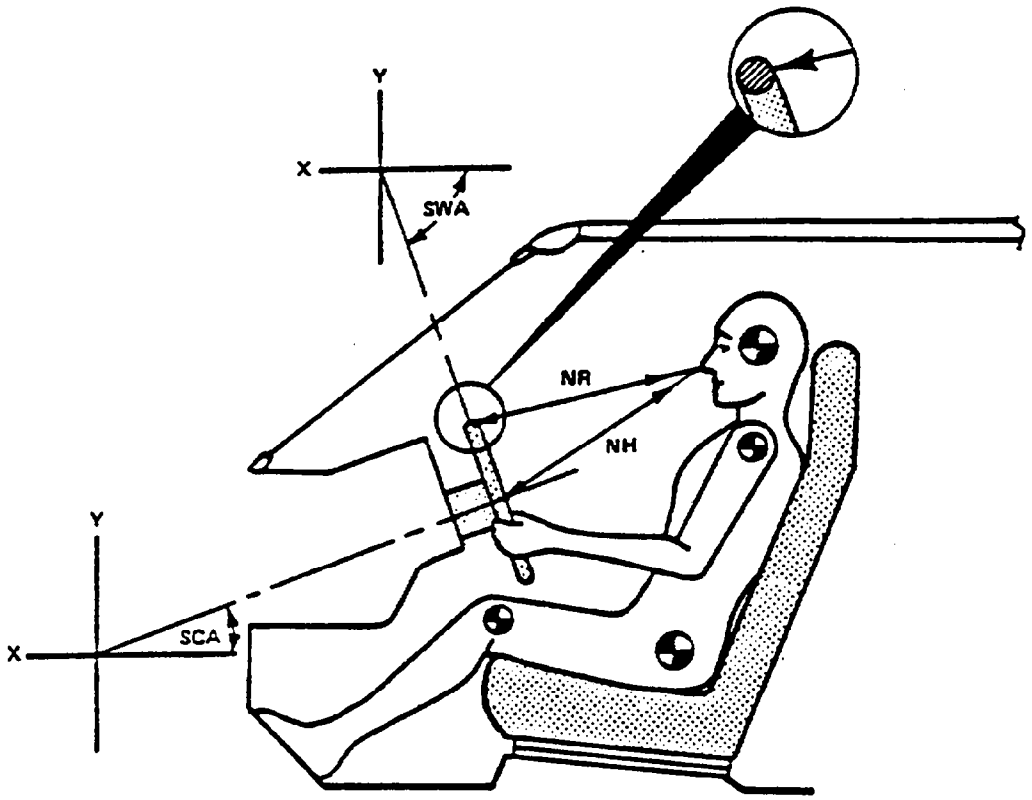
	DRIVER DUMMY	PASSENGER DUMMY
PBU -- Top surface of alum. plate to upper edge (inches)	14.5	14.5
PBL -- Top surface of alum. plate to belt lower edge (inches)	11.3	11.5
LAP BELT TENSION (lbs.)	4 oz.	4 oz.
SHOULDER BELT TENSION (lbs.)	1.3 lbs.	1.3 lbs.

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.	N/A	N/A
Shoulder belt length as measured on Part 572 Dummy.	44.4"	44.4"
Lap belt length as measured on Part 572 Dummy.	37.3"	37.8"
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis	2"	2.5"
As determined mechanically	5.6"	7.1"
As determined electronically	*	*
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	.Ø4"	.16"
Measured mechanically	Ø	Ø
RETRACTOR LOCK-UP TIME:		
As determined by shoulder belt spool-off observed in on-board cameras	3Ø msec	3Ø msec

* No room available for transducer mounting.

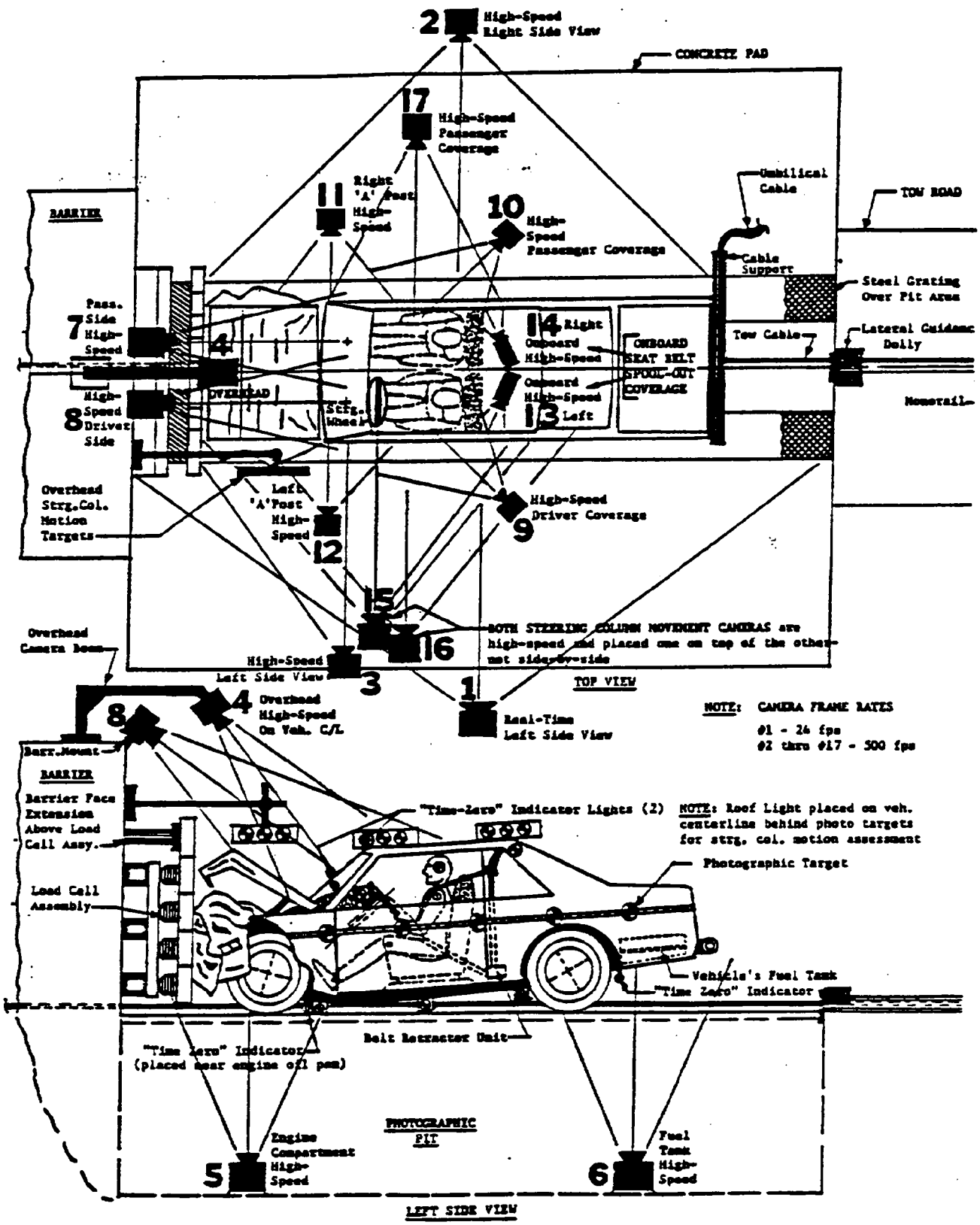
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

		MEASUREMENTS
NR ----	Distance from tip of dummy's nose to top rear surface of steering wheel rim	19.4 Inches
NH ----	Distance from tip of dummy's nose to center of steering column hub	20.3 Inches
SCA ---	Angle of Steering column relative to the horizontal X axis	30 Degrees
SWA ---	Angle of steering wheel relative to the horizontal X axis	60 Degrees

CAMERA REQUIREMENTS FOR 35 MPH FRONTAL BARRIER IMPACT ASSESSMENT PROGRAM TEST



CAMERA LOCATIONS

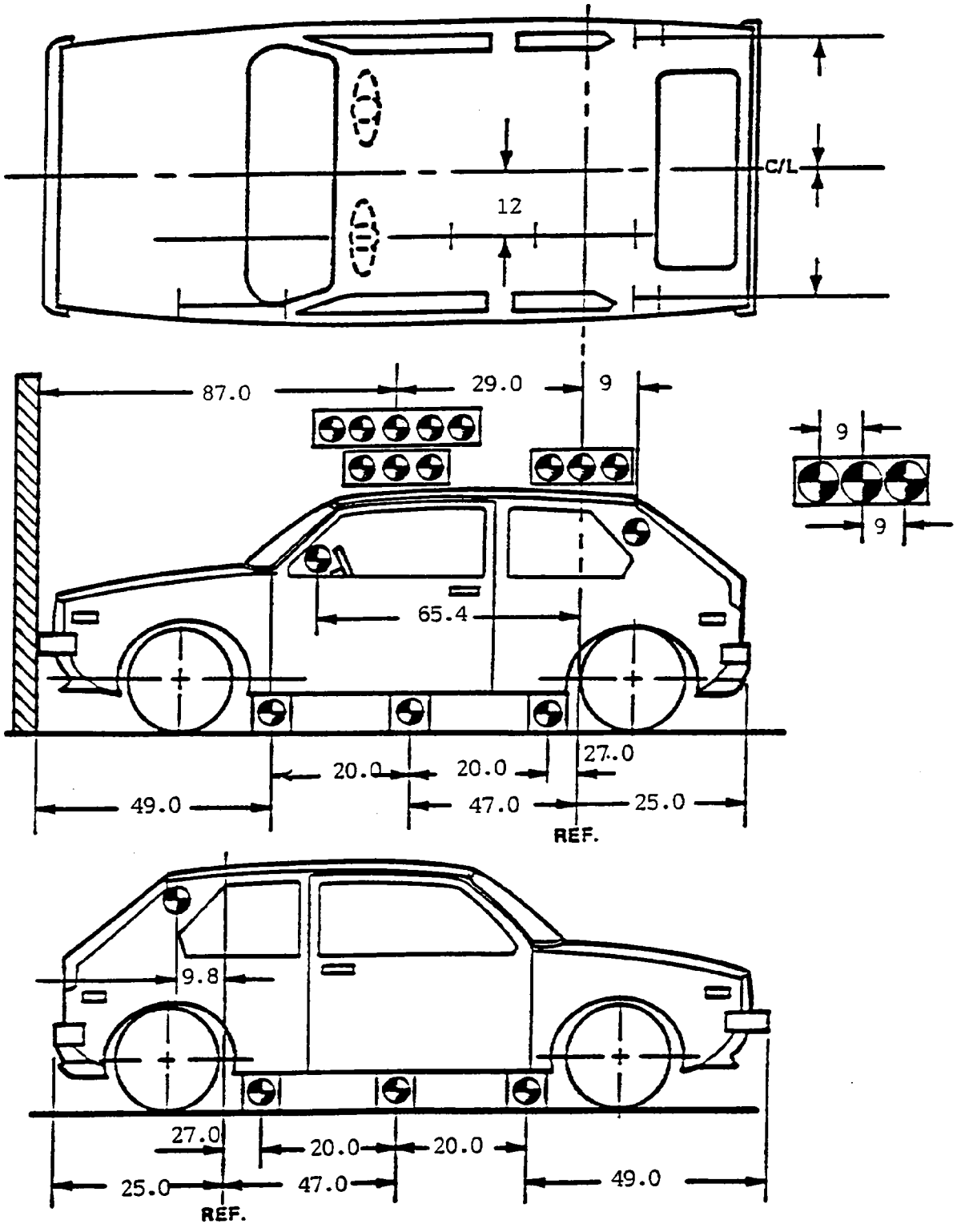
VEH. NHTSA NO.: MN0203 ; TEST DATE: May 12, 1992 ; TIME: 3:36 pm

VEH. YEAR/MAKE/MODEL/BODY STYLE: 1992 FORD FESTIVA 2 DOOR HATCHBACK

CAMERA NO.	VIEW	CAMERA POSITIONS (in.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (in.)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-	20	24
2	Right Side View	68	260	42	90	246	13	1111
3	Left Side View	28	358	48	90	343	35	1015
4	Overhead	18	3	138	45	N/A	13	1010
5	Pit-Engine	43	0	-107	90	N/A	13	1031
6	Pit-Fuel Tank	92	0	-118	90	N/A	13	1163
7	Front-Passenger	-12	14	92	45	N/A	13	-
8	Front-Driver	-12	12	92	45	N/A	13	1010
9	Left Side-Driver	152	93	82	35	N/A	35	1015
10	Right Side-Passenger	231	166	87	35	N/A	50	1015
11	Right Side-"A" Post	37	200	40	90	185	35	1117
12	Left Side-"A" Post	48	290	36	90	275	25	-
13	Onboard-Left Side	-	-	-	-	-	13	1000
14	Onboard-Right Side	-	-	-	-	-	13	-
15	Left Side-Steering Col.	67	370	60	90	355	25	985
16	Left Side-Steering Col.	67	370	40	90	355	25	513
17	Right Side-Passenger	38	230	48	90	215	25	1010

* X = film plane to monorail centerline
Y = film plane to barrier face
Z = film plane to ground

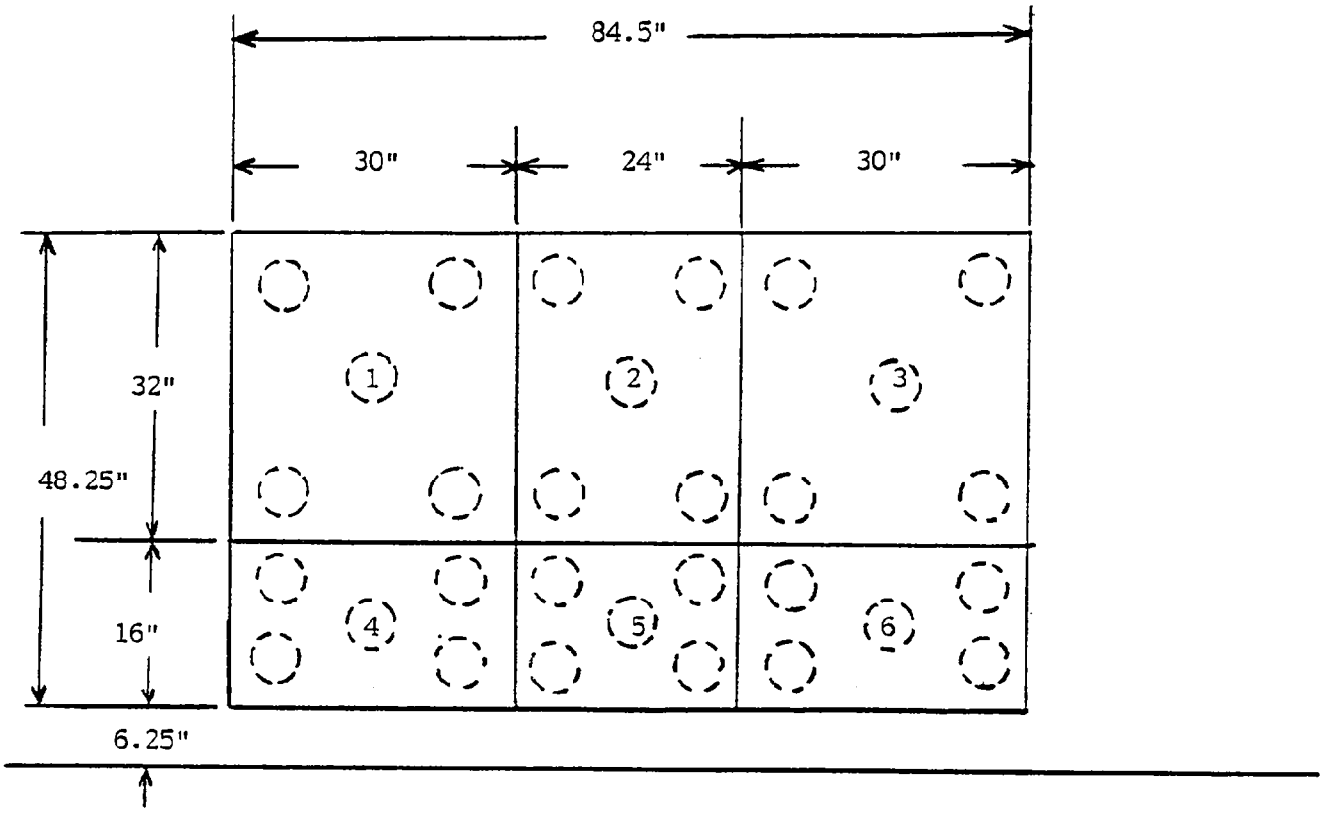
VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

LOAD CELL LOCATIONS ON FIXED BARRIER

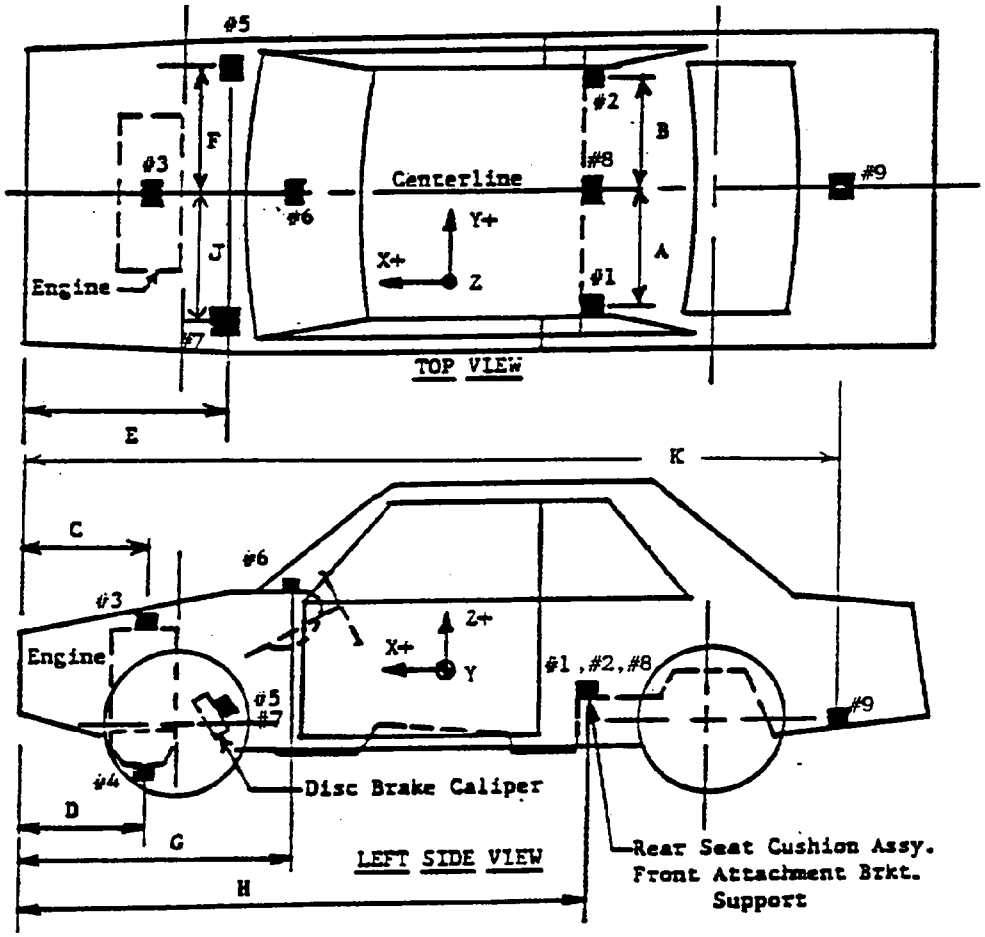
30 Load Cells
6 Rows
9 Columns
6 Groupings (5 cells/group)



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: (in.)

Dimension	Length
A	-22
B	22.5
C	21.8
D	20.0
E	23.0
F	24.5
G	42.5
H	95.5
J	-24.5
K	131.8

ACCELEROMETER	ACCELEROMETER LOCATION	DIRECTION
1	Left Rear Seat Crossmember	X
2	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
8	Center Rear Crossmember	Z
9	Vehicle Rear	Z

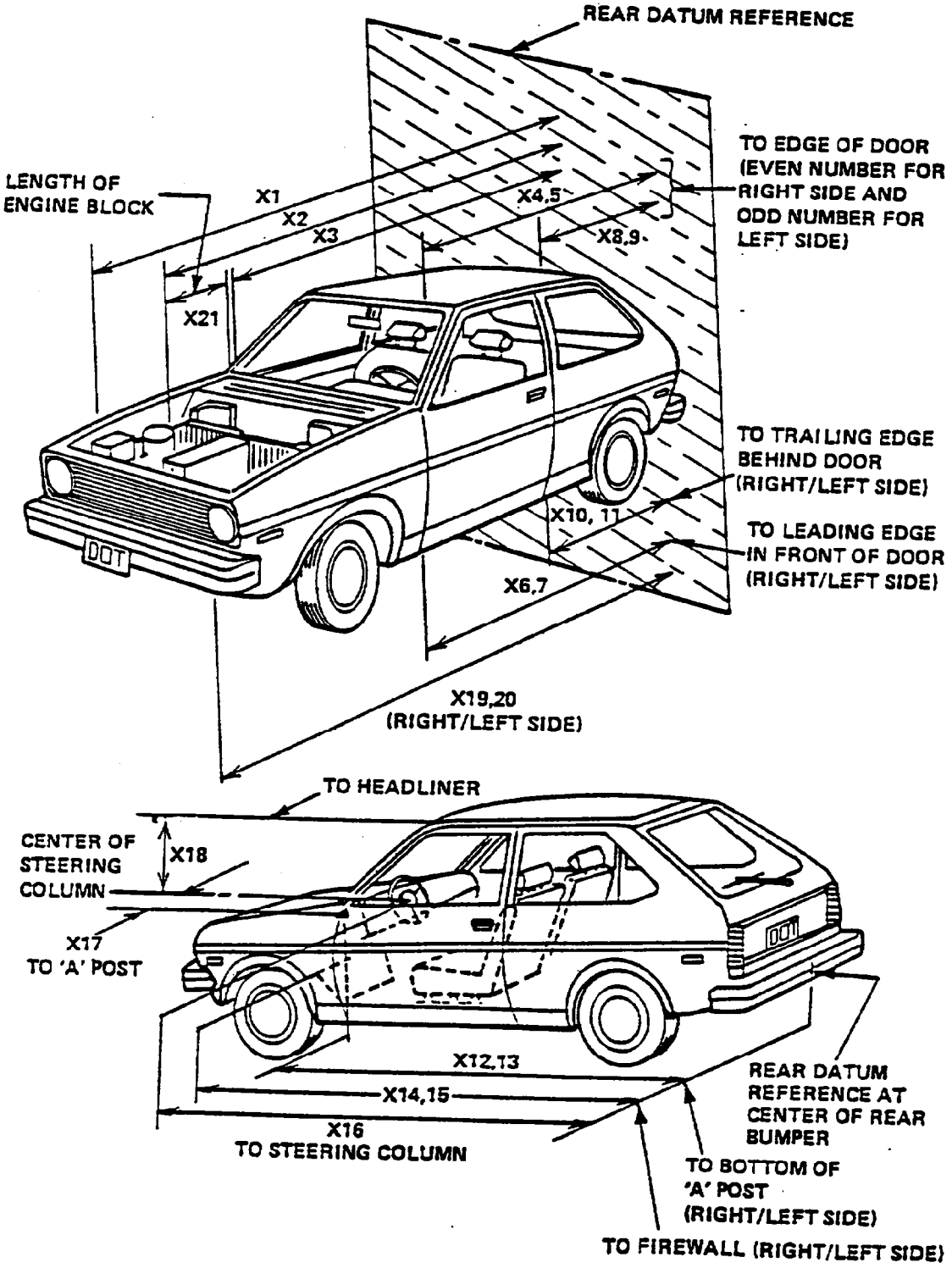
* The accelerometer pack number can be correlated with the vehicle response data traces in Appendix B.

TEST VEHICLE MEASUREMENTS

No.	MEASUREMENT DESCRIPTION:	Pre-Test (in.)	Post-Test (in.)	Diff. (in.)
X1	Total Length of Test Vehicle at Centerline	141.Ø	119.1	21.9
X2	Rear Surface of Vehicle to Front of Engine	123.5	115.8	7.7
X3	Rear Surface of Vehicle to Firewall	1Ø7.8	99.5	8.3
X4	Rear Surface to Upr. Leading Edge of Rt. Door	96	94.8	1.2
X5	Rear Surface to Upr. Leading Edge of Left Door	96.5	95.5	1.Ø
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	97.Ø	95.3	1.7
X7	Rear Surface to Lwr. Leading Edge of Left Door	98.Ø	97.3	.7
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	49.3	47.8	1.5
X9	Rear Surface to Upr. Trailing Edge of Left Door	49.5	48.6	.9
X1Ø	Rear Surface to Lwr. Trailing Edge of Rt. Door	51.3	49.6	1.7
X11	Rear Surface to Lwr. Trailing Edge of Left Door	52.3	51.5	.8
X12	Rear Surface to Bottom of `A' Post on Rt. Side	97.3	95.8	1.5
X13	Rear Surface to Bottom of `A' Post on Left Side	98.Ø	97.4	.6
X14	Rear Surface to Firewall on Right Side	1Ø6.5	1Ø2.5	4
X15	Rear Surface to Firewall on Left Side	1Ø7.8	1Ø4.9	2.9
X16	Rear Surface to Steering Column	83.5	8Ø.8	2.7
X17	Center of Steering Column to `A' Post	17.5	13.4	4.1
X18	Center of Steering Column to Headlining	17.5	12.1	5.4
X19	Rear Surface to Right Side of Front Bumper	138.Ø	119.1	18.9
X2Ø	Rear Surface to Left Side of Front Bumper	139.Ø	12Ø.4	18.6
X21	Length of Engine Block	2Ø.Ø	2Ø	Ø

*Refer to following page for No. locations

TEST VEHICLE MEASUREMENTS



ACCIDENT INVESTIGATION DIVISION DATA

FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1992 FORD FESTIVA 2 DOOR HATCHBACK

VEH. NHTSA NO.: MN0203 ; VIN: KNJPT05HON6107345

MODEL YEAR: 1992 ; BUILD DATE: 10/10/91 ; TEST DATE: 5/12/92

VEH. SIZE CATEGORY: COMPACT ; TEST WEIGHT: 2280

VEH. WHEELBASE: 90.5 ; FRONT OVERHANG: 27" ; OVERALL WIDTH: 62.3

ACCELEROMETER DATA:

LOCATION: As per measurements on pages 4-13

CALIBRATION PROCEDURE: As per MGA Calibration Procedure

LINEARITY: >99.9% ; INTEGRATION ALGORITHM: Trapezoidal

VEH: IMPACT SPEED: 34.9 mph; TIME OF SEPARATION: .075 seconds

VELOCITY CHANGE: 41 mph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal)

CRUSH DEPTH DIMENSIONS:

C1 = 18.6 inches

C2 = 20.8 inches

C3 = 21.0 inches

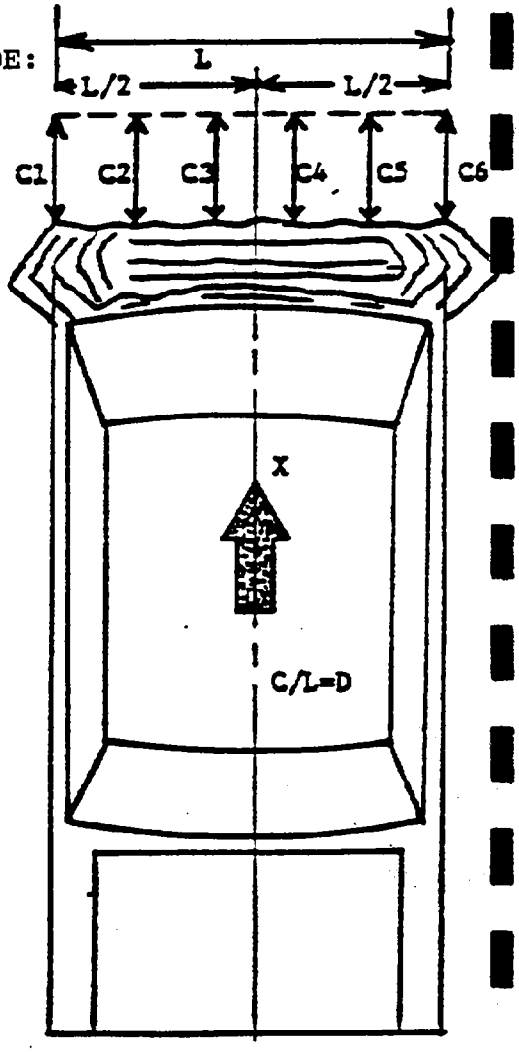
C4 = 21.1 inches

C5 = 20.9 inches

C6 = 18.9 inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitud.)

LENGTH OF DAMAGED REGION: L = 71.0 inches



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Cont'd)

Photo No. 1 - Pre-Test Front View

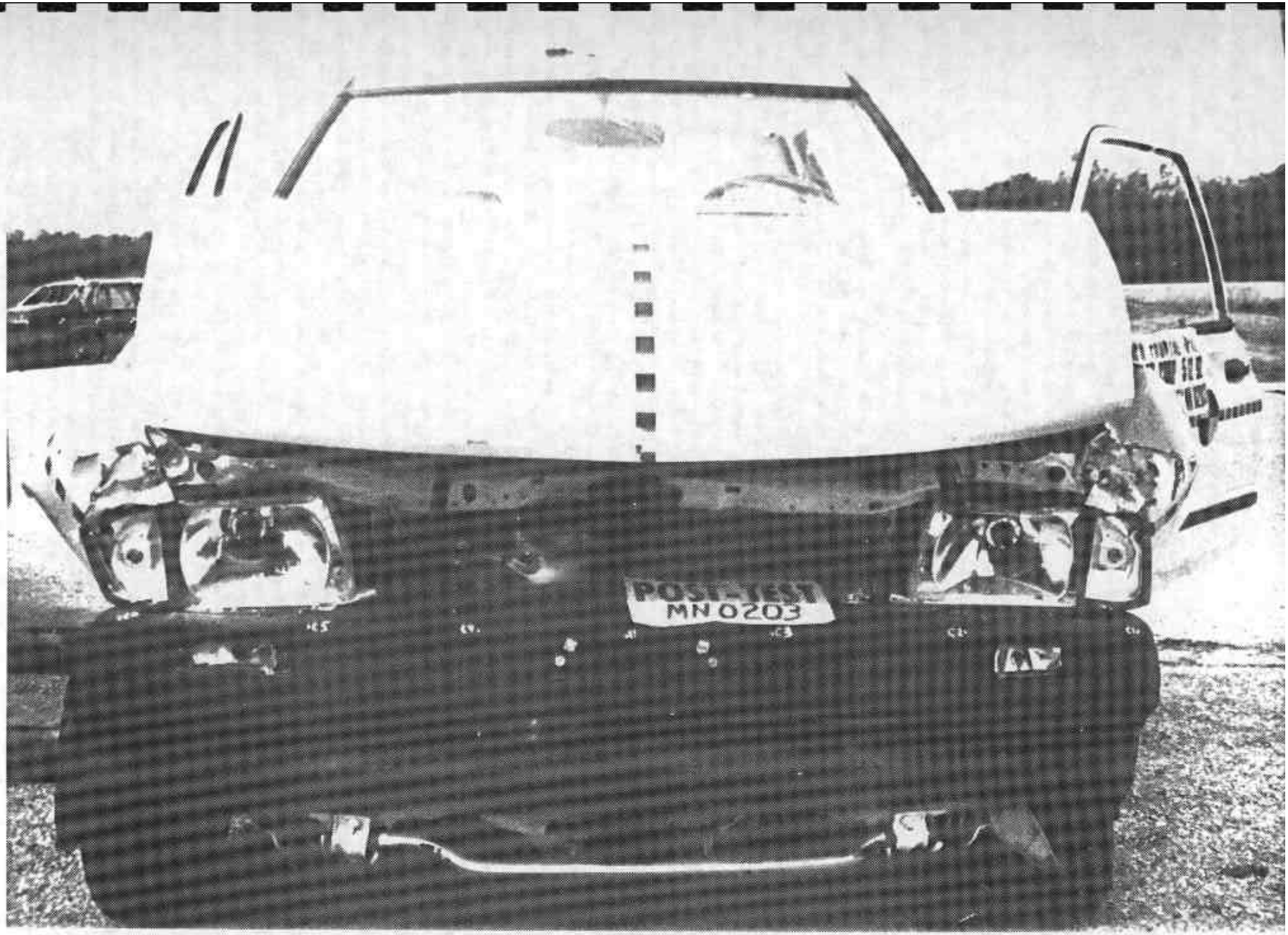


Photo No. 2 - Post-Test Front View

Photo No. 3 - Pre-Test Left Side View

Photo No. 4 - Post-Test Left Side View

Photo No. 5 - Pre-Test Right Side View

Photo No. 6 - Post-Test Right Side View

Photo No. 7 - Pre-Test Right Front Three-Quarter View

Photo No. 8 - Post-Test Right Front Three-Quarter View

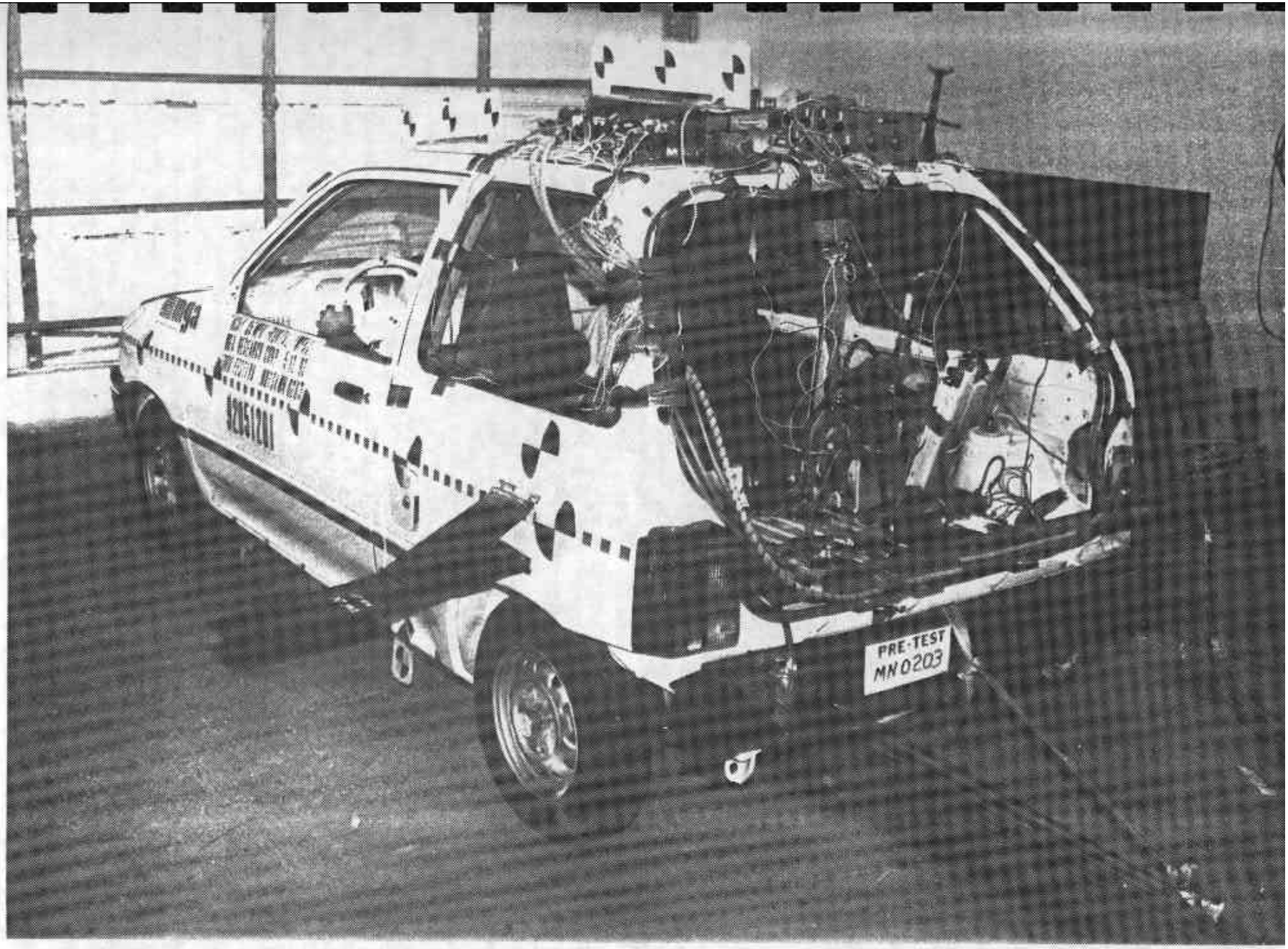


Photo No. 9 - Pre-Test Left Rear Three-Quarter View

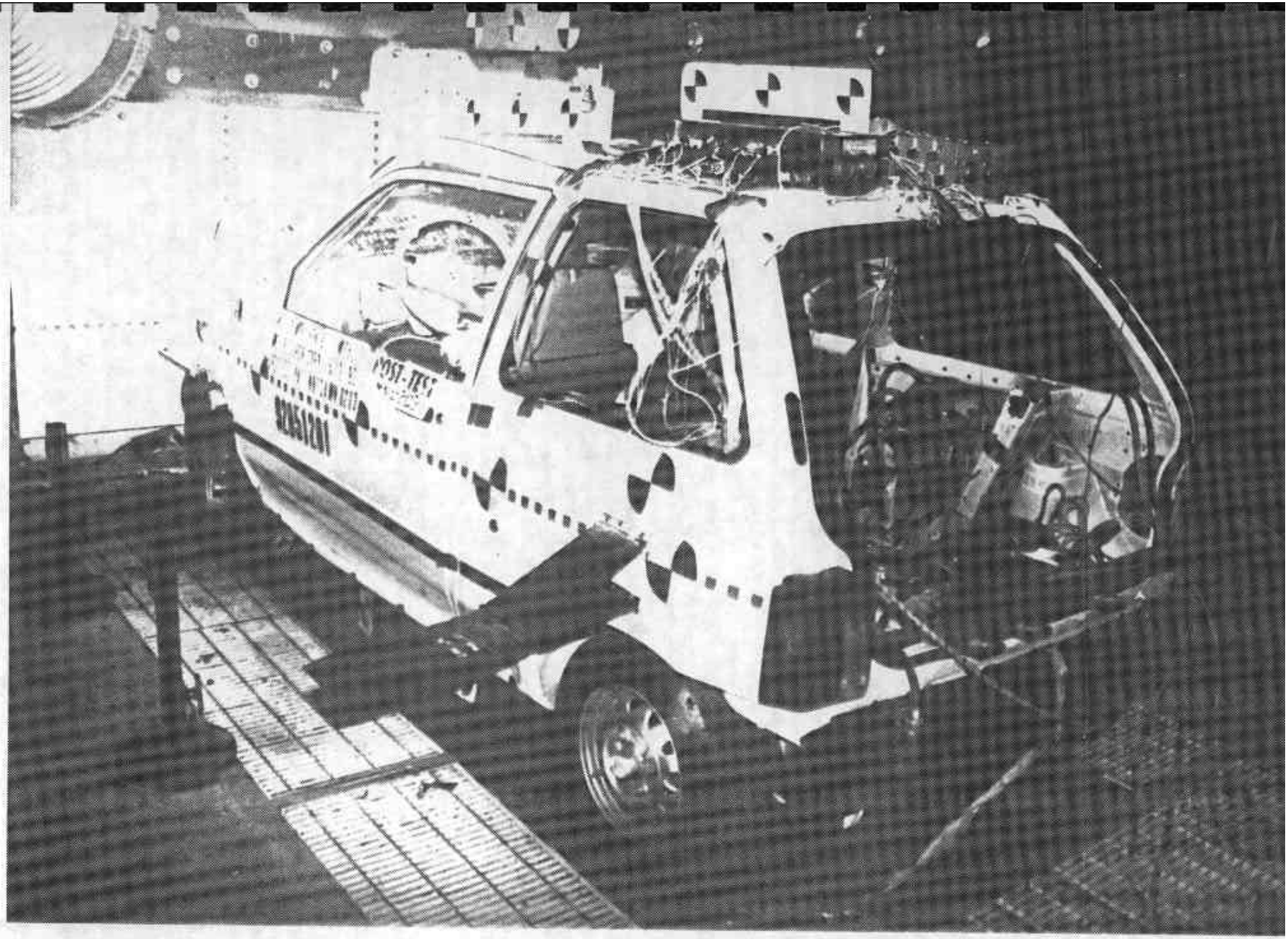


Photo No. 1Ø - Post-Test Left Rear Three-Quarter View

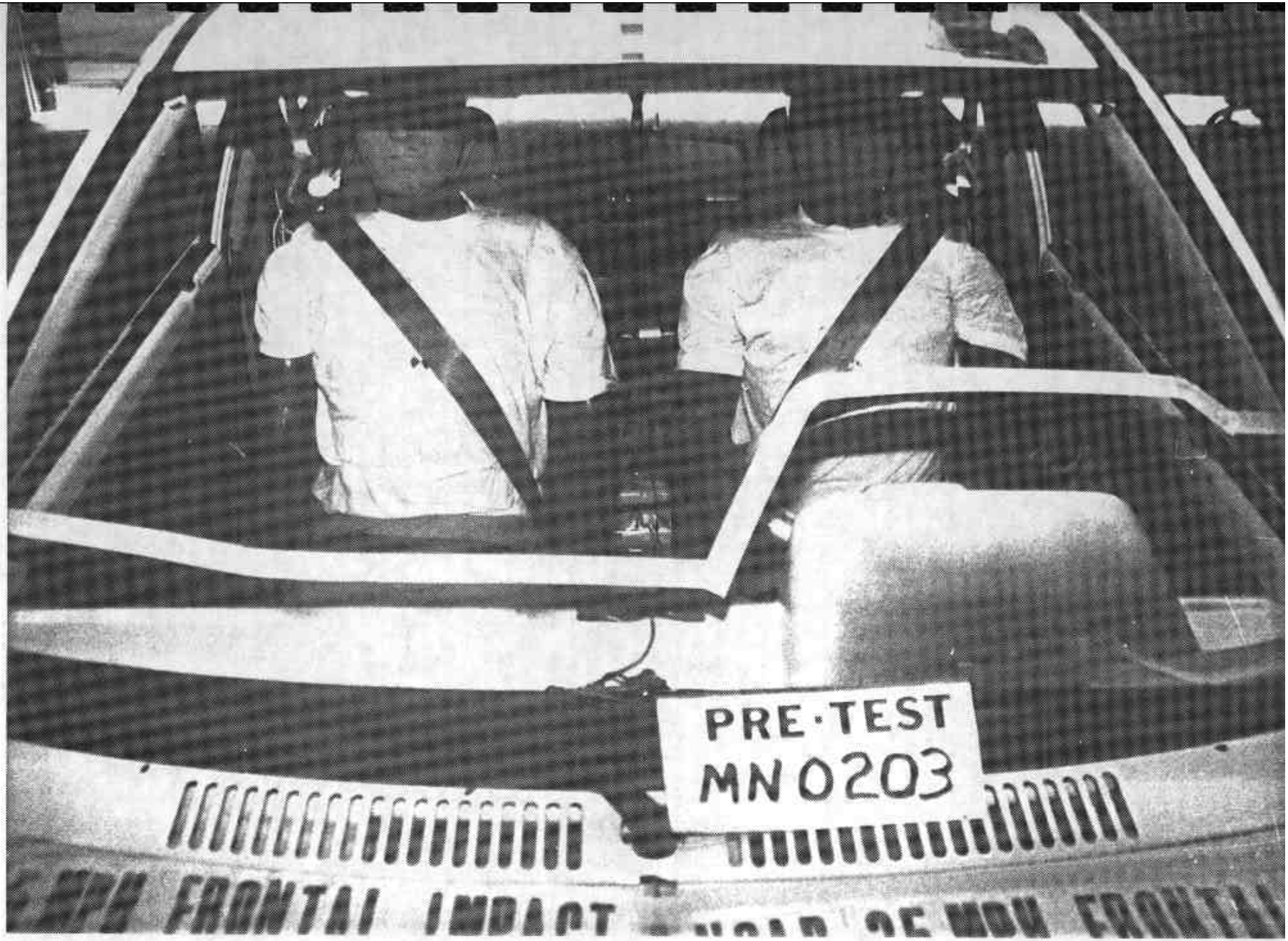


Photo No. 11 - Pre-Test Windshield View

PHOTO NOT AVAILABLE

Photo No. 12 - Post-Test Windshield View

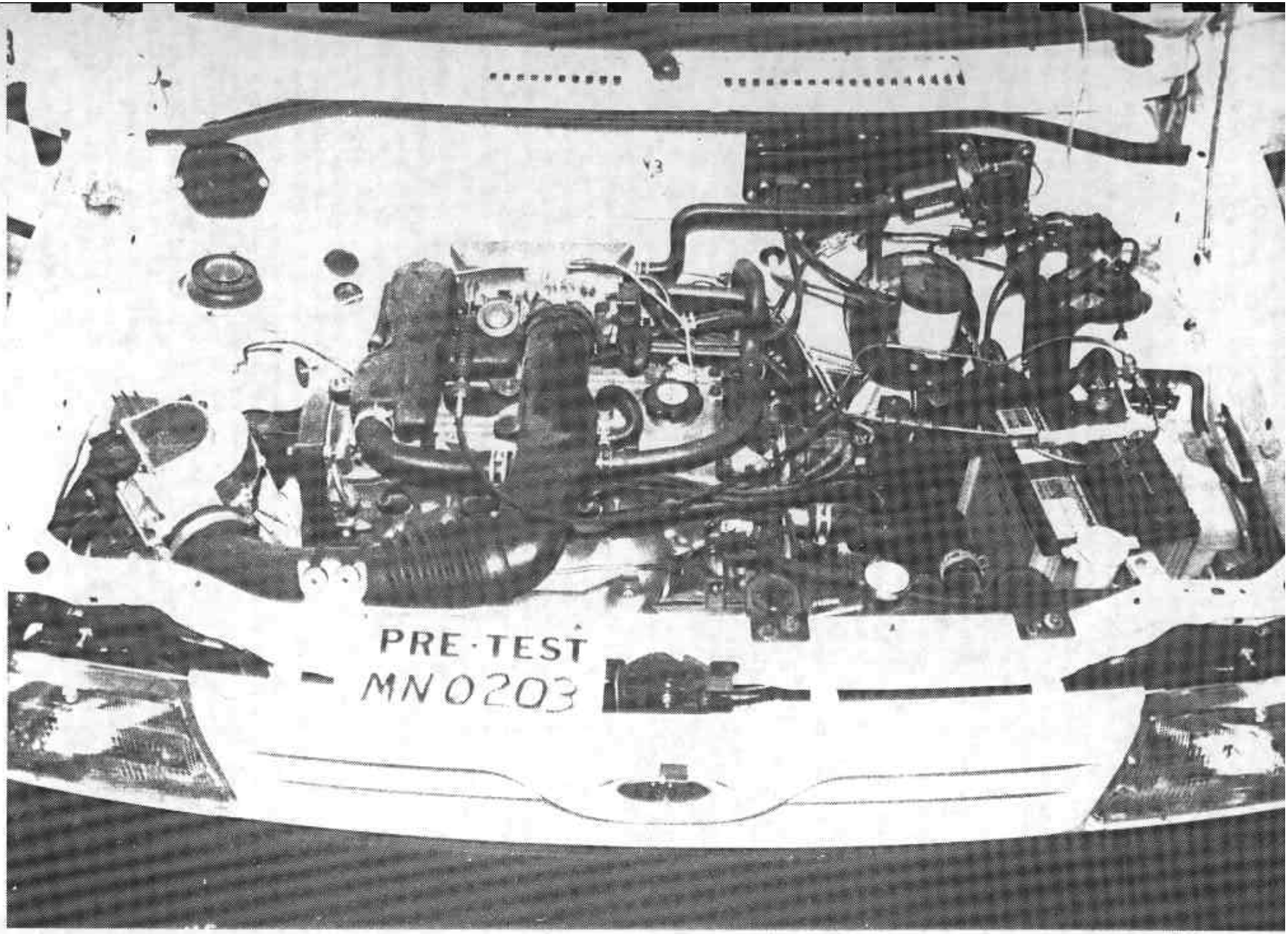


Photo No. 13 - Pre-Test Engine Compartment View

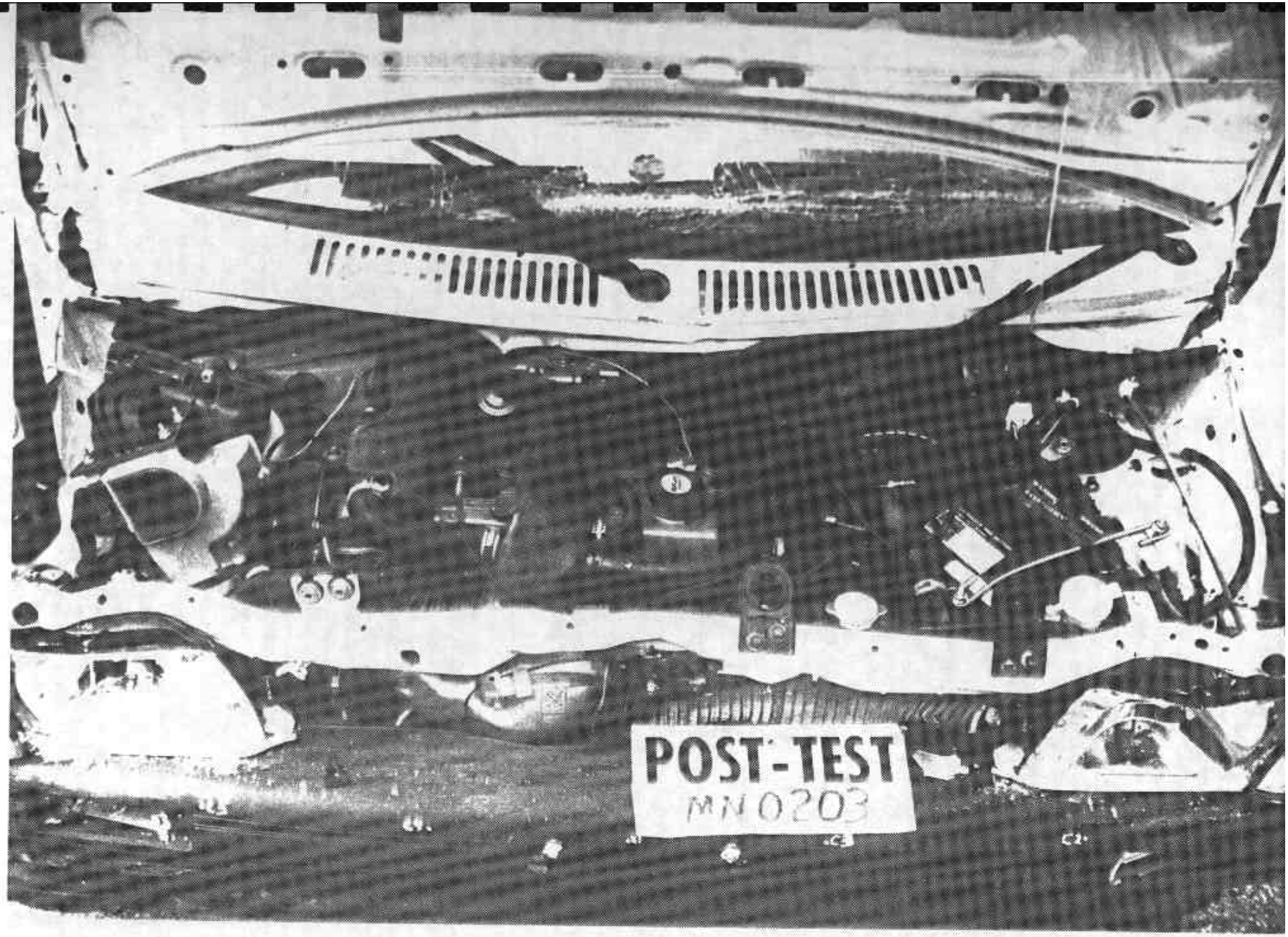


Photo No. 14 - Post-Test Engine Compartment View

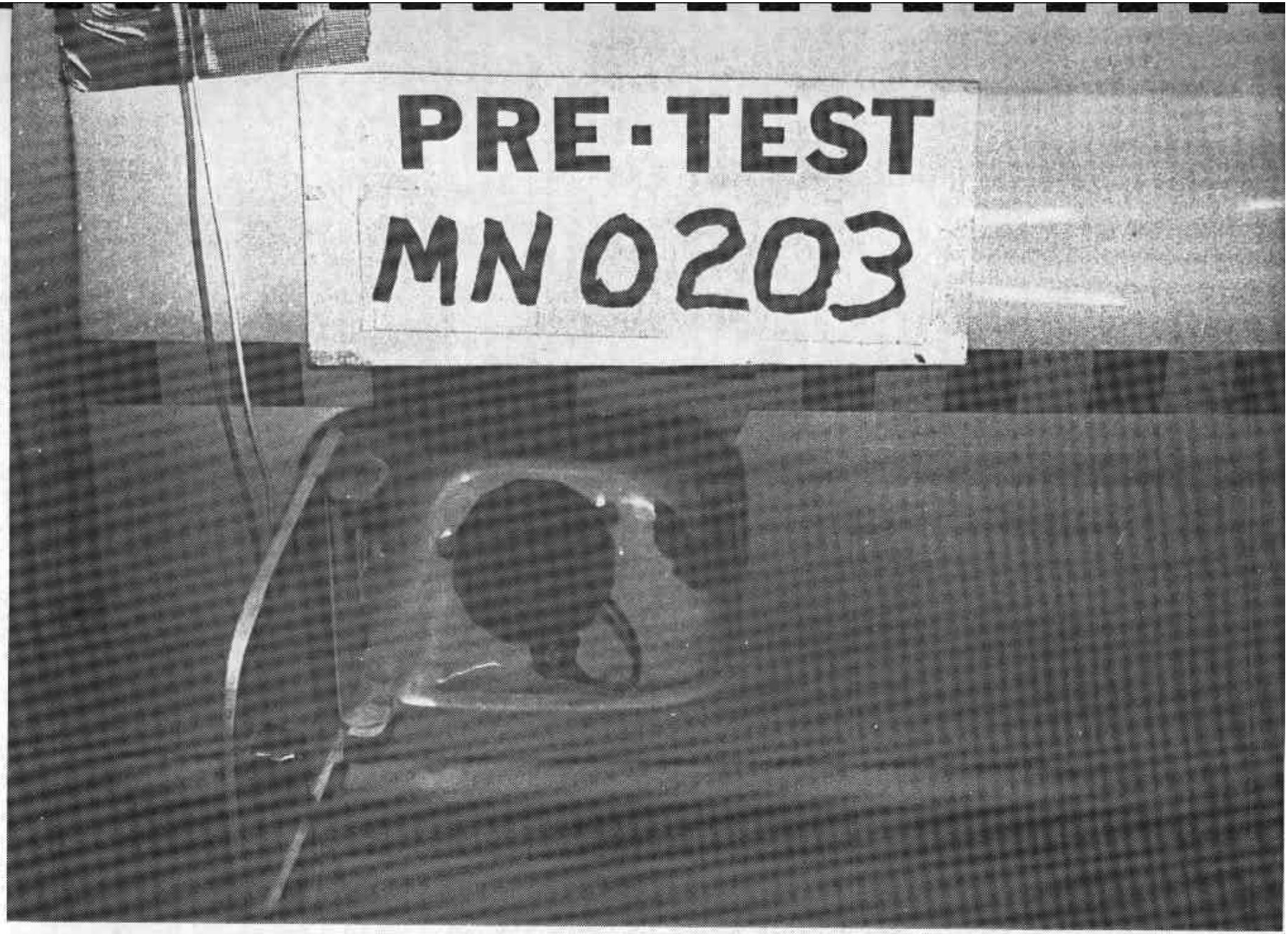


Photo No. 15 - Pre-Test Fuel Filler Cap View

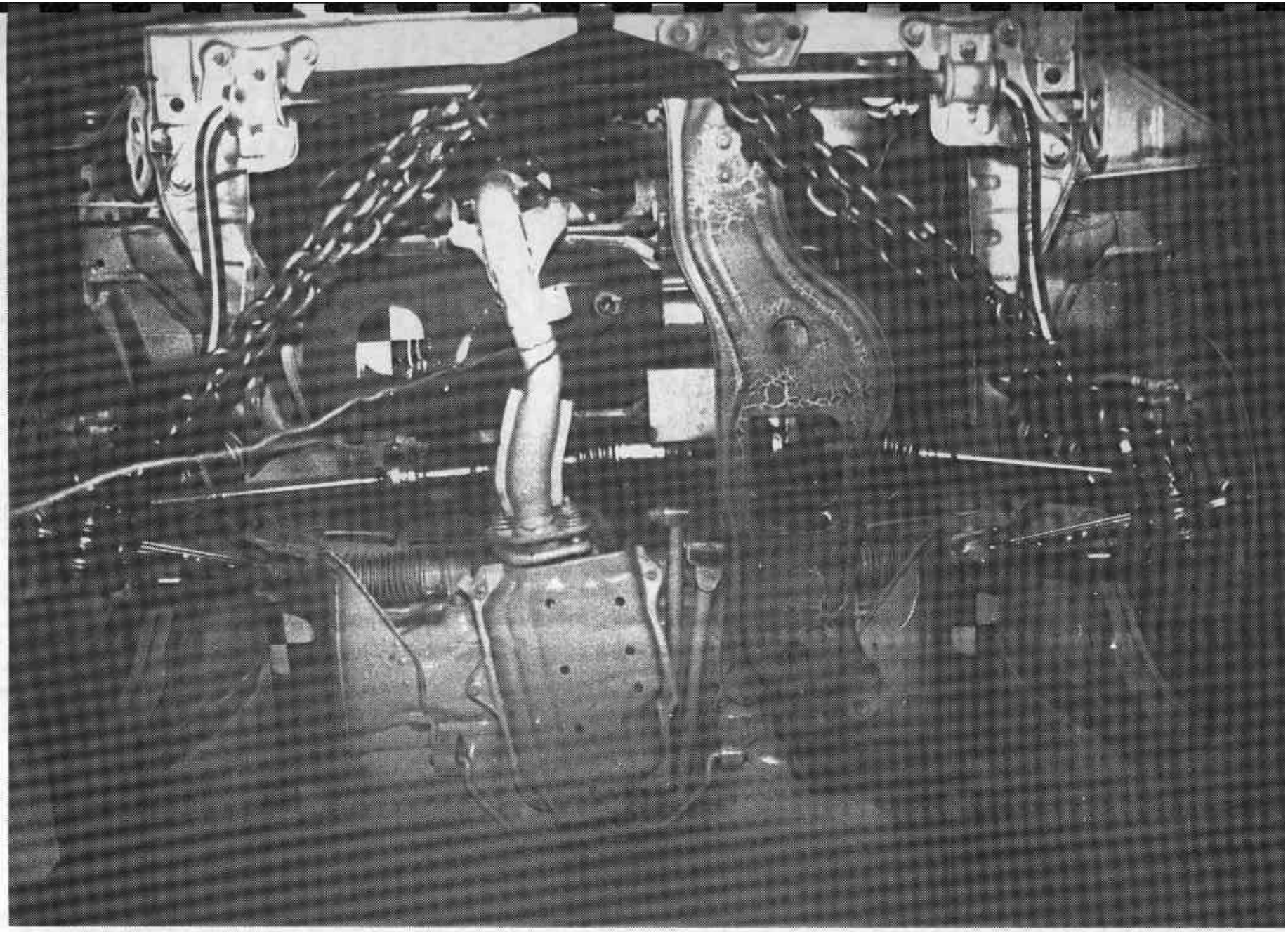


Photo No. 16 - Pre-Test Front Underbody View

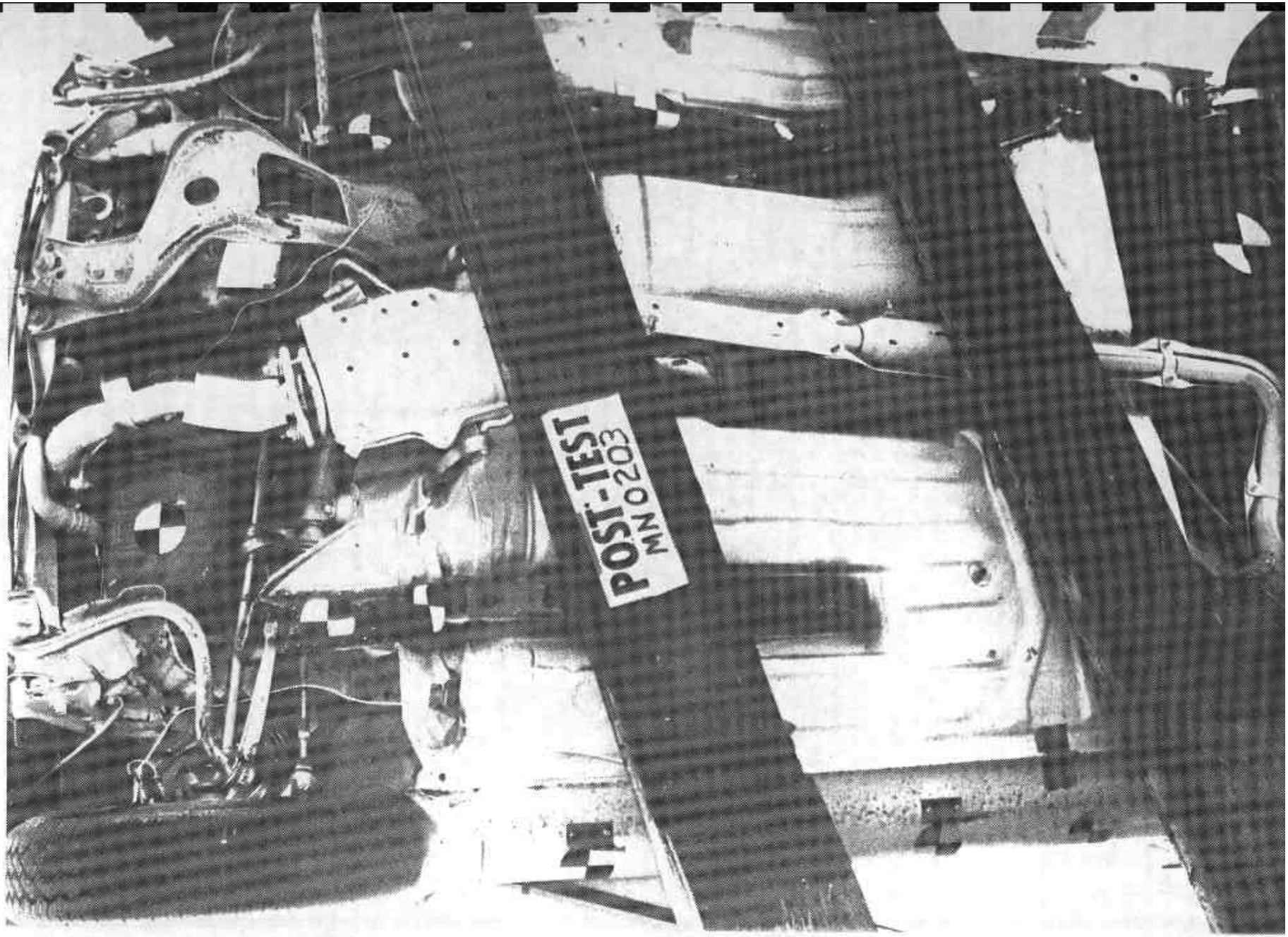


Photo No. 17 - Post-Test Front Underbody View

Photo No. 18 - Pre-Test Rear Underbody View

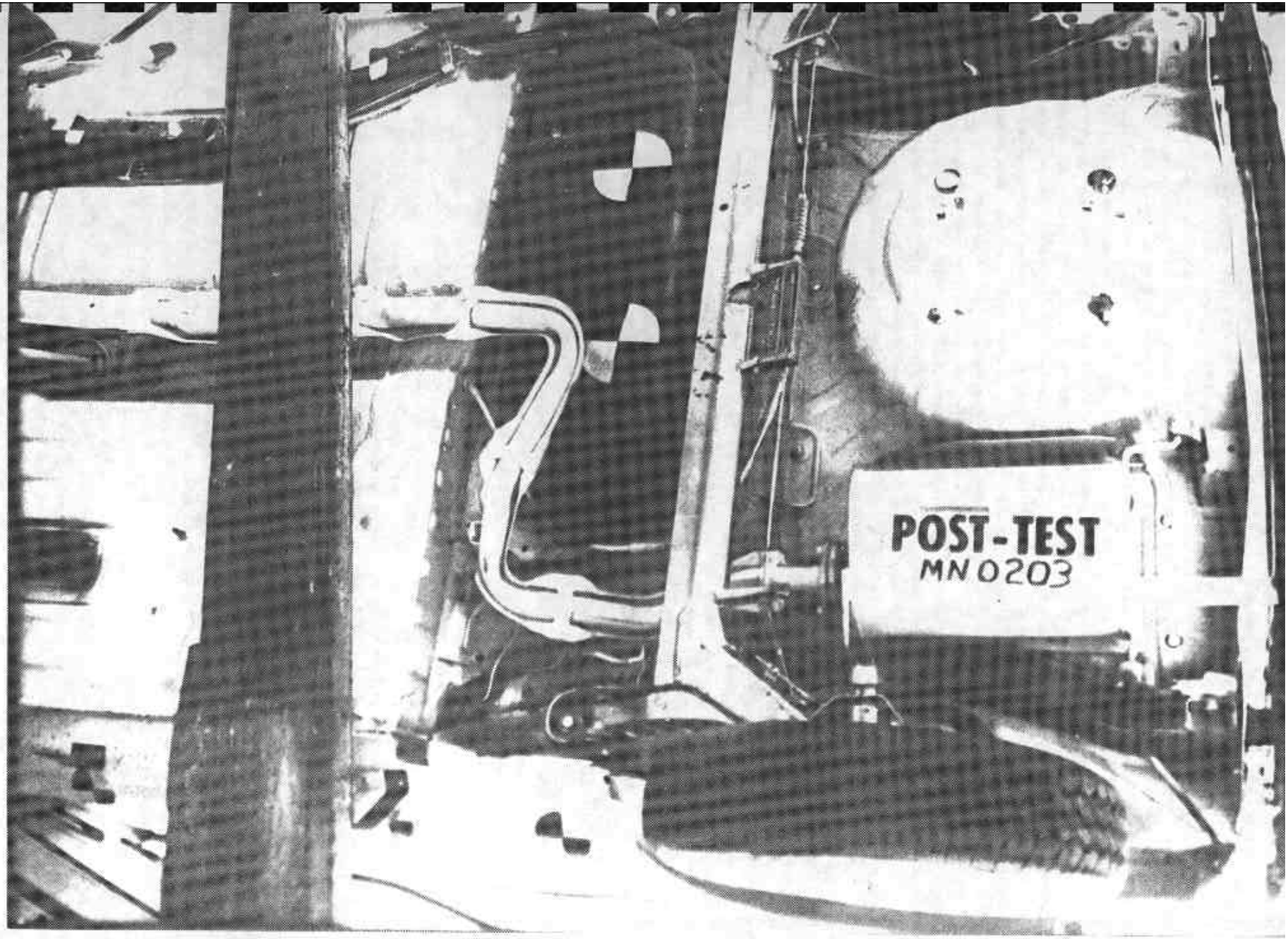


Photo No. 19 - Post-Test Rear Underbody View

Photo No. 20 - Pre-Test Rear of Vehicle

Photo No. 21 - Post-Test Rear of Vehicle

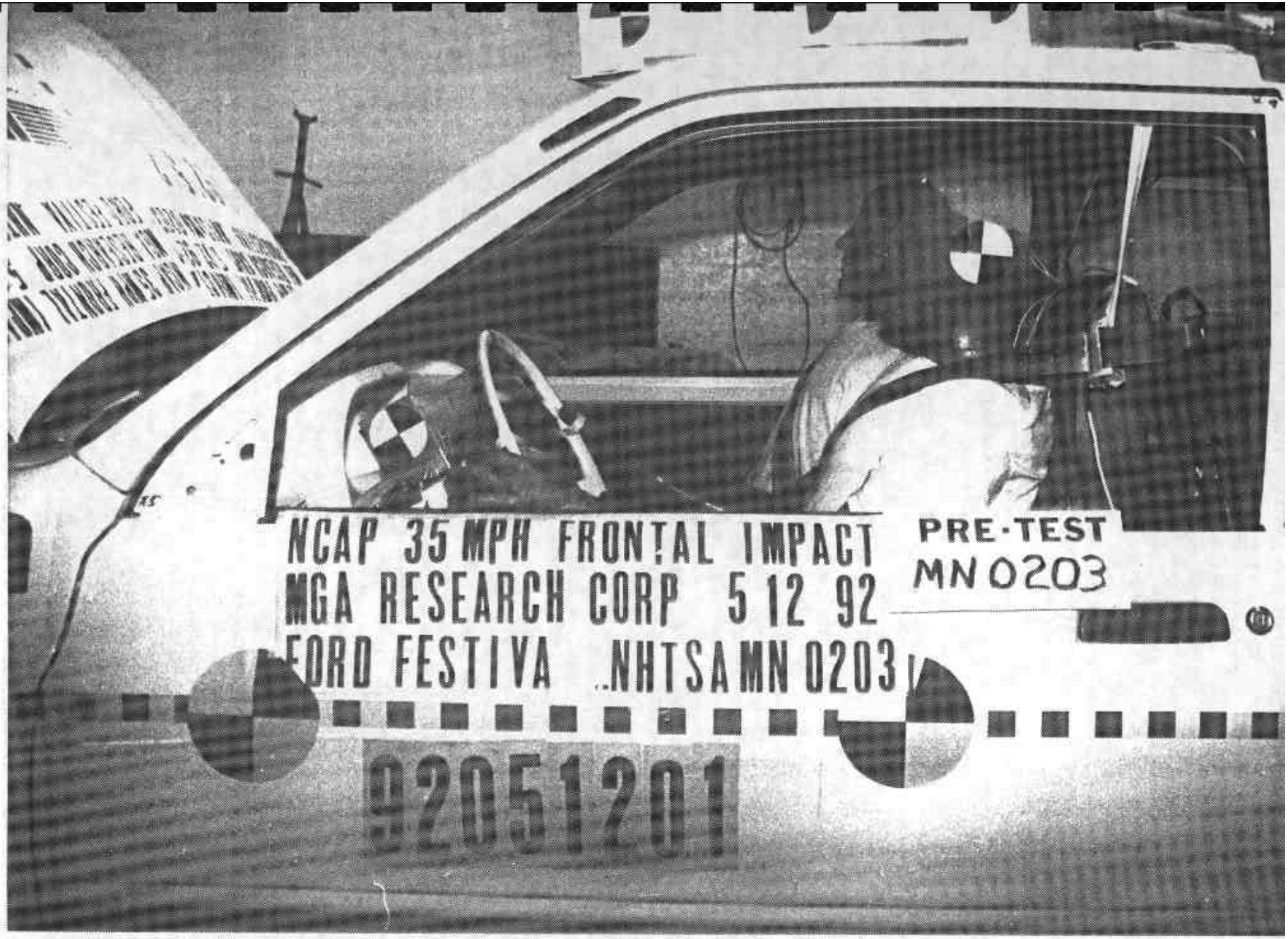


Photo No. 22 - Pre-Test Driver Dummy Position View

Photo No. 23 - Post-Test Driver Dummy Position View

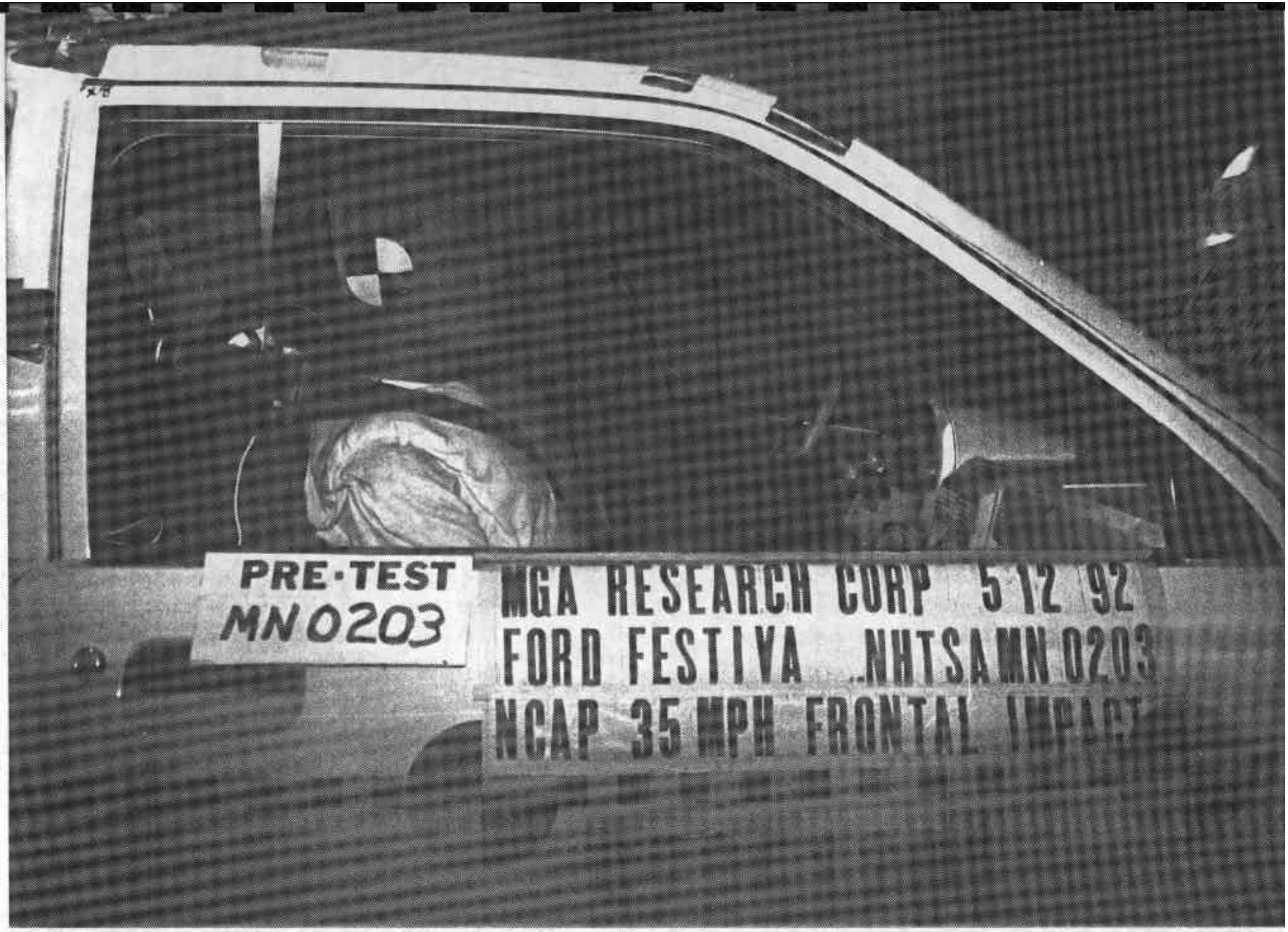


Photo No. 24 - Pre-Test Passenger Dummy Position View

Photo No. 25 - Post-Test Passenger Dummy Position View

PHOTO NOT REQUIRED

Photo No. 26 - Solvent Spillage Location View (if required)

Photo No. 27 - Pre-Test Driver Dummy & Veh. Interior View (Door Open)

Photo No. 28 - Post-Test Driver Dummy & Veh. Interior View (Door Open)

Photo No. 29 - Pre-Test Passenger Dummy & Veh. Interior View (Door Open)

Photo No. 30 - Post-Test Passenger Dummy & Veh. Interior View (Door Open)

PHOTO NOT REQUIRED

Photo No. 31 - Restraint System Problem Area View (if required)

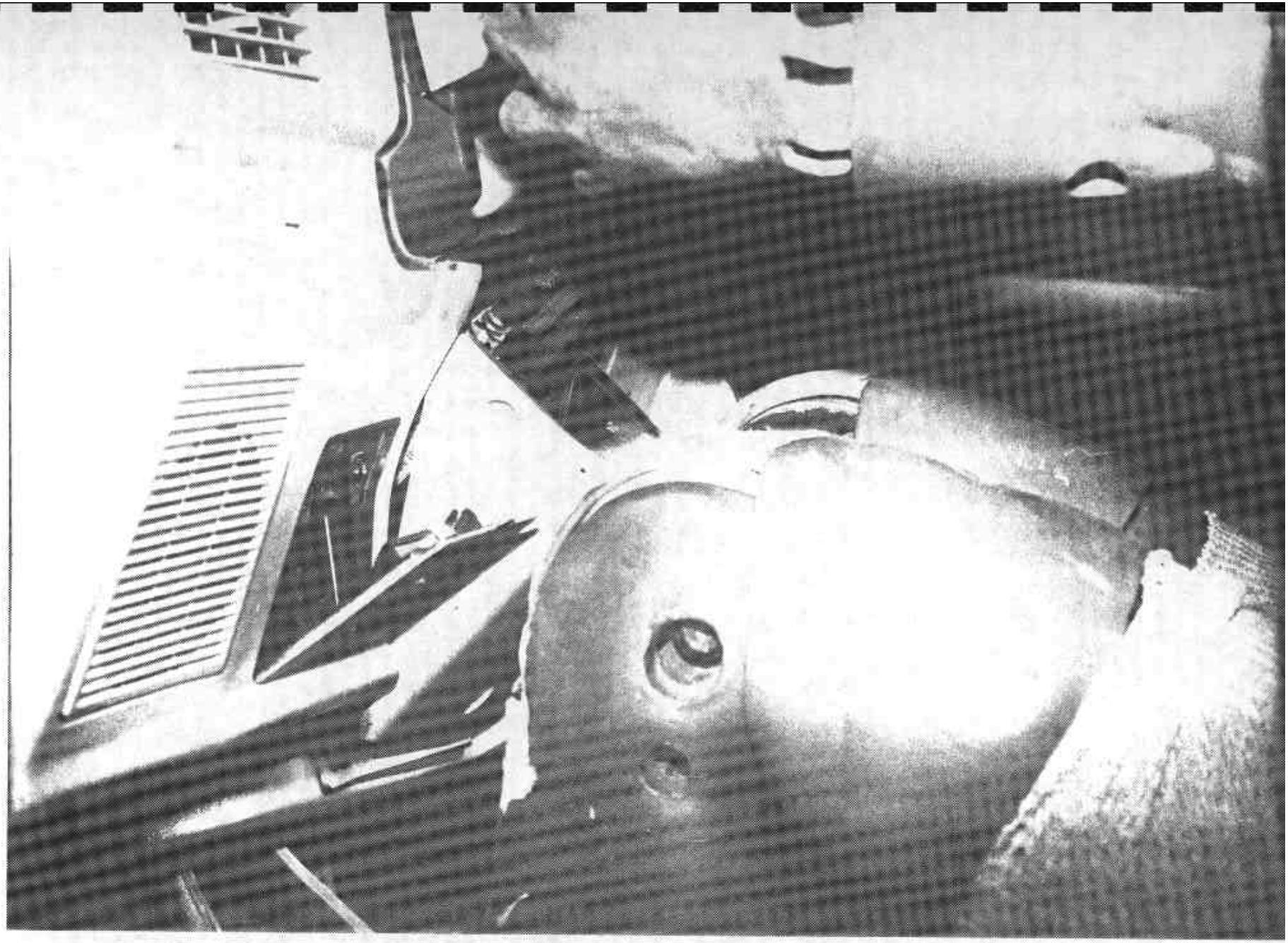


Photo No. 32 - Post-Test Driver Dummy Knee Contact Area

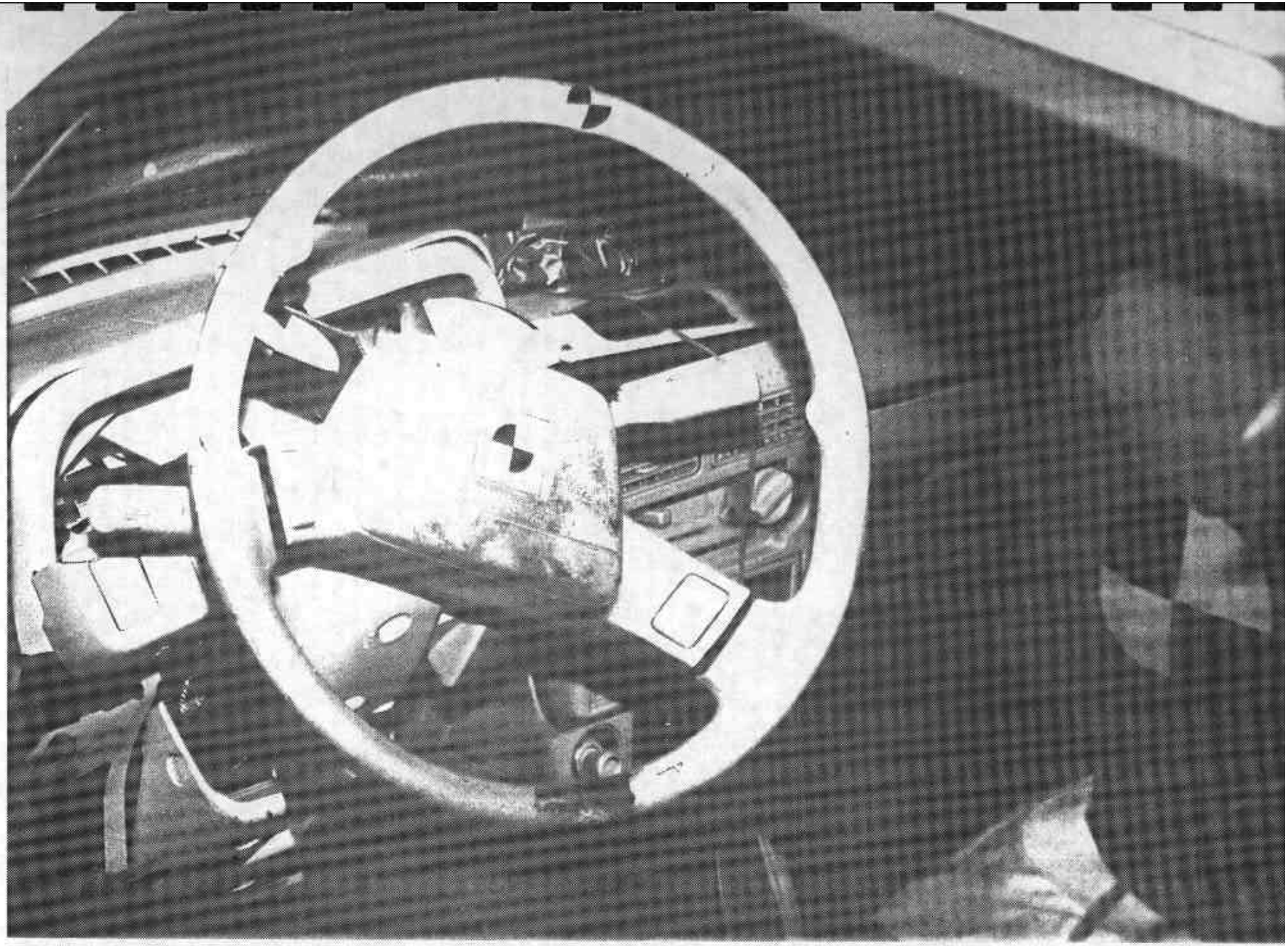


Photo No. 33 - Post-Test Steering Column Hub/Rim Contact by Dummy Driver

Photo No. 34 - Post-Test Passenger Dummy Head/Knee Contact

APPENDIX B

Vehicle, Load Cell Barrier and Dummy Response Data

1992 FORD FESTIVA 2 DOOR HATCHBACK

NHTSA NO.: MN0203

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)

* Data Loss During Impact

**Data Shift During Impact

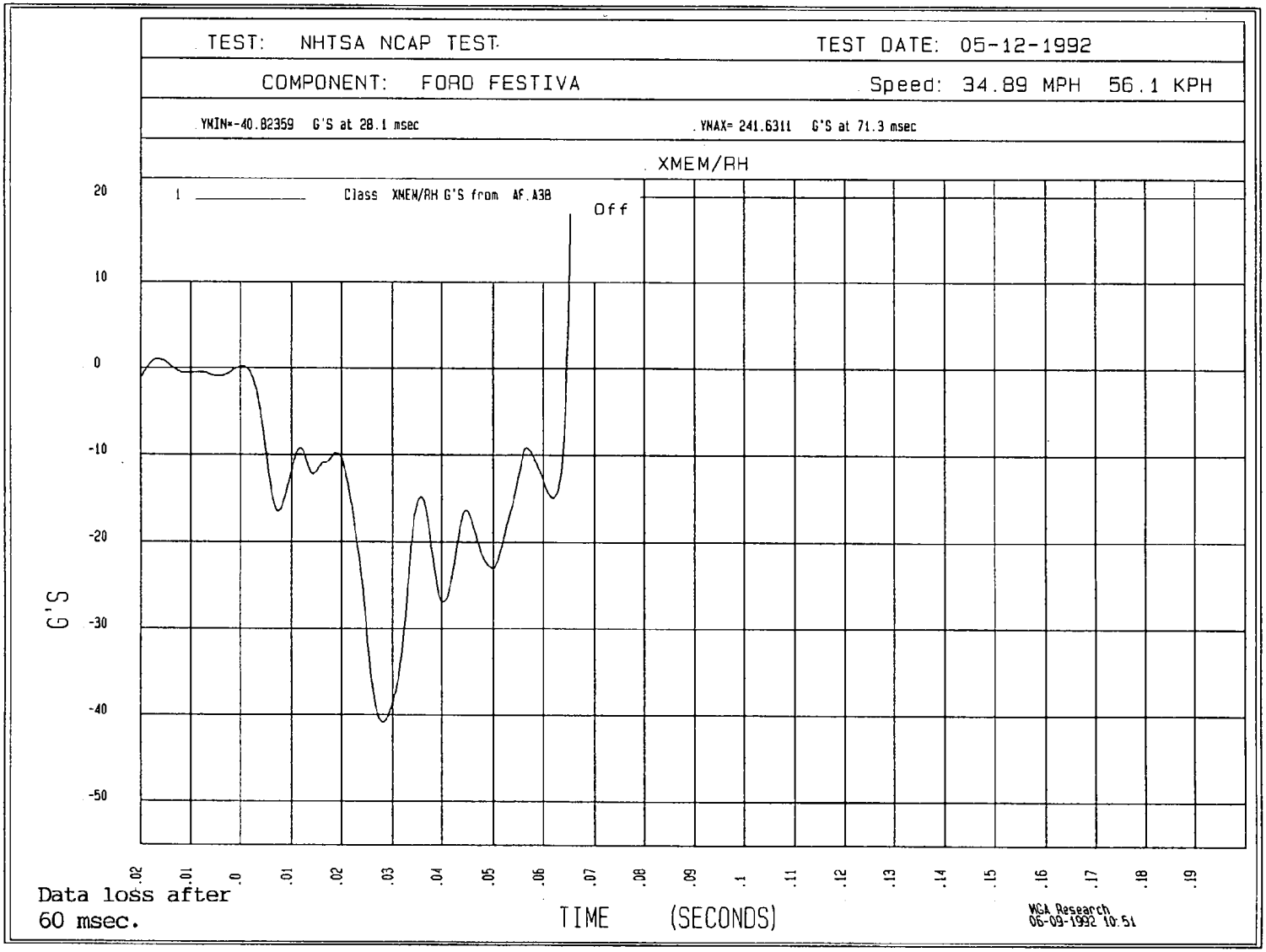


Figure B-1 - Right Rear Seat Crossmember X Acceleration vs. Time

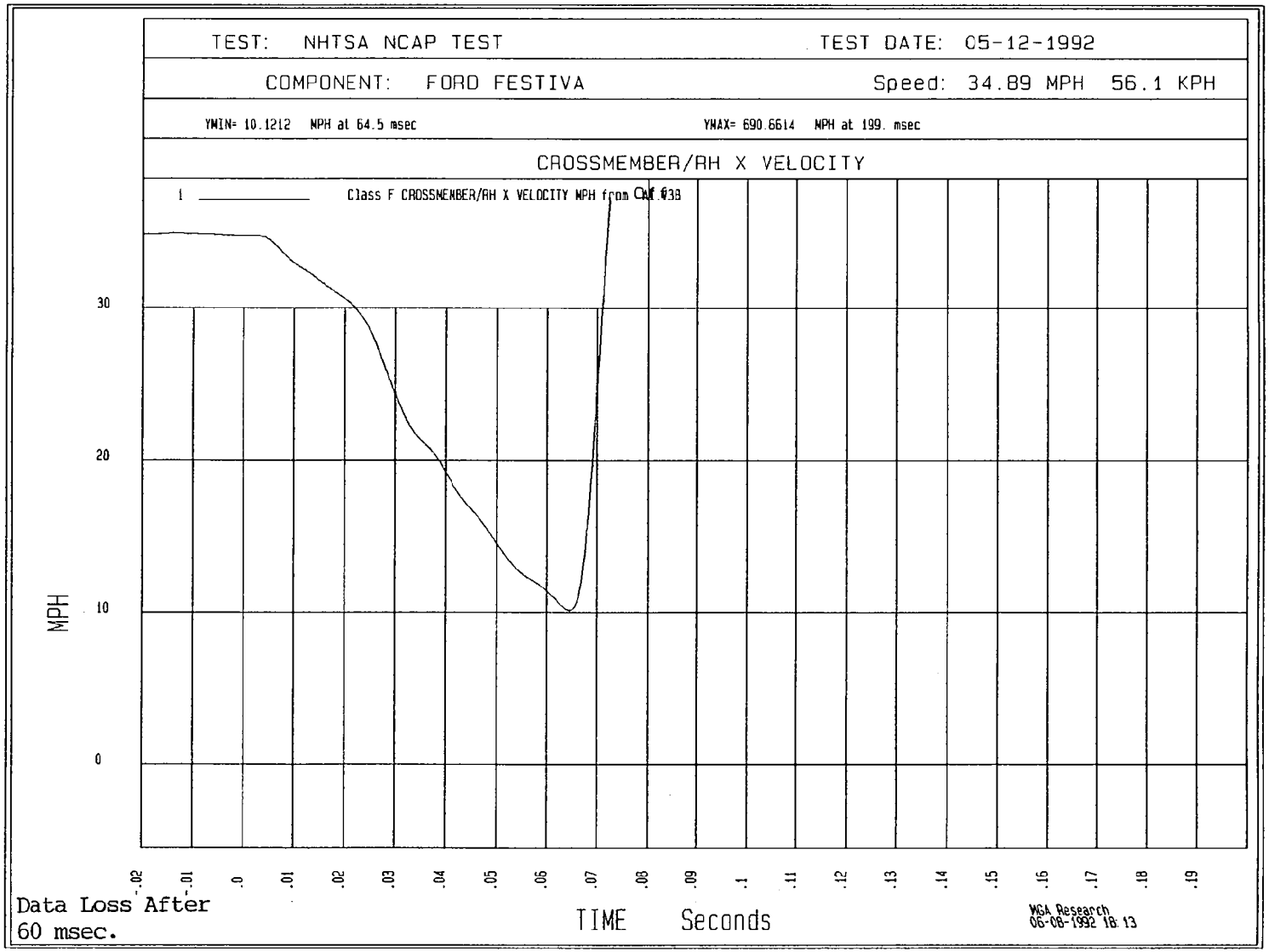


Figure B-2 - Right Rear Seat Crossmember X Velocity vs. Time

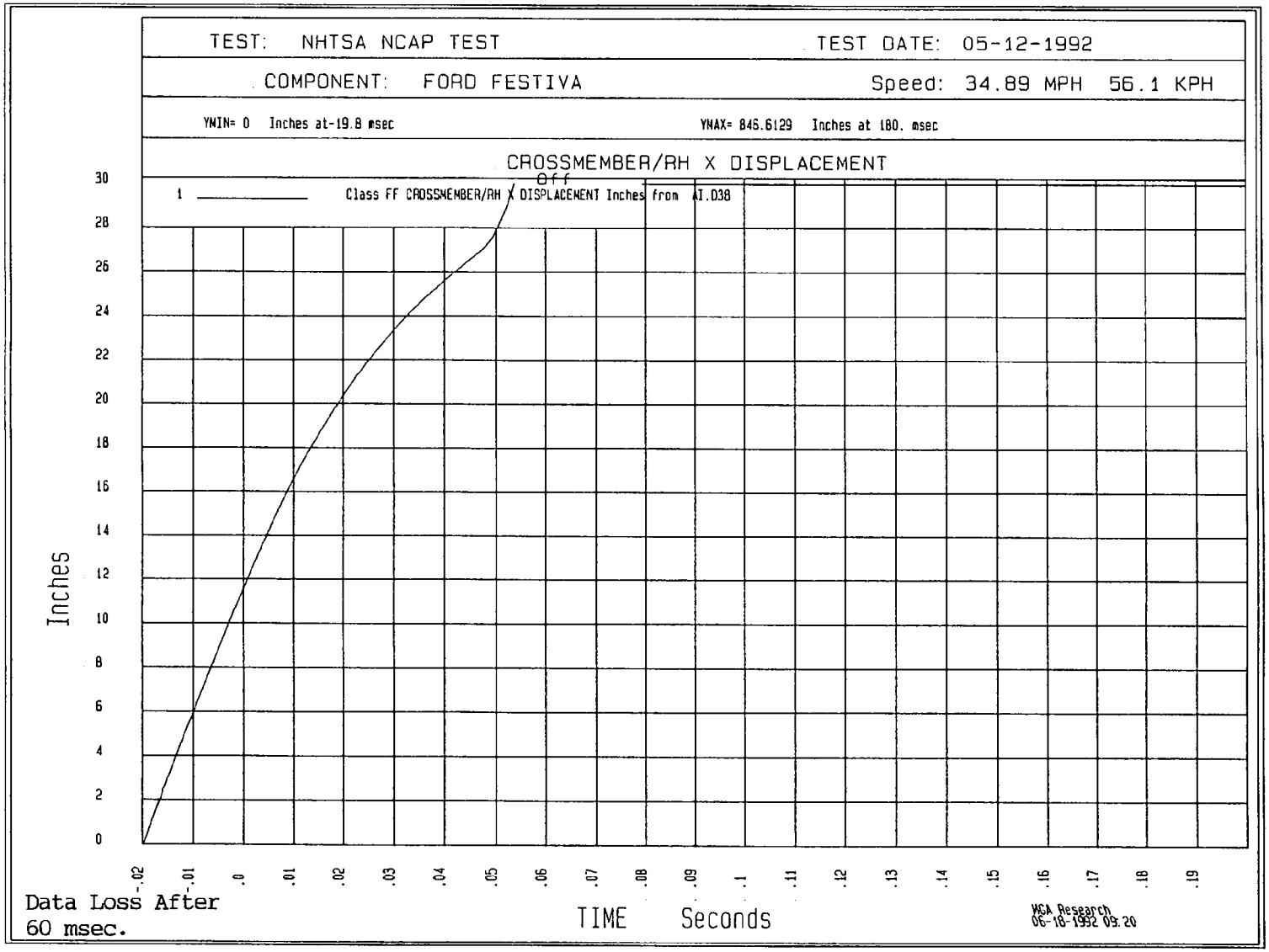


Figure B-3 - Right Rear Seat Crossmember X Displacement vs. Time

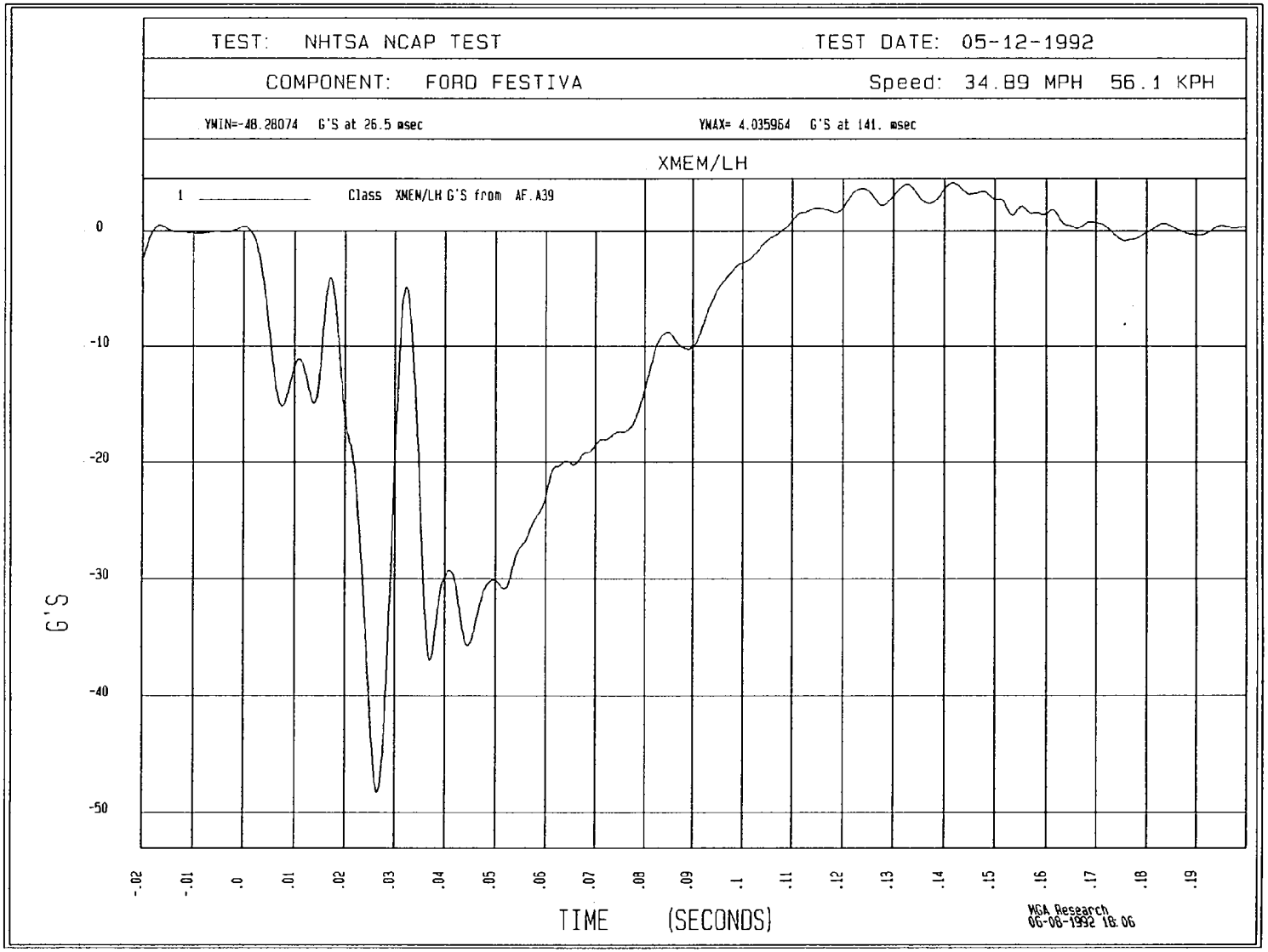


Figure B-4 - Left Rear Seat Crossmember X Acceleration vs. Time

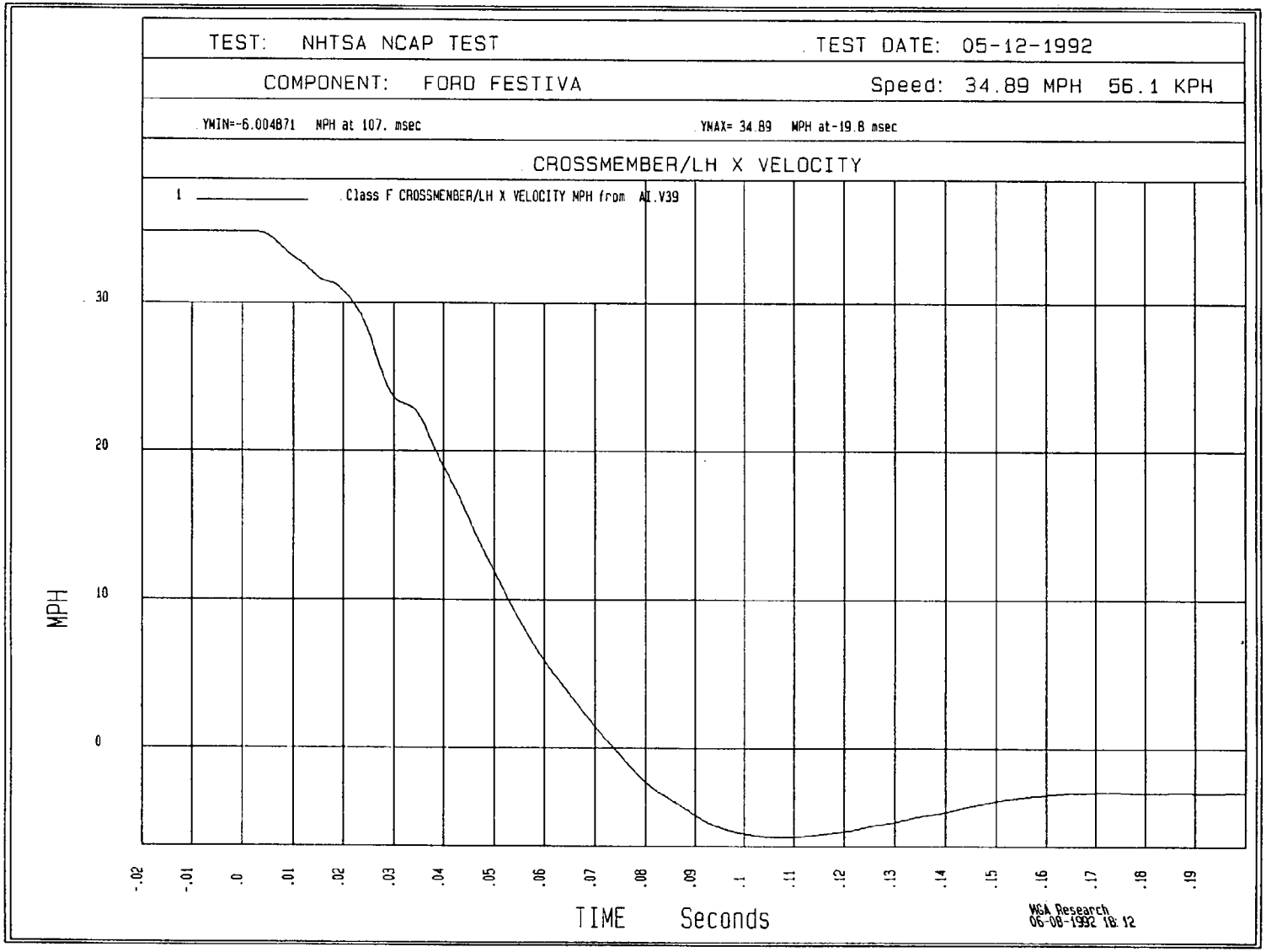


Figure B-5 - Left Rear Seat Crossmember X Velocity vs. Time

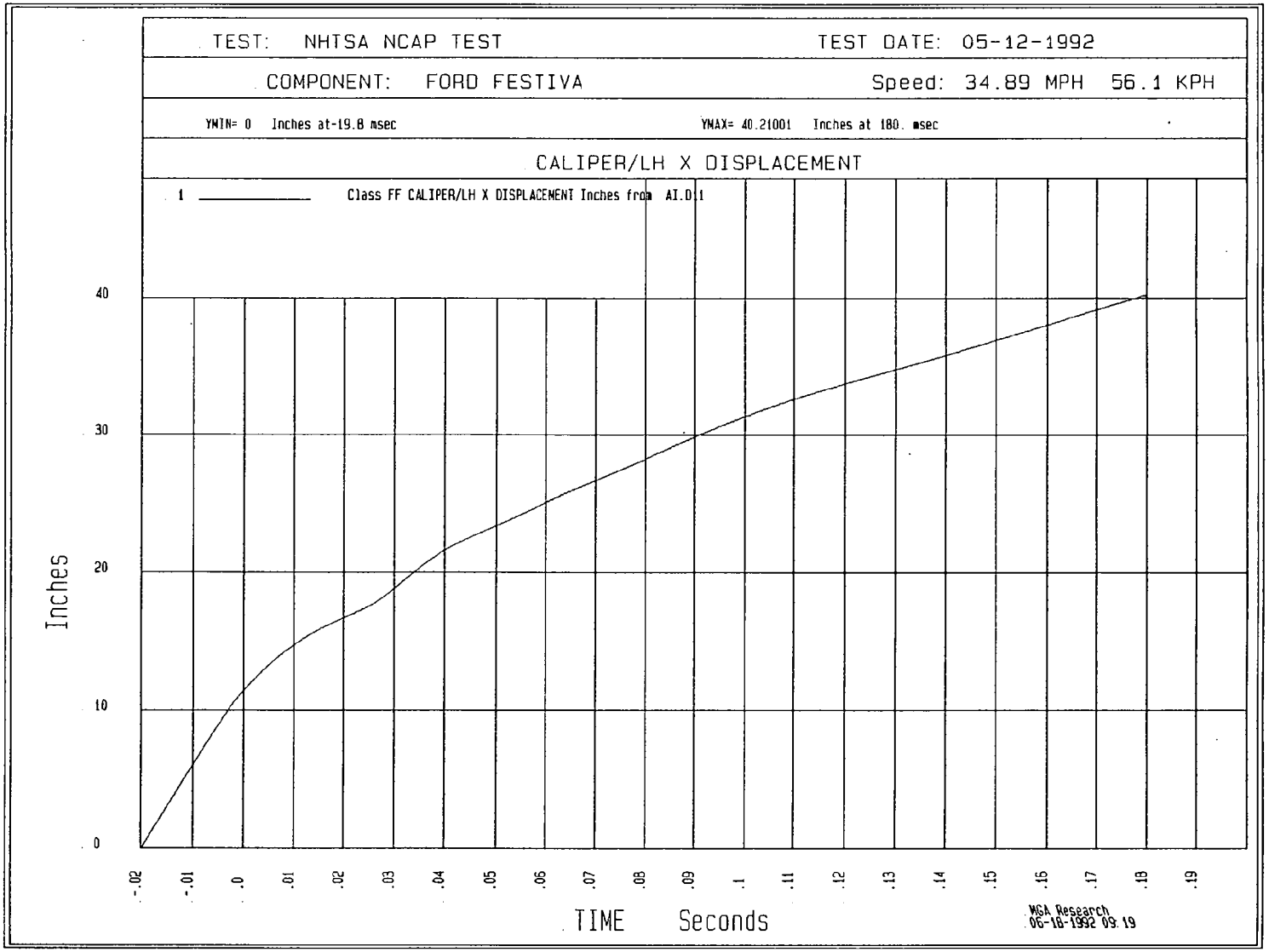


Figure B-6 - Left Rear Seat Crossmember X Displacement vs. Time

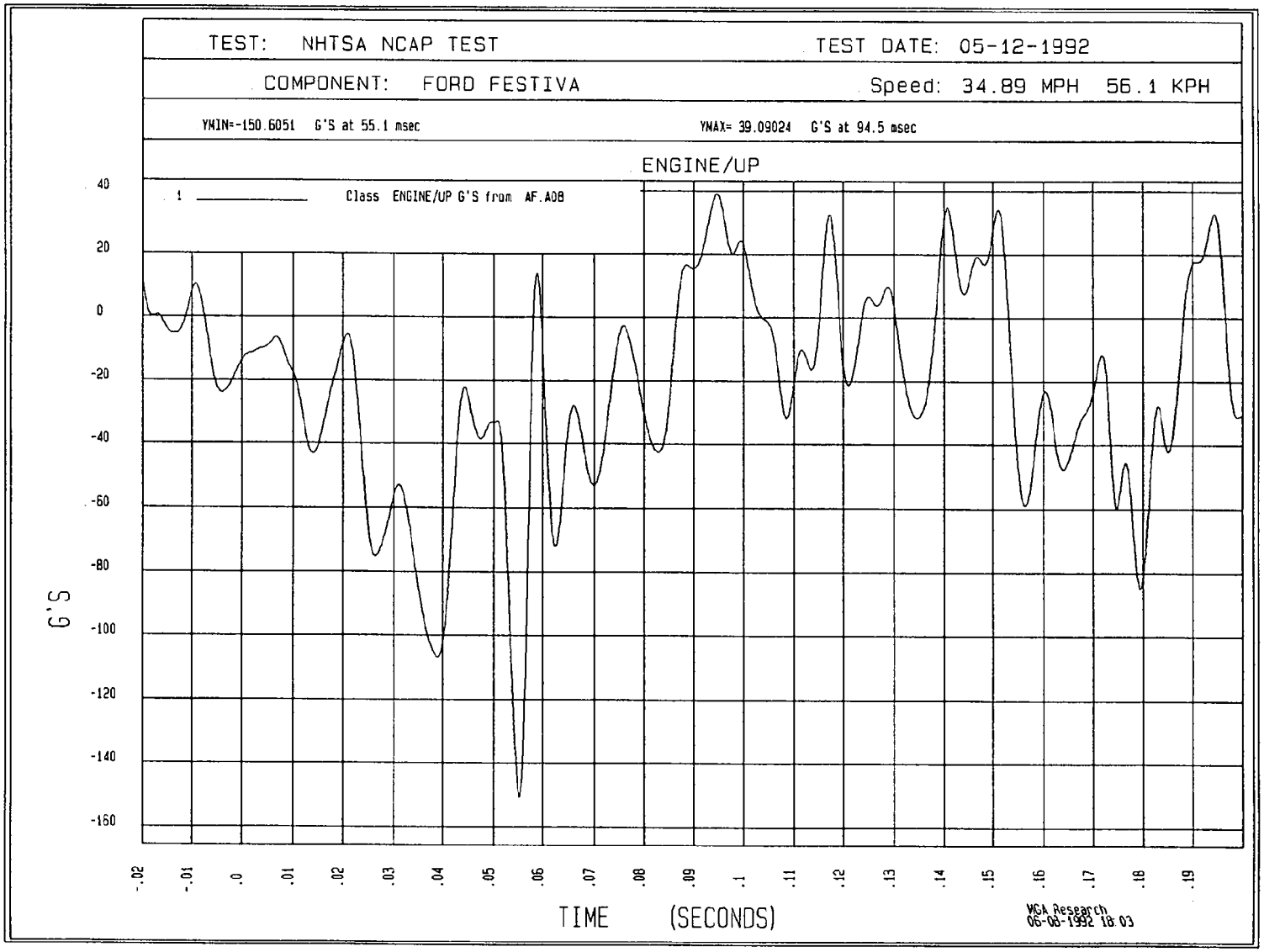


Figure B-7 - Top of Engine Block X Acceleration vs. Time

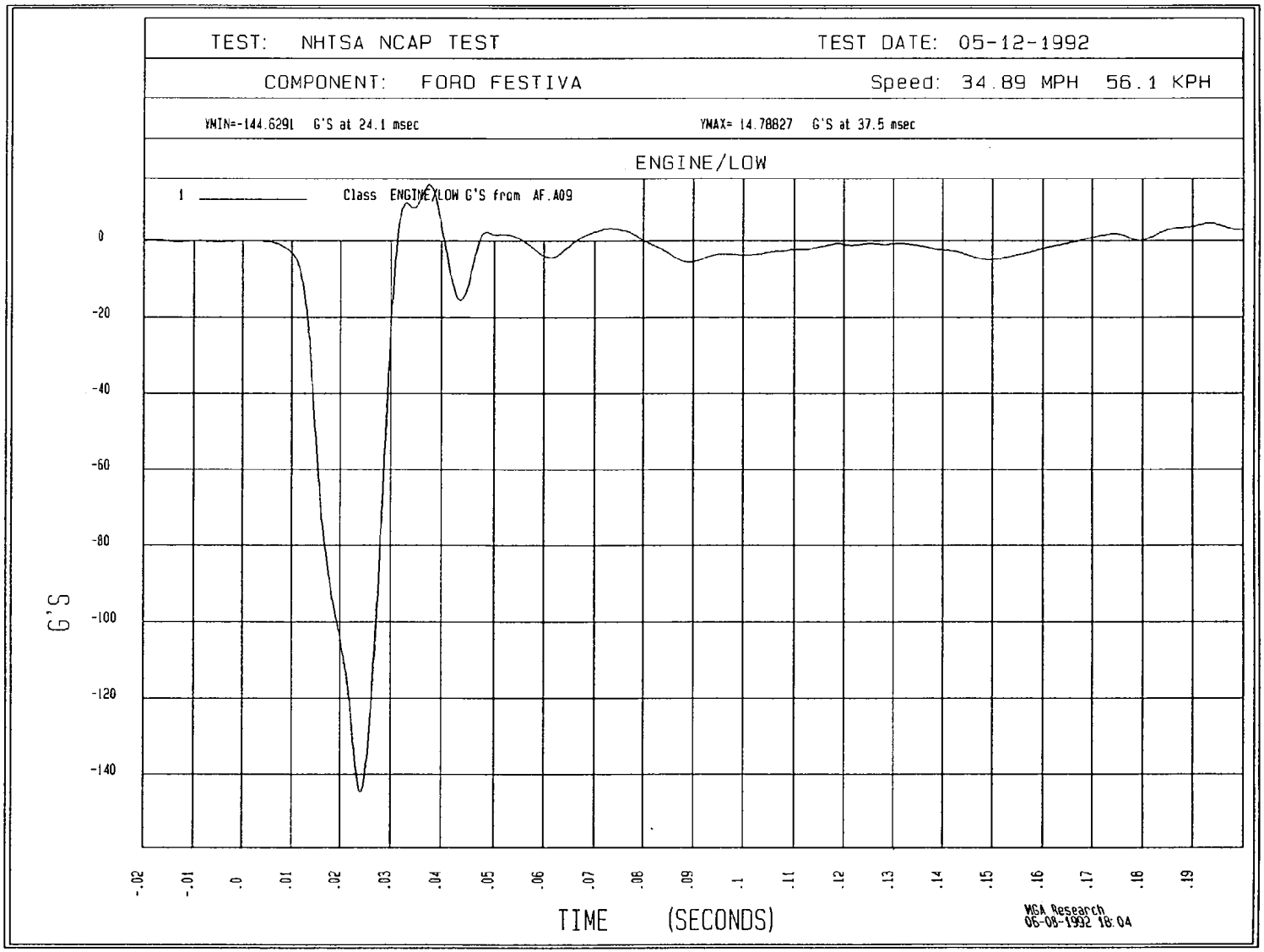


Figure B-8 - Bottom of Engine Block X Acceleration vs. Time

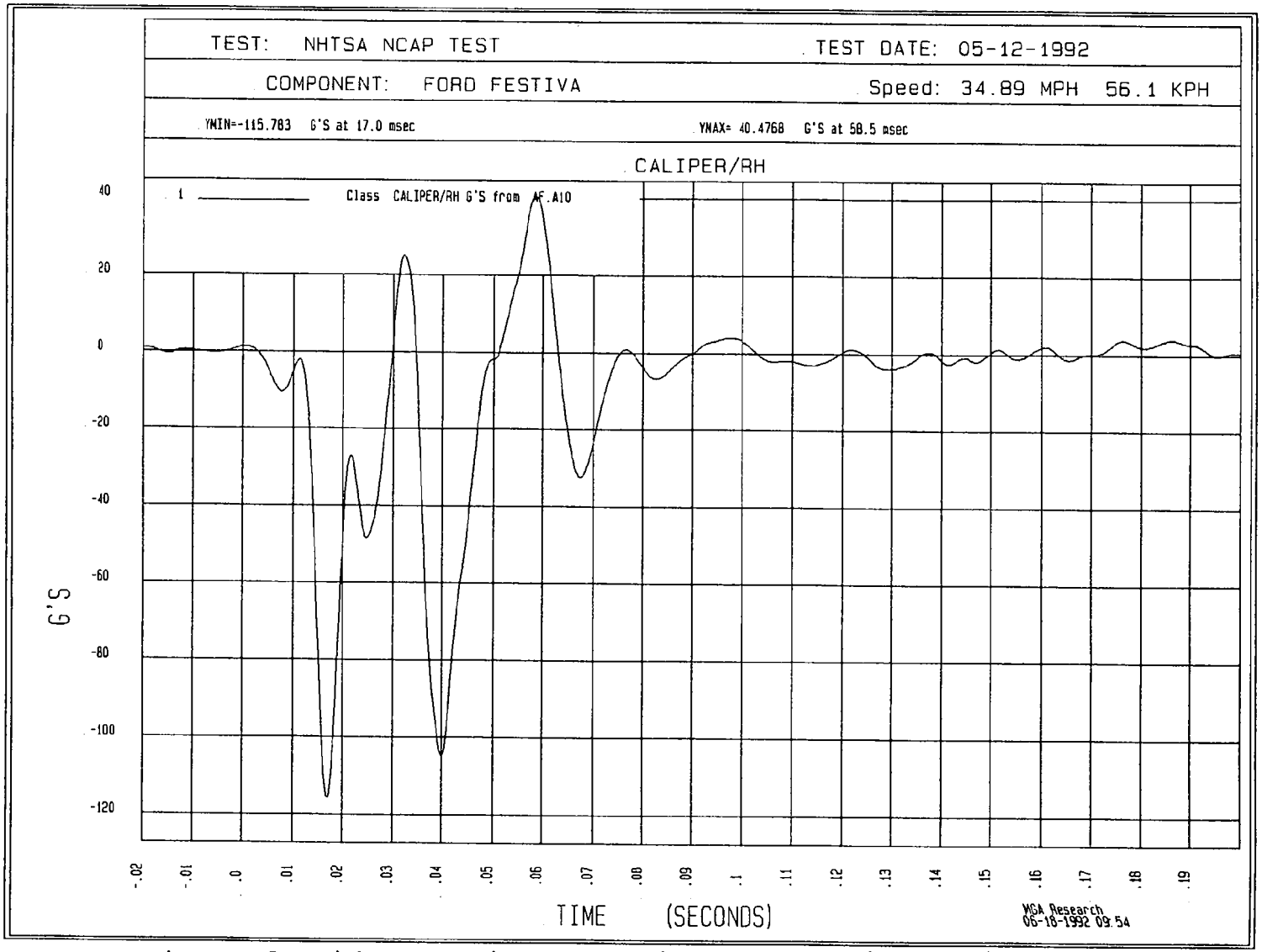


Figure B-9 - Right Front Disc Brake Caliper X Acceleration vs. Time

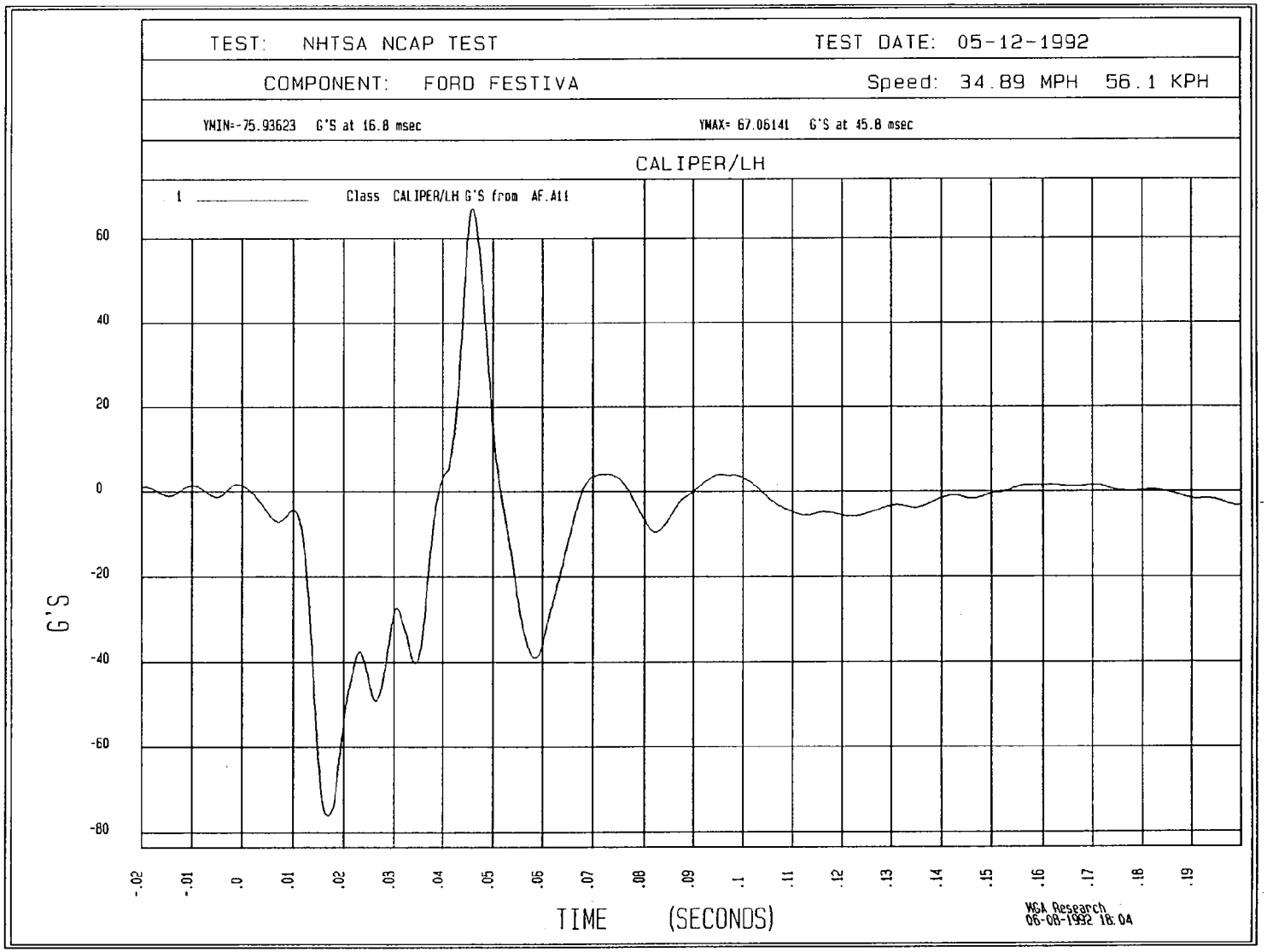


Figure B-10 - Left Front Disc Brake Caliper X Acceleration vs. Time

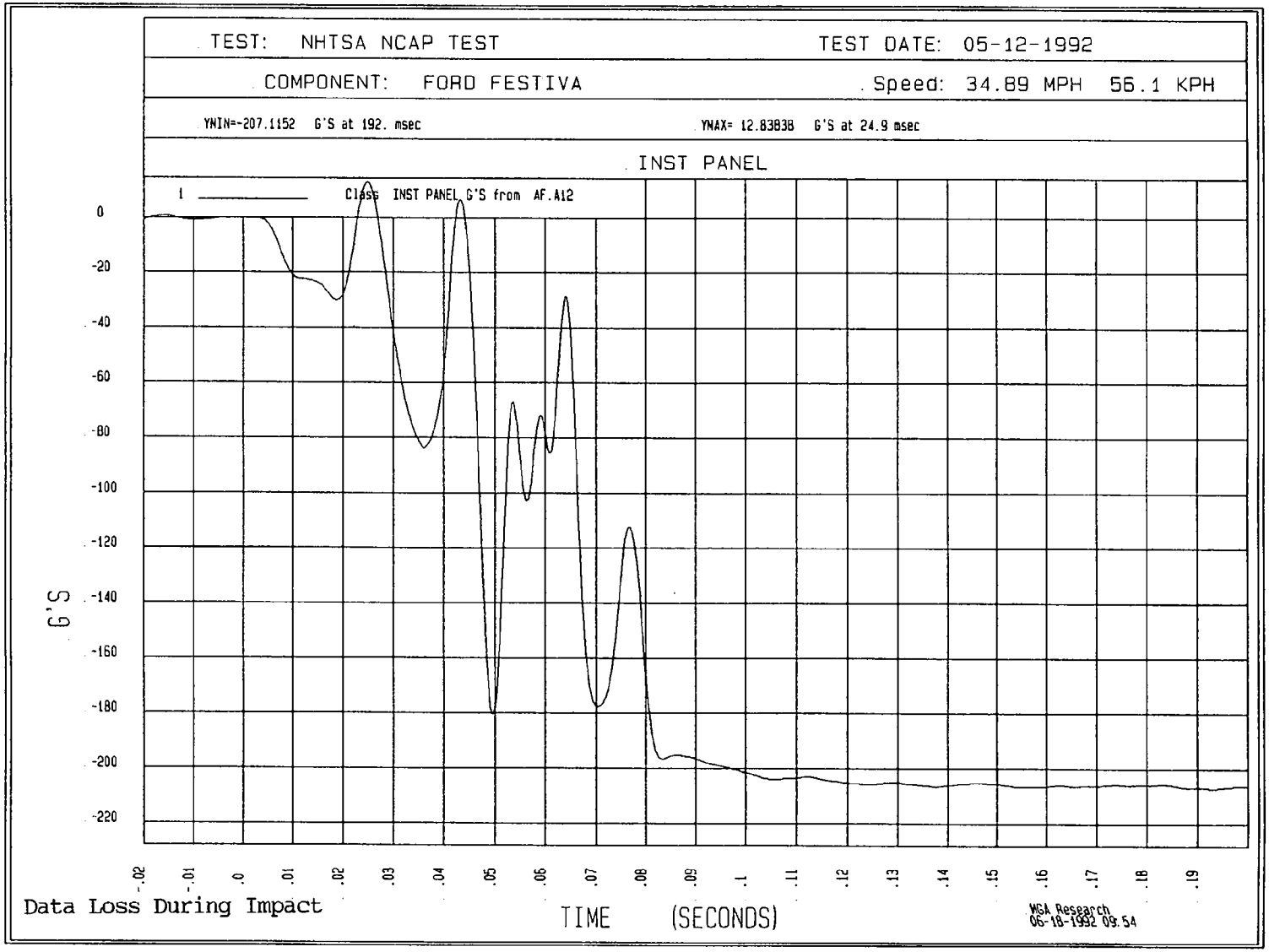


Figure B-11 - Center of Instrument Panel Top Surface X Acceleration vs. Time

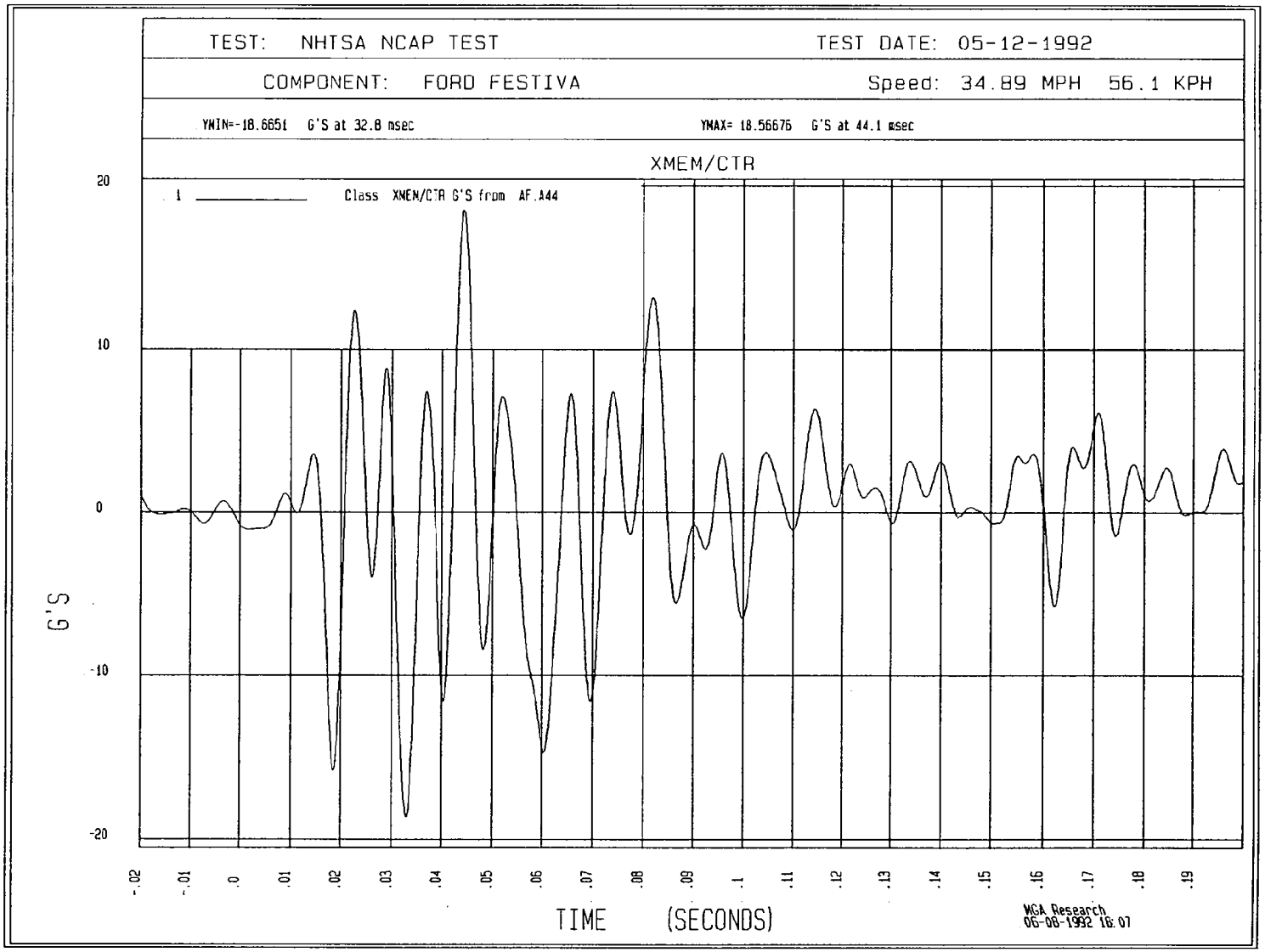


Figure B-12 - Center Rear Seat Crossmember Z Acceleration vs. Time

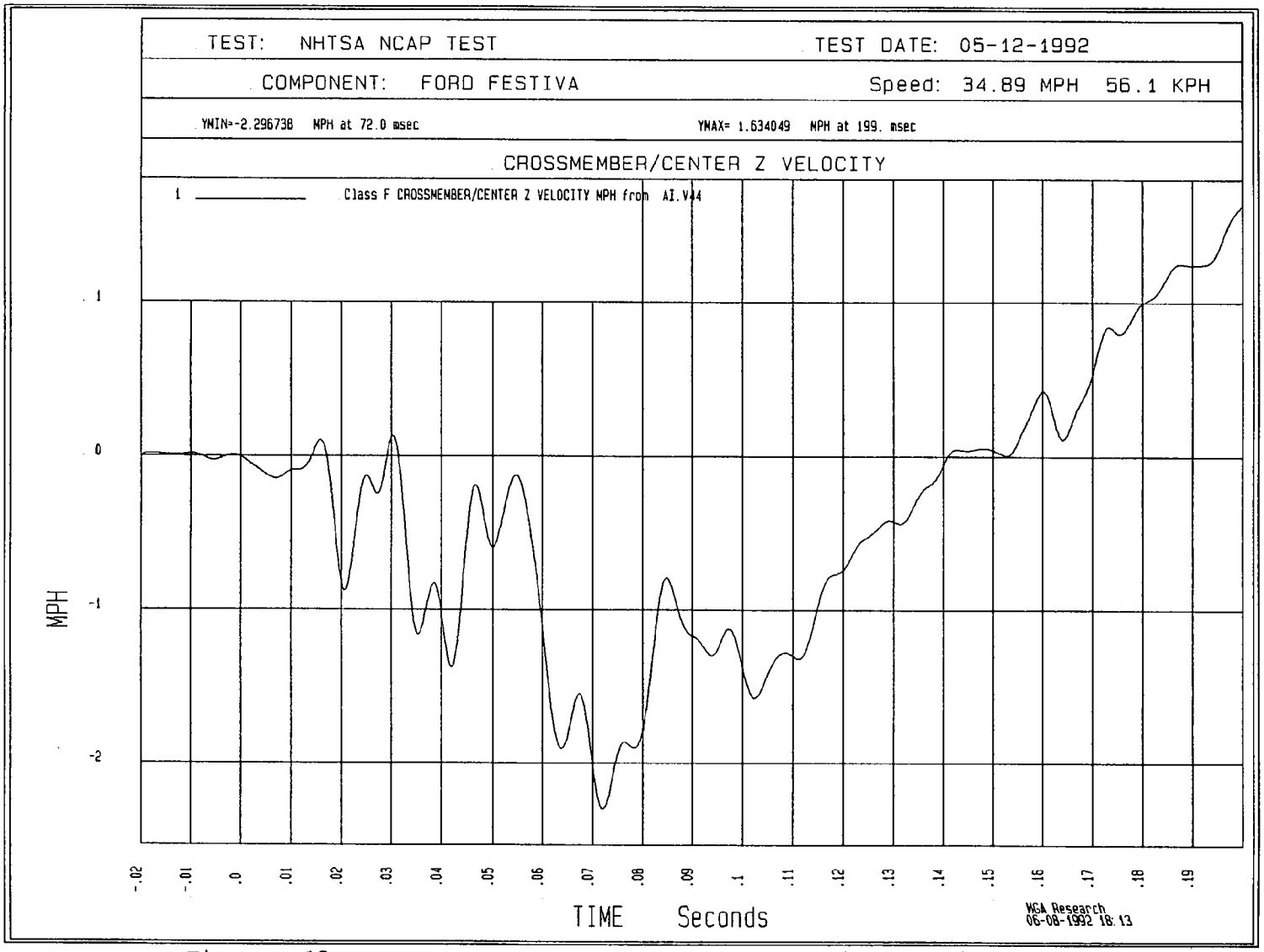


Figure B-13 - Center Rear Seat Crossmember Z Velocity vs. Time

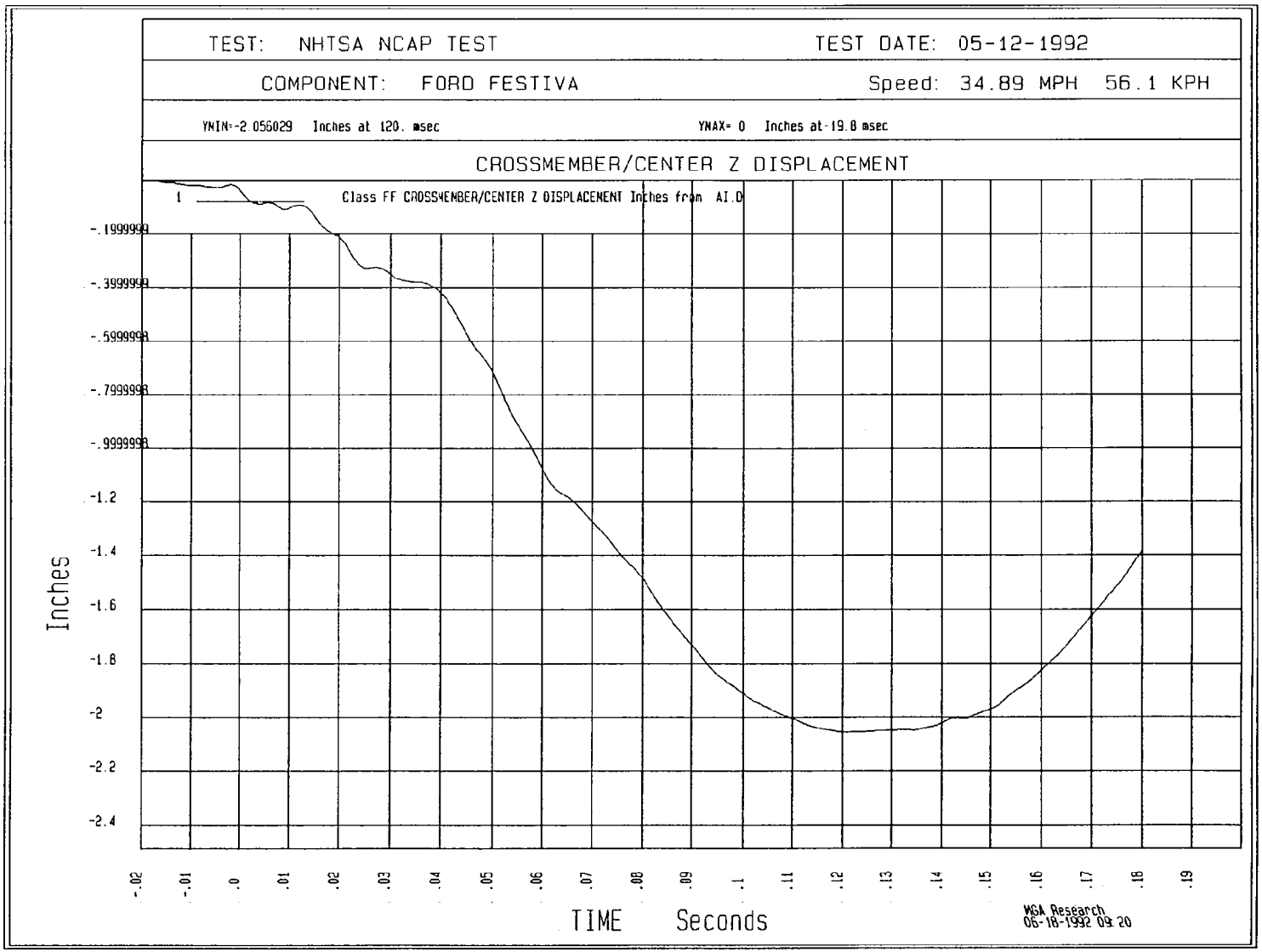


Figure B-14 - Center Rear Seat Crossmember Z Displacement vs. Time

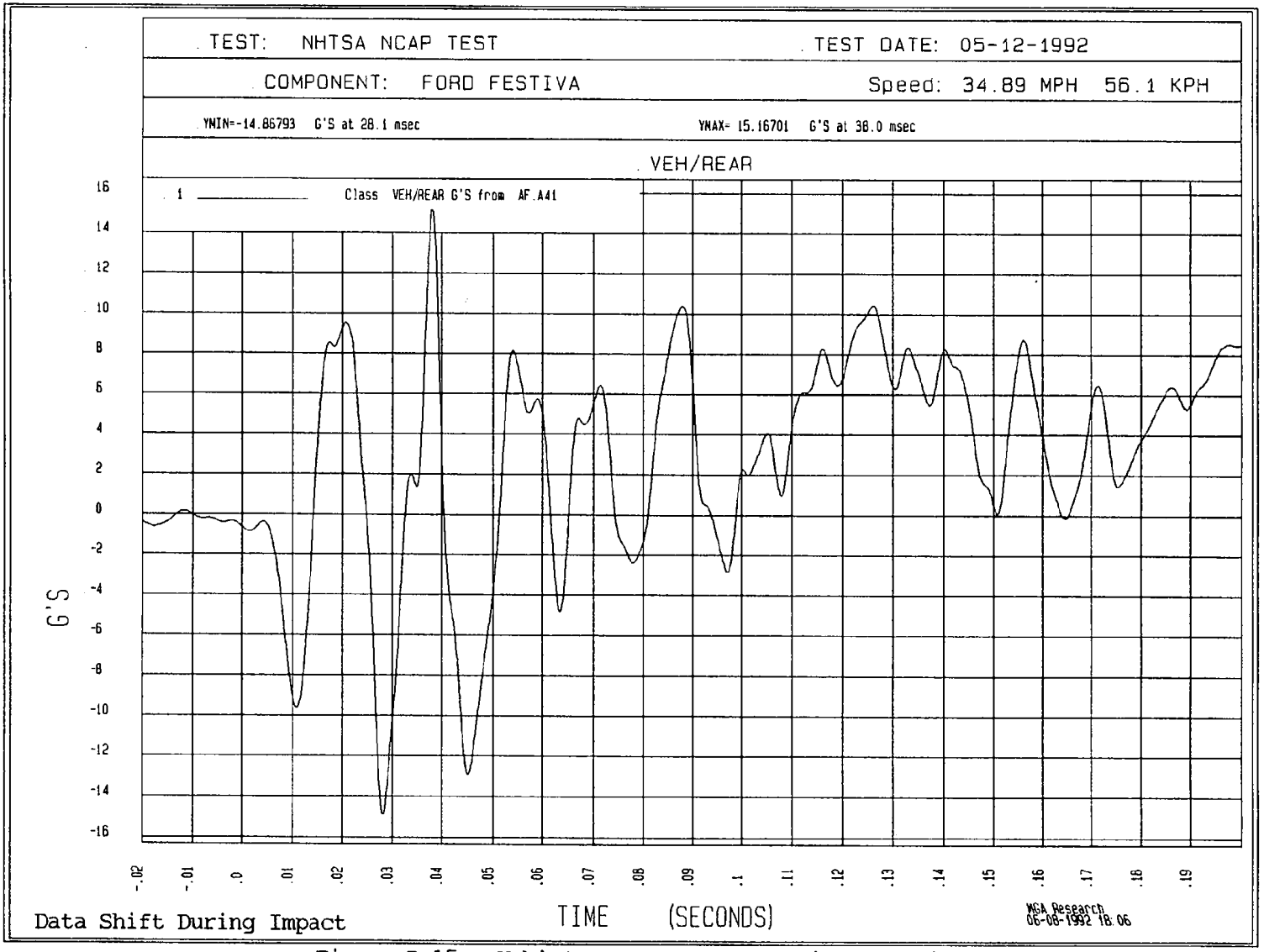


Figure B-15 - Vehicle Rear Z Acceleration vs. Time

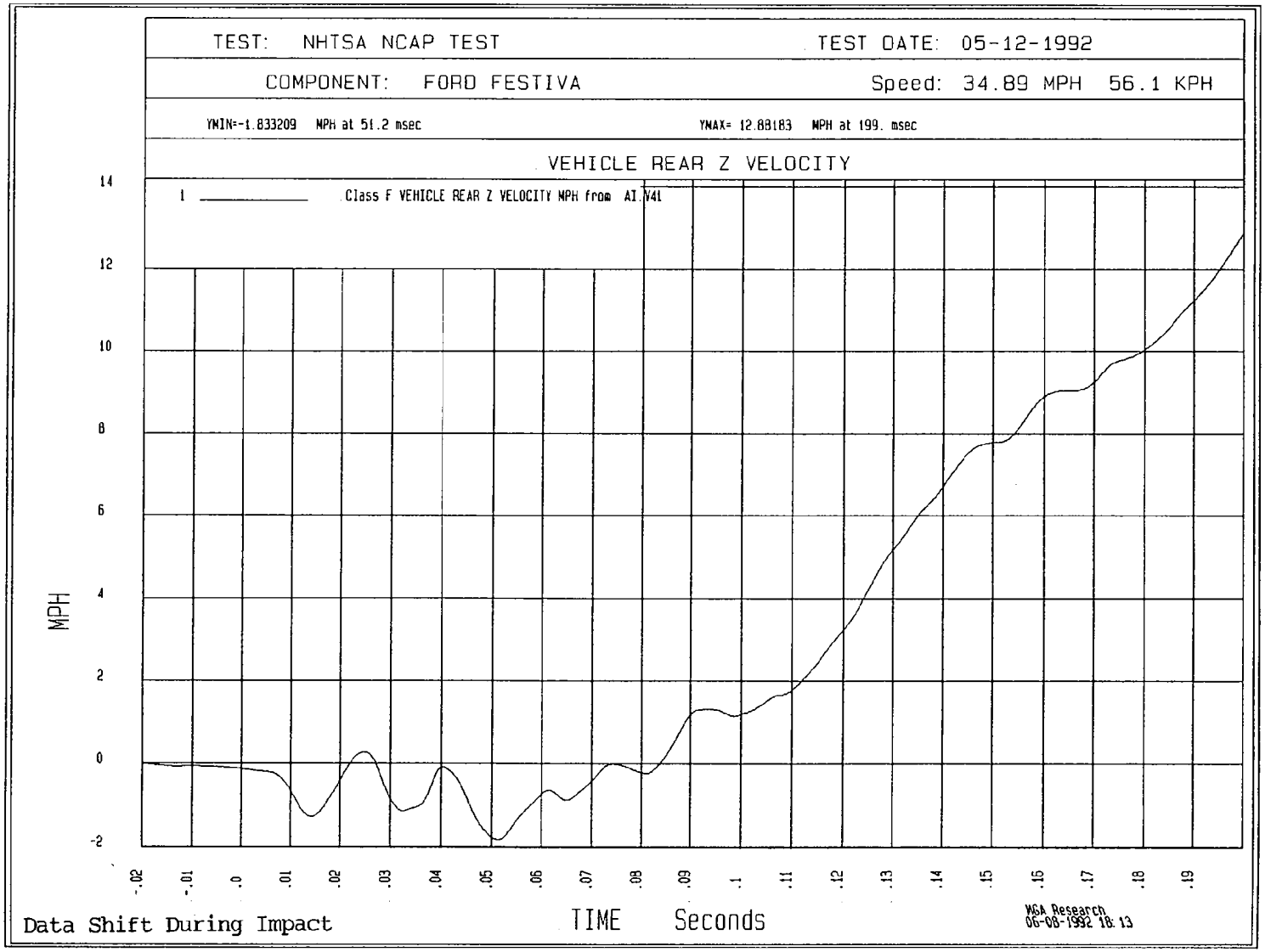


Figure B-16 - Vehicle Rear Z Velocity vs. Time

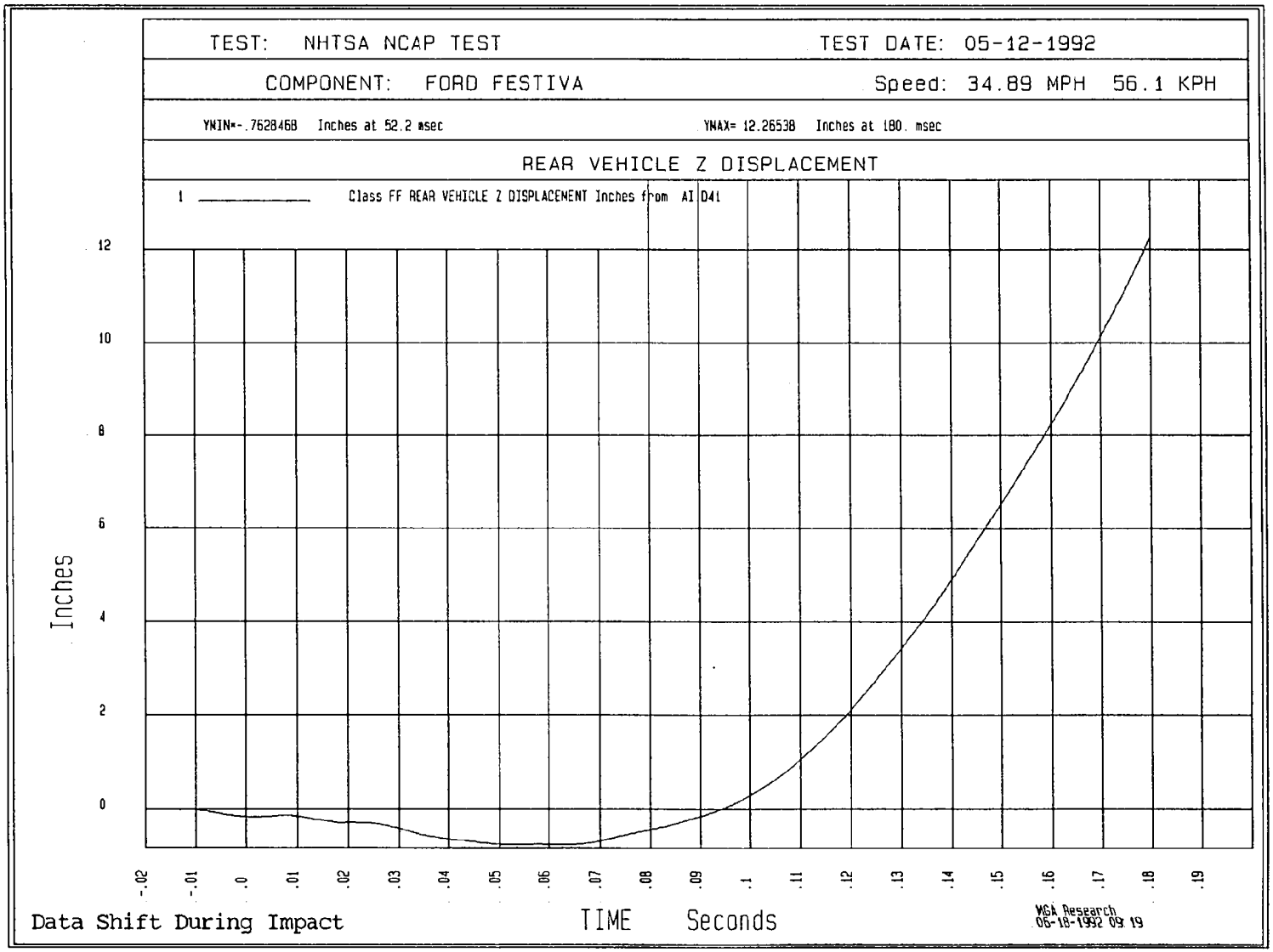


Figure B-17 - Vehicle Rear Z Displacement vs. Time

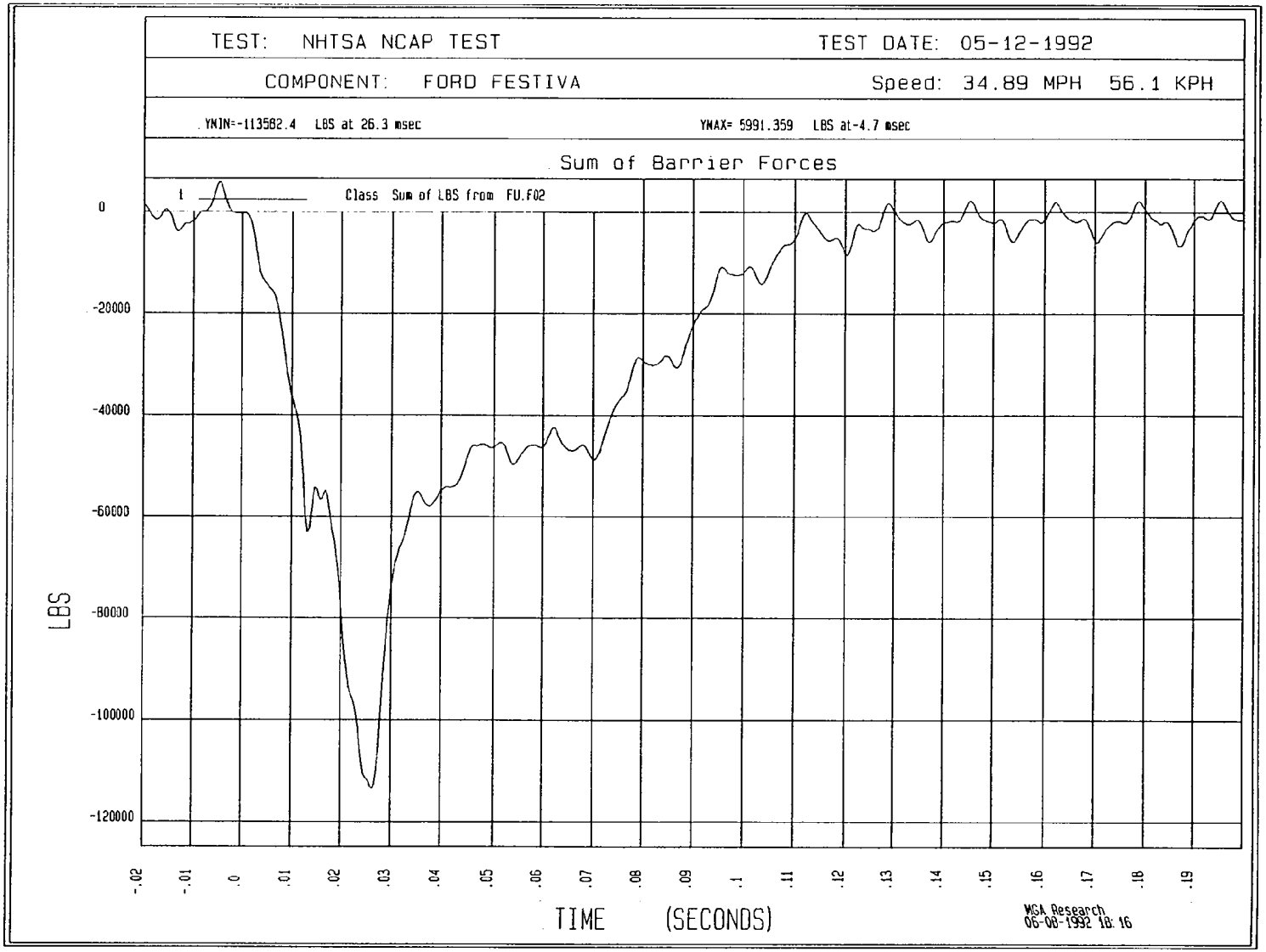


Figure B-18 - Sum of 6 Load Cells Force vs. Time

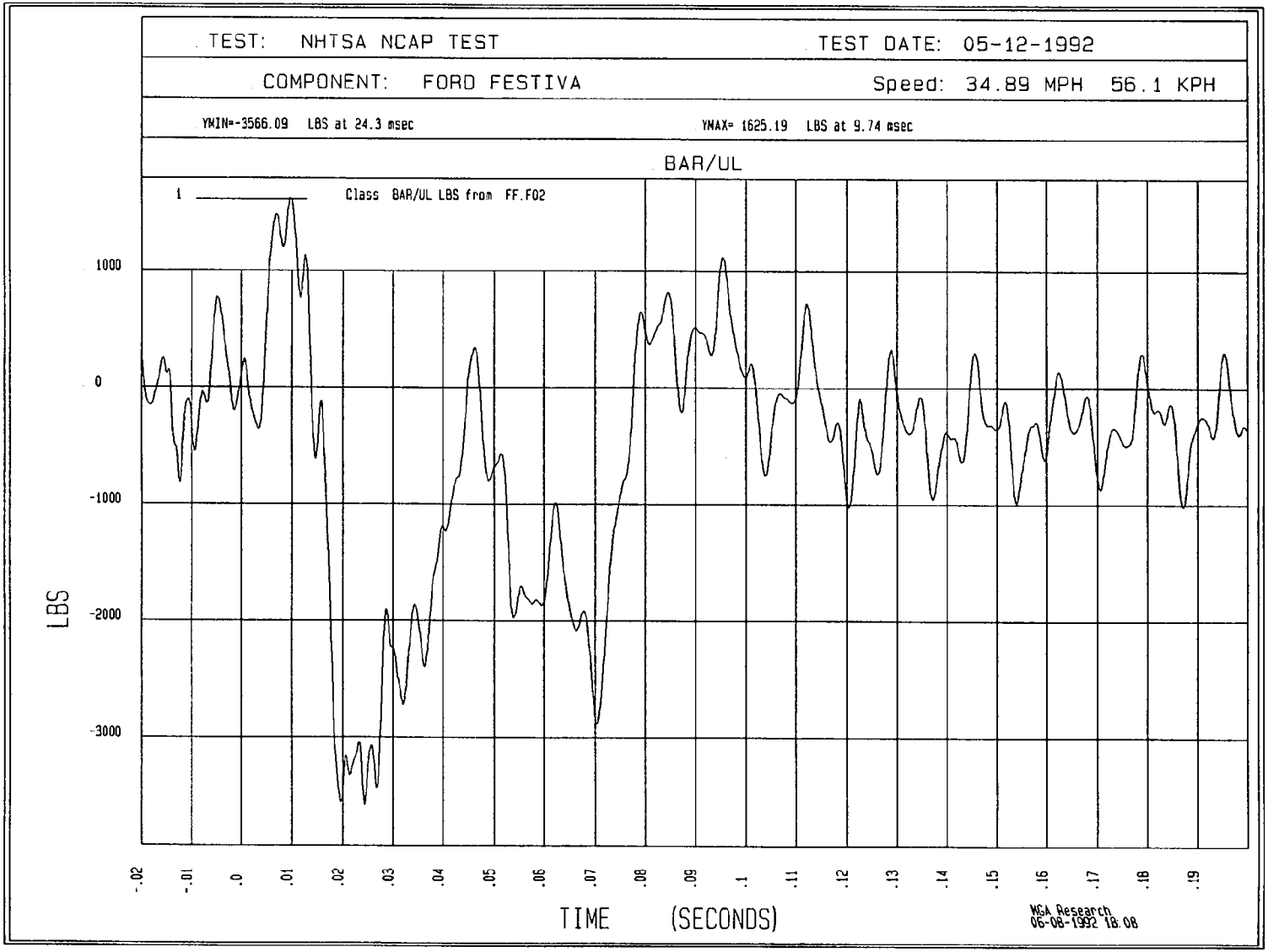


Figure B-19 - Sum of Load Cells A1-B3 Force vs. Time

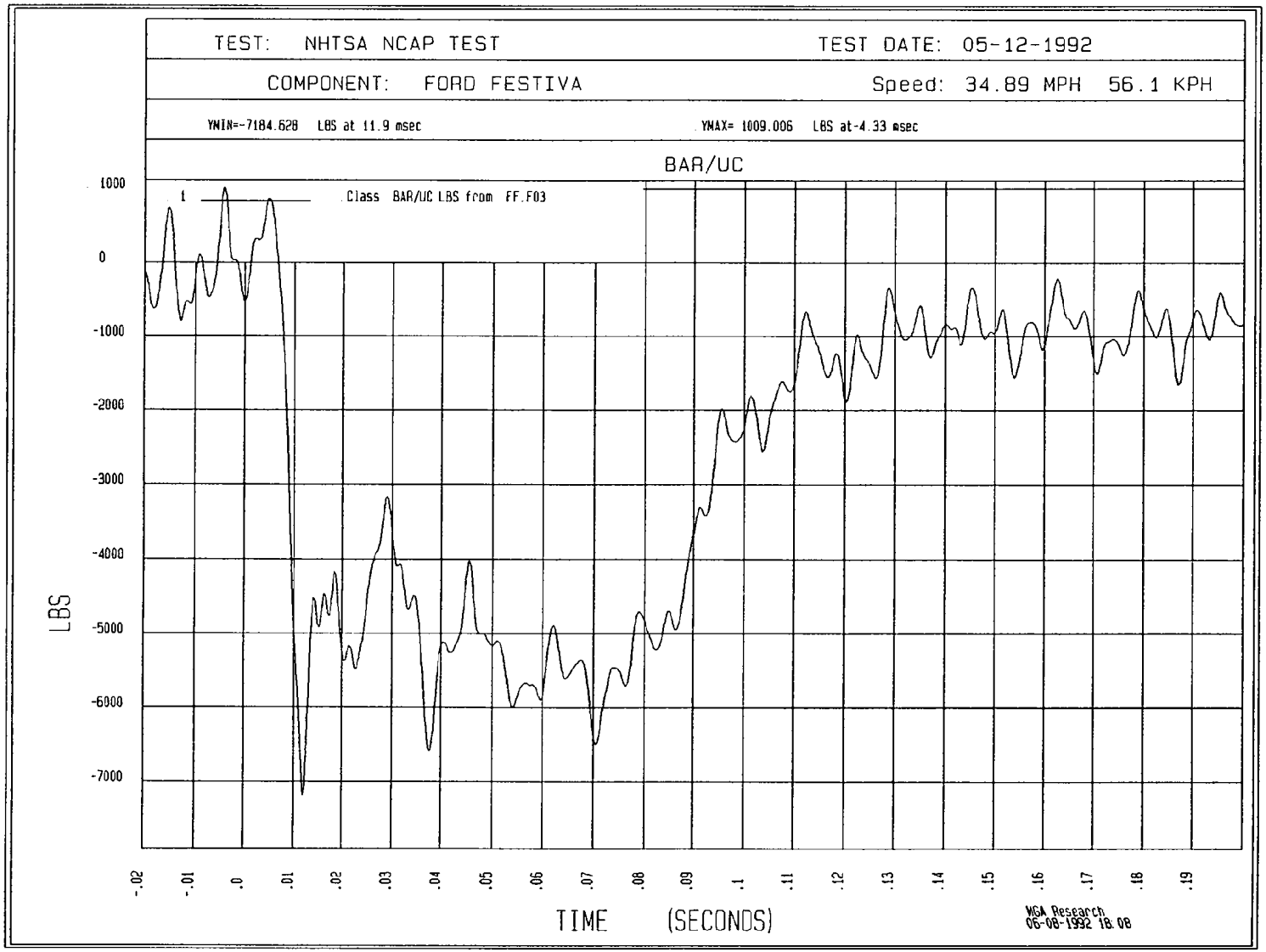


Figure B-20 - Sum of Load Cells A4-B6 Force vs. Time

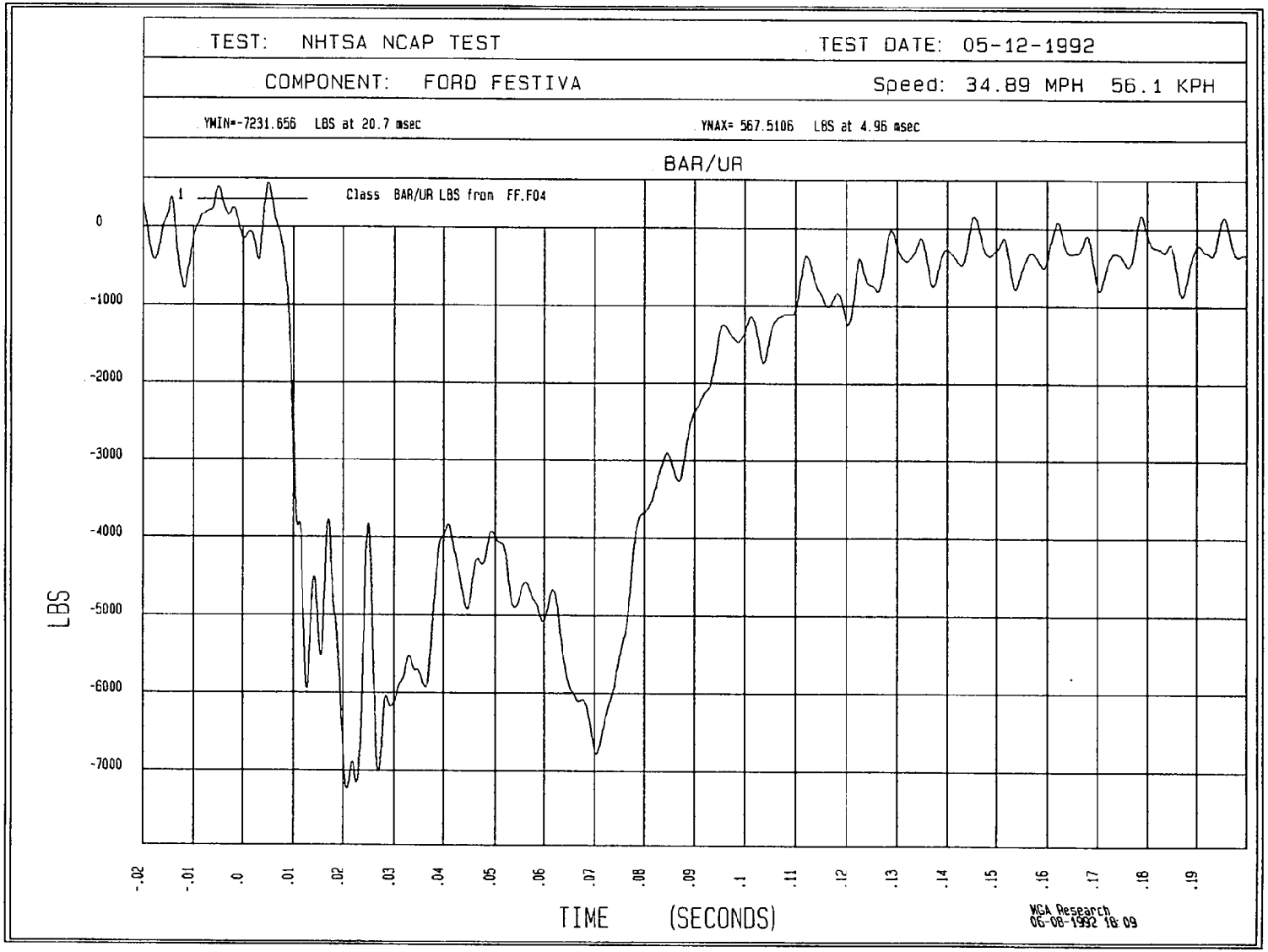


Figure B-21 - Sum of Load Cells A7-B9 Force vs. Time

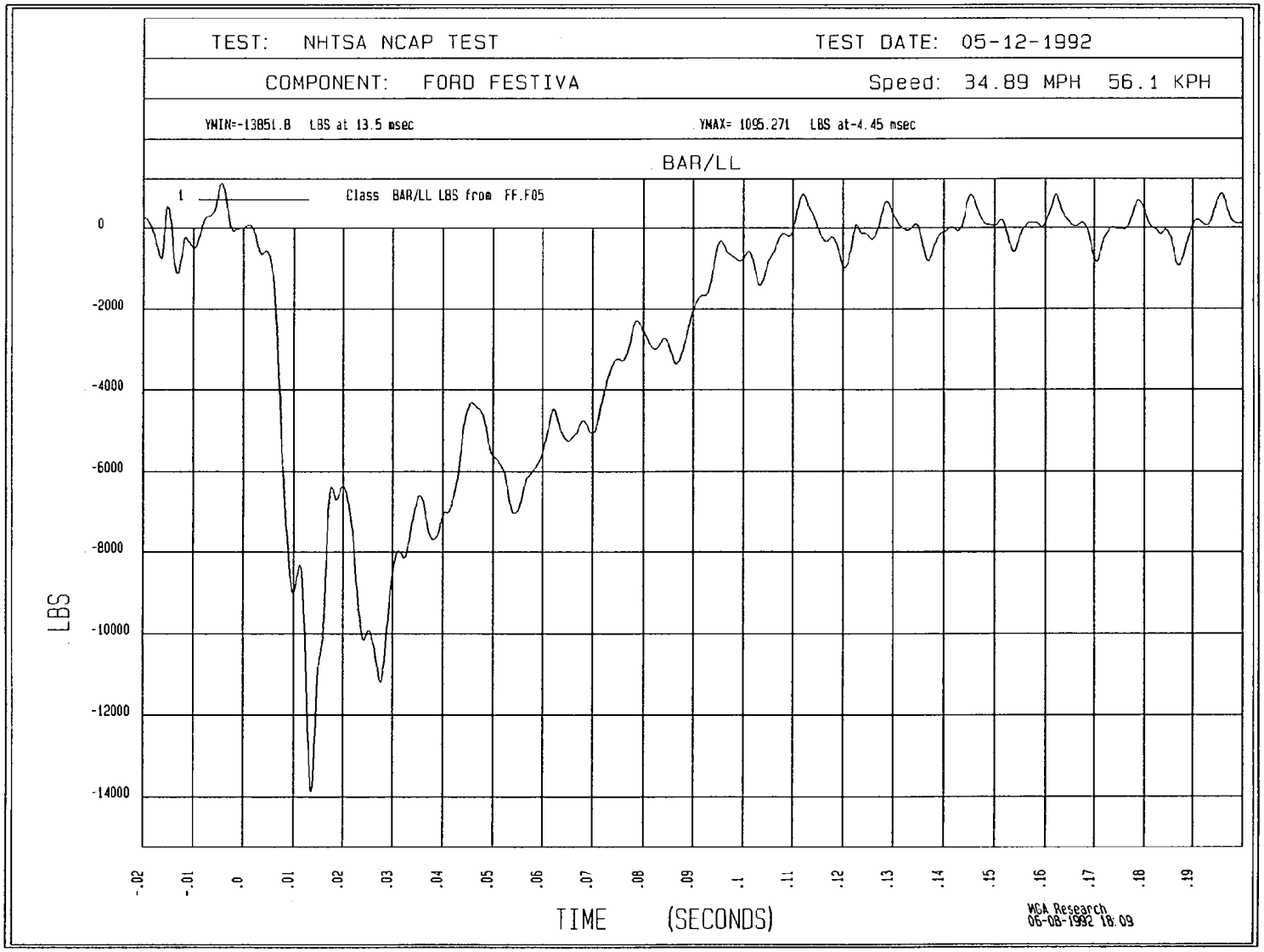


Figure B-22 - Sum of Load Cells C1-D3 Force vs. Time

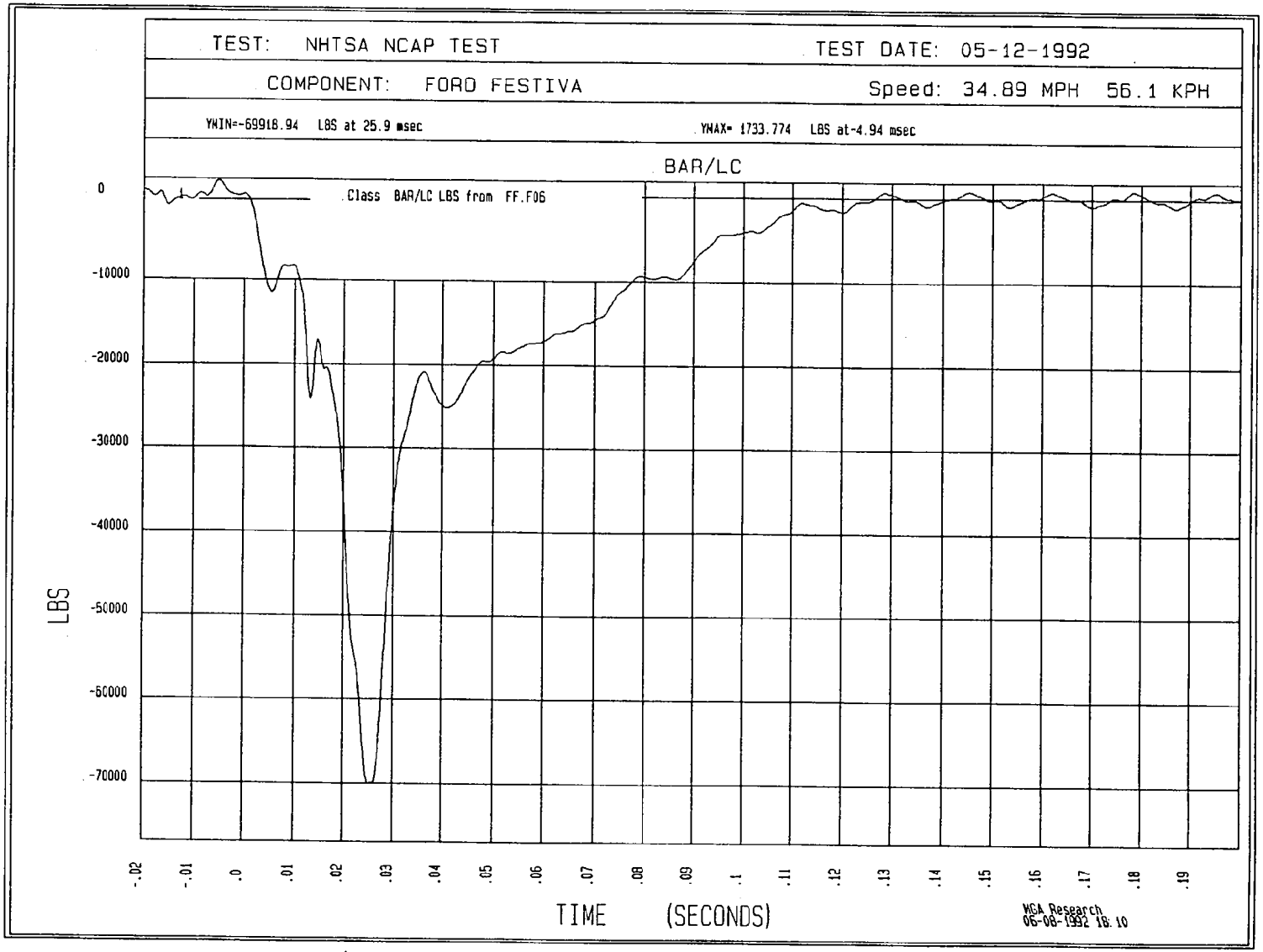


Figure B-23 - Sum of Load Cells C4-D6 Force vs. Time

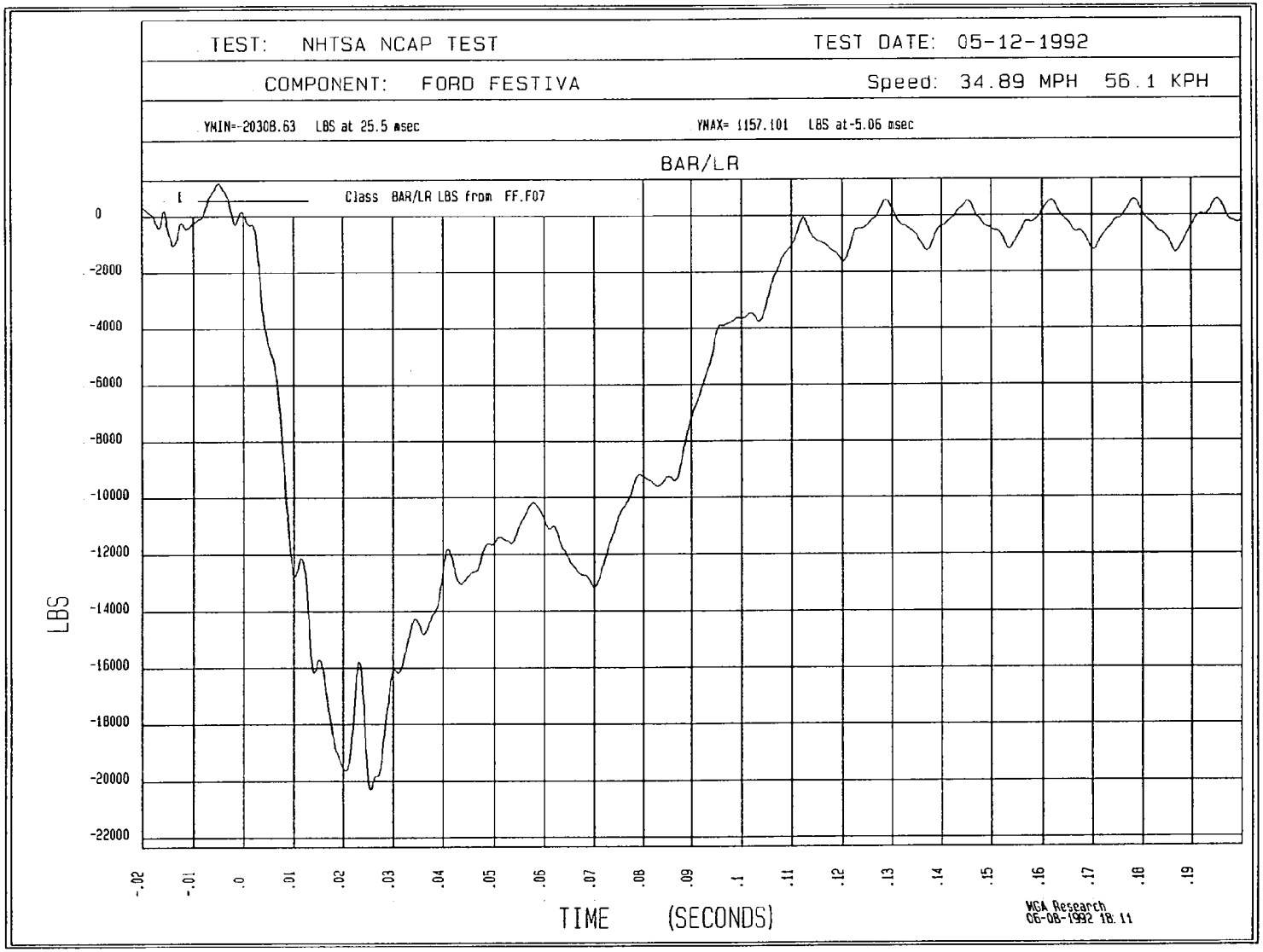


Figure B-24 - Sum of Load Cells C7-D9 Force vs. Time

NOT REPORTABLE

Figure B-25 - Driver Head X Acceleration vs. Time

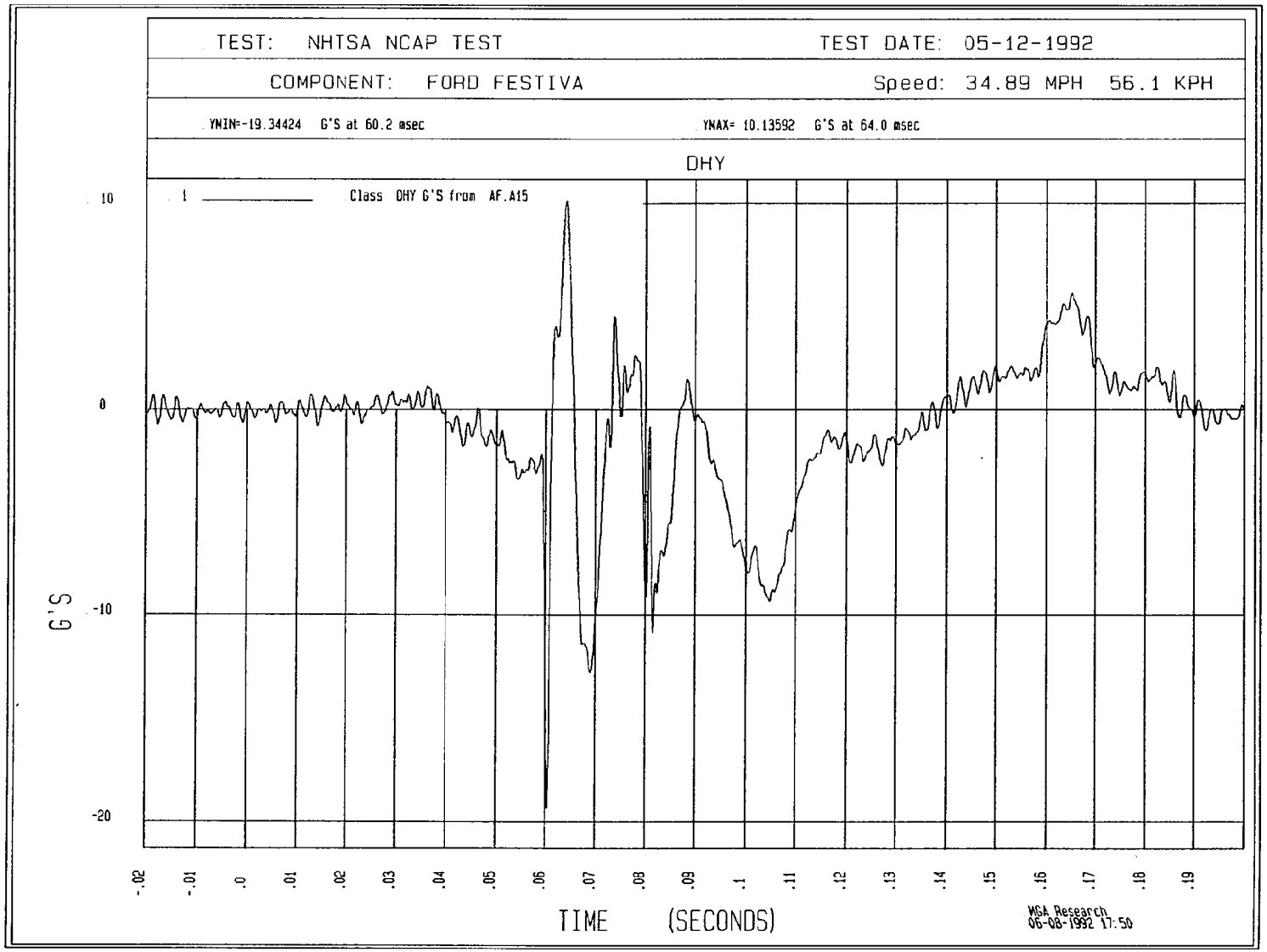


Figure B-26 - Driver Head Y Acceleration vs. Time

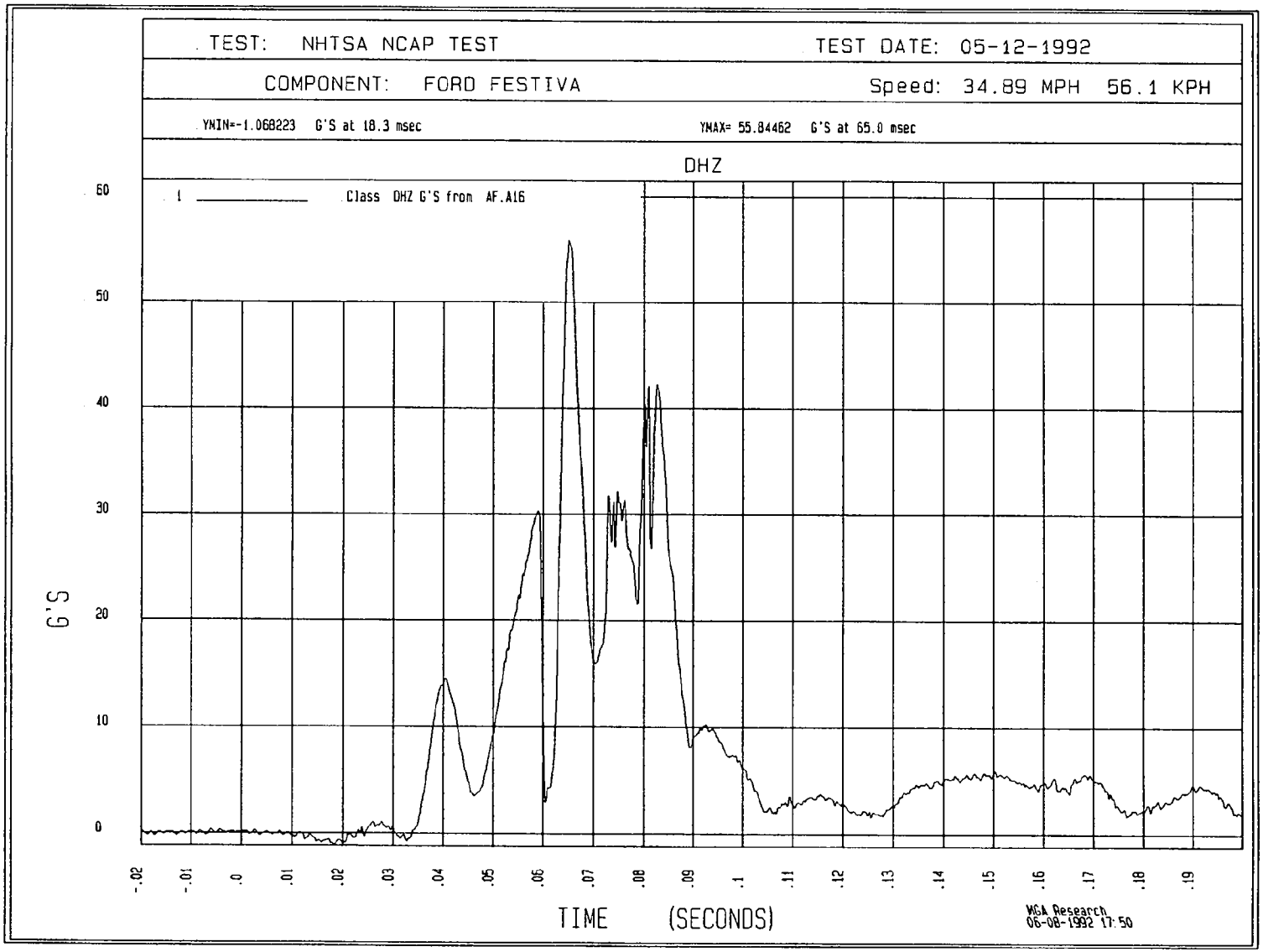


Figure B-27 - Driver Head Z Acceleration vs. Time

NOT REPORTABLE

Figure B-28 - Driver Head Resultant Acceleration vs. Time

NOT REPORTABLE

Figure B-29 - Driver Head X Velocity vs. Time

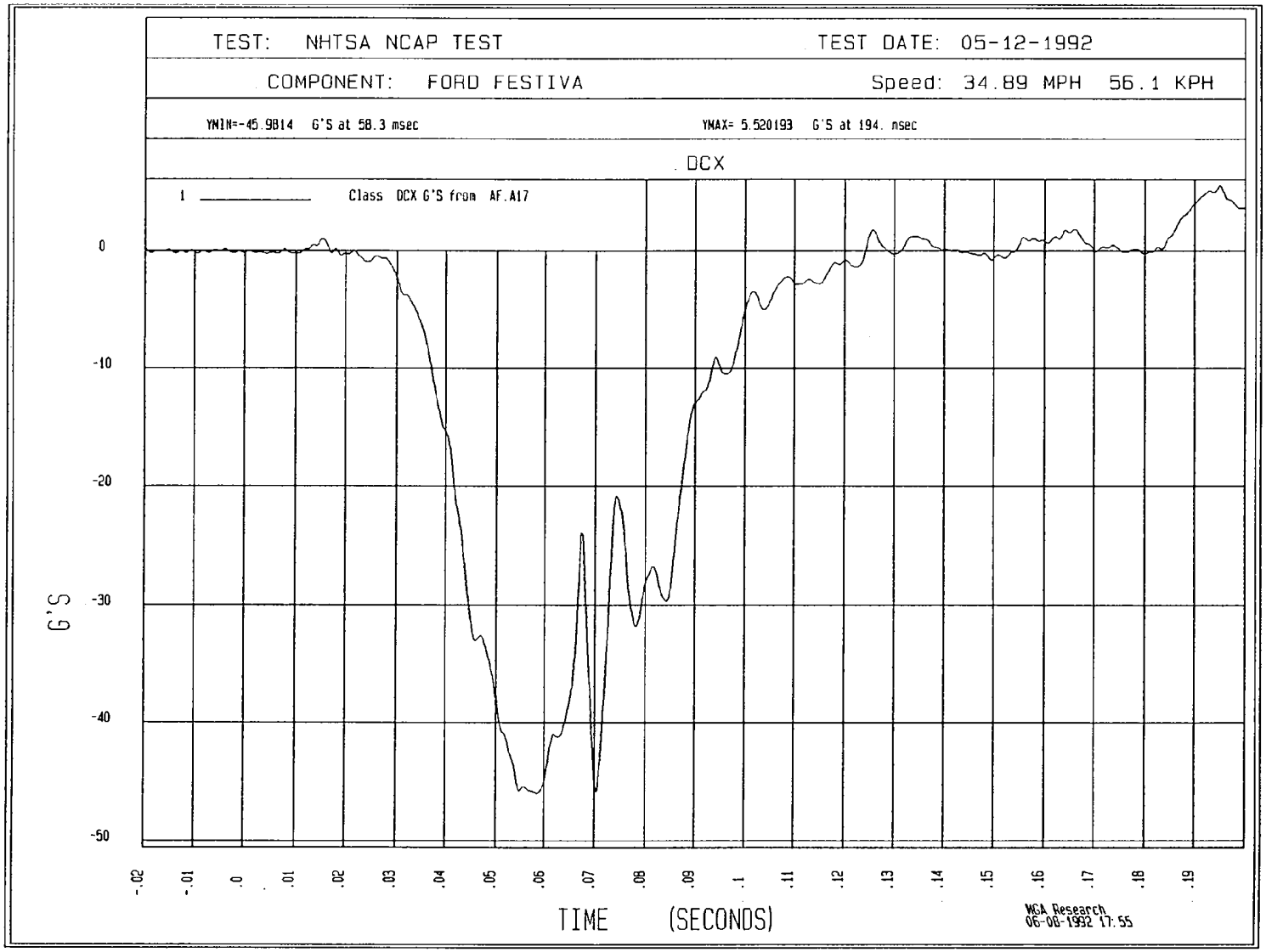


Figure B-30 - Driver Chest X Acceleration vs. Time

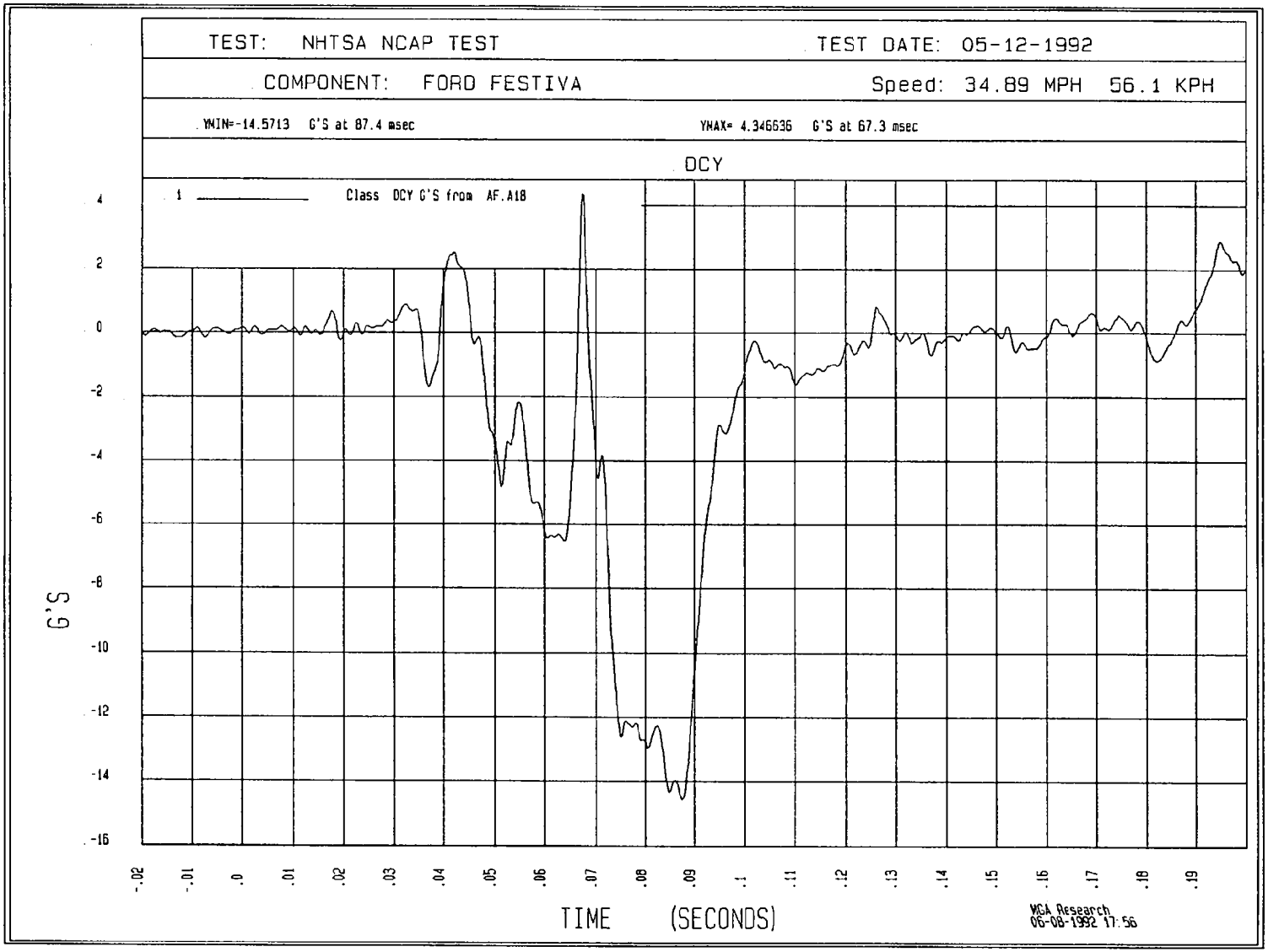


Figure B-31 - Driver Chest Y Acceleration vs. Time

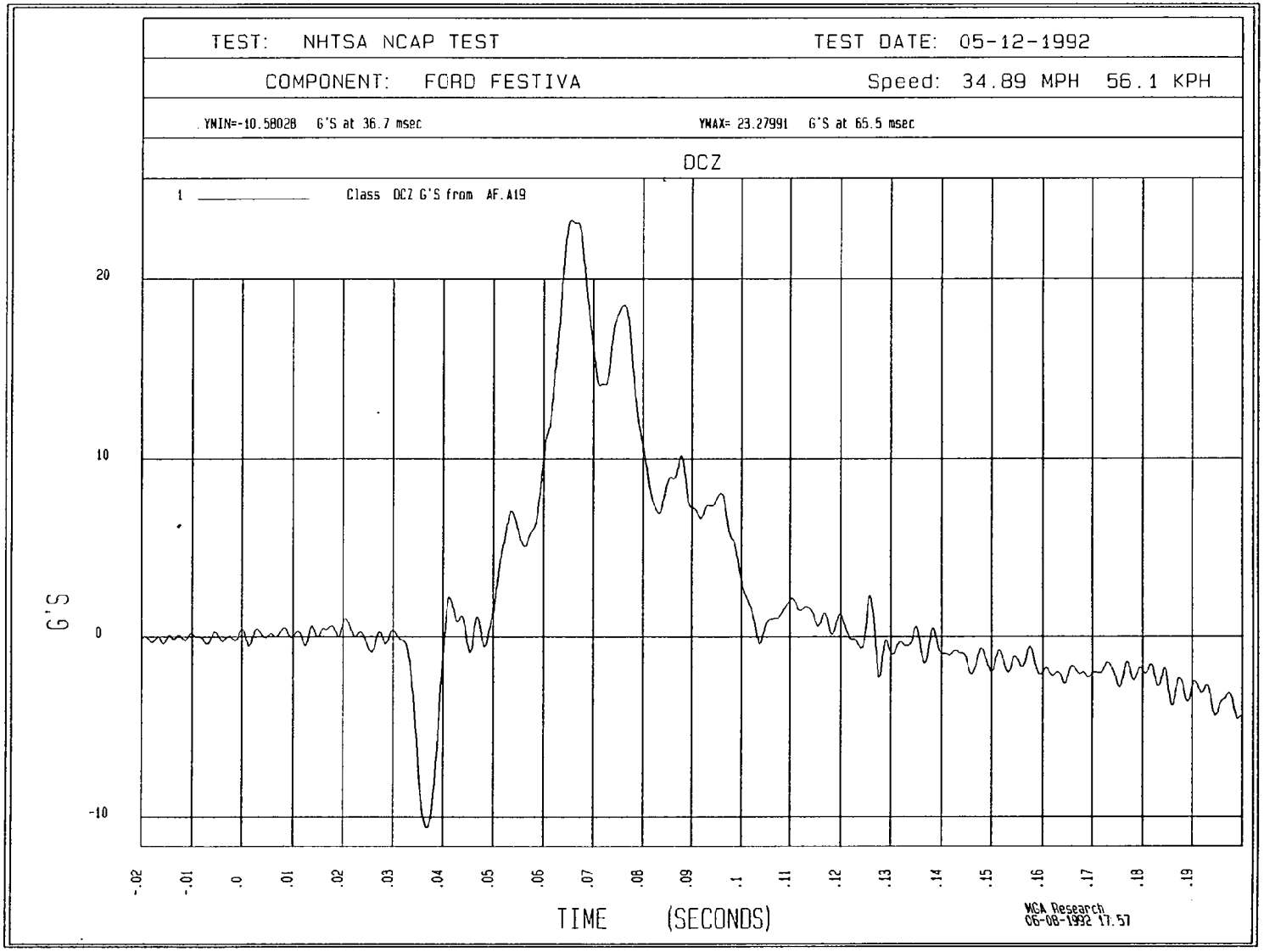


Figure B-32 - Driver Chest Z Acceleration vs. Time

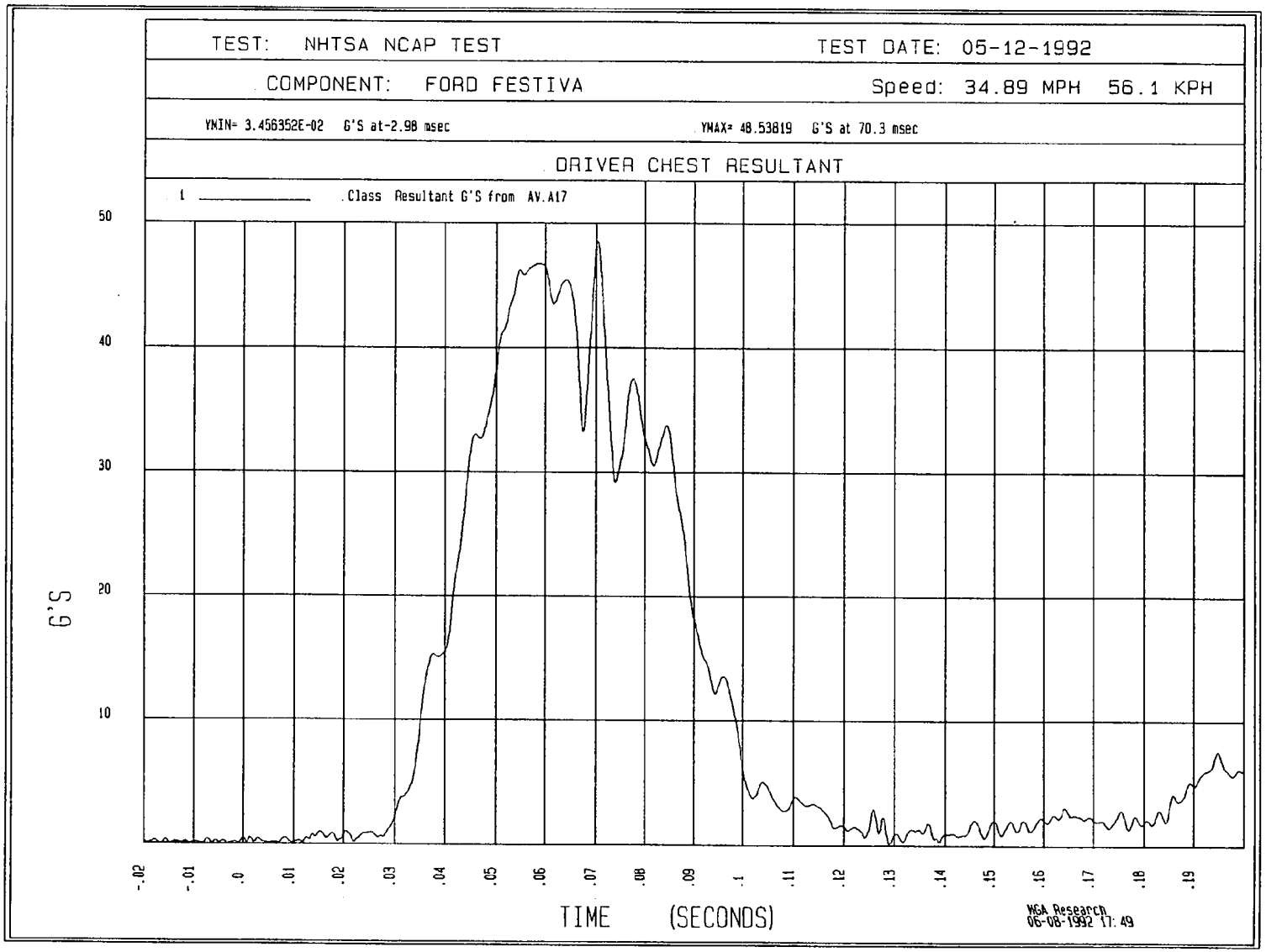


Figure B-33 - Driver Chest Resultant Acceleration vs. Time

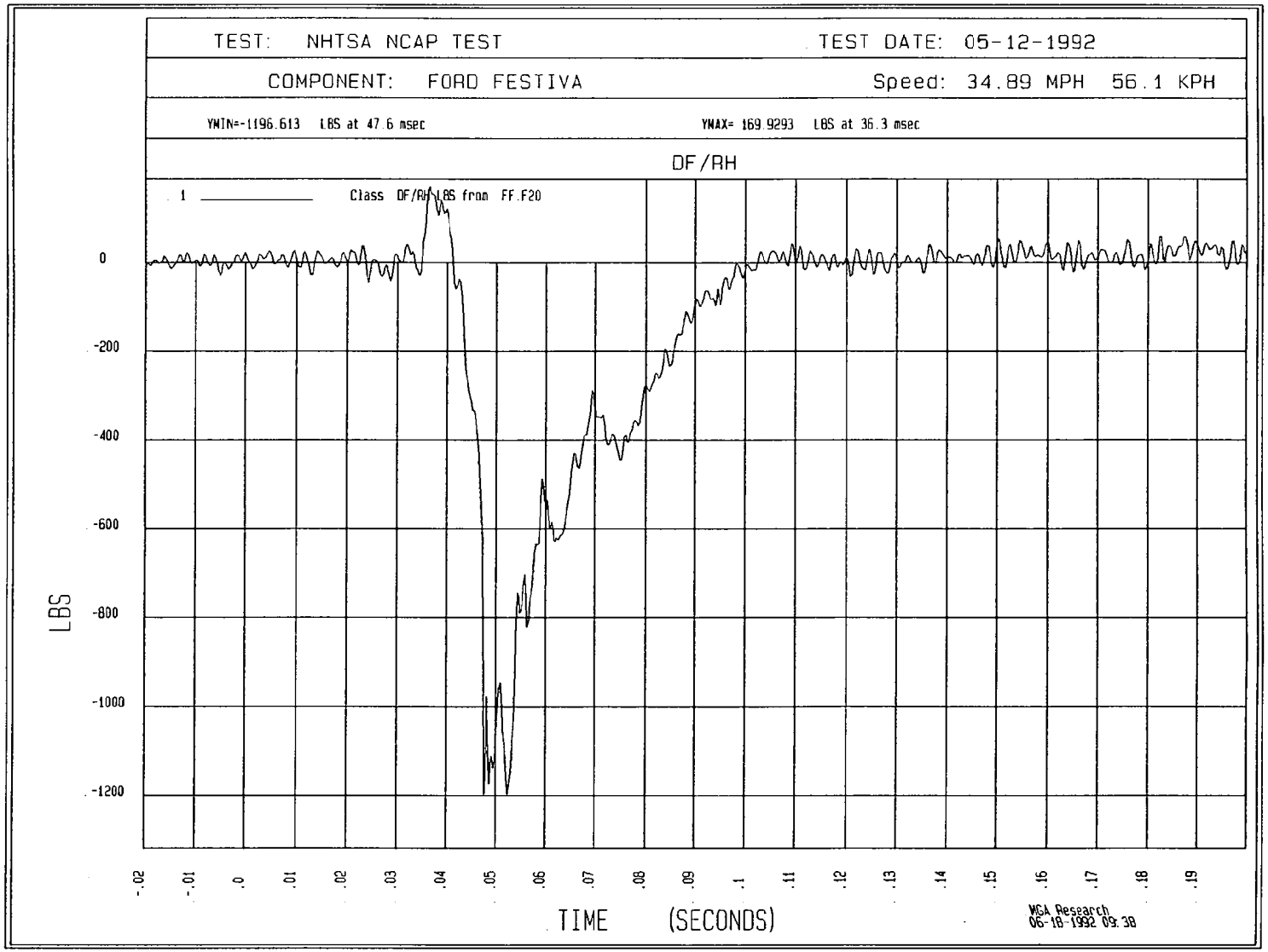


Figure B-34 - Driver Right Femur Force vs. Time

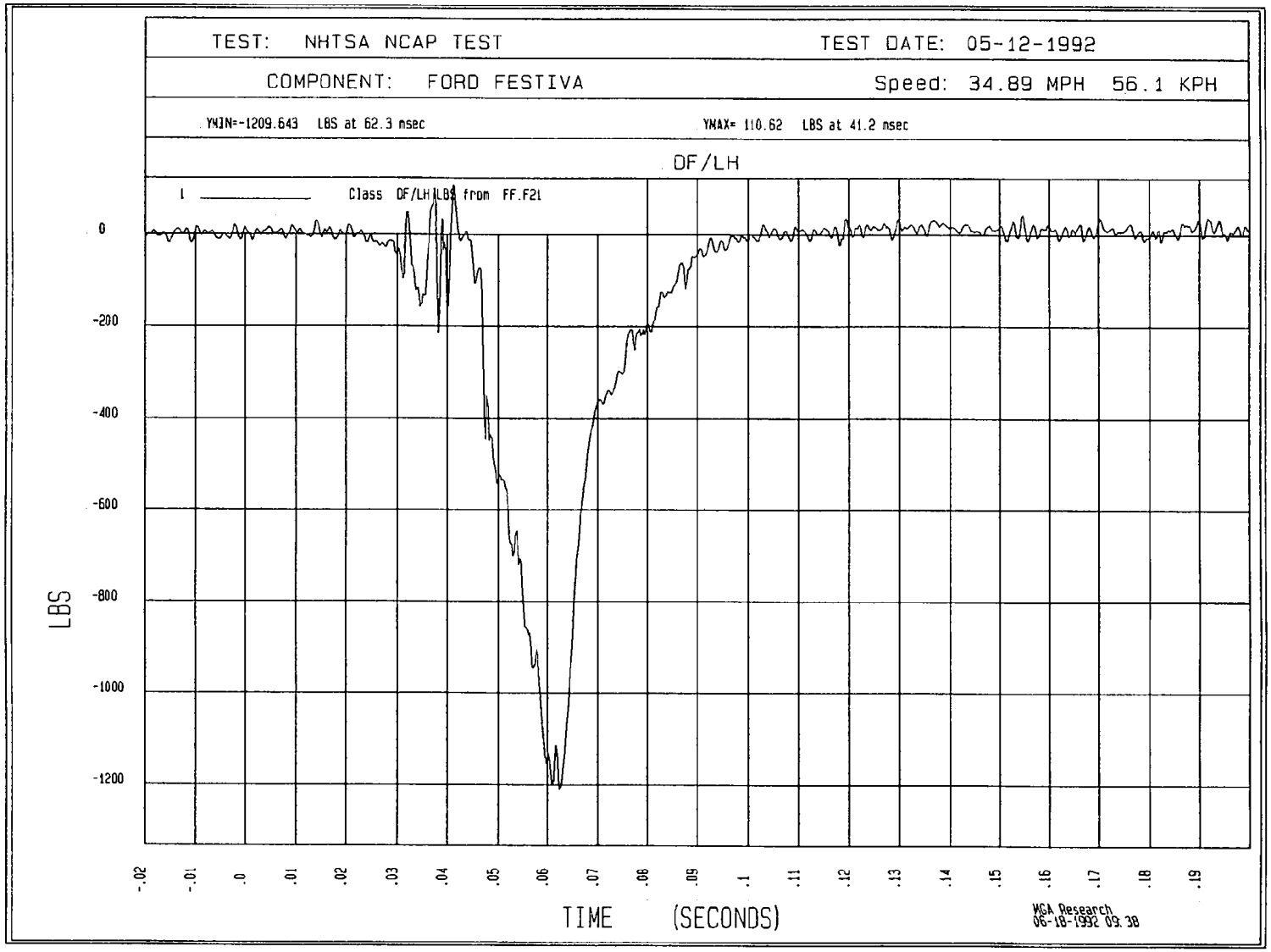


Figure B-35 - Driver Left Femur Force vs. Time

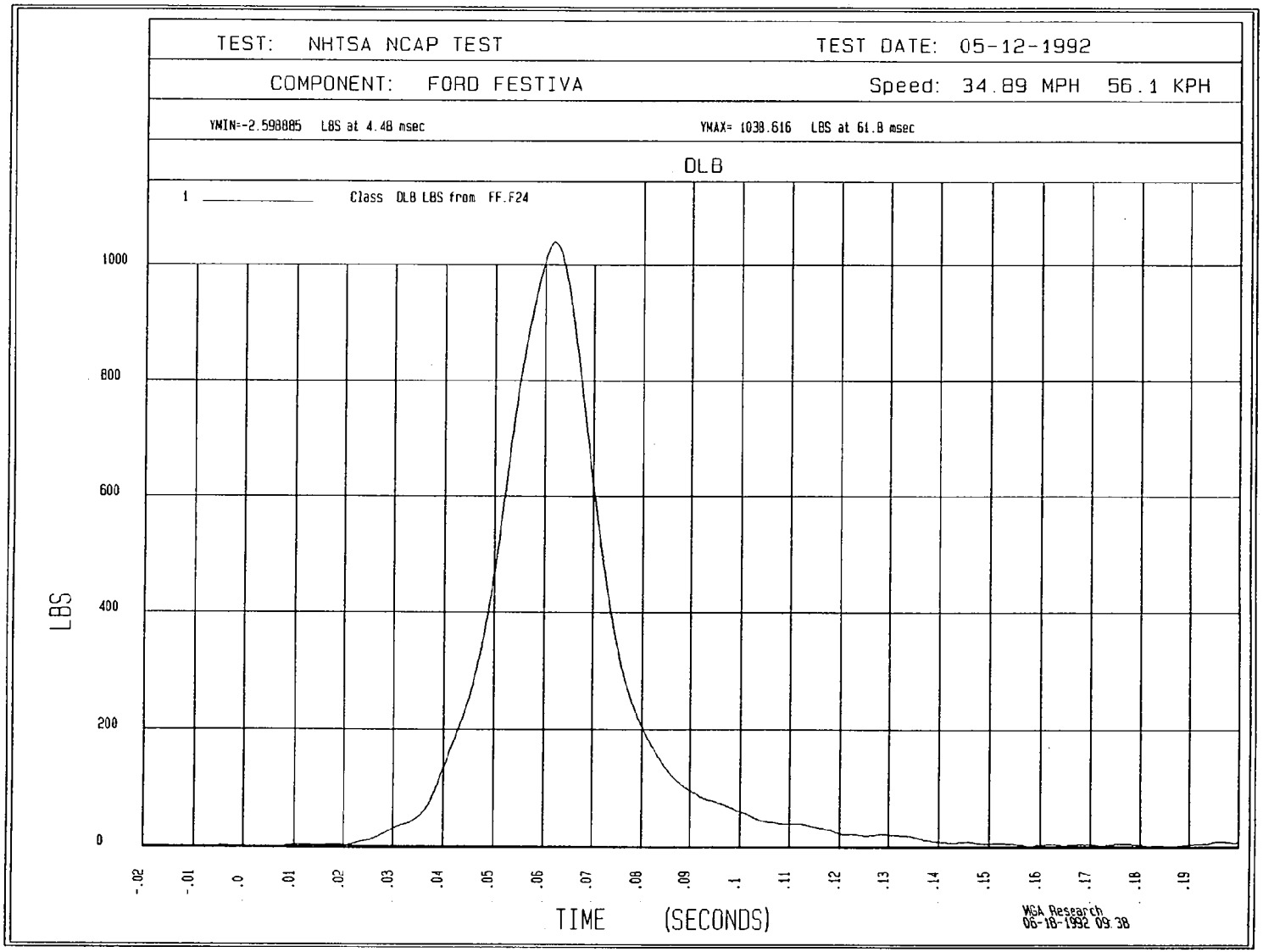


Figure B-36 - Driver Lap Belt Force vs. Time

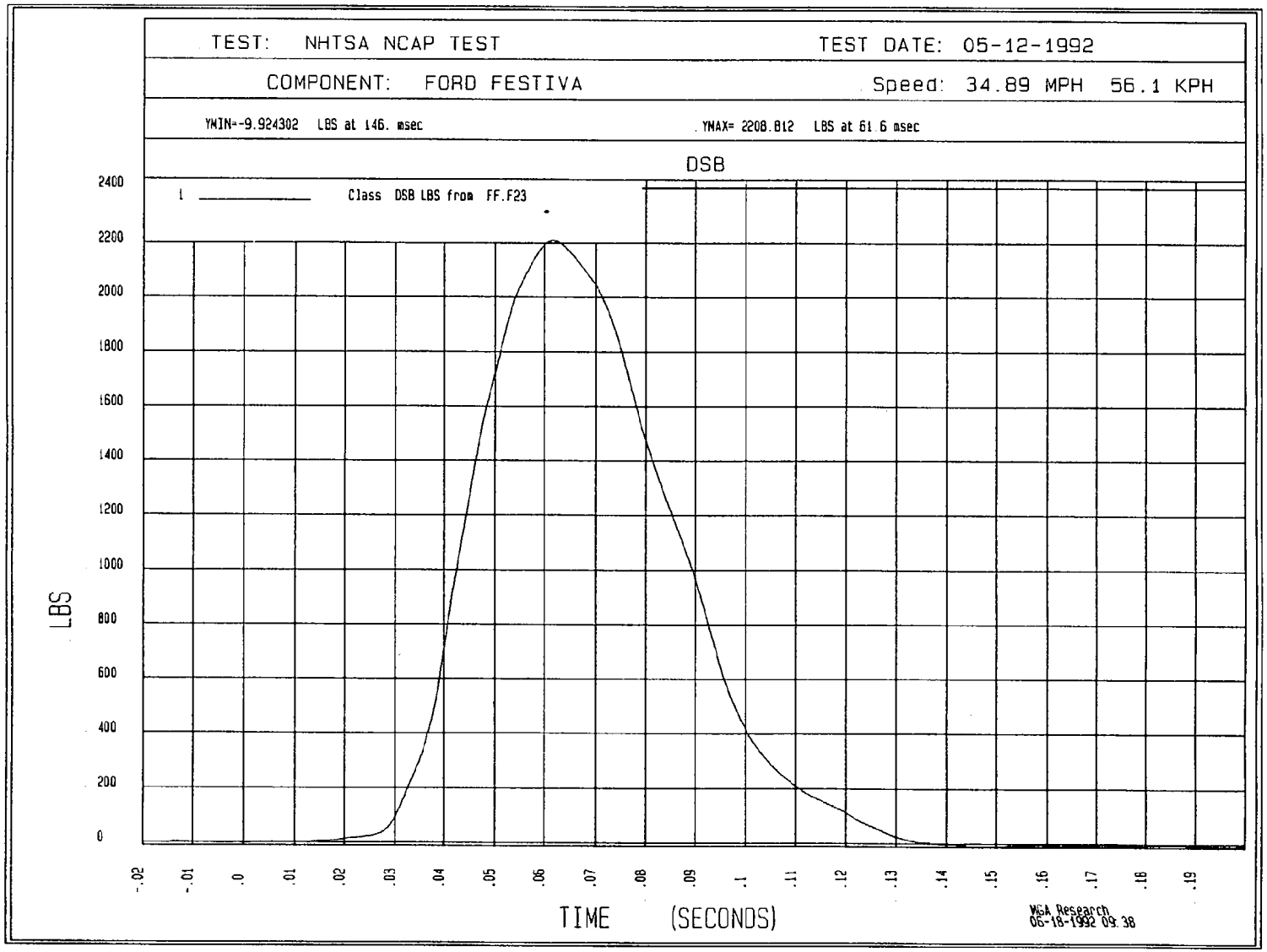


Figure B-37 - Driver Torso Belt Force vs. Time

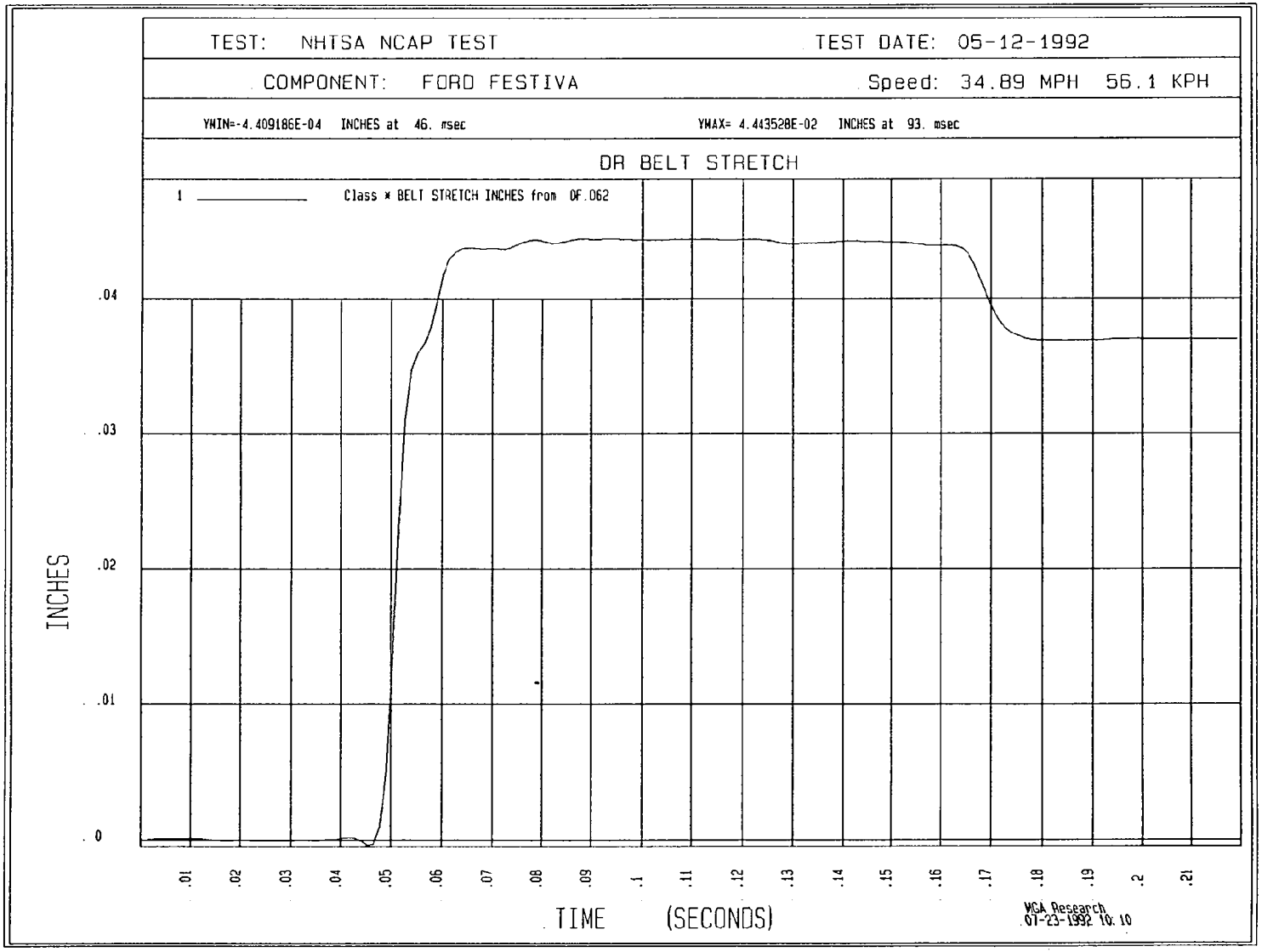


Figure B-38 - Driver Torso Belt Stretch vs. Time

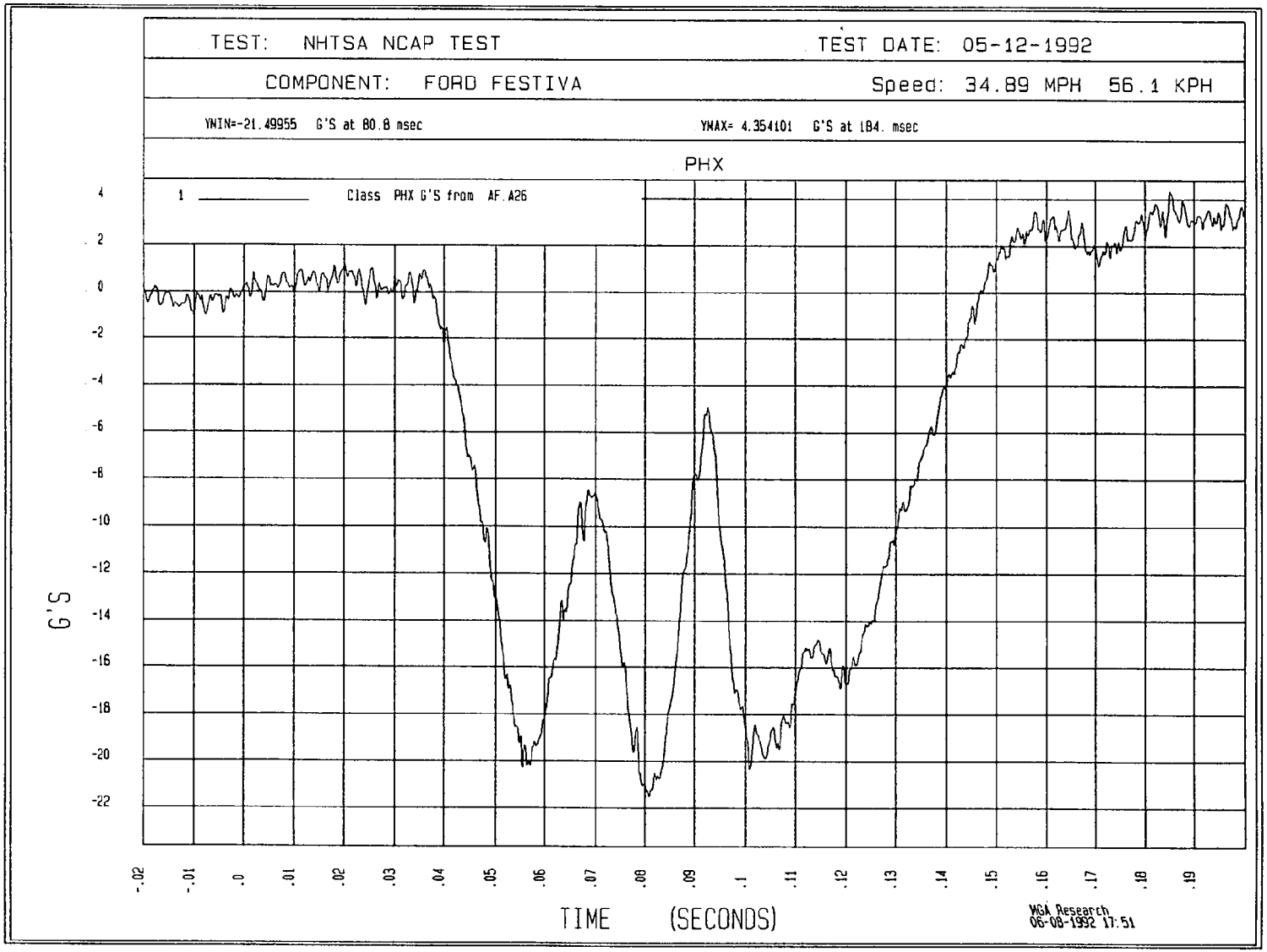


Figure B-39 - Passenger Head X Acceleration vs. Time

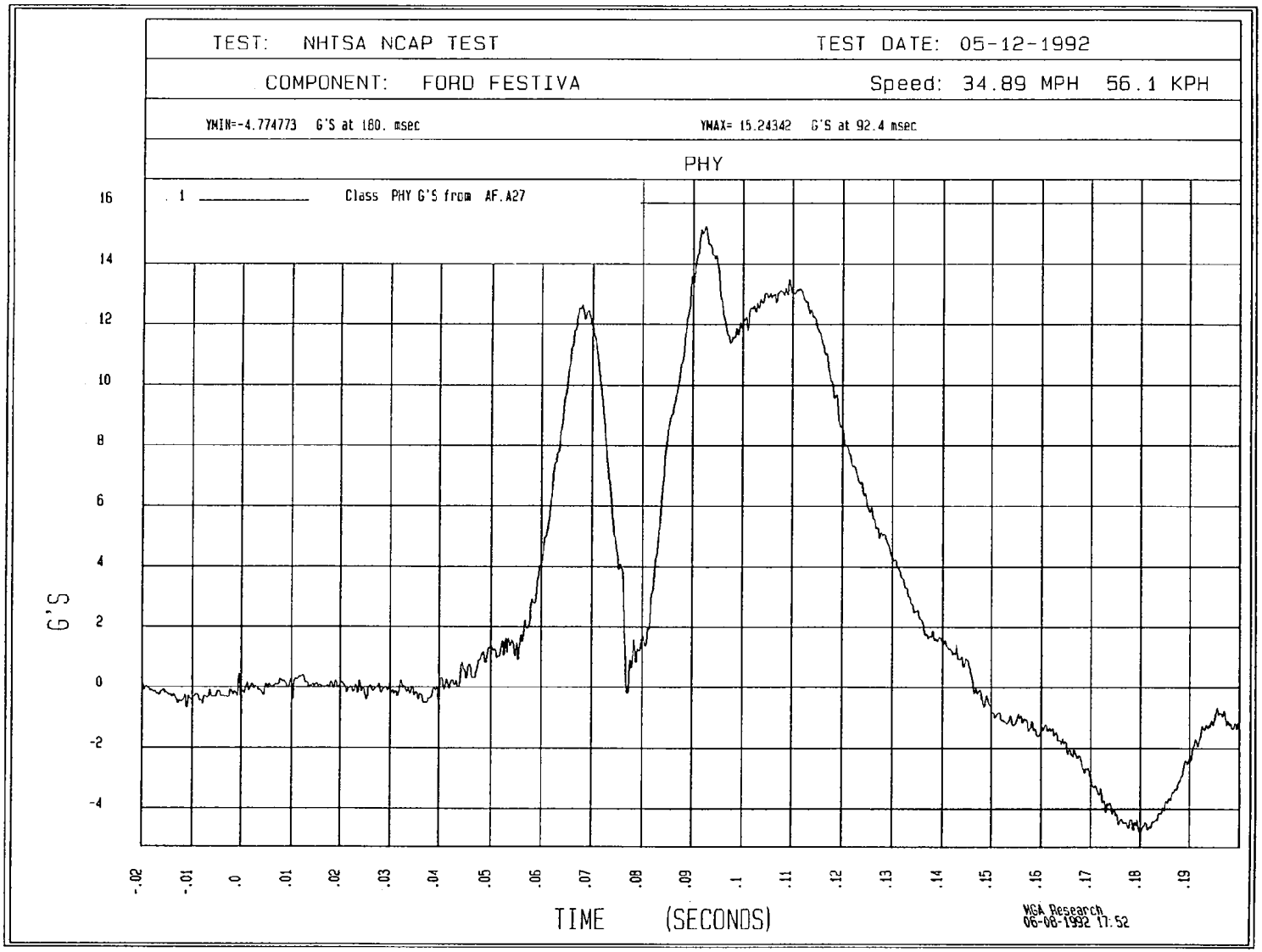


Figure B-40 - Passenger Head Y Acceleration vs. Time

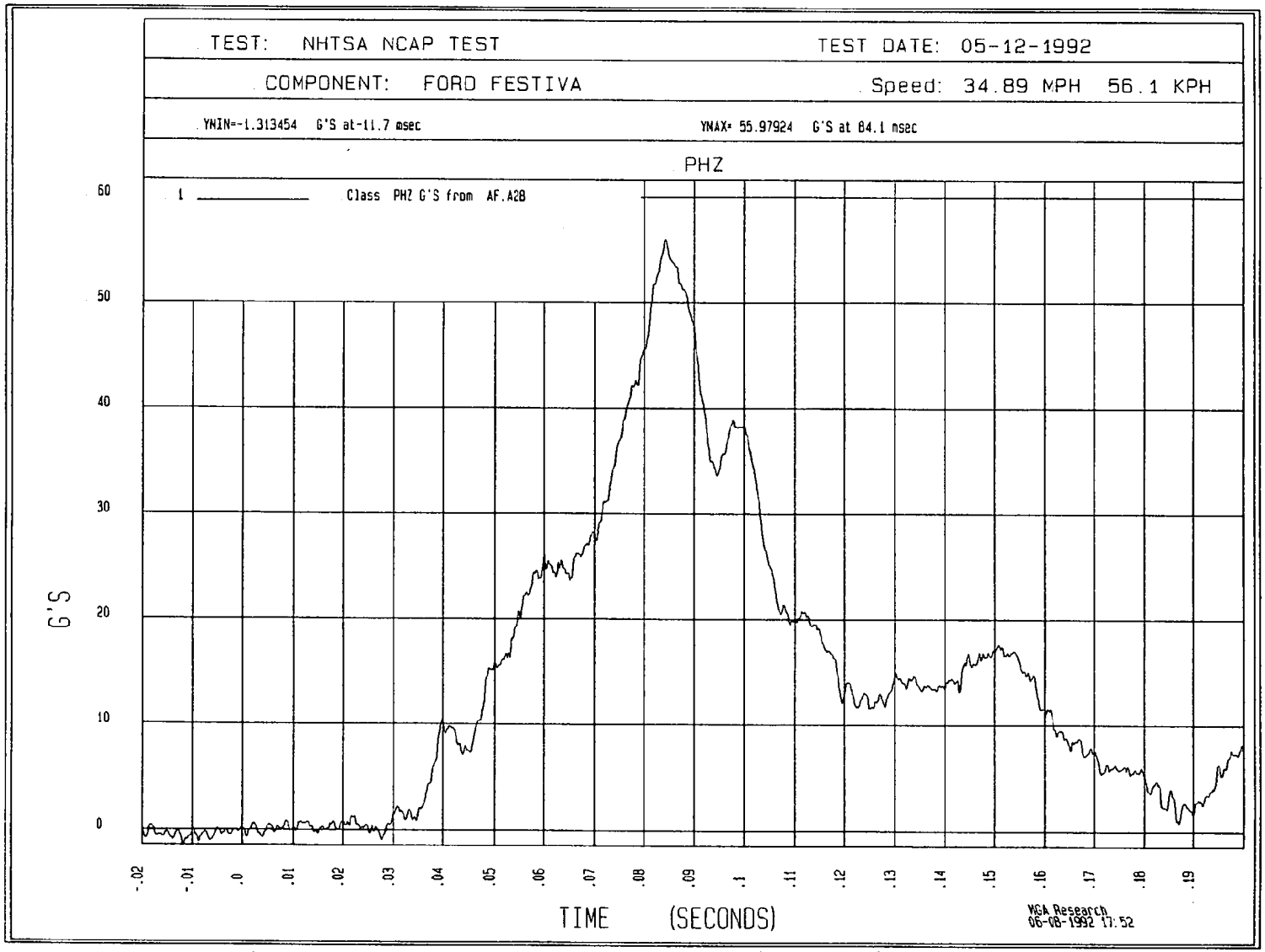


Figure B-41 - Passenger Head Z Acceleration vs. Time

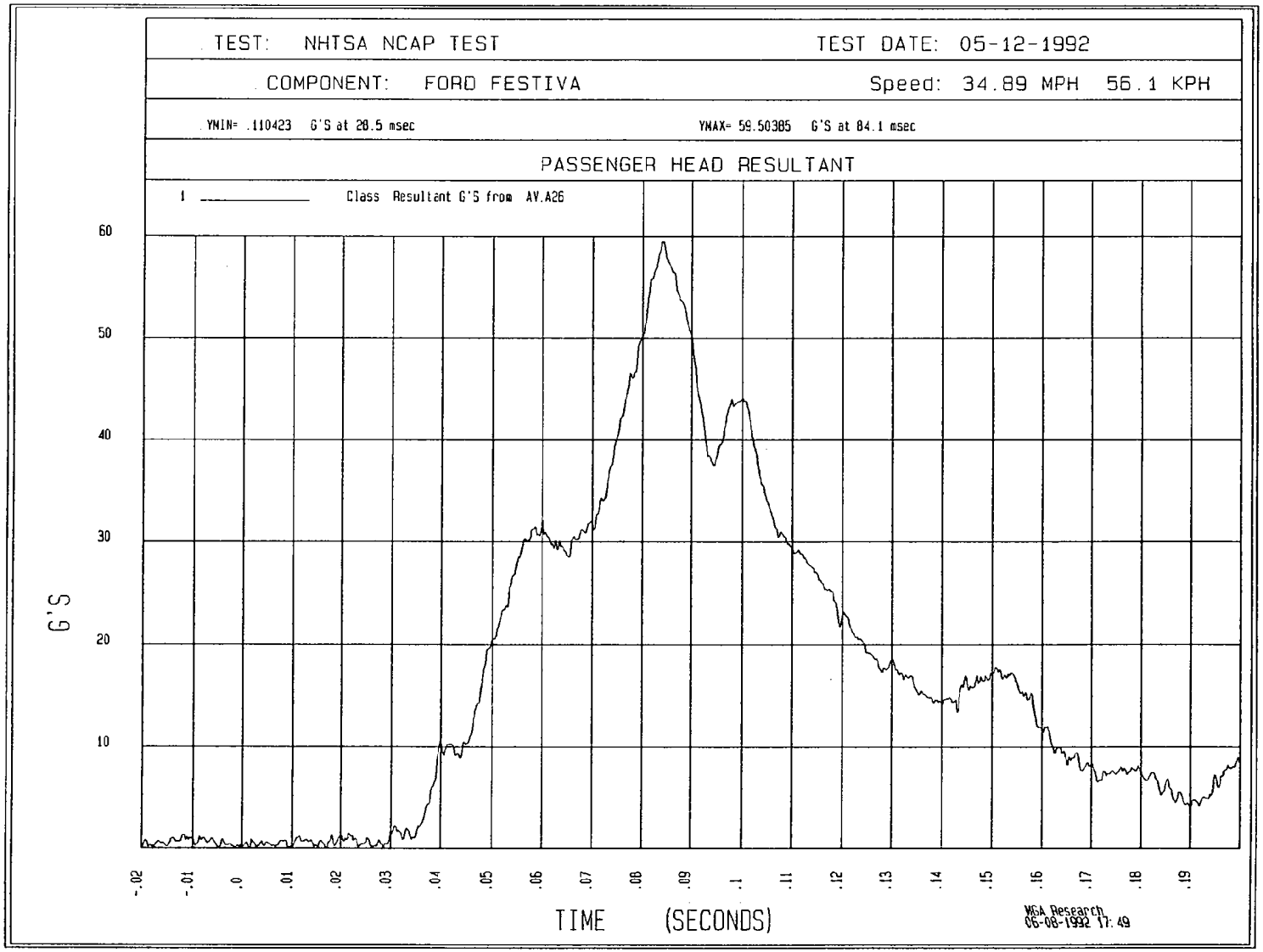


Figure B-42 - Passenger Head Resultant Acceleration vs. Time

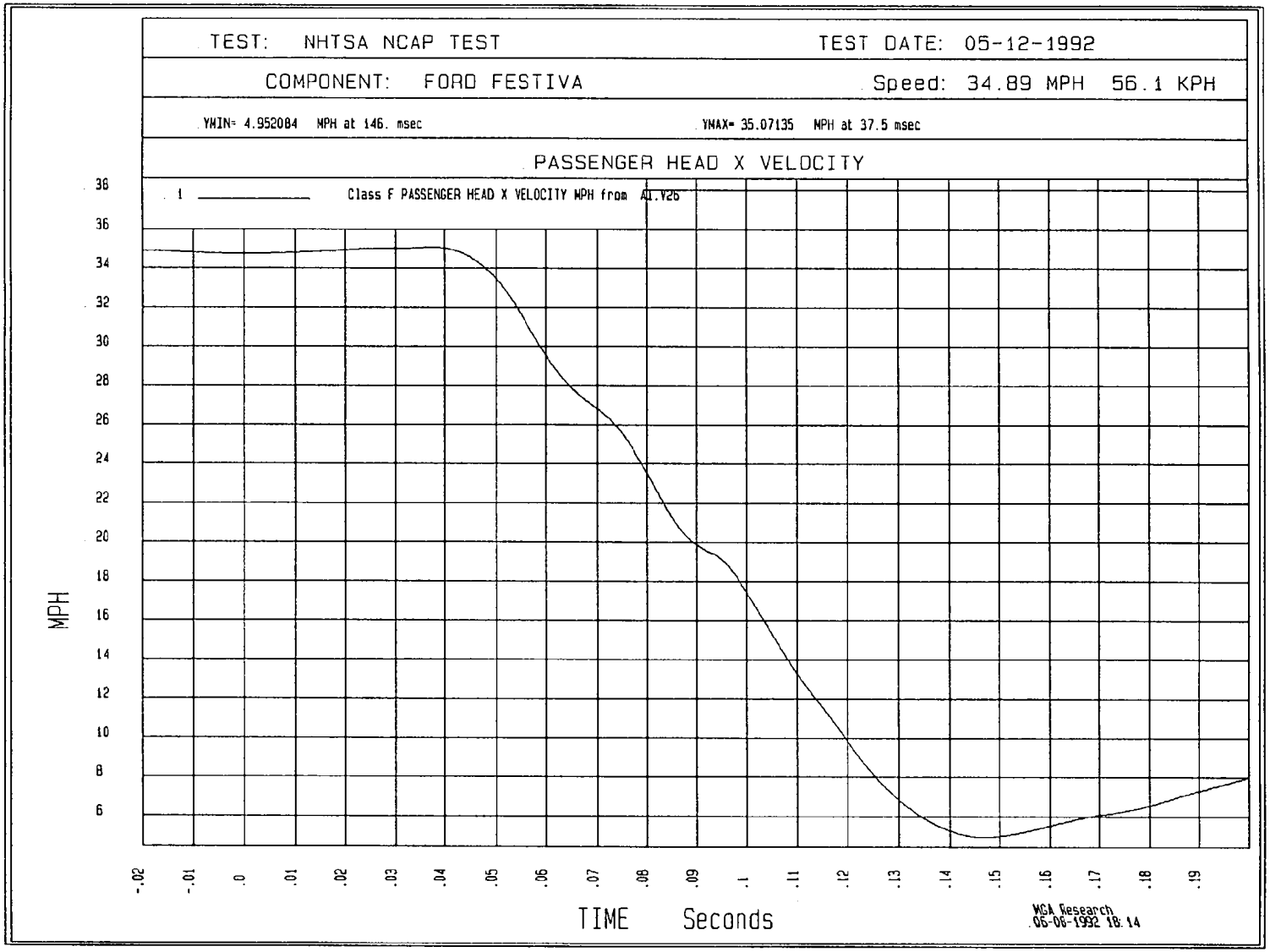


Figure B-43 - Passenger Head X Velocity vs. Time

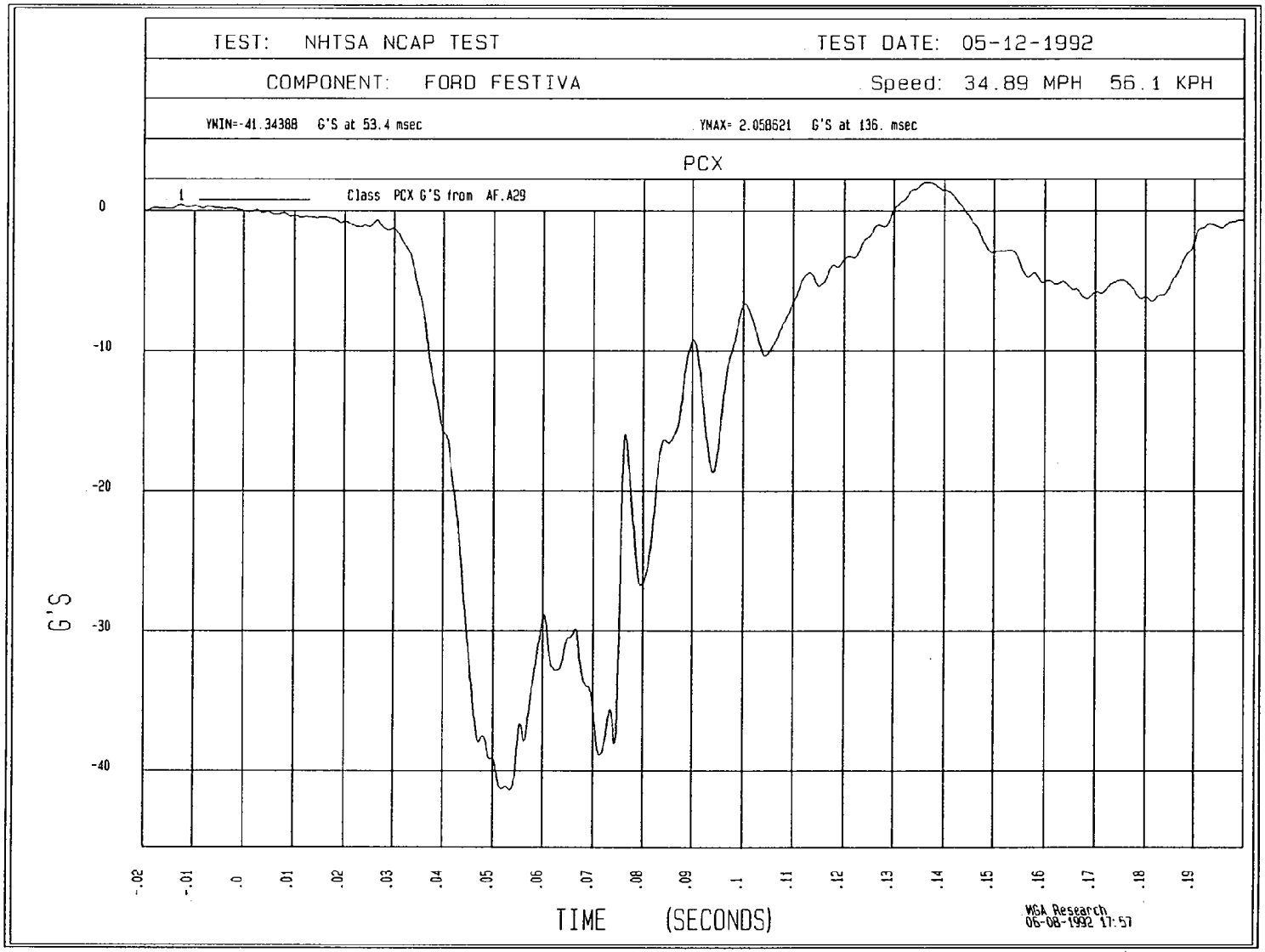


Figure B-44 - Passenger Chest X Acceleration vs. Time

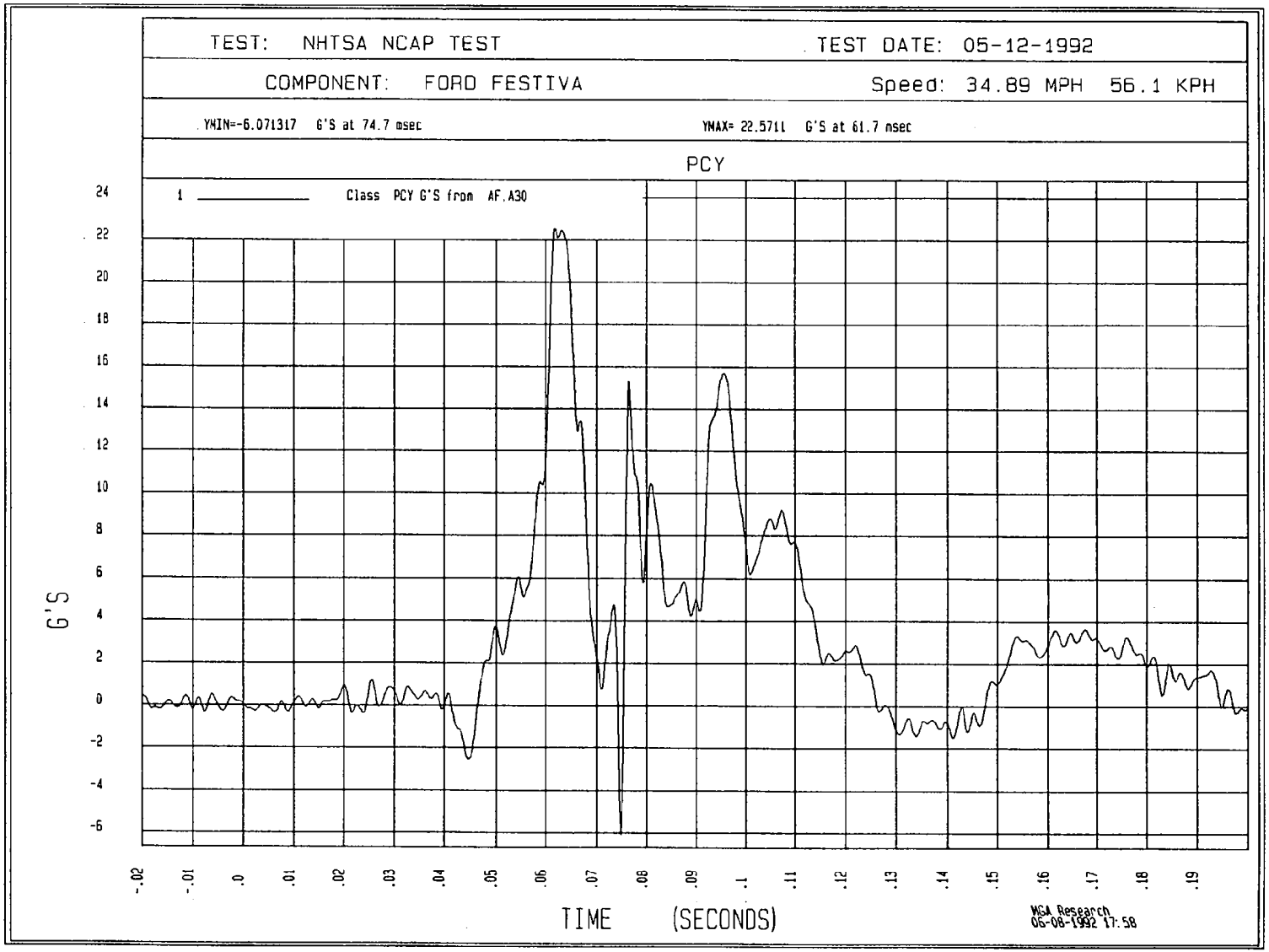


Figure B-45 - Passenger Chest Y Acceleration vs. Time

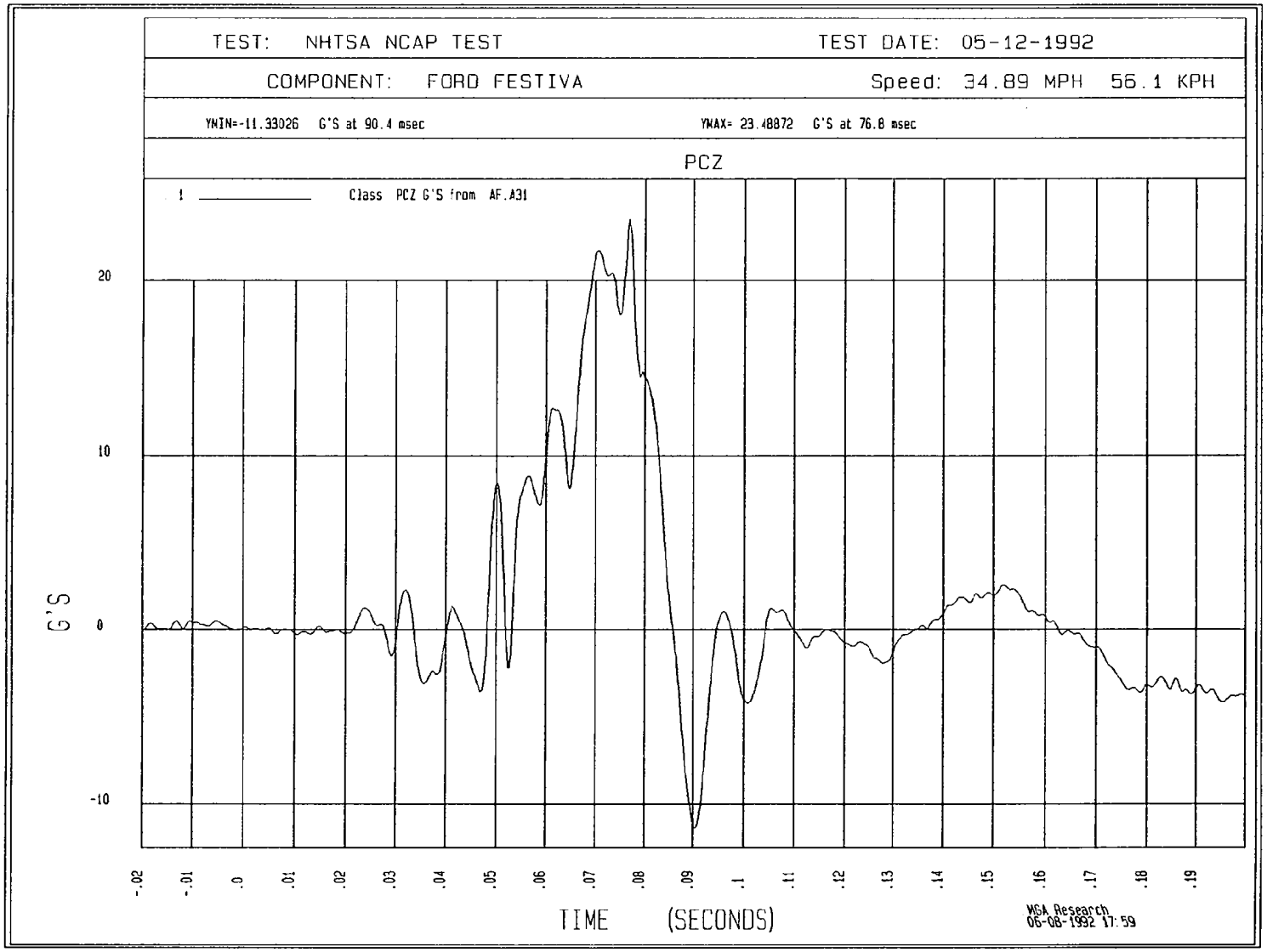


Figure B-46 - Passenger Chest Z Acceleration vs. Time

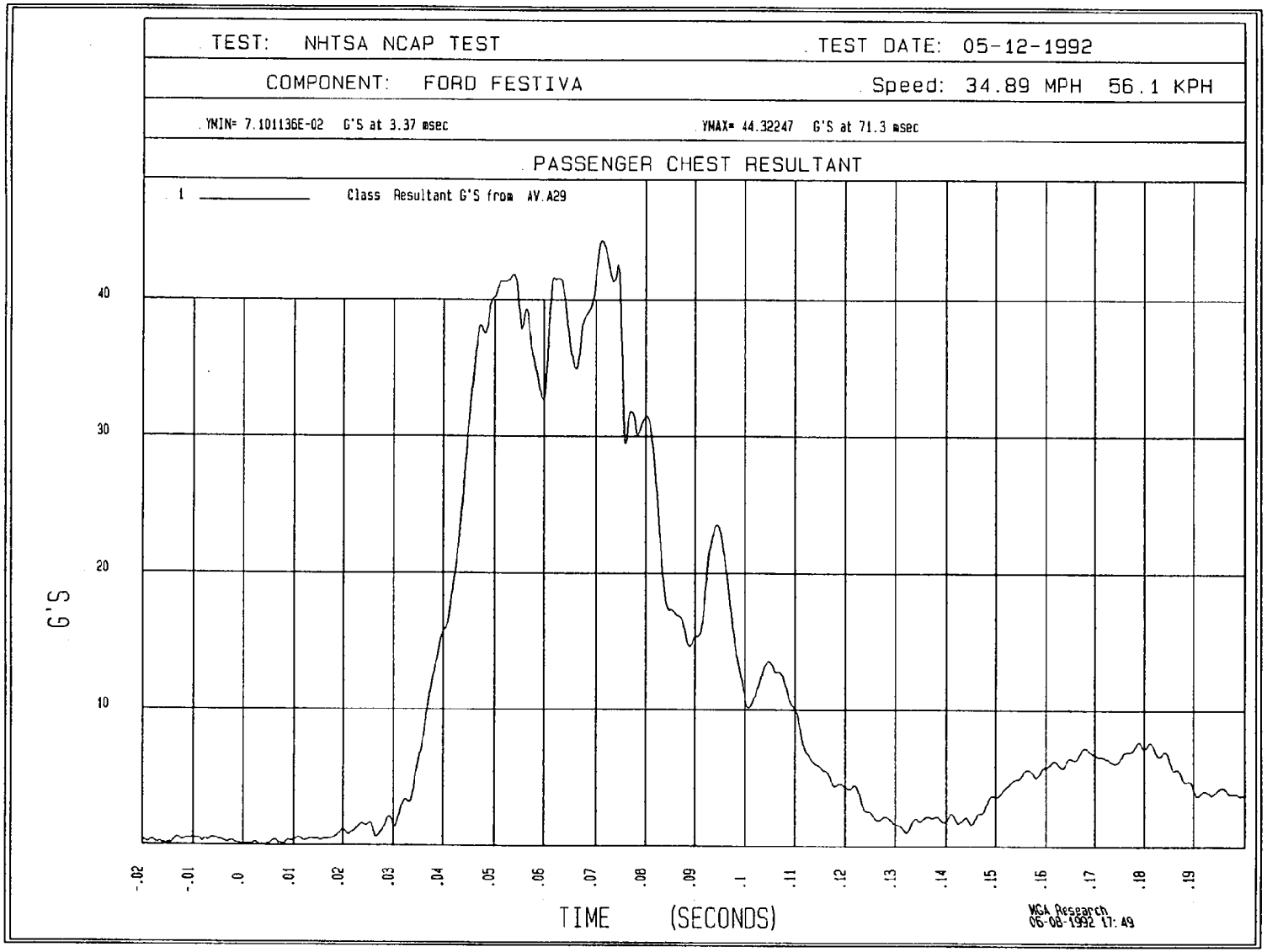


Figure B-47 - Passenger Chest Resultant Acceleration vs. Time

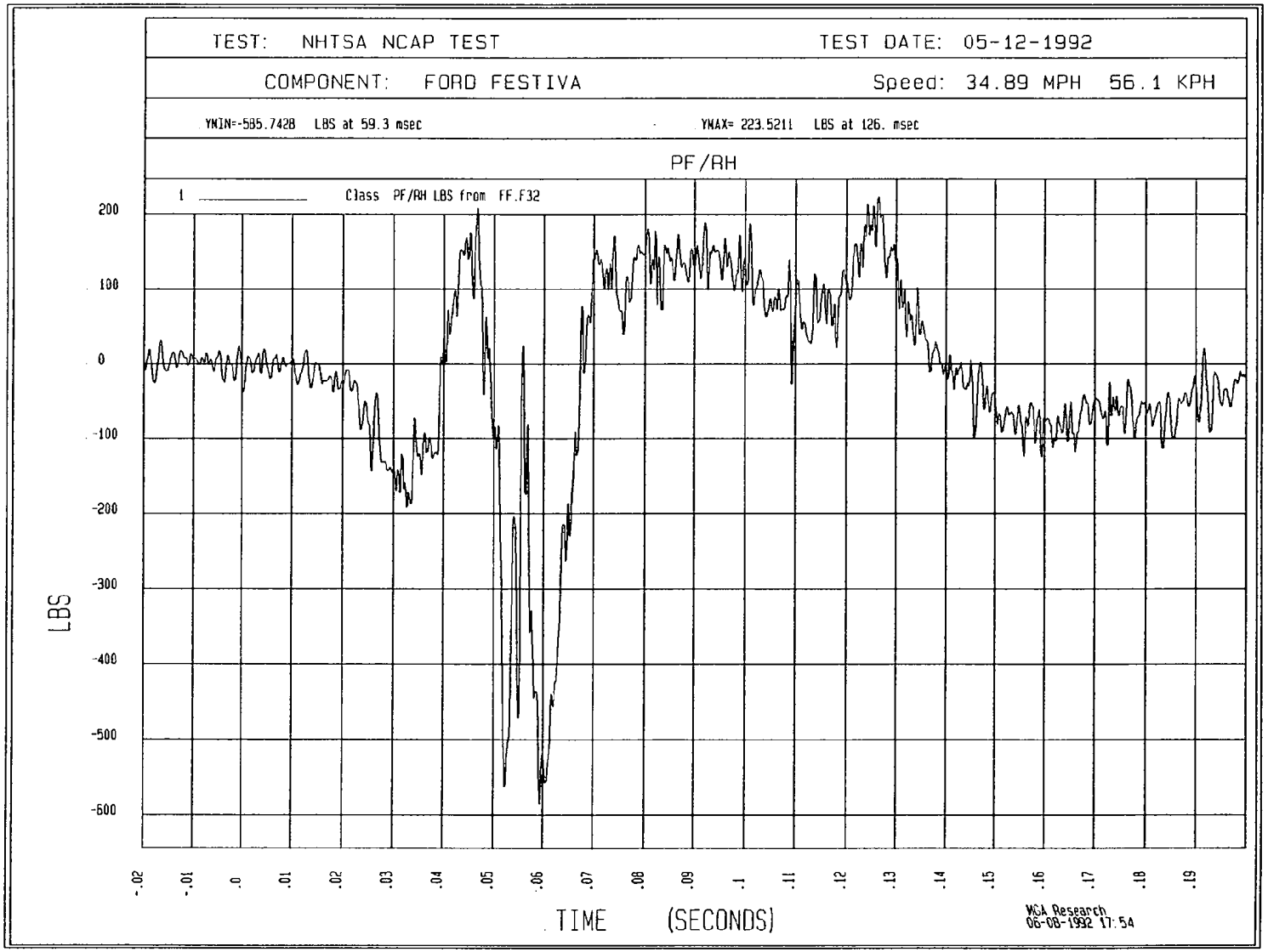


Figure B-48 - Passenger Right Femur Force vs. Time

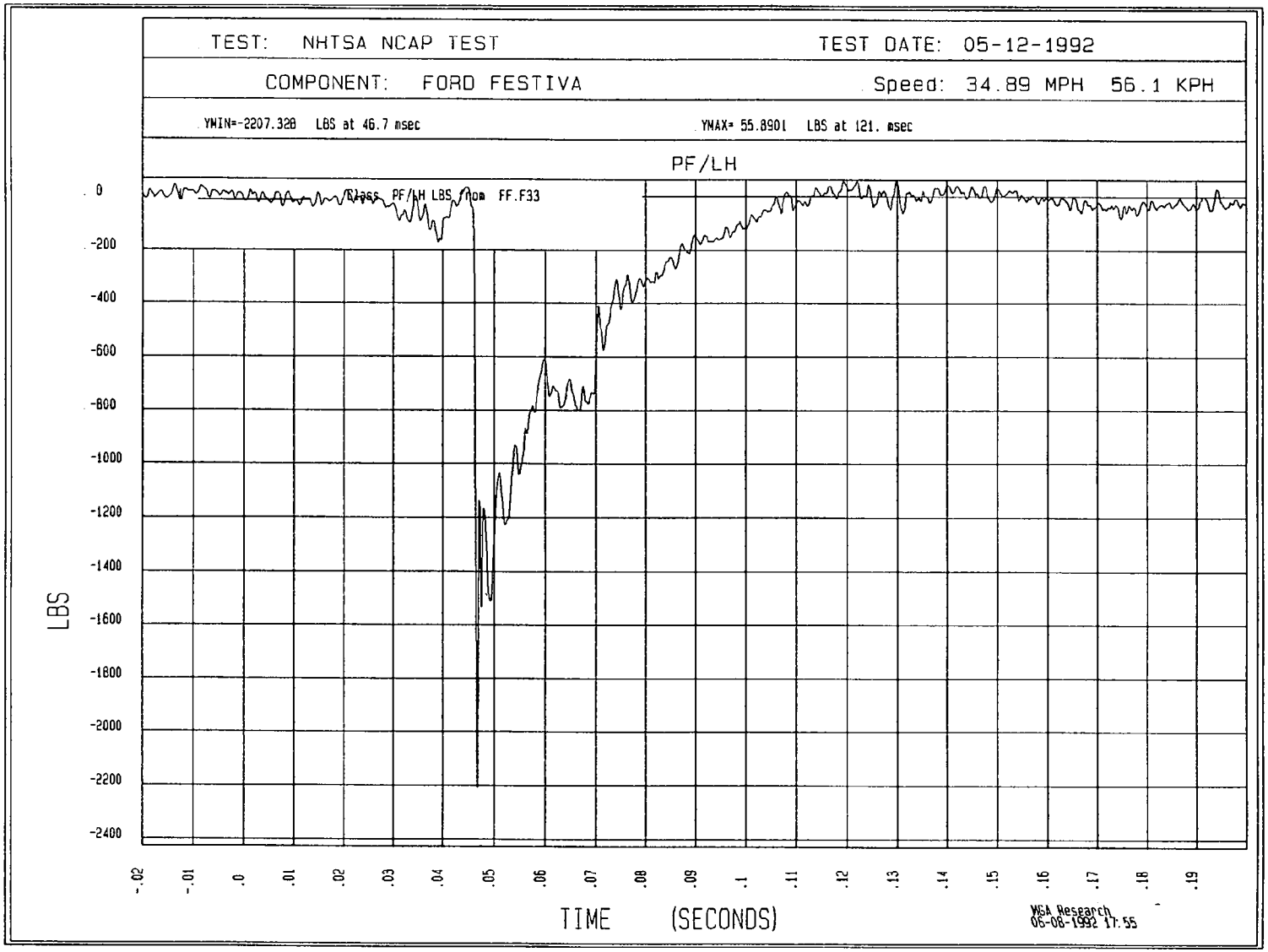


Figure B-49 - Passenger Left Femur Force vs. Time

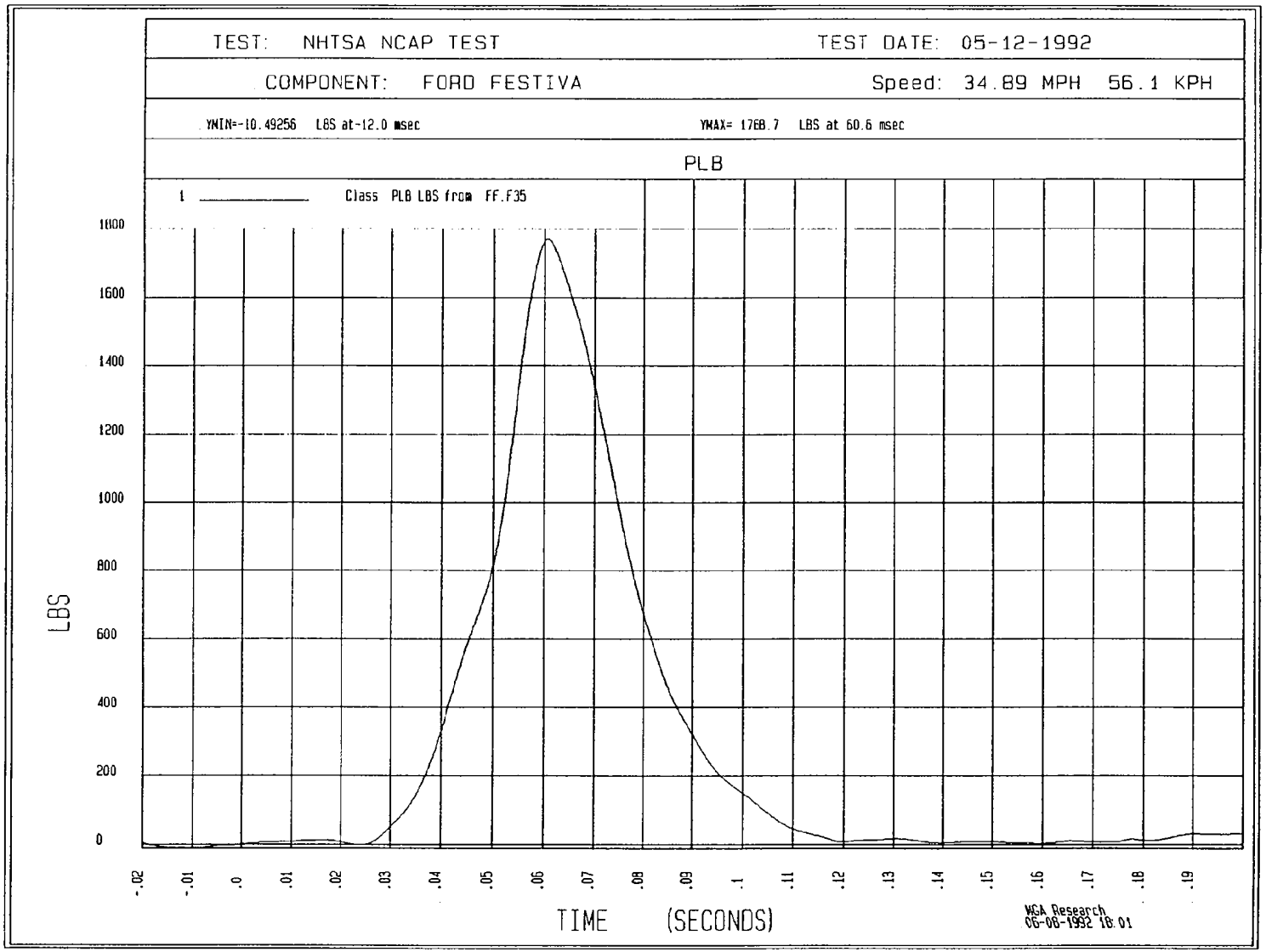


Figure B-50 - Passenger Lap Belt Force vs. Time

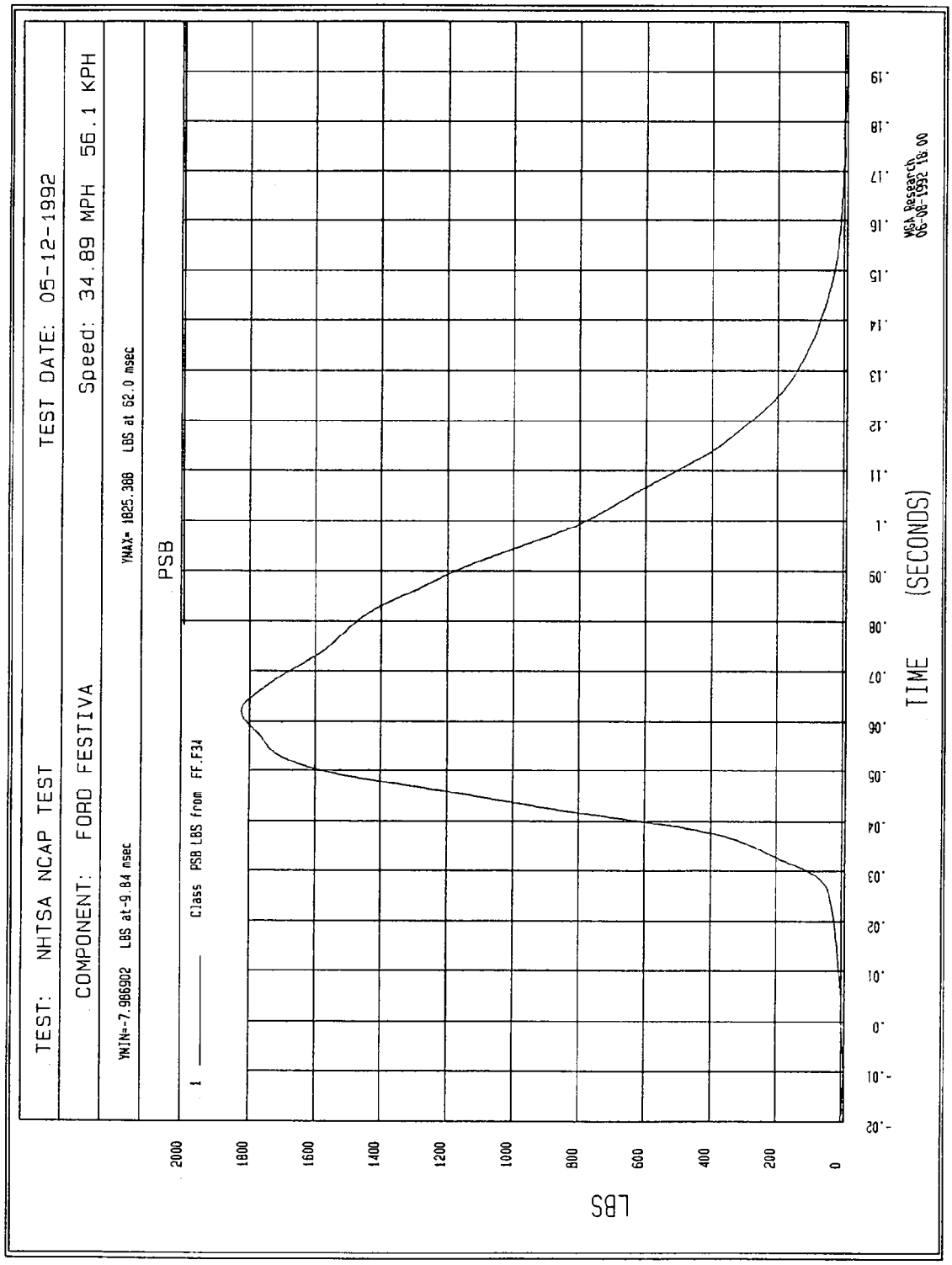


Figure B-51 - Passenger Torso Belt Force vs. Time

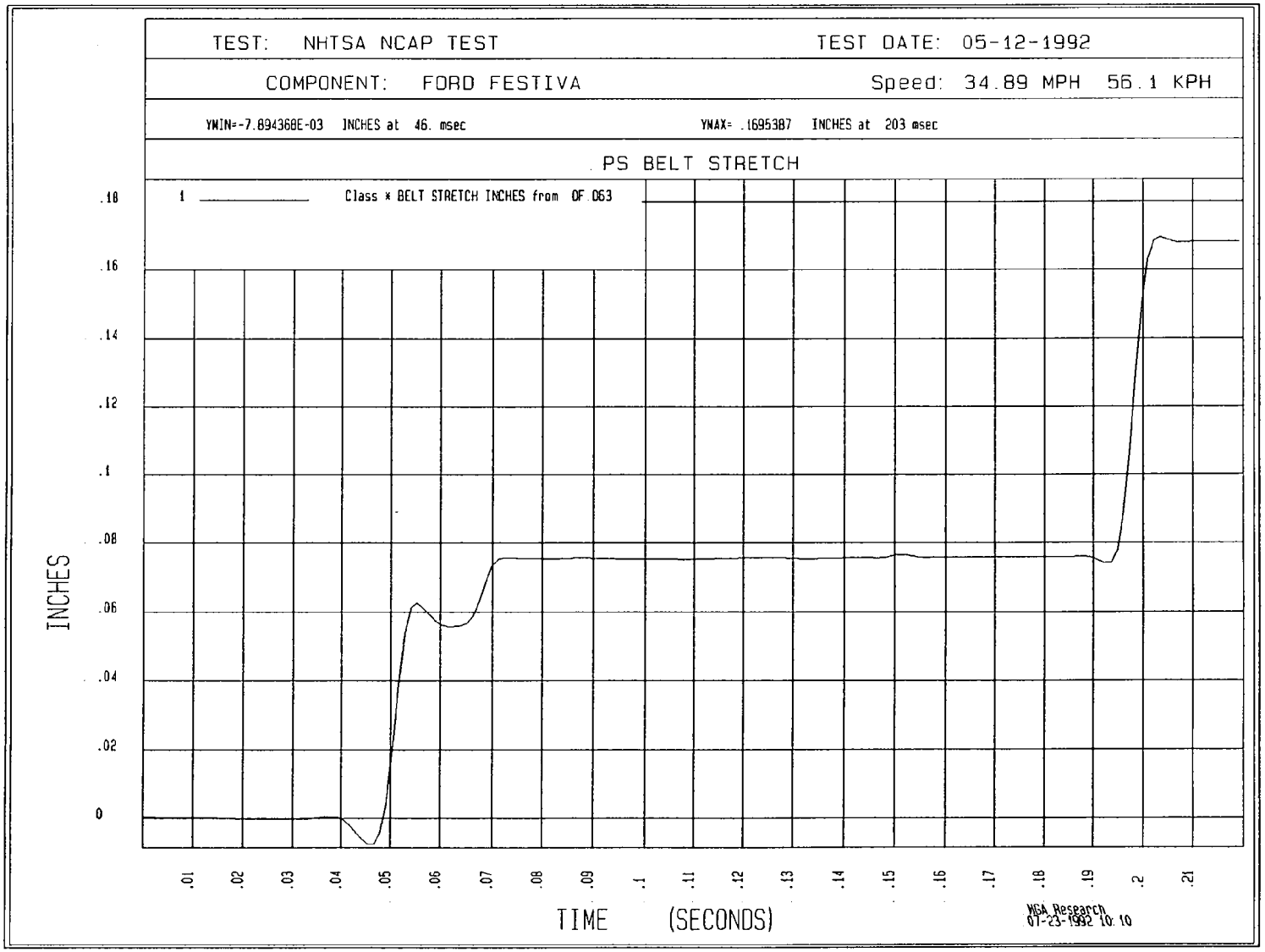


Figure B-52 - Passenger Torso Belt Stretch vs. Time

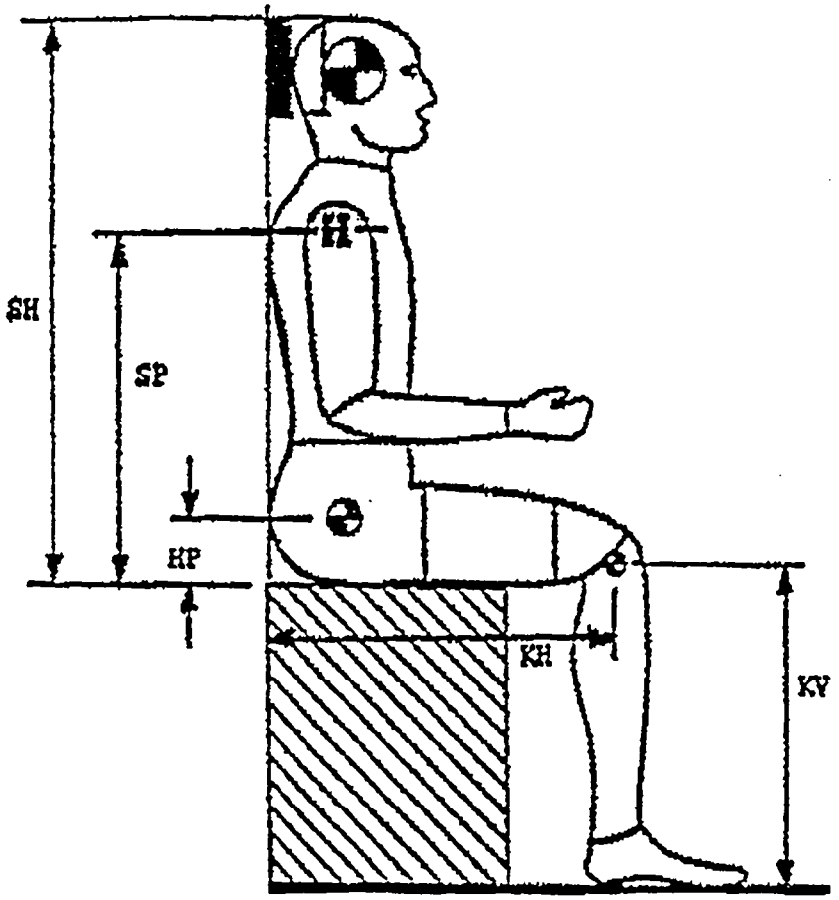
APPENDIX C

Dummy Configuration & Performance Verification Data

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 465 DUMMY CALIBRATION BY: Roni Dermer

I. CONFIGURATION VERIFICATION DATA



DATE OF VERIFICATION: 5-11-92

DESCRIPTION	SPECIFICATION	ACTUAL MEASUREMENT
SH - Seated Height	35.6" to 35.8"	35.6
SP - Shoulder Pivot Height	21.8" to 22.4"	21.9
HP - Hip Pivot Height	3.9" ref.	3.9
KH - Knee Pivot From Back Line	20.1" to 20.7"	20.6
KV - Knee Pivot From Floor	19.3" to 19.9"	19.5
SW - Shoulder Width	17.8" to 18.4"	18.1
HW - Hip Width	14.0" to 15.4"	14.8

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

II. PERFORMANCE VERIFICATION DATA

DUMMY NO.: 465 DUMMY CALIBRATION BY: Roni Dermer
VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 71°

		SPECIFICATION	MEASUREMENT
HEAD DROP TEST			
A. Peak Resultant Acc.		210 to 260 g's	238
B. Peak Lateral Acc.		< 10 g's	7
C. Time above 100 g.		0.9 to 1.5 msec.	1.4
NECK BENDING TEST			
A. Pendulum Speed		21.5 to 25.5 fps	23.5
B. Pendulum Average Decel. Over $t_3 - t_2$		20 to 24 g's	23
C. Peak Resultant Head Acc.		26 g maximum	23
D. Pendulum Decel ($t_2 - t_1$)		$\leq$ = 3 ms	2
E. Pendulum Decel ($t_3 - t_2$)		25 to 30 ms	28
F. Pendulum Decel ($t_4 - t_3$)		$\leq$ = 10 ms	7
G. Max Head Rotation		63° to 73°	67°
H. Chordal Displacement Head Rotation Angle			
0°	Time	-2 to 2 ms	0
	Displ.	-0.5 to 0.5 in	0.0
30°	Time	25.6 to 34.4 ms	27.2
	Displ.	2.1 to 3.1 in	2.5
60°	Time	40.3 to 51.7 ms	43.7
	Displ.	4.3 to 5.3 in	4.8
Maximum (68°)	Time	53.2 to 66.8 ms	57.4
	Displ.	5.0 to 6.0 in	5.3
60°	Time	67.0 to 83.0 ms	67.5
	Displ.	4.3 to 5.3 in	4.8
30°	Time	85.4 to 104.6 ms	88.1
	Displ.	2.1 to 3.1 in	2.5
0°	Time	101.0 to 123.0 ms	103.0
	Displ.	0 to 0.5 in	0.4

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

	SPECIFICATION	MEASUREMENT
ABDOMINAL COMPRESSION TEST (Preload = 10 lbs.)		
Force @ 0.5 in	23.3 to 36.5 lbs	26.4
Force @ 0.75 in	36.7 to 49.8 lbs	39.6
Force @ 1.0 in	50 to 63 lbs	56
Force @ 1.3 in	73 to 88 lbs	81

	SPECIFICATION	MEASUREMENT
LUMBAR FLEXION TEST		
A. Force @ 20°	22 to 34 lbs	25
B. Force @ 30°	34 to 46 lbs	35
C. Force @ 40°	46 to 58 lbs	47
D. Return Angle	12° Maximum	8°

	SPECIFICATION	MEASUREMENT
CHEST IMPACT TESTS		
A. High Speed		
(1) Probe Speed	21.78 to 22.22 fps	21.90
(2) Peak Deflection	1.7 in. (maximum)	1.6
(3) Peak Resistive Force	2250 lbs. (maximum)	2,047
(4) Internal Hysterisis	50% to 70%	54%
B. Low Speed		
(1) Probe Speed	13.86 to 14.14 fps	13.87
(2) Peak Deflection	1.1 in. (maximum)	1.0
(3) Peak Resistive Force	1450 lbs. (maximum)	1,251
(4) Internal Hysteresis	50% to 70%	53%

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

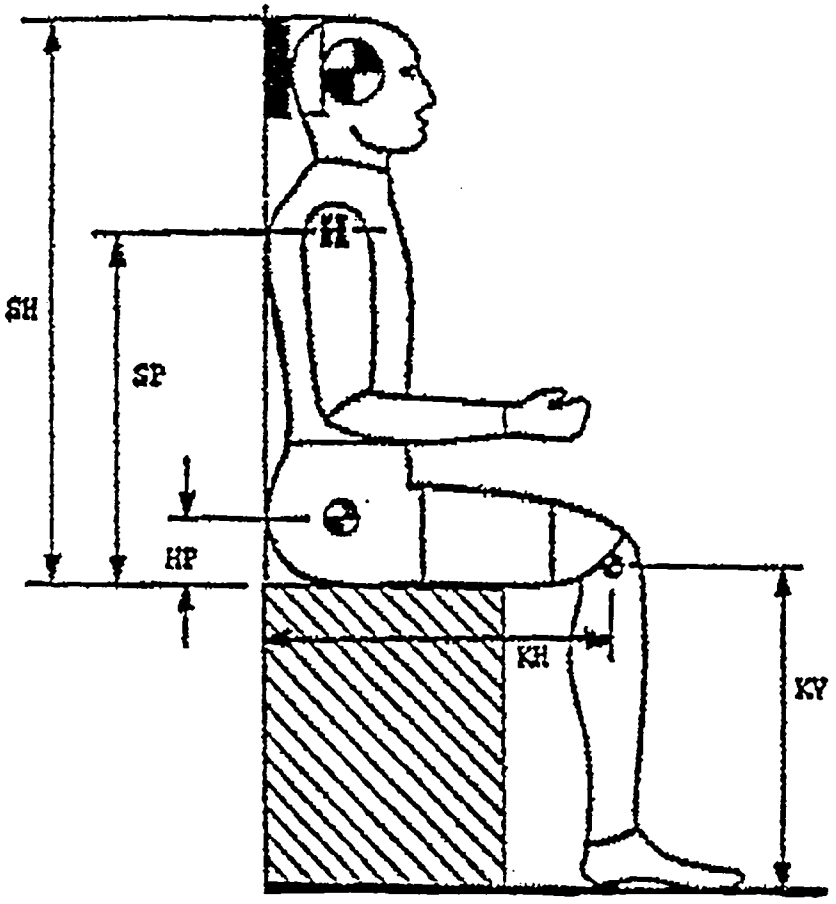
	SPECIFICATION	MEASUREMENT
KNEE IMPACT TESTS		
A. Right Side		
(1) Probe Speed	6.67 to 7.04 fps	7.04
(2) Maximum Force	1850 to 2500 lbs.	2,428
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.8
B. Left Side		
(1) Probe Speed	6.67 to 7.04 fps	7.03
(2) Maximum Force	1850 to 2500 lbs.	2,120
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.8

RD#1.P572/dmd

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 466 DUMMY CALIBRATION BY: Roni Dermer

I. CONFIGURATION VERIFICATION DATA



DATE OF VERIFICATION: 5-11-92

DESCRIPTION	SPECIFICATION	ACTUAL MEASUREMENT
SH - Seated Height	35.6" to 35.8"	35.6
SP - Shoulder Pivot Height	21.8" to 22.4"	22.2
HP - Hip Pivot Height	3.9" ref.	3.9
KH - Knee Pivot From Back Line	20.1" to 20.7"	20.4
KV - Knee Pivot From Floor	19.3" to 19.9"	19.3
SW - Shoulder Width	17.8" to 18.4"	18.0
HW - Hip Width	14.0" to 15.4"	14.8

II. PERFORMANCE VERIFICATION DATA

DUMMY NO.: 466 DUMMY CALIBRATION BY: Roni Dermer
VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 70°

		SPECIFICATION	MEASUREMENT
HEAD DROP TEST			
A. Peak Resultant Acc.		210 to 260 g's	224
B. Peak Lateral Acc.		< 10 g's	9
C. Time above 100 g.		0.9 to 1.5 msec.	1.1
NECK BENDING TEST			
A. Pendulum Speed		21.5 to 25.5 fps	23.5
B. Pendulum Average Decel. Over $t_3 - t_2$		20 to 24 g's	24
C. Peak Resultant Head Acc.		26 g maximum	23
D. Pendulum Decel ($t_2 - t_1$)		$\leq$ = 3 ms	2
E. Pendulum Decel ($t_3 - t_2$)		25 to 30 ms	30
F. Pendulum Decel ($t_4 - t_3$)		$\leq$ = 10 ms	4
G. Max Head Rotation		63 to 73°	69°
H. Chordal Displacement Head Rotation Angle			
0°	Time	-2 to 2 ms	0
	Displ.	-0.5 to 0.5 in	0.0
30°	Time	25.6 to 34.4 ms	26.8
	Displ.	2.1 to 3.1 in	2.3
60°	Time	40.3 to 51.7 ms	41.6
	Displ.	4.3 to 5.3 in	4.4
Maximum (69°)	Time	53.2 to 66.8 ms	57.3
	Displ.	5.0 to 6.0 in	5.1
60°	Time	67.0 to 83.0 ms	69.6
	Displ.	4.3 to 5.3 in	4.5
30°	Time	85.4 to 104.6 ms	87.1
	Displ.	2.1 to 3.1 in	2.5
0°	Time	101.0 to 123.0 ms	101.2
	Displ.	0 to 0.5 in	0.5

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

	SPECIFICATION	MEASUREMENT
ABDOMINAL COMPRESSION TEST (Preload = 10 lbs.)		
Force @ 0.5 in	23.3 to 36.5 lbs	28.6
Force @ 0.75 in	36.7 to 49.8 lbs	42.8
Force @ 1.0 in	50 to 63 lbs	57
Force @ 1.3 in	73 to 88 lbs	83

	SPECIFICATION	MEASUREMENT
LUMBAR FLEXION TEST		
A. Force @ 20°	22 to 34 lbs	31
B. Force @ 30°	34 to 46 lbs	41
C. Force @ 40°	46 to 58 lbs	47
D. Return Angle	12° Maximum	10°

	SPECIFICATION	MEASUREMENT
CHEST IMPACT TESTS		
A. High Speed		
(1) Probe Speed	21.78 to 22.22 fps	21.98
(2) Peak Deflection	1.7 in. (maximum)	1.3
(3) Peak Resistive Force	2250 lbs. (maximum)	2,082
(4) Internal Hysterisis	50% to 70%	58%
B. Low Speed		
(1) Probe Speed	13.86 to 14.14 fps	13.90
(2) Peak Deflection	1.1 in. (maximum)	0.8
(3) Peak Resistive Force	1450 lbs. (maximum)	1,257
(4) Internal Hysteresis	50% to 70%	55%

PART 572 DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

	SPECIFICATION	MEASUREMENT
KNEE IMPACT TESTS		
A. Right Side		
(1) Probe Speed	6.67 to 7.04 fps	7.03
(2) Maximum Force	1850 to 2500 lbs.	2,443
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.8
B. Left Side		
(1) Probe Speed	6.67 to 7.04 fps	7.03
(2) Maximum Force	1850 to 2500 lbs.	1,982
(3) Time Above 1000 lbs.	1.7 msec. (minimum)	1.7

RD#1.P572/dmd

APPENDIX D

Dummy, Vehicle and Laboratory Calibration Data

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 466

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	DK21	Endevco	12/05/91
Head Y	A87M	Endevco	1/06/92
Head Z	ED16	Endevco	1/31/92
Chest X	BA26	Endevco	2/05/92
Chest Y	A16A	Endevco	1/06/92
Chest Z	ED47	Endevco	2/11/92
Right Femur Load Cell	945	GSE	4/13/92
Left Femur Load Cell	948	GSE	4/13/92
*Neck Load Cell X			
*Neck Load Cell Y			
*Neck Load Cell Z			
*Neck Moment X			
*Neck Moment Y			
*Neck Moment Z			
*Chest Deflection Gauge			
Lap Belt Load Cell	624	Eaton	4/14/92
Torso Belt Load Cell	212	GSE	4/14/92
Spool-Out Potentiometer	4	Bourns	4/13/92
Belt Stretch Transducer			

*Hybrid III use only.

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	5220089	Kyowa	3/25/92
Right Rear Seat Crossmember X	5220078	Kyowa	2/07/92
Top of Engine X	A75M	Endevco	1/07/92
Bottom of Engine X	A18J	Endevco	1/07/92
Left Brake Caliper X	295831	Sensotec	12/15/91
Right Brake Caliper X	295824	Sensotec	1/25/92
Instrument Panel X	YJ1760046	Kyowa	5/04/92
Center Rear Crossmember Z	5220093	Kyowa	2/08/92
Vehicle Rear Z	5220084	Kyowa	5/04/92

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	1740088	Kyowa	2/07/92
Neck Bending Rotary Potentiometer	N/A	Bourns	PRIOR TO USE
Neck Bending Linerar Potentiometer	N/A	Bourns	PRIOR TO USE
Femur/Chest/Thorax Probe Accelerometer	2270026	Kyowa	2/07/92
Lumbar Flexion Force Guage	Custom Fab.	-	PRIOR TO USE
Lumbar Flexion Rotation Gauge	Custom Fab.	-	PRIOR TO USE
Abdomen Compression Displacement Gauge	4856160	CIC	5/04/92
Abdomen Compression Force Gauge	49710	Transducers Inc.	5/04/92

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

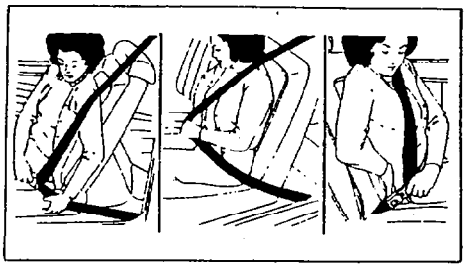
INSTRUMENTS FOR DUMMY NO. 465

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	A07F	Endevco	1/06/92
Head Y	A06M	Endevco	1/06/92
Head Z	EA45	Endevco	1/24/92
Chest X	A88H	Endevco	1/20/92
Chest Y	A96P	Endevco	1/20/92
Chest Z	A11M	Endevco	1/20/92
Right Femur Load Cell	932	GSE	4/13/92
Left Femur Load Cell	953	GSE	4/13/92
*Neck Load Cell X			
*Neck Load Cell Y			
*Neck Load Cell Z			
*Neck Moment X			
*Neck Moment Y			
*Neck Moment Z			
*Chest Deflection Gauge			
Lap Belt Load Cell	657	Eaton	4/14/92
Torso Belt Load Cell	211	GSE	4/14/92
Spool-Out Potentiometer	3	Bourns	4/13/92
Belt Stretch Transducer			

*Hybrid III use only.

APPENDIX E

Vehicle Owner's Occupant Restraint System Instructions



Fastening the Lap and Shoulder Belt

Adjust the lap part of the belt by pulling up on the shoulder belt until the lap belt fits snugly and as low as possible around your hips.

Warning: Front and rear seat outboard occupants (including pregnant women) should wear both lap and shoulder belts, for optimum protection in an accident.

Warning: Make sure that the lap belt is as low around your hips as possible. Do not wear the lap belt around your waist. If you do not use the lap belts properly, the risk of being injured in a collision greatly increases.

Warning: Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around the neck over the inside shoulder. Failure to follow these precautions could increase the risk and/or severity of injury in an accident.

Motorized Passive Shoulder Belt Restraint System (Front Seat)

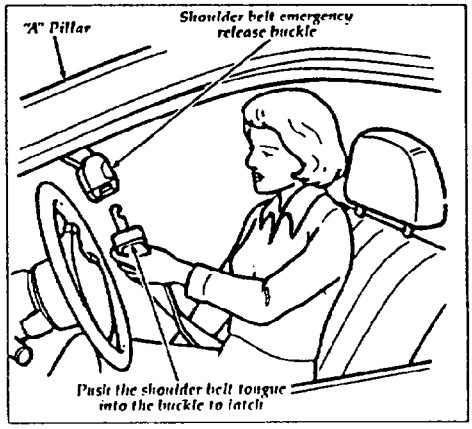
(U.S. Vehicles Only)

The passive shoulder belt restraint system operates electrically. The automatic shoulder belt and the manual lap belt provide restraint for the front seat occupants.

Warning: Be sure that the lap belt is fitted snugly and as low as possible around the hips, not around the waist. Failure to do so may increase the risk of injury in the event of a collision.

After entering the vehicle and closing the door, check to ensure the shoulder belt is latched to the emergency release buckle. The shoulder belt should remain latched to the release buckle at all times except for emergency situations.

If the shoulder belt is unlatched, refer to the following instructions:

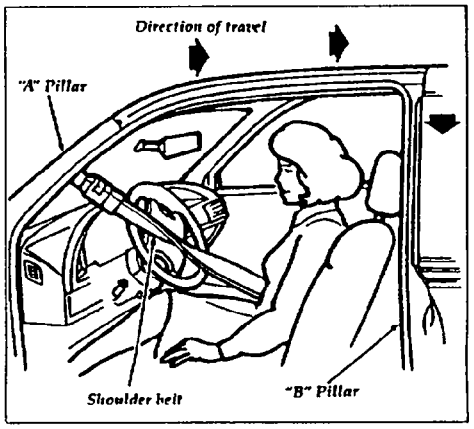


Fastening the shoulder belt to the emergency release buckle

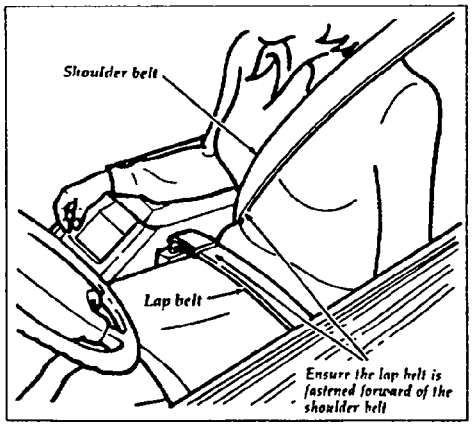
To latch the shoulder belt to the emergency release buckle at the "A" pillar, pull the shoulder belt from the retractor between the seat and console, and buckle it to the emergency release buckle.

NOTE: The buckle fits only one way, be sure to position it properly.

Close your door. Insert the ignition key and turn it to the ON position. A motor will slide the shoulder belt along its track starting at the front "A" pillar and moving rearward to its locked position on the "B" pillar.

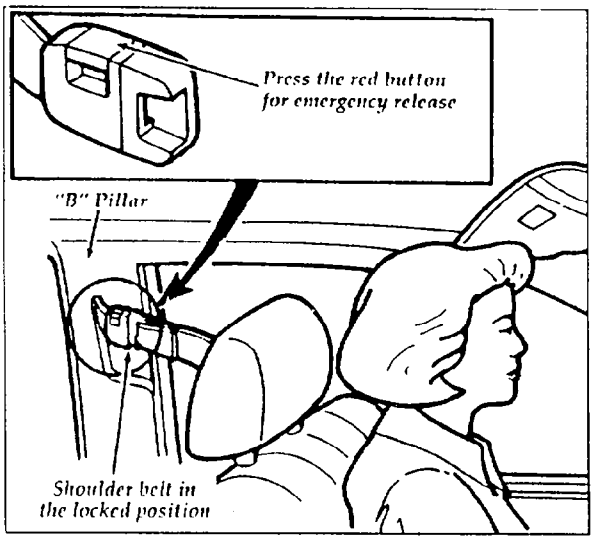


Shoulder belt movement



Shoulder belt in locked position

E-2



Shoulder belt in locked position

If either driver or passenger shoulder belt or driver's lap belt is not buckled, when the ignition switch is turned to the ON position, the reminder chime will sound for 4 to 8 seconds, and the warning lamp will illuminate until both shoulder belts are buckled.

When the ignition switch is in the ON position and the shoulder belt is moving, the warning lamp will illuminate. When the shoulder belt comes to rest (in the rear position), the warning lamp will go out.

The shoulder belt will automatically adjust itself to allow for comfortable wear and freedom of movement by the occupant. It will lock tight only on extremely hard braking, or hard cornering or impacts of approximately 5 mph (8 km/h) or more.

Warning: Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around the neck over the inside shoulder. Never use a single belt for more than one person. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

When the ignition is in any position and the door is opened, the shoulder belt will move forward to the "A" pillar. This will allow ample room for exit from the vehicle by the driver or passenger. DO NOT use the belt as an assist handle when entering or exiting the vehicle. The door should not be opened while the vehicle is in motion.

Warning: To reduce the risk of sliding under the lap belt during a collision, always drive and ride with seat backs in the upright position. If the lap belt slips above the hip-bone during a collision and applies force directly to the soft areas of the abdomen, it will increase the risk of serious injury. The seat backs and the belts provide best restraint when the seat is upright, the occupant is sitting upright in the seat (not slouching), the lap belt is snug and low on the hips, the shoulder belt is snug against the chest and the knees are straight forward.

Children should always ride with the seatback in the fully upright position. When the seatback is not fully upright, there is a greater risk that the child will slide under the safety belt and be seriously injured in a collision.

Be sure to keep the sun visors away from the side windows when the shoulder belts move along their tracks, to prevent possible damage to the sun visors or shoulder belt system.